Low Noise Bottom Port MEMS Microphone

DESCRIPTION

The ZTS6056 is a high quality, low cost, low power analog output bottom-ported omni-directional MEMS microphone. ZTS6056 consists of a MEMS microphone element and an preamplifier. ZTS6056 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, ZTS6056 shows high immunity to EMI.

The ZTS6056 is available in a thin 2.75mm × 1.85mm × 0.9mm surface-mount package. It is reflow solder compatible with no sensitivity degradation. The ZTS6056 is halide free.

APPLICATIONS

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

ORDERING INFORMATION

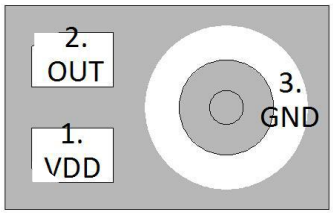
PART	RoHS	Ship, Quantity
ZTS6056	Yes	Tape and Reel, 5.2K

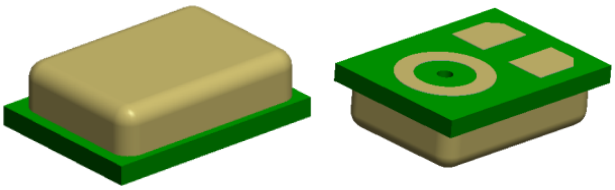
FEATURES

- Small package
- Flat Frequency Response SNR of 62.5dBA
- Low Current
- MaxRF protection
- Ultra-Stable Performance
- Standard SMD Reflow
- Omni-directional

Pins Configuration and Description

Bottom View

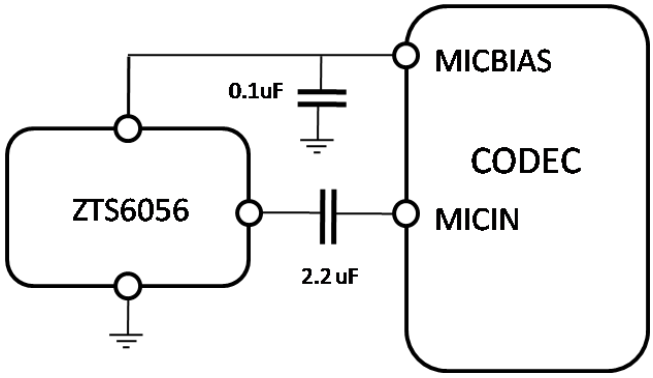




TOP BOTTOM

Typical Applications

The ZTS6056 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

Note:

All Ground pins must be connected to ground.

Capacitors near the microphone should not contain Class 2 dielectrics.

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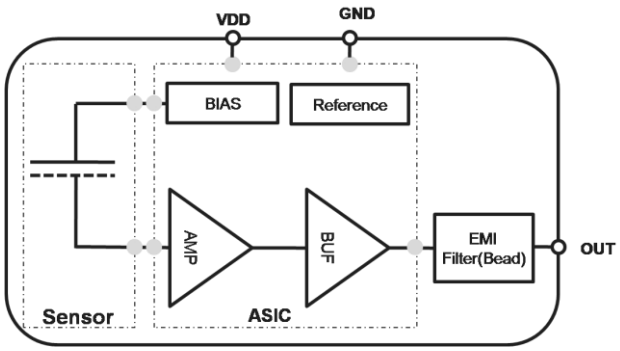
Absolute Maximum Ratings

V_{DD} to Ground ..... -0.5V to +5V
OUT to Ground ..... -0.3V to V_{DD}+0.3V
Input Current to Any Pin ..... ± 5 mA
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.

Functional Block Diagram



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	OUT	Analog output signal.
3	GND	Ground

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Specifications

(TEST CONDITIONS: 23 ±2°C, 55±20% R.H., V_{DD}(min) ≤ V_{DD} ≤ V_{DD}(max), no load, unless otherwise indicated.)

PARAMETER	Symbol	CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage[1]	V_{DD}		1.5	-	3.6	V
Supply Current[1,2]	I_{DD}		-	65	100	μA
Sensitivity[1]	S	94 dB SPL @ 1 kHz	-39	-38	-37	dBV/Pa
Signal to Noise Ratio	SNR	94 dB SPL @ 1 kHz, A-weighted	-	62.5	-	dB(A)
Total Harmonic Distortion	THD	94 dB SPL @ 1 kHz, S = Typ, R_{load} > 2 k Ω	-	0.2	0.5	%
Acoustic Overload Point	AOP	10% THD @ 1 kHz,S = Typ, V_{DD} = 3.6V, R_{load} > 2 kΩ	121	123	-	dB SPL
Power Supply Rejection Ratio	PSRR	200mVpp sinewave @ 1 kHz, V_{DD} = 1.8V	-	65	-	dB
Power Supply Rejection	PSR	100 mVpp square wave @ 217 Hz, V_{DD} = 1.8V, A-weighted	-	-91	-	dBV(A)
DC Output		V_{DD} = 1.5V	-	0.8	-	V
Output Impedance	Z_{OUT}	@ 1 kHz	-	-	400	Ω
Directivity			Omni-directional			
Polarity		Increasing sound pressure	Increasing output pressure			

Note:

[1] 100% tested

[2] Maximum specifications are measured at maximum V_{DD}. Typical specifications are measured at V_{DD} = 1.8V.

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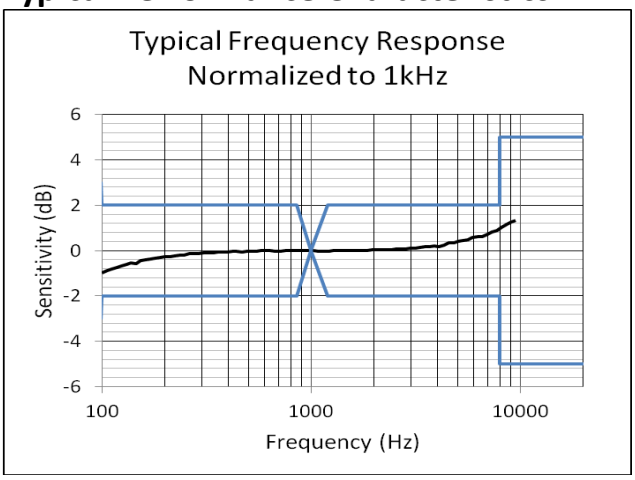
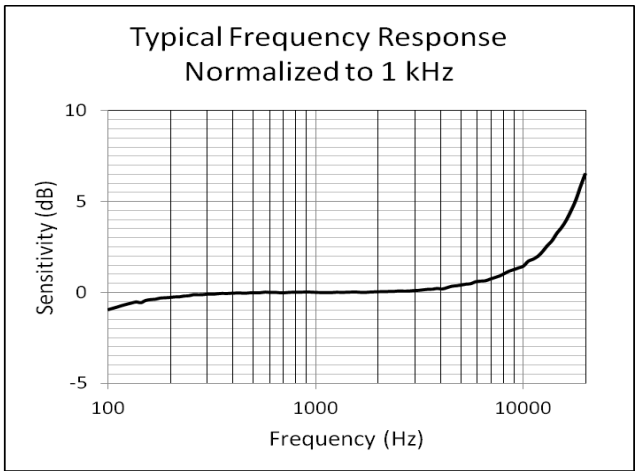
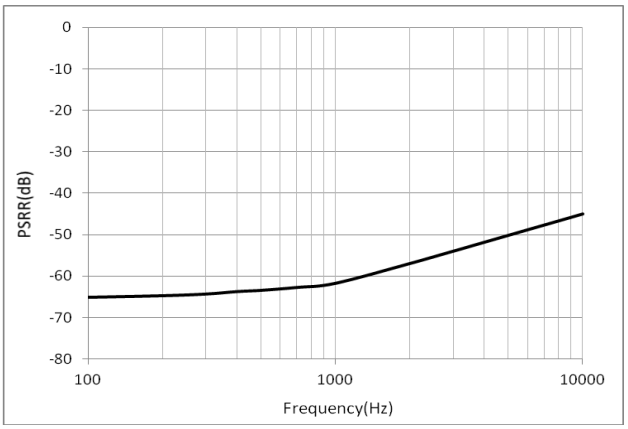
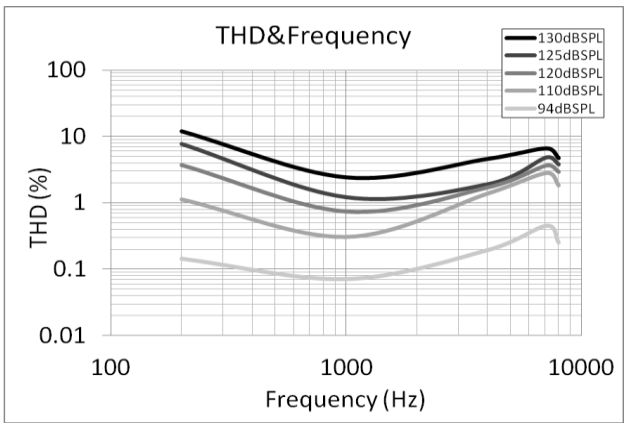
Typical Performance Characteristics









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Reliability Specifications

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

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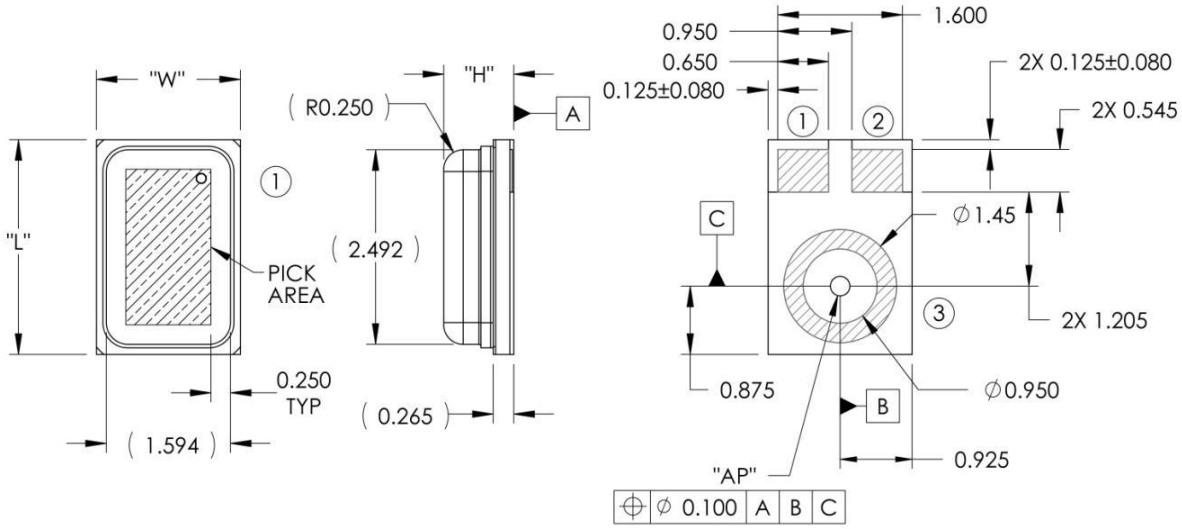
MECHANICAL SPECIFICATIOPNS



ITEM	DIMENSION	TOLERANCE	UNITS
Length (L)	2.75	±0.100	mm
Width (W)	1.85	±0.100	mm
Height (H)	0.90	±0.100	mm
Acoustic Port (AP)	Ø0.25	±0.050	mm

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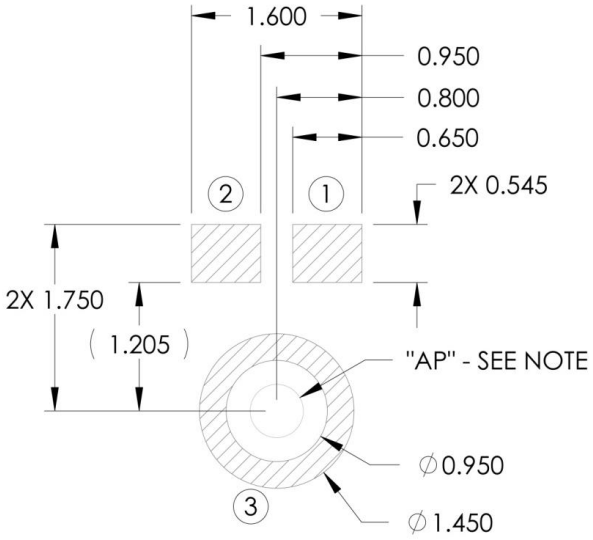
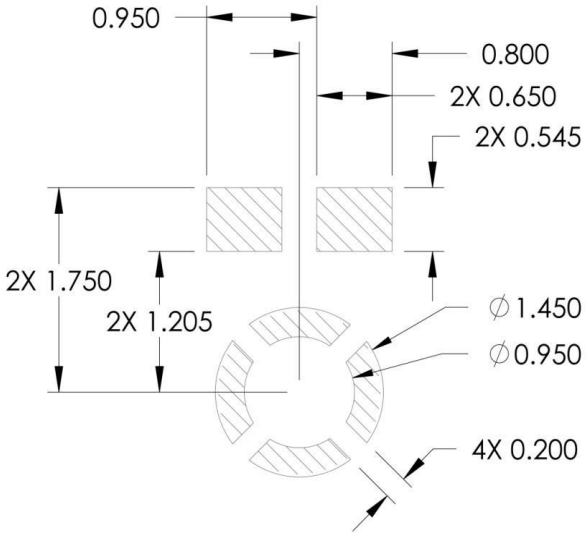
RECOMMENDED CUSTOMER LAND PATTERN

The recommended PCB land pattern for the ZTS6056 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**.





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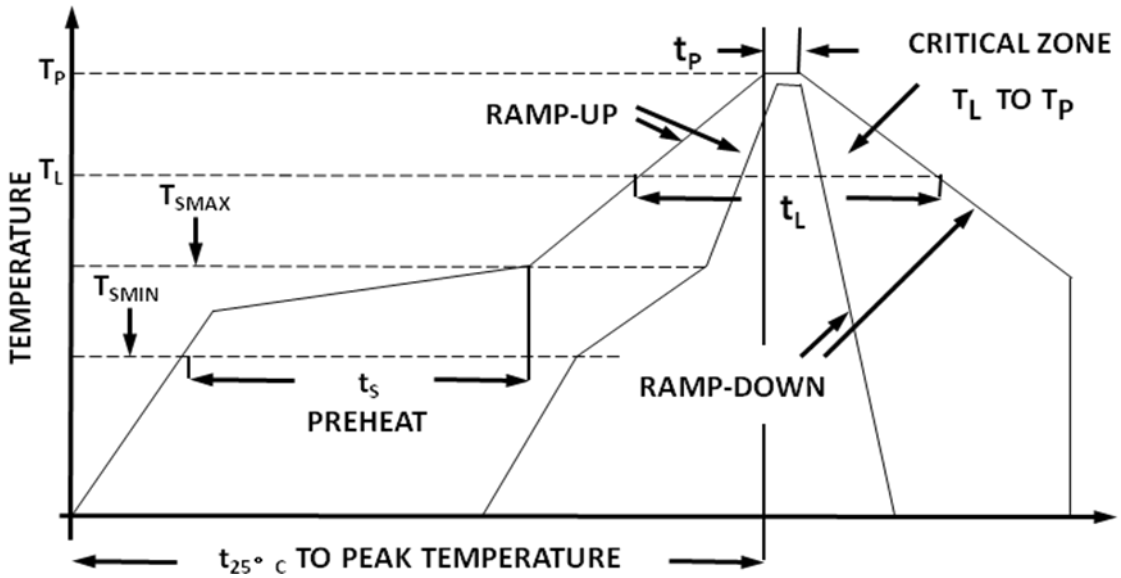
SOLDER FLOW PROFILE

The reflow profile specified in this section describes expected maximum heat exposure of components during the reflow process of NMP product PWBs. Temperature is measured on top of component. All components have to tolerate at least this profile five times (5x) without affecting electrical performance, mechanical performance or reliability.



Pb-free and Sn63/Pb37 reflow profile requirements for soldering heat resistance:

Parameter		Reference	Pb-Free	Sn63/Pb37
Average Ramp Rate		T_L to T_P	1.25°C/sec max	1.25°C/sec max
Prehear	Minimum Temperature	T_{SMIN}	100°C	100°C
	Maximum Temperature	T_{SMAX}	200°C	150°C
	Time	T_{SMIN} to T_{SMAX}	60sec to 75sec	60sec to 75sec
Ramp-Up Rate		T_{SMAX} to T_L	1.25°C/sec	1.25°C/sec
Time Maintained Above Liquidous		t_L	50sec	60sec to 75sec
Liquidous Temperature		T_L	217°C	183°C
Peak Temperature		T_P	260°C +0°C/-5°C	215°C +3°C/-3°C
Time Within +5°C of Actual Peak Temperature		t_P	20 sec to 30 sec	20 sec to 30 sec
Ramp-Down Rate		T_{peak}	3°C/sec max	3°C/sec max
Time +25°C (t_{25OC}) to Peak Temperature			5 min max	5 min max

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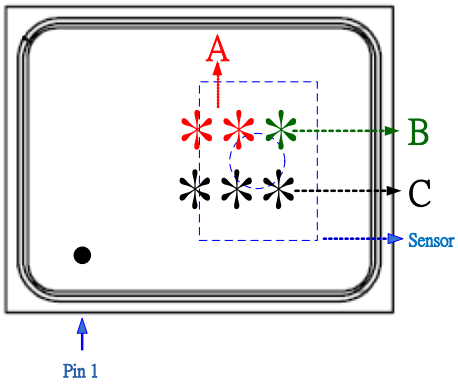
MARKING RULE



Top Side Marking：	ND YAG Laser
	Fonts: Arial Font
A: Product ID 56 B: ASIC Lot Number	C: Internal Code+ Sensor Lot Number
Product ID: 56 Internal Code: Please refer to the “Attachment” of PO	

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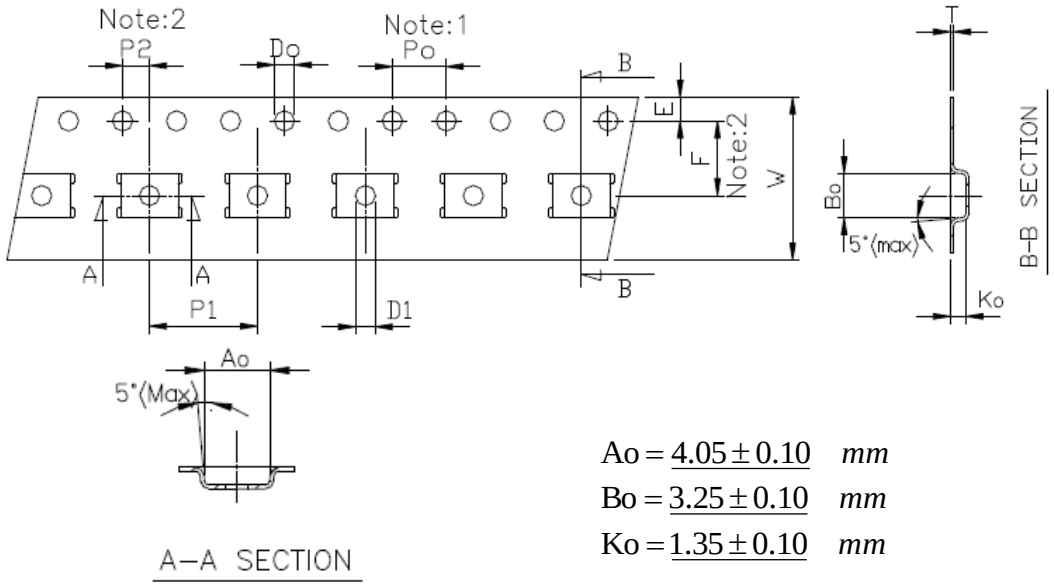
PACKAGING



$$Ao = \underline{4.05 \pm 0.10} \quad mm$$
$$Bo = \underline{3.25 \pm 0.10} \quad mm$$
$$Ko = \underline{1.35 \pm 0.10} \quad mm$$

Unit：mm

Symbol	Spec.
K1	-
P_O	4.0 ± 0.10
P1	8.0 ± 0.10
P2	2.0 ± 0.05
D_O	1.55 ± 0.05
D1	1.50 (MIN)
E	1.75 ± 0.10
F	5.50 ± 0.05
$10P_O$	40.0 ± 0.10
W	12.0 ± 0.20
T	0.30 ± 0.05

Notice：

1．10 Sprocket hole pitch cumulative tolerance is ± 0.1mm.
2．Pocket position relative to sprocket hole measured as true position of pocket not pocket hole.
3．A_O & B_O measured on a place 0.3mm above the bottom of the pocket to top surface of the carrier.
4．K_O measured from a plane on the inside bottom of the pocket to the top surface of the carrier.
5．Carrier camber shall be not that 1mm per 100mm through a length of 250mm.

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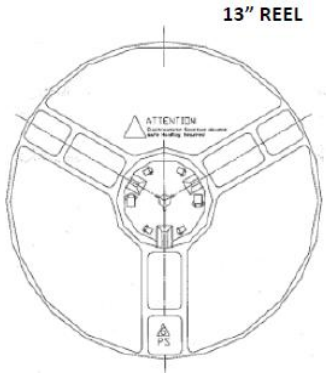
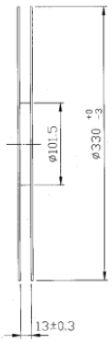
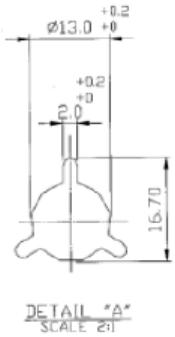
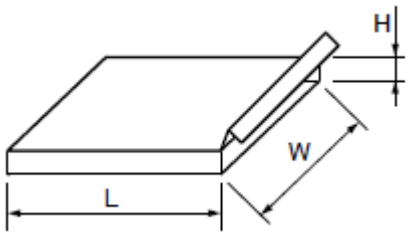






Part NO.	Reel Diameter	Quantity Per Reel	Quantity Per Inner Box	Quantity Per Outer Box
ZTS6056	13"	5,200	5,200	46,800

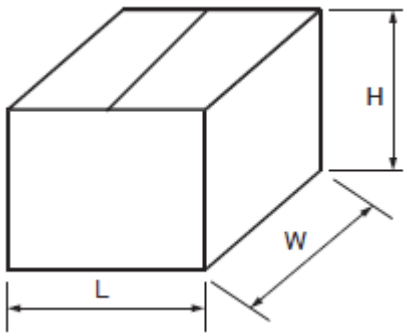
Dimensions for Inner Box



Unit：mm

L	W	H
335	339	45

Dimensions for Outer Box



Unit：mm

L	W	H
445	360	372

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