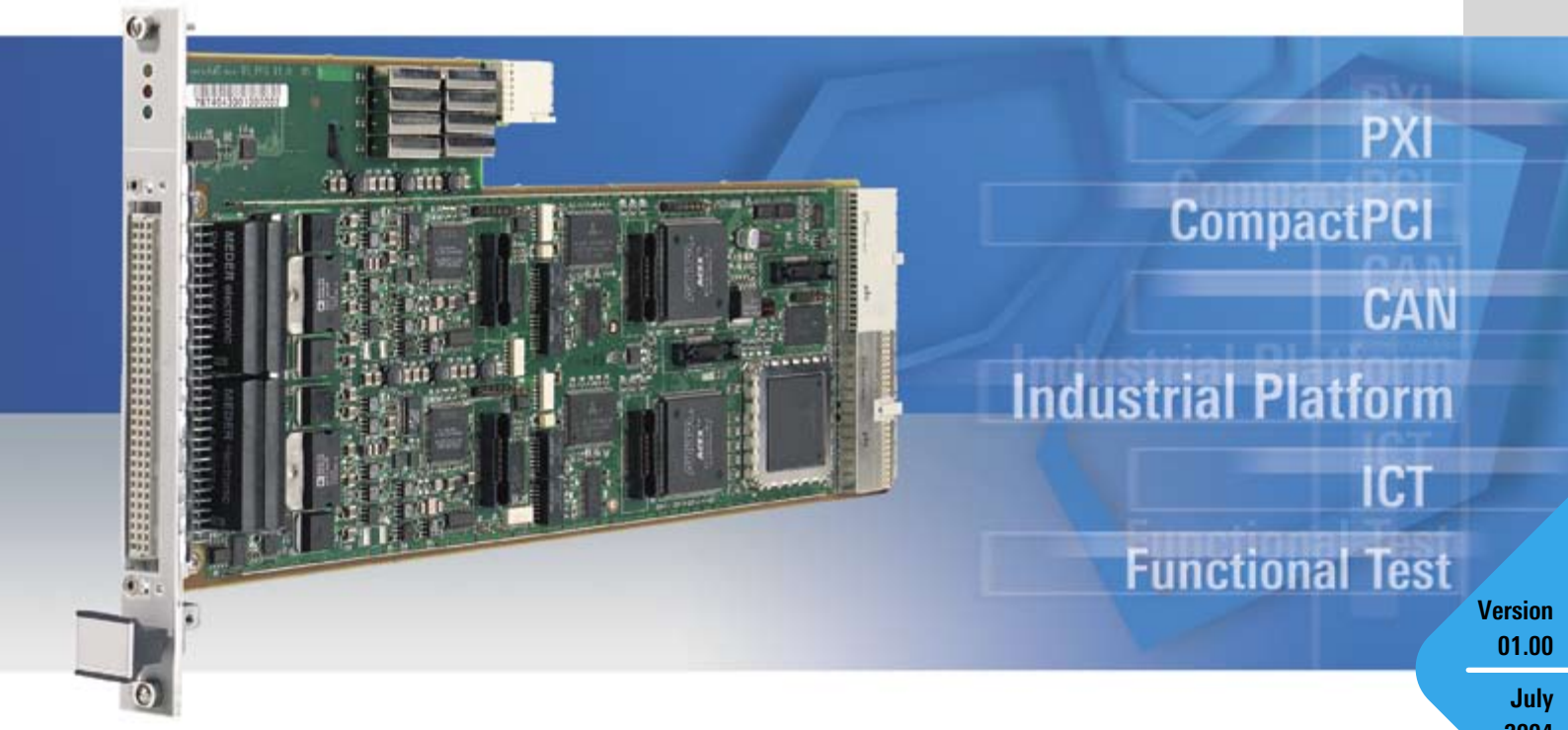
Data sheet



Version 01.00

July 2004

Function Generator Module R&S®TS-PFG

Dual-channel arbitrary waveform generator with isolated outputs

- Floating signal output with independent channel isolation
- Wide dynamic range with 16-bit resolution
- High sampling rate of 25 Msample/s per channel
- 1 MHz sine, square, triangle, arbitrary standard waveforms
- High output level range from ±1 V to ±20 V, 40 V pp
- High output current of max. ±250 mA
- 1 Msample memory depth per channel
- Sequencing of multiple memory sections and multiple repetitions
- Selftest capabilities
- Analog measurement bus access to 8 bus lines
- Soft front panel support for immediate deployment
- LabWindows/CVI device driver support
- Waveform Composer software support for arbitrary waveform creation
- GTSL test software library in DLL format

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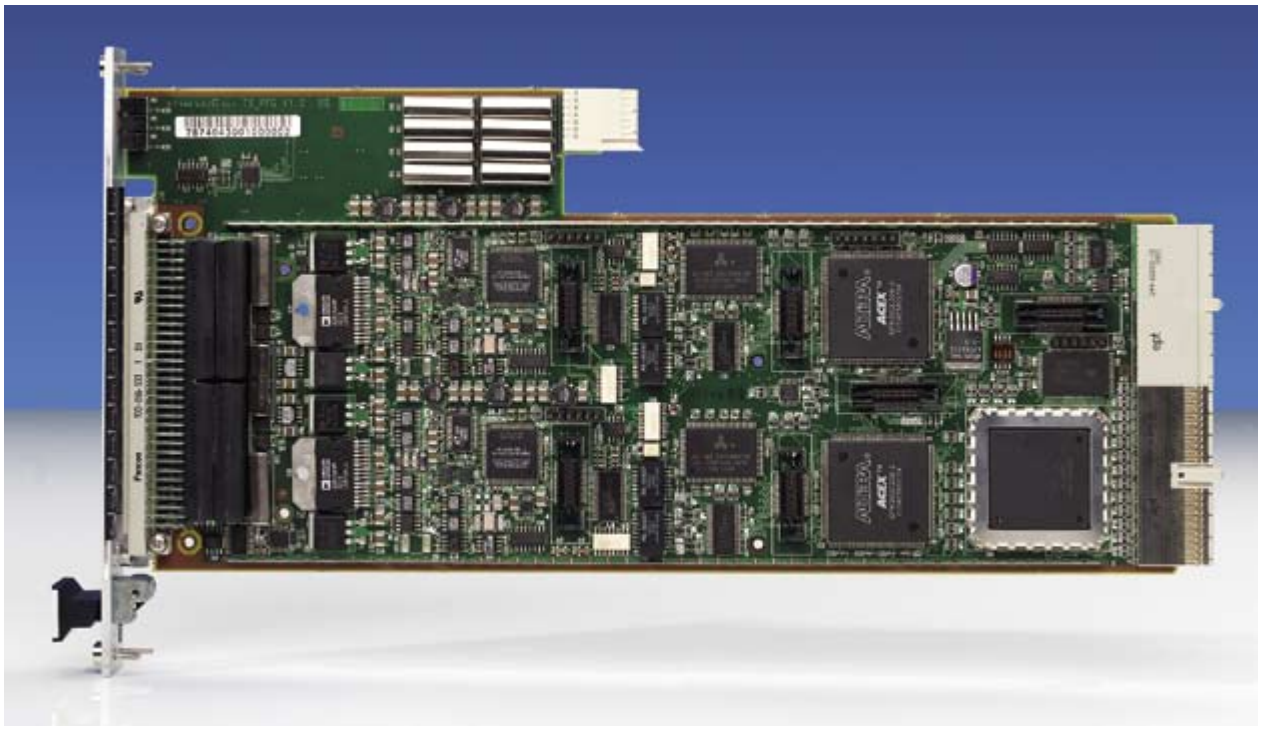


Product introduction

The Function Generator Module R&S®TS-PFG is a CompactPCI/PXI module which takes up only one slot in the R&S®CompactTSVP (Test System Versatile Platform).

The module contains two independent channels for arbitrary waveform generation featuring 16-bit resolution and floating signal output.

The output drivers can provide a maximum signal amplitude of 20 V with load currents up to 250 mA. Due to this combination of isolated output and powerful analog frontend, the R&S®TS-PFG can accurately generate waveforms for DUT stimulation for a very wide range of applications.

For secure operation in demanding applications of production test in the fields of automotive, military and communications electronics, the outputs are short-circuit-protected and cascadable.

Standard waveforms are provided using optimized digital waveform arrays for high spectral purity. The standard waveforms include the following:

- Sinewave
- Triangle
- Ramp
- Square wave or pulses

For arbitrary waveform generation, the waveform data is transmitted to the onboard memory buffer via the CompactPCI/PXI interface. The memory can hold up to 1 Msample per channel. A programmable digital marker signal ensures sophisticated trigger synchronization to each analog output channel. The high-precision 10 MHz PXI clock reference is used for system wide timebase and output signal synchronization.

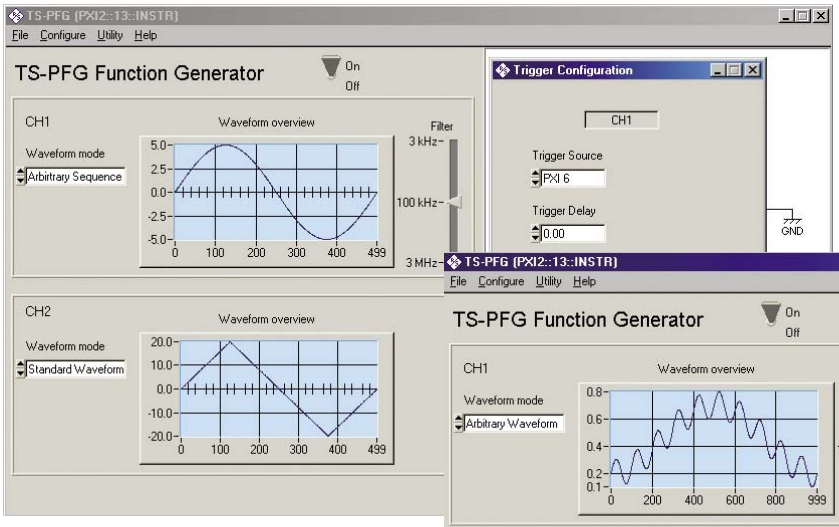
The output modes include burst mode with single output or counted repetitions, continuous output or DC mode with discrete signal values. Various arbitrary waveform portions can be combined to form sequences. Up to 256 different memory segments can be concatenated to obtain an aperiodic waveform sequence. Signal repetition is provided with up to 16382 cycles per segment.

Because of the low output impedance, the R&S®TS-PFG can work as a programmable voltage source with load currents up to 250 mA.

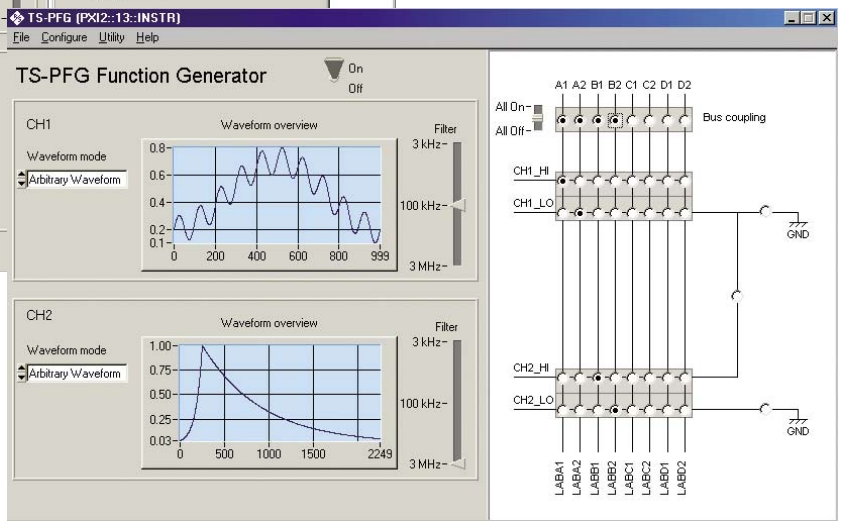
If necessary, the two function generator outputs can be taken to ground or used independently of each other. In cascaded output mode, the output voltage can be doubled.

The power supply for the floating instrument functionality is provided via an associated Rear I/O module (R&S®TS-PDC), which is included in the delivery.

The DUT stimulation signals can be routed via the front connector or to a high number of DUT pins via the analog measurement bus of the R&S®CompactTSVP. The 8-line analog bus is located above the signal conditioning area where space for on-board signal routing is provided as well as filtering and power drivers for the analog outputs.



Standard waveforms with trigger selection



Arbitrary waveform with switch configuration

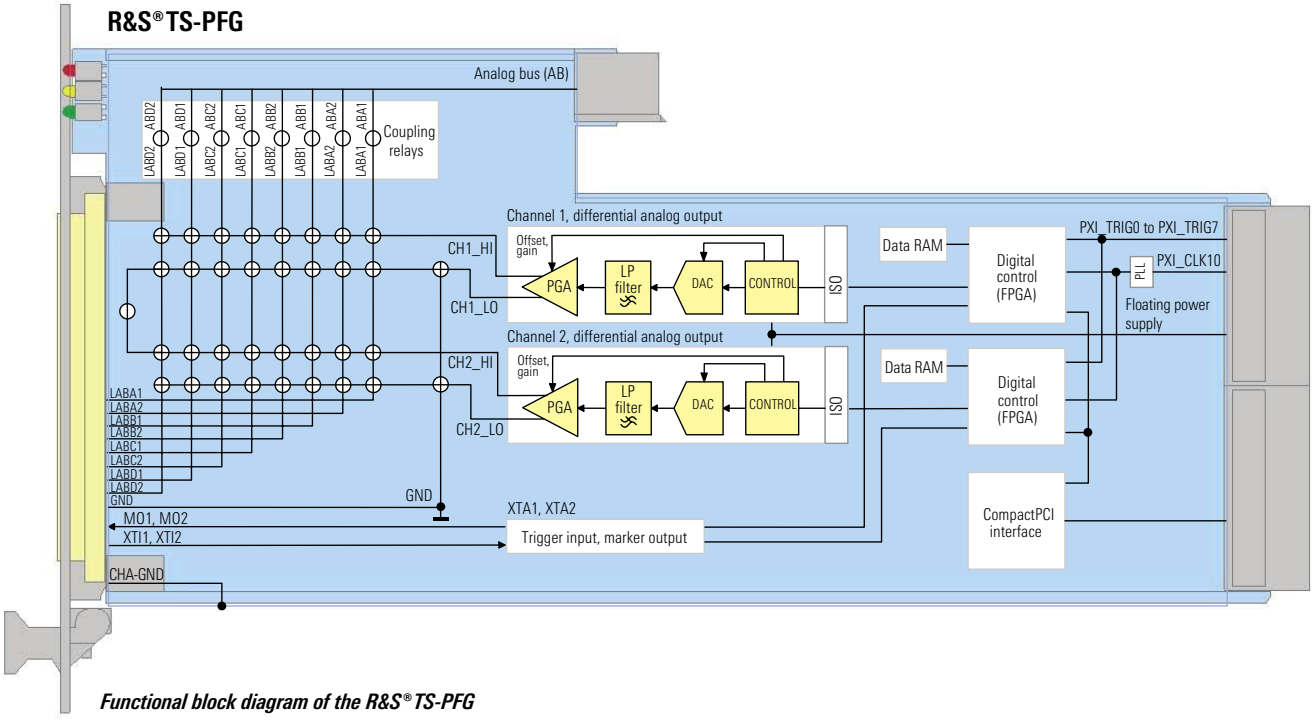
Software support

A LabWindows/CVI driver according to the IVI standard is available for the generator functions of the module. All other functional groups of the hardware are operated via specific driver extensions.

Function panels and online help are available as a common feature for the LabWindows/CVI driver which is available as a DLL file, ready to be used in various programming environments.

Security by selftest and diagnostic features

The built-in selftest capability of the module ranges from fast diagnostics to the complete, automated evaluation of output levels, trigger lines and all switching paths. Diagnostic LEDs on the module front panel speed up system integration and allow proper operation to be determined at a glance.



Functional block diagram of the R&S®TS-PFG

Specifications

Application in R&S®TSVP platform			
R&S®CompactTSVP	1 slot required		
Interface			
Control bus	CompactPCI/PXI		
DUT connector (front)	DIN 41612, 96 pins		
Rear I/O connector	CompactPCI, 110 pins		
Tolerances of specified values apply under the following conditions:			
Recommended calibration interval	1 year		
Temperature range	23 °C ±5 °C		
Additional error specified by the temperature coefficient in the range	5 °C to 18 °C and 28 °C to 40 °C		
Signal generation			
Output resolution	16 bit		
Number of analog channels	2 fully independent or synchronous, differential, floating, cascadable, short-circuit-protected		
Digital marker channels	2 TTL (one per channel)		
Memory (RAM)	1 Msample per channel		
Signal output modes			
DC mode	static value		
Sinewave	1 Hz to max. 1 MHz		
Triangle, ramp	1 Hz to max. 1 MHz		
Squarewave	1 Hz to max. 1 MHz		
Pulse (high – low)	1 % to 99 % (min. pulse width 500 ns)		
Arbitrary waveforms in burst mode			
Sample rate	DC, 1 sample/s to 25 Msample/s		
Waveform length	1 to 1048576 (1M) points per channel		
Resolution	min. 40 ns		
Chaining of sequences	256 per channel, max. 16382 cycles per segment		
Timing control			
Continuous mode			
Frequency	1 Hz to 1 MHz		
Resolution	0.004 % of setting		
Accuracy	±(resolution + reference clock accuracy)		
Reference clock	PXI clock of R&S®TS-PCA3, 10 MHz, ±(1.5 ppm + 1 ppm/year)		
Output voltage	amplitude range		
Output mode	output voltage, max.		
Single channel, GND referenced	±20 V, ±10 V, ±5 V, ±1 V		
Single channel, floating	±20 V, ±10 V, ±5 V, ±1 V		
Cascaded channels	±40 V, ±20 V, ±10 V, ±2 V		
Output current	Max. load current, depending on frequency		
Output mode	f ≤ 300 kHz	300 kHz ≤ f ≤ 500 kHz	500 kHz ≤ f ≤ 1 MHz
Single channel, GND referenced	250 mA	250 mA	125 mA
Single channel, floating	250 mA	250 mA	125 mA
Cascaded channels	250 mA	125 mA	50 mA

Amplitude accuracy (no load)			
		1 Hz to 100 kHz	100 kHz to 1 MHz
Range	Resolution	Error limits	Error limits
20 V	0.6 mV	±0.25 dB	±0.5 dB
10 V	0.3 mV	±0.25 dB	±0.5 dB
5 V	0.15 mV	±0.3 dB	±0.5 dB
1 V	0.03 mV	±0.3 dB	±0.5 dB

Temperature coefficient for amplitude	0 % to –0.05 % / °C of range
Offset range	–20 V to +20 V (offset + amplitude less than amplitude range limits)
Offset resolution	12 bit

DC offset accuracy (no load)		
Range	Resolution	Error limits
±20 V	10 mV	±(0.5 % + 100 mV)
±10 V	5 mV	±(0.5 % + 80 mV)
±1 V	0.5 mV	±(0.5 % + 20 mV)

Temperature coefficient DC offset	0 % to –0.04 % / °C of range
Source impedance	<2.5 , typ. 1.25
Output coupling	DC
Bandwidth with lowpass filter (3 dB)	3 MHz / 100 kHz / 3 kHz (programmable for arbitrary mode)
Crosstalk (typ.)	–70 dB at 100 kHz, –60 dB at 1 MHz

Spectral purity (sinewave)	
Harmonic distortion, frequency range 20 Hz ≤ f ≤ 50 kHz	
Output V_{pp}	harmonic distortion (typ.)
≤200 mV	<–70 dBc
≤2 V	<–65 dBc
≤20 V	<–48 dBc
≤40 V	<–40 dBc

Synchronization, per channel	
Trigger inputs	1 × local trigger (TTL) 8 × PXI trigger bus
Slope	positive/negative
Pattern	9 bit, 3 states: high, low, don't care
Delay	40 ns to 100 s
Trigger outputs	1 × local trigger (TTL), programmable marker synchronous with analog signal 8 × PXI trigger bus; marker channels may be used as separate digital channels

Analog measurement bus and relay multiplexer	
R&S®CompactTSVP analog measurement bus	8 lines
Relay scanner (per channel)	two pole × 8-to-1 multiplexer to local analog bus
Coupling relays	8, local bus to global analog bus
Switching voltage	125 V DC / 90 V rms max.
Switching current	1.0 A max.
Switching power DC / rms	10 W / 10 VA max.
Isolation (ch–ch, ch–earth)	125 V

Shock test	40 g, MIL-STD-810, classes 3 and 5
Temperature loading	
Operating temperature range	+5 °C to +40 °C
Permissible temperature range	0 °C to +50 °C
Storage temperature range	–40 °C to +70 °C
Humidity	+40 °C, 95 % rel. humidity
Dimensions	316 mm × 174 mm × 20 mm
Weight	0.5 kg (0.8 kg incl. R&S®TS-PDC)
Recommended calibration interval	1 year

General data

Power consumption	typ. +5 V / 3.0 A , up to 8.5 A max., +3.3 V / 1.3 A, 47 W max. incl. R&S®TS-PDC
EMC compliance	compliant with EMC directive 89 / 336 / EEC and EMC standard EN 61326
Safety	CE, EN 61010 Part 1
Mechanical loading	
Vibration test, sinusoidal	5 Hz to 55 Hz: 2 g, MIL-T-28800 D, class 5 55 Hz to 150 Hz: 0.5 g, MIL-T-288800 D, class 5
Vibration test, random	10 Hz to 300 Hz, 1.2 g

Ordering information

Designation	Type	Order No.
Function Generator Module (including R&S®TS-PDC)	R&S®TS-PFG	1158.0052.02
Platform R&S®CompactTSVP	R&S®TS-PCA3	1152.2518.02
Waveform Composer Software	R&S®AM300-K2	1147.2013.02

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

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