MQF574T Series Temperature Compensated Crystal Oscillators (TCXOs)
VMQF574T Series TCXOs with Voltage Control Function (VCTCXOs)

MERCURY
Since 1973

MQF574T and **VMQF574T** are 7.0 x 5.0 x 2.5 mm SMD CMOS output TCXOs and VCTCXOs, available in either 2.5 V or 3.3 V supply voltage, frequency up to 250 MHz. The product flexibility makes the custom (VC)TCXO frequencies more readily available than any other series, with short lead time. The 0.8 ~ 1.6 ps typical phase jitter and lower current consumption (34 mA typical for 250 MHz at 3.3 V) compared to competitions make the series ideal for multimedia, Ethernet, and networking applications.

Relevant Categories:

- **QMQF574T** and **QVMQF574T** are quick-turn delivery versions of the MQF574T and VMQF574T series respectively. quick-turn delivery products, either standard or custom frequencies, are produced and shipped from Taiwan in 10 days. Click to check our inventory and place your order online.
- For lower phase noise and phase jitter (0.6 p. sec. typical), please refer to **MQN574T** and **VMQN574T** series.
- For 3.2 x 2.5 x 1.6 mm 6-pad SMD with the same electrical performance, please refer to the **MQF326T, VMQF326T** series.

General Specifications: at Ta = +25°C

Output Logic Type	CMOS (code "T")					
TCXO Models	**MQF574T25**		**MQF574T33**			
VCTCXO Models	**VMQF574T25**		**VMQF574T33**			
Frequency Range	10 ~ 250 MHz		10 ~ 250 MHz			
Supply Voltage (V_{DD})	+2.5 V ±5%		+3.3 V ±5%			
	Code "25"		Code "33"			
Current Consumption; typical	25 MHz: 17 mA 45 MHz: 20 mA 50 MHz: 21 mA 125 MHz: 24 mA 250 MHz: 25 mA		10 MHz: 21 mA 50 MHz: 24 mA 77 MHz: 25 mA 125 MHz: 29 mA 250 MHz: 34 mA			
Load; typical	15 pF					
Output High Voltage; V_{OH}	90% V_{DD} min.					
Output Low Voltage; V_{OL}	10% V_{DD} max.					
Rise / Fall Time (Tr; Tf)	1.5 nS. Typ.; 3.0 nS. max. (10% ↔ 90% waveform)					
Frequency Stability	Stability Temperature	±0.5 ppm	±1.0 ppm	±1.5 ppm	±2.0 ppm	±2.5 ppm
	0 to +55°C	Available	Available	Available	Available	Available
	-10 to +60°C	Available	Available	Available	Available	Available
	-20 to +70°C	Available	Available	Available	Available	Available
	-30 to +85°C	Contact Mercury	Available	Available	Available	Available
	-40 to +85°C	Contact Mercury	Available	Available	Available	Available

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	Voltage Change		±0.2 ppm max. for a ±5% input voltage change					
	Load Change		±0.2 ppm max. for a ±10% load condition change					
	Aging at Ta = +25°C		±2 ppm max. first-year; ±10 ppm max. over 10 years					
	Reflow		±1.0 ppm max., one reflow and measured 24 hours afterward.					
Initial Calibration Tolerance (Initial Frequency Accuracy)	±1.0 ppm typical; ±2.0 ppm. max. at +25°C±2°C.							
Duty Cycle	50% ±5%. At 50% V_{DD}.							
Current with Output Disabled	18 mA typical							
Start-up Time	5 m. sec. max.							
Output Enable Time	200 ns max.							
Output Disable Time	50 ns max.							
Single Side-band Phase Noise (dBc / Hz; typical)	Frequency (MHz)		**16**	**25**	**49.152**	**50**	**54**	**156.250**
	Supply Voltage		3.3	3.3	3.3	3.3	3.3	3.3
	Offset	10 Hz	-92	-88	-85	-80	-77	-63
		100 Hz	-116	-109	-108	-103	-106	-91
		1 kHz	-131	-125	-121	-117	-119	-109
		10 kHz	-139	-132	-126	-124	-125	-115
		100 kHz	-140	-134	-127	-127	-126	-116
		1 MHz	-158	-151	-146	-145	-145	-137
		5 MHz	-163	-157	-154	-148	-153	-147
		10 MHz	–	–	-157	-150	-157	-150
		20 MHz	–	–	-160	-152	-160	-155
Integrated Phase Jitter, RMS 12 kHz to 20 MHz; picosecond			0.76	0.9	1.0	1.1	1.1	1.1
Control Voltage Function on Pad 1 (VCTCXOs only)								
Control Voltage ($V_{control}$)	V_{contol} center and range: +1.5 V ± 1.0 V. For both 2.5 V_{DD} and 3.3 V_{DD}							
Frequency Pulling Range	High pull: +8 ppm min. for V_{contol} from 1.5 V to +2.5V Low pull: - 8 ppm min. for V_{contol} from 0.5 V to +1.5V							
Linearity	±5% typical. ±10% max.							
Transfer Function	Positive Transfer							
Input Impedance	500 KΩ min.							
Bandwidth	10 kHz min. Measured at -3 dB.							
Tri-State function on Pad 2								
Output Enable (OE) Control	70% of V_{DD} (min.) to enable output. CMOS level. Do not leave this pin floating. If no connection is desired, please contact Mercury.							
	30% of V_{DD} (max.) to disable the output. Output is high impedance.							
Output Enable Time	200 n. sec. max.							
Output Disable Time	50 n. sec. max.							

Absolute Maximum Rating:

Input Voltage	-0.5 V to V_{DD}+0.5 V
Output Voltage	-0.5 V to V_{DD}+0.5 V
Positive Supply Voltage	4.2 V
Electrostatic Discharge (ESD)	Human Body Model (HBM): Exceeds 2000 V. Class 2 per MIL-STD-1686C
	Machine Model (MM): Exceeds 120 V. Class M2 per MIL-STD-1686C. Note: Power, ground, and outputs are 200 V.
	Charged-Device Model (CDM): Exceeds 2000 V. Class C6 per MIL-STD-1686C

Environmental Performance Specifications

Green Requirement	RoHS compliant, Pb (lead) free per EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC). Free of halide, cadmium, hexavalent chromium, lead, mercury, PBB's, and PBDE's.
Moisture Sensitivity Level	Level 2 per IPC/JEDEC J-STD-020D.1
Storage temperature range	-55 to +125°C
Humidity	85% RH, 85°C, 48 hours
Fine Leak / Gross Leak	MIL-Std-883, method 1014, condition A / MIL-Std-883, method 1014, condition C
Solderability	MIL-STD-202F method 208E
Reflow	260°C for 10 sec. 2X.
Vibration	MIL-STD-202F method 204, 35G, 50 to 2000 Hz
Shock	MIL-STD-202F method 213B, test condition. E, 1000GG ½ sine wave
Resistance to Solvent	MIL-STD-202, method 215
Temperature Cycling	MIL-STD-883, method 1010
Pad Surface Finish	Gold (0.3 um to 1.0 um) over nickel (1.27 um to 8.89 um)

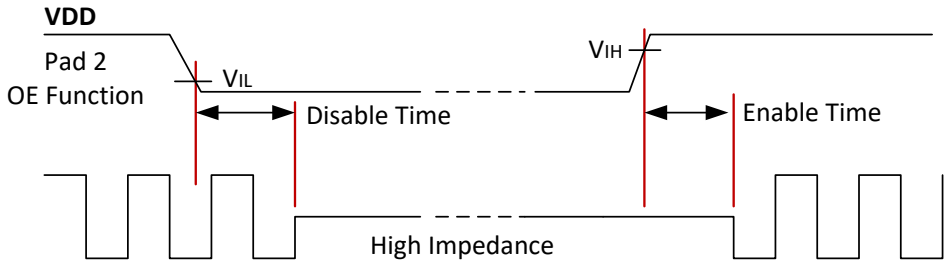
Part Number Format and Examples:

Example 1: VMQF574T33-160.000-2.0/-40+85; Example 2: MQF574T25-148.500-2.5/-30+85

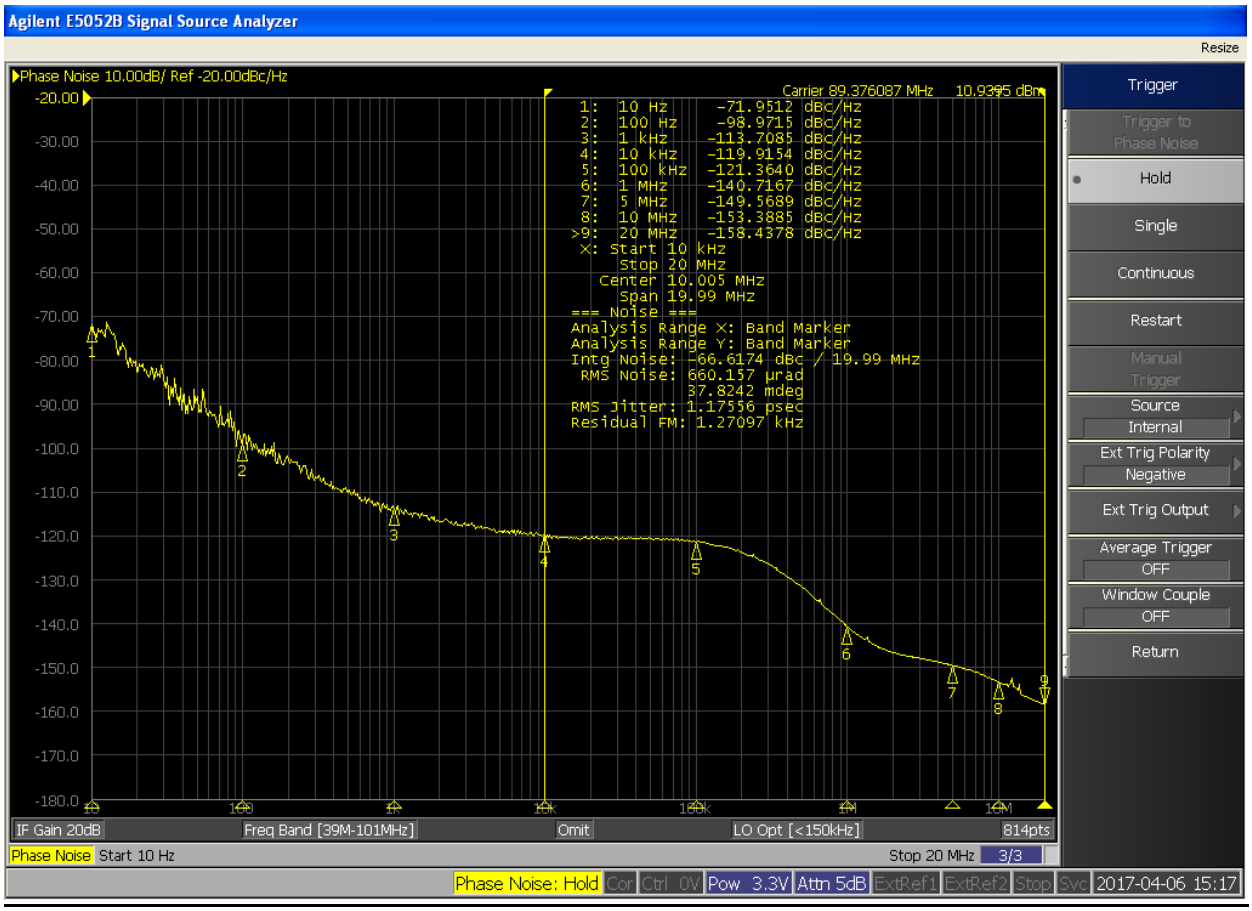
VMQF	574	T	33	-	160.000	-	2.0	/	-40+85
MQF	574	T	25	-	148.500	-	2.5	/	-30+85
Main Series "**MQF**": TCXO "**VMQF**": VCTCXO	Package Code "**574**": 7.0x5.0 mm 4-pad SMD	Output Logic **"T"**: CMOS	Supply Voltage "**33**" for 3.3V "**25**" for 2.5V		The nominal Frequency in MHz. 3 places or more after the decimal.		Frequency Stability. One decimal place.		Operating Temperature Range (°C)

Output OE Function on pad 2

Note: Do not leave this pad floating. If “no-connection” is desired, please contact Mercury.



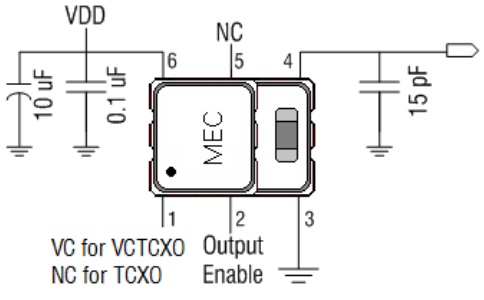
Phase Noise Plot of MQF574T33-89.376 MHz, V_{DD} = +3.3V, CMOS

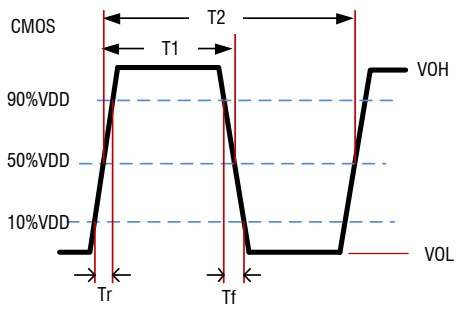


Test Circuits and Output Waveforms

Duty cycle = $\left(\frac{T1}{T2}\right) * 100\%$. Measured at 50% V_{DD}

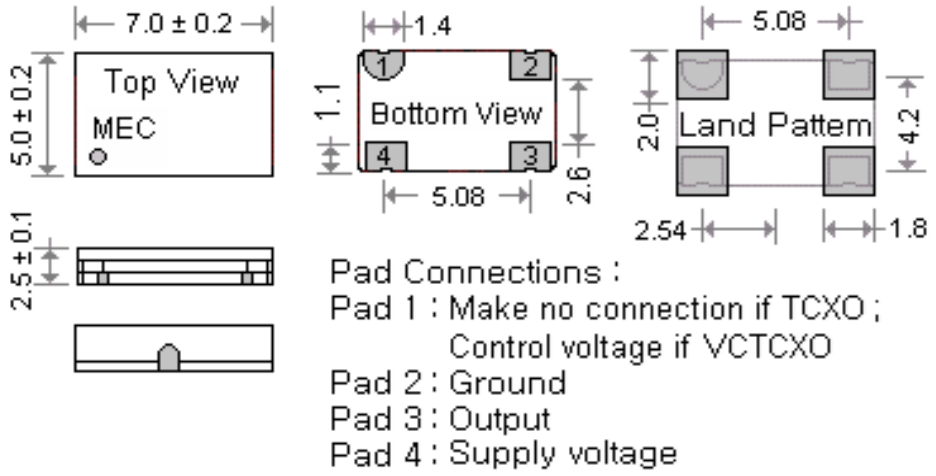
CMOS



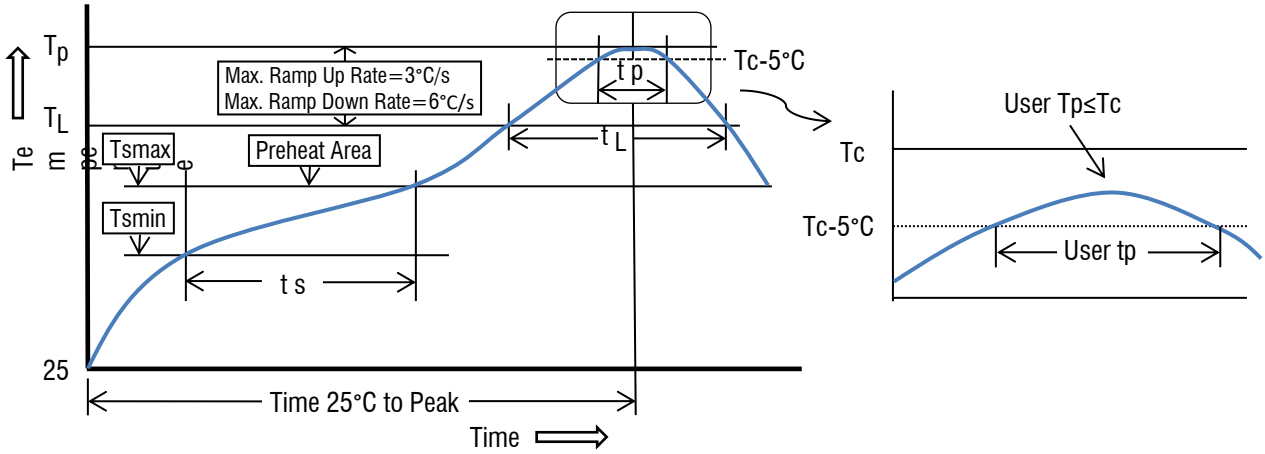


Package Dimensions and Recommended Solder Pad Layout

unit: (mm)



Recommended Solder Reflow Profile (per IPC/JEDEC J-STD-020D.1)



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak - Temperature min. (Ts min.) - Temperature max. (Ts max.) - Time (ts) (Ts min. to Ts max.)	 100ºC 150ºC 60 to 120 seconds	 150ºC 200ºC 60 to 180 seconds
Ramp-up rate (T_L to Tp)	3ºC / sec. max.	3ºC / sec. max.
Liquidous temperature (T_L) Time (t_L) maintained above T_L	183ºC 60 to 150 seconds	217ºC 60 to 150 seconds
Peak package body temperature (Tp)	235ºC	260ºC
Time (Tp) within 5ºC of the classification temperature Tc	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (Tp to T_L)	6ºC / second max.	6ºC / second max.
Time 25ºC to peak temperature	6 minutes max.	8 minutes max.

All temperatures refer to the topside of the package, measured on the package body surface.