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Form **PTO-1595** (Rev. 6-12) OMB No. 0651-0027 (exp. 04/30/2015)

U.S. DEPARTMENT OF COMMERCE
United States Patent and Trademark Office

Date: 12/20/2012 6:05:28 PM

RECORDATION FORM COVER SHEET				
PATENTS ONLY				
To the Director of the U.S. Patent and Trademark Office: Pleas	se record the attached documents or the new address(es) below.			
1. Name of conveying party(ies): Sunil SHIM (10/11/2012), Jaehoon JANG (10/11/2012), Donghyuk CHAE (11/22/2012), Youngho LIM (10/15/2012), Hansoo KIM (10/11/2012), and Jaehun JEONG (12/13/2012) Additional name(s) of conveying party(ies) attached? Yes X No	2. Name and address of receiving party(ies) Name: Samsung Electronics Co., Ltd. Internal Address: Street Address:			
3. Nature of conveyance/Execution Date(s): Execution Date(s): in parentheses after inventor name X Assignment Merger Change of Name	129, Samsung-ro, Yeongtong-gu			
Security Agreement Joint Research Agreement Government Interest Assignment Executive Order 9424, Confirmatory License Other	City: Suwon-Si, Gyeonggi-Do State: Country: Republic of Korea Zip: 443-742 Additional name(s) & address(es) Yes X No attached?			
4. Application or patent number(s): A. Patent Application No.(s) 13/721,963 Additional numbers attached?	ument serves as an Oath/Declaration (37 CFR 1.63). B. Patent No.(s) Yes X No			
Name and address to whom correspondence concerning document should be mailed: Name: John A. Castellano	6. Total number of applications and patents involved:			
HARNESS, DICKEY & PIERCE, P.L.C. Internal Address: Atty. Dkt.: 8947-000488/US/CPA Street Address: P.O. Box 8910	7. Total fee (37 CFR 1.21(h) & 3.41) \$ 40.00 X Authorized to be charged to deposit account Enclosed None required (government interest not affecting title)			
City: Reston State: VA Zip: 20195 Phone Number: (703) 668-8000 Fax Number: (703) 668-8200 Email Address: dcmailroom@hdp.com	8. Payment Information Deposit Account Number 08-0750 Authorized User Name John A. Castellano			
9. Signature Signature John A. Castelland - 35,094 Name of Person Signing	December 20, 2012 Date Total number of pages including cover sheet, attachments, and documents: 22			
Documents to be recorded fincluding cover she Mail Stop Assignment Recordation Services, Director	et) should be faxed to (571) 273-0140, or mailed to: of the USPTO, P.C.Box 1450, Alexandria, V.A. 22313-1450			

PATENT REEL: 029585 FRAME: 0457 To: 95712730140

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Date: 12/20/2012 6:05:28 PM

SAMSUNG ELECTRONICS CO., LTD.

COMBINED DECLARATION (37 CFR §1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM¹

		and as the declaration (37 CFR 1.63) for a Utility or Design Application.
WHERI	EAS, the	e undersigned, hereinafter referred to collectively as Assignor, has invented:
Γitle:	NON	VOLATILE MEMORY DEVICES AND OPERATING METHODS THEREOF
for whi		gnor is about to make or has made United States or International application
WHERI	EAS, as	a below named inventor(s), I/(we) hereby declare that:
Section	n I. Ded	claration
This de	eclaratio	on is directed to:
	\boxtimes	The attached U.S. non-provisional patent application, or
		U.S. non-provisional patent application number, filed on, or
		PCT international patent application number, filed on
The ab	ove-ide	entified application was made or authorized to be made by me (us).
		that I am (we are) the original inventor (original joint inventors) of a claimed ne above-identified application.
		acknowledge that any willful false statement made in this declaration is ider 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or
This f	orm requ	aires the use of an Application Data Sheet.
SEC Re	f No	IE-200908-050-1-US1 Attorney Ref No. 8947-000488/US/CPA

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM Page 1 of 5

Date: 12/20/2012 6:05:28 PM

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;

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-

torney Ref No. 8947-000488/US/CPA

To: 95712730140

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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 Harness, Dickey & Pierce, P.L.C. 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	Family Name	First Given Name	Second Given Name
FIRST INVENTOR/ASSIGNOR	SHIM	Sunil	
CICALATURE	Sim il St	DATE	10/11/2012
SIGNATURE _	200 N St	an a	1117012

SEC Ref No.	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA

LEGAL NAME OF	Family N	ame	First Given Name	Second Given Name
SECOND INVENTOR/ASSIGNOR	JANG		Jaehoon	
SIGNATURE	Jaehoon	Jang	DATE	2012/10/11

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
THIRD INVENTOR/ASSIGNOR	СНАЕ	Donghyuk	
		DATE	
SIGNATURE		- V - PP	an and the state of the state o

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
FOURTH INVENTOR/ASSIGNOR	LIM	Youngho	
		DATE	
SIGNATURE		4 Anti-on	

SEC Ref No. <u>IE-200908-050-1-US1</u> Attorney Ref No. <u>8947-000488/US/CPA</u>

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
FIFTH INVENTOR/ASSIGNOR	KIM	Hansoo	
	H.S.L	DATE	10/11/2012

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
SIXTH NVENTOR/ASSIGNOR	JEONG	Jaehun	
		DATE	

SEC Ref No. IE-200908-050-1-US1 Attorney Ref No. 8947-000488/US/CPA

Page: 8/22 Date: 12/20/2012 6:05:28 PM

SAMSUNG ELECTRONICS CO., LTD.

COMBINED DECLARATION (37 CFR §1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM¹

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 OPERATING METHODS THEREOF
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, filed on, 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.
¹ This form requires the use of an Application Data Sheet.
SEC Ref No. <u>IE-200908-050-1-US1</u> Attorney Ref No. <u>8947-000488/US/CPA</u>

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM Page 1 of 5

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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;

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-

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COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM Page 2 of 5

From: Harness Dickey 703-668-8200 To: 95712730140 Page: 10/22 Date: 12/20/2012 6:05:29 PM

SAMSUNG ELECTRONICS CO., LTD.

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.

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

LEGAL NAME OF FIRST	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	SHIM	Sunil	
SIGNATURE		DATE —	

SEC Ref No.	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA
sec her no.		Attorney Ker No.	8947-000488/US/CPA

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	JANG	Jaehoon	gausse (p. 11 minusconsum underdenser) Administration than (Provid Administration Crisis und. (f.
SIGNATURE		DATE	
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FOURTH L			Second Given Name
VENTOR/ASSIGNOR	LIM	Youngha	
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SIGNATURE		DATE	

SEC Ref No. IE-200908-050-1-US1 Attorney Ref No. 8947-000488/US/CPA

LEGAL NAME OF FIFTH	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	KIM	Hansoo	
SIGNATURE		DATE	

LEGAL NAME OF SIXTH	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	JEONG	Jaehun	
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SIGNATURE		DATE 	

SEC Ref No.	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA
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From: Harness Dickey 703-668-8200

To: 95712730140

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SAMSUNG ELECTRONICS CO., LTD.

COMBINED DECLARATION (37 CFR §1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM¹

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WHERE	EAS, th	e undersigned, hereinafter referred to collectively as Assignor, has invented:
Title:	NON	VOLATILE MEMORY DEVICES AND OPERATING METHODS THEREOF
for whi for pat		ignor is about to make or has made United States or International application
WHER	EAS, as	a below named inventor(s), I/(we) hereby declare that:
Section	n I. De	claration
This de	eclarati	on is directed to:
	\boxtimes	The attached U.S. non-provisional patent application, or
		U.S. non-provisional patent application number, filed on, or
		PCT international patent application number, filed on
The ab	ove-ide	entified application was made or authorized to be made by me (us).
		that I am (we are) the original inventor (original joint inventors) of a claimed he above-identified application.
		acknowledge that any willful false statement made in this declaration is nder 18 U.S.C. 1001 by fine or imprisonment of not more than five (5) years, or
¹ This f	orm req	uires the use of an Application Data Sheet.
SEC Ref	f N o	IE-200908-050-1-US1 Attorney Ref No. 8947-000488/US/CPA
CON 451		CONTRACTOR ASSOCIATION ASSOCIA

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM Page 1 of 5

From: Harness Dickey 703-668-8200 To: 95712730140 Page: 14/22 Date: 12/20/2012 6:05:29 PM

SAMSUNG ELECTRONICS CO., LTD.

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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-

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From: Harness Dickey 703-668-8200 To: 95712730140 Page: 15/22 Date: 12/20/2012 6:05:29 PM

SAMSUNG ELECTRONICS CO., LTD.

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;

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

LEGAL NAME OF FIRST	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	SHIM	Sunil	
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SIGNATURE		DATE -	~0.001 (10~40~0.00.00.00.00.00.00.00.00.00.00.00.00.

SEC Ref No.	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA

LEGAL NAME OF SECOND	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	JANG	Jaehoon	
SIGNATURE		DATE —	

LEGAL NAME OF THIRD	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	CHAE	Donghyuk	Manage Commission
		.J	
SIGNATURE		DATE –	

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
FOURTH INVENTOR/ASSIGNOR	LIM	Youngho	
SIGNATURE _	34	DATE	15/007/2012

SEC Rof No	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA	

COMBINED DECLARATION (37 CFR 1.63) FOR UTILITY PATENT APPLICATION AND ASSIGNMENT FORM
Page 4 of 5

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OSSIGNMENT

LEGAL NAME OF	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	KIM	Hansoo	
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SIGNATURE _		DATE —	Westman

LEGAL NAME OF SIXTH	Family Name	First Given Name	Second Given Name
INVENTOR/ASSIGNOR	JEONG	Jaehun	
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SIGNATURE		DATE	
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SEC Ref No.	IE-200908-050-1-US1	Attornev Ref No.	8947-000488/US/CPA

From: Harness Dickey 703-668-8200

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Page: 18/22

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Page 1 of 5

From: Harness Dickey 703-668-8200 To: 95712730140 Page: 19/22 Date: 12/20/2012 6:05:29 PM

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From: Harness Dickey 703-668-8200 To: 95712730140 Page: 20/22 Date: 12/20/2012 6:05:29 PM

SAMSUNG ELECTRONICS CO., LTD.

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 Harness, Dickey & Pierce, P.L.C. 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)

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INVENTOR/ASSIGNOR	SHIM	Sunil	
			The state of the s
SIGNATURE		DATE	

SEC Ref No.	IE-200908-050-1-US1	Attorney Ref No.	8947-000488/US/CPA
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LEGAL NAME OF	Family Name	First Given Name	Second Given Name
SECOND INVENTOR/ASSIGNOR	JANG	Jaehoon	
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INVENTOR/ASSIGNOR	CHAE	Donghyuk	
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	Family Name	First Given Name Youngho	Second Given Name

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

SEC Ref No. _________ IE-200908-050-1-US1 _____ Attorney Ref No. ______ 8947-000488/US/CPA

REEL: 029585 FRAME: 0476

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LEGAL NAME OF FIFTH	Family Name	First Given Name	Second Given Name
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SEC Ref No. IE-200908-050-1-US1 Attorney Ref No. 8947-000488/US/CPA

PATENT REEL: 029585 FRAME: 0477