ROHDE & SCHWARZ

USER MANUAL

ICT Expansion Module

TS-PICT

User Manual

for ROHDE & SCHWARZ ICT Expansion Module TS-PICT

Safety Instructions

Attention!
Electrostatic
sensitive devi-
ces require
special care

C E R T I F I C A T E

DQS GmbH

Deutsche Gesellschaft zur Zertifizierung von Managementsystemen

hereby certifies that the company

Rohde & Schwarz GmbH & Co. KG

Mühldorfstrasse 15
D-81671 München

with the production sites as listed in the annex

for the scope
Design and Development, Production, Sales, Services of Electronic-Measurement
and Communication-Equipment and Systems

has implemented and maintains a

Quality Management System.

An audit, documented in a report, has verified that this
quality management system fulfills the requirements
of the following standard:

DIN EN ISO 9001 : 2000

December 2000 edition

**The quality management system
of the sites marked with (*) in the annex fulfills the requirements
set out by the international and German Road Traffic Regulations**
including the approval objects as listed in the appendix.

This certificate is valid until	2008-01-23
Certificate Registration No.	001954 QM/ST
Frankfurt am Main	2005-01-24

This certificate is based on a quality audit in cooperation with the CETECOM ICT Services GmbH as
a Notified Body under the Scope of the EC directive 99/5/EC.
It was verified by the Notified Body that the supplementary requirements of the Annex V of the
European Concil Directive 99/5/EC are fulfilled.

Ass. iur. M. Drechsel

Dipl.-Ing. S. Heinloth

MANAGING DIRECTORS

Senior Executive Officer of CETECOM ICT Services GmbH
Dipl.-Ing. J. Schirra

D-60433 Frankfurt am Main, August-Schanz-Straße 21

Appendix to Certificate Registration No.: 001954 QM/ST

Rohde & Schwarz GmbH & Co. KG

Mühldorfstrasse 15
D-81671 München

The international and German Road Traffic Law
was audited regarding the following approval objects:

No.: 22 Electrical/Electronic Sub Assembly

This appendix (as of 2005-01-24) is only valid in connection
with the above-mentioned certificate.

Annex to Certificate Registration No.: 001954 QM ST

Rohde & Schwarz GmbH & Co. KG
Mühldorfstrasse 15
D-81671 München

Organizational unit/site	Scope
ROHDE & SCHWARZ GmbH & Co. KG Service Centre Cologne **ROHDE & SCHWARZ Systems GmbH** Graf-Zeppelin-Strasse 18 D-51147 Köln	Technical services in the field of measuring/communication techniques maintenance/repair calibration training technical documentation Development, production, systems
Rohde & Schwarz FTK GmbH Wendenschloßstrasse 168 D-12557 Berlin	Design and Development, Production and Sale of Communication Equipment, Installations and systems
Rohde & Schwarz GmbH & Co. KG Kaikenrieder Strasse 27 D-94244 Teisnach	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
Rohde & Schwarz závod Vimperk s.r.o. Spidrova 49 CZE-38501 Vimperk Tschechische Republik	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
(*) **Rohde & Schwarz GmbH & Co. KG** Mühldorfstrasse 15 81671 München	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems
(*) **Rohde & Schwarz Messgerätebau GmbH** Riedbachstrasse 58 D-87700 Memmingen	Design and Development, Production, Sales, Services of Electronic-Measurement and Communication-Equipment and Systems

This annex (as of 2005-01-24)is only valid in connection
with the above-mentioned certificate.

Support Center

Telephone Europe: **+49 180 512 42 42**

Telephone worldwide: **+49 89 4129 13774**

Fax: **+49 89 4129 13777**

e-mail: customersupport@rohde-schwarz.com

If you have any technical queries about this Rohde & Schwarz equipment, our Hotline at the Support Center of Rohde & Schwarz Sales-GmbH will be glad to help.

Our team will discuss your queries and look for solutions to your problems.

The Hotline is open Mondays to Fridays from 08.00 to 17.00 hrs.

For queries outside office hours, you can leave a message or send a note via fax or email. We will then get back to you as soon as possible.

ROHDE & SCHWARZ

Content

Figures   **5**

Tables

1 Usage

1.1 General

The ROHDE & SCHWARZ ICT Expansion Module TS-PICT is a universal expansion module for the universal test platform CompactTSVP (Test System Versatile Platform).

In combination with the TS-PSAM Measuring Module and the EGTSL software, the module is used for the realization of in-circuit measurements and the CompactTSVP self-test.

The module's ungrounded DC supply voltage is provided via the associated TS-PDC Rear I/O Module. This is plugged into the rear in the associated rear-I/O slot (same slot number as TS-PICT).

The TS-PICT module is plugged into the front of the CompactTSVP chassis. It uses the cPCI/PXI standard. At the rear the TS-PICT module is connected to the cPCI control bus and the PXI trigger bus. Analog measuring signals can be accessed using the analog measuring bus on the CompactTSVP.

A LabWindows IVI driver is provided on the card for the general functions. Other hardware functions are controlled using specific extensions of the driver.

The TS-PICT module can only be used in the CompactTSVP (TSVP = Test System Versatile Platform).

1.2 Characteristics

The ICT Expansion Module TS-PICT has the following features:

Characteristics TS-PICT
Programmable AC voltage source (AOS) for the frequencies 100 Hz, 1 kHz, 10 kHz
Programmable DC voltage source (AOS) for the generation of off-sets, ±5 V, 50 mA
ICT Current Measuring Unit (CMU) • Active current measurement, 5 µA to 250 mA • Triggered measurements via PXI trigger bus • 2 triggers derived from the measurement signal with programmable threshold • 4 filters • 16 bit converter 　　• max. signal sampling rate 200 kHz, adjustable 　　• Memory for 8 k sampling points
Self-test capability in conjunction with the TS-PSAM module
LabWindows IVI driver
Used in the *CompactTSVP*

Table 1-1 Characteristics TS-PICT

1.2.1 Applications

In combination with the TS-PSAM Measuring Module and the EGTSL software, the module is used for the realization of in-circuit measurements and the CompactTSVP self-test. For this purpose there is a programmable AC and DC voltage source (AOS) as well as a special Current Measuring Unit (CMU) for guarded measurements during the ICT (In-Circuit Test). The AC and DC voltage source (AOS) can be operated in two operating modes:

• AC mode

　• In this mode the AOS supplies AC voltages of varying frequency and voltage. If necessary with DC offset.

• DC mode

　• In this mode the AOS is used as a programmable DC voltage source.

The following in-circuit measurements are possible (only in combina-

tion with TS-PSAM and the EGTSL software):

• Guarded resistance measurements (3, 4 and 6 wire)

• Guarded impedance measurements (3, 4 and 6 wire)

• Diode test

During the ICT the units under test are connected via the TS-PMB Matrix Modules. The two modules (TS-PICT and TS-PSAM) are synchronized when the signals are measured using the 10 MHz signal on the CPCI backplane and the PXI trigger wires.

1.2.1.1 Examples of use

On this topic, see also Figure 1-1 and Figure 1-2

Connection examples for guarded measurements are given in the following section.

You will also find information on application examples and mode settings in the user manual for the TS-PSAM.
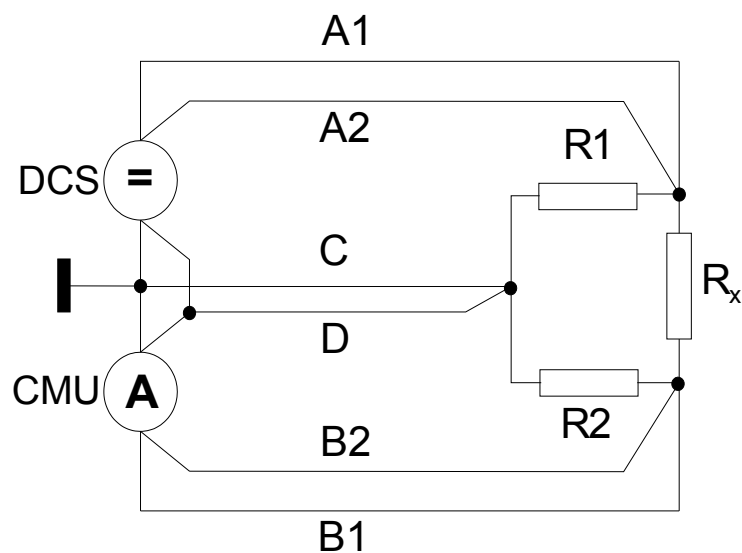
Figure 1-1 Circuit for a guarded resistance measurement (6-wire)
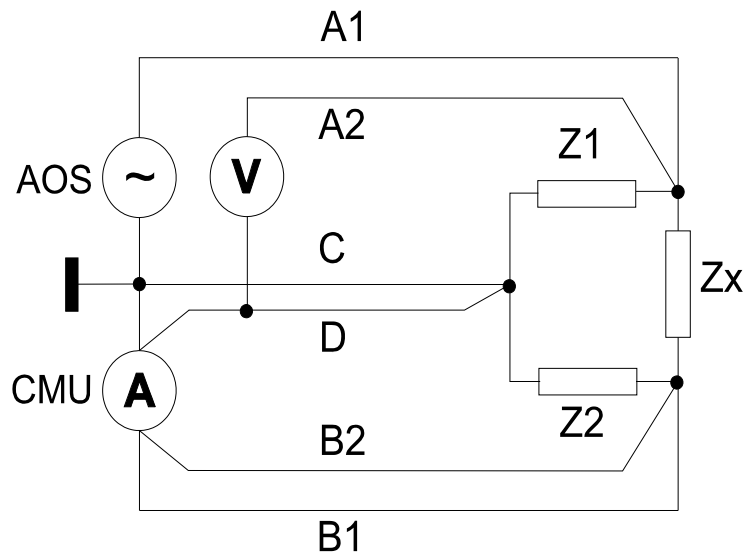
Figure 1-2 Circuit for a guarded impedance measurement (6-wire)

2 View 2-1

Figure 2-1 shows the ICT Expansion Module TS-PICT without the associated TS-PDC rear I/O module. The TS-PDC rear I/O module is shown in Figure 2-2.

Figure 2-1 View of the TS-PICT module

Figure 2-2 View of the TS-PDC rear I/O module.

3 Block Diagrams   3-1

In the following section, both the function block diagram for the TS-PICT module and the detailed block diagram are shown.

Figure 3-1 shows the function block diagram for the TS-PICT module.

Figure 3-2 shows a detailed block diagram for the TS-PICT module.
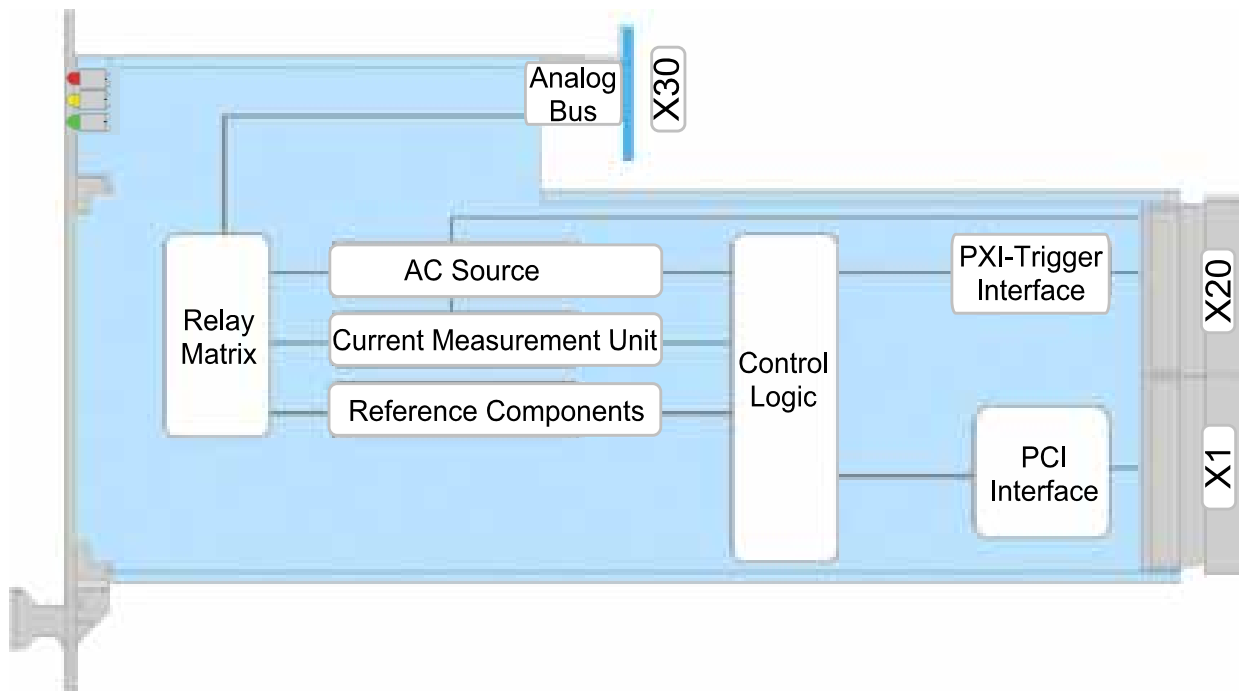
Figure 3-1 Function block diagram for the TS-PICT module
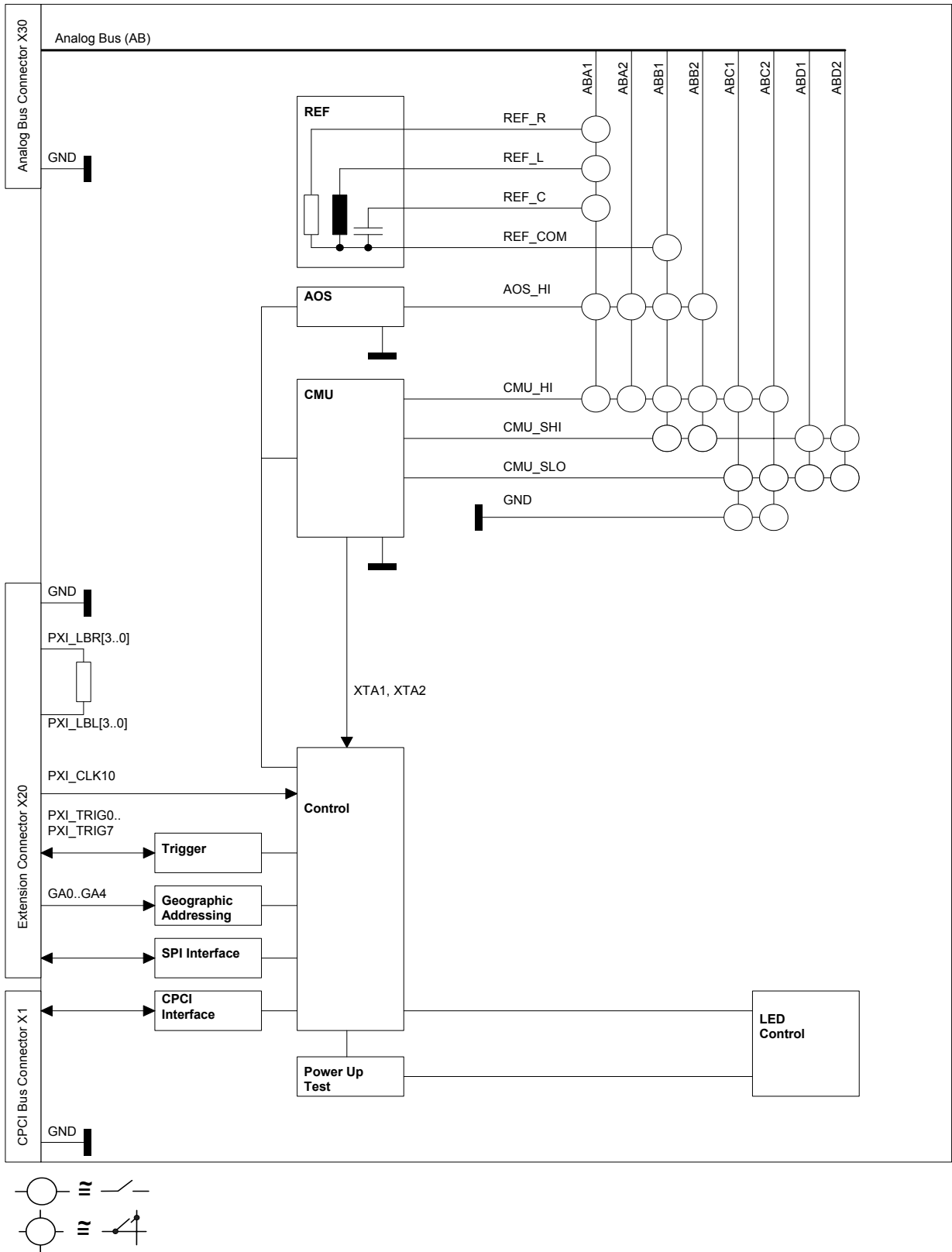
Figure 3-2 Detailed block diagram for the TS-PICT module

4 Layout

4.1 Mechanical Layout TS-PICT

The TS-PICT module is a **long cPCI plug-in module** and is designed for installation in the front of the CompactTSVP. The board height of the module is 3 HU (134 mm). The front panel is provided with a locating pin to ensure that it is correctly inserted into the Compact TSVP. The module is secured in place with the two retaining screws on the front panel. The connector X30 connects the TS-PICT module to the analogue bus backplane in the CompactTSVP. The connector X20/X1 connects the TS-PICT module to the cPCI backplane/PXI control backplane.
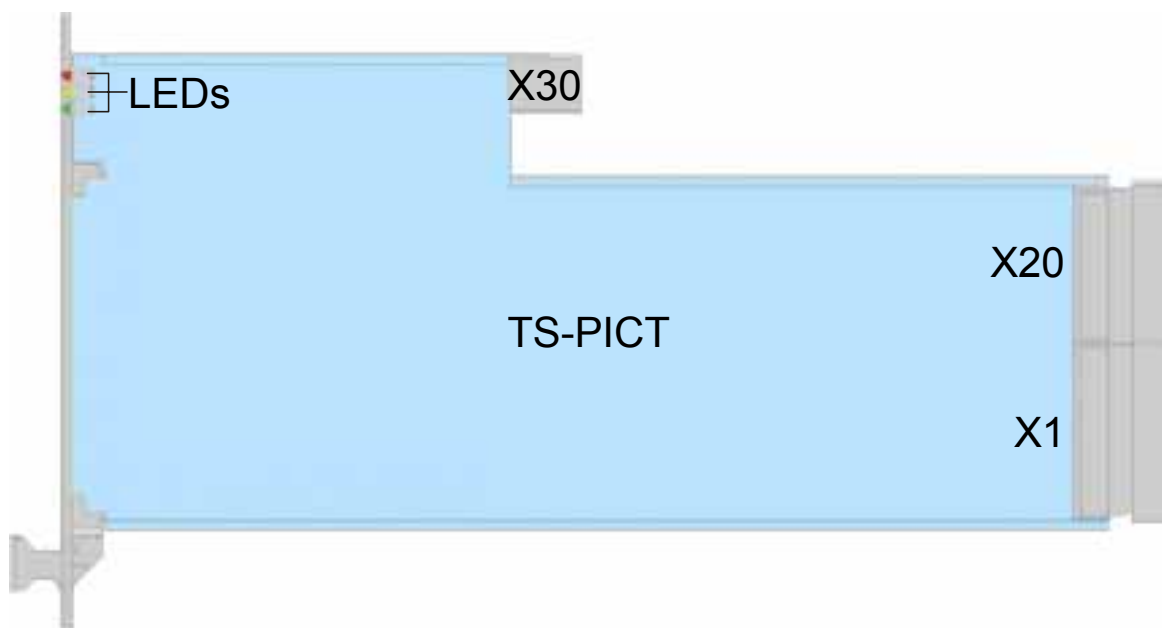
Figure 4-1 Arrangement of the connectors on the TS-PICT module

Symbol	Use
X1	cPCI Bus
X20	Extension (PXI), Rear I/O
X30	Analog bus

Table 4-1 Connectors on the TS-PICT module

4.2 Indicators on the TS-PICT module

Three light-emitting diodes (LEDs) on the front of the TS-PFG module indicate its current status. These LEDs have the following meanings:
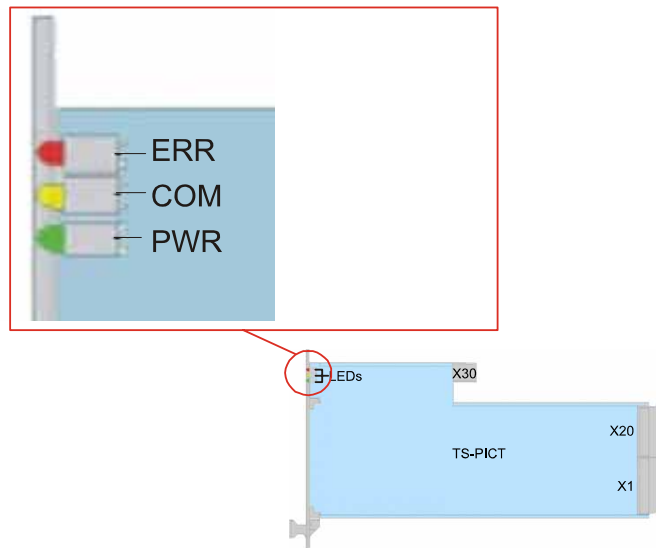
Figure 4-2 Layout of the LEDs on the TS-PICT module

LED	Description
ERR (red)	Error (ERR): Lights up when a fault is detected on the TS-PFG module during the power-on test after the supply voltage is switched on. This indicates the presence of a hardware problem on the module. (See also section 8 "Self-test")
COM (yellow)	Communication (COM): Lights up when data is exchanged across the interface.
PWR (green)	Power (PWR): Lights up when all the necessary supply voltages are present.

Table 4-2 Display elements on the TS-PICT module

4.3 Mechanical Layout TS-PDC

On this topic, see also Figure 4-3

The TS-PDC module is a **rear I/O module** for mounting in the back of the CompactTSVP. The board height of the module is 3 HU (134 mm). The module is secured in place with the two retaining screws on the front panel. Connector X20 connects the TS-PDC module to the extension backplane in the CompactTSVP. The TS-PDC module must always use the corresponding rear I/O slot for the main module (e.g. TS-PSAM module).

WARNING!

**The TS-PDC module must always be inserted in the corresponding rear I/O slot (same slot code) of the TS-PICT module.
If modules are inserted incorrectly (e.g. cPCI/PXI standard modules in the front), both modules may be damaged irreparably.**
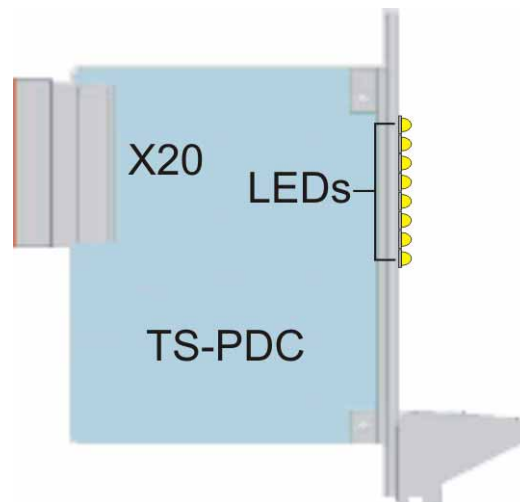
Figure 4-3 Arrangement of the connector and LEDs on the TS-PDC module

Symbol	Use
X20	Extension (Rear I/O)

Table 4-3 Connector for the TS-PDC module

4.4 Display elements of the TS-PDC module

On this topic, see also Figure 4-4

Eight light-emitting diodes (LEDs) are located on the front of the TS-PDC module to show the current status of the generated supply voltages. The individual LEDs have the following meanings:
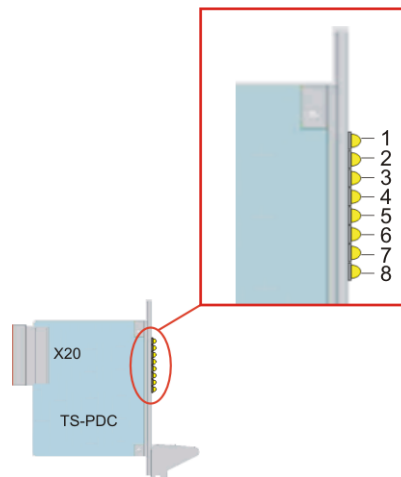
Figure 4-4 Arrangement of LEDs on the TS-PDC module

LED	Description
1, lights up	+15 VDC (MU), present
2, lights up	+5 VDC (MU), present
3, lights up	+3.3 VDC (MU), present
4, lights up	-15 VDC (MU), present
5, lights up	+15 VDC (AOS), present
6, lights up	+5 VDC (AOS), present
7, lights up	+3.3 VDC (AOS), present
8, lights up	-15 VDC (AOS), present

Table 4-4 Display elements on the TS-PDC module

5 Functional description

5.1 Functional description of the TS-PICT Module
NOT REQUIRED

5.2 Function Description of the TS-PDC Module

On this topic, see also Figure 5-1

The DC/DC converter is configured as a primary reference DC/DC converter. The input voltage (5 VDC) is transfered to two secondary potentials and rectified to the nominal voltage by line controllers. The status of the output voltage is displayed in each case by an LED.

The following DC voltages are generated:

–   +15 VDC, 0.5A (2x)

–   -15 VDC, 0.5A (2x)

–   +5 VDC, 0.5A (2x)

–   +3.3 VDC, 0.25A (2x)
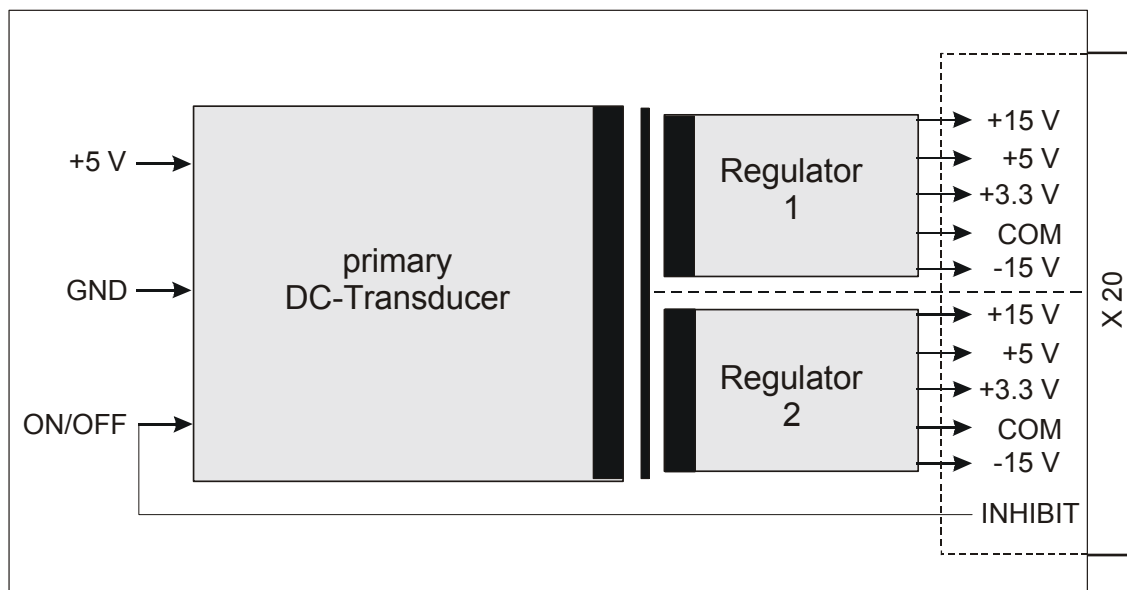
Figure 5-1 Block Diagram of TS-PDC

6 Commissioning

6.1 Installation of the TS-PICT Module

To install the plug-in module, proceed as follows:

•   Power down and switch off the CompactTSVP

•   Select a suitable slot on the front (slots 5-15 are possible, prefer-
        ably slot 9). TS-PSAM should be connected to slot 8 and TS-PICT
        to slot 9 for an in-circuit test configuration.

•   Remove the corresponding front panel portion from the TSVP
        chassis by loosening the two screws

	WARNING!
☀	**Check the backplane connectors for bent pins! Any bent pins must be straightened!** **Failure to do this may permanently damage the backplane!**

•   Apply moderate pressure to insert the plug-in module (use locating
        pin to attach)

	WARNING!
☀	**To insert the plug-in module, use both hands to guide carefully into the backplane connectors.**

•   The module is correctly located when a distinct 'stop' can be felt

•   Tighten the two locking screws on the module's front panel

6.2 Installation of the TS-PDC Module

To install the plug-in module, proceed as follows:

- The TS-PICT module must have been installed beforehand

- Select the corresponding rear I/O slot for the TS-PICT module

- Remove the corresponding rear panel portion from the Com-pactTSVP chassis by loosening the two screws

	WARNING!
⚙	**Check the backplane connectors for bent pins! Any bent pins must be straightened!** **Failure to do this may permanently damage the backplane!**

- Push in the plug-in module using moderate pressure

	WARNING!
⚙	**To insert the plug-in module, use both hands to guide carefully into the backplane connectors.**

- The module is correctly located when a distinct 'stop' can be felt.

- Tighten the two retaining screws on the front panel of the module.

7 Software

The TS-PICT module is operated using the software EGTSL. An additional driver is not provided.

8 Self-Test

The TS-PICT function generator has a built-in self-test capability. The following tests are possible:

- LED Test:

- Power-on test

- TSVP self-test

8.1 LED Test:

When the device is switched on, all three LEDs are lit for about one second. This indicates that the 5 V supply is present and all LEDs are working, also that the power-on test was successful. The following statements can be made about the different LED statuses:

LED	Description
One LED does not light up	Hardware problem on the module LED faulty
No LED's light up	No +5V supply

Table 8-1 Statements about the LED Test

NOTE:

If diagnostics suggest a problem with the supply voltage, the LEDs for the associated rear I/O module, TS-PDC, must be inspected visually. If a supply voltage failure is confirmed, the TS-PDC module must be replaced.

8.2 Power-on test

The power-on test runs at the same time as the LED test. In this test, the result of the FPGA loading process is calculated (FPGA = Field Programmable Gate Array). The following statements can be made about the different statuses of the red and green LEDs:

LED	Description
PWR (green) on	all supply voltages present
PWR (green) off	at least one supply voltage of the TS-PICT module or the rear I/O module TS-PDC is missing
ERR (red) off	no errors were detected
ERR (red) on	FPGA loading failed

Table 8-2 Statements about the power-on test

NOTE:

If diagnostics suggest a problem with the supply voltage, the LEDs for the associated rear I/O module, TS-PDC, must be inspected visually. If a supply voltage failure is confirmed, the TS-PDC module must be replaced.

8.3 TSVP Self-Test

The TSVP self-test runs an in-depth test on the module and generates a detailed log. This is performed using the "Self-Test Support Library".

The TS-PSAM module is used as a measuring unit by R&S modules in the TSVP. The correct operation of the modules is ensured by measurements on the analog bus.
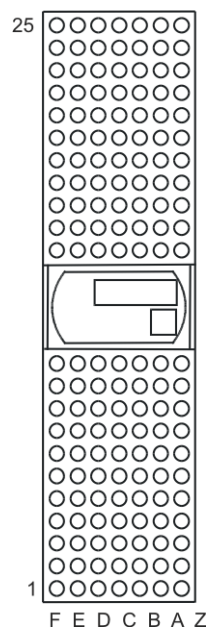
NOTE:

You will find information about starting the self-test and on the sequence of necessary steps in the GTSL software description or the GTSL on-line help.

9 Interface description

9-1

9.1 Interface description for TS-PICT

9.1.1 Connector X1 (cPCI Bus Connector)

Figure 9-1 Connector X1 (mating side)

Pin	F	E	D	C	B	A	Z	
25	GND	5V	3.3V	ENUM#	REQ64#	5V	GND	
24	GND	ACK64#	AD[0]	V(I/O)	5V	AD[1]	GND	
23	GND	AD[2]	5V	AD[3]	AD[4]	3.3V	GND	
22	GND	AD[5]	AD[6]	3.3V	GND	AD[7]	GND	
21	GND	C/BE[0]#	M66EN	AD[8]	AD[9]	3.3V	GND	
20	GND	AD[10]	AD[11]	V(I/O)	GND	AD[12]	GND	X1
19	GND	AD[13]	GND	AD[14]	AD[15]	3.3V	GND	
18	GND	C/BE[1]#	PAR	3.3V	GND	SERR#	GND	
17	GND	PERR#	GND	IPMB_SDA	IPMB_SCL	3.3V	GND	C
16	GND	LOCK#	STOP#	V(I/O)	GND	DEVSEL#	GND	O
15	GND	TRDY#	BD_SEL#	IRDY#	FRAME#	3.3V	GND	N
12..14				Key Area				N
11	GND	C/BE[2]#	GND	AD[16]	AD[17]	AD[18]	GND	E
10	GND	AD[19]	AD[20]	3.3V	GND	AD[21]	GND	C
9	GND	AD[22]	GND	AD[23]	IDSEL	C/BE[3]#	GND	T
8	GND	AD[24]	AD[25]	V(I/O)	GND	AD[26]	GND	O
7	GND	AD[27]	GND	AD[28]	AD[29]	AD[30]	GND	R
6	GND	AD[31]	CLK	3.3V	GND	REQ#	GND	
5	GND	GNT#	GND	RST#	BSRSV	BSRSV	GND	
4	GND	INTS	INTP	V(I/O)	HEALTHY#	IPMB_PWR	GND	
3	GND	INTD#	5V	INTC#	INTB#	INTA#	GND	
2	GND	TDI	TDO	TMS	5V	TCK	GND	
1	GND	5V	+12V	TRST#	-12V	5V	GND	

Table 9-1 Pin assignment for connector X1

9.1.2 Connector X20 (Extension Connector)
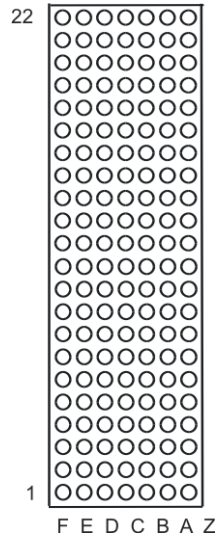
Figure 9-2 Connector X20 (mating side)

| Pin	F	E	D	C	B	A	Z	
22	GND	GA0	GA1	GA2	GA3	GA4	GND	
21	GND	PXI_LBR3	PXI_LBR2	PXI_LBR1	GND	PXI_LBR0	GND	
20	GND	PXI_LBL1	GND	PXI_LBL0			GND	
19	GND			PXI_LBL3	GND	PXI_LBL2	GND	
18	GND	PXI_TRIG6	GND	PXI_TRIG5	PXI_TRIG4	PXI_TRIG3	GND	
17	GND	PXI_CLK10			GND	PXI_TRIG2	GND	X20
16	GND	PXI_TRIG7	GND		PXI_TRIG0	PXI_TRIG1	GND	
15	GND				GND		GND	
14	NC						NC	C
13	NC						NC	O
12	NP	COM_1	+VCC3_1	+VCC2_1	-VCC_1	+VCC_1	NP	N
11	NP						NP	N
10	NC	COM_2	+VCC3_2	+VCC2_2	-VCC_2	+VCC_2	NC	E
9	NC						NC	C
8	NC	COM_1	COM_1	COM_1	COM_1	COM_1	NC	T
7	NC						NC	O
6	NC	COM_2	COM_2	COM_2	COM_2	COM_2	NC	R
5	NC						NC	
4	NC						NC	
3	GND	RSA0	RRST#		GND	RSDO	GND	
2	GND		RSDI	RSA1		RSCLK	GND	
1	GND				GND	RCS#	GND	

R&S Rear IO control (SPI)	PXI Signals
GA3..0 at GND or N.C.	GA4 at jumper field

Table 9-2 Pin assignment for connector X20

9.1.3 Connector X30 (Analog Bus Connector)
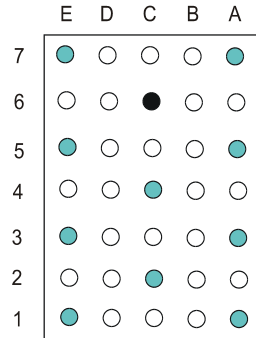
Figure 9-3 Connector X30 (mating side)

	E	D	C	B	A
7					
6			GND		
5	ABC1				ABA1
4			ABB1		
3	ABC2				ABB2
2			ABA2		
1	ABD2				ABD1

Table 9-3 Pin assignment for connector X30

9.2 Interface description for TS-PDC

9.2.1 Connector X20 (Extension Connector)
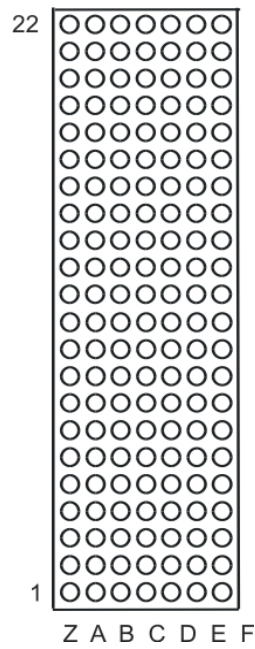
Figure 9-4 Connector X20 (TS-PDC mating side)

Pin	Z	A	B	C	D	E	F	
22	GND						GND	
21	GND		GND or NC *3)				GND	
20	GND			+5V *1)	GND	+5V *1)	GND	
19	GND		GND	+5V *1)			GND	
18	GND				GND		GND	J20
17	GND		GND	+5V *2)	+5V *2)		GND	
16	GND			+5V *2)	GND		GND	
15	GND		GND	+5V *2)	+5V *1)		GND	
14	NC						NC	C
13	NC						NC	O
12	NP	+15V_1	-15V_1	+5V_1	+3.3V_1	COM_1	NP	N
11	NP						NP	N
10	NC	+15V_2	-15V_2	+5V_2	+3.3V_2	COM_2	NC	E
9	NC						NC	C
8	NC	COM_1	COM_1	COM_1	COM_1	COM_1	NC	T
7	NC						NC	O
6	NC	COM_2	COM_2	COM_2	COM_2	COM_2	NC	R
5	NC						NC	
4	NC						NC	
3	GND		GND		RRST#		GND	
2	GND	RSCLK			RSDI		GND	
1	GND	RCS#	GND			+5V *1)	GND	
Pin	Z	A	B	C	D	E	F	

*1)   TS-PDC V1.0 is supplied via these pins from +5V, for backplanes up to V3.x
*2)   TS-PDC V1.1 is supplied via these pins or pins from *1) , for backplanes V1.x to V4.x
*3)   TS-PDC V1.1 and V1.2: GND, for version V1.3: NC (Not Connected)

Table 9-4 Pin assignment for connector X20 (TS-PDC)

10 Specifications

> **NOTE:**
>
> **See datasheet TS-PICT.**