

"TCXO" and "VCTCXO"
Wave Form: True Sine Wave

"E" Series
50 ohm Load



MERCURY
 Since 1973

PRODUCT SELECTION GUIDE

Product Summary:

Output Wave Form: Square Wave					
TCXO	VCTCXO	Available Frequency Range	RoHS Compliant Equivalent		Package Description
Thru-Hole Types					
M14E	VM14E	9.6 ~ 320 MHz	M14GE	VM14GE	4 pin DIP. Hermetically sealed.
M15E	VM15E	9.6 ~ 320 MHz	M15GE	VM15GE	4 pin DIP. With trimmer
M11E	VM11E	9.6 ~ 320 MHz	Please contact Mercury		25.4x25.4x12.7 solder sealed 4 pin package
M97E	VM97E	9.6 ~ 320 MHz			25.8x25.8x13.4 mm solder sealed 4 pin package
M78E	VM78E	9.6 ~ 320 MHz			24.1x24.1x7.5 mm solder sealed 4 pin package
M19E	VM19E	9.6 ~ 320 MHz			19.8x19.8x10 mm solder sealed 5 pin package
M16E	VM16E	9.6 ~ 320 MHz			16 pin double wide DIP. Solder sealed.
M31E	VM31E	9.6 ~ 320 MHz			24.1x24.1x9.5 mm solder sealed 5 pin package
M233E	VM233E	9.6 ~ 320 MHz			38.1x38.1x16 mm solder sealed 4 pin package
M51E	VM51E	9.6 ~ 320 MHz			30x30x10 mm solder sealed 4 pin package
Gull Wing Surface Mount Types					
M24E	VM24E	10 ~ 320 MHz	M24GE	VM24GE	4 pin gull wing. Hermetically sealed.
M25E	VM25E		M25GE	VM25GE	4 pin gull wing. With trimmer
M44E	VM44E	12.8 ~ 320 MHz	M44GE	VM44GE	9.6x11.4x4.7 mm 4 pad leadless FR4 substrate.
M64E	VM64E	12.8 ~ 320 MHz	M64GE	VM64GE	9.6x11.4x4.7 mm 6 pad leadless FR4 substrate.

For RoHS equivalent please add "G" after the package code. For example: M14GE3.


Product Options

- No mechanical Trimmer models are available.
- Narrow (± 1 ppm max.) or wide electrical tuning range (± 35 ppm max.)
- Hi-Rel (-55°C to +125°C) VCTCXOs and TCXOs.
- +15V, +12V, +10V or +9V DC supply voltages are available.
- Reference voltage output available on selected models
- External frequency adjustment option is available via external potentiometer or variable capacitor.

MERCURY www.mercury-crystal.com

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U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: sales-us@mercury-crystal.com

“TCXO” and “VCTCXO” Wave Form: True Sine Wave	“E” Series 50 ohm Load		MERCURY Since 1973
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General Specifications (at +25°C and specified input voltage)

Frequency Range		9.6 MHz ~ 320.0 MHz																											
Output Load		50 ohms																											
Output Wave Form		True Sine Wave. 50 ohm load. Wave form code is “E” For 10K Ω //10 pF load sine wave output, please refer to “U” series																											
Initial Calibration Tolerance		Models with mechanical trimmer: $\leq \pm 1$ ppm. +25°C $\pm 2^\circ\text{C}$. Models without mechanical trimmer: $\leq \pm 2$ ppm at +25°C $\pm 2^\circ\text{C}$.																											
Frequency Stability vs Temperature vs Aging vs Voltage Change vs Load Change vs reflow (SMD models only)		$\leq \pm 1$ ppm, ± 1.5 ppm, ± 2.0 ppm, ± 2.5 ppm, ± 3 ppm, ± 5 ppm, ± 25 ppm, or ± 50 ppm, over operating temperature range. $\leq \pm 1.0$ ppm max. first year at +25°C $\leq \pm 0.3$ ppm max. for a $\pm 5\%$ input voltage change $\leq \pm 0.3$ ppm max. for a $\pm 10\%$ loading condition change $\leq \pm 1$ ppm max. 1 reflow and measured 24 hours afterwards																											
Typical Operating Temperature Range (examples)		<table style="width: 100%; border: none;"> <tr> <td style="text-align: center;">0°C to +60°C</td> <td style="text-align: center;">0°C to +70°C</td> <td style="text-align: center;">-10°C to +60°C</td> <td colspan="4"></td> </tr> <tr> <td style="text-align: center;">-20°C to +70°C</td> <td style="text-align: center;">-30°C to +60°C</td> <td style="text-align: center;">-30°C to +75°C</td> <td colspan="4"></td> </tr> <tr> <td style="text-align: center;">-30°C to +85°C</td> <td style="text-align: center;">-40°C to +85°C</td> <td style="text-align: center;">-55°C to +125°C or -custom.</td> <td colspan="4"></td> </tr> </table> Customer package and /or pin configurations are welcome.							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	-55°C to +125°C or -custom.				
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-30°C to +85°C	-40°C to +85°C	-55°C to +125°C or -custom.																											
Mechanical Frequency Tuning		Standard		Mechanical trimmer built-in. ± 3 ppm min. tuning																									
		Option		No mechanical trimmer built-in (for aqueous washing cycles). To order please add “1” after the regular model prefix. For example: M141E15.																									
Input Voltage Range		+15.0V, +12.0V, +10.0V, +9.0V; +5.0V; +3.3V, +3.0V V D.C. $\pm 5\%$																											
Output Power (into 50 ohm load)		+3.0 V and +3.3V: +5 dBm (0.4Vrms, 3.2 mW) typical, +13 dBm is available for selected packages. +5.0 V and higher: +13 dBm (1 Vrms, 20 mW) typical.																											
Output Power Tolerance		“A”: ± 1 dBm; “B”: ± 2 dBm or “C”: ± 3 dBm																											
Current Consumption. (Over operating temperature range. Output level dependent.)		Current consumption greatly depends on the frequency, supply voltage and output power required. Here are some examples: 20 mA max. for 30 MHz at 5V with +13 dBm output 75 mA max. for 310 MHz at 3.3 V with +13 dBm output																											
VCTCXO only	Control voltage		+1.5 V ± 1.0 V or +2.5 V ± 2.0 V. or custom.																										
	Frequency Deviation Range	Standard	± 10 ppm typical. for +1.5 V ± 1.0 V																										
		Option	Narrow: ± 1 ppm max. or custom Wide: ± 35 min. or custom																										
	Slope Polarity	Positive slope. Positive voltage for positive frequency shift.																											
Linearity		10 % max.																											
Start-Up Time.		5 m. sec. typical, 10 m. sec. max. (reach 90% amplitude and at +25°C $\pm 2^\circ\text{C}$)																											
Harmonic		- 20 dBc max.																											
Spurious		- 60 dBc min.																											
SSB Phase Noise	Offset	10 Hz	100 Hz	1 KHz	10 KHz	100 KHz	1 MHz																						
VM16E33-310.000 MHz	dBc/Hz	-60	-90	-120	-125	-130	-140																						
Output Format		DC block, AC coupled																											
Vibration		6 G's rms over 10 to 2000 Hz																											
Shock		15G's 11 ms, 1/2 sine wave, 3 shocks in each plane																											
Storage Temperature		-40°C to +85°C or -55°C to +125°C (package dependent)																											



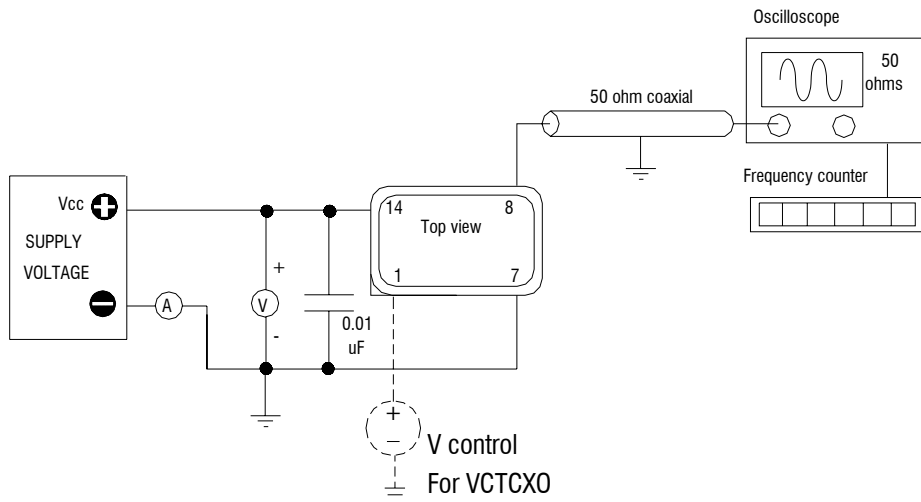
Note 1: Some specifications are package dependent. Please refer to the spec. sheet of individual packages once a package is selected..

Note 2: TCXO products ordered without mechanical and electrical frequency tuning should have a frequency tolerance of ± 2 ppm (at +25°C) and the frequency stability over temperature will be from that measured value.

Part Number Format and Examples:

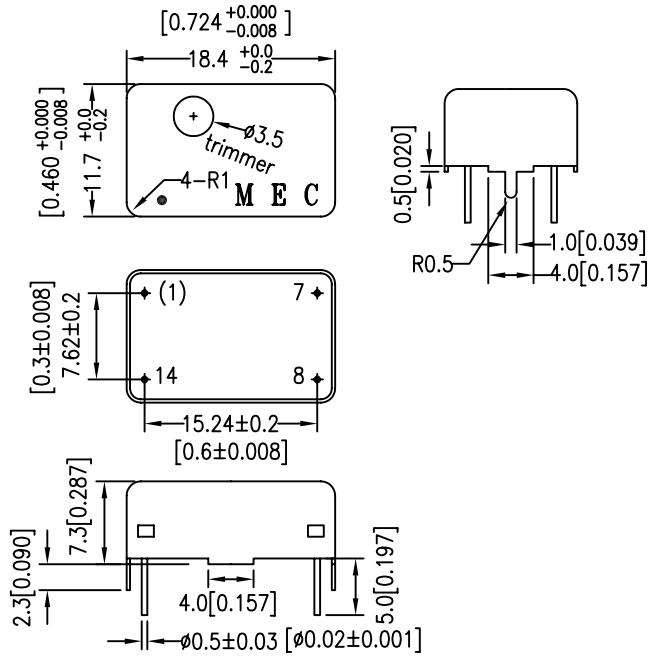
Example of TCXO: M16E15-310.000-1/-40+85-13A;												
Example of VCTCXO: VM16E15-310.000-1/-40+85-13A												
/	/		/		/		/		/	/ : customer to specify		
V	M16	E	15	—	310.000	—	1	/	-40+85	—	13	A
①	②	③	④		⑤		⑥		⑦		⑧	⑨
<p>①: “V” for VCTCXO; “blank” for TCXO ②: Package code ③: Wave form code “E” for sine wave 50 ohm load ④: Supply voltage code: “33” for +3.3V, “5” for +5.0V; “10” for +10V; “15” for +15.0V ⑤: Frequency in MHz ⑥: Frequency stability in \pmppm ⑦: Operating temperature range in °C. ⑧ Output power in dBm (tolerance is ± 1 dBm); ⑨ Output power tolerance. “A”: ± 1 dBm; “B”: ± 2 dBm or “C”: ± 3 dBm</p>												

True Sine Wave 50 ohm load TCXO (VCTCXO) Test Circuit (example of VM14)



Package: M38S,VM38S

Open bottom



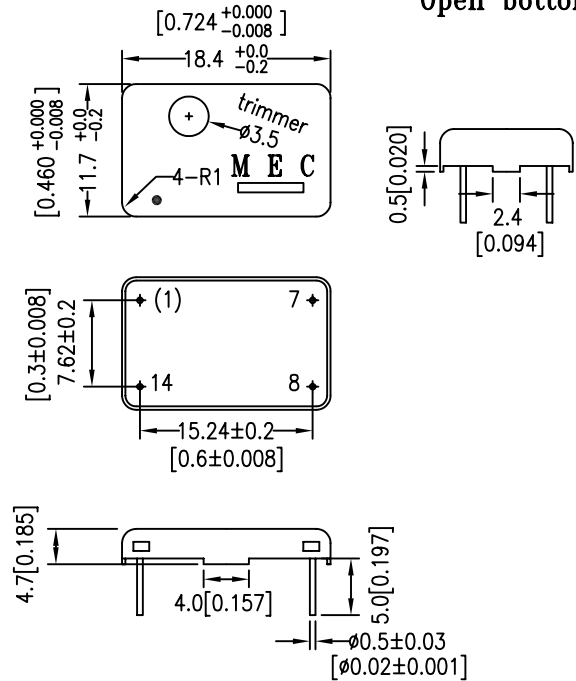
Pin Connections

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

Package: M39S,VM39S

Unit: mm [inches]

Open bottom



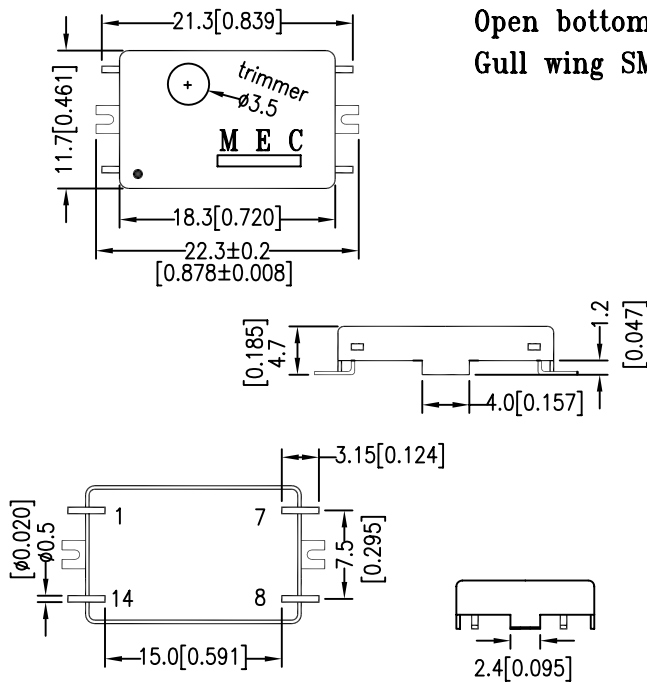
Pin Connections

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

TCXO;VCTCXO

Package: M47S,VM47S

**Open bottom
Gull wing SMD**

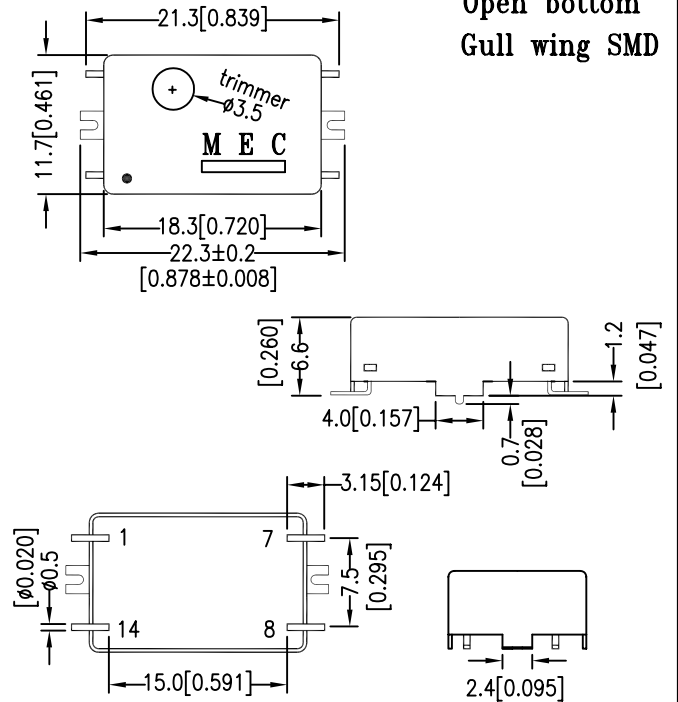


Pin Connections

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

Package: M55S,VM55S

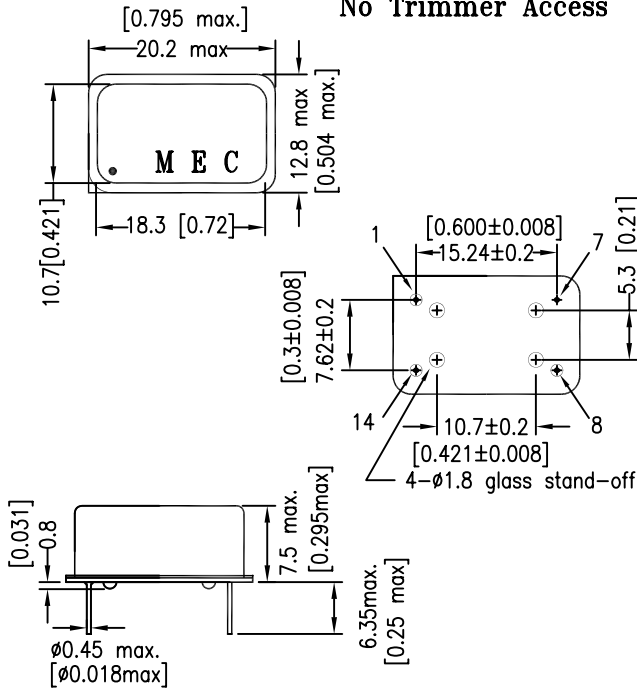
**Open bottom
Gull wing SMD**



Pin Connections

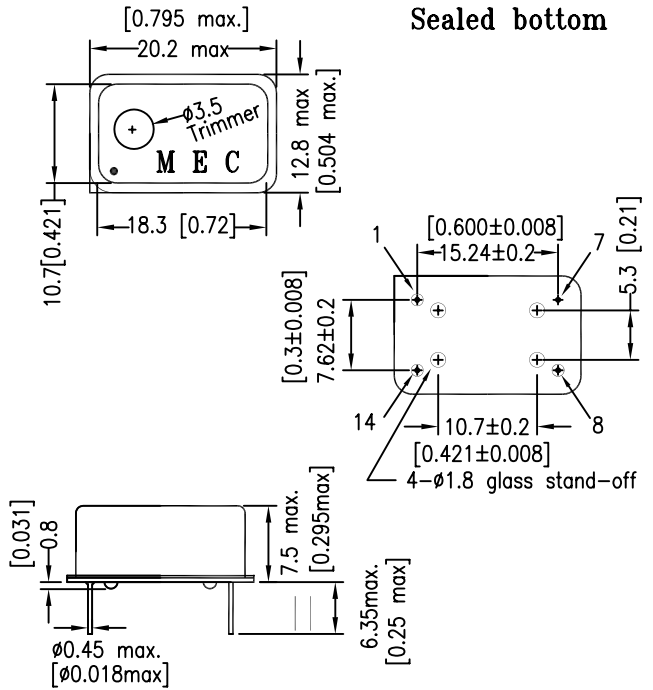
- Pin 1: Voltage Control for VCTCXO. No Connection for TCXO.
- Pin 7: Ground
- Pin 8: Output
- Pin 14: Supply Voltage

Package: M14S,VM14S 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
 Pin 8: Output
 Pin 14: Supply Voltage

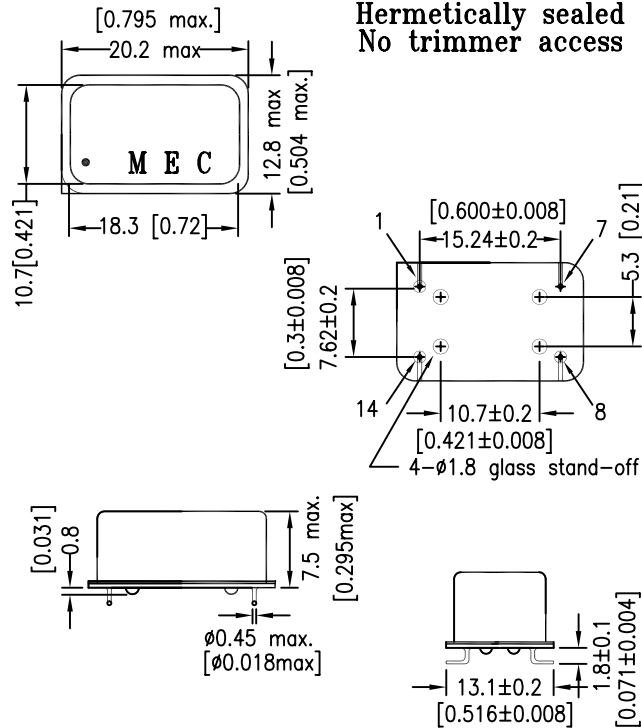
Package: M15S,VM15S Unit: mm [inches]
Sealed bottom



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

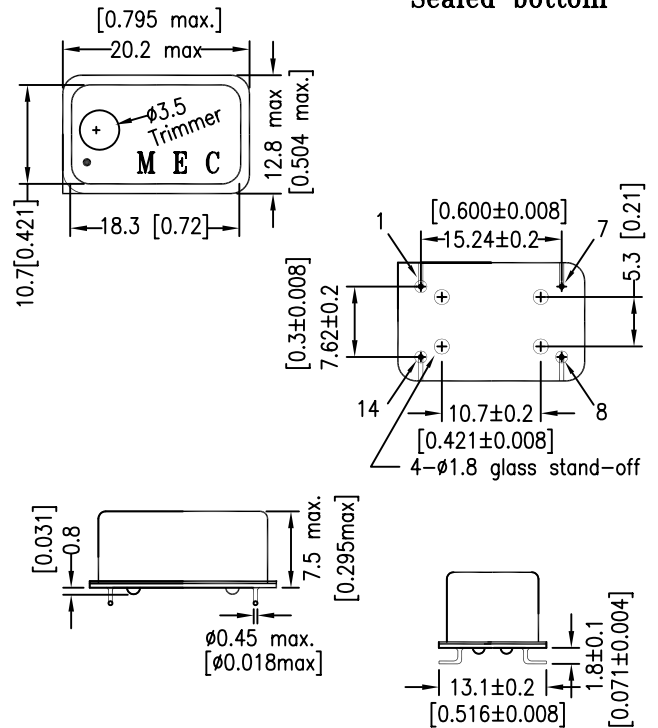
TCXO;VCTCXO

Package: M24S,VM24S 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
 Pin 8: Output
 Pin 14: Supply Voltage

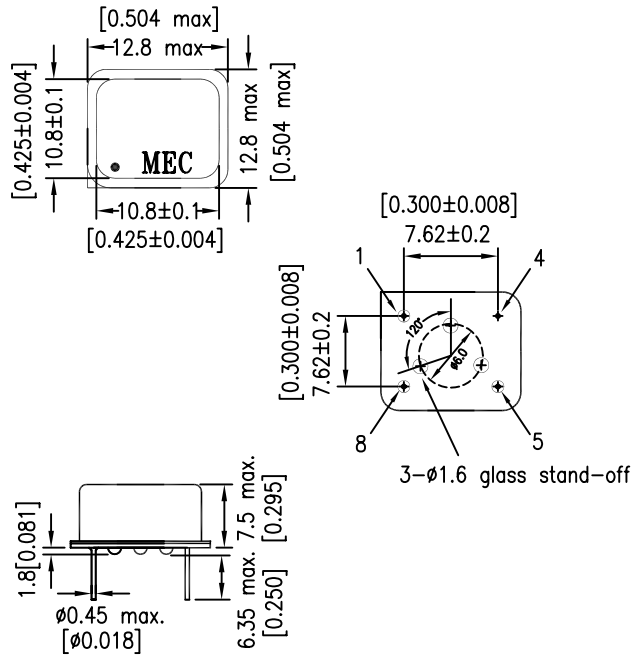
Package: M25S,VM25S Sealed bottom



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

Package: M8S,VM8S

Hermetically Sealed DIP
No trimmer Access



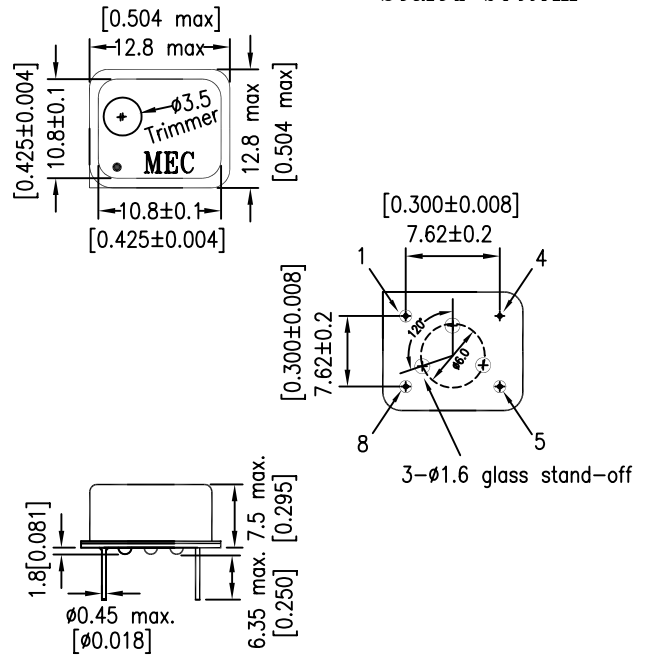
Pin Connections

Square corner denotes pin 1

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

Package: M9S,VM9S

Unit: mm [inches]
Sealed bottom



Pin Connections

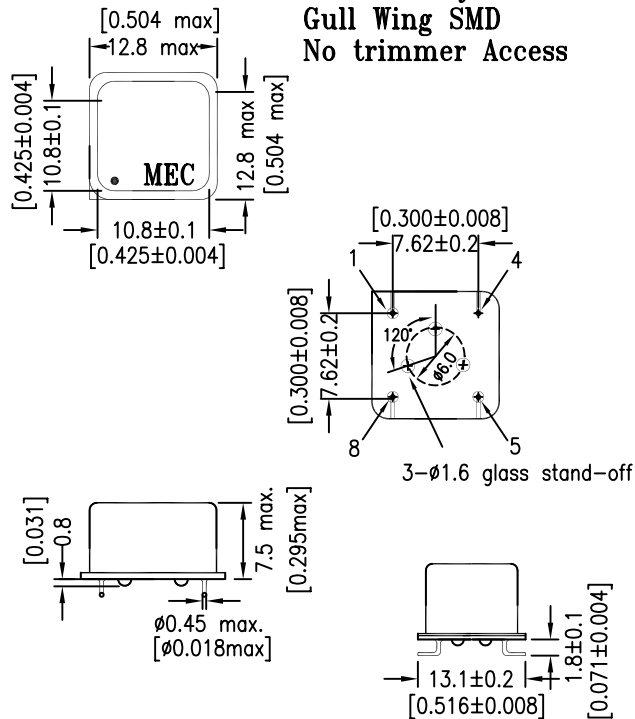
Square corner denotes pin 1

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

TCXO;VCTCXO

Package: M28S,VM28S

Hermetically Sealed
Gull Wing SMD
No trimmer Access



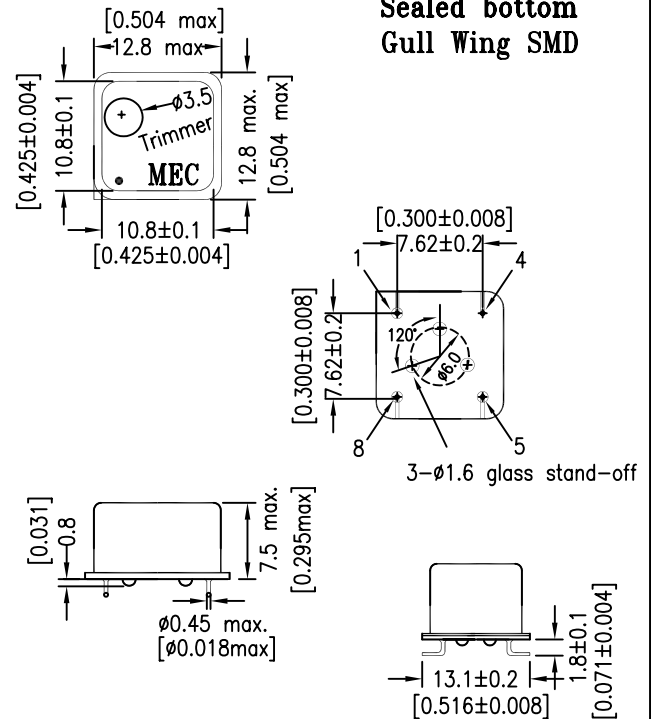
Pin Connections

Square corner denotes pin 1

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

Package: M29S,VM29S

Sealed bottom
Gull Wing SMD



Pin Connections

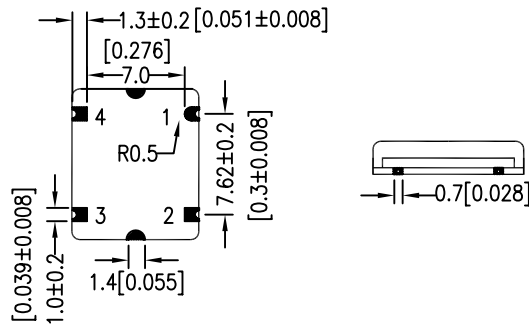
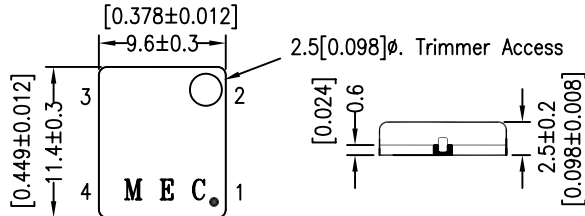
Square corner denotes pin 1

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

Package: M42S,VM42S

FR4 substrate

"42" represents 4 pads and 2.5 mm overall height



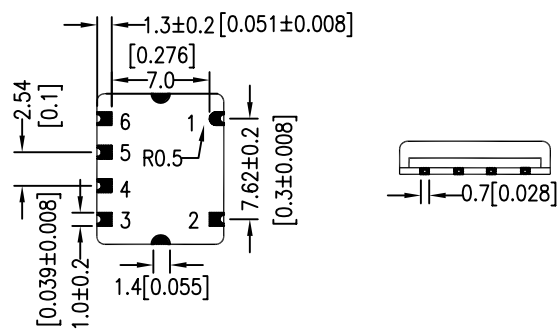
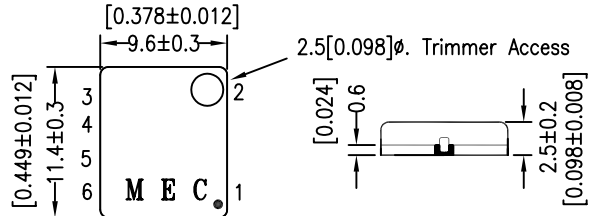
Pad Connections:

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

Package: M62S,VM62S

FR4 substrate

"62" represents 6 pads and 2.5 mm overall height



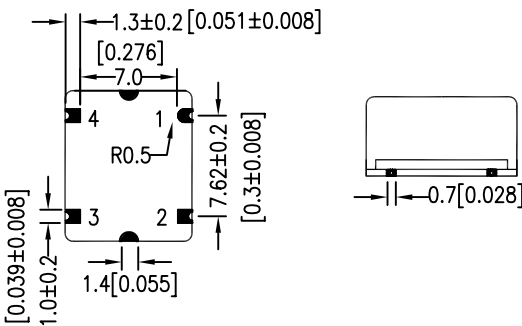
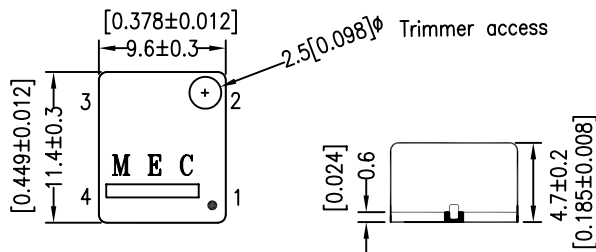
Pad Connections:

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

Package: M44S,VM44S

FR4 substrate

"44" represents 4 pads and 4.7 mm overall height



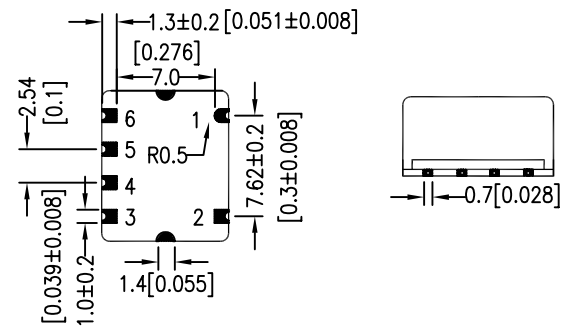
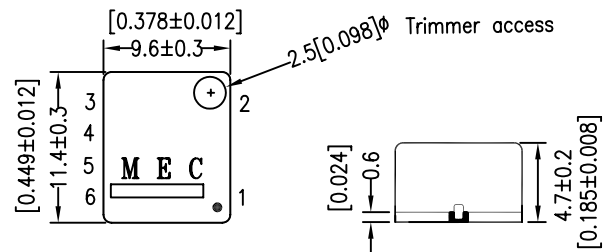
Pad Connections:

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

Package: M64S,VM64S

FR4 substrate

"64" represents 6 pads and 4.7 mm overall height



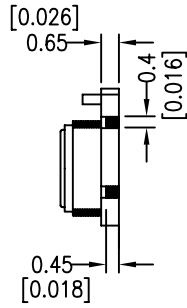
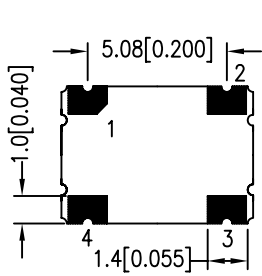
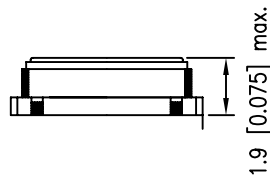
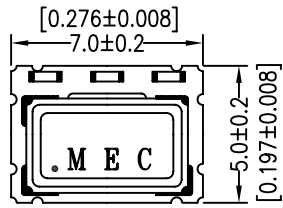
Pad Connections:

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

TCXO;VCTCXO

Package: M57S,VM57S

Ceramic SMD

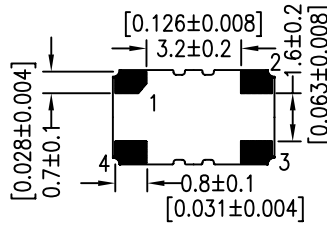
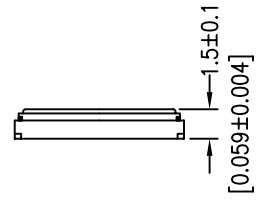
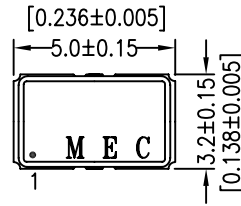


Pad Connections:

- Pad 1: Ground for TCXO; Voltage Control for VCTCXO
- Pad 2: Ground
- Pad 3: Output
- Pad 4: Supply Voltage

Package: M53S,VM53S

Ceramic SMD



Pad Connections:

- Pad 1: Ground for TCXO; Voltage Control for VCTCXO
- Pad 2: Ground
- Pad 3: Output
- Pad 4: Supply Voltage

TCXO;VCTCXO