

# EL32D1DEA1K-52.000M

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## REGULATORY COMPLIANCE (Data Sheet downloaded on Nov 9, 2017)


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## ITEM DESCRIPTION

Voltage Controlled Quartz Crystal Clock Oscillators VCXO LVDS (DS) 3.3Vdc 6 Pad 5.0mm x 7.0mm Ceramic Surface Mount (SMD) 52.000MHz  $\pm 50$ ppm Maximum over 0°C to +70°C  $\pm 75$ ppm Minimum 20% Maximum

## ELECTRICAL SPECIFICATIONS

|                                        |                                                                                                                                                                                                                                                           |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                      | 52.000MHz                                                                                                                                                                                                                                                 |
| Frequency Tolerance/Stability          | $\pm 50$ ppm Maximum over 0°C to +70°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, Shock, and Vibration.) |
| Supply Voltage                         | 3.3Vdc $\pm 5\%$                                                                                                                                                                                                                                          |
| Input Current                          | 80mA Maximum                                                                                                                                                                                                                                              |
| Output Voltage Logic High (Voh)        | 1.43Vdc Typical, 1.6Vdc Maximum                                                                                                                                                                                                                           |
| Output Voltage Logic Low (Vol)         | 1.1Vdc Typical, 0.9Vdc Minimum                                                                                                                                                                                                                            |
| Vdd Magnitude Change (dVod)            | -50mV Minimum, +50mV Maximum                                                                                                                                                                                                                              |
| Differential Output Voltage (Vod)      | 247mV Minimum, 355mV Typical, 454mV Maximum                                                                                                                                                                                                               |
| Offset Voltage (Vos)                   | 1.125V Minimum, 1.20V Typical, 1.375V Maximum                                                                                                                                                                                                             |
| Rise/Fall Time                         | 1nSec Maximum (Measured over 20% to 80% of waveform)                                                                                                                                                                                                      |
| Duty Cycle                             | 50 $\pm 10$ (%) (Measured at 50% of waveform)                                                                                                                                                                                                             |
| Offset Voltage Magnitude Change (dVos) | 25mV Maximum                                                                                                                                                                                                                                              |
| Load Drive Capability                  | 100 Ohms (Between Output and Complementary Output)                                                                                                                                                                                                        |
| Output Logic Type                      | LVDS                                                                                                                                                                                                                                                      |
| Control Voltage                        | 1.65Vdc $\pm 1.65$ Vdc (Test Conditions for Frequency Deviation)                                                                                                                                                                                          |
| Control Voltage Range                  | 0.0Vdc to Vdd +0.5Vdc                                                                                                                                                                                                                                     |
| Frequency Deviation                    | $\pm 75$ ppm Minimum (Inclusive of Operating Temperature Range, Supply Voltage, and Load)                                                                                                                                                                 |
| Linearity                              | 20% Maximum                                                                                                                                                                                                                                               |
| Transfer Function                      | Positive Transfer Characteristic                                                                                                                                                                                                                          |
| Modulation Bandwidth                   | 10kHz Minimum (Measured at -3dB with Control Voltage of +1.65Vdc)                                                                                                                                                                                         |
| Input Impedance                        | 50kOhms Typical                                                                                                                                                                                                                                           |
| Phase Noise                            | -55dBc/Hz at offset of 10Hz, -90dBc/Hz at offset of 100Hz, -120dBc/Hz at offset of 1kHz, -140dBc/Hz at offset of 10kHz, -145dBc/Hz at offset of 100kHz, -148dBc/Hz at offset of 1MHz (All Values are Typical)                                             |
| Logic Control / Additional Output      | Tri-State (Enable High) / Complementary Output                                                                                                                                                                                                            |
| Tri-State Input Voltage (Vih and Vil)  | Vih of 70% of Vdd Minimum or No Connect to Enable Output and Complementary Output, Vil of 30% of Vdd Maximum to Disable (High Impedance) Output and Complementary Output                                                                                  |
| RMS Phase Jitter                       | 0.4pSec Typical, 1pSec Maximum (Fj=12kHz to 20MHz; Random)                                                                                                                                                                                                |
| Accumulated Period Jitter (tacc)       | 4pSec Typical, 5pSec Maximum Sigma of Total Jitter Distribution                                                                                                                                                                                           |
| Period Jitter (trj)                    | 3pSec Typical, 5pSec Maximum Sigma of Random Jitter                                                                                                                                                                                                       |
| Period Jitter (trms)                   | 3pSec Typical, 5pSec Maximum Sigma of Total Jitter Distribution                                                                                                                                                                                           |
| Period Jitter (tdj)                    | 4pSec Typical, 10pSec Maximum Deterministic Jitter                                                                                                                                                                                                        |
| Period Jitter (tp-p)                   | 27pSec Typical, 40pSec Maximum Peak to Peak of Jitter Distribution                                                                                                                                                                                        |
| Start Up Time                          | 10mSec Maximum                                                                                                                                                                                                                                            |
| Storage Temperature Range              | -55°C to +125°C                                                                                                                                                                                                                                           |

EL32D1DEA1K-52.000M

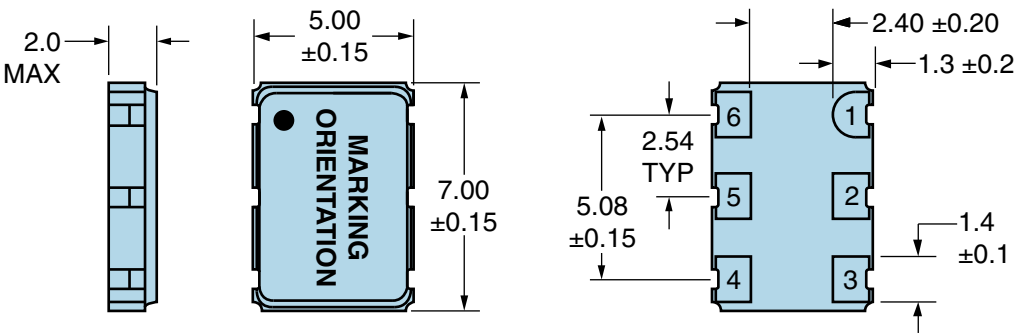
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| ENVIRONMENTAL & MECHANICAL SPECIFICATIONS |                                      |
|-------------------------------------------|--------------------------------------|
| Fine Leak Test                            | MIL-STD-883, Method 1014 Condition 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 |

EL32D1DEA1K-52.000M

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

MECHANICAL DIMENSIONS (all dimensions in millimeters)

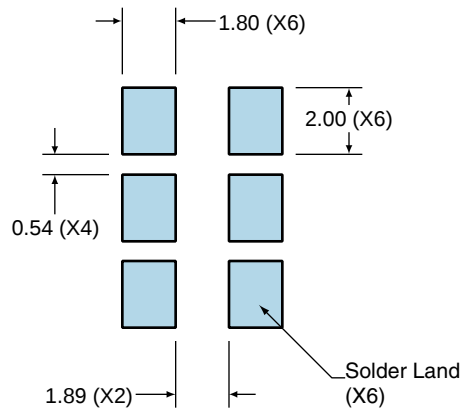


| PIN | CONNECTION           |
|-----|----------------------|
| 1   | Control Voltage      |
| 2   | Tri-State            |
| 3   | Case/Ground          |
| 4   | Output               |
| 5   | Complementary Output |
| 6   | Supply Voltage       |

| LINE | MARKING                                               |
|------|-------------------------------------------------------|
| 1    | ECLIPTEK                                              |
| 2    | 52.000M                                               |
| 3    | XXXXXX<br>XXXXXX=Ecliptek<br>Manufacturing Identifier |

Suggested Solder Pad Layout

All Dimensions in Millimeters

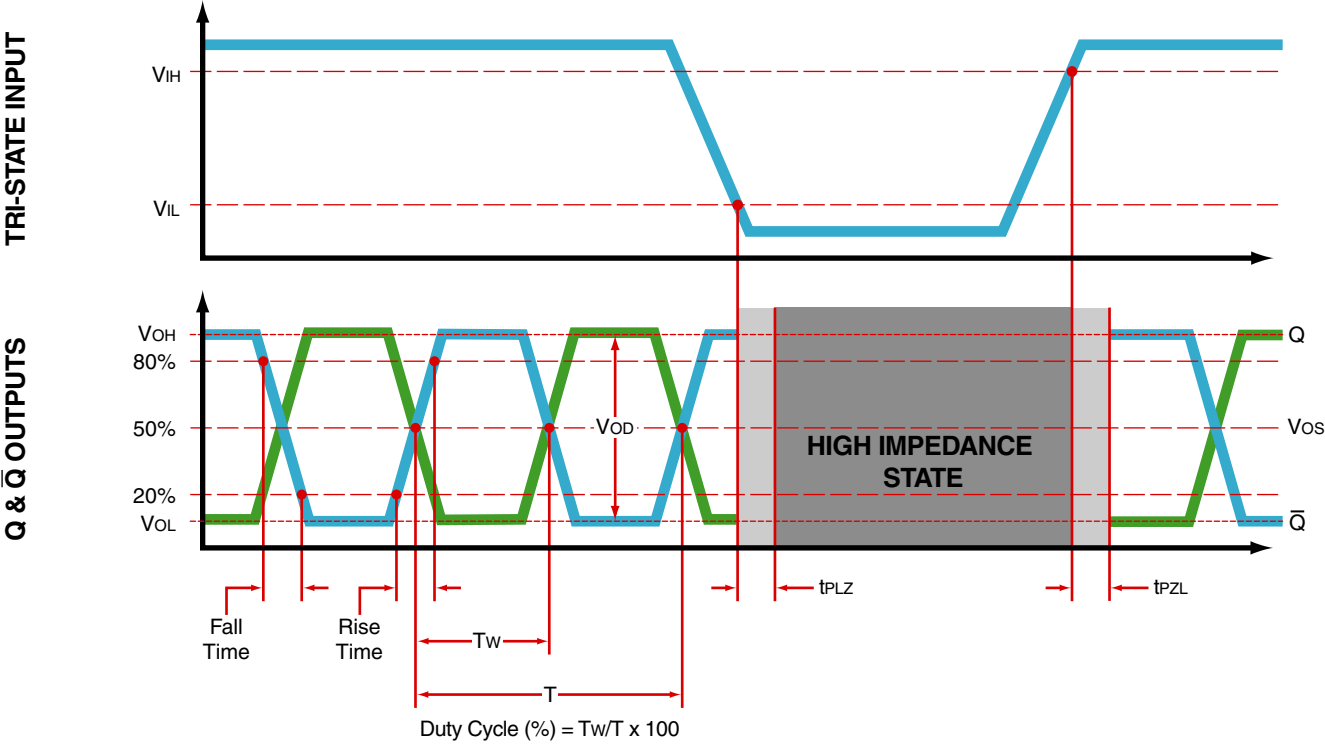


All Tolerances are ±0.1

EL32D1DEA1K-52.000M

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

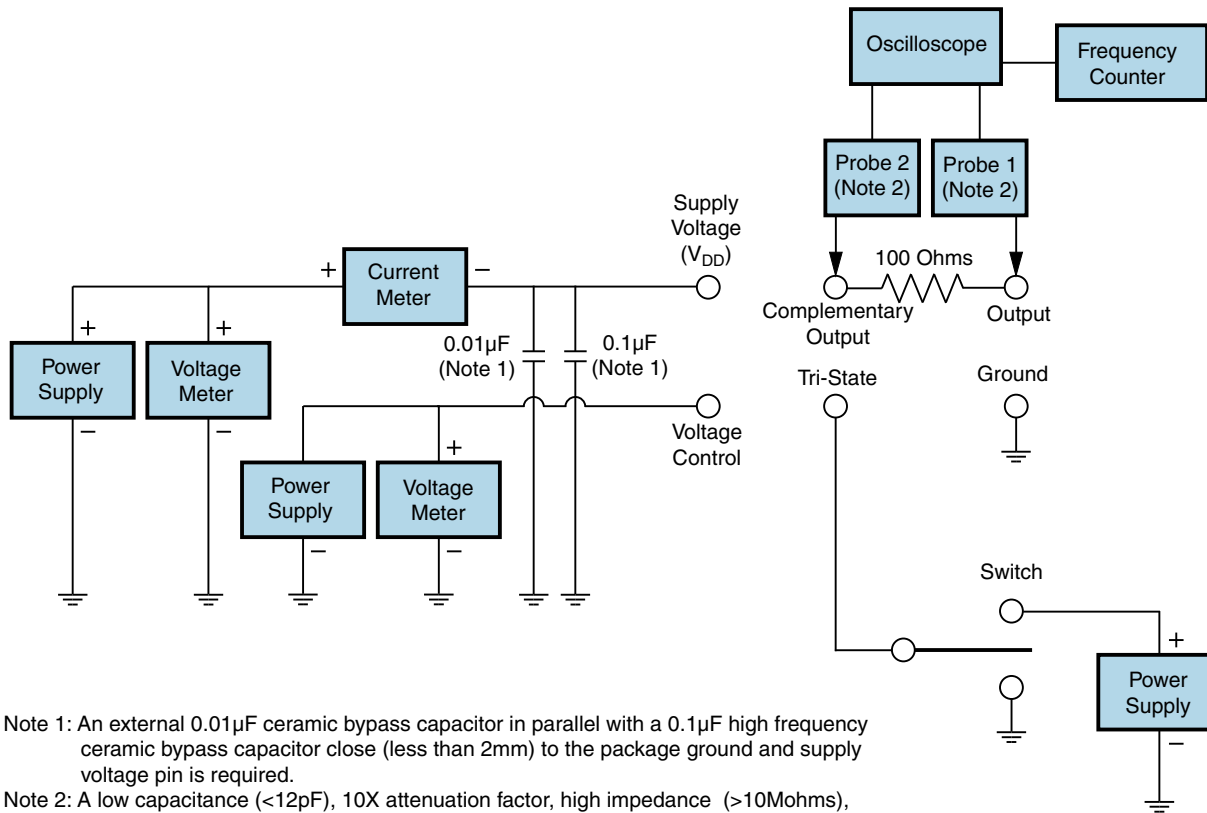
OUTPUT WAVEFORM & TIMING DIAGRAM



# EL32D1DEA1K-52.000M

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

## Test Circuit for Tri-State and Complementary Output



Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

Note 2: A low capacitance (<12pF), 10X attenuation factor, high impedance (>10Mohms), and high bandwidth (>500MHz) passive probe is recommended.

Note 3: Test circuit PCB traces need to be designed for a characteristic line impedance of 50 ohms.

EL32D1DEA1K-52.000M

[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                              |

EL32D1DEA1K-52.000M

 [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                                                |

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.