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 10kΩ // 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)

Ageing
- ±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

A Ageing adjustment by means of external Voltage Control applied to pad 1 (standard option)
- Range (frequency ≤ 20MHz) ≥ ±5ppm
- Range (frequency > 20MHz) ≥ ±7ppm
- Linearity ≤ 0.5%
- Slope Positive
- Input Resistance ≥ 100kΩ
- Modulation Bandwidth ≥ 2kHz
- Standard control voltage range 1.5V±1V

B Ageing adjustment by means of an external 100kΩ potentiometer connected as a variable resistor from pad 1 to ground.
- Range (frequency ≤ 20MHz) ≥ ±5ppm
- Range (frequency > 20MHz) ≥ ±7ppm

C No frequency adjustment
- Initial calibration ≤ ±0.5ppm

Storage Temperature Range
- -55 to 125°C

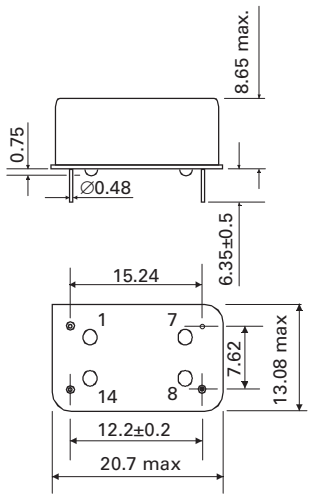
Environmental Specification
- Vibration: IEC 60068-2-6, test Fc: 10-60Hz 0.75mm displacement, 60-2000Hz 100m/s^2 (10gn) acceleration, 4 hours in each of three mutually perpendicular axes at 1 octave per minute.
- Mechanical Shock: IEC 60068-2-27, test Ea; 1000m/s^2 (100gn) acceleration for 6ms duration, 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

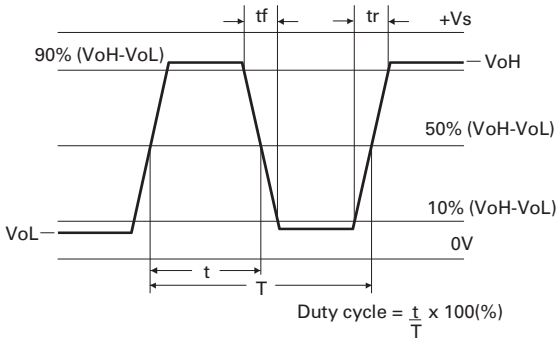
Europe Tel: +44 (0)1460 270200 Fax: +44 (0)1460 72578
Americas Tel: +1 919 941 9333 Fax: +1 919 941 9371
Asia Tel: +86 755 8826 5991 Fax: +86 755 8826 5990
Website: www.cmac.com

Outline in mm.

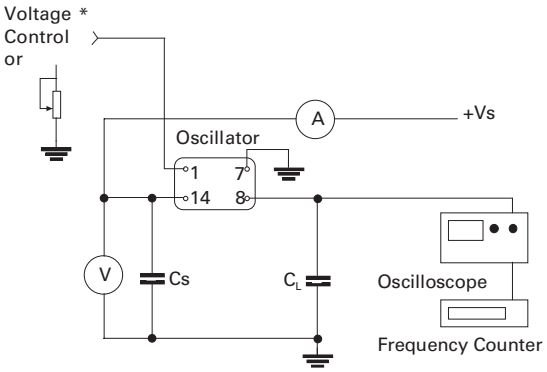


Pin Function
1. Frequency Adjust (leave unconnected in case the 'no frequency adjust' option has been ordered)
7. GND
8. Output
14. +Vs

Output Waveform - HCMOS



Test Circuit



C_L = Load 15pF (HCMOS or 10kΩ // 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

OCXOs

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)

Frequency	Frequency offset from carrier				
	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%	CFPO-20
1.25 to 33.0MHz	5.0V±10%	Square HCMOS 15pF	VoH ≥90% Vs VoL ≤ 10% Vs	8ns	8ns	45/55%	CFPO-21
10.0 to 33.0MHz	3.3V±5%	Clipped Sinewave 10kΩ//10pF	Vpk-pk ≥0.8V	-	-	-	CFPO-22
10.0 to 33MHz	5.0V±10%	Clipped Sinewave 10kΩ//10pF	Vpk-pk ≥0.8V	-	-	-	CFPO-23

Frequency Stability Available Over Operating Temperature Ranges

Operating Temperature Ranges	Frequency Stability Vs Operating Temperature Range			
	±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 **14.4MHz CFPO-20 SX A LF**

Frequency
Model No.
Frequency Stability Vs Operating Temperature Code
Frequency Adjustment
RoHS Compliance

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 + 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
Website: www.cmac.com