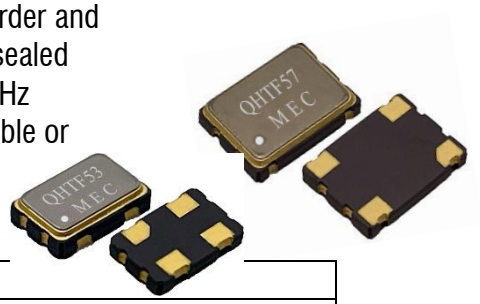
QHTF Series Quick-Turn LVCMOS Crystal Clock Oscillators

MERCURY Since 1973

QHTF is one of the Mercury quick-turn delivery family CMOS output clock oscillators. quick-turn delivery products, either standard or custom frequencies are built-to-order and shipped from Taiwan in 10 days. QHTF is available in five different hermetically sealed ceramic leadless SMD packages, three supply Voltages, and a 1.0 MHz to 200 MHz frequency range (up to 125 MHz for 1.8V). Pin 1 can be either Tri-State High Enable or Power Down.



General Specifications: at Ta = +25°C

Product Series	**QHTF_ _** Series						
Output Logic Type	**LVCMOS** (Output Logic Code: "**T**")						
HTF Series Models	**QHTF21**	**QHTF22**	**QHTF32**	**QHTF53**	**QHTF57**		
Package Dimensions (mm)	2.0x1.6x0.8	2.5x2.0x0.8	3.2x2.5x1.0	5.0x3.2x1.2	7.0x5.0x1.3		
Supply Voltage (V_{DD})	+1.8 V ±5%		+2.5 V ±10%		+3.3 V ±10%		
	Voltage Code: "**18**"		Voltage Code: "**25**"		Voltage Code: "**3**"		
Frequency Range	1.0 ~ 125.0 MHz		1.0 ~ 200.0 MHz		1.0 ~ 200.0 MHz		
Current Consumption	20 mA typical 30 mA max.		28 mA typical 35 mA max.		30 mA typical 40 mA max.		
Rise / Fall Time (Tr; Tf) 10% ↔ 90% waveform. 15 pF load.	2.0 n. sec. typical 5.0 n. sec. max.		1.4 n. sec. typical 3.0 n. sec. max.		1.1 n. sec. typical 3.0 n. sec. max.		
Frequency Stability	±50 ppm over -40 to +85°C operating temperature range						
Aging at Ta = +25°C	±3 ppm (max.) the first year; ±2 ppm (max.) per year thereafter						
Output Load	15 pF typical						
Output Drive Strength	8 mA typical						
Output High Voltage; V_{OH}	V_{DD} – 0.4 V min.						
Output Low Voltage; V_{OL}	0.4V max.						
Duty Cycle	1.0~150.0 MHz: 50% ±5%. 150.01~200.0 MHz: 50% ±10%. At V_{DD} /2.						
Start-up Time	4.5 m. sec. typical; 10 m. sec. max.						

Pin 1 Options	**Pin 1 Options**	High Enable. Option code: **OE**	Power Down. Option code: **PD**
	Output Enable / Disable	70% of V_{DD} (min.) to Enable; 30% of V_{DD} (max.) to Disable	
	Output Enable Time	10 n. sec. max.	4.5 m. sec. typical. 10 m. sec. max.
	Output Disable Current	18 mA typical; 22 mA max.	300 μA typical; 400 μA max.

Integrated Phase Jitter, RMS,12 kHz to 20 MHz	3.3 V: 1.0 p. sec. typical; 2.5 V: 1.1 p. sec. typical; 1.8 V: 1.5 p. sec. typical							
Single Sideband Phase Noise (dBc / Hz; typical)	**Offset**	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
	dBc / Hz	-61	-89	-110	-119	-119	-142	-149

MERCURY www.mercury-crystal.com

Taiwan: TEL (886)-2-2406-2779, e-mail: sales-tw@mercury-crystal.com

Absolute Maximum Rating:

Positive Supply Voltage (V_{DD})	-0.5 V ~ 7 V w.r.t. ground
Input Pin Voltage (Vin)	-0.5 V to V_{DD}+0.5 V
Output Pin Voltage (Vout)	-0.5 V to V_{DD}+0.5 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, PBBs, and PBDEs.
Moisture Sensitivity Level	Level 1 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)

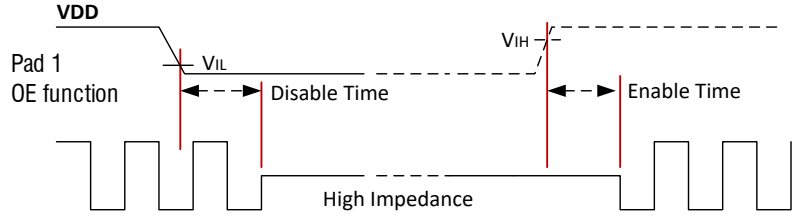
Part Number Format and Examples:

Example 1: 18QHTF57-25.000-PD Example 2: 25QHTF53-100.000-OE Example 3: 3QHTF32-200.000-PD

18	QHTF	57	-	25.000	-	PD
25		53		100.000	-	OE
3		32		200.000	-	PD
Voltage Code "**18**" for 1.8V "**25**" for 2.5V "**3**" for 3.3V	HTF Series	Package Code "**57**": 7.0x5.0x1.3 mm "**53**": 5.0x3.2x1.2 mm "**32**": 3.2x2.5x1.0 mm "**22**": 2.5x2.0x0.8 mm "**21**": 2.0x1.6x0.8 mm	a dash	The nominal Frequency in MHz. 3 places or more after the decimal point	a dash	Pin 1 option: "**PD**": Power Down "**OE**": Output Enable

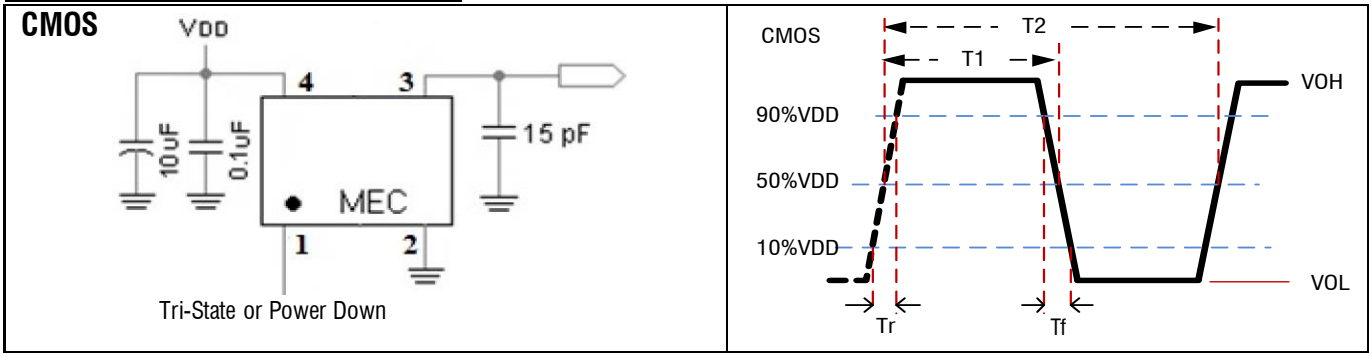
Output OE Function on pad 1

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



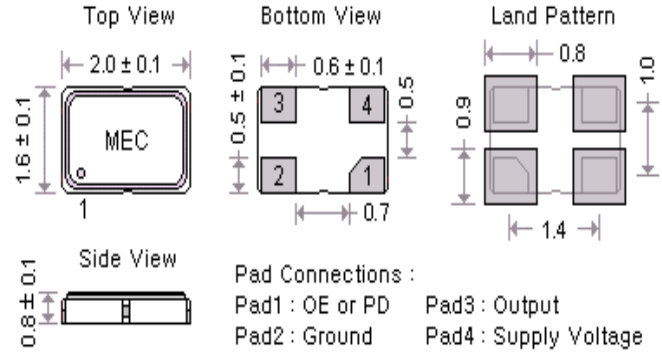
Test Circuits and Output Waveforms

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

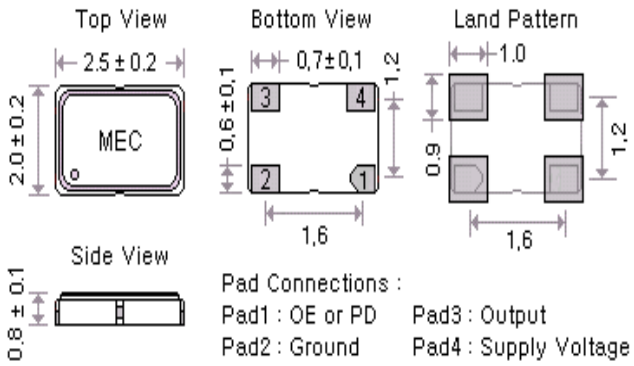


Package Dimensions and Recommended Solder Pad Layout Unit: (mm)

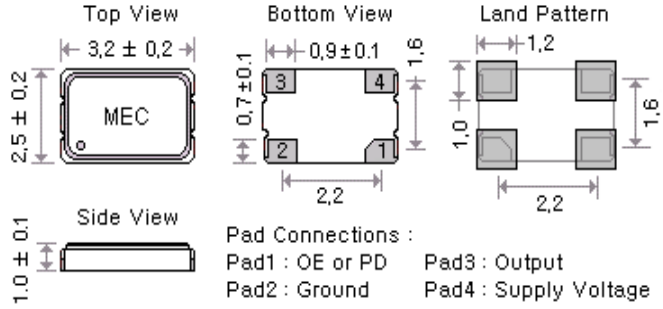
QHTF21



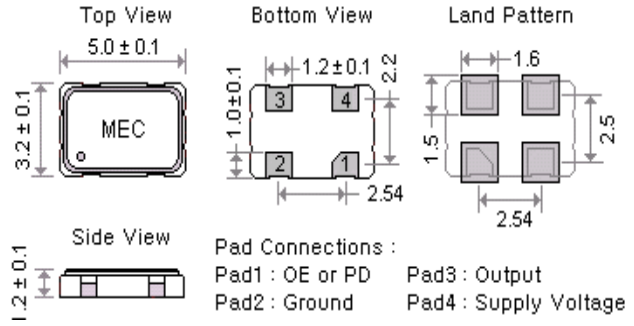
QHTF22



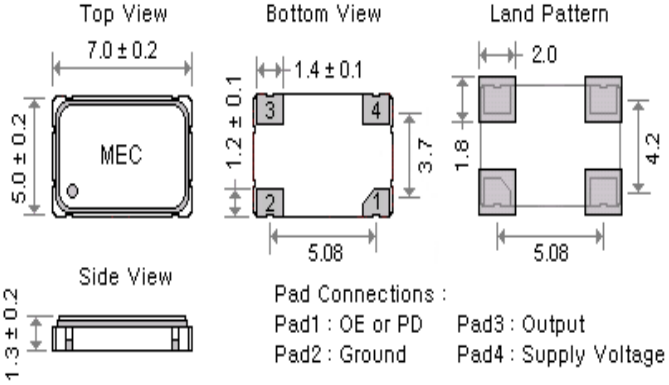
QHTF32



QHTF53



QHTF57



♦ To minimize EMI, a 10 to 100 Ω series resistor is recommended at the output signal.

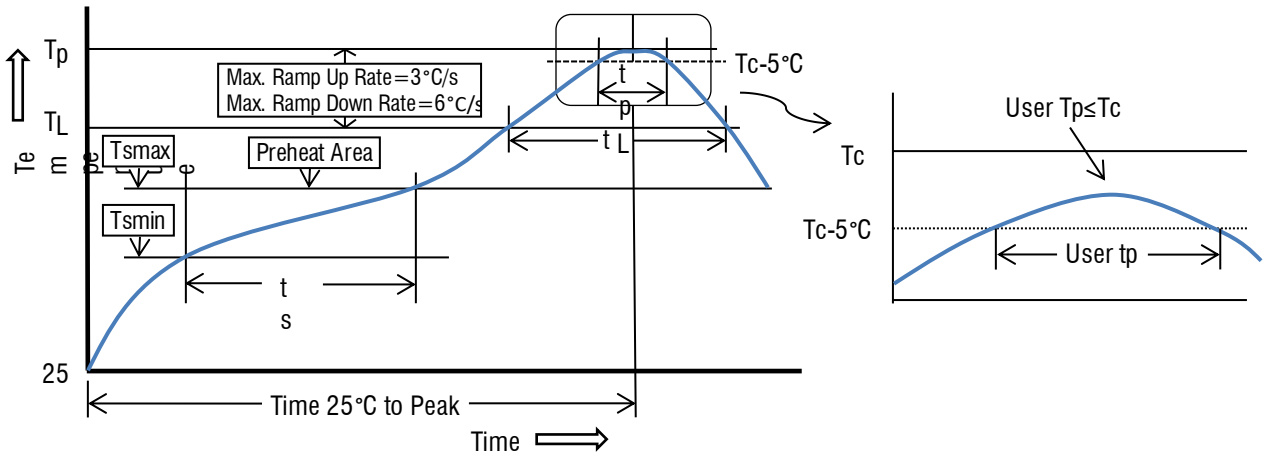
♦ To improve noise immunity: Do not float pin 1. Connect it to V_{DD}, if Tri-state or power down is not used.

Equivalent Products:

QHTF and **HTF** (click for HTF info.) are equivalent product series. They are manufactured at different Mercury facilities using identical designs, raw materials, and production processes. Once either one is approved, Mercury recommends including both the **QHTF** and the **HTF** part numbers of your referenced part on your BOM to take advantage of the **quick-turn delivery** short lead- times and the low-cost high-volume production offerings. Examples:

QHTF	HTF
A quick-turn delivery, Mercury eCommerce product. For engineering, low to medium volume. The COO is U.S.A.	High volume, low cost, regular production lead time. The COO is Taiwan.
Ex. 18QHTF57-25.000-PD (quick-turn) is equivalent to 18HTF57-ET-25.000-PD (regular lead time)	
Ex. 25QHTF53-100.000-OE (quick-turn) is equivalent to 25HTF53-ET-100.000-OE (regular lead time)	
Ex. 3QHTF32-200.000-PD (quick-turn) is equivalent to 3HTF32-ET-200.000-PD (regular lead time)	

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.