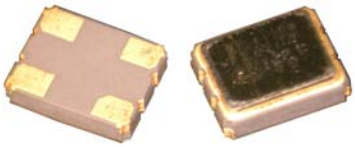
PLETRONICS
www.pletronics.com 425-776-1880



# SM33T Series 1.8 V CMOS Clock Oscillators

February 2009

Lead Free

- Pletronics' SM33 Series is a quartz crystal controlled precision square wave generator with a CMOS output.
- The package is designed for high density surface mount designs.
- This is a low cost mass produced oscillator.
- Tape and Reel or cut tape packaging is available.
- 0.75 to 50 MHZ
- 2.0 x 2.5 mm LCC Ceramic Package
- Enable/Disable Function
- Disable function includes low standby power mode
- Low Jitter

**Pletronics Inc. certifies this device is in accordance with the RoHS 6/6 (2002/95/EC) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following:
Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.022 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020C
Second Level Interconnect code: e4

## Absolute Maximum Ratings:

| Parameter | Unit |
|---|---|
| $V_{CC}$ Supply Voltage | -0.5V to +7.0V |
| Vi Input Voltage | -0.5V to $V_{CC}$ + 0.5V |
| Vo Output Voltage | -0.5V to $V_{CC}$ + 0.5V |
| Io Output Current | +25 mA to -25 mA |

## Thermal Characteristics

The maximum die or junction temperature is 155°C
The thermal resistance junction to board is 50 to 70°C/Watt depending on the solder pads, ground plane and construction of the PCB.

### Part Number:

| SM33 | 45 | T | E | X | - 75.0M | -XX | |
|---|---|---|---|---|---|---|---|
| | | | | | | | **Packaging code or blank**<br>**T250 = 250 per Tape and Reel**<br>**T500 = 500 per Tape and Reel**<br>**T1K = 1000 per Tape and Reel** |
| | | | | | | | **Frequency in MHz** |
| | | | | | | | **Supply Voltage $V_{cc}$**<br>**X** = 1.8V ± 5% |
| | | | | | | | **Temperature Range**<br>**Blank** = Temp. range -10 to +70°C<br>**E** = Temp. range -40 to +85°C |
| | | | | | | | **Series Model** |
| | | | | | | | **Frequency Stability**<br>**44** = ± 25 ppm<br>**45** = ± 50 ppm<br>**00** = ± 100 ppm |
| | | | | | | | **Series Model** |

**Part Marking:**

P*FF.FF*
• *YMDxx*

**Marking Legend:**
P = Pletronics
*FF.FF* = Frequency in MHZ
*YMD* = Date of Manufacture (year and week, or year-month-day)
All other marking is internal factory codes

Specifications such as frequency stability, supply voltage and operating temperature range, etc. are not identified from the marking. External packaging labels and packing list will correctly identify the ordered Pletronics part number.

**Codes for Date Code YMD**

| Code | 8 | 9 | 0 | 1 | 2 |
|---|---|---|---|---|---|
| Year | 2008 | 2009 | 2010 | 2011 | 2012 |

| Code | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| Code | D | E | F | G | H | J | K | L | M | N | P | R |
| Day | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 | 21 | 22 | 23 | 24 |
| Code | T | U | V | W | X | Y | Z | | | | | |
| Day | 25 | 26 | 27 | 28 | 29 | 30 | 31 | | | | | |

## Electrical Specification for 1.80V ±5% over the specified temperature range

| Item | Min | Max | Unit | Condition |
|---|---|---|---|---|
| Frequency Range | 0.75 | 50 | MHz | |
| Frequency Accuracy "00"<br>"45<br>"44 | -100<br>-50<br>-25 | 100<br>50<br>25 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| Output Waveform | | CMOS | | |
| Output High Level | 90 | - | % | of $V_{CC}$ Cload = 15 pF (See load circuit) |
| Output Low Level | - | 10 | % | |
| Rise and Fall Time | - | 10 | nS | |
| Output Symmetry | 40 | 60 | % | at 50% point of $V_{CC}$ |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | to $V_{CC}$ |
| V disable | - | 30 | % | of $V_{CC}$ applied to pad 1 |
| V enable | 70 | - | % | |
| Output leakage $V_{OUT} = V_{CC}$ | -10 | +10 | uA | Pad 1 low, device disabled |
| $V_{OUT} = 0V$ | -10 | +10 | uA | |
| Standby Current $I_{CC}$ | - | 10 | uA | |
| Operating Current $I_{CC}$ | - | 2.5<br>3.0<br>3.5 | mA | Fout < 20 MHz<br>20 MHz >= Fout <40 MHz<br>Fout >= 40MHz |
| Enable time | - | 10 | mS | Time for output to reach a logic state |
| Disable time | - | 150 | nS | Time for output to reach a high Z state |
| Start up time | - | 10 | mS | Time for output to reach specified frequency |
| Aging | -5 | +5 | ppm | First year at 25°C |
| Operating Temperature Range | -10 | +70 | °C | Standard Temperature Range |
| | -40 | +85 | °C | Extended Temperature Range "**E**" Option |
| Storage Temperature Range | -55 | +100 | °C | |

## Phase Noise Performance

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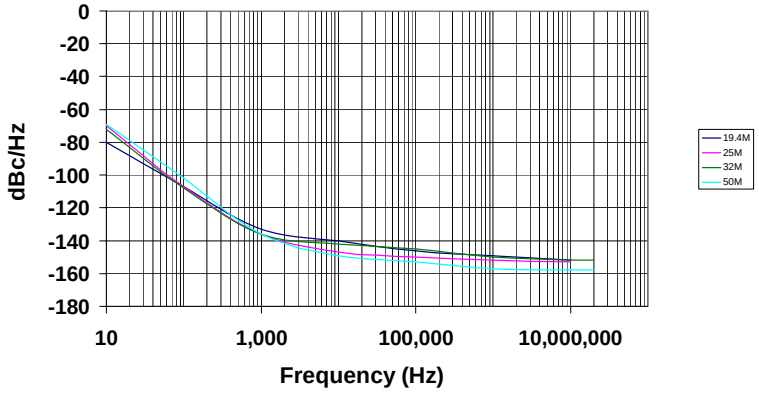
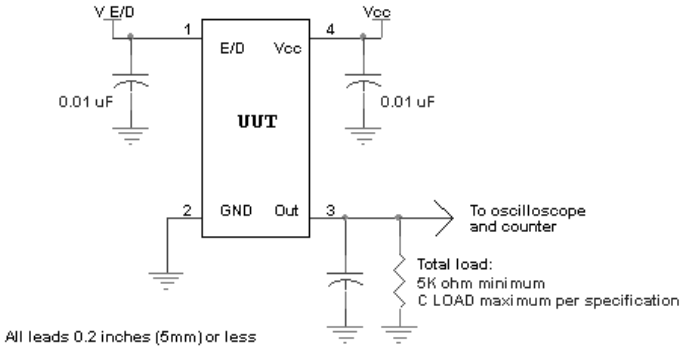
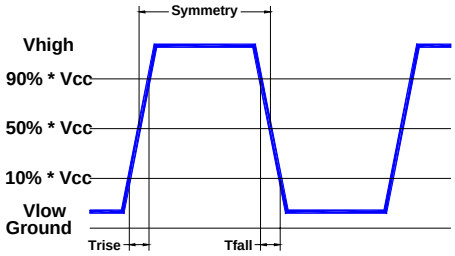


## Load Circuit and Test Waveform




## Reliability: Environmental Compliance

| Parameter | Condition |
|---|---|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition B |
| Vibration | MIL-STD-883 Method 2007, Condition A |
| Solderability | MIL-STD-883 Method 2003 |
| Thermal Shock | MIL-STD-883 Method 1011, Condition A |

## ESD Rating

| Model | Minimum Voltage | Conditions |
|---|---|---|
| Human Body Model | 1500 | MIL-STD-883 Method 3115 |
| Charged Device Model | 1000 | JESD 22-C101 |

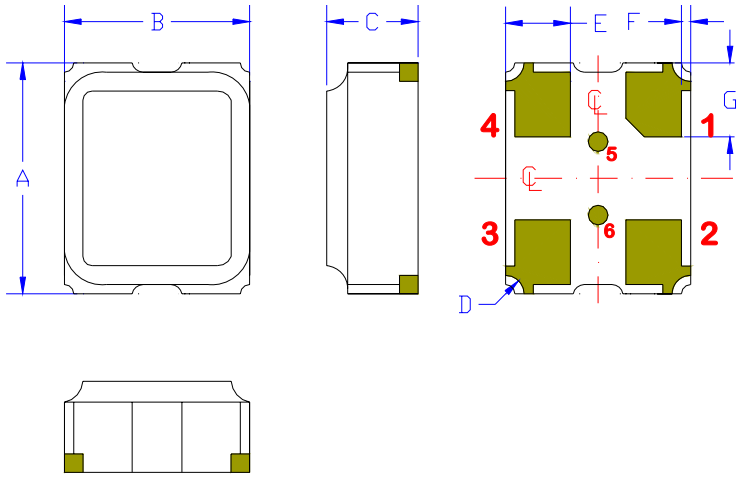
## Package Labeling

Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Courier New
Bar code is 39-Full ASCII


Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

RoHS Compliant
2nd LvL Interconnect
Category=e4
Max Safe Temp=260C for 10s 2X Max

## Mechanical:




| | Inches | mm |
|---|---|---|
| A | 0.098 ±0.004 | 2.50 ±0.10 |
| B | 0.079 ±0.004 | 2.00 ±0.10 |
| C | 0.039 ±0.004 | 1.00 ±0.10 |
| D[1] | 0.008 | 0.20R |
| E[1] | 0.028 | 0.70 |
| F[1] | 0.004 | 0.10 |
| G[1] | 0.031 | 0.80 |

Not to Scale

[1] Typical dimensions

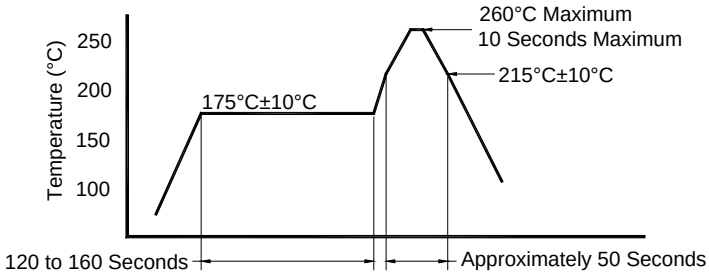
Contacts :
Gold 11.8 µinches 0.3 µm minimum over Nickel 50 to 350 µinches 1.27 to 8.89 µm

| Pad | Function | Note |
|---|---|---|
| 1 | Output Enable/Disable | When this pad is not connected the oscillator shall operate. When this pad is logic low the output will be inhibited (high impedance state.) Recommend connecting this pad to $V_{CC}$ if the oscillator is to be always on. |
| 2 | Ground (GND) | |
| 3 | Output | |
| 4 | Supply Voltage ($V_{CC}$) | Recommend connecting appropriate power supply bypass capacitors as close as possible. |

## Layout and application information

For Optimum Jitter Performance, Pletronics recommends:
- a ground plane under the device
- no large transient signals (both current and voltage) should be routed under the device
- do not layout near a large magnetic field such as a high frequency switching power supply
- do not place near piezoelectric buzzers or mechanical fans.

## Reflow Cycle (typical for lead free processing)



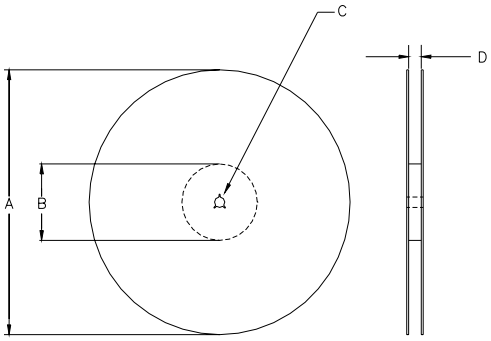

The part may be reflowed 2 times without degradation.

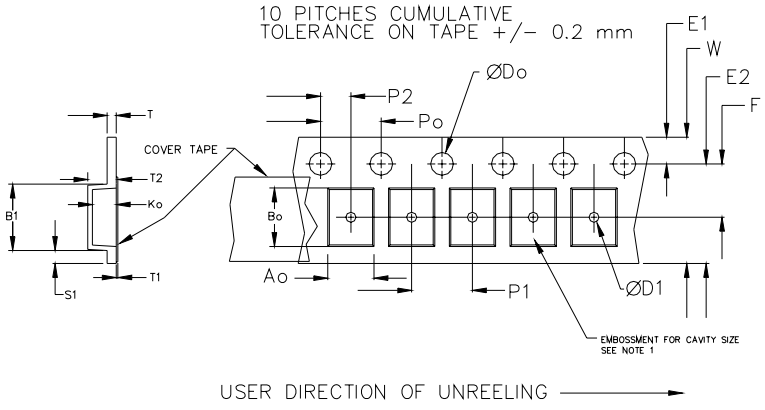
## Tape and Reel: available for quantities of 250 to 1000 per reel, cut tape for < 250

| Constant Dimensions Table 1 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Tape Size | D0 | D1 Min | E1 | P0 | P2 | S1 Min | T Max | T1 Max |
| 8mm | 1.5 +0.1 -0.0 | 1.0 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.05 | 0.6 | --- | 0.1 |
| 12mm | | 1.5 | | | | | | |
| 16mm | | 1.5 | | | 2.0 ±0.1 | | | |
| 24mm | | 1.5 | | | | | | |

| Variable Dimensions Table 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tape Size | B1 Max | E2 Min | F | P1 | T2 Max | W Max | Ao, Bo & Ko |
| 8 mm | 2.9 | 6.25 | 1.75±0.1 | 4.0 ±0.1 | 1.1 | 8.1 | Note 1 |

Note 1: Embossed cavity to conform to EIA-481-B  Dimensions in mm  Not to scale




USER DIRECTION OF UNREELING

| | | REEL DIMENSIONS | | | |
|---|---|---|---|---|---|
| A | inches | 7.0 | 10.0 | 13.0 | |
| | mm | 177.8 | 254.0 | 330.2 | |
| B | inches | 2.50 | 4.00 | 3.75 | |
| | mm | 63.5 | 101.6 | 95.3 | Tape Width |
| C | mm | 13.0 +0.5 / -0.2 | | | |
| D | mm | 16.4 +2.0 -0.0 | 16.4 +2.0 -0.0 | 16.4 +2.0 -0.0 | 16.0 |

Reel dimensions may vary from the above

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