

# Precision SMD VCTCXO/TCXO

**AST3TDA53**

Request Samples



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ESD Sensitive



5.0 x 3.2 x 0.7 mm

RoHS/RoHS II Compliant

MSL Level = 3

## Features

- Wide operating temperature range with high stability: -40°C to +105°C @ ±280ppb
- Standard available frequencies: 10, 12.8, 16.384, 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, 16.384, 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>	-280		+280	ppb	
Frequency Stability vs. Supply Voltage Change (V <sub>dd</sub> ±5%)	-100		+100	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%)	-100		+100	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 (<i>Applicable for VCTCXO only</i>)</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  $f_{ref} = (f_{max} + f_{min}) / 2$ , V<sub>cc</sub> = 3.3V, V<sub>c</sub> = 1.65V, temperature variable speed less than 2°C/min.



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**RoHS/RoHS II Compliant**  
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## Electrical Specifications *continued*

Parameters	Min.	Typ.	Max.	Units	Notes
Tuning Slope	Positive				
Linearity			10	%	
Port Impedance	100			kΩ	
Phase Noise @ 19.2MHz (@25°C):		-95	-90	dBc/Hz	Offset @10Hz
		-120	-115		Offset @100Hz
		-145	-140		Offset @1kHz
		-157	-152		Offset @10kHz
		-159	-154		Offset @100kHz
		-159	-154		Offset @1MHz
Phase Noise @ 20MHz (@25°C):		-93	-88	dBc/Hz	Offset @10Hz
		-120	-115		Offset @100Hz
		-145	-140		Offset @1kHz
		-157	-152		Offset @10kHz
		-159	-154		Offset @100kHz
		-159	-154		Offset @1MHz
Phase Noise @ 38.88MHz (@25°C):		-90	-85	dBc/Hz	Offset @10Hz
		-115	-110		Offset @100Hz
		-135	-130		Offset @1kHz
		-148	-143		Offset @10kHz
		-150	-145		Offset @100kHz
		-151	-146		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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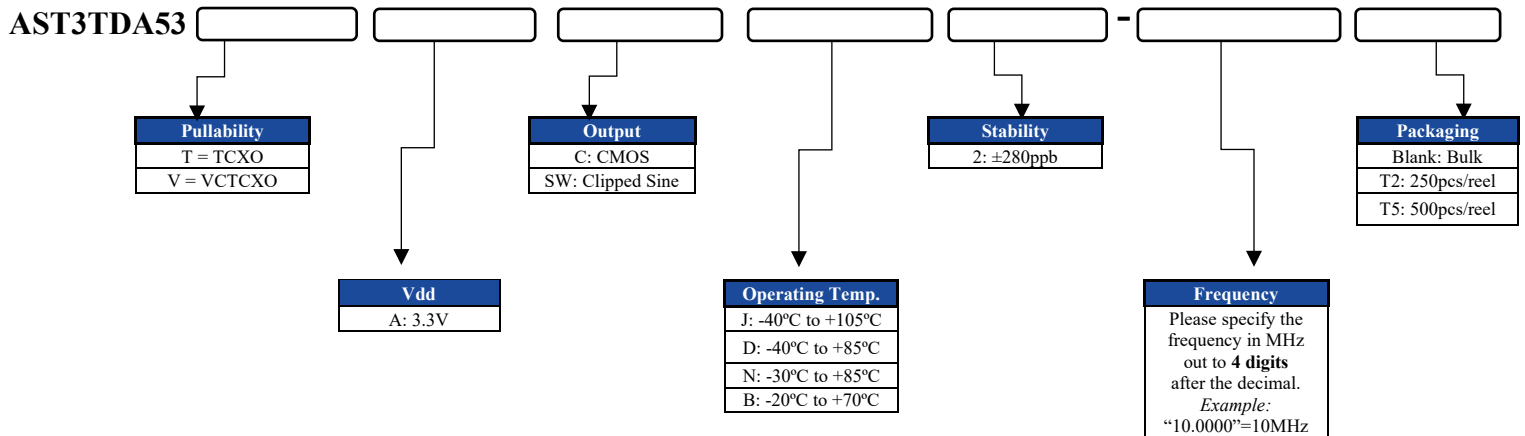
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## Part Identification



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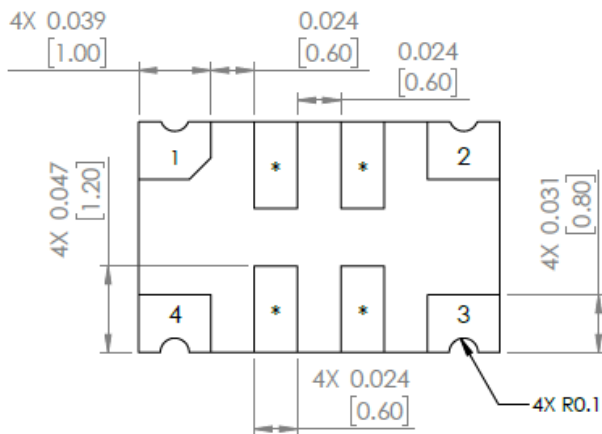
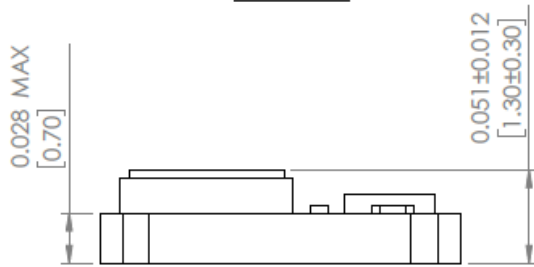
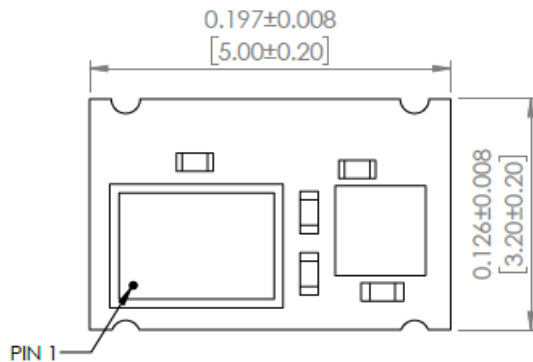


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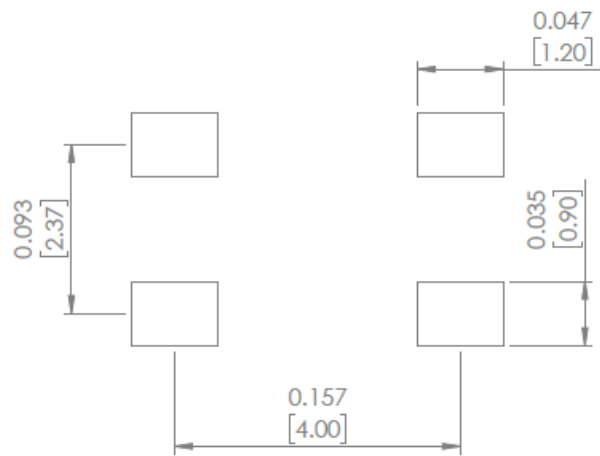


**5.0 x 3.2 x 0.7 mm**  
**RoHS/RoHS II Compliant**  
**MSL Level = 3**

## Mechanical Dimensions



### Recommended Land Pattern



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

**Dimensions: inches [mm]**  
**Tolerance ±0.2mm**



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

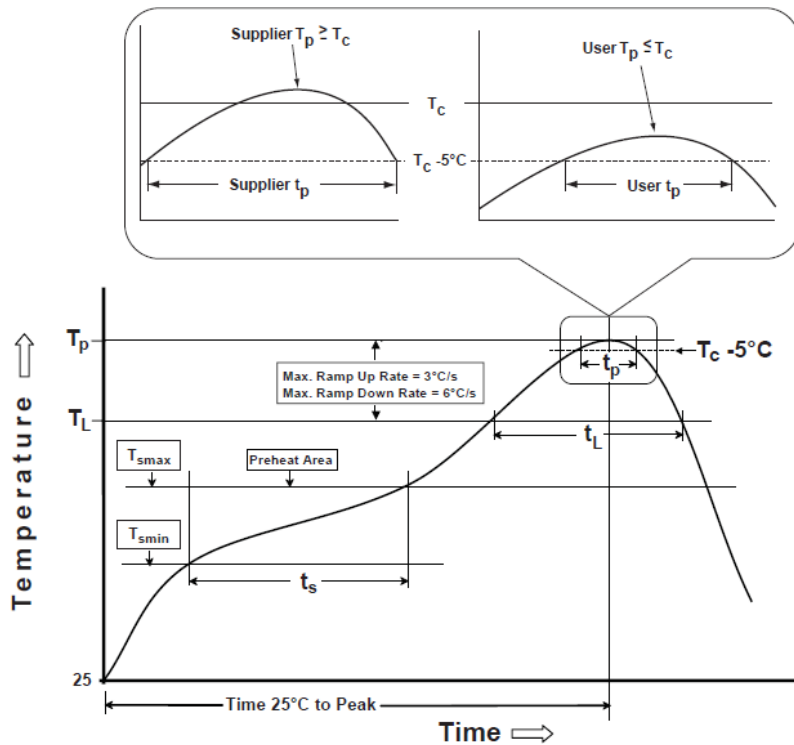


Table 1

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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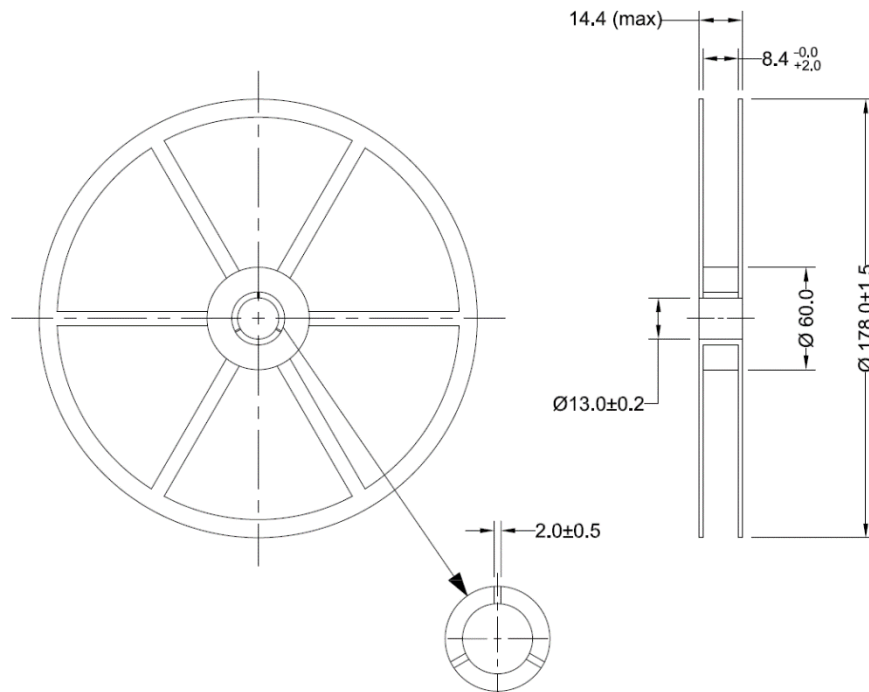
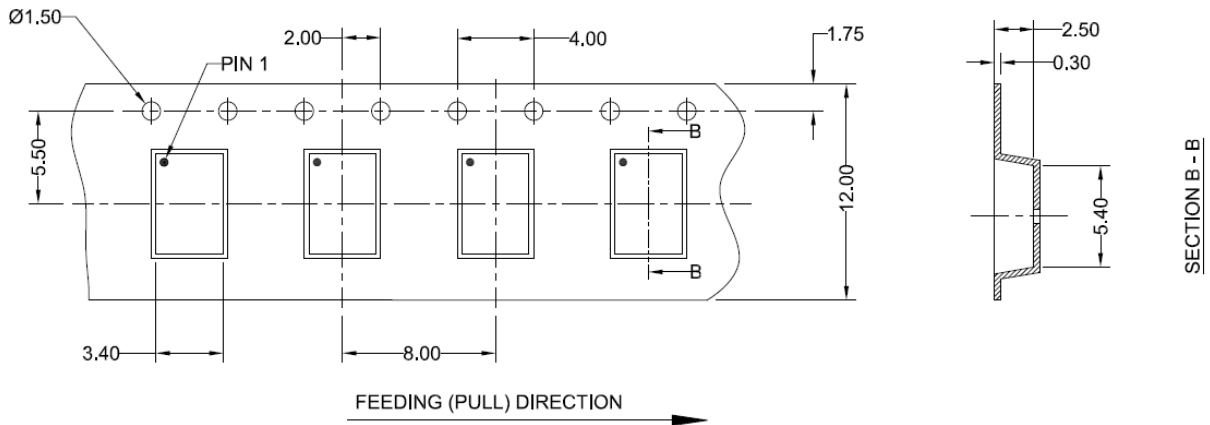


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## Packaging

T2: 250pcs/reel

T5: 500pcs/reel



Dimensions: mm

**ATTENTION:** Abracon LLC's products are COTS – Commercial-Off-The-Shelf products; suitable for Commercial, Industrial and, where designated, Automotive Applications. Abracon's products are not specifically designed for Military, Aviation, Aerospace, Life-dependent Medical applications or any application requiring high reliability where component failure could result in loss of life and/or property. For applications requiring high reliability and/or presenting an extreme operating environment, written consent and authorization from Abracon LLC is required. Please contact Abracon LLC for more information.



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