



# PLETRONICS S3880 32.768kHz CMOS Clock Oscillator



S3880  
3.2 x 1.5 x 1.0 mm  
LCC Ceramic Package

## Features

- Quartz crystal controlled precision square wave oscillator
- CMOS Output (will interface with TTL devices)
- Enable/Disable Function
- 1.2 ~ 5V nominal Supply Voltage
- 32.768 kHz

## Applications

Smart meters  
Security Systems  
Medical Monitoring  
Set top box  
Home Automation  
Automotive Entertainment system

## Electrical Characteristics

| Parameter                                                          | Min                   | Typ    | Max                | Unit  | Condition                                                                      |
|--------------------------------------------------------------------|-----------------------|--------|--------------------|-------|--------------------------------------------------------------------------------|
| Frequency Range                                                    | -                     | 32.768 | -                  | kHz   |                                                                                |
| Calibration Tolerance                                              |                       |        | ±20                | ppm   |                                                                                |
| Frequency Stability<br>(-0.035±10% ppm/Δ°C <sup>2</sup> )          | -80<br>-170           | -      | +20<br>+20         | ppm   | Operating Temperature = -20 to +70°C<br>Operating Temperature = -40 to +85°C   |
| Operable Temperature Range                                         | -40                   | -      | +85                | °C    |                                                                                |
| Turnover Temperature                                               | 20                    | 25     | 30                 | °C    |                                                                                |
| Supply Voltage <sup>1</sup> V <sub>CC</sub>                        | 1.3                   | 3.0    | 5.5                | V     | 1.2V~5.5V -30 to +85°C                                                         |
| Supply Voltage Coefficient                                         | -                     | -      | 1.5                | ppm/V | 1.5V ≤ V <sub>CC</sub> ≤ 5.5V                                                  |
| Supply Voltage Slew Rate (V <sub>CCSR</sub> )                      |                       |        | ±0.5               | V/ms  |                                                                                |
| Supply Current (I <sub>CC</sub> ) <sup>2</sup>                     |                       |        |                    |       | See note 2 below                                                               |
| Output Disabled Current I <sub>CC</sub><br>(Pin 3 Low) at 25°C     | -                     | -      | 0.5<br>0.55        | μA    | 3.0V<br>5.0V                                                                   |
| Output Disabled Current I <sub>CC</sub><br>(Pin 3 Low) -40 to 85°C | -                     | -      | 1.0<br>1.1         | mA    | 3.0V<br>5.0V                                                                   |
| Output Logic                                                       | CMOS                  |        |                    |       | Output load = 15pF max                                                         |
| Duty Cycle                                                         | 40                    | -      | 60                 | %     | At 50% V <sub>CC</sub> level                                                   |
| Output V <sub>HIGH</sub> (V <sub>OH</sub> ) I <sub>OH</sub> = -1mA | V <sub>CC</sub> - 0.4 | -      | -                  | V     |                                                                                |
| Output V <sub>LOW</sub> (V <sub>OL</sub> ) I <sub>OL</sub> = 1mA   | -                     | -      | 0.4                | V     |                                                                                |
| Output T <sub>RISE</sub> and T <sub>FALL</sub>                     | -                     | 70     | 100                | ns    | C <sub>LOAD</sub> = 10 pF<br>10% to 90% of V <sub>CC</sub><br>See Load Circuit |
| Startup Time                                                       | -                     | -      | 0.8                | s     | Time for output to reach specified frequency                                   |
| V <sub>DISABLE</sub> (V <sub>IL</sub> )                            | -                     | -      | 0.2V <sub>CC</sub> | V     |                                                                                |
| V <sub>ENABLE</sub> (V <sub>IH</sub> )                             | 0.8V <sub>CC</sub>    | -      |                    |       |                                                                                |
| Synchronized Output Enable Time                                    | 15.3                  | -      | 45.8               | μs    | See diagram page 2                                                             |
| Synchronized Output Disable Time                                   | 0                     | -      | 15.3               | μs    | See diagram page 2                                                             |
| Aging 1st Year                                                     | -                     | -      | ±3                 | ppm   | At 25°C                                                                        |
| Storage Temperature Range                                          | -55                   | -      | +125               | °C    |                                                                                |

### Notes:

<sup>1</sup> Place an appropriate power supply bypass capacitor next to device for correct operation

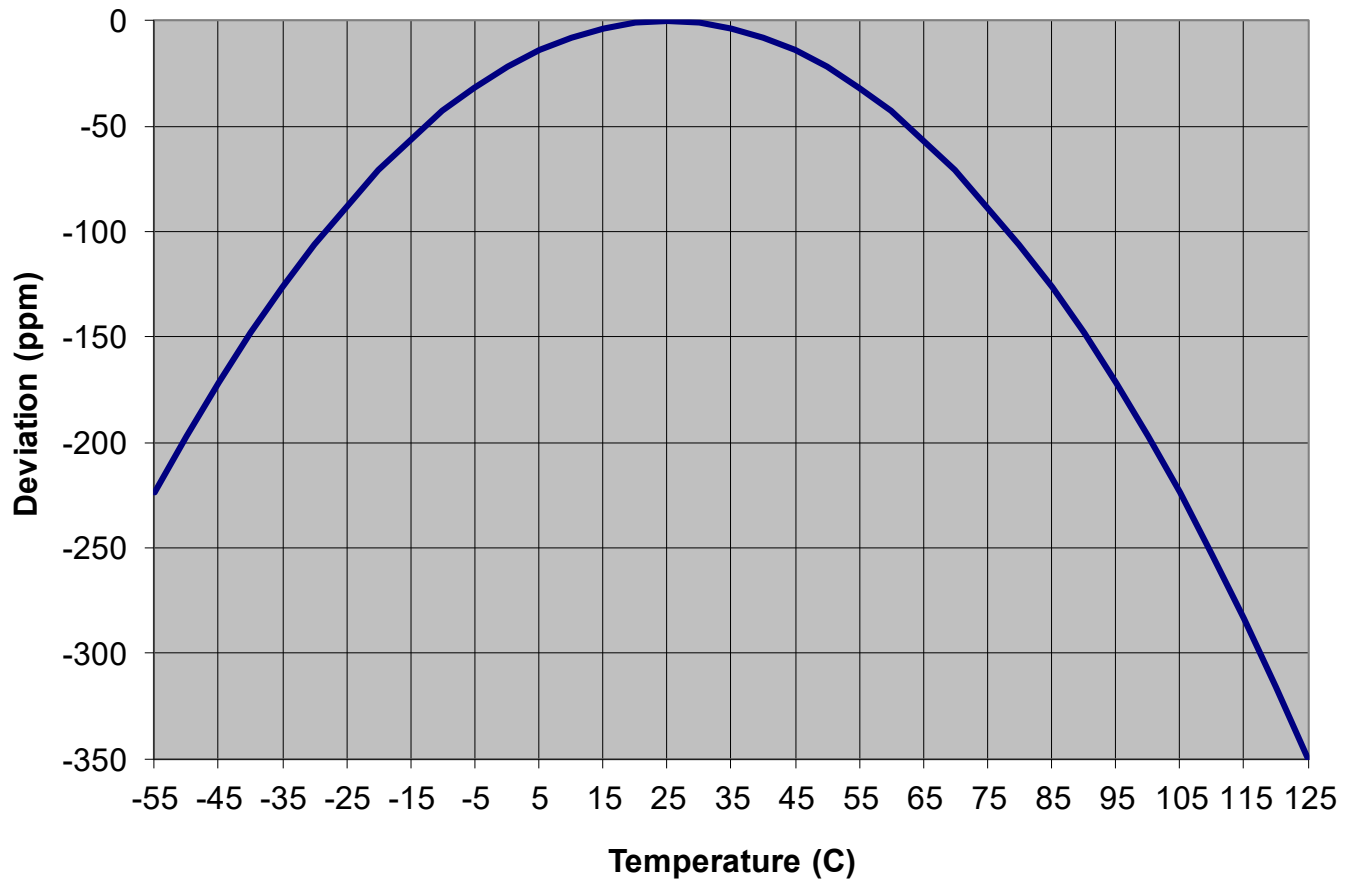
<sup>2</sup> When Pin 3 High/open, additional supply current, ΔI<sub>CC</sub>, can be calculated as follows:

ΔI<sub>CC</sub> = CL \* V<sub>CC</sub> \* 32768 Example: 10pF \* 2.5V \* 32768 = 819nA

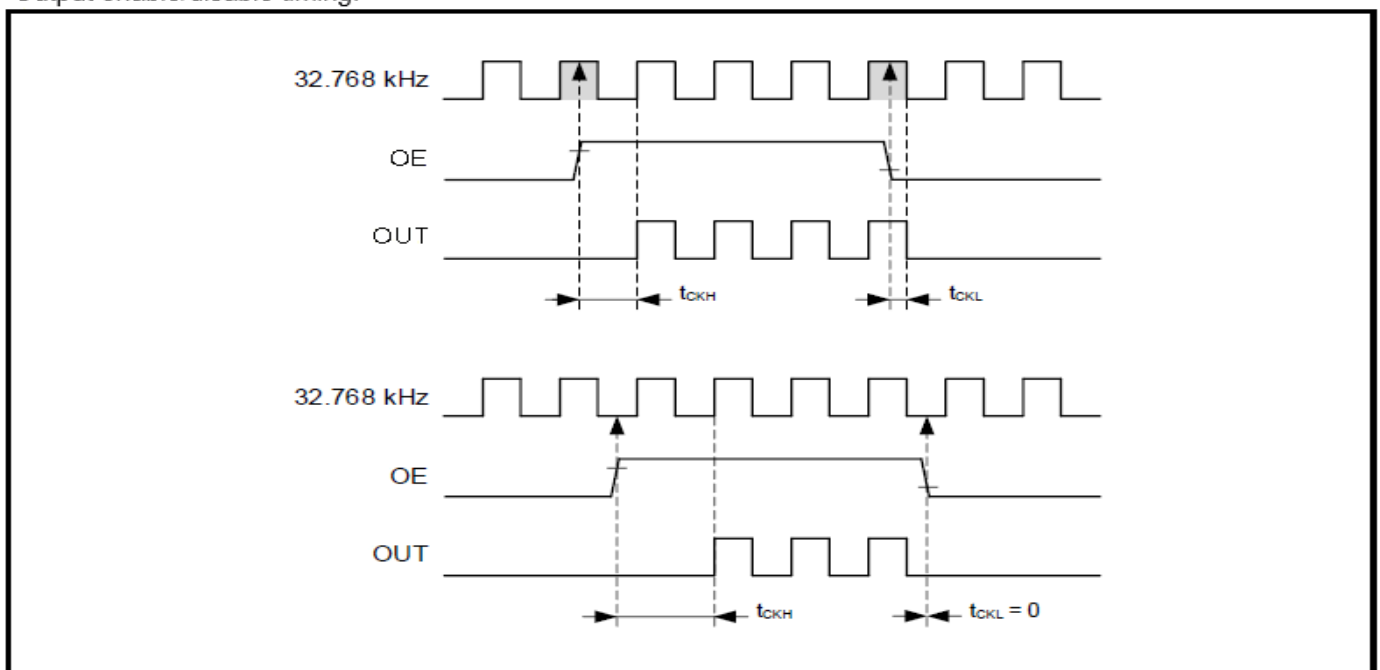


# PLETRONICS S3880 32.768kHz CMOS Clock Oscillator

Typical Frequency vs Temperature:



Output enable/disable timing:





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## Part Number

| Series Model | Frequency | Optional T&R Packaging code                                                                                                                             |
|--------------|-----------|---------------------------------------------------------------------------------------------------------------------------------------------------------|
| S3880        | - 32.768K | -XX                                                                                                                                                     |
|              | 32.768kHz | T1K = 1000 per Reel (Std)<br>T3K = 3000 per Reel<br>Quantities below 1K or not in 1K or 3K increments are supplied as 'cut tape' with no leader/trailer |

## Device Marking

|                  |                  |                                                                     |
|------------------|------------------|---------------------------------------------------------------------|
| xYWWxx<br>• 7604 | x<br>YWW<br>7604 | = Internal Code<br>= Date Code, Year WeekWeek<br>= Part Designation |
|------------------|------------------|---------------------------------------------------------------------|

## 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

|               |                 |
|---------------|-----------------|
| P/N:          |                 |
|               | PLE Part Number |
| Customer P/N: |                 |
|               | 12345678        |
| Qty:          |                 |
|               | 3000            |
| D/C           |                 |
|               | 2A1             |
| MSL: 1        |                 |

### RoHS Compliant

2nd LvL Interconnect

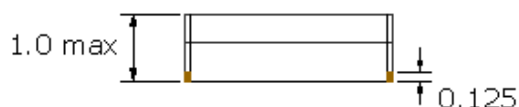
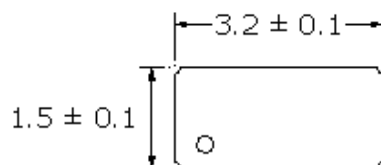
Category=e4

Max Safe Temp=260C for 10s 2X Max

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

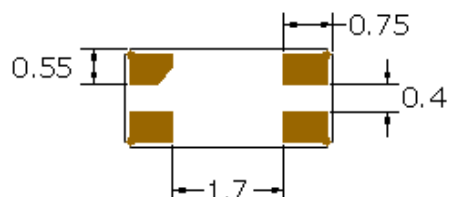
Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's  
Weight of the Device: 0.012 grams  
Moisture Sensitivity Level: 1 As defined in J-STD-020D  
Second Level Interconnect code: e4

## Mechanical Dimensions

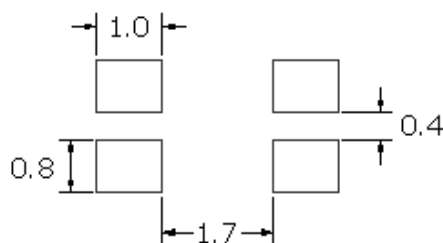


| Pin Connections |               |
|-----------------|---------------|
| Pin             | Function      |
| 1               | Output        |
| 2               | Ground        |
| 3               | Output Enable |
| 4               | Vcc           |

| Enable/Disable (Pad 3) |                            |
|------------------------|----------------------------|
| V <sub>IH</sub> /Open  | Output Enabled             |
| V <sub>IL</sub> /Gnd   | Output Disabled / Tristate |



## Recommended solder pad layout



### Pad Layout

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

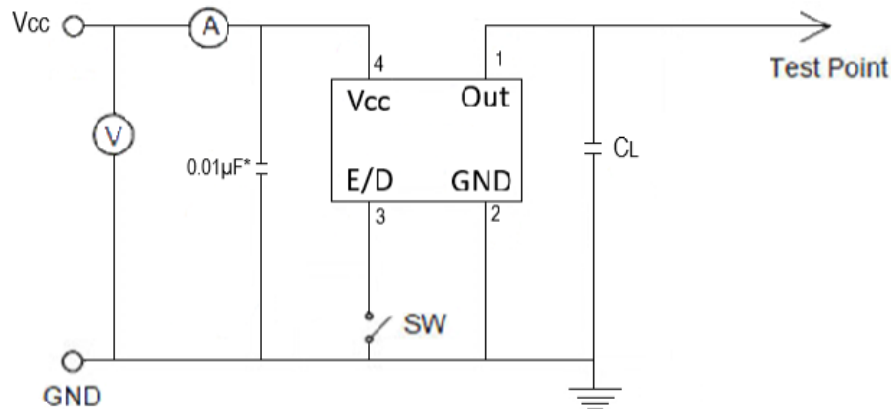
## Dimensions in mm

**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

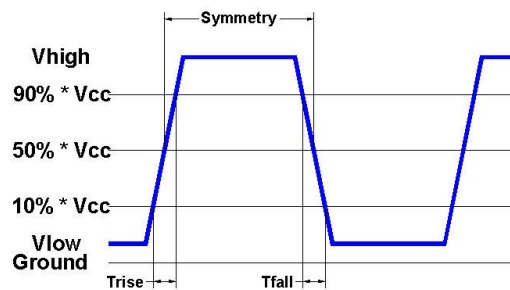
## Electrical Test / Load Circuit



Notes:

CL: 10pF Includes the input capacitance of oscilloscope

\* 0.01μF external by-pass filter is recommended



## Environmental / ESD Ratings

Reliability: Environmental

ESD Rating

| 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  |

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

Absolute Maximum Ratings

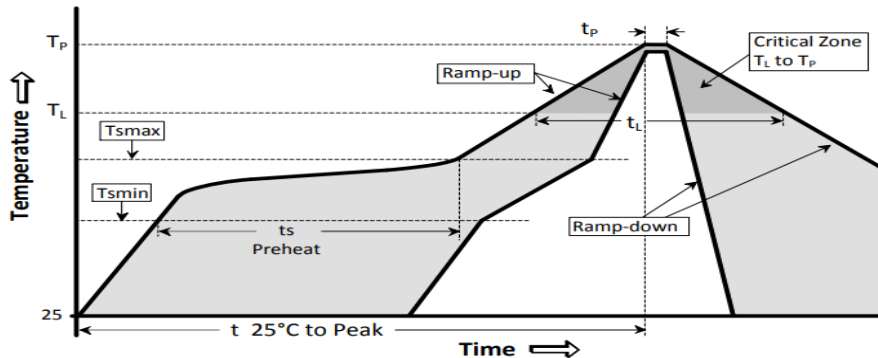
| Parameter                      | Unit           |
|--------------------------------|----------------|
| V <sub>CC</sub> Supply Voltage | -0.3V to +6.0V |
| V <sub>i</sub> Input Voltage   | -0.3V to +6.0V |
| V <sub>o</sub> Output Voltage  | -0.3V to +6.0V |

### Thermal Characteristics:

The maximum die or junction temperature is 125°C

## Reflow Cycle

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

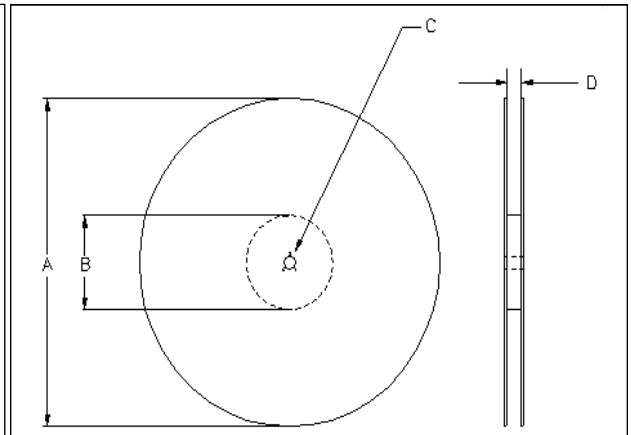
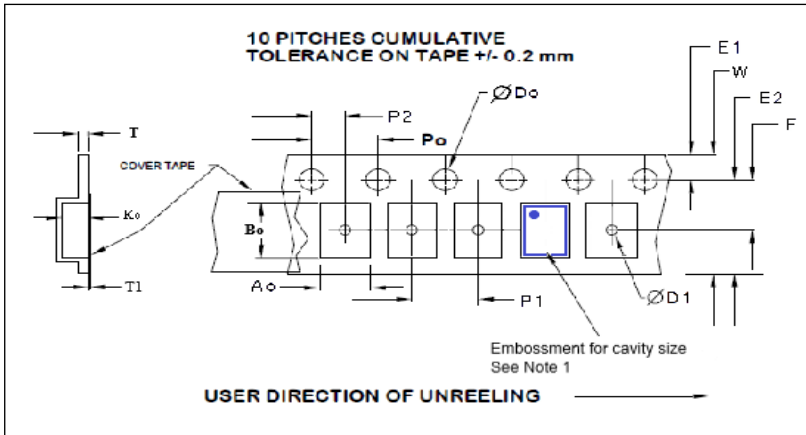


The part may be reflowed 2 times without degradation (typical for lead free processing).

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

## Tape and Reel

Quantities below 1K or not in 1K or 3K increments are supplied as 'cut tape' with no leader/trailer



Tape Variable Dimensions Table 2

| Tape Size | E2 typ | F         | P1       | W max | A <sub>0</sub> | B <sub>0</sub> | K <sub>0</sub> |
|-----------|--------|-----------|----------|-------|----------------|----------------|----------------|
| 12mm      | 10.25  | 5.5 ±0.05 | 4.0 ±0.1 | 12.3  | 1.75 ± 0.05    | 3.45 ± 0.05    | 1.05 ± 0.05    |

Dimensions in mm Drawing Not to scale

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

Tape Constant Dimensions Table 1

| Tape Size | D <sub>0</sub> | D <sub>1</sub> typ | E <sub>1</sub> | P <sub>0</sub> | P <sub>2</sub> | T max | T <sub>1</sub> max |
|-----------|----------------|--------------------|----------------|----------------|----------------|-------|--------------------|
| 12mm      | 1.5 ±0.1       | 1.5                | 1.75 ±0.1      | 4.0 ±0.1       | 2.0 ±0.05      | 0.3   | 0.1                |

Reel Dimensions (may vary) Table 3

| Reel Size | A Inches | A mm | B Inches | B mm | C mm           | D mm                |
|-----------|----------|------|----------|------|----------------|---------------------|
| 7         | 7.0      | 178  | 2.42     | 61.5 | 13.0 ±0.5 -0.2 | Tape size +0.4 -0.0 |



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