



# 产品手册

# 仪器型号: SRS斯坦福高频锁相放大器SR844

# 西安安泰测试科技有限公司

# 仪器维修|租赁|销售|测试

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# High Frequency Lock-In Amplifier

SR844 — 200 MHz dual phase lock-in amplifier



### · 25 kHz to 200 MHz frequency range

- · 80 dB dynamic reserve
- Time constants from 100 µs to 30 ks (6, 12, 18 or 24 dB/oct rolloff)
- "No Time Constant" mode (10 μs to 20 μs update rate)
- · Auto-gain, -phase, -reserve and -offset
- · Two 16-bit DACs and ADCs
- · Internal or external reference
- · GPIB and RS-232 interfaces

### SR844 200 MHz Lock-In Amplifier

The SR844 is the widest bandwidth lock-in amplifier available. It provides uncompromised performance with a frequency range of 25 kHz to 200 MHz and up to 80 dB of drift-free dynamic reserve. It includes the many features, ease of operation, and programmability that you've come to expect from SRS DSP lock-in amplifiers.

### **Digital Technology**

The SR844 uses the same advanced DSP technology found in the SR850, SR830 and SR810 lock-in amplifiers. DSP offers many advantages over analog instruments — high dynamic reserve, low zero-drift, accurate RF phase shifts and orthogonality, and digital output filtering.

### Signal Input

The SR844 has both 50  $\Omega$  and 1 M $\Omega$  inputs. The 1 M $\Omega$  input is used with high source impedances at low frequencies, or with a standard 10× scope probe. The 50  $\Omega$  input provides the best RF signal matching. Up to 60 dB of RF attenuation or 20 dB of RF gain can be selected in 20 dB increments. Full-scale sensitivities range from 1 Vrms (+13 dBm) to 100 nVrms (-127 dBm). Gain allocation can be optimized to provide up to 80 dB of dynamic reserve.

### Reference

The SR844 offers both external and internal reference operation. In both cases, the entire 25 kHz to 200 MHz



· SR844 ... \$8450 (U.S. list)

frequency range is covered without any manual range selection. The external reference input has an auto-threshold feature which locks to sine, square or pulsed signals. The internal reference is digitally synthesized and is adjustable with 3-digit frequency resolution.

Harmonic detection of the 2F component is available for both internal and external reference modes.

A reference output (1.0 Vpp square wave into 50  $\Omega$ ), which is phase synchronous with the lock-in reference, is available in both external and internal mode.

### **Output Filters**

Time constants from 100  $\mu$ s to 30 ks can be selected with a choice of 6, 12, 18 or 24 dB/oct rolloff. For high-bandwidth, real-time outputs, the filtering can be by-passed entirely. In this "No Filter" mode, the effective time constant is about 30  $\mu$ s, with the analog outputs updating every 10 to 20  $\mu$ s.

### **Ease of Operation**

The SR844 is easy to use. All instrument functions are set from the front-panel keypad, and the knob is used to quickly adjust parameters. Up to nine different instrument configurations can be stored in non-volatile memory for fast, reliable instrument setup. Standard RS-232 and GPIB (IEEE-488.2) interfaces provide connections to your data acquisition systems.

### **Useful Features**

Auto-functions allow parameters that are frequently adjusted to be set automatically. Sensitivity, dynamic reserve, phase and offset are each quickly optimized with a simple key stroke.

The offset and expand features are useful for evaluating small fluctuations in your signal. The input is nulled with the autooffset function, and output expand increases the resolution by up to  $100\times$ .

Ratio mode is used to normalize the signal to an externally applied analog voltage. It is useful to eliminate the effect of source intensity fluctuations. Transfer function measurements can be easily made from the front panel by a programmable scan of up to 11 frequencies. Setups and offsets are recalled at each frequency in the scan.

### Analog Inputs and Outputs

The two displays each have a user-defined output for measuring X, Y, R, R(dBm),  $\theta$ , and X-noise or Y-noise. Two user-programmable DACs provide -10.5 V to +10.5 V outputs with 1 mV resolution. These outputs may be set from the front panel or via the computer interfaces.

In addition, there are two general-purpose analog inputs. These are 16-bit ADCs which can be displayed on the front panel, read over the interface, or used to ratio the input signal.

### **Internal Memory**

The SR844 has two 16,000 point memory buffers for recording (rates to 512 samples/s) the time history of each displayed measurement. Data may be transferred from the buffers using either interface. A trigger input is also provided to synchronize data recording with external events.

### **Ordering Information**

SR844	200 MHz dual phase lock-in	\$8450
	amplifier	
SR445A	Voltage preamplifier	\$1200
	(350 MHz, 4 channel)	



SR844 rear panel



phone: (408)744-9040 www.thinkSRS.com

### **Signal Channel**

Voltage input Input impedance Damage threshold Bandwidth Sensitivity <1 MHz <50 MHz <200 MHz Gain accuracy <50 MHz <200 MHz Gain stability Coherent pickup f < 10 MHzf<50MHz  $f < 200 \, MHz$ Input noise  $(50 \Omega)$ Input noise  $(1 M\Omega)$ Dynamic reserve

Single-ended BNC  $50\Omega$  or  $1M\Omega + 30 \text{ pF}$   $\pm 5 \text{ V}$  (DC+AC) 25 kHz to 200 MHz

100 nVrms to 1 Vrms full scale  $1 \mu$ Vrms to 1 Vrms full scale  $10 \mu$ Vrms to 1 Vrms full scale

 $\begin{array}{l} \pm 0.25 \, dB \\ \pm 0.50 \, dB \\ 0.2 \, \% ^{\circ} C \\ Low-noise reserve, sens. <\!30 \, mV \\ <\!100 \, nV \ (typ.) \\ <\!2.5 \, \mu V \ (typ.) \\ <\!25 \, \mu V \ (typ.) \\ 2 \, nV / \sqrt{Hz} \ (typ.) \\ 5 \, nV / \sqrt{Hz} \ (typ.) , <\!8 \, nV / \sqrt{Hz} \ (max.) \\ 5 \, nV / \sqrt{Hz} \ (typ.) \\ up \ to \ 80 \, dB \end{array}$ 

### **Reference Channel**

External reference Impedance Level Pulse width Threshold setting Acquisition time Internal reference Freq. resolution Freq. accuracy Harmonic detection Reference outputs

Front panel

Rear panel (TTL)

Phase drift <10 MHz

> <100 MHz <200 MHz

### Demodulator

Zero stability

Time constants

"No Filter" mode

25 kHz to 200 MHz  $50 \Omega$  or  $10 k\Omega + 40 pF$ 0.7 Vpp pulse or 0 dBm sine >2 ns at any frequency Automatic, midpoint of waveform <10 s (auto-ranging, any frequency) <1 s (within same octave)  $25\,kHz$  to  $200\,MHz$ 3 digits  $\pm 0.1$  in the 3<sup>rd</sup> digit 2F (50 kHz to 200 MHz) Phase locked to int./ext. reference 25 kHz to 200 MHz square wave 1.0 Vpp nominal into  $50 \Omega$ 25 kHz to 1.5 MHz, 0 to +5 V nominal,  $\geq 3 \text{ V}$  into  $50 \Omega$ 0.02° <2.5° <5.0° <10.0° 0.005° rms at 100 MHz, 100 ms time constant <0.1°/°C <0.25°/°C <0.5°/°C

Digital displays have no zero-drift.

Analog outputs have <5 ppm/°C drift for all dyn. reserve settings.

100 µs to 30 ks with 6, 12, 18 or

10 to 20 µs update rate (X and Y)

24 dB/octave rolloff

Harmonic rejection Odd harmonics Even harmonics Sub-harmonics

<-40 dBc

<-30 dBc otherwise

 $-9.5 \,\mathrm{dBc}$  (a)  $3 \times \mathrm{ref}$ ,  $-14 \,\mathrm{dBc}$  (a)  $5 \times$ 

ref, etc.  $(20 \log 1/n, n = 3, 5, 7...)$ 

4<sup>1</sup>/<sub>2</sub>-digit LED and 40-seg. bar graph

X, R (V or dBm), X-noise, Aux In 1

4<sup>1</sup>/<sub>2</sub>-digit LED and 40-seg. bar graph

Y,  $\theta$ , Y-noise (V or dBm), Aux In 2

X and Y ratioed with respect to Aux

In 1 or Aux In 2 before filtering and computation of R. The ratio input

Ref Freq, Phase, Offsets, Aux Out,

×10 or ×100 for Ch1 and Ch2

is normalized to 1 V and has a dynamic range greater than 100.

### Displays

Channel 1 Type Quantities Channel 2 Type Quantities Expand Ratio

Reference Type Quantities

### **Channel 1 and Channel 2 Outputs**

Voltage range	$\pm 10$ V full scale proportional to X, Y or CH1, CH2 displayed quantity
Update rate	
X, Y	48 to 96 kHz
R, $\theta$ , Aux inputs	12 to 24 kHz
X-noise, Y-noise	512Hz

2

4<sup>1</sup>/<sub>2</sub>-digit LED

IF Freq, Elapsed Time

### **Auxiliary Inputs and Outputs**

Inputs Type Range Resolution Bandwidth Outputs Range Resolution Data buffers

Differential,  $1 M\Omega$   $\pm 10 V$  0.33 mV 3 kHz 2  $\pm 10 V$  1 mVTwo 16,000 point buffers. Data is recorded at rates up to 512 Hz and is read using computer interfaces.

### General

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InterfacesIEEE-488.2 and RS-232 interfaces<br/>are standard.Power70 \, W, \, 100/120/220/240 \, VAC,<br/>50/60 \, HzDimensions17" \times 5.25" \times 19.5" \, (WHD)Weight23 \, lbs.WarrantyOne year parts and labor on defects<br/>in materials and workmanship
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