

# Precision SMD TCXO/VCTCXO

AST3TQ53



ESD Sensitive



RoHS/RoHS II Compliant



5.0 x 3.2 x 2.0mm

## Moisture Sensitivity Level (MSL) – 3

### FEATURES:

- Standard available frequencies: 10.00, 12.80, 16.384, 19.20, 19.44, 20.00, 24.576, 25.00, 26.00, 30.72, 40.00 MHz
- LVC MOS Output or Clipped Sine Wave output
- Frequency stabilities to include  $\pm 50$ ppb,  $\pm 100$ ppb and  $\pm 280$ ppb over  $-40^{\circ}\text{C}$  to  $+85^{\circ}\text{C}$  operating temperature range
- Excellent Phase Noise, Harmonics and Spurious content
- Typical rms jitter of 400fs @ 40MHz carrier & 1.0ps @ 10MHz carrier over 12kHz to 20MHz BW

### APPLICATIONS:

- COTS Military Radios & other Communication Hardware
- WiMax,
- LTE, BTS
- CATV, LAN, LMDS
- GPS Tracking with Hold-Over accuracy
- Test & Measurement Equipment
- Point-to-Point communication networks

### STANDARD SPECIFICATIONS:

#### Maximum Rating

| Parameters                | Rating                              |
|---------------------------|-------------------------------------|
| Storage Temperature Range | $-55$ to $+125^{\circ}\text{C}$     |
| Supply Voltage            | $-0.5$ to $6\text{V}$               |
| Control Voltage           | $0$ to $3\text{V}$                  |
| ESD, HBM/CDM/MM           | $4\text{kV}/2\text{kV}/200\text{V}$ |

#### Key Electrical Specifications

| Parameters                                                                               | Minimum                                                                       | Typical   | Maximum    | Units      | Notes                                                                              |
|------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------|-----------|------------|------------|------------------------------------------------------------------------------------|
| Frequency Range                                                                          | 10                                                                            |           | 40         | MHz        |                                                                                    |
| Standard Frequencies                                                                     | 10.00, 12.80, 16.384, 19.20, 19.44, 20.00, 24.576, 25.00, 26.00, 30.72, 40.00 |           |            | MHz        |                                                                                    |
| Initial Frequency Tolerance (@ $+25^{\circ}\text{C}$ ) at shipping                       |                                                                               |           | $\pm 0.5$  | ppm        | Relative to carrier                                                                |
| <b>Frequency Stability Options (Ref. to Frequency @<math>+25^{\circ}\text{C}</math>)</b> |                                                                               |           |            |            |                                                                                    |
| $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                           |                                                                               |           | $\pm 50$   | ppb        | Option "5"                                                                         |
| $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                           |                                                                               |           | $\pm 100$  | ppb        | Option "1"                                                                         |
| $-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$                                           |                                                                               |           | $\pm 280$  | ppb        | Option "2"                                                                         |
| Frequency Stability vs. Supply Voltage Change ( $V_{\text{dd}} \pm 5\%$ )                |                                                                               |           | $\pm 100$  | ppb        |                                                                                    |
| Frequency Stability vs. Load Change ( $\text{Load} \pm 5\%$ )                            |                                                                               |           | $\pm 200$  | ppb        |                                                                                    |
| Aging (first year @ $+25^{\circ}\text{C}$ )                                              |                                                                               |           | $\pm 1.0$  | ppm        |                                                                                    |
| Aging (20 years @ $+25^{\circ}\text{C}$ )                                                |                                                                               | $\pm 3.0$ | $\pm 4.6$  | ppm        |                                                                                    |
| Supply Voltage ( $V_{\text{dd}}$ )                                                       | $+3.135$                                                                      | $+3.3$    | $+3.465$   | V          |                                                                                    |
| Supply Current ( $I_{\text{cc}}$ )                                                       |                                                                               |           | 6.0        | mA         | No load                                                                            |
| <b>Control Port ( Applicable for VCTCXO only)</b>                                        |                                                                               |           |            |            |                                                                                    |
| Control Voltage Range ( $V_{\text{c}}$ )                                                 | $+0.5$                                                                        | $+1.5$    | $+2.5$     | V          |                                                                                    |
| Center Control Voltage ( $V_{\text{c}}$ )                                                |                                                                               | $+1.5$    |            | V          | To be with-in $\pm 500$ ppb of $F_{\text{c}}$ @ $25^{\circ}\text{C}$ (at shipping) |
| Frequency Tuning Range                                                                   | $\pm 5$                                                                       | $\pm 7$   | $< \pm 13$ | ppm        |                                                                                    |
| Tuning Slope                                                                             | Positive                                                                      |           |            |            |                                                                                    |
| Linearity                                                                                |                                                                               |           | $\pm 1$    | %          |                                                                                    |
| Port Impedance                                                                           | 100                                                                           |           |            | k $\Omega$ |                                                                                    |

# Precision SMD TCXO/VCTCXO

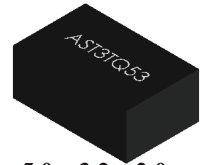
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5.0 x 3.2 x 2.0mm

## STANDARD SPECIFICATIONS:

(Continued)

| Parameters                                      | Minimum    | Typical | Maximum | Unites | Notes                                    |
|-------------------------------------------------|------------|---------|---------|--------|------------------------------------------|
| Phase Noise<br>(10MHz carrier frequency @25°C): |            |         | -95     | dBc/Hz | Offset @10Hz                             |
|                                                 |            |         | -120    |        | Offset @100Hz                            |
|                                                 |            |         | -140    |        | Offset @1kHz                             |
|                                                 |            |         | -145    |        | Offset @10kHz                            |
|                                                 |            |         | -150    |        | Offset @100kHz                           |
| RMS Jitter (@12kHz~5MHz BW)                     | 0.4        |         | 1.3     | ps     | Carrier Dependent                        |
| Clipped Sine Wave                               |            |         |         |        |                                          |
| Output Level                                    | 0.8        |         |         | Vp-p   |                                          |
| Output Load                                     | 10kΩ//10pF |         |         |        |                                          |
| LVCMOS Output (Square Wave)                     |            |         |         |        |                                          |
| V <sub>OH</sub>                                 | 2.4        |         |         | V      | Output Load=15pF                         |
| V <sub>OL</sub>                                 |            |         | 0.4     | V      | Output Load=15pF                         |
| Output Load                                     |            |         | 15      | pF     |                                          |
| Duty Cycle                                      | 45         |         | 55      | %      | @( V <sub>OH</sub> - V <sub>OL</sub> )/2 |
| Rise/Fall Time                                  |            |         | 6       | ns     | Output Load=15pF                         |

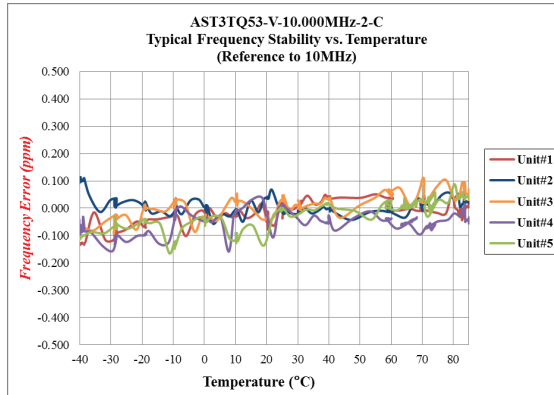
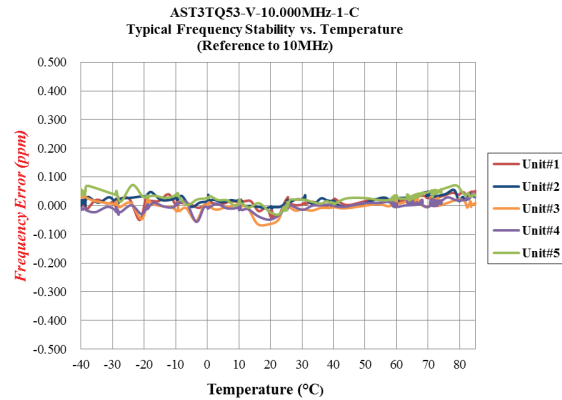
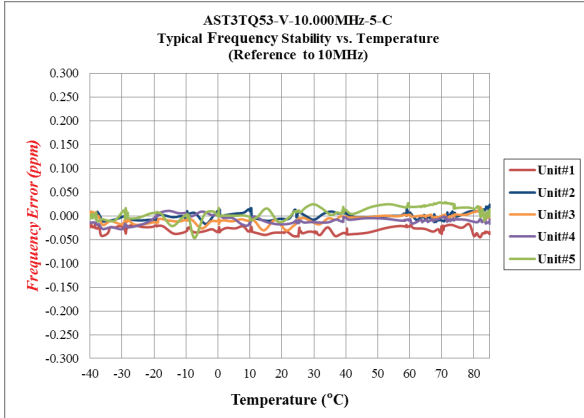
## PART IDENTIFICATION:

AST3TQ53 -  -  MHz -  -  -

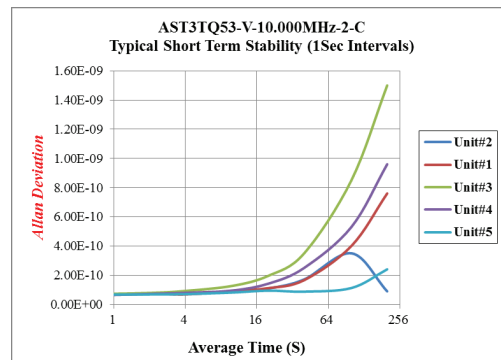
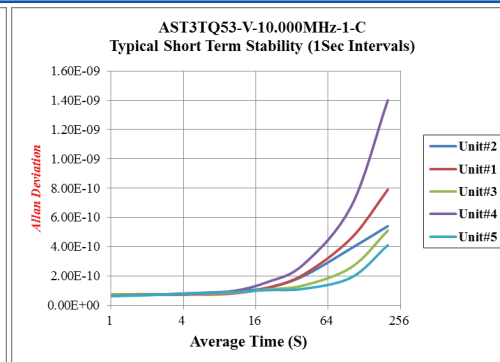
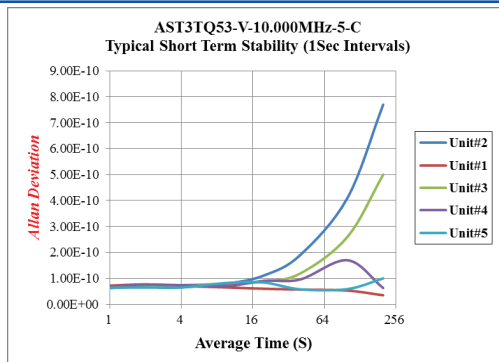
| Pullability            | Frequency in MHz                                       | Freq. Stability over Operating Temp.  | Output Type                         | Packaging                                          |
|------------------------|--------------------------------------------------------|---------------------------------------|-------------------------------------|----------------------------------------------------|
| T = TCXO<br>V = VCTCXO | Please specify the frequency in MHz.<br>e.g. 19.200MHz | 5: ±50ppb<br>1: ±100ppb<br>2: ±280ppb | C: LVC MOS<br>SW: Clipped Sine Wave | Blank: Bulk<br>T5: 500pcs/reel<br>T2: 2000pcs/reel |



### TYPICAL FREQUENCY STABILITY VS. TEMPERATURE



### TYPICAL SHORT TERM STABILITY





### TYPICAL FREQUENCY PULL VS. CONTROL VOLTAGE



### TYPICAL PHASE NOISE

#### 10.00 MHz Carrier



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## TYPICAL AGING:



| Aging Test Conditions |             |
|-----------------------|-------------|
| Series                | AST3TQ53    |
| Frequency             | 10MHz       |
| Acquisition Mode      | Cycle       |
| Acquisition Time      | 1129 hours  |
| Test Temperature      | +85°C ± 1°C |
| Number of Samples     | 5pcs        |

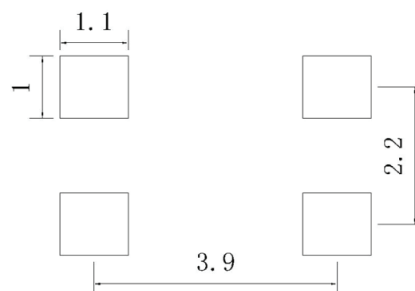
| Aging Data |                  |                 |                            |
|------------|------------------|-----------------|----------------------------|
| No.        | Aging Time (hrs) | Aging/Day (ppm) | Projected Aging/year (ppm) |
| #1         | 1129             | -0.0039         | -0.3896                    |
| #2         | 1129             | -0.0059         | -0.5925                    |
| #3         | 1129             | -0.0042         | -0.4202                    |
| #4         | 1129             | -0.0056         | -0.5555                    |
| #5         | 1129             | -0.0055         | -0.5492                    |

## OUTLINE DIMENSION:



Dimensions: mm

## Recommended Land Pattern



| Pin | Function                         |
|-----|----------------------------------|
| 1   | NC (for TCXO)<br>Vc (for VCTCXO) |
| 2   | GND                              |
| 3   | Output                           |
| 4   | Vdd                              |
| *   | For factory test only            |

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## REFLOW PROFILE:



## TAPE & REEL:

T5: 500pcs/reel; T2: 2000pcs/reel

MSL-3 packaging applies to MOQ=25 units (cut tape), T5 & T2.



| W        | A0           | B0           | K0       | P       | F        |
|----------|--------------|--------------|----------|---------|----------|
| 16.0±0.3 | 3.7±0.15     | 5.6±0.15     | 2.0±0.15 | 8.0±0.1 | 7.5±0.1  |
| E        | D            | D1           | P0       | P2      | t        |
| 1.75±0.1 | 1.5+0.1/-0.0 | 1.5+0.1/-0.0 | 4.0±0.1  | 2.0±0.1 | 0.3±0.05 |



B-B



| W        | A       | N      | T       | E       | F        | D        |
|----------|---------|--------|---------|---------|----------|----------|
| 16.4±0.3 | 178±0.5 | 62±0.4 | 1.8±0.2 | 2.0±0.5 | 21.8±0.8 | 13.5±0.3 |

Dimensions: mm

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