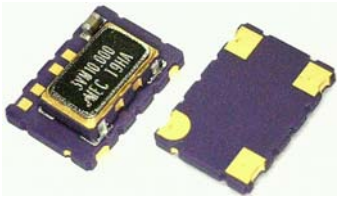
TCXO	VCTCXO	KHz range	CMOS	Thru-Hole	SMD	15pF	3.3V	5.0V	32.768 KHz	Min.	Max.
M _ T	VM _ T									20.0 KHz	52.7 KHz

Features

- Wide frequency range : [32.768 KHz] , [20.0 KHz ~ 50.0 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



RoHS Compliance

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

Frequency Range			**20.0 KHz ~ 52.7 KHz ; 32.768 KHz [From KHz with divider. mA current consumption.]**						
Output Wave Form			Square wave. Wave form code is " **T** "						
Initial Calibration Tolerance			Models with mechanical trimmer : < ±1.0 ppm. +25°C ±2°C. Models without mechanical trimmer : < ±2.0 ppm at +25°C ±2°C.						
Standard Frequency (Partial list)			32.768 KHz						
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	○	○	○	○	○	
		-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 ±5% input voltage change .						
	vs Load Change		± 0.3 ppm max. , for a ±10% load condition change .						
	vs Reflow (SMD type)		± 1.0 ppm max., 1 reflow and measured 24 hours afterwards .						
Output Logic			CMOS						
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						
Input Voltage Range		Standard	+3.3 V (voltage code is " 33 ")				+5.0 V (voltage code is " 5 ")		
Output Logic Levels		Logic High " 1 "	90% of V_{DD} min.						
		Logic Low " 0 "	10% of V_{DD} max.						
Rise and Fall Time			10.0 n sec. max. Measured at 20% ↔ 80% of the wave form						
Current Consumption. (max.) (Over operating temperature range .)			8.0 mA (max.) for 32.768 KHz at +3.3V 12.0 mA (max.) for 50.0 KHz at +3.3V						
Rise and Fall Time			10.0 n sec. max. Measured at 20% ↔ 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	10 KΩ min.						
		Modulation Bandwidth	3 KHz min. Measured at -3 dB, Vcontrol=+1.5 V_{DC}.						
		Linearity	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)						

Note 1: Some specifications are package dependent. Please refer to the spec. sheet of individual packages once a package is selected .

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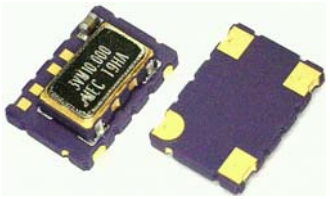
TCXO	VCTCXO	MHz range	CMOS	Thru-Hole	SMD	15pF	3.3V	5.0V	Min.	Max.
M _ T	VM _ T								1.25 MHz	156 MHz

Features

- Wide frequency range : [1.25 MHz ~ 156.0 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



RoHS Compliance

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

Frequency Range		**1.25 MHz ~ 156.0 MHz**							
Output Wave Form		Square wave. Wave form code is " **T** "							
Initial Calibration Tolerance		Models with mechanical trimmer : < ±1.0 ppm. +25°C ±2°C. Models without mechanical trimmer : ±2.0 ppm at +25°C ±2°C.							
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	38.880	40.000	54.000	77.760	125.000	155.520
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	○	○	○	○	○			
	-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 ±5% input voltage change .								
	vs Load Change	± 0.3 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)		T T L / CMOS								
Mechanical Frequency Tuning	Standard	± 3.0ppm (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.								
Input Voltage Range	Standard	+2.8 V (voltage code is " 28 ")		+3.0 V (voltage code is " 3 ")		+3.3 V (voltage code is " 33 ")		+5.0 V (voltage code is " 5 ")		
Current Consumption. (typical) (Over operating temperature range .)		2 mA @ 8.192 MHz		2 mA @ 8.192 MHz				5 mA @ 8.192 MHz		
		3 mA @ 10.0 MHz		4 mA @ 10.0 MHz				7 mA @ 10.0 MHz		
		14 mA @ 77.760 MHz		17 mA @ 77.760 MHz				32 mA @ 77.760 MHz		
		26 mA @ 155.520 MHz		35 mA @ 155.520 MHz				50 mA @ 155.520 MHz		
Output Logic Levels	Logic High " 1 "	90% of V_{DD} min.								
	Logic Low " 0 "	10% of V_{DD} max.								
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	50K Ω min.								
	Modulation Bandwidth	20 KHz min.								
	Linearity	±10 % max.								
Rise Time and fall time		10.0 n sec. max.. ; 20% ↔ 80% of the wave form.								
Duty Cycle		Standard: 50 % ± 10 % ; Option: 50 % ± 5 % ; Measured at 50% V_{DD}.								
Start-Up Time.		5.0 m sec. (typ.) , 10.0 m sec. (max.) (reach 90% amplitude and at+25°C ± 2°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
	M572T33 - 77.760	-74 dBc / Hz		-105 dBc / Hz		-120 dBc / Hz		-124 dBc / Hz		-120 dBc / Hz
	M572T33 - 155.520	-68 dBc / Hz		-96 dBc / Hz		-110 dBc / Hz		-117 dBc / Hz		-112 dBc / Hz
Storage Temperature		-40°C to +85°C or -55°C to +125°C (package dependent)								

Note 1: Some specifications are package dependent. Please refer to the spec. sheet of individual packages once a package is selected .

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

Clipped Sine " S "	CMOS " T "	PECL Differential " P "	LVDS Differential " D "

Part Number Format and Example

[1]	[2]	[3]	[4]		[5]		[6]		[7]
Holder Type	G	Output Wave	Supply Voltage	-	Center Frequency	-	Frequency Stability	/	Operating Temp. Range

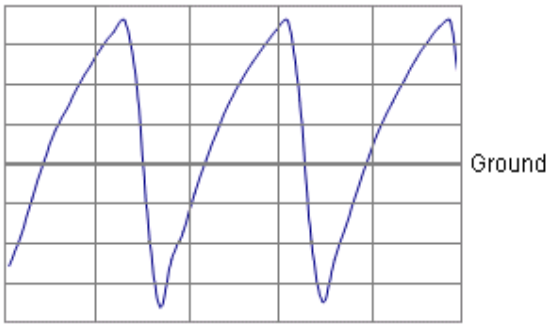
Examples	(1)	V M 38	G	T	5	-	10.000	-	1.5	/	**-20+70**
	(2)	M 57		S	3	-	20.000	-	2.5	/	**-30+75**

Ex (1) : VM38GT5 - 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) : M57S3 - 20.000 - 2.5 / -30+75 [TCXO , M57 type , Clipped Sine W ave , 3.0V , 20.000MHz , ±2.5ppm from -30°C to 75°C]

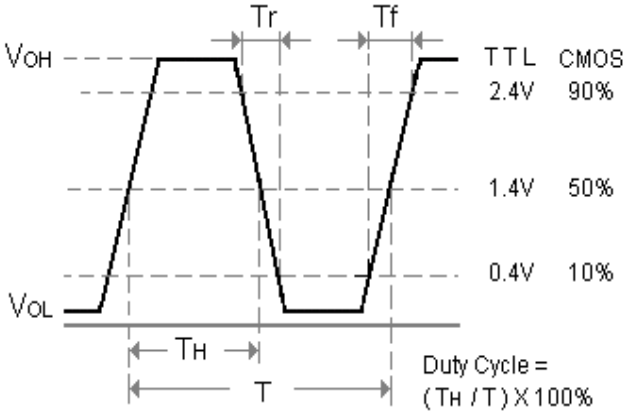
[1]	Holder Type
	" M " stands for TCXO , " VM " stands for VCTCXO
[2]	Please add "G " after the " type code " for RoHS compliant (Does not apply to (V)M32 , (V)M53 , (V)M536_ , (V)M57_ , (V)M576_)
[3]	" S " stands for Clipped Sine Wave ; " T " stands for Square Wave ; " D " stands for LVDS differential ; " P " stands for PECL differential
	ex 1 : M44T --- TCXO , M44 pcakage , CMOS output ; ex 2 : VM38P --- VCTCXO , VM38 package , PECL differential
[2]	Supply voltage , " 28 " stands for +2.8V ; " 3 " stands for +3.0V ; " 33 " stands for +3.3V ; " 5 " stands for +5.0V
[3]	Center Frequency in MHz
[4]	Frequency stability in ± _ ppm ; ex 1 : ± 2.5ppm --- 2.5 , ex 2 : ± 1.0ppm --- 1.0
[5]	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

Clipped Sine Wave , " S " series

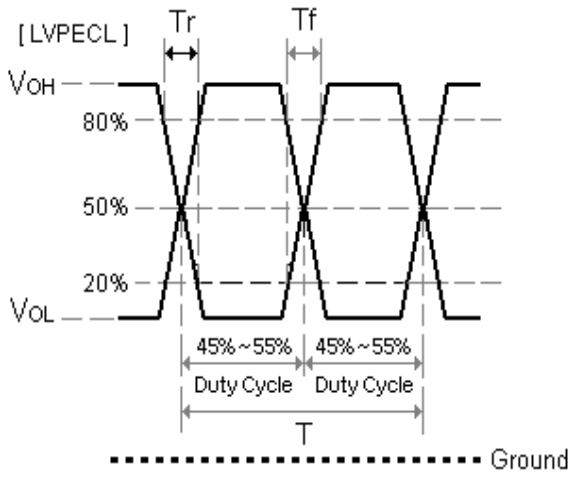


Exception : (V)53S , (V)32S have no DC-block at output

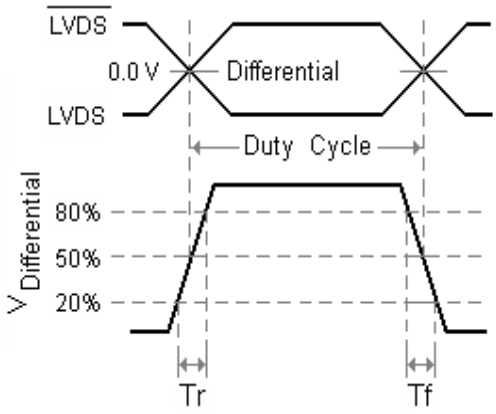
CMOS Output Wave , " T " series



PECL Square Wave Output Wave Form



LVDS Square Wave Output Wave Form



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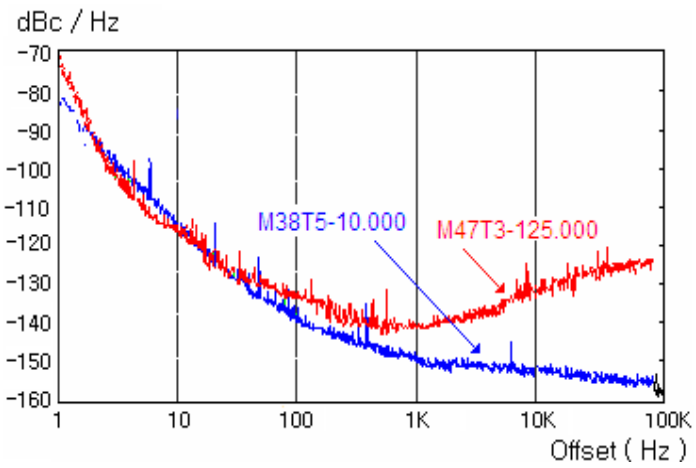
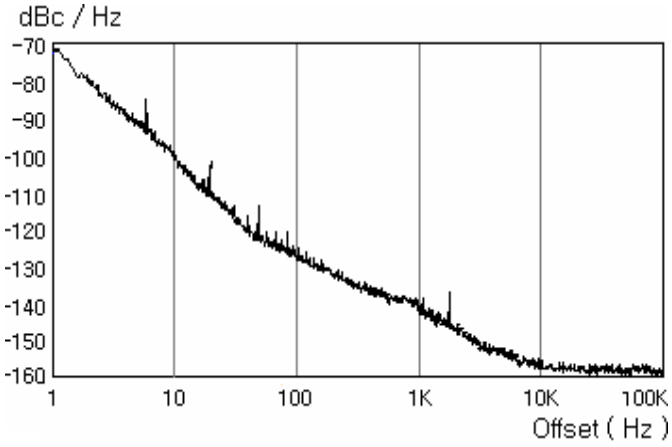
Temperature Compensated Crystal Oscillators [TCXO " **M** " and VCTCXO " **VM** "]

Clipped Sine " **S** "	CMOS " **T** "	PECL Differential " **P** "	LVDS Differential " **D** "

Square Wave Typical Phase Noise (M38T5 Series)

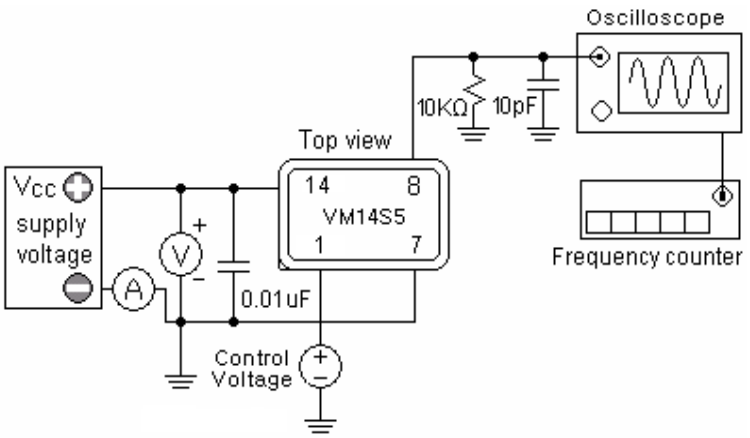


Clipped Sine Wave Typical Phase Noise (M38S5-10.000)

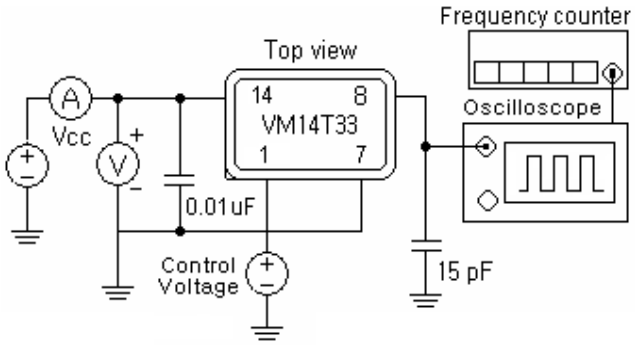


Test Circuits

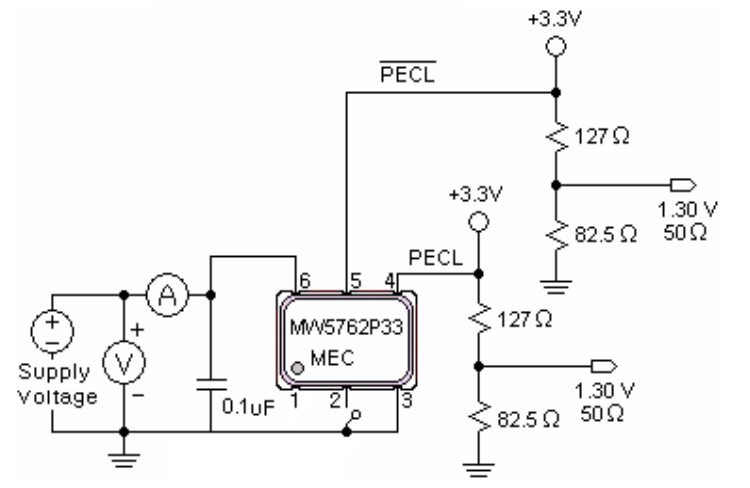
(VC)TCXO with **clipped sine** wave: Ex. VM14S5



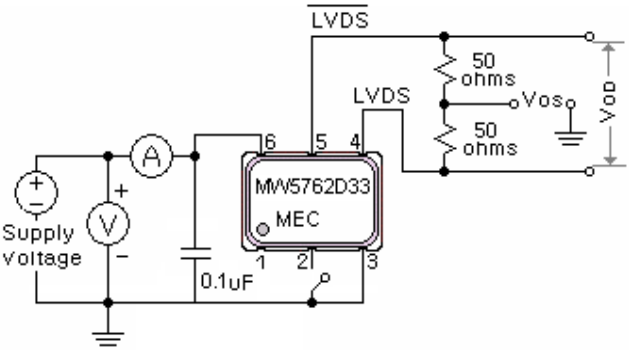
(VC)TCXO with **CMOS** square wave: Ex. VM14T33



(VC)TCXO with **PECL** output: Ex. VMW5762P33



(VC)TCXO with **LVDS** output: Ex. VMW5762D33



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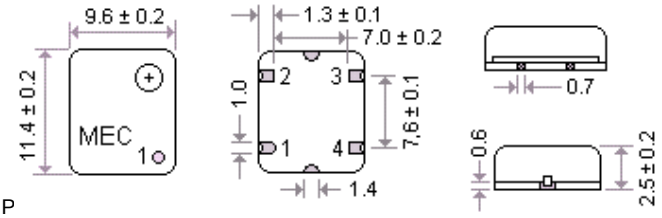
Temperature Compensated Crystal Oscillators [TCXO " **M** " and VCTCXO " **VM** "]

Clipped Sine " **S** "	CMOS " **T** "	PECL Differential " **P** "	LVDS Differential " **D** "

Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs [Please refer to page 6 for product series selections .]

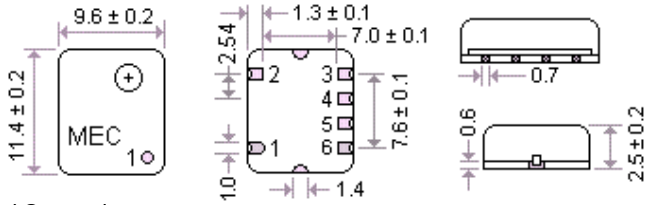
[(V) M_42 _ _]



P

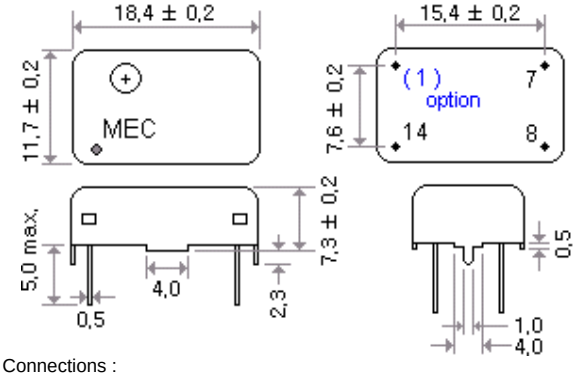
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage

[(V) M_62 _ _]



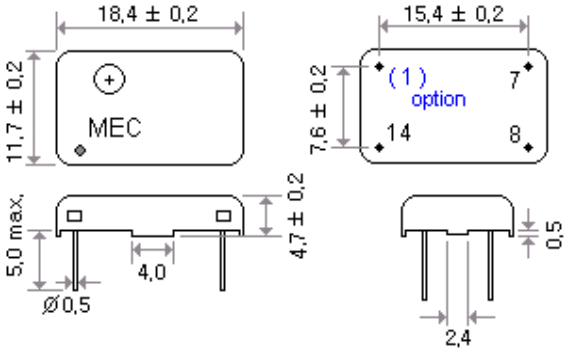
Pad Connections :
Pad 1 , 2 , 4 : Ground , Pad 3 : Output , Pad 6 : Supply Volyage
Pad 5 : Control voltage for VCTCXO. Make no connection if TCXO.

[(V) M38 _ _]



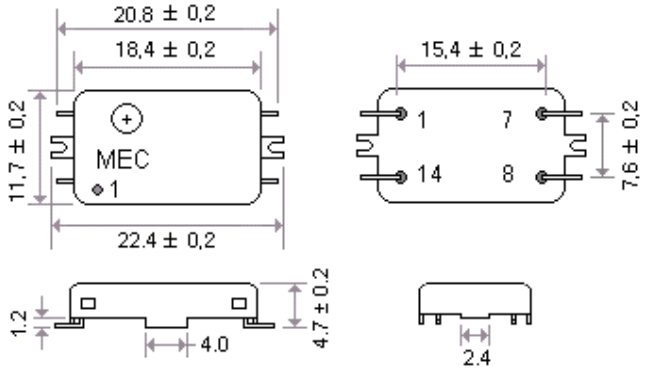
Pin Connections :
Pin 1 : Control Voltage for VCTCXO , No physical pin 1 for TCXO (3 pins only) .
Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

[(V) M39 _ _]



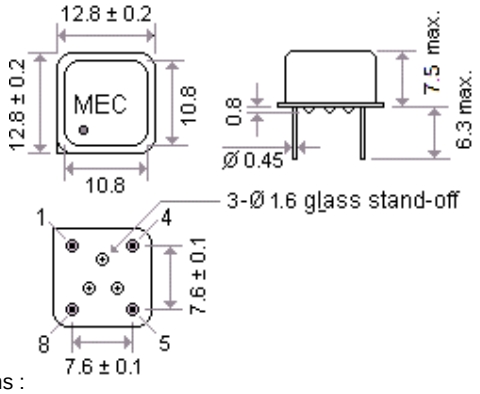
Pin Connections :
Pin 1 : Control voltage for VCTCXO [No physical pin 1 for TCXO. (3 pins only).]
Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

[(V) M47 _ _]



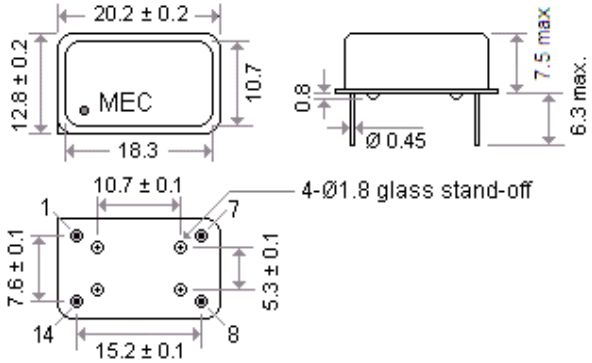
Pin Connections :
Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

[(V) M8 _ _] - - - Gull - wing SMD is also available .



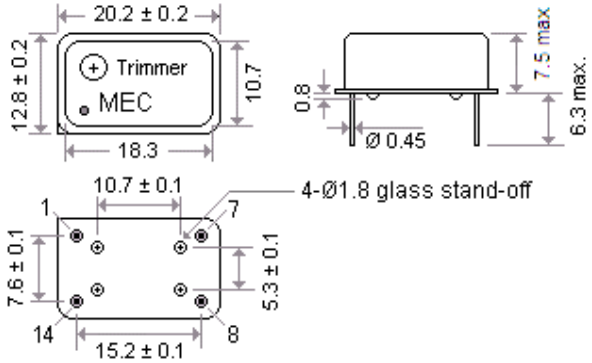
Pin Connections :
Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.
Pin 4 : Ground ; Pin 5 : Output , Pin 8 : Supply Voltage

[(V) M14 _ _] - - - Gull - wing SMD is also available .



Pin Connections :
Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

[(V) M15 _ _] - - - Gull - wing SMD is also available .



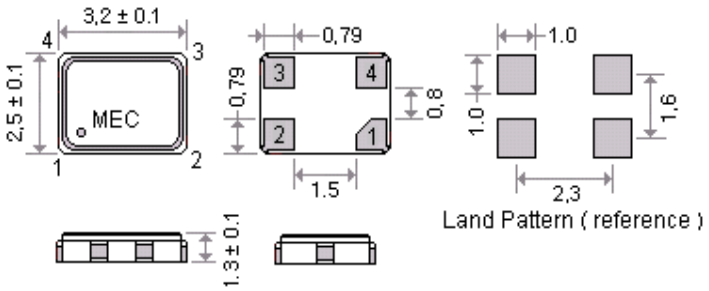
Pin Connections :
Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

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

Clipped Sine " S "	CMOS " T "	PECL Differential " P "	LVDS Differential " D "

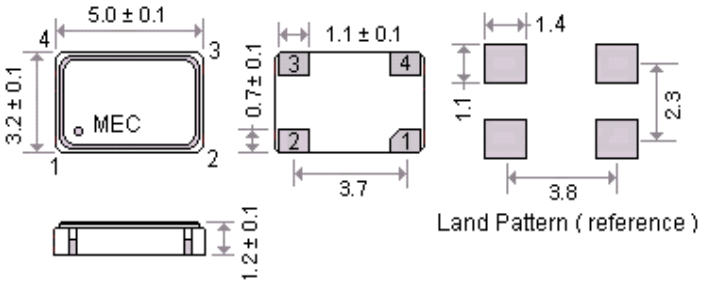
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs [Please refer to page 6 for product series selections .]

[(V) M32S] - - - Clipped Sine wave



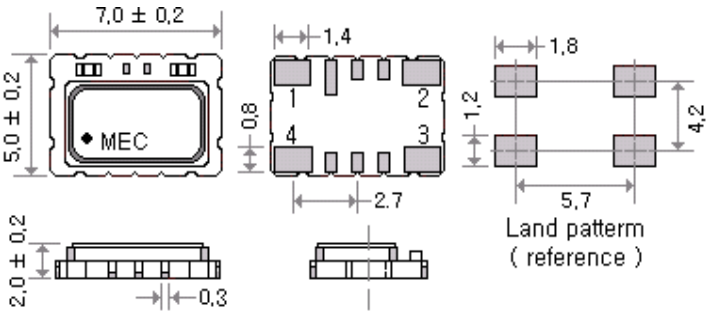
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage

[(V) M53S] - - - Clipped Sine wave



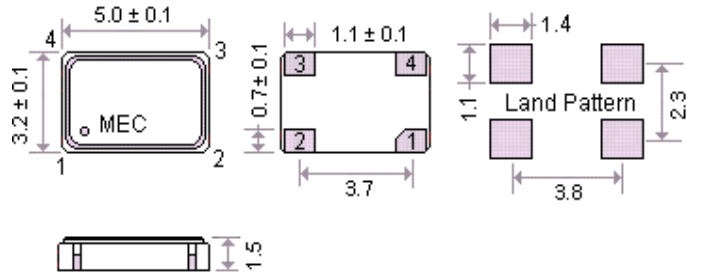
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M57S] - - - Clipped Sine wave



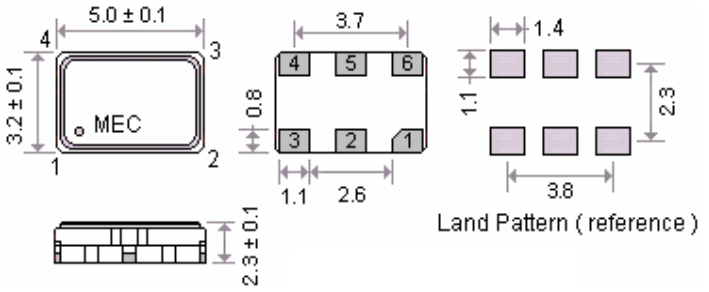
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M_531T _] , [(V) M_53T _] - - - CMOS output



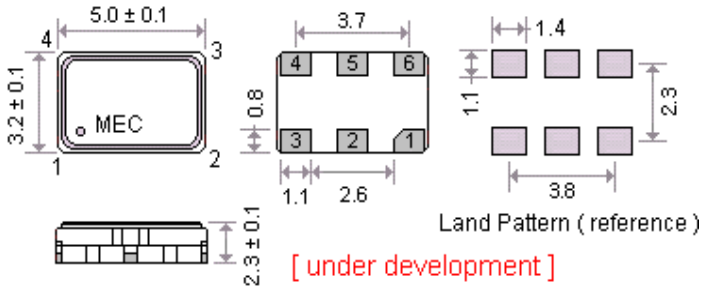
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M_536T _] - - - CMOS output



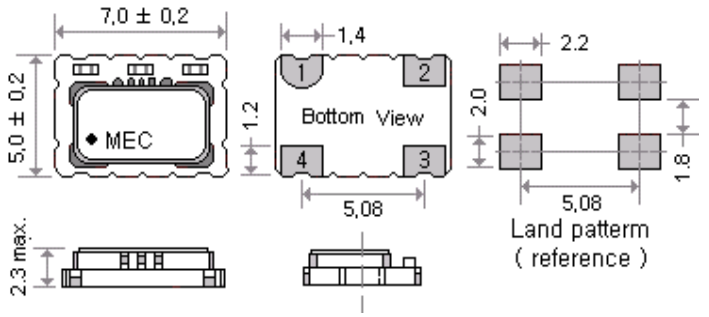
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : N / C ; Pad 3 : Ground ; Pad 4 : Output
Pad 5 : N / C ; Pad 6 : Supply Voltage

[(V)M_536P for PECL] ; [(V)M_536D for LVDS]



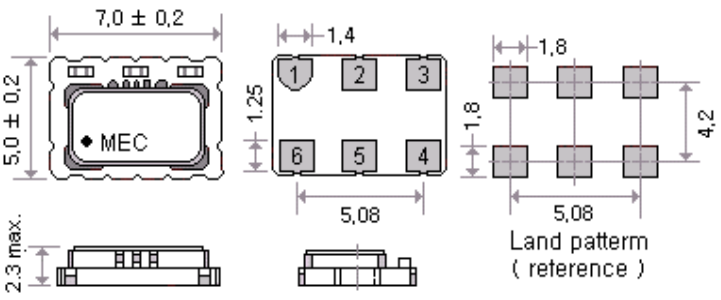
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Tri-state ; Pad 3 : Ground ; Pad 4 : PECL or LVDS output
Pad 5 : Complimentary PECL or LVDS Output ; Pad 6 : Supply Voltage

[(V) M_572T _] - - - CMOS output



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

[(V)M5762P for PECL] ; [(V)M5762D for LVDS]



Pad Connections :
Pad 1 : Control voltage for VCTCXO. Do not make any connection for TCXO.
Pad 2 : Tri-state ; Pad 3 : Ground ; Pad 4 : PECL or LVDS output
Pad 5 :Complimentary PECL or LVDS Output ; Pad 6 : Supply Voltage

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