PICOSECOND RISE TIME
HIGH VOLTAGE
PULSE GENERATOR MODULES

PPG-1.5/50 and PPG-1.5/100

USER MANUAL

v 1.0

Megaimpulse Ltd. contact information

Address: 28 Polytechnicheskaya str., St. Petersburg, 194064 Russia
www: http://www.megaimpulse.com
e-mail: mp@power.ioffe.rssi.ru
fax: +7-812-297-3145

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SAFETY MANUAL

Electrical safety

- PPG-1.5/50 and PPG-1.5/100 generator modules are high voltage equipment. Please be careful and operate by qualified personnel only.
- There is a risk of electric shock, strong electromagnetic interference, and damage to the generator or other electronic equipment in case of improper use.
- It is strongly prohibited to switch on the generator without output coaxial cable and/or matched load because there is a risk of electrical arcing on the unmated output coaxial connector and damage to the generator output circuit.
- When you add or remove the generator to or from the system, please ensure that the power supply is unplugged (in the OFF state). Apply power supply only after connecting output and input cables.
- Please allow free air flow around the generator for good cooling. Enforced air flow is required in case of long-time operation at high repetition rates.

Operation safety

- Please read this manual before installing and using the generator.
- Please be sure before using the product that all cables are applicable and undamaged. High voltage connectors are clean and dry, free from dust, dirt, and any obstacles.
- The generator modules should operate under standard laboratory conditions. Please avoid dust, humidity, and temperature extremes. Do not put the generator in a wet place.
- If you encounter any technical problems while using the generator module, then contact Megaimpulse Ltd. Please do not repair it by yourself.

PACKAGE CONTENT

Please check the package for the following items:

- ✓ PPG-1.5/50 or PPG-1.5/100 pulse generator module (hereinafter "generator");
- ✓ DC power supply cable;
- ✓ User manual (printed or electronic version).

Optional items:

- ✓ Semirigid coaxial cable assembly:
  N connector / SM141 cable / N connector
  or
  N connector / SM141 cable / open end
  for the output pulses feeding and load connection;
- ✓ Flexible coaxial cable assembly:
  SMA connector / RG316 cable / SMA connector
  or
  SMA connector / RG316 cable / BNC connector
  for the input triggering signal feeding;
- ✓ 3dB and 6dB 18GHz bandwidth coaxial attenuators with N-type input and output connectors. The attenuators are used for step dividing of the output pulse and reducing the output pulse amplitude.

DESCRIPTION

PPG-1.5/100 and PPG-1.5/100 generate picosecond rise time unipolar bell-like pulses with more than 1.5 kV amplitude, 70 ps rise time (fast part of the pulse), 300 ps pulse width, and up to 50 or 100 kHz repetition rates. The typical output pulse waveform is shown in Fig.1. The generator is designed to operate on 50 Ohm impedance coaxial cable.

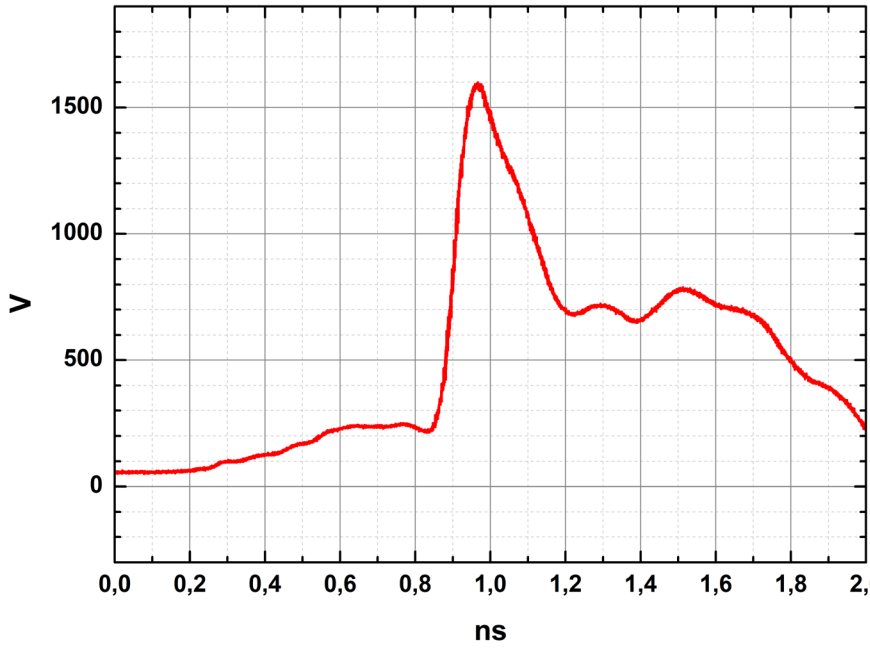

Fig.1. Typical output pulse waveform.

The generators are triggered by the external sync pulses. There is no internal triggering mode. The standard triggering pulse parameters are: amplitude +5V@50Ohm, polarity positive, pulse width 30 ns, and rise time 1 ns. A longer rise time may result in increasing the output pulse jitter. The external sync pulses should be applied to the front panel SMA connector.

The maximum repetition rate is limited to 50 or 100 kHz. To prevent damage, the generator is blocked if a higher repetition rate triggering pulses are applied or in case of wrong triggering. The generator returns to regular operation automatically when the wrong triggering is eliminated.

The output pulse amplitude and waveform are fixed. One can step divide the pulse by external attenuators (optional). 3dB attenuator has a 1.414 division

coefficient, 6dB attenuator has a 2.0 division coefficient, and both attenuators connected in series give a division coefficient of 2.828 in total.

The generators can be powered by AC 88V..264V / 47Hz..63Hz power supply outlet.

TECHNICAL SPECIFICATION

Output pulse amplitude	**> 1.5 kV**
Pulse polarity and waveform	**Positive unipolar bell like pulse**
Output impedance	**50 Ohm**
Output connector	**N-type**
Pulse rise time (20% - 80% levels)	**70 ps** [1)]
Pulse width (FWHM)	**300 ps** [1)]
Max repetition rate PPG-1.5/50 PPG-1.5/100	 **50 kHz** **100 kHz**
Mean output power	**< 2 W**
Jitter (RMS)	**10 ps**[2)]
Jitter (peak-to-peak)	**100 ps**[2)]
Internal delay (from leading edge of the triggering pulse to output pulse)	**< 150 ns**
Temperature drift of internal delay	**< 6 ns**
Triggering	**external only**
Input triggering pulse connector	**SMA**
Triggering pulse	**+3..+5V@50Ohm, 10..50 ns width, < 3ns rise time**
Power supply	**AC 88V..264V / 47Hz..63Hz**
Size	**210 x 210 x 69 mm^3**
Weight	**1.7 kg**

[1)] typical
[2)] typical, depends on the triggering pulse rise time

FRONT PANEL AND OUTLINE DIMENSIONS

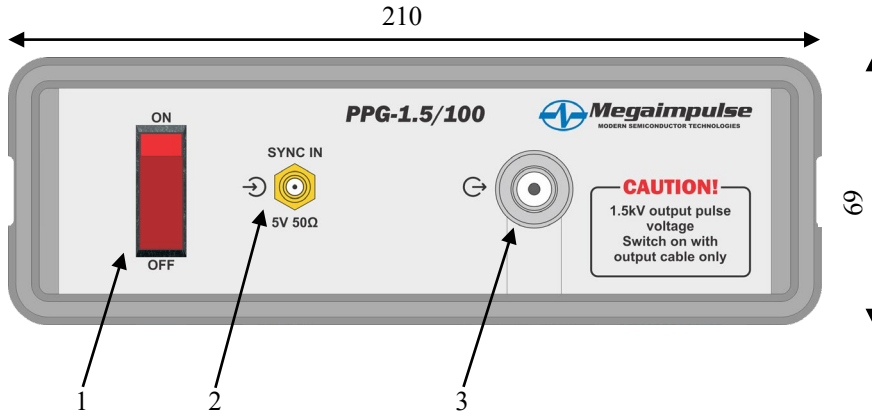

Fig.2. PPG-1/100 front panel and outline dimensions.

1. Power supply ON/OFF toggle switch
2. SYNC IN SMA-type connector for the external triggering pulses feeding
3. High voltage N-type output connector

PUTTING INTO OPERATION

➔ Please follow strictly the described steps. It helps to prevent damage to the generator and other equipment.

Step 1.

Unpack the generator and check the presence into the package of the following items:

- PPG-1.5/50 or PPG-1.5/100 pulse generator;
- power supply cable;

optional items:

- Semirigid N-to-N coaxial cable assembly and/or N-to-open coaxial cable assembly;
- Flexible coaxial cable assembly SMA-to-SMA and/or SMA-to-BNC;
- 3dB and/or 6dB 18GHz bandwidth coaxial attenuators with N-type input and output connectors.

Step 2.

Connect the output coaxial cable and the load to the generator. Use additional external attenuator(s) for the step dividing of the output pulse amplitude, if required.
Connect triggering pulse generator.

Step 3.

Plug the power supply cable into AC wall outlet. Turn on the power supply toggle switch on the front panel.
Set external triggering pulses frequency to 1 kHz. Check the presence of the output pulses on the load.
Adjust the external triggering pulses frequency as required.

➔ It is possible to use standard coaxial attenuators with N-type connectors for the direct measurement of the output pulses waveform or dividing the pulse amplitude before applying to the load. Please pay attention to the maximum allowable input power and high enough bandwidth of the attenuators. The recommended attenuators are 18N10W, 18N5W made by Aeroflex/Inmet.

The generator is suitable for a long-time operation. Please use enforced airflow to prevent overheating at high repetition rates.

The maximum repetition rate is limited to 50 kHz or 100 kHz. The triggering pulses will be blocked in the case of a higher frequency to prevent damage to the generator. Please reduce the triggering pulse frequency below the safe level.

TRIGGERING OF THE GENERATOR

The recommended triggering pulse waveform is shown in Fig. 3. The nominal triggering pulse amplitude is +5V at 50 Ohm, the pulse duration is 30 ns, and the rise time is 1 ns. A longer rise time may result in increased output pulse jitter.

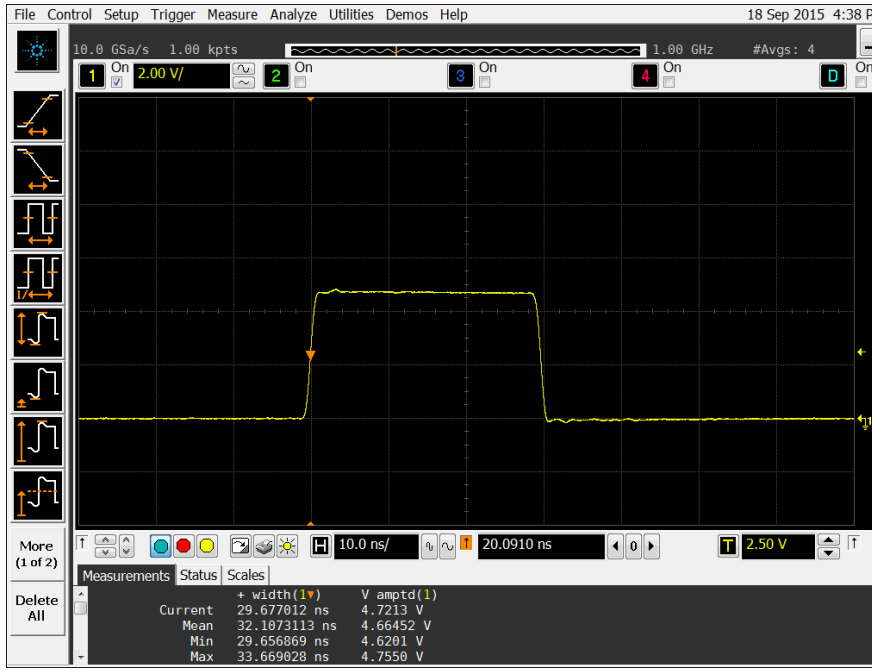

Fig. 3. Recommended triggering pulse waveform.

WARRANTY

Please see your sales agreement to determine the warranty period and warranty conditions. The generator has warranty seals. The warranty covers any component or manufacture defects, but does not cover damage to the generator due to improper or inaccurate use, including, but not limited to:

- mechanical damage to the input/output connectors;
- damage to the output circuit due to operation without output cable and/or load.

➔ Removing the warranty seals terminates the warranty.