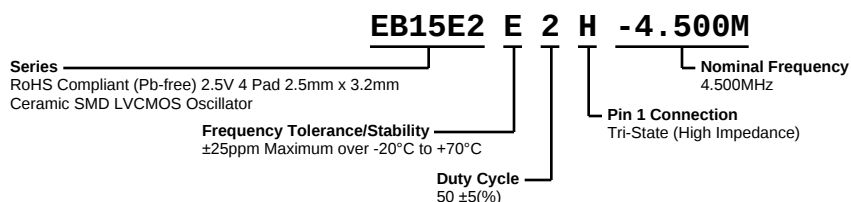


# EB15E2E2H-4.500M



**ECLIPTEK®**  
CORPORATION



## ELECTRICAL SPECIFICATIONS

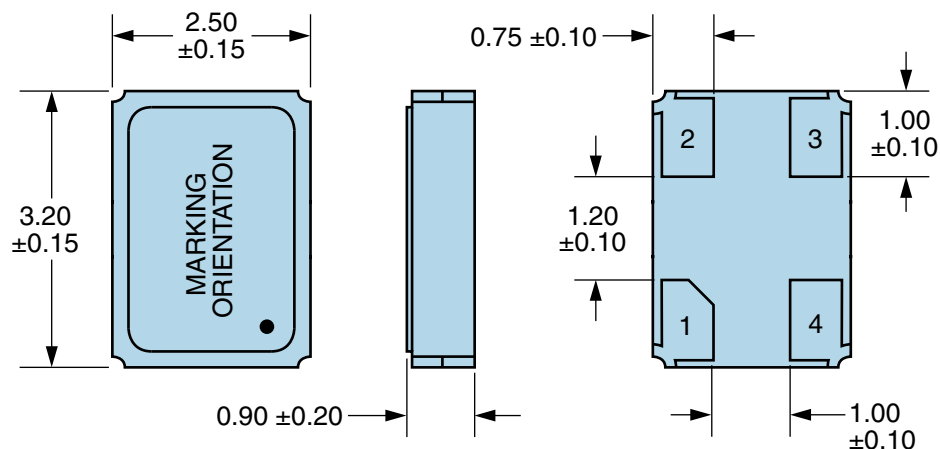
|                                       |                                                                                                                                                                                                                                                    |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 4.500MHz                                                                                                                                                                                                                                           |
| Frequency Tolerance/Stability         | ±25ppm 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 @25°C, Shock, and Vibration) |
| Supply Voltage                        | 2.5Vdc ±5%                                                                                                                                                                                                                                         |
| Input Current                         | 3mA 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 ±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                       | 10µA Maximum                                                                                                                                                                                                                                       |
| 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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## MECHANICAL DIMENSIONS (all dimensions in millimeters)

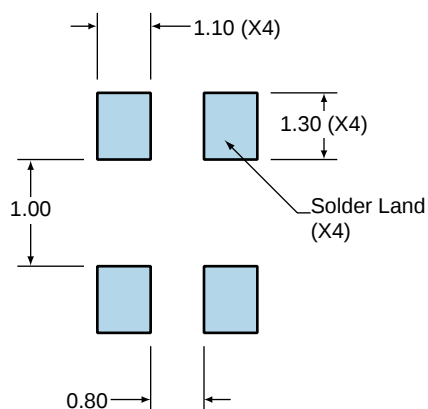


| PIN | CONNECTION     |
|-----|----------------|
| 1   | Tri-State      |
| 2   | Case/Ground    |
| 3   | Output         |
| 4   | Supply Voltage |

| LINE | MARKING                                                                                            |
|------|----------------------------------------------------------------------------------------------------|
| 1    | <b>E4.50</b><br>E=Ecliptek Designator                                                              |
| 2    | <b>XXYYZZ</b><br>XX=Ecliptek Manufacturing Code<br>Y=Last Digit of the Year<br>ZZ=Week of the Year |

## Suggested Solder Pad Layout

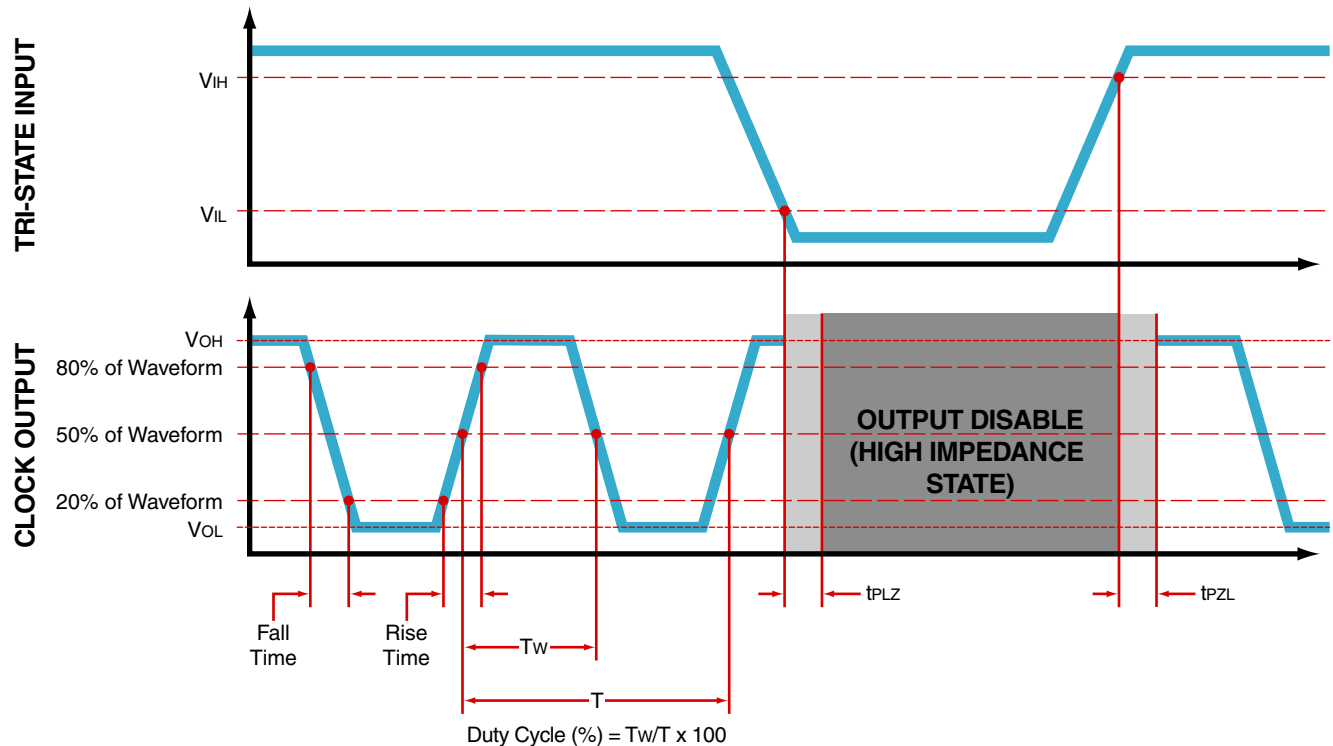
All Dimensions in Millimeters



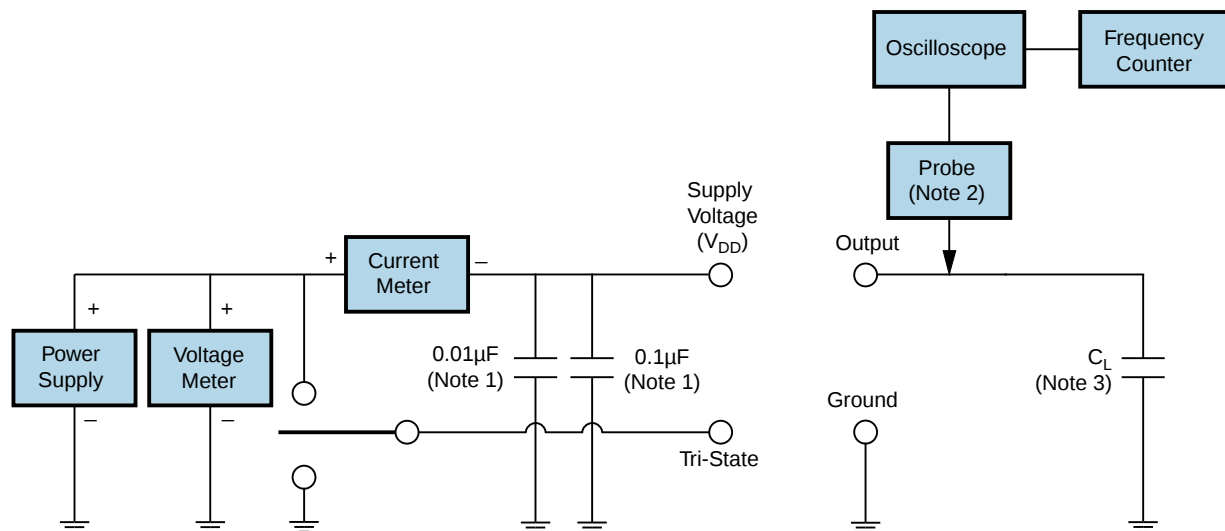
All Tolerances are  $\pm 0.1$

# EB15E2E2H-4.500M

## OUTPUT WAVEFORM & TIMING DIAGRAM



## Test Circuit for CMOS Output



Note 1: An external 0.1 $\mu\text{F}$  low frequency tantalum bypass capacitor in parallel with a 0.01 $\mu\text{F}$  high frequency ceramic bypass capacitor close to the package ground and  $V_{DD}$  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.

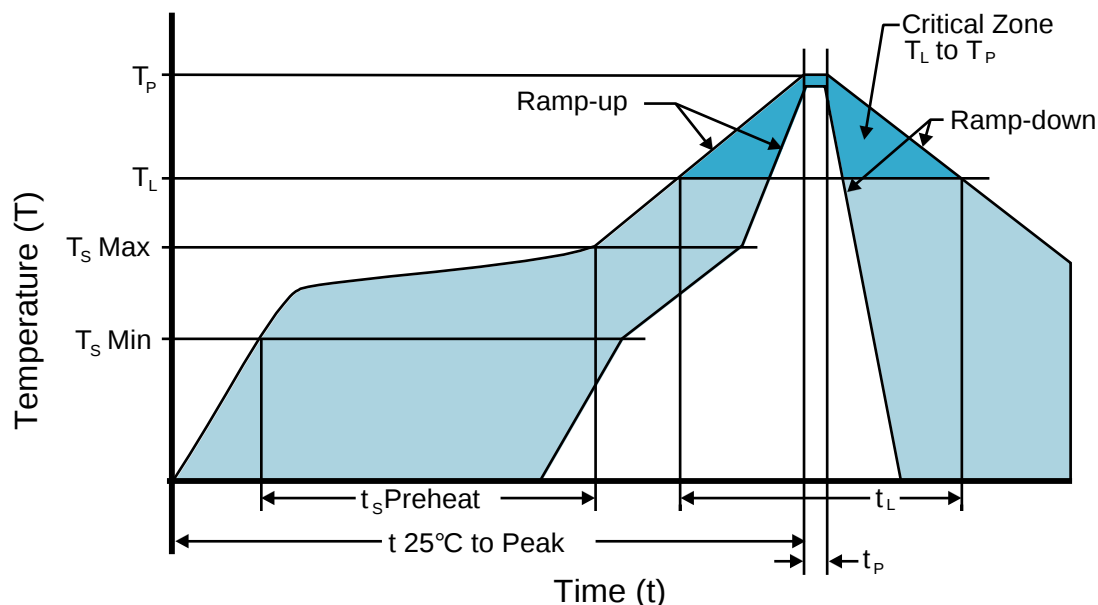
## Recommended Solder Reflow Methods



### High Temperature Infrared/Convection

|                                                                  |                                      |
|------------------------------------------------------------------|--------------------------------------|
| $T_s \text{ MAX to } T_L$ (Ramp-up Rate)                         | 3°C/second Maximum                   |
| <b>Preheat</b>                                                   |                                      |
| - Temperature Minimum ( $T_s \text{ MIN}$ )                      | 150°C                                |
| - Temperature Typical ( $T_s \text{ TYP}$ )                      | 175°C                                |
| - Temperature Maximum ( $T_s \text{ MAX}$ )                      | 200°C                                |
| - Time ( $t_s \text{ MIN}$ )                                     | 60 - 180 Seconds                     |
| <b>Ramp-up Rate (<math>T_L</math> to <math>T_p</math>)</b>       | 3°C/second Maximum                   |
| <b>Time Maintained Above:</b>                                    |                                      |
| - Temperature ( $T_L$ )                                          | 217°C                                |
| - Time ( $t_L$ )                                                 | 60 - 150 Seconds                     |
| <b>Peak Temperature (<math>T_p</math>)</b>                       | 260°C Maximum for 10 Seconds Maximum |
| <b>Target Peak Temperature (<math>T_p \text{ Target}</math>)</b> | 250°C +0/-5°C                        |
| <b>Time within 5°C of actual peak (<math>t_p</math>)</b>         | 20 - 40 seconds                      |
| <b>Ramp-down Rate</b>                                            | 6°C/second Maximum                   |
| <b>Time 25°C to Peak Temperature (t)</b>                         | 8 minutes Maximum                    |
| <b>Moisture Sensitivity Level</b>                                | Level 1                              |

## 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 1 Time / 230°C Maximum 2 Times

**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.