

Model 148

OCXO – Ultra Low Power, shock resistant

Features

- 8 to 100 MHz Frequency Range
- Fast warm-up time
- ECO-friendly, <250 mW power consumption
- HCMOS output

Applications

- Airborne and ground mobile
- PLL reference
- Battery powered applications



Part Dimensions: 16 x 15.3 x 10 mm

Description

The Model 148 is a high stability, low power OCXO that utilizes an SC-cut quartz resonator. The SC resonator insures excellent phase noise and low aging rates. The novel design featuring the oscillator and oven control circuitry inside of the vacuum sealed TO-8 crystal enclosure provides reduced size, fast warm-up, and excellent temperature stability. In addition to improved performance characteristics, the compact design of Model 148 offers increased resilience to mechanical shock and vibration.

Ordering Information – Table 1

Model	Stability	Temperature Range	Supply Voltage	Aging	Frequency, MHz
148	W	D	E	C	10.000

Code	Stability	Code	Temp range	Code	Supply	Code	Per day	Per year	For Frequencies
P	±200ppb	A	0 to 50°C	D	5.0V ±5%	L	0.3 ppb	0.03 ppm	≥8MHz
R	±100ppb	B	0 to 70°C	E	3.3V ±5%	J	0.5 ppb	0.05 ppm	≥20MHz
T	±50 ppb	C	-10 to 60°C			C	1 ppb	0.1 ppm	≥50MHz
30	±30 ppb	D	-20 to 70°C			I	1.5 ppb	0.15 ppm	≥80MHz
U	±20 ppb	E	-30 to 70°C			K	2.5 ppb	0.25 ppm	≥80MHz
V	±10 ppb	G	-40 to 85°C			B	2 ppb	0.2 ppm	≥80MHz
W	±5 ppb					F	3 ppb	0.3 ppm	≥80MHz
						A	5 ppb	0.5 ppm	≥80MHz

Available Frequency Stabilities over Operating Temperature Ranges

Order Code	Temperature Range	Stability						
		P 200ppb	R 100ppb	T 50ppb	30 30ppb	U 20ppb	V 10ppb	W 5ppb
A	0 to 50°C	*	*	*	*	C	B	B
B	0 to 70°C	*	*	*	*	C	B	A
C	-10 to 60°C	*	*	*	C	B	B	A
D	-20 to 70°C	*	*	C	B	B	A	A
E	-30 to 70°C	*	*	C	B	B	A	
G	-40 to 85°C	*	*	B	B	B	A	

Stability Legend

- * = Available for all frequencies
- A = Available only for frequencies ≤10MHz
- B = Available only for frequencies ≤30MHz
- C = Available only for frequencies ≤50MHz

Part Number Example: 148-WDEC-10.000MHz



Electrical Specifications

Parameter	Conditions & Remarks		Min	Typical	Max	Unit
Operating Conditions						
Operating Temperature Range	T_{OP}		-40	-	85	°C
Supply Voltage	V_{CC}		3.14 4.75	3.3 5.0	3.46 5.25	Vdc
Power Consumption	Warm-up		-	1.0	1.1	W
	Steady State; $T_A = 25^\circ\text{C}$		-	0.23	0.25	
Load	10 MHz			10 k Ω // 10pF		
	100 MHz			10 k Ω // 5pF		
Frequency Stability						
Frequency	F_{NOM}		8	-	100	MHz
Freq. vs Temperature (See options - Table 1)	-10°C to 60°C		-	-	±5	ppb
Freq. vs Supply Voltage	$V_{CC} \pm 5\%$		-	±2	-	ppb
Freq. vs Time - Aging (See options – Table 1)	After 30 days of operation		-	-	±0.5	ppb/day
			-	-	±0.05	ppm/year
G-Sensitivity (Note 1)	Worst direction		-	±1*	-	ppb/G
Allan Variance	1 sec		-	0.02	-	ppb
Warm-up time	@ 25°C, to within ±0.1 ppm referenced to the freq after 15 minutes on		-	60	90	sec
Output Parameters						
HCMOS Output Levels	3.3V	V_{OL}	-	-	0.4	Vdc
	5.0V		-	-	0.4	
		V_{OH}	2.4 3.8	- -	- -	
Rise/Fall Times	10-90%	10 MHz	-	-	10	ns
		100 MHz	-	-	3	
Duty Cycle	@50% of output signal		45	50	55	%
Phase Noise (Note 2)		<u>Offset</u>		<u>10 MHz (typical)</u>	<u>100 MHz (typical)</u>	dBc/Hz
		1 Hz		-90	-	
		10 Hz		-120	-90	
		100 Hz		-140	-120	
		1 kHz		-160	-140	
	10 kHz		-165	-160		

Note 1. Lower G-Sensitivity performance is available. Consult factory.

Note 2. For additional phase noise options, consult factory.

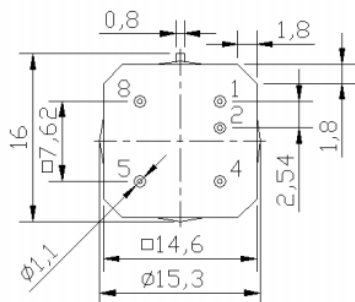
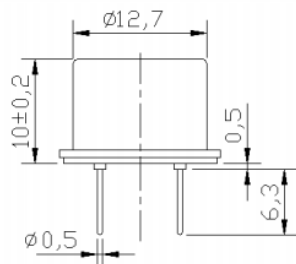
Electrical Specifications (Continued)

Parameter	Conditions & Remarks		Min	Typical	Max	Unit
Electronic Frequency Control - EFC (Optional)						
EFC Control Voltage	V_C	5V	0.0	-	4.2	Volts
		3.3V	0.0	-	2.8	
Frequency Tuning Range			± 0.5	± 1	-	ppm
Slope	Positive, monotonic		-	-	-	
Input Impedance	Z_{IN}		10	-	-	Kohms
Linearity			-	-	10	%
Reference Output	V_{REF}	5V	4.1	4.2	4.3	Volts
		3.3V	2.7	2.8	2.9	

Mechanical and Environmental

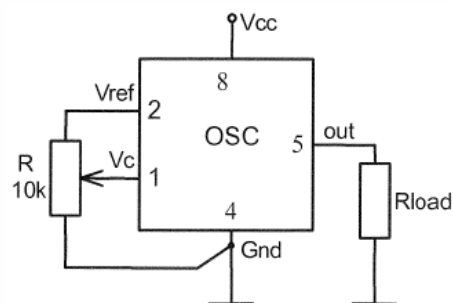
Storage Temperature Range	-60°C to +90°C
Humidity	Non-condensing 95%
Mechanical Shock	MIL-STD-202G, meth 213B, 500g, 1ms, 1/2 sine pulse - standard MIL-STD-202G, meth 213B, 1000g, 0.5ms, 1/2 sine pulse – option (consult factory)
Vibration	MIL-STD-202G, meth 204D, 1.5mm DA 10 to 100Hz, 30G pk sine to 2000Hz
Soldering Conditions	Hand solder only – not reflow compatible. 260°C, 10 seconds.
Markings	Epoxy ink or laser engraved

Mechanical Specifications



All dimensions: mm

Pin	Connection
1	V_C
2	V_{REF}
4	Ground
5	Output
8	V_{CC}



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