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SPECIFICATION FOR APPROVAL

Digital MEMS Microphone

Part Number	OWMMOD-352609A-S371102-BP
Note	This item is in compliance with the following requirements: 1. RoHS directive 2. REACH
Customer P/N	

		Prepared	Checked	Approved
Ole Wolff	Signature / Date			

		Confirmation
Customer	Signature / Date	

REVISION NOTES:

Date	Rev.	Description of Revision
2021.06.07	00	Initial Release

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1. SCOPE

THIS SPECIFICATION IS APPLIED TO OLE WOLFF MINI SILICON MICROPHONE UNIT, MODEL NO.: OWMMOD-352609A-S371102-BP

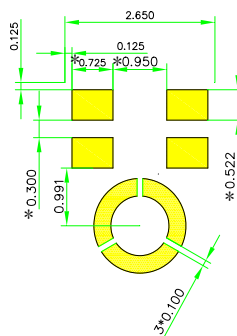
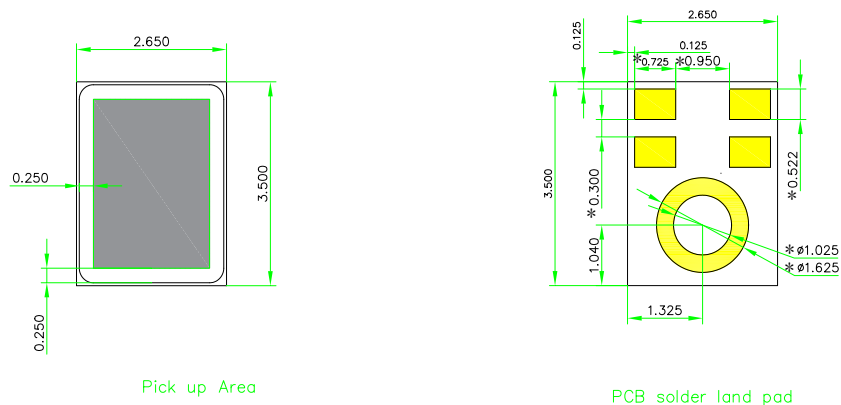
THE MEMS MICROPHONES ARE INTEGRATED WITH SPECIALIZED PRE-AMPLIFICATION ASIC TO PROVIDE HIGH SENSITIVITY, HIGH SNR OUTPUT FROM A CAPACITIVE AUDIO SENSOR. IT'S PACKAGED FOR SURFACE MOUNTING AND HIGH TEMPERATURE RE-FLOW ASSEMBLY.

2. DIMENSIONS AND MECHANICAL LAYOUT

DIMENSIONS: AS SHOWN IN FIGURE 6

WEIGHT: About 0.018g

3. PICKUP TOOL PICK LOCATION & PCB SOLDER PAD LAYOUT (FIGURE 1)



Solder Stencil Pattern

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4. ELECTRICAL SPECIFICATIONS

Standard Conditions

Ordinary Temperature 5 to 35°C

Ordinary Humidity 45 to 85%

Ordinary air pressure 86 to 106kPa

Basic Test Conditions

Temperature 20 ± 2°C

Humidity 63 to 67%

Ordinary air pressure 86 to 106kPa

Standard Conditions		Basic Test Conditions	
Ordinary Temperature	15 to 35°C	Temperature	20 ± 2°C
Ordinary Humidity	45 to 85%	Humidity	63 to 67%
Ordinary air pressure	86 to 106kPa	Ordinary air pressure	86 to 106kPa

4.1 Normal Mode (Test condition: Vdd=1.8V, Fclk=2.4MHz).

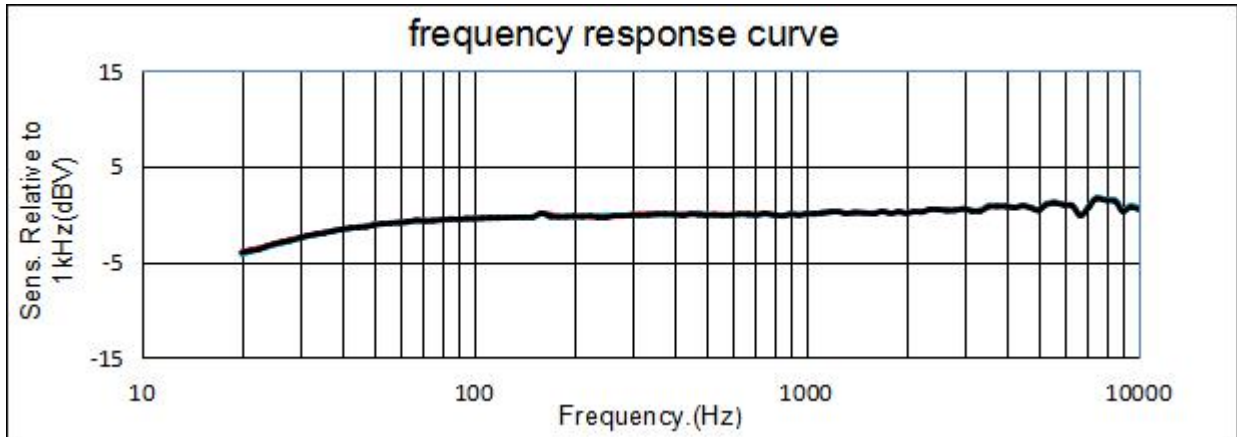
Specification	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Directivity			Omni-directional			
Clock Frequency	Fclk		1.38	2.4	3.3	MHz
Sensitivity	S	94dB SPL @1kHz,	-38	-37	-36	dBFS
Current Consumption	I	Vdd =1.8V Fclk=2.4MHz		890	1000	uA
S/N Ratio	SNR	94dB SPL @1kHz, A-Weighted		66		dB(A)
Total Harmonic distortion	THD	94dB SPL @1kHz,			0.5	%
		129dB SPL @1kHz,			1	%
Acoustic Overload Point	AOP	10% THD @1kHz		132		dB SPL
Power Supply Rejection	PSR	100mVpp Square wave @217Hz, A-weighted			-90	dBFS

Note: Frequency response, sensitivity and current consumption are tested by 100% on product line.

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4.2 Typical frequency response



4.3 Low power Mode

VDD= 1.6-3.6V, Fclock= 2.4MHz, no load unless otherwise indicated values:

Specification	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Clock Frequency	Fc		450	768	850	kHz
Sensitivity	S	94dB SPL @1kHz,	-22	-21	-20	dBFS
Current Consumption	I	Vdd =1.8V Fclk=2.4MHz		680	760	uA
S/N Ratio	SNR	94dB SPL @1kHz, A-Weighted		64.5		dB(A)
Total Harmonic distortion	THD	94dB SPL @1kHz,			1	%
Acoustic Overload Point	AOP	10% THD @1kHz		115		dB
Power Supply Rejection	PSR	100mVpp Square wave @217Hz, A-weighted			-80	dB

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4.4 Sleep mode

Test conditions (unless otherwise specified in the table): VDD= 1.8V, fclock= 350kHz, values: TA= 25° C.
Max/min values: TA= -20° C to 70° C.

Specification	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Clock Frequency	Fc				350	kHz
Current Consumption	I	Fclk=0kHz		1		uA
Current Consumption	I	Fclk=350kHz		50		uA

4.5 General microphone specification(Test condition: Vdd=1.8V, Fclk=2.4MHz)

Specification	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	Vdd		1.62	1.8	3.6	V
Low Frequency rolloff	LFRO	-3dB relative to 1kHz		32		Hz
High Frequency Flatness		+3dB relative to 1kHz		15		kHz
DC Output		Full scale= ± 100	-	0	-	%FS
Polarity		Increasing sound Pressure	Increasing density of 1' s			
Data Format			½ Cycle PDM			
Short Output Current	Isc	DATA PIN Short to GND	1		20	mA
Output Load	Cload				150	pF
Fall Asleep Time	Tslp	Fclk< 350kHz			20	us
Wake-up Time	Twk	Fclk> 350 kHz			20	ms
Power Up Time	Tpu	Time to start up in any mode after VDD off for >10ms, CLOCK remained on.			20	ms
Start time		Time to start up in any mode after VDD and CLOCK applied.			50	ms
Mode Change Time	Tmc	Time to switch between modes. VDD remains on.			20	us

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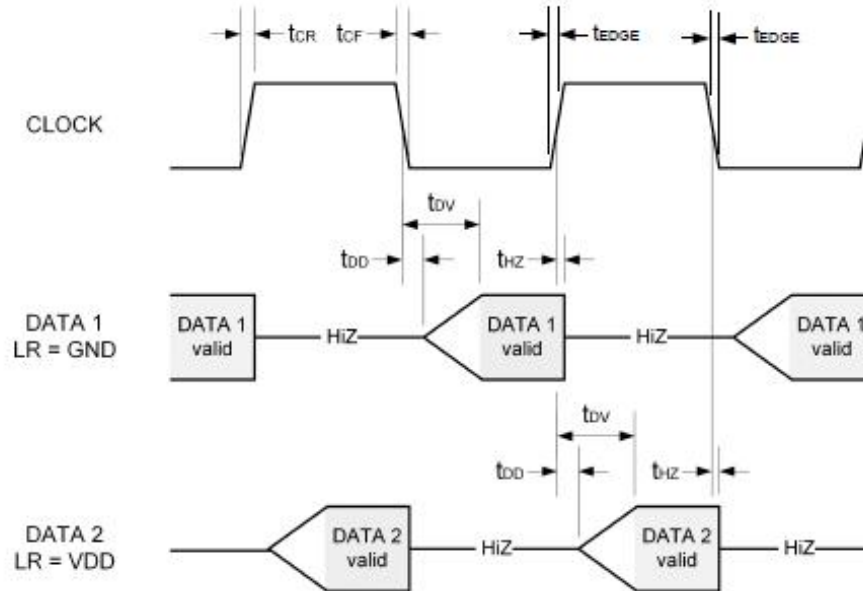
4.6 Digital interface electrical specifications

Specification	Symbol	Test Conditions	Min.	Typ	Max.	Unit
Input logic low level	VIL		-0.3		0.35 x VDD	V
Input logic high level	VIH		0.65 x VDD			V
Output logic low level	VOL				0.3 x VDD	V
Output logic high level	VOH		0.7 x VDD			V
Hysteresis width	Vhyst		0.05 x VDD			V
Clock Frequency	Fclk		0.35		3.3	MHz
Clock Duty Cycle		fclock<=2.65MHz	45		55	%
		fclock>=2.9MHzs	48		52	%
Delay Time to Data Line Driven	tDD	Delay time from CLOCK edge (50% VDD) to DATA driven.	40		80	ns
Delay time for DATA valid	tDV	Delay time from CLOCK edge (0.50 x VDD) to DATA valid (<0.30 x VDD or >0.70 x VDD)			100	ns
Delay time for DATA High-Z.	tHZ	Delay time from CLOCK edge (50% VDD) to DATA high impedance state.	5		30	ns

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4.7 Digital interface timing specifications



4.8 PDM channel configuration using L/R pad.

Channel	Data driven	Data high-Z	L/R connection
DATA1	Falling clock edge	Rising clock edge	GND
DATA2	Rising clock edge	Falling clock edge	VDD

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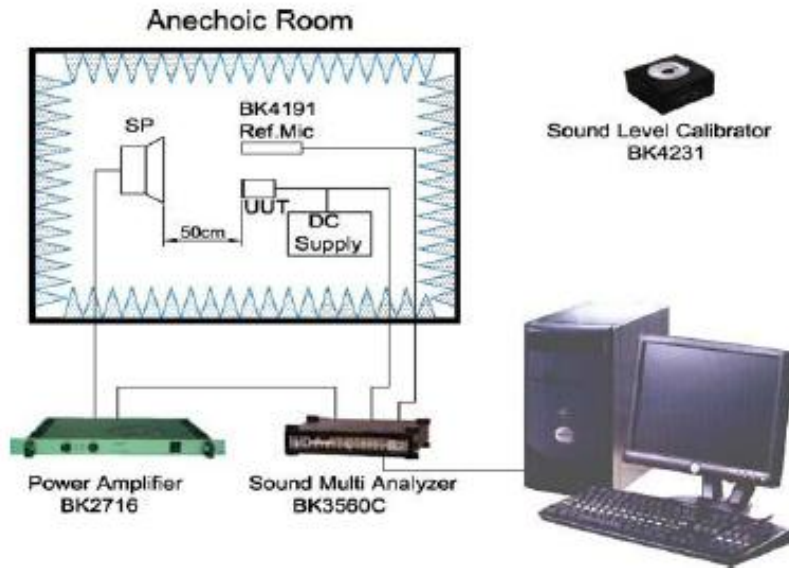
5. RELIABILITY TEST

High Temperature Test	After exposure at 105°C for 1000 hours, the sensitivity should be within ±3 dB from the initial value.
Low Temperature Test	After exposure at -40°C for 1000 hours, the sensitivity should be within ±3 dB from the initial value.
High Humidity & High Heat Test	After exposure at 85±3°C and 85% relative humidity for 1000 hours, the sensitivity should be within ±3 dB from the initial value.
Thermal Shocking Test	100 cycles air-to-air thermal shock from -40°C to +125°C with 15 minute soaks. the sensitivity should be within ±3 dB from the initial value.
Vibration Test	4 cycles of 20 to 2,000 Hz sinusoidal sweep with 20 G peak acceleration lasting 12 minutes in X, Y, and Z directions.
Drop Test	Height: 1.5m Fixture Weight: 150g (Sound Hole Diameter in the fixture is ≥0.8mm) Reference Surface: slippery marble floor Duration: 4 corners*4 times, 6 faces*4 times The sensitivity change should be less than 1dB after testing
ESD Test	3 discharges of ±2.5 kV direct contact to I/O pins. (HBM mode) 3 discharges of ±200 V direct contact to I/O pins. (MM mode)
Mechanical Shock	3 pulses of 10,000 G in the X, Y, and Z direction
Reflow	3 reflow cycles with peak temperature of +260°C

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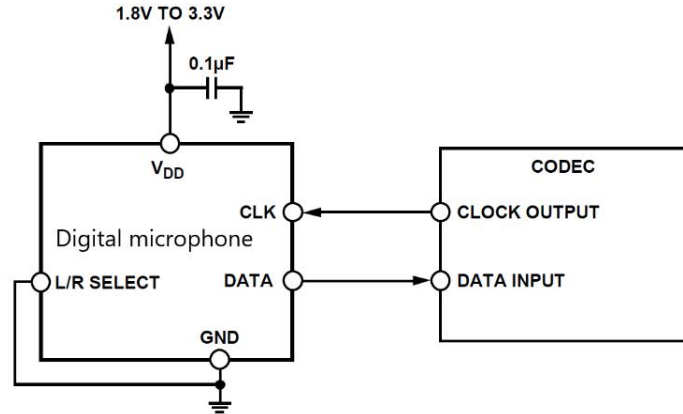
6. MEASUREMENT CIRCUIT (FIGURE 3)



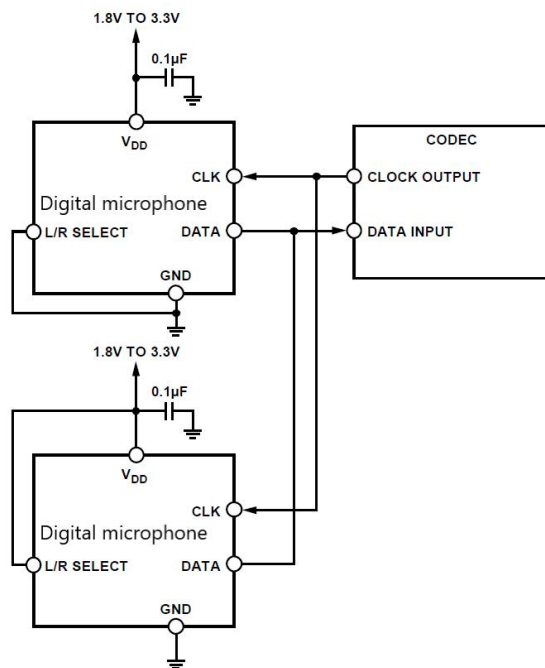
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7. APPLICATION CIRCUIT (FIGURE 4)



PDM input interface circuit(Single MIC)

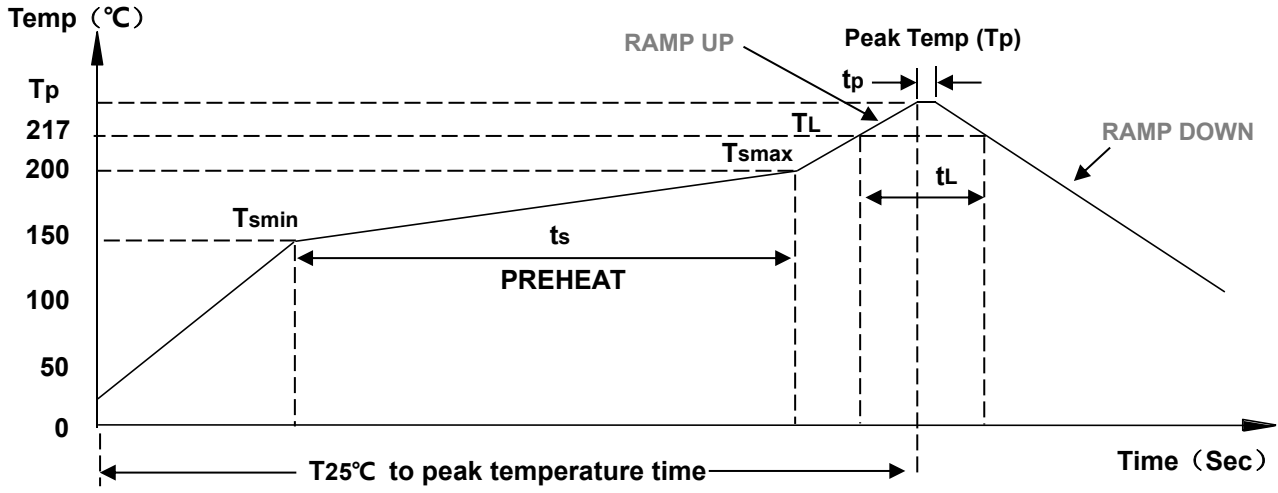


PDM input interface circuit(Dual MIC)

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8. REFLOW PROFILE (FIGURE 5)



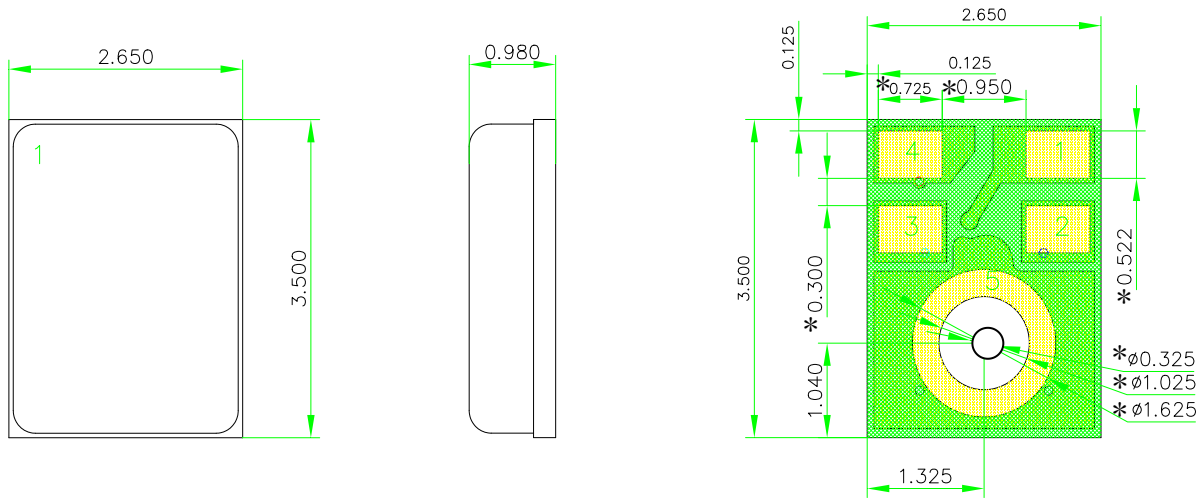
Parameter	Reference	Specification
Average Ramp Rate	T_{smax} to T_P	3°C/sec max
Preheat	Minimum Temperature	T_{SMIN}
	Maximum Temperature	T_{SMAX}
	Time T_{SMIN} to T_{SMAX}	t_s
Time Maintained Above Liquidous	t_L	60 sec to 150 sec
Liquidous Temperature	T_L	217°C
Peak Temperature	T_P	260°C +0°C/-5°C
Time Within +5°C of Actual Peak Temperature	t_p	20 sec to 40 sec
Ramp-Down Rate	T_P to T_{SMAX}	3°C/sec max
Time +25°C ($t_{25°C}$) to Peak Temperature		8 min max

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9. APPEARANCE & DIMENSIONS (FIGURE 6)

The board surface cleaning pressure is 0.3Mpa limited



Top View

Side View

Bottom View

Item	Dimension	Tolerance(+/-)	Units
Length(L)	3.5	0.10	mm
Width(W)	2.65	0.10	mm
Height(H)	0.98	0.10	mm
Acoustic Port(AP)	Ø0.325	0.05	mm

Pin #	Pin Name	Type	Description
1	Data	Digital O	PDM Output
2	L/R	L/R Channel	Channel select
3	CLK	Digital I	Clock input
4	V _{DD}	Power	Power Supply
5	GND	Ground	Ground

Notes:

All dimensions are in millimeter (mm).

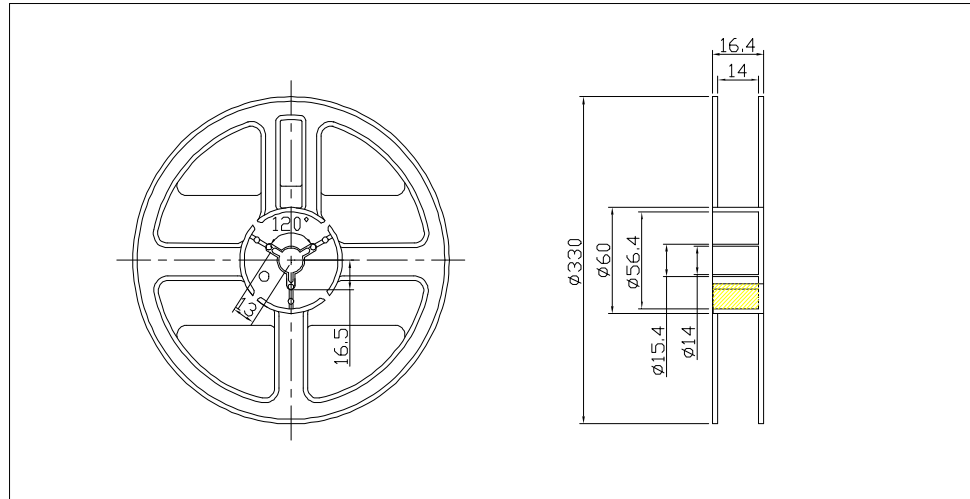
Tolerance±0.1mm unless otherwise specified.

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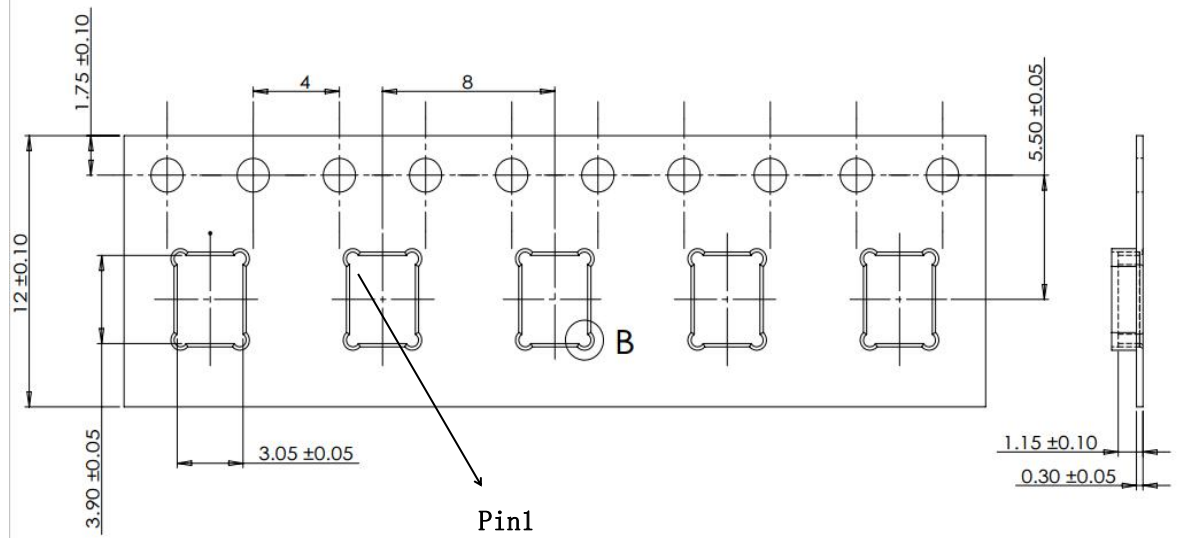
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11. PACKING (UNIT: MM) (FIGURE 7)

13" Reel drawing:



Tape drawing:



5 000 p c s

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12. CAUTIONS WHEN USING MEMS MIC

12.1 Board Wash Forbidden

- Do not board wash by liquid or ultrasonic after the reflow process, otherwise this could damage the microphone.

12.2 Negative Pressure Forbidden

- Do not pull a vacuum such as nozzle over port hole of the microphone.
- Do not vacuum seal static bags used to store unused portions of reels.

12.3 Blowing Forbidden

- Not to blow the acoustic port of the microphone directly, otherwise, this could damage the microphone. If have to, air pressure should less than 0.3MPa, distance more than 5cm, and time less than 5 seconds.

12.4 Rework

- 250°C ~ 270°C, maximum 30 sec, Peak temperature 330°C.
- Wind speed: 15L/m.
- It is very important not to put a heatgun over the acoustic port of the microphone directly.

12.5 Other Application Notes

- Maximum of 3 reflow cycles is recommended.
- Suggest SMT the microphone at last time if double side PCBA used.
- Do not insert any object in port hole of device at any time.

12.6 Storage

- MSL (moisture sensitivity level) Class 1.
- Twelve months when devices are to be stored in factory supplied, unopened ESD moisture sensitive bag under maximum environmental conditions of 30°C, 70% R.H. and floor life(out of bag) at factory no more than 4 weeks.
- Keep MEMS MIC in warehouse with less than 75% humidity and without sudden temperature change, acid air, any other harmful air or strong magnetic field.
- Please take proper measures against ESD in the process of assembly and transportation.
- Please use the shipping package for long-term storage.

12.7 Operating temperature

- Operating temperature range is from -40°C to 85°C.

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