



PRODUCT SELECTION GUIDE

Product Summary:

Output Wave Form: Square Wave					
TCXO	VCTCXO	Available Frequency Range	RoHS Compliant Equivalent Model		Package Description
Thru-Hole Types					
M38T	VM38T	32.768 KHz	M38T_G	VM38T_G	4 pin DIP
M39T	VM39T		M39T_G	VM39T_G	4 pin DIP
M14T	VM14T		M14T_G	VM14T_G	4 pin DIP. Hermetically sealed.
M15T	VM15T		M15T_G	VM15T_G	4 pin DIP. With trimmer
M8T	VM8T		M8T_G	VM8T_G	4 pin DIP. Half size. Hermetically sealed.
M9T	VM9T		M9T_G	VM9T_G	4 pin DIP. Half size. With trimmer
Gull Wing Surface Mount Types					
M55T	VM55T	32.768 KHz	N / A	N / A	4 pin gull wing
M47T	VM47T		M47T_G	VM47T_G	4 pin gull wing
M24T	VM24T		M24T_G	VM24T_G	4 pin gull wing. Hermetically sealed.
M25T	VM25T		M25T_G	VM25T_G	4 pin gull wing. With trimmer
M28T	VM28T		M28T_G	VM28T_G	4 pin gull wing. Half size. Hermetically sealed.
M29T	VM29T		M29T_G	VM29T_G	4 pin Gull wing. Half size. With trimmer
Leadless Surface Mount Types					
M62T	VM62T	32.768 KHz	M62T_G	VM62T_G	6 pad FR4 substrate. 2.5 mm H
M42T	VM42T		M42T_G	VM42T_G	4 pad FR4 substrate. 2.5mm H
M64T	VM64T		M64T_G	VM64T_G	6 pad FR4 substrate. 4.7 mm H
M44T	VM44T		M44T_G	VM44T_G	4 pad FR4 substrate. 4.7 mm H
M57T	VM57T		Same ⁽¹⁾	Same ⁽¹⁾	4 pad ceramic substrate. 5x7 mm
M53T	VM53T	Under development	Same ⁽¹⁾	Same ⁽¹⁾	4 pad ceramic substrate. 5x3.2 mm

For RoHS equivalent model please add “G” after the voltage code. For example: M14T3G.

⁽¹⁾ M57T, VM57T, M53T and VM53T are RoHS compliant and lead free products. .

Note: Frequency tuning by the built-in mechanical trimmer is standard for all models except for M57T, VM57T, M53T and VM53T.

Product Options

- No mechanical Trimmer models are available to allow for aqueous washing.
- Narrow (± 1 ppm max.) or wide electrical tuning range (± 35 ppm max.)
- +15V, +12V, +10V or +9V DC supply voltages are also available in some packages.

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“TCXO” and “VCTCXO” “T” Series 32.768 KHz
Wave Form: Square Wave



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General Specifications (at +25°C and specified input voltage)

Frequency			32.768 KHz					
Output Wave Form			Square wave. Wave form code is “T”					
Initial Calibration Tolerance			Models with mechanical trimmer: < ±1 ppm. +25°C ±2°C. Models without mechanical trimmer: ±2 ppm at +25°C ±2°C.					
Frequency Stability vs Temperature vs Aging vs Voltage Change vs Load Change vs reflow (SMD models only)			±1 ppm , ±1.5 ppm, ±2.0 ppm, ±2.5 ppm, ±3 ppm, or ±5 ppm, over operating temperature range. Referenced to frequency reading at +25°C. ±1.0 ppm max. first year at +25°C ±0.3 ppm max. for a ±5% input voltage change ±0.3 ppm max. for a ±10% loading condition change ±1 ppm max. 1 reflow and measured 24 hours afterwards					
Typical Operating Temperature Range (examples)			0°C to +60°C 0°C to +70°C -10°C to +60°C -20°C to +70°C -30°C to +60°C -30°C to +75°C -30°C to +85°C -40°C to +85°C. or custom.					
			Hi Rel: -55°C to +85°C or -55°C to +125°C. Selected models only. Customer package and /or pin configurations are welcome.					
Output Voltage Level (peak to peak)			CMOS					
Mechanical Frequency Tuning		Standard	±3 ppm min. tuning Note: VM57 and VM53 have no mechanical trimmer built-in.					
		Option	No mechanical trimmer built-in (for aqueous washing cycles). Part number: Please add “1” after the regular model prefix. For example: M381T3.					
Input Voltage Range		Option	+15.0V, +12.0V, +10.0V, +9.0; +3.0 V D.C.					
		Standard	+ 2.75 V D.C. min.; +5.0 V D.C. max.					
Output Voltage Level			Logic High “1”		2.4 V typ.;2.2 V min.		4.2 V typ.;3.9 V min.	
			Logic Low “0”		0.3 V typ.; 0.4 V max.		0.3 V typ.; 0.4 V max.	
Current Consumption. (Over operating temperature range.)			3.5 mA typical.			7.0 mA typical		
Duty Cycle			45% ~55%					
Rise Time (0.1V _{DD} → 0.9 V _{DD})			3.0 n sec. typical; 5.0 n sec max.					
Fall Time (0.9V _{DD} → 0.1 V _{DD})			3.0 n sec. typical; 5.0 n sec max.					
Pin 1 Options	VCTCXO only	Control voltage		+1.5 V±1.0 V		+2.5 V±2.0 V. +1.5 V±1.0 V for VM57T5		
		Frequency Deviation Range	Standard	±10 ppm min. for +1.5 V±1.0 V				
			Option	Narrow: ±1 ppm max. or custom Wide: ±35 min. or custom				
		Slope Polarity	Standard	Positive slope. Positive voltage for positive frequency shift.				
			Option	Negative slope. Selected packages only.				
Linearity		10 % max.						
SSB Phase Noise		Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	
		typical	-65 dBc/Hz	-100 dBc/Hz	-130 dBc/Hz	-140 dBc/Hz	-145 dBc/Hz	
Start-Up Time.			2 m. sec. Typical, 10 m. sec. max. (reach 90% amplitude and at +25°C±2°C)					
Output Load			15 pF					
Output Format			AC block, DC coupled					
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..

Note 2: TCXO products ordered without mechanical and electrical frequency tuning should have a frequency tolerance of ±2

“TCXO” and “VCTCXO” “T” Series 32.768 KHz
Wave Form: Square Wave
Logic: HCMOS



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ppm (at +25°C) and the frequency stability over temperature will be from that measured value.

Part Number Format and Examples:

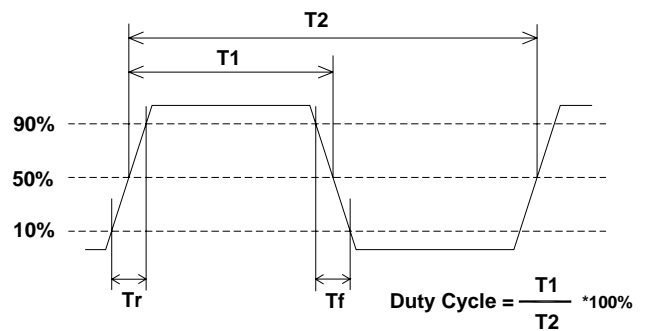
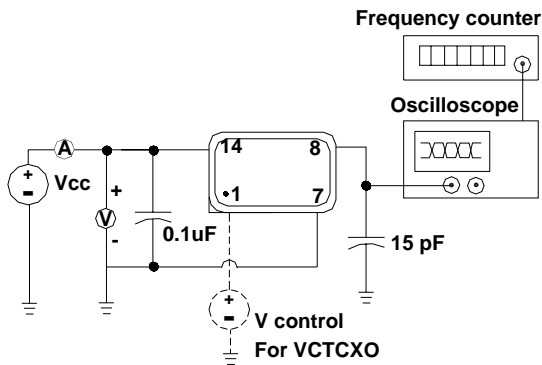
Example of TCXO: M38T33-32.768K-2.5/-30+75;

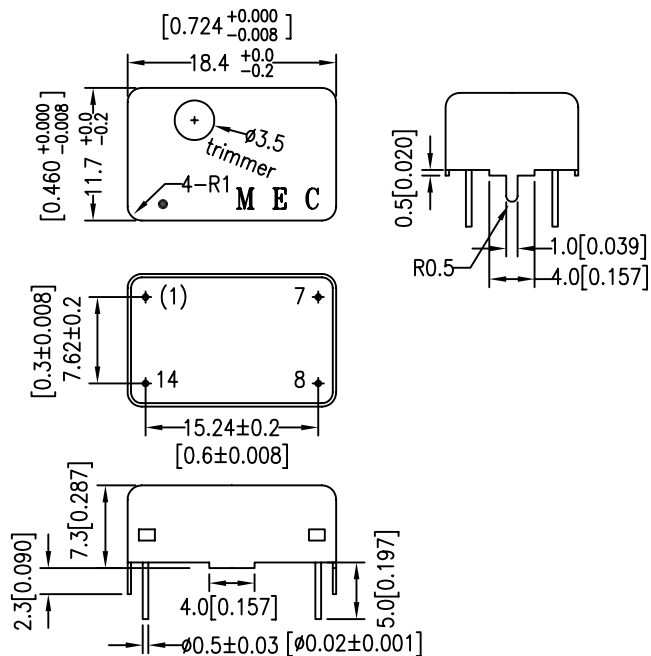
Example of VCTCXO: VM38T5-32.768K-2.5/-30+75

											: customer to specify
V	M38	T	5	—	32.768K	—	2.5	/	-30+75		
❶	❷	❸	❹		❺		❻		❼		

❶: “V” for VCTCXO; “blank” for TCXO ❷: Package code ❸: Wave form code “T” for Square wave ❹: Supply voltage code: “28” for +2.8V, “3” for +3.0V, “33” for “+3.3V, “5” for +5.0V ❺: Frequency in MHz ❻: Frequency stability in ±ppm ❼: Operating temperature range in °C

Square Wave TCXO (VCTCXO) Test Circuit (example of VM14) and Output Wave Form:

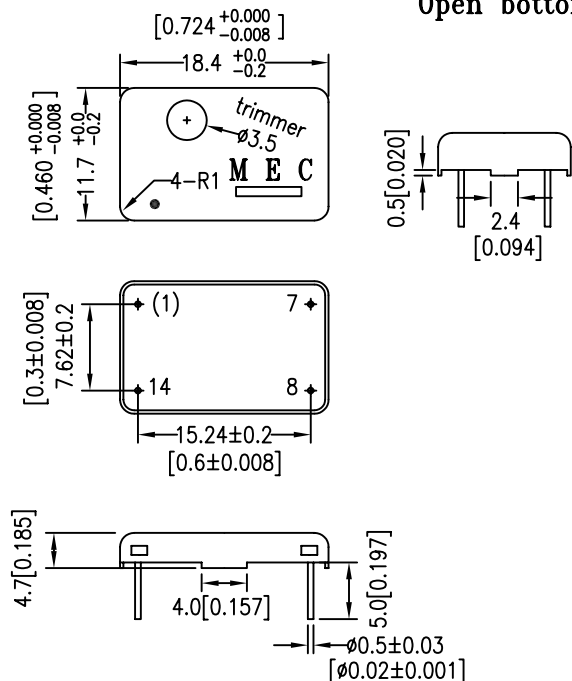


Package: M38T,VM38T**Open bottom****Pin Connections**

Pin 1: Voltage Control for VCTCXO; No physical pin 1 for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

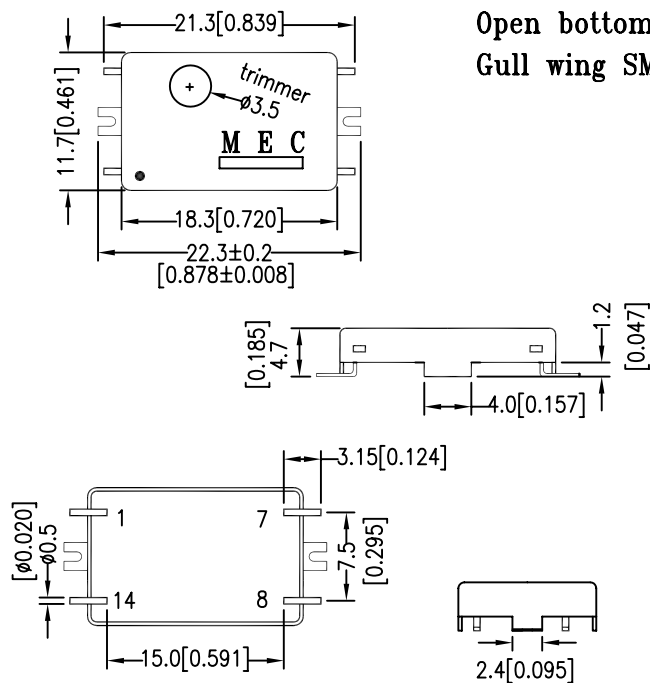
Package: M39T,VM39T

Unit: mm [inches]

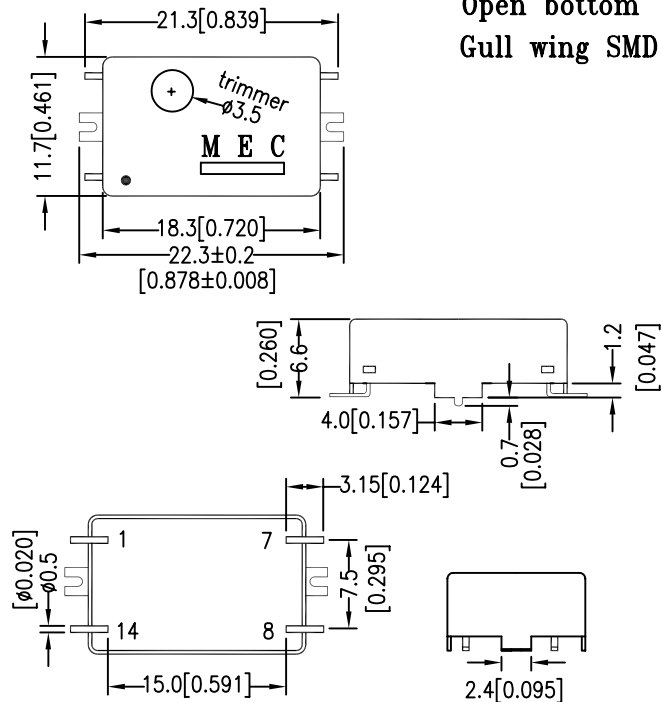
Open bottom**Pin Connections**

Pin 1: Voltage Control for VCTCXO; No physical pin 1 for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

TCXO;VCTCXO

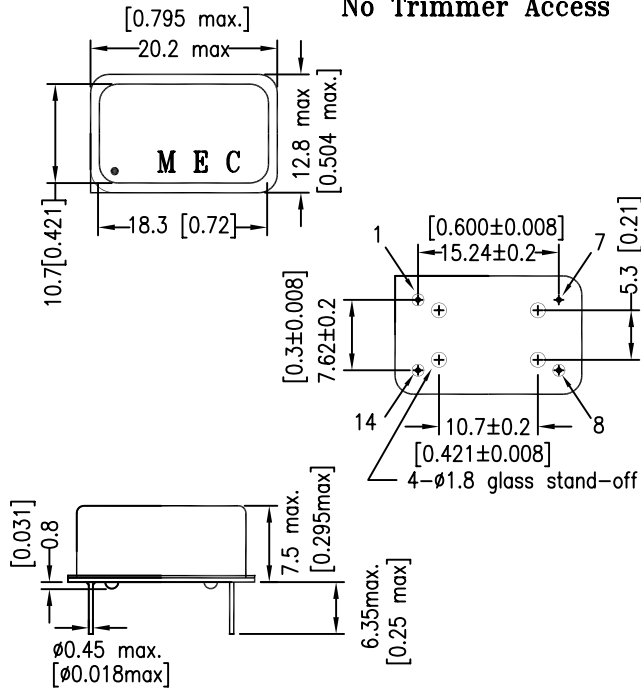
Package: M47T,VM47T**Open bottom
Gull wing SMD****Pin Connections**

Pin 1: Voltage Control for VCTCXO. No Connection for TCXO.
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

Package: M55T,VM55T**Open bottom
Gull wing SMD****Pin Connections**

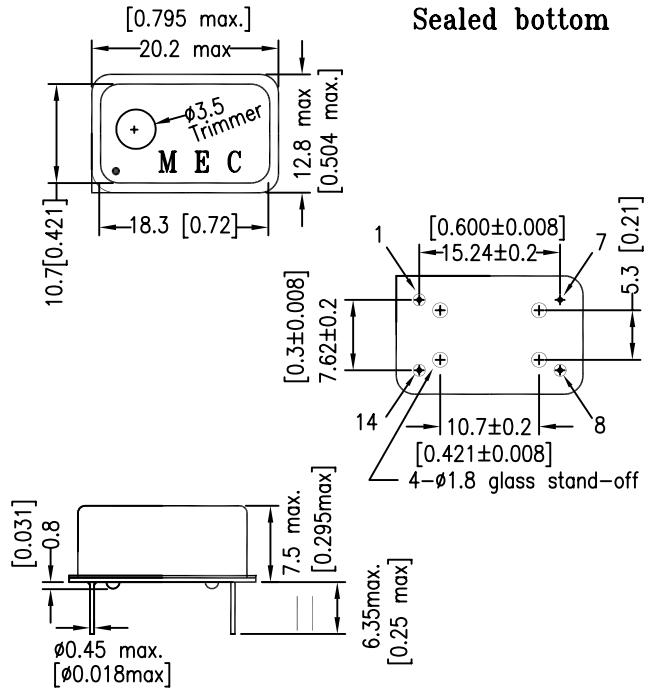
Pin 1: Voltage Control for VCTCXO. No Connection for TCXO.
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

Package: M14T,VM14T **Hermetically Sealed DIP**
No Trimmer Access



Pin Connections Square corner denotes pin 1
 Pin 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

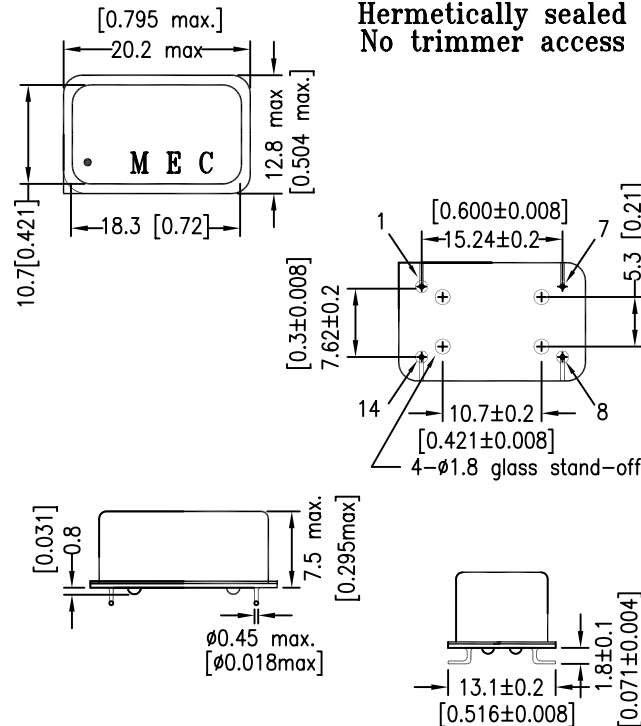
Package: M15T,VM15T **Unit: mm [inches]**
Sealed bottom



Pin Connections Square corner denotes pin 1
 Pin 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

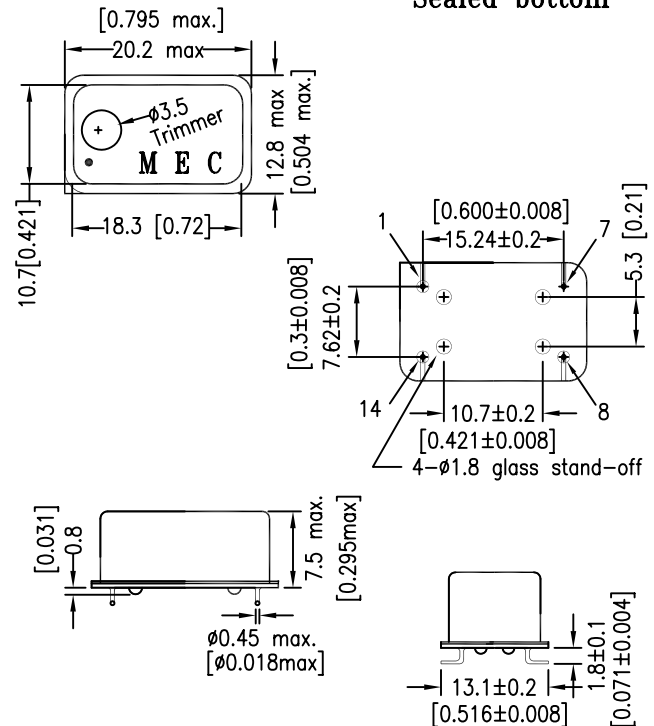
TCXO;VCTCXO

Package: M24T,VM24T **Hermetically sealed**
No trimmer access

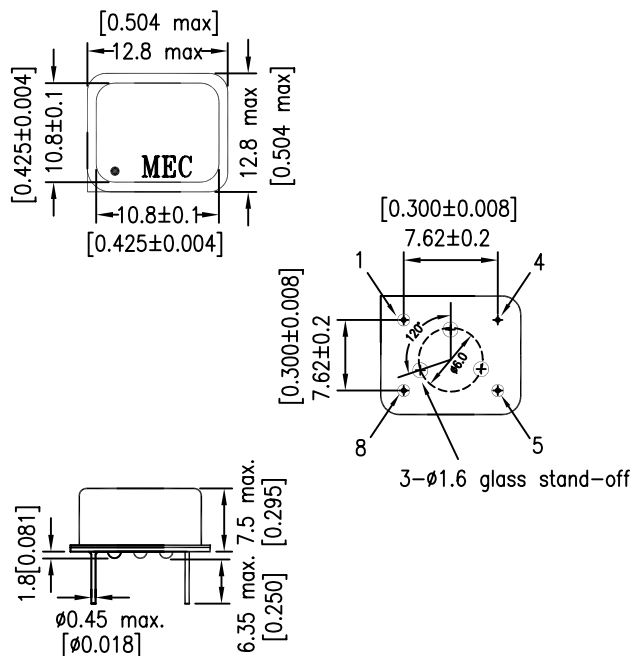


Pin Connections Square corner denotes pin 1
 Pin 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

Package:M25T,VM25T **Sealed bottom**

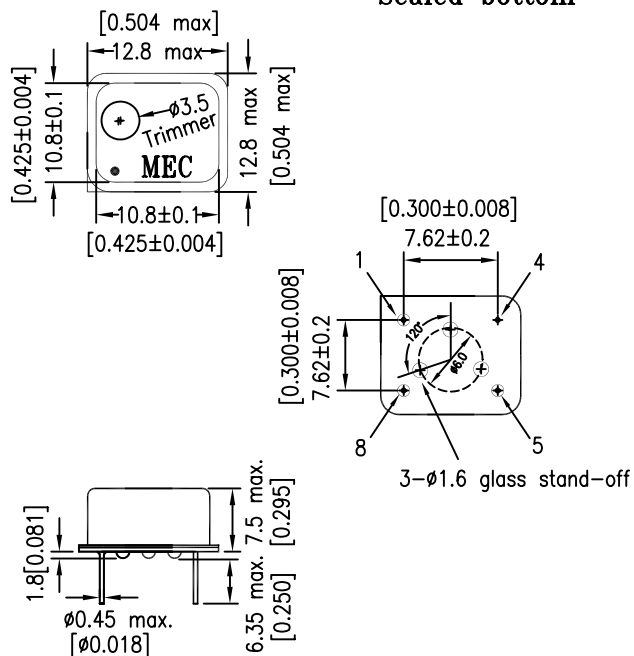


Pin Connections Square corner denotes pin 1
 Pin 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pin 7: Ground and case
 Pin 8: Output
 Pin 14: Supply Voltage

Package: M8T,VM8T**Hermetically Sealed DIP
No trimmer Access****Pin Connections**

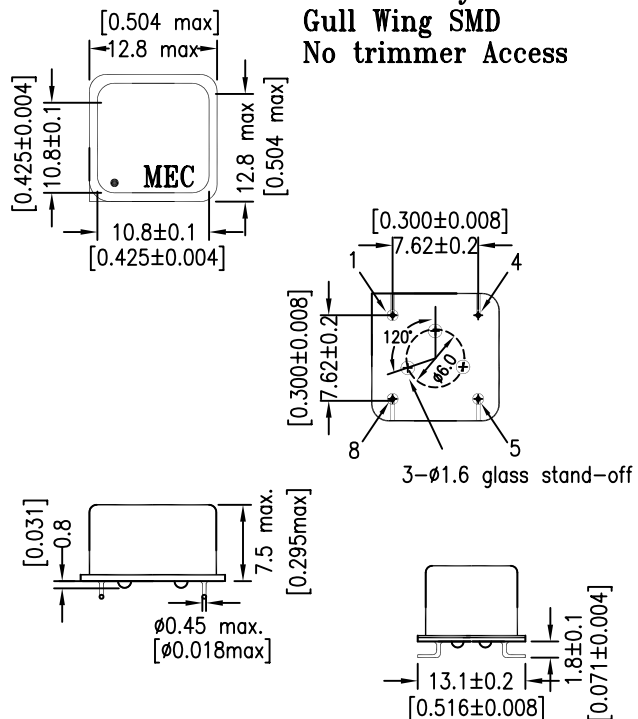
Square corner denotes pin 1

- Pin 1: Voltage Control for VCTCXO or No Connection for TCXO
 Pin 4: Ground and case
 Pin 5: Output
 Pin 8: Supply Voltage

Package: M9T,VM9T**Unit: mm [inches]
Sealed bottom****Pin Connections**

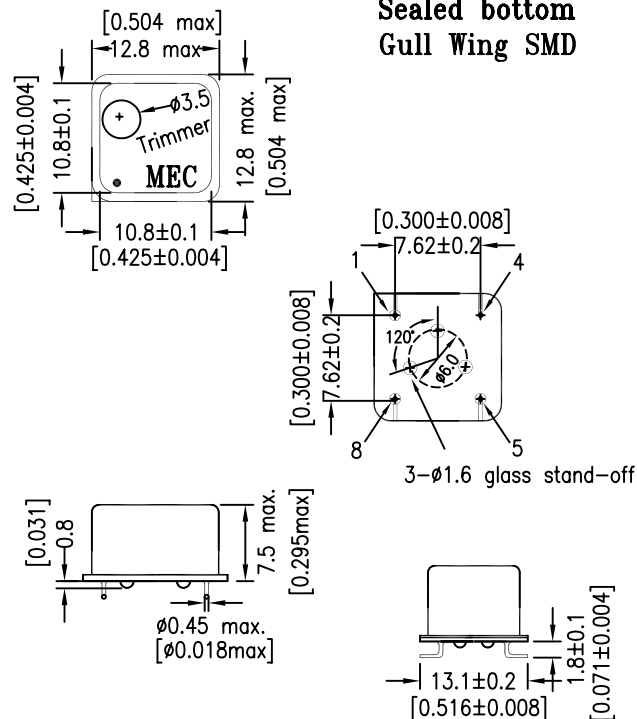
Square corner denotes pin 1

- Pin 1: Voltage Control for VCTCXO or No Connection for TCXO
 Pin 4: Ground and case
 Pin 5: Output
 Pin 8: Supply Voltage

TCXO;VCTCXO**Package: M28T,VM28T****Hermetically Sealed
Gull Wing SMD
No trimmer Access****Pin Connections**

Square corner denotes pin 1

- Pin 1: Voltage Control for VCTCXO or No Connection for TCXO
 Pin 4: Ground and case
 Pin 5: Output
 Pin 8: Supply Voltage

Package: M29T,VM29T**Sealed bottom
Gull Wing SMD****Pin Connections**

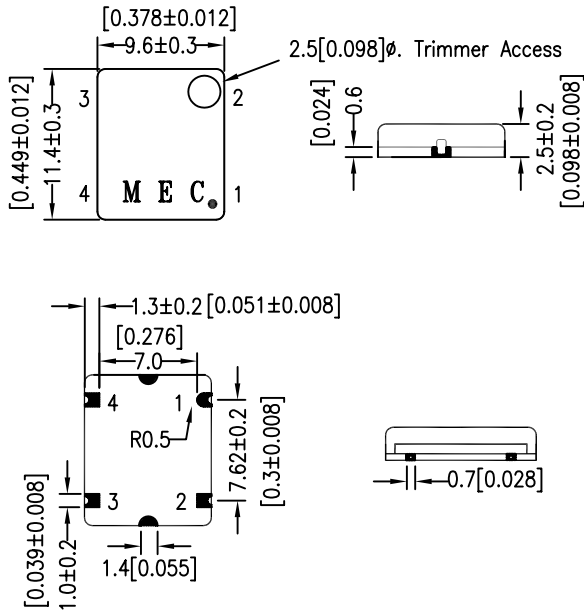
Square corner denotes pin 1

- Pin 1: Voltage Control for VCTCXO or No Connection for TCXO
 Pin 4: Ground and case
 Pin 5: Output
 Pin 8: Supply Voltage

Package: M42T,VM42T

FR4 substrate

"42" represents 4 pads and 2.5 mm overall height

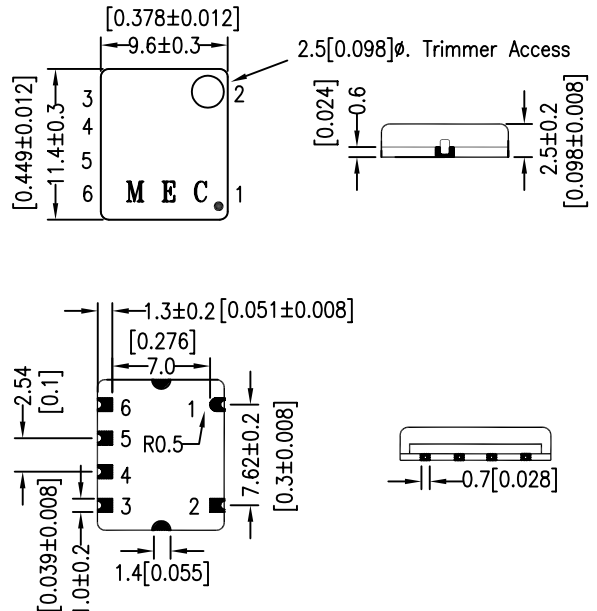
**Pad Connections:**

Pad 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pad 2: Ground and case
 Pad 3: Output
 Pad 4: Supply Voltage

Package: M62T,VM62T

FR4 substrate

"62" represents 6 pads and 2.5 mm overall height

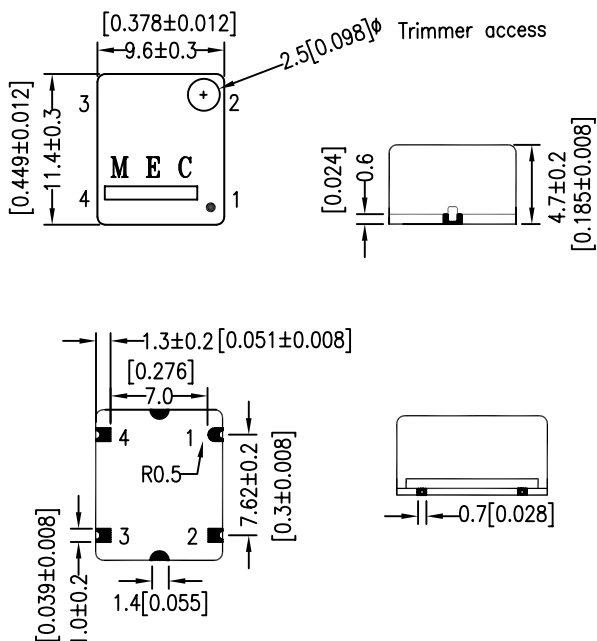
**Pad Connections:**

Pad 1,2,4: Ground and case
 Pad 3: Output
 Pad 5: Voltage Control for VCTCXO; No Connection for TCXO
 Pad 6: Supply Voltage

Package: M44T,VM44T

FR4 substrate

"44" represents 4 pads and 4.7 mm overall height

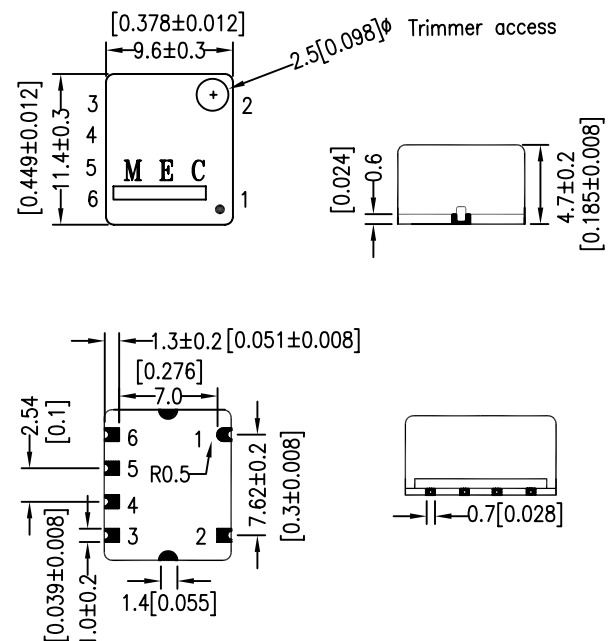
**Pad Connections:**

Pad 1: Voltage Control for VCTCXO; No Connection for TCXO
 Pad 2: Ground and case
 Pad 3: Output
 Pad 4: Supply Voltage

Package: M64T,VM64T

FR4 substrate

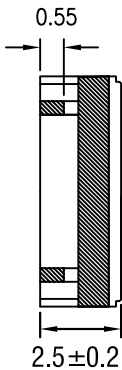
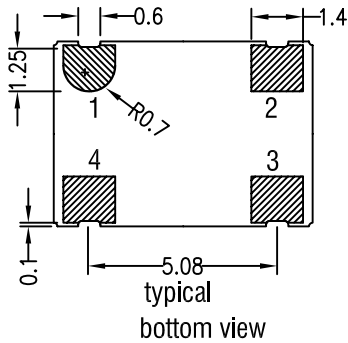
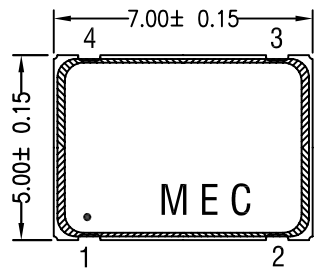
"64" represents 6 pads and 4.7 mm overall height

**Pad Connections:**

Pad 1,2,4: Ground and case
 Pad 3: Output
 Pad 5: Voltage Control for VCTCXO; No Connection for TCXO
 Pad 6: Supply Voltage

Package: M57T,VM57T

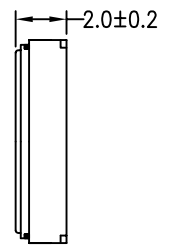
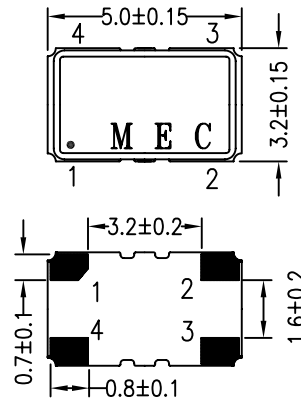
Ceramic SMD

**Pad Connections:**

Pad 1: "Do not connect" for TCXO; Voltage Control for VCTCXO
Pad 2: Ground and metal lid
Pad 3: Output
Pad 4: Supply Voltage

Package: M53T,VM53T

Ceramic SMD

**Pad Connections:**

Pad 1: "Do not connect" for TCXO; Voltage Control for VCTCXO
Pad 2: Ground and metal lid
Pad 3: Output
Pad 4: Supply Voltage

TCXO;VCTCXO