# PLETRONICS SM44J Series 3.3V CMOS Clock Oscillator

SM44JV
3.2 x 2.5 x 0.95 mm
LCC Ceramic Package

## Features

- Quartz crystal controlled precision square wave oscillator
- CMOS Output (will interface with TTL devices)
- Enable/Disable Function includes low standby power
- Low Jitter
- 3.3V nominal Supply Voltage
- 1.25-170 MHz Frequency Range

## Applications

Driving A/Ds, D/As, FPGAs
Digital Video
Ethernet, GbE
Medical
Storage Area Networking
COTS
Broad Band Access
SONET/ SDH/ DWDM
Base Stations/ Picocell
Test & Measurement

## Electrical Characteristics

| Parameter | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|
| Frequency Range [2] | 1.25 | - | 170 | MHz | Consult factory for other options |
| Frequency Stability [2]<br>± 20 = **20***, ± 25 = **44**, ± 50 = **45** | ±20 | - | ±50 | ppm | Includes supply voltage change, load change, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. *limited frequencies, see page 3 |
| Operating Temperature Range [2] | -10<br>-20<br>-40<br>-40 | -<br>-<br>- | +70<br>+70<br>+85<br>+105 | °C | Standard range<br>Extended range **C** option<br>Extended range **E** option<br>Extended range **G** option |
| Supply Voltage [1, 2] (Vcc) | 2.97 | 3.30 | 3.63 | V | 3.3V ± 10% |
| Output Waveform | | CMOS | | | |
| Duty Cycle | 45 | - | 55 | % | At 50% Vcc level |
| Output $V_{HIGH}$ (VOH) | $V_{CC}$ - 0.4 | - | - | V | |
| Output $V_{LOW}$ (VOL) | - | - | 0.4 | V | |
| Output $T_{RISE}$ and $T_{FALL}$ | - | 1 | 5 | ns | $C_{LOAD}$ = 15 pF<br>10% to 90% of $V_{CC}$<br>See Load Circuit |
| Startup Time | - | - | 10 | ms | Time for output to reach specified frequency |
| $V_{DISABLE}$ (VIL) | - | - | 0.3Vcc | V | |
| $V_{ENABLE}$ (VIH) | 0.7Vcc | - | | | |
| Output Enable Time | - | - | 100 | ns | Time for output to reach a logic state |
| Output Disable Time | - | - | 200 | ns | Time for output to reach a high Z state |
| Enable/Disable Internal Pull-up | 30 | 70 | 150 | KΩ | To $V_{CC}$, Pad 1 open or ≥0.7Vcc |
| Standby Current (Pad 1 low) | - | - | 10<br>20 | µA | -40 to +85°C<br>-40 to +105°C — Output disabled to tristate |
| Output Leakage Current | -<br>-10 | - | +10<br>- | µA | Out = Vcc<br>Out = Gnd — Pad 1 Low |
| rms Phase Jitter | - | 0.1 | 1.0 | ps | Fo ≥ 40MHz; 12kHz ~ 20MHz |
| Phase Noise<br>10 Hz<br>100 Hz<br>1 kHz<br>10 kHz<br>100 kHz<br>1 MHz<br>10 MHz | - | -78<br>-107<br>-132<br>-144<br>-151<br>-155<br>-158 | - | dBc/Hz | 25°C ± 2°C at 100 MHz |
| Storage Temperature Range | -55 | - | +125 | °C | |

Notes: Specifications with Pad 1 E/D open circuit
[1] Place an appropriate power supply bypass capacitor next to Vcc for best performance
[2] Specified by part number

## Electrical Characteristics

| Parameter | Min | Typ | Max | Unit | Condition | |
|---|---|---|---|---|---|---|
| Supply Current $I_{CC}$ | | 0.9 | 1.8 | mA | 3 MHz | no load |
| | | 1.4 | 2.8 | | 5 MHz | |
| | | 1.5 | 3.0 | | 10 MHz | |
| | - | 1.7 | 3.4 | | 20 MHz | |
| | - | 3.5 | 7.0 | | 50 MHz | |
| | - | 4.0 | 8.0 | | 65 MHz | |
| | - | 4.5 | 9.0 | | 85 MHz | |
| | | 5.5 | 10.5 | | 100 MHz | |
| | | 7.0 | 13.5 | | 133 MHz | |
| | | 10.5 | 21.0 | | 170 MHz | |

Specifications with Pad 1 E/D circuit open

## Part Number

| Series Model | Frequency Stability | | Operating Temperature Range | Supply Voltage $V_{CC}$ | Frequency in MHz | Optional T&R Packaging code |
|---|---|---|---|---|---|---|
| SM44 | 45 | J | E | V | - 125.0M | -XX |
| | 45 = ± 50 ppm (STD)<br>44 = ± 25 ppm<br>20* = ± 20 ppm | | Blank = -10 to +70°C (STD)<br>C = -20 to +70°C<br>E = -40 to +85°C<br>G = -40 to +105°C** | V = 3.3V ± 10% | 1.25 - 170 | T250 = 250 per Reel<br>T500 = 500 per Reel<br>T3K = 3000 per Reel (Std) |

* Contact PLE sales for limited frequencies. Full frequency range available which excludes aging.
** ± 50ppm

## Device Marking

**P*FF.FF* M**
- *YMDxx*

**P*FF.FF* M**
- *YMxxx*

P = Pletronics
*FF.FF* = Frequency in MHz
*YMD* or *YM* = Date Code, All other marking is internal code

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

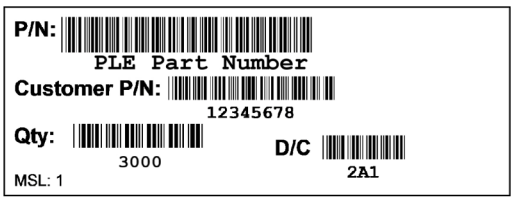
Codes for Date Code YMD (Year Month Day)

| Code | 3 | 4 | 5 | 6 | 7 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2023 | 2024 | 2025 | 2026 | 2027 | Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

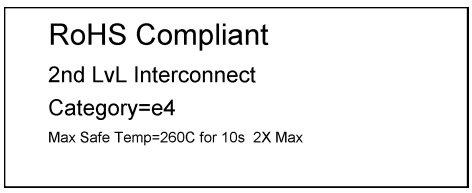
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 |
| Code | H | J | K | L | M | N | P | R | T | U | V | W | X | Y | Z | |
| Day |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

## Package Labeling

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




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

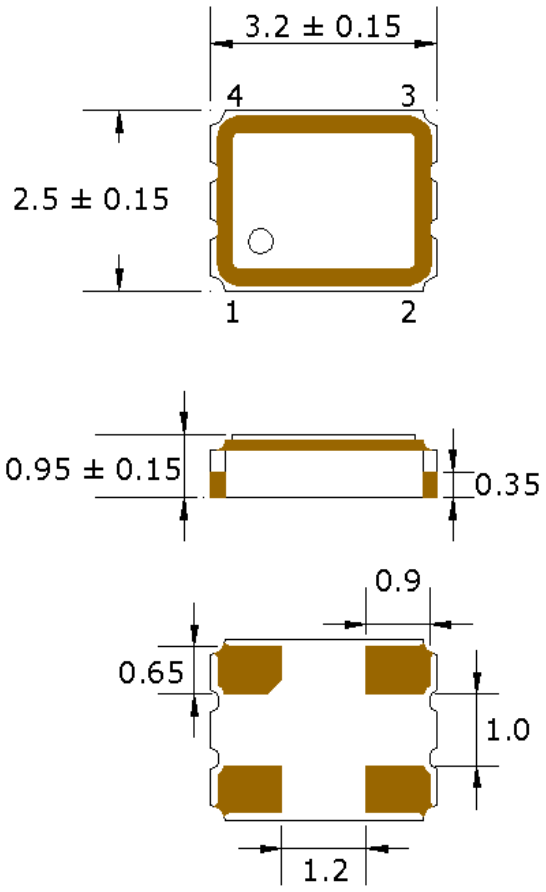



**Pletronics Inc. certifies this device is in accordance with the RoHS and REACH directives.**

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.024 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

## Mechanical Dimensions

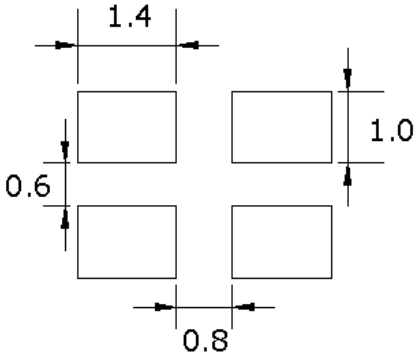



Dimensions in mm

### Pad Connections

| Pad | Function |
|---|---|
| 1 | Enable/Disable |
| 2 | Ground |
| 3 | Output |
| 4 | Vcc |

| ENABLE/DISABLE | |
|---|---|
| Pad 1 | Output |
| VIH/Open | Active |
| VIL/Gnd | Disabled/Tristate |




**Pad Layout**
Disclaimer: Recommended layout shown. Adjust layout as needed for individual process requirements.

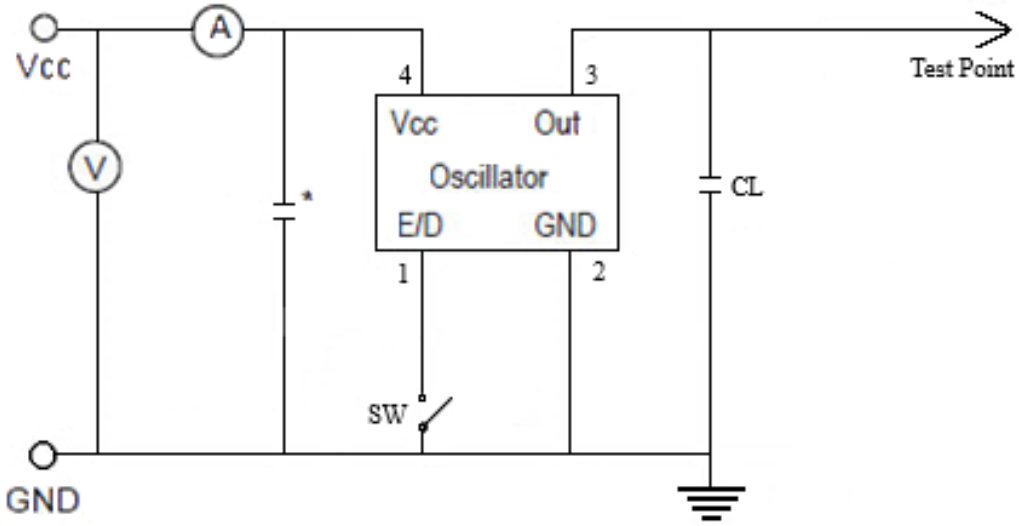
**Contacts (pads): Gold (0.3 to 1.0 µm) over Nickel (1.27 to 8.89 µm)**

For Optimum Jitter Performance, Pletronics recommends:

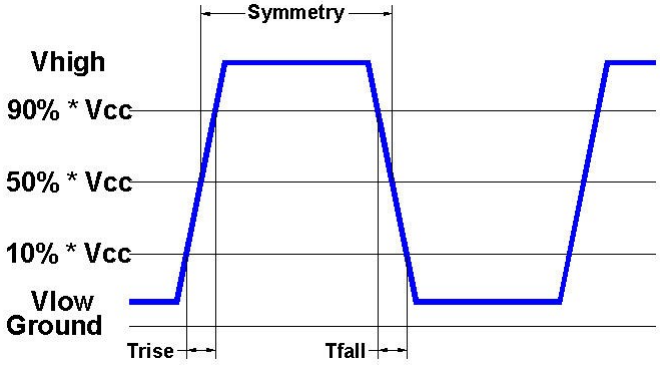
- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

## Electrical Test / Load Circuit




Notes:
CL: Includes the input capacitance of oscilloscope
* 0.01µF external by-pass filter is recommended




## Environmental / ESD Ratings

Reliability: Environmental

| Parameter | Condition |
|---|---|
| Mechanical Shock | MIL-STD-883, Method 2002, Condition B |
| Vibration | MIL-STD-883, Method 2007, Condition A |
| Solderability | IPC J-STD-002 |
| Thermal Cycle | MIL-STD-883 Method 1010, Condition B |

ESD Rating

| Model | Min. Voltage | Condition |
|---|---|---|
| Human Body Model | 2000V | JESD22-A114 |
| Machine Model | 200V | JESD22-A115 |

**Thermal Characteristics:**
The maximum die or junction temperature is150°C

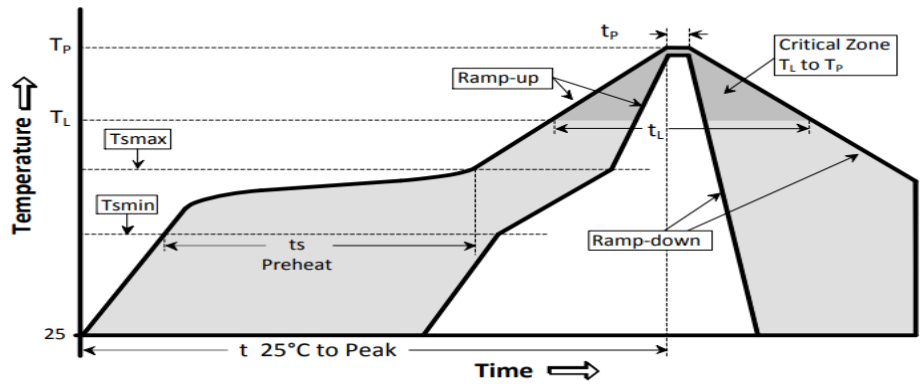
Absolute Maximum Ratings

| Parameter | Unit |
|---|---|
| $V_{CC}$ Supply Voltage | -0.3V to +4.0V |
| Vi Input Voltage | -0.3V to $V_{CC}$ + 0.3V |
| Vo Output Voltage | -0.3V to $V_{CC}$ + 0.3V |

## Reflow Cycle

**Maximum Reflow Conditions in accordance with IPC/JEDEC J-STD-020C "Pb-free"**

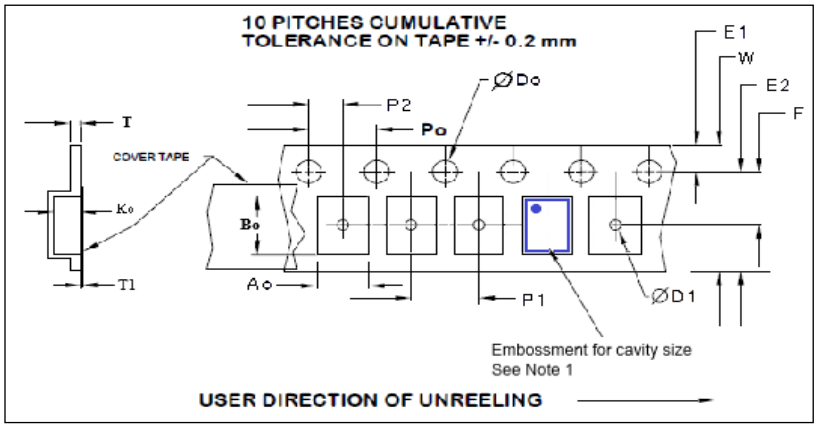


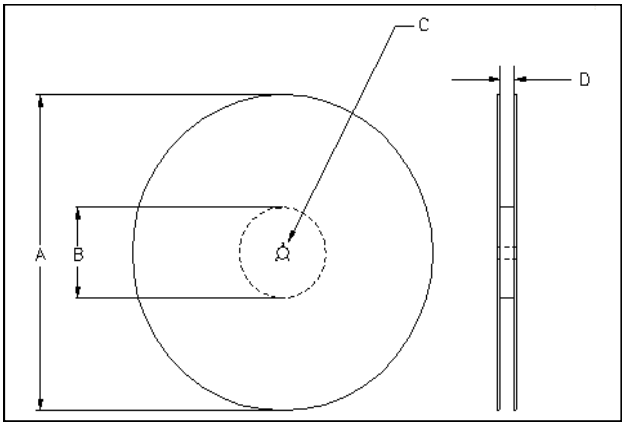

| Temperature Profile | Symbol | Condition | Unit |
|---|---|---|---|
| Average ramp-up rate | ($Ts_{max}$ to $T_P$) | 3°C / second max | °C / s |
| Ramp down Rate | $T_{cool}$ | 6°C / second max | °C / s |
| Time 25°C to Peak Temperature | $T_{to\text{-}peak}$ | 8 minutes max | min |
| **Preheat** | | | |
| Temperature min | $Ts_{min}$ | 150 | °C |
| Temperature max | $Ts_{max}$ | 200 | °C |
| Time $Ts_{min}$ to $Ts_{max}$ | ts | 60 – 180 | sec |
| **Soldering above liquidus** | | | |
| Temperature liquidus | $T_L$ | 217 | °C |
| Time above liquidus | $t_L$ | 60 – 150 | sec |
| **Peak temperature** | | | |
| Peak Temperature | Tp | 260 | °C |
| Time within 5°C of peak temperature | tp | 20 – 40 | sec |

The part may be reflowed 2 times without degradation (typical for lead free processing).

## Tape and Reel

Tape and Reel available for quantities of 250 to 3000 per reel, cut tape for < 250. 8mm tape, 4mm pitch.




| Tape Variable Dimensions Table 2 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tape Size | E2 typ | F | P1 | W max | Ao | Bo | Ko |
| 8mm | 6.25 | 3.5 ±0.05 | 4.0 ±0.1 | 8.2 | 2.7 ± 0.1 | 3.4 ± 0.1 | 1.4 ± 0.1 |

Dimensions in mm Drawing Not to scale

Note 1: Embossed cavity to conform to EIA– 481-B

| Tape Constant Dimensions Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tape Size | Do | D1 min | E1 | Po | P2 | 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 | 0.3 | 0.1 |

| Reel Dimensions (may vary) Table 3 | | | | | | |
|---|---|---|---|---|---|---|
| | A | | B | | C | D |
| Reel Size | Inch-es | mm | Inches | mm | mm | mm |
| 7 | 7.0 | 180 | 2.50 | 60 | 13.0 +0.5 -0.2 | Tape size +0.4 +2.0 -0.0 |

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