



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°C to +125°C) 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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| | | | |
|---|-------------------|---|------------------------------|
| “TCXO” and “VCTCXO” Wave Form: Clipped Sine Wave | “S” Series |  | MERCURY Since 1973 |
|---|-------------------|---|------------------------------|

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

| | | | | | |
|--|---|---|---|--|--|
| Frequency Range | | 9.6 MHz ~ 26.0 MHz | | | |
| Output Wave Form | | 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: M381S3. | | |
| 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 | VCTCXO 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: M472S3. | | |
| | Digital Sensor Output. TCXOs only. | | Digital voltage-temperature output on pin 1. Part number: Please add “3” after the regular model prefix. For example: M473S3 | | |
| 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..

**“TCXO” and “VCTCXO”
Wave Form: Clipped Sine Wave**

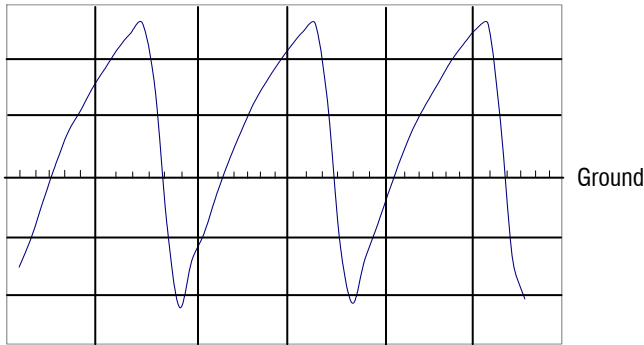
“S” Series



MERCURY
Since 1973

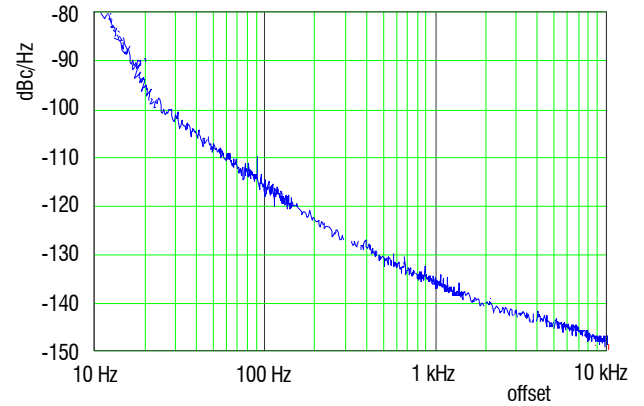
Note 2: TCXO products ordered without mechanical and electrical frequency tuning should have a frequency tolerance of ± 2 ppm (at +25°C) and the frequency stability over temperature will be from that measured value.

Wave Form – clipped sine wave



Typical Phase Noise

VM53S3-20.000



Part Number Format and Examples:

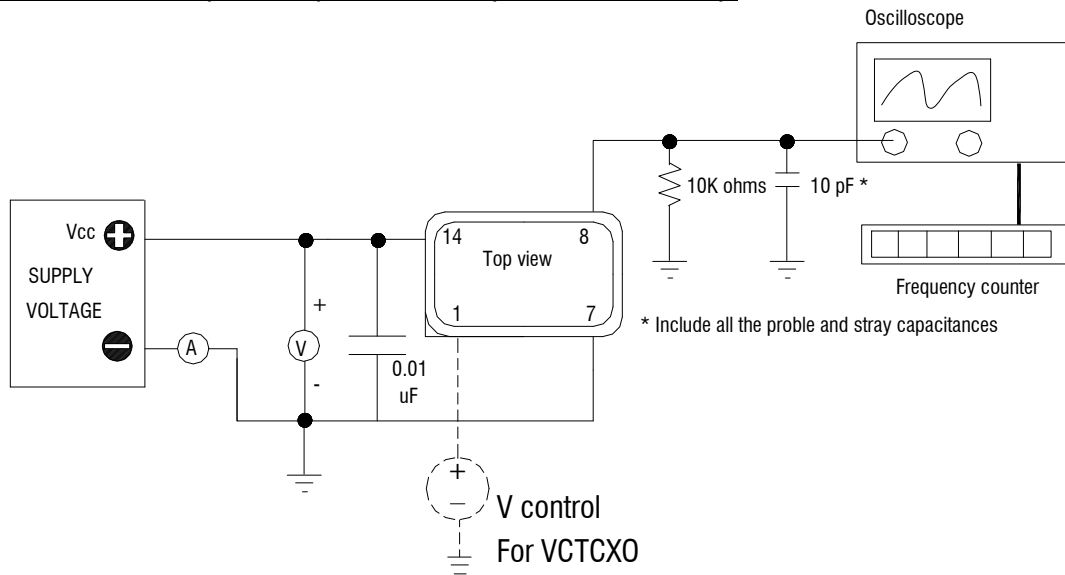
Example of TCXO: M38S5-12.800-2.5/-30+75;

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 | |

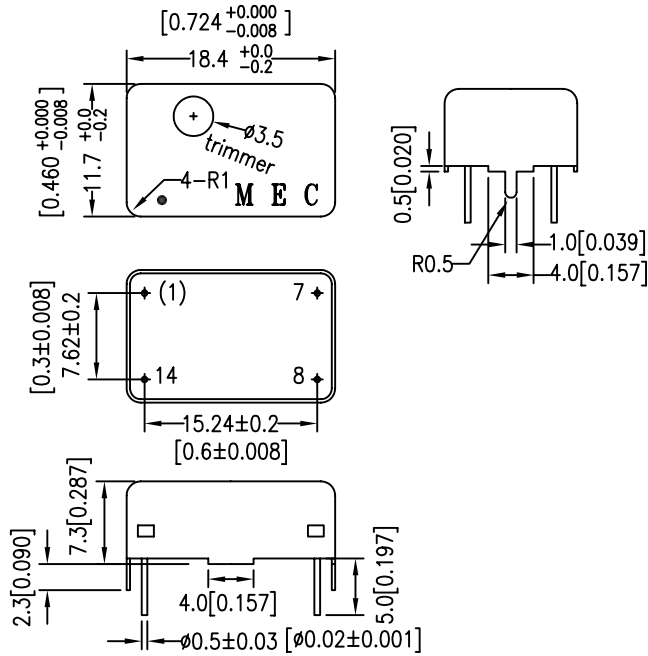
❶: “V” for VCTCXO; “blank” for TCXO
 ❷: Package code
 ❸: Wave form code “S” for clipped sine wave
 ❹: Supply voltage code: “28” for +2.8V, “3” for +3.0V, “33” for +3.3V, “5” for +5.0V
 ❺: Frequency in MHz
 ❻: Frequency stability in \pm ppm
 ❼: Operating temperature range in °C

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



Package: M38S,VM38S

Open bottom



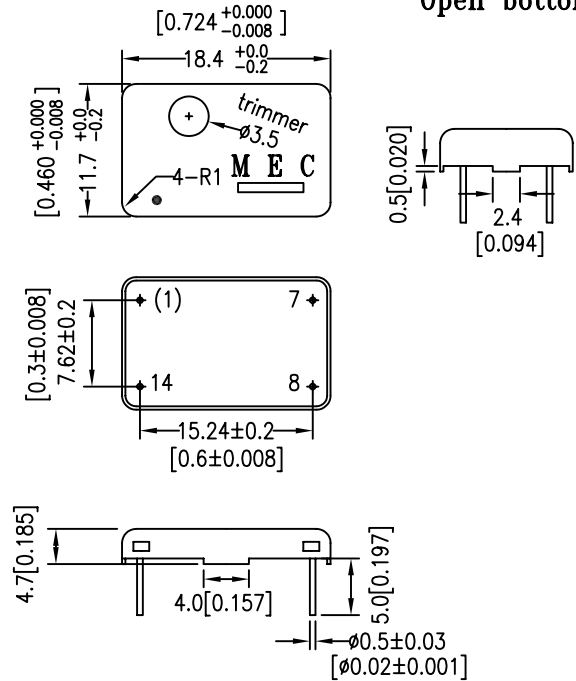
Pin Connections

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

Package: M39S,VM39S

Unit: mm [inches]

Open bottom



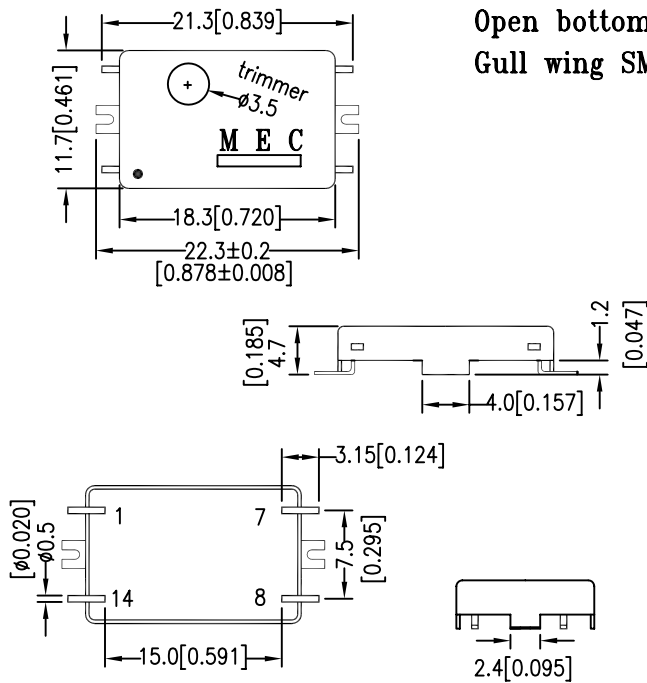
Pin Connections

- 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**

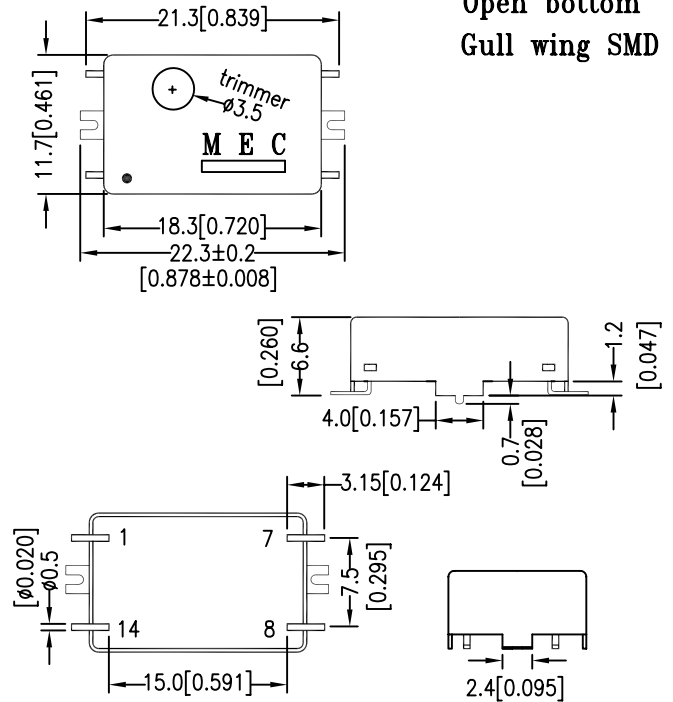


Pin Connections

- 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

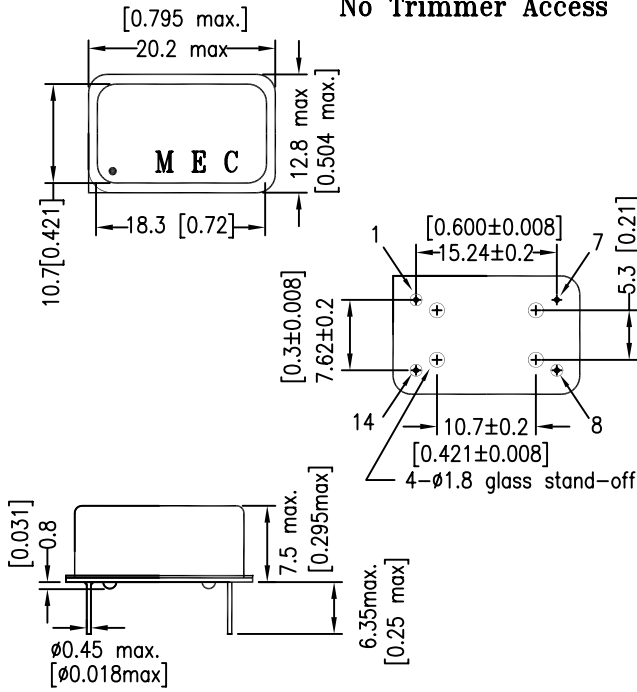
**Open bottom
Gull wing SMD**



Pin Connections

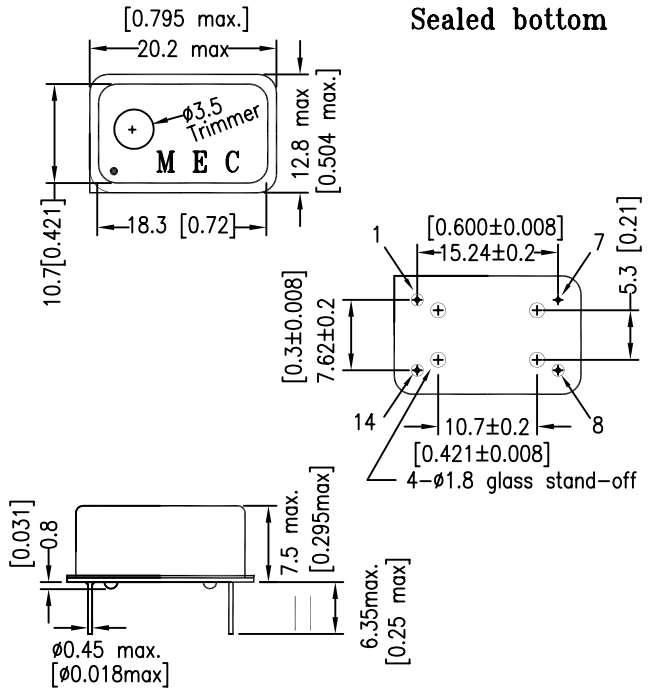
- Pin 1: Voltage Control for VCTCXO. No Connection for TCXO.
- Pin 7: Ground and case
- Pin 8: Output
- Pin 14: Supply Voltage

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

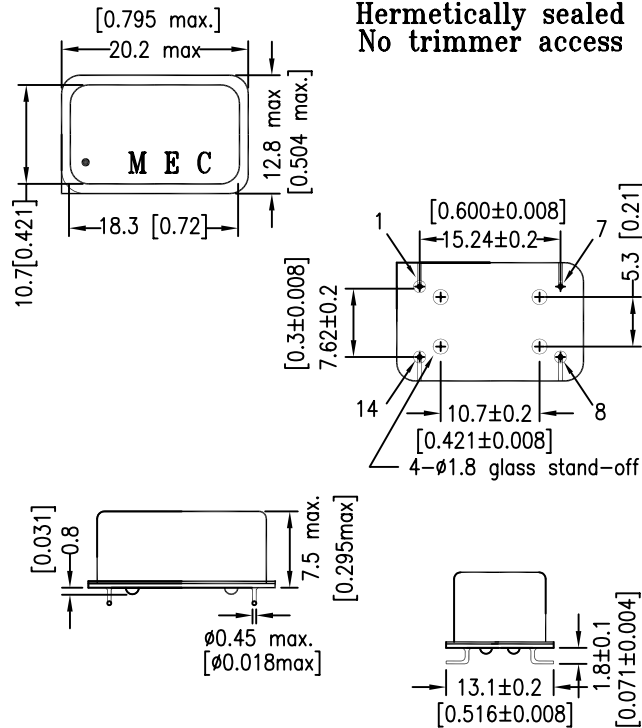
Package: M15S,VM15S Unit: mm [inches] Sealed bottom



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

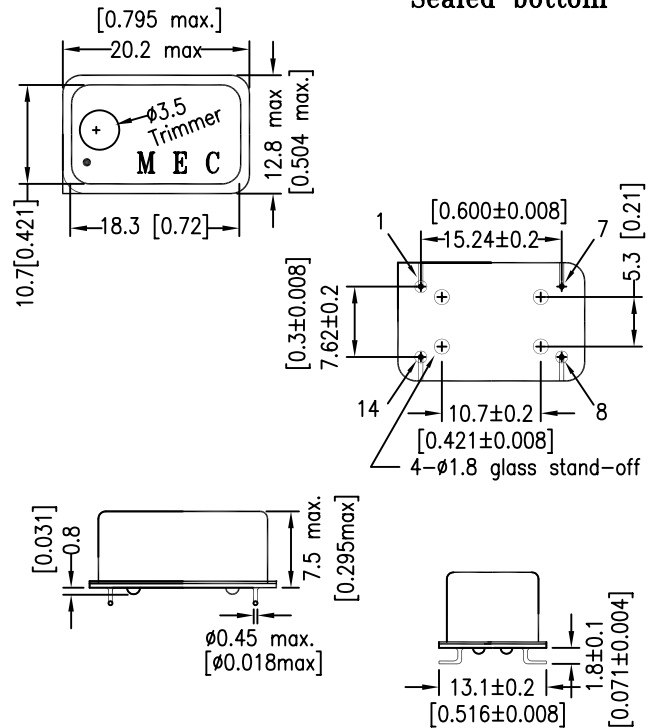
TCXO;VCTCXO

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

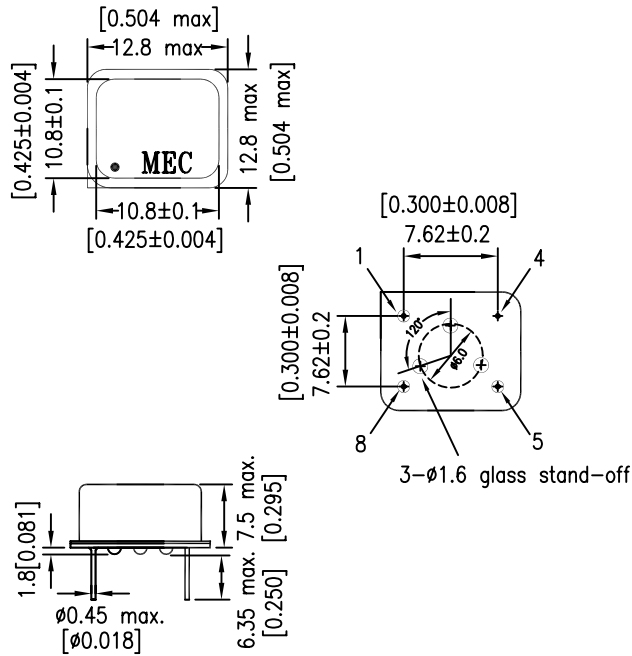
Package: M25S,VM25S Sealed bottom



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



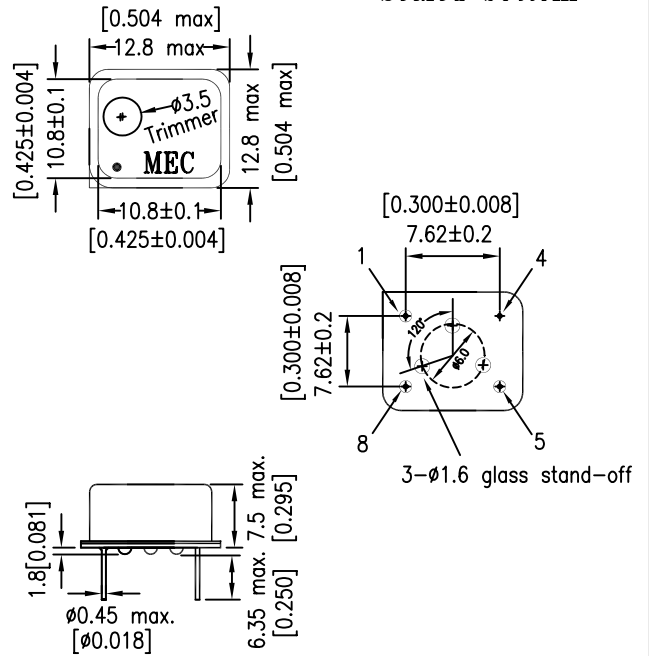
Pin Connections

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

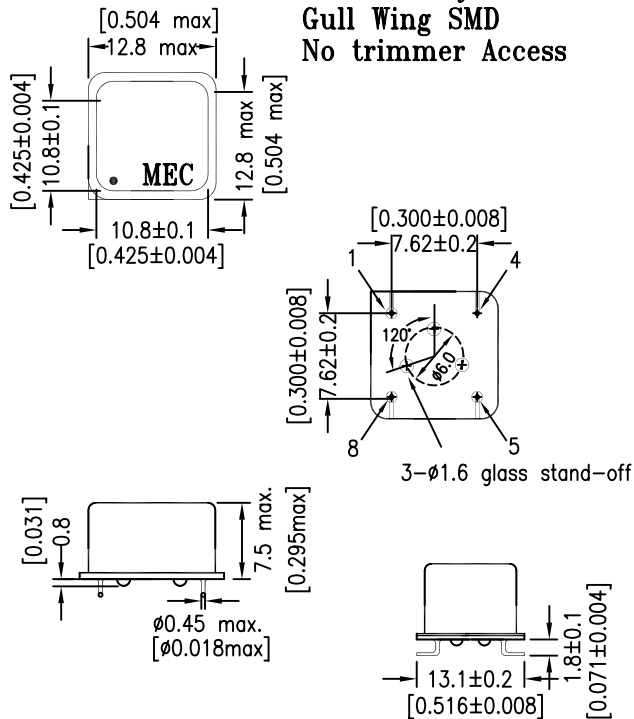
Square corner denotes pin 1

- 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



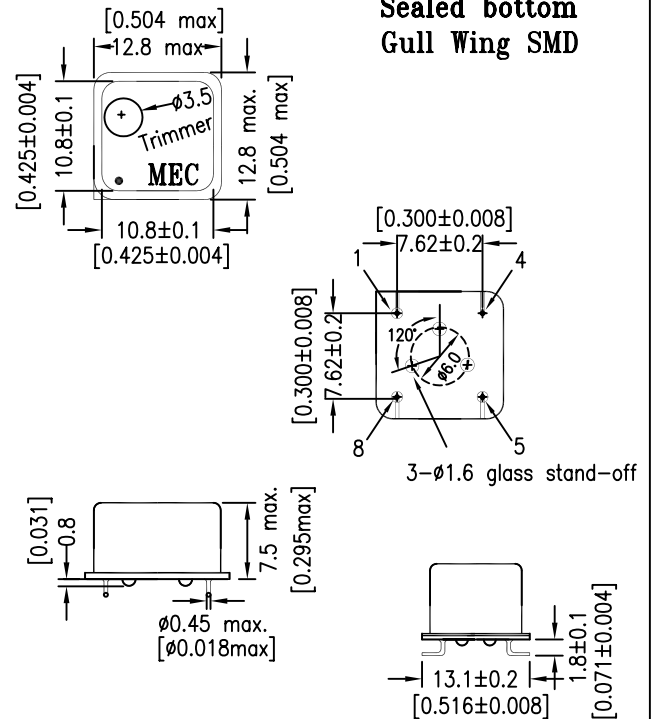
Pin Connections

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

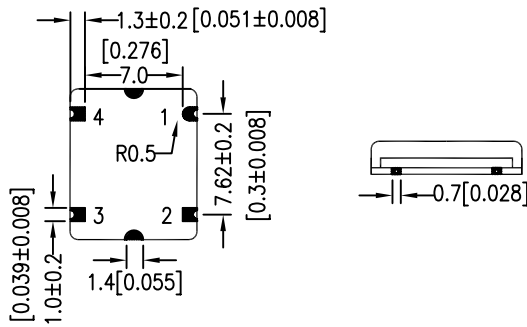
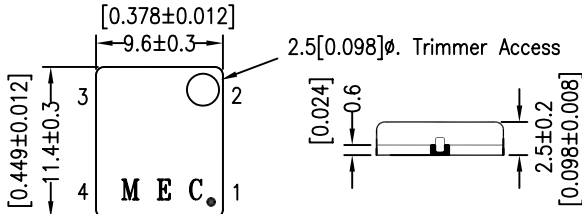
Square corner denotes pin 1

- 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



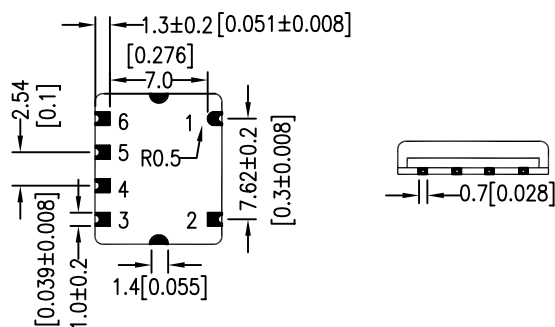
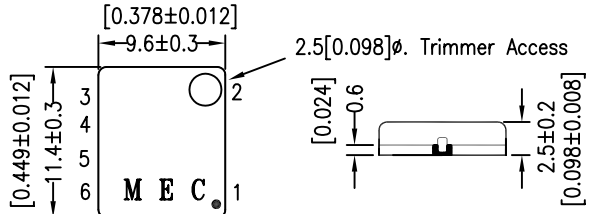
Pad Connections:

- 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



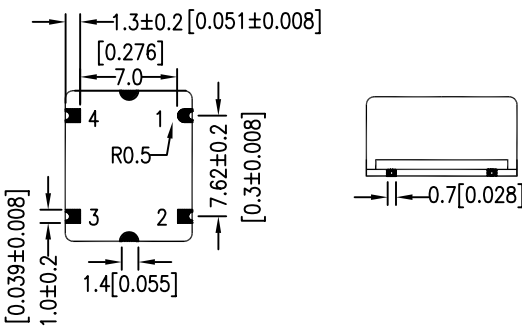
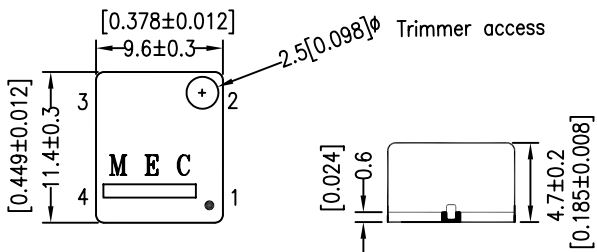
Pad Connections:

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

Package: M44S,VM44S

FR4 substrate

"44" represents 4 pads and 4.7 mm overall height



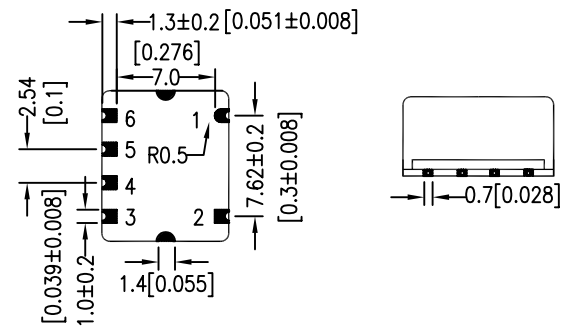
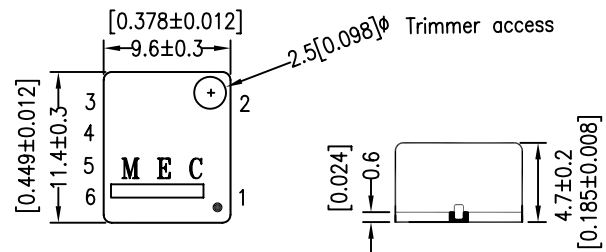
Pad Connections:

- 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



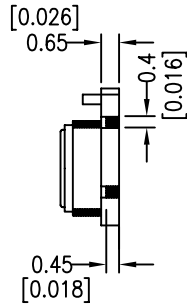
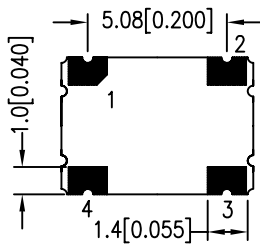
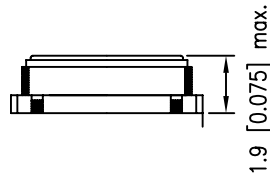
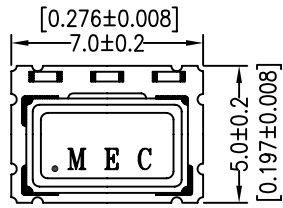
Pad Connections:

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

TCXO;VCTCXO

Package: M57S,VM57S

Ceramic SMD

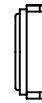
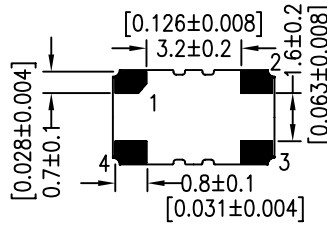
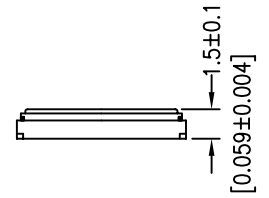
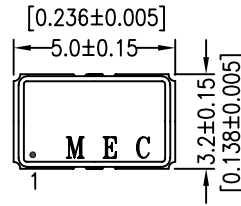


Pad Connections:

- 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