

(19)
(12)

(KR)
(B1)

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G11C 16/02

(45)
(11)
(24)

2003 09 26
10-0399365
2003 09 15

(21) 10-2000-0073031
(22) 2000 12 04

(65)
(43)

2002-0043378
2002 06 10

(73)

3 416

(72)

107 405

192

APT504-502

(74)

:

(54)

1

1 1
2 1
3 1
4 1

;
;
;
;

[illegible]

(error correction code algorithm)

()

(error capture RAM)

()

1 2
1 2

가
가
가

가
가
가

()

()

가

1 1
1 (100) (100) (1)
0, 가 (150), (120), (160), (130), (170), (140), (180) (11)

(110) (CLE, ALE, nCE, nRE, nWE)

(I/Oi) (i=0-7)
(I/Oi) 가

ata[i]) (I/Oi) (120) (Xadd_data[i], Yadd_data[i]) (I/Oi) (CMD_d
(140) (Data[i]) (180) (130)

1 (CMD_data[i]) (120) (FailDetect_CMD) (110)
(FailRead_CMD) (150) (130)

(Xaddress[n:0]) (100)
 (160) , ()
 () (160)
 (180) (170) (110),
 (170) , (140) (Yaddress
 s[m:0]) (160)
 ()
 (180)
 (1) , 1 (190),
 (200), (210), (220)
 MD) (190) (120) (FailDetect_C
 , (I/O[i]) (Dexpect_ext[i])
 (Dexpect_ext[i]) (100)
 (190) 가 2 2 ,
 가
 (190) 2- (501) (502)
 FailDetect_CMD) 2 (I/O[i]) 1 (501)
 (Dexpect_ext[i]) (502) (501)
 1
 FailDetect_CMD) (200) (nREout) (FailDetect_C
 MD) (170) (Dsense[i])
 (nREout) (, NOR (nRE, nCE)
 8) (200) (Dsense[i])
 (190) (Dexpect_ext[i]) (200)
 ()
 (FailFlag[0], FailFlag[1]) (200)
 가 3 (200)
 3 (200a) (200b) (Dsense[7]-Dsense[0])
 (200a) (200b) 3 가
 (200a) (Dsense[i]) (200a) (FailDetect_CMD, nREout)
 (503, 508, 509, 511), 2 PMOS (Dsense_int[i])
 (506, 507), (510) (504, 505), 2 NMOS
 (FailDetect_CMD)가 (Dsense[i])
 (nREout) (Dsense_int[i])
 (Dsense_int[i]) (FailDetect_CMD)가
 (nREout) (Dsense[i])
 3 (200b) (200a) (Dexpect_e
 xt[i]) (Dsense_int[i]) (190) (nREout)
 (200b) (FailFlag[0], FailFlag[1])
 (Dsense_int[i]) (, Dexpect_int[7])가
 (Dsense_int[7]) (Dexpect_ext[7]) , XOR
 (512) "1" XOR (513-515, 516-519) "0"
 (nREout)가 가 , NOR (548)
 (FailFlag[0]) , NOR (549) (FailFlag[1])
 가 (FailFlag[0])가
 (Dsense_int[7], Dsense_int[0])가 , XOR (512, 519)
 "1" , XOR "0" (nREout)
 , NOR (548, 549) - (FailFlag[0], FailFlag[1])
) 2
 (FailFlag[0], FailFlag[1])
 1 (210) (FailDetect_CMD)가
 (200) (210)
 (FailFlag[0], FailFlag[1])

(FailStatus[i])

(210) 가 4

4 (210) (560), 2 T - (561, 562), NOR (563), (564), S-R - (565, 566) (565, 566)

T - (561, 562) 가 5 (560) T - (561, 562) (210)

S-R - (FailDetect_CMD) (Clear) (Clear) (561, 562) (210)

가 2 (210) (FailFlag[0])가 - 가 T - (561) (Q) -

가 , S-R - (565) (FailStatus[0])가, 6 가 , T - (562)

(Q) - NOR (563) (FailFlag[0])가 - 가 T - (562)

가 - 6 , S-R - (566) (FailStatus[1])

(FailFlag0, FailFlag1) - 가 , 6 , S-R

- (565) T - (561) (FailStatus0) , S-R

- (566) NOR (563) (564) (FailFlag1)

(FailStatus1)

가 (210) (FailFlag[0])가 - 가 T - (561) (Q) - 가

6 , S-R - (565) (FailStatus[0])가 - (FailStatus[0], F

ailStatus[1]) , 6 (210)

1 (220) , (180)

) (Dsense[i]) (I/O[i]) (220)

us[i]) (i=0-7) (210) (FailStat (22)

0) (FailRead_CMD) (FailRead_CMD, FailDetect_CMD)

가 7 (574) (FailRead_

CMD)가 (578) (I/O[i]) (574)

(FailStatus[i])가 (210) (FailStatus[i]) (I/O[i

)] (2) (FailStatus[0], FailStatus[1])

(FailStatus[2] - FailStatus[7])

가 9

9 (S100)

가 (S110). 가 (I/O[i])

(S120). 가 (S1

30). (S140) 가 (S15

0). 가 (S160).

U.S. Patent No. 5,473,563 "NONVOLATILE SEMICONDUCTOR MEMORY"

, U.S. Patent No. 5,541,879 "NONVOLATILE SEMICONDUCTOR MEMORY HAVING PROGRAM VERIFYING CIRCUIT"

, U.S. Patent No. 5,546,341 "NONVOLATILE SEMICONDUCTOR MEMORY"

, U.S. Patent No. 5,712,818 "DATA LOADING CIRCUIT FOR PARTIAL PROGRAM OF NONVOLATILE SEMICONDUCTOR MEMORY"

(S160) (S170), 가

(S180). (LSB) 가 (160) (S190

) (S200) 가

(S210). (S220), 가

(S230). (S200-S230)

가 10 . 11a 11a 2

가 . ,

가

10 (300) (110)

(120) (120) (FailDetect_CMD) (Clear) (565, 566)

(210) (560) (4) (561, 562) S-R (565, 566)

(210) T - (561, 562) S-R (565, 566)

(S310) , 11A 11B (FailS

tatus[0] - FailStatus[7])

(S320) 가 (LSB) (170) 가 (MSB) 가

(S330) (nREout)

(180) (200) 가, (I/O[i])

(190) (FailDetect_CMD) (200) (Dsense_int[i])

(S340) (Dexpect_ext[i]) (200) (FailFlag[0], FailFlag[1])

(S350) 가 가 가 11a (nREout)

가 (FailFlag[0])가 (FailStatus[0])가

, 1- (210) S-R - (565) 가

(S370) (S370) 가 (nRE) (S370)

(S330-S370) 가 (S330-S3

70) 11a (FailFlag[1])가 (nREout)

(FailStatus[1])가

(210) S-R - (565, 566) , 2-

11b (FailFlag[0], FailFlag[1]) (nREout)

(FailStatus[0], FailStaus[1])

(210) S-R - (5

65, 566) (S330) 가 (S380)

(120) (FailDetect_CMD)가 (220)

(FailRead_CMD)가 (210)

(FailStatus[0] - FailStatus[7]) (I/O[0] - I/O[7])

(FailStatus[2] - FailStatus[7])

(I/O[0], I/O[1]) 가 11a 11b

(FailStatus[0], FailStatus[1])

(I/O[0], I/O[1]) "11" ("03h" , 2-

가

가

(FailStatus[0]) 12

(FailStatus[1], FailStatus[0])

(I/O[1], I/O[0]) "01" (

"01h") , 1-

가

가

(FailStatus[0], FailStatus[1]) 13

(FailStatus[1], FailStatus[0]) 13

(I/O[1], I/O[0]) "00" ("00h" ,

가
14 2 (Dsense[i]) (220') (200')
1 1
, 2 가 1 가
2 (180') (586) (Dsense[i]) (220') 15 (Dsense_int[i])
(가 0) (587))가 2 (200') 3 (220') (20
2
11a, 11b, 12 13
2 가 1
1
가
/ 가,
/

(57)

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가

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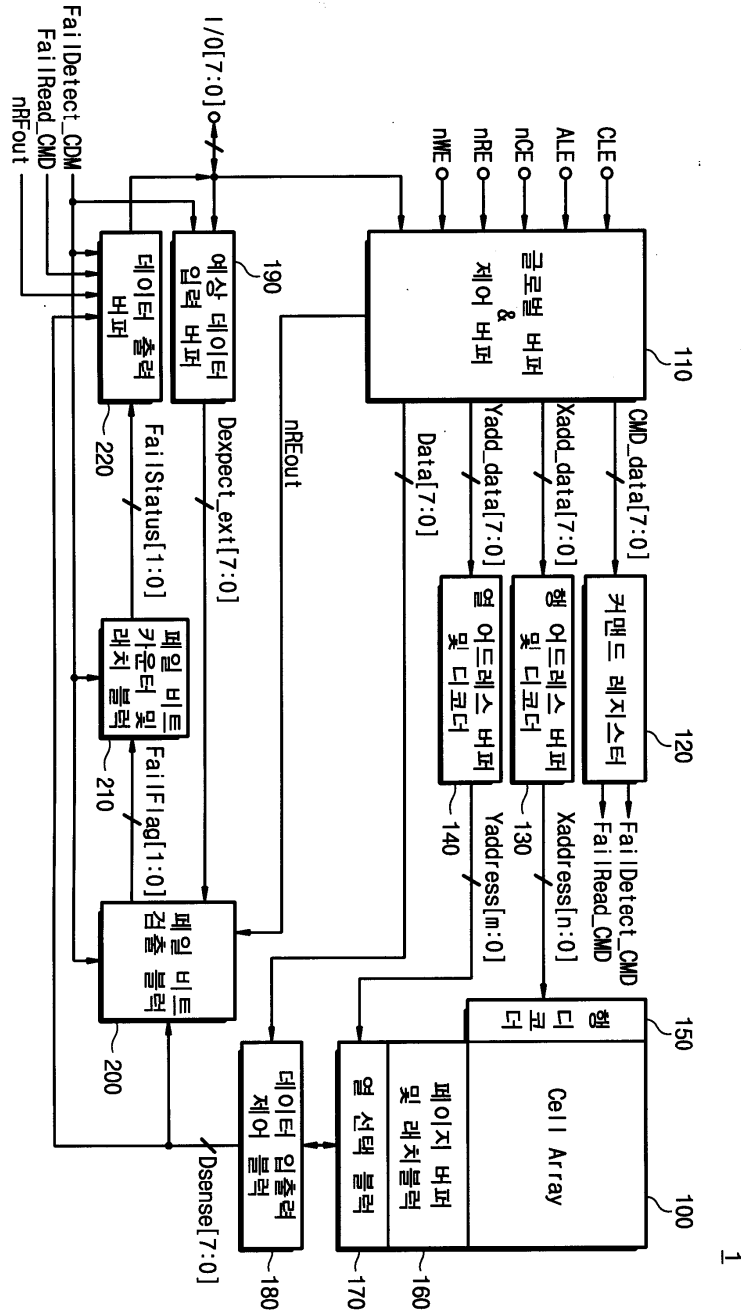
6.

5

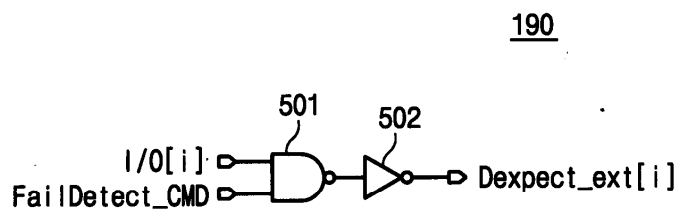
,

가
 7.
 1 2 , 가 ,
 8.
 7 ,
 가
 9.
 1 , 1 2 , ,
 2 가 가 1 2 1 ,
 10.
 9 , 1 2
 11.
 9 ,
 1 1 1 2 ; , 2
 1 1 1 2 ; ;
 2 2 가 2 1 , 가
 1 2
 12.
 11 , 가
 가 ,
 13.
 : ; ;
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 가 , 가 ,
 가 ,
 14.
 13 , 가 가 ,
 가 ,

1

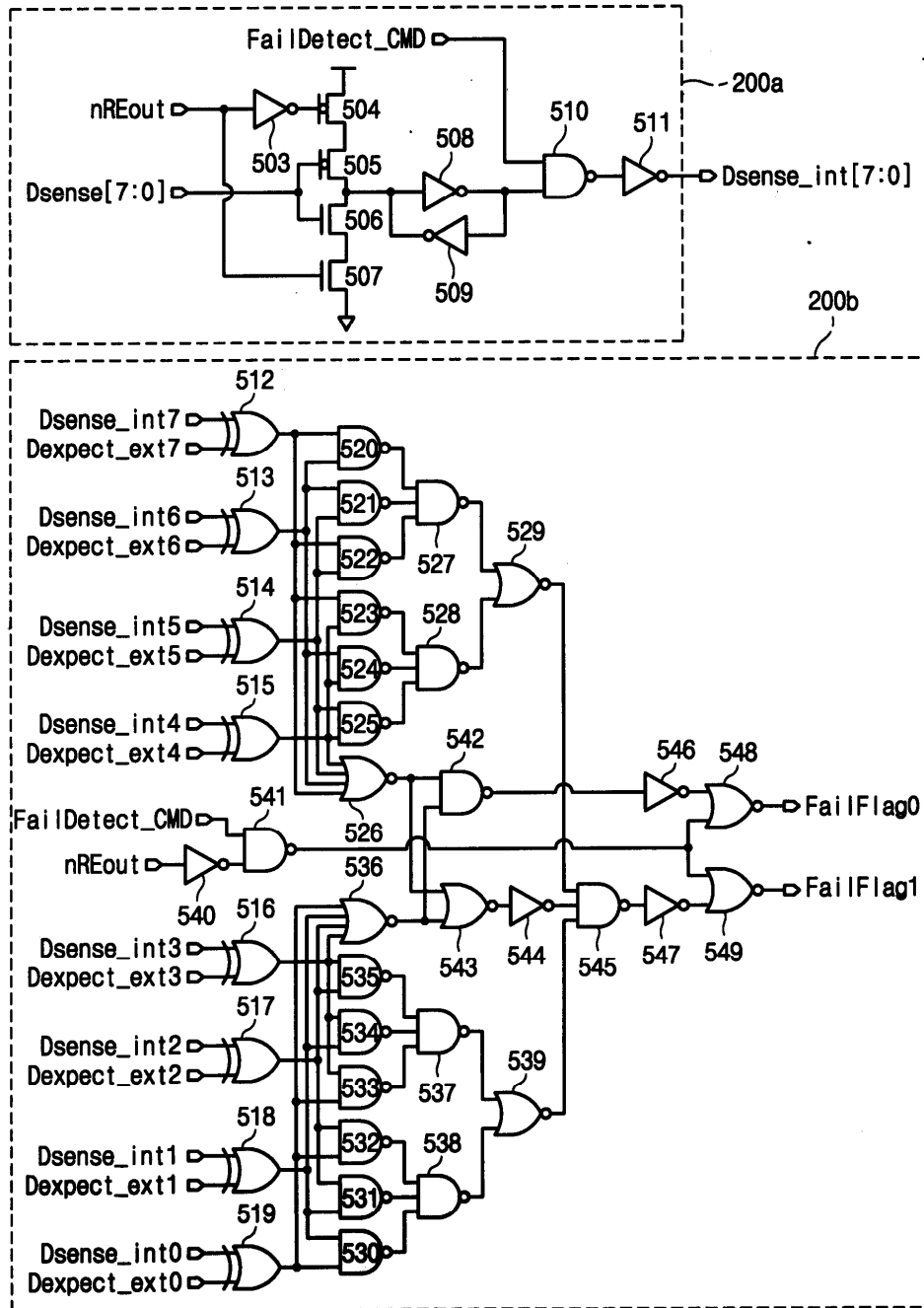


2



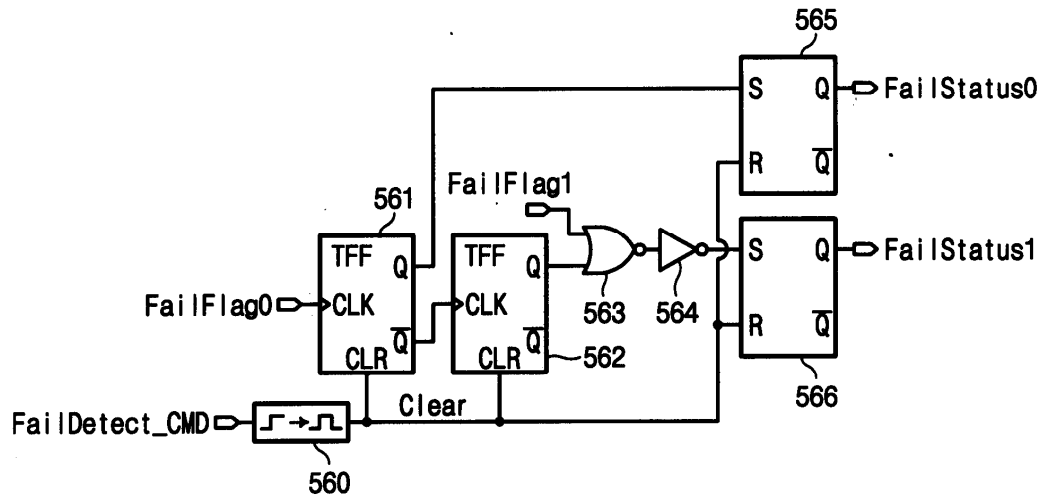
3

200

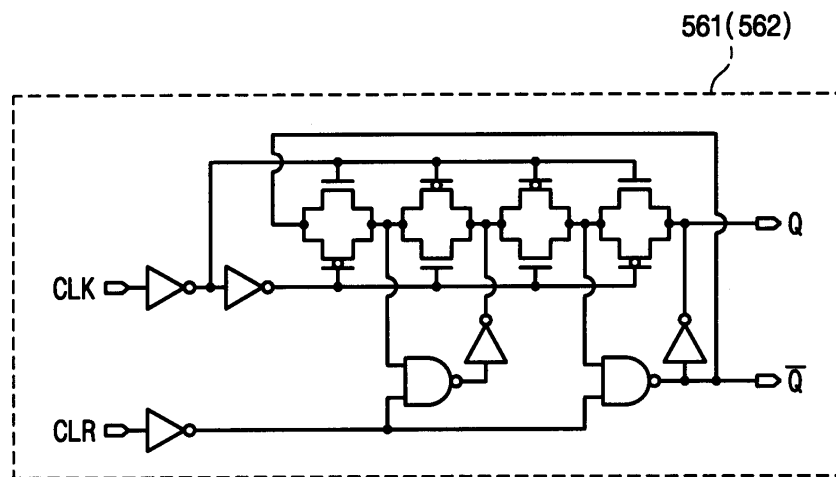


210

4



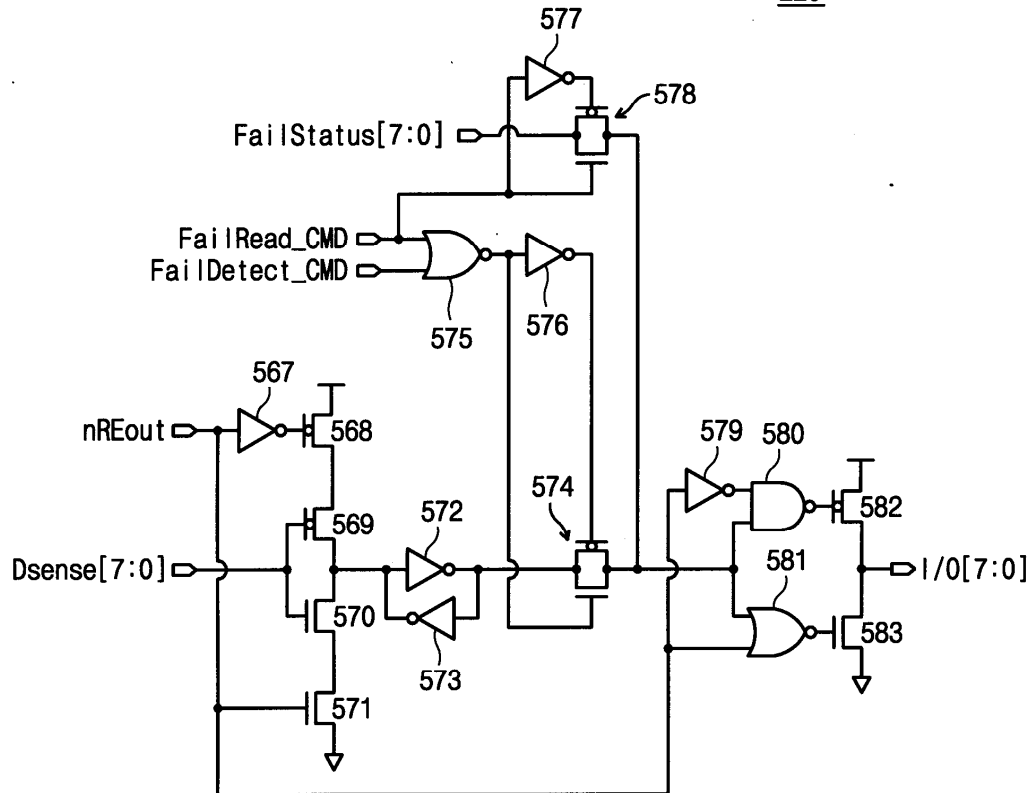
5



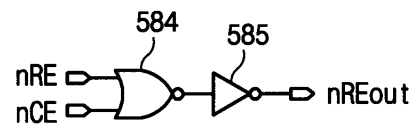
6

Number of Fail Bits		More than 2 Bits		1 Bit	none
Input	FailIFlag0				
	FailIFlag1				
Output	FailStatus0				
	FailStatus1				

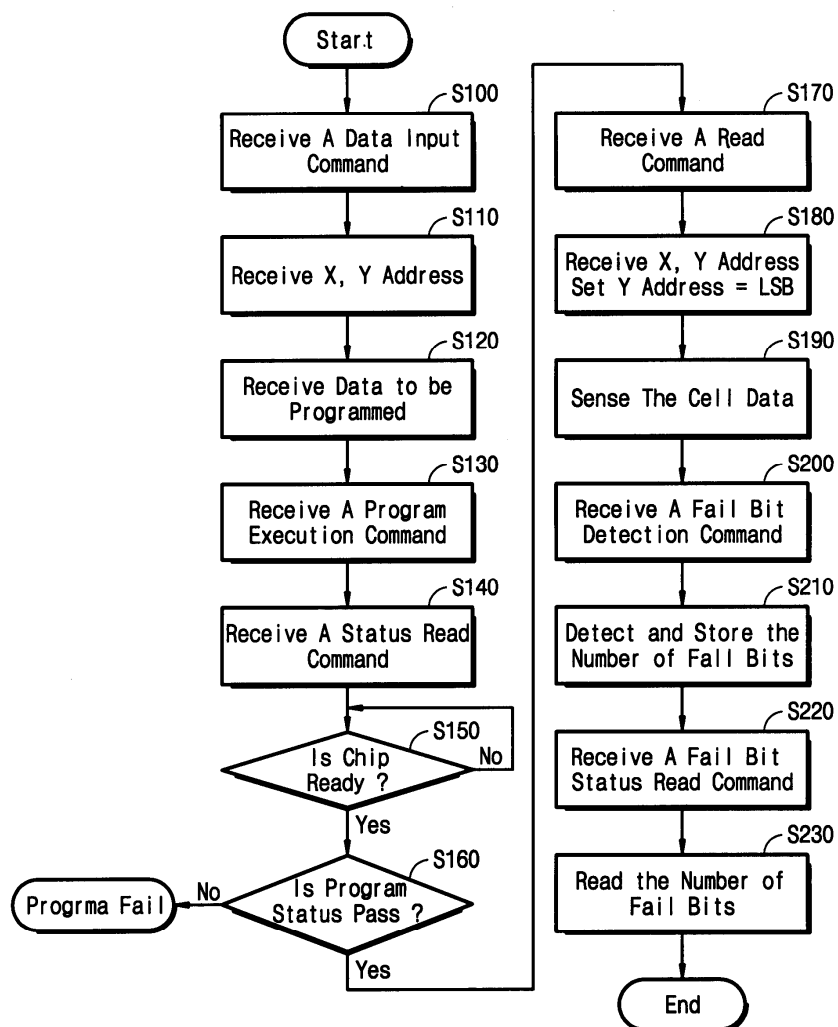
7

220

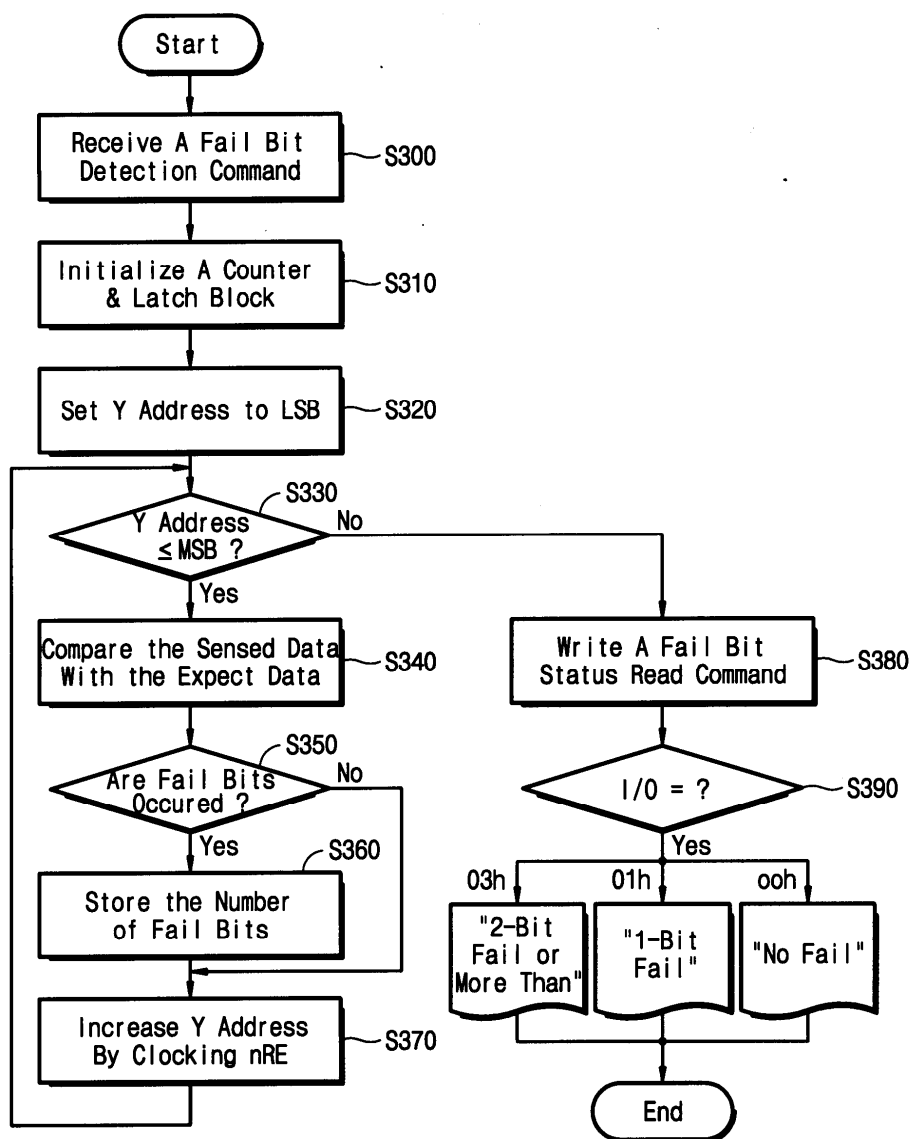
8



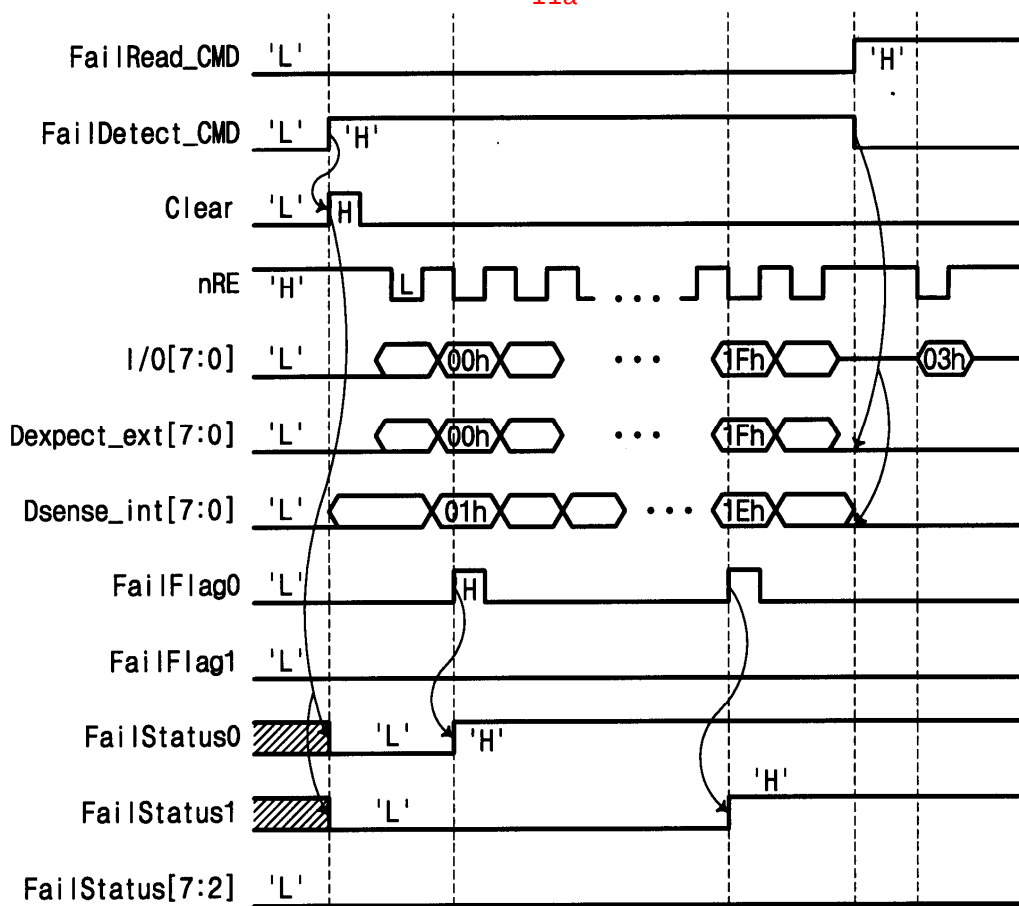
9



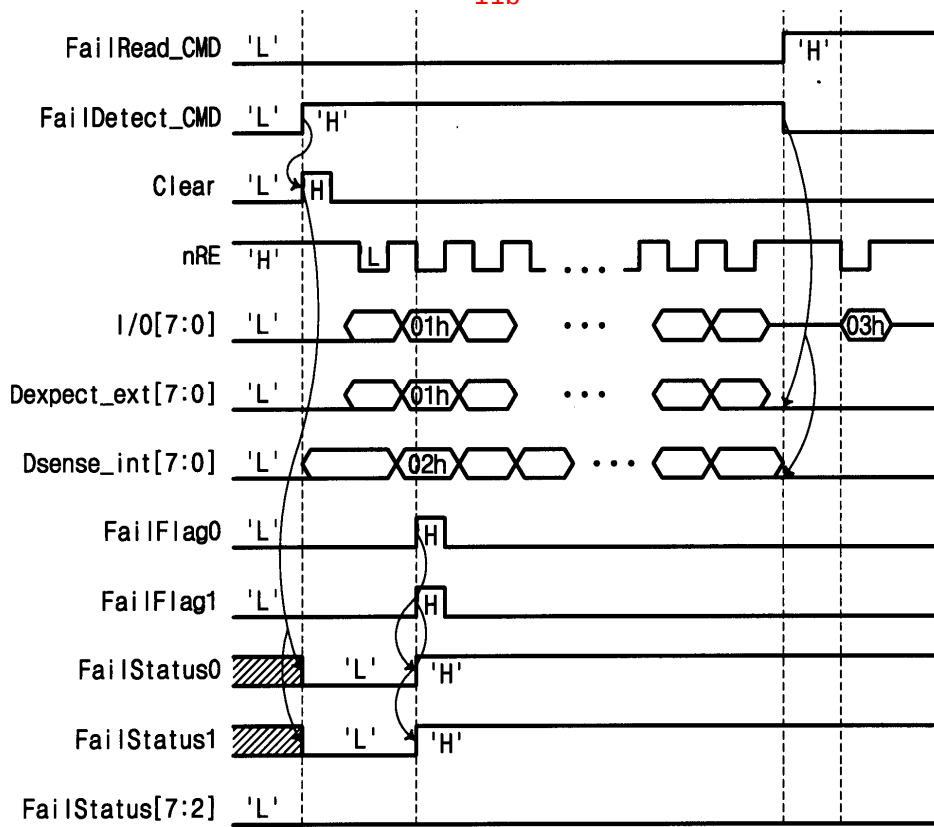
10



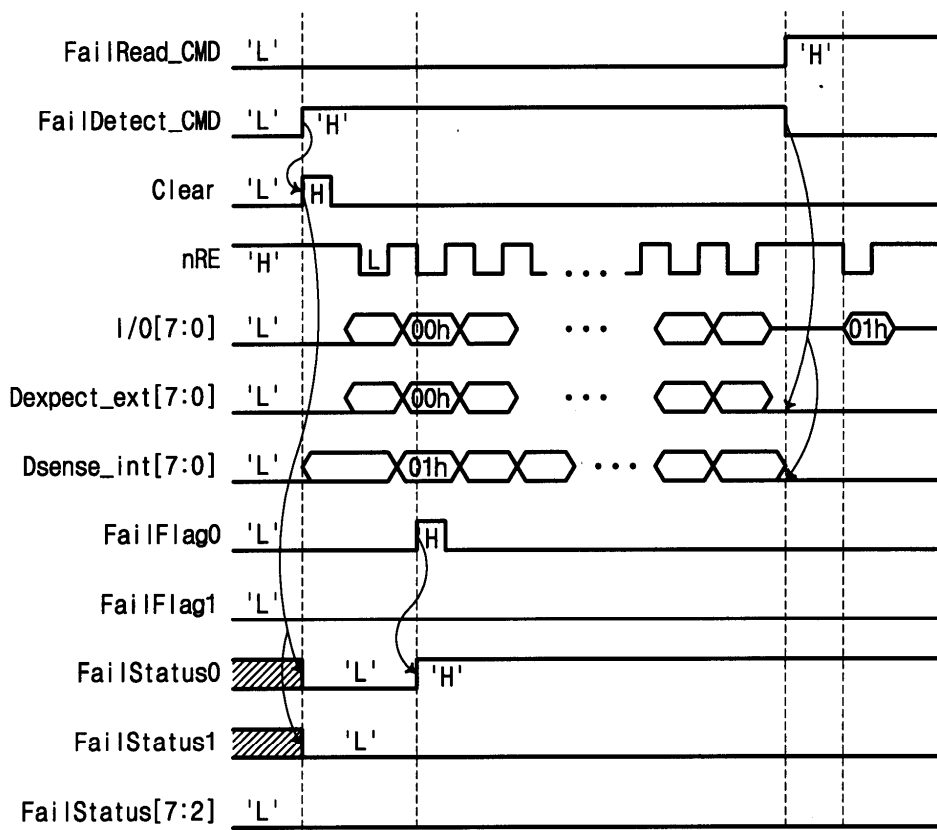
11a



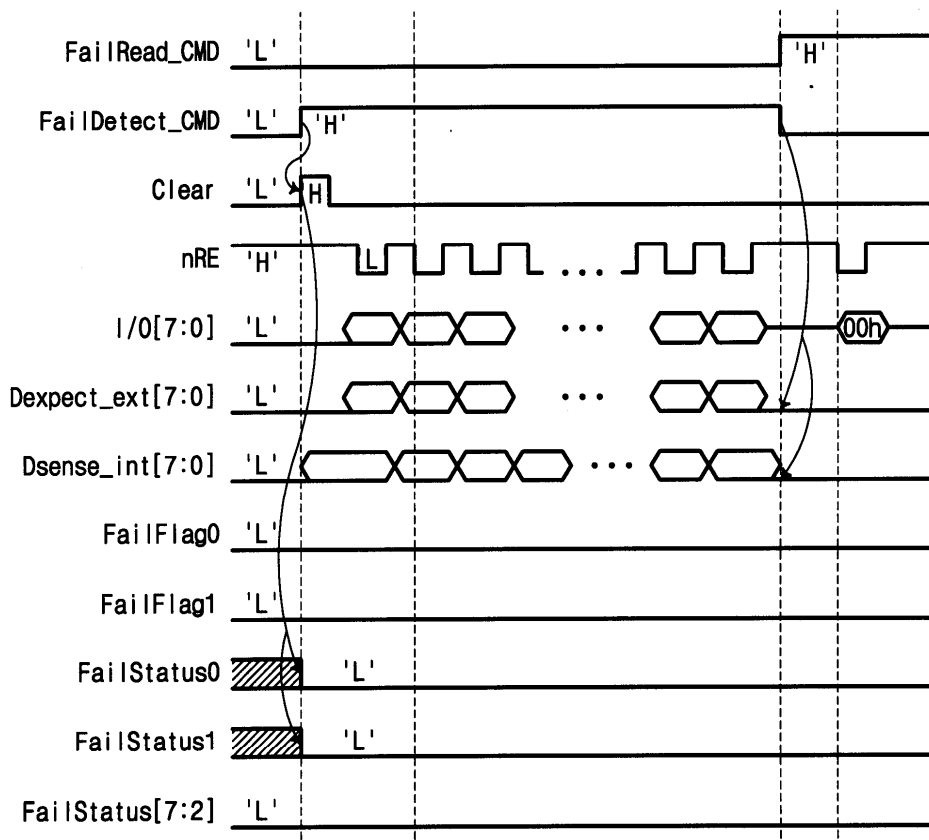
11b



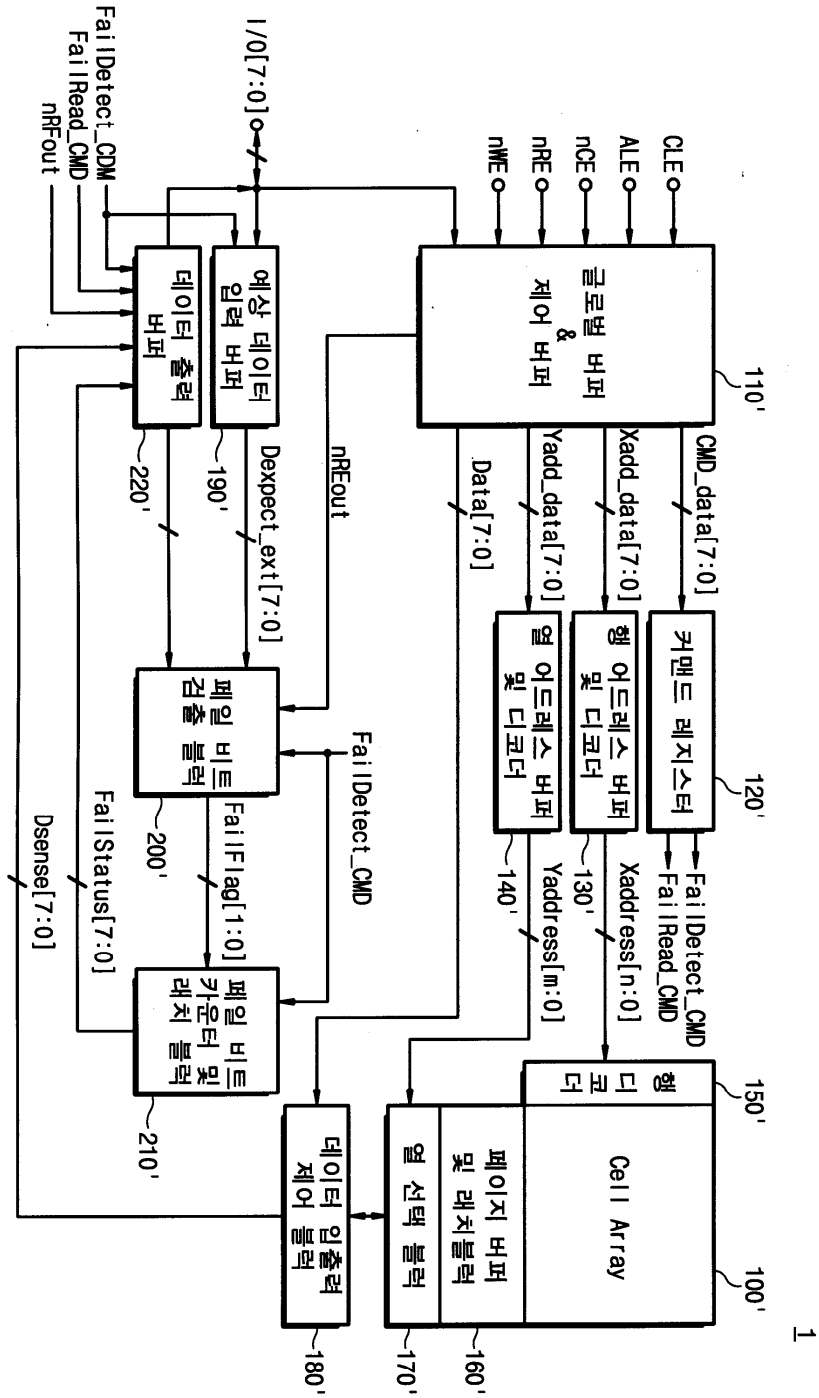
12



13

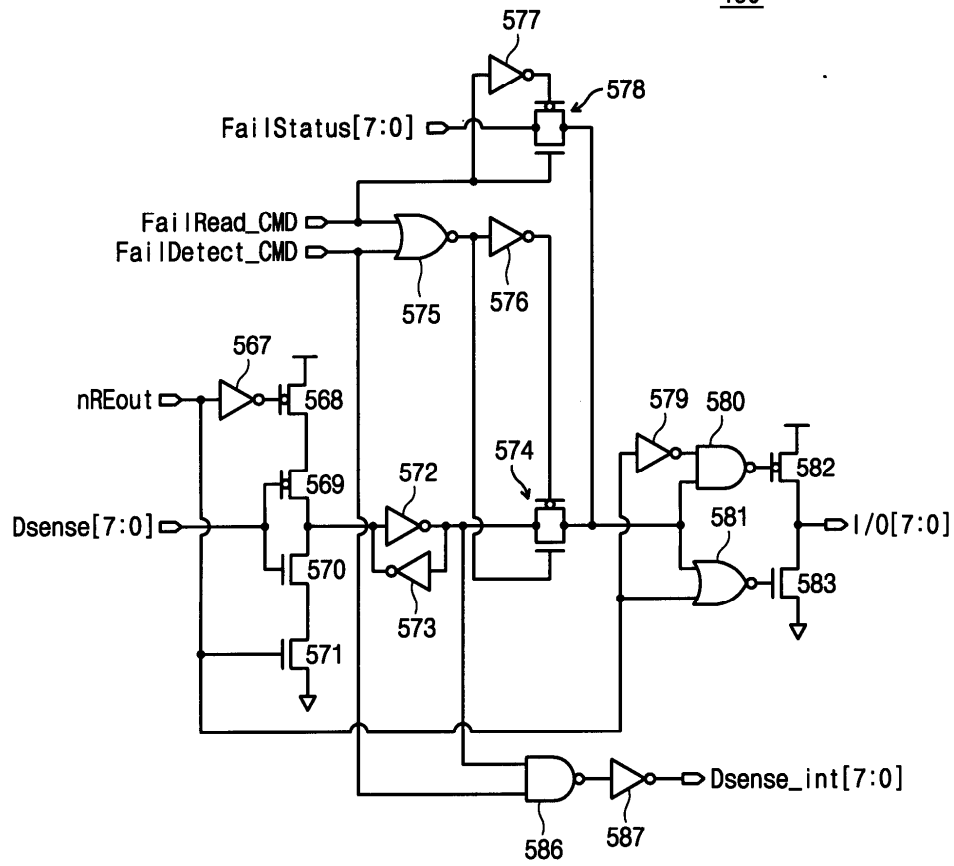


14



15

190



16

