

## REGULATORY COMPLIANCE



## ITEM DESCRIPTION

Quartz Crystal Clock Oscillators XO (SPXO) LVCMOS (CMOS) 3.3Vdc 4 Pad 3.2mm x 5.0mm Ceramic Surface Mount (SMD)

## ELECTRICAL SPECIFICATIONS

|                                                                |                                                                                                                                                                                                                                                                                                                                                                                       |
|----------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Nominal Frequency                                              | 1MHz to 170MHz                                                                                                                                                                                                                                                                                                                                                                        |
| Frequency Tolerance/Stability                                  | 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<br>±100ppm Maximum<br>±20ppm Maximum<br>±25ppm Maximum<br>±50ppm Maximum                                                                                              |
| Operating Temperature Range                                    | -10°C to +70°C<br>-40°C to +85°C                                                                                                                                                                                                                                                                                                                                                      |
| Supply Voltage                                                 | 3.3Vdc ±10%                                                                                                                                                                                                                                                                                                                                                                           |
| Input Current                                                  | 8mA Maximum over Nominal Frequency of 1MHz to 9.999999MHz<br>10mA Maximum over Nominal Frequency of 10MHz to 34.999999MHz<br>25mA Maximum over Nominal Frequency of 35MHz to 49.999999MHz<br>35mA Maximum over Nominal Frequency of 50MHz to 70MHz<br>40mA Maximum over Nominal Frequency of 70.000001MHz to 125MHz<br>50mA Maximum over Nominal Frequency of 125.000001MHz to 170MHz |
| Output Voltage Logic High (V <sub>OH</sub> )                   | IOH = -4mA<br>90% of Vdd Minimum                                                                                                                                                                                                                                                                                                                                                      |
| Output Voltage Logic Low (V <sub>OL</sub> )                    | IOL = +4mA<br>10% of Vdd Maximum                                                                                                                                                                                                                                                                                                                                                      |
| Rise/Fall Time                                                 | Measured at 20% to 80% of waveform<br>6nSec Maximum over Nominal Frequency of 1MHz to 39.999999MHz<br>4nSec Maximum over Nominal Frequency of 40MHz to 79.999999MHz<br>3nSec Maximum over Nominal Frequency of 80MHz to 100MHz<br>2nSec Maximum over Nominal Frequency of 100.000001MHz to 170MHz                                                                                     |
| Duty Cycle                                                     | Measured at 50% of waveform<br>50 ±10(%)<br>50 ±5(%)                                                                                                                                                                                                                                                                                                                                  |
| Load Drive Capability                                          | 15pF Maximum                                                                                                                                                                                                                                                                                                                                                                          |
| Output Logic Type                                              | CMOS                                                                                                                                                                                                                                                                                                                                                                                  |
| Pin 1 Connection                                               | Tri-State (High Impedance)                                                                                                                                                                                                                                                                                                                                                            |
| Tri-State Input Voltage (V <sub>IH</sub> and V <sub>IL</sub> ) | 90% of Vdd Minimum or No Connect to Enable Output,<br>10% of Vdd Maximum to Disable Output (High Impedance)                                                                                                                                                                                                                                                                           |
| Standby Current                                                | Disabled Output: High Impedance<br>10µA Maximum                                                                                                                                                                                                                                                                                                                                       |
| RMS Phase Jitter                                               | 12kHz to 20MHz offset frequency<br>1pSec Maximum                                                                                                                                                                                                                                                                                                                                      |
| Start Up Time                                                  | 10mSec Maximum                                                                                                                                                                                                                                                                                                                                                                        |
| Storage Temperature Range                                      | -55°C to +125°C                                                                                                                                                                                                                                                                                                                                                                       |

## PART NUMBERING GUIDE



## MECHANICAL DIMENSIONS



## SUGGESTED SOLDER PAD LAYOUT



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

All Tolerances are  $\pm 0.1$

**All Dimensions in Millimeters**

## OUTPUT WAVEFORM & TIMING DIAGRAM



The diagram shows a test circuit for the output of a 74VHC04. On the left, a Power Supply and a Voltage Meter are connected in parallel to the input of the 74VHC04. A Current Meter is connected in series with the input line. The output of the 74VHC04 is connected to a probe (Note 2), which is also connected to an Oscilloscope and a Frequency Counter. The output node is also connected to a load capacitor  $C_L$  (Note 3) and a Tri-State input.

**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

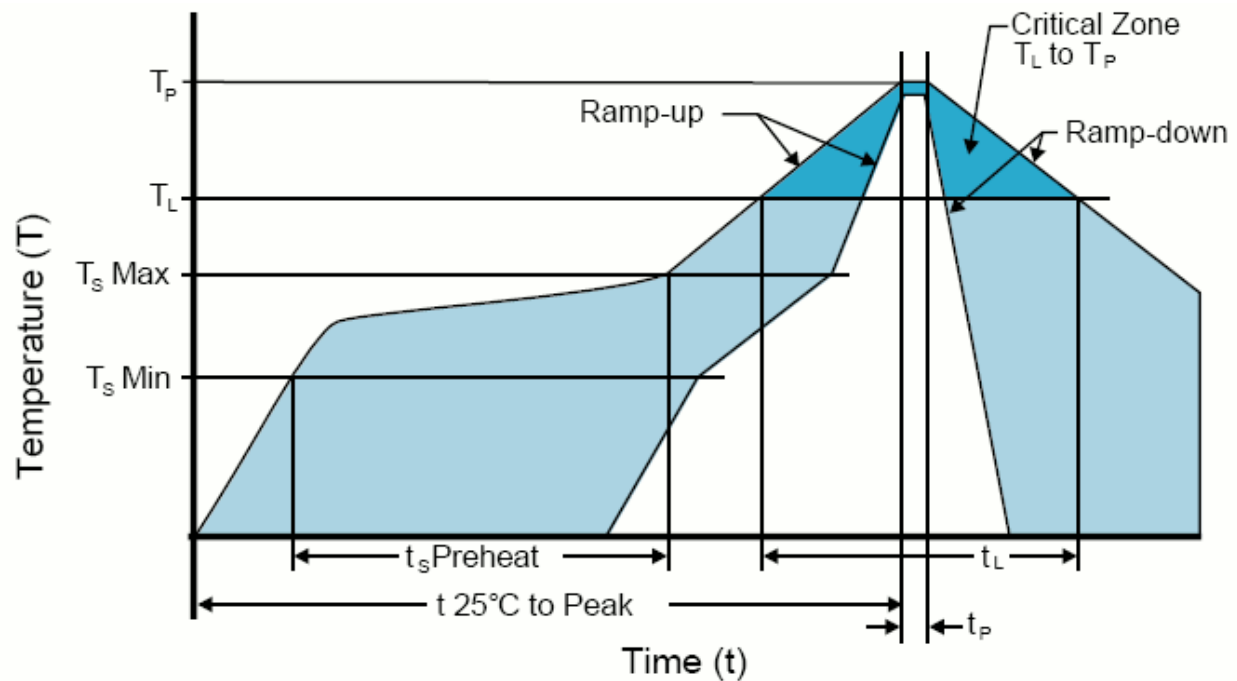
Quantity per Reel: 1000 Units

All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



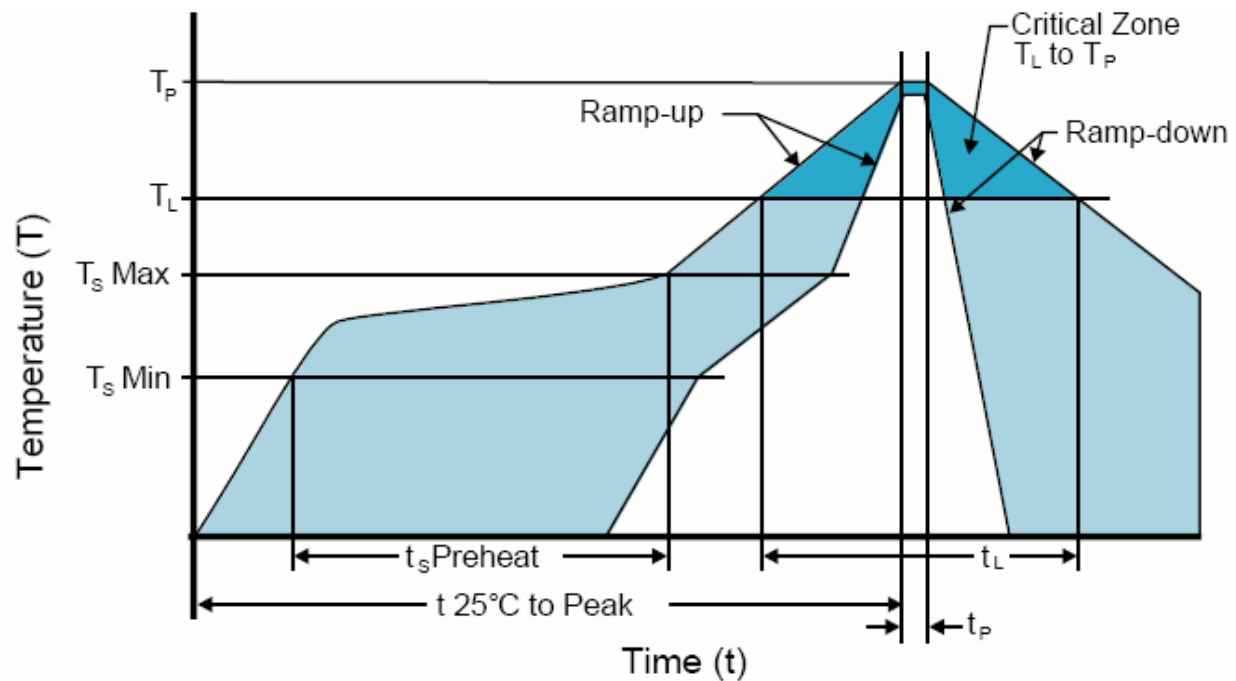
## HIGH TEMPERATURE INFRARED/CONVECTION

|                                                     |                                                   |
|-----------------------------------------------------|---------------------------------------------------|
| T <sub>S</sub> MAX to T <sub>L</sub> (Ramp-up Rate) | 3°C/Second Maximum                                |
| Preheat                                             |                                                   |
| - Temperature Minimum (T <sub>S</sub> MIN)          | 150°C                                             |
| - Temperature Typical (T <sub>S</sub> TYP)          | 175°C                                             |
| - Temperature Maximum (T <sub>S</sub> MAX)          | 200°C                                             |
| - Time (t <sub>s</sub> )                            | 60 - 180 Seconds                                  |
| Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )    | 3°C/Second Maximum                                |
| Time Maintained Above:                              |                                                   |
| - Temperature (T <sub>L</sub> )                     | 217°C                                             |
| - Time (t <sub>L</sub> )                            | 60 - 150 Seconds                                  |
| Peak Temperature (T <sub>P</sub> )                  | 260°C Maximum for 10 Seconds Maximum              |
| Target Peak Temperature (T <sub>P</sub> Target)     | 250°C +0/-5°C                                     |
| Time within 5°C of actual peak (t <sub>p</sub> )    | 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                                    | 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.)

## RECOMMENDED SOLDER REFLOW METHOD



## LOW TEMPERATURE INFRARED/CONVECTION

|                                                     |                                                        |
|-----------------------------------------------------|--------------------------------------------------------|
| T <sub>s</sub> MAX to T <sub>L</sub> (Ramp-up Rate) | 5°C/Second Maximum                                     |
| Preheat                                             |                                                        |
| - Temperature Minimum (T <sub>s</sub> MIN)          | N/A                                                    |
| - Temperature Typical (T <sub>s</sub> TYP)          | 150°C                                                  |
| - Temperature Maximum (T <sub>s</sub> MAX)          | N/A                                                    |
| - Time (t <sub>s</sub> )                            | 60 - 120 Seconds                                       |
| Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )    | 5°C/Second Maximum                                     |
| Time Maintained Above:                              |                                                        |
| - Temperature (T <sub>L</sub> )                     | 150°C                                                  |
| - Time (t <sub>L</sub> )                            | 200 Seconds Maximum                                    |
| Peak Temperature (T <sub>P</sub> )                  | 240°C Maximum                                          |
| Target Peak Temperature (T <sub>P</sub> Target)     | 240°C Maximum 2 Times / 230°C Maximum 1 Time           |
| Time within 5°C of actual peak (t <sub>P</sub> )    | 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                                    | 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.)

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