Model 148

OCXO – Ultra Low Power, shock resistant

Part Dimensions: 16 × 15.3 x 10.5 mm

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

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	Mechanical Shock	Frequency, MHz
148	— 28	D	E	C	—	— xxxMxxx

Code	Stability
27	±200ppb
17	±100ppb
58	±50 ppb
38	±30 ppb
28	±20 ppb
18	±10 ppb
59	±5 ppb

Code	Temp range
A	0 to 50°C
B	0 to 70°C
C	-10 to 60°C
D	-20 to 70°C
E	-30 to 70°C
G	-40 to 85°C

Code	Supply
D	5.0V ±5%
E	3.3V ±5%

Code	Per day	Per year	For Frequencies
L	0.3 ppb	0.03 ppm	≤10MHz
J	0.5 ppb	0.05 ppm	≤20MHz
C	1 ppb	0.1 ppm	≤40MHz
I	1.5 ppb	0.15 ppm	≤50MHz
B	2 ppb	0.2 ppm	≤100MHz
K	2.5 ppb	0.25 ppm	
F	3 ppb	0.3 ppm	
A	5 ppb	0.5 ppm	

Code	Shock Level
blank	500g (std)
1	1000g

Available Frequency Stabilities over Operating Temperature Ranges

Order Code	Temperature Range	Stability						
		27	17	58	38	28	18	59
		200ppb	100ppb	50ppb	30ppb	20ppb	10ppb	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: 148-28DEC-10M000

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 Steady State; T_A = 25°C	- -	1.0 0.23	1.2 0.25	W
Load	10 MHz 100 MHz		10 kΩ // 10pF 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 ±0.05	ppb/day 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} V_{OL}	- -	- -	0.4 0.4	Vdc
		V_{OH} V_{OH}	2.4 3.8	- -	- -	
Rise/Fall Times	10-90%	10 MHz 100 MHz	- -	- -	10 3	ns
Duty Cycle	@50% of output signal		45	50	55	%

Phase Noise (Note 2)	Offset	10 MHz (typical)	100 MHz (typical)	
	1 Hz	-90	-	dBc/Hz
	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 3.3V	0.0 0.0	- -	4.3 2.9	Volts
Frequency Tuning Range	From F_{NOM} sufficient for 10 year aging	5V 3.3V	±0.3	±1	-	ppm
Slope	Positive, monotonic		-	0.47 0.71	-	ppm/V
Input Impedance	Z_{IN}		10	-	-	Kohms
Linearity			-	-	10	%
Reference Output	V_{REF}	5V 3.3V	4.1 2.7	4.2 2.8	4.3 2.9	Volts

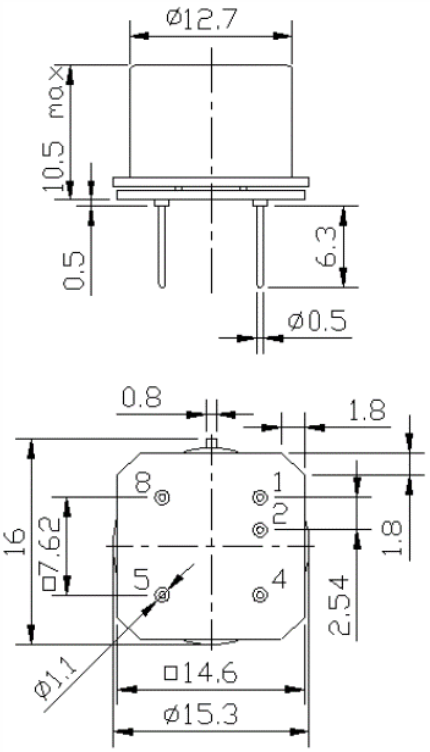
Absolute Maximum Ratings

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, Mech shock 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, Mech shock 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}