

EMI Reducing Spread Spectrum Clock Oscillators (SSXOs) 18HM Series (+1.8 V Supply Voltage) Group "F"



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Since 1973

Features:

- Reduces Electromagnetic Interference by approx. -12dB
- Drop-In Replacement for Conventional Oscillators
- No Need to Re-Spin the Board or Solder Pad Layout
- Operates with a +1.8V Supply Voltage
- RoHS Compliant & Lead - Free
- 3.2 x 2.5, 5.0 x 3.2 or 5.0 x 7.0mm Package Sizes
- Save Money & Time to Market



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
- Still Digital Cameras (SDCs)
- Medical Devices

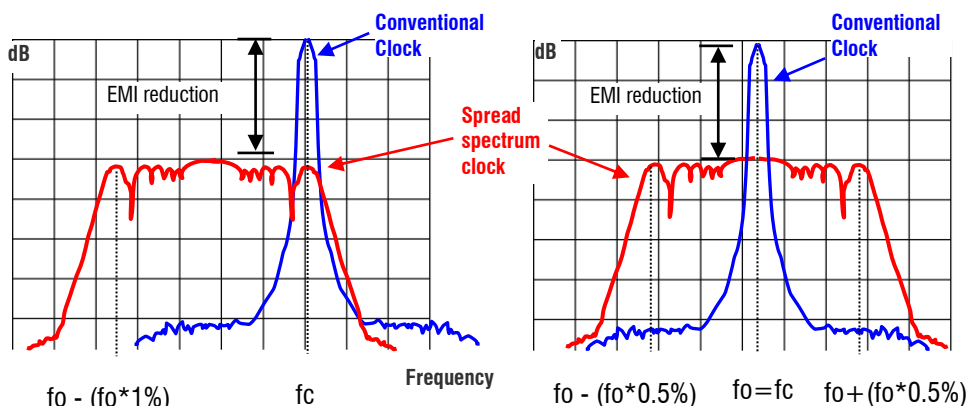
Modulation Types

DOWN SPREAD or CENTER SPREAD

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

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

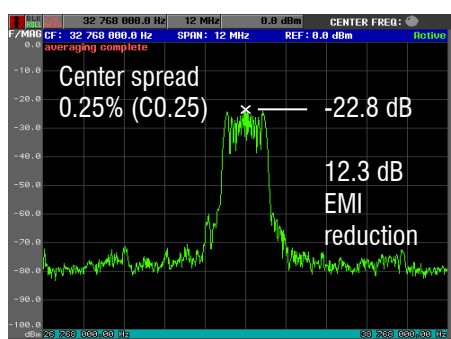
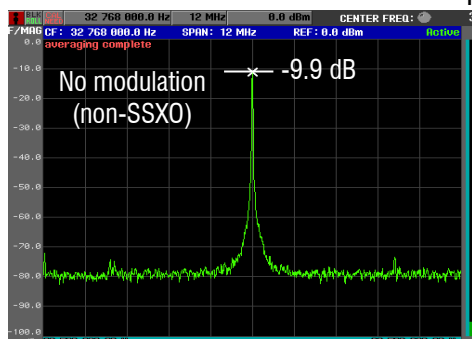
Output amplitude (dB) vs frequency span (MHz)



Spread Spectrum 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-SSC vs SSC at Center Spread 0.25%:



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

Product Models / Package Sizes	18HM572: 5 x 7 x 1.4 mm			
	18HM53: 3.2 x 5 x 1.2 mm			
	18HM32: 2.5 x 3.2 x 1.0 mm			
Performance Characteristics	Group “F”			
Frequency Range	12.5 ~ 42.0 MHz			
Spread Type / Spread Percentage / EMI Reduction Rate	Total %	Down Spread (D)	Center Spread (C)	EMI Reduction Rate (EMI reduction is applied to the entire spectrum)
	0.5%	-0.5% (D0.5)	±0.25 (C0.25)	-12 dB typical
	1%	-1% (D1)	±0.5 (C0.5)	-16 dB typical
	2%	-2% (D2)	±1.0 (C1.0)	-18 dB typical
Modulation Carrier Frequency (Dither rate, number of clocks per one modulation)	For 12.5 MHz: 10.1 KHz min.; 11.7 KHz typical; 13.9 KHz max. For 26 MHz: 21.1 KHz min.; 24.4 KHz typical; 29 KHz max. For 42 MHz: 34.0 KHz min.; 39.4 KHz typical; 46.8 KHz max. Frequency dependent. Call for details.			
Output Logic	CMOS Square Wave			
Input Voltage (V _{DD})	V _{DD} = +1.8 ±0.15 V D.C.			
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”	1.6 V min.; 1.85 V max. I _{OH} = -2 mA			
Output Voltage “Low”; “0”	0.0 V min.; 0.2 V max. I _{OL} = 2 mA			
Rise Time / Fall Time	2.5 n sec. max. (10% V _{DD} ↔ 90% V _{DD})			
Load	15 pF max.			
Output Impedance	30 Ω typical.			
Output Slew Rate	0.4 V/ns min.; 3.0 V/ns max. V _{OL} -V _{OH} , 15 pf Load			
Start-up Time	2 ms typical; 5 ms max.			
Stabilization Time	40 ms max.			
Current Consumption	13 MHz: 2.0 mA typical 16 MHz: 2.8 mA typical 25 MHz: 3.5 mA typical 42 MHz: 5.0 mA typical			
Duty Cycle	50%±10%. (C _L =15 pF ;at 50% V _{DD})			
Cycle-to-cycle Jitter	100 ps rms max.			
Aging	±5 ppm per year max.; Ta= +25°C			
Pin 1 Function	When taken LOW	Output is high impedance when taken low. Internal circuit is still operating.		
	When taken HIGH or float	Output		
	Output enable /disable time: 100 ns max.			

Absolute Maximum Ratings

Power Supply Voltage V_{DD}	-0.5 V min.; +2.5V max.
Input Voltage	$V_{SS}-0.5\text{V}$ min.; $V_{DD}+0.5\text{V}$ max.
Output Voltage	$V_{SS}-0.5\text{V}$ min.; $V_{DD}+0.5\text{V}$ max.
Operation Junction Temperature	-40°C min.; $+125^{\circ}\text{C}$ max.
Output Current	-13 mA min.; +13 mA max.

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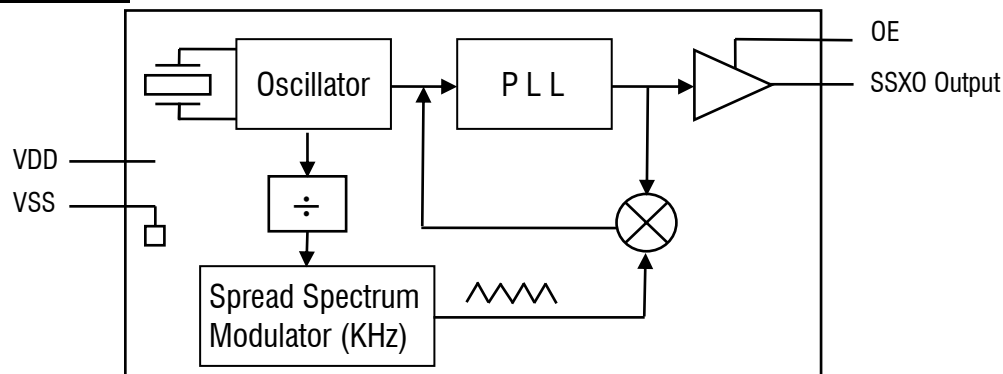


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Environmental Performance Specifications

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 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	18HM572: 0.17 grams 18HM53: 0.09 grams 18HM32: 0.04 grams

Block Diagram



Part Number Format and Example:

Format:

18HM	Package Code	-	Frequency Stability Code	T	-	Frequency in MHz	F	-	Spread Type	Spread %
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572	5x7x1.4 mm
53	3.2x5x1.0 mm
32	2.5x3.2x1.0 mm

Frequency 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		
"D0.5"	Down Spread	-0.5%
"D1"		-1%
"D2"		-2%
"C0.25"	Center Spread	±0.25%
"C0.5"		±0.5%
"C1.0"		±1%

Example: 18HM**572**-**BT**-32.768**F**-**C0.5**

Description of the example: +18V HM572 series 5x7 mm spread spectrum clock, frequency stability is ±50 ppm over -10°C to +70°C, Tri-state on pin 1, 32.768 MHz, group "F", center spread ±0.5

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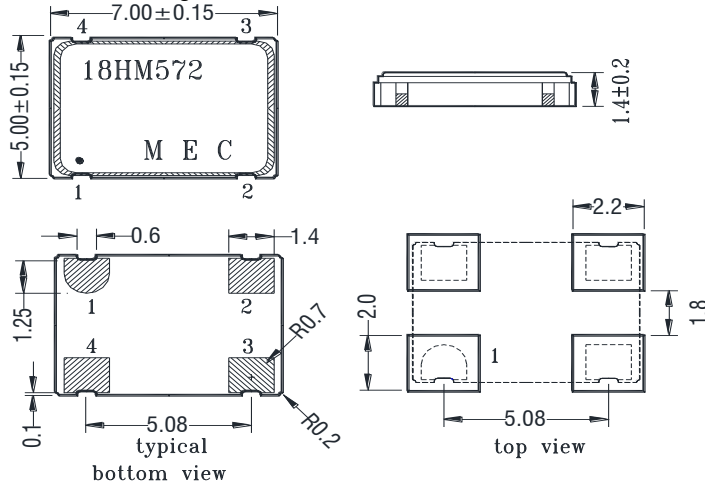


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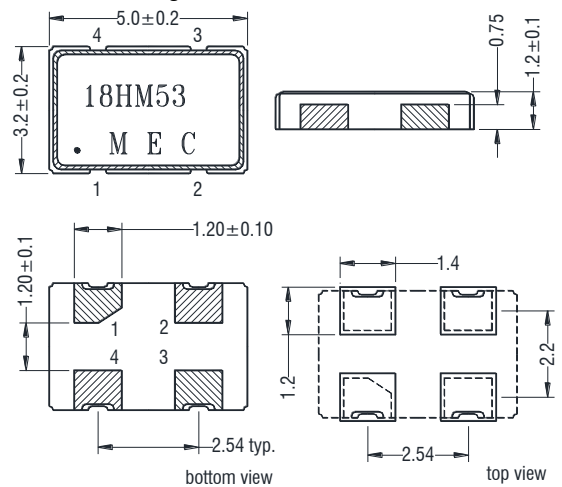
HM572 Package Dimensions and Recommended Solder Pad Layout

unit: (mm)

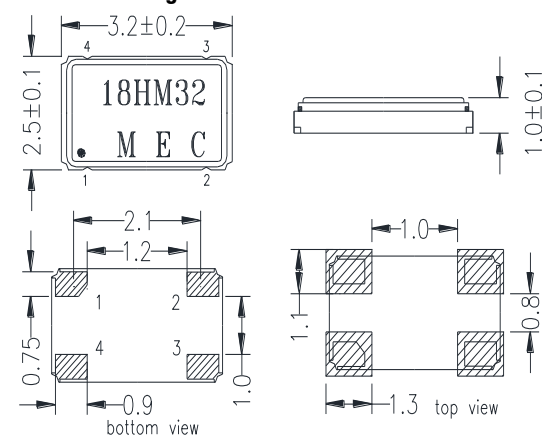
18HM572 Package



18HM53 Package



18HM32 Package



Pin Connections:

Pin 1	OE
Pin 2	Ground
Pin 3	SSXO Output
Pin 4	+1.8V D.C.

Product Marking

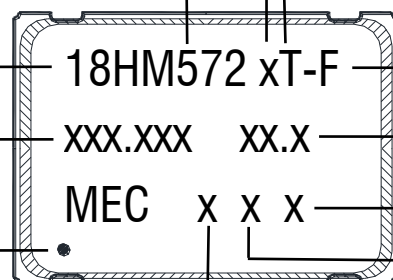
Example of HM572 package

Package code: 572

"18" for +1.8 V_{DD}
"HM572" product prefix

Frequency in MHz
Example: 100.000

Pin #1 indicator



Stability code (A ~ F)

"T": Tri-state on pin 1

Group "F"

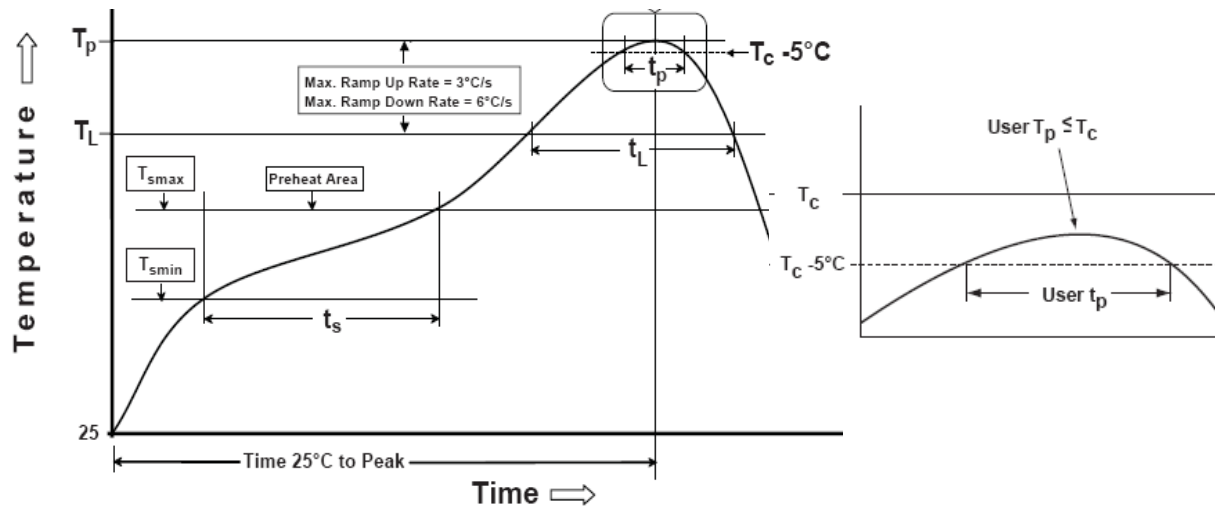
Spread type and percentage. Example: C1.5

Week number of the month. "1" ~ "5"

Month of the year. "A" for Jan. ~ "L" for Dec.

Year: "2" for 2012, "3" for 2013, etc

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.

Product Support

- ◆ Evaluation Board: Part number “**EVB-18HM-F**”. By toggling “HIGH” and “LOW” on two of the pins on this EVB, user can quickly determine the proper spread percentage (proper EMI reduction rate) for his/her specific applications. Please contact Mercury sales team.
- ◆ Technical note: [TN-030 “How to use Mercury 1.8V EMI Reducing Spread Spectrum Clock Oscillators?”](#)
- ◆ Technical note: [TN-020 “Low EMI Spread Spectrum Clock Oscillators”](#)
- ◆ Product status: Active. Product availability: Now. Lead time: 5 to 6 weeks.