80A TLP/VF-TLP/HMM Test System TLP-8010C

Advanced TLP/HMM/HBM Solutions

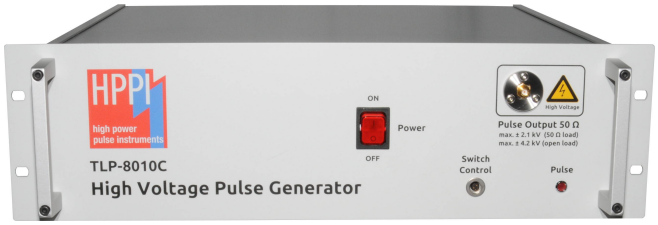
1 Features

- Wafer, package and system level TLP, VF-TLP and HMM testing
- **Combines TLP-8010A and TLP-4010C into one system**
- Can be operated together with TLP-8012A5 and TLP-3011C pulse width extenders
- Ultra fast 50 Ω high voltage pulse output with typical rise time 100 ps (0 A to 40 A) and 300 ps (>40 A)
- Up to 80 kW peak output power into 50 Ω load
- Built-in HMM pulse up to ±15 kV with 100 Ω-configuration
- High pulse output current up to ±80 A (short circuit) with 6 dB reflection suppression
- High speed 50 Ω trigger output for oscilloscopes (synchronous to high voltage pulse output)
- 6 GPIB programmable pulse rise times: 100 ps to 50 ns
- 8 programmable pulse widths: 1 ns to 100 ns (0 A to 40 A), 1 built-in pulse width: 100 ns (>40 A)
- The optional pulse width extender TLP-3011C enables pulse width up to 1.6 µs in 68 GPIB programmable steps (0 A to 40 A)
- Optional external pulse width extensions from 5 ns to 500 ns (>40 A to 80 A) using the external pulse width extender TLP-8012A5
- Built-in pulse reflection suppression
- Fast measurement time, typically less than 0.2 s per pulse including one-point DC measurement between pulses
- Efficient software for system control and waveform data management
- The software can control automatic probers for fast measurements of complete wafers
- High performance and high quality components

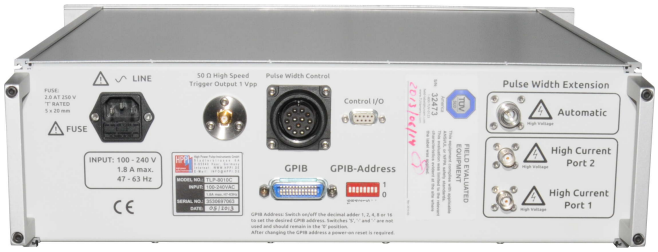
2 System Description

The high-current TLP/VF-TLP/HMM test system TLP-8010C combines the performance of the TLP-8010A and TLP-4010C system. It offers advanced features intended for the characterization of semiconductor devices, discrete components, such as TVS, varistors, capacitors, gas tubes, circuits and systems in the high power time domain. It includes high current I-V characteristics in pulsed operation mode, turn-on/off transient characteristics of the device, breakdown effects, charge recovery effects e.g. reverse recovery, Safe-Operating-Area (SOA) and ESD measurements in general.

The TLP-8010C, Fig. 1, has 8 programmable pulse widths 1 ns to 100 ns (0 A to 40 A) and 1 built-in pulse width 100 ns for currents >40 A.



(a) TLP-8010C high voltage pulse generator front side view



(b) TLP-8010C high voltage pulse generator rear side view

(c) 100 A, 50 Ω current sensor CS-0V5-A

(d) 18 GHz DUT switch

Figure 1: TLP-8010C typical system devices

Since the TLP-8010C in the current regime between 40 and 80 A is limited to just one single pulse width the TLP-8012A5 pulse width extender may be considered. With this optional extender additional pulse width of 5, 10, 50, 100, 200 and 500 ns for example can be generated.

In contrast to the TLP-4010C the selection is done manually. Using the optional pulse width extender TLP-3011C the pulse width increases up to 1.6 µs in 68 GPIB programmable steps from 0 A to 40 A. The TLP-8010C can be combined and operated together with the TLP-8012A5 and TLP-3011C extenders. The system has been optimized for high frequency performance, reliability and highly flexible fast software remote control. The DUT switch shown in Fig. 1(d) automatically connects the DUT to the pulse generator or to the source meter for DC measurements.

The advanced current sensor CS-0V5-A, with 150 ps rise-time, can be used up to 100 A at 500 ns pulse width.

The highly efficient TLP software offers best-in-class measurement speed with up to 5 pulses/s, depending on scope and SMU data transfer speed, with one DC spot measurement after every pulse. The software is based on the TLP-3010C/4010C platform and offers seamless control and enhanced features like 4 graphic plots with transient waveforms, DC and I-V data, as well as the I-V data in tabular form. Up to five different data sets can be loaded simultaneously for a direct comparison of devices.

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Data plots can be copied to the Windows® clipboard and conveniently pasted in other applications. The software offers accurate TLP full system calibration using zener-diodes and resistors as reference.

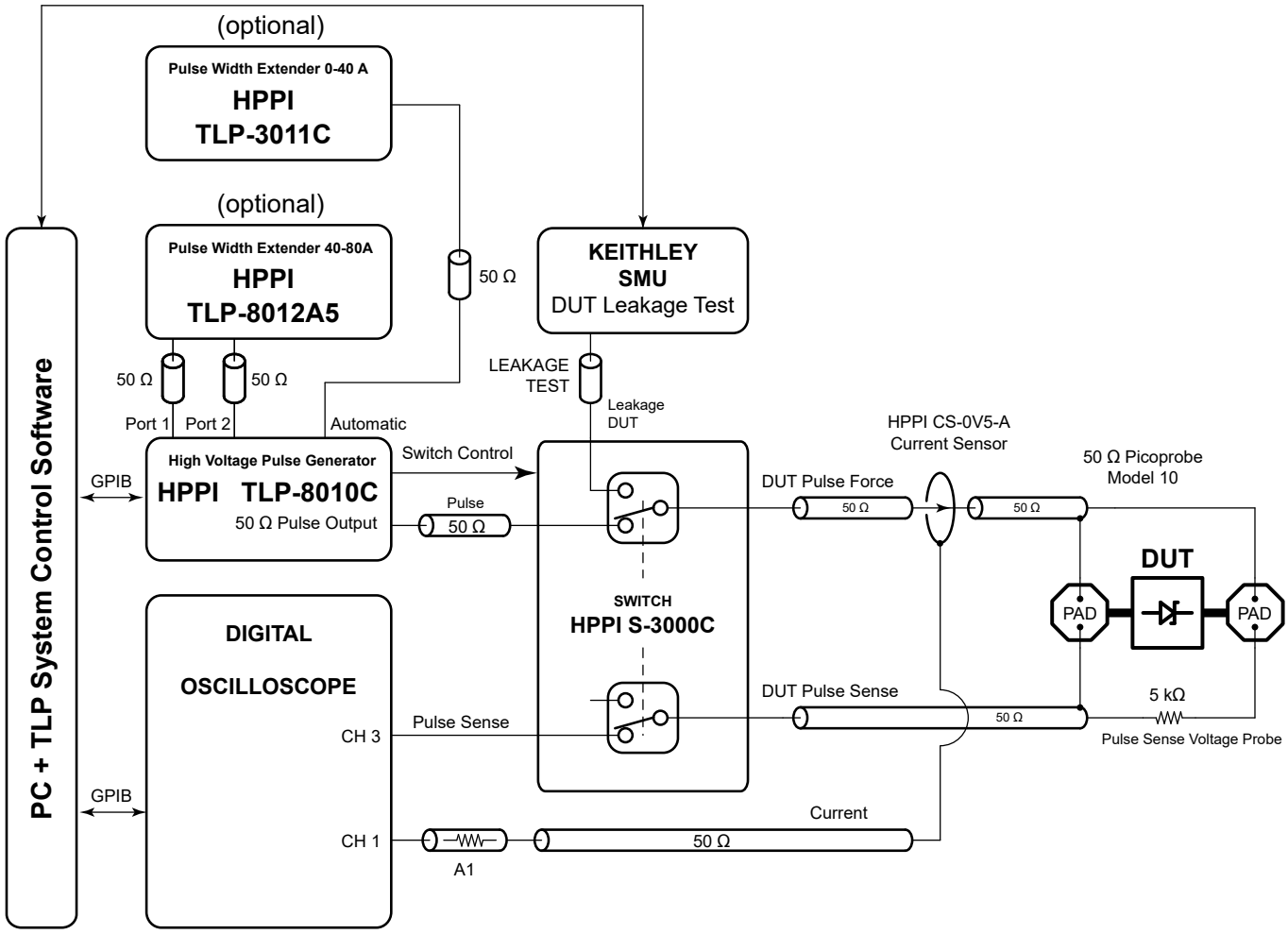

Figure 2: Typical TLP-8010C measurement setup

Fig. 2 shows a typical pulse force / pulse sense measurement configuration.

3 Specifications

Parameter	Symbol	Limit Values			Unit	Remarks
		Min.	Typ.	Max.		
Output voltage (open load)	$V_{out,\infty}$	-4.0		+4.0	kV	into open load
Output voltage (50 Ω load)	$V_{out,50\Omega}$	-2.0		+2.0	kV	into 50 Ω load
Peak pulse output power (50 Ω load)	$P_{out,50\Omega}$		80		kW	into 50 Ω load
Minimum output voltage step size	V_{Δ}		0.1		V	into open load, GPIB progr.
Maximum TLP output current	I_{tlp}	-80		+80	A	short circuit
Maximum TLP output current	I_{tlp}	-40		+40	A	50 Ω load
Maximum HMM first peak output current	I_{peak}	-57		+57	A	short circuit DUT, 50 Ω HMM
Maximum HMM broad peak output current	I_{30ns}	-30		+30	A	short circuit DUT, 50 Ω HMM, equivalent to ±15 kV IEC 61000-4-2 (330 Ω, 150 pF)

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Parameter	Symbol	Limit Values			Unit	Remarks
		Min.	Typ.	Max.		
Measurement pulse repetition time	t_m	200	500		ms	state dependent
Pulse width in 80 A mode	$t_{p,80A}$		100		ns	one external charge line cable
Pulse width in 80 A mode using pulse width extender TLP-8012A5 (optional)	$t_{p,80A}$	5		500	ns	5/10/50/100/200/500 ns manual selectable with TLP-8012A5
Pulse width in 40 A mode	$t_{p,40A}$	1		100	ns	GPIB programmable in 8 steps: 1 / 2.5 / 5 / 10 / 25 / 50 / 75 / 100 ns
Pulse width in 40 A mode using pulse width extender TLP-3011C (optional)	$t_{p,40A}$	125		1600	ns	GPIB programmable in 68 steps: 125 - 1600 ns in 25 ns steps
Output pulse rise time (40 A mode)	$t_{r,40A}$	0.1		50	ns	GPIB programmable 6 steps, out of: 0.1 / 0.3 / 0.6 / 1 / 2 / 5 / 10 / 20 / 50 ns (custom selectable)
Output pulse rise time (80 A mode)	$t_{r,80A}$	0.3		50	ns	GPIB programmable 6 steps, out of: 0.3 / 0.6 / 1 / 2 / 5 / 10 / 20 / 50 ns (rise times >0.3 ns are fixed by the 40 A customer selected configuration)
AC line voltage range	V_{AC}	100		240	V	47-63 Hz, max. 1.8 A
Dimensions TLP-8010C (W x H x D)	D_{8010C}	428 (482.6) x 132.5 x 485			mm^3	428 mm body, 482.6 mm rack flange
Weight TLP-8010C	W_{8010C}		12		kg	excluding accessories
Software support of digital oscilloscopes	All models from Keysight, LeCroy, Tektronix. New models will be added on request.					
Software support of SMU source meters	Keithley 24xx/26xx series SMU, Keithely 230 voltage source. Agilent B2900A. **5** SMUs can be controlled by the system: 1 leakage measurement SMU and **4** independent bias SMU.					
Supported automatic probe stations	all Suss **Cascade and Signatone** probe stations					
Certification marks	The TLP-8010C is in line with: 1. the requirements set forth in the Code of Federal Regulations CFR 47, Part 15, Sections 15.107 and 15.109 (Class A) of the Federal Communication Commission (FCC) and the Interference-Causing Equipment Standard ICES-003 Issue4, Sections 5.2 and 5.4 (Digital Apparatus) of Industry Canada (IC). 2. the EN61326-1:2006, Class A, EN 61000-3-2:2006, EN 61000-3-3:1995 + A1:2001 + A2:2005. 3. UL61010-1: 2004.					

4 Ordering Information

Pos.	Description	Part No.
01	High voltage pulse generator TLP-8010C including PCB adaptor, current sensor, pick-off tee, DUT switch, cables, software and manuals	TLP-8010C
02	Optional 40 A pulse width extender TLP-3011C with 125 µs to 1.6 µs in 68 programmable steps	TLP-3011C
03	Optional 80 A pulse width extender TLP-8012A5 with 6 manual selectable built-in pulse width: 5/10/50/100/200/500 ns (>40 A to 80 A)	TLP-8012A5
04	Precision Picoprobe® Micropositioner Probe Holder Kit, customizable for various micromanipulators	PHD-3001A

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:

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