CFPODO

A series of single-oven OCXOs with double-oven stability.

The CFPODO series are a range of super single oven OCXOs designed as a compact and smart frequency source /time keeping reference for all synchronization systems, including global positioning system (GPS) bases equipment.

Product description

The CFPODO series of oscillators are designed with 2 circuits: 1 circuit with the crystal enclosed in a hermetic oven and 1 circuit with the amplifier stage. This structure enables a very good stability versus temperature range. These parts are automatically tuned by a digital potentiometer.

Applications

- Basestation
- Communications
- Time & frequency reference
- Broadcasting
- Other

Features

- Hold over better than 7µs over 24 hours

Specifications

1.0 SPECIFICATION REFERENCES

Line	Parameter	Test Condition
1.1	Model description	CFPODO
1.2	RoHS compliant	Yes. Part numbers with suffix 'LF'
1.3	Package sizes available	40.0mm x 30.0mm x 20.0mm (40): CFPO DO4
1.4	Package sizes available	50.8mm x 50.8mm x 25.0mm (50): CFPO DO1
1.5	Package sizes available	51.0mm x 41.0mm x 19.05mm (51B): CFPO DO2 & CFPO DO3
1.6	Package sizes available	50.8mm x 50.8mm x 19.05mm (50LP): CFPO DO2

2.0 FREQUENCY CHARACTERISTICS

Line	Parameter	Test Condition	Value	Unit
2.1	Frequency range	Refer to note 1	5 to 15	MHz
2.2	Frequency calibration	Initial calibration @ 25°C	20 to 50	ppb
2.3	Frequency stability over temperature	See attached diagram (part number builder) for frequency stabilities vs temperature range and associated order codes		±ppb
2.4	Temperature range	(Standard)	-20 to 70	°C
2.5	Supply voltage stability ±5%	See attached diagram (part number builder) for frequency stabilities vs supply voltage and load change and associated order codes		±ppb
2.6	Load sensitivity ±10%	See attached diagram (part number builder) for frequency stabilities vs supply voltage and load change and associated order codes		±ppb
2.7	Long term stability	See attached diagram (part number builder) for long term stability (1 week after operation) and associated order codes		±ppb

3.0 POWER SUPPLY

Line	Parameter	Test Condition	Value	Unit
3.1	Supply voltage	Standard supply voltage (optional: 5V±5% except CFPO DO4)	11.4 to 12.6	V
3.2	Power consumption	DO1: Warm-up	8 max	W
3.3	Power consumption	DO1: 25°C (calm air)	2.5 max	W
3.4	Power consumption	DO2: Warm-up	8 max	W
3.5	Power consumption	DO2: 25°C (calm air)	2.5 max	W
3.6	Power consumption	DO3: Warm-up	8 max	W
3.7	Power consumption	DO3: 25°C (calm air)	2.5 max	W
3.8	Power consumption	DO4: Warm-up	6 max	W
3.9	Power consumption	DO4: 25°C (calm air)	2 max	W
3.10	Warm-up time	±0.01ppm after 10 minutes, with reference to frequency reached after 1 hour of continuous operation at 25°C		

4.0 CONTROL VOLTAGE

Line	Parameter	Test Condition	Value	Unit
4.1	Control voltage range	Min.=0. Max.=Vref		
4.2	Frequency tuning	Monotone and standard positive slope, sufficient to cover 10 years ageing	0.3	ppm
4.3	Slope	(Negative optional). Positive		

5.0 OSCILLATOR OUTPUT-SINEWAVE

Line	Parameter	Test Condition	Value	Unit
5.1	Output waveform	Sinewave into 50Ω load (order code S). Square wave optional	5 to 9	dBm

6.0 PHASE NOISE

Line	Parameter	Test Condition	Value	Unit
6.1	SSB phase noise power density at 1Hz offset	Typical values for a 10MHz oscillator at 25°C	-100	dBc/Hz
6.2	SSB phase noise power density at 10Hz offset	Typical values for a 10MHz oscillator at 25°C	-130	dBc/Hz
6.3	SSB phase noise power density at 100Hz offset	Typical values for a 10MHz oscillator at 25°C	-150	dBc/Hz
6.4	SSB phase noise power density at 1kHz offset	Typical values for a 10MHz oscillator at 25°C	-158	dBc/Hz
6.5	SSB phase noise power density at 10kHz offset	Typical values for a 10MHz oscillator at 25°C	-160	dBc/Hz

7.0 OTHER FEATURES

Line	Parameter	Test Condition	Value	Unit
7.1	Reference voltage, Vref	1. Standard output +8.0V		
7.2	Reference voltage, Vref	2. Optional outputs +5.0V or +6.2V (except Package 40)		
7.3	Reference voltage, Vref	3. If supply voltage is 5V, reference voltage = 4V		
7.4	Retrace	After 24 hours off @ 25°C (typical) and 60 min power on. Typical:	3	±ppb
7.5	Harmonic distortion	Harmonics & sub-harmonics	-35 max	dBc
7.6	Harmonic distortion	Non-harmonics	-80 max	dBc
7.7	Holdover	CFPO DO1 (see holdover diagram for a typical example)	5 max	µs
7.8	Holdover	CFPO DO2 (see holdover diagram for a typical example)	7 max	µs
7.9	Holdover	CFPO DO3 (see holdover diagram for a typical example)	10 max	µs
7.10	Holdover	CFPO DO4 (see holdover diagram for a typical example)	15 max	µs
7.11	Frequency recovery	See frequency recovery diagram. Frequency recovery: Required time for re-stabilisation of the device after storage or powered off period		

8.0 ENVIRONMENTAL INFORMATION

Line	Parameter	Test Condition
8.1	Shock	Half sine 100g 6ms / 3 per direction. IEC 68-2-27 test Ea. / severity 100A (18 shocks total)
8.2	Vibration	Vibration - 10g / 10 - 500Hz, IEC 68-2-06, test Fc. / severity 500 / 10
8.3	Storage temperature	-45°C to 85°C

9.0 MARKING

Line	Parameter	Test Condition
9.1	Type	Printed label on can (see marking diagram)
9.2	Line 1	RAKON or customer logo

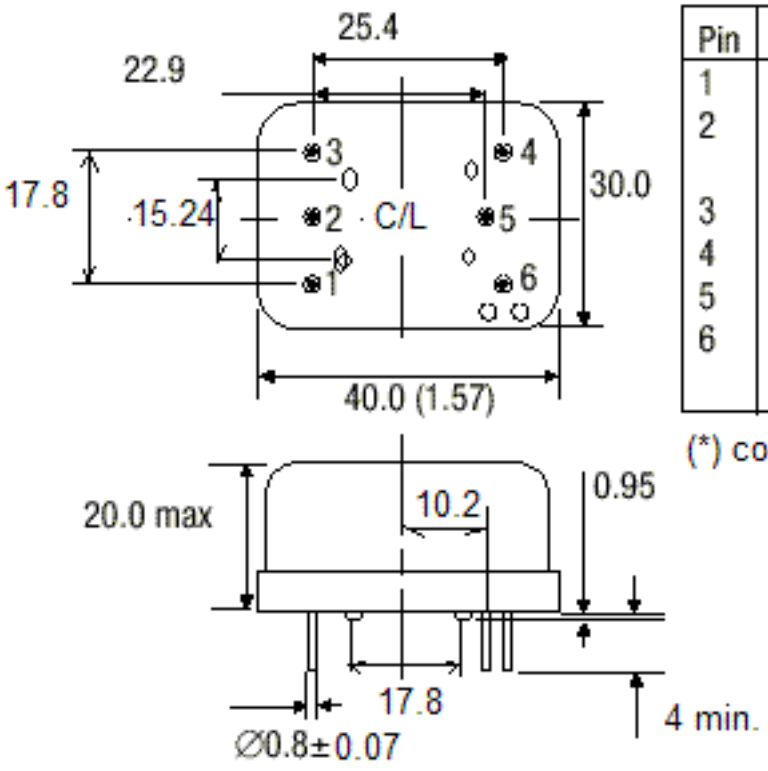
10.0 MANUFACTURING INFORMATION

Line	Parameter	Test Condition
10.1	Reflow shift	No reflow soldering. Hand and wave soldering only
10.2	Packaging description	Parts supplied in carton boxes, protected by foam. 3 parts per box for package 50. 6 parts per box for package 51/51B. 16 parts per box for package 40.

11.0 NOTES

Line	Parameter	Test Condition
11.1	1	Standard frequencies available: 10, 12.8 and 13MHz

Outline in mm (inches) - Package 40

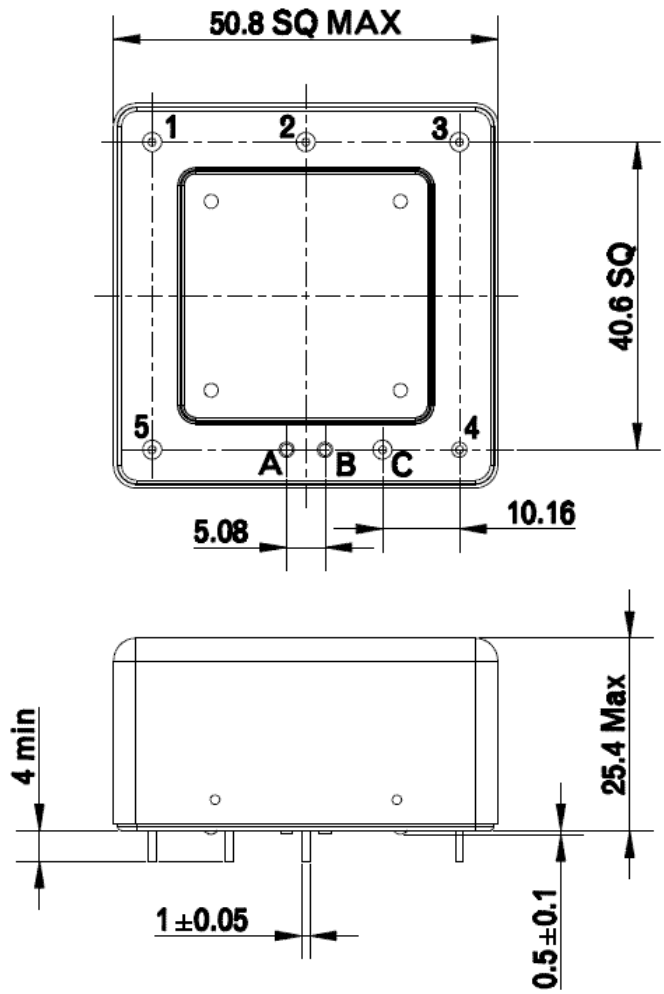


Pin	Function (*)
1	Input frequency control
2	Output reference voltage
3	Input supply (+)
4	Output signal
5	Oven alarm
6	Mechanical ground and (–) supply

(*) corresponding to bottom view

All tolerances ±0.2mm

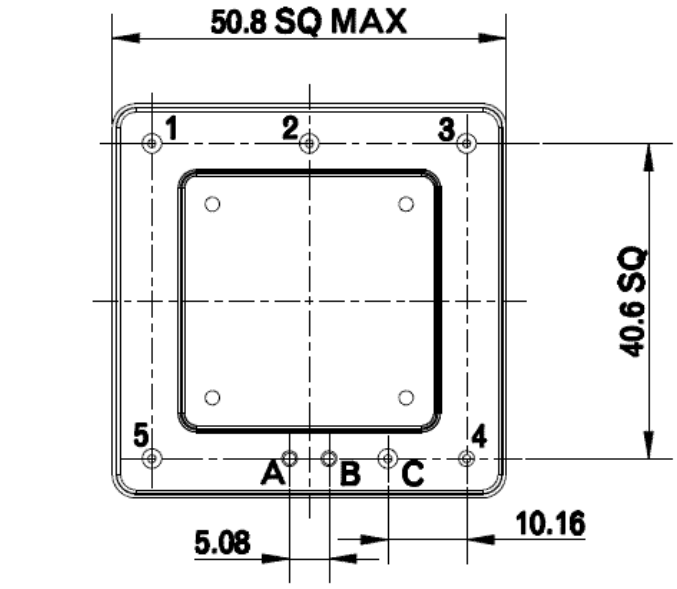
Outline in mm - Package 50



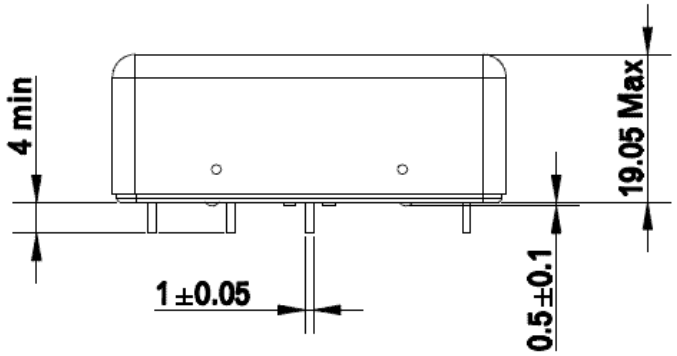
Pin	Function
1	Frequency control input
2	Ref. voltage output
3	Signal output
4	Mechanical GND and supply
5	Supply input
A	For Internal use
B	For Internal use
C	For Internal use

All tolerance : ±0.2 mm

Outline in mm - Package 50 Low Profile

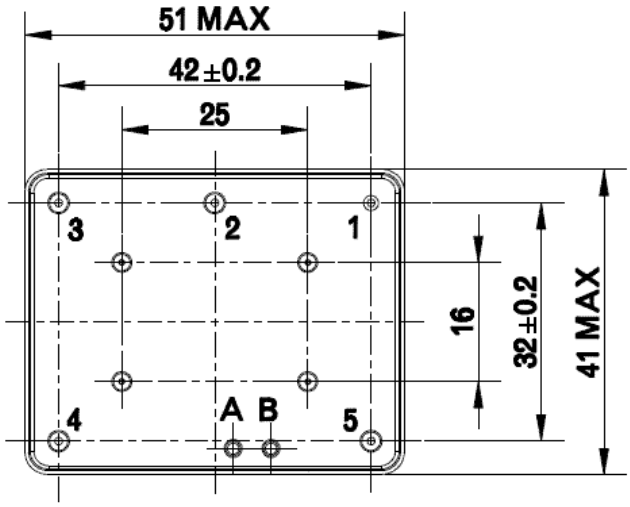


Pin	Function
1	Frequency control input
2	Ref. voltage output
3	Signal output
4	Mechanical GND and supply
5	Supply input
A	For Internal use
B	For Internal use
C	For Internal use

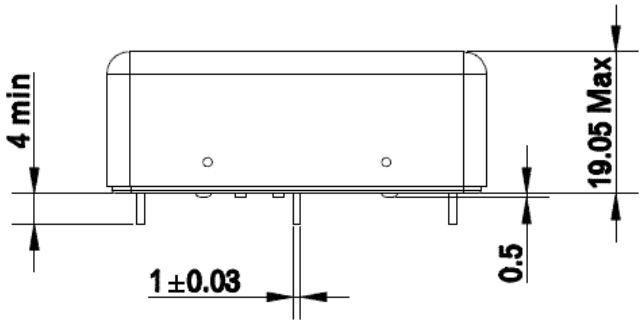


All tolerance : ±0.2 mm

Outline in mm - Package 51B



Pin	Function
1	Mechanical GND and supply
2	Frequency control input
3	Ref. voltage output
4	Supply input
5	Signal output
A	For Internal use
B	For Internal use



All tolerance : ±0.2 mm

CFPO DO MARKING	
Line 1: RAKON or Customer's logo Line 2: RAKON or Customer's part number Line 3: Nominal Frequency (F0) in MHz Line 4: Serial number (1 letter & 5 numbers) Line 5: Date Code (4 digits for year and week)	RAKON CFPO-D02 51B S12 Fo: 10 MHz S/N: A12345 DC: 0918

Operating temperature range	Stability within temperature range pk to pk	Long term stability (after 1 week operation)				Holdover performance (24 Hours)	Frequency stability Vs supply voltage Change (± 5%) and Load Change (50Ω ±10%)	Standard package Type	Model Number	Supply options
		Per day	Per Month	Per Year	Over 10 Years					
-20°C to 70°C	≤ 1 E-10	≤ ± 5 E-11	≤ ± 1.5 E-9	≤ ± 1.2 E-8	≤ ± 6 E-8	< 5µs	≤ ± 5 E-11	50	CFPO-DO1	5V / 12V
	≤ 2 E-10	≤ ± 7 E-11	≤ ± 2 E-9	≤ ± 1.5 E-8	≤ ± 7.5 E-8	< 7µs	≤ ± 1 E-10	50 LP / 51B	CFPO-DO2	5V / 12V
	≤ 5 E-10	≤ ± 1 E-10	≤ ± 3 E-9	≤ ± 2 E-8	≤ ± 1 E-7	< 10µs	≤ ± 1 E-10	51B	CFPO-DO3	5V / 12V
	≤ 1 E-9	≤± 2 E-10	≤ ± 5 E-9	≤ ± 2 E-8	≤ ± 3 E-7	< 15µs	≤ 5 E-10	40	CFPO-DO4	12 V

Ordering Example **CFPO-DO-1** **50** **S** **12** **8.0** **10.0MHz**

Model number

Package outline(50,50LP,51B,40)

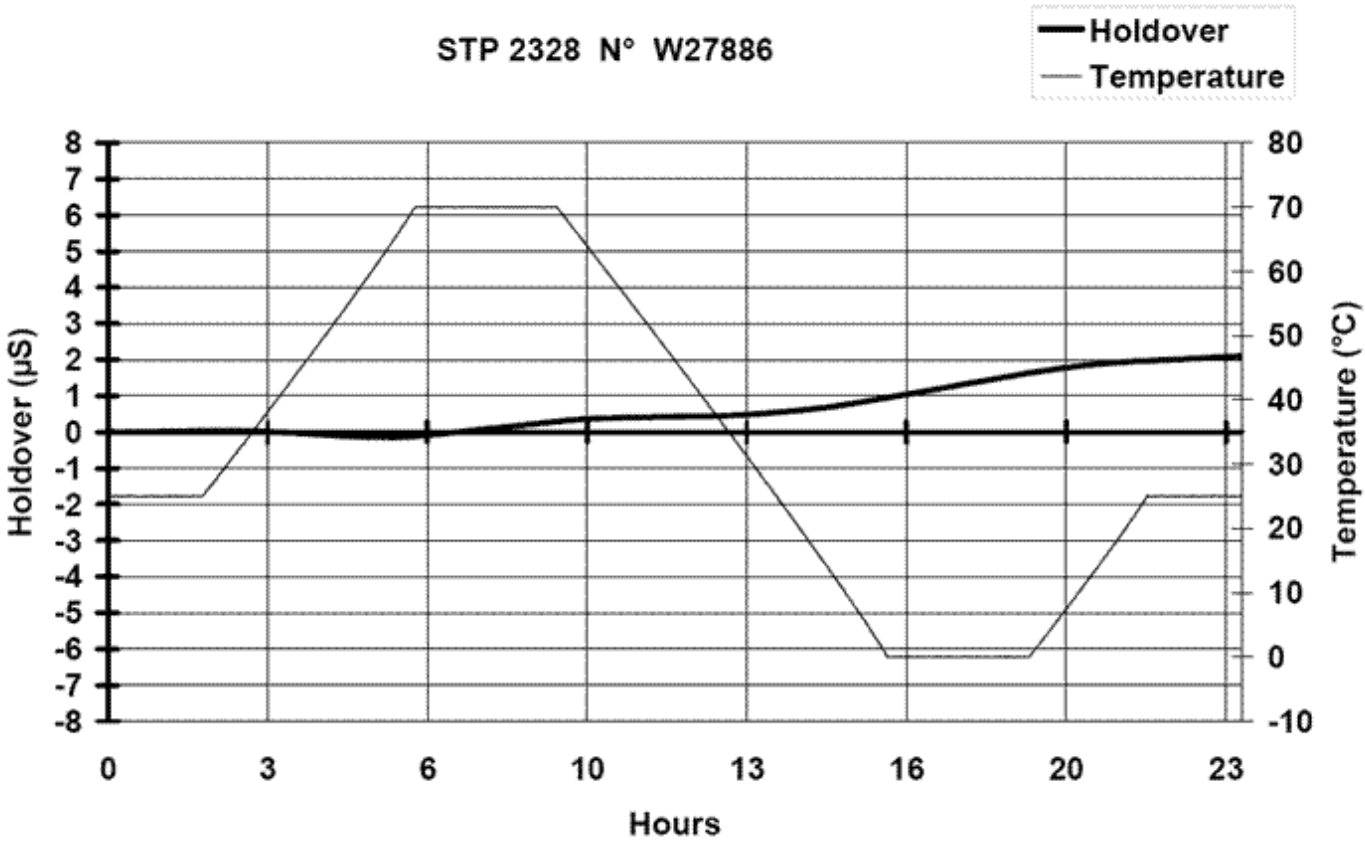
Output signal (S)Sine is standard (C) (HCMOS optional)

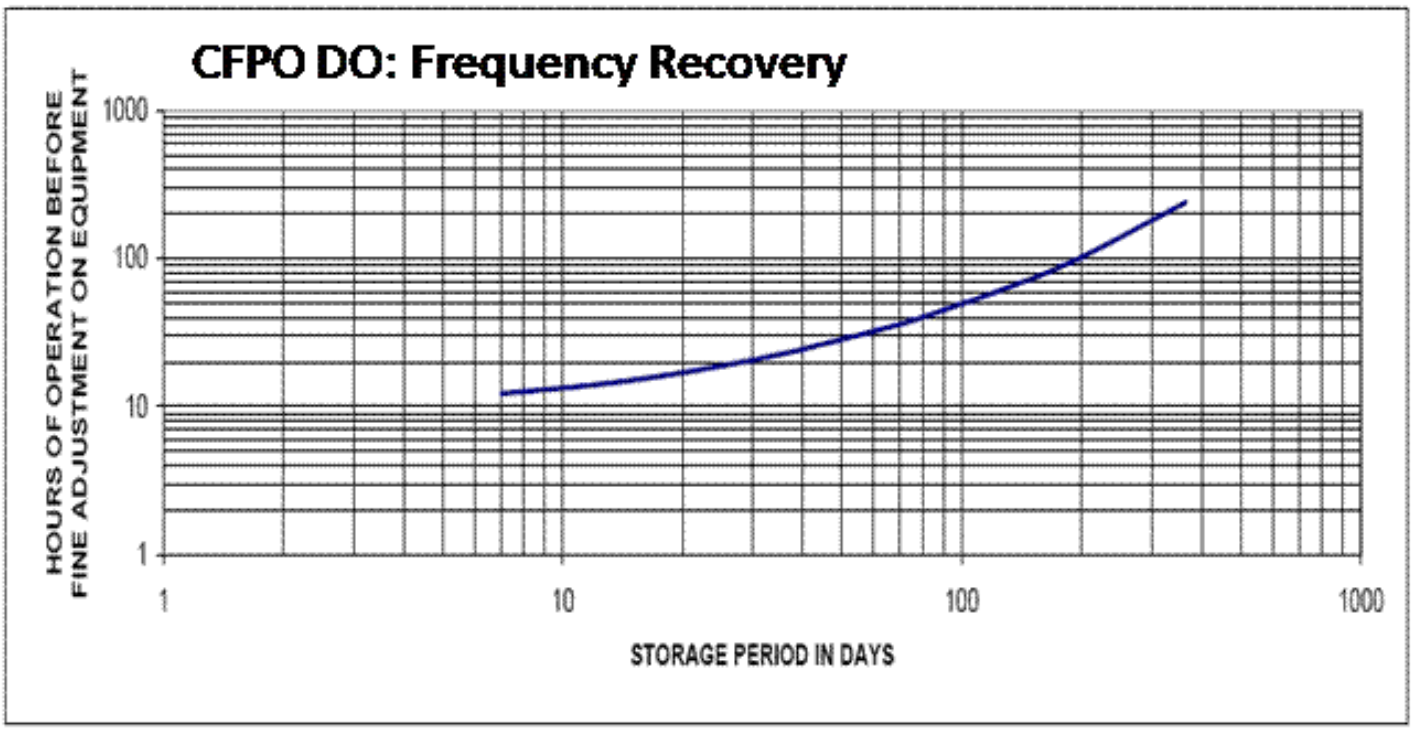
Supply Voltage (12) (12V is standard)

Reference Voltage (8.0V standard, 4V if Supply = 5V, optional = 5V or 6.2V with package 50 & 51B
No reference for all models = N)

Frequency (MHz)

CFPO DO: Example of typical holdover




CFPO DO: Frequency Recovery
HOURS OF OPERATION BEFORE FINE ADJUSTMENT ON EQUIPMENT
1000
100
10
1
1
10
100
1000
STORAGE PERIOD IN DAYS