



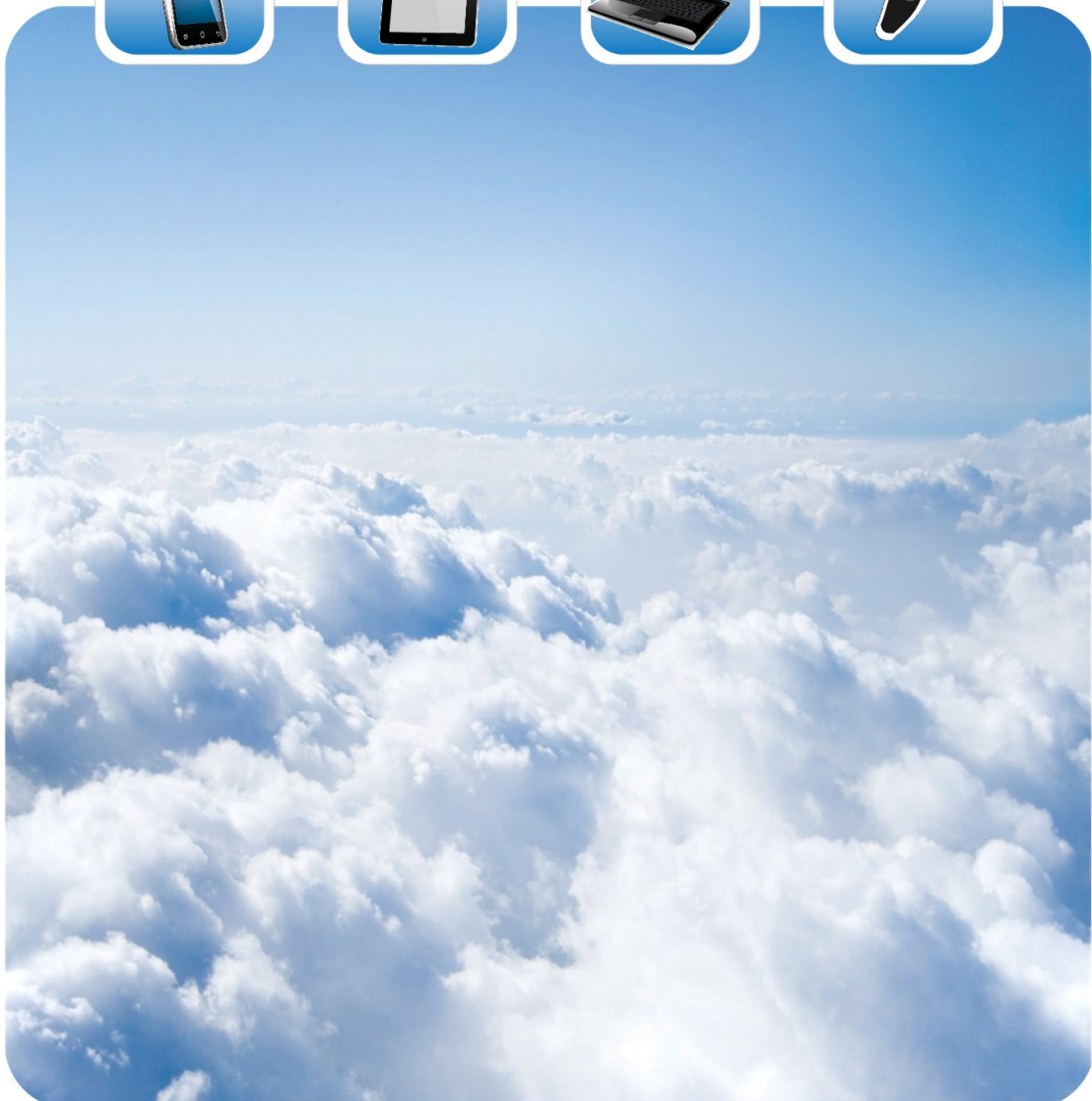
苏州敏芯微电子技术股份有限公司  
MEMSensing Microsystems (Suzhou, China) Co., Ltd.

# Data Sheet

V 1.1 / Oct. 2017

## MSM261S4030H0R

I<sup>2</sup>S digital output MEMS microphone with Multi-modes



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# MSM261S4030HOR

I<sup>2</sup>S digital output MEMS microphone



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## GENERAL DESCRIPTION

MSM261S4030HOR is an omnidirectional, Top-ported, I<sup>2</sup>S 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.

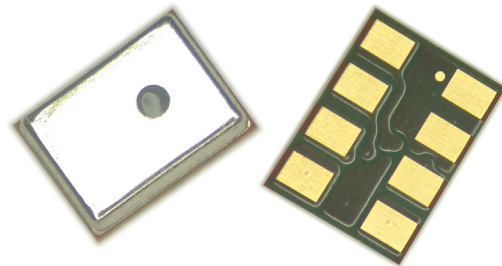
## APPLICATIONS

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

## FEATURES

- ✧ Cost effective
- ✧ Low Power mode
- ✧ Digital I<sup>2</sup>S output
- ✧ Compatible with Sn/Pb and Pb-free solder processes
- ✧ RoHS/Halogen free compliant
- ✧ Sensitivity Matching within +/-1dB

## PRODUCT VIEW



**MSM261S4030HOR**  
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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

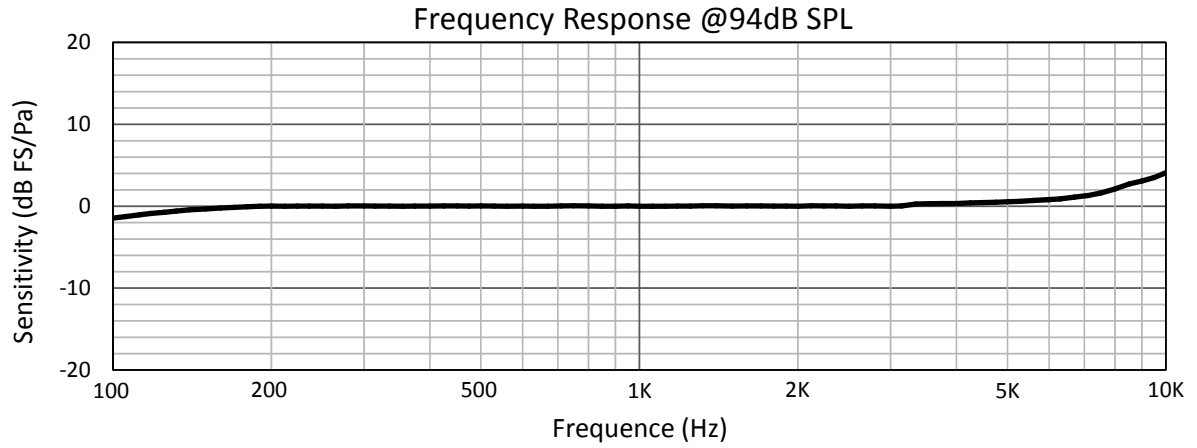
	Limits			unit	condition
	Min.	Nom.	Max.		
Directivity	Omni directional				
Sensitivity	-27	-26	-25	dB	dBFS @1kHz 1Pa
Operation voltage	1.6		3.6	V	
Freq. range	Refer to the frequency response			Hz	
Sensitivity loss across supply voltage	No change across the voltage range			dB	
Signal to noise ratio	-	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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**TYPICAL FREQUENCY RESPONSE**



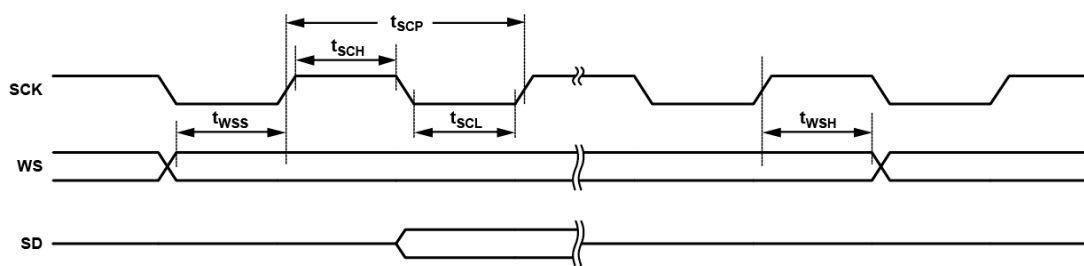
**LOGIC TABLE**

	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	Voltage Output Low	VOL		$0.1 \times VDD$	V
	Voltage Output Low	VOL		$0.3 \times VDD$	V
Digital Output	Voltage Output High	VOH	$0.7 \times VDD$		V
	Voltage Output High	VOH	$0.9 \times VDD$		V
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



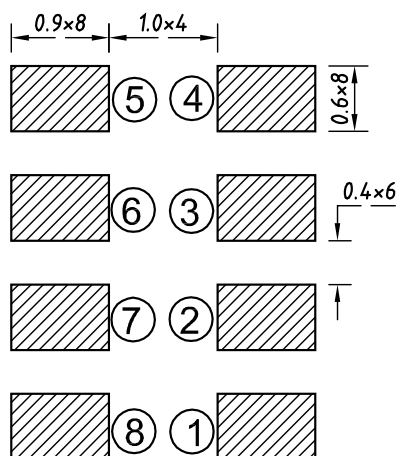
## TIMING DIAGRAM

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



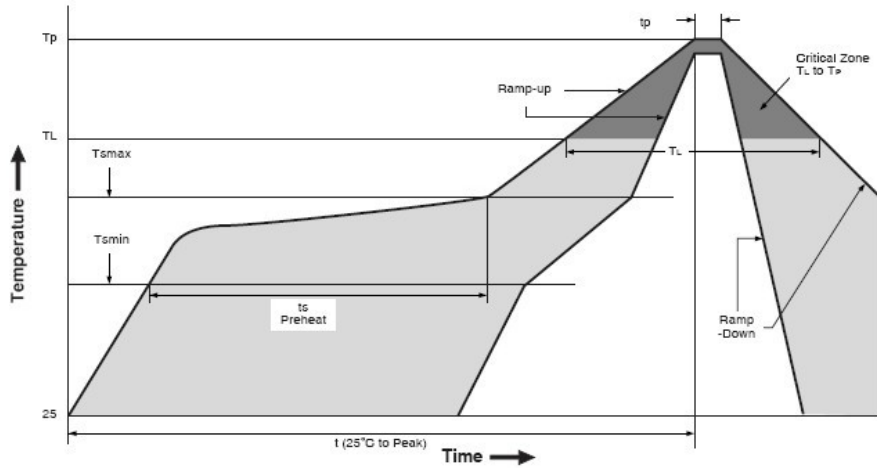
## SMT Parameters:

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





2. Recommend reflow profile:



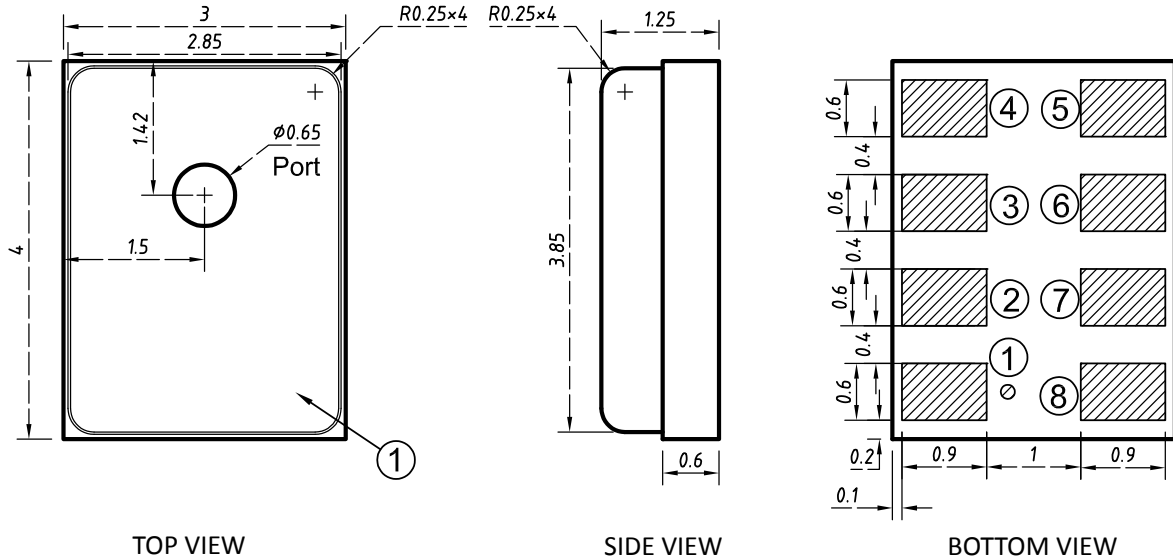
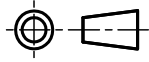
Description	Parameter	Pb free
Average ramp rate	$T_L$ to $T_P$	3 °C/sec max
Preheat		
Minimum temperature	$T_{SMIN}$	150 °C
Maximum temperature	$T_{SMAX}$	200 °C
Time( $T_{SMIN}$ to $T_{SMAX}$ )	$t_S$	60 sec to 120 sec
Ramp-up rate	$T_{SMAX}$ to $T_L$	1.25 °C/sec
Time maintained above liquidus temperature	$t_L$	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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**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 <sup>2</sup> 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 <sup>2</sup> S frame; when set high, the microphone outputs its signal in the right channel.
6	SCK	Input	Serial Data Clock for I <sup>2</sup> S Interface.
7	SD	Output	Serial Data Output for I <sup>2</sup> 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)	∅0.65	±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

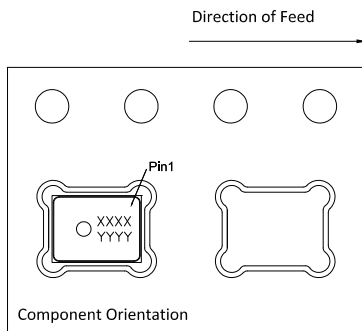
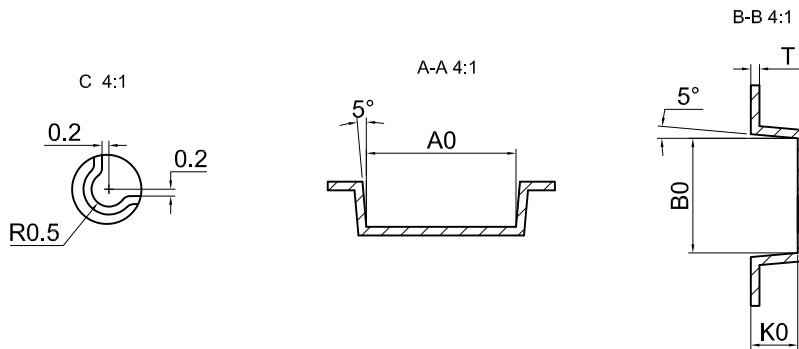
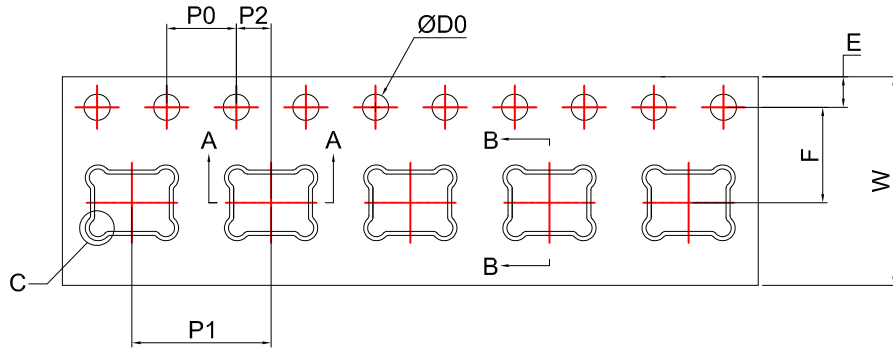
Meets the requirements of the European RoHS and Halogen-Free.



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**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 <sup>+0.10</sup> <sub>0</sub>	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			

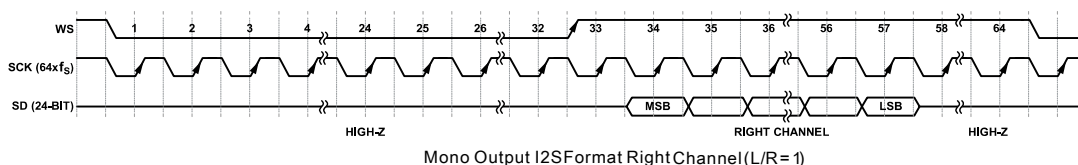
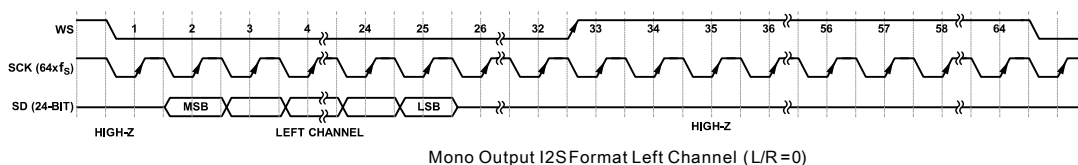
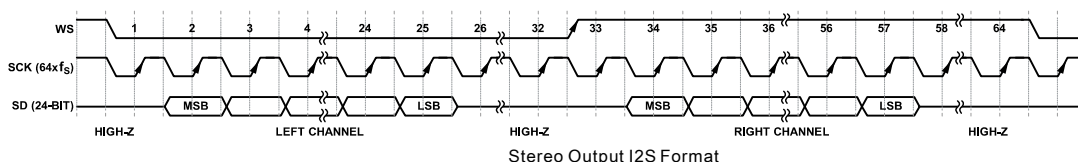
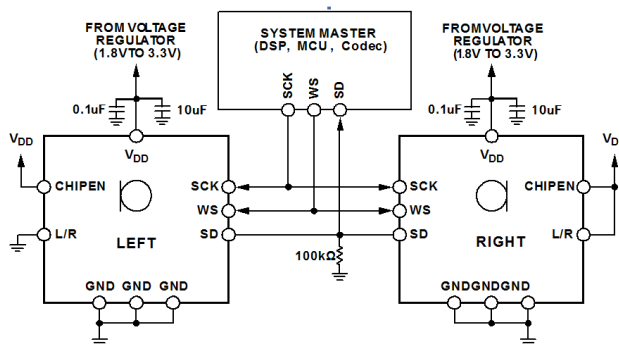
**Note:**

- 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:



## I<sup>2</sup>S DATA INTERFACE

The serial data is in slave mode I<sup>2</sup>S 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 I<sup>2</sup>S, 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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