

## PATENT ASSIGNMENT COVER SHEET

Electronic Version v1.1  
Stylesheet Version v1.2

EPAS ID: PAT2936457

<b>SUBMISSION TYPE:</b>	NEW ASSIGNMENT
<b>NATURE OF CONVEYANCE:</b>	ASSIGNMENT
<b>CONVEYING PARTY DATA</b>	
<b>Name</b>	<b>Execution Date</b>
EUN-KYUNG YIM	06/23/2014
IN-GYU BAEK	12/23/2013
JANG-EUN LEE	12/23/2013
SE-CHUNG OH	01/14/2014
KYUNG-TAE NAM	03/28/2014
JIN-SHI ZHAO	06/23/2014
<b>RECEIVING PARTY DATA</b>	
<b>Name:</b>	SAMSUNG ELECTRONICS CO., LTD.
<b>Street Address:</b>	129, SAMSUNG-RO, YEONGTONG-GU, GYEONGGI-DO
<b>City:</b>	SUWON-SI
<b>State/Country:</b>	REPUBLIC OF KOREA
<b>PROPERTY NUMBERS Total: 1</b>	
<b>Property Type</b>	<b>Number</b>
<b>Application Number:</b>	14136522
<b>CORRESPONDENCE DATA</b>	
<b>Fax Number:</b>	(617)742-7774
<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>	
<b>Phone:</b>	617-994-4900
<b>Email:</b>	mail@omiplaw.com
<b>Correspondent Name:</b>	ONELLO & MELLO LLP
<b>Address Line 1:</b>	THREE BURLINGTON WOODS DRIVE
<b>Address Line 2:</b>	SUITE 203
<b>Address Line 4:</b>	BURLINGTON, MASSACHUSETTS 01803-4532
<b>ATTORNEY DOCKET NUMBER:</b>	SAM-1236CON
<b>NAME OF SUBMITTER:</b>	ANTHONY P. ONELLO, JR.
<b>SIGNATURE:</b>	/ANTHONY P. ONELLO, JR./
<b>DATE SIGNED:</b>	07/14/2014
This document serves as an Oath/Declaration (37 CFR 1.63).	
<b>Total Attachments: 11</b>	

PATENT

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**COMBINED DECLARATION (37 CFR §1.63) FOR UTILITY PATENT APPLICATION AND  
ASSIGNMENT FORM<sup>1</sup>**

The undersigned acknowledges that this document is being used both as an assignment of the invention and as the declaration (37 CFR 1.63) for a Utility or Design Application.

WHEREAS, the undersigned, hereinafter referred to collectively as Assignor, has invented:

Title: **NONVOLATILE MEMORY DEVICES AND METHODS OF FORMING THE SAME**

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for which Assignor is about to make or has made United States or International application for patent.

WHEREAS, as a below named inventor(s), I/(we) hereby declare that:

**Section I. Declaration**

This declaration is directed to:

- The attached U.S. non-provisional patent application, or
- U.S. non-provisional patent application number 14/136,522, filed on December 20, 2013, or
- PCT international patent application number \_\_\_\_\_, filed on \_\_\_\_\_.

The above-identified application was made or authorized to be made by me (us).

I (we) believe that I am (we are) the original inventor (original joint inventors) of a claimed invention in the above-identified application.

I (we) 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.

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<sup>1</sup> This form requires the use of an Application Data Sheet.

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SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

SAMSUNG ELECTRONICS CO., LTD.

I hereby state that I have reviewed and understand the contents of the above identified application, including the claims.

I acknowledge that I am aware of the duty to disclose information which is material to patentability as defined in 37 CFR § 1.56.

## Section II. Assignment

In consideration of the sum of One Dollar (\$1.00) and other good and valuable consideration paid to each of the undersigned, the undersigned hereby sell(s) and assign(s) to

Samsung Electronics Co., Ltd.

having an address at 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do 443-742, Republic of Korea (hereinafter designated as the Assignee), the entire (100%) right, title and interest for the United States as defined in 35 USC §100, in the invention described in the application identified in Section I of this document.

Assignor hereby confirms any prior assignment to Assignee, and to the extent that Assignor has not already done so, agrees to assign, and hereby does, sell, assign and transfer unto Assignee and its successors in interest, the full and exclusive right, title and interest in the United States of America and throughout the world, including the right to claim priority under the laws of the United States, the Paris Convention, and any foreign countries, to the inventions as described in the aforesaid application, to the aforesaid application itself, and all divisions, continuations, continuations-in-part, or other applications claiming priority directly or indirectly from the aforesaid application, and any United States or foreign Letters Patent, utility model, or other similar rights which may be granted thereon, including reissues, reexaminations and extensions thereof, and all copyright rights throughout the world in the aforesaid application and the subject matter disclosed therein, these rights, title and interest to be held and enjoyed by Assignee to the full end of the term for which the Letters Patent, utility model, or other similar rights, are granted and any extensions thereof as fully and entirely as the same would have been held by Assignor had this assignment and sale not been made, and the right to sue for, and recover for past infringements of, or liabilities for, any of the rights relating to any of the applications, patents, utility models, or other similar rights, resulting therefrom, and the copyright rights;

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SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

SAMSUNG ELECTRONICS CO., LTD.

Assignor hereby covenants and agrees to execute all instruments or documents required or requested for the making and prosecution of any applications of any type for patent, utility model, or other similar rights, and for copyright, in the United States and in all foreign countries including, but not limited to, any provisional, continuation, continuation-in-part, divisional, renewal or substitute thereof, and as to letters patent any reissue, re-examination, or extension thereof, and for litigation regarding, or for the purpose of protecting title and to the said invention, the United States application for patent, or Letters Patent therefor, and to testify in support thereof, for the benefit of Assignee without further or other compensation than that above set forth;

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

Assignor hereby requests the United States Patent and Trademark Office to issue the Letters Patent of the United States of America to Assignee, and requests that any official of any country or countries foreign to the United States, whose duty it is to issue or grant patents and applications as aforesaid, to issue the Letters Patent, Utility Model Registration or other similar right to Assignee.

The undersigned hereby grant(s) the law firm of Onello & Mello, LLP the power to insert on this Declaration and Assignment any further identification which may be necessary or desirable in order to comply with the rules of the U.S. Patent and Trademark Office for recordation of this document.

**Section III. Inventor(s)/Assignor(s) Signature(s)**

LEGAL NAME OF FIRST INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Yim	Eun-Kyung	
SIGNATURE _____		DATE _____	

SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

LEGAL NAME OF SECOND INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Baek	In-Gyu	

SIGNATURE *In-Gyu Baek* DATE Dec. 23, 2013

LEGAL NAME OF THIRD INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Lee	Jang-Eun	

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

LEGAL NAME OF FOURTH INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Oh	Se-Chung	

SIGNATURE \_\_\_\_\_ DATE \_\_\_\_\_

SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

SAMSUNG ELECTRONICS CO., LTD.

LEGAL NAME OF SECOND INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Baek	In-Gyu	
SIGNATURE _____		DATE _____	

LEGAL NAME OF THIRD INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Lee	Jang-Eun	
SIGNATURE <u>07 76 Lee</u>		DATE <u>12/23/2013</u>	

LEGAL NAME OF FOURTH INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Oh	Se-Chung	
SIGNATURE _____		DATE _____	

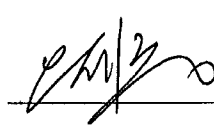
SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM

SAMSUNG ELECTRONICS CO., LTD.

LEGAL NAME OF SECOND INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Baek	In-Gyu	
SIGNATURE _____		DATE _____	

LEGAL NAME OF THIRD INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Lee	Jang-Eun	
SIGNATURE _____		DATE _____	

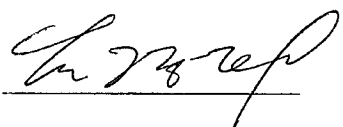
LEGAL NAME OF FOURTH INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Oh	Se-Chung	
SIGNATURE  _____		DATE 2014/1/14	

SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM



SAMSUNG ELECTRONICS CO., LTD.

LEGAL NAME OF FIFTH INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Nam	Kyung-Tae	
SIGNATURE <u></u> DATE <u>28/03/2014</u>			

LEGAL NAME OF SIXTH INVENTOR/ASSIGNOR	Family Name	First Given Name	Second Given Name
	Zhao	Jin-Shi	
SIGNATURE _____ DATE _____			

SEC Ref No. IE-200611-088 Attorney Ref No. SAM-1236CON

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM



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.

**SUBSTITUTE STATEMENT IN LIEU OF AN OATH OR DECLARATION FOR UTILITY OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)**

Title of Invention	NONVOLATILE MEMORY DEVICES AND METHODS OF FORMING THE SAME		
This statement is directed to:			
<input type="checkbox"/> The attached application,			
OR			
<input checked="" type="checkbox"/> United States application or PCT international application number <u>14/136,522</u> filed on <u>December 20, 2013</u>			
<b>LEGAL NAME of inventor to whom this substitute statement applies:</b>			
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)			
Eun-Kyung Yim			
Residence (except for a deceased or legally incapacitated inventor):			
City	State	Country	
Seoul		Korea	
Mailing Address (except for a deceased or legally incapacitated inventor):			
Intellectual Property Team, Samsung Semiconductor Samsung Electronics Co., Ltd., SAN#16, Banwol-Dong			
City	State	Zip	Country
Suwon-si	Gyeonggi-do	443-742	Korea
I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.			
The above-identified application was made or authorized to be made by me.			
I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
Relationship to the inventor to whom this substitute statement applies:			
<input type="checkbox"/> Legal Representative (for deceased or legally incapacitated inventor only),			
<input checked="" type="checkbox"/> Assignee,			
<input type="checkbox"/> Person to whom the inventor is under an obligation to assign,			
<input type="checkbox"/> Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or			
<input type="checkbox"/> Joint Inventor.			

This collection of information is required by 35 U.S.C. 115 and 37 CFR 1.63. 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 1 minute 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.

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.

## SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

- Inventor is deceased,
- Inventor is under legal incapacity,
- Inventor cannot be found or reached after diligent effort, or
- Inventor has refused to execute the oath or declaration under 37 CFR 1.63.


If there are joint inventors, please check the appropriate box below:

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.
- OR
- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) has not been submitted. Thus, a Substitute Statement Supplemental Sheet (PTO/AIA/11 or equivalent) naming the entire inventive entity and providing inventor information is attached. See 37 CFR 1.64(b).

### WARNING:

Petitioner/applicant is cautioned to avoid submitting personal information in documents filed in a patent application that may contribute to identity theft. Personal information such as social security numbers, bank account numbers, or credit card numbers (other than a check or credit card authorization form PTO-2038 submitted for payment purposes) is never required by the USPTO to support a petition or an application. If this type of personal information is included in documents submitted to the USPTO, petitioners/applicants should consider redacting such personal information from the documents before submitting them to the USPTO. Petitioner/applicant is advised that the record of a patent application is available to the public after publication of the application (unless a non-publication request in compliance with 37 CFR 1.213(a) is made in the application) or issuance of a patent. Furthermore, the record from an abandoned application may also be available to the public if the application is referenced in a published application or an issued patent (see 37 CFR 1.14). Checks and credit card authorization forms PTO-2038 submitted for payment purposes are not retained in the application file and therefore are not publicly available.

#### PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: **Taeksung KIM** Date (Optional): *June 23, 2014*  
 Signature: 

#### APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:  
 Applicant Name: **Samsung Electronics Co., Ltd.**  
 Title of Person Executing This Substitute Statement: **VP, Director of IP Prosecution Group Samsung Electronics Co., Ltd.**  
 The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

#### Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City: **Suwon-si** State: **Gyeonggi-do** Country: **Korea**  
 Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):  
**129, Samsung-ro, Yeongtong-gu**

City: **Suwon-si** State: **Gyeonggi-do** Zip: **443-742** Country: **Korea**

Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.



Doc code: Oath  
Document Description: Oath or declaration filed

PTO/AIA/02 (07-13)  
Approved for use through 01/31/2014. OMB 0651-0032  
U.S. Patent and Trademark Office; U.S. DEPARTMENT OF COMMERCE

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OR DESIGN PATENT APPLICATION (35 U.S.C. 115(d) AND 37 CFR 1.64)**

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This statement is directed to:			
<input type="checkbox"/> The attached application,			
OR			
<input checked="" type="checkbox"/> United States application or PCT international application number <u>14/136,522</u> filed on <u>December 20, 2013</u>			
<b>LEGAL NAME of inventor to whom this substitute statement applies:</b>			
(E.g., Given Name (first and middle (if any)) and Family Name or Surname)			
Jin-Shi Zhao			
Residence (except for a deceased or legally incapacitated inventor):			
City	State	Country	
Seoul		Korea	
Mailing Address (except for a deceased or legally incapacitated inventor):			
Intellectual Property Team, Samsung Semiconductor Samsung Electronics Co., Ltd., SAN#16, Banwol-Dong			
City	State	Zip	Country
Suwon-si,	Gyeonggi-do	443-742	Korea
I believe the above-named inventor or joint inventor to be the original inventor or an original joint inventor of a claimed invention in the application.			
The above-identified application was made or authorized to be made by me.			
I hereby acknowledge that any willful false statement made in this statement is punishable under 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or both.			
Relationship to the inventor to whom this substitute statement applies:			
<input type="checkbox"/> Legal Representative (for deceased or legally incapacitated inventor only),			
<input checked="" type="checkbox"/> Assignee,			
<input type="checkbox"/> Person to whom the inventor is under an obligation to assign,			
<input type="checkbox"/> Person who otherwise shows a sufficient proprietary interest in the matter (petition under 37 CFR 1.46 is required), or			
<input type="checkbox"/> Joint Inventor.			

[Page 1 of 2]

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

**PATENT**  
**REEL: 033303 FRAME: 0412**

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## SUBSTITUTE STATEMENT

Circumstances permitting execution of this substitute statement:

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- Inventor is under legal incapacity.
- Inventor cannot be found or reached after diligent effort; or
- Inventor has refused to execute the oath or declaration under 37 CFR 1.63.

If there are joint inventors, please check the appropriate box below:

- An application data sheet under 37 CFR 1.76 (PTO/AIA/14 or equivalent) naming the entire inventive entity has been or is currently submitted.

OR

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#### PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

Name: **Taeksung KIM**

Date (Optional): **June 23, 2014**

Signature: 

#### APPLICANT NAME AND TITLE OF PERSON EXECUTING THIS SUBSTITUTE STATEMENT:

If the applicant is a juristic entity, list the applicant name and the title of the signer:

**Samsung Electronics Co., Ltd.**

Applicant Name:

Title of Person Executing This Substitute Statement: **VP, Director of IP Prosecution Group Samsung Electronics Co., Ltd.**

The signer, whose title is supplied above, is authorized to act on behalf of the applicant.

Residence of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent):

City <b>Suwon-si</b>	State <b>Gyeonggi-do</b>	Country <b>Korea</b>
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Mailing Address of the signer (unless provided in an application data sheet, PTO/AIA/14 or equivalent)

**129, Samsung-ro, Yeongtong-gu**

City <b>Suwon-si</b>	State <b>Gyeonggi-do</b>	Zip <b>443-742</b>	Country <b>Korea</b>
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Note: Use an additional PTO/AIA/02 form for each inventor who is deceased, legally incapacitated, cannot be found or reached after diligent effort, or has refused to execute the oath or declaration under 37 CFR 1.63.