

EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

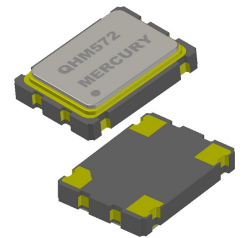
QHM572, QHM53 Series



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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



QHM572

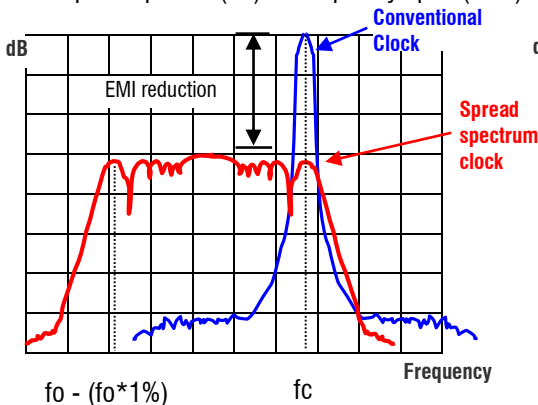
Applications:

- 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

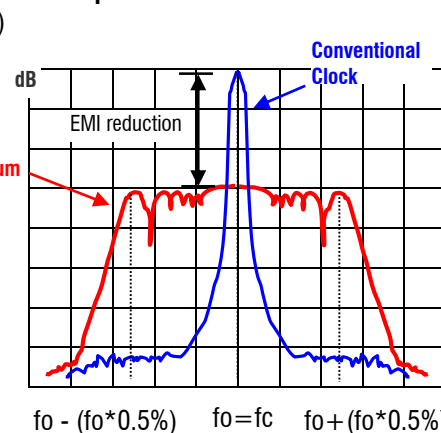
Modulation Types

Down spread:

Output amplitude (dB) vs frequency span (MHz)



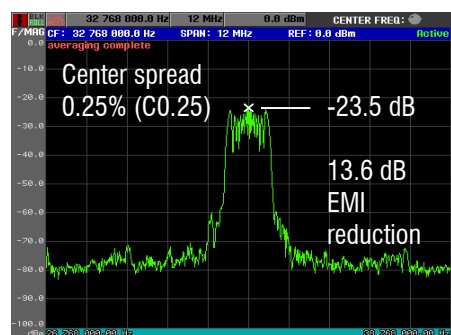
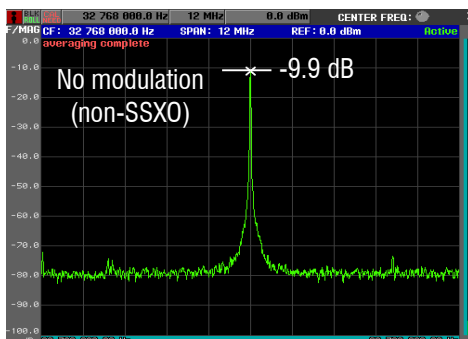
Center spread :



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

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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				

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.

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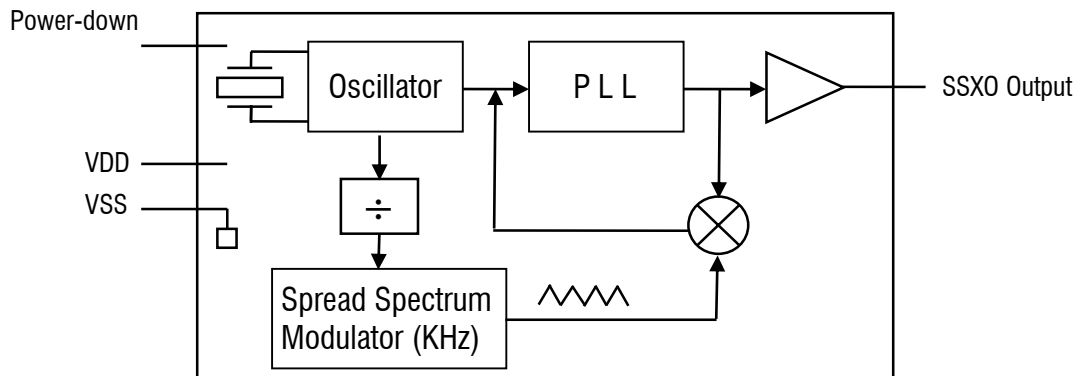


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Environmental Performance Specifications

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, 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 condi. E, 1000GG ½ sine wave
Resistance to Solvent	MIL-STD-202, method 215
Temperature Cycling	MIL-STD-883, method 1010
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}

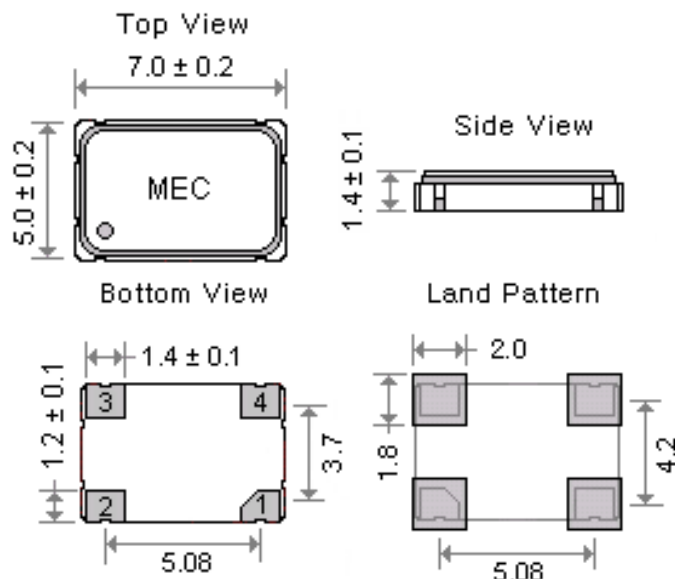
Package Code	
53	3.2x5.0x1.2 mm
572	5.0x7.0x1.4 mm

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

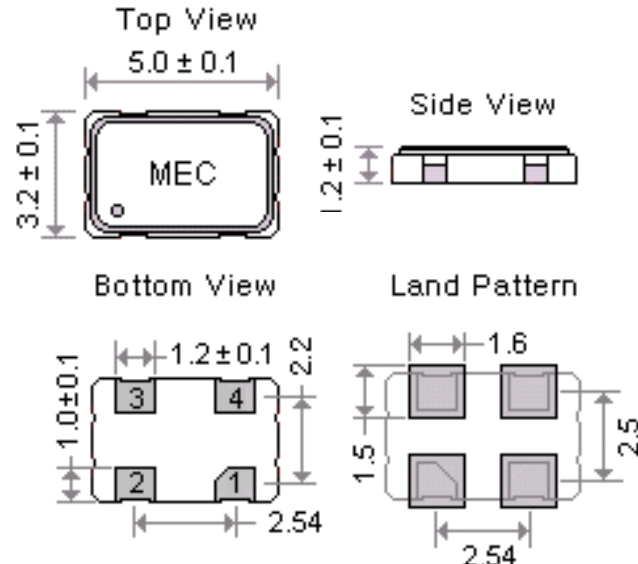
QHM Series Package Dimensions and Recommended Solder Pad Layout

unit: (mm)

QHM572 Package



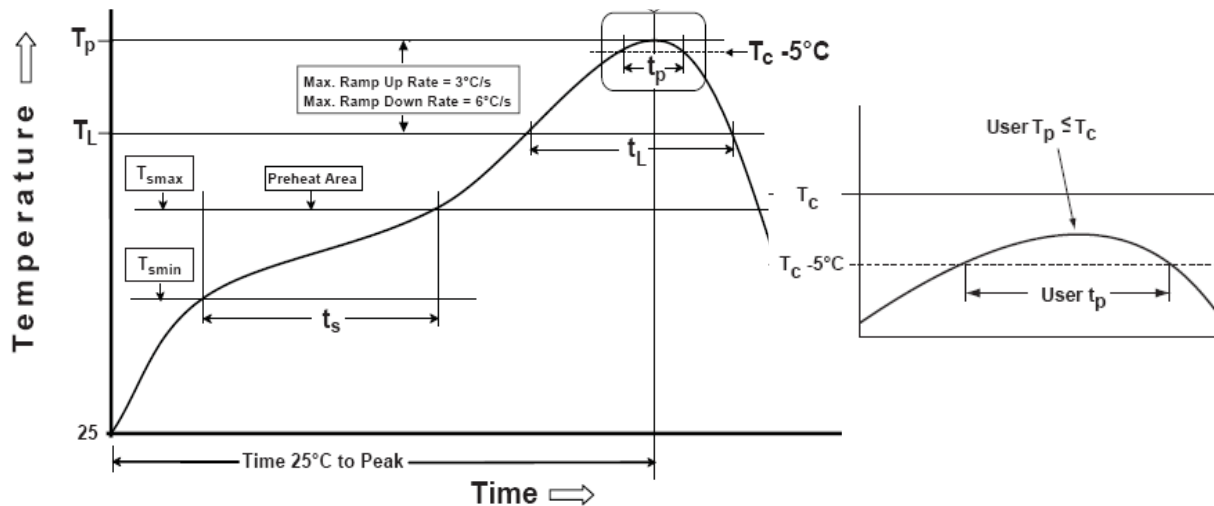
QHM53 Package



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)	$3^\circ\text{C} / \text{sec. max.}$	$3^\circ\text{C} / \text{sec. max.}$
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)	$6^\circ\text{C} / \text{second max.}$	$6^\circ\text{C} / \text{second max.}$
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.