

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

58027

OR



Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

58027

OR

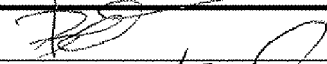
☐	Firm or Individual Name		
	Address		
	City		
	Country		
	Telephone		Email

Assignee Name and Address: Seoul Semiconductor Co., Ltd.
1B-25, 727, Wonsi-dong, Danwon-gu
Ansan-si, Gyeonggi-do 425-851
Republic of Korea

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of The practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	Sep. 18, 2012
Name	Daesung Kal	Telephone	
Title	IP team manager		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

IPR2025-00334

Samsung Electronics Co., Ltd. v. Sinotechnix, LLC.

Samsung's Exhibit 1010

EX1010, Page 1

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Seoul Semiconductor Co., Ltd.Application No./Patent No.: To be assigned Filed/Issue Date: January 22, 2014Titled: SLIM LED PACKAGESeoul Semiconductor Co., Ltd., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose one of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose one of options A or B below):

- A. ☒ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel 029204, Frame 0372, or for which a copy thereof is attached.
- B. ☐ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:
1. From: _____ To: _____
- The document was recorded in the United States Patent and Trademark Office at
- Reel _____, Frame _____, or for which a copy thereof is attached.
2. From: _____ To: _____
- The document was recorded in the United States Patent and Trademark Office at
- Reel _____, Frame _____, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/william l. brooks/

Signature

William L. Brooks

Printed or Typed Name

January 22, 2014

Date

Reg. No. 34,129

Title or Registration Number

Privacy Act Statement

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
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HC Park & Associates, PLC
COUNSELORS at LAW

ASSIGNMENT SERVING AS DECLARATION PER 37 C.F.R. § 1.63(e)

As a below named inventor and Assignor, I declare that:

This assignment and declaration are directed to:

☒ The attached application entitled **SLIM LED PACKAGE** having attorney docket number P3962USC1 ("Application"), which claims priority from: Korean Patent Application No. 10-2007-0124469, filed December 3, 2007 and PCT Application No. PCT/KR2008/006777, filed November 18, 2008.

☐ As amended on _____ (if applicable);

The above-identified Application was made or authorized to be made by me.

I believe that I am the original inventor or an original joint inventor of a claimed invention in the Application.

I hereby acknowledge that any willful false statement made in this declaration is punishable under 18 U.S.C. § 1001 by fine or imprisonment of not more than five (5) years, or both.

Whereas, Assignor has invented certain new and useful processes, machines, articles of manufacture, compositions of matter, and/or improvements thereof ("Invention") disclosed in the Application,

Whereas, Assignor desires to convey all rights, titles, and interests in and to the same to:

Seoul Semiconductor Co., Ltd.
1B-25, 727, Wonsi-dong
Danwon-gu, Gyeonggi-do
425-851 Ansan-si
South Korea

Seoul Semiconductor Co., Ltd. herein further referred to as ("Assignee").

Now, for valuable consideration by Assignee to Assignor, the receipt of which is hereby acknowledged, and for other good and valuable consideration, Assignee and Assignor hereby agree as follows:

Assignor hereby conveys, assigns, sells and transfers to Assignee all rights, title and interests in and to the Invention disclosed in said application and in and to any Letters Patent of the United States (US), any continuation, division, renewal, or substitute thereof, and hereby grant to Assignee the right to apply in its own name for patents or Inventor's certificates and



HC Park & Associates, PLC

COUNSELORS at LAW

Docket No. P3962USC1

related rights heretofore or hereafter filed for the Invention in any and all countries, including (without limitation) all rights to claim priority based thereon, all patents granted thereon and all reissues, extensions and renewals thereof.

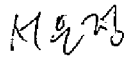
Assignor hereby covenants that no assignment, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this Assignment.

Assignor further covenants that Assignee will, upon Assignee's request, be provided promptly with all pertinent facts and documents relating to the Invention, Patent, Application and any patents granted thereon, as may be known and accessible to Assignor, and Assignor will testify as to the same in any interference, litigation or proceeding related thereto and will promptly execute and deliver to Assignee or Assignee's legal representative any and all papers, instruments or affidavits required to apply for, protect, obtain, maintain, issue, defend and enforce the Application, Patent, Invention, whether in the US or any and all foreign countries and any patents granted thereon and/or for obtaining any reissue or reissues of any patent which may be granted for the invention and perform such further acts which may be necessary or desirable to carry out the intent of this agreement as the Assignee thereof shall hereafter require and prepare at assignee's expense.

IN WITNESS WHEREOF, Inventor and Assignor has hereunto set hand and seal.

First Inventor's and Assignor's Name: Eun Jung SEO

Address: 1B-35, 727-5, Wonsi-dong
Danwon-gu, Gyeonggi-do
425-851 Ansan-si
South Korea

First Inventor's and Assignor's Signature: 

Date: 2012. 10. 5

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		2014-01-22
	First Named Inventor	Eun Jung SEO	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P3962USC1C1	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6603148		2003-08-05	Sano et al.	
	2	7291866		2007-11-06	Oshio et al.	
	3	7301176		2007-11-27	Abe et al.	
	4	7592639		2009-09-22	Maeda et al.	
	5	7682848		2010-03-23	Shimizu et al.	
	6	8390022		2013-03-05	Hussell et al.	
	7	8398892		2013-03-19	Shioi et al.	
	8	8471271		2013-06-25	Son	

**INFORMATION DISCLOSURE
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Art Unit		
Examiner Name		
Attorney Docket Number	P3962USC1C1	

	9	7183588		2007-02-07	Chia et al.	
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If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050151149		2005-07-14	Chia et al.	
	2	20060220048		2006-10-05	Matsumoto et al.	
	3	20030107316		2003-06-12	Murakami et al.	
	4	20040047151		2004-03-11	Bogner et al.	Corresponds to TW 501276
	5	20040104391		2004-06-03	Maeda et al.	
	6	20050280017		2005-12-22	Oshio et al.	
	7	20080023714		2008-01-31	Chae et al.	
	8	20080121921		2008-05-29	Loh et al.	

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9	20060220047		2006-10-05	Nagatomi et al.	
10	20070262339		2007-11-15	Hussell et al.	
11	20080023721		2008-01-31	Lee et al.	

If you wish to add additional U.S. Published Application citation information please click the Add button.

FOREIGN PATENT DOCUMENTS

Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
	1	2006-179541	JP		2006-07-06	ENOMOTO CO LTD		☐
	2	10-2002-0065729	KR		2002-08-14	CHIPPAC KOREA CO., LTD.		☐
	3	10-2006-0059575	KR		2006-06-02	SAMSUNG ELECTRONICS CO., LTD.		☐
	4	501276	TW		2002-09-01	OSRAM OPTO SEMICONDUCTORS GMBH	Corresponds to US 20040047151	☐
	5	1246780	TW		2006-01-01	TOYODA GOSEI CO., LTD.; SUMITA OPTICAL GLASS INC.		☐
	6	200636049	TW		2006-10-16	KONINKLIJKE PHILIPS ELECTRONICS N.V		☐

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First Named Inventor	Eun Jung SEO	
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Attorney Docket Number	P3962USC1C1	

7	200522396	TW		2005-07-01	LUMILEDS LIGHTING U. S. LLCUS		☐
8	63-200550	JP		1988-08-18	MATSUSHITA ELECTRONICS CORP		☐
9	2004-104153	JP		2004-04-02	ROHM CO LTD		☐
10	2005-350649	JP		2005-12-22	SEOUL SEMICONDUCTOR CO LTD		☐
11	2007-131843	JP		2007-05-31	INTEMATIX CORP		☐
12	2006-313943	JP		2006-11-16	SHARP CORP		☐
13	2005-353914	JP		2005-12-22	TOSHIBA CORP		☐
14	02-125454	JP		1990-05-14	NEC CORP		☐
15	2007-110060	JP		2007-04-26	NICHIA CHEM IND LTD		☐
16	2001-210872	JP		2001-08-03	SANYO ELECTRIC CO LTD et al.		☐
17	2001-085747	JP		2001-03-30	SANKEN ELECTRIC CO LTD		☐

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Application Number		
Filing Date		2014-01-22
First Named Inventor	Eun Jung SEO	
Art Unit		
Examiner Name		
Attorney Docket Number	P3962USC1C1	

18	2004-134805	JP		2004-04-30	LUMILEDS LIGHTING US LLC		☐
19	2006-352085	JP		2006-12-28	PHILIPS LUMILEDS LIGHTING CO LLC		☐
20	3-8459	JP		1991-01-28	SHARP INCORPORATED		☐
21	62-140758	JP		1987-09-05	ROHM INCORPORATED		☐
22	2006/059828	WO		2006-06-08	Seoul Semiconductor Co., Ltd.		☐

If you wish to add additional Foreign Patent Document citation information please click the Add button

NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
	1	European Search Report for EP Application No. 08856932.2-1226 dated March 7, 2012.	☐
	2	Taiwanese Office Action dated June 1, 2012, corresponding to U.S. Application No. 12/745,878.	☐
	3	Non-Final Office Action issued in U.S. Application No. 12/745,878 dated March 28, 2012.	☐
	4	Notice of Allowance issued in U.S. Application No. 12/745,878 dated August 1, 2012.	☐

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Attorney Docket Number	P3962USC1C1	

5	Non-Final Office Action issued in U.S. Application No. 13/631,060 dated July 2, 2013.	☐
6	Notice of Allowance issued in U.S. Application No. 13/631,060 dated October 18, 2013.	☐

If you wish to add additional non-patent literature document citation information please click the Add button

EXAMINER SIGNATURE

Examiner Signature		Date Considered	
--------------------	--	-----------------	--

*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.

¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.

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Art Unit	
Examiner Name	
Attorney Docket Number	P3962USC1C1

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/william l. brooks/	Date (YYYY-MM-DD)	2014-01-22
Name/Print	William L. Brooks	Registration Number	34,129

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether the Freedom of Information Act requires disclosure of these records.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:				
Filing Date:				
Title of Invention:	SLIM LED PACKAGE			
First Named Inventor/Applicant Name:	Eun Jung SEO			
Filer:	Hae-Chan Park/Jon Bhatta			
Attorney Docket Number:	P3962USC1C1			
Filed as Large Entity				
Utility under 35 USC 111(a) Filing Fees				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Utility application filing	1011	1	280	280
Utility Search Fee	1111	1	600	600
Utility Examination Fee	1311	1	720	720
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Post-Allowance-and-Post-Issuance:				
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				1600

Electronic Acknowledgement Receipt

EFS ID:	17995169
Application Number:	14161377
International Application Number:	
Confirmation Number:	3715
Title of Invention:	SLIM LED PACKAGE
First Named Inventor/Applicant Name:	Eun Jung SEO
Customer Number:	58027
Filer:	Hae-Chan Park/william brooks
Filer Authorized By:	Hae-Chan Park
Attorney Docket Number:	P3962USC1C1
Receipt Date:	22-JAN-2014
Filing Date:	
Time Stamp:	17:40:48
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$ 1600
RAM confirmation Number	4551
Deposit Account	
Authorized User	

File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
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1	Application Data Sheet	P3962USC1C1_ADS.pdf	97229 28d71dcca83c17ed8cedb57b317c886e3df585a	no	7
Warnings:					
Information:					
This is not an USPTO supplied ADS fillable form					
2		P3962USC1C1_Specification.pdf	61985 dd5751c9c90f7f998140d6e7128b1d36b05dab0d	yes	15
	Multipart Description/PDF files in .zip description				
	Document Description		Start	End	
	Specification		1	12	
	Claims		13	14	
	Abstract		15	15	
Warnings:					
Information:					
3	Drawings-only black and white line drawings	P3962USC1C1_Drawings.pdf	677356 ac8d1eceb96fb69fd059bb15230431d7a940de5d	no	4
Warnings:					
Information:					
4	Power of Attorney	P3962USC1C1_POA-373c.pdf	209916 672b4719cf379892063c7ccba06ff1b4ad442572	no	5
Warnings:					
Information:					
5	Oath or Declaration filed	P3962USC1C1_AssignmentDeclaration.pdf	63087 ce24518721974d8c22160d5a9dc6778d7f65c303	no	2
Warnings:					
Information:					
6	Information Disclosure Statement (IDS) Form (SB08)	P3962USC1C1_IDS.pdf	80558 80c69c4c9d9f91a53fac9a55f4f71d8ea0ef2ca9	no	8
Warnings:					
Information:					
This is not an USPTO supplied IDS fillable form					
7	Non Patent Literature	NPL_1.pdf	748008 0999ee05784fd99631457f61e7454fd50ab6f7d	no	19

Warnings:					
Information:					
8	Non Patent Literature	NPL_2.pdf	405514	no	9
			42595adb02091be2d94f677534db638dc77daa7d		
Warnings:					
Information:					
9	Fee Worksheet (SB06)	fee-info.pdf	32874	no	2
			58abfe464c39c755f49c228cd888c36e2029c478		
Warnings:					
Information:					
			Total Files Size (in bytes):	2376527	
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		
The application data sheet is part of the provisional or nonprovisional application for which it is being submitted. The following form contains the bibliographic data arranged in a format specified by the United States Patent and Trademark Office as outlined in 37 CFR 1.76. This document may be completed electronically and submitted to the Office in electronic format using the Electronic Filing System (EFS) or the document may be printed and included in a paper filed application.			

Secrecy Order 37 CFR 5.2

☐	Portions or all of the application associated with this Application Data Sheet may fall under a Secrecy Order pursuant to 37 CFR 5.2 (Paper filers only. Applications that fall under Secrecy Order may not be filed electronically.)
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Inventor Information:

Inventor 1 Remove				
Legal Name				
Prefix	Given Name	Middle Name	Family Name	Suffix
	Eun Jung		SEO	
Residence Information (Select One) ☐ US Residency ☒ Non US Residency ☐ Active US Military Service				
City	Ansan-si	Country of Residence ⁱ	KR	
Mailing Address of Inventor:				
Address 1	1B-35, 727-5, Wonsi-dong, Danwon-gu			
Address 2	Gyeonggi-do			
City	Ansan-si	State/Province		
Postal Code	425-851	Country ⁱ	KR	
All Inventors Must Be Listed - Additional Inventor Information blocks may be generated within this form by selecting the Add button. Add				

Correspondence Information:

Enter either Customer Number or complete the Correspondence Information section below. For further information see 37 CFR 1.33(a).			
☐ An Address is being provided for the correspondence information of this application.			
Customer Number	58027		
Email Address		Add Email	Remove Email

Application Information:

Title of the Invention	SLIM LED PACKAGE		
Attorney Docket Number	P3962USC1C1	Small Entity Status Claimed	☐
Application Type	Nonprovisional		
Subject Matter	Utility		
Total Number of Drawing Sheets (if any)	4	Suggested Figure for Publication (if any)	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		

Filing By Reference :

Only complete this section when filing an application by reference under 35 U.S.C. 111(c) and 37 CFR 1.57(a). Do not complete this section if application papers including a specification and any drawings are being filed. Any domestic benefit or foreign priority information must be provided in the appropriate section(s) below (i.e., "Domestic Benefit/National Stage Information" and "Foreign Priority Information").

For the purposes of a filing date under 37 CFR 1.53(b), the description and any drawings of the present application are replaced by this reference to the previously filed application, subject to conditions and requirements of 37 CFR 1.57(a).

Application number of the previously filed application	Filing date (YYYY-MM-DD)	Intellectual Property Authority or Country

Publication Information:

☐ Request Early Publication (Fee required at time of Request 37 CFR 1.219)

☐ **Request Not to Publish.** I hereby request that the attached application not be published under 35 U.S.C. 122(b) and certify that the invention disclosed in the attached application **has not and will not** be the subject of an application filed in another country, or under a multilateral international agreement, that requires publication at eighteen months after filing.

Representative Information:

Representative information should be provided for all practitioners having a power of attorney in the application. Providing this information in the Application Data Sheet does not constitute a power of attorney in the application (see 37 CFR 1.32). Either enter Customer Number or complete the Representative Name section below. If both sections are completed the customer Number will be used for the Representative Information during processing.

Please Select One:	☒ Customer Number	☐ US Patent Practitioner	☐ Limited Recognition (37 CFR 11.9)
Customer Number	58027		

Domestic Benefit/National Stage Information:

This section allows for the applicant to either claim benefit under 35 U.S.C. 119(e), 120, 121, or 365(c) or indicate National Stage entry from a PCT application. Providing this information in the application data sheet constitutes the specific reference required by 35 U.S.C. 119(e) or 120, and 37 CFR 1.78.

When referring to the current application, please leave the application number blank.

Prior Application Status	Pending	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)		
	Continuation of	13631060	2012-09-28		
Prior Application Status	Patented	Remove			
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)	Patent Number	Issue Date (YYYY-MM-DD)
13631060	Continuation of	12745878	2010-06-02	8319248	2012-11-27

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		
Prior Application Status	Pending	Remove	
Application Number	Continuity Type	Prior Application Number	Filing Date (YYYY-MM-DD)
12745878	a 371 of international	PCT/KR2008/006777	2008-11-18
Additional Domestic Benefit/National Stage Data may be generated within this form by selecting the Add button.			

Foreign Priority Information:

This section allows for the applicant to claim priority to a foreign application. Providing this information in the application data sheet constitutes the claim for priority as required by 35 U.S.C. 119(b) and 37 CFR 1.55(d). When priority is claimed to a foreign application that is eligible for retrieval under the priority document exchange program (PDX)ⁱ the information will be used by the Office to automatically attempt retrieval pursuant to 37 CFR 1.55(h)(1) and (2). Under the PDX program, applicant bears the ultimate responsibility for ensuring that a copy of the foreign application is received by the Office from the participating foreign intellectual property office, or a certified copy of the foreign priority application is filed, within the time period specified in 37 CFR 1.55(g)(1).

Remove			
Application Number	Country ⁱ	Filing Date (YYYY-MM-DD)	Access Code ⁱ (if applicable)
10-2007-0124469	KR	2007-12-03	
Additional Foreign Priority Data may be generated within this form by selecting the Add button.			

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications

☐ This application (1) claims priority to or the benefit of an application filed before March 16, 2013 and (2) also contains, or contained at any time, a claim to a claimed invention that has an effective filing date on or after March 16, 2013.

NOTE: By providing this statement under 37 CFR 1.55 or 1.78, this application, with a filing date on or after March 16, 2013, will be examined under the first inventor to file provisions of the AIA.

Authorization to Permit Access:

☒ Authorization to Permit Access to the Instant Application by the Participating Offices

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		

If checked, the undersigned hereby grants the USPTO authority to provide the European Patent Office (EPO), the Japan Patent Office (JPO), the Korean Intellectual Property Office (KIPO), the World Intellectual Property Office (WIPO), and any other intellectual property offices in which a foreign application claiming priority to the instant patent application is filed access to the instant patent application. See 37 CFR 1.14(c) and (h). This box should not be checked if the applicant does not wish the EPO, JPO, KIPO, WIPO, or other intellectual property office in which a foreign application claiming priority to the instant patent application is filed to have access to the instant patent application.

In accordance with 37 CFR 1.14(h)(3), access will be provided to a copy of the instant patent application with respect to: 1) the instant patent application-as-filed; 2) any foreign application to which the instant patent application claims priority under 35 U.S.C. 119(a)-(d) if a copy of the foreign application that satisfies the certified copy requirement of 37 CFR 1.55 has been filed in the instant patent application; and 3) any U.S. application-as-filed from which benefit is sought in the instant patent application.

In accordance with 37 CFR 1.14(c), access may be provided to information concerning the date of filing this Authorization.

Applicant Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.			
Applicant 1			
If the applicant is the inventor (or the remaining joint inventor or inventors under 37 CFR 1.45), this section should not be completed. The information to be provided in this section is the name and address of the legal representative who is the applicant under 37 CFR 1.43; or the name and address of the assignee, person to whom the inventor is under an obligation to assign the invention, or person who otherwise shows sufficient proprietary interest in the matter who is the applicant under 37 CFR 1.46. If the applicant is an applicant under 37 CFR 1.46 (assignee, person to whom the inventor is obligated to assign, or person who otherwise shows sufficient proprietary interest) together with one or more joint inventors, then the joint inventor or inventors who are also the applicant should be identified in this section.			
Clear			
☒ Assignee		☐ Legal Representative under 35 U.S.C. 117	
☐ Person to whom the inventor is obligated to assign.		☐ Joint Inventor	
☐ Person who shows sufficient proprietary interest			
If applicant is the legal representative, indicate the authority to file the patent application, the inventor is:			
Name of the Deceased or Legally Incapacitated Inventor :			
If the Applicant is an Organization check here. ☒			
Organization Name	Seoul Semiconductor Co., Ltd.		
Mailing Address Information For Applicant:			
Address 1	1B-25, 727, Wonsi-dong, Danwon-gu		
Address 2	Gyeonggi-do		
City	Ansan-si	State/Province	
Country	KR	Postal Code	425-851
Phone Number		Fax Number	

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		

Email Address	
---------------	--

Additional Applicant Data may be generated within this form by selecting the Add button.

Assignee Information including Non-Applicant Assignee Information:

Providing assignment information in this section does not substitute for compliance with any requirement of part 3 of Title 37 of CFR to have an assignment recorded by the Office.

Assignee 1				
Complete this section if assignee information, including non-applicant assignee information, is desired to be included on the patent application publication. An assignee-applicant identified in the "Applicant Information" section will appear on the patent application publication as an applicant. For an assignee-applicant, complete this section only if identification as an assignee is also desired on the patent application publication.				
If the Assignee or Non-Applicant Assignee is an Organization check here. ☐				
Prefix	Given Name	Middle Name	Family Name	Suffix
Mailing Address Information For Assignee including Non-Applicant Assignee:				
Address 1				
Address 2				
City		State/Province		
Country ⁱ		Postal Code		
Phone Number		Fax Number		
Email Address				
Additional Assignee or Non-Applicant Assignee Data may be generated within this form by selecting the Add button.				

Signature:

NOTE: This form must be signed in accordance with 37 CFR 1.33. See 37 CFR 1.4 for signature requirements and certifications.					
Signature	/william l. brooks/			Date (YYYY-MM-DD)	2014-01-22
First Name	William	Last Name	Brooks	Registration Number	34129
Additional Signature may be generated within this form by selecting the Add button.					

Application Data Sheet 37 CFR 1.76		Attorney Docket Number	P3962USC1C1
		Application Number	
Title of Invention	SLIM LED PACKAGE		

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3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

SLIM LED PACKAGE

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application is a continuation of U.S. Patent Application No. 13/631,060, filed
5 on September 28, 2012, which is a continuation of U.S. Patent Application No. 12/745,878, filed
on June 2, 2010, now U.S. Patent No. 8,319,248, which is the National Stage Entry of
International Application No. PCT/KR2008/006777, filed November 18, 2008, and claims
priority from and the benefit of Korean Patent Application No. 10-2007-0124469, filed on
December 3, 2007, which are all hereby incorporated by reference for all purposes as if fully set
10 forth herein.

BACKGROUND OF THE INVENTION

[0002] FIELD OF THE INVENTION

The present invention relates to a light emitting diode (LED) package and, more
15 particularly, to a slim LED package that is significantly reduced in thickness without
substantially reducing luminescence efficiency or while improving the luminescence efficiency.

[0003] DISCUSSION OF THE BACKGROUND

[0004] An LED emits light through recombination of electrons and holes by application
of an electric current. An LED package means a package structure in which a light emitting
20 diode chip, that is, an LED chip, is received. Many kinds of LED packages, particularly, a lead
frame type LED package and a printed circuit board (PCB) type LED package, are well known
in the art. The lead frame type LED package has a structure wherein a cavity of a housing for
supporting a lead frame is filled with an encapsulation material, with the LED chip positioned in

the cavity of the housing. The PCB type LED package has a structure wherein the LED chip is directly mounted on a PCB and covered with the encapsulation material.

[0005] For the lead frame type LED package, the housing supporting the lead frame has an excessive thickness, which makes it difficult to fabricate a thin lead frame type LED package.

5 On the other hand, since the PCB type LED package does not include a housing, it can be more easily fabricated to have a thin structure than the lead frame type LED package.

[0006] However, there are many restrictions in thickness reduction of the PCB type LED package. In other words, since the thickness of the PCB type LED package is determined by thicknesses of the PCB and LED chips, and a loop height of a bonding wire even without
10 considering the encapsulation material, it is difficult to achieve an overall thickness reduction and slimness of the PCB type LED package.

[0007] Further, the encapsulation material of the LED package, which covers the LED chip, undergoes a yellowing phenomenon by energy generated from the LED chip emitting light. Such a yellowing phenomenon is a main cause of decreased luminescence performance and
15 lifetime of the LED package. To overcome such problems, new LED packages have been developed to have a heat sink structure. In detail, the lead frame type LED package further includes a heat dissipation slug inserted into the housing by molding. Such a structure of the lead frame type LED package requires addition of components and a complicated manufacturing process, thereby decreasing economic feasibility. For the PCB type LED package, B-T resin on
20 which the LED chip is mounted has a low heat dissipation performance, and it is difficult to have the heat sink structure.

SUMMARY OF THE INVENTION

[0008] Therefore, an aspect of the present invention is to provide a slim LED package that is configured to allow a transparent encapsulation material to directly support a lead frame without a housing, that has a reduced overall thickness by reducing the thickness of a chip mounting region of the lead frame, and that exhibits good heat dissipation performance.

5 [0009] In accordance with an aspect of the present invention, a slim LED package includes: first and second lead frames separated from each other; a chip mounting recess formed on one upper surface region of the first lead frame by reducing a thickness of the one upper surface region below other upper surface regions of the first lead frame; an LED chip mounted on a bottom surface of the chip mounting recess and connected with the second lead frame via a
10 bonding wire; and a transparent encapsulation material protecting the LED chip while supporting the first and second lead frames. The LED chip may have a thickness lower than or equal to a depth of the chip mounting recess.

[0010] The chip mounting recess may be formed by thickness-etching the one upper surface region of the first lead frame. Herein, the term “thickness-etching” refers to etching
15 performed to reduce the thickness of a material, that is, the thickness of the one upper surface region of the lead frame.

[0011] The slim LED package may further include a bonding recess formed on one upper surface region of the second lead frame by reducing a thickness of the one upper surface region of the second lead frame below other upper surface regions of the second lead frame, one end of
20 the bonding wire being bonded into the bonding recess. The bonding recess may be formed by thickness-etching the one upper surface region of the second lead frame.

[0012] The slim LED package may further include openings or grooves formed on an upper or lower surface of the first or second lead frame to increase a bonding force between the

first and second lead frames and the encapsulation material. Alternatively, the slim LED package may further include scratches formed on an upper or lower surface of the first or second lead frame to increase the bonding force between the first and second lead frames and the encapsulation material. Further, the LED chip may have a lower height than the depth of the chip mounting recess. The first and second lead frames may have opposite sides facing each other and including linear or rounded slant parts facing each other in a slanted state. At least one of the opposite sides may have a depressed part formed thereon to widen a separation between the first lead frame and the second lead frame.

[0013] The slim LED package may further include a phosphor in the encapsulation material. The slim LED package may further include an adjacent resin part formed in the chip mounting recess inside the encapsulation material, and the phosphor may be disposed in the adjacent resin part. Alternatively, the phosphor may be disposed in a resin constituting the encapsulation material or may be coated on the LED chip by conformal coating.

[0014] The encapsulation material may be formed by transfer molding with a solid resin, particularly, a solid EMC. Alternatively, the encapsulation material may be formed by injection molding with a liquid resin.

[0015] According to one embodiment of the present invention, the LED package is configured to mount an LED chip on a chip mounting recess, which is formed on a predetermined region of a lead frame by reducing the thickness of the predetermined region, such that the thickness of the LED chip partially overlaps the thickness of the lead frame, whereby the LED package can be significantly reduced in overall thickness, achieving an ultrathin slimness. Further, the lead frame on which the LED chip is mounted and the lead frame with which a bonding wire is connected have a significantly increased area exposed to the

bottom, so that the LED package has greatly improved thermal dissipation efficiency.

Additionally, a bonding recess is formed on the lead frame by reducing the thickness of a part of the lead frame with which the bonding wire is connected, and is provided therein with a wire ball to be connected with the bonding wire. As a result, a factor causing an increase in thickness of the LED package can be eliminated, so that the LED package is further slimmed. Further, according to one embodiment of the present invention, openings or grooves are formed on the lead frames to increase a bonding force between the lead frames and an encapsulation material, thereby preventing separation of an interfacial surface between the encapsulation material and the lead frames. Moreover, an inside surface of the chip mounting recess serves to improve luminescence efficiency, as compared to a conventional PCB type LED package that is configured to reflect light emitted from the LED chip to an upper side.

BRIEF DESCRIPTION OF THE DRAWINGS

[0016] The above and other aspects, features and advantages of the present invention will be more clearly understood from the following detailed description taken in conjunction with the accompanying drawings, in which:

[0017] Fig. 1 is a plan view of a slim LED package according to one embodiment of the present invention;

[0018] Fig. 2 is a cross-sectional view taken along line I - I of Fig. 1;

[0019] Figs. 3 to 5 are cross-sectional views of slim LED packages according to various embodiments of the present invention;

[0020] Fig. 6 is a cross-sectional view of a slim LED package according to yet another embodiment of the present invention; and

[0021] Fig. 7 is a cross-sectional view taken along line II - II of Fig. 6; and

[0022] Figs. 8(a) and 8(b) are cross-sectional views of a slim LED package according to an embodiment of the present invention.

5 DETAILED DESCRIPTION OF THE ILLUSTRATED EMBODIMENTS

[0023] Exemplary embodiments of the present invention will be described in detail with reference to the accompanying drawings. The embodiments are given by way of illustration for complete understanding of the present invention by those skilled in the art. Hence, the present invention is not limited to these embodiments and can be realized in various forms. Further, for
10 convenience of description, width, length, and thickness of components are not drawn to scale in the drawings. Like components are indicated by like reference numerals throughout the specification.

[0024] Fig. 1 is a plan view of a slim LED package 1 according to one embodiment of the invention, and Fig. 2 is a cross-sectional view taken line I - I of Fig. 1.

15 [0025] Referring to Figs. 1 and 2, a slim LED package 1 of this embodiment includes first and second lead frames 12, 14 separated from each other. The first lead frame 12 has an LED chip 2 mounted thereon, and the second lead frame 14 is electrically connected with the LED chip 2 via a bonding wire W. The bonding wire W is connected with the second lead frame 14 via a wire ball or soldering ball (not shown).

20 [0026] The first and second lead frames 12, 14 are supported by a transparent encapsulation material 20. The transparent encapsulation material 20 is formed to entirely cover and protect the LED chip 2 and bonding wire W by molding. The encapsulation material 20 may be formed by transfer molding with an epoxy molding compound that is a solid epoxy

resin. For example, the transfer molding is performed by compressing epoxy molding compound (EMC) powder at a proper pressure into a tablet-shape, followed by positioning and molding the tablet-shaped EMC in a mold at high temperature and pressure conditions to form the encapsulation material 20.

5 **[0027]** In this embodiment, the encapsulation material 20 is formed by transfer molding, but the present invention is not limited thereto. Alternatively, the encapsulation material 20 can be formed by injection molding, in which a liquid resin is injected into a mold. The encapsulation material 20 may be formed of other kinds of transparent resins such as epoxy-based or silicone-based resins, as well as the EMC.

10 **[0028]** The first lead frame 12 is formed with a chip mounting recess 121 on its upper surface, and the chip mounting recess 121 has the LED chip 2 mounted on a bottom surface thereof in a die-attachment manner. The chip mounting recess 121 is formed by reducing the thickness of one upper surface region of the first lead frame 12 below other regions of the first lead frame 12, instead of bending the lead frame to form a reflection cup as in the prior art.

15 Accordingly, the first lead frame 12 has a decreased thickness only in the region of the first lead frame 12 where the LED chip 2 is mounted, whereby a mounting height of the LED chip 2 is lowered to contribute to slimness of the LED package 1 through an overall thickness reduction of the LED package 1. Further, an inside surface of the chip mounting groove 121 serves as a reflector for reflecting light, thereby enhancing luminescence efficiency of the LED package 1.

20 **[0029]** The chip mounting recess 121 may be formed by thickness-etching, which is performed for the purpose of reducing the thickness of the lead frame. At this time, etching can be performed, with the upper surface of the first lead frame 12 except for the chip mounting region covered with a mask. Further, the chip mounting recess 121 may have a thickness of

about half of the thickness of the first lead frame 12. However, it should be noted that the present invention is not limited thereto.

[0030] Further, the LED chip 2 may have a thickness less than or equal to the depth of the chip mounting recess 121 to prevent the height of the LED chip 2 from affecting a thickness increase of the LED package 1. In other words, it is desirable that the depth of the chip mounting recess 121 be set greater than or equal to the height of the LED chip 2.

[0031] As clearly shown in Fig. 2, the first and second lead frames 12, 14 are respectively formed on lower surfaces thereof with grooves 122, 142, which are filled with a portion of the encapsulation material 20 during the molding process. As a result, the portion of the encapsulation material 20 engages with the grooves 122, 142, and a contact area between the lead frames 12, 14 and the encapsulation material 20 increases, thereby increasing a bonding force between the encapsulation material 20 and the lead frames 12, 14. The grooves 122, 142 are also formed by reducing the thickness of predetermined regions of the lower surfaces of the first and second lead frames 12, 14, and preferably by thickness-etching as described above.

Alternatively, instead of forming the openings or grooves, as shown in Fig. 8(a) and Fig. 8(b), scratches 122' and 142' may be formed on the upper or lower surfaces of the first and second lead frames 12, 14, respectively, to increase the bonding force between the lead frames 12, 14 and the encapsulation material 20.

[0032] Referring again to Fig. 2, the encapsulation material 20 contains a phosphor 202 that is excited by light of a predetermined wavelength and emits light of a different wavelength. The phosphor 202 contributes to generation of white light through wavelength conversion by converting light emitted from the LED chip 2. In this embodiment, the phosphor 202 is mixed with a resin prepared as a molding material and is disposed in the encapsulation material 20 by

the molding process using the molding material. For example, when forming the encapsulation material 20 by transfer molding, a mixture of EMC and the phosphor 202 is prepared and used as the material for the transfer molding.

[0033] Next, various other embodiments of the present invention will be described. In description of the embodiments, a repetitious description will be omitted, and, the same or similar elements will be denoted by the same reference numerals as those of the above description.

[0034] In Fig. 3, a bonding recess 141 is shown, which is formed by reducing the thickness of one upper surface region of a second lead frame 14 below the thickness of other regions thereof. The bonding recess 141 can also be formed by the thickness-etching as in the formation of the chip mounting recess 121 of the aforementioned embodiment. At this time, one end of a bonding wire W is connected with the second lead frame 14 within the bonding recess 141.

[0035] Although not shown in the drawings, a wire ball is located in the bonding recess 141 such that the one end of the bonding wire W is connected with the wire ball in the bonding recess 141, thereby preventing a thickness increase of the LED package due to the height of the wire ball. A size increase of the wire ball ensures that the bonding wire W can be more rigidly secured to the second lead frame 14. Here, the formation of the bonding recess 141 enables more freedom to increase the size of the wire ball.

[0036] Referring to Fig. 4, in another embodiment of the present invention, a resin 21 containing a phosphor 202 is restrictively provided in the chip mounting recess 121 to cover the LED chip 2 in an adjacent distance. Herein, the resin 21 filling in the chip mounting recess 121 will be defined as an “adjacent resin part.” The adjacent resin part 21 prevents the phosphor

202 from being scattered within the encapsulation material 20, and allows the phosphor 202 to be located around the LED chip 2. This configuration can improve color conversion efficiency by the phosphor 202, and can provide light consisting of uniformly mixed colors when viewed outside the LED package 1.

5 **[0037]** Alternatively, the adjacent resin part 21 may not contain the phosphor 202. For example, the encapsulation material such as epoxy is vulnerable to heat, and can cause thermal deformation or a yellowing phenomenon around the LED chip 2. Here, when the adjacent resin part 21 formed in the chip mounting recess 121 is made of a silicone resin, which is essentially invulnerable to heat, it is possible to efficiently prevent deterioration in performance or lifetime
10 of the LED package 1 caused by the yellowing phenomenon. When using the silicone as a material for the adjacent resin part 21 to prevent thermal deformation or the yellowing phenomenon, the phosphor 202 can be included in the adjacent resin part 21 or omitted therefrom without any influence on the effect of preventing thermal deformation or the yellowing phenomenon.

15 **[0038]** Alternatively, the phosphor 202 can be coated on the surface of the LED chip 2 by, for example, conformal coating via electrophoresis. In this case, the LED package 1 has a configuration as illustrated in Fig. 5.

[0039] Fig. 6 is a cross-sectional view of a slim LED package 1 according to yet another embodiment of the present invention, and Fig. 7 is a cross-sectional view taken along line II - II
20 of Fig. 6.

[0040] Referring to Figs. 6 and 7, instead of the grooves 122, 142 (see Fig. 2) of the above embodiment, first and second lead frames 12, 14 of this embodiment are formed with openings 123, 143, which penetrate the first and second lead frames 12, 14 in the vertical

direction, to increase the bonding force between an encapsulation material 20 and the lead frames 12, 14. The openings 123, 143 can be formed by pressing or by etching the lead frames 12, 14 in the thickness direction.

5 **[0041]** As clearly shown in Fig. 6, the first and second lead frames 12, 14 include first and second slant parts 125, 145, which are formed on opposite sides of the lead frames 12, 14 facing each other in an inclined state. That is, the first slant part 125 is formed on one side of the first lead frame 12 facing the other side of the second lead frame 14 to be inclined towards right and left sides of the first lead frame 12. Further, the second slant part 145 is formed on the other side of the second lead frame 14 facing the one side of the first lead frame 12 to be inclined
10 towards right and left sides of the second lead frame 14. The first and second slant parts 125, 145 may have a linear or curved shape.

[0042] A portion of the encapsulation material 20 is interposed between the opposite sides of the first and second lead frames 12, 14 facing each other, and a force is applied to the interposed portion of the encapsulation material 20 and the opposite sides of the first and second
15 lead frames 12, 14. At this time, the slant parts 125, 145 disperse the force diagonally, thereby preventing the encapsulation material 20 from being broken on the opposite sides of the lead frames 12, 14. Furthermore, since the slant part 125 of the first lead frame 12 has a shape surrounding the portion of the encapsulation material 20 adjacent thereto, it serves to more rigidly hold the encapsulation material 20. It should be noted that the breakage of the
20 encapsulation material 20 between the opposite sides of the lead frames 12, 14 may cause electric shorts or the like.

[0043] Additionally, a depressed part 126 is formed at the center of the one side of the first lead frame 12 facing the other side of the second lead frame 14 to increase a separation

between the first lead frame 12 and the second lead frame 14. The depressed part 126 is located directly below a path of the bonding wire W which connects the first lead frame 12 with the second lead frame 14. The depressed part 126 prevents the bonding wire W from being erroneously brought into contact with the lead frames 12, 14, and an electric short of the bonding wire W caused by the erroneous contact.

[0044] To fabricate the LED packages 1 as described above, a single metal sheet is processed to have a pattern of first and second lead frames 12, 14, followed by molding an encapsulation material 20 on the patterned metal sheet. Then, the lead frames 12, 14 are sawn per each encapsulation material 20 supporting a pair of first and second lead frames 12, 14, thereby providing a plurality of LED packages 1. At this time, a process of removing burrs formed during sawing may be further included.

[0045] Although the present invention has been described with reference to the embodiments and the accompanying drawings, the present invention is not limited to these embodiments and the drawings. It should be understood that various modifications, additions and substitutions can be made by a person having ordinary knowledge in the art without departing from the scope and spirit of the invention, as defined only by the accompanying claims.

WHAT IS CLAIMED IS:

1 1. A light emitting diode (LED) package, comprising:
2 a first lead frame and a second lead frame separated from each other; and
3 an LED chip electrically connected to the first lead frame and the second lead
4 frame,
5 wherein opposing sides of the first lead frame and the second lead frame face each
6 other in a slanted state.

1 2. The LED package of claim 1, wherein both of the opposing sides have a
2 linear or curved shape.

1 3. The LED package of claim 1, wherein at least one of the opposing sides
2 comprises a depressed portion formed thereon facing the other opposing side.

1 4. The LED package of claim 3, further comprising a wire connecting the
2 LED chip to at least one of the first lead frame and the second lead frame,
3 wherein the depressed portion is disposed under the wire.

1 5. The LED package of claim 1, further comprising a chip mounting
2 recess formed on an upper surface of the first lead frame,
3 wherein the LED chip is disposed in the chip mounting recess.

1 6. The LED package of claim 5, further comprising an inner resin
2 covering the LED chip.

1 7. The LED package of claim 6, wherein the inner resin is disposed in the
2 chip mounting recess.

1 8. The LED package of claim 1, further comprising a resin covering at
2 least a portion of the surface of the first lead frame, the second lead frame, and the LED
3 chip.

1 9. The LED package of claim 8, wherein at least one of the first lead
2 frame and the second lead frame comprises a groove formed thereon, and the resin is
3 disposed in at least a portion of the groove.

1 10. The LED package of claim 1, wherein the opposing sides are slanted at
2 the same angle and are parallel to each other.

ABSTRACT

Disclosed herein is a slim LED package. The slim LED package includes first and second lead frames separated from each other, a chip mounting recess formed on one upper surface region of the first lead frame by reducing a thickness of the one upper
5 surface region below other upper surface regions of the first lead frame, an LED chip mounted on a bottom surface of the chip mounting recess and connected with the second lead frame via a bonding wire, and a transparent encapsulation material protecting the LED chip while supporting the first and second lead frames.

Fig. 1

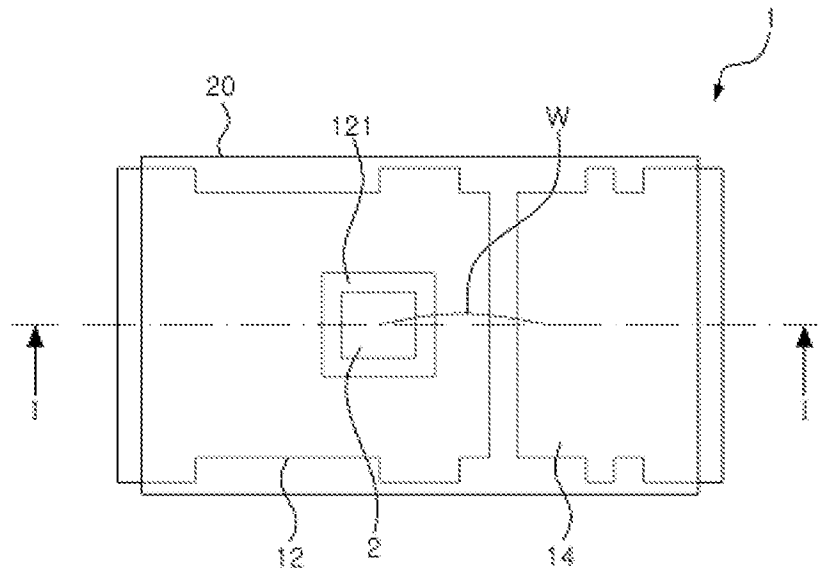


Fig. 5

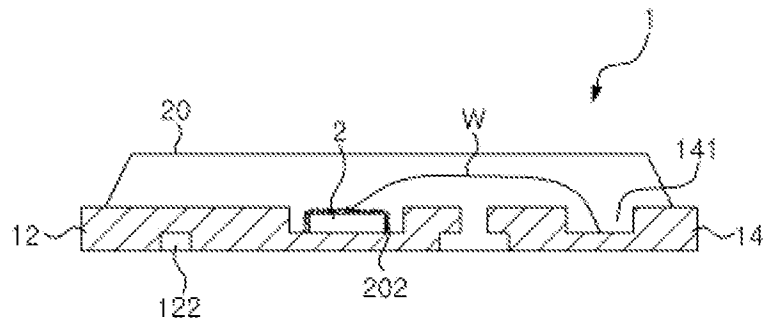


Fig. 6

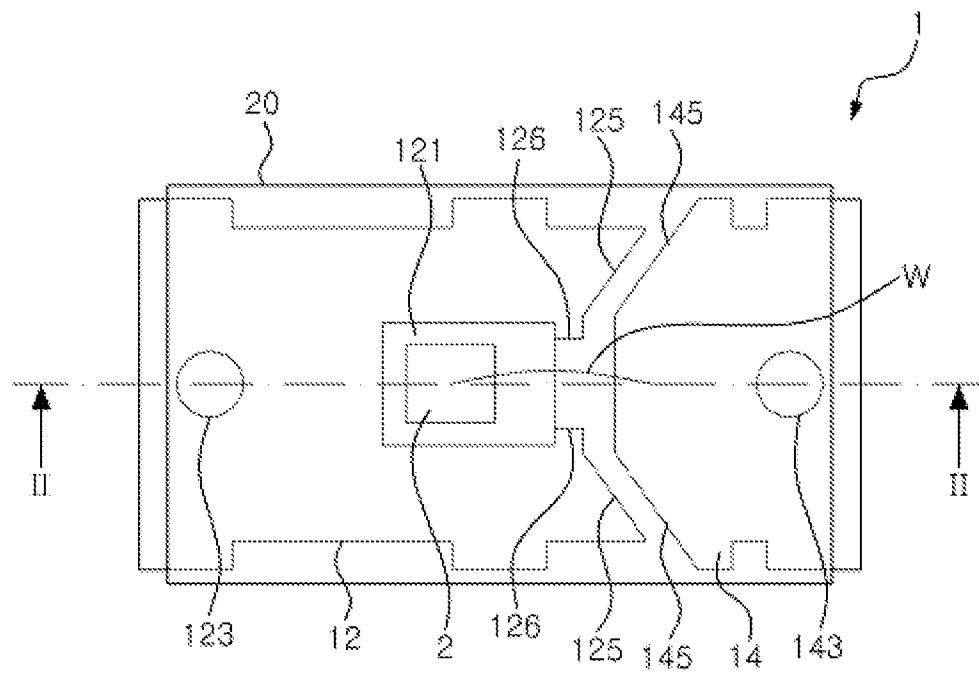


Fig. 7

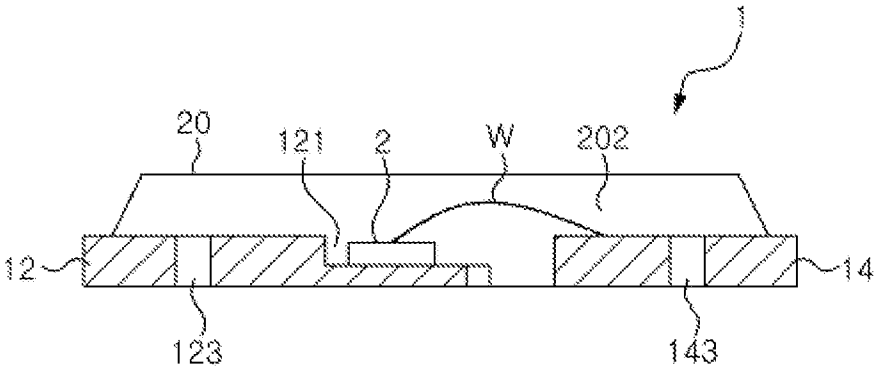
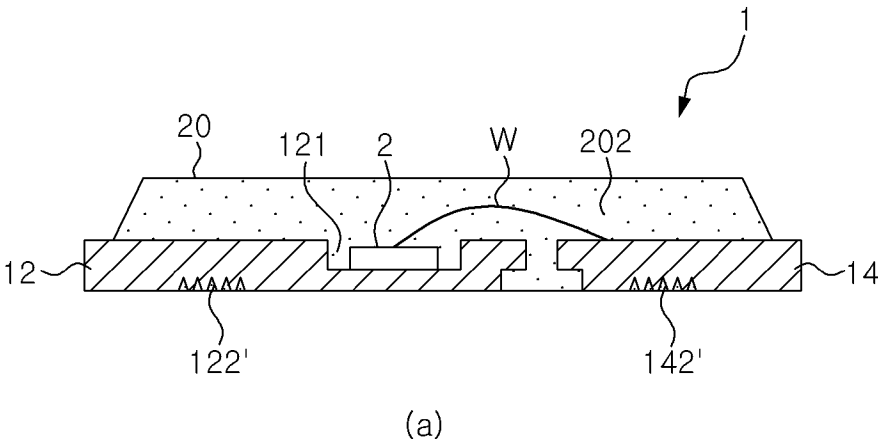
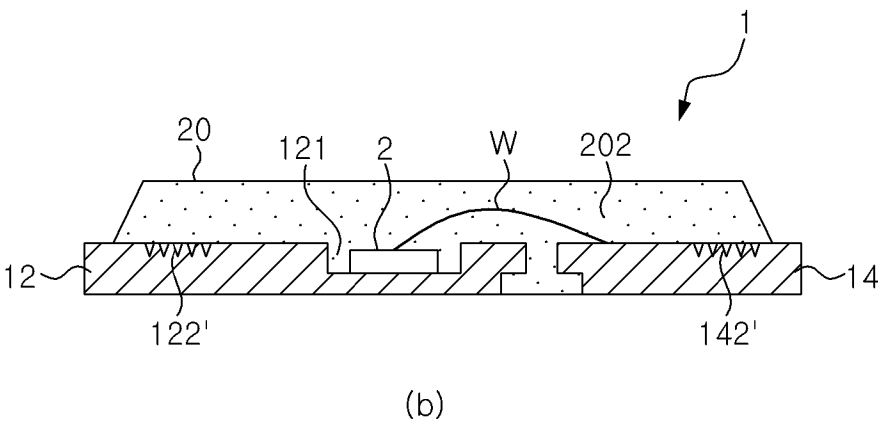


Fig. 8



(a)



(b)



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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1

58027
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

CONFIRMATION NO. 3715
IMPROPER CPOA LETTER



Date Mailed: 02/07/2014

NOTICE REGARDING POWER OF ATTORNEY

This is in response to the power of attorney filed 01/22/2014. The power of attorney in this application is not accepted for the reason(s) listed below:

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/tqlam/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875						Application or Docket Number 14/161,377			
APPLICATION AS FILED - PART I									
(Column 1)		(Column 2)		SMALL ENTITY		OTHER THAN SMALL ENTITY			
FOR	NUMBER FILED	NUMBER EXTRA	RATE(\$)	FEE(\$)		RATE(\$)	FEE(\$)		
BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A			N/A	280		
SEARCH FEE (37 CFR 1.16(k), (l), or (m))	N/A	N/A	N/A			N/A	600		
EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A			N/A	720		
TOTAL CLAIMS (37 CFR 1.16(j))	10	minus 20 = *			OR	x 80 =	0.00		
INDEPENDENT CLAIMS (37 CFR 1.16(h))	1	minus 3 = *				x 420 =	0.00		
APPLICATION SIZE FEE (37 CFR 1.16(s))			If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).			0.00			
MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))						0.00			
			TOTAL			TOTAL	1600		
* If the difference in column 1 is less than zero, enter "0" in column 2.									
APPLICATION AS AMENDED - PART II									
(Column 1)		(Column 2)		(Column 3)		SMALL ENTITY		OTHER THAN SMALL ENTITY	
AMENDMENT A	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)		
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
AMENDMENT B	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA	RATE(\$)	ADDITIONAL FEE(\$)	RATE(\$)	ADDITIONAL FEE(\$)		
	Total (37 CFR 1.16(i))	*	Minus **	=	x =	OR	x =		
	Independent (37 CFR 1.16(h))	*	Minus ***	=	x =	OR	x =		
	Application Size Fee (37 CFR 1.16(s))					OR			
	FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					OR			
			TOTAL ADD'L FEE		OR	TOTAL ADD'L FEE			
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APPLICATION NUMBER	FILING or 371(c) DATE	GRP ART UNIT	FIL FEE REC'D	ATTY. DOCKET NO	TOT CLAIMS	IND CLAIMS
14/161,377	01/22/2014	2811	1600	P3962USC1C1	10	1

CONFIRMATION NO. 3715

58027
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

FILING RECEIPT



OC000000066458128

Date Mailed: 02/07/2014

Receipt is acknowledged of this non-provisional patent application. The application will be taken up for examination in due course. Applicant will be notified as to the results of the examination. Any correspondence concerning the application must include the following identification information: the U.S. APPLICATION NUMBER, FILING DATE, NAME OF APPLICANT, and TITLE OF INVENTION. Fees transmitted by check or draft are subject to collection. Please verify the accuracy of the data presented on this receipt. **If an error is noted on this Filing Receipt, please submit a written request for a Filing Receipt Correction. Please provide a copy of this Filing Receipt with the changes noted thereon. If you received a "Notice to File Missing Parts" for this application, please submit any corrections to this Filing Receipt with your reply to the Notice. When the USPTO processes the reply to the Notice, the USPTO will generate another Filing Receipt incorporating the requested corrections**

Inventor(s)

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Assignment For Published Patent Application

Seoul Semiconductor Co., Ltd., Ansan-si, KOREA, REPUBLIC OF

Power of Attorney: None

Domestic Priority data as claimed by applicant

This application is a CON of 13/631,060 09/28/2012 PAT 8659050
which is a CON of 12/745,878 06/02/2010 PAT 8319248
which is a 371 of PCT/KR2008/006777 11/18/2008

Foreign Applications (You may be eligible to benefit from the **Patent Prosecution Highway** program at the USPTO. Please see <http://www.uspto.gov> for more information.)
REPUBLIC OF KOREA 10-2007-0124469 12/03/2007

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If Required, Foreign Filing License Granted: 02/05/2014

The country code and number of your priority application, to be used for filing abroad under the Paris Convention, is **US 14/161,377**

Projected Publication Date: 05/15/2014

Non-Publication Request: No

Early Publication Request: No
Title

SLIM LED PACKAGE

Preliminary Class

257

Statement under 37 CFR 1.55 or 1.78 for AIA (First Inventor to File) Transition Applications: No

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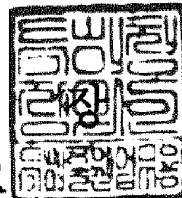
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특 허 청
COMMISSIONER



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【포괄위임등록번호】 2006-057715-4

【발명의 국문명칭】 슬림형 L E D 패키지

【발명의 영문명칭】 SLIM LED PACKAGE

【발명자】

제출 일자 : 2007-12-03

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【수수료】

【출원료】 0 면 38,000 원

【가산출원료】 19 면 0 원

【우선권주장료】 0 건 0 원

【심사청구료】 0 항 0 원

【합계】 38,000 원

【요약서】

【요약】

여기에서는 슬림형 LED 패키지가 개시된다. 개시된 LED 패키지는, 서로 이격된 제 1 및 제 2 리드프레임과, 상기 제 1 리드프레임의 상면 일 영역에서 상기 제 1 리드프레임의 두께가 타 영역에 비해 감소되어 형성된 칩 실장홈과, 상기 칩 실장홈의 바닥면에 실장된 채, 본딩와이어에 의해 상기 제 2 리드프레임과 연결되는 LED칩과, 상기 제 1 및 제 2 리드프레임을 지지하도록 그리고 상기 LED칩을 보호하도록 형성된 투광성 봉지재를 포함한다.

【대표도】

도 1

【색인어】

리드프레임, 슬림, LED, 패키지, 칩 실장홈, 본딩와이어, 두께, 식각

【명세서】

【발명의 명칭】

슬림형 L E D 패키지{SLIM LED PACKAGE}

【발명의 상세한 설명】

【기술분야】

<1> 본 발명은 LED 패키지에 관한 것으로서, 더욱 상세하게는, 발광효율의 실질적인 저하 없이, 더 나아가서는, 발광 효율을 상승시키면서, 두께를 극소화한 슬림형 LED 패키지에 관한 것이다.

【배경기술】

<2> 발광다이오드(LED; Light Emitting Diode)는 전류 인가에 의해 p-n 반도체 접합(p-n junction)에서 전자와 정공이 만나 빛을 발하는 소자로서, 통상, LED칩이 탑재된 패키지의 구조로 제작된다. 기존의 LED 패키지로는, 리드프레임을 지지하는 하우징의 캐비티 내에 LED칩을 위치시키고, 그 하우징의 캐비티를 봉지재로 충전한 구조의 리드프레임 타입의 LED 패키지와, PCB 상에 직접 LED칩을 실장한 후, LED칩을 덮는 봉지재를 PCB 상에 형성한 PCB 타입의 LED 패키지가 알려져 있다.

<3> 리드프레임 타입 LED 패키지의 경우, 리드프레임을 지지하는 하우징의 두께가 상대적으로 너무 커서, 두께가 얇은 슬림형으로의 제작이 원천적으로 힘든 구조이다. 상대적으로, PCB 타입의 LED 패키지는, 하우징의 생략으로 인해, 기존 리드프레임 타입의 LED 패키지에 비해서는 두께를 얇게 하여 제작하는 것이 상대적으로

용이하다.

<4> 하지만, PCB 타입의 LED 패키지도 두께를 줄이는데 있어서 많은 제한적인 요소들을 갖고 있다. 즉, PCB 타입의 LED 패키지는, 봉지재를 고려하지 않고라도, 크기 감소에 큰 제한이 있는, PCB의 두께, LED칩의 두께 및 본딩와이어의 루프 높이(loop height)에 의해 두께가 정해지므로, 전체적으로 총 두께의 감소 및 그에 의한 슬림화가 어렵다.

<5> 또한, LED 패키지는 LED칩 동작시 발생한 에너지에 의해 그것을 덮는 봉지재에 열변 현상이 초래된다. 이러한 열변 현상은 LED 패키지의 발광 성능 및 수명을 저하시키는 주요 원인이 된다. 이러한 이유로 방열 구조를 채택한 LED 패키지가 개발되었는 바, 리드프레임 타입의 LED 패키지는 추가적인 부품인 방열슬러그를 하우징 내측에 삽입하여 몰딩하는 구조를 채택한다. 이는 부품 추가 및 복잡한 제조 공정을 요하므로 경제성이 떨어진다. PCB 타입의 LED 패키지는 LED칩이 실장되는 B-T 수지가 방열 성능이 떨어지는 재질이며, 더 나아가, 방열 구조를 추가하는 것도 어려웠다.

【발명의 내용】

【해결하고자 하는 과제】

<6> 따라서, 본 발명의 기술적 과제는, 하우징 없이 투광성 봉지재가 리드프레임을 직접 지지하도록 하고, 리드프레임의 칩 실장 영역의 두께를 줄여, 전체적으로 두께가 감소된 슬림형이며, 더 나아가, 방열 성능도 좋은 슬림형의 LED 패키지를

제공하는 것이다.

【과제 해결 수단】

<7> 본 발명의 일 측면에 따라, 서로 이격된 제 1 및 제 2 리드프레임과, 상기 제 1 리드프레임의 상면 일 영역에서 상기 제 1 리드프레임의 두께가 타 영역에 비해 감소되어 형성된 칩 실장홈과, 상기 칩 실장홈의 바닥면에 실장된 채, 본딩와이어에 의해 상기 제 2 리드프레임과 연결되는 LED칩과, 상기 제 1 및 제 2 리드프레임을 지지하도록 그리고 상기 LED칩을 보호하도록 형성된 투광성 봉지재를 포함하는 슬림형 LED 패키지가 제공된다. 이때, 상기 LED칩의 높이는 상기 칩 실장홈의 깊이 이하인 것이 바람직하다.

<8> 바람직하게는, 상기 칩 실장홈은 상기 제 1 리드프레임의 상면 일 영역을 두께 식각하여 형성된다. 본 명세서에서, 용어 '두께 식각'은 재료, 즉, 리드프레임의 일 영역의 두께를 줄이는 목적으로 행해지는 식각을 의미하는 것이다.

<9> 바람직하게는, 상기 제 2 리드프레임의 상면 일 영역에서 상기 제 2 리드프레임의 두께가 타 영역에 비해 감소되어 형성된 본딩홈을 더 포함하며, 상기 본딩홈 내로 상기 본딩와이어의 일단부가 본딩된다. 상기 본딩홈은 상기 제 2 리드프레임의 상면 일 영역을 두께 식각하여 형성될 수 있다.

<10> 상기 제 1 리드프레임 또는 상기 제 2 리드프레임의 상면 또는 저면에 형성되어 상기 제 1 및 제 2 리드프레임과 상기 봉지재와의 접합력을 크게 하는 구멍 또는 홈들을 더 포함할 수 있다. 대안적으로, 상기 구멍 또는 홈들 대신에 상기 제

1 및 제 2 리드프레임의 상면 또는 저면에 형성된 스크래치(scratch)들이 리드프레임과 봉지재의 접합력을 증가시키는데 기여할 수 있다. 또한, 상기 LED칩의 높이는 상기 칩 실장홈의 깊이 이하인 것이 바람직하다. 상기 제 1 및 제 2 리드프레임은 서로 마주하는 대향 측면들을 갖되, 상기 대향 측면들은 서로 경사진 상태로 마주하는 직선 또는 곡선형의 경사부들을 포함하는 것이 바람직하다. 상기 대향 측면들 중 적어도 하나의 대향 측면에는 상기 제 1 리드프레임과 상기 제 2 리드프레임의 이격 거리를 넓히는 오목부가 형성된 것이 바람직하다.

<11> 또한, 상기 봉지재의 내측에는 형광체가 제공되는 것이 바람직하다. 또한, 상기 봉지재 내측에서 상기 칩 실장홈 내에 형성된 근접 수지부를 더 포함하며, 상기 형광체는 상기 근접 수지부 내에 개재된 것이 바람직하다. 대안적으로, 상기 형광체는 상기 봉지재를 구성하는 수지 내에 개재되거나, 상기 LED칩 상에 컨포멀 코팅에 의해 형성될 수도 있다.

<12> 상기 봉지재는 고상의 수지, 특히, 고상의 EMC를 이용한 트랜스퍼 몰딩에 의해 형성되는 것이 바람직하지만, 액상 수지를 이용한 인젝션 몰딩에 의해서도 형성될 수 있다.

【효과】

<13> 본 발명에 따르면, 두께를 감소시켜 형성된 리드프레임의 칩 실장홈에 LED칩을 실장하는 방식으로, LED칩의 두께와 리드프레임의 두께 일부가 중첩되게 하여, LED 패키지의 전체 두께를 크게 줄일 수 있고, 이에 의해, 초박형으로 슬림화된

LED 패키지를 얻을 수 있다. 또한, LED칩이 실장되는 리드프레임과 본딩와이어가 연결되는 리드프레임이 하우징 없이 바닥으로 노출되는 면적이 크게 증가되어 방열 성능이 크게 향상된 LED 패키지를 얻을 수 있다. 또한, 본딩와이어가 연결되는 리드프레임에도 두께를 감소시켜 형성된 본딩홈을 형성하고, 그 본딩홈 내에 본딩와이어가 연결되는 와이어볼을 마련하는 구조에 의해, LED 패키지의 두께 증가 원인을 더 줄이며, 이에 의하면, 보다 더 슬림화된 LED 패키지를 얻을 수 있다. 또한, 본 발명의 실시예에 따르면, 리드프레임에 형성된 구멍 또는 홈에 의해 리드프레임과 봉지재와의 접합력을 크게 해줄 수 있으며, 이는 봉지재와 리드프레임 사이에서 일어날 수 있는 계면 박리 현상을 막아준다. 또한, 상기 칩 실장홈의 내측면은 LED 칩으로부터 나온 광을 상측으로 반사시키는 기존 PCB 타입의 LED 패키지에 비해 발광효율을 향상시키는데 기여한다.

【발명의 실시를 위한 구체적인 내용】

<14> 이하, 첨부한 도면들을 참조하여 본 발명의 실시예들을 상세히 설명하기로 한다. 다음에 소개되는 실시예들은 당업자에게 본 발명의 사상이 충분히 전달될 수 있도록 하기 위해 예로서 제공되는 것이다. 따라서, 본 발명은 이하 설명되는 실시예들에 한정되지 않고 다른 형태로 구체화될 수도 있다. 그리고, 도면들에 있어서, 구성요소의 폭, 길이, 두께 등은 편의를 위하여 과장되어 표현될 수 있다. 명세서 전체에 걸쳐서 동일한 참조번호들은 동일한 구성요소들을 나타낸다.

<15> 도 1은 본 발명의 일 실시예에 따른 슬림형 LED 패키지를 도시한 평면도이며, 도 2는 도 1의 I-I를 따라 취해진 단면도이다.

<16> 도 1 및 도 2에 도시된 바와 같이, 본 실시예에 따른 슬림형 LED 패키지(1)는, 서로 이격된 제 1 및 제 2 리드프레임(12, 14)을 포함한다. 상기 제 1 리드프레임(12)에는 LED칩(2)이 실장되며, 상기 제 2 리드프레임(14)은 본딩와이어(W)에 의해 상기 LED칩(2)과 전기적으로 연결된다. 상기 본딩와이어(W)는 도시되지 않은 와이어볼(또는, 솔더링볼)에 의해 상기 제 2 리드프레임(14)에 연결된다.

<17> 상기 제 1 및 제 2 리드프레임(12, 14)은 투광성 봉지재(20)에 의해 지지된다. 상기 투광성 봉지재(20)는, 몰딩 성형에 의해 형성되는 것으로, LED칩(2)과 본딩와이어(W)를 전체적으로 덮어, 그것들을 보호하는 역할을 한다. 상기 투광성 봉지재(20)는 고상의 에폭시 수지재인 EMC(Epoxy Molding Compound)를 이용한 트랜스퍼 몰딩(transfer molding)에 의해 형성될 수 있다. 예컨대, 트랜스퍼 몰딩은 파워더형 EMC 재료를 적절한 압력으로 가압하여 태블릿(tablet) 형태로 만들고, 그 태블릿 형태의 EMC를 고온, 고압 조건으로 봉지재(20)의 형태를 한정하는 금형에 주입하는 방식으로 이루어진다.

<18> 그러나, 상기 봉지재(20)는 트랜스퍼 몰딩에 의해 형성되는 것이 바람직하지만, 이에 반드시 한정되는 것은 아니며, 액상 수지를 금형에 주입하여 봉지재를 형성하는 인젝션 몰딩이 이용될 수도 있다. 또한, 상기 봉지재(20)의 재질로는 에폭시 수지 외에 실리콘 수지 등의 다른 투광성 수지가 이용될 수 있다.

<19> 상기 제 1 리드프레임(12)의 상면에는 칩 실장홈(121)이 형성되며, 상기 LED

칩(2)은 상기 칩 실장홈(121)의 바닥면에 다이 어태칭 방식으로 실장된다. 상기 칩 실장홈(121)은, 기존 리드프레임의 반사컵 형성을 위해 이용되는 절곡 방식으로 형성되는 홈이 아니며, 제 1 리드프레임(12)의 상면 일 영역에서 타 영역에 비해 두께를 감소시켜 형성되는 홈이다. 따라서, 상기 LED칩(2)이 실장되는 부분에 국한하여 상기 제 1 리드프레임(12)의 두께가 감소되며, 이는 LED칩(2)의 실장 높이를 줄여 LED 패키지(1)의 전체 두께를 줄이는 슬림화에 기여한다. 또한, 상기 칩 실장홈(121)의 내측면은 광을 반사시키는 리플렉터(reflector)로서의 기능을 하여 LED 패키지(1)의 발광 효율 향상에도 기여할 수 있다.

<20> 바람직하게는, 상기 칩 실장홈(121)은 리드프레임의 두께를 줄일 목적으로 수행되는 두께 식각에 의해 형성된다. 이때, 상기 식각은 LED칩(2)의 실장 영역을 제외한 제 1 리드프레임(12)의 상면을 마스크로 가린 후 수행될 수 있다. 또한, 상기 칩 실장홈(121)의 깊이는 상기 제 1 리드프레임(12) 두께의 대략 1/2인 것이 바람직하나 이는 본 발명을 한정하는 것은 아니다.

<21> 또한, 상기 LED칩(2)의 높이가 상기 LED 패키지(1)의 두께 증가에 어떠한 영향도 미치지 않도록, 상기 LED칩(2)은 상기 칩 실장홈(121)의 깊이 이하로 그 높이가 정해지는 것이 바람직하다. 달리 말하면, 상기 칩 실장홈(121)의 깊이가 상기 LED칩(2) 이상으로 정해지는 것이 바람직하다.

<22> 도 2에 잘 도시된 바와 같이, 상기 제 1 및 제 2 리드프레임(12, 14)의 저면 각각에는 홈들(122, 142)이 형성되며, 그 홈들(122, 142)에는 몰딩 성형 중에 상기 봉지재(20)의 일부가 매워진다. 이는 상기 홈(122, 142)과 상기 봉지재(20)의 일부

가 맞물리는 효과 및 리드프레임(12, 14)과 봉지재(20) 사이의 접합 면적을 증가시키는 효과를 제공하여, 리드프레임에 대한 봉지재(20)의 접합력을 증가시키는데 기여한다. 상기 홈들(122, 142) 또한 상기 제 1 및 제 2 리드프레임(12, 14)의 저면 일부 영역의 두께를 감소시키는 방식으로 형성되며, 가장 바람직하게는, 전술한 것과 같은 두께 식각에 의해 형성될 수 있다. 또한, 상기 구멍 또는 홈들 대신에 상기 제 1 및 제 2 리드프레임의 상면 또는 저면에 형성된 스크래치(scratch)들이 리드프레임과 봉지재의 접합력을 증가시키는데 기여할 수 있다.

<23> 도 2를 더 참조하면, 상기 봉지재(20) 내에는 특정 파장의 광에 의해 여기되어 다른 파장의 광을 발하는 형광체(202)가 개재된다. 상기 형광체(202)는 LED칩(2)으로부터 나온 광의 색 변환 및 그 색 변환을 통해 백색광을 만들어내는데 참여한다. 본 실시예에서, 상기 형광체(202)는 몰딩 재료인 수지와 혼합된 후 그 몰딩 재료에 의한 몰딩 성형 공정에 의해 상기 봉지재(20) 내에 개재될 수 있다. 예컨대, 트랜스퍼 몰딩에 의한 봉지재(20)의 형성의 경우, EMC와 형광체(202)가 미리 혼합되며, 그 혼합된 재료가 트랜스퍼 몰딩의 재료로 이용된다.

<24> 이하에서는, 본 발명의 여러가지 다른 실시예들에 대한 설명이 이루어진다. 그러한 실시예들을 설명함에 있어서, 앞에서 설명된 내용은 중복을 피하기 위해 생략되며, 앞선 실시예와 동일한 부재번호는 동일한 또는 유사한 구성요소를 나타낸다.

<25> 도 3을 참조하여 본 발명의 다른 한 실시예를 설명하면, 제 2 리드프레임(14)의 상면 일 영역에서 상기 제 2 리드프레임(14)의 두께를 타 영역에 비해 감소시켜 형성된 본딩홈(141)을 볼 수 있다. 상기 본딩홈(141)도 앞선 실시예의 칩 실장홈(121)과 마찬가지로 두께 식각에 의해 형성될 수 있다. 이때, 본딩와이어(W)의 일단부는 상기 본딩홈(141) 내에서 상기 제 2 리드프레임(14)과 연결된다.

<26> 도시하지는 않았지만, 상기 본딩와이어(W)가 본딩되는 일단부에는 와이어볼이 존재하는데, 상기 본딩홈(141)은 와이어볼의 높이에 따른 LED 패키지의 두께 증가를 막아준다. 또한, 와이어볼의 크기가 클수록 본딩와이어(W)가 견고하게 제 1 리드프레임(14)에 고정될 수 있는데, 상기 본딩홈(141)의 형성으로 인해, 상기 와이어볼의 크기를 증가시키는데 있어서의 제한이 감소될 수 있다.

<27> 도 4를 참조하여 본 발명의 다른 한 실시예를 설명하면, 형광체(202)가 포함된 수지(21)가 칩 실장홈(121) 내에 한정적으로 형성되어 상기 LED칩(2)을 근접 거리에서 덮고 있다. 본 명세서에서, 칩 실장홈(121) 내에 채워진 수지를 '근접 수지부'라 정의한다. 상기 근접 수지부(21)는 형광체(202)가 상기 봉지재(20) 내에서 산재하지 않고, LED칩(21) 주변에만 한정적으로 위치할 수 있도록 해준다. 이는 형광체(202)에 의한 색 변환 효율을 높여주며, 패키지 외측에서 볼 때 균일하게 색 혼합된 광을 얻을 수 있도록 해준다.

<28> 덧붙여, 상기 근접 수지부(21)는 상기 형광체가 포함되지 않은 것도 고려될

수 있다. 예컨대, 에폭시와 같은 봉지재 제질은, 열에 취약하므로, LED칩(2) 주변에서 열변 또는 황변 현상을 일으킬 수 있다. 이때, 상기 칩 실장홈(121) 내에 형성된 근접 수지부(21)를 열에 상대적으로 강한 실리콘 수지로 하면, 전술한 열변 또는 황변 현상에 의한 LED 패키지의 성능 또는 수명 저하를 크게 줄여줄 수 있다. 열변 또는 황변 현상을 방지할 목적으로, 실리콘을 근접 수지부(21)의 재료로 이용하는 경우, 형광체(202)가 포함될 수도 있지만, 그것을 생략하더라도, 열변 또는 황변의 방지 측면에서, 충분한 효과를 제공한다.

<29> 대안적으로, 상기 형광체(202)를 예를 들면, 전기 영동법에 의한 컨포멀 코팅(conformal coating) 방식으로, 상기 LED칩(2) 표면에 형성하는 것도 고려될 수 있으며, 이러한 사항을 포함하는 LED 패키지(1)의 구조는 도 5에 도시하였다.

<30> 도 6은 본 발명의 또 다른 실시예에 따른 슬림형 LED 패키지의 평면도이고, 도 7은 도 6의 II-II를 따라 취해진 단면도이다.

<31> 도 6 및 도 7을 참조하면, 봉지재(20)와 리드프레임(12, 14) 사이의 접합력을 크게 하기 위해, 상기 제 1 및 제 2 리드프레임(12, 14)은, 앞선 실시예의 홈(122, 142; 도 2 참조)들 대신에, 상기 제 1 및 제 2 리드프레임(12, 14)을 상하로 관통하는 구멍(123, 143)들을 구비한다. 상기 구멍(123, 143)들은, 프레스 가공에 의해 형성될 수 있으며, 또한, 리드프레임의 전체 두께에 대한 식각 가공에 의해 형성될 수도 있다.

<32> 도 6에 잘 도시된 바와 같이, 상기 제 1 및 제 2 리드프레임(12, 14)은, 서로 마주하는 대향 측면들에서, 서로 경사진 상태로 마주하고 있는 제 1 및 제 2 경사부(125, 145)를 포함한다. 상기 제 1 경사부(125)는 제 1 리드프레임(12)의 대향 측면에서 좌우 양측으로 벌어진 채 경사진 구조로 형성되어 있다. 또한, 상기 제 2 경사부(145)는 제 2 리드프레임(14)의 대향 측면에서 좌우 양측으로 벌어진 채 경사진 구조로 형성되어 있다. 또한 상기 제 1 및 제 2 경사부(125, 145)는 직선형이거나 곡선형일 수 있다.

<33> 상기 제 1 및 제 2 리드프레임(12, 14)의 대향 측면들 사이에는 봉지재(20)의 일부가 개재되는데, 그 개재된 봉지재(20)와 상기 대향 측면들 상에는 힘이 작용한다. 이때, 상기 경사부(125, 145)들은 힘을 경사지게 분산시켜 상기 봉지재(20)가 대향 측면상에서 파손될 위험성이 있다. 더 더욱이, 제 1 리드프레임(12)의 경사부(125)는, 그와 인접하는 봉지재(20) 일부를 감싸는 형상이므로 보다 견고하게 봉지재(20)를 잡아주는 역할을 할 수 있다. 상기 대향 측면들 사이에서의 봉지재(20) 파손은 숏트(short) 등의 위험을 야기한다는 것에 주목한다.

<34> 또한, 상기 제 1 리드프레임(12)의 대향 측면 중앙에는 상기 제 1 리드프레임(12)과 상기 제 2 리드프레임(14)의 이격 거리를 넓히는 효과를 제공하는 오목부(126)가 형성된다. 상기 오목부(126)는 본딩와이어(W)가 상기 제 1 리드프레임(12)과 상기 제 2 리드프레임(14)을 연결하는 경로 바로 아래쪽에 위치한다. 상기 오목부(126)는 본딩와이어(W)가 리드프레임(12, 14)들에 의해 잘못 접촉되는 것과, 그 잘못된 접촉에 의해 야기될 수 있는 본딩와이어(W)의 숏트를 막아준다.

<35> 전술한 슬림형 LED 패키지(1)는 하나의 큰 금속박판을 다수의 제 1 및 제 2 리드프레임(12, 14)을 갖는 형상으로 패턴 가공하고, 그 패턴 가공된 금속박판 상에 다수의 봉지재를 형성하는 몰딩 성형을 하고, 다음, 제 1 및 제 2 리드프레임(12, 14)을 지지하는 봉지재 단위로, 리드프레임들을 절단(sawing)하는 것에 의해, 다수의 개수로 제작될 수 있다. 이때, 상기 절단시 생긴 버(burr)를 제거하는 공정이 포함될 수 있다.

【특허청구범위】

【청구항 1】

서로 이격된 제 1 및 제 2 리드프레임;

상기 제 1 리드프레임의 상면 일 영역에서 상기 제 1 리드프레임의 두께가 타 영역에 비해 감소되어 형성된 칩 실장홈;

상기 칩 실장홈의 바닥면에 실장된 채, 본딩와이어에 의해 상기 제 2 리드프레임과 연결되는 LED칩; 및

상기 제 1 및 제 2 리드프레임을 지지하도록 그리고 상기 LED칩을 보호하도록 형성된 투광성 봉지재를 포함하는 슬림형 LED 패키지.

【청구항 2】

청구항 1에 있어서, 상기 칩 실장홈은 상기 제 1 리드프레임의 상면 일 영역을 두께 식각하여 형성된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 3】

청구항 1에 있어서, 상기 제 2 리드프레임의 상면 일 영역에서 상기 제 2 리드프레임의 두께가 타 영역에 비해 감소되어 형성된 본딩홈을 더 포함하며, 상기 본딩홈 내로 상기 본딩와이어의 일단부가 본딩되는 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 4】

청구항 3에 있어서, 상기 본딩홈은 상기 제 2 리드프레임의 상면 일 영역을

두께 식각하여 형성된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 5】

청구항 1에 있어서, 상기 제 1 리드프레임 또는 상기 제 2 리드프레임의 상면 또는 저면에 형성되어, 상기 제 1 및 제 2 리드프레임과 상기 봉지재와의 접합력을 크게 하는 구멍 또는 홈들을 더 포함하는 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 6】

청구항 1에 있어서, 상기 LED칩의 높이는 상기 칩 실장홈의 깊이 이하인 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 7】

청구항 1에 있어서, 상기 제 1 및 제 2 리드프레임은 서로 마주하는 대향 측면들을 갖되, 상기 대향 측면들은 서로 경사진 상태로 마주하는 직선 또는 곡선형의 경사부들을 포함하는 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 8】

청구항 7에 있어서, 상기 대향 측면들 중 적어도 하나의 대향 측면에는 상기 제 1 리드프레임과 상기 제 2 리드프레임의 이격 거리를 넓히는 오목부가 형성된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 9】

청구항 1에 있어서, 상기 봉지재의 내측에는 형광체가 제공된 것을 특징으로

하는 슬림형 LED 패키지.

【청구항 10】

청구항 9에 있어서, 상기 봉지재 내측에서 상기 칩 실장홈 내에 형성된 근접 수지부를 더 포함하며, 상기 형광체는 상기 근접 수지부 내에 개재된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 11】

청구항 9에 있어서, 상기 형광체는 상기 봉지재를 구성하는 수지 내에 개재된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 12】

청구항 9에 있어서, 상기 형광체는 상기 LED칩 상에 컨포멀 코팅에 의해 형성된 것을 특징으로 하는 슬림형 LED 패키지.

【청구항 13】

청구항 1에 있어서, 상기 봉지재는 트랜스퍼 몰딩에 의해 형성된 것을 특징으로 하는 슬림형 LED 패키지.

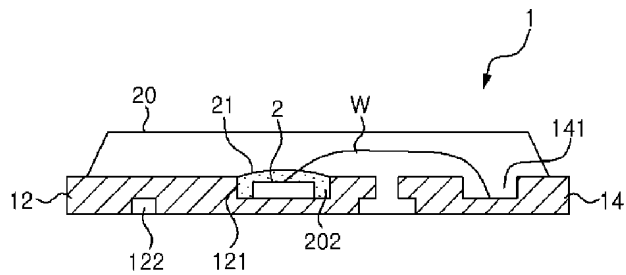
【청구항 14】

청구항 1에 있어서, 상기 제 1 리드프레임 또는 상기 제 2 리드프레임의 상면 또는 저면에 형성되어, 상기 제 1 및 제 2 리드프레임과 상기 봉지재와의 접합력을 크게 하는 스크래치를 더 포함하는 것을 특징으로 하는 슬림형 LED 패키지.

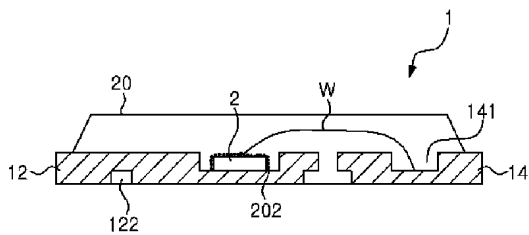
【도면의 간단한 설명】

- <36> 도 1은 본 발명의 일 실시예에 따른 슬림형 LED 패키지의 평면도.
- <37> 도 2는 도 1의 I-I를 따라 취해진 단면도.
- <38> 도 3 내지 도 5는 본 발명의 다양한 다른 실시예들을 설명하는 단면도들.
- <39> 도 6은 본 발명의 또 다른 실시예에 따른 슬림형 LED 패키지의 평면도.
- <40> 도 7은 도 6의 II-II를 따라 취해진 단면도.

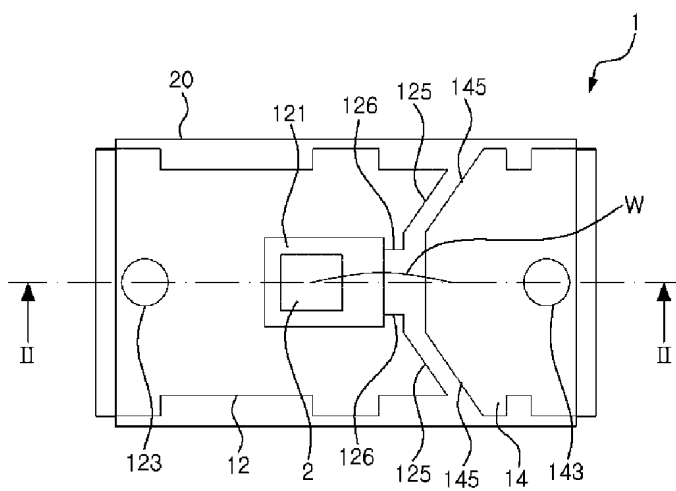
【도 4】



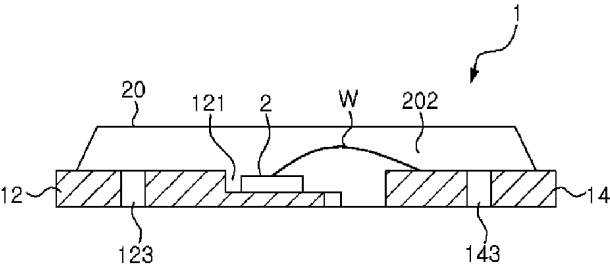
【도 5】



【도 6】



【도 7】





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APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1

CONFIRMATION NO. 3715

PUBLICATION NOTICE



OC000000068451618

58027
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

Title:SLIM LED PACKAGE

Publication No.US-2014-0131762-A1

Publication Date:05/15/2014

NOTICE OF PUBLICATION OF APPLICATION

The above-identified application will be electronically published as a patent application publication pursuant to 37 CFR 1.211, et seq. The patent application publication number and publication date are set forth above.

The publication may be accessed through the USPTO's publically available Searchable Databases via the Internet at www.uspto.gov. The direct link to access the publication is currently <http://www.uspto.gov/patft/>.

The publication process established by the Office does not provide for mailing a copy of the publication to applicant. A copy of the publication may be obtained from the Office upon payment of the appropriate fee set forth in 37 CFR 1.19(a)(1). Orders for copies of patent application publications are handled by the USPTO's Office of Public Records. The Office of Public Records can be reached by telephone at (703) 308-9726 or (800) 972-6382, by facsimile at (703) 305-8759, by mail addressed to the United States Patent and Trademark Office, Office of Public Records, Alexandria, VA 22313-1450 or via the Internet.

In addition, information on the status of the application, including the mailing date of Office actions and the dates of receipt of correspondence filed in the Office, may also be accessed via the Internet through the Patent Electronic Business Center at www.uspto.gov using the public side of the Patent Application Information and Retrieval (PAIR) system. The direct link to access this status information is currently <http://pair.uspto.gov/>. Prior to publication, such status information is confidential and may only be obtained by applicant using the private side of PAIR.

Further assistance in electronically accessing the publication, or about PAIR, is available by calling the Patent Electronic Business Center at 1-866-217-9197.

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1	3715
58027 7590 06/26/2014 H.C. PARK & ASSOCIATES, PLC 1894 PRESTON WHITE DRIVE RESTON, VA 20191			EXAMINER WILSON, ALLAN R	
			ART UNIT	PAPER NUMBER
			2897	
			NOTIFICATION DATE	DELIVERY MODE
			06/26/2014	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

PATENT@PARK-LAW.COM

Office Action Summary	Application No. 14/161,377	Applicant(s) SEO, EUN JUNG	
	Examiner ALLAN R. WILSON	Art Unit 2897	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTHS FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on January 22, 2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on ____.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on ____; the restriction requirement and election have been incorporated into this action.
- 4) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims*

- 5) ☒ Claim(s) 1-10 is/are pending in the application.
5a) Of the above claim(s) ____ is/are withdrawn from consideration.
- 6) ☐ Claim(s) ____ is/are allowed.
- 7) ☒ Claim(s) 1-10 is/are rejected.
- 8) ☐ Claim(s) ____ is/are objected to.
- 9) ☐ Claim(s) ____ are subject to restriction and/or election requirement.

* If any claims have been determined allowable, you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.

Application Papers

- 10) ☐ The specification is objected to by the Examiner.
- 11) ☐ The drawing(s) filed on ____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☒ All b) ☐ Some** c) ☐ None of the:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. ____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

** See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☒ Information Disclosure Statement(s) (PTO/SB/08a and/or PTO/SB/08b)
Paper No(s)/Mail Date ____.
- 3) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date ____.
- 4) ☐ Other: ____.

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of pre-AIA 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

Claims 1 and 2 are rejected under pre-AIA 35 U.S.C. 102(e) as being anticipated by US Patent Application Publication No. 2008/0296590 to Ng et al. (hereinafter “Ng”).

Regarding claim 1, Ng illustrates in at least figure 6 with the associated text: A light emitting diode (LED) package, comprising:

a first lead frame 74-76 and a second lead frame 77 separated from each other;
and

an LED chip 71-73 electrically connected to the first lead frame and the second lead frame,

wherein opposing sides of the first lead frame and the second lead frame face each other in a slanted state.

Regarding claim 2, Ng illustrates in figure 6 both of the opposing sides have a linear shape.

Claim Rejections - 35 USC § 103

The following is a quotation of pre-AIA 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 3-9 are rejected under pre-AIA 35 U.S.C. 103(a) as being unpatentable over Ng as applied to claim 1 above, and further in view of US Patent Application Publication No. 2005/0151149 of record to Chia et al. (hereinafter “Chia”).

Regarding claim 3, Ng is discussed above, it does not specifically show at least one of the opposing sides comprises a depressed portion formed thereon facing the other opposing side. Chia illustrates in figures 2 and 3 at least one of the opposing sides comprises a depressed portion 260 formed thereon facing the other opposing side. It would have been obvious to one of ordinary skill in the art at the time the invention was made for Ng to have a depressed portion. The rationale for doing this is

the combining of prior art elements according to known methods to yield predictable results.

Regarding claim 4, Chia illustrates in figure 2 a wire 210 connecting the LED chip 205 to the second lead frame 220, wherein the depressed portion 260 is disposed under the wire.

Regarding claim 5, Chia illustrates in figure 2 a chip mounting recess 235 formed on an upper surface of the first lead frame 215, wherein the LED chip 205 is disposed in the chip mounting recess.

Regarding claim 6, Chia illustrates in figure 2 an inner resin 225 covering the LED chip 205.

Regarding claim 7, Chia illustrates in figure 2 the inner resin 225 is disposed in the chip mounting recess 235.

Regarding claim 8, Chia illustrates in figure 2-4 a resin 225 covering at least a portion of the surface of the first lead frame 215, the second lead frame 220, and the LED chip 205.

Regarding claim 9, Chia illustrates in figure 2-4 at least one of the first lead frame 215 and the second lead frame 220 comprises a groove 250, 255, 260 formed thereon. and the resin 225 is disposed in at least a portion of the groove.

Claim 10 is rejected under pre-AIA 35 USC § 103 (a) as being unpatentable over Ng as applied to claim 1 above, and further in view of US Patent Application Publication No. 2008/0121921 to Loh et al. (hereinafter “Loh”).

Regarding claim 10, Ng is discussed above, it does not specifically show the opposing sides are slanted at the same angle and are parallel to each other. Loh illustrates in figure 2A the opposing sides 102, 104 are slanted at the same angle and are parallel to each other. It would have been obvious to one of ordinary skill in the art at the time the invention was made for Ng to have the same angle. The rationale for doing this is the use of known technique to improve similar devices (method or product) in the same way.

Conclusion

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure: See the Information Disclosure Statement.

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson by telephone number 571-272-1738, fax number 571-273-1738 or e-mail allan.wilson@uspto.gov (not secure). Examiner Wilson can normally be reached 7:30-4:30 Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fernando Toledo can be reached on 571-272-1867. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2897

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Allan R. Wilson/

Primary Examiner, Art Unit 2897

Notice of References Cited	Application/Control No. 14/161,377	Applicant(s)/Patent Under Reexamination SEO, EUN JUNG	
	Examiner ALLAN R. WILSON	Art Unit 2897	Page 1 of 1

U.S. PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-6,494,597 B1	12-2002	Yu, San-Hua	362/350
*	B	US-7,282,785 B2	10-2007	Yoshida, Kenichi	257/666
*	C	US-2008/0296590 A1	12-2008	Ng, Kee Yean	257/88
*	D	US-2010/0163913 A1	07-2010	Jeganathan et al.	257/98
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	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

FOREIGN PATENT DOCUMENTS

*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Receipt date: 01/22/2014

14161377 - GAU: 2897

PTO/SB/08a (01-10)

Doc code: IDS

Doc description: Information Disclosure Statement (IDS) Filed

Approved for use through 07/31/2012. OMB 0651-0031

U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it contains a valid OMB control number.

INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		
	Filing Date		2014-01-22
	First Named Inventor	Eun Jung SEO	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P3962USC1C1	

U.S.PATENTS						
Examiner Initial*	Cite No	Patent Number	Kind Code ¹	Issue Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	6603148		2003-08-05	Sano et al.	
	2	7291866		2007-11-06	Oshio et al.	
	3	7301176		2007-11-27	Abe et al.	
	4	7592639		2009-09-22	Maeda et al.	
	5	7682848		2010-03-23	Shimizu et al.	
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	7	8398892		2013-03-19	Shioi et al.	
	8	8471271		2013-06-25	Son	

ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.W./

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897	
	Filing Date		2014-01-22	
	First Named Inventor	Eun Jung SEO		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		P3962USC1C1	

	9	7183588		2007-02-07	Chia et al.	
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If you wish to add additional U.S. Patent citation information please click the Add button.

U.S.PATENT APPLICATION PUBLICATIONS

Examiner Initial*	Cite No	Publication Number	Kind Code ¹	Publication Date	Name of Patentee or Applicant of cited Document	Pages,Columns,Lines where Relevant Passages or Relevant Figures Appear
	1	20050151149		2005-07-14	Chia et al.	
	2	20060220048		2006-10-05	Matsumoto et al.	
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ALL REFERENCES CONSIDERED EXCEPT WHERE LINED THROUGH. /A.W./

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897	
	Filing Date		2014-01-22	
	First Named Inventor	Eun Jung SEO		
	Art Unit			
	Examiner Name			
	Attorney Docket Number		P3962USC1C1	

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If you wish to add additional U.S. Published Application citation information please click the Add button.

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Examiner Initial*	Cite No	Foreign Document Number ³	Country Code ²	Kind Code ⁴	Publication Date	Name of Patentee or Applicant of cited Document	Pages, Columns, Lines where Relevant Passages or Relevant Figures Appear	T ⁵
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/A.W./	4	501276	TW		2002-09-01	OSRAM OPTO SEMICONDUCTORS GMBH	Corresponds to US 20040047151	☐
/A.W./	5	I246780	TW		2006-01-01	TOYODA GOSEI CO., LTD.; SUMITA OPTICAL GLASS INC.		☐
/A.W./	6	200636049	TW		2006-10-16	KONINKLIJKE PHILIPS ELECTRONICS N.V		☐

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897	
	Filing Date		2014-01-22	
	First Named Inventor	Eun Jung SEO		
	Art Unit			
	Examiner Name			
	Attorney Docket Number	P3962USC1C1		

/A.W./	7	200522396	TW		2005-07-01	LUMILEDS LIGHTING U. S. LLCUS		☐
/A.W./	8	63-200550	JP		1988-08-18	MATSUSHITA ELECTRONICS CORP		☐
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/A.W./	15	2007-110060	JP		2007-04-26	NICHIA CHEM IND LTD		☐
/A.W./	16	2001-210872	JP		2001-08-03	SANYO ELECTRIC CO LTD et al.		☐
/A.W./	17	2001-085747	JP		2001-03-30	SANKEN ELECTRIC CO LTD		☐

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897	
	Filing Date		2014-01-22	
	First Named Inventor	Eun Jung SEO		
	Art Unit			
	Examiner Name			
	Attorney Docket Number	P3962USC1C1		

/A.W./	18	2004-134805	JP		2004-04-30	LUMILEDS LIGHTING US LLC		☐
/A.W./	19	2006-352085	JP		2006-12-28	PHILIPS LUMILEDS LIGHTING CO LLC		☐
/A.W./	20	3-8459	JP		1991-01-28	SHARP INCORPORATED		☐
/A.W./	21	62-140758	JP		1987-09-05	ROHM INCORPORATED		☐
/A.W./	22	2006/059828	WO		2006-06-08	Seoul Semiconductor Co., Ltd.		☐

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NON-PATENT LITERATURE DOCUMENTS

Examiner Initials*	Cite No	Include name of the author (in CAPITAL LETTERS), title of the article (when appropriate), title of the item (book, magazine, journal, serial, symposium, catalog, etc), date, pages(s), volume-issue number(s), publisher, city and/or country where published.	T ⁵
/A.W./	1	European Search Report for EP Application No. 08856932.2-1226 dated March 7, 2012.	☐
/A.W./	2	Taiwanese Office Action dated June 1, 2012, corresponding to U.S. Application No. 12/745,878. Parent	☐
/A.W./	3	Non-Final Office Action issued in U.S. Application No. 12/745,878 dated March 28, 2012. Parent	☐
/A.W./	4	Notice of Allowance issued in U.S. Application No. 12/745,878 dated August 1, 2012. Parent	☐

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897
	Filing Date		2014-01-22
	First Named Inventor	Eun Jung SEO	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P3962USC1C1	

/A.W./	5	Non-Final Office Action issued in U.S. Application No. 13/631,060 dated July 2, 2013. Parent	☐
/A.W./	6	Notice of Allowance issued in U.S. Application No. 13/631,060 dated October 18, 2013. Parent	☐

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EXAMINER SIGNATURE

Examiner Signature	/Allan Wilson/	Date Considered	06/19/2014
*EXAMINER: Initial if reference considered, whether or not citation is in conformance with MPEP 609. Draw line through a citation if not in conformance and not considered. Include copy of this form with next communication to applicant.			
¹ See Kind Codes of USPTO Patent Documents at www.USPTO.GOV or MPEP 901.04. ² Enter office that issued the document, by the two-letter code (WIPO Standard ST.3). ³ For Japanese patent documents, the indication of the year of the reign of the Emperor must precede the serial number of the patent document. ⁴ Kind of document by the appropriate symbols as indicated on the document under WIPO Standard ST.16 if possible. ⁵ Applicant is to place a check mark here if English language translation is attached.			

Receipt date: 01/22/2014 INFORMATION DISCLOSURE STATEMENT BY APPLICANT (Not for submission under 37 CFR 1.99)	Application Number		14161377 - GAU: 2897
	Filing Date		2014-01-22
	First Named Inventor	Eun Jung SEO	
	Art Unit		
	Examiner Name		
	Attorney Docket Number	P3962USC1C1	

CERTIFICATION STATEMENT

Please see 37 CFR 1.97 and 1.98 to make the appropriate selection(s):

☐ That each item of information contained in the information disclosure statement was first cited in any communication from a foreign patent office in a counterpart foreign application not more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(1).

OR

☐ That no item of information contained in the information disclosure statement was cited in a communication from a foreign patent office in a counterpart foreign application, and, to the knowledge of the person signing the certification after making reasonable inquiry, no item of information contained in the information disclosure statement was known to any individual designated in 37 CFR 1.56(c) more than three months prior to the filing of the information disclosure statement. See 37 CFR 1.97(e)(2).

☐ See attached certification statement.

☐ The fee set forth in 37 CFR 1.17 (p) has been submitted herewith.

☒ A certification statement is not submitted herewith.

SIGNATURE

A signature of the applicant or representative is required in accordance with CFR 1.33, 10.18. Please see CFR 1.4(d) for the form of the signature.

Signature	/william l. brooks/	Date (YYYY-MM-DD)	2014-01-22
Name/Print	William L. Brooks	Registration Number	34,129

This collection of information is required by 37 CFR 1.97 and 1.98. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 1 hour to complete, including gathering, preparing and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. **DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

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The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

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5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspections or an issued patent.
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EAST Search History

EAST Search History (Prior Art)

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
S177	1	14/161377	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/06/19 06:40
S178	23	((("EUN JUNG") near2 (SEO)).INV.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/06/19 06:44
S179	17	US-6603148-\$.DID. OR US-7291866- \$.DID. OR US-7301176-\$.DID. OR US- 7592639-\$.DID. OR US-7682848-\$.DID. OR US-8390022-\$.DID. OR US-8398892- \$.DID. OR US-8471271-\$.DID. OR US- 7183588-\$.DID. OR US-20050151149- \$.DID. OR US-20060220048-\$.DID. OR US-20030107316-\$.DID. OR US- 20040047151-\$.DID. OR US- 20040104391-\$.DID. OR US- 20050280017-\$.DID. OR US- 20080023714-\$.DID. OR US- 20080121921-\$.DID.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/06/19 06:52
S180	3	((("20060220047") or ("20070262339") or ("20080023721"))).PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2014/06/19 06:59
S181	20615	((257/98-100,E33.059,E33.061,E33.066) or (438/26)).OCLS.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO	OR	OFF	2014/06/19 08:03
S182	461	S181 and second adj2 lead frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:03
S183	163	S182 and (LED or (light emitting diode)) same (thickness or height)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:03
S184	41	(US-20100270571-\$ or US- 20050151149-\$ or US-20080121921-\$ or US-20110186902-\$ or US- 20110186901-\$ or US-20110133237-\$ or US-20110266584-\$ or US- 20100133563-\$ or US-20090218581-\$ or US-20080290359-\$ or US- 20080135862-\$ or US-20080023721-\$ or US-20080023714-\$ or US-	US-PGPUB; USPAT; JPO	ADJ	ON	2014/06/19 08:09

		20040104391-\$ or US-20050280017-\$ or US-20130020604-\$ or US-20060220047-\$ or US-20070262339-\$ or US-20050212145-\$ or US-20140131762-\$ or US-20140070259-\$).did. or (US-6603148-\$ or US-7488622-\$ or US-6943433-\$ or US-7282785-\$ or US-7301176-\$ or US-7858997-\$ or US-7682848-\$ or US-7592639-\$ or US-7291866-\$ or US-8319248-\$ or US-8258697-\$ or US-8398892-\$ or US-8390022-\$ or US-8471271-\$ or US-8338845-\$ or US-7183588-\$ or US-7649209-\$ or US-7262491-\$ or US-8659050-\$).did. or (JP-63200550-\$).did.				
S185	7	("20070262339" "20100019768" "20100019778" "20100019779" "20100163920" "20100176407" "6770498").PN.	US-PGPUB; USPAT; USOCR	ADJ	ON	2014/06/19 08:12
S186	7176	H01L23/49537,49541,486,62.CPC.	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:19
S187	457	S186 and second adj2 lead frame	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:19
S188	47	S187 and (LED or (light emitting diode))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:21
S189	47	S187 and (LED or (light emitting diode))	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:22
S190	89	S186 and lead frame same (slant\$2 or curv\$3) not S189	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:24
S191	89	S186 and lead frame same (slant\$2 or curv\$3) not S189	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:24

S192	176	S181 and lead frame same (slant\$2 or curv\$3) not (S189 or S191)	US-PGPUB; USPAT; USOCR; FPRS; EPO; JPO; DERWENT; IBM_TDB	ADJ	ON	2014/06/19 08:29
S193	50	(US-20100270571-\$ or US-20050151149-\$ or US-20080121921-\$ or US-20110186902-\$ or US-20110186901-\$ or US-20110133237-\$ or US-20110266584-\$ or US-20100133563-\$ or US-20090218581-\$ or US-20080290359-\$ or US-20080135862-\$ or US-20080023721-\$ or US-20080023714-\$ or US-20040104391-\$ or US-20050280017-\$ or US-20130020604-\$ or US-20060220047-\$ or US-20070262339-\$ or US-20050212145-\$ or US-20140131762-\$ or US-20140070259-\$ or US-20140008695-\$ or US-20100157595-\$ or US-20100163913-\$ or US-20110186886-\$ or US-20080296590-\$).did. or (US-6603148-\$ or US-7488622-\$ or US-6943433-\$ or US-7282785-\$ or US-7301176-\$ or US-7858997-\$ or US-7682848-\$ or US-7592639-\$ or US-7291866-\$ or US-8319248-\$ or US-8258697-\$ or US-8398892-\$ or US-8390022-\$ or US-8471271-\$ or US-8338845-\$ or US-7183588-\$ or US-7649209-\$ or US-7262491-\$ or US-8659050-\$ or US-7387916-\$ or US-7704762-\$ or US-6494597-\$ or US-7800304-\$).did. or (JP-63200550-\$).did.	US-PGPUB; USPAT; JPO	ADJ	ON	2014/06/19 09:26

6/ 19/ 2014 1:31:08 PM
C:\ Users\ awilson\ Documents\ EAST\ Workspaces\ 14\ 14161377.wsp

Corrected CPC search to the following:
H01L23/49537,49541.CPC. or H01L33/486,62.CPC.
Would not save new search. /ARW/

Search Notes 	Application/Control No. 14161377	Applicant(s)/Patent Under Reexamination SEO, EUN JUNG
	Examiner ALLAN R WILSON	Art Unit 2897

CPC- SEARCHED		
Symbol	Date	Examiner
H01L23/49537, 49541	6/19/14	ARW
H01L33/486, 62	6/19/14	ARW

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
257	98-100, E33.059, E33.061, E33.066	6/19/14	ARW
438	26	6/19/14	ARW

SEARCH NOTES		
Search Notes	Date	Examiner
See Examiner's search strategy and results	6/19/14	ARW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner

	/ALLAN R WILSON/ Primary Examiner.Art Unit 2897
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BIB DATA SHEET

CONFIRMATION NO. 3715

SERIAL NUMBER	FILING or 371(c) DATE RULE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.		
14/161,377	01/22/2014	257	2897	P3962USC1C1		
APPLICANTS Seoul Semiconductor Co., Ltd., Ansan-si, KOREA, REPUBLIC OF, Assignee (with 37 CFR 1.172 Interest); INVENTORS Eun Jung SEO, Ansan-si, KOREA, REPUBLIC OF; ** CONTINUING DATA ***** This application is a CON of 13/631,060 09/28/2012 PAT 8659050 which is a CON of 12/745,878 06/02/2010 PAT 8319248 which is a 371 of PCT/KR2008/006777 11/18/2008 ** FOREIGN APPLICATIONS ***** REPUBLIC OF KOREA 10-2007-0124469 12/03/2007 ** IF REQUIRED, FOREIGN FILING LICENSE GRANTED ** 02/05/2014						
Foreign Priority claimed ☒ Yes ☐ No 35 USC 119(a-d) conditions met ☒ Yes ☐ No Verified and Acknowledged <u>/ALLAN R WILSON/</u> Examiner's Signature		☐ Met after Allowance Initials	STATE OR COUNTRY KOREA, REPUBLIC OF	SHEETS DRAWINGS 4	TOTAL CLAIMS 10	INDEPENDENT CLAIMS 1
ADDRESS H.C. PARK & ASSOCIATES, PLC 1894 PRESTON WHITE DRIVE RESTON, VA 20191 UNITED STATES						
TITLE SLIM LED PACKAGE						
FILING FEE RECEIVED 1600	FEES: Authority has been given in Paper No. _____ to charge/credit DEPOSIT ACCOUNT No. _____ for following:			☐ All Fees ☐ 1.16 Fees (Filing) ☐ 1.17 Fees (Processing Ext. of time) ☐ 1.18 Fees (Issue) ☐ Other _____ ☐ Credit		

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Patent Application of:

Eun Jung SEO

Serial No.: 14/161,377

Confirmation No.: 3715

Filed: January 22, 2014

Docket No.: P3962USC1C1

Group Art Unit: 2897

Examiner: WILSON, ALLAN R

For: **SLIM LED PACKAGE**

Mail Stop: Amendment
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

REPLY UNDER 37 C.F.R. § 1.111

Dear Madam:

In response to the Non-Final Office Action mailed June 26, 2014 ("Office Action"), Applicant respectfully requests reconsideration of the Application in view of the following Amendments and Remarks.

Amendments to the Claims begin on page 2.

Remarks begin on page 4.

No extensions of time are required at this time. If extensions of time are necessary to prevent abandonment of this Application, then they are petitioned for under 37 C.F.R. § 1.136(a). No fees for net addition of claims are required at this time. Any fees required for extensions of time or for the net addition of claims may be charged to our Deposit Account No. 50-3698.

AMENDMENTS TO THE CLAIMS

Please **AMEND** claims 1 and 4 as shown below.

This claim list replaces all prior claim lists in the Application.

1. (Currently Amended) A light emitting diode (LED) package, comprising:
a first lead frame and a second lead frame separated from each other; ~~[[and]]~~
an LED chip disposed on the first lead frame and electrically connected to the first lead
frame and the second lead frame~~[[,]]; and~~
a wire connecting the LED chip to the second lead frame,
wherein opposing sides of the first lead frame and the second lead frame face each
other in a slanted state.
2. (Original) The LED package of claim 1, wherein both of the opposing sides have
a linear or curved shape.
3. (Original) The LED package of claim 1, wherein at least one of the opposing
sides comprises a depressed portion formed thereon facing the other opposing side.
4. (Currently Amended) The LED package of claim 3, ~~further comprising a wire~~
~~connecting the LED chip to at least one of the first lead frame and the second lead frame,~~
wherein the depressed portion is disposed under the wire.

5. (Original) The LED package of claim 1, further comprising a chip mounting recess formed on an upper surface of the first lead frame, wherein the LED chip is disposed in the chip mounting recess.
6. (Original) The LED package of claim 5, further comprising an inner resin covering the LED chip.
7. (Original) The LED package of claim 6, wherein the inner resin is disposed in the chip mounting recess.
8. (Original) The LED package of claim 1, further comprising a resin covering at least a portion of the surface of the first lead frame, the second lead frame, and the LED chip.
9. (Original) The LED package of claim 8, wherein at least one of the first lead frame and the second lead frame comprises a groove formed thereon, and the resin is disposed in at least a portion of the groove.
10. (Original) The LED package of claim 1, wherein the opposing sides are slanted at the same angle.

REMARKS

Claims 1 and 4 have been amended. Accordingly, claims 1-10 are currently pending in the Application, of which claim 1 is independent.

Applicant respectfully submits that the above amendments do not add new matter to the Application and are fully supported by the specification. Support for the amendments may be found at least in Figures 1-8(b).

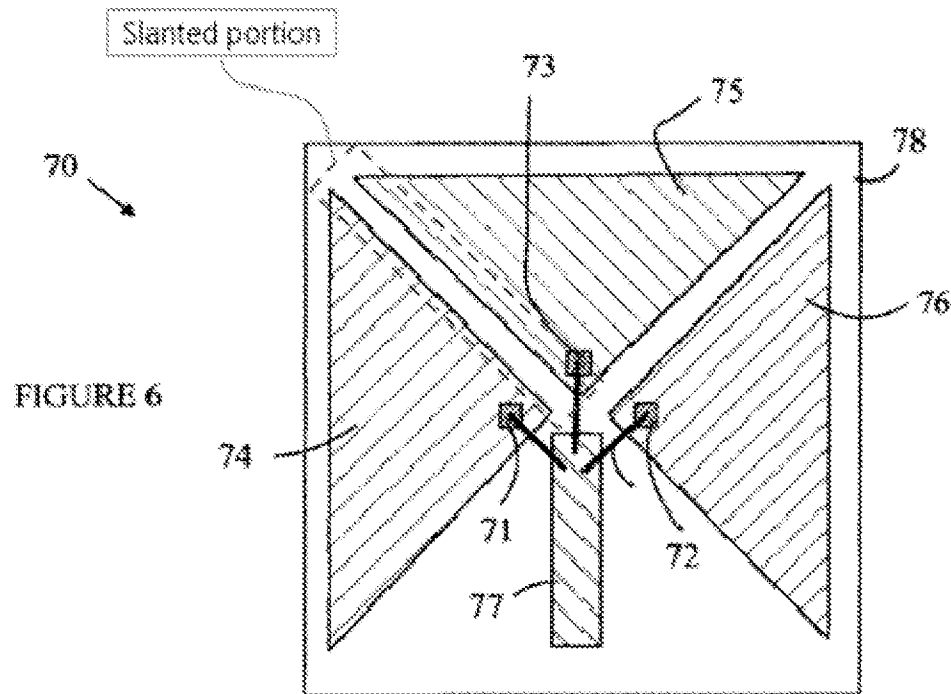
In view of the above amendments and the following remarks, Applicant respectfully requests reconsideration and timely withdrawal of the pending rejections for at least the reasons discussed below.

Rejections under 35 U.S.C. § 102

Claims 1 and 2 stand rejected under pre-AIA 35 U.S.C. § 102(e) as allegedly being anticipated by U.S. Patent Application Publication No. 2008/0296590, applied for by Ng ("Ng"). Applicant respectfully traverses this rejection for at least the following reasons.

In order for a rejection under pre-AIA 35 U.S.C. § 102(e) to be proper, a single reference must disclose every claimed feature. To be patentable, a claim need only recite a single novel feature that is not disclosed in the cited reference. Thus, the failure of a cited reference to disclose one or more claimed features renders the pre-AIA 35 U.S.C. § 102(e) rejection improper.

Annotated FIG. 6 of Ng (shown below) illustrates three triangularly-shaped leads 74-76 opposing a fourth rectangular lead 77. LED dies 71-73 are mounted on, and electrically connected to, triangularly-shaped leads 74-76, respectively, and each LED die is electrically connected to rectangular lead 77 by a wire. Although leads 74-76 may be said to have slanted portions that face each other (see FIG.), none of leads 74-76 face rectangular lead 77, to which the wires are connected from each of the LED dies 71-73, in a slanted state.



Thus, Ng fails to disclose at least the following features of claim 1, which has been amended to recite, *inter alia*:

an LED chip disposed on the first lead frame and electrically connected to the first lead frame and the second lead frame[[,]]; and

a wire connecting the LED chip to the second lead frame,

wherein opposing sides of the first lead frame and the second lead frame face each other in a slanted state. (Emphasis added.)

Accordingly, Applicant respectfully requests withdrawal of the pre-AIA 35 U.S.C. § 102(e) rejection of claim 1. Since none of the alleged prior art of record discloses or suggests all the features of the claimed subject matter, Applicant respectfully submits that independent claim 1, and all the claims that depend therefrom, are allowable.

Rejections under 35 U.S.C. § 103

Claims 3-9 stand rejected under pre-AIA 35 U.S.C. § 103(a) as allegedly being unpatentable over Ng as applied to claim 1 above, and further in view of U.S. Patent Application Publication No. 2005/0151149 applied for by Chia, *et al.* ("Chia"). Applicant respectfully traverses this rejection for at least the following reasons.

Applicant respectfully submits that claim 1 is allowable over Ng, and Chia fails to cure the deficiencies of Ng noted above with regard to claim 1. Hence, claims 3-9 are allowable at least because they depend from an allowable claim 1.

Accordingly, Applicant respectfully requests withdrawal of the pre-AIA 35 U.S.C. § 103(a) rejection of claims 3-9.

Claim 10 stands rejected under pre-AIA 35 U.S.C. § 103(a) as allegedly being unpatentable over Ng as applied to claim 1 above, and further in view of U.S. Patent Application Publication No. 2008/0121921 applied for by Loh, *et al.* ("Loh"). Applicant respectfully traverses this rejection for at least the following reasons.

Applicant respectfully submits that claim 1 is allowable over Ng, and Loh fails to cure the deficiencies of Ng noted above with regard to claim 1. Hence, claim 10 is allowable at least because it depends from an allowable claim 1.

Accordingly, Applicant respectfully requests withdrawal of the pre-AIA 35 U.S.C. § 103(a) rejection of claim 10.

CONCLUSION

A full and complete response has been made to the pending Office Action, and all of the stated grounds for rejection have been overcome or rendered moot. Accordingly, all pending claims are allowable, and the Application is in condition for allowance.

The Examiner is invited to contact Applicant's undersigned representative at the number below if it would expedite prosecution. Prompt and favorable consideration of this Reply is respectfully requested.

Respectfully submitted,

/William L. Brooks/

William L. Brooks
Reg. No. 34,129

Date: September 25, 2014

CUSTOMER NUMBER: 58027

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1894 Preston White Drive
Reston, VA 20191
Tel: 703-288-5105
Fax: 703-288-5139
HCP/WLB/dsg

Electronic Acknowledgement Receipt

EFS ID:	20247217
Application Number:	14161377
International Application Number:	
Confirmation Number:	3715
Title of Invention:	SLIM LED PACKAGE
First Named Inventor/Applicant Name:	Eun Jung SEO
Customer Number:	58027
Filer:	Hae-Chan Park/william brooks
Filer Authorized By:	Hae-Chan Park
Attorney Docket Number:	P3962USC1C1
Receipt Date:	25-SEP-2014
Filing Date:	22-JAN-2014
Time Stamp:	17:10:42
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	no
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File Listing:

Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Power of Attorney	P3962USC1C1_POA-373c.pdf	200769 28fb419347743ea3255e4523e82a7304bafed02e	no	5

Warnings:

Information:

2		P3692USC1C1-Reply.pdf	165052 c75b59e7ecbf904042bf9cee40152de981918a8	yes	7		
	Multipart Description/PDF files in .zip description						
	Document Description	Start	End				
	Amendment/Req. Reconsideration-After Non-Final Reject	1	1				
	Claims	2	3				
	Applicant Arguments/Remarks Made in an Amendment	4	7				
Warnings:							
Information:							
Total Files Size (in bytes):			365821				
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.							

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

POWER OF ATTORNEY TO PROSECUTE APPLICATIONS BEFORE THE USPTO

I hereby revoke all previous powers of attorney given in the application identified in the attached statement under 37 CFR 3.73(c).

I hereby appoint:



Practitioners associated with Customer Number:

58027

OR

Practitioner(s) named below (if more than ten patent practitioners are to be named, then a customer number must be used):

Name	Registration Number

Name	Registration Number

As attorney(s) or agent(s) to represent the undersigned before the United States Patent and Trademark Office (USPTO) in connection with any and all patent applications assigned only to the undersigned according to the USPTO assignment records or assignments documents attached to this form in accordance with 37 CFR 3.73(c).

Please change the correspondence address for the application identified in the attached statement under 37 CFR 3.73(c) to:



The address associated with Customer Number:

58027

OR

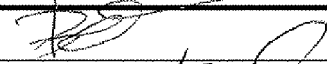
☐	Firm or Individual Name		
	Address		
	City		
	Country		
	Telephone		Email

Assignee Name and Address: Seoul Semiconductor Co., Ltd.
 1B-25, 727, Wonsi-dong, Danwon-gu
 Ansan-si, Gyeonggi-do 425-851
 Republic of Korea

A copy of this form, together with a statement under 37 CFR 3.73(c) (Form PTO/SB/96 or equivalent) is required to be filed in each application in which this form is used. The statement under 37 CFR 3.73(c) may be completed by one of the practitioners appointed in this form, and must identify the application in which this Power of Attorney is to be filed.

SIGNATURE of Assignee of Record

The individual whose signature and title is supplied below is authorized to act on behalf of the assignee

Signature		Date	Sep. 18, 2012
Name	Daesung Kal	Telephone	
Title	IP team manager		

This collection of information is required by 37 CFR 1.31, 1.32 and 1.33. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 3 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

STATEMENT UNDER 37 CFR 3.73(c)Applicant/Patent Owner: Seoul Semiconductor Co., Ltd.Application No./Patent No.: 14/161,377Filed/Issue Date: January 22, 2014Titled: SLIM LED PACKAGESeoul Semiconductor Co., Ltd., a Corporation

(Name of Assignee)

(Type of Assignee, e.g., corporation, partnership, university, government agency, etc.)

states that, for the patent application/patent identified above, it is (choose **one** of options 1, 2, 3 or 4 below):

1. ☒ The assignee of the entire right, title, and interest.
2. ☐ An assignee of less than the entire right, title, and interest (check applicable box):
- ☐ The extent (by percentage) of its ownership interest is _____%. Additional Statement(s) by the owners holding the balance of the interest must be submitted to account for 100% of the ownership interest.
- ☐ There are unspecified percentages of ownership. The other parties, including inventors, who together own the entire right, title and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

3. ☐ The assignee of an undivided interest in the entirety (a complete assignment from one of the joint inventors was made). The other parties, including inventors, who together own the entire right, title, and interest are:

Additional Statement(s) by the owner(s) holding the balance of the interest must be submitted to account for the entire right, title, and interest.

4. ☐ The recipient, via a court proceeding or the like (e.g., bankruptcy, probate), of an undivided interest in the entirety (a complete transfer of ownership interest was made). The certified document(s) showing the transfer is attached.

The interest identified in option 1, 2 or 3 above (not option 4) is evidenced by either (choose **one** of options A or B below):

- A. ☐ An assignment from the inventor(s) of the patent application/patent identified above. The assignment was recorded in the United States Patent and Trademark Office at Reel _____, Frame _____, or for which a copy thereof is attached.
- B. ☒ A chain of title from the inventor(s), of the patent application/patent identified above, to the current assignee as follows:

1. From: Eun Jung SEO To: Seoul Semiconductor Co., Ltd.The document was recorded in the United States Patent and Trademark Office at
Reel 024543, Frame 0452, or for which a copy thereof is attached.2. From: Eun Jung SEO To: Seoul Semiconductor Co., Ltd.The document was recorded in the United States Patent and Trademark Office at
Reel 029204, Frame 0372, or for which a copy thereof is attached.

[Page 1 of 2]

This collection of information is required by 37 CFR 3.73(b). The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.11 and 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.

STATEMENT UNDER 37 CFR 3.73(c)

3. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

4. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

5. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

6. From: _____ To: _____

The document was recorded in the United States Patent and Trademark Office at
 Reel _____, Frame _____, or for which a copy thereof is attached.

☐ Additional documents in the chain of title are listed on a supplemental sheet(s).

☐ As required by 37 CFR 3.73(c)(1)(i), the documentary evidence of the chain of title from the original owner to the assignee was, or concurrently is being, submitted for recordation pursuant to 37 CFR 3.11.

[NOTE: A separate copy (i.e., a true copy of the original assignment document(s)) must be submitted to Assignment Division in accordance with 37 CFR Part 3, to record the assignment in the records of the USPTO. See MPEP 302.08]

The undersigned (whose title is supplied below) is authorized to act on behalf of the assignee.

/William L. Brooks/

Signature

William L. Brooks

Printed or Typed Name

September 25, 2014

Date

Patent Attorney (Reg.# 34129)

Title or Registration Number

Privacy Act Statement

The **Privacy Act of 1974 (P.L. 93-579)** requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (*i.e.*, GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

PATENT APPLICATION FEE DETERMINATION RECORD Substitute for Form PTO-875				Application or Docket Number 14/161,377		Filing Date 01/22/2014		☐ To be Mailed	
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ENTITY: ☒ LARGE ☐ SMALL ☐ MICRO

APPLICATION AS FILED – PART I

FOR	NUMBER FILED	NUMBER EXTRA	RATE (\$)	FEE (\$)
☐ BASIC FEE (37 CFR 1.16(a), (b), or (c))	N/A	N/A	N/A	
☐ SEARCH FEE (37 CFR 1.16(k), (i), or (m))	N/A	N/A	N/A	
☐ EXAMINATION FEE (37 CFR 1.16(o), (p), or (q))	N/A	N/A	N/A	
TOTAL CLAIMS (37 CFR 1.16(i))	minus 20 =	*	X \$ =	
INDEPENDENT CLAIMS (37 CFR 1.16(h))	minus 3 =	*	X \$ =	
☐ APPLICATION SIZE FEE (37 CFR 1.16(s))			If the specification and drawings exceed 100 sheets of paper, the application size fee due is \$310 (\$155 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).	
☐ MULTIPLE DEPENDENT CLAIM PRESENT (37 CFR 1.16(j))				
* If the difference in column 1 is less than zero, enter "0" in column 2.			TOTAL	

APPLICATION AS AMENDED – PART II

	(Column 1)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
AMENDMENT	09/25/2014	CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))	* 10	Minus	** 20	=	X \$ =
	Independent (37 CFR 1.16(h))	* 1	Minus	*** 3	=	X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
				TOTAL ADD'L FEE		

	(Column 1)	(Column 2)	(Column 3)	RATE (\$)	ADDITIONAL FEE (\$)	
AMENDMENT		CLAIMS REMAINING AFTER AMENDMENT	HIGHEST NUMBER PREVIOUSLY PAID FOR	PRESENT EXTRA		
	Total (37 CFR 1.16(i))	*	Minus	**	=	X \$ =
	Independent (37 CFR 1.16(h))	*	Minus	***	=	X \$ =
	☐ Application Size Fee (37 CFR 1.16(s))					
	☐ FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM (37 CFR 1.16(j))					
				TOTAL ADD'L FEE		

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.

** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20".

*** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3".

The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

LIE
/PEGGY YARBOROUGH/

This collection of information is required by 37 CFR 1.16. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, VA 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. **SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.**

If you need assistance in completing the form, call 1-800-PTO-9199 and select option 2.



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NUMBER	FILING OR 371(C) DATE	FIRST NAMED APPLICANT	ATTY. DOCKET NO./TITLE
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1

58027
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

CONFIRMATION NO. 3715
POA ACCEPTANCE LETTER



Date Mailed: 10/02/2014

NOTICE OF ACCEPTANCE OF POWER OF ATTORNEY

This is in response to the Power of Attorney filed 09/25/2014.

The Power of Attorney in this application is accepted. Correspondence in this application will be mailed to the above address as provided by 37 CFR 1.33.

/kgebremichael/

Office of Data Management, Application Assistance Unit (571) 272-4000, or (571) 272-4200, or 1-888-786-0101



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

NOTICE OF ALLOWANCE AND FEE(S) DUE

58027 7590 10/17/2014
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

EXAMINER

WILSON, ALLAN R

ART UNIT

PAPER NUMBER

2897

DATE MAILED: 10/17/2014

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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14/161,377

01/22/2014

Eun Jung SEO

P3962USC1C1

3715

TITLE OF INVENTION: SLIM LED PACKAGE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	01/20/2015

THE APPLICATION IDENTIFIED ABOVE HAS BEEN EXAMINED AND IS ALLOWED FOR ISSUANCE AS A PATENT. PROSECUTION ON THE MERITS IS CLOSED. THIS NOTICE OF ALLOWANCE IS NOT A GRANT OF PATENT RIGHTS. THIS APPLICATION IS SUBJECT TO WITHDRAWAL FROM ISSUE AT THE INITIATIVE OF THE OFFICE OR UPON PETITION BY THE APPLICANT. SEE 37 CFR 1.313 AND MPEP 1308.

THE ISSUE FEE AND PUBLICATION FEE (IF REQUIRED) MUST BE PAID WITHIN THREE MONTHS FROM THE MAILING DATE OF THIS NOTICE OR THIS APPLICATION SHALL BE REGARDED AS ABANDONED. THIS STATUTORY PERIOD CANNOT BE EXTENDED. SEE 35 U.S.C. 151. THE ISSUE FEE DUE INDICATED ABOVE DOES NOT REFLECT A CREDIT FOR ANY PREVIOUSLY PAID ISSUE FEE IN THIS APPLICATION. IF AN ISSUE FEE HAS PREVIOUSLY BEEN PAID IN THIS APPLICATION (AS SHOWN ABOVE), THE RETURN OF PART B OF THIS FORM WILL BE CONSIDERED A REQUEST TO REAPPLY THE PREVIOUSLY PAID ISSUE FEE TOWARD THE ISSUE FEE NOW DUE.

HOW TO REPLY TO THIS NOTICE:

I. Review the ENTITY STATUS shown above. If the ENTITY STATUS is shown as SMALL or MICRO, verify whether entitlement to that entity status still applies.

If the ENTITY STATUS is the same as shown above, pay the TOTAL FEE(S) DUE shown above.

If the ENTITY STATUS is changed from that shown above, on PART B - FEE(S) TRANSMITTAL, complete section number 5 titled "Change in Entity Status (from status indicated above)".

For purposes of this notice, small entity fees are 1/2 the amount of undiscounted fees, and micro entity fees are 1/2 the amount of small entity fees.

II. PART B - FEE(S) TRANSMITTAL, or its equivalent, must be completed and returned to the United States Patent and Trademark Office (USPTO) with your ISSUE FEE and PUBLICATION FEE (if required). If you are charging the fee(s) to your deposit account, section "4b" of Part B - Fee(s) Transmittal should be completed and an extra copy of the form should be submitted. If an equivalent of Part B is filed, a request to reapply a previously paid issue fee must be clearly made, and delays in processing may occur due to the difficulty in recognizing the paper as an equivalent of Part B.

III. All communications regarding this application must give the application number. Please direct all communications prior to issuance to Mail Stop ISSUE FEE unless advised to the contrary.

IMPORTANT REMINDER: Utility patents issuing on applications filed on or after Dec. 12, 1980 may require payment of maintenance fees. It is patentee's responsibility to ensure timely payment of maintenance fees when due.

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

58027 7590 10/17/2014
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1	3715

TITLE OF INVENTION: SLIM LED PACKAGE

APPLN. TYPE	ENTITY STATUS	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
nonprovisional	UNDISCOUNTED	\$960	\$0	\$0	\$960	01/20/2015

EXAMINER	ART UNIT	CLASS-SUBCLASS
WILSON, ALLAN R	2897	257-099000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363). ☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached. ☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. Use of a Customer Number is required.	2. For printing on the patent front page, list (1) The names of up to 3 registered patent attorneys or agents OR, alternatively, 1 _____ (2) The name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed. 2 _____ 3 _____
---	---

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE (B) RESIDENCE: (CITY and STATE OR COUNTRY)

Please check the appropriate assignee category or categories (will not be printed on the patent) : ☐ Individual ☐ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted: ☐ Issue Fee ☐ Publication Fee (No small entity discount permitted) ☐ Advance Order - # of Copies _____	4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above) ☐ A check is enclosed. ☐ Payment by credit card. Form PTO-2038 is attached. ☐ The Director is hereby authorized to charge the required fee(s), any deficiency, or credits any overpayment, to Deposit Account Number _____ (enclose an extra copy of this form).
---	---

5. Change in Entity Status (from status indicated above)

- ☐ Applicant certifying micro entity status. See 37 CFR 1.29
- ☐ Applicant asserting small entity status. See 37 CFR 1.27
- ☐ Applicant changing to regular undiscounted fee status.

NOTE: Absent a valid certification of Micro Entity Status (see forms PTO/SB/15A and 15B), issue fee payment in the micro entity amount will not be accepted at the risk of application abandonment.

NOTE: If the application was previously under micro entity status, checking this box will be taken to be a notification of loss of entitlement to micro entity status.

NOTE: Checking this box will be taken to be a notification of loss of entitlement to small or micro entity status, as applicable.

NOTE: This form must be signed in accordance with 37 CFR 1.31 and 1.33. See 37 CFR 1.4 for signature requirements and certifications.

Authorized Signature _____ Date _____

Typed or printed name _____ Registration No. _____



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/161,377	01/22/2014	Eun Jung SEO	P3962USC1C1	3715
58027 7590 10/17/2014 H.C. PARK & ASSOCIATES, PLC 1894 PRESTON WHITE DRIVE RESTON, VA 20191			EXAMINER WILSON, ALLAN R	
			ART UNIT	PAPER NUMBER
			2897	
DATE MAILED: 10/17/2014				

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (Applications filed on or after May 29, 2000)

The Office has discontinued providing a Patent Term Adjustment (PTA) calculation with the Notice of Allowance.

Section 1(h)(2) of the AIA Technical Corrections Act amended 35 U.S.C. 154(b)(3)(B)(i) to eliminate the requirement that the Office provide a patent term adjustment determination with the notice of allowance. See Revisions to Patent Term Adjustment, 78 Fed. Reg. 19416, 19417 (Apr. 1, 2013). Therefore, the Office is no longer providing an initial patent term adjustment determination with the notice of allowance. The Office will continue to provide a patent term adjustment determination with the Issue Notification Letter that is mailed to applicant approximately three weeks prior to the issue date of the patent, and will include the patent term adjustment on the patent. Any request for reconsideration of the patent term adjustment determination (or reinstatement of patent term adjustment) should follow the process outlined in 37 CFR 1.705.

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Customer Service Center of the Office of Patent Publication at 1-(888)-786-0101 or (571)-272-4200.

OMB Clearance and PRA Burden Statement for PTOL-85 Part B

The Paperwork Reduction Act (PRA) of 1995 requires Federal agencies to obtain Office of Management and Budget approval before requesting most types of information from the public. When OMB approves an agency request to collect information from the public, OMB (i) provides a valid OMB Control Number and expiration date for the agency to display on the instrument that will be used to collect the information and (ii) requires the agency to inform the public about the OMB Control Number's legal significance in accordance with 5 CFR 1320.5(b).

The information collected by PTOL-85 Part B is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450. Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

Privacy Act Statement

The Privacy Act of 1974 (P.L. 93-579) requires that you be given certain information in connection with your submission of the attached form related to a patent application or patent. Accordingly, pursuant to the requirements of the Act, please be advised that: (1) the general authority for the collection of this information is 35 U.S.C. 2(b)(2); (2) furnishing of the information solicited is voluntary; and (3) the principal purpose for which the information is used by the U.S. Patent and Trademark Office is to process and/or examine your submission related to a patent application or patent. If you do not furnish the requested information, the U.S. Patent and Trademark Office may not be able to process and/or examine your submission, which may result in termination of proceedings or abandonment of the application or expiration of the patent.

The information provided by you in this form will be subject to the following routine uses:

1. The information on this form will be treated confidentially to the extent allowed under the Freedom of Information Act (5 U.S.C. 552) and the Privacy Act (5 U.S.C. 552a). Records from this system of records may be disclosed to the Department of Justice to determine whether disclosure of these records is required by the Freedom of Information Act.
2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
5. A record related to an International Application filed under the Patent Cooperation Treaty in this system of records may be disclosed, as a routine use, to the International Bureau of the World Intellectual Property Organization, pursuant to the Patent Cooperation Treaty.
6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Notice of Allowability	Application No. 14/161,377	Applicant(s) SEO, EUN JUNG	
	Examiner ALLAN R. WILSON	Art Unit 2897	AIA (First Inventor to File) Status No

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address--

All claims being allowable, PROSECUTION ON THE MERITS IS (OR REMAINS) CLOSED in this application. If not included herewith (or previously mailed), a Notice of Allowance (PTOL-85) or other appropriate communication will be mailed in due course. **THIS NOTICE OF ALLOWABILITY IS NOT A GRANT OF PATENT RIGHTS.** This application is subject to withdrawal from issue at the initiative of the Office or upon petition by the applicant. See 37 CFR 1.313 and MPEP 1308.

1. ☒ This communication is responsive to the amendment filed on September 25, 2014.
☐ A declaration(s)/affidavit(s) under **37 CFR 1.130(b)** was/were filed on _____.
2. ☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.
3. ☒ The allowed claim(s) is/are 1-10. As a result of the allowed claim(s), you may be eligible to benefit from the **Patent Prosecution Highway** program at a participating intellectual property office for the corresponding application. For more information, please see http://www.uspto.gov/patents/init_events/pph/index.jsp or send an inquiry to PPHfeedback@uspto.gov.
4. ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

Certified copies:

- a) ☒ All b) ☐ Some *c) ☐ None of the:
 1. ☒ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this national stage application from the International Bureau (PCT Rule 17.2(a)).

* Certified copies not received: _____.

Applicant has THREE MONTHS FROM THE "MAILING DATE" of this communication to file a reply complying with the requirements noted below. Failure to timely comply will result in ABANDONMENT of this application.

THIS THREE-MONTH PERIOD IS NOT EXTENDABLE.

5. ☐ CORRECTED DRAWINGS (as "replacement sheets") must be submitted.
☐ including changes required by the attached Examiner's Amendment / Comment or in the Office action of Paper No./Mail Date _____.
Identifying indicia such as the application number (see 37 CFR 1.84(c)) should be written on the drawings in the front (not the back) of each sheet. Replacement sheet(s) should be labeled as such in the header according to 37 CFR 1.121(d).
6. ☐ DEPOSIT OF and/or INFORMATION about the deposit of BIOLOGICAL MATERIAL must be submitted. Note the attached Examiner's comment regarding REQUIREMENT FOR THE DEPOSIT OF BIOLOGICAL MATERIAL.

Attachment(s)

- | | |
|--|--|
| 1. ☐ Notice of References Cited (PTO-892) | 5. ☒ Examiner's Amendment/Comment |
| 2. ☐ Information Disclosure Statements (PTO/SB/08),
Paper No./Mail Date _____ | 6. ☒ Examiner's Statement of Reasons for Allowance |
| 3. ☐ Examiner's Comment Regarding Requirement for Deposit
of Biological Material | 7. ☐ Other _____. |
| 4. ☐ Interview Summary (PTO-413),
Paper No./Mail Date _____. | |

/ALLAN R WILSON/
Primary Examiner, Art Unit 2897

DETAILED ACTION

Notice of Pre-AIA or AIA Status

The present application is being examined under the pre-AIA first to invent provisions.

Examiner's Amendment

An examiner's amendment to the record appears below. Should the changes and/or additions be unacceptable to applicant, an amendment may be filed as provided by 37 CFR 1.312. To ensure consideration of such an amendment, it MUST be submitted no later than the payment of the issue fee.

Authorization for the substance of this examiner's amendment was given in a telephone interview with William Brooks on 10/10/2014.

The application has been amended as follows:

1. (Currently Amended) A light emitting diode (LED) package, comprising:
a first lead frame and a second lead frame separated from each other;
an LED chip disposed on the first lead frame and electrically connected to the first lead frame and the second lead frame; and
a wire connecting the LED chip to the second lead frame,
wherein opposing sides of the first lead frame and the second lead frame face each other in a slanted state to the other sides of the lead frames.

Reasons for Allowance

The following is an examiner's statement of reasons for allowance:

The prior art discloses most of the limitations of the claims, but fails to show at least: Opposing sides of the first lead frame and the second lead frame face each other in a slanted state to the other sides of the lead frames.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

Conclusion

Any inquiry concerning this communication or earlier communications from an examiner should be directed to Primary Examiner Allan Wilson by telephone number 571-272-1738, fax number 571-273-1738 or email allan.wilson@uspto.gov (not secure). Examiner Wilson can normally be reached 7:30-4:30 Monday-Thursday.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fernando Toledo can be reached on 571-272-1867. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Art Unit: 2897

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Allan R. Wilson/

Primary Examiner, Art Unit 2897

Search Notes 	Application/Control No. 14161377	Applicant(s)/Patent Under Reexamination SEO, EUN JUNG
	Examiner ALLAN R WILSON	Art Unit 2897

CPC- SEARCHED		
Symbol	Date	Examiner
H01L23/49537, 49541	10/13/14	ARW
H01L33/486, 62	10/13/14	ARW

CPC COMBINATION SETS - SEARCHED		
Symbol	Date	Examiner

US CLASSIFICATION SEARCHED			
Class	Subclass	Date	Examiner
257	98-100, E33.059, E33.061, E33.066	10/13/14	ARW
438	26	10/13/14	ARW

SEARCH NOTES		
Search Notes	Date	Examiner
Updated search	10/13/14	ARW

INTERFERENCE SEARCH			
US Class/ CPC Symbol	US Subclass / CPC Group	Date	Examiner
H01L23	49537, 49541	10/13/14	ARW
H01L33	486, 62	10/13/14	ARW
257	98-100, E33.059, E33.061, E33.066	10/13/14	ARW
438	26	10/13/14	ARW

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Issue Classification 	Application/Control No. 14161377	Applicant(s)/Patent Under Reexamination SEO, EUN JUNG	
	Examiner ALLAN R WILSON	Art Unit 2897	

CPC						
Symbol					Type	Version
H01L		33	/	486	F	2013-01-01
H01L		23	/	49537	I	2013-01-01
H01L		23	/	49541	I	2013-01-01
H01L		33	/	54	A	2013-01-01
H01L		33	/	62	I	2013-01-01
H01L		2224	/	48247	A	2013-01-01
H01L		2224	/	48091	A	2013-01-01
H01L		2224	/	8592	A	2013-01-01
			/			
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CPC Combination Sets								
Symbol					Type	Set	Ranking	Version
H01L		2224	/	48091	A	1	1	2013-01-01
H01L		2924	/	00014	A	1	2	2013-01-01

NONE		Total Claims Allowed:	
		10	
(Assistant Examiner)	(Date)		
/ALLAN R WILSON/ Primary Examiner.Art Unit 2897	10/13/14	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

Issue Classification 	Application/Control No. 14161377	Applicant(s)/Patent Under Reexamination SEO, EUN JUNG
	Examiner ALLAN R WILSON	Art Unit 2897

US ORIGINAL CLASSIFICATION						INTERNATIONAL CLASSIFICATION									
CLASS		SUBCLASS				CLAIMED					NON-CLAIMED				
257		99				H	0	1	L	33 / 38 (2010.01.01)					
CROSS REFERENCE(S)															
CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)														
257	E33.066														
438	26														

NONE		Total Claims Allowed:	
		10	
(Assistant Examiner)	(Date)		
/ALLAN R WILSON/ Primary Examiner.Art Unit 2897	10/13/14	O.G. Print Claim(s)	O.G. Print Figure
(Primary Examiner)	(Date)	1	6

PART B - FEE(S) TRANSMITTAL

Complete and send this form, together with applicable fee(s), to: **Mail** **Mail Stop ISSUE FEE**
Commissioner for Patents
P.O. Box 1450
Alexandria, Virginia 22313-1450
or Fax (571)-273-2885

INSTRUCTIONS: This form should be used for transmitting the ISSUE FEE and PUBLICATION FEE (if required). Blocks 1 through 5 should be completed where appropriate. All further correspondence including the Patent, advance orders and notification of maintenance fees will be mailed to the current correspondence address as indicated unless corrected below or directed otherwise in Block 1, by (a) specifying a new correspondence address; and/or (b) indicating a separate "FEE ADDRESS" for maintenance fee notifications.

CURRENT CORRESPONDENCE ADDRESS (Note: Use Block 1 for any change of address)

H.C. Park & Associates, PLC
 1894 Preston White Drive
 Reston, VA 20191

Note: A certificate of mailing can only be used for domestic mailings of the Fee(s) Transmittal. This certificate cannot be used for any other accompanying papers. Each additional paper, such as an assignment or formal drawing, must have its own certificate of mailing or transmission.

Certificate of Mailing or Transmission

I hereby certify that this Fee(s) Transmittal is being deposited with the United States Postal Service with sufficient postage for first class mail in an envelope addressed to the Mail Stop ISSUE FEE address above, or being facsimile transmitted to the USPTO (571) 273-2885, on the date indicated below.

(Depositor's name)
(Signature)
(Date)

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
-----------------	-------------	----------------------	---------------------	------------------

14/161,377

2014-01-22

Eun Jung SEO

P3962USC1C1

3715

TITLE OF INVENTION:
 SLIM LED PACKAGE

APPLN. TYPE	SMALL ENTITY	ISSUE FEE DUE	PUBLICATION FEE DUE	PREV. PAID ISSUE FEE	TOTAL FEE(S) DUE	DATE DUE
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NONPROVISIONAL

UNDISCOUNTED

\$960

\$0

\$0

\$960

2015-01-20

EXAMINER	ART UNIT	CLASS-SUBCLASS
WILSON, ALLAN R	2897	257-099000

1. Change of correspondence address or indication of "Fee Address" (37 CFR 1.363).

☐ Change of correspondence address (or Change of Correspondence Address form PTO/SB/122) attached.

☐ "Fee Address" indication (or "Fee Address" Indication form PTO/SB/47; Rev 03-02 or more recent) attached. **Use of a Customer Number is required.**

2. For printing on the patent front page, list

(1) the names of up to 3 registered patent attorneys or agents OR, alternatively,

1 H.C. Park & Associates, PLC

(2) the name of a single firm (having as a member a registered attorney or agent) and the names of up to 2 registered patent attorneys or agents. If no name is listed, no name will be printed.

2

3

3. ASSIGNEE NAME AND RESIDENCE DATA TO BE PRINTED ON THE PATENT (print or type)

PLEASE NOTE: Unless an assignee is identified below, no assignee data will appear on the patent. If an assignee is identified below, the document has been filed for recordation as set forth in 37 CFR 3.11. Completion of this form is NOT a substitute for filing an assignment.

(A) NAME OF ASSIGNEE

(B) RESIDENCE: (CITY and STATE OR COUNTRY)

Seoul Semiconductor Co., Ltd.

Ansan-si, Republic of Korea

Please check the appropriate assignee category or categories (will not be printed on the patent): ☐ Individual ☒ Corporation or other private group entity ☐ Government

4a. The following fee(s) are submitted:

☒ Issue Fee

☐ Publication Fee (No small entity discount permitted)

☐ Advance Order - # of Copies _____

4b. Payment of Fee(s): (Please first reapply any previously paid issue fee shown above)

☐ A check is enclosed.

☒ Payment by credit card. Form PTO-2038 is attached.

☒ The Director is hereby authorized to charge the required fee(s), any deficiency, or credit any overpayment, to Deposit Account Number 50-3698 (enclose an extra copy of this form).

5. Change in Entity Status (from status indicated above)

☐ a. Applicant claims SMALL ENTITY status. See 37 CFR 1.27.

☐ b. Applicant is no longer claiming SMALL ENTITY status. See 37 CFR 1.27(g)(2).

NOTE: The Issue Fee and Publication Fee (if required) will not be accepted from anyone other than the applicant; a registered attorney or agent; or the assignee or other party in interest as shown by the records of the United States Patent and Trademark Office.

Authorized Signature /William L. Brooks/

Date 2015-01-15

Typed or printed name William L. Brooks

Registration No. 34,129

This collection of information is required by 37 CFR 1.311. The information is required to obtain or retain a benefit by the public which is to file (and by the USPTO to process) an application. Confidentiality is governed by 35 U.S.C. 122 and 37 CFR 1.14. This collection is estimated to take 12 minutes to complete, including gathering, preparing, and submitting the completed application form to the USPTO. Time will vary depending upon the individual case. Any comments on the amount of time you require to complete this form and/or suggestions for reducing this burden, should be sent to the Chief Information Officer, U.S. Patent and Trademark Office, U.S. Department of Commerce, P.O. Box 1450, Alexandria, Virginia 22313-1450. DO NOT SEND FEES OR COMPLETED FORMS TO THIS ADDRESS. SEND TO: Commissioner for Patents, P.O. Box 1450, Alexandria, Virginia 22313-1450.

Under the Paperwork Reduction Act of 1995, no persons are required to respond to a collection of information unless it displays a valid OMB control number.

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2. A record from this system of records may be disclosed, as a routine use, in the course of presenting evidence to a court, magistrate, or administrative tribunal, including disclosures to opposing counsel in the course of settlement negotiations.
3. A record in this system of records may be disclosed, as a routine use, to a Member of Congress submitting a request involving an individual, to whom the record pertains, when the individual has requested assistance from the Member with respect to the subject matter of the record.
4. A record in this system of records may be disclosed, as a routine use, to a contractor of the Agency having need for the information in order to perform a contract. Recipients of information shall be required to comply with the requirements of the Privacy Act of 1974, as amended, pursuant to 5 U.S.C. 552a(m).
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6. A record in this system of records may be disclosed, as a routine use, to another federal agency for purposes of National Security review (35 U.S.C. 181) and for review pursuant to the Atomic Energy Act (42 U.S.C. 218(c)).
7. A record from this system of records may be disclosed, as a routine use, to the Administrator, General Services, or his/her designee, during an inspection of records conducted by GSA as part of that agency's responsibility to recommend improvements in records management practices and programs, under authority of 44 U.S.C. 2904 and 2906. Such disclosure shall be made in accordance with the GSA regulations governing inspection of records for this purpose, and any other relevant (i.e., GSA or Commerce) directive. Such disclosure shall not be used to make determinations about individuals.
8. A record from this system of records may be disclosed, as a routine use, to the public after either publication of the application pursuant to 35 U.S.C. 122(b) or issuance of a patent pursuant to 35 U.S.C. 151. Further, a record may be disclosed, subject to the limitations of 37 CFR 1.14, as a routine use, to the public if the record was filed in an application which became abandoned or in which the proceedings were terminated and which application is referenced by either a published application, an application open to public inspection or an issued patent.
9. A record from this system of records may be disclosed, as a routine use, to a Federal, State, or local law enforcement agency, if the USPTO becomes aware of a violation or potential violation of law or regulation.

Electronic Patent Application Fee Transmittal

Application Number:	14161377			
Filing Date:	22-Jan-2014			
Title of Invention:	SLIM LED PACKAGE			
First Named Inventor/Applicant Name:	Eun Jung SEO			
Filer:	Hae-Chan Park/Patti Young			
Attorney Docket Number:	P3962USC1C1			
Filed as Large Entity				
Filing Fees for Utility under 35 USC 111(a)				
Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Basic Filing:				
Pages:				
Claims:				
Miscellaneous-Filing:				
Petition:				
Patent-Appeals-and-Interference:				
Post-Allowance-and-Post-Issuance:				
Utility Appl Issue Fee	1501	1	960	960

Description	Fee Code	Quantity	Amount	Sub-Total in USD(\$)
Extension-of-Time:				
Miscellaneous:				
Total in USD (\$)				960

Electronic Acknowledgement Receipt

EFS ID:	21222558
Application Number:	14161377
International Application Number:	
Confirmation Number:	3715
Title of Invention:	SLIM LED PACKAGE
First Named Inventor/Applicant Name:	Eun Jung SEO
Customer Number:	58027
Filer:	Hae-Chan Park/william brooks
Filer Authorized By:	Hae-Chan Park
Attorney Docket Number:	P3962USC1C1
Receipt Date:	15-JAN-2015
Filing Date:	22-JAN-2014
Time Stamp:	17:09:12
Application Type:	Utility under 35 USC 111(a)

Payment information:

Submitted with Payment	yes
Payment Type	Credit Card
Payment was successfully received in RAM	\$960
RAM confirmation Number	3848
Deposit Account	
Authorized User	

The Director of the USPTO is hereby authorized to charge indicated fees and credit any overpayment as follows:

File Listing:					
Document Number	Document Description	File Name	File Size(Bytes)/ Message Digest	Multi Part /.zip	Pages (if appl.)
1	Issue Fee Payment (PTO-85B)	P3962USC1C1_IssueFee.pdf	54690	no	2
			9d2d4666693e88173dd84a28cfdbe4eb775cfbbe		
Warnings:					
Information:					
2	Fee Worksheet (SB06)	fee-info.pdf	30164	no	2
			05b57a1e3b699f8818361e300ca44be5a657ba98		
Warnings:					
Information:					
Total Files Size (in bytes):			84854		
This Acknowledgement Receipt evidences receipt on the noted date by the USPTO of the indicated documents, characterized by the applicant, and including page counts, where applicable. It serves as evidence of receipt similar to a Post Card, as described in MPEP 503. <u>New Applications Under 35 U.S.C. 111</u> If a new application is being filed and the application includes the necessary components for a filing date (see 37 CFR 1.53(b)-(d) and MPEP 506), a Filing Receipt (37 CFR 1.54) will be issued in due course and the date shown on this Acknowledgement Receipt will establish the filing date of the application. <u>National Stage of an International Application under 35 U.S.C. 371</u> If a timely submission to enter the national stage of an international application is compliant with the conditions of 35 U.S.C. 371 and other applicable requirements a Form PCT/DO/EO/903 indicating acceptance of the application as a national stage submission under 35 U.S.C. 371 will be issued in addition to the Filing Receipt, in due course. <u>New International Application Filed with the USPTO as a Receiving Office</u> If a new international application is being filed and the international application includes the necessary components for an international filing date (see PCT Article 11 and MPEP 1810), a Notification of the International Application Number and of the International Filing Date (Form PCT/RO/105) will be issued in due course, subject to prescriptions concerning national security, and the date shown on this Acknowledgement Receipt will establish the international filing date of the application.					



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	ISSUE DATE	PATENT NO.	ATTORNEY DOCKET NO.	CONFIRMATION NO.
14/161,377	02/24/2015	8963196	P3962USC1C1	3715

58027 7590 02/04/2015
H.C. PARK & ASSOCIATES, PLC
1894 PRESTON WHITE DRIVE
RESTON, VA 20191

ISSUE NOTIFICATION

The projected patent number and issue date are specified above.

Determination of Patent Term Adjustment under 35 U.S.C. 154 (b) (application filed on or after May 29, 2000)

The Patent Term Adjustment is 0 day(s). Any patent to issue from the above-identified application will include an indication of the adjustment on the front page.

If a Continued Prosecution Application (CPA) was filed in the above-identified application, the filing date that determines Patent Term Adjustment is the filing date of the most recent CPA.

Applicant will be able to obtain more detailed information by accessing the Patent Application Information Retrieval (PAIR) WEB site (<http://pair.uspto.gov>).

Any questions regarding the Patent Term Extension or Adjustment determination should be directed to the Office of Patent Legal Administration at (571)-272-7702. Questions relating to issue and publication fee payments should be directed to the Application Assistance Unit (AAU) of the Office of Data Management (ODM) at (571)-272-4200.

APPLICANT(s) (Please see PAIR WEB site <http://pair.uspto.gov> for additional applicants):

Seoul Semiconductor Co., Ltd., Ansan-si, KOREA, REPUBLIC OF, Assignee (with 37 CFR 1.172 Interest);
Eun Jung SEO, Ansan-si, KOREA, REPUBLIC OF;

The United States represents the largest, most dynamic marketplace in the world and is an unparalleled location for business investment, innovation, and commercialization of new technologies. The USA offers tremendous resources and advantages for those who invest and manufacture goods here. Through SelectUSA, our nation works to encourage and facilitate business investment. To learn more about why the USA is the best country in the world to develop technology, manufacture products, and grow your business, visit SelectUSA.gov.

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT7890225

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
Name		Execution Date
SEOUL SEMICONDUCTOR CO., LTD.		12/23/2022
RECEIVING PARTY DATA		
Name:	SMART HANDOVER LLC	
Street Address:	8140 WALNUT HILL LANE	
Internal Address:	SUITE 610	
City:	DALLAS	
State/Country:	TEXAS	
Postal Code:	75231	
PROPERTY NUMBERS Total: 5		
Property Type	Number	
Patent Number:	8319246	
Patent Number:	8319248	
Patent Number:	9350942	
Patent Number:	8963196	
Patent Number:	9899573	
CORRESPONDENCE DATA		
Fax Number:		
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Email:	jason@ipval.com	
Correspondent Name:	JASON BOURGEOIS	
Address Line 1:	4940 BROADWAY STREET	
Address Line 2:	SUITE 130	
Address Line 4:	SAN ANTONIO, TEXAS 78209	
NAME OF SUBMITTER:	JASON BOURGEOIS	
SIGNATURE:	/Jason Bourgeois/	
DATE SIGNED:	04/07/2023	
This document serves as an Oath/Declaration (37 CFR 1.63).		
Total Attachments: 3		

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PATENT ASSIGNMENT AGREEMENT

THIS PATENT ASSIGNMENT AGREEMENT (the "Agreement"), is made and entered into this 23 day of December, 2022 (the "Effective Date"), by and between Seoul Semiconductor Co., Ltd. ("Assignor") and Smart Handover, LLC ("Assignee") (each a "Party" and collectively the "Parties")

WHEREAS, Assignor is the owner of all rights, title and interest in and to the patents appearing below, and including without limitation, all extensions, continuations, and provisionals thereof (the "Patents").

U.S. Patent No. 8,319,246
U.S. Patent No. 8,319,248
U.S. Patent No. 9,530,942
U.S. Patent No. 8,963,196
U.S. Patent No. 9,899,573

WHEREAS, Assignor and Assignee have agreed on a Patent Purchase Agreement (the "Purchase Agreement") dated December 23, 2022, by and between Assignor and Assignee, the terms of which are incorporated herein by reference, that Assignor shall sell, transfer, assign and set over unto Assignee and Assignee shall accept all rights, title and interest in and to the Patents as specified in this Agreement;

NOW, THEREFORE, in consideration of the mutual covenants and agreements of the Parties and pursuant to the Purchase Agreement, and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, it is hereby agreed as follows:

1. Assignor hereby sells, transfers, assigns and sets over to Assignee all rights, title and interest (for all countries) in and to the Patents, and all the rights and privileges under any letters patent that may be granted under any extensions, continuations, and provisionals thereof; and all applications for industrial property protection, including without limitation, all applications for patents, utility models, copyright, and designs which may hereafter be filed for said Invention and Patents in any country or countries, together with the right to file such applications and the right to claim for the same the priority rights derived from the Patents under the patent laws of the United States, the International Convention for the Protection of Industrial Property, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable; and all applications for industrial property protection, including, without limitation, all applications for patents, utility models, copyrights and designs which may hereafter be filed for said Invention or Patent in any country or countries, together with the right

to file such applications; and all forms of industrial property protection, including, without limitation, patents, utility models, inventors' certificates, copyrights and designs which may be granted for said Patents in any country or countries and all extensions, renewals and reissues thereof, including all moral rights and all rights relating to the past, present and future including the benefit of any attorney client privilege or attorney work product privilege, all income, royalties, damages, rights to enforce, rights to sue, and any and all payments now or hereafter due or payable with respect thereto, and the right to bring any claim, sue, counterclaim, and recover for the past, present and future infringement, the right to sue for and recover all profits and damages by reason of past infringement by any party or parties for Assignee's and Assignee's successors' and assigns' own use and benefit. All rights to royalty income, including past, present, and future royalties, are also hereby conveyed by this instrument.

2. Assignor appoints Assignee, and Assignee's successors and assigns, as its attorney-in-fact to act in Assignor's name and to execute, deliver, and record any document or instrument of assignment or conveyance necessary to perfect, grant, and confirm the rights granted herein. Assignor hereby authorizes and requests the Commissioner of Patents and Trademarks of the United States and any official of any country or countries foreign to the United States, whose duty is to issue patents or other evidence or forms of industrial property on applications as aforesaid, to issue the same to Assignee, its successors, assigns and legal representatives, or to such nominees as it may designate.

3. Assignor agrees that, whenever reasonably requested by Assignee and at Assignee's expense, Assignor will execute all papers, take all rightful oaths, and do all acts which may be reasonably necessary for securing and maintaining patents for the Invention in any country and for vesting title thereto in Assignee, its successors, assigns and legal representatives or nominees.

4. Assignor authorizes and empowers Assignee, its successors, assigns and legal representatives or nominees, to invoke and claim for any application for patent or other form of protection for the Invention, the benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it, or any other international agreement or the domestic laws of the country in which any such application is filed, as may be applicable, and to invoke and claim such right of priority without further written or oral authorization from Assignor.

5. Assignor hereby consents that a copy of this Agreement shall be deemed a full legal and formal equivalent of any assignment, consent to file or like document that may be required in any country for any purpose and more particularly in proof of the right of Assignee or nominee to claim the aforesaid benefit of the right of priority provided by the International Convention for the Protection of Industrial Property, as amended, or by any convention which may henceforth be substituted for it.

6. All of the rights, title and interest in and to the Patents sold, transferred, assigned and set over to Assignee hereunder include all income, royalties, damages, and payments now or hereafter due or payable with respect thereto, and all causes of action (whether in law or equity) and the

right to sue, counterclaim, and recover for the past, present and future infringement of the rights assigned or to be assigned hereunder.

Seoul Semiconductor Co., Ltd.

By:  _____

Name: WooHyung Yi

Title: Patent Team Director

Date: 12/23/2022

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1
 Stylesheet Version v1.2

EPAS ID: PAT7890237

SUBMISSION TYPE:	NEW ASSIGNMENT	
NATURE OF CONVEYANCE:	ASSIGNMENT	
CONVEYING PARTY DATA		
	Name	Execution Date
	SMART HANDOVER LLC	12/25/2022
RECEIVING PARTY DATA		
Name:	SEMILED INNOVATIONS LLC	
Street Address:	6841 VIRGINIA PARKWAY	
Internal Address:	STE 103-441	
City:	MCKINNEY	
State/Country:	TEXAS	
Postal Code:	75071	
PROPERTY NUMBERS Total: 6		
Property Type	Number	
Patent Number:	8309971	
Patent Number:	8319246	
Patent Number:	8319248	
Patent Number:	9530942	
Patent Number:	8963196	
Patent Number:	9899573	
CORRESPONDENCE DATA		
Fax Number:		
<i>Correspondence will be sent to the e-mail address first; if that is unsuccessful, it will be sent using a fax number, if provided; if that is unsuccessful, it will be sent via US Mail.</i>		
Email:	jason@ipval.com	
Correspondent Name:	JASON BOURGEOIS	
Address Line 1:	4940 BROADWAY STREET	
Address Line 2:	SUITE 130	
Address Line 4:	SAN ANTONIO, TEXAS 78209	
NAME OF SUBMITTER:	JASON BOURGEOIS	
SIGNATURE:	/Jason Bourgeois/	
DATE SIGNED:	04/07/2023	
	This document serves as an Oath/Declaration (37 CFR 1.63).	

Total Attachments: 2

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ASSIGNMENT OF PATENT RIGHTS

For good and valuable consideration, the receipt of which is hereby acknowledged, **Smart Handover, LLC**, a limited liability company duly organized and validly existing under the laws of the Texas, having an office at 8140 Walnut Hill Lane, Suite 500, Dallas, TX 75231; ("**Assignor**"), do hereby sell, assign, transfer, and convey unto **SemiLED LLC**, a limited liability company duly organized and validly existing under the laws of the Texas, having an office at 6841 Virginia Parkway, Suite 103-441, McKinney, TX 75071 ("**Assignee**"), or its designees, all right, title, and interest that exist today and may exist in the future in and to all of the following (collectively, the "**Assigned Patent Rights**");

(a) the invention disclosures, provisional patent applications, patent applications and patents, which are listed in the next page (the "**Patents**");

(b) causes of action (whether currently pending, filed, or otherwise) and other enforcement rights under, or on account of, any of the Patents, including, without limitation, all causes of action and other enforcement rights for (i) damages, (ii)injunctive relief, and (iii) other remedies of any kind for past, current, and future infringement; and

(c) all rights to collect royalties and other payments under or on account of any of the Patents and/or any item in the foregoing categories (b).

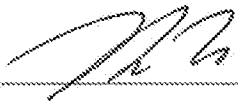
The terms and conditions of this Assignment of Assigned Patent Rights will inure to the benefit of Assignee, its successors, assigns, and other legal representatives and will be binding upon Assignors, its successors, assigns, and other legal representatives.

IN WITNESS WHEREOF the parties hereto have caused this Agreement to be executed by their duly authorized officers or representatives.

Date: December 25, 2022

Assignor

Smart Handover, LLC

By: 

Name: Hao Ni

Title: Manager

Patents

Document No.	Title
US8309971B2	Light emitting diode having electrode pads.
US8319246B2	Semiconductor device and method for manufacturing same
US8319248B2	Slim LED package
US9530942B2	Slim LED package
US8963196B2	Slim LED package
US9899573B2	Slim LED package

AO 120 (Rev. 08/10)

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been
 filed in the U.S. District Court Eastern District Of Texas on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.):

DOCKET NO. 4:23-cv-437	DATE FILED 5/15/2023	U.S. DISTRICT COURT Eastern District Of Texas
PLAINTIFF SemiLED Innovations LLC		DEFENDANT W.W. Grainger, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,963,196	2/24/2015	SemiLED Innovations LLC
2 9,530,942	12/27/2016	SemiLED Innovations LLC
3 8,309,971	11/13/2012	SemiLED Innovations LLC
4 7,128,454	10/31/2006	SemiLED Innovations LLC
5		

In the above—entitled case, the following patent(s)/ trademark(s) have been included:

DATE INCLUDED	INCLUDED BY ☐ Amendment ☐ Answer ☐ Cross Bill ☐ Other Pleading	
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
 Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy

TO: Mail Stop 8 Director of the U.S. Patent and Trademark Office P.O. Box 1450 Alexandria, VA 22313-1450	REPORT ON THE FILING OR DETERMINATION OF AN ACTION REGARDING A PATENT OR TRADEMARK
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In Compliance with 35 U.S.C. § 290 and/or 15 U.S.C. § 1116 you are hereby advised that a court action has been filed in the U.S. District Court THE SOUTHERN DISTRICT OF OHIO on the following

☐ Trademarks or ☒ Patents. (☐ the patent action involves 35 U.S.C. § 292.);

DOCKET NO.	DATE FILED	U.S. DISTRICT COURT THE SOUTHERN DISTRICT OF OHIO
PLAINTIFF SemiLED Innovations LLC		DEFENDANT LSI Industries, Inc.
PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1 8,963,196	2/24/2015	SemiLED Innovations LLC
2 9,530,942	12/27/2016	SemiLED Innovations LLC
3 8,309,971	11/13/2012	SemiLED Innovations LLC
4 7,128,454	10/31/2006	SemiLED Innovations LLC
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PATENT OR TRADEMARK NO.	DATE OF PATENT OR TRADEMARK	HOLDER OF PATENT OR TRADEMARK
1		
2		
3		
4		
5		

In the above—entitled case, the following decision has been rendered or judgement issued:

DECISION/JUDGEMENT

CLERK	(BY) DEPUTY CLERK	DATE
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Copy 1—Upon initiation of action, mail this copy to Director Copy 3—Upon termination of action, mail this copy to Director
Copy 2—Upon filing document adding patent(s), mail this copy to Director Copy 4—Case file copy