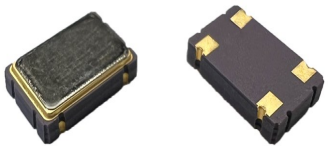
# CARDINAL COMPONENTS

# CPP_7 Series
# CMOS Clock Oscillator



7.0 x 5.0 x 1.3mm
LCC Ceramic Package

## Features

- CMOS Output (will interface with TTL devices)
- Enable/Disable Function (optional Standby function)
- 3.3V or 5.0V nominal Supply Voltage
- Size: 7 x 5mm
- Factory programmed

## Applications

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

## Electrical Characteristics

| Parameter | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|
| Frequency Range | 1 | - | 133 | MHz | (3.3V: 1 - 100MHz) |
| Frequency Stability [2] | ±25 | - | ±100 | ppm | Includes supply voltage change, load changes, aging for 1 year at 25°C ± 2°C, shock, vibration and temperatures. |
| Operating Temperature Range options [2] | 0<br>-20<br>-40 | -<br>-<br>- | +70<br>+70<br>+85 | °C | |
| Supply Voltage [1, 2] $V_{DD}$ | 2.97 | - | 5.5 | V | See Part Number options on page 2 |
| Supply Current $I_{DD}$ (No Load) | - | - | 45<br>25 | mA | $V_{DD}$ = 5.0V<br>$V_{DD}$ = 3.3V |
| Output Type | CMOS | | | | Cload = 50pF max, $V_{DD}$ = 4.5~5.5V, ≤66MHz<br>Cload = 25pF max, $V_{DD}$ = 4.5~5.5V, >66MHz<br>Cload = 30pF max, $V_{DD}$ = 3.0~3.6V, ≤40MHz<br>Cload = 15pF max, $V_{DD}$ = 3.0~3.6V, >40MHz |
| | TTL | | | | Cload = 50pF max; $V_{DD}$ = 4.5~5.5V, ≤40MHz |
| Duty Cycle | - | - | - | % | See Page 2 |
| Output $V_{OH}$ (TTL Level) | 2.4 | - | - | V | $V_{DD}$ = 4.5~5.5V |
| (CMOS Level) | $V_{DD}$ - 0.4 | | | V | All voltages |
| Output $V_{OL}$ | - | - | 0.4 | V | See Load Circuit and waveform page |
| Output $T_{RISE}$ and $T_{FALL}$ | - | - | - | ns | See page 2 |
| Startup Time | - | - | 2 | ms | Time for output to reach specified frequency |
| $V_{DISABLE}$ | - | - | 0.8<br>0.2$V_{DD}$ | V | $V_{DD}$ = 4.5~5.5V<br>$V_{DD}$ = 3.0~3.6V |
| $V_{ENABLE}$ | 2.0<br>0.7$V_{DD}$ | - | | | $V_{DD}$ = 4.5~5.5V<br>$V_{DD}$ = 3.0~3.6V |
| Enable Time | - | - | 2 | ms | |
| Disable Time - Pin 1 low to Output Hi-Z | - | T/2 | T+10 | ns | T = Frequency Period |
| Disable Current | -<br>- | -<br>0.4 | -<br>- | mA | Enable/Disable: Pad 1 low, output disabled; See above Supply Current<br>Standby option: Pad 1 low, output disabled, oscillator shutdown |
| RMS Period Jitter | - | 40<br>30 | 50<br>40 | ps | ≤33MHz<br>>33MHz |
| Period Jitter, Pk-Pk | | 100<br>75 | 250<br>175 | ps | >1,000,000 samples<br>≤33MHz<br>>33MHz |
| 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 device for correct operation
[2] Specified by part number

## Duty Cycle

| Parameter | Min | Typ | Max | Unit | |
|---|---|---|---|---|---|
| TTL @1.4V level; $V_{DD}$ = 4.5~5.5V | 45<br>45<br>40<br>40 | | 55<br>55<br>60<br>60 | % | Fo ≤ 50 MHz, $C_L$ ≤ 50pF<br>50 MHz < Fo ≤ 66MHz; $C_L$ ≤ 15pF<br>66 MHz < Fo ≤ 125MHz, $C_L$ ≤ 25pF<br>125 MHz < Fo ≤ 133MHz, $C_L$ ≤ 15pF |

| Parameter | Min | Typ | Max | Unit | |
|---|---|---|---|---|---|
| CMOS @ 0.5$V_{DD}$ level; $V_{DD}$ = 4.5~5.5V | 45<br>40<br>40 | | 55<br>60<br>60 | % | Fo ≤ 66 MHz, $C_L$ ≤ 25pF<br>66 MHz < Fo ≤ 125MHz; $C_L$ ≤ 25pF<br>125 MHz < Fo ≤ 133MHz, $C_L$ ≤ 15pF |

| Parameter | Min | Typ | Max | Unit | |
|---|---|---|---|---|---|
| CMOS @ 0.5$V_{DD}$ level; $V_{DD}$ = 3.0~3.6V | 45<br>40 | | 55<br>60 | % | Fo ≤ 40 MHz, $C_L$ ≤ 30pF<br>40 MHz < Fo ≤ 100MHz; $C_L$ ≤ 15pF |

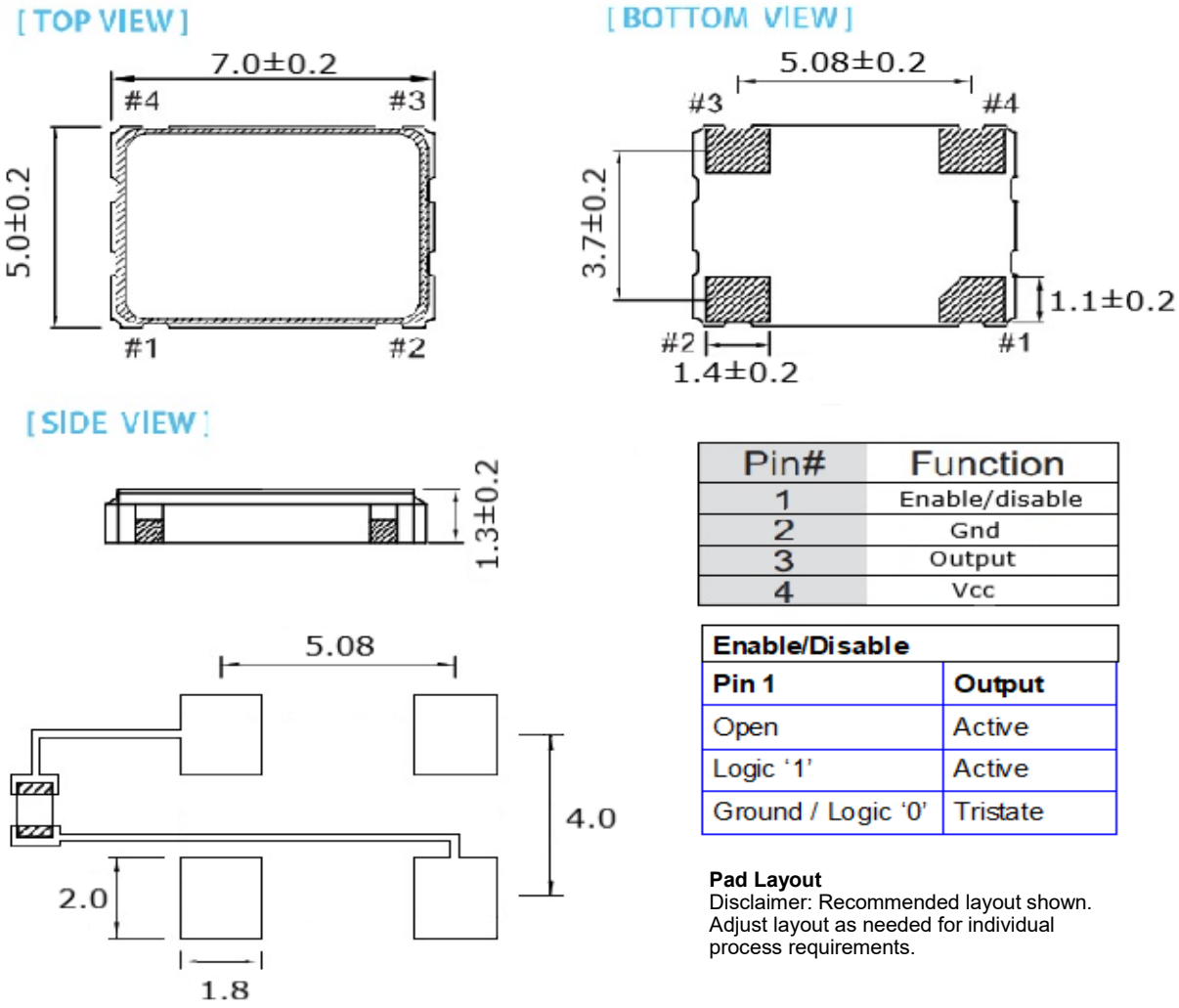
## Rise/Fall Time

| Parameter | Min | Typ | Max | Unit | |
|---|---|---|---|---|---|
| Rise/Fall Time | | | 1.8<br>1.2<br>0.9<br><br>3.4<br>4.0<br>2.4 | ns | 0.8V~2.0V, $V_{DD}$ = 4.5~5.5V, $C_L$=50pF<br>0.8V~2.0V, $V_{DD}$ = 4.5~5.5V, $C_L$=25pF<br>0.8V~2.0V, $V_{DD}$ = 4.5~5.5V, $C_L$=15pF<br><br>0.2$V_{DD}$~0.8$V_{DD}$, $V_{DD}$ = 4.5~5.5V, $C_L$=50pF<br>0.2$V_{DD}$~0.8$V_{DD}$, $V_{DD}$ = 3.0~3.6V, $C_L$=30pF<br>0.2$V_{DD}$~0.8$V_{DD}$, $V_{DD}$ = 3.0~3.6V, $C_L$=15pF |

## Part Number Example: CPPC7LZ-A7BP-50.0TS

| Series Model | Logic | Package Size (mm) | Supply Voltage $V_{CC}$ | Packaging | Operating Temperature Range | Frequency Stability (ppm) | Frequency (MHz) | Enable/Disable |
|---|---|---|---|---|---|---|---|---|
| **CPP** | **C** | **7** | **L** | **Z** | **A7** | **BP** | **50.0** | **TS** |
| | **C=CMOS**<br>T = TTL | **7 = 7 x 5** | **L = 3.3V**<br>Blank= 5.0V | Blank = Tape Only<br>**Z= Tape/reel** | Blank = 0 to +70°C<br>A5 = -20 to +70°C<br>**A7 = -40 to +85°C** | BR = ±25<br>**BP = ±50**<br>B6 = ±100 | 5V: 1 - 133<br>3.3V: 1 - 100 | **TS = Tristate**<br>PD = Powerdown |

## Mechanical Dimensions (mm)




| Pin# | Function |
|---|---|
| 1 | Enable/disable |
| 2 | Gnd |
| 3 | Output |
| 4 | Vcc |

| Enable/Disable | |
|---|---|
| **Pin 1** | **Output** |
| Open | Active |
| Logic '1' | Active |
| Ground / Logic '0' | Tristate |

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

To ensure optimal oscillator performance, place a by-pass capacitor of 0.01~0.1µF as close to the part as possible between $V_{CC}$ and GND pads.

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

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

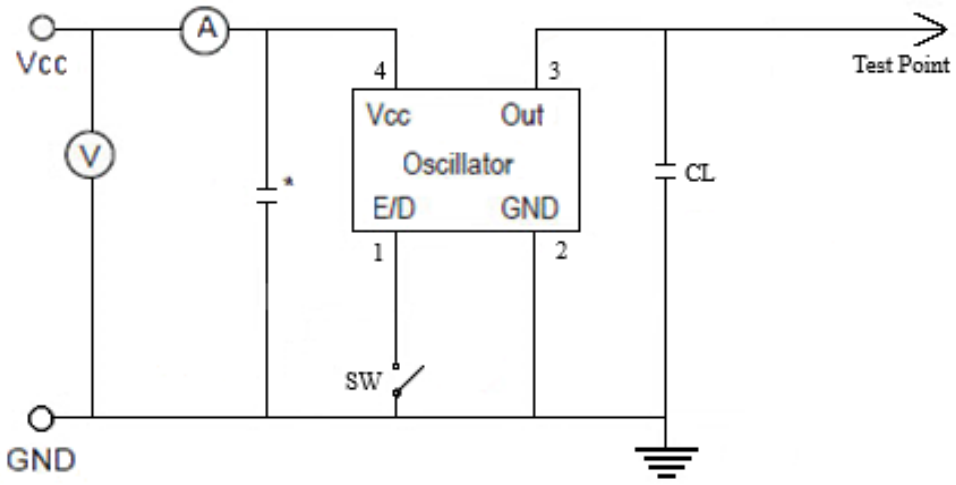
Cardinal Components guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.148 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

For Optimum Jitter Performance, Cardinal recommends:

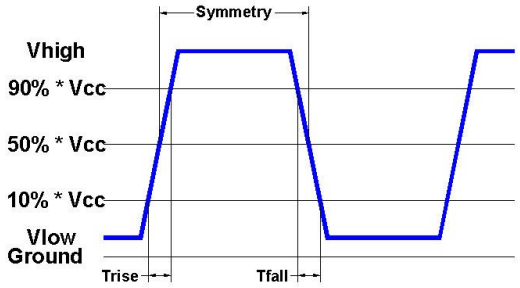
- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans

## Electrical Test / Load Circuit




Notes:
CL: 15pF Includes the input capacitance of oscilloscope
* 0.01~0.1µF 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 |

**Thermal Characteristics:**
The maximum die or junction temperature is 100°C

ESD Rating

| Model | Min. Voltage | Condition |
|---|---|---|
| Human Body Model | 2000V | MIL-STD-883 3015.7 |
| Machine Model | 200V | EIAJ ED-4701/304 |

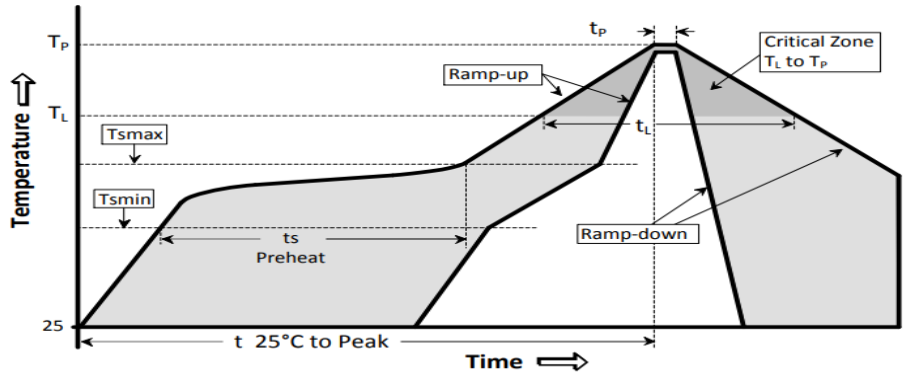
Absolute Maximum Ratings

| 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 |

## Reflow Cycle

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

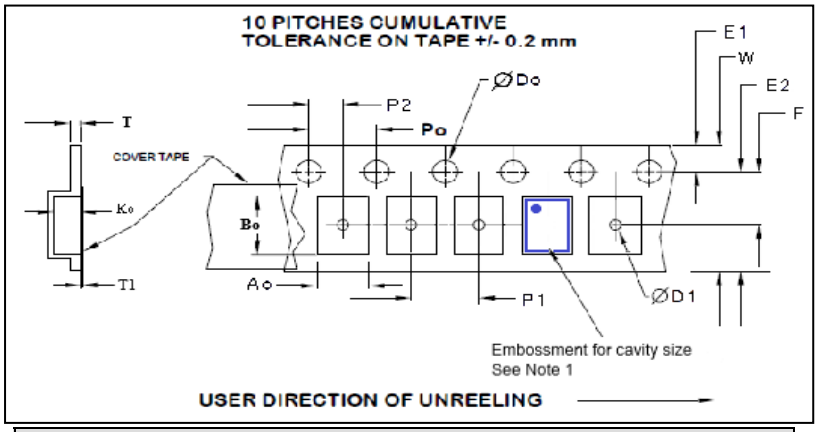


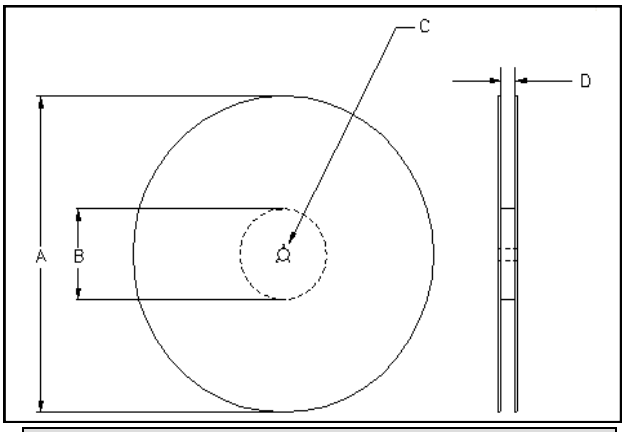

| Temperature Profile | Symbol | Condition | Unit |
|---|---|---|---|
| Average ramp-up rate | ($Ts_{max}$ to $T_P$) | 3°C / second max | °C / s |
| Ramp down Rate | $T_{cool}$ | 6°C / second max | °C / s |
| Time 25°C to Peak Temperature | $T_{to\text{-}peak}$ | 8 minutes max | min |
| **Preheat** | | | |
| 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 1000 per reel, cut tape for < 250. 16mm tape, 8mm pitch.




| Tape Variable Dimensions Table 2 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| Part Size | Tape Size | E2 typ | F | P1 | W max | Ao | Bo | Ko | Qty/reel standard |
| 7050 | 16mm | 14.25 | 7.5 ±0.05 | 8.0 ±0.1 | 16.3 | 5.56±0.1 | 7.85±0.1 | 2±0.1 | 1K |

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

| Reel Dimensions (may vary) Table 3 | | | | | | |
|---|---|---|---|---|---|---|
| | A | | B | | C | D |
| Reel Size | Inches | mm | Inches | mm | mm | mm |
| 7 | 7.0 | 180 | 2.50 | 60 | 13.0 | Tape size +0.4 |
| 13 | 13.0 | 330 | 3.75 | 100 | +0.5 -0.2 | +2.0 -0.0 |

| Tape Constant Dimensions Table 1 | | | | | | | |
|---|---|---|---|---|---|---|---|
| Tape Size | Do | D1 typ | E1 | Po | P2 | T typ | T1 max |
| 16mm | 1.5 +0.1 -0.0 | 1.5 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.1 | 0.3 | 0.1 |

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