PLETRONICS
www.pletronics.com 425-776-1880




# P113SD Series 5.0 V
## CMOS Clock Oscillators

July 2007

Lead Free

- Pletronics' P113SD Series is a quartz crystal controlled precision square wave generator with a CMOS output.
- The P113SD series will directly interface TTL devices also.
- Greatly reduces RFI and EMI system sensitivity
- Minimizes RFI radiation, eases meeting FCC Class B emissions standards.
- Capable of driving up to 30pF capacitive loads
- Tube packaging is available.
- 70 to 107 MHz
- Full Size Thru-Hole DIP package
- Enable/Disable Function
- Disable function includes low standby power mode
- 3rd Overtone Crystals used
- Improved circuit to minimize oscillator issues such as multi-mode output signal.
- Low Jitter
- Has internal bypass capacitor on the Vcc lead
- 5x7 mm LCC ceramic oscillator inside

**Pletronics Inc. certifies this device is in accordance with the RoHS (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: 4.0 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020C
Second Level Interconnect code: e1 or e2

## 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 |

## Thermal Characteristics

The maximum die or junction temperature is 155°C
The thermal resistance junction to board is 120°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Product informatin is current as of publication date. The product conforms to specifications per the terms of the Pletronics standard warranty. Production processsing does not necesarily include testing of all parameters.

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## Part Number:

| P11 | 45 | -3SD | ES | | -100.0M | -30 | -XX | | Marking |
|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Internal code or blank | |
| | | | | | | | | **Output Load Capacitance**<br>**Blank** = 15pF maximum<br>**30** = 30pF maximum | none |
| | | | | | | | | **Frequency in MHz** | ***fff.fff*** M |
| | | | | | | | | **Supply Voltage $V_{CC}$**<br>**Blank** = 5.0V ± 10% | none |
| | | | | | | | | **Enhanced Specifications**<br>(apply in the order shown)<br>**E** = Temperature range -40 to 85°C<br>**S** = Symmetry 45%/55% at 50% of $V_{CC}$ | <br><br>E<br>S |
| | | | | | | | | **Series Model** | |
| | | | | | | | | **Frequency Stability**<br>**45** = ± 50 ppm<br>**44** = ± 25 ppm<br>**20** = ± 20 ppm | <br>5<br>4<br>2 |
| | | | | | | | | **Series Model** | P3S |

## Part Marking:

**PLE**
**P3Sxss**
***fff.fff*** **M**
**yywwaLF**

Where:
*x* = Frequency stability
*ss* = Enhanced specification
*fff.fff* = Frequency in MHz
*yywwa* = Date code
LF = Lead Free
(Voltage not shown)

Pletronics may ship the following combinations without notice (this is an enhanced specified device)
44 (25 ppm) stability parts when 45 (50 ppm) was ordered
20 (20 ppm) stability parts when 45 (50 ppm) or 44 (25 ppm) was ordered.
E temperature range parts when extended was not ordered.
S symmetry parts when 40/60% symmetry was ordered.

Pletronics may ship parts that are not marked for extended temperature range but were tested for extended temperature range, a Certificate of Conformance will accompany these parts.

## Electrical Specification for 5.00V ±10% over the specified temperature range

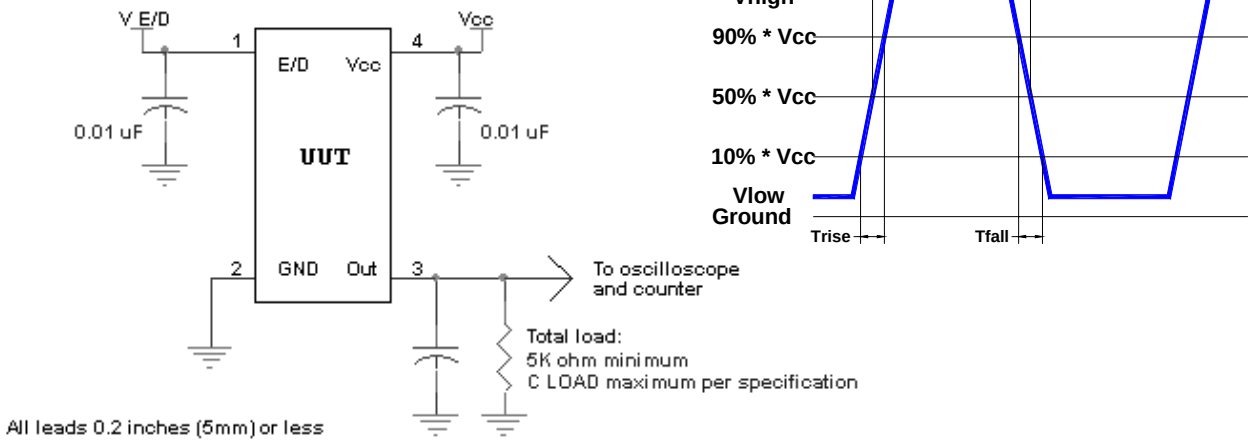
| Item | Min | Max | Unit | Condition |
|---|---|---|---|---|
| Frequency Range | 70 | 107 | MHz | |
| Frequency Accuracy "**45**" | -50 | +50 | ppm | For all supply voltages, load changes, aging for 1 year, shock, vibration and temperatures |
| "**44**" | -25 | +25 | | |
| "**20**" | -20 | +20 | | |
| Output Waveform | CMOS | | | |
| Output High Level | 0.5 | - | V | Below $V_{CC}$ (See load circuit) |
| Output Low Level | - | 0.4 | V | (See load circuit) |
| Output Symmetry | 40 | 60 | % | at 50% point of $V_{CC}$ (See load circuit) Standard |
| | 45 | 55 | % | for "**S**" option parts |
| Jitter | - | 1 | pS RMS | 12 KHz to 20 MHz from the output frequency |
| | - | 4 | pS RMS | 10 Hz to 1 MHz from the output frequency |
| Enable/Disable Internal Pull-up | 50 | - | Kohm | to $V_{CC}$ |
| V disable | - | 0.5 | V | Applied to pad 1 |
| V enable | 2.0 | - | V | Applied to pad 1 |
| Output leakage $V_{OUT} = V_{CC}$ | -10 | +10 | uA | Pad 1 low, device disabled |
| $V_{OUT} = 0V$ | -10 | +10 | uA | |
| Enable time | - | 100 | nS | Time for output to reach a logic state |
| Disable time | - | 100 | nS | Time for output to reach a high Z state |
| Start up time | - | 10 | mS | Time for output to reach specified frequency |
| Operating Temperature Range | 0 | +70 | °C | Standard Temperature Range |
| | -40 | +85 | °C | Extended Temperature Range "**E**" Option |
| Storage Temperature Range | -55 | +125 | °C | |

## Electrical Specification for 5.00V ±10% over the specified temperature range

| Item | Min | Typ | Max | Unit | Condition | |
|---|---|---|---|---|---|---|
| $V_{OUT}$ High ($V_{OH}$) | 0.5 | 0.3 | - | V | Below $V_{CC}$, $I_{OH}$ = +16 mA | |
| $V_{OUT}$ Low ($V_{OL}$) | - | 0.3 | 0.4 | V | $I_{OL}$ = -16 mA | |
| Output $T_{RISE}$ and $T_{FALL}$ | - | 2.0 | 4.0 | nS | $C_{LOAD}$ = 15 pF, | |
| | - | 3.0 | 6.0 | nS | $C_{LOAD}$ =30 pF, | |
| $V_{CC}$ Supply Current ($I_{CC}$) | - | 50 | 90 | mA | >100 MHz | $C_{LOAD}$ = 15 pF 10% to 90% of $V_{CC}$ (See load circuit) |
| | - | 45 | 80 | mA | <=100 MHz | |
| | - | 60 | 100 | mA | >100 MHz | $C_{LOAD}$ = 30 pF 10% to 90% of $V_{CC}$ (See load circuit) |
| | - | 50 | 100 | mA | <=100 MHz | |

Specifications with Pad 1 E/D open circuit

## Load Circuit and Test Waveform



## Reliability: Environmental Compliance

| Parameter | Condition |
|---|---|
| Mechanical Shock | MIL-STD-883 Method 2002, Condition A |
| 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

**Pb Free**
**2nd LvL Interconnect Catagory=e1**
**Max Safe Temp=280C for 15s (Wave solder only)**
**Max Safe Temp=245C for 10s (Reflow only)**

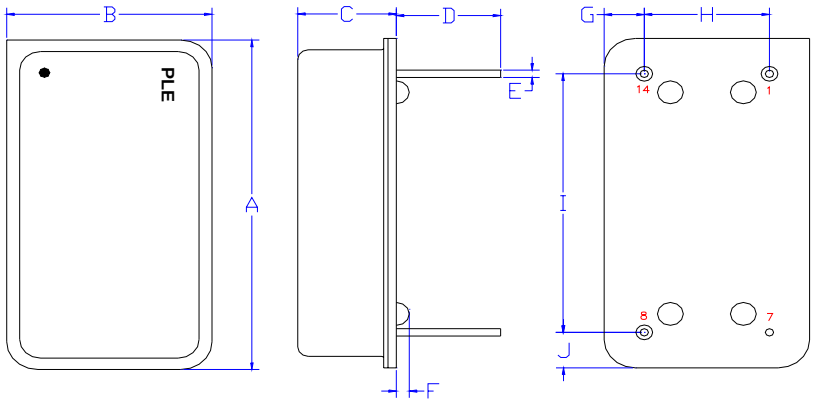
**Pb Free**
**2nd LvL Interconnect Catagory=e2**
**Max Safe Temp=280C for 15s (Wave solder only)**
**Max Safe Temp=245C for 10s (Reflow only)**

## PCB Mounting (typical for lead free processing)

**Hand soldering is recommended**.

Wave solder at 255°C to 280°C with maximum wave exposure of 15 seconds
Reflow solder maximum exposure of 245°C for 15 seconds
Soldering done in a nitrogen atmosphere enhances the solder joint quality.

## Mechanical:




| | Inches | mm |
|---|---|---|
| A | 0.787 ±0.005 | 20.00 ±0.13 |
| B | 0.487 ±0.005 | 12.37 ±0.13 |
| C | 0.225 ±0.011 | 5.72 ±0.28 |
| D[1] | 0.250 | 6.35 |
| E[1] | 0.020 | 0.51 |
| F[1] | 0.031 | 0.79 |
| G[1] | 0.094 | 2.37 |
| H[1] | 0.300 | 7.62 |
| I[1] | 0.600 | 15.24 |
| J[1] | 0.094 | 2.37 |

[1] Nominal dimension

Cover:
Kovar
Electroless Nickel Plated
1 µinch (25 µm) typical
Resistance welded to base

Label:
White Kapton with Black Letters
–or--
Blue Epoxy heat cure ink with laser marked lettering

Base:
Kovar
Glass to metal sealed leads

Pin 7 Connected to case

**Not to scale**

| 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. |
| 7 | Ground (GND) | |
| 8 | Output | |
| 14 | Supply Voltage ($V_{CC}$) | Recommend connecting appropriate power supply bypass capacitors as close as possible. |

## Layout and application information

Lead Free

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.

**IMPORTANT NOTICE**

Pletronics Incorporated (PLE) reserves the right to make corrections, improvements, modifications and other changes to this product at anytime. PLE reserves the right to discontinue any product or service without notice. Customers are responsible for obtaining the latest relevant information before placing orders and should verify that such information is current and complete. All products are sold subject to PLE's terms and conditions of sale supplied at the time of order acknowledgment.

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