

# Precision SMD VCTCXO/TCXO

AST3TDA

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ESD Sensitive



7.0 x 5.0 x 2.2 mm

RoHS/RoHS II Compliant

MSL Level = 3

## Features

- Wide operating temperature range with high stability options: -40°C to +105°C @ ±50ppb, ±100ppb and ±280ppb
- Standard available frequencies: 10, 12.8, 16.384, 18.432, 19.2, 19.44, 20, 30.72, 38.88, 40, 50MHz
- CMOS or Clipped Sine Wave output
- Voltage-control option available

## Applications

- Stratum 3
- Network routers and switches
- COTS Military Radios & other Communication Hardware
- Wireless Communication
- GPS Tracking with Hold-Over Accuracy
- Test & Measurement Equipment
- Autonomous Technologies

## Maximum Ratings

Parameters	Notes
Storage Temperature Range	-55 to +105°C
Supply Voltage	-0.5 to 6V
Control Voltage	0 to 3.3V
ESD, HBM/CDM/MM	4kV/2kV/200V/400V

## Electrical Specifications

Parameters	Min.	Typ.	Max.	Units	Notes
Frequency Range	10		50	MHz	
Standard Frequencies	10, 12.8, 15, 16.384, 18.432, 19.2, 19.44, 20, 30.72, 38.88, 40, 50			MHz	
Operating Temperature Range	-40		+105	°C	<a href="#">See options</a>
Initial Frequency Tolerance at shipping	-1		+1	ppm	@ T <sub>A</sub> = 25°C, V <sub>cc</sub> = 3.3V, V <sub>c</sub> = 1.65V within 30 days after ex-works
Frequency Stability over Operating Temperature Range <a href="#">[Note 1]</a>	-100		+100	ppb	<a href="#">See options</a>
Frequency Stability vs. Supply Voltage Change (V <sub>dd</sub> ±5%)	-50		+50	ppb	@ T <sub>A</sub> = 25°C, V <sub>cc</sub> varied from 3.13V to 3.47V, V <sub>c</sub> = 1.65V
Frequency Stability vs. Load Change (Load±5%)	-50		+50	ppb	5% load change @ T <sub>A</sub> = 25°C, V <sub>cc</sub> = 3.3V, V <sub>c</sub> = 1.65V, O <sub>Load</sub> = 15pF
Short Term Stability			200	ppb	after power for 1hour ref. to 25°C
Aging (first year)	-1		+1	ppm	T <sub>A</sub> = 25°C, V <sub>cc</sub> = 3.3V, after 1h of operation
Aging (20 years @ +25°C)	-3		+3	ppm	
Supply Voltage (V <sub>dd</sub> )	3.13	3.3	3.47	V	<a href="#">See options</a>
Supply Current (I <sub>cc</sub> )			10	mA	25°C, V <sub>cc</sub> = 3.3V, O <sub>Load</sub> = 15pF
Start-up Time			5	ms	
<b>Control Port (Applicable for VCTCXO only)</b>					
Control Voltage Range (V <sub>c</sub> )	0		3.3	V	
Center Control Voltage (V <sub>c</sub> )		1.65		V	
Frequency Tuning Range (Carrier Frequency ≤ 20MHz)			-8	ppm	V <sub>c</sub> = 0V, referenced to V <sub>c</sub> = 1.65V
	-1		+1	ppm	V <sub>c</sub> = 1.65V, referenced to carrier frequency
	+8			ppm	V <sub>c</sub> = 3.3V, referenced to V <sub>c</sub> = 1.65V
Frequency Tuning Range (Carrier Frequency > 20MHz)			-5	ppm	V <sub>c</sub> = 0V, referenced to V <sub>c</sub> = 1.65V
	-1		+1	ppm	V <sub>c</sub> = 1.65V, referenced to carrier frequency
	+5			ppm	V <sub>c</sub> = 3.3V, referenced to V <sub>c</sub> = 1.65V

Note 1: T<sub>A</sub> varied from -40°C to 105°C, measurement referenced to frequency observed with f<sub>ref</sub> = (f<sub>max</sub> + f<sub>min</sub>) / 2, V<sub>cc</sub> = 3.3V, V<sub>c</sub> = 1.65V, temperature variable speed less than 2°C/min.



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## Electrical Specifications *continued*

Parameters	Min.	Typ.	Max.	Units	Notes
Tuning Slope	Positive				
Linearity			10	%	
Port Impedance	100			kΩ	
Phase Noise (@25°C):		-85	-80	dBc/Hz	Offset @10Hz
		-115	-110		Offset @100Hz
		-140	-135		Offset @1kHz
		-150	-145		Offset @10kHz
		-152	-148		Offset @100kHz
		-155	-150		Offset @1MHz
<b>Clipped Sine Wave Output</b>					
Output Level	0.8			V <sub>p-p</sub>	
Output Load	10kΩ//10pF				
<b>CMOS (Square Wave) Output</b>					
V <sub>OH</sub>	2.4			V	V <sub>cc</sub> =3.3V, O <sub>load</sub> =15 pF
V <sub>OL</sub>			0.4	V	V <sub>cc</sub> =3.3V, O <sub>load</sub> =15 pF
Output Load	15			pF	
Duty Cycle	45	50	55	%	@50%
Rise / Fall Time (10%~90%)			8	ns	@25°C

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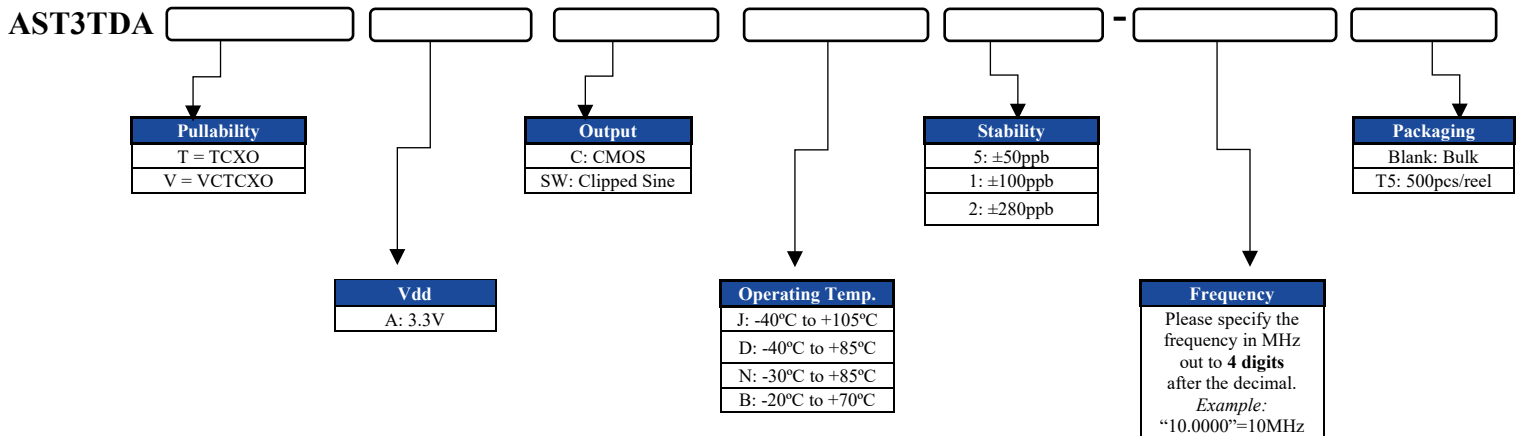


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## Part Identification



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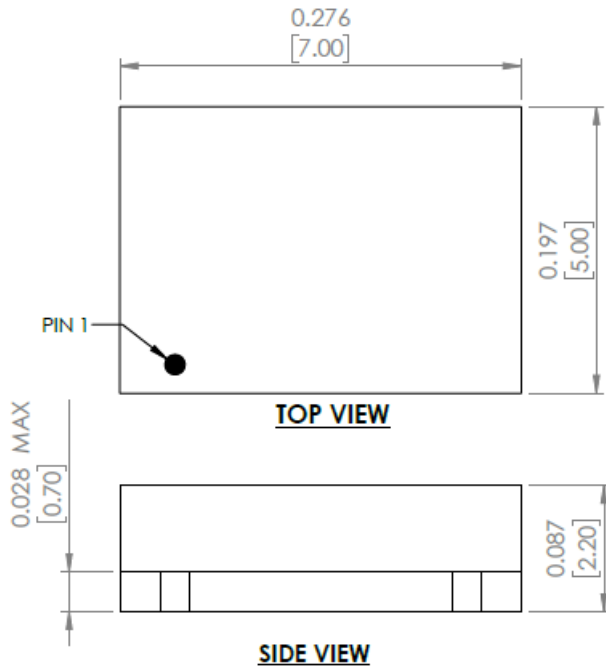


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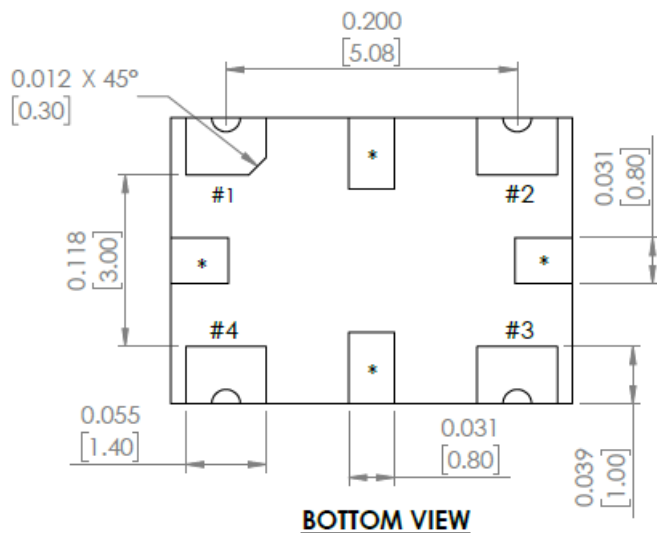
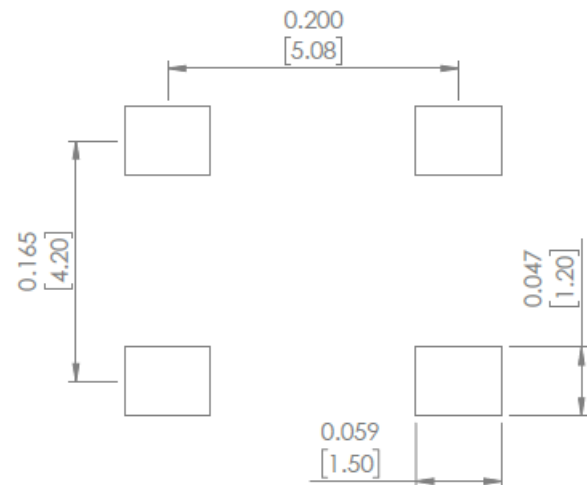


7.0 x 5.0 x 2.2 mm  
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## Mechanical Dimensions



### Recommended Land Pattern



Dimensions: inches [mm]  
Tolerance  $\pm 0.2$ mm

Pin #	Function
1	Do not connect (for TCXO) Voltage control (for VCTCXO)
2	GND
3	Output
4	Vdd
*	Do not connect

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## Reflow Profile [JEDEC J-STD-020]

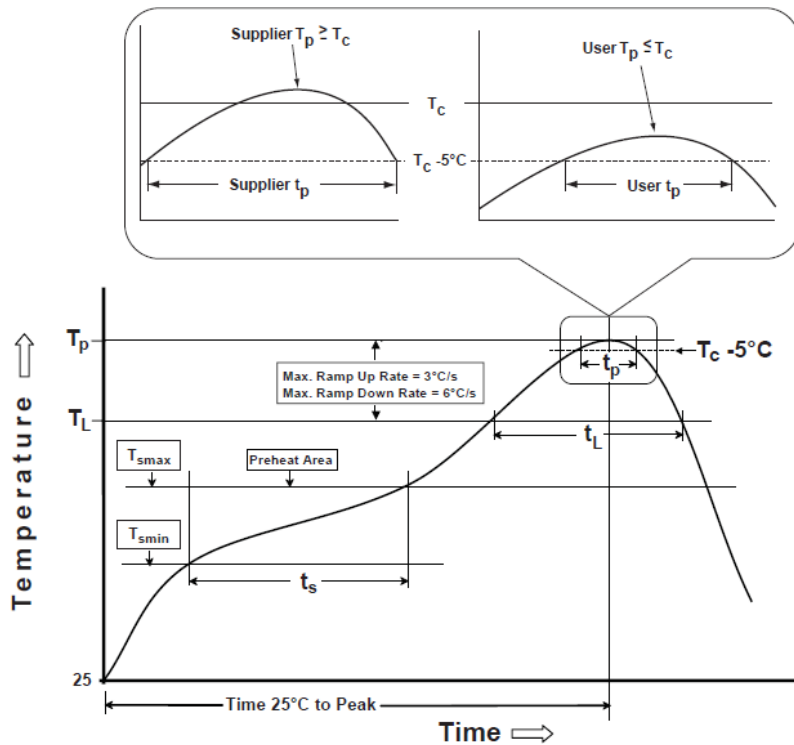


Table 1

SnPb Eutectic Process Classification Temperatures ( $T_c$ )		
Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> ≥350
<2.5 mm	235 °C	220 °C
≥2.5 mm	220 °C	220 °C

Table 2

Pb-Free Process Classification Temperatures ( $T_c$ )			
Package Thickness	Volume mm <sup>3</sup> <350	Volume mm <sup>3</sup> 350-2000	Volume mm <sup>3</sup> >2000
<1.6 mm	260 °C	260 °C	260 °C
1.6 mm - 2.5 mm	260 °C	250 °C	245 °C
>2.5 mm	250 °C	245 °C	245 °C

Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Preheat / soak		
Temperature minimum ( $T_{smin}$ )	100°C	150°C
Temperature maximum ( $T_{smax}$ )	150°C	200°C
Time ( $T_{smin}$ to $T_{smax}$ ) ( $t_s$ )	60 - 120 sec.	60 - 120 sec.
Average ramp-up rate ( $T_{smax}$ to $T_p$ )	3°C/sec. max	3°C/sec. max
Liquidous temperature ( $T_L$ )	183°C	217°C
Time at liquidous ( $t_L$ )	60 - 150 sec.	60 - 150 sec.
Peak package body temperature ( $T_p$ )*	see Table 1	see Table 2
Time ( $t_p$ )** within 5°C of the specified classification temperature ( $T_c$ )	20 sec.	30 sec.
Ramp-down rate ( $T_p$ to $T_{smax}$ )	6°C/sec. max	6°C/sec. max
Time 25°C to peak temperature	6 min. max	8 min. max
Reflow cycles	2 max	2 max

\*Tolerance for peak profile temperature ( $T_p$ ) is defined as a supplier minimum and a user maximum.

\*\*Tolerance for time at peak profile temperature ( $t_p$ ) is defined as supplier minimum and a user maximum.

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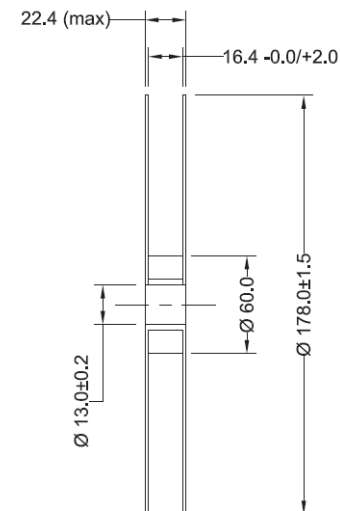
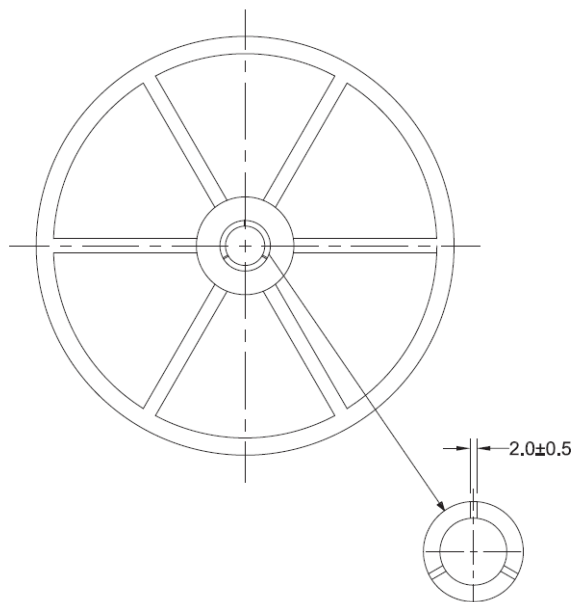
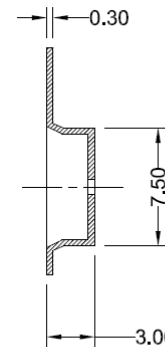
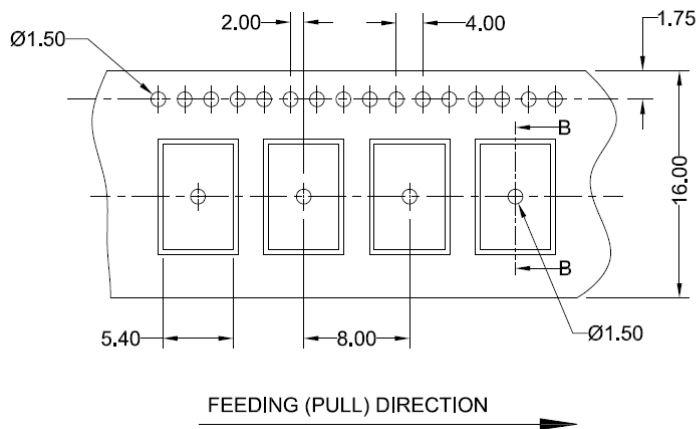
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## Packaging

T5: 500pcs/reel



Dimensions: mm

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