


**VS-506**

## Description

The VS-506 VCSO (Voltage Controlled Saw Oscillator) from Vectron is a high frequency, ultra low phase noise and low g-sensitivity oscillator designed to support harsh environmental applications. The VS-506 provides 12fs rms jitter in a 12kHz to 20MHz integration bandwidth, is available from 0.8 to 3.0GHz and is offered in a hermetic sealed package.

## Features

- Frequency Range 0.8 to 3.0 GHz
- Ultra low jitter performance
- Typical Jitter: 12fsec rms, 12kHz to 20MHz
- G-Sensitivity <1.2ppb/g
- Shock > 10.000g
- Supply 3.3 & 5V
- Output: Sinewave
- 9x14 mm hermetic package

## Applications

- Harsh Environment
- Military
- Test & Measurement

## Performance Specifications

| Pulling Characteristics           |       |      |       |       |   |
|-----------------------------------|-------|------|-------|-------|---|
| Parameter                         | Min   | Typ  | Max   | Units | Notes   |
| Absolute Pull Range (APR)         | ±20   |      |       | ppm   | Includes df vs:<br>•Operating temperature range +10 .. 85°C<br>•Aging 10 years<br>•Supply Voltage Change 5%<br>•Load change 10% |
| Tuning Slope                      |       |      |       |       | Positive  |
| Control Voltage Range             | 0.5   | 2.5  | 4.5   | V DC  | with $V_s = 5V$   |
|                                   | 0     | 1.65 | 3.3   | VDC   | with $V_s = 3.3V$   |
| Frequency control input impedance | 20    |      |       | kΩ    |   |
| Modulation bandwidth              | 100   |      |       | kHz   | @ -3dB  |
| Supply Voltage ( $V_s$ )          |       |      |       |       |   |
| Supply voltage (standard)         | 4.75  | 5.00 | 5.25  | V DC  |   |
| Current consumption               |       |      | 65    | mA    |   |
| Supply voltage (standard)         | 3.135 | 3.3  | 3.465 | V DC  |   |
| Current consumption               |       |      | 100   | mA    |   |

## Performance Specifications (Continued)

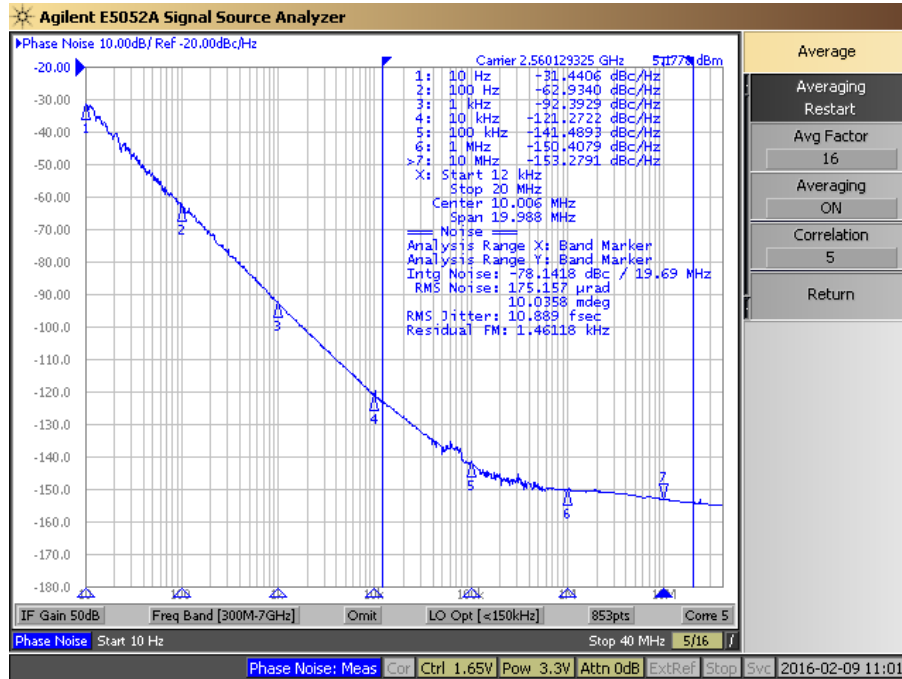
| RF Output                     |          |      |     |          |                               |
|-------------------------------|----------|------|-----|----------|-------------------------------|
| Parameter                     | Min      | Typ  | Max | Units    | Notes                         |
| Signal                        | Sinewave |      |     |          |                               |
| Load                          | 45       | 50   | 55  | $\Omega$ |                               |
| Output Power                  | 0        | 3    | 6   | dBm      |                               |
| Phase Noise: 100Hz offset     |          | -62  |     | dBc/Hz   | @ 2.56GHz<br>Sinewave<br>3.3V |
| Phase Noise: 1kHz offset      |          | -92  |     | dBc/Hz   |                               |
| Phase Noise: 10kHz offset     |          | -121 |     | dBc/Hz   |                               |
| Phase Noise: 100kHz offset    |          | -141 |     | dBc/Hz   |                               |
| Phase Noise: 1MHz offset      |          | -150 |     | dBc/Hz   |                               |
| Phase Noise: 10MHz offset     |          | -153 |     | dBc/Hz   |                               |
| Jitter: 12kHz to 20MHz offset |          | 11   |     | fs rms   |                               |

| Additional Parameters      |                              |     |      |                    |   |
|----------------------------|------------------------------|-----|------|--------------------|---|
| Parameter                  | Min                          |     | Max  | Units              | Notes   |
| Weight                     | 10.0g                        |     |      |                    |   |
| Subharmonics               |                              |     | -20  | dBc                |   |
| G-Sensitivity              |                              | 1.2 |      | ppb/g              |   |
| Shock                      | 10000                        |     |      | g                  | MIL-STD-883; method 2002.4; Condition E;<br>Duration 0.2 ms; 10000g |
| Processing and Packing     | Handling and Processing Note |     |      |                    |   |
| Absolute Maximum Ratings   |                              |     |      |                    |   |
| Parameter                  | Min                          |     | Max  | Units              | Notes   |
| Supply Voltage ( $V_s$ )   |                              |     | 6.0  | V                  |   |
| Operable Temperature Range | -40                          |     | +85  | $^{\circ}\text{C}$ |   |
| Storage Temperature Range  | -55                          |     | +105 | $^{\circ}\text{C}$ |   |

# Typical Performance

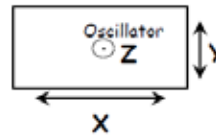
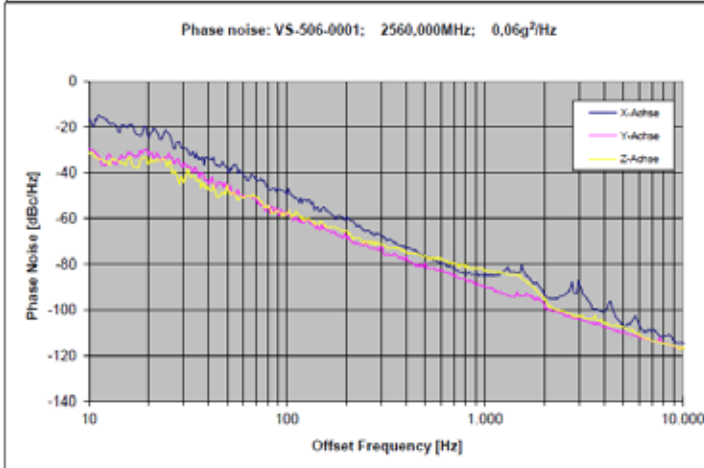
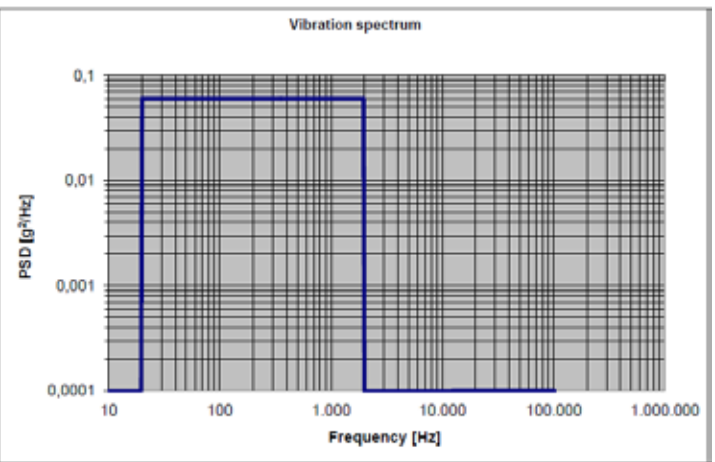
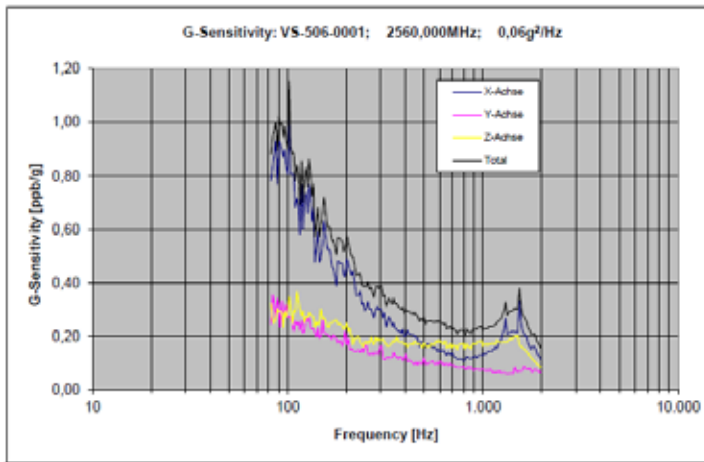
## Phase Noise

VS-506 @ 2.56GHz Sinewave



## G-Sensitivity

VS-506 @ 2.56GHz Sinewave



„Low g-sensitivity Product Solutions“

[https://www.vector.com/products/g\\_sensitivity/gsensitivity\\_index.htm](https://www.vector.com/products/g_sensitivity/gsensitivity_index.htm)

„Description of g-sensitivity and equations.“

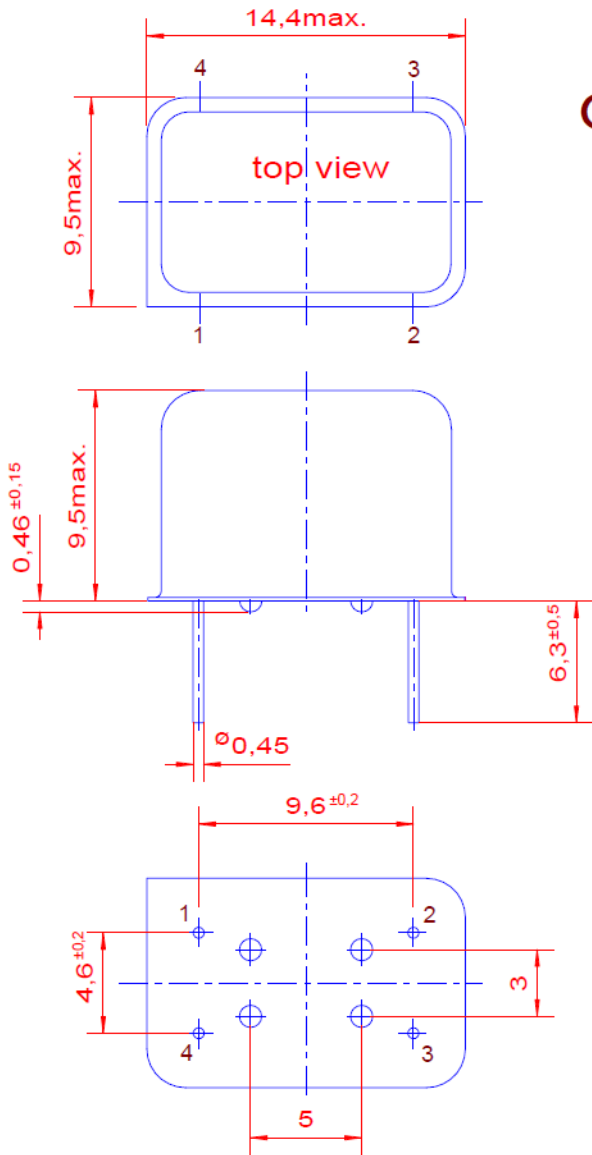
[https://www.vector.com/products/g\\_sensitivity/vg-tutorial%20on%20g-sensitivity.pdf](https://www.vector.com/products/g_sensitivity/vg-tutorial%20on%20g-sensitivity.pdf)

# Outline Drawing / Enclosure

| Package Codes |            |                |
|---------------|------------|----------------|
| Code          | Height "H" | Pin Length "L" |
| G279          | 9.5        | 6.3            |

Dimensions in mm

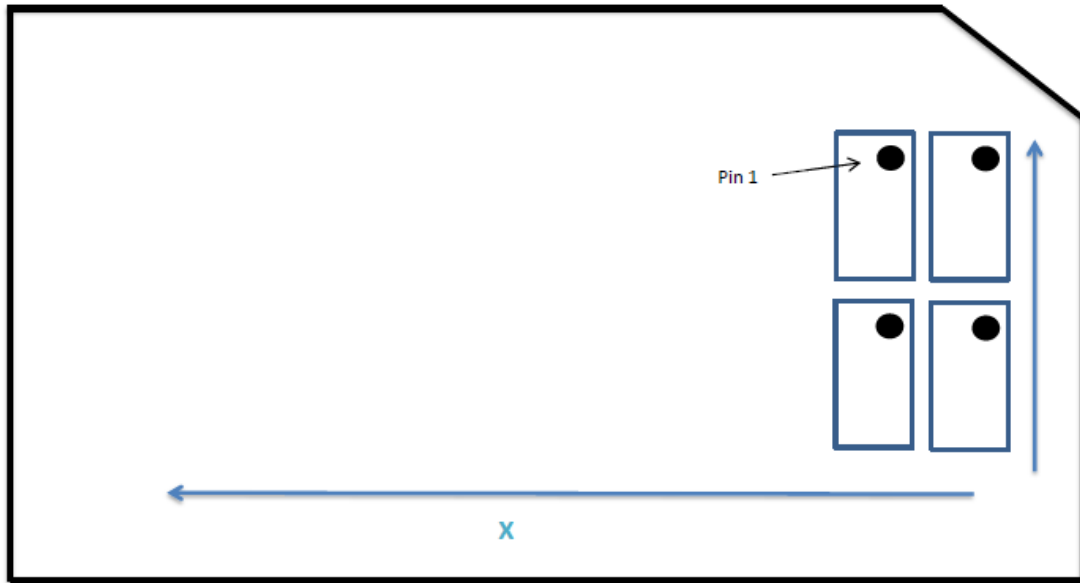
## G279



| Pin Assignment Sinewave |                                |
|-------------------------|--------------------------------|
| 1                       | Control Voltage ( $V_c$ )      |
| 2                       | GND                            |
| 3                       | RF Out                         |
| 4                       | Supply Voltage Input ( $V_s$ ) |

| Marking     |  |
|-------------|--|
| VS-506-xxxx |  |
| Frequency   |  |
| •AYYWW      |  |

## Standard Shipping Method

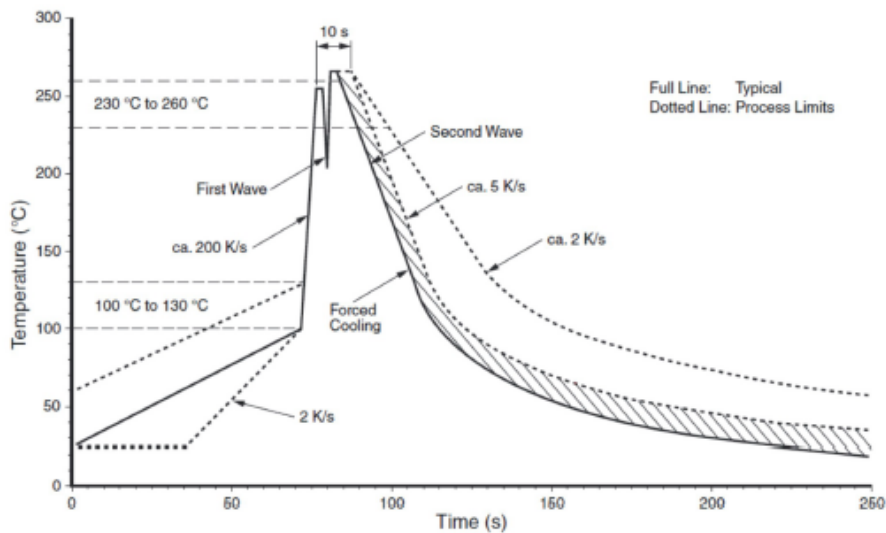


| Enclosure Type | Tray Info                               |
|----------------|---|
| G279           | 17(X) * 7(Y) array / 119 units per tray |

## Recommended Wave Soldering Profile

Recommended wave soldering profile see attached:

### WAVE SOLDERING PROFILE



Double-Wave-Soldering, Temperature/Time - Profile (Lead-Temperature)

#### Notes

- This document should serve as recommendation only. Other parameters may also affect soldering, so these profiles do not guarantee absolute success.
- Soldering profile should be determined by the manufacturer of the solder paste, providing there is no contradiction with the recommendations in this document.

**Note:** All temperatures refer to topside of the package, measured on the package body surface. SMD oscillators must be on the top side of the PCB during the reflow process.

# Ordering Information

**VS - 506 0 - E E X - 205 X - 2560M0**

Product Family  
VS: VCISO

Package  
9x14mm THT

Height  
0: 9.5mm (G279)

Supply Voltage  
D: +5.0V  
E: +3.3V

RF Output Code  
E: Sinewave

Temperature Range  
X: +10°C to +85°C  
E: -40°C to +85°C

APR Code  
205: ±20ppm

Frequency  
Enable  
X: No Enable

| Standard Frequencies (MHz) |             |             |             |             |             |             |
|----------------------------|-------------|-------------|-------------|-------------|-------------|-------------|
| 632.8125                   | 784.489605  | 832         | 867.1875    | 873.5154185 | 949.976022  | 980.604559  |
| 993.4096915                | 1000        | 1024.23965  | 1034.337568 | 1040        | 1067.686799 | 1200        |
| 1265.625                   | 1280        | 1568.97921  | 1687.5      | 1701.32     | 1707.08     | 1734.375    |
| 1747.030837                | 1747.62305  | 1748.366885 | 1769.145    | 1875        | 1879.437686 | 1884.052863 |
| 1899.952044                | 1961.209118 | 1968.75     | 1986.819383 | 2000        | 2048.4793   | 2068.675135 |
| 2104.658326                | 2135.373597 | 2187.5      | 2400        | 2457.6      | 2560        | 2812.5      |
| 2949.12                    |             |             |             |             |             |             |

Other Frequencies Available Upon Request

**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.



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