

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 × 15.3 × 10.5 mm

Description

The Model 148A 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 148A offers increased resilience to mechanical shock and vibration.

Ordering Information – Table 1

Model	Stability	Temperature Range	Supply Voltage	Aging	Mechanical Shock	Frequency, MHz					
148	V	D	E	C		10.000					
Code	Stability	Code	Temp range	Code	Supply	Code	Per day	Per year	For Frequencies	Code	Shock Level
P	±200ppb	A	0 to 50°C	D	5.0V ±5%	L	0.3 ppb	0.03 ppm	≤10MHz	blank	500g (std)
R	±100ppb	B	0 to 70°C	E	3.3V ±5%	J	0.5 ppb	0.05 ppm	≤20MHz	1	1000g
T	±50 ppb	C	-10 to 60°C			C	1 ppb	0.1 ppm	≤40MHz		
30	±30 ppb	D	-20 to 70°C			I	1.5 ppb	0.15 ppm	≤50MHz		
U	±20 ppb	E	-30 to 70°C			B	2 ppb	0.2 ppm			
V	±10 ppb	G	-40 to 85°C			K	2.5 ppb	0.25 ppm	≤100MHz		
W	±5 ppb					F	3 ppb	0.3 ppm			
						A	5 ppb	0.5 ppm			

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	
E	-30 to 70°C	*	*	C	B	B	A	
G	-40 to 85°C	*	*	C	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-VDEC-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	1.2	W	
	Steady State; T _A = 25°C	-	0.23	0.25		
Load	10 MHz		10 kΩ // 10pF			
	100 MHz		10 kΩ // 5pF			
Frequency Stability						
Frequency	F _{NOM}	8	-	100	MHz	
Freq. vs Temperature	See options Table 1	-	-	±5	ppb	
Freq. vs Supply Voltage	V _{CC} ±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 Deviation	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 5.0V	V _{OL}	-	-	0.4	Vdc
		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)	Offset		10 MHz (typical)	100 MHz (typical)		
	1 Hz		-90	-		
	10 Hz		-120	-90		
	100 Hz		-140	-120		
	1 kHz		-150	-140		
	10 kHz		-160	-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	-	4.3	Volts
		3.3V	0.0	-	2.9	
Frequency Tuning Range	From F_{NOM} sufficient for 10 year aging	5V 3.3V	± 0.5	± 1	-	ppm
Slope	Positive, monotonic		-	0.47 0.71	-	ppm/V
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	

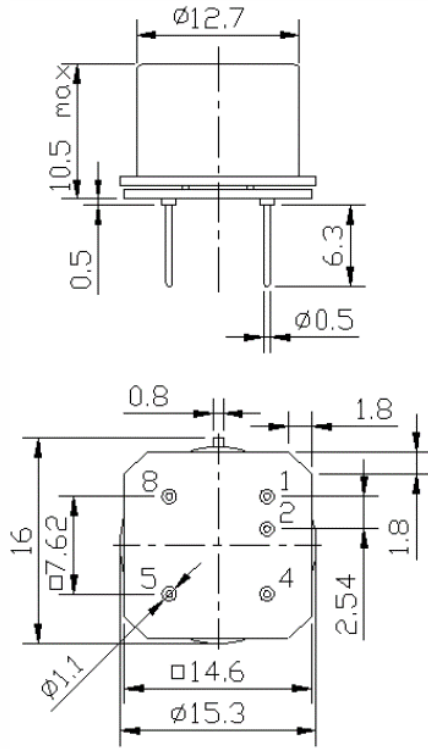
Absolute Maximum Ratings

Supply Breakdown Voltage	V_{CC}	-0.5	-	$V_{CC} + 20\%$	V
Control Voltage	V_C	-1	-	9	V

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 – (See Table 1, option “1”)
Vibration	MIL-STD-202, 1.5mm DA 10 to 57Hz, 10G pk sine to 2000Hz MIL-STD-202, 1.5mm DA 10 to 100Hz, 30G pk sine to 2000Hz – (see Table 1, option “1”)
Soldering Conditions	Hand solder only – not reflow compatible. 260°C, 10 seconds.
Markings	Laser engraved

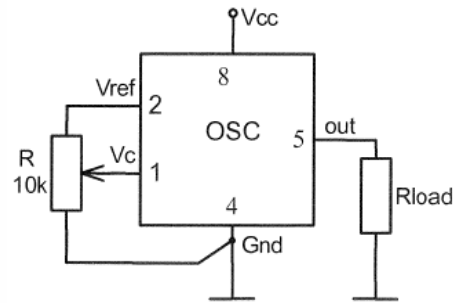
Mechanical Specifications



All dimensions: mm

Pin Assignments

Pin	Connection
1	V _C
2	V _{REF}
4	Ground
5	Output
8	V _{CC}



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