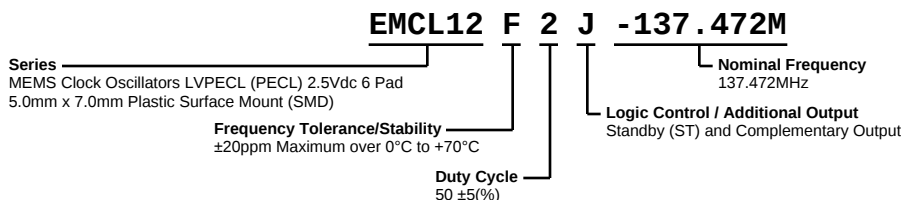


# EMCL12F2J-137.472M



## ELECTRICAL SPECIFICATIONS

|                                                   |                                                                                                                                                                                                                                                                                                                                          |
|---------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                                 | 137.472MHz                                                                                                                                                                                                                                                                                                                               |
| Frequency Tolerance/Stability                     | $\pm 20\text{ppm}$ Maximum over $0^{\circ}\text{C}$ to $+70^{\circ}\text{C}$ (Inclusive of all conditions: Calibration Tolerance at $25^{\circ}\text{C}$ , Frequency Stability over the Operating Temperature Range, Supply Voltage Change, Output Load Change, First Year Aging at $25^{\circ}\text{C}$ , Reflow, Shock, and Vibration) |
| Aging at $25^{\circ}\text{C}$                     | $\pm 1\text{ppm}$ First Year Maximum                                                                                                                                                                                                                                                                                                     |
| Supply Voltage                                    | $+2.5\text{Vdc} \pm 0.125\text{Vdc}$                                                                                                                                                                                                                                                                                                     |
| Input Current                                     | 75mA Maximum (Excluding Load Termination Current)                                                                                                                                                                                                                                                                                        |
| Output Voltage Logic High (Voh)                   | Vdd-1.10Vdc Minimum, 1.60Vdc Typical, Vdd-0.70Vdc Maximum                                                                                                                                                                                                                                                                                |
| Output Voltage Logic Low (Vol)                    | Vdd-2.0Vdc Minimum, 0.80Vdc Typical, Vdd-1.40Vdc Maximum                                                                                                                                                                                                                                                                                 |
| Rise/Fall Time                                    | 150pSec Typical, 300pSec Maximum (Measured over 20% to 80% of waveform)                                                                                                                                                                                                                                                                  |
| Duty Cycle                                        | $50 \pm 5(\%)$ (Measured at 50% of waveform)                                                                                                                                                                                                                                                                                             |
| Output Swing (VOpp)                               | 600mVdc Minimum, 800mVdc Typical, 1000mVdc Maximum                                                                                                                                                                                                                                                                                       |
| Load Drive Capability                             | 50 Ohms into Vdd-2.0Vdc                                                                                                                                                                                                                                                                                                                  |
| Output Logic Type                                 | LVPECL                                                                                                                                                                                                                                                                                                                                   |
| Logic Control / Additional Output                 | Standby (ST) and Complementary Output                                                                                                                                                                                                                                                                                                    |
| Output Control Input Voltage                      | Vih of 70% of Vdd Minimum or No Connect to Enable Output and Complementary Output, Vil of 30% of Vdd Maximum to Disable Output and Complementary Output (High Impedance)                                                                                                                                                                 |
| Standby Current                                   | 30 $\mu\text{A}$ Maximum (Without Load)                                                                                                                                                                                                                                                                                                  |
| Period Jitter (Deterministic)                     | 0.2pSec Typical                                                                                                                                                                                                                                                                                                                          |
| Period Jitter (Random)                            | 2.0pSec Typical                                                                                                                                                                                                                                                                                                                          |
| Period Jitter (RMS)                               | 1.5pSec Typical, 3.0pSec Maximum                                                                                                                                                                                                                                                                                                         |
| Period Jitter (pk-pk)                             | 20pSec Typical, 25pSec Maximum                                                                                                                                                                                                                                                                                                           |
| RMS Phase Jitter (Fj = 637kHz to 10MHz; Random)   | 1.6pSec Typical                                                                                                                                                                                                                                                                                                                          |
| RMS Phase Jitter (Fj = 1MHz to 20MHz; Random)     | 1.0pSec Typical                                                                                                                                                                                                                                                                                                                          |
| RMS Phase Jitter (Fj = 1.875MHz to 20MHz; Random) | 0.5pSec Typical                                                                                                                                                                                                                                                                                                                          |
| Start Up Time                                     | 10mSec Maximum                                                                                                                                                                                                                                                                                                                           |
| Storage Temperature Range                         | $-55^{\circ}\text{C}$ 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 (Six 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                        |

# EMCL12F2J-137.472M

## MECHANICAL DIMENSIONS (all dimensions in millimeters)



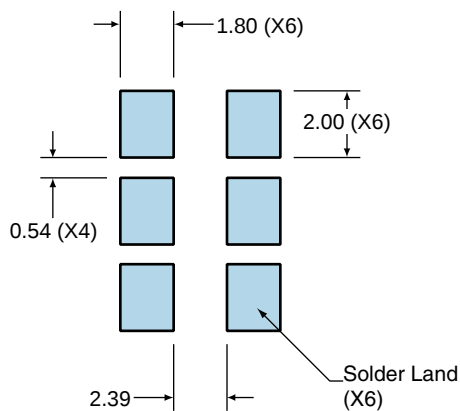
| PIN | CONNECTION           |
|-----|----------------------|
| 1   | Standby (ST)         |
| 2   | No Connect           |
| 3   | Case Ground          |
| 4   | Output               |
| 5   | Complementary Output |
| 6   | Supply Voltage       |

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

Note A: Center paddle is connected internally to oscillator ground (Pad 3).

## Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

# EMCL12F2J-137.472M

## OUTPUT WAVEFORM & TIMING DIAGRAM



# EMCL12F2J-137.472M

## OUTPUT WAVEFORM & TIMING DIAGRAM



# EMCL12F2J-137.472M

## Test Circuit for Output Enable and Complementary 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 ( $>500\text{MHz}$ ) passive probe is recommended.

Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

# EMCL12F2J-137.472M

## Test Circuit for Standby and Complementary Output

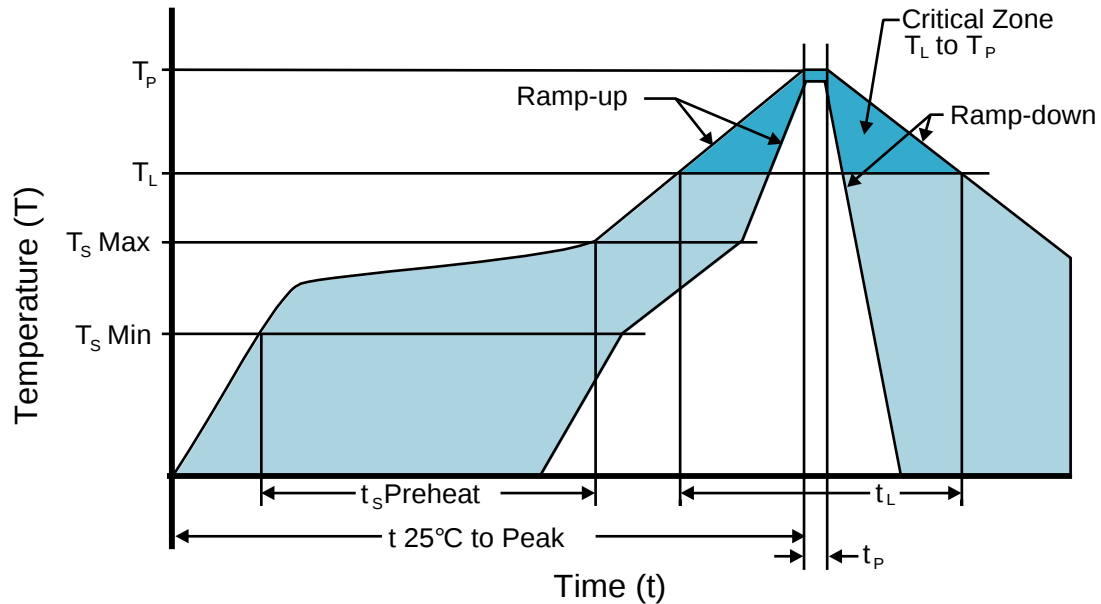


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Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

## 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 |
|----------------------------|---------|

## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection 240°C

T<sub>s</sub> MAX to T<sub>L</sub> (Ramp-up Rate) 5°C/second Maximum

#### Preheat

- Temperature Minimum (T<sub>s</sub> MIN) N/A  
 - Temperature Typical (T<sub>s</sub> TYP) 150°C  
 - Temperature Maximum (T<sub>s</sub> MAX) N/A  
 - Time (t<sub>s</sub> MIN) 60 - 120 Seconds

Ramp-up Rate (T<sub>L</sub> to T<sub>P</sub>) 5°C/second Maximum

#### Time Maintained Above:

- Temperature (T<sub>L</sub>) 150°C  
 - Time (t<sub>L</sub>) 200 Seconds Maximum

Peak Temperature (T<sub>P</sub>) 240°C Maximum

Target Peak Temperature (T<sub>P</sub> Target) 240°C Maximum 2 Times / 230°C Maximum 1 Time

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