

**VS9: FUNDAMENTAL LVPECL SERIES: HF VCXO, LVPECL, +3.3 VDC**

**DESCRIPTION:** A voltage crystal controlled oscillator, high frequency, highly stable oscillator, adhering to Low Voltage Differential Signaling (LVPECL) Standards. The output can be Tri-stated to facilitate testing or combined multiple clocks. The device is contained in a sub-miniature, very low profile, leadless ceramic SMD package with 6 gold contact pads. This miniature oscillator is ideal for today's automated assembly environments.

**APPLICATIONS AND FEATURES:**

- **Infiniband; Fiber Channel; SATA; 10GbE; Network Processors; SOHO Routing; SONET/SDH**
- **Common Frequencies: 38.88 MHz; 77.76MHz; 155.52 MHz; 156.25 MHz; 161.1328 MHz;**
- **+3.3 VDC LVPECL**
- **Frequency Range from 1.000 to 180.000 MHz**
- **No Multiplication is used, low phase noise and jitter**
- **Miniature Ceramic SMD Package Available on Tape and Reel**
- **Lead Free and ROHS Compliant**



**■ ABSOLUTE MAXIMUM RATINGS:**

| PARAMETER                   | SYMBOL | VALUE             | UNIT |
|-----------------------------|--------|-------------------|------|
| Operating temperature range | Ta     | -40...+85         | °C   |
| Storage temperature range   | T(stg) | -55...+90         | °C   |
| Supply voltage              | Vcc    | +4.6              | VDC  |
| Maximum Input Voltage       | Vi     | Vss-0.5...Vcc+0.5 | VDC  |
| Maximum Output Voltage      | Vo     | Vss-0.5...Vcc+0.5 | VDC  |

**■ ELECTRICAL PARAMETERS:**

| PARAMETER   | SYMBOL     | TEST CONDITIONS <sup>1</sup>                                  | VALUE                            | UNIT       |
|---|------------|---|----------------------------------|------------|
| Nominal Frequency   | fo         |   | 1 to 180                         | MHz        |
| Supply Voltage  | Vcc        |   | +3.3 ±5%                         | VDC        |
| Supply Current  | Is         |   | 100.0 MAX                        | mA         |
| Output Logic Type   |            |   | LVPECL                           |            |
| Load  |            | Connected between each output and Vcc – 2.0 VDC               | 50                               | Ω          |
| Output Voltage Levels   | Voh<br>Vol | min<br>max  | Vcc-1.025<br>Vcc-1.620           | VDC<br>VDC |
| Duty Cycle  | DC         | Measured at 50% of output voltage swing                       | 40/60 to 60/40 or 45/55 to 55/45 | %          |
| Rise / Fall Time  | tr / tf    | Measured at 20/80% and 80/20% output voltage swing            | 0.5 TYP                          | ns         |
| Frequency Stability   |            | Overall conditions  | ±50 ** (note 7)                  | ppm        |
| Jitter  | J          | Integrated Phase tji RMS, Fj = 12 kHz...20 MHz                | 0.3 TYP**                        | ps         |
|   |            | Integrated Phase RMS tii offset frequency 50KHz to 80MHz      | 0.5 TYP**                        | ps         |
|   |            | Deterministic period Jitter tdj using wavecrest analyz.       | 0.0TYP **                        | ps         |
|   |            | Random period Jitter trj using wavecrest analyz.              | 2.5 TYP **                       | ps         |
|   |            | Peak to Peak Jitter Tp-p using wavecrest analyz.              | 25 TYP**                         | ps         |
| Phase Noise typ.<br>@155.52MHz  | £(Δf)      | Δf=10 Hz  | -65                              | dBc/Hz     |
|   | £(Δf)      | Δf=1 KHz  | -120                             | dBc/Hz     |
|   | £(Δf)      | Δf=10 KHz   | -140                             | dBc/Hz     |
|   | £(Δf)      | Δf= >/=100 KHz  | -145                             | dBc/Hz     |
| Control Voltage Range   | VC         | Positive slope; 10% linearity MAX                             | 0 to +3.3                        | VDC        |
| Settability   | Vfo        |   | +1.65 ± 0.25                     | VDC        |
| Absolute Pull Range   | APR        | Minimum guaranteed freq. pull over Δf/fc, over all conditions | See Part Numbering               | ppm        |
| Input Impedance   | Zin        |   | 10 MIN                           | KΩ         |
| Modulation Bandwidth  | BW         | -3 dB   | 10 MIN                           | KHz        |
| <b>Enable High Option;</b><br>Pin 2 Output Enabled<br>Output Disabled | En<br>Dis  | High Voltage or No Connect<br>Ground                          | 0.7•Vcc MIN<br>0.3•Vcc MAX       | VDC<br>VDC |
| <b>Enable Low Option;</b><br>Pin 2 Output Disabled<br>Output Enabled  | Dis<br>En  | High Voltage<br>Ground or No Connect                          | 0.7•Vcc MIN<br>0.3•Vcc MAX       | VDC<br>VDC |

- \*1 Test Conditions Unless Stated Otherwise: Nominal Vcc, Nominal Load, +25 ±3°C
- \*2 Frequency Dependent
- \*3 May not be Available With All Temperature Ranges or Frequencies — Please Consult Factory
- \*4 Measured with Wavecrest SIA-3000A 10,000, Cycles no filtering
- \*5 Calculated from Agilent 5500 phase noise measurements
- \*6 Measured with Agilent 5500
- \*7 Tighter stabilities maybe available upon request – please consult factory

■ **PART NUMBERING SYSTEM:**

| SERIES   | SYMMETRY                                 | TEMPERATURE RANGE (°C)                                   | ABSOLUTE PULL RANGE  | FREQUENCY (MHz) | Enable/Disable   |
|--|--|--|--|-----------------|--|
| VS9: UHF +3.3Vdc<br>VCXO with LVPECL<br>Comp. Output | A: 40/60 to 60/40%<br>T: 45/55 to 55/45% | R: 0...+50<br>S: 0...+70<br>U: -20...+70<br>V: -40...+85 | K: ±20 ppm<br>L: ±25 ppm<br>F: ±32 ppm<br>H: ±50 ppm<br>G: ±80 ppm<br>J: ±100 ppm*(note 3) | 1...180.000     | Enable High – standard (Omit Suffix)<br>EL; Enable Low |

**EXAMPLE: VS9ASH -155.520**

VCXO, 7x5mm Package, +3.3 VDC Supply Voltage, LVPECL Output, Standard Symmetry, 0...+70°C Operating Temperature Range, ±50 ppm APR, 50 ppm stability, 155.520 MHz

■ **MECHANICAL PARAMETERS:**

**OUTLINE TOLERANCE:**  
±0.006" / 0.15mm  
(Unless otherwise specified)

**PIN FUNCTIONS:**  
[1] VOLTAGE CONTROL  
[2] ENABLE/ DISABLE, OR NO CONNECT  
[3] CASE GROUND  
[4] OUTPUT  
[5] COMP. OUTPUT  
[6] SUPPLY VOLTAGE

**MARKING:**  
VS9ASH  
155.52  
D/C

**\*0.01µF external by-pass filter is recommended as seen on solder pattern.**

**SOLDER PATTERN**

■ **REFLOW PROFILE:**

