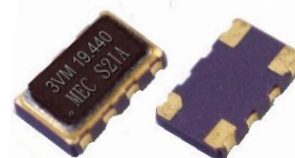


# Temperature Compensated Crystal Oscillators [ TCXO " M " and VCTCXO " VM " ]

Clipped Sine Wave ; Wave form code " S " [ SMD Type ]

## Features

- Frequency stability as tight as  $\pm 0.5$  ppm over  $-30^{\circ}\text{C}$  to  $85^{\circ}\text{C}$
- Frequency stability as tight as  $\pm 1.0$  ppm over  $-40^{\circ}\text{C}$  to  $85^{\circ}\text{C}$



General Specifications [  $T_A = +25^{\circ}\text{C}$  ,  $V_{DD} =$  at specified voltage , Load : 10K ohms/10 pF ]

Output Wave Form	Clipped Sine wave . Wave form code is " S "			
Suggested package ( SMD type )	<b>M22S , VM22S</b>	<b>M32S , VM32S</b>	<b>M53S , VM53S</b>	<b>M57S , VM57S</b>
Pads	4	4	4	4
Package size	2.5 x 2.0 x 0.8 mm	3.2 x 2.5 x 1.0 mm	5.0 x 3.2 x 1.3 mm	7.0 x 5.0 x 2.0 mm
Supply voltage ( $V_{DD}$ ) [ unit : V ]	1.8 , 2.5 , 2.8 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3	2.5 , 3.0 , 3.3 , 5.0	3.3 , 5.0
Frequency Range	10.0 ~ 52.0 MHz	8.192 ~ 52.0 MHz	6.4 ~ 52.0 MHz	1.25 ~ 52.0 MHz

Suggested package ( SMD type )	<b>M572S , VM572S</b>	<b>M43S , VM43S</b>	<b>M63S , VM63S</b>	<b>M47S , VM47S</b>
Pads	4	4	6	4 ( Gull - Wing )
Package size	7.0 x 5.0 x 2.3 mm	11.4 x 9.6 x 3.0 mm	11.4 x 9.6 x 3.0 mm	22.4 x 11.7 x 4.7 mm
Supply voltage ( $V_{DD}$ ) [ unit : V ]	3.3 , 5.0	2.5 , 3.0 , 3.3 , 5.0	2.5 , 3.0 , 3.3 , 5.0	2.5 , 3.0 , 3.3 , 5.0
Frequency Range	6.4 ~ 52.0 MHz	6.4 ~ 40.0 MHz	6.4 ~ 40.0 MHz	6.4 ~ 40.0 MHz

Standard Frequency ( Partial list ) [ MHz ]	10.000	12.800	13.000	14.400	14.7456	15.360	16.367667
	16.384	19.200	19.440	20.000	25.000	26.000	27.000
Initial Calibration Tolerance	$< \pm 1$ ppm. at $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$						
Frequency Stability ( ppm )	$\pm 0.5$ ppm	$\pm 1.0$ ppm	$\pm 1.5$ ppm	$\pm 2.0$ ppm	$\pm 2.5$ ppm	$\pm 3.0$ ppm	
Frequency Stability vs Temperature ( examples )	$0^{\circ}\text{C}$ to $50^{\circ}\text{C}$	○	○	○	○	○	○
	$-10^{\circ}\text{C}$ to $60^{\circ}\text{C}$	△	○	○	○	○	○
	$-20^{\circ}\text{C}$ to $70^{\circ}\text{C}$	△	○	○	○	○	○
	$-30^{\circ}\text{C}$ to $75^{\circ}\text{C}$	△	○	○	○	○	○
	$-30^{\circ}\text{C}$ to $85^{\circ}\text{C}$	△	○	○	○	○	○
	$-40^{\circ}\text{C}$ to $85^{\circ}\text{C}$	△	△	○	○	○	○
Frequency Stability	vs Aging	$\pm 1.0$ ppm / year max. at $25^{\circ}\text{C}$					
	vs Voltage Change	$\pm 0.2$ ppm max. , for a $\pm 5\%$ input voltage change .					
	vs Load Change	$\pm 0.2$ ppm max. , for a $\pm 10\%$ load condition change .					
	vs Reflow ( SMD type )	$\pm 1.0$ ppm max. , 1 reflow and measured 24 hours afterwards .					
Output Voltage Level ( peak to peak )	0.8 V p-p ( min. )						
Current Consumption. ( max. )	10.0 ~ 15 MHz: 1.5 mA max.		15.1 ~ 26.0 MHz : 2.0 mA		26.1 ~ 52.0 MHz : 3.5 mA		
Electrical Frequency Tuning ( EFC ) by external control voltage	Control Voltage Center	1.8 V	0.9 V $\pm$ 0.6 V		2.5 V	1.4 V $\pm$ 1.0 V	
		3.0 V	1.5 V $\pm$ 1.0 V		5.0 V	1.5 V $\pm$ 1.0 V	
	Frequency Deviation Range	$\pm 5.0$ ppm ( min. ) , $V_{\text{control}} = +1.5 \text{ V} \pm 1.0 \text{ V}$					
	Slope Polarity ( Transfer Function )	Positive slope. Positive voltage for positive frequency shift.					
	Input Impedance : 1.0M $\Omega$ min.		Modulation Bandwidth : 3 KHz min.		Linearity : $\pm 10\%$ max.		
Start-Up Time.	2.0 m sec. ( typ. ) , 5.0 m sec. ( max. ) ( reach 90% amplitude and at $+25^{\circ}\text{C} \pm 2^{\circ}\text{C}$ )						
Output Load	10 K $\Omega$ // 10 pF $\pm 10\%$						
Phase Noise ( 13.0 MHz as example ) [ dBc / Hz ; typical ]	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz		
	-80	-115	-135	-148	-148		
Storage Temperature	$-40^{\circ}\text{C}$ to $+85^{\circ}\text{C}$ or $-55^{\circ}\text{C}$ to $+125^{\circ}\text{C}$ ( package dependent )						

Mercury [www.mercury-crystal.com](http://www.mercury-crystal.com) ■ Taiwan : Tel: (+886)-2-2406-2779 / sales-tw@mercury-crystal.com

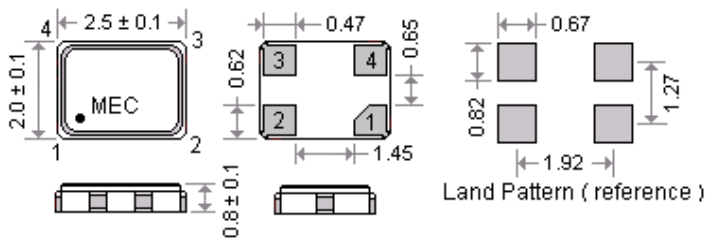
■ USA : Tel: (+1)-909-466-0427 / sales-us@mercury-crystal.com ■ China : Tel: (+86)-512-5763-8100 / sales-cn@mercury-crystal.com

# Temperature Compensated Crystal Oscillators [ TCXO " M " and VCTCXO " VM " ]

Clipped Sine wave output code " S " [ SMD Type ]

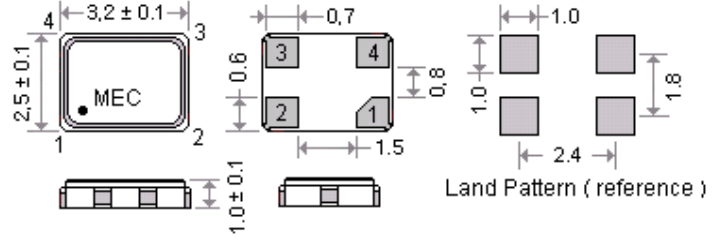
Outline Dimensions ( Unit : mm ) , Suggested pad Layout for SMDs

[ M22S \_\_ ] ; [ VM22S \_\_ ]



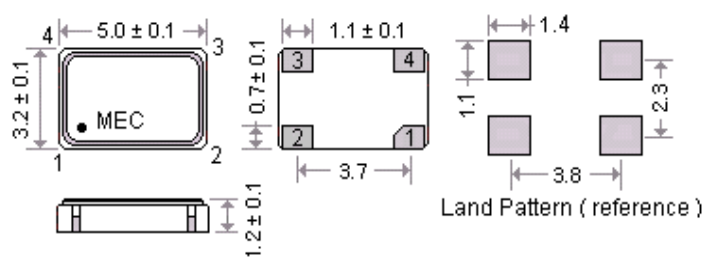
Pad Connections :  
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .  
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[ M32S \_\_ ] ; [ VM32S \_\_ ]



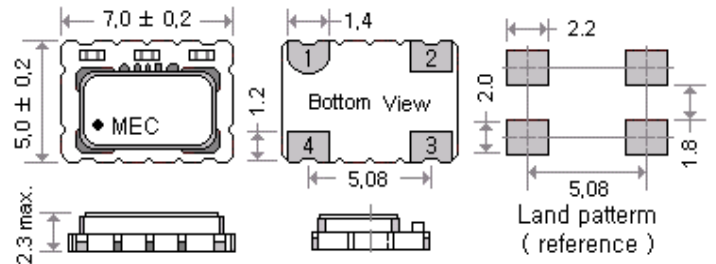
Pad Connections :  
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .  
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[ M53S \_\_ ] ; [ VM53S \_\_ ]



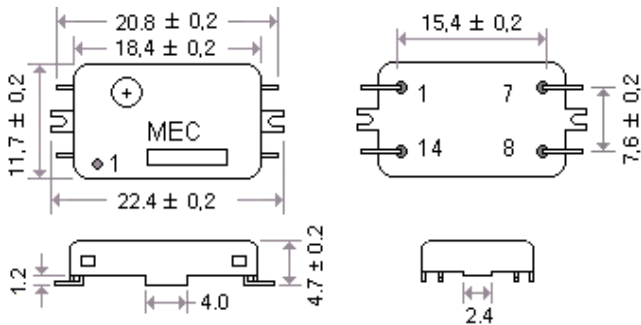
Pad Connections :  
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .  
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[ M572S \_\_ ] ; [ VM572S \_\_ ]



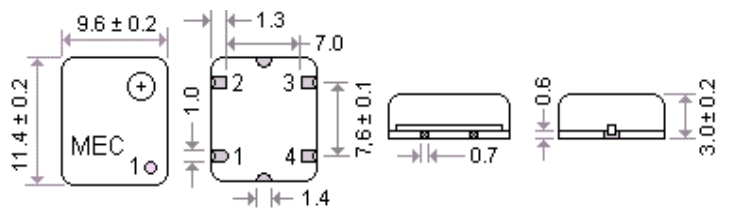
Pad Connections :  
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .  
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[ M47S \_\_ ] ; [ VM47S \_\_ ]



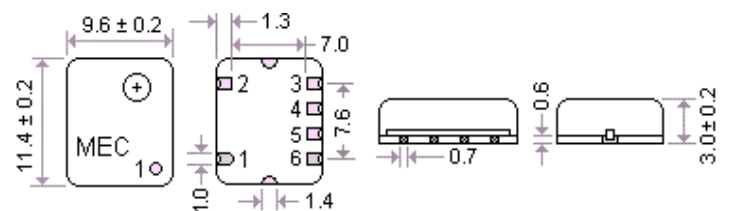
Pad Connections :  
 Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.  
 Pad 7 : Ground ; Pad 8 : Output , Pad 14 : Supply Voltage

[ M43S \_\_ ] ; [ VM43S \_\_ ]



Pad Connections :  
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .  
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[ M63S \_\_ ] ; [ VM63S \_\_ ]



Pad Connections :  
 Pad 1, 2, 4 : Ground , Pad 3 : Output , Pad 6 : Supply Voltage  
 Pad 5 : Control voltage for VCTCXO. Make no connection if TCXO.

# Temperature Compensated Crystal Oscillators [ TCXO " M " and VCTCXO " VM " ]

Clipped Sine wave output code " S "

## Part Number Format and Example

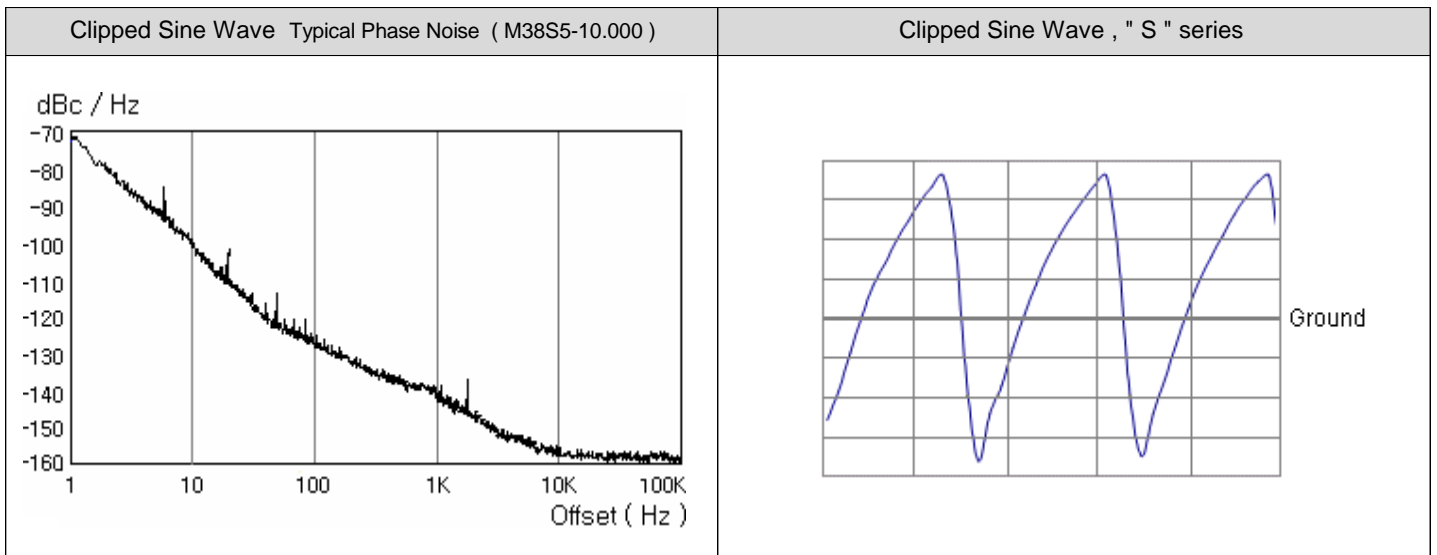
	[ 1 ]	[ 2 ]	[ 3 ]		[ 4 ]		[ 5 ]		[ 6 ]
	Holder Type	Output Wave	Supply Voltage	-	Center Frequency	-	Frequency Stability	/	Operating Temp. Range

Examples	(1)	(2)							
	V M 39	M 32	S	-	5	-	10.000	-	1.5 / -20+70
	M 32	M 32	S	-	18	-	20.000	-	2.5 / -30+75

Ex (1) : VM39S5 - 10.000 - 1.5 / -20+70 [ VCTCXO , VM39 type , Clipped Sine Wave , 5.0V , 10.000MHz , ±1.5ppm from -20°C to 70°C ]

Ex (2) : M32S18 - 20.000 - 2.5 / -30+75 [ TCXO , M32 type , Clipped Sine Wave , 1.8V , 20.000MHz , ±2.5ppm from -30°C to 75°C ]

[ 1 ]	Holder Type " M " stands for TCXO , " VM " stands for VCTCXO
[ 2 ]	" S " stands for Clipped Sine Wave ; " T " stands for Square Wave ; " D " stands for LVDS differential ; " P " stands for PECL differential
[ 3 ]	Supply voltage , " 18 " stands for +1.8V ; " 28 " stands for +2.8V ; " 3 " stands for +3.0V ; " 33 " stands for +3.3V ; " 5 " stands for +5.0V
[ 4 ]	Center Frequency in MHz
[ 5 ]	Frequency stability in ± _ ppm ; ex 1 : ± 2.5ppm --- 2.5 , ex 2 : ± 1.0ppm --- 1.0
[ 6 ]	Operating temperature range in °C ex 1 : -10 °C to 60°C ----- -10+60 ; ex 2 : -20 °C to 70°C ----- -20+70 ; ex 3 : -30 °C to 85°C ----- -30+85



## ( VC )TCXO with clipped sine wave Test Circuits : Ex. VM14S5

