4 kV High Voltage Pulse Generator TLP-16010A

Advanced TLP/HMM/HBM Solutions

1 Features

- High voltage transmission line pulse (TLP) generator
- Rectangular pulse shape
- 50 Ω high voltage TNC pulse output connector
- ±4 kV output voltage (50 Ω output load)
- ±160 A output current (output short circuit)
- 320 kW peak pulse output power into 50 Ω load
- 1 ns rise time
- 100 ns pulse width
- Optional external manual pulse width extender TLP-16012A for 10 ns to 1000 ns pulse width
- 5 Hz pulse repetition frequency
- High speed 50 Ω, 1 V trigger output for digital oscilloscopes (synchronous to high voltage pulse output)
- Software driver for stand-alone operation
- Efficient software for system control, waveform analysis and waveform data management (optional)
- Integrated interlock safety shut-down
- Industrial isolated and EMI/ESD protected USB control interface

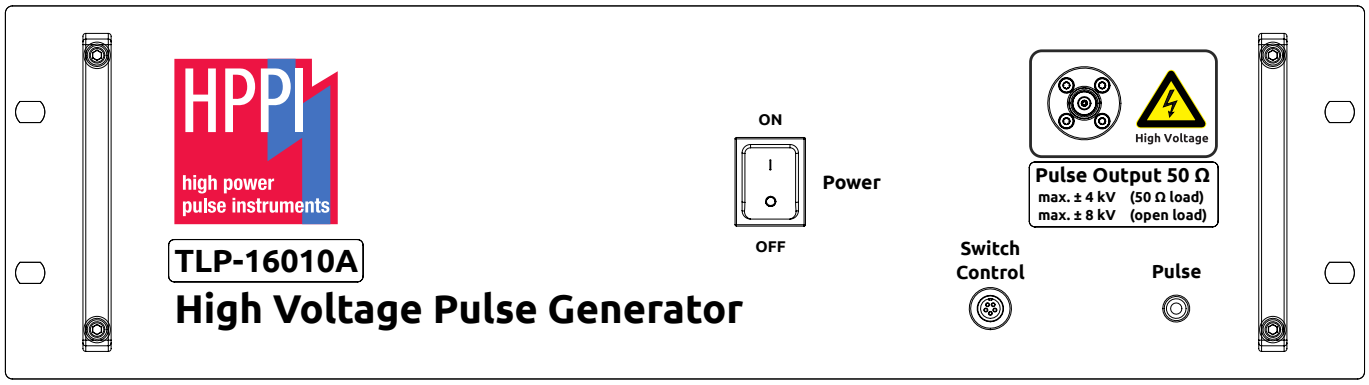

Figure 1: TLP-16010A front side view

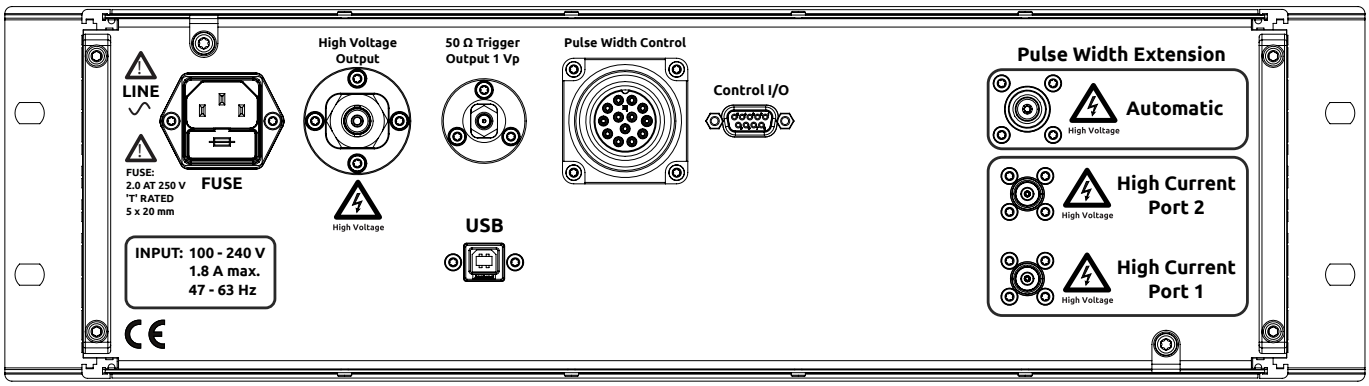

Figure 2: TLP-16010A rear side view

High Power Pulse Instruments GmbH
Internet: https://www.hppi.de/
E-mail: info@hppi.de

2 Specifications

Parameter	Symbol	Limit Values			Unit	Remarks
		Min.	Typ.	Max.		
Output voltage (open load)	$V_{out,\infty}$	-8.0		+8.0	kV	into open load [1]
Output voltage (50 Ω)	$V_{out,50\Omega}$	-4.0		+4.0	kV	into 50 Ω [2]
Peak pulse output power (50 Ω)	$P_{out,50\Omega}$		320		kW	into 50 Ω [3]
Minimum output voltage step size	V_{Δ}		0.1		V	into 50 Ω load, USB progr.
Maximum output current	I_{tlp}	-160		+160	A	into short circuit
Maximum output current	I_{tlp}	-80		+80	A	into 50 Ω load
Pulse repetition time	t_m	200	500		ms	state dependent [4]
Pulse width	t_p		100		ns	one 10 m external high voltage cable connected to port 1 and port 2
Pulse width using pulse width extender TLP-16012A (optional)	t_p	10		1000	ns	10/50/100/200/400/500/800/1000 ns manual selectable with TLP-16012A
Output pulse rise time	t_r		1		ns	built-in
Pulse Reflection Suppression	S_r	1.8		40	dB	depending on pulse amplitude setting
Digital control interface	-	USB			-	Industrial isolated and EMI/ESD protected USB 2.0 interface
AC line voltage range	V_{AC}	100		240	V	47-63 Hz, max. 1.8 A
Dimensions TLP-16010A (W x H x D)	D_{16010A}	428 (482.6) x 132.5 x 485			mm^3	428 mm body, 482.6 mm rack flange
Weight TLP-16010A	W_{16010A}		15		kg	excluding accessories
Software support of digital oscilloscopes	All models from Keysight, LeCroy, Tektronix, Iwatsu. New models will be added on request.					
Software support of SMU source meters	Keithley 24xx/26xx series SMU, Keithely 230 voltage source, Agilent B2900A, Iwatsu. New models will be added on request. 5 SMUs can be controlled by the system: 1 leakage measurement SMU and 4 independent bias SMU.					
Supported automatic probe stations	All Suss, Cascade, Signatone, MPI probe stations					
Supported PC operating system	Microsoft Windows 7-11, 64-bit (required)					
Integrated interlock safety shut-down (optional)	https://www.hppi.de/files/Interlock_Safety_Shutdown.pdf					
Pulse output and high voltage connectors	High Voltage TNC					

[1] The maximum open load output voltage could reach 8.0 kV according the pulse voltage setting. But in reality the output voltage is limited by the breakdown voltage of the interconnection devices towards the DUT. Therefore, the pulse voltage setting should not exceed the interconnection limits. The TLP-16010A should not operated at maximum voltage with open load condition.

[2] Limited by the breakdown voltage of the DUT connectors.

[3] Limited by the breakdown voltage and the thermal capability (pulse width) of the DUT connectors.

[4] Depending on the speed of the digital oscilloscope and other equipment in the measurement setup.

2.1 Pulse Generator Life-Time

The life-time of a high voltage pulse generator is depending on the operating parameters, such as pulse voltage, pulse width setting and total pulse count. In general, the life-time can be increased if the maximum ratings of the pulse generator are not exceeded.

2.1.1 Definition of the Pulse Voltage V_P

In general, the output voltage of the pulse generator at the load is not known, because it is dependent on the actual load impedance. Just 50 Ω output load impedance is a well defined case.

In contrast to the output voltage the internal pulse voltage V_P of the pulse source (Fig. 3) is constant. Therefore, V_P is always referred by the control software and manuals as the value of the pulse amplitude. The output voltage at the load is then dependent on the load impedance. Example: If 8000 V pulse voltage V_P is set by the software, and the output of the pulse generator is terminated with 50 Ω, then the output voltage across the 50 Ω load resistor will result to $V_P/2$ = 4000 V.

2.1.2 Maximum Ratings

Depending on the pulse width, the pulse voltage V_P should not exceed the limits as shown in Fig. 4.

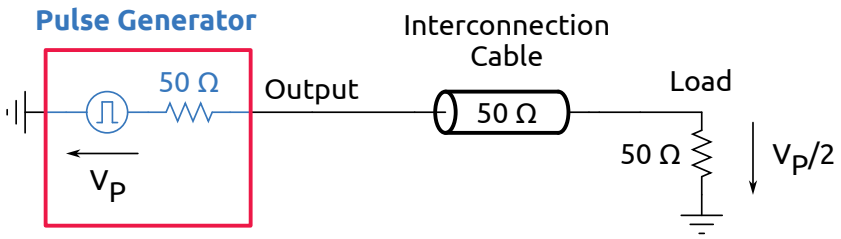

Figure 3: Definition of the pulse voltage V_P

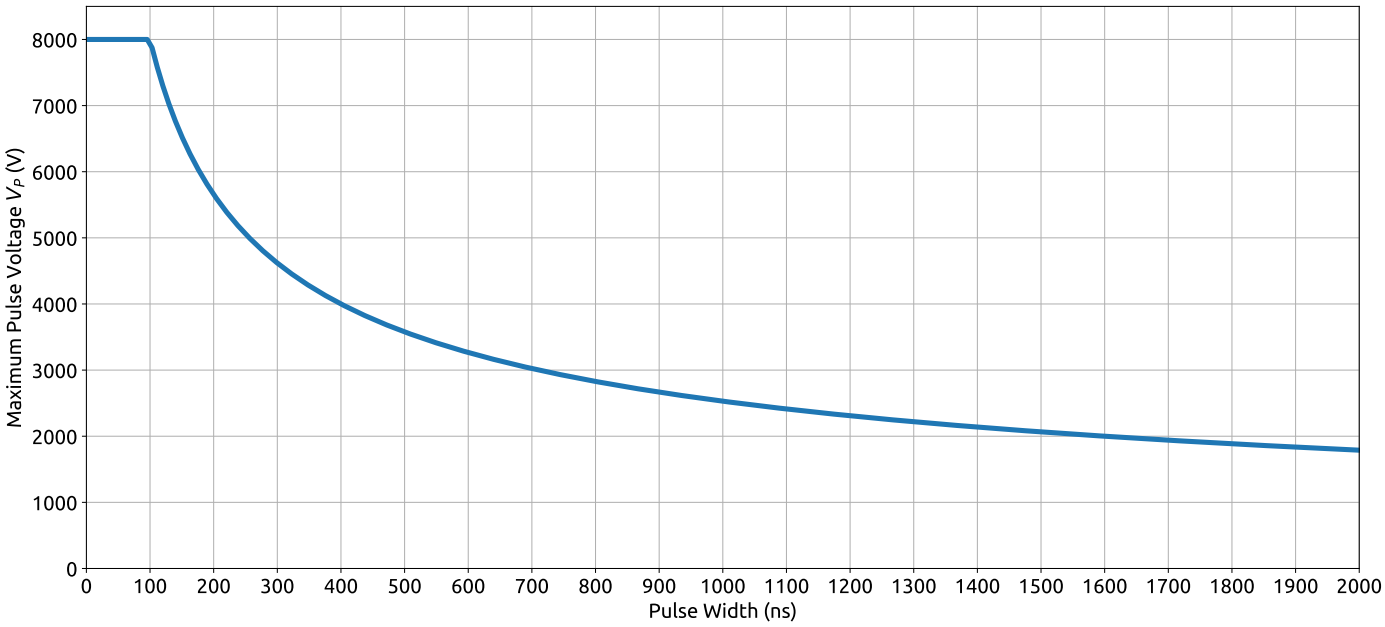

Figure 4: TLP-16010A recommended maximum ratings of the operating pulse voltage V_P versus pulse width

3 Ordering Information

Pos.	Description	Part No.
01	High voltage pulse generator TLP-16010A including software driver for stand-alone operation	TLP-16010A
02	Optional manual pulse width extender TLP-16012A with 8 manual selectable built-in pulse width: 10/50/100/200/400/500/800/1000 ns	TLP-16012A

General

The product data contained in this data-sheet is exclusively intended for technically trained staff. You and your technical departments will have to evaluate the suitability of the product for the intended application and the completeness of the product data with respect to such application. Our products are solely intended to be commercially used internally and should not be sold to consumers. This data-sheet is describing the specifications of our products for which a warranty is being granted by HPPI GmbH. Any such warranty is granted exclusively pursuant the terms and conditions of the respective supply agreement. There will be no guarantee of any kind for the product and its specifications. For further information on technology, specific applications of our product, delivery terms, conditions and prices please contact HPPI:

High Power Pulse Instruments GmbH
Stadlerstrasse 6A
D-85540 Haar, Germany
Phone : +49 (0)89 8780698 - 440
Fax : +49 (0)89 8780698 - 444
E-Mail : info@hppi.de

Due to technical requirements our products and/or their application may be harmful. For information please read carefully the manual or contact HPPI. Safety notes in the manual will inform you about possible risks that result from any foreseeable application of our products. Changes of this data-sheet are reserved.