RELIABILITY TEST REPORT

Company ：NICHICON CORPORATION.

Model Name ：TUF Type

Date Received ：JUL 07, 2009

Date Finished ：JUL 17, 2009

TESTING LABORATORY IS ACCREDITED BY:

IEC/IECQ 17025 certificate of independent test laboratory approval
Certificate No.：T1091
ISO 17025 accredited in respect of laboratory is approved by TAF
Certificate No.：L0835-080922
ISO 9001 certificate is approved by TUV CERT certification body of TUV NORD Cert GmbH

WE HEREBY CERTIFY THAT:

The test(s) shown in the attachment were conducted according to the indicating procedures. We assume full responsibility for the accuracy and completeness of these tests and vouch for the qualifications of all personnel performing them.

	Name	Signature	Date
Test Engineer	Sherry Wu		JUL 31, 2009
Approval	HK Hsieh		JUL 31, 2009

Note：

1. This report will be invalid if reproduced in whole or in part.
2. This report refers only to the specimen(s) submitted to test, and is invalid if used separately.
3. This report is ONLY valid with the examination seal and signature of this institute.
4. The tested specimen(s) will only be preserved for thirty days from the date issued, if not collected by the applicant.

TABLE OF CONTENTS

1. GENERAL INFORMATION

1.1 DESCRIPTION OF UNIT

MANUFACTURER ：SINGATRON ENTERPRISE CO., LTD.

MODEL NAME ：TUF Type

TEST ITEM, LOT NUMBER AND SAMPLE QUANTITY：

TEST ITEM	LOT NUMBER	SAMPLE QUANTITY
THERMAL SHOCK TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 11 PCS, total 55 PCS
MOSITURE RESISTANCE TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 11 PCS, total 55 PCS
SALT SPRAY TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 11 PCS, total 55 PCS
SOLDERABILITY TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 5 PCS, total 25 PCS
SOLDER BATH TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 5 PCS, total 25 PCS
VIBRATION TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 11 PCS, total 55 PCS
MECHANICAL SHOCK TEST	FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K, FP-6R3RE561M-TUCG-5K, FP-016RE101M-TUCG	Each Lot 11 PCS, total 55 PCS

2. THERMAL SHOCK TEST

2.1 TEST EQUIPMENT

Model	Serial Number	Calibration Date
KSON TSR-B4H^{++}	2618	NOV 10, 2008

2.2 LABORATORY AMBIENCE CONDITION

Temperature：25±5℃

Relative humidity：55%± 20% (RH)

2.3 REFERENCE DOCUMENT

The test refers to MIL-STD-202G TEST METHOD 107G.

2.4 TEST CONDITION

Step	Temperature(℃)	Time(minute)
1	55	15
2	25	5
3	85	15
4	25	5

Number of cycle：100 cycles

2.5 TEST RESULTS

Visual inspection of sample surfaces showed no abnormity.

Functional check is performed by customer.

3. MOSITURE RESISTANCE TEST

3.1 TEST EQUIPMENT

Model	Serial Number	Calibration Date
KSON THS-S4T-150	4510T	SEP 08, 2008

3.2 REFERENCE DOCUMENT

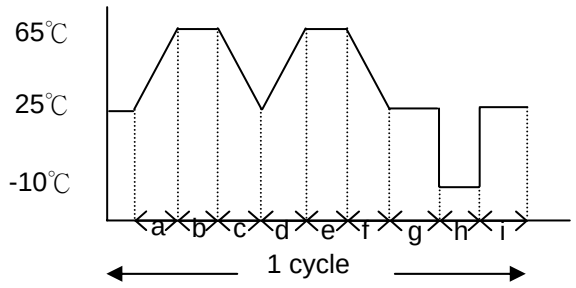
The test refers to MIL-STD-202G TEST METHOD 106G.

3.3 TEST CONDITION

Step	Temperature/Humidity	Test Time
a	25℃~65℃/95%RH	2.5 hours
b	65℃/95%RH	3 hours
c	65℃~25℃/95%RH	2.5 hours
d	25℃~65℃/95%RH	2.5 hours
e	65℃/95%RH	3 hours
f	65℃~25℃/95%RH	2.5 hours
g	25℃/95%RH	2 hours
h	-10℃	3 hours
i	25℃/95%RH	3 hours

Test cycle ：10 cycles
Time of 1 cycle ：24 hours
Total Test Time ：240 hours

Test Curve：



3.4 TEST RESULTS

Visual inspection of sample surfaces showed no abnormity.

Functional check is performed by customer.

4. SALT SPRAY TEST

4.1 TEST EQUIPMENT

Model	Serial number	Calibration Date
T MACHINE TMJ-9701	T-01-010801	AUG 11, 2008

4.2 REFERENCE DOCUMENT

The test refers to MIL-STD-883G method 1009.8.

4.3 TEST CONDITION

Temperature：35℃

Humidity：Over 85% RH

Salt Concentration：5 %

Fog(ml/80cm^2 /hr)：1.0~2.0 milliliters per hour per 80 cm^2

PH Value：6.5~7.2

Position of Specimen：The specimens shall be supported or suspended between 15 to 45 deg from the vertical and preferably parallel to the principal direction of horizontal flow of fog through the chamber, based upon the dominant surface being tested.

Test time：Total of 96 hours

4.4 TEST RESULTS

2.5.1 The corrosion area specification refers to MIL-STD 883G, Method 1009.8.

2.5.2 Functional check is performed by customer.

2.5.3 Visual inspection of sample surface shows corrosion as below:

FP-016RE271M-TUCG-5K, FP-010RE100M-TUCG, FP-3R0RE821M-TUCG-5K and FP-6R3RE561M-TUCG-5K's surface show corrosion <0.1%.

FP-016RE101M-TUCG							
No.	**corrosion area**	**No.**	**corrosion area**	**No.**	**corrosion area**	**No.**	**corrosion area**
1	< 0.1%	2	< 0.1%	3	< 2.5%	4	< 2.5%
5	< 1.0%	6	< 1.0%	7	< 1.0%	8	< 1.0%
9	< 0.1%	10	< 0.1%	11	< 0.1%	--	--

5. SOLDERABILITY TEST

5.1 TEST EQUIPMENT

Model	Serial Number	Calibration Date
RHESCA SAT-5100	627000017	MAY 20, 2009

5.2 REFERENCE DOCUMENT

The test refers to MIL-STD-202G 208H Test Method.

5.3 TEST CONDITION

Procedure 1: Flux Immersion

Flux：Conform to type ROL1 of J-STD-004(activated rosin flux having a composition of 25% ± 0.5% by weight of colophony and 0.15% ± 0.01% by weight diethylammonium Hydrochloride (CAS 660-68-4), in 74.85% ± 0.5% by weight of isopropy1 alcohol).

Flux Immersion Time：5 ~ 10 seconds

Procedure 2: Solder Immersion

Wetting Temperature：245℃± 5℃

Wetting Time：5±0.5 seconds

Solder pot：96.5%Sn, 0.5%Cu, 3.0%Ag

Immersion / Emersion Rate：25mm/second

Procedure 3: Visual Inspection

5.4 TEST RESULTS

Criteria: Wetting Area ＞ 95%.

FP-016RE271M-TUCG-5K			
Fig No.	**Solder Qty**	**Failure Qty**	**Result**
3	5	0	Accept
FP-010RE100M-TUCG			
Fig No.	**Solder Qty**	**Failure Qty**	**Result**
4	5	0	Accept
FP-3R0RE821M-TUCG-5K			
Fig No.	**Solder Qty**	**Failure Qty**	**Result**
5	5	0	Accept
FP-6R3RE561M-TUCG-5K			
Fig No.	**Solder Qty**	**Failure Qty**	**Result**
6	5	0	Accept
FP-016RE101M-TUCG			
Fig No.	**Solder Qty**	**Failure Qty**	**Result**
7	5	0	Accept

6. SOLDER BATH TEST

6.1 TEST EQUIPMENT

Model	Serial Number	Calibration Trace Date
RHESCA SAT-5100	627000017	MAY 20, 2009

6.2 REFERENCE DOCUMENT

The test refers to MIL-STD-202G-210F Test Method

6.3 TEST CONDITION

Procedure1: Flux Immersion

Flux：Conform to type ROL1 of J-STD-004(25% by weight of colophony and 0.15% by weight diethylammonium hydrochloride in 74.85% by weight of isopropyl alcohol)

Flux Immersion Time：5 seconds~10 seconds

Procedure2: Solder Bath Test

Wetting Temperature：260℃±5℃

Wetting Time：10±1 second

Immersion Angle：Vertical

Solder Pot：96.5%Sn, 0.5%Cu, 3.0%Ag

6.4 TEST RESULTS

Visual inspection of sample surfaces showed no abnormity.

Functional check is performed by customer.

7. VIBRATION TEST

7.1 TEST EQUIPMENT

Test Equipment	Serial Number	Calibration Date
LDS V-830-335T Shake system	SP8239-001	FEB 13, 2009
King Design EM-600F2K-40N120	UW102090290	MAR 27, 2009

7.2 LABORATORY AMBIENCE CONDITION

Temperature：23±3°C

Relative humidity：55%±3% (RH)

7.3 REFERENCE DOCUMENT

The test is based on MIL-STD-202G Method 201A.

7.4 TEST CONDITION

Units are non-operating.

Vibration waveform：Sine waveform

Vibration frequency：10Hz ~ 55Hz

Vibration frequency：0.06”

Cycle time：1 minute / cycle

Number of cycle：120 cycles / axis

Vibration axes：X、Y and Z axes

7.5 TEST RESULTS

No inspection requested from customer.

8. MECHANICAL SHOCK TEST

8.1 TEST EQUIPMENT

Test Equipment	Serial Number	Calibration Date
King Design DP-1200-18	UW101187397	JAN 04, 2009

8.2 LABORATORY AMBIENCE CONDITION

Temperature：23±3℃

Relative humidity：55%± 3% (RH)

8.3 REFERENCE DOCUMENT

The test is based on MIL-STD-202G Method 213B Condition D.

8.4 TEST CONDITION

Units are non-operating

Pulse shape：Half-sine waveform

Impact acceleration：500g

Pulse duration：1 ms

Number of shocks：18 shocks (3 times for each face)

8.5 TEST RESULTS

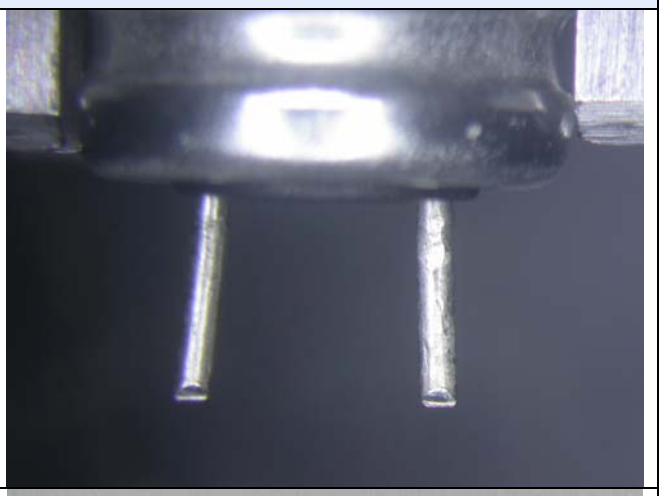
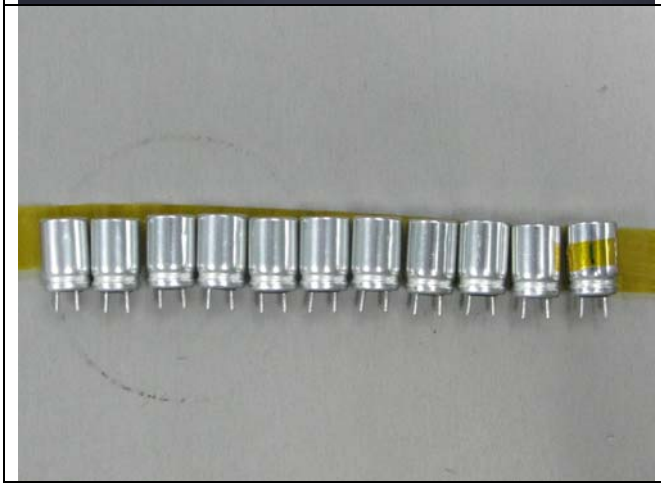
No inspection requested from customer.

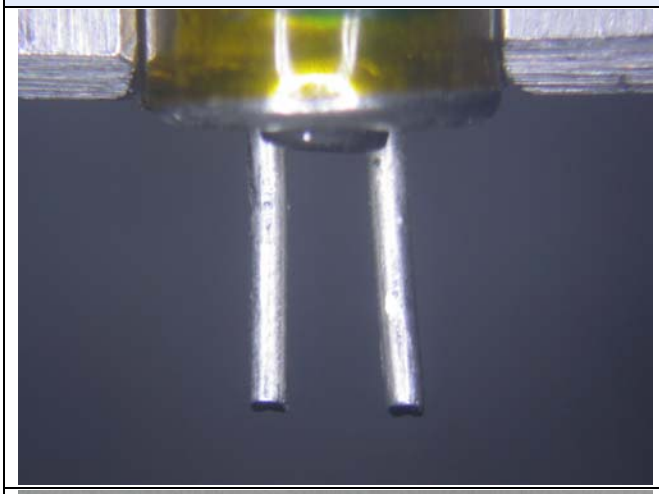
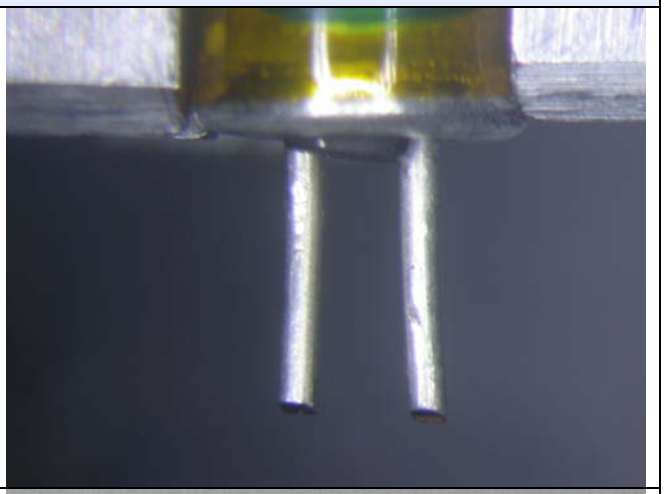
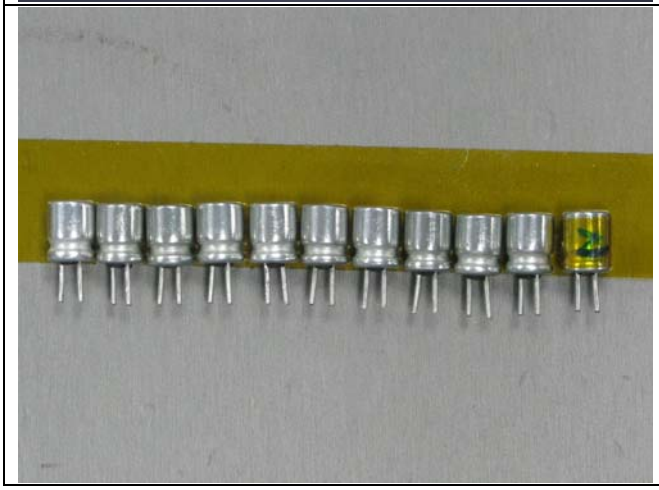
Attachment 1: Photo of Salt Spray Test

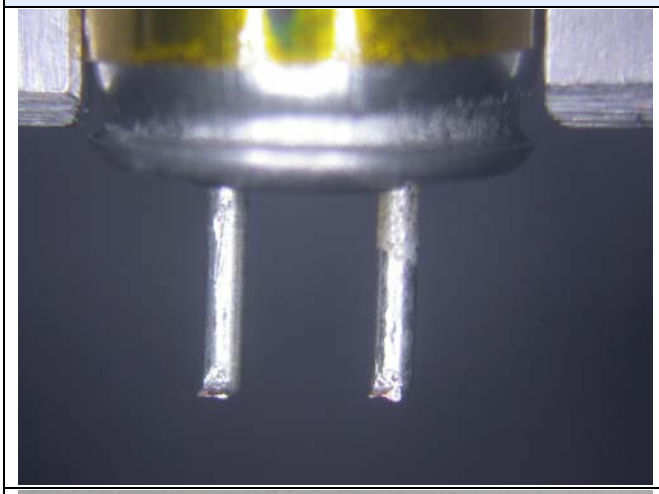
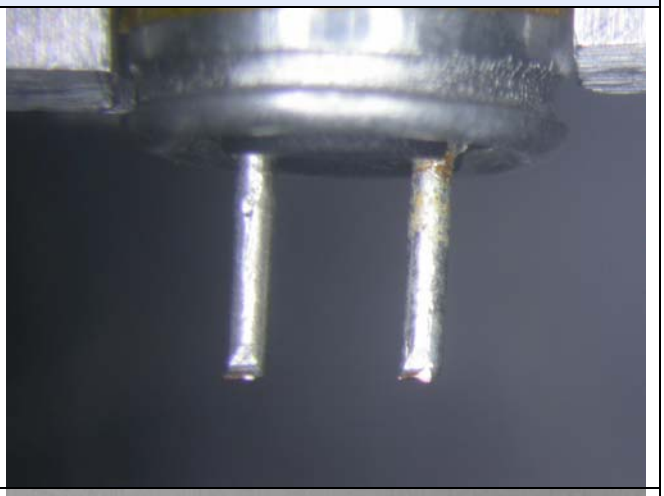
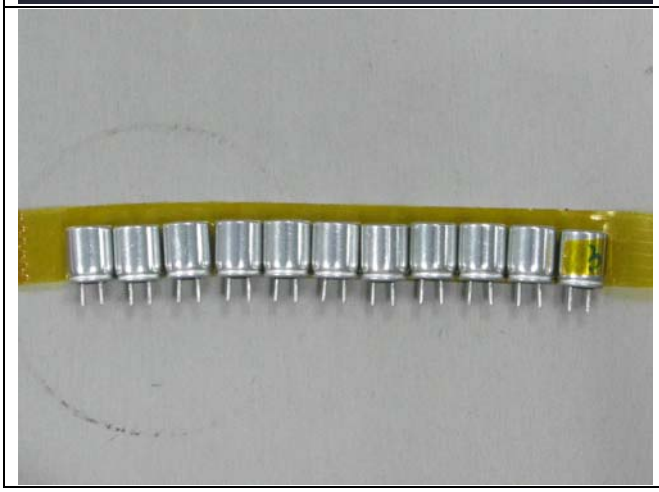
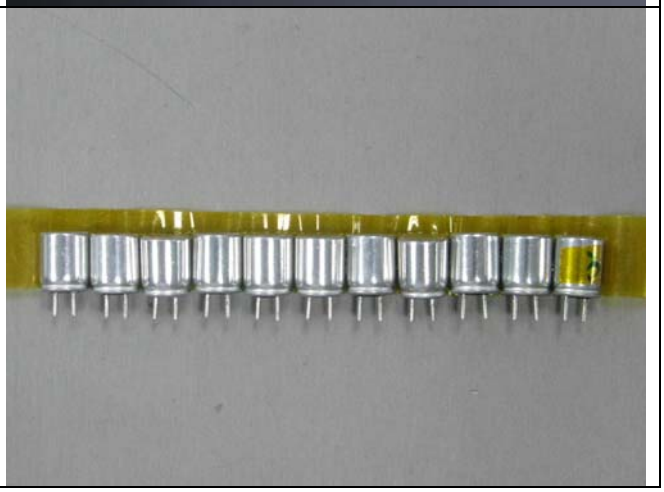
Test Equipment

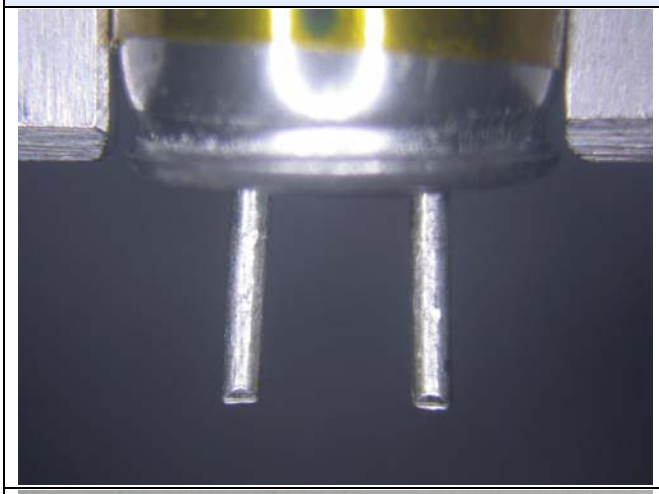
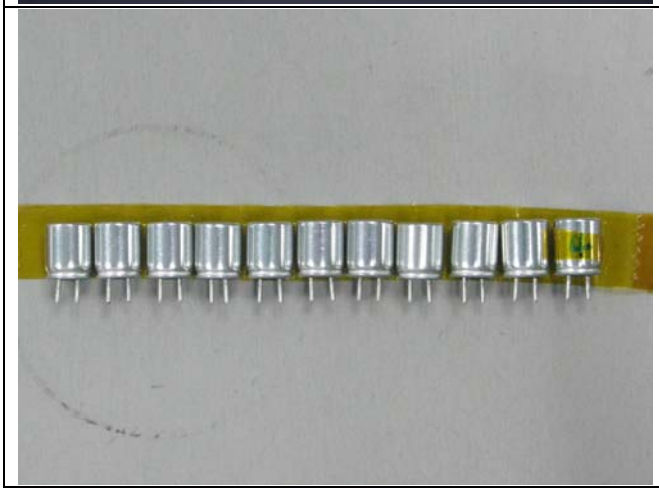
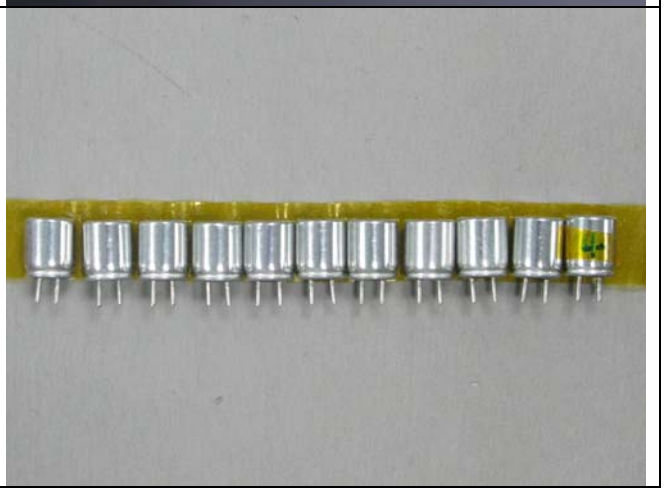
Test Setup

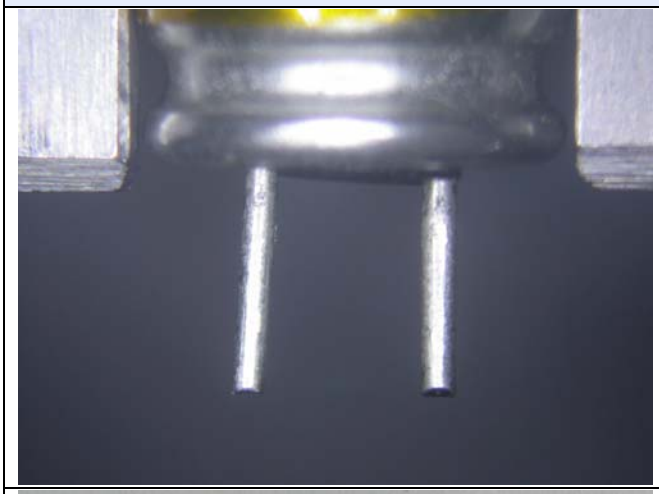
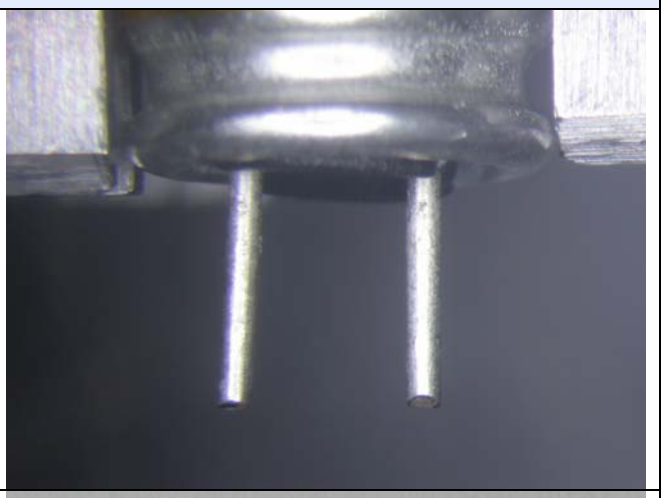
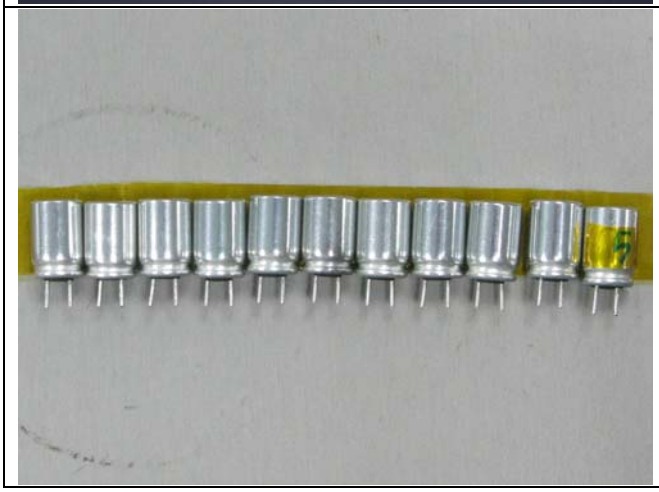

Attachment 2: Test Photo before & after Salt Spray Test

FP-016RE271M-TUCG-5K	
Before Test	**After Test**
	
	

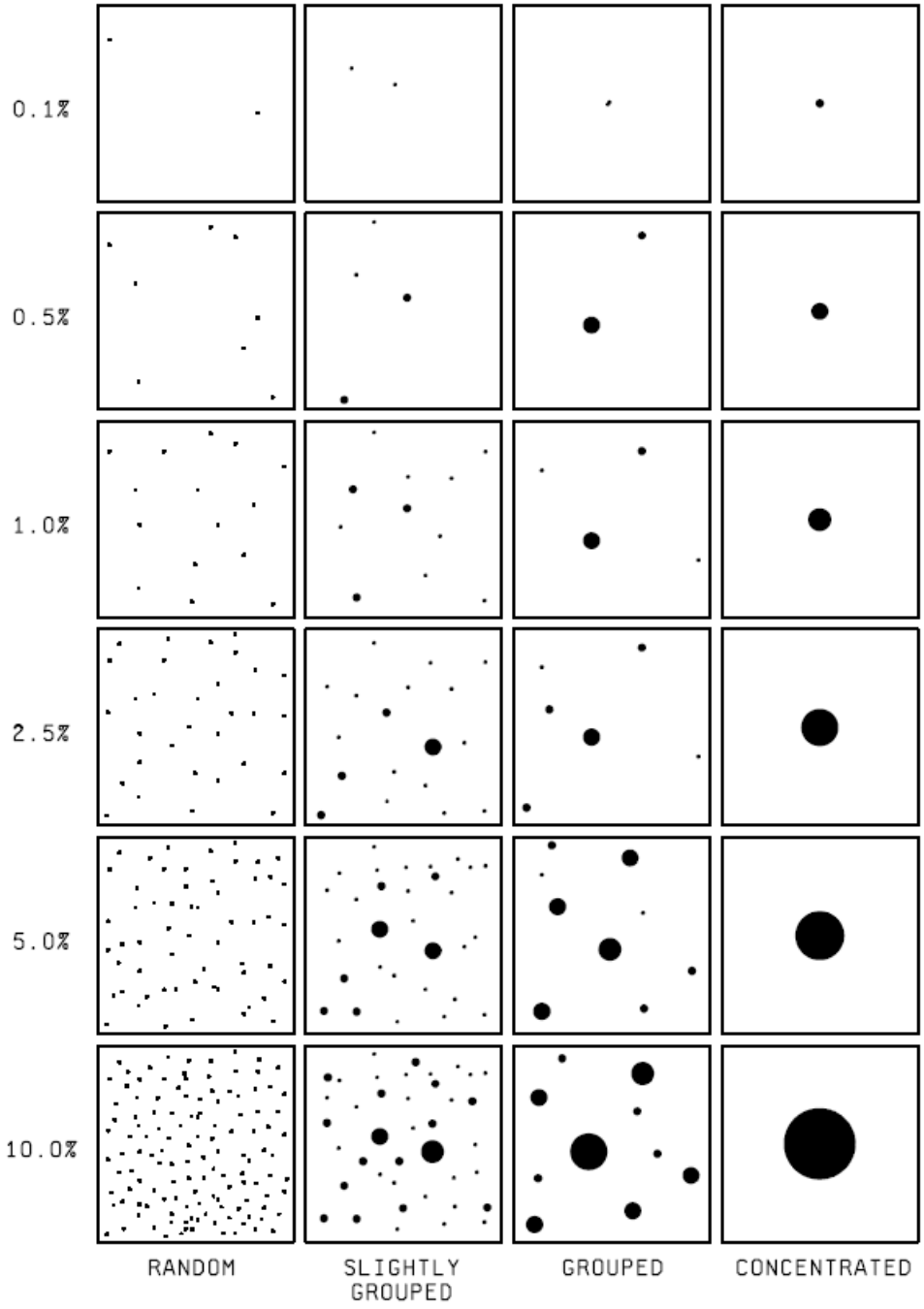
FP-010RE100M-TUCG	
Before Test	**After Test**
	
	

FP-3R0RE821M-TUCG-5K	
Before Test	**After Test**
	
	

FP-6R3RE561M-TUCG-5K	
Before Test	**After Test**
	
	

FP-016RE101M-TUCG	
Before Test	**After Test**
	
	

Attachment 3: The corrosion area charts refer to MIL-STD 883G method 1009.8



Attachment 4: Photo of solderability test

Fig.1: Equipment of solderability

Fig.2: Equipment of solderability

Attachment 5: Photo of visual inspection

After test	
Fig.3 FP-016RE271M-TUCG-5K (acceptable)	**Fig.4 FP-010RE100M-TUCG (acceptable)**

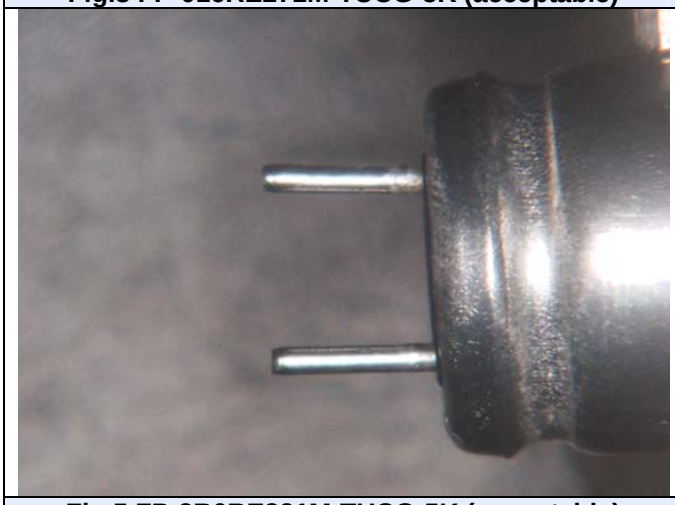
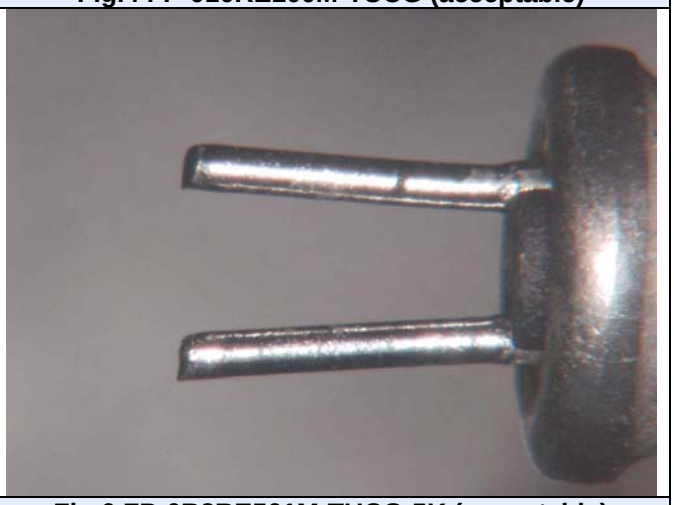

	

Fig.5 FP-3R0RE821M-TUCG-5K (acceptable)	**Fig.6 FP-6R3RE561M-TUCG-5K (acceptable)**

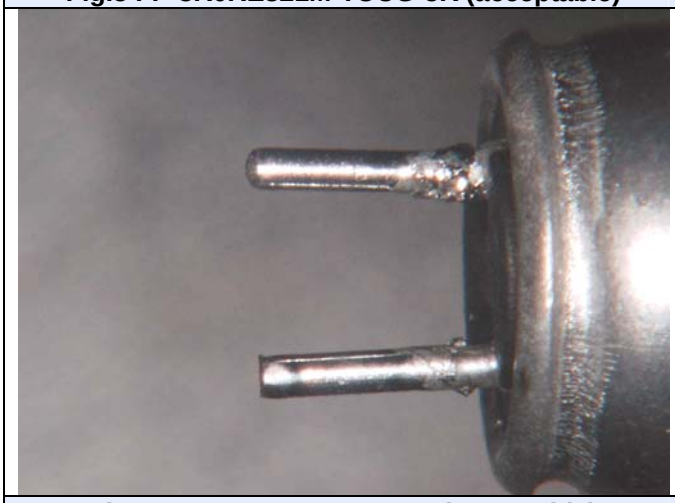
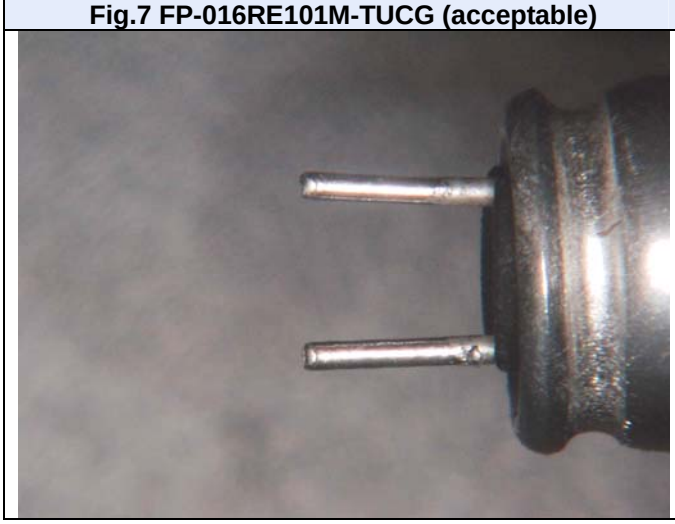



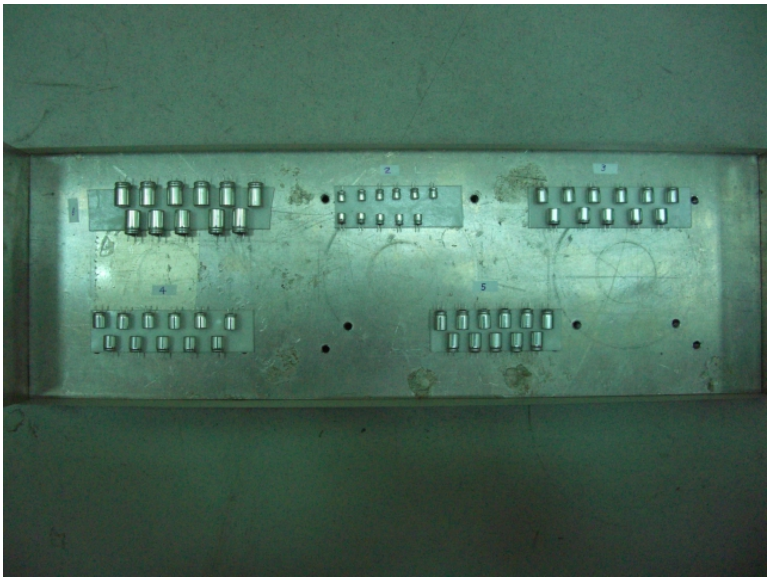
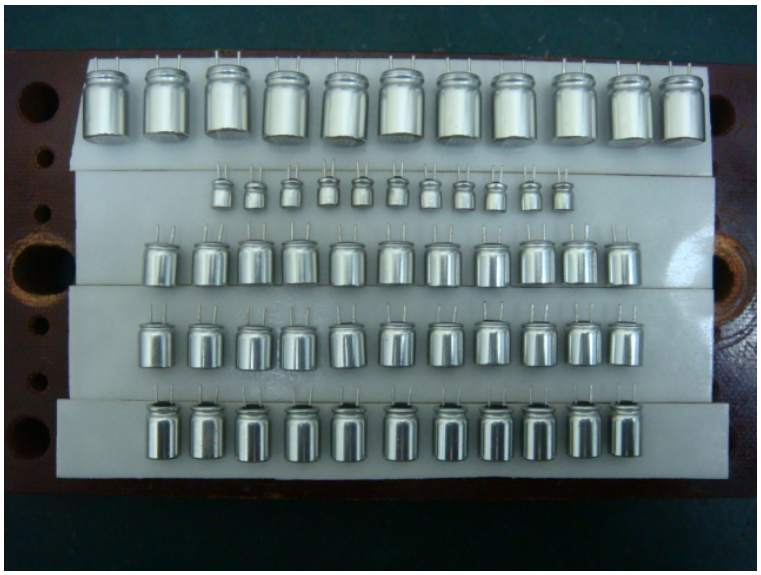
Fig.7 FP-016RE101M-TUCG (acceptable)	
	**Blank**

Attachment 6: Photo of solder bath test

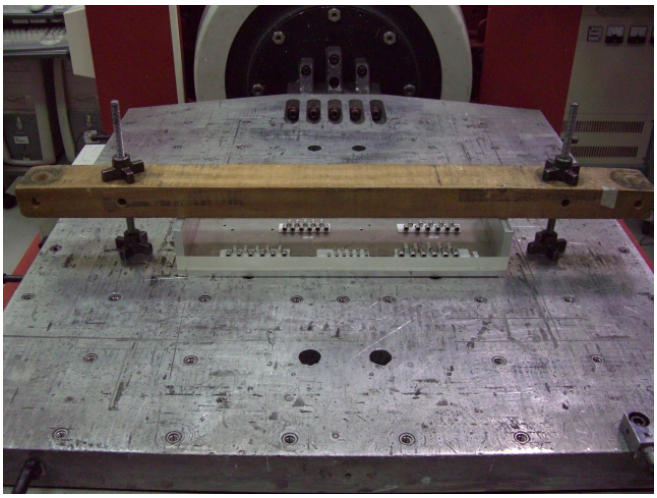
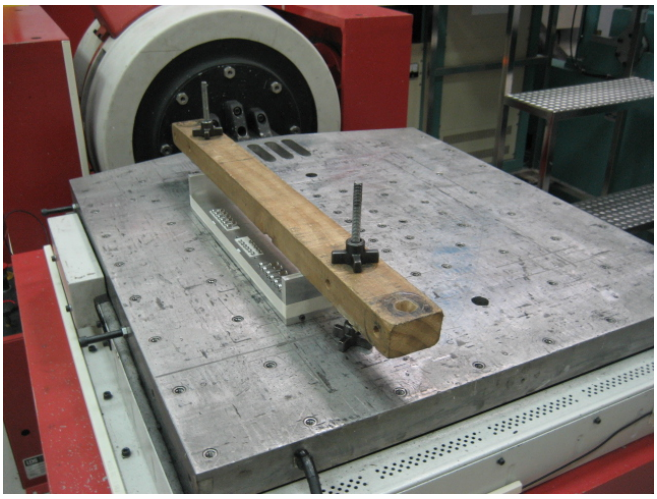
Fig.8 Equipment of Solder bath

Fig.9 Solder bath testing

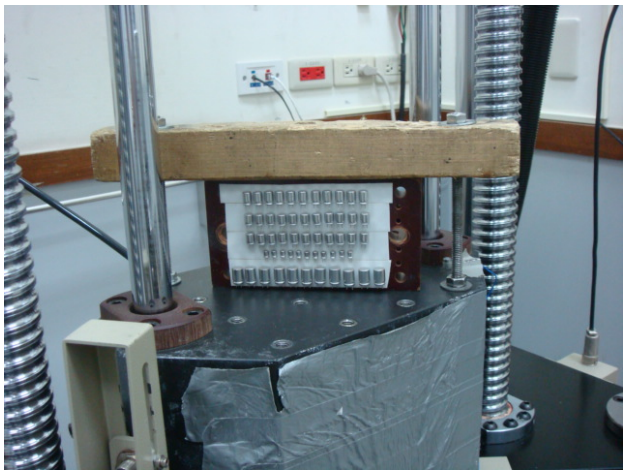
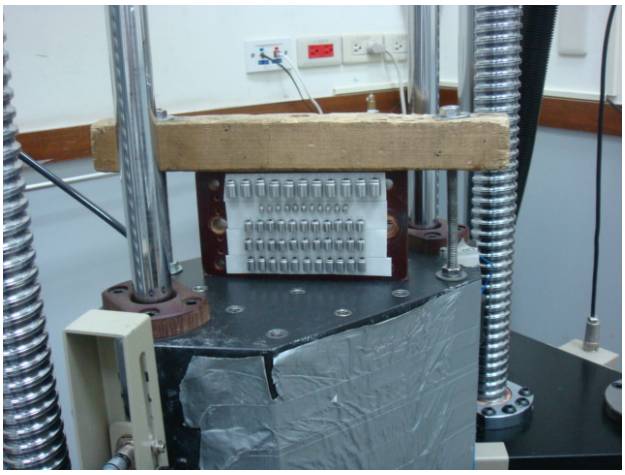
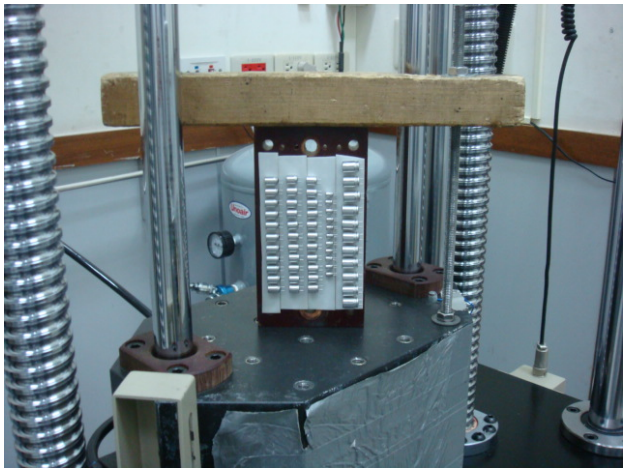
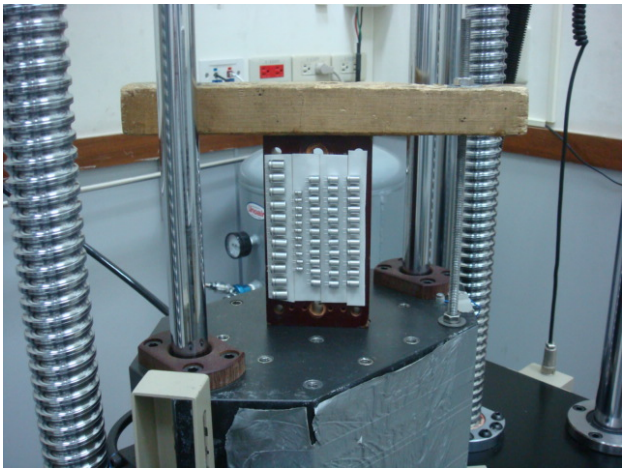
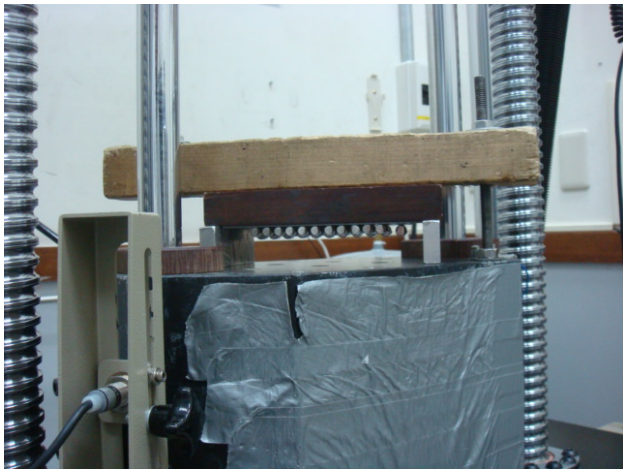
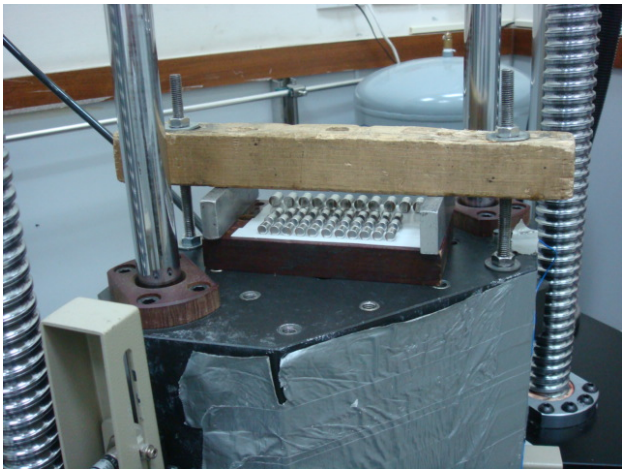
Attachment 7: Photo of units

Vibration test

Mechanical shock test


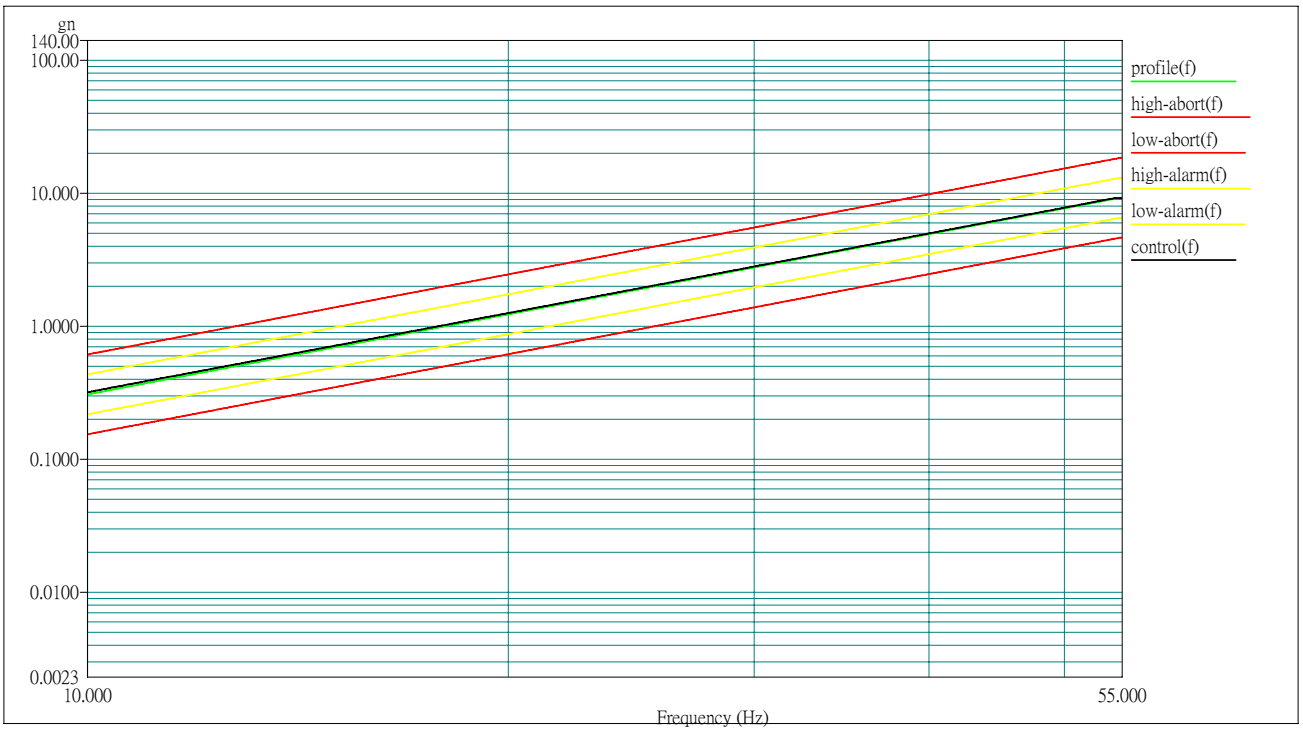
Attachment 8: Photo of vibration test setup

X axis

Y axis

Z axis


Attachment 9: Photo of mechanical shock test setup

Front	Rear
	
Left	**Right**
	
Top	**Bottom**
	

Attachment 10: Graph of vibration test



Level:	100 %				
Control Peak:	0.318442 gn	Full Level Time:	02:00:01		
Sweep Type:	Logarithmic				
Frequency:	10.000352 Hz	Demand Peak:	0.306757 gn	Time Remaining:	00:00:00
Sweep Rate:	4.92 Oct/Min				

Attachment 11: Graph of mechanical shock test

Acceleration vs Time

	Channel Description:	G's	msec	cm/s	Filter Hz	Max G's	Min G's
Ch1	table	500.42	1.02	317.58	2000.00	500.42	-7.43