



Signal Forge 1000™ Synthesized Signal Generator



Digital and RF Tester with 1 GHz Range

The Signal Forge 1000 combines a 1 GHz frequency range with three dedicated outputs to deliver the capabilities a signal generator, a sweep generator and a function generator in a single, high-performance system.

The SF1000 provides an AC-coupled output, a Digital output and a Differential output, plus a wide range of waveform modulation features making it ideal for testing clock driven systems such as serial storage devices and integrated circuits. And with its single-tone waveform and wide frequency range—starting at 1 Hz—the SF1000 is an accurate and stable signal source for testing audio systems, receivers and other radio frequency applications.

Waveforms include sine wave  and square wave  generation, frequency sweep, frequency modulation, amplitude modulation and arbitrary modulation. ASK, FSK, OOK, shaped OOK are also provided.




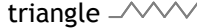
An integral TCXO oscillator ensures stability and accuracy over wide time spans and temperature ranges.

All of the SF1000 functions are controlled using the Wave Manager software, an embedded, menu-driven application.

The SF1000 is small and lightweight making it an ideal tool for field application engineers.

The wide, stable frequency range and multiple outputs, in a portable package make the SF1000 the perfect tool for a full range of IF, RF, and digital electronics test applications.

Key Features

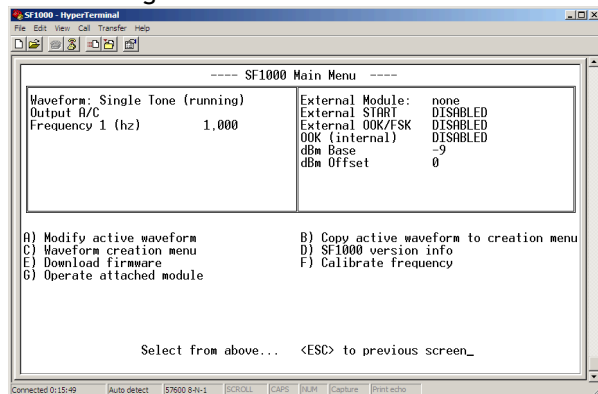
- Frequency range of 1 Hz to 1 GHz
- AC-coupled, Differential and Digital outputs
- Sine wave 
- Square wave 
- Programmable TTL voltage levels: 3.3V, 2.5V, 1.8V
- Linear sweep
- FM, AM, Arbitrary modulation
- Digitally controlled FSK: unramped, ramped , triangle 
- ASK, OOK, Shaped OOK
- External controls
- Synthesized signal and TCXO provide outstanding precision and accuracy
- Auxiliary UART output
- Menu-driven Wave Manager software
- Small form factor (8.5"x5.6"x1.5")
- Affordable

Operation

Control and Programming

Setup, configuration and programming is accomplished using Wave Manager, the menu-driven software embedded in the SF1000. There is no need to install client-based software since Wave Manager is installed on the SF1000 and is accessed using any standard serial terminal communication software such as Windows HyperTerminal.

Wave Manager Main Menu



The physical connection is a standard RS-232 serial interface.

Auto-start

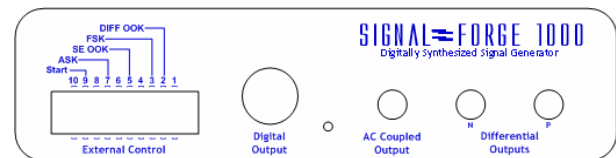
The SF1000 automatically stores the most recent waveform configuration and automatically loads and starts the stored waveform. This eliminates the need to reprogram the unit when repeating test procedures and enables it to operate in stand-alone, PC-free mode.

Up to 4 instrument setting may be stored in the on-board non-volatile memory.

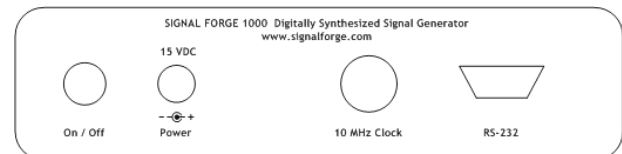
Connections

- One SMA connector for the AC-coupled output
- Two SMA connectors for the Differential output
- One BNC for the Digital output
- Dual-row 10-position header provides:
 - Remote start
 - ASK
 - FSK
 - OOK (AC-coupled and differential)
 - Connection for option modules
- BNC for 10 MHz reference
 - Output on model 1000
 - Input on model 1000E
- RS-232 connector for the remote console

Front Panel



Rear Panel



Frequency Selection

Frequency resolution of 1 Hz across the complete range of 1 Hz to 1 GHz provides the flexibility needed for testing high-speed serial interface devices such as Serial ATA and Serial SCSI disk controllers, and to test and characterize narrow band communication systems, the IF and RF section of receivers and subsystems, and selected mobile and telemetry bands.

Outputs

The SF1000 provides three output types:

- **AC Coupled**
- **Differential**
- **Digital**

AC Coupled

An AC coupled, sine wave output with a frequency range of 100 KHz to 1 GHz is provided.

Differential

A differential (LVPECL) output with a frequency range of 50 MHz to 1 GHz is provided.

Digital

A dedicated digital output supporting TTL (3.3V), LVTTTL (2.5V) and STTL (1.8V) voltage levels and a frequency range of 1 Hz to 110 MHz is provided.

Waveforms

The SF1000 provides a wide range of waveform modulation features with numerous waveform modifiers to customize the output to meet your specific testing needs. The waveforms, modifiers and

options are configured using the Wave Manager software.

In addition, you may develop arbitrary modulation files to create your own unique type of FSK or AM modulated output.

Single Tone

The Single Tone waveform outputs a continuous tone at the user-selected output frequency.

FSK Unramped

The Frequency Shift Keying (FSK) Unramped waveform allows you to select two output frequencies which are alternately driven at a preprogrammed rate. Both internal and external control of the FSK Unramped waveform is provided.

FSK Ramped

The FSK Ramped waveform varies the output frequency within a specified range. The rate of frequency change is determined by the delta frequency (the amount that the frequency is changed at each step) and the ramp rate (at what interval the frequency is changed). Both internal and external control of the FSK Unramped waveform is provided.

FSK Triangle

FSK Triangle is similar to FSK ramped, except that ramping from one frequency to the next occurs automatically. When an end frequency is reached, the direction changes and ramping continues towards the other frequency.

Sweep

Sweep is similar to the FSK ramped mode of operation except that it allows frequencies to span the full operational range. It also allows any delta frequency. Sweep allows the user to pause, change direction, or single-step. When a sweep range completes, it starts over at the first frequency.

Square AM

For Square AM, the user specifies a single frequency (the carrier frequency) and two power values. The duty cycle may be programmed to a value other than 50%, which will result in the creation of an asymmetrical wave instead of a square wave.

Arbitrary waveform modulation may be used to completely customize an AM type waveform by downloading arbitrary amplitude descriptors from a user-generated file.

Sine AM

A Sine Wave AM waveform modulates power using a sinusoidal pattern. The SF1000 outputs a discrete

number of power levels to create the sinusoidal pattern. The existence of these discrete power steps is normally not an issue since an AM demodulator includes a low pass filter at its output that will remove any high frequency components.

Arbitrary Waveforms

Arbitrary waveform modulation allows the user to define specific frequency or power values at a specified sample rate. CHIRP testing can be executed easily with the SF1000 by creating the appropriate arbitrary waveforms.

For example, for an FSK Arbitrary Waveform, a user-developed file describing a set of frequency variations is written using a text editor or waveform editor and uploaded to the SF1000 by the Wave Manager software.

Auxiliary UART

The SF1000 also provides a transmit-only UART port that may be used to send data characters to an internal or external modulation device. This port is completely separate from the UART port used for the console.

The data that is sent by the auxiliary UART port can be from a keyboard or from a file. The UART may be connected to an external modulating device or to the OOK/FSK control pins of the same SF1000. In this way, you can create modulated waveform outputs, which are actually encoding UART driven data.

Calibration

The user may calibrate the SF1000 against a known accuracy time base standard at any time. The Wave Manager software guides you through the calibration process. Calibration information is stored in non-volatile memory, loaded at power up, and used until the device is calibrated again.

Size

8.5" x 5.4" x 1.5"

Weight

2.8 pounds

SPECIFICATIONS

General Description

The Signal Forge 1000 covers a frequency range of 1 Hz to 1 GHz, in 1 Hz increments. It is configured via Wave Manager, an embedded, menu driven application which is accessed using serial communication software across a standard RS232 interface.

Frequency Range

1 Hz to 1 GHz

Frequency Resolution

1 Hz

Power Range (AC Output)

-9 to +7 dBm

Amplitude Range

500 mV to 63 mV

Amplitude Resolution

1 dB

Power Output Accuracy

±2 dB from 100 KHz to 300 MHz

±3 dB from 300MHz to 1 GHz

Operating Limits

AC Coupled Output

100 KHz to 1 GHz

Differential Output

50 MHz to 1 GHz

TTL Output

1 Hz - 110 MHz

Internal FSK Frequency Range

TTL Any deviation allowed

AC Coupled

Up to 100 MHz Any deviation allowed

>100 MHz Deviation ±1% max

Differential

Deviation ±1% max

Duty Cycle (Freq1 Direction)

10% to 90%

External OOK/FSK (User-driven signal)

Limited to 4.5 KHz maximum

Internal OOK

Limited to 500 KHz

OOK Supported For

AC Coupled Output Up to 100 MHz

Differential Output Full range

Duty Cycle (ON percentage)

10 to 90% except near the highest modulating freq

Operating Ranges

OOK

Modulating freq 0.1 Hz to 500 KHz

FSK ramped & unramped

Modulating freq 0.1 Hz to 500 KHz

FSK Arbitrary

Modulating freq 0.1 Hz to 26 KHz

Sweep

Freq sweep time:

Frequency	Min. Step Time
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≤100 MHz	5ms
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>100 MHz	10ms
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Maximum step time = 60 seconds.

Square AM wave

Modulating freq 0.1 Hz to 45 KHz

Sine AM wave

Modulating freq 0.1 Hz to 6.5 KHz

Frequency Standard

TCXO

2.5ppm

Output

10 MHz reference into 50 Ω

Frequency Accuracy

5ppm (calibrated with 1ppm freq counter)

Frequency Precision

4ppm

Frequency Stability

May drift 3ppm in the first year, then
1ppm/year thereafter

Frequency Drift per Hour

0.0002% (After warm-up)

VWSR

Output Match (VSWR)

1 MHz to 7 MHz	<1.5:1 @ +7 dBm
7 MHz to 1 GHz	<1.3:1 @ +7dBm

External Control Header

A dual-row, 10-position connector on the front panel

Input Voltage

3.3V (5V Tolerant)

Output voltage (TX_MOD pin)

5V

Spectral Purity

Harmonics

2 MHz to 50 MHz	< -40 dBc
50 MHz to 100 MHz	< -40 dBc
100 MHz to 500 MHz	< -20 dBc
500 MHz to 1GHz	< -20 dBc

Non-Harmonics (worst case)

100 KHz to 100 MHz	< -50 dBc
100 MHz to 500 MHz	< -30 dBc
500 MHz to 1 GHz	< -30 dBc

Clock Feed-Through

< -85 dBm

Phase Noise

- 50 dBc/Hz @ 10 KHz Offset
- 73 dBc/Hz @ 100 KHz Offset
-90 dBc/Hz @ 1000 KHz Offset

Power Requirements

AC Supply

15V DC (AC adapter supplied)

*Note: Output ratings at 100 MHz,
0 dBm output power and 25 °C, unless
otherwise specified.*

Models

SF1000

Digitally Synthesized Signal Generator
Provides 10 MHz Clock Output

SF1000E

Digitally Synthesized Signal Generator
Provides 10 MHz Clock Input. *External clock source required.*

The SF1000 and SF1000E
replace the
SF800 and SF800E

Model Matrix

Features / Models	1000	1000E
10 MHz Clock Output	✓	
10 MHz Clock Input		✓

Options

SF-BRK

3 Unit, 1 U Rack Mount Bracket

Purchasing Information

- Buy online at www.signalforge.com
- Place your order by phone: 512-275-3733
- Fax your order to 512-275-3735

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