VECTRON INTERNATIONAL
A DOVER COMPANY

OX-402/OX-403

Oven Controlled Crystal Oscillator

Description

The OX-402 is part of a series of oscillators specifically designed to support Timing Over Packet applications, in particular 1588-2008 based frequency and phase reference systems. The OX-402 is stratum 3E compliant.

Features

- Standard Frequencies: 10MHz, 19.44MHz, 20MHz, 38.88MHz, 40MHz
- Excellent temperature stability
- Superior long term stability
- Optimized to support Timing Over Packet applications
- Stratum 3E compliant according to GR1244

Applications

- SETS clock support
- Wireless Base Stations
- Edge and Core Routers

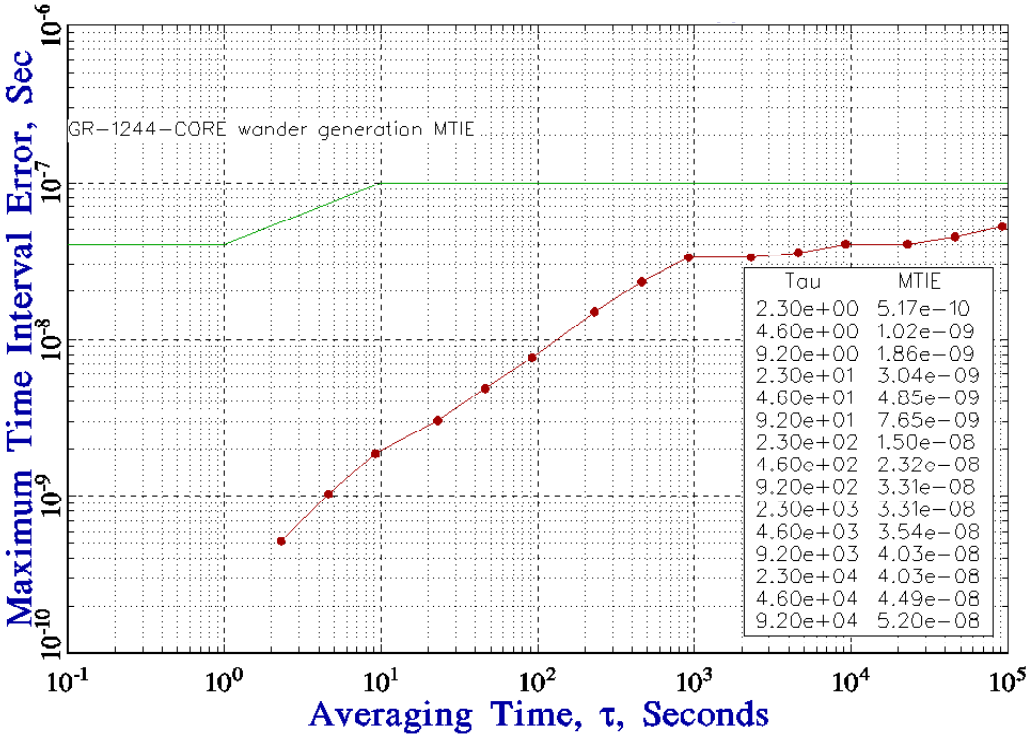
Performance Specifications

Frequency Stability[1]					
Parameter	Min	Typ	Max	Units	Notes
Over all stability (df/f_0)			±4.6	ppm	Free run accuracy
Holdover			10	ppb	Over 24 hours and 40ºC window
Drift			±1	ppb	Over 24 hours and ±2.8ºC
Temperature stability (df/f)			±10	ppb	-40 to 85ºC
Initial Tolerance (df/f_0)			±500	ppb	@25ºC
vs. supply voltage change (df/f)			±10	ppb	static; 3.3V ± 5%
vs. load change (df/f)			±10	ppb	static; Load ± 5%
vs. aging / daily (df/f)			± 1	ppb	after 30 days; @25ºC
vs. aging / month (df/f)			± 25	ppb	after 30 days; @25ºC
vs. aging / year (df/f)			± 100	ppb	after 30 days; @25ºC
vs. aging / 10 years (df/f)			± 1	ppm	after 30 days; @25ºC
Phase Stability					
Parameter	Min	Typ	Max	Units	Notes
Jitter			< 1.00	ps rms	@12kHz to 20MHz
MTIE 1s		0.2		ns	Wander Generation per GR1244, system performance when locked through a 1mHz loop bandwidth, see typical performance data.
MTIE 10s		2.0		ns	
MTIE 100s		10.0		ns	
MTIE 1000s		40.0		ns	

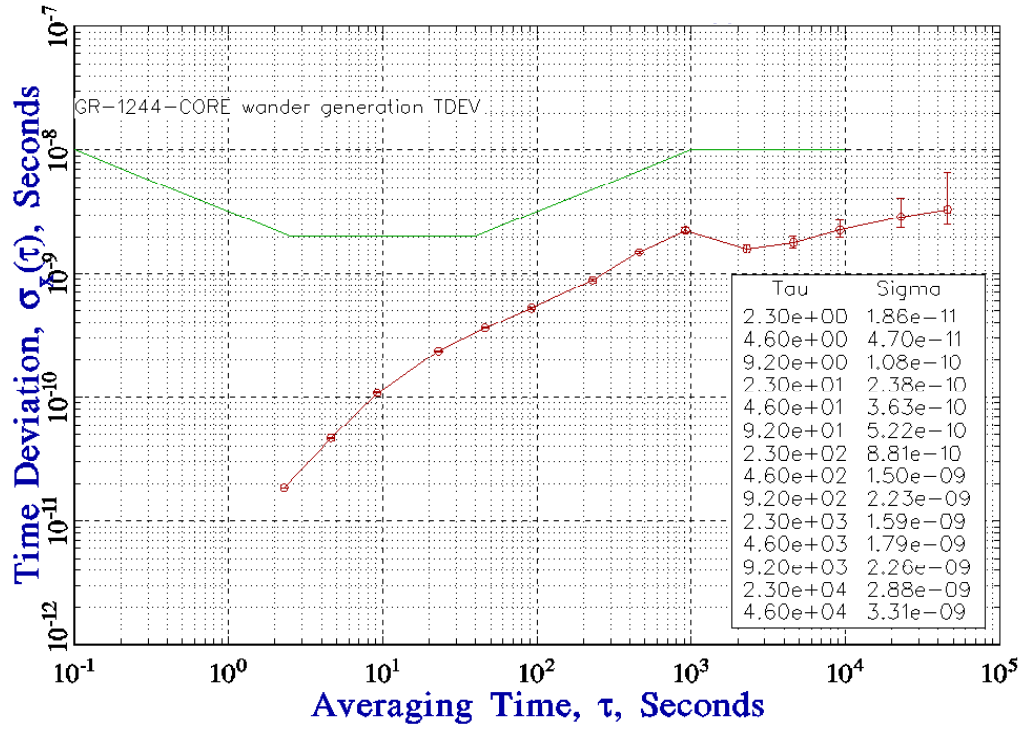
Performance Specifications

Phase Stability (continued)					
Parameter	Min	Typ	Max	Units	Notes
TDEV 1s		0.015		ns	Wander Generation per GR1244, system performance when locked through a 1mHz loop bandwidth, see typical performance data.
TDEV 10s		0.13		ns	
TDEV 100s		1.5		ns	
TDEV 1000s		5.0		ns	
Phase Noise					
Parameter	Min	Typ	Max	Units	Notes
Phase Noise at 1 Hz Offset		-85	-60	dBc/Hz	At 20MHz
Phase Noise at 10 Hz Offset		-110	-90	dBc/Hz	
Phase Noise at 100 Hz Offset		-130	-115	dBc/Hz	
Phase Noise 1 kHz Offset		-143	-130	dBc/Hz	
Phase Nosie at 10 kHz Offset		-150	-145	dBc/Hz	
RF Output					
Signal		LVCMOS			
Load		15		pF	±10%
Rise Time		< 10		ns	@ 10% to 90% V_{out}
Fall Time		<10		ns	@90% to 10% V_{out}
Duty Cycle		45/55		%	@ 1.65 V
V Low		x < 0.4		V	
V High		x > 2.4		V	
Supply					
Supply Voltage (V_S)		3.3±10%		V	
Current consumption		< 330		mA	Steady state, @ $V_S$nom, 25ºC
Current consumption		< 757		mA	During warm up, @ V_S
Additional Parameters					
Warm Up Time		< 3		minutes	@ 25ºC to final frequency
ROHS	100% ROHS 6 compliant				
Washable	Washable device (hermetically sealed).				
Absolute Maximum Ratings					
	Min		Max	Units	
Operating temperature range	-40		85	ºC	
Storage temperature range	-50		85	ºC	
Supply Voltage			5.5	V	

FREQUENCY STABILITY

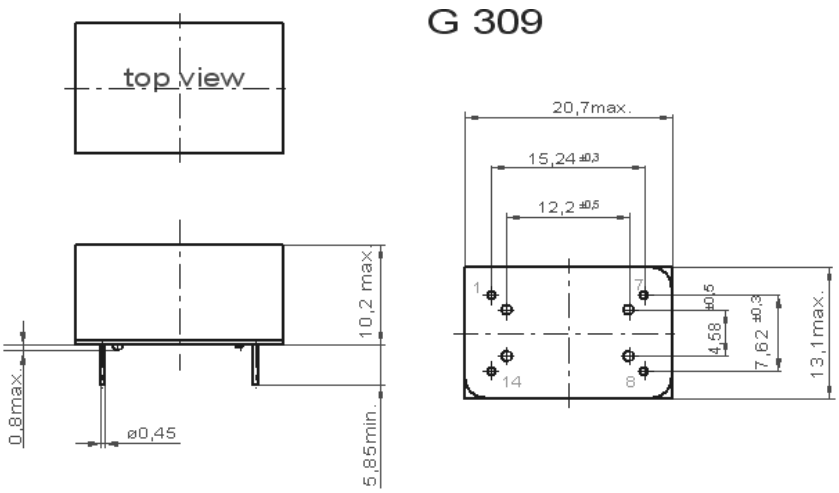


TIME STABILITY



Wander Generation per GR1244, system performance when locked through a 1mHz loop bandwidth.

Outline Drawing / Enclosure OX-402

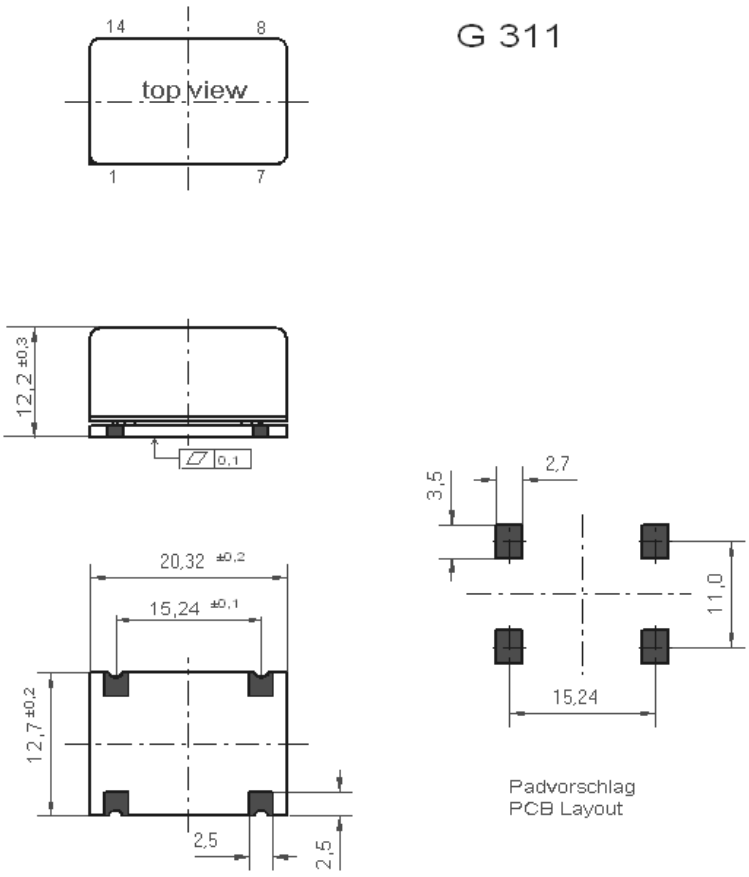


Dimensions in mm

Height Codes		
Code	Height "H"	Pin Length "L"
2	10.2	5.85

Pin Assignment	
Pin	Connection
1	I.C. (do not connect)
7	GND
8	RF Out
14	V_S (Supply)

Outline Drawing / Enclosure OX-403

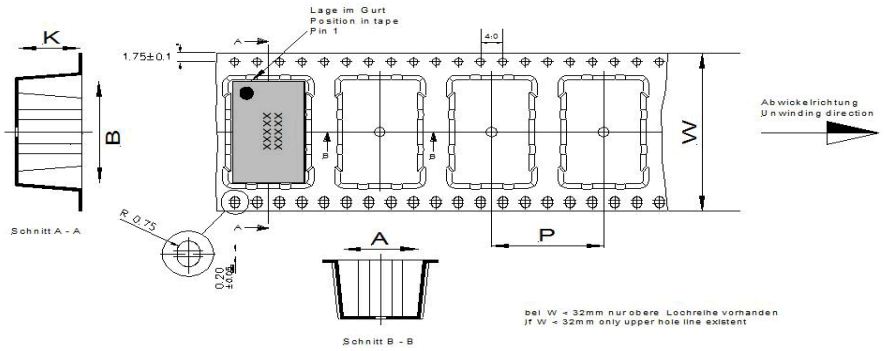


Dimensions in mm

Height Codes		
Code	Height "H"	Pin Length "L"
3	12.2	NA

Pin Assignment	
Pin	Connection
1	I.C. (do not connect)
7	GND
8	RF Out
14	V_S (Supply)

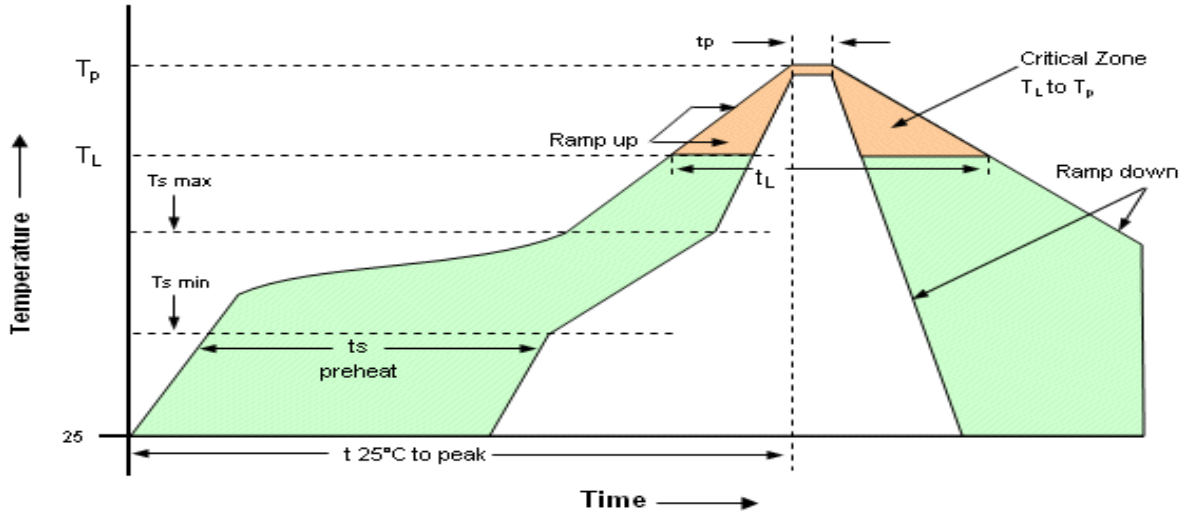
Tape and Reel Dimensions (OX-403)



Maßangaben in mm: A, B und K Maße vom Bauelement abhängig, Fertigungstoleranzen entsprechen der DIN IEC 286-3	Dimension in mm: A, B and K are dependent upon component dimensions, production tolerance complying DIN IEC 286-3

Enclosure Type	Tape Width W (mm)	Quantity per meter	Quantity per reel	Dimension P
OX-403	44	50	300	20

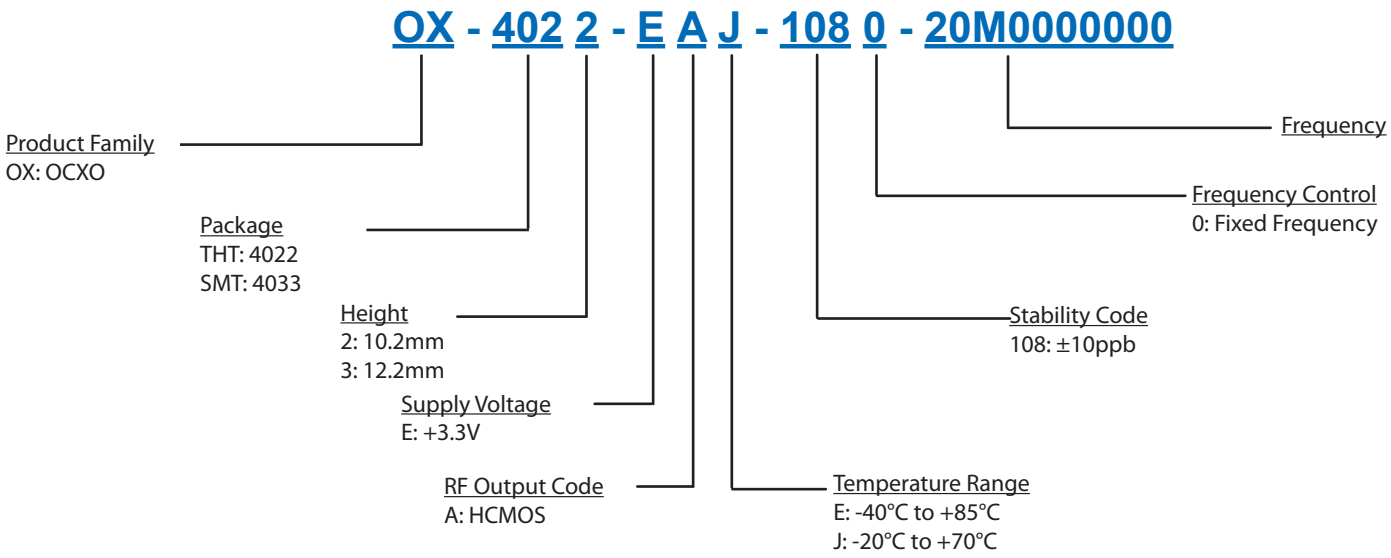
Recommended Reflow Profile



Profile Feature	Pb-Free Assembly/ Sn-Pb Assembly	Profile Feature	Pb-Free Assembly/ Sn-Pb Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.	Time 25°C to Peak Temperature	8 minutes max.
Preheat -Temperature Min T_{Smin} -Temperature Min T_{Smax} -Time (min to max) t_S	150°C 200°C 60-180 seconds	Time maintained above -Temperature (T_L) -Time (t_L)	217°C 60-150 seconds
TSmax to TL -Ramp-up Rate	3°C/second max		
Time maintained above -Temperature (T_L) -Time (t_L)	217°C 60-150 seconds	Time within 5°C of actual Peak Temperature (t_p)	20-40 seconds
Peak Temperature (T_P)	max 260°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

USA:
Vectron International
267 Lowell Road
Hudson, NH 03051
Tel: 1.888.328.7661
Fax: 1.888.329.8328

Europe:
Vectron International
Landstrasse, D-74924
Neckarbischofsheim, Germany
Tel: +49 (0) 3328.4784.17
Fax: +49 (0) 3328.4784.30

Asia:
Vectron International
1F-2F, No 8 Workshop, No 308 Fenju Road
WaiGaoQiao Free Trade Zone
Pudong, Shanghai, China 200131
Tel: 86.21.5048.0777
Fax: 86.21.5048.1881

Rev: 08/2011