

PATENT ASSIGNMENT COVER SHEET

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EPAS ID: PAT4781142

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| SUBMISSION TYPE: | NEW ASSIGNMENT |
| NATURE OF CONVEYANCE: | ASSIGNMENT |
| CONVEYING PARTY DATA | |
| Name | Execution Date |
| ADVANCED PHOTONIX, INC. | 08/09/2017 |
| PICOMETRIX, LLC | 08/09/2017 |
| RECEIVING PARTY DATA | |
| Name: | MACOM TECHNOLOGY SOLUTIONS HOLDINGS, INC. |
| Street Address: | 100 CHELMSFORD STREET |
| City: | LOWELL |
| State/Country: | MASSACHUSETTS |
| Postal Code: | 01851 |
| PROPERTY NUMBERS Total: 1 | |
| Property Type | Number |
| Application Number: | 10538248 |
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| NAME OF SUBMITTER: | JOHN A. LINGL |
| SIGNATURE: | /John A. Lingl/ |
| DATE SIGNED: | 01/18/2018 |
| Total Attachments: 10 | |
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PATENT ASSIGNMENT

This PATENTASSIGNMENT (the "Assignment") is made as of August 9, 2017 by Advance Photonix, Inc., a Delaware corporation, Picometrix, LLC, a Delaware limited liability company (collectively, the "Assignors") and MACOM Technology Solutions Holdings, Inc., a Delaware corporation ("Assignee").

WHEREAS, pursuant to, and subject to the terms and conditions of the Asset Purchase Agreement (the "Asset Purchase Agreement"), dated as of August 9, 2017, by and among the Assignors, Assignee and, solely with respect to Section 8.14, Luna Innovations Incorporated, a Delaware corporation, the Assignors and Assignee are to enter into this Assignment;

WHEREAS, the Assignors own the patent applications and patents as set forth on Schedule I as well as all patents and patent applications (such as divisional applications, continuation applications, national applications derived from regional applications) generated from any of the applications listed herein (collectively, the "Assigned Patents"); and

WHEREAS, Assignee desires to purchase and acquire all of the Assignors' right, title and interest in and to the Assigned Patents;

NOW, THEREFORE, subject to the terms and conditions of the Asset Purchase Agreement and in consideration thereof, the receipt of which is hereby acknowledged, the parties hereto, intending to be legally bound, agree as follows:

1. The Assignors hereby sell, convey, assign and transfer to Assignee, and Assignee hereby accepts, all right, title and interest in and to the Assigned Patents, including all corresponding applications such as continuation, continuations-in-part, divisionals, provisionals, reissues, reexaminations thereof and the subject matter of any and all claims which may be obtained in every such patent, as well as all corresponding foreign patents, foreign patent applications, free and clear of all Encumbrances; all rights to apply for registration in all countries with full benefit of such priority as may now or hereafter be granted to it by law, treaty or other international convention; and all rights, interests, claims and demands recoverable in law or equity, that the Assignors have or may have in profits and damages for past, present and future infringements of the Assigned Patents, including, without limitation, the right to compromise, sue for and collect such profits and damages; all of the foregoing to be held and enjoyed by Assignee, its successors and assigns or their legal representatives, as fully and entirely as the same would have been held and enjoyed by the Assignors if this Assignment had not been made.

2. From and after the Closing Date, the Assignors shall, without further consideration, execute and deliver such instruments of transfer, conveyance, assignment and assumption, in addition to the Ancillary Agreements, and take such other action as may be necessary to consummate the transactions contemplated by the Asset Purchase Agreement or to give effect to the transactions contemplated by the Ancillary Agreements.

3. Nothing in this Assignment, express or implied, is intended to or shall be construed to modify, expand, supersede or limit in any way the terms, conditions or obligations of the Asset Purchase Agreement. To the extent any provision of this Assignment conflicts with

or is inconsistent with the terms of the Asset Purchase Agreement, the Asset Purchase Agreement shall control and govern.

4. Capitalized terms used herein without definition shall have the meanings set forth in the Asset Purchase Agreement.

5. This Assignment shall be governed by, and construed in accordance with, the laws of the United States, in respect to patent issues and in all other respects including as to validity (except for patent validity issues), interpretation and effect by the laws of the State of Delaware without giving effect to the conflict of laws rules thereof.

6. This Assignment may be executed electronically or otherwise (where permitted in an applicable jurisdiction) in any number of identical counterparts each of which when so executed shall be deemed to be an original and all of which taken together shall constitute one and the same agreement.

[Signature Page Follows]

IN WITNESS WHEREOF, Assignors and Assignee have caused this Assignment to be duly executed as of the date first written above.

Assignors

ADVANCED PHOTONIX, INC.

By: 

Name: Dale Messick

Title: Chief Executive Officer

PICOMETRIX, LLC

By: 

Name: Dale Messick

Title: Authorized Person

Assignee

MACOM TECHNOLOGY SOLUTIONS HOLDINGS, INC.

By: _____

Name:

Title:

[Signature Page to Patent Assignment]

IN WITNESS WHEREOF, Assignors and Assignee have caused this Assignment to be duly executed as of the date first written above.

Assignors

ADVANCED PHOTONIX, INC.

By: _____

Name:

Title:

PICOMETRIX, LLC

By: _____

Name:

Title:

Assignee

MACOM TECHNOLOGY SOLUTIONS HOLDINGS, INC.

By: 

Name: John Croteau

Title: President and Chief Executive Officer

[Signature Page to Patent Assignment]

PATENT
REEL: 044649 FRAME: 0359

SCHEDULE I

This Schedule includes and incorporates all patents and applications set forth on the Attachment to this Schedule I, as well as all patents and patent applications (such as divisional applications, continuation applications, national applications derived from regional applications) generated from any of the applications listed herein even if not explicitly listed on the Attachment.

1. Patents

| Country | Patent Title | Application Number | Filing Date | Patent Number | Issue Date |
|---|---|--------------------|-------------|---------------|------------|
| Japan | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 2000-572949 | 09/24/1999 | 4755341 | 6/3/2011 |
| Israel | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 142195 | 09/24/1999 | 142195 | 4/25/2005 |
| Australia | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 62676/99 | 09/24/1999 | 765715 | 1/8/2004 |
| Canada | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 2345153 | 09/24/1999 | 2345153 | 9/24/1999 |
| South Korea | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 2001-7003783 | 09/24/1999 | 660471 | 12/15/2006 |
| Europe, France, Great Britain, Italy | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 99949900.7 | 09/24/1999 | 1116280 | 10/24/2007 |
| Germany | Highly-Doped P-type contact for high-speed, Front-Side Illuminated Photodiode | 99949900.7 | 09/24/1999 | 69937406.5 | 10/24/2007 |
| Canada | Precision Fiber Attachment | 2509530 | 12/10/2003 | 2509530 | 7/23/2013 |
| U.S. | Planar Avalanche Photodiode | 10/836,878 | 04/30/2004 | 7,348,608 | 3/25/2008 |
| U.S. | Focusing Fiber Optic | 10/295,512 | 11/15/2002 | 7,039,275 | 5/2/2006 |
| Europe, France, Italy, Netherlands, Great Britain | Focusing Fiber Optic | 02789655.4 | 11/15/2002 | 1454173 | 5/13/2009 |
| Canada | Focusing Fiber Optic | 2467400 | 11/15/2002 | 2467400 | 9/20/2011 |
| China | Focusing Fiber Optic | 02825106.7 | 11/15/2002 | ZL02825106.7 | 4/17/2009 |

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|--|-----------------------------|----------------|------------|----------------|------------|
| South Korea | Focusing Fiber Optic | 7007422/2004 | 11/15/2002 | 817638 | 3/21/2008 |
| Hong Kong | Focusing Fiber Optic | 06106256.0 | 05/30/2006 | HK1086340 | 2/12/2010 |
| Germany | Focusing Fiber Optic | 02789655.4 | 11/15/2002 | 60232362.2 | 5/13/2009 |
| U.S. | Planar Avalanche Photodiode | 10/502,110 | 02/03/2003 | 7,348,607 | 03/28/2008 |
| Canada | Planar Avalanche Photodiode | 2474560 | 02/03/2003 | 2474560 | 03/20/2012 |
| Japan | Planar Avalanche Photodiode | 2003-564912 | 02/03/2003 | 4938221 | 3/2/2012 |
| South Korea | Planar Avalanche Photodiode | 7011857/2004 | 02/03/2003 | 811365 | 02/29/2008 |
| Hong Kong | Planar Avalanche Photodiode | 08102803.5 | 04/30/2004 | 1113520 | 3/12/2010 |
| China | Planar Avalanche Photodiode | 200480043236.8 | 04/30/2004 | 200480043236.8 | 9/16/2009 |
| U.S. | Enhanced Photo Detector | 10/502,109 | 02/03/2003 | 7,078,741 | 7/18/2006 |
| Europe, Austria, France, Germany, Italy, Netherlands, Spain, Great Britain | Enhanced Photo Detector | 03708942.2 | 02/03/2003 | 1470574 | 11/30/2016 |
| Canada | Enhanced Photo Detector | 2474556 | 02/03/2003 | 2474556 | 10/07/2014 |
| Japan | Enhanced Photo Detector | 2003-564910 | 02/03/2003 | 5021888 | 6/22/2012 |
| South Korea | Enhanced Photo Detector | 7011856/2004 | 02/03/2003 | 766174 | 10/04/2007 |
| China | Enhanced Photo Detector | 03803039.X | 02/03/2003 | ZL03803039.X | 04/01/2009 |
| Hong Kong | Enhanced Photo Detector | 06105823.6 | 05/19/2006 | HK1085841 | 12/18/2009 |
| U.S. | Precision Fiber Attachment | 10/538,248 | 12/10/2003 | 7,263,266 | 08/28/2007 |
| China | Precision Fiber Attachment | 200380108777.X | 12/10/2003 | 200380108777.X | 08/05/2009 |
| Japan | Precision Fiber Attachment | 2004-558729 | 12/10/2003 | 4436915 | 01/08/2010 |
| South Korea | Precision Fiber Attachment | 7010628/2005 | 12/10/2003 | 1034433 | 05/03/2011 |
| Europe, Austria, Italy, France, Great Britain | Precision Fiber Attachment | 03799898.6 | 12/10/2003 | 1570306 | 08/27/2008 |
| Hong Kong | Precision Fiber Attachment | 07102889.3 | 12/10/2003 | HK1095637 | 04/23/2010 |
| Germany | Precision Fiber Attachment | 03799898.6 | 12/10/2003 | 60323261.2 | 08/27/2008 |

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|---|--|----------------|------------|-----------------------|------------|
| U.S. | PIN Photodetector | 10/555,144 | 04/30/2004 | 7,468,503 | 12/23/2008 |
| Europe, Austria, France, Italy, Netherlands, Spain, Great Britain | PIN Photodetector | 04751056.5 | 04/30/2004 | 1620899 | 3/12/2014 |
| South Korea | PIN Photodetector | 7020803/2005 | 04/30/2004 | 1131650 | 03/22/2012 |
| Canada | PIN Photodetector | 2528216 | 04/30/2004 | 2528216 | 04/08/2014 |
| China | PIN Photodetector | 200480015226.3 | 04/30/2004 | 200480015226.3 | 06/10/2009 |
| Japan | PIN Photodetector | 2006-514183 | 04/30/2004 | 5022032 | 06/22/2012 |
| Hong Kong | PIN Photodetector | 07104303.7 | 04/30/2004 | HK1097957 | 03/19/2010 |
| Germany | PIN Photodetector | 4751056.5 | 04/30/2004 | 602004044587.8 | 3/12/2014 |
| Hong Kong | PIN Photodetector (Abandoned) | 06106658.4 | 06/09/2006 | HK1090282 (Abandoned) | 10/6/2010 |
| U.S. | Photoconductive Device | 11/718,959 | 12/07/2005 | 9,136,419 | 09/15/2015 |
| Europe, Austria, France, Italy, Netherlands, Spain, Great Britain | High Speed Ingaas Photoconductive Device | 05853521.2 | 12/07/2005 | 1820219 | 1/19/2011 |
| Japan | High Speed Ingaas Photoconductive Device | 2007-545665 | 12/07/2005 | 4980238 | 4/27/2012 |
| Canada | High Speed Ingaas Photoconductive Device | 2586112 | 12/07/2005 | 2586112 | 07/22/2014 |
| South Korea | High Speed Ingaas Photoconductive Device | 7012804/2007 | 12/07/2005 | 1321280 | 10/16/2013 |
| China | High Speed Ingaas Photoconductive Device | 200580041877.4 | 12/07/2005 | 200580041877.4 | 04/13/2011 |
| Hong Kong | High Speed Ingaas Photoconductive Device | 08100313.2 | 01/10/2008 | HK 1106330 | 05/13/2011 |
| Germany | High Speed Ingaas Photoconductive Device | 05853521.2 | 12/07/2005 | 602005026049.8 | 01/19/2011 |
| U.S. | Highly-Doped P-Type Contact for High-Speed Front-Side Illuminated Photodiode | 09/161,097 | 09/25/1998 | 6,262,465 | 7/17/2001 |

2. Patent Applications

| Country | Patent Title | Application Number | Filing Date | Patent Number | Issue Date |
|------------|--|--------------------|-------------|---------------|------------|
| PCT | Highly-Doped P-Type Contact for High-Speed Front-Side Illuminated Photodiode | PCT/US1999/022339 | 9/24/1999 | N/A | N/A |
| U.S. | Lensed Optical Fiber for Right-Angle Focusing Application | 60/336,302 | 11/15/2001 | N/A | N/A |
| PCT | Focusing Fiber Optic | PCT/US2002/036584 | 11/15/2002 | N/A | N/A |
| PCT | Enhanced Photodetector | PCT/US2003/003181 | 02/03/2003 | N/A | N/A |
| U.S. | High Speed Enhanced Responsivity Photo Detector | 60/353,849 | 02/01/2002 | N/A | N/A |
| U.S. | Avalanche Photodiodes with Ultra-Thin Carbon-Doped Chargecontrol Layer | 60/353,418 | 02/01/2002 | N/A | N/A |
| PCT | Charge Controlled Avalanche Photodiode and Method of Making the Same | PCT/US2003/003203 | 02/03/2003 | N/A | N/A |
| U.S. | Pin Photodetector | 60/467,399 | 05/02/20003 | N/A | N/A |
| PCT | Pin Photodetector | PCT/US2004/013464 | 4/30/2004 | N/A | N/A |
| U.S. | Precision Fiber Attachment | 60/432,332 | 12/10/2002 | N/A | N/A |
| PCT | Precision Fiber Attachment | PCT/US2003/039553 | 12/10/2003 | N/A | N/A |
| U.S. | High-Speed InGaAs Photoconductive Device | 60/633,862 | 12/07/2004 | N/A | N/A |
| PCT | High-Speed InGaAs Photoconductive Device | PCT/US2005/044620 | 12/07/2005 | N/A | N/A |
| PCT | Planar Avalanche Photodiode | PCT/US2004/013584 | 04/30/2004 | N/A | N/A |
| PCT | Planar Avalanche Photodiode | PCT/US2013/041536 | 05/17/2013 | N/A | N/A |
| Europe | Planar Avalanche Photodiode | 03710845.3 | 02/03/2003 | N/A | N/A |
| Europe | Planar Avalanche Photodiode | 04822037.0 | 04/30/2004 | N/A | N/A |
| Hong Kong | Planar Avalanche Photodiode | 07105539 | 05/25/2007 | N/A | N/A |
| U.S. | Planar Avalanche Photodiode | 14/400,478 | 11/11/2014 | N/A | N/A |
| U.S. | Planar Avalanche Photodiode | 60/353,765 | 02/01/2002 | N/A | N/A |
| PCT | Planar Avalanche Photodiode | PCT/US2003/003323 | 02/03/2003 | N/A | N/A |
| Canada | Planar Avalanche Photodiode | 2873841 | 11/14/2014 | N/A | N/A |
| China P.R. | Planar Avalanche Photodiode | 201380025871.2 | 11/17/2014 | N/A | N/A |
| EPC | Planar Avalanche Photodiode | 13793205.9 | 11/13/2014 | N/A | N/A |
| Japan | Planar Avalanche Photodiode | 2015-514068 | 11/14/2014 | N/A | N/A |
| South | Planar Avalanche Photodiode | 7035498/2014 | 12/17/2014 | N/A | N/A |

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|-------------|--|--------------------------|------------|-----|-----|
| Korea | | | | | |
| U.S. | Mini-Mesa Avalanche Photodiodes | 60/353,530 | 02/01/2002 | N/A | N/A |
| U.S. | Photodiode | 61/648,401 | 5/17/2012 | N/A | N/A |
| China | Planar Avalanche Photodiode (Abandoned) | 3803038.1 (Abandoned) | 02/03/2003 | N/A | N/A |
| Japan | Planar Avalanche Photodiode (Abandoned) | 2010-229902 (Abandoned) | 08/01/2010 | N/A | N/A |
| South Korea | Planar Avalanche Photodiode (Abandoned) | 7025099/2006 (Abandoned) | 04/30/2004 | N/A | N/A |
| Canada | Planar Avalanche Photodiode (Abandoned) | 2564218 (Abandoned) | 04/30/2004 | N/A | N/A |
| Japan | Planar Avalanche Photodiode (Abandoned) | 2007-510676 (Abandoned) | 04/30/2004 | N/A | N/A |
| Norway | Highly-Doped P-Type Contact for High-Speed Front-Side Illuminated Photodiode (Abandoned) | 20011497 (Abandoned) | 09/24/1999 | N/A | N/A |
| Japan | Focusing Fiber Optic (Abandoned) | 2003-546142 (Abandoned) | 11/15/2002 | N/A | N/A |
| Japan | Focusing Fiber Optic (Abandoned) | 2009-143970 (Abandoned) | 06/17/2009 | N/A | N/A |
| U.S. | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 10/502,111 (Abandoned) | 07/21/2004 | N/A | N/A |
| Japan | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 2003-564911 (Abandoned) | 02/03/2003 | N/A | N/A |
| South Korea | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 7011855/2004 (Abandoned) | 07/30/2004 | N/A | N/A |
| China | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 3803050 (Abandoned) | 02/03/2003 | N/A | N/A |
| Hong Kong | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 5112002.6 (Abandoned) | 12/28/2005 | N/A | N/A |
| Europe | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 3706052.2 (Abandoned) | 02/03/2003 | N/A | N/A |
| Canada | Charge Controlled Avalanche Photodiode and Method of Making the Same (Abandoned) | 2473223 (Abandoned) | 02/03/2003 | N/A | N/A |

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|------|--|---------------------------|------------|-----|-----|
| U.S. | Low-Temperature-Grown Dilute Nitrides Lattice-Matched | 61/051,189 (Abandoned) | 05/07/2008 | N/A | N/A |
|------|--|---------------------------|------------|-----|-----|