

Helping Customers Innovate, Improve & Grow



## Description

The OX-222 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-222 is stratum 3E compliant.

## Features

- Available in three standard frequencies (10MHz, 12.8MHz, 20MHz, 24.576MHz and 25MHz)
- Excellent temperature stability
- Superior long term stability
- Optimised 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

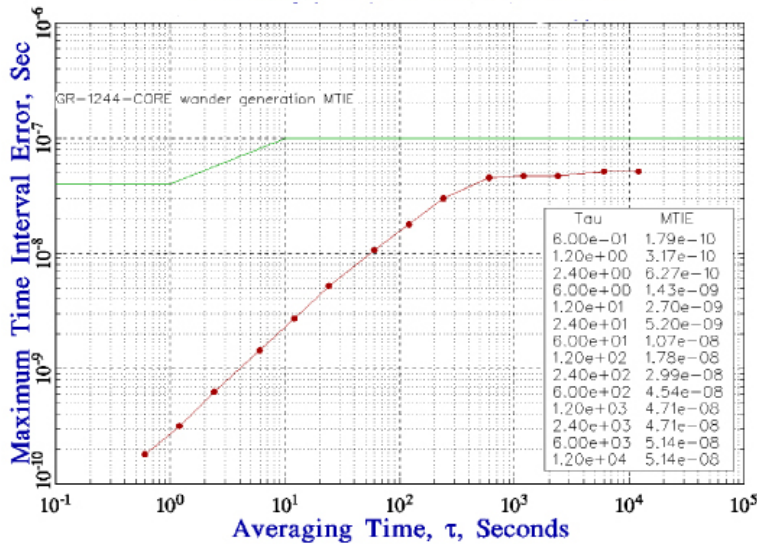
| Frequency Stability <sup>1</sup>        |     |      |        |        |                                                                                                                           |
|-----------------------------------------|-----|------|--------|--------|---------------------------------------------------------------------------------------------------------------------------|
| Parameter                               | Min | Typ  | Max    | Units  | Notes                                                                                                                     |
| Over all stability (df/f <sub>0</sub> ) |     |      | ±4.6   | ppm    | Free run accuracy                                                                                                         |
| Holdover                                |     |      | 10     | ppb    | Over 24 hours and 40°C window                                                                                             |
| Drift                                   |     |      | ±1.0   | ppb    | Over 24 hours and ±2.8°C                                                                                                  |
| Temperature stability (df/f)            |     |      | ±10    | ppb    | -40 to 85°C (-20 to 70°C for 2226 version)                                                                                |
| Initial Tolerance (df/f <sub>0</sub> )  |     |      | ±500   | ppb    | @25°C                                                                                                                     |
| vs. supply voltage change (df/f)        |     |      | ±5     | ppb    | static; 3.3V ± 5%                                                                                                         |
| vs. load change (df/f)                  |     |      | ±5     | ppb    | static; Load ± 5%                                                                                                         |
| vs. aging / daily (df/f)                |     |      | ± 1    | ppb    | after 30 days; @25°C                                                                                                      |
| vs. aging / month (df/f)                |     |      | ± 25   | ppb    | after 30 days; @25°C                                                                                                      |
| vs. aging / year (df/f)                 |     |      | ± 100  | ppb    | after 30 days; @25°C                                                                                                      |
| vs. aging / 10 years (df/f)             |     |      | ± 1    | ppm    | after 30 days; @25°C                                                                                                      |
| 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

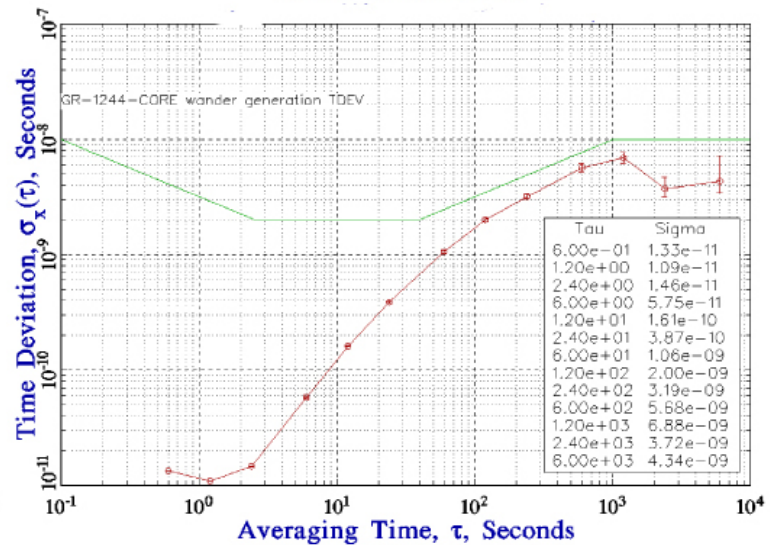
| Phase Stability (continued)      |                                     |       |      |         |                                                                                                                           |
|----------------------------------|-------------------------------------|-------|------|---------|---------------------------------------------------------------------------------------------------------------------------|
| 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  | 20MHz output                                                                                                              |
| 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 Nosit at 10 kHz Offset     |                                     | -150  | -145 | dBc/Hz  |                                                                                                                           |
| RF Output                        |                                     |       |      |         |                                                                                                                           |
| Signal                           | LVCMOS                              |       |      |         |                                                                                                                           |
| Load                             | 15                                  |       |      | pF      | ±10%                                                                                                                      |
| Rise Time                        | < 10                                |       |      | ns      | @ 10% to 90% V <sub>out</sub>                                                                                             |
| Fall Time                        | <10                                 |       |      | ns      | @90% to 10% V <sub>out</sub>                                                                                              |
| Duty Cycle                       | 45/55                               |       |      | %       | @ 1.65 V                                                                                                                  |
| V Low                            | x < 0.4                             |       |      | V       |                                                                                                                           |
| V High                           | x > 2.4                             |       |      | V       |                                                                                                                           |
| Supply                           |                                     |       |      |         |                                                                                                                           |
| Supply Voltage (V <sub>s</sub> ) | 3.3±10%                             |       |      | V       |                                                                                                                           |
| Current consumption              | < 400                               |       |      | mA      | Steady state, @ V <sub>s</sub> nom, 25°C                                                                                  |
| Current consumption              | < 950                               |       |      | mA      | During warm up, @ V <sub>s</sub>                                                                                          |
| Additional Parameters            |                                     |       |      |         |                                                                                                                           |
| Warm Up Time                     | < 5                                 |       |      | minutes | @ 25°C to final frequency                                                                                                 |
| ROHS                             | 100% ROHS 6 compliant               |       |      |         |                                                                                                                           |
| Washable                         | Non-washable device (non-hermetic). |       |      |         |                                                                                                                           |
| Absolute Maximum Ratings         |                                     |       |      |         |                                                                                                                           |
|                                  | Min                                 |       | Max  | Units   |                                                                                                                           |
| Operating temperature range      | -40                                 |       | 85   | °C      |                                                                                                                           |
| Storage temperature range        | -50                                 |       | 85   | °C      |                                                                                                                           |
| Supply Voltage                   |                                     |       | 5.5  | V       |                                                                                                                           |

## Typical Performance

### FREQUENCY STABILITY

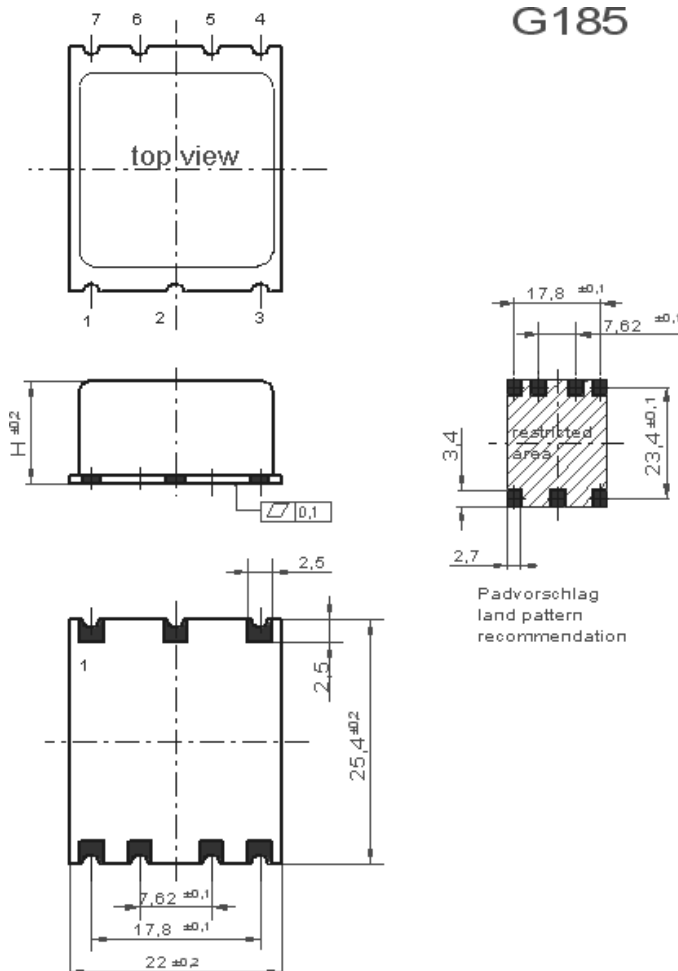


### TIME STABILITY



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

## Outline Drawing / Enclosure



Dimensions in mm

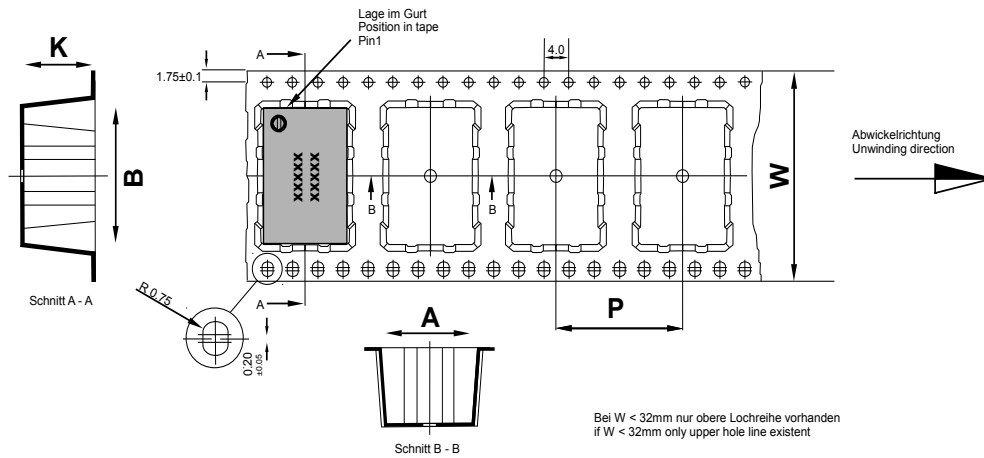
#### Height Codes

| Code | Height "H" |
|------|------------|
| 1    | 12.1       |
| 6    | 8.3        |

#### Pin Assignment

| Pin | Connection              |
|-----|-------------------------|
| 1   | I.C. (do not connect)   |
| 2   | N.C                     |
| 3   | V <sub>s</sub> (Supply) |
| 4   | RF Out                  |
| 5   | N.C                     |
| 6   | N.C                     |
| 7   | GND (case)              |

## Tape and Reel Dimensions



Maßangaben in mm:

A, B und K Maße von Bauelement abhängig

Fertigungstoleranzen entsprechen der DIN IEC 286-3

Dimension in mm:

A, B und K are dependent upon component dimensions

production tolerance complying DIN IEC 286-3

All dimensions in millimeters unless otherwise stated

| Enclosure Type   | Tape Width W (mm) | Quantity per meter | Quantity per reel | Dimension P |
|------------------|-------------------|--------------------|-------------------|-------------|
| OX-2221 (12.1mm) | 44                | 37.5               | 175               | 28          |
| OX-2226 (8.3mm)  | 44                | 37.5               | 250               | 28          |

## Recommended Reflow Profile

IPC/JEDEC J-STD-020 (latest revision)

Additional Information:

This SMD oscillator has been designed for pick and place reflow soldering.

SMD oscillators must be on the top side of the PCB during the reflow process.

## Additional Environmental Conditions

| Parameter                 | Description                                                                                                                               |
|---------------------------|-------------------------------------------------------------------------------------------------------------------------------------------|
| Rapid temperature changes | MIL-883-1010 Cond B 1000 cycles -55/125C                                                                                                  |
| Vibration                 | MIL-STD-883 Meth 2007 Cond A 20G 20-2000Hz 4x in each 3axis 4 min                                                                         |
| Shock                     | Mech.Shock MIL-STD-202 Meth 213 Cond.C 100G 6ms 6 shocks in each direction                                                                |
| Solderability             | J_STD_002C Cond A, Through hole device/ Cond. B, SMD 255C (diving time 50,5sec.) Dip+Look with 8h damp pre-treatment: solder wetting >95% |
| Solvent resistance        | MIL-STD-883 Meth 2015 Solv. 1,3,4                                                                                                         |
| ESD                       | HBM JESD22-A114-F Class 1C 10* 1000V                                                                                                      |
| Moisture Sensit.          | Level 1 JESD22-A113-B                                                                                                                     |
| RoHS compliance           | 100% RoHS 6 compliant                                                                                                                     |
| Washable                  | non-washable device                                                                                                                       |

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

## Ordering Information

**OX - 222 1 - E A E - 108 0 - 20M0000000**

Product Family  
OX: OCXO

Package  
25x22mm SMT

Height  
1: 12.1mm  
6: 8.3mm

Supply Voltage  
E: +3.3V

RF Output Code  
A: HCMOS

Temperature Range  
E: -40°C to +85°C  
J: -20°C to +70°C  
N: -5°C to +70°C

Stability Code  
108: ±10ppb

Frequency  
Frequency Control  
0: Fixed Frequency

### 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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