



Description

The 7027 and 7027A are high quality 3 GHz and 6 GHz universal frequency counter modules that offer period measurement, frequency ratio, pulse width and event counting. Each module 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. The large 10 digit LCD display has a full set of annunciators. 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.

Features

High measurement accuracy:

The 7027 and 7027A use 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 modules use 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.

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 (7027A only) uses a standard N connector and has a nominal 50 Ω input for frequencies in the range 1.8 GHz to > 6 GHz.

Features

- 0.001 Hz to 3000 MHz (7027) / 6000 MHz (7027A)
- TCXO timebase - better than 1 ppm stability
- Frequency, period, & pulse width modes
- Frequency ratio & event counter modes
- Reciprocal counting measurements
- High impedance measurement up to 125 MHz
- Low pass filter, attenuator & trigger level control
- AC/DC coupling, 1 MΩ / 50 Ω selection, polarity invert
- Large 10 digit LCD display with annunciators
- Remote control and readback capabilities

Multiple measurement functions:

The 7027 and 7027A can measure frequency, period, pulse width, duty cycle and frequency ratio, as well as event counting (totalise).

Remote control and read-back via USB:

Both modules incorporate a USB interface which allows it to be remotely controlled using RS-232 protocol via a computer's USB port. Connection is internal if the CalBench features a control centre module.

Ten digit LCD:

Both modules feature a high contrast display has ten 12.5 mm (0.5 ") high digits along with a comprehensive set of annunciators. These show input configuration and function, measurement time and status, external reference connection, low battery and the units of the measurement which may be Hz, kHz, MHz, ns, us, ms or s.



Technical Specifications

Input Specifications

Input A

Input Coupling.....AC or DC

Input Impedance.....1 M Ω /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 M Ω , DC coupled)
< 30 Hz to > 125MHz (1 M Ω , 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 M Ω , DC - 0 to 3.3V (1:1) or 1 to 12 V (5:1),
1 M Ω , 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 \pm 200 mV (1:1) or \pm 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 (7027A only)

Input Impedance.....50 Ω (AC coupled)

Frequency Range.....< 1800 MHz to > 6000 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

External Reference

Input Impedance.....> 100 k Ω , 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 & Input B.....30 V dc; 30 V rms 50/60 Hz reducing to 1 V rms above 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 V rms.

Operating Facilities

Noise Filter

The Filter key controls a low pass filter, with a cut-off frequency of about 50kHz, to ensure more stable readings at low frequencies.

Hold

Pressing the Hold key will stop further measurements being made and the current measured value will remain in the display, with the Hold indicator on, until the Hold key is pressed again. A long press on the Hold key clears old data and restarts the measurement.

Signal Activity Indication

Dual bi-colour LEDs show signal activity and indicate whether a DC coupled signal is above or below the trigger threshold.

Measurement Specifications

Frequency

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

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

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

Period

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

B Input Range.....333 ps to 12.5 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.

Time Base

Measurement Clock.....50 MHz

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

Temperature Stability.....Better than \pm 1 ppm over rated temperature range

Initial Error.....< \pm 0.2 ppm at 25 $^{\circ}$ C

Ageing Rate.....< \pm 1 ppm/year

General Specifications

Operating Range.....+5 $^{\circ}$ C to +40 $^{\circ}$ C, 20 % to 80 % RH

Display.....10 digits

Interface.....1 x USB, internal connection to control centre (if ordered)

Module Width.....295 mm (primary console fitting only)

Ordering Information

7027.....3 GHz Universal Frequency Counter Module

7027A.....6 GHz Universal Frequency Counter Module