



中川電子有限公司  
*Nakagawa Electronics Limited*

VS9L: PLL LVPECL SERIES: ULTRA HF VCXO, LVPECL, +3.3 VDC

**DESCRIPTION:** A voltage control crystal 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; Switches;
- Common Frequencies: 150 MHz; 156.25 MHz; 155.52 MHz; 161.1328 MHz; 212.5MHz; 312.5MHz
- +3.3 VDC LVPECL
- Frequency Range from 38MHz to 640MHz
- Advanced Low Noise PLL multiplication (F>25MHz)
- Miniature Ceramic SMD Package Available on Tape and Reel
- Lead Free and ROHS Compliant

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■ 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		38 to 640	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 Vol	min max	Vcc-1.025 Vcc-1.620	VDC 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	0.3 to 0.5 TYP, 0.5 to 0.7 MAX**	ns	
Jitter	J	Integrated Phase t <sub>j</sub> RMS, F <sub>j</sub> = 12 kHz...20 MHz <sup>5</sup>	Fo=155.52MHz	0.4 TYP	ps
			Fo=622.08MHz	0.4 TYP**	
		Random period Jitter R <sub>j</sub> using wavecrest analyzer <sup>4</sup>	Fo=155.52MHz	3.5 TYP **	ps
			Fo=622.08MHz	6 TYP **	
Acumm. Peak to Peak Jitter T <sub>p-p</sub> using wavecrest analyzer <sup>4</sup>	Fo=155.52MHz	20 TYP**	ps		
	Fo=622.08MHz	40 TYP**			
Phase Noise	ε(Δf)	typ. @155.52MHz <sup>6</sup>	Δf=10 Hz	-60	dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz dBc/Hz
			Δf=100 Hz	-90	
			Δf=1 KHz	-120	
			Δf=10 KHz	-130	
			Δf=100 KHz	-128	
			Δf=1M Hz	-144	
			Δf=10M Hz	-150	
Δf>20M Hz	-150				
Overall Frequency Stability typ.	Δf/fc	Op. Temp., Aging, Load, and Supply Variations	<±50*(Note 7)	ppm	
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	
Enable High Option; Pin 2 Output Enabled Output Disabled	En Dis	High Voltage or No Connect Ground	0.7•Vcc MIN 0.3•Vcc MAX	VDC VDC	
Enable Low Option; Pin 2 Output Disabled Output Enabled	Dis En	High Voltage Ground or No Connect	0.7•Vcc MIN 0.3•Vcc MAX	VDC 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 Wavcrest 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
VS9L: UHF +3.3Vdc VCXO with LVPECL Comp. Output	A: 40/60 to 60/40% T: 45/55 to 55/45%	R: 0...+50 S: 0...+70 U: -20...+70 V: -40...+85	K: ±20 ppm L: ±25 ppm F: ±32 ppm H: ±50 ppm G: ±80 ppm J: ±100 ppm*(note 3)	38.000...640.000	Enable High – standard (Omit Suffix) EL; Enable Low

**EXAMPLE: VS9LASH-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:

**INDICATES PIN 1**

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

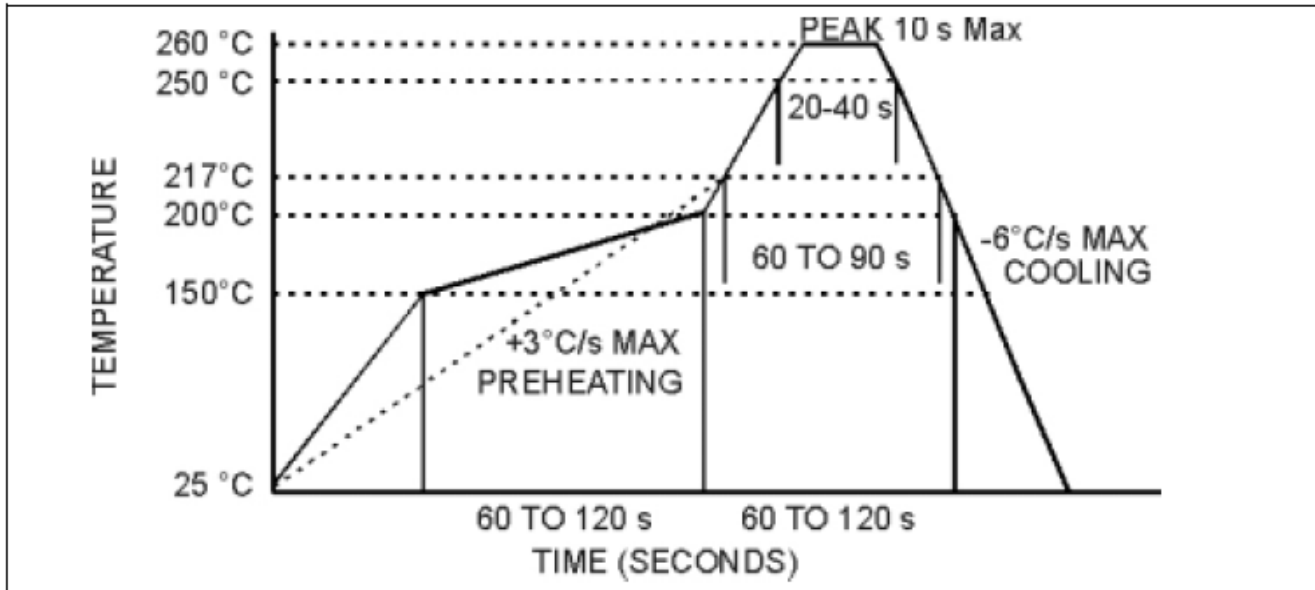
**PIN FUNCTIONS:**  
[1] VOLTAGE CONTROL  
[2] ENABLE/ DISABLE, OR NO CONNECT  
[3] CASE GROUND  
[4] OUTPUT  
[5] COMP. OUTPUT  
[6] SUPPLY VOLTAGE

**MARKING:**  
VS9LASH  
155.52  
RAL D/C

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

**SOLDER PATTERN**

■ REFLOW PROFILE:



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