

**VSMF SERIES: Multi-Frequency Voltage Control Crystal Oscillator with Low Jitter Output  
10MHz – 1200MHz**
**■ PRODUCT DESCRIPTION**

The VSMF clock series is a cutting edge family of High Frequency, Low Jitter Output, Multi-Frequency VCXO based on an advanced digital PLL platform. The VSMF oscillators are available in a 7x5mm ceramic package with output frequency from 10MHz to 1.2 GHz. The VSMF units are pre-programmed with up to 2 different output frequencies, any of which are user selected. Such flexibility significantly reduces design cycle time and overall cost. The VSMF oscillator design incorporates a low frequency crystal along with low Jitter frequency synthesizer to provide a wide range of frequencies. The VSMF Clocks are available in LVCMOS, LVPECL and LVDS outputs, making them suitable for a wide range of applications.

**■ APPLICATION**

- SONET/SDH
- FIBRE CHANNEL
- 10G,100G, GIGABIT ETHERNET
- CLOCK / DATA RECOVERY
- TEST AND MEASUREMENT

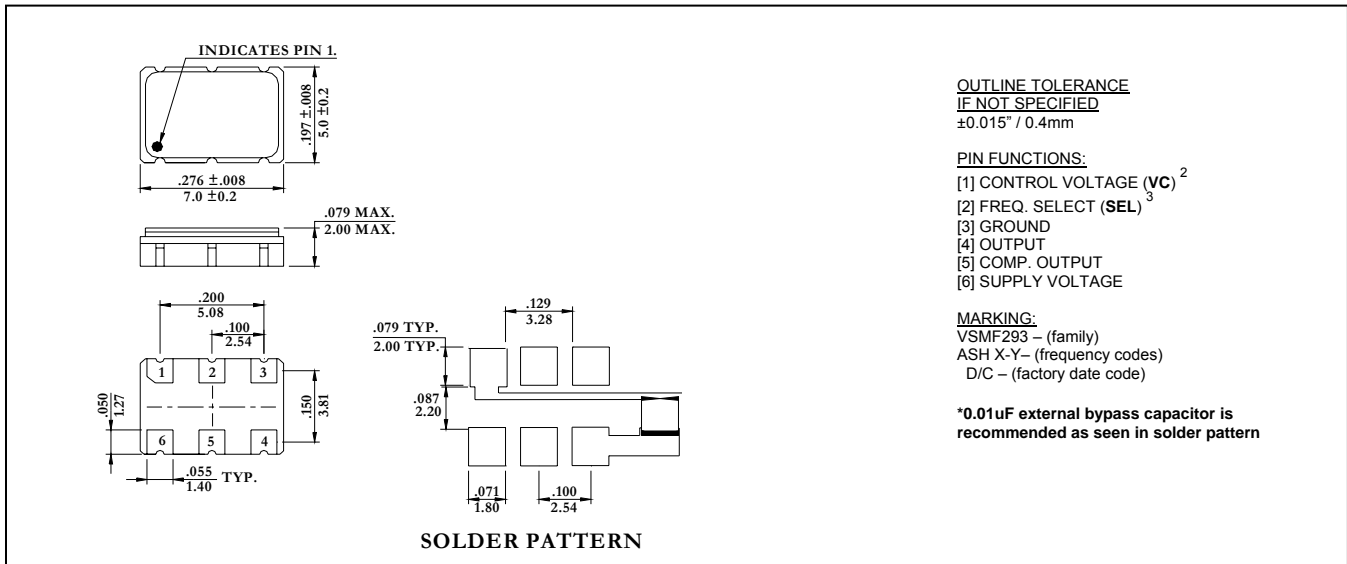
**■ ELECTRICAL SPECIFICATION**

PARAMETER	SYMBOL	CONDITIONS	VALUE	UNIT
Frequency, nominal	$f_o$	Up to 2 available output frequencies	10 -1200	MHz
Supply voltage, nom.	$V_{CC}$		2.5 or 3.3	V
Supply current	$I_s$	Typical (depending on output)	35 ~ 45	mA
LVPECL output levels	VOH	Output termination 50Ω ~ Vcc - 2.0V	$V_{cc} - 1.4 \sim V_{cc} - 0.9$	V
	VOL		$V_{cc} - 2.0 \sim V_{cc} - 1.7$	V
LVPECL output voltage swing	$V_{p-p}$	Output termination 50Ω ~ Vcc - 2.0V	0.6 ~ 1.0	V
LVDS differential output voltage	$\Delta V_{OD}$	100Ω termination between outputs	350	mV
LVDS offset voltage, typical	$V_{OS}$		1.25	V
LVCMOS / LVTTTL output levels	VOH / VOL	min/max	$0.7V_{cc} / 0.3V_{cc}$	V
Duty cycle	DC	Load = 10kΩ // 20pF	40/60 or 45/55	%
Rise/ fall time, max.	tr / tf	20% - 80% (VOL, VOH)	0.6	ns
Absolute Pull Range	APR	Min guaranteed freq. pull over $\Delta f/f_c$	$\pm 32,50,80,100$	ppm
Control Voltage	VC	Centered = $\frac{1}{2}(V_{cc})$	1.25, 1.65	V
Control Voltage Range		Positive Slope; 10% Linearity, max	$0.3 \sim 0.9(V_{cc})$	V
Modulation Bandwidth, min	BW	-3dB	10	KHz
RMS phase jitter	J	Typical	0.8	ps
Overall freq. stability, max. <sup>1</sup>	$\Delta f/f_c$	Various available, specified when ordered	$\pm 20 \sim \pm 100$ .	ppm
Enable / Disable	En / Dis	Min (logic 1) / Max (logic 0)	$0.7(V_{cc}) / 0.3(V_{cc})$	V
Operating temperature	Ta		-40 ~ +85	°C
Storage temperature	T(stg)	Absolute max	-45 ~ +100	°C
Absolute voltage range	$V_{cc}(abs)$		$V_{cc} \pm 0.5$	V

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

<sup>2</sup>Contact factory

### MECHANICAL SPECIFICATION



#### Notes

<sup>2</sup> V<sub>C</sub> available on pin 1 or 2. See options on part numbering table.

<sup>3</sup> Frequency Select pin (SEL)

Logic 1 (NC) = Output Frequency 1 (First frequency listed in part # is automatically available. Customer specified at time of order)

Logic 0 = Output Frequency 2 (Second frequency listed in part # is available. Customer sets SEL pin to Low)

### PART NUMBERING SYSTEM:

SERIES	NUMBER OF OUTPUTS	OUTPUT	SUPPLY VOLTAGE (V)	SYMMETRY (%)	TEMP RANGE (°C)	APR (ppm)	V <sub>C</sub> and SEL Option	OUTPUT FREQUENCY (MHz)
Surface mount Multi-frequency Clock Oscillator	1: Single Output 2: Dual Output	9: LVPECL 8: LVDS 4: LVCMOS	1: V <sub>CC</sub> = 2.5 3: V <sub>CC</sub> = 3.3	A: 40/60 T: 45/55	R: 0~50 S: 0~70 U: -20~70 V: -40~85	F: ±32 H: ±50 G: ±80 J: ±100 <sup>4</sup>	1 <sup>5</sup> : Pin 1 = V <sub>C</sub> 2: Pin 1 = SEL	XXX.XXX-YYY.YYY Freq1- Freq 2
<b>VSMF</b>	<b>2</b>	<b>9</b>	<b>3</b>	<b>A</b>	<b>S</b>	<b>H</b>	<b>2</b>	<b>-</b>
								<b>XXX-YYY</b>

#### Notes

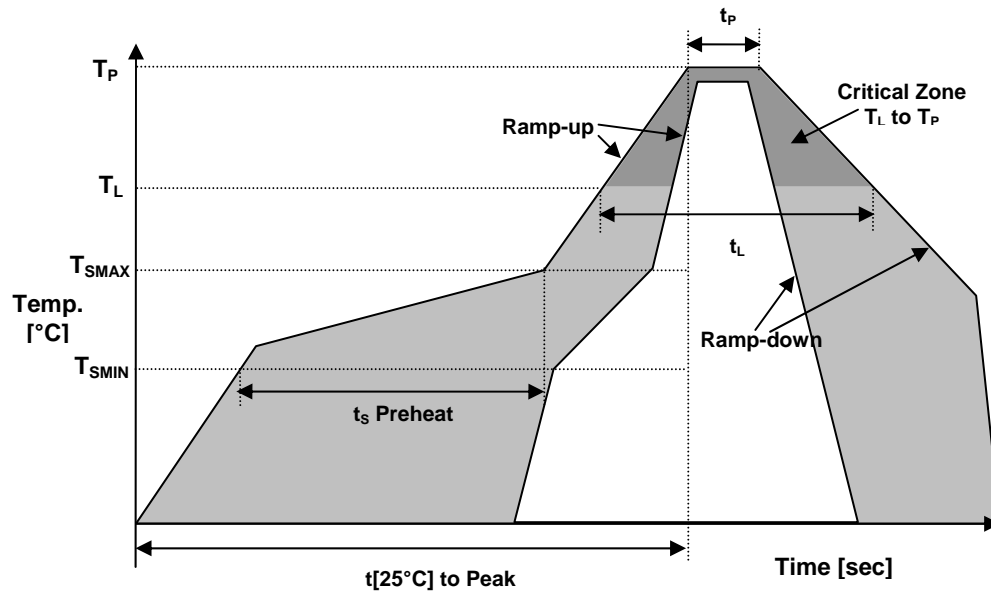
<sup>4</sup> ± 100ppm APR may not be available with all frequencies and operating temperature ranges

<sup>5</sup> Pin 1 = V<sub>C</sub> is default configuration.

#### EXAMPLE: VSMF293ASH2-622-311

Clock Oscillator, 7x5mm package, Dual output, LVPECL, +3.3V Supply, 40/60 Symmetry, 0~+70°C Operating Temperature Range, ±50ppm APR, Select on pin 1, 622.080 MHz and 311.040MHz output frequency.

REFLOW PROFILE:



Reflow profile IPC/JEDEC J-STD-020 REV. C			
Temperature Min Preheat	$T_{SMIN}$		150°C
Temperature Max Preheat	$T_{SMAX}$		200°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	$t_p$		20-40 sec.
Time t[25°C] to Peak Temperature	t[25°C] to Peak		480 sec.
Time	$t_L$		60-150 sec.