

CFPO-20,-21,-22,-23 TC-OCXO

ISSUE 2; 20 APRIL 2006

Preliminary Specification

Recommended for new designs

Delivery Options

Please contact our sales office for current leadtimes

Description

A series of high stability crystal oscillators, using a hybrid combination of oven control and temperature compensation capable of sub 0.05ppm stability. By using a loosely controlled miniature oven that is thermally isolated from the ambient the frequency stability of a crystal oscillator is enhanced. Stability is further improved by compensating the residual frequency error with C-MAC's proprietary ASIC "Pluto", a single chip oscillator with analogue compensation circuit. The combination of these two functions result in an oscillator with the best stability / power consumption ratio and fast warm-up, making it particularly suitable for battery powered applications

Standard Frequencies

- HCMOS only: 5, 6.4, 8, 8.192MHz
- HCMOS & Clipped Sinewave 10.0, 12.8, 16.0, 16.384 and 20.0MHz
- Other frequencies in the range 1.25 to 33MHz may be available upon request

Waveform

- Standard
- Square HCMOS 15pF load Clipped Sinewave 10kΩ // 10pF, AC-coupled
- Optional Square ACMOS 50pF max. load Sinewave $10k\Omega$ // 10pF, DC-coupled

Supply Voltage

Operating range 3.3V or 5.0V, see table.

Input Power		-20 to 70°C	-40 to 85°C	
	Warm-up	≤ 1.0W	≤ 1.0W	
•	Steady state @ 25°C	≤ 270mW	≤ 350mW	
	Steady state @ -20°C	≤ 400mW	≤ 525mW	
•	Steady state @ -40°C		≤ 600mW	

Warm-up time to reach ±0.01ppm of final frequency

< 30 secs. (@25°C)

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

Frequency Stability

- Temperature: see table
- Supply Voltage Variation, ±5% ±0.1ppm typ.
- Load Coefficient, 15pF ±5pf (HCMOS) or 10kΩ // 10pF ±10% (clipped sinewave) ±0.1ppm typ.

Frequency Adjustment, three options

- Ageing adjustment by means of external Voltage Control applied to pad 1 (standard option)
 - Range (frequency \leq 20MHz) \geq ±5ppm ■ Range (frequency > 20MHz) ≥ ±7ppm Linearity ≤ 0.5% ■ Slope Positive ■ Input Resistance $\geq 100 k\Omega$
 - ≥ 2kHz Modulation Bandwidth Standard control voltage range 1.5V±1V
- Ageing adjustment by means of an external 100kΩ potentiometer connected as a variable resistor from pad 1 to ground.
 - Range (frequency ≤ 20MHz) $> \pm 5$ ppm Range (frequency > 20MHz) ≥ ±7ppm
- No frequency adjustment
 - Initial calibration $\leq \pm 0.5$ ppm

Storage Temperature Range

-55 to 125°C

Environmental Specification

- Vibration: IEC 60068-2-6, test Fc: 10-60Hz 0.75mm displacement, 60-2000Hz 100m/s² (10gn) acceleration, 4 hours in each of three mutually perpendicular axes at 1 octave per minute.
- Mechanical Shock: IEC 60068-2-27, test Ea; 1000m/s² (100gn) acceleration for 6ms duration, Half sine pulse, 3 shocks in each direction along three mutually perpendicular axes (18 shocks total)
- 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 Lead/Tin solders.
- Marking: Laser Marked

Marking, includes

- CMAC
- Part number (Pxxxx)
- Pad 1 / Static sensitivity identifier (triangle)
- Device date / location code (YYWWL)

Package

Hermetically sealed, industry standard, DIL 14/4 leaded package

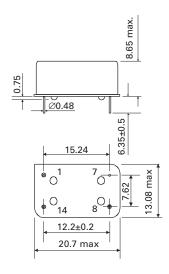
Europe Tel: +44 (0)1460 270200 Fax: +44 (0)1460 72578 Americas Tel: +1 919 941 9333 Fax: +1 919 941 9371 Tel: +86 755 8826 5991 Fax: +86 755 8826 5990 Website: www.cmac.com



Website: www.cmac.com



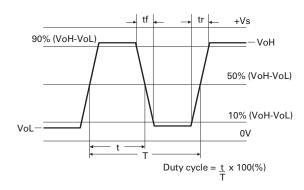
Outline in mm.



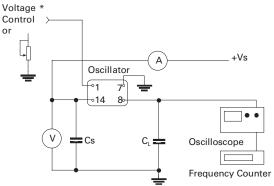
Pin Function

- Frequency Adjust (leave unconnected in case the 'no frequency adjust' option has been ordered)
- 7. GND
- 8. Output
- 14. +Vs

Output Waveform - HCMOS



Test Circuit



 $\rm C_L$ = Load 15pF (HCMOS or $10k\Omega$ // 10pF (Clipped Sinewave), inclusive of probe and jig capacitance.

Cs = 100nF
*The GND of the control voltage needs to be connected directly to pin 7 as ground lead impedance may cause performance degradation

 Europe
 Tel: +44 (0)1460 270200
 Fax: +44 (0)1460 72578

 Americas Tel: +1 919 941 9333
 Fax: +1 919 941 9371

 Asia
 Tel: +86 755 8826 5991
 Fax: +86 755 8826 5990



Website: www.cmac.com

Phase Noise (typical figures)

Eroguanou	Frequency offset from carrier					
Frequency	10Hz	100Hz	1kHz	10kHz	100kHz	
12.8MHz	-95dBc/Hz	-115dBc/Hz	-135dBc/Hz	-140dBc/Hz	-145dBc/Hz	

Electrical Specification - limiting values when measured in test circuit

Frequency Range	Supply Voltage	Output Waveform	Output Levels	Rise Time (t _r)	Fall Time (t _f)	Duty Cycle	Model Number
1.25 to 33.0MHz	3.3V ±5%	Square HCMOS 15pF	VoH ≥90% Vs VoL ≤ 10% Vs	7ns	7ns	45/55%	CFP0-20
1.25 to 33.0MHz	5.0V±10%	Square HCMOS 15pF	VoH ≥90% Vs VoL ≤ 10% Vs	8ns	8ns	45/55%	CFP0-21
10.0 to 33.0MHz	3.3V±5%	Clipped Sinewave 10kΩ//10pF	Vpk-pk ≥0.8V	-	-	-	CFP0-22
10.0 to 33MHz	5.0V±10%	Clipped Sinewave 10kΩ//10pF	Vpk-pk ≥0.8V	-	-	-	CFP0-23

Frequency Stability Available Over Operating Temperature Ranges

Onereting Temperature	Frequency Stability Vs Operating Temperature Range					
Operating Temperature Ranges	±0.025ppm	±0.05ppm	±0.1ppm	±0.2ppm		
-20 to 70°C	Code PS*	Code RS	Code SS	Code MS		
-40 to 85°C	-	Code RX	Code SX	Code MX		
Ordering Example Frequency Model No. Frequency Stability Vs Operati Frequency Adjustment RoHS Compliance	ng Temperature Code	14.4MHz CFPO-20 S)	C A LF			
Note: * Codes may not be avai	lable for all frequencies					

Minimum Order Information Required

■ Frequency + Model Number + Frequency Stability vs Operating Temperature Range Code + Frequency Adjustment Code + RoHS Compliance Code

OR

■ Discrete Part Number (suffix 'LF' signifies RoHS compliance)

Custom Specification

Non-standard requirements like high drive ACMOS output, low harmonic sinewave output, 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

Europe Tel: +44 (0)1460 270200 Fax: +44 (0)1460 72578 Americas Tel: +1 919 941 9333 Fax: +1 919 941 9371 Asia Tel: +86 755 8826 5991 Fax: +86 755 8826 5990