

## Precision Ultra Low Phase Noise OCXO in 36x27mm “Europack”



ESD Sensitive

36 x 27 x 16mm  
Datasheet #1714A

### Features

- SC-cut Crystal
- High Stability
- Low Aging
- Ultra Low Phase Noise  
Extraordinary (E) -91 dBc/Hz at 0.1 Hz  
-123 dBc/Hz at 1 Hz  
-151 dBc/Hz at 10 Hz  
-172 dBc/Hz on the floor
- Sine Wave output +14 dBm TYP

### Applications

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

### Absolute Maximum Ratings

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Input Break Down Voltage	V <sub>cc</sub>	5 V supply	-0.5		5.5	V	
Storage Temperature Range	T <sub>s</sub>		-50		90	°C	
Control Voltage	V <sub>c</sub>		-1		11	V	Slope option “L”

### Electrical (2\*)

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes
Frequency				10.000		MHz	
Frequency stability	ΔF/F	vs. Temp.	From ±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.	
Aging		per day		2E-10			after 30 days
		per year, first year		2E-8			
		second year		1E-8			
		10 years		1E-7			
Allan Deviation		0.1 s		15E-14	2E-13		Static and benign conditions
		1 s		15E-14	2E-13		
		10 s		8E-13	1E-12		
		100 s		2E-12			
SSB Phase Noise (achieved after 10 minutes warm-up)		0.01 Hz		-42	-37	dBc/Hz	Static and benign conditions
		0.1 Hz		-91	-87		
		1Hz		-123	-120		
		10 Hz		-151	-148		
		100 Hz		-162	-160		
		1 KHz		-170	-168		
		10 KHz		-172	-170		
		100 KHz		-172	-170		
Retrace		After 30 minutes			±2	ppb	24 Hours off 1*
G-sensitivity		Gamma 3 directions			±1.0	ppb/G	
Input Voltage	V <sub>cc</sub>		4.75	5.0	5.25	V	
Power consumption, Still air	P	steady state, 25°C		1.4	1.7	W	Still air
		start-up @ -30°C		4.0	4.5		

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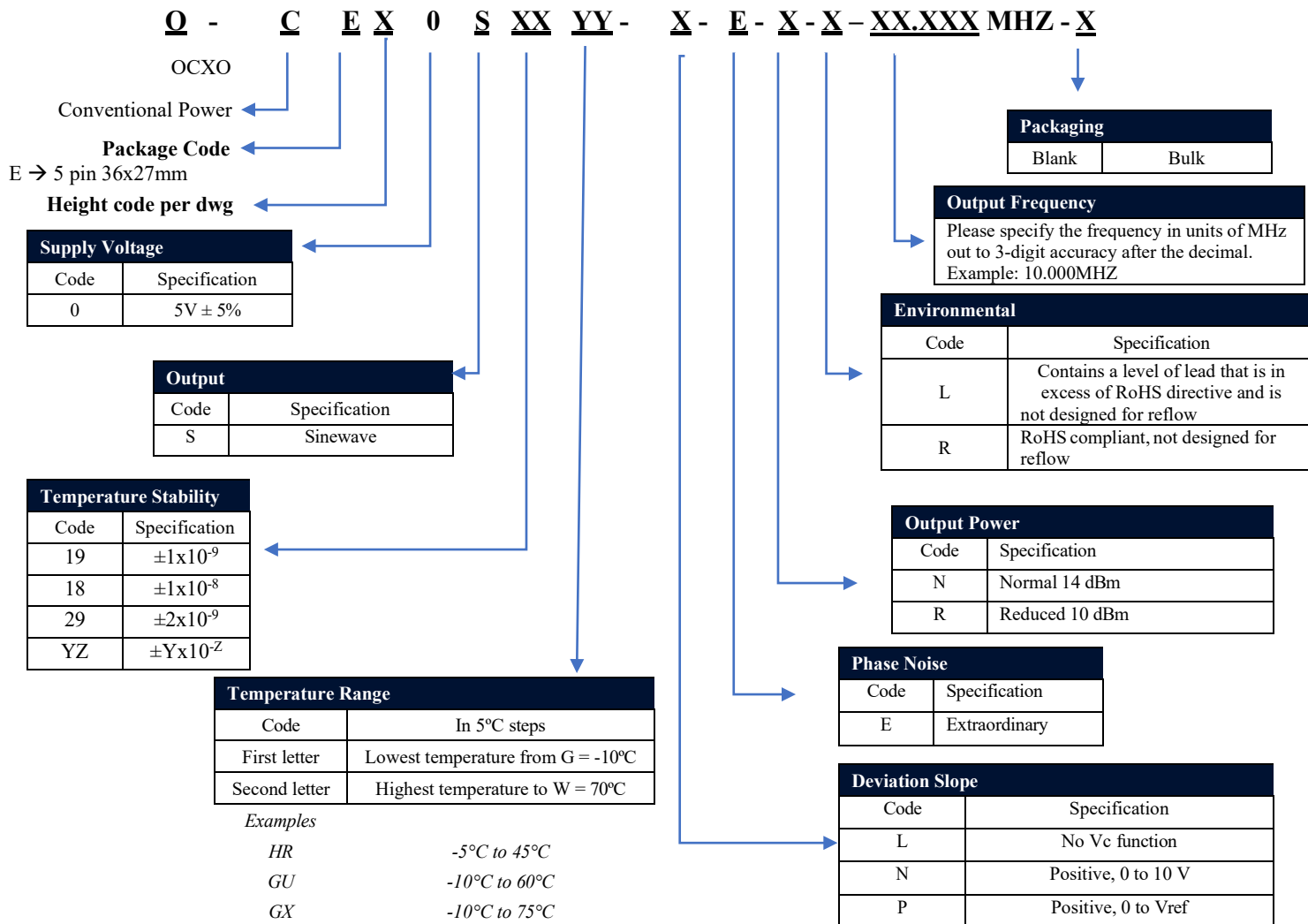
### Electrical (cont.)

Parameters	Symbol	Condition	Min	Typ	Max	Unit	Notes	
Spectral Purity		Subharmonics		none		dBc	Produced by device, not set-up related	
		Spurious			-135			
		Harmonics		-35	-30			
Load		AC-coupled 50 Ohm (Sine-wave)						
Warm-up time	$\tau$	to 0.1ppm accuracy		3	5	minutes		
Cold Start		Must start at -40°C with about 10 MHz frequency and about +14 dBm Output Power						
Output Waveform			Sine-wave					
Output Power			+13	+14	+15	dBm	Option N	
			+9	+10	+11		Option R	
Control voltage	Vc		0		10.0	V	L slope	
			0		Vref		P slope	
Input impedance	Zin	At Vc pin	10			KOhm	L slope	
Modulation bandwidth	Fm		DC		1	KHz	L slope	
Reference Voltage	Vref			4.096		V	P slope only	
Output Impedance		At Vref pin		100		Ohm		
Pull range		from nominal F	±0.3	±0.4		ppm	L slope, P slope	
Deviation slope		Monotonic, positive		0.1		ppm/V	L slope	
				0.2			P slope	
Setability	Vc0	@25°C, Fnom.	4.096 ±0.5			V	L slope	
			2.048 ±0.25				P slope	
Initial calibration	$\Delta F/F$			±25	±50	ppb	No Vc Function	

### Environmental and Mechanical

Parameter	Description
Operating Temperature Range	0°C to 70°C Standard, Other options – see chart below
Storage Temperature Range	-50°C to 90°C
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

## Creating a Part Number



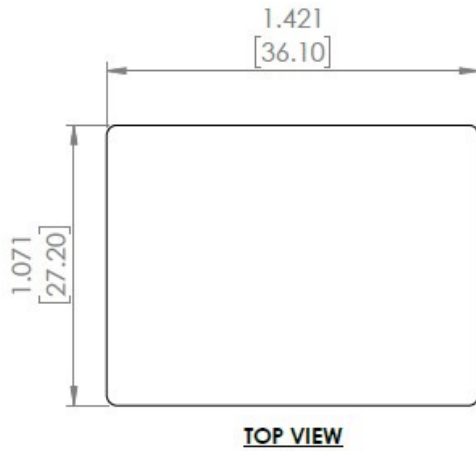
### 8\* Temperature Code Table

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		

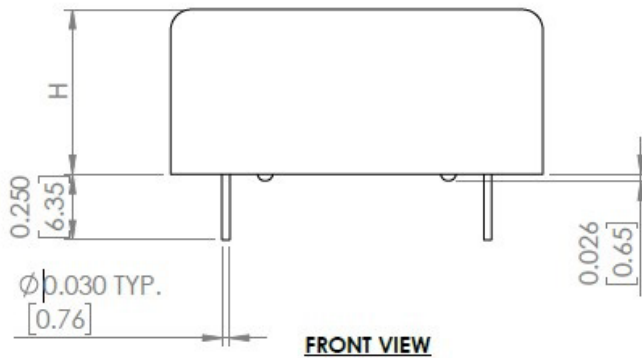
Notes:

- 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 ± 50 ppb MAX, ±25 ppb TYP as shipped.
- 5\*. Frequency jumps < 300E-12 (1 s gate time on the counter) guaranteed, not tested.
- 6\*. Vc internal bias 4.096V for L slope, 2.048V for P slope.
- 7\*. Height code 6 by special requirement only, consult NEL.
- 8\*. Not all combinations are available. Consult Factory.

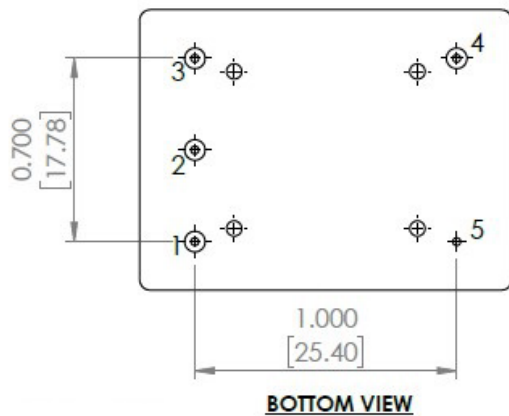
## Mechanical Dimensions



H Code #	Height, inches (mm) TYP
6	0.63 (16 mm) 7*
7	0.75 (19 mm)
1	1.0 (25.4 mm)



Pin #	Function
1	(Vc) or N/C
2	Vref (P slope only)/NC
3	Vcc
4	Output
5	Ground



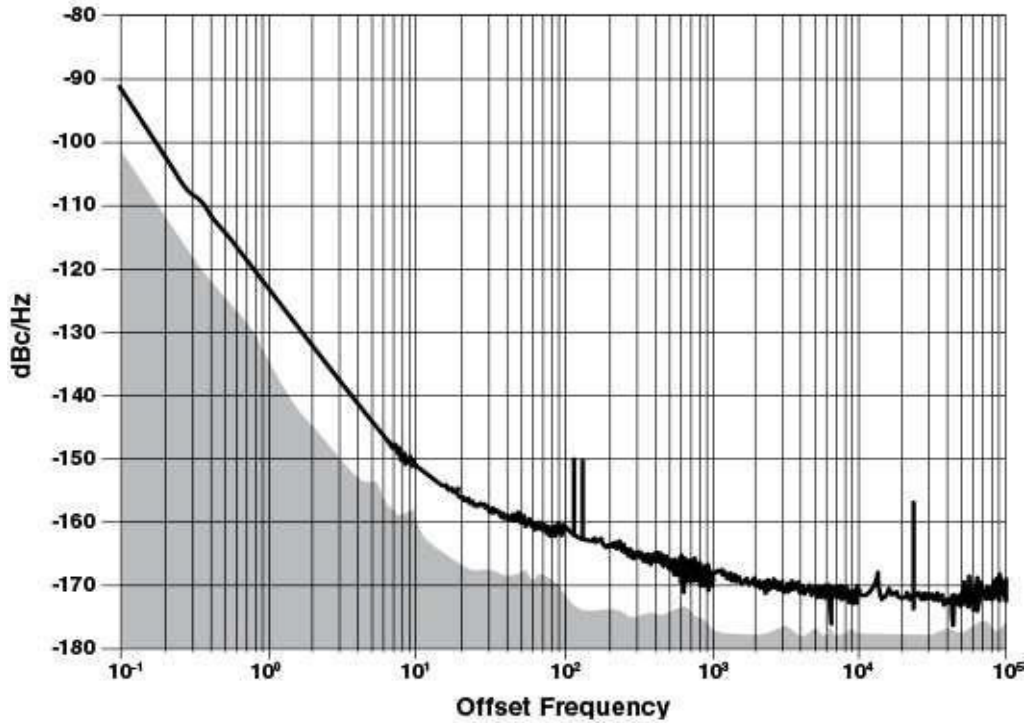
Dimensions: inches [mm]

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## Phase Noise Plot & Allan Deviation Plot



## ADEV

