



2011-012

Evaluation Report

**3M™ Textool™ Open-Top
Sockets for QFN Applications**

**0.4 mm and 0.5 mm Pitch Open-Top
QFN Test & Burn-In Sockets**

Electronic Solutions Technical Department
SUMITOMO 3M LIMITED

1. Objective

To evaluate the performance of the 0.4 mm and 0.5 mm pitch open-top QFN test and burn-in socket family by testing the 0.4 mm pitch, 88 leads, part number 288-4205-00. The same contact is used for both the 0.4 mm and 0.5 mm pitch offerings.

2. Applied specification

Applied following spec for this test.

MIL-STD-202F

MIL-STD-1344

JIS C 5402

3. Test samples

Socket: 0.4 mm pitch QFN socket 88 contacts (288-4205-00) 3 pcs.

Package: 0.4 mm pitch QFN package 88 leads 10 pcs.

4. Test method

4.1 Initial test

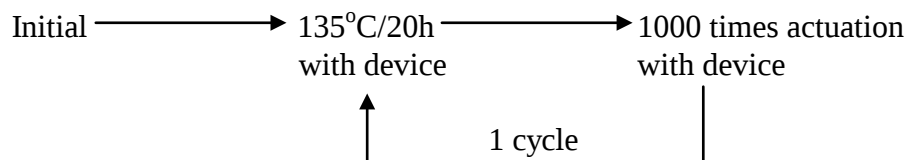
- 1) Measure the actuation force after each evaluation.
- 2) Measure the contact force after each evaluation.
- 3) Confirm the package guiding performance when the package is dropped (IC containment test).
- 4) Confirm the contact mark to the package terminals.

4.2 Heat cycle

Measure the low-level contact resistance after heat cycle (135°C/24h).

One cycle test is done as following conditions and repeated 10 times.

(Condition is according to JIS C 5402)

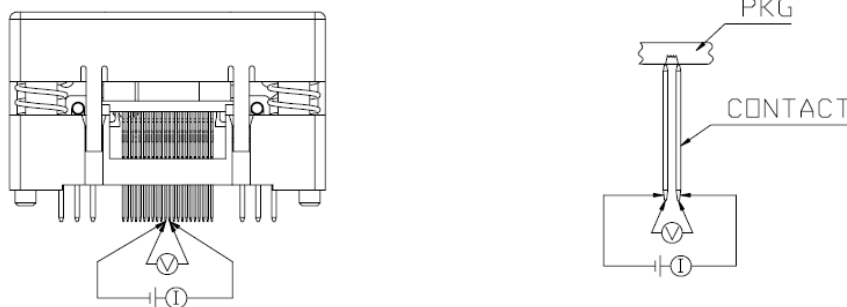


a) Method of measurement: See figure below (4-wire method).

b) Test current: 5mA max.

c) Open circuit voltage: 20mV max.

Measurement equipment: HIOKI 3225 MILLI OHM tester



4.3 Durability test

Measure the low-level contact resistance every 10,000 times actuation.

5 Test result

5.1 Initial Test

5.1.1 Actuation Force

	[unit:g]		
	a	b	c
Initial	3150	-	-
After Heat cycle	-	3050	-
After Durability	-	-	3100

5.1.2 Contact Force

	[unit:g]		
	d	e	f
Initial	25.2	-	-
After Heat cycle	-	21.2	-
After Durability	-	-	24.7

5.1.3 IC Containment Test

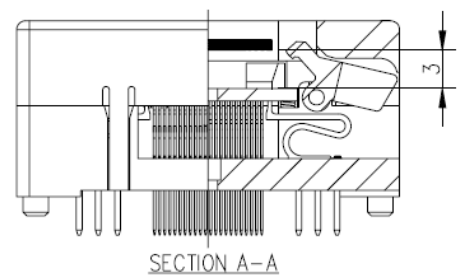
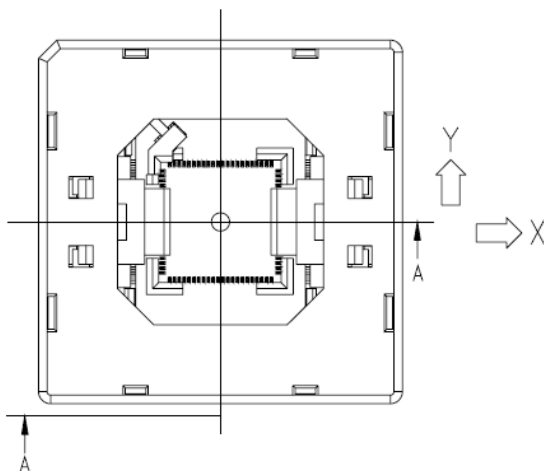
IC package is dropped 10 times at each position and count a failed number.

Drop height: 3 mm from seating plane

Displacement: X = +/-0.5 mm, Y = +/-0.5 mm (shifted 0.1mm in each direction)

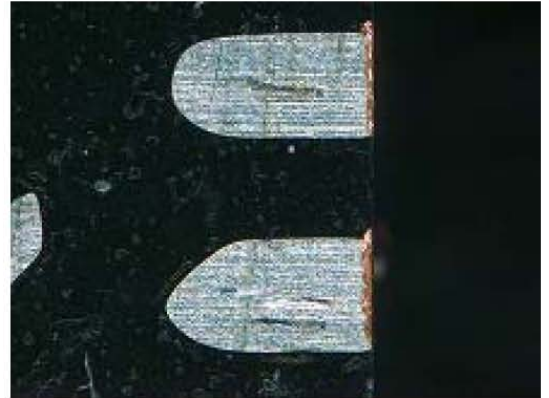
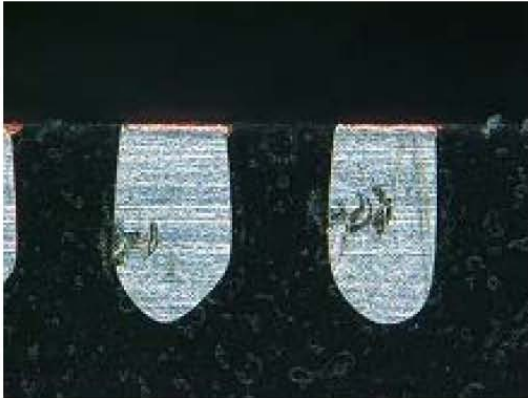
	[unit:mm]										
	-0.5	-0.4	-0.3	-0.2	-0.1	0	0.1	0.2	0.3	0.4	0.5
0.5	0	0	0	0	0	0	0	0	0	0	0
0.4	0	0	0	0	0	0	0	0	0	0	0
0.3	0	0	0	0	0	0	0	0	0	0	0
0.2	0	0	0	0	0	0	0	0	0	0	0
0.1	0	0	0	0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0	0	0	0	0
-0.1	0	0	0	0	0	0	0	0	0	0	0
-0.2	0	0	0	0	0	0	0	0	0	0	0
-0.3	0	0	0	0	0	0	0	0	0	0	0
-0.4	0	0	0	0	0	0	0	0	0	0	0
-0.5	0	0	0	0	0	0	0	0	0	0	0

0 - - - No failure

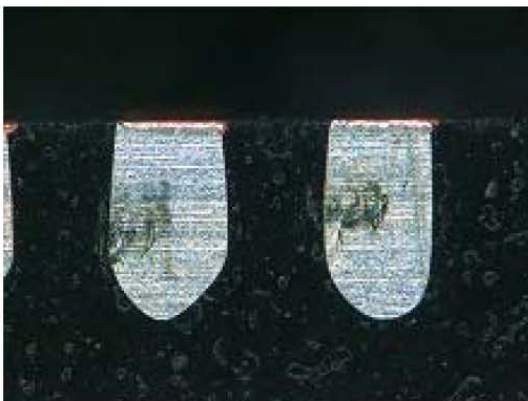


5.1.4 Contact Mark

Confirm the contact mark following each condition (room temperature).



Initial



10 times insertion same IC



50 times insertion same IC

5.2 Heat Cycle Test

Table and Figure 5.2 show test result.

Table 5.2.1 Result of heat cycle test (Socket A)

(unit: m-ohms) (Include the bulk resistance of package and contact)

	Initial	1cycle		2cycle		3cycle		4cycle		5cycle	
		High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate
Max.	133	134	134	136	137	137	133	137	134	134	136
Ave.	107.5	107.1	107.5	108.4	110.1	108.2	106.6	107.6	107.5	107.1	106.7
Min.	99	99	100	98	100	102	100	101	99	99	100
St. Dev.	6.24	6.20	6.59	7.44	9.31	6.96	6.42	7.26	6.97	6.60	7.02
n	44	44	44	44	44	44	44	44	44	44	44

	6cycle		7cycle		8cycle		9cycle		10cycle	
	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate
Max.	134	135	135	132	134	136	135	136	138	132
Ave.	107.6	107.3	107.4	106.5	107.4	107.5	107.7	108.0	108.6	108.1
Min.	100	99	100	98	99	101	98	99	101	100
St. Dev.	6.71	6.93	6.92	6.47	6.80	6.61	6.76	6.62	7.44	6.28
n	44	44	44	44	44	44	44	44	44	44

Fig. 5.2.1 LLCR of heat cycle test (Socket A)**SOCKET A**

(Include the bulk resistance of package and contact)

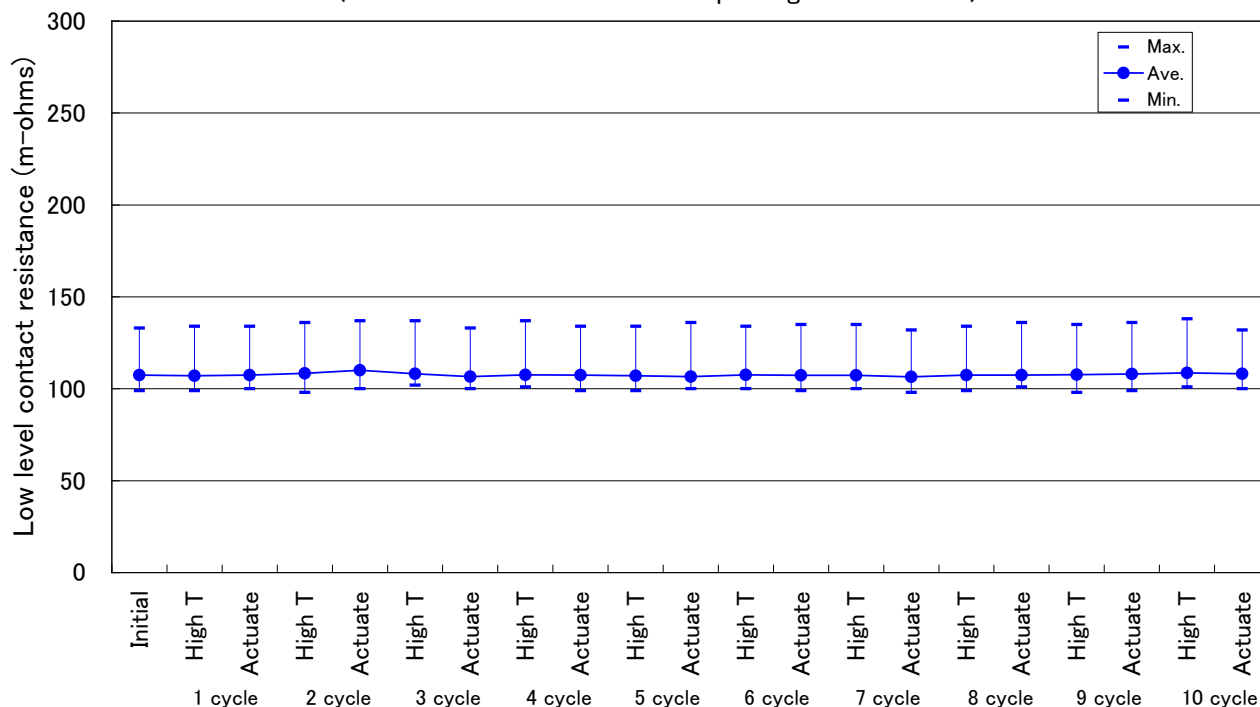


Table 5.2.2 Result of heat cycle test (Socket B)

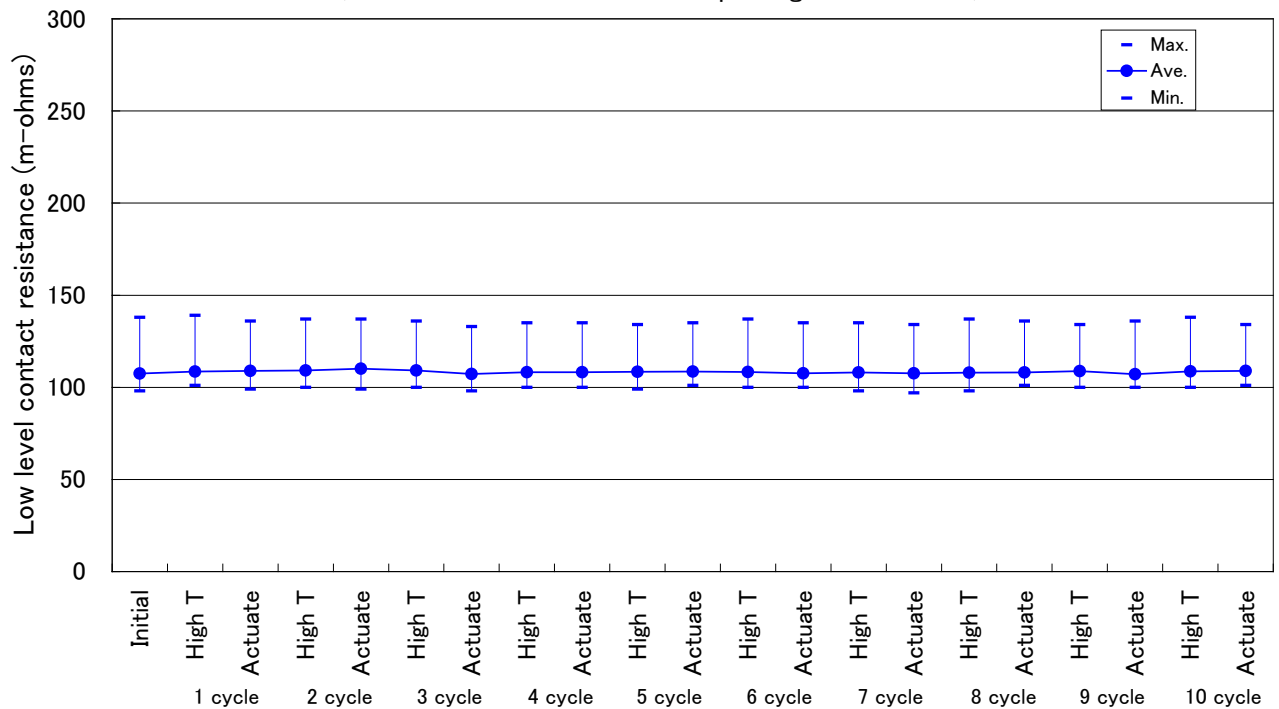
(unit: m-ohms) (Include the bulk resistance of package and contact)

	Initial	1 cycle		2 cycle		3 cycle		4 cycle		5 cycle	
		High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate
Max.	138	139	136	137	137	136	133	135	135	134	135
Ave.	107.5	108.6	109.0	109.2	110.1	109.2	107.2	108.2	108.2	108.4	108.5
Min.	98	101	99	100	99	100	98	100	100	99	101
St. Dev.	7.22	7.91	7.33	6.64	7.40	6.81	6.69	6.35	6.46	6.60	6.35
n	44	44	44	44	44	44	44	44	44	44	44

	6 cycle		7 cycle		8 cycle		9 cycle		10 cycle	
	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate	High T	Actuate
Max.	137	135	135	134	137	136	134	136	138	134
Ave.	108.4	107.6	108.1	107.6	108.0	108.1	108.8	107.1	108.7	109.0
Min.	100	100	98	97	98	101	100	100	100	101
St. Dev.	7.05	6.70	7.09	6.49	7.24	6.90	6.83	6.99	7.03	6.26
n	44	44	44	44	44	44	44	44	44	44

Fig. 5.2.2 LLCR of heat cycle test (Socket B)**SOCKET B**

(Include the bulk resistance of package and contact)



5.3 Durability Test

Table and Figure 5.3 show test result.

Table 5.3.1 Result of heat cycle test (Socket C)

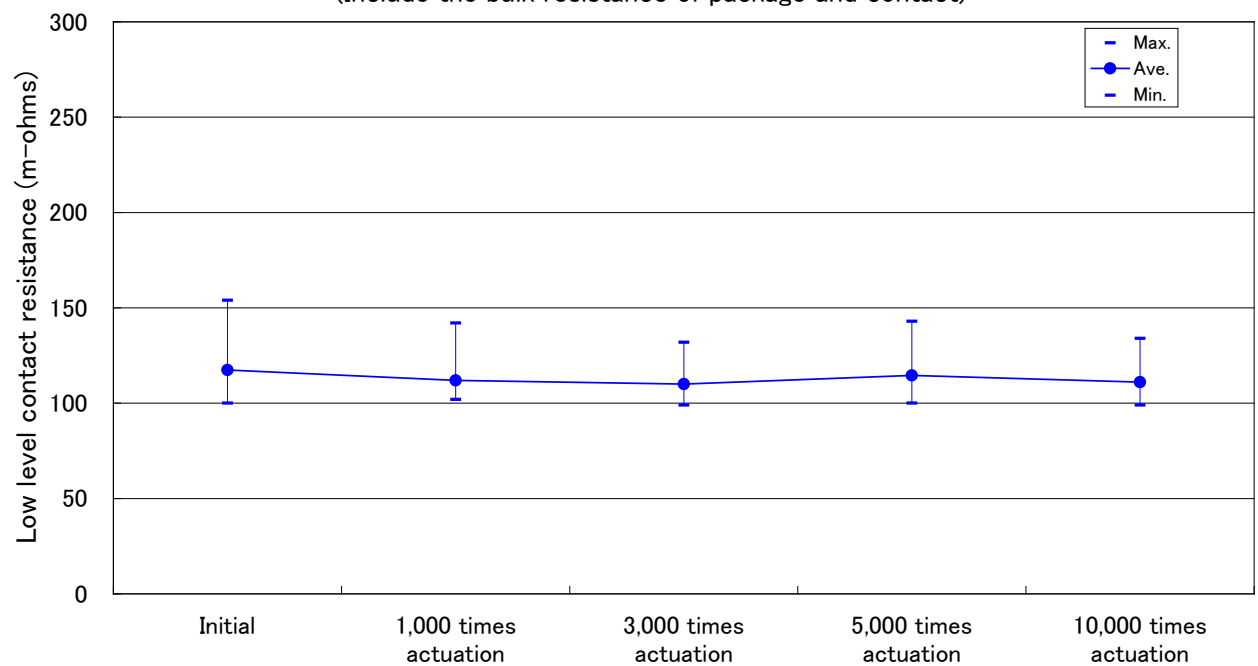
(unit: m-ohms) (Include the bulk resistance of package and contact)

	Initial	1,000 times actuation	3,000 times actuation	5,000 times actuation	10,000 times actuation
Max.	154	142	132	143	134
Ave.	117.4	112.0	110.0	114.5	111.1
Min.	100	102	99	100	99
St. Dev.	11.22	9.27	6.98	11.65	7.83
n	44	44	44	44	44

Fig. 5.3.1 LLCR of heat cycle test (Socket C)

SOCKET C

(Include the bulk resistance of package and contact)



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