

**EMTB84A8D-32.768K TR** [Click part number to visit Part Number Details page](#)
**REGULATORY COMPLIANCE** (Data Sheet downloaded on Jun 12, 2020)

**ITEM DESCRIPTION**

Temperature Compensated MEMS Clock Oscillators TCMO LVC MOS (CMOS) 2.8Vdc 4 Pad 0.8mm x 1.5mm Chip Scale Package (CSP) 32.768KHz -40°C to +85°C

**ELECTRICAL SPECIFICATIONS**

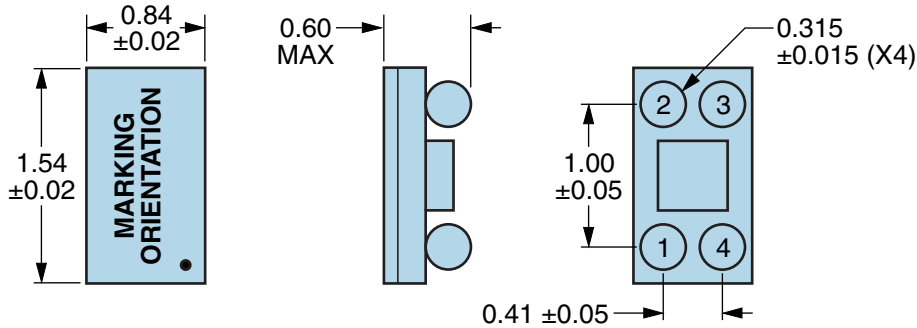
Nominal Frequency	32.768KHz
Frequency Stability	±5.0ppm Maximum (Inclusive of Operating Temperature Range, Output Load Change (±20%), and Reflow, at Vdd=2.8Vdc)
Frequency Stability vs. Frequency Tolerance	±5.0ppm Maximum (Measured at 25°C ±2°C, at Vdd=2.8Vdc, Post Reflow)
Frequency Stability vs. Input Voltage	±0.75ppm Maximum (±10%)
Frequency Stability vs. Aging	±1ppm/Year Maximum (at 25°C)
Operating Temperature Range	-40°C to +85°C
Supply Voltage	2.8Vdc ±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	1.2µA Typical (at 25°C), 1.9µA 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, 380mSec 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

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### MECHANICAL DIMENSIONS (all dimensions in millimeters)

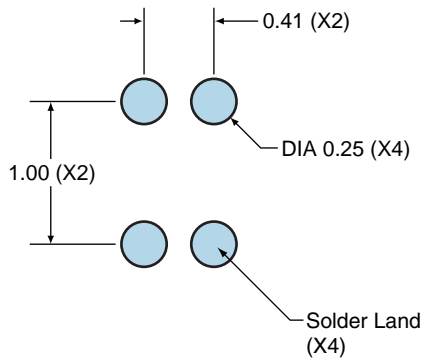


PIN	CONNECTION
1	Ground
2	Output
3	Supply Voltage
4	Ground

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

### Suggested Solder Pad Layout

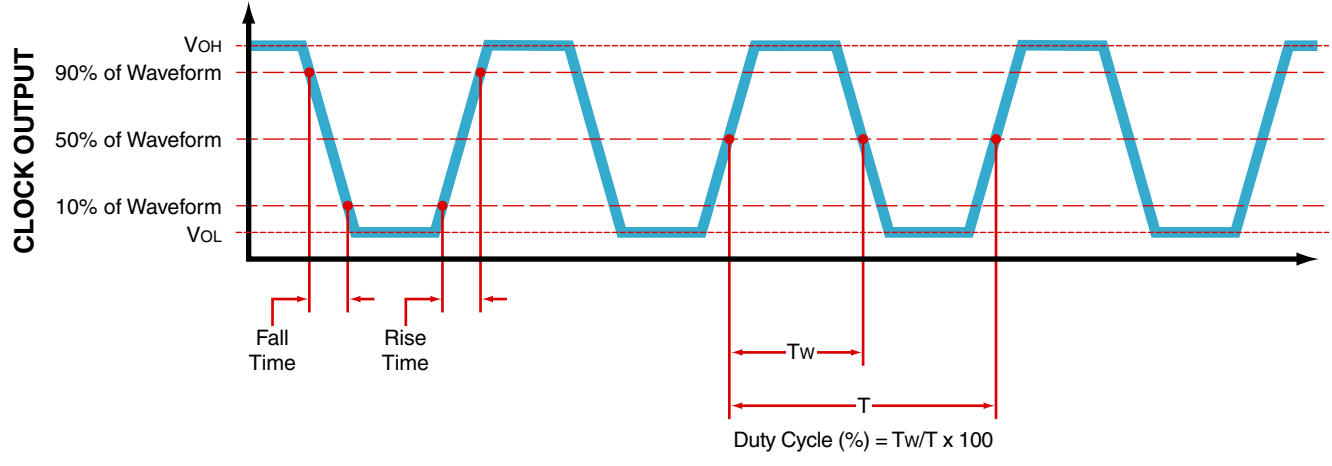
All Dimensions in Millimeters



All Tolerances are  $\pm 0.1$

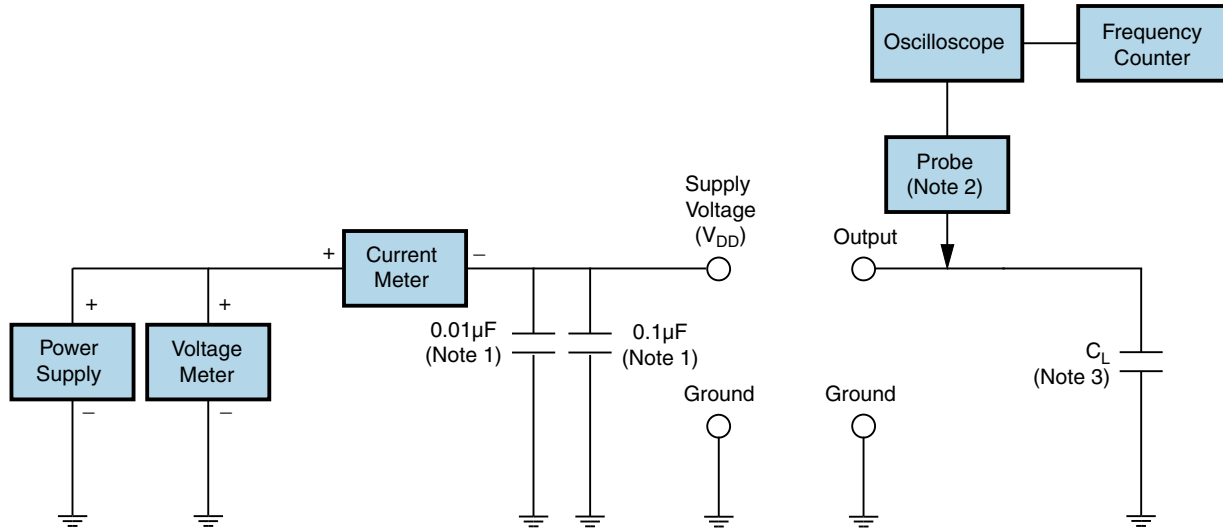
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## OUTPUT WAVEFORM



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## 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'.

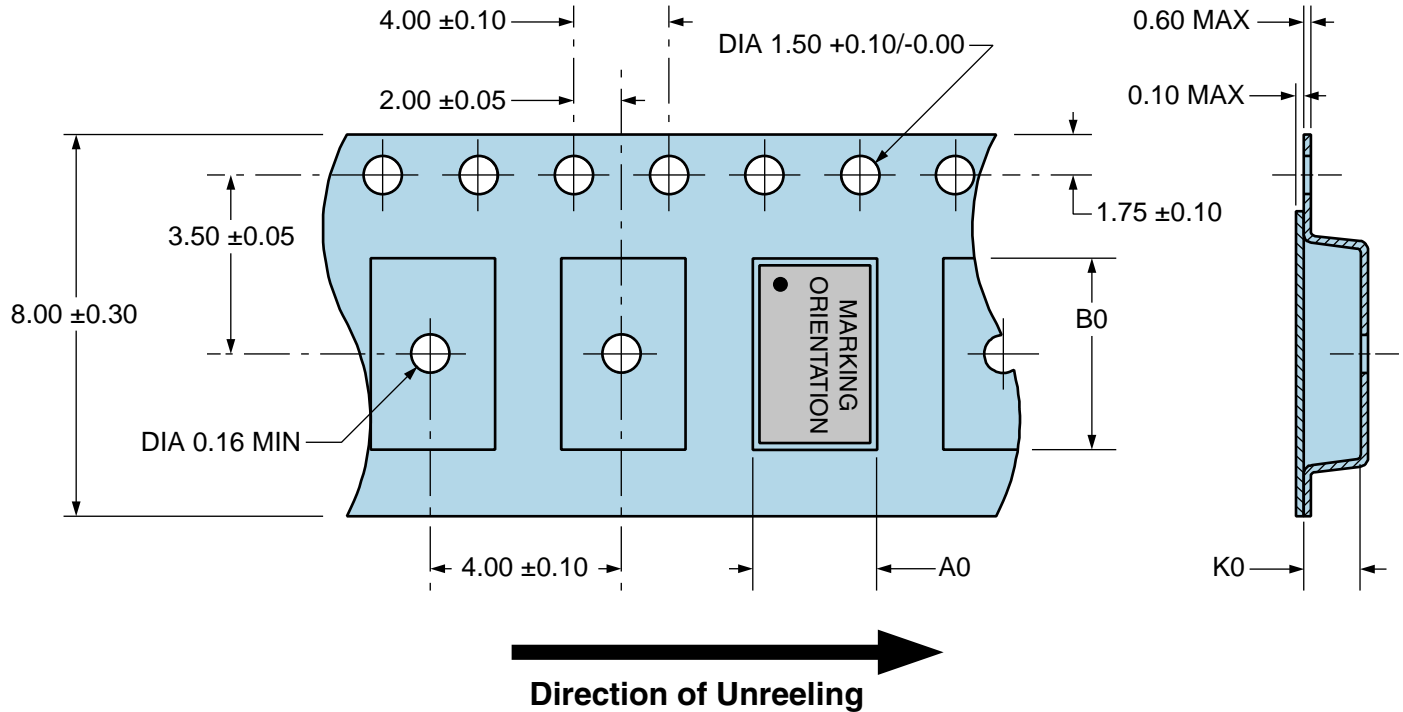
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## Tape & Reel Dimensions

Quantity Per Reel: 1,000 units

All Dimensions in Millimeters

Compliant to EIA-481



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## Recommended Solder Reflow Methods



### High Temperature Infrared/Convection

<b>Ts MAX to Tl (Ramp-up Rate)</b>	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (Ts MIN)	150°C
- Temperature Typical (Ts TYP)	175°C
- Temperature Maximum (Ts MAX)	200°C
- Time (ts MIN)	60 - 180 Seconds
<b>Ramp-up Rate (Tl to Tp)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (Tl)	217°C
- Time (tL)	60 - 150 Seconds
<b>Peak Temperature (Tp)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature (Tp Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (tp)</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>	Temperature shown are applied to body of device.

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## Recommended Solder Reflow Methods



### Low Temperature Infrared/Convection 240°C

Ts MAX to Tl (Ramp-up Rate)	5°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (Ts MIN)	N/A
- Temperature Typical (Ts TYP)	150°C
- Temperature Maximum (Ts MAX)	N/A
- Time (ts MIN)	60 - 120 Seconds
<b>Ramp-up Rate (Tl to Tp)</b>	5°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (Tl)	150°C
- Time (tL)	200 Seconds Maximum
<b>Peak Temperature (Tp)</b>	240°C Maximum
<b>Target Peak Temperature (Tp Target)</b>	240°C Maximum 2 Times / 230°C Maximum 1 Time
<b>Time within 5°C of actual peak (tp)</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>	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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