RADITEK INC.

Oven Controlled Crystal Oscillators

code-v4

Precision Ultra Low Phase Noise

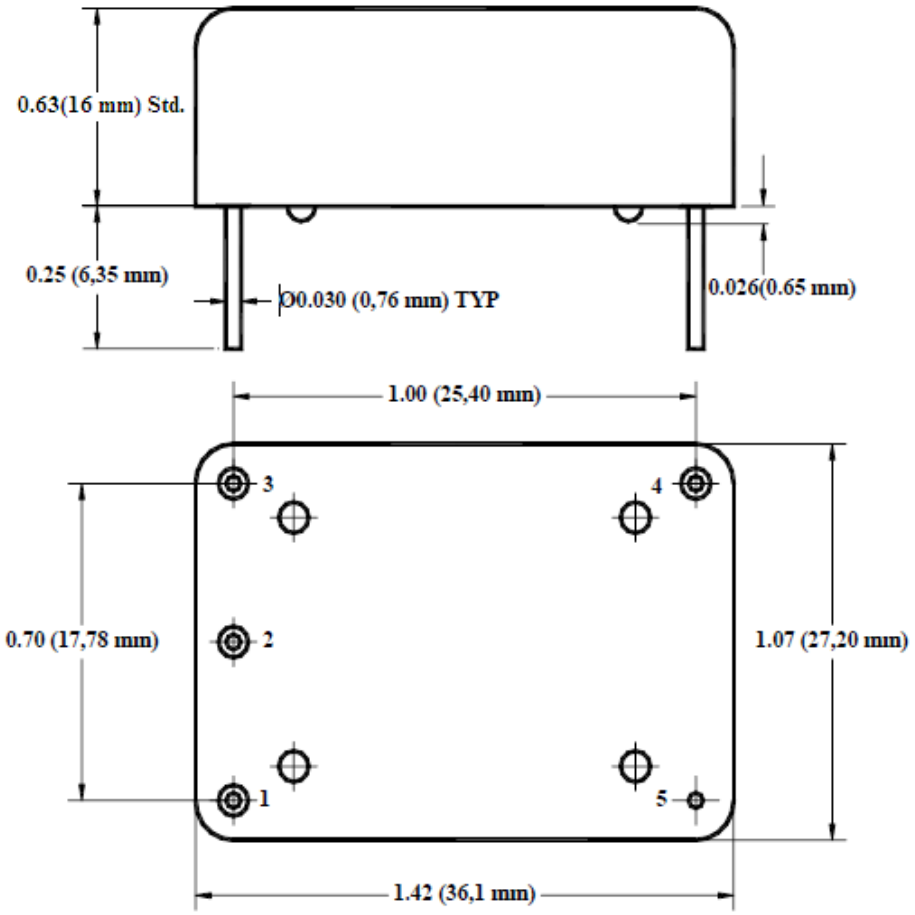
ROCXO-H Series 8-13M-v4

Features

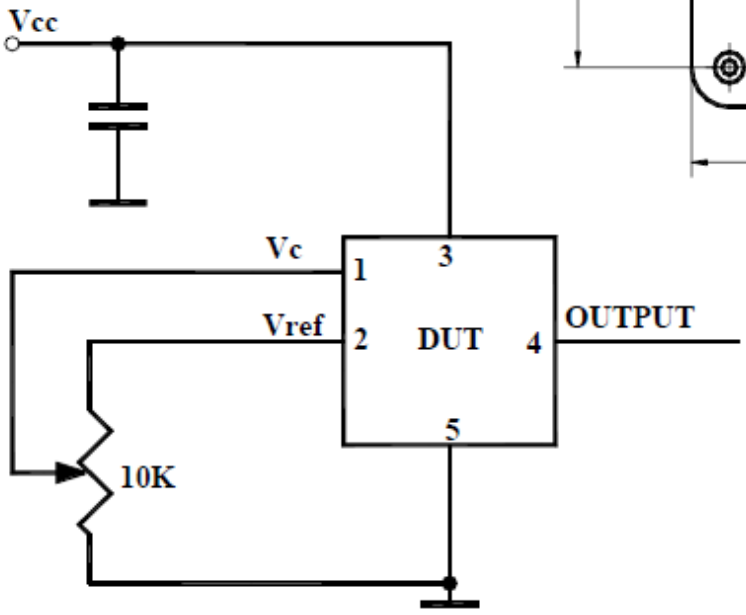
- SC-cut crystal
- High Stability
- Low Aging
- Ultra Low Phase Noise Option:
  Standard (L) -140dBc/Hz at 10Hz;
  -169dBc/Hz on the floor
  Premium (P) -145dBc/Hz at 10Hz;
  -170dBc/Hz on the floor
  Ultimate (U) -115 dBc/Hz at 1 Hz
  -146dBc/Hz at 10Hz;
  -170dBc/Hz on the floor
- Sine Wave or HCMOS/TTL output

Applications

- Telecommunication Systems
- Data Communications
- GPS
- Instrumentation



Units: Inch (mm)
Not to scale



WORLD HQ: 1702L Meridian Ave. Suite 127, San Jose, Ca 95125, U.S.A.
Telephone: (408) 266-7404 Fax: (408) 266-4483
WEB: www.raditek.com , E-mail: sales@raditek.com

ROHS Compliant

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Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Absolute Maximum Ratings							
Input Break Down Voltage	Vcc	12 V supply 5 V supply	-0.5 -0.5		13.0 5.5	V	
Storage temper.	Ts		-50		90	°C	
Control Voltage	Vc		-1 -5 -1		5.5 5 11	V	Slope option "P" Slope option "N" Slope option "L"
Electrical							
Frequency	F		8	10.000	13	MHz	
Frequency stability	ΔF/F	vs. Temp. 4*		20		ppb	See chart below
		vs. Supply		0.2	0.3	ppb/10%Vcc	
Aging		per day per year, first year second year		5E-10 1E-7 3E-8			after 30 days 5E-8 available
Allan Variance		0.1s 1s 10s		5E-13 2E-12 5E-12			Premium version, Option "P"
SSB Phase Noise (achieved after 10 minutes warm-up)		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-105	 -140 -155 -162 -168 -169	dBc/Hz	Standard version, option L
		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz			-112 -145 -155 -162 -169 -170		Premium version, option P
		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz			-115 -146 -156 -163 -169 -170		Ultimate version, \option U 2*
Retrace		After 30 minutes			±10	ppb	24 Hours off 3*
G-sensitivity		worst direction			±1.0	ppb/G	
Input Voltage	Vcc		4.75 11.4	5.0 12.0	5.25 12.6	V	See chart below to specify
Power consumption, Still air	P	steady state, 25°C steady state, -30°C start-up @ -30°C		1.0 1.7 2.5	1.4 3.2	W	Standard Operating Temperature*
Spectral Purity		Sub harmonics Spurious Harmonics		None -35	 -80 -30	dBc	
Load	10KOhm//15pF (HCMOS/TTL), AC-coupled 50 Ohm (Sine-wave)						Output Code T Output Code S

All parameters for 10 MHz

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Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Warm-up time	τ	to 0.1ppm accuracy		3	5	minutes	
Output Waveform		HCMOS/TTL compatible or Sinewave					
Output Power			+10	+13		dBm	Output Code S
Logic 1 (CMOS)	Voh		0.7 Vref			V	Output Code T
Logic 0 (CMOS)	Vol				0.1 Vref	V	Output Code T
Control voltage	Vc		0 -4.0 0		Vref 4.0 10.0	V	Slope option "P" Slope option "N" Slope option "L"
Input impedance	Zin	At Vc pin	10			KOhm	
Modulation	Fm		150			Hz	
bandwidth							
Reference Voltage	Vref	Vcc = 12V Vcc = 5V		5 or 4.5 4.5		V	N/A with slope options "N" and "L"
Output Impedance		At Vref pin		100		Ohm	
Pull range		from nominal F	±0.3 ±0.4	±0.5 ±0.6		ppm	Slope option "P" Slope option "N" or "L"
Deviation slope		Monotonic, positive Monotonic, negative Monotonic, positive		1.0/Vref -0.13 0.12		ppm/V	Slope option "P" Slope option "N" Slope option "L"
Setability	Vc0	@25°C, Fnom. No internal bias for slope option "L"		Vref/2 ± 0.5 0 ± 0.5 5 ±0.5		V	Slope option "P" 3* Slope option "N" Slope option "L"

Notes:
*. For highest operating temperature higher than 70ºC the power consumption will be higher (about 20% for 85ºC). Values listed are for test in still air environment, the values will go up while testing in the temperature chamber.
2*. It is recommended to specify Slope option "N" for Ultimate Phase noise performance. For recommended phase noise test, contact factory. It's assumed that phase noise test is performed under static conditions (no vibration), in still air, and care is taken for minimizing EMI.
3*. Longer storage time, especially at low temperatures, may affect both retrace and setability parameters. It may \ require few days on power for re-stabilization.
4*. Temperature stability is specified in total peak to peak frequency excursion over entire operating range, not in ± from RT measurement. Over-specifying may cause cost increase.

Environmental and Mechanical	
Operating temp. range	-30°C to 70°C Standard, Other options – see chart below
Mechanical Shock	Per MIL-STD-202, 30G, 11ms
Vibration	Per MIL-STD-202, 5G to 2000 Hz
Soldering Conditions	260°C for 10s Max leads only
Electrical Connections	
Pin Out	Pin #1-Vc ; Pin#2 – Vref; Pin #3 – Vcc; Pin #4- Output ; Pin #5- GND;

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Creating a Part Number

ROCXO - H - X X YZ XX - X - X - XX - R - XXM - v4

Frequency 8-13MHz

Environmental

Code	Specification
R	RoHS compliant, not designed for reflow

Height code per dwg

Supply Voltage

Code	Specification
0	5V ± 5%
F	12V± 5%

Aging

Insert Value per day times 1E-10	
Examples	
5	5E-10 = 0.5 ppb/day
10	1E-9 = 1 ppb/day

Phase Noise (See Table)

Code	Specification
L	Standard
P	Premium
U	Ultimate 5*

5*Consult factory on "U" code phase noise

Output

Code	Specification
T	CMOS/TTL
S	Sinewave

Temperature Stability 4*

Code	Specification
17	$1x10^{-7}$
58	$5x10^{-8}$
28	$2x10^{-8}$
18	$1x10^{-8}$
YZ	$Yx10^{-Z}$

Temperature Range

Code	In 5°C steps 6*
First letter	Lowest temperature from A = -40°C
Second letter	Highest temperature to Z = 85°C
Examples	
IS	0°C to 50°C
GU	-10°C to 60°C
EW	-20°C to 70°C

Deviation slope

Code	Specification
P	Positive, 0 to Vref
N	Negative, -4 to 4V
L	Positive, 0 to 10 V

Not all combinations are available. Consult Factory

6*Temperature Code Table

Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C	Letter	Temp °C
A	-40	**F**	-15	**K**	10	**P**	35	**U**	60	**Z**	85
B	-35	**G**	-10	**L**	15	**Q**	40	**V**	65		
C	-30	**H**	-5	**M**	20	**R**	45	**W**	70		
D	-25	**I**	0	**N**	25	**S**	50	**X**	75		
E	-20	**J**	5	**O**	30	**T**	55	**Y**	80		

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