

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

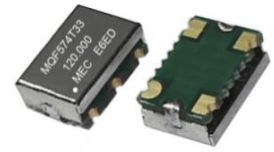


TCXO			VCTCXO			Min.	Max.
MQF _ T	MQF _ P	MQF _ D	VMQF _ T	VMQF _ P	VMQF _ D	10	1,500
CMOS	PECL	LVDS	CMOS	PECL	LVDS	MHz	MHz

## Features

**1.5 pS Phase Jitter ( typical )**

The (V)MQF\_\_T, (V)MQF\_\_P and (V)MQF\_\_D Series are members of Mercury's Q-Family Quick-Turn Temperature Compensated oscillators that can be delivered within days. With low current consumption (44 mA for PECL 212.500 MHz at 3.3V) and an integrated phase jitter performance of 1.0 pS RMS, they have gained its precision frequency control market position by providing engineers with next-day samples for prototypes and low cost, fast delivery for volume production ( ± 2.5 ppm over -30°C to +85°C ).



## General specifications , at Ta=+25°C , CL=15pF

Model	(V)MQF574T , (V)MQF576T	(V)MQF576P	(V)MQF576D					
Output Logic	CMOS	PECL	LVDS					
Supply Voltage V <sub>DD</sub> ( code )	+ 2.5 V ± 5% ( voltage code " 25 " ) + 3.3 V ± 5% ( voltage code " 33 " )	+ 2.5 V ± 5% ( voltage code " 25 " ) + 3.3 V ± 5% ( voltage code " 33 " )	+ 2.5 V ± 5% ( voltage code " 25 " ) + 3.3 V ± 5% ( voltage code " 33 " )					
Available Frequency Range	10 ~ 250 MHz	10 ~ 1,500 MHz	10 ~ 1,500 MHz					
Output Load	15 pF	50 Ω into V <sub>CC</sub> - 2V or Thevenin equivalent	100 Ω					
Output Logic " High " , " 1 "	90 % V <sub>DD</sub>	V <sub>DD</sub> - 1.03 ( min. ) , V <sub>DD</sub> - 0.6 ( max. )	1.4 V ( Typ. ) , 1.6 V ( max. )					
Output Logic " Low " , " 0 "	10 % V <sub>DD</sub>	V <sub>DD</sub> - 1.85 ( min. ) , V <sub>DD</sub> - 1.6 ( max. )	1.1 V ( Typ. ) , 0.9 V ( min. )					
( V <sub>DD</sub> = + 2.5V )	50 MHz : 34 mA	156 MHz : 46 mA	156 MHz : 32 mA					
Current Consumption ( max. )	125 MHz : 38 mA	600 MHz : 50 mA	600 MHz : 38 mA					
	200 MHz : 40 mA	1,000 MHz : 60 mA	1,000 MHz : 44 mA					
( V <sub>DD</sub> = + 3.3V )	50 MHz : 36 mA	156 MHz : 50 mA	156 MHz : 35 mA					
Current Consumption ( max. )	125 MHz : 40mA	600 MHz : 55 mA	600 MHz : 40 mA					
	200 MHz : 44 mA	1,000 MHz : 62 mA	1,000 MHz : 46 mA					
Current with Output Disabled	18 mA ( Typ. )	18 mA ( Typ. )	18 mA ( Typ. )					
Rise Time / Fall Time	1.5 nsec. ( Typ. ) , 3.0 nsec. ( max. ) Tr / Tf : 10% → 90% waveform	0.2 nsec. ( Typ. ) , 0.5 nsec. ( max. ) Tr / Tf : 20% → 80% waveform	0.2 nsec. ( Typ. ) , 0.4 nsec. ( max. ) Tr / Tf : 20% → 80% waveform					
Initial Calibration Tolerance	±2.0 ppm ( max. ) at +25°C±2°C ( at the shipment )							
Frequency Stability Codes	Temperature ( refer to +25°C )	± 2.5 ppm over -30°C to +85°C ( default for Quick - Turn ) ± 1.0 ppm over -40°C to +85°C ( available )						
	Aging at Ta = +25°C	± 2.0 ppm ( max. ) first year ; ± 10 ppm ( max. ) over 10 years						
	Voltage Change	± 0.2 ppm ( max. ) , for a ±5% input voltage change.						
	Load Change	± 0.2 ppm ( max. ) , for a ±10% load condition change.						
	Reflow	± 1.0 ppm ( max. ) , 1 reflow and measured 24 hours afterwards.						
Duty Cycle	50 % ± 5%							
Start-up Time	5 msec. ( max. )							
Storage Temperature	-55°C to + 150°C							
RMS Jitter [ 12 kHz ~ 20 MHz ]	1.5 psec ( typ. )							
Phase Noise [ dBc / Hz ( typ. ) ]	Offset	10 Hz	100 Hz	1K Hz	10K Hz	100K Hz	1M Hz	10M Hz
	156.250 MHz	-65	-92	-108	-114	-117	-139	-147
	212.500 MHz	-61	-90	-106	-110	-112	-133	-142
	312.500 MHz	-51	-79	-97	-102	-103	-125	-134
Storage Temperature	-55°C to + 150°C							

Control Voltage Function on Pad 1		Output Enable Function on pad 2		
Control Voltage Center and Range	+1.5V ± 1.0V for both V <sub>DD</sub> = 2.5V and 3.3V	OE Control on Pad 2	70% of V <sub>DD</sub> ( min. ) to enable output. ( Open connection prohibit. )	
Frequency Pulling Range	± 8 ppm ( min. )		Output Enable Time / Disable Time	30% of V <sub>DD</sub> ( max. ) to disable output.
Linearity	± 1 % ( typ. ) ± 10% ( max. )			200 nsec. ( max. ) / 50 nsec. ( max. )
Transfer Function	Positive Transfer			
Absolute Voltage	4.0 V ( max. )			
Input Impedance	770 KΩ ( typ. )			

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

TCXO			VCTCXO			F series	SMD	2.5 V	3.3 V	Min.	Max.
MQF _ T	MQF _ P	MQF _ D	VMQF _ T	VMQF _ P	VMQF _ D					10 MHz	1,500 MHz
CMOS	PECL	LVDS	CMOS	PECL	LVDS						

## Part Number Format and Example

- Example :
- 1.VMQF574T33 - 120.000 - 2.5 / -40+85
  - 2.VMQF576P33 - 120.000 - 2.5 / -40+85

VMQF	574	T	33	-	120.000	-	2.5	/	-40+85
Hold Type " MQF " : TCXO " VMQF " : VCTCXO	Package " 574 " 4pad ( 5.0 * 7.0 mm )	T : CMOS	Supply Voltage " 33 " for 3.3V " 25 " for 2.5V		Center Freq. ( MHz )		Freq. Stability		Operating Temperature Range
VMQF	576	P	33	-	120.000	-	2.5	/	-40+85
Hold Type " MQF " : TCXO " VMQF " : VCTCXO	Package " 576 " 6pad ( 5.0 * 7.0 mm )	T : CMOS P : PECL D : LVDS	Supply Voltage " 33 " for 3.3V " 25 " for 2.5V		Center Freq. ( MHz )		Freq. Stability		Operating Temperature Range

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

[ (V)MQF574T ]	[ (V)MQF576T ] , [ (V)MQF576P ] , [ (V)MQF576D ]
<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Top View</p> </div> <div style="text-align: center;"> <p>Bottom View</p> </div> <div style="text-align: center;"> <p>Land Pattern</p> </div> </div> <p>Side View</p> <p>Pad Connections :</p> <ul style="list-style-type: none"> <li>Pad 1 : Make no connection if TCXO ; Control voltage if VCTCXO</li> <li>Pad 2 : Ground</li> <li>Pad 3 : Output</li> <li>Pad 4 : Supply voltage</li> </ul>	<div style="display: flex; justify-content: space-around;"> <div style="text-align: center;"> <p>Top View</p> </div> <div style="text-align: center;"> <p>Bottom View</p> </div> <div style="text-align: center;"> <p>Land Pattern</p> </div> </div> <p>Side View</p> <p>Pad Connections :</p> <ul style="list-style-type: none"> <li>Pad 1 : No Connection for TCXO ; Voltage Control for VCTCXO</li> <li>Pad 2 : Output Enable</li> <li>Pad 3 : Ground</li> <li>Pad 4 : CMOS : Output ; PECL / LVDS : Differential</li> <li>Pad 5 : CMOS : No Connection ; PECL / LVDS : Complementary</li> <li>Pad 6 : Supply Voltage</li> </ul>

## Test Circuits and Output Waveforms

CMOS	PECL	LVDS
<p>No Connection for TCXO Voltage Control for VCTCXO</p>	<p>VC for VCTCXO NC for TCXO Output Enable</p> <p><math>V_{DD} = 3.3V ; R1 = R3 = 127 \Omega ; R2 = R4 = 82.5 \Omega</math>  <math>V_{DD} = 2.5V ; R1 = R3 = 250 \Omega ; R2 = R4 = 62.5 \Omega</math></p>	<p>No Connection for TCXO Voltage Control for VCTCXO</p>

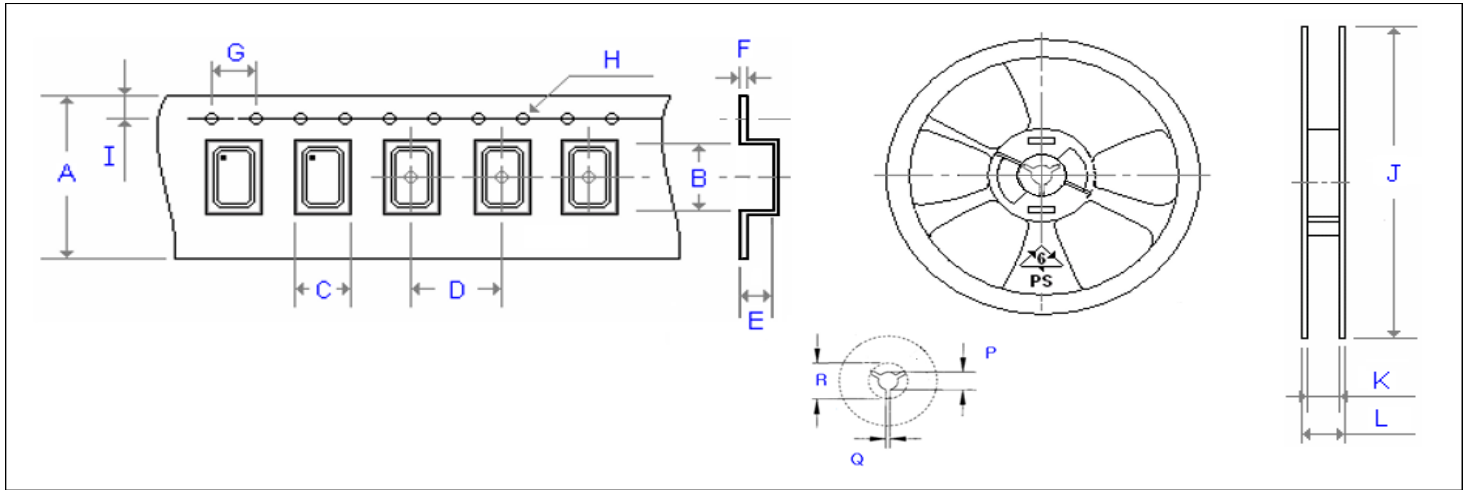
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## Emboss Taping and Reel Specifications

[ VCXO ]

[ ( VC )TCXO ]



Carrier Type Dimensions ( unit : mm ) ±0.3mm

	A	B	C	D	E	F	G	H	I	pcs / reel
G_226	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	∅ 1.50	1.75	3000
G_534	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.50	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.32	4.00	∅ 1.50	1.75	1000
G_43	24.00	11.80	10.00	16.00	5.00	0.30	4.00	∅ 1.50	1.75	500
G_63	24.00	11.80	10.00	16.00	5.00	0.30	4.00	∅ 1.50	1.75	500
G_JF538	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.50	1.75	1000
G_JF578	16.00	7.30	5.30	8.00	1.90	0.32	4.00	∅ 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	∅ 1.50	1.75	3000
(V)ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	∅ 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	∅ 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	∅ 1.50	1.75	3000
(V)MQ_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	∅ 1.50	1.75	3000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	∅ 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	∅ 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	∅ 1.50	1.75	500

Reel Dimensions ( unit : mm ) ±2mm

	J	K	L	P	Q	R	pcs / reel
G_226	180.00	8.40	11.40	13.00	2.50	20.20	3000
G_326	180.00	9.00	12.00	13.00	2.50	20.20	3000
G_534	180.00	13.00	16.00	13.00	2.50	20.20	1000
G_576	180.00	17.20	19.30	13.00	2.50	20.20	1000
G_43	330.00	24.50	29.10	13.00	2.50	20.20	500
G_63	330.00	24.50	29.10	13.00	2.50	20.20	500
G_JF538	180.00	13.00	16.00	13.00	2.50	20.20	1000
G_JF578	180.00	17.20	19.30	13.00	2.50	20.20	1000
(V)M21	180.00	8.40	11.40	13.00	2.50	20.20	3000
(V)ME21	180.00	9.00	12.00	13.00	2.50	20.20	3000
(V)M22	180.00	8.40	11.40	13.00	2.50	20.20	3000
(V)M_32	180.00	9.00	11.40	13.00	2.50	20.20	3000
(V)MQ_326	180.00	13.00	16.00	13.00	2.50	20.20	3000
(V)M_53	180.00	13.00	16.00	13.00	2.50	20.20	1000
(V)M_57(2)	180.00	17.20	19.30	13.00	2.50	20.20	500
(V)M_43 (63)	330.00	24.50	29.10	13.00	2.50	20.20	500

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