PATENT ASSIGNMENT COVER SHEET

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SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
CHIA-CHUN LIAO	12/15/2017
MIN-SHUEH YUAN	12/15/2017
CHAO-CHIEH LI	12/15/2017
ROBERT BOGDAN STASZEWSKI	01/23/2018

RECEIVING PARTY DATA

Name:	TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LTD.
Street Address:	NO.8, LI-HSIN RD. 6, HSINCHU SCIENCE PARK
City:	HSINCHU
State/Country:	TAIWAN

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	15878754

CORRESPONDENCE DATA

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NAME OF SUBMITTER:	ANTHONY KING
SIGNATURE:	/Anthony King/
DATE SIGNED:	02/22/2018

Total Attachments: 3

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> **PATENT REEL: 045009 FRAME: 0687** 504789651

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ASSIGNMENT

WHEREAS, I(we), <u>LIAO</u>, <u>CHIA-CHUN</u>, <u>YUAN</u>, <u>MIN-SHUEH</u>, <u>LI</u>, <u>CHAO-CHIEH</u> and <u>STASZEWSKI</u>, <u>ROBERT BOGDAN</u> whose post office address(es) appear(s) below, hereinafter referred to as ASSIGNOR, have invented certain new and useful invention entitled

FREQUENCY GENERATOR AND ASSOCIATED METHOD

	as the INVENTION) for whi herewith unless at least of the sign Patent was			ers Patent /Utility Patent
executed on:	voign r deven mus			
☑ filed on: 24	January 2018 PCT International Patent A	Serial No.: application No.:	15/878,754 filed:	designating the
☐ issued on	as U.S. Pa	atent No.:		
WHEREAS, TAIWAN	SEMICONDUCTOR	MANUFACT	URING COMPANY	LTD. whose post office

WHEREAS, TAIWAN SEMICONDUCTOR MANUFACTURING COMPANY LTD. whose post office address is NO.8, LI-HSIN RD. 6, HSINCHU SCIENCE PARK, HSINCHU, TAIWAN, R.O.C. hereinafter referred to as ASSIGNEE, is desirous of acquiring the entire right, title and interest in and to the same in the United States and its territorial possessions;

NOW, THEREFORE, for good and valuable consideration, receipt of which is hereby acknowledged, I (we), ASSIGNOR, by these presents do sell, assign and transfer unto said ASSIGNEE, the entire right, title, and interest in and to said INVENTION and application throughout the United States of America, including any and all Letters Patent granted on any division, continuation, continuation-in-part and reissue of said application for the full term or terms for which the same may be granted, including all priority rights under any International Convention.

ASSIGNOR further covenants that no assignments, sale, agreement or encumbrance has been or will be made or entered into which would conflict with this Assignment;

ALSO, ASSIGNOR hereby agrees to execute any documents that legally may be required in connection with the filing, prosecution and maintenance of said application or any other patent application(s) in the United States for said INVENTION, including additional documents that may be required to affirm the rights of ASSIGNEE in and to said INVENTION, all without further consideration. ASSIGNOR also agrees, without further consideration and at ASSIGNEE'S expense, to identify and communicate to ASSIGNEE at ASSIGNEE'S request documents and information concerning the INVENTION that are within ASSIGNOR'S possession or control, and to provide further assurances and testimony on behalf of ASSIGNEE that lawfully may be required of ASSIGNOR in respect of the prosecution, maintenance, litigation and defense of any patent application or patent encompassed within the terms of this instrument. ASSIGNOR'S obligations under this instrument shall extend to ASSIGNOR'S heirs, executors, administrators and other legal representatives.

ALSO, ASSIGNOR hereby authorizes and requests the Commissioner of Patents and Trademarks to issue any and all Letters Patent referred to above to ASSIGNEE, as the ASSIGNEE of the entire right, title and interest in and to the same, for ASSIGNEE'S sole use and behoof; and for the use and behoof of ASSIGNEE'S legal representatives and successors, to the full end of the term for which such Letters Patent may be granted, as fully and entirely as the same would have been held by ASSIGNOR had this assignment and sale not been made.

Assignor Name LIAO, CHIA-CHUN	Address 5F., NO.42, ALY. 8, LN. 76, SEC. 6, XINYI RD., XINYI DIST., TAIPEI CITY 110, TAIWAN (R.O.C.)
Signature of Assignor (X) LZAO, CHZA — (HUN	Date of Signature (X) [2/(5/201)
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name YUAN, MIN-SHUEH	F4, NO. 10, LN 163, XIUMING RD SEC 2, WEN-SHAN DIST, TAIPEI, TAIWAN (R.O.C.)
Signature of Assignor (X) Mtnohnel	Date of Signature (X) 1/15/2017
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name LI, CHAO-CHIEH LL, CHAO-CHIEH	NO.3, ALY. 6, LN. 67, MINZU RD., EAST DIST., HSINCHU CITY 300, TAIWAN (R.O.C.)
Signature of Assignor (X) /J , CHAO – CHT GL	Date of Signature (X) M(5/70/7)
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name STASZEWSKI, ROBERT BOGDAN	Address SUMMERHILL, 12 MOUNT ANVILLE ROAD, DUBLIN D14 P9H0, IRELAND
Signature of Assignor (X)	Date of Signature (X)
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name YUAN, MIN-SHUEH	Address F4, NO. 10, LN 163, XIUMING RD SEC 2, WEN-SHAN DIST, TAIPEI, TAIWAN (R.O.C.)
Signature of Assignor (X)	Date of Signature (X)
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name LI, CHAO-CHIEH	NO.3, ALY. 6, LN. 67 , MINZU RD., EAST DIST., HSINCHU CITY 300, TAIWAN (R.O.C.)
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Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)

Assignor Name STASZEWSKI, ROBERT BOGDAN	Address SUMMERHILL, 12 MOUNT ANVILLE ROAD, DUBLIN D14 P9H0, IRELAND
Signature of Assignor (X)	Date of Signature (X) 20/7-01-23
Name of Witness (optional)	Name of Witness (optional)
Signature of Witness (optional)	Signature of Witness (Optional)