DC 504A

The easy-to-use DC 504A Counter/Timer measures frequency from dc to 100 MHz, with an internal prescaler being used for frequencies above 10 MHz. Both direct and prescaled counting are done through the same input connector; no need to change connectors when changing frequency range. Autoranging permits virtual hands-off operation for most measurements. The 100X resolution multiplier automatically provides 0.01 Hz resolution in one second or 0.001 Hz resolution in ten seconds on signals from 10 Hz to 25 kHz.

The DC 504A features period and width averaging of up to 1000 events. Selectable dc coupling of the input eliminates the potential errors associated with making width measurements on signals of varying duty cycle with counters that are only ac coupled. Input trigger sensitivity is 30 mV RMS across the entire 100 MHz frequency range. The trigger-level range of ±2 V and the selectable 5X attenuator provide a triggering range of up to ±10 volts.

The totalize mode permits totalizing up to 999,999 events – and beyond, with overflow – with a Display Update-Run/Hold control to hold the display while the internal counter continues to advance.

CHARACTERISTICS

Display – Six-digit LED readout with automatic decimal-point positioning and leading-zero suppression. LED annunciators indicate gate open, resolution multiplier lock, and display overflow.

INPUT

Frequency Range – Front Panel: DC coupled to 100 MHz. AC coupled is 10 Hz to 100 MHz. Rear Interface: DC coupled is 0 to 50 MHz. AC coupled is 10 Hz to 50 MHz.

Sensitivity – 1X Attenuation: 30 mV RMS sinewave to 100 MHz; 85 mV p-p (at a minimum pulse width at 5 ns). 5X attenuation accuracy is within 2% at dc.

Attenuation – Selectable 1X, 5X.

Impedance – Front Panel, 1X, 5X: 1 M Ω, paralleled by ≈25 pF. Rear Interface, 1X, 5X: 50 Ω ±10% at dc.

Dynamic Range – 1X: 2.0 V p-p signal within a ±2 V dc window. 5X: 10 V peak, ±10 V dc.

Trigger Level Range – ±2.0 V x attenuation minimum.

Maximum Input Voltage – Front Panel: 1X is 200 V peak; 400 V p-p from dc to 50 kHz, derate to 15 V p-p from 1.33 to 100 MHz. 5X is 200 V peak; 400 V p-p from dc to 5 MHz, derate to 20 V p-p at 100 MHz. Rear Interface: ≤ 4 V peak.

FREQUENCY TO 100 MHz

Gate Time (Resolution) – 10 ms to 10 s (1 kHz to 1 Hz), selectable in decade steps; or autoranging (10 ms to 1 s only).

Accuracy – ±1 Count ± Time Base Error x Freq.

Prescale Factor – ÷10.

PERIOD AVERAGE

Range – DC Coupled: 0 Hz to 2.5 MHz. AC Coupled: 10 Hz to 2.5 MHz.

Resolution – 100 to 0.1 ns, in decade steps; or autoranging (100 to 1 ns only).

Events Averaged (N) – 10^0 to 10^3, in decade steps; or autoranging (10^0 to 10^2 only).

Accuracy –

$$\frac{\pm 100\ ns}{N} \pm \text{Time Base Error x Period}$$

$$\pm 1.4 \times \left(\frac{\text{Trigger Jitter Error}}{N} \right)$$

WIDTH AVERAGE

Range – DC Coupled: 200 ns to <10 sec. AC Coupled: 200 ns to 100 ms

Resolution – 100 ns / $\sqrt{N}$

Events Averaged (N) – 10^0 to 10^3, selectable in decade steps; or autoranging (10^0 to 10^2 only).

Accuracy –

$$\frac{100\ ns}{\sqrt{N}} \pm \text{Time Base Error x Width}$$

$$\pm \frac{\text{Start Trigger Jitter Error}}{\sqrt{N}} \pm \frac{\text{Stop Trigger Jitter Error}}{\sqrt{N}}$$

+ (Stop Slew Rate Error – Start Slew Rate Error) ± 10 ns.

TOTALIZE

Frequency Range – DC Coupled: > 0 Hz to 10 MHz. AC Coupled: 10 Hz to 10 MHz. Overflows above 999,999. Display update Run/Hold will hold display while counter continues to advance. Releasing Run/Hold will update display to new value.

TIME BASE

Frequency (At Calibration) – 10 MHz ±1 x 10^{-7}

Temperature Stability – ±5x10^{-6} (±5 ppm), 0 to + 50°C.

Adjustment Resolution – ±5x10^{-8}

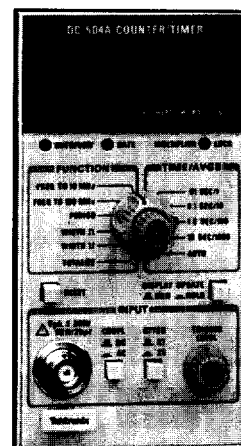**Aging Rate** – ≤1x10^{-6}/year (≤1 ppm/year).

External Time Base Input – 10 MHz.

RESOLUTION AND ACCURACY DEFINITIONS

Same as DC 503A except DC 504A has 100 MHz bandwidth and input hysteresis =30 mV p-p typical.

DC 504A
Counter/Timer

- *DC to 100 MHz*
- *Period and Period Averaging*
- *Width and Width Averaging*
- *Autoranging*
- *100X Resolution Multiplier*