

Notes on the use of

ASG1 pulser

Serial No. 94003

Introduction

Our range of solid state pulsers (ASG, SPS, HMPS and PBG series) allows very high voltage, fast rising pulses to be obtained from compact bench top units. Voltage pulses as short as 100ps FWHM, in excess of 4kV peak voltage into 50Ω , and with a pulse repetition frequency (PRF) $>1\text{kHz}$ can be produced. The performance of our compact, convenient and reliable pulsers is to our knowledge exceeded only by laser driven photoconductive switches in terms of voltage switching speeds. These pulsers will find applications in many fields such as high speed camera research, electro-optic switching, triggering systems and radar.

A large range of output pulse lengths can be provided by the incorporation of internal passive pulse forming networks. There is very little jitter in the output of the pulsers and two independent pulsers can be used in parallel to drive low impedances. This aspect makes the pulsers particularly useful for driving microchannel plate systems. Transformers with output impedances as low as 5Ω are available.

The standard drivers and speed-up modules have a life of $>10^{10}$ pulses and have a PRF of $\geq 1000\text{Hz}$, although special units with a PRF $>10\text{kHz}$ can be supplied. The high repetition rates allow sampling oscilloscopes to be used to characterise a system and verify the pulse shape.

The pulsers can feed into a short circuit load without damage. This allows them to be used in sub-nanosecond pulse chopping systems by feeding through a pockels cell into a shorting stub. Variations on the standard driver are available.

Use

The pulser requires A.C. power and a trigger signal to operate. The trigger signal can be generated internally or applied externally. When external triggering is used, the trigger signal, which is applied to the trigger input (BNC), should be ≥ 5 volts with a fast rising edge ($<5\text{ns}$) to maintain the low jitter of the system

When triggered the "triggered" light on the front panel will flash. A monitor pulse is available to establish remotely that the unit has triggered. This monitor may also be used to trigger ancillary pieces of equipment, e.g. intensifiers etc. An auxiliary 10V output is provided which has fixed timing with respect to the main output. It appears within $\sim 5\text{ns}$ of the main output (except when "direct" mode is selected).

The main output of the unit appears at the front panel connector

(SMA type). If it is necessary to monitor or characterise this pulse suitable attenuators should be used. We recommend the use of a high voltage, high speed attenuator manufactured by Barth™ as the first attenuator in a series.

The high voltage pulse from this unit is capable of destroying lower power attenuators.

The output may be observed with a high bandwidth oscilloscope. This may either be a fast (>3GHz) direct access type or a sampling type.

If the output of the pulser is to be used directly or via any passive network it is essential that cable lengths are kept as short as possible and that only high quality cable is used. This will enable the fast rising edge generated by the unit to reach the load without serious degradation.

In the internal trigger, single shot and "delayed" modes there is an internal delay which may be adjusted by the user. There are coarse (10ns per step) and fine (~12ns full scale) delay controls.

In "direct" mode the trigger is applied directly to the avalanche stack and the low level circuitry is bypassed. In this mode the trigger delay is at a minimum of ~20ns. There is no auxiliary output in this mode.

There are thermal drifts in the delay generator which will stabilise after the pulser has been switched on for ~20 minutes.

SPECIFICATIONS

Output voltage:	>200V into 50Ω
Rise time:	≤ 100pS
Flatness:	<+/-4% for 8ns
Polarity:	Negative
Trigger:	Requires ≥ 5V into 50Ω , ~5ns rise time.
Jitter:	<20ps RMS
Trigger delay:	~20ns in direct mode
Repetition rates:	≥ 1000Hz
Power supply:	240V AC
Outputs:	
Pulse output SMA	200V pulse
Pretrigger output	BNC 10V into 50Ω , leads main
output by the	delay when the delay is active
Auxiliary output	BNC 10V into 50Ω , after delay (i.e.
fixed timing	with respect to main output)

Inputs:

Trigger input BNC $\geq 5V$ into 50Ω
Output disable BNC +5V into $10K\Omega$ disables output
when delay active, 0V or open circuit enables output.

Controls:

Mode Sets one of the following modes:
Single shot (delay active)
0.1-1Hz (delay active)
1-10Hz (delay active)
10-100Hz (delay active)
100-1000Hz (delay active)
External trigger (delay active) "Delay"
External trigger (delay inactive) "Direct"
Fine rate Varies internal rate by a ratio of 10:1
Delay (and fine delay) Sets internal delay, up to 100ns pretrigger
delay
Single shot button Depressing this button cause a single
trigger
when single shot mode selected
Power Switches AC power in the pulser

Indicators:

Power Shows that AC power is applied and the unit is switched
on
Triggered Illuminates while the unit is being triggered

Test data

Serial number:

Test equipment:

Tek 7834, 7S11, 7T11, S4, Barth 142 (x10), 2 x Radial SMA (x10)