

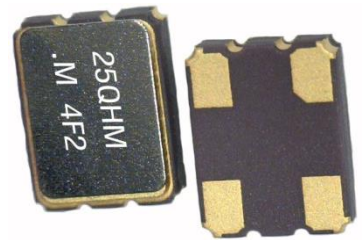
# EMI Reduction Spread Spectrum Clock Oscillators (SSXOs) QuikXO™ Family QHM572, QHM53 and QHM43 Series



**MERCURY**  
Since 1973

## Features:

- Lead time: 3 to 5 days.
- Reduces system level (both fundamental and harmonics) 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
- 7.0x5.0 mm, 5.0x3.2 mm or 11.4 x 9.6 mm package sizes
- Cycle-to-cycle jitter: 100 pS max.
- Compliant to 2011/65 EU RoHS 2 Directive



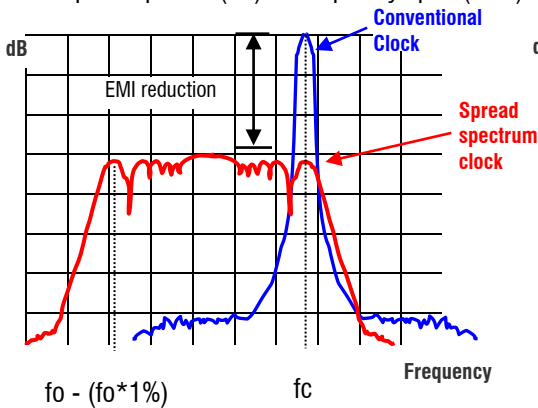
## Applications:

- 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

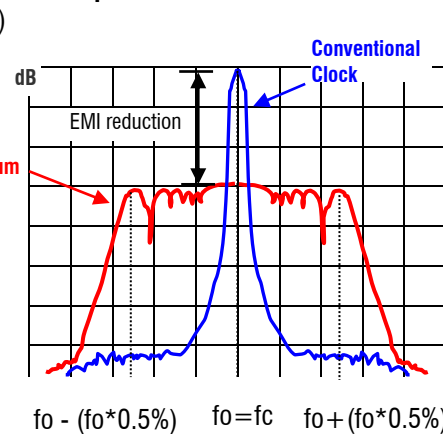
## Modulation Types

### Down spread:

Output amplitude (dB) vs frequency span (MHz)



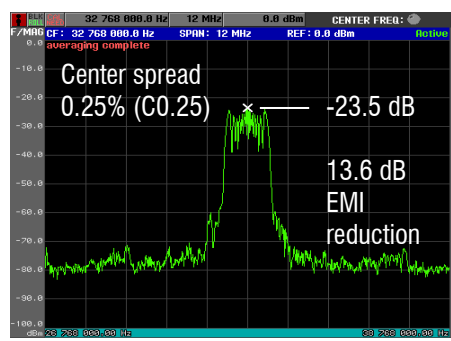
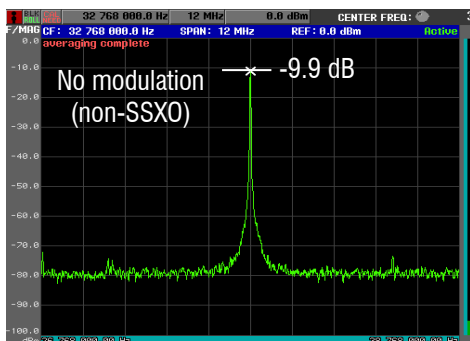
### Center spread :



### 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](http://www.mercury-crystal.com)



Taiwan: TEL (886)-2-2406-2779, FAX (886)-2-2496-0769, e-mail: [sales-tw@mercury-crystal.com](mailto:sales-tw@mercury-crystal.com)  
U.S.A.: TEL (1)-909-466-0427, FAX (1)-909-466-0762, e-mail: [sales-us@mercury-crystal.com](mailto:sales-us@mercury-crystal.com)

# EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

## QuikXO™ Family **QHM572, QHM53 and QHM43 Series**



**MERCURY**  
Since 1973

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

<b>Product Family</b>	QuikXO™				
<b>Product Series</b>	QHM572: Package size 7.0 x 5.0 x 1.4 mm				
	QHM53: Package size 5.0 x 3.2 x 1.2 mm				
	QHM43: Package size 11.4 x 9.6 x 3.0 mm				
<b>Frequency Range</b>	$V_{DD} = 2.5\text{ V}$ : 1.0 ~ 166.0 MHz $V_{DD} = 3.3\text{ V}$ : 1.0 ~ 200.0 MHz				
<b>Available Spread Type and Spread Percentage for ordering</b>	<b>Down Spread</b>		<b>Center Spread</b>		<b>Total Spread %</b>
	<b>Spread %</b>	<b>Ordering code</b>	<b>Spread %</b>	<b>Ordering code</b>	
	-0.25%	<b>D0.25</b>	±0.125	<b>C0.125</b>	0.25%
	-0.5%	<b>D0.5</b>	±0.25	<b>C0.25</b>	0.5%
	-1%	<b>D1</b>	±0.5	<b>C0.5</b>	1%
	-2%	<b>D2</b>	±1.0	<b>C1</b>	2%
	-3%	<b>D3</b>	±1.5	<b>C1.5</b>	3%
-4%	<b>D4</b>	±2.0	<b>C2</b>	4%	
<b>EMI Reduction, system level</b>	20 dB typical. For fundamental and harmonic frequencies				
<b>Modulation Carrier Frequency (Dither rate)</b>	31 ~ 40 KHz typical. Frequency dependent. Call for details.				
<b>Output Logic</b>	CMOS Square Wave				
<b>Frequency Stability</b>	±50 ppm over -40°C to +85°C; exclude modulation.				
<b>Input Voltage (<math>V_{DD}</math>)</b>	$V_{DD} = +2.5\text{V}$ or $+3.3\text{V}$ D.C.				
<b>Load</b>	15 pF max.				
<b>Supply Current; Loaded</b>	15 mA typical, 3.3V, 15 pF load, 26 MHz				
<b>Output Voltage “High”; “1”</b>	$V_{DD} - 0.4\text{V}$ min. $I_{OH} = -4\text{ mA}$				
<b>Output Voltage “Low”; “0”</b>	0.4 V ma., $I_{OL} = 4\text{ mA}$				
<b>Output Current</b>	8 mA min				
<b>Output Rise Time</b>	2.0 n sec. typical, 10% $V_{DD} \rightarrow 90\% V_{DD}$ , 15 pF load				
<b>Output Fall Time</b>	1.7 n sec. typical, 90% $V_{DD} \rightarrow 10\% V_{DD}$ , 15 pF load				
<b>Start-up Time</b>	2 ms typical; 5 ms max.				
<b>Duty Cycle</b>	50%±5%. ( $C_L = 15\text{ pF}$ ; at 50% $V_{DD}$ )				
<b>Output Impedance</b>	30 $\Omega$ typical.				
<b>Cycle-to-cycle Jitter</b>	100 ps max., 3.3V				
<b>Aging</b>	±3 ppm per year max.; $T_a = +25^\circ\text{C}$				
<b>Pin 1 Function</b>	<b>Tri-State</b> (standard)	When taken LOW	Output is high impedance. output		
		When taken HIGH or float	Output		
	<b>Power Down</b> (optional, contact Mercury)	When taken LOW	All circuitries (PLL, oscillator, counters and all other active) are disabled. High impedance output. Current is 10 $\mu\text{A}$ typical.		
		When taken HIGH or float	Output		

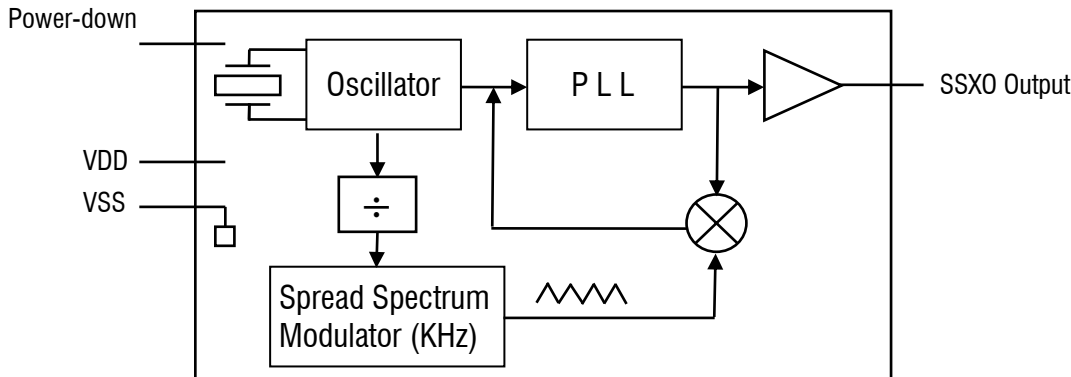
### Absolute Maximum Ratings

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

**Environmental Performance Specifications**

<b>RoHS Status</b>	RoHS compliant, Pb (lead) free in accordance with EU Directive 2002/95/EC 6/6 (2002/95/EC) and WEEE (2002/96/EC)
<b>Moisture Sensitivity Level</b>	Level 1 (infinite) according to IPC/JEDEC J-STD-020D.1
<b>Second Level Interconnect</b>	e4
<b>Storage temp. range</b>	-55°C to +125°C
<b>Humidity</b>	85% RH, 85°C, 48 hours
<b>Fine Leak / Gross Leak</b>	MIL-Std-883, method 1014, condition A / MIL-Std-883, method 1014, condition C
<b>Solderability</b>	MIL-STD-202F method 208E
<b>Reflow</b>	260°C for 10 sec. 2X.
<b>Vibration</b>	MIL-STD-202F method 204, 35G, 50 to 2000 Hz
<b>Shock</b>	MIL-STD-202F method 213B, test condi. E, 1000GG ½ sine wave
<b>Resistance to Solvent</b>	MIL-STD-202, method 215
<b>Temperature Cycling</b>	MIL-STD-883, method 1010
<b>ESD Rating</b>	>2000 V (per MIL-STD-883, method 3015)
<b>Pad Surface Finish</b>	Gold (0.3~1.0 μm) over nickel (1.27 ~ 8.89 μm)

**Block Diagram**



**Part Number Format and Example:**

**Example: 25QHM572D2-66.000**

25	QHM	572	D2	—	66.000
Input Voltage		Package Code	Spread Type and Spread %		Frequency in MHz

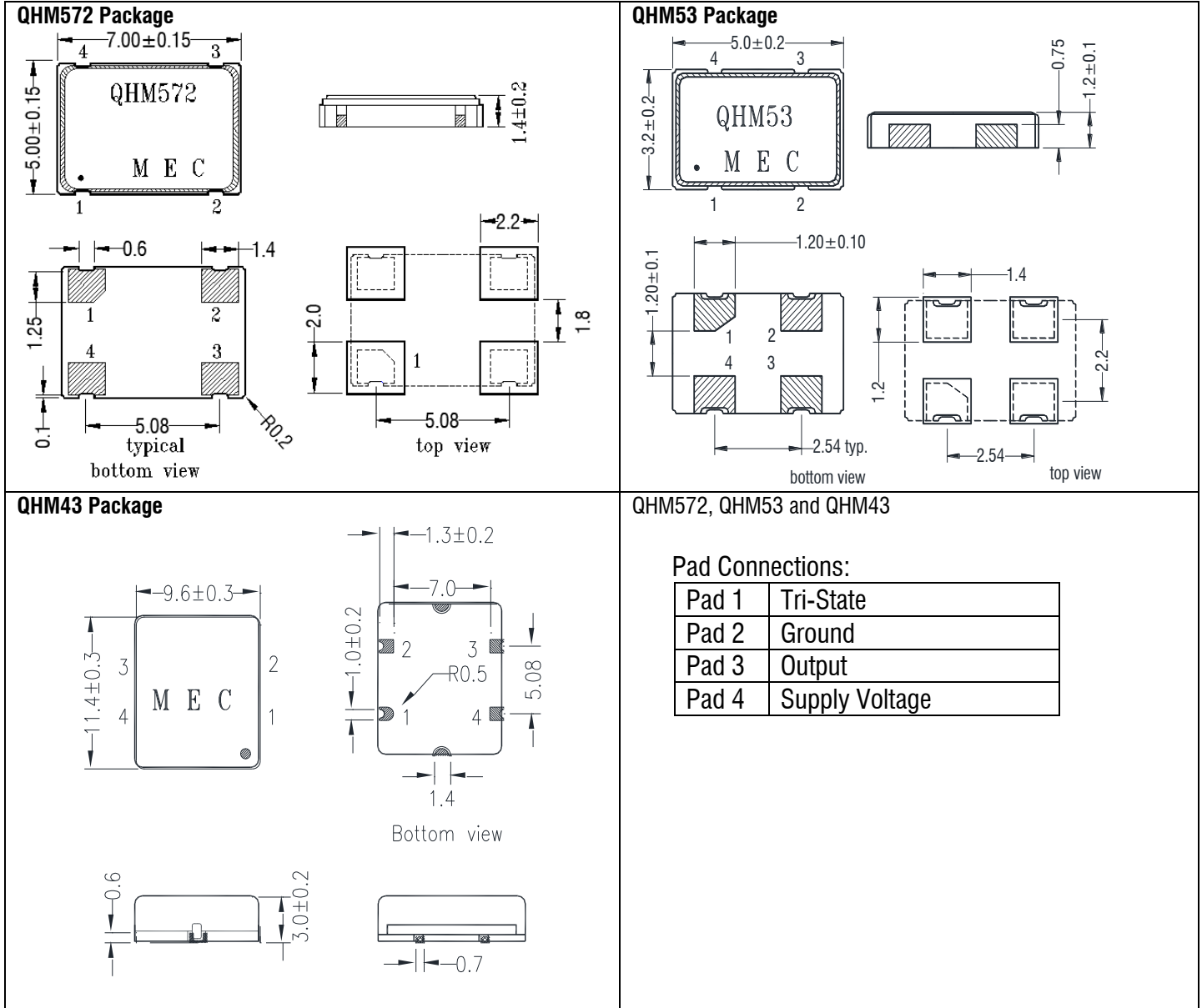
Input Voltage	
<b>25</b>	2.5 V V <sub>DD</sub>
<b>3</b>	3.3 V V <sub>DD</sub>

Package Code	
572	7.0x5.0x1.4 mm
53	5.0x3.2x1.2 mm
43	11.4x9.6x3.0 mm

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

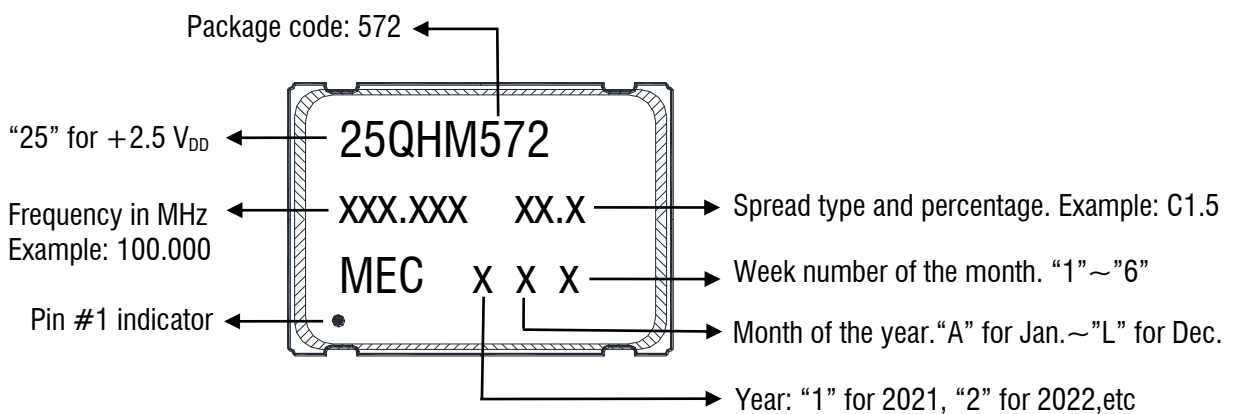
**QHM Series Package Dimensions and Recommended Solder Pad Layout**

unit: (mm)

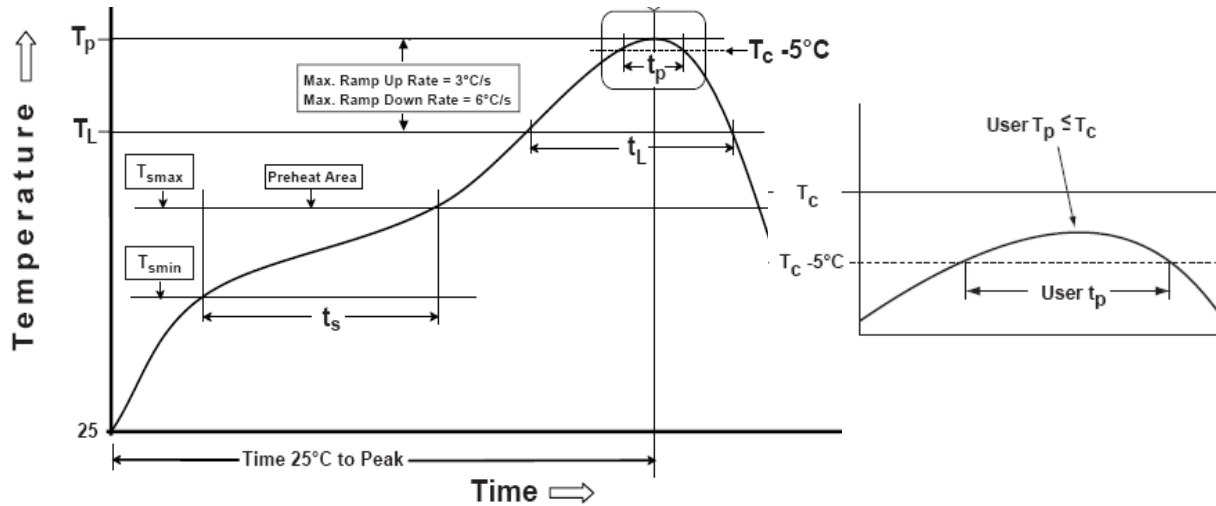


**Product Marking**

Example of QHM572 package



**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 <sub>s</sub> min.)	100°C	150°C
- Temperature max. (T <sub>s</sub> max.)	150°C	200°C
- Time (t <sub>s</sub> ) (T <sub>s</sub> min. to T <sub>s</sub> max.)	60 to 120 seconds	60 to 180 seconds
Ramp-up rate (T <sub>L</sub> to T <sub>p</sub> )	3°C / sec. max.	3°C / sec. max.
Liquidous temperature (T <sub>L</sub> )	183°C	217°C
Time (t <sub>L</sub> ) maintained above T <sub>L</sub>	60 to 150 seconds	60 to 150 seconds
Peak package body temperature (T <sub>p</sub> )	235°C	260°C
Time (T <sub>p</sub> ) within 5°C of the classification temperature T <sub>c</sub>	10 to 30 seconds	20 to 40 seconds
Ramp-down rate (T <sub>p</sub> to T <sub>L</sub> )	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.