# Precision SMD VCTCXO/TCXO

**AST3TDA**

Request Samples | Check Inventory | 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: -40ºC to +105ºC @ ±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 | ºC | *See options* |
| Initial Frequency Tolerance at shipping | -1 | | +1 | ppm | @ $T_A$ = 25ºC, $V_{cc}$= 3.3V, $V_c$=1.65V within 30 days after ex-works |
| Frequency Stability over Operating Temperature Range [Note 1] | -100 | | +100 | ppb | *See options* |
| Frequency Stability vs. Supply Voltage Change (Vdd±5%) | -50 | | +50 | ppb | @ $T_A$=25ºC, $V_{cc}$ varied from 3.13V to 3.47V, $V_c$=1.65V |
| Frequency Stability vs. Load Change (Load±5%) | -50 | | +50 | ppb | 5% load change @ $T_A$= 25ºC, $V_{cc}$=3.3V, $V_c$=1.65V, $O_{Load}$= 15pF |
| Short Term Stability | | | 200 | ppb | after power for 1hour ref. to 25ºC |
| Aging (first year) | -1 | | +1 | ppm | $T_A$=25ºC, $V_{cc}$=3.3V, after 1h of operation |
| Aging (20 years @+25°C) | -3 | | +3 | ppm | |
| Supply Voltage (Vdd) | 3.13 | 3.3 | 3.47 | V | *See options* |
| Supply Current (Icc) | | | 10 | mA | 25ºC, $V_{cc}$=3.3V, $O_{Load}$= 15pF |
| Start-up Time | | | 5 | ms | |
| **Control Port (*Applicable for VCTCXO only*)** | | | | | |
| Control Voltage Range (Vc) | 0 | | 3.3 | V | |
| Center Control Voltage (Vc) | | 1.65 | | V | |
| Frequency Tuning Range (Carrier Frequency <=20MHz) | | | -8 | ppm | $V_c$=0V, referenced to $V_c$=1.65V |
| | -1 | | +1 | ppm | $V_c$=1.65V, referenced to carrier frequency |
| | +8 | | | ppm | $V_c$=3.3V, referenced to $V_c$=1.65V |
| Frequency Tuning Range (Carrier Frequency >20MHz) | | | -5 | ppm | $V_c$=0V, referenced to $V_c$=1.65V |
| | -1 | | +1 | ppm | $V_c$=1.65V, referenced to carrier frequency |
| | +5 | | | ppm | $V_c$=3.3V, referenced to $V_c$=1.65V |

**Note 1:** $T_A$ varied from -40ºC to 105ºC, measurement referenced to frequency observed with $f_{ref}=(f_{max}+f_{min})/2$, $V_{cc}$= 3.3V, $V_c$=1.65V, temperature variable speed less than 2ºC/min.

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**MSL Level = 3**

## 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 |
| ***Clipped Sine Wave Output*** | | | | | |
| Output Level | 0.8 | | | Vp-p | |
| Output Load | | 10kΩ//10pF | | | |
| ***CMOS (Square Wave) Output*** | | | | | |
| $V_{OH}$ | 2.4 | | | V | $V_{cc}$=3.3V, $O_{load}$=15 pF |
| $V_{OL}$ | | | 0.4 | V | $V_{cc}$=3.3V, $O_{load}$=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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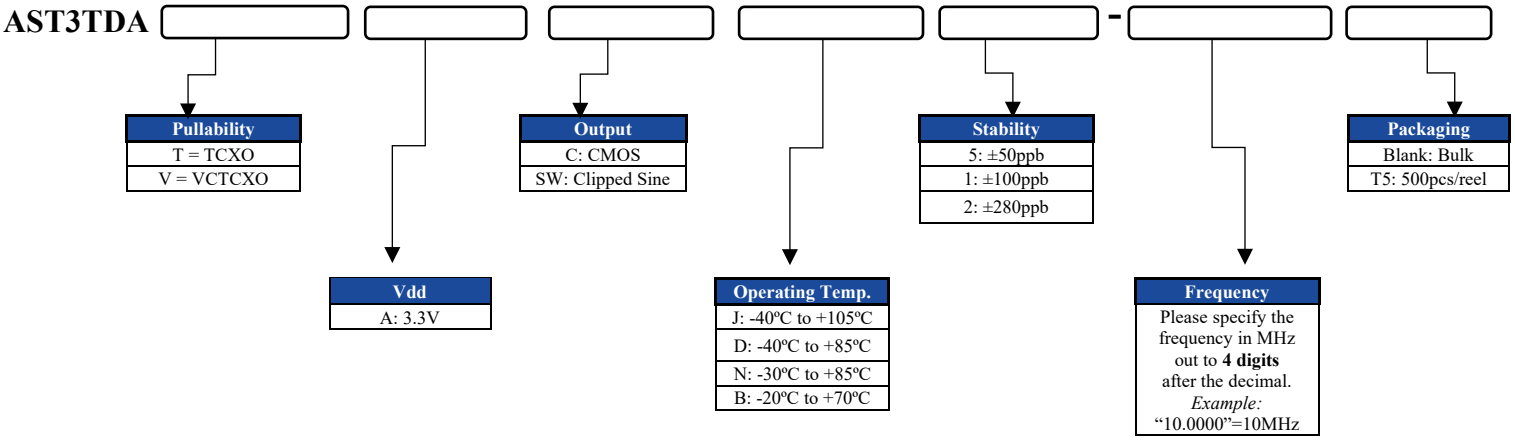
### Part Identification





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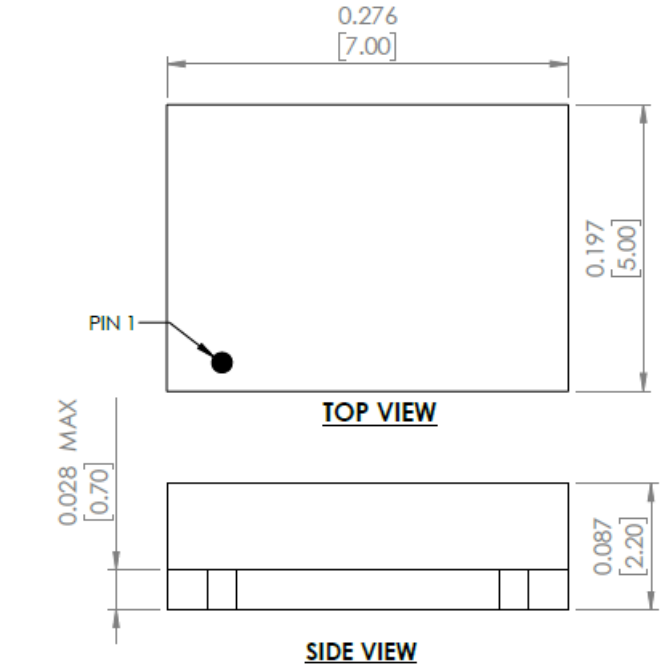
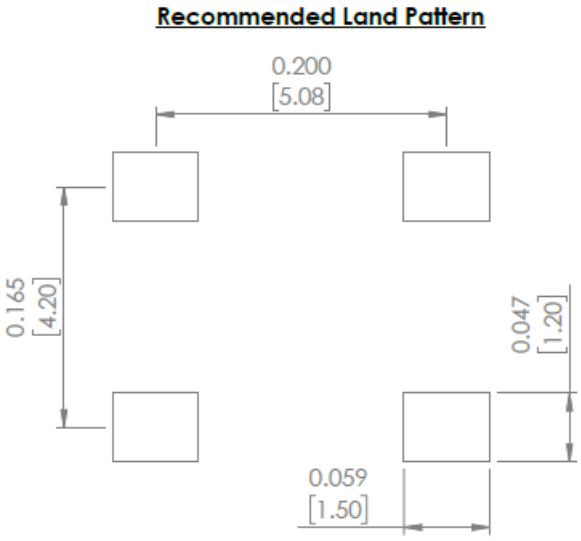
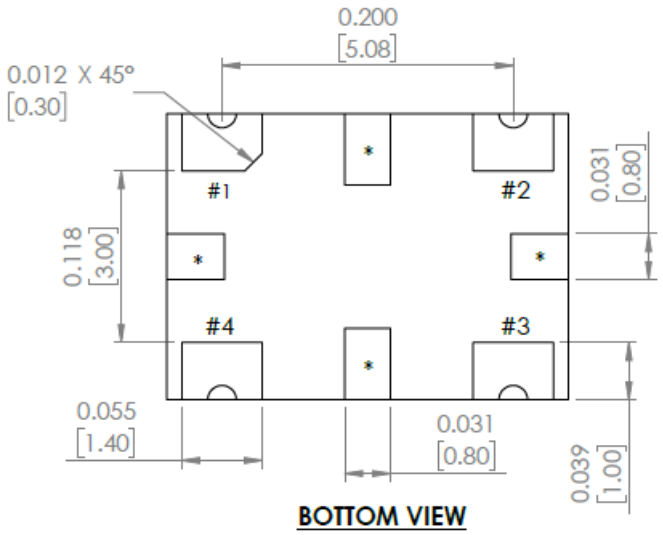
## Mechanical Dimensions




| Pin # | Function |
|---|---|
| 1 | Do not connect (for TCXO)<br>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]

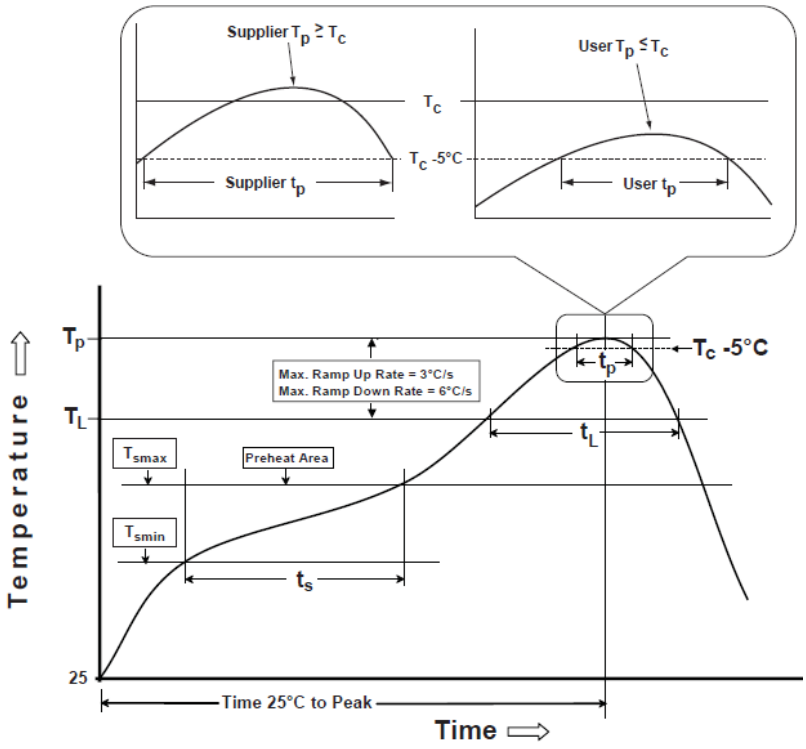


**Table 1**

| SnPb Eutectic Process Classification Temperatures ($T_c$) | | |
|---|---|---|
| Package Thickness | Volume mm³ <350 | Volume mm³ ≥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 mm³ <350 | Volume mm³ 350-2000 | Volume mm³ >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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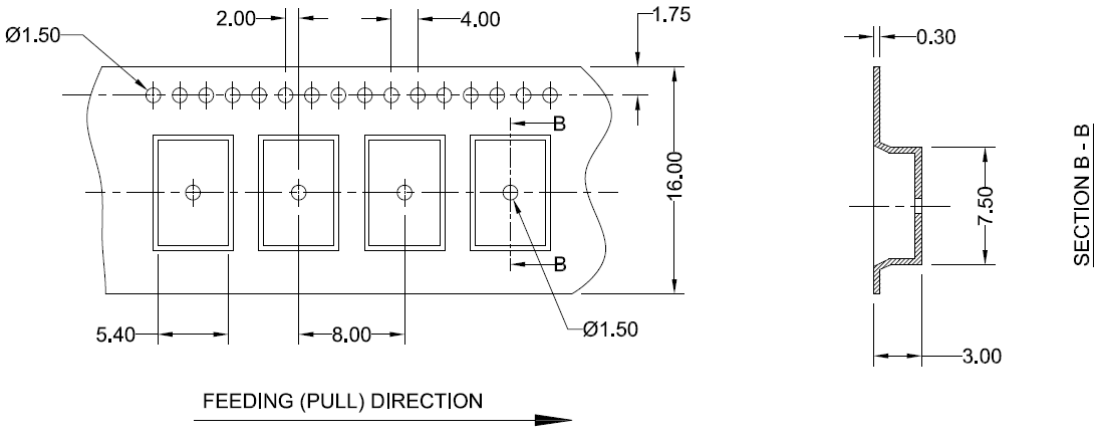
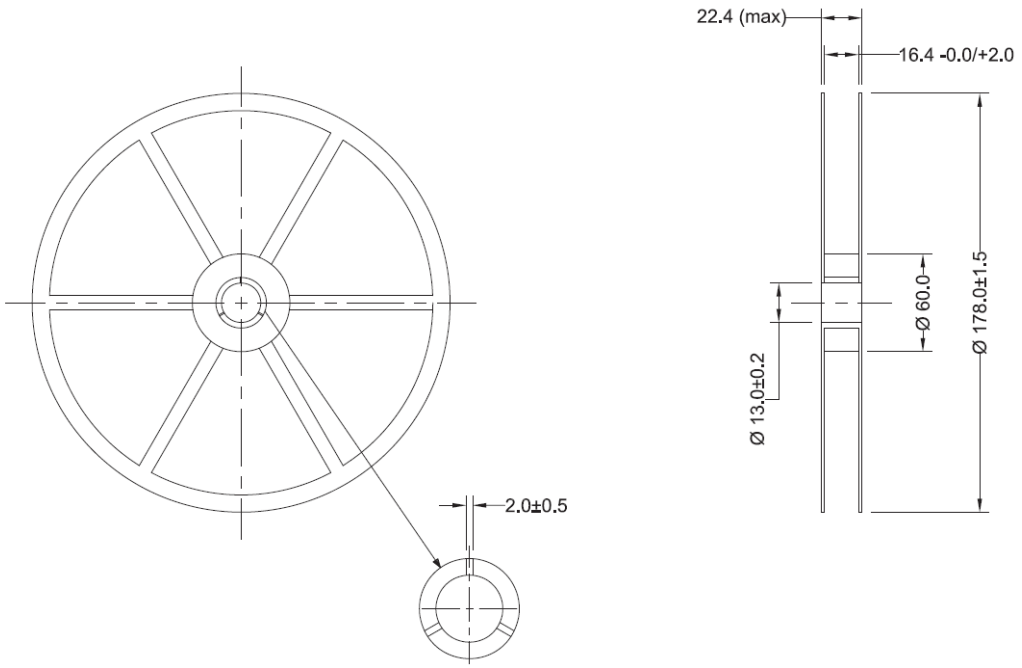
## Packaging

### T5: 500pcs/reel




**Dimensions: mm**



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