

# XVO

# FAST TURNAROUND VCXO

### DESCRIPTION

The XVO clock series is a cutting edge family of low to high frequency, **low jitter output, single or multi - frequency** voltage controlled clock oscillators (VCXO). The XVO VCXO's are available in **7.0 x 5.0, 5.0 x 3.2, or 3.2 x 2.5 mm** ceramic packages with output frequencies ranging from **10 MHz to 1.2 GHz**. Its outstanding flexibility significantly reduces design cycle time and overall cost. The XVO design incorporates a low frequency crystal along with low jitter frequency synthesizer to provide a wide range of frequencies. The XVO VCXO's are available in **LVC MOS, LVPECL** and **LVDS** outputs, allowing for a wide variety of applications.

This product is ideal for the time conscious customer as shipments are made within days of a placed order.

### FEATURES

- **Fast Turnaround (Ships Within Days)**
- **Very Low Jitter (Typical 0.6 ps)**
- **10 MHz to 1.2 GHz Frequency Range**
- **Selectable Single or Dual Frequencies**
- **Stability as low as ±20 ppm (-40 ~ 85 °C)**
- **Available Sizes:**
  - ✓ **7.0 x 5.0 mm**
  - ✓ **5.0 x 3.2 mm**
  - ✓ **3.2 x 2.5 mm**

SELECTOR GUIDE	LVC MOS			LVDS			LVPECL		
Package Size (mm)	7.0x5.0	5.0x3.2	3.2x2.5	7.0x5.0	5.0x3.2	3.2x2.5	7.0x5.0	5.0x3.2	3.2x2.5
Family Part Number	XVO-74	XVO-54	XCO-34	XVO-78	XVO-58	XCO-38	XVO-79	XVO-59	XCO-39
Frequency Range (MHz)	10 – 250			10 – 1200			10 - 1200		
Absolute Pull Range (ppm)	±20, ±25, ±50, ±100			±20, ±25, ±50, ±100			±20, ±25, ±50, ±100		
Number of Frequencies	1, 2			1, 2			1, 2		
Supply Voltage (V)	2.5, 3.3			2.5, 3.3			2.5, 3.3		
Temperature Range (°C)	-20 ~ +70			-20 ~ +70			-20 ~ +70		
	-40 ~ +85			-40 ~ +85			-40 ~ +85		

## OUTPUT CHARACTERISTICS

	PARAMETER	SYMBOL	CONDITION	VALUE			UNIT	
				Min	Typ.	Max		
LVCMOS	Frequency Range	$f_o$		10		250	MHz	
	Output Levels	$V_{OH}$		$0.9V_{cc}$			V	
		$V_{OL}$				$0.1V_{cc}$	V	
	Rise/Fall Time	$T_r/T_f$	20% - 80% ( $V_{OL}$ , $V_{OH}$ )			0.5	ns	
	Supply Current	$I_s$	2.5V	10 – 50 MHz			30	mA
				51 – 135 MHz			45	
				136 – 250 MHz			55	
			3.3V	10 – 50 MHz			35	
51 – 135 MHz						50		
136 – 250 MHz						60		
Output Load	$O_{CL}$	Standard			15	pF		

	PARAMETER	SYMBOL	CONDITION	VALUE			UNIT	
				Min	Typ.	Max		
LVPECL	Frequency Range	$f_o$		10		1200	MHz	
	Output levels	$V_{OH}$	Load 50Ω to $V_{cc}$ -2V	$V_{cc}$ -1.03		$V_{cc}$ -0.6	V	
		$V_{OL}$		$V_{cc}$ -1.85		$V_{cc}$ -1.6	V	
	Rise/Fall Time	$T_r/T_f$				0.25	ns	
	Output Voltage Swing	$V_{P-P}$	Output termination 50Ω / $V_{cc}$ - 2.0V	0.6 ~ 1.0			V	
	Supply Current	$I_s$	2.5 V	10 – 50 MHz			35	mA
				51 – 215 MHz			45	
				216 – 640 MHz			65	
				641 – 1200 MHz			70	
			3.3V	10 – 50 MHz			85	
51 – 215 MHz						95		
216 – 640 MHz						115		
641 – 1200 MHz						120		
Output Load	$O_{CL}$	Output Termination 50Ω to $V_{cc}$ -2V			50	Ω		

	PARAMETER	SYMBOL	CONDITION	VALUE			UNIT	
				Min	Typ.	Max		
LVDS	Frequency Range	$f_o$		10		1200	MHz	
	Differential Output Voltage	$V_{OD}$	10 – 1200 MHz		0.6		V	
	Offset Voltage	$V_{OS}$	V DC		1.3		V	
	Rise/Fall Time	$T_r/T_f$				0.35	ns	
	Supply Current	$I_s$	2.5V	10 – 50 MHz			25	mA
				51 – 215 MHz			30	
				216 – 640 MHz			43	
				641 – 1200 MHz			60	
			3.3V	10 – 50 MHz			65	
				51 – 215 MHz			72	
216 – 640 MHz						83		
641 – 1200 MHz						100		
Output Load	$O_{CL}$	Differential 100Ω Load Connected Between Each Output			100	Ω		

## ELECTRICAL SPECIFICATIONS

PARAMETER	SYMBOL	CONDITION	VALUE			UNIT
			Min.	Typ.	Max.	
Supply Voltage <sup>1</sup>	V <sub>CC</sub>			2.5 or 3.3		V
Duty Cycle	DC	Load depends on output type	45		55	%
RMS Phase Jitter	J	12 kHz – 20 MHz Bandwidth		0.6	1	ps
Absolute Pull Range <sup>1,2</sup>	$\Delta f/f_c$	Min. guaranteed frequency pull over $\Delta f/f_c$  -40°C to +85°C			$\pm 20$ $\pm 50$ $\pm 100$	ppm
Control Voltage	V <sub>C</sub>	Centered = 1/2 (V <sub>CC</sub> )		1.25, 1.65		V
Control Voltage Range		Positive slope; 10% linearity			V <sub>CC</sub>	V
Input Impedance	Z			500		kΩ
Modulation Bandwidth	BW	-3db	20			kHz
Start-Up Time	t <sub>start</sub>	T <sub>a</sub> =25°C			10	ms
Enable	En	Min (logic 1 or open) HCMOS levels	0.7V <sub>CC</sub>			V
Disable <sup>3</sup>	Dis	Max (logic 0) HCMOS levels			0.3	V
OE Function OE Pin Input LVCMOS/ LVTTTL	Input Capacitance	C <sub>IN</sub>		4		pF
	Input High Voltage	V <sub>IH</sub>	0.7V <sub>CC</sub>			V
	Input Low Voltage	V <sub>IL</sub>			0.3V <sub>CC</sub>	V
	Input High Current	I <sub>IH</sub>			5	μA
	Input Low Current	I <sub>IL</sub>		-10		μA
	Equivalent Internal Pull-up Resistance	R <sub>PULLUP</sub>			900	
Aging		First year			±5	ppm
		Year thereafter			±2	
Operating Temperature <sup>1</sup>	T <sub>a</sub>		-40		+85	°C
Storage Temperature	T <sub>(stg)</sub>	Absolute max	-45		+100	°C
Absolute Voltage Range	V <sub>CC(abs)</sub>				4.6	V
Moisture Sensitivity Level	MSL	JEDEC J-STD-020			1	
Termination Finish				Au		
ESD Sensitivity	HBM	Human body model JESD22-A114			3	kV

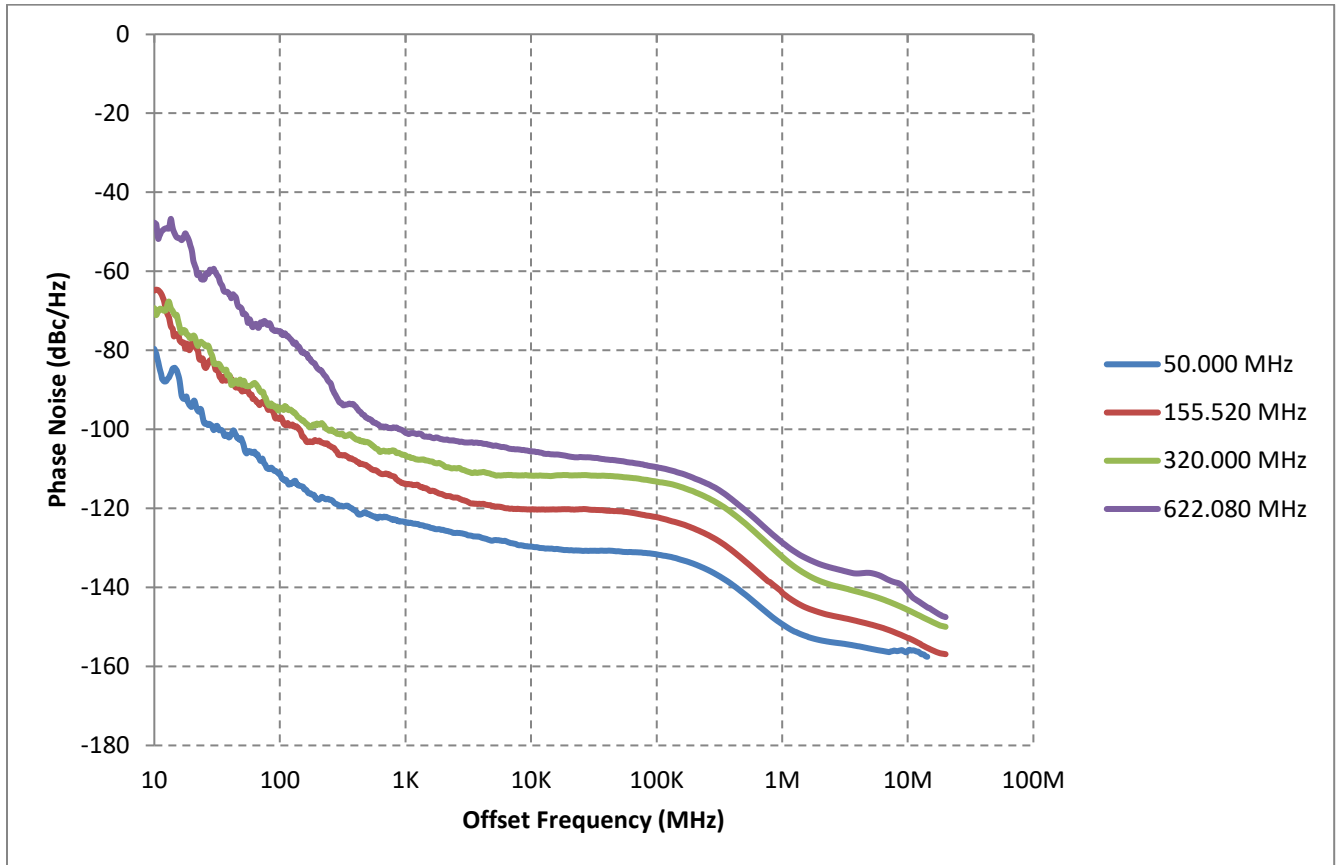
**Notes**

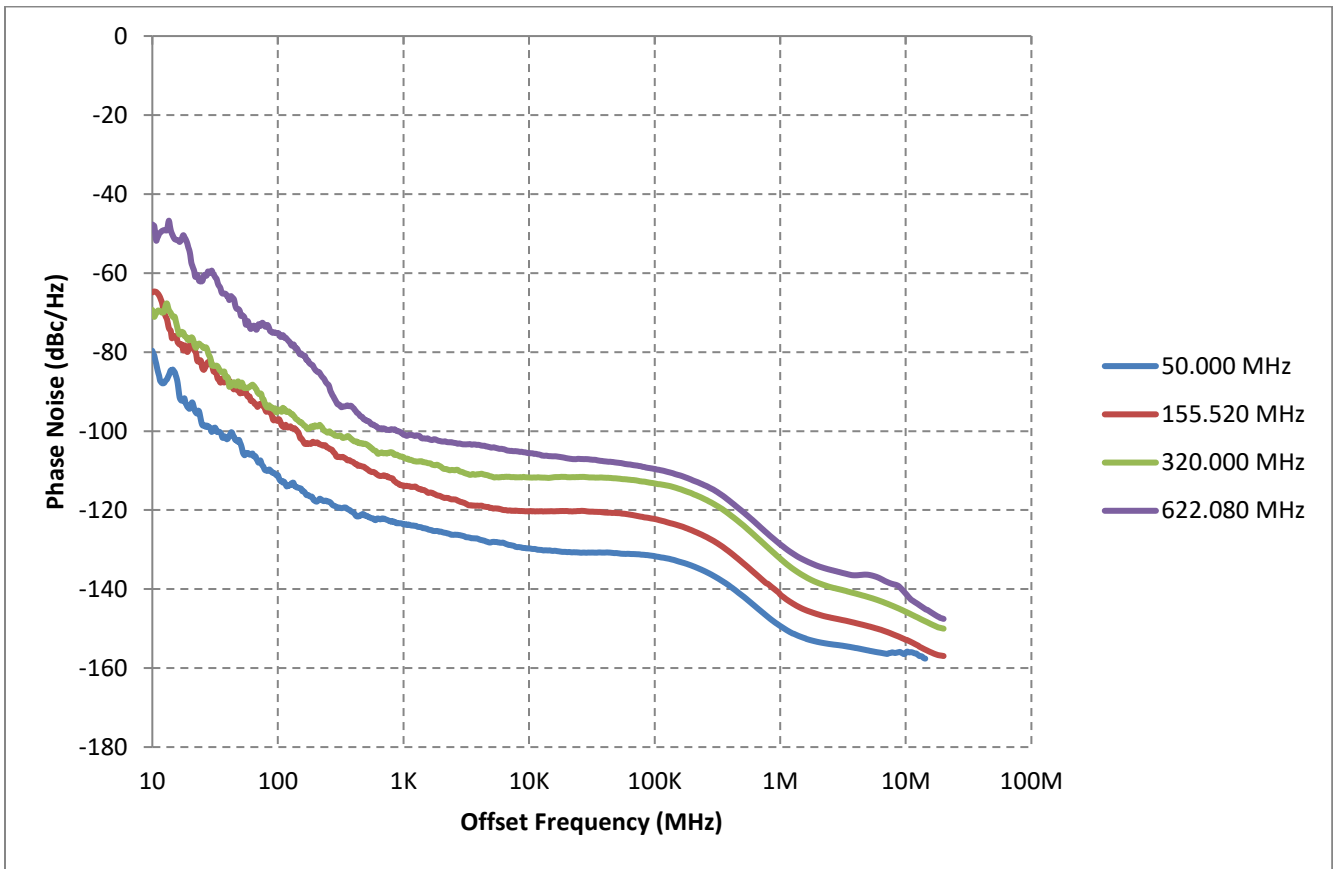
<sup>1</sup> See part numbering table

<sup>2</sup> Inclusive of 25°C calibration, tolerance, operating temperature range, input voltage variation, load change, aging, shock and vibration

<sup>3</sup> Output goes to high impedance

## PHASE NOISE AND JITTER PERFORMANCE



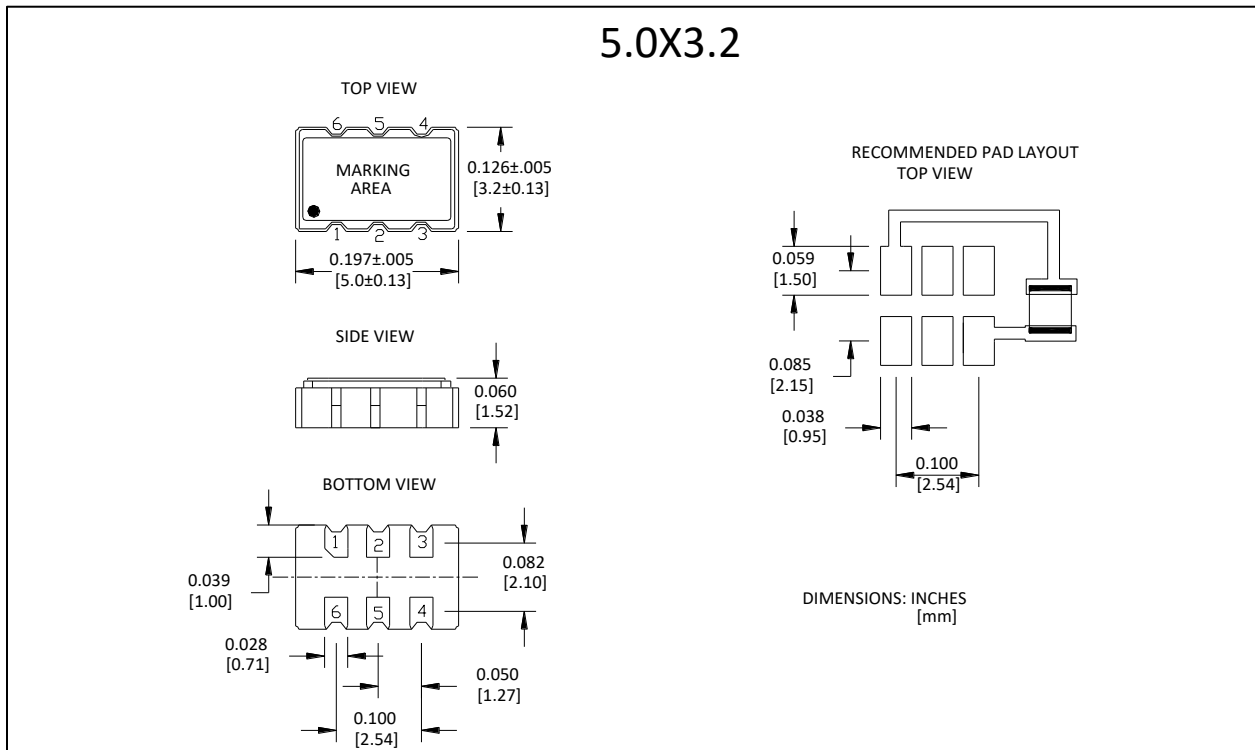
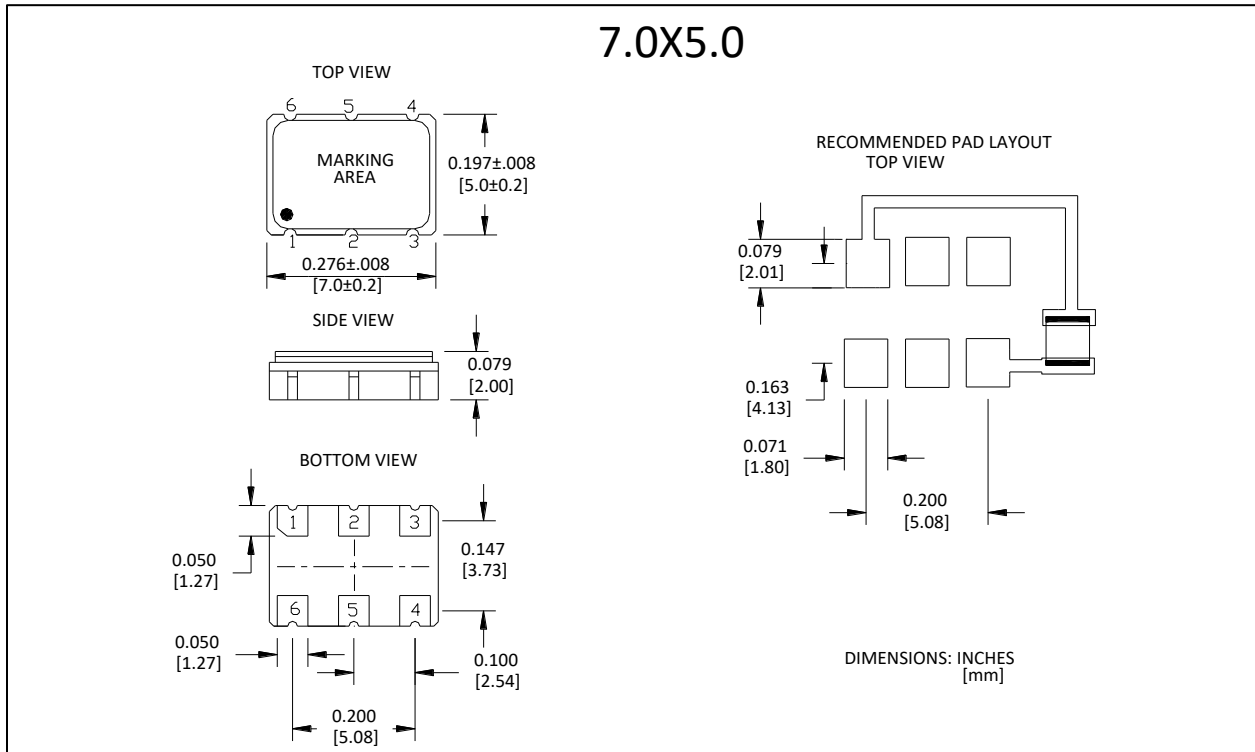


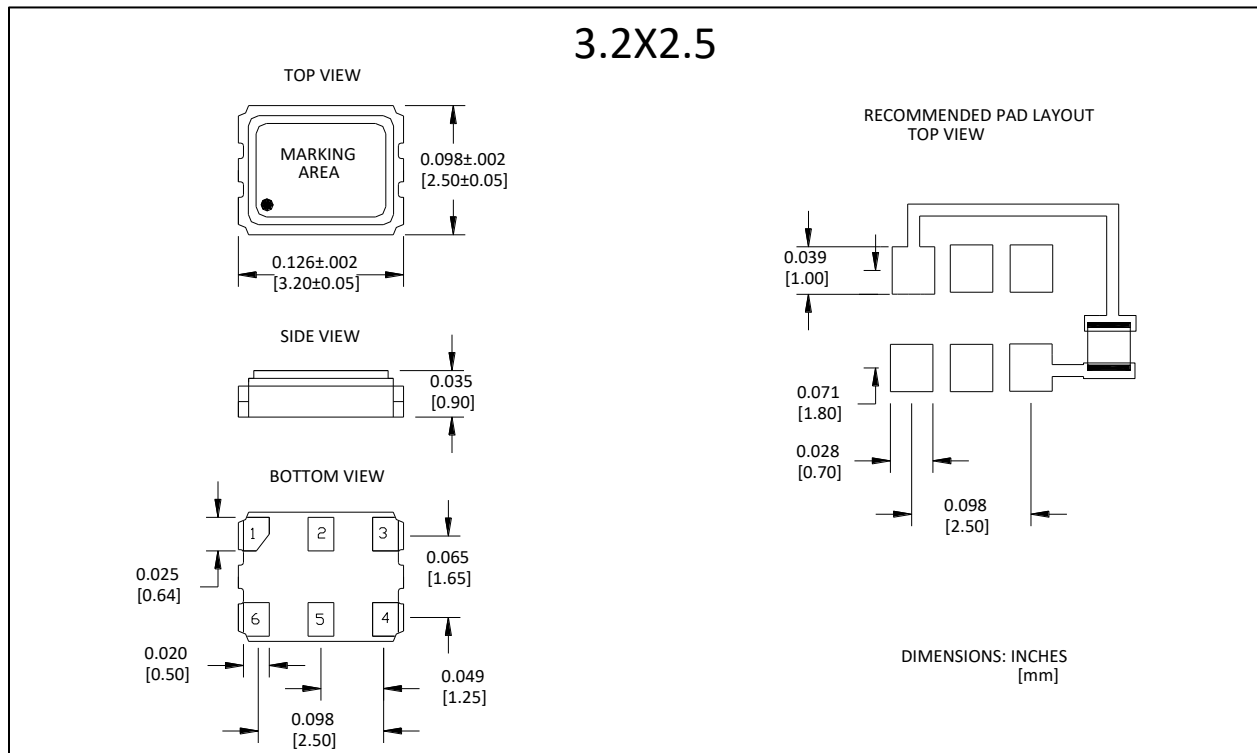
Data collected using Agilent E5052B signal source analyzer.  $V_{cc} = 2.5V$ .

FREQUENCY (MHz)	FULL BANDWIDTH PHASE JITTER (ps)	PHASE JITTER 12 kHz to 20 MHz INTEGRATED BANDWIDTH (ps RMS)
50.000	3.0	0.9
155.520	2.1	0.6
320.000	3.2	0.7
622.080	3.3	0.7

Phase jitter integrated using Agilent E5052B signal source analyzer.  $V_{cc} = 2.5V$  (LVCMOS, LVDS, LCPECL – load)

### MECHANICAL DIMENSIONS AND PIN FUNCTIONING





**Notes (Applicable To All Packages)**

- <sup>1</sup> Enable / Disable feature is available on either pin 1 or pin 2. See options on part numbering table.
- <sup>2</sup> There is no enable/disable option when the number of output frequencies is four.
- <sup>3</sup> 0.01  $\mu$ F external bypass capacitor is recommended as seen in solder pattern for 7 x 5 mm, and required for 5 x 3.2 and 3.2 x 2.5 mm

PIN	SYMBOL	FUNCTION
1	$V_c$	Control Voltage
2	see below	Refer to Pin Logic Table Below
3	GND	Case and Electrical Ground
4	Output 1	Output 1
5	Output 2 or NC	Complementary Output (LVPECL, LVDS) or N/C (LVCMOS)
6	$V_{cc}$	Power Supply Voltage

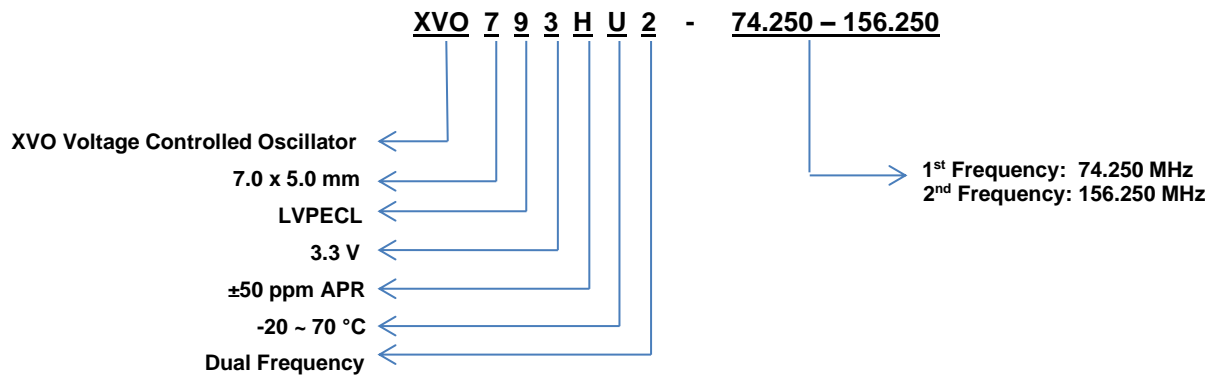
PIN LOGIC TABLE			
NUMBER OF FREQUENCIES	PIN 1	PIN 2	FREQUENCY OUTPUT
1	Control Voltage	N/C or "1" Logic Level	$F_1$
		"0" Logic Level	Output Disabled
2	Control Voltage	"0" Logic Level	$F_1$
		"1" Logic Level	$F_2$



## PART NUMBERING

SERIES	PACKAGE (mm)	OUTPUT	SUPPLY VOLTAGE (V)	APR (ppm)	TEMP RANGE (°C)	NUMBER OF FREQUENCIES	-	OUTPUT FREQUENCY (MHz)
XVO	7: 7.0 x 5.0 5: 5.0 x 3.2 3: 3.2 x 2.5	4: LVCMOS 8: LVDS 9: LVPECL	2: V <sub>cc</sub> = 2.5 3: V <sub>cc</sub> = 3.3	K: ±20 H: ±50 J: ±100	U: -20~70 V: -40~85	1: Single 2: Dual	-	F <sub>1</sub> F <sub>1</sub> - F <sub>2</sub>

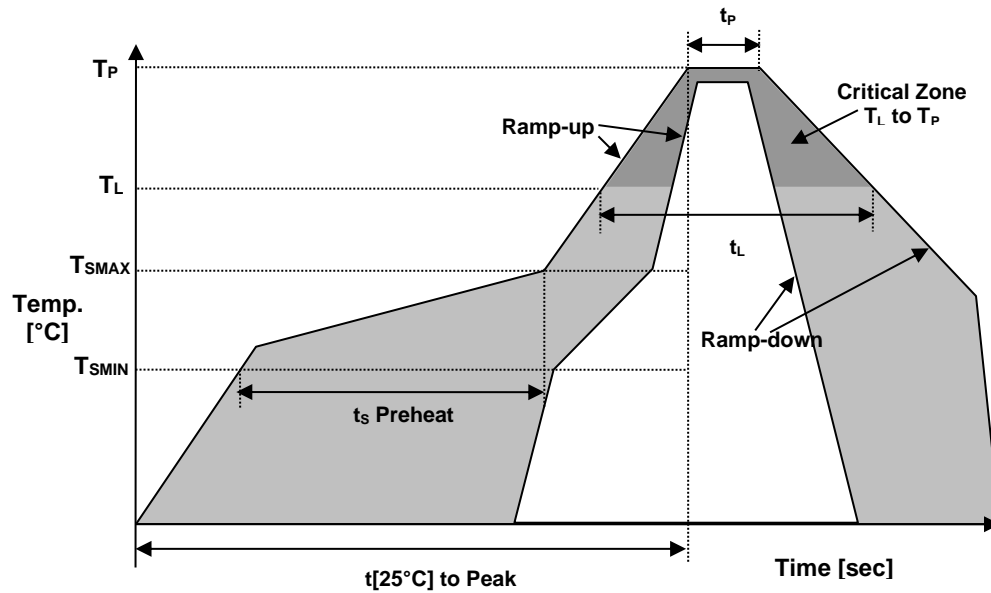
### EXAMPLE:



## MARKING

- A marking code will be issued by the sales department at order confirmation.

## REFLOW PROFILE



Recommended Solder Reflow Profile		
Temperature Min Preheat	$T_{SMIN}$	150°C
Temperature Max Preheat	$T_{SMAX}$	175°C
Time ( $T_{SMIN}$ to $T_{SMAX}$ )	$t_s$	60-180 sec.
Temperature	$T_L$	217°C
Peak Temperature	$T_P$	260°C
Ramp-up rate	$R_{UP}$	3°C/sec max.
Ramp-down rate	$R_{DOWN}$	6°C/sec max.
Time within 5°C of Peak Temperature	$t_p$	10 sec max.
Time $t[25^\circ\text{C}]$ to Peak Temperature	$t[25^\circ\text{C}]$ to Peak	480 sec.
Time	$t_L$	60-150 sec.

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