

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

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

Features

- 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 2.6mm
- Next-Day sample for prototypes

Quick - Turn Clock Oscillators

1.0 pS Phase Jitter (typical)



General specifications , at Ta=+25°C

Model	(V)MQF326T , (V)MQF574T			(V)MQF326P , (V)MQF576P			(V)MQF326D , (V)MQF576D		
Output Logic	CMOS			LVPECL			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 V _{cc} - 2V or Thevenin equivalent			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)	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 _{DD} = + 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	± 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	Output Enable Time / Disable Time	200 nsec. (max.) / 50 nsec. (max.)
Absolute Voltage	4.0 V (max.)		
Input Impedance	770 KΩ (typ.)		

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Part Number Format and Example

		[1]	[2]	[3]	[4]	-	[5]	-	[6]	/	[7]
		Holder Type	Package Code	Waveform Code	Supply Voltage		Center Frequency		Frequency Stability		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 , ± 1.0 ppm from -40°C to 85°C]

Ex (2) : VMQF576P33 - 120.000 - 2.0 / -40+85 [VCTCXO , VMQF576 type , LVPECL , +3.3V , 120.000MHz , ± 2.0 ppm 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 2.6 mm 6pad
[3]	Output Waveform Code : "T" stands for CMOS ; "P" stands for LVPECL ; "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 $\pm$ ppm ; ex 1 : ± 1.0 ppm --- 1.0 , ex 2 : ± 2.0 ppm --- 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]	[(V)MQF576P] , [(V)MQF576D]	[(V)MQF326T] , [(V)MQF326P] , [(V)MQF326D]
Top View Land Pattern Bottom View Side View Pad Connections : Pad 1 : VC / GND Pad 2 : Ground Pad 3 : Output Pad 4 : Supply Voltage	Top View Land Pattern Bottom View Side View Pad Connections : Pad 1 : VC / GND Pad 2 : Output Enable Pad 3 : Ground Pad 4 : Output Pad 5 : Complementary Pad 6 : Supply Voltage	Top View Land Pattern Bottom View Side View Pad Connections : Pad 1 : VC / GND Pad 2 : Output Enable Pad 3 : Ground Pad 4 : Output Pad 5 : CMOS : NC ; LVPECL / LVDS : Complementary Pad 6 : Supply Voltage

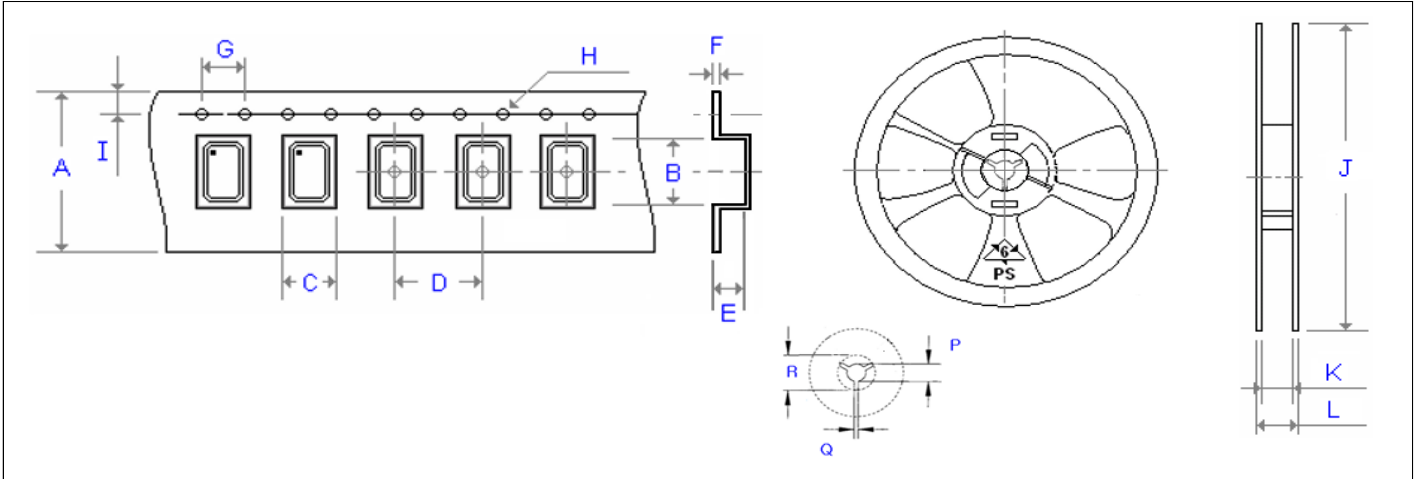
Test Circuits and Output Waveforms

CMOS for 4pad package	CMOS for 6pad package
LVPECL	LVDS
VDD = 3.3 V : R1 = R3 = 127 Ω ; R2 = R4 = 82.5 Ω VDD = 2.5 V : R1 = R3 = 250 Ω ; R2 = R4 = 62.5 Ω	

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

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