General-Purpose Oscilloscopes

The **Protek 6800-Series** Digital Storage Oscilloscopes offer exceptional waveform viewing and measurements in a small, lightweight package. The 6810, 6806, and 6804 are suited for production, field service, research and design labs, applications involving digital circuit test and troubleshooting, and education applications.
Each of these oscilloscopes gives you:

- 100-MHz bandwidth (6810)
  60-MHz bandwidth (6806)
  40-MHz bandwidth (6804)
- 16K/Channel Memory Depth
- 100MS/s Real-time Sample Rate on all Channels
- 10GS/s equivalent Sample Rate
- Automatic setup of the front panel
- Automatic and cursor measurements of frequency, time, and voltage
- Auto Calibration
- Waveform storage
- Save and recall of 5 front-panel setups
- XY-PLOT
- Built-in FFT function
- Dual Language User Interface (English, Chinese)

These oscilloscopes are easy to use with familiar controls and high display update rate, but with none of the viewing problems that are associated with analog oscilloscopes. A Color LCD or a Mono LCD is used for bright and clear display. Storage is as simple as pressing a button. Negative time allows the viewing of events that occur before the trigger event. Cursors and automatic measurements greatly simplify the analysis of these events. You can upgrade this oscilloscope for communication with PC or remote control with the addition of an interface module. The FFT math function is built-in the 6810 oscilloscopes.

Bring your scope and PC together with Ultrascope software. Ultrascope, which runs under Windows, allows easy transfer of scope traces and waveform data to your PC for incorporation into documents or storage, enables remote control with PC through RS-232 or GPIB (IEEE 488) port.

Accessories already included in the package

- Two 1.5 meter, 10:1 probes
- Power cable for country of destination
- This *User Manual*
- Warranty and Registration Form

Options available

- UltraScope Software for Win95/98/NT/2000/XP
- Communications Extension Module (RS-232)
- Communications Extension Module (GPIB&RS-232)
- Accessories Case: (already included in 6810)

Chapter 6: Reference

Appendix A: Specifications

All specifications apply to the 6800 Series Digital Oscilloscopes and a probe with the Attenuation switch set to 10X unless noted otherwise. To meet specifications, two conditions must first be met:

- The instrument must have been operating continuously for twenty minutes within the specified operating temperature.
- You must perform the Self Cal operation, accessible through the Utility menu, if the operating temperature changes by more than 5 ° C.

All specifications are guaranteed unless noted "typical".

Specifications

Acquisition		
Acquisition Modes	Real-Time	Equivalent
Acquisition Rate	100 MS/s	10GS/s
Averages	N acquisition, all channels simultaneously, N is selectable from 2, 4, 8, 16, 32, 64 and 128.	

Inputs	
Input Coupling	AC, DC, GND
Input Impedance, DC Coupling	1MΩ±2%，in parallel with 15pF±3pF
Probe Attenuation Factors	1X, 10X, 100X, 1000X
Maximum input voltage	400V（DC+AC Peak）
Time delay between channel (typical)	150ps

Vertical	
Digitizers	8-bit resolution, each channel sampled simultaneously
VOLTS/DIV Range	2mV/div-5V/div at input BNC
Position Range	±0.5 screen
Analog BandWidth	100MHz (6810), 60MHz (6806), 40MHz (6804)
Single-shot BandWidth	25MHz
Selectable Analog Bandwidth Limit (typical)	20MHz
Lower Frequency Limit (AC)	≤5Hz (at input BNC)
Rise Time at BNC, typical	<3.5ns (6810), <5.8ns (6806), <8.8ns (6804)
DC Gain Accuracy	2mV/div-5mV/div, ±4% (Sample or Average acquisition mode) ≥10mV/div, ±3% (Sample or Average acquisition mode)
DC Measurement Accuracy, Average Acquisition Mode	Average of ≥16 Waveforms with vertical position at zero: ±(4%×reading+0.1div+1mV) at 2mV/div or 5mV/div ±(3%×reading+0.1div+1mV) at settings ≥10mV/div Average of ≥16 Waveforms with vertical position not at zero: ±[3%×(reading+vertical position)+(1% of vertical position)+0.2div] Add 2mV for settings from 2mV/div to 200 mV/div Add 50mV for settings from 500mV/div to 5V/div
Delta Volts Measurement Accuracy (Average Acquisition Mode)	Delta Volts between any two averages of ≥16 waveforms acquired under same setup and ambient conditions: ±(3%×reading + 0.05 div)

Probe	1X position	10X position
Bandwidth	DC to 6 MHz	DC to 100MHz/60MHz/40MHz
Attenuation ratio	1:1	10:1
Compensation Range	10pf-35pf Oscilloscope with 1MΩ input	
Input resistance	1MΩ±2%	10MΩ±2%
Input capacitance	85pf-115pf	14.5pf-17.5pf
Input voltage	150V RMS CAT I or 150V DC CAT I 150V RMS CAT II or 150V DC CAT II 100V RMS CAT III or 100V DC CAT III	300V RMS CAT I or 300V DC CAT I 300V RMS CAT II or 300V DC CAT II 100V RMS CAT III or 100V DC CAT III

- The probe index of different models is following its attached specification.

Horizontal	
Sample Rate Range	10S/s-100MS/s (Real-Time), 10GS/s (Equivalent)
Waveform Interpolation	(Sin x)/x
Record Length	16K samples for each channel (Fast Trigger OFF) 2K samples for each channel (Fast Trigger ON)
SEC/DIV Range	5ns/div-5s/div in 1-2-5 steps UltraZoom to 2.5ns/div
Sample Rate and Delay Time Accuracy	±100ppm over any ≥1ms time interval
Delta Time Measurement Accuracy (Full Bandwidth)	Single-shot: ±(1 sample interval+100ppm×reading+0.6 ns) >16 averages: ±(1 sample interval+100ppm×reading+0.4 ns)

Trigger		
Trigger Sensitivity, (Edge Trigger Type)	DC	CH1, CH2: 1div(DC~10MHz) EXT: 100mV(DC~10MH), 200mV(10MHz~Full) EXT/5: 500mV(DC~100MHz)
	AC	Same as DC at 50Hz and above
	LF REJ	Same as the DC- coupled limits for frequencies above 100 kHz, attenuates signals below 8kHz.
	HF REJ	Same as the DC- coupled limit from DC to 10 kHz, attenuates signals above 150 kHz
Trigger Level Range	Internal	±8 divisions from center of screen
	EXT	±1.6V
	EXT/5	±8V
Trigger Level Accuracy, (typical)	Internal	±(0.3div×Volts/div) (±4 divisions from center of screen)
	EXT	±(6% of setting + 40 mV)
	EXT/5	±(6% of setting + 200 mV)
Set Level to 50%, (typical)	Operates with input signals ≥50 Hz	
Default Settings, Video Trigger	Trigger mode is Auto and Coupling is AC	
Sensitivity, (Video Trigger Type, typical)	Internal	Pk-pk amplitude of 2 divisions
	EXT	400mV
	EXT/5	2V
Signal Formats and Field Rates, Video Trigger Type	Supports NTSC, PAL, and SECAM broadcast systems for any field or any line	

Measurements		
Cursors Measure	Manual	Voltage difference between cursors (ΔV) Time difference between cursors (ΔT) Reciprocal of ΔT in Hertz (1/ΔT)
	Trace	Voltage value for Y-axis waveform Time value for Y-axis waveform
	AutoMeasure	Cursors are visible for Automatic Measurement
AutoMeasure	Vpp, Vmax, Vmin, Vtop, Vbase, Vavg, Vrms, Freq, Period, Rise Time, FallTime, +Width, -Width, Delay1->2 ↓, Delay1->2 ↑	

General Specifications

Display	
Display Type	5.7 in. (145 mm) diagonal liquid crystal
Display Resolution	320 horizontal by 240 vertical pixels
Display Color	VGA color, 256 colors
Display Contrast	Adjustable
Backlight Intensity, typical	60 cd/㎡

Probe Compensator Output	
Output Voltage, typical	5 V into ≥1 MΩ load
Frequency, typical	1KHz, 2KHz, 6KHz

Power	
Source Voltage	100-240 Vrms (± 10%) from 45Hz through 440Hz,CATII
Power Consumption	Less than 50W
Fuse	2 A, T rating, 250 V

Environmental	
Temperature	Operating 10℃~ 40℃
	Nonoperating -20℃~ +60℃
Cooling Method	Convection
Humidity	+40℃ or below: ≤90% relative humidity
	+40℃~ +50℃: ≤60% relative humidity
Altitude	Operating 3,000 m
	Nonoperating 15,000 m

Mechanical		
Size	Height	288 mm
	Width	350 mm
	Depth	145 mm
Weight (approximate)	Nonpackaged	4.5 kg
	Packaged	5.6 kg

Adjustment Interval
The recommended calibration interval is one year