3SM127NZB1HA AEC-Q103 Qualified

MEMS Microphone IC

Product Description

The ***3SM127NZB1HA*** microphone IC are integrated with specialized pre-amplification ASIC to provide high sensitivity, high SNR output from a capacitive audio sensor. It's packaged for surface mounting and high temperature reflow assembly. ***3SM127NZB1HA*** which is able to endure reflow temperature up to 260℃ for 30 seconds can be used in SMT process. It is widely used in automotive and industrial electronics device.

Features

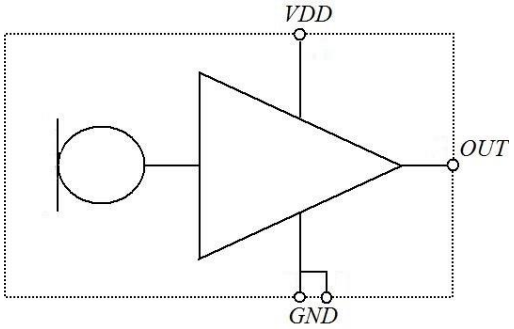
- AEC-Q100/103 qualified
- Bottom port
- High stability - no risk of membrane aging
- Suitable for automatic pick-and-place handler and SMT process
- Miniature dimension 3.50mm x 2.65mm x 0.98mm
- Low current consumption 80uA
- RoHS/Green compliant
- Sensitivity deviation within ±1dB
- Package type : LGA 5-pin
- Omnidirectional

Applications

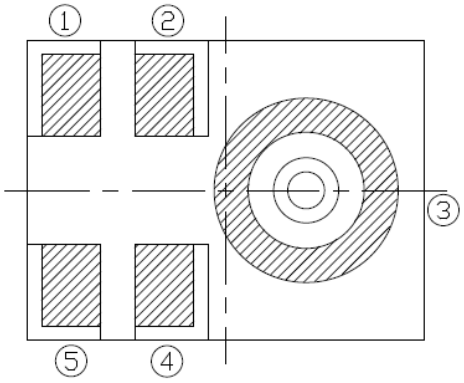
- Automotive
- Industrial

Table of Contents

Functional Block Diagram



Pin Definition and Function



Bottom View

Table 1

Pin #	Symbol	Function
1	OUTPUT	Analog signal output
2	GND	Ground
3	GND	Ground
4	GND	Ground
5	VDD	Power supply

Temperature Range

Table 2

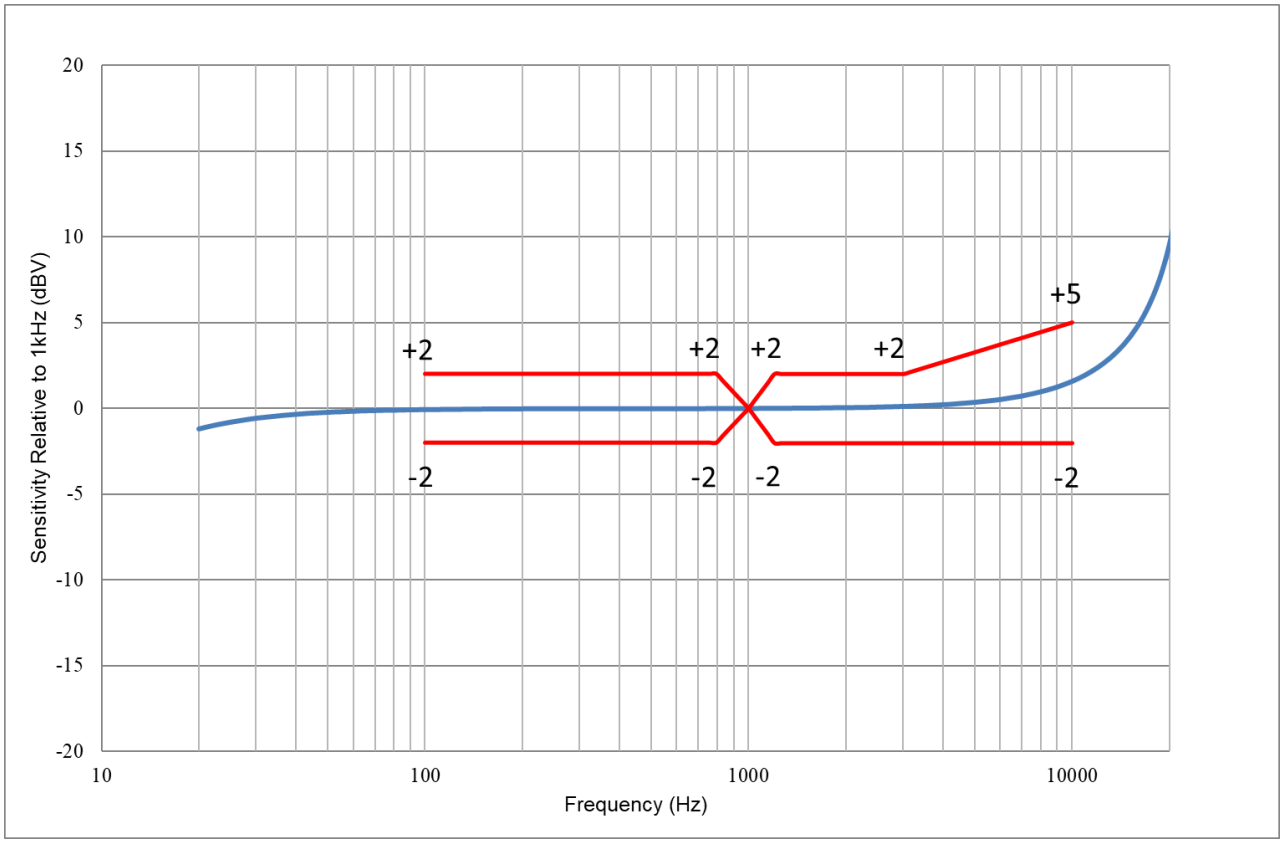
Storage Temperature	T_{STG}	-40℃ ~ 150℃
Operating Temperature Range	T_A	-40℃ ~ 125℃

Acoustical and Electrical Characteristics

Table 3 Typical test conditions are TA = 23 ℃, VDD = 1.8V and R.H. = 50 % measured in a pressure chamber test setup. All voltages refer to GND node

Parameters	Symbol	Min.	Typ.	Max.	Unit	Test Conditions
Acoustic						
Sensitivity	S	-39	-38	-37	dBV/Pa	1KHz, 94dBSPL
Signal to Noise Ratio	S/N		67		dBA	A-weighted
Equivalent Noise Level	ENL		27		dBA	A-weighted
Total Harmonic Distortion	THD		0.1		%	94dBSPL
			1		%	118dBSPL
Acoustic Overload Point	AOP		128		dBSPL	10% THD@1KHz, S = Typ.
Low Frequency Roll-off	LFRO		10		Hz	-3dB relative to 1KHz
High Frequency Flatness			13		kHz	+3dB relative to 1KHz
Resonant Frequency Peak			24		kHz	
Electrical						
Supply Voltage	Vdd	1.6		3.6	V	
Current Consumption	Isb		80		μA	Vdd=2.1V
			80		μA	Vdd=3.6V
Power Supply Rejection	PSR+N		-93		dBV(A)	217Hz, 100 mV peak to peak square wave
Power Supply Rejection Ratio	PSRR		63		dB	1KHz, 200 mV peak to peak sine wave
Output Impedance	Zout			200	Ω	@1KHz
Output DC Offset			1.3		V	
Directivity	Omnidirectional					
Polarity	Decreasing output voltage					Increasing sound pressure

Frequency Response



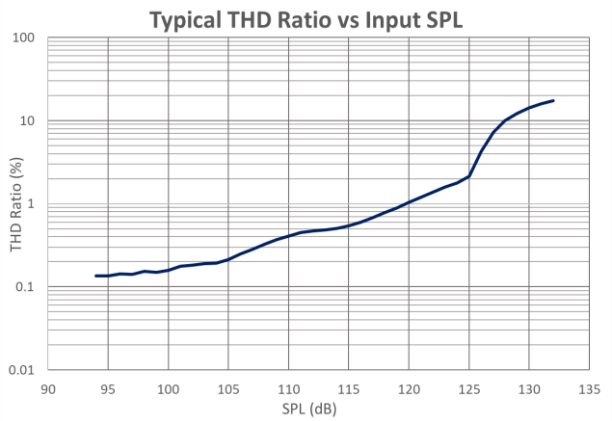
Typical frequency response normalized to 1KHz (Measured)

Upper Limit						
Hz	100	800	1000	1200	3000	10000
dB ref. 1KHz	+2	+2	0	+2	+2	+5
Lower Limit						
Hz	100	800	1000	1200	3000	10000
dB ref. 1KHz	-2	-2	0	-2	-2	-2

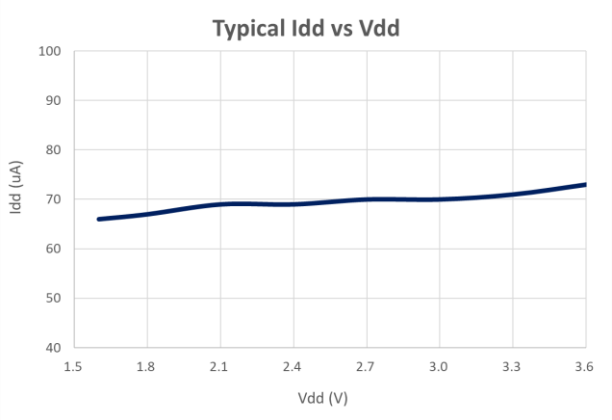
Performance Curves

Typical test conditions are TA = 23 ℃, VDD = 1.8V and R.H. = 50 %, output unloaded

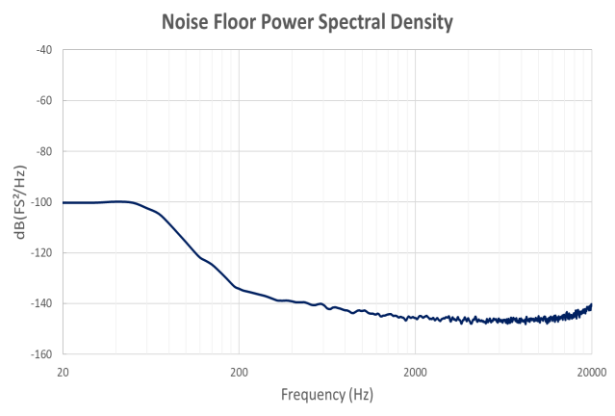
Typical THD vs Input SPL



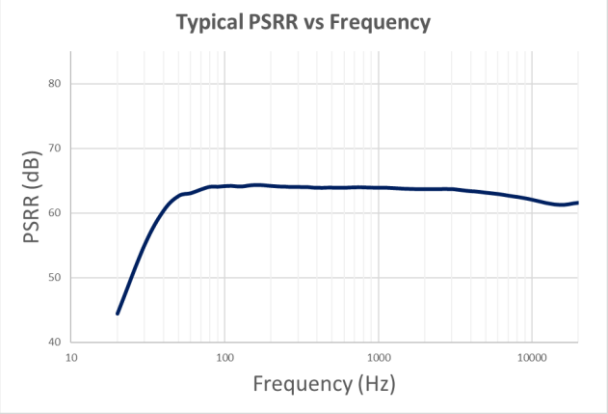
Typical Idd vs Vdd



Noise Floor Power Spectral Density



Typical PSRR vs Frequency



Reliability Qualifications

Table 4

Test Item	Description	Standard	Result
High Temperature Operating Life	T_A=125℃, V_{CC}=3.6V, 1000hours	AEC Q100 Rev.H	PASS
Low Temperature Operation Life	T_A=-40℃, V_{CC}=3.6V, 1000hours	JESD22-A108	PASS
High Temperature Storage Life	T_A=150℃, 1000hours	AEC Q100 Rev.H	PASS
Low Temperature Storage Life	T_A=-40℃, 1000hours	JESD22-A119	PASS
Pre-Condition	Temperature cycling 5 cycles, Bake 24hrs, Moisture sock 168hrs, Reflow 3 cycles	JESD22-A113	PASS
Temperature Humidity Bias	T_A=125℃, R.H.=85%, V_{CC}=3.6V, 1000hours	AEC Q100 Rev.H	PASS
Thermal Cycling	TA=-55℃ to 150 ℃, 1000cycles	AEC Q100 Rev.H	PASS
Humidity & Temperature Cycle	+65℃/90%RH +45℃/95%RH -10℃ , 5cycles	AEC Q103-003	PASS
Reflow	Peak temperature = 260℃, 5cycles	J-STD-020	PASS
Variable Frequency Vibration	Peak acceleration 20G, frequency = 20Hz to 2KHz, total 48min duration	AEC Q103-003	PASS
Mechanical Shock	Peak acceleration 10KG, 0.2ms pulse duration, 3 pulses/direction, 6 directions	JESD22-B104	PASS
Package Drop	10 drops on each of 6 faces (total 60 drops) from a high of 1.2m to concrete surface	AEC Q100 Rev.H	PASS
ESD	HBM : All pins, Test Voltage=±3KV	JESD22-A114	PASS
	MM : All pins, Test Voltage=±300V	JESD22-A115	PASS
	CDM : All pins, Test Voltage=±500V	JEDEC JS-002	PASS
	Air Discharge : Test Voltage=±15KV	IEC 61000-4-2	PASS
	Contact Discharge : Test Voltage=±8KV	IEC 61000-4-2	PASS
Latch-up	Class II, TA=105℃, I=±150mA	AEC Q100 Rev.H	PASS

Notes: Microphones meet all acoustic and electrical specifications before and after reliability testing, except sensitivity which can deviate up to 3dB from its initial value.

After 5 reflow cycles, the sensitivity of the microphone shall not deviate more than 1 dB from its initial value.

Reflow Profile

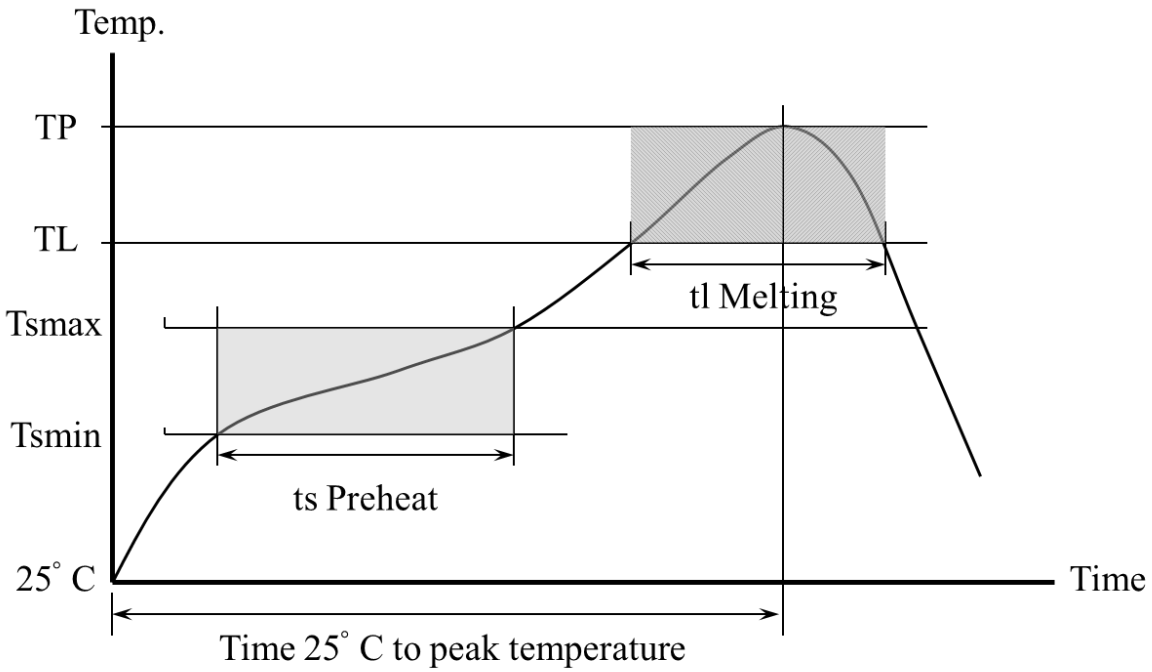


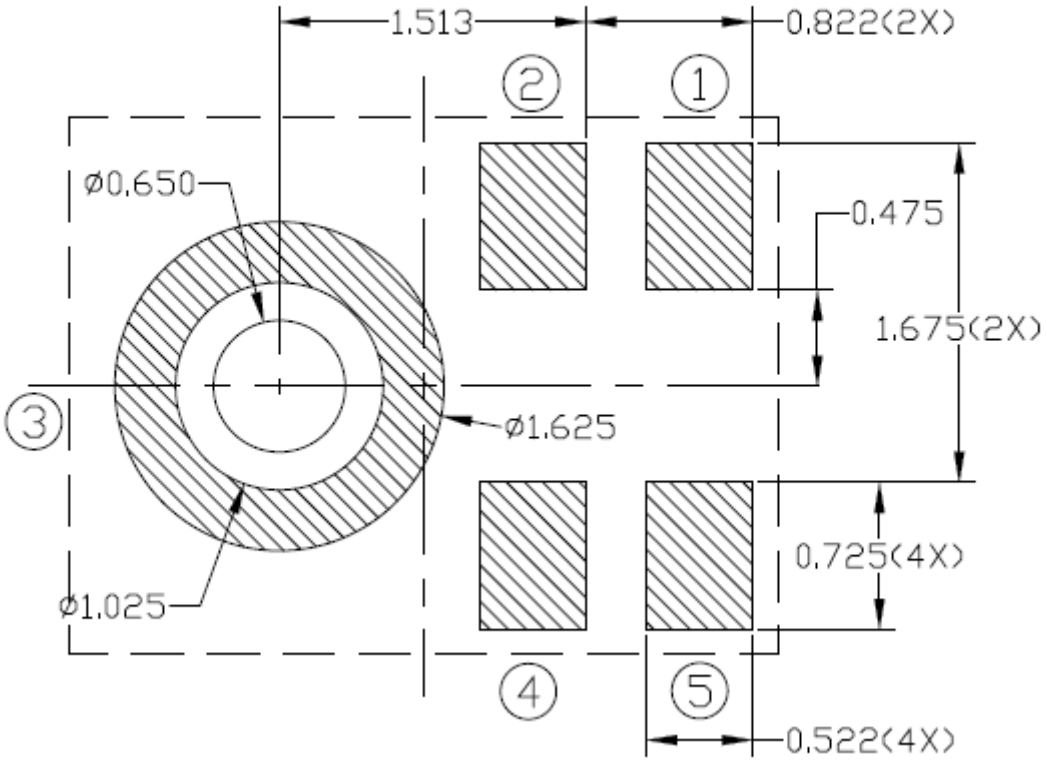
Table 5. Recommended Reflow Profile Limits

Profile Feature	Pb-free
Preheat	
Minimum temperature (Tsmin)	150 ℃
Maximum temperature (Tsmax)	200 ℃
Time (ts)	60~180 sec
Average Ramp up rate (Tsmax to Tp)	3 ℃/sec
Melting area	
Melting temperature (TL)	217 ℃
Time maintained above melting (tl)	60~150 sec
Peak Temperature (TP)	260 ℃
Time within 5℃ of actual peak temperature	20~40 sec
Ramp down rate	6 ℃/sec maximum
Time 25℃ to peak temperature	8 minute maximum

Notes: Based on IPC/JDEC J-STD-020 Revision F.

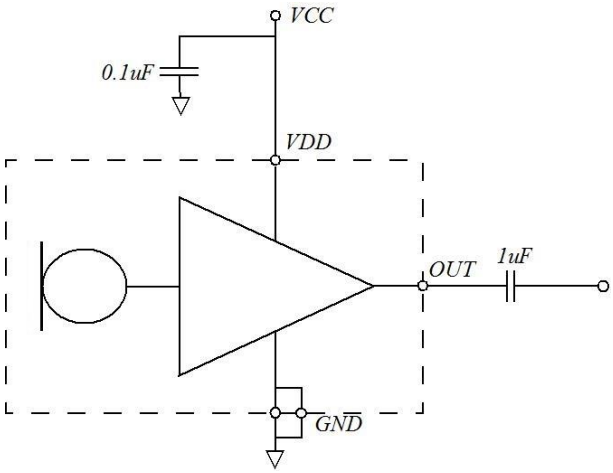
All temperatures refer to topside of the package, measured on the package body surface.

PCB Land Pattern Layout



Application Circuit

Typical Application:



Handling Instructions

The MEMS microphone IC can be handled using standard pick-and-place and chip-shooting equipment. Care should be taken to avoid damage to the MEMS microphone IC structure as follows:

- Do not apply vacuum nozzle over the acoustic port (AP) of the microphone to avoid damage to the device.
- Do not blow air directly into acoustic port. If air gun cleaning is required, the minimum distance is 10cm and the maximum air blow pressure is 30psi.
- Brushing the board with/without solvents may damage the device.
- Do not use excessive force to place the microphone on the PCB.
- In case of manual handling, it should be handled with plastic tweezers to avoid damage to the device.
- Do not open and remove IC from packaging until devices are ready to be mounted.
- Suggest PCB depaneling be done with depaneling cutter/router, or manually de-panel PCB with care and without any contact of MEMS Microphone IC.

Dimensions

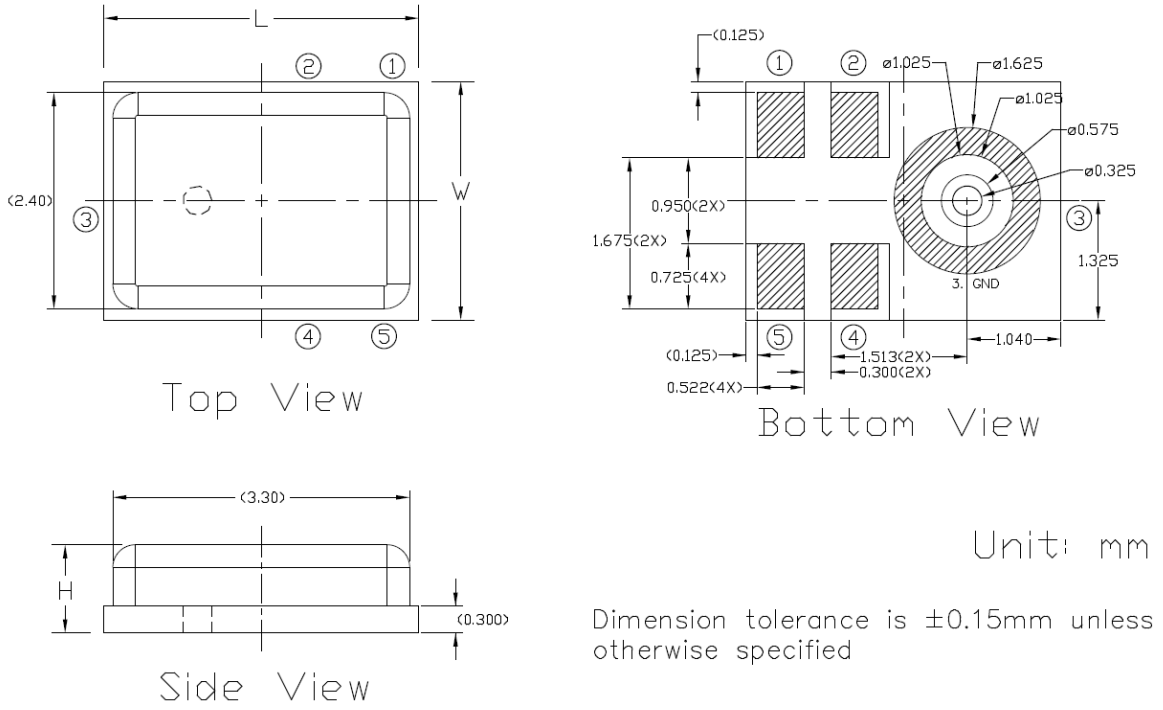
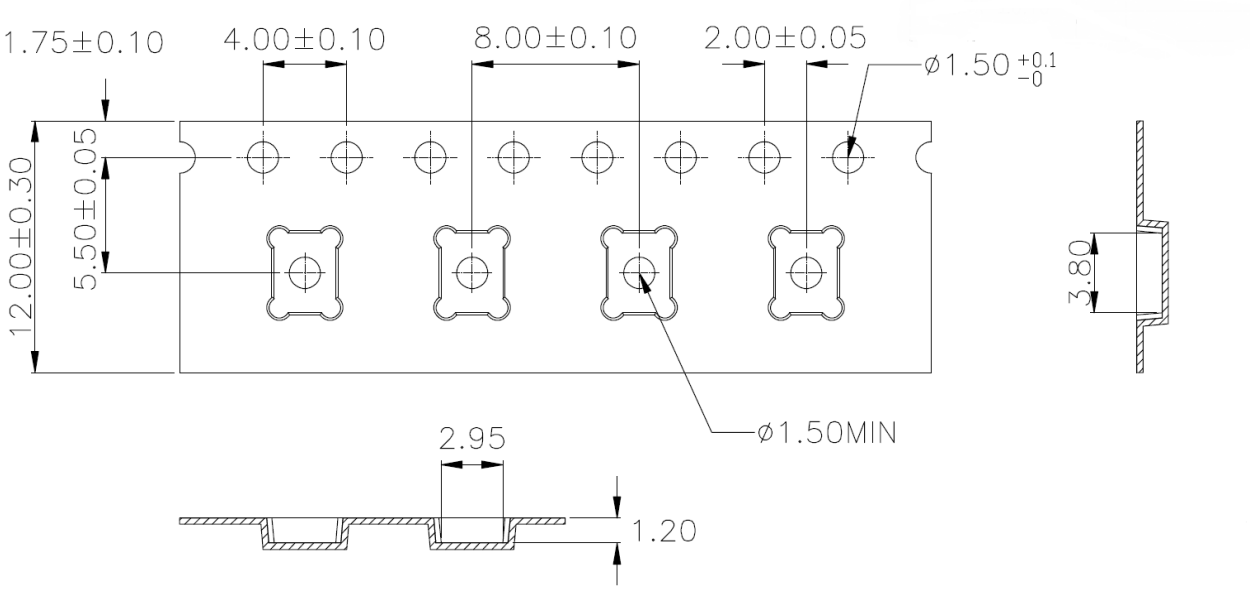


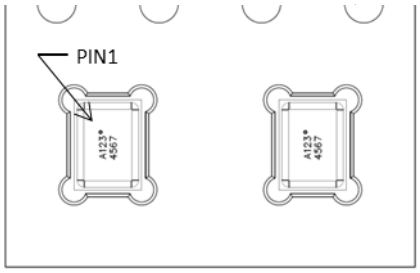
Table 6(Top View)

Item	Dimension	Tolerance
Length (L)	3.50 mm	±0.10 mm
Width (W)	2.65 mm	±0.10 mm
Height (H)	0.98 mm	±0.10 mm
Acoustic Port	Φ 0.325 mm	±0.05 mm

Package Information

Carrier Tape:





1. 10 sprocket hole pitch cumulative tolerance ±0.20.
2. Carrier camber is within 1 mm in 250 mm.
3. Material : Black Conductive Polystyrene Alloy.
4. All dimensions meet EIA-481 requirements.
5. Thickness : 0.30±0.05 mm.
6. MSL(Moisture sensitivity level) Class1.
7. Materials comply with ANSI/ESD S20.20 and IEC61340-5-1 standard.

Laser Marking:

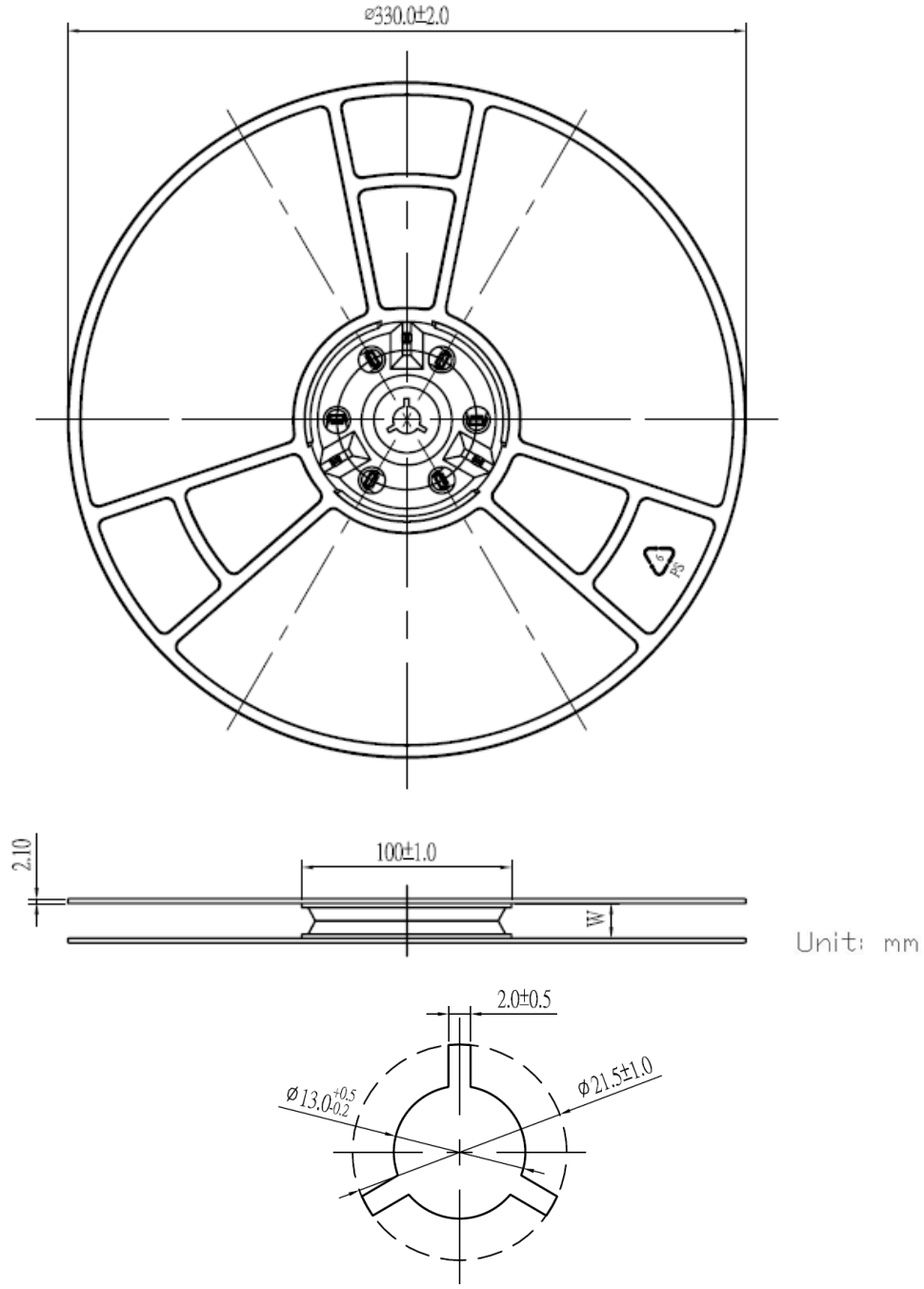
XXXX

AAAA

Laser marking on the top side

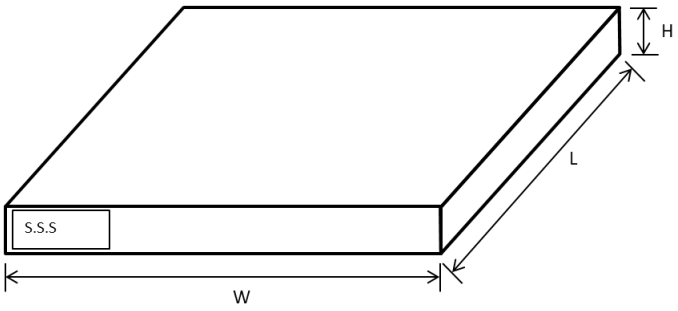
XXXX	**Internal Tracking Code**
AAAA	**Lot Tracking Code**

13” Tape Reel :



Model Number	Reel Diameter	Quantity Per Reel
3SM127NZB1HA	13”	5,000

Dimensions for Inner Box :

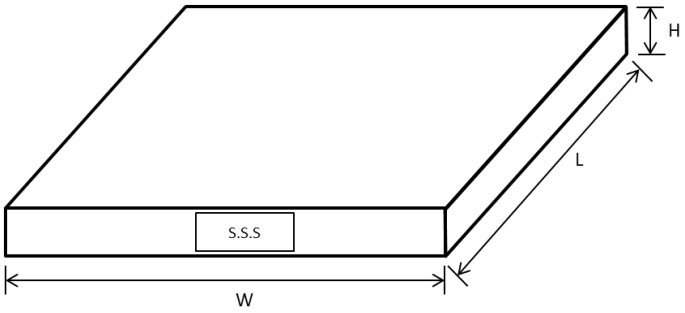


Unit : mm

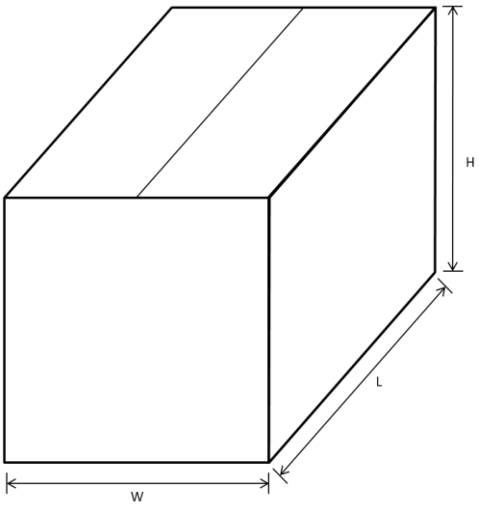
L	W	H
355	375	40

Dimensions for Outer Box:

Outer Box for Quantity 5K-10K



Outer Box for Quantity 15K-30K, 35K-50K



Unit : mm

Quantity	L	W	H
5K - 10K	400	410	100
15K - 30K	380	280	380
35K – 50K	420	380	380

Revision History

Revision	Date	Description
1.0	2025/07/18	Formal release
1.1	2025/08/29	Modify “Frequency Response”
1.2	2025/11/25	Modify “Frequency Response”