

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

CMOS Output

TCXO	VCTCXO	KHz range	CMOS	Thru-Hole	SMD	15pF	3.3V	32.768 KHz
M _ T	VM _ T							

Features

- Wide frequency range : [32.768 KHz]
- Frequency stability as tight as ± 0.5 ppm over 0°C to 50°C
- Frequency stability as tight as ± 1.0 ppm over -40°C to 85°C



General specifications of all available packages , at Ta=+25°C , CL=15pF

Output Wave Form		Square wave [CMOS] . Wave form code is " T "					
Suggested Package (Size)	Type	SMD			Thru - Hold		
	Demensions	(V)M572T (7.0 x 5.0 x 2.3 mm)		(V)M8T (12.8 x 12.8 x 5.5 mm)	(V)M14T (20.2 x 12.8 x 7.0 mm)		
Frequency Range		32.768 KHz [From KHz with divider. mA current consumption.]					
Input Voltage Range	Standard	+3.3 V (voltage code is " 33 ")					
Output Logic Levels	Logic High " 1 "	2.97 V _{DD} min.					
	Logic Low " 0 "	0.33 V _{DD} max.					
Current Consumption. (max.) (Over operating temperature range .)		8.0 mA (max.) for 32.768 KHz at +3.3V					
Initial Calibration Tolerance		Models with mechanical trimmer : $< \pm 1.0$ ppm. +25°C ± 2 °C. Models without mechanical trimmer : $< \pm 2.0$ 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
Frequency Stability vs Temperature (examples)	0°C to 50°C	○	○	○	○	○	○
	-10°C to 60°C	△	○	○	○	○	○
	-20°C to 70°C	X	○	○	○	○	○
	-30°C to 75°C	X	○	○	○	○	○
	-30°C to 85°C	X	○	○	○	○	○
	-40°C to 85°C	X	△	○	○	○	○
		○ : available	△ : contact us	X : not available			
Frequency Stability	vs Aging	± 1.0 ppm max., per year at 25°C .					
	vs Voltage Change	± 0.3 ppm max. , for a $\pm 5\%$ input voltage change .					
	vs Load Change	± 0.3 ppm max. , for a $\pm 10\%$ load condition change .					
	vs Reflow (SMD type)	± 1.0 ppm max., 1 reflow and measured 24 hours afterwards .					
Mechanical Frequency Tuning	Standard	± 3.0 ppm (min.) tuning					
		Note: (V)M57 has no mechanical trimmer built -in.					
	Option	No mechanical trimmer built-in (for aqueous washing cycles). To order please add " 1 " after the regular model prefix . Example: M381					
Rise and Fall Time		10.0 n sec. max. Measured at 20% \leftrightarrow 80% of the wave form					
Electrical Frequency Tuning (EFC) by external control voltage	Control Voltage Center	Standard: +1.5 V ± 1.0 V for all input voltages.					
	Frequency Deviation Range	± 5.0 ppm. (min.) with Vcon = +1.5 V ± 1.0 V					
	Slope Polarity (Transfer Function)	Positive slope. Positive voltage for positive frequency shift.					
		Input Impedance : 1 M Ω min.		Modulation Bandwidth : 3 KHz min.		Linearity : $\pm 10\%$ max.	
Duty Cycle		50 % ± 5 %					
Start-Up Time.		10.0m sec. (typ.) , 5.0m sec. (max.) (reach 90% amplitude and at+25°C ± 2 °C)					
Output Load		15 pF					
Storage Temperature		-40°C to +85°C or -55°C to +125°C (package dependent)					

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

CMOS Output

TCXO	VCTCXO	MHz range	CMOS	SMD	15pF	2.5 V	3.0 V	Min.	Max.
M _ T	VM _ T					3.3 V	5.0 V	1.25 MHz	52.0 MHz

Features

- Wide frequency range : [1.25 MHz ~ 52.0 MHz]
- Frequency stability as tight as ± 0.5 ppm over 0°C to 50°C
- Frequency stability as tight as ± 1.0 ppm over -40°C to 85°C



General specifications of all available packages , at Ta=+25°C , CL=15pF

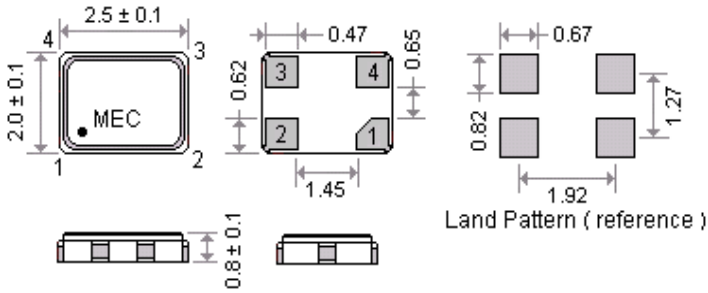
Output Wave Form		Square wave [CMOS] . Wave form code is " T "						
Type	M32T , VM32T		(V)M53T , VM53T		M572T , VM572T			
Package (Size)	(3.2 x 2.5 x 1.0 mm)		(5.0 x 3.2 x 1.3 mm)		(7.0 x 5.0 x 2.3 mm)			
Frequency Range	8.192 ~ 52.0 MHz		6.4 ~ 52.0 MHz		1.25 ~ 52.0 MHz			
Input Voltage Range	Standard		+2.5 V (code is " 25 ")	+3.0 V (code is " 3 ")	+3.3 V (code is " 33 ")	+5.0 V (code is " 5 ")		
Current Consumption. (max.) (Over operating temperature range .)	Package	M32T	6 mA	6 mA	6 mA	-----		
		M53T	6 mA	6 mA	6 mA	-----		
		M572T	10 mA	13 mA	13 mA	27 mA		
Output Logic Levels	Logic High " 1 " (min.)		2.25 V	2.7 V	2.97 V	4.5 V		
	Logic Low " 0 " (max.)		0.25 V	0.3 V	0.33 V	0.5 V		
Standard Frequency (Partial list) [MHz]			10.000	12.800	13.000	14.7456	16.000	16.384
			19.200	19.440	19.680	20.000	25.000	27.000
Initial Calibration Tolerance		Models with mechanical trimmer : $< \pm 1.0$ ppm. +25°C $\pm 2^\circ$ C. Models without mechanical trimmer : ± 2.0 ppm at +25°C $\pm 2^\circ$ C.						
Frequency Stability (ppm)		± 0.5 ppm	± 1.0 ppm	± 1.5 ppm	± 2.0 ppm	± 2.5 ppm	± 3.0 ppm	○ : available △ : please contact us X : not available
Frequency Stability vs Temperature (examples)	0°C to 50°C	○	○	○	○	○	○	
	-10°C to 60°C	△	○	○	○	○	○	
	-20°C to 70°C	X	○	○	○	○	○	
	-30°C to 75°C	X	○	○	○	○	○	
	-30°C to 85°C	X	○	○	○	○	○	
-40°C to 85°C	X	△	○	○	○	○	○	
Frequency Stability	vs Aging		± 1.0 ppm max., per year at 25°C .					
	vs Voltage Change		± 0.3 ppm max. , for a $\pm 5\%$ input voltage change .					
	vs Load Change		± 0.3 ppm max. , for a $\pm 10\%$ load condition change .					
	vs Reflow (SMD type)		± 1.0 ppm max., 1 reflow and measured 24 hours afterwards .					
Output Voltage Level (peak to peak)		CMOS						
Mechanical Frequency Tuning	Standard		± 3.0 ppm (min.) tuning Note: VM57 has no mechanical trimmer built-in.					
	Option		No mechanical trimmer built-in (for aqueous washing cycles). To order please add " 1 " after the regular model prefix . Example: M381T.					
Electrical Frequency Tuning (EFC) by external control voltage	Control Voltage Center		Standard: +1.5 V ± 1.0 V for all input voltages.					
	Frequency Deviation Range		± 5.0 ppm. (min.) with Vcon = +1.5 V ± 1.0 V					
	Slope Polarity (Transfer Function)		Positive slope. Positive voltage for positive frequency shift.					
		Input Impedance : 1 M Ω min.		Modulation Bandwidth : 20 KHz min.		Linearity : $\pm 10\%$ max.		
Rise Time and fall time		10.0 n sec. max. ; 20% \leftrightarrow 80% of the wave form.						
Duty Cycle		Standard: 50 % $\pm 10\%$; Option: 50 % $\pm 5\%$						
Start-Up Time.		5.0 m sec. (typ.) , 10.0 m sec. (max.) (reach 90% amplitude and at +25°C $\pm 2^\circ$ C)						
Output Load		15 pF						
SSB Phase Noise at 25°C , 15pF	Offset / dBc / Hz [typical]		10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	
	M572T33 - 10.000		-96 dBc / Hz	-122 dBc / Hz	-138 dBc / Hz	-145 dBc / Hz	-150 dBc / Hz	
Storage Temperature		-55°C to +125°C						

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CMOS wave output code " T "

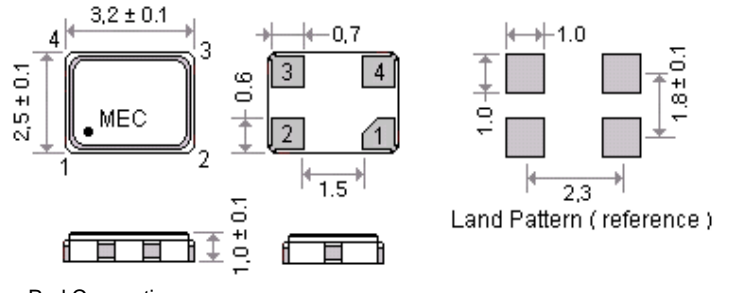
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[(V) M22T]



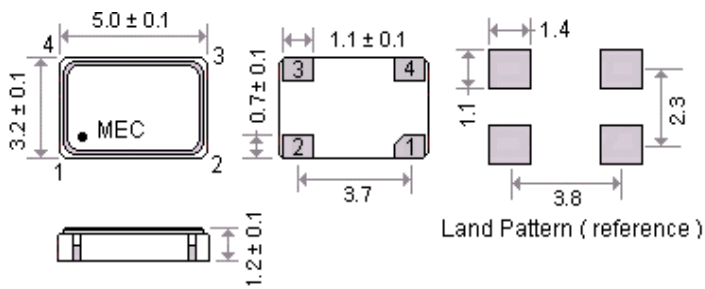
Pad Connections :
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
 Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage

[(V) M32T]



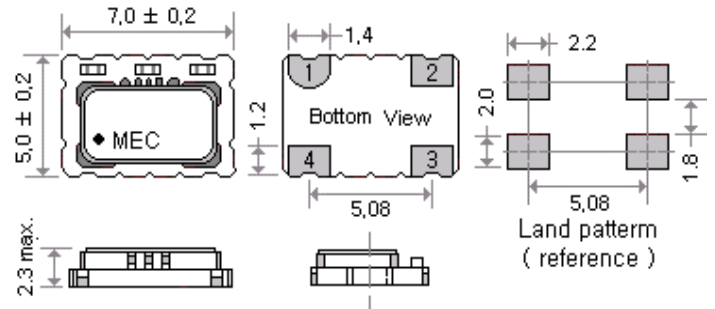
Pad Connections :
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M53T]



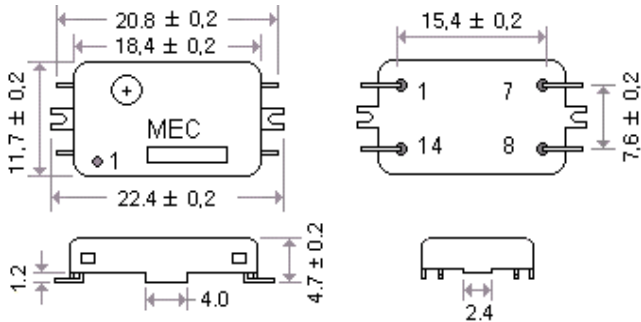
Pad Connections :
 Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M572T] , [(V) M_572T]



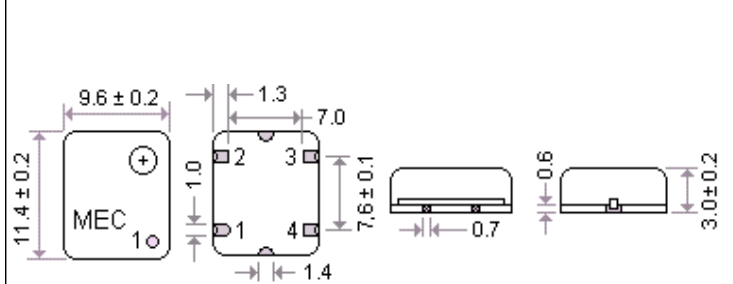
Pad Connections :
 Pad 1 : NC --- TCXO ; Vcon --- VCTCXO
 Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M47T] ; [(V) M_47T]



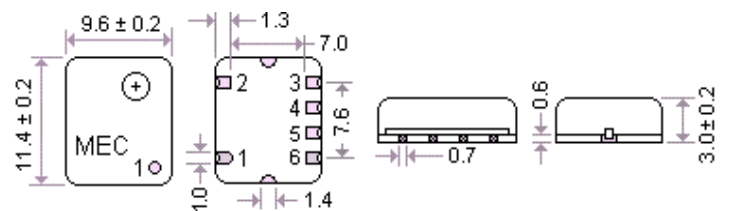
Pad Connections :
 Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
 Pad 7 : Ground ; Pad 8 : Output , Pad 14 : Supply Voltage

[(V) M43T] ; [(V) M_43T]



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

[(V) M63T] ; [(V) M_63T]



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 "]

CMOS wave output code " T "

Part Number Format and Example

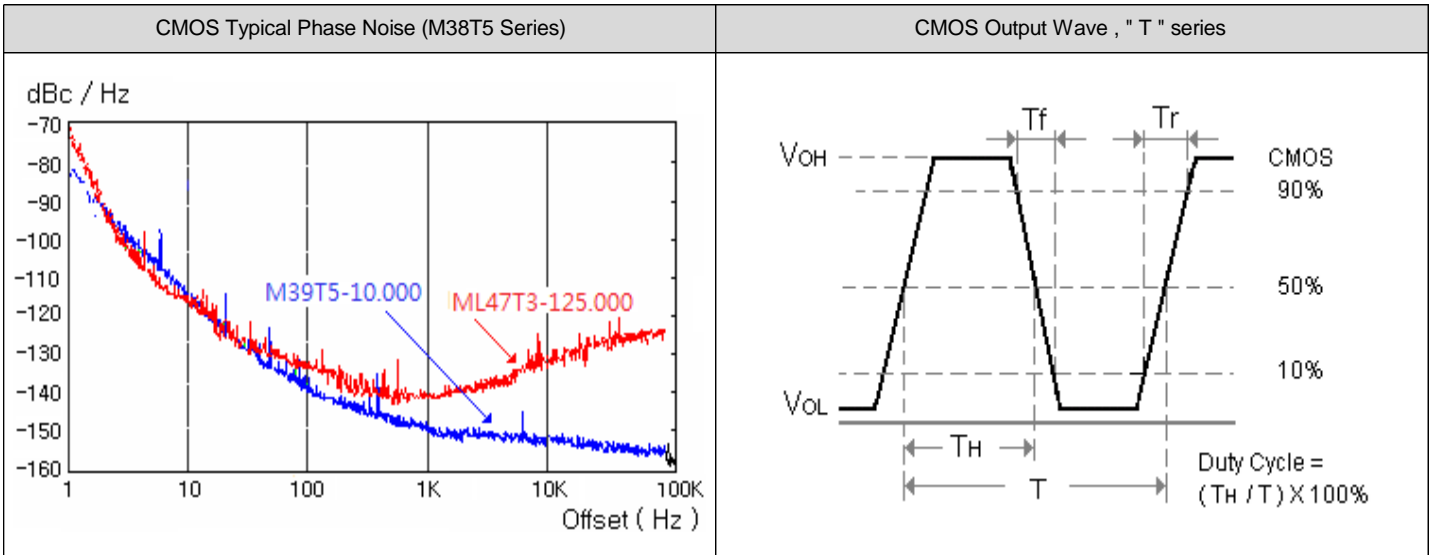
	[1]	[2]	[3]		[4]		[5]		[6]
	Holder Type	Output Wave	Supply Voltage	-	Center Frequency	-	Frequency Stability	/	Operating Temp. Range

Examples	(1)	VM 39	T	5	-	10.000	-	1.5	/	-20+70
	(2)	M 572	T	3	-	20.000	-	2.5	/	-30+85

Ex (1) : VM39T5 - 10.000 - 1.5 / -20+70 [VCTCXO , VM38 type , RoHS , CMOS output , 5.0V , 10.000MHz , ±1.5ppm from -20°C to 70°C]

Ex (2) : M572T3 - 20.000 - 2.5 / -30+85 [TCXO , M572 type , CMOS output , 3.0V , 20.000MHz , ±2.5ppm from -30°C to 85°C]

[1]	Holder Type " M " stands for TCXO , " VM " stands for VCTCXO
[2]	" T " stands for Square Wave ex : M43T --- TCXO , M43 package , CMOS output
[3]	Supply voltage , " 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 : -40 °C to 85°C ----- -40+85



(VC)TCXO with CMOS square wave: Ex. VM14T33

