

Precision Ultralow Noise Microphone with Top Port and Analog Output

DESCRIPTION

The ZTS6213 is a high quality, low cost, low power analog output top-ported omni-directional MEMS microphone. ZTS6213 consists of a MEMS microphone element and an preamplifier. ZTS6213 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, ZTS6213 shows high immunity to EMI.

The ZTS6213 is available in a thin 3.5mm × 2.65mm × 1.0mm surface-mount package. It is reflow solder compatible with no sensitivity degradation. The ZTS6213 is halide free.

APPLICATIONS

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

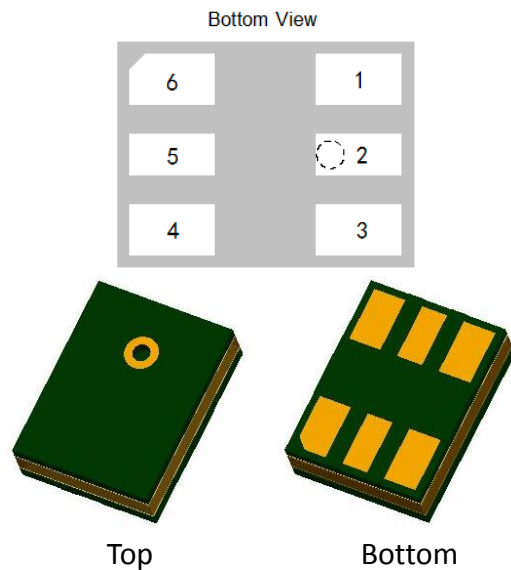
ORDERING INFORMATION

PART	RoHS	Ship, Quantity
ZTS6213	Yes	Tape and Reel, 5.2K

FEATURES

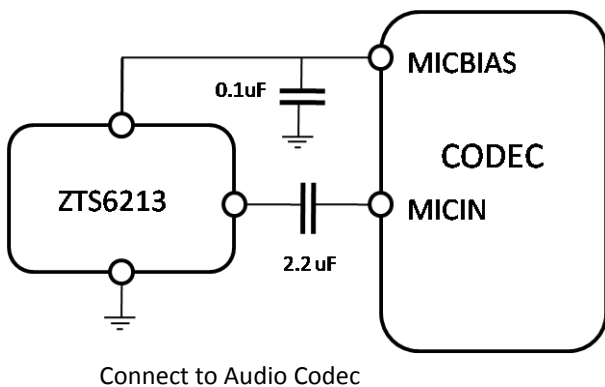
- 3.50mm×2.65mm×1.0mm surface-mount package
- Stable sensitivity over power supply range of 1.5V-3.6V
- SNR of 65 dBA
- Sensitivity of -38dBV
- Low current consumption of <200µA
- Multi Chip Module (MCM) Package

Pins Configuration and Description



Typical Applications

The ZTS6213 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.

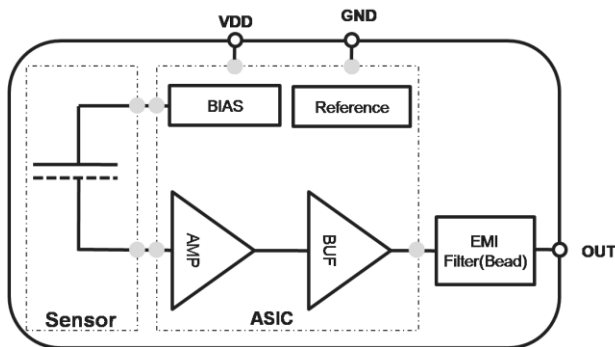


Absolute Maximum Ratings

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.

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}	VDD=1.8V		60	90	μA
		VDD=3.6V		120	200	μA
Sensitivity (Note)		1kHz, 94dB SPL	-39	-38	-37	dBV
Signal-to-Noise-Ratio	SNR			65		dB
Equivalent Input Noise	EIN			28		dB SPL
Total Harmonic Distortion	THD	94dB SPL @ 1KHz		0.1	0.2	%
Acoustic Overload Point	AOP	10% THD @ 1KHz		125		dB SPL
Power Supply Rejection Ratio	PSRR	217Hz, 100mV Vp-p, square wave on V _{DD}		70		dB
Power Supply Rejection	PSR	100 mVpp square wave @ 217 Hz, V _{DD} =1.8V, A-weighted		-100		dB(A)
Output Impedance	Z _{out}			200	450	Ω
Output DC Offset				0.70		V
Output Current Limit				90		μA
Polarity				Noninverting		

Note: Base on BK sound test system.

Electro-Static Discharge Sensitivity

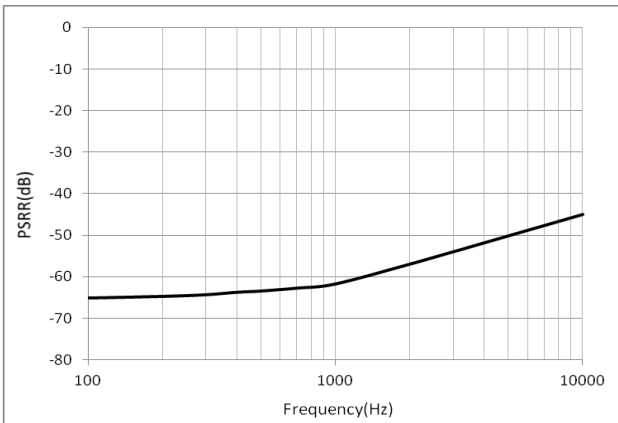
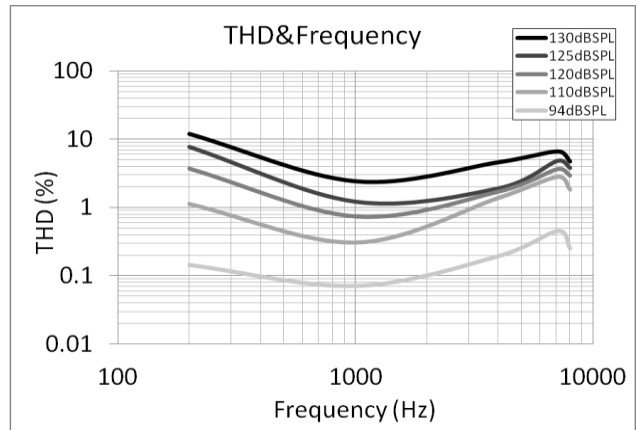
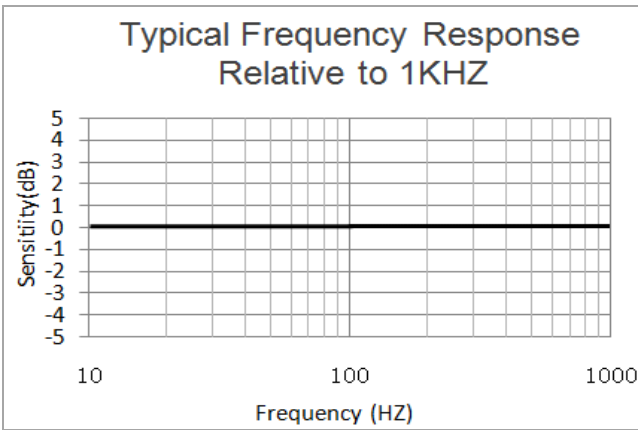
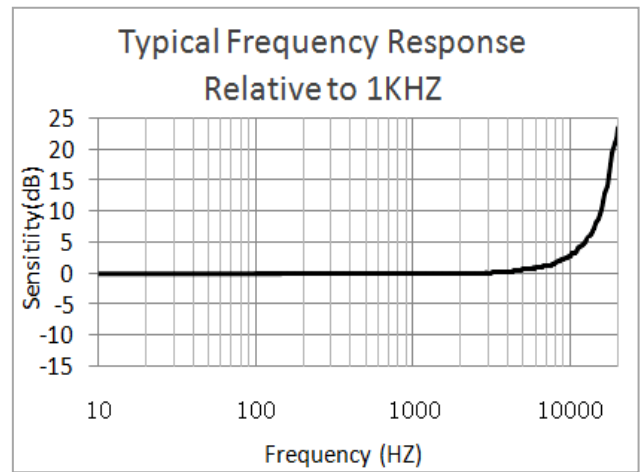
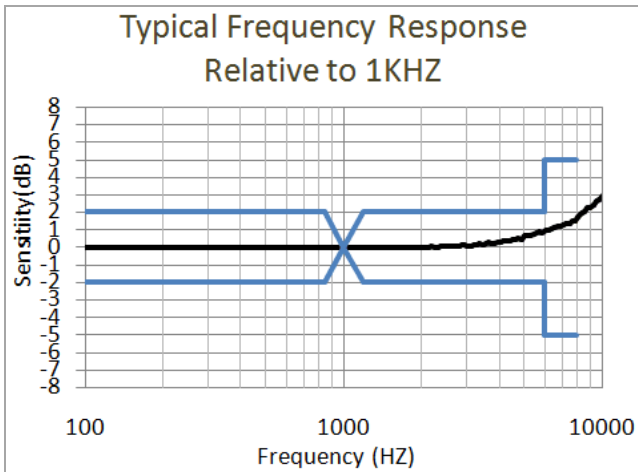


This integrated circuit can be damaged by ESD. It is recommended that all integrated circuits be handled with proper precautions. Failure to observe proper handling and installation procedures can cause damage. ESD damage can range from subtle performance degradation to complete device failure.

Pins Description

Pin	Symbol	Description
1,2,3,5	GND	Ground.
4	OUT	Analog output signal.
6	VDD	Power Supply.

Typical Performance Characteristics



TDMA Disturbance Immunity

- 65 dB Max @500~2500MHz (Direct RF injection test according to set figure , this set figure is based on below block diagram.)

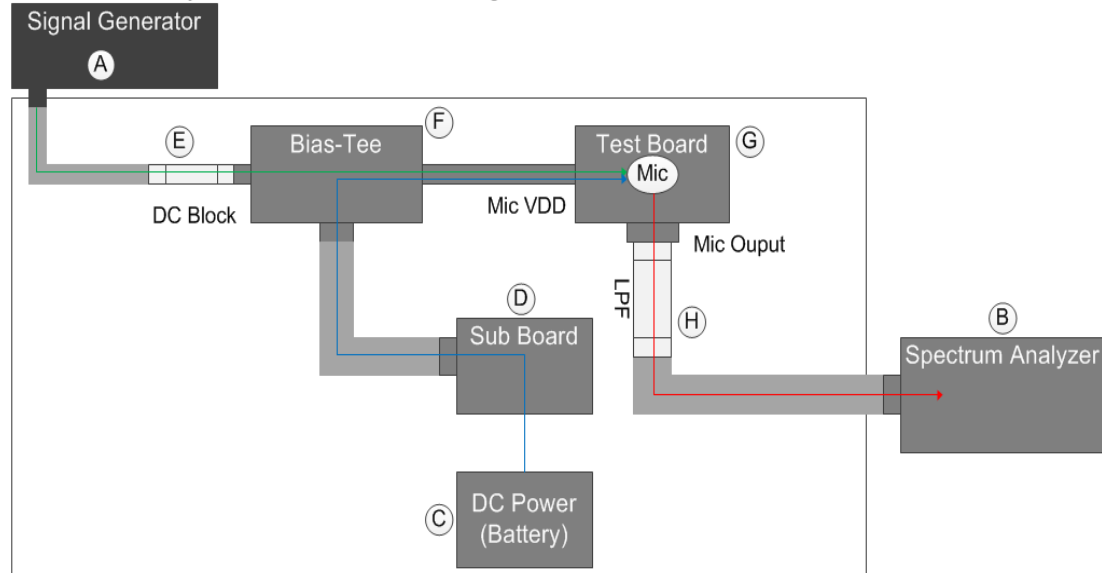
Instrument settings

Signal Generator

- modulation: 1 kHz, AM, depth 80%
- test frequency and amplitude from frequency/amplitude table

MHz	dBm	MHz	dBm	MHz	dBm	MHz	dBm	MHz	dBm
100	-4.08	600	-2.85	1100	-1.64	1600	-0.52	2100	0.05
200	-3.68	700	-2.61	1200	-1.33	1700	-0.29	2200	0.12
300	-3.31	800	-2.39	1300	-1.25	1800	-0.11	2300	0.27
400	-3.24	900	-2.11	1400	-1.08	1900	-0.04	2400	0.31
500	-3.09	1000	-1.84	1500	-0.86	2000	-0.01	2500	0.45

RF Immunity Measurement Diagram



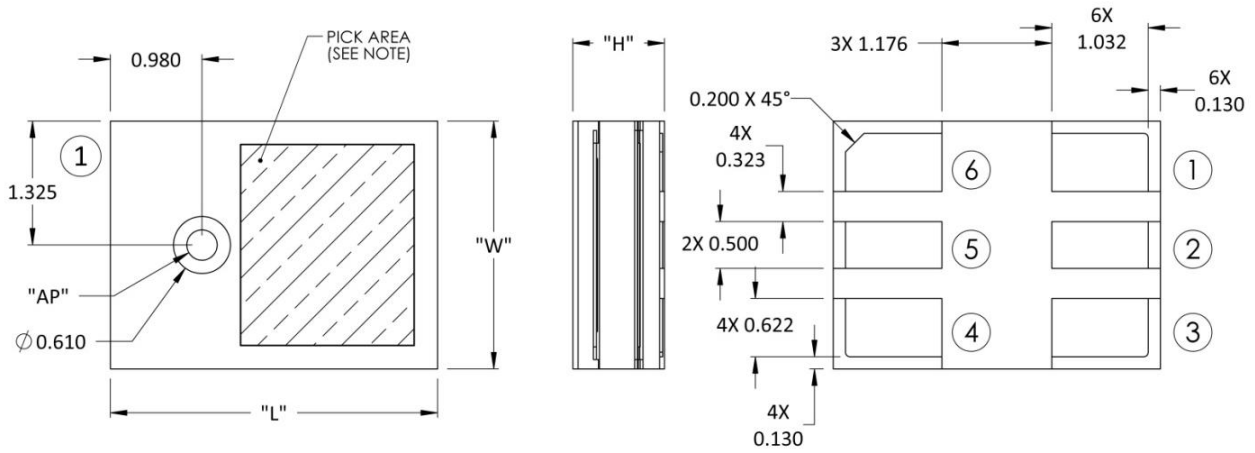
A	Signal Generator	Rode & Schwarz SMIQ 03B
B	Spectrum Analyzer	Audio Precision APx525
C	DC Power	Battery 3V
D	Sub Board with RL & Capacitor	C: 0.1uF
E	DC block	Agilent 11742A
F	Bias-Tee	Mini-Circuits ZFBT-6GW
G	Test Board	ZTS6213 EVB
H	Low pass filter (Pass band 5M~2.5GHz)	Mini-Circuits SLP-2.5, SLP-5, SLP-150, SLP-450, SLP-1200, SLP-1650

Reliability Tests

The microphone sensitivity after stress must deviate by no more than $\pm 3\text{dB}$ from the initial value.

1. Heat Test, Operational	Temperature: $125\pm 3^{\circ}\text{C}$ Duration: 1000 hours Voltage: Applied
2. Cold Test, Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ Duration: 1000 hours Voltage: Applied
3. Heat Test, Non-Operational	Temperature: $125\pm 3^{\circ}\text{C}$ Duration: 1000 hours Voltage: Not Applied
4. Cold Test, Non-Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ Duration: 1000 hours Voltage: Not Applied
5. Thermal Shock Test, Non-Operational	Temperature: $-40\pm 3^{\circ}\text{C}$ and $125\pm 3^{\circ}\text{C}$ Duration: 30 minutes each, during 5 minutes ramp, 256 cycles Voltage: Not applied
6. Temperature humidity storage	Temperature: $85\pm 3^{\circ}\text{C}$ Humidity: $85\pm 3\% \text{RH}$ Duration: 1000 hours
	Temperature: $65\pm 3^{\circ}\text{C}$ Humidity: $95\pm 3\% \text{RH}$ Duration: 168 hours
7. Free Fall Test 1.5m	Placed inside test fixture and dropped on concrete from height 1.5m. 4 times by each surface and corner
8. Vibration	4 cycles of 20 to 2000 Hz sinusoidal sweep with 20G peak acceleration lasting 12 minutes in X, Y, and Z directions
9. Mechanical Shock	5 pulses of 10000g in each of the $\pm X$, $\pm Y$, and $\pm Z$ directions
10. Electrostatic Discharge Test	Capacitance: 150pF Resistance: 330Ω Duration: 10 times Air Discharge: Level 4(+/-15kV) Direct contact discharge: Level 4 (+/-8kV)
11. Human Body Mode	± 2000 Volt
12. Charged-Device Model	± 250 Volt
13. Reflow	5 reflow cycles with peak temperature of 260°C
14. Solderability	$245\pm 5^{\circ}\text{C}$, 5sec, 95% Tin on pad surface
15. Tumble test	300 tumbles from a height of 1m onto a steel base.
16. HAST	Temperature: $130\pm 3^{\circ}\text{C}$ Humidity: $85\pm 3\% \text{RH}$ Duration: 96 hours Voltage: Applied
17. Air Blow	0.45MPa, distance 3cm, time 10s

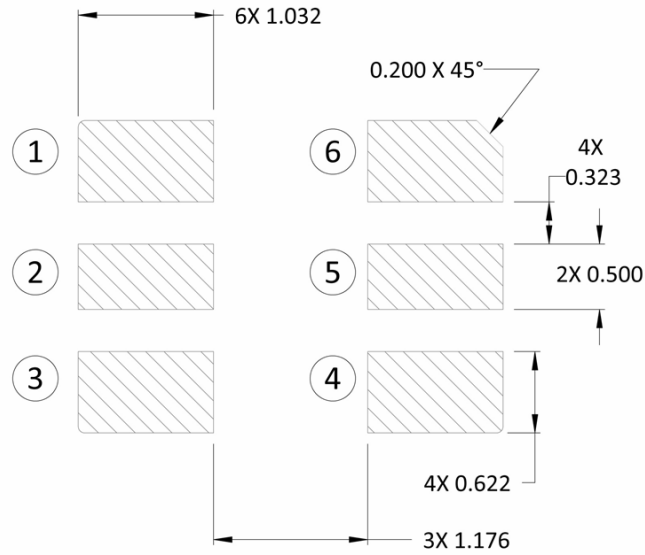
MECHANICAL SPECIFICATIOPNS



ITEM	DIMENSION	TOLERANCE	UNITS
Length (L)	3.50	± 0.100	mm
Width (W)	2.65	± 0.100	Mm
Height (H)	1.00	± 0.100	Mm
Acoustic Port (AP)	$\phi 0.325$	± 0.050	Mm

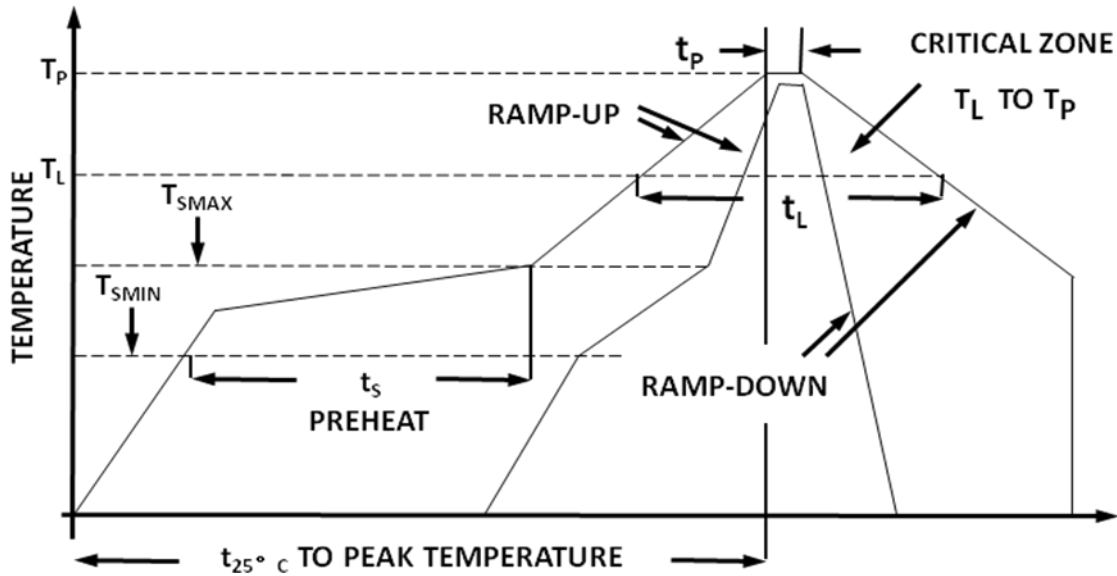
RECOMMENDED CUSTOMER LAND PATTERN

The recommended PCB land pattern for the ZTS6213 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**.



SOLDER FLOW PROFILE

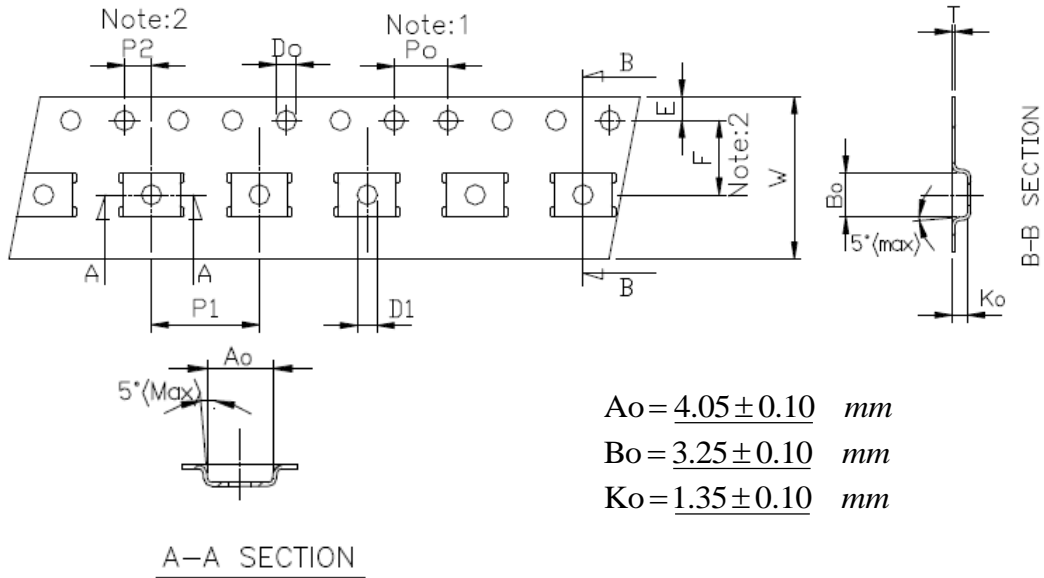
The reflow profile specified in this section describes expected maximum heat exposure of components during the reflow process of NMP product PWBs. Temperature is measured on top of component. All components have to tolerate at least this profile five times (5x) without affecting electrical performance, 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	100°C	100°C
	Maximum Temperature	200°C	150°C
	Time	T_{SMIN} to T_{SMAX}	60sec to 120sec
Ramp-Up Rate	T_{SMAX} to T_L	1.25°C/sec	1.25°C/sec
Time Maintained Above Liquidous	t_L	60sec to 150sec	60sec to 150sec
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}	6°C/sec max	6°C/sec max
Time +25°C (t_{250C}) to Peak Temperature		8 min max	6 min max

PACKAGING



$A_o = 4.05 \pm 0.10 \text{ mm}$

$B_o = 3.25 \pm 0.10 \text{ mm}$

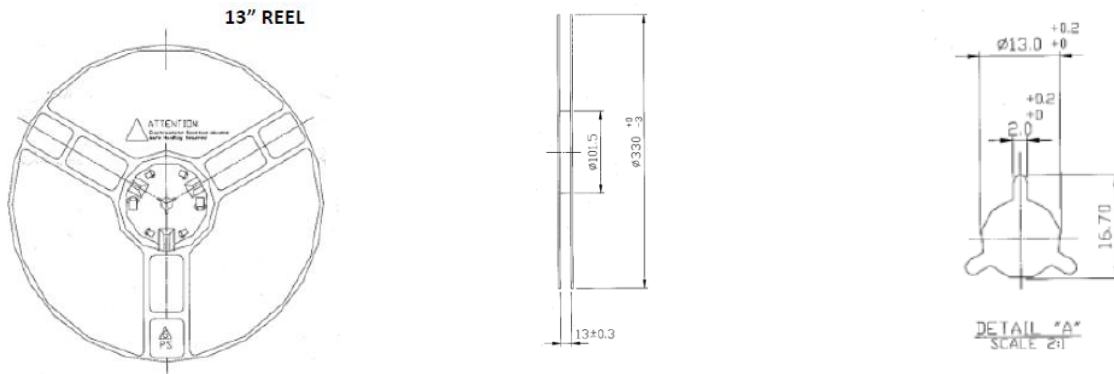
$K_o = 1.35 \pm 0.10 \text{ mm}$

Unit : mm

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

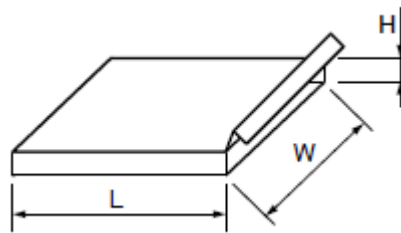
Notice :

- 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 · Ao & Bo measured on a place 0.3mm above the bottom of the pocket to top surface of the carrier.
- 4 · Ko 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.



Part NO.	Reel Diameter	Quantity Per Reel	Quantity Per Inner Box	Quantity Per Outer Box
ZTS6213	13"	5,200	5,200	46,800

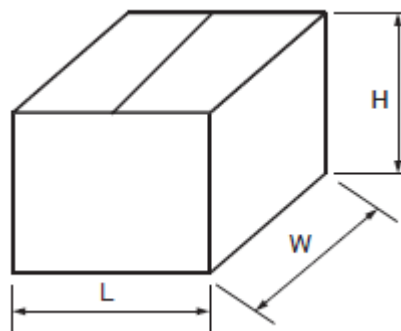
Dimensions for Inner Box



Unit : mm

L	W	H
335	339	45

Dimensions for Outer Box



Unit : mm

L	W	H
445	360	372