

## Oscilloscope/ Spectrum Analyzer/ Data Recorder

1 GHz analog input bandwidth

## Automated Frequency Response Analyzer

Frequency range: 1 Hz to 150 MHz

## Arbitrary Waveform Generator

10 mHz to 150 MHz output frequency

## Logic Analyzer

200 MHz clock rate

16 channels, 16 X 512K buffer memory

## Pattern Generator

1 mHz to 100 MHz frequency range

16 X 512k pattern length

## Frequency & Phase Meter

Frequency Range: 10 Hz to 1 GHz



- Custom API to control all features
- No external power supply required
- Intuitive application software with an assortment of features

## Introduction

**SF Series** is an 8-in-1 complete USB-powered test instrument. **SF Series** includes an oscilloscope, a frequency response analyzer, a spectrum analyzer, a data recorder, an AWG function generator, a frequency and phase meter, a logic analyzer, and a pattern generator. This compact device has been developed for professionals with a limited budget. Audio and system engineers, and researchers can also benefit from the many features of the instruments. The oscilloscope offers a bandwidth of 1 GHz, and a real sampling rate of up to 250 MHz (125 MHz/channel) with an effective sampling rate of 100 GHz. The frequency response analyzer performs impedance, and both gain and phase analysis for frequencies of up to 150 MHz with a dynamic range of better than 100 dB in the audio range. To achieve its unprecedented performance, the product uses a proprietary narrow band filter as well as an automatic range adjustment algorithm for each measurement. The AWG generates over 25 standard functions with frequencies of up to 150 MHz. Arbitrary wave-forms can also be generated with sampling rates of 1 to 100 MHz and memory depths of 1 to 64K. Its graphical editor makes generation of any signal seamless. The logic analyzer and the pattern generator of **SF Series** feature a complete protocol analyzer, a powerful pattern generator editor, and an intuitive interface.

## Applications

- Power supply gain and phase analysis
- Electronic filter design and test
- Speaker and amplifier test
- Mechanical vibration analysis
- Electro-Mechanical control loop analysis
- Data Acquisition Development

## Technical Specifications Frequency Response Analyzer

Model	SF880	SF650	SF830	SF610
<b>Frequency Range</b>	150MHz	100 MHz	50 MHz	10 MHz
<b>Dynamic Range (Typical)</b>				
< 2 KHz	100 dB	90 dB	80 dB	70 dB
< 5 MHz	95 dB	90 dB	80 dB	70 dB
< 25 MHz	90 dB	85 dB	80 dB	70 dB
< 50 MHz	85 dB	80 dB	70 dB	N.A
< 100 MHz	80 dB	70 dB	N.A	N.A
< 150 MHz	70 dB	N.A.	N.A.	N.A
<b>Gain Accuracy (Typical)</b>				
< 1 KHz	0.02 dB	0.05 dB	0.10 dB	0.25 dB
< 10 KHz	0.05 dB	0.10 dB	0.20 dB	0.50 dB
< 1 MHz	0.20 dB	0.25 dB	0.50 dB	0.50 dB
< 10 MHz	0.25 dB	0.25 dB	1 dB	1.5 dB
< 50 MHz	0.5 dB	1 dB	1.5 dB	N.A.
< 100 MHz	1.0 dB	1.5 dB	N.A.	N.A
< 150 MHz	1.5 dB	N.A.	N.A.	N.A
<b>Phase Accuracy (Typical)</b>				
< 1 KHz	0.02°	0.05°	0.10°	0.25°
< 10 KHz	0.02°	0.05°	0.15°	0.50°
< 1 MHz	0.05°	0.075°	0.25°	0.75°
< 10 MHz	0.075°	0.10°	0.5°	1.00°
< 50 MHz	0.10°	0.15°	0.75°	N.A.
< 100 MHz	0.15°	0.20°	N.A.	N.A
< 150 MHz	0.20°	N.A.	N.A.	N.A
<b>Common Mode Rejection Ratio</b>	> 100 dB	> 90 dB	> 80 dB	> 70 dB
<b>Frequency Source</b>	Internal Generator (Sine-wave)			
<b>Signal Amplitude</b>	0.05 to 6.0 Volts peak-to-peak (Selectable)			
<b>Signal Offset</b>	- 1 Volt to + 1 Volt (Selectable)			
<b>Sweep Type</b>	Linear - Logarithmic			
<b>Sweep Increment</b>	0.01 % to 10 % (Selectable)			
<b>Measurement Resolution</b>	Up to 1 M point DFT (Selectable)			
<b>Integration Time</b>	10 mS to 10 S (Selectable)			

## Technical Specifications

### Oscilloscope/ Spectrum Analyzer/ Data Recorder

Model	SF880	SF650	SF830	SF610
<b>Oscilloscope</b>				
Bandwidth	1 GHz	500 MHz	300 MHz	100 MHz
Rise time	0.5 nS	1.0 nS	2.5 nS	5.0 nS
Input channels	2			
Vertical resolution	8 bits			
DC accuracy	< ±3%			
Input characteristics	1 MΩ in parallel with 5 pF			
Common Mode Rejection Ratio	> 70 dB			
Input type	Single-ended, BNC connector			
Input coupling	Software selectable AC/DC			
<b>Input Ranges (full scale)</b>				
10X probe	±80 mV to ±80 V in 10 ranges			
1X probe	±8 mV to ±8 V in 10 ranges			
<b>Overload protection</b>	±150 V (DC+AC peak)			
<b>Sampling rate (each channel)</b>				
Real / per channel	125 MHz			100 MHz
Effective / per channel	100 GHz			25 GHz
<b>Vertical Sensitivity</b>				
1X probe	2 mV - 2 V / DIV			
10X probe	20 mV - 20 V / DIV			
<b>Buffer memory size</b>				
One channel in use	1024 KB			
Two channels in use	512 KB			
<b>Time Base</b>	1 ns/div to 100 ms/div			5 ns/div to 100 ms/div
<b>Time base (Data Recorder)</b>	500 nS to 365 days with data recorder			
<b>Timing accuracy</b>	50 ppm	100 ppm		200 ppm
<b>Trigger modes</b>	Normal, auto, one shot, single, CH1, CH2			
<b>Trigger threshold</b>				
Internal	Adjustable, ± range setting (variable) 8 bits			
External	1.2 Volts			
<b>Basic triggers</b>	External/ CH1/ CH2/ Alternative/Rising edge/ Falling edge/ Auto/ Normal/ Single			
<b>External trigger bandwidth</b>	1 GHz	500 MHz	300 MHz	100 MHz

Model	SF880	SF650	SF830	SF610
<b>Spectrum Analyzer (Typical)</b>				
Common features between the Oscilloscope and the spectrum analyzer have the same specifications.				
Frequency Bandwidth	1 GHz	500 MHz	300 MHz	100 MHz
Display Span	204.8 KHz to 60 MHz			
Minimum Span (at selected Display Bandwidth)	100 KHz (display bandwidth of 51.2 MHz) 5 KHz (display bandwidth of 2.56 MHz) 400 Hz (display bandwidth of 204.8 MHz)			
Resolution	$(\text{Span}/2^{18})$ 0.78 Hz to 195 Hz			
Spectrum Flatness	1dB			
Frequency Error [6]	50 ppm		100 ppm	200 ppm
Relative Frequency Accuracy	> 1 ppm			
Maximum number of bins	1M			
Dynamic Range	8 bits (< 65 dB)			
Spurious Free Range	< 70 dB (@ 10 MHz, 2 V range)			
Frequency Response	$\pm 0.5$ dB			
<b>Reference Levels (10 ranges)</b>				
1X probe	- 35 dBV to 25 dBV (0.6 to 5.623 VRMS)			
10X probe	- 25 dBV to 35 dBV (0.06 to 56.23 VRMS)			
Display modes	Sampling, peak hold, average, history			
Windowing types	Rectangular, Bartlett, Gaussian (2.5, 3.5, 4.5), Triangular, Blackman, Blackman–Harris, Hamming, Hanning, Welch, Kaiser Bessel, Flat Top,			
<b>Frequency Analyzer (Typical)</b>				
The same specifications apply to the common features of the oscilloscope and the frequency and phase analyzer in the model.				
Frequency Range	1 GHz	500 MHz	300 MHz	100 MHz
Resolution	0.1Hz			
Tolerance [6]	50 ppm		100 ppm	200 ppm
Relative Tolerance	0.01 ppm		0.1 ppm	1 ppm
<b>Data Recorder (Typical)</b>				
The same specifications apply to the common features of the oscilloscope and the data recorder in the model.				
Sampling Interval	102 MHz to 10 pHz			
Time Base	500 nS to 365 days			
Timing Accuracy	50 ppm		100 ppm	200 ppm

Model	SF880	SF650	SF830	SF610
<b>Arbitrary Waveform Generator</b>				
Arbitrary waveform length	2 to 64K adjustable			
Ram (Memory)	64K			
Amplitude resolution	12-bits (with 14-bits optional)			
Sample rate (sine wave)	400MHz	300MHz	200 MHz	100MHz
Sample rate	100 MHz			50MHz
Sample rate (Arbitrary)	1MHz to 100 MHz			1-MHz to 50MHz
Frequency adjustment resolution	10 mHz (with 1 $\mu$ Hz optional)			
Standard waveforms	DC, Sine, square, pulse, triangle, rising ramp, falling ramp, noise, rising exponent, falling exponent, sinc, cardiac, gated burst, single burst, log continuous sweep, linear continuous sweep, gated ASK, gated FSK, gated PSK  AM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)  FM (modulating signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)  burst (carrier signals; pulse, square, rising ramp, falling ramp, triangle, sinc, cardiac, rising exponent, falling exponent, noise, edited waveforms)			
<b>Output Amplitude</b> (Frequencies < 5MHz) Open circuit 50 $\Omega$	0 to $\pm$ 3.5V(7 Vpp) 0 to $\pm$ 1.75V(3.5 Vpp)			
(5MHz > Freq. < 15MHz) Open circuit 50 $\Omega$	0 to $\pm$ 3.0V(6 Vpp) 0 to $\pm$ 1.5V(3.0 Vpp)			
(15MHz > Freq. < 50MHz) Open circuit 50 $\Omega$	0 to $\pm$ 2.0V(4 Vpp) 0 to $\pm$ 1.0V(2.0 Vpp)			
(50MHz > Freq. < 100MHz) Open circuit 50 $\Omega$	0 to $\pm$ 1.5V(3 Vpp) 0 to $\pm$ 0.75V(1.5 Vpp)			
(100MHz > Freq. < 150MHz) Open circuit 50 $\Omega$	0 to $\pm$ 1.0V(2 Vpp) 0 to $\pm$ 0.5V(1.0 Vpp)			
Accuracy (up to 100 kHz)	.1% of the specified output			
Adjustment resolution	$\pm$ 5mV 3 digits (1mv)			

Model	SF880	SF650	SF830	SF610
<b>Open offset</b>				
Open circuit	0 to $\pm 2.2V(7 V_{pp})$			
500	0 to $\pm 2.2V(3.5 V_{pp})$			
Accuracy	2% $\pm 5mV$ (0.1% Optional)			
Adjustment resolution	3 digits(1mv)			
Output Impedance	500			
Output Current	60 mA ( With the standard 50 O impedance )			
Sync	TTL compatible			
<b>Frequencies Ranges</b>				
Sine Wave	10 mHz to 150 MHz	10 mHz to 100 MHz	10 mHz to 50 MHz	10 mHz to 10 MHz
Square	10 mHz to 15 MHz			10 mHz to 5 MHz
Pulse	10 mHz to 15 MHz			10 mHz to 5 MHz
Triangle	10 mHz to 100 KHz			10 mHz to 100 KHz
Ramp	10 mHz to 100 KHz			10 mHz to 100 KHz
Sinc	1 Hz to 5 MHz			1 Hz to 1 MHz
Noise (White) Bandwidth	25 MHz			10 MHz
AM (Carrier)	1 Hz to 5 MHz			1 Hz to 1 MHz
FM (Carrier)	1 Hz to 5 MHz			1 Hz to 1 MHz
Sweep	DC to 15 MHz (start & stop frequency)			DC to 5 MHz
Burst (Burst Rate)	100 Hz to 2 MHz			100 Hz to 1 MHz
Digital (shift keying rate)	1 kHz to 2 MHz			1 kHz to 1 MHz
Exponent	1 Hz to 5 MHz			1 Hz to 1 MHz
Cardiac	1 Hz to 1 MHz			1 Hz to 1 MHz
Resolution	10 mHz (1 $\mu$ Hz optional)			
Accuracy	2% $\pm 5mV$ (.1% optional) At room temperature			
Temp Coefficient	20 pm/ $^{\circ}C$			
Aging	10 ppm/yr			

Model	SF880	SF650	SF830	SF610
<b>Waveform Characteristics</b>				
<b>Sine Wave Output</b>				
Flatness				
< 1 MHz	0.1 dB		0.1 dB	
< 10 MHz	0.5 dB		0.2 dB	
< 100 MHz	1 dB		-	
<b>Sine Wave (2Vpp)</b>				
Adjustment resolution				
10 mHz (1 $\mu$ Hz optional)				
<b>Harmonic Distortion</b>				
DC to 100 kHz	-70 dBc			
100 kHz to 1 MHz	-65 dBc			
1 MHz to 10 MHz	-60 dBc			
10 MHz to 50 MHz	-55 dBc (when applicable)			
50 MHz to 100 MHz	-50 dBc (when applicable)			
100 MHz to 150 MHz	-45 dBc (when applicable)			
<b>Spurious</b>				
Dc to 100 kHz	-70 dBc			
100 kHz to 1 MHz	-60 dBc			
1 MHz to 10 MHz	-60 dBc			
10 MHz to 50 MHz	-55 dBc (when applicable)			
50 MHz to 100 MHz	-55 dBc (when applicable)			
100 MHz to 150 MHz	-50 dBc (when applicable)			
<b>Noise</b>				
Dc to 100 kHz	-60 dBc			
100 kHz to 1 MHz	-60 dBc			
1 MHz to 10 MHz	-55 dBc			
10 MHz to 50 MHz	-50 dBc (when applicable)			
50 MHz to 100 MHz	-40 dBc (when applicable)			
100 MHz to 150 MHz	-35 dBc (when applicable)			
<b>Phase noise</b>				
< -60 dBc in a 50 kHz band				

Model	SF880	SF650	SF830	SF610
<b>Sine Wave (2Vpp)</b>				
Frequency	10 mHz - 15 MHz			10 mHz - 5 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Rise/ Fall time	< 4 nS			
Overshoot	1%			
Settling time	10 nS to .5% of final value			
Asymmetry	< 2 nS			
Duty cycle	5% to 95% (1MHz)			
Adjustment resolution	10nS			
Jitter	< 10pS (rms)			
<b>Triangle, Ramp (2Vpp)</b>				
Frequency	10 mHz- 15 MHz			10 mHz - 5 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Linearity	.1% of peak output			
Asymmetry	< 2 nS			
Duty cycle	5% to 95%			
Adjustment resolution	10nS			
Jitter	< 10pS (rms)			
<b>Exponential (2Vpp)</b>				
Frequency	10 mHz- 5 MHz			10 mHz - 1 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Rise/ Fall time	< 4 nS			
Damping factor	-1,000 to 1,000			
Jitter	< 10pS (rms)			
<b>Sinc (sin(x)/x) (2Vpp)</b>				
Frequency	10 mHz- 5 MHz			10 mHz - 1 MHz
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Zero crossings	2 to 1,000			



Model	SF880	SF650	SF830	SF610
<b>Cardiac (2Vpp)</b>				
Frequency	10 mHz- 1 MHz			
Adjustment resolution	10 mHz (1 $\mu$ Hz optional)			
Zero crossings	2 to 1,000			
<b>Noise</b>				
Type	White			White
Bandwidth	50MHz			20MHz
<b>AM (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Frequency	10 mHz to 1MHz			
Modulation depth	0% to 150%			
Source	internal (external optional)			
<b>External AM modulation</b>	(optional)			
<b>FM (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Frequency	10 mHz to 1MHz			
Modulation depth	0% to 100%			
Source	internal (external optional)			
<b>ASK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Getting signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			
<b>FSK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Gating signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			

Model	SF880	SF650	SF830	SF610
<b>PSK (2Vpp)</b>				
Frequency	10 MHz to 5 MHz			10 mHz - 1 MHz
Modulating signal	any internal waveform including Arb			
Gating signal	5(TTL, CMOS) to 1.2 V (CMOS, TTL, LVTTTL)			
<b>Burst (2Vpp)</b>				
Carrier (-3dB)	10 mHz to 5 MHz			10 mHz - 1 MHz
Source	any internal waveform including Arb			
Rate	100 Hz to 2 MHz			
Count	variable			10 mHz - 1 MHz
Gate source	internal (external optional)			
Trigger	single, internal rate, external(optional)			
<b>Sweep</b>				
Type	Linear or log (exponential)			
Direction	up or down			
Start frequency	0 to 15MHz			0 to 1 MHz
Stop frequency	0 to15 MHz			0 to 1 MHz
Sweep time	1 uS to 1mS			1 uS to 1mS
<b>Editing Tools</b>				
Math operation	Addition, subtraction, multiplication, gain, clip, absolute, resize, invert, mirror, expand to fit			
Filtering	smoothing, ideal low pass, first order low pass			
Windowing	Gaussians, Blackman, Blackman-Harris, Cosine, Hanning, Hamming, Flat-Top, Kaiser-Bessel, Welch, Triangular			
<b>Signal library</b>	Sine, square, triangle, falling ramp, rising ramp, rising exponent, falling exponent, sinc, cardiac, noise			
<b>GUI Editors</b>	Pen, line, manual, insert			
<b>Options</b>	save / recallin.txt & .csv format			
<b>Units</b>				
Frequency	Hz, kHz, MHz			
Amplitude	mVpp, Vpp			
Offset	mV, V			

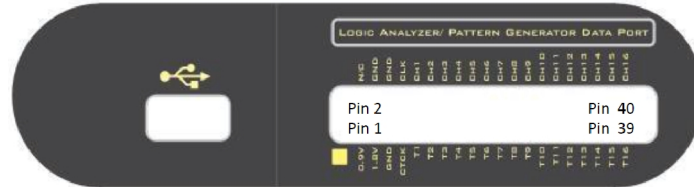
Model	SF880	SF650	SF830	SF610
<b>Protection</b>	short circuit			
<b>Configuration time</b>				
Arbitrary save	10 mS			
Arbitrary Recall	100 mS			
Setting save	10 mS			
Setting Recall	100 mS			
Function	100 mS			
Model	SF880		SF830	
<b>Logic Analyzer/ Pattern Generator</b>				
<b>Logic Analyzer</b>				
<b>Internal Clock</b> The internal clock makes the memory address counter follow the rising edges of the internally generated programmable clock.				
Range	100 KHz - 100 MHz		100 KHz - 50 MHz	
Resolution	1 Hz		5 Hz	
Period	10 nS - 1 uS		20 nS - 1 uS	
Period Accuracy	± 0.01%		±0. 1%	
<b>External Clock</b> The external clock makes the memory address counter follow the rising edges of the externally generated clock.				
Range Logic	100 KHz - 100 MHz		100 KHz - 50 MHz	
Input Logic	TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)			
<b>Maximum Sample Rate</b>				
8 Channels	200 MHz		100 MHz	
16 Channels	100 MHz		50 MHz	
<b>Minimum Sample Rate</b>				
Internal Clock	1 MHz		1 MHz	
External Clock	100 KHz		100 KHz	
<b>Minimum Detectable Pulse Width</b>	15 nS		25 nS	
<b>Input/ Output Channels</b>				
Number of Channels	16			
Input Levels	TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)			

Model	SF880	SF830
Output Levels - Logic Analyzer	1.8 LVCMOS	
Channel-to-Channel Skew	1 nS	
Input Impedance	100 kO, parallel 2 pF	
Maximum External Voltage	-2V to 5 V	
Coupling	DC	
<b>Pulse / Level Parameters</b>		
Output	1.8 LVCMOS	
Amplitude Accuracy	± (5% Amplitude + 10 mV)	
Offset Accuracy	± 20 mV	
Overshoot / pre-shoot / ringing	± 2% ± 10 mV	
Rise / Fall Time	< 2ns	
Source Impedance	200 O [7]	
Short Circuit Current	± 30mA	
<b>Timing accuracy</b>	100 ppm	
<b>Trigger Types</b>	Edge, pattern, pulse width, pattern width	
<b>Memory/ Channel Parameters</b>		
Number of Input Channels	16/ 8	
Data Length (16 channels )	524 K	
Data Length (8 channels )	1048 K	
<b>Protocols</b>	I2C, SIM, 1-Wire,SPI, Quad SPI (includes data wizard)	
<b>Patten Generator (Typical)</b>		
The output is a pattern event. The pattern is programmable, or may be selected from a library of pre-configured patterns. The graphical and the math editor enables the user to seamlessly create any desired pattern.		
<b>Internal Clock</b>		
The internal clock makes the memory address counter follow the rising edges of the internally generated programmable clock.		
Range	100 KHz - 100 MHz	100 KHz - 50 MHz
Resolution	1 Hz	5 Hz
Period	10 nS - 1 uS	20 nS - 1 uS
Period Accuracy	± 0.01%	±0. 1%

Model	SF880	SF830
<b>External Clock</b> The external clock makes the memory address counter follow the rising edges of the externally generated clock.		
Range Logic	100 KHz - 100 MHz	100 KHz - 50 MHz
Input Logic	TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)	
<b>Maximum Sample Rate</b>		
16 Channels	100 MHz	50 MHz
<b>Minimum Sample Rate</b>		
Internal Clock	1 MHz	1 MHz
External Clock	100 KHz	100 KHz
<b>Minimum Detectable Pulse Width</b>	15 nS	25 nS
<b>Input/ Output Channels</b>		
Number of Channels	16	
Source Impedance	200 O, selectable	
Output Levels	1.8 LVCMOS	
Input Levels	TTL, CMOS (1.8 V, 2.5 V, 3.3 V, 5 V)	
Channel-to-Channel Skew	1 nS	
Input Impedance	100 kO parallel 2 pF	
Maximum External Voltage	-2V to 5 V	
Coupling	DC	
<b>Pulse / Level Parameters</b>		
Output	1.8 LVCMOS	
Amplitude Accuracy	± (5% Amplitude + 10 mV)	
Offset Accuracy	± 20 mV	
Overshoot / pre-shoot / ringing	± 2% ± 10 mV	
Rise / Fall Time	< 2ns	
Source Impedance	200 O [8]	
Short Circuit Current	± 30mA	
<b>Timing accuracy</b>	100 ppm	
<b>Trigger Types</b>	Edge, pattern, pulse width, pattern width	
<b>Memory/ Channel Parameters</b>		
Number of Output Channels	16/ 8	
Data length (16 channels )	524 K	

<b>Model</b>	<b>SF880</b>	<b>SF830</b>
<b>Protocols</b>	I2C, SIM, 1-Wire,SPI, Quad SPI (includes data wizard)	
<b>Editor - Pattern Generator</b>	Graphical, Line, Math, and function	

### Logic Analyzer/ Pattern Pin Assignment



### Logic Analyzer/ Pattern Generator Back panel

Pin No.	Pin Name	Pin Assignment	Pin No.	Pin Name	Pin Assignment
1	0.9V	Open	2	N/C	Ground [8]
3	1.8V	Open	4	GND	Ground
5	GND	Ground	6	GND	Ground
7	CTCK	Clock In/ Out [9]	8	CLK	Clock In/ Out
9	T1	Channel 1	10	CH1	Channel 1
11	T2	Channel 2	12	CH2	Channel 2
13	T3	Channel 3	14	CH3	Channel 3
15	T4	Channel 4	16	CH4	Channel 4
17	T5	Channel 5	18	CH5	Channel 5
19	T6	Channel 6	20	CH6	Channel 6
21	T7	Channel 7	22	CH7	Channel 7
23	T8	Channel 8	24	CH8	Channel 8
25	T9	Channel 9	26	CH9	Channel 9
27	T10	Channel 10	28	CH10	Channel 10
29	T11	Channel 11	30	CH11	Channel 11
31	T12	Channel 12	32	CH12	Channel 12
33	T13	Channel 13	34	CH13	Channel 13
35	T14	Channel 14	36	CH14	Channel 14
37	T15	Channel 15	38	CH15	Channel 15
39	T16	Channel 16	40	CH16	Channel 16

Model	SF880	SF650	SF830	SF610
<b>Physical Properties</b>				
<b>Dimensions</b>	128.0 x 77.0 x 31.6 (mm), 5.0 x 3.0 x 1.2 (inches)			
<b>Weight</b>	340 grams, 12 Ounces			
<b>Other</b>				
<b>PC Requirements Recommended</b>	Operating system: 32/ 64-bit edition of Microsoft Windows XP (SP3), Vista, Windows 7/ Windows 8/ Windows 10 Ports: USB 2.0/ 3.0 compliant port			
<b>Environmental</b>				
Operating environment	0 °C to 40 °C for normal operation			
Temperature range	15 °C to 32 °C for quoted accuracy			
Humidity	5% to 80% RH, non-condensing			
<b>Storage environment</b>				
Temperature range	-20 °C to +60 °C			
Humidity	5% to 95% RH, non-condensing			
<b>Software</b>	Save setting, recall setting, save plot, recall/print plot, zoom in vertical, zoom in horizontal, pen editor, line editor, DSP, variable sampling rate			