PRODUCT SELECTION GUIDE

Product Summary:

Output Wave Form: Clipped Sine Wave					
TCXO	**VCTCXO**	**Available Frequency Range**	**RoHS Compliant Equivalent Model**		**Package Description**
Thru-Hole Types					
M38S_	**VM38S_**	9.6 ~ 26 MHz	**M38GS_**	**VM38GS_**	4 pin DIP
M39S_	**VM39S_**	9.6 ~ 26 MHz	**M39GS_**	**VM39GS_**	4 pin DIP
M14S_	**VM14S_**	9.6 ~ 26 MHz	**M14GS_**	**VM14GS_**	4 pin DIP. Hermetically sealed.
M15S_	**VM15S_**	9.6 ~ 26 MHz	**M15GS_**	**VM15GS_**	4 pin DIP. With trimmer
M8S_	**VM8S_**	10.0 ~ 26 MHz	**M8GS_**	**VM8GS_**	4 pin DIP. Half size. Hermetically sealed.
M9S_	**VM9S_**	10.0 ~ 26 MHz	**M9GS_**	**VM9GS_**	4 pin DIP. Half size. With trimmer
Gull Wing Surface Mount Types					
M55S_	**VM55S_**	9.6 ~ 26 MHz	**N / A**	**N / A**	4 pin gull wing
M47S_	**VM47S_**	9.6 ~ 26 MHz	**M47GS_**	**VM47GS_**	4 pin gull wing
M24S_	**VM24S_**	9.6 ~ 26 MHz	**M24GS_**	**VM24GS_**	4 pin gull wing. Hermetically sealed.
M25S_	**VM25S_**	9.6 ~ 26 MHz	**M25GS_**	**VM25GS_**	4 pin gull wing. With trimmer
M28S_	**VM28S_**	10.0 ~ 26 MHz	**M28GS_**	**VM28GS_**	4 pin gull wing. Half size. Hermetically sealed.
M29S_	**VM29S_**	10.0 ~ 26 MHz	**M29GS_**	**VM29GS_**	4 pin Gull wing. Half size. With trimmer
Leadless Surface Mount Types					
M62S_	**VM62S_**	10.0 ~ 26 MHz	**M62GS_**	**VM62GS_**	6 pad FR4 substrate. 2.5 mm H
M42S_	**VM42S_**	10.0 ~ 26 MHz	**M42GS_**	**VM42GS_**	4 pad FR4 substrate. 2.5mm H
M64S_	**VM64S_**	9.6 ~ 26 MHz	**M64GS_**	**VM64GS_**	6 pad FR4 substrate. 4.7 mm H
M44S_	**VM44S_**	9.6 ~ 26 MHz	**M44GS_**	**VM44GS_**	4 pad FR4 substrate. 4.7 mm H
M57S_	**VM57S_**	10.0 ~ 26 MHz	**Same**(1)	**Same**(1)	4 pad ceramic substrate. 5x7 mm
M53S_	**VM53S_**	12.5 ~26 MHz	**Same**(1)	**Same** (1)	4 pad ceramic substrate. 5x3.2 mm

"_" is voltage code. Please see the table on next page.

For RoHS equivalent model please add "**G**" after the package code. For example: M14GS**.**

(1) M57S, VM57S, M53S and VM53S are RoHS compliant and lead free products. .

Note: Frequency tuning by the built-in mechanical trimmer is standard for all models except for M57S, VM57S, M53S and VM53S.

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.)
- Negative slope polarity
- Hi-rel (-55℃ to +125℃) VCTCXOs and TCXOs.
- +15V, +12V, +10V or +9V DC supply voltages are also available in some packages.
- Analog sensor output (TCXOs only); Digital sensor output (TCXOs only)

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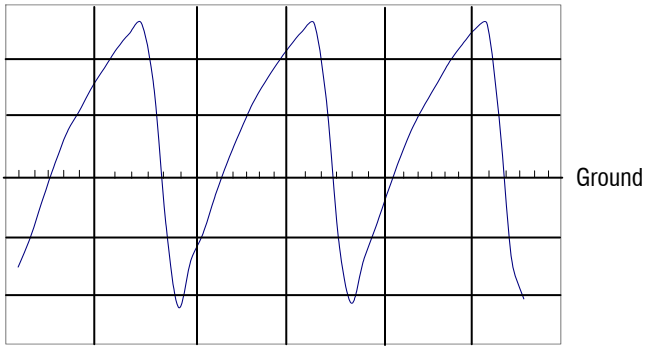
General Specifications (at+25°C and specified input voltage)

Frequency Range				9.6 MHz ~ 26.0 MHz	
Output Wave From				**Clipped Sine** wave. Wave form code is "**S**"	
Initial Calibration Tolerance				With mechanical trimmer: < ±0.5 ppm. +25°C ±2°C. Without mechanical trimmer: ±2 ppm at +25°C ±2°C.	
Standard Frequencies (partial list)				9.6, 10.0, 12.8, 13.0, 14.4, 15.36, 16.384, 19.2, 19.440, 19.68 MHz	
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 ±0.2 ppm max. for a ±5% input voltage change ±0.2 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)				0.8 V p-p min.	
Current Consumption. **(Over operating temperature range.)**				9.6~13 MHz: 1.3 mA max. 13.1~20 MHz: 1.5 mA max. 20.1~26 MHz: 2.0 mA max.	
Mechanical Frequency Tuning			**Standard**	±3 ppm min. tuning. (not for aqueous washing cycles) Note: VM57 and VM53 have no mechanical trimmer built-in.	
			Option	No mechanical trimmer built-in (Able to withstand aqueous washing cycles). Part number: Please add "**1**" after the regular model prefix. For example: M38**1**S3.	
Input Voltage Range			**Option**	+15.0V, +12.0V, +10.0V, +9.0; +3.3V D.C.	
			Standard	+ 2.75 V D.C. min.; +5.0 V D.C. max.	
				+3.0 V (voltage code is "**3**")	+5.0 V (voltage code is "**5**")
Pin 1 Options	**V C T C X O only**	**Control voltage**		+1.5 V±1.0 V	+2.5 V±2.0 V. +1.5 V±1.0 V for VM57S5
		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.	
		Modulation Band Width		10 KHz min. Measured at -3 dB.	
		Input Impedance		1 meg Ω min.	
	Analog Sensor Output. TCXOs only.			Linear analog voltage-temperature output on pin 1. Part number: Please add "**2**" after the regular model prefix. For example: M47**2**S3.	
	Digital Sensor Output. TCXOs only.			Digital voltage-temperature output on pin 1. Part number: Please add "**3**" after the regular model prefix. For example: M47**3**S3	
Start-Up Time.				2 m. sec. Typical, 3 m. sec. max. (reach 90% amplitude and at+25°C±2°C)	
Output Load				10 K Ω // 10 pF ±10%	
Harmonics Distortion				- 7dBc max.	
Output Format				DC block, AC coupled. VM53 and M53 are 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..

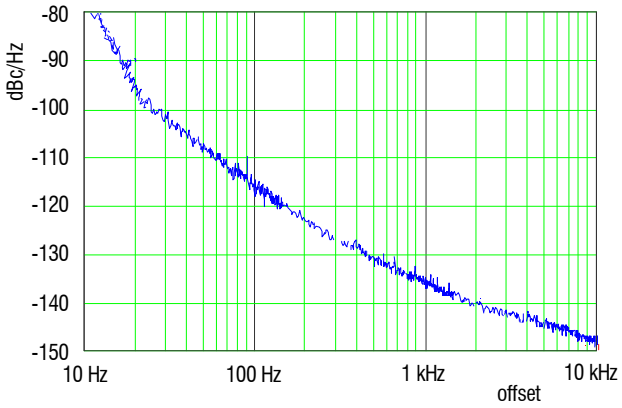
Note 2: TCXO products ordered without mechanical and electrical frequency tuning should have a frequency tolerance of ±2 ppm (at +25°C) and the frequency stability over temperature will be from that measured value.

Wave Form – clipped sine wave



Typical Phase Noise

VM53S3-20.000



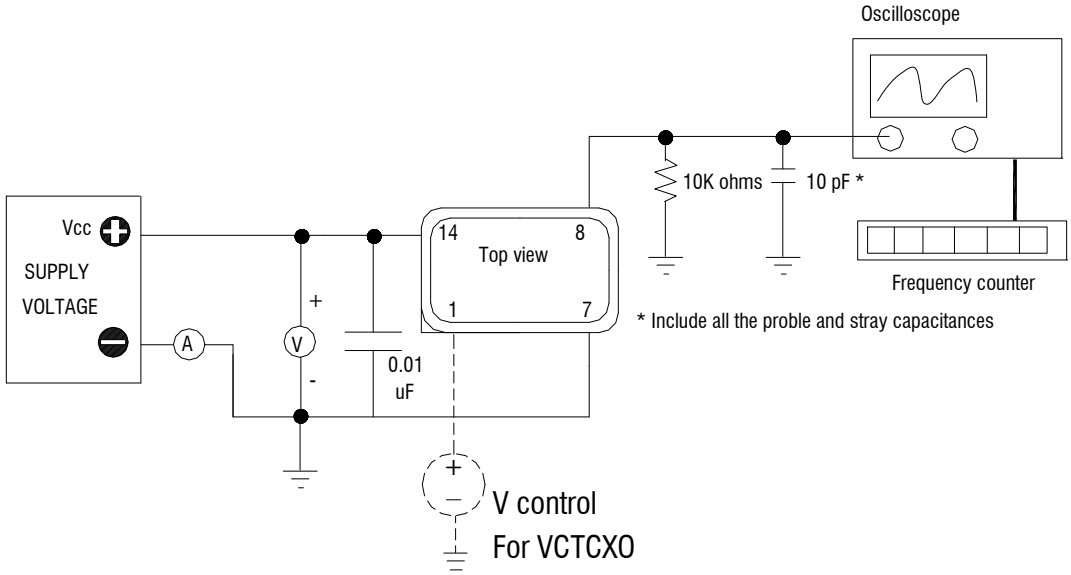
Part Number Format and Examples:

Example of TCXO: M38S5-12.800-2.5/-30+75;
Example of VCTCXO: VM38S5-12.800-2.5/-30+75

✍	✍		✍		✍		✍		✍	✍: customer to specify
V	M38	S	5	—	12.800	—	2.5	/	-30+75	
❶	❷	❸	❹		❺		❻		❼	

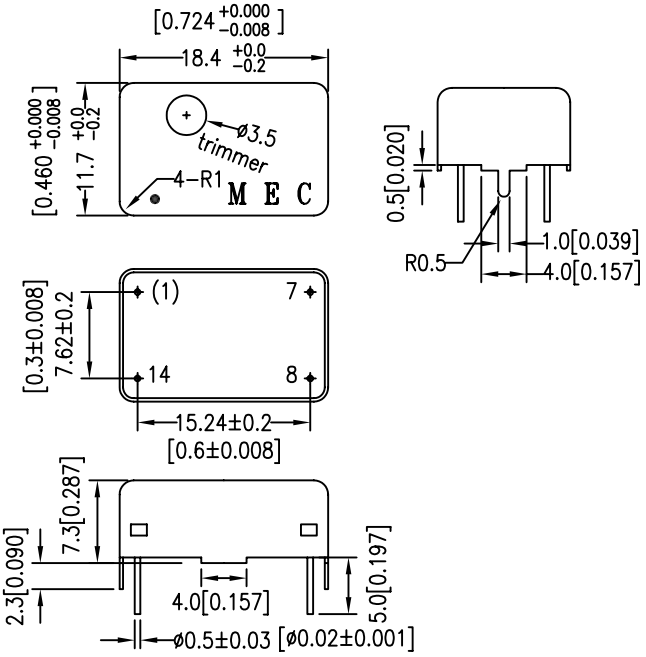
❶: “**V**” for **VCTCXO**; “**blank**” for **TCXO** ❷: Package code ❸: Wave form code “**S**” for clipped sine wave ❹: Supply voltage code: “**28**” for +2.8V, “**3**” for +3.0V, “**33**” for “+3.3V, “**5**” for +5.0V ❺:Frequency in MHz ❻: Frequency stability in ±ppm ❼: Operating temperature range in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

Clipped Sine Wave TCXO (VCTCXO) Test Circuit (example of VM14):



Package: M38S,VM38S

Open bottom



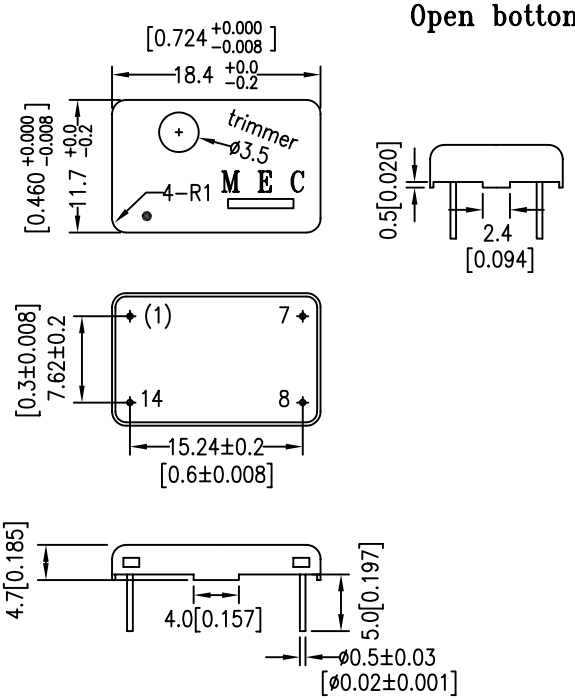
Pin Connections

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

Package: M39S,VM39S

Unit: mm [inches]

Open bottom



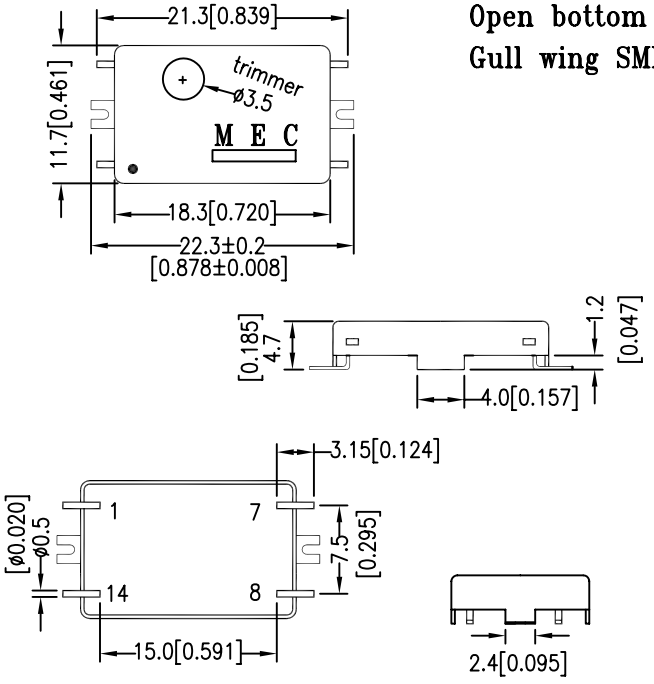
Pin Connections

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

TCXO;VCTCXO

Package: M47S,VM47S

Open bottom
Gull wing SMD

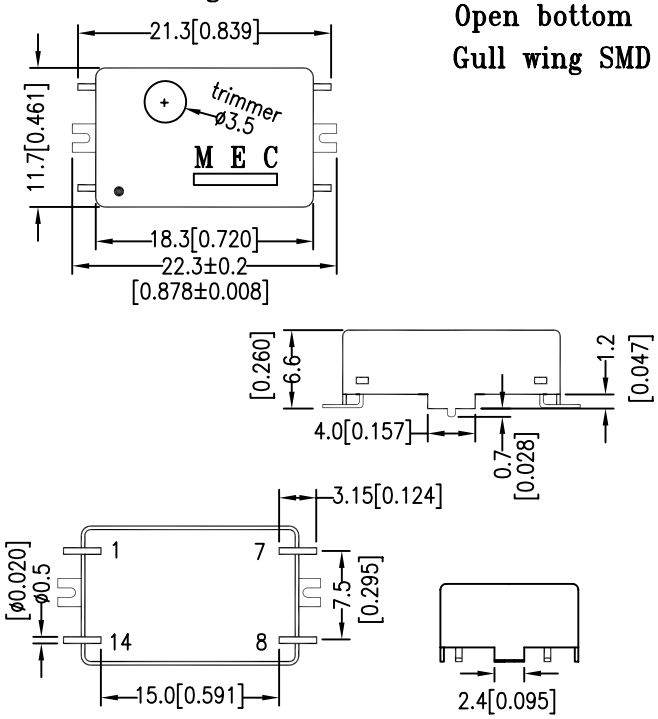


Pin Connections

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

Package: M55S,VM55S

Open bottom
Gull wing SMD

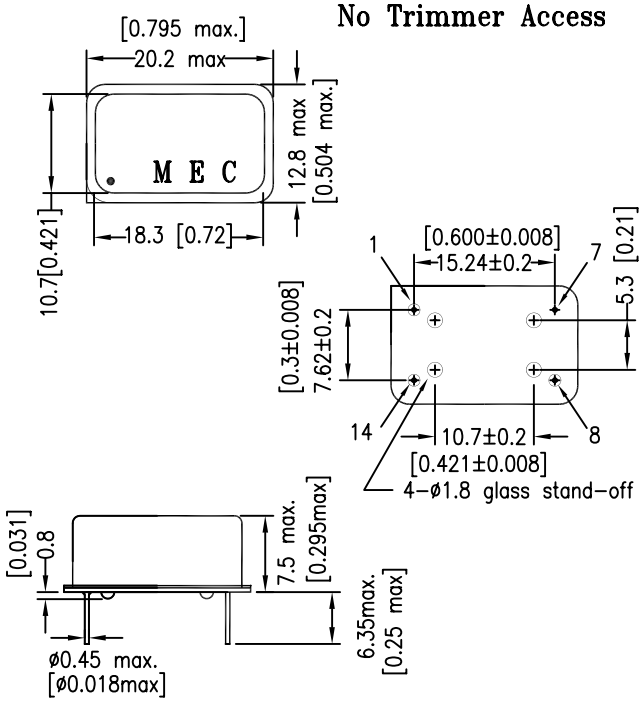


Pin Connections

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

Package: M14S,VM14S

Hermetically Sealed DIP
No Trimmer Access



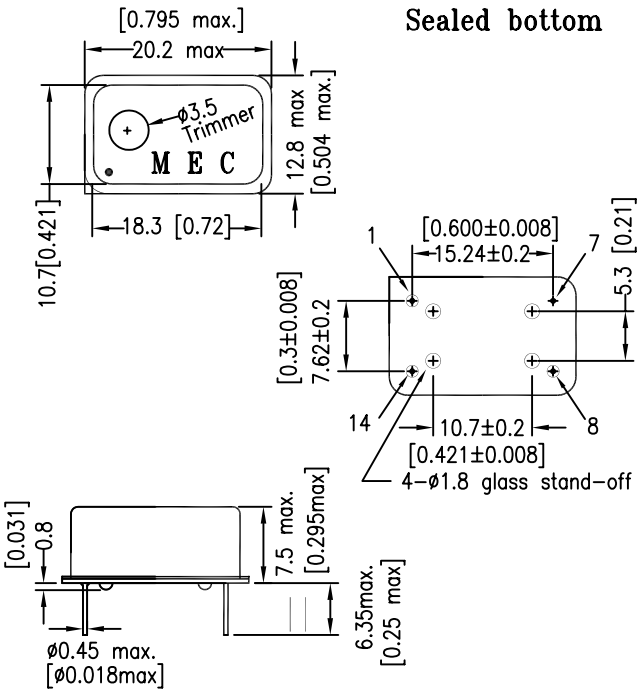
Pin Connections

Square corner denotes pin 1

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

Package: M15S,VM15S

Unit: mm [inches]
Sealed bottom



Pin Connections

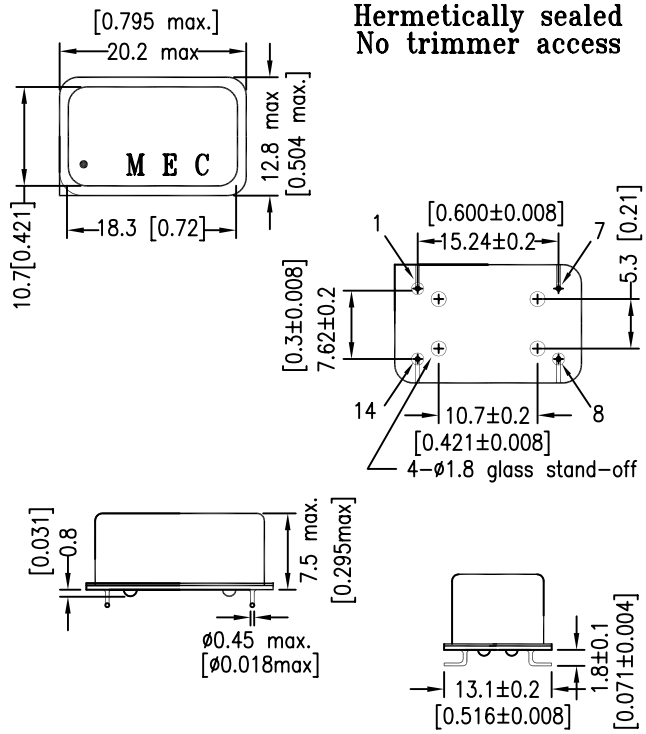
Square corner denotes pin 1

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

TCXO;VCTCXO

Package: M24S,VM24S

Hermetically sealed
No trimmer access



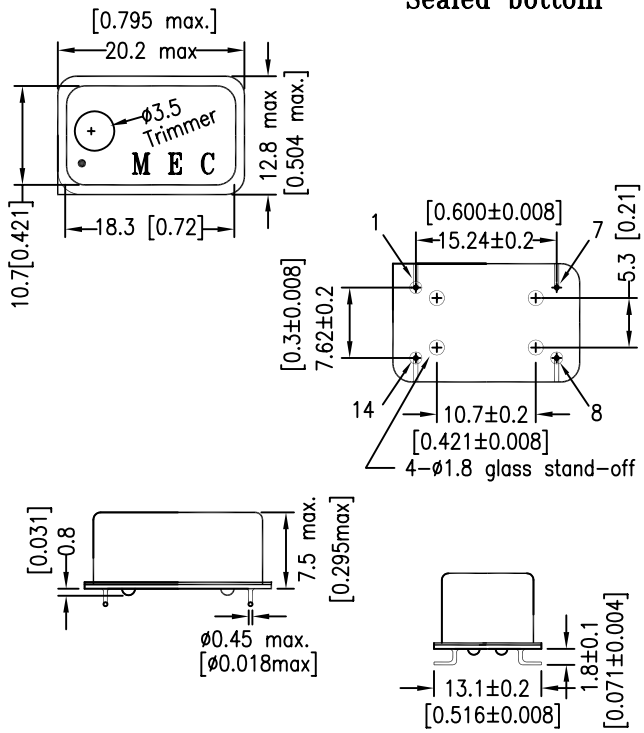
Pin Connections

Square corner denotes pin 1

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

Package:M25S,VM25S

Sealed bottom



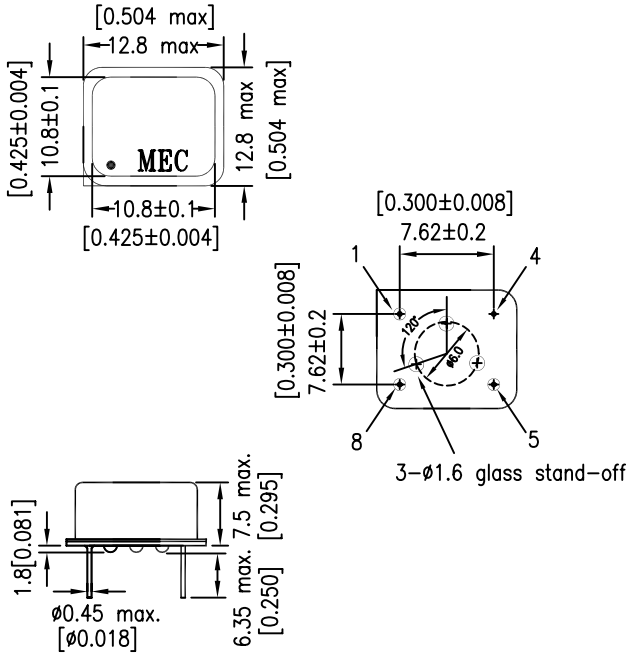
Pin Connections

Square corner denotes pin 1

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

Package: M8S,VM8S

Hermetically Sealed DIP
No trimmer Access



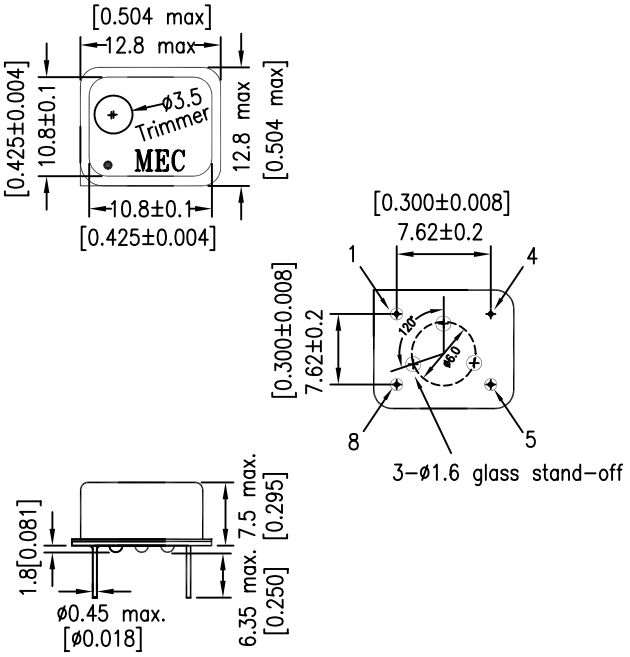
Pin Connections

Square corner denotes pin 1

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

Package: M9S,VM9S

Unit: mm [inches]
Sealed bottom



Pin Connections

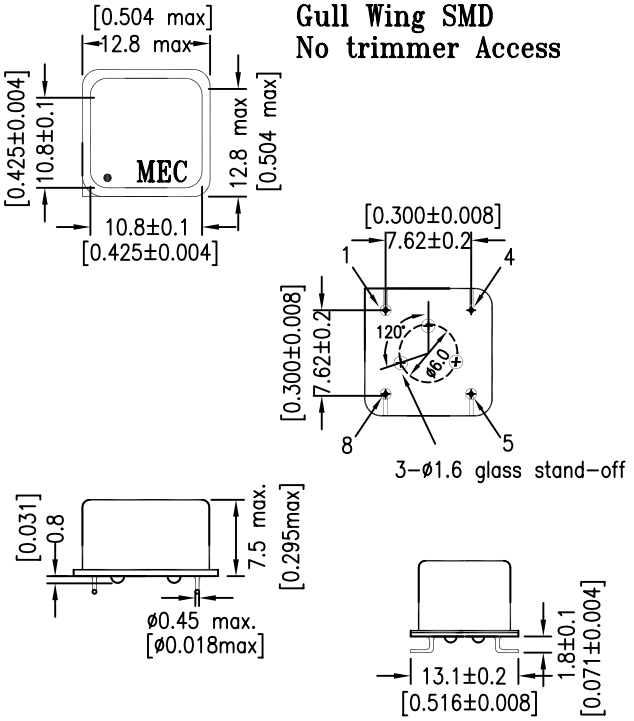
Square corner denotes pin 1

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

TCXO;VCTCXO

Package: M28S,VM28S

Hermetically Sealed
Gull Wing SMD
No trimmer Access



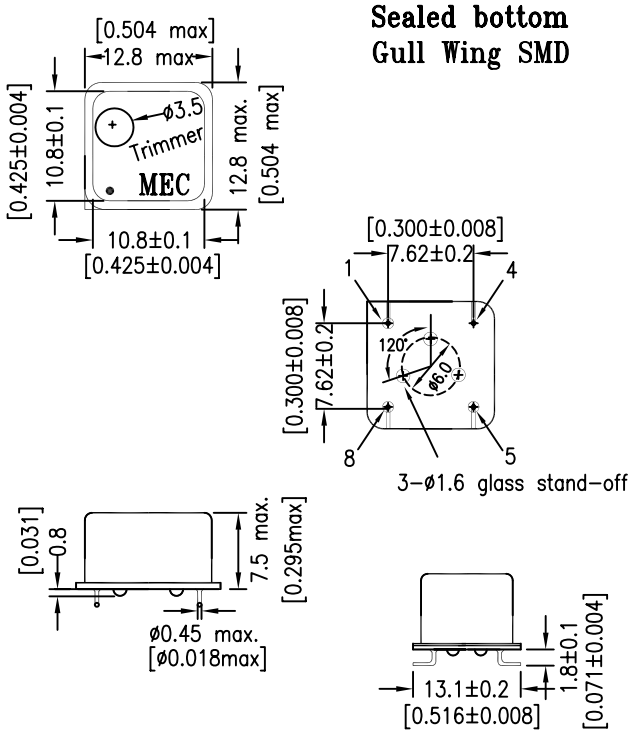
Pin Connections

Square corner denotes pin 1

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

Package: M29S,VM29S

Sealed bottom
Gull Wing SMD



Pin Connections

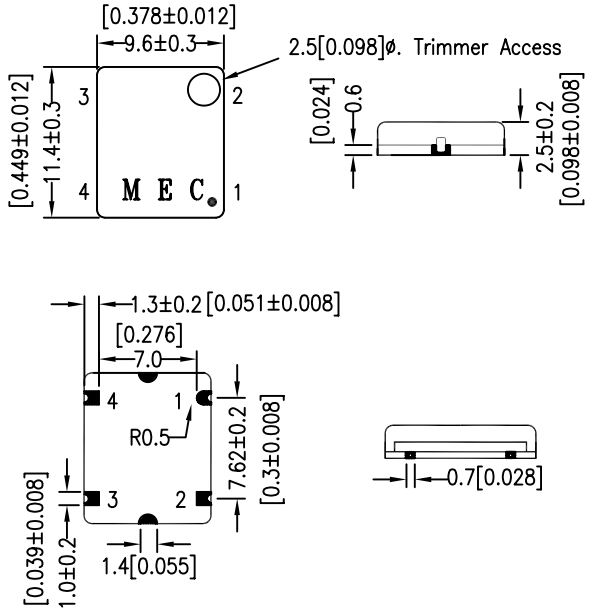
Square corner denotes pin 1

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

Package: M42S,VM42S

FR4 substrate

"42" represents 4 pads and 2.5 mm overall height



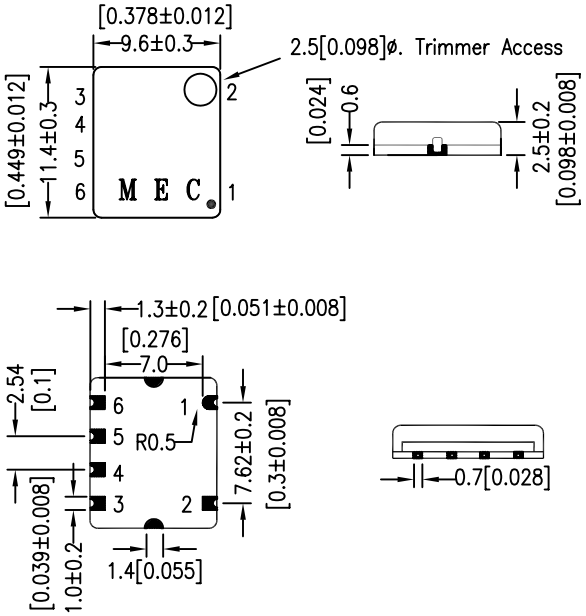
Pad Connections:

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

Package: M62S,VM62S

FR4 substrate

"62" represents 6 pads and 2.5 mm overall height



Pad Connections:

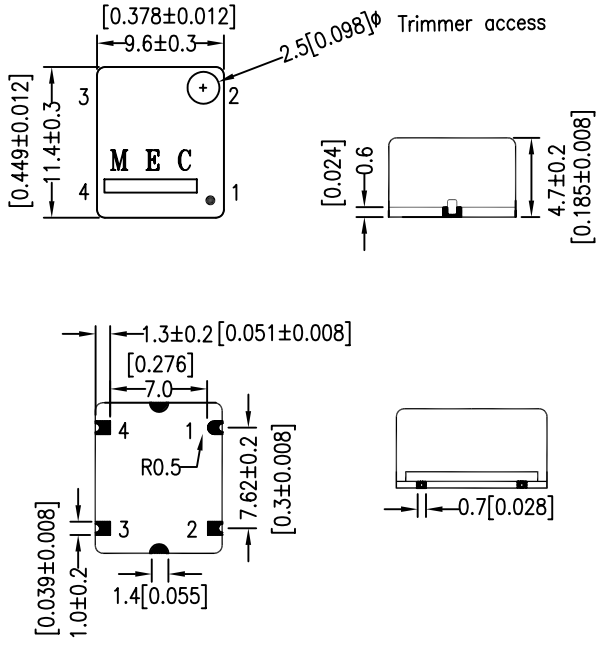
Pad 1,2,4: Ground and case
Pad 3: Output
Pad 5: Voltage Control for VCTCXO; No Connection for TCXO
Pad 6: Supply Voltage

TCXO;VCTCXO

Package: M44S,VM44S

FR4 substrate

"44" represents 4 pads and 4.7 mm overall height



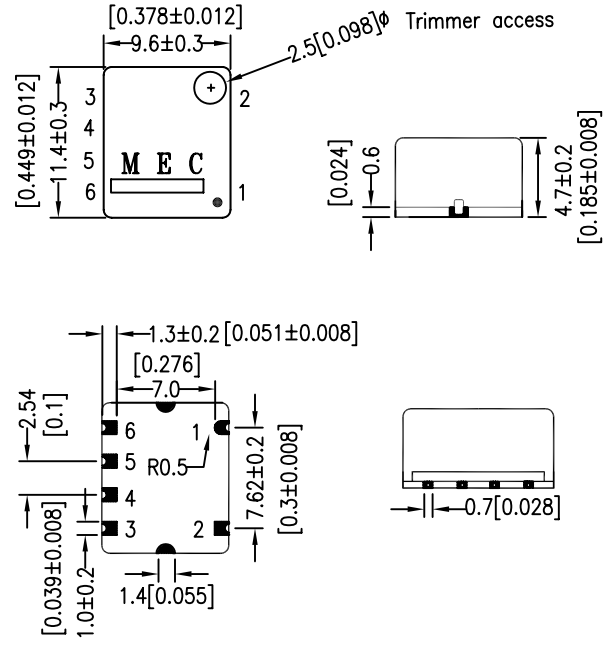
Pad Connections:

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

Package: M64S,VM64S

FR4 substrate

"64" represents 6 pads and 4.7 mm overall height

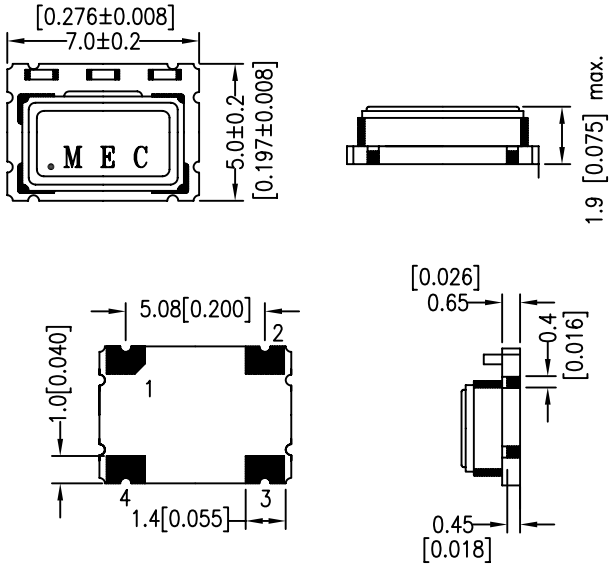


Pad Connections:

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

Package: M57S,VM57S

Ceramic SMD

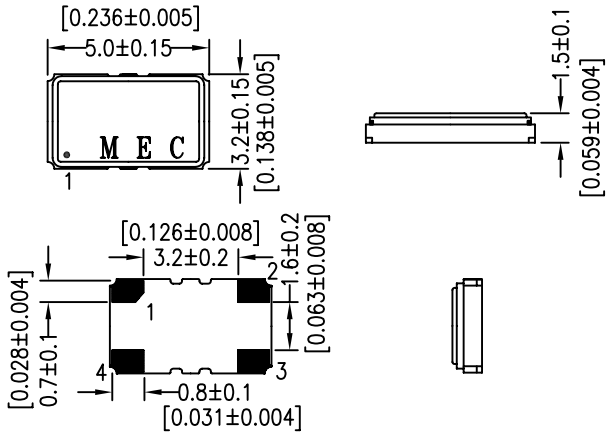


Pad Connections:

Pad 1: Ground for TCXO; Voltage Control for VCTCXO
Pad 2: Ground and metal lid
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 and metal lid
Pad 3: Output
Pad 4: Supply Voltage

TCXO;VCTCXO