EX-401

Evacuated Miniature Crystal Oscillator

Description

The EX-401 provides exceptionally low aging rates and tight temperature stabilities in an extremely small package over a wide range of environmental conditions. This EMXO series bridges the gap between current large, high precision OCXO's and smaller TCXO's. The EX-401 Series becomes the most economical choice where there is a need for spectral purity, short and long term stability, along with small size and dramatically reduced power consumption.

Features

- Low Power Consumption Precision Oscillator
- Fast Warm-up
- Low Phase Noise
- Good Aging
- Small Form Factor
- SMD and Thru-Hole Mounting Option
- RoHS Compliant *
- Standard Frequencies: 10MHz, 20MHz and 100MHz
- Design/Material Sourcing/Manufacture/Test in MHS,PA COO:USA
- No ITAR Restriction for importing EAR99
- Previous Model Number: EX-380, EX-400 series

Applications

- Mobile Data Communications
- Military Portable Radio
- Satellite Communications
- Airborne Equipment
- Avionics
- Instrumentation
- Marine/Land Seismic

* (Except parts with Sn-Pb Solder Coated Option)

Performance Specifications

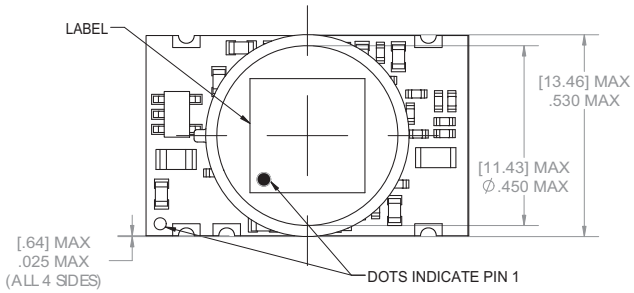
Frequency Stabilities[1]					
Parameter	Min	Typ	Max	Units	Condition
vs. operating temperature range (referenced to +25°C)	-10 -20 -30 -30		+10 +20 +30 +30	ppb ppb ppb ppb	0… +50°C -20… +70°C -40… +85°C -55… +85°C
Initial Accuracy vs. supply voltage change vs. load change vs. aging / day vs. aging / 1st year vs. aging / 10 years	-0.2 -5 -5 -1.0 -100 -1		+0.2 +5 +5 +1.0 +100 +1	ppm ppb ppb ppb ppb ppm	at time of shipment VS ± 5% Load ± 5% after 30 days of operation
Warm-up Time			45 60	seconds seconds	to ± 1 ppm of final frequency (1 hour) to ± 100 ppb of final frequency (1 hour)
Supply Voltage (Vs)					
Supply voltage (Standard)	4.75	5.0	5.25	VDC	
Supply voltage (Option)	3.14	3.3	3.46	VDC	
Power Consumption			1.5 0.25	Watts Watts	during warm-up steady state @ +25°C

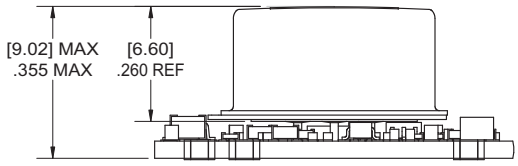
Performance Specifications

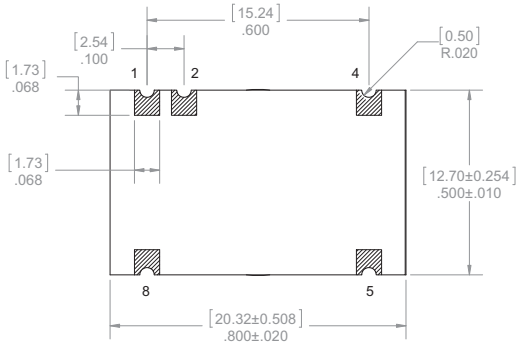
Frequency Stabilities[1]					
Parameter	Min	Typ	Max	Units	Condition
RF Output					
Signal [Standard]		HCMOS			
Load		15		pF	
Signal Level (Vol)			0.2	VDC	
Signal Level (Voh)	2.6 4.0			VDC VDC	Vs = 3.3 Vdc Vs = 5.0 Vdc
Rise \ Fall Time			5	ns	(10 - 80 %)
Duty cycle	40		60	%	
Signal [Standard]		Sinewave			
Load		50		ohm	
Output Power [Standard] Output Power [Option]	0 +3		+4 +7	dBm dBm	50 Ohm load 50 Ohm load
Harmonics			-30	dBc	50 Ohm load
Frequency Tuning (EFC)					
Reference Voltage (Vref)		2.8 4.3			Vs = 3.3 Vdc Vs = 5.0 Vdc
Tuning Voltage	0		+Vref	VDC	
Tuning Range	±1.0			ppm	
Tuning Slope		Positive			
Additional Parameters					
Phase Noise (10 MHz)		-90 -125 -145 -160 -165		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	1 Hz 10 Hz 100 Hz 1 KHz 10 KHz
Allan Deviation			0.1	ppb	Tau = 1 sec
Acceleration Sensitivity			1.0	ppb/g	Total Gamma
Weight			5	g	
Absolute Maximum Ratings					
Supply Voltage			5.5	VDC	
Output Load			50	pF	
Operable temperature range	-55		+85	°C	
Storage temperature range	-55		+85	°C	

Outline Drawing / Enclosure

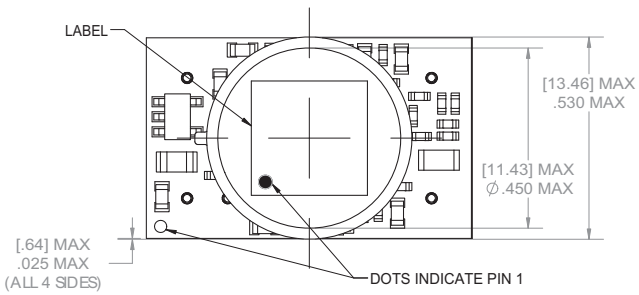
Surface Mount

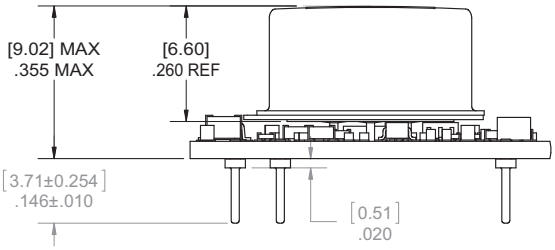


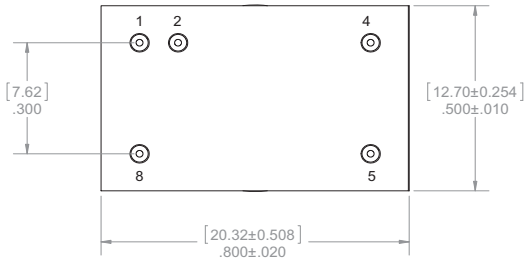




Thru-hole

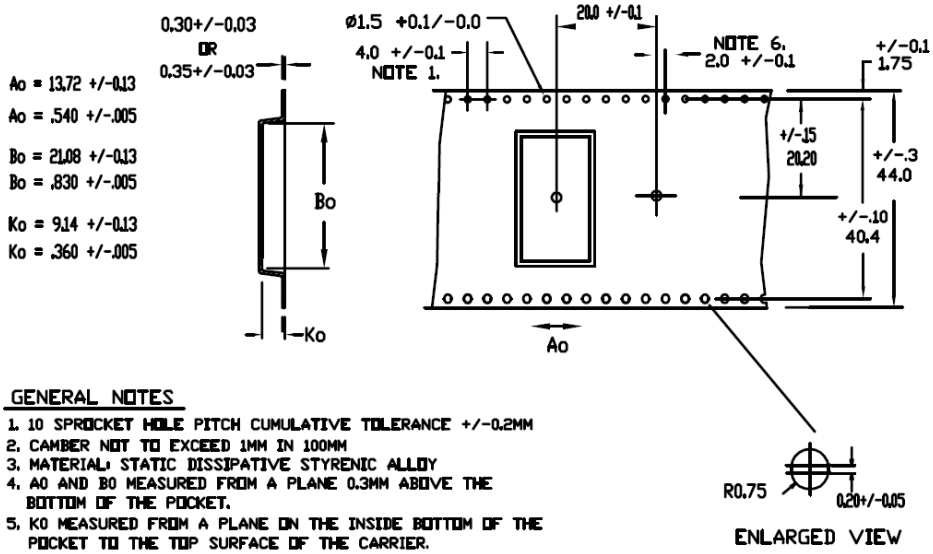






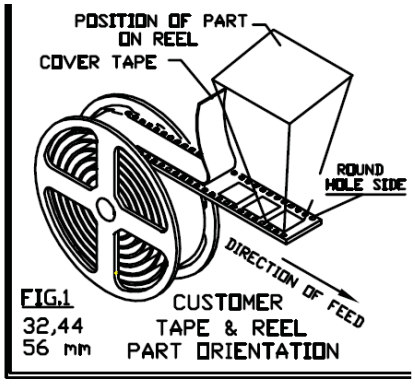
Pin Connections	
Pin	Function
1	EFC Input
2	Vref Output
4	Ground (Case)
5	RF Output
8	Supply Voltage Input

Standard Shipping Method

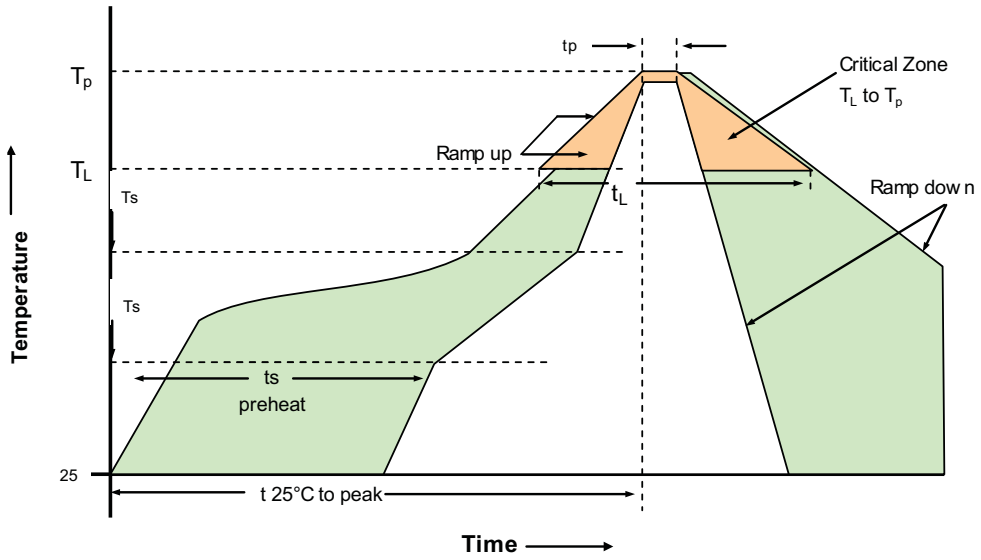


GENERAL NOTES

1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE +/-0.2MM
2. CAMBER NOT TO EXCEED 1MM IN 100MM
3. MATERIAL: STATIC DISSIPATIVE STYRENIC ALLOY
4. A0 AND B0 MEASURED FROM A PLANE 0.3MM ABOVE THE BOTTOM OF THE POCKET.
5. K0 MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER.
6. POCKET POSITION RELATIVE TO THE SPROCKET HOLE MEASURED AS TRUE POSITION OF THE POCKET, NOT THE POCKET HOLE.



Recommended Reflow Profiles for Pb-Free & Sn-Pb



230°C Reflow Profile

Profile Feature	Sn-Pb Assembly	Profile Feature	Sn-Pb Assembly
Average ramp-up rate (TL to TP)	3°C/seconds max.	Time 25°C to Peak Temperature	4 minutes max.
Preheat - Temperature min Tsmin - Temperature Min Tsmax - Time (min to max) (ts)	135°C 155°C 60-90 seconds	Time maintained above - Temperature (TL) - Time (tL)	 183°C 45-60 seconds
Tsmax to TL -Ramp-up Rate	3°C/seconds max.		
Time maintained above - Temperature (TL) - Time (TL)	183°C 40-60 seconds	Time within 5°C of actual Peak Temperature (tp)	10-20 seconds max.
Peak Temperature (Tp)	max 230°C	Ramp-down Rate	6°C/seconds max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

260°C Reflow Profile

Profile Feature	Pb-Free Assembly	Profile Feature	Pb-Free Assembly
Average ramp-up rate (TL to TP)	3°C/seconds max.	Time 25°C to Peak Temperature	8 minutes max.
Preheat - Temperature min Tsmin - Temperature min Tsmax - Time (min to max) (ts)	150°C 200°C 60-180 seconds	Time maintained above - Temperature (TL) - Time (tL)	 217°C 60-150 seconds
Tsmax to TL -Ramp-up Rate	3°C/seconds max.		
Time maintained above - Temperature (TL) - Time (TL)	217°C 60-150 seconds	Time within 5°C of actual Peak Temperature (tp)	20-40 seconds max.
Peak Temperature (Tp)	max 260°C	Ramp-down Rate	6°C/seconds max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

Ordering Information

EX - 401 0 - D A P - 108 0 - 10M0000000

Product Family
EX: EMXO

Package
13x 20mm

Configuration
0: Surface Mount
1: Thru-hole
2: Surface Mount with Solder Coated Pads
3: Thru-hole with Solder Coated Leads

Supply Voltage
D: 5 Vdc
E: 3.3 Vdc

RF Output Code
A: HCMOS
E: Sinewave

Temperature Range
A: -55°C to +85°C
E: -40°C to +85°C
J: -20°C to +70°C
P: 0°C to +50°C

Stability Code
108: ±10ppb
208: ±20ppb
308: ±30ppb
508: ±50ppb
758: ±75ppb
107: ±100ppb

Frequency Control
0: Fixed Frequency (HCMOS)
1: Fixed Frequency (0 dBm)
2: Fixed Frequency (+3 dBm)
3: Electrical Tuning (HCMOS)
4: Electrical Tuning (0 dBm)
5: Electrical Tuning (+3 dBm)

Frequency

Temperature Range and Stability Table				
Stability/Temperature	A: -55°C to +85°C	E: -40°C to +85°C	J: -20°C to +70°C	P: 0°C to +50°C
108 (+/-10ppb)				10-30MHz
208 (+/-20ppb)			10-30MHz	10-30MHz
308 (+/-30ppb)	10-30MHz	10-30MHz	10-30MHz	10-30MHz
508 (+/-50ppb)	10-50MHz	10-50MHz	10-50MHz	10-50MHz
758 (+/-75ppb)	10-80MHz	10-100MHz	10-100MHz	10-100MHz
107 (+/-100ppb)	10-100MHz			

Notes:

1. Contact factory for improved stabilities or additional product options. Not all options and codes are available at all frequencies.
2. Unless other stated all values are valid after warm-up time and refer to typical conditions for supply voltage, frequency control voltage, load, temperature (25°C).
3. Phase noise degrades with increasing output frequency.
4. Subject to technical modification.
5. Contact factory for availability.

For Additional Information, Please Contact

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