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R&S® PowerTSVP Switching Application Chassis R&S® TS-PWA3

Open test platform based on CAN bus

- ◆ Modular switching instrument chassis
- ◆ Standard 19" rackmount 4 HU enclosure
- ◆ 16 peripheral slots for switching instrumentation
- ◆ Rear I/O support for easy system cabling (IEEE 1101.11-1998)
- ◆ Sophisticated analog measurement bus subsystem
- ◆ Support of system-wide trigger concept
- ◆ Seamless test adaptation by using standardized adapter components
- ◆ Simple and efficient module connection concept
- ◆ Easily expandable ATE switching
- ◆ High-pincount switching applications, e.g. for in-circuit test (ICT)
- ◆ High-power switching
- ◆ Cost-effective peripheral control via controller area network (CAN)
- ◆ Switching extension for R&S® CompactTSVP



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Product introduction

The R&S®PowerTSVP chassis (product name R&S®TS-PWA3) was created as a cost-efficient subsystem for switching applications. It can be used to build systems ranging from dedicated switching instruments up to complex switching applications inside test and measurement systems.

Most common applications:

- ◆ Expanding the number of input pins for general-purpose signals using the R&S®TS-PMB high-density relay matrix module. The module can be used for functional tests and together with the modular ICT option for the R&S®CompactTSVP (R&S®TS-PICT)
- ◆ Switching of high-power signals up to 16 A coming from DUTs or going into loads using the R&S®TS-PSM1 high-power multiplexer module. The module can be used for monitoring input currents via on-board shunt resistors, where the shunt voltage is routed to the R&S®CompactTSVP via the analog measurement bus

- ◆ Integrating customer-defined or application-specific modules or original loads related to the DUTs
- ◆ Separating the switching or load unit built with the R&S®PowerTSVP chassis and measurement unit based on the R&S®CompactTSVP

The analog measurement bus from the R&S®TS-PWA3 architecture routes general-purpose signals from switching modules to various measurement and stimulus instruments integrated in the R&S®CompactTSVP (product name R&S®TS-PCA3).

The analog bus lines from an R&S®TS-PWA3 chassis are connected to an R&S®TS-PCA3 master chassis for signal acquisition and various measurements 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®TS-PCA3. The serial control backplane provides 16 slots for CAN-based R&S®TSVP modules and includes the system-wide 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 of the R&S®TS-PSYS2 CAN bus slave interface to the R&S®TS-PSYS1 CAN bus master interface inside the R&S®CompactTSVP.

This remote connection is provided as an accessory product as well (product name 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 R&S®TS-PSM1 power-switching module which is a CAN-based module and suitable for both the R&S® CompactTSVP and the R&S® PowerTSVP.

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 adaptations close to the DUT power signals or adjacent to power supplies and loads.

R&S® CompactTSVP module formats and features

The main objective behind the R&S® PowerTSVP 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 usually reduced by a CompactPCI bus interface chip and circuitry.

Therefore, the R&S® CompactTSVP and R&S® PowerTSVP module format was extended by 130 mm in length to bring primary switching and signal conditioning on board.

The concept benefits from double board space versus PXI one-slot Eurocard modules.

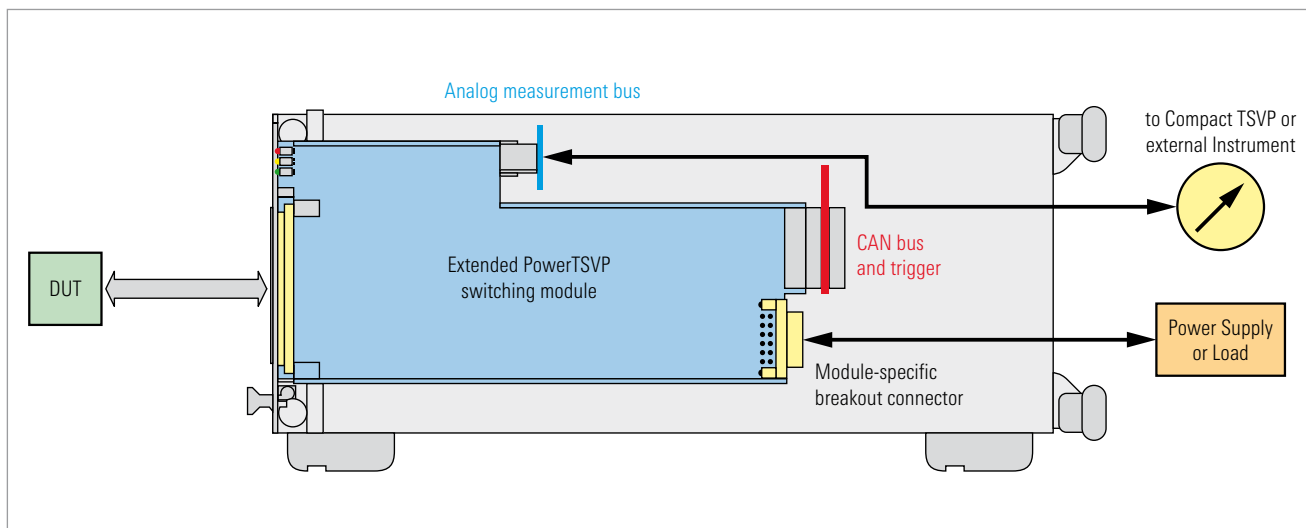
Analog measurement bus

The analog measurement bus offers short routing of signals to the measurement modules and electrical immunity to the digital signals on the 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 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 on-board signal conditioning and signal routing by means of coupling relays for the analog bus.



General concept of the R&S® PowerTSVP module format

Versatile backplane architecture

The R&S®TS-PWA3 comprises the control backplane which provides 16 peripheral slots according to the CAN bus specification CAN 2.0b.

The power-switching module R&S®TS-PSM1 offers a breakout connector to the rear side of the switching instrument. This rear side cabling is truly beneficial when deploying a 19" rackmountable standard test adapter, which is available for the R&S®PowerTSVP as a set of off-the-shelf products, ready for use in production test applications.

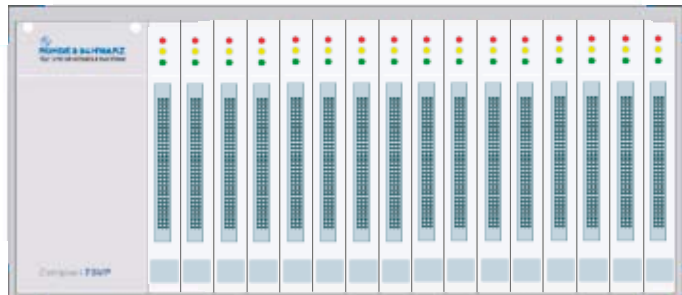
Slots 1 to 16 also include the system-wide triggering and a high-precision system clock of 10 MHz for synchronization.

Variable power backplane

The R&S®PowerTSVP chassis offers space for two power supply slots which are implemented as CompactPCI power interfaces according to the PICMG 2.11 Rev. 1.0 standard.

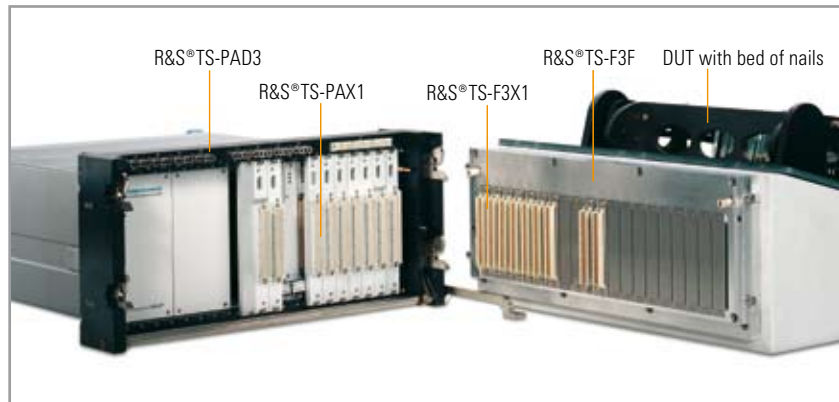
The power interface at slots A3 and A4 is equipped with one R&S®TS-PPS1 module which is included as a system power supply for the R&S®TS-PCA3.

The adjacent slots A1 and A2 can be used to extend the available power by means of 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.



Bus	Slot	A1	A2	A3	A4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	
Trigger						[Orange bar]																
CAN bus						[Yellow bar]																
Analog bus						[Green bar]																
Rear I/O						[Blue bar]																
Power supplies		[Dark Blue bar]																				

System backplane architecture of the R&S®TS-PWA3



Test adapter accessories

Cooling considerations for secure operation

The 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®PowerTSVP chassis is measured at four locations.

Test adapter accessories

To accelerate incorporation of the R&S®PowerTSVP 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 DIN 41612 connector which is easy to manipulate and is convenient for wiring. The interfacing of the R&S®TS-PAD3 test adapter receiver frame to the R&S®TS-F3F test adapter connector frame is implemented by the R&S®TS-PAX1 modular connector carriers on the test instrument side and the R&S®TS-F3X1 connector carriers on the adapter side.

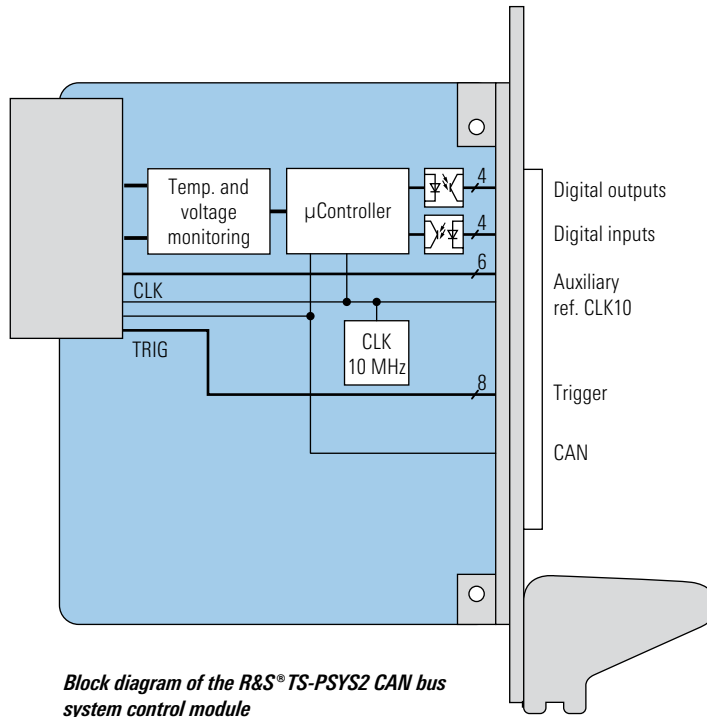
Serial system control module with CAN bus

To allow relay-based switching modules offered as part of the R&S® CompactTSVP product family to be deployed, the backplane is equipped with a CAN serial communication bus at slots 1 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 Rohde & Schwarz's overall commitment to industrial standards, various reliable and high-performance serial communication 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 rear transmission module (RTM) – the R&S®TS-PSYS2 system control module – located at the rear side of slot 15. The module is included with the



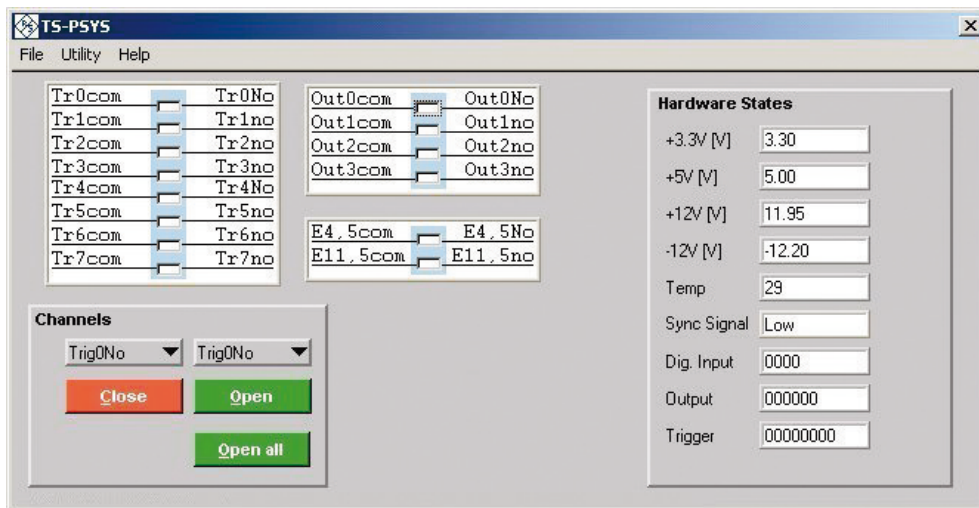
Block diagram of the R&S®TS-PSYS2 CAN bus system control module

R&S®TS-PWA3 and contains additional system administration functionalities such as temperature monitoring and digital I/O lines to interface automation devices with 24 V digital I/O levels.

The R&S®TS-PSYS2 system control module is used to route the CAN bus to the internal R&S®PowerTSVP switching modules which are based on the cost-efficient CAN bus remote control.

Software support

The R&S®TS-PSYS2 system control module is configured and controlled by a device driver based on the Virtual Instrument Software Architecture (VISA). 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® CompactTSVP family, a soft front panel is provided.

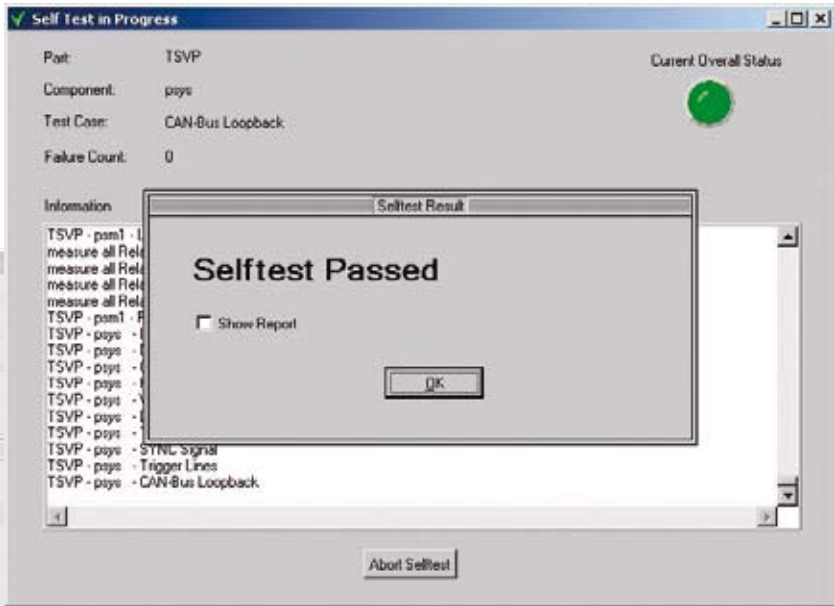


Soft front panel of the R&S®TS-PSYS2 system control module

Security by selftest and diagnostics features

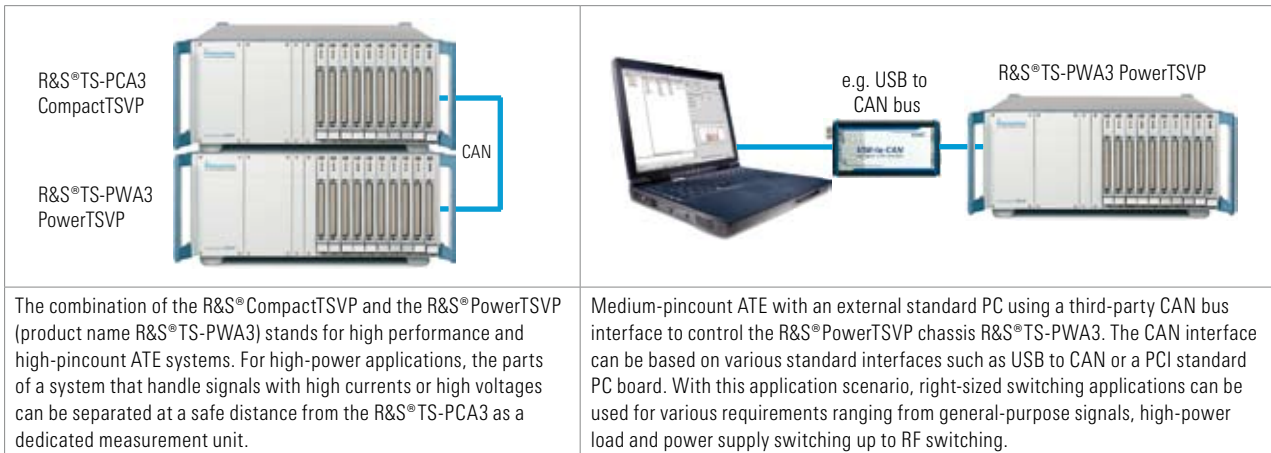
The built-in selftest capability of the R&S®TS-PSYS2 system control module includes automated evaluation of module functionality including a CAN bus loopback test, diagnostics for temperature monitoring and digital I/O lines.

The comprehensive selftest software concept using an R&S®TS-PSAM instrument module inside the R&S®CompactTSVP provides ready-to-run selftest sequences for every R&S®PowerTSVP and R&S®CompactTSVP platform product.



A comprehensive selftest program is provided for the R&S®TS-PSYS2 system control module

System layout



Specifications

Control backplane	
Bus systems	CAN 2.0b, 1 Mbit trigger bus, 8 signals
Slots 1 to 16	16 peripheral slots for CAN bus-controlled modules
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-PSYS2 rear I/O interface for CAN bus (CAN 2.0b) 4 outputs, PhotoMOS relay, 42 V, 200 mA 4 inputs, optocoupler, 2.4 V to 42 V, 5 mA 2 switchable ext. supply voltages 4.5 V at 0.5 A, 11.5 V at 0.5 A 8 switchable ext. trigger inputs/ outputs 5 monitoring lines: temperature, 3.3 V, 5 V, +12 V, -12 V buffered clock 10 MHz, ±(1.5 ppm + 1 ppm/year)
Analog measurement bus backplane	
Analog bus lines	8 (breakout connector at rear side)
Voltage	max. 125 V peak, max. 90 V rms
Current	max. 1 A
Bandwidth (typ.)	40 MHz (3 dB)
Crosstalk (typ.)	<-60 dB (100 kHz) <-45 dB (1 MHz) <-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
General data	
Temperature	
Operating range	0 °C to +50 °C
Storage range	-40 °C to +70 °C
Humidity	+40 °C, 95% r.h., noncondensing
Cooling	4 fans, low-noise, temperature-controlled
Electromagnetic compatibility	meets EMC directive 89/336/EEC and EMC standard EN 61326
Electrical safety	CE, DIN EN 61010-1

Mechanical resistance (nonoperating mode)	
Vibration, sinusoidal	meets IEC 1010-1, EN 61010-1, MIL-T-28800 D class 5, 5 Hz to 150 Hz, max. 2 g at 55 Hz, 55 Hz to 150 Hz, 0.5 g const.
Vibration, random	meets DIN IEC 60068-2-64 10 Hz to 300 Hz, acceleration 1.2 g rms
Shock	meets MIL-STD-810D 40 g shock spectrum
Dimensions (W × H × D)	465 mm × 193 mm × 517 mm (19"; 4 HU)
Rackmount kit	standard design 2000 brackets
Weight	
Base unit	11 kg
With typical options	18 kg

Ordering information

Designation	Type	Order number
R&S®PowerTSVP Switching Application Chassis	R&S®TS-PWA3	1157.8043.02
Related products		
R&S®CompactTSVP Test and Measurement Chassis	R&S®TS-PCA3	1152.2518.02
System Controller, embedded computer recommended	R&S®TS-PSC3	1134.2503.06
Power Supply, spare part	R&S®TS-PSP1	1501.0457.02
Power Supply Extension Kit, includes power backplane and cabling	R&S®TS-PCPA	1165.1509.02
Analog Bus Extension Cable	R&S®TS-PK01	1166.4147.02
CAN Bus Control Cable for extension with R&S®CompactTSVP	R&S®TS-PK02	1166.4160.02
RF Shielding Kit	R&S®TS-PSK1	1157.9004.02
19" Adapter, 4 HU	R&S®ZZA-411	1096.3283.00
Test adapter products		
Receiver Frame	R&S®TS-PAD3 R&S®TS-PAX1	1061.8566.02 1157.9404.02
Fixture Frame	R&S®TS-F3F R&S®TS-F3X1	1157.9504.02 1157.9604.02

More information at
www.rohde-schwarz.com
(search term: TS-PWA3)



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