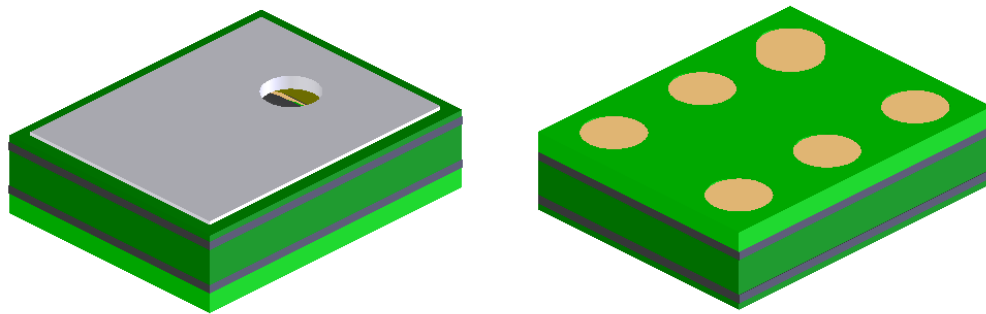


Digital "Mini" SiSonic™ Microphone
Specification - *Halogen Free*



Knowles Acoustics
1151 Maplewood Drive
Itasca, IL 60143

1. DESCRIPTION AND APPLICATION

1.1 DESCRIPTION

Digital "Mini" Surface Mount Silicon Microphone -
Halogen Free

1.2 APPLICATION

Consumer electronics 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, 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. ACOUSTIC & ELECTRICAL SPECIFICATIONS

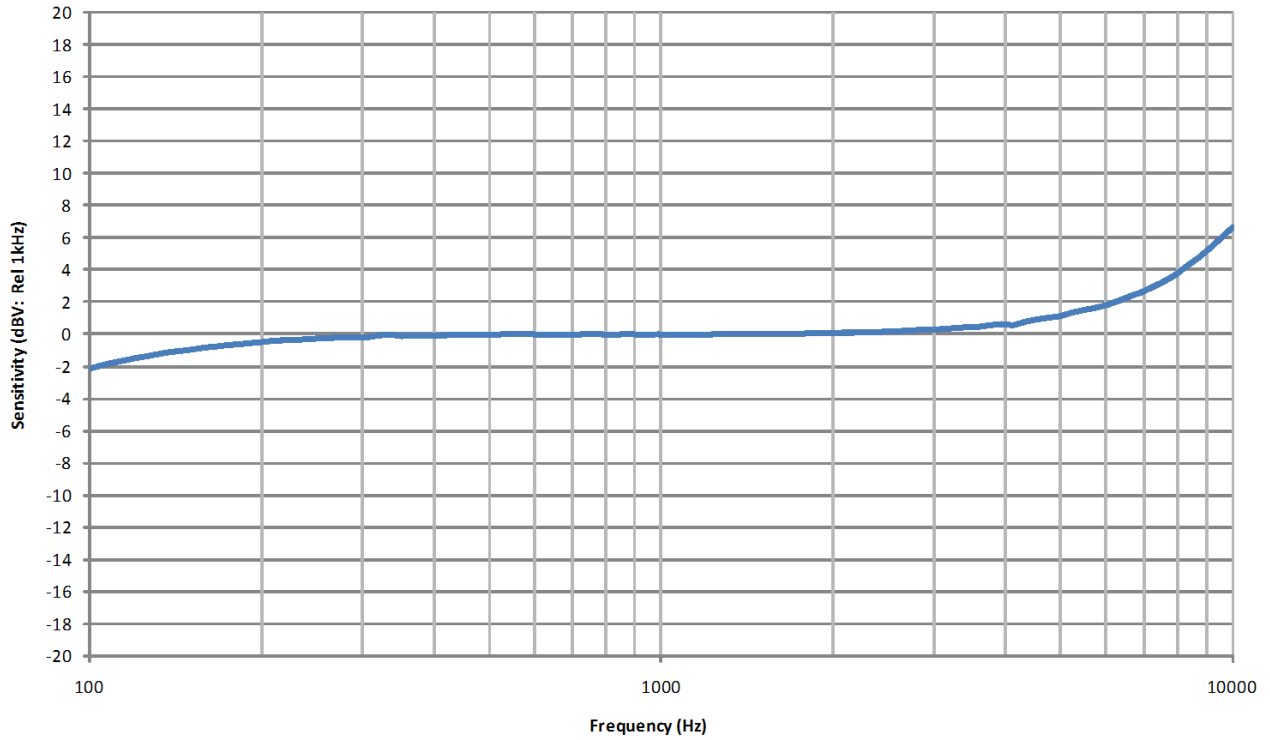
TEST CONDITIONS: +20°C, 60-70% R.H.

Absolute Maximums	
Supply Voltage, V _{dd} to Ground	-0.5, +5.0 VDC
Output Short Circuit	indefinite to either supply rail

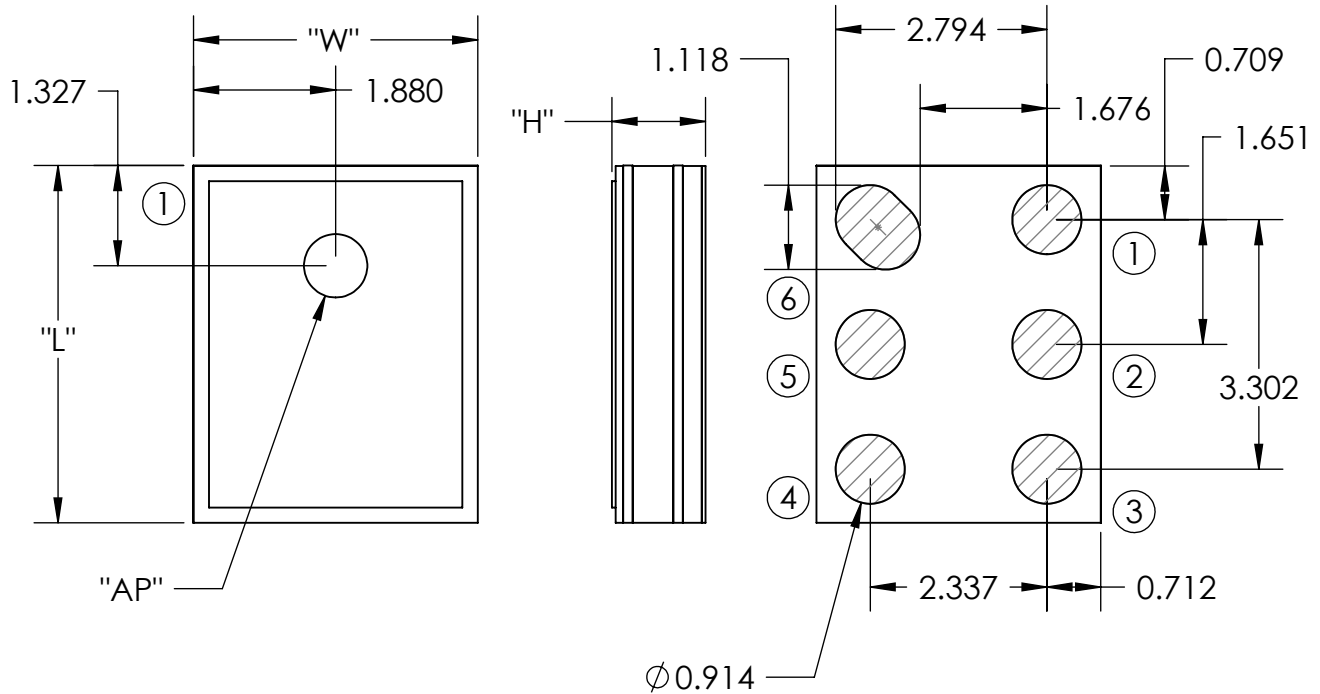
	Symbol	Condition	Limits			Unit
			Min.	Nom.	Max.	
Test Conditions: V _{dd} =1.8V, f _{clock} =2.4MHz, T _a =25C unless otherwise noted						
Directivity		Omni-directional	---	---	---	
Sensitivity	S	1kHz, 1Pa, ref Full Scale	-29	-26	-23	dB FS
Current Consumption	I _{DDs}	Output Open Circuit	---	---	600	μA
Signal to Noise Ratio	S/N	@ 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	1000	---	10000	μA
Load Capacitance	C _{out}	Maxim load capacitance	---	---	100	pF
Standby Current	I	f _{clk} < 1kHz (sleep mode)	---	---	50	μA
Fall-Asleep Time	n/a	f _{clock} < 1kHz	---	---	10	ms
Wake-Up Time	n/a	f _{clock} ≥ 1MHz	---	---	10	ms
Lid to Ground Resistance			---	---	100	Ω
Data Format		1/2 Cycle PCM	---	---	---	
Clock Frequency	f _{clock}		1.0	---	3.25	MHz
Clock Duty Cycle			40	---	60	%
Clock Rise Time	t _{cr}		---	---	10	ns
Clock Fall Time	t _{cf}		---	---	10	ns
Logic Low	V _{OL}		-0.3	V _{ss}	0.35xV _{dd}	V
Logic High	V _{OH}		0.65xV _{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

5. FREQUENCY RESPONSE CURVE

TYPICAL FREE FIELD RESPONSE
NORMALIZED TO 1kHz



6. MECHANICAL SPECIFICATIONS



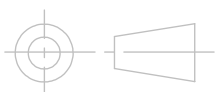
ITEM	DIMENSION	TOLERANCE	UNITS
LENGTH (L)	4.720	±0.100	mm
WIDTH (W)	3.760	±0.100	mm
HEIGHT (H)	1.250	±0.100	mm
ACOUSTIC PORT (AP)	Ø0.840	±0.100	mm

PIN OUTPUT	
PIN #	FUNCTION
1	GROUND
2	LEFT/RIGHT
3	GROUND
4	CLOCK
5	DATA
6	POWER (Vdd)

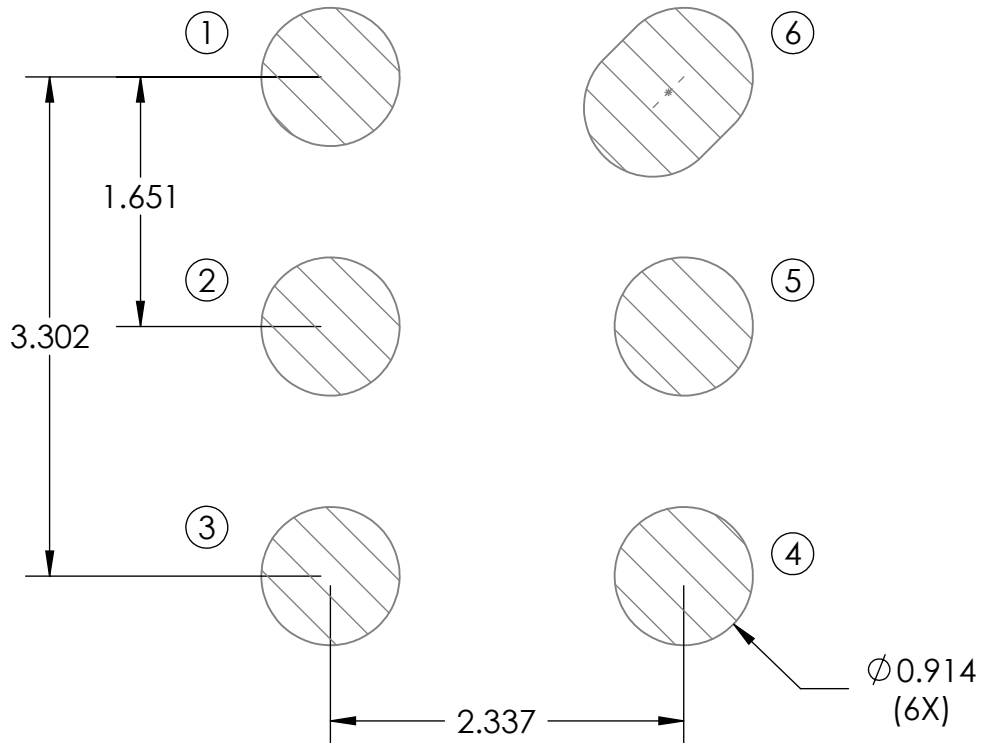
Note:

Dimensions are in millimeters unless otherwise specified.

Tolerance ±0.15mm unless otherwise specified.



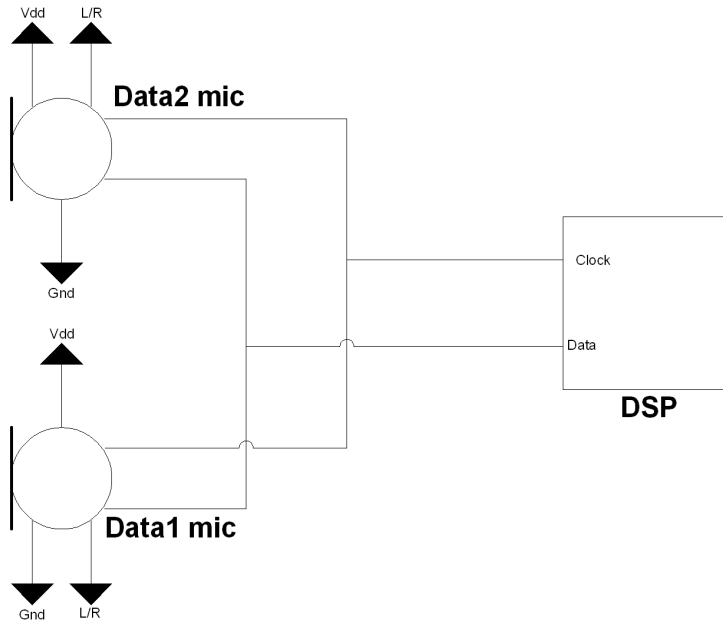
7. RECOMMENDED CUSTOMER LAND PATTERN



8. RECOMMENDED SOLDER STENCIL PATTERN

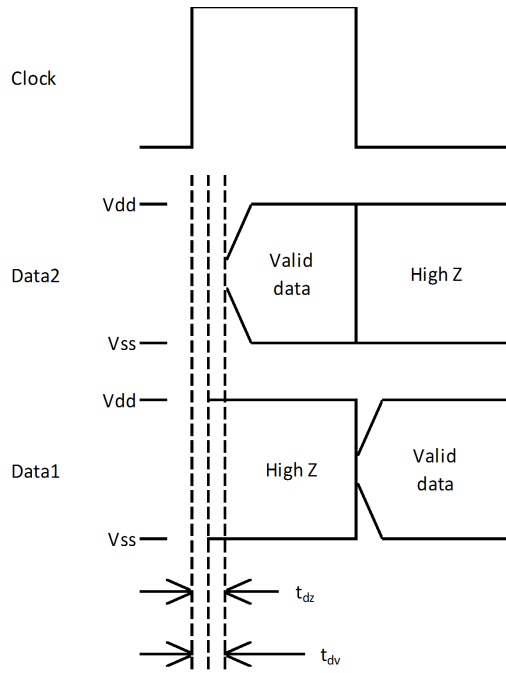
N/A

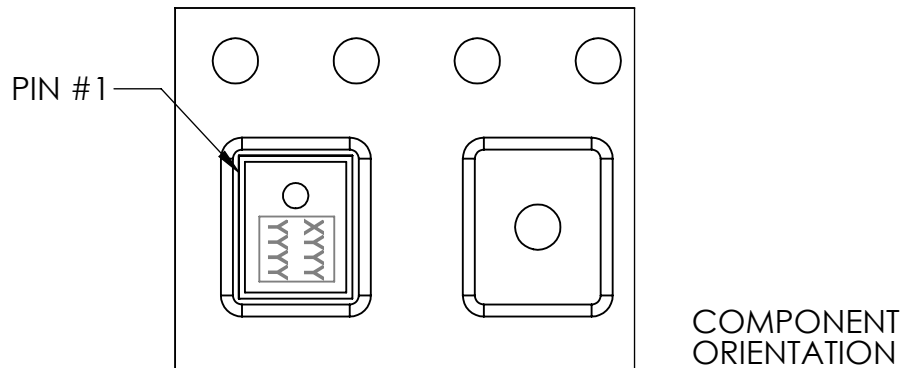
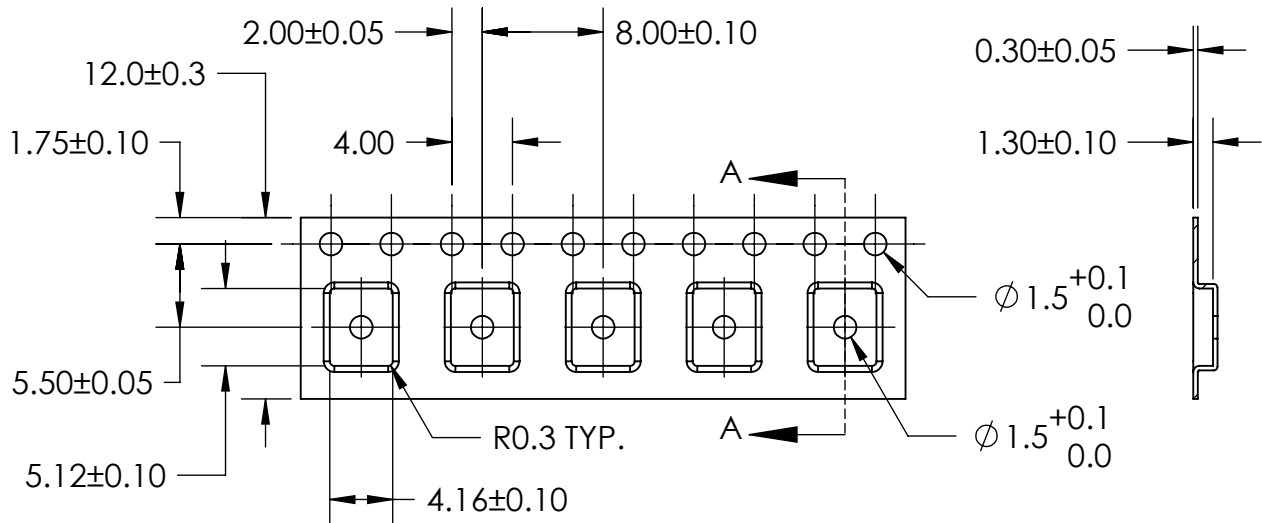
9. RECOMMENDED INTERFACE CIRCUIT & TIMING DIAGRAM



LABEL	L/R	Drives data after	High-Z after
Data2	High	Rising clock edge	Falling clock edge
Date1	Low	Falling clock edge	Rising clock edge

TIMING DIAGRAM



10. PACKAGING DETAIL


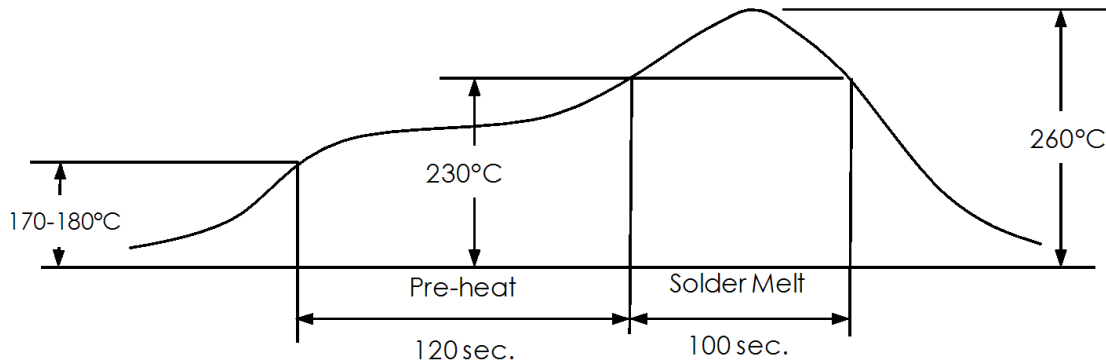
MODEL NUMBER	SUFFIX	REEL DIAMETER	QUANTITY PER REEL
SPM0405HD4H-WB	-2	7"	1,200
	-6	13"	4,800

TAPE & REEL	PER EIA-481
LABEL	LABEL APPLIED TO EXTERNAL PACKAGE & DIRECT TO REEL.

Note:

Dimensions are in millimeters unless otherwise specified.

11. SOLDER FLOW PROFILE



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

12. ADDITIONAL NOTES

- (A) Shelf life: Twelve (12) 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.
- (B) MSL (moisture sensitivity level) Class 2a.
- (C) Do not pull a vacuum over port hole of the microphone. Pulling a vacuum over the port hole can damage the device.
- (D) 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.
- (E) Do not brush board after the reflow process. Brushing the board with/without solvents can damage the device.
- (F) Do not insert any object in port hole of device at any time as this can damage the device.
- (G) Number of reflow - Recommend no more than 3 cycles.

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 -40°C to +125°C with 15 minute soaks. (ICE 68-2-4)
High Temperature Storage	+105°C environment for 1,000 hours. (ICE 68-2-2 Test Ba)
Low Temperature Storage	-40°C environment for 1,000 hours. (ICE 68-2-2 Test Aa)
High Temperature Bias	+105°C environment while under bias for 1,000 hours. (ICE 68-2-2 Test Ba)
Low Temperature Bias	-40°C environment while under bias for 1,000 hours. (ICE 68-2-2 Test Aa)
Temperature / Humidity Bias	+85°C/85% R.H. environment while under bias for 1,000 hours. (JESD22-A101A-B)
Vibration	4 cycles lasting 12 minutes from 20 TO 2,000 Hz in X, Y and Z direction with peak acceleration of 20g. (MIL 883E, Method 2007.2, A)
Electrostatic Discharge	3 discharges at +/-8kV direct contact to lid when unit is grounded (IEC 61000-4-2) and 3 discharges at +/-2kV direct contact to I/O pins. (MIL 883E, Method 3015.7)
Reflow	5 reflow cycles with peak temperature of +260°C.
Mechanical Shock	3 pulses of 10,000g in the X, Y and Z direction. (IEC 68-2-27, Test Ea)

14. SPECIFICATION REVISIONS

Revision	Detailed Specification Changes	Date
A	INITIAL RELEASE	8-28-09

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