

EMI Reduction Spread Spectrum Clock Oscillators (SSXOs)

Supply Voltage: **+5.0V**; 5HM43 Series Group "J"



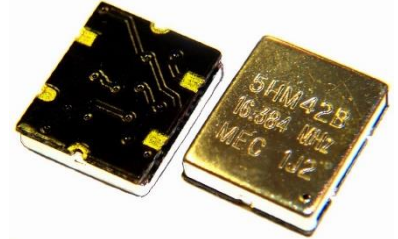
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Features:

- Supply voltage +5.0 V for legacy circuit designs
- Reduces system level (both fundamental and harmonic signals; clock and all signals synchronized to this clock) electromagnetic interference (EMI) by approx. 8 dB
- Center or down spread.
- Compliant to 2011/65 EU RoHS 2 Directive

Applications:

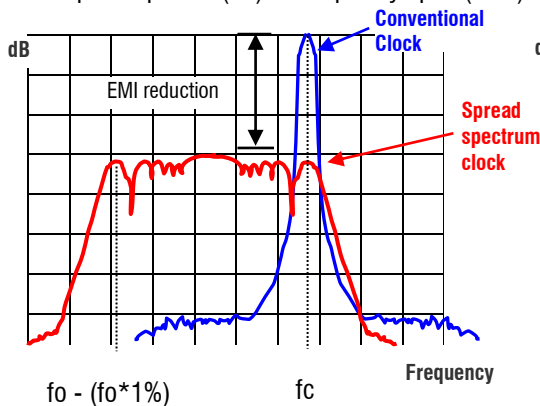
- Printers; Multiple function printers (MPCs)
- Digital copiers; PDAs
- Networking; LAN / WAN; routers
- Storage systems (CD-ROM, VCD, DVD & HDD)
- Scanner; modems; projectors
- Hand-held ID readers
- Embedded systems
- Automotive; GPS navigation systems
- LCD PC Monitors / LCD TVs
- ADSL; PCMCIA
- Digital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



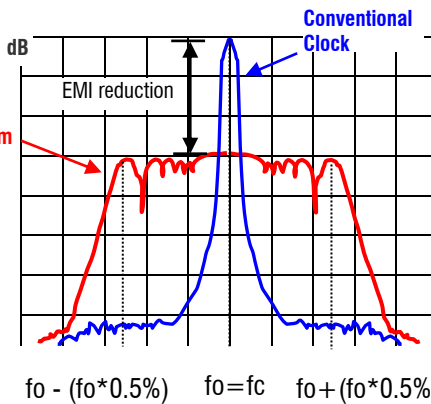
Modulation Types

Down spread:

Output amplitude (dB) vs frequency span (MHz)

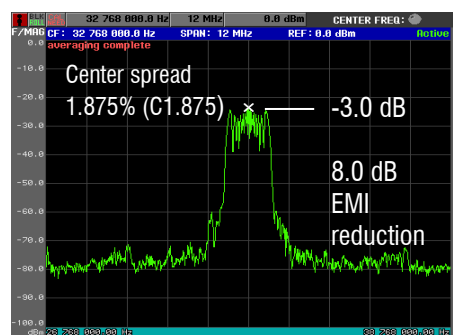
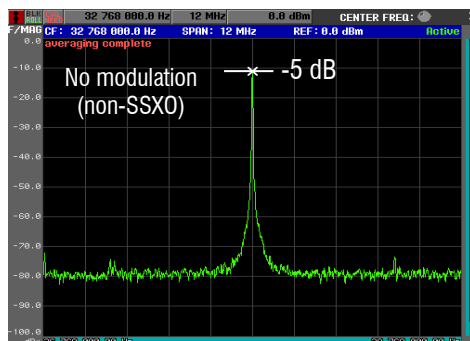


Center spread:



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**).



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

Product Series	5HM43 : Package size 9.6x11.4x3.0 mm			
Product Group	Group "J"			
Package Structure	FR-4 substrate; Grounded metal cover			
Supply Voltage	$+5.0\text{ V} \pm 10\%$			
Frequency Range	10.0 MHz to 33.0 MHz			
Frequency Stability Codes (exclude modulation)	Commercial (Operating Temperature Range: -10°C to $+70^{\circ}\text{C}$): "A": $\pm 25\text{ ppm}$; "B": $\pm 50\text{ ppm}$; "C": $\pm 100\text{ ppm}$			
	Industrial (Operating Temperature Range: -40°C to $+85^{\circ}\text{C}$): "D": $\pm 25\text{ ppm}$; "E": $\pm 50\text{ ppm}$; "F": $\pm 100\text{ ppm}$			
Available Spread Type and Spread Percentage for ordering	Down Spread		Center Spread	
	Spread %	Ordering code	Spread %	Ordering code
	20.0 MHz ~ 33.0 MHz		10.0 MHz ~ 20.0 MHz	
	-2.0%	D2.0	$\pm 1.0\%$	C1.0
			10.0 MHz ~ 33.0 MHz	
			± 1.875	C1.875
EMI Reduction, system level	8 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			
Load	15 pF max.			
Supply Current; Loaded	32 mA typical, 40 mA max.			
Output Voltage "High"; "1"	2.5 V min.			
Output Voltage "Low"; "0"	0.4 V max.			
Output Rise Time	2.0 n sec. typical, 5.0 n sec. max. $0.8\text{ V} \rightarrow 2.4\text{ V}$, 15 pF load			
Output Fall Time	2.0 n sec. typical, 5.0 n sec. max. $2.4\text{ V} \rightarrow 0.8\text{ V}$, 15 pF load			
Start-up Time	5 m sec. max.			
Duty Cycle	$50\% \pm 5\%$. ($C_L = 15\text{ pF}$; at $50\% V_{DD}$)			
Output Impedance	20 Ω typical.			
Cycle-to-cycle Jitter	300 p sec. max.			
Aging	$\pm 3\text{ ppm}$ per year max.; $T_a = +25^{\circ}\text{C}$			
Pin 1 Function	When taken LOW		High impedance	
	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.

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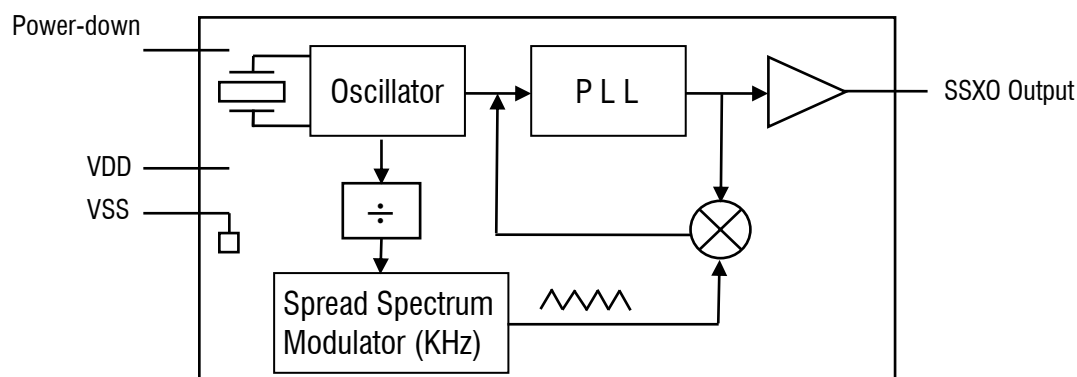


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Environmental Performance Specifications

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 2 according to IPC/JEDEC J-STD-020D.1; Crystal is level 1 (infinite)
Storage temp. range	-40°C to +105°C
Humidity	85% RH, 85°C, 48 hours
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	ENIG (Electrodeless Nickel Immersion Gold)

Block Diagram



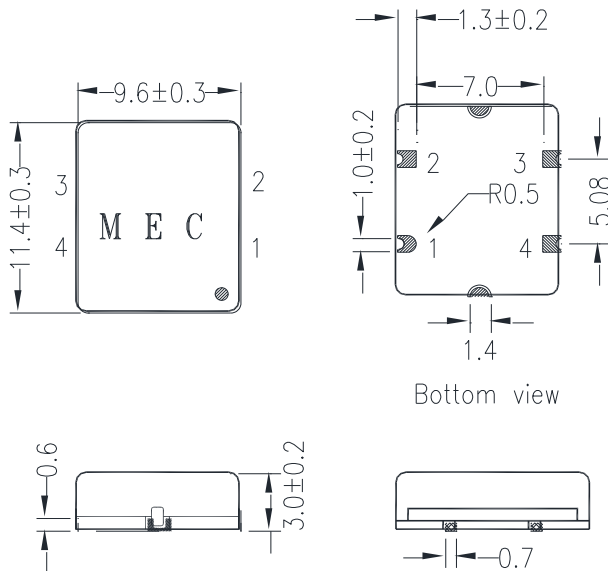
Part Number Format and Example:

Example: 5HM43-BT-12.000J-C1.875

5HM43	-	B	T	-	12.000	J	-	C1.875
Product series	dash	"A" ~ "F" Frequency Stability Code. See table on page 1.	Tri-state on pad 1	dash	Frequency in MHz	Group ID	dash	Spread type and percentage code. See table on page 1.

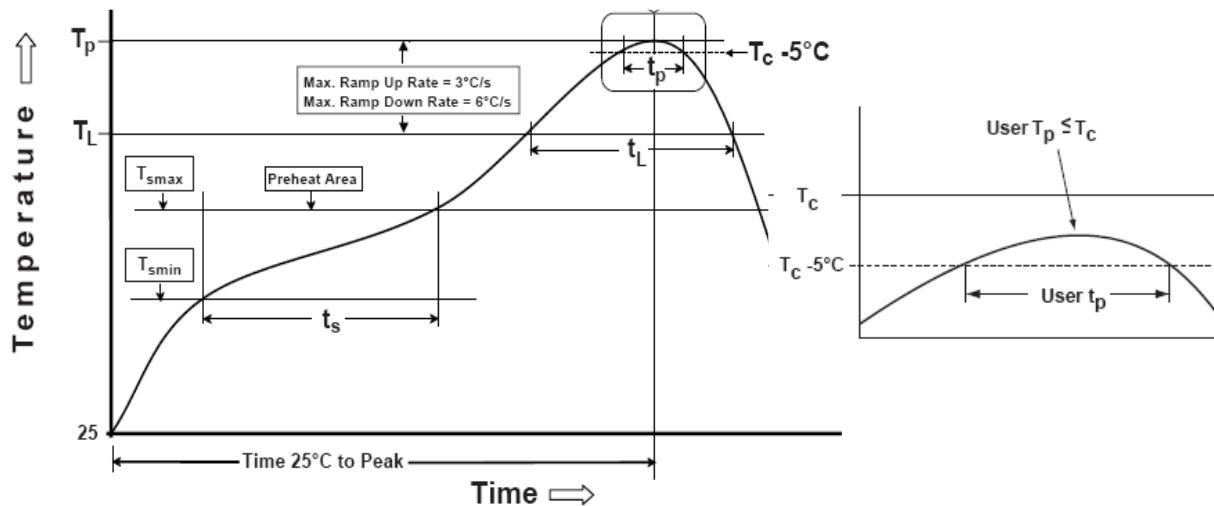
5HM43 Series Package Dimensions and Recommended Solder Pad Layout

unit: (mm)



Pad Number	Connection
1	Tri-state
2	Ground
3	Output
4	Supply 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.