

# EMS13CKF-25.000M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Dec 2, 2017)


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## ITEM DESCRIPTION

Spread Spectrum MEMS Clock Oscillators LVCMOS (CMOS) 3.3Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD) 25.000MHz  $\pm 100$ ppm Maximum over -20°C to +70°C Spread Disable (Spread Spectrum On Output Disabled) -2.00% Down

## ELECTRICAL SPECIFICATIONS

|                                             |                                                                                                                                                                                                                                                                           |
|---------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                           | 25.000MHz                                                                                                                                                                                                                                                                 |
| Frequency Tolerance/Stability               | $\pm 100$ ppm Maximum over -20°C to +70°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                              | 3.3Vdc $\pm 10\%$                                                                                                                                                                                                                                                         |
| Maximum Supply Voltage                      | -0.5Vdc to +3.65Vdc                                                                                                                                                                                                                                                       |
| Input Current                               | 30mA 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=+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                     | Spread Disable (Spread Spectrum On Output Disabled)                                                                                                                                                                                                                       |
| Spread Spectrum Input Voltage (Vih and Vil) | 70% of Vdd Minimum or No Connection to Enable Spread Spectrum-On Output, 30% of Vdd Maximum to Disable Spread Spectrum-On Output                                                                                                                                          |
| Spread Spectrum                             | -2.00% Down Spread                                                                                                                                                                                                                                                        |
| Modulation Frequency                        | 30kHz Minimum, 32kHz Typical, 35kHz Maximum                                                                                                                                                                                                                               |
| Period Jitter                               | 30pSec Maximum (Cycle to Cycle; Spread Spectrum-On; Fo=133.333M, Vdd=3.3Vdc)                                                                                                                                                                                              |
| Start Up Time                               | 10mSec 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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Technical drawing of a marking orientation plate, showing three views: front, side, and top.

**Front View:** A rectangular plate with a width of  $5.00 \pm 0.15$  and a height of  $7.00 \pm 0.15$ . The text "MARKING ORIENTATION" is printed vertically. A small circular feature is located in the top-left corner.

**Side View:** A narrow vertical profile with a thickness of  $0.85 \pm 0.15$ . A small rectangular feature is located on the right side, with a height of  $0.08 \text{ MAX}$ .

**Top View:** A rectangular plate with a width of  $2.60 \pm 0.15$  and a height of  $5.08 \pm 0.10$ . The plate features four circular holes, numbered 1, 2, 3, and 4, arranged in a square pattern. The distance between the centers of the holes is  $1.20 \pm 0.10$  (x4). The distance from the center of hole 1 to the right edge is  $2.1$ . The distance from the center of hole 2 to the bottom edge is  $1.40 \pm 0.10$  (x4). The distance from the center of hole 3 to the left edge is  $R0.70 \pm 0.10$ . The distance from the center of hole 4 to the top edge is  $1.70$ . The distance from the center of hole 1 to the top edge is  $C0.25 \pm 0.10$ . A central rectangular feature is labeled "A".

| PIN | CONNECTION                   |
|-----|------------------------------|
| 1   | Spread Disable<br>(Disabled) |
| 2   | Ground                       |
| 3   | Output                       |
| 4   | Supply Voltage               |

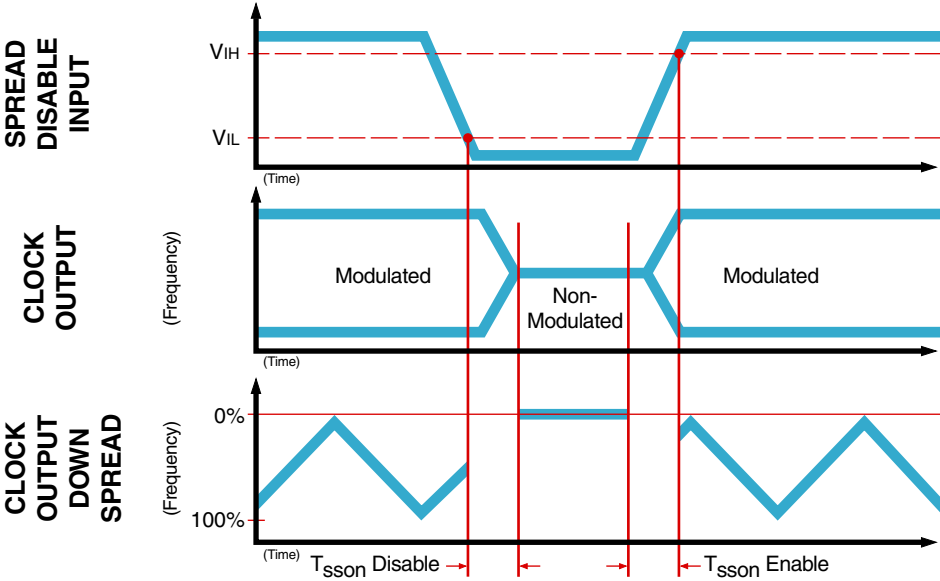
| LINE | MARKING                                                                    |
|------|----------------------------------------------------------------------------|
| 1    | <b>XXXX or XXXXX</b><br>XXXX or XXXXX=Ecliptek<br>Manufacturing Identifier |

1-800-ECLIPTEK or 714.433.1200

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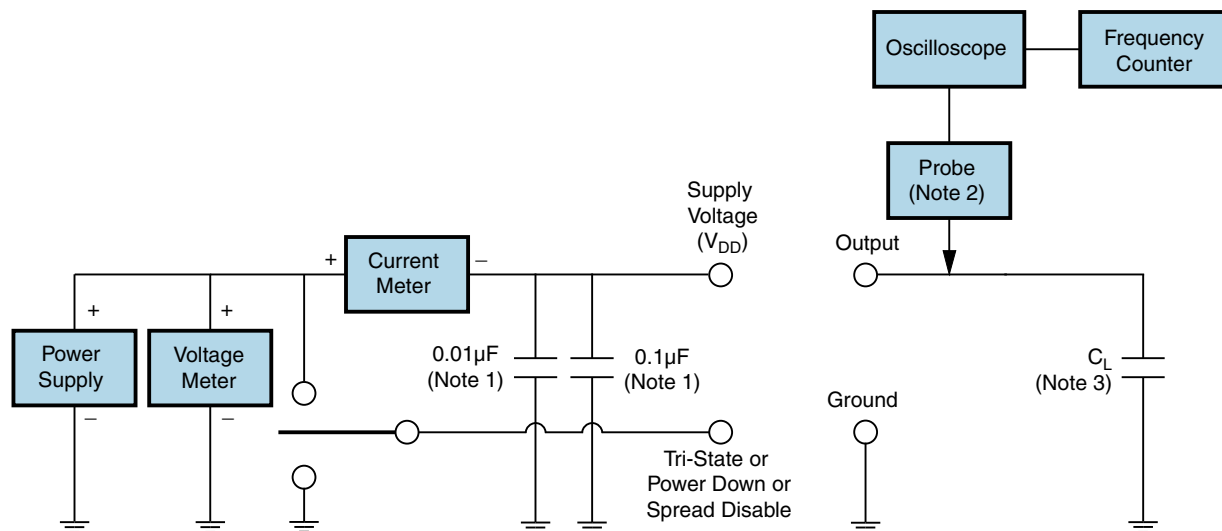
OUTPUT WAVEFORM & TIMING DIAGRAM



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## 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 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.

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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.