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

TCXO	VCTCXO	MHz range	CMOS	DIP	15pF	1.8 V / 2.5 V / 3.0 V / 3.3 V	Min.	Max.
M _ T	VM _ T						6.4 MHz	52.0 MHz

Features

- Wide frequency range : [6.4 ~ 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 Waveform	Square wave [CMOS] . Waveform code is " T "				
Suggested package (Dip type)	M8T , VM8T	M9T , VM9T	M14T , VM14T	M15T , VM15T	M39T , VM39T
Model with Trimmer	- - - - -	with Trimmer	- - - - -	with Trimmer	with Trimmer
Package size (mm)	12.8 x 12.8 x 6.3	12.8 x 12.8 x 6.3	20.2 x 12.8 x 7.8	20.2 x 12.8 x 7.8	18.4 x 11.7 x 4.7
Supply voltage (V_{DD}) [unit : V]	1.8 , 2.5 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3	1.8 , 2.5 , 3.0 , 3.3
Frequency Range	6.4 ~ 52.0 MHz	6.4 ~ 52.0 MHz	6.4 ~ 52.0 MHz	6.4 ~ 52.0 MHz	6.4 ~ 52.0 MHz

Supply Voltage V_{DD} (code)		+1.8 V ± 5% (code is " 18 ")	+2.5 V ± 5% (code is " 25 ")	+3.0 V ± 5% (code is " 3 ")	+3.3 V ± 5% (code is " 33 ")	
Current Consumption. (max.) (Over operating temperature range .)	Package M8T	5 mA	7 mA	- - - - -	10 mA	
	Package M9T	6 mA	6 mA	6 mA	6 mA	
	Package M14T	10 mA	10 mA	13 mA	13 mA	
	Package M15T	10 mA	10 mA	13 mA	13 mA	
	Package M39T	- - - - -	10 mA	13 mA	13 mA	
Output Logic Levels	Logic High " 1 " (min.)	1.62 V	2.25 V	2.7 V	2.97 V	
	Logic Low " 0 " (max.)	0.25 V	0.25 V	0.3 V	0.33 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 : < ± 1.0 ppm. +25°C ± 2°C. Models without mechanical trimmer : < ± 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 at Ta = +25°C	± 1.0 ppm / year (max.)		
	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 .		
Electrical Frequency Tuning (EFC) by external Control Voltage	Control Voltage Center	0.9 V ± 0.6 V (1.8 V) ; 1.4 V ± 1.0 V (2.5V) ; 1.5 V ± 1.0 V (3.0V / 3.3V)		
	Frequency Deviation Range	± 5.0 ppm (min.)		
	Slope Polarity (Transfer Function)	Positive slope. Positive voltage for positive frequency shift.		
		Input Impedance : 1.0M Ω (min.)	Modulation Bandwidth : 20 KHz (min.)	Linearity : ± 10 % (max.)

Output Load	15 pF
Rise and Fall Time	10.0 nsec. (max.) Measured at 20% ↔ 80% of the waveform
Start-Up Time.	5.0 msec. (typ.) , 10.0 msec. (max.) (reach 90% amplitude and at+25°C±2°C)
Duty Cycle	Standard: 50 % ± 10 % ; Option: 50 % ± 5 %
Storage Temperature	-40°C to +85°C or -55°C to +125°C (package dependent)

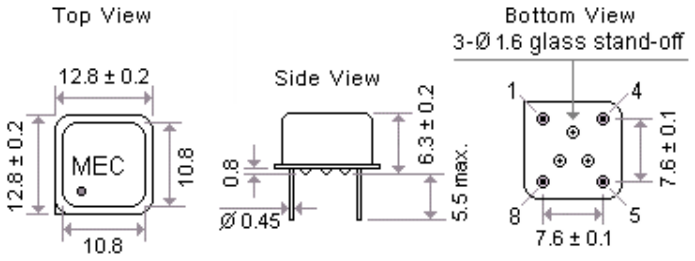
Phase Noise [dBc / Hz (typ.)]	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz
	M572T33 - 10.000	-96 dBc / Hz	-122 dBc / Hz	-138 dBc / Hz	-145 dBc / Hz	-150 dBc / Hz

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

CMOS Wave Output Code " T "

Outline Dimensions (Unit : mm) , Suggested pin Layout

[(V) M_8T_ _] - - - Gull - wing SMD is also available .

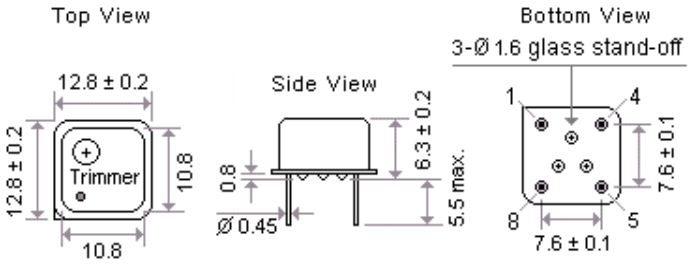


Pad Connections :

Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.

Pin 4 : Ground ; Pin 5 : Output ; Pin 8 : Supply Voltage

[(V) M_9T_ _] - - - with mechanical trimmer

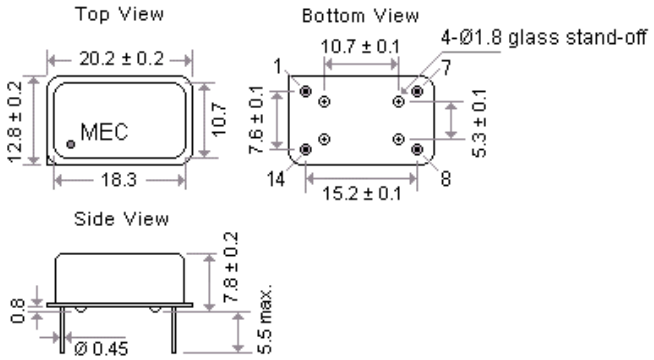


Pad Connections :

Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.

Pin 4 : Ground ; Pin 5 : Output ; Pin 8 : Supply Voltage

[(V) M_14T_ _] - - - Gull - wing SMD is also available .

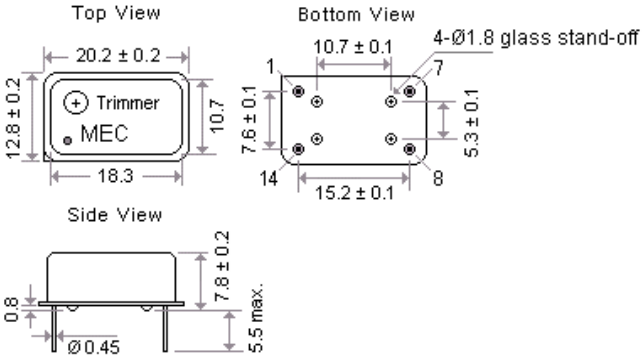


Pad Connections :

Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.

Pin 7 : Ground ; Pin 8 : Output ; Pin 14 : Supply Voltage

[(V) M_15T_ _] - - - with mechanical trimmer

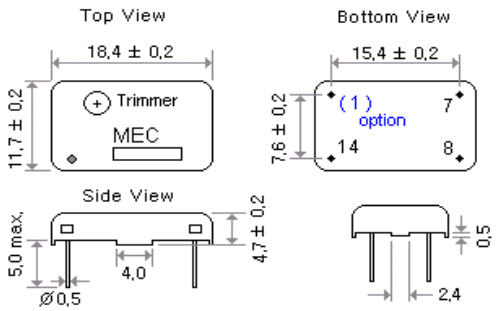


Pad Connections :

Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.

Pin 7 : Ground ; Pin 8 : Output ; Pin 14 : Supply Voltage

[(V) M_39T_ _]



Pad 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

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

CMOS Wave Output Code " T "

Part Number Format and Example

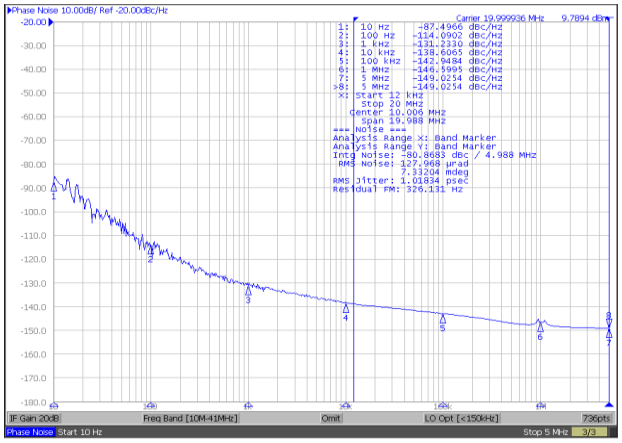
	[1] Holder Type	[2] Output Wave	[3] Supply Voltage		[4] Center Frequency		[5] Frequency Stability		[6] Operating Temp. Range
Examples (1)	VM32	T	3	-	10.000	-	1.5	/	-20+70
(2)	M572	T	3	-	20.000	-	2.5	/	-30+85

Ex (1) : VM32T3 - 10.000 - 1.5 / -20+70 [VCTCXO , VM32 type , CMOS output , 3.0V , 10.000MHz , ±1.5ppm from -20°C to 70°C]

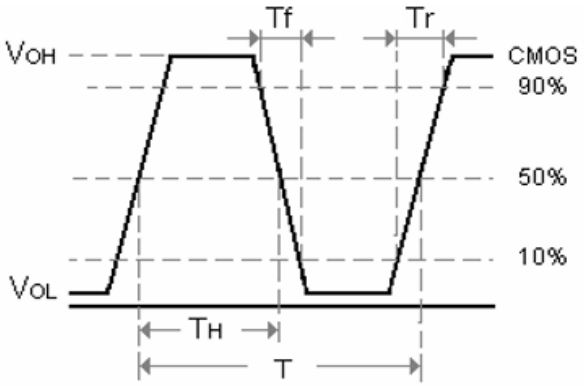
Ex (2) : M572T3 - 20.000 - 2.5 / -30+85 [TCXO , M572 type , CMOS output , 3.0V , 20.000MHz , ±2.5ppm from -30°C to 85°C]

[1]	Holder Type
	" M " stands for TCXO , " VM " stands for VCTCXO
[2]	" T " stands for Square Wave
	ex 1 : VM32T --- VCTCXO , VM32 pcakage , CMOS Output ; ex 2 : M572T --- TCXO , M572 pcakage , CMOS Output
[3]	Supply voltage , " 18 " stands for +1.8V ; " 25 " stands for +2.5V ; " 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
[6]	Operating temperature range in °C
	ex 1 : -20 °C to 70°C ----- -20+70 ; ex 2 : -30 °C to 85°C ----- -30+85

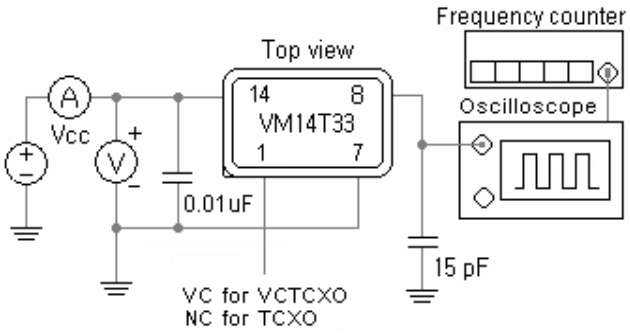
CMOS Typical Phase Noise (M572T33-20.000)



CMOS Output Wave , " T " series

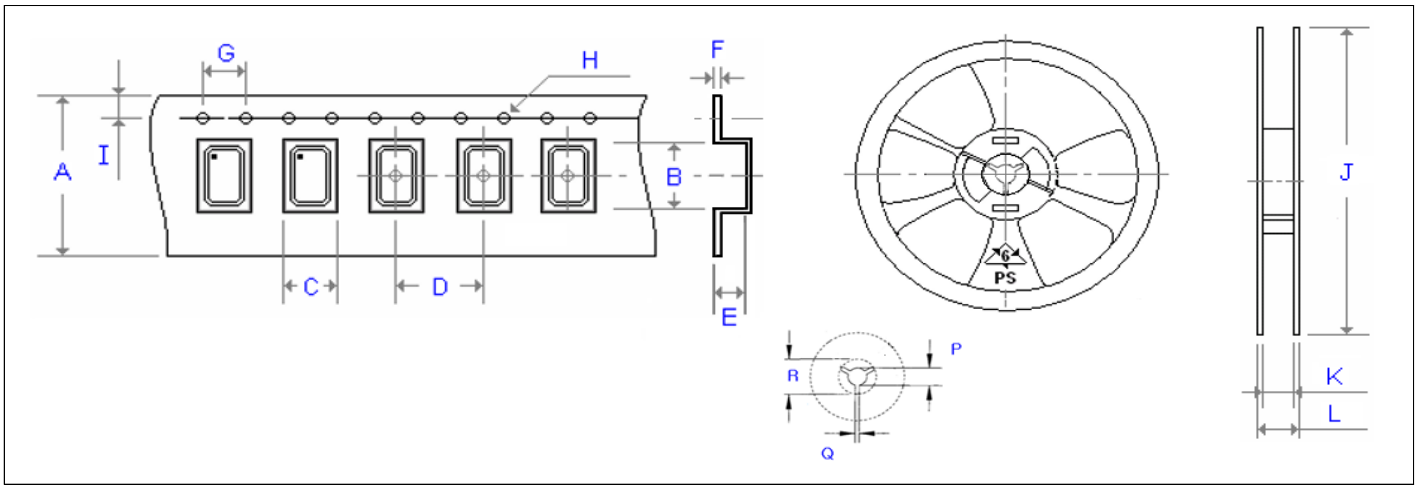


(VC)TCXO with CMOS square wave: Ex. VM14T33



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