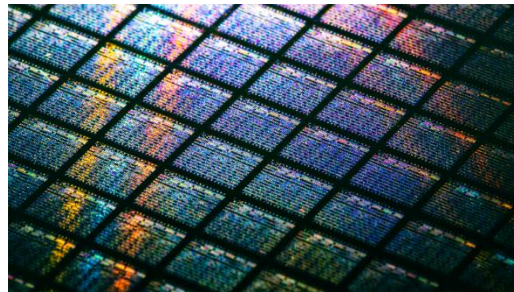
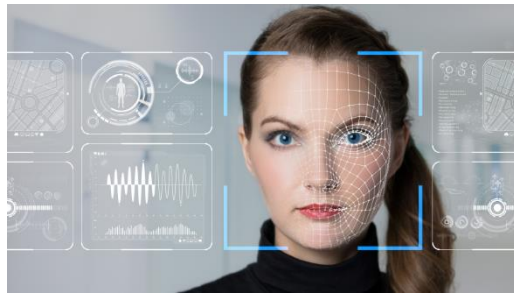
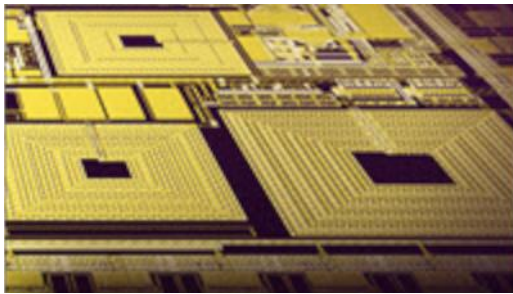


PZ2100 Series High-Channel Density Precision Source / Measure Unit Solution

Precision high-density ATE solution with flexible
module options

Managing the Cost and Complexity of Integrated Devices, Modules, and Circuits

As devices, modules, and integrated circuits (ICs) become more highly integrated, the number of ports you must evaluate increases dramatically. In addition, emerging applications have more diverse measurement requirements that require both DC and dynamic measurements. To meet these demands, the number of precision power supply channels required for integrated device, module, and circuit characterization has increased significantly, necessitating the addition of new instrumentation, such as pulsers and digitizers. As a result, the space occupied by the test system and costs increase, setup and control become more complex, and the effort required to develop and maintain the test system rises.



Keysight Solution

The Keysight PZ2100 Series is the leading automated test equipment (ATE) solution that integrates enormous source / measure unit (SMU) resources into valuable rack space with flexible module options. The PZ2100 provides flexible scalability with multiple SMU module options covering a wide range of applications, from conventional static DC measurements down to 10 fA to emerging dynamic / pulsed measurements up to 15 MSa/s and down to 10 μ s width. The PZ2100 provides an uncompromising high-density integration that fully uses available rack space, slots, or SMU module capabilities. The PZ2100 enables a lower cost per channel and 20x smaller rack space than conventional SMUs, significantly reducing your test costs and saving valuable rack space.

Key benefits	Key features
Save cost and valuable rack space	5 SMU module options flexibly configurable and upgradable in 1U, 4 slot mainframe at lower cost/ch - Scalable up to 20 ch, 20x higher density than conventional SMU - SMU integrating pulser / digitizer eliminates the need for additional instruments
Wide application coverage from DC to dynamic measurements	- Wide output range of up to 210 V / 3.5 A DC / 10.5 A pulse - Low current measurement supported by min. 10 fA high resolution - Dynamic / pulsed measurement with 15 MSa/s sampling rate and 10 μs narrow pulse - Wide dynamic range with auto-ranging and seamless ranging
Simple integration and time-savings	- Single box solution simplifies synchronization with multiple SMUs at < 50 ns accuracy - User-friendly GUI accelerates the test prototyping, debugging, and troubleshooting - SCPI programming via LAN / USB / GPIB for easy adoption to various environments - PathWave IV Curve Software enables quick measurements without programming

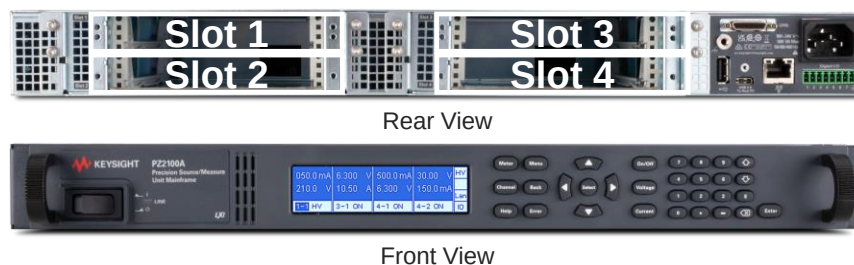


Figure 1. PZ2100A precision source / measure unit mainframe

Save Cost and Valuable Rack Space

Flexibly configurable and upgradable at a lower cost / ch

The Keysight PZ2100A is a precision SMU mainframe that provides 4 slots and flexibly integrates 5 SMU module options. It allows any mixed module configuration, which enables you to configure and upgrade your test system flexibly according to your application requirements.

Type	Model	Description and key features
Mainframe	PZ2100A 	Precision SMU mainframe, 4 slots, 1U - Scalable up to 20 channels 5 SMU module options, flexibly configurable and upgradable - Simplified synchronization at <50 ns accuracy - User-friendly GUI, collectively managing up to 20 channels
High-resolution SMU	PZ2110A 	Precision SMU, 1.25 MSa/s, 10 fA, 210 V, 315 mA DC/pulse 10 fA resolution with 30 fArms measurement noise (1 PLC) - Narrow pulse down to 20 μs pulse width - Fast digitizer mode with sampling rate up to 1.25 MSa/s - Fast transient with 1.4 V/μs slew rate at max.
High-speed SMU	PZ2120A 	Precision SMU, 1 MSa/s, 100 fA, 60 V, 3.5 A DC/10.5 A pulse - Narrow pulse down to 50 μs pulse width - Fast digitizer mode with 1 MSa/s sampling rate - Wide output range up to 60V/3.5 A DC/10.5 A pulse - Wide dynamic range with seamless measurement ranging
	PZ2121A 	Precision SMU, 15 MSa/s, 100 fA, 60 V, 3.5 A DC/10.5 A pulse - Narrow pulse down to 10 μs pulse width - Fast digitizer mode with 15 MSa/s sampling rate - Wide output range up to 60V/3.5 A DC/10.5 A pulse - Wide dynamic range with seamless measurement ranging
High-channel density SMU	PZ2130A 	5-ch Precision SMU, 100 pA, 30 V, 500 mA DC ¹ - High-density (20 Ch in 1U rack height, full width at max.) - Low cost/ch for multi-ch applications - Fast sampling measurement with a sampling rate of 250 kSa/s - Low voltage source noise down to 25 μVrms with PX0107A
	PZ2131A 	5-ch Precision SMU, 500 kSa/s, 10 pA, 30 V, 500 mA DC/pulse ¹ - High-density (20 Ch in 1U rack height, full width at max.) - Narrow pulse down to 100 μs pulse width - Fast digitizer mode with a sampling rate at 500 kSa/s - Low voltage source noise down to 25 μVrms with PX0107A

1. Ch1 and Ch2 expand the maximum current to +750 mA by over-range capability.

Scalable up to 20 channels, 20x higher density than conventional SMU

The PZ2100A integrates up to 20 SMU channels into valuable 1U-height, full-width rack space, and unlike conventional SMUs, it does not require any cooling spacers when stacked. It achieves a 20x smaller footprint than conventional SMUs and enables you to save cost and valuable rack space.

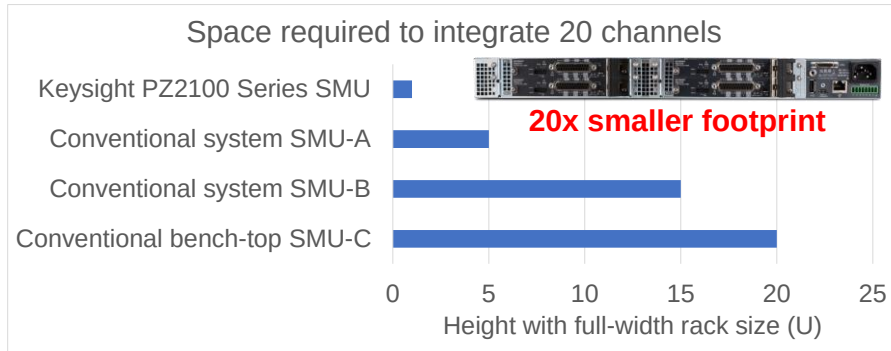


Figure 2. The PZ2100A provides 20x higher channel density integrating 20 channels in 1U rack space

All-in-one SMU integrating pulser / digitizer

An SMU is an instrument that combines the capabilities of a current source, a voltage source, a current meter, and a voltage meter, along with the ability to switch easily between these various functions. The source and measurement circuitry are closely integrated, allowing user to achieve far better measurement performance with less measurement error than using various independent instruments to make the same measurement. The Keysight PZ2100 Series provides an all-in-one SMU module that integrates pulser / digitizer functions with conventional SMU functions, such as precise DC voltage / current sourcing and measuring. The integration enables the PZ2100 Series to meet emerging dynamic / pulsed measurement requirements without additional instruments.

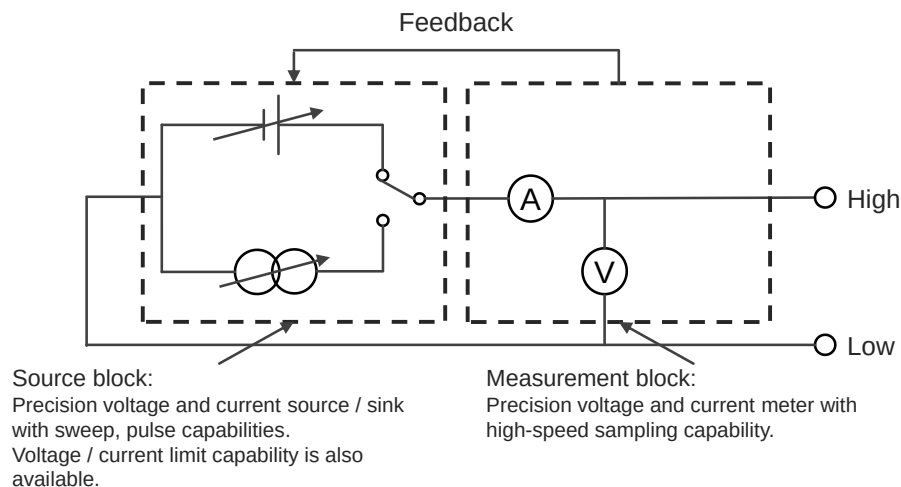


Figure 3. A simplified block diagram of an SMU

Wide Application Coverage From DC To Dynamic Measurements

The Keysight PZ2100 Series provides an all-in-one SMU that integrates pulser / digitizer functions into a conventional SMU capability. Its pulser enables narrow pulsed measurements down to 10 μ s width, and its digitizer mode enables fast dynamic measurements with a sampling rate of up to 15 MSa/s. An auto measurement range capability enables a wide dynamic range in DC measurements, and the seamless current measurement ranging function offers a wide dynamic range, even in dynamic measurements. These capabilities help the PZ2100 Series cover a wide range of applications, from conventional static DC measurements with high resolution down to 10 fA to emerging dynamic / pulsed measurements without additional instruments.

PZ2110A is a high-resolution precision SMU expanding precise static DC measurements with 10 fA resolution for fast dynamic measurements at a 1.25 MSa/s sampling rate.

PZ2120/21A is a high-speed SMU enabling best-in-class dynamic/pulsed measurements with a narrow pulse down to 10 μ s at a fast sampling rate of up to 15 MSa/s for a wide range of emerging applications.

PZ2130/31A is a high channel density SMU with 5 ch/module, saving space at a low cost per channel for a wide range of applications requiring numerous precision power supplies.

Typical application	PZ2110A	PZ2120/21A	PZ2130/31A
Optical devices (laser diodes, photodiodes, LEDs, etc.)		✓	✓
Optoelectronic components (ITLA, CDM, ICR, IC-TROSA, etc.)	✓		✓
VCSEL sensors/modules		✓	✓
Silicon photonics	✓		✓
IC design verification tests/function tests (RF PA/FEM, analog ICs, RFICs, MMICs, etc.)		✓	✓
Quantum computing	✓		✓
Semiconductor devices (FETs, diodes, transistors, etc.)	✓		✓
Passive component devices (resistors, varistors, capacitors, etc.)	✓		✓

Single-box Solution Offers Easy Integration and Time Efficiency

Integrating the source and measurement resources in an SMU allows much tighter synchronization than is possible with separate instruments. In addition, the PZ2100 Series provides flexible triggering options that define the measurement points independently from the sourced current or voltage waveform. You can operate multiple channels in synchronization or independently.

The PZ2100 Series is a single-box solution that simplifies channel stacking and synchronization, which removes integration and coding complexity. The PZ2100A's 6 internal trigger lines enable synchronization among the channels at less than 50 ns accuracy without any cabling. The external trigger ports on the mainframe and modules allow it to synchronize with any external equipment flexibly and accurately. Because the SMUs function as precision power supplies and work synchronously with the other equipment in a wide range of applications, these essential capabilities enable the PZ2100 Series to meet the requirements of various applications.

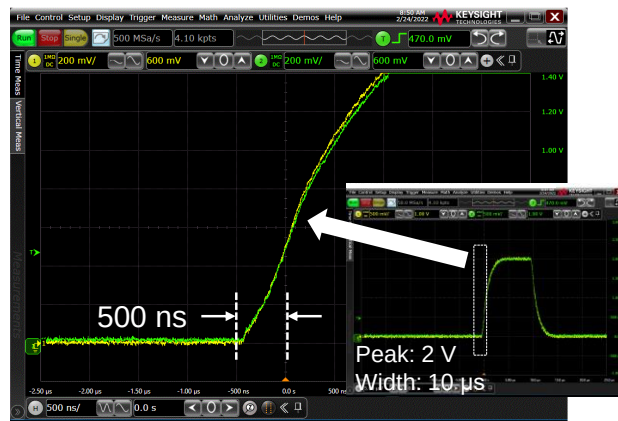
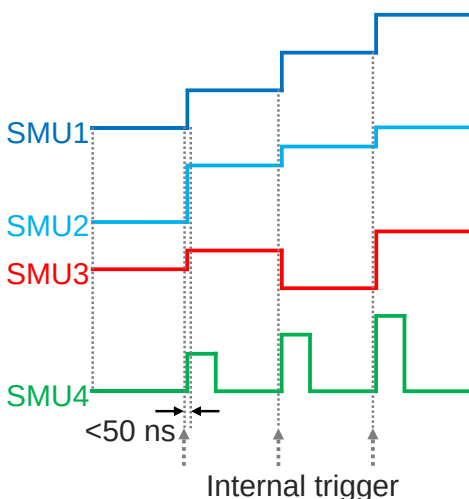
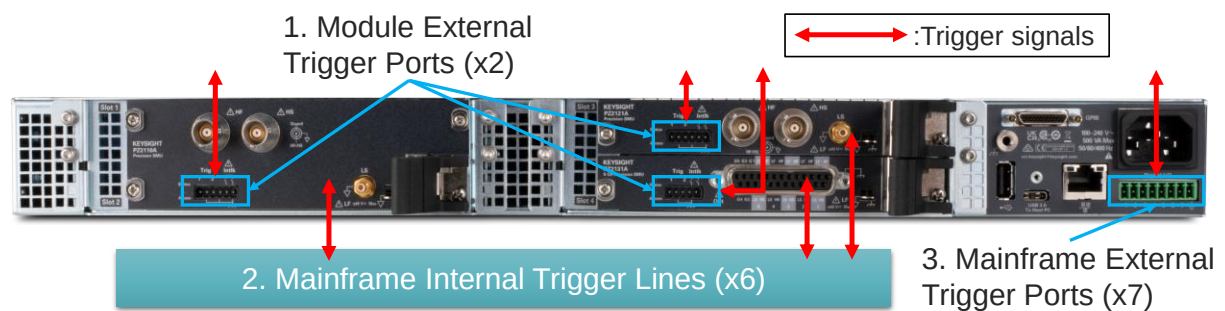


Figure 4. Internal trigger lines enable channel synchronization at less than 50 ns accuracy, and external trigger ports enable synchronization with any piece of external equipment

The PZ2100 Series has a user-friendly graphical user interface (GUI) that provides two view modes, meter view and menu view, and collectively manages a maximum of 20 channels. Select an appropriate view for your purpose to set and review the status of all the channels in a single interface; this helps you accelerate test prototyping, debugging, and troubleshooting. The PZ2100 Series also supports Standard Commands for Programmable Instruments (SCPI), a popular and easy-to-understand instrument control protocol commonly used among Keysight SMUs such as the B2900 Series. Because many of its commands are compatible with existing SMUs, you can minimize code conversion work and enable remote control through LAN / USB / GPIB using simple programming to align with various environments.

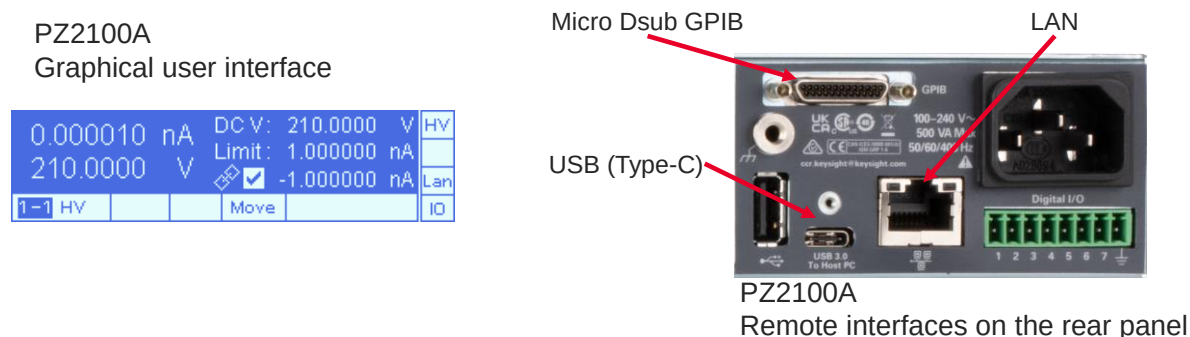


Figure 5. The PZ2100A's GUI and remote interfaces

The PZ2100 Series can also be used hand-in-hand with the PW9251A PathWave IV Curve, a ready-made GUI software that performs a variety of synchronous current-voltage (IV) measurements on up to 20 channels of SMUs without programming. You can review test results immediately after making measurements using various analysis functions on graphs and tables. Export functions for graphs with markers and tables support efficient reporting. In addition, the test result files contain all the settings, allowing you to review and repeat a test accurately.

The PathWave IV Curve can accelerate your research, development, and design verification activities, enabling more accurate and reliable data acquisition and more efficient use of the equipment.

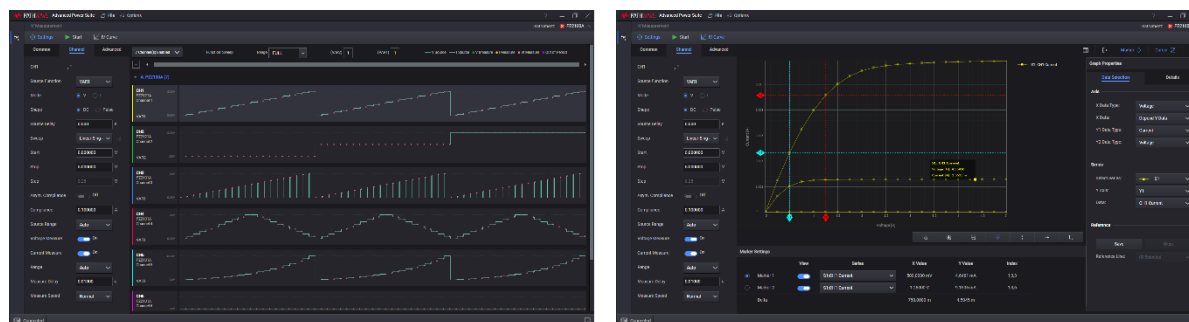


Figure 6. PathWave IV Curve software

Conclusion

The Keysight PZ2100 Series is the leading ATE solution that integrates enormous SMU resources into valuable rack space with flexible module options. The Series' flexible scalability covers various applications, from conventional static DC measurements to emerging dynamic / pulsed measurements. Its uncompromisingly high-density integration makes full use of available rack space, slots, and SMU module capabilities. In addition, the Series enables a lower cost per channel and a 20x smaller rack space than conventional SMUs to reduce your test costs and save valuable rack space significantly.



Figure 7. Keysight PZ2100 Series high channel density precision SMU

Comparison Table by Model

		PZ2110A	PZ2120A	PZ2121A	PZ2130A	PZ2131A
Number of channels		1	1		5	
Number of slots		2	1		1	
Output range	Max. voltage	210 V	60 V		30 V	
	Max. current (DC)	315 mA	3.5 A		500 mA	
	Max. current (Pulse)	315 mA	10.5 A		N/A	500 mA
Resolution	Min. voltage	500 nV	6 μ V		6 μ V	
	Min. current	10 fA	100 fA		100 pA	10 pA
Current measurement noise RMS (1 PLC)		30 fArms	400 fArms		75 pArms	35 pArms
Voltage source noise	Peak-to-peak (0.1 - 10 Hz)	< 4 μ V	< 12 μ V		< 20 μ V	
	Peak-to-peak (20 MHz)	< 25 mV	< 30 mV		< 12 mV	
	RMS (20 MHz)	< 3 mVrms	< 2.5 mVrms		< 1 mVrms (< 25 μ Vrms with PX0107A)	
	RMS (200 MHz)	< 5 mVrms	< 4.5 mVrms		< 3.3 mVrms	
Min. pulse width		20 μ s	50 μ s	10 μ s	N/A	100 μ s
Max. slew rate		1.4 V/ μ s	3.5 V/ μ s		0.15 V/ μ s	
Digitizer mode		Yes	Yes		No	Yes
Max. sampling rate		1.25 MSa/s	1 MSa/s	15 MSa/s	250 kSa/s	500 kSa/s
Auto measurement ranging		Yes	Yes		Yes	
Seamless current measurement ranging		No	Yes		Yes	
Remote sense (4-wire connection)		Yes	Yes		Yes	
Guard shield port for low current measurement		Yes	Yes		Yes	
Operation mode	Standard mode	Yes	Yes		Yes	
	PS mode	Yes	Yes		Yes	
	High capacitance mode	No	Yes		No	
	Laser diode mode	No	Yes		No	

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