Description

The CC-FRQC is a frequency counter module that has a control interface via the CalBench control centre. It is a high quality 6 GHz counter that offers period measurement, frequency ratio, pulse width and event counting. It uses an advanced reciprocal frequency counting technique to achieve high resolution at all frequencies. A DC coupled input enables VLF measurements to be made (down to 1 mHz).

The timebase uses a high quality TCXO crystal with a very low ageing rate. An external reference can also be used. Measurement times can be set between 0.3 seconds and 10 seconds.

Pulse width measurements can be made from rising to falling or falling to rising edge with adjustable thresholds. A variable attenuator is incorporated the input impedance is switchable between 1 MΩ and 50 Ω.

The counter is operated via a dedicated software application on the CalBench control centre module. The functions and settings are easily selectable and provide an intuitive mode of operation.

Features

High measurement accuracy:

The CC-FRQC uses a high quality temperature compensated internal frequency reference (TCXO) which has a low aging rate and is stable to within ± 1 ppm over the full temperature range. Its short warm-up time allows accurate measurements. An external reference input is provided and changeover from the internal timebase is automatic when an external reference standard is connected.

High resolution:

For frequency, period and frequency ratio functions the module uses a reciprocal counting technique to provide high resolution at all frequencies. Eight significant digits of answer are produced in a 1 second measurement time, nine digits in 10 s and ten digits in 100 s with a granularity of less than 2 counts in the least significant digit.

Features

- 0.001 Hz to 6000 MHz frequency range
- TCXO timebase - better than 1 ppm stability
- Frequency, period, and pulse width modes
- Frequency ratio and event counter modes
- Reciprocal counting measurements
- High performance temperature compensated timebase
- High impedance measurement up to 125 MHz
- Low pass filter, attenuator and trigger level control
- AC/DC coupling, 1 MΩ / 50 Ω selection, polarity invert
- CalBench control centre software interface

Flexible signal conditioning:

Input A has configurable coupling (AC or DC), input impedance (1 MΩ or 50 Ω), attenuation (1:1 or 5:1), threshold (fully variable) and active edge, and can be used for frequencies in the range 0.001 Hz to >125 MHz. Input B is a nominal 50Ω input for frequencies in the range 80 MHz to > 3 GHz. Input C uses a standard N connector and has a nominal 50 Ω input for frequencies in the range 1.8 GHz to > 6 GHz.

Multiple measurement functions:

The CC-FRQC can measure frequency, period, pulse width, duty cycle and frequency ratio, as well as event counting (totalise).

Technical Specifications

Input Specifications

Input A

Input Coupling ....AC or DC

Input Impedance ....1 MΩ//25 pF (DC or AC coupled), or 50 Ω (AC coupled only)

Attenuation ....1:1 or 5:1

Active Edge ....Rising or falling, or width high or low

Low Pass Filter ....50 kHz cut-off, or None

Frequency Range.........0.001 Hz to > 125 MHz (1 MΩ, DC coupled)

< 30 Hz to > 125MHz (1 MΩ, AC coupled)

< 500 kHz to > 125MHz (50 Ω, AC coupled).

Sensitivity ....Sinewave - 15 mV rms 30 Hz to 100 MHz, 25 mV to 125 MHz at optimum threshold adjustment.

Signal Range................1 MΩ, DC - 0 to 3.3V (1:1) or 1 to 12 V (5:1),

1 MΩ, AC to 1 V rms (3 V pp) (1:1) or to 4 V rms (12 V pp) (5:1)

50 Ω, AC - up to 1V rms above 300 kHz

Trigger Threshold ....DC coupled - 0 to 2 V (1:1) or 0 to 10 V (5:1)

AC coupled - Average ± 200 mV (1:1) or ± 1 V (5:1)

Input B

Input Impedance ....50 Ω (AC coupled)

Frequency Range.........< 80 MHz to > 3000 MHz

Sensitivity.....................Sinewave - 12 mV rms 80 MHz - 2 GHz, 25 mV to 2.5 GHz, 50 mV rms to 3 GHz

Signal Range................< 0 dBm recommended, + 13 dBm (1 V rms) maximum

Input C

Input Impedance ....50 Ω nominal (AC coupled) in-band. 250 kΩ at DC.

Frequency Range.........2 GHz to >6 GHz (typically 1.8 GHz to 7.5 GHz).

Sensitivity.....................25 mVrms (–19 dBm) 2 GHz to 6 GHz.

Signal Range................< 0 dBm recommended, + 13 dBm (1 V rms) maximum

External Reference

Input Impedance ....> 100 kΩ, AC coupled

Frequency ....10 MHz

Signal Level ....TTL, 3 V pp to 5 V pp CMOS or 1 to 2 V rms sinewave

Maximum Input Voltage

Input A, B, C & Ext Ref ...30 V DC; 30 V rms 50/60 Hz reducing to 1 V rms > 1 MHz

Note that the inputs will not be damaged if subjected to an accidental short-term connection to a 50/60 Hz line voltage not exceeding 250 Vrms, or 250 V DC.

Time Base

Measurement Clock .....50 MHz

Internal Reference ....10 MHz TCXO with electronic calibration adjustment (> ± 8 ppm)

Temperature Stability ....Better than ± 1 ppm over rated temperature range

Initial Error...< ± 0.2 ppm at 25 °C

Ageing Rate...< ± 1ppm/year

Measurement Specifications

Frequency

A Input Range ....0.001 Hz (DC coupled) to > 125 MHz

B Input Range ....80 MHz to >3000 MHz

C Input Range ....2 GHz to >6 GHz

Resolution ....up to 10 digits or 0.001 Hz

Period

A Input Range ....8 ns to 100 s (DC coupled)

B Input Range ....0.333 ns to 12.5 ns

C Input Range ....0.166 ns to 0.5 ns

Resolution ....up to 10 digits

Pulse Width Mode (Input A only)

Functions....................Width high, width low, ratio H:L (high time to low time) and duty cycle

Pulse Width Range.....40 ns to 1000 s

Averaging.....................Automatic within measurement time selected, up to 50 pulses

Resolution ....20 ns for one pulse; up to 1 ns or 10 digits with multiple and pulse averaging 0.01 % for Ratio H:L and Duty Cycle.

Total Count (Input A only)

Count Range ....1 to 9 999 999 999

Minimum Width ....8 ns

Frequency Ratio B:A

Resolution ....Equal to the resolution of the two frequency measurements, If the ratio exceeds 10 digits, 6 digits and the exponent are displayed.

Measurement Time

Selectable as 100 s, 10 s, 1 s or 0.3 s. The instrument displays the average value of the input signal over the measurement time selected, updated every 2 s, 1 s, 0.5 s or 0.3 s respectively. The hardware captures the count values & continues measuring without any dead time.

Resolution

The displayed resolution depends upon measurement time and input frequency. The basic resolution of period is 8 digits for every 2 seconds of measurement time. Frequency resolution is the reciprocal of period resolution. Usable resolution can be reduced by noise at low frequencies.

Accuracy

Measurement accuracy is timebase accuracy + measurement resolution + 2 counts.

General Specifications

Operating Range..........+5 °C to +40 °C, 20 % to 80 % RH

Display..........................Via software application on CalBench control centre

Module Width ....50 mm (primary console fitting only)

Note: Calbench control centre ordered separately (included with 8060 or 7051).

Ordering Information

CC-FRQC .... 6 GHz Universal Frequency Counter Module

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Due to continuous development Time Electronics reserves the right to change specifications without prior notice.