

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

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

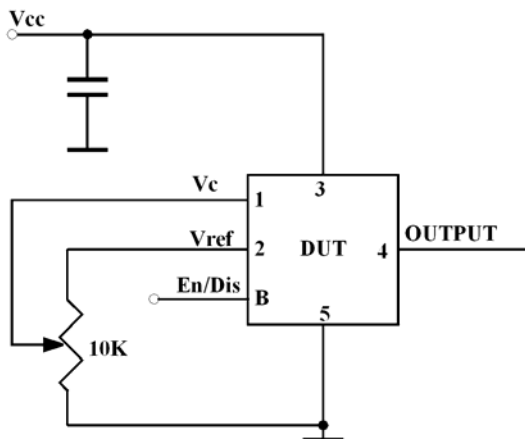
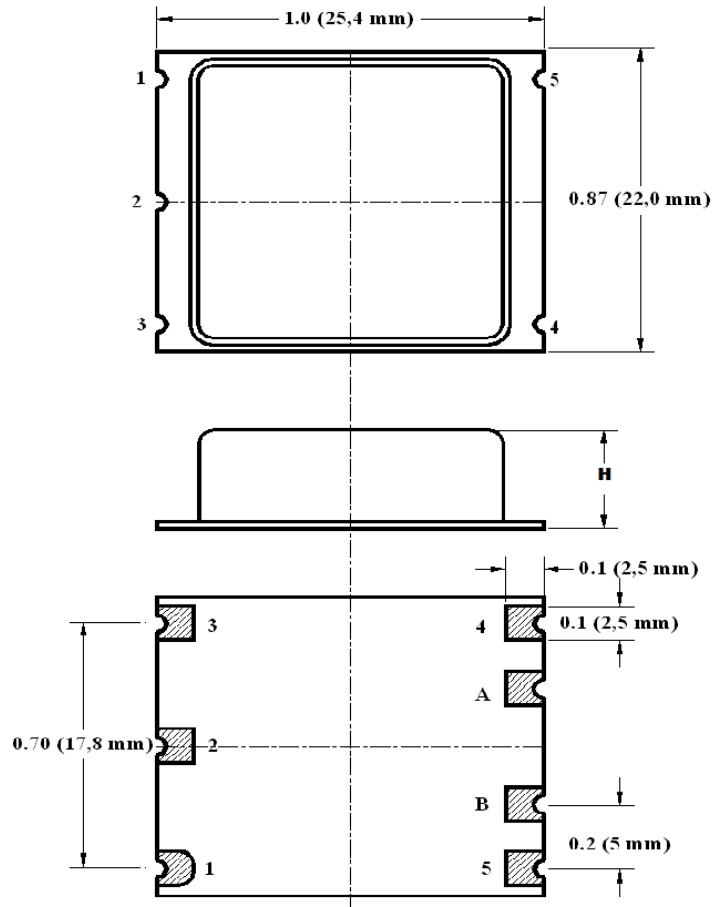
### Product Data Sheet

#### 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
0.350"(9.0 mm)	09
0.394"(10.0 mm)	10

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
<b>Absolute Maximum Ratings</b>							
Input Break Down Voltage	V <sub>cc</sub>	5 V supply	-0.5		5.5	V	
Storage temper.	T <sub>s</sub>		-50		90	°C	
Control Voltage	V <sub>c</sub>		-1		5.5	V	Slope option "P" Slope option "L"

**Electrical**

Frequency	F		8	10.000	13	MHz		All parameters for 10 MHz
Frequency stability	ΔF/F	vs. Temp.		20		ppb	See chart below	
		vs. Supply		0.2	0.3	ppb/10%V <sub>cc</sub>		
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		5E-13			Premium version, Option "P"	
		1s		2E-12				
		10s		5E-12				
SSB Phase Noise (achieved after 10 minutes warm-up)	S <sub>p</sub>	1Hz			-112	dBc/Hz	Premium version, option "P"	
		10 Hz			-145			
		100 Hz			-155			
		1 KHz			-162			
		10 KHz			-169			
		100 KHz			-172			
		1Hz		-115	-114			Ultimate version, option "U" 2*
		10 Hz			-146			
		100 Hz			-156			
1 KHz			-163					
10 KHz			-169					
100 KHz			-172					
1Hz			-120	Extraordinary version, option E, available with slope option L				
10 Hz			-148					
100 Hz			-160					
1 KHz			-168					
10 KHz			-170					
100 KHz			-172					
Retrace		After 30 minutes				±10	ppb	24 Hours off 3*
G-sensitivity		worst direction				±1.0	ppb/G	
Input Voltage	V <sub>cc</sub>		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 <sub>oh</sub>		3.3			V	Output Code T	
Logic 0 (CMOS)	V <sub>ol</sub>				0.1	V	Output Code T	



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

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 "L" for Ultimate Phase noise performance. Recommended test equipment – 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. "Clean" 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 – the higher the power consumption. The values in the table are for high operating temperature at 70°C.

**Environmental and Mechanical**

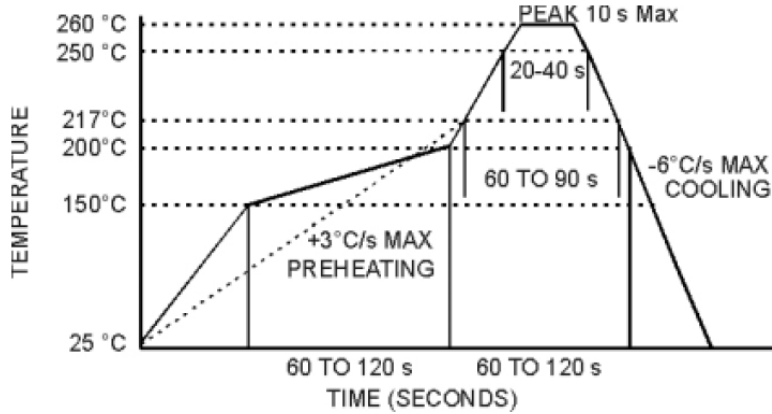
<b>Operating temp. range</b>	0°C to 70°C Standard, Other options – see chart below
<b>Mechanical Shock</b>	Per MIL-STD-202, 30G, 11ms
<b>Vibration</b>	Per MIL-STD-202, 5G to 2000 Hz
<b>Soldering Conditions</b>	See profile below. The device may be reflowed once. Reflowing upside down is not allowed. Hand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

**Electrical Connections**

<b>Pin Out</b>	Pad #1-Vc ; Pad#2 – Vref; Pad #3 – Vcc; Pad #4- Output ; Pad #5- GND; Pad A – N/C; Pad B – Output Enable
----------------	--

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** | **Enable Option** | **Phase Noise (See Table)** | **Deviation slope**

**Height**  
**Supply Voltage**

Code	Specification
0	5V ± 5%

**Output**

Code	Specification
T	CMOS/TTL
S	Sinewave

**Temperature Stability 4\***

Code	Specification
17	1x10 <sup>-7</sup>
58	5x10 <sup>-8</sup>
28	2x10 <sup>-8</sup>
18	1x10 <sup>-8</sup>
YZ	Yx10 <sup>-Z</sup>

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

