

# EMK42H2J-47.0312M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Nov 16, 2016)


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## ITEM DESCRIPTION

MEMS Clock Oscillators LVCMOS (CMOS) 2.5Vdc 4 Pad 2.0mm x 2.5mm Plastic Surface Mount (SMD) 47.0312MHz  $\pm 50$ ppm over -40°C to +85°C

## ELECTRICAL SPECIFICATIONS

|                                 |                                                                                                                                                                                                                                                                          |
|---------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency               | 47.0312MHz                                                                                                                                                                                                                                                               |
| 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                  | 2.5Vdc $\pm 5\%$                                                                                                                                                                                                                                                         |
| Input Current                   | 20mA 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         | Power Down (Disabled Output: Logic Low)                                                                                                                                                                                                                                  |
| Output Control Input Voltage    | +0.7Vdd Minimum or No Connect to Enable Output, +0.3Vdd Maximum to Disable Output                                                                                                                                                                                        |
| Standby Current                 | 50 $\mu$ A Maximum (Disabled Output: Logic Low)                                                                                                                                                                                                                          |
| Peak to Peak Jitter (tPK)       | 250pSec Maximum, 100pSec Typical                                                                                                                                                                                                                                         |
| Start Up Time                   | 50mSec Maximum                                                                                                                                                                                                                                                           |
| Storage Temperature Range       | -55°C to +125°C                                                                                                                                                                                                                                                          |

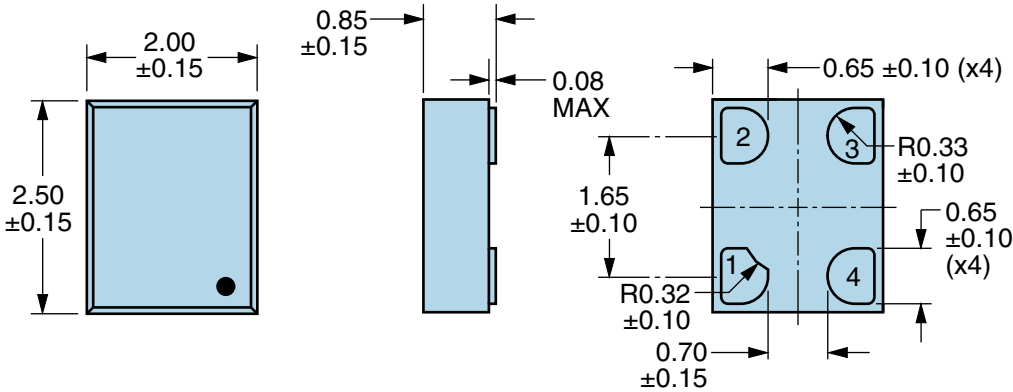
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                                           |
|------------------------------|-----------------------------------------------------------|
| 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 (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)

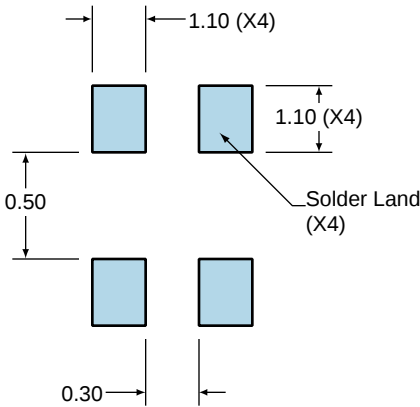


| PIN | CONNECTION     |
|-----|----------------|
| 1   | Power Down     |
| 2   | Ground         |
| 3   | Output         |
| 4   | Supply Voltage |

| LINE | MARKING                                                           |
|------|-------------------------------------------------------------------|
| 1    | XXXX or XXXXX<br>XXXX or XXXXX=Ecliptek<br>Manufacturing Lot Code |

Suggested Solder Pad Layout

All Dimensions in Millimeters



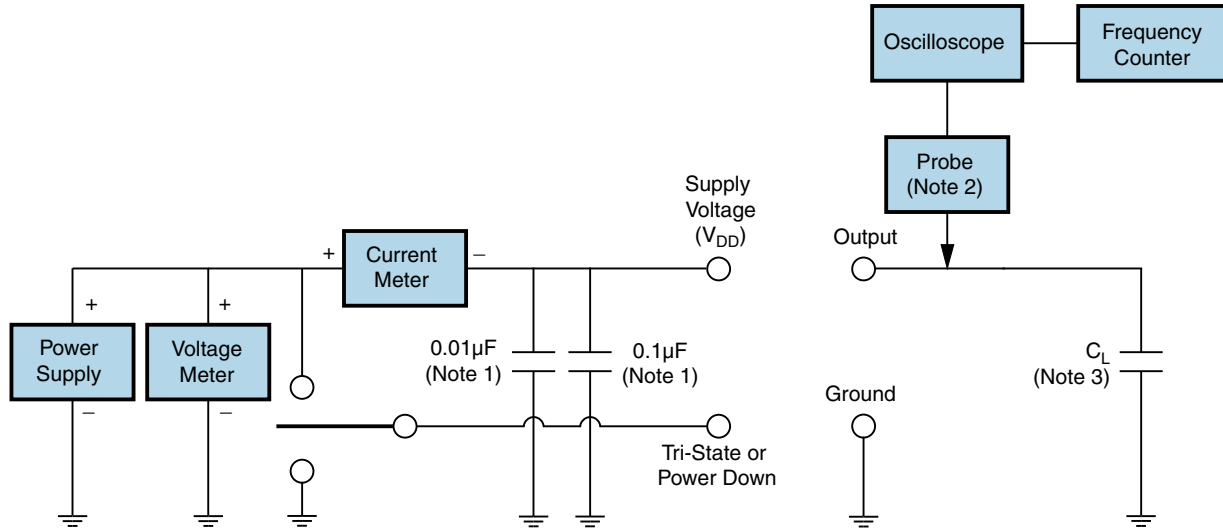
All Tolerances are ±0.1

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OUTPUT WAVEFORM & TIMING DIAGRAM



**EMK42H2J-47.0312M** [Click part number to visit Part Number Details page](#)**Test Circuit for CMOS Output**

Note 1: An external 0.01μF ceramic bypass capacitor in parallel with a 0.1μF 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 (<12pF), 10X Attenuation Factor, High Impedance (>10Mohms), and High bandwidth (>300MHz) passive probe is recommended.

Note 3: Capacitance value C<sub>L</sub> 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

|                                                     |                    |
|-----------------------------------------------------|--------------------|
| T <sub>S</sub> MAX to T <sub>L</sub> (Ramp-up Rate) | 3°C/Second Maximum |
|-----------------------------------------------------|--------------------|

### Preheat

|                                            |                  |
|--------------------------------------------|------------------|
| - Temperature Minimum (T <sub>S</sub> MIN) | 150°C            |
| - Temperature Typical (T <sub>S</sub> TYP) | 175°C            |
| - Temperature Maximum (T <sub>S</sub> MAX) | 200°C            |
| - Time (t <sub>s</sub> MIN)                | 60 - 180 Seconds |

|                                                  |                    |
|--------------------------------------------------|--------------------|
| Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> ) | 3°C/Second Maximum |
|--------------------------------------------------|--------------------|

### Time Maintained Above:

|                                 |                  |
|---------------------------------|------------------|
| - Temperature (T <sub>L</sub> ) | 217°C            |
| - Time (t <sub>L</sub> )        | 60 - 150 Seconds |

|                                    |                                      |
|------------------------------------|--------------------------------------|
| Peak Temperature (T <sub>P</sub> ) | 260°C Maximum for 10 Seconds Maximum |
|------------------------------------|--------------------------------------|

|                                                 |               |
|-------------------------------------------------|---------------|
| Target Peak Temperature (T <sub>P</sub> Target) | 250°C +0/-5°C |
|-------------------------------------------------|---------------|

|                                                  |                 |
|--------------------------------------------------|-----------------|
| Time within 5°C of actual peak (t <sub>p</sub> ) | 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.