

1

MEMS

1

2

3

4

5 15

16

17

18

19

20

가 MEMS(Micro Electromechanical System)



(High Aspect Ratio) 가

MEMS , MEMS 가 MEMS (chip) IC/ASIC Q - (factor)가

- 1 MEMS
- 2 가 MEMS
- 3 가 MEMS

1 , 1 ;

2 ;

1 2 ;

1 MEMS 3 ;

3 MEMS 가 4 ;

1 가 MEMS 3 5 ;

3 , MEMS 가 ,

, 3 , MEMS

5 (Anodic bonding) 1 3 , SDB(Silicon Direct Bonding) (eutectic bonding)

3 가 , 4 3

2 ,

1 1 ;

2 ;

3 ;

2 ;

1 4 ;

1

MEMS

5 ;

3

MEMS

가

6 ;

1

3

7 ;

가

MEMS

7

SDB

1

6

3

가

MEMS

, MEMS 가

가 ,

MEMS

1

2

, 3

, 4

1

2 , MEMS

, 1 (1)

MEMS

(6)가

130

(900)

(110)

, 100 MEMS

2

(6)

(900)

2

(100)

3

4

, 1 (1)

(2)

, (2)

(130)

1

(21)

2

(21, 22)가

(3)

1, 2

(11, 12)

(11, 12)

1, 2

(11, 12)

(3)

(7)

(7)

1, 2

33)

1, 2

(21, 22)

가

(33)

1, 2

(11, 12)

,

x

y

가 (

가

, 1, 2

(21, 22)

y

.

, 가

1

(21, 22)

1, 2 (21, 22) (2) (sensing electrode, 31, 32)가
 (31, 32) 1, 2 (21, 22)

1, 2 (21,22) 1 (21) 2 (22)
 1 2 (40)가 1

(40) , 1 (21) (40) , 2 (22)
 (40) , 1 (21) , 2 (22)
 (40)

(21, 22) (21, 22)
 (21, 22) (40) , (41) ,
 40) 1 2 (41a)가 (41) ,
 (41) (42) 1 (21) 1 (42a) , (41)
 (43) 2 (22) 2 (43a) (41)
 (41a) 1, 2 (11,12) 1, 2 (11a, 12a)

(21, 22) (40) (21, 22) 가 (dri
 ving comb electrode, 51) (21, 22) 가 (driving sensing comb electro
 de, 52)

(51) 가 (52) 1, 2 (21, 22) 가
 (21a, 22a, 51a, 52a)

1, 2 (21, 22)

4 61 , 6
 4 가

5 (100) TEOS (200) 0.01 $\mu\text{m}^2/\text{cm}^2$ 가 n - 1

6 (200) LPCVD (Feed
 Through Layer, 300) (300) (61)

7 (300) (400), (500)
 (600)

8 , 1 (100) 40 μm (600)
 2 (1) SDB

9 /Au, RIE (300) 1 (100) (61) (130) (6) Cr

10 0) (200) HF (13

11 3 (900) 1, 2 (901, 902)

12 1 (901) (130) 1 (901) 3 (900)

13 2 (902) (130) 3 (900)

14 1 (901) 2 (902) 3 (900)

15 (903) 1 (100) 1, 2 (901, 902) 3 (900) (glass frit) (904) 3MPa/cm² 16 1 (904) 400 600 1 (100) 3 (900) (904) (eutectic bonding) SDB(Silicon Direct Bonding), (An

odidic bonding)

16 (1001) (1000) (1003) (1000) (1100) (1002)가 (1000) 가 (1100) 가 (1100) 가 (1005)가 (1007) (1002) 가 (1006) (1001) 가

17 3 (900) 18

19 가 19 20 가 , MEMS

MEMS

2 : 1 ; 1 MEMS 2 ; 1 ; 3 MEMS 3 MEMS 가 4 ; 1 MEMS 3 MEMS 5 ; 1 가 MEMS

MEMS ; 1 1 2 ; 2 ;

MEMS MEMS ; 2 가 ,

가 MEMS

MEMS (Poly Silicon) (Residual Stress) MEMS (Single Silicon) 2μm~10μm RIE(Deep Rea

ctive Ion Etch) 20:1 10μm (High Aspect Ratio) 가

(Wafer Level Vacuum Packaging)

가

Q- 가

SOI 가 가 (Interconnection)

가 (Leakage)

가 MEMS 가

가 가

(57)

1.

1 ;

2 ;

1 2 ;

1 MEMS

3 ;

3 MEMS 가 4 ;

1 가 MEMS 3 5 ;

2.

1 ,
3 , MEMS 가 MEMS , .

3.

1 2 ,
3 , MEMS 가 MEMS .

4.

1 2 ,
5 가 MEMS 1 3 .

5.

3 ,
5 가 MEMS 1 3 .

6.

1 2 ,
5 1 3 SDB
가 MEMS .

7.

3 ,
5 1 3 SDB
가 MEMS .

8.

1 2 ,
가 5 MEMS 1 3 .

9.

3 ,
가 5 1 3
MEMS .

10.

1 2 ,
3 가 MEMS .

11.

10 ,
4 3 가 가
MEMS .

12.

1 1 ;
2 ;
3 ;
2 ;
1 4 ;
1 MEMS 5 ;
3 MEMS 가 6 ;
1 가 MEMS 3 7 ;

13.

12 ,
7 1 3
가 MEMS .

14.

12 ,

7 1 2 SDB
가 MEMS .

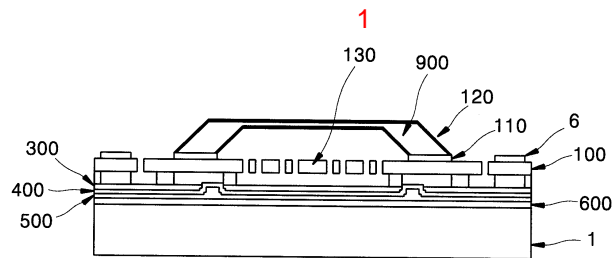
15.

12 14 ,

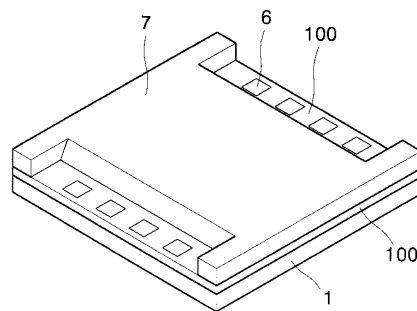
1 가 MEMS .

16.

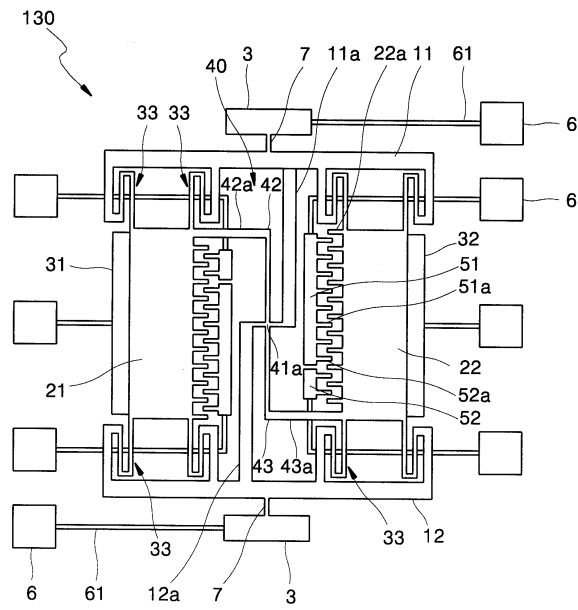
15 , 6 3 가
가 MEMS .



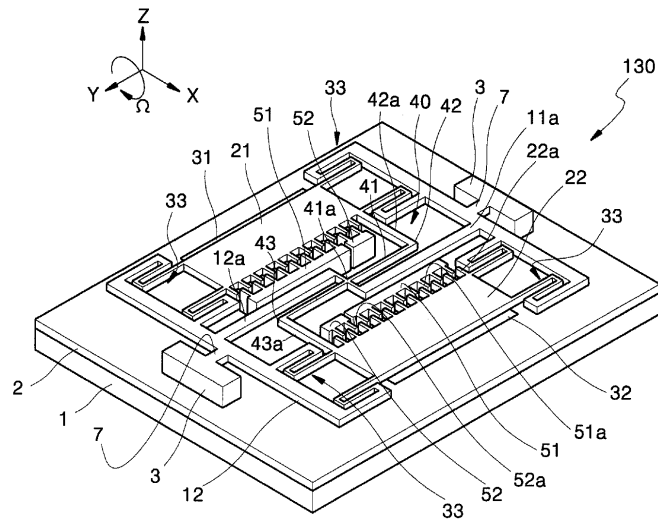
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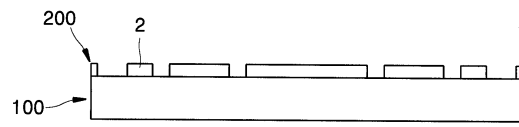
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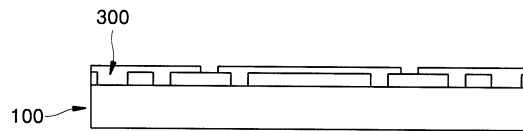
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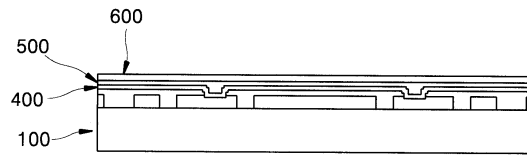
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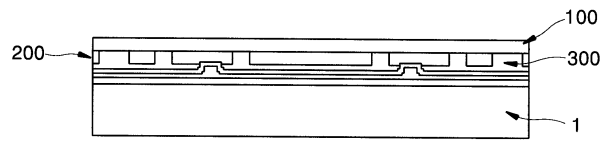
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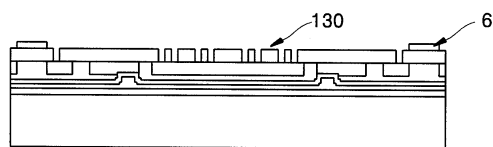
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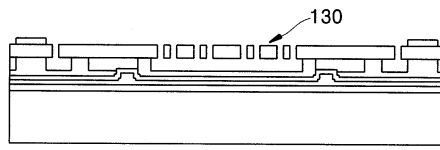
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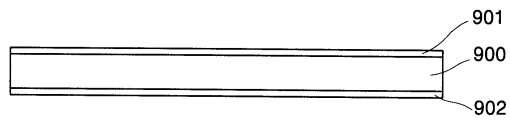
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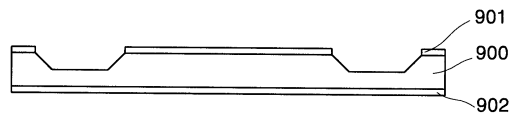
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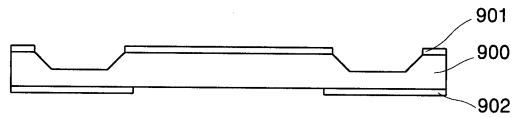
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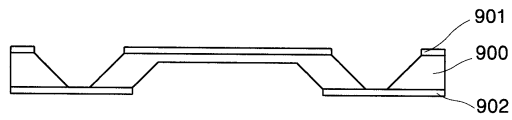
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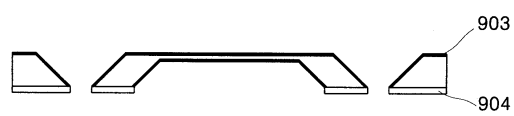
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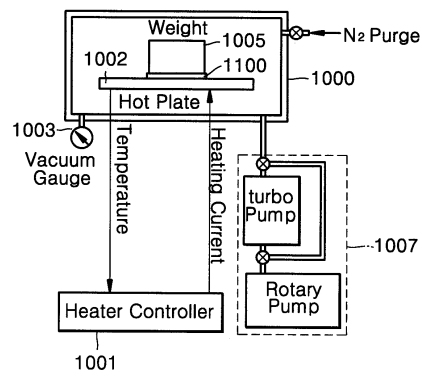
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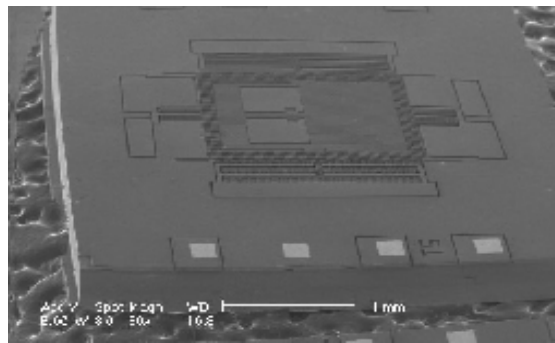
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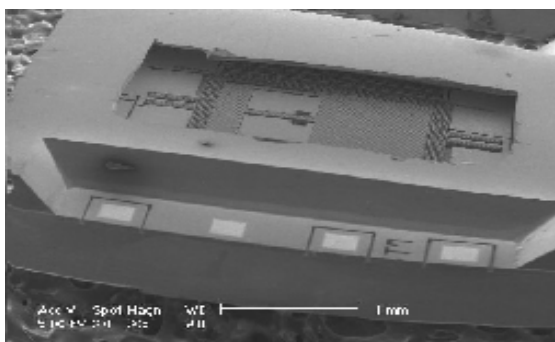
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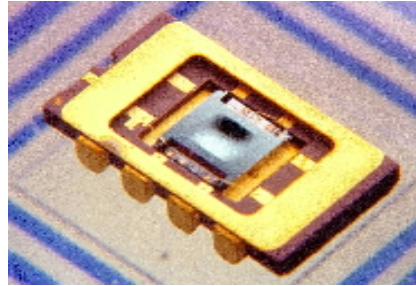
17



18



19



20

