

# SFG-20X

## 5 & 10 MHz ARBITRARY/FUNCTION SIGNAL GENERATORS

### Applications

The SFG-20X Series Signal Generators are ideally suited for applications where value and quality are equally important such as for:

- Educational labs
- Technical schools
- Internal training facilities
- Hobbyists



### Overview

The Global Specialties SFG-20X Series are single channel function/arbitrary waveform generators, capable of generating a 10 MHz sine wave (SFG-210). They have an informative, easy-to-read color display, user-friendly controls and a numeric keypad which allows users to easily configure waveform properties. In addition, they feature non-volatile built-in memory to create, store, and recall arbitrary waveforms up to 16,000 points with 14-bit vertical resolution. 46 predefined arbitrary waveforms are also available for output. A standard USB interface on the rear panel allows users to easily interface with application software to create and load arbitrary waveforms into the instrument.

### Features

- 5 MHz Bandwidth (SFG-205)
- 10 MHz Bandwidth (SFG-210)
- 125 MSa/s sample rate
- 14 bit vertical resolution
- 3.5-inch TFT-LCD color display
- USB interface
- 16k pts arbitrary waveform memory
- 88 built-in predefined arbitrary waveforms
- Store/recall up to 10 instrument settings
- DDS technology
- 5 standard output waveforms
- 46 built-in arbitrary waveforms
- Modulations: AM, DSB-AM, FM, PM, FSK, ASK, PWM, Sweep, and Burst
- EasyWave arbitrary waveform editing software included

## SDG800 Series DataSheet

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### Specification

| Model                     | SFG-205                                                                                   | SFG-210 |
|---------------------------|-------------------------------------------------------------------------------------------|---------|
| Max. output frequency     | 5 MHz                                                                                     | 10 MHz  |
| Output channels           | 1                                                                                         |         |
| Sample rate               | 125MSa/s                                                                                  |         |
| Arbitrary waveform length | 16kpts                                                                                    |         |
| Frequency resolution      | 1 $\mu$ Hz                                                                                |         |
| vertical resolution       | 14bits                                                                                    |         |
| Waveform                  | Sine, Square, Ramp, Pulse, Gaussian Noise. 46 built-in arbitrary waveforms (including DC) |         |
| Modulation                | AM, DSB-AM, FM, PM, FSK, ASK, PWM, Sweep, Burst                                           |         |
| Standard interface        | USB Host & USB Device                                                                     |         |
| Dimension                 | W x H x D=229mm x 105mm x 281mm                                                           |         |

### Attention:

All specifications apply to the SFG-20X Series Function/Arbitrary Waveform Generator unless otherwise explanation. To satisfy these specifications, the following conditions must be met first:

1. The instrument has been operating continuously for more than 30 minutes within specified operating temperature range (18°C~28°C).
2. The temperature variation does not exceed 5°C.

**Note: All specifications subject to change.**

## SFG-20X Series DataSheet

| Frequency Specification |                                             |               |               |
|-------------------------|---------------------------------------------|---------------|---------------|
| Model                   | SFG-205                                     | SFG-210       |               |
| Waveform                | Sine, Square, Ramp, Pulse, Noise, Arbitrary |               |               |
| Sine                    | 1μHz ~ 5MHz                                 | 1μHz ~ 10MHz  | 1μHz ~ 30MHz  |
| Square                  | 1μHz ~ 5MHz                                 | 1μHz ~ 10MHz  | 1μHz ~ 10MHz  |
| Pulse                   | 500μHz ~ 5MHz                               |               |               |
| Ramp/Triangular         | 1μHz ~ 300kHz                               |               |               |
| Gaussian White noise    | >5MHz (-3dB)                                | >10MHz (-3dB) | >30MHz (-3dB) |
| Arbitrary               | 1μHz ~ 5MHz                                 |               |               |
| Resolution              | 1μHz                                        |               |               |
| Accuracy                | Within 90days ±50ppm within 1 year ±100ppm  |               |               |
| Temperature Coefficient | <5ppm/°C                                    |               |               |

| Sine Wave                          |                                                           |
|------------------------------------|-----------------------------------------------------------|
| Harmonic Distortion                | DC~1MHz <-60dBc                                           |
|                                    | 1MHz~10MHz <-55dBc                                        |
|                                    | 10MHz~30MHz <-50dBc                                       |
| Total Harmonic Waveform Distortion | DC~20kHz, 1Vpp<0.2%                                       |
| Spurious Signal (non-harmonic)     | DC~1MHz<-70dBc<br>1MHz~10MHz<-60dBc<br>10MHz~30MHz<-55dBc |
| Phase Noise                        | 10kHz Offset, -108dBc/Hz (typical value)                  |

| Square Wave                 |                                        |
|-----------------------------|----------------------------------------|
| Rise/fall time              | <24ns(10% ~ 90%)                       |
| Overshoot                   | <5%(typical, 1kHz, 1Vpp)               |
| Duty Cycle                  | 20%~80%                                |
| Asymmetric (50% Duty Cycle) | 1% of period+20ns(typical, 1kHz, 1Vpp) |
| Jitter                      | 500ps + 0.001% of period               |

| Ramp/Triangle Wave |                                                   |
|--------------------|---------------------------------------------------|
| Linearity          | <0.1% of Vpp(typical, 1kHz, 1Vpp, 100% symmetric) |
| Symmetry           | 0%~100%                                           |

| Pulse Wave                          |                           |
|-------------------------------------|---------------------------|
| Pulse width                         | 16ns, Min. 1ns resolution |
| Rise/Fall time (10% ~ 90%, typical) | 20ns~1.6ks                |
| Duty Cycle                          | 0.1%Resolution            |
| Overshoot                           | <5%                       |
| Jitter(pk-pk)                       | 500ps + 0.001% of period  |

## SFG-20X Series DataSheet

| Arbitrary Wave                                   |                |
|--------------------------------------------------|----------------|
| Waveform length                                  | 16 kpoints     |
| Vertical resolution                              | 14 bits        |
| Sample rate                                      | 125 MSa/s      |
| Min. Rise/Fall time                              | 8 ns (typical) |
| Jitter(pk-pk)                                    | 8 ns (typical) |
| Storage in non-volatile RAM memory (10 in total) | 10 waveforms   |

| Output Specification                               |                                                                                                                                       |
|----------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------|
| Amplitude                                          | 2mVpp~10Vpp(50Ω,≤10MHz)<br>2mVpp~5Vpp(50Ω,>10MHz)<br>4mVpp ~ 20 Vpp (High impedance, <10MHz)<br>4mVpp ~ 10Vpp (High impedance,>10MHz) |
| Vertical accuracy (100 kHz sine)                   | ±(1mVpp +0.3dB of setting value)                                                                                                      |
| Amplitude flatness (compared to 100 kHz sine,5Vpp) | ±0.3 dB                                                                                                                               |
| Impedance                                          | 50Ω                                                                                                                                   |
| Protection                                         | short-circuit protection                                                                                                              |

| DC Offset       |                                  |
|-----------------|----------------------------------|
| Range(DC)       | ±5V(50Ω)<br>±10V(High-Z)         |
| Offset accuracy | ±( setting offset value *1%+3mV) |

| AM Modulation       |                                                     |
|---------------------|-----------------------------------------------------|
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)            |
| Modulation waveform | Sine, Square, Ramp, Noise, Arbitrary (2mHz ~ 20kHz) |
| Modulation depth    | 0% ~ 120%                                           |
| DSB-AM Modulation   |                                                     |
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)            |
| Modulation waveform | Sine, Square, Ramp, Noise, Arbitrary (2mHz ~ 20kHz) |
| Modulation depth    | 0% ~ 120%                                           |
| FM Modulation       |                                                     |
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)            |
| Modulation waveform | Sine, Square, Ramp, Noise, Arbitrary(2mHz~20kHz)    |
| Frequency deviation | 0 ~0.5*bandwidth 1mHz resolution                    |

## SFG-20X Series DataSheet

| PM Modulation       |                                                      |
|---------------------|------------------------------------------------------|
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)             |
| Modulation waveform | Sine, Square, Ramp, Noise, Arbitrary<br>(2mHz~20kHz) |
| Phase Deviation     | 0~360°, 0.1° Resolution                              |
| FSK Modulation      |                                                      |
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)             |
| Modulation waveform | 50% duty-cycle square waveform(2mHz~50kHz)           |
| ASK Modulation      |                                                      |
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)             |
| Modulation waveform | 50% duty-cycle square waveform(2mHz~50kHz)           |
| PWM Modulation      |                                                      |
| Frequency           | 500μHz~20kHz                                         |
| Modulation waveform | Sine, Square, Ramp, Arbitrary(except DC)             |
| Sweep               |                                                      |
| Carrier             | Sine, Square, Ramp, Arbitrary(except DC)             |
| Type                | linear/logarithmic                                   |
| Direct              | Up/down                                              |
| Sweep time          | 1ms~500s                                             |
| Trigger source      | Manual, external, internal                           |
| Burst               |                                                      |
| Waveform            | Sine, Square, Ramp, Pulse, Arbitrary(except DC)      |
| Type                | Count(1~50,000 periods), infinite, Gated             |
| Start/Stop phrase   | 0°~360°                                              |
| Internal period     | 1μs~500s                                             |
| Gated source        | External trigger                                     |
| Trigger source      | Manual, External or Internal                         |

| Trigger Input   |                   |
|-----------------|-------------------|
| Input Level     | TTL compatible    |
| Slope           | Up or down        |
| Pulse width     | >100ns            |
| Input impedance | >5kΩ, DC coupling |

| SYNC Output      |                |
|------------------|----------------|
| Voltage level    | TTL compatible |
| Pulse width      | >50ns          |
| Output impedance | 50Ω(typical)   |
| Max. frequency   | 2MHz           |

## SFG-20X Series DataSheet

### General Specification

| Display                       |                                              |
|-------------------------------|----------------------------------------------|
| Display type                  | 3.5 inch TFT-LCD                             |
| Resolution                    | 320×RGB×240                                  |
| Color depth                   | 24 bit                                       |
| Contrast Ratio                | 350:1(typical)                               |
| Luminance                     | 300 cd/m <sup>2</sup> (typical)              |
| Power                         |                                              |
| Voltage                       | 100~240 VAC <sub>RMS</sub> , 45~66Hz, CATII  |
|                               | 100~127 VAC <sub>RMS</sub> , 45~440Hz, CATII |
| Consumption                   | <30 W                                        |
| Fuse                          | 1.25 A, 250 V                                |
| Environment                   |                                              |
| Temperature                   | Operation: 0°C~40°C                          |
|                               | Storage: -20°C~60°C                          |
| Humidity range                | Below +35°C: ≤90% relative humidity          |
|                               | +35°C~+40°C: ≤60% relative humidity          |
| Altitude                      | Operation: below 3,000 meters                |
|                               | Storage: below 15,000 meters                 |
| Electromagnetic Compatibility | 2004/108/EC Directive                        |
|                               | Applicable standards EN 61326-1:2006         |
|                               | EN 61000-3-2:2006 + A2:2009                  |
|                               | EN 61000-3-3:2008                            |
| Safety                        | 2006/95/EC Low Voltage Directive             |
|                               | EN 61010-1:2010                              |
| Others                        |                                              |
| Dimension                     | Width: 229 mm                                |
|                               | Height: 105 mm                               |
|                               | Depth: 281 mm                                |
| Weight                        | N.W: 2.6 kg                                  |
|                               | G.W: 3.4 kg                                  |
| IP protection                 |                                              |
| IP2X                          |                                              |
| Calibration Cycle             |                                              |
| 1year                         |                                              |

### **Standard Accessories**

- Quick Start Guide (printed)
- Power Cord
- USB Cable
- EasyWave Software (download)
- User Manual (download)



**Стандарт  
Электрон  
Связь**

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**Наши контакты:**

**Телефон:** +7 812 627 14 35

**Электронная почта:** [sales@st-electron.ru](mailto:sales@st-electron.ru)

**Адрес:** 198099, Санкт-Петербург,  
Промышленная ул, дом № 19, литера Н,  
помещение 100-Н Офис 331