

Rev H

**O-CEX-XSXXYY-X-E-X-10.000 MHz  
Precision Ultra Low Phase Noise OCXO in 36x27 mm  
“Europack”**

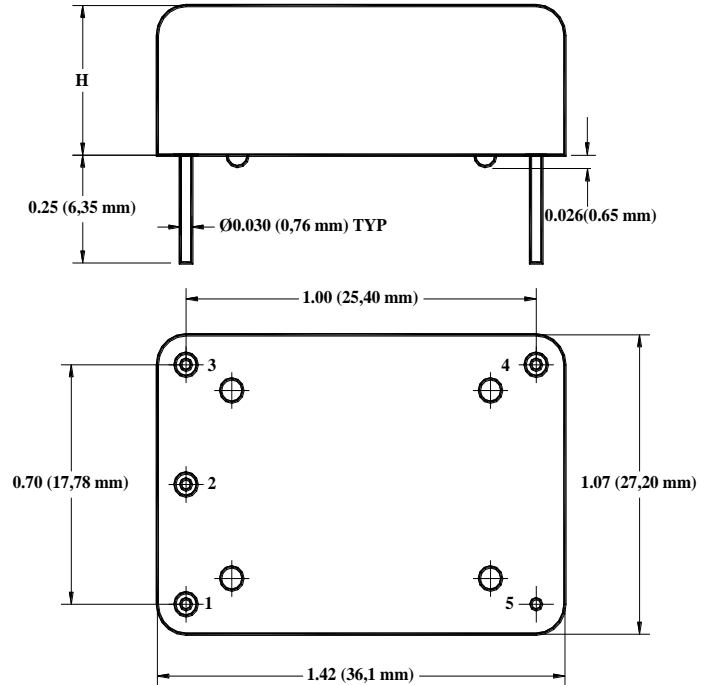
**Product Data Sheet**

**Features**

- SC-cut crystal
- High Stability
- Low Aging
- Ultra Low Phase Noise  
Extraordinary (E) -89 dBc/Hz at 0.1 Hz  
-120 dBc/Hz at 1 Hz  
-148 dBc/Hz at 10 Hz  
-170 dBc/Hz on the floor
- Sine Wave output +14 dBm TYP

**Applications**

- Instrumentation
- GPS
- Telecommunication Systems
- Radar
- COTS/Dual use



H code	Height, inches (mm) TYP
5	0.5 (12.7 mm)
6	0.63 (16 mm)
7	0.75 (19 mm)
1	1.0 (25.4 mm)

Parameter	Symb	Condition	Min	Typ	Max	Unit	Note
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**Absolute Maximum Ratings**

<b>Input Break Down Voltage</b>	V <sub>cc</sub>	12 V supply 5 V supply	-0.5 -0.5		13.0 5.5	V	
<b>Storage temper.</b>	T <sub>s</sub>		-50		90	°C	
<b>Control Voltage</b>	V <sub>c</sub>		-1		11	V	Slope option "L"

**Electrical (6)**

<b>Frequency</b>	F			10.000		MHz	
<b>Frequency stability</b>	$\Delta F/F$	vs. Temp.	From $\pm 2.0$			ppb	See chart below
		vs. Supply		0.1	0.2	ppb/5% V <sub>cc</sub>	
		vs. Load			0.5	ppb/5% load var.	
<b>Aging</b>		per day		2E-10			after 30 days
		per year, first year		2E-8			
		second year		1E-8			
		10 years		1E-7			
<b>Allan Deviation</b>		0.1 s		2E-13	3E-13		Static and benign conditions
		1 s		4E-13	5E-13		
		10 s		2E-12	4E-12		
		100 s		5E-12	7E-12		
<b>SSB Phase Noise (achieved after 10 minutes warm-up)</b>		0.01 Hz			-37	dBc/Hz	Static and benign conditions. Test schedule TBD
		0.1 Hz		-89	-87		
		1 Hz			-120		
		10 Hz			-148		
		100 Hz			-160		
		1 KHz			-168		
		10 KHz			-170		
		100 KHz			-170		
<b>Retrace</b>		After 30 minutes			$\pm 2$	ppb	24 Hours off 1*
<b>G-sensitivity</b>		Gamma 3 directions			$\pm 1.0$	ppb/G	
<b>Input Voltage</b>	V <sub>cc</sub>		4.75	5.0	5.25	V	See chart below to specify
			11.4	12.0	12.6		
<b>Power consumption, Still air</b>	P	steady state, 25°C start-up @ -30°C		1.4 4.0	1.7 4.5	W	Still air
<b>Spectral Purity</b>		Subharmonics		none		dBc	Produced by device, not set-up related
		Spurious			-135		
		Harmonics		-35	-30		
<b>Load</b>	AC-coupled 50 Ohm (Sine-wave)						
<b>Warm-up time</b>	$\tau$	to 0.1ppm accuracy		3	5	minutes	
<b>Cold Start</b>	Must start at -40°C with about 10 MHz frequency and about +14 dBm Output Power						
<b>Output Waveform</b>	Sine-wave						
<b>Output Power</b>			+13	+14	+15	dBm	
<b>Control voltage</b>	V <sub>c</sub>		0		10.0	V	L slope
<b>Input impedance</b>	Z <sub>in</sub>	At V <sub>c</sub> pin	10			KOhm	L slope
<b>Modulation bandwidth</b>	F <sub>m</sub>		DC		1	KHz	L slope
<b>Reference Voltage</b>	V <sub>ref</sub>			4.5		V	
<b>Output Impedance</b>		At V <sub>ref</sub> pin		100		Ohm	
<b>Pull range</b>		from nominal F	$\pm 0.3$	$\pm 0.4$		ppm	L slope
<b>Deviation slope</b>		Monotonic, positive		0.12		ppm/V	L slope
<b>Setability</b>	V <sub>c0</sub>	@25°C, F <sub>nom.</sub>	4.5 $\pm$ 0.5			V	L slope
<b>Initial calibration</b>	$\Delta F/F$	V <sub>c</sub> = 4.5 V			$\pm 70$	ppb	Internally biased 3*,1*,4*

Notes:

- 1\*. Longer storage time, especially at low temperatures, may affect both retrace and setability parameters. It may require few days on power for re-stabilization.
- 2\*. All parameters, unless otherwise specified, are guaranteed over specified temperature and Vcc range. The tests of phase noise and short-term stability, however, are performed at room temperature in benign and static environment only.
- 3\*. It is highly recommended, if possible, to avoid tuning the calibration externally in order to avoid deteriorating the phase noise and short-term stability performance. If necessary, metal film low noise resistors with bias from Vref port must be used.
- 4\*. If No Vc option is selected, pin #1 is not connected. Initial calibration in this case will be  $\pm 50$  ppb MAX,  $\pm 25$  ppb TYP as shipped.
- 5\*. Frequency jumps  $< 300E-12$  (1 s gate time on the counter) guaranteed, not tested.

**Environmental and Mechanical**

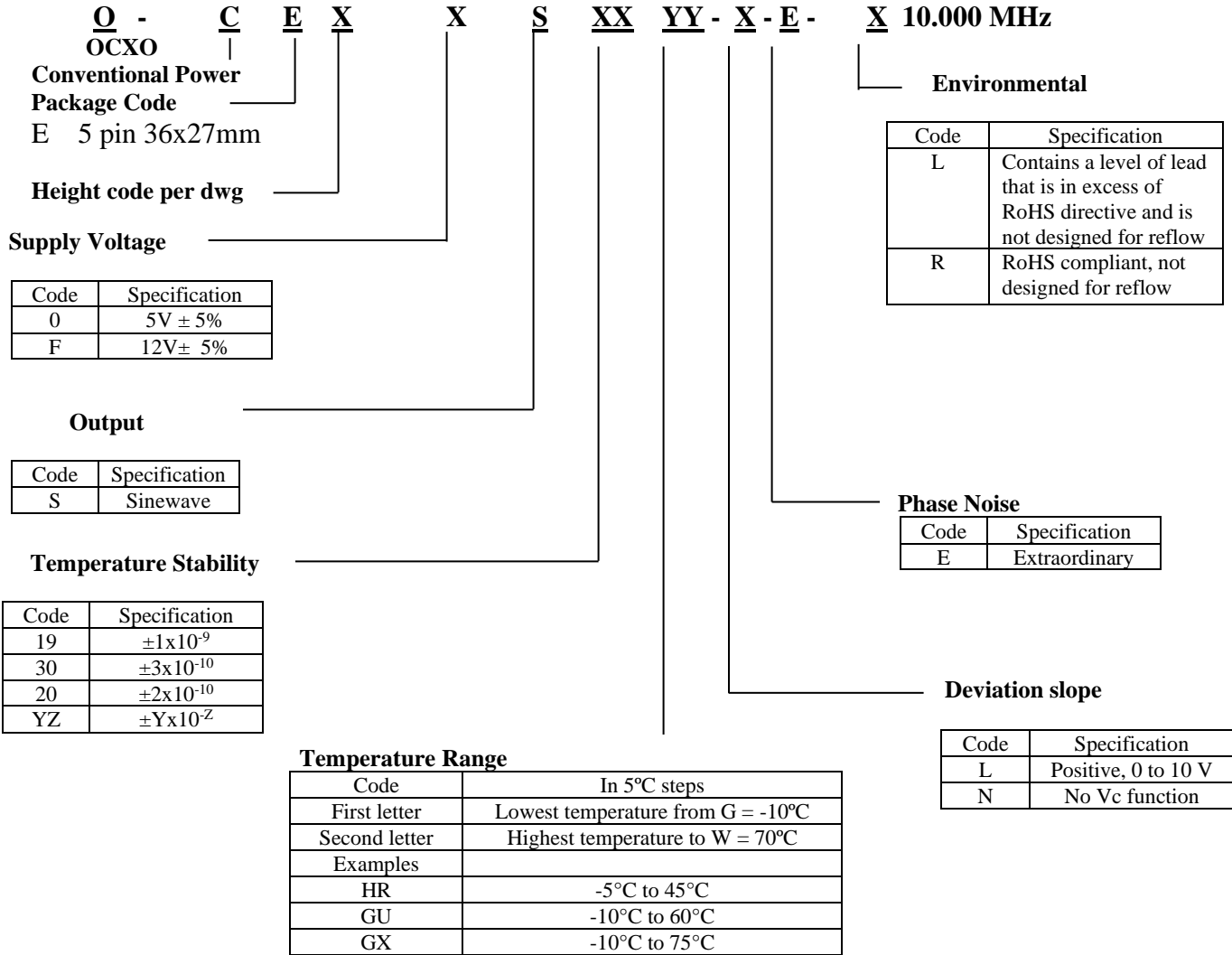
<b>Operating temp. range</b>	0°C to 70°C Standard, Other options – see chart below
<b>Storage Temperature</b>	-50°C to 90°C
<b>Mechanical Shock</b>	Per MIL-STD-202, 30G, 11ms
<b>Vibration</b>	Per MIL-STD-202, 5G to 2000 Hz
<b>Soldering Conditions</b>	260°C for 10s Max leads only

**Electrical Connections**

<b>Pin Out</b>	Pin #1-Vc or N/C ; Pin#2 – Vref ; Pin #3 – Vcc; Pin #4- Output ; Pin #5- GND;
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## Creating a Part Number



\*Not all combinations are available. Consult Factory.



**7\*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		

**FREQUENCY  
CONTROLS, INC.**