

Kentech Instruments Ltd.

PBG High Voltage Pulse Sources

The PBG high voltage pulse sources are a new generation of solid state pulse generators based on our latest avalanche switch technology. They provide considerably enhanced performance over earlier instruments in terms of pulse amplitude, fast rise times and reliability.

The standard pulsers are designed to drive a 50Ω load but are fully protected against open and short circuit loads. The unformed output waveform is a fast rising edge of >6.5kV, >8.5kV or >12kV with ~90ps rise time, followed by a slower, approximately exponential, decay. Pulse generators with shaped output pulses including rectangular pulses and impulses can also be produced, the PBG1, for example, can provide an impulse of >3.5kV at 90ps f.w.h.m. or >4kV at 100ps f.w.h.m.

There is very little trigger to pulse output timing jitter, and the shot to shot amplitude jitter is extremely low. This together with the high maximum repetition rates allows the use of sampling oscilloscopes rather than ultra fast transient digitisers.

The standard units have a life of > 10¹⁰ shots. The output pulse shape is highly reproducible.

These pulse generators will find applications in camera gating systems, pockels cell drivers and wide band radar systems. When combined with power dividers they are also useful for providing several relatively high voltage absolutely synchronised outputs.

Specifications

- Output Voltage into 50Ω
 - PBG1 >6.5kV (7kV typical)
 - PBG2 >8.5kV (9kV typical)
 - PBG3 >12kV (13kV typical)
- Rise time < 100ps (10 - 90%)
- Pulse shape Fast rising edge then exponential decay.
- Pulse width ~ 3ns f.w.h.m.
- Polarity Either positive or negative but must be specified at time of ordering. Polarity cannot be changed.
- Trigger Requires 5V into 50Ω with rise time < 5ns to retain jitter specification.
- Jitter ~ 10ps rms.
- Repetition Rates ≤100Hz is standard.
- Power supply Universal.

Standard Options

- /P Positive output.
- /N Negative output.
- /D Internal repetition rate and delay generator.
- /F 1kHz maximum repetition rate.
- /V Variable output amplitude down to 60% of the normal output.
- /S Output pulse forming.

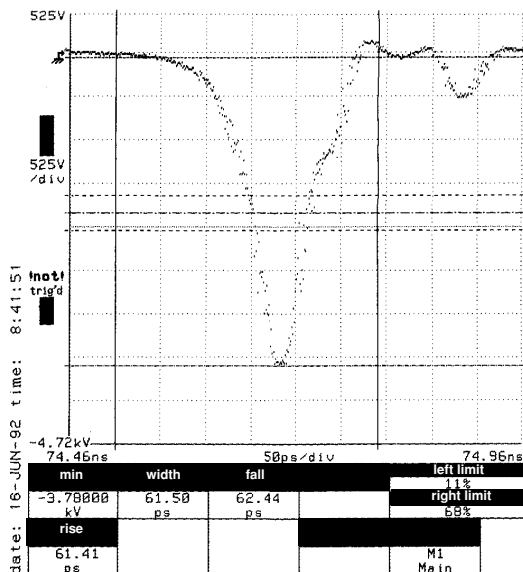
Special Options - Please consult our factory to discuss these.

- Multiple outputs with very low relative jitter.
- Output amplitudes to >20kV.
- Pulse widths to 15ns.
- Maximum repetition rates to 10kHz.
- Output impedances from 1Ω to 100Ω.
- Remote control.

Physical Dimensions

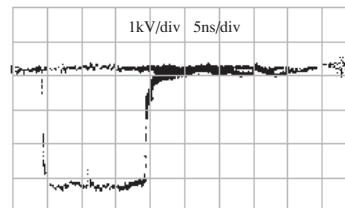
The dimensions depend upon the options, included here are some typical examples*. Please consult the factory for further information.

PBG1	115h	200w	260d	mm
PBG1/D	170h	210w	260d	mm
PBG2	170h	290w	260d	mm
PBG2/D	170h	290w	260d	mm
PBG3	170h	290w	360d	mm
PBG3/D	170h	290w	360d	mm

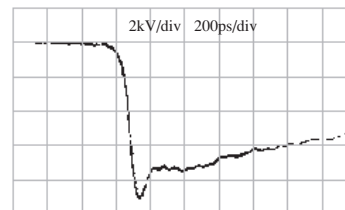


PBG1/N/S with minimum pulse length measured with Barth™ attenuators and a Tektronix™ SD32 sampling head

Typical output waveforms from PBG pulse sources.



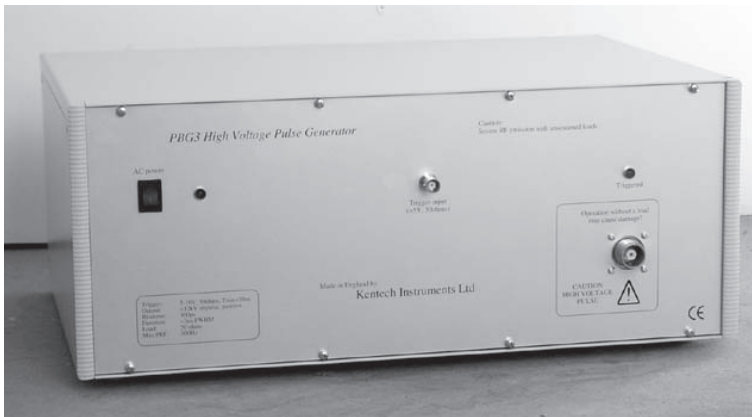
PBG1/N/S



PBG2/N

* In order to comply with new EU EMC legislation, all pulser box designs have changed and dimension given here are only a guide.

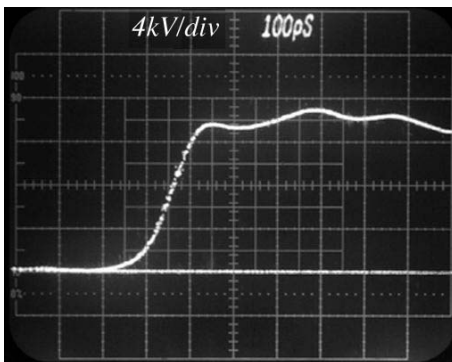
Some Examples of PBG3 Systems



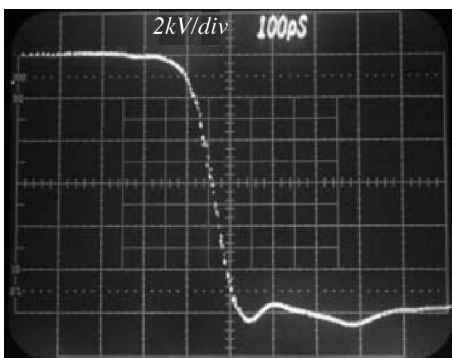
PBG3 with single output and unformed pulse shape.
Box dimensions 178 x 427 x 305 mm³



PBG3/D [Delay option] with single output and unformed pulse shape.

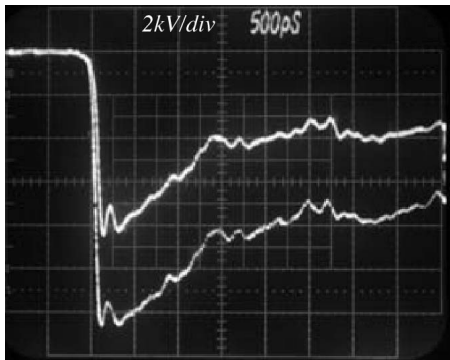


Typical output for positive going pulse at 4kV/div and 100ps/div

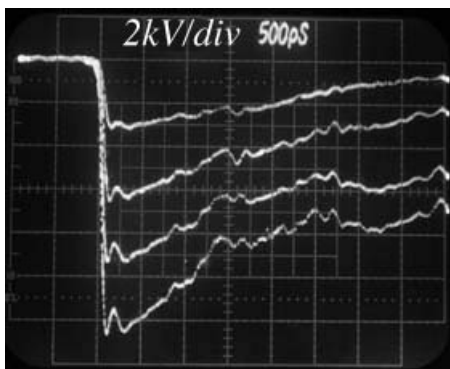


Typical output for negative going pulse at 2kV/div and 100ps/div running at 1kHz.

Variable Output Performance

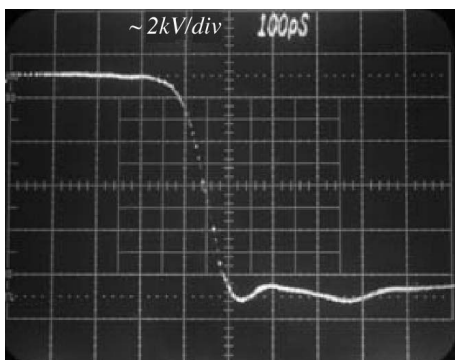


Variable output with standard variable control, This typically gives continuous adjustment to around 75% of maximum.



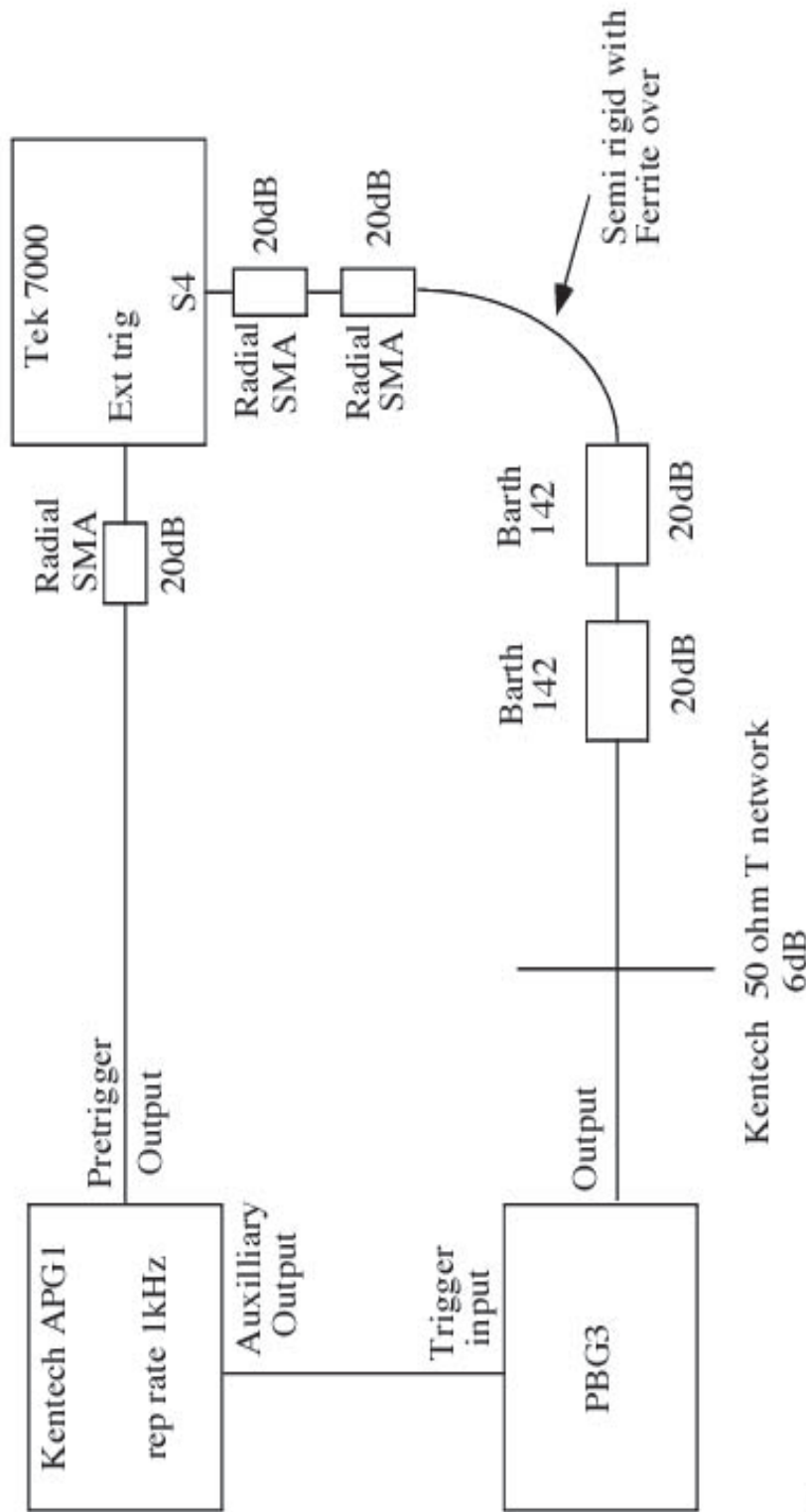
Variable output with special variable control.

Rise Time Measurement



Note: The rise time measures approximately 100ps. The Kentech suicide "T" has a rise time of 50ps. A simple correction gives a pulser rise time of less than 90ps. See method on next page.

Test method for Kentech PBG3 J0496241



Notes.

1. The T network is used to reduce the 12kV output to 6kV to protect the Barth 142 attenuators.
2. The T network has a risetime of approximately 50ps.
3. The side arms of the T network are long and do not show as reflections.
4. The Pretrigger output has an amplitude of 10V and the Radial SMA attenuator is used to reduce the input to the scope external trigger input to below the maximum of 2V.
5. Barth 142 attenuators are type 142-NMFP-20-B.
6. Radial SMA attenuators have bandwidth of 18GHz
7. Tests of PBG3 recorded in "Direct" mode (Pretrigger output from PBG3 disabled).