EX-423

Evacuated Miniature Crystal Oscillator
Low Power

Features

- Low power
- Fast warm-up
- Improved temperature stability
- Lower phase noise
- Ruggedized with four-point mount crystal
- Small form factor
- SMD and through-hole mounting option
- Frequency range: 10 MHz–20 MHz

Applications

- Battery applications
- Ocean bottom nodes
- Marine and land seismic
- Mobile data communications
- Military portable radios
- Satellite communications
- Airborne equipment

Performance Specifications

Frequency Stabilities					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
vs. operating temperature range	-5		+5	ppb	0°C to +50°C
	-10		+10	ppb	-20°C to +70°C
	-20		+20	ppb	-40°C to +85°C
vs. aging/day	-0.5		+0.5	ppb	After 30 days of operation Curve fit and projection per MIL-PRF-55310
vs. aging/first year	-0.05		+0.05	ppm	
vs. aging/10 years	-0.5		+0.5	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			120	seconds	< ±10 ppb referenced to one-hour frequency +25°C Vcc = 3.3V

Supply Voltage (Vs)					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Supply voltage (standard)	4.75	5.0	5.25	VDC	
Supply voltage (option)	3.14	3.3	3.46	VDC	
Power consumption at 3.3V			0.9	W	During warm-up
			0.20	W	Steady state @ +25°C, 5.0 VDC
Power consumption at 5V			1.0	W	During warm-up
			0.22	W	Steady state @ +25°C, 3.3 VDC

RF Output (CMOS)					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Load		15		pF	
Signal level (Vol)			0.1×Vref	VDC	
Signal level (Voh)	0.8*VREF			VDC	Vs = 3.3 VDC
	0.8*VREF			VDC	Vs = 5.0 VDC
Rise and fall times			5	ns	20%/80 %
			3	ns	
Duty cycle	45		55	%	

RF Output (Sinewave)					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Load		50		ohm	
Output power (standard)	0		4	dBm	Contact factory for higher power
Harmonics			-30	dBc	
Spurious			-60	dBc	

Frequency Tuning					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Reference voltage (Vref)	2.7	2.8	2.9	VDC	Vs = 3.3 VDC
	4.2	4.3	4.4	VDC	Vs = 5.0 VDC
Control voltage range	0	VREF/2	VREF	VDC	
Tuning frequency pull range	-0.5		+0.5	ppm	Minimum, referenced to nominal frequency
Linearity			20	%	Per MIL-PRF-55310
Tuning range slope	Positive, monotonic				
Input impedance		80		kΩ	
Modulation bandwidth		875		Hz	

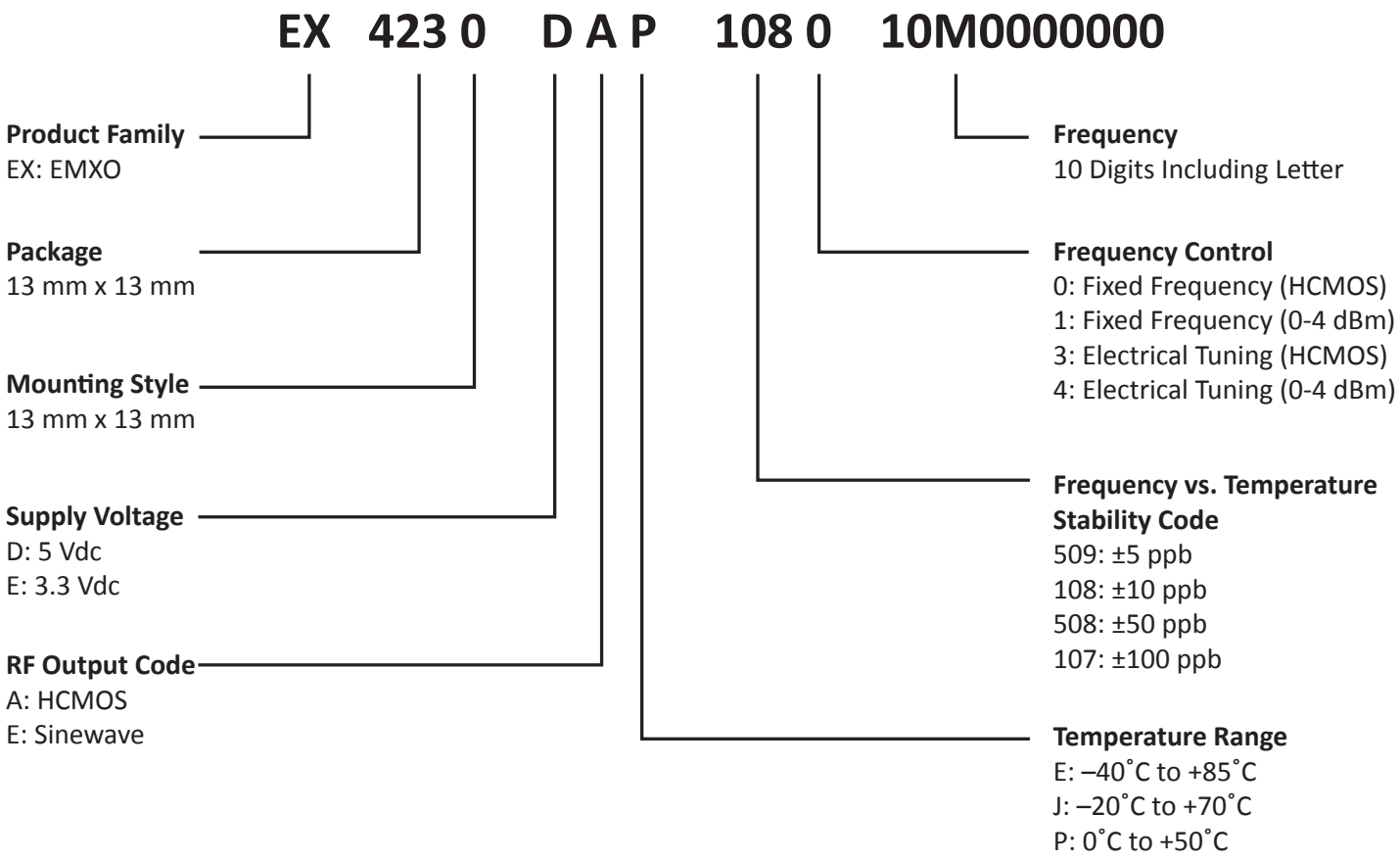
Additional Parameters					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Phase noise (10 MHz)		-105		dBc/Hz	1 Hz
		-130			10 Hz
		-145			100 Hz
		-155			1 kHz
		-160			10 kHz
Allan deviation (10 MHz)		4e–12			Tau = 1 sec

Additional Parameters		
Screening	Microchip verification (standard)	See table below
	Class B, MIL-PRF-55310 (Optional)	See table below
Acceleration sensitivity	<1 ppb/g per axis	Flat random 0.008 g2/Hz 20 Hz to 2 kHz
Weight	<5 grams	
Processing and packing	Tape and reel	
RoHS compliance	RoHS 6 compliant	Unless SnPb solder coated
Solder-coated pads	Sn63/Pb37 solder (optional)	See package code in part number
ESD	± 2000 V	HBM per MIL-STD-883 Method 3015
MTBF/FIT (generic)	1,541,000 Hours	MIL-HBK-217, Hybrid, Discrete, Ground, Commercial, Benign Contact Factory for Custom MTBF/FIT
ECCN	EAR99	
Country of origin	USA	Mount Holly Springs, PA
Software 3D Model	IGS/STEP file	Contact VOP-Support@microchip.com

Absolute Maximum Ratings					
Parameter	**Min**	**Typ**	**Max**	**Units**	**Condition**
Supply voltage			5.5	VDC	
Operable temperature range	-55		+85	°C	Operable temperature range implies the device will operate with no long-term damage to unit; however, it may not be specification compliant outside the operating temperature range.
Storage temperature range	-55		+85	°C	
Shock			1000	g	MIL-STD-202, Method 213, Condition E

Standard Environmental Testing Met by Design	
Vibration Sine (Endurance)	MIL-STD-202, Method 204, Condition B (15g peak, 10 Hz–2000 Hz)
Vibration Random (Endurance)	MIL-STD-202, Method 214, Condition I-E (15g RMS, 10 Hz–2000 Hz)
Shock	MIL-STD-202, Method 213, Condition D (1000g, 1 ms, 1/2 sine)
Solderability	MIL-STD-883, Method 2003

Ordering Information



Note: The full part number does not have spaces and must contain dashes as indicated.

Example: EX-4230-DAP-1080-10M0000000

Due to the effectively unlimited number of possible part-number configurations, we cannot create or publish every possible part number combination in advance. If a part number configuration is not yet assigned, a new part number must be ordered using "VOP-Future Part" accompanying this with the desired part number as a note. Please note unassigned (future) part numbers cannot be found through distributors or via the Microchip website.

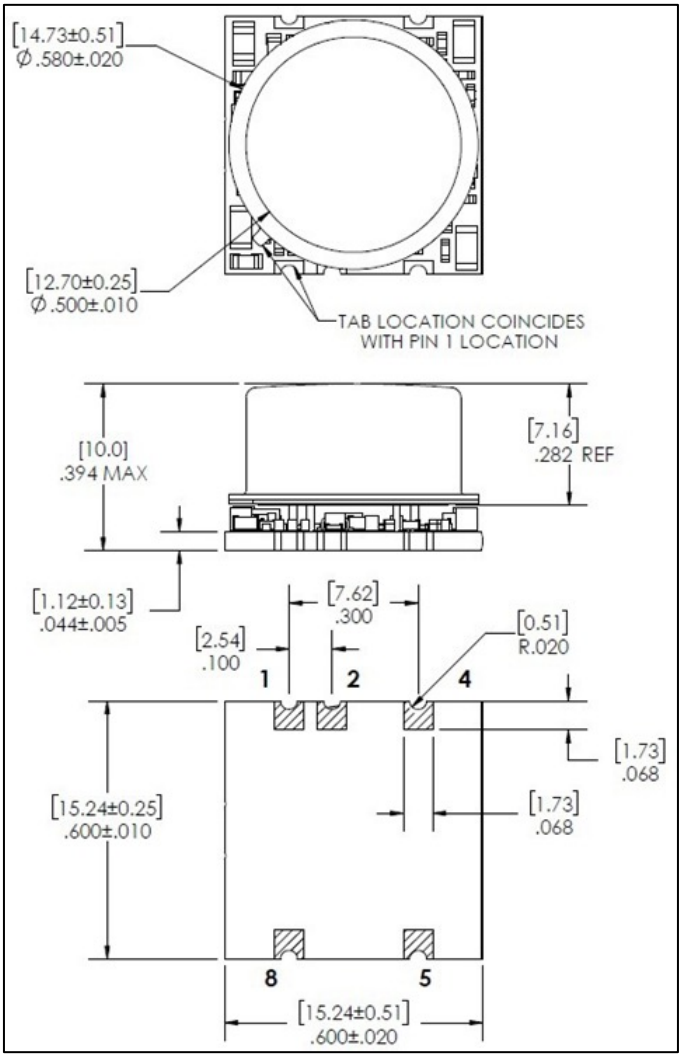
Notes:

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

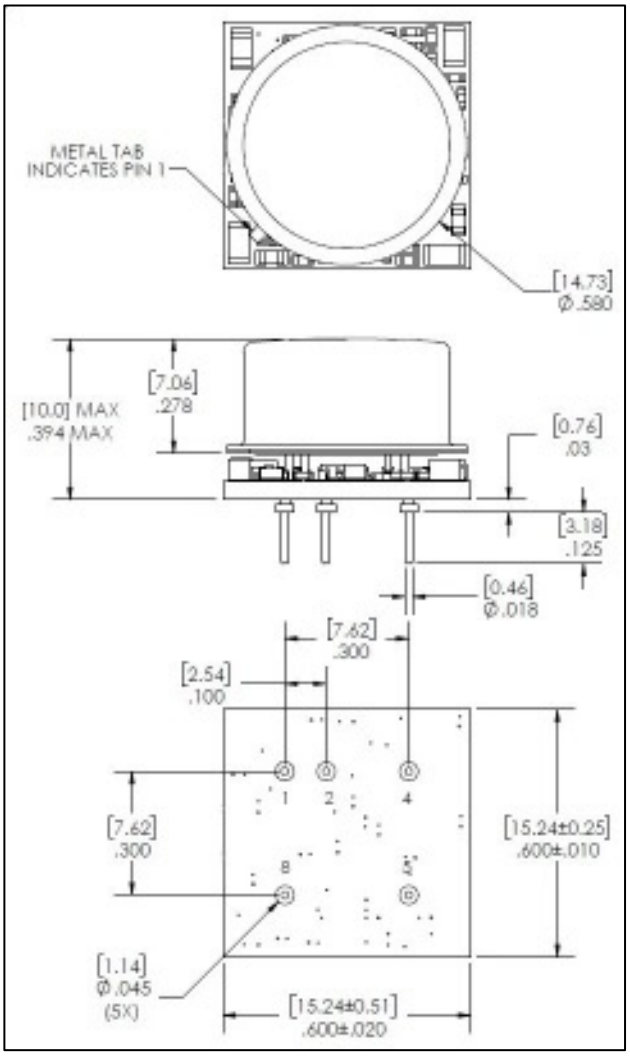
For factory questions or product support, please email: VOP-Support@microchip.com

Outline Drawing/Enclosure

Surface Mount



Through-Hole

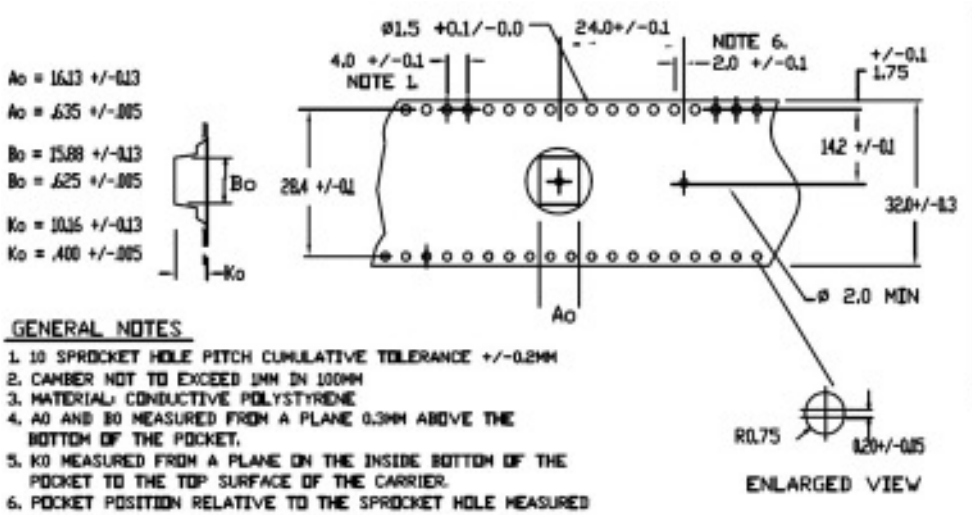


PCB pad plating: Immersion gold over electroless nickel per IPC4552

Through-hole pin plating: 0.25 um gold over nickel

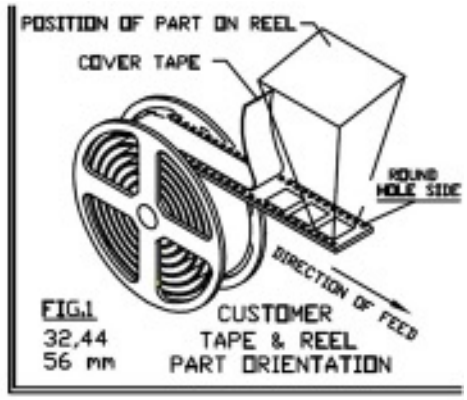
Pin	EX-423 with EFC option	Fixed frequency EX-423
1	EFC input	No connection/floating
2	VREF output	No connection/floating
4	Ground (case)	Ground (case)
5	RF output	RF output
8	Supply voltage	Supply voltage

Standard Shipping Method (Surface Mount)

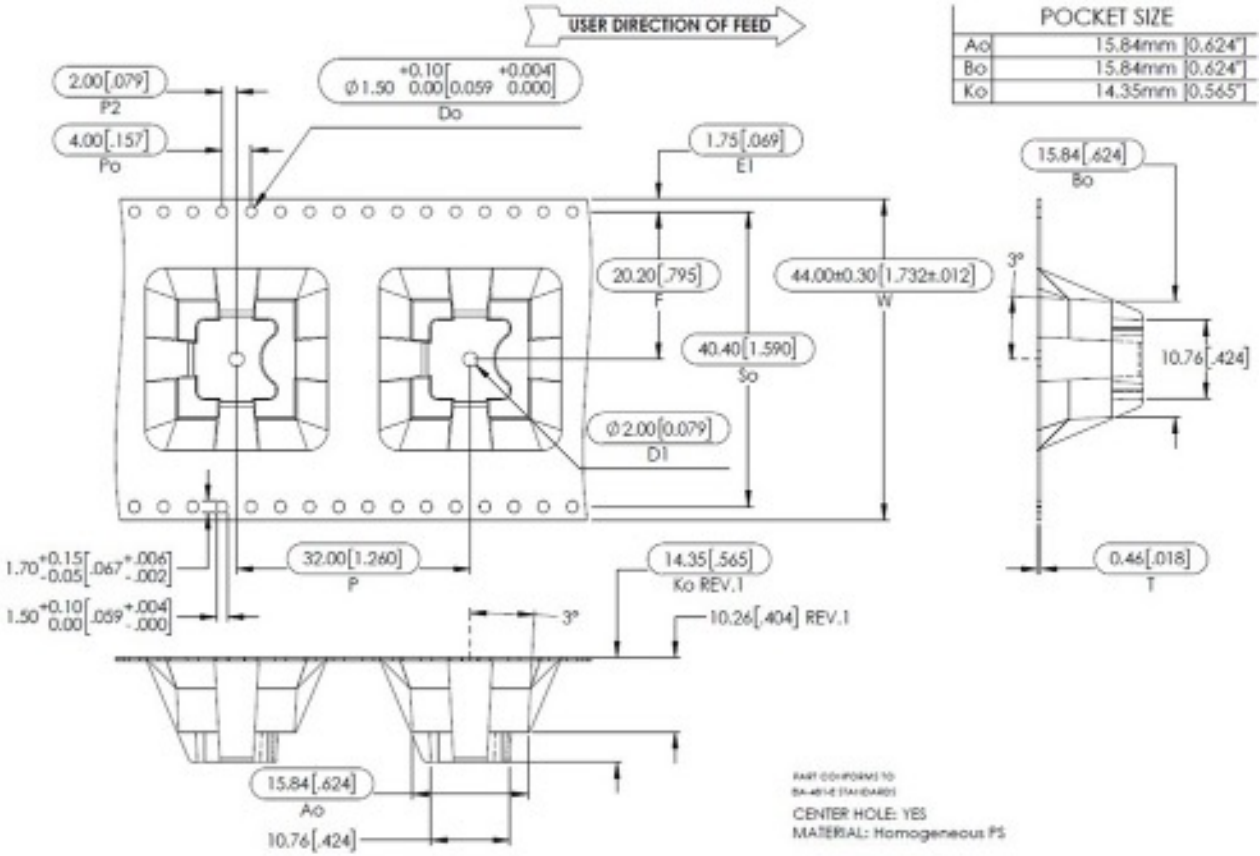


GENERAL NOTES

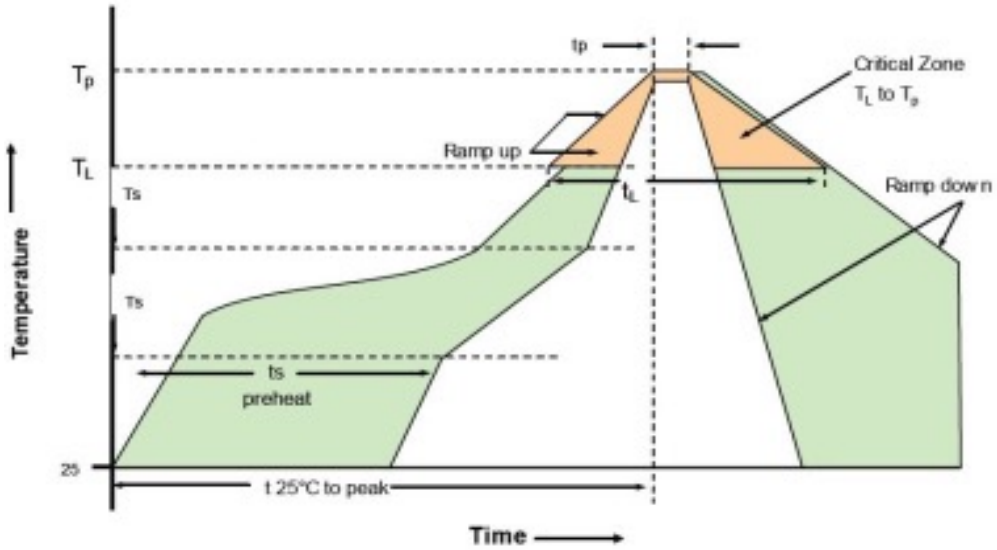
1. 10 SPROCKET HOLE PITCH CUMULATIVE TOLERANCE +/-0.2MM
2. CAMBER NOT TO EXCEED 1MM IN 100MM
3. MATERIAL: CONDUCTIVE POLYSTYRENE
4. AO AND BO MEASURED FROM A PLANE 0.3MM ABOVE THE BOTTOM OF THE POCKET.
5. KO MEASURED FROM A PLANE ON THE INSIDE BOTTOM OF THE POCKET TO THE TOP SURFACE OF THE CARRIER.
6. POCKET POSITION RELATIVE TO THE SPROCKET HOLE MEASURED AS TRUE POSITION OF THE POCKET, NOT THE POCKET HOLE.



Standard Shipping Method (Through-Hole)



Recommended Reflow Profiles for Pb-Free and 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/second 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/second 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/second 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/second max.	Time 25°C to Peak Temperature	8 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/second 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/second max.
Note: All temperatures refer to topside of the package, measured on the package body surface.			