

Helping Customers Innovate, Improve & Grow



EX-420

## Description

The EX-420 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-420 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 Half Dip
- Fast Warmup
- Low Power Consumption
- Previous Model Number: EX-620 series
- Frequency Range: 10 MHz - 30 MHz

## Applications

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

## Performance Specifications

| Frequency Stabilities <sup>1</sup>                    |      |     |      |       |              |
|-------------------------------------------------------|------|-----|------|-------|--------------|
| Parameter                                             | Min  | Typ | Max  | Units | Condition    |
| vs. operating temperature range (referenced to +25°C) | -50  |     | +50  | ppb   | 0... +70°C   |
|                                                       | -75  |     | +75  | ppb   | -20... +70°C |
|                                                       | -100 |     | +100 | ppb   | -40... +85°C |

# Performance Specifications

| Frequency Stabilities <sup>1</sup>       |                |                            |     |                              |                                      |                                                                                                   |
|------------------------------------------|----------------|----------------------------|-----|------------------------------|--------------------------------------|---------------------------------------------------------------------------------------------------|
| Parameter                                |                | Min                        | Typ | Max                          | Units                                | Condition                                                                                         |
| vs. Stratum<br>3 per<br>GR-1244-<br>CORE | Operating Temp | -140                       |     | +140                         | ppb                                  | -20... +70°C                                                                                      |
|                                          |                | -140                       |     | +140                         | ppb                                  | -40... +85°C                                                                                      |
|                                          | Holdover       | -370                       |     | +370                         | ppb                                  | 24 hours                                                                                          |
|                                          | Drift          | -4.63                      |     | +4.63                        | ppb                                  | Over 7100 seconds                                                                                 |
|                                          | MTIE           |                            |     | +1                           | 10-13/sec<br>ppm                     | 0.16 sec < Observe Times < 64 sec                                                                 |
| Warm-up Time                             |                |                            |     | 1<br>1.5                     | minutes<br>minutes                   | to ± 100 ppb of final frequency (1 hour) @+25°C<br>to ± 100ppb of final frequency (1 hour) @-40°C |
| Initial Accuracy                         |                | -1                         |     | +1                           | ppm                                  | fixed frequency, no EFC input                                                                     |
| vs. supply voltage change                |                | -20                        |     | +20                          | ppb                                  | VS ± 5%                                                                                           |
| vs. load change                          |                | -10                        |     | +10                          | ppb                                  | Load ± 5%                                                                                         |
| vs. aging / day                          |                | -2.0                       |     | +2.0                         | ppb                                  | after 30 days of operation                                                                        |
| vs. aging / 1 year                       |                | -300                       |     | +300                         | ppb                                  | after 30 days of operation                                                                        |
| Supply Voltage (Vs)                      |                |                            |     |                              |                                      |                                                                                                   |
| Supply voltage (Standard)                |                | 4.75                       | 5.0 | 5.25                         | VDC                                  |                                                                                                   |
| Supply voltage (Option)                  |                | 3.135                      | 3.3 | 3.465                        | VDC                                  |                                                                                                   |
| Power Consumption                        |                |                            |     | 1.5<br>0.3<br>0.6            | Watts<br>Watts<br>Watts              | during warm-up<br>steady state @ +25°C<br>steady state @ -40°C                                    |
| RF Output                                |                |                            |     |                              |                                      |                                                                                                   |
| Signal [Standard]                        |                | HCMOS                      |     |                              |                                      |                                                                                                   |
| Load                                     |                |                            | 15  |                              | pF                                   |                                                                                                   |
| Signal Level (Vol)                       |                |                            |     | 0.1                          | VDC                                  |                                                                                                   |
| Signal Level (Voh)                       |                | 0.8                        |     |                              | VDC                                  |                                                                                                   |
| Duty cycle                               |                | 40                         |     | 60                           | %                                    | (Voh-Vol)/2                                                                                       |
| Signal [Standard]                        |                | Sinewave                   |     |                              |                                      |                                                                                                   |
| Load                                     |                |                            | 50  |                              | ohm                                  |                                                                                                   |
| Output Power [Standard]                  |                | 0                          |     | +4                           | dBm                                  | 50 Ohm load                                                                                       |
| Output Power [Option]                    |                | +3                         |     | +7                           | dBm                                  | 50 Ohm load                                                                                       |
| Harmonics                                |                |                            |     | -30                          | dBc                                  | 50 Ohm load                                                                                       |
| Spurs                                    |                |                            |     | -60                          | dBc                                  | 50 Ohm load                                                                                       |
| Frequency Tuning (EFC) 10 to 80 MHz      |                |                            |     |                              |                                      |                                                                                                   |
| Tuning Range                             |                | Fixed EMXO; No adjust      |     |                              |                                      |                                                                                                   |
| Tuning Range                             |                | ±3.0                       |     | ±10.0                        | ppm                                  | from 0V to Vs                                                                                     |
| Linearity                                |                |                            |     | 20                           | %                                    |                                                                                                   |
| Tuning Slope                             |                | Positive                   |     |                              |                                      |                                                                                                   |
| Additional Parameters                    |                |                            |     |                              |                                      |                                                                                                   |
| Phase Noise                              |                |                            |     | -100<br>-130<br>-140<br>-145 | dBc/Hz<br>dBc/Hz<br>dBc/Hz<br>dBc/Hz | 10 Hz<br>100 Hz<br>1 KHz<br>10 KHz                                                                |
| Allan Deviation                          |                |                            |     | 0.2                          | ppb                                  | Tau = 1 sec to 10 sec                                                                             |
| Weight                                   |                |                            |     | 3                            | g                                    |                                                                                                   |
| Processing & Packing                     |                | Handling & processing note |     |                              |                                      |                                                                                                   |
| Absolute Maximum Ratings                 |                |                            |     |                              |                                      |                                                                                                   |
| Supply Voltage                           |                |                            |     | 5.5                          | VDC                                  |                                                                                                   |
| Output Load                              |                |                            |     | 30                           | pF                                   |                                                                                                   |

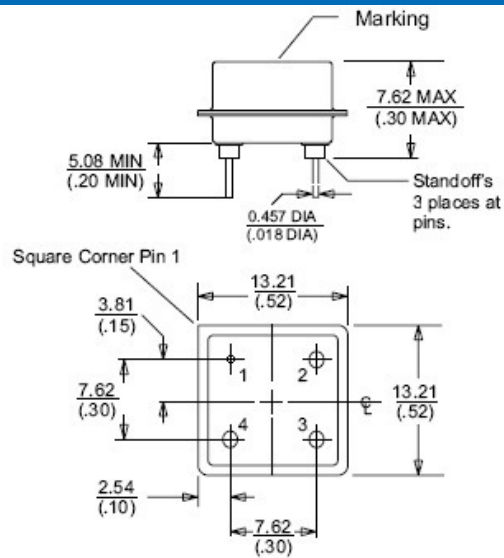
### Frequency Stabilities<sup>1</sup>

| Parameter                  | Min | Typ | Max | Units | Condition |
|----------------------------|-----|-----|-----|-------|-----------|
| Operable temperature range | -55 |     | +85 | °C    |           |
| Storage temperature range  | -55 |     | +85 | °C    |           |

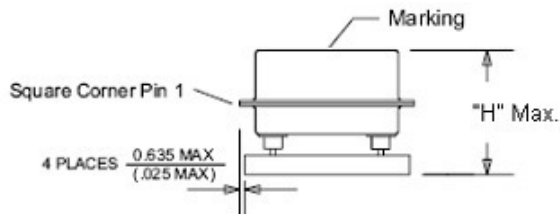
### Environmental Conditions

|                              |                                                                          |
|------------------------------|--------------------------------------------------------------------------|
| • Mechanical Shock (survive) | MIL-STD-202, Test Method 213, Condition E (100G, 0.5msec)                |
| • Vibration Random (survive) | MIL-STD-202, Test Method 214, Condition I-H (20Grms, 3 minutes/axis)     |
| • Vibration Sine (survive)   | MIL-STD-202, Test Method 204, Condition D (20Grms, 20 minutes/axis)      |
| • Thermal Shock (survive)    | MIL-STD-202, Test Method 107, Condition A-2 (50 Cycles, -55°C to +85 °C) |

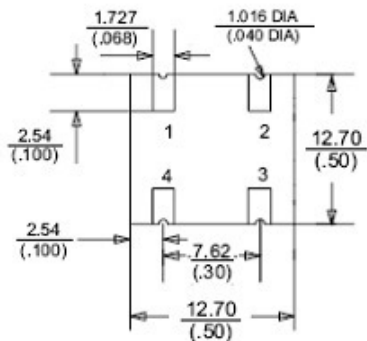
## Outline Drawing / Enclosure



mm  
(in.)



mm  
(in.)



Dimensions in mm (inches)

### Type A

| Code | Height "H" | Pin Length "L" |
|------|------------|----------------|
| 0    | 7.62       | 5.08           |

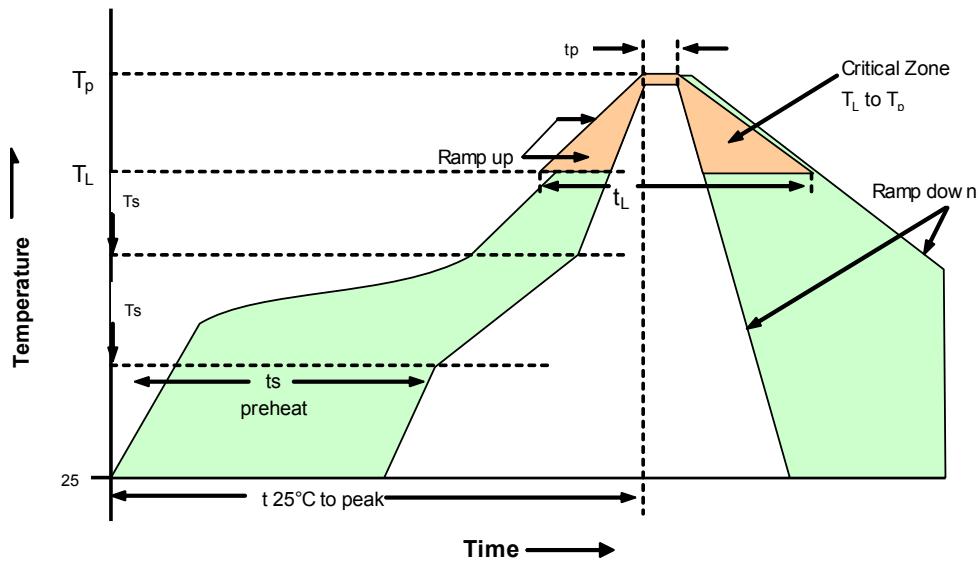
### Type B

| Code | Height "H" | Pin Length "L" |
|------|------------|----------------|
| 1    | 8.89       | NA             |
| 2    | 9.65       | NA             |

### Pin Connections

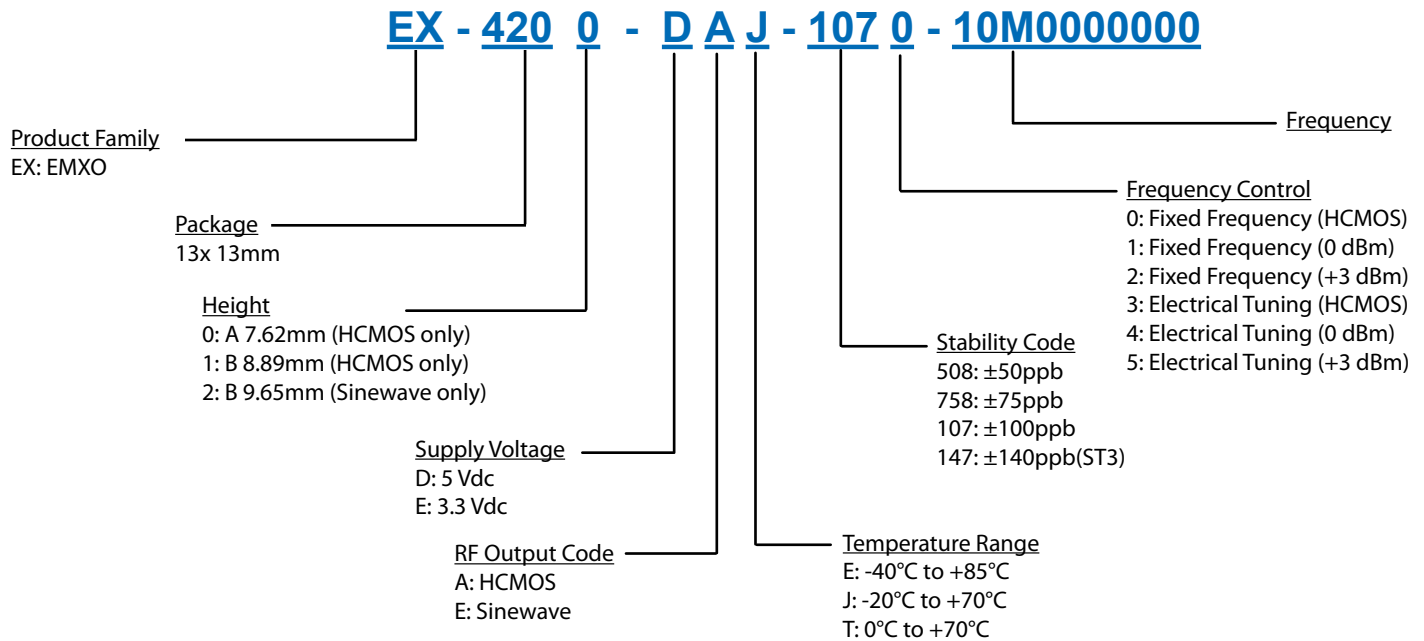
|   |                      |
|---|----------------------|
| 1 | EFC \ No Connect     |
| 2 | Ground (Case)        |
| 3 | RF Output            |
| 4 | Supply Voltage Input |

## 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 (TL to Tp)                                                                                                                                              | 3°C/second max.                 | Time 25°C to Peak Temperature                              | 4 minutes max.         |
| Preheat -Temperature Min Tsmin)<br>-Temperature Min Tsmax)<br>-Time (min to max) (ts)                                                                                        | 135°C<br>155°C<br>60-90 seconds | Time maintained above<br>- Temperature (TL)<br>- Time (tL) | 183°C<br>45-60 seconds |
| Tsmax to TL - Ramp-up Rate                                                                                                                                                   | 3°C/second max.                 |                                                            |                        |
| Time maintained above<br>- Temperature (TL)<br>- Time (tL)                                                                                                                   | 183°C<br>45-60 seconds          | Time within 5°C of actual<br>Peak Temperature (tp)         | 10-20 seconds max.     |
| Peak Temperature (Tp)                                                                                                                                                        | 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



### 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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