

UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE PATENT TRIAL AND APPEAL BOARD

INTEL CORPORATION,

Petitioner

v.

TELEFONAKTIEBOLAGET L M ERICSSON (publ),

Patent Owner.

Case No. IPR2024-00728
Patent No. 7,151,430 B2

Before Daveina B. Williams, *Trial Paralegal*

PATENT OWNER SUR-REPLY

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<i>TomTom, Inc. v. Adolph</i> , 790 F.3d 1315 (Fed. Cir. 2015)	3, 4
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EXHIBIT LIST

Petitioner Exhibits

Ex. No.	Description
1001	US 7,151,430 Mattsson
1003	Declaration of Tentzeris
1005	US PUB 20030063034 A1 Taniguchi
1006	US 6,373,447 Rostoker
1007	PCT WO 9805048 Midya
1008	US PUB 20050077992 A1 Raghavan
1009	US PUB 2001/0030591 Gardner
1010	“Signal Integrity Issues and Printed Circuit Board Design” to Brooks
1011	Declaration of June Ann Munford
1012	RFID Handbook 2 nd Ed. 2003
1013	Serway
1014	Ulaby
1015	Translation JP PCT EP 2005001515
1016	Excerpt Prosecution EP3567614
1017	WO 2004/0122213 Enzinger
1018	US6708880 Acher
1019	Excerpt ITC INV TA 1376 Claim Construction 3-13-2024
1020	ITC 337 TA 1300 Claim Construction 9-26-2022
1021	U6533178 Gaul
1022	US5345231 Koo
1023	US6,137,447 to Saitoh
1024	US6320491 Gevorgian
1025	US7088964 O
1026	US PUB 20020044058 Heinrich
1027	US6970088 Kovach
1028	US4724427Carroll
1029	US7057514 Mickle
1030	Comprehensive Explanation On The High Quality Characteristics of Symmetrical Octagonal Spiral Inductor -- Ooi
1031	Design and Analysis of Symmetric Dual-Layer Spiral Inductors for RF Integrated Circuits -- Lee

Ex. No.	Description
1032	A Q-FACTOR ENHANCEMENT TECHNIQUE FOR MMIC INDUCTORS -- Danesh
1033	PCT PUB WO9949513 Zhou
1034	US5583474 Mizoguchi
1035	RESERVED
1036	“A Single-Chip 900-MHz Spread-Spectrum Wireless Transceiver in 1-up CMOS – Part 1: Architecture and Transmitter Design” by Ahmadreza Rofougaran et al. , IEEE Journal of Solid-State Circuits, Vol. 33, No. 4 (April 1998)
1037	“A Single-Chip CMOS Transceiver for DCS-1800 Wireless Communication” by Michiel Steyaert, et al. ISSCC98, Session 3, Transceiver and Power Amplifiers (1998)
1038	“A 1.8-GHz Low-Phase-Noise CMOS VCO Using Optimized Hollow Spiral Inductors” by Craninckx, et al. (“Craninckx”)
1039	“Low-Phase-Noise LC Quadrature VCO Using Coupled Tank Resonators in a Ring Structure” by ElSayed, et al. (“ElSayed”)
1040	“A CMOS Frequency Synthesizer with an Injection-Locked Frequency Divider for a 5-GHz Wireless LAN Receiver” to Rategh, et al. (“Rategh”)
1041	“Illustrated Dictionary of Electronics” to Gibilisco, Eighth Edition
1042	“Class Definition for Class 343 Communications: Radio Wave Antennas,” U.S. Patent & Trademark Office (2001), https://web.archive.org/web/20011123183942/http://www.uspto.gov/web/patents/classification/uspc343/defs343.htm
1043	Supplemental Declaration of Dr. Manos Tentzeris
1044	Deposition Transcript of Dr. Paul Prucnal
1045	“Antenna Theory” by Constantine Balanis (2nd Ed. 1997)
1046	U.S. Patent 5,070,317 to Bhagat (“Bhagat”)
1047	“Advanced Silicon IC Interconnect Technology and Design: Pre-sent Trends and RF Wireless Implications” by Ronald J. Gutmann, IEEE Transactions on Microwave Theory and Techniques, Vol. 47, No. 6 (June 1999)
1048	“Interconnect Technology and Design Implications for Future ASIC and System-on-a-Chip (SOC) Implementations” by Ronald J. Gutmann et al., 10th Annual IEEE/SEMI Advanced Semiconductor Manufacturing Conference, ASMC 99 Proceedings (Cat. No.99CH36295) (1999)

Ex. No.	Description
1049	“Core Design and System-on-a-Chip Integration” by Ann Marie Rincon, et al., IEEE Design and Test of Computers (October-December 1997)
1050	WO 03/015110 to Tiemeijer (“Tiemeijer”)
1051	Prucnal Ex. 1, ITC-337-TA-1300, CXM-0035, Declaration of Paul R. Prucnal, Ph.D. in Support of Complainant’s Claim Construction Brief
1052	U.S. Patent Publication 2003/0186674 to Keeney (“Keeney”)

Patent Owner Exhibits

Ex. No.	Description
2001	Statutory Disclaimer of claims 20 & 21 of U.S. Patent 7,151,430
2002	Declaration of Dr. Paul Prucnal In Support of Patent Owner Preliminary Response
2003	US 6,512,422 Dufour
2004	US 6,664,606 Estes
2005	US 6,891,444 Jacobson
2006	US 6,894,598 Heima
2007	WO 2003/084295 Bhailis
2008	US 6,194,987 Zhou
2009	Supplemental Declaration of Dr. Paul Prucnal, Ph.D.
2010	Dr. Tentzeris Deposition Transcript

I. Introduction

Intel has not shown with particularity why claims 1-19 in the ‘430 Patent (“Challenged Claims”) are unpatentable.

As to claims 2 and 11-19, none of the references, alone or in combination, teach or disclose *first and second inductors on a semiconductor die* to reduce EM coupling. Grounds 2 and 4 add Rostoker to Ground 1 and Gardner to Ground 3. Intel’s Petition does not rely on Rostoker or Gardner for any other limitation besides “on a semiconductor die.” Paper 2, 60, 101-2. The limitations missing from Ground 1 and 3 are also missing from Grounds 2 and 4.

Ground 2 fails because a POSITA would not have been motivated to modify Taniguchi’s antennas on a printed circuit board (PCB) based on Rostoker’s integrated circuit (IC) teachings to arrive at the inductors on a semiconductor die in the Challenged Claims. The magnetic fields generated by antennas and inductors have similar physical origins, but the design constraints for inductors on ICs differ from those of antennas on PCBs, and a POSITA would not have been motivated to apply the designs of one to the other. Ground 4 fails because a POSITA would not have been motivated to combine Midya, Raghavan, and Gardner, and Gardner fails to disclose the missing limitations from the Midya/Raghavan combination.

Grounds 5-8 add Brooks to Grounds 1-4 for the “closely spaced terminals” and “minimizing magnetic field contributions from the terminals” limitations in the Challenged Claims. Paper 2, 104-106. Grounds 5-8 do not cure the deficiencies in Grounds 1-4. The remaining Grounds in the Petition fail to disclose or teach other limitations in the Challenged Claims as explained below.

II. None of the Asserted Grounds Disclose or Render Obvious a *First and a Second Inductor on a Semiconductor Die* in Claims 2 and 11-19

The body of claim 2, the preamble of claim 11, and dependent claims 12-19 require the first and second inductors to be formed “on a semiconductor die.” Intel’s Petition recognizes this limitation is missing from Taniguchi, Midya, Raghavan, and Brooks in Grounds 1, 3, and 5-8. Paper 2, 60, 101.

A. Claim 11’s Preamble is Limiting

Whether a preamble is limiting is “resolved only on review of the entire[] . . . patent to gain an understanding of what the inventors actually invented and intended to encompass by the claim.” *Catalina Mktg. Int’l v. Coolsavings.com, Inc.*, 289 F.3d 801, 808 (Fed. Cir. 2002) (citations omitted). Claim construction “demands interpretation of the entire claim in context, not a single element in isolation.” *Sound View Innovations, LLC v. Hulu, LLC*, 33 F.4th 1326, 1333 (Fed. Cir. 2022) (citations omitted)

Claim 11’s preamble states: “method of reducing mutual electromagnetic coupling between a first inductor and a second inductor on a semiconductor die.” EX1001, 10:61-63; EX2009, ¶ 11; EX1051, ¶ 57. The phrase “*first inductor and a second inductor on a semiconductor die*” provides essential structure. EX2009, ¶ 14; Paper 16, pp. 5-7. *Semiconductor die* modifies the *first inductor* and the *second inductor* and provides essential structure in the claim body. Paper 16, p. 5 & 7-10. The *semiconductor die* cannot be read out of the structure for the *first inductor* and the *second inductor* without impacting the completeness of claim 11.

Rather than interpret the entire claim in context, Intel improperly isolates the term on a *semiconductor die* from the terms *first inductor* and *second inductor*. The case on which Intel relies, *TomTom, Inc. v. Adolph*, 790 F.3d 1315 (Fed. Cir. 2015), supports Ericsson’s position. Preamble language reciting essential structure is limiting, *TomTom*, 790 F.3d at 1323. Comparison of the preamble in *TomTom* and claim 11 (analogous limiting language in bold and italics) shows a *semiconductor die* is essential structure.

Claim 11 Preamble	<i>TomTom</i> Preamble
“method of reducing mutual electromagnetic coupling between [“the <i>reducing language</i> ”] <i>a first</i>	“method for generating and updating data for use in [(“the <i>generating language</i> ”)] <i>a destination tracking system of at least one mobile unit</i> ”

<i>inductor and a second inductor on a semiconductor die</i> ” EX1001, 10:61-63	<i>TomTom</i> , 790 F.3d at 1322
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In *TomTom*, the phrase “destination tracking system of at least one mobile unit” was limiting because it provided the necessary structure for the claim. *TomTom*, 790 F.3d at 1323. Like the “destination tracking system of at least one mobile unit” in *TomTom*, the first and second inductors being positioned on a semiconductor die is limiting. The phrase *on a semiconductor die* recites essential structure to give life, meaning, and vitality to claim 11. *TomTom*, 790 F.3d at 1323. The body of claim 11 would be incomplete without limiting the first inductor and the second inductor to being positioned on a semiconductor die.

The other cases Intel cites do not change the outcome. In *Catalina*, the preamble phrase in claim 1 was “located at predesignated sites such as consumer stores.” 289 F.3d at 810. The patentee did not use that preamble to define the invention, and the preamble was not essential to understand the limitations in the claim body. *Id.* Claim 25 in *Catalina*, however, the phrase appeared in the preamble and claim body and was limiting. *Id.* at 811. The semiconductor die limitation appears in claims 11’s preamble and claim body and restricts the position of the first and second inductors. The first and second inductors on a semiconductor die phrase in claim 11 is like the phrase in *Catalina*’s claim 25 that provided essential structure for the body of the claim.

In *Arctic Cat Inc. v. GEP Power Prods.*, 919 F.3d 1320 (Fed. Cir. 2019), the preamble recited a “power distribution module for a personal recreational vehicle.” *Id.* at 1327. The preamble referred to “a personal recreational vehicle only as an intended use.” *Id.* at 1328. Conversely, the *first inductor and second inductor on a semiconductor die* language of claim 11 provides essential structure for the claim body. *Arctic Cat* does not support Intel’s argument.

Intel references the ID (Paper 10, p. 17) to support its argument that *semiconductor die* is not limiting. Paper 19, p. 2. That section of the ID discusses the alleged obviousness of claim 1. But, claim 1, unlike claims 2 and 11-19, does not contain the words *semiconductor die*. The analysis of claim 1 has no relevance to whether the *first inductor and a second inductor on a semiconductor die* phrase in claim 11 is limiting.

The prosecution history demonstrates Ericsson added limitations to claim 11 thereby narrowing the scope of the claim. EX1002, 23, 72. The deletion of “said semiconductor die” in the claim body did not broaden the claim. The change in form required both inductors to be positioned on a semiconductor die and was accompanied by the removal of “said semiconductor die” from the claim body. EX1051, ¶ 60, n. 1. The structural limitation *on a semiconductor die* extends throughout the body of claim 11 where it refers to the first inductor and the second inductor. In a related EP application, Ericsson argued the semiconductor die

limitation distinguished prior art. EX1016, 59 (“However, in the interest of expediting the examination procedure, the claims have been amended to be directed towards “a semiconductor die” having the first and second inductor formed thereon.”).

Because claim 11’s preamble (unlike claim 1) states the first inductor and second inductor are on a semiconductor die, claim 11 lacks a dependent method claim corresponding to claim 2. EX1051, ¶ 60. Dependent claims 12-19 include all the limitations of independent claim 11 and also require the first and second inductors to be positioned on a semiconductor die. 35 U.S.C. § 112, fourth paragraph (pre-AIA); MPEP § 608.01(n). .

B. A POSITA Would Not have been Motivated to Modify Taniguchi or Midya and Raghavan to Create a First and Second Inductor on a Semiconductor Die [2 & 11p]

Without the benefit of hindsight reasoning, a POSITA would not have modified Taniguchi (concentric antennas on a PCB) alone or with Rostoker (antennas on ICs) (Grounds 1 or 2) and would not have modified Midya (PCB) with Raghavan (spiral inductors) (Grounds 3 or 4) and with Gardner (IC inductor) to arrive at *a first and a second inductor on a semiconductor die*. These references relate to different fields of endeavor and are not analogous art.

1. The Field of Endeavor is Inductor Design for

Semiconductors¹

The field of endeavor determine what prior art is relevant to the ‘430 Patent “by reference to explanations of the invention’s subject matter in the patent application, including the embodiments, function, and structure of the claimed invention.” *Netflix, Inc. v. DivX, LLC*, 80 F.4th 1352, 1358 (Fed. Cir. 2023).

The Petition asserted a POSITA would have had experience “designing integrated circuits or inductors.” Paper 2 , 2 & EX1003, ¶ 58. The Reply argued the field of endeavor was “efficient circuit design.” Paper 8, 4. Ericsson explained Intel broadly mischaracterized the problem as “efficient circuit design.” Paper 9, 6. The Board preliminarily concluded the field of endeavor was “inductor design.” Paper 10, 17. Ericsson explained why a POSITA would have experience “designing integrated radiofrequency circuits and inductors for semiconductors.” Paper 16, 4-5 & 13, EX2009, ¶¶ 7-10. That definition tracks Ericsson’s position in ITC337-TA-1300. EX1051, ¶¶ 2, 37. It is erroneous to define the field of endeavor

¹ Ericsson acknowledges the Board preliminarily agreed the field of endeavor is inductor design. Institution Decision (“ID”), Paper 10, p. 17. As discussed in this Section, evidence submitted after the ID (Dr. Prucnal’s deposition) suggests the Board should reconsider that preliminary determination.

as efficient circuit design when the '430 Patent's specification focuses on inductor designs for integrated circuits. EX2002, ¶ 17-28; EX2009, ¶¶ 20, 22, 39.

Intel's references to the '430 Patent do not support its arguments. Paper 19, 5. The reference to 3:4-6 omits the beginning of the sentence stating: "As mentioned above." What appears above the clause quoted by Intel refers to inductors on semiconductors. *See e.g.*, EX1001, 1:26-28 ("on a single semiconductor chip"); 1:61 ("on a single semiconductor chip"); 2:14-14 ("on a semiconductor die"). The reference to 3:36-40 is taken out of context because it relates back to text discussing forming inductors on semiconductor dies. EX1001, 3:14 ("on-chip", meaning a semiconductor). The passage at 5:32-39 refers to the four-leaf clover shaped inductors for semiconductors. The statement that only claims 2 and 11 recite semiconductors ignores the principle that dependent claims 12-19 include all the limitations of claim 11, including *the first inductor and second inductor on a semiconductor die*.

Broadening the field of endeavor from inductor designs for semiconductors to efficient circuit design invites Intel to rely improperly on teachings from disparate fields. The Board should reconsider its preliminary determination and conclude the field of endeavor is designing integrated RF circuits and inductors for semiconductors.

2. Taniguchi and Rostoker are not Analogous Art

(Grounds 1 & 2)

Petitioners must “adhere to the requirement that the initial petition identify ‘with particularity’ the ‘evidence that supports the grounds for the challenge to each claim.’” *TQ Delta, LLC v. Cisco Sys., Inc.*, 942 F.3d 1352, 1358, n. 4 (Fed. Cir. 2019) (internal citations omitted) The Board declined to consider additional evidence the petitioner submitted with its reply. *Id.* Intel introduces new evidence exceeding the scope of the Petition and Ericsson’s Reply, and the Board should not consider it. *Hulu, LLC v. Sound View Innovations, LLC*, 2019 Pat. App. LEXIS 11904, * 7, IPR2018-01039, Paper 29 (PTAB 2019) (precedential).

EX1043, ¶¶ 6-36, EX1047, EX1049 & EX1050 constitute impermissible new evidence. Paragraphs 6-36 of EX1043 provide EM field simulations not included with the Petition. Taniguchi does not mention EM field simulations. Even if considered, these simulations show a Ph.D. relying on hindsight used significant effort to modify Taniguchi’s PCB concentric antennas to the ‘430 Patent’s laterally offset inductors on semiconductors, thereby negating any motivation to modify. Paper 16, § VI.C.

EX1043, ¶ 41 discusses new exhibit Balanis (EX1045). The last sentence ignores that the ‘430 Patent’s inductors are orders of magnitude smaller than Taniguchi’s antennas. The size difference means they would not produce identical EM fields. EX1044, 110:2-18. Paragraphs 44-47 of EX1043 discuss small form

factors, but those form factors do not suggest inductors on semiconductor dies.

Likewise, ¶ 50 does not establish that inductors on ICs and antennas on PCBs are interchangeable. Exhibits 1047 and 1049 exceed arguments in the Petition and should not be considered. *Hulu*, 2019 Pat. App. LEXIS *7.

Dr. Tentzeris states a POSITA would understand a “loop antenna and an inductor of the same size and shape, and carrying the same current” are similar and would produce identical EM fields. EX10143, ¶ 41. Dr. Tentzeris does not say that antennas on a PCB (Taniguchi), differing in size, shape, and current from the ‘430 Patent’s inductors on an IC, produce identical EM fields as the ‘430 Patent’s inductors.

Dr. Prucnal explained the size and scale of the ‘430 Patent’s inductors differ substantially from Taniguchi’s antennas and the distances where the EM fields might cancel would differ. EX1044, 110:7-18. Taniguchi is designed to produce a strong field at a distance away from the antennas, not to produce field cancellation. *Id.*, 110:19-111:1; EX1051, ¶ 53. Due to design constraints in ICs that are not present in PCBs, a POSITA would not look to Taniguchi’s antennas on PCBs to solve the coupling problems between inductors on ICs addressed by the ‘430 Patent. EX1001, 3:44-63. (describing the topological constraints for planar integrated inductors on ICs.). Brooks teaches away from using inductors in PCBs, and a POSITA would not look to Brooks to solve problems with inductors in ICs.

EX1010, Part 9 of 10, page 342. (describing inductor design constraints pointing a POSITA away from using inductors on PCBs).

Taniguchi addresses increasing the mutual magnetic coupling between antennas in a transmitter with an RFID tag. EX2002, ¶ 28. Transmit antennas 1 and 2 induce opposing currents in each other that reduce mutual coupling, not by reducing the EM fields. EX1005, [0057]. Antennas perform a different function than the inductors of the ‘430 Patent; the antennas are designed to emit EM radiation for RFID communications. EX002, ¶ 40-41. The ‘430 Patent’s inductors suppress emitted radiation. EX1001, 1:29-21. A POSITA would not have been motivated to modify Taniguchi’s signal-emitting antennas in the same circuit to arrive at the ‘430 Patent’s inductors in different circuits.

In re ICON Health & Fitness, 496 F.3d 1374 (Fed. Cir. 2007) involved technology related to folding mechanisms, without requiring focus on treadmills. *Id.* at 1379. The court found analogous art could come from any area describing hinges, springs, *etc.* *Id.* Here, the ‘430 Patent focuses on reducing EM coupling between inductors on IC chips. EX1001, 1:29-61. Taniguchi relates to a radio guidance antenna. EX1005, [0001]. Rostoker relates to IC chips having an antenna. EX1006, 1:5-7. The antennas in Taniguchi and Rostoker lack the commonality with the ‘430 Patent’s inductors seen with the prior art’s folding mechanisms in *ICON Fitness*.

3. Midya/Raghavan and Gardner are not Analogous Art (Grounds 3 & 4)

A POSITA would not have been motivated to combine Midya and Raghavan. Paper 16, 54-57. Midya relates to PCBs, and its structure creates additional loops eliminating the substantial symmetry the Challenged Claims require, and adding Raghavan's inductors would not fix the asymmetry present in Midya. Paper 16, 55-59. Adding Gardner does not solve the asymmetry caused by Midya and Raghavan necessary to motivate a POSITA to form the claimed inductors on a semiconductor. A patent is not proved obvious by showing each of its elements was, independently, known in the prior art. *KSR Int'l. Co. v. Teleflex, Inc.*, 550 U.S. 398, 418 (2007). Intel has not met its burden to show why a POSITA would have combined Midya, Raghavan, and Gardner.

4. A POSITA would not look to PCB teachings to solve issues related to inductor interference on ICs.

The analysis in Sections II.B.1-3 *supra* apply here. The evidence allows the Board to conclude that Dr. Tentzeris reached his conclusions by looking for something figure 8-shaped and applying hindsight bias to arrive at his conclusions. Paper 16, 31-2.

Ericsson relies on more than mere conclusory statements. Dr. Prucnal provided sufficient bases for his opinions. EX2002, ¶¶ 26-28 (explaining why Taniguchi is not in the same field of endeavor); 39 (prior art taught away from

invention); 40-42 (inductors differ from antennas); 80 (POSITA would look to more relevant and precise design rules other than PCBs) & EX2009, ¶¶ 24-25 (explaining why POSITA would not have been motivated to combine Taniguchi and Rostoker); 33-34 (explaining why a POSITA would not have been motivated to combine Midya and Raghavan); 38-39 (explaining why Taniguchi would lead a POSITA in a direction divergent from the '430 Patent). A POSITA would not look to PCB teachings to learn about inductors for semiconductors because the design rules are entirely different. EX1044, 132:7-133:17. Although physics dictates current flowing through wire creates a magnetic field, teachings regarding PCBs do not relate to ICs or inductors on ICs. EX1044:132:13-18. Brooks teaches away from using inductors on PCBs. EX1010, Part 9, page 342. The concept of current producing EM fields is the same, but the pertinent far-field reductions would be materially different based on the size differential between Taniguchi's antennas and the '430 Patent's inductors. EX1044, 110:7-18.

The impermissible new evidence (Paper 19, 10) fails to show design similarities between PCBs and ICs. EX1047 discusses virtual design environment (VDE) software for interconnecting IP cores on ICs, not for designing inductors on ICs for RF circuits, and reinforces the conclusion that models created by the VDE had to be "fully developed in a form suitable for IC's." EX1047, 671 & EX1048,

166. These exhibits do not support the conclusion that a POSITA would look to PCB designs to solve IC design problems..

Taniguchi is less material than other references before the examiner.

EX2002, ¶¶ 29, 44. That does not mean the prior art identified during prosecution relating to PCBs was material. It just means that Taniguchi was less material than PCB prior art cited by the examiner (*e.g.*, Midya) who allowed the Challenged Claims.

The Petition fails to show a POSITA would have been motivated to modify PCB teachings to solve inductor interference problems on ICs.

III. Intel has not established the Taniguchi combinations in Grounds 1 (claims 1, 3-5, 7, 10-11, 13-15, 17, 19), 2 (claims 2, 8, 11, 13-15, 17-19), 5 (claims 1, 3-5, 7, 10-11, 13-15, 17, 19), or 6 (2, 8, 11, 13-15, 17-19) render obvious the Challenged Claims.

For the reasons discussed in Section II, the Petition fails to establish that Grounds 1-8 render obvious the first and second inductors on a semiconductor die limitation. Grounds 1, 2, 5, and 6 based on Taniguchi fail for additional reasons. Ground 2 only relates to the limitation a first and second inductors on a semiconductor die. Grounds 5 and 6 provide a cursory analysis with respect to Brooks. Paper 2, 106.

A. A POSITA would not have been motivated to modify Taniguchi (Ground 1).

In addition to Section II.B, the Challenged Claims require the reduced mutual EM coupling result from the first inductor having a reduced EM field. EX1001, 10:27-31. Taniguchi does not teach that; rather, it discloses reduced mutual EM coupling due to the antennas inducing opposing currents in each other, which requires the antennas to be concentric (the lateral distance between the antennas is zero). EX1005, [0057].

The cases Intel cites are distinguishable. In *In re Fulton*, 391 F.3d 1195 (Fed. Cir. 2004), the prior art disclosed the claimed feature of hexagonal surfaces. *Id.* at 1201. Taniguchi does not teach spacing its antennas laterally, and Dr. Tentzeris confirmed the antennas must be positioned concentrically. EX1003, ¶ 107 163, 166, 184-5, 190. *In re Fulton* does not support the argument that a POSITA would have been motivated to modify Taniguchi's concentric antennas to arrive at the '430 Patent's laterally spaced-apart inductors.

In *Cont'l Cirs. LLC v. Intel Corp.*, 915 F.3d 788 (Fed. Cir. 2019), none of the claims recited the "repeated desmear process." *Id.* at 796. The court acknowledged the "fine line between construing the claims in light of the specification and improperly importing a limitation from the specification into the claims." *Id.* The purpose of the specification is to enable those skilled in the art to make and use the invention. *Id.*

The '430 Patent specification requires positioning the inductors so their respective centers are laterally offset. EX1001, Figs. 5, 6, 7, 8, 11 & 12 and Tables 2 & 3 (identifying the "offset" in the left column). "Inductor coil 704 [...] has been offset vertically from the symmetry axis X by a certain distance Z to a new axis X'." EX1001, 7:42-44. The '430 Patent does not enable Intel's argument that *predetermined distance* in the claims encompasses the concentric positioning required by Taniguchi. The phrase *at a predetermined distance*, when read in light of the specification, requires the inductors to be laterally offset, not concentric. Taniguchi's concentric antennas are not positioned at a predetermined distance as the Challenged Claims require.

Dr. Prucnal explained Taniguchi teaches one antenna did not provide effective coupling with the tags and the second antenna was needed for stronger coupling with the tags. EX1044, 69:14-70:10; 73:5-15. But the effectiveness of Taniguchi depends on the two antennas being positioned concentrically, not offset laterally. A POSITA would not have been motivated to modify Taniguchi's concentrically positioned antennas to arrive at laterally spaced-apart inductors as claimed in the '430 Patent.

Whether the use of planar concentric inductors was well known misses the point. Paper 19, 14. Dr. Tentzeris fails to explain how a POSITA would have interlaced Taniguchi's antennas on the same plane. Taniguchi fails to show

reduced EM coupling resulting from the first inductor having a reduced EM field at a predetermined distance as the Challenged Claims require.

B. Taniguchi, Rostoker, and/or Brooks do not render obvious “reducing electromagnetic coupling between a first inductor and a second inductor on a semiconductor die.” (Grounds 1, 2, 5, and 6)[11P]

Claim 11’s preamble is limiting. Section II, *supra*. Intel’s Petition does not rely on Taniguchi or Brooks to disclose the preamble limitation or claim 2. Paper 2, 31, 104-106. Taniguchi does not teach or disclose reducing EM coupling between a first inductor and a second inductor on a semiconductor die. Paper 16, pp. 37-41. Taniguchi fails to disclose or render obvious the first and second inductors on a semiconductor die having reduced EM coupling between them as a result of the first inductor having a reduced EM field as claims 2 and 11-19 require.

C. Taniguchi, Rostoker and/or Brooks do not render obvious the “reduced far field” [1A]/[11A] and “reduced electromagnetic field” [1B]/[11B] limitations. (Grounds 1, 2, 5, 6)

The Petition does not rely on Rostoker or Brooks to disclose this limitation. Paper 2, §§ VI & IX. Dr. Tentzeris did not know the boundaries of the limitation *reduced far field*. Paper 16, p. 41-2. It belies logic to conclude Taniguchi discloses a claim limitation when Dr. Tentzeris did not know the boundaries of that claim limitation. Dr. Tentzeris’ conclusion that Taniguchi discloses the *reduced far field*

and *reduced electromagnetic field* limitations when he admitted not knowing those boundaries is suspect. *Yorkey v. Diab*, 601 F.3d 1279, 1284 (Fed. Cir. 2010) (holding the Board is “well within its discretion” to give more or less credibility to expert testimony unless “no reasonable trier of fact could have done so”).²

The *reduced EM field* limitation requires the *at a predetermined distance* limitation. Ericsson established *at a predetermined distance* means the center points of the first inductor and the second inductor are laterally offset from one another far enough away to reduce EM coupling. Paper 16, § VI.D.2 & 4; EX2002, ¶ 69; EX1001, 2:19-24; § III.A.2, *supra*. The specification confirms the term “far field” means “electromagnetic field at a certain distance from the first inductor.” EX1051, ¶ 79-80; EX1001, 2:13-19. The examples in the specification show the distance between the first and second inductors varying between 0.5 mm and 2.00 mm. EX1001, Figs. 6 & 12; EX1051, ¶ 82.

² Ericsson does not concede these claim terms are indefinite, and its expert opined on these limitations accordingly. EX2009, ¶¶ 13, 15-18.

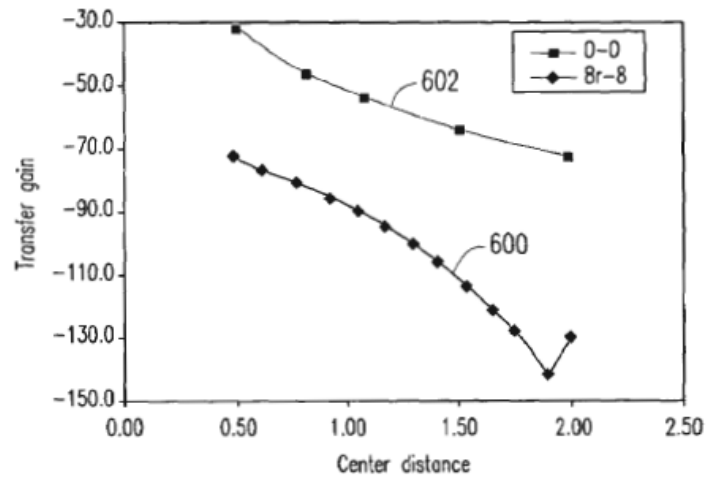


FIG. 6

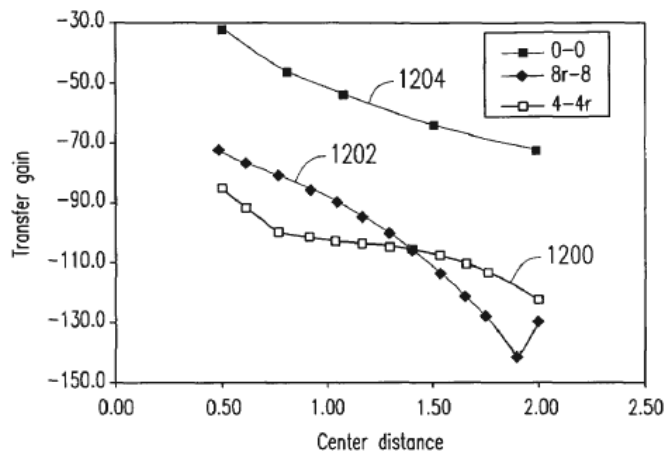


FIG. 12

The concentric position of Taniguchi's antennas is patentably distinct from being laterally offset at a predetermined distance as the Challenged Claims require.

Taniguchi does not teach or disclose a second inductor positioned *at a predetermined distance* from the first inductor to reduce EM coupling.

Intel's new evidence (EX1043, ¶¶ 6-36) should be excluded. But, if considered, it proves a POSITA needed undue experimentation to discover a single figure 8 antenna had a reduced EM field at a distance. Dr. Tentzeris did not run those simulations until after seeing Dr. Prucnal's declarations and deposition. A POSITA would not have been motivated to modify Taniguchi to arrive at the Challenged Claims in 2004.

D. Taniguchi, Midya, Raghavan, Rostoker, Brooks and Gardner do not render obvious the “closely spaced terminals” limitation [1A.3]/[11A.3] (Grounds 1-8)

With respect to Taniguchi, Intel isolates “two closely spaced” terminals from the balance of the claim: “connected to the first loop for supplying electrical current to the first and second loops while *minimizing magnetic field contributions from the terminals*.” EX1001, 10:22-26; Paper 19, 18-19.³ The limitation requires the terminals to be spaced close enough to minimize magnetic field contributions, not just closely spaced relative to the width of the conductors. *Id.* Intel has not met its burden to demonstrate that Taniguchi's terminals are positioned close enough to minimize the magnetic field contributions from the terminals. Paper 16, 43-44.

³ Intel's Petition does not rely on Rostoker to disclose this limitation. Paper 2, §§ VI & IX.

Intel tries to fill that gap with Brooks. Paper 16, 28-30. Dr. Prucnal clarified that Brooks discloses PCBs, so although the principle may be the same, Brooks does not relate to integrated circuits or inductors on integrated circuits. EX1044, 132:13-18. Brooks is not a source that a POSITA would consider in designing inductors for ICs because the design rules are entirely different. *Id.*, 133:2-135:13. Brooks does not provide a POSITA with motivation to modify Taniguchi's feeding points to separate antennas to arrive at "two closely spaced terminals to the first loop for supplying electrical current to the first and second loops while minimizing magnetic field contributions from the terminals" as claims 1 and 11 require.

A POSITA would not have been motivated to combine Midya and Raghavan. See § II.B.3, *supra*. Intel relies on *Enzo Life Scis., Inc. v. Becton, Dickinson & Co.*, 780 Fed. Appx. 903 (Fed. Cir. 2019), but *Enzo* is distinguishable. Both the prior-art references disclosed nucleic acids bound to solid support surfaces with other chemical groups. *Id.* at 910. Here, Midya and Raghavan are disparate prior art references.

E. Taniguchi, Rostoker, and/or Brooks do not render obvious the "predetermined distance" limitation. [1B.1]/[11B.1] (Grounds 1, 2, 5, 6)

Intel's Petition does not rely on Rostoker or Brooks to disclose this limitation. Paper 2, §§ VI & IX. With respect to Taniguchi, Ericsson refers to Section III.A above and Paper 16, pp. 44-45. Taniguchi's antennas 1 and 2 are not

inductors, and antenna 2 is not laterally offset at a predetermined distance from antenna 1. EX2002, ¶ 67; EX1005, [0055], & FIG. 8E.

IV. Intel has not established the Midya and Raghavan combinations in Grounds 3 (claims 1, 3-6, 9, 11-16), 4 (claims 2, 11-16), 7 (claims 1, 3-6, 9, 11-16), or 8 (2, 11-16) render obvious the challenged claims.

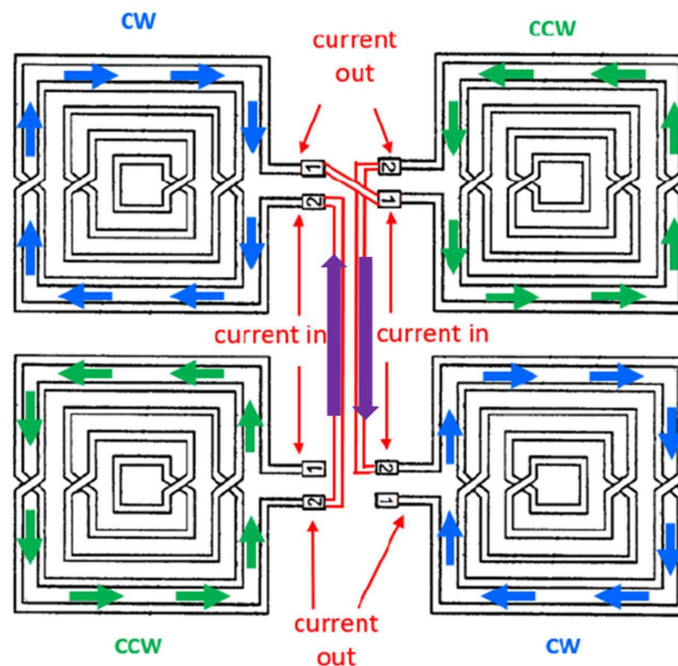
Intel's Grounds 3, 4, 7, and 8 based on Midya/Raghavan fail for several reasons. See § II.B, *supra*. Ground 4 only relates to the limitation a first and second inductor "on a semiconductor die." Intel's Grounds 7 and 8 provide only a cursory analysis with respect to Brooks. Paper 2, 104-106.

A. Midya, Raghavan, Gardner, and Brooks do not render obvious "reducing electromagnetic coupling between a first inductor and a second inductor on a semiconductor die." (Grounds 3, 4, 7, and 8)

Claim 11's preamble is limiting. Section II.A, *supra*. Intel's Petition does not rely on the Midya/Raghavan combination or Brooks to disclose the semiconductor die limitation. Paper 2, 89-94. Ericsson addressed the combination with Gardner above at Section II. A POSITA would not combine Midya and Raghavan, and that combination does not teach or disclose reducing EM coupling between a first inductor and a second inductor on a semiconductor die. Paper 16, 57-59. Midya/Raghavan fails to disclose or render obvious the first and second inductors on a semiconductor die having reduced EM coupling between them as claims 2 and 11-19 require.

B. Midya, Raghavan, Gardner, and/or Brooks do not render obvious “a first loop having a shape that is substantially symmetrical about a first predefined axis” or “two closely spaced terminals” (Grounds 3, 4, 7, and 8)

Intel’s Petition does not rely on Gardner for these limitations and relies on Brooks for the “closely spaced” limitation. Paper 2, VII.B.1.(b) and IX. Regarding Midya and Raghavan, Intel’s expert, using hindsight reasoning, created a configuration with an additional loop (purple and red portions shown below) that creates an additional EM field that is not reduced or canceled. EX1044, 119:6-122:18.



EX1043, ¶ 65. This construction does not eliminate the asymmetry because the additional interconnection lines produce as much, if not more, asymmetry than

Midya. EX2009, ¶ 57. The Midya/Raghavan combination does not disclose or teach connecting two closely spaced terminals to the first loop. *Id.* Dr. Tentzeris' figure above shows current going in through the lower left loop and current exiting through the lower right loop. The interconnect between the upper left loop and the upper right loop (shown between respective blocks 1 above) creates additional EM field contributions that are not cancelled. *Id.*

The asymmetry caused by the additional loop in the Midya/Raghavan combination does not teach or disclose the *substantial symmetry* required in the '430 Patent claims. Claims 1 & 11 of the '430 Patent requires the first loop to be substantially symmetrical about a first axis and second loop to have a size and shape substantially identical to the first loop. EX1001, 10:15-19 & 10:66-11:2. The Petition does not prove by a preponderance of the evidence the diagonally adjacent loops (*e.g.*, EX1007, Fig. 1 106/110 and 108/112) would cancel to arrive at the substantial symmetry such that the EM field from the second loop tends to cancel the EM field from the first loop. EX1001, 10:15-16 & 10:66-67.

Claims 1 and 11 also require “connecting two closely spaced terminals connected to the first loop for supplying electrical current to the first and second loops while minimizing magnetic field contributions from the terminals.” [1A.3] & [11A.3]. Midya does not teach or disclose two closely spaced terminals connected to the first loop. EX2002, ¶ 89; EX2009, ¶ 30. Raghavan, considered in

combination with Midya, does not disclose or render obvious this limitation either. EX2002, ¶ 100. Raghavan explains conventional spiral inductors, such as the inductors shown in the Midya, are asymmetrical and can cause signal degradation. EX2002, ¶ 101; EX1008, [0004]. The configuration and function of the inductors shown in FIGS. 2 and 3 (EX1008) formed from concentric circles or square windings differ from the configuration and function of the inductors claimed in the ‘430 Patent. EX2002, ¶ 102; EX1001, Figs. 4, 5, 7, 10 & 11.

Intel’s cursory analysis of Brooks in Grounds 7 and 8 (Paper 2, 104-106) does not satisfy its burden to show with particularity why the Challenged Claims are unpatentable. Dr. Tentzeris did not show Taniguchi’s terminals are close enough to minimize or cancel the EM fields. Paper 16, 68. Brooks teaches that the EMI radiation is reduced when the parallel wires carry opposing currents relative to an outside perspective. EX1044, 131:17-132:18. The point of Brooks was to motivate the concept of using twisted pairs. *Id.*, 134:10-13. A POSITA would not consult Brooks to solve problems of EM coupling between inductors on an IC. EX2009, ¶ 36, 60; EX2002, ¶ 82. The Petition relies on Gardner for the “semiconductor die” limitation, and this combination inherits the same deficiencies in Midya/Raghavan discussed above. §§ II.B.3 and III.D.

V. Conclusion

Intel has not established by a preponderance of the evidence that claims 1-19 of U.S. Patent 7,151,430 are unpatentable. Ericsson respectfully requests the Board enter a final written decision concluding claims 1-19 are patentable.

Date: May 27, 2025

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CERTIFICATE OF WORD COUNT

Pursuant to 37 C.F.R. §42.24(b), the undersigned certifies this PATENT OWNER'S RESPONSE complies with the type-volume limits of 37 C.F.R. §42.24(b) because it contains 5,445 words according to the word-processing system to prepare it, excluding words in the Table of Contents, Table of Authorities, List of Exhibits, Certification under 37 C.F.R. §42.24, and Certificate of Service, and any claims listing. This word count was prepared using Microsoft Word.

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CERTIFICATE OF SERVICE

The undersigned hereby certifies that on Tuesday, May 27, 2025 a copy of the foregoing Patent Owner Response was served via email on the following attorneys for the Petitioner:

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