Hitachi Chemical Data Sheet

Hitachi Anisotropic Conductive Film

ANISOLM®

AC-823CY-20

Issued 2008/03/03 (Ver.5)

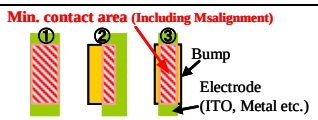
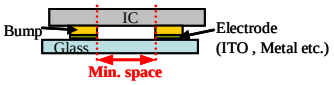
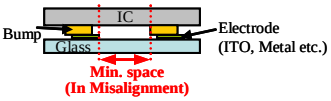
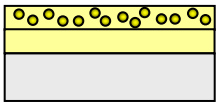
Display Materials Div.

Display Materials R&D Dept.

Hitachi Chemical Co.,Ltd.

Hitachi Chemical

1. Standard specification, bonding condition, storage condition and characteristic

Item				Unit	AC-823CY-20	Remark
Standard Specifications	Capability in interconnection circuit		Connection area	um^2	800	 Ave.-3σ ≧3pcs.
			Insulation gap	um	12	
					7	
	Conductive particle		Size	um	3	Au coated plastic particle with **insulation surface treatment**
			Density	pcs/mm^2	55,000	
	Thickness			um	20	
	Width			mm	1.5, 2.0, 2.5, 3.0	Contact us for other width request
	Length			m	50 / 100	
	Color			–	Transparent (gray)	
	Core diameter			mm	18.5	
	Configuration			–	－Double-Layer ACF－  Particle-filled layer Non particle-filled layer Separator (White PET 50um)	
Bonding conditions	ACF lamination		Temperature	degC	50 - 70	Final ANISOLM temperature
			Pressure	MPa	1 - 1.5	Per unit area of ANISOLM
			Time	s	1 - 2	
	IC main bonding		Temperature	degC	170±10	Final ANISOLM temperature
			Pressure	MPa	30 - 120	Per total bump area
			Time	s	5 or more	Including temp increasing time
Storage conditions			Unopened	–	4.5 months after date of manufacture when stored at -10 to 5degC.	
			Opened	–	10 days at 25 degC or below and 70%RH or below.	

Notes:

1) Leave ANISOLM at room temperature for an hour before opening sealed bag. Make sure ANISOLM is not wet before using it.
2) Suitable bonding condition depends on specification of IC chip, glass substrate, bonding machines etc. Please contact us for detailed information.

The values given above represent typical measurements, not guaranteed ones.

2. ACF Lamination process window

Checking issues before start of ACF Lamination process

(1) Make sure adjustment to the depth and parallel of half cut knife edge in the ACF

(2) Make sure adjustment to the bonding head position and select of cushion sheet

ACF : AC-823CY-20

Time [s]	Temperature [degC]	Pressure [MPa]		
		0.5	1.0	1.5
1.0	40	△ / ○	○ / ○	○ / ○
	50	○ / ○	○ / ○	○ / ○
	60	○ / ○	○ / ○	○ / ○
	70	○ / ○	○ / ○	○ / ○
	80	○ / ○	○ / △	○ / △
	90	○ / ×	○ / ×	× / ×
1.5	40	△ / ○	○ / ○	○ / ○
	50	○ / ○	○ / ○	○ / ○
	60	○ / ○	○ / ○	○ / ○
	70	○ / ○	○ / ○	○ / ○
	80	○ / △	○ / △	○ / △
	90	○ / ×	○ / ×	× / ×
2.0	40	○ / ○	○ / ○	○ / ○
	50	○ / ○	○ / ○	○ / ○
	60	○ / ○	○ / ○	○ / ○
	70	○ / ○	○ / ○	○ / ○
	80	○ / △	○ / ×	○ / ×
	90	○ / ×	○ / ×	× / ×

Lamination property / ACF Oozing property

○ : Superior Result
△ : A little Inferior Result
× : Inferior Result

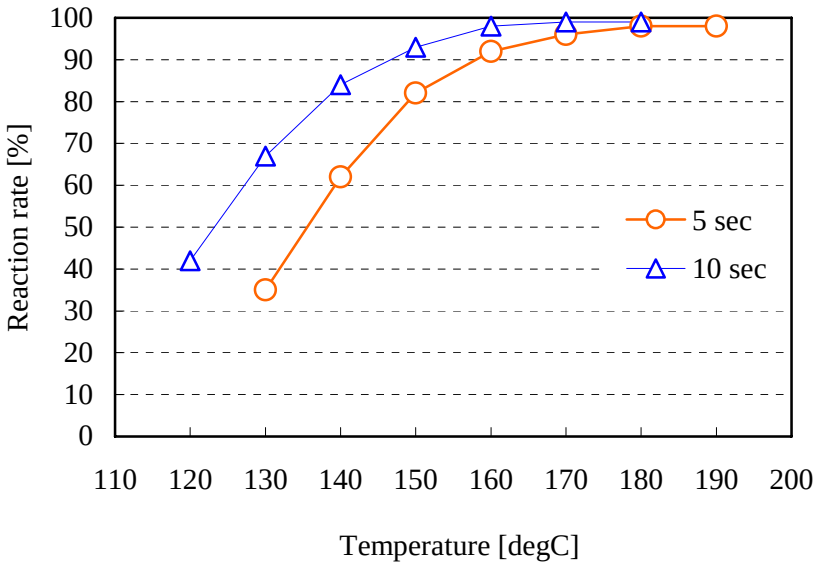
3. ACF Reaction rate

Measuring method:

Each specimen was heated and hardened in oil kept at a specified temperature for a specified time, the amount of heat generated was measured with a DSC unit, and the reaction rate was determined with the following formula;

Reaction rate = $(Q_0-Q_T)/Q_0 \times 100$ Q_0 : initial amount of heat generated

Q_T : amount of heat generated after hardening



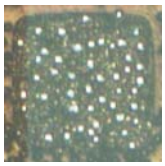
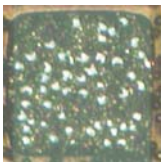
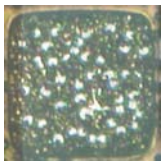
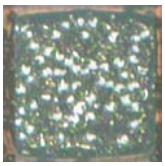
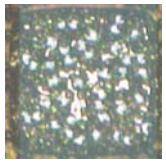
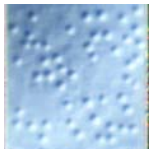
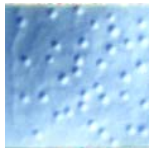
4. Bonding appearance depend on final bonding conditions

Measuring method:

/ Test chip : Bump size **2,500**um2 (**50 x 50um**), IC size: 1.7 x 17 x 0.55mm

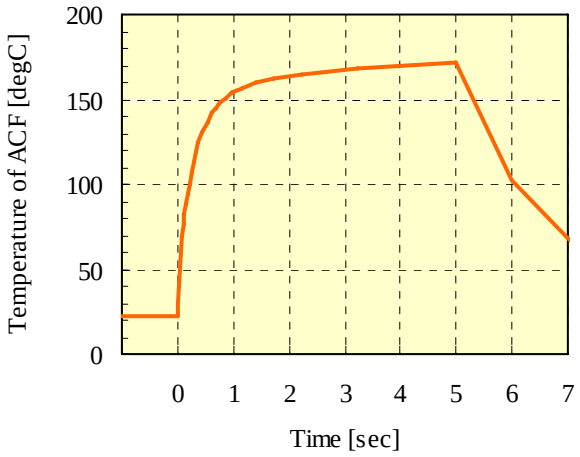
/ Test board: Al/Nd coated glass

/ Bonding condition: 160-170degC 30～150MPa 5sec

Pressure / Glass Electrode	30 MPa	50 MPa	80 MPa	100 MPa	120 MPa
ITO (Particle Deformation)					
Al/Nd (Particle Trace)					
Judgment	Excellent	Excellent	Excellent	Excellent	Excellent

5. Precautions in bonding

5.1 Temperature profile in main-bonding of IC chip



Ex.)

Bonding condition: 170 degC-5sec

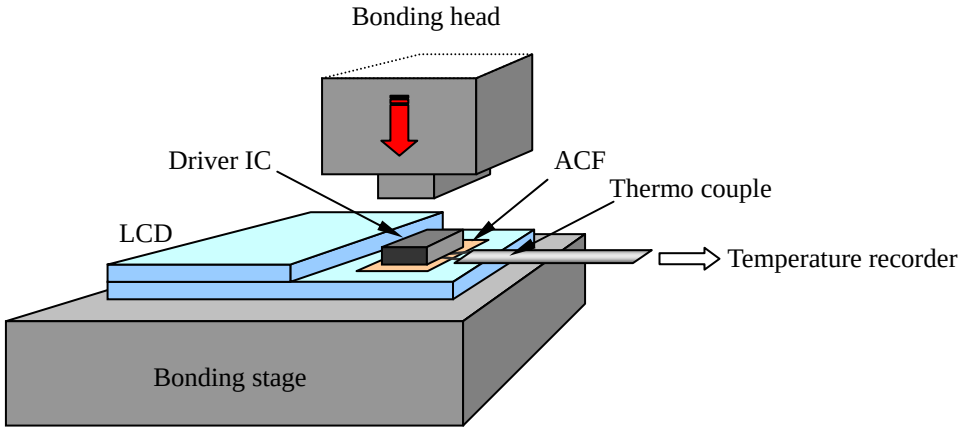
Head setting temperature: 190 degC

Chip size: 1.7mm x 17.2mm x 0.55mmt

Thickness of glass substrate: 0.7mmt

Caution: Temperature should reach at more than 90% of targeting ACF temperature within first 2 seconds.

5.2 Measurement of ANISOLM temperature



5.3 Bonding head

(1) Make sure the coplanarity of bonding head is even and parallel to IC chip.

(2) Use slightly wider head than IC chip. Example; Chip width 2.0mm → Head width 2.5mm

5.4 Misalignment of opposite circuits

Make sure opposite circuits are well aligned and matched each other.

6. Connection reliability

6.1 Measurement

(1) Used materials for measurement

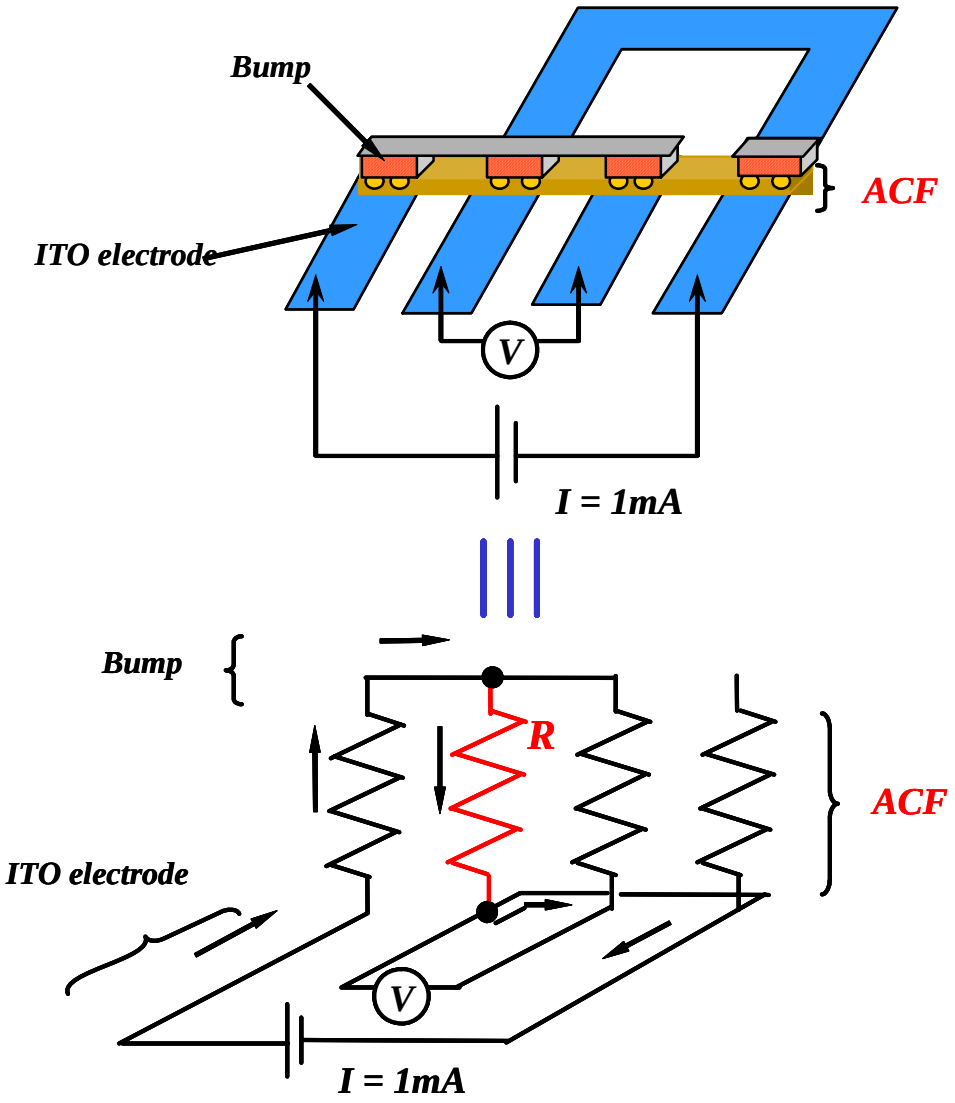
/ Test chip : Connection area **2,500**um2 (Bump size: 50 x 50um, IC size: 1.7 x 17 x 0.55mm)

/ Test board: ITO coated glass (ITO thickness: 0.2um, Surface resistance: 10ohm/sq)

(2) Measurement of connection resistance (refer to the diagram below)

/ Four-probe measurement (Circuit resistance can be cancelled)

/ Applied current: 1mA



Four probe measurement in COG interconnection

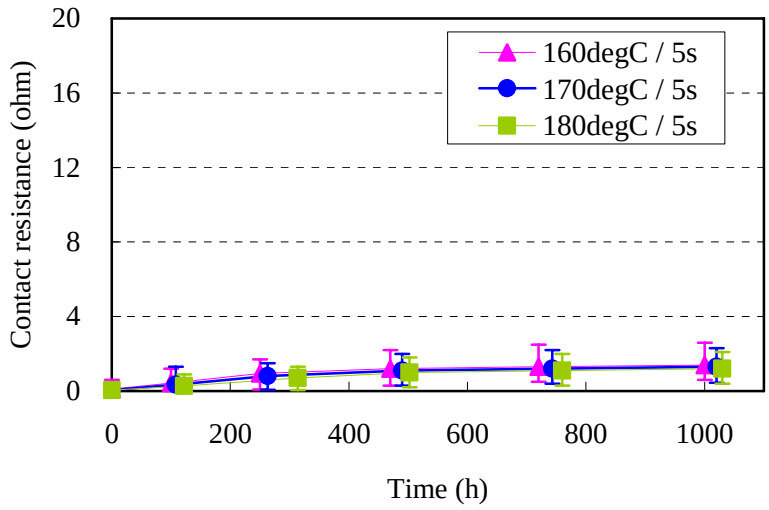
6.2 Test results

ACF : AC-823CY-20

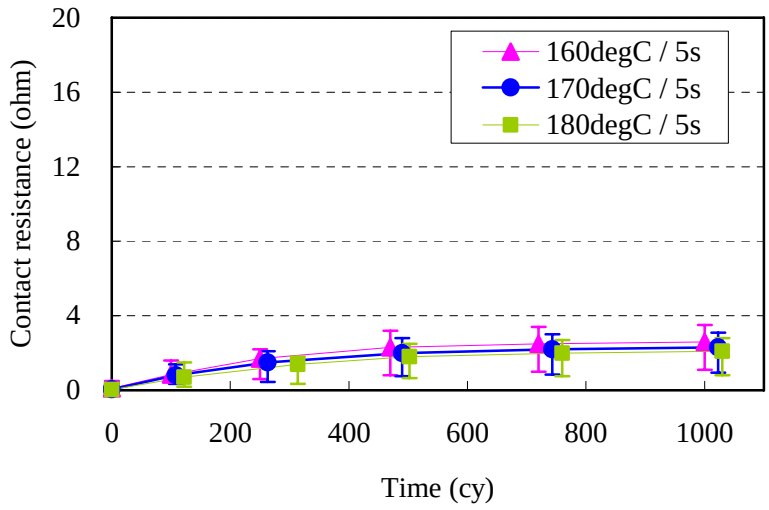
Lamination condition : 70degC 1MPa 2sec

Main bonding condition : 160 - 180degC 80MPa 5sec

(1) High temperature humidity test (85degC85%RH)



(2) Temperature cycling test (-40 / 100degC)



7. Insulation reliability

7.1 Non-bias test

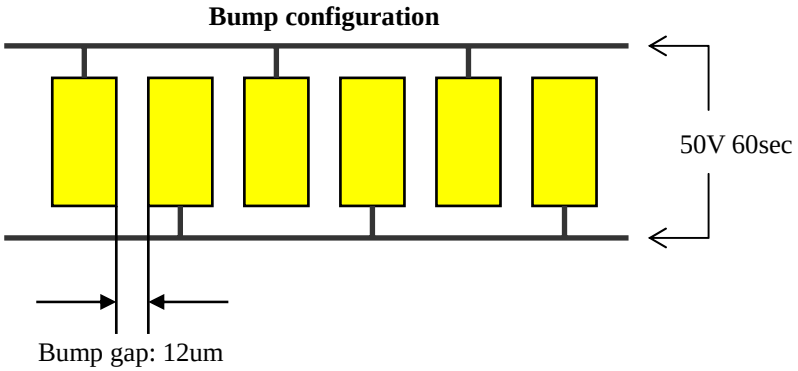
(1) Used materials for measurement

/ Test chip: Bump gap 12um (Bump size: 30 x 100um, IC size: 1.9 x 15 x 0.55mm)

/ Test board: ITO coated glass (ITO thickness: 0.2um, Surface resistance: 10ohm/sq)

(2) Measurement of insulation resistance

The resistance of each test piece was measured after applying 50V DC to it for 60 seconds in an atmosphere at 23degC and 65%RH.



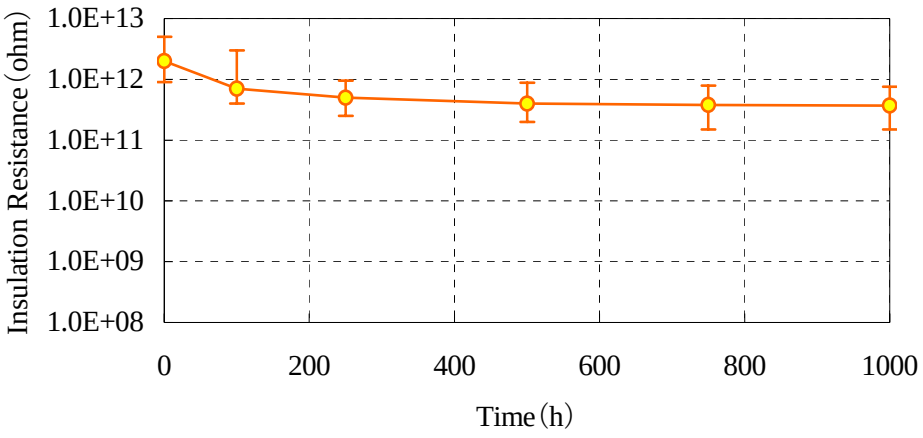
(3) Result

ACF: AC-823CY-20

Lamination condition : 70degC 1MPa 2sec

Main bonding condition: 170degC 80MPa 5sec

Test condition: 85degC85%RH



7.2 In-situ Bias test

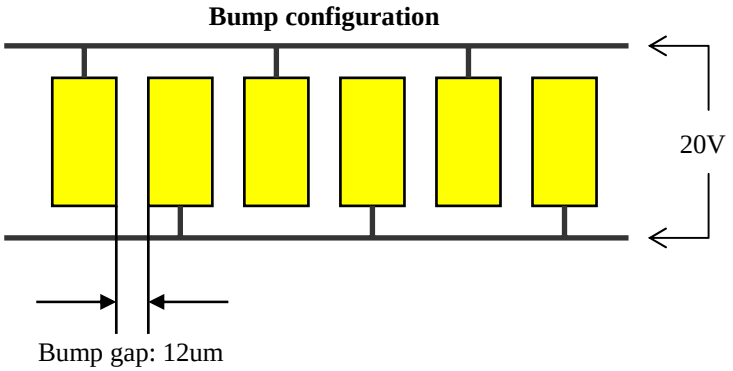
(1) Used materials for measurement

/ Test chip: Bump gap 12um (Bump size: 30 x 100um, IC size: 1.9 x 15 x 0.55mm)

/ Test board: ITO coated glass (ITO thickness: 0.2um, Surface resistance: 10ohm/sq)

(2) Test procedure

20V was continuously applied between comb shaped circuit during high temp humidity test and the insulation resistance was monitored by insulation resistance meter.



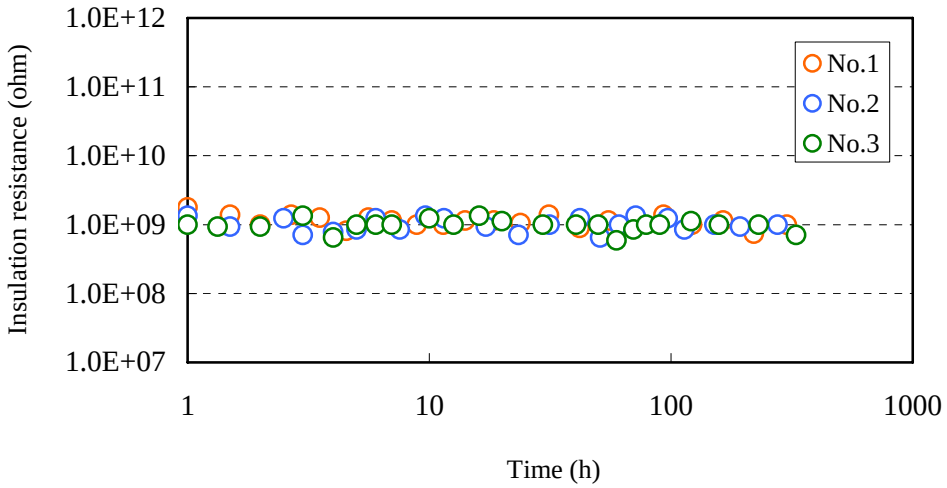
(3) Result

ACF: AC-823CY-20

Lamination condition : 70degC 1MPa 2sec

Main bonding condition: 170degC 80MPa 5sec

Test condition: 60degC90%RH



8. Particle counts data on bump

(1) Used materials for measurement

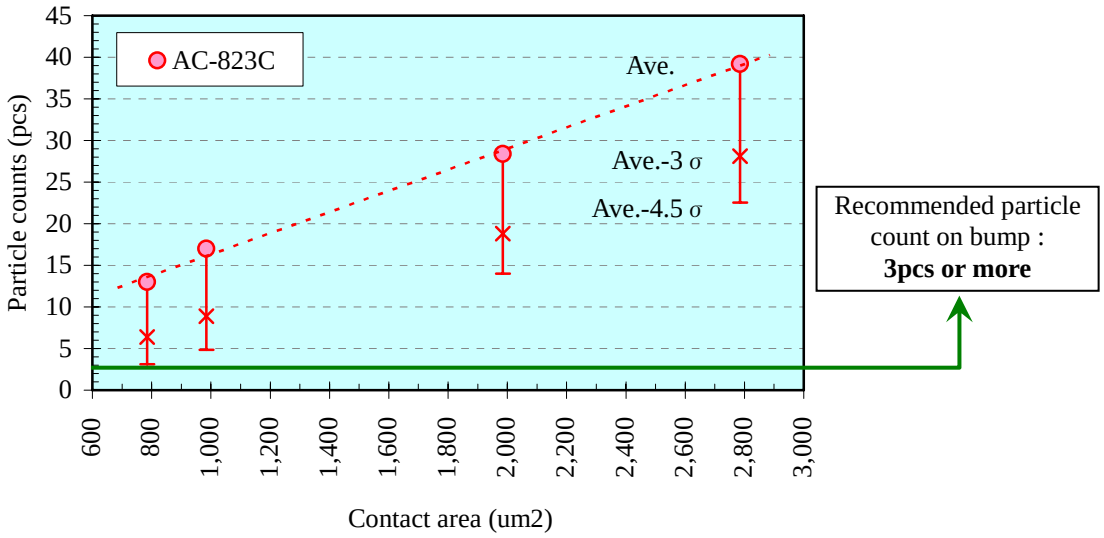
/ Test chip 1: Bump size **2,800**um2 (**28 x 100um**), IC size: 1.9 x 15 x 0.55mm

/ Test chip 2: Bump size **2,000**um2 (**20 x 100um**), IC size: 1.6 x 15 x 0.55mm)

/ Test board: ITO coated glass(ITO thickness: 0.2um, Surface resistance: 10ohm/☐)

(2) Measurement of particle counts on bump

After main bonding IC chip onto test glass, particle count on bump was measured by optical microscope. The data at 1,000um2 and 800um2 were calculated value based on the actual data at 2,000um2 and 2,800um2 bump size.



9. Physical properties

Item	Unit	**AC-823C**
Tg *1	degC	135
Elastic modulus	GPa	1.8
C.T.E *2	ppm/degC	60
Water absorption rate	wt%	1.0

Conditions

*1 Measured with DVE; Dynamic Visco-Elastic Analyzer

Test conditions: Fully cured sample, Tensile mode, 10Hz Frequency, 10degC/min

*2 Measured with TMA; Thermal Mechanical Analyzer

Test conditions: Fully cured sample, Tensile mode, 10degC/min, Load 5gf