

## REGULATORY COMPLIANCE



## ITEM DESCRIPTION

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

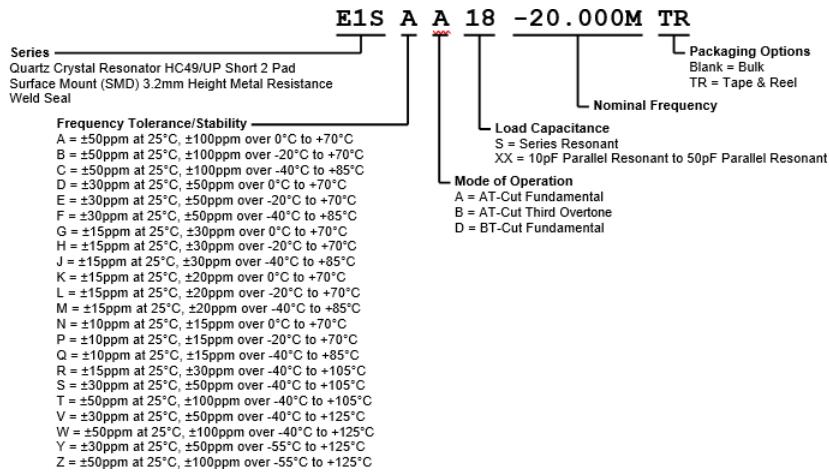
## ELECTRICAL SPECIFICATIONS

Nominal Frequency	3.579545MHz to 50MHz
Frequency Tolerance/Stability	±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
Aging at 25°C	±5ppm/year Maximum
Load Capacitance	Series Resonant, 10pF Parallel Resonant to 50pF Parallel Resonant
Shunt Capacitance	7pF Maximum
Equivalent Series Resistance	See the Equivalent Series Resistance (ESR), Mode of Operation, and Crystal Cut Table Below
Mode of Operation	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)
Drive Level	1mWatt Maximum
Storage Temperature Range	-55°C to +125°C
Insulation Resistance	500 Megaohms Minimum (Measured at 100Vdc)

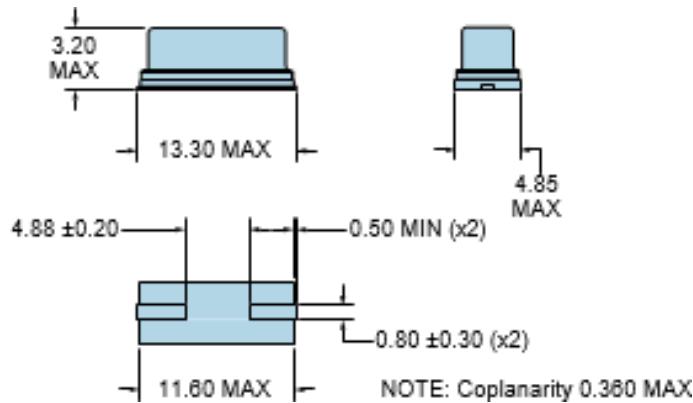
## EQUIVALENT SERIES RESISTANCE (ESR), MODE OF OPERATION AND CRYSTAL CUT

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

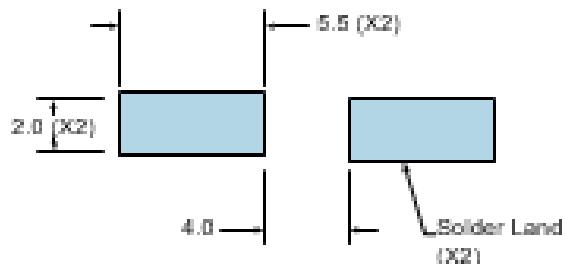


## MECHANICAL DIMENSIONS



## SUGGESTED SOLDER PAD LAYOUT

All Dimensions in Millimeters



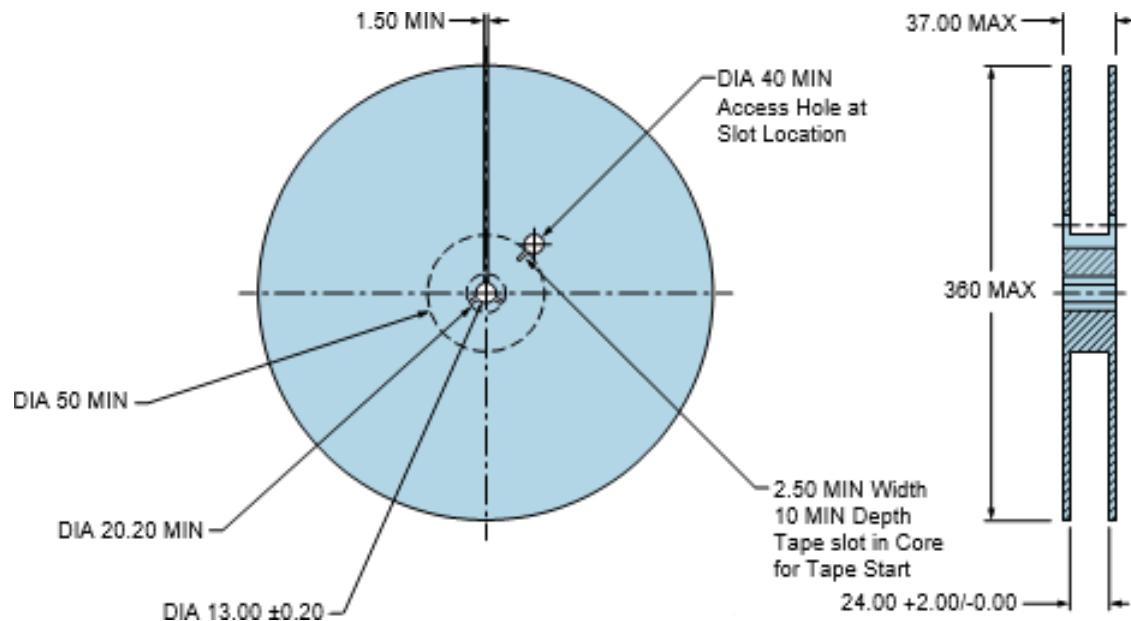
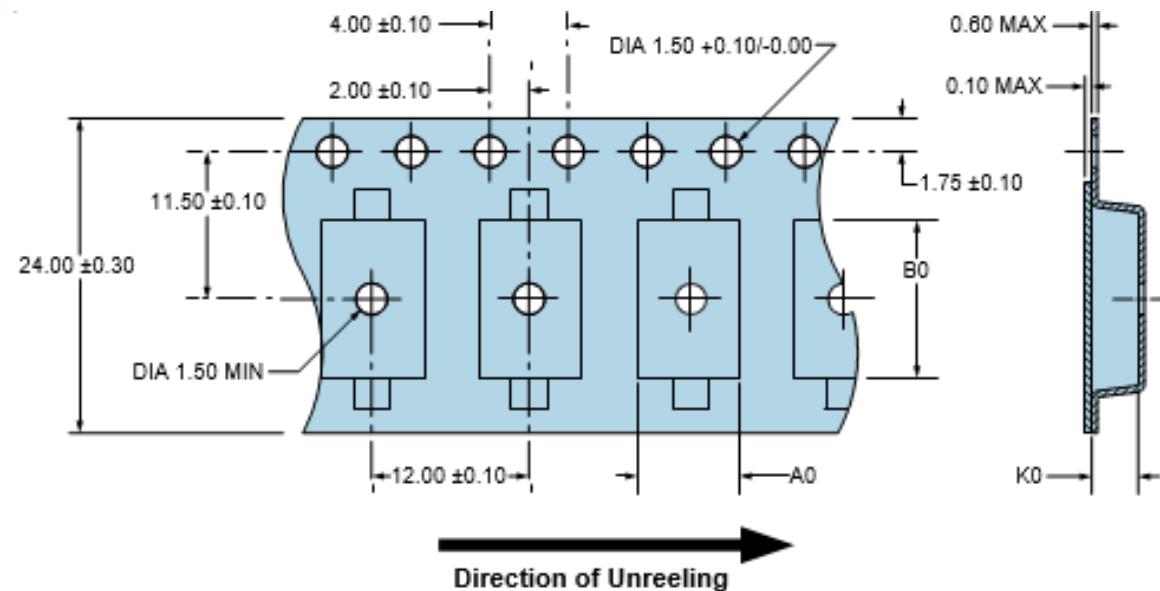
All Tolerances are ±0.1

**TAPE & REEL DIMENSIONS**

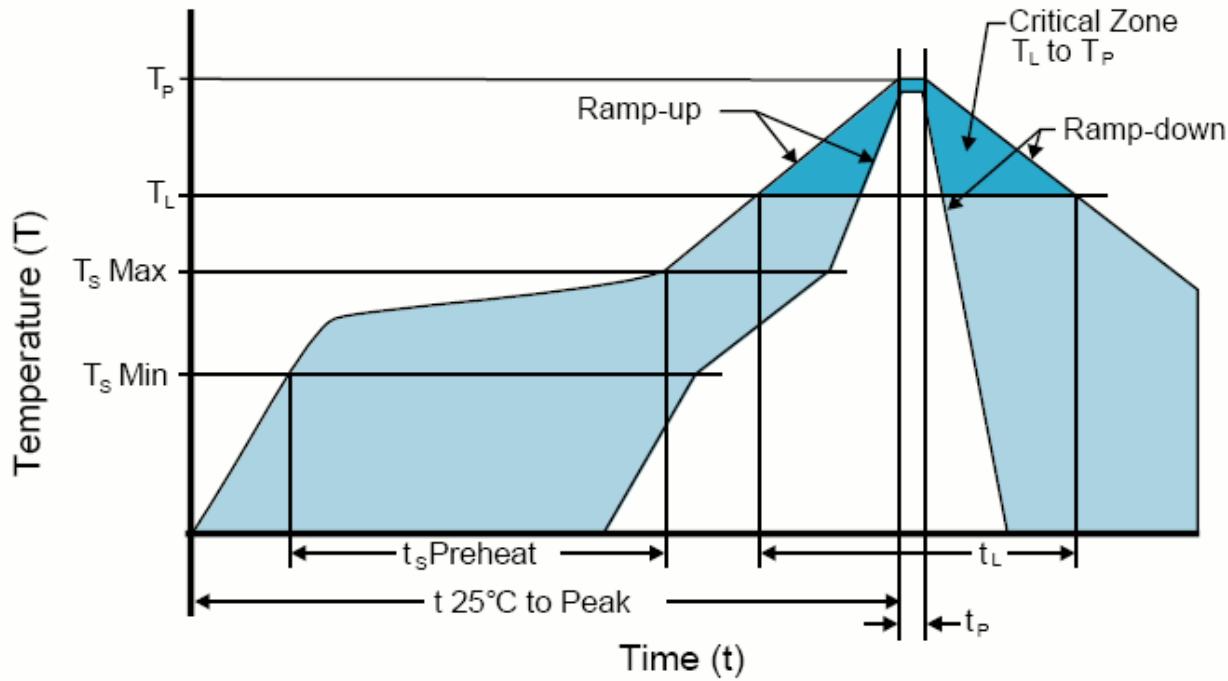
Quantity Per Reel: 1,000 units

All Dimensions in Millimeters

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



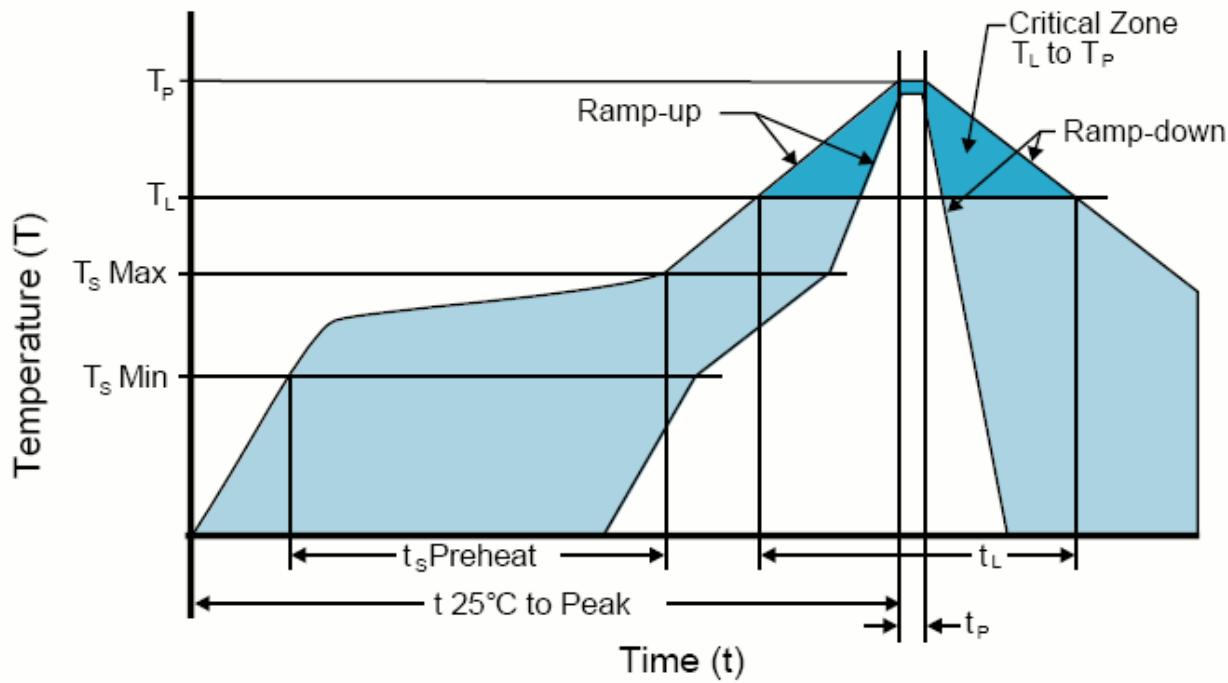
### HIGH TEMPERATURE INFRARED/CONVECTION

$T_s \text{ MAX to } T_l$ (Ramp-up Rate)	3°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s \text{ MIN}$ )	150°C
- Temperature Typical ( $T_s \text{ TYP}$ )	175°C
- Temperature Maximum( $T_s \text{ MAX}$ )	200°C
- Time ( $t_s$ )	60 - 180 Seconds
<b>Ramp-up Rate (<math>T_l</math> to <math>T_p</math>)</b>	3°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature ( $T_l$ )	217°C
- Time ( $t_L$ )	60 - 150 Seconds
<b>Peak Temperature (<math>T_p</math>)</b>	260°C Maximum for 10 Seconds Maximum
<b>Target Peak Temperature(<math>T_p</math> Target)</b>	250°C +0/-5°C
<b>Time within 5°C of actual peak (<math>t_p</math>)</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>	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

$T_s \text{ MAX to } T_l$ (Ramp-up Rate)	5°C/Second Maximum
<b>Preheat</b>	
- Temperature Minimum ( $T_s \text{ MIN}$ )	N/A
- Temperature Typical ( $T_s \text{ TYP}$ )	150°C
- Temperature Maximum( $T_s \text{ MAX}$ )	N/A
- Time ( $t_s$ )	30 - 60 Seconds
<b>Ramp-up Rate (<math>T_l</math> to <math>T_p</math>)</b>	5°C/Second Maximum
<b>Time Maintained Above:</b>	
- Temperature ( $T_l$ )	150°C
- Time ( $t_L$ )	200 Seconds Maximum
<b>Peak Temperature (<math>T_p</math>)</b>	245°C Maximum
<b>Target Peak Temperature (<math>T_p</math> Target)</b>	245°C Maximum 2 Times / 230°C Maximum 1 Time
<b>Time within 5°C of actual peak (<math>t_p</math>)</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>	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.)