

## PATENT ASSIGNMENT COVER SHEET

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<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
WEN LO	07/02/2019
SHIH-MING CHANG	07/02/2019
CHUN-HUNG LIU	07/02/2019
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<b>Name:</b>	TAIWAN SEMICONDUCTOR MANUFACTURING CO., LTD.
<b>Street Address:</b>	NO.8, LI-HSIN RD.6, SCIENCE-BASED INDUSTRIAL PARK
<b>City:</b>	HSINCHU
<b>State/Country:</b>	TAIWAN
<b>Postal Code:</b>	300
<b>PROPERTY NUMBERS Total: 1</b>	
<b>Property Type</b>	<b>Number</b>
Application Number:	16441158
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<b>NAME OF SUBMITTER:</b>	DANIEL R. MCCLURE
<b>SIGNATURE:</b>	/Daniel R. McClure/
<b>DATE SIGNED:</b>	07/18/2019
<b>Total Attachments: 2</b>	
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source=00698496#page2.tif	

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ASSIGNMENT

This assignment agreement is applicable to an invention entitled (Invention Title) SEMICONDUCTOR APPARATUS AND METHOD OF OPERATING THE SAME

The PATENT RIGHTS referred to in this agreement are:

- (check one) [ ] a patent application for this invention, executed by the ASSIGNOR(S) concurrently with this assignment.
[X] U.S. patent application Serial No. 16/441,158, filed June 14, 2019
[ ] a U.S. patent application based on PCT International Application No. filed on (date) (U.S. patent application Serial No., if known).
[ ] U.S. patent No., issued.

The PATENT RIGHTS also include all divisions, reissues, continuations and extensions of the patents and patent applications identified above.

The PATENT RIGHTS assigned under this agreement are:

- [X] U.S. patent rights only.

The ASSIGNOR(S) referred to in this agreement is (or are) the inventor(s) whose signatures appear on page 2 of this Assignment and any Supplemental Sheet(s).

The ASSIGNEE referred to in this agreement is:

(Name of Assignee) TAIWAN SEMICONDUCTOR MANUFACTURING CO., LTD.
(Address) NO. 8, LI-HSIN RD. 6, SCIENCE-BASED INDUSTRIAL PARK, HSINCHU, TAIWAN 300, R.O.C.

The ASSIGNEE is:

- (check one) [ ] An individual.
[ ] A Partnership.
[X] A Corporation of TAIWAN, R.O.C. (specify state or country)
[ ] (other)

The ASSIGNOR(S), in consideration of \$10.00 paid by the ASSIGNEE, and other good and valuable consideration, receipt of which is acknowledged, hereby assign(s) the following rights to the ASSIGNEE, its successors and assigns:
the full and exclusive right to the invention;
the entire right, title and interest in and to the PATENT RIGHTS;
the right to sue and recover for any past infringement; and
the right to claim priority under 35 USC 119, 35 USC 120, or any other applicable provisions, based on any earlier patent applications for this invention.

THIS IS PAGE 2 OF AN ASSIGNMENT FROM THE INVENTOR(S) TO  
ASSIGNEE: TAIWAN SEMICONDUCTOR MANUFACTURING CO., LTD.  
INVENTION TITLE: SEMICONDUCTOR APPARATUS AND METHOD OF  
OPERATING THE SAME

As to all U.S. patent applications assigned under this agreement, the ASSIGNOR(S) hereby authorize(s) and request(s) the Commissioner of Patents and Trademark to issue all Letters Patent to the ASSIGNEE as the assignee of the entire right, title and interest, for the sole use and enjoyment of said ASSIGNEE, its successors and assigns.

Further, the ASSIGNOR(S) agree(s) to communicate to said ASSIGNEE, or its representatives, any fact known to the ASSIGNOR(S) with respect to said invention, and testify in any legal proceeding, sign all lawful papers, execute all divisional, continuation, substitute, renewal, reexamination and reissue applications, execute all necessary assignment papers to cause and all Letter Patent to be issued to said ASSIGNEE, make all rightful oaths and generally do everything necessary or desirable to aid said ASSIGNEE, its successors and assigns, to obtain and enforce proper protection for said invention.

The ASSIGNOR(S) authorize(s) the attorneys and agents who have the power of attorney in this application to check any appropriate boxes and to insert the Serial Number and filing date in this document after it has been executed.

Wen LO  
Name of sole or first inventor

Wen Lo  
Signature

July 2, 2019  
Date

Shih-Ming CHANG  
Name of second inventor, if any

Shih-Ming Chang  
Signature

2019-07-02  
Date

Chun-Hung LIU  
Name of third inventor, if any

Chun-Hung Lin  
Signature

July 2, 2019  
Date