



# CRYSTAL OSCILLATORS HCMOS/TTL 3.3V



**SURFACE MOUNT  
T package**  
T1380, T1381,  
T1382, T1388,  
T1389  
T3390, T3391,  
T3392, T3398,  
T3399

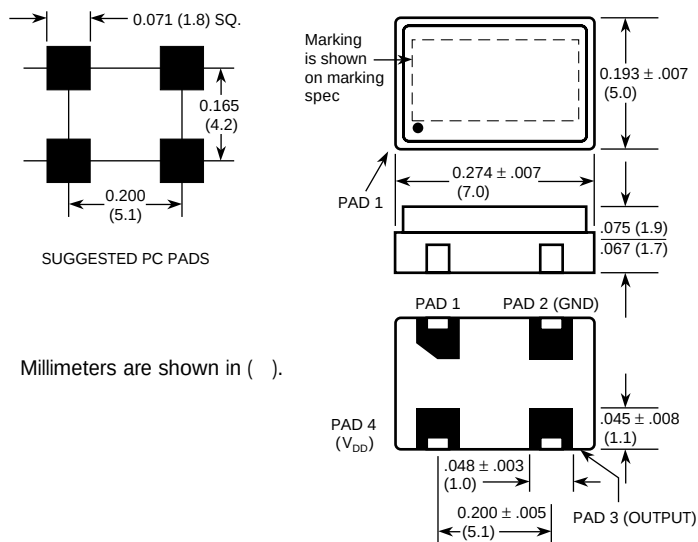
## 5 x 7 mm Surface Mount Commercial: 0° to 70°C FIXED FREQUENCY, 1 KHz to 125 MHz TRISTATE, 14 KHz to 125 MHz

### FEATURES

- Fixed frequency or Tristate
- Very low power when tristated
- Start up time less than 5 ms.
- Stability options from  $\pm 100$  ppm to  $\pm 20$  ppm
- Guaranteed start-up with ramping DC Supply
- 45/55 symmetry is standard

### TYPICAL APPLICATIONS

- Any surface mount PCB that requires a standard HCMOS/TTL 3.3V clock, including microprocessors and microcontrollers.



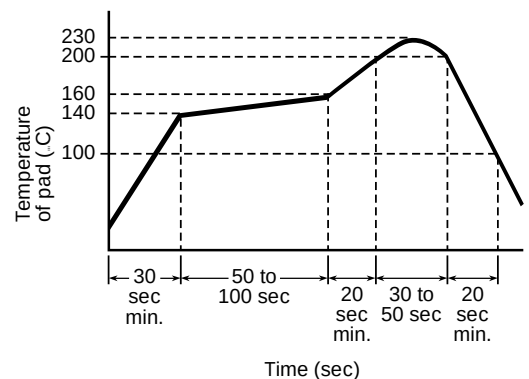
**"T" Package**

### Description

MF Electronics T-series surface mount (SMD) oscillators provide clock waveforms needed to clock standard HCMOS or TTL circuits.

### CONNECTIONS

|       | Fixed Output Models | Tristate Models                                                   |
|-------|---------------------|-------------------------------------------------------------------|
| PAD 1 | NOT USED            | Floating or 1 : Oscillator runs Ground or 0 : Disable or Tristate |
| PAD 2 | Ground and Case     |                                                                   |
| PAD 3 | Output              |                                                                   |
| PAD 4 | +3.3V, $V_{DD}$     |                                                                   |



**Recommended Reflow Soldering Profile**





**CRYSTAL OSCILLATORS**  
**HCMOS/TTL 3.3V**  
**5 x 7 mm Surface Mount**  
**Commercial: 0° to 70°C**  
**FIXED FREQUENCY, 1 KHz to 125 MHz**  
**TRISTATE, 14 KHz to 125 MHz**

**SURFACE MOUNT**  
**T package**  
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**ELECTRICAL SPECIFICATIONS**

**Frequency Range**

|              |                   |
|--------------|-------------------|
| Fixed Output | 1 KHz to 125 MHz  |
| Tristate     | 14 KHz to 125 MHz |

**Frequency Stability** Includes calibration at 25°C, operating temperature, change of input voltage, change of load, shock and vibration.

|                                           | MIN | TYP | MAX | UNITS |
|-------------------------------------------|-----|-----|-----|-------|
| <b>Input Voltage, <math>V_{DD}</math></b> | 3.0 | 3.3 | 3.6 | volts |

**Input Current**

|                 |      |      |    |
|-----------------|------|------|----|
| 3 M to 10 MHz   | 2.0  | 3.5  | mA |
| 10.1 to 20 MHz  | 3.0  | 4.0  | mA |
| 20.1 to 30 MHz  | 5.0  | 6.0  | mA |
| 30.1 to 50 MHz  | 7.0  | 8.0  | mA |
| 50.1 to 67 MHz  | 11.0 | 12.0 | mA |
| 67.1 to 125 MHz | 13.0 | 16.0 | mA |

**Output Levels**

|                                  |               |       |
|----------------------------------|---------------|-------|
| "0" Level, sinking 16 mA         | 0.4           | volts |
| "1" Level<br>CMOS, sourcing 8 mA | $V_{DD} - .4$ | volts |

**Rise and Fall Times**

|                                     |     |     |    |
|-------------------------------------|-----|-----|----|
| CMOS, 15 pf,<br>20 to 80% (<60 MHz) | 3.0 | 4   | ns |
| CMOS, 30 pf,<br>20 to 80% (<60 MHz) | 4.0 | 5   | ns |
| CMOS, 50 pf,<br>20 to 80% (<60 MHz) | 6.0 | 8   | ns |
| CMOS, 15 pf,<br>20 to 80% (>60 MHz) | 2.0 | 2.5 | ns |
| CMOS, 30 pf,<br>20 to 80% (>60 MHz) | 3.0 | 4.5 | ns |

**Jitter**

|                                     |     |        |
|-------------------------------------|-----|--------|
| from positive edge to positive edge | 100 | ps RMS |
|-------------------------------------|-----|--------|

**Symmetry**

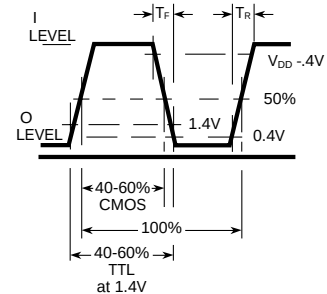
|                      |       |       |         |
|----------------------|-------|-------|---------|
| CMOS, @ 50% $V_{DD}$ | 48/52 | 45/55 | percent |
|----------------------|-------|-------|---------|

**Aging**

|                  |   |        |
|------------------|---|--------|
| First year       | 3 | ppm    |
| After first year | 1 | ppm/yr |

**Input Requirements for Pin 1.:**

- "1": On – Pin 1 may float or 2.4V min., sourcing 400 microAmp
- "0": Disable or Tristate – Pin 1 requires 0.4V, sinking 400 microAmp.



**WAVEFORMS**

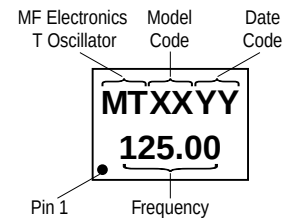
| <b>FIXED OUTPUT</b> |                    |                     |
|---------------------|--------------------|---------------------|
| MODEL               | Marking Letter ID* | Frequency Stability |
| T1380               | E                  | ±100 ppm            |
| T1381               | AL                 | ±25 ppm             |
| T1382               | F                  | ±50 ppm             |
| T1388               | BV                 | ±20 ppm             |
| T1389               | BW                 | ±32 ppm             |

\* See Marking Specification

| <b>TRISTATE</b> |                    |                     |
|-----------------|--------------------|---------------------|
| MODEL           | Marking Letter ID* | Frequency Stability |
| T3390           | G                  | ±100 ppm            |
| T3391           | Q                  | ±25 ppm             |
| T3392           | H                  | ±50 ppm             |
| T3398           | BY                 | ±20 ppm             |
| T3399           | BZ                 | ±32 ppm             |

**MARKING SPECIFICATION**

The format for the marking is:





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**ENVIRONMENTAL SPECIFICATIONS**

**Temperature**

Operating 0° to 70°C  
Storage -55° to +125°C

**Shock** – 1000 Gs, 0.35 ms, 1/2 sine wave, 3 shocks in each plane

**Vibration** – 10-2000 Hz of .06" d.a. or 20 Gs, whichever is less

**Humidity** – Resistant to 85° R.H. at 85°C

**MECHANICAL SPECIFICATIONS**

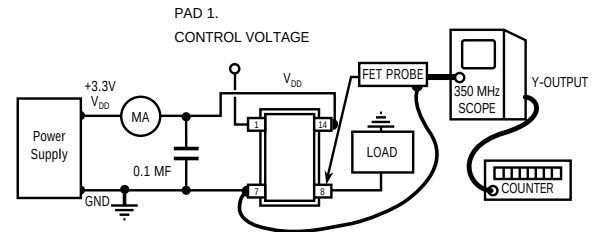
**Leak** – MIL STD 883, Method 1014, condition A1

**Case** – Hermetically sealed package

**Pads** – 60 microinch of gold over nickel

**Marking** – Epoxy ink or laser engraved

**Resistance to Solvents** – MIL STD 202, Method 215



To adapt FET probe to receptacle  
use Tektronix Part #103-0164-00

To connect output to scope use  
Tektronix Part #131-0258-00 (receptacle)

**TEST CIRCUIT**

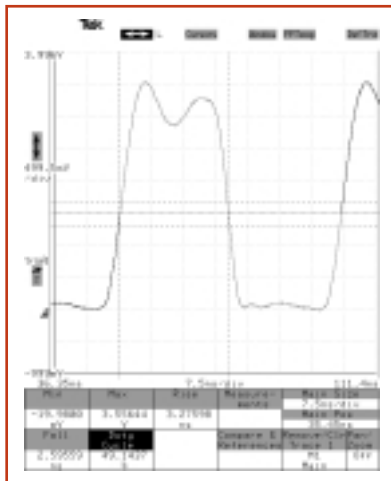


Fig.1 T3392-20M with 25pf load

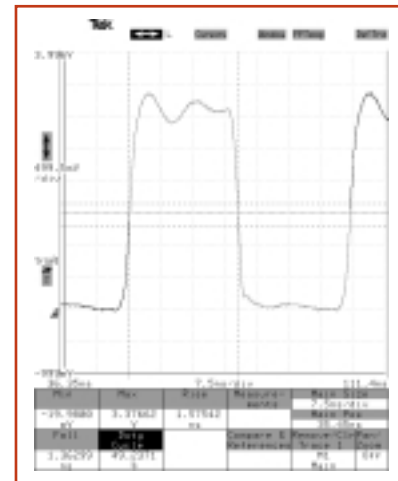


Fig. 2 T3392-20M without load

**HOW TO ORDER**

For Part Number, put package type before model number,  
and add frequency in MHz, for example:

**T 3391 - 125M**

"T" is SMD  
"T" package

"3391"  
is model  
type

"125 M"  
frequency  
in MHz

| SS#   | Rev. |
|-------|------|
| T1380 | A    |

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