

**(19) (KR)**  
**(12) (B1)**

(51) Int. Cl.<sup>7</sup>  
B23K 35/26

(45) 2004 04 27  
(11) 10-0428277  
(24) 2004 04 09

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(21)	10-2001-0032783	(65)	10-2001-0111635
(22)	2001 06 12	(43)	2001 12 19

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(30)	2000-180719	2000 06 12	(JP)
	2000-396905	2000 12 25	(JP)

(73)	가 가	가 4 6	
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(72)	가	1 5-1	가 가
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	1 5-1	가 가	
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	1 5-1	가 가	
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가	1 5-1	가 가	
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	1 5-1	가 가	
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	1 5-1	가 가	
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	1 5-1	가 가	
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(74)

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**(54)**

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가 Cu Sn ,

1

, , , ,

1  
2  
3  
4  
5  
6  
7 RF  
8 RF  
9 RF  
10 RF  
11 RF  
12 RF  
13 RF  
14 ,  
15

16 CSP  
17 Cu BGA, CSP  
18 Cu BGA, CSP  
19 Sn/Cu

1 : Cu  
2 :  
4 :  
6, 14 :  
8 :  
9 :  
13 :  
15 : 가  
18 : Cu  
19 :  
20 :

Sn-Pb  
330 350

Pb가

Pb-5Sn( : 314 310 ), Pb-10Sn( : 302 275 )  
Sn-37Pb (183 )



< 1 >  
,  
1  
1 . 1 ,  
30μm Cu [1( Ag, Au, Al, Cu-Sn  
Sn ,  
가 )]  
,  
30μm Sn Au , Ni/Au  
[2( : 232  
)]  
Sn (4)  
Sn (2)  
Sn(3) Cu (1)  
, Cu (1)  
250  
Cu  
가



/mm<sup>2</sup> 270 ( : 50mm/min) , 0.3kgf  
 가 Ni-Au , Al Fe-Ni , Ni 가 3μm ( , Ni-Sn  
 175 Cu-Sn ( , D. Olsen ; Reliability Physics, 13th  
 Annual Proc., pp80-86, 1975), Ni<sub>3</sub>Sn<sub>4</sub> ,  
 Cu<sub>6</sub>Sn<sub>5</sub> 가 Ni Sn Sn-40Pb 가 Ni  
 가 Ni Sn 280 10 1μm (170 , 8 1μm Sn-40Pb ),  
 , Sn-40Pb Cu 170 , 6 1μm 가 ( , Cu  
 가 230 , 1 1μm ). 350 5 1μm 가 , Cu  
 5μm Cu<sub>6</sub>Sn<sub>5</sub> 가  
 , Cu Sn Bi Sn-Cu Sn-Bi  
 , Sn-Ag Sn , Sn-Cu , Sn-Ag Bi 가 , Sn-Ag-Cu Sn  
 In, Zn, Bi 가  
 , 2 Sn  
 ,  
 3  
 2 (7) Au-20Sn  
 , Pb Pb-10Sn  
 ,  
 Cu 5 10μm 가 ,  
 u-Au, Ni ) Cu , Cu 가 Si ( Sn Cu, Sn Ni Cr-C  
 (脆性) 가  
 4  
 ,  
 , Cu Ni ,  
 ,  
 ,  
 3 (a) (19) Cu (18) Cu (20)  
 Sn (75) Cu Ni Cu  
 3 (b) 가  
 ,  
 ,  
 5  
 ,  
 (280 ) 280 Au-Sn 3 Au-Sn Au-Sn Au-20Sn  
 , Au-Sn 10 37% Sn 55 70% Sn  
 (1 ) 252 (Hansen; Constitution of Binary Alloys, McGRAW-HILL 1958),  
 ,  
 uSn4가 252  
 % 309 370 (252 )  
 ) Ni(2μm)-Au (0.1μm ) (19)  
 3μm: 23) , Ni-Sn Au-Sn  
 , Sn ,  
 AuSn4가 (217 ) , Au-Sn Sn  
 Sn , AuSn2 Sn 350 380  
 , 252



. Zn-Al (Zn-Al-Mg, Zn-Al-Ge, Zn-Al-Mg-Ge, Zn-Al-Mg-Ga ) , Sn, In , Sn . Zn-Al , 가 ( Hv120 160), Si , 가 . Sn , In , 가

10  
5 15mm







(57)

1.  $\text{Cu}_6\text{Sn}_5$ ,  $\text{CuSn}$ ,  $\text{Cu}$

2.  $\text{Cu}$

3.

4.

1,  $\text{Sn}$ ,  $\text{Sn}$ ,  $\text{Cu}$

5.  $\text{Sn-Ag-Cu}$ ,  $\text{Sn}$ ,  $\text{Sn-Cu}$  (共晶系),  $\text{Sn-Ag}$

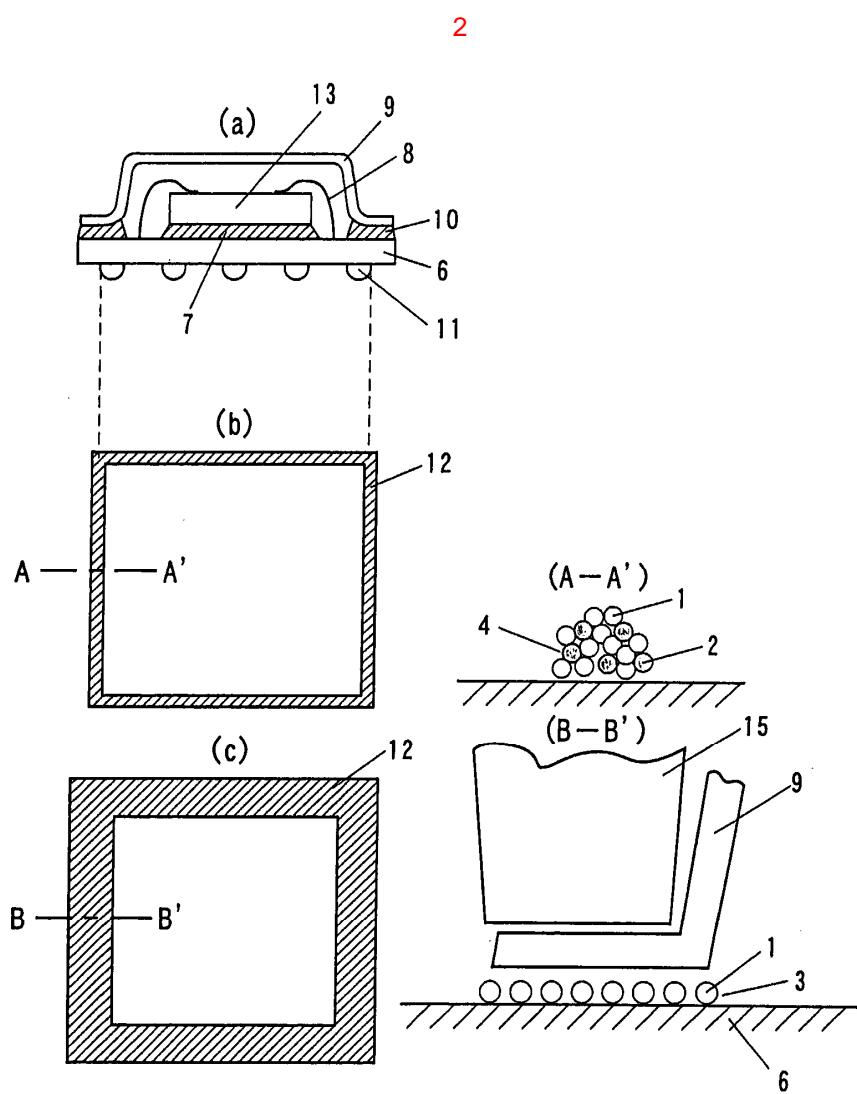
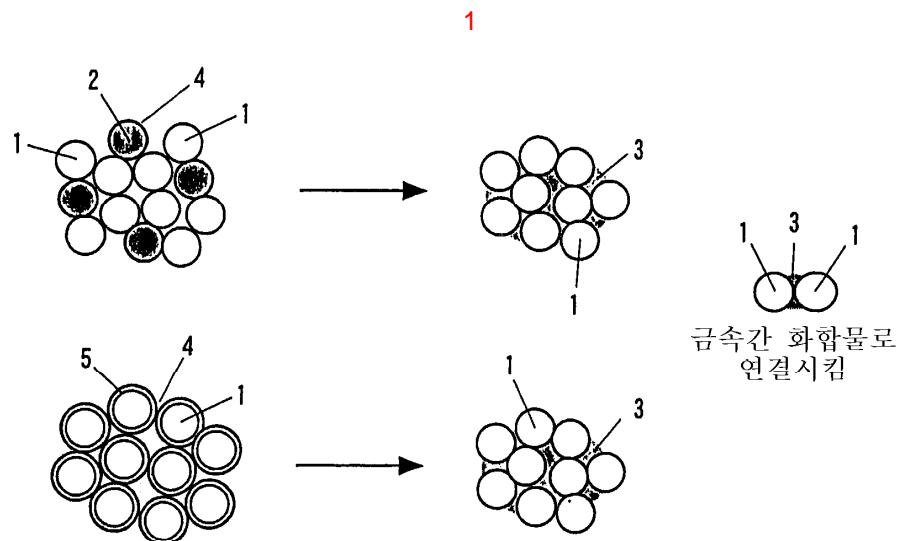
6.  $\text{Cu}$ , 0.6, 1.4

7. 4, 6

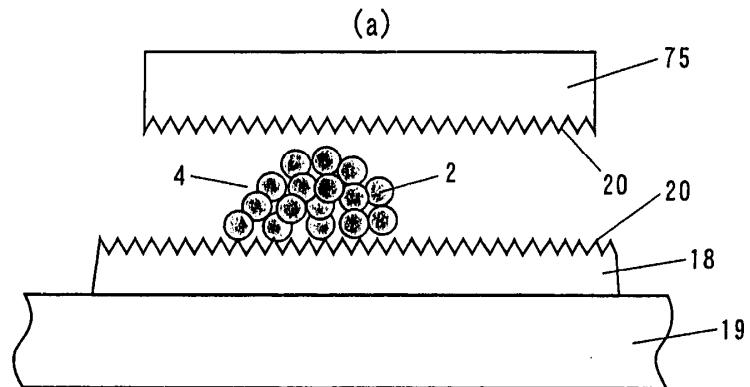
The diagram illustrates the phase relationships in the Cu-Sn system. It shows the following regions and points:

- 1.**  $\text{Cu}_6\text{Sn}_5$  (a dark grey region),  $\text{CuSn}$  (a light grey region), and  $\text{Cu}$  (the base metal).
- 2.** A single-phase  $\text{Cu}$  region.
- 3.** An unlabeled region, likely a solid solution or a low-temperature phase.
- 4.** An unlabeled region, likely a solid solution or a low-temperature phase.
- 1.** A two-phase region containing  $\text{Sn}$  and  $\text{Sn}$  (labeled twice).
- 5.** A three-phase region containing  $\text{Sn-Ag-Cu}$ ,  $\text{Sn}$ , and  $\text{Sn-Cu}$ . This is labeled as a "(共晶系)" (eutectic system).
- 6.** A two-phase region containing  $\text{Cu}$  and two eutectic points at 0.6 and 1.4.
- 7.** Two eutectic points at 4 and 6.

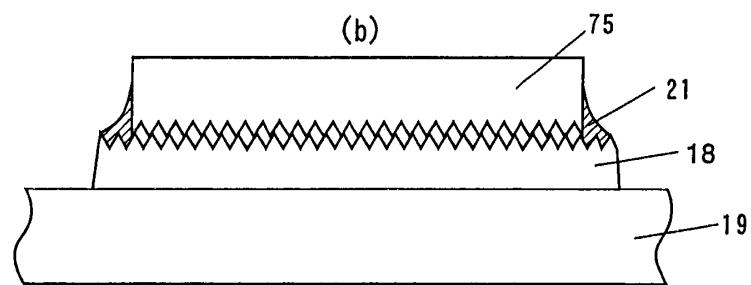




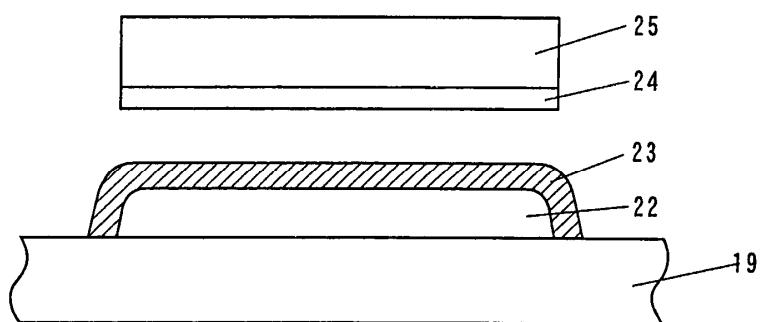
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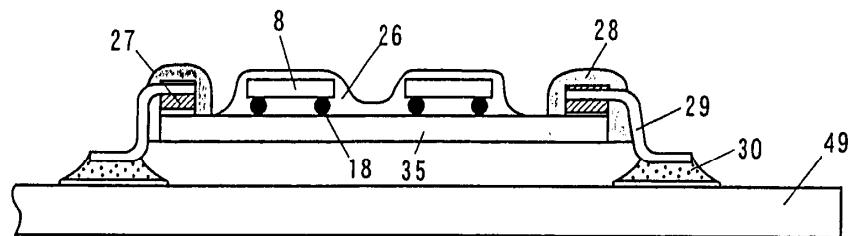
(b)



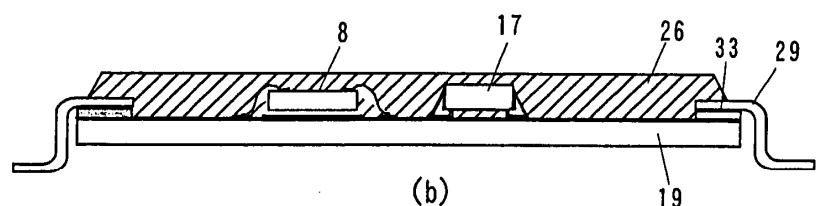
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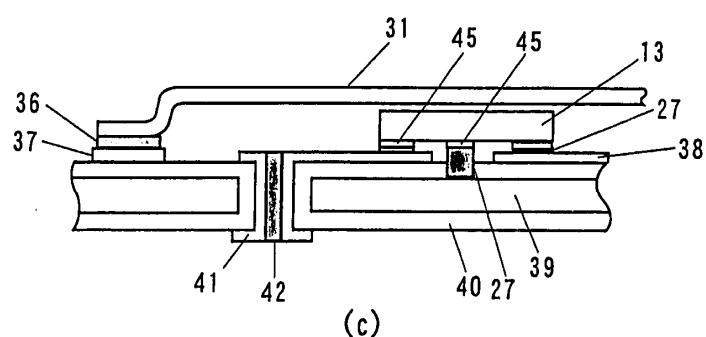
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(a)

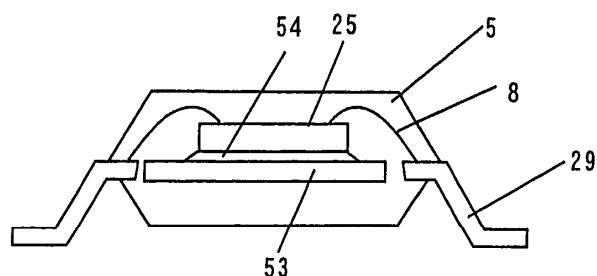


(b)

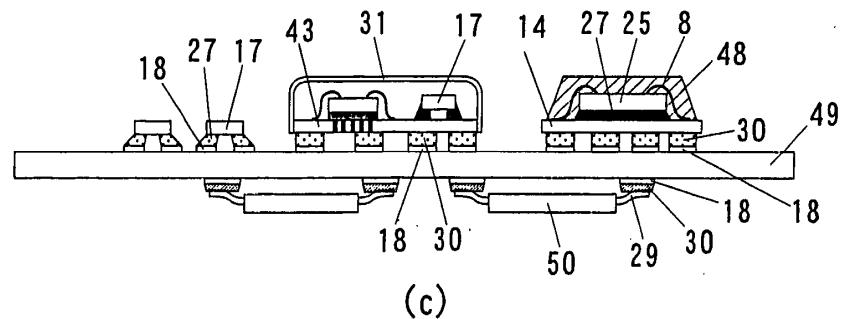
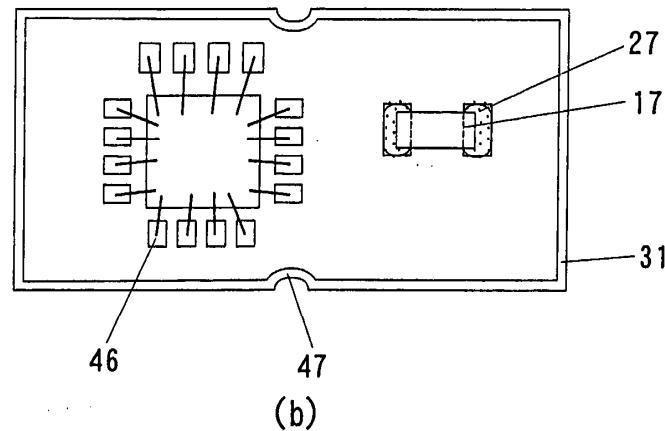
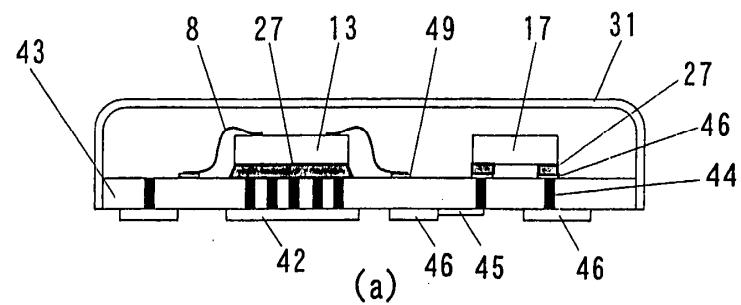


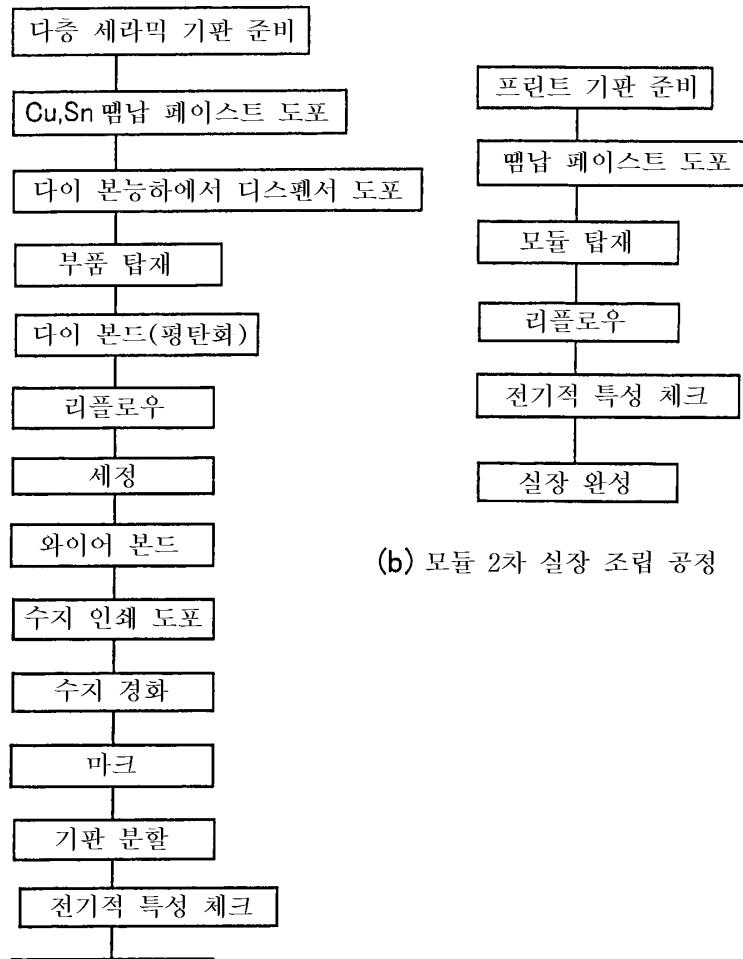
(c)

6

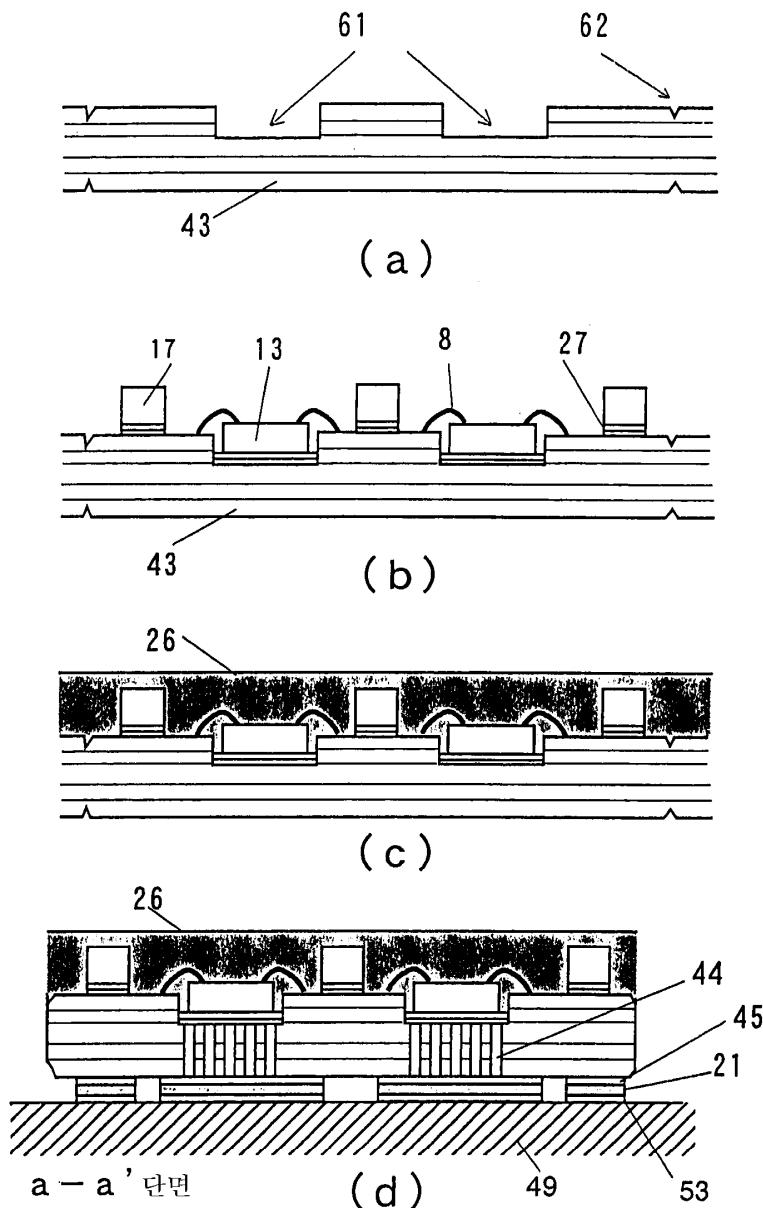


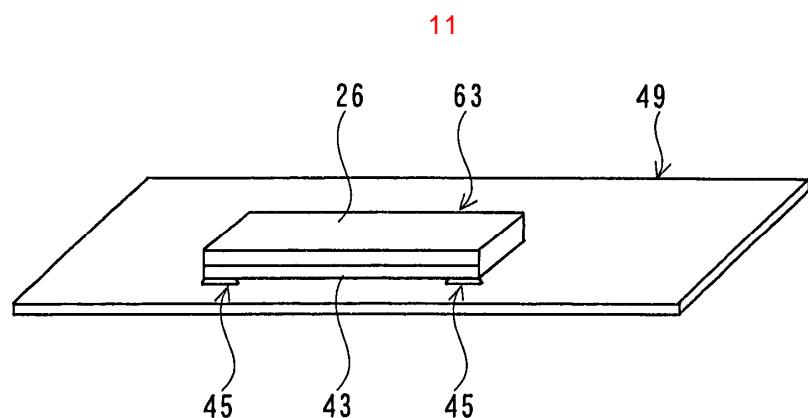
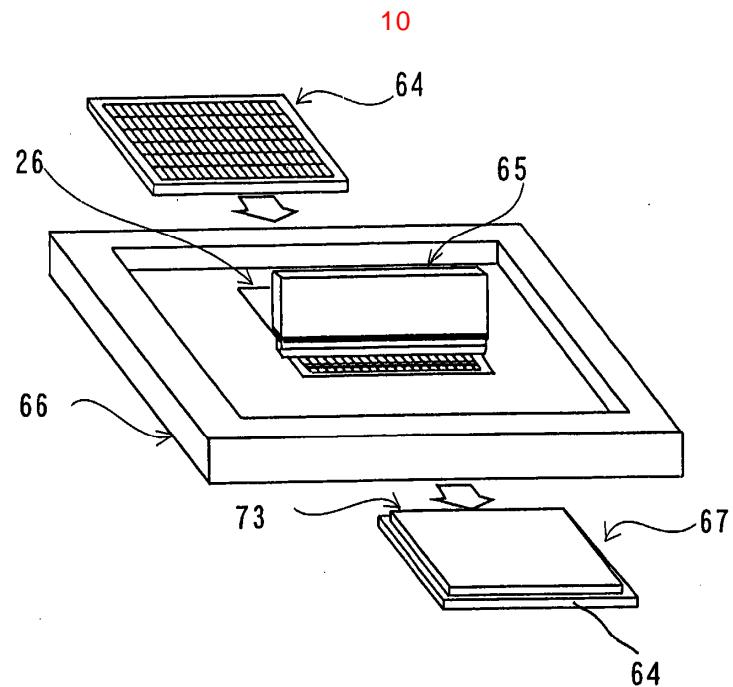
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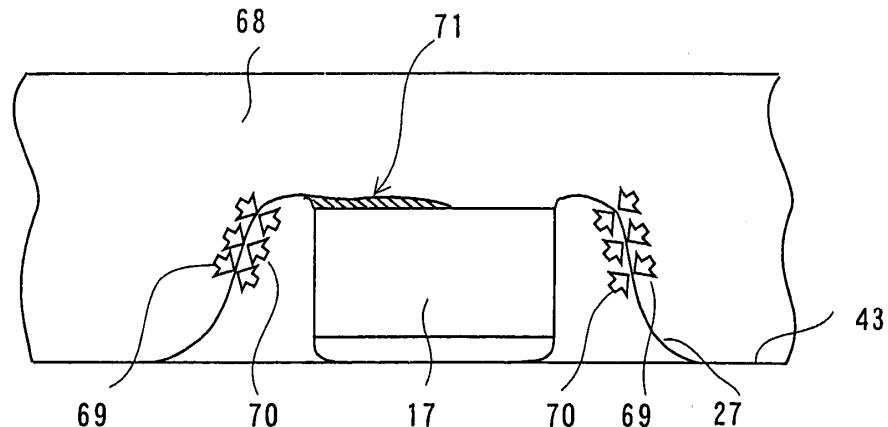


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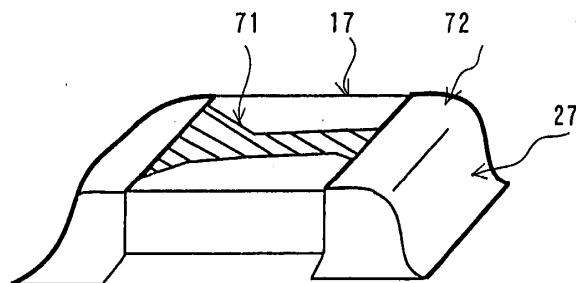




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(a)

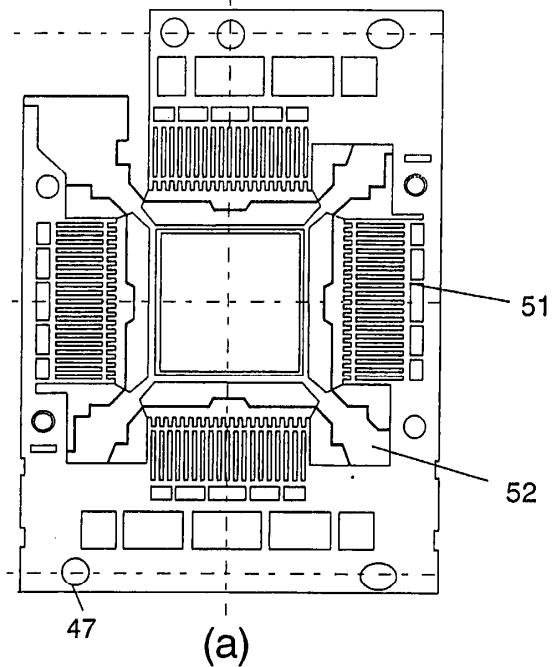


(b)

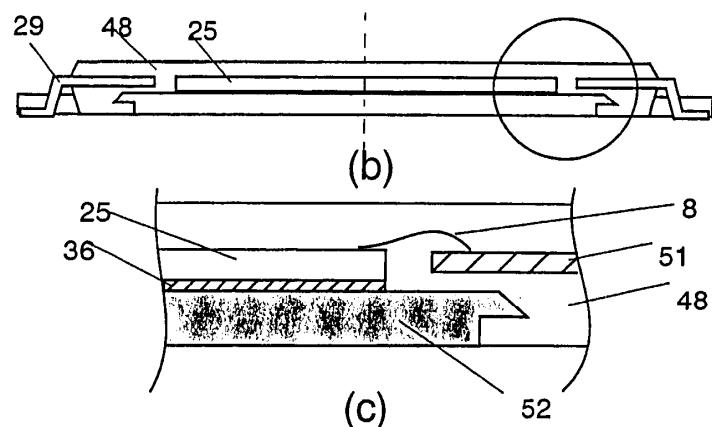
13

	체적 팽창(%) (비율)	수지에 요구되는 종탄성율	현상	
현용 (Pb계)	3.6 (2.6)	180°C에서 200MPa >	제용용시에 액체(고상 있음)의 클리프 타입	
본인 (Cu50/Sn50)	1.4※ (1)	180°C에서 500MPa >※	Cu 입자가 고정되어 있기 때문에, 접합부는 움직이지 않는다고 예상됨	
가정	※ Sn의 1/2로 함	※단순히 현용의 현재 사용하는 것의 1.5배한 값		

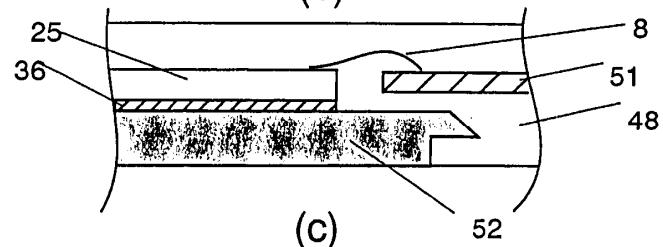
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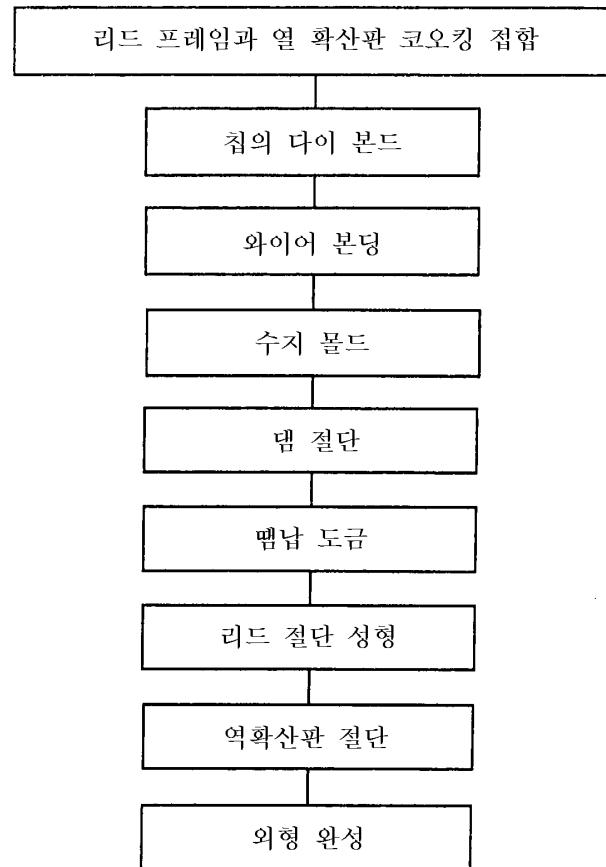
(a)



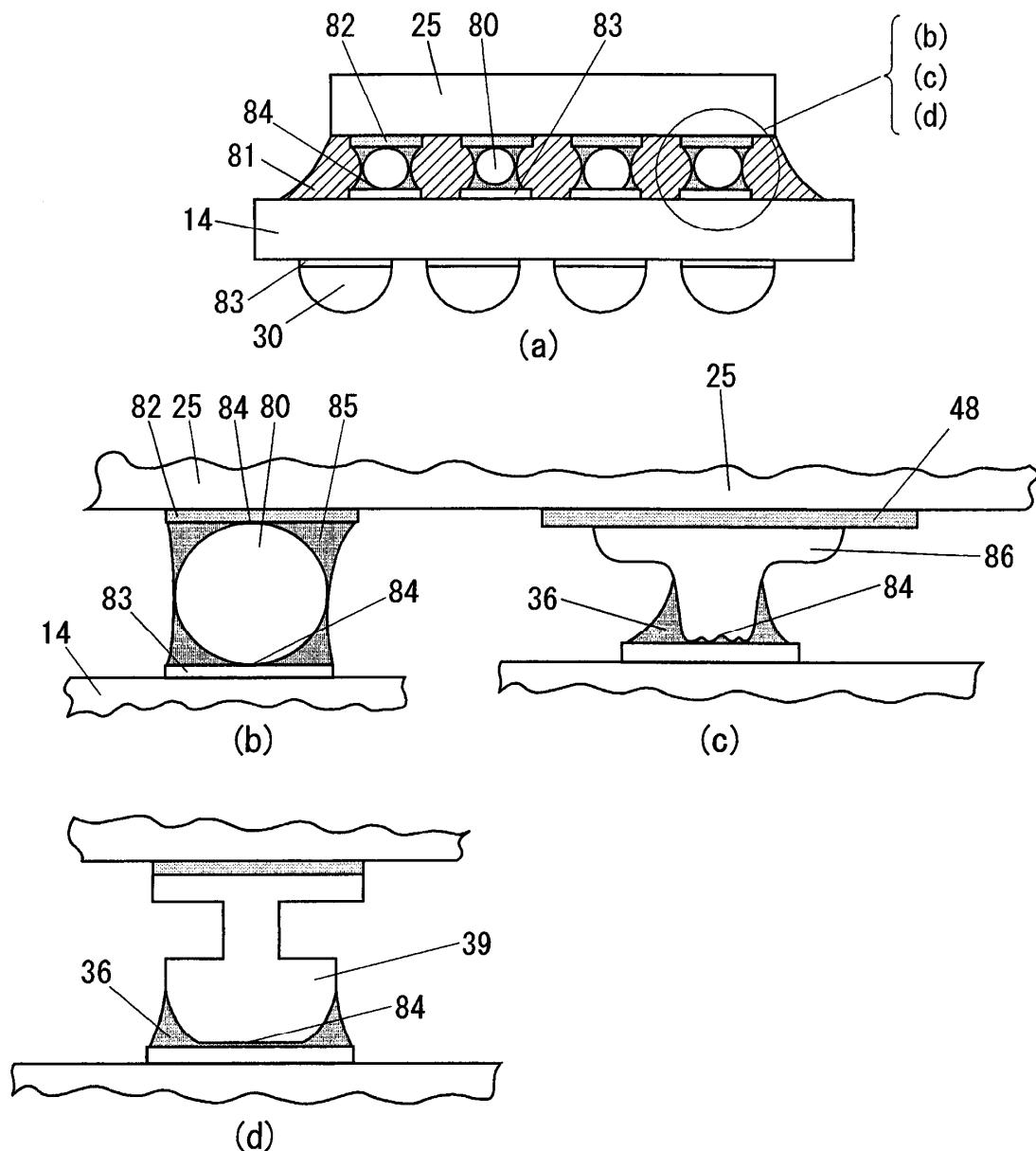
(b)

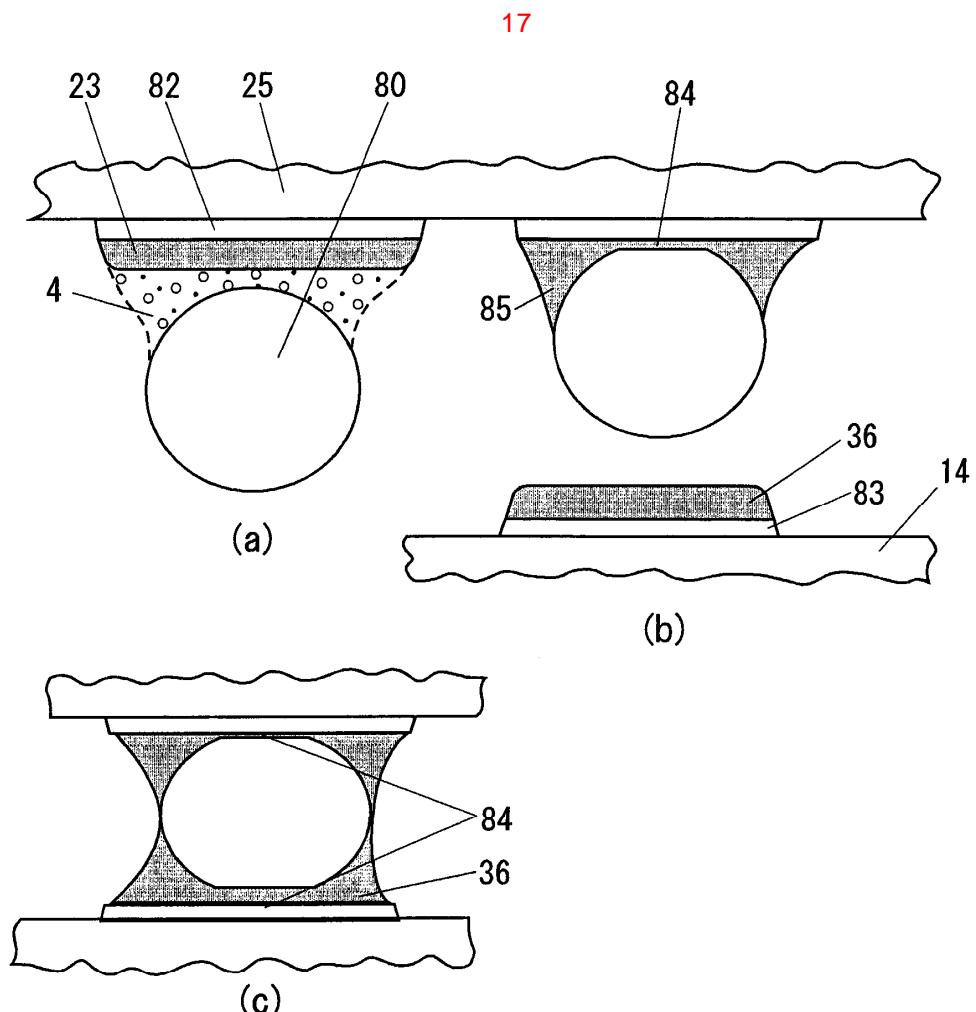


(c)

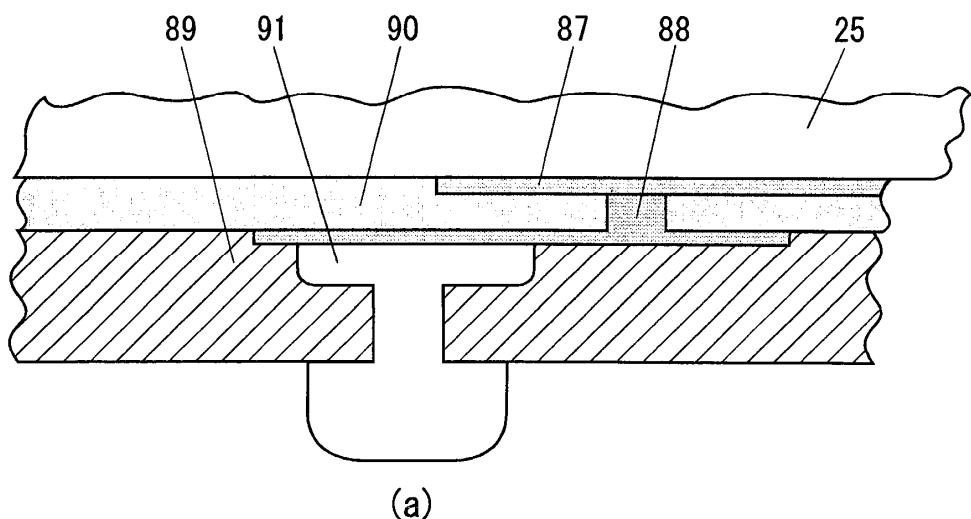


16

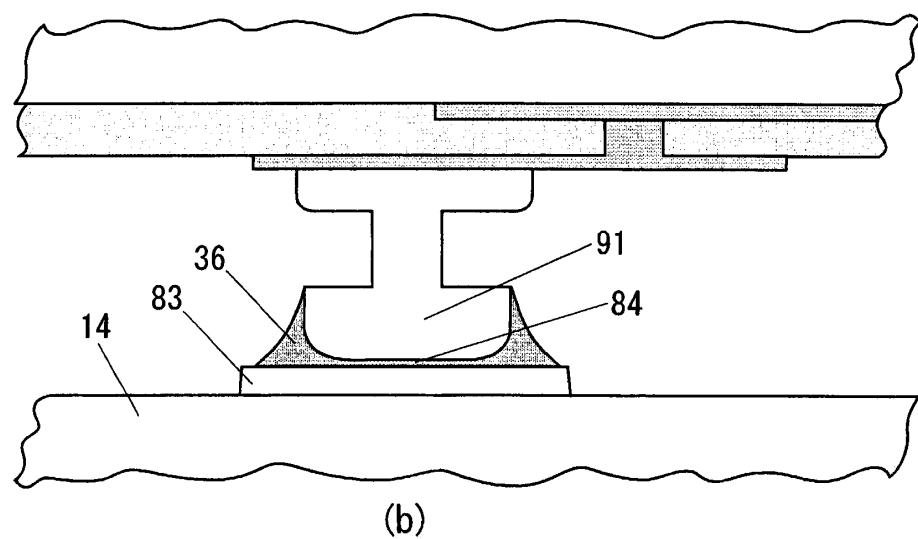




18



(a)



(b)

Sn/Cu 비율	평가 판정	판정 이유
10/4	×	↑
10/5	×	Sn이 많다
10/7 (1.43)	△	
10/8 (1.25)	△~○	
10/10	○	
10/12.5 (0.8)	○	
10/15	△~○	
10/16.7 (0.6)	△	
10/25	×	Sn 부족
10/50	×	↓
10/100	×	↓

판정 기준 : ○ : 적정

△ : 대체로 적정

× : Sn 부족(과다)