

## SATCOM / "1 ppm Forever" Temperature Compensated Crystal Oscillators



### Features

- Frequency from 0.5 MHz to 160 MHz
- Stability to  $\pm 0.1$  ppm 0 to 50°C
- +5Vdc to +24Vdc supply voltage options
- Sinewave, HCMOS, TTL options
- Over 500,000 units produced

### Applications

- SATCOM
- Base Stations and Picocells
- LMDS, WLL, SONET, Stratum 3

### Description

The SATCOM and "1 ppm Forever" series of Temperature Compensated Crystal Oscillators (TCXO's) are available in frequencies from 0.5 MHz to 160 MHz.

These series offer performance for short term stability, phase noise, G sensitivity, aging and temperature stability normally only associated with Oven Controlled Crystal Oscillators (OCXO's), while consuming typically < 20 mA.

With over 500,000 units produced, Vectron International has more experience with this type of TCXO than the rest of the industry combined.

# SATCOM / "1 ppm Forever" TCXO

## Performance Characteristics

Characteristics	
<b>Output Options:</b>	<b>AC</b> = ACMOS            0.5 to 160 MHz <b>HC</b> = HCMOS            0.5 to 160 MHz <b>TD</b> = 10 TTL             0.5 to 160 MHz <b>RG</b> = 0 dBm 50 ohm    3.0 to 30 MHz <b>RC</b> = +7.0 dBm 50 ohm 3.0 to 90 MHz
<b>Stability Options:</b> (Other stability options are available)	<b>A17</b> = ± 0.1 ppm        0°C to +50°C <b>B37</b> = ± 0.3 ppm        0°C to +70°C <b>C57</b> = ± 0.5 ppm       -20°C to +70°C <b>D16</b> = ± 1.0 ppm       -40°C to +85°C <b>EA6</b> = ± 1.5 ppm       -55°C to +85°C
<b>Supply Voltage:</b> (Other voltage options are available)	<b>AC</b> = +12 Vdc ± 5% <b>HC</b> = +12 Vdc ± 5% <b>TD</b> = +12 Vdc ± 5% <b>RG</b> = +5 Vdc ± 5% <b>RC</b> = +12 Vdc ± 5%
<b>Allan Variance</b> (typical):	± 1 x 10 <sup>-10</sup> at tau = 1 sec
<b>Aging (at 10MHz):</b>	"1 ppm Forever"       < 0.2 ppm / 1 <sup>st</sup> year < 0.7 ppm / 10 years SATCOM                 < 0.5 ppm / 1 <sup>st</sup> year < 2.0 ppm / 10 years
<b>Phase Noise</b> (typical): 10 MHz, RC option	-110 dBc / Hz            @ 10 Hz offset -135 dBc / Hz            @ 100 Hz offset -150 dBc / Hz            @ 1 kHz offset -155 dbc / Hz             @ 100 kHz offset
<b>Typical P/N:</b>	<b>(SATCOM) RCR7HYA17C 10.00 MHz</b> <b>("1 ppm Forever") RGR5HXB37C 15.00 MHz</b>

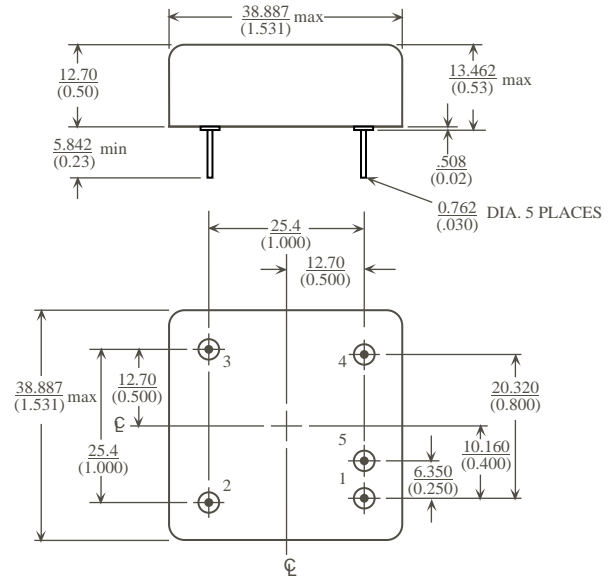
*HY is predetermined, HX is for "1 ppm Forever" max temp range -20 to +70*

*Note:* Not all stabilities are available with all options. Vectron International does not recommend wave soldering, IR reflow or other elevated temperature processing without consulting the factory. For AC, HC and TD outputs with frequencies above 30 MHz a low phase noise PLL multiplier **will** be used. Please inform the factory of your phase noise requirements.

# SATCOM / "1 ppm Forever" TCXO

Pin	Function
1	Output
2	+Vdd
3	Gnd, Case
4	Gnd / V tune
5	Gnd

Frequency Adjust:	
Option	Specification
HY	± 3 ppm min. via external voltage, 0 to +5 Vdc
HX	NONE

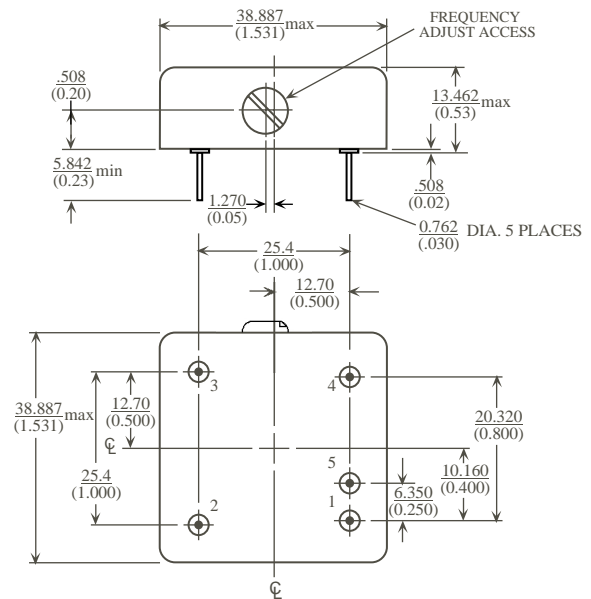


## R5 PACKAGE

mm  
(in.)

Pin	Function
1	Output
2	+Vdd
3	Gnd, Case
4	Gnd
5	Gnd

Frequency Adjust:	
Option	Specification
HY & HX	± 3 ppm min. via internal mechanical adjust

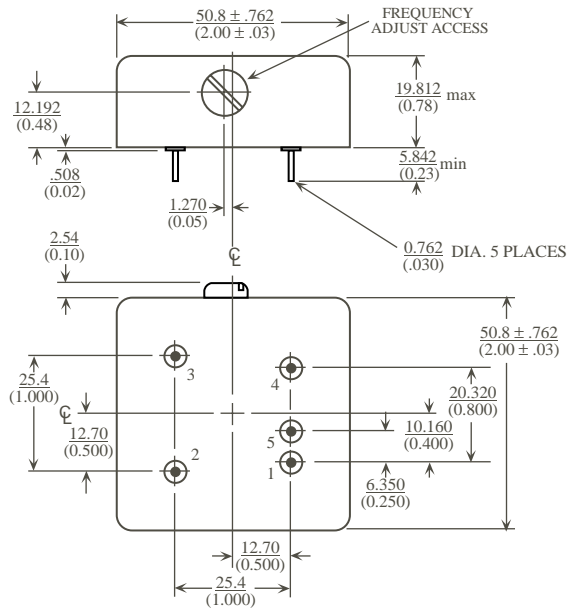


## R7 PACKAGE

# SATCOM / "1 ppm Forever" TCXO

Pin	Function
1	Output
2	+Vdd
3	Gnd, Case
4	Gnd
5	Gnd

Frequency Adjust:	
Option	Specification
HY & HX	± 3 ppm min. via internal mechanical adjust

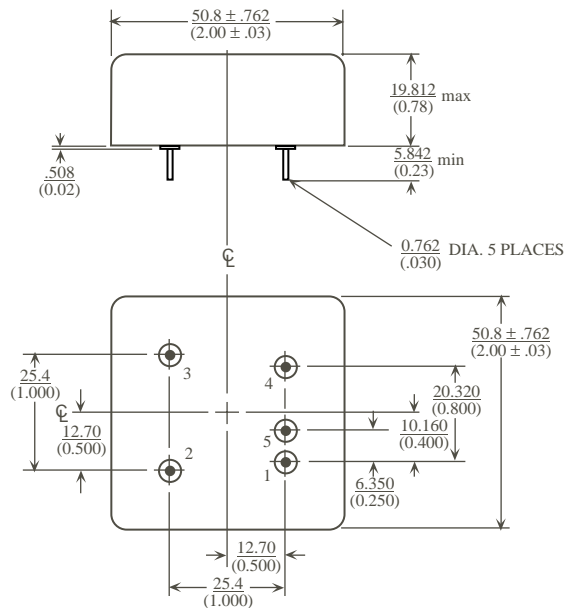


## S5 PACKAGE

mm  
(in.)

Pin	Function
1	Output
2	+Vdd
3	Gnd, Case
4	Gnd / V tune
5	Gnd

Frequency Adjust:	
Option	Specification
HY	± 3 ppm min. via external voltage, 0 to +5 Vdc
HX	NONE



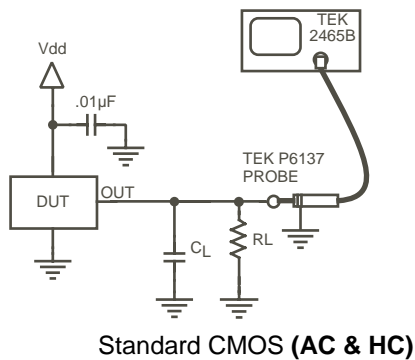
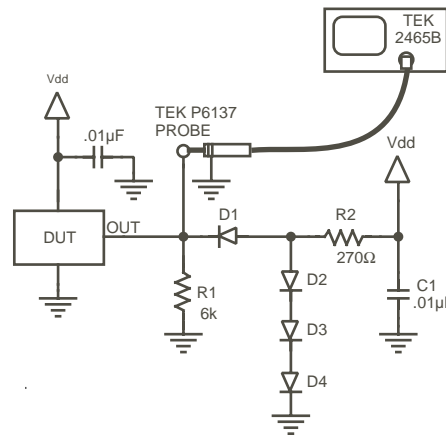
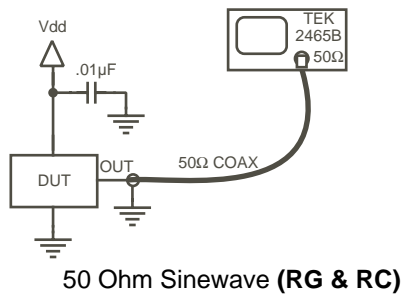
## S7 PACKAGE

## SATCOM / "1 ppm Forever" TCXO

Output Option	AC	HC	TD
Output	ACMOS	HCMOS	10 TTL
Voh min.	+4.5 Vdc	+4.5 Vdc	+2.4 Vdc
Voh max.	+0.5 Vdc	+0.5 Vdc	+0.5 Vdc
Load (typical)	100 k ohm // 10 pF	100 k ohm // 10 pF	10 TTL
Duty Cycle	50% ± 10%	50% ± 10%	50% ± 10%
Rise and Fall	3 nS max.	5 nS max.	10 nS max.

Output Option	RG	RC
Output	Sinewave	Sinewave
Level	0 dBm to +6 dBm	+7.0 dBm to +13 dBm
Load	50 ohm	50 ohm
Harmonics / Sub	-20 dBc max.	-20 dBc max.
Other Spurious	-60 dBc max.	-60 dBc max.

### Test Loads:



# SATCOM / "1 ppm Forever" TCXO

## Specifying Temperature Stability:

RC/R7/HY/A17/C

└───→ **A17** → A = X = Temperature Range  
                   1 = N1 = Stability Multiplier  
                   7 = N2 = Stability Scale

<b>X</b>	<b>N1</b>	<b>N2</b>
<b>Temp Range</b>	<b>Stability Multiplier</b>	<b>Stability Scale</b>
A = 0 to +50°C	N1 = 1 to 9 and A,B & C	10 to the -N2 power
B = 0 to +70°C	1 = ± 1.0	5 = 10 <sup>-5</sup> = 10 ppm
C = -20 to +70°C	2 = ± 2.0	6 = 10 <sup>-6</sup> = 1 ppm
D = -40 to +85°C	3 = ± 3.0	7 = 10 <sup>-7</sup> = 0.1 ppm
E = -55 to +85°C	4 = ± 4.0	8 = 10 <sup>-8</sup> = 0.01 ppm
	5 = ± 5.0	
	6 = ± 6.0	
	7 = ± 7.0	
	8 = ± 8.0	
	9 = ± 9.0	
	A = ± 1.5	
	B = ± 2.5	
	C = ± 3.5	

### Examples:

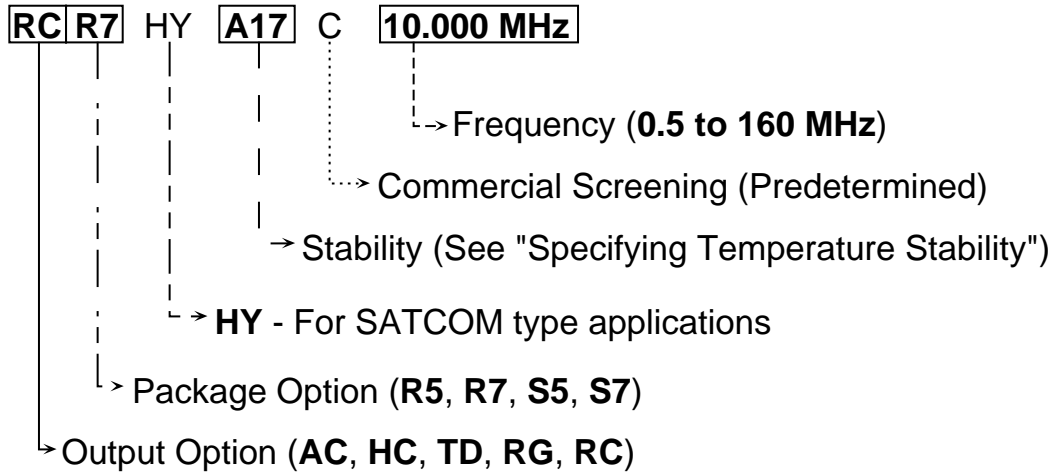
<b>XN1N2</b>	<b>X</b> , <b>N1</b> x <b>N2</b>	<b>X</b> , <b>N1N2</b>
A17 =	0 to +50°C, ± 1 x 10 <sup>-7</sup>	= 0 to +50°C, ± 0.1 ppm
B37 =	0 to +70°C, ± 3 x 10 <sup>-7</sup>	= 0 to +70°C, ± 0.3 ppm
C57 =	-20 to +70°C, ± 5 x 10 <sup>-7</sup>	= -20 to +70°C, ± 0.5 ppm
D16 =	-40 to +85°C, ± 1 x 10 <sup>-6</sup>	= -40 to +85°C, ± 1.0 ppm
EA6 =	-55 to +85°C, ± 1.5 x 10 <sup>-6</sup>	= -55 to +85°C, ± 1.5 ppm

**Note:** Temperature stabilities listed on the website are for the best possible stability in that series. Next to quantity, Frequency vs. Temperature is the highest cost multiplier. Please do not over specify temperature stability as we will 100% test units to your requirements. The temperature ranges listed above are industry standards. However, if for example your requirements were for -33 to +55°C please let us know, by choosing -40 to +85°C arbitrarily you will be paying more than is required. Custom stabilities are always welcome and recommended. We do **not** charge extra for custom temperature ranges or stabilities.

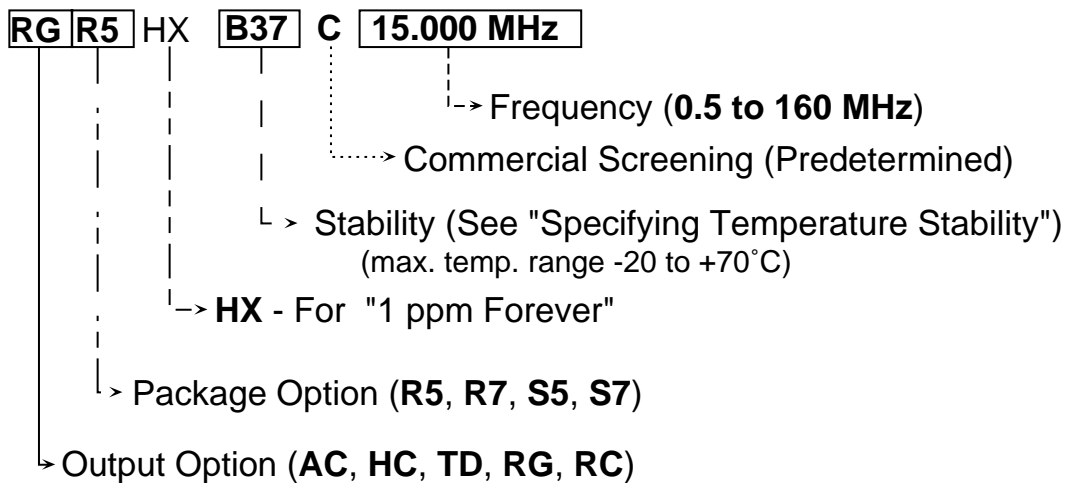
# SATCOM / "1 ppm Forever" TCXO

## How to Order

For HY Option:



For HX Option:



Visit Our Website at  
[www.vectron.com](http://www.vectron.com)

For additional information please contact:



USA: Vectron International • 267 Lowell Road, Hudson, NH 03051 . . . . . Tel: 1-88-VECTRON-1 • Fax: 1-888-FAX-VECTRON  
EUROPE: . . . . . Tel: 49 (0) 3328 4784 17 • Fax: 49 (0) 3328 4784 30  
ASIA: . . . . . Tel: +86 21 28909740 / 41 /42 • Fax: +86 21 28909240 / 2890999

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