TR0636E-20176

IT3D(M)-300S-BGA (37) Lead-Free
SHEARING FORCE TEST REPORT

- Post 6000 cycles Report -

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HIROSE ELECTRIC

[1] Objective

To verify BGA shearing force by comparing Initial state and Post 6000 thermal cycle in accordance with IPC-9701.

[2] Specimens

Type	Product	State	Assembly	Solder paste	QTY
1	IT3D-300S-BGA (37) Lead-Free	Initial	Virgin	No clean	3
2				Water soluble	3
3			Reworked	No clean	3
4				Water soluble	3
5		Post 6000 cycles	Virgin	No clean	2
6				Water soluble	2
7			Reworked	No clean	2
8				Water soluble	2

	Virgin	Reworked
Solder Ball on Connector	Sn-3.0Ag-0.5Cu	Sn-3.0Ag-0.5Cu

[3] Test period

From: 2008-10-28
To : 2008-11-09

[4] Test Equipment

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

BGA shearing force

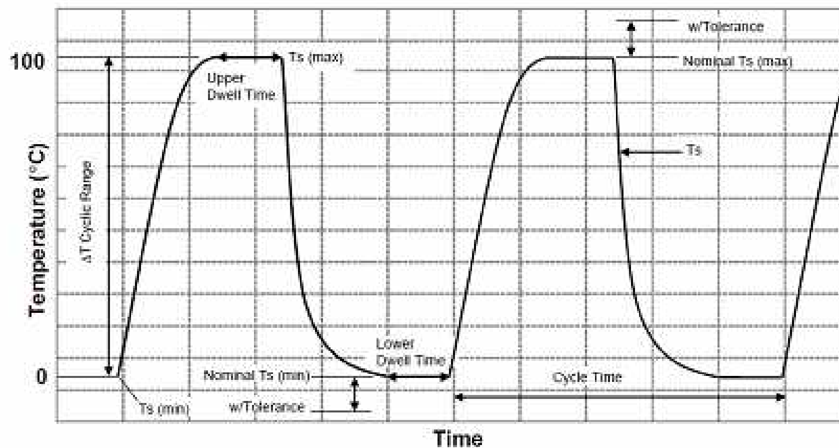
1. Requirements

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

2. Conditions

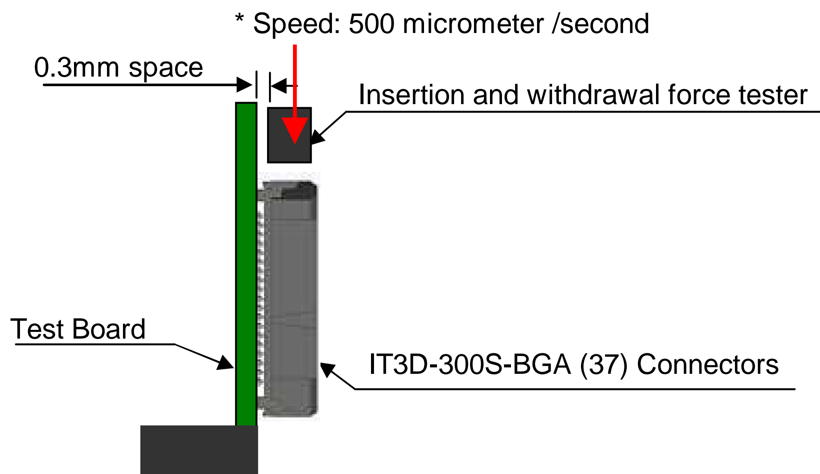
2-1 Thermal Cycling Condition

- ❑ Thermal cycle profile
  - T_{max} = 100 °C (+10 / 0 °C)
  - T_{min} = 0 °C (0 / -10°C)
  - Ramp rate = Approximately 10 °C/min (10% to 90% of test temperature range)
  - Dwell time = 5 to 10 min (Holding time of maximum and minimum temperature)



- ☐ Number of cycles : 6000
- ☐ For details, please refer to IPC-9701 and JESD22-A-104-B.

2-2 BGA Shearing Force



2-3 Test Board

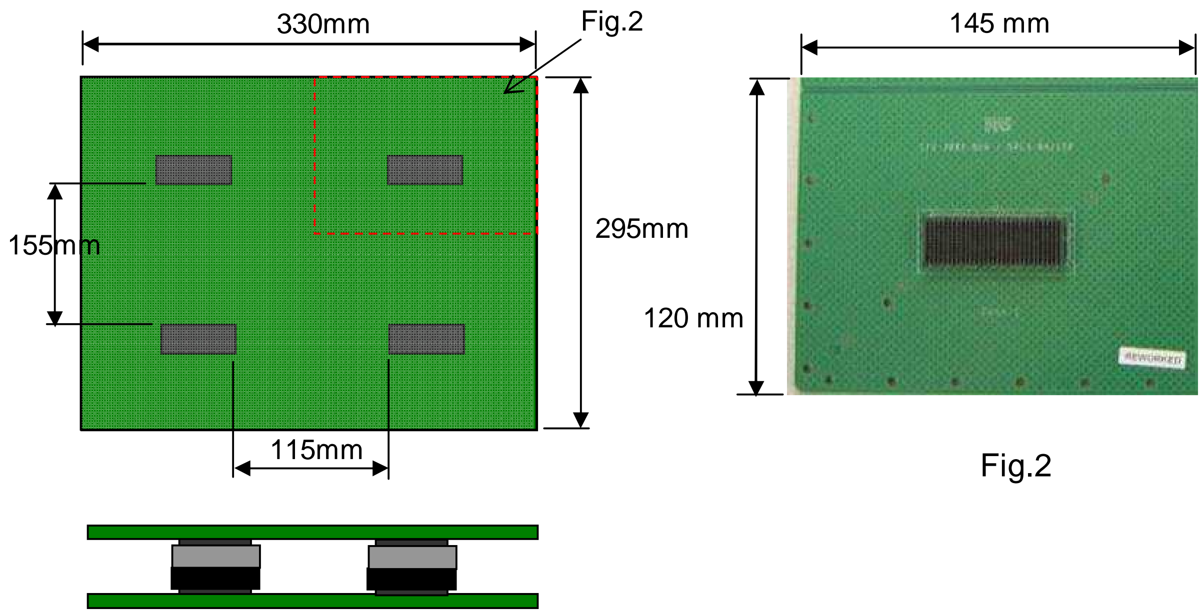


Fig.2

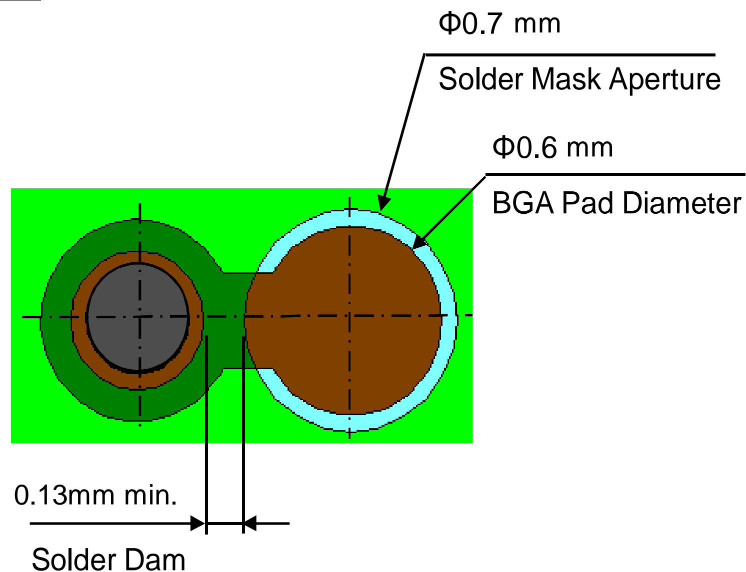
Fig.1

*Type_5, 6, 7, and 8 are assembled as Fig.1 shows. The test specimens are cut into the size of Fig.2

*The test board design is based on IPC-9701 specification.

*Thickness of the PCB: 3.3mm

2-4 PAD Specification



3. Results

3-1 BGA Shearing Force

Initial UNIT: KN

Type	1	2	3	4
Assembly	Virgin		Reworked	
Solder Paste	No Clean	Water Soluble	No Clean	Water Soluble
1	1.92	1.83	1.65	2.12
2	1.91	1.75	1.97	2.19
3	1.86	1.90	1.84	1.96
MAX	1.92	1.90	1.97	2.19
MIN	1.86	1.75	1.65	1.96
AVG	1.90	1.83	1.82	2.09

Post 6000 Thermal Cycles UNIT: KN

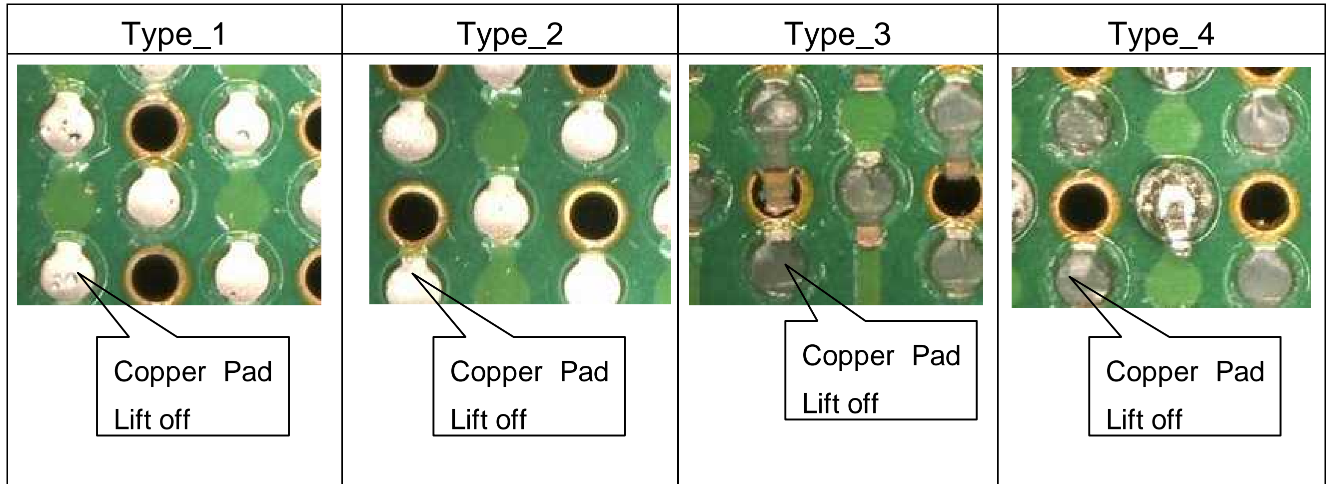
Type	5	6	7	8
Assembly	Virgin		Reworked	
Solder Paste	No Clean	Water Soluble	No Clean	Water Soluble
1	1.81	1.88	1.34	1.88
2	1.61	1.57	1.57	1.58
MAX	1.81	1.88	1.57	1.88
MIN	1.61	1.57	1.34	1.58
AVG	1.71	1.72	1.45	1.73

3-2 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 page.

Initial



Post 6000 cycle