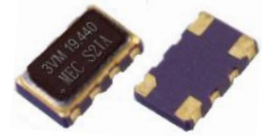


Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

Clipped Sine Wave ; Waveform Code " S " [SMD Type]

Features

- Frequency stability as tight as ± 0.5 ppm over -30°C to 85°C
- Frequency stability as tight as ± 1.0 ppm over -40°C to 85°C



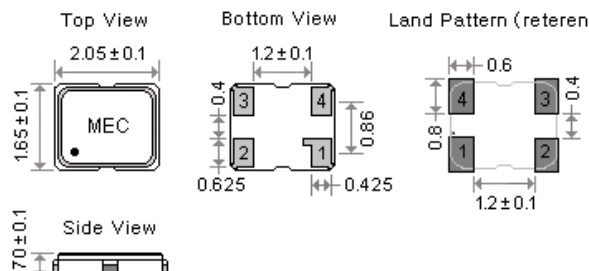
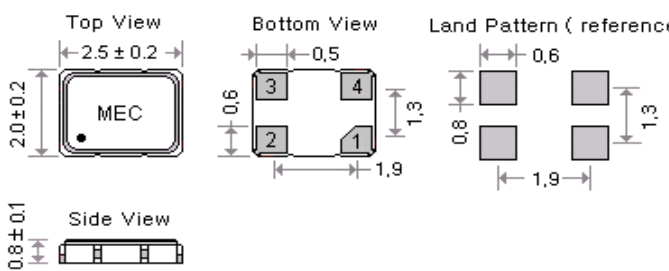
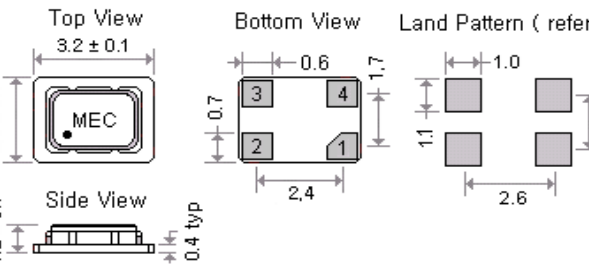
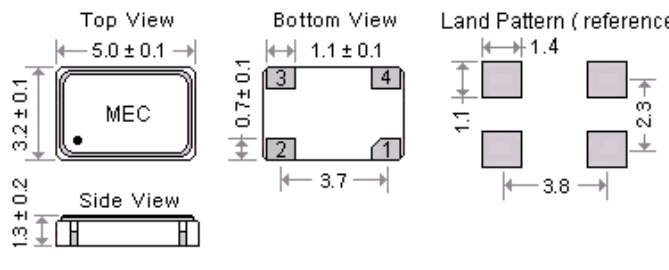
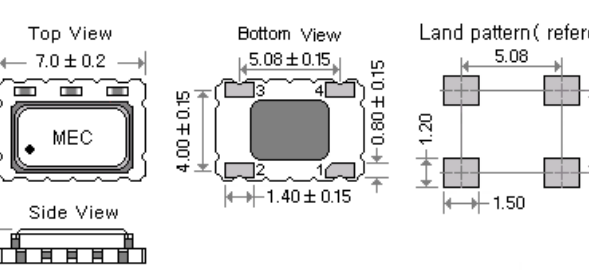
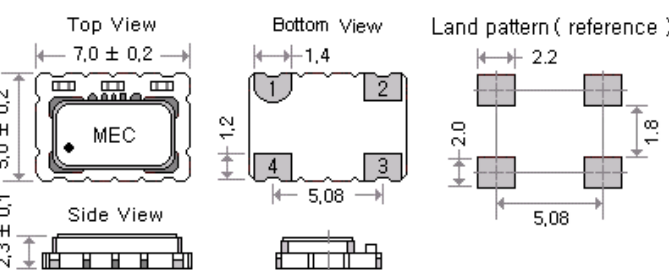
General Specifications [$T_A = +25^{\circ}\text{C}$, V_{DD} = at specified voltage , Load : 10K ohms//10 pF]

Output Waveform		Clipped Sine wave . Waveform code is “ S ”							
Suggested package		M21S , VM21S	M22S , VM22S	M32S , VM32S	M53S , VM53S				
Package size		2.05 x 1.65 x 0.70 mm	2.5 x 2.0 x 0.8 mm	3.2 x 2.5 x 1.2 mm	5.0 x 3.2 x 1.3 mm				
Supply voltage (V _{DD}) [unit : V]		1.8 , 2.5 , 2.8 , 3.0 , 3.3	1.8 , 2.5 , 2.8 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3	1.8 , 2.5 , 2.8 , 3.0 , 3.3				
Frequency Range		10.0 ~ 52.0 MHz	10.0 ~ 52.0 MHz	8.192 ~ 52.0 MHz	6.4 ~ 52.0 MHz				
Suggested package		M57S , VM57S	M572S , VM572S	M53S-AB , VM53S-AB	M57S-AB , VM57S-AB				
Package size		7.0 x 5.0 x 1.9 mm	7.0 x 5.0 x 2.3 mm	5.0 x 3.2 x 1.3 mm	7.0 x 5.0 x 1.4 mm				
Supply voltage (V _{DD}) [unit : V]		2.5 , 3.0 , 3.3	1.8 , 2.5 , 2.8 , 3.0 , 3.3	1.8 , 2.5 , 2.8 , 3.0 , 3.3	1.8 , 2.5 , 2.8 , 3.0 , 3.3				
Frequency Range		6.4 ~ 52.0 MHz	6.4 ~ 52.0 MHz	10.0 ~ 52.0 MHz	10.0 ~ 52.0 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			< ± 1 ppm. at + 25°C ± 2°C						
Frequency Stability (ppm)			± 0.5 ppm	± 1.0 ppm	± 1.5 ppm	± 2.0 ppm	± 2.5 ppm	± 3.0 ppm	○ : available △ : contact us × : not available
Frequency Stability vs Temperature (examples)	0°C to 50°C	○	○	○	○	○	○		
	-10°C to 60°C	△	○	○	○	○	○		
	-20°C to 70°C	△	○	○	○	○	○		
	-30°C to 75°C	△	○	○	○	○	○		
	-30°C to 85°C	△	○	○	○	○	○		
	-40°C to 85°C	△	△	○	○	○	○		
Frequency Stability	vs Aging at Ta = +25°C	± 1.0 ppm / year (max.)							
	vs Voltage Change	± 0.2 ppm (max.) , for a ±5% input voltage change .							
	vs Load Change	± 0.2 ppm (max.) , for a ±10% load condition change .							
	vs Reflow (SMD type)	± 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 ; 15.1 ~ 26.0 MHz : 2.0 mA ; 26.1 ~ 52.0 MHz : 3.5 mA						
Electrical Frequency Tuning	Control Voltage Center	1.8 V		2.5 V		3.0 V / 3.3V			
(EFC) by external		0.9 V ± 0.6 V		1.4 V ± 1.0 V		1.5 V ± 1.0 V			
	Frequency Deviation Range	± 5.0 ppm (min.)							
	Slope Polarity (Transfer Function)	Positive slope. Positive voltage for positive frequency shift.							
Control Voltage		Input Impedance : 1.0M Ω (min.)		Modulation Bandwidth : 3 KHz (min.)		Linearity : ± 10 % (max.)			
Start-Up Time	2.0 msec. (typ.) , 5.0 msec. (max.) (reach 90% amplitude and at +25°C ± 2°C)								
Output Load	10 KΩ // 10 pF ± 10%								
Output Format	DC block , AC coupled. EX : (V) M53 and (V) M32 model.								
Phase Noise [dBc / Hz ; (typ.)]		Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz		
		13.000 MHz	-80	-115	-135	-148	-148		
Storage Temperature	-40°C to +85°C or -55°C to +125°C (package dependent)								

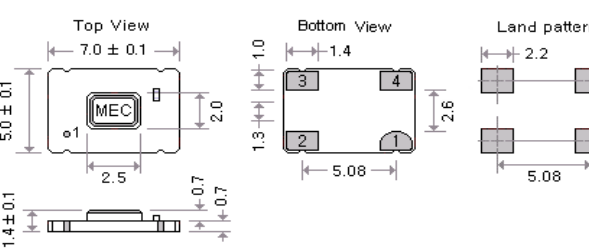
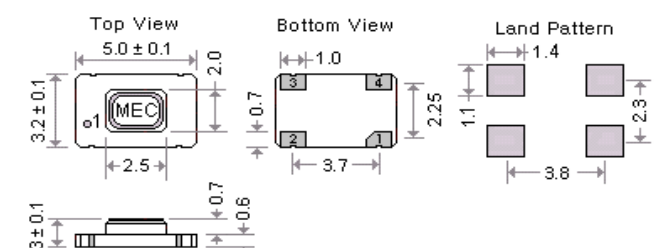
Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

Clipped Sine Wave Output Code " S " [SMD Type]

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

[M21S __] ; [VM21S __]	[M22S __] ; [VM22S __]
 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage	 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage
[M32S __] ; [VM32S __]	[M53S __] ; [VM53S __]
 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage	 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage
[M57S __] ; [VM57S __]	[M572S __] ; [VM572S __]
 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage	 Pad Connections : Pad 1 : Control voltage for VCTCXO ; Ground for TCXO . Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage

Outline Dimensions (Unit : mm) , Adapter Board Type

[M57S __ AB] ; [VM57S __ AB]	[M53S __ AB] ; [VM53S __ AB]
 Pad Connections : Pad 1 : Control voltage for VCTCXO ; No connection for TCXO Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage White marker is pad1 on PCB	 Pad Connections : Pad 1 : Control voltage for VCTCXO ; No connection for TCXO Pad 2 : Ground ; Pad 3 : Output ; Pad 4 : Supply Voltage White marker is pad1 on PCB

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]	-	[7]
	Holder Type	Output Wave	Supply Voltage		Center Frequency		Frequency Stability		Operating Temp. Range		Adapter Board
Examples	(1)	VM21	S	3	10.000	1.5	∕	-20+70			
	(2)	M32	S	18	20.000	2.5	∕	-30+75			
	(3)	VM57	S	33	10.000	1.0	∕	-20+70	-	AB	
	(4)	M53	S	18	16.384	2.5	∕	-40+85	-	AB	

Ex (1) : VM21S3 - 10.000 - 1.5 / -20+70 [VCTCXO , VM21 type , Clipped Sine Wave , 3.0V , 10.000MHz , ±1.5ppm from -20°C to 70°C]

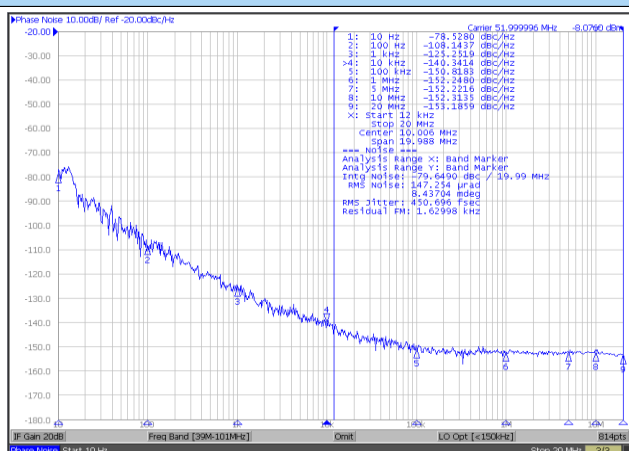
Ex (2) : M32S18 - 20.000 - 2.5 / -30+75 [TCXO , M32 type , Clipped Sine Wave , 1.8V , 20.000MHz , ±2.5ppm from -30°C to 75°C]

Ex (3) : VM57S33 - 10.000 - 1.0 / -20+70 - AB [VCTCXO , VM57 type , Clipped Sine Wave , 3.3V , 10.000MHz , ±1.0ppm from -20°C to 70°C , Adapter Board]

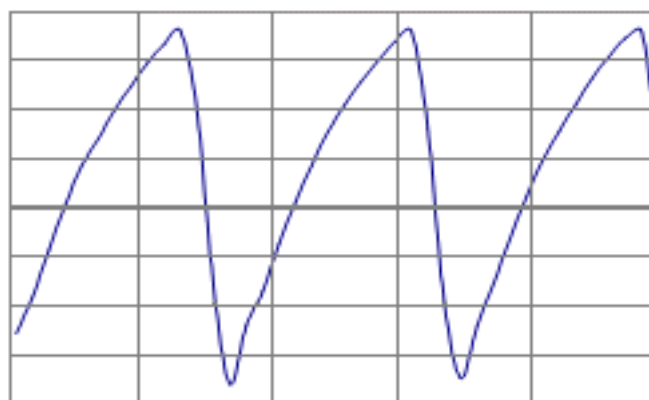
Ex (4) : M53S18 - 16.384 - 2.5 / -40+85 - AB [TCXO , M53 type , Clipped Sine Wave , 1.8V , 16.384MHz , ±2.5ppm from -40°C to 85°C , Adapter Board]

[1]	Holder Type " M " stands for TCXO , " VM " stands for VCTCXO
[2]	" S " stands for Clipped Sine Wave
[3]	Supply voltage , " 18 " stands for +1.8V ; " 25 " stands for +2.5V ; " 28 " stands for +2.8V ; " 3 " stands for +3.0V ; " 33 " stands for +3.3V
[4]	Center Frequency in MHz
[5]	Frequency stability in ±_ ppm ; ex 1 : ± 1.5ppm --- 1.5 , ex 2 : ± 2.5ppm --- 2.5 , ex 3 : ± 1.0ppm --- 1.0 , ex 4 : ± 2.5ppm --- 2.5
[6]	Operating temperature range in °C ex 1 : -20 °C to 70°C ----- -20+70 ; ex 2 : -30 °C to 75°C ----- -30+75 ; ex 3 : -20 °C to 70°C ----- -20+70 ; ex 4 : -40 °C to 85°C ----- -40+85
[7]	Adapter Board Type ----- AB

Clipped Sine Wave Typical Phase Noise (M22S33-52.000)

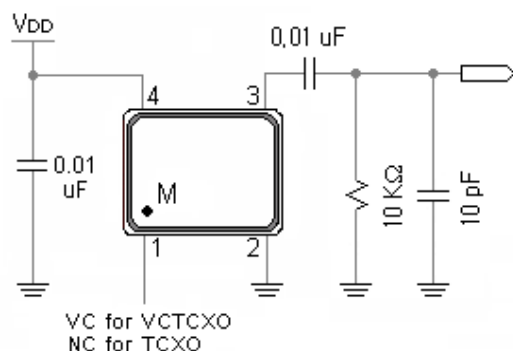


Clipped Sine Wave , " S " series

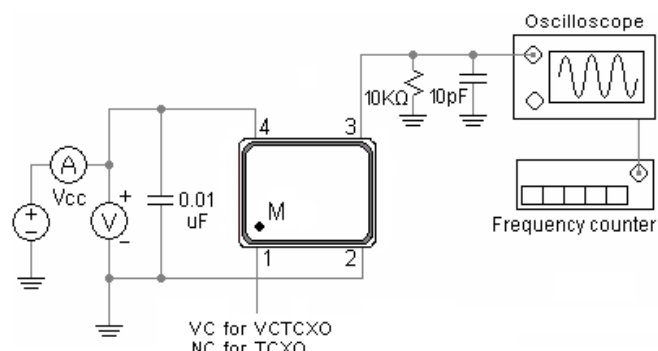


Test Circuits

(VC)TCXO with clipped sine wave Test Circuits



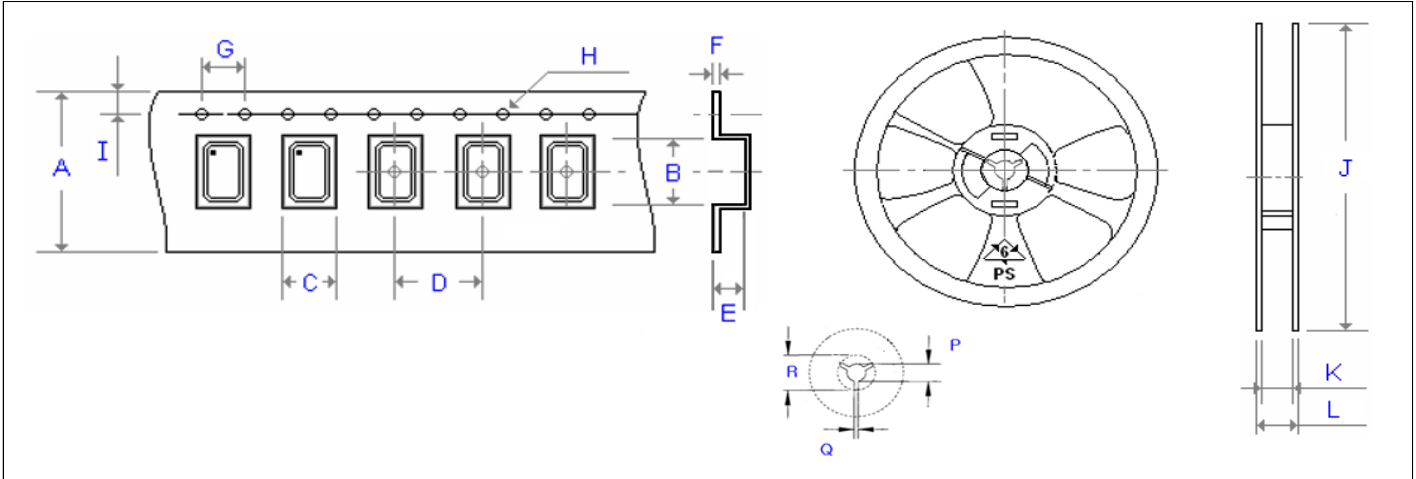
(VC)TCXO with clipped sine wave Test Circuits
For [(V)M57S] ; [(V)M572S] ; [(V)M57S __ AB] ; DIP Type



Emboss Taping and Reel Specifications

[VCXO]

[(VC)TCXO]



Carrier Type Dimensions (unit : mm) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
G_226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
G_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
G_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
G_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	Ø 1.50	1.75	3000
ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	Ø 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	Ø 1.50	1.75	3000
(V)M_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
(V)M_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	Ø 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	Ø 1.50	1.75	500

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	J	K	L	P	Q	R	pcs / reel
G_226	180.00	9.00	12.00	13.20	2.10	-	3000
G_326	180.00	9.00	12.00	13.20	2.10	-	3000
G_536	180.00	13.00	16.00	13.20	2.50	-	1000
G_576	180.00	17.20	19.30	13.30	2.20	22.00	1000
G_538	180.00	13.00	16.00	13.20	2.50	-	1000
G_578	180.00	17.20	19.30	13.30	2.20	22.00	1000
(V)M21	180.00	9.00	12.00	13.20	2.10	-	3000
ME21	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M22	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_32	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_326	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_53	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_538	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_57(2)	180.00	17.20	19.30	13.30	2.20	22.00	500
(V)M_43 (63)	330.00	24.50	29.10	13.00	2.20	17.30	500