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(30) 2000-152651 2000 05 24 (JP)

(73) 가 가 2 2 3

(72) 2 2-3 가 가

2 2-3 가 가

2 2-3 가 가

2 2-3 가 가

가 2 2-3 가 가

(74)

:

(54) 가

(2) 가 DRAM (4) 가 (132)

가 (1) 가

가

1		1	(1)	
2	1		(132)	
3				
4	3			
5	2		(312)	1
6	5		(312)	
7		(312)		(312a)
8	7		(312a)	
9		2		
10	9	DRAM		
11	10		PCKT1, PCKT2	1
12			2	
13			3	
14				
15		I/O		
16	15		(1172a)	
17	14		(1154)	
18	17		(1154)	(528)
19				가
20				
21			2	
22				
23	21		(620)	
24	1.5V	3.3V		1 (660)
25			2	(680)
26			3	(710)
27			(730)	
28			2	(740)
29			3	(757)
30		3	(800)	
31	30	DRAM	(810)	
32	30	/	(806)	
33	30		DRAM	
34	33			
35			(1000)	
36		LSI		
37	36	DRAM	MEM	

< >

1 :
2 :
4 : DRAM
100a :
118 :
120 :
122 :
124 :
126 :
128 :
130 :
132 :

, BA0 BA2 (1040 1044)
 , BA0 BA2 (1052) , (1122) ,
 (1000) () / 가 0 7
 (1000a 1000g) , (1122) (1136)
 , () (1244) , (1134)
 () (1242) , G-I/O
 I/O G-I/O (1266) ,
 I/O G-I/O (1070) DQ0 DQ31
 (1086) , (1086) (1072 1082)
 (1072 1082) (1046)
 36 LSI
 35 , LSI CH LG DRAM MEM . DRAM V
 PP LG VGEN1 , VBB VGEN2
 T50 3.3V LVDDH가 T51 1.5V
 LVDDL , DRAM MEM T52 3.3V DVDDH가
 T53 1.5V DVDDL
 LSI , DRAM MEM
 LG LVDDH, LVDDL 0V
 LG 가 가
 LSI 가 가
 LSI가 DRAM 1
 가 ,
 DRAM MOS
 가 가
 37 36 DRAM MEM
 36, 37 DRAM MEM
 (1404), (1406), (1414)
 (1412), (1416)
 DVDDL (1402),
 (1408), (1410),
 (1414) DVDDL 36
 가
 DRAM
 가
 1 , 2
 1 2
 1
 1
 [1]
 1 (1)

1 (1) PG (2)가 , (2) , DRAM (4) (2) ,
 (2) CLK, /CLK, CKE, /CS, /RAS, /CAS, /WE , Vref ,
 (2) RA0 RA12 , CA0 CA10 , BA0 BA2 DRA
 M (4) (2) DRAM (4) 1 (2) DRAM (4) DQ0 DQ31 .
 (2) DRAM (4) 1 , 1 ,
 DRAM (4) (2) DRAM CLK /CLK (50, 52
) , (50, 52) int.CLK (11
 8) , CKE, /CS, /RAS, /CAS /WE int.CLK (12 20) ,
 (12 20) (120) .
 CKE 가 ,
 가 가 DRAM (4) ,
 /CS 가 , 가
 (L) (120) , ROWA, COLA, ACT, PC, READ,
 WRITE, APC SR .
 ROWA 가 , COLA 가
 PC , ACT . READ
 , WRITE
 APC .
 SR ,
 , , SR가
 , 가 ,
 DRAM (4) H L VREF .
 DRAM (4) (122) , RA0
 RA12 (124) , CA0 CA10
 (126) , (124)
 (140) , (126)
 (122) (134) , (134) ,
 42) , (40 44) (1) int.CLK
 BA0 BA2 (128) , (128)
 (136) .
 , BL , CAS
 CL ,
 BA0 BA2 (2) BA0 BA
 2 (128) , (136) ()
 DRAM (4) SR
 (132) , (132)가
 (140) (136) SR (144)
 DRAM (4) / 가 0 7
 (100a 100g) , (144) ()
 (244) , (142) ()
 (242) ,
 I/O G-I/O G-I/O
 I/O (266) , (130) , G-I/O (130)
 G-I/O (2) DQ0 DQ31 (72 78) .

DRAM (4) 3.3V VDDH , 2.0 VDD2
 VDC (138) .
 2 1 (132)
 2 , (132) 1 (120) SR
 TRIG (302) , (302)
 CYCLE (304) , TRIG (306) , CYCLE
 RASCK RAS (308) , RASCK (310)
 EQ, MWL, SO, PC EQ, MWL, SO PC
 IEN (310) .
 EQ , SO (132) PC
 SADR, (312) PON EADR (312) SRRST
 ReADR , 가 RASCK TRST (302)
 (132) (302) , TRIG가 ,
 TRIG (312)가 (302)가 (312)
 가 , (312)
 3 3 5 IV1-IV5가 IV1 IV5 가 IV1 MOS
 IN , N MOS L NT . IV1 MOS PT NT , P MOS
 가 PT , N MOS (L-Vth) MOS Vcc (321) , (321) P
 MOS IV1 IV5 PQ N MOS NQ (323) , Vss (322) ,
 MOS (322) PQ NQ MOS 가, MOS (324) PT NT .
 MOS PQ MOS / , MOS H NQ 가 가
 L 가 , / L 가 가
 H .
 IV1, IV3 IV5 ... P MOS PT 가 (321)
 , N MOS PT 가 NT 가 (324) N MOS NT IV2, IV4, ... P (322)
 MOS (323)
 4 3 4 L H ,
 3, 4 IN L MOS PQ NQ가 가 가 PT
 가 , N MOS IV1, IV3 IV5 IN L MOS P MOS (321)
 가 , N MOS PT MOS NT가 가 NT (324) 가 Vcc
 P MOS PT () (321) 가 .
 , N MOS NT L 가 가 , (324)
) M-Vth MOS NQ (322)
 , IV1, IV3 IV5 ... 가 (324) , SVss가
 MOS NQ Vss (324) SVss MOS NQ가 , (324)
 SVss가 Vss , IV1, IV3, IV5 ... N MOS NT
 가

MOS (322) IV2, IV4 ... PT 가 (323) IV2, IV4 ... MOS N MOS NT 가 P
 Vss , P MOS PT 가
 OS PQ가 (321) (323) (321) (M-Vth)가 MOS M
 PQ2 (323) SVcc (323) Vcc PQ SVcc가
 Vcc IV2, IV4, ... IV2, IV4 ... P MOS PT -
 가 가 H / 가 L MOS
 PQ NQ 가 (321) (323) (322)
 (324) Vss (323) SVcc가 Vcc IN MOS
 가 IV1 IV5 ... MOS PQ NQ
 MOS
 /
 2 (312) MOS
 가 가 MOS PQ, NQ
 5 2 (312) 1 SADR (334) 2 RAS (332) , (308)
 5 (312) EADR ReADR0 (336) ReADR0 (332)가
) 가 RASCK TRST ReADR0 SADR (334)가 EA ()
 (312) (336)가 ReADR0 EADR IEN AND (342) ,
 DR (338) , ReADR0 (338, 340) ReADR IEN (344)
 6 5 (312) 가 t1
 5, 6 가 DRAM t1 가
 CLK L DRAM /CS, /RAS, /CAS, /WE LSI 가 가
 DRAM t1 가 가
 가 ,
 가 CADD0 CADDn RADD0 RADDn
 SADR EADR 가 DRAM
 가 DRAM 가 t1 (312) (332, 334) ,
 가 DRAM

1 (120) SR (132) , 2 (302)
 , 가
 t2 (302)가 (304)가
 YCLE TRIG , (306)가 C
 336) RASCK가 (312) (312) (
 , 가 RASCK가 (336)가 ReADR0
 (336) 가 ReADR0
 IEN (338) (340)
 t2 t3 가 (344)
 IEN (310)
 , 가 가
 t3 (336)가 ReADR0 (332)가 가
 , (338) IEN
 , t4 (334)가 EADR (336)가 RASCK
 IEN ReADR0 (340)
 t5 (336)가 가 (336)
 TRST (312)
 t6 (302)가 TRIG가 t7 가
 (312) 가
 t8 CKE가 H , DRAM
 CLK가 가
 DRAM
 7 (312) (312a) 5 (312) (338, 3
 7 (342) (312a) (344) (352) (354)
 40), AND (312) (352) (332, 334) 가 SADR EADR
 (306) SELC 2 (306) 가 R
 가 SELC RASCK가 (336) R
 eADR 가 , 4012 32ms RAS
 , CK 4 4012 4 1
 (336)가 ReADR (334)가 EADR
 (354)가 2 (302) (312a) TRST
 8 7 t1 가 (302) 6
 7, 8 가 t2 가
 t2 (302) TRIG가 (306)
 (352)가 CYCLE (336)
 (332) SADR ReADR 6
 가 6 가 , 6
 가 ,

t5 , (336)가 , (354)
TRST가 , (302)
[2]
1
DRAM
가 가
9 2
9 , CH LG DRAM MEM , DRAM VPP
VGEN1 VBB VGEN2가
3.3V LVDDH , T2 1.5V VDD
LG T1 VDD DRAM MEM T3 3.3V
DVDDH가
LG DVDDH LVDDH VDD
. DRAM MEM
10 9 DRAM
10 , DRAM ARY1, AR
Y2 PCKT1, PCKT2가
1.5V
가 ,
가 가
PCKT1 L1, L4 1.5V VDD
가 ARY1, ARY2
PCKT VDD3 , DRAM 9 3.3V
DVDDH , DRAM DVDDH
PCKT2가 VDD3 2.0V VDC , V
, 3.3V DVDDH L1, L4 SE1, SE2가
DD VDC
N SE1 , SR VDC L2
MOS VDD L2 Tr2 , N MOS Tr1 /SR
SE2 L3 SR L3 Tr3 , /SR VDC
VDD 가 L1 L2 Tr4 가
SW2가 , SW1, SW2 SW1 L3 L4
11 10 PCKT1, PCKT2 1
11 , DRAM (402), (404),
(406), (408), (410),
(414) (416)가 (412),
(402) , 1 (50, 52) (118)가
(404) , (12 20) (120)
(406) , (12 20) (120)
가 (408) , (124), (140)가
(410) , (40 44) (128), (136)가
(412) , (126), (134)
(142) (414) , (72 78)
(130)가 (416) (132) (144)

1, 1, 10, (414)가 VDD
 VDD3, PCKT2, 11, DVDDH, PCKT1, (414)가
 (408), (402), (404), (406),
 (410), (412), (416)
 가
 12, 2, VDD, (424), (414),
 12, (412), (406), (402), VDD3, (422)
 (416), (404), (408),
 (410)
 12, 10, PCKT1, (402), (406),
 (412), (414)가, PCKT2
 (404), (408), (410)가
 13, 3, VDD, (428), (402), (406),
 13, (408), VDD3, (410), (412), (41
 4) (404), (426), (416)
 13, 10, PCKT1, (402), (406),
 (408), (410), (412), (4
 14)가, PCKT2, (404), (416)가
 가
 14, 4, 4, I/O, (1152)가
 (1142), (1150)가
 (1148), (1160)
 S, (1146), YS, SDYS가, MYS가, SDY
 SYS가, I/O, (1162), I/O, (1164), YS
 , SD, (1144), SD가, MWL, SD
 (1166), 가, (1168)가, (1170)
 가 I/O, (1164), (1158), 가
) (1153)가, (1154), I/O, (1164), (1154
 (1172), (1154), (1153), (1172)
 (1174), (1176)
 11, 12, 13, (414)
 가, VDD, (1172), (1174), (1176), 가
 I/O, (1164), 가
 15, I/O, (1172), VDD가, (1172)
 15, (1172a, 1172b), WDATA, WDATb, (1172a, 1172b)
 (1172a, 1172b), 가, VDD3, 가, (504)
 AND, (505a), /SR, (1172b), L, AND, (505b), (1172a), (505a)
 I/O, WIOa, (1153a), AND, (505b), AND, (505b), I/O
 WIOb, (1153b), /SR, L, AND, (505a, 505b), (504), H
 , I/O, H
 , 16, 15, (1172a), D, /CK, (508)
 16, (506), (506), (508), (508), CK, (508)
) (508), CK, (510), (512), /CK
 (508), (512), (514), (514), /CK
 (514), (514), (514), /CK

(516), (514) Q (518)
 (1172b), (1172a) 가 (504) /
 15, (1172) VDD가
 (1172a, 1172b) 가
 SR I/O 가 VDD
 17 14 (1154)
 17 I/O, /RIO (528)가 H
 I/O (528) VDD3
 I/O, /RIO (1154) (1154)
 (1172c) RDAT
 (1154) (1172c) 가
 VDD
 18 17 (1154) (528)
 18 (528) I/O, /RIO VDD3 P
 MOS (538, 540) MOS (538, 540) /PC
 (1154) NOUT1 I/O, /RIO가 N
 MOS (534), NOUT2 I/O, /RIO가 N
 MOS (536), VDD가 NOUT2 I/O, /RIO가 NOU
 T1 가 NOUT2 P MOS (532), VDD가 NOUT1
 가 NOUT2 MOS (530) VDD
 19 가
 19 가 (626) SR
 Add (606), SR (616), SR (618)가
 Ref-Add (606) (606) (614)가
 (608) (608) SR
 (608) (604) (610)
 (604) (602) (610)
 가 (610) (612), (612)
 (610) (612)
 CMD (620) SR (618) (622)
 (620) SR (624)
 (624) (628)가
 19 가
 19 (614), SR (616), SR (618)
 (602) (604) 3.3V
 (608, 620) (626, 628) , 1.5V
 20
 20 Add
 Ref-Add 19 (608) (608) Add
 Ref-Add (608a) 608c)
 SR (550) (550) N1
 N MOS (552) 556) N MOS (552) 55
 (608a) 608c) N1 MOS /PC
 P MOS (566) OUT VDD3 OUT N1 N1 VDD3 (558)

P MOS (564)
 (558) VDD3 MOS (562) , N MOS MOS (560) P MOS (560) N MOS (560),
 N MOS (562) N1 OUT , N MOS MOS (560) N MOS MOS (56
 2)
 21 21 , 2 (609) 1 (549) (608)
 (550) (568, 570) (568) 20 (549) 가
 N MOS (572 576) Add N1
 (570) Ref - Add (578 582) N1
 N MOS (570) , Add
 Ref - Add 가 L MOS (570) N MOS Add
 가 L Vth가 N MOS (568) (570) (568) L
 , Add (572 576) , 가 , L
 (570) (578 582)
 L , 19 가
 22 22 , N3 CMD N
 MOS (638) , N2 N MOS (638)
 VDD가 N MOS P MOS (636) , N2 VDD가
 가 N3 가 N2 P MOS (632) (634) VDD가 N3 OUT
 , CMD VDD
 23 21 (620) CMD N
 MOS (648) , (620) N6 MOS (648)
 /SR 가 N4 N MOS (646) , N4 VDD3
 N6 가 N4 P MOS (642) , (644) VDD3 N6
 OUT (620) , N6 Ref - CMD
 N MOS (652) , N4 N MOS (652) (650) N MOS (650, 652) 가
 N MOS
 24 1.5V 3.3V 1 (660)
 24 , (660) Sig N10 (666) , (666)
 Ref (666) Mode
 670) , 3.3V 가 (676) , 3.3V 가 (678) , N10 MOS (672), N
 MOS (674), N MOS (678) , N MOS (676) P MOS N10
 OS P MOS (674) N MOS (672) N MOS (676) P M
 . P MOS (674) N MOS (678) MOS (676) Sout
 (660) , (672 678) MOS 가 ,
 MOS 가 가

25 25 2 (680) Sig (680) (686) , Mode (692) , (680) Mode (694) N12 Ref (696) (694, 6 N13

(680) Mode가 L (686) Sig N12 N13 (68

(682) , (680) Mode가 L N14 가 N12 N MOS (704) (702) , N15 가 N13 N MOS P MOS (698) , 3.3V가 N14 가 N15 가 N14 P MOS (700) (680) Ref 3.3V 가 (660) 3.3V , 1.5V (682, 688) 24 (710) 3 (710) Sig (722) , N23 N23 (72

26 26 , (710) MOS (716) , N21 3.3V가 N23 (718) , N20 3.3V가 N21 (712) , 3.3V가 (714) (710) P MOS Mode (730) , N21 (728) , Mode (728) Ref (710) (724) (722) (680) 1.5V Sig 2 (710) Ref (710) (680) 1.5V

27 27 (730) WE Yadd NAND (736) , NAND (732) C CS (732) , (736) NAND (734) , NAND (734) (738) , NAND (734) (740) 1.5V (734) H (740) WE 3.3V (742) , NAND (742) 1.5V 2.5V Self (746) , (746) Self (746) , (746) N30 P MOS (752) , N30 N30 2.5V 3.3V (740) 가 , 2.5V/3.3V Self H (748) 가 N30 H (748) CSLWL, CSLWR (744)가 H N30 (748) (742) CSLWL, CSLWR (742)가 H N30 (748) (742) (748) (757)

28 28 (742) , NAND (742) 1.5V 2.5V Self (746) , (746) Self (746) , (746) N30 P MOS (752) , N30 N30 2.5V 3.3V (740) 가 , 2.5V/3.3V Self H (748) 가 N30 H (748) CSLWL, CSLWR (744)가 H N30 (748) (742) CSLWL, CSLWR (742)가 H N30 (748) (742) (748) (757)

29 3 (757)

29 , (757) WE Yadd NAND
 (758) , NAND (758) (760) , (760) H Self
 (762) , (760) (770) , (770) Self (762) Self
 CSLWL (764) , (770) Self (768)
 CSLWR (772) , Self
 CSLWL, CSLWR N MOS (76
 6, 778) .
 (757) 28 (740) ,
 (754, 756)가 ,
 (762, 768) (764, 772) (762, 768)
 CSLWL, CSLWR L
 가 .
 가 , LSI DRAM
 [3]
 30 3 (800)
 30 , (800) 가 (802) ,
 (802) (802) DRAM (804)
 . DRAM (804) NPDSR PDSR
 / (806) , (802)
 (812) , (812)
 (814) , (814)
 (808) , 3.3V VDDH 1.5V CLKS VDD
 , 812) 1.5V VDD3 2.0V VDD2 DRAM (810) , (814
 (812) 가 (860)
 (812) CMD 1.5V (822) , (802)
 RAD[14 : 0] 1.5V (824) , (802)
 CAD[7 : 0] 1.5V (826) , (826)
 (828) , (802) 1.5V CLK DRAM (804)
 (834)
 (812) (860)
 / (858) , / (860)
 (828) I/O (858)
 (832) (802) 1.5V DI REFS DO
 (814) (822) PDSR , / (806)
 REFSD (822) REFSD (833) ,
 NACT ACT (838) , REFA NACT NRSTR
 CLKR (840) , (840)
 (844)
 (814) REFA REFSD NACT
 (835) , REFA REFSD ,
 (836) , 가 (848) , (824)
 (846) (850) , (854) NRSTR (846) ,
 (814) CLKR (860) (852)
 (854) , (828) (856)
 (856) PDSR CSLR/W 가
 (808) REFSD (818) , (818)
 ,
 (816) , (816)
 (820) (820) CLKS
 ACT (838) .
 , (800) VDDH 3.3V
 . , VDD 1.5V VDDH

VDD (814) DRAM (810)
 가 1.5V VDD3
 (812) VDD
 31 30 DRAM (810)
 31 , DRAM (810) 3.3V
 (862) , 3.3V (862)
 (862) 2V (866) , 3.3V VDDH (864) ,
 VDD2 (868) , MOS (872) , 1.5V
 VDD (868) NVO N N MOS (870) NVO VDD2
 DRAM (810) VDD3
 , N MOS (870) 2V , N MOS
 (870) VDD3
 1.5V 가 VDD가 NVO
 (874)가 (874)
 32 30 / (806)
 32 , / (806)
 NRST (900) NRSTR NPDSR (902) NRESET (900) , NRESET
 / (806) , (882) , NPDSR
 REFA (900) 8 NRESET
 86) NRSTS (888) , OR (904) , (886) , (8
 RSET / (806) (890) /Q (886) L
 (883) (890) (883) , (882) Q N
 (884)
 PDSR (806) 1.5V CLK 30 CLK
 / (816) REFSD
 R (896) CLKS
 33 30 DRAM (800) DRAM (802)
 30, 33 NRESET가 t1 가 REFA가 가 t2
 t3 가 t3 t4 NPDSR L DRAM
 , t4 DRAM
 , t5 LVDDH 1.5V VCC 1.5 DVDDH t6
 가 , 3.3V VCC 1.5
 1.5V
 t7 200 μ NRESET L , NRESET H
 가 REFA 8 SREX NPDSR L H
 tSRX DRAM , DRAM tRC+1
 , 가 REFA가 가 가
 34 33 t4 NPDSR L (882)가 L
 32, 34 , (884) PDSR H
 FS t7 REFA가 8 NRESET가 (890) , (890)
 , (890) /Q t8 LAT가 H , (883)
) (884) , PDSR L 가

가 .

, , NRESET

, REFA 8 ,

, t9 NPDSR H , NPDSR ,

H , 3 가 ,

가 .

, 1 ,

, 가 ,

, .

(57)

1.

, 가

, (100a, 100g) ,

1 (130, 72 78) ,

2 (132, 144)

2.

1 ,

2 ,

,

,

(132) .

3.

1 ,

1 (T2) ,

1 2 (T3) ,

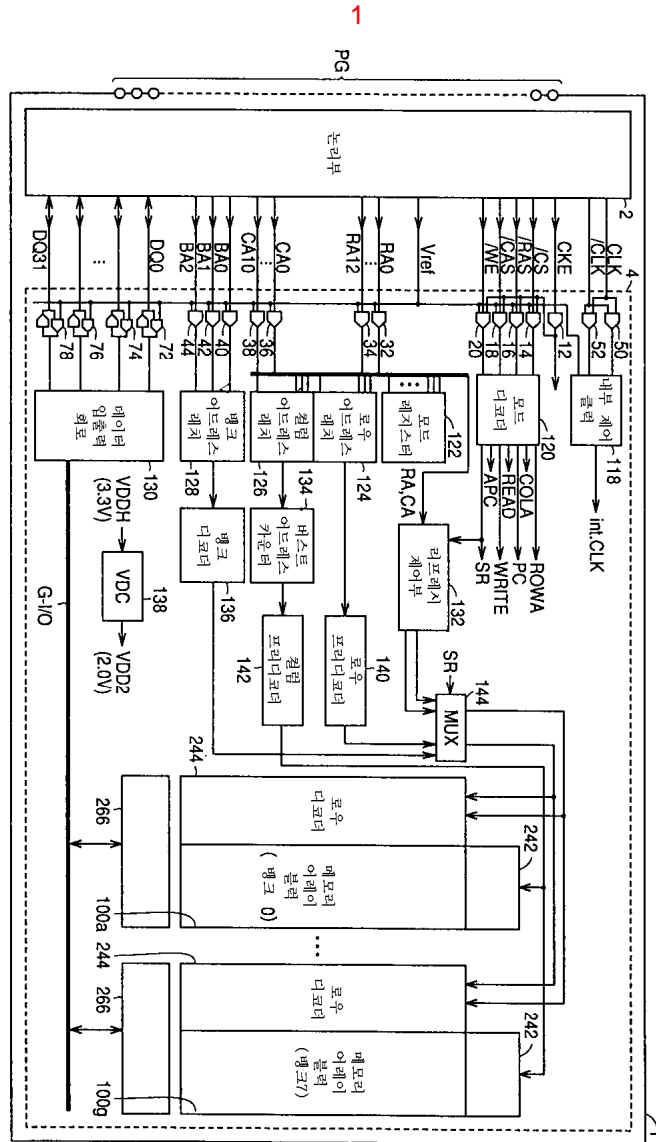
1 (PCKT1) (L1, L4) ,

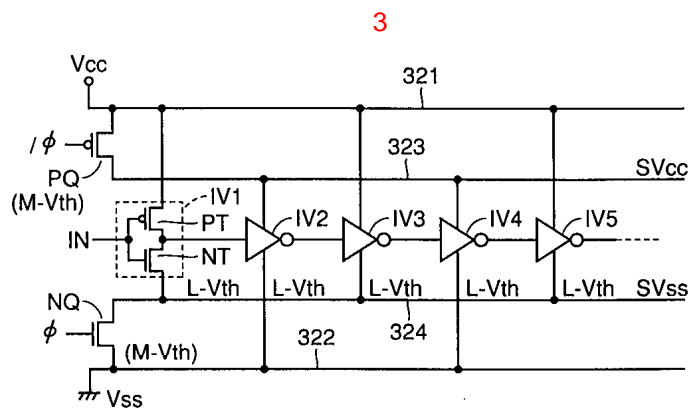
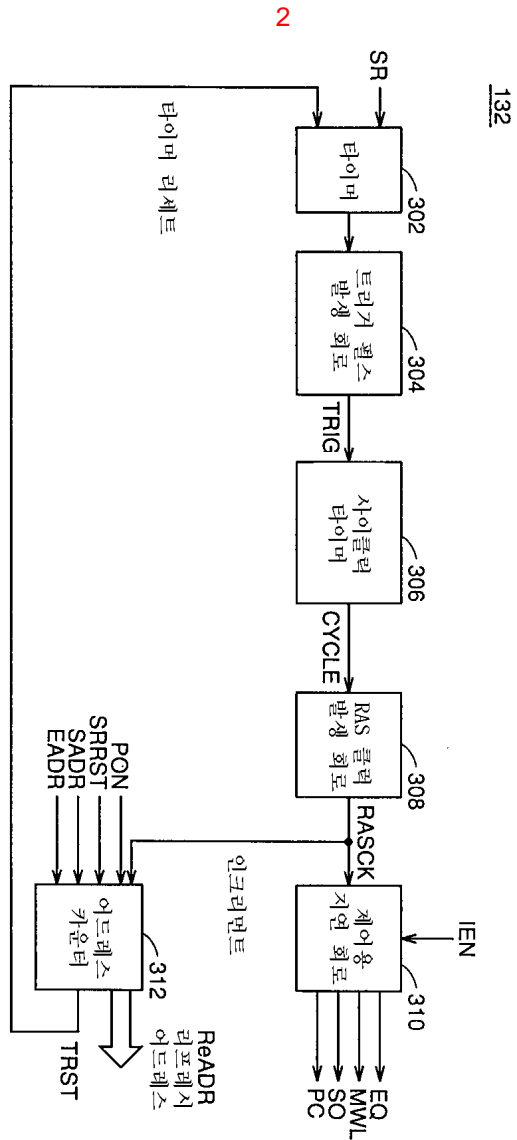
2 3 (VDC) ,

1 3 (SE1, SE

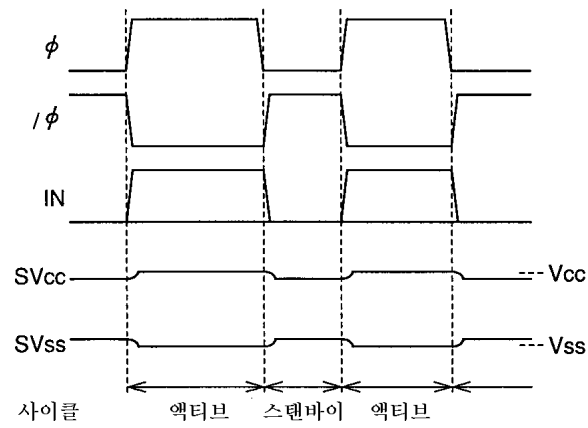
2) ,

2 2 (L2, L3)

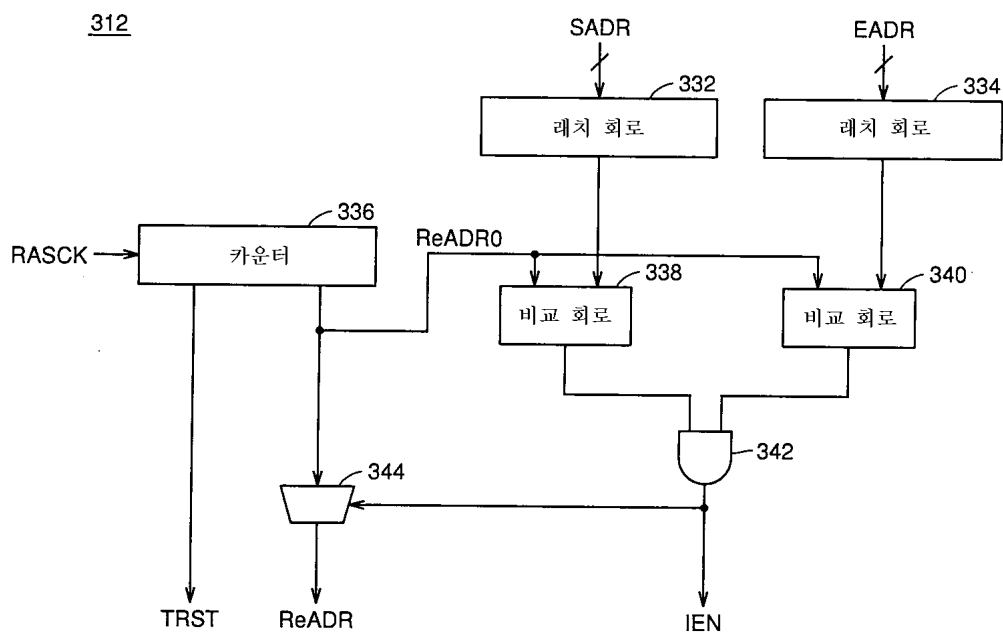




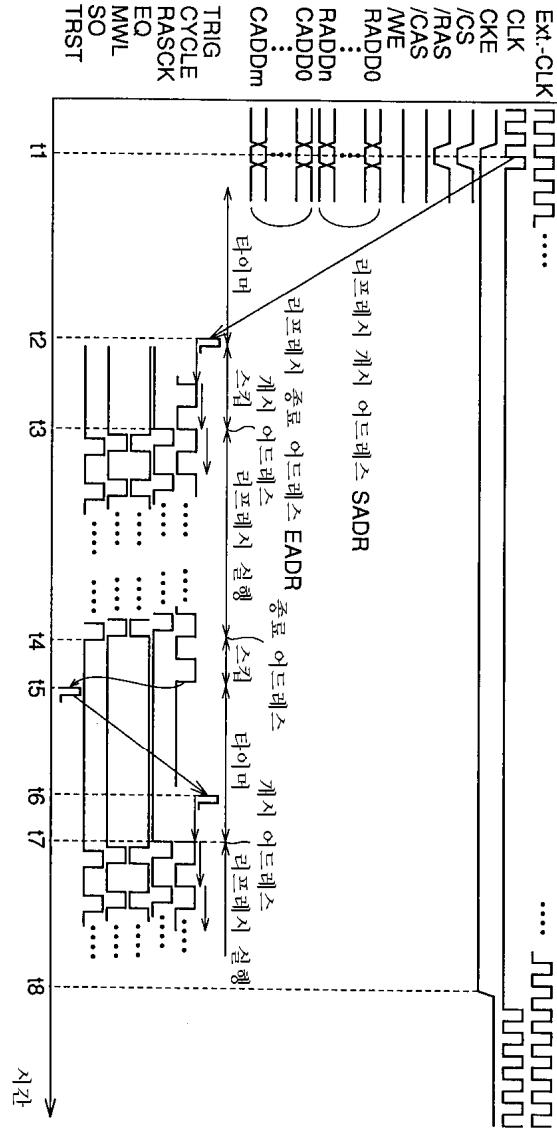
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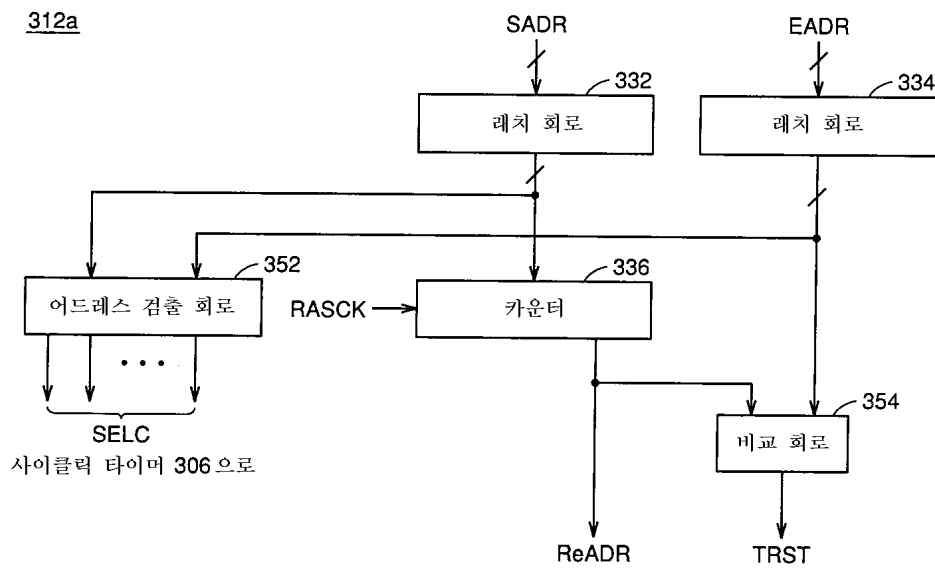
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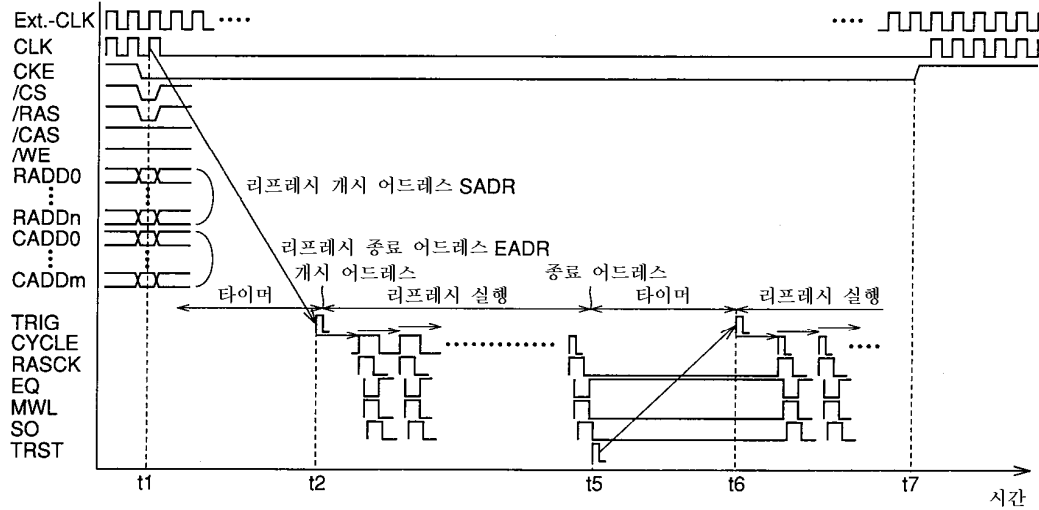
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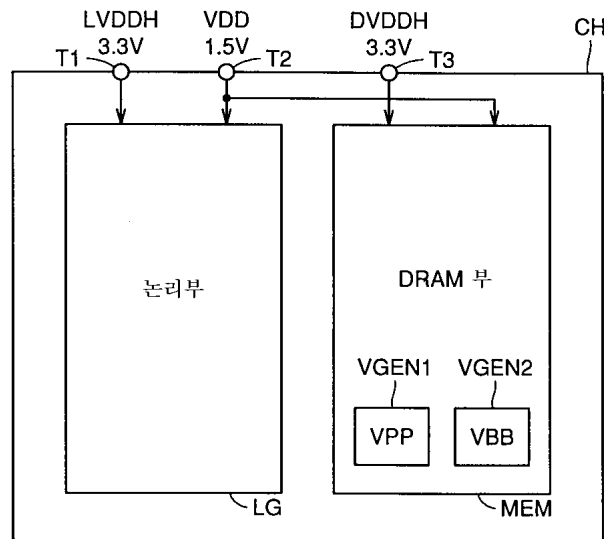
7



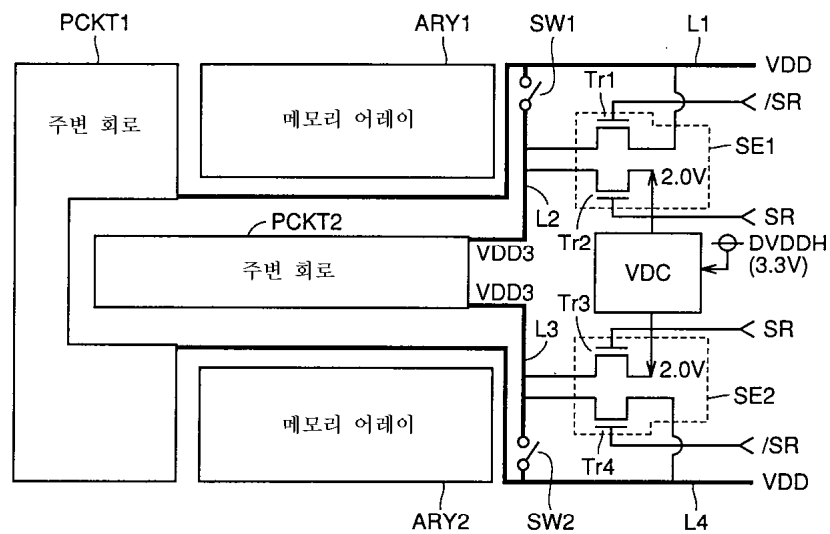
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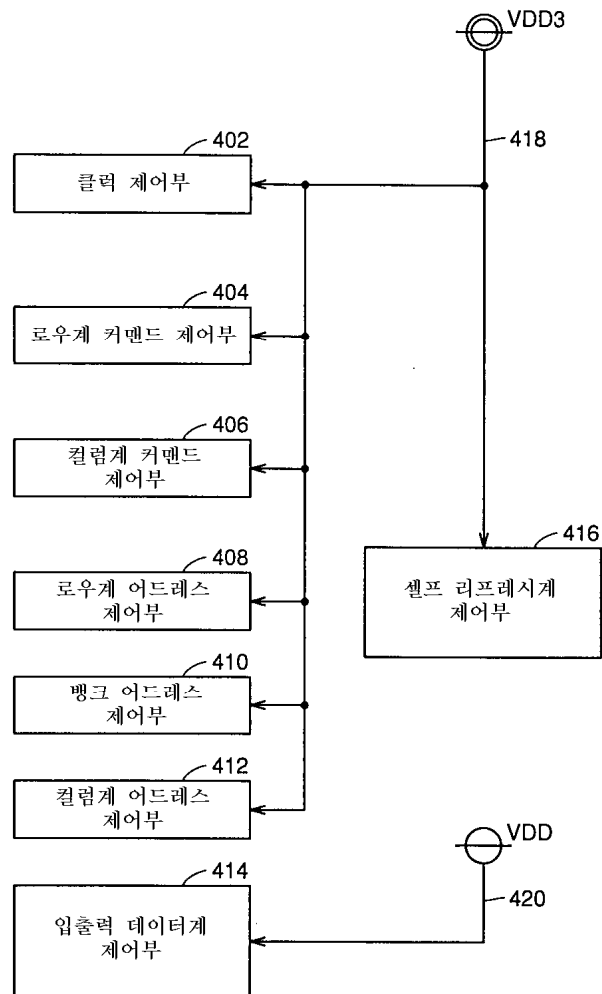
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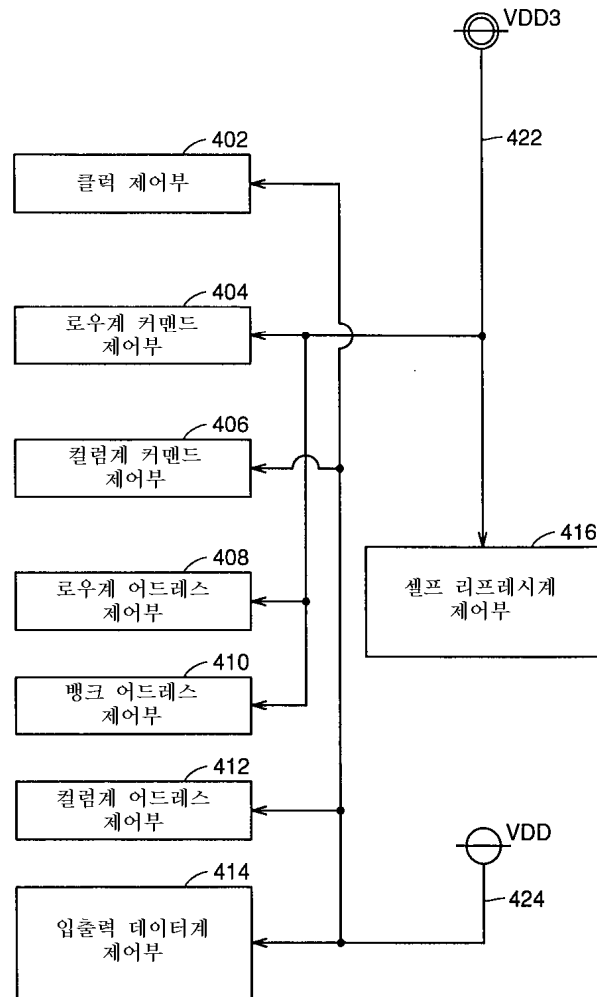
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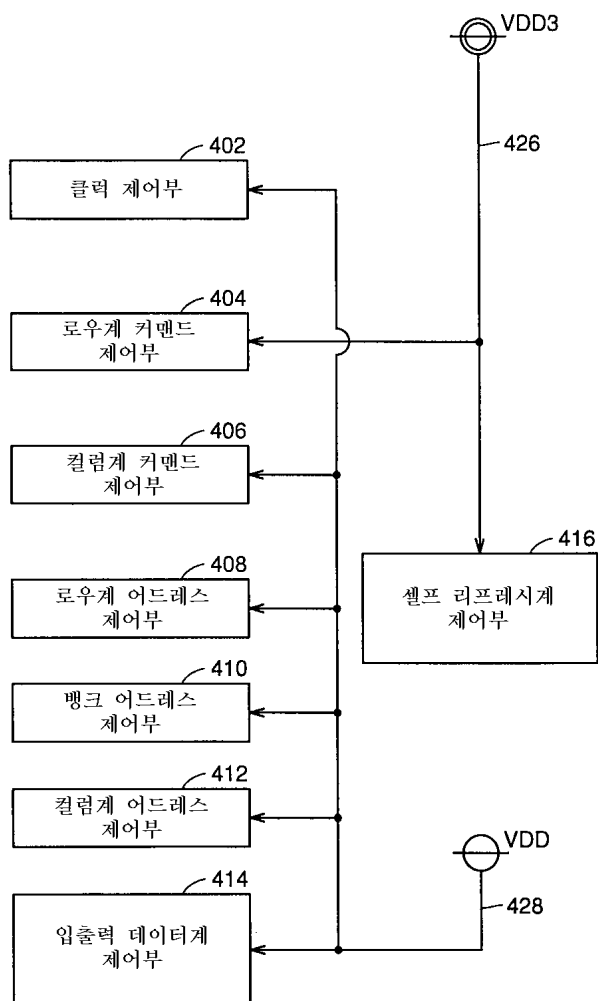
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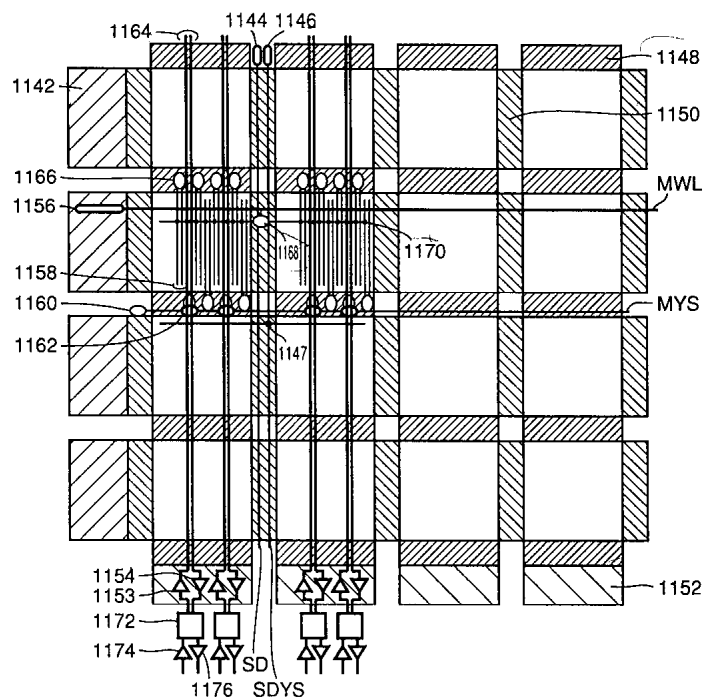
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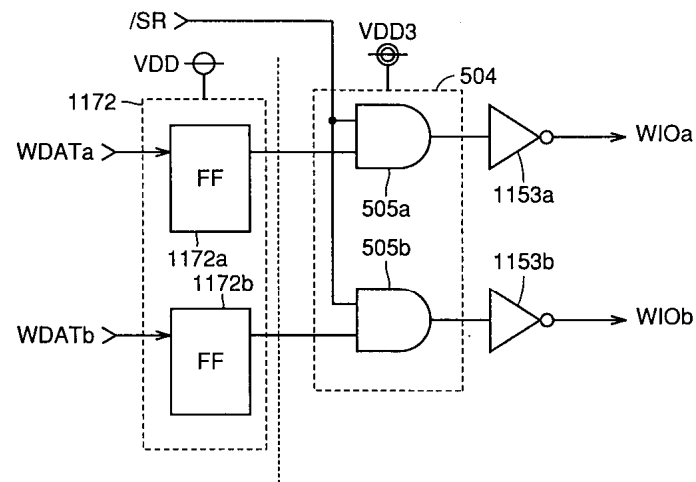
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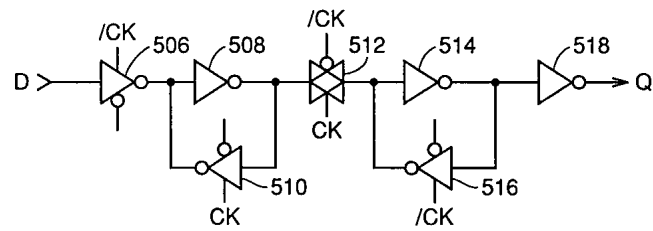
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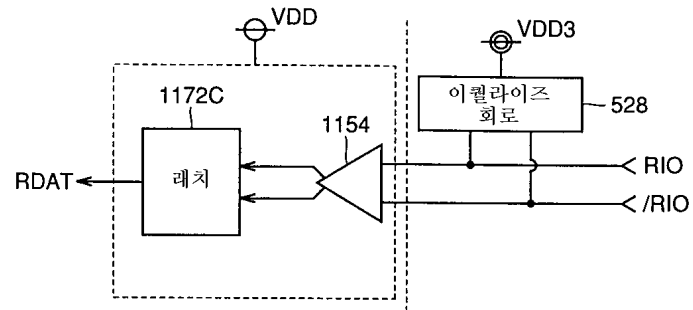
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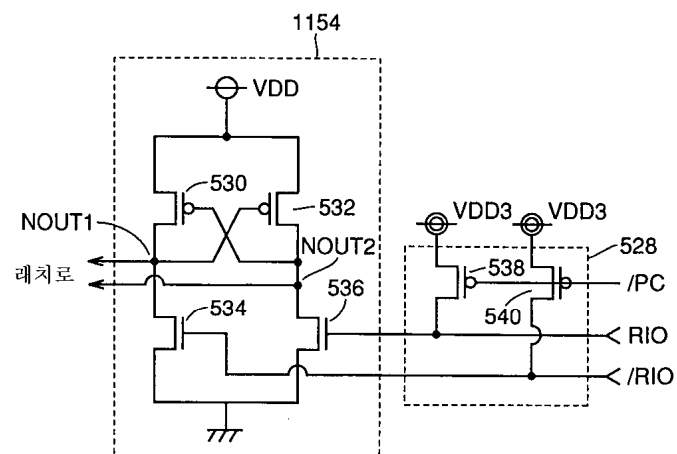
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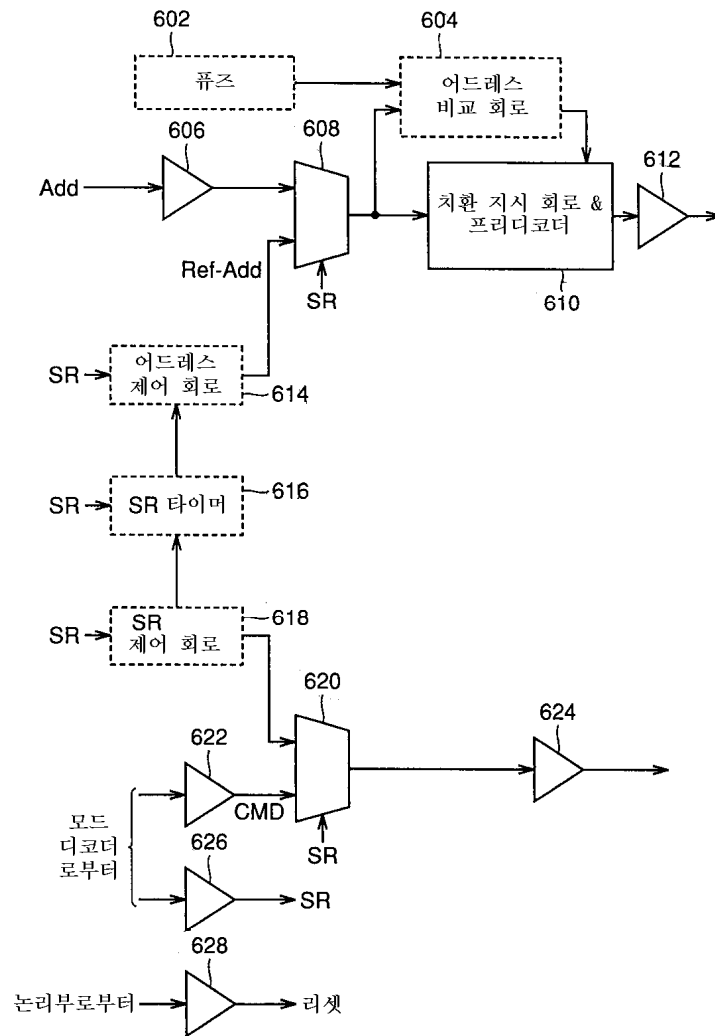
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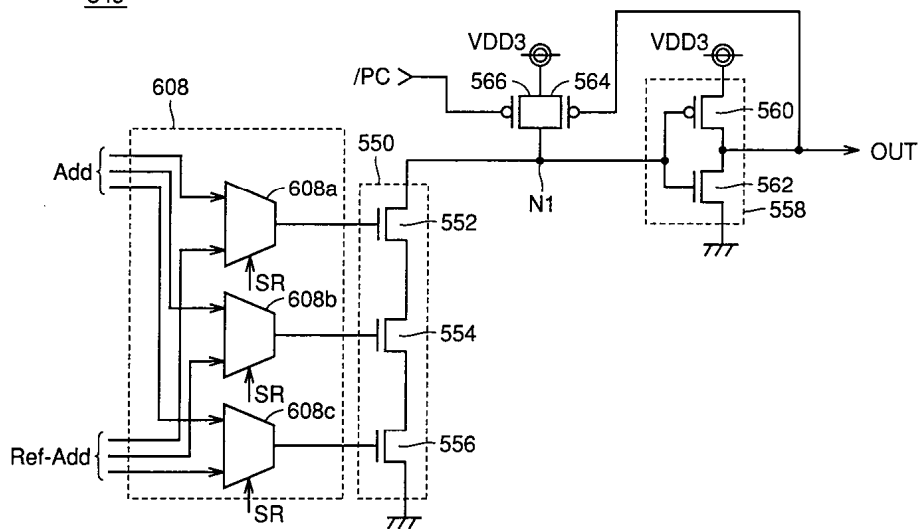


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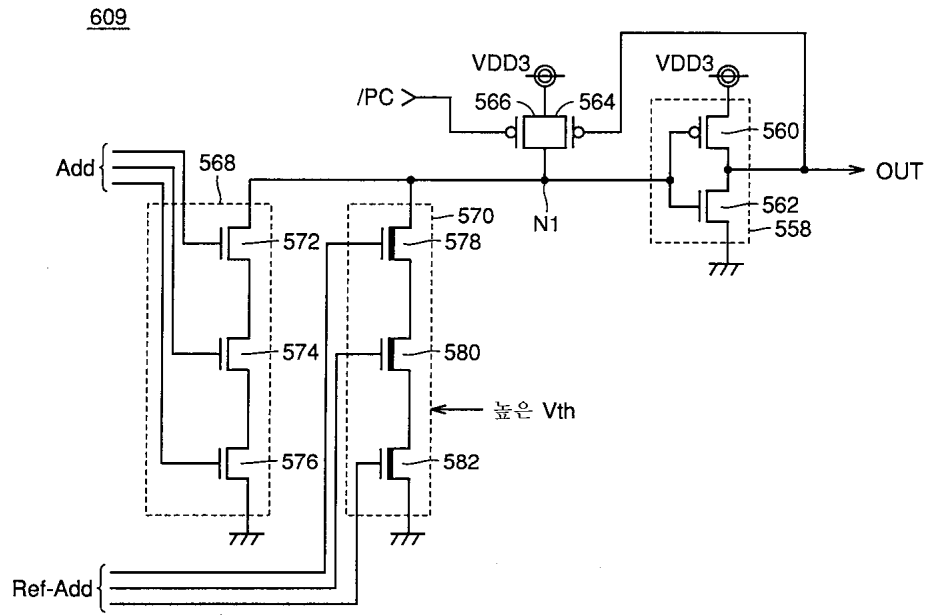


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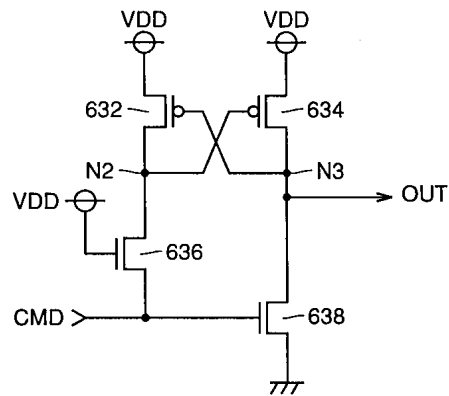
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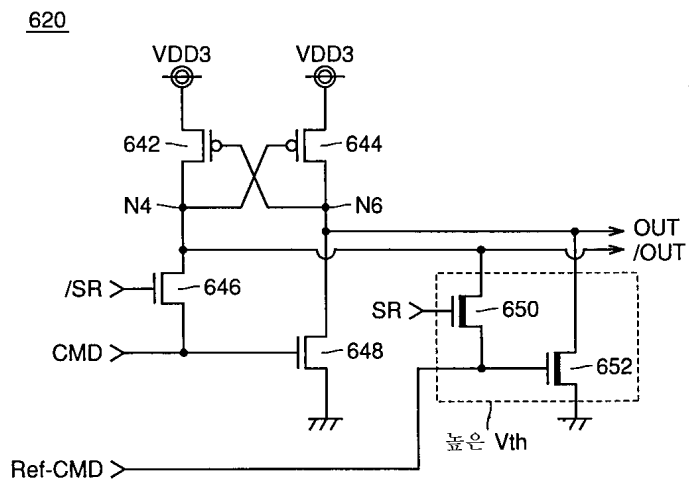
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22



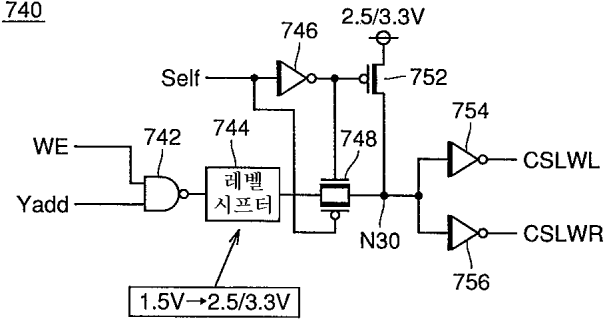
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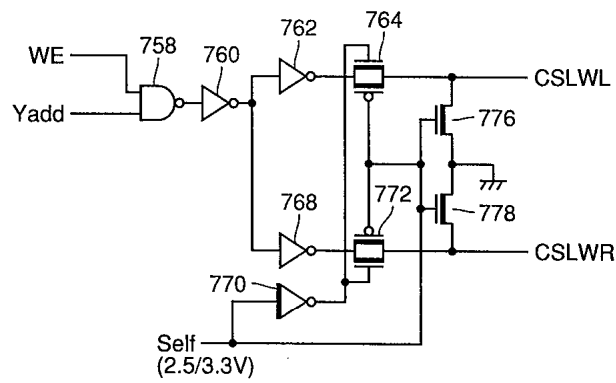
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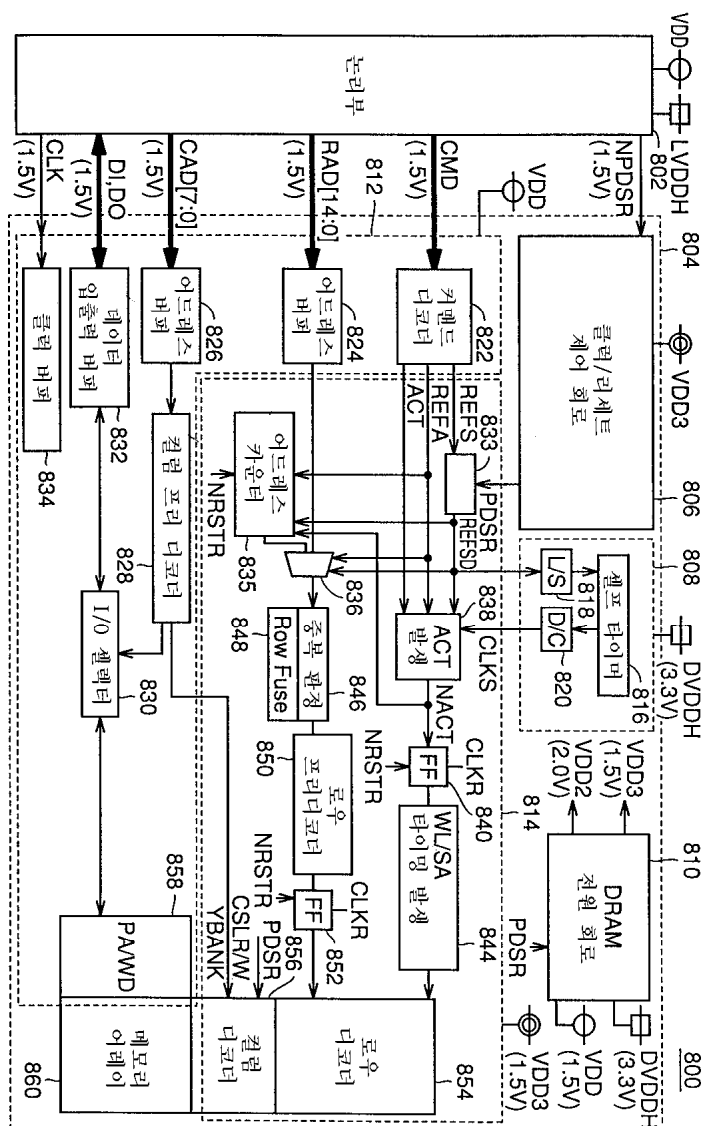


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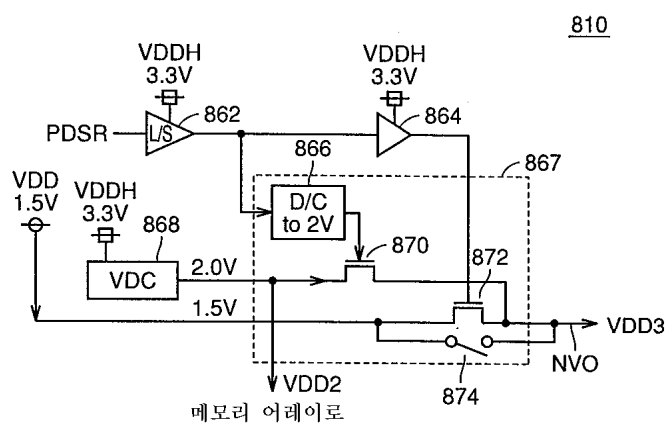
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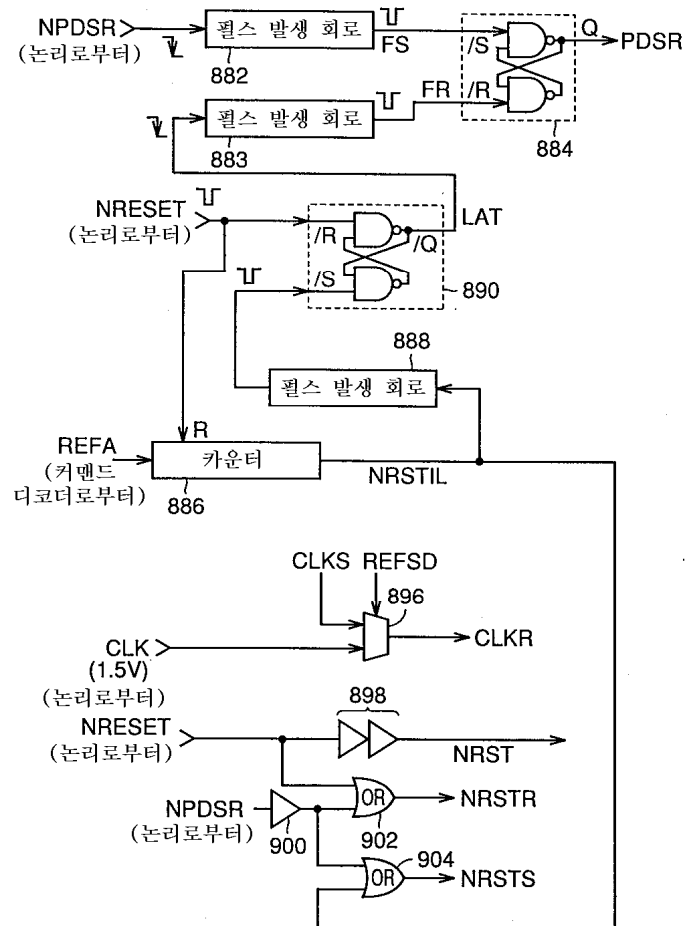
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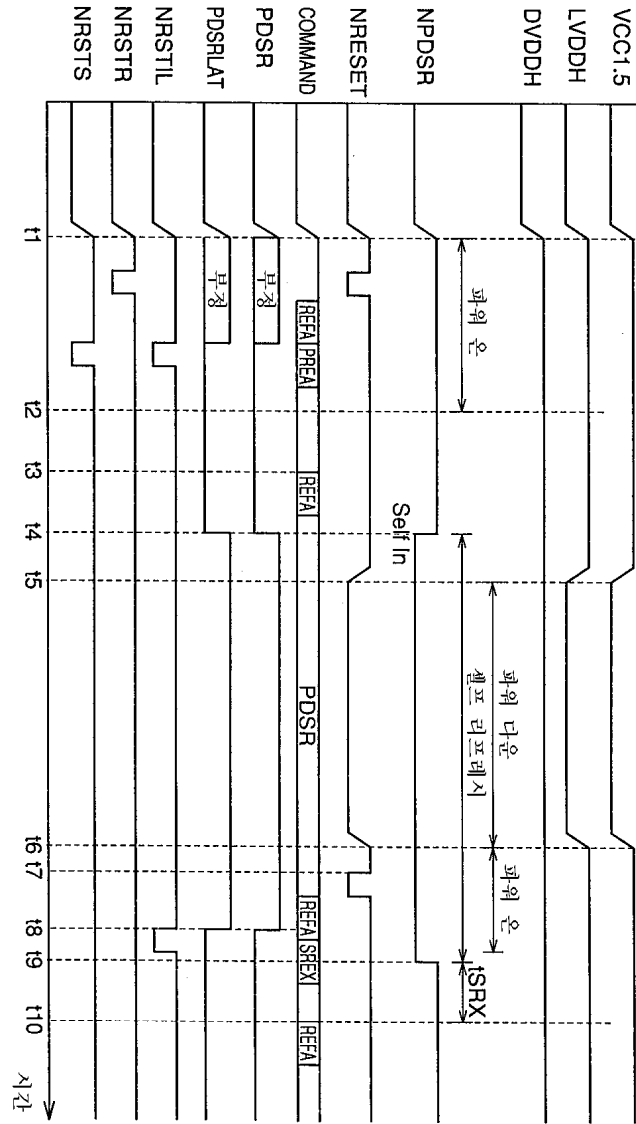
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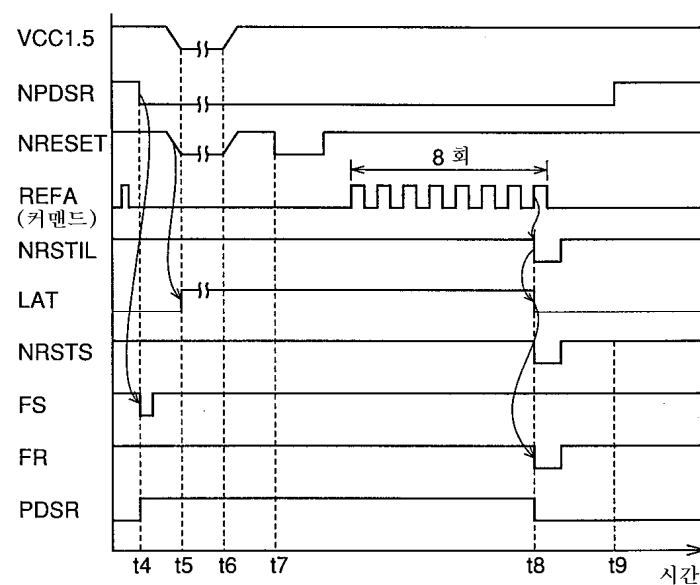
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(종래 기술)

