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(12)

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(B1)

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(24)

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10 - 0363540
2002 11 21

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2000 12 21

(65)
(43)

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2002 06 27

(73)

3 416

(72)

94 - 16

APT3 411

(74)

:

(54)

가
가 가
가 가
가 가
가 가

1 ;

2 ;

3 ;

4 3 ;

5 3 ;

6 3 ;

7a 7b ;

8 9 7a 7b 가
;

10a 13b 7a 7b 0 - 32, 0 - 48, 0 - 64, 32 -
64 .

* *

1 : 2 :

3 : 4 :

5, 50 : 52 :

54 : 56 :

100 :

,
.
, (Liquid Crystal)
가 .
, LCD(Liquid Crystal Display)
가
.
1 (10) (10)
(10) (1), (1) (2), (3), (4),
(gray voltage generating circuit)(
generating circuit))(5) (gamma reference voltage

(1) , (G0 - Gn) , (G0 - Gn) (2)가 ,
 (D1 - Dm) . (G0 - Gn) (3)가 (1)
 (D1 - Dm) (pixel)가 , (Thin Film Transis
 tor ; TFT), (storing capacitor ; Cst), (liquid crystal capacit
 or ; Cp) . (1) (red ; R), (green ; G), (blue ; B)
 (subpixels) . (1) R, G,
 B (10)
 , , , (gray scales) .

(4) (R, G, B), (HSync, VSync), (CLK)
 (2) (3) (, (Gate Clock),
 (Gate On Signal)) . (5) (3) ,
 (Vdrive) ((gray voltage ; Vgray) (gamma re
 ference voltage)) . (5) 2000 5 23 , Kim
 6,067,063 , "LIQUID CRYSTAL DISPLAY HAVING A WIDE VIEW ANGLE AND METHOD FOR DRIVING
 THE SAME" . (5) , (VCC) (GND)
 , n (R1 Rn+1) , (R1 Rn+1) (VCC)
 (VG1 VGn) .

가 (10) . (2)가 (V
 (1) 1 , (3) (5) (V
 gray) (4) (R, G, B) (Vdrive)
 , (Vdrive) (1) 가 .

가 , (3) (TFT) (Vdrive) , (Cp)가
 , 가 (Cp) (3) 가 ,
 (1) (TFT) (3) 가
 (Vdrive) .

가 ,
 (Cp) 가 , (Cp) , (3) 가
 (Vdrive) 가 , (Cp) (Vdrive) 가
 , (Cp) .

(3) 가 (Vdrive)
 가 가 , (Vdrive)
 (2) (3) , (2, 3)

(4)

가

(Vdrive)

가

(Vdrive)

가 가

가

1

가

가

()

2

13

가

2

(100)

(10)

(1),

(1)

(2),

(3),

(4),

(50)

1

ck)

(10)

(Vgray')

(4)

(Gate Clo

(10)

가

(50)

1

1

(R, G, B)

(Vdrive)

가

(3)

(1)

(Cp)

가

(Cp)

(Vdrive)

(50)

(Vgray')

(100)

(1)

(Cp)

가

(3) (Vdrive) (2), (3)
 (4) 가 , 가
 가 (50) (100) .

3 (50) 3 ,
 (50) (52), (54), (56)
 (52) (4) (Gate Clock)
 n (G_CLK1, ...G_CLKn) (54) (V_{DD})
 n (Vref1, ...Vrefn) (V_{DD})
 , (3) .

(52) (54) n (G_CLK1, ...G_CLKn) n
 (Vref1, ...Vrefn) (56) , (56) (G_CLK1, ...G_CLK
 n) (Vref1, ...Vrefn) 가 m (Vgr
 ay1', ..., Vgraym')
 (3) (Gate Clock) (clock period) (Gate Clock)
 (high) (low) 가 (Vdrive')
 가 (3) (Vdrive') (1)
 (Cp) 가 , (100) 가 .

4 3 (52) , 5 3 (54) ,
 6 3 (56) . 4 5 (52) (5
 4) 6 (G_CLK1, ...G_CLK6) 6 (Vref1, ...Vref6) , 6
 (56) 6 (G_CLK1, ...G_CLK6) 6 (Vref1, ...Vref6)
 10 (Vgray1', ..., Vgray10') . ,

4 , (52) (4) (Gate Clock)
 (52a - 52f) 1 6 (52a - 52f),
 f) (C1, ..., C6) (R1, ..., R6)
 (4) (Gate Clock) 1 6
 (G_CLK1, ..., G_CLK6) .

5 , (54) (V_{DD}) 가 6
 (Vref1, ..., Vref6) 1 6 (54a - 54f) . 1
 6 (54a - 54f) (V_{DD}) (GND)
 (54a - 54f) (V_{DD}) (GND) ,

6 , (56) 1 5
 (Vgray1', ..., Vgray5') 1 (56a) , 6
 10 (Vgray6', ..., Vgray10') 2 (56b) .

1 (56a) (52) (G_CLK1, G_CLK4, G_CLK5)
 (54) (Vref1, Vref4, Vref5) 1 6 ,
 (G_CLK1, G_CLK4, G_CLK5) (Vref1, Vref4, Vref5) 가
 (Vgray1', Vgray4', Vgray5') 1 3
 (AMP1 - AMP3), (AMP1, AMP3) (Vgray1', Vgray4',
 Vgray5') , 1 (AMP1) 1 (G_CLK1)
 1 (Vref1) 가 (Vgray1') , 2
 (AMP2) 4 (G_CLK4) 4 (Vref4) 가 4
 (Vgray4') , 3 (AMP3) 5 (G_CLK5) 5 (Vref5)
 가 5 (Vgray5') , 1 (56a)
 1 3 (AMP1 - AMP3) (Vgray1', Vgray4', Vgray5')

[1]

$$V_{gray1'} = \frac{R19+R20}{R19} \left[V_{ref1} + \frac{R1}{R1+R19} V_{G_CLK} \right]$$

[2]

$$V_{gray4'} = \frac{R25+R26}{R25} \left[V_{ref4} + \frac{R4}{R4+R25} V_{G_CLK} \right]$$

[3]

$$V_{gray5'} = \frac{R27+R28}{R27} \left[V_{ref5} + \frac{R5}{R5+R27} V_{G_CLK} \right]$$

, V_{G_CLK} (Gate Clock) .

1 (56a) , (Vgray1', Vgray4', Vgray5') 2 3
 (Vgray2', Vgray3') , (Vgray2', Vgray3') 1 2 (AMP1, AM
 P2) (R31, R32, R33) 가 .

, 2 (56b) , 2 (56b) (52)
 (G_CLK2, G_CLK3, G_CLK6) (54) (Vref2, Vref3, Vref6)
 7 12 , (Vref2, Vref3, Vref6)
 (G_CLK2, G_CLK3, G_CLK6) (Vgray6', Vgray7', Vgray10')
 4 6 (AMP4 - AMP6), (AMP4 - AMP6)
 (Vgray6', Vgray7', Vgray10') , 4 (AMP4) 2
 (Vref2) 2 (G_CLK2) 6 (Vgray6')
 , 5 (AMP5) 3 (Vref3) 3 (G_CLK3)
 7 (Vgray7') , 6 (AMP6) 6 (Vref6)
 6 (G_CLK6) 10 (Vgray10') .

, 2 (56b) 4 6 (AMP4 - AMP6)
(Vgray6', Vgray7', Vgray10')

[4]

$$V_{gray6'} = \frac{R2 + R21 + R22}{R22} \left[V_{ref2} - \frac{R22}{R2 + R21} V_{G_CLK} \right]$$

[5]

$$V_{gray7'} = \frac{R3 + R23 + R24}{R24} \left[V_{ref3} - \frac{R24}{R3 + R23} V_{G_CLK} \right]$$

[6]

$$V_{gray10'} = \frac{R6 + R29 + R30}{R30} \left[V_{ref6} - \frac{R30}{R6 + R29} V_{G_CLK} \right]$$

, V_{G_CLK} (Gate Clock)

2 (56b) , (Vgray6', Vgray7', Vgray10') 8 9
(Vgray8', Vgray9') , (Vgray8', Vgray9') 5 6 (AMP5, A
MP6) (R38, R39, R40) 가 .

, 4 (Vgray4') 7 (Vgray7') 가
MP2) , 4 4 (Vgray4') 2 (A
2 (AMP2) , 5 4 (Vgray4')
(56) (Vgray1', ..., Vgray10') ,
ay7') , 4 7 (Vgray4', Vgr
(Vgray4', Vgray7')
가 .

7a 7b
7a , 7b .

, (4) (Gate Clock) ,
48 , 64 .

8 9 7a 7b (Vgray1', ..., Vgray10') 가 (3)
, 8 (dot inversion) , 9
2 - (2 - line inversion) , 가 (Norm
ally White Mode) .

8 9 (4) (Gate Clock) , (100)
 (Vdrive), (4)
 (3) (Vdrive'), n n+3
 (Gate On(n) - Gate On(n+3)) .
 , (Gate Clock)
 V_{F+} V_{F-} (Vdrive) (Vdrive)
 (Vcom) .
 , (100) (3) (Gate Clock)
 (Vdrive' = Vgray(t)) (Vdrive')
 (Gate Clock) , (Vdrive' = Vgray'(t)) (1)
 (Vdrive') ,
 (Cp) , .
 8 , (dot inversion) , n (Gate Clock)가 (3)
 Gate On(n))가 가 (Vdrive) 1 (Vdrive') ,
 (Gate Clock)가 (Vdrive) V_{F+} 1 2
 2 (Vdrive') 가 1 2
 (Vcom) 가 , 1 2 가 .
 , n+1 (Gate On(n))가 가 ,
 (3) (Gate Clock)가 (Vdrive)
 3 (Vdrive') (Gate Clock)가 ,
 (Vdrive) V_{F-} 4 (Vdrive')
 . 3 4 가 3 4 가 .
 9 , 2 - (2 - line inversion) , n n+1 (3) (Ga
 te Clock)가 (Vdrive) (Vdrive') (Ga
 , (Gate Clock)가 (Vdrive) V_{F+} (G
 ate On(n))가 가 , n+2 n+3 (3) (Gate Clock)가
 (Vdrive) (Vdrive') ,
 (Gate Clock)가 (Vdrive) V_{F-}
 (Vdrive') . 7 8 (3)
 , (, n - (n - line inversion))
 가 .
 10a 13b 7a 7b (3) 0 - 32, 0 - 48, 0 - 64, 3
 2 - 64 . 10a
 0 - 32 , 10b 0 - 32 , 11a
 0 - 48 , 11b 0 - 48
 , 12a 0 - 64 , 12b

0 - 64 , 13a 32 - 64 , 7a 7b 48

13b (, ') 64 (, ') 가 , (fallin

(rising time) , g time) .

10a	10b	0 - 32							
(,)	26.0ms	(,)	3.6ms						
(,)	24.2ms	(,)	3.6ms						
	가		26ms	24.2ms	1.8ms	가			

11a	11b	0 - 48	
(,)	36.8ms	(,)	3.6ms
(,)	26.2ms	(,)	4.4ms
	0.8ms	가	36.8ms 26.2ms 10.6ms가

12a	12b	, 0 - 64	,
(,)	22.6ms	(,)	4.7ms
(,)	15.1ms	(,)	4.6ms
	0.1ms		22.6ms 15.1ms 7.5ms

13a 13b , 32 - 64 , ,
 (,) 20.8ms , (,) 3.4ms ,
 (,) 15.0ms , (,) 3.4ms
 , 가 , 20.8ms 15.0ms 5.8ms가

10a	13b	(3)	26ms	2
4.2ms	1.8ms	36.8ms	26.2ms	22.
6ms	15.1ms	32 - 64	20.8ms	

[1]

0 - 32	26.0 ms (1.00)	24.2 ms (0.93)
0 - 48	36.8 ms (1.00)	26.2 ms (0.71)
0 - 64	22.6 ms (1.00)	15.1 ms (0.67)
32 - 64	20.8 ms (1.00)	15.0 ms (0.72)

[1]

(normalization)

[1] , 0 - 32 , 26.0ms 24.2ms 1.8ms가 , 0 - 48 , 36.8ms 26.2ms 10.6ms가 , 0 - 64 , 22.6ms 15.1ms 7.5ms가 , 32 - 64 , 20.8ms 15.0ms 5.8ms가 , 0 - 32 7%가 , 0 - 48 29%가 , 0 - 64 3 3%가 , 32 - 64 28%가 . [1] , , 가 .

, (50) , (3) 7 8 가 (Vdrive ') (Vgray ') . (3) (Gate Clock) (Cp) , (3) Vdrive ' = Vgray '(t)) (1) (Vdrive ') (falling time) 가 .

(57)

1. : ;

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1

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가

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가

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2.

1

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1

2

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1

2

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3.

2

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2

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3

4

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4.

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5.

4 ,
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 n n ,
 ,

6.

4 ,
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 가 n n
 ,
 ,

7.

4 ,
 ,
 1 , 가 m/2
 ;
 2 , 가 m/2

8.

7 ,

1 ,
n
1 , 2 n
2
.

9.

8 ,
 , 가
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10.

8 ,
 ,
.

11.

7 ,
2 ,
n n 1 2 ,
2 n 2
.

12.

11 ,
 ,
.

13.

11 ,
 ,
.

14.

1

가

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15.

14

;

n

n

,

16.

14

가 n n

17.

14 ,
 ,
 , 가 $m/2$
 1 ;
 , 가 $m/2$
 2
 .

18.

17 ,
 1 ,
 n
 1 , n
 , 2 ,
 .

19.

18 ,
 , 가
 .

20.

18 ,
 , ,
 .

21.

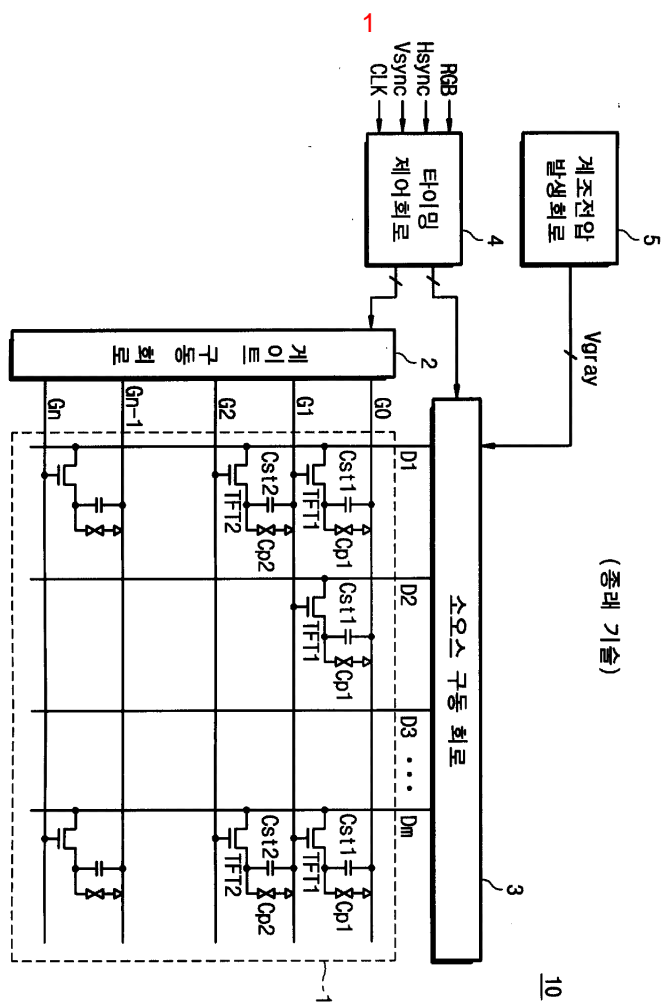
17 ,
 2 ,
 n n
 1 , ,
 2 ,
 .

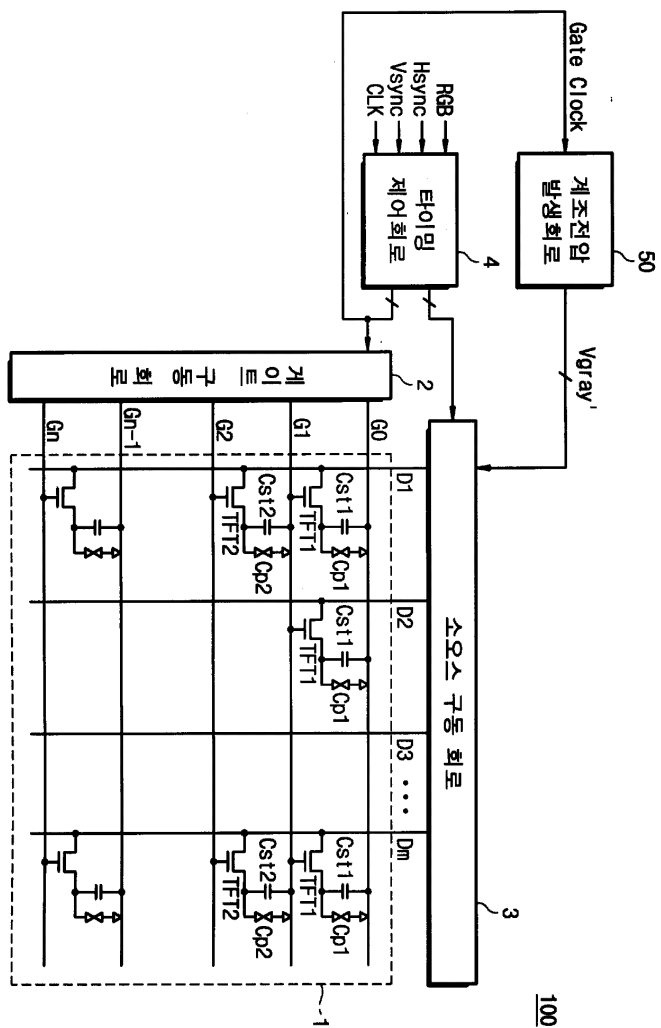
22.

21

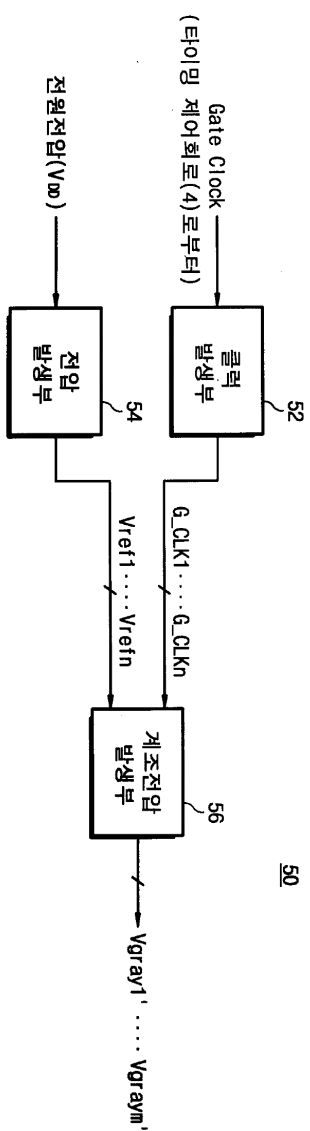
23.

21



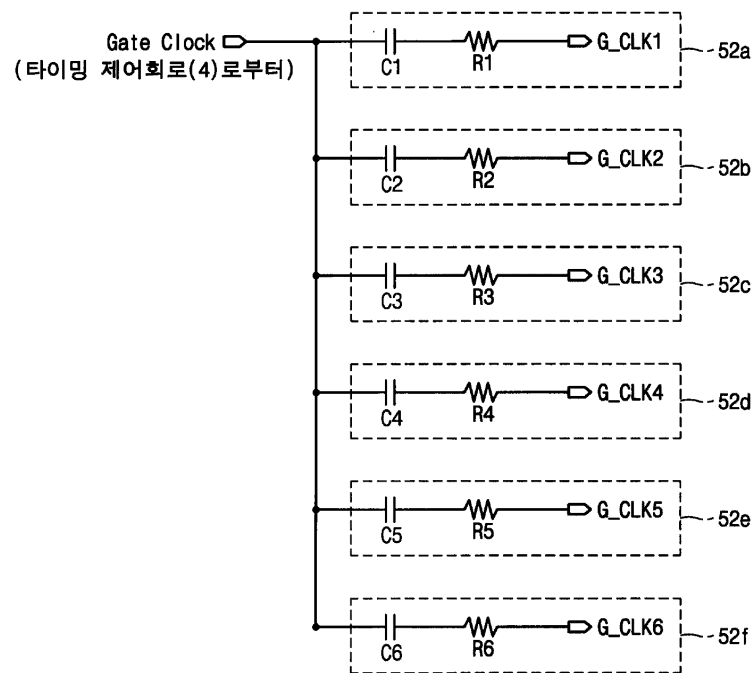


3

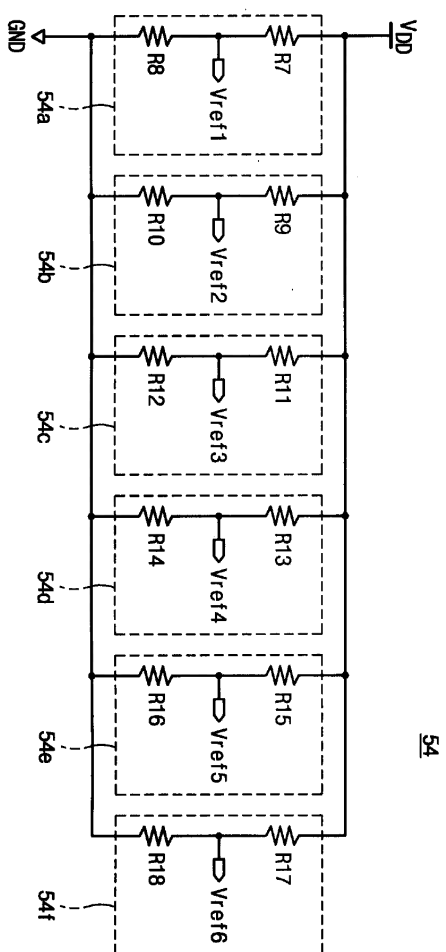


4

52

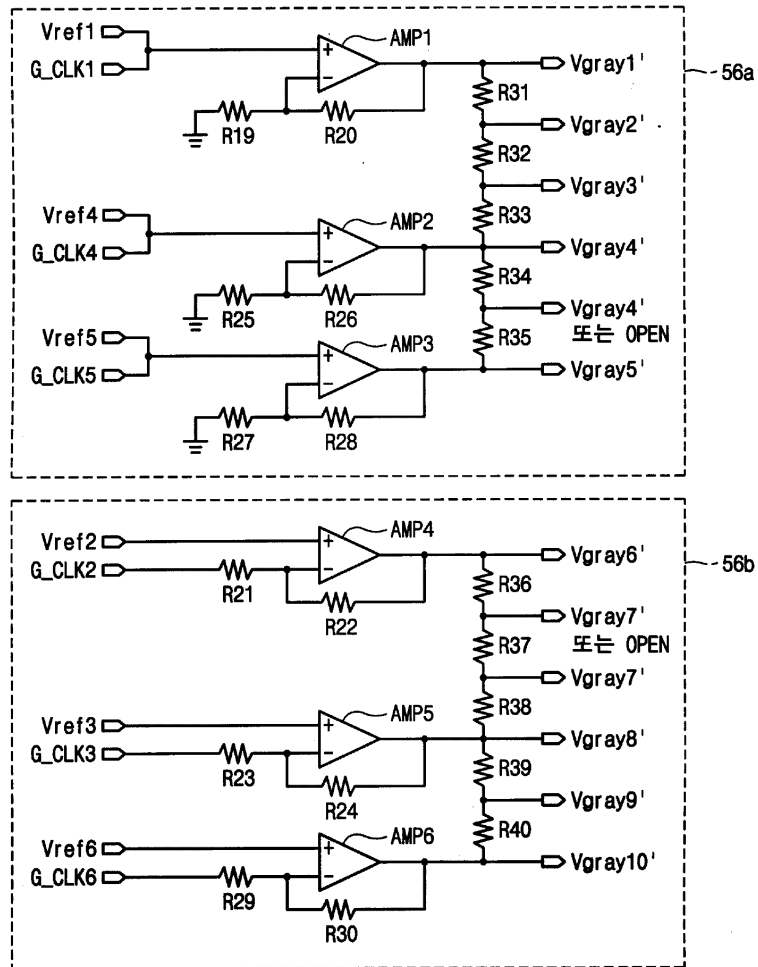


5



6

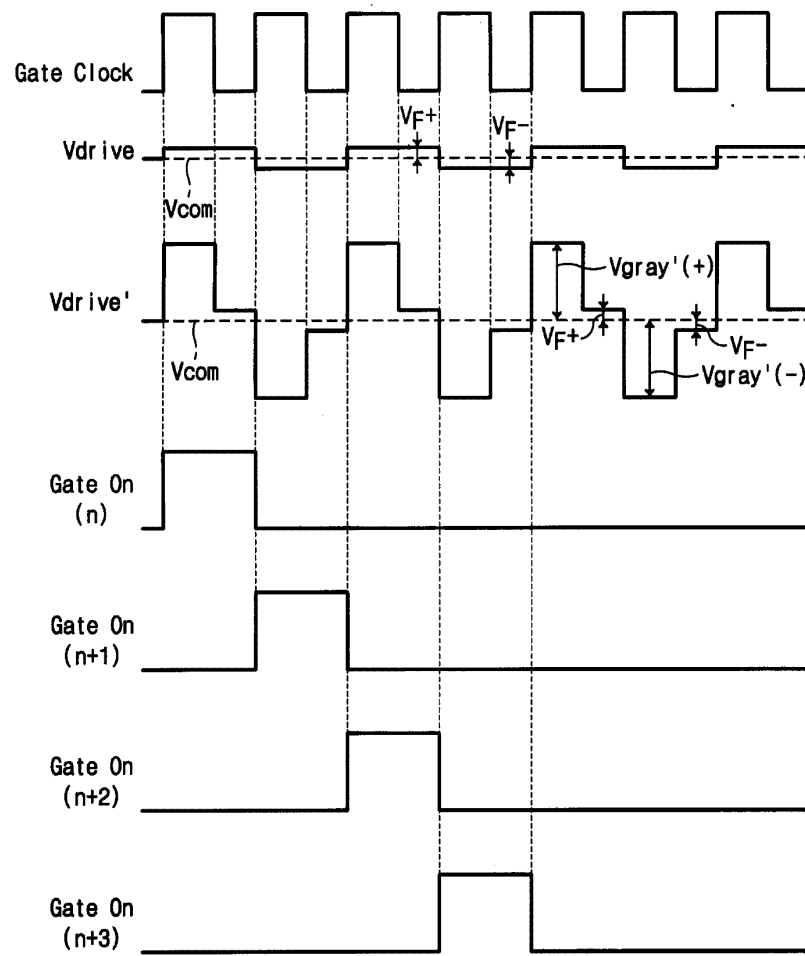
56

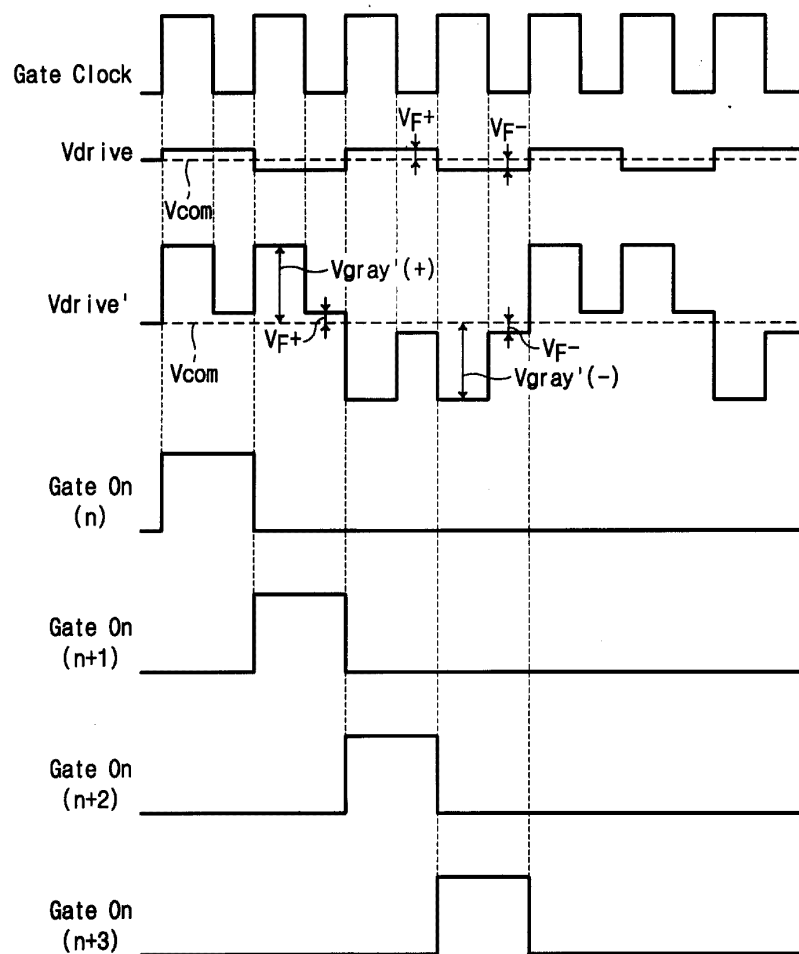


7b

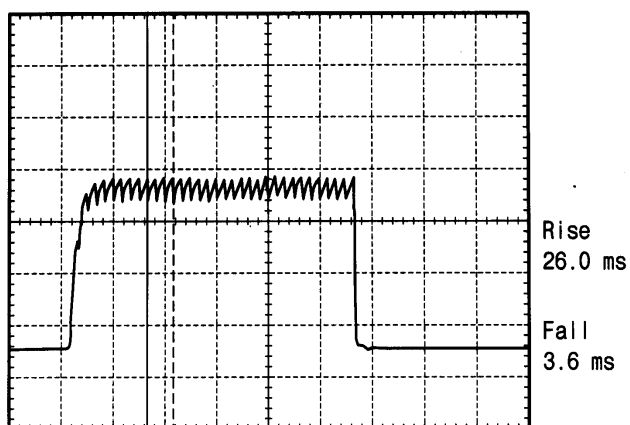


8

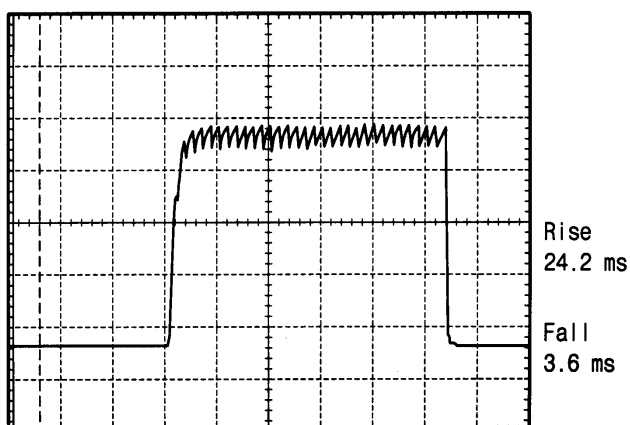




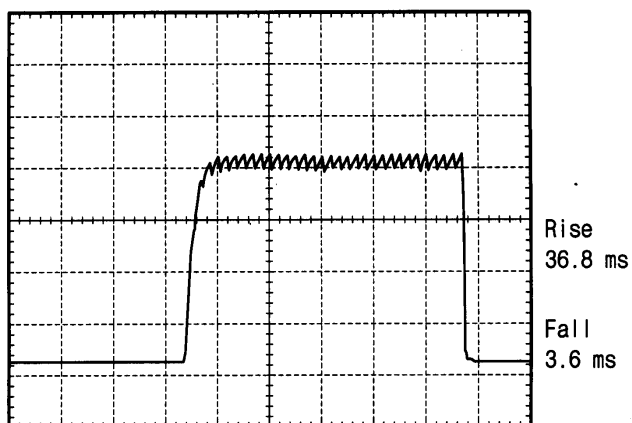
10a



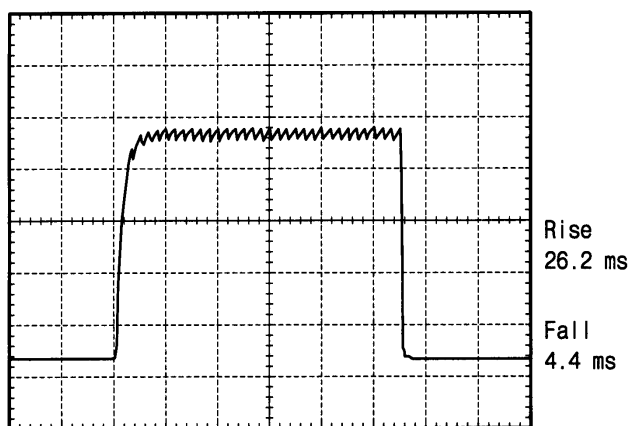
10b



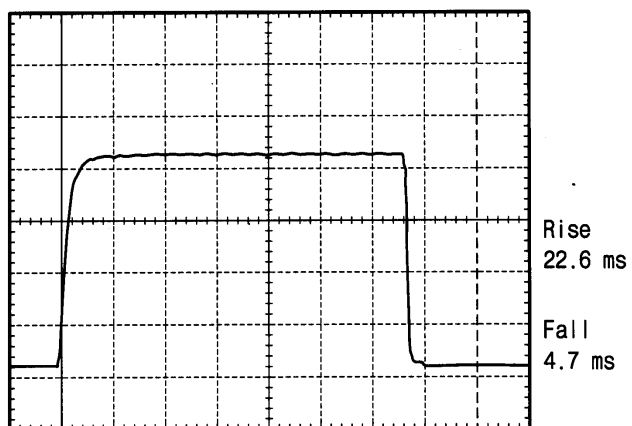
11a



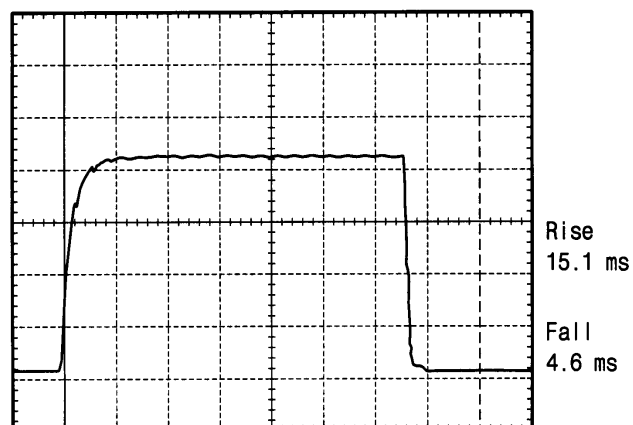
11b



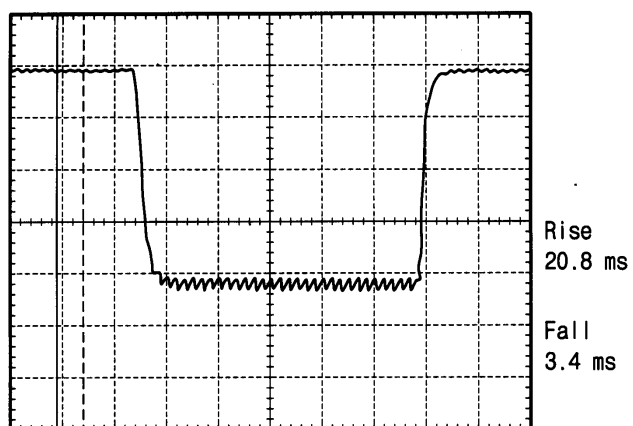
12a



12b



13a



13b

