

EMS11HHC-10.0227M

[Click part number to visit Part Number Details page](#)

REGULATORY COMPLIANCE (Data Sheet downloaded on May 19, 2019)


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ITEM DESCRIPTION

Spread Spectrum MEMS Clock Oscillators LVCMOS (CMOS) 1.8Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD) 10.0227MHz ± 50 ppm Maximum over -40°C to $+85^{\circ}\text{C}$ Tri-State $\pm 1.00\%$ Center Spread

ELECTRICAL SPECIFICATIONS

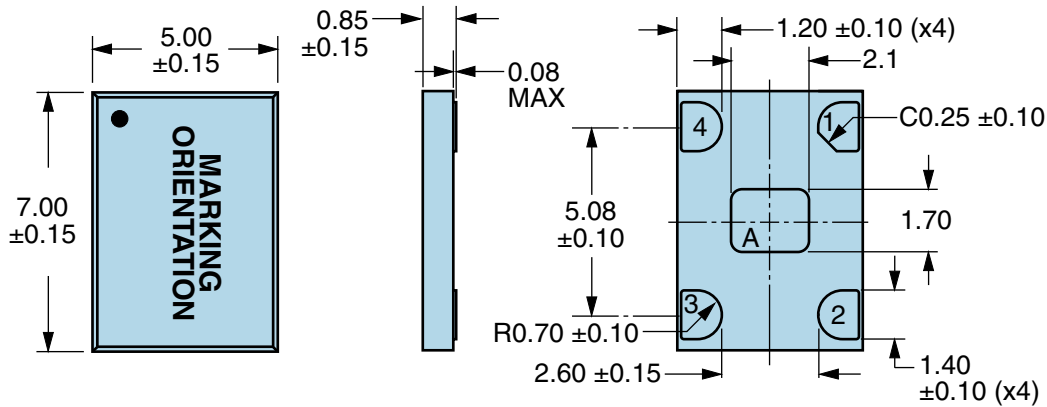
| | |
|---------------------------------------|--|
| Nominal Frequency | 10.0227MHz |
| Frequency Tolerance/Stability | ± 50 ppm Maximum over -40°C to $+85^{\circ}\text{C}$ (Inclusive of all conditions: Calibration Tolerance at 25°C , Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at 25°C , 260°C Reflow, Shock, and Vibration) |
| Aging at 25°C | ± 1 ppm Maximum First Year |
| Supply Voltage | 1.8Vdc $\pm 5\%$ |
| Maximum Supply Voltage | -0.5Vdc to $+1.98\text{Vdc}$ |
| Input Current | 25mA Maximum (Unloaded; Nominal Vdd) |
| Output Voltage Logic High (Voh) | 90% of Vdd Minimum (IOH= -8mA) |
| Output Voltage Logic Low (Vol) | 10% of Vdd Maximum (IOL= $+8\text{mA}$) |
| Rise/Fall Time | 2nSec Maximum (Measured from 20% to 80% of waveform) |
| Duty Cycle | 50 ± 5 (%) (Measured at 50% of waveform) |
| Load Drive Capability | 15pF Maximum |
| Output Logic Type | CMOS |
| Output Control Function | Tri-State (Disabled Output High Impedance) |
| Tri-State Input Voltage (Vih and Vil) | 70% of Vdd Minimum or No Connection to Enable Output, 30% of Vdd Maximum to Disable Output |
| Disable Current | 20mA Maximum (Disabled Output: High Impedance) (Pad 1=Ground) |
| Spread Spectrum | $\pm 1.00\%$ Center Spread |
| Modulation Frequency | 30kHz Minimum, 32kHz Typical, 35kHz Maximum |
| Period Jitter | 90pSec Maximum (Cycle to Cycle; Spread Spectrum-On; Fo=133.333M, Vdd=1.8Vdc) |
| Start Up Time | 10mSec Maximum |
| Storage Temperature Range | -55°C to $+125^{\circ}\text{C}$ |

ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

| | |
|------------------------------|--|
| ESD Susceptibility | MIL-STD-883, Method 3015, Class 2, HBM 2000V |
| Flammability | UL94-V0 |
| Mechanical Shock | MIL-STD-883, Method 2002, Condition G, 30,000G |
| Moisture Resistance | MIL-STD-883, Method 1004 |
| Moisture Sensitivity Level | J-STD-020, MSL 1 |
| Resistance to Soldering Heat | MIL-STD-202, Method 210, Condition K |
| Resistance to Solvents | MIL-STD-202, Method 215 |
| Solderability | MIL-STD-883, Method 2003 (Four I/O Pads on bottom of package only) |
| Temperature Cycling | MIL-STD-883, Method 1010, Condition B |
| Thermal Shock | MIL-STD-883, Method 1011, Condition B |
| Vibration | MIL-STD-883, Method 2007, Condition A, 20G |

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MECHANICAL DIMENSIONS (all dimensions in millimeters)



| PIN | CONNECTION |
|-----|----------------------------|
| 1 | Tri-State (High Impedance) |
| 2 | Ground |
| 3 | Output |
| 4 | Supply Voltage |

| LINE | MARKING |
|------|---|
| 1 | XXXX or XXXXX XXXX or XXXXX=Ecliptek Manufacturing Identifier |

Note A: Center paddle is connected internally to oscillator ground (Pad 2).

Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are ±0.1

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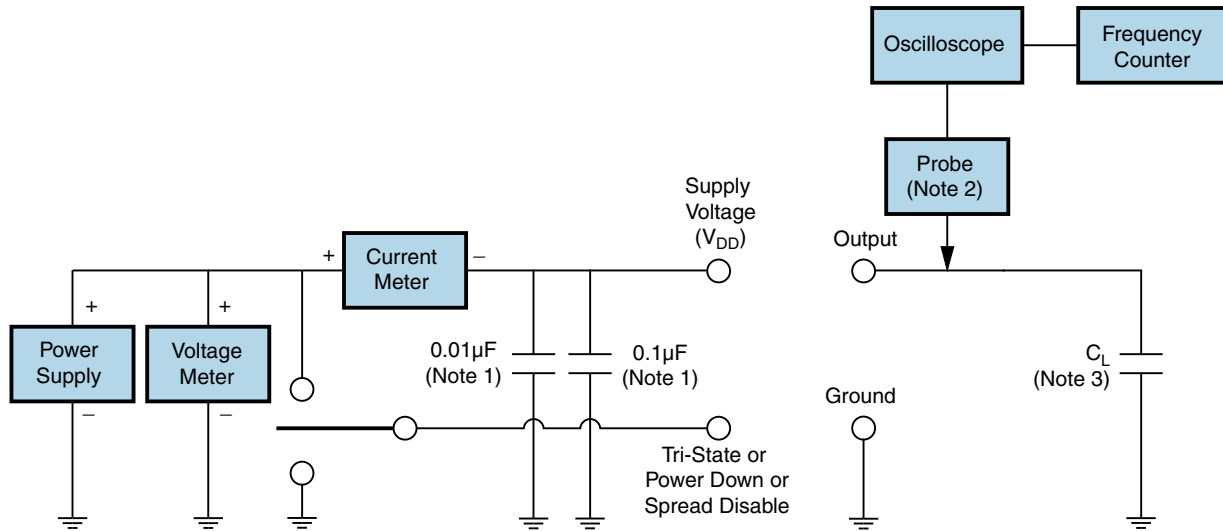
OUTPUT WAVEFORM & TIMING DIAGRAM



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Test Circuit for CMOS Output



Note 1: An external $0.01\mu\text{F}$ ceramic bypass capacitor in parallel with a $0.1\mu\text{F}$ high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

Note 2: A low capacitance ($<12\text{pF}$), 10X attenuation factor, high impedance ($>10\text{Mohms}$), and high bandwidth ($>300\text{MHz}$) passive probe is recommended.

Note 3: Capacitance value C_L includes sum of all probe and fixture capacitance.

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Recommended Solder Reflow Methods



High Temperature Infrared/Convection

| | |
|--|--------------------------------------|
| $T_S \text{ MAX}$ to T_L (Ramp-up Rate) | 3°C/Second Maximum |
| Preheat | |
| - Temperature Minimum ($T_S \text{ MIN}$) | 150°C |
| - Temperature Typical ($T_S \text{ TYP}$) | 175°C |
| - Temperature Maximum ($T_S \text{ MAX}$) | 200°C |
| - Time ($t_s \text{ MIN}$) | 60 - 180 Seconds |
| Ramp-up Rate (T_L to T_P) | 3°C/Second Maximum |
| Time Maintained Above: | |
| - Temperature (T_L) | 217°C |
| - Time (t_L) | 60 - 150 Seconds |
| Peak Temperature (T_P) | 260°C Maximum for 10 Seconds Maximum |
| Target Peak Temperature ($T_P \text{ Target}$) | 250°C +0/-5°C |
| Time within 5°C of actual peak (t_p) | 20 - 40 Seconds |
| Ramp-down Rate | 6°C/Second Maximum |
| Time 25°C to Peak Temperature (t) | 8 Minutes Maximum |
| Moisture Sensitivity Level | Level 1 |

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Recommended Solder Reflow Methods



Low Temperature Infrared/Convection 240°C

| | |
|--|--|
| $T_S \text{ MAX}$ to T_L (Ramp-up Rate) | 5°C/Second Maximum |
| Preheat | |
| - Temperature Minimum ($T_S \text{ MIN}$) | N/A |
| - Temperature Typical ($T_S \text{ TYP}$) | 150°C |
| - Temperature Maximum ($T_S \text{ MAX}$) | N/A |
| - Time ($t_s \text{ MIN}$) | 60 - 120 Seconds |
| Ramp-up Rate (T_L to T_P) | 5°C/Second Maximum |
| Time Maintained Above: | |
| - Temperature (T_L) | 150°C |
| - Time (t_L) | 200 Seconds Maximum |
| Peak Temperature (T_P) | 240°C Maximum |
| Target Peak Temperature ($T_P \text{ Target}$) | 240°C Maximum 2 Times / 230°C Maximum 1 Time |
| Time within 5°C of actual peak (t_p) | 10 Seconds Maximum 2 Times / 80 Seconds Maximum 1 Time |
| Ramp-down Rate | 5°C/Second Maximum |
| Time 25°C to Peak Temperature (t) | N/A |
| Moisture Sensitivity Level | Level 1 |

Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum.

High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum.