Surface Mount
Oven Stabilized Oscillator
DOCATM-Series

`OCXO`

CONNOR WINFIELD

Description:

Connor-Winfield's high stability DOCATM Series is an exceptionally precise frequency standard, excellent for use in cellular base stations, test equipment, Synchronous Ethernet and VSAT applications.
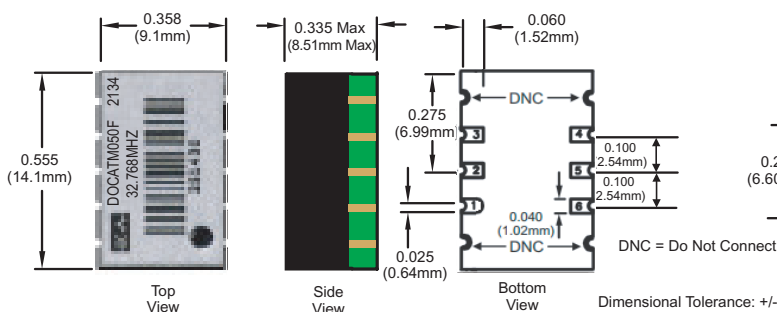
Based on an AT-cut crystal, the DOCATM Series offers low aging and tight stability in a 9x14mm surface mount package.
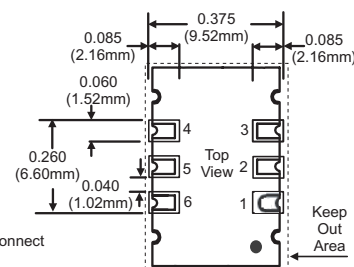
Features:

- OCXO
- 3.3 Vdc Operation
- SMT Package
- Frequency Stabilities:
  ±20 ppb, ±50 ppb and ±100 ppb
- Temperature Ranges: 0 to 70°C, -20 to 75°C, -40 to 85°C or -40 to 70°C
- Low Phase Noise
- LVCMOS Output
- RoHS Compliant / Lead Free ✓RoHS

Package Outline

Top View

Side View

Bottom View

DNC = Do Not Connect

Dimensional Tolerance: +/-0.005 (0.127mm)

Suggested Pad Layout

Top View

Keep Out Area

Pad Connections

1:	Do Not Connect*
2:	Do Not Connect*
3:	Ground
4:	Output
5:	Do Not Connect*
6:	Supply Voltage (Vcc)

* Do Not Connect: Pins used for Internal Programming.

Ordering Information

DOCATM	05	0	F	-032.768M
Oscillator Type	Frequency Stability	Temperature Range	Fixed Frequency	Output Frequency
3.3 Vdc LVCMOS Output Surface Mount OCXO	02 = ±20 ppb 05 = ±50 ppb 10 = ±100 ppb	0 = 0 to 70°C 1 = -20 to 75°C 2 = -40 to 85°C 3 = -40 to 70°C	F = OCXO (Fixed Freq.)	Frequency Format -xxx.xM Min * -xxx.xxxxxxM Max * *1 digit min, 6 digits max after the decimal point.

Note: Frequency stability ±20 ppb over temperature range -40/85°C is not available in all frequencies. Contact factory for details.

Ordering Information: Example part number DOCATM050F-032.768M

Attention: System Designers please review Application Note AN2093:
System Design Information and Printed Circuit Board Layout Guidelines for OCXO Oscillators.
@ www.conwin.com/suppport.html

RoHS COMPLIANT

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Absolute Maximum Ratings

Parameter	Minimum	Nominal	Maximum	Units	Notes
Storage Temperature	-55	-	125	°C	
Supply Voltage - 3.3 Vdc (Vcc)	-0.5	-	4.5	Vdc	

Operating Specifications

Parameter	Minimum	Nominal	Maximum	Units	Notes
Center Frequency (Fo)	10	-	50	MHz	
Frequency Stability vs. Change in Temperature					
Option 02	-20	-	20	ppb	1
Option 05	-50	-	50	ppb	
Option 10	-100	-	100	ppb	
Operating Temperature Range					
Option 0	0	-	70	°C	
Option 1	-20	-	75	°C	
Option 2	-40	-	85	°C	
Option 3	-40	-	70	°C	
Frequency Calibration	-1.0	-	1.0	ppm	2
Frequency Stability vs Load	-20	-	20	ppb	±5%
Frequency Stability vs Voltage	-20	-	20	ppb	±5%
Aging: Daily	-10	-	10	ppb/day	3
Aging: First Year	-0.5	-	0.5	ppm	
Total Frequency Tolerance (20 Years)	-4.6	-	4.6	ppm	4
Supply Voltage (Vcc)	3.13	3.30	3.47	Vdc	5
Power Consumption Vcc = Nominal Voltage					
Commercial Temperature Range: 0 to 70 °C					
Turn On	-	-	2.5	W	
Steady State @ 25°C	-	-	1.1	W	
Industrial Temperature Range: -40 to 85 °C					
Turn On	-	-	3.0	W	
Steady State @ 25°C	-	-	1.3	W	
Phase Jitter: (BW: 12 KHz to Fo/2 MHz @ Fo=40.0MHz)	-	0.25	0.35	ps RMS	
Allan Deviation (Tau=1s) Fo=20MHz	-	1.0E-10	-		
Start-Up Time (when Vcc ramp ≤ 500us)	-	-	10	ms	6
Warm Up Time (Within Calibration @ 25°C)	-	-	60	s	
Warm Up Time (Within Calibration @ -40°C)	-	-	90	s	

CMOS Output Characteristics

Parameter	Minimum	Nominal	Maximum	Units	Notes
Load	-	15	-	pF	7
Output Voltage					
Output Voltage: High (Voh)	2.7	-	-	V	
Low (Vol)	-	-	0.3	V	
Output Current: High (Ioh)	-4	-	-	mA	
Low (Iol)	-	-	4	mA	
Duty Cycle at 50% of Vcc	45	50	55	%	
Rise / Fall Time: 10% to 90%	-	-	6.5	ns	

Notes:

1. Frequency stability vs. change in temperature. [±(Fmax - Fmin)/(2*Fo)].

2. Initial calibration @ 25°C.

3. After 10 days of operation

4. Inclusive of calibration @ 25°C, frequency vs. change in temperature, change in supply voltage (±5%), load change (±5%), shock and vibration and 20 years aging

5. Minimum "Power On Time" after rail rises from 0 to within +/-5% of Vcc = 1 second. Supply must Supply voltage must reach Vcc level monotonically.

6. 10ms start time is guaranteed when supply voltage reaches Vcc level in <= 500us. If supply ramp is greater than 500us, then start times as long as 1s are possible.

7. Attention: To achieve optimal frequency stability, and in some cases to meet the specification stated on this data sheet, it is required that the circuit connected to this OCXO output must have the equivalent input capacitance that is specified by the nominal load capacitance. Deviations from the nominal load capacitance will have a graduated effect on the stability of approximately 20 ppb per pF load difference.
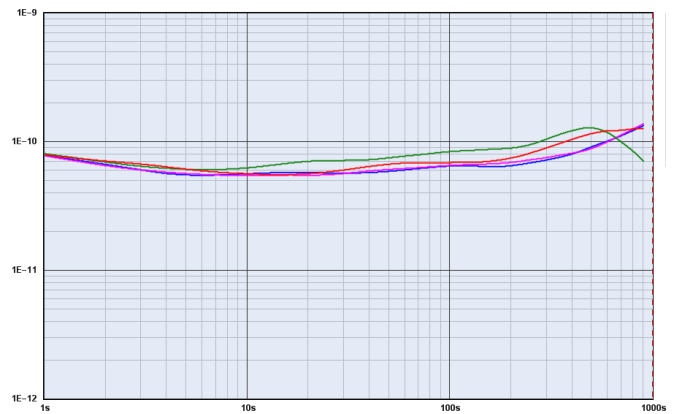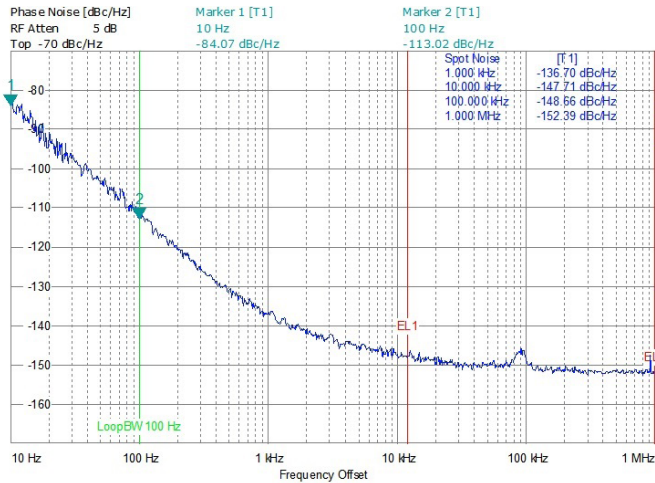
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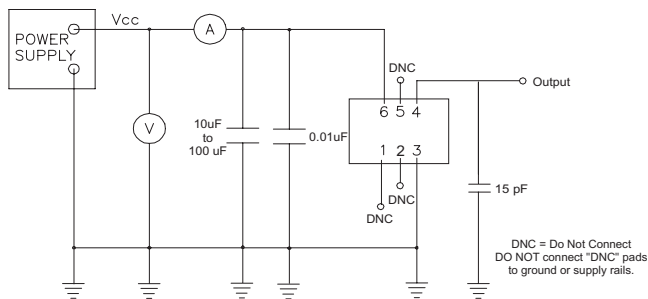*@ www.conwin.com/technologies.html*

Typical Phase Noise Characteristics

Parameter	Fo=32.768MHz	Units	Notes
@ 1 Hz offset	TBD	dBC/Hz	
@ 10 Hz offset	-84	dBC/Hz	
@ 100 Hz offset	-112	dBC/Hz	
@ 1 KHz offset	-136	dBC/Hz	
@ 10 KHz offset	-147	dBC/Hz	
@ 100 KHz offset	-149	dBC/Hz	
@ 1MHz offset	-152	dBC/Hz	

Package Characteristics

DOCATM-Series Package — Package consisting of a FR-4 substrate and Ryton-R-4 cover. Water Resistant package, non-hermetic seal. (Engineering Properties of Ryton R-4 Application Note AN2100)

Environmental Characteristics

Shock 500 G's 1ms, Halfsine, 3 shocks per direction, per MIL-STD 202G, Method 213B Test Condition D.

Sinusoidal Vibration 0.06" D.A. or 10G's Peak, 10 to 500 Hz, per MIL-STD-202G, Method 204D, Test Condition A.

Random Vibration 5.35 G's rms. 20 to 2000 Hz per MIL-STD-202G, Method 214,Test Condition 1A, 15 minutes each axis.

Moisture 10 cycles, 95% RH, Per MIL-STD-202G, Method 112.

Marking Permanency Per MIL-STD-202G, Method 215J.

Solder Process Recommendations: RoHS compliant, lead free. See solder profile on page 4.

In-line reflow: Refer to recommended reflow pre-heat and reflow temperatures on page 4. Package material consist of Ryton R-4 high temperature cover with FR4 substrate. Component solder is Pb free high temperature eutectic alloy with a melting point of 221°C.

In-line oven profile: We recommend using KIC profiler or similar device placing one of the thermocouples on the device to insure that the internal package temperature does not exceed 221°C.

Removal of device: If for any reason the device needs to be removed from the board, use a temperature controlled repair station with profile monitoring capabilities. Following a monitored profile will insure the device is properly pre-heated prior to reflow. Refer to IPC 610E for inspection guidelines.

Recommended Cleaning Process: (If required)

Device is non-hermetic, water resistance with four weep holes, one in each corner to allow moisture to be removed during the drying cycle. We recommend in-line warm water wash with air knife and drying capabilities. If cleaner does not have drying capability, then use hot air circulated oven. Boards should be placed in the oven vertically for good water runoff.

Device must be dried properly prior to use!

Note: If saponifier is used make sure the device is rinsed properly to insure all residues are removed. PH of saponifier should not exceed 10.

Drying Temperature: Between 85 to 100°C.

Drying Time: Time will vary depending on the board size.

Caution: Do not submerge the device!

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Typical Phase Noise Plot
DOCATM050F-032.768M

Phase Noise [dBc/Hz]
RF Atten   5 dB
Top -70 dBc/Hz

Marker 1 [T1]
10 Hz
-84.07 dBc/Hz

Marker 2 [T1]
100 Hz
-113.02 dBc/Hz

Spot Noise	[T1]
1.000 kHz	-136.70 dBc/Hz
10.000 kHz	-147.71 dBc/Hz
100.000 kHz	-148.56 dBc/Hz
1.000 MHz	-152.39 dBc/Hz

LoopBW 100 Hz

Frequency Offset

Allan Deviation Plot
DOCATM050F-032.768M

Test Circuit

DNC = Do Not Connect
DO NOT connect "DNC" pads
to ground or supply rails.

RoHS Solder Profile
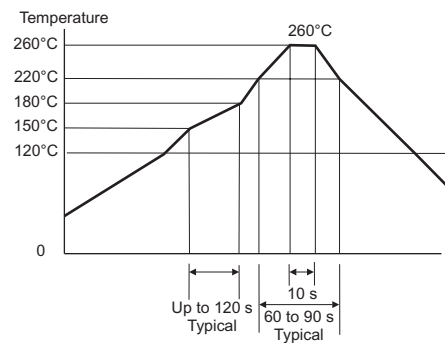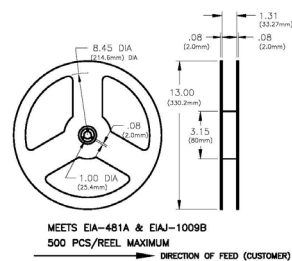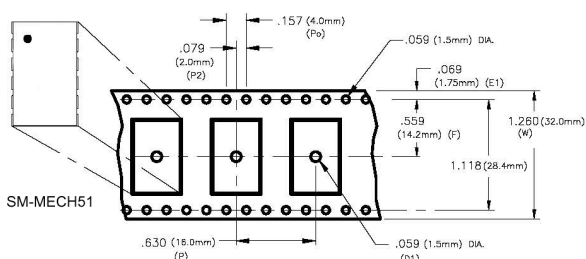

Meets IPC/JEDEC J-STD-020C

Tape and Reel Information

MEETS EIA-481A & EIAJ-1009B
500 PCS/REEL MAXIMUM
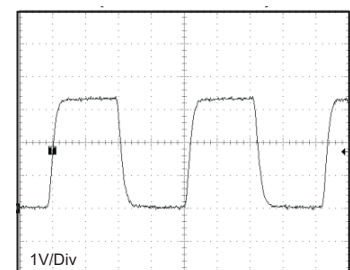DIRECTION OF FEED (CUSTOMER)

SM-MECH51

MEETS EIA-481A & EIAJ-1009B
500 PCS/REEL MAXIMUM
DIRECTION OF FEED (CUSTOMER)

CMOS Output Waveform

1V/Div

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