

# R&S® TS-PSU12 Power Supply/Load Module

## Four-quadrant source with integrated measurement unit





Integrated 4-to-1 multiplexers are provided for the force and sense lines of each channel, which enables highly versatile signal routing and in many cases eliminates the need for additional switch modules.

In addition, each channel can be switched to four lines of the R&S®CompactTSVP analog bus. Via this bus, the channels can be routed to other measurement and switch modules of the R&S®CompactTSVP without requiring any additional external wiring.

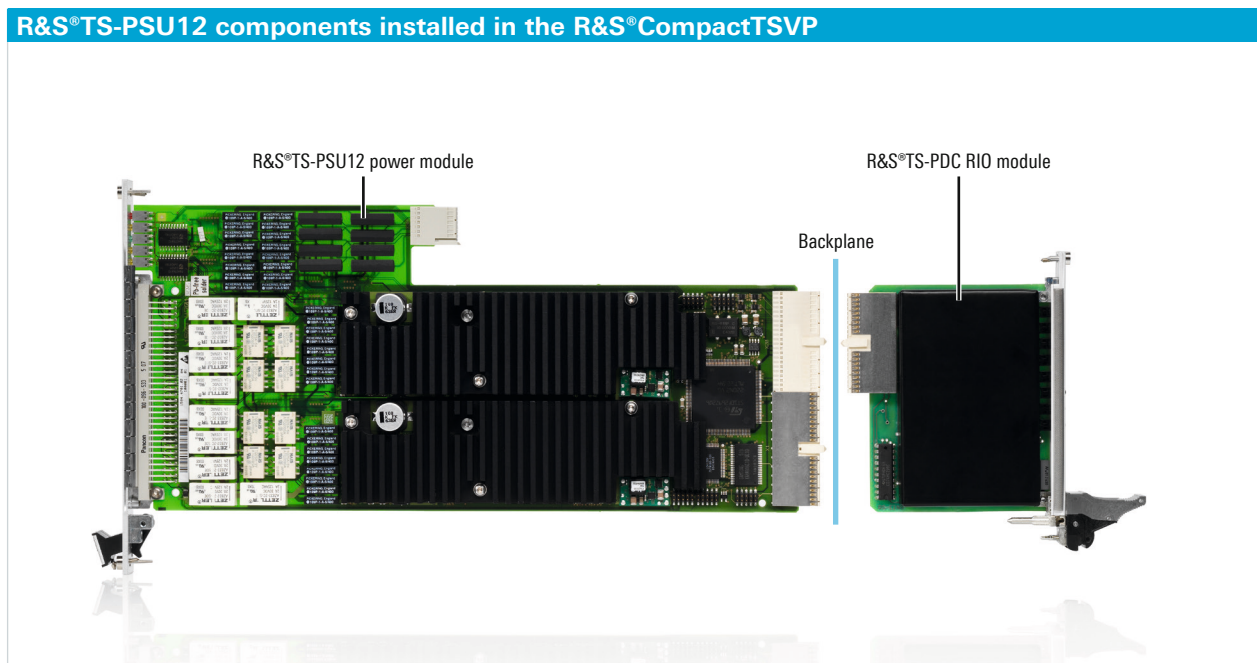
As a four-quadrant source, the R&S®TS-PSU12 not only acts as a power supply for DUTs but is also capable of electronic load simulation. For example, the R&S®TS-PSU12 can be used for testing the behavior of automotive control units by applying a defined load to their control outputs.

By external serial cascading of the two output channels, auxiliary voltages of up to 24 V can be generated during in-circuit tests (e.g. for testing Zener diodes or relays). As an additional feature, the output power of the module can be controlled by modulating the pulse width of the output voltage.

The two output channels can be controlled via external trigger signals or internal PXI trigger lines to synchronize them with other instruments. Conversely, each channel can generate trigger events.

The R&S®TS-PSU12 power supply/load module is supplied with the following components:

- R&S®TS-PSU12 power module  
Plug-in card to be inserted at the front of the R&S®CompactTSVP or the R&S®PowerTSVP
- R&S®TS-PDC RIO module  
Plug-in card to be inserted at the rear of the R&S®CompactTSVP or the R&S®PowerTSVP (behind the R&S®TS-PSU12 power module, in the same slot)



## Typical applications

- High-performance voltage and current supply in functional tests
- Recording of current/voltage characteristics of the DUT being powered
- Electronic load simulation
- Auxiliary voltage source for in-circuit tests (e.g. up to 24 V for Zener diodes)
- Charge/discharge tests (e.g. by defined discharging of batteries)

## Software support

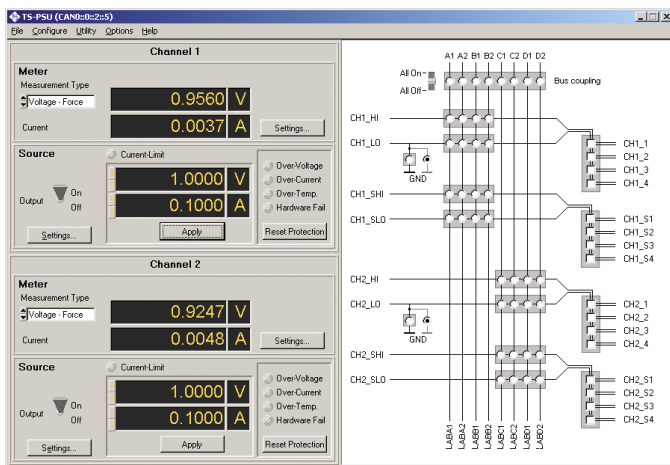
The R&S®TS-PSU12 power supply/load module is supplied with an IVI-compliant LabWindows/CVI driver, which offers control panels and online help as standard features. Alternatively, all functions for configuring the channels and measurement units can be called via the GTSL DC power supply library.

## Selftest and diagnostics for reliable operation

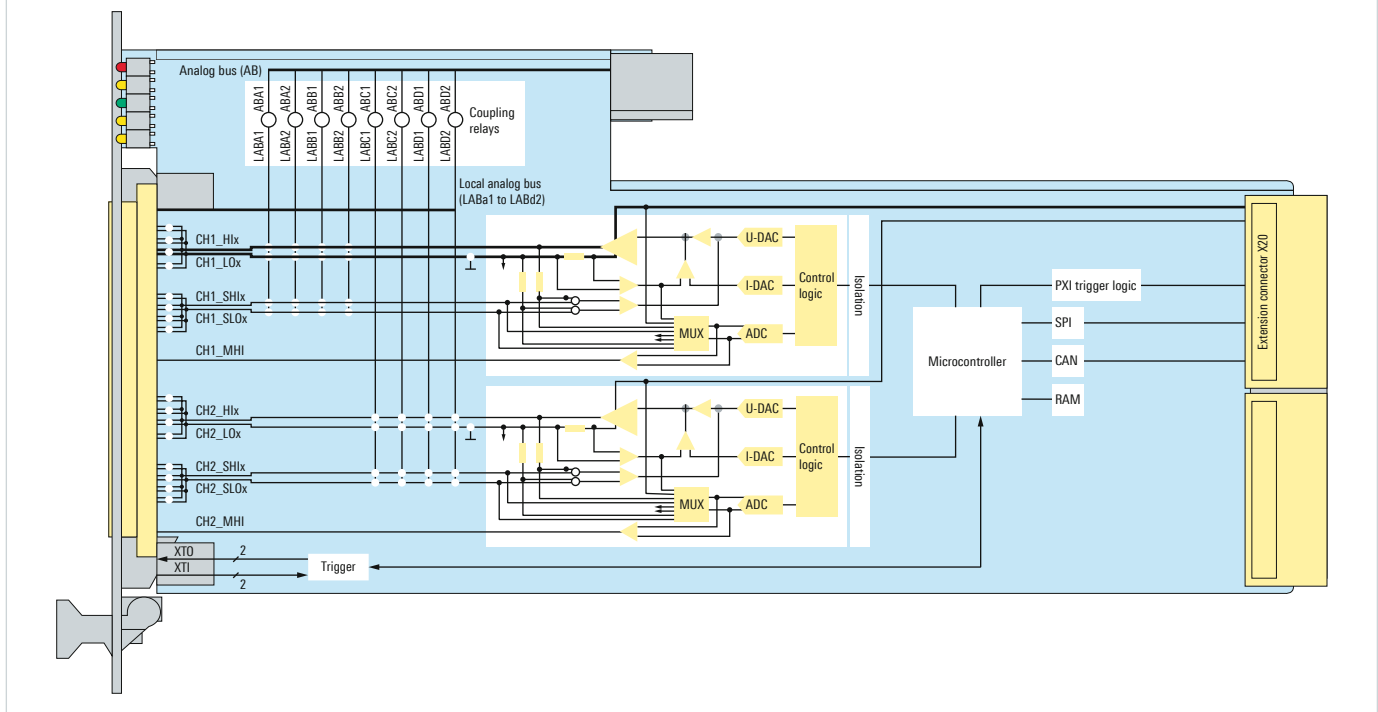
The built-in selftest capability of the module ranges from fast diagnostics to a fully automatic test of all relays and switching paths (requires R&S®TS-PSAM).

Diagnostic LEDs on the front panel make system integration faster and easier. The user can see at a glance whether the module is in proper working order.

Software control panel for the R&S®TS-PSU12.



## R&S®TS-PSU12 power module



# Specifications

Specifications		
<b>Application in the R&amp;S®TSVP platform</b>	R&S®CompactTSVP or R&S®PowerTSVP	1 slot required
<b>Interface</b>		
Control bus		CAN 2.0B (1 Mbit/s)
DUT connector (front)		in line with DIN41612, 96 pins
Tolerances of specified values apply under the following conditions	recommended calibration interval	1 year
	temperature range	+23°C ±5°C
	additional error indicated by the temperature coefficient in the range <sup>1)</sup>	+5°C to +18°C and +28°C to +40°C
<b>Output channels</b>		
Number of channels		2 (independent, floating)
Source type		four-quadrant
Max. operating voltage		125 V (signal-to-earth isolation: 750 V)
Max. output power per channel	source mode	5 W
	sink mode	6 W
Sampling mode	profiles	voltage, current
	sample clock	max. 10 kHz
	memory, voltage profile	10 000 samples
	memory, current profile	10 000 samples
<b>Output voltage</b>		
Type		bipolar
Voltage range		±12 V
Resolution		16 bit + sign
Line regulation		0.1 %
Load regulation in external sense mode (10% to 90%)		0.1 %
Ripple + noise		typ. 4 mV RMS at 20 MHz bandwidth
Settling time (10% to 90%/90% to 10%), resistive load only	range 10 mA/100 mA	100 µs
	range ≤ 1.3 A/15 V	100 µs
	range ≤ 0.4 A/50 V	100 µs
	other ranges	formula: $t = (\Delta V \times 0.32)/(3.5 I_{\text{actual}})$ ms
Load transient recovery time (10% to 90%)		100 µs
Polarity switching time		typ. 200 µs
Recovery time from short		max. 10 ms + settling time
Remote sensing		compensation for 2.0 V per lead
<b>Output current</b>		
Type		source/sink
Current ranges		10 mA, 100 mA, 500 mA
Resolution (effective bits)		16 bit
Accuracy of DC stimulus unit	Voltage	Current
Stimulus range	12 V	10 mA, 100 mA, 500 mA <sup>2)</sup>
Resolution	230 µV	0.39 µA, 3.7 µA, 29 µA
Error limits	0.2% + 15 mV	0.4 % + 20 µA, 0.4 % + 200 µA, 0.4 % + 1.5 mA

## Specifications

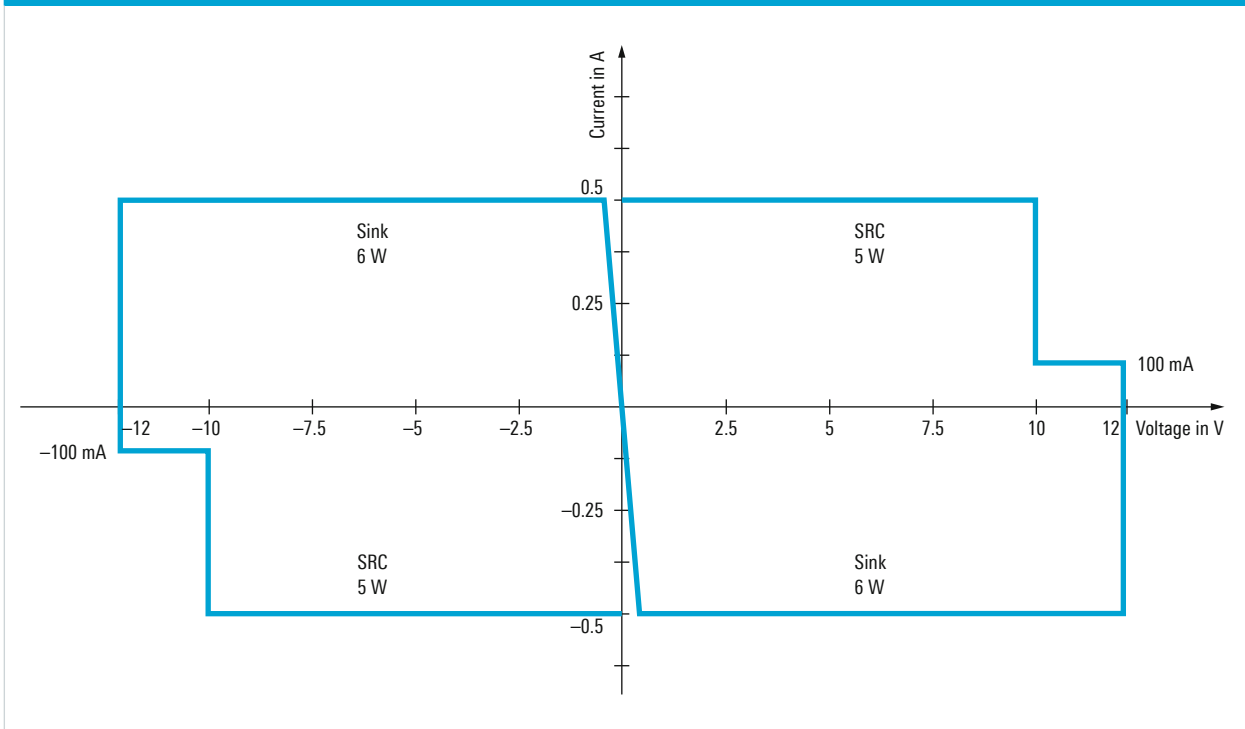
### Measurement channels

Type		built-in, one measurement channel per power supply/load channel
Measurement source		voltage, current, external voltage
Voltage range		12 V
Current ranges		10 mA, 100 mA, 500 mA
Resolution (effective bits)		16 bit
Sampling mode	sample clock	max. 10 kHz
	sample memory	10000 samples
Accuracy of measurement unit	Voltage	Current
Measurement range	12 V	10 mA, 100 mA, 500 mA
Resolution	1.56 mV	0.78 $\mu$ A, 7.4 $\mu$ A, 57 $\mu$ A
Error limits, average <sup>1), 3)</sup>	0.1% + 50 mV	0.4% + 20 $\mu$ A, 0.4% + 200 $\mu$ A, 0.4% + 1.5 mA
Error limits, sampling mode <sup>1), 3)</sup>	0.1% + 50 mV	0.4% + 80 $\mu$ A, 0.4% + 800 $\mu$ A, 0.4% + 6 mA

### Miscellaneous

Protection		overvoltage, overtemperature, shorted outputs, sense lines shorted or inverted: typ. 5 V voltage rise
Inhibit		electronic on/off within 200 $\mu$ s
Pulse-width modulation (PWM)		pulse width $\geq$ 50 $\mu$ s, frequency $\leq$ 10 kHz
Remote sensing		switch-selected
Paralleled outputs		not allowed
Cascaded outputs		allowed, external jumper required
Trigger lines		8 PXI, 2 XTI, 2 XTO
Isolation (signal – signal, signal – earth)		125 V DC

## Source/sink characteristic



## Specifications

### Analog measurement bus and relay multiplexer

Rohde & Schwarz analog measurement bus		8 lines
Coupling relays		8, local bus to global bus
	switching voltage DC/RMS	125 V/90 V
	switching current	max. 1.0 A
	switching power DC/RMS	10 W/10 VA
Relay multiplexer		4-to-1 DPST (one for each force and sense channel)
	switching voltage DC/RMS	125 V/90 V
	switching current	3.0 A
	switching power DC/RMS	60 W/250 VA

### General data

Power consumption		max. +5 V/6 A from R&S®CompactTSVP frame (including R&S®TS-PDC)
Environmental conditions		
Temperature	operating temperature range	+5°C to +40°C
	storage temperature range	-10°C to +60°C
Damp heat		+40°C, 80% rel. humidity, steady state, in line with EN 60068-2-30
Mechanical resistance		
Vibration	sinusoidal	5 Hz to 55 Hz, 0.15 mm amplitude const., 55 Hz to 150 Hz, 0.5 g const., in line with EN 60068-2-6
	random	10 Hz to 300 Hz, acceleration 1.2 g (RMS), in line with EN 60068-2-64
Shock		40 g shock spectrum, in line with MIL-STD-810E, method 516.4, procedure I
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2004/108/EC	applied harmonized standards: EN 61326-1 (industrial environment), EN 61326-2-1, EN 55011 (class A), EN 61000-3-2, EN 61000-3-3
Electrical safety	EU: in line with Low Voltage Directive 2006/95/EC	applied harmonized standard: EN 61010-1
Dimensions (W × H × D)	R&S®TS-PSU12 power module	316 mm × 174 mm × 20 mm (12.4 in × 6.8 in × 0.8 in)
	R&S®TS-PDC RIO module	130 mm × 128 mm × 20 mm (5.1 in × 5.0 in × 0.8 in)
Weight	R&S®TS-PSU12 power module	0.8 kg (1.76 lb)
	R&S®TS-PDC RIO module	0.3 kg (0.70 lb)
Recommended calibration interval		12 months

<sup>1)</sup> Accuracy: ±(% of set value + absolute value); temperature coefficient: ±(0.1 × accuracy)/°C.

<sup>2)</sup> Maximum output voltage = 10 V.

<sup>3)</sup> Average of 1000 samples, measuring time 100 ms.

# Ordering information

Designation	Type	Order number
Power Supply/Load Module	R&S®TS-PSU12	1504.4530.03
Open Test Platform R&S®CompactTSVP	R&S®TS-PCA3	1152.2518.02
R&S®PowerTSVP Switching Application Chassis	R&S®TS-PWA3	1157.8043.02

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## Service that adds value

- | Worldwide
- | Local and personalized
- | Customized and flexible
- | Uncompromising quality
- | Long-term dependability

## About Rohde & Schwarz

Rohde & Schwarz is an independent group of companies specializing in electronics. It is a leading supplier of solutions in the fields of test and measurement, broadcasting, radiomonitoring and radiolocation, as well as secure communications. Established more than 75 years ago, Rohde & Schwarz has a global presence and a dedicated service network in over 70 countries. Company headquarters are in Munich, Germany.

## Environmental commitment

- | Energy-efficient products
- | Continuous improvement in environmental sustainability
- | ISO 14001-certified environmental management system

Certified Quality System  
**ISO 9001**

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R&S®TS-PSU12

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