



## 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
- 3<sup>rd</sup> 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 <sub>CC</sub> Supply Voltage | -0.5V to +7.0V                  |
| V <sub>i</sub> Input Voltage   | -0.5V to V <sub>CC</sub> + 0.5V |
| V <sub>o</sub> Output Voltage  | -0.5V to V <sub>CC</sub> + 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.

## Part Number:

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

## Part Marking:

PLE  
P3Sxxs  
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 $\pm 10\%$ over the specified temperature range

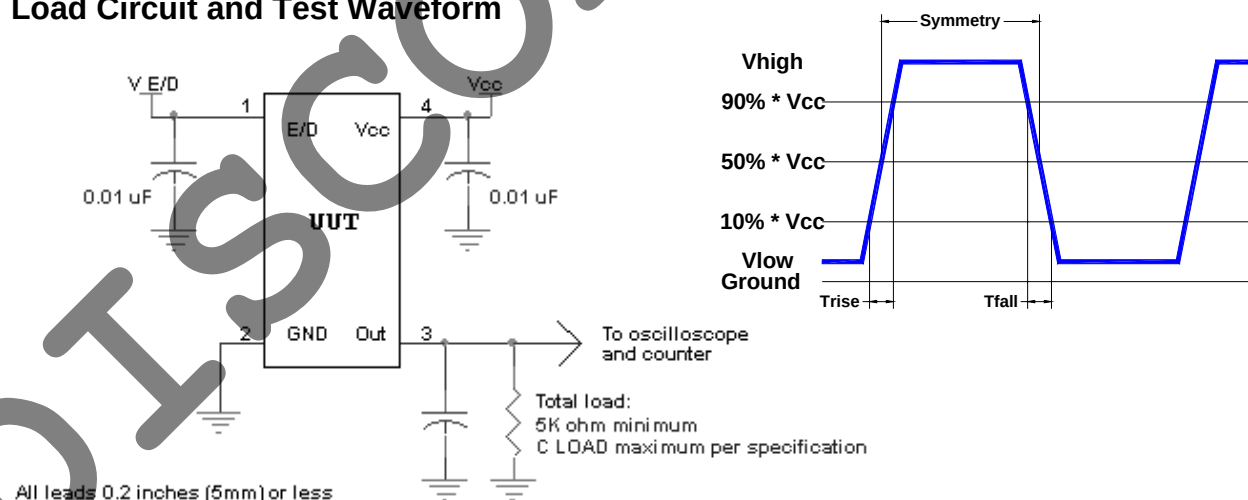
| Item                              | Min  | Max  | Unit   | Condition                                                                                  |
|-----------------------------------|------|------|--------|--------------------------------------------------------------------------------------------|
| 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  $\pm 10\%$  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                           |
|                                      | -   | 45  | 80  | mA   | $\leq 100$ MHz                     |
|                                      | -   | 60  | 100 | mA   | >100 MHz                           |
|                                      | -   | 50  | 100 | mA   | $\leq 100$ 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

|               |                                                                                     |                                                                                          |
|---------------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------|
| P/N:          |  |       |
|               | P1145-3SD-100.0M                                                                    |                                                                                          |
| Customer P/N: |  |                                                                                          |
|               | 12345678                                                                            |                                                                                          |
| Qty:          |  | D/C:  |
|               | 1000                                                                                | 0502A6                                                                                   |

### 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

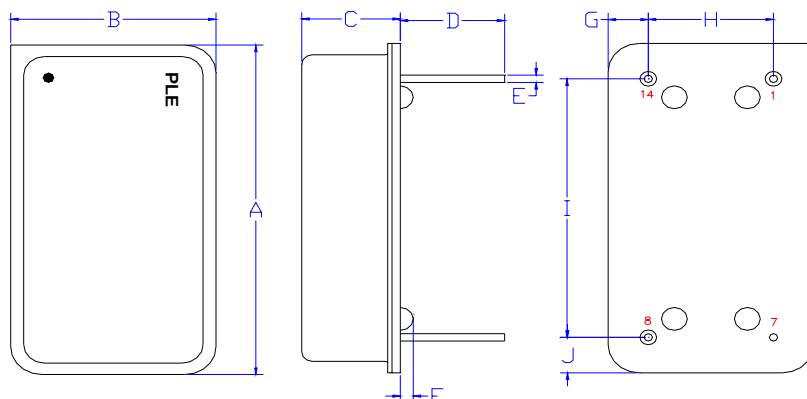
Max Safe Temp=280C for 15s (Wave solder only)  
Max Safe Temp=245C for 10s (Reflow only)

## 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:**



Cover:  
Kovar  
Electroless Nickel Plated  
1  $\mu$ inch (25  $\mu$ m) typical  
Resistance welded to base

Base:  
Kovar  
Glass to metal sealed leads

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

Pin 7 Connected to case

**Not to scale**

|                | Inches            | mm               |
|----------------|-------------------|------------------|
| A              | 0.787 $\pm$ 0.005 | 20.00 $\pm$ 0.13 |
| B              | 0.487 $\pm$ 0.005 | 12.37 $\pm$ 0.13 |
| C              | 0.225 $\pm$ 0.011 | 5.72 $\pm$ 0.28  |
| D <sup>1</sup> | 0.250             | 6.35             |
| E <sup>1</sup> | 0.020             | 0.51             |
| F <sup>1</sup> | 0.031             | 0.79             |
| G <sup>1</sup> | 0.094             | 2.37             |
| H <sup>1</sup> | 0.300             | 7.62             |
| I <sup>1</sup> | 0.600             | 15.24            |
| J <sup>1</sup> | 0.094             | 2.37             |

<sup>1</sup> Nominal dimension

| Pad | Function                          | Note                                                                                                                                                                                                                                      |
|-----|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1   | Output Enable/Disable             | When this pad is not connected the oscillator shall operate.<br>When this pad is logic low the output will be inhibited (high impedance state.)<br>Recommend connecting this pad to V <sub>CC</sub> if the oscillator is to be always on. |
| 7   | Ground (GND)                      |                                                                                                                                                                                                                                           |
| 8   | Output                            |                                                                                                                                                                                                                                           |
| 14  | Supply Voltage (V <sub>CC</sub> ) | 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.



## IMPORTANT NOTICE

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