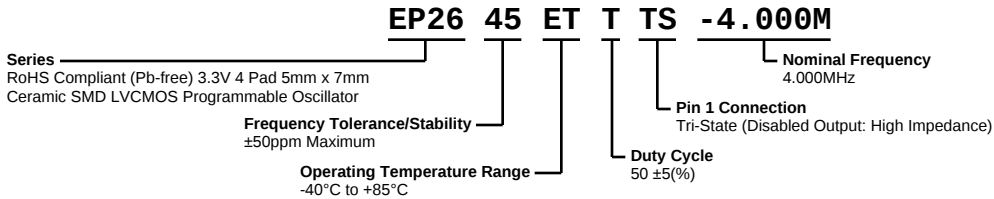


# EP2645ETTS-4.000M



**ECLIPTEK**  
CORPORATION



## ELECTRICAL SPECIFICATIONS

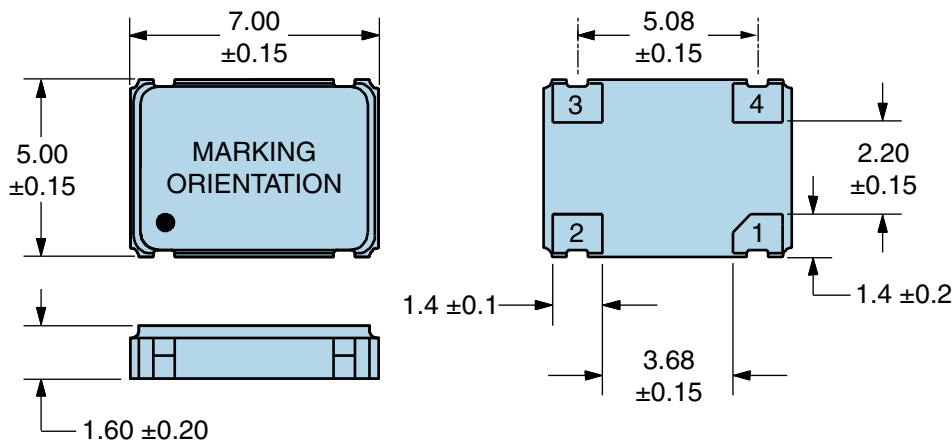
|                                       |                                                                                                                                                                                                                                  |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 4.000MHz                                                                                                                                                                                                                         |
| Frequency Tolerance/Stability         | ±50ppm Maximum (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) |
| Aging at 25°C                         | ±5ppm/year Maximum                                                                                                                                                                                                               |
| Operating Temperature Range           | -40°C to +85°C                                                                                                                                                                                                                   |
| Supply Voltage                        | 3.3Vdc ±0.3Vdc                                                                                                                                                                                                                   |
| Input Current                         | 28mA Maximum (Unloaded)                                                                                                                                                                                                          |
| Output Voltage Logic High (Voh)       | Vdd-0.4Vdc Minimum (IOH= -8mA)                                                                                                                                                                                                   |
| Output Voltage Logic Low (Vol)        | 0.4Vdc Maximum (IOL= +8mA)                                                                                                                                                                                                       |
| Rise/Fall Time                        | 4nSec Maximum (Measured at 20% to 80% of waveform)                                                                                                                                                                               |
| Duty Cycle                            | 50 ±5(%) (Measured at 50% of waveform)                                                                                                                                                                                           |
| Load Drive Capability                 | 30pF Maximum                                                                                                                                                                                                                     |
| Output Logic Type                     | CMOS                                                                                                                                                                                                                             |
| Pin 1 Connection                      | Tri-State (Disabled Output: High Impedance)                                                                                                                                                                                      |
| Tri-State Input Voltage (Vih and Vil) | 70% of Vdd Minimum to enable output, 20% of Vdd Maximum to disable output, No Connect to enable output.                                                                                                                          |
| Standby Current                       | 20µA Maximum (Pin 1 = Ground)                                                                                                                                                                                                    |
| Disable Current                       | 16mA Maximum (Pin 1 = Ground)                                                                                                                                                                                                    |
| Absolute Clock Jitter                 | ±250pSec Maximum, ±100pSec Typical                                                                                                                                                                                               |
| One Sigma Clock Period Jitter         | ±50pSec 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          |
| 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 (High Impedance) |
| 2   | Ground/Case Ground         |
| 3   | Output                     |
| 4   | Supply Voltage             |

| LINE | MARKING                                                                                                                             |
|------|-------------------------------------------------------------------------------------------------------------------------------------|
| 1    | ECLIPTEK                                                                                                                            |
| 2    | 4.000M                                                                                                                              |
| 3    | PXXYYZ<br><i>P=Configuration Designator<br/>XX=Ecliptek Manufacturing Code<br/>Y=Last Digit of the Year<br/>ZZ=Week of the Year</i> |

## Suggested Solder Pad Layout

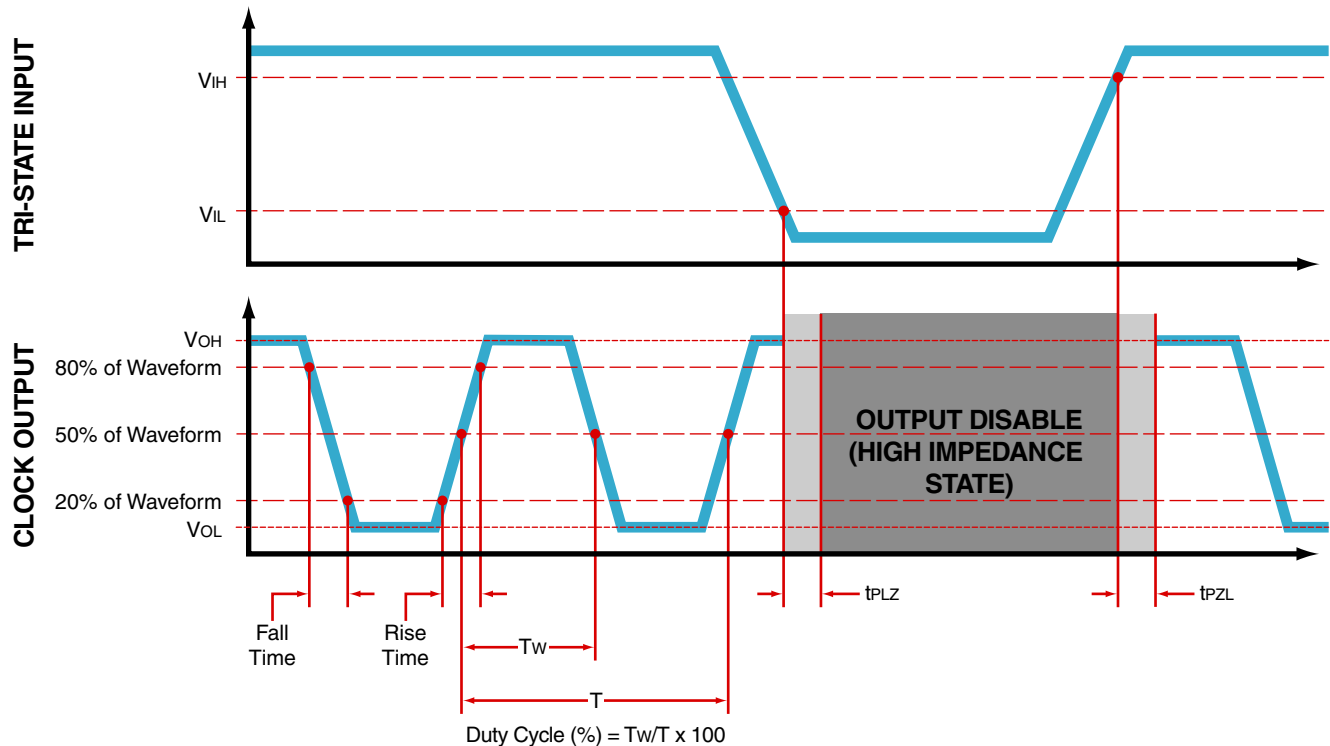
All Dimensions in Millimeters



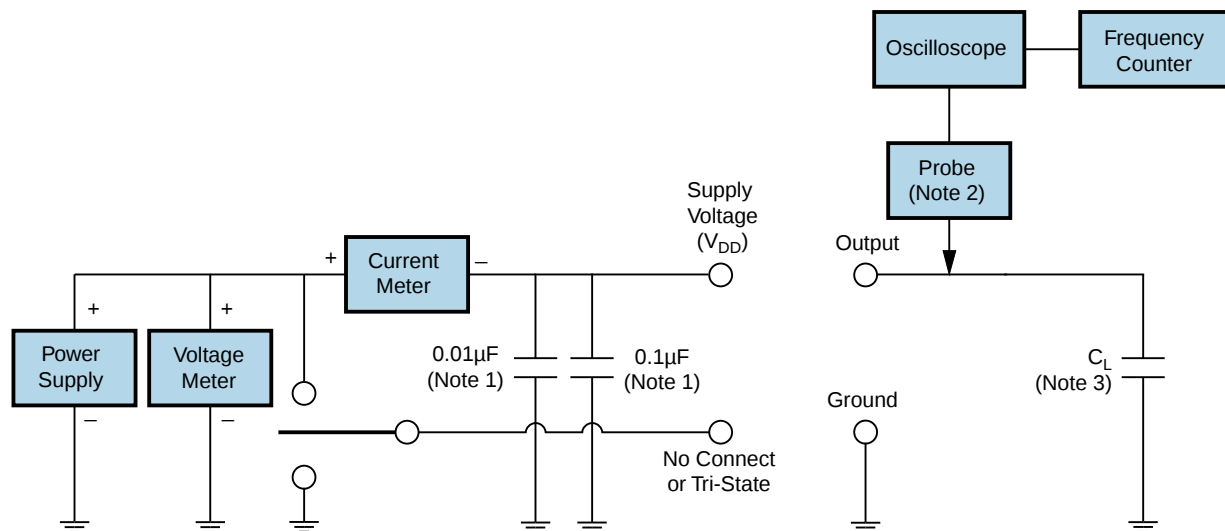
All Tolerances are ±0.1

# EP2645ETTS-4.000M

## OUTPUT WAVEFORM & TIMING DIAGRAM



## Test Circuit for CMOS Output



Note 1: An external 0.1 $\mu$ F low frequency tantalum bypass capacitor in parallel with a 0.01 $\mu$ 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.

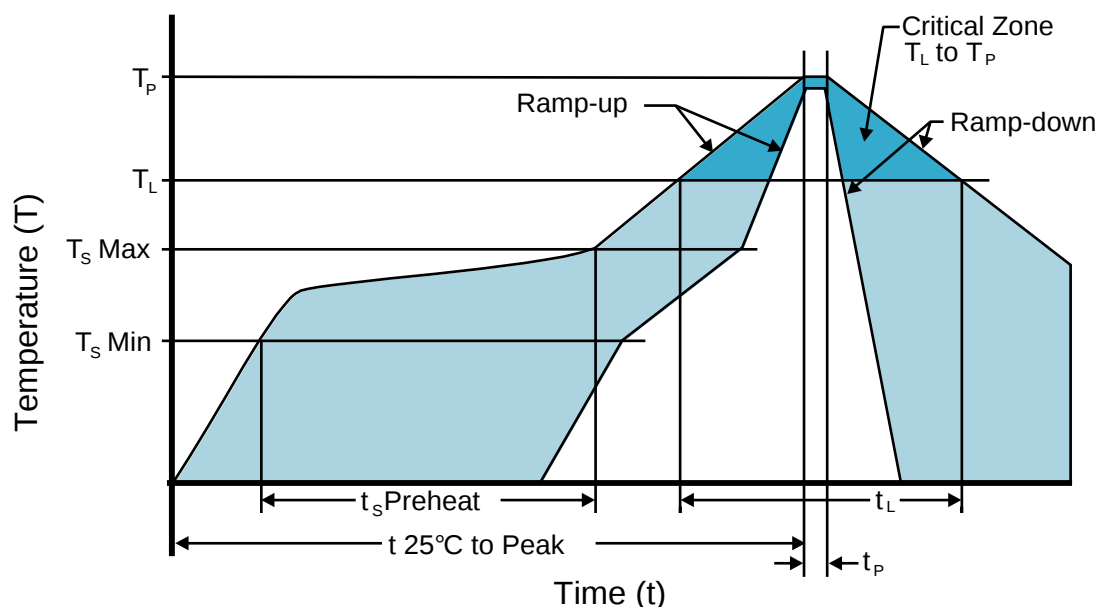
## Recommended Solder Reflow Methods



### High Temperature Infrared/Convection

|                                                                |                                                   |
|----------------------------------------------------------------|---------------------------------------------------|
| <b><math>T_S</math> MAX to <math>T_L</math> (Ramp-up Rate)</b> | 3°C/second Maximum                                |
| <b>Preheat</b>                                                 |                                                   |
| - Temperature Minimum ( $T_S$ MIN)                             | 150°C                                             |
| - Temperature Typical ( $T_S$ TYP)                             | 175°C                                             |
| - Temperature Maximum ( $T_S$ MAX)                             | 200°C                                             |
| - Time ( $t_s$ 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</math> Target)</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                                           |
| <b>Additional Notes</b>                                        | Temperatures shown are applied to body of device. |

## 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 1 Time / 230°C Maximum 2 Times

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.)