

Helping Customers Innovate, Improve & Grow


EX-400

Description

The EX-400 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-400 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

- 4-Pin Dip
- Uses Doubly Rotated Crystal
- Low Power Consumption: <0.35 watts @ +25°C
- Previous Model Number: EX-380, EX-381, EX-385 series
- Frequency Range: 10 MHz - 80 MHz

Applications

- SONET/SDH, DWDM, FDM, ATM, 3G
- Telecom Transmission and Switching Equipment
- Wireless Communication Equipment
- Military Airborne and Mobile Systems

Performance Specifications

Frequency Stabilities¹

Parameter	Min	Typical	Max	Units	Condition
vs. operating temperature range (reference to +25°C)	-75		+75	ppb	-20... +70°C (10 to 20.49 MHz)
	-100		+100		-20... +70°C (10 to 50 MHz)
	-250		+250		-20... +70°C (10 to 80 MHz)
	-100		+100	ppb	-40... +85°C (10 to 20.49 MHz)
	-150		+150		-40... +85°C (10 to 50 MHz)
	-250		+250		-40... +85°C (10 to 80 MHz)
	-150		+150	ppb	-55... +85°C (10 to 50 MHz)
	-250		+250		-55... +85°C (10 to 80 MHz)
	-140		+140	ppb	-20... +70°C
vs. Stratum3 per GR-1244-CORE	-140		+140		-40... +85°C (10 to 50 MHz)
	-140		+140		-55... +85°C (10 to 20.49 MHz)
	Operating Temp				
	-370		+370	ppb	24 hours
Warm-up Time	-4.63		+4.63		Over 7100 seconds
			+1000		0.16sec < Observe Times < 64 sec
Initial Tolerance (10 to 19.9 MHz)	-1.0		+1.0	ppm	to ± 1ppm of final frequency (1 hour)
Initial Tolerance (20 to 80 MHz)	-1.5		+1.5		to ± 100ppb of final frequency (1 hour)
vs. supply voltage change (10 to 50 MHz)	-15		+15	ppb	VS ± 5%
vs. supply voltage change (50 to 80 MHz)	-25		+25		
vs. load change (10 to 80 MHz)	-15		+15	ppb	Load ± 5%

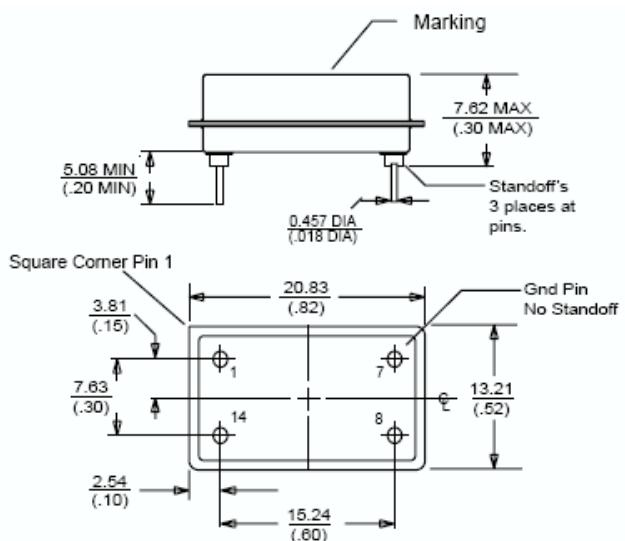
Performance Specifications

Frequency Stabilities ¹ (continued)						
Parameter	Min	Typical	Max	Units	Condition	
vs. aging / day (10 to 14.9 MHz)	-1.0		+1.0			
vs. aging / day (15 to 19.9 MHz)	-2.0		+2.0			
vs. aging / day (20 to 49.9 MHz)	-3.0		+3.0	ppb	after 30 days of operation	
vs. aging / day (50 to 80.0 MHz)	-4.0		+4.0			
vs. aging / 1st year (10 to 14.9 MHz)	-200		+200			
vs. aging / 1st year (15 to 19.9 MHz)	-300		+300	ppb	after 30 days of operation	
vs. aging / 1st year (20 to 80 MHz)	-500		+500			
vs. aging / 10 year (10 to 14.9 MHz)	-1000		+1000			
vs. aging / 10 year (15 to 19.9 MHz)	-2000		+2000	ppb	after 30 days of operation	
vs. aging / 10 year (20 to 80 MHz)	-3000		+3000			
Supply Voltage (Vs)						
Supply voltage (Vs)	4.75	5.0	5.25	VDC		
Supply voltage (Vs)	3.135	3.3	3.465	VDC		
Power Consumption			1.5	Watts	during warm-up	
			0.35		steady state @ +25°C (10 to 29.99 MHz)	
			0.45		steady state @ +25°C (30 to 80 MHz)	
			0.7		steady state @ -40°C (10 to 29.99 MHz)	
			0.8		steady state @ -40°C (30 to 80 MHz)	
RF Output						
Signal [Standard]		HCMOS				
Load		15		pF		
Signal Level (Vol)			0.4	VDC		
Signal Level (Voh)	4.0 2.6			VDC	Vs=5 Vdc Vs=3.3 vdc	
Rise/Fall Time			+5	ns	(10-80%) of Vs	
Duty cycle	40		60	%	(Voh-Vol)/2	
Signal [Option]		Sinewave				
Load		50		ohm		
Output Power [Standard]	0		+4	dBm	50 ohm load	
Output Power [Option]	+3		+7	dBm	50 ohm load	
Frequency Tuning (EFC)						
Tuning Range	Fixed OCXO; No adjust					
Tuning Range	±1.0 ±2.0 ±3.0 ±4.0		±5.0 ±8.0 ±10.0 ±12.0	ppm	with 10 to 14.99 MHz with 15 to 20.48 MHz with 20.5 to 49.99 MHz with 50 to 80 MHz	
Control Voltage Range	0		Vs	VDC		
Tuning Slope	Positive					
Oven Alarm Logic	4.0 2.6		0.4	VDC	During Warmup Vs=5.0 Vdc After Warmup Vs=3.3 Vdc After Warmup	
Additional Parameters						
Phase Noise @ 10 MHz (Typical)		-120 -140 -145 -155 -155		dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz	
Phase Noise @ 20 MHz (Typical)		-100 -130 -140 -145 -150		dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz	

Frequency Stabilities¹ (continued)

Parameter	Min	Typical	Max	Units	Condition
Additional Parameters					
Phase Noise @ 50 MHz (Typical)		-80 -110 -130 -135 -140		dBc/Hz	10 Hz 100 Hz 1 kHz 10 kHz 100 kHz
Additional Parameters (continued)					
Parameter	Min	Typical	Max	Units	Condition
Allan Deviation			0.2	ppb	Tau = 1 sec to 10 sec (10 to 20.49 MHz)
			0.5		Tau = 1 sec to 10 sec (20.5 to 80 MHz)
Acceleration Sensitivity (10 MHz)			1.0	ppb/g	Total Gamma
Weight			5	g	
Absolute Maximum Ratings					
Supply Voltage			5.5	VDC	with Vs=5 V
			5.5		with Vs=3.3 V
Output Load			30	pF	
Operable temperature range	-55		+85	°C	
Storage temperature range	-55		+85	°C	
Standard Environmentals					
Vibration - Sine	MIL-STD-202, Method 204, Condition D (20 G, 10Hz-2000Hz)				
Vibration - Random	MIL-STD-202, Method 214, Condition I-F (20 Grms, 10Hz-2000Hz)				
Shock	MIL-STD-202, Method 213, Condition E (1000 G, 0.5ms, halfsine)				
Solderability	MIL-STD-202, Method 208				

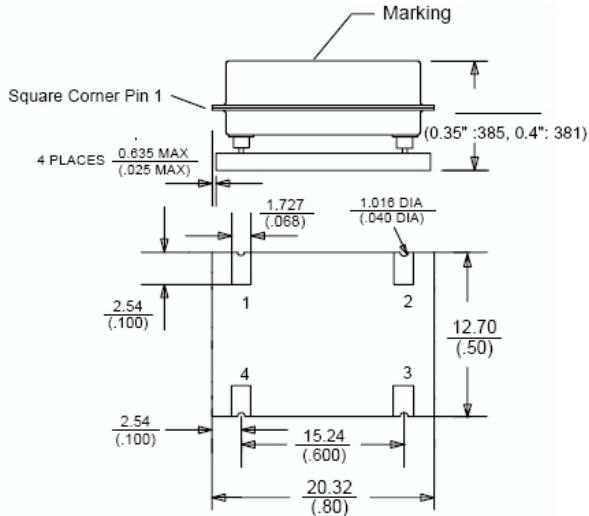
Outline Drawing / Enclosure



Type A		
Code	Height "H"	Pin Length "L"
0	7.62	5.08

Pin Connections	
1	EFC \ No Connect \ Oven Monitor
7	Ground (Case)
8	RF Output
14	Supply Voltage Input

Outline Drawing / Enclosure

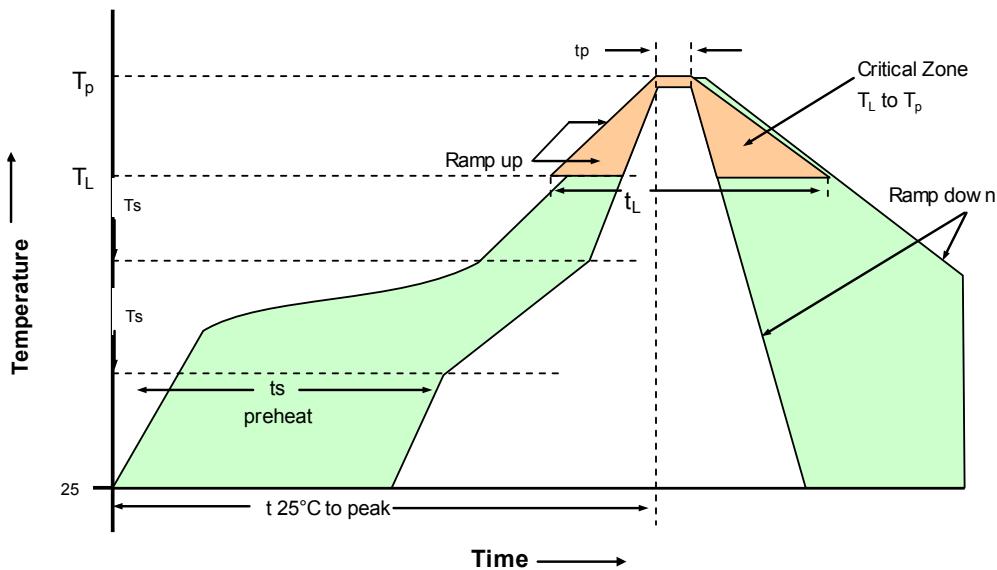


Dimensions in mm (inches)

Type B		
Code	Height "H"	Pin Length "L"
1	8.9 (0.35")	NA
2	10.2 (0.4")	NA

Pin Connections	
1	EFC \ No Connect \ Oven Monitor
7	Ground (Case)
8	RF Output
14	Supply Voltage Input

Recommended Reflow Profile



Profile Feature	Sn-Pb Assembly	Profile Feature	Sn-Pb Assembly
PRECAUTION: Series shall not expose to temperature higher than 230°C. If exposing to temperature higher than 230°C, stability and power consumption may permanently degrade.			
Average ramp-up rate (T _L to T _p)	3°C/second max.	Time 25°C to Peak Temperature	4 minutes max.
Preheat -Temperature Min T _{smin}) -Temperature Min T _{smax}) -Time (min to max) (t _s)	135°C 155°C 60-90 seconds	Time maintained above - Temperature (T _L) - Time (t _L)	183°C 45-60 seconds
T _{smax} to T _L - Ramp-up Rate	3°C/second max.		
Time maintained above - Temperature (T _L) - Time (t _L)	183°C 45-60 seconds	Time within 5°C of actual Peak Temperature (t _p)	10-20 seconds max.
Peak Temperature (T _p)	max 220°C	Ramp-down Rate	6°C/second max.
Note: All temperatures refer to topside of the package, measured on the package body surface.			

Ordering Information

EX - 400 0 - D A J - 107 0 - 10M0000000

Product Family

EX: EMXO

Package

13x20mm

Height

0: A 7.62mm (HCMOS only)
1: B 8.9mm (HCMOS only)
2: B 10.2mm (Sinewave only)

Supply Voltage

D: +5V
E: +3.3V

RF Output Code

A: HCMOS
E: Sinewave

Frequency

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)
6: Oven Alarm Option (HCMOS)
7: Oven Alarm Option (0 dBm)
8: Oven Alarm Option (+3 dBm)

Stability Code

758: $\pm 75\text{ppb}$
107: $\pm 100\text{ppb}$
157: $\pm 150\text{ppb}$
257: $\pm 250\text{ppb}$
507: $\pm 500\text{ppb}$
147: $\pm 140\text{ppb(ST3)}$

Temperature Range

A: -55°C to +85°C
E: -40°C to +85°C
J: -20°C to +70°C

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
758: ($\pm 75\text{ppb}$)			10 to 20 MHz
107: ($\pm 100\text{ppb}$)	10 to 40 MHz	10 to 40 MHz	10 to 65 MHz
157: ($\pm 150\text{ppb}$)	10 to 65 MHz	10 to 65 MHz	10 to 65 MHz
257: ($\pm 250\text{ppb}$)	10 to 80 MHz	10 to 80 MHz	10 to 80 MHz
507: ($\pm 500\text{ppb}$)	10 to 80 MHz	10 to 80 MHz	10 to 80 MHz
147: ($\pm 140\text{ppb(ST3)}$)	10 to 65 MHz	10 to 65 MHz	10 to 65 MHz

Frequency Range

10 to 20 MHz
10 to 40 MHz
10 to 65 MHz
10 to 80 MHz

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.

Contact Information

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