

JESD22-A115 Machine-Model (MM) Pulse Emulator MM-10A

Advanced TLP/HMM/HBM Solutions

1 Features

- Pulse unit to generate JESD22-A115 machine-model (MM) waveforms with TLP
- Extremely stable and reproducible machine-model (MM) waveforms
- Compatible with HPPI TLP-3010C/4010C/8010A/8010C systems which have installed pulse width of 25 ns and rise time of 100 ps to 300 ps
- Up to ± 10 A machine-model peak current with TLP-3010C, which is equivalent to ± 667 V (MM)
- Up to ± 15 A machine-model peak current with TLP-4010C, which is equivalent to ± 1000 V (MM)
- Up to ± 30 A machine-model peak current with TLP-8010A and TLP-8010C, which is equivalent to ± 2000 V (MM)
- Same measurement procedure as TLP including DC test of the DUT
- Compatible with HPPI TLP software and waveform data storage and management
- $50\ \Omega$ SMA input and output connectors
- Compact size: 61 mm x 25 mm x 17 mm

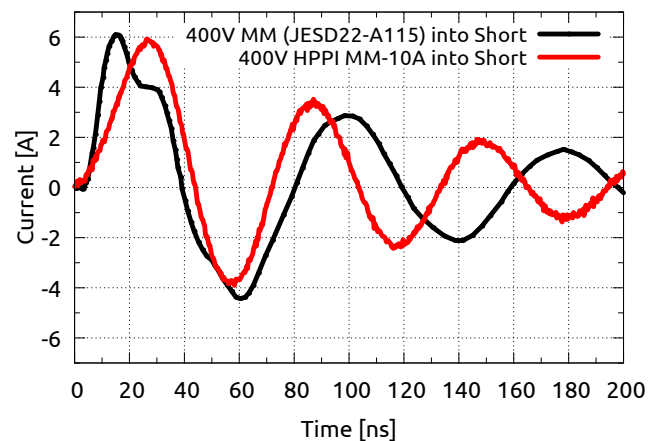
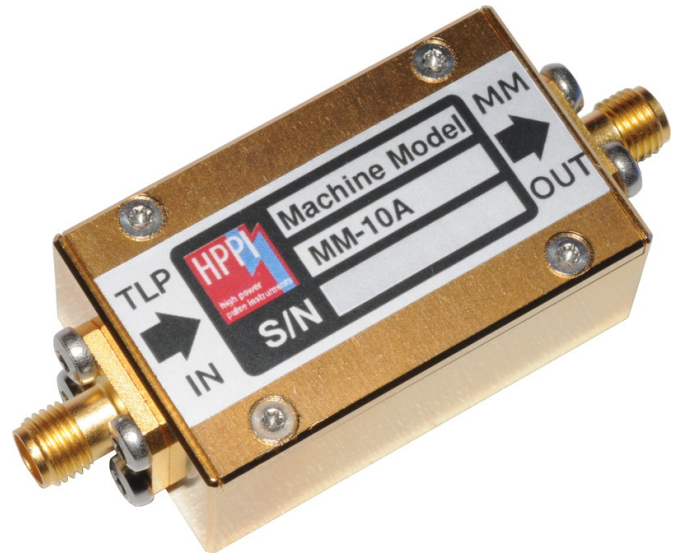


Figure 1: Comparison of 400 V MM according JESD22-A115 and HPPI MM-10A into short circuit

2 Description

The MM-10A pulse unit is used for device testing according to JESD22-A115 machine-model (MM) up to 2000 V (MM) by using a TLP system.

To operate the MM-10A correctly and in order to get the right machine-model waveforms, the TLP system must be configured for **25 ns pulse width** and **100 ps to 300 ps rise time**.

2.1 Electrical Characteristics

TLP Input Pulse Width ¹⁾	:	25	ns
TLP Input Rise Time ¹⁾	:	100 - 300	ps
MM to TLP Scaling Factor ²⁾	:	1.75	V/V
Max. Output MM Voltage ^{3) 4)}	:	± 2000	V
Max. Output MM Peak Current ⁴⁾	:	± 30	A

¹⁾ required to generate pulse waveforms according JESD22-A115 machine-model (MM)

²⁾ example: for 400 V MM set 700 V TLP pulse voltage

³⁾ equivalent to JESD22-A115

⁴⁾ with TLP-8010A/8010C system

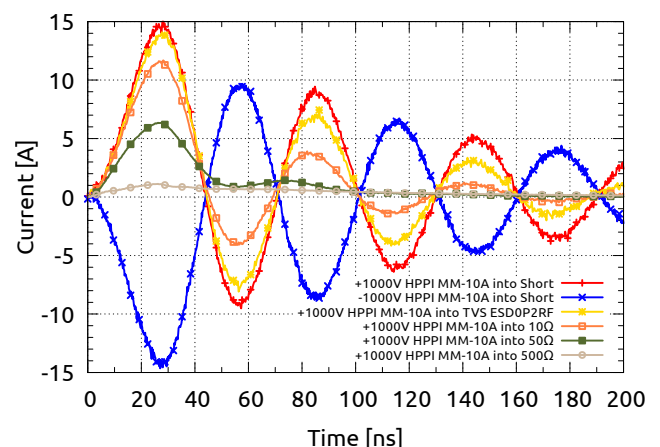


Figure 2: MM-10A measurement results at different load conditions using a HPPI TLP-4010C test system

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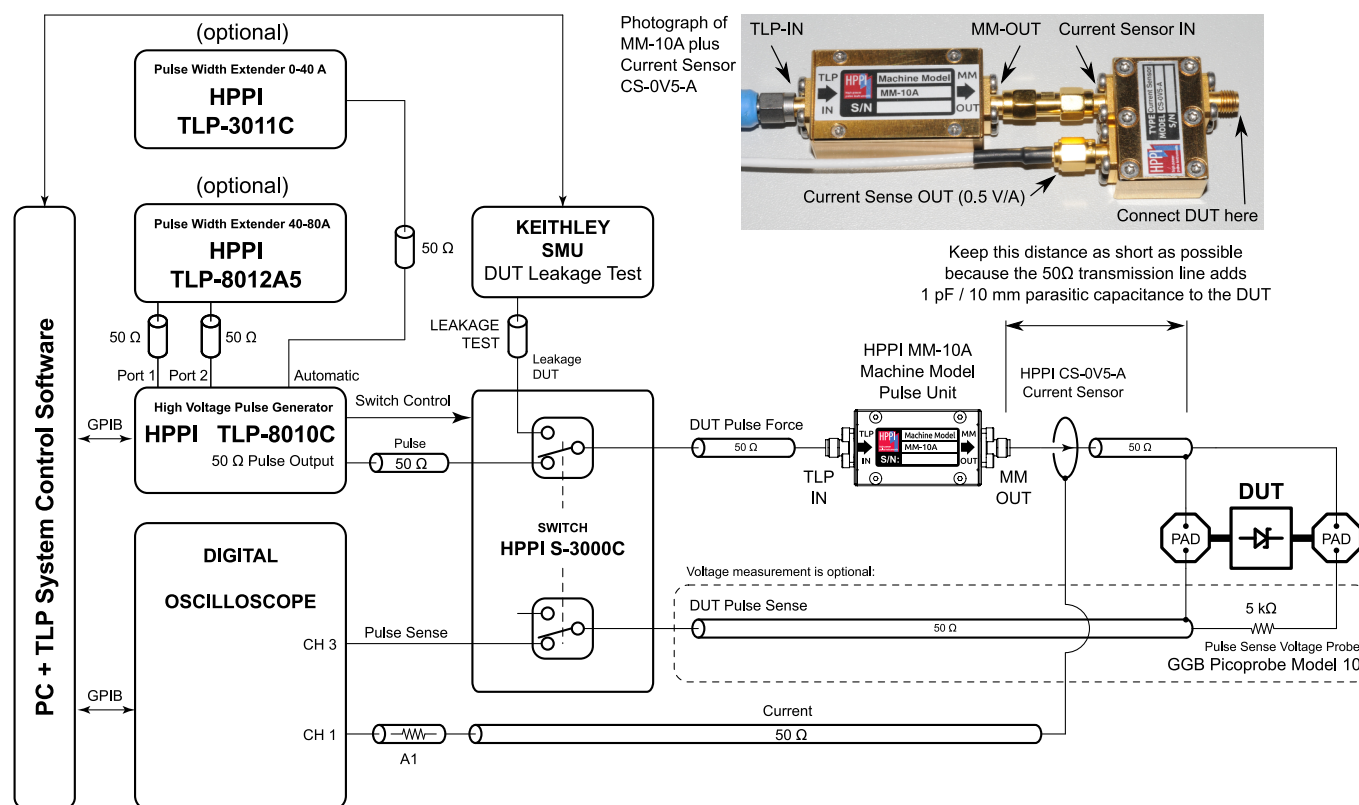


Figure 3: Machine model MM-10A measurement setup using e.g. TLP-8010C system

3 Measurement Setup

Fig. 3 shows the typical machine model measurement setup using the MM-10A. Voltage measurement (pulse sense) is optional and can be omitted. Before to start measurement of the DUT, it is recommended to check the setup with reference devices (e.g. short circuit) and to compare the measured waveforms with Fig. 2. This ensures that the setup works properly and calibrated.

3.1 DC Test

DC test of the DUT can be done using the SMU shown in Fig. 3. But it must be considered that the MM-10A has an equivalent circuit as shown in Fig. 4. The settling and hold times of the SMU may be affected by this parasitic RCL network.

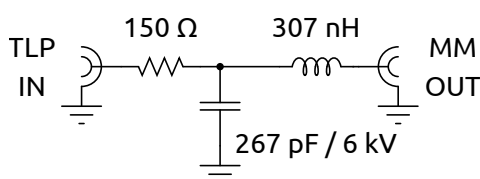


Figure 4: Equivalent circuit of the MM-10A

4 Ordering Information

Pos.	Description	Part No.
01	MM Pulse Unit	MM-10A

Acknowledgment

The concept of this TLP-to-MM pulse converter has been proposed to HPPI by Gijs de Raad (NXP) at the EOS/ESD Symposium 2016, Anaheim, CA, USA.

General

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