

R&S® CompactTSVP INDUSTRIAL TEST AND MEASUREMENT CHASSIS

Open test platform based on CompactPCI and PXI



Product Brochure
Version 02.00

ROHDE & SCHWARZ

Make ideas real



AT A GLANCE

The R&S®CompactTSVP concept represents true innovation in state-of-the-art PC based instrumentation while offering traditional capabilities found in high-performance ATE systems. The versatile platform accelerates the adoption of CompactPCI and PXI in all major fields of industrial test and measurement applications.

With its large number of CompactPCI/PXI slots and the tight integration of ATE functionality provided by Rohde & Schwarz instrumentation and switching modules, the R&S®CompactTSVP is the ideal platform for highly productive system engineering. Compact units are used to configure complex ATE functionality which can be interfaced to DUTs by the standardized test receiver concept that provides multiple application flexibility and easy handling on the factory floor. Unique data acquisition and stimulation modules provide floating potential measurements and DUT stimulation.

The R&S®CompactTSVP open test platform was developed as an all-in-one solution for test and measurement applications in development, production and servicing of telecommunications and automotive electronics.

As an industrial ATE platform, the R&S®CompactTSVP product line features in-circuit test (ICT) as a modular hardware and software option for creating powerful and affordable manufacturing test systems.

Key facts

- ▶ Modular instrument chassis for CompactPCI and PXI modules
- ▶ Standard 19", 4 HU rackmount enclosure for 3 HU CompactPCI
- ▶ CompactPCI backplane in line with PICMG 2.0 rev. 3.0 specification
- ▶ Rear I/O support for easy system cabling (IEEE 1101.11-1998)
- ▶ Sophisticated analog measurement bus subsystem
- ▶ Support of PXI trigger concept
- ▶ 14 peripheral slots for versatile instrumentation
- ▶ Seamless test adaptation by using standardized adapter components
- ▶ Simple and efficient module connection concept
- ▶ Easily expandable ATE switching
- ▶ High pin count switching expansion by cascading an R&S®PowerTSVP chassis
- ▶ Cost-effective peripheral control via CAN
- ▶ Rohde & Schwarz commitment to industrial standards



R&S® CompactTSVP MODULE FORMATS AND FEATURES

The main objective behind the R&S® CompactTSVP is to offer an inherently flexible and cost-effective modular test and measurement platform. The performance of the platform product should be sophisticated enough that even VXI test system applications can be addressed by the platform technology. Although tight integration and electronic miniaturization help when building powerful devices with smaller footprints, available board space is still a major issue. The board space of a 3 HU CompactPCI or PXI module is the same as the Eurocard mechanical packaging measuring 160 mm × 100 mm (length × height), and the application-specific space is reduced by the CompactPCI bus interface chip and circuitry. Therefore, the R&S® CompactTSVP module format was extended by 130 mm in length to bring primary switching and signal conditioning on board.

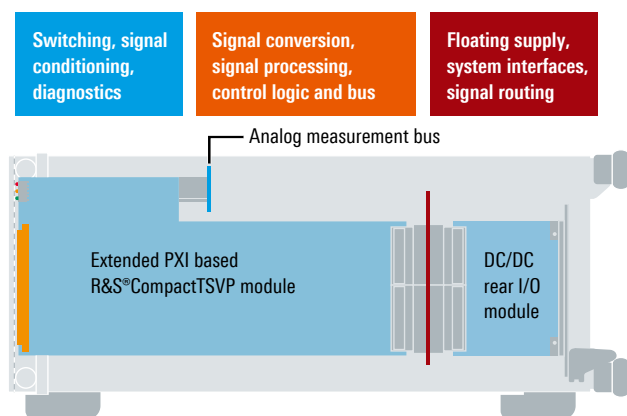
Core functionalities such as A/D conversion, storage and computing are combined into a comprehensive environment. For the analog frontends of floating measurement units, the isolated power supply is provided by a DC/DC conversion module that uses the space of the CompactPCI standardized rear transmission module (RTM) section. The concept benefits from double board space versus PXI one-slot Eurocard modules.

The isolated R&S® TS-PDC DC supply modules are placed behind the backplane as a thermal barrier to prevent the measurement modules from heating up. It provides high thermal stability of measurements over the full temperature range. The module is included at no extra cost in every measurement module that requires a floating DC supply.

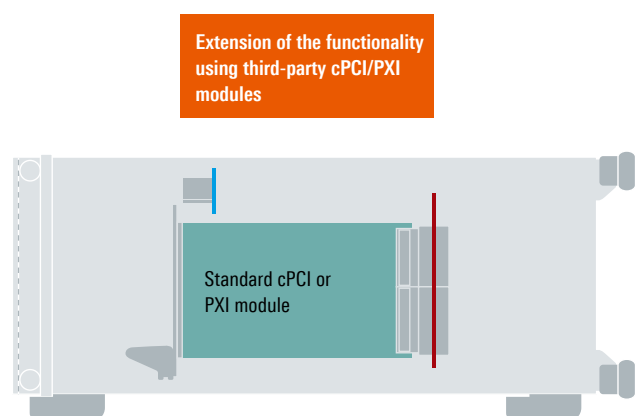
For various application requirements, such as special interface functionality or additional test and measurement modules, the R&S® CompactTSVP is interoperable with commercially available 3 HU CompactPCI and PXI products.

This allows users to benefit from technology advances in the mainstream industrial PC industry as well as imaging and test and measurement products for dedicated application requirements. PXI modular instrumentation can be used, including features that provide advanced timing and triggering capabilities.

Concept of the R&S® CompactTSVP module format



Deployment of commercially available CompactPCI or PXI modules



OVERVIEW OF THE R&S® CompactTSVP COMPONENTS

Analog measurement bus

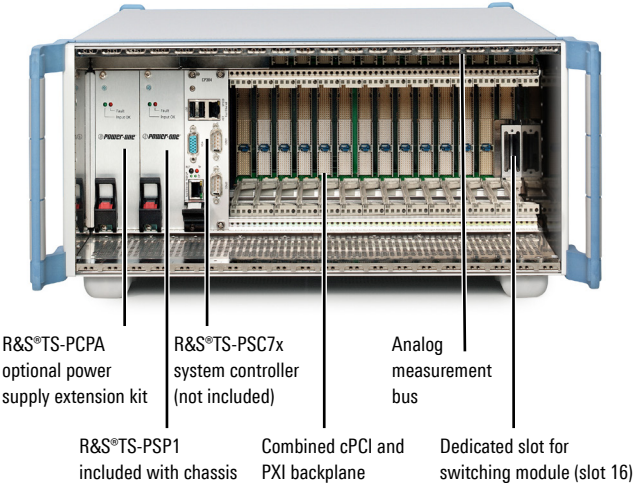
The analog measurement bus offers short routing of signals to the measurement modules and electrical immunity to the digital PCI backplane.

The eight lines of the system-wide analog measurement bus are available at all peripheral slots. They are used to temporarily interconnect DUT signals routed via switching modules and various measurement or stimulus modules that have access to the analog measurement bus.

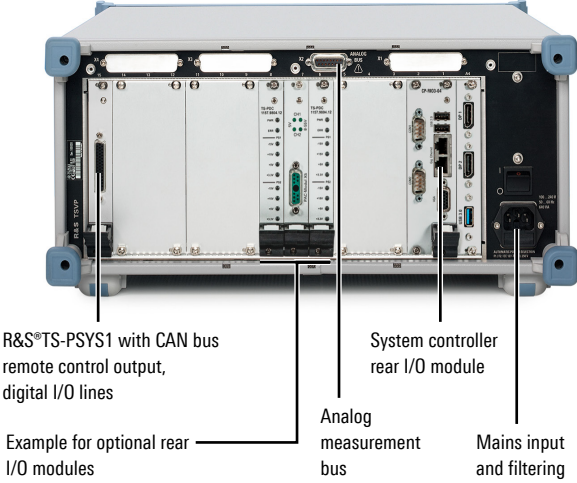
The implementation is a physically dedicated backplane located 160 mm from the digital CompactPCI/PXI backplane.

The multilayer backplane implements three-dimensional shielding with adjacent ground lines for optimized signal quality and seamless signal interconnection. The connectors to the modules are implemented as modified C-module connectors (2 mm metric system). The highly sophisticated handling of analog signals led to the interconnection solution for the R&S® CompactTSVP analog bus. The analog bus is located directly above the front connector area where space is provided for onboard signal conditioning and signal routing using coupling relays for the analog bus.

Concept of the R&S® CompactTSVP module format



System interfaces and supply modules at the rear



Versatile backplane architecture

The R&S®CompactTSVP industrial test and measurement chassis comprises the control backplane which provides 14 peripheral slots in line with the CompactPCI specification PICMG 2.0 Rev. 3.0 with CompactPCI rear I/O support for RTM modules.

Additionally, 11 slots are extended to support special PXI features (PCI eXtensions for Instrumentation).

The CompactPCI standard 32 bit design makes it possible to route module-specific signals via the RTM concept to the rear side of the test platform without special cabling. To enable this important flexibility, slots 3 and 4 support the RTM feature instead of PXI. The rear side cabling is truly beneficial when deploying a 19" rackmountable standard test adapter, available for the R&S®CompactTSVP as a set of off-the-shelf products, ready for use in production test applications. Slots 5 to 15 cover the PXI features for triggering and a high-precision 10 MHz system clock for synchronization.

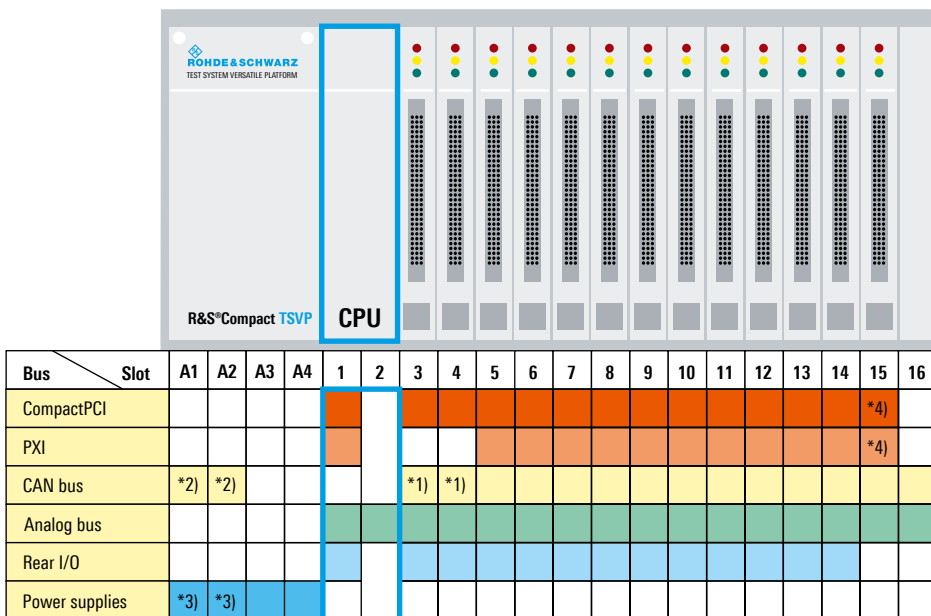
The backplane concept offers maximum flexibility for integrating either the ATE instrumentation modules of the R&S®TSVP product line or common off-the-shelf CompactPCI-based products.

Variable power backplane

The R&S®CompactTSVP chassis offers space for two power supply slots which are implemented as CompactPCI power interfaces in line with the PICMG 2.11 Rev. 1.0 standard.

The power interface at slots A3 and A4 is equipped with one R&S®TS-PSP1 module which is included as a system power supply. The adjacent slots A1 and A2 can be used to extend the available power with the R&S®TS-PCPA extension kit, which includes one power supply unit, backplane extension and cabling. This feature can be used for optimized availability or current sharing for fully equipped chassis configurations that require an extended power budget.

System backplane architecture



*1) with backplane version V4.x

*2) with option TS-PXB2

*3) with option TS-PCPA

*4) only for R&S modules or CompactPCI modules equipped only with J1 connector

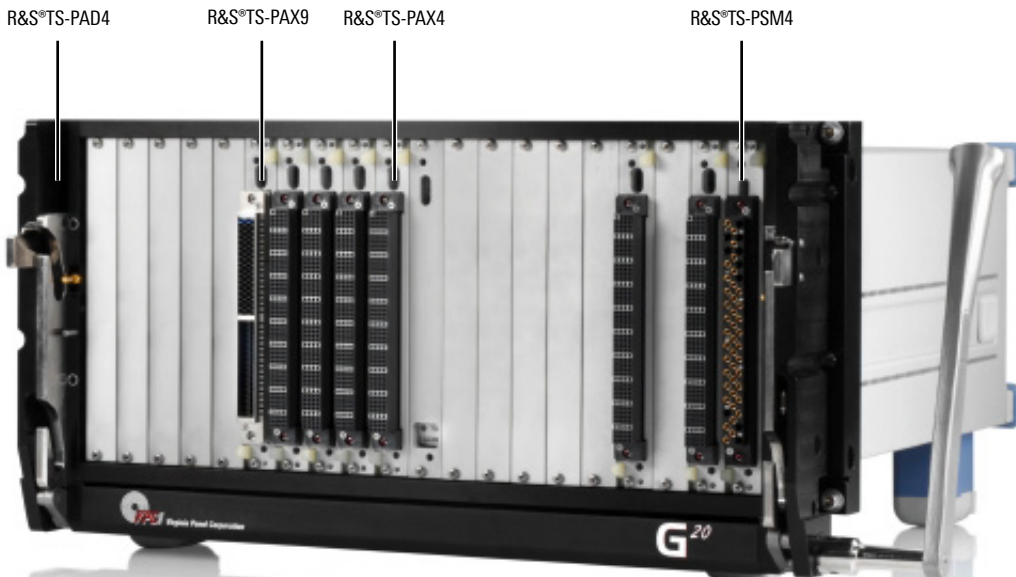
Cooling considerations for reliable operation

The CompactPCI slot area is equipped with four radial low-noise fans. The fans are mounted above the slot area and deliver consistent airflow from bottom to top. The fans are temperature-controlled, and the temperature inside the R&S®CompactTSVP chassis is measured at four locations. Additional fans are located above the rear I/O area.

Test adapter accessories

To accelerate incorporation of the R&S®CompactTSVP into production test environments in a quick and cost-effective manner, an entire set of mass-interconnection support products has been created. The platform modules are equipped with a 96-pin DIN41612 connector which is easy to handle and is convenient for wiring. The interfacing of the R&S®TS-PAD4 test adapter receiver frame to the R&S®PFPID4 interchangeable test adapter frame is implemented by the R&S®TS-PAX4 signal modules on the test instrument side.

Test adapter accessories



Serial system control module with CAN bus

To allow the use of relay based switching modules offered as part of the R&S®TSVP product family, the backplane is additionally equipped with a controller area network (CAN) serial communications bus at slots 3 to 16. The low-noise and interference-resistant CAN bus ensures high reliability and high signal quality.

In addition, the interfaces for switching modules have been simplified significantly while still providing sufficient performance for setting up switching paths using mechanical relays.

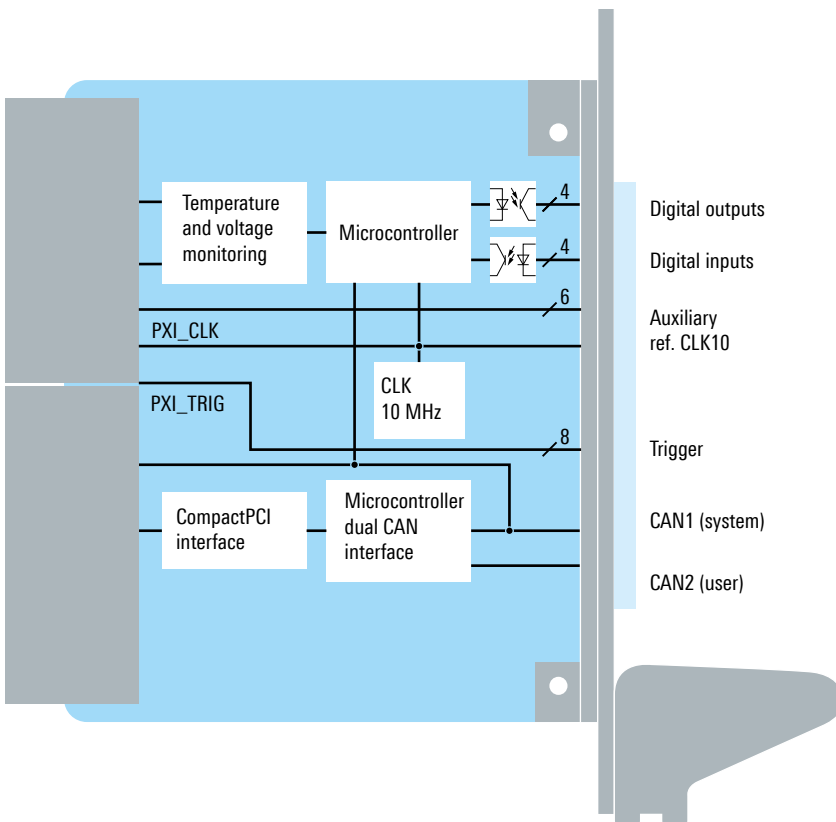
In line with company's overall commitment to industrial standards, various reliable and high-performance serial communications standards are available to choose from.

One straightforward approach is the deployment of a CAN bus, which has been used successfully in automotive electronics for many years.

The interface is physically implemented as a CompactPCI based R&S®TS-PSYS1 RTM module, located at the rear of slot 15. The module is part of the device and contains additional system administration functions such as temperature monitoring and digital I/O lines to interface automation devices with 24 V digital I/O levels.

The R&S®TS-PSYS1 is used to configure and control the internal R&S®CompactTSVP modules that are based on the CAN bus and all modules of the R&S®PowerTSVP extension chassis (which is based solely on the cost-efficient CAN bus).

Block diagram of the R&S®TS-PSYS1 CAN bus system control module



R&S®PowerTSVP FOR SWITCHING APPLICATIONS

The R&S®PowerTSVP chassis was created as a cost-efficient subsystem for switching applications. It can be used to build systems ranging from dedicated switching instruments to complex switching applications inside test and measurement systems.

The analog measurement bus routes general purpose signals from switching modules to various measurement and stimulus instruments integrated into the R&S®CompactTSVP.

The analog bus lines from an R&S®CompactTSVP chassis are connected to an R&S®PowerTSVP extension chassis for switching by means of the R&S®TS-PK01 cable.

The R&S®PowerTSVP is an industrial chassis including one power supply, with space for an additional power supply in adherence to the identical concept for the R&S®CompactTSVP. The serial control backplane provides 16 slots for CAN based R&S®TSVP modules and includes PXI trigger support.

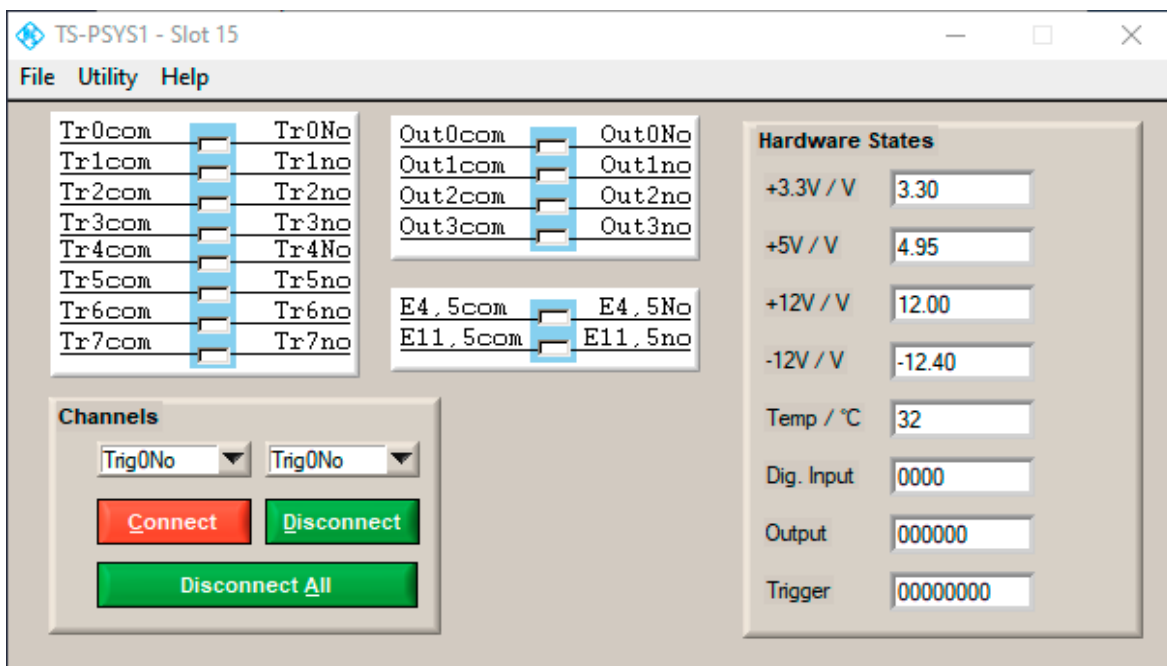
The CAN bus remote control is implemented as the R&S®TS-PSYS2 interface module, which is part of the R&S®PowerTSVP.

Cascading an R&S®PowerTSVP extension chassis to an R&S®CompactTSVP chassis only requires the connection between the R&S®TS-PSYS2 CAN bus slave interface and the R&S®TS-PSYS1 CAN bus master interface inside the R&S®CompactTSVP. This remote connection is also provided as an accessory (R&S®TS-PK02, cable from R&S®TS-PSYS1 to R&S®TS-PSYS2).

Power switching and the interconnection of external power supplies and electronic loads to DUTs are provided via the optional CAN based power switching modules.

Power signal handling is usually not possible inside laboratory equipment. With a remote power-switching unit such as the R&S®PowerTSVP, it is possible to prepare test adaptaters close to the DUT power signals or adjacent to power supplies and loads.

Soft front panel of the R&S®TS-PSYS1 system control module.



SOFTWARE SUPPORT

The R&S®TS-PSYS1 system control module is configured and controlled by a device driver DLL. Function panels and online help are available as common features for the LabWindows/CVI driver software.

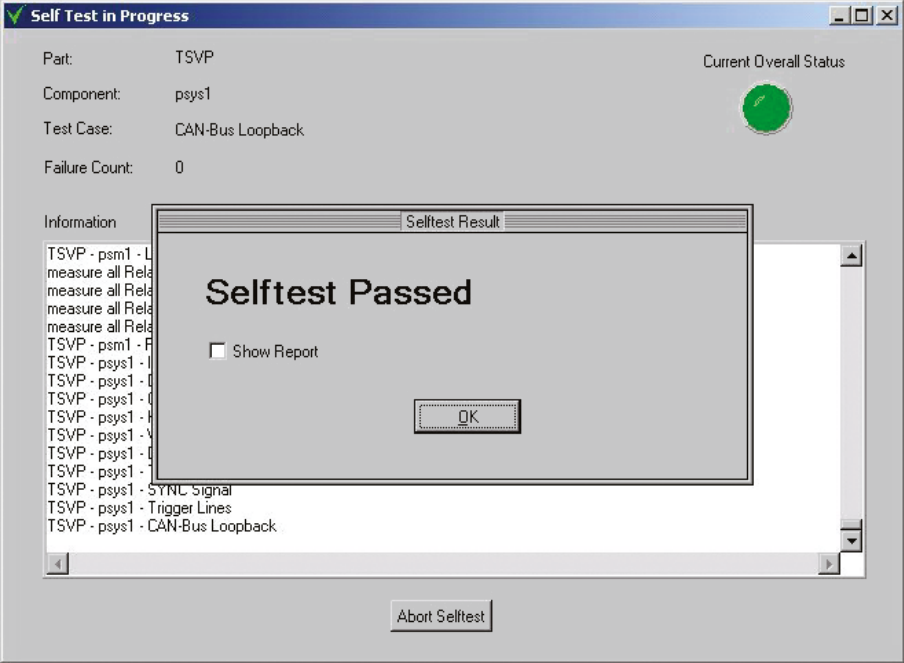
As with every modular instrumentation product in the R&S®TSVP family, a software front panel is provided.

SECURITY BY SELF-TEST AND DIAGNOSTICS FEATURES

The built-in self-test capability of the R&S®TS-PSYS1 system control module includes automated evaluation of module functionality.

The system-wide self-test of the R&S®CompactTSVP is performed by using the R&S®TS-PSAM digital multimeter module as the measurement unit to test other modules and components in the chassis. The comprehensive self-test software concept provides ready-to-run self-test sequences for every R&S®TSVP platform product.

A comprehensive self-test program is provided for the R&S®TS-PSYS1 module.



SYSTEM LAYOUT

R&S®CompactTSVP

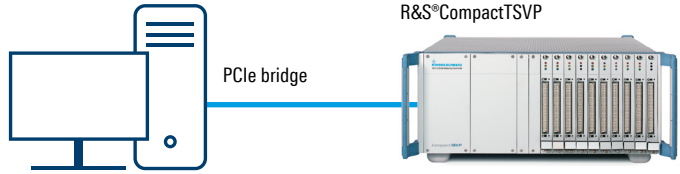
The R&S®CompactTSVP chassis with an embedded computer enables a more compact solution with unimpeded use of the CPU. With its 14 peripheral slots, medium pin count ATE systems with up to 990 channels can be built as a one-box approach.

R&S®CompactTSVP



R&S®CompactTSVP with external PC

Alternatively, the R&S®CompactTSVP can also be controlled by means of an external computer using a PCIe bridge. This allows more flexible selection of the control computer and its configuration.



R&S®CompactTSVP and R&S®PowerTSVP

The combination of the R&S®CompactTSVP and the R&S®PowerTSVP stands for high performance and high pin count ATE systems. For high-power applications, the parts of a system that handle signals with high currents or high voltages can be separated to ensure a safe distance from the R&S®CompactTSVP as a dedicated measurement unit.

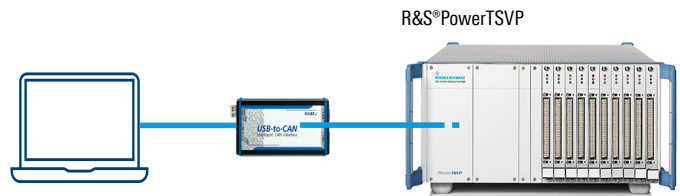
R&S®CompactTSVP

R&S®PowerTSVP



R&S®PowerTSVP

Medium pin count ATE with an external standard PC using a CAN bus interface to control the R&S®PowerTSVP chassis. The CAN interface can be based on various standard interfaces such as USB to CAN. With this application scenario, correctly dimensioned switching applications can be used for various requirements ranging from general purpose signals, high power load and power supply switching.



SPECIFICATIONS

Specifications

Control backplane

Bus systems	PXI trigger bus, 8 signals	CompactPCI/PXI, 32 bit, 33 MHz in line with PICMG 2.0 rev. 3.0 CAN 2.0b, 1 Mbit
Slots 1 and 2		1 CPU, for CompactPCI, with rear I/O module
Slots 3 and 4		2 peripherals, for CompactPCI, CPCI RTM
Slots 5 to 15		11 peripherals, for CompactPCI/PXI, DC/DC RTM
Slot 16		1 peripheral, for CAN bus-controlled
Slots A3 and A4		1 power supply, for CompactPCI, P47 connector (2 slots wide)
Slots A1 and A2		2 extensions such as for redundant power supply, DUT supply
System control module	R&S®TS-PSYS1	rear I/O interface, for CompactPCI to CAN bus (2 CAN 2.0b)
		4 digital outputs, PhotoMOS relay, 42 V, 200 mA
		4 digital inputs, optocoupler, 2.4 V to 42 V, 5 mA
		2 switchable external supply voltages: ▶ 1152.4004.02 X30.20: 4.5 V, X30.21: 11.5 V ▶ 1157.9910.10 X30.20: 5.0 V, X30.21: 12.0 V
		8 switchable external PXI trigger inputs/outputs
		5 monitoring lines: temperature, 3.3 V, 5 V, +12 V, -12 V buffered PXI clock 10 MHz, ±(1.5 ppm + 1 ppm/year)

Analog measurement bus backplane

Analog bus lines	breakout connector at rear	8
Voltage	DC	max. 120 V
	AC	max. 50 V (RMS)
Current		max. 1 A
Bandwidth		typ. 40 MHz (3 dB)
Crosstalk		typ. < -60 dB (100 kHz)
		typ. < -45 dB (1 MHz)
		typ. < -26 dB (10 MHz)

AC power supply

AC power supply module	modular device for standard CompactPCI power interface	250 W, P47 connector
Input voltage		100 V to 240 V ± 10% (AC)
Input frequency		50 Hz to 60 Hz ± 5%
Power consumption		max. 250 VA
Output voltages	+3.3 V	40 A
	+5 V	40 A
	+12 V	5.5 A
	-12 V	2 A

Power consumption frame including R&S®TS-PSYS1

	+3.3 V	typ. 20 mA
	+5 V	typ. 520 mA
	+12 V	typ. 750 mA
	-12 V	typ. 1 mA

Specifications

General data

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 60068-2-78
Altitude	operating	up to 2000 m
Mechanical resistance		
Vibration	sinusoidal	in line with EN 60068-2-6, frequency range: 5 Hz to 55 Hz, displacement: 0.3 mm (peak-to-peak) (1.8 g at 55 Hz), frequency range: 55 Hz to 150 Hz, acceleration: 0.5 g constant
	random	in line with EN 60068-2-64, 8 Hz to 500 Hz, acceleration 1.2 g (RMS); 5 min/axis
Shock		shock test in line with MIL-STD-810G, method 516.6, procedure I: shock response spectrum ramp 6 dB/octave up to 45 Hz, 45 Hz to 2000 Hz: max. 40 g
Product conformity		
Electromagnetic compatibility	EU: in line with EMC Directive 2014/30/EC	applied harmonized standards: ▶ EN 61326-1 (industrial environment) ▶ EN 61326-2-1 ▶ EN 55011 Group 1, Class A
Electrical safety	EU: in line with Low Voltage Directive 2014/35/EC	applied harmonized standard: EN 61010-1
	USA	applied standard: UL 61010
	Canada	applied standard: CSA-C22.2 No. 61010-1
RoHS	EU: in line with the restriction of the use of hazardous substances in electrical and electronic equipment 2011/65/EU	compliant; applied harmonized standard: EN IEC 63000
Dimensions	W × H × D	465 mm × 193 mm × 517 mm (18.31 in × 7.6 in × 20.35 in) (19", 4 HU)
Weight	base unit	11 kg (24.25 lb)
	with typical options	18 kg (39.68 lb)

ORDERING INFORMATION

Designation	Type	Order No.
R&S®CompactTSVP industrial test and measurement chassis	R&S®TSVP	1152.2518.02
Related products		
Power supply extension kit, includes power supply, power backplane and cabling	R&S®TS-PCPA	1165.1509.02
RF shielding kit	R&S®TS-PSK1	1157.9004.02
Backplane extension module, CAN bus, 2 slots	R&S®TS-PXB2	1512.3600.02
Cable set	R&S®TS-PK04	1157.9104.02
19" adapter, 4 HU	R&S®ZZA-411	1096.3283.00

Service that adds value

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

Rohde & Schwarz

The Rohde&Schwarz technology group is among the trailblazers when it comes to paving the way for a safer and connected world with its leading solutions in test & measurement, technology systems and networks & cybersecurity. Founded more than 85 years ago, the group is a reliable partner for industry and government customers around the globe. The independent company is headquartered in Munich, Germany and has an extensive sales and service network with locations in more than 70 countries.

www.rohde-schwarz.com

Sustainable product design

- ▶ Environmental compatibility and eco-footprint
- ▶ Energy efficiency and low emissions
- ▶ Longevity and optimized total cost of ownership

Certified Quality Management

ISO 9001

Certified Environmental Management

ISO 14001

Rohde & Schwarz training

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Rohde & Schwarz customer support

www.rohde-schwarz.com/support

