505771863 11/13/2019

PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1 Stylesheet Version v1.2

EPAS ID: PAT5818680

SUBMISSION TYPE:	NEW ASSIGNMENT
NATURE OF CONVEYANCE:	ASSIGNMENT

CONVEYING PARTY DATA

Name	Execution Date
TAE-SIK YUN	11/01/2019
DAE-SUK KIM	11/01/2019
SEOK-CHEOL YOON	11/01/2019
NO-GUEN JOO	11/01/2019

RECEIVING PARTY DATA

Name:	SK HYNIX INC.
Street Address:	2091, GYEONGCHUNG-DAERO, BUBAL-EUB, ICHEON-SI
City:	GYEONGGI-DO
State/Country:	KOREA, REPUBLIC OF

PROPERTY NUMBERS Total: 1

Property Type	Number
Application Number:	16682696

CORRESPONDENCE DATA

Fax Number: (571)327-5452

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.

Phone: 5713275450

Email: ipntlaw@ipntlaw.com **Correspondent Name:** IP & T GROUP LLP Address Line 1: 8230 LEESBURG PIKE

Address Line 2: SUITE 650

Address Line 4: VIENNA, VIRGINIA 22182

ATTORNEY DOCKET NUMBER:	P18H0283/US
NAME OF SUBMITTER:	KEON WOO PARK
SIGNATURE:	/Keon Woo PARK/
DATE SIGNED:	11/13/2019
	This document serves as an Oath/Declaration (37 CFR 1.63).

Total Attachments: 4

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PATENT REEL: 050999 FRAME: 0205 505771863

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PATENT REEL: 050999 FRAME: 0206

SHINSUNG: IVX000141633(P18H0283/US)

Attorney Docket No.:	
ASSIGNMENT OF AND DECLARATION FOR APPLICATION FOR UNITED STATES LETTERS PATENT	
WHEREAS YUN Tae-Sik hereinaster	
referred to collectively as the assignor and inventor, has invented a certain improvement relating to	
SEMICONDUCTOR MEMORY DEVICE AND OPERATING METHOD THEREOF	
[X] said application being attached hereto; [] said application having heen filed in the United States Patent and Trademark Office on us Application Serial No	
AND said assignor hereby agrees to perform, upon the request of said assignee, or said assignce's successors or assigns, any and all acts relating to the obtaining or to the asserting of said patents, including any and all renewals, reissues and prolongations thereof.	
AND said assignor authorizes and requests the Commissioner of Patents and Trademarks to issue Letters Patent on usual application, and on any and all divisions and continuations thereof, to said assignee, and said assignee's successors and assigns, in accordance herewith.	
As an above-named inventor, I hereby declare that the above-identified application was made or authorized to be made by me, and 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.	
ASSIGNOR (INVENTOR):	
Signature: You Tae S:k Date: November 01 2019	
Printed or Typed Name: YUN, Tae-Sik	
Page 1 of 1	

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SHINSUNG: IV X0001-H03/RP	(2H6522AC2)
Attorney Docket No.:	
ASSIGNMENT OF AND DECLARATION FOR APPLICATION FOR UNITED STATES LETTERS PATENT	
WHEREAS KIM, Dae-Suk	, hereinatier
referred to collectively as the assignor and inventor, has invented a certain improvement relating to	
SEMICONDUCTOR MEMORY DEVICE AND OPERATING METHOD THEREOF	
[X] said application being attached hereto; [I said application having been filed in the United States Patent and Trademark Office on and was Application Serial No	more
on	
[] the specification of which was filed under the Patent Cooperation Treaty on	
AND WHEREAS SK hymx lnc. of 2091, Gyrongehung-daem, Bubal-euh, Icheon-si, Gyrongei-do, Rem Koren, hereinafter referred to us the assignee or applicant, is desirous of acquiring the entire right, title and intersaid application, including any and all divisions and continuations thereof, and in and to said invention and any patents which may be granted therefor, including any and all renewals, reissues and prolongations thereof. NOW THIS WITNESSETH, that for and in consideration of One Dollar (\$1,00), and other good consideration paid by said assignee to said assigner, the receipt of which is hereby acknowledged, said assigns, salls and transfers to said assignee, and said assignee's successors and assigns, the full and exclusive r interest in and to said application, including any and all divisions and continuations thereof, and in and to said any and all patents which may be granted therefor, including any and all renewals, reissues and protongations assignee, and said assignee's successors and assigns, to have, hold, exercise and enjoy the said application, including any and all renewals, reissues and protongations of invention and any and all patents which may be granted divisions and continuations thereof, and the said invention and any and all patents which may be granted divisions and continuations thereof, and the said invention and any and all patents which may be granted divisions and continuations thereof, for and during the term or terms of any and all such patents wincluding any and all renewals, reissues and protongations thereof, for the use and benefit of said assignee's successors and assigns, in as ample and beneficial a manner as the said assignor might or could be enjoyed the same, if this assignment had not been made.	est in and to and all and valuable ignor hereby ight, title and nvention and wention and dling any and allog any and sed therefor, abvantages in then granted, see, and said
AND said assignor hereby agrees to perform, upon the request of said assignee, or said assignee's assigns, any and all acts relating to the obtaining or to the asserting of said patents, including any and all renes and prolongations thereof.	
AND said assignor authorizes and requests the Commissioner of Patents and Trademarks to issue Lett said application, and on any and all divisions and continuations thereof, to said assignee, and said assignee's seassigns, in accordance herewith.	
As no above-named inventor, I hereby declare that the above-identified application was made or and made by me, and that I am the original inventor or an original joint inventor of a claimed invention in the applica-	

Page lof I

DATE SUK Date: November 01, 2019

I hereby acknowledge that any willful labse 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.



ASSIGNOR (INVENTOR):

Printed or Typed Name: KIM, Dae-Suk

SHINSUNG:	IVX000141633(P18H0283/US)
Amorney	Dineker Na ·

ASSIGNMENT OF AND DECLARATION FOR APPLICATION FOR UNITED STATES LETTERS PATENT

WHEREAS YOON Seek-Cheel	, hereinafter
referred to collectively as the assignor and inventor, has invented a certain improvement relating to	
SEMICONDUCTOR MEMORY DEVICE AND OPERATING METHOD THEREOF	***************************************
[X] said application being attached hereto; [] said application having been filed in the United States Patent and Trademark Office on	and was amended
on	પ ર
AND WHEREAS SK hynix Inc. of 2001. Gyeonechung-daero, Bubal-eub, Icheon-si, Gyeonegi Korea, bereinafter referred to as the assignee or applicant, is desirous of acquiring the entire right, title said application, including any and all divisions and continuations thereof, and in and to said invention patents which may be granted therefor, including any and all renewals, reissues and prolongations ther	and interest in and to and any and all
NOW THIS WITNESSETH, that for and in consideration of One Dollar (\$1.00), and of consideration paid by said assigned to said assigner, the receipt of which is hereby acknowledged assigns, sells and transfers to said assignee, and said assignee's successors and assigns, the full and estimeres in and to said application, including any and all divisions and continuations thereof, and in an any and all patients which may be granted therefor, including any and all renewals, reissues and probassignee, and said assignee's successors and assigns, to have, hold, exercise and enjoy the said applicated divisions and continuations thereof, and the said invention and any and all patients which may including any and all renewals, reissues and prolongations thereof, with all the rights, powers, privile anywise arising from or appertaining thereto, for and during the term or terms of any and all such including any and all renewals, reissues and prolongations thereof, for the use and benefit of sa assignee's successors and assigns, to as ample and benefitical a manner as the said assignor neight of enjoyed the same, if this assignment had not been made.	, said assignor hereby achiesive right, title and if to said invention and organisms thereof; said tion, including any and y be granted therefor, ages and advantages in patents when granted, aid assignos, and said
AND said assigner hereby agrees to perform, upon the request of said assignee, or said assigns, any and all acts relating to the obtaining or to the asserting of said patents, including any and prolongations thereof.	signer's successors or lall renewals, reissues
AND said assignor authorizes and requests the Commissioner of Patents and Trademarks to said application, and on any and all divisions and continuations thereof, to said assignee, and said assigns, in accordance herewith.	
As an above-named inventor, I hereby declare that the above-identified application was ma made by me, and that I am the original inventor or an original joint inventor of a claimed invention in t	de or authorized to be he application.
I hereby acknowledge that any willful false statement made in this declaration is punishable by line or imprisonment of not more than five (5) years, or both.	under 18 U.S.C. 1001
ASSIGNOR (INVENTOR):	
Signature: Youn Seak Ches/ Date: November 01, 2019	
Printed or Typed Name: YOON, Seek-Cheel	
	ło.:
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SHINSUNG: IVX000141633(P18H02837US)

ASSIGNMENT OF AND DECLARATION FOR APPLICATION FOR UNITED STATES LETTERS PATENT

WHEREAS 100. No-Guen	, hereinalter	Į.
referred to collectively as the assignor and inventor, has invented a certain improvement relating to		
SEMICONDUCTOR MEMORY DEVICE AND OPERATING METHOD THEREOF	-	
[X] said application being attached hereto; [] said application having been filed in the United States Patent and Trademark Office on		
as Application Serial No.	and was amende	લ્ડો
on		
Serial Nothe United States of America being designated.	٠	
AND WHEREAS SK hynix loc. of 2091. Greengehung-dauro, Bubsl-eub, Icheon-si, Greening Korea, hereinafter referred to as the assignee or applicant, is desirous of acquiring the entire right, title said application, including any and all divisions and continuations thereof, and in and to said invention patents which may be granted therefor, including any and all renewals, reissues and prolongations therefor.	s and interest in and to n and any and all	9
NOW THIS WITNESSETH, that for and in consideration of One Dollar (\$1.00), and of consideration paid by said assignee to said assigner, the receipt of which is hereby neknowledged assigns, sells and transfers to said assignee, and said assignee's successors and assigns, the full and einterest in and to said application, including any and all divisions and continuations thereof, and in an any and all patents which may be granted therefor, including any and all renewals, reissues and prolassignee, and said assignee's successors and assigns, to have, hold, exercise and enjoy the said applicated divisions and continuations thereof, and the said invention and any and all patents which maincluding any and all renewals, reissues and prolongations thereof, with all the rights, powers, privile anywise arising from or appertaining thereto, for and during the term or terms of any and all such including any and all renewals, reissues and prolongations thereof, for the use and benefit of spassignee's successors and assigns, in as ample and beneficial a manner as the said assignor might empoyed the same, if this assignment had not been made.	d, said assignor herebachusive right, title and to said invention and hongations thereof; said tion, including any any be granted thereforeges and advantages in patents when granted and assignee, and said assignee, and said assignee, and said	ny nd sid sid sid sid
ANIX said assignor hereby agrees to perform, upon the request of said assignee, or said a assigns, any and all acts relating to the obtaining or to the asserting of said patents, including any and prolongations thereof.		
AND said assignor authorizes and requests the Commissioner of Patents and Trademarks to said application, and on any and all divisions and continuations thereof, to said assignee, and said assayings, in accordance herewith.		
As an above-named inventor, I hereby declare that the above-identified application was manade by me, and that I am the original inventor or an original joint inventor of a claimed invention in		ıc
I hereby acknowledge that any willful false statement made in this declaration is punishable by fine or imprisonment of not more than five (5) years, or both.	under 18 U.S.C. 100) [
ASSIGNOR (INVENTOR):		
Signature: Tw Ob Gam Date: November 01, 2019	<u></u>	
Primed or Typed Name: 100, No-Guen		

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RECORDED: 11/13/2019

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