

SMA100
Top Port Analog MEMS Microphone
Datasheet

Rev. 2.0

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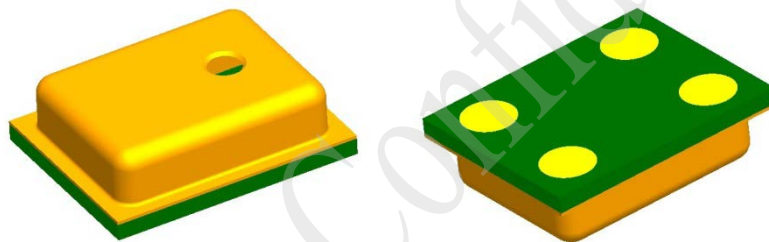
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1. General Description

The SMA100 is a top port analog MEMS microphone designed in a SMD compliant package of 3.76mm×2.95mm×1.10mm. Integrated with reliable and high performance MEMS acoustic sensor and analog amplifier ASIC, it offers high SNR and flat wideband frequency response, resulting in natural sound with high intelligibility. In addition, SMA100 operates from 1.5v to 3.6v and consumes power less than 65uA. Due to built-in filter for RF noise attenuation, SMA100 shows high immunity to EMI.

With all these brilliant features, SMA100 can meet the demanding requirement of Smartphone & tablet handsets, teleconferencing & Voice over IP system, and Bluetooth headsets etc.



2. Features

- Analog output Omni-directional microphone
- 3.76mm×2.95mm×1.1mm surface-mount package
- Stable sensitivity over power supply range of 1.5V-3.6V
- Signal to Noise Ratio (SNR): 59 dBA
- Sensitivity: -42 ± 3 dBV
- Low current consumption of $<65\mu$ A
- Multi Chip Module (MCM) Package

3. Pin Description and Mechanical Dimension

3.1 Pin Description

Pin	Function	Dir	Description
1	VDD	P	Power supply
2	GND	G	Ground
3	GND	G	Ground
4	OUT	O	Data output

3.2 Mechanical Dimension

Notes: Pick Area only extends to 0.25 mm of any edge or hole unless otherwise specified.

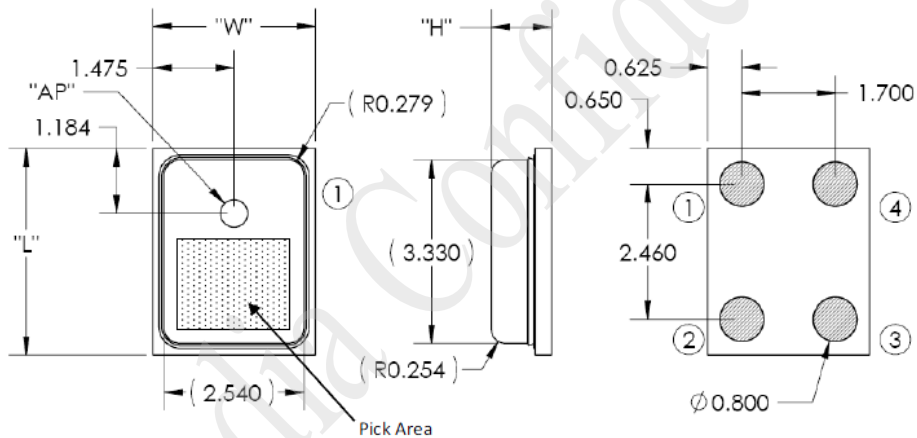


Figure 1: SMA100 Mechanical Outline

Item	Dim.	Tol.(±)	Units
Length(L)	3.76	0.10	mm
Width(W)	2.95	0.10	mm
Height(H)	1.10	0.10	mm
Port(AP)	∅0.50	0.10	mm

Table 1: SMA100 Mechanical Dimension

4. Electrical and Acoustic Characteristics

4.1 Absolute Maximum Ratings

Caution: Stresses above those listed in Table 2 “Absolute maximum ratings” may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

Parameter	Absolute Maximum Rating
Supply Voltage	-0.5V to +4V
Sound Pressure Level	160dB
Mechanical Shock	10000g
Vibration	Per MIL-STD-883 Method 2007, Test Condition B
Temperature Range	-40°C to +85°C

Table 2: Absolute Maximum Ratings

4.2 Electrical and Acoustic Specifications

Unless otherwise specified, test conditions are shown as below:

Temperature = 27°C, V_{DD} = 1.8V.

Items	Symbol	Conditions	Limits			Unit
			Min	Nom	Max	
Acoustic						
Directivity		Omni-directional				
Sensitivity	S	1KHz, 94dB SPL	-45	-42	-39	dBV/Pa
Total harmonic distortion	THD	108dB SPL		0.1		%
Signal-to-noise ratio	SNR	1KHz, 94dB SPL, A-weighted		59		dB(A)
Maximum Acoustic Input				130		dB SPL
Polarity		Increasing Sound Pressure		Decreasing Output Voltage		
Electrical						
Supply voltage	V_{DD}		1.5		3.6	V
Current Consumption	I_{DD}			50	65	μA
Output impedance	Z_{out}			300	400	Ω
Output DC Offset				0.75		V

Output current limit			90		μ A
Power Supply Rejection Ratio	PSRR	1000Hz, 200mV _{pp} , Sinewave, V _{DD} =1.8V	65		dB
Power Supply Rejection	PSR	217Hz, 100mV _{pp} , Squarewave, A Weighted	-90		dBV(A)

Table 3: Acoustic and Electrical Specifications

4.3 Typical Performance Characteristics

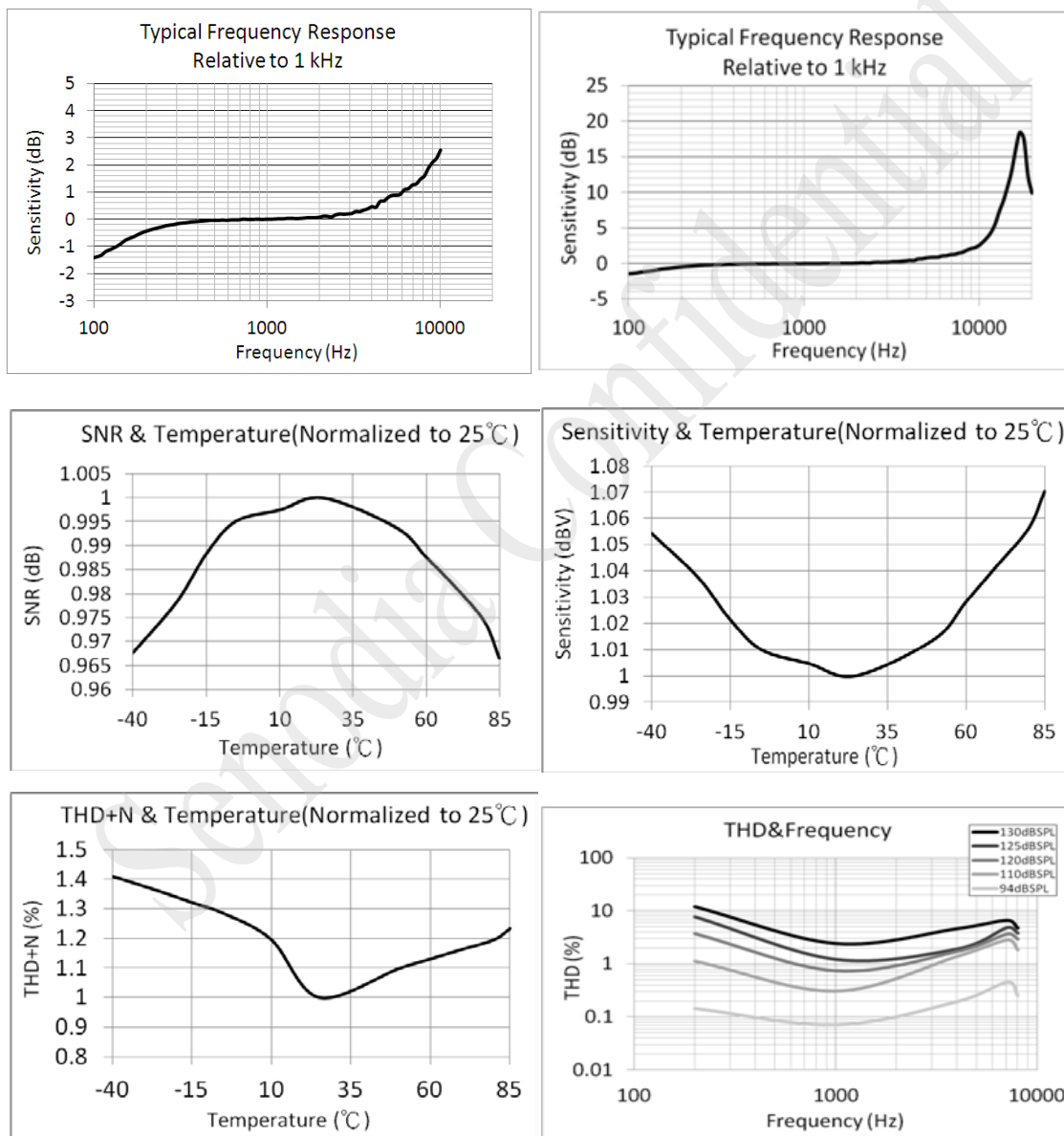


Figure 2: Typical Performance Characteristics

5. Marking and Packing

5.1 Marking Information

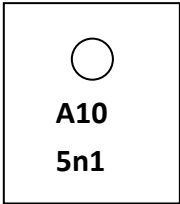
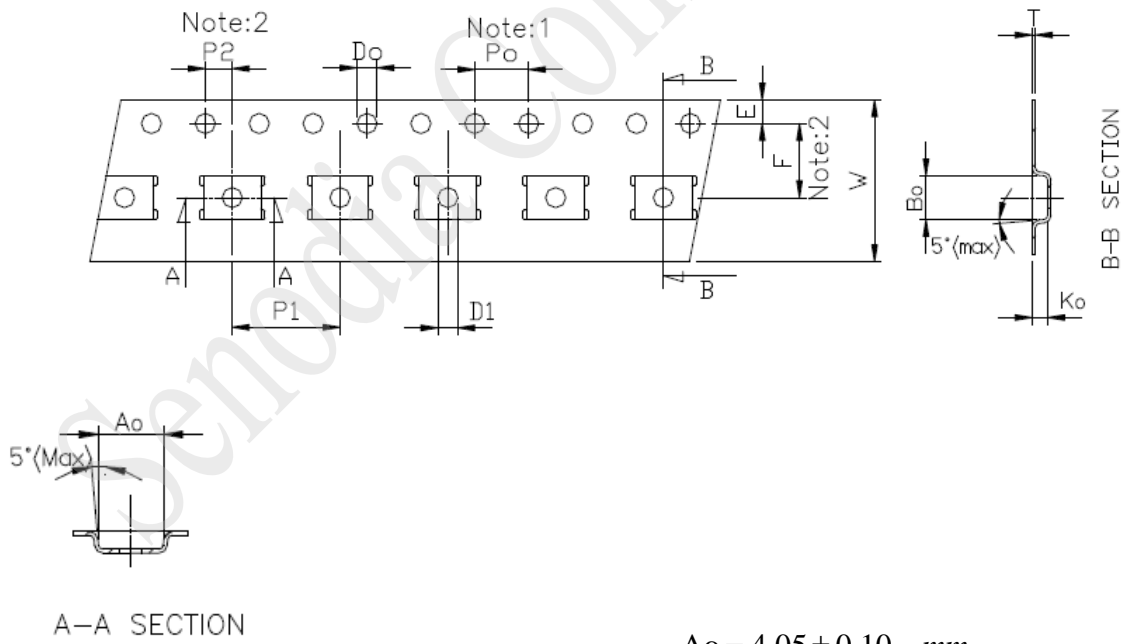
Mark	Name	Symbol	Remark
	Product Name	A10	3 alphanumeric, fixed to identify product name
	Trace Code	5n1	3 alphanumeric, variable to generate mass production trace code: YWL (year, week, lot number)

Table 4: Marking Information

5.2 Packing Information



$$A_o = 4.05 \pm 0.10 \text{ mm}$$

$$B_o = 3.25 \pm 0.10 \text{ mm}$$

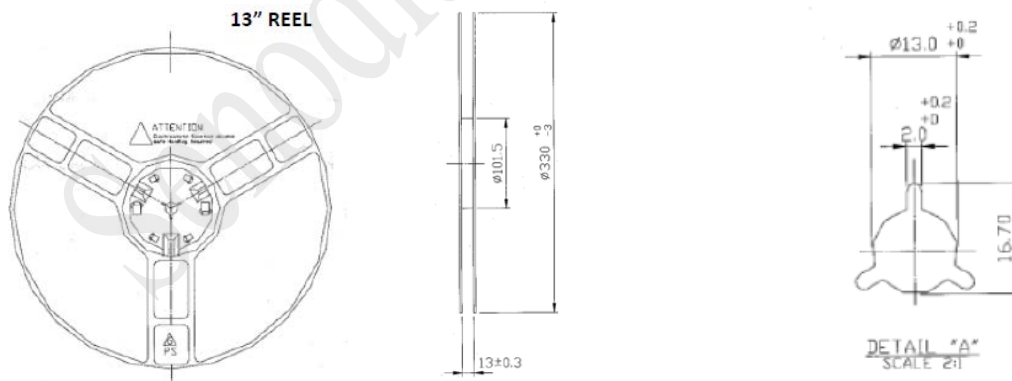
$$K_o = 1.35 \pm 0.10 \text{ mm}$$

Symbol	Spec.(mm)
K1	-
P ₀	4.0 ± 0.10
P1	8.0 ± 0.10
P2	2.0 ± 0.05
D ₀	1.55 ± 0.05
D1	1.50 (MIN)
E	1.75 ± 0.10
F	5.50 ± 0.05
10P ₀	40.0 ± 0.10
W	12.0 ± 0.20
T	0.30 ± 0.05

Notice :

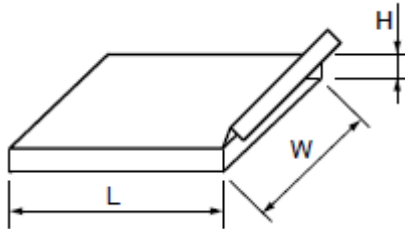
- 1 · 10 Sprocket hole pitch cumulative tolerance is ± 0.1mm.
- 2 · Pocket position relative to sprocket hole measured as true position of pocket not pocket hole.
- 3 · A₀ & B₀ measured on a plane 0.3mm above the bottom of the pocket to top surface of the carrier.
- 4 · K₀ measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
- 5 · Carrier camber shall be no more than 1mm per 100mm through a length of 250mm.

Table 5: Packing Dimension



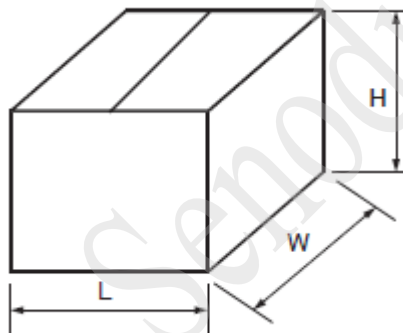
Part NO.	Reel Diameter	Quantity Per Reel	Quantity Per	
			Inner Box	Outer Box
SMA100	13"	5,000	5,000	45,000

Dimensions for Inner Box



L(mm)	W(mm)	H(mm)
335	339	45

Dimensions for Outer Box



L(mm)	W(mm)	H(mm)
445	360	372

6. Recommended Customer Land Pattern

The recommended PCB land pattern for the SMA100 should have a 1:1 ratio to the solder pads on the microphone package. The dimensions of suggested solder paste pattern refer to the land pattern which should be shrunk by 0.025 per side compared with the PCB land pattern for better reliability, therefore the diameter of the circle in solder paste land pattern is 0.85mm.

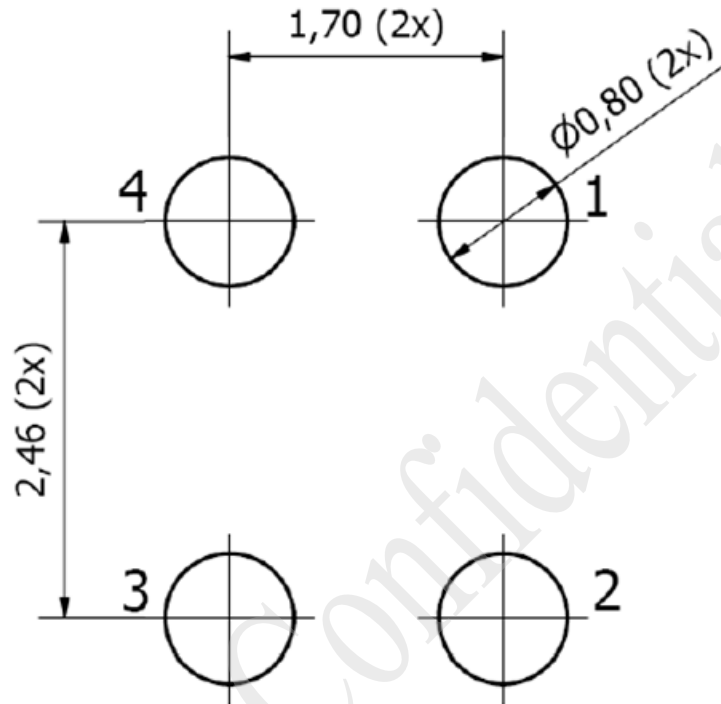


Figure 3: Top view of recommended PCB land pattern (unit: mm)

7. Recommended Interface Circuit

The SMA100 output can be connected to a codec microphone input or to a high input impedance gain stage. A DC-blocking capacitor is required at the output of the microphone.

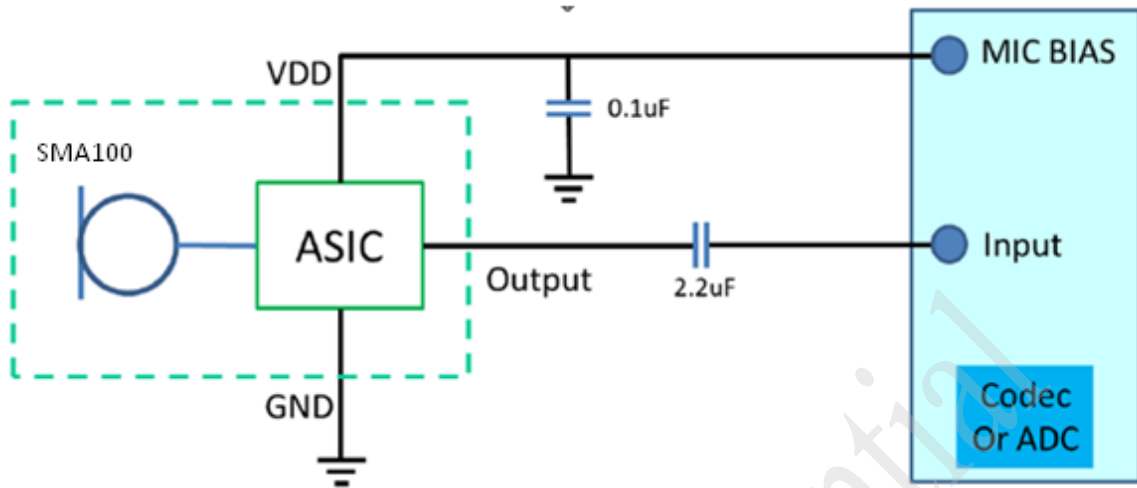


Figure 4: Connect to Audio Codec

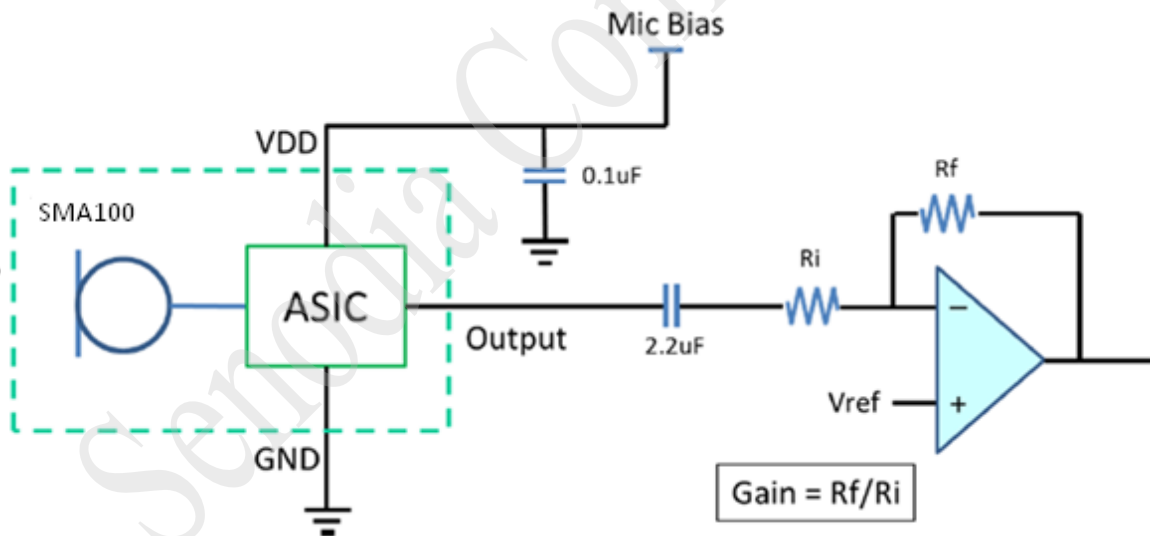


Figure 5: Connect to Audio OPAMP

8. Soldering Reflow Profile

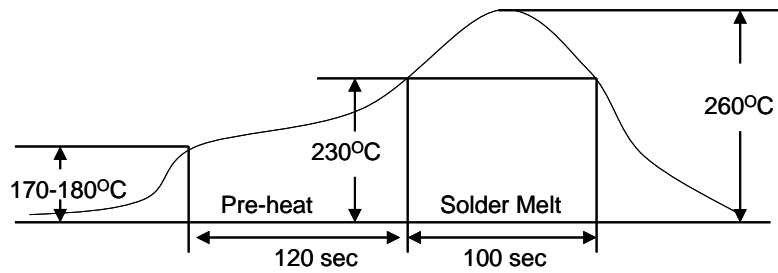


Figure 6: Recommended solder reflow profile

Parameter	Temperature Profile	Time(maximum)
Pre-heat	+170°C~+180°C	120s
Soldering	>230°C	100s
Peak	+260°C (maximum)	30s

Table 6: Recommended Solder flow Specifications

9. Reliability

The sensitivity of the microphone shall not deviate more than $\pm 3\text{dB}$ from its initial value after each test condition is performed.

Test Item	Detail
1.Heat Test, Operational	Temperature: $85\pm 3^{\circ}\text{C}$ Humidity: $85\pm 5\%\text{RH}$ Duration: 12 hours Voltage: Applied
2.Cold Test, Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ Duration: 12 hours Voltage: Applied
3.Heat Test, Non-Operational	Temperature: $85\pm 3^{\circ}\text{C}$ Humidity: $50\pm 5\%\text{RH}$ Duration: 96 hours Voltage: Not Applied
4.Cold Test, Non-Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ Duration: 96 hours Voltage: Not Applied
5.Condensation Test, Non-Operational	Temperature: $25\pm 3^{\circ}\text{C}$ and $55\pm 3^{\circ}\text{C}$ Humidity: $95\pm 5\%\text{RH}$ Duration: 1 hours each, during 10 minutes ramp, 45 cycles Voltage: Not applied
6.Temperature Cycling, Non-Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ and $85\pm 3^{\circ}\text{C}$ Humidity: $50\pm 5\%\text{RH}$ Duration: 2 hours each, during 6 hours ramp, 5 cycles Voltage: Not applied
7.Thermal Shock Test, Non-Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ and $85\pm 3^{\circ}\text{C}$ Duration: 30 minutes each, during 5 minutes ramp, 256 cycles Voltage: Not applied
8.Free Fall Test 1.5m	Placed inside test fixture and dropped on concrete from height 1.5m. (1)3 times by 6 surfaces (2)1 times by 12 edges (3)1 times by 8 corners

9.Random Vibration	<p>Temperature: 23±5°C Humidity: 35~70% RH Duration: 2 hours each axis(X,Y,Z) Power Spectral Density: 5Hz 0.10m2/s3(=1.0391*10-3g2/Hz) 12Hz 2.20m2/s3(=22.8602*10-3g2/Hz) 20Hz 2.20m2/s3(=22.8602*10-3g2/Hz) 200Hz 0.04m2/s3(=0.41534*10-3g2/Hz) 200Hz 0.04m2/s3(=0.41564*10-3g2/Hz)</p>
10.Repeated Low Level Free Fall Test	<p>Placed inside test fixture and dropped on rubber mat from height of 10cm. Each surface 2500 times(Total 6 surfaces, 15000times)</p>
11.1m Repeated Rotating	<p>Placed inside test fixture and dropped on steel sheet from height of 1.0m. 100 times(all surfaces) Rotation speed of barrel: 10~12 drops/minute</p>
12.Free Fall Test for master box	<p>Corner drop: Each Corner 1 time Edge drop: Each Edge 1 time. surface drop: Each surface 1 time.</p>
13.Random Vibration for master box	<p>Sinusoidal wave vibration Frequency: 5~50Hz Acceleration:7.4m/s2(0.76G) Sweep speed:9Hz/min(5~50Hz, one way 5 min) Test duration: Direction of surface 1-3 20min Direction of surface 2-4 20min Direction of surface 5-6 20min Sample and direction of vibration : 1 direction for 1 sample Package on vibrating table: Free</p>
14.Substrate bending Test	<p>Deflection: 3mm Rate: 0.5mm/sec</p>
15.Adhesion	<p>Load: 10 N Duration: 10 seconds</p>
16.Electrostatic Discharge Test	<p>Capacitance: 150pF Resistance: 330Ω Duration: 10 times Air Discharge: Level 3(+/-8kV) Direct contact discharge: Level 1 (+/-2kV)</p>
17.Human Body Model	2000 Volts (100pF,1500Ω)
18.Charged Device Model	500 Volts

Table 7: Reliability Test Items and Procedures

10. Disclaimer

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