# CFPT-5300 SERIES

**ISSUE 1; 15 OCTOBER 2004**

**Delivery Options**
- Please contact our sales office for current lead times

**Description**
- The CFPT-5300 series of temperature compensated crystal oscillators (TCXOs), provide for ultra high stabilities down to ±0.3ppm and operating temperature ranges as wide as -55 to 95°C. Housed in an industry standard 4 pin DIL 14 package, the oscillator uses C-MAC's latest custom ASIC "Pluto", a single chip oscillator and analogue compensation circuit. Its wide frequency range, operating temperature range, coupled with it's high stability and linear frequency pulling make it the ideal reference oscilator. Its ability to function down to supply voltage of 2.4V and low power consumption makes it suitable for a wide range of applications

**Standard Frequency**
- 3.2, 4.096, 5.0, 6.4, 8.192, 9.6, 10.0, 12.8, 13.0, 14.4, 14.85, 16.384, 16.8, 19.2, 19.44, 19.8, 20, 32.768, 38.88, 40.0 MHz

  Non - standard frequencies in the range 1.25MHz to 40.0MHz are available on request, please contact our sales office

**Waveform**
- Square HCMOS 15pF load

  The following non-standard outputs are available on request, contact sales office:

- Square ACMOS 50pF max load

- Sinewave, $\geq$ 1.0pk-pk, 10kΩ // 10pF load

- Clipped Sinewave, $\geq$0.8Vpk-pk, 10kΩ // 10pF load

  Sinewave and clipped sinewave signals are superimposed on a DC offset, to remove this offset insert an external coupling capacitor in series with the output

**Supply Voltages**
- 3.3V or 5.0V
  (non standard supply voltages in the range 2.4V to 6.0V are available on request, please contact our sales office)

**Current Consumption**
- HCMOS Typically »

  $1+Frequency(MHz)*Supply(V)*\{Load(pF)+15\}*10^{-3}mA$
  Eg 20MHz, 5V, 15pF » 4mA

- Sinewave, $\leq$ 8mA

- Clipped sinewave,
  $1+Frequency(MHz)*1.2*\{Load(pF)+30\}*10^{-3}mA$

**Package Outline**
- Low Profile DIL 14 resistance welded enclosure, hermetically sealed

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

**Frequency Stability**
- Temperature: see table
- Supply Voltage Variation ±10% $\leq$ ±0.2ppm*
- Load co-efficient 15pF ±5pF $\leq$ ±0.2ppm*
- * Dependent on frequency and output type

**Frequency Adjustment**

- **Option A (standard)**:
  Control Voltage 1.5V±1.0V, applied to pin 1
  $\geq$ ±5ppm*, frequency $\leq$ 20MHz
  $\geq$ ±7ppm, frequency > 20MHz
  Linearity                       $\leq$3%
  Slope                           Positive
  Input resistance                >100kΩ
  Modulation Bandwidth            >2kHz
- **Option B**:
  $\geq$ ±5ppm *($\geq$±7ppm if frequency >20MHz) by means of an external 100kΩ potentiometer connected as a variable resistor from pin 1 to GND

- *  Higher adjustment range up to ±50ppm and non standard control voltage ranges are available on request. This may not be compatible with all stability options, contact sales office

- **Option C**:
  No frequency adjustment, initial calibration @25°C $\leq$±1.0ppm

**Storage Temperature Range**
- -55 to 95°C

## Environmental Specification

- Bump: IEC 60068-2-29, Test Eb, 4000 ±10 bumps at 390m/s² in each of the three mutually perpendicular axes

- Shock: IEC 60068-2-27 Test Ea, 980m/s² acceleration for 6ms duration, 3 shocks in each direction along three mutually perpendicular axes

- Solderability: IEC 60068-2-20, Test T, method 1 (solder bath): Temperature 235°C

- Vibration: IEC 60068-2-6 Test Fc Procedure B4, 10-60Hz 1.5mm displacement, 60-2000Hz at 98.1 m/s², 30 minutes in each of three mutually perpendicular axes at 1 octave per minute

- Damp Heat (steady state): IEC 60068-2-3, Test Ca, Duration 56 days

- Robustness of Termination: IEC 60068-2-21, Test Ua (tensile): Force 1Kg

- Sealing: IEC 60068-2-17, Test Qc (gross) & test Qk (fine)

- Marking: Heat cured epoxy ink, engraving or label

- Immersion in Solvents: IEC 60068-2-45, Test Xa

## Marking Includes

- C-MAC

- Part Number (E and four digits)

- Frequency (MHz)

- Pin 1 / Static sensitivity identified (Triangle)

- Date Code and manufacturing location code (YYWWL)
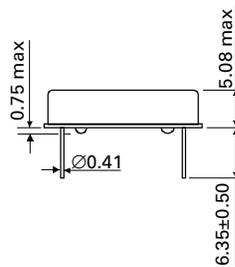
## Minimum Order Information Required

- Frequency + Model Number + Frequency Stability Vs Operating Temperature Code + Frequency Adjustment Code

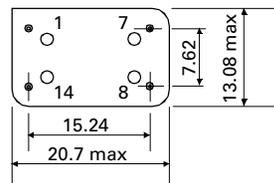*OR*

- Discrete part number for repeat orders

Please supply full information for non-standard options, if required
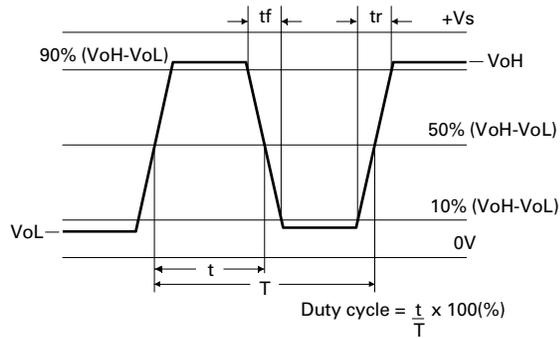
**Outline in mm**



Pin Connections

1. Frequency Adjust (do not connect if Frequency Adjust option C has been selected)
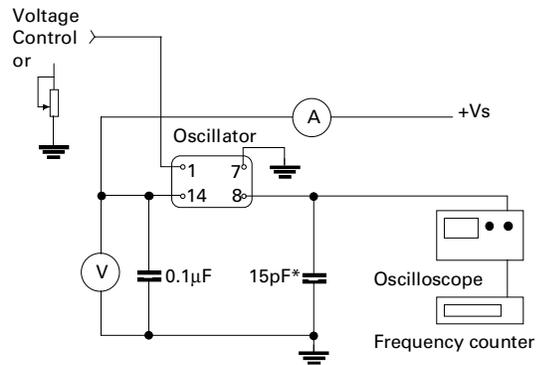7. GND
8. Output
14. +Vs

**Output Waveform - HCMOS**



Duty cycle = $\frac{t}{T}$ x 100(%)

**Test Circuit - HCMOS**

**Phase Noise (typical figures)**

| Frequency | Frequency offset from carrier: 10Hz | Frequency offset from carrier: 100Hz | Frequency offset from carrier: 1kHz | Frequency offset from carrier: 10kHz | Frequency offset from carrier: 100kHz |
|---|---|---|---|---|---|
| 10.0MHz | −95 dBc/Hz | −120 dBc/Hz | −135 dBc/Hz | −140 dBc/Hz | −145 dBc/Hz |
| 20.0MHz | −85 dBc/Hz | −110 dBc/Hz | −125 dBc/Hz | −135 dBc/Hz | −140 dBc/Hz |
| 40.0MHz | −75 dBc/Hz | −100 dBc/Hz | −120 dBc/Hz | −130 dBc/Hz | −135 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 |
|---|---|---|---|---|---|---|---|
| 1.25 to 40.0MHz | 3.3V±10% | Square HCMOS 15pF | Voh ≥ 90% Vs Vol ≤ 10% Vs | 8ns | 8ns | 45/55% | CFPT-5301 |
| 1.25 to 40.0MHz | 5.0V±10% | Square HCMOS 15pF | Voh ≥ 90% Vs Vol ≤ 10% Vs | 7ns | 7ns | 45/55% | CFPT-5302 |

**Frequency Stability Available Over Operating Temperature Ranges**

| Operating Temperature Ranges | Frequency Stabilities Vs Operating Temperature Range | | | | |
|---|---|---|---|---|---|
| | ±0.3ppm | ±0.5ppm | ±0.8ppm | ±1.0ppm | ±1.5ppm |
| 0 to 70°C | Code AC* | Code EC | Code BC | Code FC | Code CC |
| −20 to 70°C | Code AS* | Code ES | Code BS | Code FS | Code CS |
| −30 to 75°C | —— | Code EU* | Code BU | Code FU | Code CU |
| −40 to 85°C | —— | Code EX* | Code BX | Code FX | Code CX |
| −55 to 95°C | —— | —— | —— | Code FA* | Code CA* |

| |
|---|
| **Ordering Example**  10.0MHz  CFPT-5301 FX  A |
| Frequency ———— |
| Model number ———— |
| Frequency Stability Vs Operating Temperature Code ———— |
| Frequency Adjustment Code ———— |
| *(For frequency adjustment codes see main text)* |
| Note:* Codes may not be available for all frequencies |