



## CFPT-5300 SERIES

ISSUE 2; 20 JUNE 2006

### 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  $\pm 0.3\text{ppm}$  and operating temperature ranges as wide as  $-55$  to  $95^\circ\text{C}$ . Housed in an industry standard 4 pin DIL 14 package, the oscillator uses RAKON'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 oscillator. Its ability to function down to supply voltage of  $2.4\text{V}$  and low power consumption makes it suitable for a wide range of applications.

### RoHS Compliance

- Parts with the suffix "LF" on the ordering code and part number 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: The RoHS compliant parts are suitable for assembly using both Lead-free solders and Tin / Lead solders.

### 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 AC MOS 50pF max load
- Sinewave,  $\geq 1.0\text{pk-pk}$ ,  $10\text{k}\Omega$  //  $10\text{pF}$  load
- Clipped Sinewave,  $\geq 0.8\text{Vpk-pk}$ ,  $10\text{k}\Omega$  //  $10\text{pF}$  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  $2.4\text{V}$  to  $6.0\text{V}$  are available on request, please contact our sales office)

### Current Consumption

- HCMOS Typically »  
 $1 + \text{Frequency(MHz)} * \text{Supply(V)} * \{\text{Load(pF)} + 15\} * 10^{-3}\text{mA}$   
Eg 20MHz, 5V, 15pF » 4mA
- Sinewave,  $\leq 8\text{mA}$
- Clipped sinewave,  
 $1 + \text{Frequency(MHz)} * 1.2 * \{\text{Load(pF)} + 30\} * 10^{-3}\text{mA}$

### Package Outline

- Low Profile DIL 14 resistance welded enclosure, hermetically sealed

### Ageing

- $\pm 1\text{ppm}$  maximum in first year, frequency  $\leq 20\text{MHz}$
- $\pm 3\text{ppm}$  maximum for 10 years, frequency  $\leq 20\text{MHz}$
- $\pm 2\text{ppm}$  maximum in first year, frequency  $> 20\text{MHz}$
- $\pm 5\text{ppm}$  maximum for 10 years, frequency  $> 20\text{MHz}$

### Frequency Stability

- Temperature: see table
  - Supply Voltage Variation  $\pm 10\% \leq \pm 0.2\text{ppm}^*$
  - Load co-efficient  $15\text{pF} \pm 5\text{pF} \leq \pm 0.2\text{ppm}^*$
- \* Dependent on frequency and output type

### Frequency Adjustment

- **Option A (standard):**  
Control Voltage  $1.5\text{V} \pm 1.0\text{V}$ , applied to pin 1  
 $\geq \pm 5\text{ppm}^*$ , frequency  $\leq 20\text{MHz}$   
 $\geq \pm 7\text{ppm}$ , frequency  $> 20\text{MHz}$ 

Linearity	$\leq 3\%$
Slope	Positive
Input resistance	$> 100\text{k}\Omega$
Modulation Bandwidth	$> 2\text{kHz}$
  - **Option B:**  
 $\geq \pm 5\text{ppm}^*$  ( $\geq \pm 7\text{ppm}$  if frequency  $> 20\text{MHz}$ ) by means of an external  $100\text{k}\Omega$  potentiometer connected as a variable resistor from pin 1 to GND
- \* Higher adjustment range up to  $\pm 50\text{ppm}$  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 @  $25^\circ\text{C}$   
 $\leq \pm 1.0\text{ppm}$

### Storage Temperature Range

- $-55$  to  $95^\circ\text{C}$

## Environmental Specification

- Bump: IEC 60068-2-29, Test Eb, 4000  $\pm 10$  bumps at 390m/s<sup>2</sup> in each of the three mutually perpendicular axes
- Shock: IEC 60068-2-27 Test Ea, 980m/s<sup>2</sup> 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/s<sup>2</sup>, 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

- RAKON
- 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

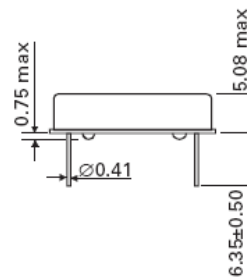
- Frequency + Model Number + Frequency Stability Vs Operating Temperature Code + Frequency Adjustment Code + RoHS compliance code

OR

- Discrete part number for repeat orders (suffix 'LF' signifies RoHS compliance)

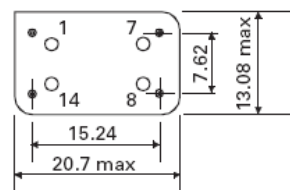
Please supply full information for non-standard options, if required

## Outline in mm

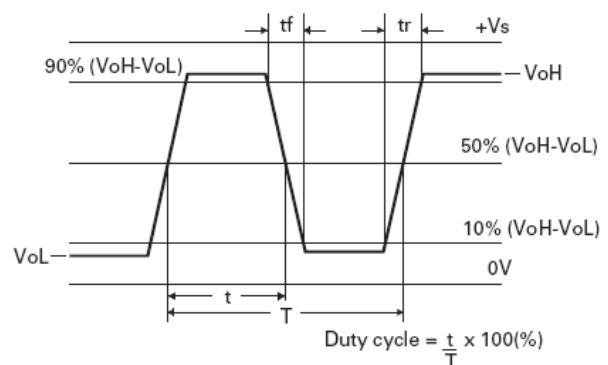


## Pin Connections

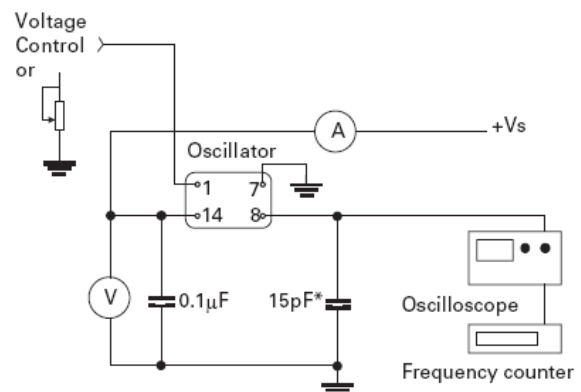
1. Frequency Adjust (do not connect if Frequency Adjust option C has been selected)
7. GND
8. Output
14. +Vs



## Output Waveform - HCMOS



## 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**

Frequency 10.0MHz      CFPT-5301 FX A LF

Model number \_\_\_\_\_

Frequency Stability Vs Operating Temperature Code \_\_\_\_\_

Frequency Adjustment Code \_\_\_\_\_

Lead-Free Version \_\_\_\_\_

(For frequency adjustment codes see main text)

Note:\* Codes may not be available for all frequencies