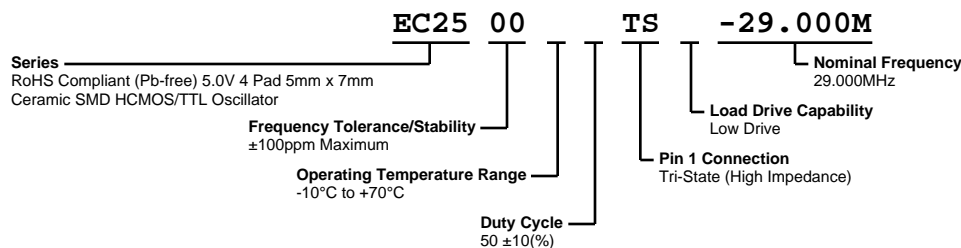


# EC2500TS-29.000M



## ELECTRICAL SPECIFICATIONS

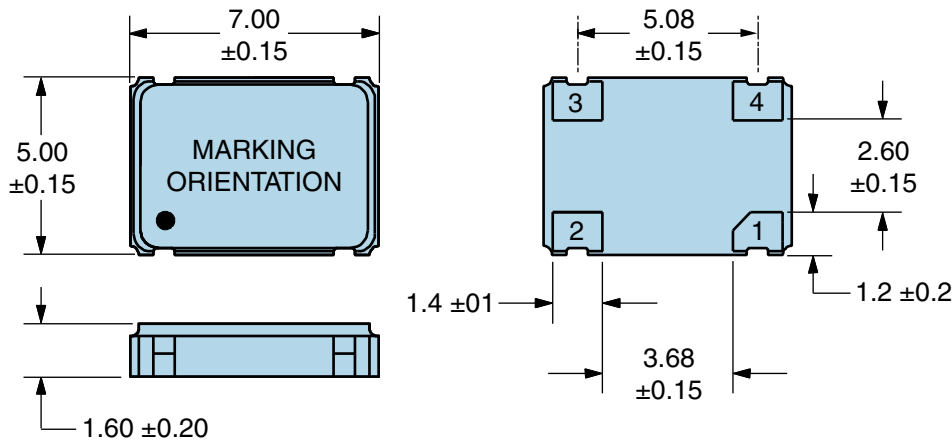
|                                       |                                                                                                                                                                                                                                   |
|---------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                     | 29.000MHz                                                                                                                                                                                                                         |
| Frequency Tolerance/Stability         | ±100ppm 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           | -10°C to +70°C                                                                                                                                                                                                                    |
| Supply Voltage                        | 5.0Vdc ±10%                                                                                                                                                                                                                       |
| Input Current                         | 10mA Maximum (No Load)                                                                                                                                                                                                            |
| Output Voltage Logic High (Voh)       | 2.4Vdc Minimum with TTL Load, Vdd-0.5Vdc Minimum with HCMOS Load                                                                                                                                                                  |
| Input Current Logic High (Ioh)        | -4mA                                                                                                                                                                                                                              |
| Output Voltage Logic Low (Vol)        | 0.4Vdc Maximum with TTL Load, 0.5Vdc Maximum with HCMOS Load                                                                                                                                                                      |
| Input Current Logic Low (Iol)         | 4mA                                                                                                                                                                                                                               |
| Rise/Fall Time                        | 10nSec Maximum (Measured at 0.4Vdc to 2.4Vdc with TTL Load; Measured at 10% to 90% of waveform with HCMOS Load)                                                                                                                   |
| Duty Cycle                            | 50 ±10(%) (Measured at 50% of waveform with HCMOS Load or at 1.4Vdc with TTL Load)                                                                                                                                                |
| Load Drive Capability                 | Low Drive (10LSTTL Load or 30pF HCMOS Load Maximum)                                                                                                                                                                               |
| Output Logic Type                     | CMOS                                                                                                                                                                                                                              |
| Pin 1 Connection                      | Tri-State (High Impedance)                                                                                                                                                                                                        |
| Tri-State Input Voltage (Vih and Vil) | +2.0Vdc Minimum to enable output, +0.8Vdc Maximum to disable output (High Impedance), No Connect to enable output.                                                                                                                |
| RMS Phase Jitter                      | 1pSec Maximum (12kHz to 20MHz offset frequency)                                                                                                                                                                                   |
| Start Up Time                         | 10mSec Maximum                                                                                                                                                                                                                    |
| Storage Temperature Range             | -55°C to +125°C                                                                                                                                                                                                                   |

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                              |                                       |
|------------------------------|---------------------------------------|
| Fine Leak Test               | MIL-STD-883, Method 1014, Condition A |
| Gross Leak Test              | MIL-STD-883, Method 1014, Condition C |
| Mechanical Shock             | MIL-STD-202, Method 213, Condition C  |
| Resistance to Soldering Heat | MIL-STD-202, Method 210               |
| Resistance to Solvents       | MIL-STD-202, Method 215               |
| Solderability                | MIL-STD-883, Method 2003              |
| Temperature Cycling          | MIL-STD-883, Method 1010              |
| Vibration                    | MIL-STD-883, Method 2007, Condition A |

# EC2500TS-29.000M

## MECHANICAL DIMENSIONS (all dimensions in millimeters)

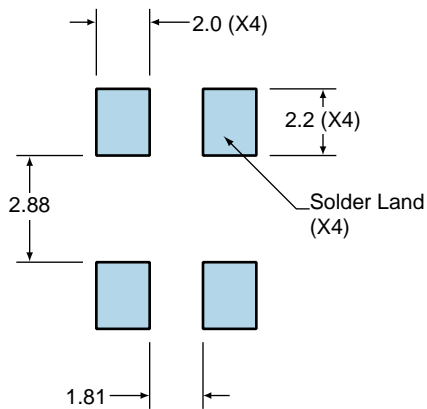


| PIN | CONNECTION     |
|-----|----------------|
| 1   | Tri-State      |
| 2   | Ground         |
| 3   | Output         |
| 4   | Supply Voltage |

| LINE | MARKING                                                                                           |
|------|---------------------------------------------------------------------------------------------------|
| 1    | <b>ECLIPTEK</b>                                                                                   |
| 2    | <b>29.000M</b>                                                                                    |
| 3    | <b>XXYYZ</b><br>XX=Ecliptek Manufacturing Code<br>Y=Last Digit of the Year<br>ZZ=Week of the Year |

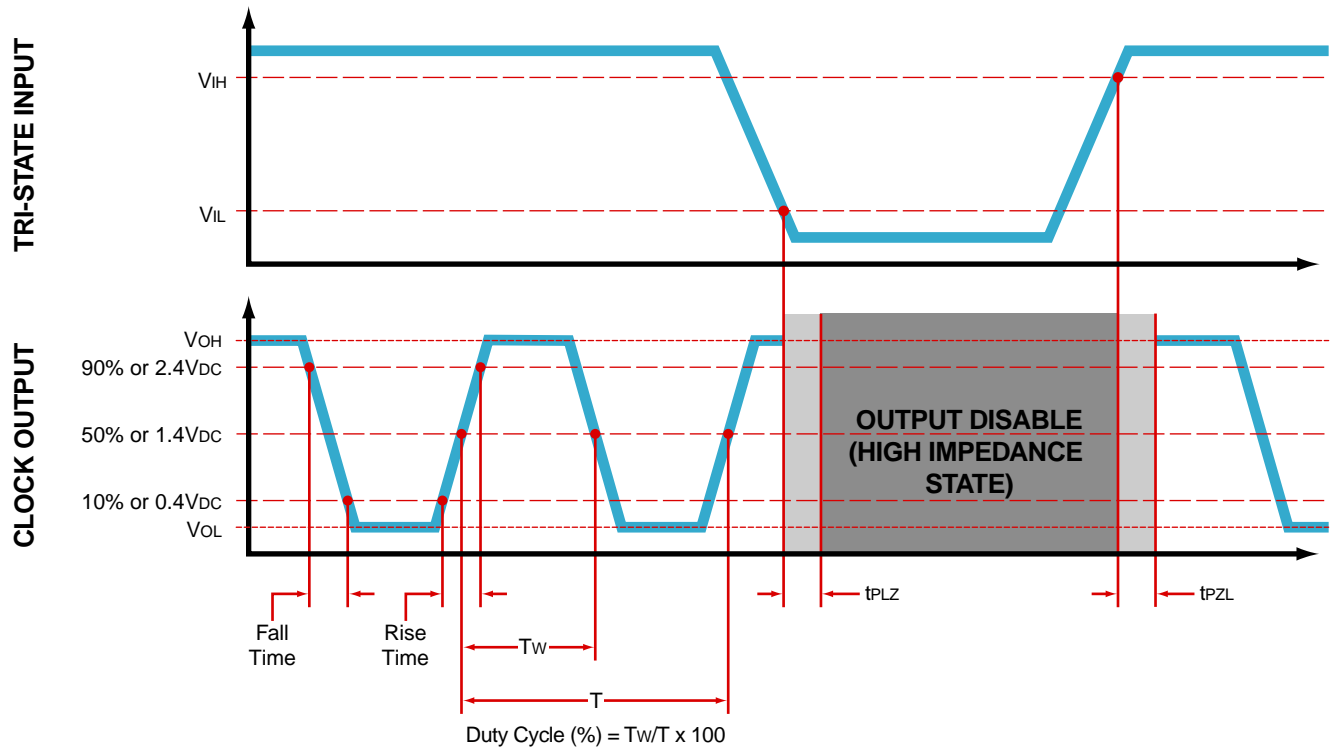
## Suggested Solder Pad Layout

All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

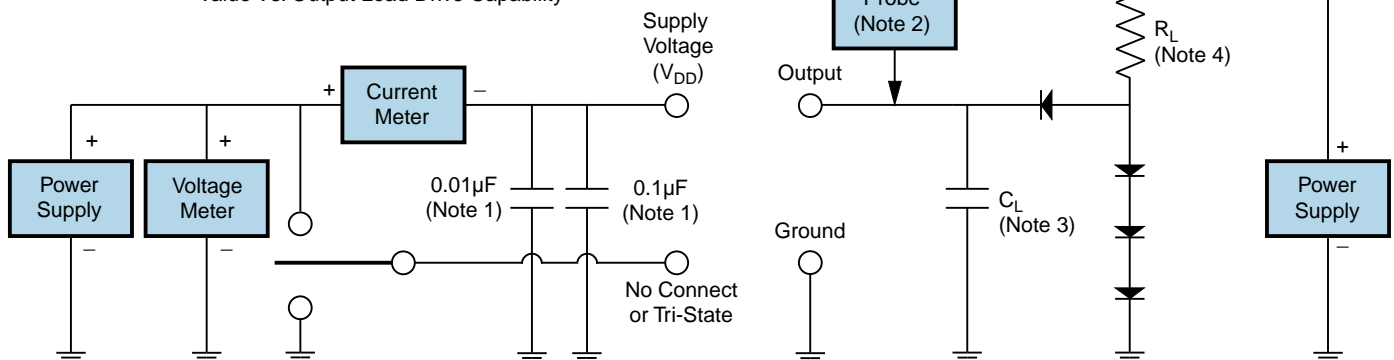
## OUTPUT WAVEFORM & TIMING DIAGRAM



### Test Circuit for TTL Output

| Output Load Drive Capability | $R_L$ Value (Ohms) | $C_L$ Value (pF) |
|------------------------------|--------------------|------------------|
| 10TTL                        | 390                | 15               |
| 5TTL                         | 780                | 15               |
| 2TTL                         | 1100               | 6                |
| 10LSTTL                      | 2000               | 15               |
| 1TTL                         | 2200               | 3                |

Table 1:  $R_L$  Resistance Value and  $C_L$  Capacitance Value Vs. Output Load Drive Capability



- 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.
- Note 4: Resistance value  $R_L$  is shown in Table 1. See applicable specification sheet for 'Load Drive Capability'.
- Note 5: All diodes are MMBD7000, MMBD914, or equivalent.

# EC2500TS-29.000M

## 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 ( $<12\text{pF}$ ), 10X attenuation factor, high impedance ( $>10\text{Mohms}$ ), and high bandwidth ( $>300\text{MHz}$ ) 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

|                                                                |                                                        |
|----------------------------------------------------------------|--------------------------------------------------------|
| <b><math>T_S</math> MAX to <math>T_L</math> (Ramp-up Rate)</b> | 5°C/second Maximum                                     |
| <b>Preheat</b>                                                 |                                                        |
| - 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                                       |
| <b>Ramp-up Rate (<math>T_L</math> to <math>T_P</math>)</b>     | 5°C/second Maximum                                     |
| <b>Time Maintained Above:</b>                                  |                                                        |
| - Temperature ( $T_L$ )                                        | 150°C                                                  |
| - Time ( $t_L$ )                                               | 200 Seconds Maximum                                    |
| <b>Peak Temperature (<math>T_P</math>)</b>                     | 240°C Maximum                                          |
| <b>Target Peak Temperature (<math>T_P</math> Target)</b>       | 240°C Maximum 1 Time / 230°C Maximum 2 Times           |
| <b>Time within 5°C of actual peak (<math>t_p</math>)</b>       | 10 seconds Maximum 2 Times / 80 seconds Maximum 1 Time |
| <b>Ramp-down Rate</b>                                          | 5°C/second Maximum                                     |
| <b>Time 25°C to Peak Temperature (t)</b>                       | N/A                                                    |
| <b>Moisture Sensitivity Level</b>                              | Level 1                                                |
| <b>Additional Notes</b>                                        | 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.)