

## **SERIES QR HIGH PRECISION TIMEBASE/REFERENCE CRYSTALS**

## **SERIES QT HIGH PRECISION TEMPERATURE SENSOR CRYSTALS**



### **FEATURES**

- Rugged
- Low aging
- Optimized for use with QUARTZDYNE® Pressure Transducers
- High temperature: 350°F [177°C]
- SERIES QR Timebase/Reference Crystals offer stable frequency over a wide temperature range
- SERIES QT Temperature Sensor Crystals provide high temperature sensitivity

### **APPLICATIONS**

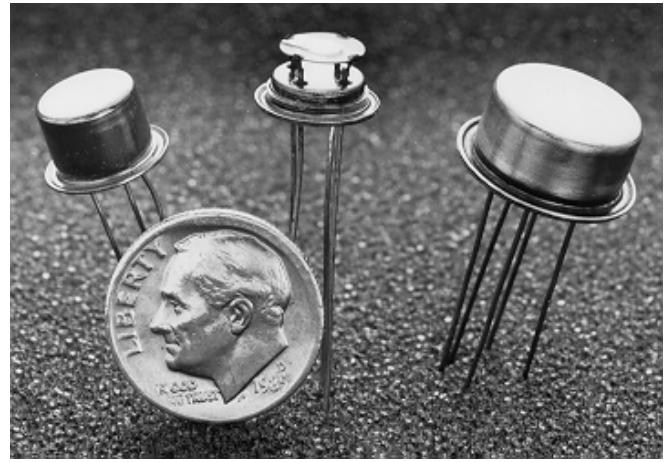
- Microprocessor clock for high temperature environments
- Frequency reference for precision measurement
- Temperature sensing for display or sensor compensation
- Oil, gas, geothermal, and other high temperature environments

### **DESCRIPTION**

The QUARTZDYNE® SERIES QR HIGH PRECISION TIMEBASE/REFERENCE CRYSTALS and SERIES QT HIGH PRECISION TEMPERATURE SENSOR CRYSTALS were originally developed for use in Quartzdyne's line of precision surface and downhole pressure transducers. However, due to overwhelming requests from its customers, Quartzdyne now offers these precision resonators for incorporation in your application (i.e., memory recorders, bottom-hole temperature gauges, frequency counter references, microprocessor clocks, etc.) to provide superior temperature compensation and precision reference frequency for laboratory, surface (well-head), downhole, and other demanding applications.

The SERIES QR is an SC-cut, fundamental mode resonator in a TO-5 or TO-8 can. The resonator is designed for minimum aging (frequency change with time), minimum frequency shift versus temperature (typically  $\pm 20$  ppm from 68-350°F [20-177°C]), and maximum resistance to shock and vibration. Most microprocessors in use today can oscillate this crystal with their built-in, on-board timebase oscillator. The SERIES QR provides a significant improvement in accuracy and stability over the AT-cut crystals in common usage. Custom frequencies from 3.68 MHz to 8.39 MHz are also available. Above 6 MHz the crystals are packaged in the smaller TO-5 package; contact Quartzdyne for price and delivery. Minimum quantities may apply.

The SERIES QT is a 7.144 MHz temperature-sensitive crystal packaged in a TO-5 can. This crystal is manufactured to the same standards (i.e., aging and shock) as the SERIES QR reference crystal. Its frequency is a strong function of temperature. Repeatability is better than 0.002°F [0.001°C]. Temperature resolution is dependent upon the frequency counter design: even simple methods can provide 0.010°F [0.005°C]. (Note: the accuracy depends upon the user's care in thermal design and calibration procedures.) In addition, the low thermal mass of the package and crystal means rapid thermal response time for the bare unit (thermal response for the end product is a function of the user's design).



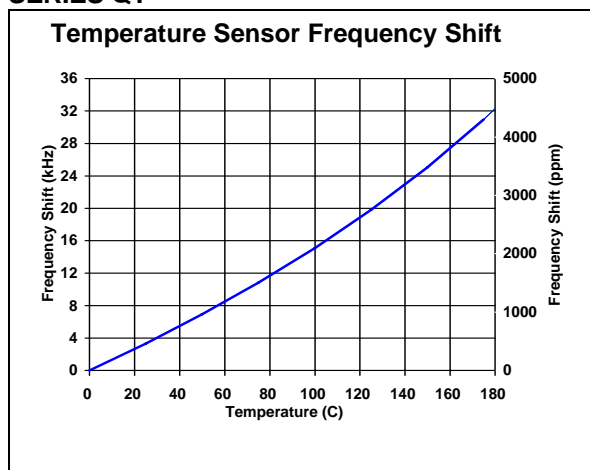
## GENERAL SPECIFICATIONS SERIES QR SERIES QT

Frequency.....	3.68-8.39 MHz.....	7.144 MHz
Crystal cut.....	SC.....	Proprietary
Overtone.....	Fundamental.....	Fundamental
Nominal load capacitance .....	22 pF ±5 pF.....	N/A
Nominal room temperature frequency tolerance .....	±5 ppm <sup>1</sup> .....	±10 kHz
Motional resistance.....	<20 Ω <sup>2</sup> .....	<20 Ω
Aging after 14 days (at 350°F [177°C]) .....	≤2 ppm/year.....	≤2 ppm/year
Package.....	TO-8(HC-37)/TO-5(HC-35).....	TO-5(HC-35)
Storage/operating temperature range .....	32-350°F [0-177°C].....	32-350°F [0-177°C]
Frequency vs. temperature (32-350°F [0-177°C]).....	±20 ppm Nominal*.....	+4500 ppm Nominal
Frequency slope .....	<1 ppm/°C.....	~135 Hz/°C @ 25°C
		~260 Hz/°C @ 177°C
Shock.....	100 g, 10 ms half sine.....	100 g, 10 ms half sine
Vibration.....	Survives random vibration per Section 3.2.1 of NAVMAT P-9492	
Hysteresis (retrace) .....	<0.5 ppm.....	<0.5 ppm

<sup>1</sup>Looser specifications apply to the SERIES QR reference crystal: 7.200 MHz ± 7 kHz.

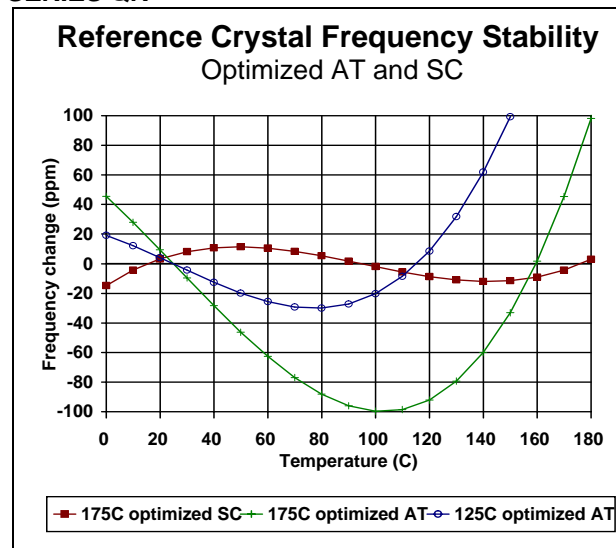
<sup>2</sup>Selected frequencies may be higher—consult factory.

### SERIES QT



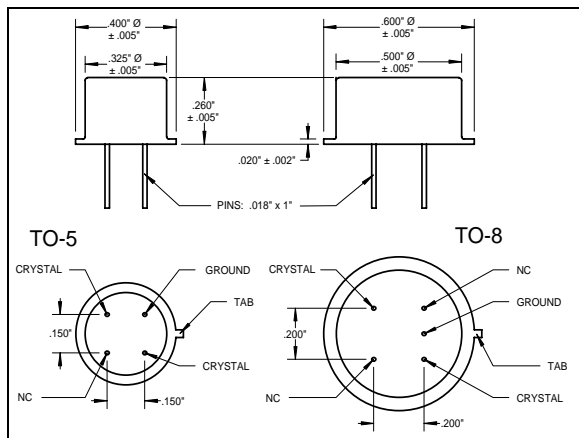
(NOMINAL) FREQUENCY VS TEMPERATURE

### SERIES QR



(NOMINAL) FREQUENCY VS TEMPERATURE

Frequency stability versus temperature for Series QR (175°C optimized SC) and AT. Note that crystals which are not optimized for these temperature ranges will show much more variation in frequency.



### MECHANICAL SPECIFICATIONS

Dimensions of TO-5 and TO-8 crystal packages. Cut leads carefully to avoid shock to crystal. Solder all leads to PC board for mechanical strength.



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