

# High Voltage 50 $\Omega$ Pulse Generator CMTI-8010C

Advanced TLP/HMM/HBM Solutions

## 1 Features

- High voltage 50  $\Omega$  pulse generator for static and dynamic common mode transfer interference (CMTI) evaluations of digital isolators according IEC-60747-5-5 and IEC-60747-17
- Two digital programmable operation modes:
  1. Mode A: high voltage mode at minimum 0.3 ns pulse rise time
  2. Mode B: medium voltage mode at minimum 100 ps pulse rise time
- CMTI slew rate:
  - a) up to 10 000 V ns<sup>-1</sup> at 3 kV open load output voltage and 0.3 ns rise time (mode A)
  - b) up to 20 000 V ns<sup>-1</sup> at 2 kV open load output voltage and 100 ps rise time (mode B)
- 80 kW output power into 50  $\Omega$  load (mode A)
- 8 programmable pulse rise times out of: 50 ns, 20 ns, 10 ns, 7 ns, 5 ns, 3.5 ns, 2 ns, 1 ns, 0.6 ns, 0.3 ns, 200 ps, 100 ps (other values on request)
- Optional manual external pulse width extensions from 5 ns to 500 ns (up to 2  $\mu$ s on request) using the external pulse width extender [TLP-8012A5](#) in mode A up to 3 kV open load output voltage.
- Optional automatic programmable pulse width extensions from 125 ns to 1600 ns (up to 2  $\mu$ s on request) in 25 ns step size using the external pulse width extender [TLP-3011C](#) in mode B up to 2 kV open load output voltage.
- High speed 50  $\Omega$  trigger output for oscilloscopes (synchronous to high voltage pulse output)
- Built-in pulse reflection suppression
- Fast pulse repetition rate, typically 100 ms per pulse
- Application programming interface (API): software macros to control pulse generator in standalone operation
- Integrated interlock safety shut-down needed for pulse widths beyond 500 ns
- Industrial isolated and EMI/ESD protected USB control interface
- Two years warranty on the total system

## 2 Description

The CMTI-8010C is a high voltage 50  $\Omega$  pulse generator for static and dynamic common mode transfer interference (CMTI) evaluations of digital isolators according IEC-60747-5-5 and IEC-60747-17. Fig. 1 shows a typical measurement setup for CMTI evaluation. The output supply voltage domain GND2 and VDD2 of the digital isolator (DUT) acts as reference voltage. The input supply domain is pulsed in common mode by the CMTI-8010C. The output of the digital isolator is evaluated regarding digital transmission errors.

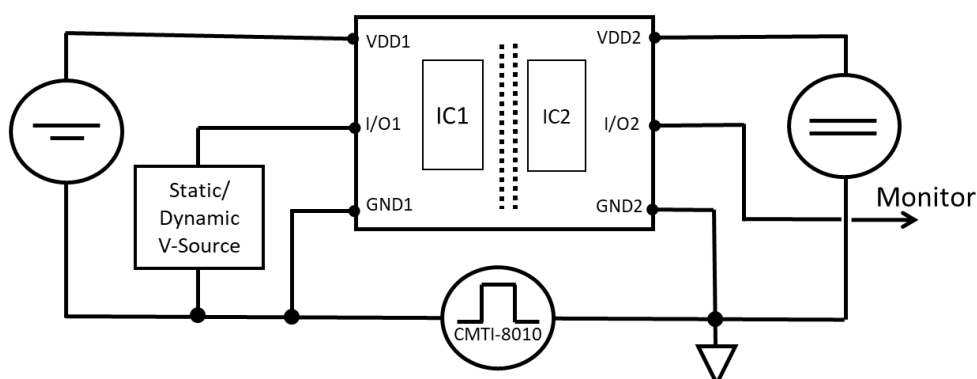


Figure 1: Typical CMTI measurement setup

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The CMTI-8010C offers two digital remote programmable operating modes:

**Mode A (high voltage mode)** provides a maximum open load output voltage of 4 kV<sup>1</sup> at minimum 0.3 ns pulse rise time. 8 programmable pulse rise times out of: 50 ns, 20 ns, 10 ns, 7 ns, 5 ns, 3.5 ns, 2 ns, 1 ns, 0.6 ns, 0.3 ns, 200 ps, 100 ps (other values on request). One built-in pulse width of 100 ns. Manual switchable pulse width of 5 ns to 500 ns (up to 2 μs on request) using the external pulse width extender TLP-8012A5.

**Mode B (medium voltage mode)** provides a maximum open load output voltage of 2 kV at minimum 100 ps pulse rise time. 8 programmable pulse rise times out of<sup>2</sup>: 50 ns, 20 ns, 10 ns, 7 ns, 5 ns, 3.5 ns, 2 ns, 1 ns, 0.6 ns, 0.3 ns, 200 ps, 100 ps (other values on request). 8 programmable built-in pulse width of 1, 2.5, 5, 10, 25, 50, 75, 100 ns. Further programmable pulse width of 125 ns to 1600 ns (up to 2 μs on request) in 25 ns step size using the external automatic pulse width extender TLP-3011C.

The CMTI-8010C can be controlled by the unified standard HPPI tester GUI<sup>3</sup> including automation, or by an independent application programming interface (API) that allows for communication between network software and network services, such as Transmission Control Protocol/Internet Protocol (TCP/IP): [High-Level Interactive Language for HPPI System Remote Control](#).

## 2.1 Front and Rear Panel View

Fig. 2 and Fig. 3 show the schematic front and rear view of the CMTI-8010C pulse generator.

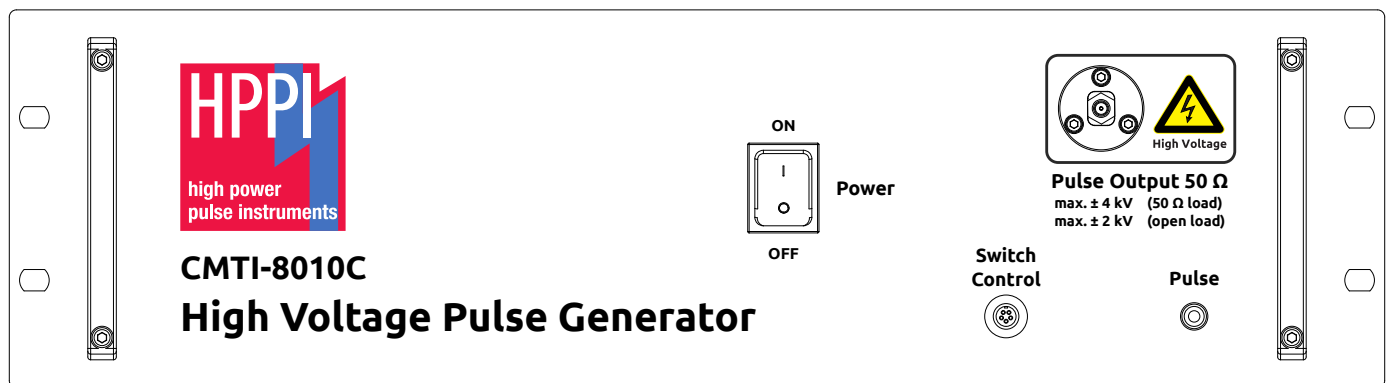


Figure 2: CMTI-8010C schematic front view (482.6 mm x 132.55 mm)

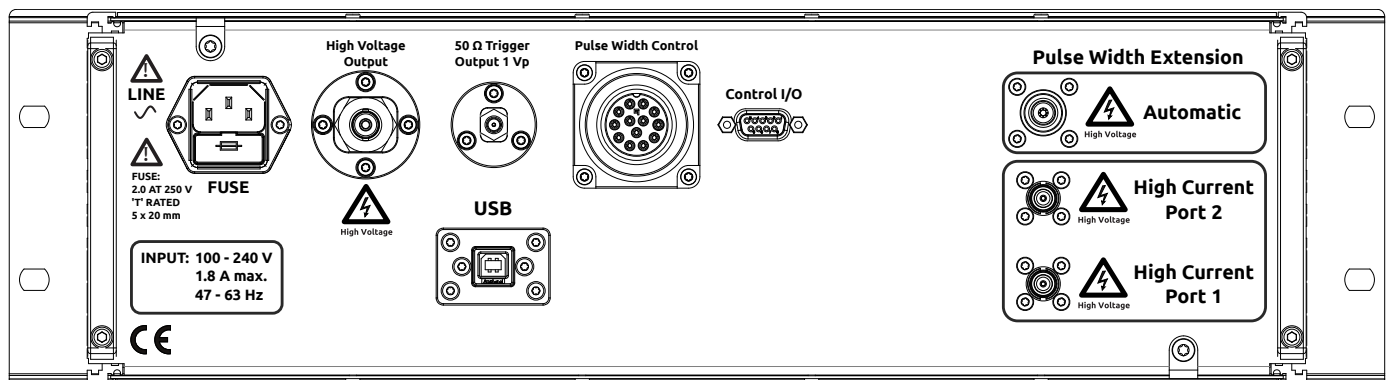


Figure 3: CMTI-8010C schematic rear view

<sup>1</sup>limited probably to 3 kV or less depending on the real breakdown voltage of external DUT connectors and interconnection cables.

<sup>2</sup>same set as in mode A.

<sup>3</sup>same for all HPPI pulse generators.

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## 3 CMTI-8010C Specifications

Parameter	Symbol	Limit Values			Unit	Remarks
		Min.	Typ.	Max.		
Output voltage (open load)	$V_{outA,\infty}$	-4.0		+4.0	kV	mode A, into open load <sup>1)</sup>
	$V_{outB,\infty}$	-2.0		+2.0	kV	mode B, into open load
Output voltage (50 $\Omega$ load)	$V_{outA,50\Omega}$	-2.0		+2.0	kV	mode A, into 50 $\Omega$ load
	$V_{outB,50\Omega}$	-1.0		+1.0	kV	mode B, into 50 $\Omega$ load
Peak pulse output power (50 $\Omega$ load)	$P_{outA,50\Omega}$			80	kW	mode A, into 50 $\Omega$ load
	$P_{outB,50\Omega}$			20	kW	mode B, into 50 $\Omega$ load
Minimum output voltage step size	$V_{\Delta}$		0.1		V	into open load, programmable
Maximum output current (short circuit)	$I_{maxA,0\Omega}$	-80		+80	A	mode A, short circuit
	$I_{maxB,0\Omega}$	-40		+40	A	mode B, short circuit
Maximum output current (50 $\Omega$ )	$I_{maxA,50\Omega}$	-40		+40	A	mode A, 50 $\Omega$ load
	$I_{maxB,50\Omega}$	-20		+20	A	mode B, 50 $\Omega$ load
Measurement pulse repetition time	$t_m$	200	500		ms	state dependent
Pulse width	$t_{pA,int}$		100		ns	mode A, no external pulse width extender TLP-8012A5 connected
	$t_{pB,int}$	1		100	ns	mode B, programmable in 8 steps: 1, 2.5, 5, 10, 25, 50, 75, 100 ns
Pulse width using the external manual pulse width extender TLP-8012A5 (optional)	$t_{pA,ext}$	5		500	ns	mode A, manual switchable 5, 10, 50, 100, 200 and 500 ns, optional 1 out of 6 with up to 2 $\mu$ s pulse width
Pulse width using the external automatic pulse width extender TLP-3011C (optional)	$t_{pB,ext}$	125		1600	ns	mode B, digital programmable in 68 steps: 125 ns to 1600 ns at 25 ns step size, optional up to 2 $\mu$ s <sup>2)</sup>
Output pulse rise time	$t_{rAB}$	0.1 <sup>3)</sup>		50	ns	programmable 8 steps, out of: 0.1 <sup>3)</sup> , 0.3, 0.6, 1, 2, 3.5, 5, 7, 10, 20, 50 ns (other custom values on request)
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 CMTI-8010C (W x H x D)	D	428 (482.6) x 132.5 x 485			mm <sup>3</sup>	428 mm body, 482.6 mm rack flange outer dimension
Weight CMTI-8010C	W		20		kg	excluding accessories

<sup>1)</sup>limited probably to 3 kV or less depending on the real breakdown voltage of external DUT connectors and interconnection cables. Therefore, at open load condition the DUT voltage should not set to 2.5 kV to 3 kV.

<sup>2)</sup>at different step size >25 ns

<sup>3)</sup>100 ps pulse rise time is only available in operation *mode B*. In operation *mode A* a pulse rise time 0.3 ns onward is available.

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## 4 Accessories Suitcase Included With CMTI-8010C (Typical Set)

Item	Sub-Item	Qty.	Descriptions	Model Number
1	1.0	1	High voltage 50 $\Omega$ pulse generator for static and dynamic common mode transfer interference evaluations of digital isolators according IEC-60747-5-5 and IEC-60747-17. A interlock safety switch is implemented inside the CMTI-8010C in order to guarantee safe usage of the high voltage capabilities. The customer has to provide adequate measurement set-up housing to guarantee the safety of the operators.	CMTI-8010C
	1.1	1	Built-in, industrial, isolated and protected USB 2.0 control interface	CMTI-8010C-USB
	1.2	4	BNC(m) to SMA(fm) adaptor	BNC(m)/SMA(fm)
	1.3	2	SMA(m)/SMA(m) adaptor	SMA(m)/SMA(m)
	1.4	2	SMA(f)/SMA(f) adaptor	SMA(f)/SMA(f)
	1.5	2	50 $\Omega$ high performance SMA cable 2m, Sucoflex 104	SF104-2x11SMA-2m
	1.6	1	High voltage attenuator 50 $\Omega$ , 34 dB, 3 GHz, 2 kV	HVA-34A
	1.7	1	Transient voltage suppressor protection for scope input	TVS-70MF-10
	1.8	1	Power line cable according supply voltage, 1.5 m	PLC-150A
	1.9	1	SMA torque wrench	74Z-0-0-21
	1.10	1	Hardware manual CMTI-8010C	CMTI-HM
	1.11	1	Safety switch to allow 2 $\mu$ s pulse width	CMTI-IN-LO

## 5 Ordering Information

Pos.	Description	Part No.
01	High voltage 50 $\Omega$ pulse generator CMTI-8010C including cables, software and manuals	CMTI-8010C
02	Optional manual pulse width extender 5 ns to 500 ns (optional up to 2 $\mu$ s on request)	TLP-8012A5
03	Optional automatic pulse width extender 125 ns to 1600 ns (optional up to 2 $\mu$ s on request)	TLP-3011C

### 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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