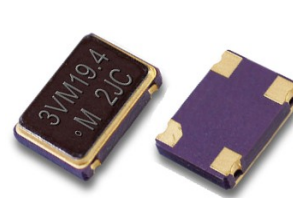


TCXO	VCTCXO	MHz range	CMOS	SMD	15pF	2.5 V 3.3 V	3.0 V 5.0 V	Min. 1.25 MHz	Max. 40.0 MHz
M _ T	VM _ T								

Features

- Wide frequency range : [1.25 MHz ~ 38.4 MHz]
- Frequency stability as tight as ± 0.5 ppm over 0°C to 50°C
Frequency stability as tight as ± 1.0 ppm over -40°C to 85°C



RoHS Compliance

General specifications of all available packages , at Ta=+25°C , CL=15pF

Output Wave Form				Square wave [LVCMOS] . Wave form code is “ T ”						
Suggested Package (Size)				(V)M32T (3.2 x 2.5 x 1.0 mm)	(V)M53T (5.0 x 3.2 x 1.5 mm)	(V)M572T (7.0 x 5.0 x 2.3 mm)				
Frequency Range				8.192 ~ 40.0 MHz		6.4 ~ 40.0 MHz		1.25 ~ 40.0 MHz		
Input Voltage Range		Standard		+2.5 V (code is “ 25 ”)	+3.0 V (code is “ 3 ”)	+3.3 V (code is “ 33 ”)		+5.0 V (code is “ 5 ”)		
Current Consumption. (max.) (Over operating temperature range .)			Package	M32T	6 mA	6 mA	6 mA		-----	
				M53T	6 mA	6 mA	6 mA		-----	
				M572T	10 mA	13 mA	13 mA		27 mA	
Output Logic Levels		Logic High " 1 " (min.)		2.25 V	2.7 V	2.97 V		4.5 V		
		Logic Low " 0 " (max.)		0.25 V	0.3 V	0.33 V		0.5 V		
Standard Frequency (Partial list) [MHz]				10.000	12.800	13.000	14.7456	16.000	16.384	
				19.200	19.440	19.680	20.000	25.000	27.000	
Initial Calibration Tolerance				Models with mechanical trimmer : < ± 1.0 ppm. +25°C ± 2°C. Models without mechanical trimmer : ± 2.0 ppm at +25°C ± 2°C.						
Frequency Stability (ppm)				± 0.5 ppm	± 1.0 ppm	± 1.5 ppm	± 2.0 ppm	± 2.5 ppm	± 3.0 ppm	○ : available △: please contact us × : not available
Frequency Stability vs Temperature (examples)			0°C to 50°C		○	○	○	○	○	
			-10°C to 60°C		△	○	○	○	○	
			-20°C to 70°C		X	○	○	○	○	
			-30°C to 75°C		X	○	○	○	○	
			-30°C to 85°C		X	○	○	○	○	
			-40°C to 85°C		X	△	○	○	○	
Frequency Stability		vs Aging		± 1.0 ppm max., per year at 25°C .						
		vs Voltage Change		± 0.3 ppm max. , for a ± 5% input voltage change .						
		vs Load Change		± 0.3 ppm max. , for a ± 10% load condition change .						
		vs Reflow (SMD type)		± 1.0 ppm max., 1 reflow and measured 24 hours afterwards .						
Output Voltage Level (peak to peak)				T T L / CMOS						
Mechanical Frequency Tuning			Standard	± 3.0 ppm (min.) tuning						
				Note: VM57 has no mechanical trimmer built-in.						
			Option	No mechanical trimmer built-in (for aqueous washing cycles).						
				To order please add “ 1 ” after the regular model prefix . Example: M381T.						
Output Logic Levels			Logic High " 1 "		90% of V _{DD} min.					
			Logic Low " 0 "		10% of V _{DD} max.					
Electrical Frequency Tuning (EFC) by external control voltage		Control Voltage Center		Standard: +1.5 V ± 1.0 V for all input voltages.						
		Frequency Deviation Range		± 5.0 ppm. (min.) with Vcon = +1.5 V±1.0 V						
		Slope Polarity (Transfer Function)		Positive slope. Positive voltage for positive frequency shift.						
				Input Impedance : 50M Ω min.		Modulation Bandwidth : 20 KHz min.		Linearity : ± 10 % max.		
Rise Time and fall time				10.0 n sec. max.. ; 20% ↔ 80% of the wave form.						
Duty Cycle				Standard: 50 % ± 10 % ; Option: 50 % ± 5 % ; Measured at 50% V _{DD} .						
Start-Up Time.				5.0 m sec. (typ.) , 10.0 m sec. (max.) (reach 90% amplitude and at+25°C ± 2°C)						
Output Load				15 pF						
SSB Phase Noise at 25°C , 15pF		Offset / dBc / Hz [typical]		10 Hz	100 Hz	1 KHz	10 KHz	100 KHz		
		M572T33 - 10.000		-96 dBc / Hz	-122 dBc / Hz	-138 dBc / Hz	-145 dBc / Hz	-150 dBc / Hz		
		M572T33 - 77.760		-74 dBc / Hz	-105 dBc / Hz	-120 dBc / Hz	-124 dBc / Hz	-120 dBc / Hz		
		M572T33 - 155.520		-68 dBc / Hz	-96 dBc / Hz	-110 dBc / Hz	-117 dBc / Hz	-112 dBc / Hz		
Storage Temperature				-40°C to +85°C or -55°C to +125°C (package dependent)						

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Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

Clipped Sine " S "

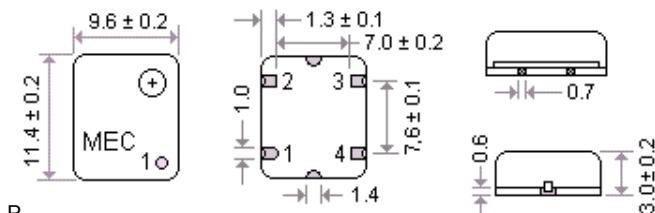
CMOS " T "

PECL Differential " P "

LVDS Differential " D "

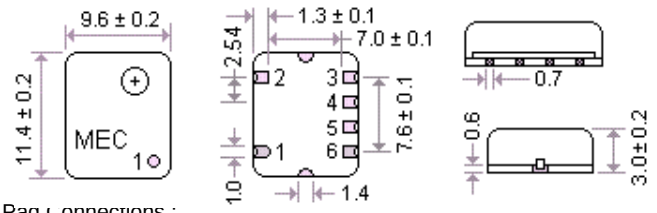
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[(V) M_43 _ _]



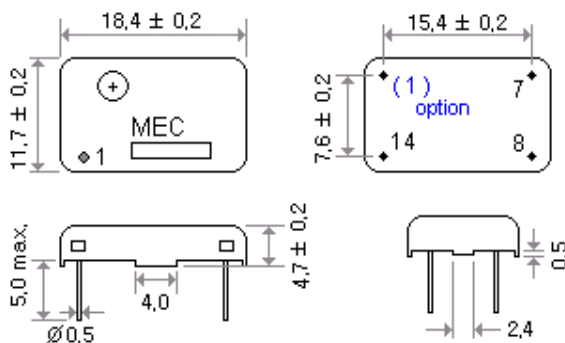
Pin Connections :
 Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
 Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage

[(V) M_63 _ _]



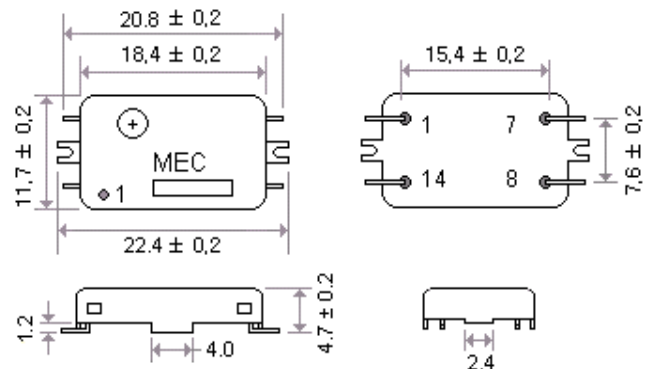
Pad Connections :
 Pad 1, 2, 4 : Ground , Pad 3 : Output , Pad 6 : Supply Voltage
 Pad 5 : Control voltage for VCTCXO. Make no connection if TCXO.

[(V) M39 _ _]



Pin Connections :
 Pin 1 : Control voltage for VCTCXO [No physical pin 1 for TCXO. (3 pins only).]
 Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

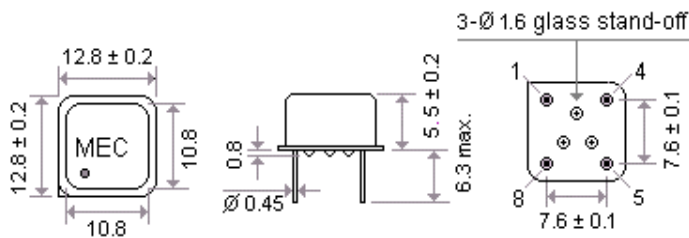
[(V) M47 _ _]



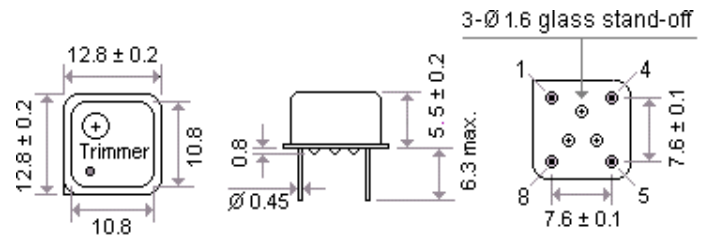
Pin Connections :
 Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
 Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

[(V) M47 _ _] - - - Gull - wing SMD is also available .

[(V) M9 _ _] - - - with mechanical trimmer



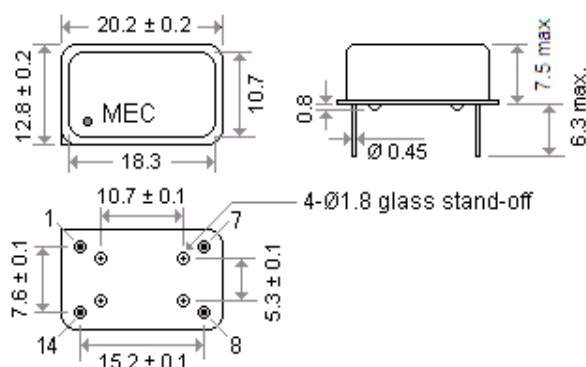
Pin Connections :
 Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
 Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage



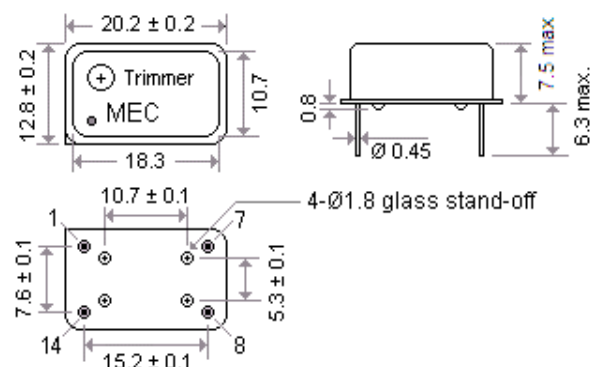
Pin Connections :
 Pin 1 : Control voltage for VCTCXO ; No connection for TCXO.
 Pin 4 : Ground ; Pin 5 : Output , Pin 8 : Supply Voltage

[(V) M14 _ _] - - - Gull - wing SMD is also available .

[(V) M15 _ _] - - - with mechanical trimmer



Pin Connections :
 Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
 Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage



Pin Connections :
 Pin 1 : Control voltage for VCTCXO , No connection for TCXO .
 Pin 7 : Ground ; Pin 8 : Output , Pin 14 : Supply Voltage

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Temperature Compensated Crystal Oscillators [TCXO " M " and VCTCXO " VM "]

Clipped Sine " S "

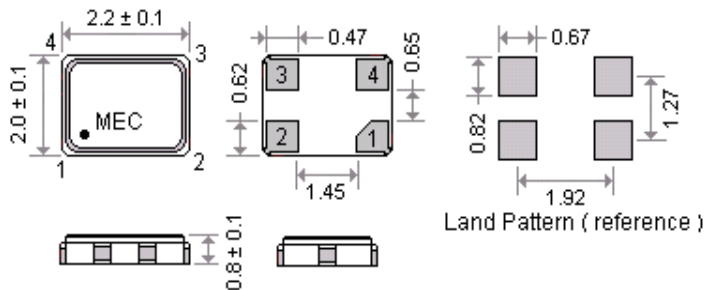
CMOS " T "

PECL Differential " P "

LVDS Differential " D "

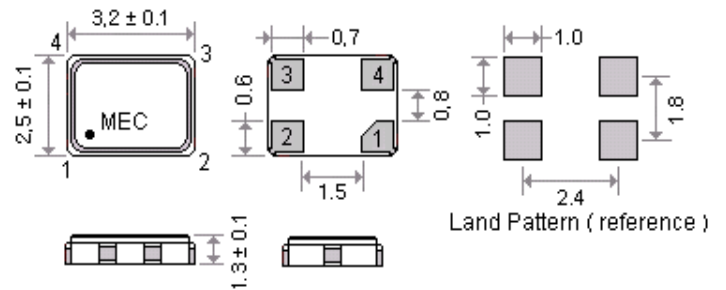
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[(V) M22S] --- Clipped Sine wave



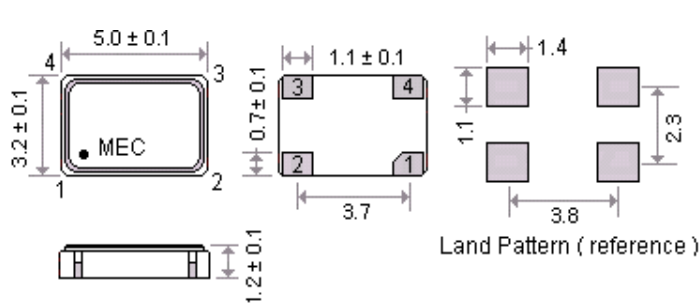
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pin 3 : Output , Pin 4 : Supply Voltage

[(V) M32S] --- Clipped Sine wave



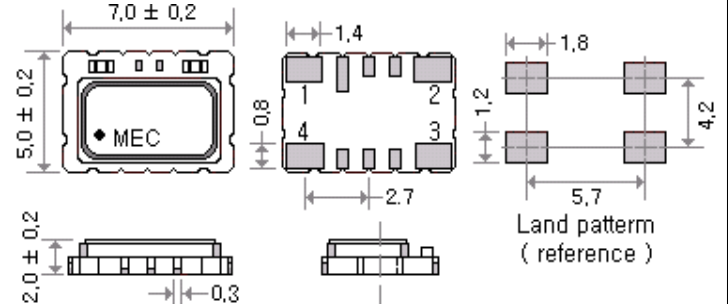
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M53S] --- Clipped Sine wave



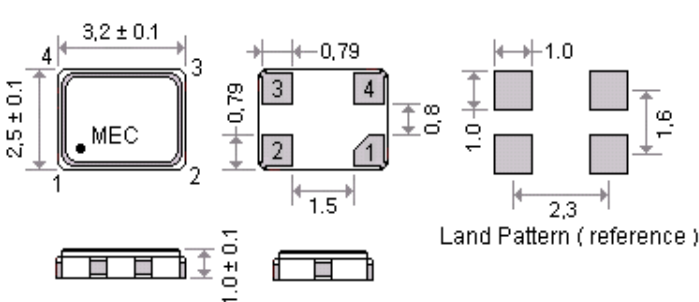
Pad Connections :
Pad 1 : Control voltage for VCTCXO ; Ground for TCXO .
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M57S] --- Clipped Sine wave



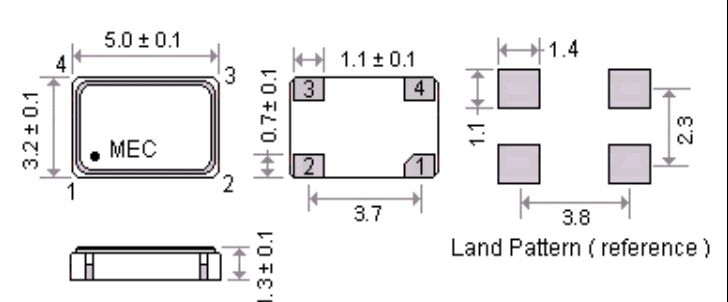
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M_32T_] --- CMOS output



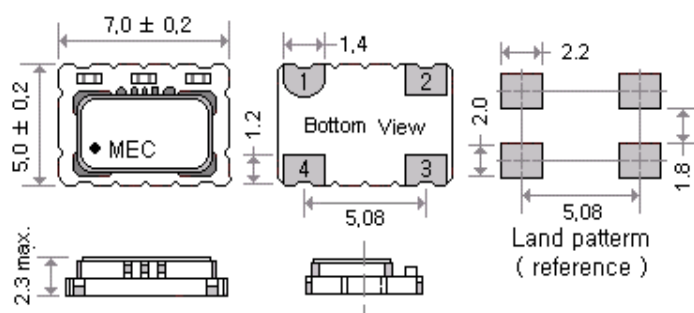
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M_53T_] --- CMOS output



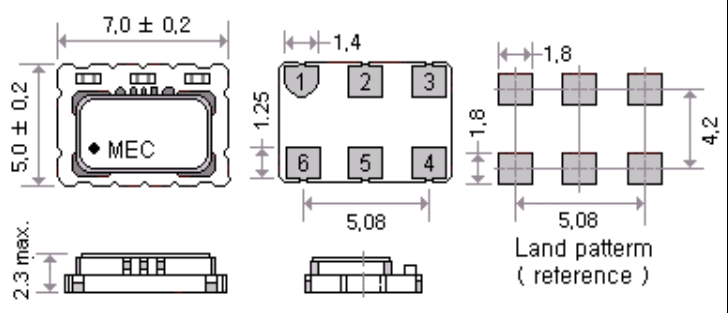
Pad Connections :
Pad 1 : Control voltage for VCTCXO. Make no connection if TCXO.
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V) M572T_] , [(V) ML572T_] , [(V) MV572T_] --- for CMOS



Pad Connections :
Pad 1 : NC --- TCXO ; Vcon --- VCTCXO
Pad 2 : Ground ; Pad 3 : Output , Pad 4 : Supply Voltage

[(V)M5762P for LVPECL] ; [(V)M5762D for LVDS]



Pad Connections :
Pad 1 : Control voltage for VCTCXO. Do not make any connection for TCXO.
Pad 2 : Tri-state ; Pad 3 : Ground ; Pad 4 : PECL or LVDS output
Pad 5 : Complimentary PECL or LVDS Output ; Pad 6 : Supply Voltage

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Part Number Formats and Product Marking Rules

[TCXO vs VCTCXO] Temperature Compensated Crystal Oscillators

Holder Type

Wave Form	TCXO	VCTCXO	SMD types	Thru-Hole types	Gull Wing types
Clipped Sine Wave	M x x (G) S	VM x x (G) S	X X = 42 , 32 , 53 , 57 , 62	X X = 8 , 9 , 14 , 15 , 39	X X = 47
CMOS output	M x x (G) T	VM x x (G) T	X X = 42 , 53, 536 , 57 , 62		
	ML x x (G) T	VML x x (G) T			
	MB x x (G) T	VMB x x (G) T			
	MV x x (G) T	VMV x x (G) T			
	MW x x (G) T	VMW x x (G) T			
	ME83 x	- - - - -	7.0 * 5.0 * 1.8 mm	- - - - -	- - - - -
LVPECL output	MW x x (G) P	VMW x x (G) P	X X = 536, 576	- - -	- - -
LVDS output	MW x x (G) D	VMW x x (G) D			

x x = package code

Part Number Format

[1]	[2]	[3]	[4]		[5]		[6]		[7]
Holder Type	G	Output Wave	Supply Voltage	-	Center Frequency	-	Frequency Stability	/	Operating Temp. Range

Examples	(1)	V M 38	G	T	5	-	10.000	-	1.5	/	-20+70
	(2)	M 57		S	3	-	20.000	-	2.5	/	-30+75
	(2)	V M W 576		P	33	-	432.000	-	1.0	/	0+50

Ex (1) : VM38GT5 - 10.000 - 1.5 / -20+70 [VCTCXO, VM38 type, RoHS, CMOS output, 5.0V, 10.000MHz, ±1.5ppm from -20°C to 70°C]

Ex (2) : M57S3 - 20.000 - 2.5 / -30+75 [TCXO, M57 type, Clipped Sine Wave, 3.0V, 20.000MHz, ±2.5ppm from -30°C to 75°C]

Ex (3) : VMW576P33 - 432.000 - 1.0 / 0+50 [VCTCXO, VMW576 type, PECL output, 3.3V, 432.000MHz, ±1.0ppm from 0°C to 50°C]

[1]	Holder Type " M " stands for TCXO, " VM " stands for VCTCXO
[2]	Please add " G " after the " type code " for RoHS compliant (Does not apply to (V)M32, (V)M53, (V)M536, (V)M57, (V)M576)
[3]	" S " stands for Clipped Sine Wave ; " T " stands for CMOS output ; " D " stands for LVDS differential ; " P " stands for PECL differential ex 1 : M44T --- TCXO, M44 package, CMOS output ; ex 2 : VM38P --- VCTCXO, VM38 package, PECL differential
[4]	Supply voltage, " 28 " stands for +2.8V ; " 3 " stands for +3.0V ; " 33 " stands for +3.3V ; " 5 " stands for +5.0V
[5]	Center Frequency in MHz
[6]	Frequency stability in ± ppm ; ex 1 : ± 2.5ppm --- 2.5, ex 2 : ± 1.0ppm --- 1.0
[7]	Operating temperature range in °C ex 1 : -10 °C to 60°C ----- -10+60 ; ex 2 : -20 °C to 70°C ----- -20+70 ; ex 3 : -40 °C to 85°C ----- -40+85

Production Marking Rules

General (VC)TCXO package types marking rules	(V)M53, (V)M57, (V)M576	(V)M32S	(V)M22S
Hold Type M: TCXO VM: VCTCXO Output wave form : T: CMOS output S: Clipped sine wave P: PECL output D: LVDS output For RoHS compliant Input Voltage 3: for +3.0 V 33: for +3.3 V 5: for +5.0 V Pin # 1 indicator lot code (Month) : Table 2 (Year) : ex: 2010 - 0	Input Voltage 3: for +3.0 V 33: for +3.3 V 5: for +5.0 V M: for TCXO VM: for VCTCXO Frequency 20.0 MHz -- 20.000 lot code (Month) : Table 2 (Year) : ex: 2010 -- 0 Output wave form : T: CMOS output S: Clipped sine wave P: PECL output D: LVDS output	Input Voltage 3: for +3.0 V 33: for +3.3 V 5: for +5.0 V M: for TCXO VM: for VCTCXO Frequency 20.0 MHz - 20.0 (month) : -- Table 2 (Year) ex: 2010 -- 0 Output wave S: Clipped sine wave	M: for TCXO VM: for VCTCXO Frequency 20.0 MHz - 20 (month) : -- Table 2 (Year) ex: 2010 -- 0

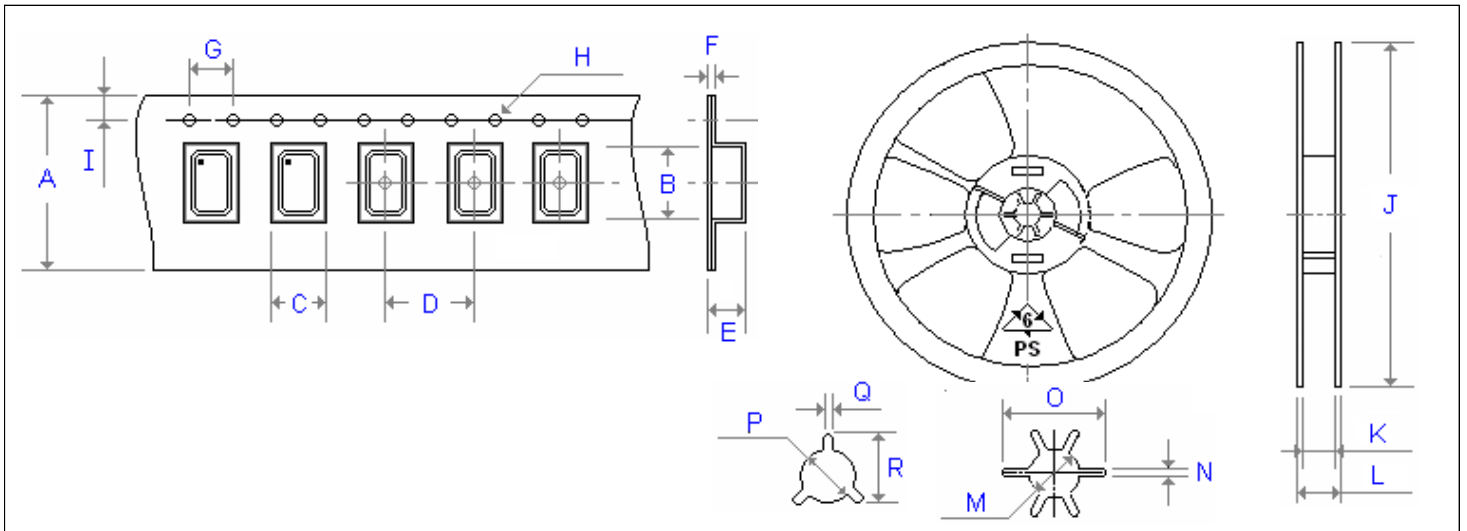
Table 2

Month	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sep.	Oct.	Nov.	Dec.
Code	A	B	C	D	E	F	G	H	I	J	K	L

Emboss Taping and Reel Specifications

[VCXO]

[(VC)TCXO]



Carrier Type Dimensions (unit : mm)

	A	B	C	D	E	F	G	H	I	pcs / reel
G_324 (6)	8.0	3.4	2.7	4.0	1.4	0.25	4.0	Ø 1.5	1.75	3000
G_534	12.0	5.3	3.6	8.0	1.4	0.3	4.0	Ø 1.5	1.75	1000
G_576	16.0	7.2	5.4	8.0	1.8	0.3	4.0	Ø 1.5	1.75	1000
G_42	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
G_44	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
G_62	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
G_64	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
(V)M_22	8.0	2.7	2.3	4.0	1.2	0.3	4.0	Ø 1.0	1.8	3000
(V)M_32	8.0	3.4	2.7	4.0	1.4	0.25	4.0	Ø 1.5	1.75	3000
(V)M_53	12.0	5.3	3.6	8.0	1.4	0.3	4.0	Ø 1.5	1.75	1000
(V)M_57	16.0	7.2	5.4	8.0	1.8	0.3	4.0	Ø 1.5	1.75	1000
(V)M_42	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
(V)M_43	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
(V)M_62	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500
(V)M_63	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.4	1.8	500

Reel Dimensions (unit : mm)

	J	K	L	P	Q	R	pcs / reel
G_324 (6)	180.0	12.8	17.0	13.4	2.5	19.5	3000
G_534	180.0	16.5	19.6	13.4	2.5	19.5	1000
G_576	180.0	16.5	19.6	13.4	2.5	19.5	1000
G_42	330.0	30.0	25.0	13.4	2.5	19.5	500
G_44	330.0	30.0	25.0	13.4	2.5	19.5	500
G_62	330.0	30.0	25.0	13.4	2.5	19.5	500
G_64	330.0	30.0	25.0	13.4	2.5	19.5	500
(V)M_22	180.0	9.0	12.0	13.2	2.5	19.5	3000
(V)M_32	180.0	12.8	17.0	13.4	2.5	19.5	3000
(V)M_53	179.0	16.5	19.6	13.4	2.5	19.5	1000
(V)M_57	179.0	16.5	19.6	13.4	2.5	19.5	1000
(V)M_42	330.0	30.0	25.0	13.4	2.5	19.5	500
(V)M_43	330.0	30.0	25.0	13.4	2.5	19.5	500
(V)M_62	330.0	30.0	25.0	13.4	2.5	19.5	500
(V)M_63	330.0	30.0	25.0	13.4	2.5	19.5	500

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