

Helping Customers Innovate, Improve & Grow



EX-421

Description

The EX-421 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-421 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-620, EX-420 series

Applications

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



Performance Specifications

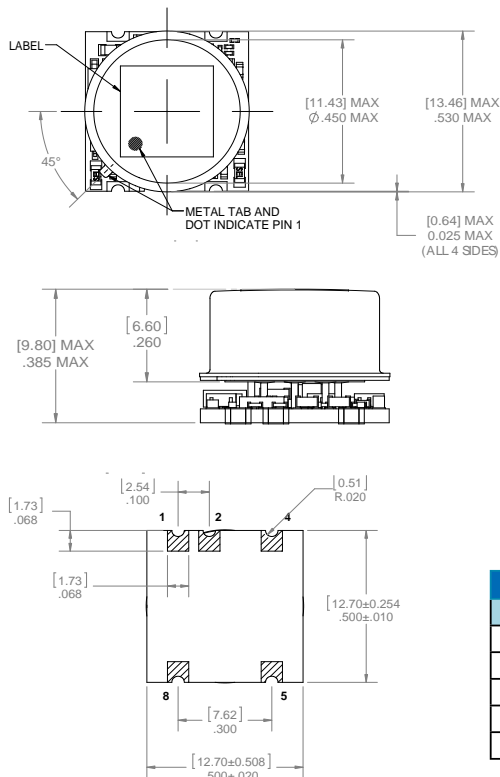
Frequency Stabilities ¹					
Parameter	Min	Typ	Max	Units	Condition
vs. operating temperature range (See temperature & stability table)			±10	ppb	0... +50°C
			±20	ppb	-20... +70°C
			±30	ppb	-40... +85°C
vs. aging / day (See aging table)			±1.0	ppb	after 30 days of operation
vs. aging / per year			±100	ppb	
vs. aging / 10 years			±1	ppm	
Initial Accuracy	-0.2		+0.2	ppm	at time of shipment
vs. supply voltage change	-5		+5	ppb	VS ± 5%
vs. load change	-5		+5	ppb	Load ± 5%
Warm-up Time			45	sec.	to ± 1 ppm of final frequency (1 hour) to ± 100 ppb of final frequency (1 hour)
			60	sec.	
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	Watts	during warm-up
			0.25	Watts	steady state @ +25°C / 3.3 Vdc
			0.30	Watts	steady state @ +25°C / 5.0 Vdc

Performance Specifications

Parameter	Min	Typ	Max	Units	Condition
Signal [Standard]	HCMOS				
Load		15		pF	
Signal Level (Vol)			0.1 Vs	VDC	
Signal Level (Voh)	0.8 Vs 0.8 Vs			VDC VDC	Vs = 3.3 Vdc Vs = 5.0 Vdc
Rise \ Fall Time			5	ns	10MHz to 29.999MHz , (10 % - 80 %)
Rise \ Fall Time			3	ns	30MHz to 100MHz , (10 % - 80 %)
Duty cycle	45		55	%	
Signal [Standard]	Sinewave				
Load		50		ohm	
Output Power [Standard]	0		+4	dBm	50 Ohm load
Output Power [Option]	+3		+7	dBm	50 Ohm load
Output Power [Option]	+5		+9	dBm	50 Ohm load
Harmonics			-30	dBc	50 Ohm load
Frequency Tuning (EFC)					
Reference Voltage (Vref)	2.7 4.2		2.9 4.4	VDC VDC	Vs = 3.3 Vdc Vs = 5.0 Vdc
Tuning Voltage	0		+Vref	VDC	
Tuning Range	See tuning range table				
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
Phase Noise (100 MHz)		-95 -125 -150 -160 -165		dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz	10 Hz 100 Hz 1 KHz 10 KHz 100 KHz
Allan Deviation (10 MHz)			0.02	ppb	Tau = 1 sec
Acceleration Sensitivity			1.0	ppb/g	Total Gamma
Weight			5	grams	
Absolute Maximum Ratings					
Supply Voltage			5.5	VDC	
Output Load			50	pF	
Operable temperature range	-55		+85	°C	
Storage temperature range	-55		+85	°C	

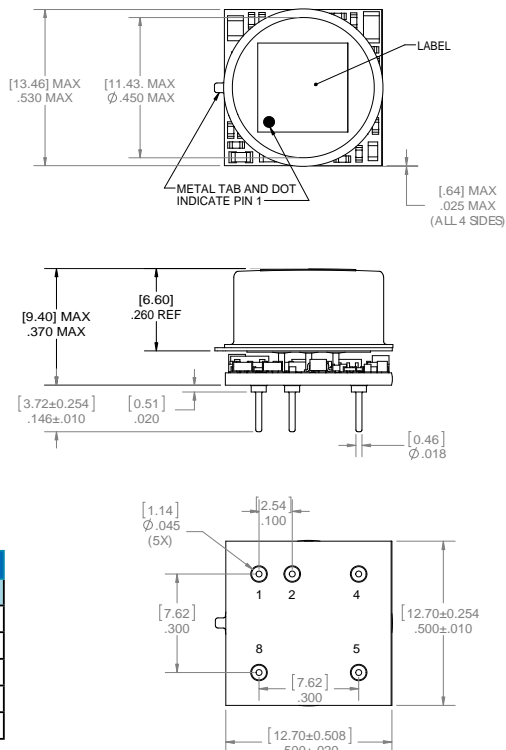
Standard Environmentals	
Vibration Sine	MIL-STD-202, Method 204, Condition G (30g peak, 10Hz-2000Hz)
Vibration Random	MIL-STD-202, Method 214, Condition I-H (30g RMS, 10Hz-2000Hz)
Shock	MIL-STD-202, Method 213, Condition E (1000g, 0.5ms, 1/2 sine)
Solderability	MIL-STD-883, Method 2003

Surface Mount

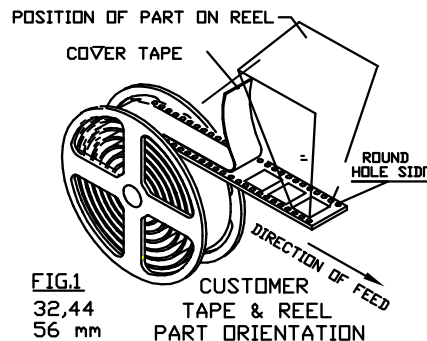
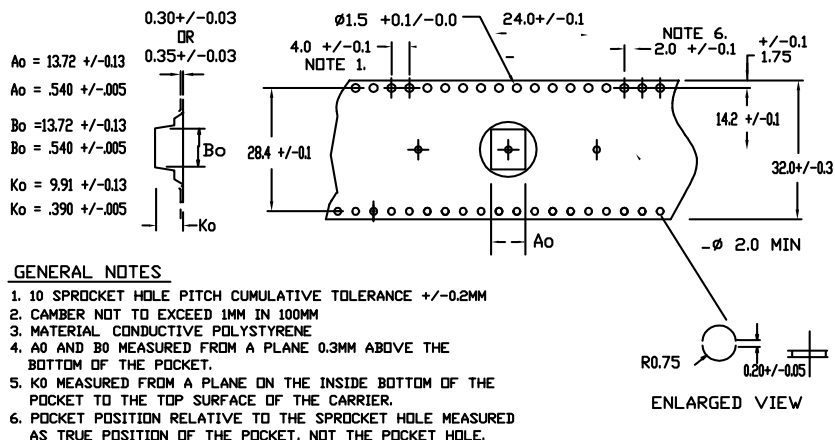


Pin Connections		
Pin	EFC OPTIONS	FIX FREQ. OPTIONS
1	EFC Input	No Connection
2	Vref Output	No Connection
4	Ground (Case)	Ground (Case)
5	RF Output	RF Output
8	Supply Voltage Input	Supply Voltage Input

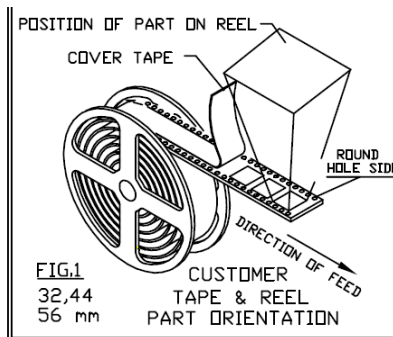
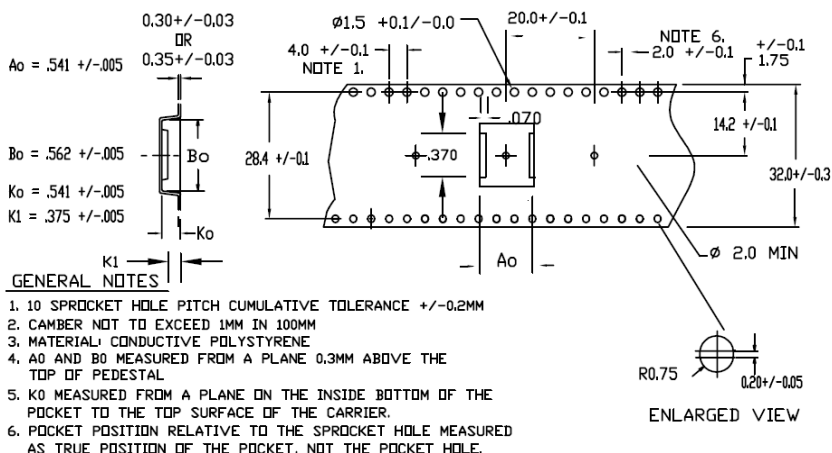
Thru-hole



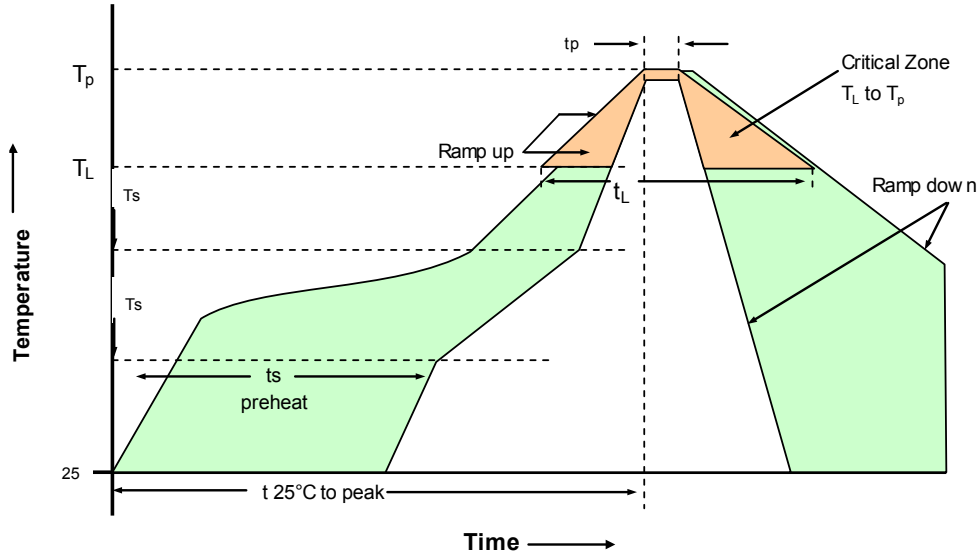
Standard Shipping Method (surface mount)



Standard Shipping Method (thru-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 T _{sm} - Temperature Min T _{smax} - Time (min to max) (ts)	135°C 155°C 60-90 seconds	Time maintained above - Temperature (TL) - Time (tL)	183°C 45-60 seconds
T _{smax} 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.

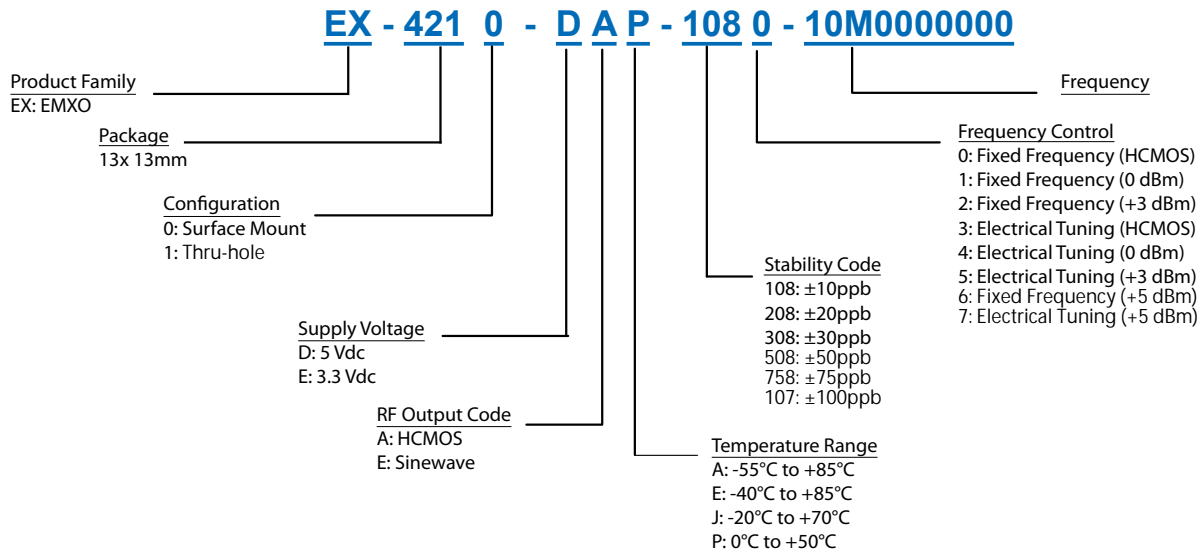
Note: All temperatures refer to topside of the package, measured on the package body surface.

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 T _{sm} - Temperature min T _{smax} - Time (min to max) (ts)	150°C 200°C 60-180 seconds	Time maintained above - Temperature (TL) - Time (tL)	217°C 60-150 seconds
T _{smax} 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



Temperature Range and Stability Table				
(Temperature Stability Reference to $(F_{max}-F_{min})/2$)				
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)				10-20MHz
208 (+/-20ppb)			10-20MHz	10-20MHz
308 (+/-30ppb)	10-20MHz	10-20MHz	10-20MHz	10-20MHz
508 (+/-50ppb)	10-50MHz	10-50MHz	10-50MHz	10-50MHz
758 (+/-75ppb)	10-80MHz	10-100MHz	10-100MHz	10-100MHz
107 (+/-100ppb)	10-100MHz			

Aging Table			
Frequency Range	Daily Rate (ppb/day)	Yearly Rate (ppb/year)	Tuning Range (ppm)
10MHz to 15MHz	± 1	± 100	± 1
>15MHz to 100MHz	± 2	± 200	± 2

Notes:

- Contact factory for improved stabilities or additional product options. Not all options and codes are available at all frequencies.
- 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).
- Phase noise degrades with increasing output frequency.
- Subject to technical modification.
- Contact factory for availability.

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