Semight INSTRUMENTS

Precision PSMU

S3029P

Datasheet V1.3

Compliance with PXIe standard.
Maximal ±2A pulse current output.
Fast rising time up to 400ns or below.
Minimal 3μs pulse width. Maximal sampling rate 125MS/s

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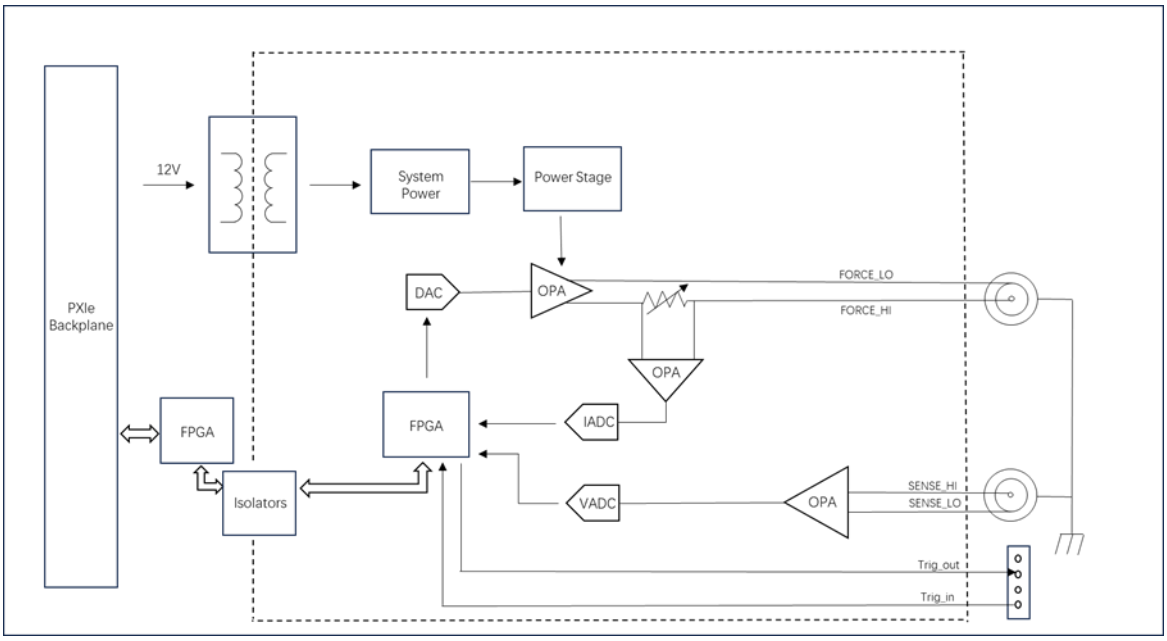
1 Product Description

S3029P by Semight is a standard single-channel pulse current source/measurement unit. It can output ±2A high-precision current pulses. It supports the mainstream PXIe chassis and the legacy SCPI commands for software controlling. S3029P can be used as either a master or a slave in order to achieve multi-card synchronization. It supports the measurement of pulse current and voltage synchronously. S3029P covers the broad applications: semiconductor device testing, laser driver, material research, EMC inspection, etc. It enables one-stop solution to meet the challenges in current pulse measurement in many applications.



S3029P Block Diagram

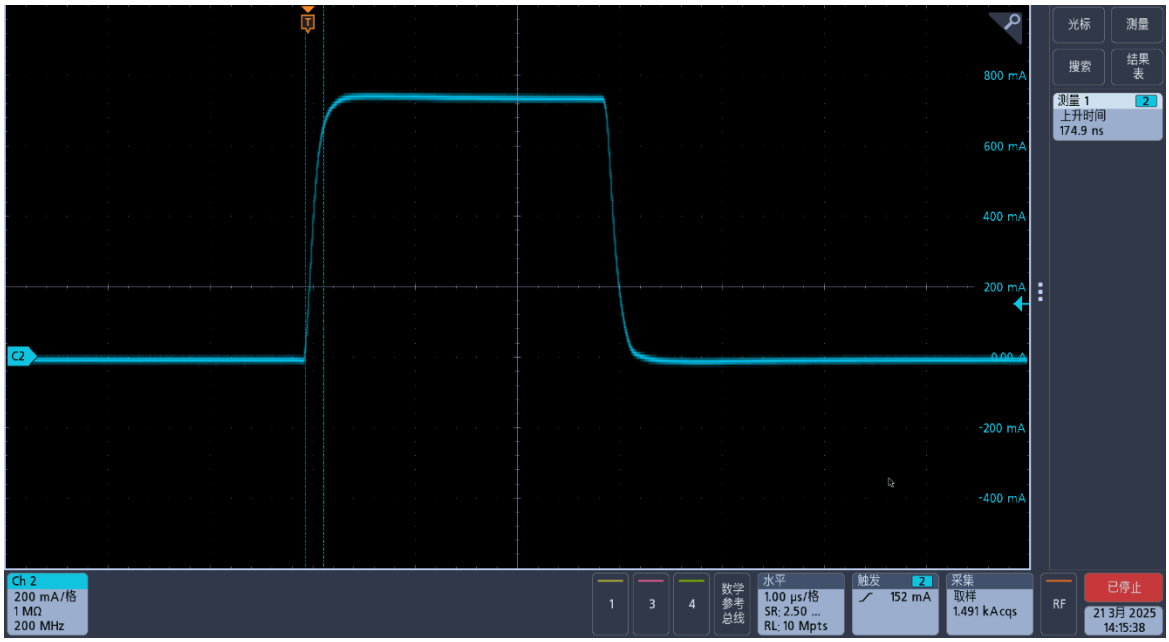
2 Features and Highlights

Maximal Range

- S3029P outputs maximal ±2A pulse current, and has three ranges for current measurement: ±0.15A, ±0.75A and ±2A. User can choose the fixed range or auto-range according to their needs.

Pulse Width and Rising Time

- S3029P achieves a rise time of less than 400ns (10%-90%) using a 2m length standard cable, therefore resulting in the pulse width as low as 3μs.



Typical Rising Time

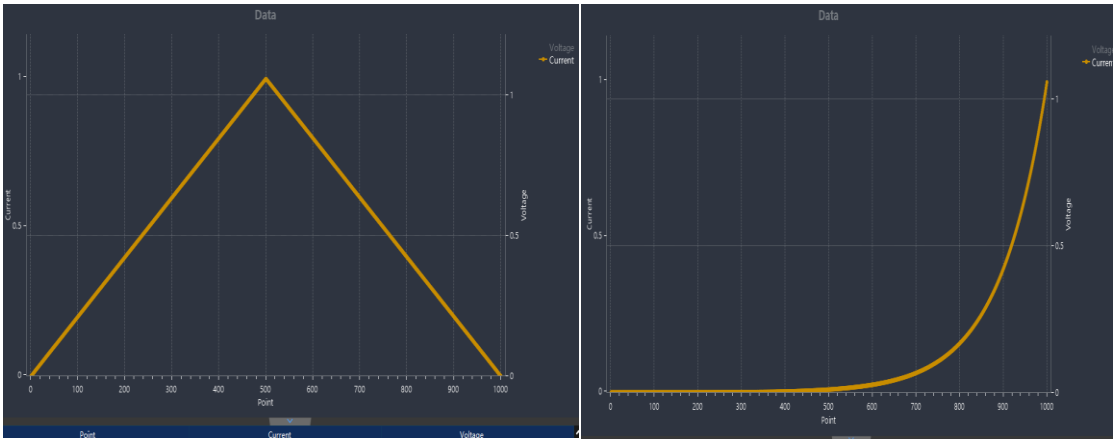
Capability in Adjusting the Load Response

- According to the characteristics of load and line, S3029P is capable to adjust the load response by setting the user parameters. The adjustment of load response can be used to optimize the waveform quality.

Before Adjustment (left) vs After Adjustment (Right)

Scan Mode

- The current source supports unidirectional linear scan, bidirectional linear scan, unidirectional logarithmic scan, bidirectional logarithmic scan, list scan, with the number of points up to 65535 in a single scan. It supports both unlimited pulse mode for continuous pulse output and DC output mode.



Bidirectional Linear Scan (left) vs Unidirectional Logarithmic Scan (right)

High Sampling Rate

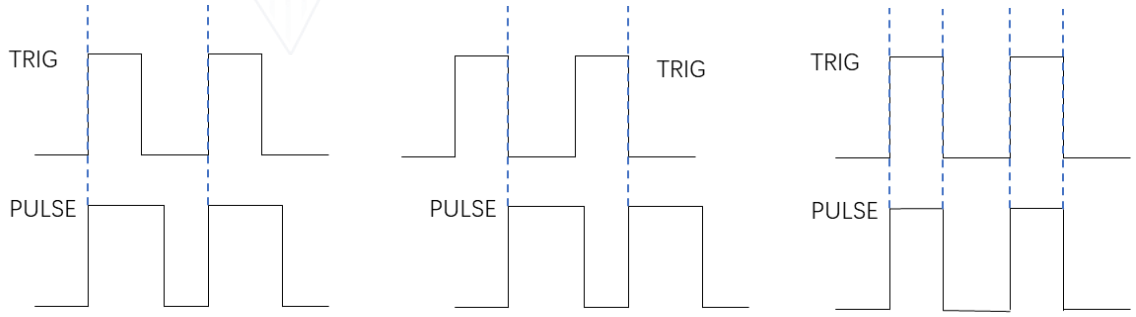
- S3029P utilizes a 125Msps high speed ADC so as to enable fast readback of test results. The NPLC value can be programmed.

Multiple Protection

- Support over-temperature protection and the over-temperature threshold can be set. In case of very high internal temperature caused by environment abnormality or misconfigurations, the S3029P will automatically power off and restart again once the error is clear up.
- Support over-current protection. The S3029P board will light up red and shut down the output if the current exceeds the setting value of threshold.
- Support over-voltage protection. The board will light up red and shut down the output if the load voltage exceeds the maximal value of voltage sampling range.

Trig

- Built-in multiple PXIe and external input (Trig_in) and output (Trig_out) trig channel. User can select the trig channels to achieve multi-card measurement synchronization.
- There are three trig models, including rising edge trig, failing edge trig, and dual edge trig. Each mode is user selectable.
- The pulse width of trig signal can be set by users.



Rising Edge Trigger　　Falling Edge Trigger　　Dual-Edge Trigger

Minimal PC Requirements

- Intel i7 and above
- 8GB memory
- Installation of the software driver by Semight
- Windows11 (64bit) / Windows10 (64bit) / Windows7 (64bit)

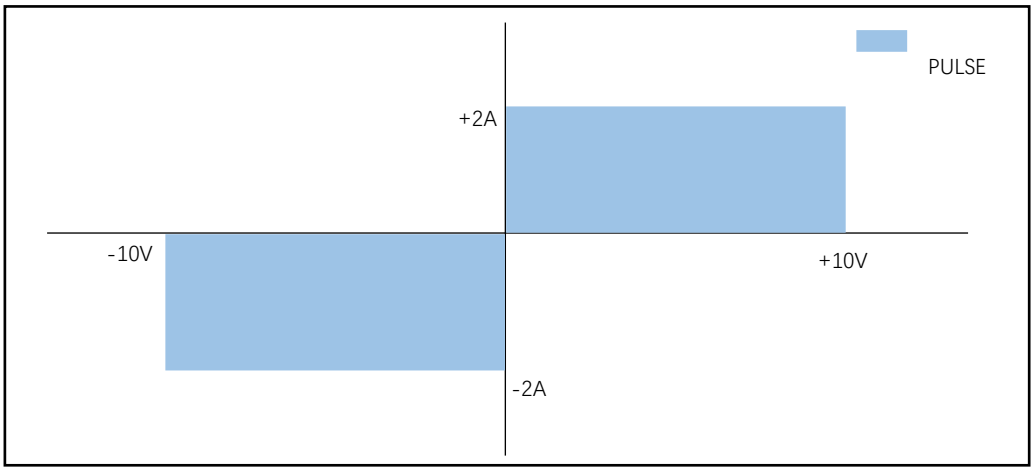
3 Specifications

Operation Conditions:

1. Temperature: 23℃±5℃
2. Ambient temperature change within ±3℃, 2-hour later after system warming up
3. The total inductance along transmission line and DUT < 200nH (100k)
4. Calibration period of 1 year
5. Measurement with 0.02 NPLC

6. Maximum fan speed for PXIe chassis

Current/Voltage Output Capability



I-V Output Capability

Pulse Current Output

Parameter	Specification			
Current Accuracy	Range	Programming Resolution	Accuracy[1] (1Y) ± (%RD+Offset)	*Typical Noise[3] (RMS)* 1Hz-10MHz
	±150mA[2]	20μA	0.1%+0.2mA	0.2mA
	±750mA	20μA	0.1%+0.3mA	0.3mA
	±2A	40μA	0.1%+2mA	0.4mA
Maximum Load Voltage Drop	10V			
Pulse Width Resolution	80ns			

Parameter	Specification	
Maximal Pulse Width T_{on-max}	500μs	
Minimal Pulse Width T_{on-min}	3μs	
Pulse Minimal Cut-off Time $T_{off-min}$	100μs	
Pulse Width Accuracy	100ns[4]	
Pulse Period Jitter	500ns（Typical）	
Rising Time (10%-90%)	< 400ns[4][5][6]	
Pulse Overshoot	< 3%[4][5][6]	
Current Regulation Rate	Line Regulation	0.05% of Range
	Load Regulation	±100μA
Duty Cycle Limitation[7]	D≤50%, where: $D < 3/[(Vsp - Vload) \times (\lvert Iset \rvert - \lvert Ibias \rvert)]$	
Maximum Number of Pulses per Scan	65535	

[1]Test Setup：current pulse width 500μs，use of high accuracy ammeter，measurement speed 0.02 NPLC；

[2]Switched internally, user setting not required；

[3]Measure the voltage noise across a 10Ω load resistor, and then calculate the corresponding current noise using the formula I=V/R；

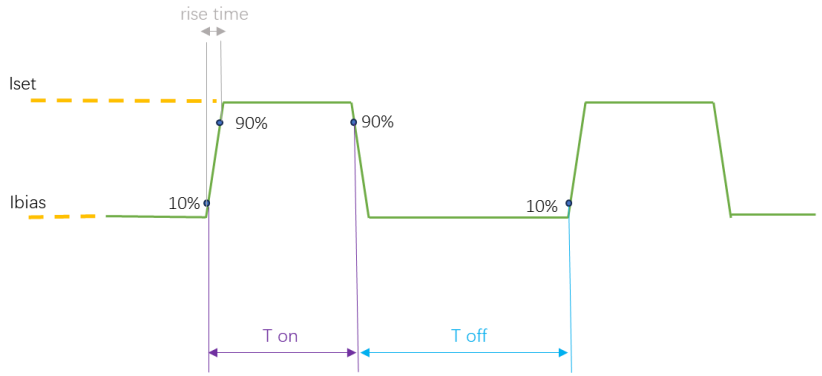
[4]Bias current>1mA，pulse width measured from 10% of rising edge to 90% of falling edge；

[5]Load: 0.5Ω resistor；

[6]Total inductance of output lineand DUT < 200nH（100k）；

[7] Iset：setting current；Ibias：bias current；D：duty cycle；Vsp：programmed source voltage from 5-40V；Vload：voltage drop of load；

Note: In current output mode, the instrument will automatically detect the circuit loop state. In case of external circuit open, it will shut down the output and report error.



Pulse Measurement (both Voltage and Current)

Parameter	Specification		
Pulse Voltage Measurement	Range	Display Resolution	Accuracy ± (%RD+Offset)
	6V	1mV	0.1%+22mV
	10V	10mV	0.1%+24mV
Pulse Current Measurement	Range	Display Resolution	Accuracy ± (%RD+Offset)
	150mA	100μA	0.1%+1mA
	750mA	100μA	0.1%+3mA
	2A	1000μA	0.1%+15mA
Sense Constrain (PULSE VM)	Max Voltage between HI and SENSE HI =±10V; Max Voltage between LO and SENSE LO =±10V;		

Sampling Rate and NPLC

NPLC	Sampling Rate[8]
0.0000004~10	5sps~125Msps

[8]With asynchronous mode, the number of points for consecutive data is 2048;

Bias Current

Parameter	Specification				
Current Accuracy	Range	Max Current	Programming Resolution	Accuracy ± (%RD+Offset)	*Typical Noise[3] (RMS) 1Hz-10MHz*
	±0.15A	50mA	20μA	0.1%+0.2mA	0.2mA
	±0.75A		20μA		
	±2A		40μA		

Trig Signal

Trig Source	Trig Function	Level	Delay[8] (Typical[9])	Trig Mode
PXI0-PXI7	Trig_IN[10]	/	500ns	Rising/Falling/Dual Edge
PXI0-PXI7	Trig_OUT[11]	/	300ns	Rising Edge
DIO[12]	Trig_IN	5V	500ns	Rising/Falling/Dual Edge
DIO	Trig_OUT	5V	300ns	Rising Edge

[8]The delay between trig signal and current pulse;

[9]Test setup: output current > 100mA, bias current > 1mA;

[10]Trig_In (slave);

[11]Trig_Out (master);

[12]Max input voltage 5V, min input voltage 0V, VOL 1.5V, VOH 3.5V, max output/input current 2mA.

Environment

Parameter	Specifications
Environment	Indoor
Operation Conditions	0℃ ~ +50℃, < 70% RH (no condensation)

Storage Temperature	-30℃ ~ 70℃
Altitude	Operation: 0m ~ 2000m Storage: 0m ~ 4600m
Preheating	2 hour
Power Supply	Full Load: 12V/5A; 3.3V/0.5A; 5V/0.2A
Pollution Level	2
Size (mm)	210*130*41
Net Weight	0.55kg

* size and weight might vary with different options

* Warning: external source is not allowed, when output is disabled

4 Procurement

Factory accessories with product: USB flash drive with software and manuals (PC software, drivers, product specifications documentation, user manual for PC software), DIO trig signal interface terminal

Product Model	
S3029P	Precision PSMU
Accessories	
FC010013	PSMU
FC010014	PSMU
Service	
R3C	Factory Extended Service Plan – 36 months
R5C	Factory Extended Service Plan – 60 months

5 Warranty

No	Item	Description	Warranty Time
1	Machine	Free repair (except for ESD or human damage)	12 months
2	Calibration Interval	Factory calibrated or calibrated at the nearest Semight service center	12 months
3	Accessories	Consumables and accessories are not covered under warranty	

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*Product specifications and descriptions herein may be updated without notice.