

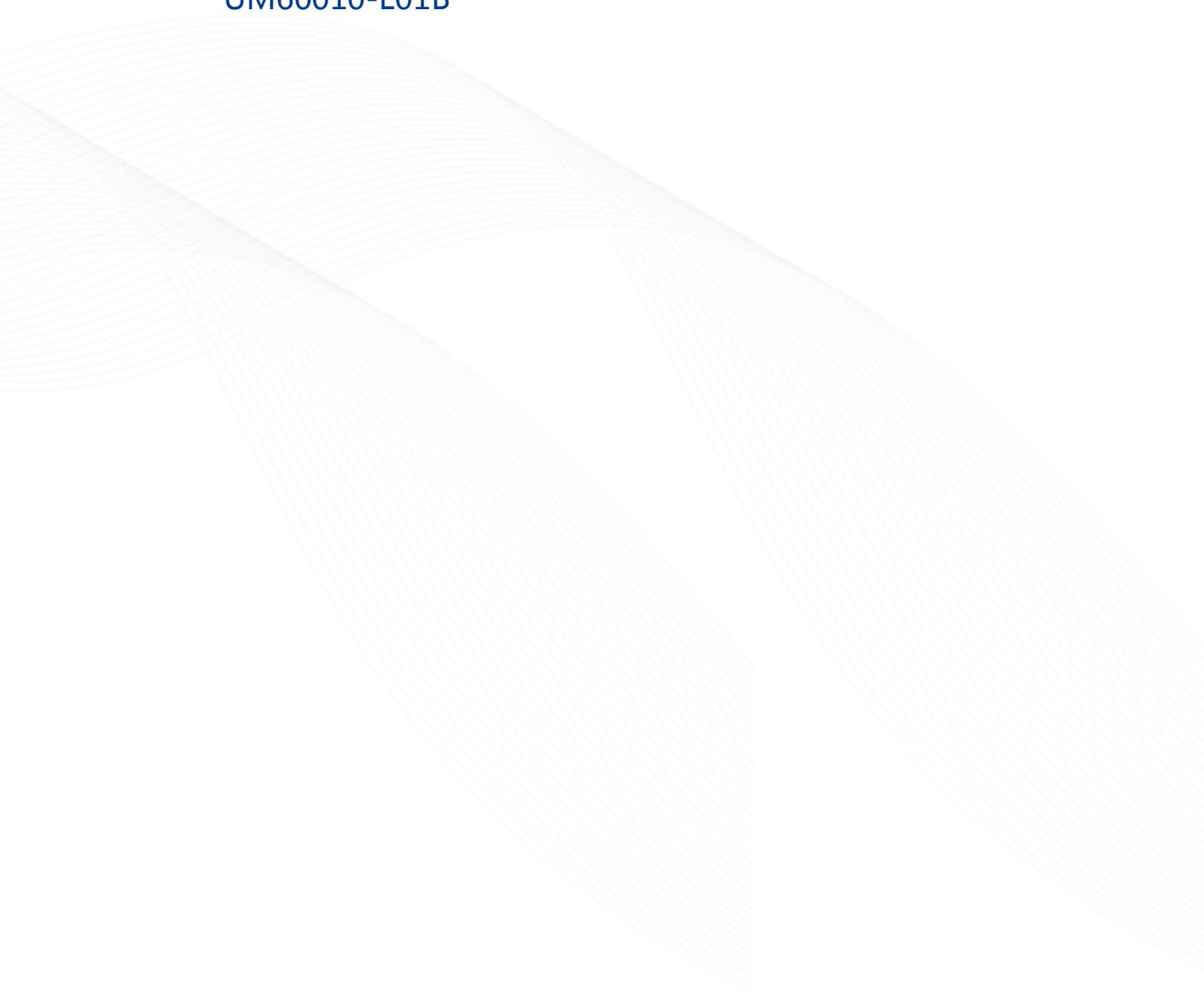


**SPA1010**

**Power Amplifier**

User Manual

UM60010-E01B



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# 1 General Safety Summary

This chapter contains information and warnings that must be followed to keep the instrument operating under the appropriate safety conditions. In addition to the safety precautions specified in this section, you must also follow recognized safety procedures.

## 1.1 Safety Terms and Symbols

When the following symbols or terms appear on the front or rear panel of the instrument or in this manual, they indicate special care in terms of safety.

	This symbol is used where caution is required. Refer to the accompanying information or documents in order to protect against personal injury or damage to the instrument.
	This symbol warns of a potential risk of shock hazard.
	This symbol is used to denote the measurement ground connection.
	This symbol is used to denote a safety ground connection.
	This symbol is used to represent alternating current, or "AC".
<b>CAUTION</b>	The " <b>CAUTION</b> " symbol indicates a potential hazard. It calls attention to a procedure, practice or condition which may be dangerous if not followed. Do not proceed until its conditions are fully understood and met.
<b>WARNING</b>	The " <b>WARNING</b> " symbol indicates a potential hazard. It calls attention to a procedure, practice or condition which, if not followed, could possibly cause bodily injury or death. If a <b>WARNING</b> is indicated, do not proceed until the safety conditions are fully understood and met.

## 1.2 Working Environment

This instrument is intended for indoor use and should be operated in a clean,

dry environment with an ambient temperature range of 0 °C -40 °C.

**Note:** Direct sunlight, radiators, and other heat sources should be taken into account when assessing the ambient temperature.

	<b>WARNING:</b> Do not operate the instrument in an explosive atmosphere or wet and damp conditions.
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	<b>CAUTION:</b> Do not connect the output to a signal source or power source.
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	<b>CAUTION:</b> The input impedance of the instrument ( $Z_i$ ) is 15 k $\Omega$ , and the range of voltage is -6.5 V ~ +6.5 V (1X voltage gain) or -1.3 V ~ +1.3 V (10X voltage gain setting). Input exceeds these ranges may cause damages to the instrument or other hazards.
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### 1.3 Cooling Requirements

This instrument relies on the forced air cooling with internal fans and ventilation openings. Care must be taken to avoid restricting the airflow around the apertures (fan holes). To ensure adequate ventilation, it is required to leave enough gap around the sides of the instrument.

	<b>CAUTION:</b> Do not block the ventilation holes located on both sides of the instrument.
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	<b>CAUTION:</b> Do not allow any foreign matter to enter the instrument through the ventilation holes, etc.
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## 1.4 Use The Proper Power Adapter

Use only the power adapter provided in the accessories. Use only the power cord specified for this adapter and certified for the country of use.



**CAUTION:** Do not use any other adapters to supply power for the instrument, or it may cause degradation or perpetual damage.

## 1.5 Cleaning

Clean only the exterior of the instrument, using a damp, soft cloth. Do not use chemicals or abrasive elements. Under no circumstances allow moisture to penetrate the instrument. To avoid electrical shock, unplug the power cord from the AC outlet before cleaning.



**WARNING:** Electrical Shock Hazard!  
No operator serviceable parts inside. Do not remove covers.  
Refer servicing to qualified personnel

## 1.6 Abnormal Conditions

Only operate the instrument for the purposes specified by the manufacturer.

Do not operate the instrument if there is any visible sign of damage or has been subjected to severe transport stresses.

If you suspect the instrument's protection has been impaired, disconnect the power cord and secure the instrument against any unintended operation.

Proper use of the instrument depends on careful reading of all instruction and labels.



**WARNING:** Any use of the instrument in a manner not specified by the manufacturer may impair the instrument's safety protection. This instrument should not be directly connected to human subjects or used for patient monitoring.

## 2 SPA1010 Power Amplifier Introduction

The SPA1010 is a power amplifier designed to source up-to 1 MHz full power bandwidth at 90 V/us slew rate. It is ideal for increasing the power output for any SIGLENT Function/Arbitrary Waveform Generators but can also be used with other manufacturers' products.

### Features

- 10 W output power
- Two gain settings (x1 or x10)
- Over current protection and over temperature protection
- Compact size, easy to carry and use.

## 3 Quick start

This chapter shows you how to operate the front/rear panel and steps for your first use of the instrument.

### 3.1 General Inspection

#### 1. Inspect the shipping container.

Keep the damaged shipping container or cushioning material until the contents of the shipment have been completely checked and the instrument has passed both electrical and mechanical tests.

The consigner or carrier will be responsible for damages to the instrument resulting from shipment. SIGLENT would not provide free maintenance or replacement.

#### 2. Inspect the instrument.

If there are instruments found damaged, defective or failure in electrical and mechanical tests, please contact SIGLENT.

#### 3. Check the accessories.

Please check the accessories according to the packing list. If the accessories are incomplete or damaged, please contact your SIGLENT sales representative.

### 3.2 The Front Panel

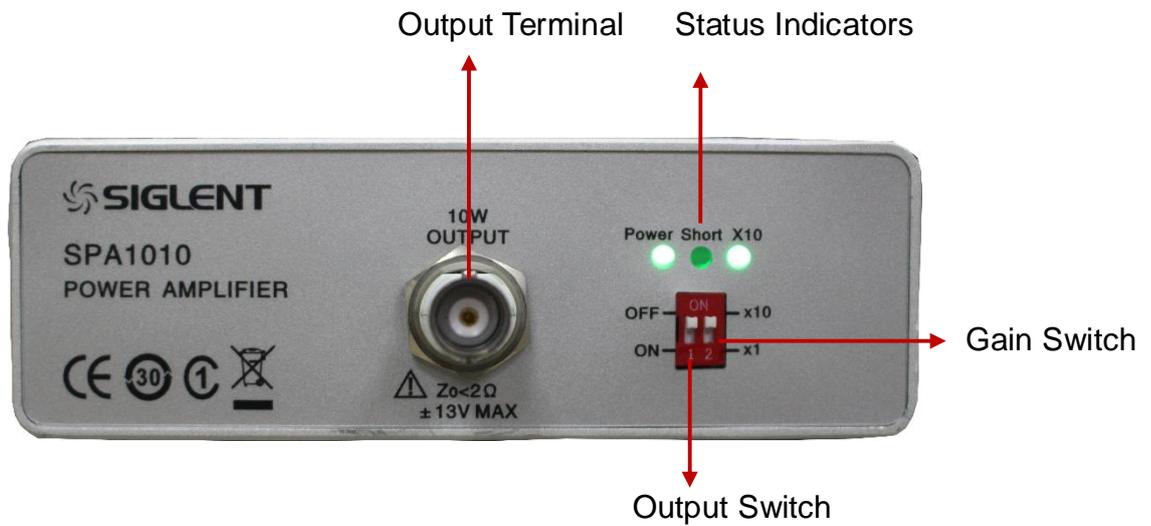


Figure 1 SPA1010 Front Panel

#### Status Indicators

- **Power:** On Green, indicates that the power supply is operating and the instrument is on.
- **Short:** On Red, indicates that the over current protection is enabled.
- **X10:** On Green, indicates that the voltage gain select is set to X10.

### 3.3 The Rear Panel

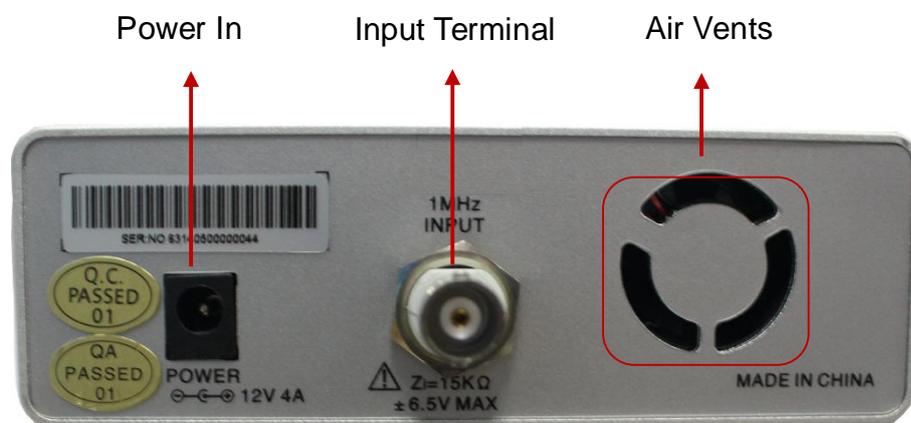


Figure 2 SPA1010 Rear Panel

## 4 Operation

For the details of each selection on the front panel of SPA1010, see table below:

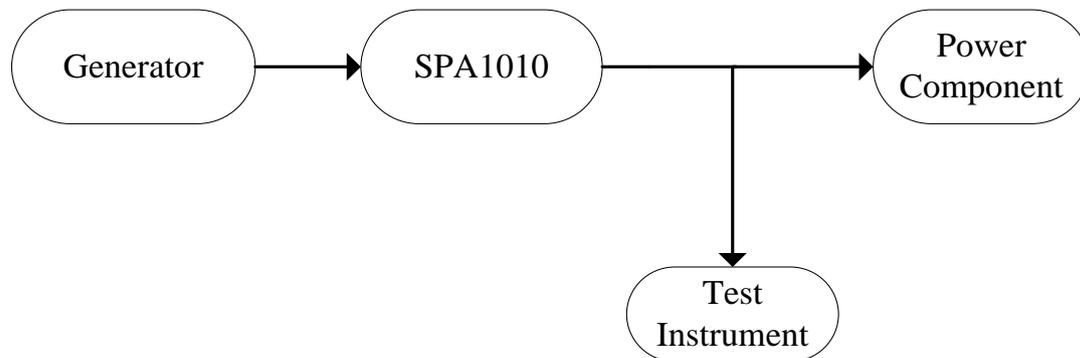
<b>Function</b>	<b>Setup</b>	<b>Explanation</b>
Gain	X1, X10	Sets the gain. The input ranges of signals are different with different gain settings.
Output Switch	ON, OFF	Enables or disables the output.

## 5 Application Examples

### Power Component Measurements

The SPA1010 can be used to amplify the output signal of a generator to evaluate the performance of a power component. In virtue of its wide bandwidth and high speed output, users can evaluate or test the components through various waves, pulses and arbitrary waves.

See the measurement system of a power component below:



## 6 Troubleshooting

This chapter lists some troubles that may occur when you use the power amplifier and the corresponding solutions. Please follow the appropriate steps to deal with; if the trouble still exists, please contact SIGLENT for help.

### **No response at the output when connect the DC power.**

- (1) Check if the power adapter/plug is correctly connected
- (2) Check if the power switch is enabled
- (3) After above checks, restart the instrument
- (4) If it is still not operating correctly, , please contact SIGLENT for help

### **Circuit Protection**

The instrument will trigger over-current protection or over-temperature protection once the output current is too high or the internal temperature of SPA1010 is abnormal (over temperature) to avoid damage.

SPA10100 must be restarted after the protection is activated.

We suggest you to inspect the load of the SPA1010 or the ambient temperature and make sure both of these specifications are within the limits when the circuit protection is activated.

## 7 Specifications

All specifications listed in the table below can be met under following two conditions unless where noted:

- The instrument has been continuously operated for more than 30 minutes within the operating temperature range.
- All the specifications are guaranteed except for those marked “typical”.

<b>Signal Input</b>	
Input Impedance	15 k $\Omega$
External Input	-6.5 V ~ +6.5 V (Gain: X1) -1.3 V ~ +1.3 V (Gain: X10)
<b>Amplifier</b>	
Gain	10 V/1 V and 10 V/10 V
Virtual Value of Output Power	10 W (typical, input: Sine, 1 kHz, X1, R <sub>L</sub> = 7.5 $\Omega$ ) (Note <sup>1</sup> )
Output Voltage	25.4 V <sub>pp</sub> (input: Sine, 1 kHz, R <sub>L</sub> = 1 k $\Omega$ )
Output Current	1.12 A (input: Sine, 1 kHz, R <sub>L</sub> = 8 $\Omega$ )
Output Impedance	< 2 $\Omega$
-3dB Bandwidth	$\geq$ 1 MHz
Full Power Bandwidth	$\geq$ 1 MHz (Note <sup>2</sup> )

<sup>1</sup> The output power of the SPA1010 is limited by frequency. When the input frequency is between 500 Hz and 200 kHz, the SPA1010 is able to deliver 10 watts into an 8  $\Omega$  load. As the SPA10100 has overload protection circuit and thermal protection circuit to prevent permanent damage, it will not deliver 10 watts when the input frequency is below 500 Hz and above 200 kHz.

<sup>2</sup> The full power bandwidth refers to the maximum frequency of the signal generated with undistorted and utmost amplitude in AC output state from the Amplifier.

$$FPB = \frac{SR}{2\pi V_{max}}$$

SR: Slew Rate; V<sub>max</sub>: Maximum undistorted output amplitude

Slew Rate	$\geq 90 \text{ V}/\mu\text{s}$ (Note <sup>3</sup> )
Overshoot	$\leq 4\%$
Maximum Allowed Access to Capacitive Load	1 $\mu\text{F}$
Over temperature Protection Threshold	60 °C
<b>Power In</b>	
Rated Voltage	12 Vdc
Rated Current	4 A
<b>Others</b>	
Operating Temperature	0 ~ 40°C
Dimension( W x H x D)	193 mm x 122 mm x 42 mm
Net Weight	540 g

<sup>3</sup> Slew Rate: When you send a large step signal to the amplifier, the output slope of signal will be stable as a constant at some certain point; this constant is named Slew Rate.

## 8 Contact SIGLENT

### America

#### **SIGLENT Technologies NA, Inc**

6557 Cochran Rd Solon, Ohio 44139

Tel: 440-398-5800

Toll Free: 877-515-5551

Fax: 440-399-1211

[info@siglent.com](mailto:info@siglent.com)

[www.siglentamerica.com](http://www.siglentamerica.com)

### Headquarters

#### **SIGLENT TECHNOLOGIES CO., LTD.**

Blog No.4 & No.5, Antongda Industrial Zone, 3rd Liuxian Road, Bao'an District, Shenzhen, 518101, China.

Tel: + 86 755 3688 7876

Fax: + 86 755 3359 1582

[market@siglent.com](mailto:market@siglent.com)

[www.siglent.com/ens](http://www.siglent.com/ens)

### Europe

#### **SIGLENT TECHNOLOGIES EUROPE GmbH**

Liebigstrasse 2-20, Gebaeude 14, 22113 Hamburg Germany

Tel: +49(0)40-819-95946

Fax: +49(0)40-819-95947

[info-eu@siglent.com](mailto:info-eu@siglent.com)

[www.siglenteu.com](http://www.siglenteu.com)

#### **About SIGLENT**

SIGLENT is an international high-tech company, concentrating on R&D, sales, production and services of electronic test & measurement instruments.

SIGLENT first began developing digital oscilloscopes independently in 2002. After more than a decade of continuous development, SIGLENT has extended its product line to include digital oscilloscopes, function/arbitrary waveform generators, digital multimeters, DC power supplies, spectrum analyzers, isolated handheld oscilloscopes and other general purpose test instrumentation. Since its first oscilloscope, the ADS7000 series, was launched in 2005, SIGLENT has become the fastest growing manufacturer of digital oscilloscopes. We firmly believe that today SIGLENT is the best value in electronic test & measurement.

#### **Headquarter:**

SIGLENT TECHNOLOGIES CO., LTD.  
Add: Blog No.4 & No.5, Antongda Industrial Zone, 3rd Liuxian Road, Bao'an District, Shenzhen, 518101, China.  
Tel: + 86 755 3661 5186  
Fax: + 86 755 3359 1582  
Email: sales@siglent.com;  
Website: <http://www.siglent.com/ens/>

#### **USA:**

SIGLENT Technologies America, Inc  
6557 Cochran Rd Solon, Ohio 44139  
Tel: 440-398-5800  
Toll Free: 877-515-5551  
Fax: 440-399-1211  
Email: info@siglent.com  
Website: [www.siglentamerica.com](http://www.siglentamerica.com)

#### **Europe:**

SIGLENT TECHNOLOGIES EUROPE GmbH  
ADD: Liebigstrasse 2-20, Gebaeude 14,  
22113 Hamburg Germany  
Tel: +49(0)-819-95946  
Fax: +49(0)-819-95947  
Email: info-eu@siglent.com  
Website: [www.siglenteu.com](http://www.siglenteu.com)

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