EMS13 Series

Ecliptek

REGULATORY COMPLIANCE

Lead Free Pb COMPLIANT

EU RoHS 2011/65 + 2015/863 COMPLIANT

China RoHS COMPLIANT

REACH SVHC COMPLIANT

DRC CONFLICT FREE

ITEM DESCRIPTION
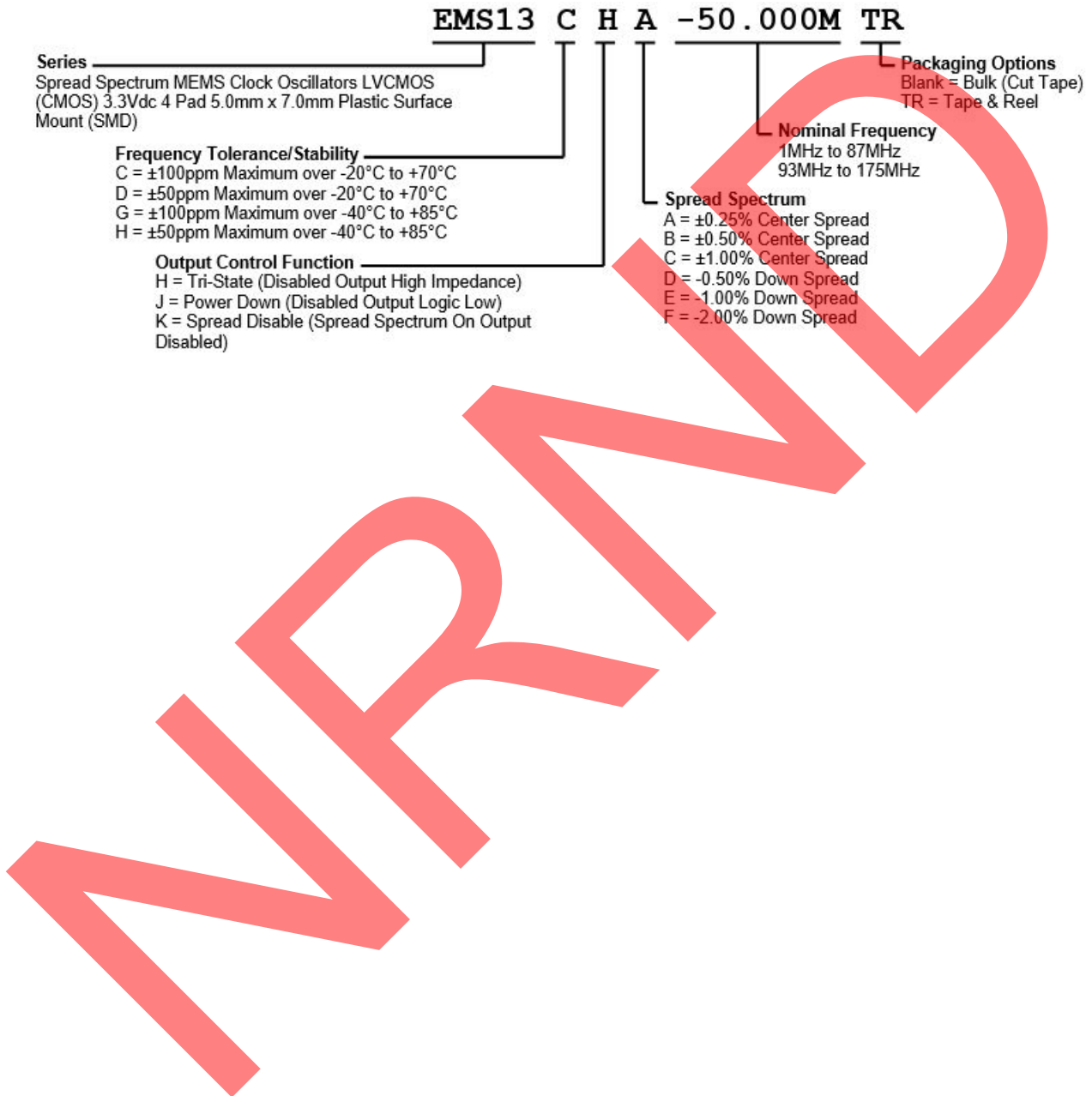
Spread Spectrum MEMS Clock Oscillators LVCMOS (CMOS) 3.3Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD)
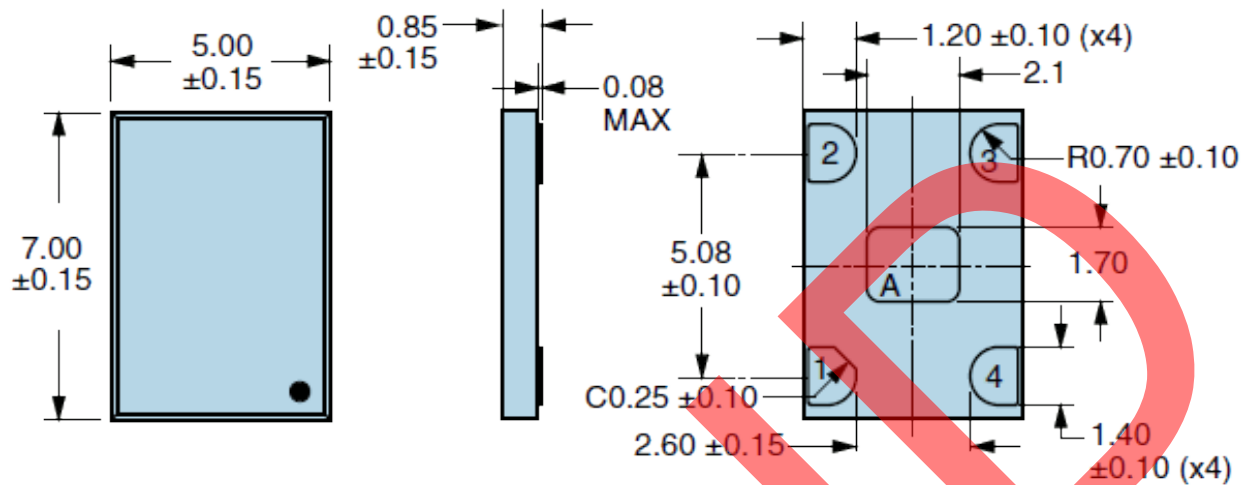
ELECTRICAL SPECIFICATIONS

Nominal Frequency	1MHz to 175MHz
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, 260°C Reflow, Shock, and Vibration ±100ppm Maximum over -20°C to +70°C ±50ppm Maximum over -20°C to +70°C ±100ppm Maximum over -40°C to +85°C ±50ppm Maximum over -40°C to +85°C
Aging at 25°C	±1ppm Maximum First Year
Supply Voltage	3.3Vdc ±10%
Maximum Supply Voltage	-0.5Vdc to +3.65Vdc
Input Current	Unloaded; Nominal Vdd 30mA Maximum over Nominal Frequency of 1MHz to 25MHz 40mA Maximum over Nominal Frequency of 25.000001MHz to 175MHz
Output Voltage Logic High (V$_{Oh}$)	IOH=-8mA 90% of Vdd Minimum
Output Voltage Logic Low (V$_{Ol}$)	IOL=+8mA 10% of Vdd Maximum
Rise/Fall Time	Measured from 20% to 80% of waveform 2nSec Maximum
Duty Cycle	Measured at 50% of waveform 50 ±5(%) over Nominal Frequency of 1MHz to 75MHz 50 ±10(%) over Nominal Frequency of 75.000001MHz to 175MHz
Load Drive Capability	15pF Maximum
Output Logic Type	CMOS
Output Control Function	Tri-State (Disabled Output - High Impedance) Power Down (Disabled Output - Logic Low) Spread Disable (Spread Spectrum On Output - Disabled)
Power Down Input Voltage(Vih and Vil)	70% of Vdd Minimum or No Connection to Enable Output, 30% of Vdd Maximum to Disable Output (Disabled Output - Logic Low)
Tri-State Input Voltage (Vih and Vil)	70% of Vdd Minimum or No Connection to Enable Output, 30% of Vdd Maximum to Disable Output (Disabled Output - High Impedance)
Standby Current	Pad 1=Ground 50µA Maximum (Disabled Output - Logic Low)
Disable Current	Pad 1=Ground 20mA Maximum (Disabled Output - High Impedance)
Spread Spectrum Input Voltage (Vih and Vil)	70% of Vdd Minimum or No Connection to Enable Spread Spectrum-On Output, 30% of Vdd Maximum to Disable Spread Spectrum-On Output
Spread Spectrum	±0.25% Center Spread (Not available with Output Spread Disable Function) ±0.50% Center Spread (Not available with Output Spread Disable Function) ±1.00% Center Spread (Not available with Output Spread Disable Function) -0.50% Down Spread -1.00% Down Spread -2.00% Down Spread
Modulation Frequency	30kHz Minimum, 32kHz Typical, 35kHz Maximum
Period Jitter	Cycle to Cycle; Spread Spectrum-On; Fo=133.333M, Vdd=3.3Vdc 30pSec Maximum
Start Up Time	10mSec Maximum

Storage Temperature Range	-55°C to +125°C

PART NUMBERING GUIDE

EMS13 C H A -50.000M TR

Series
Spread Spectrum MEMS Clock Oscillators LVCMOS (CMOS) 3.3Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD)

Frequency Tolerance/Stability
C = ±100ppm Maximum over -20°C to +70°C
D = ±50ppm Maximum over -20°C to +70°C
G = ±100ppm Maximum over -40°C to +85°C
H = ±50ppm Maximum over -40°C to +85°C

Output Control Function
H = Tri-State (Disabled Output High Impedance)
J = Power Down (Disabled Output Logic Low)
K = Spread Disable (Spread Spectrum On Output Disabled)

Spread Spectrum
A = ±0.25% Center Spread
B = ±0.50% Center Spread
C = ±1.00% Center Spread
D = -0.50% Down Spread
E = -1.00% Down Spread
F = -2.00% Down Spread

Nominal Frequency
1MHz to 87MHz
93MHz to 175MHz

Packaging Options
Blank = Bulk (Cut Tape)
TR = Tape & Reel

MECHANICAL DIMENSIONS

5.00 ±0.15

7.00 ±0.15

0.85 ±0.15

0.08 MAX

1.20 ±0.10 (x4)

2.1

R0.70 ±0.10

5.08 ±0.10

1.70

C0.25 ±0.10

2.60 ±0.15

1.40 ±0.10 (x4)

Note A: Center paddle is connected internally to oscillator ground (Pad 2).

SUGGESTED SOLDER PAD LAYOUT

2.0 (X4)

2.2 (X4)

Solder Land (X4)

2.88

1.81

All Tolerances are ±0.1
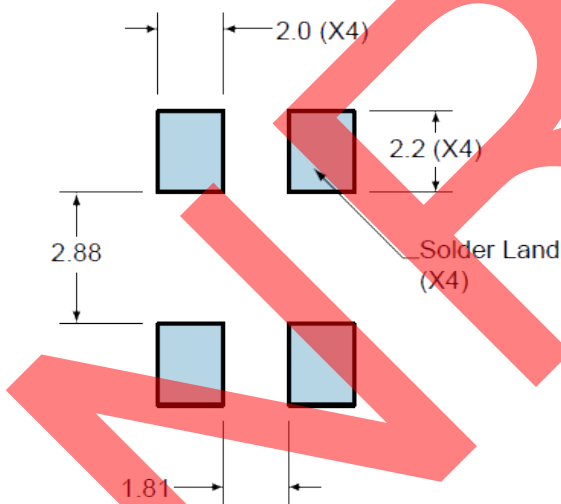
PIN	CONNECTION
1	Power Down (Logic Low) Or Spread Disable (Disabled) Or Tri-State (High Impedance)
2	Ground
3	Output
4	Supply Voltage

All Dimensions in Millimeters

OUTPUT WAVEFORM & TIMING DIAGRAM

Duty Cycle (%) = T_W/T x 100

TEST CIRCUIT FOR CMOS OUTPUT
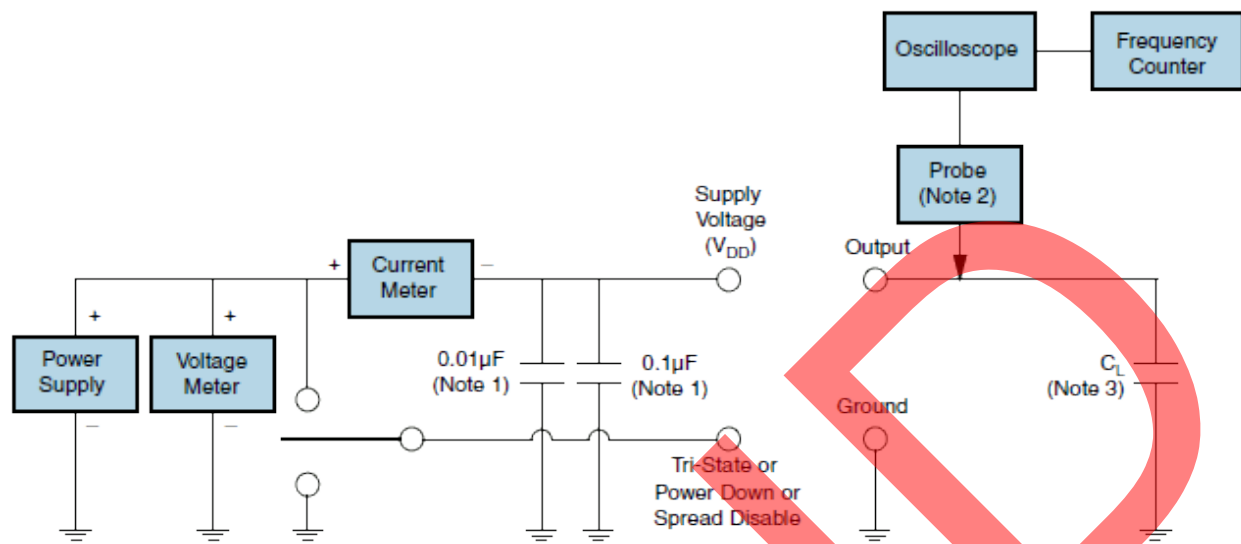
Note 1: An external 0.01µF ceramic bypass capacitor in parallel with a 0.1µF high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.
Note 2: A low capacitance (<12pF), 10X Attenuation Factor, High Impedance (>10Mohms), and High bandwidth (>300MHz) Passive probe is recommended.
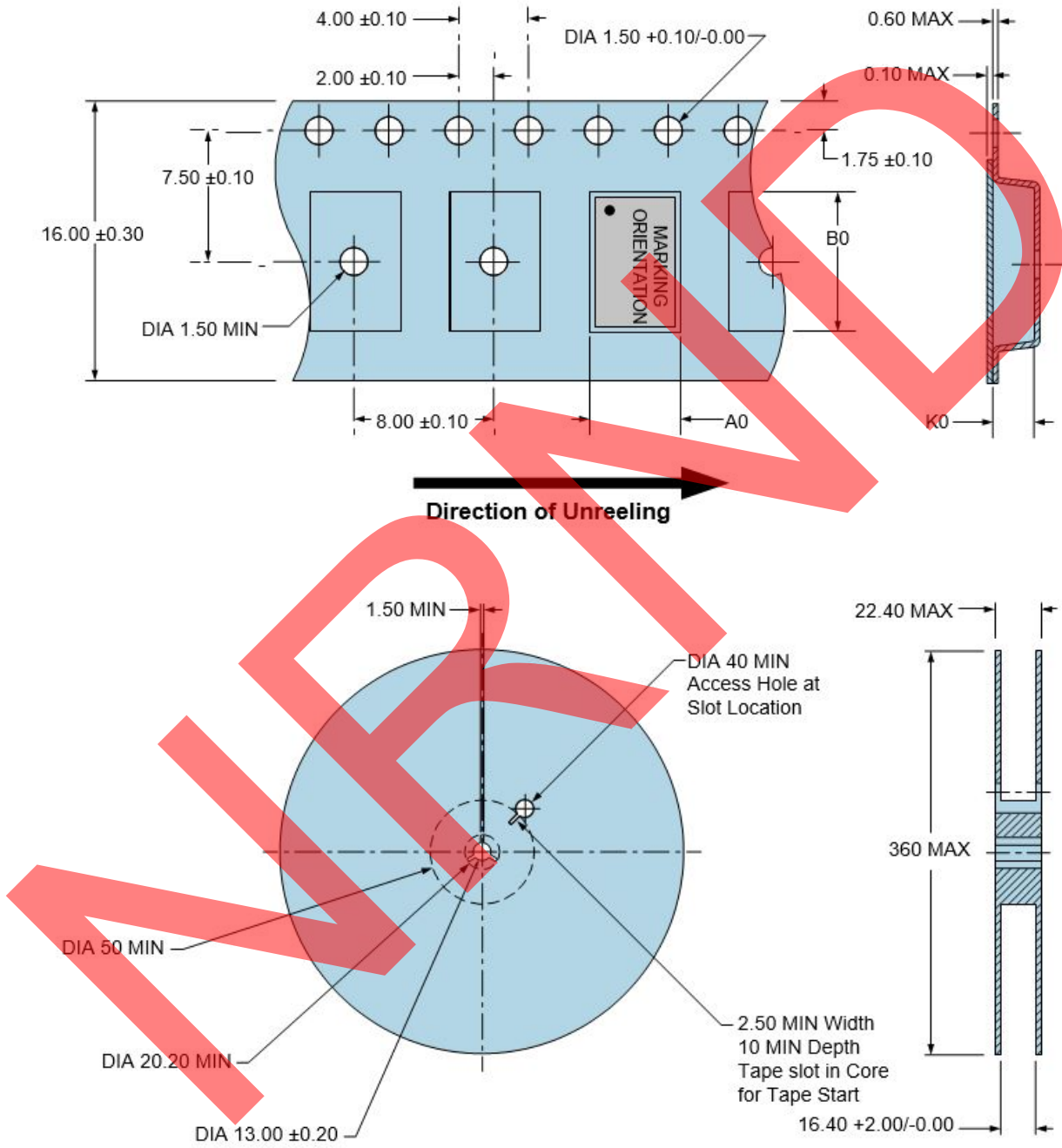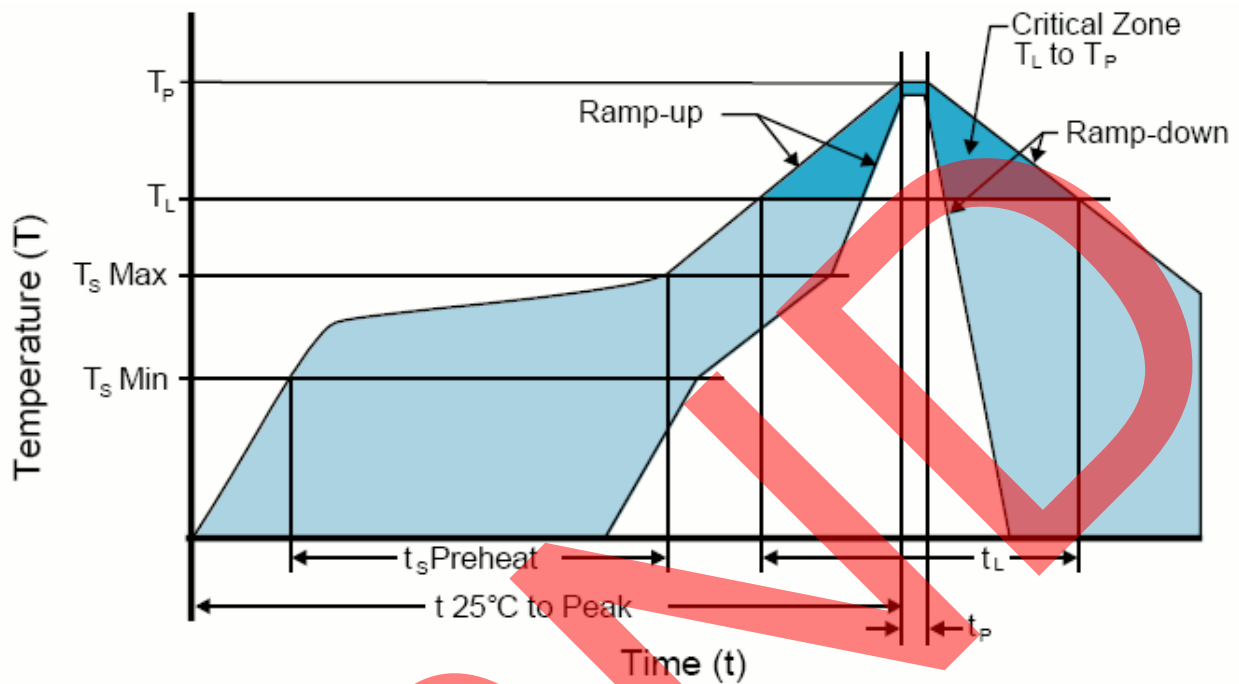**Note 3:** Capacitance value (C_L) includes sum of all probe and fixture capacitance.

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TAPE & REEL DIMENSIONS

Quantity per Reel: 1,000 Units

All Dimensions in Millimeters

Compliant to EIA-481

4.00 ±0.10

2.00 ±0.10

DIA 1.50 +0.10/-0.00

0.60 MAX

0.10 MAX

7.50 ±0.10

1.75 ±0.10

16.00 ±0.30

B0

DIA 1.50 MIN

MARKING ORIENTATION

8.00 ±0.10

A0

K0

Direction of Unreeling

1.50 MIN

DIA 40 MIN Access Hole at Slot Location

22.40 MAX

360 MAX

DIA 50 MIN

DIA 20.20 MIN

DIA 13.00 ±0.20

2.50 MIN Width 10 MIN Depth Tape slot in Core for Tape Start

16.40 +2.00/-0.00

RECOMMENDED SOLDER REFLOW METHOD

HIGH TEMPERATURE INFRARED/CONVECTION	
T_S MAX to T_L (Ramp-up Rate)	3°C/Second Maximum
Preheat - Temperature Minimum (T_S MIN) - Temperature Typical (T_S TYP) - Temperature Maximum(T_S MAX) - Time (t_S)	150°C 175°C 200°C 60 - 180 Seconds
Ramp-up Rate (T_L to T_P)	3°C/Second Maximum
Time Maintained Above: - Temperature (T_L) - Time (t_L)	217°C 60 - 150 Seconds
Peak Temperature (T_P)	260°C Maximum for 10 Seconds Maximum
Target Peak Temperature(T_P Target)	250°C +0/-5°C
Time within 5°C of actual peak (t_p)	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
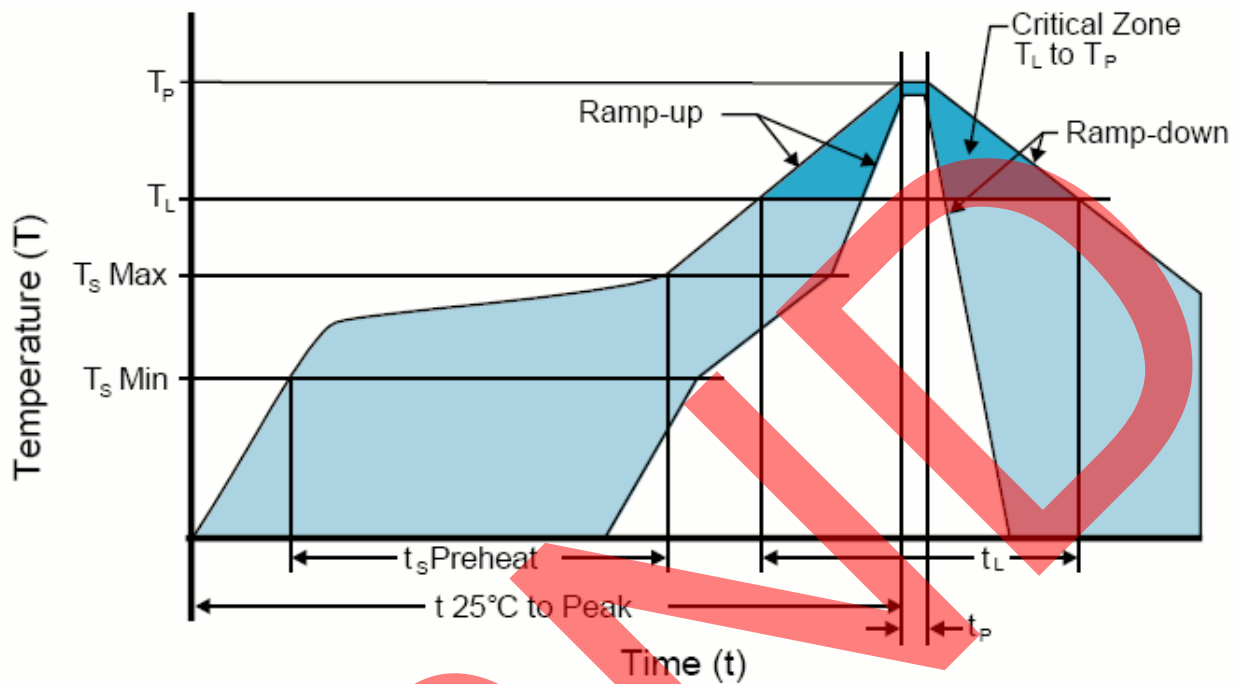
LOW TEMPERATURE INFRARED/CONVECTION	
T_s MAX to T_L (Ramp-up Rate)	5°C/Second Maximum
Preheat - Temperature Minimum (T_s MIN) - Temperature Typical (T_s TYP) - Temperature Maximum(T_s MAX) - Time (t_s)	N/A 150°C N/A 60 - 120 Seconds
Ramp-up Rate (T_L to T_P)	5°C/Second Maximum
Time Maintained Above: - Temperature (T_L) - Time (t_L)	150°C 200 Seconds Maximum
Peak Temperature (T_P)	240°C Maximum
Target Peak Temperature (T_P Target)	240°C Maximum 2 Times / 230°C Maximum 1 Time
Time within 5°C of actual peak (t_p)	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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