

### Product Features

- Most precise single, OCXO in the industry
- Stability to ±2 ppb (commercial temperature) and ±3 ppb (industrial temperature)
- Excellent phase noise performance (-155 dBc at 10kHz offset)
- Custom capabilities for specific application optimization
- RoHS 5/6 now RoHS 6/6 in development

#### Product Description



The XO5120 series is an industry standard 1" x 1.4" single OCXO which offers the best in phase noise combined with stability over a wide range of operating temperatures. With output logic (HC-MOS/TTL) or sinewave, this product fits most applications. The XO5120 series is based on a standard design platform that can then be tailored to the customer's specific requirements with little extra effort. Standard frequencies of 10.00, 12.80, 13.00, 16.384, and 20.00MHz are available as standard designs. Other frequencies between 10 and 100MHz can be developed in a short time.

### **Product Applications**

The basis for all reference timing sources. With stability to +/-2ppb, this device even replaces Double OCXOs (DOCXO) in some applications. It can be used in:

- Microwave radios
- Base stations
- Test and Measurement equipment
- Reference timing circuits

### **Product Ordering Information**

| Ordering Information   |               |        |            |
|--|---------------|--------|------------|
|  |               |        |            |
|  | XO512x        | -      | XXX-V      |
| Product Series<br>5121: AT/Sine<br>5122: AT/HCMOS/TTL<br>5123: SC/Sine<br>5124: SC/HCMOS/TTL |               |        |            |
| Assigned Customer Specific   |               |        |            |
| RoHS 5/6<br>V: RoHS 5/6<br>R: RoHS 6/6 (contac   | ct factory fo | or ava | ilability) |



#### **Performance Characteristics**

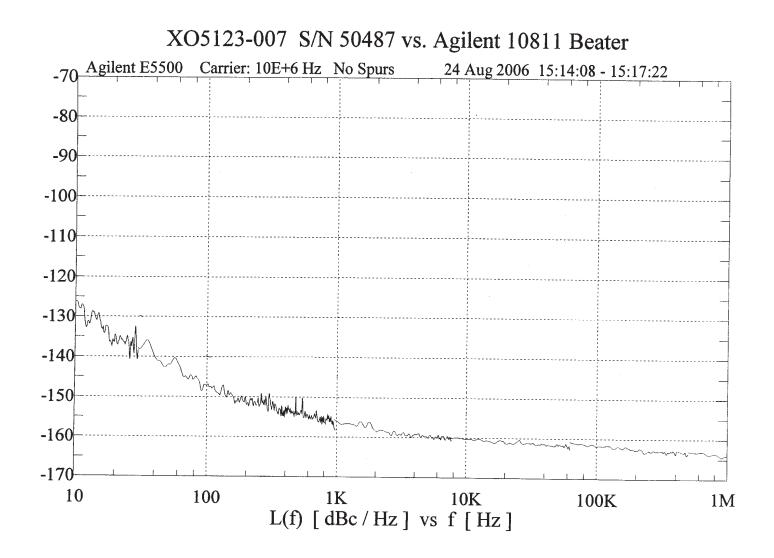
| Optional Temperature Ranges and<br>Frequency Stabilities (F/T) |                     |                     |  |  |
|--|---------------------|---------------------|--|--|
| OTR °C   | SC-Cut              | AT-Cut              |  |  |
| 0 to +50   | ±2x10 <sup>-9</sup> | ±2x10 <sup>-8</sup> |  |  |
| 0 to +70   | ±2x10 <sup>-9</sup> | ±2x10 <sup>-8</sup> |  |  |
| -10 to +70   | ±3x10 <sup>-9</sup> | ±2x10 <sup>-8</sup> |  |  |
| -30 to +70   | ±3x10 <sup>-9</sup> | ±3x10 <sup>-8</sup> |  |  |
| -40 to +70   | ±3x10 <sup>-9</sup> | ±3x10 <sup>-8</sup> |  |  |
| -40 to +85   | ±3x10 <sup>-9</sup> | ±4x10 <sup>-8</sup> |  |  |

|                           | PARAMETER   | Symbol                            | Minimum                  | Typical                        | Maximum              | Units     | Condition       |
|---------------------------|---|-----------------------------------|--------------------------|--------------------------------|----------------------|-----------|-----------------|
|                           | Frequency Range   | F <sub>ON</sub>                   | 10                       | Typical                        | 100                  | MHz       | Condition       |
|                           | Operating Temperature   | TA                                | 10                       | -40 to +8                      |                      | °C        | Consult Factory |
|                           | Stability Over Temperature  | ΔF/F                              | ±20                      | ±30                            |                      | dqq       | AT-Cut          |
|                           | etabling even remperature   | $\Delta F/F$                      | ±5                       | ±10                            |                      | ppb       | SC-Cut          |
|                           | Short Term Stability  |                                   | <u></u> 0                | 0.1                            |                      | ppb       | AT-Cut          |
|                           | enert renn etablicy   |                                   |                          | 0.01                           |                      | ppb       | SC-Cut          |
|                           | Daily Aging   |                                   |                          | ±1.0                           |                      | ppb       | AT-Cut          |
|                           | Yearly Aging  |                                   |                          | ±0.5                           |                      | ppm       | AT-Cut          |
|                           | Daily Aging   |                                   |                          | ±0.1                           |                      | ppb       | SC-Cut          |
|                           | Yearly Aging  |                                   |                          | ±0.3                           |                      | ppm       | SC-Cut          |
|                           | Frequency vs. Supply  |                                   |                          | <u>±</u> 0.0<br>±1             |                      | pph       |                 |
|                           | Frequency vs. Load  |                                   |                          | ±1                             |                      | ppb       |                 |
|                           | Supply Voltage  | Vs                                |                          | 3.3 to 12                      |                      | Volts     | Consult Factory |
|                           | Power Consumption   | •3                                |                          | 0.01012                        |                      | Volto     |                 |
| <b>"</b>                  | @ Warm-Up   |                                   |                          |                                | 3.5                  | Watts     |                 |
| Ĩ                         | Steady Sate @ 25°C  |                                   |                          |                                | 1.25                 | Watts     |                 |
| Electrical Specifications | Warm-Up Time @ 25°C   |                                   | To within                | ±1 x 10 <sup>-7</sup> i        | n 3 minutes          | Minutes   |                 |
| l₿                        | HCMOS Output Signal   |                                   | = +3.3V or               |                                |                      |           |                 |
| ١ X                       | Rise/Fall Time  |                                   | Ŭ                        | 3nsec                          | 7nsec                |           |                 |
| ကြိ                       | Logic "0" Level   |                                   | 0.2                      |                                |                      | Volts     |                 |
| <u>ca</u>                 | Logic "1" Level   |                                   |                          |                                | V <sub>S</sub> - 0.2 | Volts     |                 |
| Ē                         | Symmetry  |                                   | 40                       |                                | 60                   | %         |                 |
| l 🌐                       | Output Load   |                                   |                          | 10                             |                      | рF        |                 |
| Ι_                        | Sinewave Output Signal  |                                   |                          |                                |                      |           |                 |
|                           | Level   |                                   |                          | +3                             |                      | dBm       |                 |
|                           | Output Load   |                                   |                          | 50                             |                      | Ω         |                 |
|                           | Frequency Adjustment (Pin 7)  |                                   |                          |                                |                      |           |                 |
|                           | Slope   | .,                                |                          | Positive                       | 1 40                 |           |                 |
|                           | External Voltage  | Vc                                | 0                        |                                | 10                   | Volts     | Consult Factory |
|                           | Range   |                                   |                          | ±4                             |                      | ppm       | AT-Cut          |
|                           | Range   |                                   | 20                       | ± <b>4</b>                     |                      | ppm<br>KΩ | SC-Cut          |
|                           | Input Impedance (Pin 7)<br>Phase Noise  |                                   | 20<br>AT-Cut             |                                |                      |           |                 |
|                           |   | Typical @ 10MHz                   |                          | SC-Cui                         |                      |           |                 |
|                           | 1 Hz  |                                   |                          | -90                            | dBc/Hz               |           |                 |
|                           | 1 HZ<br>10 Hz   |                                   |                          | -115 -120                      |                      | dBc/Hz    |                 |
|                           | 10 Hz   |                                   | -115<br>-140             |                                |                      | dBc/Hz    |                 |
|                           | 1 kHz   |                                   | -140 -140 -140 -145 -150 |                                | dBc/Hz               |           |                 |
|                           | 10 kHz  |                                   | -140                     |                                | -155                 | dBc/Hz    |                 |
| $\vdash$                  | 10 112  | 1                                 | 100                      |                                |                      |           |                 |
| tal                       | Mechanical Shock Per MIL-STD-2  |                                   |                          | D-202, Method 213, Condition C |                      |           |                 |
| Environmental             | Vibration   | Per MIL-STD-202, Method 201 & 204 |                          |                                |                      |           |                 |
| 1                         | Storage Temperature   | -55°C to 125°C                    |                          |                                |                      |           |                 |
| j.                        | Hermeticity   |                                   | D-202, Meth              | od 112                         |                      |           |                 |
| ١ <u></u>                 | Solderability   | Per EIAJ-S                        |                          |                                |                      |           |                 |
| ["                        | Max. Wave Soldering Cond.   | +260°C for                        | 10 seconds               |                                |                      |           |                 |
|                           | HCMOS Load - see load circuit diagram #2. Sinewave Load - see load circuit diagram #8 |                                   |                          |                                |                      |           |                 |

HCMOS Load - see load circuit diagram #2. Sinewave Load - see load circuit diagram #8

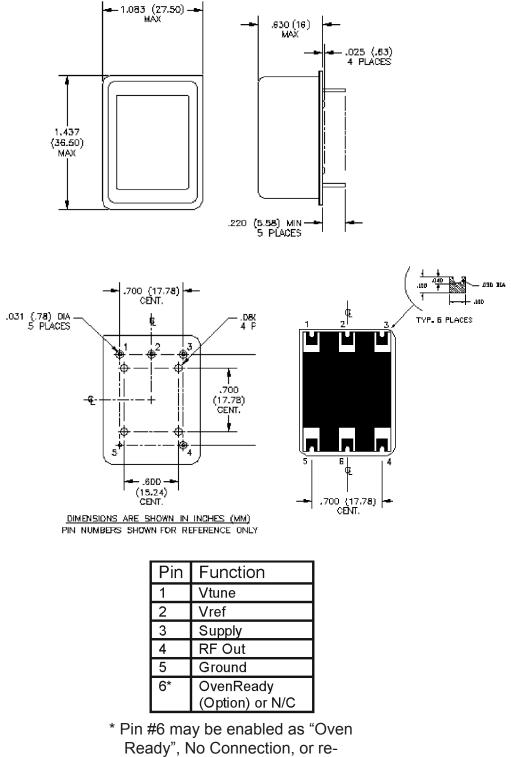


**Phase Noise Plot** 





### **Product Dimension & Pinout Information**



moved entirely.



### Handling Information

Although protection circuitry has been designed into the XO5120 oscillator, proper precautions should be taken to avoid exposure to electrostatic discharge (ESD) during handling and mounting. MtronPTI utilizes a human-body model (HBM) and a charged-device model (CDM) for ESD-susceptibility testing and protection design evaluation. ESD voltage thresholds are dependent on the circuit parameters used to define the mode. Although no industry-wide standard has been adopted for the CDM, a standard HBM (resistance = 1500  $\Omega$ , capacitance = 100 pF) is widely used and therefore can be used for comparison purposes. The HBM ESD threshold presented here was obtained using these circuit parameters.

| Model          | ESD Threshold, Minimum | Unit |
|----------------|------------------------|------|
| Human Body     | 1500*                  | V    |
| Charged Device | 1500*                  | V    |

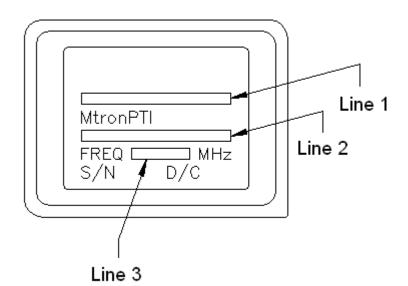
\* MIL-STD-833D, Method 3015, Class 1



### **Quality Parameters**

Environmental Specifications/Qualification Testing Performed on the XO5120 OCXO Test Test Method **Test Condition Electrical Characteristics** Internal Specification Per Specification Frequency vs. Temperature Internal Specification Per Specification Mechanical Shock MIL-STD-202, Method 213, C 100 g, 6 ms 10 g from 10-2000 Hz Vibration MIL-STD-202, Method 201-204 -55 Deg. C to +125 Deg. C, 15 minute Dwell, 10 cycles Thermal Cycle MIL-STD-883, Method 1010, B Internal Specification 168 Hours at 105 Degrees C Aging Gross Leak MIL-STD-202, Method 112 30 Second Immersion Fine Leak MIL-STD-202, Method 112 Must meet 1x10<sup>-8</sup> MIL-STD-883, Method 2003 8 Hour Steam Age – Must Exhibit 95% coverage Solderability Resistance to Solvents MIL-STD-883, Method 2015 Three 1 minute soaks MIL-STD-883, Method 2004, A 2 Pounds Terminal Pull Lead Bend MIL-STD-883, Method 2004, B1 1 Bending Cycle **Physical Dimensions** MIL-STD-883, Method 2016 Per Specification Internal Visual Internal Specification Per Internal Specification

### Part Marking Guide



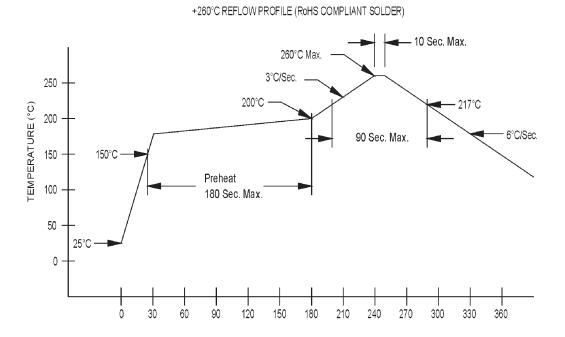
Line 1: Optional Customer Specified

Line 2: MtronPTI Model Number

Line 3: Frequency (XXX.YYY)



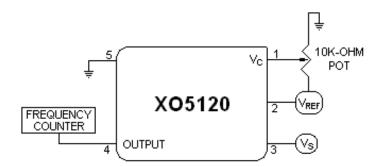
### **Maximum Soldering Conditions**



### **Solder Conditions**

Note: Exceeding these limits may damage the device.

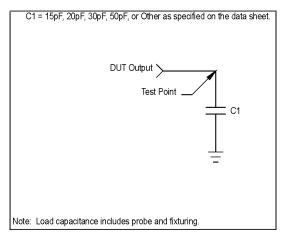
### **Typical Test Circuit**



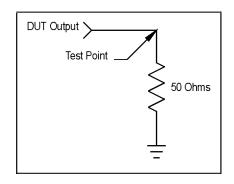


Load Circuit

Load Circuit #2 - HCMOS



Load Circuit #8 - Sinewave - 50 Ohms



### Product Revision Table

| Date | Revision | PCN Number | Details of Revision |
|------|----------|------------|---------------------|
|      |          |            |                     |

For custom products or additional specifications contact our sales team at 800.762.8800 (toll free) or 605.665.9321

For more information on this product visit the MtronPTI website at www.mtronpti.com