

# 5.0V Surface Mount Crystal Clock Oscillator HSM9



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**XO**

The Connor-Winfield HSM91, HSM92, HSM93, and HSM94 models are 7.5mm x 5mm, 5.0V HCMOS, Surface Mount, Fixed Frequency Crystal Oscillators (XO) designed for use in all applications requiring precision clocks. The RoHS compliant surface mount package is designed for high-density mounting and is optimum for mass production.

## Features:

1.0 to 80 MHz  
5.0V Operation  
RoHS Compliant  
Tri-State Enable / Disable  
Overall Frequency Tolerance:  
HSM94  $\pm 20$  ppm, HSM91  $\pm 25$  ppm  
HSM92  $\pm 50$  ppm, HSM93  $\pm 100$  ppm  
Temperature Range: 0 to 70°C  
Ceramic Surface Mount Package  
Tape and Reel Packaging

## Absolute Maximum Ratings

| Parameter            | Minimum | Nominal | Maximum | Units | Notes |
|----------------------|---------|---------|---------|-------|-------|
| Storage Temperature  | -55     | -       | 125     | °C    |       |
| Supply Voltage (Vcc) | -0.5    | -       | 7.0     | Vdc   |       |

## Operating Specifications

| Parameter            | Minimum | Nominal | Maximum | Units | Notes |
|----------------------|---------|---------|---------|-------|-------|
| Frequency Range (Fo) |         | -       | 80      | MHz   |       |
| HSM94                | 1.8     |         |         |       |       |
| HSM91                | 1.0     |         |         |       |       |
| HSM92                | 1.0     |         |         |       |       |
| HSM93                | 1.0     |         |         |       |       |
| Frequency Tolerance  |         | -       |         | ppm   | 1     |
| HSM94                | -20     |         | 20      |       |       |
| HSM91                | -25     |         | 25      |       |       |
| HSM92                | -50     |         | 50      |       |       |
| HSM93                | -100    |         | 100     |       |       |
| Operating Temp Range | 0       | -       | 70      | °C    |       |
| Supply Voltage (Vdd) | 4.5     | 5.0     | 5.5     | Vdc   |       |
| Supply Current (Icc) | -       | -       |         | mA    |       |
| 1.0 to 31.999 MHz    |         |         | 27      |       |       |
| 32 to 49.999 MHz     |         |         | 45      |       |       |
| 50 to 80.0 MHz       |         |         | 75      |       |       |

## Input Characteristics

| Parameter               | Minimum         | Nominal | Maximum         | Units | Notes |
|-------------------------|-----------------|---------|-----------------|-------|-------|
| Enable Voltage - (Vih)  | $\geq 70\%$ Vdd | -       | -               | Vdc   | 2     |
| Disable Voltage - (Vil) | -               | -       | $\leq 30\%$ Vdd | Vdc   |       |
| Enable Time             | -               | -       | 100             | mS    |       |
| Disable Time            | -               | -       | 100             | nS    |       |

## HCMOS Output Characteristics

| Parameter                   | Minimum | Nominal | Maximum | Units  | Notes |
|-----------------------------|---------|---------|---------|--------|-------|
| Load                        | -       | -       | 50      | pF     |       |
| Voltage High (Voh)          | 4.5     | -       | -       | Vdc    |       |
| Low (Vol)                   | -       | -       | 0.55    | Vdc    |       |
| Current High (Ioh)          | -16     | -       | -       | mA     |       |
| Low (Iol)                   | -       | -       | 16      | mA     |       |
| Duty Cycle at 50% of Vcc    | 45      | 50      | 55      | %      |       |
| Rise / Fall Time 10% to 90% | -       | -       | 6       | nS     |       |
| Start-Up Time               | -       | -       | 10      | mS     |       |
| Jitter                      | -       | -       | 5       | pS RMS |       |

## Notes:

- Inclusive of calibration @ 25°C, frequency vs temperature stability, supply voltage change, load change, shock and vibration, 10 years aging.
- Oscillator output is enabled with no connection on pad 1



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## Package Characteristics

|         |                                                     |
|---------|-----------------------------------------------------|
| Package | Hermetically sealed ceramic package and metal cover |
|---------|-----------------------------------------------------|

## Environmental Characteristics

|                    |                                                                                                                        |
|--------------------|------------------------------------------------------------------------------------------------------------------------|
| Temperature Cycle  | The specimen shall meet electrical characteristics after tested 5 cycles of -55°C / 30 minutes and +125°C / 30 minutes |
| Hermetical         | No bubbles appear in Flourinert (FC-43) at 125°C ±5°C for 5 minutes                                                    |
| Solvent Resistance | Marking will withstand immersion in Isopropyl Alcohol or Trichloroethylene                                             |

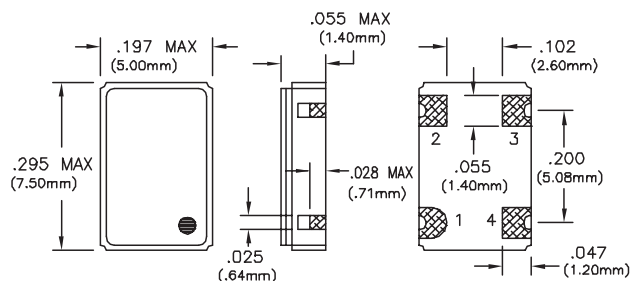
## Soldering

|                        |                                                                                                                         |
|------------------------|-------------------------------------------------------------------------------------------------------------------------|
| General Conditions     | 260°C max x 10 sec max x 2 times max or<br>230°C max x 180 sec max x 1 time                                             |
| Typical Operation Data | (Vapor phase reflow)<br>20 to 100 sec up to 215°C, 50 sec<br>at 215°C, then down to room temperature per 1 to 5°C / sec |

## Mechanical Characteristics

|               |                                                                                                                                                                                                                                                                                                         |
|---------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Free Drop     | The specimen shall meet electrical characteristics after tested 3 times, Free Drop testing on the hard wooden board from a height of 75 cm.                                                                                                                                                             |
| Vibration     | The specimen shall meet electrical characteristics after tested by the following conditions: 10-55Hz 1.5mm Amplitude, 55-2000 Hz 20 G's, 2 hours for each plane                                                                                                                                         |
| Thermal Shock | After applied Thermal Shock of 260°C max x 10 sec max x 2 times, or 230°C max x 180 sec max, the specimen shall meet electrical characteristics                                                                                                                                                         |
| Solderability | (EIAJ-RCX-0102.101 Condition 1a)<br>1) Flux: MIL-F-14256 (WW Rosin=25%, Isopropyl Alcohol = 75%)<br>2) Solder: QQ-S-571 (Sn = 63%, Pb = 37%)<br>3) Solder bath temperature: 235°C ±5°C<br>4) Depth of immersion: Up to electrical terminal<br>5) Immersing time: Within 2 sec ±0.5 sec into solder bath |

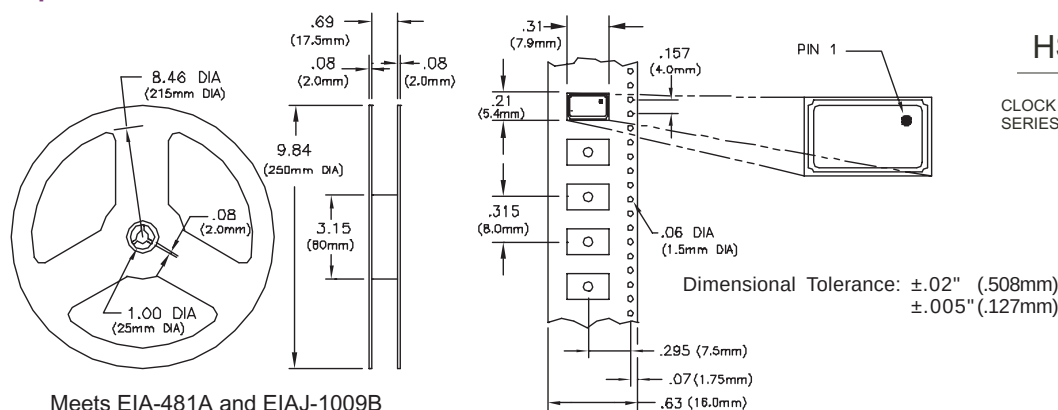
After performing the above procedures, a newly soldered coverage shall be greater than 90%.



## Pin Connections

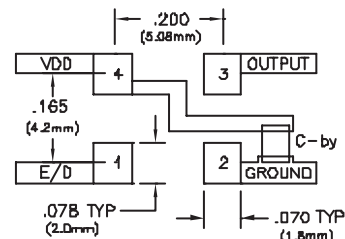
- 1: Tri-State E/D
- 2: Ground
- 3: Output
- 4: VDD

## Tape and Reel Dimensions



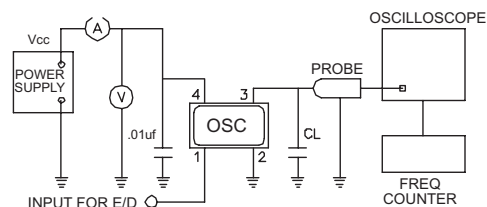
Meets EIA-481A and EIAJ-1009B  
2,000 PCS/Reel

## Suggested Pad Layout

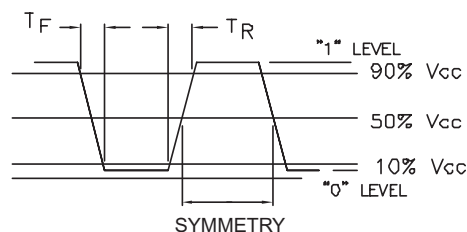


Bypass capacitor, C-by, should be ceramic capacitor  $\geq .01 \mu\text{f}$

## Test Circuit



## Output Waveform



## Ordering Information

HSM91 - 050.0M

CLOCK  
SERIES

CENTER  
FREQUENCY

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