

Helping Customers Innovate, Improve & Grow



VS-502

Features

*Ultra low jitter
Low phase noise
Small low profile*

Typical Applications

*Point to Point / Point to Multi Point Radios
Instrumentation
Test & Measurement*

Previous Vectron Model Numbers

VS-502

Frequency Range

300 MHz – 1350 MHz

Standard Frequencies

480, 622.08, 640, 672.1627, 696.4215, 840, 930, 970, 983.04, 1000, 1200, 1330, 1344.3200 MHz

Frequency stabilities¹

| Parameter | Min | Typ | Max | Units | Operating temp range | Notes |
|-----------------------|-----|------|-----|-------|----------------------|-------|
| Absolute Pull Range | | ±50 | | ppm | | 2,3,9 |
| Temperature Stability | | ±200 | | ppm | -40 ... +85°C | 6,9 |

Supply Voltage (Vs)

| Parameter | Min | Typ | Max | Units | Condition | Notes |
|-------------------|-------|------|-------|-------|-----------|-------|
| Supply voltage | 11.4 | 12.0 | 12.6 | VDC | | 2,3 |
| Supply voltage | 4.75 | 5.0 | 5.25 | VDC | | 2,3 |
| Supply voltage | 3.135 | 3.3 | 3.465 | VDC | | 2,3 |
| Current (No Load) | | 55 | 70 | mA | | 2,3 |

RF Output

| Parameter | Min | Typ | Max | Units | Condition | Notes |
|--|----------|-------|--------|---------|-------------|-------|
| Signal | PECL | | | | | |
| Signal Level (Vol) | | | -1.525 | VDC | | 2,3,5 |
| Signal Level (Voh) | -1.125 | | | VDC | | 2,3,5 |
| Rise & Fall Time | | 200 | 350 | ps | | 2,3,5 |
| Duty cycle | 45 | 49/51 | 55 | % | | 2,3,5 |
| Signal | Sinewave | | | | | |
| Output Power | 0 | | | dBm | 50 ohm load | 2,3 |
| Output Power | 3 | | | dBm | 50 ohm load | 2,3 |
| Output Power | 7 | | | dBm | 50 ohm load | 2,3 |
| Output Power | 10 | | | dBm | 50 ohm load | 2,3 |
| Harmonics | | | -20 | dBc | | 2,3 |
| Jitter @ 622.08 MHz (12 kHz to 20 MHz) | | 0.035 | 0.050 | ps, rms | | 6,7 |
| Jitter @ 622.08 MHz (50 kHz to 80 MHz) | | 0.035 | 0.050 | ps, rms | | 6,7 |

Frequency Tuning

| Parameter | Min | Typ | Max | Units | Condition | Notes |
|---|-----|-----|------|-------|----------------------|---------|
| Linearity | | | ±20 | % | with Vs=12.0V | 2,3,4,9 |
| Linearity | | | ±10 | % | with Vs=3.3V or 5.0V | 2,3,4,9 |
| Gain Transfer | | | +100 | ppm/V | with Vs=12.0V | 2,8 |
| Gain Transfer | | | +200 | ppm/V | with Vs=5.0V | 2,8 |
| Gain Transfer | | | +300 | ppm/V | with Vs=3.3V | 2,8 |
| Input Impedance | | 100 | | k Ω | | 6 |
| Modulation BW (Driven from Low Impedance) | | 100 | | kHz | | 6 |

Table Notes:

1. See Standard Frequencies and Ordering Information
2. Parameters are tested with production test circuit
3. Parameters are tested at ambient temperature with test limits guard-banded for specified operating temperature.
4. Measured as the maximum deviation from the best straight-line fit, per MIL-0-55310.
5. Output levels are standard 100K PECL compatible and measured from 20% to 80% of a full output swing (Fig 1).
6. Not tested in production, guaranteed by design, verified at qualification.
7. Integrated across 12 kHz to 20 MHz, or 50 KHz to 80 MHz per GR-253-CORE Issue3. LVPECL Output
8. Tested with Vc = 0.3V to 3V for 3.3V supply, Vc = 0.5V to 4.5 V for 5V supply, Vc = 0.5V to 11.5V for 12V supply
9. Maximum frequency occurs at room temperature

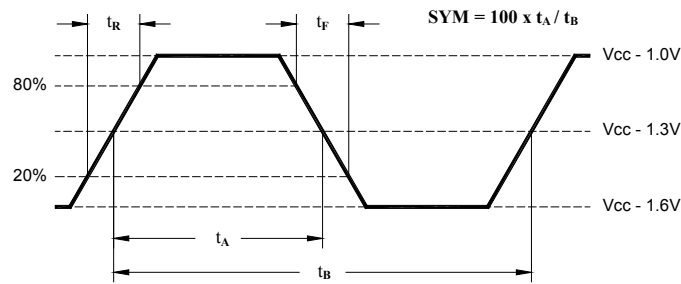
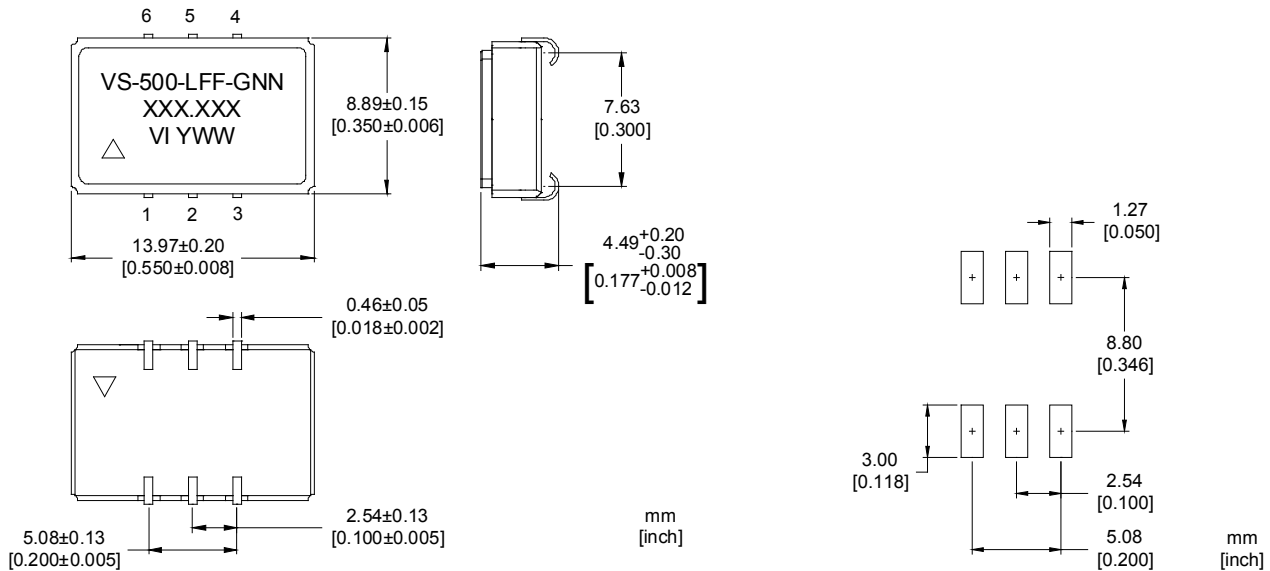


Figure 1. 100K PECL Waveform

Outline Diagram

Pad Layout



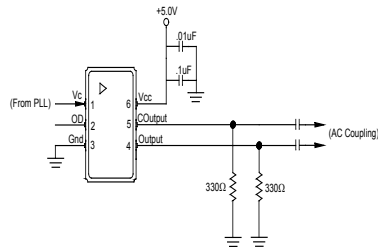
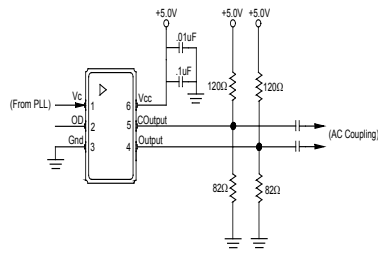
Pin Out – PECL Option

| Pin | Symbol | Function |
|-----|---------|------------------------------------|
| 1 | VC | VCSO Control Voltage |
| 2 | OD | N/C or Output Disable ¹ |
| 3 | GND | Case and Electrical Ground |
| 4 | Output | VCSO Output |
| 5 | COutput | VCSO Complementary Output |
| 6 | VCC | Power Supply Voltage |

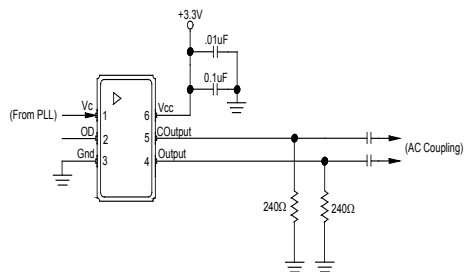
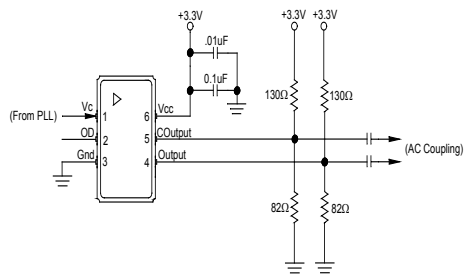
Table Notes:

- By setting Output Disable pin high, the RF output is disabled and pin 4 is held high, pin 5 is held low. The threshold for Output Disable is 2.3V above pin 3. Output disable pin can be left floating for normal operation

Suggested Output Load Configurations – PECL Operation



Suggested Output Load Configurations – LVPECL Operation



<http://www.vectron.com>

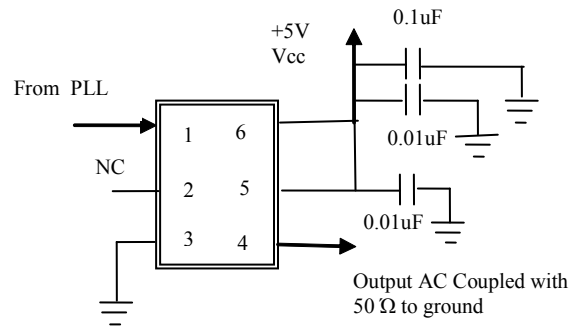
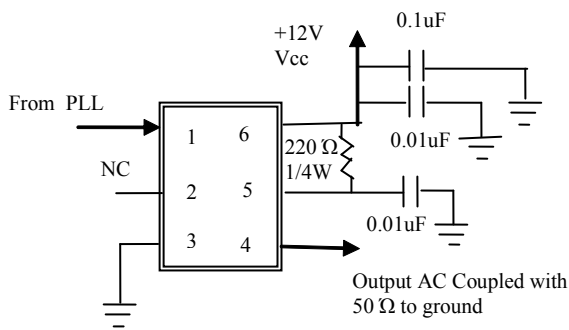
Pin Out – Sinewave Option

| Pin | Symbol | Function |
|-----|--------|----------------------|
| 1 | VC | VCSO Control Voltage |
| 2 | - | N/C |
| 3 | VEE | Ground |
| 4 | Output | VCSO Sinewave Output |
| 5 | VCC | Vcc21 |
| 6 | VCC | Vcc1 |

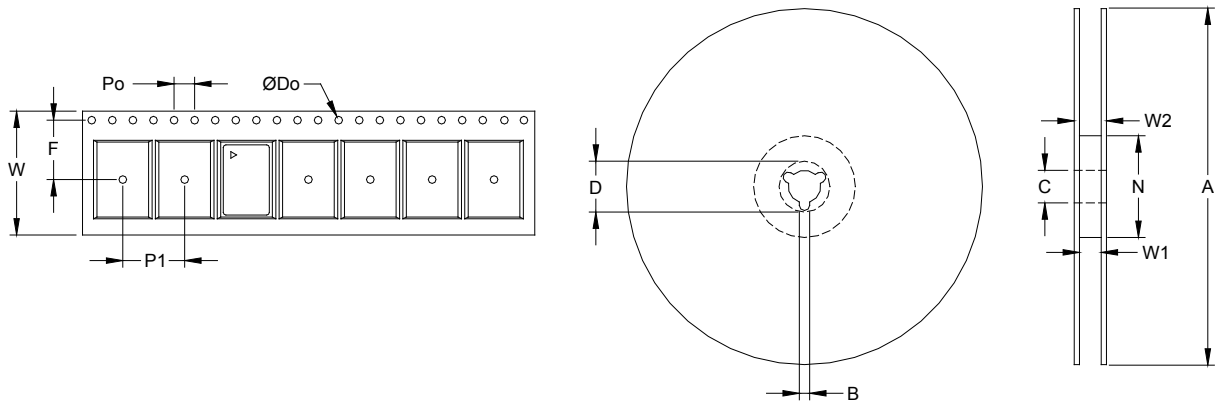
Table Notes:

1. If Vcc1 is +12V and a separate 5V is not applied to pin 5 then pin 5 must be connected through a 220Ω 1/4W external resistor.

Suggested Output Load Configurations – SINEWAVE Operation



Tape and Reel (EIA-481-2-A)



| Tape Dimensions (mm) | | | | | | Reel Dimensions (mm) | | | | | | | |
|----------------------|-----|------|-----|-----|-----|----------------------|-----|-----|------|-----|------|------|-------|
| Dimension | W | F | Do | Po | P1 | A | B | C | D | N | W1 | W2 | # Per |
| Tolerance | Typ | Typ | Typ | Typ | Typ | Typ | Min | Typ | Min | Min | Typ | Min | Reel |
| VS-502 | 24 | 11.5 | 1.5 | 4 | 12 | 330 | 1.5 | 13 | 20.2 | 100 | 24.4 | 30.4 | 200 |

Absolute Maximum Ratings

| Parameter | Symbol | Ratings | Unit |
|-----------------------|--------|-------------------|--------|
| Power Supply | VCC | VCC + 1.0V | V |
| Voltage Control Range | VC | -0.5 to VCC +0.5V | V |
| Storage Temperature | TS | -55 to +125 | °C |
| Soldering Temp/Time | TLS | +260/40 | °C/sec |

Stresses in excess of the absolute maximum ratings can permanently damage the device. Functional operation is not implied at these or any other conditions in excess of conditions represented in the operational sections of this datasheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

Reliability

The VS-502 family is capable of meeting the following qualification tests:

| Environmental Compliance | |
|--------------------------|--------------------------|
| Parameter | Conditions |
| Mechanical Shock | MIL-STD-883, Method 2002 |
| Mechanical Vibration | MIL-STD-883, Method 2007 |
| Solderability | MIL-STD-883, Method 2003 |
| Gross and Fine Leak | MIL-STD-883, Method 1014 |
| Resistance to Solvents | MIL-STD-883, Method 2016 |

Handling Precautions

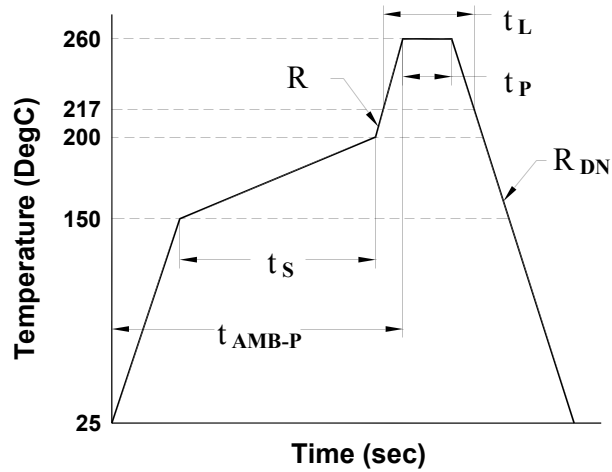
Although ESD protection circuitry has been designed into the VS-502 proper precautions should be taken when handling and mounting. VI employs a human body model and a charged-device model (CDM) for ESD susceptibility testing and design protection evaluation.

| ESD Ratings | | |
|----------------------|---------|--------------------------|
| Model | Minimum | Conditions |
| Human Body Model | 1500 V | MIL-STD 883, Method 3015 |
| Charged Device Model | 1000 V | JESD 22-C101 |

| Reflow Profile (IPC/JEDEC J-STD-020) | | |
|--------------------------------------|---------|-------------------------|
| Parameter | Symbol | Value |
| PreHeat Time | t S | 60 sec Min, 180 sec Max |
| Ramp Up | R UP | 3 °C/sec Max |
| Time Above 217 °C | t L | 60 sec Min, 150 sec Max |
| Time To Peak Temperature | t AMB-P | 480 sec Max |
| Time At 260 °C | t P | 20 sec Min, 40 sec Max |
| Ramp Down | R DN | 6 °C/sec Max |

The device is designed to meet the JEDEC standard for Pb-Free assembly. The temperatures and time intervals listed are based on the Pb-Free small body requirements. The VS-502 device is hermetically sealed so an aqueous wash is not an issue.

Termination Plating: Electroless Gold Plate over Nickel Plate.



How to order this product:

Use this worksheet to forward the following information to your factory representative :

| Model | Height | - | Supply Voltage Code | RF Output Code | Temperature Range | - | Stability | Option | - | Frequency |
|--------|--------|---|---------------------|----------------|-------------------|---|-----------|--------|---|------------|
| VS-502 | 0 | - | D | E | J | - | KXX | 2 | - | 300M000000 |

Height:
0: 4.49 mm

Supply Voltage:
B: 12 V
D: 5 V
E: 3.3 V

RF Output Code:
C: PECL/LVPECL
E: Sinewave

Temperature Range:
E: -40...+85°C
J: -20...+70°C
T: 0...+70°C

Stability Code:
E: ±20ppm
H: ±32ppm
K: ±50ppm

Output Power:
0: 0 dBm
1: +3 dBm
2: +7 dBm
3: +10 dBm