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

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

Features

Quick - Turn Clock Oscillators | **1.0 pS Phase Jitter (typical)**

- Wide frequency range : 10 ~ 1500 MHz
- RMS Jitter (12 KHz ~ 20MHz) : 1.0 ps typ. (at 156.250 MHz)
- Package size : 3.2 x 2.5 x 1.6mm and 7.0 x 5.0 x 2.5mm
- Next-Day sample for prototypes

General specifications , at Ta=+25°C

Model	(V)MQF326T , (V)MQF574T	(V)MQF326P , (V)MQF576P	(V)MQF326D , (V)MQF576D
Output Logic	**CMOS**	**PECL**	**LVDS**
Supply Voltage V_{DD} (code)	+ 2.5 V ± 5% (voltage code " 25 ")	+ 2.5 V ± 5% (voltage code " 25 ")	+ 2.5 V ± 5% (voltage code " 25 ")
	+ 3.3 V ± 5% (voltage code " 33 ")	+ 3.3 V ± 5% (voltage code " 33 ")	+ 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 Vcc - 2V or Thevenin equiralent	100 Ω
Output Logic " High " , " 1 "	90 % V_{DD}	V_{DD} - 1.03 (min.) , V_{DD} - 0.6 (max.)	1.4 V (Typ.) , 1.6 V (max.)
Output Logic " Low " , " 0 "	10 % V_{DD}	V_{DD} - 1.85 (min.) , V_{DD} - 1.6 (max.)	1.1 V (Typ.) , 0.9 V (min.)
(V_{DD} = + 2.5V) Current Consumption (max.)	50 MHz : 34 mA	156 MHz : 46 mA	156 MHz : 32 mA
	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_{DD} = + 3.3V) Current Consumption (max.)	50 MHz : 36 mA	156 MHz : 50 mA	156 MHz : 35 mA
	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	± 1.0 ppm (max.) at +25°C±2°C (at the shipment) for Package Size (3.2 * 2.5 mm)							
	± 2.0 ppm (max.) at +25°C±2°C (at the shipment) for Package Size (5.0 * 7.0 mm)							
Frequency Stability Codes	Temperature (refer to +25°C)	± 2.0 ppm over -40°C to +85°C (default for Quick - Turn)						
		± 1.0 ppm over -40°C to +85°C (available)						
	Aging at Ta = +25°C	± 1.0 ppm (max.) first year						
	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 +125°C							
RMS Jitter [12 KHz ~ 20 MHz]	1.0 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

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

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

TCXO			VCTCXO			F series	SMD	2.5V	3.3V	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

	[1] Holder Type	[2] Package Code	[3] Waveform Code	[4] Supply Voltage	-	[5] Center Frequency	-	[6] Frequency Stability	/	[7] Operating Temp. Range
Examples (1)	MQF	326	D	25	-	622.080	-	1.0	/	-40+85
(2)	VMQF	576	P	33	-	120.000	-	2.0	/	-40+85

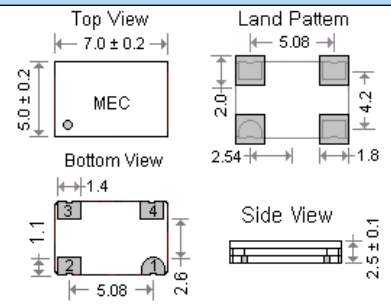
Ex (1) : MQF326D25 - 622.080 - 1.0 / -40+85 [TCXO , MQF326 type , LVDS , +2.5V , 622.080MHz , ±1.0ppm from -40°C to 85°C]

Ex (2) : VMQF576P33 - 120.000 - 2.0 / -40+85 [VCTCXO , VMQF576 type , PECL , +3.3V , 120.000MHz , ±2.0ppm from -40°C to 85°C]

[1]	Holder Type : " MQF " stands for TCXO ; " VMQF " stands for VCTCXO
[2]	Package Code : " 326 " stands for 3.2 x 2.5 x 1.6 mm 6pad ; " 576 " stands for 5.0 x 7.0 x 2.5 mm 6pad
[3]	Output Waveform Code : " T " stands for CMOS ; " P " stands for PECL ; " D " stands for LVDS
[4]	Supply Voltage : " 25 " stands for +2.5V ; " 33 " stands for +3.3V
[5]	Center Frequency in MHz
[6]	Frequency Stability in ± _ ppm ; ex 1 : ± 1.0ppm --- 1.0 , ex 2 : ± 2.0ppm --- 2.0
[7]	Operating Temperature Range in °C ex : -40 °C to 85°C ----- -40+85

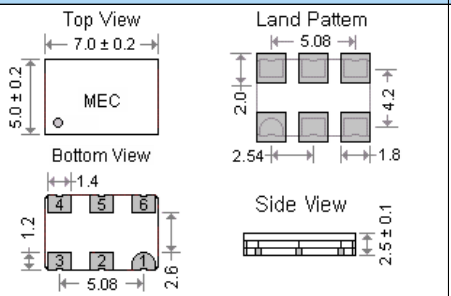
Outline Dimensions (Unit : mm) , Suggested pad Layout for SMDs

[(V)MQF574T]



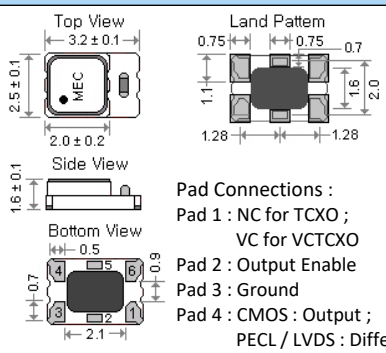
Pad Connections :
Pad 1 : NC for TCXO ;
VC for VCTCXO
Pad 2 : Ground
Pad 3 : Output
Pad 4 : Supply Voltage

[(V)MQF576P] , [(V)MQF576D]



Pad Connections :
Pad 1 : NC for TCXO ;
VC for VCTCXO
Pad 2 : Output Enable
Pad 3 : Ground
Pad 4 : Output
Pad 5 : Complementary
Pad 6 : Supply Voltage

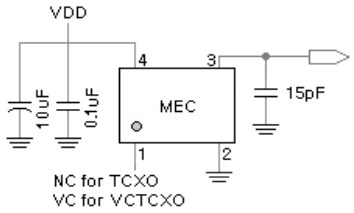
[(V)MQF326T] , [(V)MQF326P] , [(V)MQF326D]



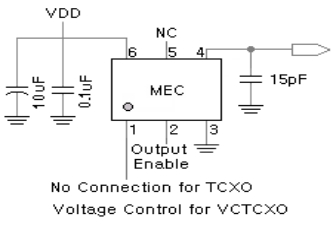
Pad Connections :
Pad 1 : NC for TCXO ;
VC for VCTCXO
Pad 2 : Output Enable
Pad 3 : Ground
Pad 4 : CMOS : Output ;
PECL / LVDS : Differential
Pad 5 : CMOS : No Connection ;
PECL / LVDS : Complementary
Pad 6 : Supply Voltage

Test Circuits and Output Waveforms

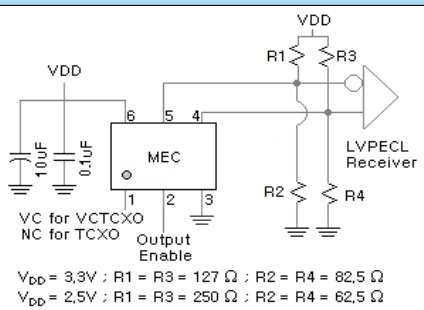
CMOS for 4pad package



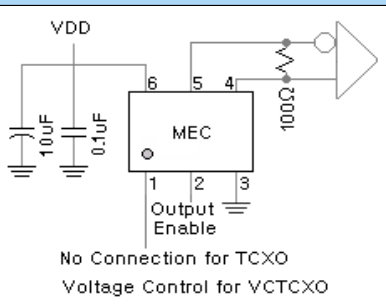
CMOS for 6pad package



PECL

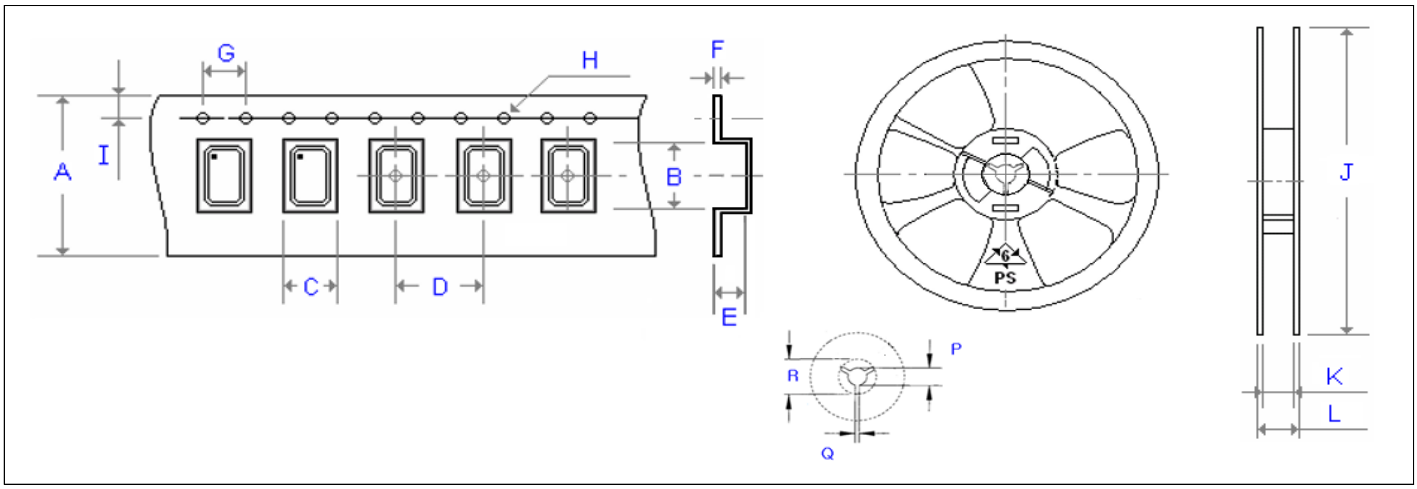


LVDS



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	Ø 1.50	1.75	3000
G_326	8.00	3.40	2.70	4.00	1.40	0.25	4.00	Ø 1.50	1.75	3000
G_536	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
G_576	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
G_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
G_578	16.00	7.30	5.30	8.00	1.90	0.30	4.00	Ø 1.50	1.75	1000
(V)M21	8.00	2.30	1.90	4.00	0.90	0.25	4.00	Ø 1.50	1.75	3000
ME21	8.00	2.30	1.50	4.00	1.35	0.25	4.00	Ø 1.50	1.75	3000
(V)M22	8.00	2.80	2.25	4.00	1.10	0.30	4.00	Ø 1.50	1.75	3000
(V)M_32	8.00	3.71	2.80	4.00	1.75	0.25	4.00	Ø 1.50	1.75	3000
(V)M_326	12.00	3.60	2.90	4.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_53	12.00	5.30	3.60	8.00	1.40	0.30	4.00	Ø 1.50	1.75	1000
(V)M_538	12.00	5.40	3.60	8.00	1.70	0.30	4.00	Ø 1.50	1.75	1000
(V)M_57(2)	16.00	7.40	5.50	8.00	2.80	0.35	4.00	Ø 1.50	1.75	500
(V)M_43 (63)	24.00	11.80	10.00	16.00	5.00	0.30	4.00	Ø 1.50	1.75	500

Reel Dimensions (unit : mm) +2.0 / -0.0mm

	J	K	L	P	Q	R	pcs / reel
G_226	180.00	9.00	12.00	13.20	2.10	-	3000
G_326	180.00	9.00	12.00	13.20	2.10	-	3000
G_536	180.00	13.00	16.00	13.20	2.50	-	1000
G_576	180.00	17.20	19.30	13.30	2.20	22.00	1000
G_538	180.00	13.00	16.00	13.20	2.50	-	1000
G_578	180.00	17.20	19.30	13.30	2.20	22.00	1000
(V)M21	180.00	9.00	12.00	13.20	2.10	-	3000
ME21	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M22	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_32	180.00	9.00	12.00	13.20	2.10	-	3000
(V)M_326	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_53	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_538	180.00	13.00	16.00	13.20	2.50	-	1000
(V)M_57(2)	180.00	17.20	19.30	13.30	2.20	22.00	500
(V)M_43 (63)	330.00	24.50	29.10	13.00	2.20	17.30	500