# PLETRONICS THA4 Series
# TCXO / TCVCXO

THA4
5.0 x 7.0 x 2.6 mm
LCC Ceramic Package

## Features

- Pletronics' THA4 Series Temperature Compensated Crystal Oscillator
- Optional Voltage Control Function
- CMOS Output
- 2.8V to 3.3V nominal Supply Voltage
- 8 - 40 MHz Frequency

## Applications

SONET / SDH / DWDM
Test & Measurement
Telecom Transmission & Switching Equipment
Base Stations / Picocell
Wireless Communication Equipment

## Electrical Characteristics

| Parameter | Min | Typ | Max | Unit | Condition |
|---|---|---|---|---|---|
| Frequency Range [2] | 8 | - | 40.0 | MHz | Consult factory for other options |
| Frequency Stability vs. Temperature [2] | - | ±0.5 | - | ppm | $(f_{max} - f_{min}) / 2$ |
| Frequency Initial Calibration | - | - | ±2.0 | ppm | Vcontrol 1.50 volts nominal if used when $V_{CC} \geq 3.0$ volts<br>Referenced to the value 25°C ± 2°C |
| Operating Temperature Range [2] | -40 | - | +85 | °C | Widest range available |
| Supply Voltage [1, 2] $V_{CC}$ | 2.8 | - | 3.3 | Volts | ± 5% |
| Supply Current $I_{CC}$ | - | 4.0<br>5.0<br>7.0 | - | mA | 13 MHz<br>26 MHz Load: 15 pF, $V_{CC}$ ± 5%<br>40 MHz |
| Frequency Stability vs. Supply | - | - | ±0.2 | ppm | Load: 15 pF, $V_{CC}$ ± 5% |
| Frequency Stability vs. Load | - | - | ±0.2 | ppm | Load: 15 pF, $V_{CC}$ ± 5% |
| Vcontrol Range | 0.5 | - | 2.5 | Volts | 1.50 volts nominal for $V_{CC}$ |
| Frequency Pullability [2] | 0 | ±8.0 | ±12.0 | ppm | Positive Slope |
| Output Waveform | | CMOS | | | |
| Duty Cycle | 40 | 50 | 60 | % | Load: 15 pF<br>Vth: $T_R$ and $T_F$ 10% and 90% of amplitude<br>Vth: D.C. 50% of amplitude |
| Output $V_{HIGH}$ | 90 | - | - | %Vdd | |
| Output $V_{LOW}$ | - | - | 10 | %Vdd | |
| Output $T_{RISE}$ and $T_{FALL}$ | - | - | 6.5 | nS | |
| Startup Time | - | - | 10.0 | mS | Within ± 2.0 ppm of final frequency |
| Long Term Stability (Aging) | - | - | ±1.0 | ppm | Per year at 25°C ± 2°C |
| Phase Noise 100 Hz<br>1 kHz<br>10 kHz<br>100 kHz | - | -115<br>-136<br>-144<br>-145 | - | dBc/Hz | 25°C ± 2°C at 26.0 MHz |
| Storage Temperature Range | -55 | - | +95 | °C | |

Notes:
[1] Place an appropriate power supply bypass capacitor next to device for correct operation
[2] Specified by part number

## Part Number

| Series Model | $V_{CC}$ Supply Voltage [1] | | Operating Temperature | | Stability [1, 2] | Pullability [1] | Frequency |
|---|---|---|---|---|---|---|---|
| | Lowest | Highest | Lowest | Highest | (ppm) | (ppm) | (MHz) |
| **THA4** | **031** | **035** | **C** | **G** | **015** | **008** | **-19.44M** |
| | **047** = 4.75 for 5.0 volts nominal<br>**031** = 3.1 for 3.3 volts nominal<br>**029** = 2.9 for 3.0 volts nominal<br>**027** = 2.7 for 2.8 volts nominal | **052** = 5.25 for 5.0 volts nominal<br>**035** = 3.5 for 3.3 volts nominal<br>**031** = 3.1 for 3.0 volts nominal<br>**029** = 2.9 for 2.8 volts nominal | **A** = +10°C<br>**B** = +5°C<br>**C** = +0°C<br>**D** = -5°C<br>**E** = -10°C<br>**F** = -15°C<br>**G** = -20°C<br>**H** = -25°C<br>**J** = -30°C<br>**K** = -35°C<br>**L** = -40°C | **A** = +40°C<br>**B** = +45°C<br>**C** = +50°C<br>**D** = +55°C<br>**E** = +60°C<br>**F** = +65°C<br>**G** = +70°C<br>**H** = +75°C<br>**J** = +80°C<br>**K** = +85°C | **005** = ± 0.5<br>**010** = ± 1.0<br>**015** = ± 1.5<br>**020** = ± 2.0<br>**025** = ± 2.5 | **000** = TCXO<br>**005** = ± 5<br>**008** = ± 8 | 8 - 40 MHz |

[1] Contact Factory for non-standard specifications
[2] Not all stabilities are available with all operating temperature ranges. Contact Factory for exact combinations available.

## Device Marking

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| P*FFFF*<br>• *YMDzzz* | OR | *YMD*<br>*FFFF.zzz*<br>*YMD*<br>• PLE*zzzzz*<br>*YMD* | OR | *FFFF zzz*<br>• P *zzzzzz*<br>*YMD* | OR | *FFFF zzz*<br>• PLE *zz YWWz* | OR | *FFFF zzz*<br>• PLE *z YWWz* | |

| | |
|---|---|
| P or PLE | = Pletronics |
| *FFFF* | = Frequency in MHz |
| *YWW* | = Date Code (year week) |
| *YMD* | = Date code (year month day) - See table below (may appear in any one of the locations shown) |
| *z* | = Internal factory codes |

**Note: Output Frequency may be half the Crystal Frequency marking, depending on requirements**.

Specifications such as part number, 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 | 5 | 6 | 7 | 8 | 9 | Code | A | B | C | D | E | F | G | H | J | K | L | M |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Year | 2015 | 2016 | 2017 | 2018 | 2019 | Month | JAN | FEB | MAR | APR | MAY | JUN | JUL | AUG | SEP | OCT | NOV | DEC |

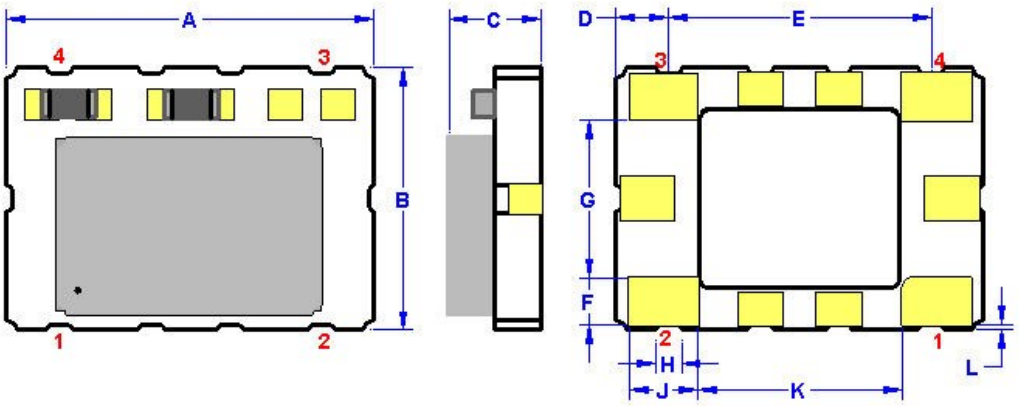
| Code | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | A | B | C | D | E | F | G | H | J | K | L | M | N | P | R | T | U | V | W | X | Y | Z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Day | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8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

## Mechanical Dimensions

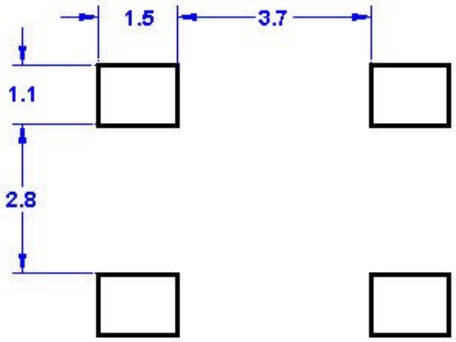
| | Inches | mm |
|---|---|---|
| A | 0.276 ± 0.006 | 7.00 ± 0.15 |
| B | 0.197 ± 0.006 | 5.00 ± 0.15 |
| C | 0.089 max | 2.25 max |
| D[1] | 0.039 | 1.00 |
| E[1] | 0.197 | 5.00 |
| F[1] | 0.025 | 0.90 |
| G[1] | 0.118 | 3.00 |
| H[1] | 0.020 | 0.50 |
| J[1] | 0.051 | 1.30 |
| K[1] | 0.154 | 3.90 |
| L[1] | 0.004 | 0.10 |

[1] Typical dimensions




**Pad Layout** mm shown (Top View)

Disclaimer: Recommended layout shown.
Adjust pad layout as needed for individual process requirements.
Solder mask required, as shown.




**(Not to Scale)**

**Contacts (pads):** Gold 11.8 to 39.4 µinches (0.3 to 1.0 µm) over Nickel 50 to 350 µinches (1.27 to 8.89 µm)

## Layout

| Pad | Function | Note |
|---|---|---|
| 1 | Vcontrol Input | If this function is not specified, recommend connecting this pad to ground. EFC (Electronic Frequency Control). |
| 2 | Ground (GND) | |
| 3 | Output | CMOS |
| 4 | $V_{CC}$ Supply Voltage | Connect an appropriate 10nF power supply bypass capacitor as close as possible |

For Optimum Jitter Performance, Pletronics recommends:

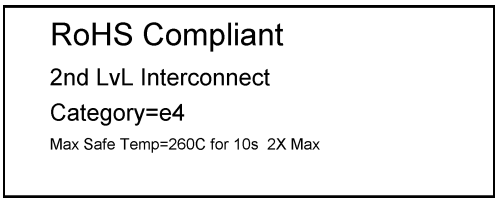
- A ground plane under the device
- Do not route large transient signals (both current and voltage) under the device
- Do not place near a large magnetic field such as a high frequency switching power supply
- Do not place near piezoelectric buzzers or mechanical fans
- Minimize air flow across the device

## Package Labeling

Tape and Reel available for quantities of 250 to 1000 per reel, cut tape for < 250. 16mm tape, 8mm pitch.

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

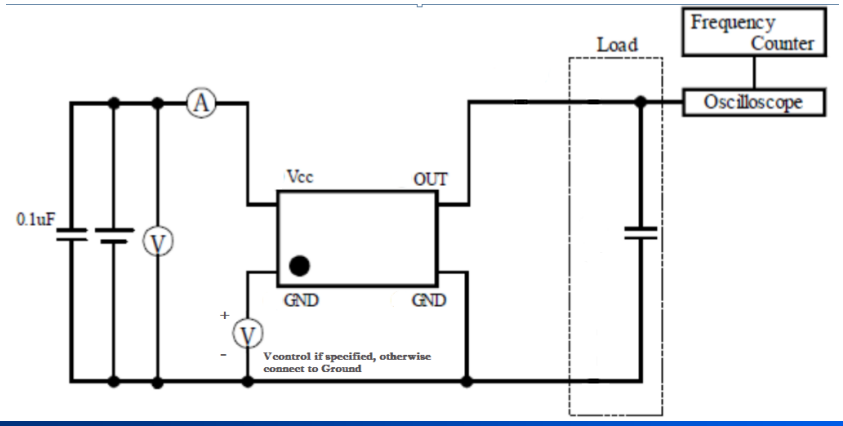
RoHs Label is 1" x 2.6" (25.4mm x 66.7mm)
Font is Arial

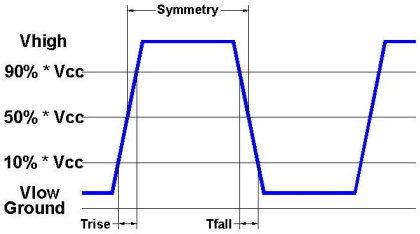




**Pletronics Inc. certifies this device is in accordance with the RoHS 2 (2011/65/EU) and WEEE (2002/96/EC) directives.**

Pletronics Inc. guarantees the device does not contain the following: Cadmium, Hexavalent Chromium, Lead, Mercury, PBB's, PBDE's
Weight of the Device: 0.3 grams
Moisture Sensitivity Level: 1 As defined in J-STD-020D
Second Level Interconnect code: e4

## Electrical Test /Load Circuit




## Environmental / ESD Ratings

Reliability: Environmental Compliance

| Parameter | Condition |
|---|---|
| Mechanical Shock | JESD22-B104 |
| Vibration | JESD22-B103 |
| Solderability | IPC J-STD-002 |
| Thermal Shock | MIL-STD-883 Method 1011, Condition A |

ESD Rating

| Model | Min. Voltage | Condition |
|---|---|---|
| Human Body Model | 2000V | JESD22-A114 |
| Charged Device Model | 500V | JESD 22-C101 |
| Machine Model | 200V | JESD22-A115 |

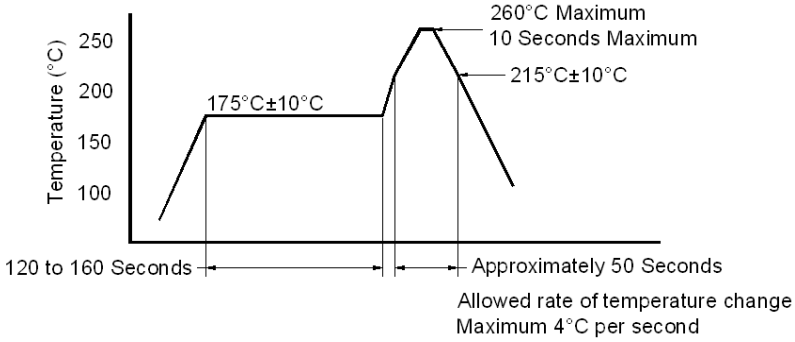
**Thermal Characteristics:**
The maximum die or junction temperature is 155°C
The thermal resistance junction to board is 30 to 50°C/Watt depending on the solder pads, ground plane and construction of the PCB.

Absolute Maximum Ratings

| Parameter | Unit |
|---|---|
| $V_{CC}$ Supply Voltage | -0.6V to +6V |
| Vi Input Voltage | -0.6V to $V_{CC}$ + 0.6V |
| Io Output Current | -10mA to +10mA |

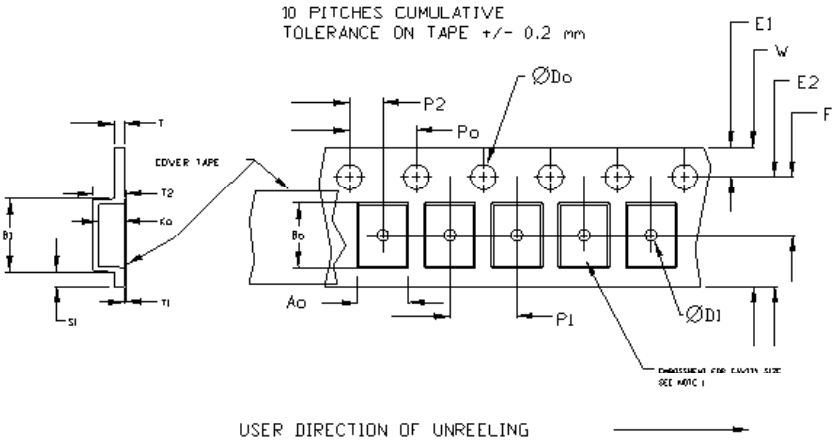
## Reflow Cycle




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

Parts assembled with No Clean (NC) solder paste.

## Tape and Reel




Tape Constant Dimensions Table 1

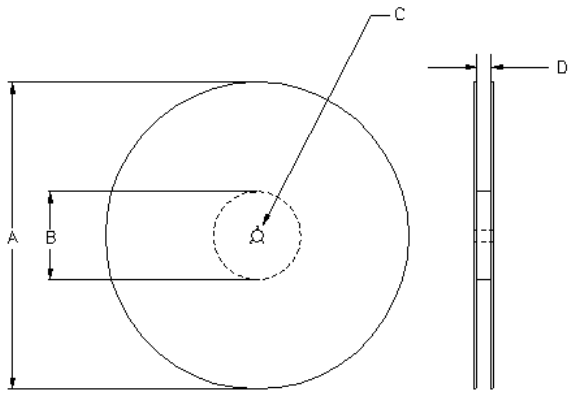
| Tape Size | Do | D1 min | E1 | Po | P2 | S1 min | T max | T1 max |
|---|---|---|---|---|---|---|---|---|
| 8mm | 1.5 +0.1 -0.0 | 1.0 | 1.75 ±0.1 | 4.0 ±0.1 | 2.0 ±0.05 | 0.6 | 0.6 | 0.1 |
| 12mm | | 1.5 | | | | | | |
| 16mm | | 1.5 | | | 2.0 ±0.1 | | | |
| 24mm | | 1.5 | | | | | | |

Tape Variable Dimensions Table 2

| Tape Size | B1 max | E2 min | F | P1 | T2 max | W max | Ao, Bo & Ko |
|---|---|---|---|---|---|---|---|
| 16mm | 12.1 | 14.25 | 7.5 ±0.1 | 8.0 ±0.1 | 8.0 | 16.3 | Note 1 |

Dimensions in mm  Drawing 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 | 177.8 | 2.50 | 63.5 | 13.0 +0.5 -0.2 | Tape size +0.4 +2.0 -0.0 |
| 10 | 10.0 | 254.0 | 4.00 | 101.6 | | |
| 13 | 13.0 | 330.2 | 3.75 | 95.3 | | |

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