PRODUCT SPECIFICATION

EMI Reduction - Spread Spectrum Clock Oscillator **AEL HM60-R & HM43-R**

Why Spread Spectrum

The clock oscillator is often the most significant source of Electro-Magnetic Interference (EMI), and as a consequence additional expense may well be incurred in reducing this to an acceptable level by means of EMI filters and metal shielding.

However, the simple substitution of a standard 7x5mm or 5x3mm clock oscillator with a drop-in replacement **AEL HMxxxR Spread-Spectrum Oscillator** offers a significant reduction in EMI of at least **9dB.** There is no nead to change any other components, or any of the PCB layout.

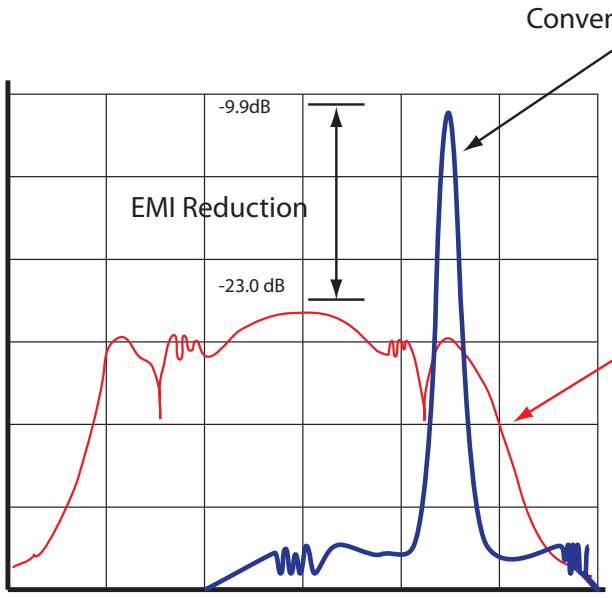
Principle Behind Spread Spectrum

Unlike a conventional clock, the energy of a spread spectrum clock is distributed over a wider bandwidth between two predefined 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 output frequency. The controlled modulation process can be all on one side of the nominal frequency (down spread), which is preferred if over-clocking is impractical, or 50% up and 50% down, (centre spread)

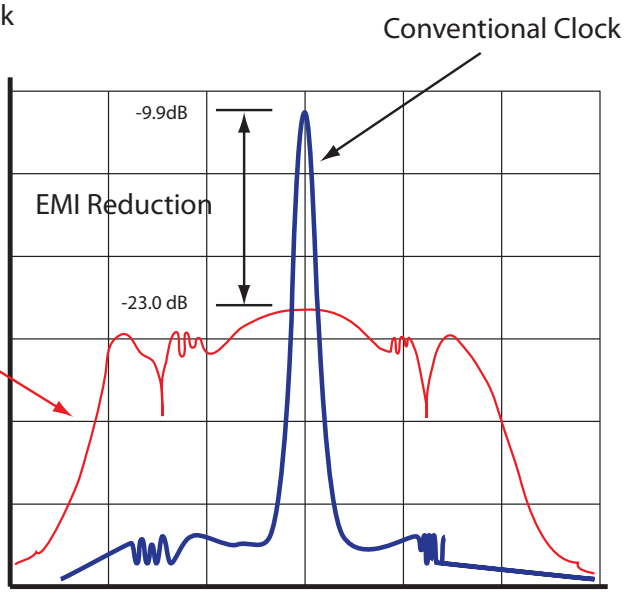
Application Examples

- Printers
- Digital Copiers
- Networking (LAN/WAN) Routers
- Storage Systems (CD-ROM, DVD & HDD)
- Automotive Systems
- LCD PC Monitors
- LCD TV
- Digital Cameras
- Medical Devices
- Embedded Systems

Modulation Types



Example of Down Spread Clock



Example of Centre Spread Clock

Spread Spectrum Clock

PRODUCT SPECIFICATION

EMI Reduction - Spread Spectrum Clock Oscillator **AEL HM60-R & HM43-R**

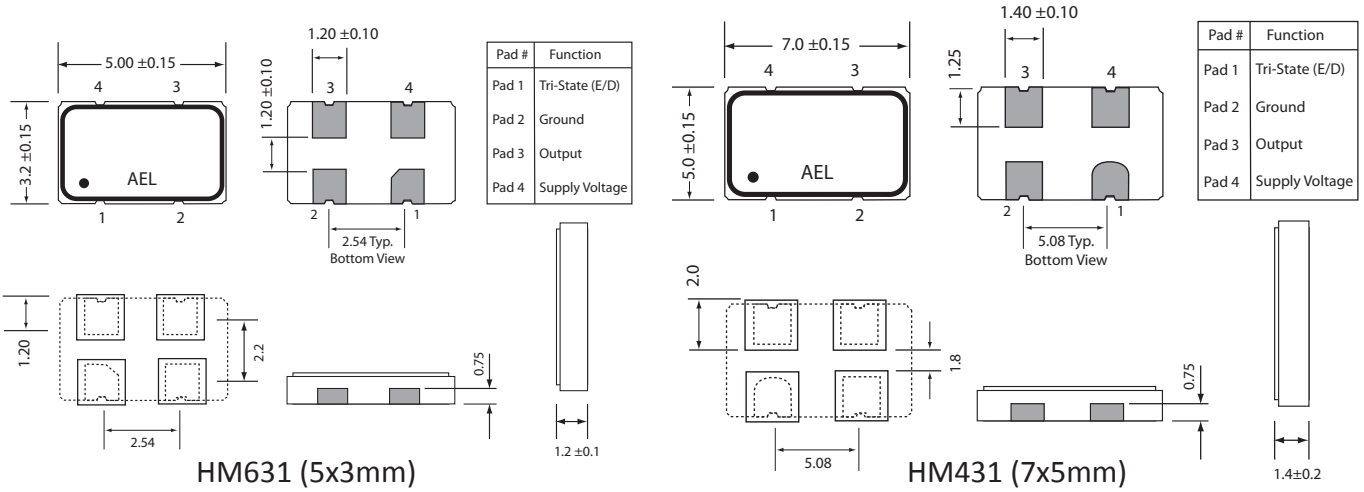
Specifications

Parameter	Value		
Frequency Range	5.00 MHz to 160.00 MHz		
Spread Type	Total %	Down Spread (D)	Centre Spread (C)
Spread Percentage Tolerance ±2% of total %	1%	-1% (D1)	±0.5% (C0.5)
	3%	-3% (D3)	±1.5% (1.5)
EMI Reduction EMI Reduction is applied to the entire spectrum	-9dB min. measured at 100MHz with C0.5		
	-15dB min. measured at 100MHz with C1.5		
	With respect to the dB level with no modulation		
Modulation Carrier Freq. (Dither Rate)	6.9kHz min. to 55.5kHz max.		
	Actual value is frequency dependant		
Output Logic	CMOS Square wave		
Input Voltage (V_{DD})	+3.3V DC ±5%		
Frequency Stability	See ordering code information		
Output Voltage "High"	2.0V min (at 90% V_{DD})		
Output Voltage "Low"	0.8V max. (at 10% V_{DD})		
Rise/Fall Time	4ns max. (10% **V_{DD}** to 90% V_{DD})		
Load	15pF		
Start-Up Time	2 ms typ. 5ms max.		
Stabilization Time	2 ms max.		
Current Consumption	10MHz = 7mA - 32.768MHz = 8mA - 75MHz = 17mA - 125MHz = 18mA		
Duty Cycle	50% ±5% (CL = 15pF at 50% **V_{DD}**)		
Cycle to Cycle Jitter	±250ps typ. - ±300ps max.		
Output Impedance	40 Ohms typ.		
Ageing	±5PPM per year max. at 25^{0}C		
Pin 1 Function	Output is high impedence when taken low		
	Output enable/disable time = 100ns max.		

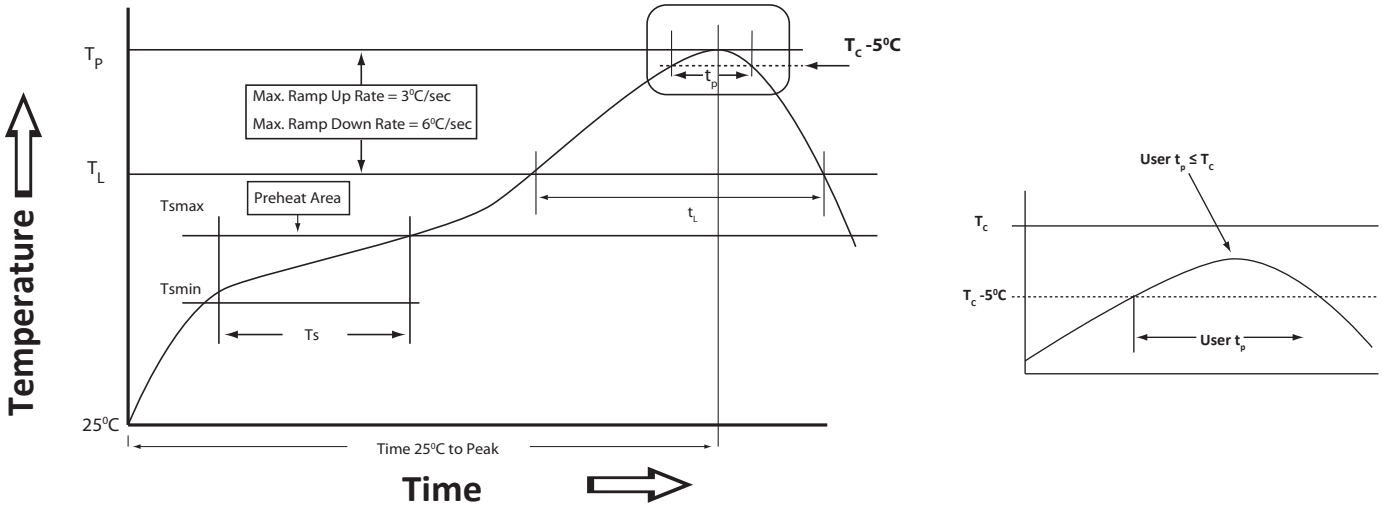
Environmental & Performance Specifications

Environmental	RoHS Compliant & Lead (pB) Free
MSL Level	MSL 1 per IPC/JEDEC-STD-020C
Humidity	85% RH at 85^{0}C 48 Hours (Crystal Only)
Hermeticity	Leak Rate 2x10^{-8} ATM-cm^3/sec max. (Crystal Only)
Solderability	MIL-STD-202F method 208E
Reflow	260^{0}C for 10 sec 2 x
Temperature Cycling	MIL-STD-883 Method 1010
Vibration	MIL-STD-202F method 204 - 35G 50-2000Hz
Shock	MIL-STD-202F method 213B test cond. E 1000GG ½ sinewave
Storage Temp. Range	-55^{0}C to +125^{0}C
ESD Rating	MIL-STD-883 Method 3015 - <2000V
Solvent Resistance	MIL-STD-202 method 215

Package Options & Dimensions



Recommended Solder Reflow Profile

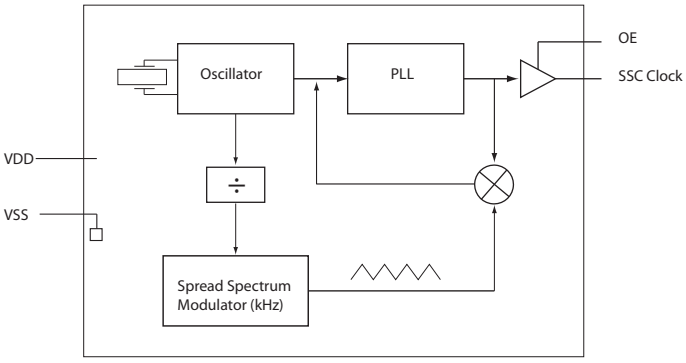


Solder Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Pre-Heat/Soak		
Temperature min. (Ts min.)	100°C	150°C
Temperature max. (Ts max.)	150°C	200°C
Time (ts) (Ts min. to Ts max.)	60 to 120 seconds	60 to 180 seconds
Ramp-Up Rate (T_L to T_P)	3°C/sec. max.	3°C/sec. max.
Liquidious Temperature (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	235°C	260°C
Time (T_P) within 50C of Classification Temp. T_C	10 to 30 seconds	20 to 40 seconds
Ramp-Down Rate	6°C/second max.	6°C/second max.
Time 25°C to Peak Temperature	6 minutes max.	8 minutes max.

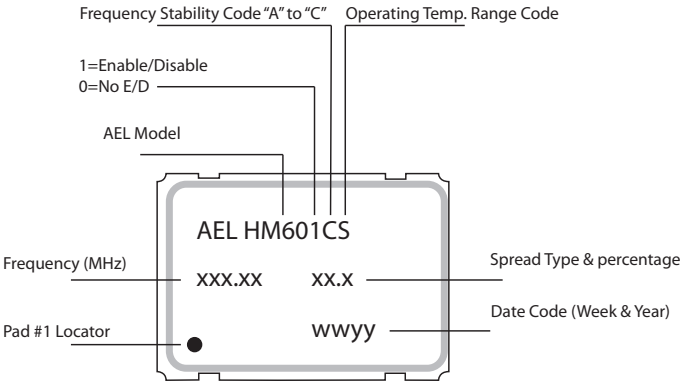
PRODUCT SPECIFICATION

EMI Reduction - Spread Spectrum Clock Oscillator **AEL HM60-R & HM43-R**

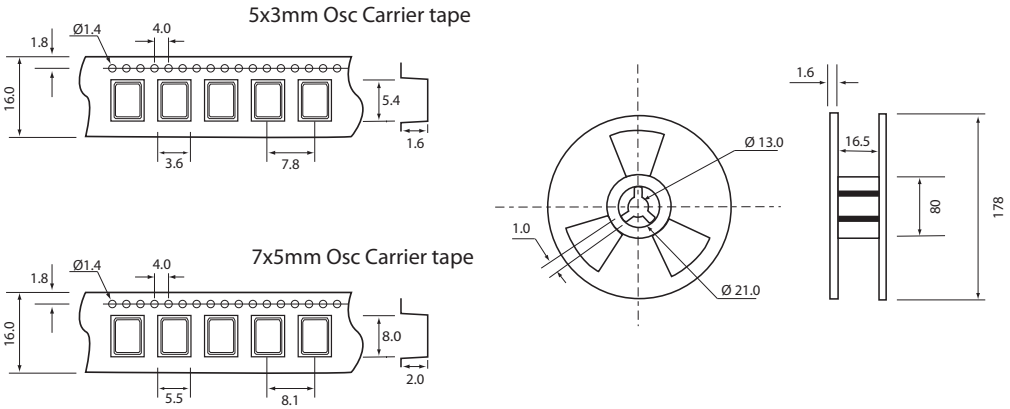
Block Diagram



Product Marking



Tape & Reel Specifications



Ordering Codes

Package Size	Enable/Disable	Freq (MHz)	Spread & Percentage
60: 5x3mm	1: Tristate Function	125.00	D1: Down Spread -1.0%
43: 7x5mm	0: No Enable/Disable		D3: Down Spread -3.0%
			C0.5: Centre Spread ±0.5%
			C1.5: Centre Spread ±1.5%

AEL HM	60	1	C	S	-	125.000	C1.5

Frequency Stability	Temp. Range
A: ±25PPM	S: -10^{0}C to +70^{0}C
B: ±50PPM	I: -40^{0}C to +85^{0}C
C: ±100PPM	