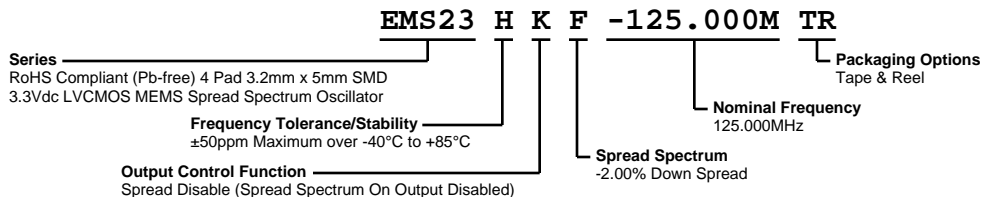


# EMS23HKF-125.000M TR



**ECLIPTEK**<sup>®</sup>  
CORPORATION



## ELECTRICAL SPECIFICATIONS

|  |  |
|--|--|
| <b>Nominal Frequency</b>                           | 125.000MHz   |
| <b>Frequency Tolerance/Stability</b>               | ±50ppm 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, 260°C Reflow, Shock, and Vibration) |
| <b>Aging at 25°C</b>                               | ±1ppm Maximum First Year   |
| <b>Supply Voltage</b>                              | 3.3Vdc ±10%  |
| <b>Maximum Supply Voltage</b>                      | -0.5Vdc to +3.65Vdc  |
| <b>Input Current</b>                               | 40mA Maximum (Unloaded; Nominal Vdd)   |
| <b>Output Voltage Logic High (Voh)</b>             | 90% of Vdd Minimum (IOH=-8mA)  |
| <b>Output Voltage Logic Low (Vol)</b>              | 10% of Vdd Maximum (IOL=+8mA)  |
| <b>Rise/Fall Time</b>                              | 2nSec Maximum (Measured from 20% to 80% of waveform)   |
| <b>Duty Cycle</b>                                  | 50 ±10(%) (Measured at 50% of waveform)  |
| <b>Load Drive Capability</b>                       | 15pF Maximum   |
| <b>Output Logic Type</b>                           | CMOS   |
| <b>Output Control Function</b>                     | Spread Disable (Spread Spectrum On Output Disabled)  |
| <b>Spread Spectrum Input Voltage (Vih and Vil)</b> | 70% of Vdd Minimum or No Connection to Enable Spread Spectrum-On Output, 30% of Vdd Maximum to Disable Spread Spectrum-On Output   |
| <b>Spread Spectrum</b>                             | -2.00% Down Spread   |
| <b>Modulation Frequency</b>                        | 30kHz Minimum, 32kHz Typical, 35kHz Maximum  |
| <b>Period Jitter</b>                               | 30pSec Maximum (Cycle to Cycle; Spread Spectrum-On; Fo=133.333M, Vdd=3.3Vdc)   |
| <b>Start Up Time</b>                               | 10mSec Maximum   |
| <b>Storage Temperature Range</b>                   | -55°C to +125°C  |

## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                                     |   |
|-------------------------------------|---|
| <b>ESD Susceptibility</b>           | MIL-STD-883, Method 3015, Class 2, HBM 2000V              |
| <b>Flammability</b>                 | UL94-V0   |
| <b>Mechanical Shock</b>             | MIL-STD-883, Method 2002, Condition G, 30,000G            |
| <b>Moisture Resistance</b>          | MIL-STD-883, Method 1004                                  |
| <b>Moisture Sensitivity Level</b>   | J-STD-020, MSL 1  |
| <b>Resistance to Soldering Heat</b> | MIL-STD-202, Method 210, Condition K                      |
| <b>Resistance to Solvents</b>       | MIL-STD-202, Method 215                                   |
| <b>Solderability</b>                | MIL-STD-883, Method 2003 (Pads on bottom of package only) |
| <b>Temperature Cycling</b>          | MIL-STD-883, Method 1010, Condition B                     |
| <b>Thermal Shock</b>                | MIL-STD-883, Method 1011, Condition B                     |
| <b>Vibration</b>                    | MIL-STD-883, Method 2007, Condition A, 20G                |

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## MECHANICAL DIMENSIONS (all dimensions in millimeters)

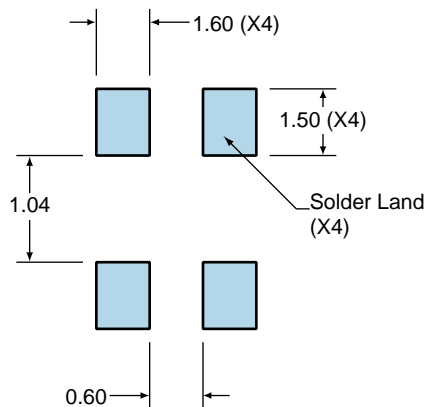


| PIN | CONNECTION                |
|-----|---------------------------|
| 1   | Spread Disable (Disabled) |
| 2   | Ground                    |
| 3   | Output                    |
| 4   | Supply Voltage            |

| LINE | MARKING  |
|------|--|
| 1    | <b>XXXX</b><br>XXXX=Ecliptek<br>Manufacturing Lot Code |

## Suggested Solder Pad Layout

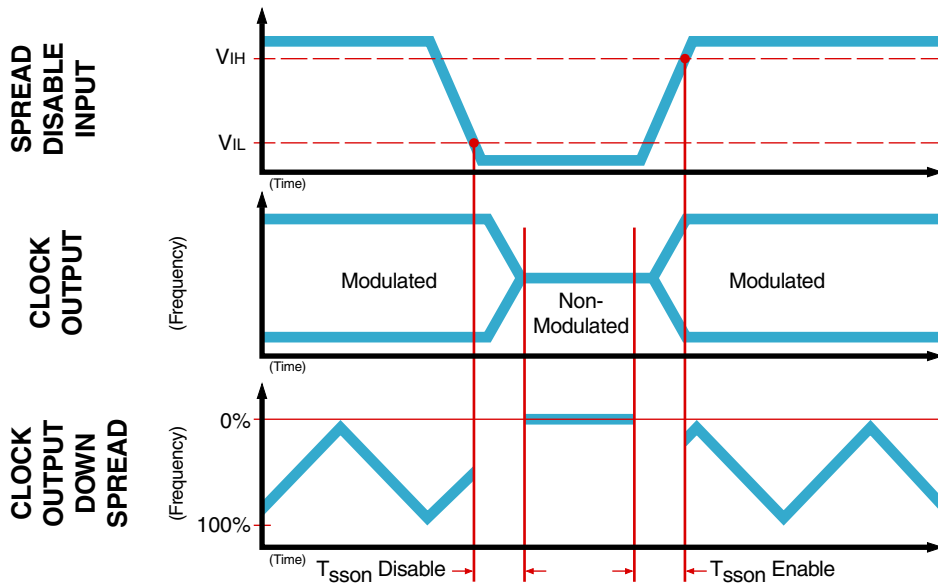
All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

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## 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.

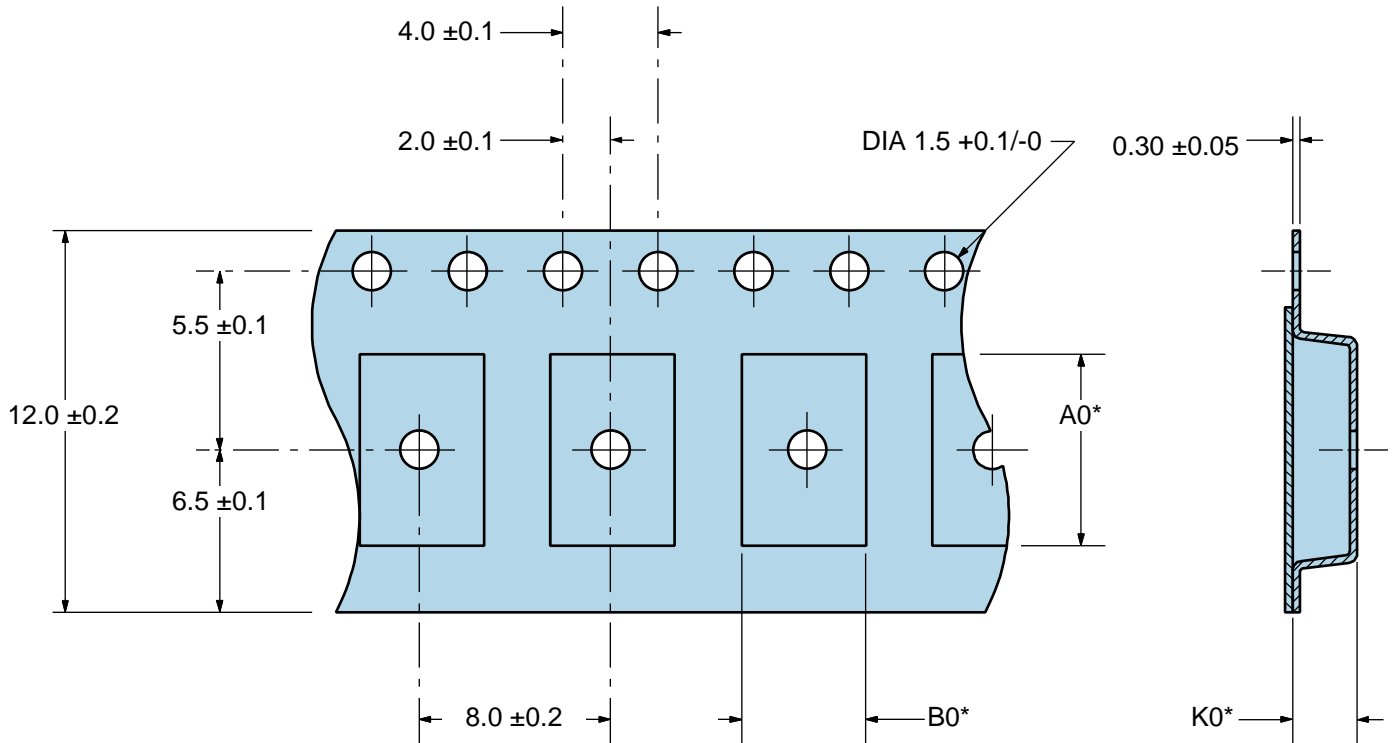
Note 2: A low capacitance ( $<12pF$ ), 10X attenuation factor, high impedance ( $>10Mohms$ ), and high bandwidth ( $>300MHz$ ) passive probe is recommended.

Note 3: Capacitance value  $C_L$  includes sum of all probe and fixture capacitance.

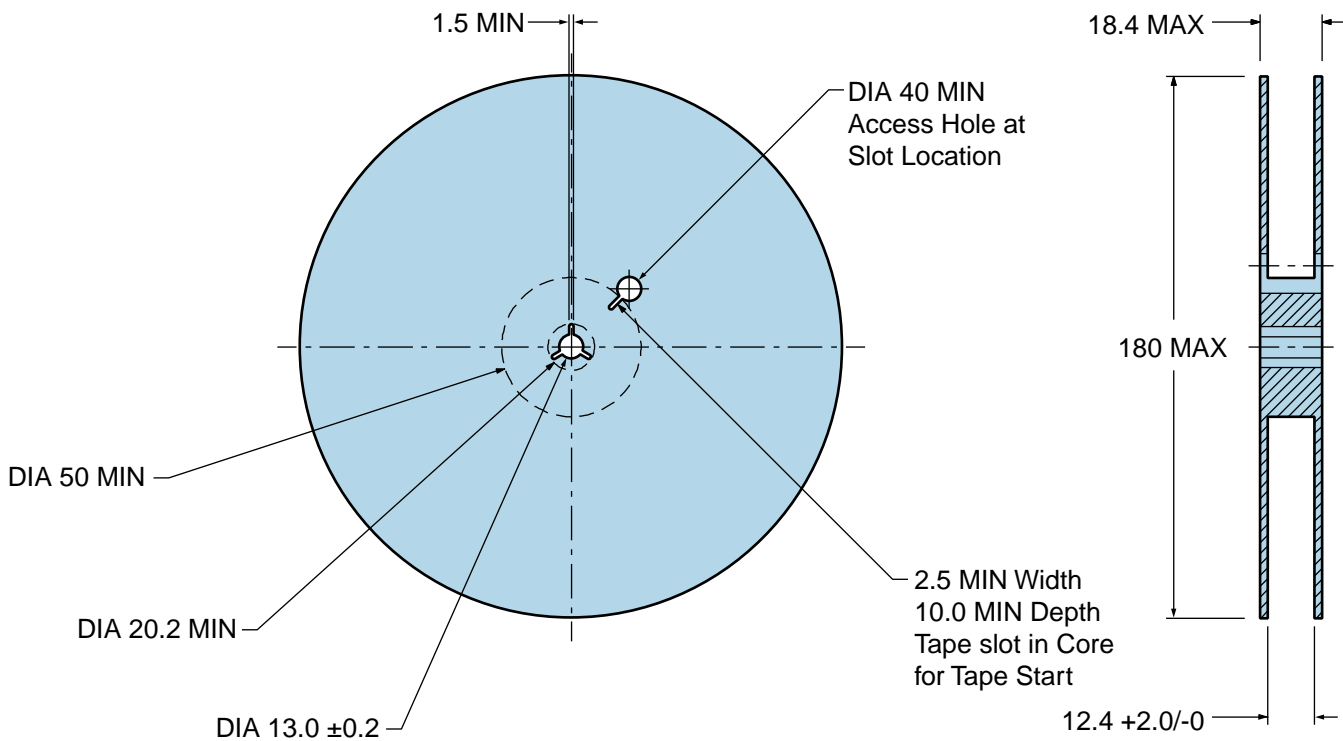
# EMS23HKF-125.000M TR

## Tape & Reel Dimensions

Quantity Per Reel: 1,000 units



\*Compliant to EIA 481A



# EMS23HKF-125.000M TR

## 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                              |

## 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  |

### 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.