Waterproof MEMS Microphone with Top Port and Analog Output

DESCRIPTION

The ZTS6411 is a high quality, low cost, low power analog output top-ported omni-directional MEMS microphone. ZTS6411 consists of a MEMS microphone element and an preamplifier. ZTS6411 has a high SNR and flat wideband frequency response, resulting in natural sound with high intelligibility. Extra EMI filter for RF noise attenuation is built inside. Due to the built-in filter, ZTS6411 shows high immunity to EMI.

The ZTS6411 is available in a thin 3.76mm × 2.95mm × 1.3mm surface-mount package. It is reflow solder compatible with no sensitivity degradation. The ZTS6411 is halide free.

APPLICATIONS

- Mobile telephones
- PDAs
- Digital video cameras
- Portable media devices with audio input

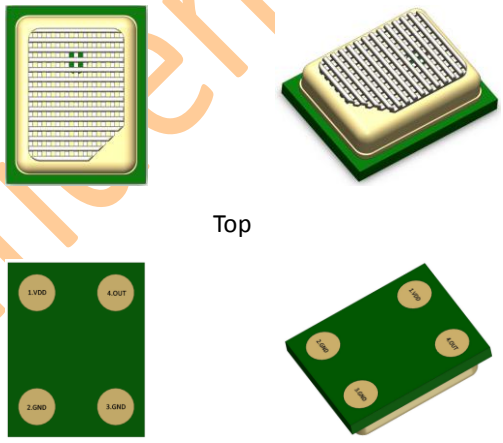
ORDERING INFORMATION

PART	RoHS	Ship, Quantity
ZTS6411	Yes	Tape and Reel, 5.2K

FEATURES

- 3.76mm×2.95mm×1.3mm surface-mount package
- Stable sensitivity over power supply range of 1.5V-3.6V
- SNR of 59dBA
- Sensitivity of −42dBV
- Low current consumption of <200μA
- Multi Chip Module (MCM) Package
- IP68 compatible

Pins Configuration and Description



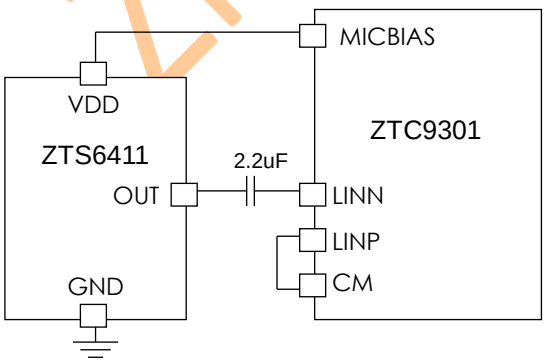
Top

Bottom

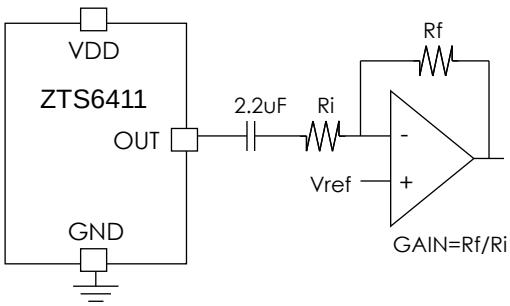
Isometric Views of ZTS6411 Microphone Package

Typical Applications

The ZTS6411 output can be connected to a codec microphone input or to a high input impedance gain stage. A dc-blocking capacitor is required at the output of the microphone.



Connect to Audio Codec



Connect to Audio OPAMP

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Absolute Maximum Ratings

Supply Voltage ..... –0.5V to +4V
Sound Pressure Level 160dB
Mechanical Shock 10000g
Vibration ..... Per MIL-STD-883 Method 2007, Test Condition B
Temperature Range ..... –40°C to +100°C

CAUTION: Stresses above those listed in "Absolute Maximum Ratings" may cause permanent damage to the device. This is a stress only rating and operation of the device at these or any other conditions above those indicated in the operational sections of this specification is not implied.

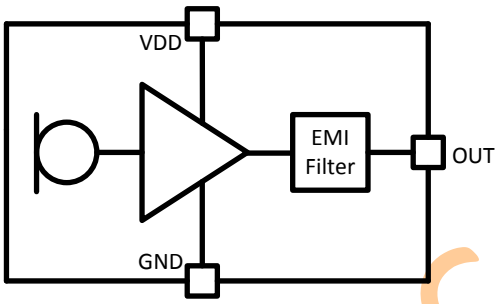
Electro-Static Discharge Sensitivity

This integrated circuit can be damaged by ESD. It is recommended that all integrated circuits be handled with proper precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.

Pins Description

Pin	Symbol	Description
1	VDD	Power Supply.
2,3	GND	Ground.
4	OUT	Analog output signal.

Functional Block Diagram



Specifications

(T_A = +15°C ~+25°C, V_{DD} = +1.8V, unless otherwise noted.)

PARAMETER	Symbol	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Directivity				Omni		
Supply Voltage	V_{DD}		1.5		3.6	V
Current Consumption	I_{DD}				200	µA
Sensitivity (Note)		1kHz, 94dB SPL	–43	–42	–41	dBV
Signal-to-Noise-Ratio	SNR			59		dB
Equivalent Input Noise	EIN			35		dBA SPL
Total Harmonic Distortion	THD	105dB SPL			3	%
Power Supply Rejection Ratio	PSRR	217Hz, 100mV Vp-p, square wave on V_{DD}		65		dB
Maximum Acoustic Input				120		dB SPL
Output Impedance	Zout			200		Ω
Output DC Offset				0.75		V
Output Current Limit				90		µA
Polarity				Noninverting		

Note: Base on BK sound test system.

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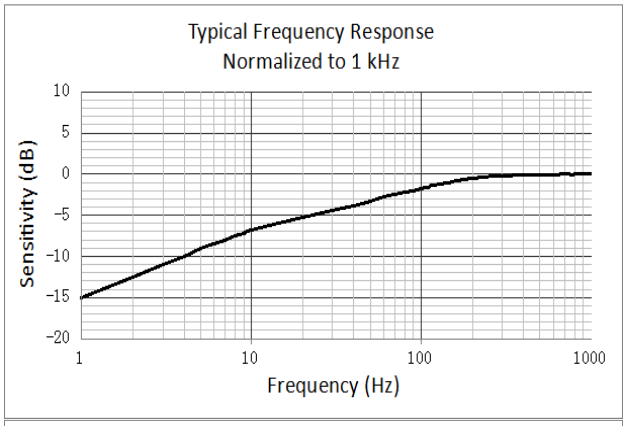
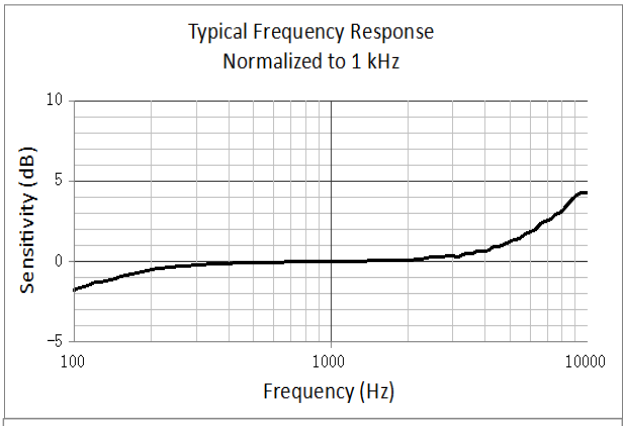
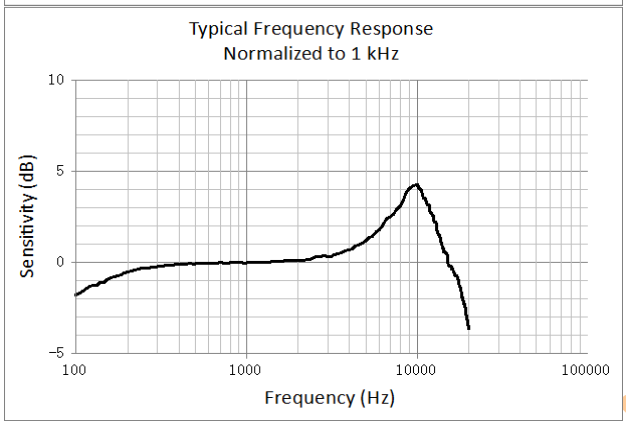
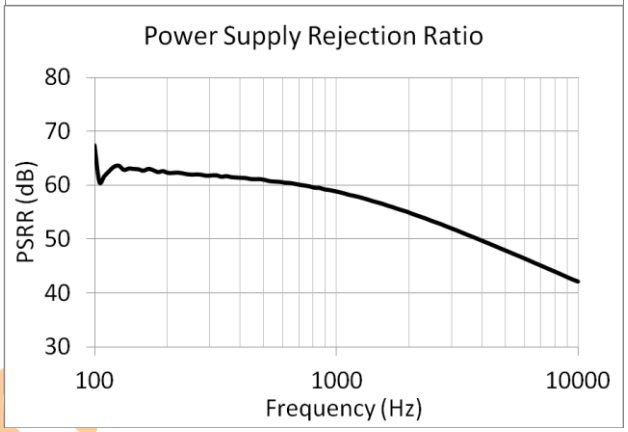
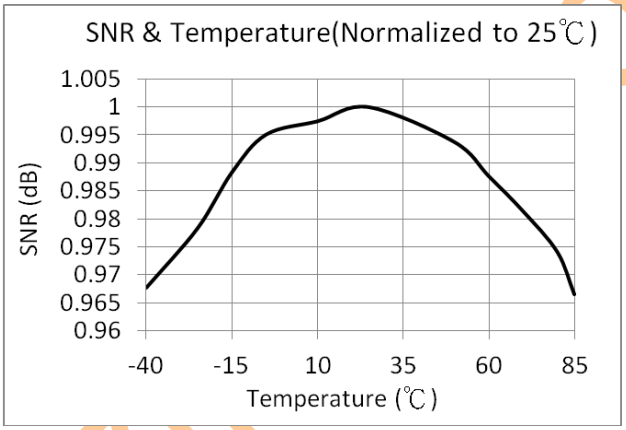
Typical Performance Characteristics

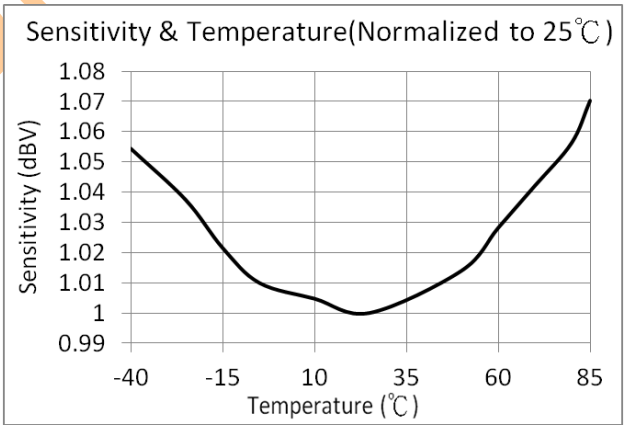


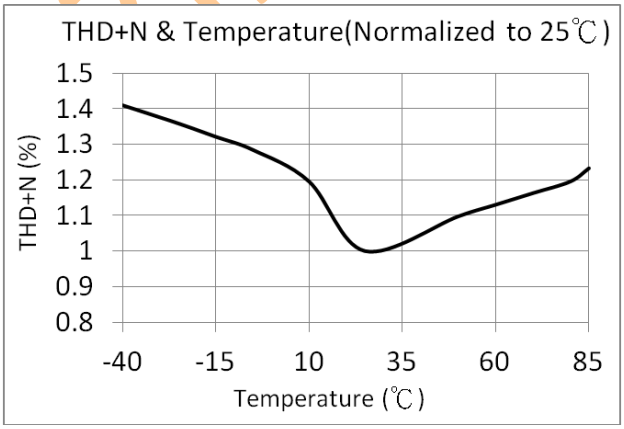












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Reliability Tests

The microphone sensitivity after stress must deviate by no more than ±3dB from the initial value.

1.Heat Test, Operational	Temperature: 85±3°C Humidity: 85±5%RH Duration: 12 hours Voltage: Applied
2.Cold Test, Operational	Temperature: -40±3°C Duration: 12 hours Voltage: Applied
3.Heat Test, Non-Operational	Temperature: 85±3°C Humidity: 50±5%RH Duration: 96 hours Voltage: Not Applied
4.Cold Test, Non-Operational	Temperature: -40±3°C Duration: 96 hours Voltage: Not Applied
5.Condensation Test, Non-Operational	Temperature: 25±3°C and 55±3°C Humidity: 95±5%RH Duration: 1 hours each, during 10 minutes ramp, 45 cycles Voltage: Not applied
6.Temperature Cycling, Non-Operational	Temperature: -40±3°C and 85±3°C Humidity: 50±5% RH Duration: 2 hours each, during 6 hours ramp, 5 cycles Voltage: Not applied
7.Thermal Shock Test, Non-Operational	Temperature: -40±3°C and 85±3°C Duration: 30 minutes each, during 5 minutes ramp, 256 cycles Voltage: Not applied
8.Free Fall Test 1.5m	Placed inside test fixture and dropped on concrete from height 1.5m. (1)3 times by 6 surfaces (2)1 times by 12 edges (3)1 times by 8 corners
9.Random Vibration	Temperature: 23±5°C Humidity: 35~70% RH Duration: 2 hours each axis(X,Y,Z) Power Spectral Density: 5Hz 0.10m2/s3(=1.0391*10-3g2/Hz) 12Hz 2.20m2/s3(=22.8602*10-3g2/Hz) 20Hz 2.20m2/s3(=22.8602*10-3g2/Hz) 200Hz 0.04m2/s3(=0.41534*10-3g2/Hz) 200Hz 0.04m2/s3(=0.41564*10-3g2/Hz)
10.Repeated Low Level Free Fall Test	Placed inside test fixture and dropped on rubber mat from height of 10cm. Each face 2500 times(Total 6 faces, 15000times)
11.1m Repeated Rotating Free Fall	Placed inside test fixture and dropped on steel sheet from height of 1.0m. 100 times(all faces) Rotation speed of barrel: 10~12 falls/minute
12.Free Fall Test for master box	Corner drop: Each Corner 1 time Edge drop: Each Edge 1 time Face drop: Each Face 1 time

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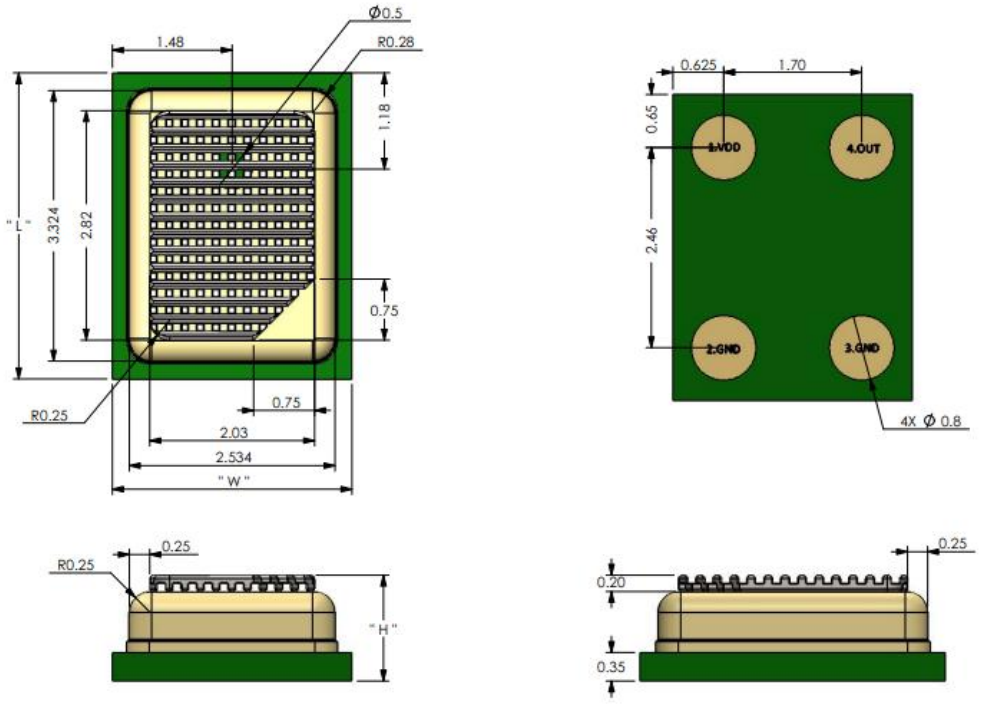
13.Random Vibration for master box	Sinusoidal wave vibration Frequency: 5~50Hz Acceleration:7.4m/s2(0.76G) Sweep speed:9Hz/min(5~50Hz, one way 5 min) Test duration: Direction of Face 1-3 20min Direction of Face 2-4 20min Direction of Face 5-6 20min Sample and direction of vibration : 1 direction for 1 sample Package on vibrating table: Free
14.Substrate bending Test	Deflection: 3mm Rate: 0.5mm/sec
15.Adhesion	Load: 10 N Duration: 10 seconds
16.Electrostatic Discharge Test	Capacitance: 150pF Resistance: 330Ω Duration: 10 times Air Discharge: Level 3(+/-8kV) Direct contact discharge: Level 1 (+/-2kV)
17.Human Body Model	2000 Volts (100pF,1500Ω)
18.Charged Device Model	500 Volts
19.Self alignment effect	Displacement: 0.15mm

MECHANICAL SPECIFICATIOPNS



ITEM	DIMENSION	TOLERANCE	UNITS
Length (L)	3.760	±0.100	mm
Width (W)	2.950	±0.100	mm
Height (H)	1.300	+0.100 -0.150	mm
Acoustic Port (AP)	Ø0.500	±0.050	mm

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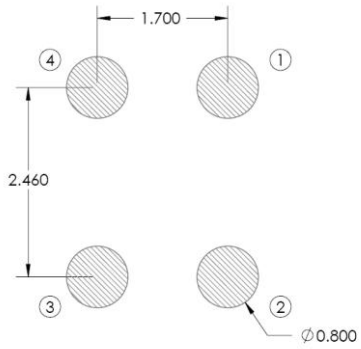
RECOMMENDED CUSTOMER LAND PATTERN

The recommended PCB land pattern for the ZTS6411 should have a 1:1 ratio to the solder pads on the microphone package. Care should be taken to avoid applying solder paste to the sound hole in PCB. The dimensions of suggested solder paste pattern refer to the land pattern **which should be shrunk by 0.025 per side**.



WATERPROOF MEMBRANE

Product Information		
performance	series ZTW 325	
Minimum instantaneous water entry pressure	1.0 bar	
IP rating	IP68	
Comparative water spray efficiency	85%	
Maximum transmission loss (max value 200-5000Hz)	<1dB	
Material type	PET-Nonwoven	
Material color	taupe	
Typical thickness	0.15mm	
temperature range	-40℃ to 300℃	
Material characteristic	Oleophobic	
Adhesive type	3M-9079	
	characteristics	0.002 in. (0.05 mm) thick high double coated non-woven high temperature acrylic adhesive
	Release Liner	0.0036 in. (0.09 mm) thickheat resistant liner heat resistant liner
	Color	clear
	Temperature tolerance (Short term)	Adhesive：530°F (300°C) Liner：500°F (260°C)
	Temperature tolerance (Long term)	Adhesive：350°F (175°C) Liner：N/A
RoHS	Meets threshold requirements	
Note. High temperatures may cause produce color changes, but without losing the waterproof feature.		

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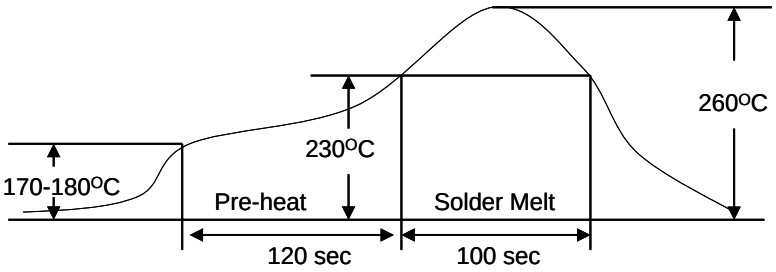
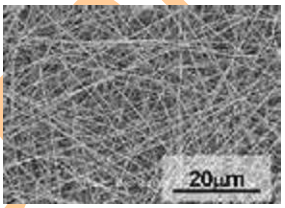
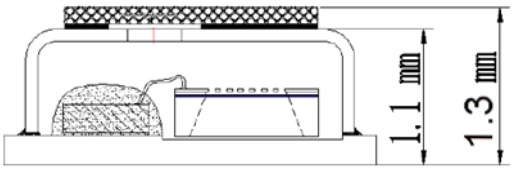
SOLDER FLOW PROFILE



Stage	Temperature Profile	Time (maximum)
Pre-heat	+170°C ~ +180°C	120sec
Supply Voltage	> +230°C	100sec
Peak	+260°C maximum	30sec

IP68 Standard And Appearance

Item		
Hole Size	Sound Hole: Φ=0.50mm	
Picture		
Structure		
Dimension	Length(L)	3.76 ± 0.100 mm
	Width(W)	2.95 ± 0.100 mm
	Height(H)	1.30 + 0.100/-0.150 mm

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Operating Instructions

Operating Instruction							
Document NO.	14091201	**Date**	20140912	**Page**	2	**Version**	A/0
Part NO.	ZTS6411 (ZTS325)	**Name**	Paste Waterproof	**Type**	Detection	**Staffing**	2
Item	**Material Code**		**Material Name**		**Material Spec.**		**Quantity**
1	ZTW32500010		ZTW325		1000mm*1000mm*0.15mm		1PCS
2							
3							

	Description	**Restriction**
Inspection Procedures	Check station and surface cleaning of product.	
	Check material attribute.	
	Check for Defects in the finished Product.	
Processes	1・Check the quality of the material, for example material attribute, surface cleaning.	
	2・Chopping film of test samples and posted on the bearer.	Ensure no leakage.
	3・Injected water in the vertically container, ensure a high degree of 1.5M.	
	4・Immersed not less than 30 minutes for testing sample in the container and observe whether leakage.	
	5・Three high-temperature treatment of waterproof membrane, observe the surface of the products is abnormal.	No abnormality in the surface, ex: no unglued.
	6・The reflow monomer into a 1.5M container and ensure that the test time is not less than 30 minutes.	
	7・Conducted acoustic test system validation of testing monomer sample.	Verify electrical characteristics and Frequency response test.
	8・Check and correct, into to the process.	
Introspection	Cut out defective products.	

Testing Process	
IQC	
Test Conditions	1・Chopped the Waterproof, posted on the bearer. 2・Filled with water in a height of 1.5m depth's container. 3・Testing with a stopwatch. Until did not find leaks and testing time over 30 minutes 1 second.
Monomer Testing	
Test Conditions	1・Posted on the Products after finished chopped of Waterproof membrane. 2・Three times reflow. Waterproof membrane without exception. 3・The reflow monomer into a 1.5M container. 4・Testing with a stopwatch. Until did not find leaks and testing time over 30 minutes 3 seconds.

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Equipment & P/N		Note.			
Equipment	**P/N**				
Container	ZTS1409001				
Waterproof membrane	ZTW325				
Chip	ZTS6411				
Stopwatch	ZTS1408102	**Approved**		**Audit**	
Acoustic test system	ZTS1410020				

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