

O-CS22-HH-0XYZXX-X-X-X-X Series

Precision Ultra Low Phase Noise OCXO in Low Profile 22x25x10 mm SMD package

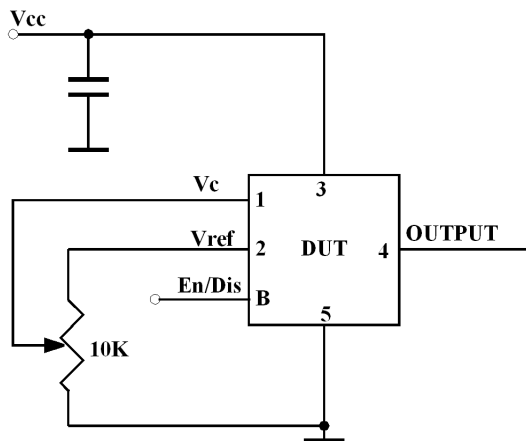
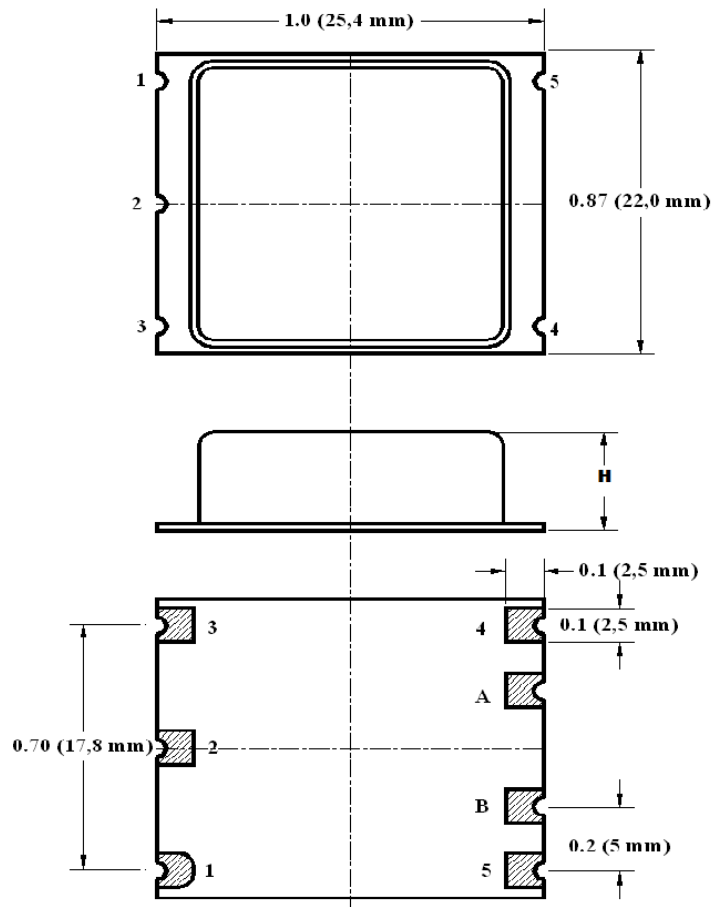
Product Data Sheet

Features

- SC-cut crystal
- High Stability
- Low Profile (10 mm) SMD package
- Low Aging
- Ultra Low Phase Noise Option:
 Premium(P) -145dBc/Hz at 10Hz;
 -172dBc/Hz on the floor
 Ultimate(U) -115 dBc/Hz at 1 Hz
 -146dBc/Hz at 10Hz;
 -172dBc/Hz on the floor
 Extraordinary(E) -120 dBc/Hz at 1 Hz
 -148 dBc/Hz at 10 Hz
 -172 dBc/Hz on the floor
- Sine Wave or HCMOS/TTL output

Applications

- Instrumentation
- Tele/Data Communications
- GPS



Height, H	Code
0.350ö(9.0 mm)	09
0.394ö(10.0 mm)	10

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
Absolute Maximum Ratings							
Input Break Down Voltage	V _{cc}	5 V supply	-0.5		5.5	V	
Storage temper.	T _s		-50		90	°C	
Control Voltage	V _c		-1		5.5	V	Slope option δPö Slope option δLö

Electrical

Frequency	F		8	10.000	13	MHz	
Frequency stability	ΔF/F	vs. Temp.		20		ppb	See chart below
		vs. Supply		0.2	0.3	ppb/10% V _{cc}	
Aging		per day per year, first year second year		5E-10 5E-8 3E-8			after 30 days of continuous operation
Allan Deviation		0.1s 1s 10s		5E-13 2E-12 5E-12			Premium version, Option δPö
SSB Phase Noise (achieved after 10 minutes warm-up)	S	1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz			-112 -145 -155 -162 -169 -172	dBc/Hz	Premium version, option δPö
		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz		-115	-114 -146 -156 -163 -169 -172		Ultimate version, option δUö 2*
		1Hz 10 Hz 100 Hz 1 KHz 10 KHz 100 KHz			-120 -148 -160 -168 -170 -172		Extraordinary version, option E, available with slope option L
Retrace		After 30 minutes			±10	ppb	24 Hours off 3*
G-sensitivity		worst direction			±1.0	ppb/G	
Input Voltage	V _{cc}		4.75	5.0	5.25	V	
Power consumption, Still air 4*	P	steady state, 25°C, start-up @ -30°C		0.6 2.0	0.8 2.5	W	Operating temp range to 70°C
Spectral Purity		Subharmonics Spurious Harmonics		none -35	-80 -30	dBc	
Load		10KOhm//15pF (HCMOS/TTL), AC-coupled 50 Ohm (Sine-wave)					Output Code T Output Code S
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)	V _{oh}		3.3			V	Output Code T
Logic 0 (CMOS)	V _{ol}				0.1	V	Output Code T

All parameters for 10 MHz

Control voltage	Vc		0 0		4.5 10.0	V	Slope option $\delta P\delta$ Slope option $\delta L\delta$
Output Enable		CMOS Logic $\delta 1\delta$ (4.5V>V>2.5) or floating Logic $\delta 0\delta$ (V<0.5V)	Enabled Disabled	V			Optional
Input impedance	Zin	At Vc pin	10			KOhm	
Modulation bandwidth	Fm				1,000	Hz	
Reference Voltage	Vref			4.5		V	
Output Impedance		At Vref pin		100		Ohm	
Pull range		from nominal F	± 0.4	± 0.6		ppm	
Deviation slope		Monotonic, positive Monotonic, positive		$1.0/Vref$ f 0.12		ppm/V	Slope option $\delta P\delta$ Slope option $\delta L\delta$
Setability	Vc0	@25°C, Fnom. Internal bias is optional, specify on PO 2.25 V for $\delta P\delta$, 4.5 V for $\delta L\delta$		2.25 ± 0.5 5 ± 0.5		V	Slope option $\delta P\delta$ 3* Slope option $\delta L\delta$

Notes:

- *. For highest operating temperature higher than 70°C the power consumption will be higher (about 20% for 85°C). Values listed are for test in still air environment, the values will go up while testing in the temperature chamber.
- 2*. This specification is preliminary. It is recommended to specify Slope option $\delta L\delta$ for Ultimate Phase noise performance. Recommended test equipment δ Symmetricom 5120A-01 Phase Noise and Allan Deviation Test Set (be aware of limitations on the floor, especially if the DUT frequency is not 10.000 MHz), Noise XT DCNTS, or Holtzworth HA7000B series. δ Clean δ analog power supply i.e. HP E3610A or equivalent. 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*. The power consumption is affected by the operating temperature range (the higher the highest temperature δ the higher the power consumption. The values in the table are for high operating temperature at 70°C.

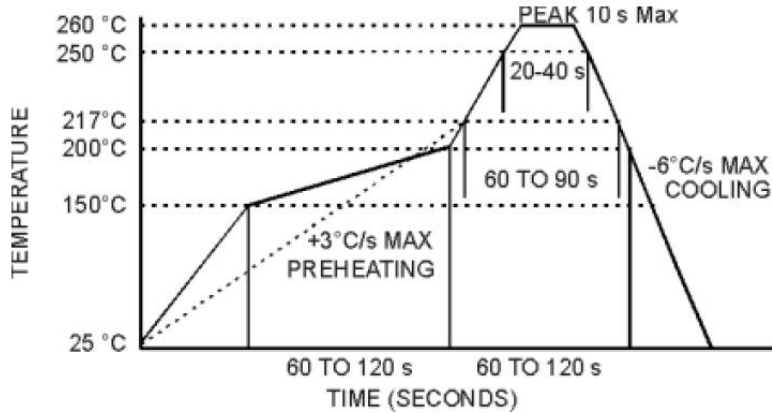
Environmental and Mechanical

Operating temp. range	0°C to 70°C Standard, Other options δ see chart below
Mechanical Shock	Per MIL-STD-202, 30G, 11ms
Vibration	Per MIL-STD-202, 5G to 2000 Hz
Soldering Conditions	See profile below. The device may be reflowed once. Reflowing upside down is not allowed. Hand soldering is highly encouraged. NO CLEAN assembly is recommended

Electrical Connections

Pin Out	Pad #1-Vc ; Pad#2 δ Vref; Pad #3 δ Vcc; Pad #4- Output ; Pad #5- GND; Pad A δ N/C; Pad B δ Output Enable
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MAX Reflow Profile



Creating a Part Number

Q - **C** **S22** - **HH** - **0** **X** **YZ** **XX** - **X** - **X** - **X** - **X** **FREQ**
OCXO | **Package Code** | **Height** | **Supply Voltage** | **Environmental**

Height

Supply Voltage

Code	Specification
0	5V ± 5%

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

Environmental

Code	Specification
L	Contains a level of lead that is in excess of RoHS directive and is not designed for reflow
R	RoHS compliant, not designed for reflow

Enable Option

Code	Function
N	N/A
E	Per table

Phase Noise (See Table)

Code	Specification
P	Premium
U	Ultimate
E	Extraordinary

Deviation slope

Code	Specification
P	Positive, 0 to Vref
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		

