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CAMBRIDGE INDUSTRIES USA INC.

UNITED STATES DISTRICT COURT

NORTHERN DISTRICT OF CALIFORNIA

SAN FRANCISCO DIVISION

APPLIED OPTOELECTRONICS, INC.,

Plaintiff,

v.

CAMBRIDGE INDUSTRIES USA, INC.,

Defendant.

Case No. 3:24-cv-01010-JD

CAMBRIDGE INDUSTRIES USA INC.'S AMENDED INVALIDITY CONTENTIONS

Judge: Hon. James Donato

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Pursuant to Patent L.R. 3-3, Defendant Cambridge Industries USA Inc., ("CIG USA") hereby provide these Invalidity Contentions ("Invalidity Contentions") for U.S. Patent Nos. 9,170,383 ("the '383 patent"), 9,523,826 ("the '826 patent"), 10,042,116 ("the '116 patent"), 10,175,431 ("the '431 patent"), 10,313,024 ("the '024 patent"), 10,379,301 ("the '301 patent"), 10,466,432 ("the '432 patent") and 10,788,690 ("the '690 patent") (collectively "the Asserted Patents") to Plaintiff Applied Optoelectronics, Inc. ("AOI").

I. GENERAL STATEMENT AND OBJECTIONS

Defendant's Invalidity Contentions set forth below and in the accompanying charts are directed solely to the sixty-six claims ("the Asserted Claims") AOI identified in its Disclosure of Asserted Claims and Infringement Contentions served June 6, 2024 ("AOI's Infringement Contentions").[1] Furthermore, these Invalidity Contentions are based on Defendant's understanding of how AOI appears to be reading those claims. Should AOI attempt to assert any additional claims, and should the Court permit any such assertion, Defendant reserves the right to supplement these Invalidity Contentions to address the newly asserted claims. Defendant expressly reserves the right to supplement its Invalidity Contentions even as to the currently Asserted Claims should the Court permit assertion of any claim other than the sixty-six claims identified below because any additionally asserted claims, and how AOI reads them on any product, may impact the interpretation of the existing Asserted Claims.

Defendant also reserves the right to revise its Invalidity Contentions concerning the invalidity of the Asserted Claims, which may change its contentions depending upon any findings as to the priority date of those claims and/or positions that Plaintiff or expert witnesses may take concerning infringement and/or invalidity issues.

A. Invalidity Contentions

Defendant's invalidity positions are necessarily based, at least in part, on Defendant's present

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[1] '024 patent: 1-4, 7, 8, 10-12, 14-17.
'826 patent: 1-7.
'432 patent: 1-3.
'383 patent: 1, 2, 5-8.
'116 patent: 1, 3, 4, 10-13, 15, 16.
'431 patent: 1-6, 8-16.
'301 patent: 1-4, 7.
'690 patent: 1-8.

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understanding of constructions of claim terms which would need to be adopted by the Court for Plaintiff's P.L.R. 3-1 infringement contentions to be plausible. These claim terms include, for example and without limitation:

- '024 patent: "substrate," "interconnect," "DC bus bar interconnect," "first and second surfaces disposed opposite each other," "first surface disposed opposite a second surface," "opposing arrangement"
- '826 patent: "limiting space," "limited part," "fastening surface," "first limiting surface," "second limiting surface"
- '432 patent: "receiver," "transmitter," "passive optical element"
- '383 patent: "slot," "groove," "flange" "connector receptacle," "LC connector," "sleeve," "outer housing"
- '116 patent: "substrate," "the same side" (indefinite), "AWG device package," "air gap,"
- '431 patent: "minimum bend radius R_{min}," "diameter of the intermediate optical fiber," "about 20 mm," "LC-type receptacle,"
- '301 patent: "carrier," "top surface," "the same top surface" (indefinite)
- '690 patent: "disposed between," "substrate mating surface," "substrate"

No inference is intended or should be drawn that Defendant adopts the presumed claim constructions for purposes of its Invalidity Contentions given the present stage of the case, and Defendant reserves the right to apply alternate claim constructions for all purposes in the invalidity and non-infringement contexts that may contradict those implied below, and to present revised final invalidity contentions that do not contradict any Court-ordered constructions.

B. Prior Art Citation

In the accompanying contentions, Defendant identifies specific portions of prior art references that disclose the elements of the Asserted Claims. Although Defendant has identified at least one citation per element for each reference, each and every disclosure of the same element is not necessarily identified. In an effort to focus the issues, Defendant identifies only limited portions of the cited references.

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It should be recognized that a person of ordinary skill in the art generally would read a prior art reference as a whole and with the knowledge of a person of skill in the art. It should also be recognized that, when evaluating a prior art product, a person of ordinary skill in the art generally would consult multiple documents about that product. One of ordinary skill in the art would read these prior art references in the context of other publications, literature, and general knowledge in the field. To understand and interpret any specific statement or disclosure in a prior art reference, a person of ordinary skill in the art would rely upon other information, including other publications and general scientific or engineering knowledge.

Defendant reserves the right to rely upon other unidentified portions of the prior art references and on other publications and expert testimony to provide context and to aid understanding and interpretation of the identified portions. Defendant also reserves the right to rely upon other portions of the prior art references, other publications, and the testimony of experts to establish that the alleged inventions are anticipated or would have been obvious to a person of ordinary skill in the art, including on the basis of modifying or combining certain cited references.

Defendant also reserves the right to rely upon any admissions relating to prior art in the Asserted Patents or their respective prosecution histories.

Where Defendant identifies a particular figure in a prior art reference, the identification should be understood to encompass the caption and description of the figure as well as any text relating to the figure in addition to the figure itself. Similarly, where an identified portion of text refers to a figure or other material, the identification should be understood to include the referenced figure or other material as well.

To the extent that they constitute prior art, Defendant reserves the right to rely upon foreign counterparts of the U.S. Patents identified in the Invalidity Contentions; U.S. counterparts of foreign patents and foreign patent applications identified in the Invalidity Contentions; U.S. and foreign patents and patent applications corresponding to articles and publications identified in the Invalidity Contentions; and any systems, products, or prior inventions that relate to any references identified in the Invalidity Contentions.

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C. Obviousness

As discussed below and in the attached claim charts, prior art renders the Asserted Patents obvious. The U.S. Supreme Court decision in *KSR International Co. v. Teleflex Inc.*, 127 S. Ct. 1727, 1739 (2007) held that a claimed invention can be obvious even if there is no teaching, suggestion, or motivation for combining the prior art to produce that invention. In summary, *KSR* holds that patents that are based on new combinations of elements or components already known in a technical field may be found to be obvious. *See generally, KSR*, 127 S. Ct. 1727.

Specifically, the Court in *KSR* rejected a rigid application of the "teaching, suggestion, or motivation [to combine]" test. *Id.* at 1741. "In determining whether the subject matter of a patent claim is obvious, neither the particular motivation nor the avowed purpose of the patentee controls. What matters is the objective reach of the claim." *Id.* at 1741-1742. "Under the correct analysis, any need or problem known in the field of endeavor at the time of invention and addressed by the patent can provide a reason for combining the elements in the manner claimed." *Id.* at 1742. In particular, in *KSR*, the Supreme Court emphasized the principle that "[t]he combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results." *Id.* at 1739. A key inquiry is whether the "improvement is more than the predictable use of prior art elements according to their established functions." *Id.* at 1740.

The rationale to combine or modify prior art references is significantly stronger when the references seek to solve the same problem, come from the same field, and correspond well. *In re Inland Steel Co.*, 265 F.3d 1354, 1362 (Fed. Cir. 2001). The Federal Circuit allows two references to be combined as invalidating art under similar circumstances, namely "[the prior art] focus[es] on the same problem that the … patent addresses: enhancing [the flexibility of stents]. Moreover, both [prior art references] come from the same field . . . . Finally, the solutions to the identified problems found in the two references correspond well." *Id.* at 1364 (concerning patents and prior art relating to improving the magnetic and electrical properties of steel).

In view of the Supreme Court's *KSR* decision, the USPTO issued a set of new Examination Guidelines. *See* Examination Guidelines for Determining Obviousness Under 35 U.S.C. § 103 in view of the Supreme Court Decision in *KSR International Co. v. Teleflex, Inc.*, 72 Fed. Reg. 57526 (October

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10, 2007). Those Guidelines summarized the *KSR* decision, and identified various rationales for finding a claim obvious, including those based on other precedents. Those rationales include:

(A) Combining prior art elements according to known methods to yield predictable results;

(B) Simple substitution of one known element for another to obtain predictable results;

(C) Use of known technique to improve similar devices (methods, or products) in the same way;

(D) Applying a known technique to a known device (method, or product) ready for improvement to yield predictable results;

(E) "Obvious to try" – choosing from a finite number of identified, predictable solutions, with a reasonable expectation of success;

(F) Known work in one field of endeavor may prompt variations of it for use in either the same field or a different one based on design incentives or other market forces if the variations would have been predictable to one of ordinary skill in the art;

(G) Some teaching, suggestion, or motivation in the prior art that would have led one of ordinary skill to modify the prior art reference or to combine prior art reference teachings to arrive at the claimed invention.

Id. at 57529. Defendant contends that one or more of these rationales apply in considering the obviousness of the Asserted Claims of the Asserted Patents.

D. On-Going Discovery and Disclosures

Discovery in this case is ongoing and Defendant's investigation, including Defendant's search for prior art, is ongoing. Defendant therefore reserves the right to further supplement or alter the positions taken and information disclosed in these Invalidity Contentions including, without limitation, the prior art and grounds of invalidity set forth herein, to take into account information or defenses that may come to light as a result of these continuing efforts.

E. Incorporation by Reference

Defendant hereby incorporates by reference the testimony of any fact witnesses that are deposed, that provide declarations, or that otherwise testify in this lawsuit.

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F. Priority Date

For each of the Asserted Claims of the '826 patent, '432 patent, and '301 patents, Plaintiff has failed to demonstrate any basis upon which the claims are entitled to claim priority to a date earlier than the filing date of the applications. *See, e.g.*, *PowerOasis, Inc. v. T-Mobile USA, Inc.*, 522 F.3d 1299, 1303-06 (Fed. Cir. 2008). Therefore, Defendants contend that the Asserted Claims are not entitled to the priority dates alleged in Plaintiff's infringement contentions. Defendants reserve the right to present additional items of prior art or further support for current prior art under 35 U.S.C. §§ 102(a), (b), (e), (f) and/or (g), and/or § 103 if any court or the United States Patent and Trademark Office determines that any of Asserted Claims are not entitled to the priority dates identified in Plaintiff's infringement contentions.

II. DOCUMENT PRODUCTION

In accordance with Patent L.R. 3-4, CIG provides the following information:

Rule	Document Types	Bates Range
3-4(a)	Technical Documents	CIGUSA-AOI001645-2071
3-4(b)	Prior Art	CIGUSA-AOI000001-1660, CIGUSA-AOI002072-2215
3-4(c)	Agreements Related to the Accused Instrumentalities	CIGUSA-AOI001607-1643, CIGUSA-AOI002216-2221
3-4(d)	Sales Information	CIGUSA-AOI001644
3-4(e)	Agreements that May Be Used to Support Damages Case	None at this time.

III. U.S. PATENT NO. 10,313,024

AOI alleges infringement of claims 1-4, 7, 8, 10-12, and 14-17 of the '024 patent ("the Asserted Claims of the '024 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
U.S. 9,568,694	Mizobuchi	U.S.	2/14/2007	A-2

2. Prior Art Publications

Title	Date	Author	Chart
U.S. Patent App. Pub. No. 20140140665A1	May 22, 2014	Akashi	A-3
U.S. Patent App. Pub. No. 20130001410A1	January 3, 2013	Zhao	A-2

3. Prior Art Sales

Product	Date of Sale	Entity Making the Offer or Sale	Chart
CFP4 Module	At least August 2015	Oclaro	A-1

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '024 patent as illustrated by the claim charts provided in Exhibits A-1 to A-3.

C. Additional Prior Art

In addition to the prior art references listed above, and those listed on the face of the patent, the following document references may be used to show the state of the art:

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module

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- Fiber Optic Cable Bend Radius or Diameter
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber

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- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano

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- WO 2009119426A1 to Tamura

IV. U.S. PATENT NO. 9,523,826

AOI alleges infringement of claims 1-7 of the '826 patent ("the Asserted Claims of the '826 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
CN 201820017	Chao	China	1/22/2019	B-1
U.S. 7,201,520	Mizue	U.S.	4/10/2007	B-4
JP 2014-92604	Hiroyoshi	Japan	5/15/2014	B-5

2. Prior Art Publications

Title	Date	Author	Chart
Oclaro Packaging	July 7, 2011	Oclaro / P. Firth	B-2
INF-8077i 10 Gigabit Small Form Factor Pluggable Module	August 31, 2005	SFF Committee	B-2
U.S. Patent App. Pub. No. US 2011/0081114	April 7, 2011	Togami	B-3 / B-4

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '432 patent as illustrated by the claim charts provided in Exhibits B-1 to B-5.

C. Additional Prior Art

In addition to the prior art references listed above, and those listed on the face of the patent, the following document references may be used to show the state of the art:

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017

- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards

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- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber
- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)

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- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

V. U.S. PATENT NO. 10,466,432

AOI alleges infringement of claims 1-3 of the '432 patent ("the Asserted Claims of the '432 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
U.S. 9,419,717	Huang	U.S.	8/16/2016	C-1
U.S. 9,419,191	Huang	U.S.	8/1/2017	C-2
U.S. 9,341,786	Gamache	U.S.	5/17/2016	C-3

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '432 patent as illustrated by the claim charts provided in Exhibits C-1 to C-3.

C. Other Grounds for Invalidity (P.L.R. 3-3(d))

1. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

The Notice of Allowance dated August 13, 2019, contained in the prosecution history of the '432 patent demonstrates at pages 2-4 that the "passive optical element" of the claims must be construed as a "separable" passive element that is "insertable/pluggable" into the PCBA element; if the claim is construed to read on a device that is created using well-known components but lacks the "separability" feature identified in the '432 patent file history, the claim is indefinite.

D. Additional Prior Art

In addition to the prior art references listed above, and those listed on the face of the patent, the

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following document references may be used to show the state of the art:

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie

- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber
- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere

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- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

VI. U.S. PATENT NO. 9,170,383

AOI alleges infringement of claims 1, 2, 5-8 of the '383 patent ("the Asserted Claims of the '383 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
CN 201820017	Chao	China	1/22/2019	D-1
U.S. 7,941,053	Dallesasse	U.S.	8/16/2016	D-3

2. Prior Art Publications

Title	Date	Author	Chart
INF-8077i 10 Gigabit Small Form Factor Pluggable Module	August 31, 2005	SFF Committee	D-1 / D-2 / D-3
Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)	September 14, 2000	Agilent Technologies, *et. al.*	D-1 / D-2 / D-3

Oclaro Packaging	July 7, 2011	Oclaro / P. Firth	D-2

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '383 patent as illustrated by the claim charts provided in Exhibits D-1 to D-3.

C. Additional Prior Art

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi

- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber
- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch

- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

VII. U.S. PATENT NO. 10,042,116

AOI alleges infringement of claims 1, 3, 4, 10-13, 15 and 16 of the '116 patent ("the Asserted Claims of the '116 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
9,768,901	Soldano	U.S.	9/19/2017	E-5

2. Prior Art Publications

Title	Date	Author	Chart
U.S. Patent App. Pub. No. US 2016/034951	December 1,	Shen	E-1

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	2016		
Introduction to NEON Photonics & PLC Technology ("Neon Deck")	December 2015	Neon	E-2
Japanese Patent Pub No. JP-PUB-2017-194565	October 26, 2017	Masato	E-3
Japanese Patent Pub. No. JP-PUB-2003-215371	July 30, 2003	Junichi	E-4

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '116 patent as illustrated by the claim charts provided in Exhibits E-1 to E-5.

C. Other Grounds for Invalidity (P.L.R. 3-3(d))

1. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

Claim 1 is indefinite for failing to provide proper antecedent basis for the phrase "the same side."

2. Lack of Enablement and Written Description Under 35 U.S.C. § 112 ¶ 1

Claim 1 additionally in invalid for lack of written description as the specification does not identify or explain what "the same side" recited in claim 1 refers to.

D. Additional Prior Art

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module

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- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber
- U.S. Patent App. No. 20150316732A1 to Schamuhn

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- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

VIII. U.S. PATENT NO. 10,175,431

AOI alleges infringement of claims 1-6, 8-16 of the '431 patent ("the Asserted Claims of the '431 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
9,341,786	Gamache	U.S.	5/17/2016	F-1
9,519,117	Macall	U.S.	5/13/2016	F-1

2. Prior Art Publications

Title	Date	Author	Chart
Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)	September 14, 2000	Agilent Technologies, *et. al.*	F-1
An Overview of Macrobending and Microbending of Optical Fiber	December 2010	John A. Jay	F-1

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '431 patent as illustrated by the claim chart provided in Exhibit F-1.

C. Other Grounds for Invalidity (P.L.R. 3-3(d))

1. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

All claims recite the term "minimum bend radius R_{min}" which is disclosed in the '431 patent specification only as that "associated with the intermediate optical fiber to reduce bending losses." Because this limitation of claim 1 depends entirely upon the formula or test-method used to compute R_{min}, the claim has no concrete value and thus does not fulfill the public notice function of patent claiming. Claims 3 and 12 additionally are indefinite for failure to specify which "diameter" of the

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intermediate optical fiber is intended – the outer diameter of the cladding, the diameter of the core, or some other diameter.

2. Lack of Enablement and Written Description Under 35 U.S.C. § 112 ¶ 1

The '431 patent specification lacks written description because it fails to disclose how the claimed minimum bending radii R_{min} is determined, and instead references unspecified manufacturers' commercial literature, which may include differently determined and changeable values for this critical claim limitation.

D. Additional Prior Art

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao

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- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber
- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie

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- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

IX. U.S. PATENT NO. 10,379,301

AOI alleges infringement of claims 1-4 and 7 of the '301 patent ("the Asserted Claims of the '301 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
9,768,901	Soldano	U.S.	9/19/2017	G-5

2. Prior Art Publications

Title	Date	Author	Chart
U.S. Patent App. Pub. No. US 2016/0349451	December 1, 2016	Shen	G-1
Introduction to NEON Photonics & PLC Technology ("Neon Deck")	December 2015	Neon	G-2
Japanese Patent Pub No. JP-PUB-2017-194565	October 26, 2017	Masato	G-3
Japanese Patent Pub. No. JP-PUB-2003-215371	July 30, 2003	Junichi	G-4

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '301 patent as illustrated by the claim charts provided in Exhibits G-1 to G-5.

C. Other Grounds for Invalidity (P.L.R. 3-3(d))

1. Indefiniteness Under 35 U.S.C. § 112 ¶ 2

All claims of the '301 patent are indefinite for failing to provide proper antecedent basis for the phrase "the same top surface."

2. Lack of Enablement and Written Description Under 35 U.S.C. § 112 ¶ 1

All claims additionally are invalid for lack of written description as the specification does not identify or explain what "the same top surface" recited in claims refers to.

D. Additional Prior Art

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter

- IEC 60793-2-50
- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
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- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
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- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi

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- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)

- U.S. Patent No. 9,768,901 to Soldano
- WO 2009119426A1 to Tamura

X. U.S. PATENT NO. 10,788,690

AOI alleges infringement of claims 1-8 of the '690 patent ("the Asserted Claims of the '690 patent").

A. Identification of Prior Art (P.L.R. 3-3(a))

1. Prior Art Patents

Number	First Named Inventor	Country of Origin	Issue Date	Chart
208421455U	Peng	China	5/4/2011	H-1

2. Prior Art Publications

Title	Date	Author	Chart
U.S. Patent App. Pub. No. US 2003/0053208	March 20, 2003	Hata	H-1

B. Anticipation and Obviousness (P.L.R. 3-3(b) and (c))

The above-mentioned references anticipate and/or render obvious the Asserted Claims of the '301 patent as illustrated by the claim chart provided in Exhibit H-1.

C. Additional Prior Art

- 2015 Neon deck
- An Overview of Macrobending and Microbending of Optical Fiber
- China Patent No. 201820017
- China Patent No. 208421455U
- Japanese Patent App. No. JP-PUB-2003-215371
- Japanese Patent App. No. JP-PUB-2017-194565
- Fiber Optic Cable Bend Radius or Diameter
- IEC 60793-2-50

- INF-8077i 10 Gigabit small Form Factor Pluggable Module
- MAOR-011000-V2
- Oclaro CFP4 Development of CFP4
- Oclaro CFP4 EML TOSA
- Oclaro Packaging
- Small Form-factor Pluggable (SFP) Transceiver Multisource Agreement (MSA)
- The Mechanical Reliability of Corning Optical Fiber in Bending - White Paper
- U.S. Patent App. No. 20030053208 to Hata
- U.S. Patent App. No. 200330174964A1 to Gao
- U.S. Patent App. No. 20040033032A1 to Nakanishi
- U.S. Patent App. No. 20050175350A1 to Hartzell
- U.S. Patent App. No. 20050225955A1 to Grebenkemper
- U.S. Patent App. No. 20060024005A1 to Ice
- U.S. Patent App. No. 20080056644A1 to Naka
- U.S. Patent App. No. 20100002988A1 to Yoshie
- U.S. Patent App. No. 20110081114A1 to Togami
- U.S. Patent App. No. 20110229095A1 to Oki
- U.S. Patent App. No. 20120275784A1 to Soto
- U.S. Patent App. No. 20120301152A1 to Edwards
- U.S. Patent App. No. 20130114629A1 to Firth
- U.S. Patent App. No. 20140140665A1 to Akashi
- U.S. Patent App. No. 20140152373A1 to Romas
- U.S. Patent App. No. 2014070615 to Akashi
- U.S. Patent App. No. 20150162990A1 to Daiber

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- U.S. Patent App. No. 20150316732A1 to Schamuhn
- U.S. Patent App. No. 20160131854A1 to de Jong
- U.S. Patent App. No. 20160139477A1 to Jack
- U.S. Patent App. No. 20160349451A1 to Shen
- U.S. Patent App. No. 20170168252A1 to Pezehki
- U.S. Patent App. No. 20170307819A1 to Ho
- U.S. Patent No. 10,139,578 to Usenlight
- U.S. Patent No. 10,466,432 to Luo
- U.S. Patent No. 5,351,327 to Lurie
- U.S. Patent No. 7,058,263 to Welch
- U.S. Patent No. 7,162,124 to Gunn
- U.S. Patent No. 7,201,520 to Mizue
- U.S. Patent No. 7,439,449 to Kumar
- U.S. Patent No. 7,532,783 to Bai
- U.S. Patent No. 7,773,836 to De Dobbelaere
- U.S. Patent No. 7,941,053 to Dallesasse
- U.S. Patent No. 8,213,802 to Little
- U.S. Patent No. 9,341,786 to Gamache
- U.S. Patent No. 9,419,717 to Huang (LexNet Patent)
- U.S. Patent No. 9,482,819 to Li
- U.S. Patent No. 9,519,117 to Macall
- U.S. Patent No. 9,568,694 to Mizobuchi
- U.S. Patent No. 9,720,191 to Huang (Usenlight)
- U.S. Patent No. 9,768,901 to Soldano

- WO 2009119426A1 to Tamura

DATED: October 15, 2024

Respectfully submitted,

EVERSHEDS SUTHERLAND (US) LLP

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CAMBRIDGE INDUSTRIES USA INC.

CERTIFICATE OF SERVICE

I am a citizen of the United States of America and I am employed in San Diego, California. I am over the age of 18 and not a party to the within action. My business address is 12255 El Camino Real, Suite 100, San Diego, California 92130.

On October 15, 2024, I caused to be served the within **CAMBRIDGE INDUSTRIES USA INC.'S AMENDED INVALIDITY CONTENTIONS** on the parties or their counsel shown below, by mailing the enclosed via U.S. Mail, addressed as follows:

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Dated: October 15, 2024

EVERSHEDS SUTHERLAND (US) LLP

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EXHIBIT A

Invalidity of the '024 Patent

EXHIBIT A-1 – Pages 1-9

REMOVED AS MARKED CONFIDENTIAL

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,313,024 Against U.S. Patent No. 9,568,694 ("Mizobuchi")

U.S. Patent No. 9,568,694 to Mizobuchi

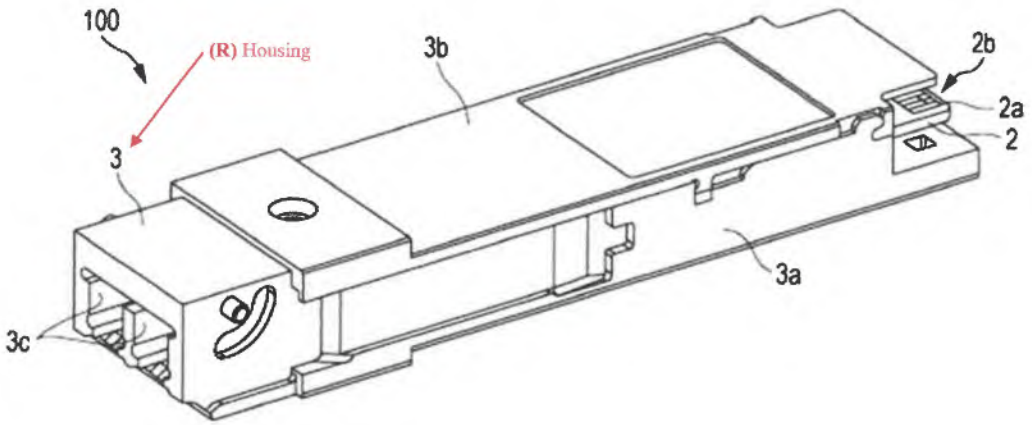


FIG. 1A (Mizobuchi)

50655127.7

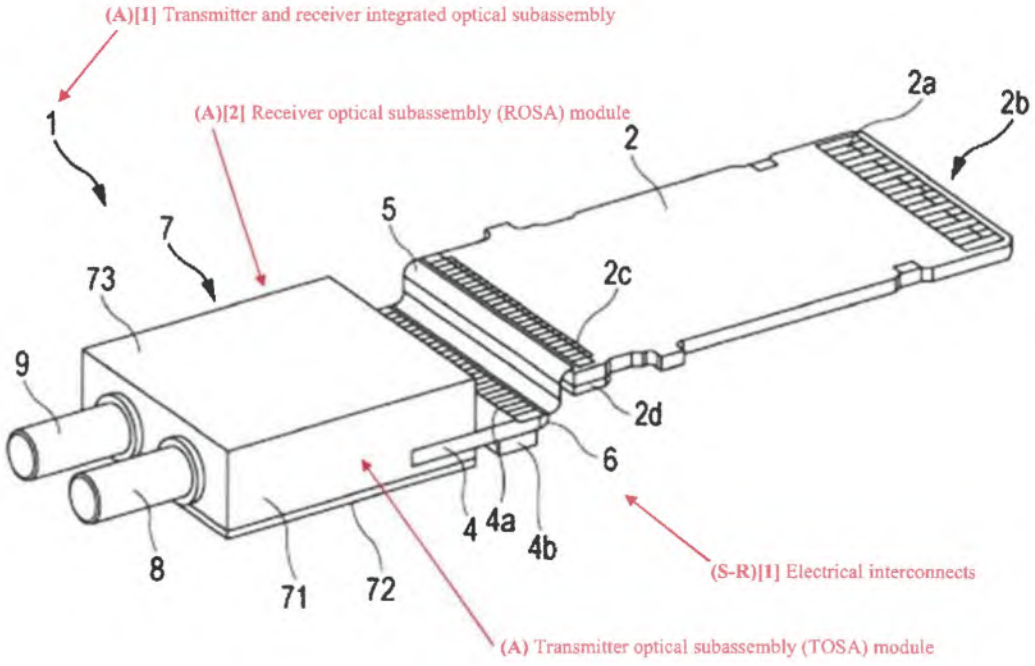


FIG. 1B (Mizobuchi)

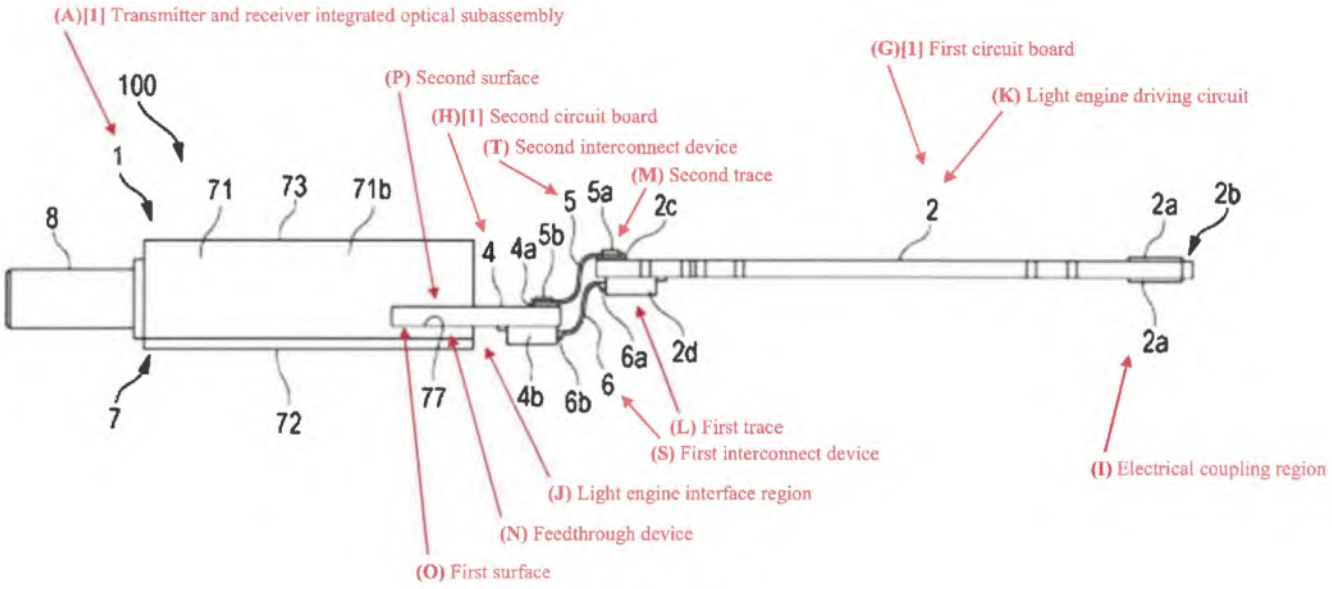


FIG. 2 (Mizobuchi)

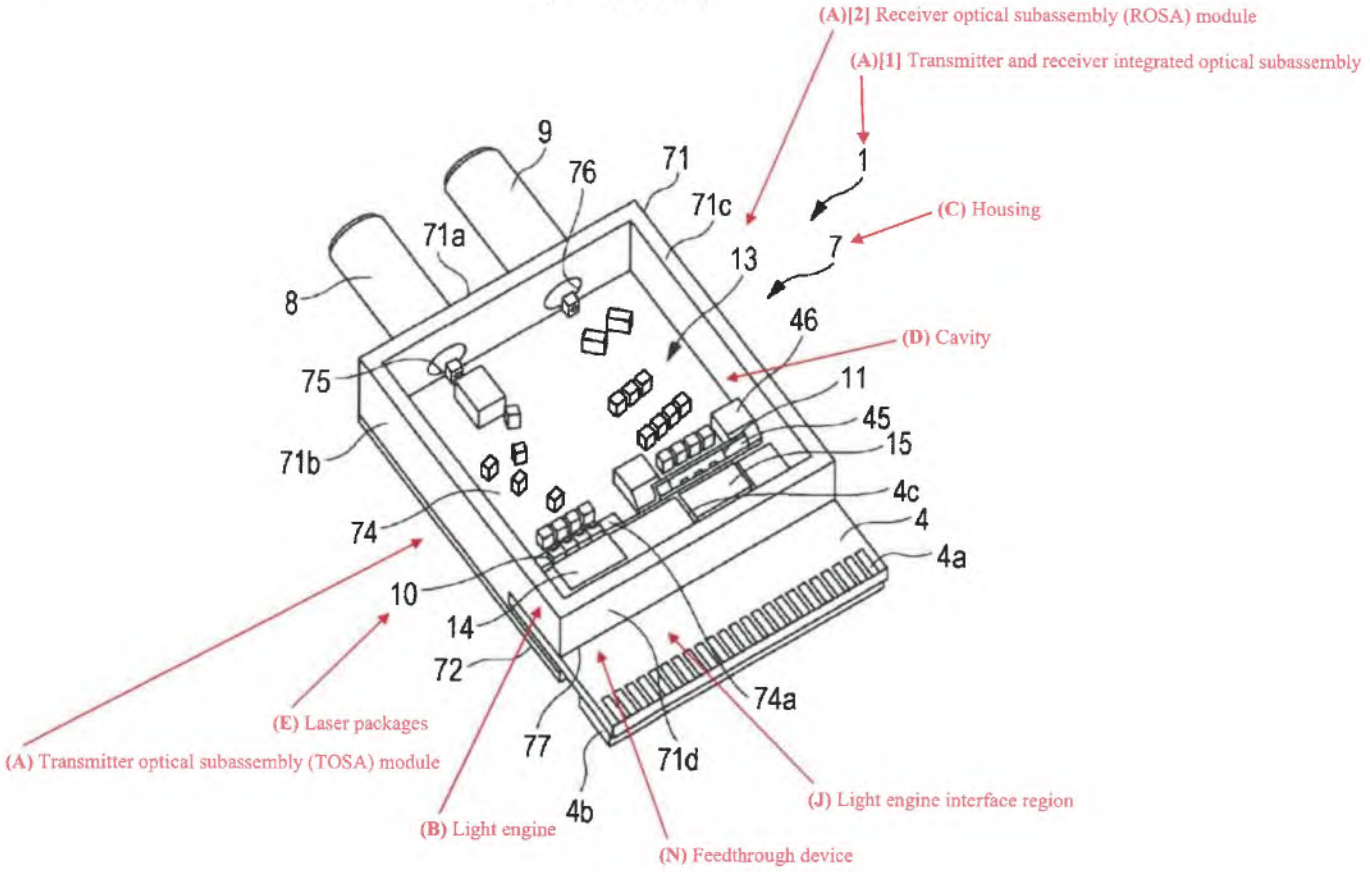


FIG. 3A (Mizobuchi)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,313,024 Against U.S. Patent No. 9,568,694 ("Mizobuchi")

U.S. Patent No. 10,313,024	Disclosure in Mizobuchi
Independent Claim 1	
[1a] A transmitter optical subassembly (TOSA) module comprising:	Mizobuchi discloses a transmitter and receiver integrated optical subassembly **(A)[1]**, which includes a transmitter optical subassembly (TOSA) module **(A)**. *See* FIGS. 1B, 3A; Col. 12, lines 42–58.
[1b] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package for emitting an associated channel wavelength disposed within the hermetic-sealed cavity;	Mizobuchi discloses the TOSA module **(A)** of the transmitter and receiver integrated optical subassembly **(A)[1]** includes a hermetically-sealed light engine **(B)** with a housing **(C)** that defines a hermetic-sealed cavity **(D)**; multiple laser packages **(E)** are disposed within the cavity **(D)**, each of the laser packages **(E)** designed to serve as a light emitting element and to thereby emit an associated channel wavelength. *See* FIG. 3A; Col. 5, lines 43–50; Col. 7, lines 15–21; Col. 12, lines 46–48.
[1c] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	Mizobuchi discloses a first circuit board **(G)[1]** has first and second surfaces disposed opposite each other and defines a substrate; the first circuit board **(G)[1]** is connected to a second circuit board **(H)[1]**; the substrate defined by the first circuit board **(G)[1]** includes an electrical coupling region **(I)** and a light engine interface region **(J)**, the electrical coupling region **(I)** designed to electrically couple with a transmit connecting circuit and the light engine interface region **(J)** designed to electrically couple with the hermetically-sealed light engine **(B)** via the second circuit board **(H)[1]**. *See* FIGS. 2, 3A; Col. 4, lines 22–Col. 5, line 34; Col. 6, lines 32–60.
[1d] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to	Mizobuchi discloses a light engine driving circuit **(K)**, including a clock data recovery (CDR) circuit and a power supply circuit, is disposed on the substrate and is designed to provide a radio

drive the hermetically-sealed light engine to output one or more channel wavelengths;	frequency (RF) signal and a power signal to drive the hermetically-sealed light engine **(B)** to output one or more channel wavelengths. *See* FIGS. 2, 3A; Col. 3, lines 57–64; Col. 12, lines 27–41; *see also* U.S. Patent App. Pub. No. 2013/0001410 A1 to Zhao et al., para. [0004] (discussing need to separate RF signal and power into separate plans in RF transmission systems).
[1e] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal and at least a second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal	Mizobuchi discloses the substrate includes a first trace **(L)** disposed on its first surface to provide the power signal and a second trace **(M)** disposed on its second surface to provide the RF signal; the first trace **(L)** and the second trace **(M)** are disposed in an opposing arrangement, which provides electrical isolation and thereby reduces electrical interference between the power signal and the RF signal. *See* FIG. 2; Col. 4, lines 22–Col. 5, line 34; Col. 6, lines 48–60.
[1f] a feedthrough device to electrically couple the at least one laser package to the light engine driving circuit; and	Mizobuchi discloses a feedthrough device **(N)** electrically couples the laser packages **(E)** to the light engine driving circuit **(K)**. *See* FIGS. 2, 3A; Col. 6, lines 32–37; Col. 6, line 61–Col. 7, line 64.
[1g] wherein the feedthrough device is defined by at least a first surface disposed opposite a second surface, and wherein the first and second surfaces extend substantially parallel with the first and second surfaces of the substrate.	Mizobuchi discloses the feedthrough device **(N)** is defined, in part, by a first surface **(O)** and a second surface **(P)**; the first surface **(O)** and the second surface **(P)** of the feedthrough device **(N)** extend substantially parallel with the respective opposing surfaces of the substrate. *See* FIG. 2; Col. 6, lines 32–60.
Dependent Claim 2	
[2a] The TOSA module of claim 1, further comprising at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine housing to provide the power signal, and at least a	*See,* Claim 1, *supra.* Mizobuchi further discloses a first interconnect device **(S)** of a first type is electrically coupled to the first trace **(L)** and a

second interconnect device of a second type electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine housing to provide the RF signal, the first and second types of interconnect devices being different.	corresponding trace of the housing **(C)** of the hermetically-sealed light engine **(B)** to provide the power signal; a second interconnect device **(T)** of a second type is electrically coupled to the second trace **(M)** and a corresponding trace of the housing **(C)** of the light engine **(B)** to provide the RF signal; the first type of the first interconnect device **(S)** is different than the second type of the second interconnect device **(T)**. *See* FIG. 2; Col. 4, line 22–Col. 5, line 34.
Dependent Claim 3	
[3a] The TOSA module of claim 2, wherein the first type of interconnect device is a DC bus bar interconnect.	*See,* Claim 2, *supra.* Mizobuchi further discloses the first type of the first interconnect device **(S)** may be a DC bus bar interconnect. *See* FIG. 2; Col. 12, lines 11–15.
Dependent Claim 4	
[4a] The TOSA module of claim 2, wherein the second type of interconnect device is a wire bond.	*See,* Claim 2, *supra.* Mizobuchi further discloses the second type of the second interconnect device **(T)** may be a wire bond. *See* FIG. 2; Col. 5, lines 6–10.
Dependent Claim 7	
[7a] The TOSA module of claim 1, wherein the electrical isolation is provided at least in part by a width of the substrate and/or material properties of a material that forms the substrate.	*See,* Claim 1, *supra.* Mizobuchi further discloses electrical isolation is provided at least in part by a width of the substrate defined by the opposing first and second surfaces of the first circuit board **(G)[1]** and/or material properties of a material that forms the substrate. *See* FIG. 2; Col. 12, lines 35–41.
Dependent Claim 8	

[8a] The TOSA module of claim 1, further comprising a plurality of electrical interconnects that brace the substrate to the housing of the hermetically-sealed light engine.	*See,* Claim 1, *supra.* Mizobuchi further discloses a plurality of electrical interconnects **(S-R)[1]** may brace the substrate to the housing **(C)** of the hermetically-sealed light engine **(B)**. *See* FIGS. 1B, 2, 3A; Col. 10, lines 4–12; Col. 12, lines 6–15.
Dependent Claim 10	
[10a] The TOSA module of claim 1, wherein the first and second surfaces of the feedthrough device are substantially coplanar with the first and second surfaces of the substrate when the feedthrough device and substrate are coupled together.	*See,* Claim 1, *supra.* Mizobuchi further discloses as construed by AOI in its infringement claim charts, the first and second surfaces **(O, P)** of the feedthrough device **(N)** are substantially coplanar with the respective opposing surfaces of the substrate when the feedthrough device **(N)** and substrate are coupled together. *See* FIG. 2.
Dependent Claim 11	
[11a] The TOSA module of claim 1, further comprising at least one trace for receiving the power signal from the light engine driving circuit disposed on the first surface of the feedthrough and at least one trace for receiving the RF signal from the light engine driving circuit disposed on the second surface.	*See,* Claim 1, *supra.* Mizobuchi further discloses the TOSA module **(A)** may include at least one trace for receiving the power signal from the light engine driving circuit **(K)** located on the first surface **(O)** of the feedthrough device **(N)** and at least one trace for receiving the RF signal from the light engine driving circuit **(K)** located on the second surface **(P)**. *See* FIGS. 1B, 2; Col. 15, lines 10–18.
Independent Claim 12	
[12a] An optical transceiver comprising:	*See,* [1a], *supra.*
[12b] a housing;	*See,* [1b], *supra.*
[12c] a transmitter optical subassembly (TOSA) module disposed in the housing, the TOSA module comprising:	*See,* [1b], *supra.*

[12d] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package disposed within the hermetic-sealed cavity;	*See*, [1b], *supra*.
[12e] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	*See*, [1c], *supra*.
[12f] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine to output one or more channel wavelengths; and	*See*, [1d], *supra*.
[12g] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal, and at least a second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal;	*See*, [1e], *supra*.
[12h] at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine to provide the power signal, and at least a second interconnect device of a second type electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine to provide the RF signal, the first and second types of interconnect devices being different;	*See*, [2a], *supra*.
[12i] a receive optical subassembly (ROSA) module disposed in the housing.	Mizobuchi disclose a receive optical subassembly (ROSA) module **(A)[2]** is disposed in the housing **(R)**. *See* FIG. 3A.
Dependent Claim 14	

[14a] The optical transceiver of claim 12, wherein the second type of interconnect device is a wire bonds.	*See*, Claim 12, *supra*. *See*, [4a], *supra*.
Independent Claim 15	
[15a] A transmitter optical subassembly (TOSA) module comprising:	*See*, [1a], *supra*.
[15b] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package for emitting an associated channel wavelength disposed within the hermetic-sealed cavity;	*See*, [1b], *supra*.
[15c] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	*See*, [1c], *supra*.
[15d] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine to output one or more channel wavelengths;	*See*, [1d], *supra*.
[15e] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal and at least a second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal; and	*See*, [1e], *supra*.
[15f] at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine housing to provide the power signal, and at least a second interconnect device of a second type	*See*, [2a], *supra*.

electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine housing to provide the RF signal, the first and second types of interconnect devices being different.	
Dependent Claim 16	
[16a] The TOSA module of claim 15, wherein the first type of interconnect device is a DC bus bar interconnect.	*See*, Claim 15, *supra*. *See*, [3a], *supra*.
Dependent Claim 17	
[17a] The TOSA module of claim 15, wherein the second type of interconnect device is a wire bond.	*See*, Claim 15, *supra*. *See*, [4a], *supra*.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,313,024 Against U.S. Patent App. Pub. No. 2014/0140665 A1 ("Akashi")

U.S. Patent App. Pub. No. 2014/0140665 A1 to Akashi et al.

FIG.1

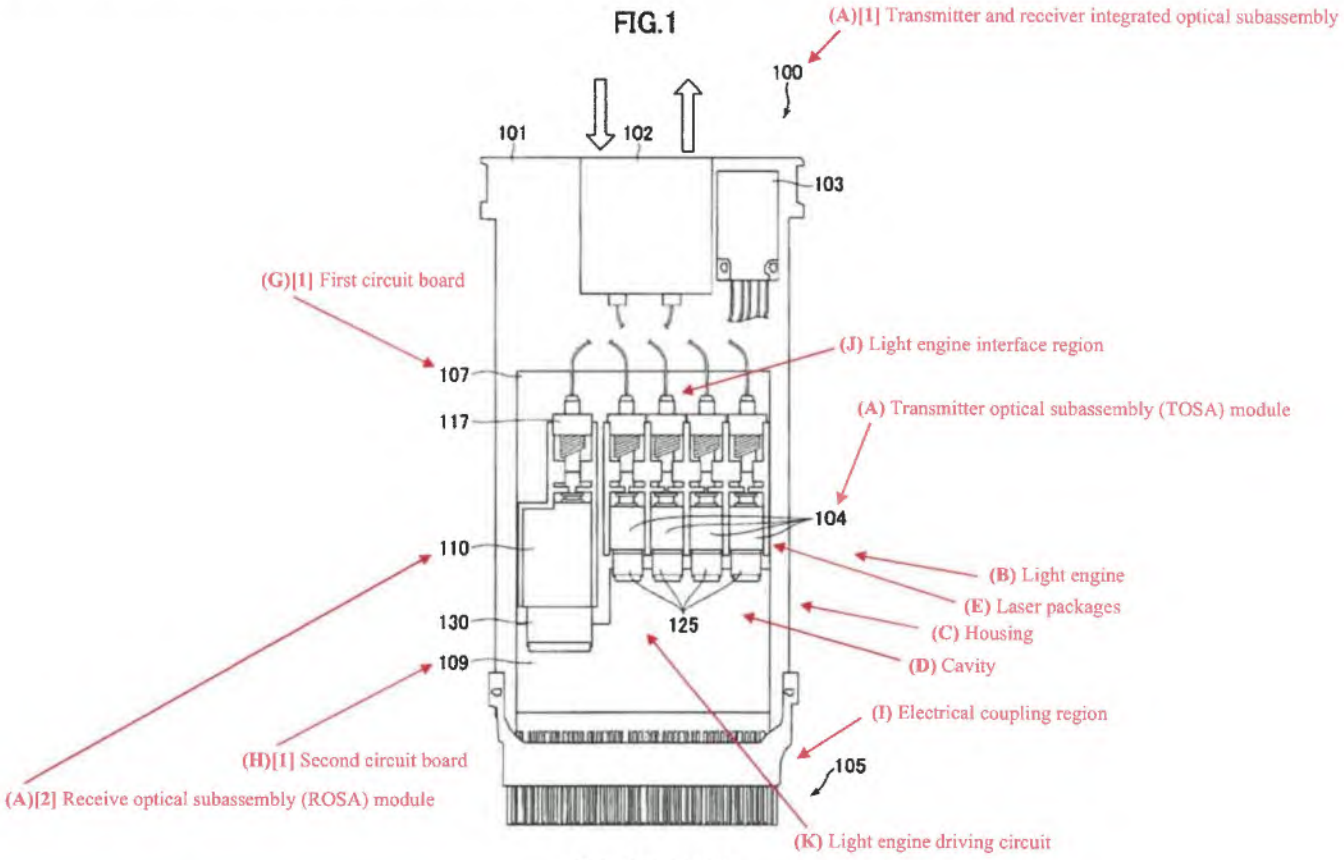


FIG. 1 (Akashi)

50655127.7

FIG.2

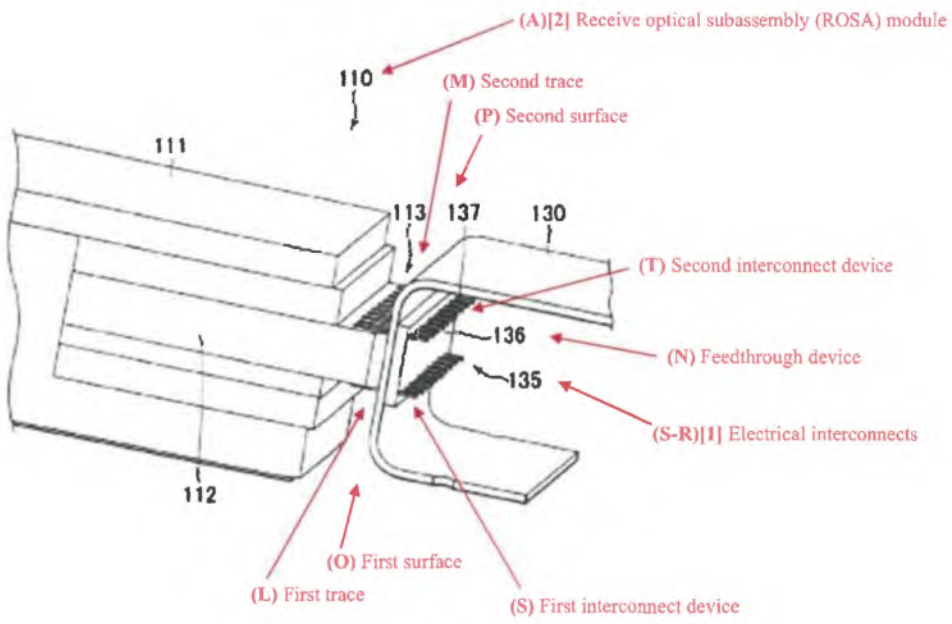


FIG. 2 (Akashi)

FIG.6

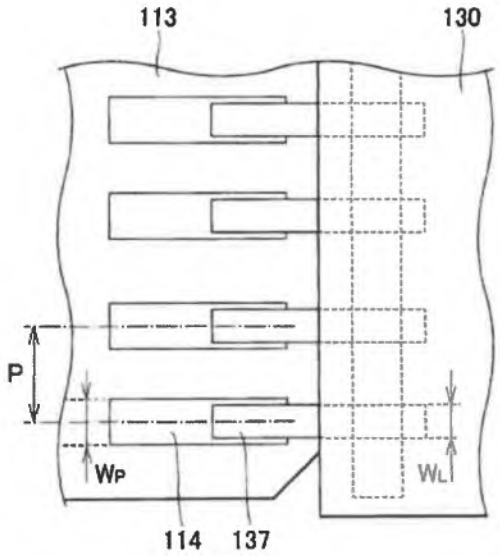


FIG. 6 (Akashi)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,313,024 Against U.S. Patent App. Pub. No. 2014/0140665 A1 ("Akashi")

U.S. Patent No. 10,313,024	Disclosure in Akashi
Independent Claim 1	
[1a] A transmitter optical subassembly (TOSA) module comprising:	Akashi discloses a transmitter and receiver integrated optical subassembly **(A)[1]**, which includes a transmitter optical subassembly (TOSA) module **(A)**. *See* FIG. 1; para. [0026].
[1b] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package for emitting an associated channel wavelength disposed within the hermetic-sealed cavity;	Akashi discloses a hermetically-sealed light engine **(B)** with a housing **(C)** that defines a hermetic-sealed cavity **(D)**; multiple laser packages **(E)** disposed within the cavity **(D)**, each of the laser packages **(E)** designed to serve as a light emitting element and to thereby emit an associated channel wavelength. *See* FIG. 1; paras. [0010], [0026], [0027].
[1c] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	Akashi discloses a first circuit board **(G)[1]** has first and second surfaces disposed opposite each other and defines a substrate; the first circuit board **(G)[1]** is connected to a second circuit board **(H)[1]**; the substrate defined by the first circuit board **(G)[1]** includes an electrical coupling region **(I)** and a light engine interface region **(J)**, the electrical coupling region **(I)** designed to electrically couple with a transmit connecting circuit and the light engine interface region **(J)** designed to electrically couple with the hermetically-sealed light engine **(B)** via the second circuit board **(H)[1]**. *See* FIG. 1; para. [0026].
[1d] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine to output one or more channel wavelengths;	Akashi discloses a light engine driving circuit **(K)** is disposed on the substrate and is designed to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine **(B)** to output one or more channel wavelengths. *See* FIG. 1; para. [0026].
[1e] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal and at least a	Akashi discloses the substrate includes a first trace **(L)** disposed on its first surface to provide the power signal and a second trace

second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal	**(M)** disposed on its second surface to provide the RF signal; the first trace **(L)** and the second trace **(M)** are disposed in an opposing arrangement, which provides electrical isolation and thereby reduces electrical interference between the power signal and the RF signal. *See* FIGS. 1, 2, 6; paras. [0010], [0015], [0030] [0033], [0038] (explaining that configurations described in relation to the receiver optical sub-assembly 110 also apply to the transmitter optical sub assembly 104).
[1f] a feedthrough device to electrically couple the at least one laser package to the light engine driving circuit; and	Akashi discloses a feedthrough device **(N)** electrically couples the laser packages **(E)** to the light engine driving circuit **(K)**. *See* FIGS. 1, 2; paras. [0030], [0035], [0038] (explaining that configurations described in relation to the receiver optical sub-assembly 110 also apply to the transmitter optical sub assembly 104).
[1g] wherein the feedthrough device is defined by at least a first surface disposed opposite a second surface, and wherein the first and second surfaces extend substantially parallel with the first and second surfaces of the substrate.	Akashi discloses the feedthrough device **(N)** is defined, in part, by a first surface **(O)** and a second surface **(P)**; the first surface **(O)** and the second surface **(P)** of the feedthrough device **(N)** extend substantially parallel with the respective opposing surfaces of the substrate. *See* FIG. 2; paras. [0010], [0015], [0031].
Dependent Claim 2	
[2a] The TOSA module of claim 1, further comprising at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine housing to provide the power signal, and at least a second interconnect device of a second type electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine housing to provide the RF	*See,* Claim 1, *supra.* Akashi further discloses a first interconnect device **(S)** of a first type is electrically coupled to the first trace **(L)** and a corresponding trace of the housing **(C)** of the hermetically-sealed light engine **(B)** to provide the power signal; a second interconnect device **(T)** of a second type is electrically coupled to the second trace **(M)** and a corresponding trace of the housing

signal, the first and second types of interconnect devices being different.	**(C)** of the light engine **(B)** to provide the RF signal; the first type of the first interconnect device **(S)** is different than the second type of the second interconnect device **(T)**. *See* FIGS. 1, 2; paras. [0010], [0014], [0015], [0033], [0038] (explaining that configurations described in relation to the receiver optical sub-assembly 110 also apply to the transmitter optical sub assembly 104).
Dependent Claim 3	
[3a] The TOSA module of claim 2, wherein the first type of interconnect device is a DC bus bar interconnect.	*See,* Claim 2, *supra.* Akashi further discloses the first type of the first interconnect device **(S)** is a DC bus bar interconnect. *See* FIG. 2; paras. [0010], [0015]; Claim 6.
Dependent Claim 4	
[4a] The TOSA module of claim 2, wherein the second type of interconnect device is a wire bond.	*See,* Claim 2, *supra.* Akashi further discloses the second type of the second interconnect device **(T)** is a wire bond. *See* FIG. 2; paras. [0010], [0015]; Claim 6.
Dependent Claim 7	
[7a] The TOSA module of claim 1, wherein the electrical isolation is provided at least in part by a width of the substrate and/or material properties of a material that forms the substrate.	*See,* Claim 1, *supra.* Akashi further discloses electrical isolation is provided at least in part by a width of the substrate defined by the opposing first and second surfaces of the first circuit board **(G)[1]** and/or material properties of a material that forms the substrate. *See* FIGS. 1, 6; para. [0033].
Dependent Claim 8	
[8a] The TOSA module of claim 1, further comprising a	*See,* Claim 1, *supra.*

plurality of electrical interconnects that brace the substrate to the housing of the hermetically-sealed light engine.	Akashi further discloses a plurality of electrical interconnects **(S-R)[1]** may brace the substrate to the housing **(C)** of the hermetically-sealed light engine **(B)**. *See* FIG. 2; paras. [0028], [0029].
Dependent Claim 10	
[10a] The TOSA module of claim 1, wherein the first and second surfaces of the feedthrough device are substantially coplanar with the first and second surfaces of the substrate when the feedthrough device and substrate are coupled together.	*See,* Claim 1, *supra.* Akashi further discloses, as construed by AOI in its infringement claim charts, the first and second surfaces **(O, P)** of the feedthrough device **(N)** are substantially coplanar with the respective opposing surfaces of the substrate when the feedthrough device **(N)** and substrate are coupled together. *See* FIGS. 1, 2.
Dependent Claim 11	
[11a] The TOSA module of claim 1, further comprising at least one trace for receiving the power signal from the light engine driving circuit disposed on the first surface of the feedthrough and at least one trace for receiving the RF signal from the light engine driving circuit disposed on the second surface.	*See,* Claim 1, *supra.* Akashi further discloses the TOSA module **(A)** at least one trace for receiving the power signal from the light engine driving circuit **(K)** located on the first surface **(O)** of the feedthrough device **(N)** and at least one trace for receiving the RF signal from the light engine driving circuit **(K)** located on the second surface **(P)**. *See* FIGS. 1, 2; paras. [0010], [0015], [0033], [0038] (explaining that configurations described in relation to the receiver optical sub-assembly 110 also apply to the transmitter optical sub assembly 104).
Independent Claim 12	
[12a] An optical transceiver comprising:	*See,* [1a], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,313,024 Against U.S. Patent App. Pub. No. 2014/0140665 A1 ("Akashi")

[12b] a housing;	*See,* [1b], *supra.*
[12c] a transmitter optical subassembly (TOSA) module disposed in the housing, the TOSA module comprising:	*See,* [1b], *supra.*
[12d] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package disposed within the hermetic-sealed cavity;	*See,* [1b], *supra.*
[12e] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	*See,* [1c], *supra.*
[12f] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine to output one or more channel wavelengths; and	*See,* [1d], *supra.*
[12g] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal, and at least a second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal;	*See,* [1e], *supra.*
[12h] at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine to provide the power signal, and at least a second interconnect device of a second type electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine to provide the RF signal, the first and second types of interconnect devices being different;	*See,* [2a], *supra.*

[12i] a receive optical subassembly (ROSA) module disposed in the housing.	Akashi discloses a receive optical subassembly (ROSA) module **(A)[2]** is disposed in the housing **(C)**. *See* FIGS. 1, 2; para. [0026].
Dependent Claim 14	
[14a] The optical transceiver of claim 12, wherein the second type of interconnect device is a wire bonds.	*See*, Claim 12, *supra*. *See*, [4a], *supra*.
Independent Claim 15	
[15a] A transmitter optical subassembly (TOSA) module comprising:	*See*, [1a], *supra*.
[15b] a hermetically-sealed light engine with a housing that defines a hermetic-sealed cavity and at least one laser package for emitting an associated channel wavelength disposed within the hermetic-sealed cavity;	*See*, [1b], *supra*.
[15c] a substrate defined by first and second surfaces disposed opposite each other, the substrate including an electrical coupling region for electrically coupling with a transmit connecting circuit and a light engine interface region for electrically coupling with the hermetically-sealed light engine;	*See*, [1c], *supra*.
[15d] a light engine driving circuit disposed on the substrate to provide a radio frequency (RF) signal and a power signal to drive the hermetically-sealed light engine to output one or more channel wavelengths;	*See*, [1d], *supra*.
[15e] wherein the substrate includes at least a first trace disposed on the first surface to provide the power signal and at least a second trace disposed on the second surface to provide the RF signal, the first and second traces being disposed in an opposing arrangement to provide electrical isolation to reduce electrical interference between the power signal and the RF signal; and	*See*, [1e], *supra*.

[15f] at least a first interconnect device of a first type electrically coupled to the first trace and a corresponding trace of the hermetically-sealed light engine housing to provide the power signal, and at least a second interconnect device of a second type electrically coupled to the second trace and a corresponding trace of the hermetically-sealed light engine housing to provide the RF signal, the first and second types of interconnect devices being different.	*See,* [2a], *supra.*
Dependent Claim 16	
[16a] The TOSA module of claim 15, wherein the first type of interconnect device is a DC bus bar interconnect.	*See*, Claim 15, *supra.* *See,* [3a], *supra.*
Dependent Claim 17	
[17a] The TOSA module of claim 15, wherein the second type of interconnect device is a wire bond.	*See*, Claim 15, *supra.* *See,* [4a], *supra.*

EXHIBIT B

Invalidity of the '826 Patent

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against China Patent No. 201820017 ("Chao")

China Patent No. CN201820017

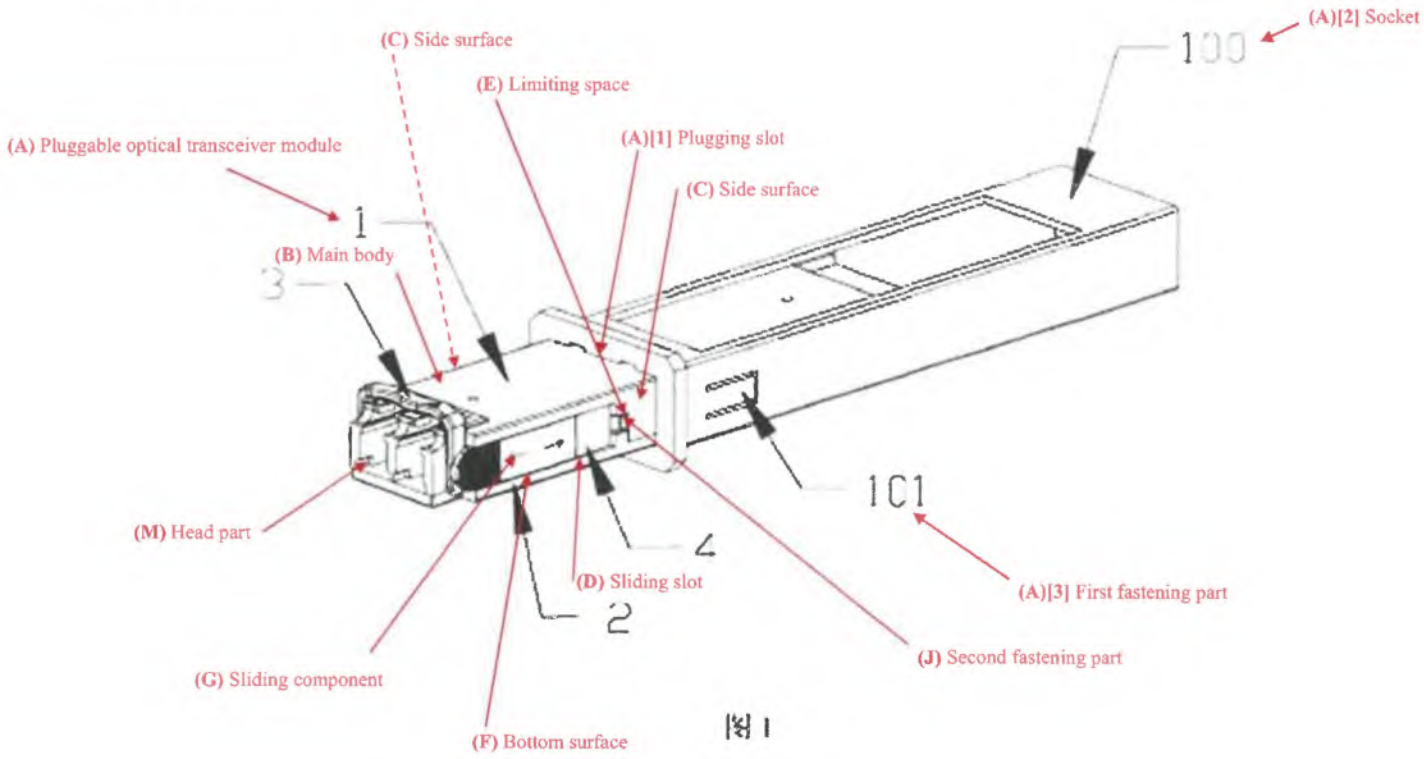


FIG. 1 (Chao)

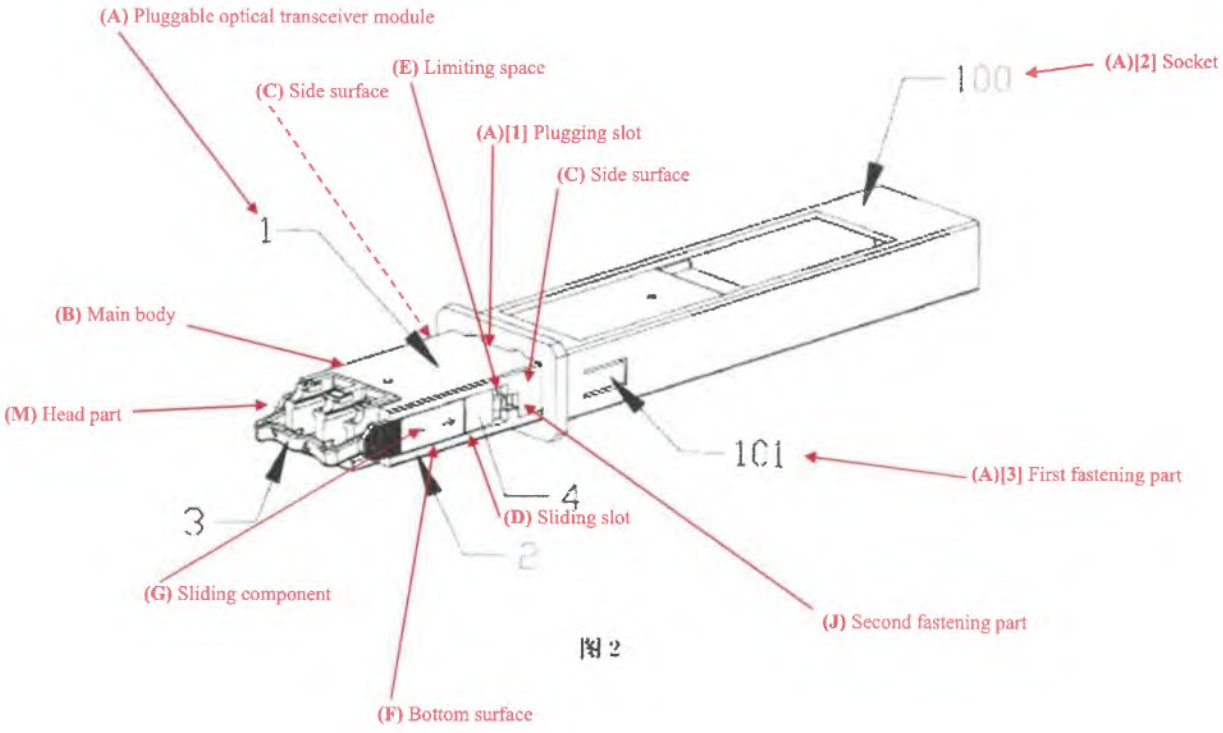

(A) Pluggable optical transceiver module
(E) Limiting space
(C) Side surface
(A)[1] Plugging slot
(C) Side surface
100
(A)[2] Socket
1
(B) Main body
(M) Head part
101
(A)[3] First fastening part
4
(D) Sliding slot
3
2
(G) Sliding component
(J) Second fastening part
(F) Bottom surface

图 2

FIG. 2 (Chao)

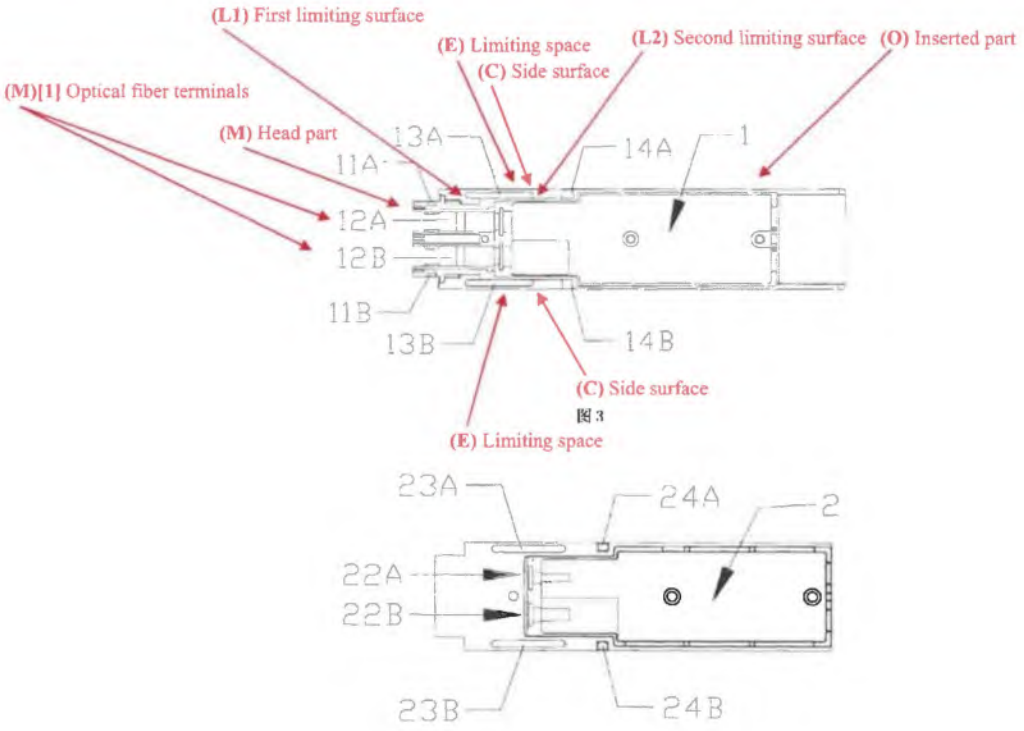
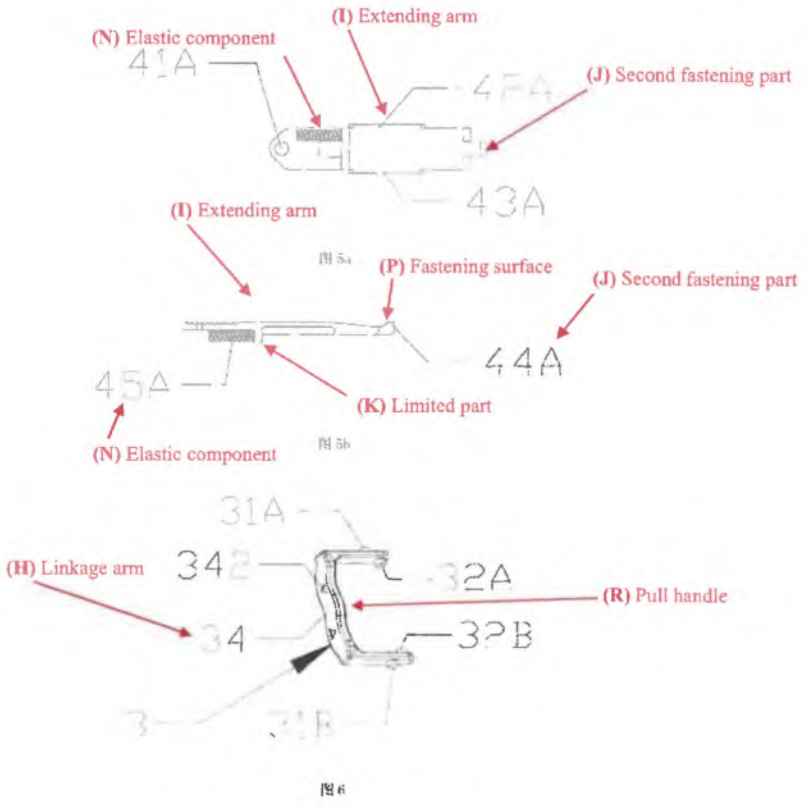


图 3

图 4

FIGS. 3 & 4 (Chao)



FIGS. 5(a), 5(b) & 6 (Chao)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against China Patent No. 201820017 ("Chao")

U.S. Patent No. 9,523,826	Disclosure in Chao
Independent Claim 1	
[1a] A pluggable optical transceiver module, for being inserted into a plugging slot of a socket, the socket comprising two first fastening parts located in the plugging slot, the pluggable optical transceiver module comprising:	Chao discloses a pluggable optical transceiver module **(A)**, for being inserted into a plugging slot **(A)[1]** of a socket **(A)[2]**. The socket **(A)[2]** includes two first fastening parts **(A)[3]** located in the plugging slot **(A)[1]**. *See* FIGS. 1, 2; Specification at "The Utility Model Content" ("Technical problem to be solved in the utility model is, a kind of XFP integrated module of optical transceiver is provided, and meets the hot plug requirement . . ") (Google Patents machine translation); Specification at "Embodiment" ("In conjunction with referring to FIG. 1, shown in Figure 2, the disclosed a kind of XFP integrated module of optical transceiver of the utility model embodiment . . ."; "During use, from the whole insertion in end cage … slot 100, because the locking shell fragment 101 of cage 1 slot 100 both sides inwardly compresses, the XFP integrated module of optical transceiver keeps normal operating conditions under the impaction state of locking shell fragment 101 . . .") (Google Patents machine translation).
[1b] a main body having two side surfaces that are opposite to each other and two sliding slots located at the two side surfaces, respectively, wherein the main body is configured to be inserted into the plugging slot, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Chao discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having two side surfaces **(C)** that are opposite to each other and two sliding slots **(D)** located at the two side surfaces **(C)**, respectively. The main body **(B)** is designed to be inserted into the plugging slot **(A)[1]**. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)** forming the two sliding slots **(D)**, respectively. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* FIGS. 1–3; Specification at "Embodiment" (". . . the

	boundary drives the described lock slide 4 of separating and slides in described vallecular cavity with described stopper slot. . . . the second stopper slot 13A, 13B extend along the direction that is parallel to surface, module … 1 place and are symmetrical arranged, and the two ends of its bottom plate rabbet can be played further restriction to the slip of separating lock slide 4; . . .") (Google Patents machine translation).
[1c] a sliding component comprising a linkage arm and two extending arms, wherein the two extending arms are connected to two ends of the linkage arm, respectively, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are slidably disposed on the two sliding slots to have a fastening position and a releasing position, the two first fastening parts are fastened to the two second fastening parts when the two extending arms are located at the fastening position, and the two second fastening parts press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms are located at the releasing position, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	Chao discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The two extending arms **(I)** are connected to two ends of the linkage arm **(H)**, respectively. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are slidably disposed on the two sliding slots **(D)** to have a fastening position and a releasing position. The two first fastening parts **(A)[3]** are fastened to the two second fastening parts **(J)** when the two extending arms **(I)** are located at the fastening position, and the two second fastening parts **(J)** press the two first fastening parts **(A)[3]**, respectively, to make the two first fastening parts **(A)[3]** be farther away from each other when the two extending arms **(I)** are located at the releasing position. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1, 2, 5(a), 5(b), 6; Specification at "Embodiment" ("In conjunction with referring to FIG. 1, shown in Figure 2, . . . described release draw ring 3 is arranged in the described stopper slot by the rotating fixing of its rotating shaft that has, the described lock slide 4 of separating of described release draw ring 3 hinged securement, described release draw ring 3 are

	rotation center by described rotating shaft and are that the boundary drives the described lock slide 4 of separating and slides in described vallecular cavity with described stopper slot."; Shown in Fig. 5 a, Fig. 5 b, release draw ring 3 hinged securement are separated lock slide 4 . . . ; Referring to FIG. 6, release draw ring 3 is that the structural elements that lock slide 4 slides in separated in traction, . . .") (Google Patents machine translation).
[1d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	Chao discloses the pluggable optical transceiver module **(A)** includes an elastic component **(N)**. The main body **(B)** has a first limiting surface **(L1)** and a second limiting surface **(L2)** forming the limiting space **(E)**. The first limiting surface **(L1)** is closer to a head part **(M)** than the second limiting surface **(L2)**, and the elastic component **(N)** is located in the limiting space **(E)** and between the first limiting surface **(L1)** and the limited part **(K)** and is covered by the extending arm **(I)** such that the elastic component **(N)** is confined by the main body **(B)** and the sliding component **(G)**. *See* FIGS. 1–3, 5(a), 5(b); Specification at "Embodiment" (". . . as shown in the figure, . . . slide block 4A, 4B cooperate suitable spring respectively"; ". . . the elastic force effect of the spring in the flange of separating lock slide 4A, 4B . . .") (Google Patents machine translation).
Dependent Claim 2	
[2a] The pluggable optical transceiver module according to claim 1, wherein the main body comprises a head part and an inserted part connected to each other, the inserted part is configured to be inserted into the socket, the two side surfaces are located at two sides of the head part and the inserted part opposite to each other, respectively, wherein both the two sliding	*See,* claim 1, *supra.* Chao further discloses the main body **(B)** may include a head part **(M)** and an inserted part **(O)** connected to each other. The inserted part **(O)** is designed to be inserted into the socket **(A)[2]**. The two side surfaces **(C)** are located at two sides of the

slots extend from the head part towards the inserted part, and the two extending arms are able to slide relative to the two sliding slots to have the fastening position which is farther away from the head part and the releasing position which is closer to the head part.	head part **(M)** and the inserted part **(O)** opposite to each other, respectively. Both of the two sliding slots **(D)** extend from the head part **(M)** towards the inserted part **(O)**, and the two extending arms **(I)** are able to slide relatively to the two sliding slots **(D)** to have the fastening position, which is farther away from the head part **(M)**, and the releasing position, which is closer to the head part **(M)**. *See* FIGS. 1–3, 5(a), 5(b); Specification at "The Utility Model Content" ("Implement the utility model embodiment, has following beneficial effect: . . .") (Google Patents machine translation); Specification at "Embodiment" ("In conjunction with referring to FIG. 1, shown in Figure 2, . . . the boundary drives the described lock slide of separating and slides in described vallecular cavity with described stopper slot."; "Referring to Fig. 3, . . . two ends of its bottom plate rabbet can be played further restriction to the slip of separating lock slide 4; Module … 1 middle part has locating flange 14A and 14B.") (Google Patents machine translation).
Dependent Claim 3	
[3a] The pluggable optical transceiver module according to claim 2, wherein each second fastening part has a fastening surface, and a distance between one side of the fastening surface which is close to the side surface and the head part is less than a distance between another side of the fastening surface which is far away from the side surface and the head part.	*See,* claim 2, *supra.* Chao further discloses each second fastening part **(J)** may have a fastening surface **(P)**, and a distance between one side of the fastening surface **(P)** which is close to the side surface **(C)** and the head part **(M)** is less than a distance between another side of the fastening surface **(P)** which is far away from the side surface **(C)** and the head part **(M)**. *See* FIGS. 1–3, 5(b); Specification at "Embodiment" ("Shown in Fig. 5 a, Fig. 5 b, . . . terminal 44A, . . . its end is provided and can outwards push ejection locking shell fragment 101.") (Google Patents machine translation).

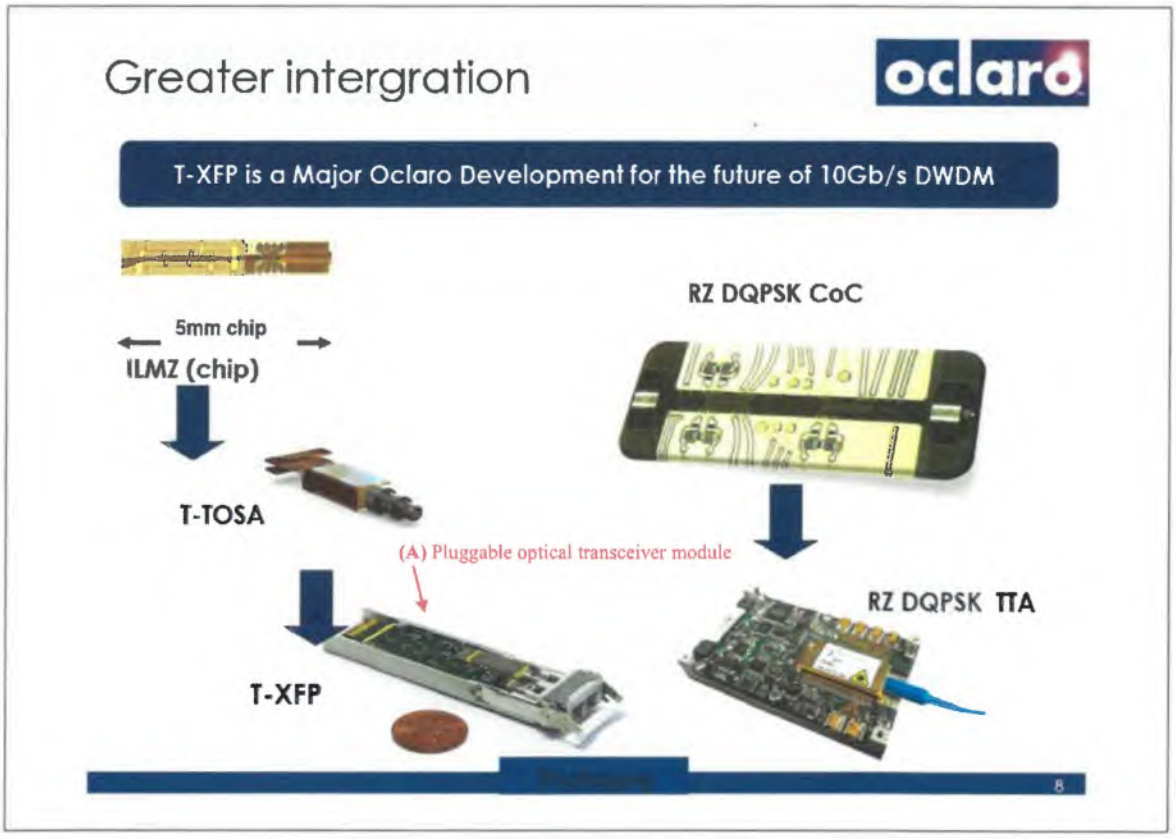
Dependent Claim 4	
[4a] The pluggable optical transceiver module according to claim 2, wherein the head part has at least one optical fiber terminal.	*See,* claim 2, *supra.* Chao further discloses the head part **(M)** may include at least one optical fiber terminal **(M)[1]**. *See* FIG. 3; Specification at "Embodiment" ("Referring to FIG. 3, module … 1 roughly is rectangular shape, its front end is provided with the cavity lane 12B that is used to hold the cavity lane 12A of an optical fiber receive module ROSA . . .") (Google Patents machine translation).
Dependent Claim 5	
[5a] The pluggable optical transceiver module according to claim 1, further comprising two elastic components, wherein the number of the at least one limiting surface is two the main body has two first limiting surfaces and two second limiting surfaces forming the two limiting spaces together, respectively, the two first limiting surfaces are closer to the head part than the two second limiting surfaces, the two elastic components are located in the two limiting spaces, respectively, and each elastic component is between the first limiting surface and the limited part.	*See,* claim 1, *supra.* Chao further discloses the pluggable optical transceiver module **(A)** may further include two elastic components **(N)**. The number of the at least one limiting space **(E)** is two. The main body **(B)** has two first limiting surfaces **(L1)** and two second limiting surfaces **(L2)** forming the two limiting spaces **(E)** together, respectively. The two first limiting surfaces **(L1)** are closer to the head part **(M)** than the two second limiting surfaces **(L2)**. The two elastic components **(N)** are located in the two limiting spaces **(E)**, respectively, and each elastic component **(N)** is between the first limiting surface **(L1)** and the limited part **(K)**. *See* FIGS. 1–3, 5(a), 5(b); Specification at "Embodiment" (". . . as shown in the figure, . . . slide block 4A, 4B cooperate suitable spring respectively"; ". . . the elastic force effect of the spring in the flange of separating lock slide 4A, 4B . . .") (Google Patents machine translation).

Dependent Claim 6	
[6a] The pluggable optical transceiver module according to claim 1, wherein the pluggable optical transceiver module further comprises a pull handle pivoted on the linkage arm of the sliding component.	*See,* claim 1, *supra.* Chao further discloses the pluggable optical transceiver module **(A)** may further include a pull handle **(R)** pivoted on the linkage arm **(H)** of the sliding component **(G)**. *See* FIG. (6); Specification at "Embodiment" ("Preferably, the cross section of draw ring handle 34 is set to waveform, and its effect is, adhesion the XFF integrated module of optical transceiver is pulled out more in the process of rotating pulling draw ring handle 34.") (Google Patents machine translation).
Independent Claim 7	
[7a] A pluggable optical transceiver module, comprising:	*See,* [1a], *supra.*
[7b] a main body having a head part and an inserted part that are connected to each other, wherein the main body further comprises opposite two side surfaces and two sliding slots which are located at two sides of the head part and the inserted part opposite to each other, respectively, the two sliding slots are located at the two side surfaces, and the two sliding slots extend from the head part to the inserted part, respectively, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Chao discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having a head part **(M)** and an inserted part **(O)** that are connected to each other. The main body **(B)** further includes opposite two side surfaces **(C)** and two sliding slots **(D)** which are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. The two sliding slots **(D)** are located at the two side surfaces **(C)**, and the two sliding slots **(D)** extend from the head part **(M)** to the inserted part **(O)**, respectively. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)** forming the two sliding slots **(D)**, respectively. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* FIGS. 1–3, 5(a), 5(b); Specification at "The Utility Model Content" ("Implement the utility model embodiment, has following beneficial effect: . . .") (Google Patents machine translation);

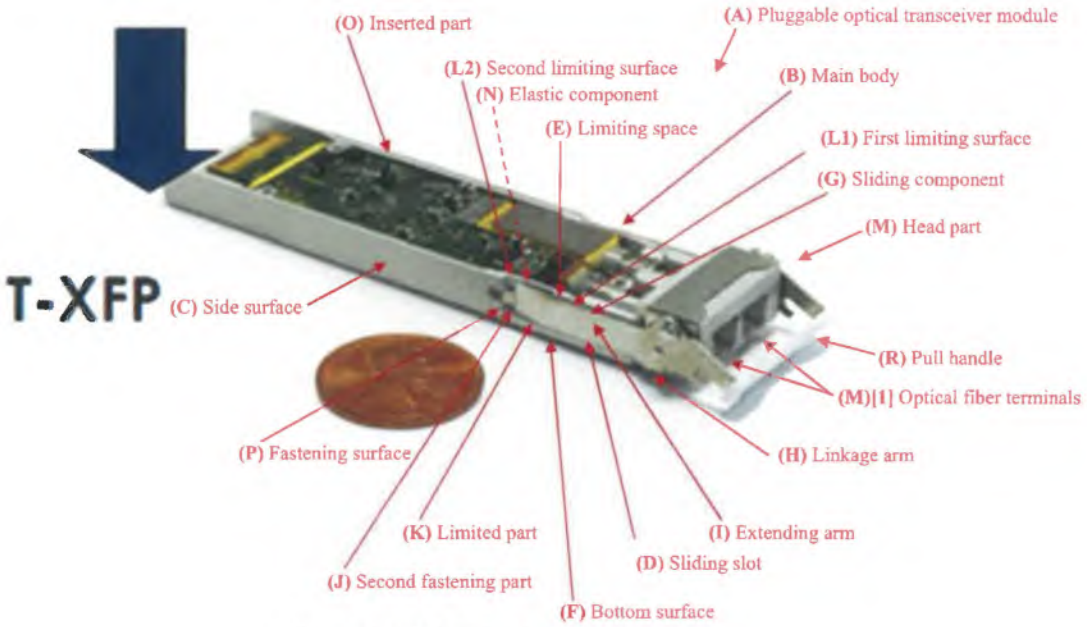
	Specification at "Embodiment" ("In conjunction with referring to FIG. 1, shown in Figure 2, . . . the boundary drives the described lock slide 4 of separating and slides in described vallecular cavity with described stopper slot."; "Referring to Fig. 3, . . . the second stopper slot 13A, 13B extend along the direction that is parallel to surface, module … 1 place and are symmetrical arranged, and the two ends of its bottom plate rabbet can be played further restriction to the slip of separating lock slide 4; Module … 1 middle part has locating flange 14A and 14B.") (Google Patents machine translation).
[7c] a sliding component comprising a linkage arm and two extending arms, wherein the linkage arm is connected between the two extending arms, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are able to slide relative to the two sliding slots to have a fastening position which is farther away from the head part and a releasing position which is closer to the head part, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	Chao discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The linkage arm **(H)** is connected between the two extending arms **(I)**. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have a fastening position, which is farther away from the head part **(M)**, and a releasing position, which is closer to the head part **(M)**. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1, 2, 5(a), 5(b), 6; Specification at "Embodiment" ("In conjunction with referring to FIG. 1, shown in Figure 2, . . . described release draw ring 3 is arranged in the described stopper slot by the rotating fixing of its rotating shaft that has, the described lock slide 4 of separating of described release draw ring 3 hinged securement, described release draw ring 3 are rotation center by described rotating shaft and are that the boundary drives the described lock slide 4 of separating and slides in described

	vallecular cavity with described stopper slot."; Shown in Fig. 5 a, Fig. 5 b, release draw ring 3 hinged securement are separated lock slide 4 . . . ; Referring to FIG. 6, release draw ring 3 is that the structural elements that lock slide 4 slides in separated in traction, . . ."") (Google Patents machine translation).
[7d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See,* [1d], *supra.*

2011 Oclaro Deck (T-XFP)



Slide 8 (2011 Oclaro Deck)



Slide 8 (2011 Oclaro Deck)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against 2011 Oclaro Deck

U.S. Patent No. 9,523,826	Disclosure in 2011 Oclaro Deck
Independent Claim 1	
[1a] A pluggable optical transceiver module, for being inserted into a plugging slot of a socket, the socket comprising two first fastening parts located in the plugging slot, the pluggable optical transceiver module comprising:	The 2011 Oclaro Deck discloses a pluggable optical transceiver module **(A)**, for being inserted into a plugging slot of a socket that includes two first fastening parts located in the plugging slot. *See* Slide 8 and XFP MSA, showing cage with first fastening parts, page 100, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf).
[1b] a main body having two side surfaces that are opposite to each other and two sliding slots located at the two side surfaces, respectively, wherein the main body is configured to be inserted into the plugging slot, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	The 2011 Oclaro Deck discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having two side surfaces **(C)** that are opposite to each other and two sliding slots **(D)** located at the two side surfaces **(C)**, respectively. The main body **(B)** is designed to be inserted into the plugging slot. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)** forming the two sliding slots **(D)**, respectively. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* Slide 8. *See, e.g.*, module depicted in XFP MSA cited above.
[1c] a sliding component comprising a linkage arm and two extending arms, wherein the two extending arms are connected to two ends of the linkage arm, respectively, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are slidably disposed on the two sliding slots to have a fastening position and a releasing position, the two first fastening parts are fastened to the two second fastening parts when the two extending arms are located	The 2011 Oclaro Deck discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The two extending arms **(I)** are connected to two ends of the linkage arm **(H)**, respectively. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are slidably disposed on the two sliding slots **(D)** to have a

at the fastening position, and the two second fastening parts press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms are located at the releasing position, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	fastening position and a releasing position. The two first fastening parts are fastened to the two second fastening parts **(J)** when the two extending arms **(I)** are located at the fastening position, and the two second fastening parts **(J)** press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms **(I)** are located at the releasing position. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* Slide 8.
[1d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	The 2011 Oclaro Deck discloses the pluggable optical transceiver module **(A)** includes an elastic component **(N)**. The main body **(B)** has a first limiting surface **(L1)** and a second limiting surface **(L2)** forming the limiting space **(E)**. The first limiting surface **(L1)** is closer to a head part **(M)** than the second limiting surface **(L2)**, and the elastic component **(N)** is located in the limiting space **(E)** and between the first limiting surface **(L1)** and the limited part **(K)** and is covered by the extending arm **(I)** such that the elastic component **(N)** is confined by the main body **(B)** and the sliding component **(G)**. *See* Slide 8.
Dependent Claim 2	
[2a] The pluggable optical transceiver module according to claim 1, wherein the main body comprises a head part and an inserted part connected to each other, the inserted part is configured to be inserted into the socket, the two side surfaces are located at two sides of the head part and the inserted part opposite to each other, respectively, wherein both the two sliding slots extend from the head part towards the inserted part, and the two extending arms are able to slide relative to the two sliding slots to have the fastening position which is farther away from	*See,* Claim 1, *supra*. The 2011 Oclaro Deck further discloses the main body **(B)** may include a head part **(M)** and an inserted part **(O)** connected to each other. The inserted part **(O)** is designed to be inserted into the socket. The two side surfaces **(C)** are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. Both of the two sliding slots **(D)** extend from the head part **(M)** towards the inserted part **(O)**, and the

the head part and the releasing position which is closer to the head part.	two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have the fastening position, which is farther away from the head part **(M)**, and the releasing position, which is closer to the head part **(M)**. *See* Slide 8.
Dependent Claim 3	
[3a] The pluggable optical transceiver module according to claim 2, wherein each second fastening part has a fastening surface, and a distance between one side of the fastening surface which is close to the side surface and the head part is less than a distance between another side of the fastening surface which is far away from the side surface and the head part.	*See,* Claim 2, *supra.* The 2011 Oclaro Deck further discloses each second fastening part **(J)** may have a fastening surface **(P)**, and a distance between one side of the fastening surface **(P)** which is close to the side surface **(C)** and the head part **(M)** is less than a distance between another side of the fastening surface **(P)** which is far away from the side surface **(C)** and the head part **(M)**. *See* Slide 8.
Dependent Claim 4	
[4a] The pluggable optical transceiver module according to claim 2, wherein the head part has at least one optical fiber terminal.	*See,* Claim 2, *supra.* The 2011 Oclaro Deck further discloses the head part **(M)** may include at least one optical fiber terminal **(M)[1]**. *See* Slide 8.
Dependent Claim 5	
[5a] The pluggable optical transceiver module according to claim 1, further comprising two elastic components, wherein the number of the at least one limiting surface is two the main body has two first limiting surfaces and two second limiting surfaces forming the two limiting spaces together, respectively, the two first limiting surfaces are closer to the head part than the two second limiting surfaces, the two elastic components are located in the two limiting spaces, respectively, and each elastic	*See,* Claim 1, *supra.* The 2011 Oclaro Deck further discloses the pluggable optical transceiver module **(A)** may further include two elastic components **(N)** (e.g., one proximate to each extending arm **(I)**). The number of the at least one limiting space **(E)** is two. The main body **(B)** has two first limiting surfaces **(L1)** and two second limiting surfaces **(L2)** forming the two limiting spaces **(E)** together, respectively. The two first limiting surfaces **(L1)**

component is between the first limiting surface and the limited part.	are closer to the head part **(M)** than the two second limiting surfaces **(L2)**. The two elastic components **(N)** are located in the two limiting spaces **(E)**, respectively, and each elastic component **(N)** is between the first limiting surface **(L1)** and the limited part **(K)**. *See* Slide 8.
Dependent Claim 6	
[6a] The pluggable optical transceiver module according to claim 1, wherein the pluggable optical transceiver module further comprises a pull handle pivoted on the linkage arm of the sliding component.	*See,* Claim 1, *supra*. The 2011 Oclaro Deck further discloses the pluggable optical transceiver module **(A)** includes a pull handle **(R)** pivoted on the linkage arm **(H)** of the sliding component **(G)**. *See* Slide 8.
Independent Claim 7	
[7a] A pluggable optical transceiver module, comprising:	*See,* [1a], *supra*.
[7b] a main body having a head part and an inserted part that are connected to each other, wherein the main body further comprises opposite two side surfaces and two sliding slots which are located at two sides of the head part and the inserted part opposite to each other, respectively, the two sliding slots are located at the two side surfaces, and the two sliding slots extend from the head part to the inserted part, respectively, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	The 2011 Oclaro Deck discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having a head part **(M)** and an inserted part **(O)** that are connected to each other. The main body **(B)** further includes opposite two side surfaces **(C)** and two sliding slots **(D)** which are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. The two sliding slots **(D)** are located at the two side surfaces **(C)**, and the two sliding slots **(D)** extend from the head part **(M)** to the inserted part **(O)**, respectively. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)** forming the two sliding slots **(D)**, respectively. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* Slide 8.
[7c] a sliding component comprising a linkage arm and two extending arms, wherein the linkage arm is connected between	The 2011 Oclaro Deck discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The

the two extending arms, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are able to slide relative to the two sliding slots to have a fastening position which is farther away from the head part and a releasing position which is closer to the head part, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The linkage arm **(H)** is connected between the two extending arms **(I)**. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have a fastening position, which is farther away from the head part **(M)**, and a releasing position, which is closer to the head part **(M)**. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* Slide 8.
[7d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See,* [1d], *supra*.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against U.S. Patent Pub. No. 2011/0081114 A1 ("Togami")

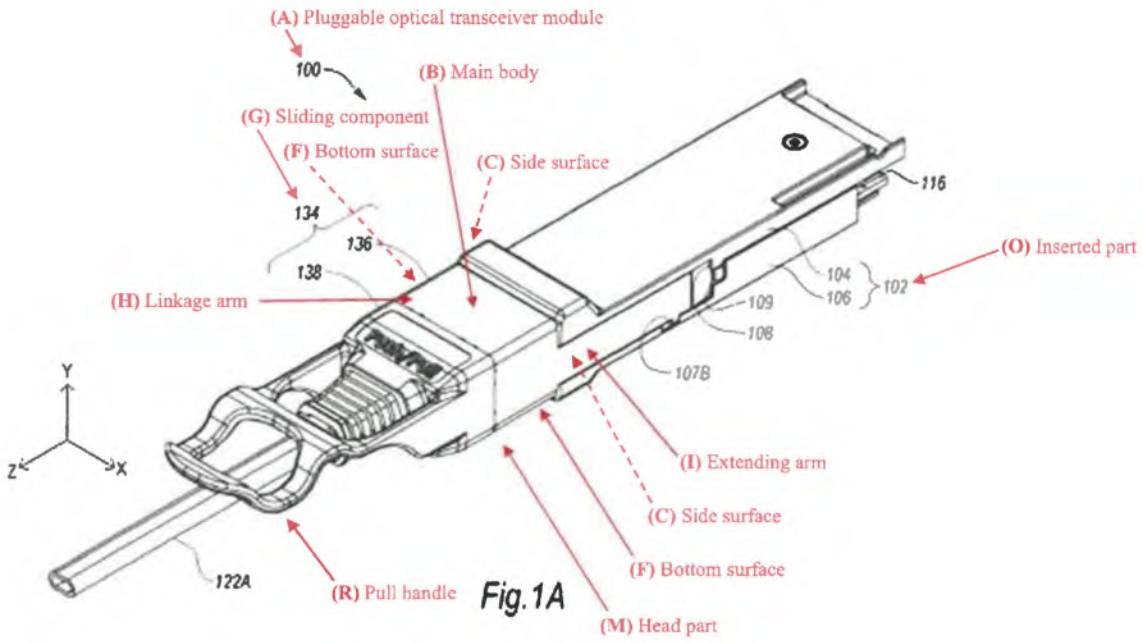


FIG. 1A (Togami)

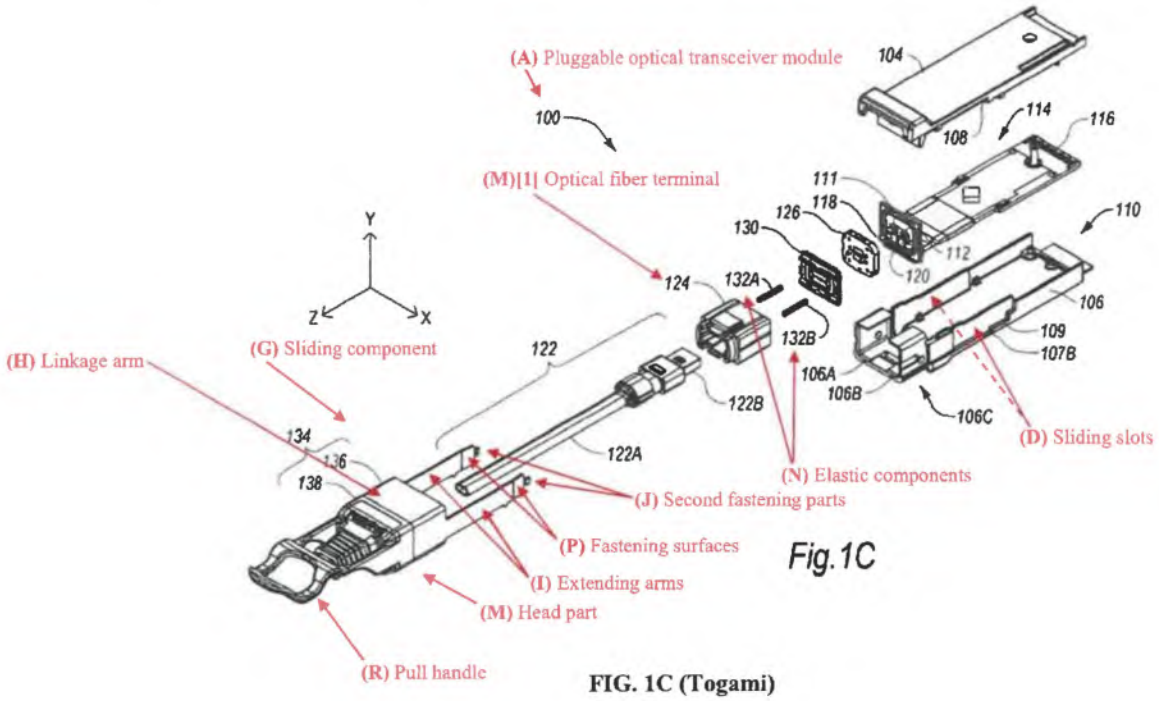


FIG. 1C (Togami)

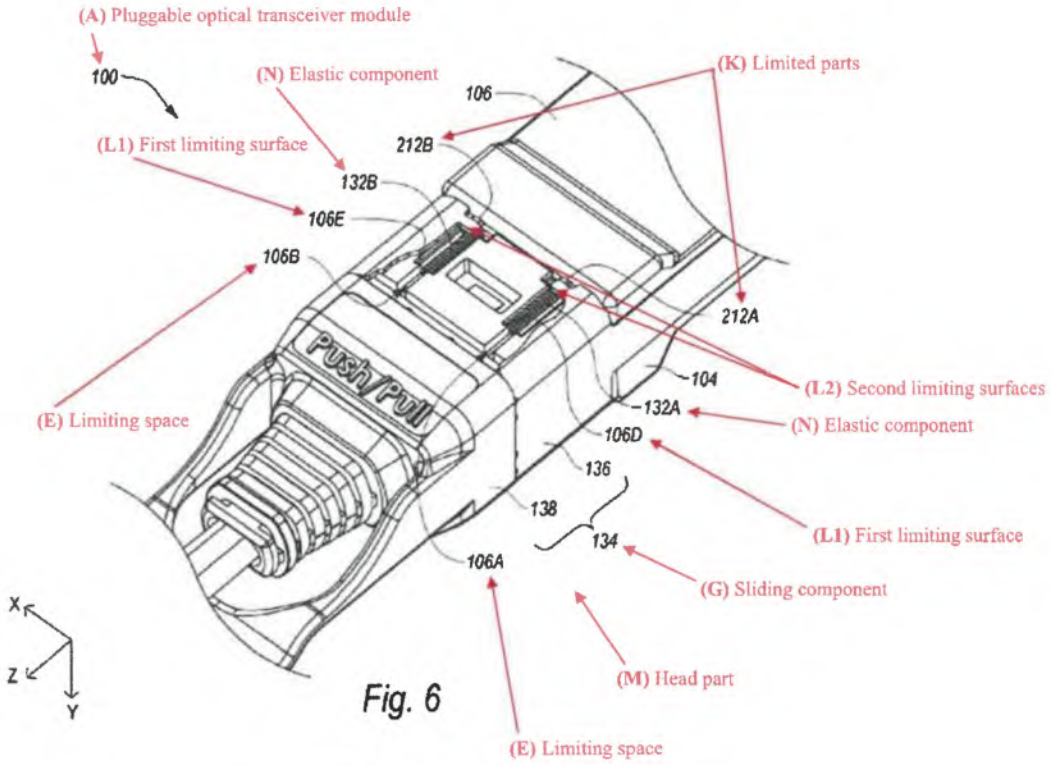

(A) Pluggable optical transceiver module
100
(N) Elastic component
(K) Limited parts
106
(L1) First limiting surface
212B
132B
106E
106B
212A
Push/Pull
104
(L2) Second limiting surfaces
132A
(N) Elastic component
(E) Limiting space
106D
136
138
134
(L1) First limiting surface
106A
(G) Sliding component
(M) Head part
(E) Limiting space
X
Z
Y
Fig. 6

FIG. 6 (Togami)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against U.S. Patent Pub. No. 2011/0081114 A1 ("Togami")

U.S. Patent No. 9,523,826	Disclosure in Togami
Independent Claim 1	
[1a] A pluggable optical transceiver module, for being inserted into a plugging slot of a socket, the socket comprising two first fastening parts located in the plugging slot, the pluggable optical transceiver module comprising:	Togami discloses a pluggable optical transceiver module **(A)**, for being inserted into a plugging slot of a socket that includes two first fastening parts located in the plugging slot. *See* FIGS. 1A, 1C, 6; paras. [0031]–[0033], [0037].
[1b] a main body having two side surfaces that are opposite to each other and two sliding slots located at the two side surfaces, respectively, wherein the main body is configured to be inserted into the plugging slot, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Togami discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having two side surfaces **(C)** that are opposite to each other and two sliding slots **(D)** located at the two side surfaces **(C)**, respectively. The main body **(B)** is designed to be inserted into the plugging slot. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. It would have been obvious to one of skill in the art to relocate the at least one limiting space **(E)** to one of the two side surfaces **(C)** such that each sliding slot **(D)** was formed from the at least one limiting space **(E)** and one of the two bottom surfaces **(F)**. *See* FIGS. 1A, 1C, 6; paras. [0031]–[0033], [0037], [0039], [0045].
[1c] a sliding component comprising a linkage arm and two extending arms, wherein the two extending arms are connected to two ends of the linkage arm, respectively, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are slidably disposed on the two sliding slots to have a fastening position and a releasing position, the two first fastening parts are fastened to the two second fastening parts when the two extending arms are located at the fastening position, and the two second fastening parts	Togami discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The two extending arms **(I)** are connected to two ends of the linkage arm **(H)**, respectively. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are slidably disposed on the two sliding slots **(D)** to have a fastening position and a releasing position. The two first fastening parts are fastened to the two

press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms are located at the releasing position, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	second fastening parts **(J)** when the two extending arms **(I)** are located at the fastening position, and the two second fastening parts **(J)** press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms **(I)** are located at the releasing position. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1A, 1C, 6; paras. [0031], [0046], [0052], [0053], [0055], [0071]–[0075].
[1d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See*, [1b], supra. Togami discloses the pluggable optical transceiver module **(A)** includes an elastic component **(N)**. The main body **(B)** has a first limiting surface **(L1)** and a second limiting surface **(L2)** forming the limiting space **(E)**. The first limiting surface **(L1)** is closer to a head part **(M)** than the second limiting surface **(L2)**, and the elastic component **(N)** is located in the limiting space **(E)** and between the first limiting surface **(L1)** and the limited part **(K)**. It would have been obvious to one of skill in the art to relocate the limiting space **(E)** in which the elastic component **(N)** is located in order for the extending arm **(I)** to cover the elastic component **(N)** such that the elastic component **(N)** would be confined by the main body **(B)** and the sliding component **(G)**. *See* FIGS. 1A, 1C, 6; paras. [0031]–[0033], [0037], [0039], [0045], [0073].
Dependent Claim 2	
[2a] The pluggable optical transceiver module according to claim 1, wherein the main body comprises a head part and an inserted part connected to each other, the inserted part is	*See,* claim 1, *supra.*

configured to be inserted into the socket, the two side surfaces are located at two sides of the head part and the inserted part opposite to each other, respectively, wherein both the two sliding slots extend from the head part towards the inserted part, and the two extending arms are able to slide relative to the two sliding slots to have the fastening position which is farther away from the head part and the releasing position which is closer to the head part.	Togami further discloses the main body **(B)** includes a head part **(M)** and an inserted part **(O)** connected to each other. The inserted part **(O)** is designed to be inserted into the socket. The two side surfaces **(C)** are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. Both of the two sliding slots **(D)** extend from the head part **(M)** towards the inserted part **(O)**, and the two extending arms **(I)** are able to slide relatively to the two sliding slots **(D)** to have the fastening position, which is farther away from the head part **(M)**, and the releasing position, which is closer to the head part **(M)**. *See* FIGS. 1A, 1C, 6; paras. [0046], [0073]–[0075].
Dependent Claim 3	
[3a] The pluggable optical transceiver module according to claim 2, wherein each second fastening part has a fastening surface, and a distance between one side of the fastening surface which is close to the side surface and the head part is less than a distance between another side of the fastening surface which is far away from the side surface and the head part.	*See,* claim 2, *supra.* Togami further discloses each second fastening part **(J)** has a fastening surface **(P)**, and a distance between one side of the fastening surface **(P)** which is close to the side surface **(C)** and the head part **(M)** is less than a distance between another side of the fastening surface **(P)** which is far away from the side surface **(C)** and the head part **(M)**. *See* FIGS. 1A, 1C; paras. [0031], [0052]–[0054].
Dependent Claim 4	
[4a] The pluggable optical transceiver module according to claim 2, wherein the head part has at least one optical fiber terminal.	*See,* claim 2, *supra.* Togami further discloses the head part **(M)** includes at least one optical fiber terminal **(M)[1]**. *See* FIG. 1C; para. [0044].
Dependent Claim 5	

[5a] The pluggable optical transceiver module according to claim 1, further comprising two elastic components, wherein the number of the at least one limiting surface is two the main body has two first limiting surfaces and two second limiting surfaces forming the two limiting spaces together, respectively, the two first limiting surfaces are closer to the head part than the two second limiting surfaces, the two elastic components are located in the two limiting spaces, respectively, and each elastic component is between the first limiting surface and the limited part.	*See,* claim 1, *supra.* Togami further discloses the pluggable optical transceiver module **(A)** further includes two elastic components **(N)**. The number of the at least one limiting space **(E)** is two. The main body **(B)** has two first limiting surfaces **(L1)** and two second limiting surfaces **(L2)** forming the two limiting spaces **(E)** together, respectively. The two first limiting surfaces **(L1)** are closer to the head part **(M)** than the two second limiting surfaces **(L2)**. The two elastic components **(N)** are located in the two limiting spaces **(E)**, respectively, and each elastic component **(N)** is between the first limiting surface **(L1)** and the limited part **(K)**. *See* FIGS. 1A, 1C, 6; paras. [0031]–[0033], [0037], [0039], [0045], [0073].
Dependent Claim 6	
[6a] The pluggable optical transceiver module according to claim 1, wherein the pluggable optical transceiver module further comprises a pull handle pivoted on the linkage arm of the sliding component.	*See,* claim 1, *supra.* Togami further discloses the pluggable optical transceiver module **(A)** further includes a pull handle **(R)** pivoted on the linkage arm **(H)** of the sliding component **(G)**. *See* FIGS. 1A, 1C; para. [0032].
Independent Claim 7	
[7a] A pluggable optical transceiver module, comprising:	*See,* [1a], *supra.*
[7b] a main body having a head part and an inserted part that are connected to each other, wherein the main body further comprises opposite two side surfaces and two sliding slots which are located at two sides of the head part and the inserted part opposite to each other, respectively, the two sliding slots are	Togami discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having a head part **(M)** and an inserted part **(O)** that are connected to each other. The main body **(B)** further includes opposite two side surfaces **(C)** and two sliding slots **(D)** which are located at two sides of the head part **(M)** and

located at the two side surfaces, and the two sliding slots extend from the head part to the inserted part, respectively, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	the inserted part **(O)** opposite to each other, respectively. The two sliding slots **(D)** are located at the two side surfaces **(C)**, and the two sliding slots **(D)** extend from the head part **(M)** to the inserted part **(O)**, respectively. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. It would have been obvious to one of skill in the art to relocate the at least one limiting space **(E)** to one of the two side surfaces **(C)** such that each sliding slot **(D)** was formed from the at least one limiting space **(E)** and one of the two bottom surfaces **(F)**. *See* FIGS. 1A, 1C, 6; paras. [0031]–[0033], [0037], [0039], [0045], [0046], [0073]–[0075].
[7c] a sliding component comprising a linkage arm and two extending arms, wherein the linkage arm is connected between the two extending arms, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are able to slide relative to the two sliding slots to have a fastening position which is farther away from the head part and a releasing position which is closer to the head part, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	Togami discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The linkage arm **(H)** is connected between the two extending arms **(I)**. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have a fastening position, which is farther away from the head part **(M)**, and a releasing position, which is closer to the head part **(M)**. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1A, 1C, 6; paras. [0031], [0032], [0046], [0052], [0053], [0055], [0071]–[0075].
[7d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part	*See,* [1d], *supra.*

than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	

IPR2025-00434, Ex. 2002

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against U.S. Patent Pub. No. 2011/0081114 A1 ("Togami") in View of U.S. Patent No. 7,201,520 ("Mizue")

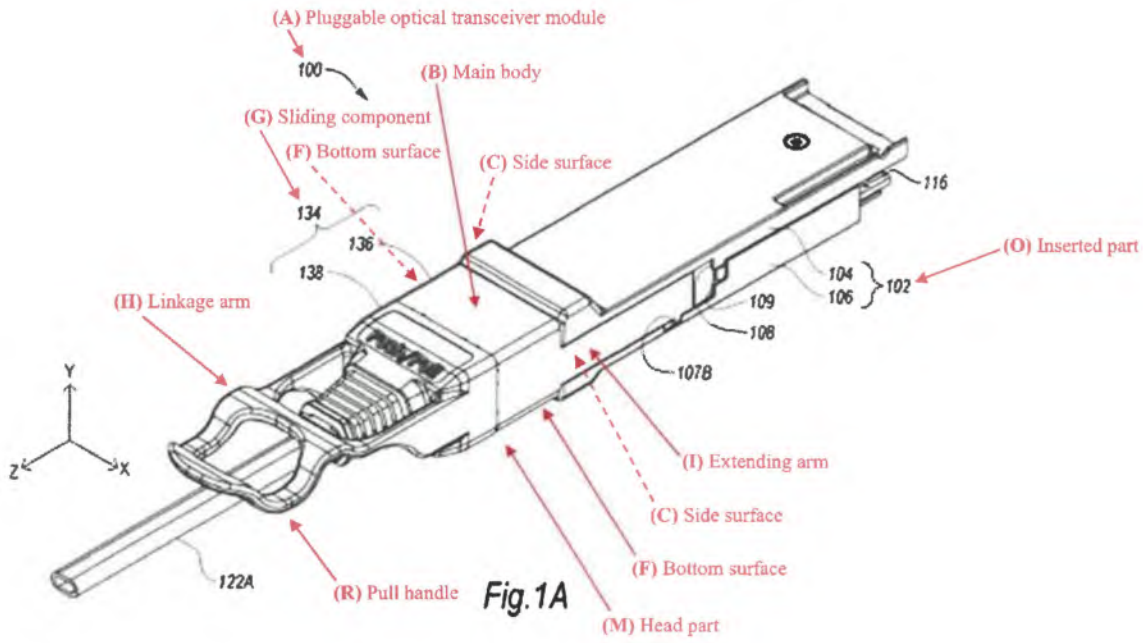


FIG. 1A (Togami)

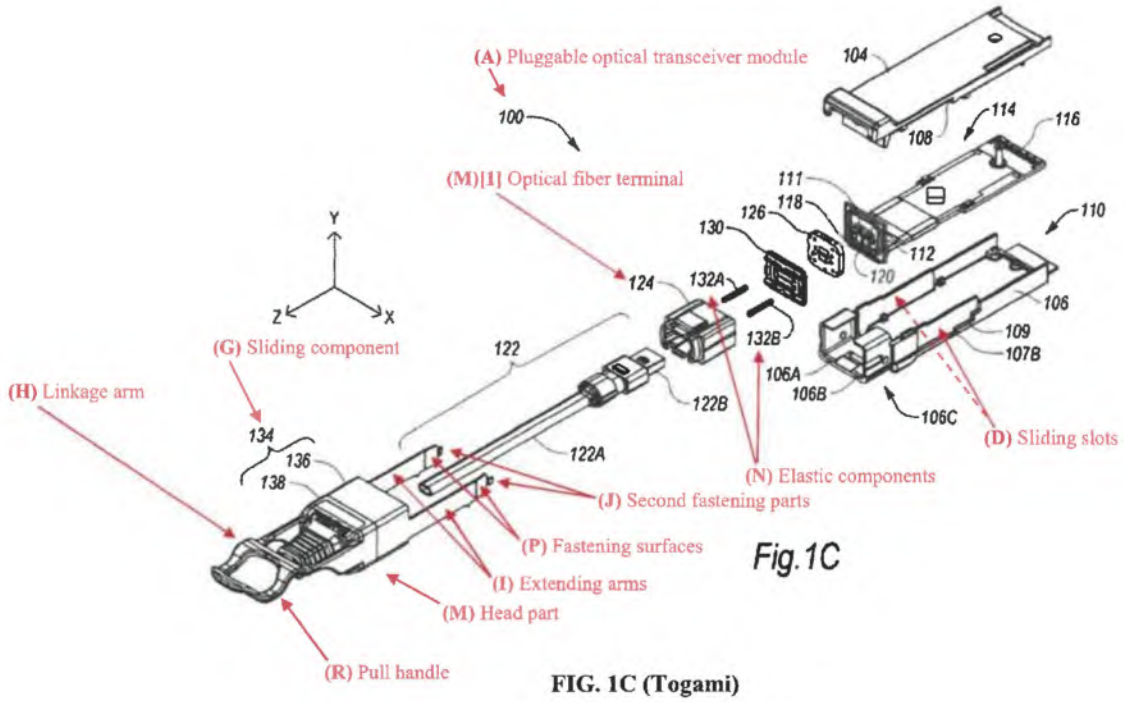


Fig.1C

FIG. 1C (Togami)

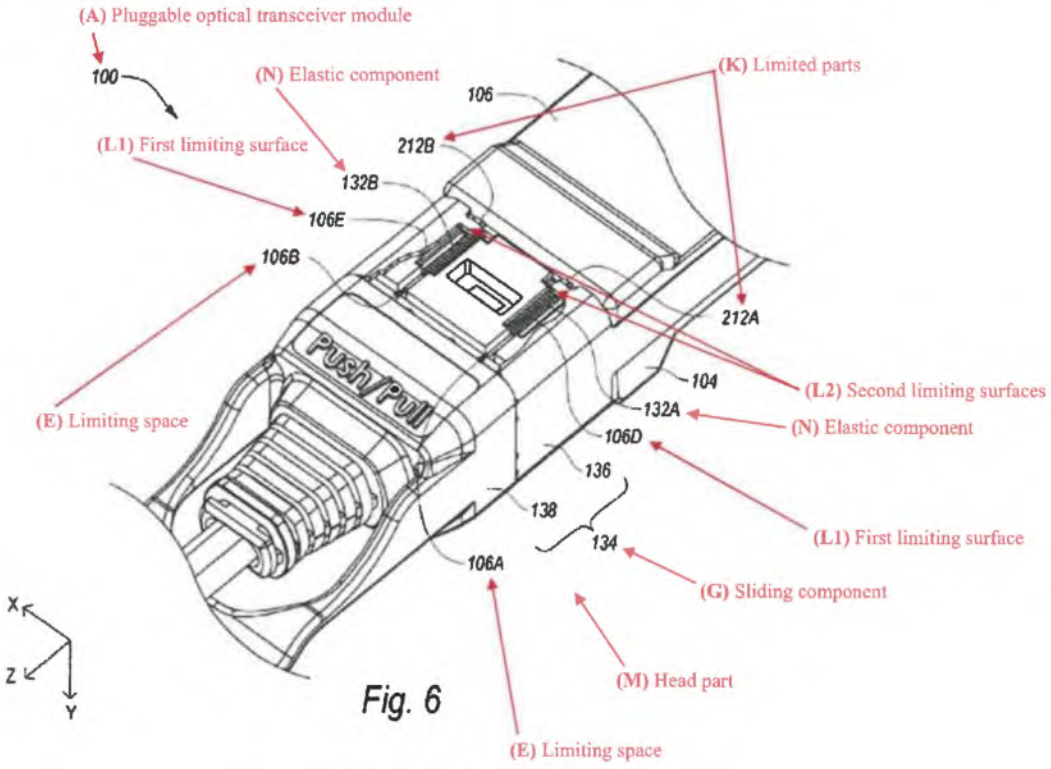


Fig. 6

FIG. 6 (Togami)

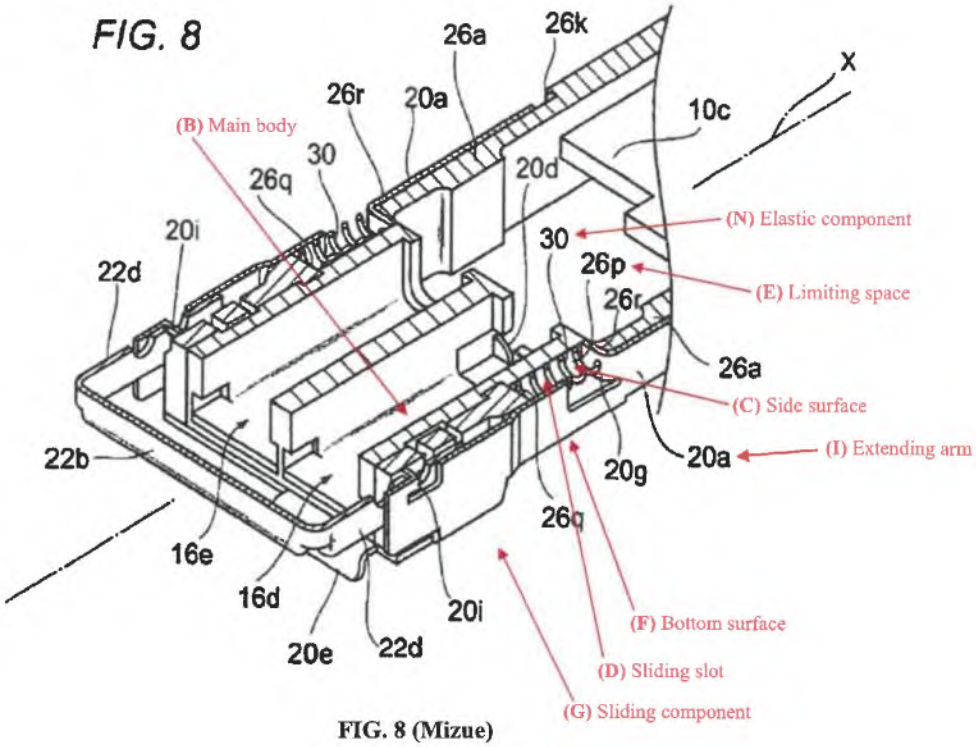

FIG. 8
26a
26k
X
26r
20a
10c
(B) Main body
30
26q
20d
20i
(N) Elastic component
30
22d
26p
(E) Limiting space
26r
26a
(C) Side surface
22b
20a
(I) Extending arm
20g
26q
16e
16d
20i
(F) Bottom surface
20e
22d
(D) Sliding slot
(G) Sliding component

FIG. 8 (Mizue)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against U.S. Patent Pub. No. 2011/0081114 A1 ("Togami") in View of U.S. Patent No. 7,201,520 ("Mizue")

U.S. Patent No. 9,523,826	Disclosure in Togami and Mizue
Independent Claim 1	
[1a] A pluggable optical transceiver module, for being inserted into a plugging slot of a socket, the socket comprising two first fastening parts located in the plugging slot, the pluggable optical transceiver module comprising:	Togami discloses a pluggable optical transceiver module **(A)**, for being inserted into a plugging slot of a socket that includes two first fastening parts located in the plugging slot. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031]–[0033], [0037].
[1b] a main body having two side surfaces that are opposite to each other and two sliding slots located at the two side surfaces, respectively, wherein the main body is configured to be inserted into the plugging slot, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Togami discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having two side surfaces **(C)** that are opposite to each other and two sliding slots **(D)** located at the two side surfaces **(C)**, respectively. The main body **(B)** is designed to be inserted into the plugging slot. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. Mizue further discloses, and it would have been obvious to one of skill in the art, to locate the at least one limiting space **(E)** at one of the two side surfaces **(C)** such that each sliding slot **(D)** is formed from the at least one limiting space **(E)** and one of the two bottom surfaces **(F)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031]–[0033], [0037], [0039], [0045]; *see also* Mizue, FIG. 8; Mizue, Col. 7, lines 27–37.
[1c] a sliding component comprising a linkage arm and two extending arms, wherein the two extending arms are connected to two ends of the linkage arm, respectively, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are slidably disposed on the two sliding slots to have a fastening position and a releasing position, the two first fastening parts are fastened to the two second fastening parts when the two extending arms are located	Togami discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The two extending arms **(I)** are connected to two ends of the linkage arm **(H)**, respectively. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are slidably disposed on the two sliding slots **(D)** to have a fastening position and a releasing

at the fastening position, and the two second fastening parts press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms are located at the releasing position, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	position. The two first fastening parts are fastened to the two second fastening parts **(J)** when the two extending arms **(I)** are located at the fastening position, and the two second fastening parts **(J)** press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms **(I)** are located at the releasing position. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031], [0046], [0052], [0053], [0055], [0071]–[0075].
[1d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See*, [1b], supra. Togami discloses the pluggable optical transceiver module **(A)** includes an elastic component **(N)**. The main body **(B)** has a first limiting surface **(L1)** and a second limiting surface **(L2)** forming the limiting space **(E)**. The first limiting surface **(L1)** is closer to a head part **(M)** than the second limiting surface **(L2)**, and the elastic component **(N)** is located in the limiting space **(E)** and between the first limiting surface **(L1)** and the limited part **(K)**. Mizue further discloses, and it would have been obvious to one of skill in the art, to locate the limiting space **(E)** in which the elastic component **(N)** is located in order for the extending arm **(I)** to cover the elastic component **(N)** such that the elastic component **(N)** is confined by the main body **(B)** and the sliding component **(G)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031]–[0033], [0037], [0039], [0045], [0073]; *see also* Mizue, FIG. 8; Col. 7, lines 14–47.
Dependent Claim 2	

[2a] The pluggable optical transceiver module according to claim 1, wherein the main body comprises a head part and an inserted part connected to each other, the inserted part is configured to be inserted into the socket, the two side surfaces are located at two sides of the head part and the inserted part opposite to each other, respectively, wherein both the two sliding slots extend from the head part towards the inserted part, and the two extending arms are able to slide relative to the two sliding slots to have the fastening position which is farther away from the head part and the releasing position which is closer to the head part.	*See,* claim 1, *supra.* Togami further discloses the main body **(B)** includes a head part **(M)** and an inserted part **(O)** connected to each other. The inserted part **(O)** is designed to be inserted into the socket. The two side surfaces **(C)** are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. Both of the two sliding slots **(D)** extend from the head part **(M)** towards the inserted part **(O)**, and the two extending arms **(I)** are able to slide relatively to the two sliding slots **(D)** to have the fastening position, which is farther away from the head part **(M)**, and the releasing position, which is closer to the head part **(M)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0046], [0073]–[0075].
Dependent Claim 3	
[3a] The pluggable optical transceiver module according to claim 2, wherein each second fastening part has a fastening surface, and a distance between one side of the fastening surface which is close to the side surface and the head part is less than a distance between another side of the fastening surface which is far away from the side surface and the head part.	*See,* claim 2, *supra.* Togami further discloses each second fastening part **(J)** has a fastening surface **(P)**, and a distance between one side of the fastening surface **(P)** which is close to the side surface **(C)** and the head part **(M)** is less than a distance between another side of the fastening surface **(P)** which is far away from the side surface **(C)** and the head part **(M)**. *See* Togami, FIGS. 1A, 1C; Togami, paras. [0031], [0052]–[0054].
Dependent Claim 4	
[4a] The pluggable optical transceiver module according to claim 2, wherein the head part has at least one optical fiber terminal.	*See,* claim 2, *supra.*

	Togami further discloses the head part **(M)** includes at least one optical fiber terminal **(M)[1]**. *See* Togami, FIG. 1C; Togami, para. [0044].
Dependent Claim 5	
[5a] The pluggable optical transceiver module according to claim 1, further comprising two elastic components, wherein the number of the at least one limiting surface is two the main body has two first limiting surfaces and two second limiting surfaces forming the two limiting spaces together, respectively, the two first limiting surfaces are closer to the head part than the two second limiting surfaces, the two elastic components are located in the two limiting spaces, respectively, and each elastic component is between the first limiting surface and the limited part.	*See,* claim 1, *supra.* Togami further discloses the pluggable optical transceiver module **(A)** further includes two elastic components **(N)**. The number of the at least one limiting space **(E)** is two. The main body **(B)** has two first limiting surfaces **(L1)** and two second limiting surfaces **(L2)** forming the two limiting spaces **(E)** together, respectively. The two first limiting surfaces **(L1)** are closer to the head part **(M)** than the two second limiting surfaces **(L2)**. The two elastic components **(N)** are located in the two limiting spaces **(E)**, respectively, and each elastic component **(N)** is between the first limiting surface **(L1)** and the limited part **(K)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031]–[0033], [0037], [0039], [0045], [0073].
Dependent Claim 6	
[6a] The pluggable optical transceiver module according to claim 1, wherein the pluggable optical transceiver module further comprises a pull handle pivoted on the linkage arm of the sliding component.	*See,* claim 1, *supra.* Togami further discloses the pluggable optical transceiver module **(A)** further includes a pull handle **(R)** pivoted on the linkage arm **(H)** of the sliding component **(G)**. *See* Togami, FIGS. 1A, 1C; Togami, para. [0032].
Independent Claim 7	
[7a] A pluggable optical transceiver module, comprising:	*See,* [1a], *supra.*

[7b] a main body having a head part and an inserted part that are connected to each other, wherein the main body further comprises opposite two side surfaces and two sliding slots which are located at two sides of the head part and the inserted part opposite to each other, respectively, the two sliding slots are located at the two side surfaces, and the two sliding slots extend from the head part to the inserted part, respectively, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Togami discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having a head part **(M)** and an inserted part **(O)** that are connected to each other. The main body **(B)** further includes opposite two side surfaces **(C)** and two sliding slots **(D)** which are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. The two sliding slots **(D)** are located at the two side surfaces **(C)**, and the two sliding slots **(D)** extend from the head part **(M)** to the inserted part **(O)**, respectively. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. Mizue further discloses, and it would have been obvious to one of skill in the art, to locate the at least one limiting space **(E)** at one of the two side surfaces **(C)** such that each sliding slot **(D)** is formed from the at least one limiting space **(E)** and one of the two bottom surfaces **(F)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031]–[0033], [0037], [0039], [0045], [0046], [0073]–[0075]; *see also* Mizue, FIG. 8; Mizue, Col. 7, lines 27–37.
[7c] a sliding component comprising a linkage arm and two extending arms, wherein the linkage arm is connected between the two extending arms, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are able to slide relative to the two sliding slots to have a fastening position which is farther away from the head part and a releasing position which is closer to the head part, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	Togami discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The linkage arm **(H)** is connected between the two extending arms **(I)**. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have a fastening position, which is farther away from the head part **(M)**, and a releasing position, which is closer to the head part **(M)**. Each extending arm **(I)** has a limited part **(K)**

	designed to move in the limiting space **(E)**. *See* Togami, FIGS. 1A, 1C, 6; Togami, paras. [0031], [0032], [0046], [0052], [0053], [0055], [0071]–[0075].
[7d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See,* [1d], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against JP Patent Pub. No. 2014-92604 ("Hiroyoshi")

Japanese Patent Pub. No. 2014-92604

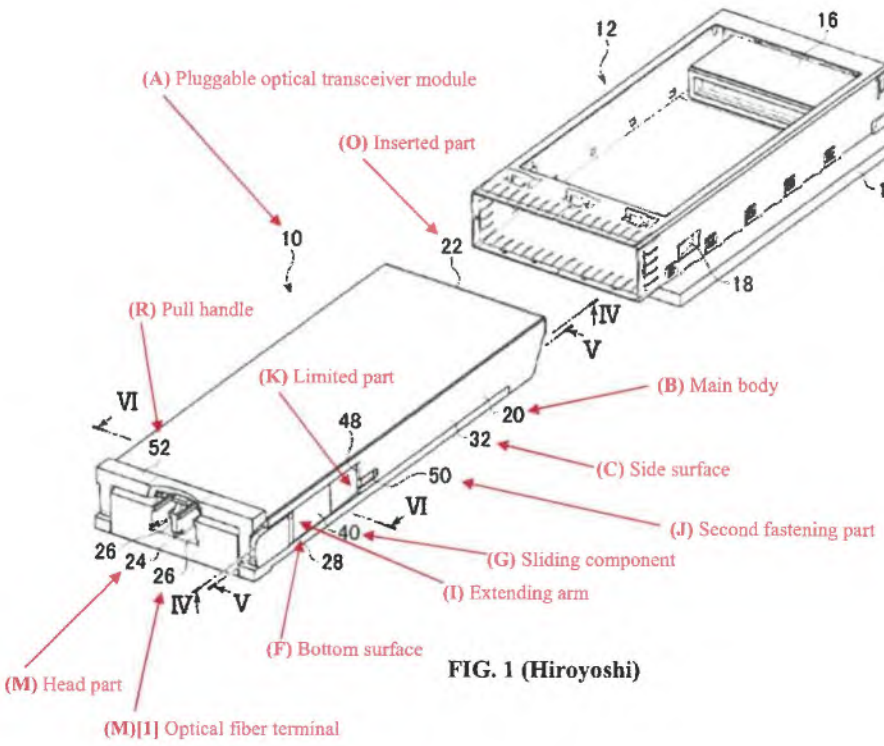


FIG. 1 (Hiroyoshi)

[FIG.2]

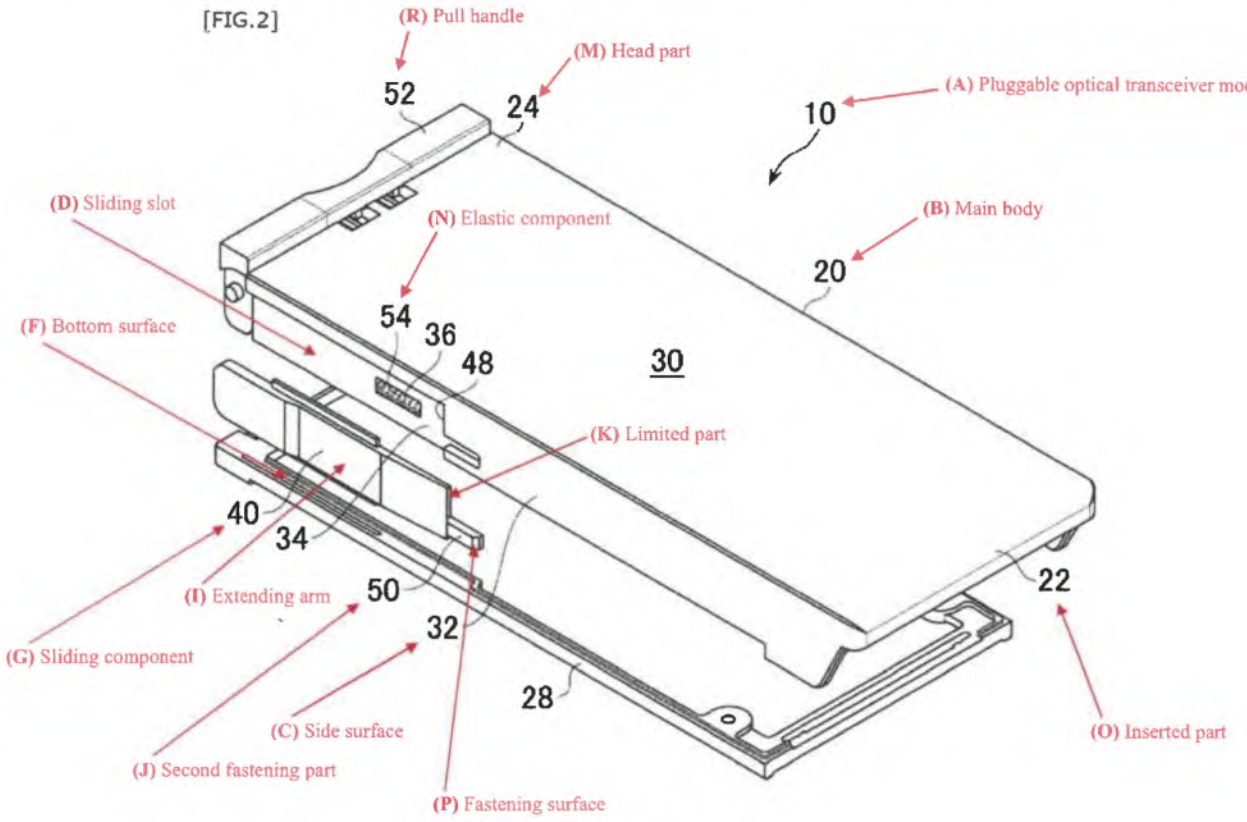


FIG. 2 (Hiroyoshi)

[FIG.4]

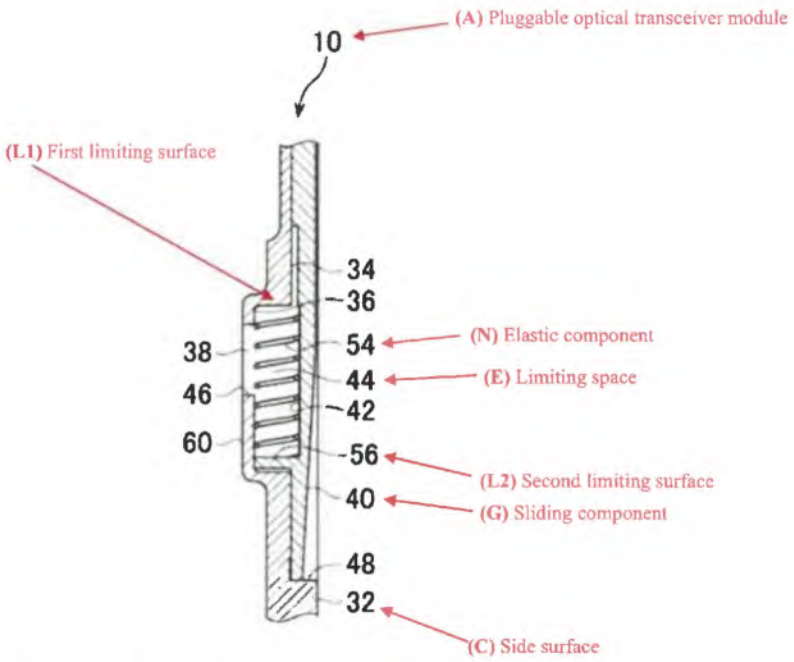


FIG. 4 (Hiroyoshi)

[FIG.7]

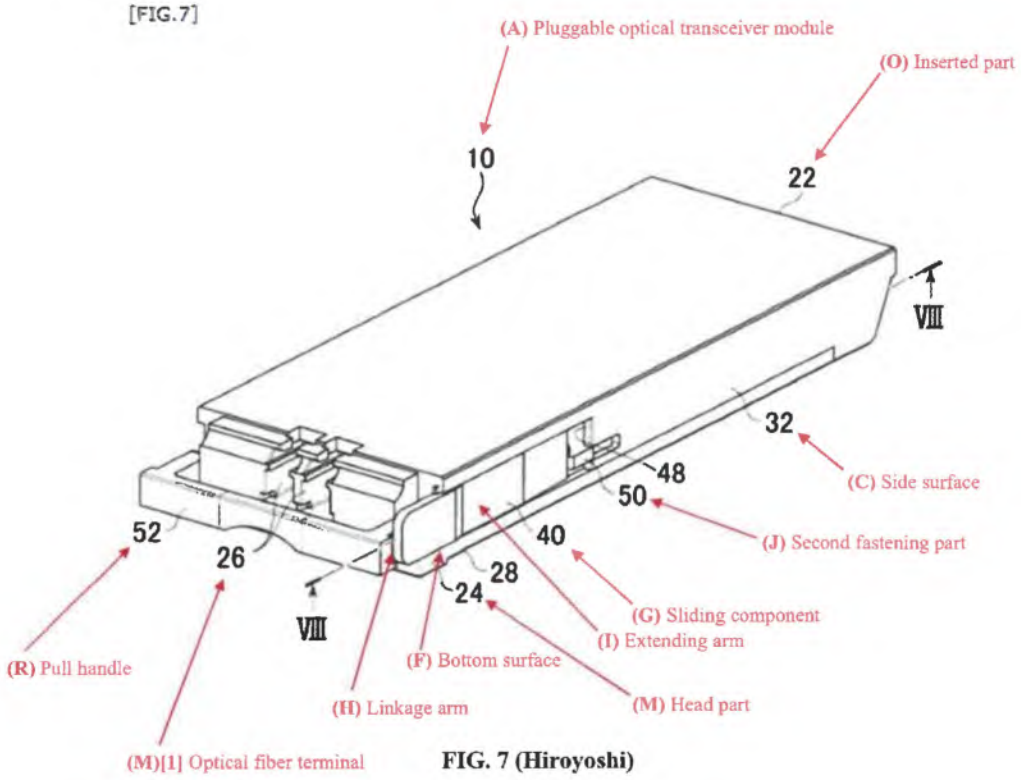


FIG. 7 (Hiroyoshi)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,523,826 Against JP Patent Pub. No. 2014-92604 ("Hiroyoshi")

U.S. Patent No. 9,523,826	Disclosure in Hiroyoshi
Independent Claim 1	
[1a] A pluggable optical transceiver module, for being inserted into a plugging slot of a socket, the socket comprising two first fastening parts located in the plugging slot, the pluggable optical transceiver module comprising:	Hiroyoshi discloses a pluggable optical transceiver module **(A)**, for being inserted into a plugging slot of a socket that includes two first fastening parts located in the plugging slot. *See* FIG. 1; paras. [0027], [0028] (JPO machine translation).
[1b] a main body having two side surfaces that are opposite to each other and two sliding slots located at the two side surfaces, respectively, wherein the main body is configured to be inserted into the plugging slot, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	Hiroyoshi discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having two side surfaces **(C)** that are opposite to each other and two sliding slots **(D)** located at the two side surfaces **(C)**, respectively. The main body **(B)** is designed to be inserted into the plugging slot. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The at least one limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* FIGS. 1, 2, 4; paras. [0008]–[0011], [0028], [0031], [0032], [0034]–[0037] (JPO machine translation)
[1c] a sliding component comprising a linkage arm and two extending arms, wherein the two extending arms are connected to two ends of the linkage arm, respectively, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are slidably disposed on the two sliding slots to have a fastening position and a releasing position, the two first fastening parts are fastened to the two second fastening parts when the two extending arms are located at the fastening position, and the two second fastening parts press the two first fastening parts, respectively, to make the two	Hiroyoshi discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The two extending arms **(I)** are connected to two ends of the linkage arm **(H)**, respectively. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are slidably disposed on the two sliding slots **(D)** to have a fastening position and a releasing position. The two first fastening parts are fastened to the two second fastening parts **(J)** when the two extending arms **(I)** are located at the fastening position, and the two second fastening

first fastening parts be farther away from each other when the two extending arms are located at the releasing position, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	parts **(J)** press the two first fastening parts, respectively, to make the two first fastening parts be farther away from each other when the two extending arms **(I)** are located at the releasing position. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1, 2, 4, 7; paras. [0008]–[0011], [0031]–[0035] (JPO machine translation).
[1d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See*, [1b], supra. Hiroyoshi discloses the pluggable optical transceiver module **(A)** includes an elastic component **(N)**. The main body **(B)** has a first limiting surface **(L1)** and a second limiting surface **(L2)** forming the limiting space **(E)**. The first limiting surface **(L1)** is closer to a head part **(M)** than the second limiting surface **(L2)**, and the elastic component **(N)** is located in the limiting space **(E)** and between the first limiting surface **(L1)** and the limited part **(K)**. The limiting space **(E)** is covered by the extending arm **(I)** such that the elastic component **(N)** is confined by the main body **(B)** and the sliding component **(G)**. *See* FIGS. 2, 4; paras. [0034]–[0039] (JPO machine translation).
Dependent Claim 2	
[2a] The pluggable optical transceiver module according to claim 1, wherein the main body comprises a head part and an inserted part connected to each other, the inserted part is configured to be inserted into the socket, the two side surfaces are located at two sides of the head part and the inserted part opposite to each other, respectively, wherein both the two sliding slots extend from the head part towards the inserted part, and the two extending arms are able to slide relative to the two sliding	*See,* claim 1, *supra.* Hiroyoshi further discloses the main body **(B)** includes a head part **(M)** and an inserted part **(O)** connected to each other. The inserted part **(O)** is designed to be inserted into the socket. The two side surfaces **(C)** are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. Both of the two sliding slots **(D)** extend from the

slots to have the fastening position which is farther away from the head part and the releasing position which is closer to the head part.	head part **(M)** towards the inserted part **(O)**, and the two extending arms **(I)** are able to slide relatively to the two sliding slots **(D)** to have the fastening position, which is farther away from the head part **(M)**, and the releasing position, which is closer to the head part **(M)**. *See* FIGS. 1, 2, 7; paras. [0008]–[0011], [0031]–[0035], [0038] (JPO machine translation).
Dependent Claim 3	
[3a] The pluggable optical transceiver module according to claim 2, wherein each second fastening part has a fastening surface, and a distance between one side of the fastening surface which is close to the side surface and the head part is less than a distance between another side of the fastening surface which is far away from the side surface and the head part.	*See,* claim 2, *supra.* Hiroyoshi further discloses each second fastening part **(J)** has a fastening surface **(P)**, and a distance between one side of the fastening surface **(P)** which is close to the side surface **(C)** and the head part **(M)** is less than a distance between another side of the fastening surface **(P)** which is far away from the side surface **(C)** and the head part **(M)**. *See* FIGS. 1, 2, 4, 7; paras. [0008]–[0011], [0031]–[0035] (JPO machine translation).
Dependent Claim 4	
[4a] The pluggable optical transceiver module according to claim 2, wherein the head part has at least one optical fiber terminal.	*See,* claim 2, *supra.* Hiroyoshi further discloses the head part **(M)** includes at least one optical fiber terminal **(M)[1]**. *See* FIGS. 2, 7; paras. [0028], [0038] (JPO machine translation).
Dependent Claim 5	
[5a] The pluggable optical transceiver module according to claim 1, further comprising two elastic components, wherein the number of the at least one limiting surface is two the main body has two first limiting surfaces and two second limiting surfaces forming the two limiting spaces together, respectively, the two	*See,* claim 1, *supra.* Hiroyoshi further discloses (see FIG. 3), the pluggable optical transceiver module **(A)** further includes two elastic components **(N)** and the number of the at least one limiting space **(E)** is two.

first limiting surfaces are closer to the head part than the two second limiting surfaces, the two elastic components are located in the two limiting spaces, respectively, and each elastic component is between the first limiting surface and the limited part.	The main body **(B)** has two first limiting surfaces **(L1)** and two second limiting surfaces **(L2)** forming the two limiting spaces **(E)** together, respectively. The two first limiting surfaces **(L1)** are closer to the head part **(M)** than the two second limiting surfaces **(L2)**. The two elastic components **(N)** are located in the two limiting spaces **(E)**, respectively, and each elastic component **(N)** is located between the first limiting surface **(L1)** and the limited part **(K)**. *See* FIGS. 2-4; paras. [0034]–[0039] (JPO machine translation).
Dependent Claim 6	
[6a] The pluggable optical transceiver module according to claim 1, wherein the pluggable optical transceiver module further comprises a pull handle pivoted on the linkage arm of the sliding component.	*See,* claim 1, *supra.* Hiroyoshi further discloses the pluggable optical transceiver module **(A)** further includes a pull handle **(R)** pivoted on the linkage arm **(H)** of the sliding component **(G)**. *See* FIGS. 1, 2, 7; para. [0033] (JPO machine translation).
Independent Claim 7	
[7a] A pluggable optical transceiver module, comprising:	*See,* [1a], *supra.*
[7b] a main body having a head part and an inserted part that are connected to each other, wherein the main body further comprises opposite two side surfaces and two sliding slots which are located at two sides of the head part and the inserted part opposite to each other, respectively, the two sliding slots are located at the two side surfaces, and the two sliding slots extend from the head part to the inserted part, respectively, wherein the main body has at least one limiting space and two bottom surfaces forming the two sliding slots, respectively, the two	Hiroyoshi discloses the pluggable optical transceiver module **(A)** includes a main body **(B)** having a head part **(M)** and an inserted part **(O)** that are connected to each other. The main body **(B)** further includes opposite two side surfaces **(C)** and two sliding slots **(D)** which are located at two sides of the head part **(M)** and the inserted part **(O)** opposite to each other, respectively. The two sliding slots **(D)** are located at the two side surfaces **(C)**, and the two sliding slots **(D)** extend from the head part **(M)** to the inserted part **(O)**, respectively. The main body **(B)** has at least one limiting space **(E)** and two bottom surfaces **(F)**. The two

bottom surfaces are parallel to the two side surfaces, the at least one limiting space is located at one of the two side surfaces;	bottom surfaces **(F)** are parallel to the two side surfaces **(C)**. The at least one limiting space **(E)** is located at one of the two side surfaces **(C)**. *See* FIGS. 1, 2, 4, 7; paras. [0008]–[0011], [0028], [0031], [0032], [0034]–[0038] (JPO machine translation).
[7c] a sliding component comprising a linkage arm and two extending arms, wherein the linkage arm is connected between the two extending arms, each extending arm has a second fastening part, the main body is between the two extending arms, the two extending arms are able to slide relative to the two sliding slots to have a fastening position which is farther away from the head part and a releasing position which is closer to the head part, wherein each extending arm has a limited part configured to move in the at least one limiting space; and	Hiroyoshi discloses the pluggable optical transceiver module **(A)** includes a sliding component **(G)**. The sliding component **(G)** includes a linkage arm **(H)** and two extending arms **(I)**. The linkage arm **(H)** is connected between the two extending arms **(I)**. Each extending arm **(I)** has a second fastening part **(J)**. The main body **(B)** is between the two extending arms **(I)**. The two extending arms **(I)** are able to slide relative to the two sliding slots **(D)** to have a fastening position, which is farther away from the head part **(M)**, and a releasing position, which is closer to the head part **(M)**. Each extending arm **(I)** has a limited part **(K)** designed to move in the limiting space **(E)**. *See* FIGS. 1, 2, 4, 7; paras. [0008]–[0011], [0028], [0031]–[0038] (JPO machine translation).
[7d] an elastic component, wherein the main body has a first limiting surface and a second limiting surface forming the limiting space, the first limiting surface is closer to the head part than the second limiting surface, and the elastic component is located in the limiting space and between the first limiting surface and the limited part and is covered by the extending arm such that the elastic component is confined by the main body and the sliding component.	*See,* [1d], *supra.*

EXHIBIT C

Invalidity of the '432 Patent

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,717 ("Huang '717")

U.S. Patent No. 9,419,717 to Huang

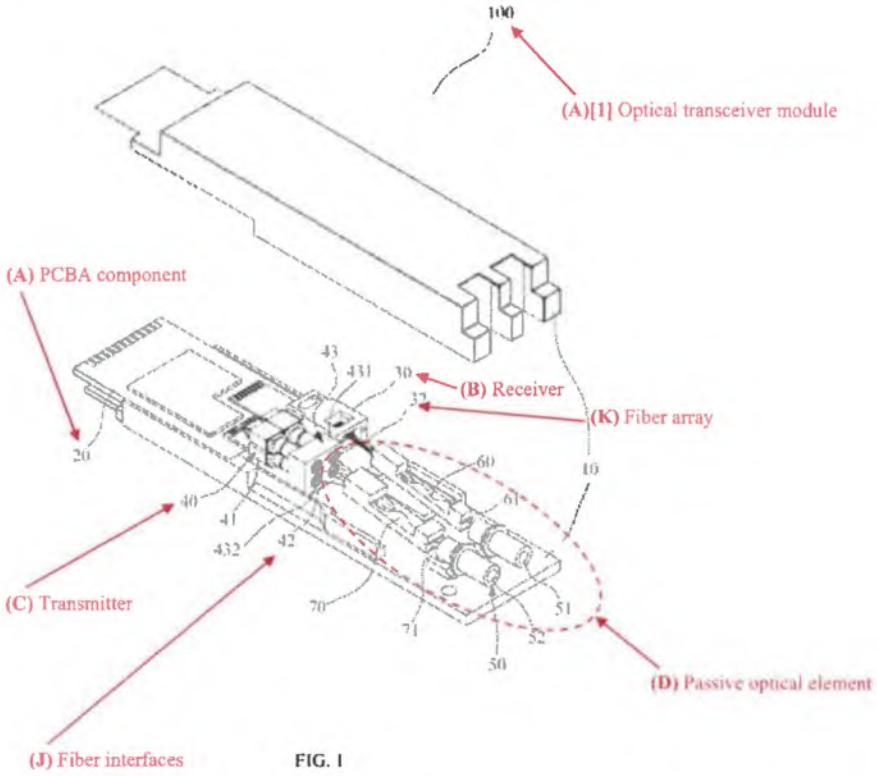


FIG. 1 (Huang '717)

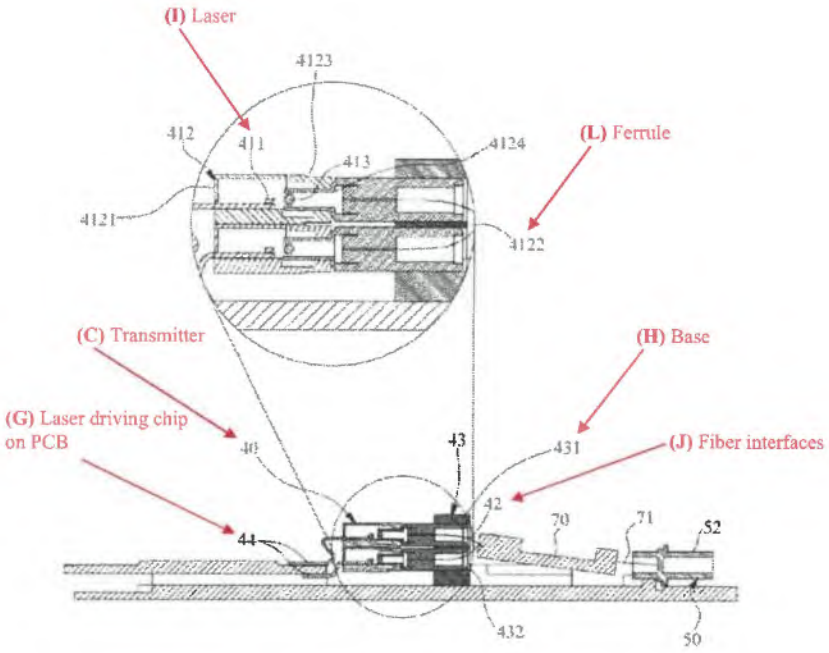


FIG. 3

FIG. 3 (Huang '717)

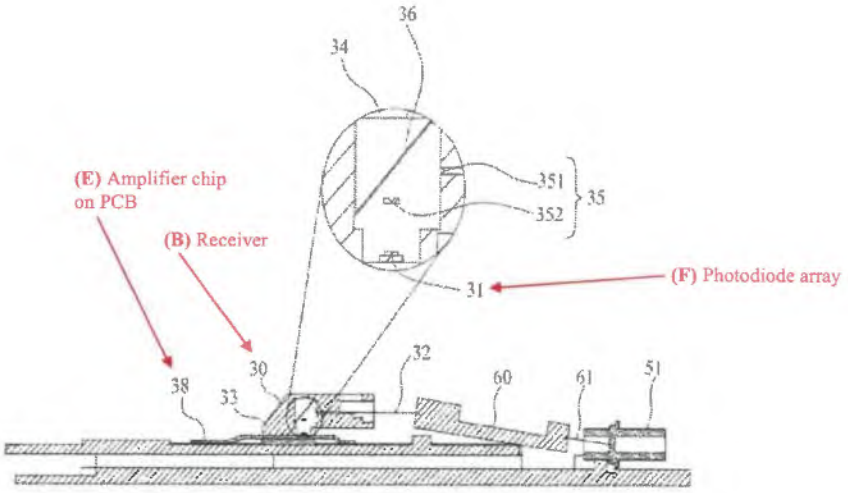


FIG. 4

FIG. 4 (Huang '717)

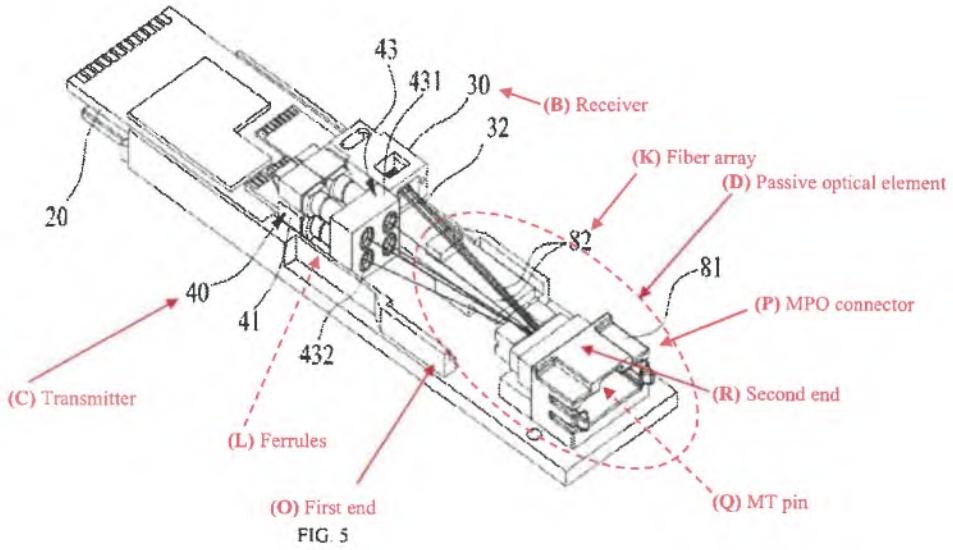


FIG. 5

FIG. 5 (Huang '717)

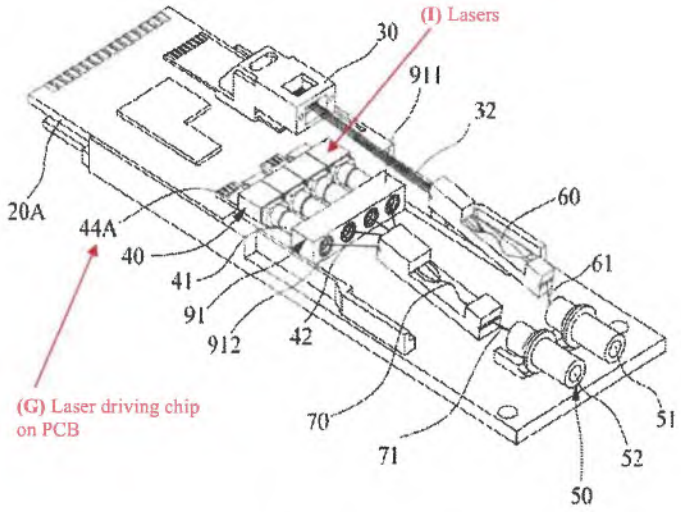


FIG. 7

FIG. 7 (Huang '717)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,717 ("Huang '717")

U.S. Patent No. 10,466,432	Disclosure in Huang '717
Independent Claim 1	
[1a] A high-speed optical transceiver module, comprising:	Huang '717 discloses a high-speed optical transceiver module **(A)[1]**. *See* FIG. 1; Col. 4, lines 53–60.
[1b] a printed circuit board assembly (PCBA) component having a receiver and a transmitter; and	Huang '717 discloses the high-speed optical transceiver module **(A)[1]** includes a printed circuit board assembly (PCBA) component **(A)** connected to a receiver **(B)** and a transmitter **(C)**. *See* FIG. 1; Col. 4, lines 53–60.
[1c] a passive optical element, wherein	Huang '717 discloses a passive optical element **(D, E)** is connected to the receiver **(B)** and the transmitter **(C)**. *See* FIGS. 1, 5; Col. 5, lines 11–55; Col. 7, lines 16–46.
[1d] the receiver comprises an amplifier chip and a photodiode array connected to pins of the amplifier chip;	Huang '717 discloses the receiver **(B)** includes an amplifier chip **(E)** and a photodiode array **(F)** connected to pins of the amplifier chip **(E)**. *See* FIG. 4; Col. 4, line 61–Col. 5 line 1; Col. 6, lines 32–40.
[1e] the transmitter comprises a laser driving chip and a base;	Huang '717 discloses the transmitter **(C)** includes a laser driving chip **(G)** and a base **(H)**. *See* FIG. 3; Col. 5, lines 59–62; Col. 6, lines 1–7.
[1f] the base comprises a plurality of lasers arranged side by side;	Huang '717 discloses the base **(H)** includes a plurality of lasers **(I)** arranged side by side. *See* FIGS. 3, 7; Col. 6, lines 54–59.
[1g] the plurality of lasers are connected to the laser driving chip;	Huang '717 discloses the plurality of lasers **(I)** are connected to the laser driving chip **(G)**. *See* FIGS. 3, 7; Col. 6, lines 5–7; Col. 7, lines 53–56.
[1h] a plurality of fiber interfaces are arranged on output light paths corresponding to the lasers;	Huang '717 discloses a plurality of fiber interfaces **(J)** are arranged on output light paths corresponding to the lasers **(I)**. *See* FIG. 3; Col. 5, 21–26; Col. 6, 54-59.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,717 ("Huang '717")

[1i] the passive optical element comprises ferrules corresponding to the fiber interfaces and a fiber array for emitting light on the photodiode array of the receiver; and	Huang '717 discloses the passive optic element **(D)** includes ferrules **(L)** corresponding to the fiber interfaces **(J)** and a fiber array **(K)** for emitting light on the photodiode array **(F)** of the receiver **(B)**. *See* FIGS. 1, 3, 4, 5; Col. 5, lines 26–28, 30-35; Col. 6, lines 9–24.
[1j] the ferrules are inserted into the plurality of fiber interfaces in one-to-one correspondence.	Huang '717 discloses the ferrules **(L)** are inserted into the plurality of fiber interfaces **(J)** in one-to-one correspondence. *See* FIGS. 1, 3; Col. 6, lines 7-28.
Dependent Claim 2	
[2a] The high-speed optical transceiver module of claim 1, wherein the plurality of lasers comprise 4 lasers, and the plurality of fiber interfaces comprise 4 fiber interfaces.	*See,* Claim 1, *supra.* Huang '717 further discloses the plurality of lasers **(I)** may include four lasers **(I)**, and the plurality of fiber interfaces **(J)** may include four fiber interfaces **(J)**. *See* FIG. 1, 3; Col. 7, lines 3–5.
Dependent Claim 3	
[3a] The high-speed optical transceiver module of claim 2, wherein the passive optical element is a multi push on (MPO) connector, the MPO connector having the ferrules and the fiber array at a first end and a mechanical transfer (MT) pin at a second end opposite the first end.	*See,* Claim 1, *supra.* Huang '717 further discloses the passive optical element **(D)** may be a multi push on (MPO) connector **(P)**. The MPO connector **(P)** may have the ferrules **(L)** and the fiber array **(K)** at a first end **(O)** and a mechanical transfer (MT) pin **(Q)** at a second end **(R)** opposite the first end **(O)**. *See* FIG. 5; Col. 7, lines 27–46.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,191 ("Huang '191")

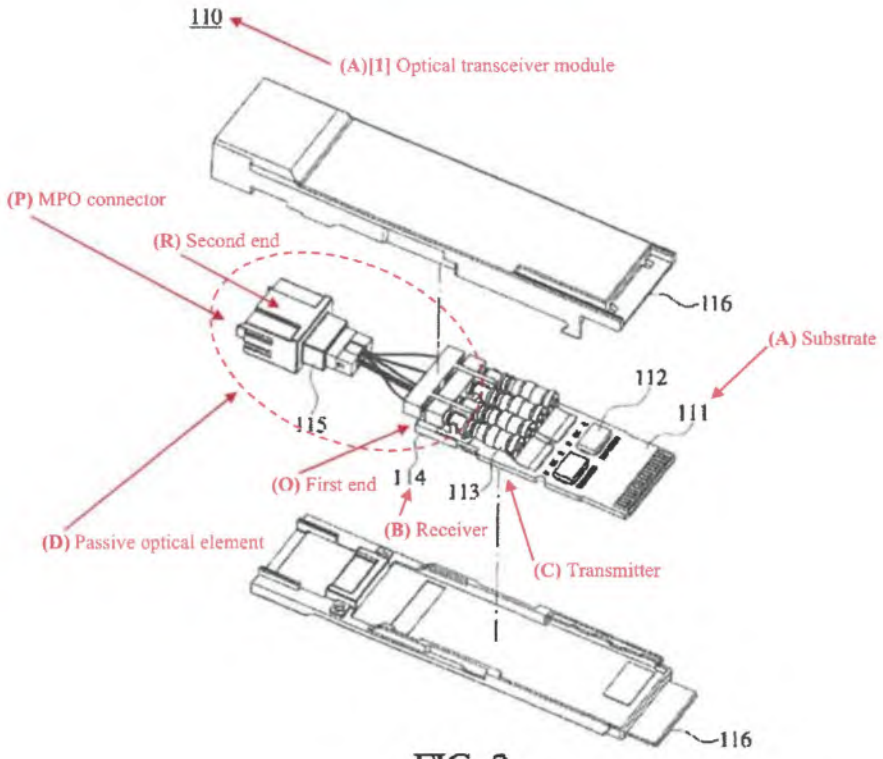


FIG. 2

FIG. 2 (Huang '191)

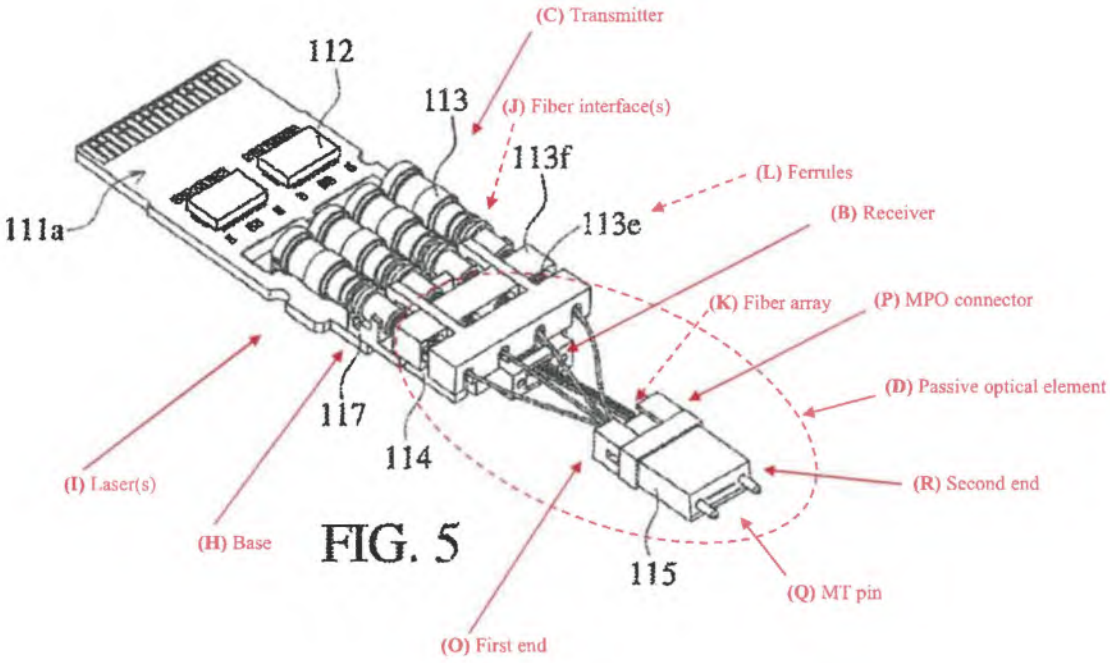


FIG. 5

FIG. 5 (Huang '191)

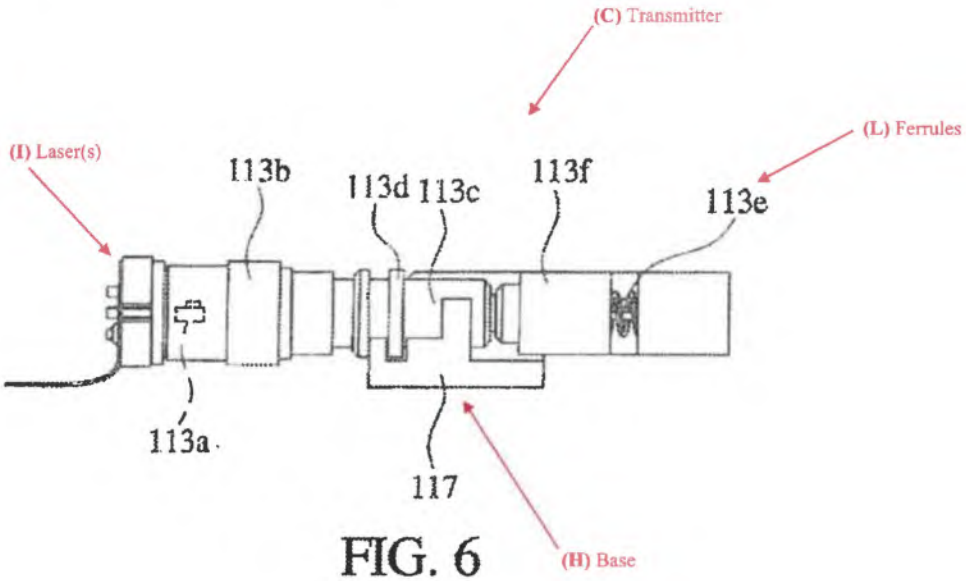


FIG. 6

FIG. 6 (Huang '191)

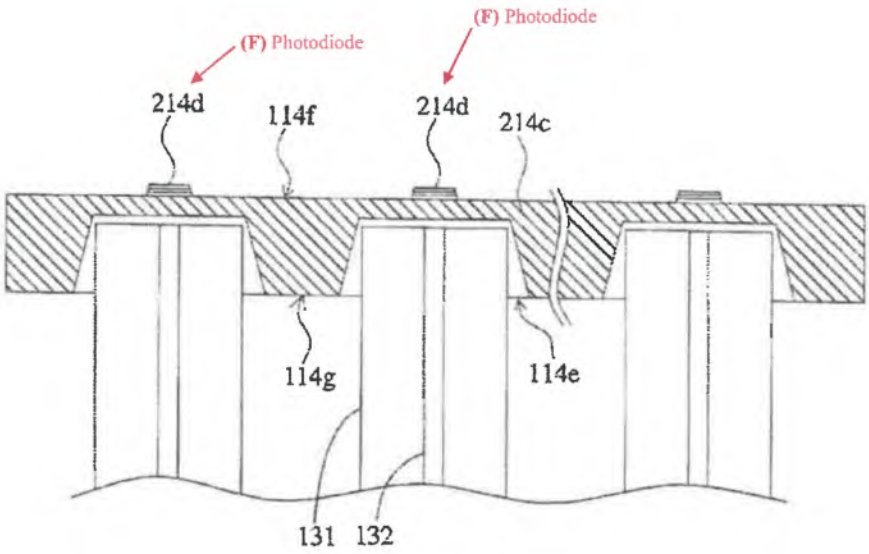


FIG. 17

FIG. 17 (Huang '191)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,191 ("Huang '191")

U.S. Patent No. 10,466,432	Disclosure in Huang '191
Independent Claim 1	
[1a] A high-speed optical transceiver module, comprising:	Huang '191 discloses a high-speed optical transceiver module **(A)[1]**. *See* FIG. 2; Col. 9, lines 3–46.
[1b] a printed circuit board assembly (PCBA) component having a receiver and a transmitter; and	Huang '191 discloses the optical transceiver module **(A)[1]** includes a substrate **(A)**, which may be a printed circuit board assembly (PCBA) component. The optical transceiver module **(A)[1]** includes a receiver **(B)** and a transmitter **(C)**, located on the substrate **(A)**. *See* FIG. 2; Col. 9, lines 5–26.
[1c] a passive optical element, wherein	Huang '191 discloses the optical transceiver module **(A)[1]** includes a passive optical element **(D)**. *See* FIG. 2; Col. 9, lines 5–8, 47–51.
[1d] the receiver comprises an amplifier chip and a photodiode array connected to pins of the amplifier chip;	Huang '191 discloses the receiver **(B)** includes an amplifier chip and an array of photodiodes **(F)** connected to pins of the amplifier chip. *See* FIGS. 2, 10, 17; Col. 4, lines 31–34; Col. 9, lines 14–21; Col. 14, line 67–Col. 15, line 6.
[1e] the transmitter comprises a laser driving chip and a base;	Huang '191 discloses the transmitter **(C)** includes a laser driving chip and a base **(H)**. *See* FIGS. 5, 6; Col. 9, lines 14–21; Col. 11, lines 6–15. 22–27.
[1f] the base comprises a plurality of lasers arranged side by side;	Huang '191 discloses the base **(H)** includes a plurality of lasers **(I)** arranged side by side. *See* FIGS. 5 6; Col. 10, lines 38–43.
[1g] the plurality of lasers are connected to the laser driving chip;	Huang '191 discloses the plurality of lasers **(I)** are connected to the laser driving chip. *See* FIG. 6; ; Col. 9, lines 14–21; Col. 11, lines 12–15.
[1h] a plurality of fiber interfaces are arranged on output light paths corresponding to the lasers;	Huang '191 discloses a plurality of fiber interfaces **(J)** are arranged on output light paths corresponding to the lasers **(I)**. *See* FIGS. 5, 6; Col. 10, lines 38–47; Col. 11, lines 16–56.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,419,191 ("Huang '191")

[1i] the passive optical element comprises ferrules corresponding to the fiber interfaces and a fiber array for emitting light on the photodiode array of the receiver; and	Huang '191 discloses the passive optical element **(D)** includes ferrules **(L)** corresponding to the fiber interfaces **(J)** and a fiber array **(K)** for emitting light on the array of photodiodes **(F)** of the receiver **(B)**. *See* FIGS. 2, 5, 10, 17; Col. 11, lines 22–36.
[1j] the ferrules are inserted into the plurality of fiber interfaces in one-to-one correspondence.	Huang '191 discloses the ferrules **(L)** are inserted into the plurality of fiber interfaces **(J)** in one-to-one correspondence. *See* FIG. 5; Col. 10, lines 15–17.
Dependent Claim 2	
[2a] The high-speed optical transceiver module of claim 1, wherein the plurality of lasers comprise 4 lasers, and the plurality of fiber interfaces comprise 4 fiber interfaces.	*See,* Claim 1, *supra*. Huang '191 further discloses the plurality of lasers **(I)** may include four lasers **(I)**, and the plurality of fiber interfaces **(J)** may include four fiber interfaces **(J)**. *See* FIG. 5; Col. 10, lines 38–40.
Dependent Claim 3	
[3a] The high-speed optical transceiver module of claim 2, wherein the passive optical element is a multi push on (MPO) connector, the MPO connector having the ferrules and the fiber array at a first end and a mechanical transfer (MT) pin at a second end opposite the first end.	*See,* Claim 1, *supra*. Huang '191 further discloses the passive optical element **(D)** may be a multi push on (MPO) connector **(P)**. The MPO connector **(P)** may have the ferrules **(L)** and the fiber array **(K)** at a first end **(O)** and a mechanical transfer (MT) pin **(Q)** at a second end **(R)** opposite the first end **(O)**. *See* FIGS. 2, 5; Col. 8, lines 29–38; Col. 10, lines 15–17.

U.S. Patent No. US 9,341,786 to Gamache

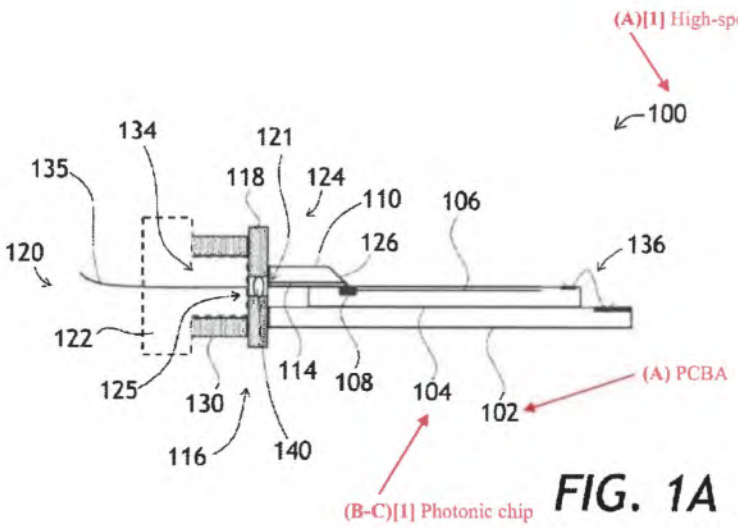


FIG. 1A (Gamache)

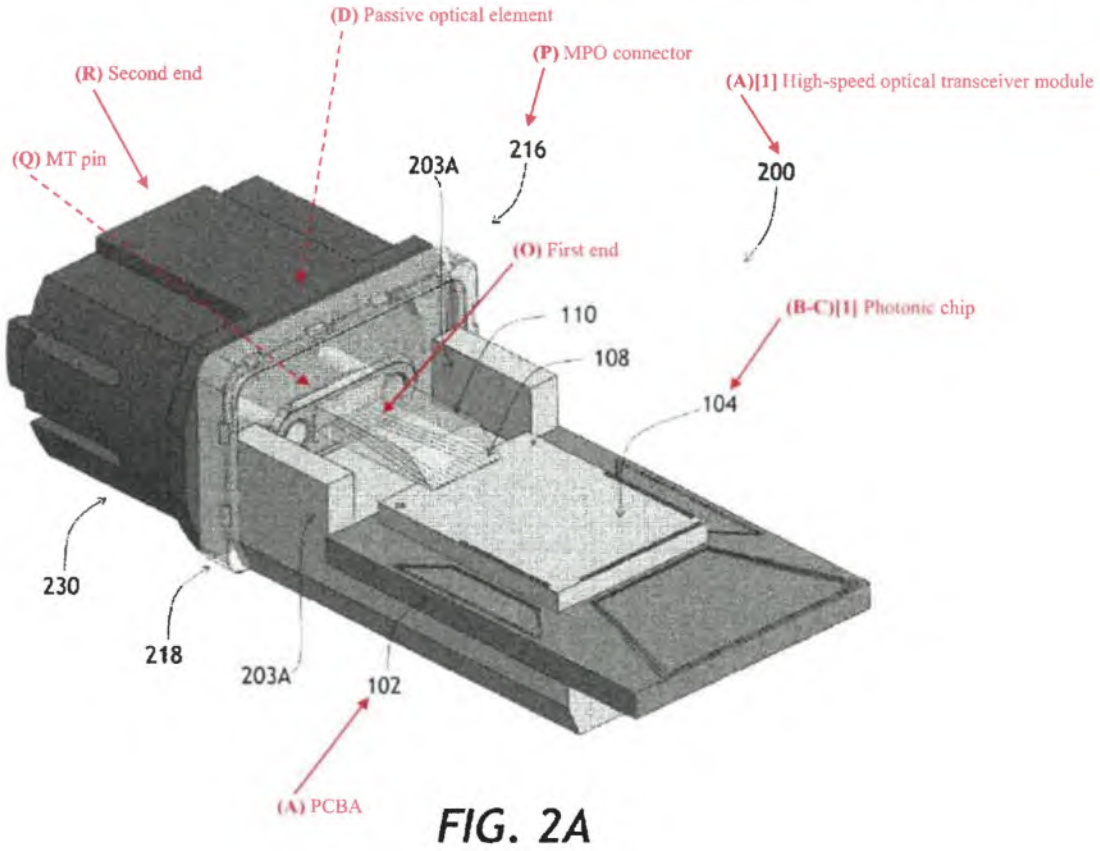


FIG. 2A

FIG. 2A (Gamache)

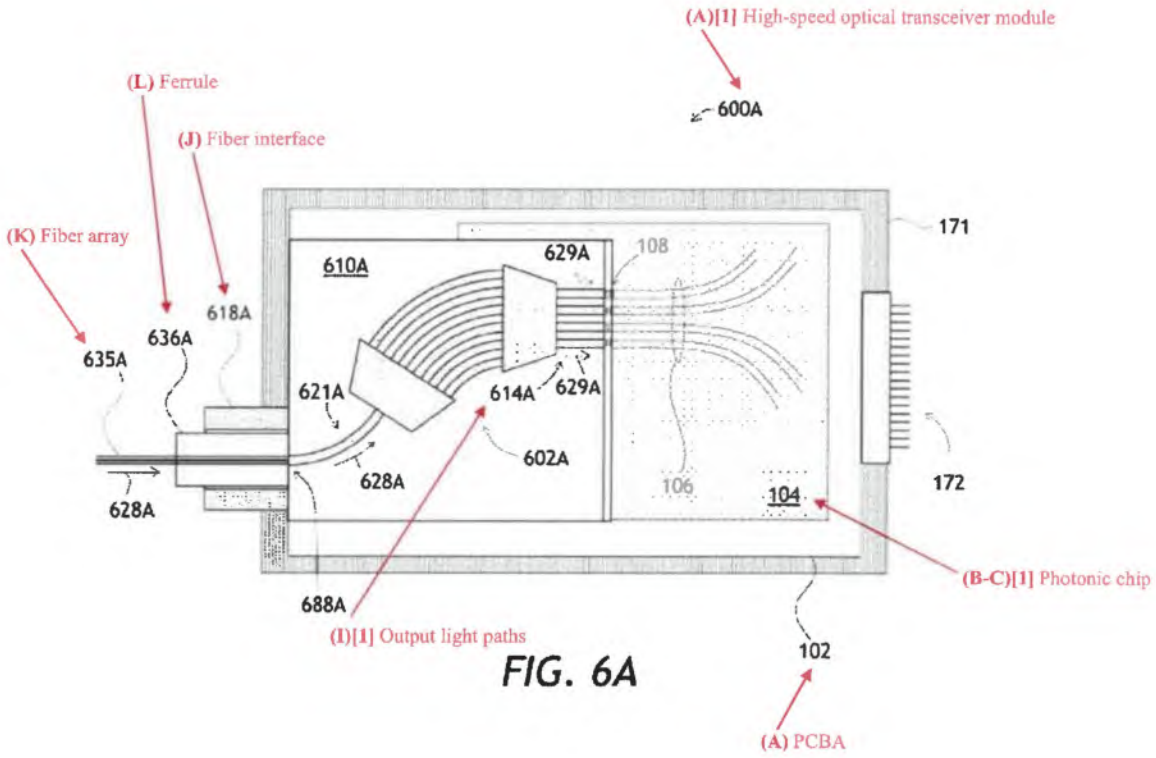


FIG. 6A

FIG. 6A (Gamache)

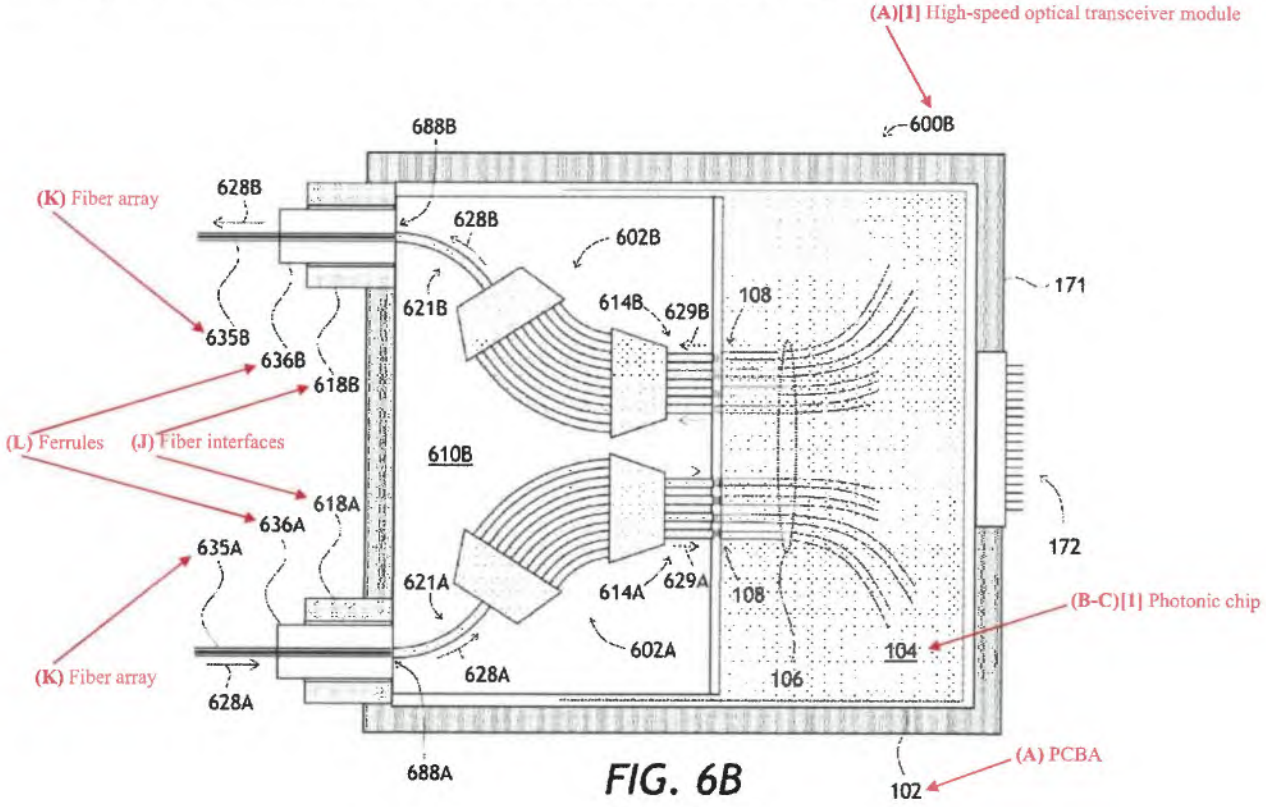


FIG. 6B

FIG. 6B (Gamache)

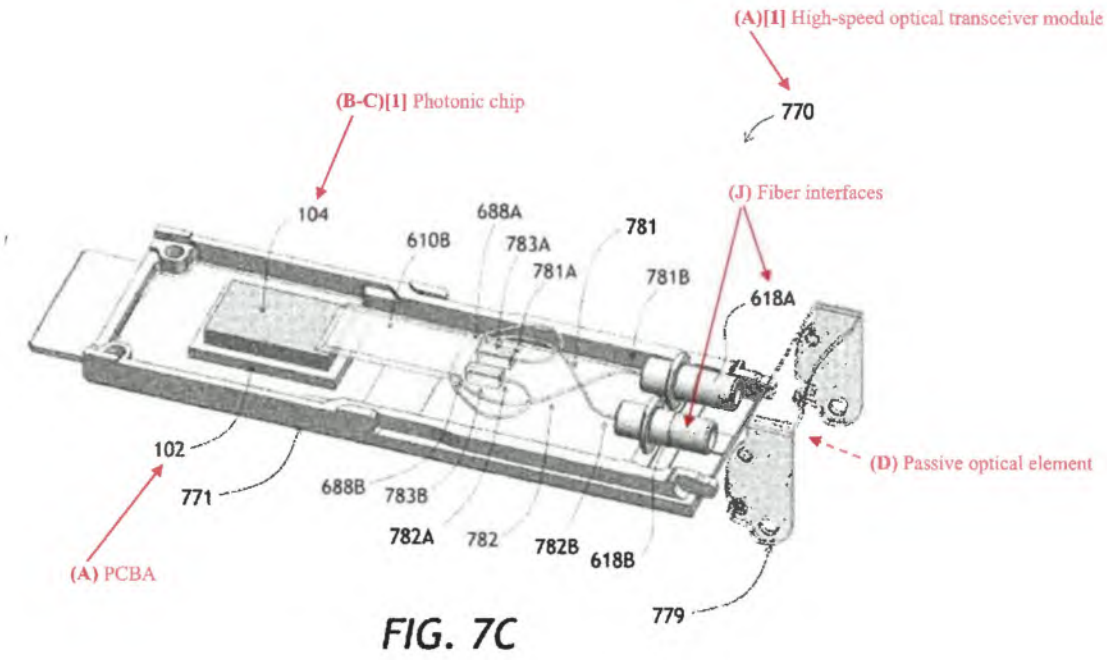


FIG. 7C

FIG. 7C (Gamache)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,466,432 Against U.S. Patent 9,341,786 ("Gamache")

U.S. Patent No. 10,466,432	Disclosure in Gamache
Independent Claim 1	
[1a] A high-speed optical transceiver module, comprising:	Gamache discloses a high-speed optical transceiver module **(A)[1]**. *See* FIG. 7C; Col. 9, lines 45–48.
[1b] a printed circuit board assembly (PCBA) component having a receiver and a transmitter; and	Gamache discloses the optical transceiver module **(A)[1]** includes a printed circuit board assembly component **(A)** electrically coupled to a photonic chip **(B-C)[1]**, which may include, for example, a receiver and a transmitter. *See* FIG. 7C; Col. 6, lines 2–4, 18–22; Col. 7, lines 51–54; Col. 9, lines 8–11.
[1c] a passive optical element, wherein	Gamache discloses the optical transceiver module **(A)[1]** includes a passive optical element **(D)**. *See* FIGS. 2A, 7C; Col. 4, lines 59–64; Col. 6, lines 26–34; Col. 7, line 65–Col. 8, line 5; Col. 9, lines 61–67.
[1d] the receiver comprises an amplifier chip and a photodiode array connected to pins of the amplifier chip;	Gamache discloses the receiver of the photonic chip **(B-C)[1]** includes a photodiode array. It would be understood that the photodiode array would be connected to an amplifier chip of the receiver (e.g., via pins of the amplifier chip) to amplify optical signals associated with the photodiode array. *See* FIGS. 1A, 6A; Col. 4, lines 59–64; Col. 8, lines 6–16.
[1e] the transmitter comprises a laser driving chip and a base;	Gamache discloses the transmitter of the photonic chip **(B-C)[1]** may include a laser driving chip and a base. *See* FIGS. 1A, 7C; Col. 4, lines 59–60; Col. 7, lines 27–54.
[1f] the base comprises a plurality of lasers arranged side by side;	Gamache discloses that it would be understood that the base of the transmitter of the photonic chip **(B-C)[1]** might include a plurality of lasers and that the lasers might be arranged side by side. *See* FIGS. 1A, 2A, 6A, 7C; Col. 7, lines 46–54; Col. 9, lines 1–4.
[1g] the plurality of lasers are connected to the laser driving chip;	Gamache discloses that it would be understood that the plurality of lasers would be connected to the laser driving chip in order to

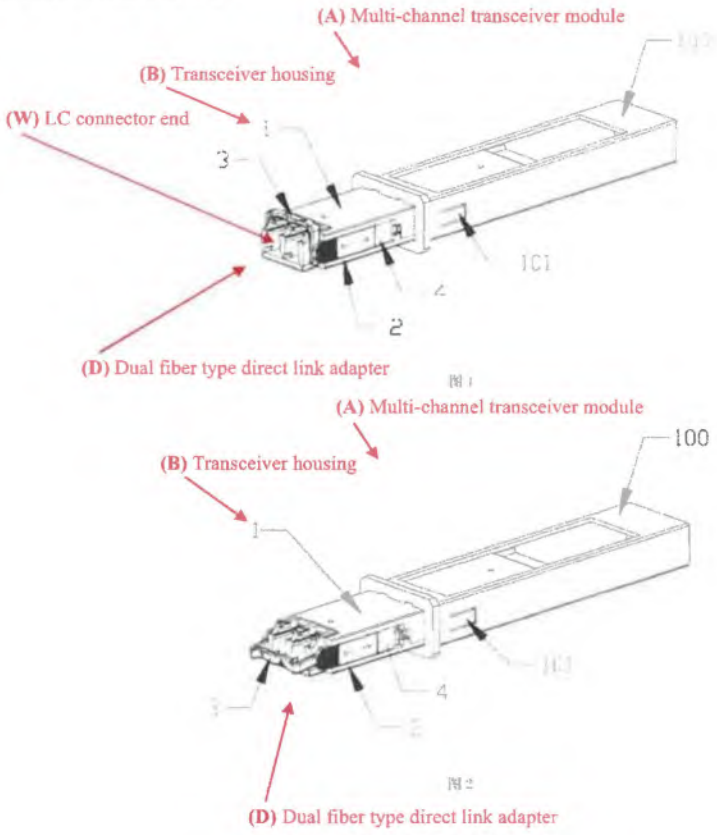
	drive the plurality of lasers for light-transmission purposes. *See* FIG. 7C; Col. 4, lines 59–60; Col. 7, lines 27–54.
[1h] a plurality of fiber interfaces are arranged on output light paths corresponding to the lasers;	Gamache discloses a plurality of fiber interfaces **(J)** are arranged on output light paths **(I)[1]** corresponding to the lasers. *See* FIGS. 6A, 7C; Col. 7, lines 39–44, 54–59.
[1i] the passive optical element comprises ferrules corresponding to the fiber interfaces and a fiber array for emitting light on the photodiode array of the receiver; and	Gamache discloses the passive optical element **(D)** includes ferrules **(L)** corresponding to the fiber interfaces **(J)** and a fiber array **(K)** for emitting light on the photodiode array of the receiver. *See* FIGS. 6A, 7C; Col. 7, line 65–Col. 8, line 16.
[1j] the ferrules are inserted into the plurality of fiber interfaces in one-to-one correspondence.	Gamache discloses the ferrules **(L)** are inserted into the plurality of fiber interfaces **(J)** in one-to-one correspondence. *See* FIG. 6A; Col. 8, line 1.
Dependent Claim 2	
[2a] The high-speed optical transceiver module of claim 1, wherein the plurality of lasers comprise 4 lasers, and the plurality of fiber interfaces comprise 4 fiber interfaces.	*See,* Claim 1, *supra*. Gamache further discloses the plurality of lasers might include 4 lasers, and the plurality of fiber interfaces **(J)** might include 4 corresponding fiber interfaces. *See* Col. 5, lines 22–35.
Dependent Claim 3	
[3a] The high-speed optical transceiver module of claim 2, wherein the passive optical element is a multi push on (MPO) connector, the MPO connector having the ferrules and the fiber array at a first end and a mechanical transfer (MT) pin at a second end opposite the first end.	*See,* Claim 1, *supra*. Gamache further discloses the passive optical element **(D)** may be a multi push on (MPO) connector **(P)**. It would be understood that the ferrules **(L)** and the fiber array **(K)** might be located at a first end **(O)** of the MPO connector **(P)**, while a mechanical transfer (MT) pin **(Q)** might be located at a second end **(R)** opposite the first end **(O)**. *See* FIGS. 2A, 6A; Col. 1, lines 36–44; Col. 6, lines 23–34; Claim 9.

EXHIBIT D

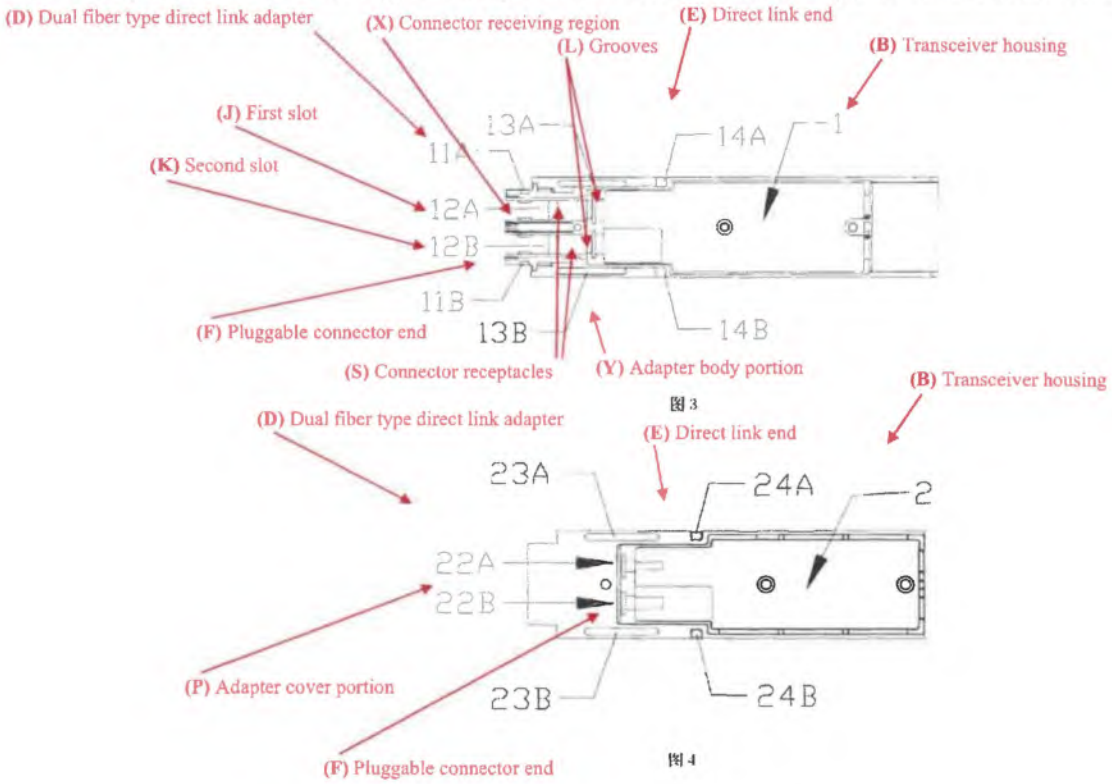
Invalidity of the '383 Patent

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,170,383 Against China Patent No. 201820017 ("Chao")

China Patent No. CN201820017 to Chao



FIGS. 1 & 2 (Chao)


(D) Dual fiber type direct link adapter
(X) Connector receiving region
(L) Grooves
(E) Direct link end
(B) Transceiver housing
(J) First slot
(K) Second slot
13A
14A
1
11A
12A
12B
11B
13B
14B
(F) Pluggable connector end
(S) Connector receptacles
(Y) Adapter body portion
图 3
(B) Transceiver housing
(D) Dual fiber type direct link adapter
(E) Direct link end
23A
24A
2
22A
22B
(P) Adapter cover portion
23B
24B
(F) Pluggable connector end
图 4

FIGS. 3 & 4 (Chao)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,170,383 Against China Patent No. 201820017 ("Chao")

U.S. Patent No. 9,170,383	Disclosure in Chao
Independent Claim 1	
[1a] A multi-channel transceiver module comprising:	Chao discloses a multi-channel transceiver module **(A)**. *See* FIGS. 1, 2; Specification at "Embodiment" ("In conjunction with referring to Fig. 1, shown in Figure 2, the disclosed a kind of XFP integrated module of optical transceiver . . .") (Google Patents machine translation).
[1b] a transceiver housing;	Chao discloses the multi-channel transceiver module **(A)** includes a transceiver housing **(B)**. *See* FIGS. 1–3; Specification at "Embodiment" ("Referring to Fig. 3, module … 1 roughly is rectangular shape, its front end is provided with the cavity lane 12B that is used to hold the cavity lane 12A of an optical fiber receive module ROSA and is used to hold light emission component TOSA, the rear end of module … 1 is provided with the cavity (figure does not show) that is used for the holding module circuit board, . . .") (Google Patents machine translation).
[1c] a multi-channel transmitter optical subassembly (TOSA) located in the transceiver housing, the TOSA being configured to transmit a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths;	Chao discloses an XFP transceiver module including a multi-channel transmitter optical subassembly (TOSA) located in the transceiver housing **(B)**. XFP modules were known in the art to use Dense Wavelength Division Multiplexing ("DWDM"). *See, e.g.,* XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf). *See* FIGS. 1–3; Specification at "Embodiment" ("Referring to Fig. 3, module .. 1 roughly is rectangular shape, its front end is provided with the cavity lane 12B that is used to hold the cavity lane 12A of an optical fiber receive module

	ROSA and is used to hold light emission component TOSA, the rear end of module … 1 is provided with the cavity (figure does not show) that is used for the holding module circuit board, . . .") (Google Patents machine translation).
[1d] a multi-channel receiver optical subassembly (ROSA) located in the transceiver housing, the ROSA being configured to receive a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths; and	Chao discloses the XFP transceiver module includes a multi-channel receiver optical subassembly (ROSA) located in the transceiver housing **(B)**. ROSAs are known components of multi-channel transceiver modules and are understood as being designed to receive WDM optical signals on multiple channel wavelengths. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf). *See* FIGS. 1–3; Specification at "Embodiment" ("Referring to Fig. 3, module … 1 roughly is rectangular shape, its front end is provided with the cavity lane 12B that is used to hold the cavity lane 12A of an optical fiber receive module ROSA and is used to hold light emission component TOSA, the rear end of module … 1 is provided with the cavity (figure does not show) that is used for the holding module circuit board, . . .") (Google Patents machine translation).
[1e] a dual fiber type direct link adapter located inside the transceiver housing and at one side of the transceiver housing, the dual fiber type direct link adapter having a direct link end located in the transceiver housing and a pluggable connector end facing outside of the transceiver housing, the direct link end of the dual fiber type direct link adapter being coupled to the TOSA with a first optical fiber and coupled to the ROSA with a second optical fiber to provide a direct link between the dual fiber type	Chao discloses a dual fiber type direct link adapter **(D)** is located inside the transceiver housing **(B)** and at one side of the transceiver housing **(B)**. The dual fiber type direct link adapter **(D)** has a direct link end **(E)** located in the transceiver housing **(B)** and a pluggable connector end **(F)** facing outside of the transceiver housing **(B)**. The direct link end **(E)** of the dual fiber type direct link adapter **(D)** is designed to be coupled to the TOSA with a first optical fiber and coupled to the ROSA with a

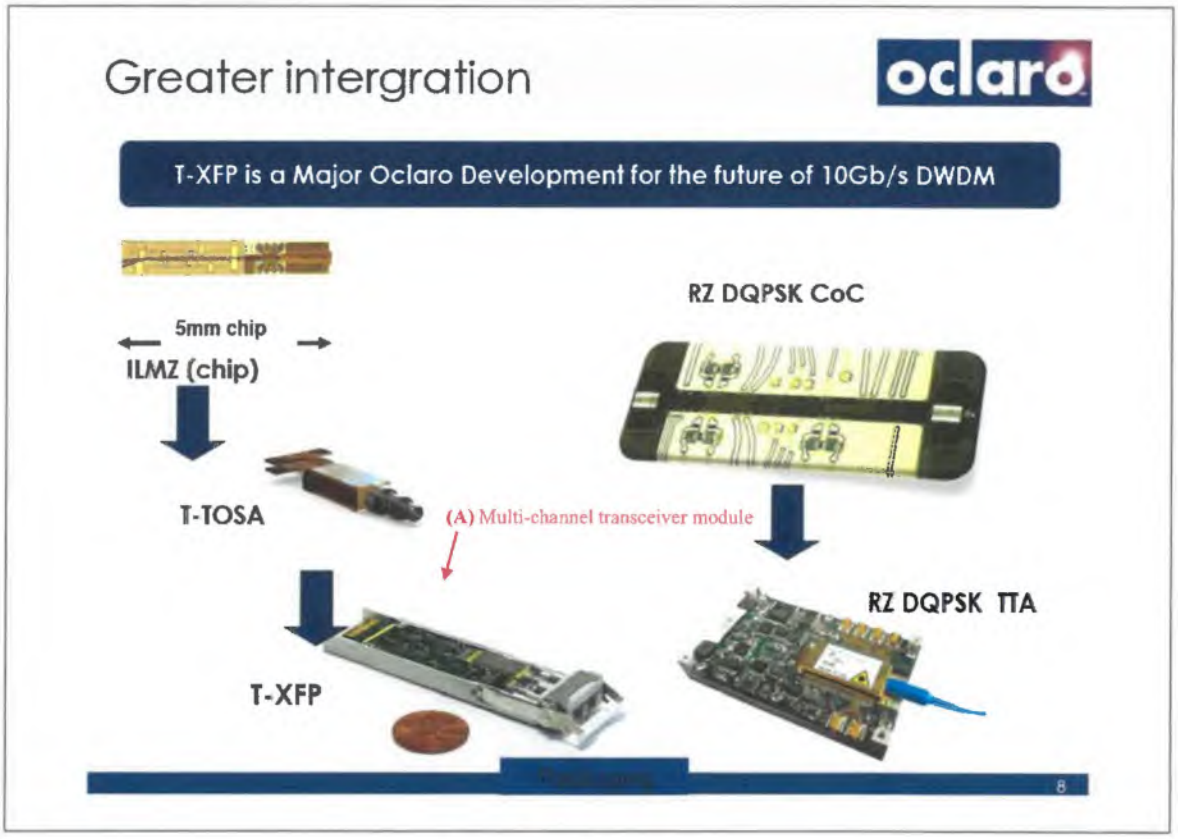
direct link adapter and the TOSA and the ROSA, the pluggable connector end being configured to receive first and second pluggable optical connectors for optically coupling the TOSA and the ROSA to external optical fibers, wherein the dual fiber type direct link adapter comprises:	second optical fiber to provide a direct link between the dual fiber type direct link adapter **(D)** and the TOSA and the ROSA. The pluggable connector end **(F)** is designed to receive first and second pluggable optical connectors for optically coupling the TOSA and the ROSA to external optical fibers. *See* FIGS. 1–4; Specification at "Abstract" ("The embodiment of the utility model discloses an XFP (10 gigabit small form factor pluggable) optical transceiver integrated module.") (Google Patents machine translation); *id* at "Embodiment" ("Referring to Fig. 3, module …1 roughly is rectangular shape, its front end is provided with the cavity lane 12B that is used to hold the cavity lane 12A of an optical fiber receive module ROSA and is used to hold light emission component TOSA, the rear end of module … 1 is provided with the cavity (figure does not show) that is used for the holding module circuit board, . . .") (Google Patents machine translation); claim 2.
[1f] an adapter body portion defining first and second slots, each of the first and second slots including at least one groove;	Chao discloses the dual fiber type direct link adapter **(D)** includes an adapter body portion **(Y)** defining a first slot **(J)** and a second slot **(K)**. Each of the first and the second slots **(J, K)** include at least one groove **(L)**. *See* FIGS. 3, 4.
[1g] first and second direct link connector assemblies received in the first and second slots, respectively, of the adapter body portion, each of the first and second direct link connector assemblies including at least one flange extending into the groove in the first and second slots, respectively, to prevent axial movement of the first and second direct link connector assemblies, wherein one end of each of the direct link connector assemblies defines a connector receptacle configured to receive a portion of the optical connector for optical coupling, and	Chao discloses the first and second slots **(J, K)** of the adapter body portion **(Y)** are designed to receive first and second direct link connector assemblies respectively to optical fibers to the transceiver (A). Each of the first and second direct link connector assemblies include at least one structural feature (e.g., a flange) to engage grooves **(L)** in the first and second slots **(J, K)**, respectively, to prevent axial movement of the first and second direct link connector assemblies. *See* FIGS. 3, 4.

wherein another end of each of the connector assemblies is directly linked to a respective optical fiber; and	
[1h] an adapter cover portion covering the first and second slots and retaining the first and second direct link connector assemblies in the first and second slots, respectively.	Chao discloses an adapter cover portion **(P)** covers the first and second slots **(J, K)** and is designed to retain the first and second direct link connector assemblies in the first and second slots **(J, K)**, respectively. *See* FIGS. 3, 4; Specification at "Embodiment" ("Referring to Fig. 4, module lower cover 2 is the roughly the same polymorphic structures that are rectangular shape of shape and module … 1, … cavity lane 12A, 12B position are corresponding to have a cavity cover plate 22 that cavity lane 12A, 12B is played partially enclosed effect, when module lower cover 2 fixed closure with module 1… 1, cavity cover plate 22 was with the partially enclosed cavity lane 12B that is formed for holding the cavity lane 12A of an optical fiber receive module ROSA and is used to hold light emission component TOSA of cavity lane 12A, the 12B of two-way opening; . . .") (Google Patents machine translation).
Dependent Claim 2	
[2a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter is a dual fiber type direct link LC adapter including an LC connector end configured to receive first and second LC connectors.	*See,* Claim 1, *supra*. Chao further discloses the use of LC connector in XFP transceivers, which was well known in the field at the time of filing the application for the '383 patent; use of such connectors is described in the XFP MSA as well as the preceding SFP MSA. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf); Small Form Factor Pluggable (SFP) Transceiver

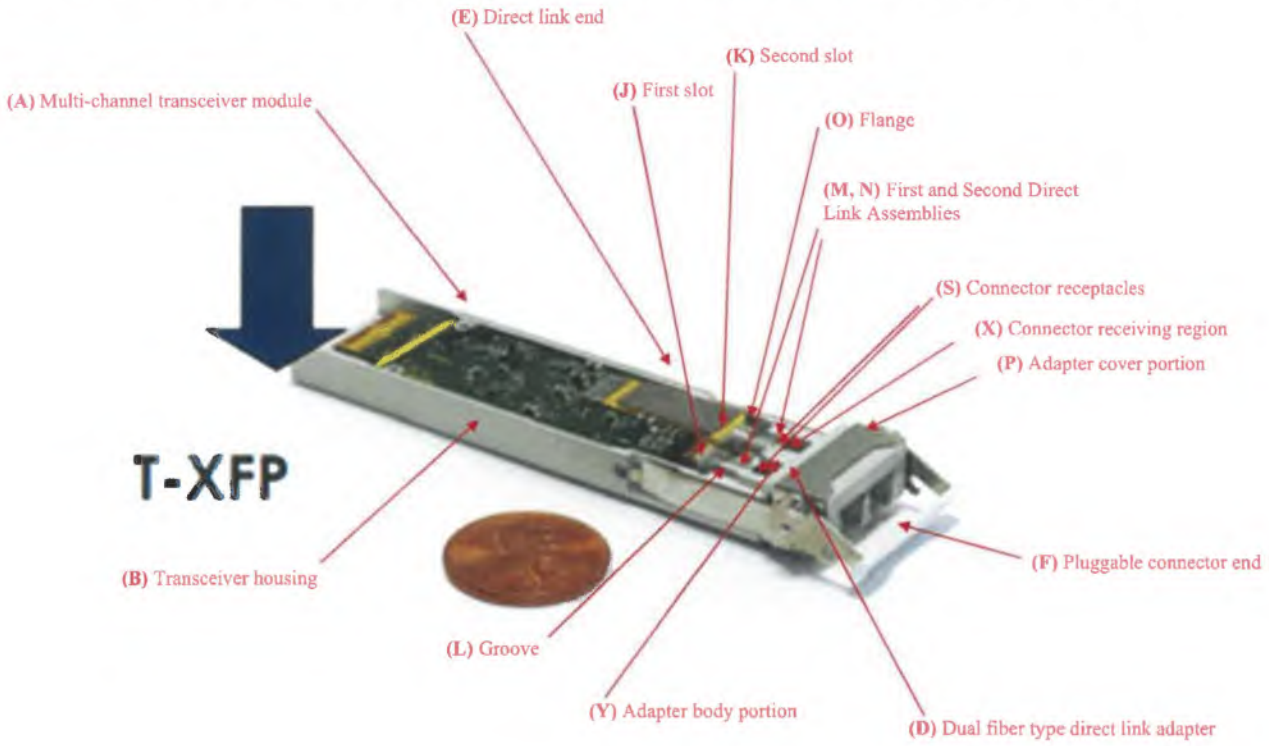
	MultiSource Agreement, 2001, available at Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (http://schelto.com/SFP/SFP%20MSA.pdf)("SPF MSA") at page 1.
Dependent Claim 5	
[5a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies comprises a fiber ferrule receiving a respective one of the optical fibers and a sleeve around the fiber ferrule, and wherein the sleeve defines at least a portion of the connector receptacle.	*See,* Claim 1, *supra*. Chao further discloses that it would be understood that each of the direct link connector assemblies for use first slot **(J)** and second slot **(K)** include a fiber ferrule receiving a respective one of the optical fibers and a sleeve around the fiber ferrule such that the sleeve defines at least a portion of the connector receptacle **(S)**. *See* FIGS. 3, 4;
Dependent Claim 6	
[6a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies further comprises an outer housing around the fiber ferrule and sleeve, the outer housing defining at least a portion of the connector receptacle and including the flange portion for securing the direct link connector assembly.	*See,* Claim 1, *supra*. Chao further discloses that it would be understood that each of the direct link connector assemblies include an outer housing around the fiber ferrule and sleeve, and further includes a flange portion for securing the direct link connector assembly in grooves **(L)** of first slot **(J)** and second slot **(K)**. *See* FIGS. 3, 4.
Dependent Claim 7	
[7a] The multi-channel transceiver module of claim 1 wherein the connector receptacle is configured to mate with an LC connector.	*See,* Claim 1, *supra*. Chao further discloses the connector receptacle **(S)** may be designed to mate with an LC connector (e.g., at LC connector end **(W)**). The use of LC connector in XFP transceivers, as described in the '017 publication, was well known in the field at the time of filing the application for the '383 patent; use of such

	connectors is described in the XFP MSA as well as the preceding SFP MSA. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf); Small Form Factor Pluggable (SFP) Transceiver MultiSource Agreement, 2001, available at Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (http://schelto.com/SFP/SFP%20MSA.pdf) ("SPF MSA") at page 1.
Dependent Claim 8	
[8a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter defines first and second connector receiving regions configured to receive respective first and second pluggable optical connectors, and wherein the connector receptacles extend into the connector receiving regions.	*See,* Claim 1, *supra.* Chao further discloses the dual fiber type direct link adapter **(D)** defines first and second connector receiving regions **(X)** (e.g., between first and second slots **(J, K)** and connector receptacles **(S)**) designed to receive respective first and second pluggable optical connectors. The connector receptacle **(S)** extend into the connector receiving regions **(X)**. *See* FIGS. 3, 4.

2011 Oclaro Deck (T-XFP)



Slide 8 (2011 Oclaro Deck)



Slide 8 (2011 Oclaro Deck)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,170,383 Against 2011 Oclaro Deck

U.S. Patent No. 9,170,383	Disclosure in 2011 Oclaro Deck
Independent Claim 1	
[1a] A multi-channel transceiver module comprising:	The 2011 Oclaro Deck discloses a multi-channel transceiver module **(A)**. *See* Slide 8.
[1b] a transceiver housing;	The 2011 Oclaro Deck discloses the multi-channel transceiver module **(A)** includes a transceiver housing **(B)**. *See* Slide 8.
[1c] a multi-channel transmitter optical subassembly (TOSA) located in the transceiver housing, the TOSA being configured to transmit a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths;	The 2011 Oclaro Deck discloses, in Slide 8, the T-XFP was a tunable XFP module and in accordance with the XFP MSA, a XFP module included a multi-channel transmitter optical subassembly (TOSA) **(C)** located in the transceiver housing **(B)**. XFP modules were known in the art to use Dense Wavelength Division Multiplexing ("DWDM"). *See, e.g.,* XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf) and thus were understood to transmit wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths. *See* Slide 8.
[1d] a multi-channel receiver optical subassembly (ROSA) located in the transceiver housing, the ROSA being configured to receive a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths; and	The 2011 Oclaro Deck discloses, in Slide 8, the T-XFP was a tunable XFP module and in accordance with the XFP MSA, a XFP module included a multi-channel receiver optical subassembly (ROSA) located in the transceiver housing **(B)**. XFP modules were known in the art to use Dense Wavelength Division Multiplexing ("DWDM"). *See, e.g.,* XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-

	8077i.pdf) and thus were understood to receive wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths. *See* Slide 8.
[1e] a dual fiber type direct link adapter located inside the transceiver housing and at one side of the transceiver housing, the dual fiber type direct link adapter having a direct link end located in the transceiver housing and a pluggable connector end facing outside of the transceiver housing, the direct link end of the dual fiber type direct link adapter being coupled to the TOSA with a first optical fiber and coupled to the ROSA with a second optical fiber to provide a direct link between the dual fiber type direct link adapter and the TOSA and the ROSA, the pluggable connector end being configured to receive first and second pluggable optical connectors for optically coupling the TOSA and the ROSA to external optical fibers, wherein the dual fiber type direct link adapter comprises:	The 2011 Oclaro Deck discloses a dual fiber type direct link adapter **(D)** is located inside the transceiver housing **(B)** and at one side of the transceiver housing. The dual fiber type direct link adapter **(D)** has a direct link end **(E)** located in the transceiver housing **(B)** and a pluggable connector end **(F)** facing outside of the transceiver housing **(B)**. The direct link end **(E)** of the dual fiber type direct link adapter **(D)** is designed to couple the TOSA to a first optical fiber and to couple the ROSA with a second optical fiber to provide a direct link between the dual fiber type direct link adapter **(D)**. The pluggable connector end **(F)** is designed to receive first and second pluggable optical connectors, which optically couple the TOSA and the ROSA to external optical fibers. *See* Slide 8.
[1f] an adapter body portion defining first and second slots, each of the first and second slots including at least one groove;	The 2011 Oclaro Deck discloses the dual fiber type direct link adapter **(D)** includes an adapter body portion **(Y)** defining a first slot **(J)** and a second slot **(K)**. Each of the first and the second slots **(J, K)** may include at least one groove **(L)**. *See* Slide 8.
[1g] first and second direct link connector assemblies received in the first and second slots, respectively, of the adapter body portion, each of the first and second direct link connector assemblies including at least one flange extending into the groove in the first and second slots, respectively, to prevent axial movement of the first and second direct link connector assemblies, wherein one end of each of the direct link connector assemblies defines a connector receptacle configured to receive a portion of the optical connector for optical coupling, and	The 2011 Oclaro Deck discloses the first and second slots **(J, K)** of the adapter body portion **(Y)** are designed to couple the TOSA and the ROSA, via first and second direct link connector assemblies **(M, N)** to optical fibers. First and second direct link connector assemblies **(M, N)** include flange **(O)** extending into the groove **(L)** in the first and second slots **(J, K)**, respectively, to prevent axial movement of the first and second direct link connector assemblies **(M, N)**. One end of each of the direct link connector assemblies **(M,N)** defines a connector receptacle **(S)**

wherein another end of each of the connector assemblies is directly linked to a respective optical fiber; and	designed to receive a portion of the optical connector for optical coupling, while another end of each of the connector assemblies **(M, N)** is directly linked to a respective optical fiber. *See* Slide 8.
[1h] an adapter cover portion covering the first and second slots and retaining the first and second direct link connector assemblies in the first and second slots, respectively.	The 2011 Oclaro Deck discloses an adapter cover portion **(P)** covers the first and second slots **(J, K)** and is designed to retain the first and second direct link connector assemblies **(M, N)** in the first and second slots **(J, K)**, respectively. *See* Slide 8.
Dependent Claim 2	
[2a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter is a dual fiber type direct link LC adapter including an LC connector end configured to receive first and second LC connectors.	*See,* Claim 1, *supra*. The 2011 Oclaro Deck further discloses the use of LC connector in XFP transceivers, which was well known in the field at the time of filing the application for the '383 patent; use of such connectors is described in the XFP MSA as well as the preceding SFP MSA. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf); Small Form Factor Pluggable (SFP) Transceiver MultiSource Agreement, 2001, available at Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (http://schelto.com/SFP/SFP%20MSA.pdf)("SPF MSA") at page 1.
Dependent Claim 5	
[5a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies comprises a fiber ferrule receiving a respective one of the optical fibers and a	*See,* Claim 1, *supra*.

sleeve around the fiber ferrule, and wherein the sleeve defines at least a portion of the connector receptacle.	The 2011 Oclaro Deck further discloses each of the direct link connector assemblies **(M. N)** includes a fiber ferrule receiving a respective one of the optical fibers and a sleeve around the fiber ferrule such that the sleeve defines at least a portion of the connector receptacle **(S).** *See* Slide 8.
Dependent Claim 6	
[6a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies further comprises an outer housing around the fiber ferrule and sleeve, the outer housing defining at least a portion of the connector receptacle and including the flange portion for securing the direct link connector assembly.	*See,* Claim 1, *supra.* The 2011 Oclaro Deck further discloses each of the direct link connector assemblies **(M, N)** includes an outer housing around the fiber ferrule and sleeve, wherein the outer housing defines at least a portion of the connector receptacle **(S),** including a flange portion **(O)** for securing the direct link connector assembly **(M, N).** *See* Slide 8.
Dependent Claim 7	
[7a] The multi-channel transceiver module of claim 1 wherein the connector receptacle is configured to mate with an LC connector.	*See,* Claim 1, *supra.* The 2011 Oclaro Deck further discloses the connector receptacle **(S)** may be designed to mate with an LC connector (e.g., at LC connector end **(W)**). The use of LC connector in XFP transceivers, as described in the '017 publication, was well known in the field at the time of filing the application for the '383 patent; use of such connectors is described in the XFP MSA as well as the preceding SFP MSA. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf); Small Form Factor Pluggable (SFP) Transceiver

	MultiSource Agreement, 2001, available at Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (http://schelto.com/SFP/SFP%20MSA.pdf)("SPF MSA") at page 1.
Dependent Claim 8	
[8a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter defines first and second connector receiving regions configured to receive respective first and second pluggable optical connectors, and wherein the connector receptacles extend into the connector receiving regions.	*See,* Claim 1, *supra*. The 2011 Oclaro Deck further discloses the dual fiber type direct link adapter **(D)** defines first and second connector receiving regions **(X)**, wherein the connector receptacles **(S)**) extend to receive respective first and second pluggable optical connectors and extend into the connector receiving regions **(X)**. *See* Slide 8.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,170,383 Against U.S. Patent No. 7,941,053 ("Dallesasse")

U.S. Patent No. 7,941,053 to Dallesasse

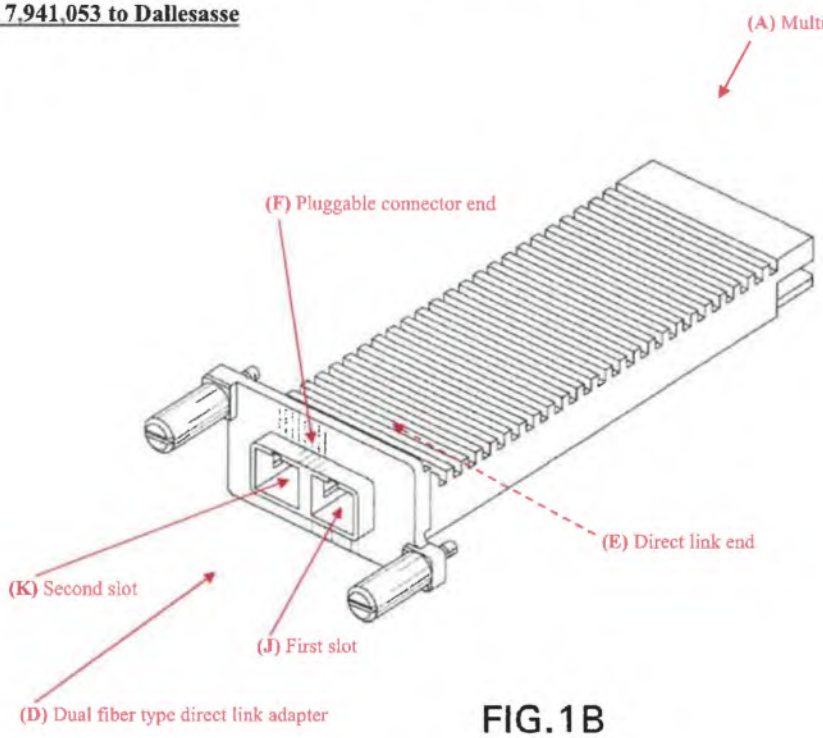


FIG. 1B

FIG. 1B (Dallesasse)

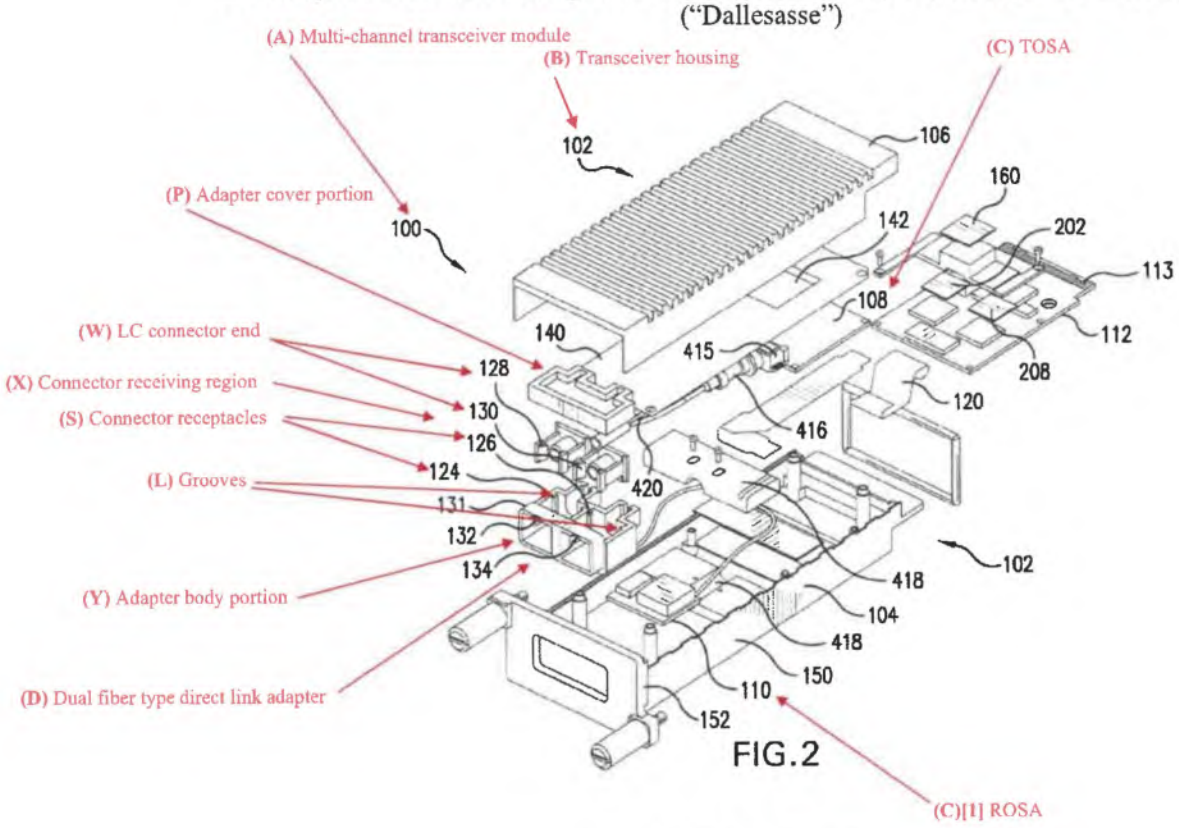


FIG.2

FIG. 2 (Dallesasse)

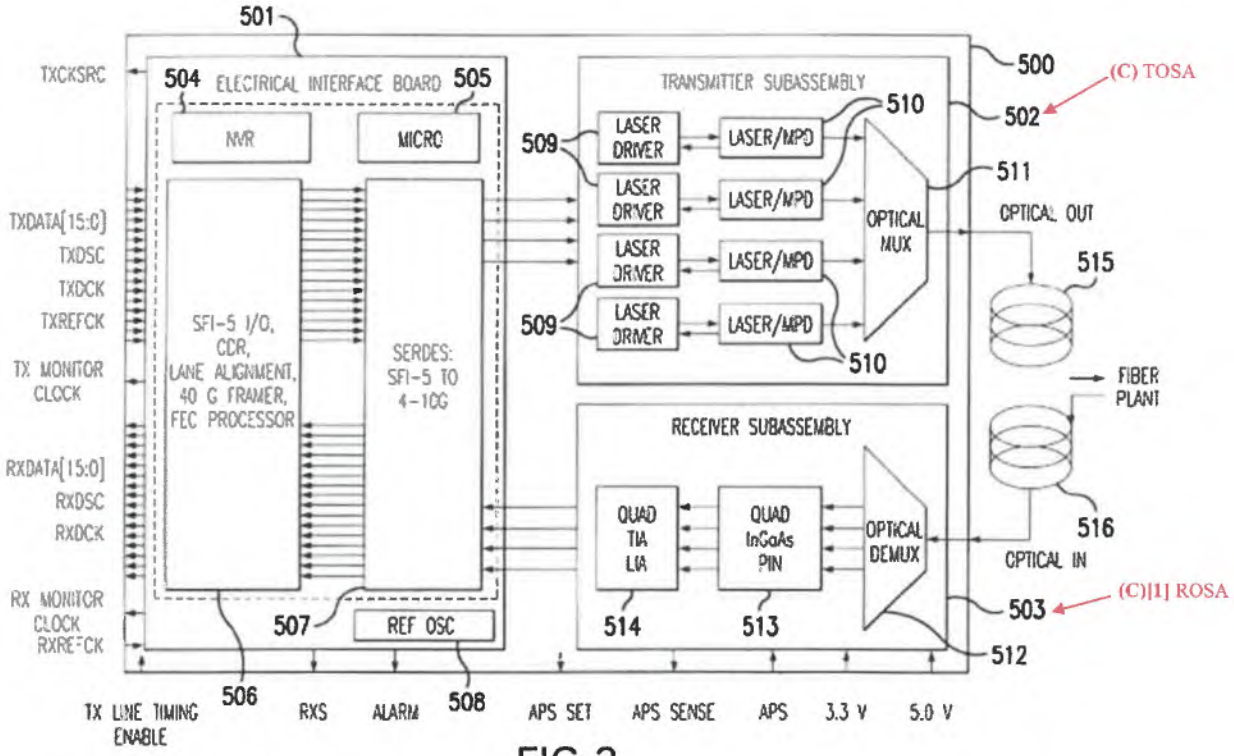


FIG.3

FIG. 3 (Dallesasse)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 9,170,383 Against U.S. Patent No. 7,941,053 ("Dallesasse")

U.S. Patent No. 9,170,383	Disclosure in Dallesasse
Independent Claim 1	
[1a] A multi-channel transceiver module comprising:	Dallesasse discloses a multi-channel transceiver module **(A)**. *See* FIGS. 1, 2; Col. 7, lines 6–27.
[1b] a transceiver housing;	Dallesasse discloses the multi-channel transceiver module **(A)** includes a transceiver housing **(B)**. *See* FIG. 2; Col. 7, lines 28–35.
[1c] a multi-channel transmitter optical subassembly (TOSA) located in the transceiver housing, the TOSA being configured to transmit a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths;	Dallesasse discloses an XFP transceiver module including a multi-channel transmitter optical subassembly (TOSA) **(C)** located in the transceiver housing **(B)** and designed to transmit a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths. *See* FIGS. 2, 3; Col. 1, lines 56–64; Col. 2, lines 20–32; Col. 5, lines 59–Col. 6, line 16; Col. 7, lines 49–66; Col. 8, lines 32–36; Col. 9, lines 4–10. XFP modules were further known in the art to use Dense Wavelength Division Multiplexing ("DWDM"). *See, e.g.,* XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf).
[1d] a multi-channel receiver optical subassembly (ROSA) located in the transceiver housing, the ROSA being configured to receive a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths; and	Dallesasse discloses the XFP transceiver module includes a multi-channel receiver optical subassembly (ROSA) **(C)[1]** located in the transceiver housing **(B)** and designed to receive a wavelength division multiplexed (WDM) optical signal on multiple channel wavelengths. *See* FIGS. 2, 3; Col. 2, lines 5–32; Col. 5, lines 59–Col. 6, line 16; Col. 7, lines 49–65; Col. 8,

	lines 32–36; Col. 9, lines 11–21. ROSAs are further known components of multi-channel transceiver modules and are understood as being designed to receive WDM optical signals on multiple channel wavelengths. *See, e.g.*, XFP MSA, INF-8077i, Rev. 4.5, August 31, 2005 at page 91, available at XFP MSA (INF-8077i): 10 Gigabit Small Form Factor Pluggable Module Specification Rev 4.5 (https://www.gigalight.com/downloads/standards/INF-8077i.pdf).
[1e] a dual fiber type direct link adapter located inside the transceiver housing and at one side of the transceiver housing, the dual fiber type direct link adapter having a direct link end located in the transceiver housing and a pluggable connector end facing outside of the transceiver housing, the direct link end of the dual fiber type direct link adapter being coupled to the TOSA with a first optical fiber and coupled to the ROSA with a second optical fiber to provide a direct link between the dual fiber type direct link adapter and the TOSA and the ROSA, the pluggable connector end being configured to receive first and second pluggable optical connectors for optically coupling the TOSA and the ROSA to external optical fibers, wherein the dual fiber type direct link adapter comprises:	Dallesasse discloses a dual fiber type direct link adapter **(D)** located inside the transceiver housing **(B)** and at one side of the transceiver housing **(B)**. The dual fiber type direct link adapter **(D)** has a direct link end **(E)** located in the transceiver housing **(B)** and a pluggable connector end **(F)** facing outside of the transceiver housing **(B)**. The direct link end **(E)** of the dual fiber type direct link adapter **(D)** is designed to be coupled to the TOSA **(C)** with a first optical fiber and coupled to the ROSA **(C)[1]** with a second optical fiber to provide a direct link between the dual fiber type direct link adapter **(D)** and the TOSA **(C)** and the ROSA **(C)[1]**. The pluggable connector end **(F)** is designed to receive first and second pluggable optical connectors for optically coupling the TOSA **(C)** and the ROSA **(C)[1]** to external optical fibers. *See* FIGS. 1B, 2; Col. 7, lines 36–Col. 8, line 17.
[1f] an adapter body portion defining first and second slots, each of the first and second slots including at least one groove;	Dallesasse discloses the dual fiber type direct link adapter **(D)** includes an adapter body portion **(Y)** defining a first slot **(J)** and a second slot **(K)**. Each of the first and the second slots **(J, K)**

	include at least one groove **(L)**. *See* FIGS. 1B, 2; Col. 7, lines 36–48.
[1g] first and second direct link connector assemblies received in the first and second slots, respectively, of the adapter body portion, each of the first and second direct link connector assemblies including at least one flange extending into the groove in the first and second slots, respectively, to prevent axial movement of the first and second direct link connector assemblies, wherein one end of each of the direct link connector assemblies defines a connector receptacle configured to receive a portion of the optical connector for optical coupling, and wherein another end of each of the connector assemblies is directly linked to a respective optical fiber; and	Dallesasse discloses the first and second slots **(J, K)** of the adapter body portion **(Y)** are designed to receive first and second direct link connector assemblies respectively to optical fibers to the transceiver **(A)**. Each of the first and second direct link connector assemblies includes at least one structural feature (e.g., a flange) to engage grooves **(L)** in the first and second slots **(J, K)**, respectively, to prevent axial movement of the first and second direct link connector assemblies. *See* FIGS. 1B, 2; Col. 7, lines 36–48.
[1h] an adapter cover portion covering the first and second slots and retaining the first and second direct link connector assemblies in the first and second slots, respectively.	Dallesasse discloses an adapter cover portion **(P)** covers the first and second slots **(J, K)** and is designed to retain the first and second direct link connector assemblies in the first and second slots **(J, K)**, respectively. *See* FIGS. 1B, 2; Col. 7, lines 28–48.
Dependent Claim 2	
[2a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter is a dual fiber type direct link LC adapter including an LC connector end configured to receive first and second LC connectors.	*See,* Claim 1, *supra*. Dallesasse further discloses the dual fiber type direct link adapter **(D)** is a dual fiber type direct link LC adapter including an LC connector end **(W)** designed to receive first and second LC connectors. *See* FIGS. 1B, 2; Col. 1, lines 56–61; Col. 7, lines 40–48.
Dependent Claim 5	
[5a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies comprises a fiber	*See,* Claim 1, *supra*.

ferrule receiving a respective one of the optical fibers and a sleeve around the fiber ferrule, and wherein the sleeve defines at least a portion of the connector receptacle.	Each of the direct link connector assemblies includes a fiber ferrule receiving a respective one of the optical fibers and a sleeve around the fiber ferrule such that the sleeve defines at least a portion of the connector receptacle **(S)**. *See* FIGS. 1B, 2; Col. 7, lines 6–65.
Dependent Claim 6	
[6a] The multi-channel transceiver module of claim 1 wherein each of the direct link connector assemblies further comprises an outer housing around the fiber ferrule and sleeve, the outer housing defining at least a portion of the connector receptacle and including the flange portion for securing the direct link connector assembly.	*See,* Claim 1, *supra*. Each of the direct link connector assemblies includes an outer housing around the fiber ferrule and sleeve such that the outer housing defines at least a portion of the connector receptacle **(S)** and includes the flange portion for securing the direct link connector assembly in grooves **(L)** of the first slot **(J)** and the second slot **(K)**. *See* FIGS. 1B, 2; Col. 7, lines 6–65.
Dependent Claim 7	
[7a] The multi-channel transceiver module of claim 1 wherein the connector receptacle is configured to mate with an LC connector.	*See,* Claim 1, *supra*. Dallesasse discloses the connector receptacle **(S)** is designed to mate with an LC connector (e.g., at LC connector end **(W)**). *See* FIGS. 1B, 2; Col. 1, lines 56–61; Col. 7, lines 40–48.
Dependent Claim 8	
[8a] The multi-channel transceiver module of claim 1 wherein the dual fiber type direct link adapter defines first and second connector receiving regions configured to receive respective first and second pluggable optical connectors, and wherein the connector receptacles extend into the connector receiving regions.	*See,* Claim 1, *supra*. Dallesasse further discloses the dual fiber type direct link adapter **(D)** defines first and second connector receiving regions **(X)** (e.g., between first and second slots **(J, K)** and connector receptacles **(S)**) designed to receive respective first and second pluggable optical connectors. The connector receptacle **(S)**

	extend into the connector receiving regions **(X)**. *See* FIGS. 1B, 2; Col. 7, lines 36–Col. 8, line 17.

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EXHIBIT E

Invalidity of the '116 Patent

U.S. Patent App. Pub. No. US 2016/0349451 to Shen

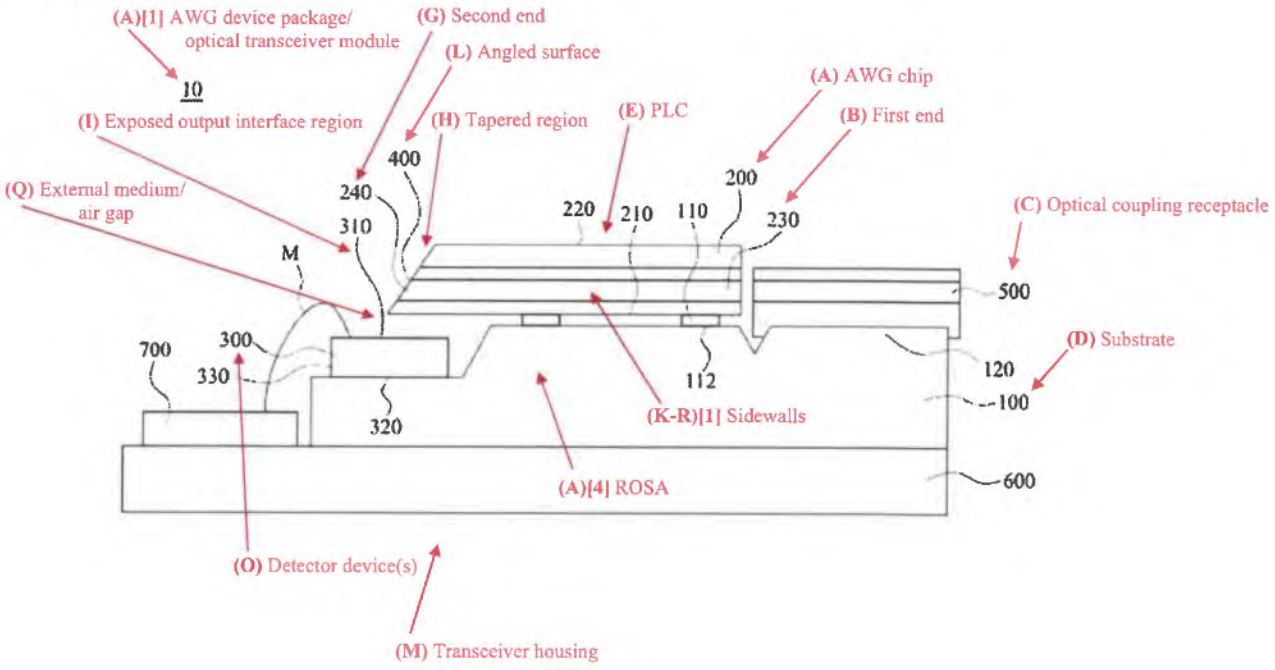


Fig. 1

FIG. 1 (Shen)

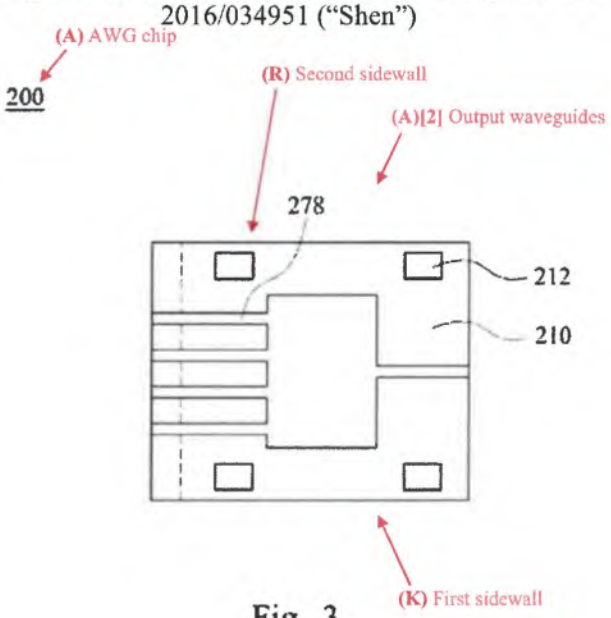


Fig. 3

FIG. 3 (Shen)

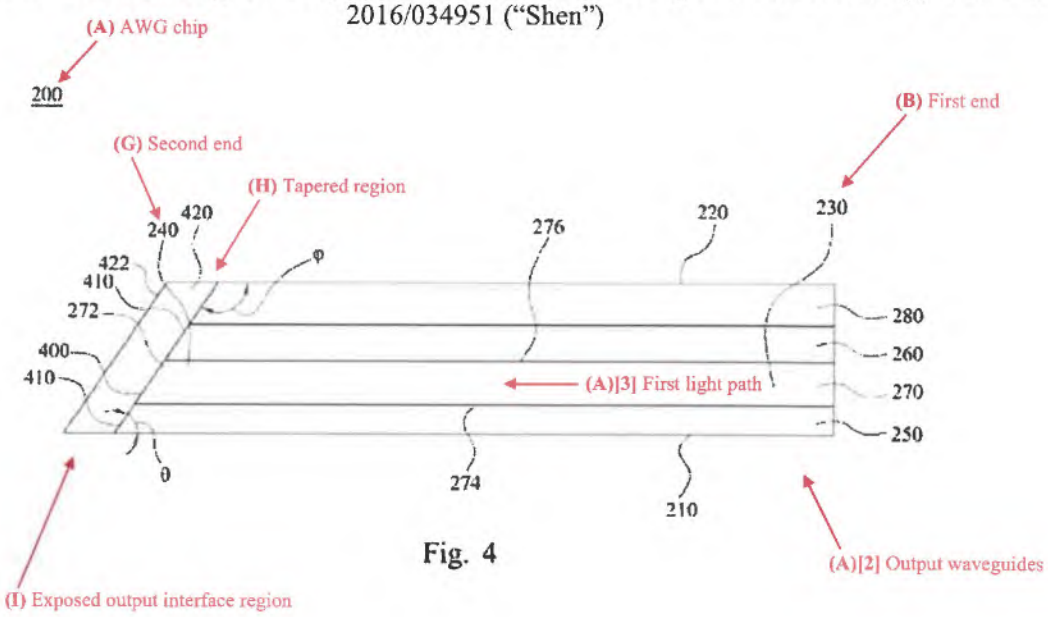


Fig. 4

FIG. 4 (Shen)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against U.S. Patent App. Pub. No. US 2016/034951 ("Shen")

U.S. Patent No. 10,042,116	Disclosure in Shen
Independent Claim 1	
[1a] An arrayed waveguide grating (AWG) chip comprising:	Shen discloses an arrayed waveguide grating (AWG) chip **(A)**. *See* FIG. 1; para. [0007].
[1b] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;	Shen discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal including a plurality of channel wavelengths. *See* FIG. 1; paras. [0035], [0043], [0044].
[1c] a substrate;	Shen discloses the AWG chip **(A)** is disposed on a substrate **(D)**. *See* FIG. 1; para. [0033].
[1d] a planar lightwave circuit (PLC) disposed on the substrate, the PLC coupled to the first end and configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	Shen discloses a planar lightwave circuit (PLC) **(E)** is disposed on the substrate **(D)**. The PLC **(E)** is coupled to the first end **(B)** of the AWG chip **(A)** and designed to de-multiplex each channel wavelength of the plurality of channel wavelengths. *See* FIG. 1; paras. [0035]; [0038]–[0043].
[1e] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	Shen discloses a plurality of output waveguides **(A)[2]** coupled to the PLC **(E)**. Each of the output waveguides **(A)[2]** is designed to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC **(E)** and provide the light along a first light path **(A)[3]** that extends toward a second end **(G)** of the AWG chip **(A)**. *See* FIGS. 1, 3, 4; paras. [0038]– [0043]
[1f] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an exposed output interface region of the AWG chip, wherein the exposed output interface region emits the received light from the AWG chip on	Shen discloses a tapered region **(H)** is disposed at the second end **(G)** of the AWG chip **(A)**. The tapered region **(H)** is designed to receive light via the plurality of output waveguides **(A)[2]** and reflect the same towards an exposed output interface region **(I)** of the AWG chip **(A)**. The exposed output interface region **(I)** emits the received light from the AWG chip **(A)** on the same

the same side as the substrate without passing the received light through the substrate.	side as the substrate **(D)** without passing the received light through the substrate **(D)**. *See* FIGS. 1, 4; paras. [0033], [0045].
Dependent Claim 3	
[3a] The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 1, *supra*. Shen further discloses the AWG chip **(A)** defines a plurality of sidewalls **(K-R)[1]** extending longitudinally from the first end **(B)** to the second end **(G)**. The tapered region **(H)** of the second end **(G)** define an angled surface **(L)** that extends from a first sidewall **(K)** of the plurality of sidewalls **(K-R)[1]** to a second sidewall **(R)** of the plurality of sidewalls **(K-R)[1]**. *See* FIGS. 1, 3; paras. [0038]–[0040].
Dependent Claim 4	
[4a] The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the exposed output interface region.	*See,* Claim 3, *supra*. Shen further discloses the angled surface **(L)** may form any acute interior angle (including an interior angle of about 41 to 45 degrees) relative to the exposed output interface region **(I)**. *See* FIG. 4; para. [0039].
Dependent Claim 10	
[10a] The AWG chip of claim 1, wherein the AWG chip is configured as a 1×N demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.	*See,* Claim 1, *supra*. Shen further discloses the AWG chip **(A)** is designed as a 1×N demultiplexer device such that a single optical input signal, received via the first end **(B)**, is de-multiplexed into N (e.g., four) different channel wavelengths. *See* FIGS. 1, 3; paras. [0035], [0043].

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against U.S. Patent App. Pub. No. US 2016/034951 ("Shen")

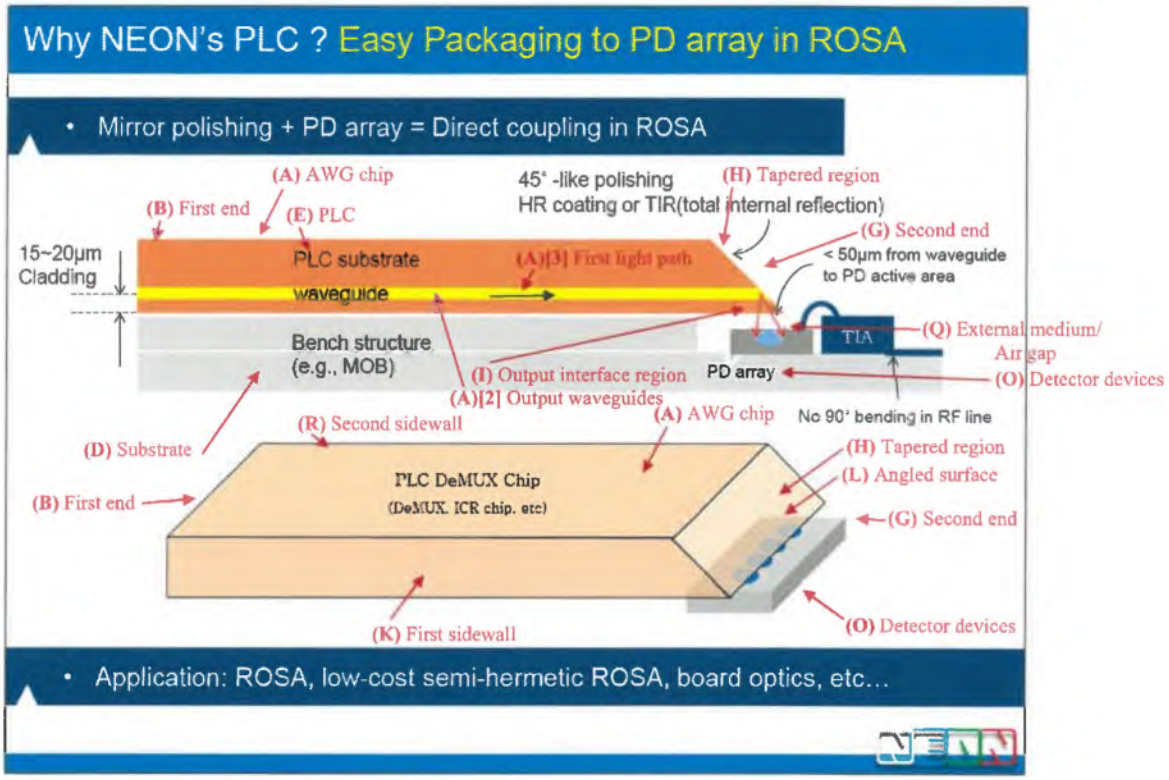
Dependent Claim 11	
[11a] The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.	The AWG chip **(A)** is implemented in an AWG device package **(A)[1]**. *See* FIG. 1; para. [0033].
Independent Claim 12	
[12a] An optical transceiver module comprising:	Shen discloses an optical transceiver module (i.e., AWG device package) **(A)[1]**.
[12b] a transceiver housing;	Shen discloses the optical transceiver module **(A)[1]** includes a transceiver housing **(M)**, which may or may not be integrally formed with one or more other components of the optical transceiver module **(A)[1]**. *See* FIG. 1; para. [0050].
[12c] a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:	Shen discloses the transceiver housing **(M)** includes a multi-channel receiver optical sub-assembly (ROSA) **(A)[4]** located in the transceiver housing **(M)** and including an arrayed waveguide grating (AWG) chip **(A)**. *See* FIG. 1; paras. [0005], [0021], [0033]–[0035], [0043].
[12d] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths, wherein the first end for coupling to the optical coupling receptacle includes an angled surface to reduce back reflections of an optical signal launched into the AWG chip;	Shen discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal including a plurality of channel wavelengths. As was well known in the art, it is desirable to couple optical optical fibers via angled surfaces to reduce back reflection, as described, e.g., in U.S. Patent 5,351,327. One of ordinary skill would therefore have understood that the first end **(B)** should have an angled surface to thereby reduce back reflections of the optical signals launched into the AWG chip **(A)**. *See* FIGS. 1, 4; paras. [0035], [0038]–[0044].
[12e] a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	*See,* [1d], *supra*.

[12f] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	*See,* [1e], *supra.*
[12g] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;	*See,* [1f], *supra.*
[12h] an array of detector devices disposed adjacent to the output interface region of the AWG chip; and	Shen discloses an array of detector devices **(O)** may be disposed adjacent to the output interface region **(I)** of the AWG chip **(A)**. *See* FIG. 1; para. [0033].
[12i] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	It would be understood that the optical transceiver module **(A)[1]** includes a multi-channel transmitter optical assembly (TOSA) located in the transceiver housing **(M)** for transmitting optical signals at different channel wavelengths, as TOSAs are known components of optical transceivers understood to be used in conjunction with ROSAs including AWG chips (such as those described in Shen). Shen discloses an AWG structure including multiple optical channels for transmitting light within different wavelength ranges, as well as a driver disposed on a circuit board, electrically connected to an optical detector, and designed to drive the optical detector or provide the optical detector with an electric signal. It further would be understood that a TOSA associated with such operations includes at least one laser package for transmitting optical signals at different channel wavelengths. *See* FIG. 1; paras. [0043], [0044].

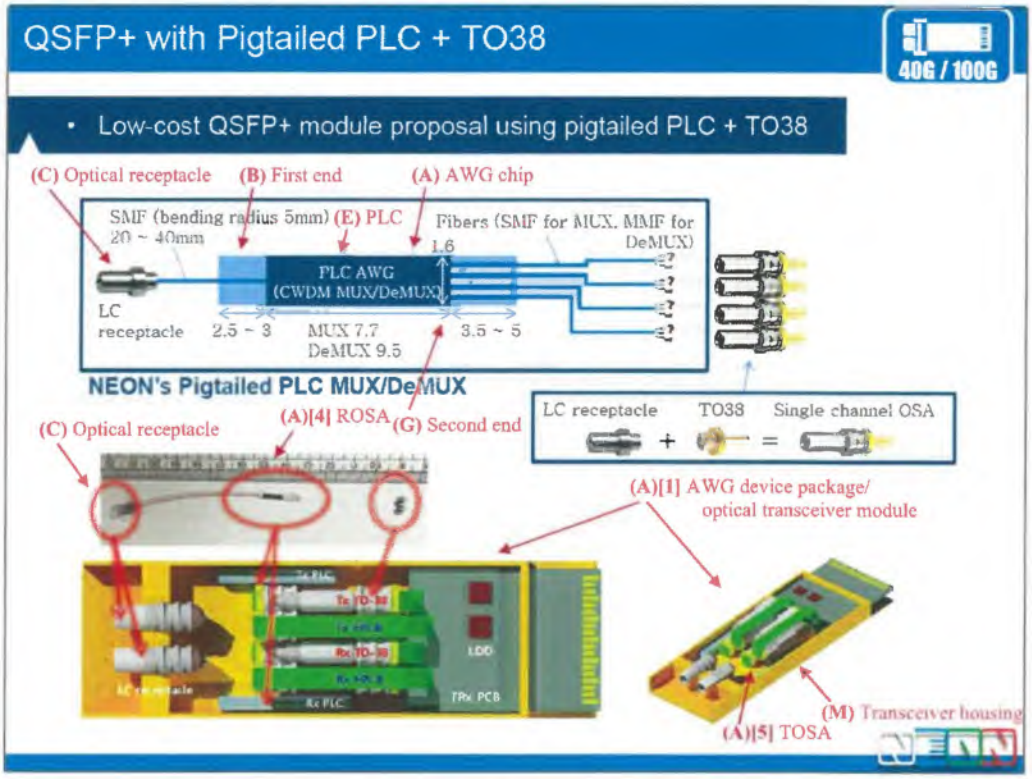
Dependent Claim 13	
[13a] The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is an exposed region adjacent an air gap, and wherein the air gap separates the output interface region of the AWG chip and the array of detector devices.	*See,* Claim 12, *supra.* Shen further discloses the output interface region **(I)** of the AWG chip **(A)** is an exposed region adjacent an air gap **(Q)**. The air gap **(Q)** separates the output interface region **(I)** of the AWG chip **(A)** and the array of detector devices **(O)**. *See* FIG. 1; paras. [0046], [0050].
Dependent Claim 15	
[15a] The optical transceiver module of claim 12 wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 12, *supra.* *See,* [3a], *supra.*
Dependent Claim 16	
[16a] The optical transceiver module of claim 15 wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.	*See,* Claim 15, *supra.* *See,* [4a], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against 2015 Neon Deck

2015 Neon Deck



Slide 11 (2015 Neon Deck)



Slide 13 (2015 Neon Deck)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against 2015 Neon Deck

U.S. Patent No. 10,042,116	Disclosure in 2015 Neon Deck
Independent Claim 1	
[1a] An arrayed waveguide grating (AWG) chip comprising:	The 2015 Neon Deck discloses an arrayed waveguide grating (AWG) chip **(A)**. *See* Slides 11, 13.
[1b] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;	The 2015 Neon Deck discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical receptacle **(C)** to receive an optical signal comprising a plurality of channel wavelengths. *See* Slide 13.
[1c] a substrate;	The 2015 Neon Deck discloses the AWG chip **(A)** includes a substrate **(D)**.
[1d] a planar lightwave circuit (PLC) disposed on the substrate, the PLC coupled to the first end and configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	The 2015 Neon Deck discloses a planar lightwave circuit (PLC) **(E)** is disposed on the substrate **(D)**. The PLC **(E)** is coupled to the first end **(B)** and designed to de-multiplex each channel wavelength of the plurality of wavelengths. *See* Slides 11, 13.
[1e] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	The 2015 Neon Deck discloses a plurality of output waveguides **(A)[2]** are coupled to the PLC **(E)**. Each of the output waveguides **(A)[2]** is designed to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC **(E)** and provide the light along a first light path **(A)[3]** that extends toward a second end **(G)** of the AWG chip **(A)**. *See* Slides 11, 13.
[1f] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an exposed output interface region of the AWG chip, wherein the exposed output interface region emits the received light from the AWG chip on	The 2015 Neon Deck discloses the second end **(G)** of the AWG chip **(A)** has a tapered region **(H)** designed to receive light via the plurality of output waveguides **(A)[2]** and reflect the same towards an exposed output interface region **(I)** of the AWG chip **(A)**. The exposed output interface region **(I)** emits the received light from the AWG chip **(A)** on the same side as the substrate

the same side as the substrate without passing the received light through the substrate.	**(D)** without passing the received light through the substrate **(D)**. *See* Slide 11.
Dependent Claim 3	
[3a] The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 1, *supra*. The 2015 Neon Deck further discloses the AWG chip **(A)** defines a plurality of sidewalls extending longitudinally from the first end **(B)** to the second end **(G)**. The tapered region **(H)** of the second end **(G)** define an angled surface **(L)** that extends from a first sidewall **(K)** to a second sidewall **(R)** of the plurality of sidewalls. *See* Slide 11.
Dependent Claim 4	
[4a] The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the exposed output interface region.	*See,* Claim 3, *supra*. The 2015 Neon Deck further discloses that the angled surface **(L)** may have an interior angle of about 41 to 45 degrees relative to the exposed output interface region **(I)**. *See* Slide 11.
Dependent Claim 10	
[10a] The AWG chip of claim 1, wherein the AWG chip is configured as a 1×N demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.	*See,* Claim 1, *supra*. The 2015 Neon Deck further discloses the AWG chip **(A)** is designed as a 1×N demultiplexer device for de-multiplexing a single optical input signal into N different channel wavelengths. *See* Slides 13.
Dependent Claim 11	
[11a] The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.	*See,* Claim 1, *supra*. The 2015 Neon Deck further discloses the AWG chip **(A)** is implemented in an AWG device package **(A)[1]**. *See* Slide 13.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against 2015 Neon Deck

Independent Claim 12	
[12a] An optical transceiver module comprising:	The 2015 Neon Deck discloses an optical transceiver module **(A)[1]**. *See* Slide 13.
[12b] a transceiver housing;	The 2015 Neon Deck discloses the optical transceiver module includes a transceiver housing **(M)**. *See* Slide 13.
[12c] a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:	The 2015 Neon Deck discloses a multi-channel receiver optical sub-assembly (ROSA) **(A)[4]** is located in the transceiver housing **(M)** and includes an arrayed waveguide grating (AWG) chip **(A)**. *See* Slide 13.
[12d] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths, wherein the first end for coupling to the optical coupling receptacle includes an angled surface to reduce back reflections of an optical signal launched into the AWG chip;	The 2015 Neon Deck discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical receptacle **(C)** to receive an optical signal comprising a plurality of channel wavelengths. As was well known in the art, it is desirable to couple optical optical fibers via angled surfaces to reduce back reflection, as described, e.g., in U.S. Patent 5,351,327. One of ordinary skill would therefore have understood that the first end **(B)** for coupling to the optical coupling receptacle **(C)** should include an angled surface (e.g., associated with the waveguides **(A)[2]**, the first sidewall **(K)**, and/or the second sidewall **(R)**) to reduce back reflections of an optical signal launched into the AWG chip **(A)**. *See* Slides 11, 13.
[12e] a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	*See,* [1d], *supra*.
[12f] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a	*See,* [1e], *supra*.

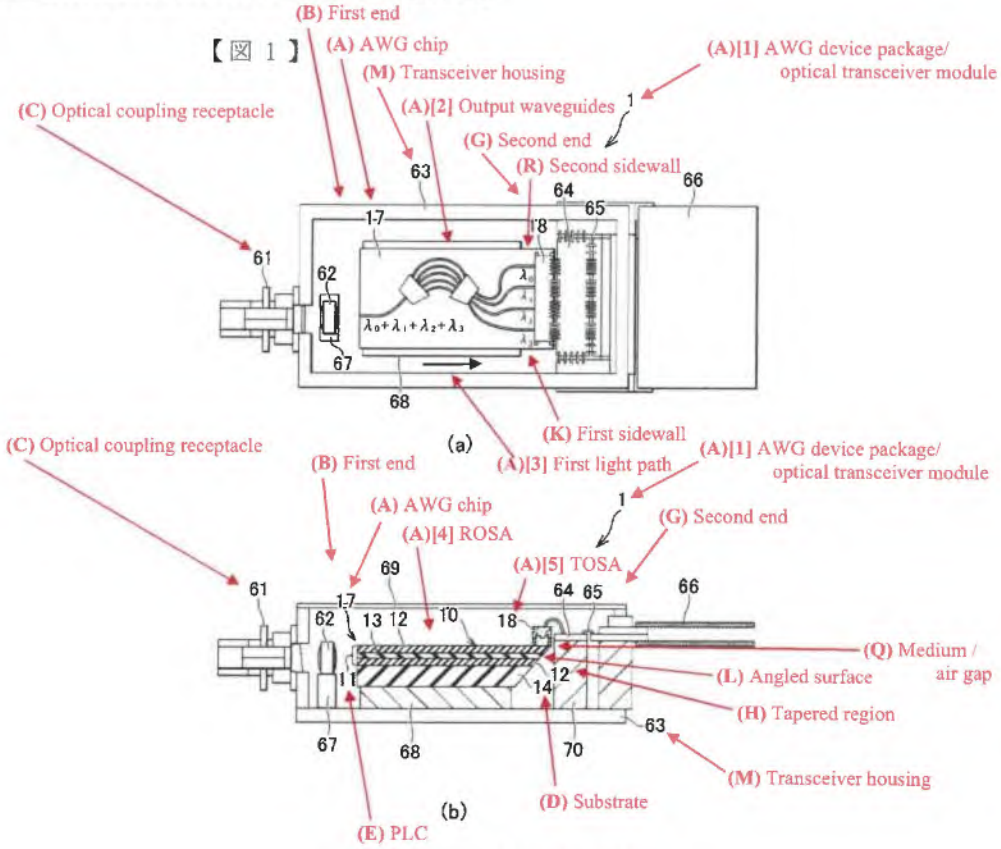
first light path that extends towards a second end of the AWG chip; and	
[12g] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;	*See,* [1f], *supra.*
[12h] an array of detector devices disposed adjacent to the output interface region of the AWG chip; and	The 2015 Neon Deck discloses an array of detector devices **(O)** is disposed adjacent to the output interface region **(I)** of the AWG chip **(A)**. *See* Slide 11.
[12i] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	The 2015 Neon Deck discloses a multi-channel transmitter optical assembly (TOSA) **(A)[5]** including at least one laser package is located in the transceiver housing **(M)** for transmitting optical signals at different channel wavelengths. *See* Slide 13.
Dependent Claim 13	
[13a] The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is an exposed region adjacent an air gap, and wherein the air gap separates the output interface region of the AWG chip and the array of detector devices.	*See,* Claim 12, *supra.* The 2015 Neon Deck further discloses the output interface region **(I)** of the AWG chip **(A)** is an exposed region adjacent an air gap **(Q)**. The air gap **(Q)** separates the output interface region **(I)** of the AWG chip **(A)** and the array of detector devices **(O)**. *See* Slide 11.
Dependent Claim 15	
[15a] The optical transceiver module of claim 12 wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 12, *supra.* *See,* [3a], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against 2015 Neon Deck

Dependent Claim 16	
[16a] The optical transceiver module of claim 15 wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.	*See,* Claim 15, *supra.* *See,* [4a], *supra.*

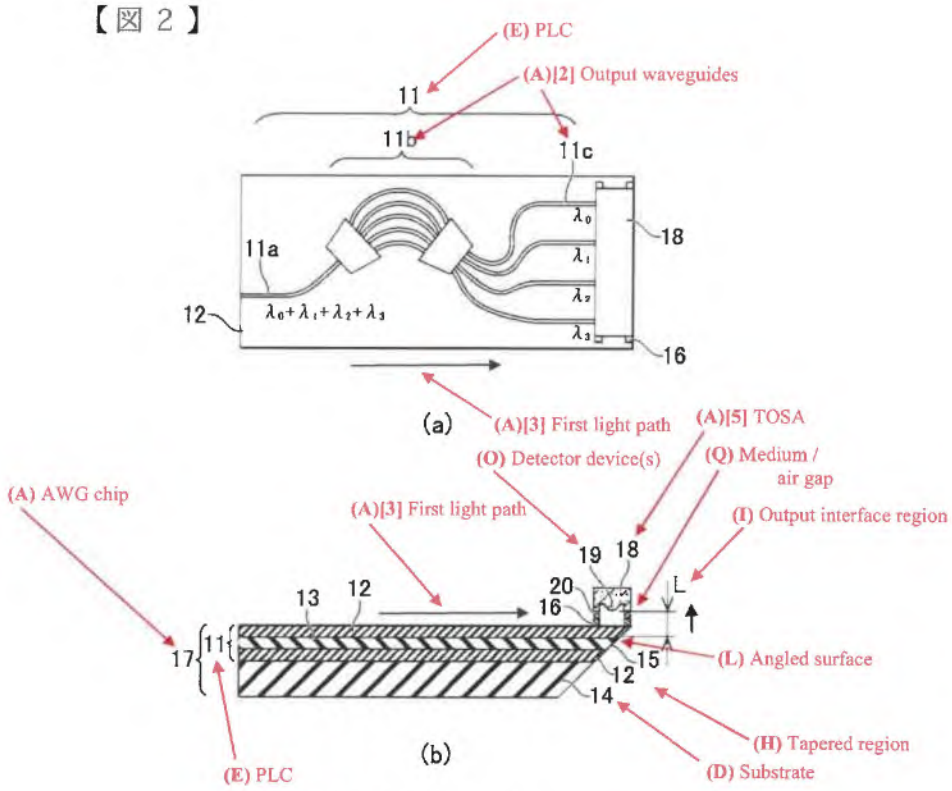
Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against Japanese Patent Pub. No. JP-PUB-2017-194565 ("Masato")

Japanese Patent Pub No. JP-PUB-2017-194565 to Masato et al.



FIGS. 1(a) & 1(b) (Masato)

【図２】



FIGS. 2(a) & 2(b) (Masato)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against Japanese Patent Pub. No. JP-PUB-2017-194565 ("Masato")

U.S. Patent No. 10,042,116	Disclosure in Masato
Independent Claim 1	
[1a] An arrayed waveguide grating (AWG) chip comprising:	Masato discloses an arrayed waveguide grating (AWG) chip **(A)**. *See* FIGS. 1(a), 1(b), 2(b); paras. [0025], [0026], [0028] (JPO machine translation).
[1b] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;	Masato discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal comprising a plurality of channel wavelengths. *See* FIGS. 1(a), 1(b); paras. [0014], [0018], [0020]–[0022] (JPO machine translation).
[1c] a substrate;	Masato discloses the AWG chip **(A)** includes a substrate **(D)**. *See* FIGS. 1(b), 2(b); para. [0026] (JPO machine translation).
[1d] a planar lightwave circuit (PLC) disposed on the substrate, the PLC coupled to the first end and configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	Masato discloses a planar lightwave circuit (PLC) **(E)** is disposed on the substrate **(D)**. The PLC **(E)** is coupled to the first end **(B)** and designed to de-multiplex each channel wavelength of the plurality of channel wavelengths. *See* FIGS. 1(a), 2(a), 2(b); paras. [0024], [0028], [0032] (JPO machine translation).
[1e] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	Masato discloses a plurality of output waveguides **(A)[2]** are coupled to the PLC **(E)**. Each of the output waveguides **(A)[2]** is designed to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC **(E)** and provide the light along a first light path **(A)[3]** that extends toward a second end **(G)** of the AWG chip **(A)**. *See* FIGS. 1(a), 1(b), 2(a); paras. [0009], [0010], [0024]–[0026] (JPO machine translation).
[1f] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output	Masato discloses the second end **(G)** of the AWG chip **(A)** has a tapered region **(H)** designed to receive light via the plurality of

waveguides and reflect the same towards an exposed output interface region of the AWG chip, wherein the exposed output interface region emits the received light from the AWG chip on the same side as the substrate without passing the received light through the substrate.	output waveguides **(A)[2]** and reflect the same towards an exposed output interface region **(I)** of the AWG chip **(A)**. The exposed output interface region **(I)** emits the received light from the AWG chip **(A)** on the same side as the substrate **(D)** without passing the received light through the substrate **(D)**. *See* FIGS. 1(b), 2(b); para. [0026] (JPO machine translation).
Dependent Claim 3	
[3a] The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 1, *supra.* Masato further discloses the AWG chip **(A)** defines a plurality of sidewalls extending longitudinally from the first end **(B)** to the second end **(G)**. The tapered region **(H)** of the second end **(G)** defines an angled surface **(L)** that extends from a first sidewall **(K)** to a second sidewall **(R)** of the plurality of sidewalls. *See* FIGS. 1(a), 1(b), 2(b); para. [0026] (JPO machine translation).
Dependent Claim 4	
[4a] The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the exposed output interface region.	*See,* Claim 3, *supra.* Masato further discloses the angled surface **(L)** may have an interior angle of about 41 to 45 degrees relative to the exposed output interface region **(I)**. *See* FIGS. 1(b), 2(b); para. [0026] (JPO machine translation).
Dependent Claim 10	
[10a] The AWG chip of claim 1, wherein the AWG chip is configured as a 1×N demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.	*See,* Claim 1, *supra.* Masato further discloses the AWG chip **(A)** is designed as a 1×N demultiplexer device for de-multiplexing a single optical input

	signal into N different channel wavelengths. *See* FIGS. 1(a), 2(b); paras. [0012], [0024] (JPO machine translation).
Dependent Claim 11	
[11a] The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.	*See,* Claim 1, *supra.* Masato further discloses the AWG chip **(A)** is implemented in an AWG device package **(A)[1]**. *See* FIGS. 1(a), 1(b); paras. [0009]–[0013], [0017]–[0022] (JPO machine translation).
Independent Claim 12	
[12a] An optical transceiver module comprising:	Masato discloses an optical transceiver module **(A)[1]**. *See* FIGS. 1(a), 1(b); paras. [0009]–[0013], [0017]–[0022] (JPO machine translation).
[12b] a transceiver housing;	Masato discloses the optical transceiver module **(A)[1]** includes a transceiver housing **(M)**. *See* FIGS. 1(a), 1(b); para. [0018] (JPO machine translation).
[12c] a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:	Masato discloses a multi-channel receiver optical sub-assembly (ROSA) **(A)[4]** is located in the transceiver housing **(M)** and includes an arrayed waveguide grating (AWG) chip **(A)**. *See* FIG. 1(b); paras. [0010], [0025] (JPO machine translation).
[12d] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths, wherein the first end for coupling to the optical coupling receptacle includes an angled surface to reduce back reflections of an optical signal launched into the AWG chip;	Masato discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical receptacle **(C)** to receive an optical signal comprising a plurality of channel wavelengths. As was well known in the art, it is desirable to couple optical optical fibers via angled surfaces to reduce back reflection, as described, e.g., in U.S. Patent 5,351,327. One of ordinary skill would therefore have understood that the first end **(B)** for coupling to the optical coupling receptacle **(C)** should include an angled surface (e.g., associated with the waveguides **(A)[2]**, the first sidewall **(K)**,

	and/or the second sidewall **(R)**) to reduce back reflections of an optical signal launched into the AWG chip **(A)**. FIGS. 1(a), 1(b); para. [0026] (JPO machine translation).
[12e] a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	*See,* [1d], *supra*.
[12f] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	*See,* [1e], *supra*.
[12g] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;	*See,* [1f], *supra*.
[12h] an array of detector devices disposed adjacent to the output interface region of the AWG chip; and	Masato discloses an array of detector devices **(O)** are disposed adjacent to the output interface region **(I)** of the AWG chip **(A)**. *See* FIG. 2(b); paras. [0019], [0020], [0025], [0026] (JPO machine translation).
[12i] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	Masato discloses a multi-channel transmitter optical assembly (TOSA) **(A)[5]** including at least one laser package is located in the transceiver housing **(S)** for transmitting optical signals at different channel wavelengths. *See* FIGS. 1(b), 2(b); paras. [0025], [0028] (JPO machine translation).
Dependent Claim 13	
[13a] The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is an exposed region	*See,* Claim 12, *supra*.

adjacent an air gap, and wherein the air gap separates the output interface region of the AWG chip and the array of detector devices.	Masato further discloses the output interface region **(I)** of the AWG chip **(A)** is an exposed region adjacent an air gap **(Q)**. The air gap **(Q)** separates the output interface region **(I)** of the AWG chip **(A)** and the array of detector devices **(O)**. *See* FIGS. 1(b), 2(b); para. [0029] (JPO machine translation).
Dependent Claim 15	
[15a] The optical transceiver module of claim 12 wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 12, *supra*. *See,* [3a], *supra*.
Dependent Claim 16	
[16a] The optical transceiver module of claim 15 wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.	*See,* Claim 15, *supra*. *See,* [4a], *supra*.

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against Japanese Patent Pub. No. JP-PUB-2003-215371 ("Junichi")

Japanese Patent Pub. No. JP-PUB-2003-215371 to Junichi

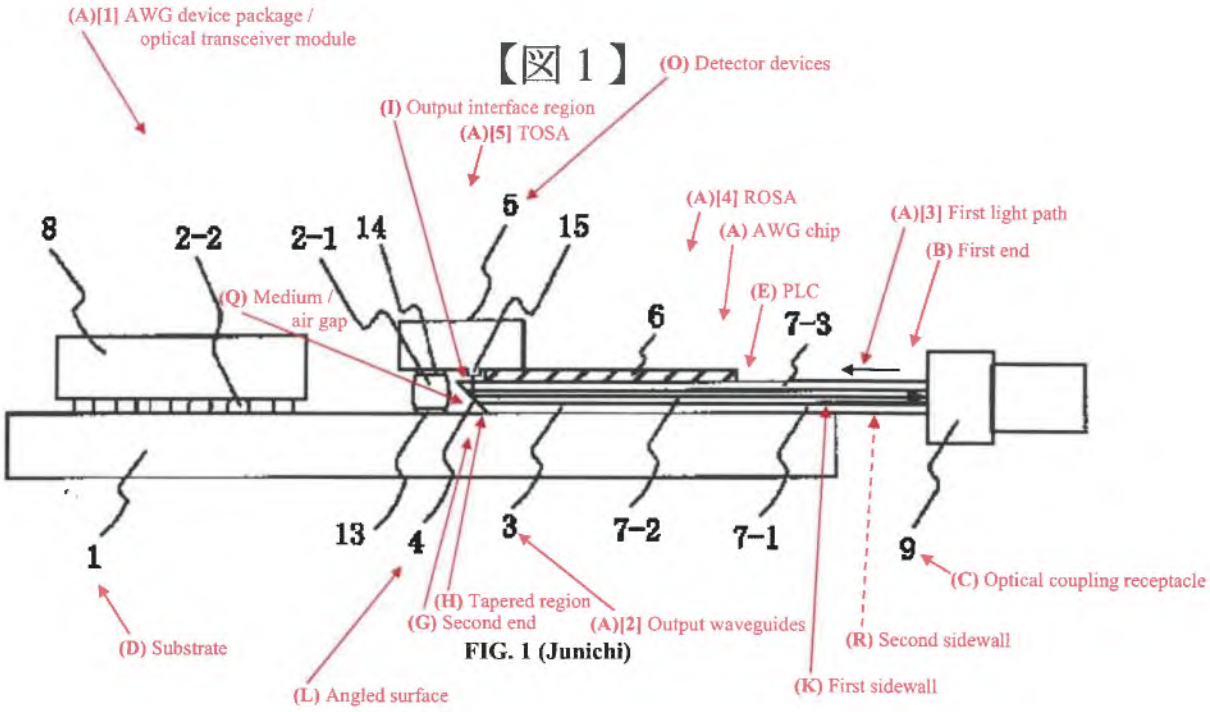


FIG. 1 (Junichi)

【図５】

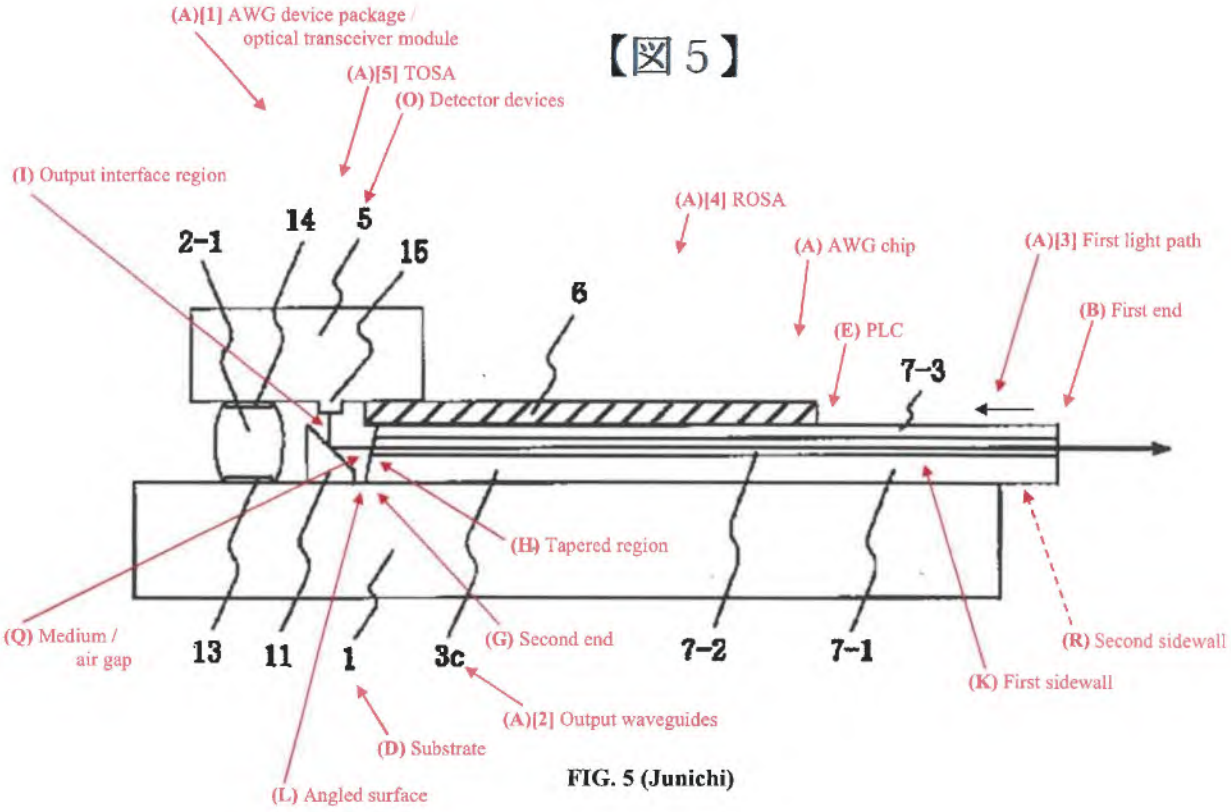


FIG. 5 (Junichi)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against Japanese Patent Pub. No. JP-PUB-2003-215371 ("Junichi")

U.S. Patent No. 10,042,116	Disclosure in Junichi
Independent Claim 1	
[1a] An arrayed waveguide grating (AWG) chip comprising:	Junichi discloses an arrayed waveguide grating (AWG) chip **(A)**. *See* FIGS. 1, 5; paras. [0018]-[0020], [0025], [0042] (JPO machine translation).
[1b] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;	Junichi discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal including a plurality of channel wavelengths. *See* FIGS. 1, 5; paras. [0018], [0023], [0032] (JPO machine translation).
[1c] a substrate;	Junichi discloses the AWG chip **(A)** includes a substrate **(D)**. *See* FIGS. 1, 5; para. [0026] (JPO machine translation).
[1d] a planar lightwave circuit (PLC) disposed on the substrate, the PLC coupled to the first end and configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	Junichi discloses a planar lightwave circuit (PLC) **(E)** is located on the substrate **(D)**. The PLC **(E)** is coupled to the first end **(B)** and designed to de-multiplex each channel wavelength of the plurality of channel wavelengths. *See* FIGS. 1, 5; paras. [0018]-[0020]; claim 5 (JPO machine translation).
[1e] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	Junichi discloses a plurality of output waveguides **(A)[2]** are coupled to the PLC **(E)**. Each of the output waveguides **(A)[2]** is designed to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC **(E)** and provide the light along a first light path **(A)[3]** that extends toward a second end of the AWG chip **(A)**. *See* FIGS. 1, 5; paras. [0017], [0018], [0025], [0057] (JPO machine translation).
[1f] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an exposed output interface region of the AWG chip, wherein the exposed output	Junichi discloses the second end **(G)** of the AWG chip **(A)** has a tapered region **(H)** designed to receive light via the plurality of output waveguides **(A)[2]** and reflect the same towards an exposed output interface region **(I)** of the AWG chip **(A)**. The

interface region emits the received light from the AWG chip on the same side as the substrate without passing the received light through the substrate.	exposed output interface region **(I)** emits the received light from the AWG chip **(A)** on the same side as the substrate **(D)** without passing the received light through the substrate **(D)**. *See* FIGS. 1, 5; paras. [0017]–[0020], [0035] (JPO machine translation).
Dependent Claim 3	
[3a] The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 1, *supra*. Junichi further discloses the AWG chip **(A)** defines a plurality of sidewalls extending longitudinally from the first end **(B)** to the second end **(G)**. The tapered region **(H)** of the second end **(G)** defines an angled surface **(L)** that extends from a first sidewall **(K)** to a second sidewall **(R)** of the plurality of sidewalls. *See* FIGS. 1, 5; paras. [0017]–[0019], [0029], [0031]; claim 1 (JPO machine translation).
Dependent Claim 4	
[4a] The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the exposed output interface region.	*See,* Claim 3, *supra*. Junichi further discloses the angled surface **(L)** may have an interior angle of about 41 to 45 degrees (e.g., 45 degrees) relative to the exposed output interface region **(I)**. *See* FIG. 1; para. [0025] (JPO machine translation).
Dependent Claim 10	
[10a] The AWG chip of claim 1, wherein the AWG chip is configured as a 1×N demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.	*See,* Claim 1, *supra*. Junichi further discloses the AWG chip **(A)** may be designed as a 1×N demultiplexer device where a single optical input signal may be de-multiplexed into N different channel wavelengths. *See* FIG. 1; para. [0047]; claim 5 (JPO machine translation).

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against Japanese Patent Pub. No. JP-PUB-2003-215371 ("Junichi")

Dependent Claim 11	
[11a] The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.	*See,* Claim 1, *supra*. Junichi further discloses the AWG chip **(A)** may be implemented in an AWG device package **(A)[1]**. *See* FIGS. 1, 5; paras. [0017], [0018] (JPO machine translation).
Independent Claim 12	
[12a] An optical transceiver module comprising:	Junichi discloses an optical transceiver module **(A)[1]**. *See* FIGS. 1, 5; paras. [0017], [0018], [0042] (JPO machine translation).
[12b] a transceiver housing;	Junichi discloses it would be understood that the components of the optical transceiver module **(A)[1]** would be housed in a transceiver housing for installation and/or use, e.g., with an information processing apparatus. *See* FIGS. 1, 5; paras. [0001]–[0003] (JPO machine translation).
[12c] a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:	Junichi discloses a multi-channel receiver optical sub-assembly (ROSA) **(A)[4]** is located in the transceiver housing and includes an arrayed waveguide grating (AWG) chip **(A)**. *See* FIGS. 1, 5; paras. [0017], [0018], [0020], [0021]; claim 1 (JPO machine translation).
[12d] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths, wherein the first end for coupling to the optical coupling receptacle includes an angled surface to reduce back reflections of an optical signal launched into the AWG chip;	Junichi discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical receptacle **(C)** to receive an optical signal comprising a plurality of channel wavelengths. As was well known in the art, it is desirable to couple optical optical fibers via angled surfaces to reduce back reflection, as described, e.g., in U.S. Patent 5,351,327. One of ordinary skill would therefore

	have understood that the first end **(B)** for coupling to the optical coupling receptacle **(C)** should include an angled surface (e.g. associated with the waveguides **(A)[2]**, the first sidewall **(K)**, and/or the second sidewall **(R)**) to reduce back reflections of an optical signal launched into the AWG chip **(A)**. *See* FIGS. 1, 5; paras. [0032], [0043], [0057] (JPO machine translation).
[12e] a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	*See,* [1d], *supra.*
[12f] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	*See,* [1e], *supra.*
[12g] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;	*See,* [1f], *supra.*
[12h] an array of detector devices disposed adjacent to the output interface region of the AWG chip; and	Junichi discloses an array of detector devices **(O)** may be disposed adjacent to the output interface region **(I)** of the AWG chip **(A)**. *See* FIGS. 1, 5; paras. [0017], [0018].
[12i] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	Junichi discloses a multi-channel transmitter optical assembly (TOSA) **(A)[5]** including at least one laser package may be located in the transceiver housing for transmitting optical signals at different channel wavelengths. *See* FIGS. 1, 5; paras. [0023], [0029] (JPO machine translation).
Dependent Claim 13	

[13a] The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is an exposed region adjacent an air gap, and wherein the air gap separates the output interface region of the AWG chip and the array of detector devices.	*See,* Claim 12, *supra.* Junichi further discloses the output interface region **(I)** of the AWG chip **(A)** may be an exposed region adjacent an air gap **(Q)**. The air gap **(Q)** may separate the output interface region **(I)** of the AWG chip **(A)** and the array of detector devices **(O)**. *See* FIGS. 1, 5; paras. [0018], [0029] (JPO machine translation).
Dependent Claim 15	
[15a] The optical transceiver module of claim 12 wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 12, *supra.* *See,* [3a], *supra.*
Dependent Claim 16	
[16a] The optical transceiver module of claim 15 wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.	*See,* Claim 15, *supra.* *See,* [4a], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against U.S. Patent No. 9,768,901 ("Soldano")

U.S. Patent No. 9,768,901 to Soldano

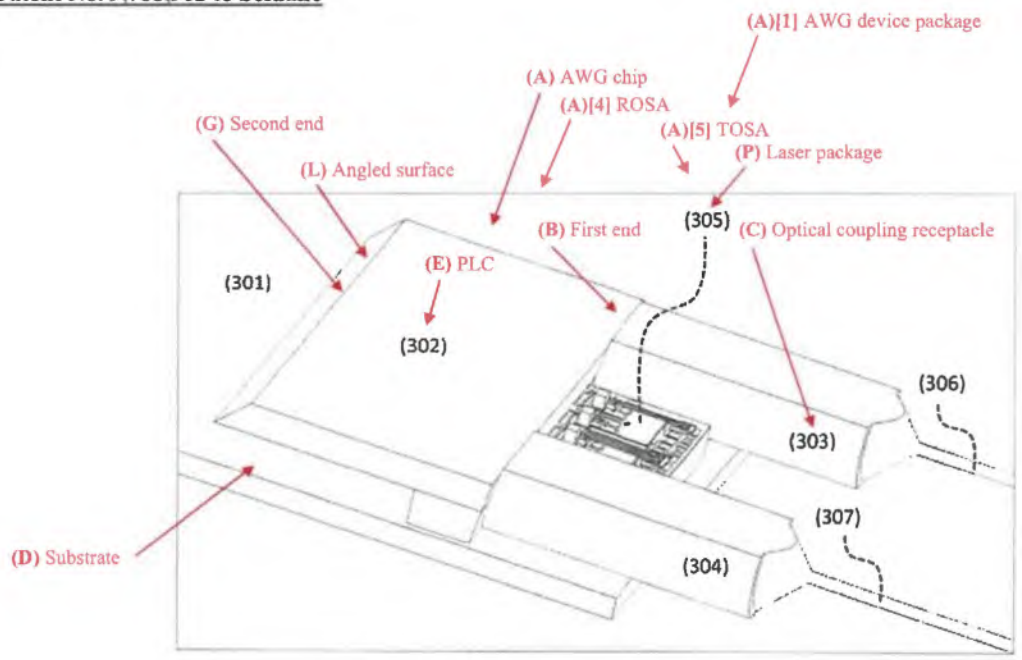


Fig 3

FIG. 3 (Soldano)

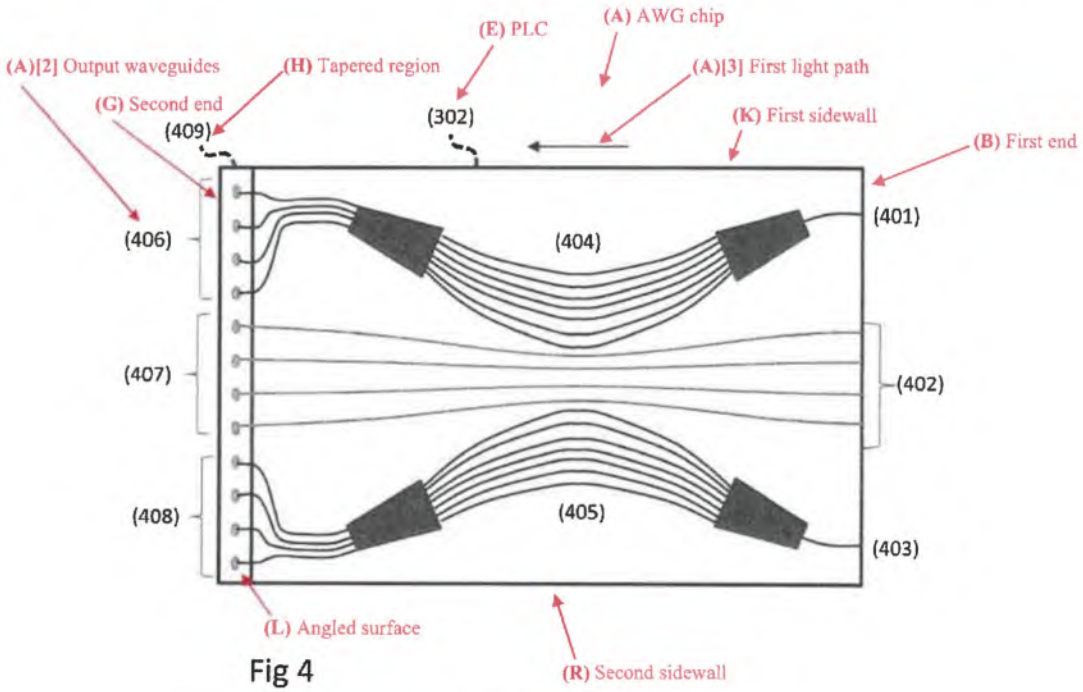


FIG. 4 (Soldano)

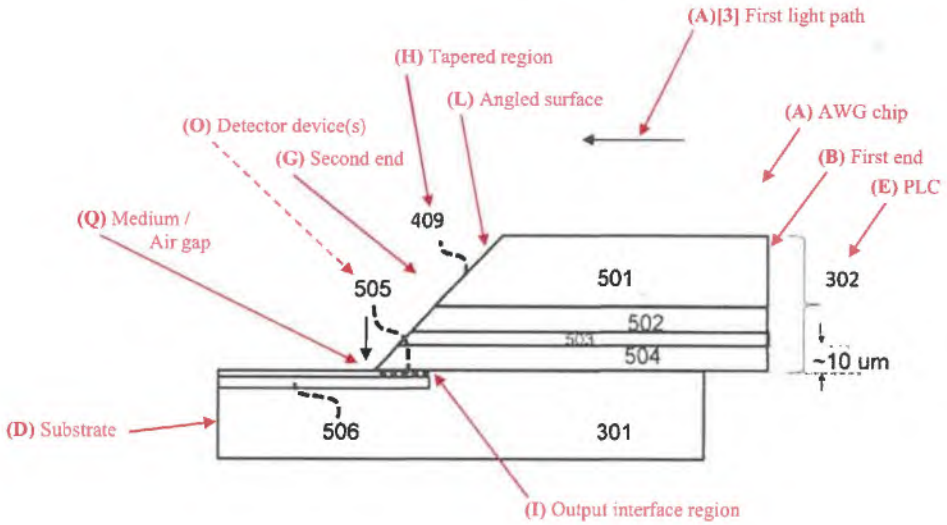


Fig 5

FIG. 5 (Soldano)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,042,116 Against U.S. Patent No. 9,768,901 ("Soldano")

U.S. Patent No. 10,042,116	Disclosure in Soldano
Independent Claim 1	
[1a] An arrayed waveguide grating (AWG) chip comprising:	Soldano discloses an arrayed waveguide grating (AWG) chip **(A)**. *See* FIGS. 3–5; Col. 7, line 62–Col. 8, line 28.
[1b] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths;	Soldano discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal including a plurality of channel wavelengths. *See* FIGS. 3–5; Col. 7, line 62–Col. 8, line 8; Col. 8, line 61–Col. 9, line 23.
[1c] a substrate;	Soldano discloses the AWG chip **(A)** includes a substrate **(D)**. *See* FIG. 5; Col. 9, lines 53–55.
[1d] a planar lightwave circuit (PLC) disposed on the substrate, the PLC coupled to the first end and configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	Soldano discloses a planar lightwave circuit (PLC) **(E)** is located on the substrate **(D)**. The PLC **(E)** is coupled to the first end **(B)** and designed to de-multiplex each channel wavelength of the plurality of wavelengths. *See* FIGS. 3–5; Col. 4, lines 15–39; Col. 7, lines 62–Col. 8, line 8; Col. 8, line 61–Col. 9, line 10.
[1e] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	Soldano discloses a plurality of output waveguides **(A)[2]** are coupled to the PLC **(E)**, each of the output waveguides **(A)[2]** designed to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC **(E)** and provide the light along a first light path **(A)[3]** that extends towards a second end **(G)** of the AWG chip **(A)**. *See* FIGS. 3–5; Col. 8, line 61–Col. 9, line 23.
[1f] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an exposed output interface region of the AWG chip, wherein the exposed output interface region emits the received light from the AWG chip on	Soldano discloses a tapered region **(H)** is located at the second end **(G)** of the AWG chip **(A)**. The tapered region **(H)** is designed to receive light via the plurality of output waveguides **(A)[2]** and reflect the same towards an exposed output interface region **(I)** of the AWG chip **(A)**. The exposed output interface

the same side as the substrate without passing the received light through the substrate.	region **(I)** emits the received light from the AWG chip **(A)** on the same side as the substrate **(D)** without passing the received light through the substrate **(D)**. *See* FIGS. 4, 5; Col. 9, line 52–Col. 10, line 25.
Dependent Claim 3	
[3a] The AWG chip of claim 1, wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end, and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 1, *supra*. Soldano further discloses the AWG chip **(A)** defines a plurality of sidewalls extending longitudinally from the first end **(B)** to the second end **(G)**. The tapered region **(H)** of the second end **(G)** defines an angled surface **(L)** that extends from a first sidewall **(K)** of the plurality of sidewalls to a second sidewall **(R)** of the plurality of sidewalls. *See* FIGS. 4, 5; Col. 9, lines 23–37.
Dependent Claim 4	
[4a] The AWG chip of claim 3, wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the exposed output interface region.	*See,* Claim 3, *supra*. Soldano further discloses the angled surface **(L)** may have an interior angle, for example, of about 41 to 45 degrees, relative to the exposed output interface region **(I)**. *See* FIGS. 3–5; Col. 9, lines 23–45.
Dependent Claim 10	
[10a] The AWG chip of claim 1, wherein the AWG chip is configured as a 1×N demultiplexer device whereby a single optical input signal is de-multiplexed into N different channel wavelengths.	*See,* Claim 1, *supra*. Soldano further discloses the AWG chip **(A)** is designed as a 1×N demultiplexer device where a single optical input signal is de-multiplexed into N different channel wavelengths. *See* FIGS.

	3–5; Col. 7, line 24–Col. 8, line 8; Col. 8, lines 61–Col. 9, line 23.
Dependent Claim 11	
[11a] The AWG chip of claim 1, wherein the AWG chip is implemented in an AWG device package.	*See,* Claim 1, *supra.* Soldano further discloses the AWG chip **(A)** is implemented in an AWG device package **(A)[1]**. *See* FIG. 3; Col. 7, lines 24–61.
Independent Claim 12	
[12a] An optical transceiver module comprising:	Soldano discloses that the various chips and other components described therein may be used in optical transceiver modules. *See* Col. 12, lines 53–62.
[12b] a transceiver housing;	Soldano discloses it would be understood that the components of the optical transceiver module would be housed in a transceiver housing for installation and/or use. *See* Col. 12, lines 53–62.
[12c] a multi-channel receiver optical sub-assembly (ROSA) located in the transceiver housing and including an arrayed waveguide grating (AWG) chip, the AWG chip comprising:	Soldano discloses an arrayed waveguide grating (AWG) chip **(A)** is included in a multi-channel receiver optical sub-assembly (ROSA) **(A)[4]**, which is located in the transceiver housing. *See* FIG. 3; Col. 7, line 24–Col. 8, line 28.
[12d] a first end for coupling to an optical coupling receptacle to receive an optical signal comprising a plurality of channel wavelengths, wherein the first end for coupling to the optical coupling receptacle includes an angled surface to reduce back reflections of an optical signal launched into the AWG chip;	Soldano discloses the AWG chip **(A)** has a first end **(B)** for coupling to an optical coupling receptacle **(C)** to receive an optical signal including a plurality of channel wavelengths. As was well known in the art, it is desirable to couple optical optical fibers via angled surfaces to reduce back reflection, as described, e.g., in U.S. Patent 5,351,327. One of ordinary skill would therefore have understood that the first end **(B)** for coupling to the optical coupling receptacle **(C)** should include an angled surface to reduce back reflections of an optical signal launched

	into the AWG chip **(A)**. *See* FIGS. 3–5; Col. 7, line 62–Col. 8, line 8; Col. 8, line 61–Col. 9, line 23; Col. 9, lines 23–37.
[12e] a planar lightwave circuit (PLC) coupled to the first end configured to de-multiplex each channel wavelength of the plurality of channel wavelengths;	*See,* [1d], *supra.*
[12f] a plurality of output waveguides coupled to the PLC, each of the output waveguides configured to receive light corresponding to an associated de-multiplexed channel wavelength launched from the PLC and provide the light along a first light path that extends towards a second end of the AWG chip; and	*See,* [1e], *supra.*
[12g] a tapered region disposed at the second end of the AWG chip configured to receive light via the plurality of output waveguides and reflect the same towards an output interface region of the AWG chip;	*See,* [1f], *supra.*
[12h] an array of detector devices disposed adjacent to the output interface region of the AWG chip; and	Soldano discloses an array of detector devices **(O)** is located adjacent to the output interface region **(I)** of the AWG chip **(A)**. *See* FIG. 5; Col. 10, lines 10–17.
[12i] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	Soldano discloses a multi-channel transmitter optical assembly (TOSA) **(A)[5]** including at least one laser package **(P)** may be located in the transceiver housing for transmitting optical signals at different channel wavelengths. *See* FIG. 3; Col. 7, lines 37–61; Col. 8, lines 29–34; Col. 12, lines 17–19.
Dependent Claim 13	
[13a] The optical transceiver module of claim 12, wherein the output interface region of the AWG chip is an exposed region adjacent an air gap, and wherein the air gap separates the output	*See,* Claim 12, *supra.* Soldano further discloses the output interface region **(I)** of the AWG chip **(A)** may be an exposed region adjacent an air gap

interface region of the AWG chip and the array of detector devices.	**(Q)**. The air gap **(Q)** may separate the output interface region **(I)** of the AWG chip **(A)** and the array of detector devices **(O)**. *See* FIG. 5; Col. 10, lines 10– 17.
Dependent Claim 15	
[15a] The optical transceiver module of claim 12 wherein the AWG chip defines a plurality of sidewalls extending longitudinally from the first end to the second end and wherein the tapered region of the second end defines an angled surface that extends from a first sidewall of the plurality of sidewalls to a second sidewall of the plurality of sidewalls.	*See,* Claim 12, *supra.* *See,* [3a], *supra.*
Dependent Claim 16	
[16a] The optical transceiver module of claim 15 wherein the angled surface has an interior angle of about 41 to 45 degrees relative to the output interface region.	*See,* Claim 15, *supra.* *See,* [4a], *supra.*

EXHIBIT F

Invalidity of the '431 Patent

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,175,431 Against U.S. Patent No. 9,341,786 ("Gamache")

U.S. Patent No. 9,341,786 to Gamache

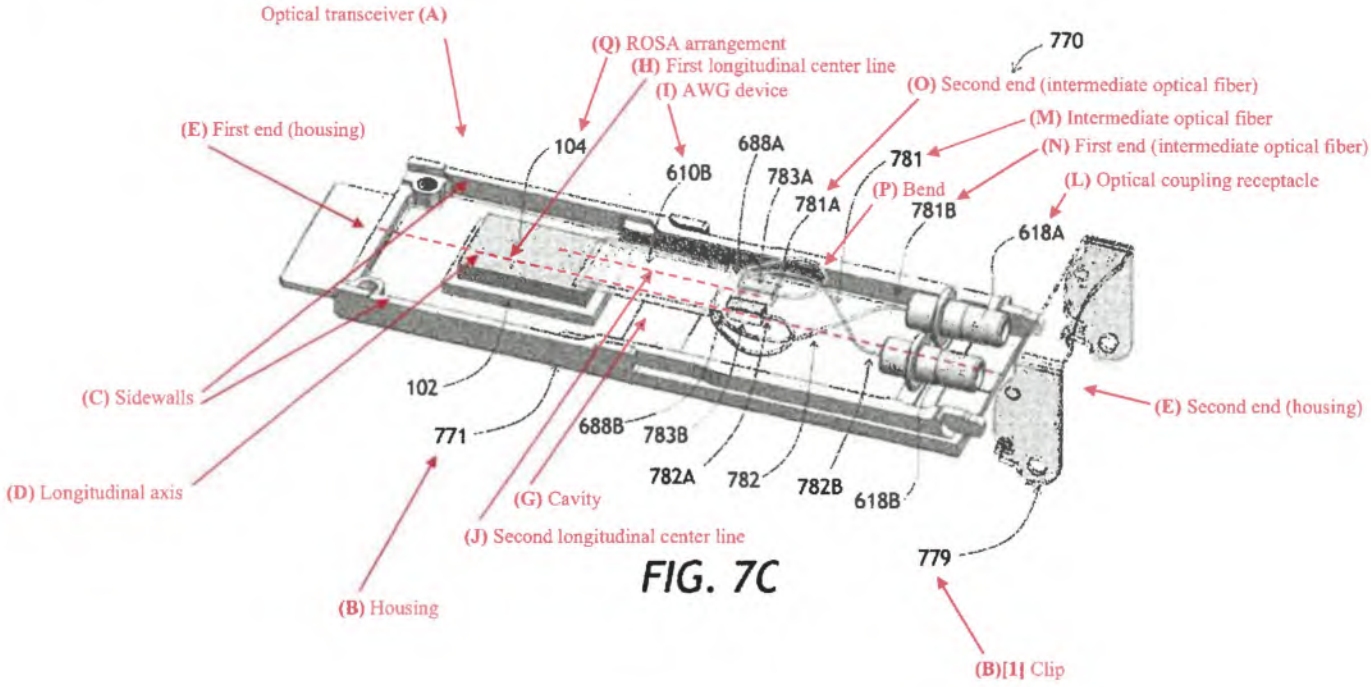


FIG. 7C

FIG. 7C (Gamache)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,175,431 Against U.S. Patent No. 9,341,786 ("Gamache")

U.S. Patent No. 10,175,431	Disclosure in Gamache
Independent Claim 1	
[1a] An optical transceiver comprising:	Gamache discloses an optical transceiver **(A)**. *See* FIG. 7C; Col. 9, lines 45–48.
[1b] a housing comprising a plurality of sidewalls extending from a first end to a second end along a longitudinal axis, wherein the plurality of sidewalls define a cavity having a first longitudinal center line;	Gamache discloses a housing **(B)** includes a plurality of sidewalls **(C)** extending from a first end **(E)** to a second end **(F)** along a longitudinal axis **(D)**. The plurality of sidewalls **(C)** define a cavity **(G)** having a first longitudinal center line **(H)**. *See* FIG. 7C; Col. 9, lines 59–64.
[1c] an arrayed waveguide grating (AWG) device at least partially disposed within the cavity and having a second longitudinal center line that extends substantially in parallel with the first longitudinal center line of the cavity, the second longitudinal center line being disposed at a lateral offset D_{offset} that measures at least 1 millimeter relative to the first longitudinal center line;	Gamache discloses an arrayed waveguide grating (AWG) device **(I)** is at least partially located within the cavity **(G)** and has a second longitudinal center line **(J)** that extends substantially in parallel with the first longitudinal center line **(H)** of the cavity **(G)**. Gamache teaches that AWG device **(I)** may be offset and further that space may be required to accommodate minimal fiber bend radii of optical fibers. The second longitudinal center line **(J)** is located at a lateral offset D_{offset} of at least 1 millimeter relative to the first longitudinal center line **(H)** to accommodate the minimal bend radius of the optical fiber (e.g., intermediate optical fiber **(M)**) coupled to the AWG device **(I)**. *See* FIG. 7C; Col. 1, line 61–Col. 2, line 1; Col. 6, lines 48–54; Col. 9, line 65–Col. 10 line 4.
[1d] an optical coupling receptacle at least partially disposed within the cavity for optically coupling to a receive optical fiber; and	Gamache discloses an optical coupling receptacle **(L)** is at least partially located within the cavity **(G)** for optically coupling to a receive optical fiber. *See* FIG. 7C; Col. 7, lines 65–67; Col. 9, lines 39–44.
[1e] an intermediate optical fiber disposed within the cavity and having a first end optically coupled to the optical coupling	Gamache discloses the intermediate optical fiber **(M)** is located within the cavity **(G)** and has a first end **(N)** optically coupled to

receptacle and a second end optically coupled to the AWG device, the intermediate fiber having a bend adjacent to the second end of the intermediate optical fiber with a bend radius equal to or greater than a minimum bend radius R_{min} associated with the intermediate optical fiber to reduce fiber bending losses.	the optical coupling receptacle **(L)** and a second end **(O)** optically coupled to the AWG device **(I)**. The intermediate optical fiber **(M)** has a bend **(P)** adjacent to the second end **(O)** of the intermediate optical fiber **(M)**. As Gamache teaches that an optical fiber has a minimal bend radius that must be accommodated during assembly, it would be understood that the intermediate optical fiber **(M)** has a bend radius equal to or greater than a minimum bend radius R_{min} associated with the intermediate optical fiber to reduce fiber bending losses. *See* FIG. 7C; Col. 1, lines 61–64; Col. 9, lines 48–55; Col. 9, line 67–Col. 10, line 2; *see also* U.S. Pat. No. 9,519,117 to Macall, Col. 1, lines 32–37; Col. 2, lines 1–19 (disclosing that "optical fibers have a minimum bend radius, and bending the optical fiber beyond this minimum bend radius may cause signal degradation" and that "optical fibers frequently have to be routed, or looped, around a circuit board several times, while at the same time not being bent beyond their minimum bend radius").
Dependent Claim 2	
[2a] The optical transceiver of claim 1, wherein the bend radius is least 1.5× greater than the minimum bend radius R_{min}.	*See,* Claim 1, *supra.* Gamache further discloses it would be understood that the intermediate optical fiber **(M)** necessarily would not have a bend **(P)** with a bend radius equal to the minimum bend radius R_{min} associated with the intermediate optical fiber **(M)** and that preferably the bend radius is greater than the minimum bend radius R_{min} by a determined safety factor to reduce fiber bending losses. It would be a matter of routine experimentation to arrive

	at a bend radius at least 1.5× greater than the minimum bend radius R_{min}. *See* FIG. 7C; Col. 1, lines 61–64; Col. 9, line 67–Col. 10, line 2.
Dependent Claim 3	
[3a] The optical transceiver of claim 1, wherein a diameter of the intermediate optical fiber is about 0.20 to 0.25 millimeters and the bend radius is equal to or greater than 4 mm.	*See,* Claim 1, *supra*. IEC 60793-50, cited at Col. 2, lines 20-21 of the '431 patent, describes that the minimum bending radius for single mode 0.25 mm is 5 mm. Accordingly, merely reciting a minimum bend raduis of ≥ 4 mm for a fiber diameter of about 0.20 to 0.25 millimeters is not patentabled. *See also, e.g.,* Corning technical overview, WP1212, December 2010. Moreover, Gamache discloses that the intermediate optical fiber **(M)** may be flexible enough to be bent or coiled at a bend radius of less than 8 mm. *See* FIG. 7C; Col. 9, line 67–Col. 10, line 2.
Dependent Claim 4	
[4a] The optical transceiver of claim 1, wherein lateral offset D_{offset} displaces the AWG device towards the optical coupling receptacle relative to the second longitudinal center line of the cavity.	*See,* Claim 1, *supra*. Gamache further discloses that the AWG device **(I)** and/or components optionally may be offset within the housing **(B)** to enable coupling of the AWG device **(I)** to the optical coupling receptacle **(L)** via the intermediate optical fiber **(M)** while accommodating the minimum bend radius of the intermediate optical fiber **(M)**. It would have been a matter of design choice to displace the AWG device **(I)** a lateral offset D_{offset} towards the optical coupling receptacle **(L)** relative to the second longitudinal center line **(J)** of the cavity **(G)** of the housing **(B)** as in Gamache to accommodate the minimum bend radius of the

	intermediate optical fiber **(M)** and components of the optical transceiver **(A)** within the housing **(B)**. *See* FIG. 7C; Col. 1, line 61–Col. 2, line 2; Col. 6, lines 46–67; Col. 9, line 35–Col. 10, line 2.
Dependent Claim 5	
[5a] The optical transceiver of claim 1, wherein the housing has a length L_1 of about 20 mm and a width W_1 of about 10 mm.	*See,* Claim 1, *supra*. The actual dimensions of the "housing" of the Accused Product are about 60 -70 mm long by 17 mm wide. AOI in its Exhibit 10 infringement claim chart of the Accused Product construes a length about 60 mm to be "about 20 mm" and a width of 15 mm to be "about 10 mm." Gamache describes at Col. 9, lines 61-64 that the device of FIG. 7C is an SPF module, which were well known to have dimensions of 56 mm long by 13.4 wide. *See, e.g.,* Small Form Factor Pluggable (SFP) Transceiver MultiSource Agreement, 2001, available at Small Form-Factor Pluggable (SFP) Transceiver Multisource Agreement (http://schelto.com/SFP/SFP%20MSA.pdf) (SPF MSA") at pages 6-7. As construed by AOI in its infringement contentions, the housing **(B)** of the SFP module described Gamache has a length of about 20 mm and a width of about 10 mm. *See* FIG. 7C; Col. 9, line 59–Col. 10, line 2.
Dependent Claim 6	
[6a] The optical transceiver of claim 1, wherein the optical receptacle is an LC-type receptacle.	*See,* Claim 1, *supra*. Gamache further that the housing **(B)** for a SFP module may include a clip **(B)[1]** for affixing a dual LC-type connector to the optical coupling receptacle **(L)**. *See* FIG. 7C; Col. 9, lines 61–

	64. In addition, LC-type connectors were known for use with SFP modules per the SFP MSA at page 1.
Dependent Claim 8	
[8a] The optical transceiver of claim 1, wherein the AWG device forms at least a portion of a receiver optical subassembly (ROSA) arrangement.	*See,* Claim 1, *supra*. Gamache further in FIGS. 6A and 6B and 7B a ROSA **(Q)** in which the AWG serves as a demultiplexer to separate the multiplexed optical signal, such that the wavelength channels of may be detected by photodetectors. *See, e.g.*, Col. 7, lines 65 to Col. 8, line 49; Col. 9, line 45 to Col.10, line 10.
Dependent Claim 9	
[9a] The optical transceiver of claim 1, wherein the AWG device comprises a planar lightwave circuit chip configured to de-multiplex N number of channel wavelengths.	*See,* Claim 1, *supra*. *See* [8a], *supra*.
Independent Claim 10	
[10a] An optical transceiver module comprising:	*See,* [1a], *supra*.
[10b] a transceiver housing comprising a plurality of sidewalls extending from a first end to a second end along a longitudinal axis, wherein the plurality of sidewalls define a cavity having a first longitudinal center line;	*See,* [1b], *supra*.
[10c] a multi-channel receiver optical sub-assembly (ROSA) arrangement located in a cavity of the transceiver housing, the ROSA arrangement comprising:	Gamache discloses in FIGS. 6A and 6B and 7B a ROSA **(Q)** in which the AWG serves as a demultiplexer to separate the multiplexed optical signal, such that the wavelength channels of may be detected by photodetectors. *See, e.g.*, Col. 7, lines 65 to Col. 8, line 49; Col. 9, line 45 to Col.10, line 10.
[10d] an arrayed waveguide grating (AWG) device at least partially disposed within the cavity and having a second longitudinal center line that extends substantially in parallel with	*See,* [1c], [4a], *supra*.

the first longitudinal center line of the cavity, the second longitudinal center line being disposed at a lateral offset D_{offset} relative to the first longitudinal center line, wherein lateral offset D_{offset} displaces the AWG device towards the optical coupling receptacle relative to the second longitudinal center line of the cavity;	
[10e] an optical coupling receptacle at least partially disposed within the cavity for optically coupling to a receive optical fiber; and	*See,* [1d], *supra.*
[10f] an intermediate optical fiber disposed within the cavity and having a first end optically coupled to the optical coupling receptacle and a second end optically coupled to the AWG device, the intermediate fiber having a bend adjacent to the second end of the intermediate optical fiber with a bend radius equal to or greater than a minimum bend radius R_{min} associated with the intermediate optical fiber to reduce fiber bending losses;	*See,* [1e], *supra.*
[10g] a multi-channel transmitter optical assembly (TOSA) including at least one laser package located in the transceiver housing for transmitting optical signals at different channel wavelengths.	Gamache discloses in FIG. 6B a device having a receiver (ROSA) 602A and a transmitter (TOSA) 602B that transmits optical signals at different channel wavelengths. *See, e.g.,* FIG. 6B; Col. 8, lines 17-39.
Dependent Claim 11	
[11a] The optical transceiver module of claim 10, wherein the bend radius is least 1.5× greater than the minimum bend radius R_{min}.	*See* Claim 10, *supra.* *See*, [2a], *supra.*
Dependent Claim 12	
[12a] The optical transceiver module of claim 10, wherein a diameter of the intermediate optical fiber is about 0.20 to 0.25 millimeters and the bend radius is equal to or greater than 4 mm.	*See* Claim 10, *supra.* *See*, [3a], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,175,431 Against U.S. Patent No. 9,341,786 ("Gamache")

Dependent Claim 13	
[13a] The optical transceiver module of claim 10, wherein the lateral offset D_{offset} measures at least 1 millimeter relative to the first longitudinal center line of the cavity.	*See* Claim 10, *supra*. Gamache further discloses that the lateral offset D_{offset} as at least 1 millimeter relative to the first longitudinal center line **(H)** to accommodate the minimal bend radius of the optical fiber (e.g., intermediate optical fiber **(M)**) coupled to the AWG device **(I)**.. *See* FIG. 7C; Col. 1, line 61–Col. 2, line 1; Col. 6, lines 48–54; Col. 9, line 65–Col. 10, line 4.
Dependent Claim 14	
[14a] The optical transceiver module of claim 10, wherein the transceiver housing has a length L_1 of about 20 mm and a width W_1 of about 10 mm.	*See* Claim 10, *supra*. *See*, [5a], *supra*.
Dependent Claim 15	
[15a] The optical transceiver module of claim 10 wherein the optical receptacle is an LC-type receptacle.	*See* Claim 10, *supra*. *See*, [6a], *supra*.
Independent Claim 16	
[16a] An optical transceiver comprising:	*See*, [1a], *supra*.
[16b] a housing comprising a plurality of sidewalls extending from a first end to a second end along a longitudinal axis, wherein the plurality of sidewalls define a cavity having a first longitudinal center line;	*See*, [1b], *supra*.
[16c] an arrayed waveguide grating (AWG) device at least partially disposed within the cavity and having a second longitudinal center line that extends substantially in parallel with the first longitudinal center line of the cavity, the second longitudinal center line being disposed at a lateral offset D_{offset}	*See*, [1c], *supra*.

that measures at least 1 millimeter relative to the first longitudinal center line;	
[16d] an optical coupling receptacle at least partially disposed within the cavity for optically coupling to a receive optical fiber; and	*See*, [1d], *supra*..
[16e] an intermediate optical fiber disposed within the cavity and having a first end optically coupled to the optical coupling receptacle and a second end optically coupled to the AWG device, the intermediate fiber having a bend adjacent to the second end of the intermediate optical fiber with a bend radius greater than or equal to a minimum bend radius R_{min} associated with the intermediate optical fiber, the minimum bend radius R_{min} being 4 millimeters.	*See*, [1a], [3a], and claim 10 *supra*.

EXHIBIT G

Invalidity of the '301 Patent

U.S. Patent App. Pub. No. US 2016/0349451 to Shen

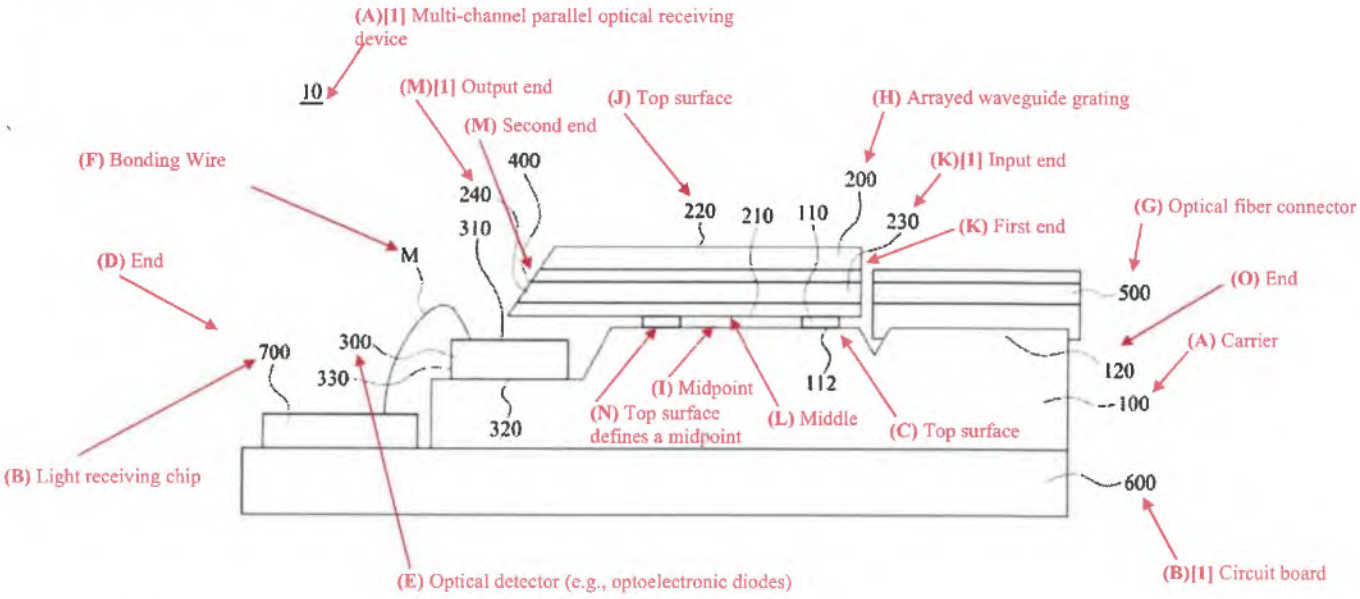


Fig. 1

Fig. 1 (Shen)

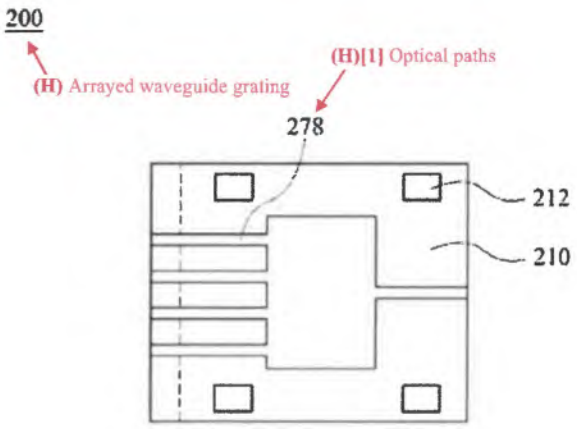


Fig. 3

Fig. 3 (Shen)

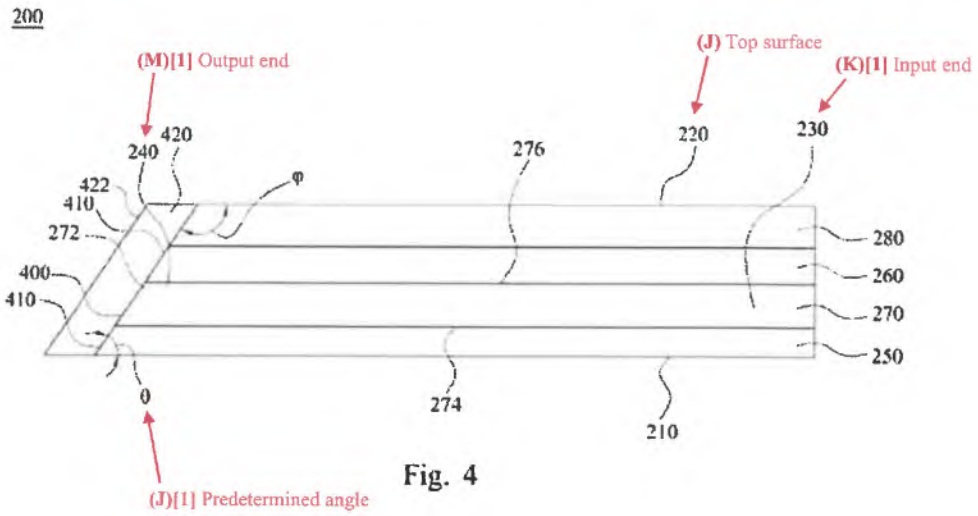


Fig. 4

Fig. 4 (Shen)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against U.S. Patent App. Pub. No. US 2016/034951 ("Shen")

U.S. Patent No. 10,379,301	Disclosure in Shen
Independent Claim 1	
[1a] A multi-channel parallel optical receiving device, comprising:	Shen discloses a multi-channel parallel optical receiving device **(A)[1]**. *See* FIG. 1; paras. [0033], [0043].
[1b] a carrier;	As construed in AOI's infringement contentions, Exhibits 7 and 8, Shen discloses a multi-channel parallel optical receiving device **(A)[1]** that includes a carrier **(A)**. *See* FIG. 1; para. [0033].
[1c] a light receiving chip disposed on a top surface of an end of the carrier;	Shen discloses a light receiving chip **(B)** is located on a top surface **(C)** of an end **(D)** of the carrier **(A)**. *See* FIG. 1; paras. [0033]–[0037], [0044].
[1d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;	Shen discloses an optical detector **(E)** is located on the top surface **(C)** of the end **(D)** of the carrier **(A)**. The optical detector **(E)** includes a plurality of optoelectronic diodes, one for each wavelength output by the AWG. The optical detector (e.g., optoelectronic diodes) **(E)** are electrically connected to, the light receiving chip **(B)** via bonding wire **(F)**. The optical detector (e.g., optoelectronic diodes) **(E)** and the light receiving chip **(B)** are located directly on the same top surface **(C)** of the end **(D)** of the carrier **(A)**. *See* FIG. 1; paras. [0033]–[0037], [0044].
[1e] an optical fiber connector disposed in an end of the carrier;	Shen discloses an optical fiber connector **(G)** is located in an end **(O)** of the carrier **(A)**. *See* FIG. 1; para. [0044].
[1f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber	Shen discloses an arrayed waveguide grating **(H)** is further located on a top surface **(N)** of the carrier **(A)** that defines a midpoint **(I)** of the carrier **(A)**. The arrayed waveguide grating **(H)** has a first end **(K)**, a middle **(L)**, a second end **(M)** located opposed the first end **(K)**, and an input end **(K)[1]** of the arrayed waveguide grating **(H)** connected to the optical fiber connector

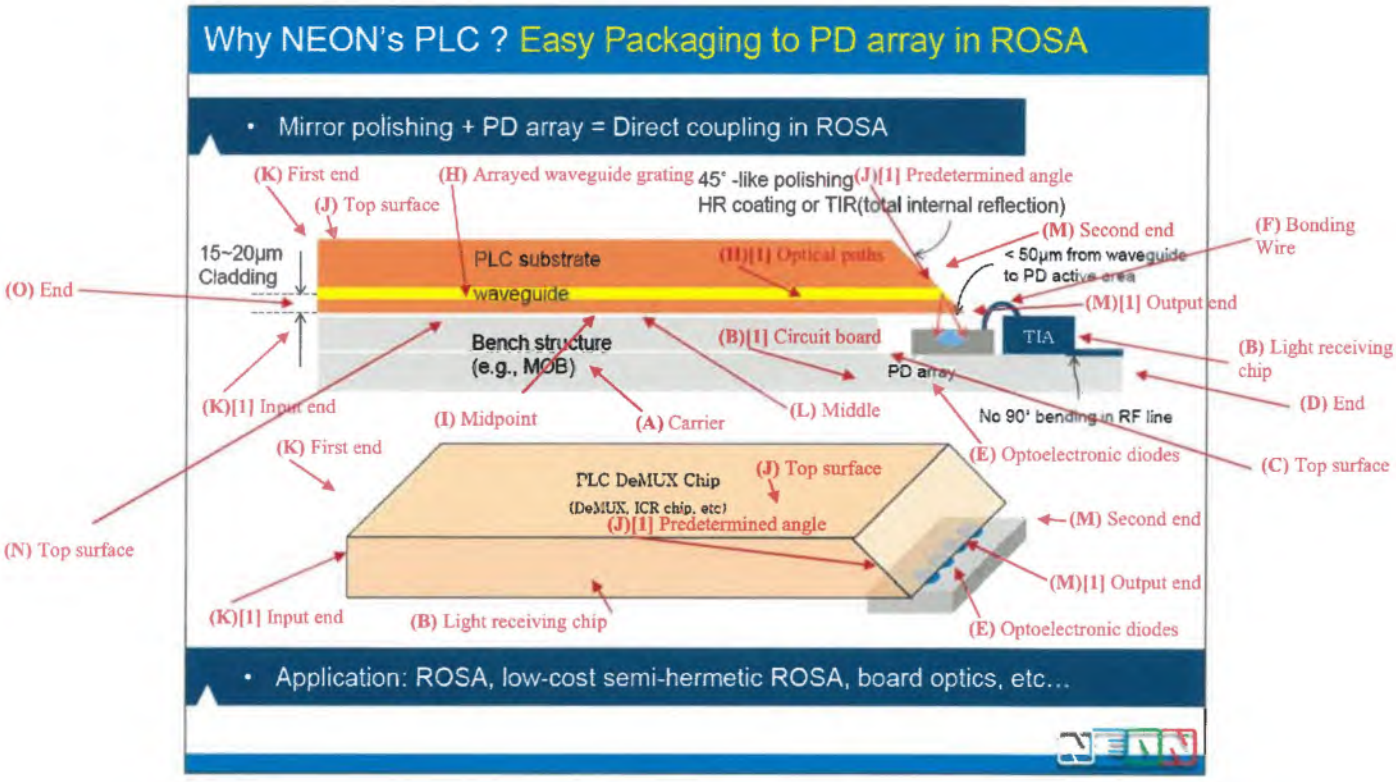
wherein the top surface of the carrier underlies the middle of the arrayed waveguide grating; and	**(G)** for receiving an optical signal from the optical fiber. The top surface **(C)** of the carrier **(A)** underlies the middle **(L)** of the arrayed waveguide grating **(H)**. *See* FIGS. 1, 4; para. [0044].
[1g] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.	Shen discloses the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating **(H)** based on their wavelengths. A top surface **(J)** defined by an output end **(M)[1]** of the arrayed waveguide grating **(H)** is at a predetermined angle **(J)[1]**, causing the multi-channel optical signals reflected by the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** to be reflected to a photosensitive surface of the optical detector (e.g., optoelectronic diodes) **(E)** arranged in parallel. The predetermined angle **(J)[1]** of the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** is in a range of 41 to 46 degrees such that the top surface **(J)** provides the reflection. *See* FIGS. 1 and 4; paras. [0038]-[0039], [0046].
Dependent Claim 2	
[2a] The multi-channel parallel optical receiving device according to claim 1, wherein the top surface of the end of the carrier is defined at least in part by a circuit board and wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the circuit board.	*See,* Claim 1, *supra.* Shen further discloses the top surface **(C)** of the end **(D)** of the carrier **(A)** may be defined at least in part by a circuit board **(B)[1]**. The optical detector (e.g., optoelectronic diodes) **(E)** and the light receiving chip **(B)**, which may be integrally formed with the carrier **(A)**, may thereby be directly located on the circuit board **(B)[1]**. *See* FIG. 1; paras. [0037], [0044].
Dependent Claim 3	
[3a] The multi-channel parallel optical receiving device according to claim 1, wherein the amount of the optoelectronic	*See,* Claim 1, *supra.*

diodes is equal to the amount of optical paths divided by the arrayed waveguide grating.	Shen discloses that the optical detector **(E)** includes a plurality of optoelectronic diodes equal to the number of optical paths **(H)[1]** divided by the arrayed waveguide grating **(H)**. *See* FIGS. 1, 3; paras. [0033], [0040], [0043].
Dependent Claim 4	
[4a] The multi-channel parallel optical receiving device according to claim 1, wherein the predetermined angle of the top surface of the output end of the arrayed waveguide grating is 42 degrees.	*See,* Claim 1, *supra.* Shen further discloses the predetermined angle **(J)[1]** of the top surface **(J)** of the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be an acute angle (e.g., 42 degrees). *See* FIGS. 1, 4; paras. [0039], [0046].
Independent Claim 7	
[7a] A multi-channel parallel optical receiving device, comprising:	*See,* [1a], *supra.*
[7b] a carrier;	*See,* [1b], *supra.*
[7c] a light receiving chip disposed on a top surface of an end of the carrier;	*See,* [1c], *supra.*
[7d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via wire bonding, wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the same top surface of the end of the carrier;	*See,* [1d], *supra.*
[7e] an optical fiber connector disposed in an end of the carrier;	*See,* [1e], *supra.*
[7f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of	*See,* [1f], *supra.*

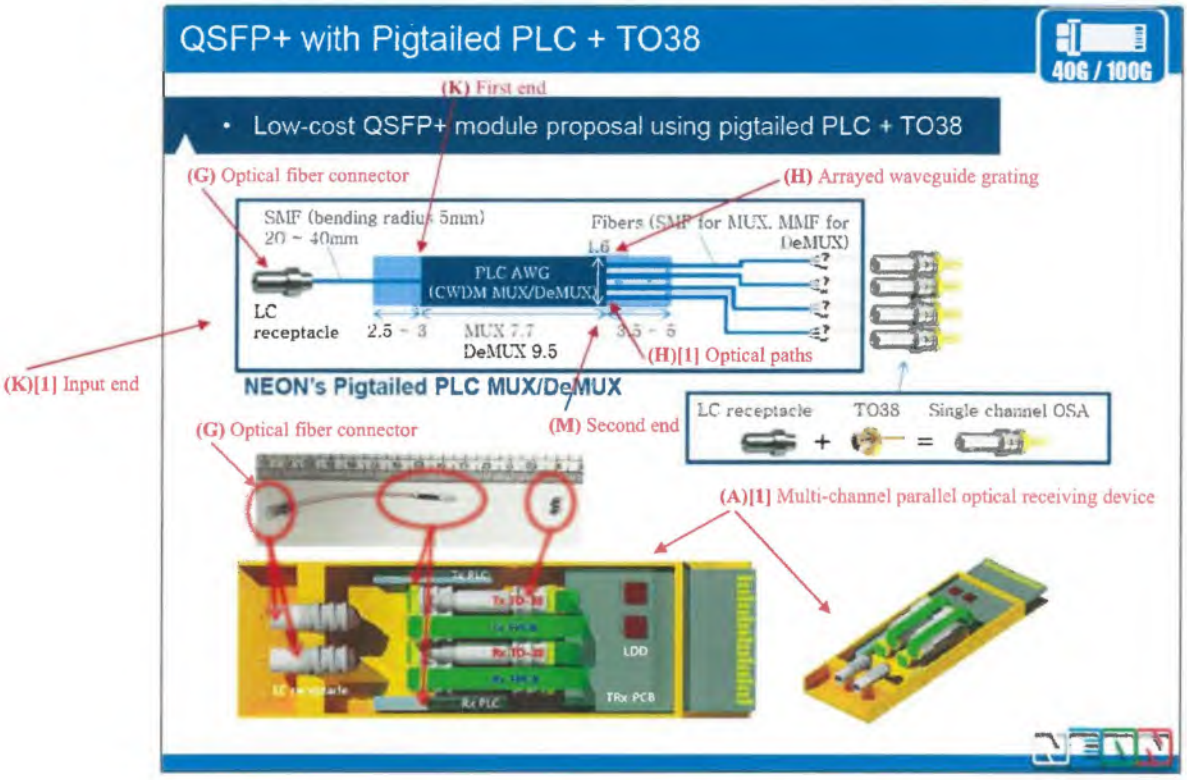
the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber;	
[7g] wherein the top surface of the carrier that defines the midpoint of the carrier underlies the middle of the arrayed waveguide grating; and	*See,* [1f], *supra.*
[7h] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle of 42 degrees, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel.	*See,* [1g], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against Neon Deck

2015 Neon Deck



Slide 11 (2015 Neon Deck)



Slide 13 (2015 Neon Deck)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against Neon Deck

U.S. Patent No. 10,379,301	Disclosure in 2015 Neon Deck
Independent Claim 1	
[1a] A multi-channel parallel optical receiving device, comprising:	The 2015 Neon Deck discloses a multi-channel parallel optical receiving device **(A)[1]**. *See* Slide 13.
[1b] a carrier;	As construed in AOI's infringement contentions, Exhibits 7 and 8, the 2015 Neon Deck discloses a carrier **(A)**. *See* Slide 11.
[1c] a light receiving chip disposed on a top surface of an end of the carrier;	The 2015 Neon Deck discloses a light receiving chip **(B)** is located on a top surface **(C)** of an end **(D)** of the carrier **(A)**. *See* Slides 11, 13.
[1d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;	The 2015 Neon Deck discloses a plurality of optoelectronic diodes **(E)** are located on the top surface **(C)** of the end **(D)** of the carrier **(A)**. The optoelectronic diodes **(E)** are electrically connected to the light receiving chip **(B)** via bonding wires **(F)**. The optoelectronic diodes **(E)** and the light receiving chip **(B)** are located directly on the same top surface **(C)** of the end **(D)** of the carrier **(A)**. *See* Slide 11.
[1e] an optical fiber connector disposed in an end of the carrier;	The 2015 Neon Deck discloses an optical fiber connector **(G)** is located in an end **(O)** of the carrier **(A)**. *See* Slides 11 and 13.
[1f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber wherein the top surface of the carrier underlies the middle of the arrayed waveguide grating; and	The 2015 Neon Deck discloses an arrayed waveguide grating **(H)** is further located on a top surface **(N)** of the carrier **(A)** that defines a midpoint **(I)** of the carrier **(A)**. The arrayed waveguide grating **(H)** has a first end **(K)**, a middle **(L)**, a second end **(M)** located opposed the first end **(K)**, and an input end **(K)[1]** of the arrayed waveguide grating **(H)** connected to the optical fiber connector **(G)** for receiving an optical signal from the optical fiber. The top surface **(C)** of the carrier **(A)** underlies the middle **(L)** of the arrayed waveguide grating **(H)**. *See* Slides 11, 13.

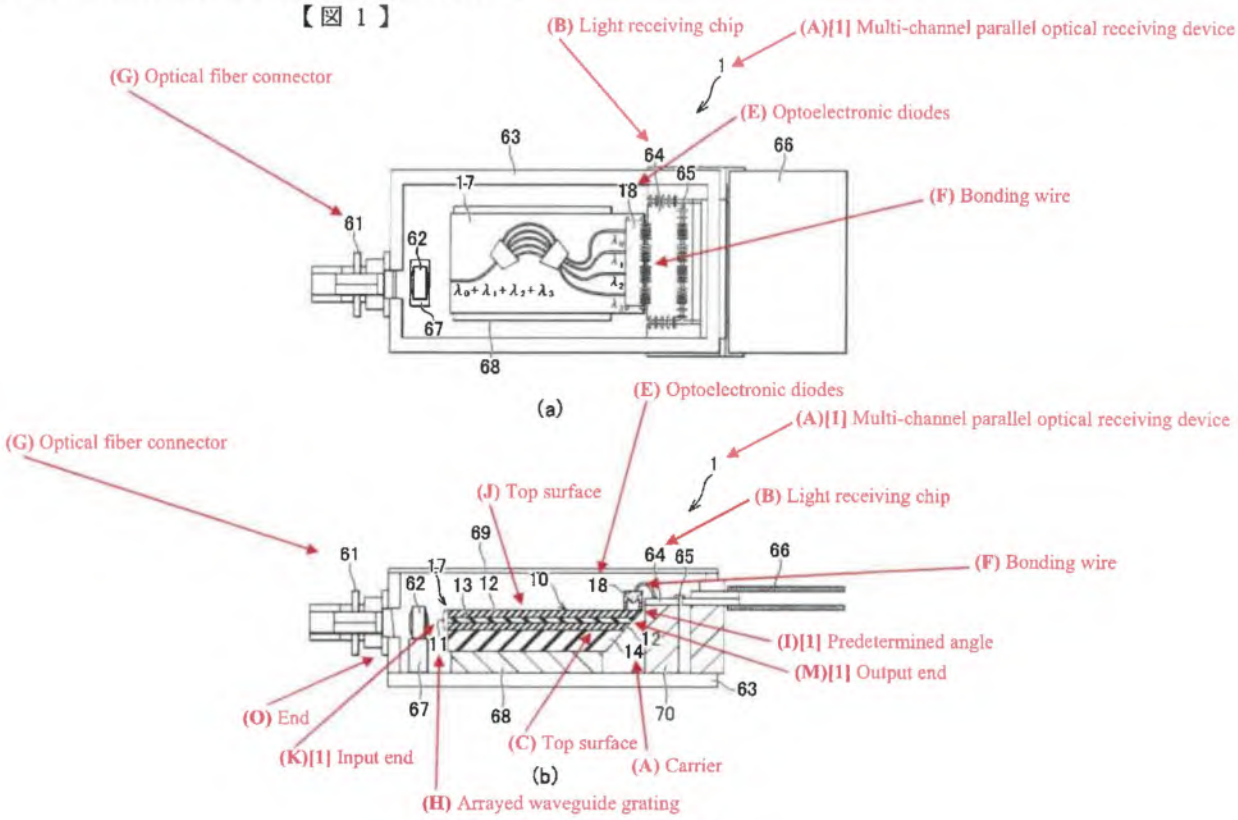
[1g] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.	The 2015 Neon Deck discloses the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating **(H)** based on their wavelengths. A top surface **(J)** defined by an output end **(M)[1]** of the arrayed waveguide grating **(H)** is at a predetermined angle **(J)[1]**, causing the multi-channel optical signals reflected by the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** to be reflected to a photosensitive surface of the plurality of optoelectronic diodes **(E)** arranged in parallel. The predetermined angle **(J)[1]** of the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be an acute angle (e.g., in a range of 41 to 46 degrees) such that the top surface **(J)** provides the reflection. *See* Slides 11, 13.
Dependent Claim 2	
[2a] The multi-channel parallel optical receiving device according to claim 1, wherein the top surface of the end of the carrier is defined at least in part by a circuit board and wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the circuit board.	*See,* Claim 1, supra. The 2015 Neon Deck further discloses the top surface **(C)** of the end **(D)** of the carrier **(A)** may be defined at least in part by a circuit board **(B)[1]**. The plurality of optoelectronic diodes **(E)** and the light receiving chip **(B)**, which may be directly located on the circuit board **(B)[1]**. *See* Slide 11.
Dependent Claim 3	
[3a] The multi-channel parallel optical receiving device according to claim 1, wherein the amount of the optoelectronic diodes is equal to the amount of optical paths divided by the arrayed waveguide grating.	*See,* Claim 1, supra. The 2015 Neon Deck discloses that the number of optoelectronic diodes **(E)** is equal to the number of optical paths **(H)[1]** output by the arrayed waveguide grating **(H)** (e.g., four). Slides 11, 13.
Dependent Claim 4	

[4a] The multi-channel parallel optical receiving device according to claim 1, wherein the predetermined angle of the top surface of the output end of the arrayed waveguide grating is 42 degrees.	*See,* Claim 1, supra. The 2015 Neon Deck further discloses, the predetermined angle **(J)[1]** of the top surface **(J)** of the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be an acute angle (e.g., 42 degrees). *See* Slide 11.
Independent Claim 7	
[7a] A multi-channel parallel optical receiving device, comprising:	*See,* [1a], *supra.*
[7b] a carrier;	*See,* [1b], *supra.*
[7c] a light receiving chip disposed on a top surface of an end of the carrier;	*See,* [1c], *supra.*
[7d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via wire bonding, wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the same top surface of the end of the carrier;	*See,* [1d], *supra.*
[7e] an optical fiber connector disposed in an end of the carrier;	*See,* [1e], *supra.*
[7f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber;	*See,* [1f], *supra.*
[7g] wherein the top surface of the carrier that defines the midpoint of the carrier underlies the middle of the arrayed waveguide grating; and	*See,* [1f], *supra.*

[7h] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle of 42 degrees, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel.	*See,* [1g], *supra.*

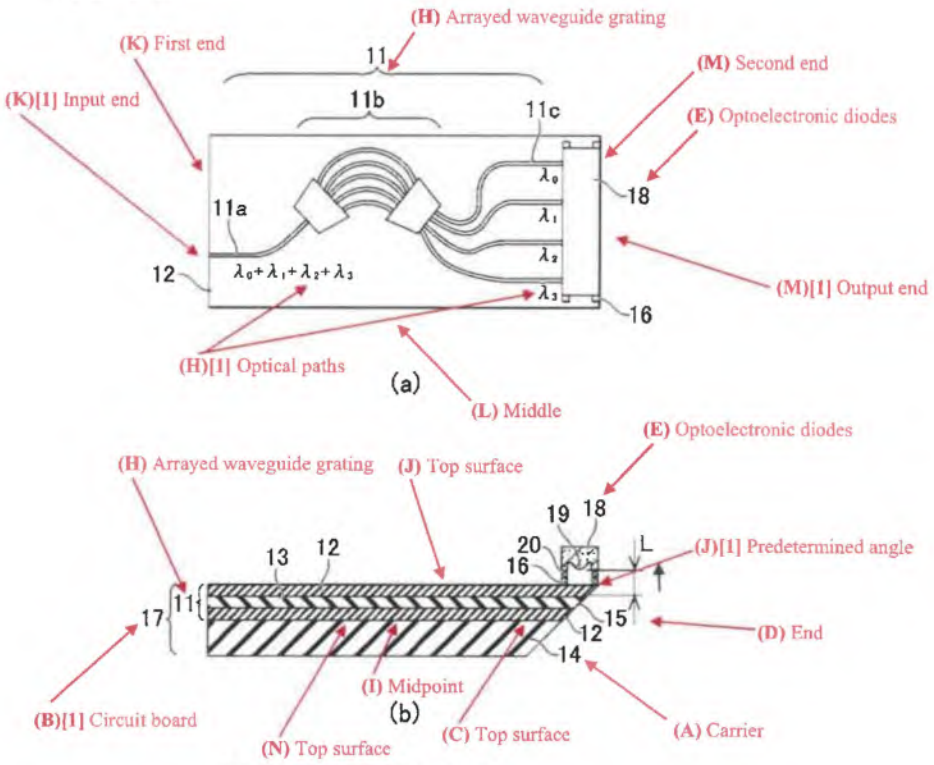
Japanese Patent Pub No. JP-PUB-2017-194565 to Masato

【図 1】



FIGS. 1(a) & 1(b) (Masato)

【図２】



FIGS. 2(a) & 2(b) (Masato)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against Japanese Patent Pub. No. JP-PUB-2017-194565 ("Masato")

U.S. Patent No. 10,379,301	Disclosure in Masato
Independent Claim 1	
[1a] A multi-channel parallel optical receiving device, comprising:	Masato discloses a multi-channel parallel optical receiving device **(A)[1]**. *See* FIGS. 1(a), 1(b), 2(b); paras. [0025], [0026], [0028] (JPO machine translation).
[1b] a carrier;	As construed in AOI's infringement contentions, Exhibits 7 and 8, Masato discloses the multi-channel parallel optical receiving device **(A)[1]** includes a carrier **(A)**. *See* FIGS. 1(b), 2(b); para. [0026] (JPO machine translation).
[1c] a light receiving chip disposed on a top surface of an end of the carrier;	Masato discloses a light receiving chip **(B)** is located on a top surface **(C)** of an end **(D)** of the carrier **(A)**. *See* FIGS. 1(a), 1(b), 2(b); paras. [0025], [0026], [0028] (JPO machine translation).
[1d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;	Masato discloses a plurality of optoelectronic diodes **(E)** are located on the top surface **(C)** of the end **(D)** of the carrier **(A)**. The plurality of optoelectronic diodes **(E)** are electrically connected to the light receiving chip **(B)** via bonding wire **(F)**. The optoelectronic diodes **(E)** and the light receiving chip **(B)** are located directly on the same top surface **(C)** of the end **(D)** of the carrier **(A)**. *See* FIGS. 1(a), 1(b), 2(a), 2(b); paras. [0027], [0028] (JPO machine translation).
[1e] an optical fiber connector disposed in an end of the carrier;	Masato discloses an optical fiber connector **(G)** is located in an end **(O)** of the carrier **(A)**. *See* FIGS. 1(a), 1(b); paras. [0020], [0022], [0030] (JPO machine translation).
[1f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a	Masato discloses an arrayed waveguide grating **(H)** is further located on a top surface **(N)** of the carrier **(A)** that defines a midpoint **(I)** of the carrier **(A)**. The arrayed waveguide grating

second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber wherein the top surface of the carrier underlies the middle of the arrayed waveguide grating; and	**(H)** has a first end **(K)**, a middle **(L)**, a second end **(M)** located opposed the first end **(K)**, and an input end **(K)[1]** of the arrayed waveguide grating **(H)** connected to the optical fiber connector **(G)** for receiving an optical signal from the optical fiber. The top surface **(C)** of the carrier **(A)** underlies the middle **(L)** of the arrayed waveguide grating **(H)**. *See* FIGS. 1(a), 1(b), 2(a); paras. [0009], [0010], [0028] (JPO machine translation).
[1g] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.	Masato discloses the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating **(H)** based on their wavelengths. A top surface **(J)** defined by an output end **(M)[1]** of the arrayed waveguide grating **(H)** is at a predetermined angle **(J)[1]**, causing the multi-channel optical signals reflected by the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** to be reflected to a photosensitive surface of the plurality of optoelectronic diodes **(E)** arranged in parallel. The predetermined angle **(J)[1]** of the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be 45 degrees or another angle (e.g., in a range of 41 to 46 degrees) such that the top surface **(J)** provides the reflection. *See* FIG. 1(a), 1(b), 2(a), 2(b); paras. [0009], [0010], [0012], [0022], [0024], [0026] (JPO machine translation).
Dependent Claim 2	
[2a] The multi-channel parallel optical receiving device according to claim 1, wherein the top surface of the end of the carrier is defined at least in part by a circuit board and wherein	*See,* Claim 1, *supra.* Masato further discloses the top surface **(C)** of the end **(D)** of the carrier **(A)** may be defined at least in part by a circuit board

the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the circuit board.	**(B)[1]**. The plurality of optoelectronic diodes **(E)** and the light receiving chip **(B)** may be directly located on the circuit board **(B)[1]**. *See* FIG. 2(b); paras. [0017]–[0019], [0023], [0025] (JPO machine translation).
Dependent Claim 3	
[3a] The multi-channel parallel optical receiving device according to claim 1, wherein the amount of the optoelectronic diodes is equal to the amount of optical paths divided by the arrayed waveguide grating.	*See,* Claim 1, *supra.* Masato discloses that the number of the optoelectronic diodes **(E)** is equal to the number of optical paths **(H)[1]** output by the arrayed waveguide grating **(H)**. *See* FIG. 2(a); paras. [0002], [0003], [0012], [0024], [0038], [0045], [0048] (JPO machine translation).
Dependent Claim 4	
[4a] The multi-channel parallel optical receiving device according to claim 1, wherein the predetermined angle of the top surface of the output end of the arrayed waveguide grating is 42 degrees.	*See,* Claim 1, *supra.* Masato further discloses the predetermined angle **(J)[1]** of the top surface **(J)** of the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be 45 degrees or another angle (e.g., 42 degrees). *See* FIGS. 1(b), 2(b); para. [0026] (JPO machine translation).
Independent Claim 7	
[7a] A multi-channel parallel optical receiving device, comprising:	*See,* [1a], *supra.*
[7b] a carrier;	*See,* [1b], *supra.*
[7c] a light receiving chip disposed on a top surface of an end of the carrier;	*See,* [1c], *supra.*

[7d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via wire bonding, wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the same top surface of the end of the carrier;	*See,* [1d], *supra.*
[7e] an optical fiber connector disposed in an end of the carrier;	*See,* [1e], *supra.*
[7f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber;	*See,* [1f], *supra.*
[7g] wherein the top surface of the carrier that defines the midpoint of the carrier underlies the middle of the arrayed waveguide grating; and	*See,* [1f], *supra.*
[7h] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle of 42 degrees, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel.	*See,* [1g], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against Japanese Patent Pub. No. JP-PUB-2003-215371 ("Junichi")

Japanese Patent Pub. No. JP-PUB-2003-215371 to Junichi

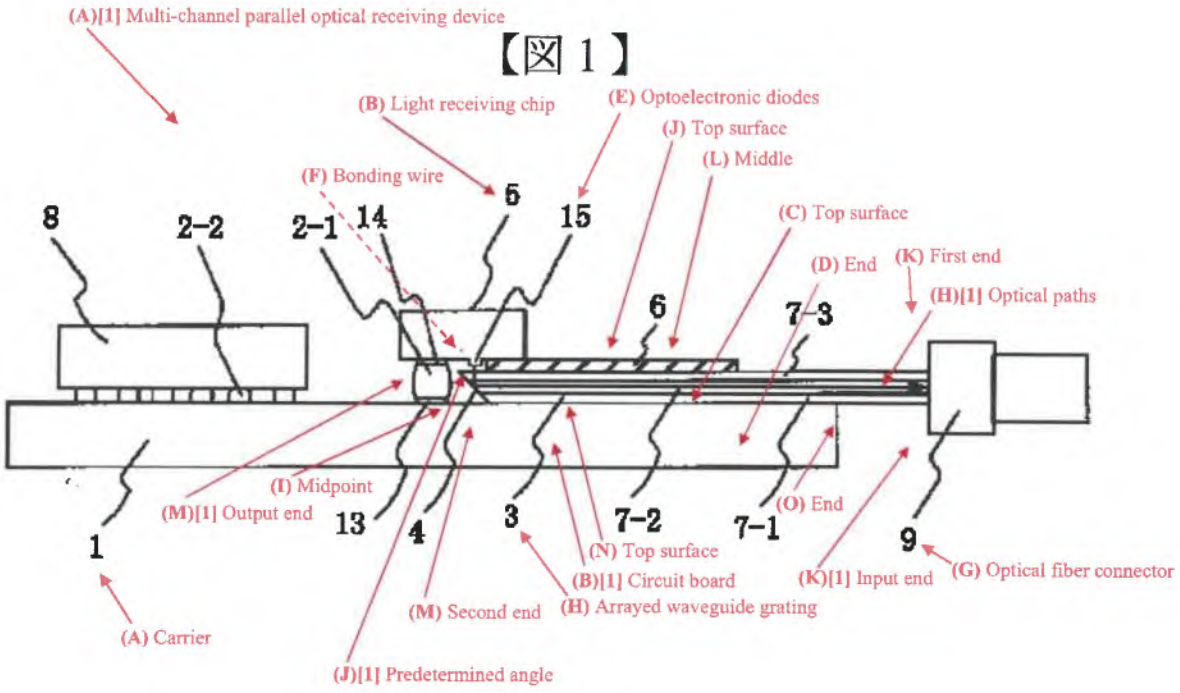


FIG. 1 (Junichi)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against Japanese Patent Pub. No. JP-PUB-2003-215371 ("Junichi")

U.S. Patent No. 10,379,301	Disclosure in Junichi
Independent Claim 1	
[1a] A multi-channel parallel optical receiving device, comprising:	Junichi discloses a multi-channel parallel optical receiving device **(A)[1]**. *See* FIG. 1; paras. [0017], [0018] (JPO machine translation).
[1b] a carrier;	As construed in AOI's infringement contentions, Exhibits 7 and 8, Junichi discloses a carrier **(A)**. *See* FIG. 1; para. [0026] (JPO machine translation).
[1c] a light receiving chip disposed on a top surface of an end of the carrier;	Junichi discloses a light receiving chip **(B)** is located on a top surface **(C)** of an end **(D)** of the carrier **(A)**. A person of ordinary skill in the art would have understood that for a light receiving circuit, photodiodes would replace the VCSELs. *See* FIG. 1; Overview, paras. [0017]–[0020], [0025] (JPO machine translation).
[1d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;	Junichi discloses a plurality of optoelectronic diodes **(E)** are located on the top surface **(C)** of the end **(D)** of the carrier **(A)**. The plurality of optoelectronic diodes **(E)** are electrically connected to the light receiving chip **(B)** via bonding wire **(F)**. The optoelectronic diodes **(E)** and the light receiving chip **(B)** are located directly on the same top surface **(C)** of the end **(D)** of the carrier **(A)**. *See* FIG. 1; Overview, paras. [0002], [0018], [0035], [0052], [0057], [0063].
[1e] an optical fiber connector disposed in an end of the carrier;	Junichi discloses an optical fiber connector **(G)** is located in an end **(O)** of the carrier **(A)**. *See* FIG. 1; para. [0032] (JPO machine translation).
[1f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a	Junichi discloses an arrayed waveguide grating **(H)** is further located on a top surface **(N)** of the carrier **(A)** that defines a midpoint **(I)** of the carrier **(A)**. The arrayed waveguide grating

second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber wherein the top surface of the carrier underlies the middle of the arrayed waveguide grating; and	**(H)** has a first end **(K)**, a middle **(L)**, a second end **(M)** located opposed the first end **(K)**, and an input end **(K)[1]** of the arrayed waveguide grating **(H)** connected to the optical fiber connector **(G)** for receiving an optical signal from the optical fiber. The top surface **(C)** of the carrier **(A)** underlies the middle **(L)** of the arrayed waveguide grating **(H)**. *See* FIG. 1; paras. [0016] – [0018], [0025], [0032], [0057]; claim 5 (JPO machine translation).
[1g] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.	Junichi discloses the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating **(H)** based on their wavelengths. A top surface **(J)** defined by an output end **(M)[1]** of the arrayed waveguide grating **(H)** is at a predetermined angle **(J)[1]**, causing the multi-channel optical signals reflected by the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** to be reflected to a photosensitive surface of the plurality of optoelectronic diodes **(E)** arranged in parallel. The predetermined angle **(J)[1]** of the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be, for example, 45 degrees or another angle between 41 degrees and 49 degrees (e.g., in a range of 41 to 46 degrees) such that the top surface **(J)** provides the reflection. *See* FIG. 1; paras. [0025], [0032], [0057] (JPO machine translation).
Dependent Claim 2	
[2a] The multi-channel parallel optical receiving device according to claim 1, wherein the top surface of the end of the carrier is defined at least in part by a circuit board and wherein	*See,* Claim 1, *supra*. Junichi further discloses the top surface **(C)** of the end **(D)** of the carrier **(A)** may be defined at least in part by a circuit board

the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the circuit board.	**(B)[1]**. The plurality of optoelectronic diodes **(E)** and the light receiving chip **(B)** may be directly located on the circuit board **(B)[1]**. *See* FIG. 1; para. [0003] (JPO machine translation).
Dependent Claim 3	
[3a] The multi-channel parallel optical receiving device according to claim 1, wherein the amount of the optoelectronic diodes is equal to the amount of optical paths divided by the arrayed waveguide grating.	*See,* Claim 1, supra. Junichi discloses that the number of the optoelectronic diodes **(E)** is equal to the number of optical paths **(H)[1]** output by the arrayed waveguide grating **(H)**. *See* FIG. 1; paras. [0002], [0047], [0057] (JPO machine translation).
Dependent Claim 4	
[4a] The multi-channel parallel optical receiving device according to claim 1, wherein the predetermined angle of the top surface of the output end of the arrayed waveguide grating is 42 degrees.	*See,* Claim 1, *supra*. Junichi further discloses the predetermined angle **(J)[1]** of the top surface **(J)** of the output end **(M)[1]** of the arrayed waveguide grating **(H)** may, for example, be 45 degrees or another angle between 41 degrees and 49 degrees (e.g., 42 degrees). *See* FIG. 1; paras. [0025], [0032], [0057] (JPO machine translation).
Independent Claim 7	
[7a] A multi-channel parallel optical receiving device, comprising:	*See,* [1a], *supra.*
[7b] a carrier;	*See,* [1b], *supra.*
[7c] a light receiving chip disposed on a top surface of an end of the carrier;	*See,* [1c], *supra.*
[7d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light	*See,* [1d], *supra.*

receiving chip via wire bonding, wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the same top surface of the end of the carrier;	
[7e] an optical fiber connector disposed in an end of the carrier;	*See,* [1e], *supra.*
[7f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber;	*See,* [1f], *supra.*
[7g] wherein the top surface of the carrier that defines the midpoint of the carrier underlies the middle of the arrayed waveguide grating; and	*See,* [1f], *supra.*
[7h] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle of 42 degrees, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel.	*See,* [1g], *supra.*

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against U.S. Patent No. 9,768,901 ("Soldano")

U.S. Patent No. 9,768,901 to Soldano

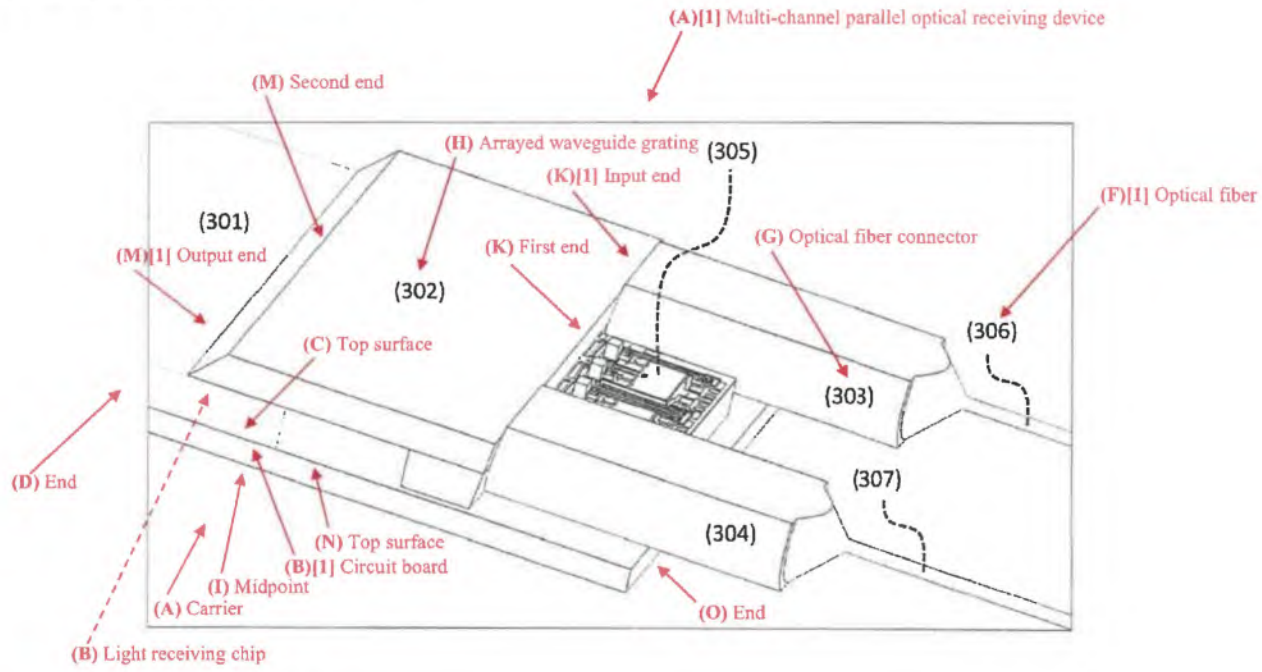


Fig 3

FIG. 3 (Soldano)

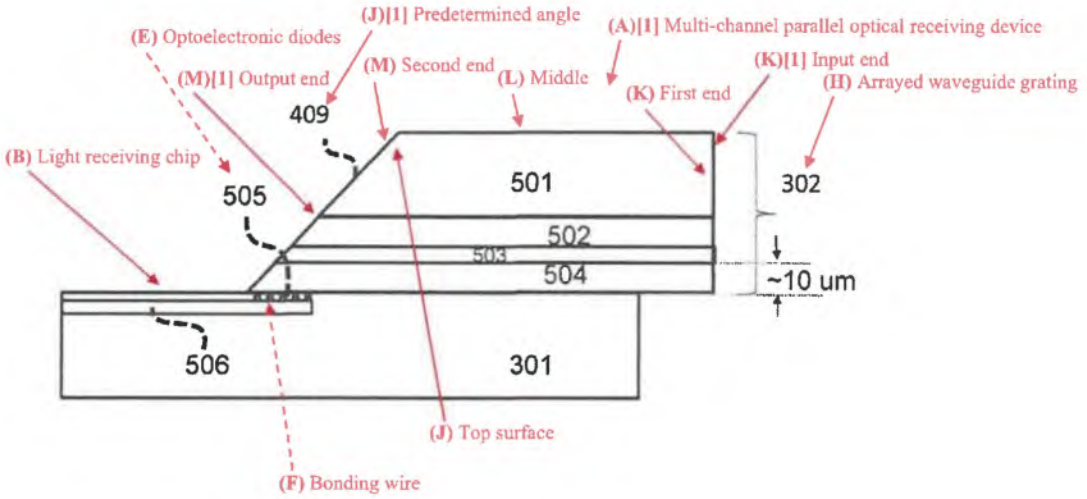


Fig 5

FIG. 5 (Soldano)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,379,301 Against U.S. Patent No. 9,768,901 ("Soldano")

U.S. Patent No. 10,379,301	Disclosure in Soldano
Independent Claim 1	
[1a] A multi-channel parallel optical receiving device, comprising:	Soldano discloses a multi-channel parallel optical receiving device **(A)[1]**. *See* FIGS. 3, 5; Col. 7, line 29–Col. 8, line 28.
[1b] a carrier;	As construed in AOI's infringement contentions, Exhibits 7 and 8, Soldano discloses a carrier **(A)**. *See* FIGS. 3, 5; Col. 7, line 29–Col. 8, line 28.
[1c] a light receiving chip disposed on a top surface of an end of the carrier;	Soldano discloses a light receiving chip **(B)** is located on a top surface **(C)** of an end **(D)** of the carrier **(A)**. *See* FIGS. 3, 5; Col. 8, lines 8–10; Col. 9, lines 15–20.
[1d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via bonding wire, wherein the optoelectronic diodes and the light receiving chip are disposed directly on the same top surface of the end of the carrier;	Soldano discloses a plurality of optoelectronic diodes **(E)** are located on the top surface **(C)** of the end **(D)** of the carrier **(A)**. The plurality of optoelectronic diodes **(E)** are electrically connected to the light receiving chip **(B)** via bonding wire **(F)**. The optoelectronic diodes **(E)** and the light receiving chip **(B)** are located directly on the same top surface **(C)** of the end **(D)** of the carrier **(A)**. *See* FIGS. 3, 5; Col. 8, lines 17–28; Col. 10, lines 10–25.
[1e] an optical fiber connector disposed in an end of the carrier;	Soldano discloses an optical fiber connector **(G)** is located in an end **(O)** of the carrier **(A)**. *See* FIG. 3; Col. 7, lines 24–32, 52–65.
[1f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber wherein the top surface of the carrier underlies the middle of the arrayed waveguide grating; and	Soldano discloses an arrayed waveguide grating **(H)** is further located on a top surface **(N)** of the carrier **(A)** that defines a midpoint **(I)** of the carrier **(A)**. The arrayed waveguide grating has a first end **(K)**, a middle **(L)**, a second end **(M)** located opposite the first end **(K)**. An input end **(K)[1]** of the arrayed waveguide grating **(H)** is connected to the optical fiber connector **(G)** for receiving an optical signal from the optical fiber **(F)[1]**. The top surface **(C)** of the carrier **(A)** underlies the

	middle **(L)** of the arrayed waveguide grating **(H)**. *See* FIGS. 3, 5; Col. 7, line 24–Col. 8, line 10.
[1g] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel, wherein the predetermined angle of the top surface defined by the output end of the arrayed waveguide grating is in a range of 41 to 46 degrees such that the top surface provides the reflection.	Soldano discloses the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating **(H)** based on their wavelengths. A top surface **(J)** defined by an output end **(M)[1]** of the arrayed waveguide grating **(H)** is at a predetermined angle **(J)[1]**, causing the multi-channel optical signals reflected by the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** to be reflected to a photosensitive surface of the plurality of optoelectronic diodes **(E)** arranged in parallel. The predetermined angle **(J)[1]** of the top surface **(J)** defined by the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be in a range of 41 to 46 degrees such that the top surface **(J)** provides the reflection. *See* FIGS. 3, 5; Col. 7, line 62–Col. 8, line 10; Col. 9, line 31–Col. 10, line 25.
Dependent Claim 2	
[2a] The multi-channel parallel optical receiving device according to claim 1, wherein the top surface of the end of the carrier is defined at least in part by a circuit board and wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the circuit board.	*See,* Claim 1, *supra*. Soldano further discloses the top surface **(C)** of the end **(D)** of the carrier **(A)** may be defined at least in part by a circuit board **(B)[1]**. The plurality of optoelectronic diodes **(E)** and the light receiving chip **(B)** may be directly located on the circuit board **(B)[1]**. *See* FIGS. 3, 5; Col. 7, line 24–Col. 8, line 28; Col. 9, line 52–Col. 10, line 25.
Dependent Claim 3	
[3a] The multi-channel parallel optical receiving device according to claim 1, wherein the amount of the optoelectronic	*See,* Claim 1, *supra*.

diodes is equal to the amount of optical paths divided by the arrayed waveguide grating.	Soldano discloses that the number of optoelectronic diodes **(E)** is equal to the number of optical paths output by the arrayed waveguide grating **(H)**. *See* FIGS. 3, 5; Col. 8, lines 1–20; Col. 8, line 61–Col. 9, 45.
Dependent Claim 4	
[4a] The multi-channel parallel optical receiving device according to claim 1, wherein the predetermined angle of the top surface of the output end of the arrayed waveguide grating is 42 degrees.	*See,* Claim 1, *supra.* Soldano further discloses the predetermined angle **(J)[1]** of the top surface **(J)** of the output end **(M)[1]** of the arrayed waveguide grating **(H)** may be 42 degrees. *See* FIGS. 3, 5; Col. 7, lines 35–37; Col. 8, lines 8–14.
Independent Claim 7	
[7a] A multi-channel parallel optical receiving device, comprising:	*See,* [1a], *supra.*
[7b] a carrier;	*See,* [1b], *supra.*
[7c] a light receiving chip disposed on a top surface of an end of the carrier;	*See,* [1c], *supra.*
[7d] a plurality of optoelectronic diodes disposed on the top surface of the end of the carrier, and the plurality of optoelectronic diodes electrically connected to the light receiving chip via wire bonding, wherein the plurality of optoelectronic diodes and the light receiving chip are directly disposed on the same top surface of the end of the carrier;	*See,* [1d], *supra.*
[7e] an optical fiber connector disposed in an end of the carrier;	*See,* [1e], *supra.*
[7f] an arrayed waveguide grating further disposed on a top surface of the carrier that defines a midpoint of the carrier, the arrayed waveguide grating having a first end, a middle, and a second end disposed opposite the first end, and an input end of	*See,* [1f], *supra.*

the arrayed waveguide grating connected to the optical fiber connector for receiving an optical signal from the optical fiber;	
[7g] wherein the top surface of the carrier that defines the midpoint of the carrier underlies the middle of the arrayed waveguide grating; and	*See,* [1f], *supra.*
[7h] wherein the optical signal is divided into multi-channel optical signals in parallel by the arrayed waveguide grating based on their wavelengths, a top surface defined by an output end of the arrayed waveguide grating is at a predetermined angle of 42 degrees, causing the multi-channel optical signals reflected by the top surface defined by the output end of the arrayed waveguide grating to be reflected to a photosensitive surface of the plurality of optoelectronic diodes arranged in parallel.	*See,* [1g], *supra.*

EXHIBIT H

Invalidity of the '690 Patent

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,788,690 Against China Patent No. 208421455U ("Peng")

China Patent No. CN208421455U to Peng

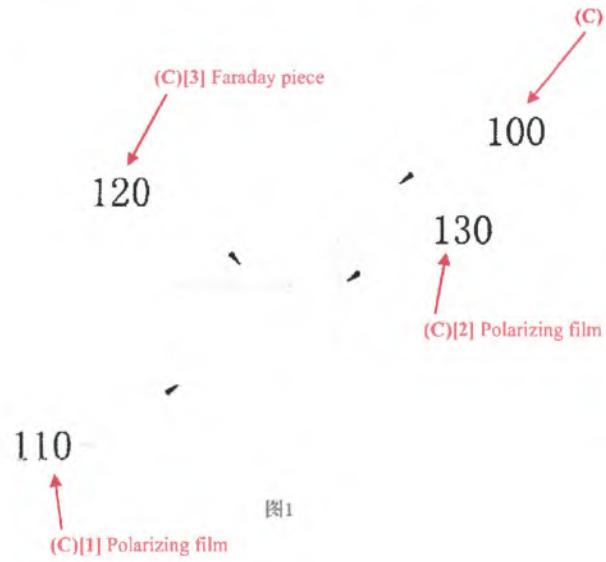


FIG. 1 (Peng)

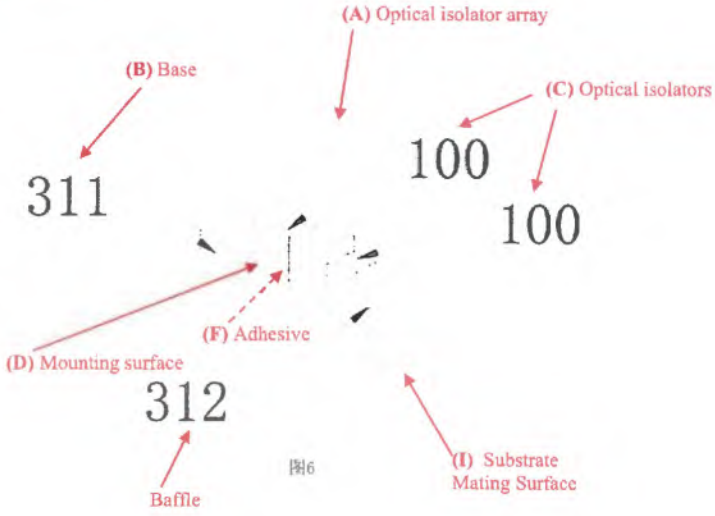


FIG. 6 (Peng)

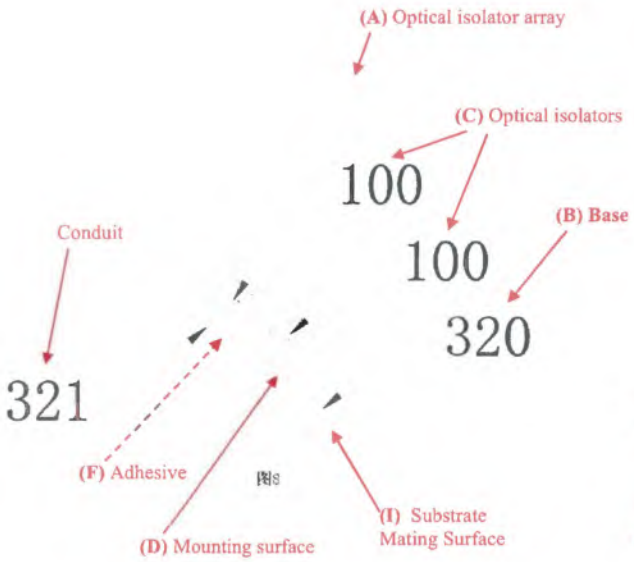


FIG. 8 (Peng)

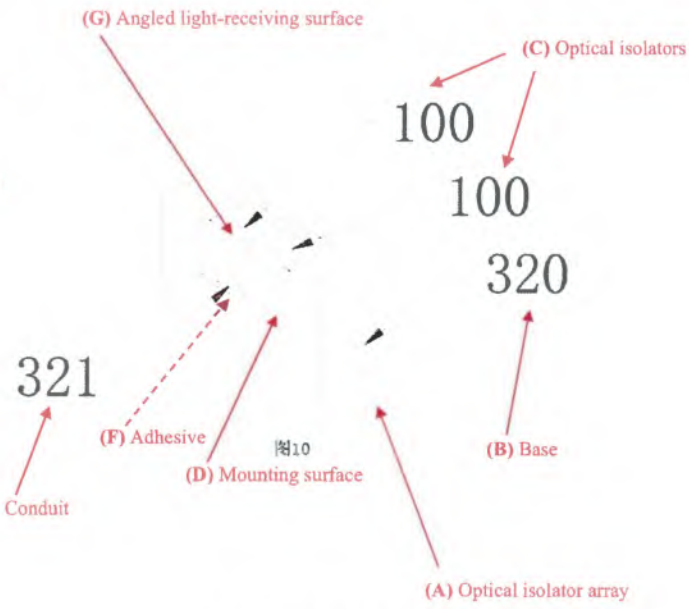


FIG. 10 (Peng)

Invalidity Claim Chart Showing Invalidity of U.S. Patent 10,788,690 Against China Patent No. 208421455U ("Peng")

U.S. Patent No. 10,788,690	Disclosure in Peng
Independent Claim 1	
[1a] An optical isolator array for use in an optical subassembly module, the optical isolator array comprising:	Peng discloses an optical isolator array **(A)** for use in an optical subassembly module. *See, e.g.,* FIGS. 6, 8 and 10; Description at "Specific embodiment" ("A kind of isolator device . . . multiple isolators 100 on substrate in each channel . . .") [Google Patents machine translation].
[1b] a first magnetic base defining at least one mounting surface;	Peng discloses the optical isolator array **(A)** includes a base **(B)** (pedestal 311 or substrate 320) that defines at least one mounting surface **(D)** for the optical isolator array **(A)**. Some or all of the material of the base **(B)** is a magnetic material. *See, e.g.,* FIGS. 6, 8, 10; Description at "Specific embodiment" (". . . all or part of material of the substrate is the magnetic material that can produce magnetic field.") [Google Patents machine translation].
[1c] a plurality of optical isolators mounted to the at least one mounting surface, each of the plurality of optical isolators disposed substantially in parallel relative to each other; and	Peng discloses multiple optical isolators **(C)** are disposed on the mounting surface(s) **(D)** in a substantially parallel arrangement relative to each other. *See* FIGS. 6, 8, 10; Description at "Specific embodiment" (". . . multiple isolators 100 on substrate in each channel . . ."; ". . . the positive direction of the isolator 100 and channel direction is identical . . .") [Google Patents machine translation].
[1d] at least one layer of adhesive disposed on the at least one mounting surface to couple the plurality of optical isolators to the first magnetic base and to hold each optical isolator of the plurality of optical isolators at a predefined position relative to each other.	Peng discloses the optical isolators **(C)** are bonded to the magnetic base **(B)** by an adhesive **(F)** (i.e., a viscous glutinous agent) applied to the mounting surface(s) **(D)**. The layer(s) of adhesive **(F)** further hold each optical isolators **(C)** at a predefined position relative to the other optical isolator(s) **(C)**. *See, e.g.,* FIGS. 6, 8, 10; Description at "Specific embodiment"

	(". . . the isolator 100 is bonded setting with substrate by viscous glutinous agent. . . . while filling the gap of isolator 100 to substrate, improve the installation accuracy of isolator 100."; "The baffle 312 and pedestal 311 constitute the channel for accommodating isolator 100, the isolator 100 [secured] by viscous glutinous agent respectively...") [Google Patents machine translation].
Dependent Claim 2	
[2a] The optical isolator array of claim 1, wherein the magnetic base is formed from a permanent magnet.	*See,* Claim 1, *supra*. Peng discloses the magnetic base **(B)** is formed at least in part from magnetic material that can produce a magnetic field (i.e., a permanent magnet). *See* Description at "Specific embodiment" (". . . all or part of material of the substrate is the magnetic material that can produce magnetic field.") [Google Patents machine translation].
Dependent Claim 3	
[3a] The optical isolator array of claim 1, wherein the magnetic base introduces a first magnetic field that intersects with the plurality of optical isolators to establish a direction of propagation.	*See,* Claim 1, *supra*. Peng discloses the magnetic base **(B)** is formed from magnetic material capable of producing a magnetic field that intersects with the optical isolators **(C)** to establish a direction of propagation defined in part by polarizing film (**(C)[1], (C)[2]**) of each optical isolator **(C)**. *See* FIGS. 1, 6; Description at "Specific embodiment" ("And all or part of material of the substrate is the magnetic material that can produce magnetic field . . ."; "Faraday's piece 120 utilizes magnetic . . . nonreciprocity of luminescent material . . . And on a substrate, it

	is arranged multiple for accommodating the channels of isolator 100, . . . polarizing film 110, Faraday's piece 120 and 130 direction of analyzing polarizing film are positive direction, the positive direction of the isolator 100 and channel direction is identical, and channel both ends are respectively provided with opening, convenient for the incidence and outgoing of light.") [Google Patents machine translation].
Dependent Claim 4	
[4a] The optical isolator array of claim 1, wherein each optical isolator of the plurality of optical isolators comprises a Faraday Isolator.	*See,* Claim 1, *supra*. Peng discloses each optical isolator **(C)** may include a Faraday piece **(C)[3]** such as a Faraday rotator. *See* FIG. 1; Description at "Specific embodiment" ("Specifically, isolator 100 is polarized polarizing film 110, Faraday's piece 120 and analyzing polarizing film including what is set gradually 130 . . ."; "In the present embodiment, Faraday's piece 120 is Faraday rotator, and the material of the Faraday rotator is magnetic property material or non magnetic material.") [Google Patents machine translation].
Dependent Claim 5	
[5a] The optical isolator array of claim 1, wherein each optical isolator of the plurality of optical isolators includes an angled light-receiving surface to receive channel wavelengths from an associated laser diode.	*See,* Claim 1, *supra*. Peng discloses each optical isolator **(C)** may include an angled light-receiving surface **(G)** to receive channel wavelengths from an associated laser diode. *See, e.g.,* FIG. 10, in which the front and rear faces of the isolators are offset, showing that the light-receiving surfaces of the isolators 100 are angled relative to the incident light. It was well known in the field opto-isolators to

	angle the light-receiving surfaces of such devices relative to the incident light to reduce back reflection. *See* US2003/0053208, FIG. 1 and paragraph [0084].
Dependent Claim 6	
[6a] The optical isolator array of claim 1, wherein the plurality of optical isolators is disposed uniformly across the at least one mounting surface.	*See,* Claim 1, *supra*. Peng discloses the optical isolators **(C)** are uniformly arranged across the mounting surface(s) **(D)** of the base **(B)** (e.g., in one or more conduits provided on the base **(B)**). *See, e.g.,* FIGS. 6 and 8; Description at "Specific embodiment" ("Multiple conduits 321 for constituting channel are provided on the substrate 320, before and after the conduit 321 is on substrate 320[.] Both ends all have opening, and the isolator 100 is arranged in the conduit 321 of substrate 320 by viscous glutinous agent.") [Google Patents machine translation].
Dependent Claim 7	
[7a] The optical isolator array of claim 1, wherein the at least one layer of adhesive is disposed between adjacent optical isolators of the plurality of optical isolators.	*See,* Claim 1, *supra*. Peng discloses the layer(s) of adhesive **(F)** may be applied between adjacent optical isolators **(C)**, which may be located within a conduit on the base **(B)**. *See* FIG. 10; Description at "Specific embodiment" ("On the basis of preferred embodiment two of aforesaid substrate 320, multiple isolators 100 are arranged in a conduit 321 . . . all isolators 100 fit closely setting in the conduit 321.") [Google Patents machine translation].
Dependent Claim 8	
[8a] The optical isolator array of claim 1, wherein the magnetic base includes a substrate mating surface, and whereby the	*See,* Claim 1, *supra*.

substrate mating surface is substantially flat to correspond with a mounting surface of a substrate and to mount thereto.	Peng discloses the magnetic base **(B)** includes a substantially flat substrate mating surface **(I)** (e.g., a horizontal lower surface of the pedestal or substrate), to enable mounting thereof. *See* FIGS. 6, 8 and 10.