Reliability test of PCB and Solder-jointing

1. Failure factor of joiting: Thermal diffusion (recrystallization, Intermetallic compound growth)
   Creep, Crack

2. Failure factor of insulation:
   Ionic Migration, Moisture adsorption, Corrosion

3. Environmental test method:

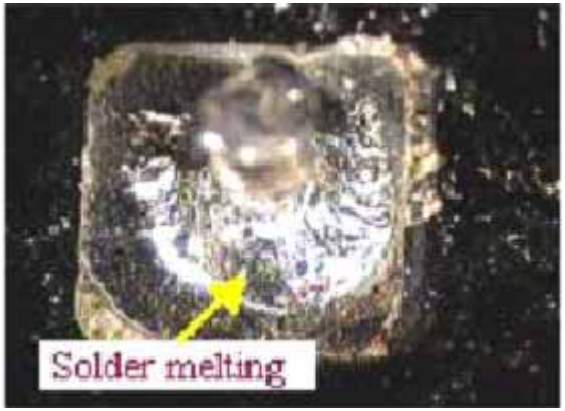
Test Method	Crack	Thermal Diffusion	Creep	Ionic Migration	Moisture Adsorption
High temp. test		◎			
Temp.cyclic test (Thermal shock)	◎	○	○		
Vibration combined test	◎		○		
High temp./High humid. test				◎	◎
HAST				◎	◎

Solder Crack and Contact resistance increase, Heat

C2 – Solder side (Solder cracking)

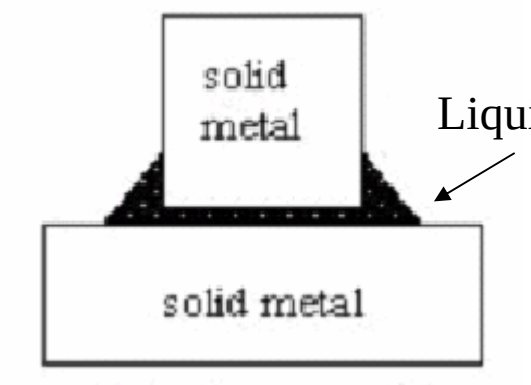
C1 – Solder side (Solder melting)

C2 + Component side

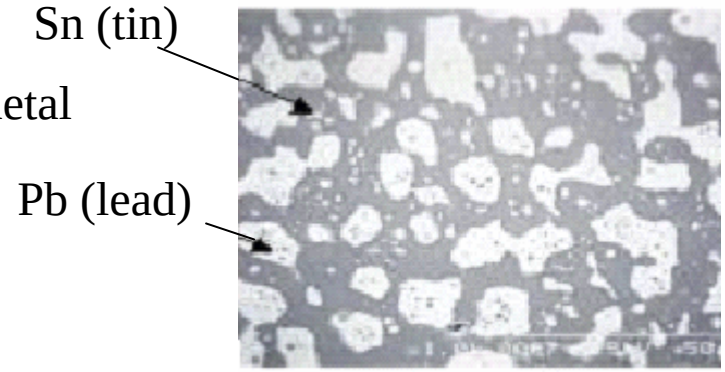


C1 + Component side (Solder melting)

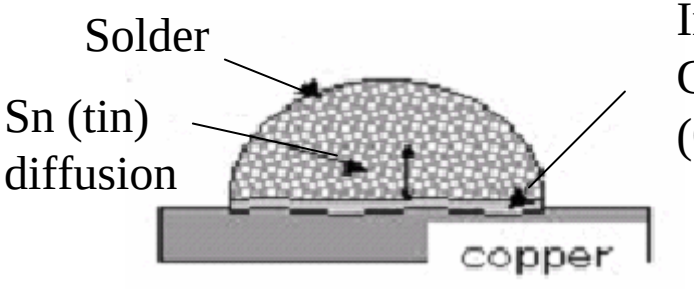
Solder-jointing



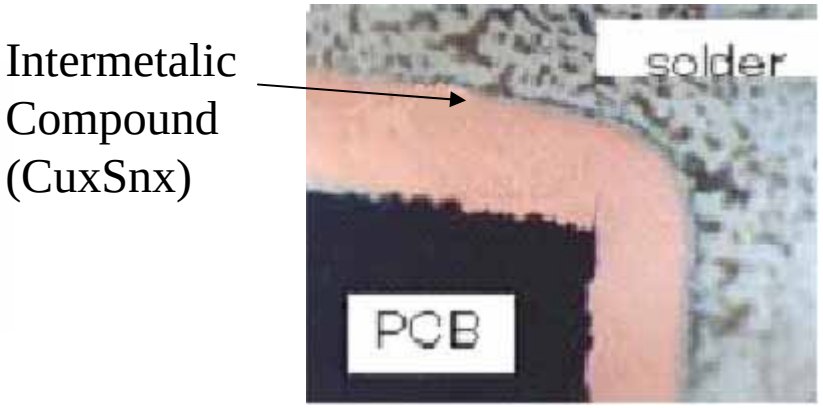
Jointing Model



Solder Organization



Solder Jointing



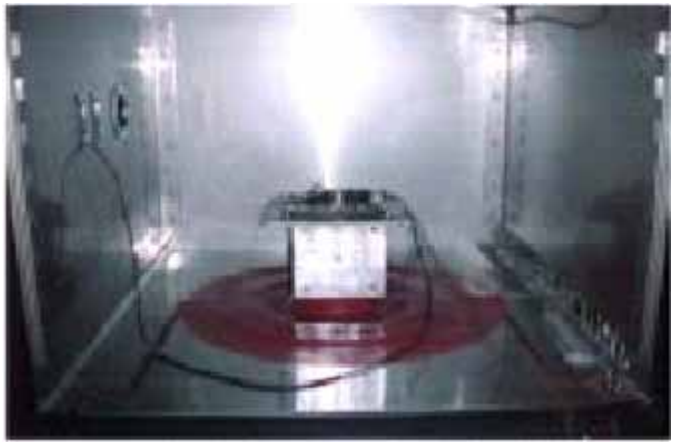
Intermetalic Compound Jointing

Reproduction test and Life test

High Temp.Test

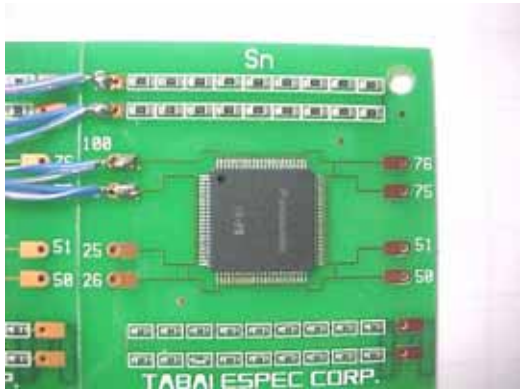
Temp.Cyclic Test

High Temp./High Humid.Test



Vibration Combined Test

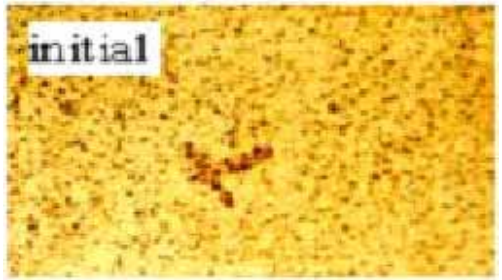
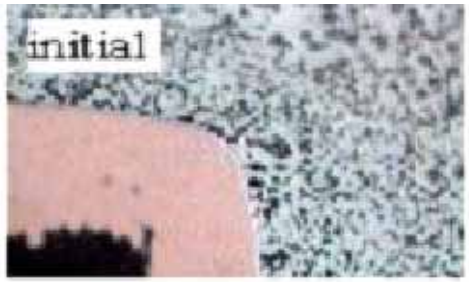
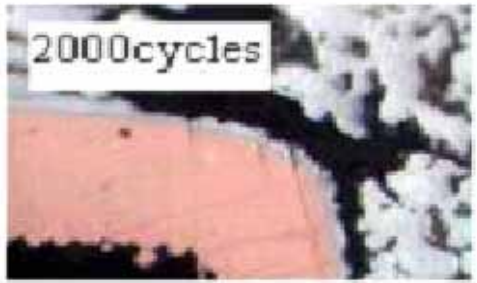
Reliability evaluation test (Temp.Cycle)



Wiring for PCBs

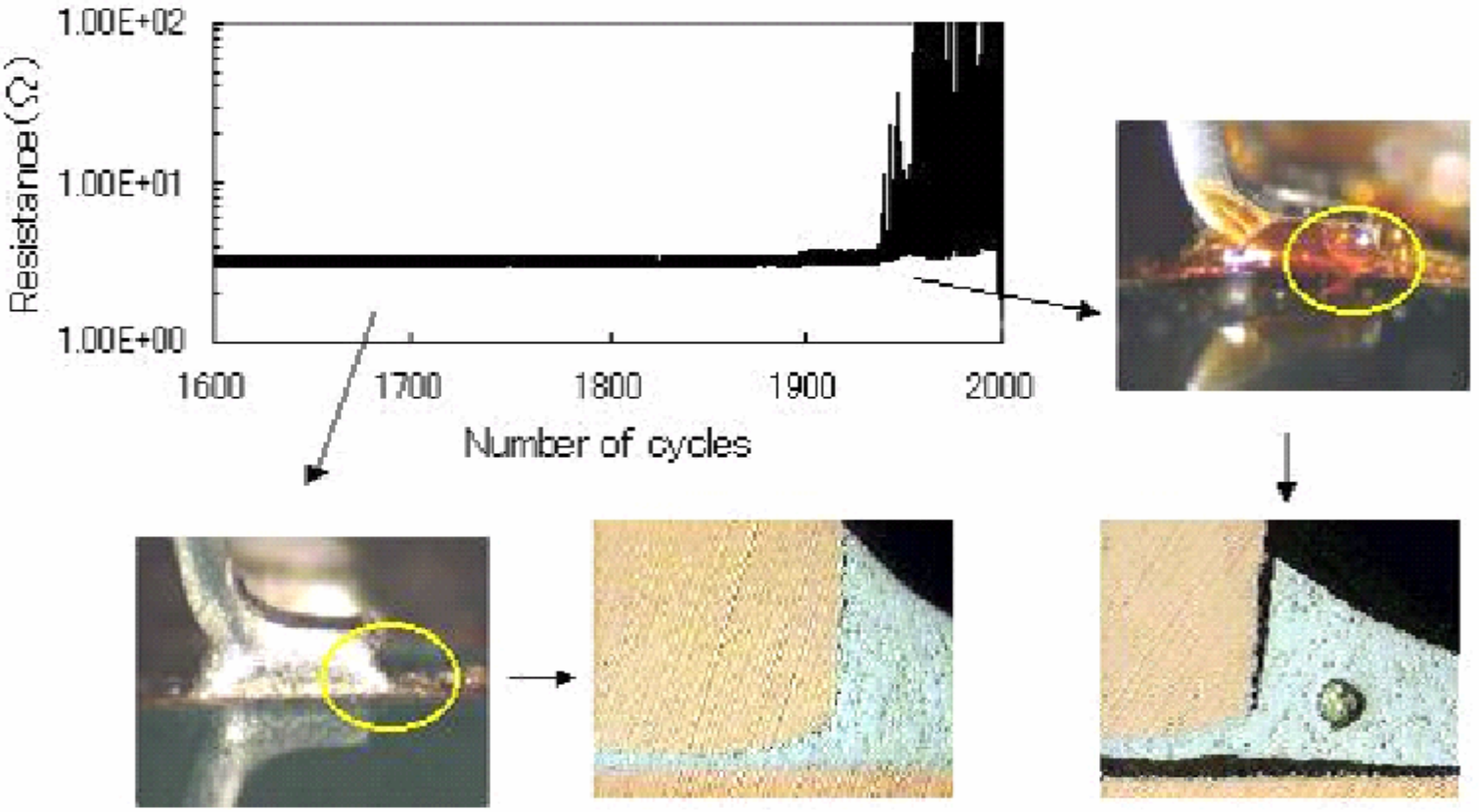
Set-up into chamber

Result of test: Factor of Solder-jointing deterioration

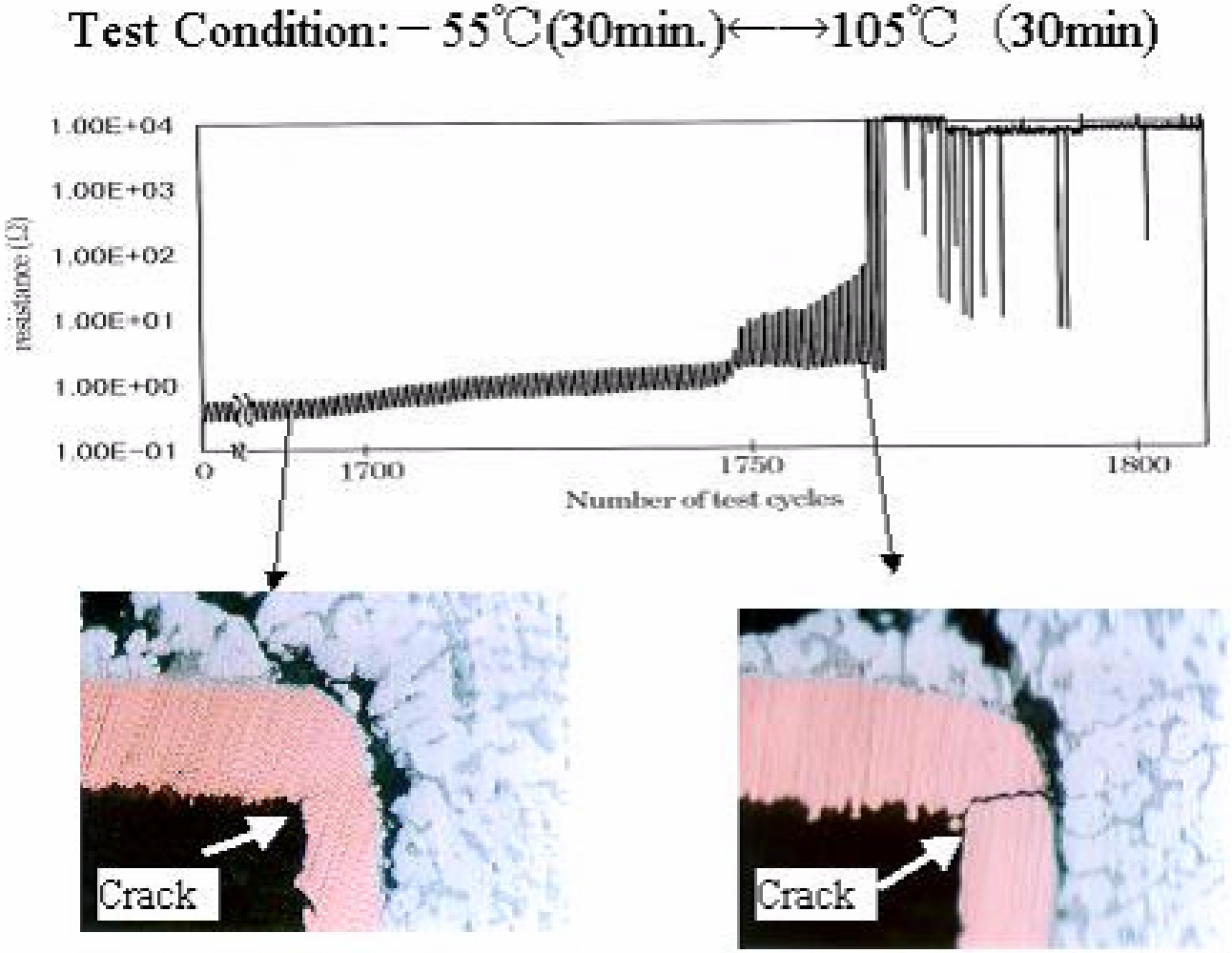
High Temp. (+150 ˚C)	Temp.Cyclic Test	Load Cyclic Test (3kg)
		
		
		

Test Method: Temp. Cycle Test (Solder-joint)

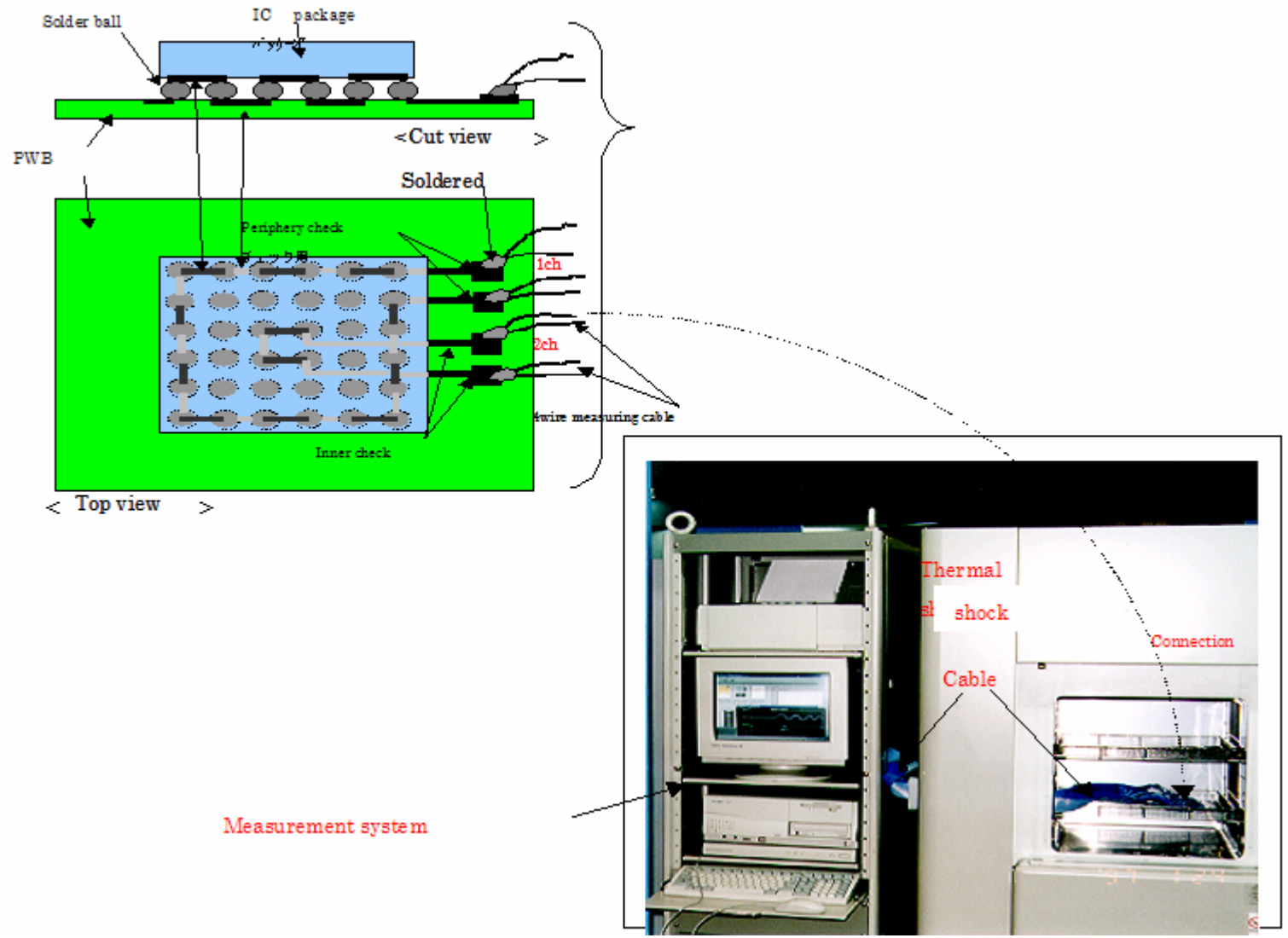
Test Condition: 40 ˚C (30min.) ↔ 120 ˚C (30min.)



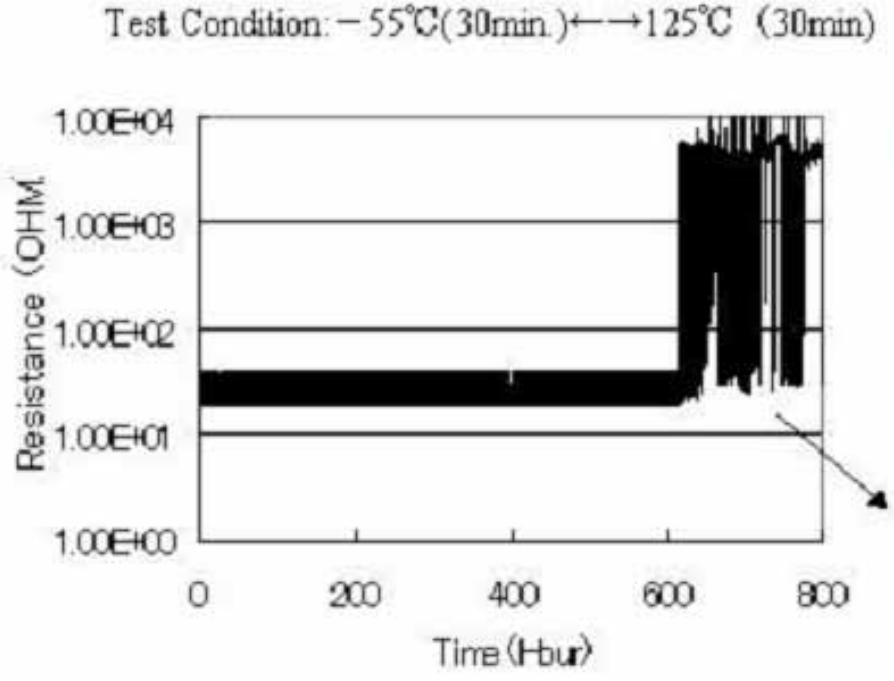
Test method: Temp. Cycle test (Print-Circuit Board)



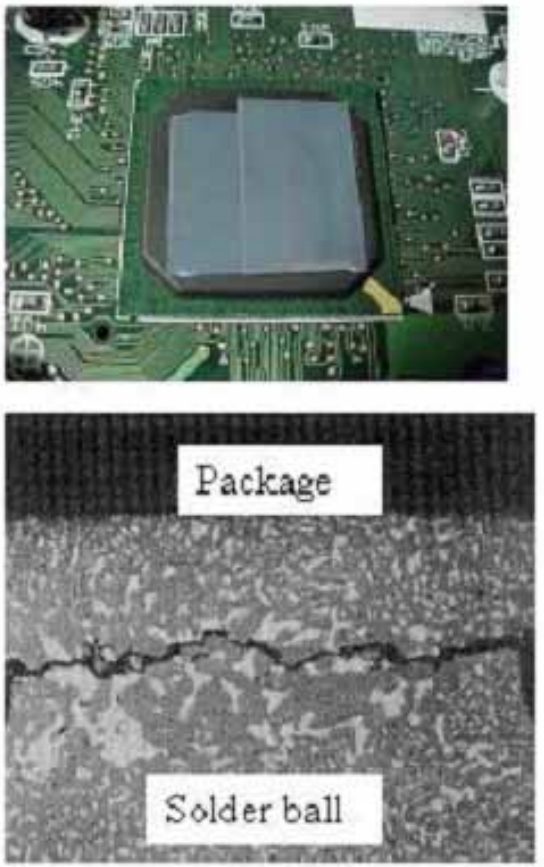
Evaluation method by
Conductor resistance evaluation system (BGA, CSP)



Test method: Temp. Cycle test (BGA, CSP)



*Reference: I.shoji, MES'99, pp137-142(1999)



(1) Reference photograph*