

EB13E2G2H-20.000M
[Click part number to visit Part Number Details page](#)
REGULATORY COMPLIANCE (Data Sheet downloaded on Jun 14, 2020)
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**ITEM DESCRIPTION**

Quartz Crystal Clock Oscillators XO (SPXO) LVC MOS (CMOS) 3.3Vdc 4 Pad 2.5mm x 3.2mm Ceramic Surface Mount (SMD) 20.000MHz ± 100 ppm over -40°C to +85°C

ELECTRICAL SPECIFICATIONS

Nominal Frequency	20.000MHz
Frequency Tolerance/Stability	± 100 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, Shock, and Vibration)
Supply Voltage	3.3Vdc $\pm 5\%$
Input Current	5mA Maximum
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	5nSec Maximum (Measured at 20% to 80% of waveform)
Duty Cycle	50 $\pm 5\%$ (Measured at 50% of waveform)
Load Drive Capability	15pF Maximum
Output Logic Type	CMOS
Pin 1 Connection	Tri-State (High Impedance)
Tri-State Input Voltage (Vih and Vil)	80% of Vdd Minimum or No Connect to Enable Output, 20% of Vdd Maximum to Disable Output (High Impedance)
Standby Current	10 μ A Maximum (Disabled Output: High Impedance)
RMS Phase Jitter	1pSec Maximum (Fj = 12kHz to 20MHz)
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
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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Technical drawing of a square microchip showing three views: top, side, and bottom views. Dimensions are in millimeters (mm).

- Top View:**
 - Overall width: 2.50 ± 0.15
 - Overall height: 3.20 ± 0.15
 - Internal marking: "MARKING ORIENTATION" with a dot.
 - Bottom view offset: 0.90 ± 0.20
- Side View:**
 - Thickness: 0.75 ± 0.10
- Bottom View:**
 - Distance from top edge to first row of pads: 1.20 ± 0.10
 - Distance between first and second rows of pads: 1.00 ± 0.10
 - Distance between second and third rows of pads: 1.00 ± 0.10
 - Distance from bottom edge to third row of pads: 1.00 ± 0.10
 - Pad locations are numbered 1, 2, 3, and 4.

LINE	MARKING
1	E20.0 <i>E=Eclipsek Designator</i>
2	XXXXXX <i>XXXXXX=Eclipsek Manufacturing Identifier</i>

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 $0.01\mu F$ ceramic bypass capacitor in parallel with a $0.1\mu F$ high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

Note 2: A low capacitance ($<12pF$), 10X attenuation factor, high impedance ($>10M\Omega$), 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

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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.

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