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(B1)(51) 。 Int. Cl. ⁶
H01L 27/04(45)
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(24)2002 02 02
10 - 0321815
2002 01 10(21) 10 - 1999 - 0012874
(22) 1999 04 12(65) 1999 - 0083141
(43) 1999 11 25(30) 1998 - 109547 1998 04 20 (JP)
1998 - 239928 1998 08 26 (JP)(73) 가 가
,
2 2 3(72) 2 2 - 3 가 가
2 2 - 3 가 가

(74)

:

(54)

(electrostatic protection circuit)

가

1		(1000)	.
2			
	(4000)	.	
3			
	(5000)	.	
4	1	(2000)	.
5	4	(50)	.
6	5	P - P'	.
7		(1000)	.
8		(2000) SOI(Silicon On Insulator)	.
9	8	Q - Q'	.
10		(2000)	.
11	10	R - R'	.
12		2	(3000) .
13	12	(61)	.
14	12	(62)	.
15		2	(3100) .
16		3	(400) .
17		(400) P	.
18	17	S - S'	.
19		가	1 .
20		가	2 .
21		(6000)	.
22			(7000)

<

1000 :

10 :

11 :

20 :

21 :

22 :

23 :

30 :

31 :

32 :

40, 50, 400 :

가 (electrostatic protection circuit) .

, 가 , 가 .

가 , , 가 .

21 (6000) .

21 , (Vdd1 , Vss1) Vdd1 , (Vdd1)
(22) Vss1 (, Vss1) (23) .

(40) (41) (42) .

(41) (42)
(11) Vdd1 (22) (11) Vss1 (23) .

(41) (,)
) , Vdd1 (22) PN (,

(11) Vdd1 (22) (正) , (41)
ON , (11) (41) Vdd1 (22) .

, (21) (11) .

(42) 가 , (11) Vss1 (23)
PN , (11) Vss1 (負)
(21) .

가
5 - 291503 .

22 3

22 (7000) 3 (301) (303)
(311) (313) (321) (323) .

, (7000) (311) (313) (321) (323)
(,)(341) (346) . ,
(341) (346) 3

, ,

, 21 22 가 , , ,

가 , 가

, 가

, 가 가 HBM(Human Body Model), MM(Mac
hine Model), CDM(Charged Device Model) 가
 , 가 .

distance) , 가 (electrostatic breakdown re

1 1 .

2 1 2 .

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, 1 2 가 , 1

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1 1

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1 2 .

1 1

, , 2 1 1

1

가 . , 가

, .

가 가 가 ,

.

, .

1

<

1 (1000) .

1 , (1000)

(10), (30)

(20),

(10) 가 .

(20) .

(20) 가 , ,

, 가 .

(30) ,

(30) .

가 , 1 (20) 가

2 21

(4000)

(22)(, Vdd1 (4000) (6000) (31),
(32)(, Vdd2 (31) (, Vdd2) (33)(
, Vss2)

(40) (41) (42)

(11) Vdd1 (22) Vss1 (23)
(40) 21
(32) Vss2 (33) (11) Vdd2 (32) Vss
2 (33) (40) (41)
42)

3 5 - 291503 (4000)

(5000)

3 (5000) Vdd1 (22) Vdd
2 (32) Vss1 (23) Vss2 (33) (50)

(50) (51), (52) (53), (54)
(50) (31) (21)

(50) (52) Vdd2 (32) Vdd1 (22)
(51) Vdd2 (32) Vdd1 (31)
(11) Vdd2 (41)
(51) Vdd2 (32)

(53), (54) 가 , Vss2 (33) (11) V

ss2

4 (51), (52) (53), (54)
1 (2000)

4 (55) (58) (50)

(55) (58)

(55) (58)

5 4 (2000) (50)

6 5 P - P'

5 4 (55) (56)가

(56) (55) (105) (104) Vdd2 (32) 가 ,
(205) (204) Vdd1 (22)

6 (55) (105) (56) (205)

Vdd1 (22) Vdd2 (32) 가

1 (1000) (10),
(20), (30)

<

7 1 (1000) (20)

7 (10) (11) Vdd1 (21), Vss1 (22), Vdd2 (32) Vss2
(33)

(20) (40) (50)

(1000) (20)

(40) (50) (20)

(30) (40) (50) (11)
(22, 23, 32, 33)

(50) (20)

(20) 가

8 (20) 가 SOI(Silicon on
Insulator)

8 (55) (56) (55) /
(101, 102), (103), (105) (104)

, (56) / (201, 202), (203), (205)
(204) .

(55) (56) (120) .

, 9 8 Q - Q' .

9 , P (55) (105) (56) (205) N
(110) .

(100) N (110) (130) (130)
(120) (55) (56) , (105)
(205) 가 .

, (55) (56)가 Vdd1 (22) Vdd2 (23)
, Vdd1 (22) Vdd2 (23) .

(20) , SOI

(1000)
가 .

, (57 58) N (57) (58) P
, 가 , (20) .

, .

[1]

10 (20) 가
. 10 (55) (56)가
(102), (103), (105) (1

04) .

, (56) / (202), (203), (205) (204)
. .

11 10 R - R' .

11 , (55) (56) P (55) (56) (105) (20
5) N 1 (140) (240) . 1 (140) (240) P 2 (160)
(260) 1 (140) (240) .

, 2 (160) (260) LOCOS (150) , (55) (56)
. .

, (55) (56)가 Vdd1 (22) Vdd2 (23)
, LOCOS (150) Vdd1 (22) Vdd2 (23)
. .

(20) ,

(1000)
가 .

, (57) (58) N (57) (58) (105) (205)가 P
 , 가 (20)

, 1 (50)

, 가 ,

2

12 3 (5000) (51), (52) (53), (54)
 (3000)

12 , (3000) (5000) , (51), (52)
 (61) , (53), (54) (62) (50)

(50) (5000)

13 (61)

가 , 14 (62)

, (61)

13 P (61) (104) / (101) (103)
 / (102) (103) Vdd2 (32) , (104) Vdd1 (22)

, Vdd1 (22) Vdd2 (32) P (61)

(a) Vdd1 (22) Vdd1 (22) / (101)
 Vdd2가 , P (61)가 ,
 Vdd1 (22) / (101) (105) / (102) Vdd2 (32)

(b) Vdd1 (22) (104) Vdd1 (22) N
 (105) Vdd2 (32) P / (102) PN 가
 Vdd1 (22) (105) / (102) Vdd2 (32)

(c) Vdd2 (32) Vdd2 (32) P / (102) N
 (105) PN 가 , V
 dd2 (32) / (102) (105) Vdd1 (22)

(d) Vdd2 (32) Vdd1 (22) / (101)
 (103) Vdd2가 , P (61)
 Vdd2 (32) / (102) (105) / (101) Vdd1 (22)

, P (61) Vdd1 (22) Vdd2 (32) (55) (56) , .

가 , 14 N (62) 13 P (61) ,
가 (2000) , N (62) (57) (58) .

, (61) (62) 가 (20) Vdd1
Vss1 , (61) (62) Vdd1 (22) Vss1 (23) .

, (20) 가 1 (50) (61)
(62) , (20)

, (3000) , (61) Vdd2 (32) , Vdd1 (2
2) , (61) .

가 , (62) Vss2 (33) , Vss1 (23)
(62) .

15 (3100) , (50) (3100) (61) 가 Vdd2 (32) ,
(40) (41) Vdd1 (22) .

, (41) (61)
Vdd1 (22) Vdd2 (32) 가 , (3100) ,
(40) (50) (20) (20) 가 1
, (20) 가 .

, (3000) (3100)
(20) ,
1 (half)
가 .

, 2 (61)
(62) , 가 .

1 2 , (20) (20) 가
, .

, (30) 가 .

, 가 (20)
, 1 2 ,
가 .

1 2

, 3 가

.

16 3 (400) 16

, (400) (410) (420) .

(410) (22) (11) , 1 2 (40)

(41) 가 , (420) (23) (11) ,

1 2 (40) (442) .

(410) 3 P (411) (413) . P (411) (413)

, (22) (11) .

가 , (420) 3 N (421) (423) . N

(421) (423) , (23) (11) .

P (411) N (421) (401) , P (412) N

(422) (402) , P (413) N (423)

(403) .

, (410) (420) 3 ,

.

17 P (411) (413) 17 , P (411)

(501) (511) (512) . (511) (512)

,). P (411) (413) 가 , P

(411) (413) . ,

.

18 17 S - S' 18 , (411) (413)

(550) (550)

17

.

P (411) (413) , (550) .

, (411) (413) .

,

,

,

,

.

N (421) (423) 가 , N (421) (423)

P (411) (413) .

가 가 가

가 3 (400)

19 20 가 1 2 19
20 (411) (511)

19 (500) P⁺ (511)
(560)
: W)

20 Ti (570)
(550) (550) (560)

W

3 (11) (400)

1 2 3

가

(30) (30)

가

(57)

1.

(10);

1 1 2 (32, 22);

1 2 3 4 (33, 23);

0); 1 3 1 (3

, 2 4 , (20)

1 ,
가 (31)

2 ,
(21) 1 (11)

2 4 (surge)
1 1 (40) 2
1 2 3 4
2 (50) 3

2.

(10);

1 1 2 (32, 22);
1 2 3 4 (33, 23);
, 1 3 1 (3
0);

, 2 4 (20)
2

1 ,
가 (31)

2 ,
(21) 1 (11)

2 4 (surge)
1 (40) 2 ,

1 2 3 4 ,
1 3
2 (50) 3

,

3 ,

1 (32) 2 (22) , 1
(61),

3 (33) 4 (23) , 2
(62)

,

1 ,

(102) , 1 (103) ,

(101) , 2
(105) 가 ,

2 ,

(102) , 3 (103) ,

(101) , 4
(105)

.

3.

,

1 1 ;

1 2 2 ;

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1 2

;

, 1 2

1

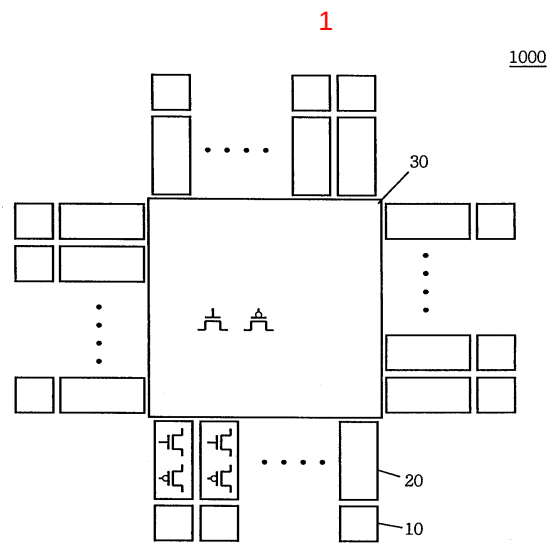
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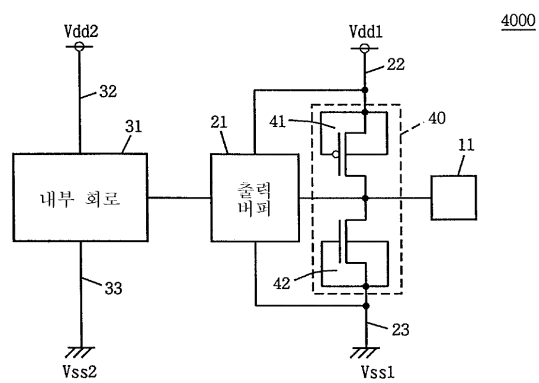
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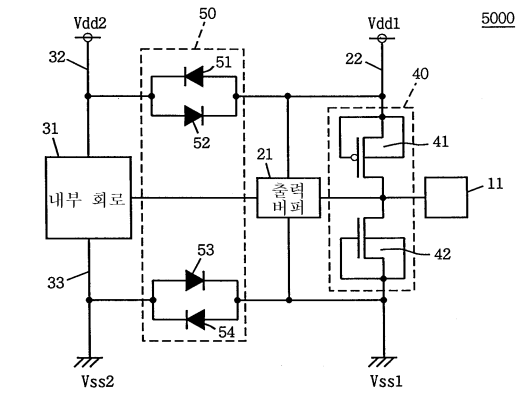
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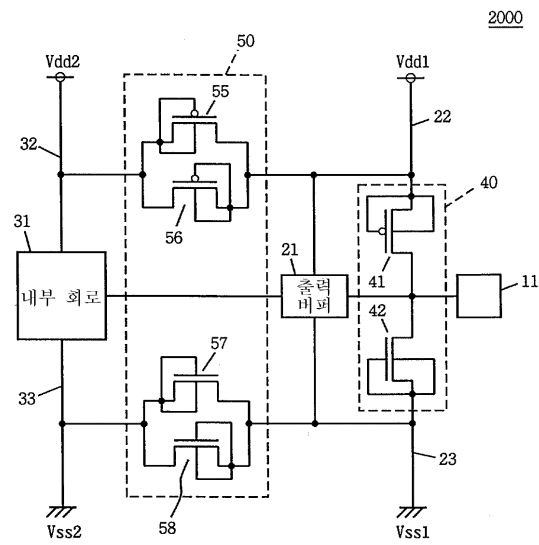
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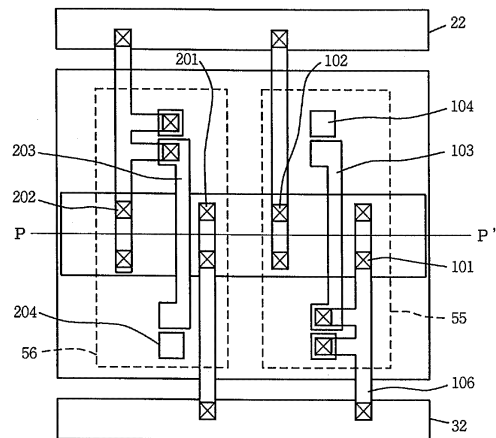
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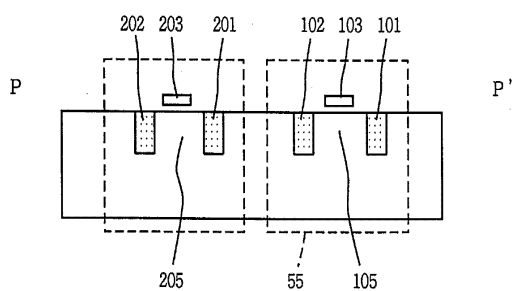
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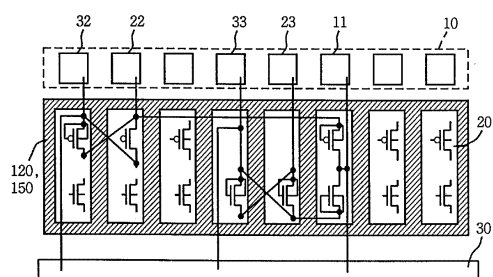
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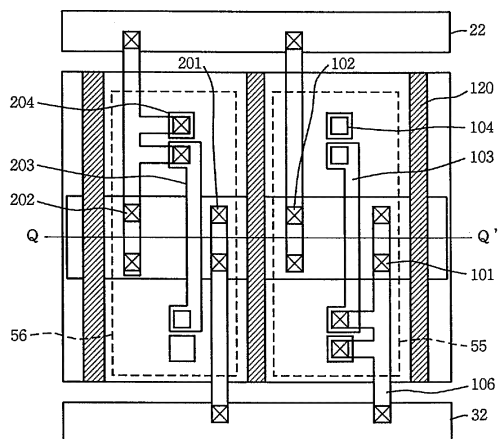
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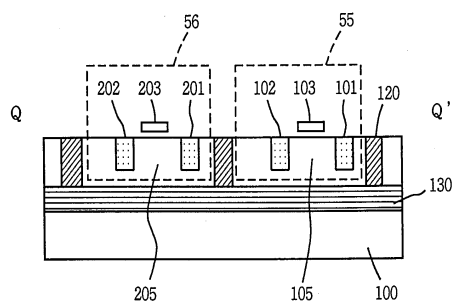
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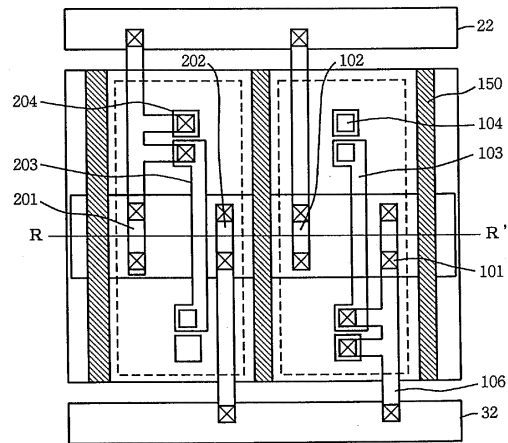
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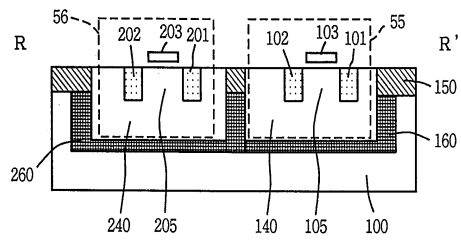
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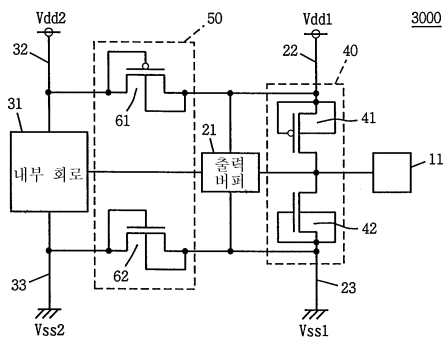
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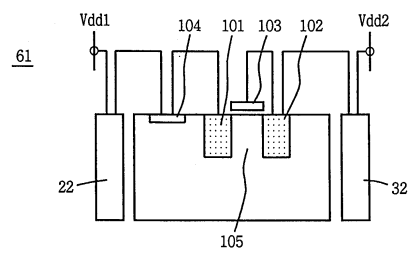
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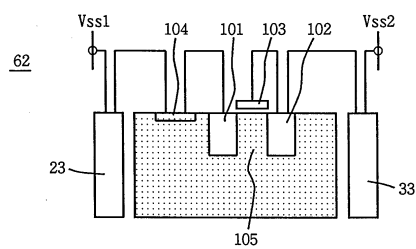
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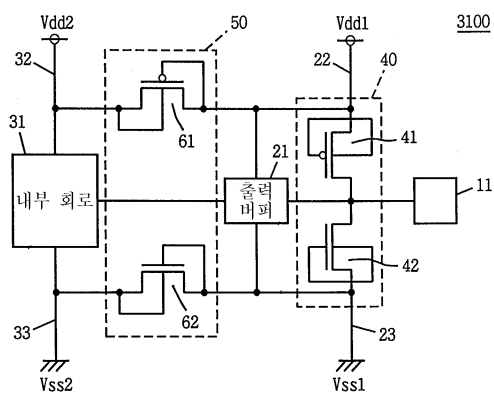
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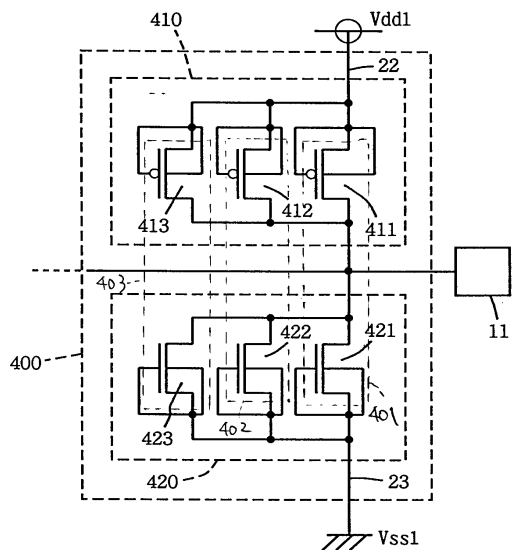
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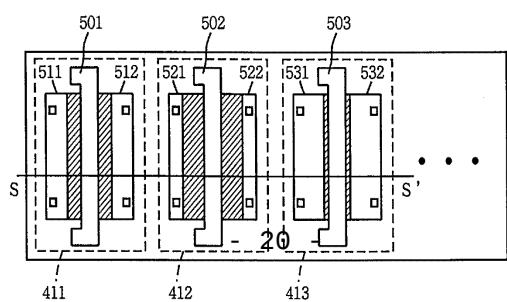
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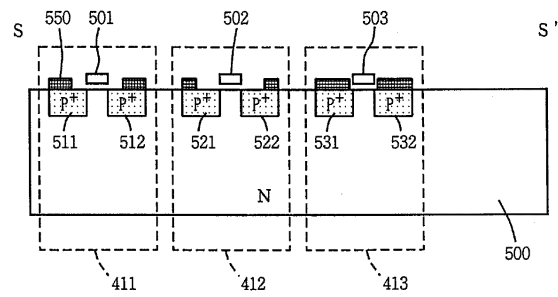
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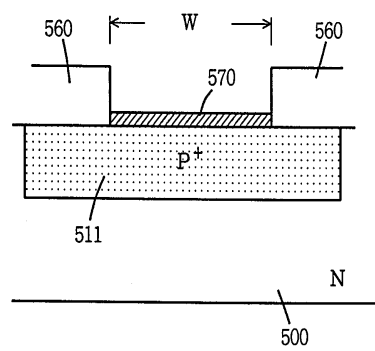
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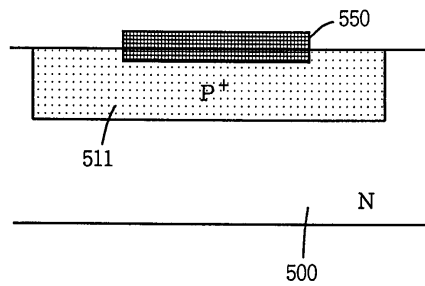
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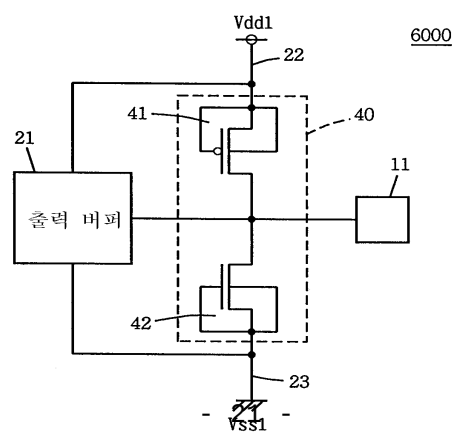


20



21

(종래 기술)



22

(종래 기술)

