

# S1435 Series Signal Generator

## Datasheet



## The document applies to the signal generator of the following models:

- S1435A Signal Generator (9kHz - 3GHz).
- S1435B Signal Generator (9kHz - 6GHz).
- S1435C Signal Generator (9kHz - 12GHz).
- S1435D Signal Generator (9kHz - 20GHz).
- S1435F Signal Generator (9kHz - 40GHz).

## Standard pack and accessories:

No.	Item
1	Main machine
2	Power cord assembly
3	User manual
4	Programming manual
5	Product certificate

## Options of the S1435 series signal generator in addition to standard accessories:

Model No.	Name	Description
S1435-H01-A	115dB programmable step attenuator	Expand the output power dynamic range.
S1435-H01-C	115dB programmable step attenuator	Expand the output power dynamic range.
S1435-H01-F	115dB programmable step attenuator	Expand the output power dynamic range.
S1435-H02	Analog modulation	Increase analog modulation functions, including AM, FM, $\Phi$ M, and low frequency output.
S1435-H03	Pulse modulation	Increase the pulse modulation function with a minimum pulse width of 100ns.
S1435-H04	Narrow pulse modulation	Increase the pulse modulation function with a minimum pulse width of 20ns.
S1435-H05	Multi-function function generator	Add a richer analog modulation signal format. (Note: The H05 option is available after the H02 analog modulation option is selected).

Model No.	Name	Description
S1435-H06-A	Low phase noise	Optimize phase noise, 10GHz@10kHz: -113dBc/Hz.
S1435-H06-C	Low phase noise	Optimize phase noise, 10GHz@10kHz: -113dBc/Hz.
S1435-H08	High power output	Increase the maximum output power.
S1435-H10	High stability time base option	Internal time base aging rate.
S1435-H50	Calibration certificate	Instrument calibration.
S1435-H91	N type connector for RF output	N type connector for RF output, applicable to S1435D.
S1435-H92	RF output moved to the rear panel	RF output on rear panel.
S1435-H93	Portable handle	3U handle.
S1435-H94	Rack mount kit	Mounting kit for the upper cabinet.
S1435-H95	Aluminum alloy transport case	High-strength lightweight aluminum alloy transport case with handle and universal roller for easy transportation.

## Preface

Thank you for choosing S1435 signal generator produced by Saluki Technology Inc.

We devote ourselves to meeting your demands, providing you high-quality measuring instrument and the best after-sales service. We persist with “superior quality and considerate service”, and are committed to offering satisfactory products and service for our clients.

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## Document Authorization

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## Product Quality Assurance

The warranty period of the product is 5 years from the date of delivery. The instrument manufacturer will repair or replace damaged parts according to the actual situation within the warranty period.

## 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/Settings Management

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

## Contacts

Service Tel: 886. 909 602 109

Website: [www.salukitec.com](http://www.salukitec.com)

Email: [sales@salukitec.com](mailto:sales@salukitec.com)

Address: No. 367 Fuxing N Road, Taipei 105, Taiwan (R.O.C.)

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## 1. Overview

Based on innovative technologies, Saluki S1435 series signal generator achieves balance in terms of performance, economy and volumetric weight. It also has excellent spectral purity, with a single side band (SSB) phase noise of -136dBc/Hz (when the carrier is 1GHz and the frequency offset is 10kHz) or -116dBc/Hz (when the carrier is 10GHz and the frequency offset is 10kHz). It provides a high power output and a large dynamic range, with the maximum output power up to 20dBm@20GHz and an output power dynamic range greater than 150dB. It responds fast and switches to another frequency in only 1ms, which shortens the test time and improves test efficiency, meeting the needs of massive data testing; in addition, it also has excellent analog modulation and pulse modulation functions. By adopting advanced frequency synthesis and RF channel signal processing technologies, it can achieve high performance while reducing the cost. Besides, it is equipped with a 7-inch high-sensitivity LED touch screen, and supports operation by touch screen, panel buttons, rotary knobs, external mouse and keyboard, etc., which fully upgrades the users' operation experience. It adopts portable 3U chassis structure and is featured by small size and light weight, and thus is easy to carry. The S1435 series signal generator can meet both the test requirements for high performance in the R&D phase and the test requirements for high efficiency in the production phase.

### 1.1. Definitions

#### **Specification (Spec.)**

Specifications describe the performance of parameters within the warranty of the instrument. Product specifications applies under the following conditions:

- 1) Two hours storage at ambient temperature(0-40°C) followed by 30 minutes warm-up operation
- 2) Specified environmental conditions met
- 3) Instrument is within its calibration cycle.
- 4) The specification listed in the datasheet includes measurement uncertainties.

Data in this document are Spec. unless otherwise noted.

#### **Typical (typ.)**

Typical data is not guaranteed by instrument warranty. It describes additional product performance information that 80 percent of the units exhibit. Typical data only valid at 25°C. Typical performance does not include measurement uncertainty.

#### **Nominal(nom.)**

Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but are not covered by the product warranty.

## 2. Specifications

### 2. 1. Frequency Features

#### 2. 1. 1. Frequency Range

Model	Frequency	N (number of fundamental and harmonic waves)
<b>S1435A: 9kHz - 3GHz</b> <b>S1435B: 9kHz - 6GHz</b> <b>S1435C: 9kHz - 12GHz</b> <b>S1435D: 9kHz - 20GHz</b> <b>S1435F: 9kHz - 40GHz</b>	9kHz≤f<250MHz	1/8
	250MHz≤f≤375MHz	1/16
	375MHz<f≤750MHz	1/8
	750MHz<f≤1.5GHz	1/4
	1.5GHz<f≤3GHz	1/2
	3GHz<f≤6GHz	1
	6GHz<f≤12GHz	2
	12GHz<f≤24GHz	4
24GHz<f≤40GHz	8	

#### 2. 1. 2. Frequency Reference

<b>Resolution</b>	0.001Hz	
<b>Frequency Switching Time</b>	≤1ms (typical value <sup>2</sup> )	
<b>Time Base Aging Rate (Typ.)</b>	Standard: $\pm 5 \times 10^{-7}$ /year (after continuous switch-on for 30 days) High stability time base option H10: $\pm 5 \times 10^{-8}$ /year (after continuous switch-on for 30 days), $\pm 5 \times 10^{-10}$ /day(after continuous switch-on for 30 days)	
<b>Reference Output</b>	Frequency	10MHz
	Power	>+4dBm, to 50Ω load
<b>Reference Input</b>	Frequency	1MHz - 50MHz, step 1Hz
	Power	0dBm to +7dBm, impedance 50Ω

### 2. 2. Scanning Features

<b>Scanning Mode</b>	Step scan, list scan
<b>Scan Dwell Time</b>	100μs - 100s



## 2. 3. Power Features

### 2. 3. 1. Minimum Power

<b>Standard</b>	-15dBm (can be set -20dBm)
<b>Option H01</b>	-110dBm (can be set -135dBm)

### 2. 3. 2. Maximum Power

- **Settings:**  $25 \pm 10^{\circ}$  C

Frequency Range	Standard	High power output (option H08)
<b>S1435A/B</b>		
9kHz≤f≤3GHz	18dBm	22dBm
3GHz<f≤5GHz	16dBm	20dBm
5GHz<f≤6GHz	15dBm	18dBm
<b>S1435C/D</b>		
9kHz≤f≤3GHz	16dBm	21dBm
3GHz<f≤20GHz	15dBm	20dBm
<b>S1435F</b>		
9kHz≤f≤3GHz	14dBm	20dBm
3GHz<f≤17GHz	13dBm	17dBm
17GHz<f≤40GHz	11dBm	15dBm

### 2. 3. 3. Power Accuracy

- **Settings:**  $25 \pm 10^{\circ}$  C

<b>Standard</b>	Frequency Power (dBm)	10 - max. power	-10 to 10	-15 to -10	
	9kHz≤f≤2GHz	±0.8dB	±0.6dB	±1.5dB	
	2GHz<f≤20GHz	±0.9dB	±0.7dB	±1.5dB	
	20GHz<f≤40GHz	±0.9dB	±0.8dB	±1.8dB	
<b>H01A/B programmable step attenuator option</b>	Frequency Power (dBm)	10 - max. power	-10 to 10	-70 to -10	-90 to -70
	9kHz≤f≤2GHz	±0.8dB	±0.6dB	±0.7dB	±1.4dB
	2GHz<f≤20GHz	±0.9dB	±0.7dB	±0.7dB	±1.6dB
	20GHz<f≤40GHz	±0.9dB	±0.8dB	±1.1dB	±2.0dB

### 2. 3. 4. Power Resolution

<b>Power resolution</b>	0.01dB
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### 2. 3. 5. Output Impedance

<b>Outout impedance</b>	50Ω (rated value3)
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### 2. 3. 6. Source Standing Wave Ratio, VSWR

<b>Frequency Range</b>	<b>Typ.</b>
9kHz≤f≤3GHz	<1.7
3GHz<f≤13GHz	<1.6
13GHz<f≤20GHz	<1.8
20GHz<f≤40GHz	<1.6

### 2. 3. 7. Maximum Reverse Power

<b>Max. Reverse power</b>	0.5W (0V DC) (rated value)
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## 2. 4. Spectral Purity

### 2. 4. 1. Harmonic Wave

- **Settings:** at +10dBm

<b>Frequency Range</b>	<b>Value</b>
9kHz≤f≤10MHz	<-23dBc
10MHz<f≤2GHz	<-30dBc
2GHz<f≤6GHz (1435B)	<-30dBc
2GHz<f≤20GHz	<-55dBc
20GHz<f≤40GHz	<-50dBc (typ.)

### 2. 4. 2. Subharmonic Wave

- **Settings:** at +10dBm

<b>Frequency Range</b>	<b>Value</b>
9kHz≤f≤6GHz	None
6GHz<f≤12GHz	<-60dBc
12GHz<f≤24GHz	<-55dBc

24GHz<f≤40GHz	<-50dBc
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### 2. 4. 3. Non-Harmonic Wave

- **Settings:** at 0dBm, 10kHz Frequency Offset

Frequency Range	Standard
9kHz≤f≤250MHz	<-54dBc
250MHz<f≤3GHz	<-62dBc
3GHz<f≤6GHz	<-56dBc
6GHz<f≤12GHz	<-50dBc
12GHz<f≤24GHz	<-44dBc
24GHz<f≤40GHz	<-38dBc

### 2. 4. 4. SSB Phase Noise

- **Settings:** at 10dBm
- **Standard**

Frequency	100Hz	10kHz
100MHz	-83	-115
250 MHz	-93	-127
500MHz	-89	-121
1 GHz	-83	-115
2 GHz	-77	-109
3GHz	-74	-105
4 GHz	-71	-103
6 GHz	-68	-99
10 GHz	-63	-95
20 GHz	-57	-89
40 GHz	-51	-83

- **Low Phase Noise (Option H06)**

Frequency	100Hz	1kHz	10kHz	100kHz
100MHz	-83	-112	-131	-131

250 MHz	-93	-123	-139	-139
500MHz	-89	-119	-135	-135
1 GHz	-83	-113	-132	-132
2 GHz	-77	-107	-126	-126
3GHz	-74	-104	-121	-121
4 GHz	-71	-101	-120	-120
6 GHz	-68	-98	-115	-115
10 GHz	-63	-93	-113	-113
20 GHz	-57	-87	-107	-107
40 GHz	-51	-81	-101	-101

## 2. 5. Modulation Features

<b>Frequency Modulation</b> <b>(Option H02)</b>	<p>Maximum frequency offset: <math>N \times 16\text{MHz}</math> (N is the number of fundamental harmonic wave).</p> <p>Accuracy (1kHz modulation rate, frequency offset: <math>N \times 500\text{kHz}</math>): <math>\pm (2\% \times \text{set frequency offset} + 20\text{Hz})</math>.</p> <p>Modulation rate (3dB bandwidth, frequency offset: <math>N \times 500\text{kHz}</math>): DC - 7MHz.</p> <p>Distortion (1kHz rate, frequency offset: <math>N \times 500\text{kHz}</math>): &lt;0.4%.</p>
<b>Phase Modulation</b> <b>(Option H02)</b>	<p>Maximum phase offset: <math>N \times 16\text{rad}</math> (N is the number of fundamental harmonic wave).</p> <p>Accuracy (1kHz modulation rate, frequency offset: <math>N \times 500\text{kHz}</math>): <math>\pm (2\% \times \text{set phase offset} + 0.01\text{rad})</math>.</p> <p>Modulation rate (3dB bandwidth, phase offset: <math>N \times 8\text{rad}</math>): DC - 1MHz.</p> <p>Distortion (1kHz modulation rate, phase offset: <math>N \times 8\text{rad}</math>): &lt;0.4%.</p>
<b>Amplitude Modulation</b> <b>(Option H02)</b>	<p>Maximum depth: &gt;90%.</p> <p>Modulation rate: (1kHz modulation rate, 30% modulation depth): <math>\pm (4\% \times \text{set depth} + 1\%)</math>.</p> <p>Modulation rate (bandwidth: 3dB; modulation depth: 30%; frequency test points: 1GHz, 5GHz, 20GHz, 40GHz): DC - 100kHz.</p> <p>Distortion: (1kHz modulation rate, linear mode, total harmonic distortion, 30% modulation depth): &lt;2%.</p>
<b>Pulse Modulation <sup>5</sup></b> <b>(Option H03)</b>	<p>Switching ratio: &gt;80dB.</p> <p>Rise and fall time: &lt;10ns.</p> <p>Minimum pulse of internal fixed amplitude: <math>1 \mu\text{s}</math>.</p>

	Minimum pulse of non-fixed amplitude: 100ns.
<b>Narrow Pulse Modulation 5 (Option H04)</b>	<p>Switching ratio: &gt;80dB.</p> <p>Rise and fall time: &lt;10ns.</p> <p>Minimum pulse of internal fixed amplitude: 1 <math>\mu</math> s.</p> <p>Minimum pulse of non-fixed amplitude: 20ns.</p>
<b>Internal Analog Modulation Signal Generator (Option H02)</b>	<p>It provides three independent signals for frequency/phase modulation, amplitude modulation and low frequency output signals.</p> <p>Waveform: sine wave, square wave, triangle wave, sawtooth wave.</p> <p>Frequency range: sine wave 0.1Hz - 10MHz.</p> <p>Square wave, triangle wave, sawtooth wave 0.1Hz - 1MHz.</p> <p>Frequency resolution: 0.1Hz.</p> <p>Low frequency output: amplitude 0 - 5V peak (rated value), to 50<math>\Omega</math> load.s</p>
<b>Internal Pulse Generator (Option H03)</b>	<p>Pulse width: 20ns - (42s-10ns) (rated value).</p> <p>Pulse period: 40ns - 42s (rated value).</p> <p>Resolution: 10ns.</p>
<b>Multi-Function Function Generator (Option H05)</b>	<p>The Multi-function generator consists of 7 waveform generators. The generator can be set separately or five generators can be set simultaneously by using the AM, FM/<math>\Phi</math>M and the composite modulation features in the low-frequency output.</p> <p>Waveform:</p> <p>Function generator 1: sine wave, triangle wave, square wave, sawtooth wave, pulse</p> <p>Function generator 2: sine wave, triangle wave, square wave, sawtooth wave, pulse</p> <p>Dual function generator: sine wave, triangle wave, square wave, sawtooth wave, pulse, phase offset and amplitude ratio of audio 2 relative to audio 1;</p> <p>Scan function generator: sine wave, triangle wave, square wave, sawtooth wave;</p> <p>Noise generator 1: uniform, Gaussian;</p> <p>Noise generator 2: uniform, Gaussian;</p> <p>DC: LF output only;</p> <p>Frequency parameters:</p> <p>Sine wave: 0.1Hz to 10MHz;</p> <p>Triangle wave, square wave, sawtooth wave, pulse: 0.1Hz to 1MHz;</p> <p>Resolution: 0.1Hz.</p>

## 2. 6. General Features

<b>RF Output Port</b>	S1435A/B/C: N type (negative), impedance 50 Ω
	S1435D: 3.5mm (positive), N type (negative) (option H91), impedance 50 Ω
	S1435F: 2.4mm (positive), impedance 50 Ω
<b>Max.Dimensions</b> (W × H × D)	330mm × 147mm × 397mm (excluding the handle)
	420mm × 147mm × 445mm (including the handle)
<b>Weight</b>	<12kg (the weight varies with the model and option configuration)
<b>Power Supply</b>	100 - 120VAC, 50 - 60Hz; or 200 - 240VAC, 50 - 60Hz (self-adaptive)
<b>Power Consumption</b>	Less than 300W
<b>Temperature Range</b>	Operating temperature: 0° C to +50° C; storage temperature: -40° C to +70° C

### Note:

1. The S1435 series signal generator can be stored at ambient temperature for 2 hours. After preheating for 30 minutes, the attenuator is automatically coupled (or ALC power is greater than -5dBm) to meet the performance of each indicator within a given working range.
2. The typical value is a supplementary feature given based on the stereotype value, which is only for user reference, and will not be assessed.
3. The rated value refers to the expected performance, or describes the product performance that is useful in the product but is not included in the product warranty.
4. The spectral purity indicates that the point frequency has no modulation mode.
5. The technical specifications of pulse modulation and narrow pulse modulation are applicable to frequencies above 50MHz.

## 2. 7. Compliant

### 2. 7. 1. CE



- EMC

Complies with the requirements of the **EC EMC** directives.

Test Standards:EN 61326

- Safety

Complies with **EC LVD** Directive.

Test Standard:EN61010-1

### 2. 7. 2. ISO



- Manufacturing

This instrument is manufactured in an ISO-9001 registered facility

**- End of Document -**