

EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

QHM572, QHM53 Series



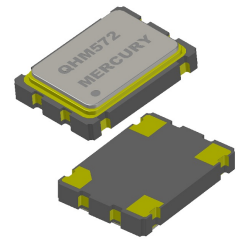
MERCURY
Since 1973

Features:

- Lead time: 10 days.
- Reduces system level (both fundamental and harmonic) electromagnetic interference (EMI) by approx. 20 dB
- Drop-in replacement for conventional crystal oscillators, no need to re-spin board layout
- Center or down spread. 6 modulation percentages to choose from for each type
- Operates with a +2.5V or +3.3V supply voltage
- 3.2x5.0 mm or 5.0 x 7.0mm hermetically sealed ceramic package
- Cycle-to-cycle jitter: 100 pS max.
- Compliant to 2011/65 EU RoHS 2 Directive



RoHS Compliant Product
by Mercury



QHM572

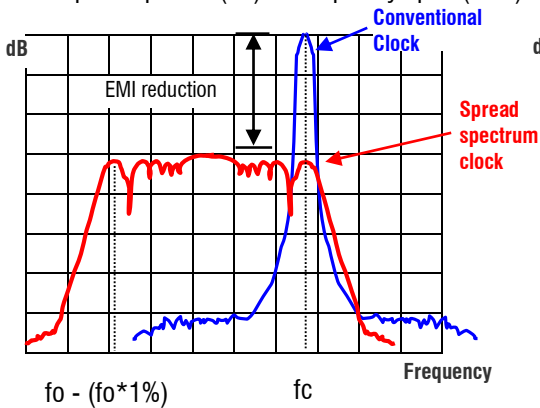
Applications:

- Printers; Multiple function printers (MPCs)
- Digital copiers; PDAs
- Networking; LAN / WAN; routers
- Storage systems (CD-ROM, VCD, DVD & HDD)
- Scanner; modems; projectors
- Hand-held ID readers
- Embedded systems
- Automotive; GPS navigation systems
- LCD PC Monitors / LCD TVs
- ADSL; PCMCIA
- Digital cameras
- Medical equipment and devices

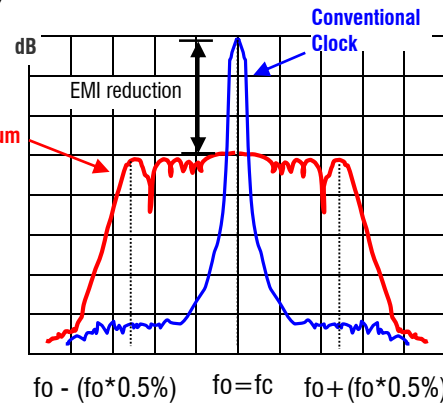
Modulation Types

Down spread:

Output amplitude (dB) vs frequency span (MHz)



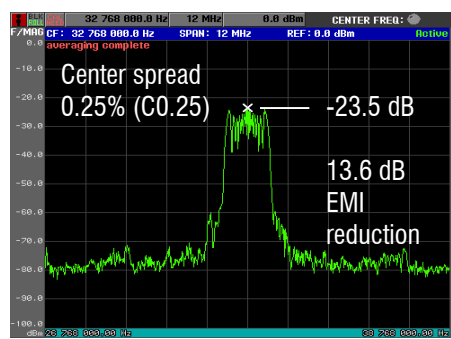
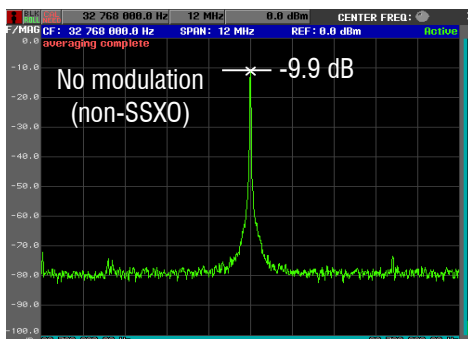
Center spread :



Spread Spectrum Crystal Oscillator (SSXO):

Unlike the conventional clock, the mode energy of a spread spectrum clock is spread (distributed) over a wider bandwidth between two pre-defined frequency boundaries by the **frequency modulation** technique. The modulation carrier frequency is in the KHz range which makes the modulation process transparent to the oscillator frequency. This controlled modulation process can be on all of one side of the nominal frequency (**down spread**), which is preferred if system over-clocking is a concern, or 50% up and 50% down (**center spread**).

42 MHz non-SSXO vs SSXO at Center Spread 0.25%:



MERCURY www.mercury-crystal.com

Taiwan: TEL (886)-2-2406-2779, FAX (886)-2-2496-0769, e-mail: sales-tw@mercury-crystal.com

EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

QHM572, QHM53 Series



MERCURY
Since 1973

General Specifications: at $T_a = +25^\circ\text{C}$, $C_L = 15\text{ pF}$

Product Family	quick-turn delivery				
Product Series	QHM572: Package size 5.0 x 7.0 x 1.4 mm				
	QHM53: Package size 3.2 x 5.0 x 1.2 mm				
Frequency Range	$V_{DD} = 2.5\text{V}$: 1 ~ 166 MHz $V_{DD} = 3.3\text{V}$: 1 ~ 200 MHz				
Available Spread Type and Spread Percentage for ordering	Down Spread		Center Spread		Total Spread %
	Spread %	Ordering code	Spread %	Ordering code	
	-0.25%	D0.25	± 0.125	C0.125	0.25%
	-0.5%	D0.5	± 0.25	C0.25	0.5%
	-1%	D1	± 0.5	C0.5	1%
	-2%	D2	± 1.0	C1	2%
	-3%	D3	± 1.5	C1.5	3%
-4%	D4	± 2.0	C2	4%	
EMI Reduction, system level	20 dB typical. For fundamental and harmonic frequencies				
Modulation Carrier Frequency (Dither rate)	31 ~ 40 KHz typical. Frequency dependent. Call for details.				
Output Logic	CMOS Square Wave				
Frequency Stability	± 50 ppm over -40°C to $+85^\circ\text{C}$; exclude modulation.				
Input Voltage (V_{DD})	$V_{DD} = +2.5\text{V}$ or $+3.3\text{V}$ D.C.				
Load	15 pF max.				
Supply Current; Loaded	15 mA typical, 3.3V, 15 pF load, 26 MHz				
Output Voltage "High"; "1"	$V_{DD} - 0.4\text{V}$ min. $I_{OH} = -4\text{ mA}$				
Output Voltage "Low"; "0"	0.4 V max., $I_{OL} = 4\text{ mA}$				
Output Current	8 mA min				
Output Rise Time	2.0 n sec. typical, 10% $V_{DD} \rightarrow 90\% V_{DD}$, 15 pF load				
Output Fall Time	1.7 n sec. typical, 90% $V_{DD} \rightarrow 10\% V_{DD}$, 15 pF load				
Start-up Time	2 ms typical; 5 ms max.				
Duty Cycle	50% $\pm 5\%$. ($C_L = 15\text{ pF}$; at 50% V_{DD})				
Output Impedance	30 Ω typical.				
Cycle-to-cycle Jitter	100 ps max., 3.3V				
Aging	± 3 ppm per year max.; $T_a = +25^\circ\text{C}$				
Pin 1 Function, Power-down control	When taken LOW	All circuitries (PLL, oscillator, counters and all other active) are disabled. High impedance output. Current is 10 μA typical.			
	When taken HIGH or float	Output			

Absolute Maximum Ratings

Power Supply Voltage V_{DD}	-0.5 V min; +7.0V max.
Input Voltage Range	-0.5V min.; $V_{DD} + 0.5\text{V}$ max.
Output Voltage Range	-0.5V min.; $V_{DD} + 0.5\text{V}$ max.

EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

QHM572, QHM53 Series

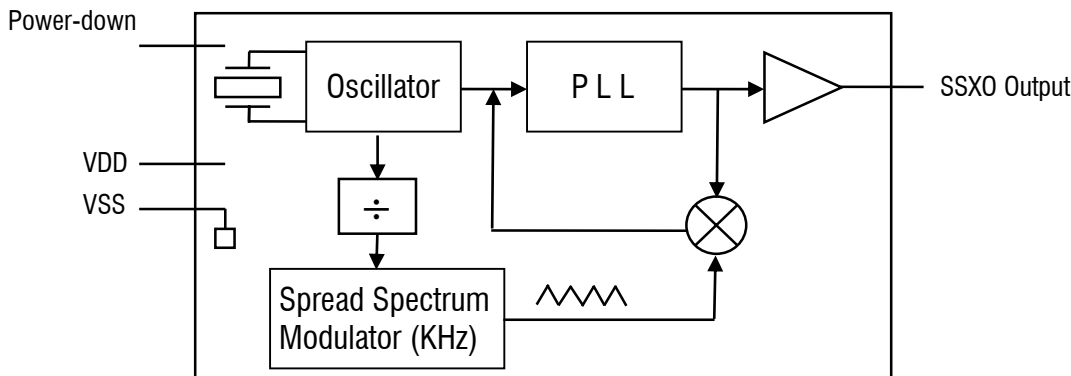


MERCURY
Since 1973

Environmental Performance Specifications

RoHS Status	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC)
Moisture Sensitivity Level	Level 1 (infinite) according to IPC/JEDEC J-STD-020D.1
Second Level Interconnect	e4
Storage temp. range	-55°C to +125°C
Humidity	85% RH, 85°C, 168 hours
Fine Leak / Gross Leak	MIL-Std-883, method 1014, condition A / MIL-Std-883, method 1014, condition C
Solderability	MIL-STD-202G method 210F
Reflow	260°C for 40 sec(MAX). 1X.
Vibration	MIL-STD-883F:2007.3, 20G, 20 to 2000 Hz
Shock	MIL-STD-883F:2002.4, 1500G for 0.5mS, 3cycles
Resistance to Solvent	MIL-STD-202, method 215
Temperature Cycling	MIL-STD-883F-1010.8 Condition B
ESD Rating	>2000 V (per MIL-STD-883, method 3015)
Pad Surface Finish	Gold (0.3~1.0 μm) over nickel (1.27 ~ 8.89 μm)

Block Diagram



Part Number Format and Example:

Example: 25QHM53D2-66.000

25	QHM	53	D2	—	66.000
Input Voltage		Package Code	Spread Type and Spread %		Frequency in MHz

Input Voltage	
25	2.5 V V _{DD}
3	3.3 V V _{DD}

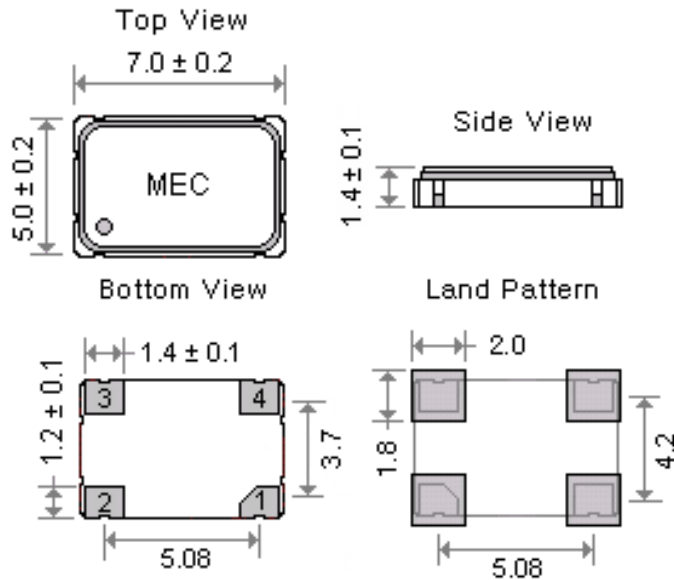
Package Code	
53	3.2x5.0x1.2 mm
572	5.0x7.0x1.4 mm

Spread Type and Spread %	
Down Spread	From D0.25 to D4
Center Spread	From C0.125 to C2

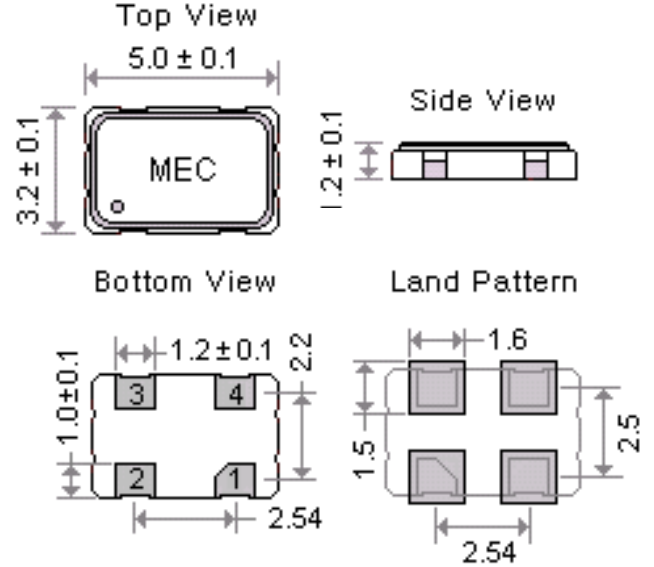
QHM Series Package Dimensions and Recommended Solder Pad Layout

unit: (mm)

QHM572 Package



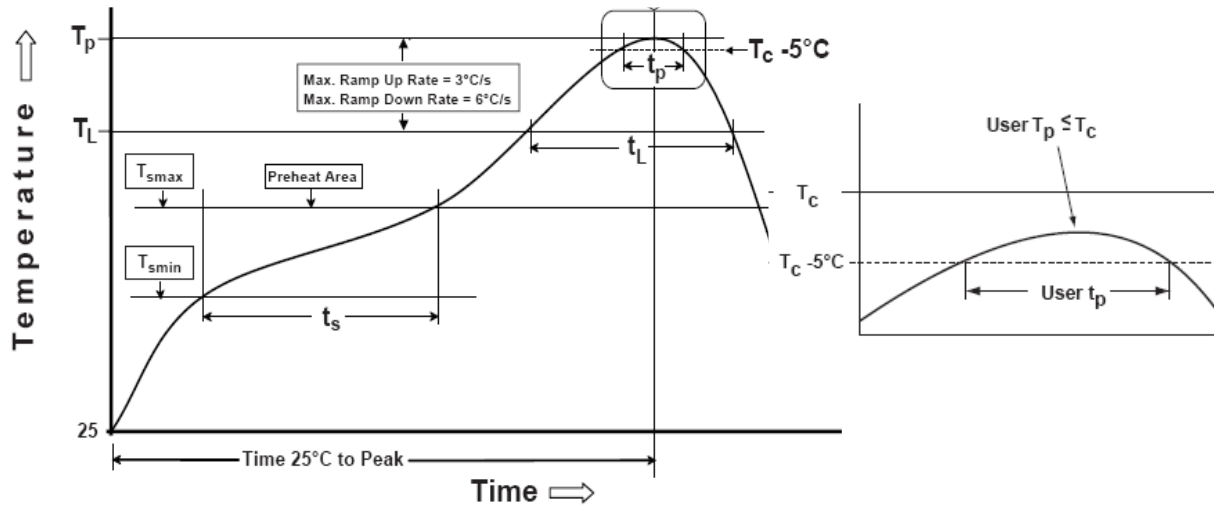
QHM53 Package



Pin Connections:

Pin 1	Power-down when low
Pin 2	Ground
Pin 3	Output
Pin 4	Input Voltage

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



Profile Feature	Sn-Pb Eutectic Assembly	Pb-free Assembly
Preheat/Soak		
- Temperature min. (T _s min.)	100°C	150°C
- Temperature max. (T _s max.)	150°C	200°C
- Time (t _s) (T _s min. to T _s max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (T _L to T _p)	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (T _L)	183°C	217°C
Time (t _L) maintained above T _L	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (T _p)	235°C	260°C
Time (T _p) within 5°C of the classification temperature T _c	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (T _p to T _L)	6°C / second max.	6°C / second max.
Time 25°C to peak temperature	6 minutes max.	8 minutes max.

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