

CFPT-9300 Series Lead-Free Miniature High Precision TCXO / TCVCXO

ISSUE H; 29th APRIL 2005

Preliminary Specification

Recommended for new Designs

Delivery Options

- Please contact our sales office for current delivery times.

Description

- A series of Lead Free, surface mountable TCXO / TCVCXO for medium to high volume applications where small size and high performance are pre-requisites. This oscillator uses C-MAC's latest custom ASIC "Pluto", a single chip oscillator and analogue compensation circuit, capable of sub 0.3ppm performance over an extended temperature range. Its ability to function down to a supply voltage of 2.4V and low power consumption makes it particularly suitable for mobile applications.

Frequency

- Standard: 10.0 (HCMOS only), 12.688375, 12.8, 13, 14.4, 16, 16.367, 16.384, 16.8, 19.2, 19.44, 20, 24, 24.5535, 26, 32.768, 33.6, 36, 38.88 and 40 MHz
- Optional Range 1.5 to 52 MHz

Waveform

- Standard
 - Square HCMOS 15pF load
 - Clipped sinewave(CS) 10kΩ // 10pF, DC-coupled
- Optional
 - Square AC MOS 50pF max. load
 - Sinewave 10kΩ // 10pF, DC-coupled

Supply Voltage

- Operating range 2.4 to 6.0V, see table.

Current Consumption (typically)

- HCMOS
 $1 + \text{Frequency(MHz)} * \text{Supply(V)} * \{\text{Load(pF)} + 15\} * 10^{-3}$
 mA, e.g. 20MHz, 3.3V, 15pF \Rightarrow 3 mA
- Clipped Sinewave
 $1 + \text{Frequency(MHz)} * 1.2 * \{\text{Load(pF)} + 30\} * 10^{-3}$ mA
 e.g. 20MHz, 10pF \Rightarrow 2 mA

Package Outline

- SMD (surface mount device), ceramic carrier, nom. dimensions 5.0 x 3.2 x 1.6mm
- Optional low profile, nom dimensions 5.0 x 3.2 x 1.4mm

Ageing

- ± 1 ppm maximum in first year, frequency \leq 20MHz
- ± 2 ppm maximum in first year, frequency $>$ 20MHz
- ± 3 ppm maximum for 10 years, frequency \leq 20MHz
- ± 5 ppm maximum for 10 years, frequency $>$ 20MHz
- ± 1 ppm maximum after reflow

Frequency Stability

- Temperature: see table
- Supply Voltage Variation, $\pm 10\%$
 - HCMOS ± 0.2 ppm typ.
 - Clipped Sinewave ± 0.05 ppm typ.
- Load Coefficient,
 - 15pF \pm 5pF (HCMOS) ± 0.2 ppm typ.
 - 10kΩ // 10pF $\pm 10\%$ (CS) ± 0.05 ppm typ.

Frequency Adjustment, two options

- A** Ageing adjustment by means of external Control Voltage applied to pad 1 (standard option)
- Range (frequency \leq 20MHz) $\geq \pm 5$ ppm
 - Range (frequency $>$ 20MHz) $\geq \pm 7$ ppm
 - Linearity $\leq 2\%$
 - Slope Positive
 - Input resistance ≥ 100 kΩ
 - Modulation bandwidth ≥ 2 kHz
 - Standard control voltage range 1.5V \pm 1V
- B** No frequency adjustment
- Initial calibration $\leq \pm 1.0$ ppm

Storage Temperature Range

- -55 to +125°C

Environmental Specification

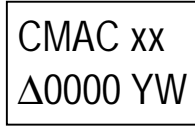
- Vibration: IEC 60068-2-6, test Fc, procedure B4: 10-60Hz 1.5 mm displacement, 60-2000Hz at 20gn, 4 hours in each of three mutually perpendicular axes at 1 octave per minute.
- Shock: IEC 60068-2-27, test Ea: 1500gn acceleration for 0.5ms duration, Half-sine pulse, 3 shocks in each direction along three mutually perpendicular axes.
- Soldering: SMD Product suitable for Reflow soldering. Peak temperature 260°C. Maximum time above 220°C, 60 sec.
- Marking: Laser Marked
- RoHS: Parts are fully compliant with the European Union directive 2002/95/EC on the restriction of the use of certain hazardous substances in electrical and electronic equipment. Note: These RoHS compliant parts are suitable for assembly using both Lead-free solders and Tin/Lead solders.



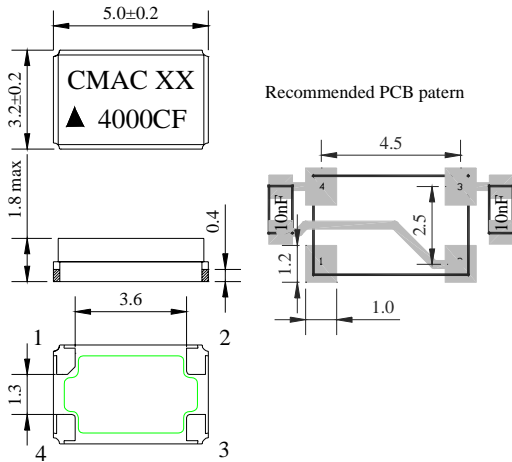
Frequency Products

Marking, includes

- CMAC
- Manufacturing identifier (xx)
- Pad 1 / Static sensitivity identifier (Triangle)
- Part Number (Four digits)
- Device date code (YW)



Outline in mm



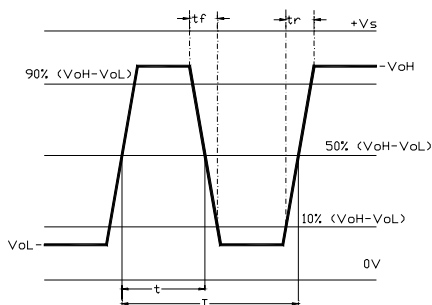
Pad Function

- 1 Voltage Control (leave unconnected in case the 'no frequency adjust' option has been ordered)
- 2 Ground
- 3 Output
- 4 Supply Voltage, Vs

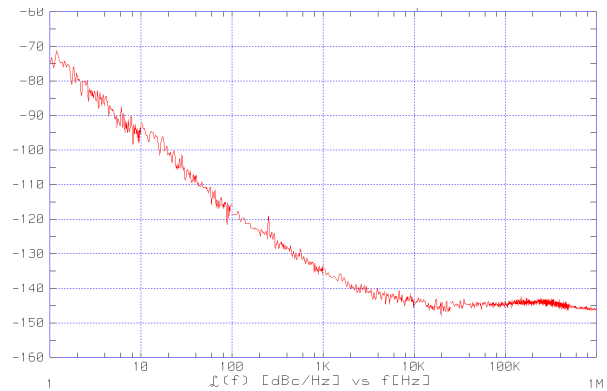
Low Profile option, 1.6mm max height.

Note: for correct operation a 10nF supply de-coupling capacitor should be placed next to the device, as shown above. If an AC coupled output is required a 10nF should be placed in series with output pad 3.

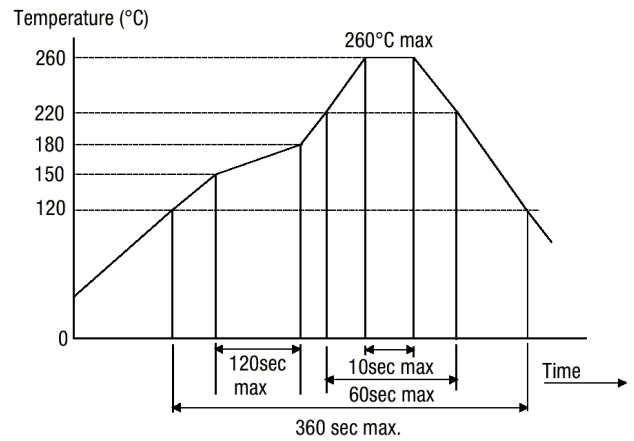
Output Waveform - HCMOS



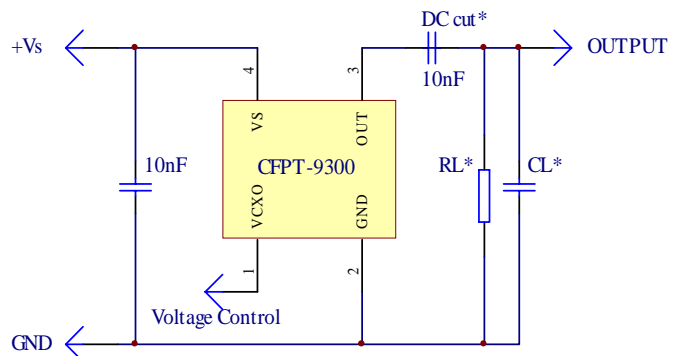
Typical Phase Noise at 14.4 MHz



Reflow Solder Profile



Test Circuit



*DC cut capacitor required for AC coupled Clipped sinewave.

*Load 15pF (HCMOS) or 10kΩ // 10pF (Clipped Sinewave), inclusive of probe and jig capacitance.

Phase Noise (typical figures)

| Frequency | Frequency offset from carrier | | | | |
|-----------|-------------------------------|-------------|-------------|-------------|-------------|
| | 10Hz | 100Hz | 1kHz | 10kHz | 100kHz |
| 14.4MHz | -95 dBc/Hz | -115 dBc/Hz | -135 dBc/Hz | -140 dBc/Hz | -145 dBc/Hz |

Electrical Specification – limiting values when measured in test circuit

| Frequency Range | Supply Voltage | Output Waveform | Output Levels | Rise Time (tr) | Fall time (tf) | Duty cycle | Model Number |
|--------------------|----------------|----------------------------|----------------------------|----------------|----------------|------------|--------------|
| 1.5MHz to 52.0MHz | 3.3V±10% | Square HCMOS 15pF | Voh ≥ 90%Vs Vol ≤ 10%Vs | 8ns | 8ns | 45/55% | CFPT-9301 |
| 12.0MHz to 52.0MHz | 3.0V±10% | Clipped Sinewave 10kΩ/10pF | Vpk-pk ≥ 0.8V | - | - | - | CFPT-9302 |

Frequency Stability Available Over Operating Temperature Ranges

| Operating Temperature Ranges | Frequency Stability vs Operating Temperature Range | | | | |
|--|--|----------|----------|---------|---------|
| | ±0.2ppm | ±0.3ppm | ±0.5ppm | ±1.0ppm | ±2.0ppm |
| -20 to 70°C | Code MS* | Code AS* | Code ES | Code FS | Code GS |
| -40 to 85°C | - | Code AX* | Code EX* | Code FX | Code GX |
| Ordering Example | | | | | |
| Frequency _____ 14.4MHz _____ CFPT-9301 _____ FX _____ A Model No _____ Frequency Stability vs Operating Temperature Code _____ Frequency Adjustment Code _____ | | | | | |
| Note: *Codes may not be available for all frequencies | | | | | |

Minimum Order Information Required

- Frequency + Model Number + Frequency Stability vs Operating Temperature Range Code + Frequency Adjustment Code
- OR
- Discrete Part Number (ExxxxLF)

Custom Specifications

Non-standard requirements like high drive ACMOS output, low harmonic sinewave output, low profile outline, different supply and control voltages, high frequency pulling, different stabilities and temperature ranges may be available upon request. Please contact our sales office to discuss your requirements.