

## REGULATORY COMPLIANCE



## ITEM DESCRIPTION

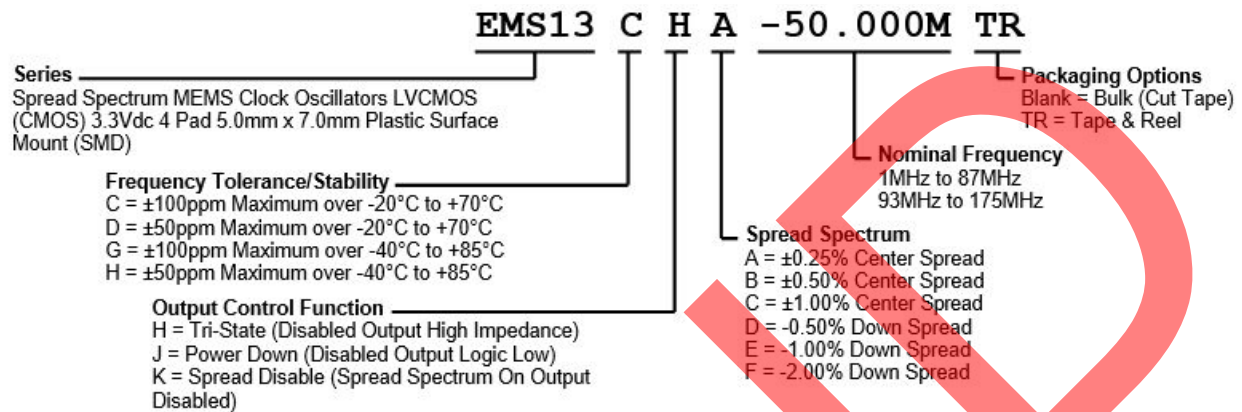
Spread Spectrum MEMS Clock Oscillators LVCMOS (CMOS) 3.3Vdc 4 Pad 5.0mm x 7.0mm Plastic Surface Mount (SMD)

## 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 $\pm 100\text{ppm}$ Maximum over -20°C to +70°C $\pm 50\text{ppm}$ Maximum over -20°C to +70°C $\pm 100\text{ppm}$ Maximum over -40°C to +85°C $\pm 50\text{ppm}$ Maximum over -40°C to +85°C
Aging at 25°C	$\pm 1\text{ppm}$ Maximum First Year
Supply Voltage	3.3Vdc $\pm 10\%$
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 ( $V_{OH}$ )	$I_{OH} = -8\text{mA}$ 90% of Vdd Minimum
Output Voltage Logic Low ( $V_{OL}$ )	$I_{OL} = +8\text{mA}$ 10% of Vdd Maximum
Rise/Fall Time	Measured from 20% to 80% of waveform 2nSec Maximum
Duty Cycle	Measured at 50% of waveform 50 $\pm 5\%$ over Nominal Frequency of 1MHz to 75MHz 50 $\pm 10\%$ 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 ( $V_{IH}$ and $V_{IL}$ )	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 ( $V_{IH}$ and $V_{IL}$ )	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 50 $\mu\text{A}$ Maximum (Disabled Output - Logic Low)
Disable Current	Pad 1=Ground 20mA Maximum (Disabled Output - High Impedance)
Spread Spectrum Input Voltage ( $V_{IH}$ and $V_{IL}$ )	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	$\pm 0.25\%$ Center Spread (Not available with Output Spread Disable Function) $\pm 0.50\%$ Center Spread (Not available with Output Spread Disable Function) $\pm 1.00\%$ 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; $F_o = 133.333\text{M}$ , Vdd=3.3Vdc 30pSec Maximum
Start Up Time	10mSec Maximum

Storage Temperature Range	-55°C to +125°C
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## PART NUMBERING GUIDE



The image contains three mechanical drawings of an oscillator module:

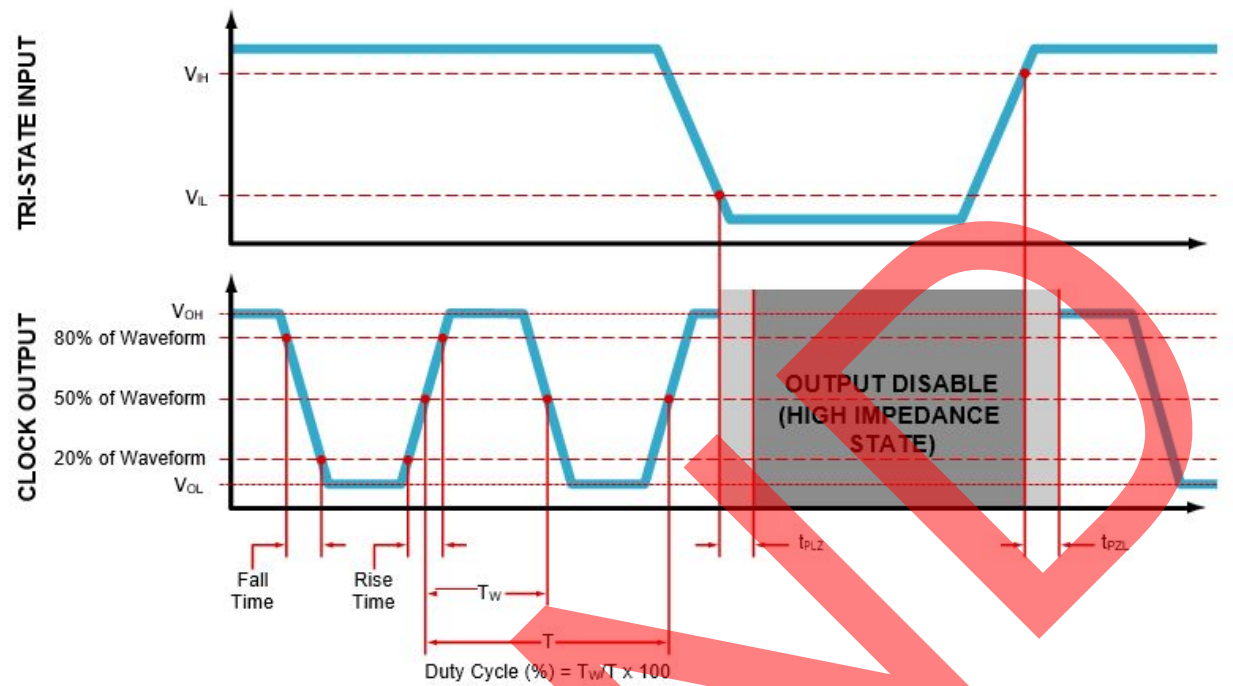
- Top View:** A rectangle with a width of  $5.00 \pm 0.15$  and a height of  $7.00 \pm 0.15$ . A small circle is located in the bottom right corner.
- Side View:** A narrow rectangle with a thickness of  $0.85 \pm 0.15$ . A feature on the right side has a height of  $0.08 \text{ MAX}$ .
- Detail View:** A square pad with a side length of  $2.60 \pm 0.15$ . It features four circular pads labeled 1, 2, 3, and 4. Pad 1 is a small circle with a diameter of  $C0.25 \pm 0.10$ . Pads 2, 3, and 4 have a diameter of  $R0.70 \pm 0.10$ . The distance from the top edge to the center of pad 2 is  $5.08 \pm 0.10$ . The distance from the right edge to the center of pad 3 is  $1.70$ . The distance from the bottom edge to the center of pad 4 is  $1.40 \pm 0.10$ . The distance from the left edge to the center of pad 1 is  $1.20 \pm 0.10$  (x4). The distance from the right edge to the center of pad 4 is  $2.1$ . A center pad labeled 'A' is located in the center of the square pad.

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

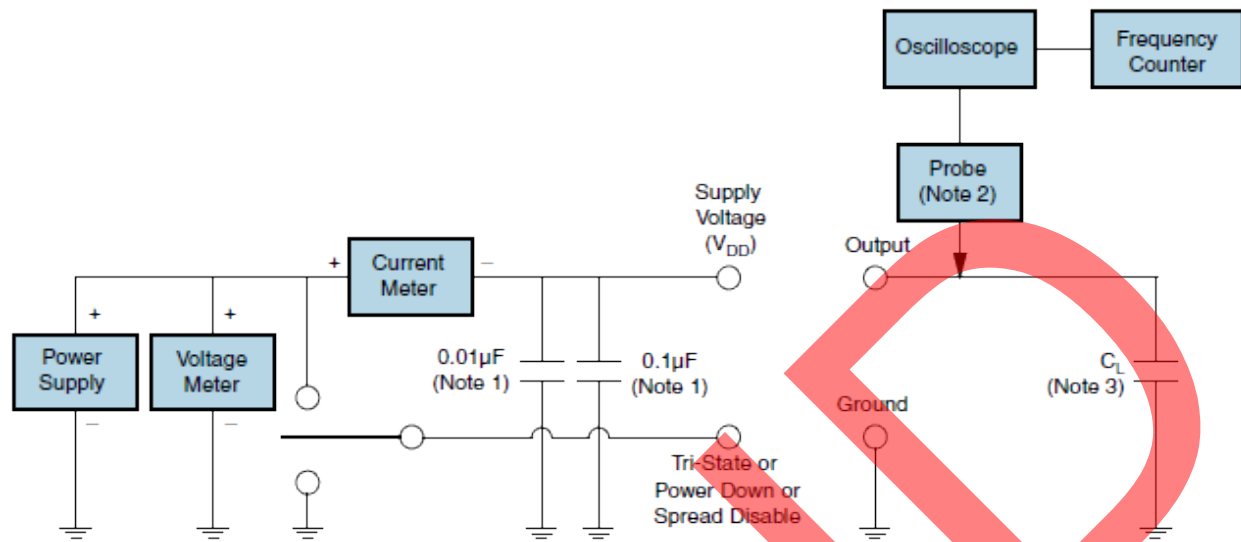
PIN	CONNECTION
1	Power Down (Logic Low) Or Spread Disable (Disabled) Or Tri-State (High Impedance)
2	Ground
3	Output
4	Supply Voltage

### All Dimensions in Millimeters

## OUTPUT WAVEFORM & TIMING DIAGRAM



## TEST CIRCUIT FOR CMOS OUTPUT



**Note 1:** An external  $0.01\mu\text{F}$  ceramic bypass capacitor in parallel with a  $0.1\mu\text{F}$  high frequency ceramic bypass capacitor close (less than 2mm) to the package ground and supply voltage pin is required.

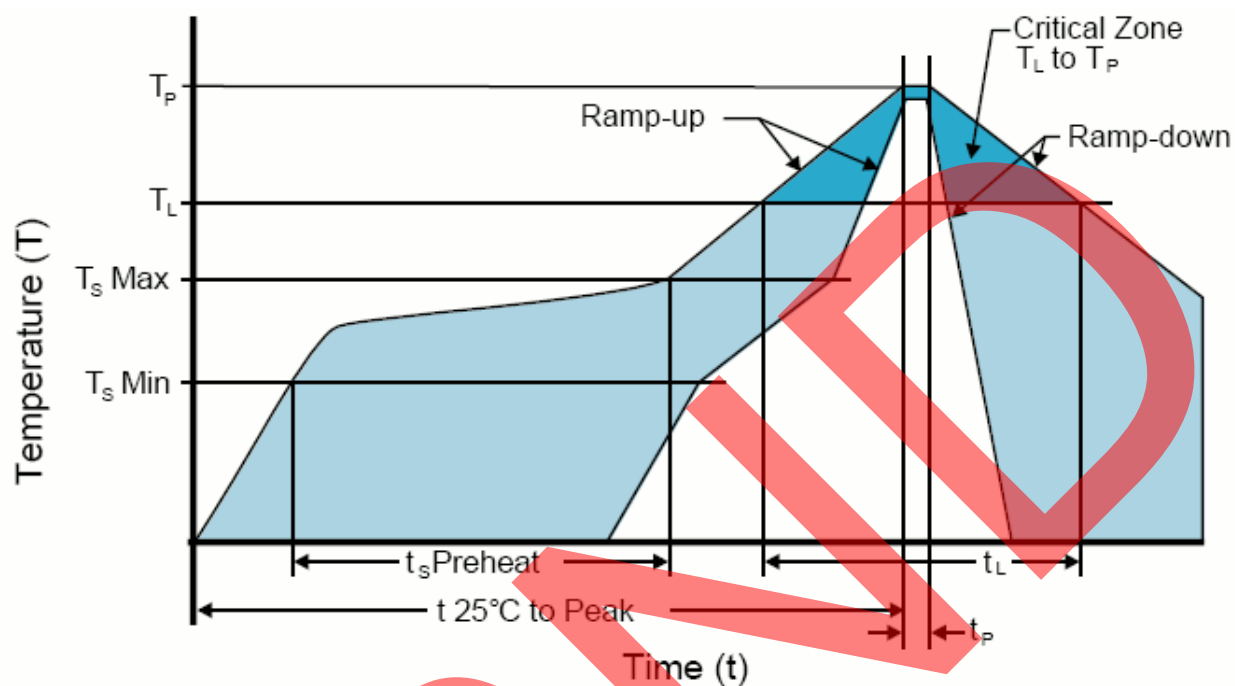
**Note 2:** A low capacitance ( $<12\text{pF}$ ), 10X Attenuation Factor, High Impedance ( $>10\text{Mohms}$ ), and High bandwidth ( $>300\text{MHz}$ ) Passive probe is recommended.

**Note 3:** Capacitance value ( $C_L$ ) includes sum of all probe and fixture capacitance.

Compliant to EIA-481



## RECOMMENDED SOLDER REFLOW METHOD



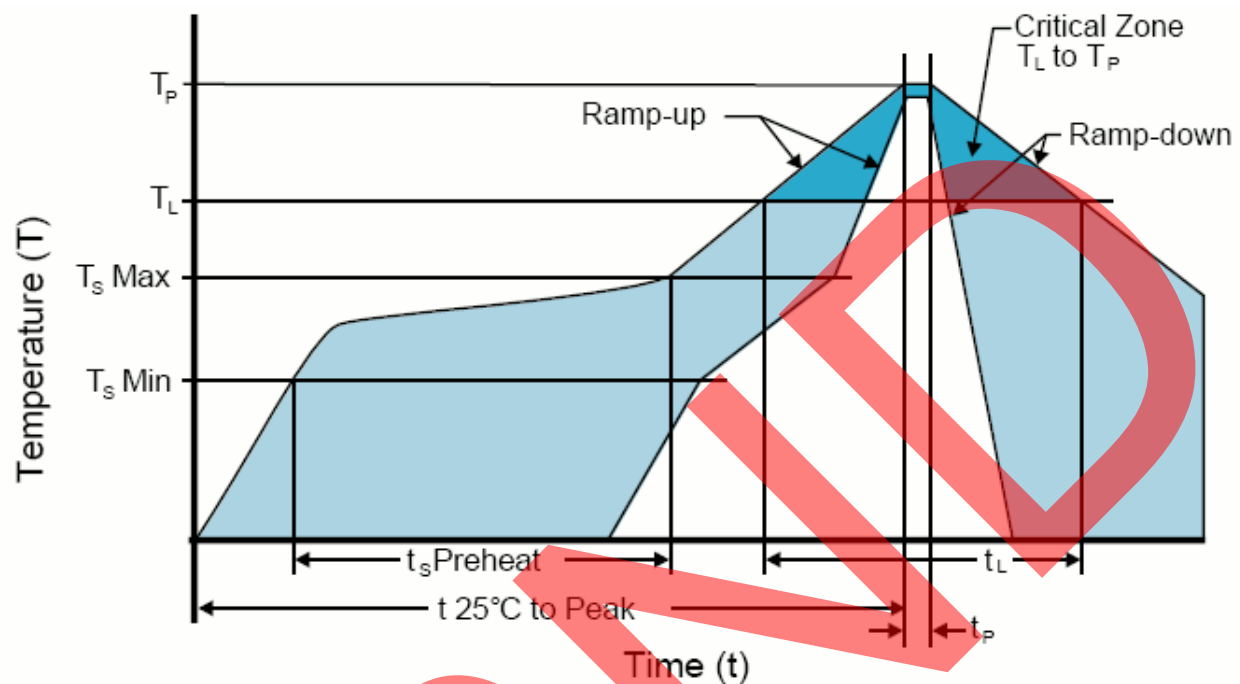
## HIGH TEMPERATURE INFRARED/CONVECTION

<b><math>T_S \text{ MAX to } T_L</math> (Ramp-up Rate)</b>	$3^\circ\text{C/Second Maximum}$
<b>Preheat</b>	
- Temperature Minimum ( $T_S \text{ MIN}$ )	$150^\circ\text{C}$
- Temperature Typical ( $T_S \text{ TYP}$ )	$175^\circ\text{C}$
- Temperature Maximum ( $T_S \text{ MAX}$ )	$200^\circ\text{C}$
- Time ( $t_s$ )	60 - 180 Seconds
<b>Ramp-up Rate (<math>T_L</math> to <math>T_P</math>)</b>	$3^\circ\text{C/Second Maximum}$
<b>Time Maintained Above:</b>	
- Temperature ( $T_L$ )	$217^\circ\text{C}$
- Time ( $t_L$ )	60 - 150 Seconds
<b>Peak Temperature (<math>T_P</math>)</b>	$260^\circ\text{C Maximum for 10 Seconds Maximum}$
<b>Target Peak Temperature (<math>T_P \text{ Target}</math>)</b>	$250^\circ\text{C} \pm 0/-5^\circ\text{C}$
<b>Time within <math>5^\circ\text{C}</math> of actual peak (<math>t_p</math>)</b>	20 - 40 Seconds
<b>Ramp-down Rate</b>	$6^\circ\text{C/Second Maximum}$
<b>Time <math>25^\circ\text{C}</math> to Peak Temperature (<math>t</math>)</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

$260^\circ\text{C}$  Maximum for 5 Seconds Maximum, 2 times Maximum. (Temperatures shown are applied to body of device.)

## RECOMMENDED SOLDER REFLOW METHOD



## LOW TEMPERATURE INFRARED/CONVECTION

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

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## ABRACON:

[EMS13CHA-80.000M](#) [EMS13CKD-48.000M](#) [EMS13CKE-48.000M](#) [EMS13CKF-48.000M](#) [EMS13CHC-5.069M](#)  
[EMS13CHA-50.000MHz](#) [EMS13GHC-40.000M](#)