

***3SM200GMT0KB* MEMS Microphone**

Product Description

The ***3SM200GMT0KB*** is a monolithic MEMS top performing miniature digital microphone based on CMOS foundry process. By integrating an acoustic transducer and an analog amplifier circuit followed by a fourth-order sigma-delta modulator into a single chip, it eliminates the inter-die wire bonds, resulting in a simpler and more reliable package. ***3SM200GMT0KB*** is ideal in many compact portable consumer electronic devices such as cellular phone, headset and other space limited applications that require high performance.

Features

- High performance single chip digital CMOS MEMS microphone
- High stability - no risk of membrane aging
- Suitable for automatic pick-and-place handler and SMT process
- Pulse density modulator (PDM) output interface supports two microphones on a single data line
- Miniature dimension 4.00mm x 3.00mm x 1.06mm
- Metal Cover and Top port design
- RoHS/Green Compliant

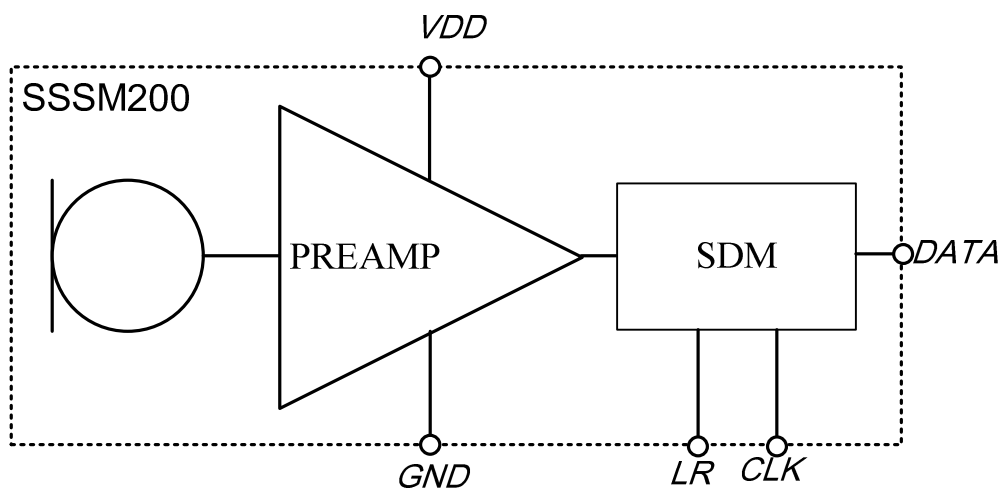
Applications

- Compact thin-profile cellular phones
- Compact headsets
- Space limited portable consumer electronic devices
- Note Book, Pad
- Multi-microphone devices, Microphone array
 - Noise cancellation, Noise reduction
 - Echo cancellation
 - Beam forming

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Functional Block Diagram



Acoustical and Electrical Characteristics

Table 1. Typical test conditions are $T_A = 23\text{ }^{\circ}\text{C}$, $V_{DD} = 1.8$, $\text{Clock} = 2.4\text{MHz}$ 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	-27	-26	-25	dBFS	1kHz, 94dB SPL
Signal to Noise Ratio	S/N	-	61	-	dBA	A-weighted
Equivalent Noise Level	ENL	-	33	-	dBA	A-weighted
Total Harmonic Distortion	THD	-	0.2	-	%	@94dB SPL
Acoustic Overload Point	AOP	-	120	-	dB SPL	
Electrical						
Supply Voltage	V _{DD}	1.64		3.6	V	
Current Consumption	I _{sb}	-	650	-	μA	Clock = VDD or GND
Sleep Mode	I _{sleep}		10			
Power Supply Rejection	PSR	-	-70	-	dBFS	217hz, 100 mV peak to peak square wave superimposed on Vcc 1.8V
Logic Input High	V _{IH}	0.65x VDD	-	VDD	V	
Logic Input Low	V _{IL}	-0.3	-	0.35x VDD	V	
Logic Output High	V _{OH}	0.65x VDD	-	VDD	V	I _{out} = 1mA
Logic Output Low	V _{OL}	0	-	0.35x VDD	V	I _{out} = 1mA
Output Load	C _{Load}	-	-	100	pF	
Clock Frequency	F _{clk}	1.0	-	3.25	MHz	
Clock Duty Cycle	-	40	-	60	%	
Wake-up Time ⁽¹⁾	-	-	100	-	ms	F _{clk} \geq 1MHz
Sleep Time	-	-	1	-	ms	F _{clk} \leq 1KHz

1. Time from the first clock edge to valid output data

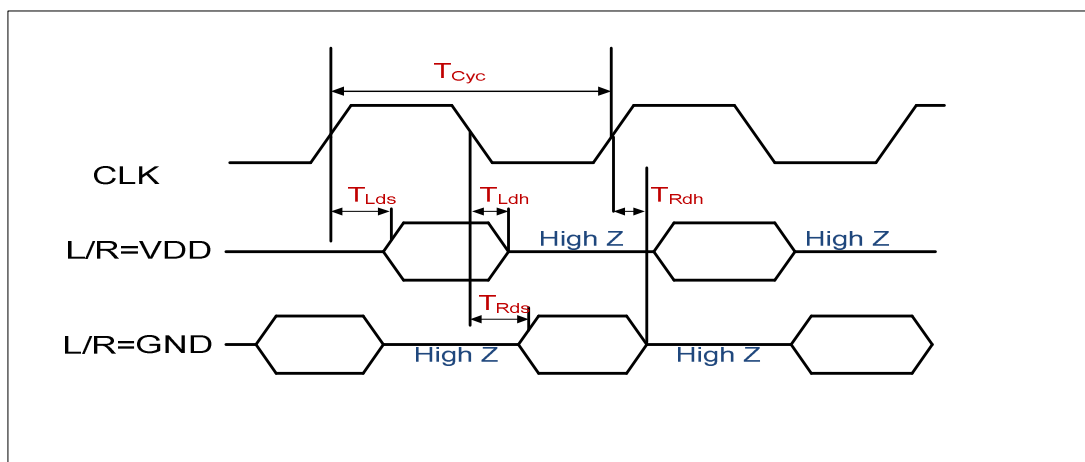
Timing characteristics

Table 2.

Parameters	Description	Min.	Max.	Unit
T _{cyc}	Clock period for normal mode	308	1000	ns
T _{RDS}	Data Setup Time, L/R pin=1	30 ⁽¹⁾	-	ns
T _{RDH}	Data Hold Time, L/R pin=1	-	20 ⁽¹⁾	ns
T _{LDS}	Data Setup Time, L/R pin=0	30 ⁽¹⁾	-	ns
T _{LDH}	Data Hold Time, L/R pin=0	-	20 ⁽¹⁾	ns

(1). Guaranteed by design

Timing waveforms



Functionality

L/R channel selection

The L/R digital pad lets the user select the DATA signal pattern as explained in Table 7. The L/R pin must be connected to VDD or GND.

Table 3. LR channel selection

LR	CLK low	CLK high
GND	DATA valid	High impedance
VDD	High impedance	DATA valid

Temperature Range

Table 4.

Storage Temperature	T _{STG}	-40°C ~ 100°C
Operating Temperature Range	T _A	-30°C ~ 85°C

Reliability Qualifications

Table 5.

Test Item	Description
High Temperature Storage	Storage at 105°C for 1,000 hours IEC 60068-2-2 Test Ba
Low Temperature Storage	Storage at -40°C for 1,000 hours IEC 60068-2-1 Test Aa
High Temperature Operation Bias	Under Bias at 105°C for , 1,000 hours IEC 60068-2-2 Test Ba
Low Temperature Operation Bias	Under Bias at -40°C for , 1,000 hours IEC 60068-2-1 Test Aa
Temperature Humidity Bias	Under Bias at 85°C/85%RH for 1,000 hours JESD22-A101-B
Thermal Shock	Thermal Shock 100 cycles from -40°C~100°C, 100 cycles IEC 60068-2-14
Reflow	5 reflow cycles with peak 260°C J-STD-020D
Vibration	4 cycles lasting 12 minutes from 20 to 2,000Hz in X, Y and Z with peak acceleration of 20G MIL 883E, Method 2007.2, A
Shock	3 pulses 10,000G in X,Y and Z IEC 60068-2-27, Test Ea
ESD	HBM: 3KV, MM:300V, CDM:500V JESD22-A114(HBM); JESD22-A115(MM)

Solder Flow Profile

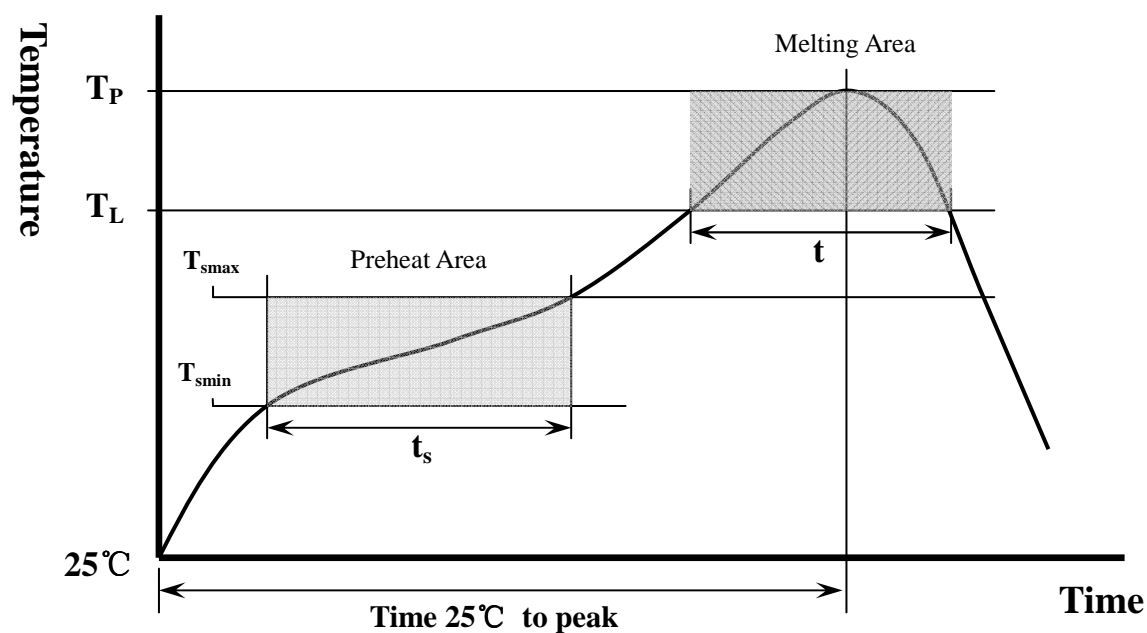
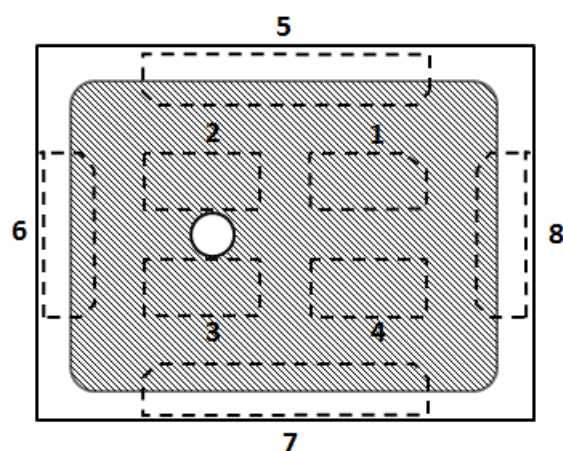


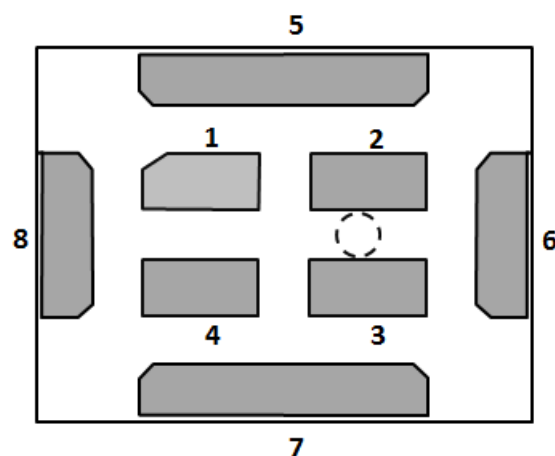
Table 6. Recommended Soldering Profile Limits

Profile Feature	Pb-free
Preheat	
Minimum temperature (T_{smin})	150 °C
Maximum temperature (T_{smax})	200 °C
Time (t_s)	60sec to 180sec
Average Ramp up rate (T_{smax} to T_P)	3°C/sec
Melting area	
Melting temperature (T_L)	217°C
Time maintained above melting (t)	60~150sec
Peak Temperature (T_P)	260°C
Time within 5°C of actual peak temperature	20~40 sec
Ramp down rate	6°C/sec maximum
Time 25°C to peak temperature	8 minute maximum

Pin Definition and Function



Top view of the chip



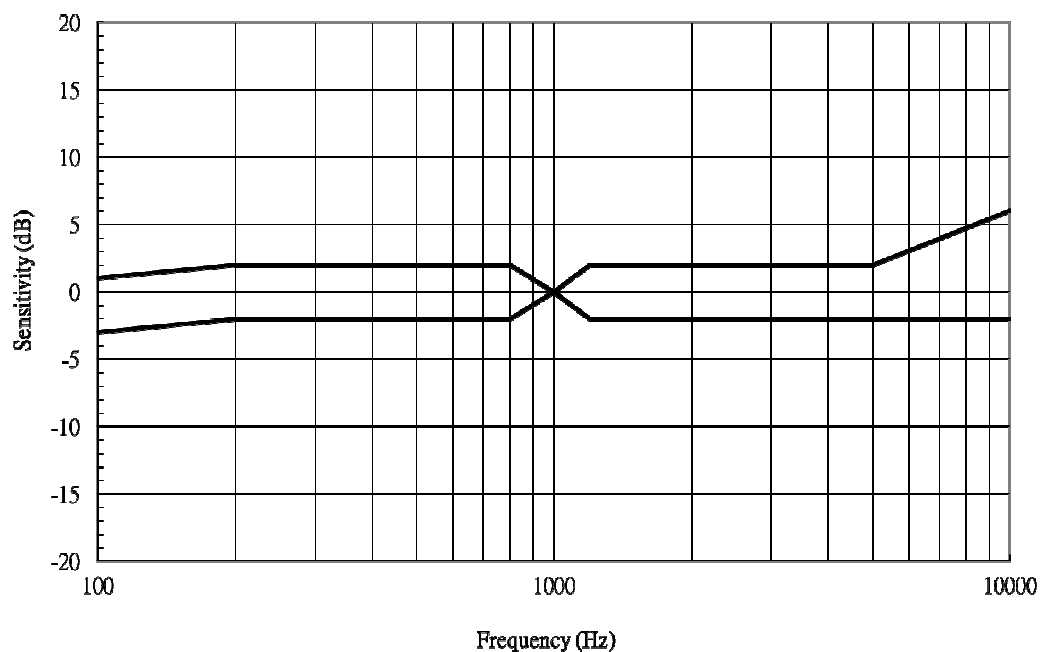
Bottom view of the chip

Table 7.

Pin #	Symbol	Type	Function
1	VDD	Power	Power Supply
2	L/R	Digital I	Left(Low) / Right(High) Select pin
3	CLK	Digital I	Clock Input to Microphone
4	DATA	Digital O	Digital Output Signal
5	GND	Power	Ground
6	GND	Power	Ground
7	GND	Power	Ground
8	GND	Power	Ground

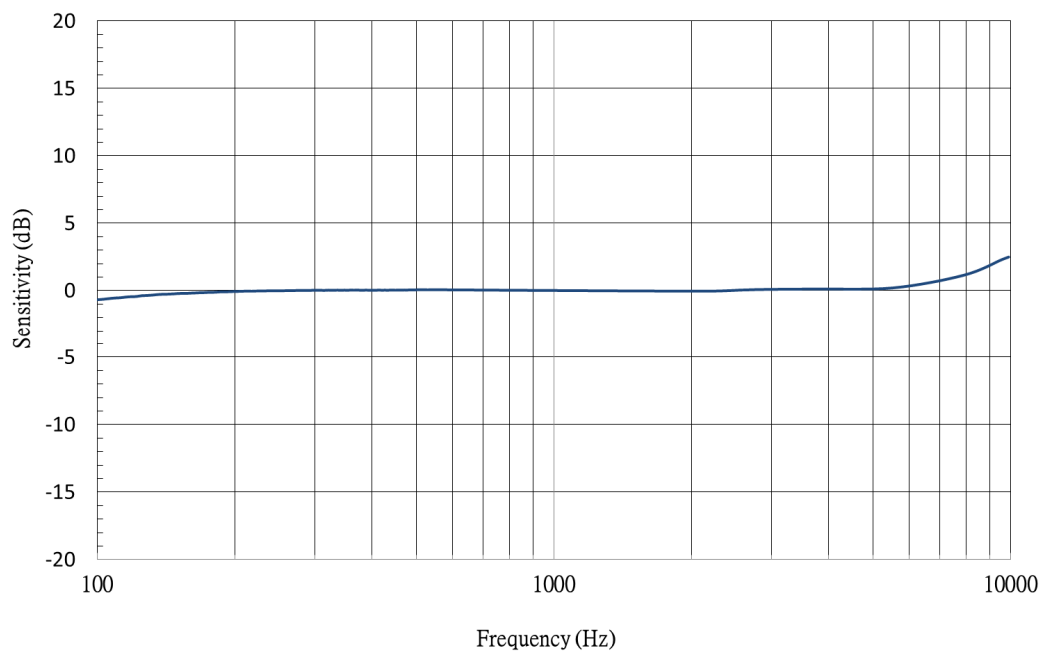


Typical Performance Characteristics



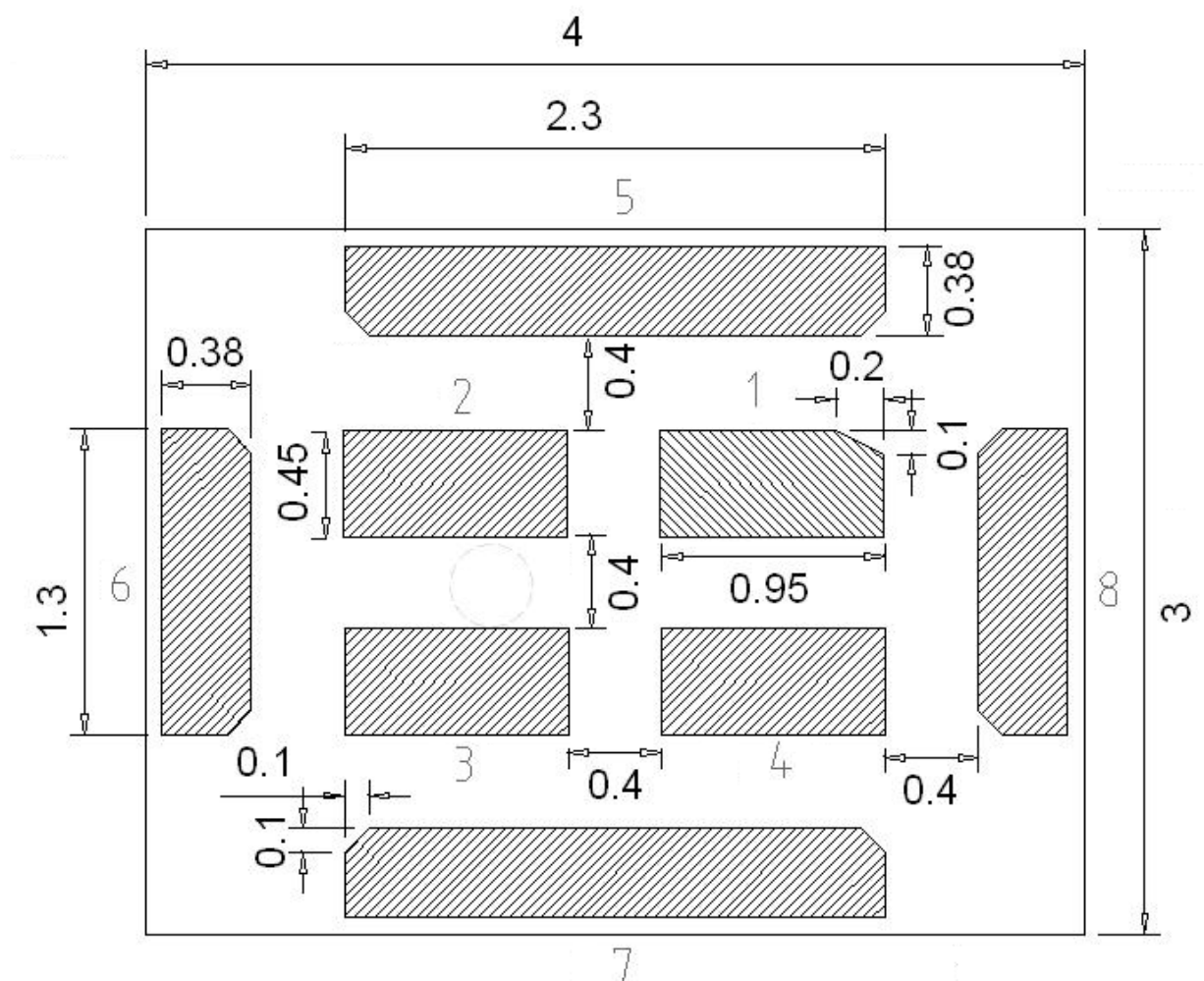
Typical frequency response curves relative to the sensitivity at a frequency of 1 kHz

Frequency Response

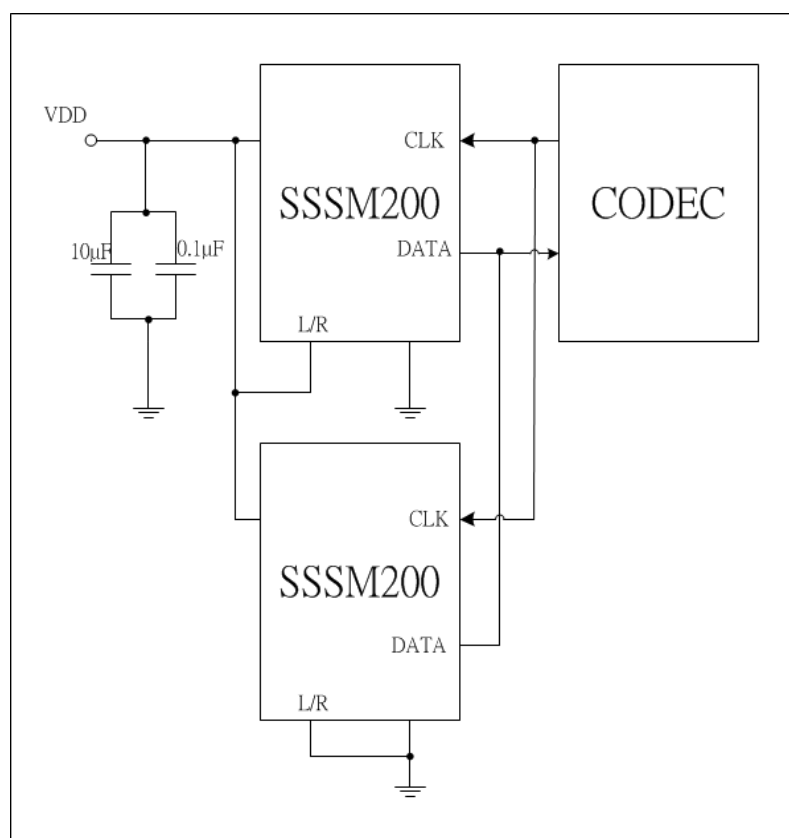
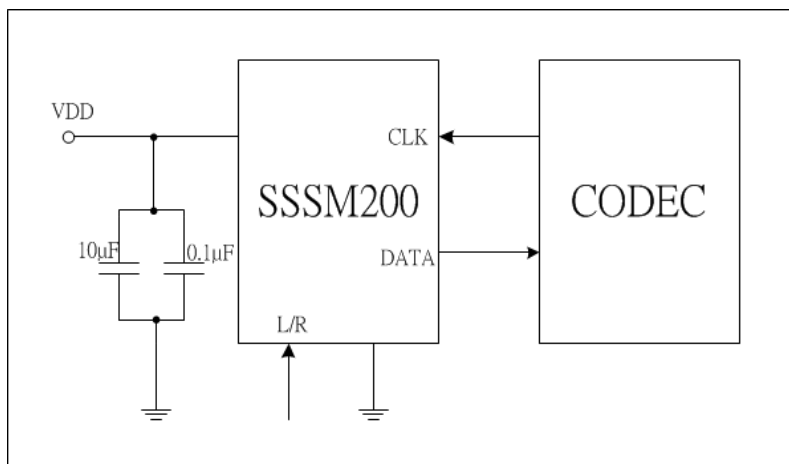


** Measured by 3SM200GMT0KB at a frequency of 1 kHz*

PCB Land Pattern Layout



Application Circuit

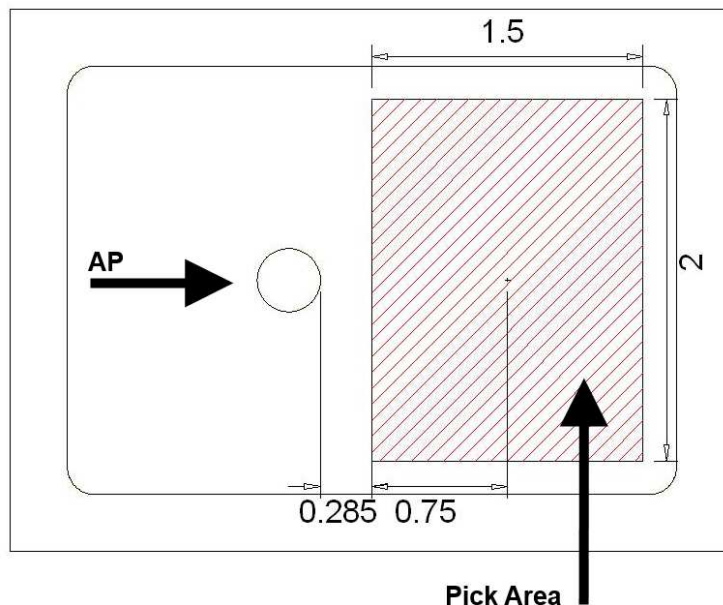


0.1μF ceramic, and 10μF ceramic power supply decoupling capacitors should be placed as near as possible to VDD of the device. The L/R pin must be connected to VDD or GND (refer to Table 7).

Handling Instruction

The MEMS microphone can be handled using standard pick-and-place and chip shooting equipment. Care should be taken to avoid damage to the MEMS microphone 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 the device.
- Do not open and remove MEMS Microphone from packaging until device 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.



Dimensions

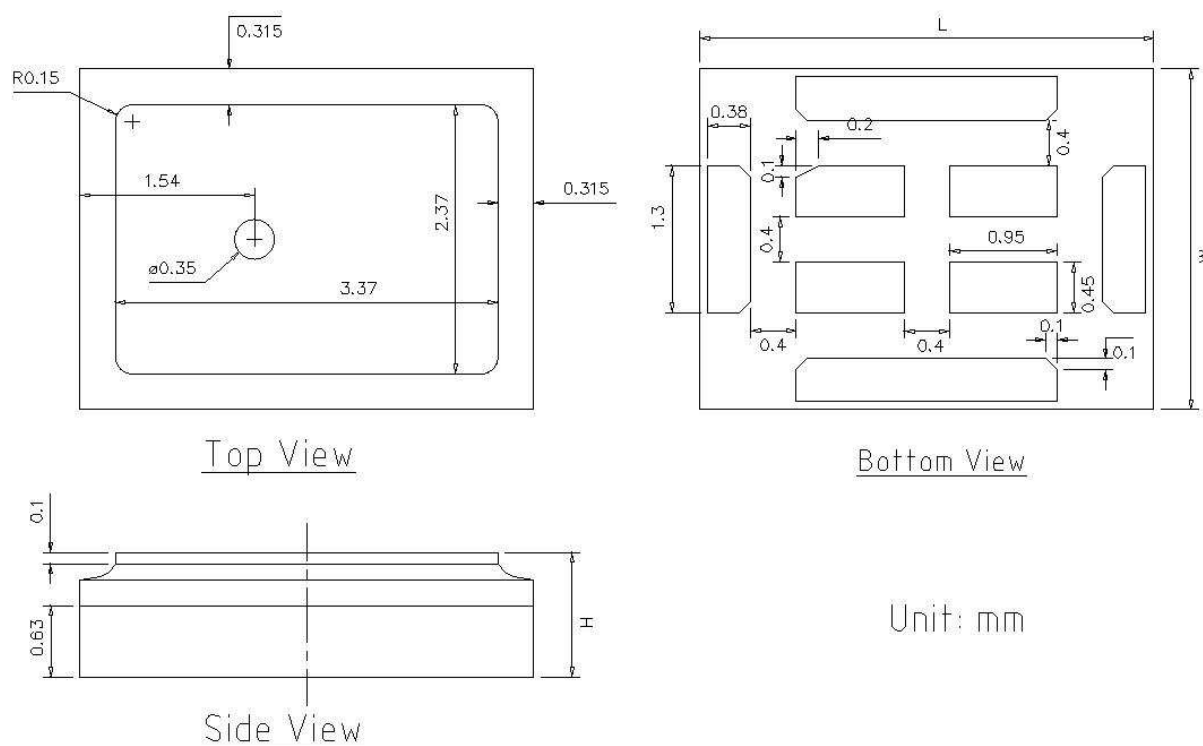
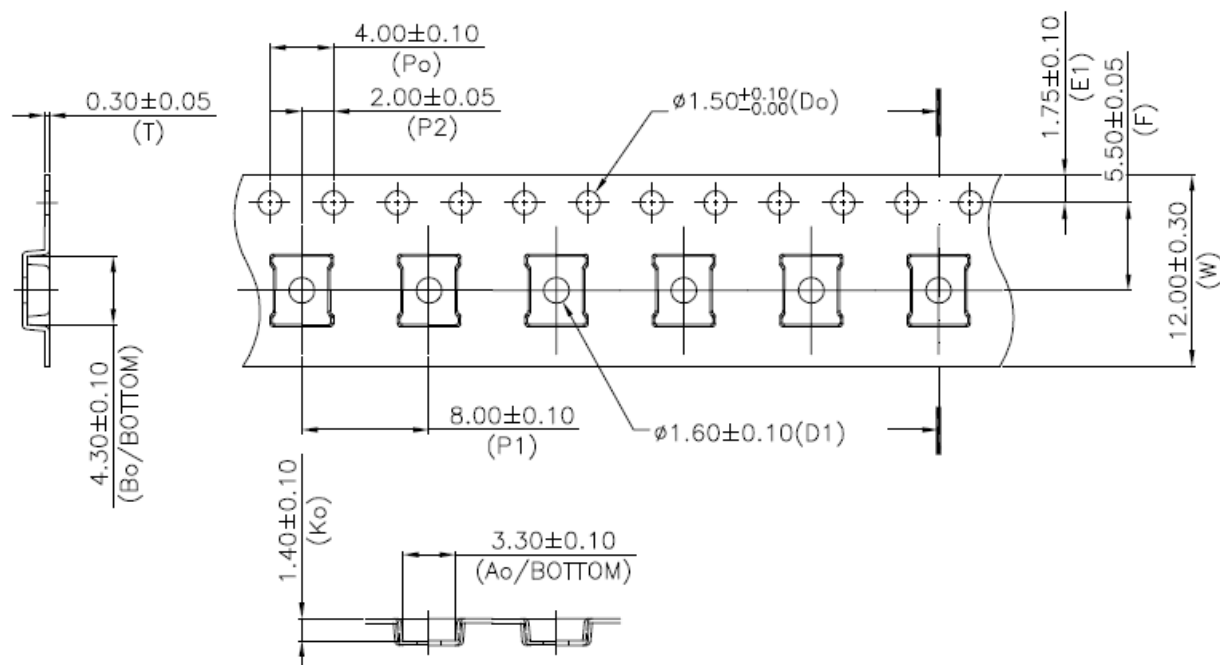


Table 7 (Top View)

Item	Dimension	Tolerance
Length (L)	4.00 mm	± 0.10 mm
Width (W)	3.00 mm	± 0.10 mm
Height (H)	1.06 mm	± 0.10 mm
Acoustic Port	$\Phi 0.35$ mm	± 0.04 mm

Package Information

Carrier Tape:



Note:

1.MSL(Moisture sensitivity level) Class1.

Revision History

Revision	Date	Description
0.8	2015/04/01	Initial release
1.0	2015/06/01	Fix pin out typo
1.1	2015/10/15	Fix dimintions