

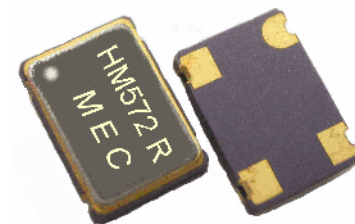
EMI Reduction Spread Spectrum Clock Oscillators

3HM572 Series Group "R"



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The most efficient way to reduce EMI (Electromagnetic Interference) is to reduce it from its principle source – the clock oscillator. Mercury 3HM572, an integrated clock module composed of a spread spectrum clock and a quartz crystal, reduces EMI by 9 dB or more while providing the clock speed needed for the system. It is a drop-in replacement for standard 5x7 mm non-SSC clocks, no need to change the board or the solder pad layout.



The 3HM572 series (1.4 mm height) replaces the 3HM57 series (1.8 mm height). They are identical products, with the only difference being the package heights. The 3HM57 is obsolete. Please refer to Mercury [PCN-111004 "Change HM57 to HM572"](#).

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; Electrical Musical Instrument
- Automotive; GPS Car Navigation Systems
- LCD PC Monitors / LCD TVs
- ADSL; PCMCIA
- Still Digital Cameras (SDCs)
- Medical Devices

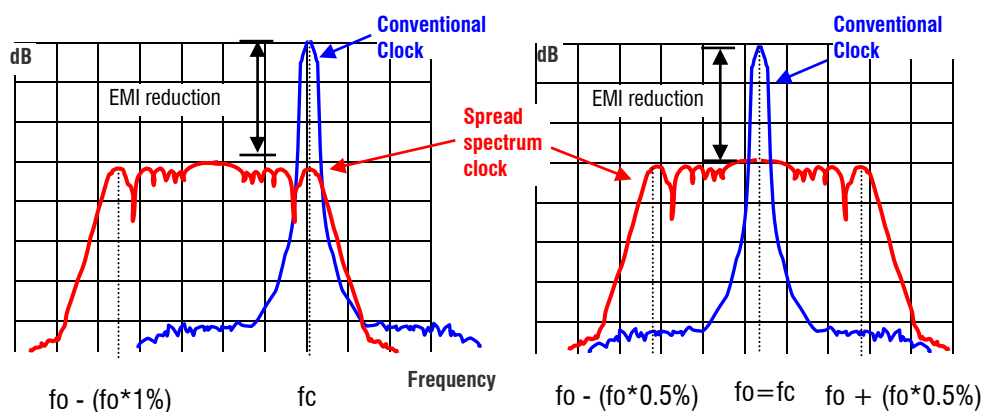
Modulation Types

DOWN or CENTER spread

Down spread "D". "D1" as an example

Center spread "C". "C0.5" as an example

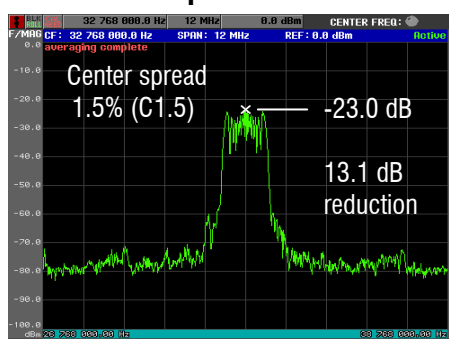
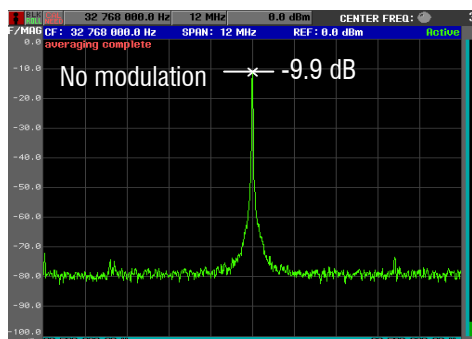
Output amplitude (dB) vs frequency span (MHz)



Spread Spectrum Clock (SSC):

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**).

32.768 MHz non-SSC vs SSC at Center Spread 1.5%:



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Taiwan: TEL (886)-2-2406-2779, FAX (886)-2-2496-0769, e-mail: sales-tw@mercury-crystal.com
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Oct. 18, 2011 Rev. 0

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General Specifications: at Ta= +25°C, CL=15 pF

| | | | |
|---|---|------------------------|--------------------------|
| Mercury Model | 3HM572 Group "R" | | |
| Frequency Range | 5.0 ~ 160.0 MHz | | |
| Spread Type | Total % | Down Spread (D) | Center Spread (C) |
| Spread Percentage (tolerance : ±2% of the total %) | 1% | -1% (D1) | ±0.5 (C0.5) |
| | 3% | -3% (D3) | ±1.5 (C1.5) |
| EMI Reduction (EMI reduction is applied to the entire spectrum) | -9 dB min. 100 MHz at C0.5 -15 dB min. 100 MHz at C1.5 With respect to the dB level when no modulation. | | |
| Modulation Carrier Frequency (Dither rate) | 6.9 KHz min.; 55.5 KHz max.; Frequency dependent. Call for details. | | |
| Output Logic | CMOS Square Wave | | |
| Input Voltage (VDD) | VDD = +3.3 V D.C. ±5% | | |
| Frequency Stability (exclude modulation) | Commercial (-10°C to +70°C): "A": ±25 ppm ; "B": ±50 ppm; "C": ±100 ppm | | |
| | Industrial (-40°C to +85°C): "D": ±25 ppm ; "E": ±50 ppm; "F": ±100 ppm | | |
| Output Voltage "High"; "1" | 2.0 V min.; 3.2 V typical (at 90% VDD) | | |
| Output Voltage "Low"; "0" | 0.8 V max. ; 0.2 V typical (at 10% VDD) | | |
| Rise Time / Fall Time | 4 n sec. max. (10% VDD ↔ 90% VDD) | | |
| Load | 15 pF | | |
| Start-up Time | 2 ms typical; 5 ms max. | | |
| Stabilization Time | 2 ms max. | | |
| Current Consumption | 10.0 MHz: 7 mA; 32.768 MHz: 8 mA 75.0 MHz: 17 mA; 125 MHz: 18 mA | | |
| Duty Cycle | 50%±5%. (CL=15 pF ;at 50% VDD) | | |
| Cycle-to-cycle Jitter | ±250 ps typical; ±300 ps max. | | |
| Output Impedance | 40 ohms typical | | |
| Static Discharge Voltage | >2000 V (per MIL-STD-883, method 3015) | | |
| Aging | ±5 ppm per year max.; Ta= +25°C | | |
| Packaging | 16 mm tape and reel. 1000 pcs per reel | | |
| Pin 1 Function | Output is high impedance when taken low. Output enable /disable time: 100 ns max. | | |

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 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 um min.) over nickel (1.27 um to 8.89 um) |
| Weight of the Device | 155 mg per unit typical |



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Part Number Format and Example:

{__}: User to specify.

Format: 3HM572-{stability code}T-{nominal frequency}R-{spread type}{spread %}

Example: 3HM572-BT-32.768R-C0.5

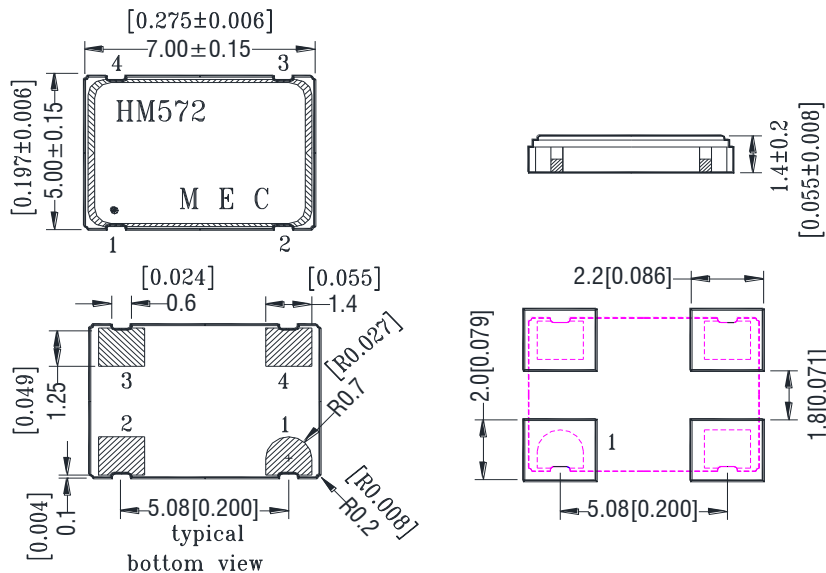
| | |
|-----------------|--------------------|
| Option on pin 1 | |
| "T" | Tri-state. Default |
| " " (blank) | No connection |

| Stability Code | | |
|----------------|-------------------------------|----------|
| "A" | Commercial (-10°C ~ +70°C) | ±25 ppm |
| "B" | | ±50 ppm |
| "C" | | ±100 ppm |
| "D" | Industrial (-40°C ~ +85°C) | ±25 ppm |
| "E" | | ±50 ppm |
| "F" | | ±100 ppm |

| Spread Type and Percentage | | |
|----------------------------|---------------|-------------|
| "D1" | Down Spread | -1% |
| "D3" | | -3% |
| "C0.5" | Center Spread | $\pm 0.5\%$ |
| "C1.5" | | $\pm 1.5\%$ |

Description of the example: +3.3V HM572 series 5x7 mm spread spectrum clock, frequency stability is ± 50 ppm over -10°C to $+70^{\circ}\text{C}$, Tri-state on pin 1, 32.768 MHz, center spread $\pm 0.5\%$

HM572 Package Dimensions and Recommended Solder Pad Layout



| | |
|--------------------|----------------|
| Pin 1 (Rounded) | Tri-state |
| Pin 2 | Ground |
| Pin 3 | Output |
| Pin 4: | Supply Voltage |

Group R is also available in these packages:

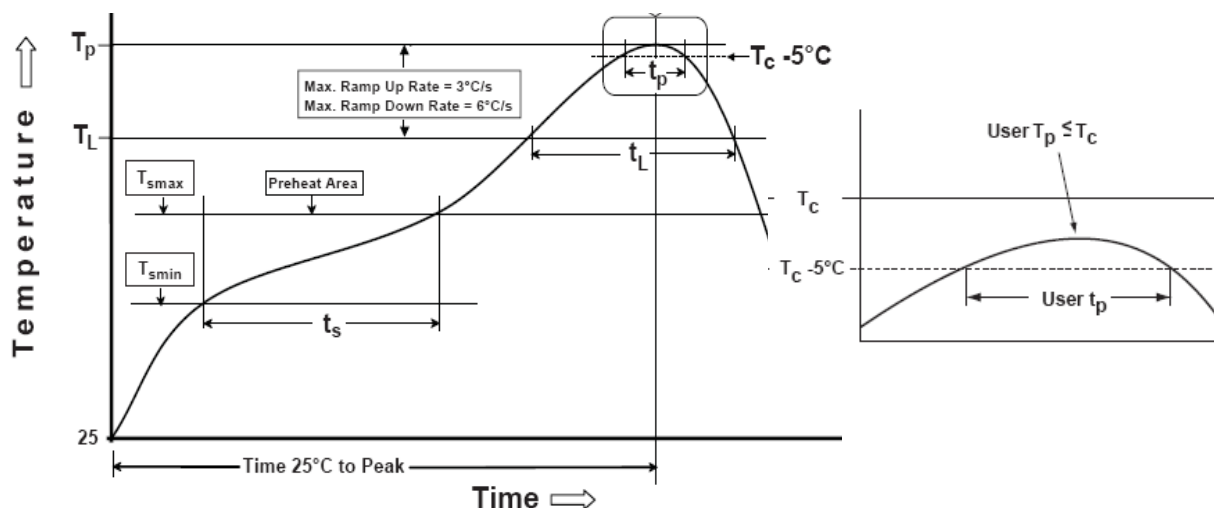
HM53:

5x3.2x1.2 mm 4 pad ceramic SMDs

HM43:

9.6x11.4x3.0 mm FR4 base leadless SMDs

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



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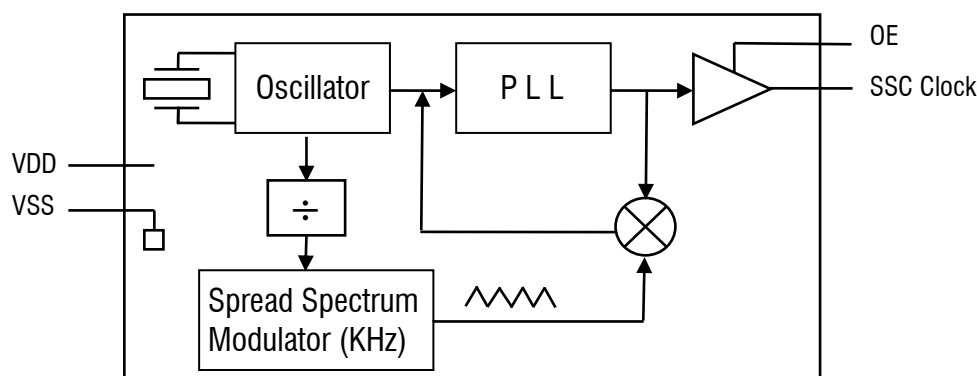


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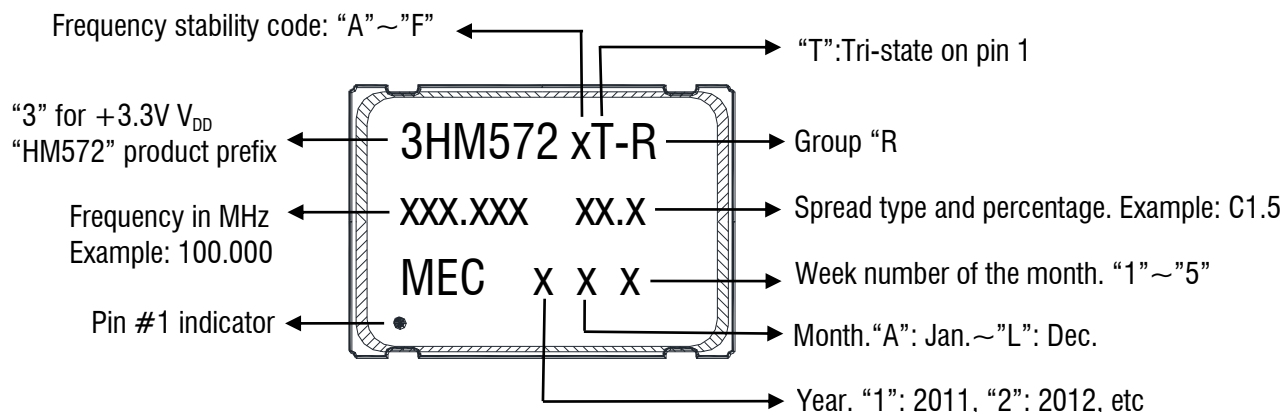
| Profile Feature | Sn-Pb Eutectic Assembly | Pb-free Assembly |
|--|-------------------------|-------------------|
| Preheat/Soak | | |
| - Temperature min. (Ts min.) | 100°C | 150°C |
| - Temperature max. (Ts max.) | 150°C | 200°C |
| - Time (ts) (Ts min. to Ts max.) | 60 to 120 seconds | 60 to 180 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.

Block Diagram



Product Marking



Product Support and Related Document

Technical note: [TN-020 "Low EMI Spread Spectrum Clock Oscillators"](#)

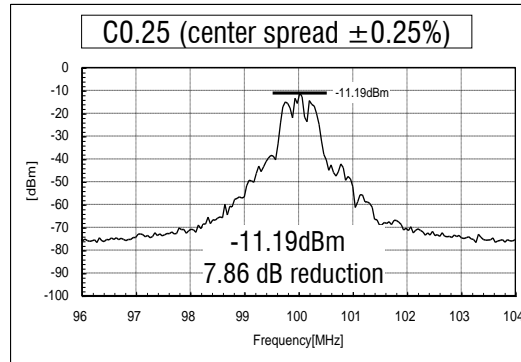
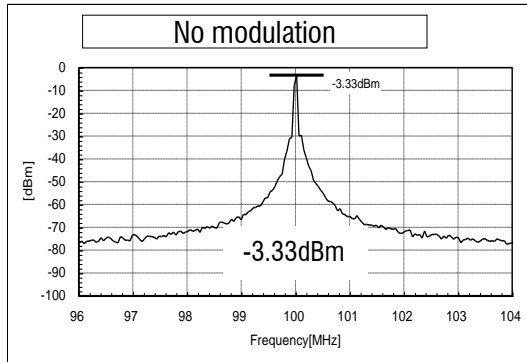
Product Change Notice: [PCN-111004 "Change HM57 to HM572"](#)

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EMI Reduction of 3HM572 100 MHz at C0.25, C0.5 and C1.5. The Main Mode and the Modulated Spectra.



Modulation carrier
frequency is 34.87 KHz

C0.25 is for information only.
Not an orderable option.

