WBC4030DT26UJ1

Top port digital silicon Microphone

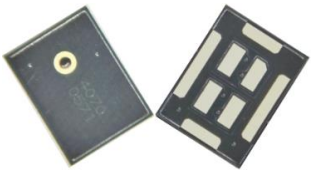
Descriptions

WBC4030DT26UJ1is a Silicon Microphone with digital output and top inlet for sound input. It consists of a MEMS sensor and an encoder IC. It converts sensor analog output signal into 1-bit digital PDM data. The digital output format eliminates AC coupling capacitor, reduces RF noise coupling and eases PCB layout requirement.

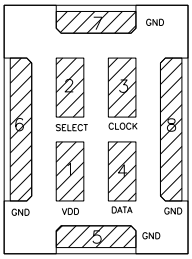
WBC4030DT26UJ1 is a cost-effective alternative to traditional electret condenser microphone (ECM). Provided on tap-and-reel, it is ideally suited for high volume applications and it can be processed directly to customer's PCB using standard automatic pick-and-place equipment and surface mounted via standard solder reflow equipment.

WBC4030DT26UJ1 can be used to implement the array microphones. Speech quality can be significantly improved by combining two microphones.

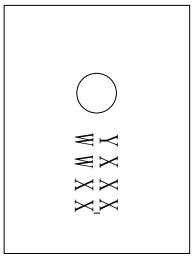
The WBC4030DT26UJ1is manufactured in a compact 4.00mm*3.00mm*1.00mm, 8-pin package.



Product appearance



Pin configuration (Bottom view)



Marking (Top view)

Y = Year code
WW = Week code
X X= Batch code

Features

- PDM Output
- High SNR
- Multiple performance modes
- Ultra-Stable Performance
- Standard SMD Reflow
- RoHS/Halogen free compliant
- Omnidirectional

Order information

Device	Package(mm)	Shipping
WB C4030DT26UJ1-8/TR	4.00*3.00*1.00	5000/Reel&Tape

Applications

- Smart phones
- Smart speakers
- Portable communication device
- Notebook and desktop
- Digital still cameras
- Portable music recorders

Absolute Maximum Ratings

Parameter	Maximum Ratings	Unit
Power supply voltage	6.5	V
Operation temperature range	-40~85	℃
Storage temperature range	-40~125	℃

Stresses at the maximum ratings shown in Table 1 may cause permanent damage to the device. These are stress ratings only at which the device may not function when an operation at these or any other condition beyond those specified under “Electro-Acoustic Specifications”.

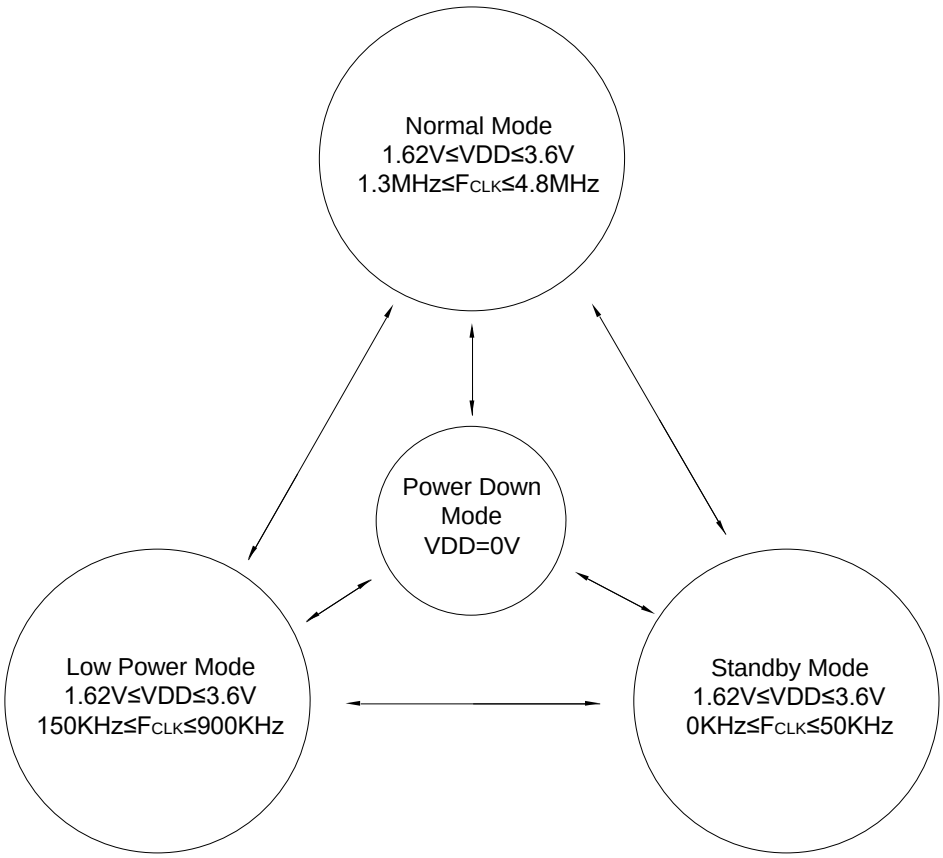
Acoustic & Electrical Specifications

Test conditions: 23 ±2°C, 55±20% R.H., VDD=1.8V, Fclock=2.048MHz, Duty Cycle=50%, SELECT pin grounded, no load, unless otherwise indicated.

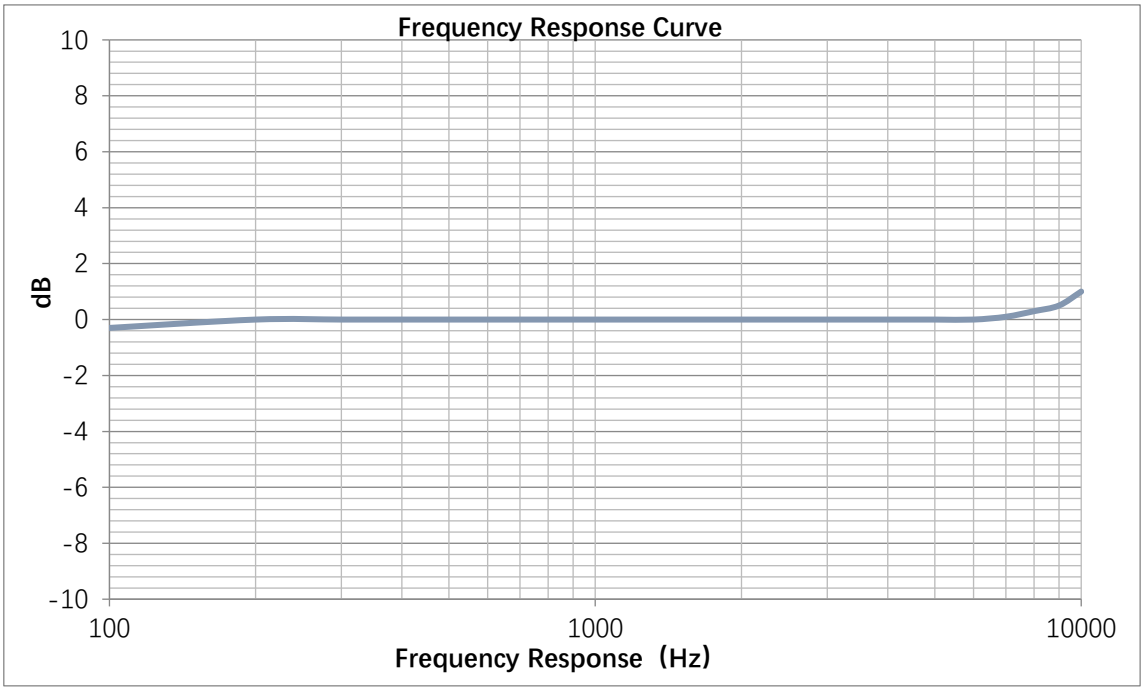
Parameter		Symbol	Conditions	Min	Typ	Max	Units
Supply Voltage		V_{DD}		1.6	-	3.6	V
Supply Current		I_{DD}	Normal operation, Fclk(1MHz~4.8MHz)	-	770	-	uA
		I_{low_power}	Low power mode, Fclk(350KHz~800KHz)	-	340	-	uA
		I_{sleep}	Sleep mode, Fclk(<250KHz)	-	6	50	uA
Clock Frequency Rang	Sleep mode			0	-	50	KHz
	Low power mode			150	-	900	KHz
	Standard Performance Mode			1.3	-	4.8	MHz
Sensitivity		Sense	94dB SPL @1KHz	-27	-26	-25	dBFS
Signal to Noise Ratio		SNR	Normal mode 94dB SPL @1KHz, A-weighted	-	65	-	dB(A)
Total Harmonic Distortion		THD	94dB SPL @1KHz, S=Typ	-	0.08	-	%
Acoustic Overload Point		AOP	10%THD @1KHz, S=Typ	-	121	-	dB SPL
Power Supply Rejection		PSR	100 mVpp square wave @ 217Hz, A-weighted	-	-90	-	dBFS(A)
Power Supply Rejection Ratio		PSRR	200 mVpp sinewave @ 1 KHz	-	60	-	dBv/FS
DC Output		ZOUT	DC fullscale=±100	-	50	-	%FS
Directivity				Omnidirectional			

Data Format			1/2 Cycle 1 bit PDM			
Logic Input High	V_{ih}		0.65x V_{DD}	-	VDD+0 .3	V
Logic Input Low	V_{il}		-0.3	-	0.35x VDD	V
Logic Output High	V_{oh}		VDD-0.45	-	-	V
Logic Output Low	V_{ol}		-	-	0.45	V
Output Load	C_{LOAD}		-	-	140	pF
Short Circuit Output Current		94dB SPL @1KHz	1		20	mA
Clock Duty Cycle			40		60	%
Clock Rise/Fall Time	T_{EDGE}		-	-	15	ns

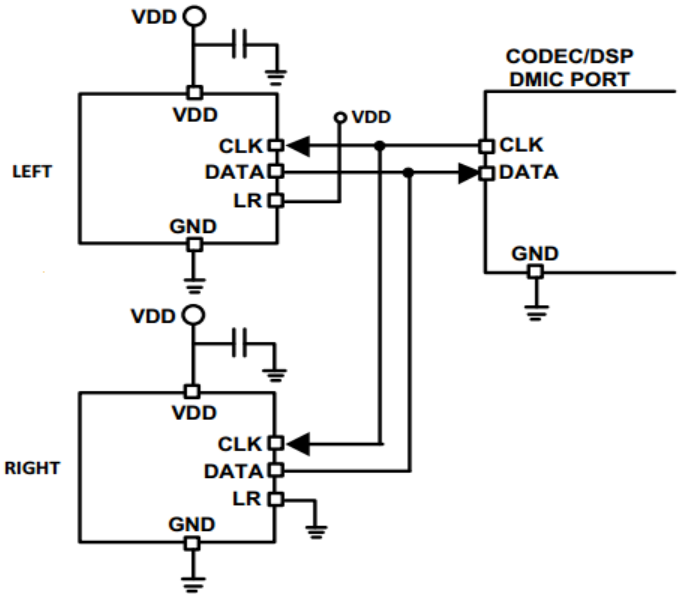
Microphone State Diagram



Frequency Response Curve



Application Informations

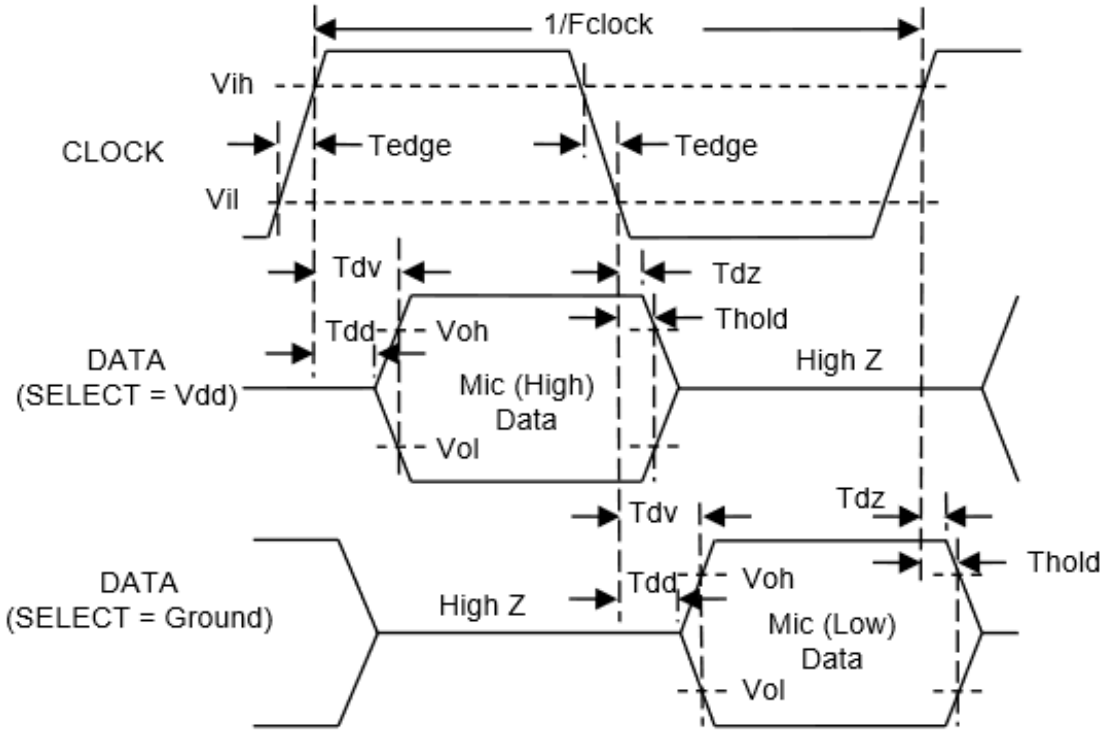


Microphone	SELECT	Asserts DATA On	Latch DATA On
Mic (High)	V_{DD}	Rising Clock Edge	Falling Clock Edge
Mic (Low)	GND	Falling Clock Edge	Rising Clock Edge

Note:

- All GND pins must be connected to ground.
- Capacitors near the microphone should not contain Class 2 dielectrics.

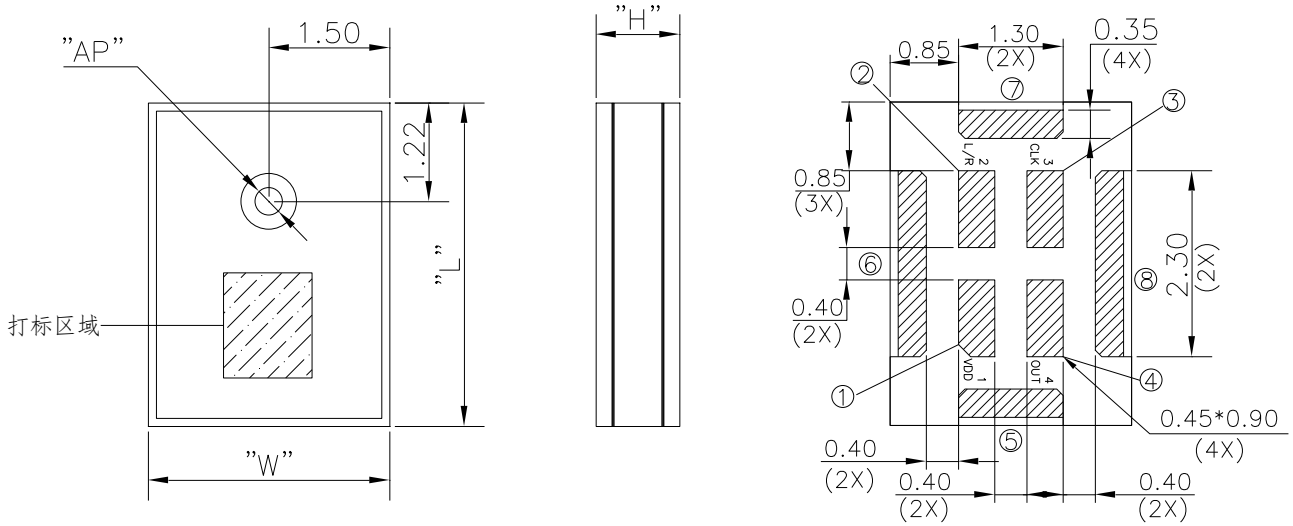
Clock Timing Diagram



Timing Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Clock duty cycle		40	50	60	%	
Operation Voltage	V_{DD}	1.62		3.6	V	
Input Logic Low Level	V_{IL}	-0.3		0.35×V_{DD}	V	
Input Logic High Level	V_{IH}	0.65×V_{DD}		V_{DD}+0.3	V	
Output Logic Low Level	V_{OL}			0.45	V	
Output Logic High Level	V_{OH}	V_{DD}-0.45			V	
Clock rise time	t_{CR}			6	ns	35%~65%
Clock fall time	t_{CF}			6	ns	65%~35%
Delay time for data valid	t_{DV}	40		100	ns	Delay time from clock edge(0.50 x VDD) to data valid(<V_{OL} or > V_{OH})
Delay time for data driven	t_{DD}	25		50	ns	Delay time from clock edge (50% VDD) to data driven.
Delay time for data high Z	t_{Hz}	5		20	ns	Delay time from clock edge(50% VDD) to data

Mechanical Specification



Top View **Side View** **Bottom View**

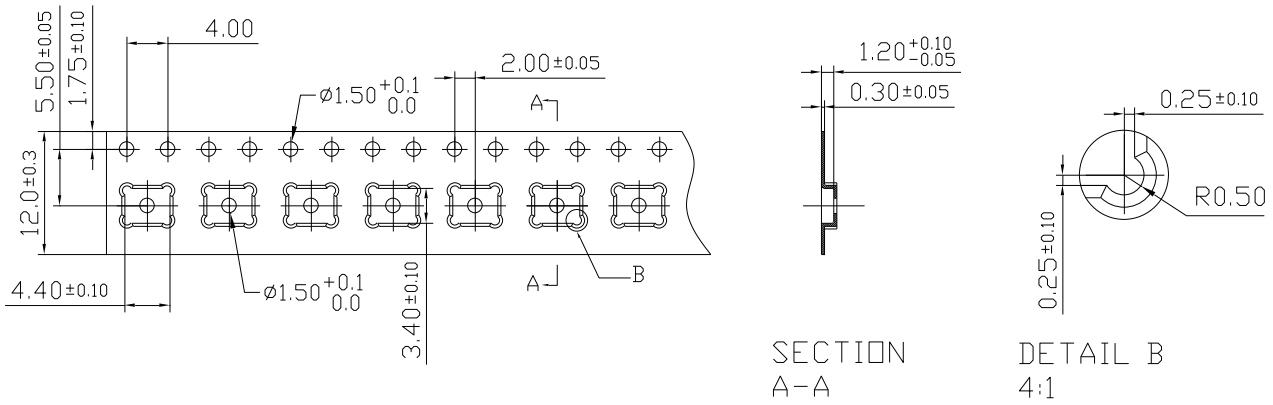
Item	Dimension	Tolerance
Length(L)	4.00	±0.10
Width(W)	3.00	±0.10
Height(H)	1.00	±0.10
Acoustic Port (AP)	Ø0.35	±0.10

Pin#	Pin Name	Description
1	VDD	Power Supply
2	SELECT	Lo/Hi (L/R) Select This pin is internally pulled low
3	CLOCK	Clock input
4	DATA	PDM Output
5	GND	GND
6	GND	GND
7	GND	GND
8	GND	GND

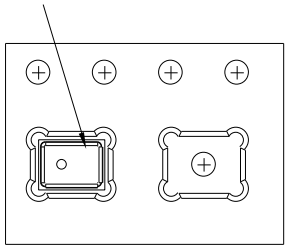
Notes:

- Dimensions are in millimeters unless otherwise specified.
- Tolerance is ±0.10mm unless otherwise specified.
- Pick Area only extends to 0.25 mm of any edge or hole unless otherwise specified.
- Suggestion to use the same date code microphone in one array microphone module.

Packaging & Marking Detail



PIN1

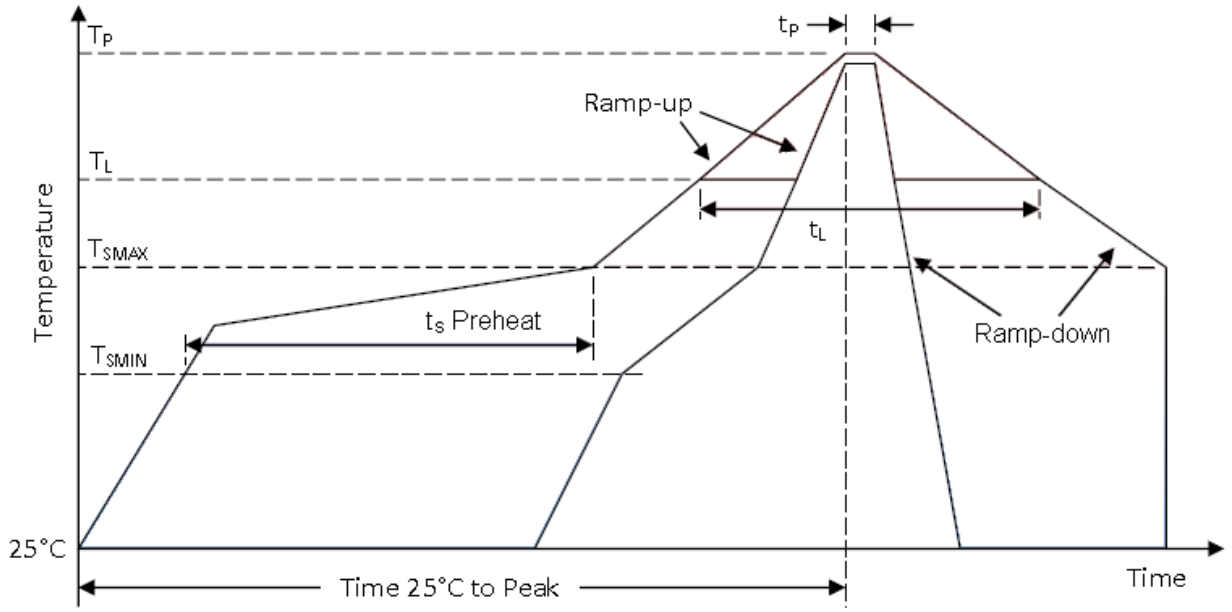


Model Number	Reel Diameter	Quantity Per Reel
WBC4030DT26UJ1	**13”**	**5,000**

Notes:

- Dimensions are in millimeters unless otherwise specified.
- Vacuum pickup only in the pick area indicated in Mechanical Specifications.
- Tape & reel per EIA-481.
- Labels applied directly to reel and external package.

Referenced Reflow Profile



Profile Feature	Pb-Free
Average Ramp-up rate (T_{SMAX} to T_P)	3°C/second max.
Preheat • Temperature Min (T_{SMIN}) • Temperature Max (T_{SMAX}) • Time (T_{SMIN} to T_{SMAX}) (t_S)	150°C 200°C 60-180 seconds
Time maintained above: • Temperature (T_L) • Time (t_L)	217°C 60-150 seconds
Peak Temperature (T_P)	260°C
Time within 5°C of actual Peak Temperature (t_P)	20-40 seconds
Ramp-down rate (T_P to T_{SMAX})	6°C/second max
Time 25°C to Peak Temperature	8 minutes max

Note:

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

Additional Notes

(A) Maximum of 3 reflow cycles is recommended.

(B) In order to minimize device damage:

- Do not board wash or clean after the reflow process.
- Do not brush board with or without solvents after the reflow process.
- Do not directly expose to ultrasonic processing, welding, or cleaning.
- Do not insert any object in port hole of device at any time.
- Do not apply over 30 psi of air pressure into the port hole.
- Do not pull a vacuum over port hole of the microphone.
- Do not apply a vacuum when repacking into sealed bags at a rate faster than 0.5 atm/sec.

Materials Statement

Meets the requirements of the European RoHS and Halogen-Free.

Reliability Specifications

Test	Description
Thermal Shock	100 cycles air-to-air thermal shock from -40°C to +125°C with 15 minute soaks. (IEC 68-2-4)
High Temperature Storage	1000 hours at +105°C environment. (IEC 68-2-2 Test Ba)
Low Temperature Storage	1000 hours at -40°C environment. (IEC 68-2-2 Test Aa)
High Temperature Bias	1000 hours at +105°C under bias. (IEC 68-2-2 Test Ba)
Low Temperature Bias	1000 hours at -40°C under bias. (IEC 68-2-2 Test Aa)
Temperature / Humidity Bias	1000 hours at +85°C /85% R.H. under bias. (JESD22-A101A-B)
Vibration	4 cycles of 20 to 2,000 Hz sinusoidal sweep with 20g peak acceleration lasting 12 minutes in X, Y, and Z directions. (Mil-Std-883E, method 2007.2 A)
ESD-HBM	3 discharges of ±3.5kV direct contact to I/O pins. (ESD STM5.2)
ESD-LID/GND	3 discharges of ±8 kV direct contact to lid while unit is grounded. (IEC 61000-4-2)
ESD-MM	3 discharges of ±200V direct contact to I/O pins. (ESD STM5.2)
Reflow	5 reflow cycles with peak temperature of +260°C.
Mechanical Shock	3 pulses of 10000g in the X, Y, and Z direction. (IEC 68-2-27, Test Ea)
Drop Test	To be no interference in operation after dropped to marble or 1.0cm steel plate 18 times from 1.5 meter height.

Note:

After reliability tests are performed, the sensitivity of the microphones shall not deviate more than 3 dB from its initial value. (The measurement to be done after 2 hours of conditioning at 20±2 °C, R.H 60%～70%)