

# EMTB81A3D-32.768K TR

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Aug 3, 2020)


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## ITEM DESCRIPTION

Temperature Compensated MEMS Clock Oscillators TCMO LVCMOS (CMOS) 1.8Vdc 4 Pad 0.8mm x 1.5mm Chip Scale Package (CSP) 32.768KHz 0°C to +70°C

## ELECTRICAL SPECIFICATIONS

|                                             |                                                                                                                  |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                           | 32.768KHz                                                                                                        |
| Frequency Stability                         | ±5.0ppm Maximum (Inclusive of Operating Temperature Range, Output Load Change (±20%), and Reflow, at Vdd=1.8Vdc) |
| Frequency Stability vs. Frequency Tolerance | ±5.0ppm Maximum (Measured at 25°C ±2°C, at Vdd=1.8Vdc, Post Reflow)                                              |
| Frequency Stability vs. Input Voltage       | ±0.75ppm Maximum (±10%)                                                                                          |
| Frequency Stability vs. Aging               | ±1ppm/Year Maximum (at 25°C)                                                                                     |
| Operating Temperature Range                 | 0°C to +70°C                                                                                                     |
| Supply Voltage                              | 1.8Vdc ±10%                                                                                                      |
| Core Operating Current                      | 0.99µA Typical (at 25°C), 1.52µA Maximum                                                                         |
| Output Stage Operating Current              | 0.065µA/Vpp Typical, 0.125µA/Vpp Maximum                                                                         |
| Input Current                               | 1.1µA Typical (at 25°C), 1.8µA Maximum (No Load, Nominal Vdd)                                                    |
| Output Voltage Logic High (Voh)             | 90% of Vdd Minimum (IOH = -10µA)                                                                                 |
| Output Voltage Logic Low (Vol)              | 10% of Vdd Maximum (IOL = +10µA)                                                                                 |
| Rise/Fall Time                              | 100nSec Typical, 200nSec Maximum (Measured at 10% to 90% of waveform)                                            |
| Duty Cycle                                  | 50 ±2(%) (Measured at 50% of waveform)                                                                           |
| Load Drive Capability                       | 15pF Maximum                                                                                                     |
| Output Logic Type                           | CMOS                                                                                                             |
| Peak to Peak Jitter (tPK)                   | 2.5µSec Maximum                                                                                                  |
| Period Jitter (RMS)                         | 33nSec Typical (Measured at 25°C)                                                                                |
| Power Supply Ramp                           | 100mSec Maximum (Measured at 0Vdc to 90% of Vdd)                                                                 |
| Start Up Time                               | 180mSec Typical, 350mSec Maximum (Measured at Nominal Vdd)                                                       |
| Storage Temperature Range                   | -55°C to +125°C                                                                                                  |

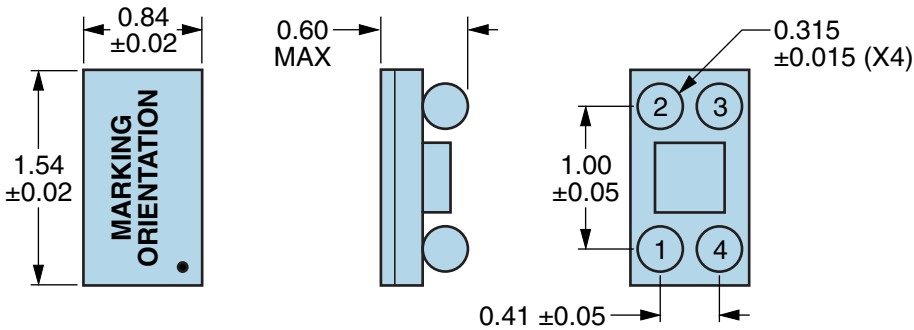
## ENVIRONMENTAL & MECHANICAL SPECIFICATIONS

|                      |                                                |
|----------------------|------------------------------------------------|
| ESD Susceptibility   | JESD22-A114, HBM, 3000V                        |
| Flammability         | UL94-V0                                        |
| Mechanical Shock     | MIL-STD-883, Method 2002, Condition E, 10,000G |
| Moisture Sensitivity | J-STD-020, MSL 1                               |
| Solderability        | MIL-STD-883, Method 2003                       |
| Temperature Cycling  | JESD22-A104, Condition G                       |
| Vibration            | MIL-STD-883, Method 2007, Condition C, 70G     |

EMTB81A3D-32.768K TR

[Click part number to visit Part Number Details page](#)

MECHANICAL DIMENSIONS (all dimensions in millimeters)

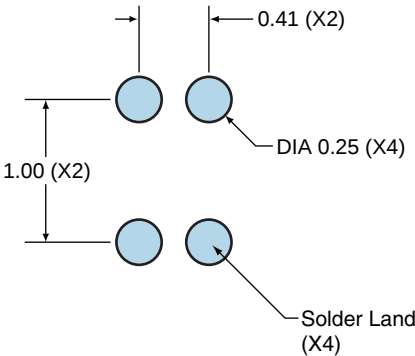


| PIN | CONNECTION     |
|-----|----------------|
| 1   | Ground         |
| 2   | Output         |
| 3   | Supply Voltage |
| 4   | Ground         |

| LINE | MARKING                                                         |
|------|-----------------------------------------------------------------|
| 1    | <b>XX</b><br>XX=Ecliptek Manufacturing Identifier               |
| 2    | <b>XXX</b><br>XXX=Ecliptek Manufacturing Identifier (continued) |

Suggested Solder Pad Layout

All Dimensions in Millimeters

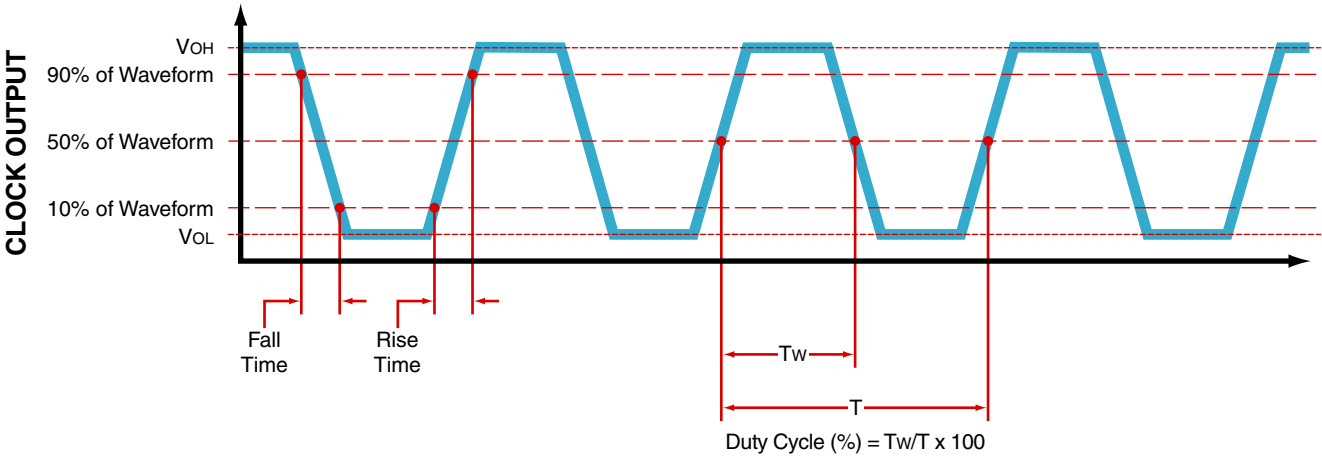


All Tolerances are ±0.1

EMTB81A3D-32.768K TR

[Click part number to visit  
Part Number Details page](#)

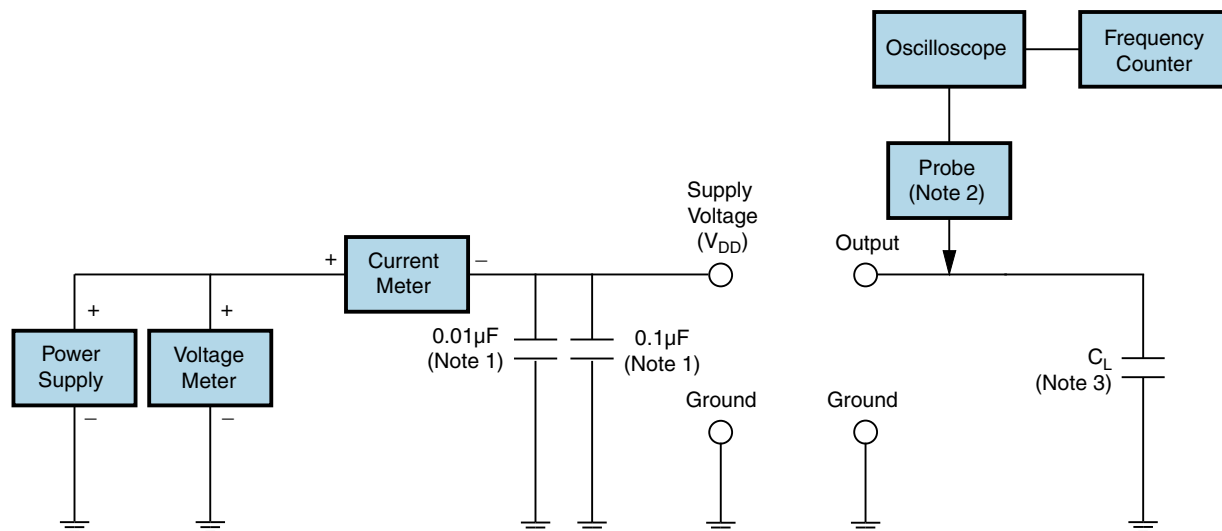
OUTPUT WAVEFORM



# EMTB81A3D-32.768K TR

[Click part number to visit Part Number Details page](#)

## Test Circuit for CMOS Output



Note 1: An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is recommended.

Note 2: A low input capacitance ( $<12\text{pF}$ ), 10X Attenuation Factor, High Impedance ( $>10\text{Mohms}$ ), and High bandwidth ( $>300\text{MHz}$ ) passive probe is recommended.

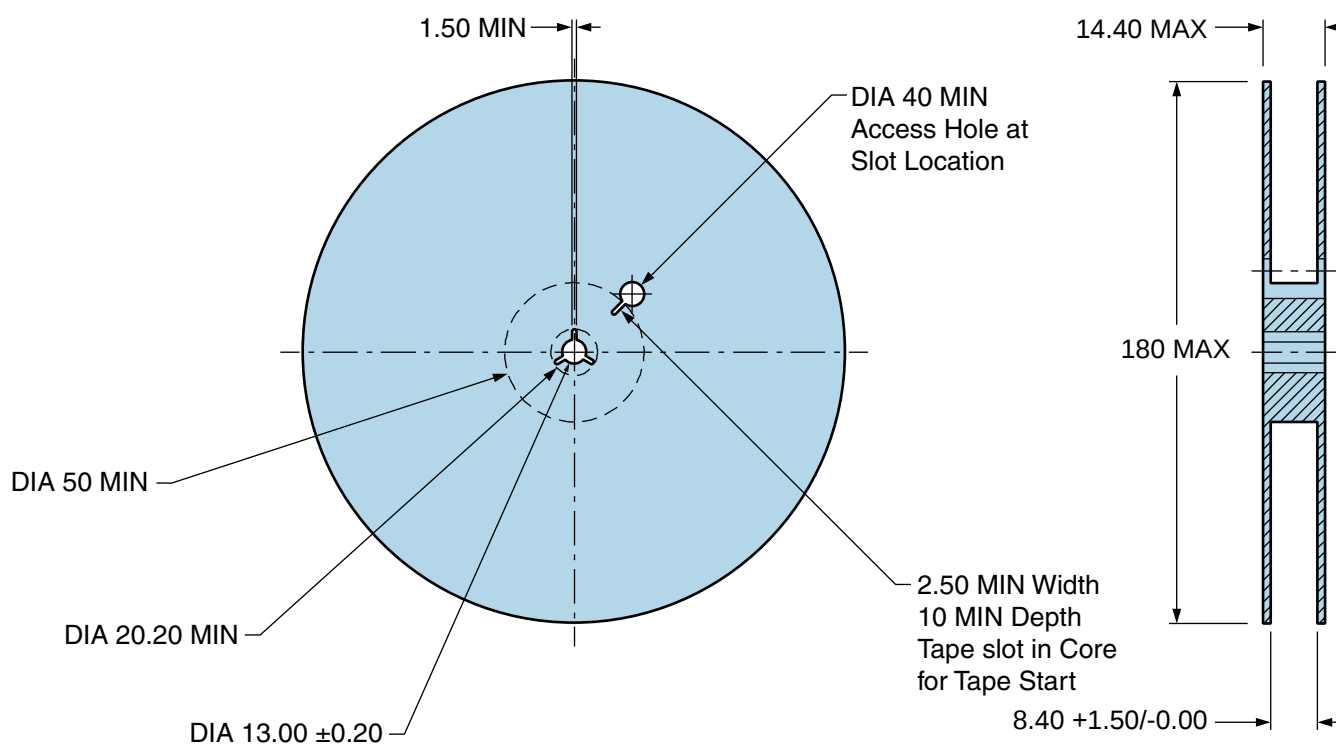
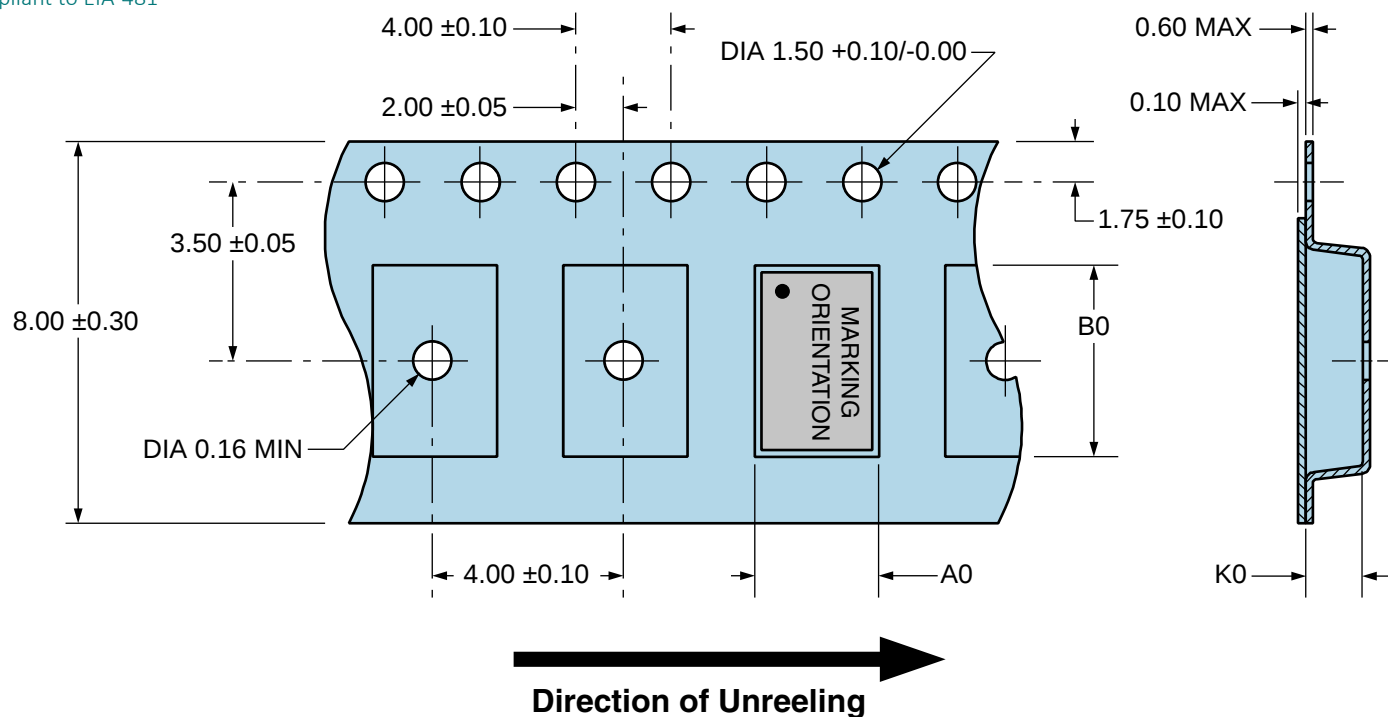
Note 3: Capacitance value  $C_L$  includes sum of all probe and fixture capacitance. See applicable specification sheet for 'Load Drive Capability'.

## Tape & Reel Dimensions

Quantity Per Reel: 1,000 units

All Dimensions in Millimeters

Compliant to EIA-481



EMTB81A3D-32.768K TR

[Click part number to visit Part Number Details page](#)

Recommended Solder Reflow Methods



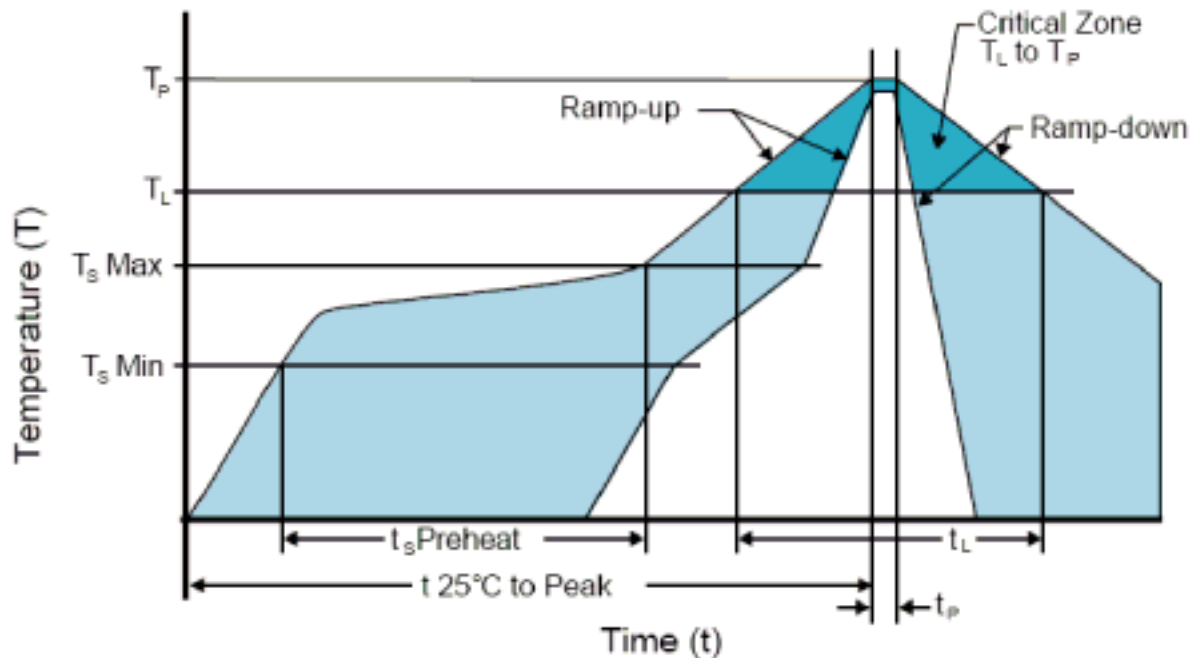
High Temperature Infrared/Convection

|                                     |                                                  |
|-------------------------------------|--------------------------------------------------|
| 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                                          |
| Additional Notes                    | Temperature shown are applied to body of device. |

# EMTB81A3D-32.768K TR

[Click part number to visit Part Number Details page](#)

## 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 |
|----------------------------|---------|

|                  |                                                  |
|------------------|--------------------------------------------------|
| Additional Notes | Temperature shown are applied to body of device. |
|------------------|--------------------------------------------------|

## Low Temperature Manual Soldering

185°C Maximum for 10 Seconds Maximum, 2 times Maximum. (Temperature shown are applied to body of device.)

## High Temperature Manual Soldering

260°C Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperature shown are applied to body of device.)

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Authorized Distributor

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