

Features

- 4.0x3.0x1.3mm Bottom Port
- PDM digital Output
- SNR of 67dBA
- AEC-Q103-003 Qualified
- Automotive qualification
- RoHS Compliance & Halogen Free

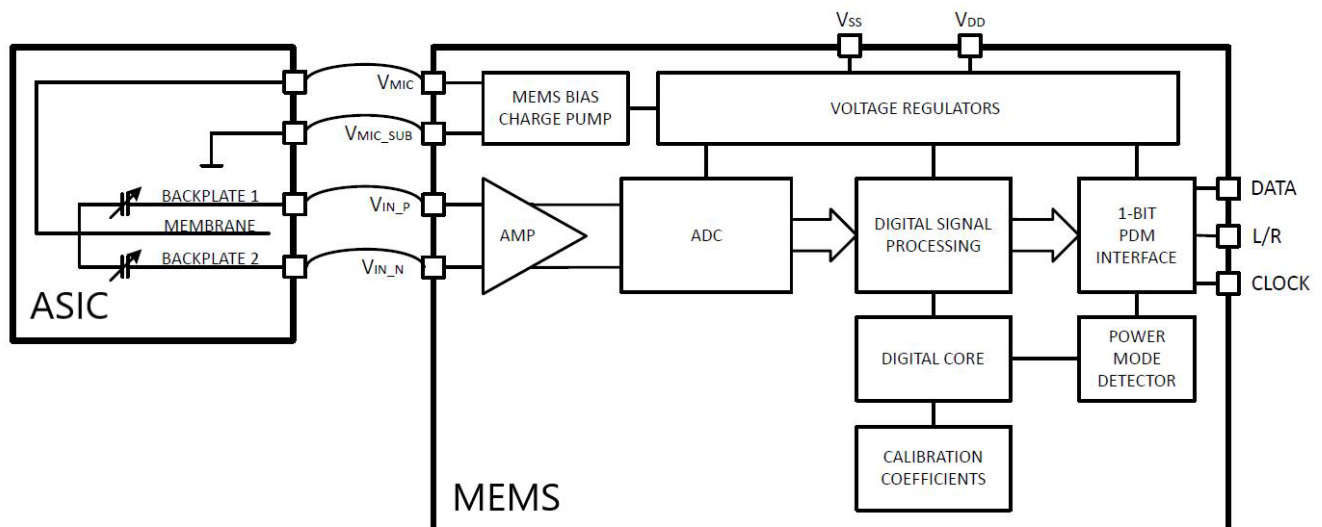
Applications

- Smart Phones
- TWS Headsets
- Smart Speakers
- Voice Control
- ANC&RNC
- Smart Home Electronics
- Laptop Computes



Description: RMIC-94-4-4030-RG-NS1 is a digital MEMS microphone, and integrated with Particle Barrier, which can protect acoustic port hole from particle. The MEMS Microphones are also 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.

BLOCK DIAGRAM



ABSOLUTE MAXIMUM RATINGS

Parameters	Value			Unit
	min	typ	max	
Supply Voltage			4	V
Supply Current			1	mA
Supply Current			1	mA
Operation Temperature Range	-40		+105	°C
Storage Temperature Range	-40		+125	°C

Note : Stresses at the maximum ratings shown in Table 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".

ELECTRICAL SPECIFICATIONS

Normal Mode: Vdd=1.8V, Fclk=2.4MHz, no load, unless otherwise specified.

Parameters		Value			Unit
		min	typ	max	
Directivity		Omni-Directional			
Clock Frequency (Fclk)		1.38	3.072	3.3	MHz
Sensitivity (S)	94db SPL@ 1kHz	-27	-26	-25	dBFS
Current Consumption (I)	Vdd=1.8V Fclk=2.4MHz		800	1100	uA
S/N Ratio (SNR)	20-20kHz, A-Weighted		67		dB
Total Harmonic Distortion (THD)	@ 94dB SPL @1kHz		0.1	0.5	%
Acoustic Overload Point (AOP)	@10% THD @1kHz		120		dB SPL
Power Supply Rejection (PSR)	@100mVpp Square wave, 217Hz, A-weighted		-105	-95	dBFS

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

Low Power Mode: Vdd=1.8V, Fclk=768kHz, no load, unless otherwise specified

Parameters		Value			Unit
		min	typ	max	
Clock Frequency (Fc)		450	768	850	kHz
Sensitivity (S)	94db SPL@ 1kHz	-27	-26	-25	dBFS
Current Consumption (I)	Vdd=1.8V, Fclk=768kHz		310	350	uA
S/N Ratio (SNR)	94dB SPL @1kHz, A-Weighted		65		dBA
Total Harmonic Distortion (THD)	94dB SPL @1kHz		0.1	0.5	%
Acoustic Overload Point (AOP)	@10% THD @1kHz		120		dB
Power Supply Rejection (PSR)	@100mVpp Square wave, 217Hz, A-weighted		-95	-85	dB

Sleep Mode: Vdd=1.8V

Parameters		Value			Unit
		min	typ	max	
Clock Frequency (Fc)				350	kHz
Current Consumption (I)	Fclk=0kHz		1		uA
Current Consumption (I)	Fclk=350kHz		50		uA

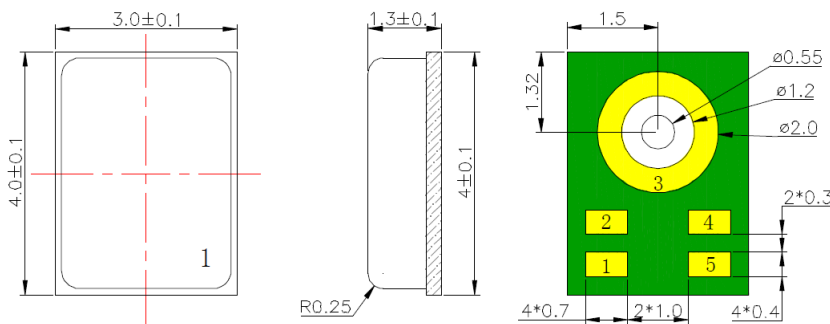
General Microphone Specification

Parameters		Value			Unit
		min	typ	max	
Supply Voltage	Vdd	1.62	1.8	3.6	V
Low Frequency Rolloff (LFRO)	-3dB relative to 1kHz		28		Hz
High Frequency Flatness	+3dB relative to 1 kHz		15		kHz
DC Output	Full scale=+100	-	0	-	%FS
Polarity	Increasing sound pressure	Increasing density of 1' s			
Data Format		½ Cycle PDM			
Sensitivity Drop	Vdd(min)≤Vdd≤Vdd(max)	-0.5		0.5	dB
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>350kHz			20	ms
Power Up Time (Tpu)	Time to start up in any mode after Vdd off for >10ms clock remain 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			20	us

Digital Interface Electrical Specifications

Parameters		Value			Unit
		min	typ	max	
Input Logic Low Level	VIL	-0.3		0.35xVDD	V
Input Logic High Level	VIH	0.65xVDD			V
Output Logic Low Level	VOL			0.3xVDD	V
Output Logic High Level	VOH	0.7xVDD			V
Hysteresis Width	Vhyst	0.05xVDD			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	Delay time from CLOCK edge (50% VDD) to DATA driven.	40		80	ns
Delay Time for DATA Valid	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.	Delay time from CLOCK Edge (50% VDD) to DATA high impedance state.	5		30	ns

DIMENSIONS



Item	Dimension	Tolerance(+/-)
Length(L)	4.0	0.10
Width(W)	3.0	0.10
Height(H)	1.3	0.10
Acoustic Port(AP)	$\phi 0.55$	0.05

Top View

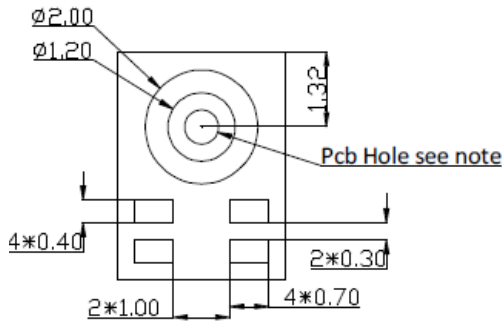
Side View

Bottom View

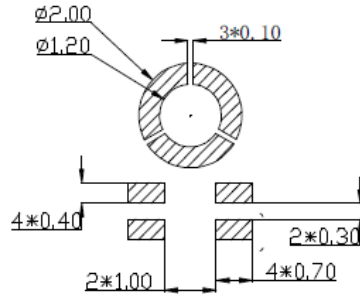
Unit: mm Unmarked Tolerance: ± 0.1 (mm)

Pin No.	Pin Name	Type	Description
1	CLK	Clock	Clock input
2	L/R	L/R Channel	Channel select
3	GND	Ground	Ground
4	VDD	Power	Power Supply
5	DATA	Digital output	PDM output

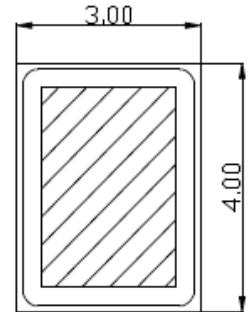
PICKUP TOOL PICK LOCATION & PCB SOLDER



PCB Land Pattern

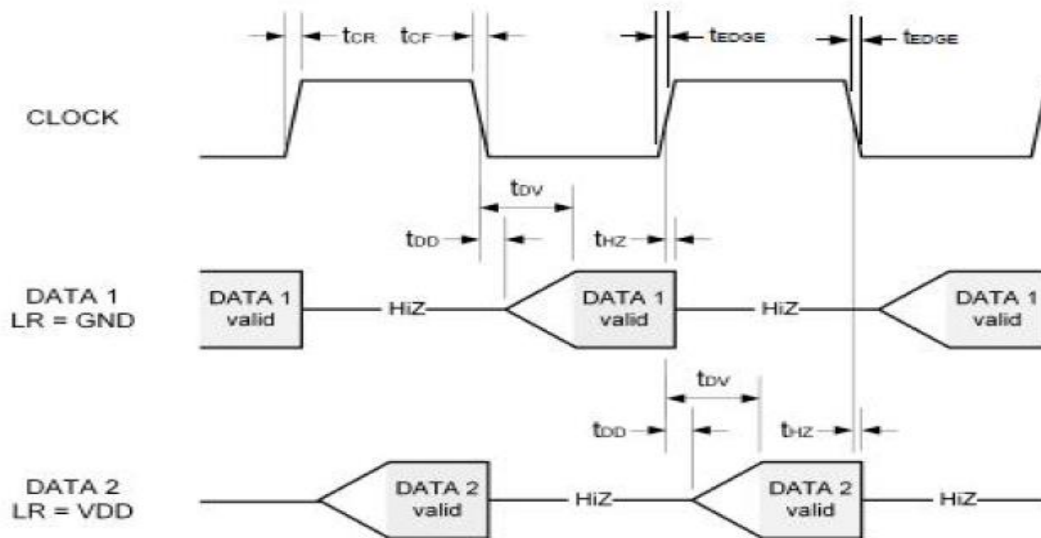


Solder Stencil pattern



Pick up area

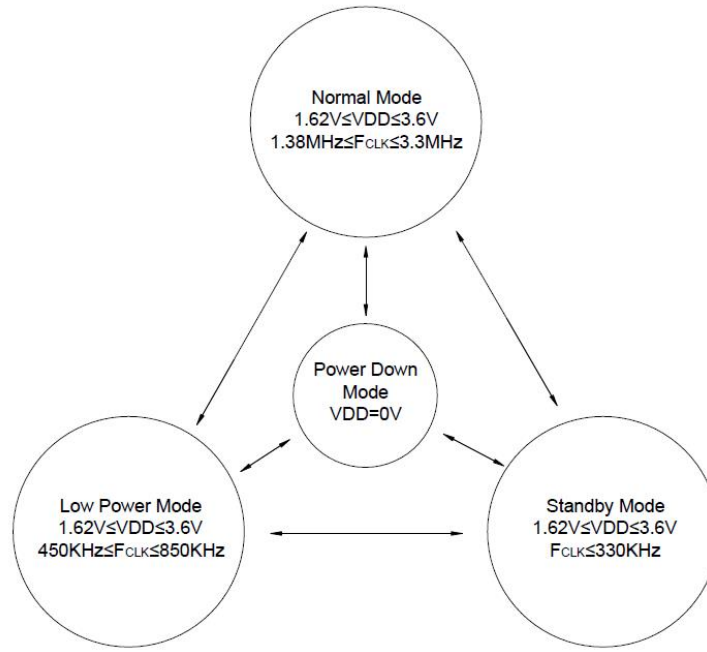
DIGITAL INTERFACE TIMING SPECIFICATION



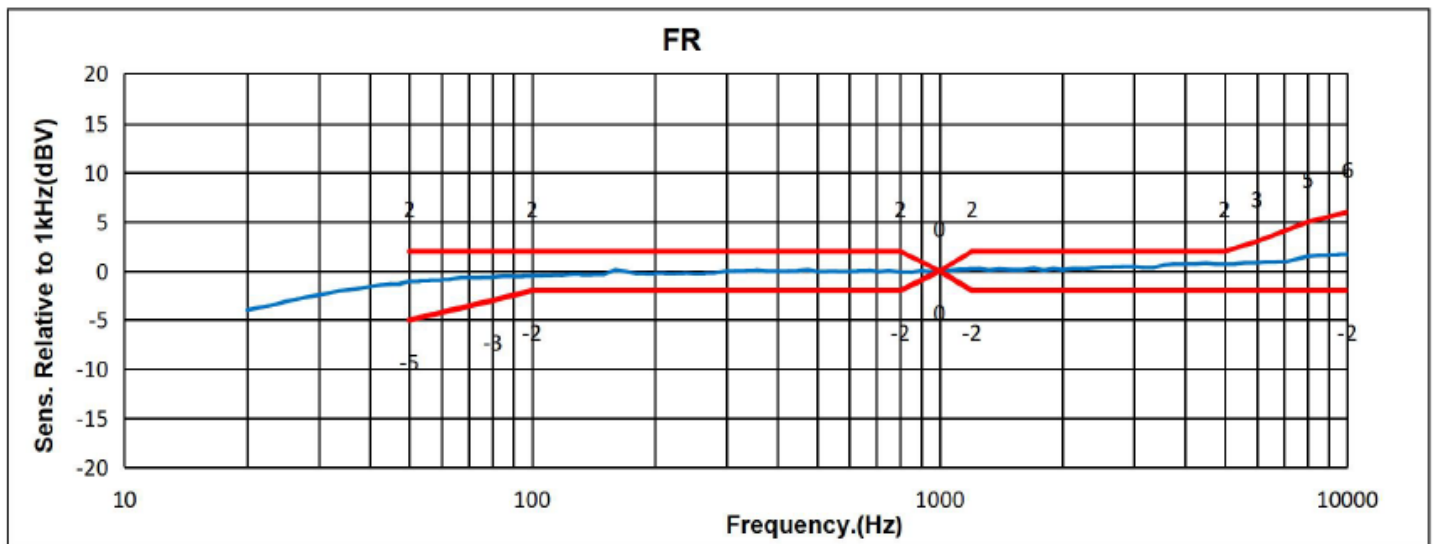
PDM channel configuration using L/R pad.

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

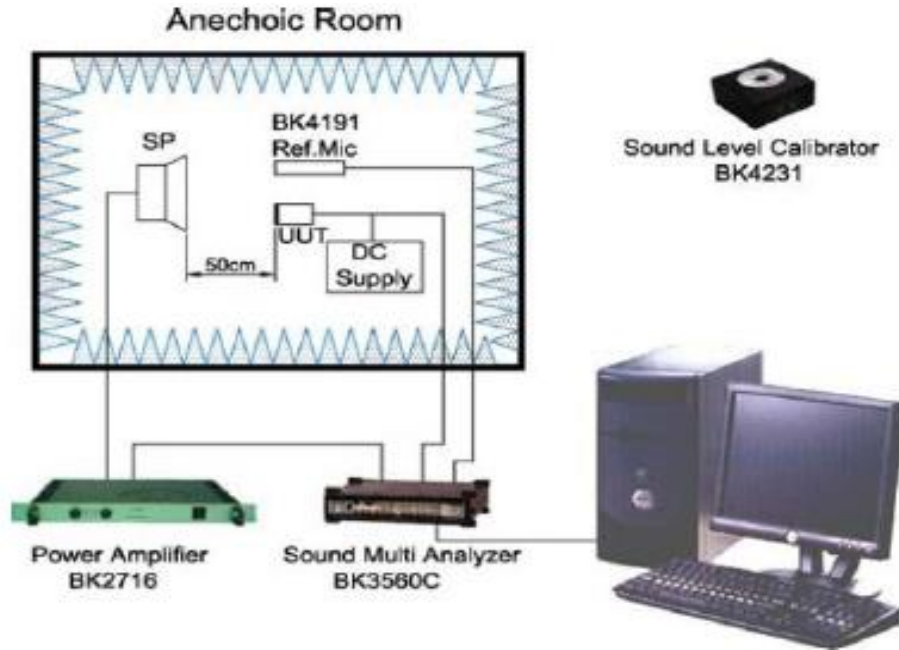
STATE DIAGRAM



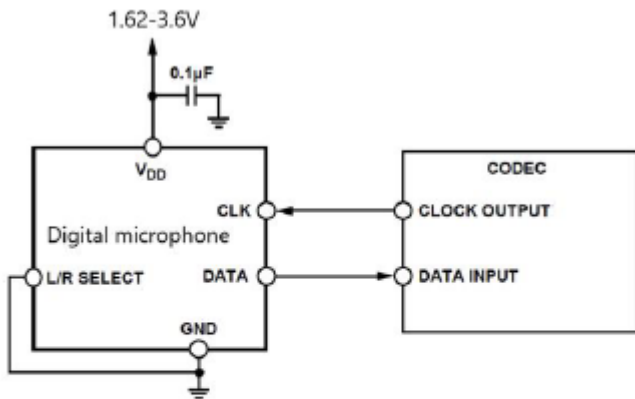
FREQUENCY CHARACTERISTICS



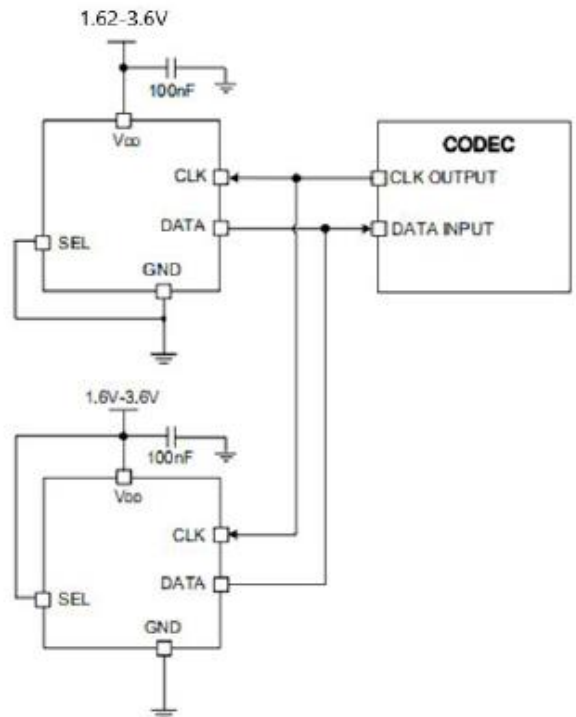
MEASUREMENT SYSTEM SETUP



TYPICAL APPLICATION CIRCUIT

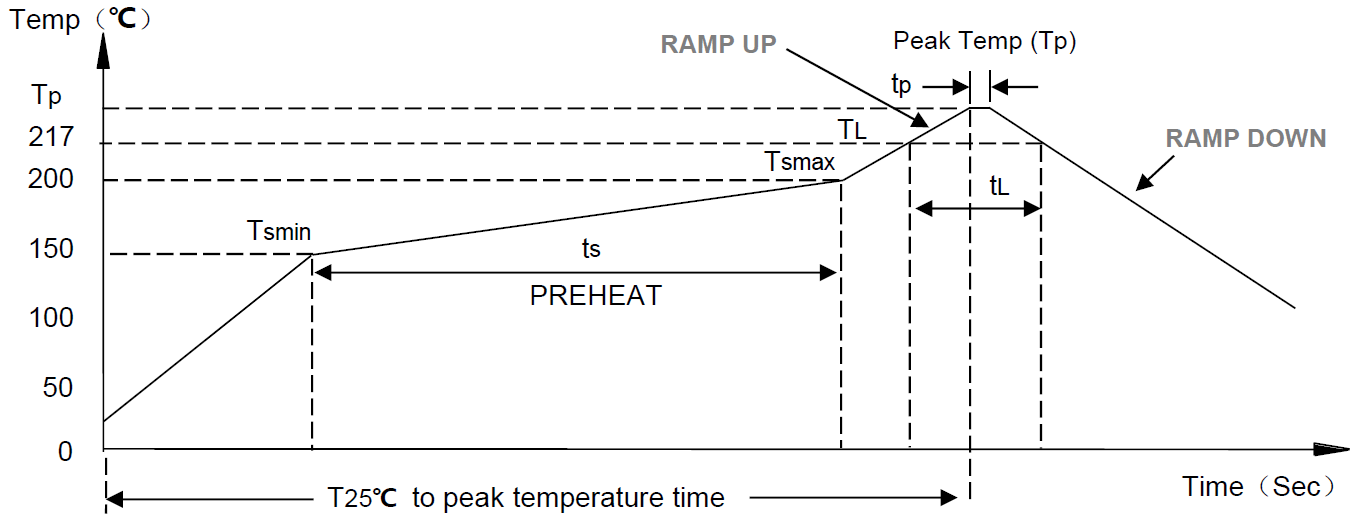


PDM input interface circuit(Single MIC)



PDM input interface circuit(Dual MIC)

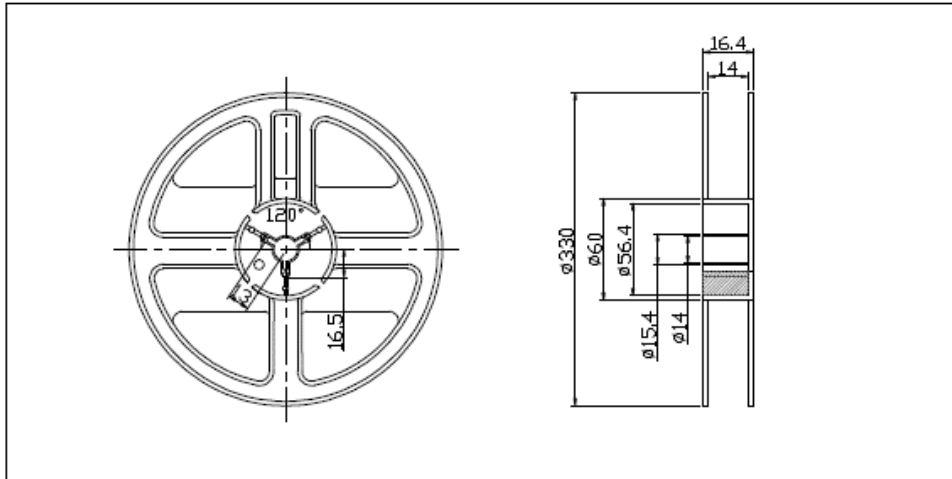
REFLOW PROFILE



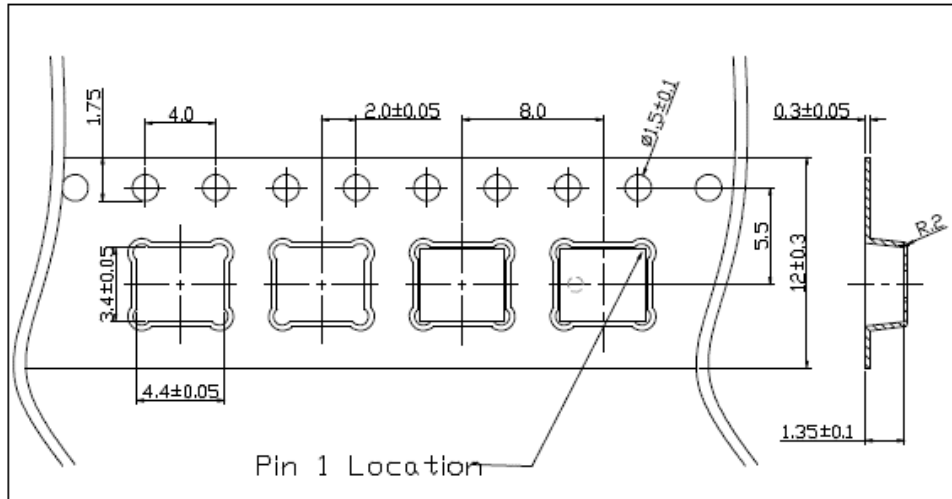
Parameter		Specification
Average temperature change rate (TSMAX to TP)		3°C /second max.
Preheat	Temperature min.(TSMIN)	150°C
	Temperature max.(TSMAX)	200°C
	Time TSMIN to TSMAX	60-180 Seconds
Time Maintained Above Liquidous		60-150 Seconds
Liquidous Temperature		217°C
Peak Temperature		260°C +0°C/-5°C
Time Within +5°C of Actual Peak Temperature		20 sec to 40 sec
Ramp-Down Rate		3°C/sec max
Time +25°C (t25°C) to Peak Temperature		8 min max

PACKAGING

13" Reel drawing:



Tape drawing:



APPROVAL

DRAWN BY	JS, May 31, 2024
APPROVED BY	AR, May 31, 2024
REVISION	A, Initial Release

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