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(24)

2002 07 24
10 - 0344373
2002 07 03

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10 - 2000 - 0054154
2000 09 15

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(43)

2001 - 0039886
2001 05 15

(30)

1999 - 305262

1999 10 27

(JP)

(73)

가 가

2 2 3

(72)

가

2 2 - 3

가 가

2 2 - 3

가 가

(74)

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(54)

(3) y

(1)

(3)

(2)

(1)

(4)

Al Cu

(2)

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1	1	.
2		.
3	1	x .
4		.
5		.
6	C_1, C_2	.
7	1	4 x .
8	2	.
9	3	.
10	z	.
11	z	.
12	4	.
13	4	.
14	4	.
15	4	.
16	4	.
17	4	.
18	4	.
19	4	.
20	5	.
21	5	.
22	5	.

23	5		.
24	5		.
25	5		.
26	5		.
27	5		.
28	6		.
29	7		.
30	7		.
31	z		.
32			.
33	8	1	.
34	8	1	.
35	8	2	.
36			.
37			.
38			.
39			.
40			.
41	39	가	.

<

2 :

2a, 2a1, 2a2 :

2b, 2bb :

3, 3a, 3b :

4, 4a 4c :

5 :

6, 9, 10 :

7a, 7b :

8 :

11 :

12 :

, .

39 LSI (101) (120)
 , (103) , (103) (102, 104)
 가 (120) . (105) ,
 (105) (106, 107) (106, 107) (105)
 (108, 109) (102, 104) .

, 40 (112) , (112)
 (110, 111) 가 (120) .

, 39 (102, 104) , 가 41
 , R101, R102
 가 .

, 40 (110, 111)
 , (112) 가 (0.2 μ m
 1 μ m) 가 .

,
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1 , (下地層)
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 , 1 2

, 2 , 1 2 1
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 , , 3
 , , 3 가 , 3 3
 1 2
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가

0.2 μ m

가

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< 1

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(11) ,
(12)

가

(12)

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x

Al

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(3)

y

(4)

(1)

(1)

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(3)

(2)

(3)

x

3

(3)

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(3)

S

0.2 μ m

(3)

T

0.5 μ m

3

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(3)

V1 가

(3)

V2 가

(5)

4

4

5

(A × A)

5

C₁ ,

1

$$C_1 = K_0 \epsilon_0 \frac{T \times A}{S} \times \frac{A}{2S} = K_0 \epsilon_0 \frac{TA^2}{2S^2}$$

가 . ,

K₀=3.9, $\epsilon_0=8.86 \times 10^{-14}$ F/cm .C₂ ,

2

$$C_2 = \epsilon_0 K_0 \frac{A^2}{D}$$

가 , 4 5 D=5L=5S 가 C₂ ,

3

$$C_2 = K_0 \epsilon_0 \frac{A^2}{5S}$$

가 .

, T=0.5 μ m, A=100 μ m , (L S) 0.1 1 μ m
C₁, C₂ 6 . 1 μ m C₁, C₂ , 0.2 μ m
가 C₁ C₂ 1 . ,

7 1 4 (3) , x 7
V2 , 가 (3b) V1 가 (3a) ,

1 ,

가 가 .

< 2

8 2 2
1 7 (4)
(4a 4c) 3a 3b가 z
(2) 3 .

, 8 3 (4a 4c) , 4 .

, (3) (1) (3) ,

3 6 가 .

2, (3a, 3b), 4 (3b, 3a)
 2, 1
 2
 , (4b) (3) 가 (3)
 < 3
 9 3, 7 (4) 3
 1 (4a, 4b) (3a) (3b) z
 (2) 2, z (3a) (3b) (2)
 가 W (6) 9
 2 (4a, 4b) 3
 10 11 (6) z (6)
 (10) (3a, 3b) (11).
 3, 9 (6)
 , 11 (6)
 < 4
 12 4, 4 7
 1 V2가 가 x y
 (7b) (4) z (2)
 (7b) 2 (12)
 4, (3a) (7b)
 13 (7b) (3a)
 (3b) (1) (8)
 4, 14 (3a) (3b)
 (7b), (7b) (3a) (8)
 15 19 4, 12
 (4) V2가 가 (7b)
 V1 가 (7a) (15).
 , 12 (4)
 (4) (8) (7b) (4) (1)
 (16, 17).

, 12 7 1 , 8
2
4 (18, 19). 9 3

< 5

20 5
4 , V2가 가 (3b) (7b) 12
2) 가 W (9) .
(9) 10 11

(3b), 5 (9) , V1 가 (3a) V2가 가
(7b) (3a) (1) (8)

, (3a) (9)
21 27 5
(4) V2가 가 (7b)
, V1 가 (7a) (3a) , (7a)
(9) (21).

, 20 (4)
(4a, 4b)가 , (4a, 4b) 20
(22).

, 20 12 , 5 (23, 24). 18 19
, 24 2 (4a, 4b) 5
, 3 , 4 5 (6) (4a 4e)
, 5 (25 27).

< 6

28 6 . 6 24
5 , (4a, 4b) (7
b) V1 가 , (7b) (7a) (7b)
(4a, 4b) z (2)
(7a) (3a) (2) 가 W (10)
(10) 10 11

V2가 6 (3b), 28 (6, 9) (3a) (6) (7b)
 가 (6, 9) V1 가 (3a), (7a) (3b), (7b)
 , (3a, 3b) (1) (8) .
 , 28 (9) (3a) (4a, 4b) (7a) (7b)
 (10) (3b) , (7a) 가
 .
 < 7
 29 7 29 (3a,
 3b) (2b) (4) ,
 SiN BST (2a) .
 , 30 7 30
 (3a) (3b) (2) (2a) .
 7 (3a, 3b) (2a)
 (2) .
 , 29 (2a) 30 (2a) ,
 .
 < 8
 31 z (11) (1
 2) 가 (12) 29 30 , (3a, 3b) (
 2a) . , (11) 32 , (2b)
 (2) .
 8 (12)
 (11) .
 , 33, 34 8 1 33
 (11) 34 (12) .
 (4) (2a) (11) (2a1)
 (12) (2a2) , (11) (12)
 (2a) 가 .
 , 35 8 2 (11)
 . (3) (2b) F
 (2b) , (12) (2)
 (11) .
 , 1 8 36

, 37
 . C1, C2
 . 36 C 1 8 , v
 , C , 37, 38
 , C 1 8 ,
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 2, 2, 2
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(57)

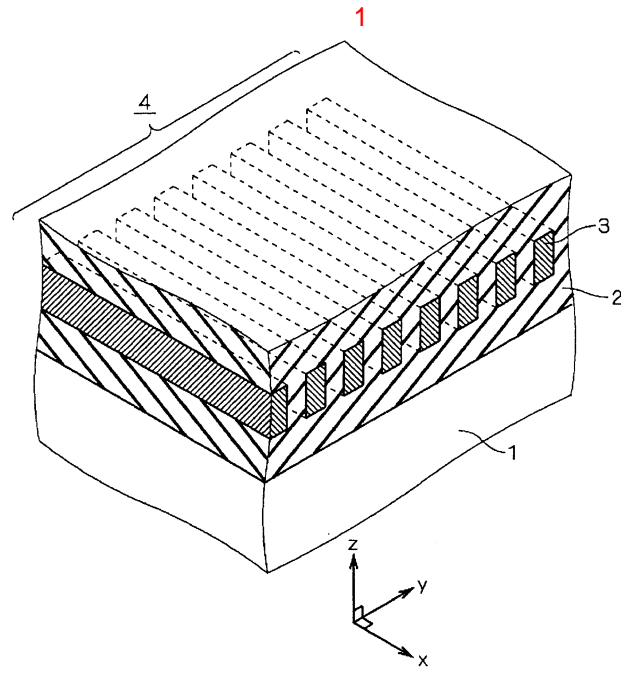
1.

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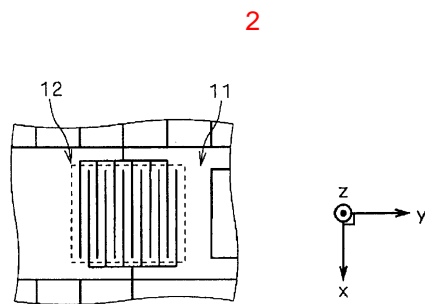
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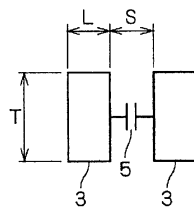


- 1: 반도체 기판
2: 절연막
3: 배선
4: 라인 엔드 스페이스 구조



- 11: 배선부 12: 캐패시터부

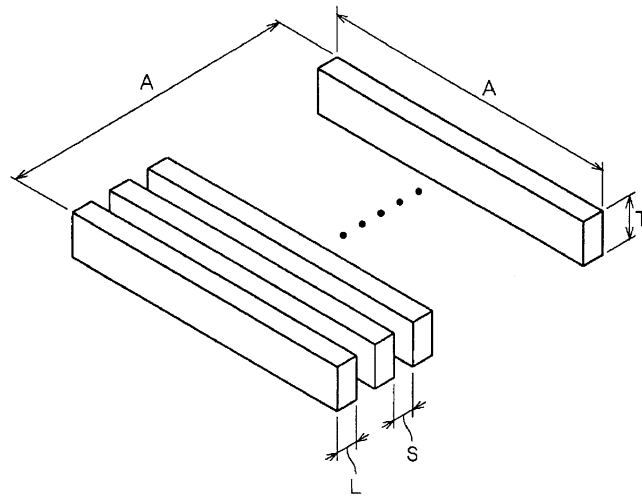
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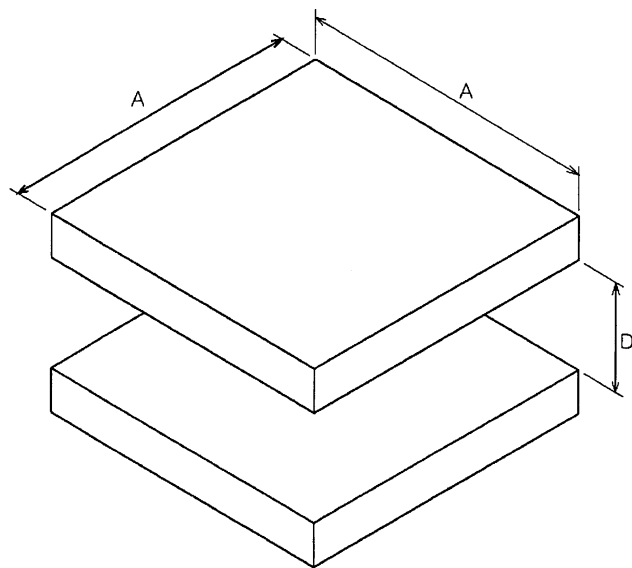
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5: 용량

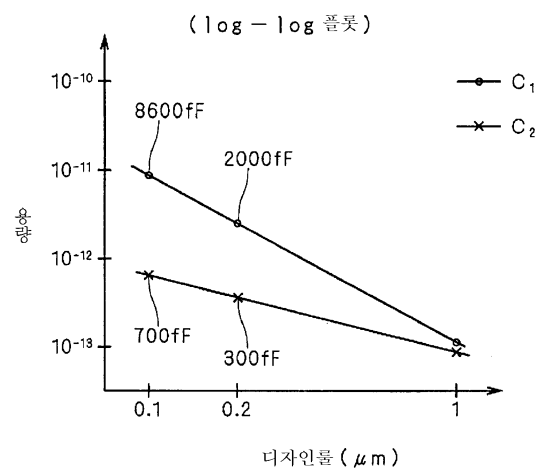
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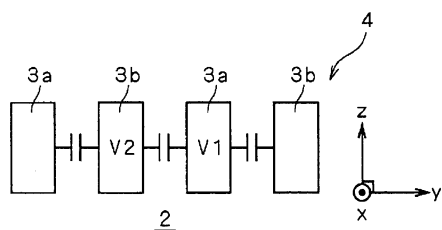
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6

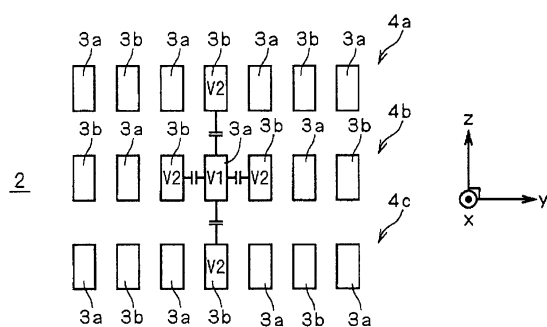


7



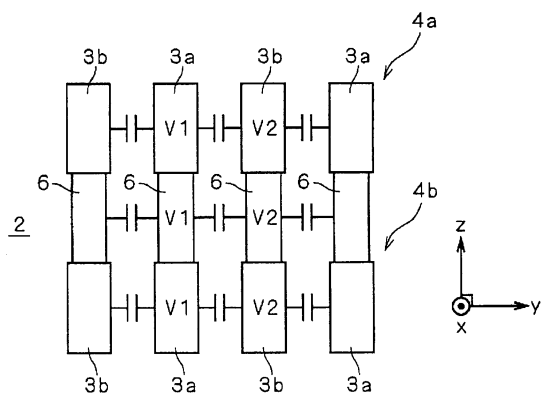
3a, 3b: 배선

8



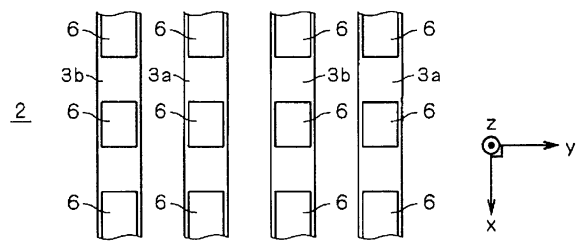
4a~ 4c: 라인 앤드 스페이스 구조

9

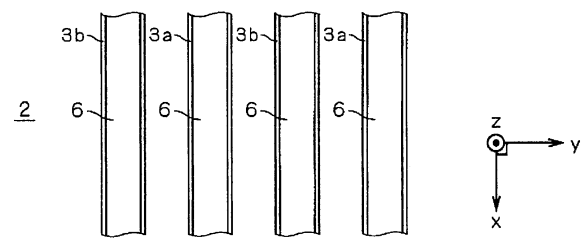


6: 관통 구멍

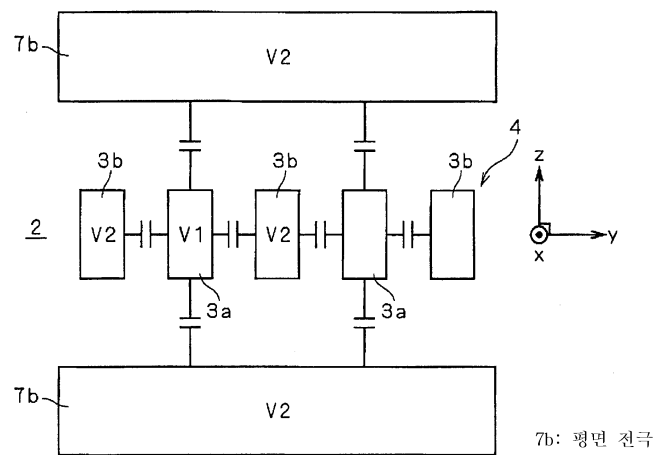
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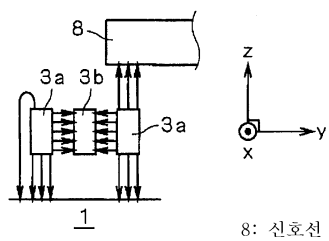
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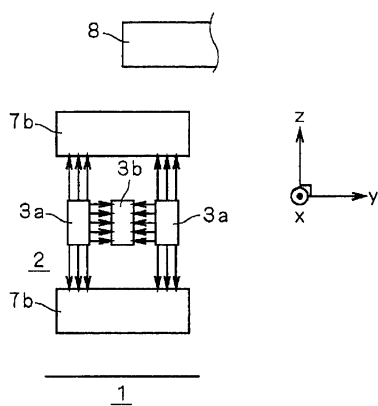
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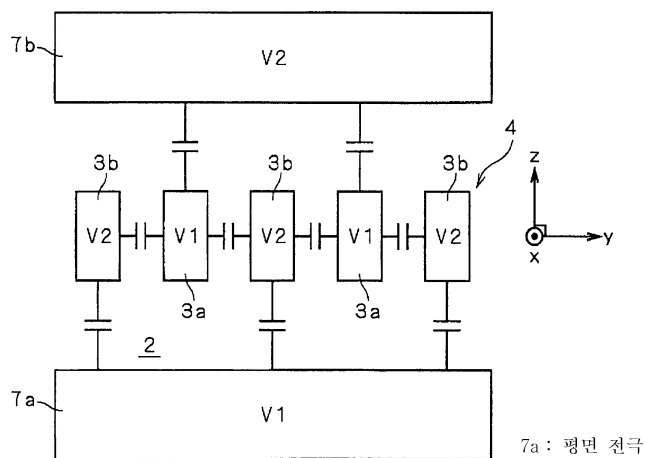
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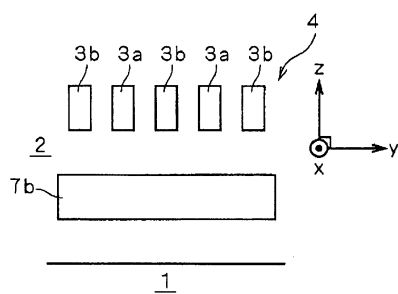
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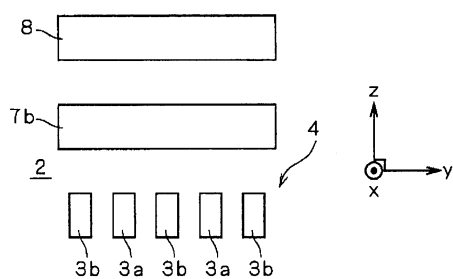
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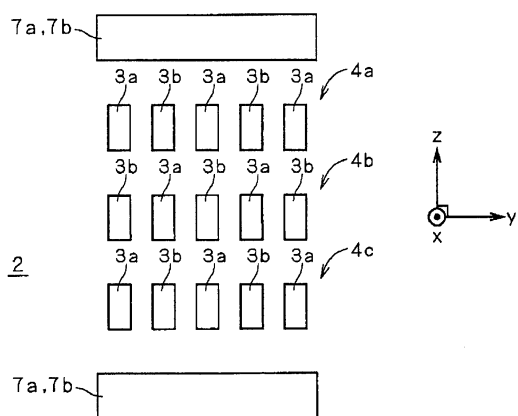
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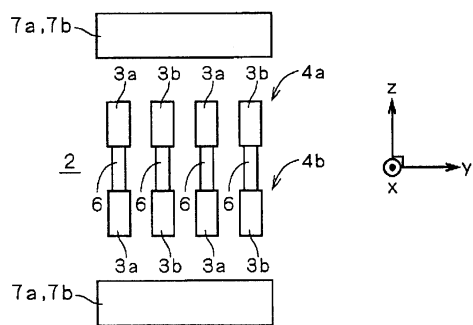
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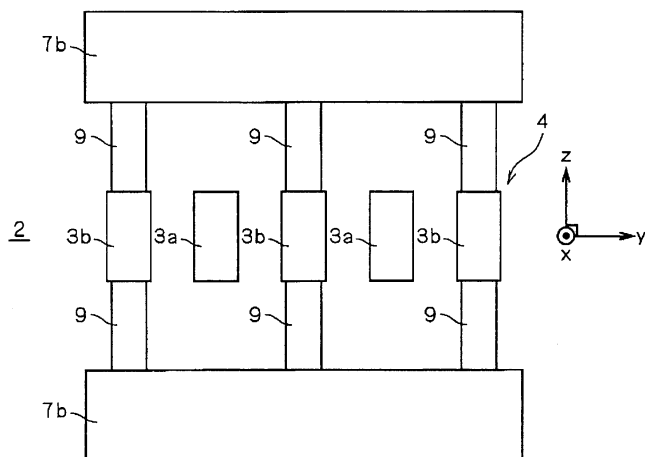
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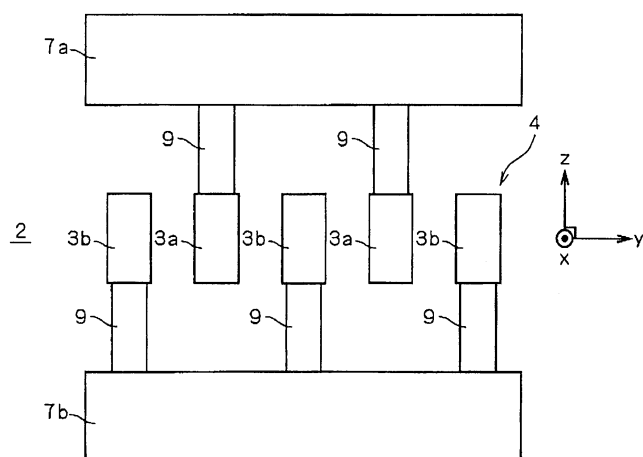


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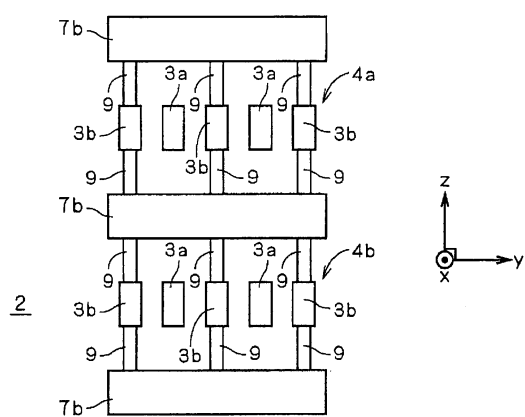


9: 관통 구멍

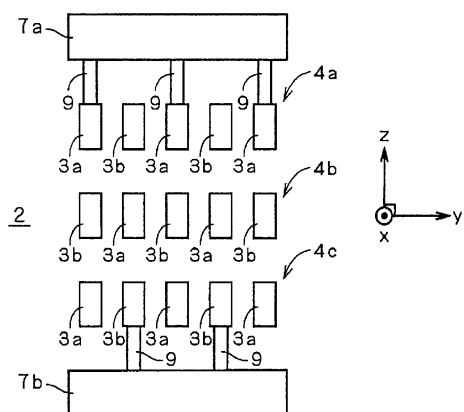
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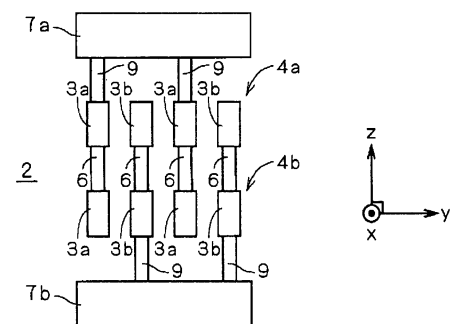
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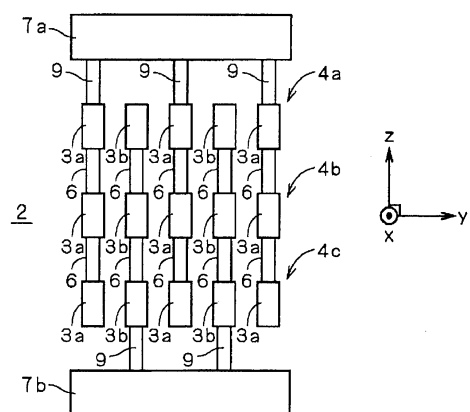
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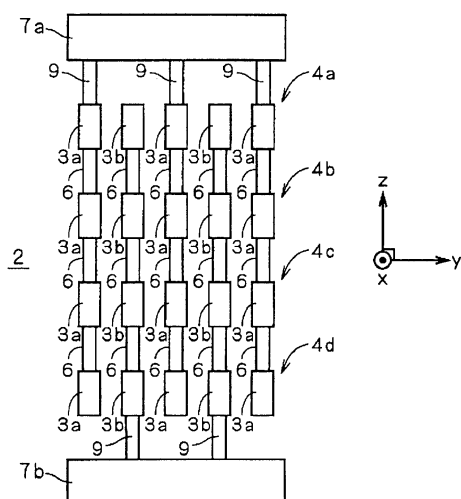
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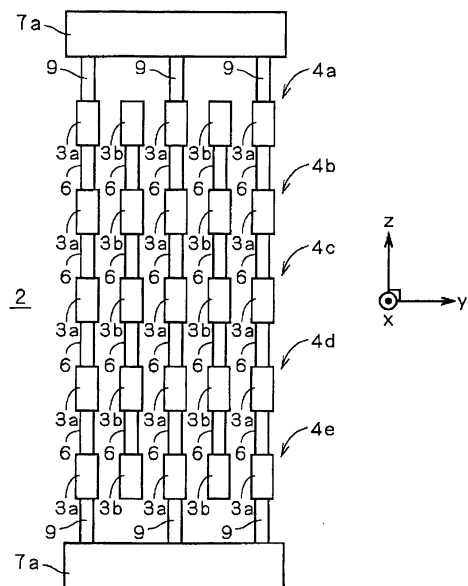
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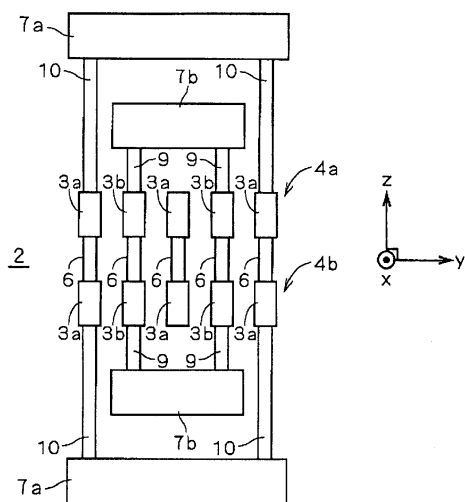
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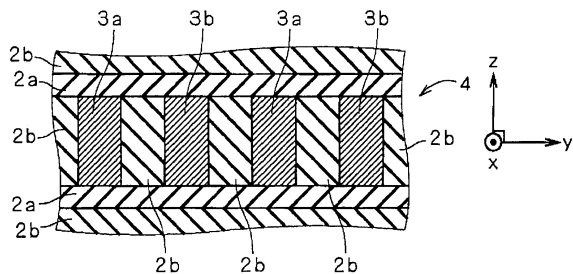


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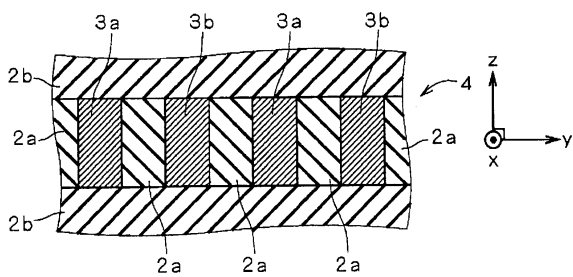
10 : 관통 구멍

29

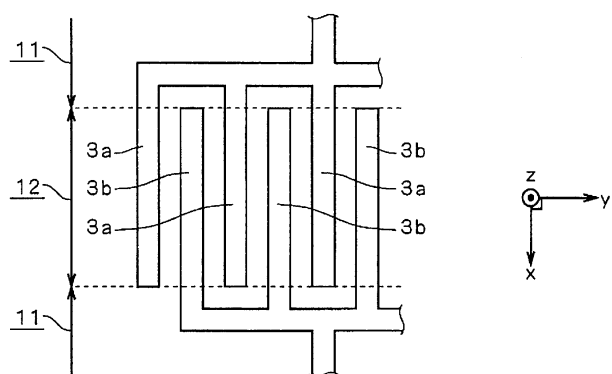


2a: 고유전체막
2b: 실리콘 산화막

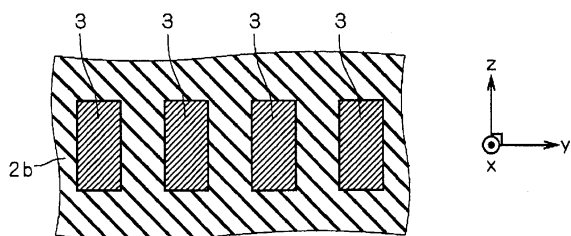
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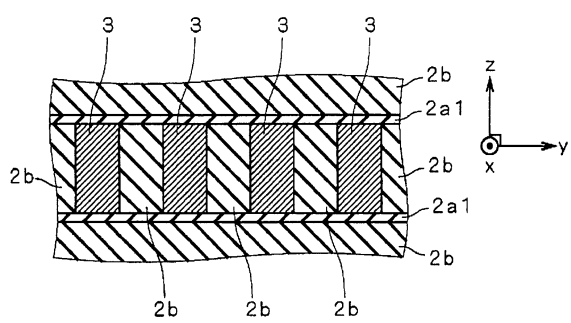
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32

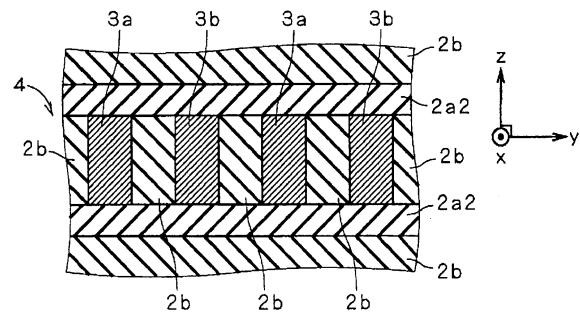


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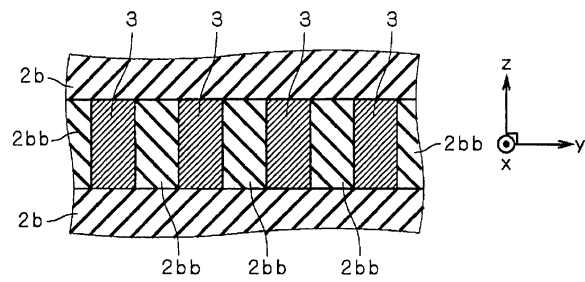


2a1: 고유전체막

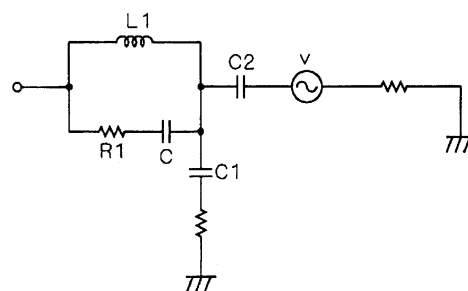
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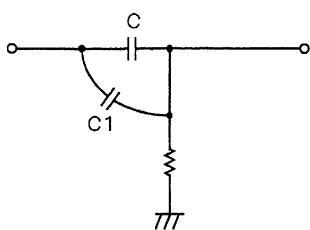
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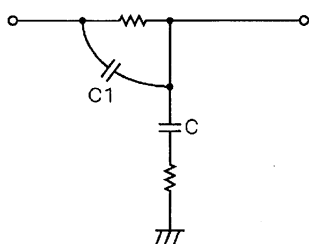
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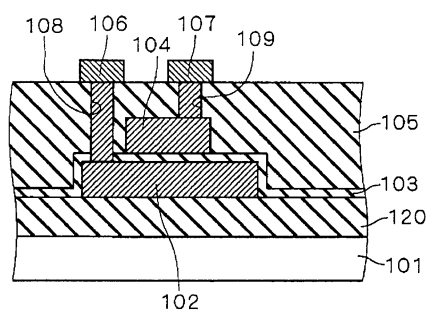
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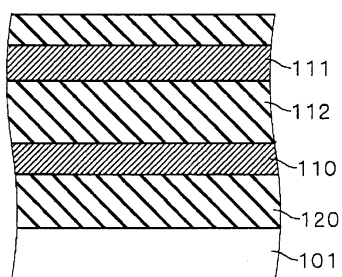
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