

# 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

**1.0 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

Model	(V)MQF574T , (V)MQF576T	(V)MQF576P	(V)MQF576D						
Output Logic	CMOS	PECL	LVDS						
Supply Voltage V <sub>DD</sub> ( code )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 5% ( voltage code " 33 " )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 5% ( voltage code " 33 " )	+ 2.5 V <sub>DD</sub> ± 5% ( voltage code " 25 " ) + 3.3 V <sub>DD</sub> ± 5% ( voltage code " 33 " )						
Available Frequency Range	10 ~ 250 MHz	10 ~ 1,500 MHz	10 ~ 1,500 MHz						
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 Typical , 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 Typical , 0.9 V min.						
( V <sub>DD</sub> = + 2.5V )	50 MHz : 24 mA	156 MHz : 36 mA	156 MHz : 22 mA						
Current Consumption	125 MHz : 28 mA	600 MHz : 40 mA	600 MHz : 28 mA						
	200 MHz : 30 mA	800 MHz : 46 mA	800 MHz : 30 mA						
All values are typical and over the operating temperatures.		1,000 MHz : 50 mA	1,000 MHz : 34 mA						
( V <sub>DD</sub> = + 3.3V )	50 MHz : 26 mA	156 MHz : 40 mA	156 MHz : 25 mA						
Current Consumption	125 MHz : 30mA	600 MHz : 45 mA	600 MHz : 30 mA						
	200 MHz : 34 mA	800 MHz : 48 mA	800 MHz : 32 mA						
All values are typical and over the operating temperatures.		1,000 MHz : 52 mA	1,000 MHz : 36 mA						
Current with Output Disabled	18 mA ( typical )	18 mA ( typical )	18 mA ( typical )						
Rise Time / Fall Time	1.5 nS. ( Typical ) , 3.0 nS. ( max. ) Tr / Tf : 10% ↔ 90% waveform	0.2 nS. ( Typical ) , 0.5 nS. ( max. ) Tr / Tf : 20% ↔ 80% waveform	0.2 nS. ( Typical ) , 0.4 nS. ( 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	± 1.0 ppm max . , per year at 25°C							
	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 m sec. ( max. )								
Aging at Ta = +25°C	± 2 ppm max. first year at 25°C ; ± 10 ppm max. over 10 years								
Storage Temperature	-55°C to + 150°C								
SSB Phase Noise [ dBc / Hz ( typical ) ]	Offset	10 Hz	100 Hz	1K Hz	10K Hz	100K Hz	1M Hz	10M Hz	Phase Jitter ( 12KHz ~ 20 MHz )
	156.25 MHz	-65	-92	-108	-114	-117	-139	-147	0.9 pS
	212.5 MHz	-61	-90	-106	-110	-112	-133	-142	1.2 pS
	622.08 MHz	-51	-79	-97	-102	-103	-125	-134	1.1 pS
<b>Control Voltage Function on Pad 1</b>					<b>Output Enable Function on pad 2</b>				
Control Voltage Center and Range	+1.5V ± 1.0V for both V <sub>DD</sub> = 2.5V and 3.3V				OE Control	70% of V <sub>DD</sub> (min.) to enable output. (Open connection prohibit.)			
Frequency Pulling Range	± 8 ppm min.					30% of V <sub>DD</sub> (max.) to disable output			
Linearity	± 1 % typical. ± 10% max.								
Transfer Function	Positive Transfer				Output Enable / Disable Time	200 nS. Max. / 50 nS. Max.			
Input Impedance	770 KΩ typical.								
Harmonics	-5.0 dBc max.								

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## 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

[ MQF574T ]	[ MQF576T ] , [ MQF576P ] , [ MQF576D ]
<p><b>Pad Connections :</b>                  Pad 1 : Make no connection if TCXO ;                  Control voltage if VCTCXO                  Pad 2 : Ground                  Pad 3 : Output                  Pad 4 : Supply voltage</p>	<p><b>Pad 1 :</b> No Connection for TCXO Voltage Control for VCTCXO  <b>Pad 2 :</b> Output Enable  <b>Pad 3 :</b> Ground  <b>Pad 4 :</b> CMOS : Output                  PECL / LVDS : Differential  <b>Pad 5 :</b> CMOS : No Connection                  PECL / LVDS : Complementary  <b>Pad 6 :</b> Supply Voltage</p>

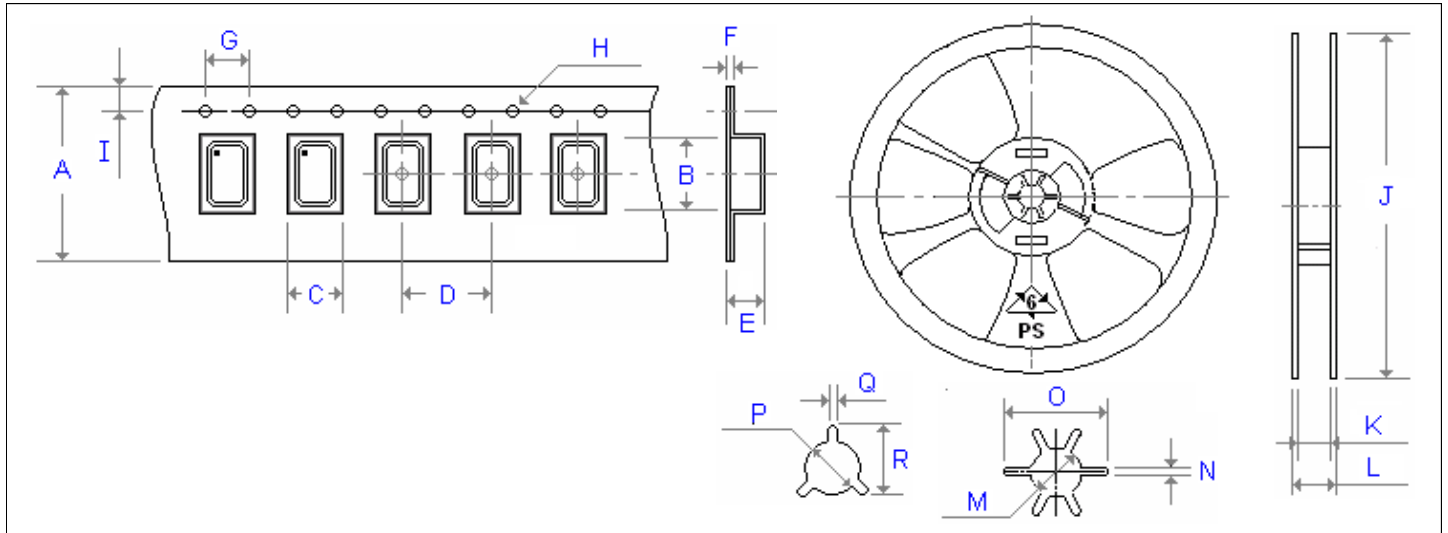
## Test Circuits and Output Waveforms

CMOS	PECL	LVDS
<p>No Connection for TCXO Voltage Control for VCTCXO</p>	<p>VC for VCTCXO Output NC for TCXO Enable                  VDD = 3.3 V : R1 = R3 = 127Ω ; R2 = R4 = 82.5Ω                  VDD = 2.5 V : R1 = R3 = 250Ω ; R2 = R4 = 62.5Ω</p>	<p>No Connection for TCXO Voltage Control for VCTCXO</p>

# 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	0.3	4.0	Ø 1.50	1.75	3000
G_534	12.0	5.3	3.6	8.0	1.4	0.3	4.0	Ø 1.55	1.75	1000
G_576	16.0	7.3	5.3	8.0	1.9	0.3	4.0	Ø 1.55	1.75	1000
G_42	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
G_43	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
G_62	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
G_63	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
(V)M_22	8.0	2.8	2.3	4.0	1.1	0.3	4.0	Ø 1.50	1.75	3000
(V)M_32	8.0	3.4	2.7	4.0	1.4	0.3	4.0	Ø 1.50	1.75	3000
(V)MQ_326	12.0	3.6	2.9	4.0	1.7	0.3	4.0	Ø 1.55	1.75	3000
(V)M_53	12.0	5.3	3.6	8.0	1.4	0.3	4.0	Ø 1.55	1.75	1000
(V)M_57	16.0	7.4	5.5	8.0	2.8	0.4	4.0	Ø 1.50	1.75	500
(V)M_42	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
(V)M_43	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
(V)M_62	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500
(V)M_63	24.0	12.4	10.3	16.0	5.0	0.3	4.0	Ø 1.55	1.75	500

Reel Dimensions ( unit : mm )

	J	K	L	P	Q	R	pcs / reel
G_324 ( 6 )	180.0	9.0	12.0	13.2	2.1	-	3000
G_534	180.0	13.0	16.0	13.2	2.5	-	1000
G_576	180.0	17.2	19.3	13.3	2.2	22.0	1000
G_42	330.0	30.0	25.0	13.4	2.5	19.5	500
G_43	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_63	330.0	30.0	25.0	13.4	2.5	19.5	500
(V)M_22	180.0	9.0	12.0	13.2	2.1	-	3000
(V)M_32	180.0	9.0	12.0	13.2	2.1	-	3000
(V)MQ_326	180.0	9.0	12.0	13.2	2.1	-	3000
(V)M_53	180.0	13.0	16.0	13.2	2.5	19.5	1000
(V)M_57	180.0	17.2	19.3	13.3	2.2	22.0	500
(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