Model 3820
Universal Counter

FEATURES

- ◆ **Measures Frequency, Period, Duty Cycle, Pulse High/Low Time, Logic Level**

- ◆ **Counts periodic or random pulses**

- ● **Complete with software that acquires, displays, and saves data under Win98/ 2000/XP**

- ● **USB interface for power and control**

- ● **ActiveX control for use with LabVIEW, C++, Visual Basic and VBA**

APPLICATIONS

- ◆ **Photon Counting**

- ◆ **Electronics R&D**

- ◆ **Logic testing**

- ◆ **Frequency monitoring**

DESCRIPTION

The Model 3820 Universal Counter is a compact and cost effective tool for characterizing analog and digital pulses of a periodic or random nature. It measures frequency, period, duty cycle, pulse high and low times, event counts and logic level all as a function of elapsed time.

The counter is principally intended for counting bi-level signals, which have two distinct voltage levels and clean transitions between them. Such signals include those generated by all common logic families used in electronic circuits, as well as most Trigger or Sync outputs of common test instruments. Measurements are updated at one of five user selectable intervals in the range 5 ms to 100 ms. the module is powered and controlled directly from the PC's USB port, so requires no additional power source. Operation is entirely via software, with no manual switches or settings.

Two inputs are provided, each connected to a separate discriminator with adjustable threshold in the range –0.2 V to +0.5 V (–2.0 V to +5.0 V when used with a x10 probe). Following the discriminators, a multiplexer selects one of the signals for processing, allowing two different signals to be measured sequentially.

The supplied instrument control software consists of two layers. At the upper level, a simple Windows dialog application, "SR3820Counter", offers a convenient panel that allows the input (A, B or one of three internal test sources) to be selected, an update rate to be specified and all eight output measurements to be displayed. A further display area shows one of the measurements in a larger font size, as well as displaying a graphical trendline display.
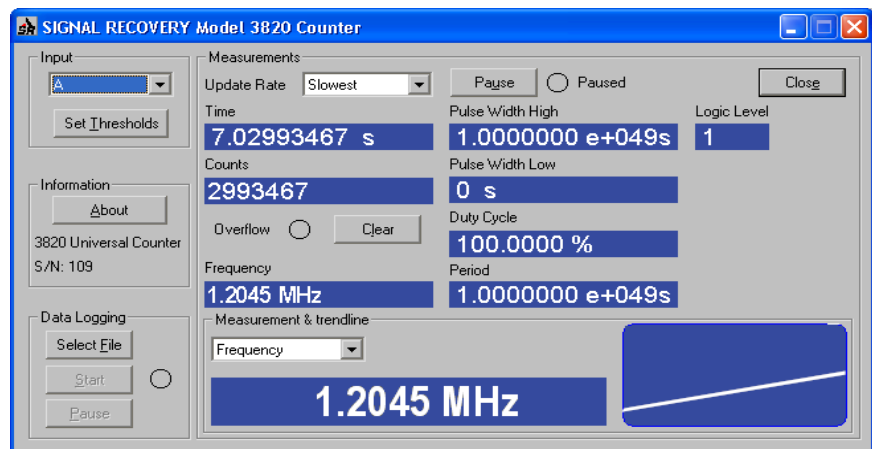
3820 Control/Display Software
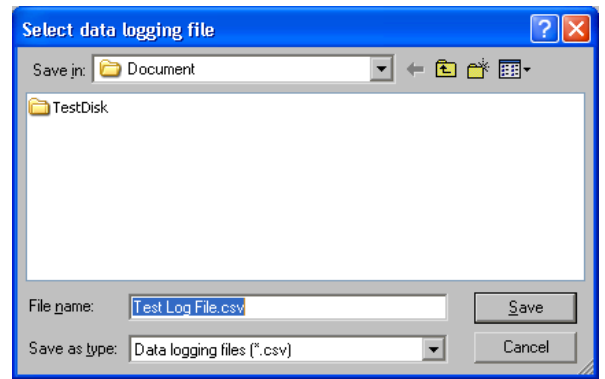
Universal Counter

The program also supports data logging to text file of the output measurements, with data being written directly in CSV (comma separated value) format for easy import to other programs. The software includes a sub menu where the voltage input thresholds can be set for the two inputs.

At the lower level, a dedicated ActiveX control known as "SR3820Comms" takes care of all communications to and from the instrument. Two main modes of operation are therefore possible. Users who simply want to operate the counter "out of the box" need do no more than plug it in, install the driver and software, and then use the SR3820 Universal Counter software to control it. Alternatively, when the counter is to be used as part of a computer controlled test system, then the user can develop software to control it via the SR3820Comms ActiveX control. The control eliminates the need for users to write the low-level code needed to send commands to and receive responses from the counter, allowing them to concentrate on developing the higher level program to run their experiments. Typical applications include:

◆ Photon counting

◆ Frequency measurement

◆ Test and measurement systems implement in LabVIEW where a **SIGNAL RECOVERY** 3820 counter can be used at the same time as instruments from different suppliers.

◆ Measurement system using scripted web pages (HTML files) operated via Internet Explorer.

The SR3820Comms control can of course also be used at the same time as other **SIGNAL RECOVERY** software ActiveX controls, such as SR3830Comms, allowing sophisticated systems to be assembled. For example, five APD's (avalanche photodiodes) could each be connected to the inputs of a model 3830 multiplexer, with the output being in turn connected to the A input of a model 3820 counter. Using both controls a user-developed application program could sequentially count the pulses being generated by each APD.
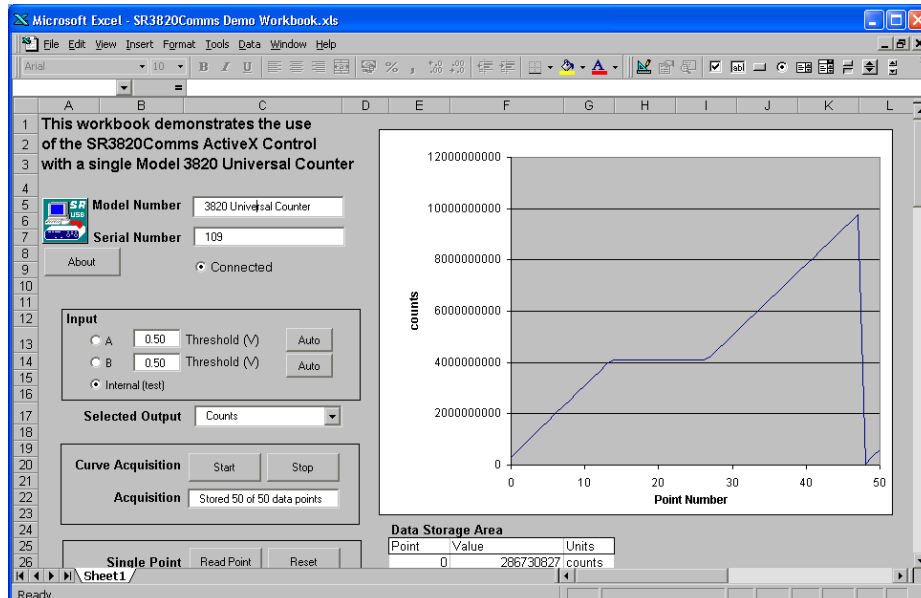
Both the top level SR3820 Universal Counter software and the lower-level SR3820Comms ActiveX control include comprehensive on-screen help files, while examples of how to use the control in LabVIEW, Visual Basic, VBScript, Visual C++ and Excel are also supplied.

Log Measured Data to File
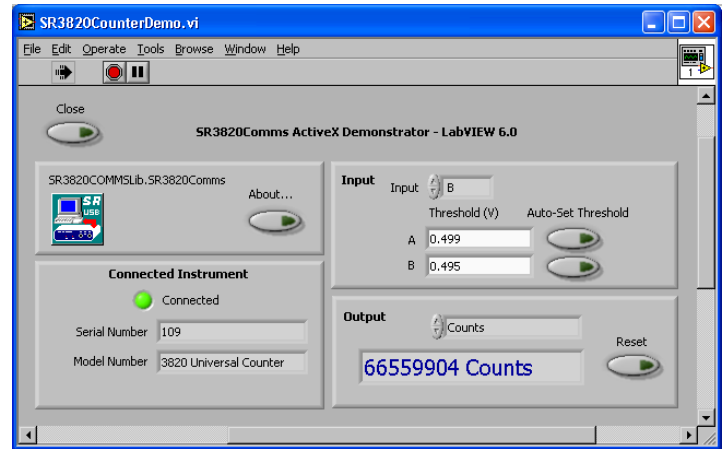
LabVIEW Driver

Sample Excel Workbook using SR3820Comms

Specifications

General

Dual input discriminator, single channel counter measuring frequency, period, duty cycle, pulse high and low times, logic level and event counts as a function of time. Power and control via USB and supplied software. ActiveX control included.

Inputs

Impedance	1 MΩ, DC coupled
Threshold	
Direct	-0.2 V to 0.5 V in 1 mV steps
With x10 probe	-2 V to 5 V in 10 mV steps
Polarity	Event counter triggers on rising edge of signal
Sensitivity	
Direct	-15 dBm/50 Ω (23 mV rms) at 100 MHz, -10 dBm/50 Ω (0.7 V rms) at 120 MHz
With x10 probe	1 V pk-pk sinewave at 125 MHz
Absolute max input	≤ 50 V DC

Measurement

Frequency Range	DC to 125 MHz min, 160 MHz typ
Timebase accuracy	≤ 50 ppm, 0 to 50°C
Reporting Intervals	100, 50, 25, 10 and 5 ms
Functions	
Frequency	0 to 125 MHz
Avg Period	≥ 8 ns
Avg Duty Cycle	0 to 100%. Measured by sampling with a 65 MHz clock.
Avg Pulse High or Low Time	≥ 5ns. Computed from Duty Cycle and Frequency
Events	0 to 9,999,999,999 counts
Logic Probe	0 = input voltage below threshold, 1 = input voltage above threshold.

Indicators

USB	Front-panel LED turns on during USB communications
EVENT	Front-panel LED turns on when the input signal is above the threshold

USB Connector	Rear-panel, female USB connector for connection to the PC or a USB hub.

General

Power Requirements	
Voltage	<500 mA @ +5 V DC, supplied via USB
Dimensions	
Width	5½" (134 mm)
Depth	4½" (114 mm)
Height	1¼" (32 mm)
Weight	9.9 oz (280 g)

Software

A CD containing the full applications package for Windows 98/2000/XP allowing threshold and input to be adjusted, and measurements to be displayed and saved is supplied with each unit. SR3820Comms ActiveX control also included for use with compatible programming languages, and examples provided of its use in C++, VisualBasic, VBScript, LabVIEW and Excel. Both top-level and ActiveX software include on-screen help.