

## REGULATORY COMPLIANCE



## ITEM DESCRIPTION

Quartz Crystal Resonator HC49/UP Short 2 Pad Surface Mount (SMD) 3.2mm Height Metal Resistance Weld Seal

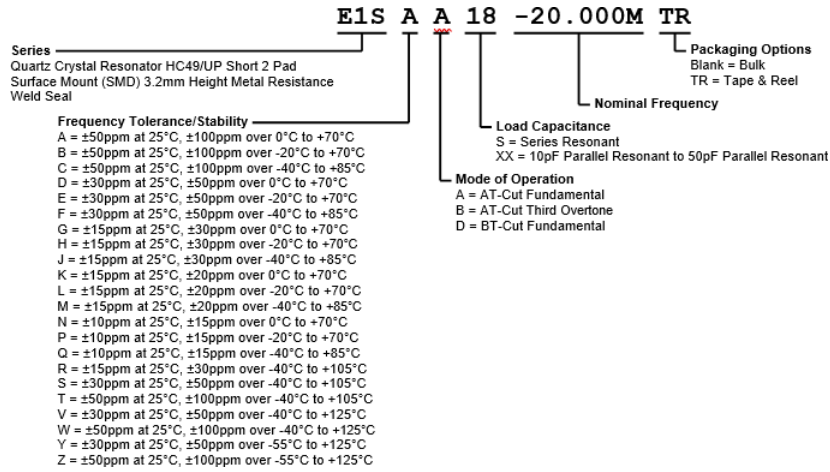
## ELECTRICAL SPECIFICATIONS

<b>Nominal Frequency</b>	3.579545MHz to 50MHz
<b>Frequency Tolerance/Stability</b>	±50ppm at 25°C, ±100ppm over 0°C to +70°C ±50ppm at 25°C, ±100ppm over -20°C to +70°C ±50ppm at 25°C, ±100ppm over -40°C to +85°C ±30ppm at 25°C, ±50ppm over 0°C to +70°C ±30ppm at 25°C, ±50ppm over -20°C to +70°C ±30ppm at 25°C, ±50ppm over -40°C to +85°C ±15ppm at 25°C, ±30ppm over 0°C to +70°C ±15ppm at 25°C, ±30ppm over -20°C to +70°C ±15ppm at 25°C, ±30ppm over -40°C to +85°C ±15ppm at 25°C, ±20ppm over 0°C to +70°C ±15ppm at 25°C, ±20ppm over -20°C to +70°C ±15ppm at 25°C, ±20ppm over -40°C to +85°C ±10ppm at 25°C, ±15ppm over 0°C to +70°C ±10ppm at 25°C, ±15ppm over -20°C to +70°C ±10ppm at 25°C, ±15ppm over -40°C to +85°C ±15ppm at 25°C, ±30ppm over -40°C to +105°C ±30ppm at 25°C, ±50ppm over -40°C to +105°C ±50ppm at 25°C, ±100ppm over -40°C to +105°C ±30ppm at 25°C, ±50ppm over -40°C to +125°C ±50ppm at 25°C, ±100ppm over -40°C to +125°C ±30ppm at 25°C, ±50ppm over -55°C to +125°C ±50ppm at 25°C, ±100ppm over -55°C to +125°C
<b>Aging at 25°C</b>	±5ppm/year Maximum
<b>Load Capacitance</b>	Series Resonant, 10pF Parallel Resonant to 50pF Parallel Resonant
<b>Shunt Capacitance</b>	7pF Maximum
<b>Equivalent Series Resistance</b>	See the Equivalent Series Resistance (ESR), Mode of Operation, and Crystal Cut Table Below
<b>Mode of Operation</b>	AT-Cut Fundamental (Only available over Nominal Frequency range of 3.579545MHz to 30MHz) AT-Cut Third Overtone (Only available over Nominal Frequency range of 24.576MHz to 50MHz) BT-Cut Fundamental (Only available with Frequency Tolerance/Stability of ±50ppm at 25°C, ±100ppm over 0°C to +70°C; Only available over Nominal Frequency range of 24MHz to 40MHz)
<b>Drive Level</b>	1mWatt Maximum
<b>Storage Temperature Range</b>	-55°C to +125°C
<b>Insulation Resistance</b>	500 Megaohms Minimum (Measured at 100Vdc)

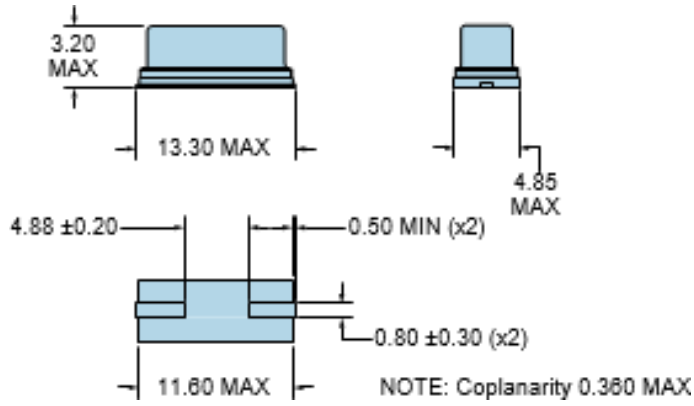
## EQUIVALENT SERIES RESISTANCE (ESR), MODE OF OPERATION AND CRYSTAL CUT

Frequency Range	ESR (Ohms Max)	Mode	Frequency Range	ESR (Ohms Max)	Mode
3.579545MHz to 4.999999MHz	200	AT-Cut Fundamental	15MHz to 15.999999MHz	60	AT-Cut Fundamental
5MHz to 5.999999MHz	150	AT-Cut Fundamental	16MHz to 23.999999MHz	50	AT-Cut Fundamental
6MHz to 7.999999MHz	102	AT-Cut Fundamental	24MHz to 30MHz	40	AT-Cut Fundamental
8MHz to 8.999999MHz	90	AT-Cut Fundamental	24.576MHz to 29.999999MHz	150	AT-Cut Third Overtone
9MHz to 9.999999MHz	80	AT-Cut Fundamental	30MHz to 50MHz	100	AT-Cut Third Overtone
10MHz to 14.999999MHz	70	AT-Cut Fundamental	24MHz to 40MHz	40	BT-Cut Fundamental

## PART NUMBERING GUIDE

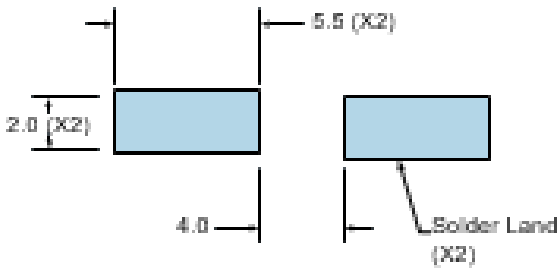


## MECHANICAL DIMENSIONS



## SUGGESTED SOLDER PAD LAYOUT

All Dimensions in Millimeters



All Tolerances are ±0.1

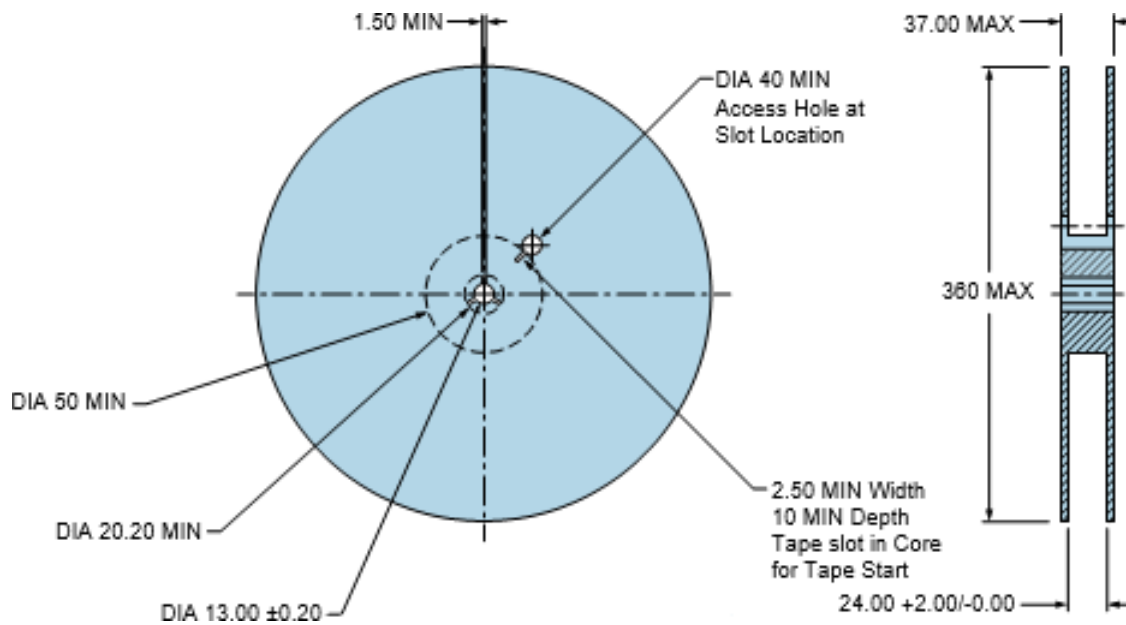
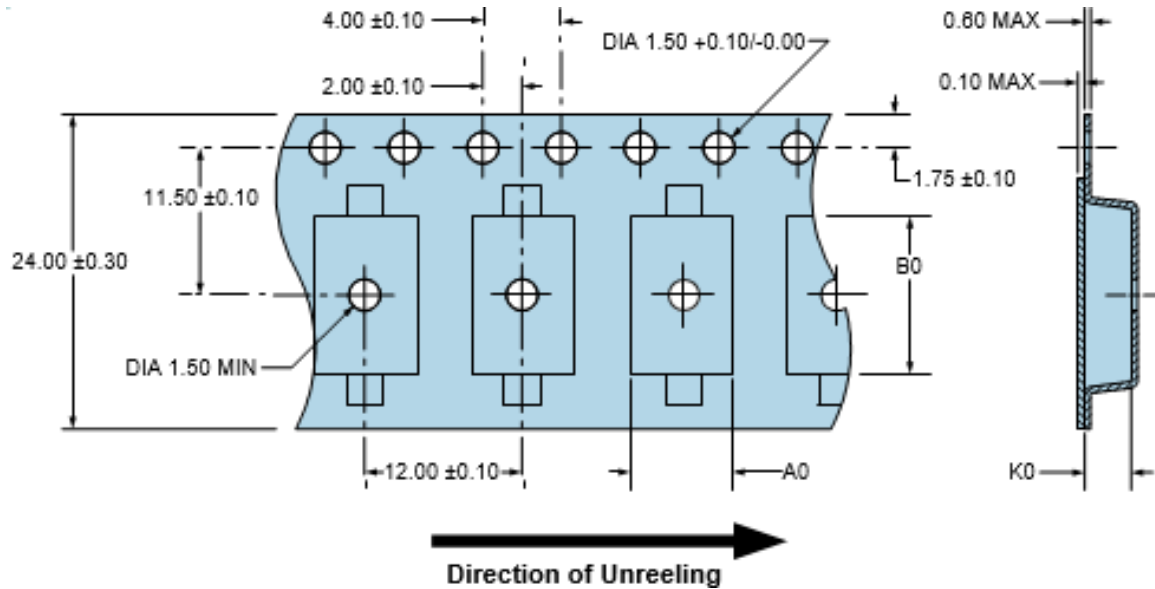
# E1S Series

## TAPE & REEL DIMENSIONS

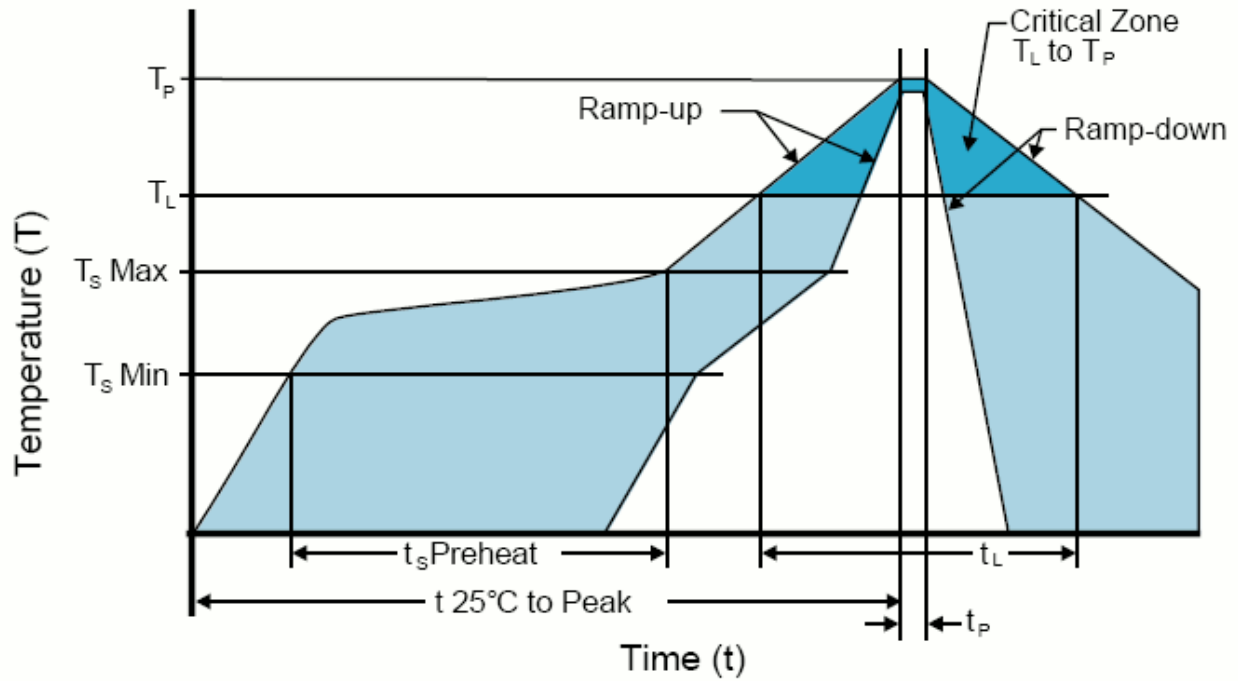
Quantity Per Reel: 1,000 units

All Dimensions in Millimeters

Compliant to EIA-481



**RECOMMENDED SOLDER REFLOW METHOD**

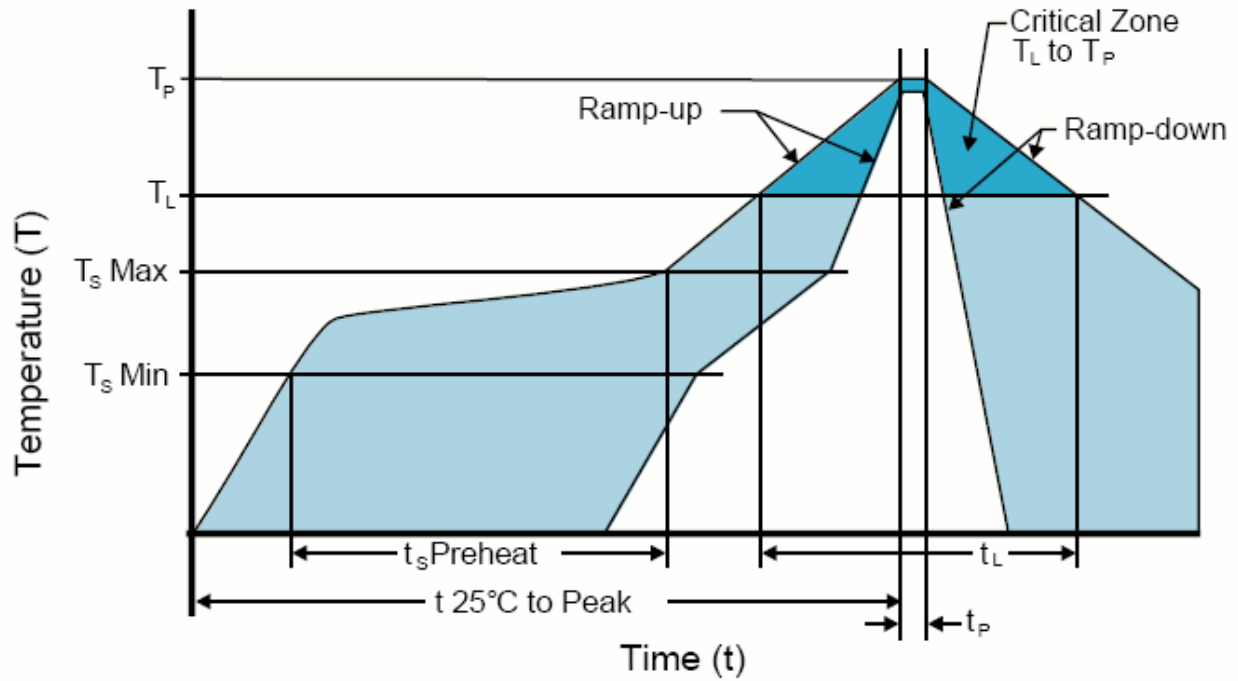


HIGH TEMPERATURE INFRARED/CONVECTION	
T <sub>s</sub> MAX to T <sub>L</sub> (Ramp-up Rate)	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum (T <sub>s</sub> MIN)	150°C
- Temperature Typical (T <sub>s</sub> TYP)	175°C
- Temperature Maximum(T <sub>s</sub> MAX)	200°C
- Time (t <sub>s</sub> )	60 - 180 Seconds
Ramp-up Rate (T <sub>L</sub> to T <sub>P</sub> )	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- 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
<b>Preheat</b>	
- 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> )	30 - 60 Seconds
Ramp-up Rate (T <sub>L</sub> to T <sub>p</sub> )	5°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature (T <sub>L</sub> )	150°C
- Time (t <sub>L</sub> )	200 Seconds Maximum
Peak Temperature (T <sub>p</sub> )	245°C Maximum
Target Peak Temperature (T <sub>p</sub> Target)	245°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.)