Flextronics

HITACHI CHEMICAL DATA SHEET

Hitachi Anisotropic Conductive Film
ANISOLM®
AC-2056R

2015/12/04 Revised

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Conductive Materials R&D Dept.
Advanced Performance Materials R&D Division
Hitachi Chemical Co., Ltd.

1. Standard Specification, Bonding and Storage Conditions, Repairability, and Characteristics

Item				Unit	AC-2056R		Remark
Standard specification	Resolution	Min. contact area		um	100,000		
		Min. spacing		um	50		
	Conductive particle		Size	um	2		Nickel particle
			Density	pcs/mm^2	20,000		Theoretical value
	Thickness			um	35		
	Width			mm	1.5,2.0,2.5		
	Length			m	50,100		
	Color			—	Transparent(gray)		
	Core			mm	18.5		
Bonding conditions	Temporary bonding	Temperature		deg.C	60~90		Final temp. of ACF
		Pressure		MPa	1		
		Time		s	1~5		
	Final bonding	Temperature		deg.C	170	180	Final temp. of ACF (Lowest limit)
		Pressure		MPa	2	2	
		Time		s	15	10	
Storage conditions	Shelf life	Packed		—	7 months after date of manufacture when stored at -10 to 5deg.C.		
		Unpacked		—	1 month at 25deg.C or below and 70%RH or below.		
Repairability				—	Repairable		By acetone or toluene
Characteristics	Connection resistance			Ω	0.2		PWB / TCP; bonding width, 2.0mm
	Insulation resistance			Ω	10^{12}		Space100um; bonding width, 2.5mm
	Peel strength (20deg.C)			kN/m	1.2		PWB / TCP hot-bonded
	Tack strength (20deg.C)			kN/m	0.08		PWB / TCP cold-bonded
	Operating range		Temperature	deg.C	-40 to 100		Under no stress
			Current	A/mm^2	1 or below		
			Voltage	V	50 or below		

Notes:

1)Take ANISOLM out of the refrigerator or other storage without taking it out of its hermetic containers. Leave the ANISOLM in the containers at room temperature for about an hour. Then make sure that it does not risk condensation before using it.

2)Connection resistance: The table indicates a half of the resistance between neighboring circuits.
Current measured: 1mA. Includes the circuit resistances of the TCP and PWB.

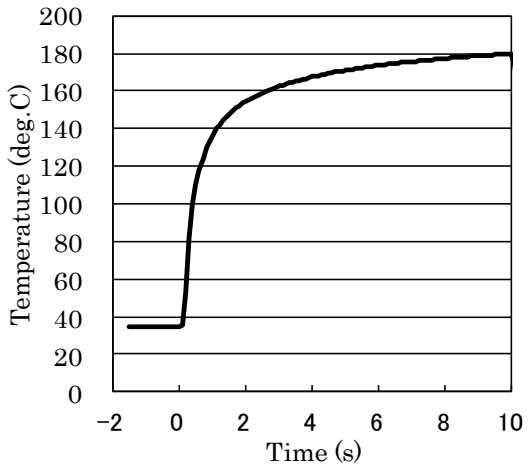
3)Tack strength: Pre-bond an ANISOLM sample to an PWB, peel its separator off, then tack TCP to it at room temperature. Then measure the tack strength of this sample.

4)Operating range: As per reliability tests using Hitachi's test pieces.(This range varies according to the material used and external stress applied. Check the reliability of specific pieces.)

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

2. Precautions in Bonding

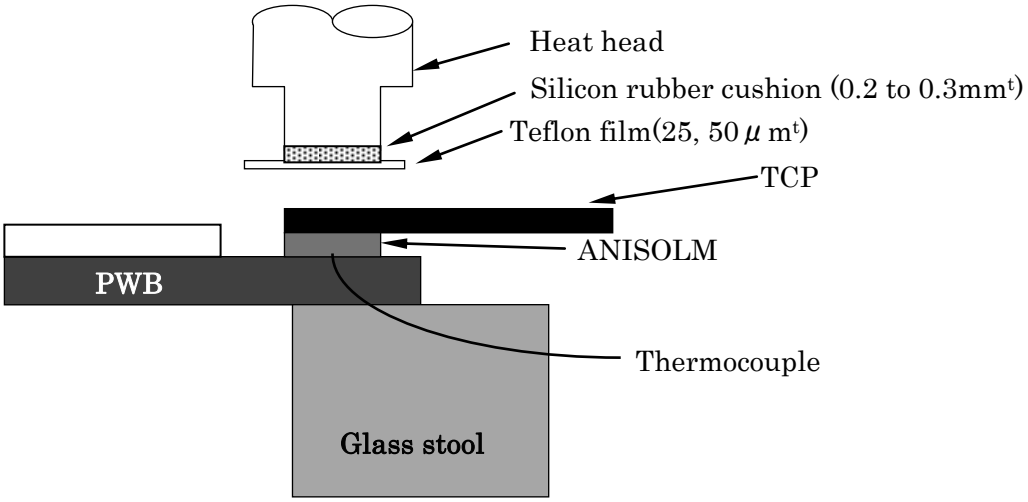
2.1. Connection time and ANISOLM temperature(Typical)



Head temperature: 380deg.C
TCP: Pl, 75μm; Cu, 35μm; Sn plating
PWB:FR-4, 1.0mm^t

Ratio of temperature reached 5 seconds later: 90% or more of the ultimate temperature(deg.C)

2.2. Measuring ANISOLM temperature



2.3. Heat/Pressure Head

(1) Adjust carefully the eveness and parallelism of the heating head to keep the equal pressure.
(2) Use a head slightly wider than the ANISOLM piece to be connected.
-Example: ANISOLM width, 2.5mm→ head width, 3.0mm
(3) Tip the head with a thin and hard cushion, not a soft and thick one. Silicon rubber(about 0.2 mm thick with a hardness of 70 degrees or above) may be used for example.
The use of too soft a cushion or excessive pressure in connection will drive adhesive in the space toward the end, resulting in insufficient adhesion. Be particularly careful when the space is wider than the circuits.

2.4. Misalignment of Opposite Circuits

(1) Align opposite circuits well. Do not let them get misaligned.
(2) In designing TCPs(FPCs), allow for the misalignment of opposite circuits due to their expansion during connection.
(3) Keep the circuit misalignment at or less than the circuit width.

３．Connection Reliability

-Connection circuits

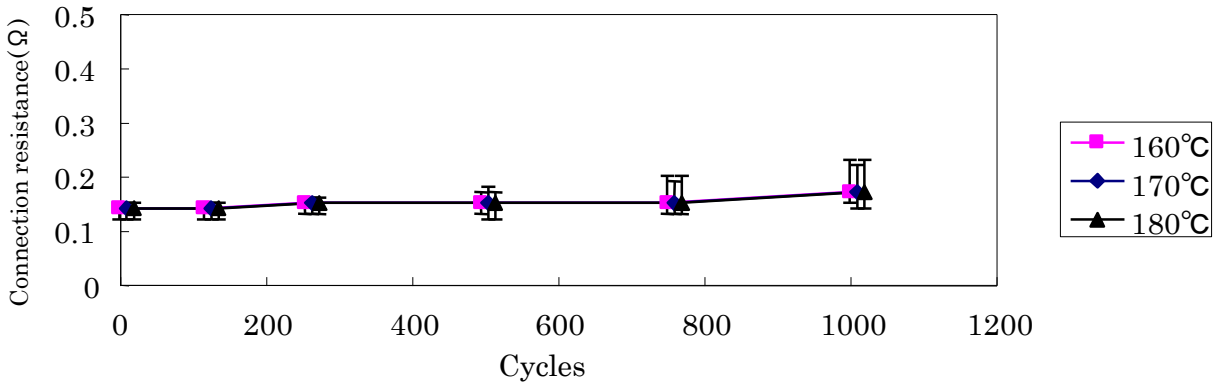
TCP: Pl, 75μm; Cu, 35μm; Sn plating; pitch, 200μm

PWB: Cu 35μm Au plating; pitch, 200μm

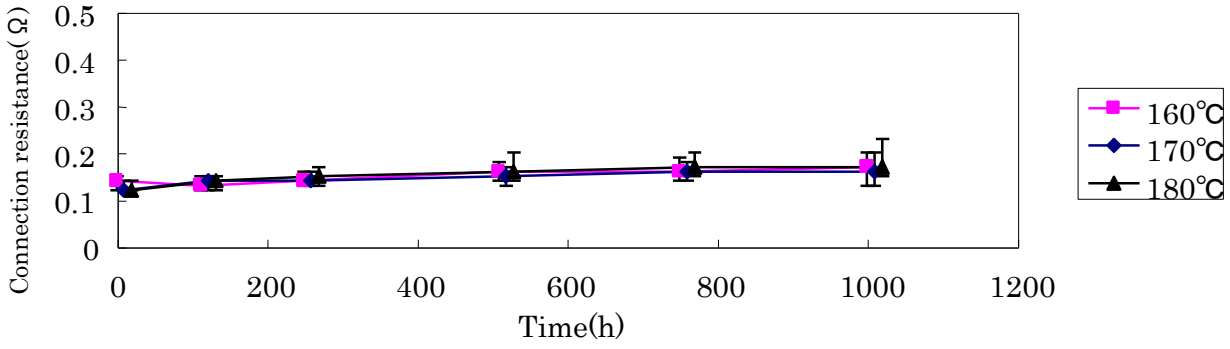
-Bonding conditions; 160,170,180deg.C－2MPa－15s; ANISOLM width 2.0mm

３．１．Changes in connection resistance in a thermal shock test

(-40deg.C, 30min⇔room temperature, 5min⇔100deg.C, 30min)



３．２．Changes in connection resistance in a high-temperature, high-humidity test (85deg.C, 85%RH)

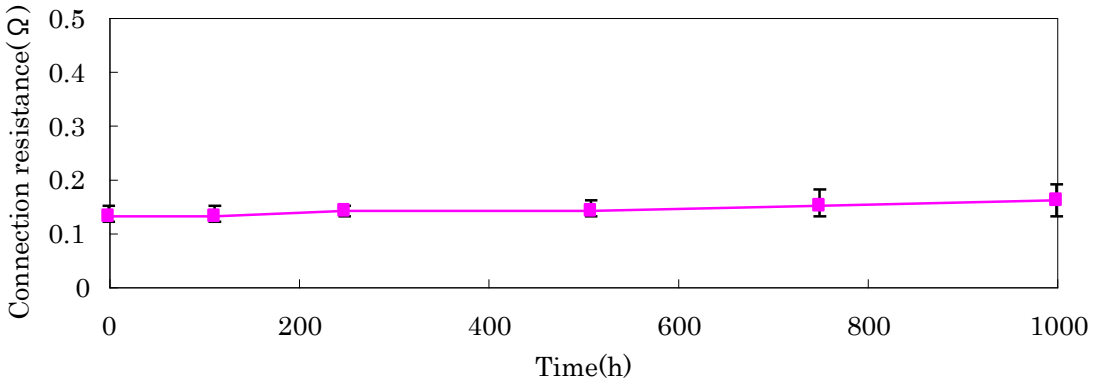


AC-2056 connected at 160deg.C to 180deg.C change little in connection resistance over time, thus a stable connection reliability is obtained.

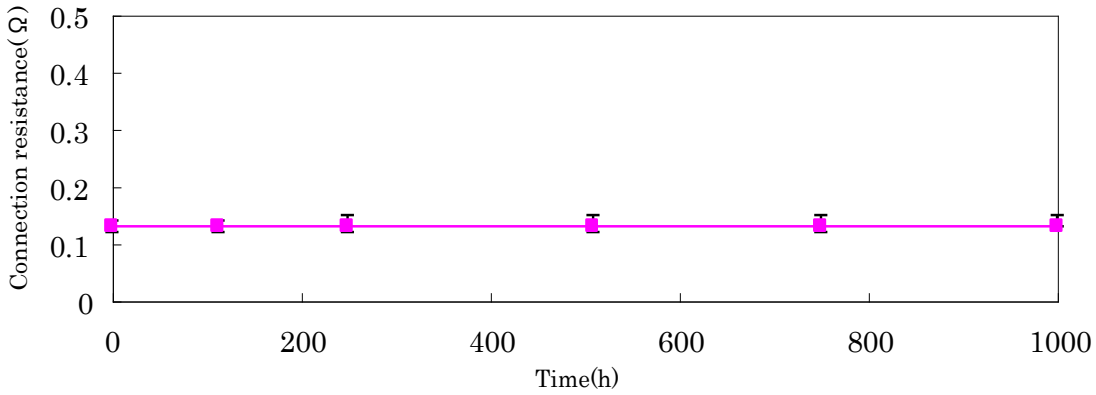
４． Effect of Bonding Temperature on Connection Reliability

-Connection circuits
TCP: Pl, 75μm; Cu, 35μm; Sn plating; pitch, 200μm
PWB: Cu 35μm Au plating; pitch, 200μm
-Bonding conditions; 170deg.C－2MPa－15s; ANISOLM width 2.0mm

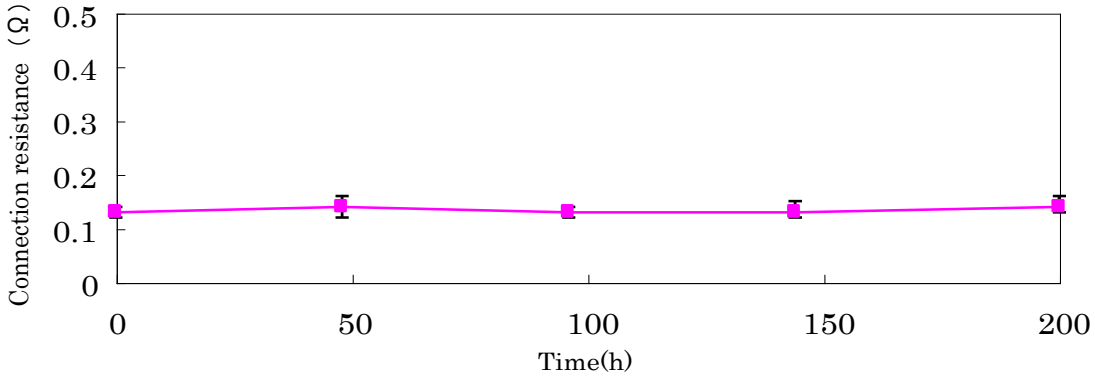
４．１． Changes in connection resistance in a high-temperature test (100deg.C)



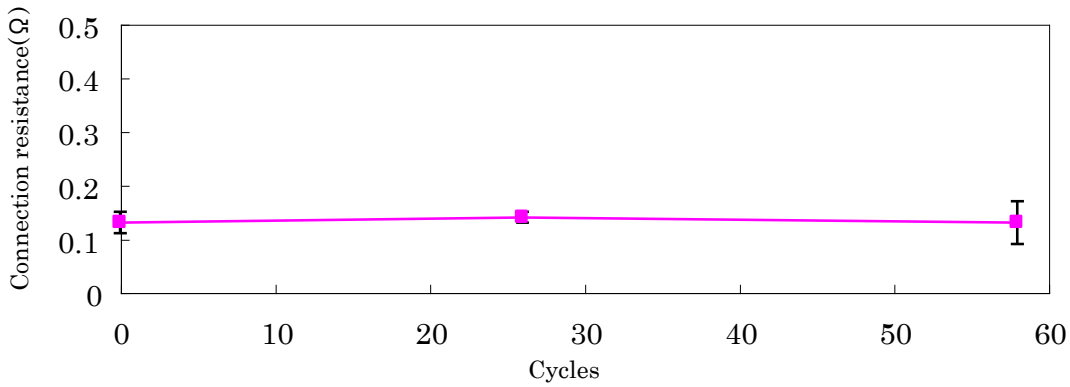
４．２． Changes in connection resistance in a low-temperature test (-40deg.C)



４．３． Changes in connection resistance in a PCT test (121deg.C-100%RH)



4.4. Changes in connection resistance in a moisture absorption and freeze test (-30⇔70deg.C-95%RH)



AC-2056 changes little in connection resistance over time in various tests, thus a stable connection reliability is obtained.

5. Peel Strength

-Connection circuits

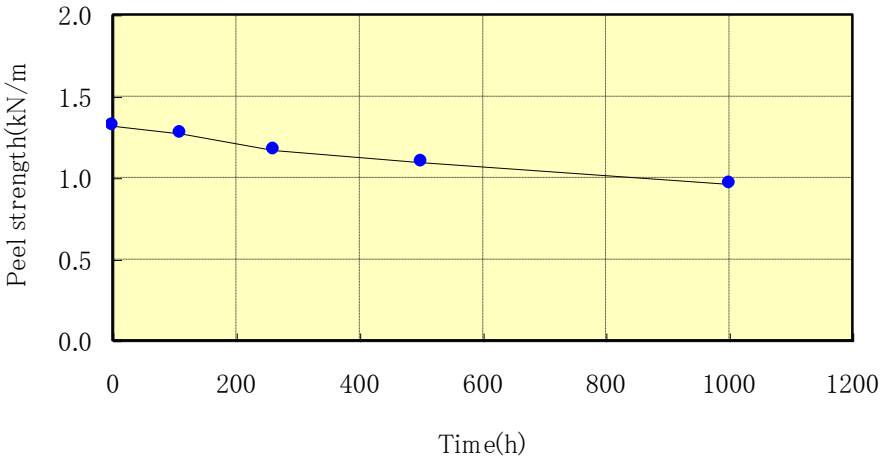
TCP: Pl, 75μm; Cu, 35μm; Sn plating; pitch, 200μm

PWB: Cu 35μm Au plating; pitch, 200μm

-Connection conditions

170deg.C、2MPa、15s　ANISOLM width 2.0mm

Changes in peel strength in a high-temperature, high-humidity test (85deg.C, 85%RH)



Our high-temperature,high-humidity test indicated a considerably small decline in the adhesive strength of samples,thus showing the high stability of our product.

６. Insulation Reliability

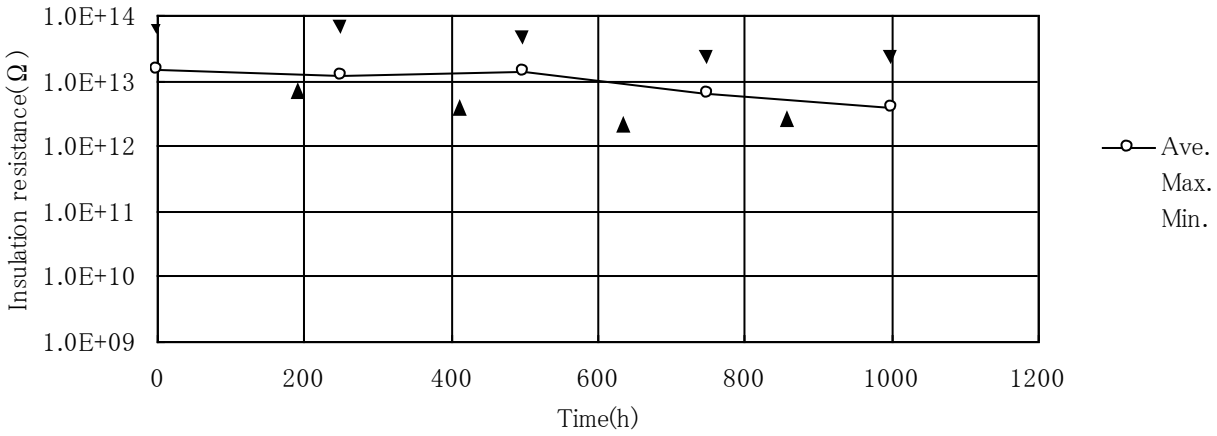
-Connection circuits

PWB: Pl, 75μm; Cu, 35μm; Au plating;comb-like pattern pitch, 50μm
(Line/Spacing: 25μm / 25μm)

TCP: Pl, 75μm; Cu, 35μm; Sn plating; pitch, 200μm

-Measuring method

Measure the resistance of samples with the condition to 100V DC for 60 seconds.
Insulation resistance=measured resistance × 100 circuits
Measurement condition : 23deg.C and 65%RH
Reliability test conditions : High-temperature, high-humidity test (85deg.C, 85%RH)



７. Reaction Rate

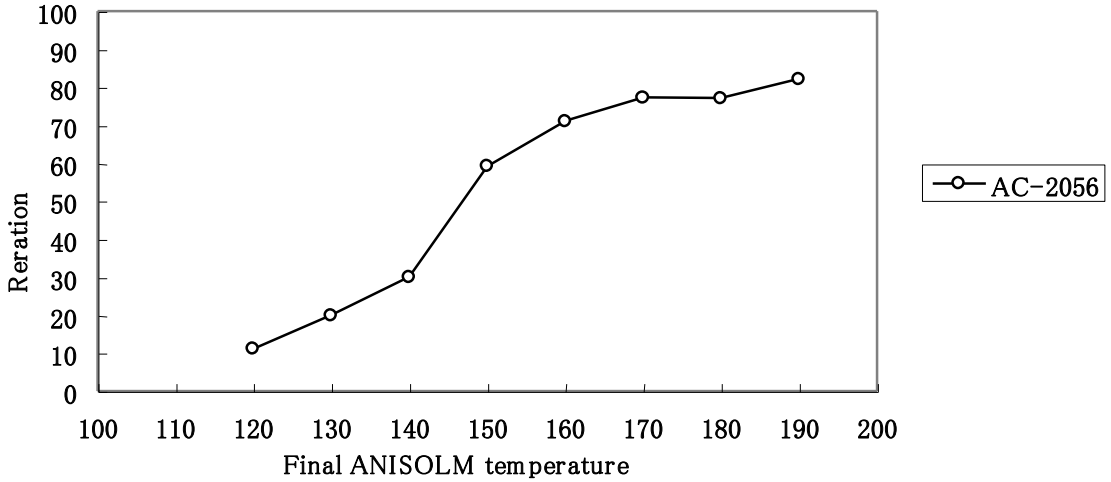
-measuring:

Each specimen was heated and hardened in oil kept at a specified temperature for 15 seconds, 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



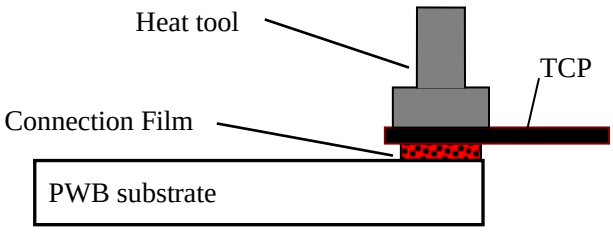
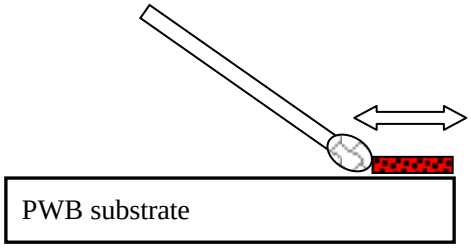
8. Physical Properties

ANISOLM	Elastic modules(Gpa)	tan Δ max
	40deg.C	(deg.C)
AC-2056	1.2	125

-Measuring conditions

DVE: hardened specimens (200deg.C,2min); tensile mode
Frequency, 10Hz; programming rate, 10deg.C/min.
tan Δ is the temperature at which the elastic modules begins to go down and is the temperature at which softening after hardeningChecking Connection Status

９. Repairability

Method of repairability	
 Fig. 1 The Method of heat to the connection point	Heated the connection point by using the tool below. The examples of the tool ① Equipment of the exclusive use heater ② Use of the simple heater Big soldering iron (on the market) ③ Heat board (Heated from the substrate) Heat condition 150 – 180deg. C, About 5 second
 Fig. 2 Exfoliation of TCP	Exfoliated TCP at the high temperature by heating.
 Fig. 3 Remove of the rest of adhesive	(1) Wiped up strongly the rest of adhesive by the cotton sunken repair material (Acetone and so on). (In the case of the repair liquid of our company, applied the liquid to the rest of adhesive, stood for about 30 minutes, and wiped up strongly.) (2) At the end, wiped up the rest by the cotton sunken alcohol and so on. Attention); Avoid that the repair liquid sinks into the connection of the adjoining TCP.

Estimation of repairability using the above method with acetone

ANISOLM	AC-2056
Repairabile time (s) / 50mm x 3mm	80