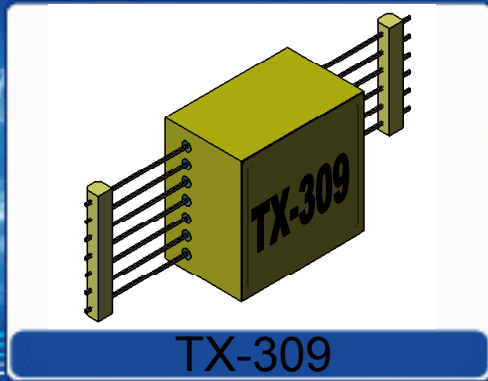


Helping Customers Innovate, Improve & Grow



TX-309

### Features

*Radiation Tolerant  
Small footprint*

### Typical Applications

*Reference clock for space and satellite  
Military airborne and mobile systems*

### Previous Vectron Model Numbers

C2501

### Frequency Range

0.3 MHz – 150 MHz

### Frequency stabilities<sup>1</sup>

| Parameter   | Min | Typ | Max | Units   | Operating temp range |
|---|-----|-----|-----|---------|----------------------|
| vs. Temperature Stability (includes initial accuracy, Load±10% & Supply±5%) | -1  |     | +1  | ppm     | 0 ... +50°C          |
|   | -2  |     | +2  |         | -20 ... +70°C        |
|   | -4  |     | +4  |         | -40 ... +85°C        |
|   | -10 |     | +10 |         | -55 ... +105°C       |
| Parameter   | Min | Typ | Max | Units   | Condition            |
| vs aging / 1 year   | -1  |     | +1  | ppm     |                      |
| vs aging / 10 year  | -5  |     | +5  | ppm     |                      |
| Short Term Stability  | -1  |     | +1  | ppb/sec |                      |

## Supply Voltage (Vs)

| Parameter           | Min   | Typ  | Max   | Units | Condition       |
|---------------------|-------|------|-------|-------|-----------------|
| Supply voltage      | 4.75  | 5.0  | 5.25  | VDC   |                 |
|                     | 3.135 | 3.3  | 3.465 | VDC   |                 |
|                     | 14.25 | 15.0 | 15.75 | VDC   |                 |
| Current consumption |       |      | 50    | mA    | ACMOS output    |
|                     |       |      | 35    | mA    | Sinewave output |

## RF Output

| Parameter               | Min      | Typ | Max  | Units | Condition                     |
|-------------------------|----------|-----|------|-------|-------------------------------|
| Signal                  | CMOS     |     |      |       |                               |
| Duty Cycle              | 40       |     | 60   | dBm   |                               |
| Rise\Fall time          |          |     | +5   | ns    | (10% to 90%) with 2CMOS Loads |
| Logic Level "0"         |          |     | +0.5 | V     |                               |
| Logic Level "1"         | Vcc-0.5V |     |      |       |                               |
| Signal                  | Sinewave |     |      |       |                               |
| Power                   | +3       |     |      | dBm   |                               |
| Power                   | +7       |     |      | dBm   |                               |
| Harmonics/Sub-Harmonics |          |     | -20  | dBc   | (>75 MHz)                     |
| Spurious                |          |     | -70  | dBc   |                               |

## Frequency Tuning (EFC)

| Parameter    | Min  | Typ | Max | Units | Condition |
|--------------|--|-----|-----|-------|-----------|
| Tuning Range | Sufficient to tune to nominal frequency for 15 years |     |     |       |           |

## Additional Parameters

| Parameter             | Min | Typ  | Max | Units  | Condition |     |
|-----------------------|-----|------|-----|--------|-----------|-----|
|                       |     |      |     |        |           |     |
| Phase Noise (10MHz)   |     | -95  |     | dBc/Hz | 10        | Hz  |
|                       |     | -125 |     | dBc/Hz | 100       | Hz  |
|                       |     | -145 |     | dBc/Hz | 1         | kHz |
|                       |     | -150 |     | dBc/Hz | 10        | kHz |
|                       |     | -150 |     | dBc/Hz | 100       | kHz |
| Phase Noise (>75 MHz) |     | -75  |     | dBc/Hz | 10        | Hz  |
|                       |     | -105 |     | dBc/Hz | 100       | Hz  |
|                       |     | -135 |     | dBc/Hz | 1         | kHz |
|                       |     | -145 |     | dBc/Hz | 10        | kHz |
|                       |     | -145 |     | dBc/Hz | 100       | kHz |
| Weight                |     |      | 30  | g      |           |     |

**CONSTRUCTION, SCREENING & TESTING OPTIONS**

NOTE: For Engineering or Prototype TCXOs requiring basic electrical testing only and no Screening, or Groups 'A' and 'B' Testing, use the code letter 'E'.

| Operation \ Code   | S   | R   | C   | B   |
|--|---|---|---|---|
| Design, Construction & Component Screen (see Mfging Section) | Mil-PRF-55310 Class 'S'                           | Mil-PRF-55310 Class 'B'                           | Mil-PRF-55310 Class 'B'                           | Mil-PRF-55310 Class 'B'                           |
| Workmanship  | M883, Method 2017 for Class 'S'                   | M883, Method 2017 for Class 'B'                   | M883, Method 2017 for Class 'B'                   | M883, Method 2017 for Class 'B'                   |
| Screening  | Mil-PRF-55310 Class 'S'                           | Mil-PRF-55310 Class 'S'                           | Mil-PRF-55310 Class 'B' modified                  | Mil-PRF-55310 Class 'B'                           |
| Non-Destruct Wire Bond Pull                                  | 100%  | 100%  | N/A   | N/A   |
| Internal Visual  | M883, Method 2017 for Class 'S'                   | M883, Method 2017 for Class 'B'                   | M883, Method 2017 for Class 'B'                   | M883, Method 2017 for Class 'B'                   |
| Stabilization Bake   | 48 hrs minimum @ +150°C                           | 48 hrs minimum @ +150°C                           | 48 hrs minimum @ +150°C                           | 48 hrs minimum @ +150°C                           |
| Thermal Shock  | M883, Method 1011, TC 'A'                         | M883, Method 1011, TC 'A'                         | N/A   | N/A   |
| Constant Acceleration  | M883, Method 2001, TC 'A' (5000 gs, Y1 Axis only) | M883, Method 2001, TC 'A' (5000 gs, Y1 Axis only) | M883, Method 2001, TC 'A' (5000 gs, Y1 Axis only) | M883, Method 2001, TC 'A' (5000 gs, Y1 Axis only) |
| Seal Test (fine & gross)                                     | 100%  | 100%  | 100%  | 100%  |
| PIND   | M883, Method 2020, TC 'B'                         | M883, Method 2020, TC 'B'                         | M883, Method 2020, TC 'B'                         | N/A   |
| Electrical Test Frequency, Output levels, Input Current      | @ +25°C only                                      | @ +25°C only                                      | @ +25°C only                                      | @ +25°C only                                      |
| Burn-In (Powered with load)                                  | +125°C for 240 hours                              | +125°C for 240 hours                              | +125°C for 160 hours                              | +125°C for 160 hours                              |
| Electrical Test Frequency, Output levels, Input Current      | @ +25°C & Temp Extremes specified in Table II     | @ +25°C & Temp Extremes specified in Table II     | @ +25°C & Temp Extremes specified in Table II     | @ +25°C & Temp Extremes specified in Table II     |
| PDA  | 2% applies to Input Current @ +25°C               | 2% applies to Input Current @ +25°C               | 10% applies to Input Current @ +25°C              | 10% applies to Input Current @ +25°C              |
| Radiographic   | M883, Method 2012                                 | M883, Method 2012                                 | N/A   | N/A   |
| Group 'A'  | 100%  | 100%  | Sample per Mil-PRF-55310                          | Sample per Mil-PRF-55310                          |
| Group 'B' (30 day Aging @ +70°C)                             | 100%  | 100%  | Sample per Mil-PRF-55310                          | Sample per Mil-PRF-55310                          |

| ENVIRONMENTAL CHARACTERISTICS |  |
|-------------------------------|--|
| Sine Vibration                | Mil-STD-202, Method 204, TC "D"  |
| Random Vibration              | Mil-STD-202, Method 214 TC "I-K" (15 minutes per axis)   |
| Shock                         | Mil-STD-202, Method 213, TC "F"  |
| Acceleration                  | Mil-STD-883, Method 2001, TC "A"   |
| Altitude                      | 50,000 feet minimum to deep space  |
| Radiation                     | Radiation testing is not performed at the oscillator level, but these TCXOs have been acceptable for use in environments of up to 100K rads total dose, by analysis of the components used. The TTL Output TCXOs are assembled with all bipolar semiconductors. The CMOS Output TCXOs are assembled with all bipolar semiconductors with the exception of the ACMOS chip used to provide the CMOS output. A CMOS chip that is from a radiation tested, certified wafer lot can be provided if specified on the Purchase Order. A copy of the parts list and materials can be provided for customer review. |

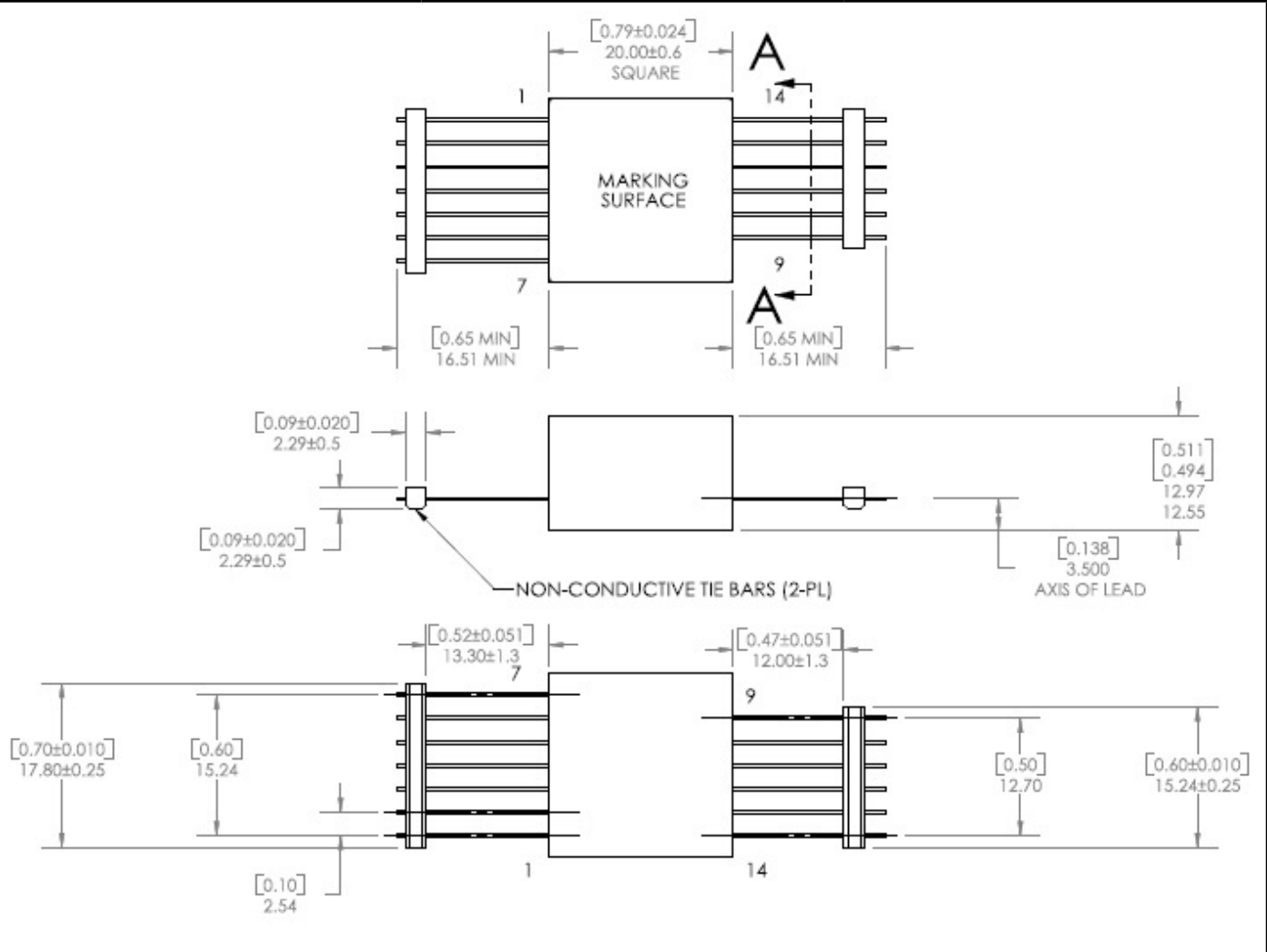
| MANUFACTURING INFORMATION   |
|---|
| <p style="text-align: center;"><b>QUARTZ CRYSTAL</b></p> <p>For the flight models, swept quartz shall be used in the manufacture of the crystals. For the Engineering models, non-swept quartz shall be used.</p> <p style="text-align: center;"><b>TRAVELLERS</b></p> <p>Travellers or Process Cards are used in the manufacturing and testing of all Hi-Rel TCXOs and are available for customer review. Copies of these Travellers can be provided with the TCXOs at time of shipment if so specified on the purchase order.</p> <p style="text-align: center;"><b>TRACEABILITY and HOMOGENEOUS MATERIAL</b><br/>Option Codes 'S' &amp; 'R' only</p> <p>Manufacturing lot and date code information shall be recorded, by TCXO serial number, of every component and all materials used in the manufacture of that TCXO. Also all semiconductors used in the manufacture of any given Production Lot of TCXOs, shall be from the wafer and have the same manufacturing lot date code. A Production Lot, as defined by Corning, is all oscillators that have been kitted and assembled as a single group. After the initial kitting and assembly, this Production Lot may be divided into multiple sublots to facilitate alignment and test capacity and may be sealed at multiple times within a 13 week window.</p> <p style="text-align: center;"><b>TEST DATA</b></p> <p>All Test Data is recorded by TCXO serial number. Copies of this data can be provided with the TCXOs at time of shipment if so specified on the purchase order.</p> <p style="text-align: center;"><b>REWORK</b></p> <p>All rework follows the requirements of Mil-PRF-55310 Class 'S' for Option Code 'S' and Class 'B' for Option Codes 'R', 'B' and 'C'. The only exception is the Select-At-Test components may be replaced up to four times.</p> |

### Absolute Maximum Ratings:

| Parameter                                | Min          | Typ | Max           | Units | Condition             |
|--|--------------|-----|---------------|-------|-----------------------|
| Supply voltage (Vs)                      | -0.5<br>-0.5 |     | +7.0<br>+20.0 | V     | (ACMOS)<br>(Sinewave) |
| DC Input Current                         |              |     | 50            | mA    |                       |
| Lead Temperature (Soldering, 10 seconds) |              |     | 300           | °C    |                       |
| Operable temperature range               | -55          |     | +125          | °C    |                       |
| Storage temperature range                | -62          |     | +125          | °C    |                       |

### Configuration:

| Type B |            |            |
|--------|------------|------------|
| Code   | Height "H" | Length "L" |
| B1     | 0.5 "      | 0.65 "     |



### Pin Configuration

|                 |                            |
|-----------------|----------------------------|
| 1, 3, 7, 12, 14 | Ground                     |
| 2               | Supply                     |
| 4, 5, 9, 10, 11 | No Connection              |
| 6               | External Frequency Control |
| 13              | RF Output                  |

## How to order this product:

Use this worksheet to forward the following information to your factory representative :

| Model  | Height | - | Supply Voltage Code | RF Output Code | Temperature Range | - | Stability | Option | - | Frequency  |
|--------|--------|---|---------------------|----------------|-------------------|---|-----------|--------|---|------------|
| TX-309 | 0      | - | D                   | A              | J                 | - | XXS       | X      | - | 100M000000 |

Height:  
0: 0.5 inch

Supply Voltage:  
A: 15 V  
D: 5 V  
E: 3.3 V

RF Output Code:  
A: CMOS  
E: Sinewave

Temperature Range:  
B: -55...+105°C  
E: -40...+85°C  
J: -20...+70°C  
P: 0...+50°C

Options:  
X: No Option

Stability Code(1st digit):

B: ±10ppm  
0: ±4ppm  
1: ±2ppm  
2: ±1ppm

Enable (2 digit):

X: No Enable

Screening (3 digit):

S: Class "S" Level Screening  
R: Class "S", Class B components  
C: "C" Class B modified  
B: Class "B" Level Screening

### Notes:

- 1 Contact factory for improved stabilities or additional product options. Not all options and codes are available at all frequencies.
- 2 Unless otherwise stated all values are valid after warm-up time and refer to typical conditions for supply voltage, frequency control voltage, load, temperature (25°C)
- 3 Phase noise degrades with increasing output frequency.
- 4 Subject to technical modification.
- 5 Contact factory for availability.