



6-324640, 7-98577, 9

-43568

7 (701) (702) , 2 1 (703) , 2

2 (704) (706 710) , VDD VLCD

(702) (V1 V4) VDD V0 ( VLCD (V5)

( ) SEG1 13 SEG4 ( ) COM0, COM1, COMX , 14

1 (803) (703) 8 (801), P (802)

N (805) (801) (803) , P

(804) (V1, V3) 1 (703) V1 V3 (

) ( ) 13 14 (1102

) , 1 (703) P 가 (804)

2 (704) 9 (901), N (902)

(903) , (903) , N P (9

05) (904) (901) , V2 V4가 (

01) ) ( ) , 13 14 (12

2 (704) (704) 가

2 (704) N (905)

(703) + (702) V1 V4 , (V1, V3) 2 1

, V1 V4 , V2, V4 2 2 (704) +

, 가 , 가

V0(VDD) (705) 7 가 가 , V1 V4

(705) (705) ,

가

, 1, 2 N

2 N N 1, 2 ( 1, 1 N 2 ) , 1, 2 N

N 1, 2 , N N

N N 1, 2 , 1, 2 , P

1 N 1 , P 2 N 2 P

, N , 1 , P

2 , , 1, 2 , 1, 2 ,

, N , P , , 1 , N

, , 2 P N P N

. , P N 1, 2 P N P N

P N , 가 . , ,

, 가 . , , N P

, , 1, 2 , 가 .

, 1, 2 , 1, 2 , 1, 2 가

가 . 1 , 1 N 가

가 N , 2 , 2 P

, , 1, 2 P N 2 가 1

, , 1, 2 가 2 가 N 가

N , 가 2 N N 가

, N 1 가 P P 가

, P ,

N N 1, 2 1 ,

N , 가, 가

, N 1, 2 2 ,

N , 가, 가

1  
 2 1  
 3 2 가  
 4 1 1, 2  
 5 1 1  
 6 1 2  
 7  
 8 7 1  
 9 7 2  
 10 4  
 11 5 1  
 12 6 2  
 13  
 14  
 15 1 1, 2  
 16 15 1, 2  
 17 CMOS  
 18 P N  
 19

( )  
 1 (102) , 2 1 (103) , 2 2 (101) (104)  
 1, 2 (103, 104) 15 , P (110), N  
 103, 104 (120) P N (110, 120) , 1, 2 (130)  
 (+NV) , P (+PV) , N  
 , (134) VLCD 2 (106) (130) VDD 1 (105)  
 (132) P N (132, 134) OUT가 (132) N  
 (132) P 가 , N (134) N  
 (120) 가 VDD( V0)가, VLCD(  
 (V5)가 (102) V0 V5 N=4 1 (+NV1) (+NV4) N=4 2  
 (+PV1) (+PV4) , 1 (+NV1) 2 (+PV1) 1,  
 2 (102) N=4 1, 2  
 P 1, 2 (+NV1), (+PV1) (V1) 1 (103) +N , +  
 (104) +N , +P (V2) 2  
 (V3) 1, 2 (+NV2), (+PV2) 1, 2 (+NV3), (+PV3)  
 1, 2 (+NV4), (+PV4) (V4) 2 (104) +N , +P  
 (102) (V1 V4)

VDD, (+NV1) (+NV4), (+PV1) (+PV4), VLCD (1)

VDD > (+NV1) > (+PV1) > (+NV2) > (+PV2) > (+NV3) > (+PV3) > (+NV4) > (+PV4) > VLCD... (1)

15 (130) P N (132, 134)가  
 1, 2 (105, 106) P N (132, 134)  
 가 16 15 P (110) N (120)  
 , 16 P N (110) N (120)  
 , P N (132, 134)가  
 , 16 P N (132, 134) CMOS  
 가 CMOS P N (132, 134)가 17  
 가 P N (132, 134)가  
 P N (132, 134)가  
 4) 가 1, 2 N P P N (132, 13)  
 (110, 120) P N (110, 120)  
 VOFFSET  
 15 N (120)  
 1 |VOFFSETN| P (110) 2  
 |VOFFSETP| 1, 2  
 , 1 (V1) 1 (103) , 1 (NV) N  
 (120) 1 (VN) , 2 (PV) P , 1 (110) 2  
 (VP) (VN-VP)가, 0 (NV1) N  
 (120) 1 (VN)= NV1- |VOFFSETN| (PV1) P  
 (110) 2 (VP)= PV1+ |VOFFSETP|  
 , VN-VP=NV1- |VOFFSETN| -(PV1+ |VOFFSETP|) > 0  
 (103) 15 (130) P N (132, 134)가  
 , |VOFFSETN| + |VOFFSETP| = VOFFSET , 가  
 (2)

VOFFSET < (+NV1) - (+PV1) . . . . . (2)  
 1 (103, 104) 가 , (3) (5)  
 가

VOFFSET < (+NV2) - (+PV2) . . . . . (3)

VOFFSET < (+NV3) - (+PV3) . . . . . (4)

VOFFSET < (+NV4) - (+PV4) . . . . . (5)

(2) (5) , 15 P (132) N  
 (134)가 가 , 18 P  
 N (132, 134) , 18  
 , VDD, V1, V2, V3, V4, VLCD , (6)

VDD = V0 > V1 > V2 > V3 > V4 > V5 = VCDL . . . . . (6)

( )  
 2 1 (102) , VDD( V0) 1 (105) ,  
 ( V5) 2 (106) 5 1 (201) 4 2  
 (202)가  
 4 2 (202) R2, R4, R6, R8 VDD-VLCD VOP, R1 R9 R  
 t , (7), (8)

R2 = R4 = R6 = R8 = Ra . . . . . (7)

Ra = VOFFSET / (VOP / Rt) . . . . . (8)

, 1 (201) R1, R3, R5, R7, R9 VDD, VLCD  
 , V1 V4 (+PV1) (+PV4) , 1 (201) 1/5

R1, R3, R5, R7, R9 (9), (10)  
R1= R3= R5= R7= Rt/5-Ra . . . . . (9)  
R9=Rt/5 . . . . . (10)

3 1 (102) , 1, 2 (105, 106) 5 (301)  
4 가 (302)

5 (301) R1, R3, R5, R7, R9 (9), (10) . 4 가  
(302) R2, R4, R6, R8 가 , R2, R4, R6, R8 (7)

( 1, 2 )  
4 1 1 (103) 2 (104) (40)

(404) (400) (401), P (402), N (403)  
(404) P (404) 1, 2 (105, 106) (405), N (406) , (405, 406)

OUT가  
P (402) N (403) , ( )  
+N, +P) (404) P 1, 2 (405) 가 . (402) 가 , (403)

VDD가 , (404) N (406) N (405) N (403)  
(406) , 10 , 4 , VLCD가 . P (405) N  
OUT가 (400) (V1)

10 4 (400) OUT  
10 (1001) N (406) , (1002) P (405) ,  
(1003) P (402) N (403) OUT , N  
4 (403) +N (+NV1) OUT , P  
+P , P (+PV1) P (405) (406) , P  
, P (405), N (406) ( ) (1003)  
(+NV1) (+PV1) (V1) OUT ,

(404) 가 , (400) (+N  
V1) V1 가 , ( 10 (1001) ). , (400) (406)가 .  
, OUT (+NV1) ( 10 1001 ). , N (406)가  
, OUT +N (+NV1) , N (406)가  
, (NV1, PV1) (V1) .  
, OUT (+PV1) 가  
가 ( 10 (1002) ). , (400) (407)가 . , O  
, P (402) 가 , P (407)가  
UT , (+PV1) ( 10 1002 ). , P (407)가  
, OUT +P (+PV1) , P (407)가  
, (NV1, PV1) (V1) .

( 1, 2 )  
5 1 1 (103) . 1 (103)  
(501), P (502), N (503) (504) , 4  
(506) , 4 (400) , (504)가, P (505) N  
OUT 2 (106) N (400) . 4 (507) N (507)  
(501) 가 . , N (507) 가 ,

6 1 2 (104) . 2 (104)  
(601), P (602), N (603) (604) , 4  
(606) , 4 (400) , (604)가, P (605) N  
(105) OUT 4 P (400) . 4 P (607) 1 (607)

(601) 가 . , P (607) 가 ,

11, 12 , 5, 6

11 5 (103) OUT

(1101) N (506) , (1102) P (505) (1103)

P N (505, 507) (507) (1104) N (507) (

), (1105) N (507) ( )

5 1 (103) 4 (400)

, N (507)가 (501) , P

(505), N (506)가 ( ) (1104) 가 N

(507)가 (103) OUT

(+PV1) (+PV3) V1 V3 ( 11 (1104) ).

(V1 V3) OUT

(+NV1) (+NV3) 가 ( 11 (1101) 13, 14 (1101)

). 1 (103) (506)가 . , OUT , N (50) (+NV1) (

+NV3) ( 11 1101 ).

N , OUT (+NV1) (+NV3) , N (506)가 ,

(507) ( 11 1105 ).

OUT (+PV1) (+PV3)

3) 가 , 가 ( 11 (1102) 13, 14 (1102) ). , 1 가 ,

(103) (505)가 . , OUT (+PV1) (502) ( 11 1102

P ).

가 , N OUT +P (+PV1) (+PV3) , P (505)

(507) , OUT (+PV1) (+PV3)

, 6 2 (104) 12 . 6 2

(104) (601) 4 (400) , P (60

7)가 V2 V4 ( 12 (1204) ) , OUT

14 (1201) ). , 2 (104) 가 ( 12 (1201) 13,

, N (+NV2 (+NV4) ( 12 1201 ).

(603) , N (606)가 . , OUT

(+NV2 (+NV4) , N (606)가 , P

(607) OUT (+PV2 (+PV4)

가 , 가 OUT ( 12 (1202) 13, 14 (1202) ). , 2

(104) (605)가 . , OUT (+PV2 (+PV4) ( 12 1

202 ).

, P OUT +P (+PV2 (+PV4) , P (605)가

(607) OUT (+NV2 (+NV4) , P (607)

, OUT

가 , 1,

2 (103, 104)

( 1, 2 )

4 (400) , +N +P

, 1 1, 2 (103, 104)

5, 6 1, 2 (103, 104)

1/5 ,

(V1, V3) 1 1 (103)

(103) 가 13, 14 (1101, 1102)

, 1

V2-V3 (1 ) , (1101)

(4 ) , (1102)

+PV1= V1 . . . . . (II) (11) (14) V0-V1

V5-V1

+PV3= V3 . . . . . (12)  
 +NV1-V1 > VOFFSET . . . . . (13)  
 +NV3-V3 > VOFFSET . . . . . (14)

OUT , (+PV1) (+PV3)  
 1 1 (103)

V1 V3

V2, V4 1 2 (104)  
 (104) 가 13, 14 (1201, 1202) 2

V5-V2 (3) (1201) (1202) V0-V4  
 (4) (15) (18)

+NV2= V2 . . . . . (15)  
 +NV4= V4 . . . . . (16)  
 +PV2-V2 > VOFFSET . . . . . (17)  
 +PV4-V4 > VOFFSET . . . . . (18)

OUT , (+NV1) (+NV3)  
 2 2 (10)

V2 V4

4) (7) (8) (19)

R1+R2 = R3 = R4+R5+R6 = R7 = R8+R9 = Rt/5 . . (19)

가

( 19 ) 가 1  
 (1300) (1300) , (1310) ,  
 (1300) (1320) ,  
 (1330)

(57)

1.

1, 2 N  
 N N 1, 2 ( , 1 N 2 ) , 1, 2 N  
 N 1, 2 , N N  
 N 1, 2 , 1, 2 ,  
 1 N 1 P 2 N 2 P  
 N 1 , , P  
 2 ,

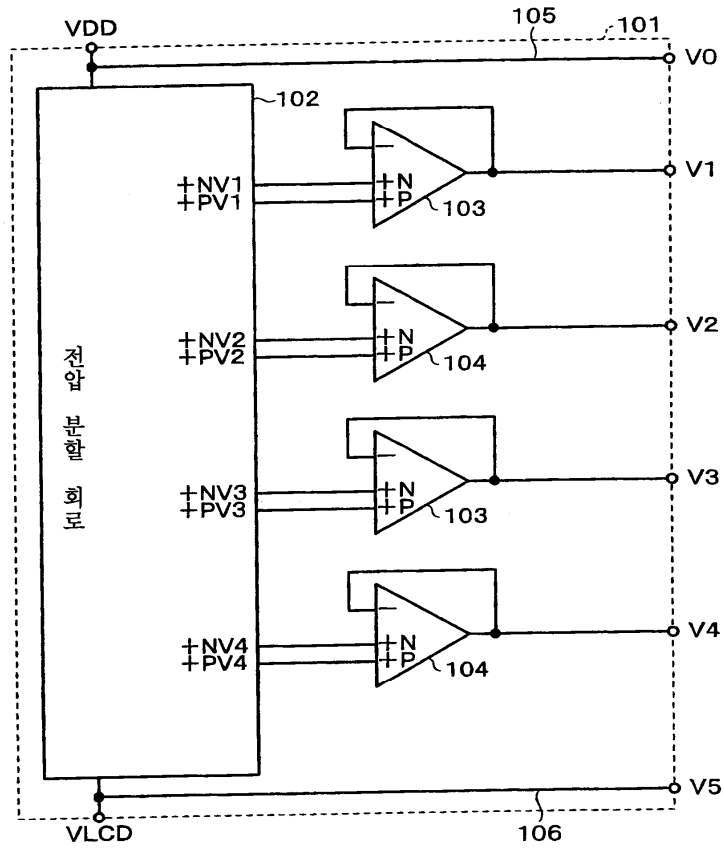
2.

1 , 1 N  
 , 2 P N P ,

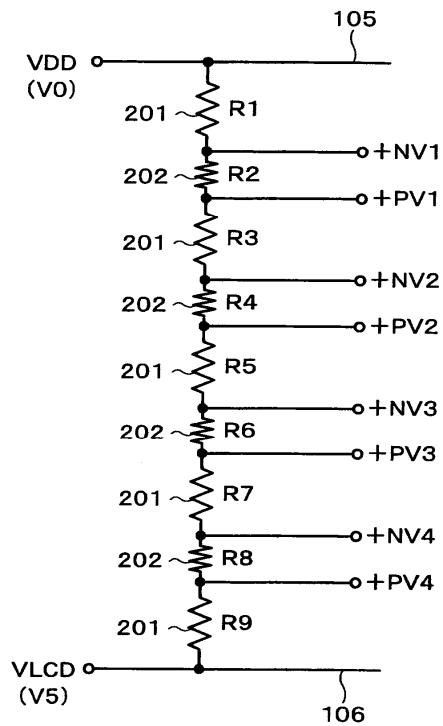


- 3. 1 P N ,
- 4. 1 , 1, 2 가가
- 5. 1 , 1, 2
- 6. 1 , 1 , , 1 N 가 N , 2 , , 2 P 가 P
- 7. 6 , , 1, 2 , N 2 가 1 , P
- 8. 6 N , , 가 2 N N ,
- 9. 8 N , 1 가 P P ,
- 10. 6 N 9 , , 1, 2 1 N ,
- 11. 10 N , , 1, 2 2 N ,
- 12. 1 , , ,
- 13. 12

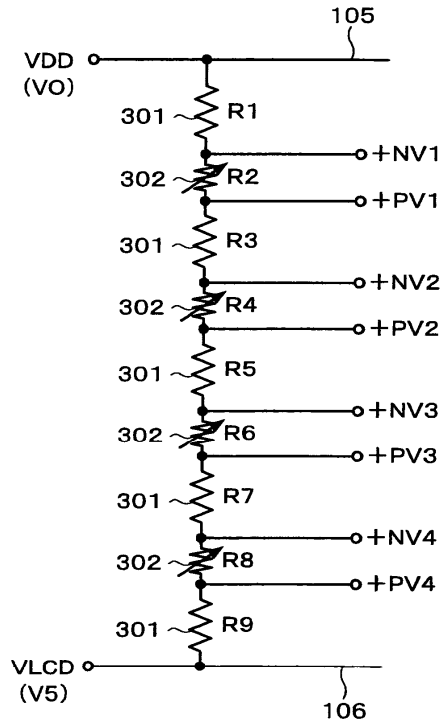
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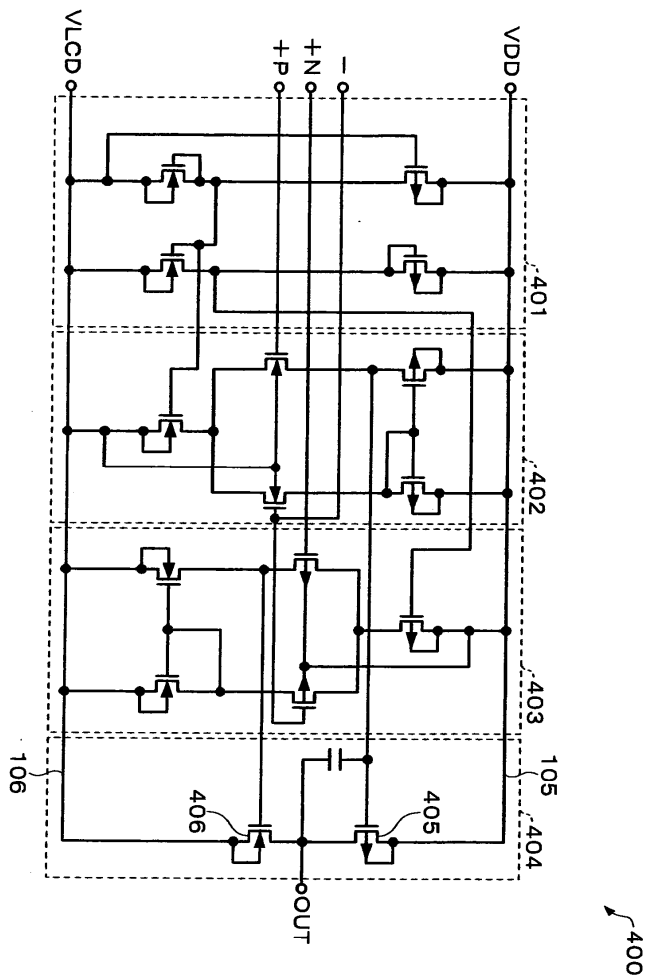
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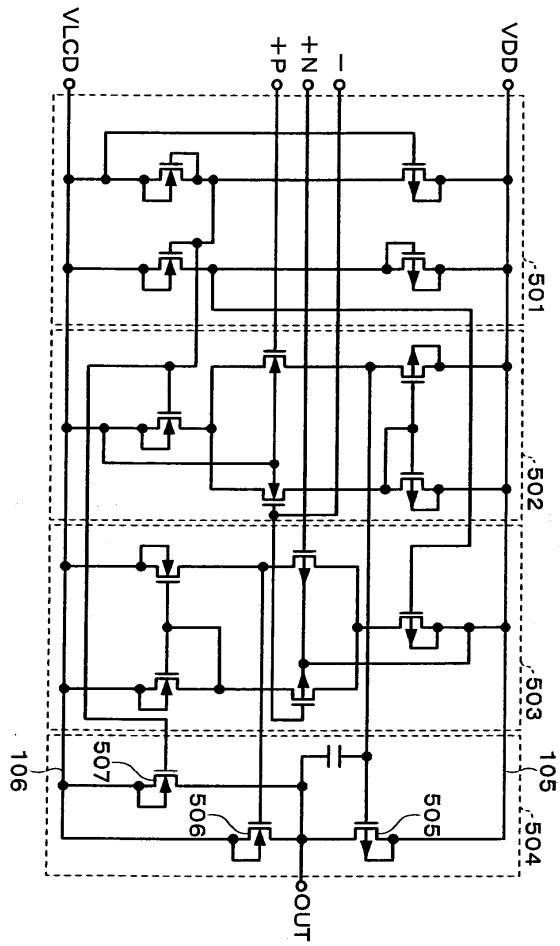
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4

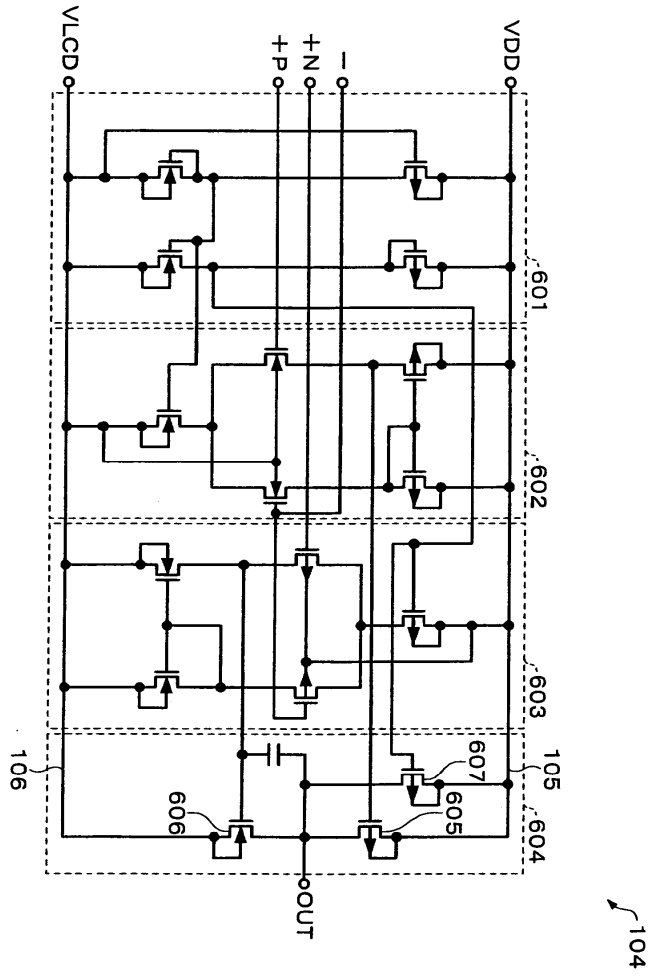


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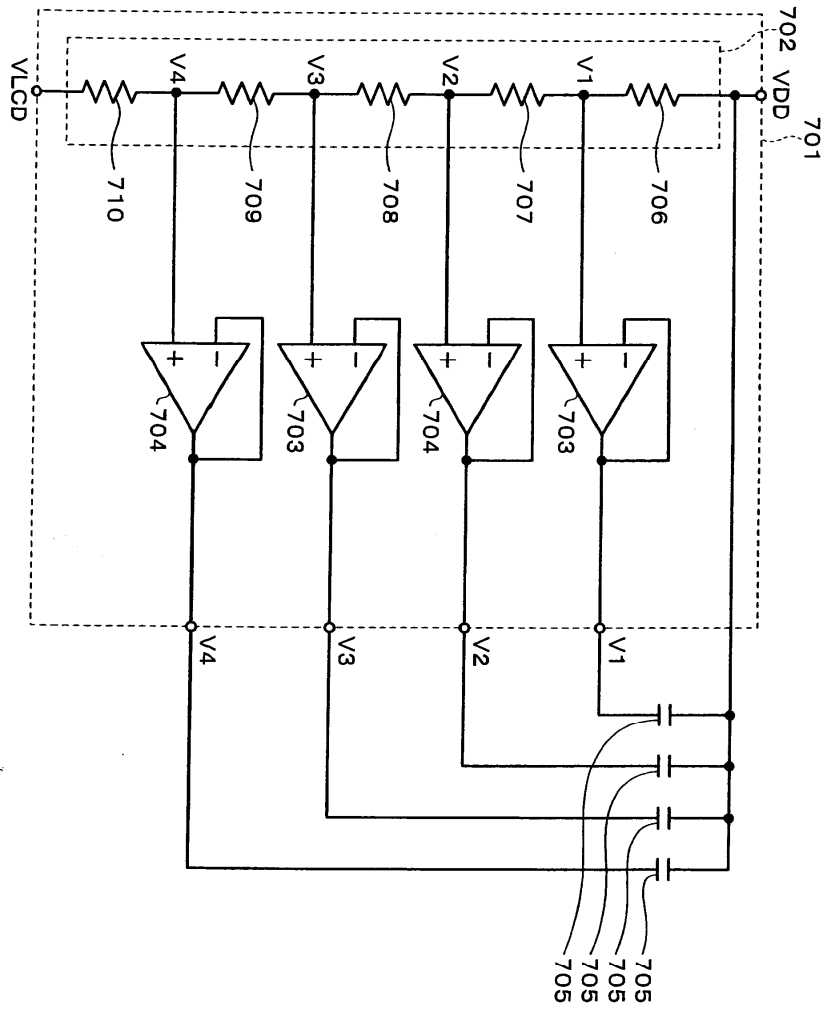


103

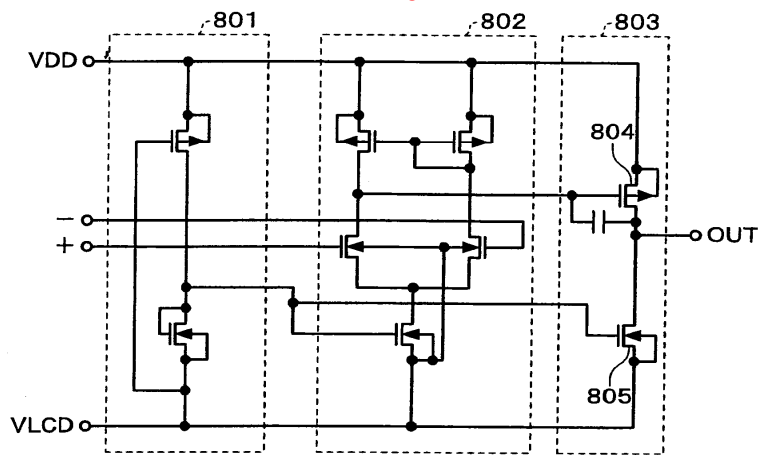
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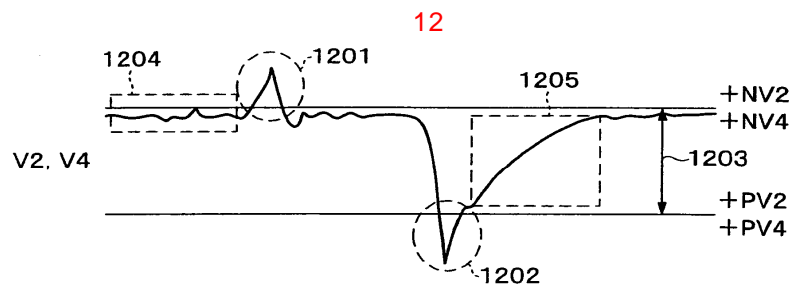
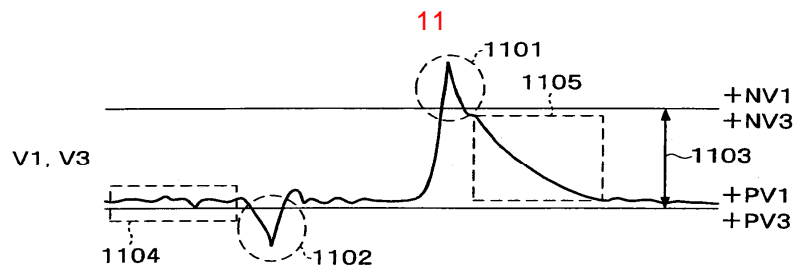
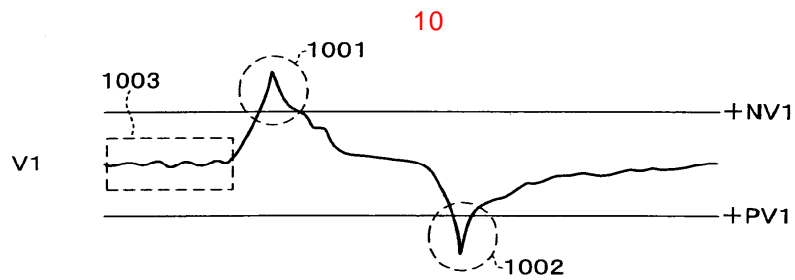
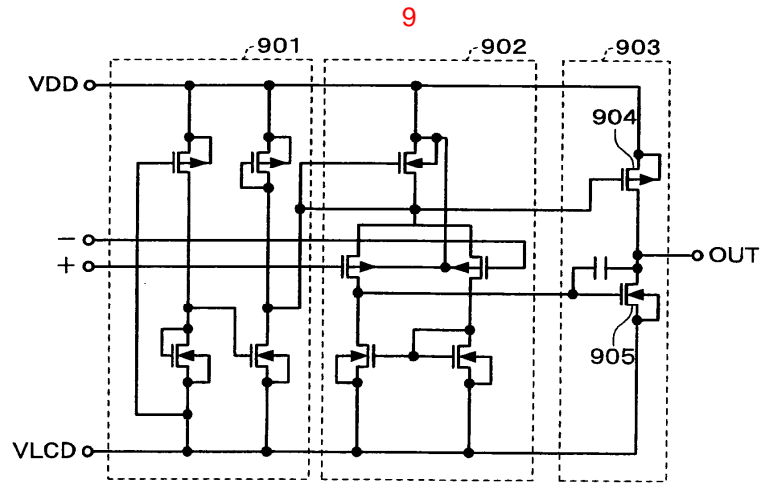


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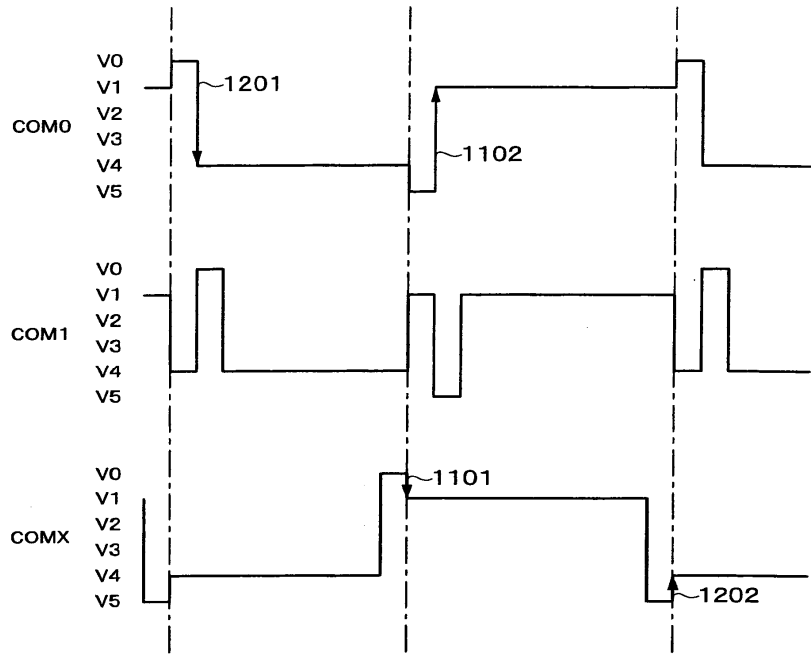


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13



14

