

Data Sheet

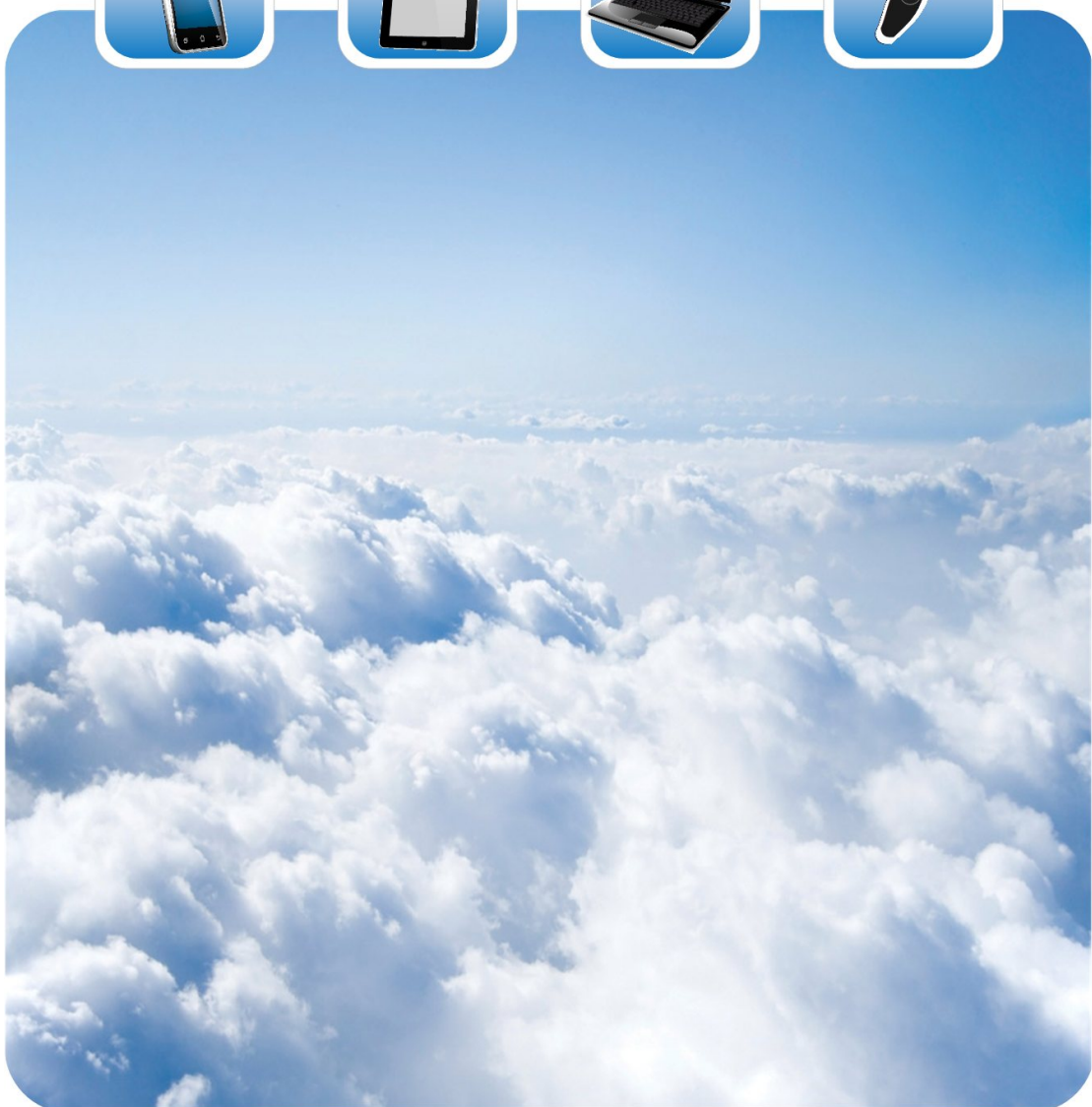
V 1.1 / Oct. 2017

MSM261S4030HOR

I²S digital output MEMS microphone with Multi-modes



苏州敏芯微电子技术股份有限公司
MEMSensing Microsystems (Suzhou, China) Co., Ltd.



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I²S digital output MEMS microphone



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GENERAL DESCRIPTION

MSM261S4030HOR is an omnidirectional, Top-ported, I²S digital output MEMS microphone. It has high performance and reliability.

MSM261S4030HOR is available in a 4 mm × 3 mm × 1.0 mm metal can LGA package. It is SMT compatible with no sensitivity degradation.

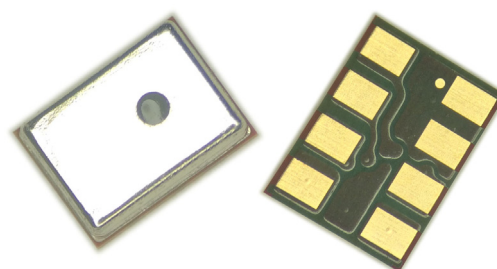
APPLICATIONS

- ✧ Mobile Phone
- ✧ Laptop
- ✧ Tablet computer
- ✧ Bluetooth headset
- ✧ Earphone
- ✧ Wearable intelligent equipment

FEATURES

- ✧ Cost effective
- ✧ Low Power mode
- ✧ Digital I²S output
- ✧ Compatible with Sn/Pb and Pb-free solder processes
- ✧ RoHS/Halogen free compliant
- ✧ Sensitivity Matching within +/-1dB

PRODUCT VIEW



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ABSOLUTE MAXIMUM RATINGS

| Parameter | Maximum value | Unit |
|------------------------------------|---------------|--------|
| Supply Voltage | -0.3 to 4.0 | V |
| Sound Pressure Level | 140 | dB SPL |
| Mechanical Shock | 10,000 | g |
| Temperature Range | -40 to 100 | °C |
| Electrostatic discharge protection | 2 (HBM) | kV |

SPECIFICATIONS

All data taken at 25°C, Relative Humidity 45±5% L/R pin grounded unless otherwise specified
Vdd=1.8V, clock frequency=3.072MHz

| | Limits | | | unit | condition |
|--|------------------------------------|------|------|---------|------------------------------------|
| | Min. | Nom. | Max. | | |
| Directivity | Omni directional | | | | |
| Sensitivity | -27 | -26 | -25 | dB | dBFS @1kHz 1Pa |
| Operation voltage | 1.6 | | 3.6 | V | |
| Freq. range | Refer to the frequency response | | | Hz | |
| Sensitivity loss across supply voltage | No change across the voltage range | | | dB | |
| Signal to noise ratio | - | 61 | - | dB | 20 kHz bandwidth, A-weighted |
| THD | - | 0.2 | - | % | 94dB SPL @1kHz S =Nom, Rload > 2 k |
| AOP | - | 124 | - | dB SPL | 10% THD @1kHz S =Nom, Rload > 2 k |
| Polarity | Increasing sound | | | | Increasing density of 1's |
| PSR | -72 | | | dBFS(A) | |
| Current consumption | - | 750 | 1000 | μA | Normal mode |
| | - | 400 | - | μA | Low power mode |
| Clock frequency | 1.0 | 3 | 4.0 | MHz | Normal mode |
| | 150 | - | 800 | KHz | Low power mode |
| Storage temperature | -40 | - | 100 | °C | |

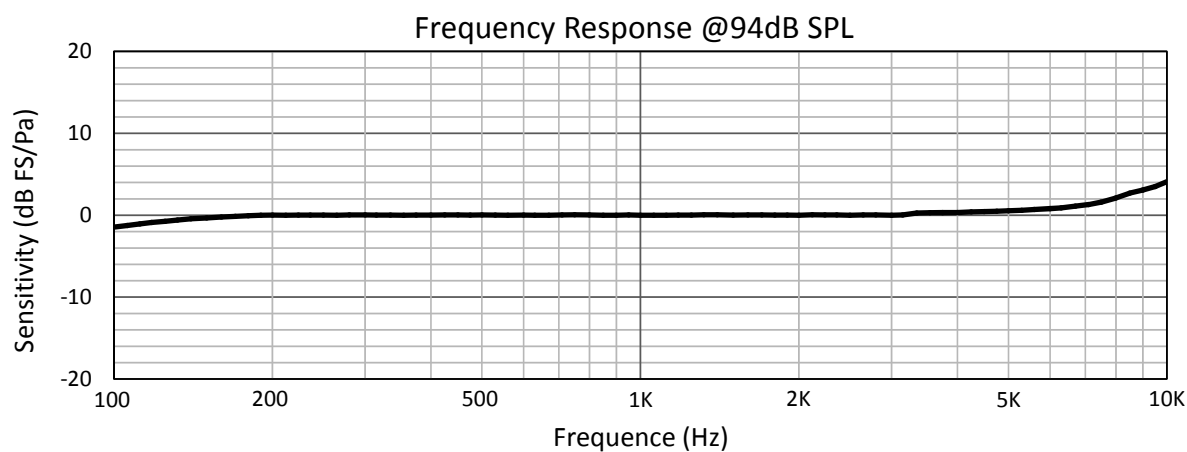
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I²S digital output MEMS microphone

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TYPICAL FREQUENCY RESPONSE



LOGIC TABLE

| | Parameter | Symbol | Min | Max | Unit |
|-------------------|----------------------------------|--------|------------------|-------------------|------|
| Digital Input | Low Voltage Input(L/R, WS, SCK) | VIL | 0 | $0.25 \times VDD$ | V |
| | High Voltage Input(L/R, WS, SCK) | VIH | $0.7 \times VDD$ | VDD | V |
| SD Digital Output | Voltage Output Low | VOL | | $0.1 \times VDD$ | V |
| | Voltage Output Low | VOL | | $0.3 \times VDD$ | V |
| | Voltage Output High | VOH | $0.7 \times VDD$ | | V |
| | Voltage Output High | VOH | $0.9 \times VDD$ | | V |
| Digital Output | Voltage Output Low | VOL | | $0.1 \times VDD$ | V |
| | Voltage Output Low | VOL | | $0.3 \times VDD$ | V |
| | Voltage Output High | VOH | $0.7 \times VDD$ | | V |
| | Voltage Output High | VOH | $0.9 \times VDD$ | | V |

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I²S digital output MEMS microphone

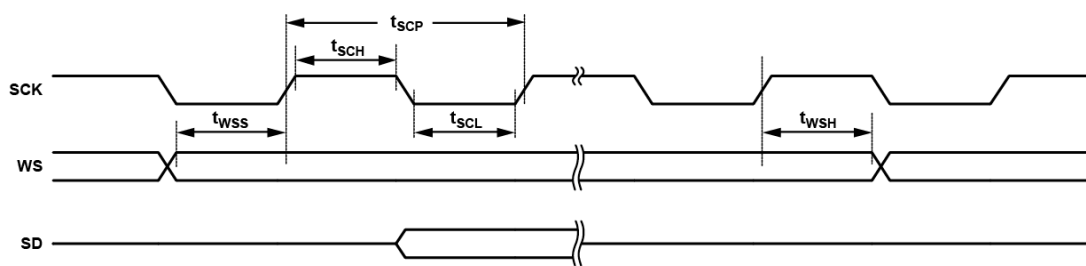


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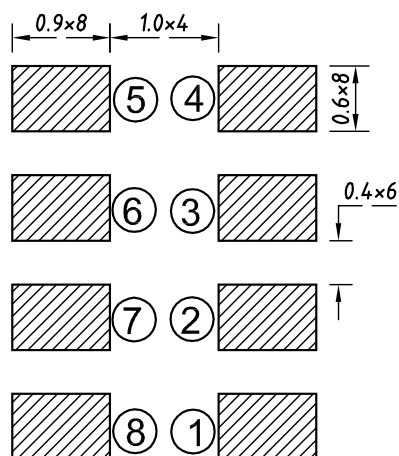
TIMING DIAGRAM

| Parameter | Description | Min. | Norm. | Max. | Unit |
|-----------|---------------|------|-------|------|------|
| tSCH | SCK High | — | 50 | — | ns |
| tSCL | SCK Low | — | 50 | — | ns |
| tSCP | SCK Period | — | 325 | — | ns |
| fSCK | SCK Frequency | — | 3.072 | — | MHz |
| tWSS | WS Setup | — | 0 | — | ns |
| tWSH | WS Hold | — | 20 | — | ns |
| fWS | WS Frequency | — | 48 | — | kHz |



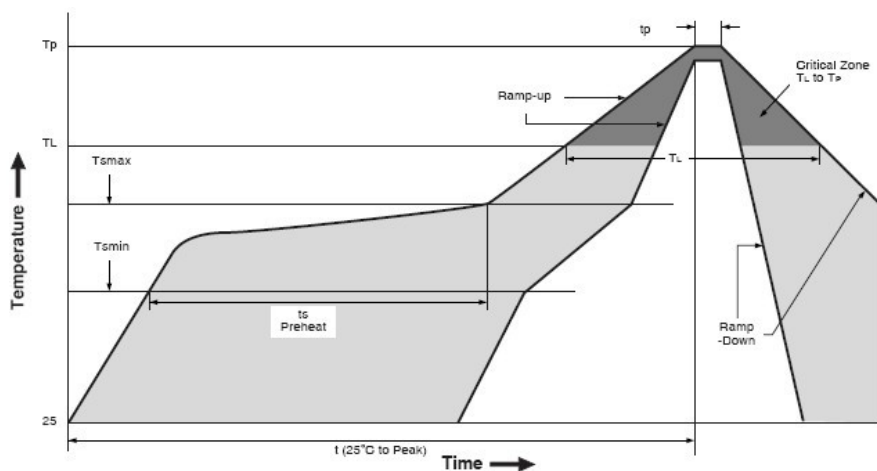
SMT Parameters:

1. Recommend PCB land pattern layout: (unit: mm)





2. Recommend reflow profile:



| Description | Parameter | Pb free |
|--|---------------------|-------------------|
| Average ramp rate | T_L to T_P | 3 °C/sec max |
| Preheat | | |
| Minimum temperature | T_{SMIN} | 150 °C |
| Maximum temperature | T_{SMAX} | 200 °C |
| Time(T_{SMIN} to T_{SMAX}) | t_S | 60 sec to 120 sec |
| Ramp-up rate | T_{SMAX} to T_L | 1.25 °C/sec |
| Time maintained above liquidus temperature | t_L | 60 sec to 150 sec |
| Liquidus temperature | T_L | 217 °C |
| Peak temperature | T_P | 260 °C |
| Time within 5°C of actual peak temperature | t_p | 20 sec to 40 sec |
| Ramp-down rate | T_P to T_{smax} | 6 °C/sec max |
| Time 25 °C ($t_{25 °C}$) to peak temperature | t | 8 minutes max |

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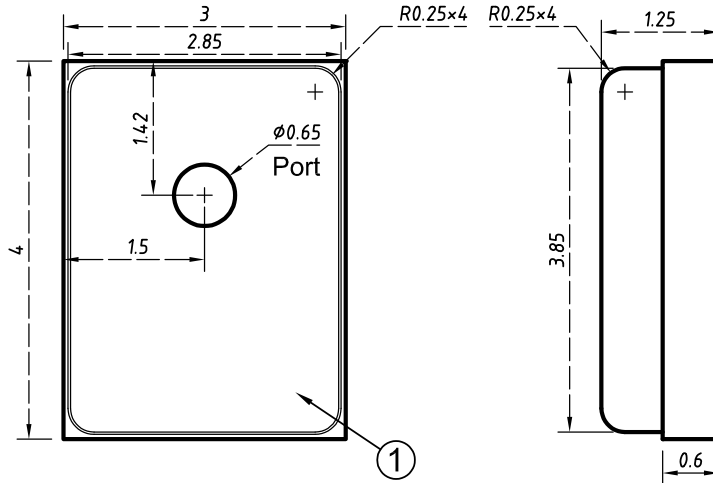
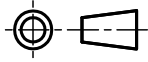
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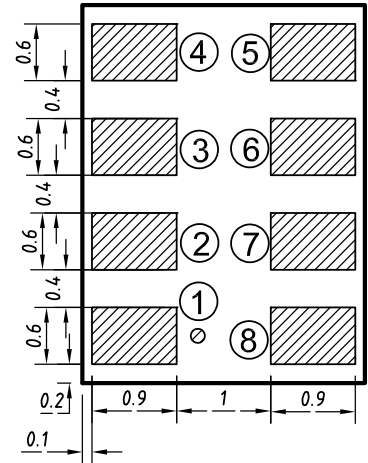


OUTLINE DIMENSIONS AND PIN DEFINITION:



TOP VIEW

SIDE VIEW



BOTTOM VIEW

| | | | |
|---|--------|--------|--|
| 1 | GND | Ground | Connect to ground on the PCB. |
| 2 | N/C | — | Do not connect |
| 3 | WS | Input | Serial Data-Word Select for I ² S Interface. |
| 4 | CHIPEN | Input | Microphone Enable. When set low (ground), the microphone is disabled and put in power-down mode. When set high (VDD), the microphone is enabled. |
| 5 | L/R | Input | Left/Right Channel Select. When set low, the microphone outputs its signal in the left channel of the I ² S frame; when set high, the microphone outputs its signal in the right channel. |
| 6 | SCK | Input | Serial Data Clock for I ² S Interface. |
| 7 | SD | Output | Serial Data Output for I ² S Interface. This pin tristates when not actively driving the appropriate output channel. The SD trace should have a 100 kΩ pull-down resistor to discharge the line during the time that all microphones on the bus have tristated their outputs. |
| 8 | VDD | Power | 1.8 to 3.3 V. This pin should be decoupled to Pin 1 with a 0.1 μF capacitor and a 10μF capacitor. |

| Item | Dimension | Tolerance |
|--------------------|-----------|-----------|
| Length (L) | 4.0 | ±0.10 |
| Width (W) | 3.0 | ±0.10 |
| Height (H) | 1.25 | ±0.10 |
| Acoustic Port (AP) | Ø0.65 | ±0.05 |

Dimensions are in millimeters
Tolerance is ±0.1mm unless otherwise specified.

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ADDITIONAL NOTES

- (A) MSL (moisture sensitivity level) Class 2a.
- (B) Maximum of 3 reflow cycles is recommended.
- (C) In order to minimize device damage:
 - Do not board wash or clean after the reflow process.
 - Do not brush board with or without solvents after the reflow process.
 - Do not directly expose to ultrasonic processing, welding, or cleaning.
 - Do not insert any object in port hole of device at any time.
 - Do not apply air pressure into the port hole.
 - Do not pull a vacuum over port hole of the microphone.

MATERIALS STATEMENT

Meets the requirements of the European RoHS and Halogen-Free.

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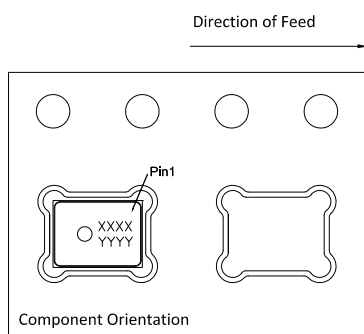
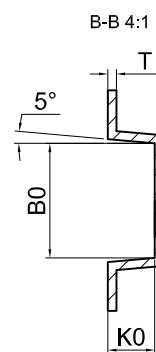
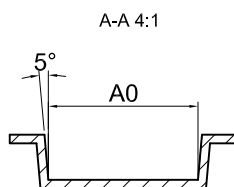
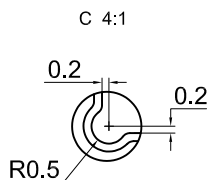
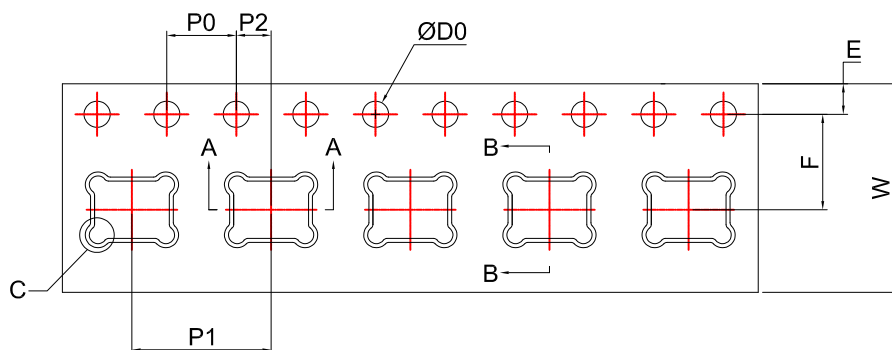
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PACKAGING & MARKING DETAIL:



| ITEM | W | E | F | ØD0 | K0 |
|---------|------------|------------|-----------|------------------------------------|-----------|
| DIM(mm) | 12.00±0.30 | 1.75±0.10 | 5.50±0.10 | 1.50 ^{+0.10} ₀ | 1.35±0.10 |
| ITEM | P0 | 10P0 | P1 | A0 | B0 |
| DIM(mm) | 4.00±0.10 | 40.00±0.20 | 8.00±0.10 | 4.30±0.10 | 3.30±0.10 |
| ITEM | P2 | T | | | |
| DIM(mm) | 2.00±0.10 | 0.25±0.05 | | | |

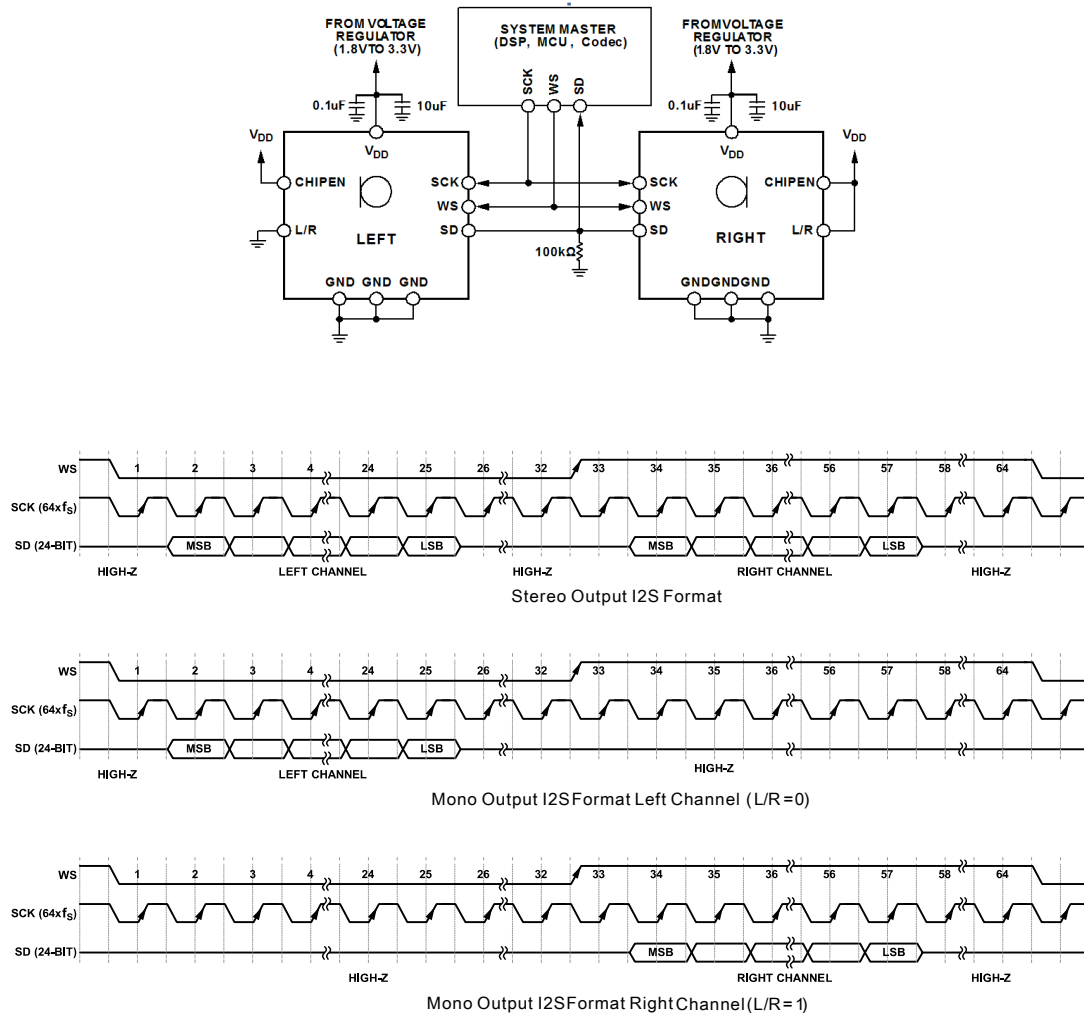
Note:

- 1) Dimensions are in mm;
- 2) Don't put the vacuum suction nozzle alignment the port hole;
- 3) Tape & Reel Per EIA-481 standard;
- 4) Label applied to external package and direct to reel;
- 5) Static voltage <100V;

| Model Number | Reel Diameter | Quantity Per Reel |
|----------------|---------------|-------------------|
| MSM261S4030HOR | 13 inch | 5700 |



RECOMMENDED INTERFACE CIRCUIT:



I²S DATA INTERFACE

The serial data is in slave mode I²S format, which has 24-bit depth in a 32 bit word. In a stereo frame there are 64 SCK cycles, or 32 SCK cycles per data-word. When L/R=0, the output data in the left channel, while L/R=VDD, data in the right channel. The output data pin (SD) is tri-stated after the LSB is output so that another microphone can drive the common data line.

Data Word Length

The output data-word length is 24 bits per channel. The Mic must always have 64 clock cycles for every stereo data-word ($f_{SCK} = 64 \times f_{WS}$).

Data-Word Format

The default data format is I²S, MSB-first. In this format, the MSB of each word is delayed by

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one SCK cycle from the start of each half-frame.

RELIABILITY SPECIFICATIONS

| Test | Description |
|---------------------------|--|
| Thermal Shock | 100 cycles air-to-air thermal shock from -40°C to +125°C with 15 minute soaks. (IEC 68-2-4) |
| High Temperature Storage | 1,000 hours at +105°C environment (IEC 68-2-2 Test Ba) |
| Low Temperature Storage | 1,000 hours at -40°C environment (IEC 68-2-2 Test Aa) |
| Reflow | 5 reflow cycles with peak temperature of +260°C |
| ESD-HBM/LID-GND | 3 discharges of ±2 kV direct contact to I/O pins. (MIL 883E, Method 3015.7)& 3 discharges of ±8 kV direct contact to lid while unit is grounded. (IEC 61000-4-2) |
| Vibration | 4 cycles of 20 to 2,000 Hz sinusoidal sweep with 20 G peak acceleration lasting 12 minutes in X, Y and Z directions. (Mil-Std-883E, Method 2007.2 A) |
| Mechanical Shock | 3 pulses of 10,000 G in the X, Y and Z direction (IEC 68-2-27, Test Ea) |
| High Temperature Bias | 1,000 hours at +105°C under bias (IEC 68-2-2 Test Ba) |
| Low Temperature Bias | 1,000 hours at -40°C under bias (IEC 68-2-2 Test Aa) |
| Temperature/Humidity Bias | 1,000 hours at +85°C/85% R.H. under bias. (JESD22-A101A-B) |
| Drop Test | To be no interference in operation after dropped to 1.0cm steel plate 18 times from 1.5 meter height |

NOTE: Sensitivity should vary within ±3dB from initial sensitivity. (The measurement to be done after 2 hours of conditioning at 20±2°C, R.H 60%~70%)

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REVISION HISTORY:

| Revision | Subjects (major changes since last revision) | Date |
|----------|--|------------|
| 0.8 | Preliminary Edition | 2017-02-14 |
| 1.0 | Initial release | 2017-05-02 |
| 1.1 | Update packaging detail | 2017-10-24 |

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