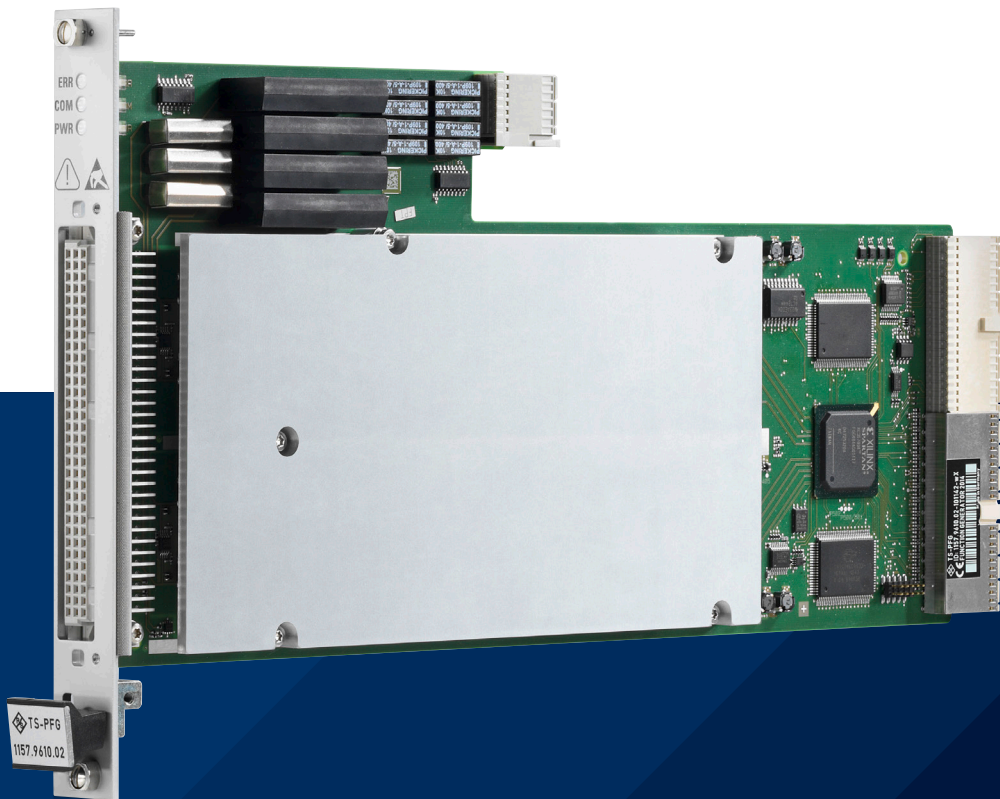


R&S® TS-PFG FUNCTION GENERATOR MODULE

Dual-channel arbitrary waveform generator
with isolated outputs



Product Brochure
Version 04.00

ROHDE & SCHWARZ

Make ideas real



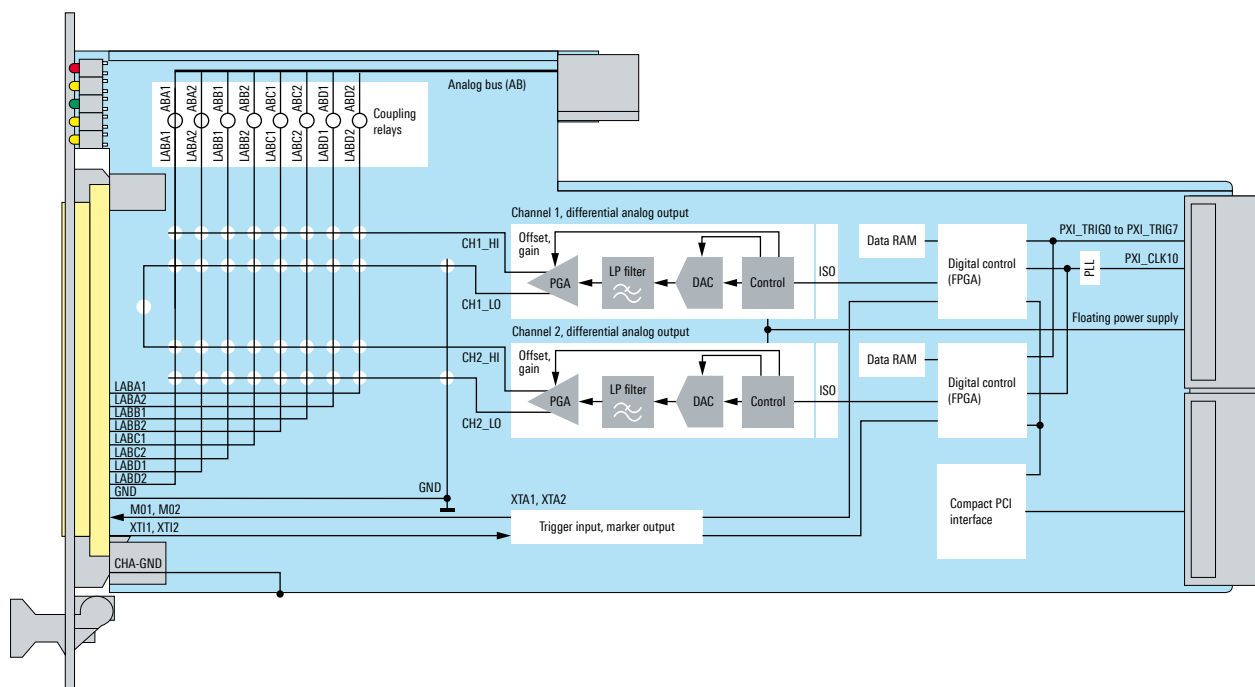
AT A GLANCE

The R&S®TS-PFG function generator module is a PXI module which takes up only one slot in the R&S®TSVP chassis.

Key facts

- ▶ 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 segments and multiple repetitions
- ▶ Self-test capabilities
- ▶ Analog measurement bus access to eight bus lines
- ▶ Soft front panel support for immediate deployment
- ▶ LabWindows/CVI device driver support
- ▶ GTSL test software library in DLL format

Functional block diagram



PRODUCT INTRODUCTION

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 front-end, the R&S®TS-PFG can accurately generate waveforms for DUT stimulation for a very wide range of applications.

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

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

- ▶ Sinewave
- ▶ Triangle, ramp
- ▶ Squarewave
- ▶ Pulse (high – low)

For arbitrary waveform generation, the waveform data is transmitted to the onboard memory buffer via the PXI interface. The memory can store 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 grounded or used independently of each other. In cascaded output mode, the output voltage can be doubled.

The power supply for the floating instrument function is provided via an associated rear I/O module (R&S®TS-PDC), which is supplied with the R&S®TS-PFG.

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

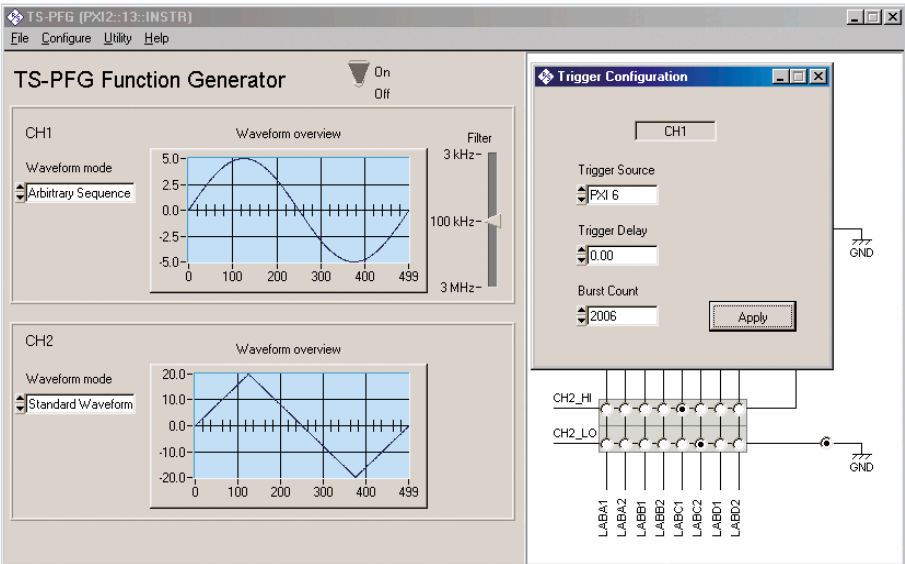
SOFTWARE SUPPORT

A LabWindows/CVI driver in line with the IVI standard is available for the module's generator functions. All other functional hardware groups operated via specific driver extensions.

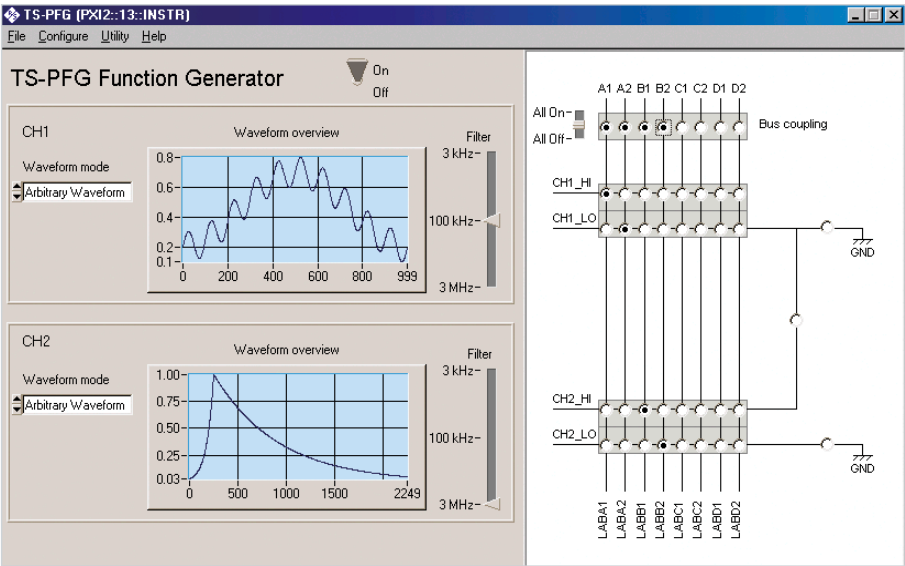
Function panels and online help are available as a common feature for the LabWindows/CVI driver which is available as a DLL file, ready to be used in various programming environments.

SECURITY THROUGH SELF-TEST AND DIAGNOSTIC FEATURES

The module's built-in self-test capability ranges from fast diagnostics to 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.



Standard waveforms with trigger selection



Arbitrary waveform with switch configuration

SPECIFICATIONS

Specifications			
Application in the R&S®TSVP platform		PXI module	1 slot required
Interface			
Control bus			PXI
DUT connector (front)			DIN 41612, 96 pins
Rear I/O connector			CompactPCI, 110 pins
Signal generation			
Output resolution			16 bit
Number of analog channels		fully independent or synchronous, differential, floating, cascadable, short-circuit proof	2
Digital marker channels		one per channel	2 TTL
Memory (RAM)			1 Msample per channel
Signal output modes			
DC mode			static value
Sinewave			max. 1 Hz to 1 MHz
Triangle, ramp			max. 1 Hz to 1 MHz
Squarewave			max. 1 Hz to 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 (1 M) points per channel
	if sample rate = 25 Msample/s		18 to 1048576 (1 M) points per channel
	resolution		min. 40 ns
	chaining of sequences		256 waveform segments 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 chassis, 10 MHz, ±(1.5 ppm + 1 ppm/year)
Output voltage			amplitude range
Output mode			max. output voltage
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		$f \leq 300 \text{ kHz}$	$300 \text{ kHz} \leq f \leq 500 \text{ kHz}$ $500 \text{ kHz} \leq f \leq 1 \text{ MHz}$
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

Specifications

DC offset accuracy (no load)

Range	Resolution	Error limits
±20 V	10 mV	±(0.5% + 100 mV)
±10 V	2 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 Ω, 1.25 Ω (typ.)
Output coupling		DC
Bandwidth with lowpass filter (3 dB)	programmable for arbitrary mode	3 MHz/100 kHz/3 kHz
Crosstalk (typ.)	at 100 kHz	-70 dB
	at 1 MHz	-60 dB

Spectral purity (sinewave)

Harmonic distortion, frequency range $20 \text{ Hz} \leq f \leq 50 \text{ kHz}$

Output V_{pp}		typ. harmonic distortion
≤ 200 mV		< -70 dBc
≤ 2 V		< -65 dBc
≤ 20 V		< -48 dBc
≤ 40 V		< -40 dBc

Synchronization, per channel

Trigger inputs	local trigger (TTL)	2
	PXI trigger bus	8
Delay		40 ns to 100 s
Trigger outputs	programmable marker synchronous with analog signal	2 × local trigger (TTL)

Analog measurement bus and relay multiplexer

Relay scanner (per channel)		two pole × 8-to-1 multiplexer to local analog bus
Coupling relays	local bus to global analog bus	8
Switching voltage		max. 120 V DC/50 V AC (RMS)
Switching current		max. 1.0 A
Switching power DC (RMS)		max. 10 W/10 VA
Isolation (channel-to-channel, channel-to-earth)		120 V

Specifications

General data

Power consumption		typ. +5 V/3.0 A max. ≥ 8.5 A
		+3.3 V/1.3 A
	incl. R&S®TS-PDC	max. 47 W
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	20 mm × 174 mm × 316 mm (0.79 in × 6.85 in × 12.44 in)
Weight		0.5 kg (1.1 lb)
	incl. R&S®TS-PDC	0.64 kg (1.41 lb)
Recommended calibration interval		12 months

ORDERING INFORMATION

Designation	Type	Order No.
Function generator module (including R&S®TS-PDC)	R&S®TS-PFG	1157.9610.02

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

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