Halogen Free Enhanced RF Protected Digital Mini SiSonic™ Microphone Specification

Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

1. DESCRIPTION AND APPLICATION

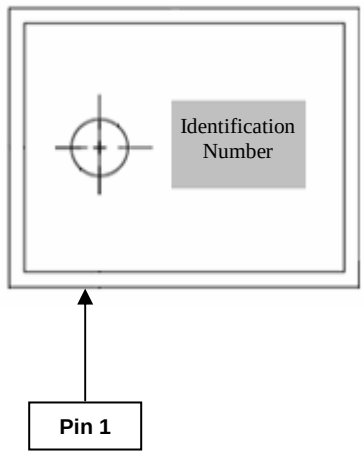
1.1 Description

Digital Surface Mount Silicon Microphone with RF Protection – Halogen Free

1.2 Application

Hand-held consumer electronic devices

2. PART MARKING



Identification Number Convention

S	1	2	3
4	5	6	7

S: Manufacturing Location
"S" – Knowles Electronics Suzhou
Suzhou, China

"No Alpha Character" – Knowles Electronics Itasca
Itasca, IL USA

"E" – Engineering Samples

Digits 1 – 7: Job Identification Number

3. TEMPERATURE RANGE

3.1 Operating Temperature Range: -40°C to +100°C

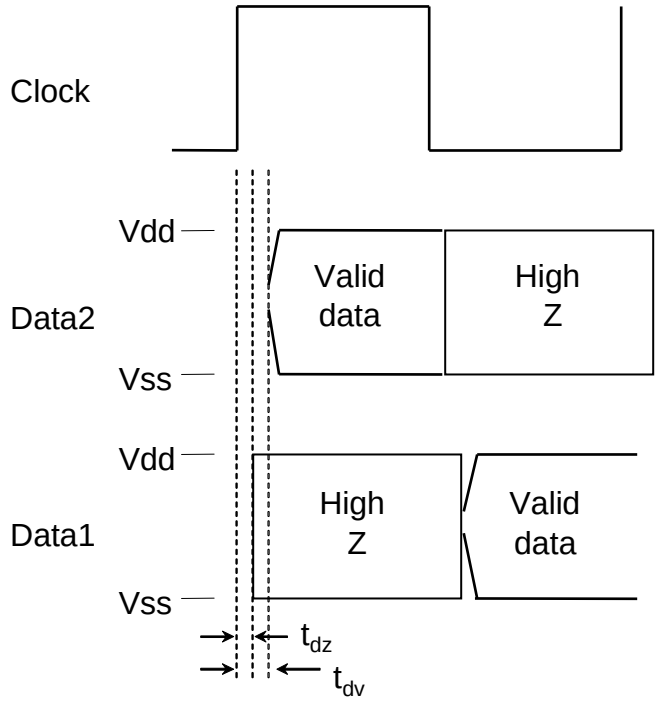
3.2 Storage Temperature Range: -40°C to +100°C

4. (a) ACOUSTIC & ELECTRICAL SPECIFICATIONS

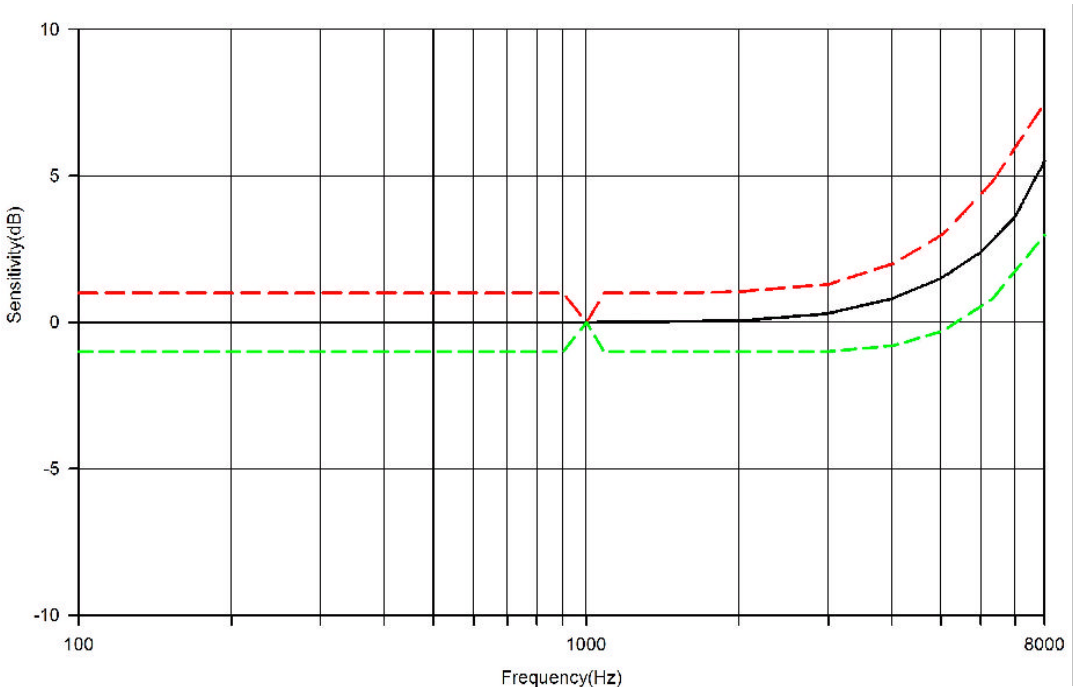
Absolute Maximums	
Supply Voltage, V_{dd} to Ground	-0.5, +5.0 VDC
Output Short Circuit	indefinite to either supply rail
ESD Tolerance	4kV

	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Test Conditions: V_{dd}=1.8V, f_{clock}=2.4MHz, T_a = 25C unless otherwise noted						
Directivity		Omni-directional				
Sensitivity	S	1kH, 1Pa, ref Full Scale	-30	-26	-22	dB FS
Current Consumption	I_{dd}	Output Open Circuit			600	uA
Signal to Noise Ratio	SNR	@ 1kHz (0dB=1V/Pa)		56		dB
Operating Voltage	V_{dd}		1.6		3.6	V
Maximum Input Signal		f=1kHz, THD<10%	115			dB
Short Circuit Output Current	I_{SC}	Output grounded	1		10	mA
Load Capacitance	C_{out}	Maxim load capacitance			100	pF
Standby Current (sleep mode)	I	f_{clk} < 1kHz			50	uA
Lid to Ground Resistance					100	Ω
Data Format		½ Cycle PDM				
Clock Frequency	f_{clock}		1.0		3.25	MHz
Clock Duty Cycle			40		60	%
Logic Low	V_{OL}		-0.3	V_{ss}	0.35x V_{dd}	V
Logic High	V_{OH}		0.65x V_{dd}	V_{dd}	V_{dd} +0.3	V
Delay time for valid data	t_{dv}		18		60	ns
Delay time for High Z	t_{dz}		0		16	ns

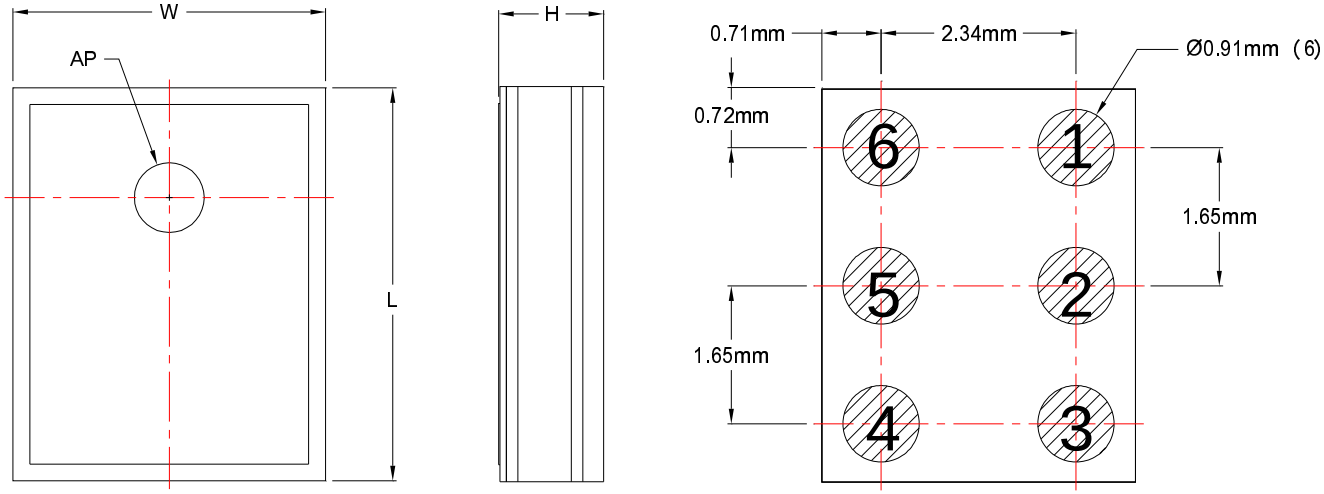
4. (b) TIMING DIAGRAM



5. FREQUENCY RESPONSE CURVE



6. MECHANICAL SPECIFICATIONS



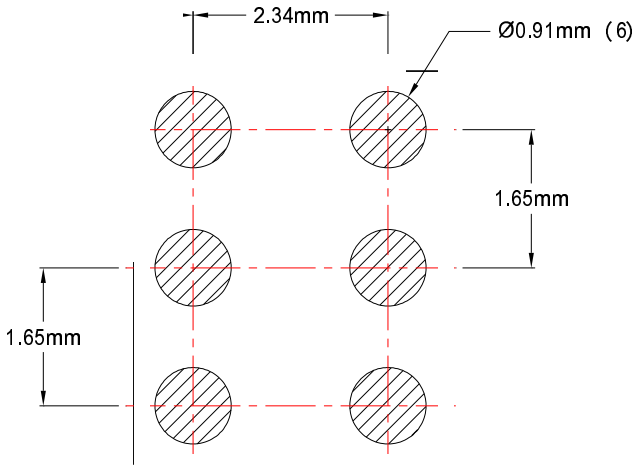
Item	Dimension	Tolerance (+/-)	Units
Length (L)	4.72	0.10	mm
Width (W)	3.76	0.10	mm
Height (H)	1.25	0.10	mm
Acoustic Port *Diameter* (AP)	0.84	0.10	mm
Short Edge to AP	1.32	0.25	mm
Long Edge to AP	1.88	0.25	mm

PIN Designation

Pin #	Function
1	Ground
2	Left/Right
3	Ground
4	Clock
5	Data
6	Power (Vdd)

Note: (Tolerance +/-0.10 mm unless otherwise specified)

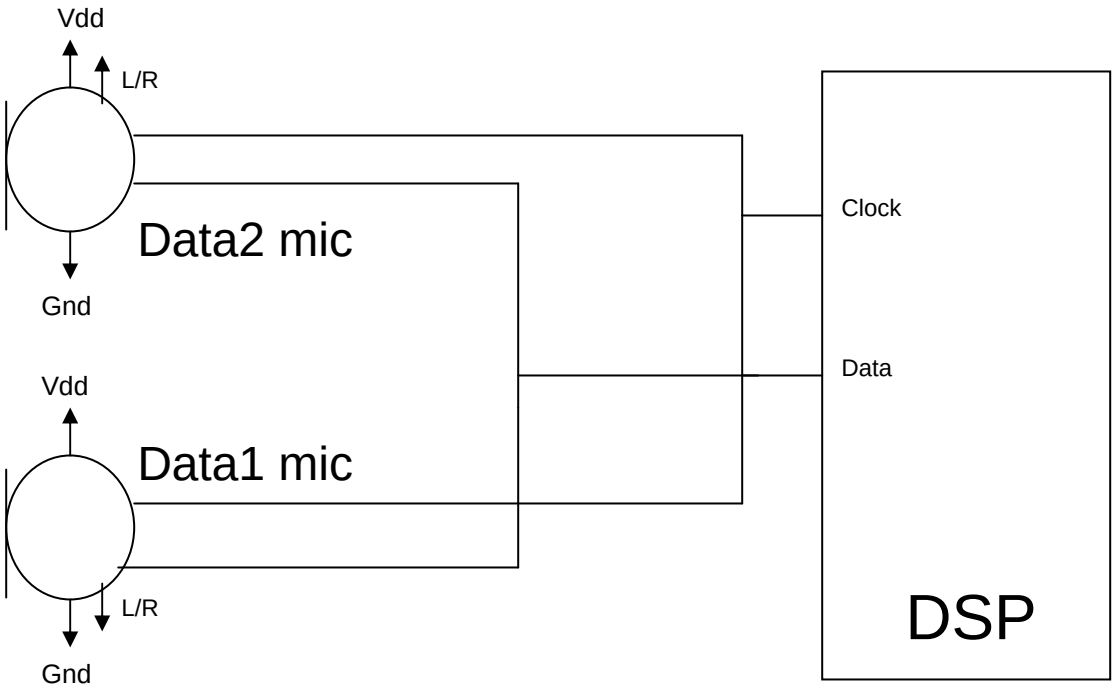
7. RECOMMENDED CUSTOMER LAND PATTERN



8. RECOMMENDED SOLDER STENCIL PATTERN

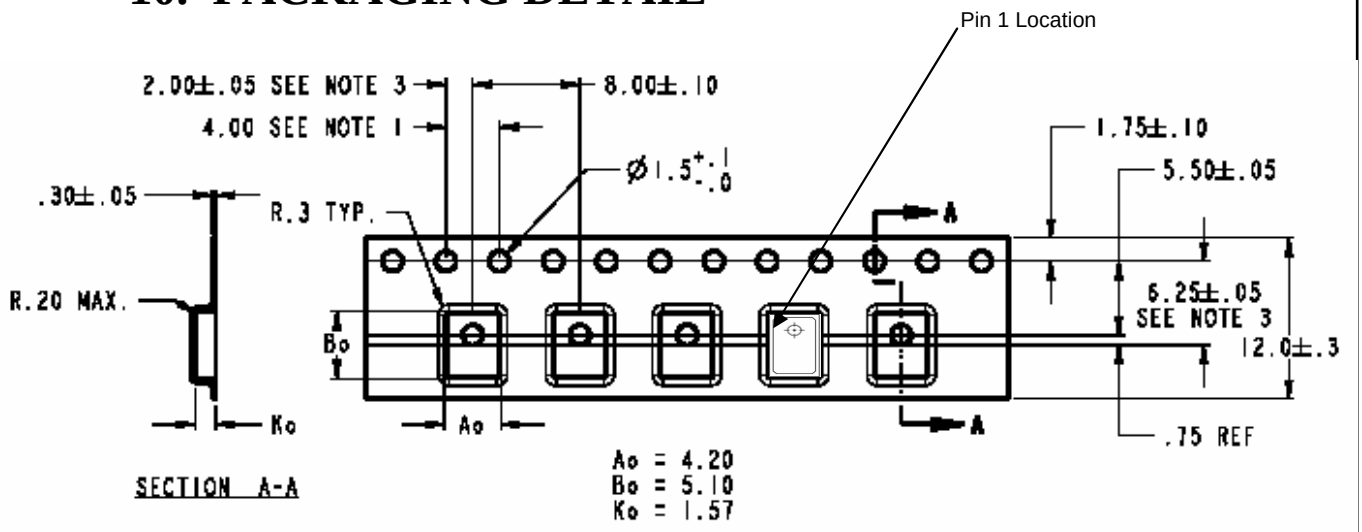
N/A

9. RECOMMENDED INTERFACE CIRCUIT



Label:	L/R:	Drives data after:	High-Z after:
Data2	High	Rising clock edge	Falling clock edge
Data1	Low	Falling clock edge	Rising clock edge

10. PACKAGING DETAIL

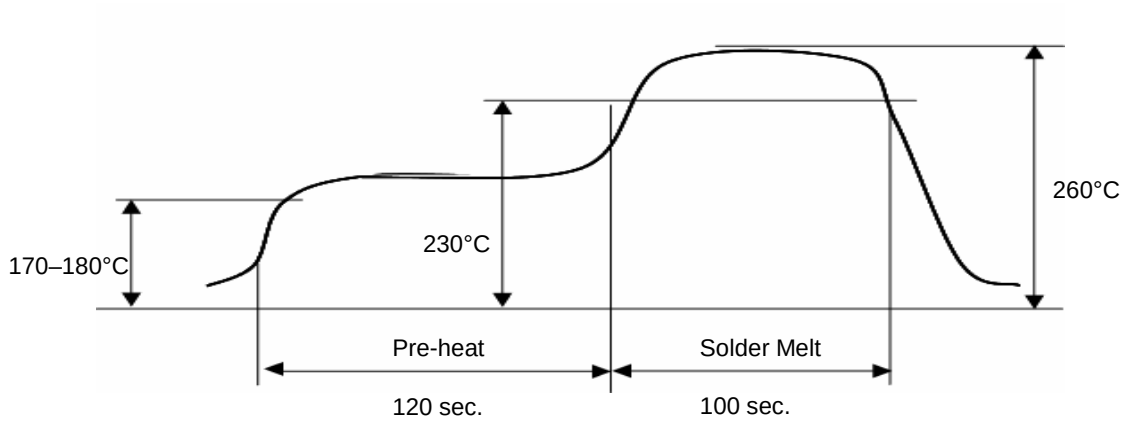


NOTES:
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE ±0.2.
2. CAMBER IN COMPLIANCE WITH EIA 481.
3. POCKET POSITION RELATIVE TO SPROCKET HOLE MEASURED AS TRUE POSITION OF POCKET.

Model Number	Suffix	Reel Diameter	Quantity per Reel
SPM0205HD4	-2	7”	1,200
SPM0205HD4	-6	13”	4,800

Tape & Reel	Available in 13” and 7” diameter.
Empty Units	No consecutive empty pockets; No more than 3 empty pockets per reel. (Does not include empty pockets for leader/follower)

11. MAXIMUM SOLDER REFLOW PROFILE



Stage	***Temperature Profile***	***Time (maximum)***
Pre-heat	170 ~ 180 C	120 sec.
Solder Melt	Above 230 C	100 sec.
Peak	260 C maximum	30 sec.

Notes:
1. Do not pull a vacuum over the port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
2. Do not board wash after the reflow process. Board washing and cleaning agents can damage the device. Do not expose to ultrasonic processing or cleaning.
3. Number of Reflow = recommend no more than 3 cycles.

12. ADDITIONAL NOTES

(A) Packaging (reference SiSonic_Packaging_Spec.pdf)
(B) Shelf life: Twelve (12) months when devices are to be stored in factory supplied, unopened ESD moisture sensitive bag under maximum environmental conditions of 30ºC, 70% R.H.
(C) Exposure: Devices should not be exposed to high humidity, high temperature environment. MSL (moisture sensitivity level) Class 2A.
(D) Out of bag: Maximum of 90 days out of ESD moisture sensitive bag, assuming maximum conditions of 30ºC/70% R.H.

13. RELIABILITY SPECIFICATIONS

Note: After test conditions are performed, the sensitivity of the microphone shall not deviate more than 3dB from its initial value.

Test	Description
Thermal Shock	100 cycles of air-air thermal shock from -40C to +125C with 15min soaks. (ICE 68-2-4)
High Temperature Storage	+105C environment for 1,000 hours. (IEC 68-2-2 Test Ba)
Low Temperature Storage	-40C environment for 1,000 hours. (IEC 68-2-2 Test Aa)
High Temperature Bias	+105C environment while under bias for 1,000 hours. (IEC 68-2-2 Test Ba)
Low Temperature Bias	-40C environment while under bias for 1,000 hours. (IEC 68-2-2 Test Aa)
Temperature / Humidity Bias	+85C/85% RH environment while under bias for 1,000 hours. (JESD22-A101A-B)
Vibration	4 cycles lasting 12 minutes from 20 to 2,000Hz in X, Y, and Z direction with a peak acceleration of 20g. (MIL 883E, Method 2007.2, A)
Electrostatic Discharge	3 discharges at +/- 8kV direct contact to the lid when unit is grounded (IEC 1000-4-2) and 3 discharges at +/- 2kV direct contact to the I/O pins (MIL 883E, Method 3015.7)
Reflow	5 reflow cycles with peak temperature of 260C.
Mechanical Shock	3 pulses of 5,000g in the X, Y, and Z direction. (IEC 68-2-27, Test Ea)

14. SPECIFICATION REVISIONS

Revision	Detailed Specification Changes	Date
A	Preliminary Specification	8/23/2007
B	Part number change from SPM0205HE4 to SPM0405HE4H	11/27/2007
C	Released spec, footprint updated to all round pads.	5/9/2008
D	Specification Release. Update Section 2: Identification Number Convention	5/28/2008