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**	1.6 ~ 156 MHz 32.768 KHz	**M38GT_**	**VM38GT_**	4 pin DIP
M39T	**VM39T**		**M39GT_**	**VM39GT_**	4 pin DIP
M14T	**VM14T**		**M14GT_**	**VM14GT_**	4 pin DIP. Hermetically sealed.
M15T	**VM15T**		**M15GT_**	**VM15GT_**	4 pin DIP. With trimmer
M8T	**VM8T**		**M8GT_**	**VM8GT_**	4 pin DIP. Half size. Hermetically sealed.
M9T	**VM9T**		**M9GT_**	**VM9GT_**	4 pin DIP. Half size. With trimmer
Gull Wing Surface Mount Types					
M55T	**VM55T**	1.6 ~ 156 MHz 32.768 KHz	**N / A**	**N / A**	4 pin gull wing
M47T	**VM47T**		**M47GT_**	**VM47GT_**	4 pin gull wing
M24T	**VM24T**		**M24GT_**	**VM24GT_**	4 pin gull wing. Hermetically sealed.
M25T	**VM25T**		**M25GT_**	**VM25GT_**	4 pin gull wing. With trimmer
M28T	**VM28T**		**M28GT_**	**VM28GT_**	4 pin gull wing. Half size. Hermetically sealed.
M29T	**VM29T**		**M29GT_**	**VM29GT_**	4 pin Gull wing. Half size. With trimmer
Leadless Surface Mount Types					
M62T	**VM62T**	1.6 ~ 156 MHz 32.768 KHz	**M62GT_**	**VM62GT_**	6 pad FR4 substrate. 2.5 mm H
M42T	**VM42T**		**M42GT_**	**VM42GT_**	4 pad FR4 substrate. 2.5mm H
M64T	**VM64T**		**M64GT_**	**VM64GT_**	6 pad FR4 substrate. 4.7 mm H
M44T	**VM44T**		**M44GT_**	**VM44GT_**	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 package code. For example: M14GT**.**

(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.)
- 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)

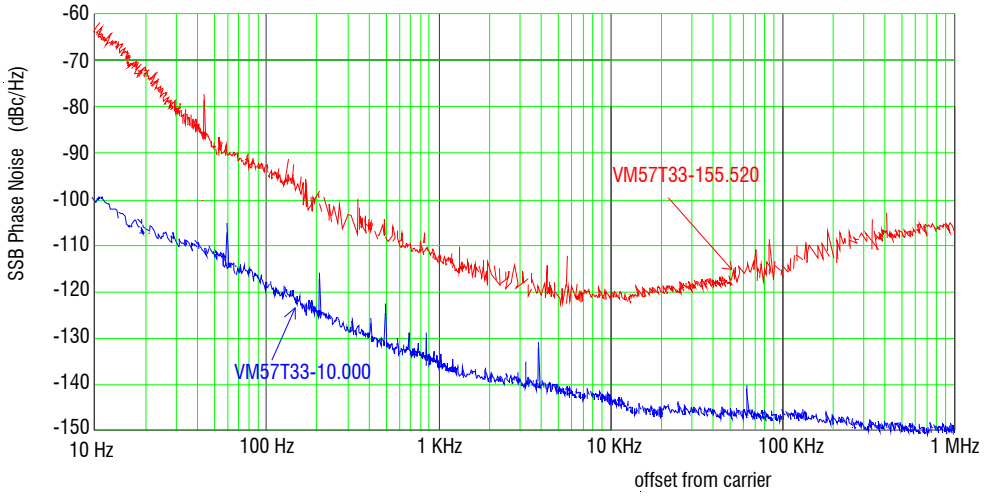
Frequency Range			1.6 MHz ~ 156.0 MHz	
Output Wave From			**Square** wave. Wave form code is “**T**”	
Initial Calibration Tolerance			Models with mechanical trimmer: < ±1 ppm. +25°C ±2°C. Models without mechanical trimmer: ±2 ppm at +25°C ±2°C.	
Standard Frequencies (partial list)			10.0, 12.8, 13.0, 14.4, 15.36, 16.384, 19.2, 19.440, 19.68 MHz, 25.0 MHz, 38.880 MHz, 40.0 MHz, 77.760 MHz, 125.0 MHz; 155.520 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 ±0.3 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: M38**1**T3.	
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.	
			+3.3 V (voltage code is “**33**”)	+5.0 V (voltage code is “**5**”)
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.
Duty Cycle			45% ~55%	
Rise Time ($0.1V_{DD}$→ $0.9\ V_{DD}$)			4.0 n sec. typ; 8.0 n sec max.	3.0 n sec. typ; 5.0 n sec max.
Fall Time ($0.9V_{DD}$→ $0.1\ V_{DD}$)			2.0 n sec. typ; 8.0 n sec max.	2.0 n sec. typ; 5.0 n sec max.
Current Consumption. (Over operating temperature range.)			15 mA max. for 20 MHz at +3.3V 30 mA max for 125 MHz at +3.3V	13 mA max. for 13 MHz at +5V 27 mA max for 100 MHz at +5V
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
	VCTCXO only — **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	
	VCTCXO only — **Slope Polarity**	**Standard**	Positive slope. Positive voltage for positive frequency shift.	
		Option	Negative slope. Selected packages only.	
	VCTCXO only — **Linearity**		10 % max.	
	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**T3.	
	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**T3	
	Tri-State. TCXOs only	**High; “H”**	>0.7*V_{DD} or open: Square output; Internal pull-up;	
		Low; “L”	<0.7*V_{DD}: Output high impedance Part number: Please add “**4**” after the regular model prefix. For example: M39**4**T3.	

Start-Up Time.	2 m. sec. Typical, 3 m. sec. max. (reach 90% amplitude and at+25°C±2°C)
Output Load	15 pF
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.

Typical Phase Noise



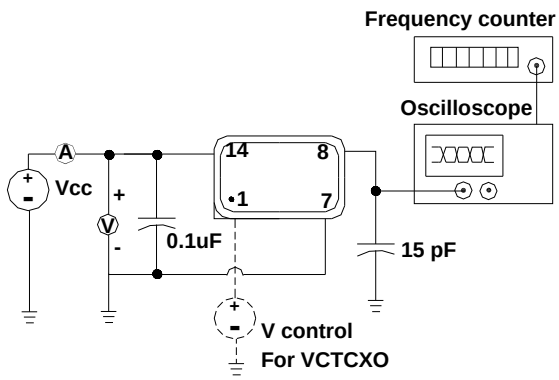
Part Number Format and Examples:

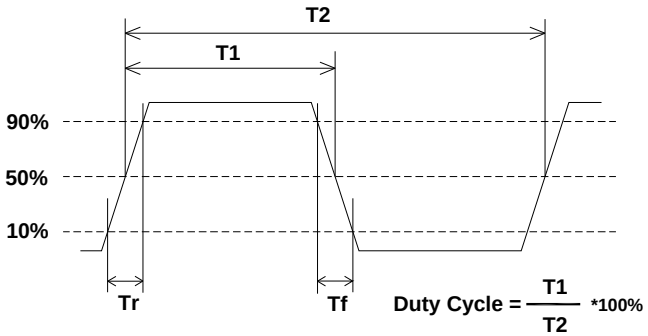
Example of TCXO: M38T33-12.800-2.5/-30+75;
Example of VCTCXO: VM38T5-12.800-2.5/-30+75

✍	✍		✍		✍		✍		✍	✍: customer to specify
V	M38	T	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 “**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

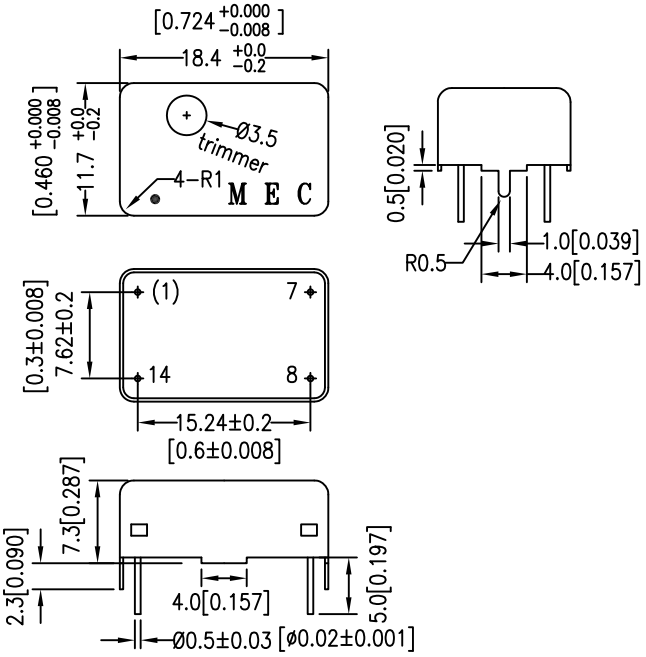
Square Wave TCXO (VCTCXO) Test Circuit (example of VM14) and Output Wave Form:





Package: M38T,VM38T

Open bottom



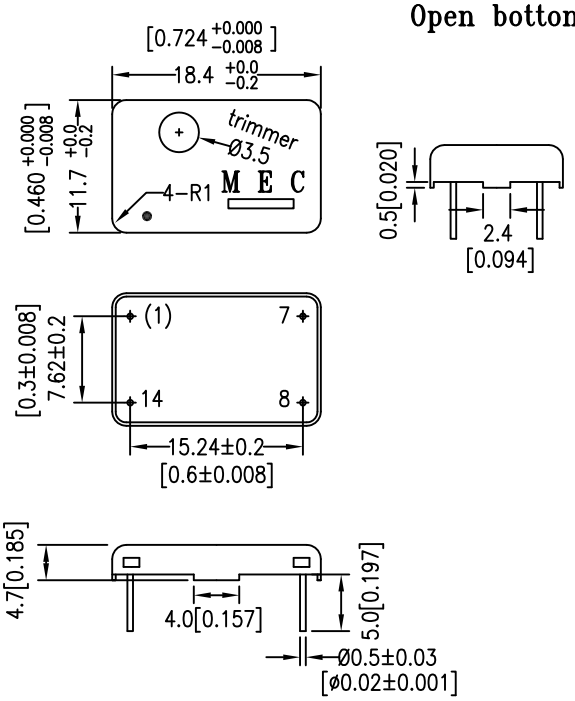
Pin Connections

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

Package: M39T,VM39T

Unit: mm [inches]

Open bottom



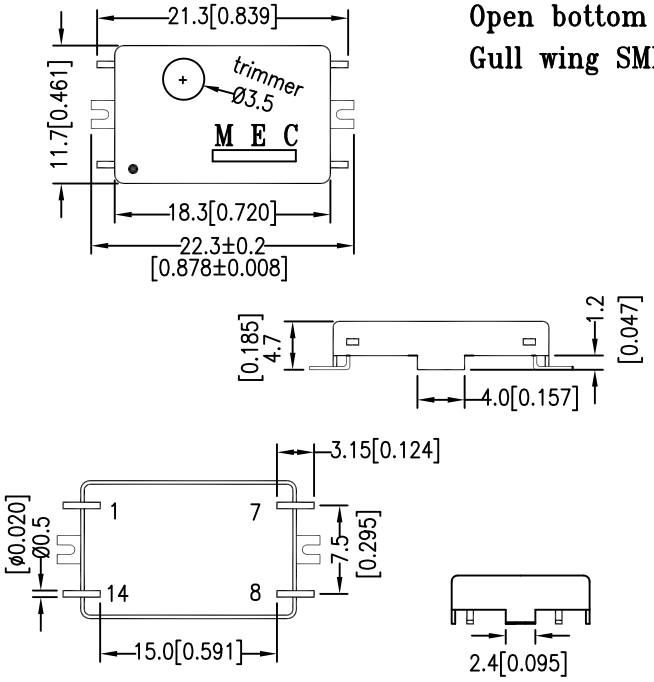
Pin Connections

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

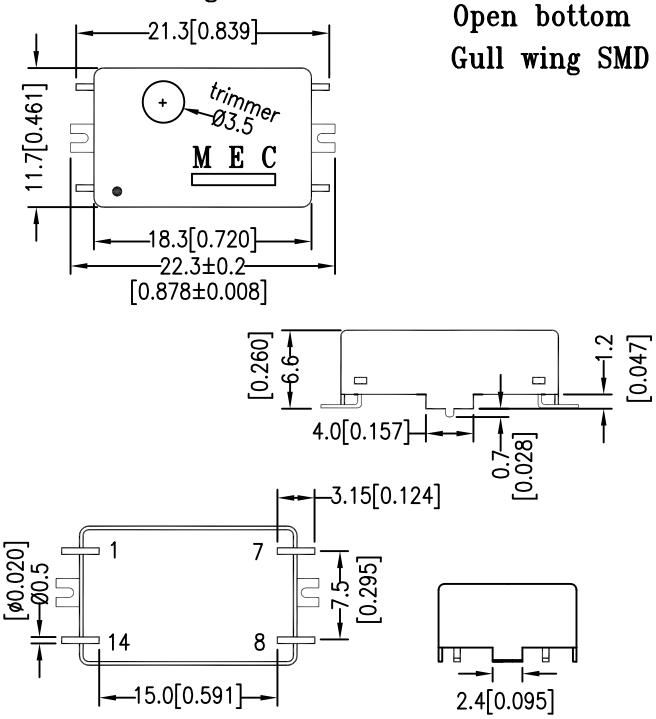


Pin Connections

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

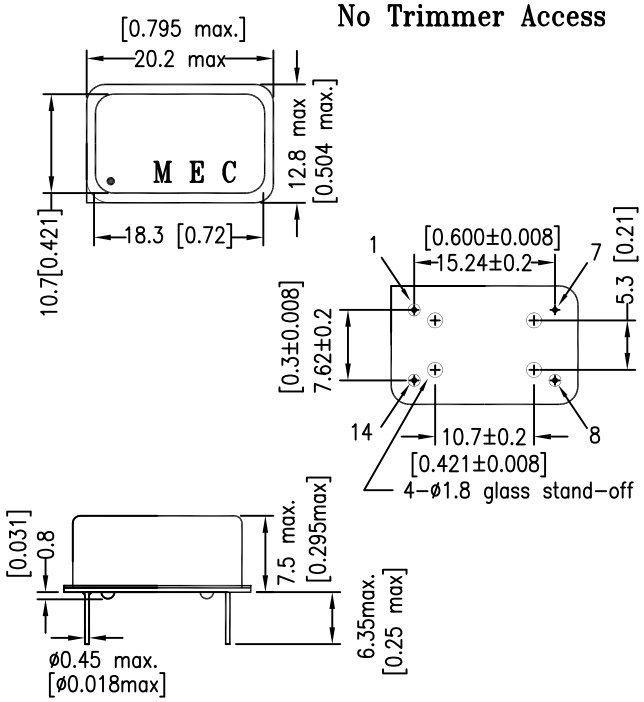


Pin Connections

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



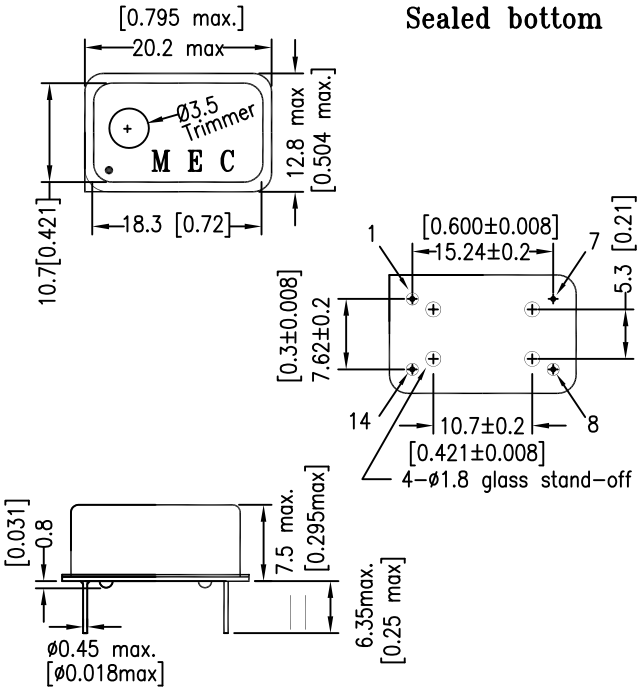
Pin Connections

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

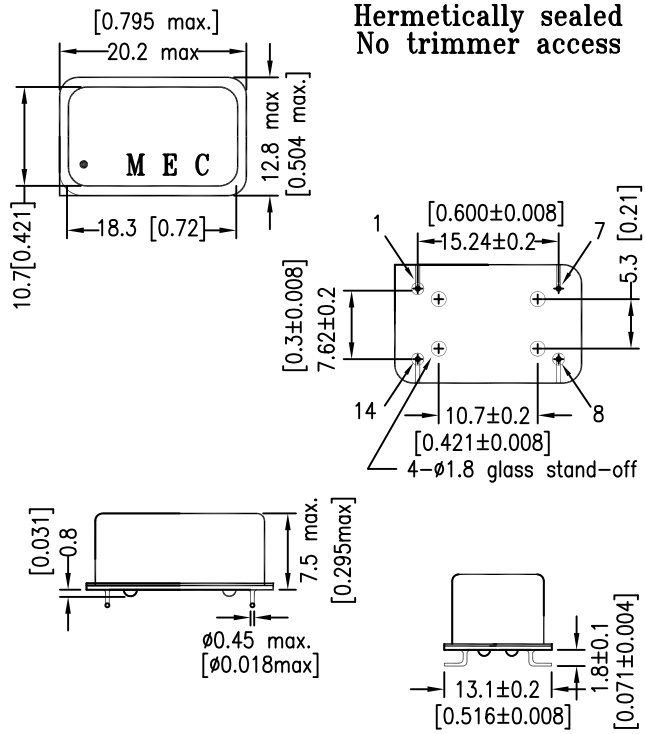
Square corner denotes pin 1

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



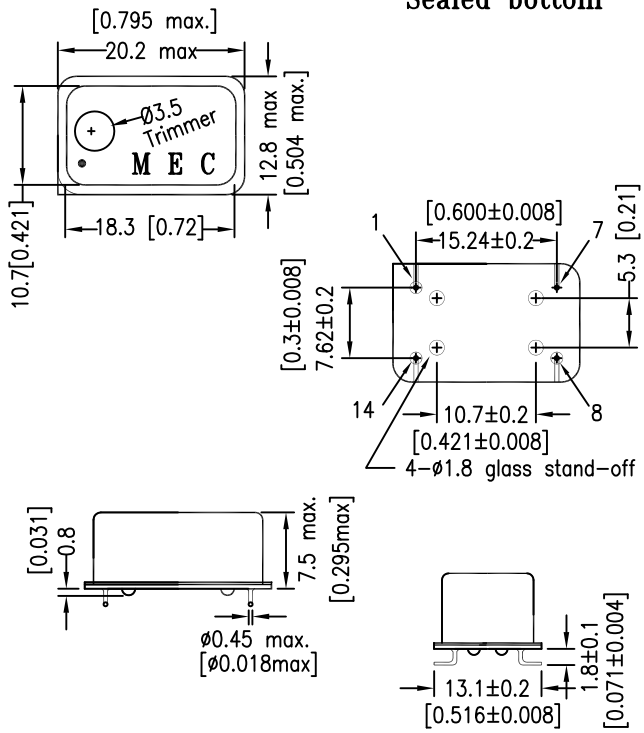
Pin Connections

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



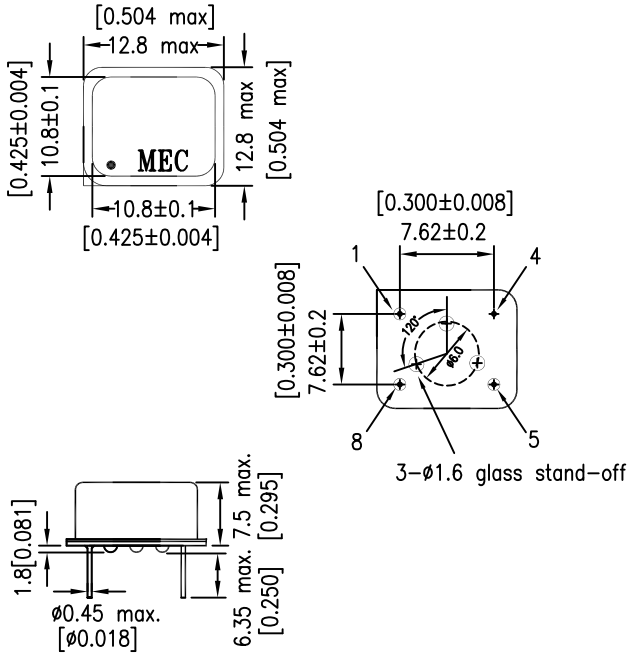
Pin Connections

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



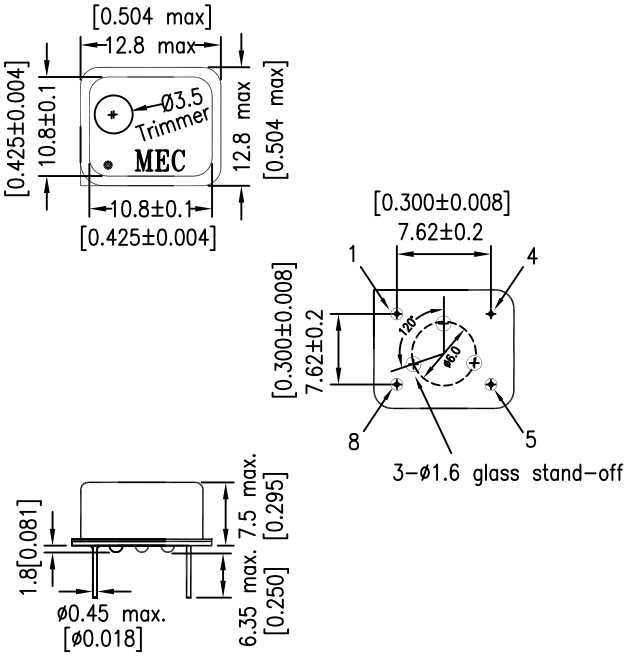
Pin Connections

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

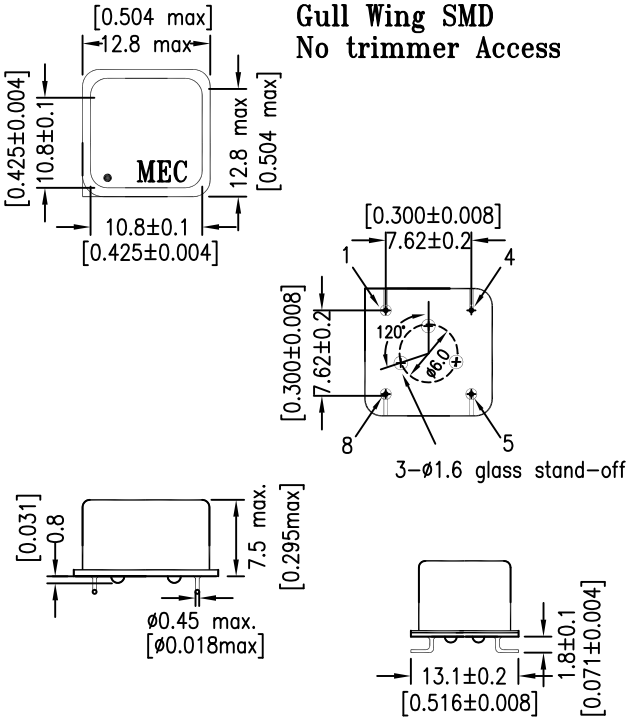
Square corner denotes pin 1

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



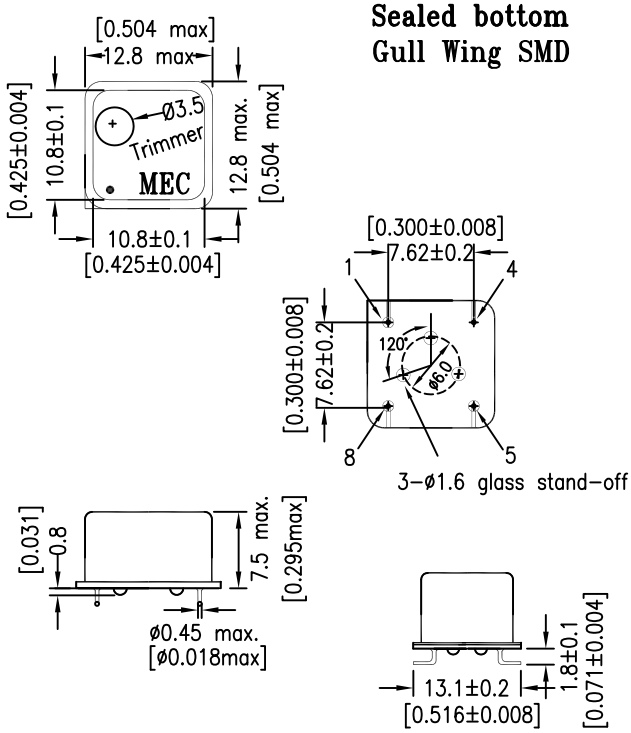
Pin Connections

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

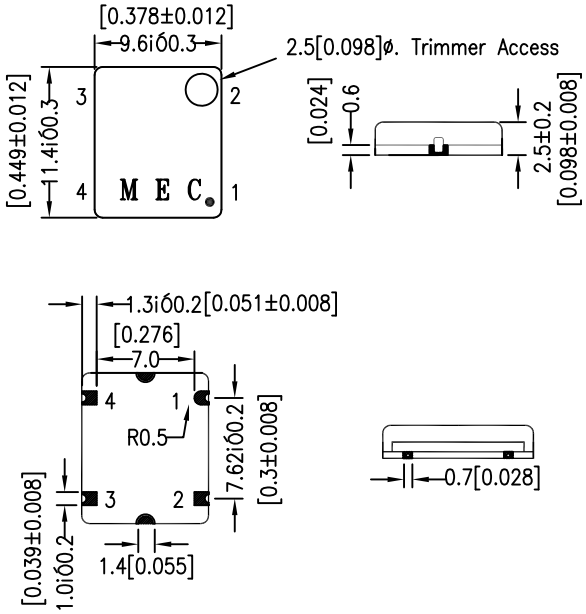
Square corner denotes pin 1

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



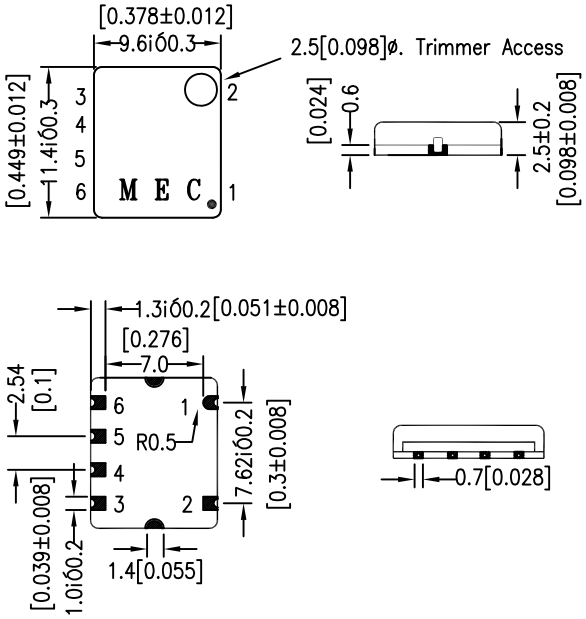
Pad Connections:

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:

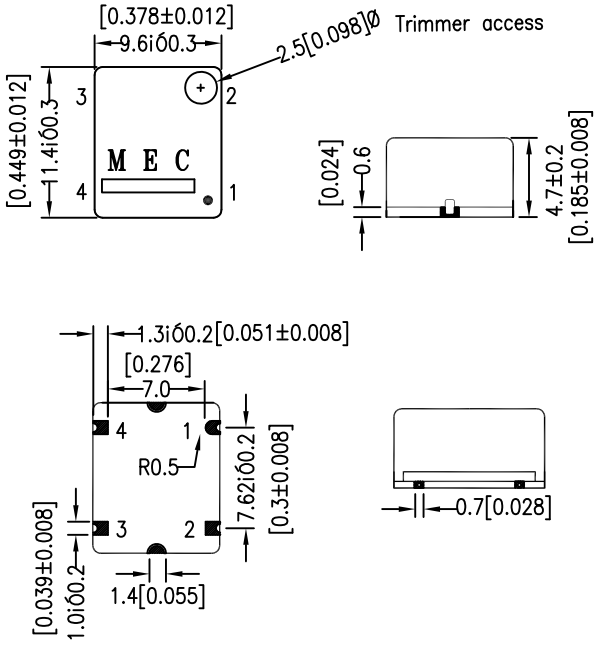
Pad 1,2,4: Ground and case
Pad 3: Output
Pad 5: Voltage Control for VCTCXO; No Connection for TCXO
Pad 6: Supply Voltage

TCXO;VCTCXO

Package: M44T,VM44T

FR4 substrate

"44" represents 4 pads and 4.7 mm overall height



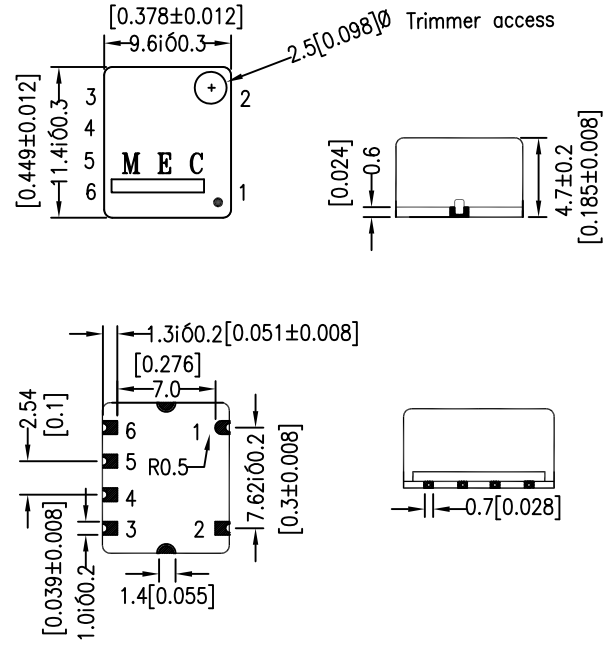
Pad Connections:

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

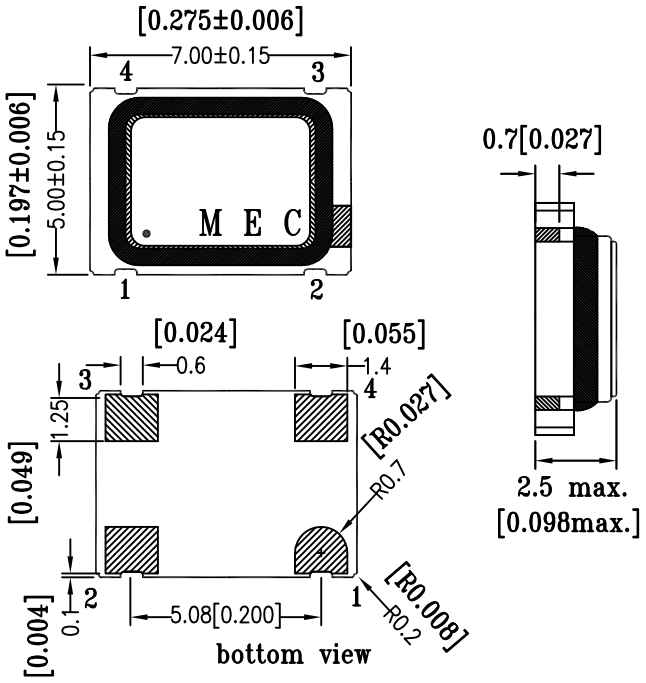


Pad Connections:

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

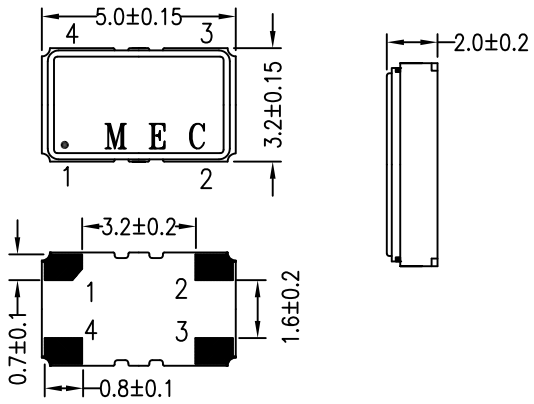


Pad Connections:

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