

TR0636E-20027

IT3D(M)-300S-BGA (57) BGA Shearing Force
TEST REPORT

APPROVED	TY. ARAI
CHECKED	TM.MATSUO
PREPARED	TY.TAKADA

[1] Objective

To evaluate BGA shearing force by comparing Initial state and Post 3500 thermal cycle in accordance with IPC-9701.

[2] Specimens

Type	Product	Assembly	State	# of specimens
Type_1	IT3D-300S-BGA (57)	Virgin	Initial	3
Type_2	IT3D-300S-BGA (57)	Reworked	Initial	3
Type_3	IT3D-300S-BGA (57)	Virgin	Post 3500 cycles	3
Type_4	IT3D-300S-BGA (57)	Reworked	Post 3500 cycles	3

Remarks

- *Type_3, Type_4 are assembled as Fig.1.
- *The test board design is based on IPC-9701 specification.
- *Thickness of the PCB: 3.3mm

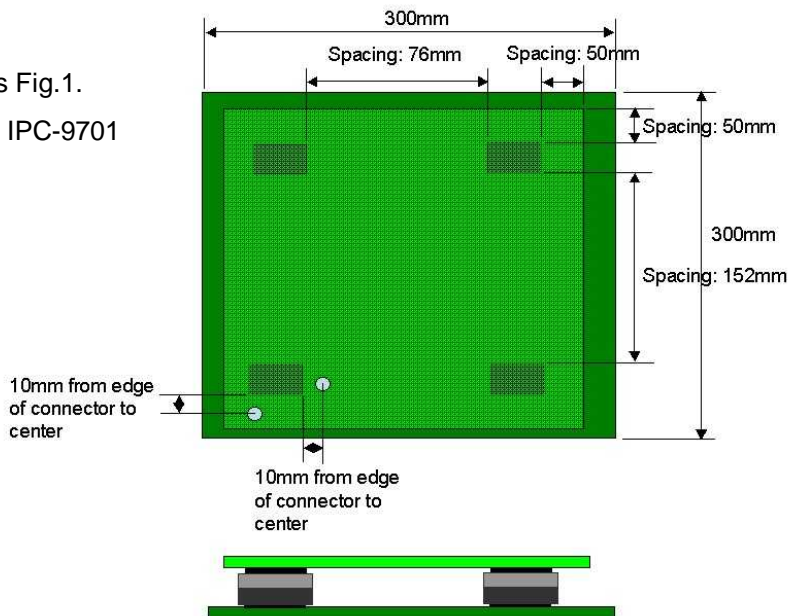


Fig.1

[3] Test period

From: 2007-09-12
 To : 2008-01-18

[4] Test Equipment

Test equipment	Model	Manufacture
Insertion and withdrawal force tester	AG-IS	Shimazu

BGA shearing force

1. Requirements

The failure mode for the sheared balls shall be either bulk solder failure or copper pad lift-off.

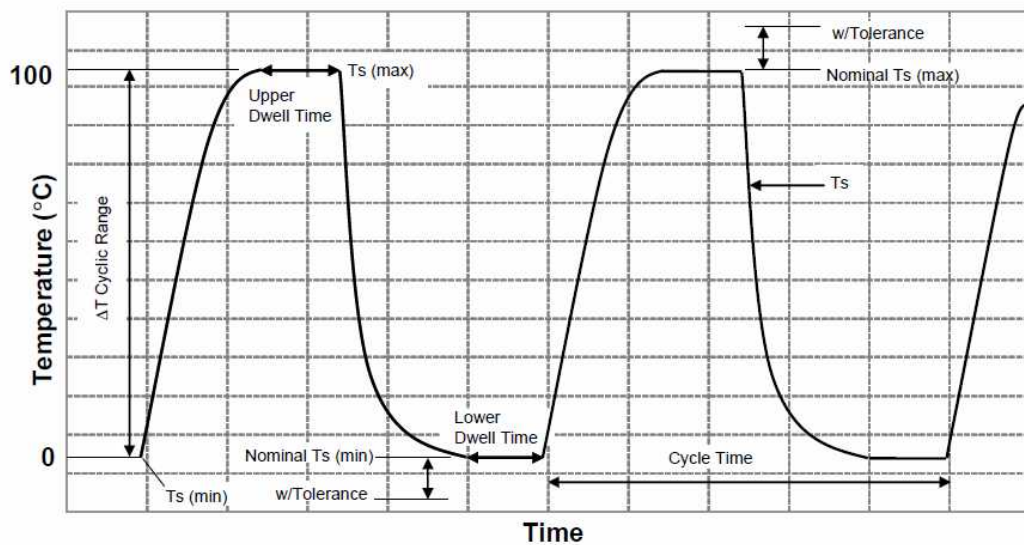
Intermetallic failure is unacceptable.

2. Conditions

2-1 Test Condition

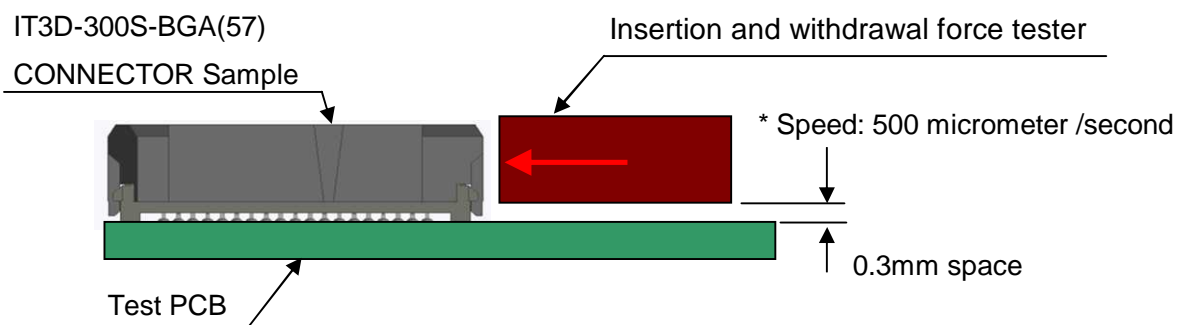
□ Thermal cycle profile

- $T_{\max} = 100\text{ }^{\circ}\text{C}$ (+10 / 0 $^{\circ}\text{C}$)
- $T_{\min} = 0\text{ }^{\circ}\text{C}$ (0 / -10 $^{\circ}\text{C}$)
- Ramp rate = Approximately 10 $^{\circ}\text{C}/\text{min}$ (10% to 90% of test temperature range)
- Dwell time = 5 to 10 min (Holding time of maximum and minimum temperature)



- Test cycle : 3500 cycles

2-2 BGA Shearing Force



4. Results

4-1 BGA Shearing Force

UNIT: KN

No.	Type-1	Type-2	Type-3	Type-4
State	Initial		Post 3500 thermal cycles	
Assembly	Virgin	Reworked	Virgin	Reworked
1	1.22	1.18	1.21	1.13
2	1.18	1.16	1.13	0.91
3	1.25	1.18	1.13	1.11
MAX	1.25	1.18	1.21	1.13
MIN	1.18	1.16	1.13	0.91
AVG	1.22	1.17	1.16	1.05

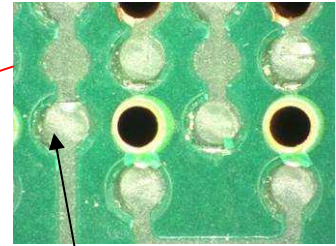
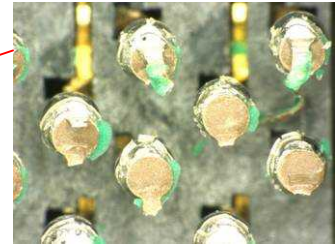
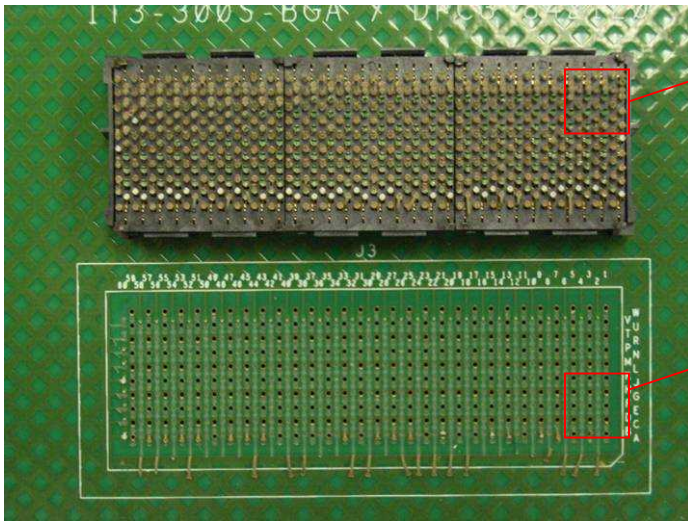
4-2 Failure Mode

No intermetallic failure was found in all specimens.
Copper pad lift-off was found in the sheared area.

Details are shown in the following pages.

Type-1 (Initial)

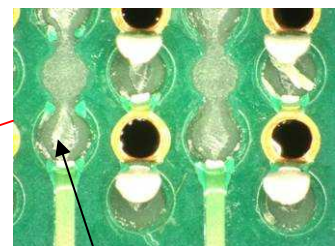
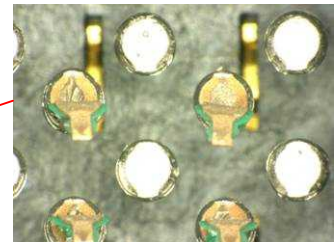
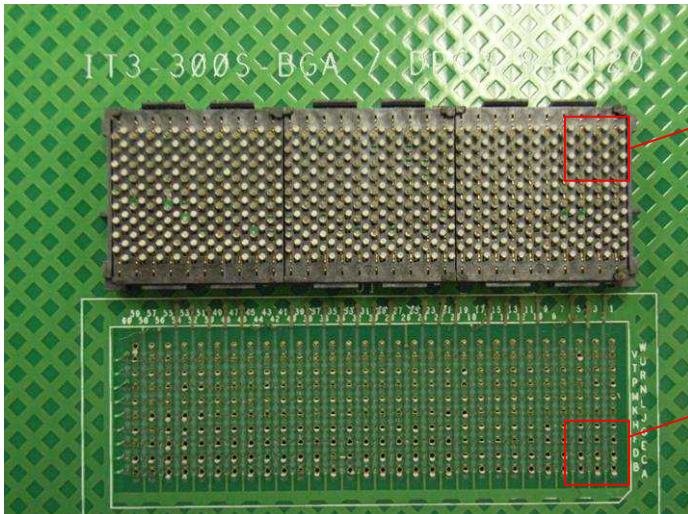
Virgin



Copper Pad lift-off

Type-2 (Initial)

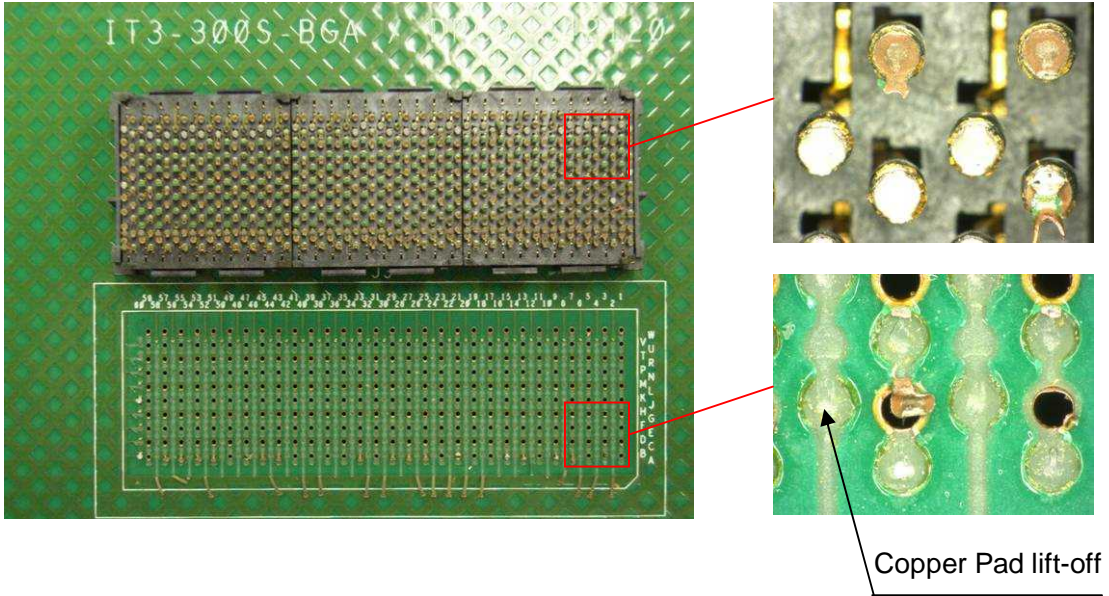
Reworked



Copper Pad lift-off

Type-3 (Post 3500 thermal cycles)

Virgin



Type-4 (Post 3500 thermal cycles)

Reworked

