

Kentech Instruments Ltd.

APG1 Special Pulse Generator

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PLEASE READ THIS MANUAL CAREFULLY BEFORE USING THE UNIT



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1 DISCLAIMER

This equipment uses high voltage power supplies. Although the current supply capacity is small, careless use could result in electric shock. It is assumed that this highly specialised equipment will only be used by qualified personnel.

Kentech Instruments Ltd. accept no responsibility for any electric shock or injury arising from use or misuse of this equipment. It is the responsibility of the user to exercise care and common sense with this highly versatile equipment.

2 ABBREVIATIONS

SD Standard Deviation

3 INTRODUCTION

This manual describes the operation and use of an APG1 -Special pulse generator. The generator is a free running device that delivers ~170 volt 130ps wide pulses at ~10kHz, into 50Ω.

4 SPECIFICATIONS OF THE UNIT

Number of channels	1
Output pulse voltage	>150V
Output pulse width	<150ps
Repetition rate	fixed internally to ~10kHz
Monitor output	1ns rise, 10 volts into 50Ω
Monitor output cross timing	see Figure 3 on page 7
Monitor output timing SD	<2ps typically
Enable input	TTL high to enable.
Power	+12 volts DC at 1.25A (Run current is ~ 800mA but there is a turn on surge)

Connectors - All on front panel

Output	SMA 50Ω jack
Monitor Output	SMA 50Ω jack
Power	2.1 x 5.5 mm
Enable	BNC jack 50Ω

Indicators - All on front panel

Power ON indicator	LED green
Triggered	LED orange

Enclosure

230 x 110 x 45 mm³ Black painted Aluminium alloy
Plus feet and connectors.

External power supply

DSA-15P-12 EU P/N T4344ST Strontronics Ltd.
Input 100 to 240 AC 50/60Hz at 0.5A
Output +12V at 1.25A
Positive on centre pin of 2.1 x 5.5 connector

5 OVERALL DESCRIPTION

The unit uses a small avalanche pulse generator to deliver very fast edges.

The avalanche stack is triggered from a free running 100kHz oscillator that is divided down by a factor of 10.

A monitor signal is taken from the stack and filtered to deliver the required output shape.

6 RUNNING THE ELECTRONICS

The unit will free run at 10kHz when connected to power and the enable input is raised to ~2.7 volts. It is best not to run the enable input near its threshold as this may be a little temperature sensitive.

The unit dissipates about 7 watts and should be allowed to cool via natural convection or conduction.

7 OBSERVING THE OUTPUT

The output voltage may damage an SMA attenuator and even if it does not it may well drive it into a non-linear response. We recommend Barth type 142B attenuators in the first of a string to attenuate the signal to the level required for an oscilloscope. Please note that Barth type 142As have significant overshoot.

The two output connectors should be used with care. They have anti-rotation fitted but plugs should always be tightened with a suitable torque wrench to the SMA specified torque of 0.34 - 0.57 NM

8 THE MONITOR OUTPUT

The monitor signal is derived from the main out just before the main output is shaped. There are no active parts in the main output pulse shaping so the jitter between the main and monitor outputs should in principal be zero.

Measurements indicate a SD of around 1.5ps. This is close to the limit of our ability to measure timing but also the random noise on the signals introduced by components including the oscilloscope limits the timing measurement.

9 TEST RESULTS

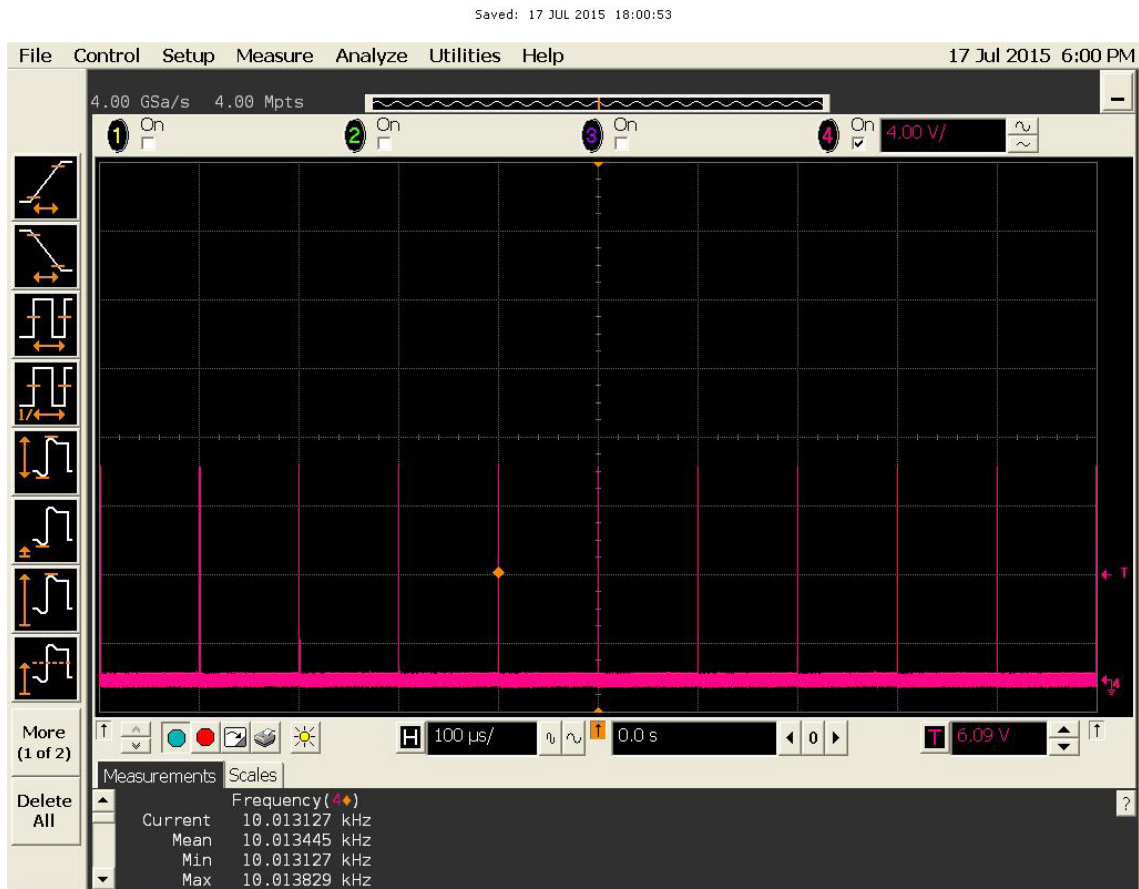


Figure 1 Repetition rate ~10kHz

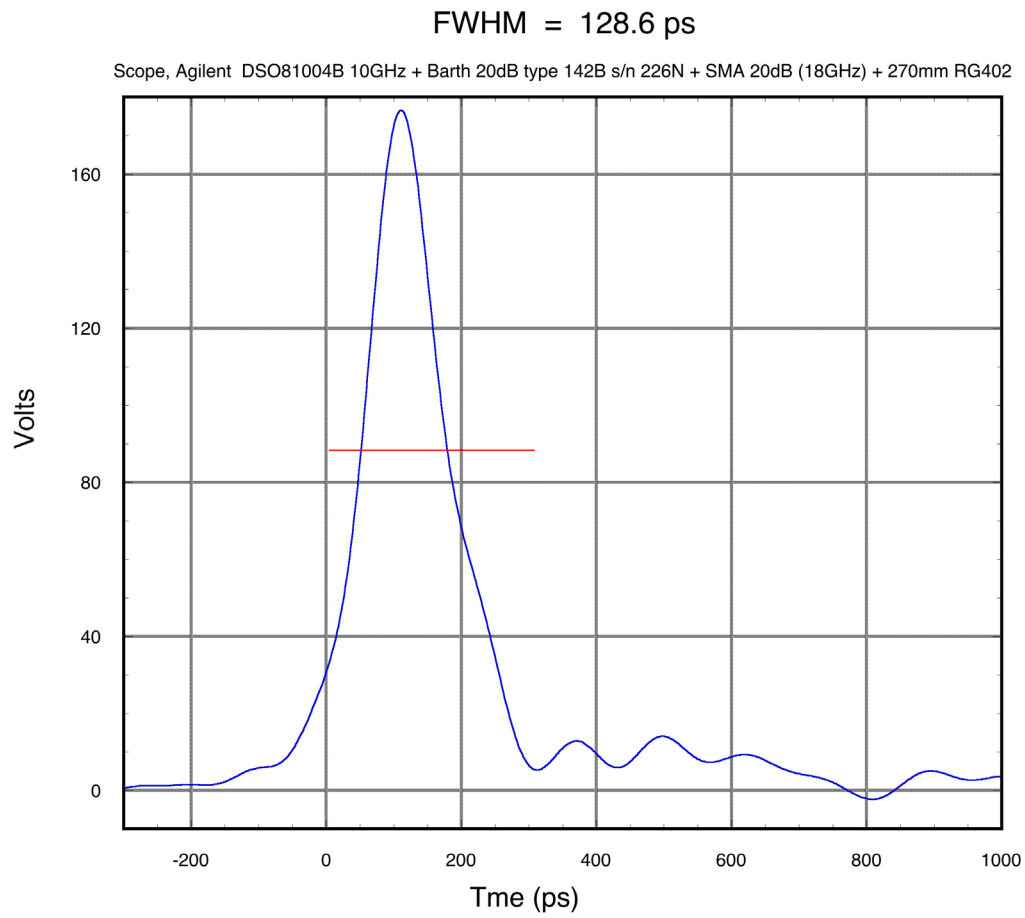


Figure 2 Main output 128.6ps amplitude 176.5 volts

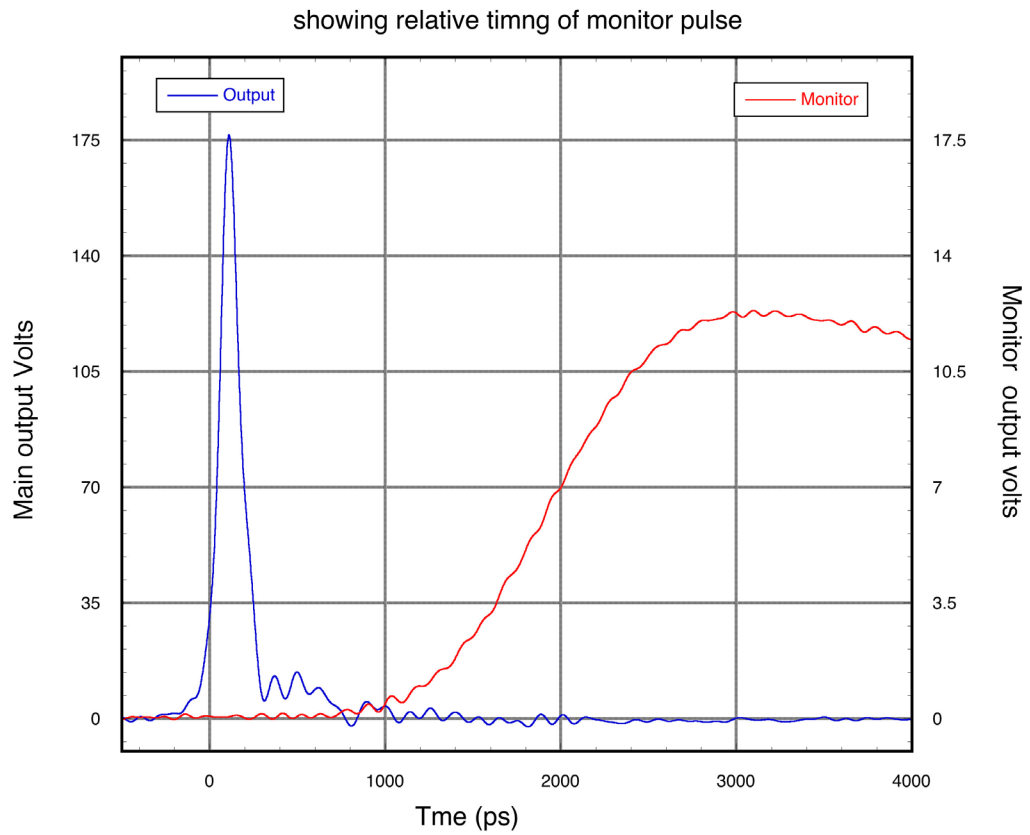


Figure 3 Main output and monitor output showing relative timing.
 Monitor output >10 volts rising in ~1ns.
 The monitor output reaches half amplitude around 2ns after the main pulse.