

EQRA22F2H-24.788M

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REGULATORY COMPLIANCE (Data Sheet downloaded on Jul 16, 2019)


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ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 2.5Vdc 6 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD) 24.788MHz ± 50 ppm over -20°C to +70°C

ELECTRICAL SPECIFICATIONS

| | |
|---|---|
| Nominal Frequency | 24.788MHz |
| Frequency Tolerance/Stability | ± 50 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 and Output Load Change) |
| Aging at 25°C | ± 2 ppm Maximum First Year, ± 10 ppm/10 Years Maximum |
| Supply Voltage | 2.5Vdc $\pm 5\%$ |
| Input Current | 20mA Maximum (Unloaded) |
| Output Voltage Logic High (Voh) | 90% of Vdd Minimum (IOH = -4mA) |
| Output Voltage Logic Low (Vol) | 10% of Vdd Maximum (IOL = +4mA) |
| Rise/Fall Time | 3nSec Maximum (Measured at 10% to 90% of Waveform) |
| Duty Cycle | 50 ± 5 (%) (Measured at 50% of Waveform) |
| Load Drive Capability | 15pF Maximum |
| Output Logic Type | CMOS |
| Phase Noise | -64dBc/Hz at 10Hz offset; -96dBc/Hz at 100Hz offset; -124dBc/Hz at 1kHz offset; -131dBc/Hz at 10kHz offset; -132dBc/Hz at 100kHz offset; -149dBc/Hz at 1MHz offset; -157dBc/Hz at 10MHz offset; -159dBc/Hz at 20MHz offset (All Values are Typical) |
| Output Control Function | Output Enable (OE) |
| Output Control Input Voltage Logic High (Vih) | 90% of Vdd Minimum or No Connect to Enable Output |
| Output Control Input Voltage Logic Low (Vil) | 10% of Vdd Maximum to Disable Output (High Impedance) |
| Output Enable Time | 100nSec Maximum |
| Output Disable Time | 50nSec Maximum |
| Output Enable Current | 15mA Maximum (Without Load (Pin 1 = Ground)) |
| RMS Phase Jitter | 1.5pSec Maximum (Fj=12kHz to 20MHz (Random)) |
| Period Jitter (Deterministic) | 0.2pSec Typical |
| Period Jitter (Random) | 2pSec Typical |
| Period Jitter (RMS) | 3pSec Maximum |
| Period Jitter (pk-pk) | 30pSec Maximum |
| Start Up Time | 10mSec Maximum |
| Storage Temperature Range | -55°C to +125°C |

ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

| | |
|------------------------------|---|
| ESD Susceptibility | MIL-STD-883, Method 3015, Class 1, HBM: 1500V |
| Fine Leak Test | MIL-STD-883, Method 1014, Condition A |
| Flammability | UL94-V0 |
| Gross Leak Test | MIL-STD-883, Method 1014, Condition C |
| Mechanical Shock | MIL-STD-883, Method 2002, Condition B |
| Moisture Resistance | MIL-STD-883, Method 1004 |
| Moisture Sensitivity | J-STD-020, MSL 1 |
| Resistance to Soldering Heat | MIL-STD-202, Method 210, Condition K |

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ENVIRONMENTAL & MECHANICAL SPECIFICATIONS CONTINUED

| | |
|-------------------------------|---------------------------------------|
| Resistance to Solvents | MIL-STD-202, Method 215 |
| Solderability | MIL-STD-883, Method 2003 |
| Temperature Cycling | MIL-STD-883, Method 1010, Condition B |
| Vibration | MIL-STD-883, Method 2007, Condition A |

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MECHANICAL DIMENSIONS (all dimensions in millimeters)



| PIN | CONNECTION |
|-----|--------------------|
| 1 | Output Enable (OE) |
| 2 | Do Not Connect |
| 3 | Case/Ground |
| 4 | Output |
| 5 | Do Not Connect |
| 6 | Supply Voltage |

| LINE | MARKING |
|------|--|
| 1 | E24.788 <i>E=Ecliptek Designator</i> |
| 2 | XXXXX <i>XXXXX=Ecliptek Manufacturing Identifier</i> |

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 0.01µF 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_L 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 |
| Additional Notes | Temperatures shown are applied to body of device. |

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Recommended Solder Reflow Methods



Low Temperature Infrared/Convection 240°C

| | |
|--|--|
| T_s MAX to T_L (Ramp-up Rate) | 5°C/Second Maximum |
| Preheat | |
| - Temperature Minimum (T_s MIN) | N/A |
| - Temperature Typical (T_s TYP) | 150°C |
| - Temperature Maximum (T_s MAX) | N/A |
| - Time (t_s 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 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 |
| Additional Notes | Temperatures shown are applied to body of device. |

Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)

High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)