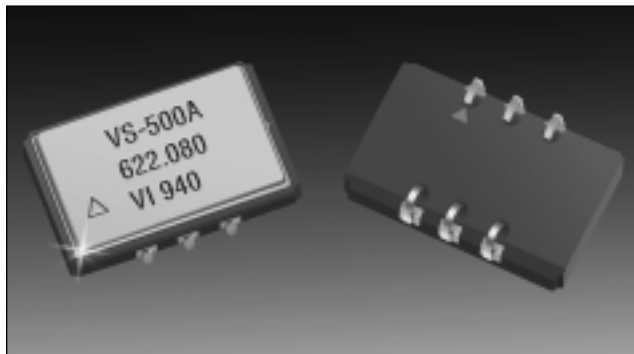


VS-500A

Voltage Controlled Saw Oscillator



Features

- Output Frequency @ 155 MHz to 1 GHz
- Low jitter, 1.5ps rms (typical) for 622.080 MHz, 3ps rms (typical) for 155 MHz
- J-type package - *smallest 622.080 MHz package available*
- Ideal for clock smoothing, frequency translation, clock and data retiming applications
- 10K ECL, PECL logic levels with fast transition times
- Complementary outputs
- Low profile, surface mount package
- Output disable feature

Applications

- OC192/OC48/OC12/OC3 Clock Smoothing
- STS96/STS48/STS12/STS3/STS1 Clock Smoothing
- Frequency Translation

Description

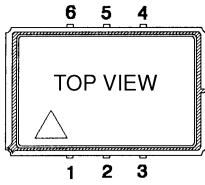
The VS 500A is a SAW stabilized, voltage controlled oscillator that operates at the fundamental frequency of the internal SAW filter. This filter is a high stability, high-Q quartz device that enables the circuit to achieve low phase jitter performance over a wide operating temperature range. The oscillator is housed in a hermetically sealed J-lead surface mount package. It has an output disable to facilitate on-board testing.

VS-500A Voltage Controlled SAW Oscillator

Pin Information

Table 1. Pin Function

Pin	Symbol	Function
1	V _c	VCXO Control Voltage
2	OD	Output Disable
3	GND	Case and electrical ground
4	Output	VCXO Output
5	COutput	VCXO Complimentary Output
6	V _{CC}	Power Supply Voltage (5.0 V ±10%)



1. By setting OD low, the outputs are disabled and OUT is held high while Complementary OUT is held low. The threshold for Output Disable is 1.4V above VEE. Output Disable should not be driven above mid supply and during normal operation, should be left floating (use with an open collector or 3-State gate for interfacing with standard logic).

Performance Characteristics

Table 2. Electrical Performance @ 25°C

Parameter	Symbol	Minimum	Typical	Maximum	Units
Center Frequency, <i>see ordering information</i>	F _N	155		1000	MHz
Operating Temperature	T _{OP}	-40	25	+85	°C
Supply Current	I _{CC}		55	70	mA
Supply Voltage	V _{CC}	4.5	5	5.5	V
Absolute Pull Range (V _c = 0.5 to 4.5) over temperature/aging/power supply	APR	±50	-	-	ppm
Positive Gain Transfer (freq vs V _c) 155.520MHz	K _v	-	350	-	ppm/V
Positive Gain Transfer (freq vs V _c) 622.080MHz	K _v	-	200	-	ppm/V
Linearity	Lin		±3		%
Frequency Stability, -40 to 85 wrt 25°C	F _{STAB}		±150		ppm
Output Level Low ¹	V _{OL}	V _{CC} -1.95	-	V _{CC} -1.63	V
Output Level High ¹	V _{OH}	V _{CC} -0.98	-	V _{CC} -0.75	V
Output Rise Time ²	t _R		250	400	pS
Output Fall Time ²	t _F		250	400	pS
Jitter @ 622.080 MHz offset from carrier 12 KHz to 20 MHz			0.230		ps rms
Jitter @ 622.080 MHz offset from carrier 50 KHz to 80 MHz			0.458		ps rms
Spurious Suppression		-50	-60		dB
Data Symmetry	SYM	45	49/51	55	%
Control Voltage Input Impedance	Z _c	8	10	12	KΩ
Control Voltage Modulation Bandwidth	BW	-	500	-	kHz
Output Current	I _{OUT}	-	-	20	mA

1. Output Levels are standard 10K ECL and are fully 100K ECL compatible.

2. Transition times are measured from 20% to 80% of a full 10K ECL level swing.

Table 3. Typical Single Side-Band Phase Noise (dBc/Hz)

Offset from Carrier	100 Hz	1kHz	10kHz	100kHz
VS-500A 622.080	-64	-93	-109	-127

VS-500A Voltage Controlled SAW Oscillator

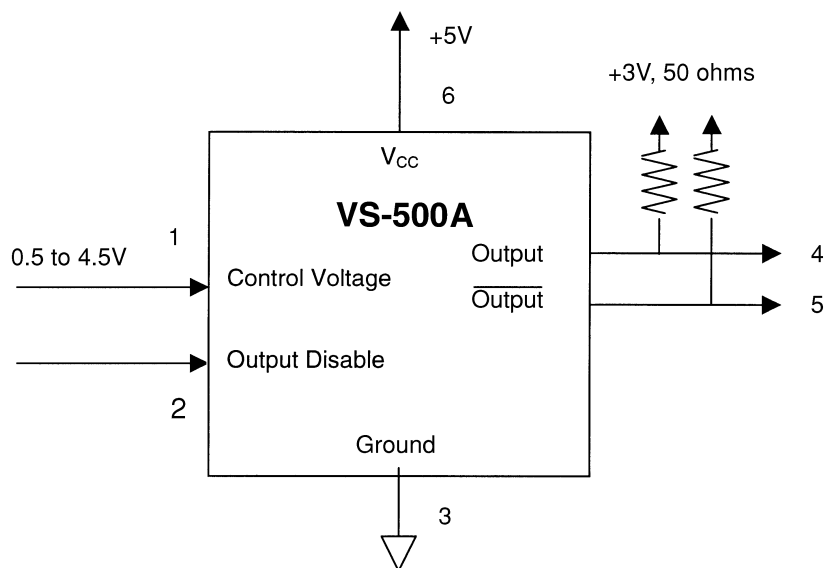
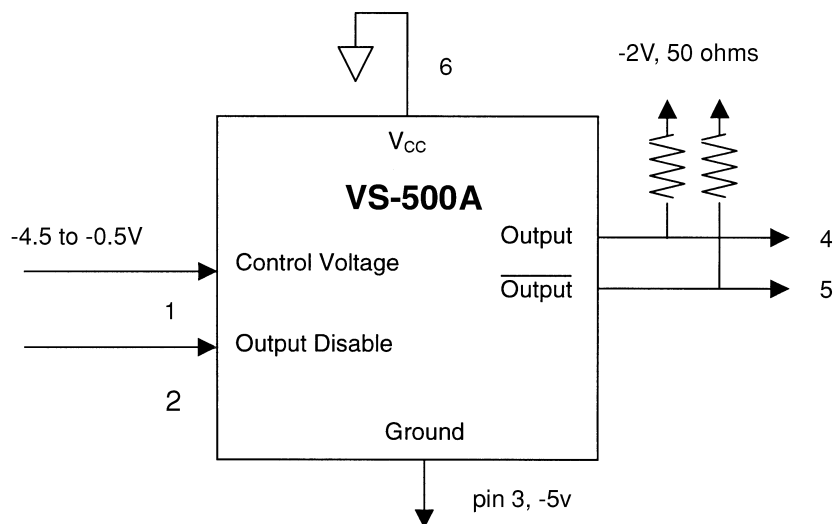


Figure 1. PECL Operation



Note: Conductive lid will be @ -5V for ECL configuration

Figure 2. ECL Operation

VS-500A Voltage Controlled SAW Oscillator

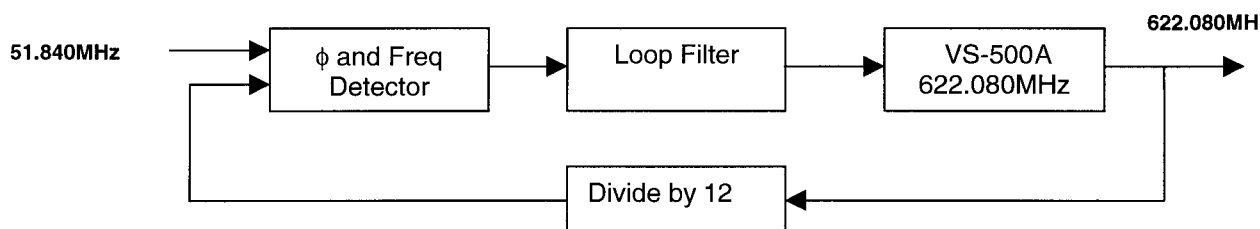


Figure 3. Typical Frequency Translation Diagram

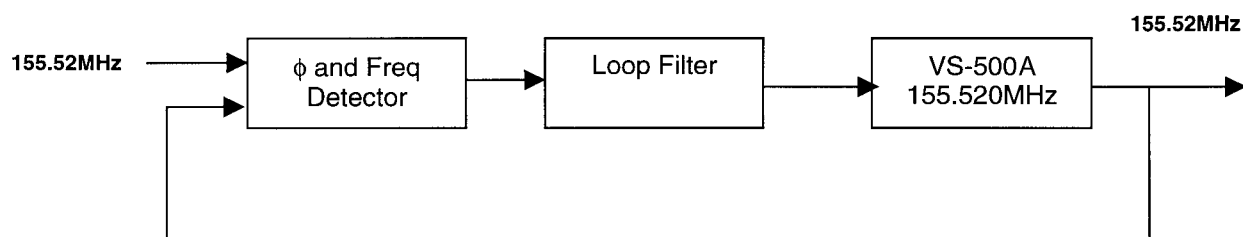


Figure 4. Typical Clock Smoothing Diagram

Absolute Maximum Ratings

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 data sheet. Exposure to absolute maximum ratings for extended periods may adversely affect device reliability.

Table 4. Absolute Maximum Ratings

Parameter	Symbol	Ratings	Unit
Power Supply	V _{CC}	0 to +8	V
Output Current ¹	I _{out}	20	mA
Output Current ²	I _{out}	50	mA
Voltage Control Range ¹	V _c	V _{EE} to V _{CC}	V
Voltage Control Range ²	V _c	V _{EE} -0.5 to V _{CC} +0.5	V
Storage Temperature	T _s	-55 TO +125	°C
Soldering Temp./Time	T _{LS}	220/10	°C/S

1 Limits beyond which performance can not be guaranteed.

2 Limits beyond which device life may be impaired.

Qualification Conformance

The VS-500A family passes the following Mil-Std qualification.

Table 5. 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

VS-500A Voltage Controlled SAW Oscillator

Handling Precautions

Although ESD protection circuitry has been designed into the the VS-500A, 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 thresholds are dependent on the circuit parameters used to define the model. Although no industry wide standard has been adopted for the CDM, a standard HBM of resistance=1.5Kohms and capacitance = 100pF is widely used and therefore can be used for comparison purposes.

Table 6. ESD Ratings

Model	Minimum
Human Body Model	1000V
Charged Device Model	1000V

Minimum model values to be supplied upon completion of qualification program.

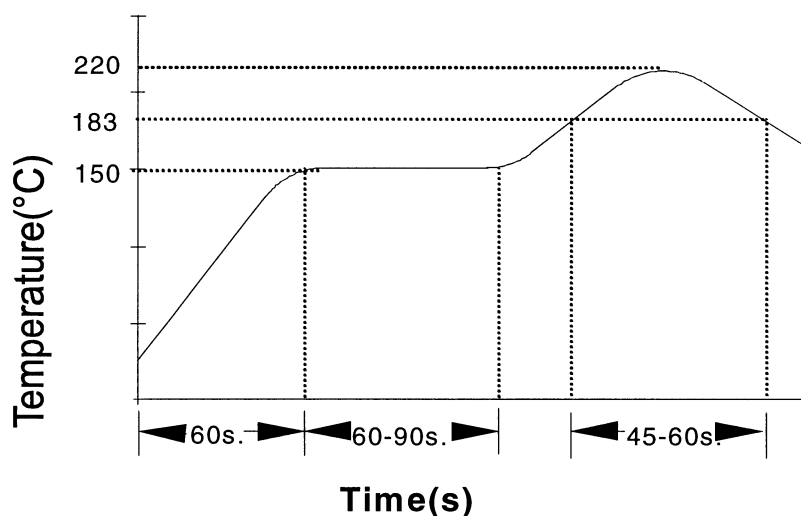


Figure 5. Suggested IR profile

VS-500A Voltage Controlled SAW Oscillator

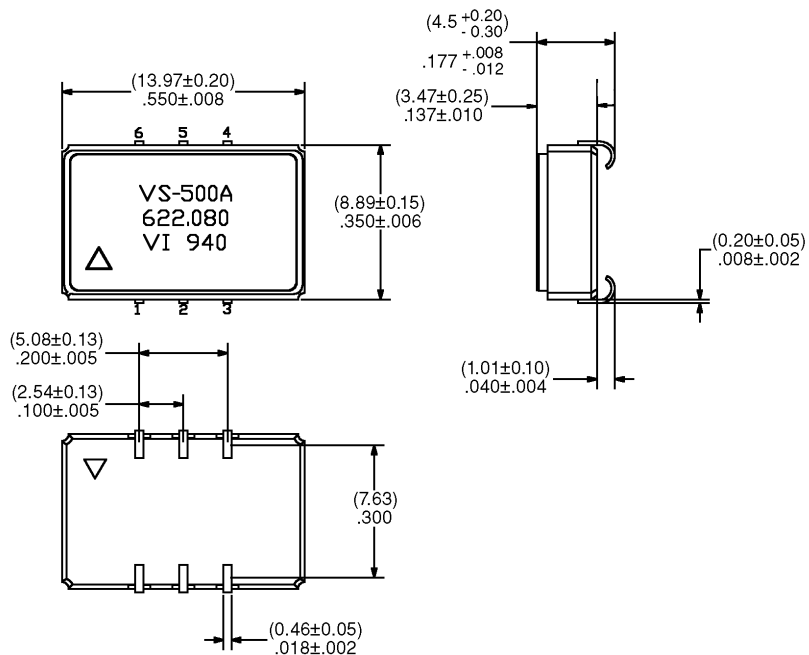


Figure 6. Outline Diagram

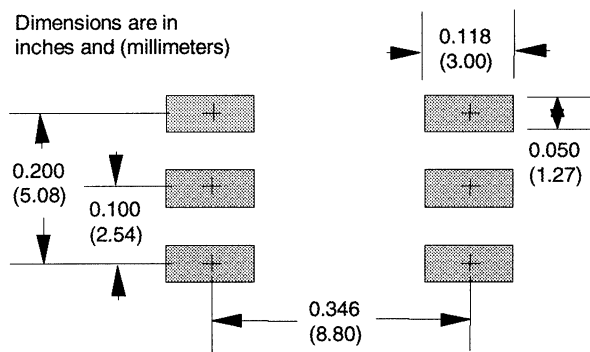


Figure 7. Suggested Pad Layout

VS-500A Voltage Controlled SAW Oscillator

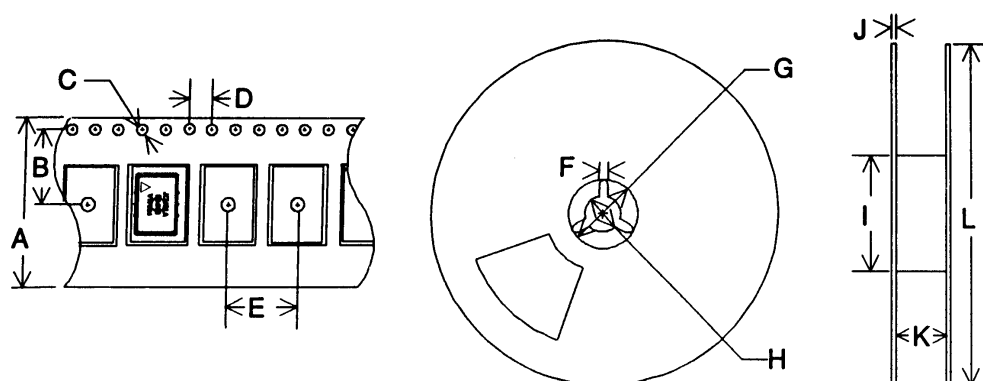


Figure 8. Tape Reel Drawing

Table 7. Tape and Reel Dimensions (mm)

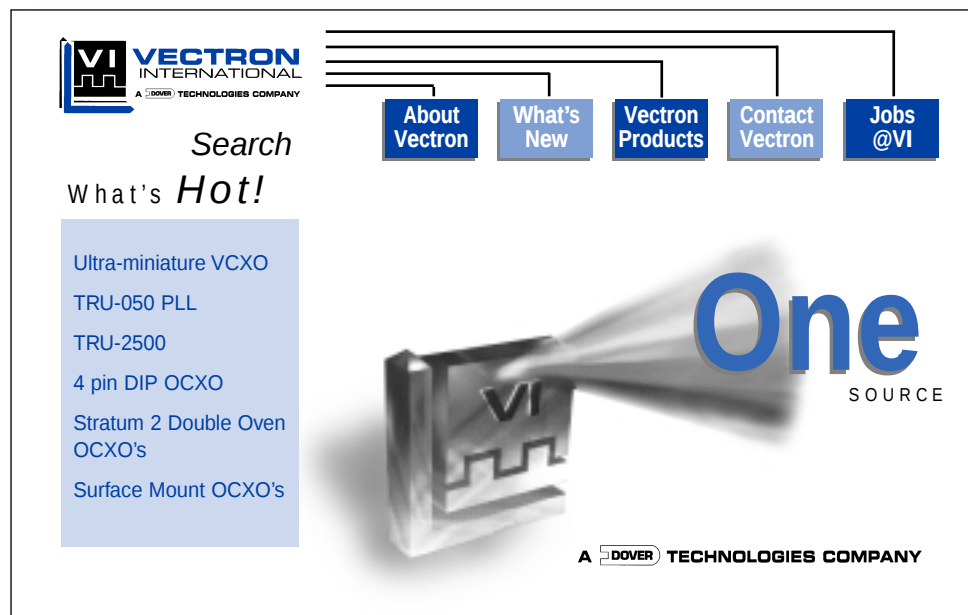
Tape Dimensions													# Per Reel
Product	A	B	C	D	E	F	G	H	I	J	K	L	
VS-500A	24	11.5	1.5	4	12	1.78	21	13	100	5	25	330	200

Ordering Information

Table 8. Available Frequencies (MHz)

155.520	156.250	161.1328
166.6286	311.040	622.080
625.000	644.5313	666.5143

VS-500A Voltage Controlled SAW Oscillator



A screenshot of the Vectron International website. The header features the Vectron International logo (a stylized 'VI' in a square) and the text 'VECTRON INTERNATIONAL A DOVER TECHNOLOGIES COMPANY'. Below the logo is a navigation menu with five blue buttons: 'About Vectron', 'What's New', 'Vectron Products', 'Contact Vectron', and 'Jobs @VI'. The main content area is divided into two columns. The left column has the heading 'Search What's Hot!' and a list of products: 'Ultra-miniature VCXO', 'TRU-050 PLL', 'TRU-2500', '4 pin DIP OCXO', 'Stratum 2 Double Oven OCXO's', and 'Surface Mount OCXO's'. The right column features a large, stylized blue 'One' with 'SOURCE' underneath it, and a 3D rendering of a SAW oscillator component. At the bottom right of the page is the text 'A DOVER TECHNOLOGIES COMPANY'.

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