

# EMK11H2H-45.000M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Mar 11, 2018)


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## ITEM DESCRIPTION

MEMS Clock Oscillators LVCMOS (CMOS) 1.8Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD) 45.000MHz  $\pm 50$ ppm over -40°C to +85°C

## ELECTRICAL SPECIFICATIONS

|                                 |                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency               | 45.000MHz                                                                                                                                                                                                                                                                |
| Frequency Tolerance/Stability   | $\pm 50$ ppm Maximum over -40°C to +85°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                   | $\pm 1$ ppm Maximum First Year                                                                                                                                                                                                                                           |
| Supply Voltage                  | 1.8Vdc $\pm 5\%$                                                                                                                                                                                                                                                         |
| Input Current                   | 18mA Maximum                                                                                                                                                                                                                                                             |
| Output Voltage Logic High (Voh) | 90% of Vdd Minimum (IOH=-8mA)                                                                                                                                                                                                                                            |
| Output Voltage Logic Low (Vol)  | 10% of Vdd Maximum (IOL=+8mA)                                                                                                                                                                                                                                            |
| Rise/Fall Time                  | 2nSec Maximum (Measured from 20% to 80% of waveform)                                                                                                                                                                                                                     |
| Duty Cycle                      | 50 $\pm 5\%$ (Measured at 50% of waveform)                                                                                                                                                                                                                               |
| Load Drive Capability           | 15pF Maximum                                                                                                                                                                                                                                                             |
| Output Logic Type               | CMOS                                                                                                                                                                                                                                                                     |
| Output Control Function         | Tri-State (Disabled Output: High Impedance)                                                                                                                                                                                                                              |
| Output Control Input Voltage    | +0.7Vdd Minimum or No Connect to Enable Output, +0.3Vdd Maximum to Disable Output                                                                                                                                                                                        |
| Peak to Peak Jitter (tPK)       | 250pSec Maximum, 100pSec Typical                                                                                                                                                                                                                                         |
| Start Up Time                   | 50mSec Maximum                                                                                                                                                                                                                                                           |
| Storage Temperature Range       | -55°C to +125°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                         |

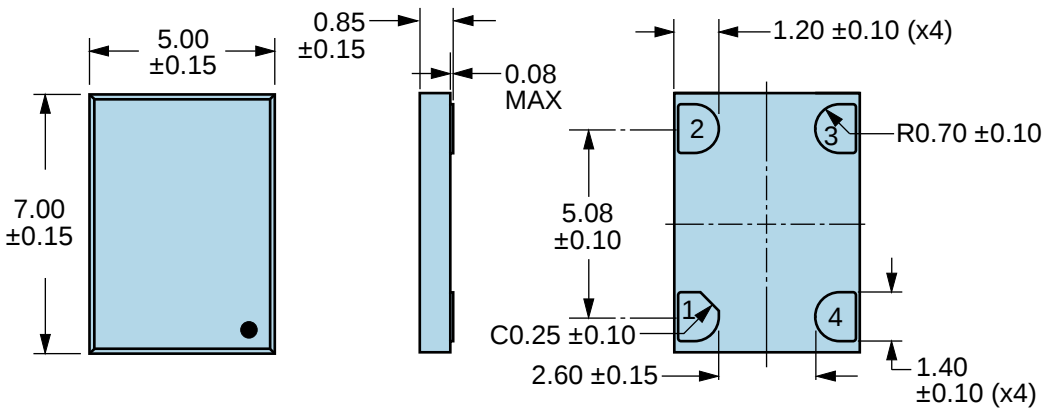
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MECHANICAL DIMENSIONS (all dimensions in millimeters)

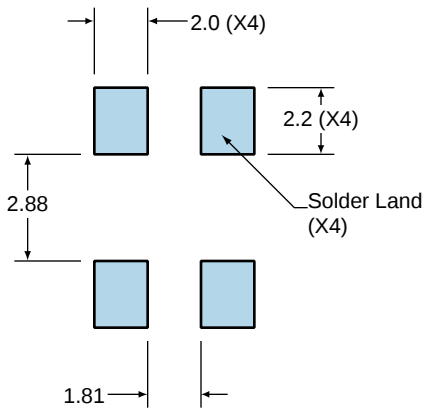
| PIN | CONNECTION                 |
|-----|----------------------------|
| 1   | Tri-State (High Impedance) |
| 2   | Ground                     |
| 3   | Output                     |
| 4   | Supply Voltage             |

| LINE | MARKING                                             |
|------|-----------------------------------------------------|
| 1    | XXXXXX<br>XXXXXX=Ecliptek<br>Manufacturing Lot Code |



Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are ±0.1

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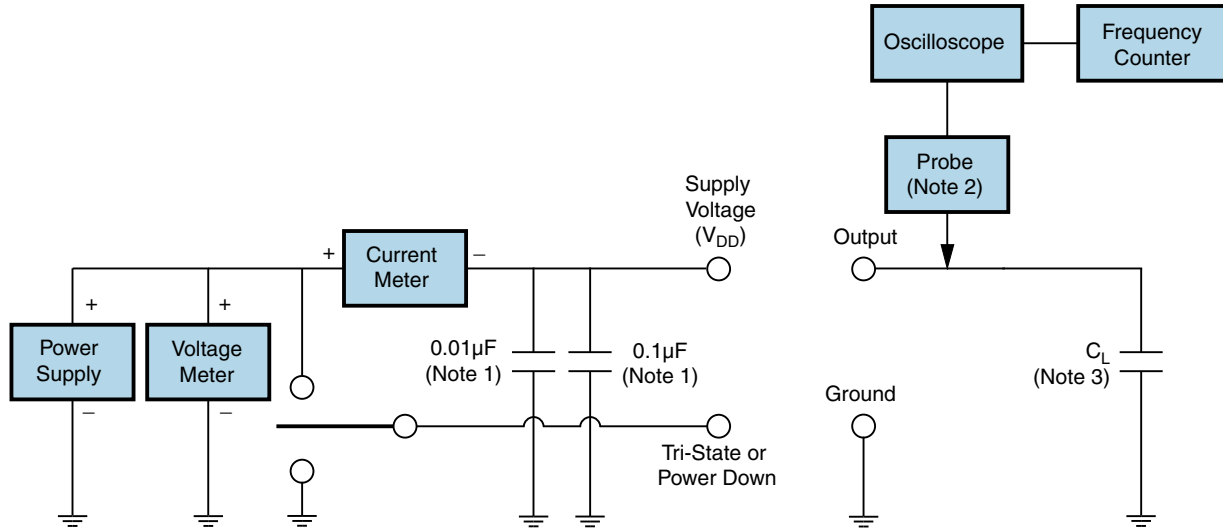
OUTPUT WAVEFORM & TIMING DIAGRAM



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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 input 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. See applicable specification sheet for 'Load Drive Capability'.

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Recommended Solder Reflow Methods



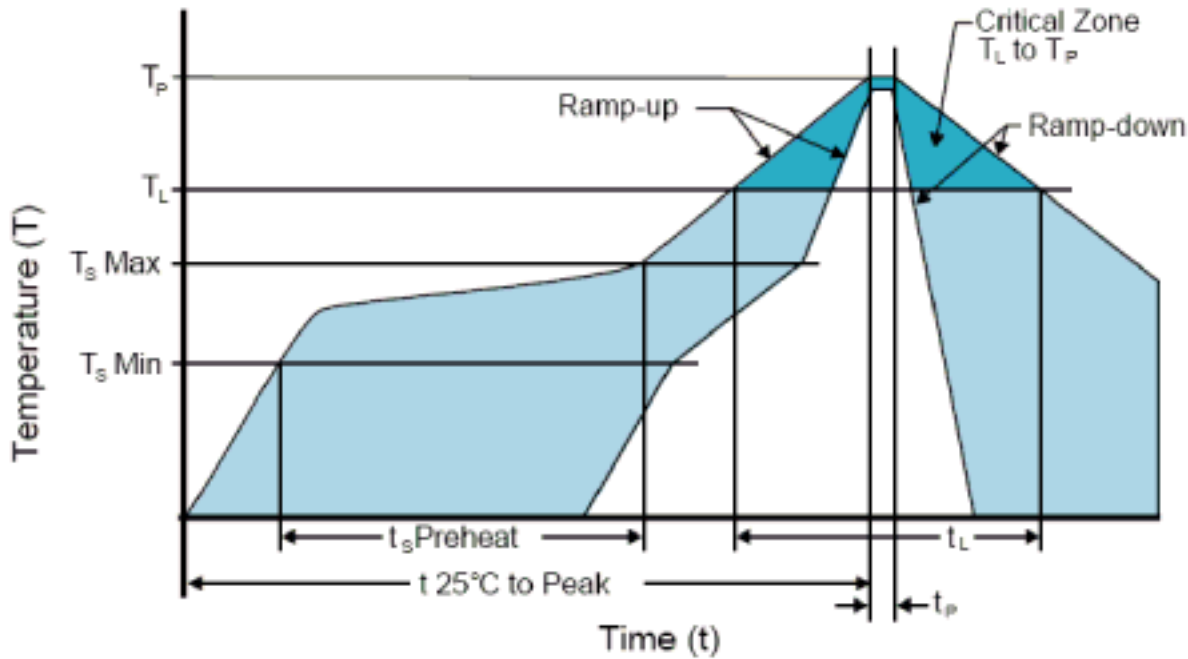
High Temperature Infrared/Convection

|                                     |  |                                      |
|-------------------------------------|--|--------------------------------------|
| TS MAX to TL (Ramp-up Rate)         |  | 3°C/Second Maximum                   |
| Preheat                             |  |                                      |
| - Temperature Minimum (TS MIN)      |  | 150°C                                |
| - Temperature Typical (TS TYP)      |  | 175°C                                |
| - Temperature Maximum (TS MAX)      |  | 200°C                                |
| - Time (ts MIN)                     |  | 60 - 180 Seconds                     |
| Ramp-up Rate (TL to TP)             |  | 3°C/Second Maximum                   |
| Time Maintained Above:              |  |                                      |
| - Temperature (TL)                  |  | 217°C                                |
| - Time (tL)                         |  | 60 - 150 Seconds                     |
| Peak Temperature (TP)               |  | 260°C Maximum for 10 Seconds Maximum |
| Target Peak Temperature (TP Target) |  | 250°C +0/-5°C                        |
| Time within 5°C of actual peak (tP) |  | 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

|                             |                    |
|-----------------------------|--------------------|
| TS MAX to TL (Ramp-up Rate) | 5°C/Second Maximum |
|-----------------------------|--------------------|

#### Preheat

|                                |                  |
|--------------------------------|------------------|
| - Temperature Minimum (TS MIN) | N/A              |
| - Temperature Typical (TS TYP) | 150°C            |
| - Temperature Maximum (TS MAX) | N/A              |
| - Time (ts MIN)                | 60 - 120 Seconds |

|                         |                    |
|-------------------------|--------------------|
| Ramp-up Rate (TL to TP) | 5°C/Second Maximum |
|-------------------------|--------------------|

#### Time Maintained Above:

|                    |                     |
|--------------------|---------------------|
| - Temperature (TL) | 150°C               |
| - Time (tL)        | 200 Seconds Maximum |

|                       |               |
|-----------------------|---------------|
| Peak Temperature (TP) | 240°C Maximum |
|-----------------------|---------------|

|                                     |                                              |
|-------------------------------------|----------------------------------------------|
| Target Peak Temperature (TP Target) | 240°C Maximum 2 Times / 230°C Maximum 1 Time |
|-------------------------------------|----------------------------------------------|

|                                     |                                                        |
|-------------------------------------|--------------------------------------------------------|
| Time within 5°C of actual peak (tP) | 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.