VS-501

Voltage Controlled SAW Oscillator

Description

The VS-501 VCSO (Voltage Controlled Saw Oscillator) from Vectron is a high frequency, ultra low phase noise oscillator designed to support high speed data converters and 100G coherent optical receivers. The VS-501 provides 12fs rms jitter in a 12kHz to 20MHz integration bandwidth and is available from 1.3GHz to 1.8GHz.

Features

- Frequency Range 0.8 to 2.5 GHz
- Ultra low jitter performance
- Typical Jitter: 12fsec rms, 12kHz to 20MHz
- 3.3 + 5V supply voltage
- Output: Sinewave, balanced Sinewave, LVPECL
- 9x14 mm SMD package
- See table on Page 5 for standard frequencies

Applications

- High Speed ADCs
- 40G & 100G Coherent Receivers
- Test & Measurement

Performance Specifications

Pulling Characteristics					
Parameter	Min	Typ	Max	Units	Notes
Absolute Pull Range (APR)	±20			ppm	Includes df vs: •Operating temperature range +10 .. 85°C •Aging 10 years •Supply Voltage Change 5% •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	100			kΩ	
Modulation bandwidth	20			kHz	@ -3dB
Supply Voltage (Vs)					
Supply voltage (standard)	4.75	5.00	5.25	V DC	
Current consumption			100	mA	
Supply voltage (standard)	3.135	3.3	3.465	V DC	
Current consumption			150	mA	

Performance Specifications (Continued)

RF Output					
Parameter	Min	Typ	Max	Units	Notes
Signal		Sinewave			
Load	45	50	55	Ω	
Output Power	7	8.5	12	dBm	
Phase Noise: 100Hz offset		-68		dBc/Hz	@ 1.7GHz Sinewave 5V
Phase Noise: 1kHz offset		-96		dBc/Hz	
Phase Noise: 10kHz offset		-122		dBc/Hz	
Phase Noise: 100kHz offset		-145		dBc/Hz	
Phase Noise: 1MHz offset		-156		dBc/Hz	
Phase Noise: 10MHz offset		-160		dBc/Hz	
Jitter: 12kHz to 20MHz offset		12		fs rms	
Signal		Balanced Sinewave			
Load	45	50	55	Ω	
Output Power	0	3	6	dBm	
Phase Noise: 100Hz offset		-64		dBc/Hz	@ 1.98GHz Balanced Sinewave 3.3V
Phase Noise: 1kHz offset		-93		dBc/Hz	
Phase Noise: 10kHz offset		-119		dBc/Hz	
Phase Noise: 100kHz offset		-142		dBc/Hz	
Phase Noise: 1MHz offset		-155		dBc/Hz	
Phase Noise: 10MHz offset		-164		dBc/Hz	
Jitter: 12kHz to 20MHz offset		9		fs rms	
Signal		LVPECL			
Load	45	50	55	Ω	
Duty Cycle	45		55	%	
Phase Noise: 100Hz offset		-61		dBc/Hz	@ 1.98GHz LVPECL 3.3V
Phase Noise: 1kHz offset		-89		dBc/Hz	
Phase Noise: 10kHz offset		-113		dBc/Hz	
Phase Noise: 100kHz offset		-139		dBc/Hz	
Phase Noise: 1MHz offset		-148		dBc/Hz	
Phase Noise: 10MHz offset		-151		dBc/Hz	
Jitter: 12kHz to 20MHz offset		22		fs rms	
Signal		Balanced Sinewave			
Load	45	50	55	Ω	
Output Power	0	3	6	dBm	
Phase Noise: 100Hz offset		-52		dBc/Hz	@ 2.45GHz Balanced Sinewave 3.3V
Phase Noise: 1kHz offset		-89		dBc/Hz	
Phase Noise: 10kHz offset		-117		dBc/Hz	
Phase Noise: 100kHz offset		-138		dBc/Hz	
Phase Noise: 1MHz offset		-155		dBc/Hz	
Phase Noise: 10MHz offset		-164		dBc/Hz	
Jitter: 12kHz to 20MHz offset		11		fs rms	

Performance Specifications (Continued)

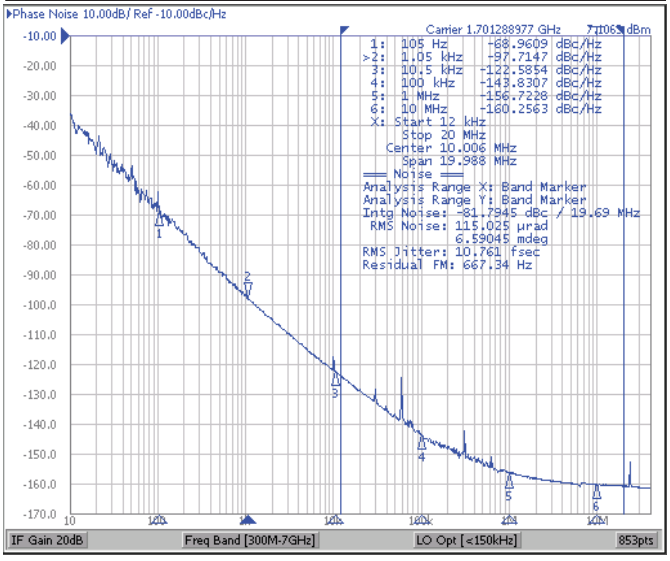
Additional Parameters					
Parameter	Min		Max	Units	Notes
Weight		2.0g			
Subharmonics			-30 -25	dBc dBc	< 2 GHz > 2 GHz
Processing and Packing		Handling and Processing Note			

Absolute Maximum Ratings					
Parameter	Min		Max	Units	Notes
Supply Voltage (V_S)			6.0	V	
Operable Temperature Range	-40		+85	ºC	
Storage Temperature Range	-55		+125	ºC	

Typical Performance

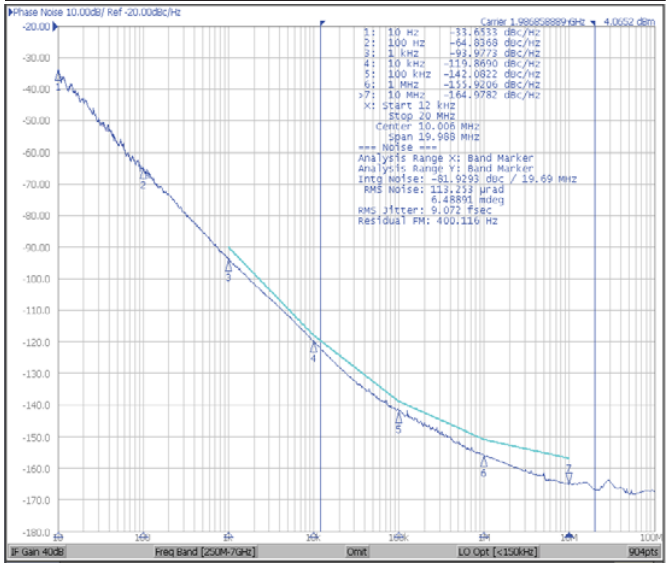
Phase Noise

VS-501 @ 1.7GHz Sinewave



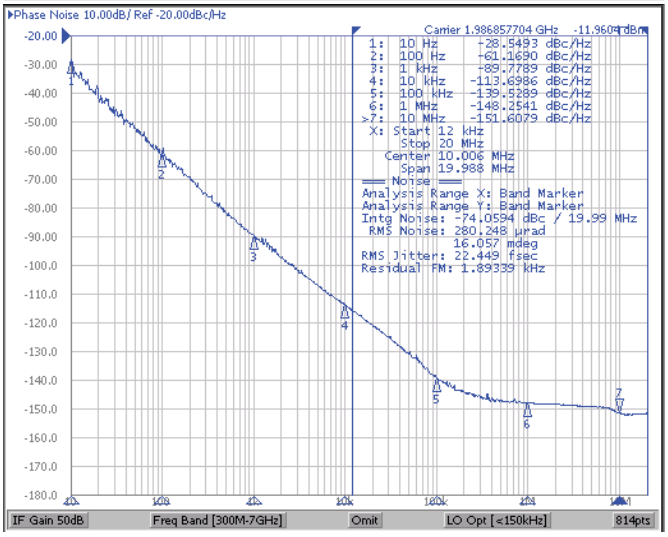
Phase Noise

VS-501 @ 1.98GHz Balanced Sinewave



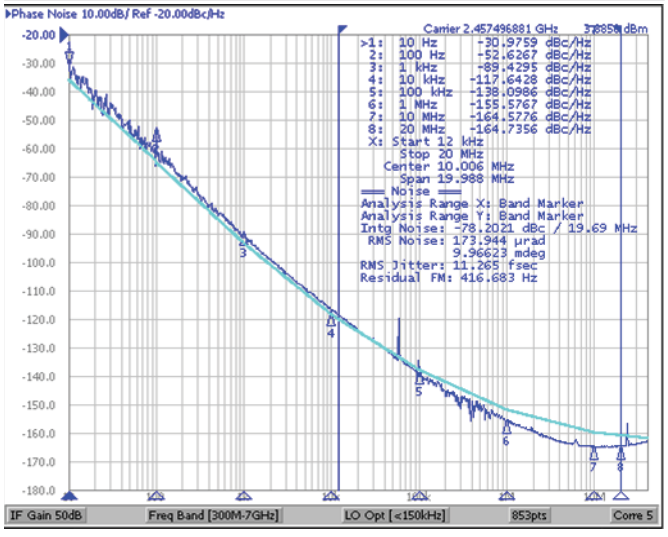
Phase Noise

VS-501 @ 1.98GHz LVPECL



Phase Noise

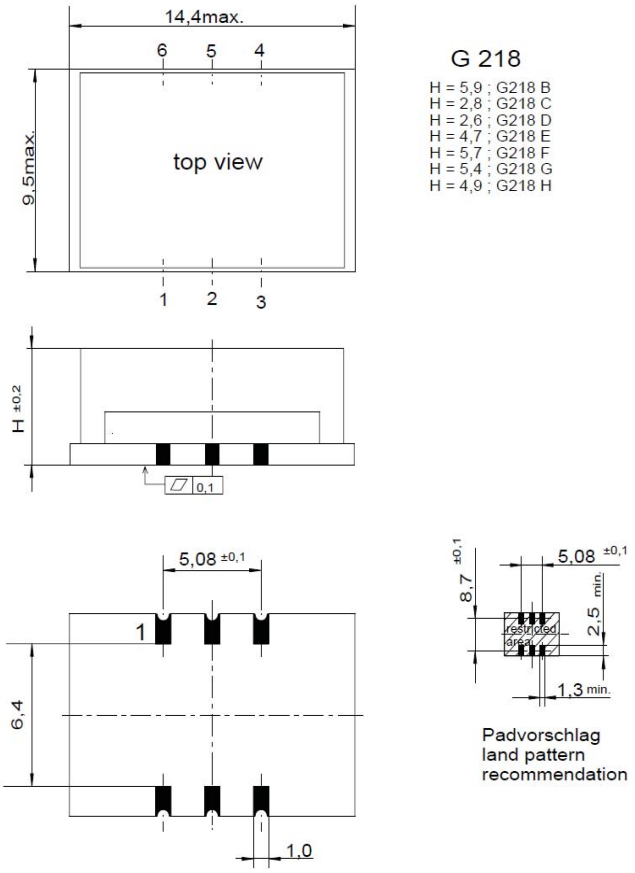
VS-501 @ 2.45GHz Balanced Sinewave



Outline Drawing / Enclosure

Package Codes		
Code	Height "H"	Pin Length "L"
G218C	2.8	N/A
G218H	4.9	N/A

Dimensions in mm



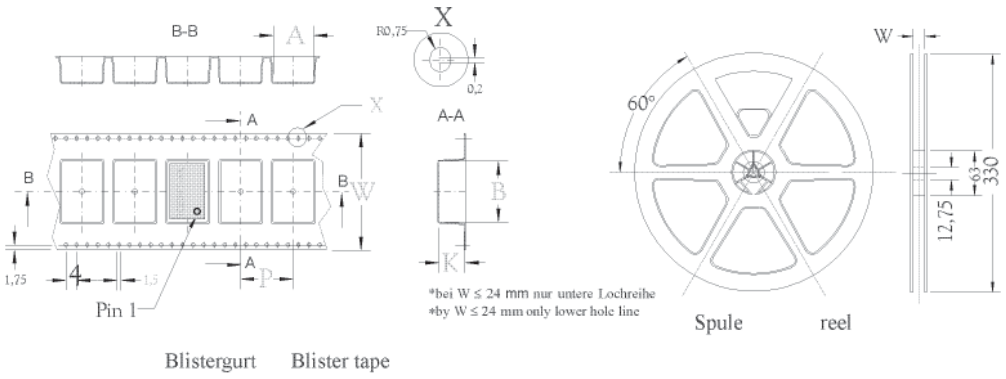
Pin Assignment Sinewave	
1	Control Voltage (V_C)
2	GND
3	GND
4	RF Out
5	GND
6	Supply Voltage Input (V_S)

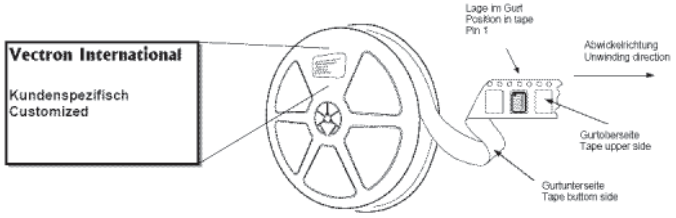
Pin Assignment Balanced Sinewave	
1	Control Voltage (V_C)
2	GND
3	GND
4	RF Out
5	RF-Out_Compl. 180° phase shifted
6	Supply Voltage Input (V_S)

Pin Assignment LVPECL	
1	Control Voltage (V_C)
2	GND
3	GND
4	RF Out
5	RF-Out_complementary
6	Supply Voltage Input (V_S)

Marking
VS-501-xxxx
Frequency
•AYYWW

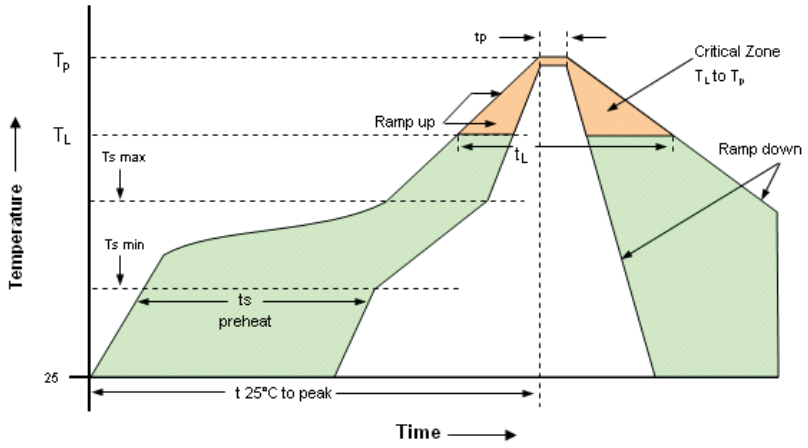
Standard Shipping Method





Enclosure Type	Tape Width W (mm)	Quantity per meter	Quantity per reel	Dimension P (mm)
G218C	24		1700	12
G218H	24		850	12

Recommended Reflow Profile



Profile Feature	Pb-Free Assembly/Sn-Pb Assembly	Profile Feature	Pb-Free Assembly/Sn-Pb Assembly
Average ramp-up rate (T_L to T_P)	3°C/second max.	Time 25°C to Peak Temperature	8 minutes max.
Preheat - Temperature Min T_{Smin} -Temperature Min T_{Sma} -Time (min to max) t_S	150°C 200°C 60-180 seconds	Time maintained above -Temperature (T_L) -Time (t_L)	 217°C 60-150 seconds
T_{Smax} to T_L -Ramp-up Rate	3°C/second max		
Time maintained above -Temperature (T_L) -Time (t_L)	 217°C 60-150 seconds	Time within 5°C of actual Peak-Temperature (t_p)	20-40 seconds
Peak Temperature (T_P)	max 260°C	Ramp-down Rate	6°C/ second max

Ordering Information

VS - 501 0 - D E X - 205 X - 1747M030837

- Product Family: VS: VCSO
- Package: 9x14mm SMT
- Height: 0: 2.8mm (G218C) (<1.7GHz, Sinewave only); 1: 4.9mm (G218H)
- Supply Voltage: D: +5.0V; E: +3.3V
- RF Output Code: C: LVPECL; E: Sinewave; F: Balanced Sinewave
- Temperature Range: X: +10°C to +85°C
- APR Code: 205: ±20ppm
- Enable: X: No Enable
- Frequency

Standard Frequencies (MHz)						
1701.32	1707.08	1747.030837	1747.62305	1748.366885	1769.145	1968.75
1986.819383	2457.6					

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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