# SAG1000 Series Arbitrary Function Generator

## Datasheet


Saluki Technology Inc.

## The document applies to the arbitrary function generator of the following models:

| Model | Digital Channel | Memory Depth | Bandwidth | Sampling Rate |
|---|---|---|---|---|
| SAG1032 | 2CH | 64M | 30MHz | 500MSa/S |
| SAG1062 | 2CH | 64M | 60MHz | 500MSa/S |
| SAG1082 | 2CH | 64M | 80MHz | 500MSa/S |
| SAG1102 | 2CH | 64M | 100MHz | 500MSa/S |

## Standard accessories of SAG1000 arbitrary function generator:

| Item | Name | Qty. |
|---|---|---|
| 1 | Main Machine | 1 |
| 2 | Power Cord | 1 |
| 3 | USB Line | 1 |
| 4 | BNC to BNC | 2 |
| 5 | PC software ( in U disk/ CD) | 1 |

## Preface

Thanks for choosing SAG1000 arbitrary function generator produced by Saluki Technology Inc.

## Document No.

SAG1000-02-01

## Version

Rev03 2020.06 Saluki Technology

## Document Authorization

The information contained in this document is subject to change without notice. The power to interpret the contents of and terms used in this document rests with Saluki.



## Product Quality Assurance

The warranty period of the product is 36 months from the date of delivery.

## Product Quality Certificate

The product meets the indicator requirements of the document at the time of delivery. Calibration and measurement are completed by the measuring organization with qualifications specified by the state, and relevant data are provided for reference.

## Quality/Environment Management

Research, development, manufacturing and testing of the product comply with the requirements of the quality and environmental management system.

## Contacts


| | |
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# Content

# 1 Overview

SAG1000 series function/arbitrary waveform generator is a powerful arbitrary waveform generator with full functions. PC software is provided freely for user to easy operate and data management. SAG1000 series has different bandwidth models for variety applications.

## Key features

- 2CH analog channels, 16CH digital channels, 500MSa/S
- 30/60/80/100MHz sine output frequency
- 16 channel digital output, together with the analog channel can rebuild the more mixed signals in daily practice
- Max 64M arbitrary waveform memory depth, 80M frequency counter
- Support AM, FM, PM, ASK, ASK, PSK and PWM modulations
- TCXO timebase standard, OCXO optional for ultra-high stability
- 7 inch, 64K true color TFT display, WVGA(800X480)
- Plenty of interfaces: USB Host, USB Device, LAN

# 2 Specification

## 2.1 Arbitrary Function Generator Main Feature

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Channel** | 2 | 2 | 2 | 2 |
| **Waveform Length** | 64M | 64M | 64M | 64M |
| **Maximum Frequency** | 30MHz | 60MHz | 80MHz | 100MHz |
| **Sample Rate** | 500MSa/S | | | |
| **Voltage Resolution** | 16bit | | | |
| **Digital Output** | 16 Channels output | | | |

## 2.2 Waveforms

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Standard Waveforms** | Sine, Square, Ramp, Pulse, Noise, Harmonics | | | |
| **Arbitrary Waveforms** | More than 160 kinds, including Sinc, Exponential Rise, Exponential Fall, ECG, Gauss, Haver Sine, Lorentz, Dual-Tone, DC, etc. | | | |

## 2.3 Frequency Characteristics

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Sine** | 1uHz - 30MHz | 1uHz - 60MHz | 1uHz - 80MHz | 1uHz - 100MHz |
| **Square** | 1uHz - 30MHz | 1uHz - 30MHz | 1uHz - 30MHz | 1uHz - 30MHz |
| **Pulse** | 1uHz - 15MHz | 1uHz - 15MHz | 1uHz - 15MHz | 1uHz - 15MHz |
| **Ramp** | 1uHz - 4MHz | 1uHz - 4MHz | 1uHz - 4MHz | 1uHz - 4MHz |
| **White Noise** | 1uHz - 30MHz | 1uHz - 60MHz | 1uHz - 80MHz | 1uHz - 100MHz |
| **Harmonic** | 1uHz - 15MHz | 1uHz - 15MHz | 1uHz - 15MHz | 1uHz - 15MHz |
| **Arbitrary** | 1uHz - 20MHz | 1uHz - 20MHz | 1uHz - 20MHz | 1uHz - 20MHz |
| **Resolution** | 1uHz | | | |
| **Accuracy** | ±2ppm, 18℃ - 28℃ | | | |

## 2.4 Waveform Details

### 2.4.1 Sine Wave Spectrum Purity

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Harmonic Distortion** | Typical (0dBm)<br>DC - 1MHz: <-60dBc;<br>1MHz - 10MHz: <-55dBc;<br>10MHz - 100MHz: <-50dBc | | | |
| **Total Harmonic Distortion** | <0.1% (10Hz - 20kHz, 0dBm) | | | |
| **Spurious Signal (non-hormonic)** | Typical (0dBm)<br>≤10MHz: <-65dBc;<br>>10MHz: <-65dBc+6dB/octave | | | |
| **Phase Noise** | Typical (0dBm,10kHz offset)<br>10MHz: ≤-115dBc/Hz | | | |

### 2.4.2 Square

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Rise / Down Time (Typical 1Vpp)** | <14ns | <12ns | <11ns | <10ns |
| **Overshoot** | <3% (Typical 100kHz, 1Vpp) | | | |

| | |
|---|---|
| **Duty Cycle** | ≤10MHz: 10% - 90%;<br>10MHz - 40MHz: 40% - 60%<br>>40MHz: 50% (fixed) |
| **Non-symmetry** | 1% of period + 5ns |
| **Jitter (rms)** | Typical (1MHz, 1Vpp, 50Ω)<br>≤5MHz: 2ppm+500ps; >5MHz: 500ps |

### 2.4.3 Ramp

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Linearity** | ≤1% of peak output (Typical 1kHz, 1VPP) | | | |
| **Symmetry** | 0% - 100% | | | |

### 2.4.4 Pulse

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Period** | 67ns - 1Ms | 67ns - 1Ms | 67ns - 1Ms | 67ns - 1Ms |
| **Pulse Width** | ≥16ns | ≥14ns | ≥14ns | ≥12ns |
| **Leading Edge Time** | ≥10ns | ≥10ns | ≥9ns | ≥8ns |
| **Overshoot** | <3% (Typical 1Vpp) | | | |
| **Jitter (rms)** | Typical (1Vpp)<br>≤5MHz: 2ppm+500ps; >5MHz: 500ps | | | |

## 2.5 Arb. Waveform Generator

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Waveform Length** | 64M | | | |
| **Vertical Resolution** | 16 Bit | | | |
| **Sample Rate** | 500MSa/s | | | |
| **Rise/Fall Time** | <6ns (Typical 1Vpp) | | | |
| **Jitter** | Typical (1Vpp)<br>≤5MHz: 2ppm+500ps; >5MHz: 500ps | | | |

## 2.6 Harmonic

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|

| | |
|---|---|
| **Harmonic Order** | ≤16 |
| **Harmonic Type** | Even, Odd, All |
| **Harmonic Amplitude** | Can be set for all harmonics |
| **Harmonic Phase** | Can be set for all harmonics |

## 2.7 Amplitude Characteristic (50Ω)

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Amplitude Range** | ≤20MHz: 1mVpp - 10Vpp;<br>≤60MHz: 1mVpp - 7.5Vpp;<br>≤80MHz: 1mVpp - 5Vpp;<br>≤90MHz: 1mVpp - 2.5Vpp;<br>≤100MHz: 1mVpp - 1Vpp | | | |
| **Accuracy** | Typical（1kHz Sine, 0V offset, >10mVpp, Auto), ±1% of setting ±2mVpp | | | |
| **Fatness (relative to 1kHz Sine wave, 500mVpp, 50Ω)** | ≤1MHz: ±0.1dB;<br>≤30MHz: ±0.2dB | ≤1MHz: ±0.1dB;<br>≤60MHz: ±0.2dB | ≤1MHz: ±0.1dB;<br>≤60MHz: ±0.2dB<br>≤80MHz: ±0.4dB | ≤1MHz: ±0.1dB;<br>≤60MHz: ±0.2dB<br>≤100MHz: ±0.4dB |
| **Units** | Vpp, mVpp, Vrms, dBm | | | |
| **Resolution** | 1mV | | | |
| **Impedance** | 50Ω (Typical) | | | |

## 2.8 Offset Characteristic (50Ω)

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Range** | \|Voltset\| < Vmax － Vpp/2 | | | |
| **Accuracy** | ±(1% of setting + 5mV + 0.5% of amplitude) | | | |

## 2.9 Modulation Characteristic

SAG1000 series arbitrary waveform generator supports **AM, DSB-AM, FM, PM, 2ASK, 2FSK, 2PSK BPSK, QPSK, 3FSK, 4FSK, OSK and PWM**.

### 2.9.1 AM&DSB-AM

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal, External, another channel | | | |
| **Modulating Waveforms** | Sine, Square, Ramp, Noise, Arb | | | |
| **Rate** | 2mHz - 50kHz | | | |
| **Depth** | 0% - 120% | | | |

### 2.9.2 FM

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal, External, another channel | | | |
| **Modulating Waveforms** | Sine, Square, Ramp, Noise, Arb | | | |
| **Rate** | 2mHz - 50kHz | | | |

### 2.9.3 PM

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal, External, another channel | | | |
| **Modulating Waveforms** | Sine, Square, Ramp, Noise, Arb | | | |
| **Rate** | 2mHz - 50kHz | | | |
| **Phase Deviation** | 0° to 360° | | | |

### 2.9.4 2ASK&2FSK&2PSK

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal, External | | | |

| | |
|---|---|
| **Modulating Waveforms** | Square with 50% duty cycle |
| **Rate** | 2mHz - 1MHz |

### 2.9.5 BPSK

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal | | | |
| **Data Source** | PN15 code, PN21 code, 01 code, 10 code | | | |
| **Rate** | 2mHz - 1MHz | | | |

### 2.9.6 QPSK

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal | | | |
| **Data Source** | PN15 code, PN21 code | | | |
| **Rate** | 2mHz - 1MHz | | | |

### 2.9.7 3FSK&4FSK

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Source** | Internal | | | |
| **Modulating Waveforms** | Square | | | |
| **Rate** | 2mHz - 1MHz | | | |

### 2.9.8 OSK

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine | | | |
| **Source** | Internal, External | | | |
| **Osc Time** | 8ns - 4.99975ms | | | |

| | |
|---|---|
| **Rate** | 2mHz - 1MHz |

### 2.9.9 PWM

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Square | | | |
| **Source** | Internal, External, another channel | | | |
| **Modulating Waveforms** | Sine, Square, Ramp, Noise, Arb | | | |
| **Rate** | 2mHz - 50kHz | | | |
| **Width Deviation** | 0% to 50% | | | |

### 2.9.10 [Sync/Mod/Trig] Input

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Maximum Input Range** | 75mVRMS to ±2.5Vac+dc | | | |
| **Input Bandwidth** | 10MHz | | | |
| **Input Impedance** | 1kΩ | | | |

## 2.10 Sweep Characteristics

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Direction** | Up | | | |
| **Type** | Linear | | | |
| **Sweep Time** | 1ms to 50ks | | | |
| **Hold/Return Time** | 1ms to 50ks | | | |
| **Trigger Source** | Internal, External, Manual | | | |
| **Mark** | Falling edge of Sync signal (programmable) | | | |

## 2.11 Burst Characteristics

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|

| | | | | |
|---|---|---|---|---|
| **Carrier Waveforms** | Sine, Square, Ramp, Pulse, Harmonics, Arb. (except DC) | | | |
| **Carrier Frequency** | 2mHz - 30MHz | 2mHz - 60MHz | 2mHz - 80MHz | 2mHz - 100MHz |
| **Burst Count** | 1 to 2000 000 000 | | | |
| **Start/Stop Phase** | 0° to 360° | | | |
| **Internal Period** | 2μs to 500s | | | |
| **Gated Source** | External trigger | | | |
| **Trigger Source** | Internal, External or Manual | | | |

## 2.12 Counter

| | **SAG1032** | **SAG1062** | **SAG1082** | **SAG1102** |
|---|---|---|---|---|
| **Function** | Frequency, Period, Positive/Negative Pulse Width, Duty Cycle | | | |
| **Frequency Resolution** | 7 digits/second (Gate Time =1s) | | | |
| **Frequency** | 1μHz to 100MHz | | | |
| **Gate Time** | 10ms - 16s | | | |
| **Voltage Range and Sensitivity** | | | | |
| **DC Coupling** | DC Offset Range | ±1.5VDC | | |
| | 1μHz to 100MHz | 50mVRMS to ±2.5Vac+dc | | |
| **Pulse Width and Duty Cycle Measurement** | | | | |
| **Frequency/ Amplitude Range** | 1μHz to 25MHz | 50mVRMS to ±2.5Vac+dc | | |
| **Pulse Width** | Resolution | 8ns | | |
| **Duty Cycle** | Range (Display) | 0% to 100% | | |
| **Input Characteristics** | | | | |
| **Input Range** | Breakdown Voltage | ±5Vac+dc | Impedance=500Ω | |
| **Input Trigger** | Trigger Level Range | -2.5V to +2.5V | | |
| | Trigger Sensitivity Range | 0% (140mV hysteresis voltage) to 100% (2mV hysteresis | | |

| | | |
|---|---|---|
| | | voltage) |

## 2.13 Trigger Characteristics

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Level** | TTL-compatible | | | |
| **Slope** | Rising or falling (selectable) | | | |
| **Pulse Width** | >50ns | | | |

## 2.14 Clock Reference

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **External Reference Input** | | | | |
| **Lock Range** | 10MHz ± 50Hz | | | |
| **Level** | 2.5Vpp to 5Vpp | | | |
| **Lock Time** | <2s | | | |
| **Impedance** | 5kΩ, AC coupling (Typical) | | | |
| **Internal Reference Input** | | | | |
| **Frequency** | 10MHz ± 50Hz | | | |
| **Level** | 3.3Vpp | | | |
| **Impedance** | 50Ω, AC coupling (Typical) | | | |

## 2.15 Sync Output

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Level** | TTL-compatible | | | |
| **Impedance** | 50Ω, nominal value | | | |

## 2.16 General Specifications

| | SAG1032 | SAG1062 | SAG1082 | SAG1102 |
|---|---|---|---|---|
| **Interface** | USB host, USB device | | | |
| **Display** | 7" 64K color TFT display, 800*480 | | | |
| **Power Voltage** | 100-240V, 45Hz - 440Hz | | | |

| | |
|---|---|
| **Power Consumption** | <50W |
| **Fuse** | T, 3.15A, 250V, 5×20mm |
| **Environmental Temperature** | Operating: 10℃ to 40℃<br>Non-operating: -20℃ to 60℃ |
| **Cooling Method** | Convection |
| **Humidity Range** | ≤+104℉(≤+40°C): ≤90% relative humidity<br>106℉~122℉ (+41°C to 50°C): ≤60% relative humidity |
| **Altitude** | Operating: 3,000 meters<br>No-operating: 15,000 meters |
| **Dimension** | 318 x 110 x 150mm(L x W x H) |
| **Weight** | 3kg |

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