Kentech Instruments Ltd
High PRF
120V demonstrator pulser

Operating notes

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CAUTION

With an appropriate load, this unit is safe for use by an educated user in a laboratory environment. You are warned however that the radiation from the system with an antenna or inappropriate load attached can interfere with sensitive equipment. The output signal should not be applied directly to test equipment and suitably rated attenuators should be used. This equipment is supplied on the understanding that the user will analyse these risks, accept responsibility for them and take appropriate precautions in the use of this instrument.
It is the user's responsibility to ensure that any apparatus connected to the output is suitably rated.
Kentech Instruments Ltd accepts no responsibility for any damage or liabilities incurred in the operation of this equipment.
Please read the manual before applying power.
Do not remove the covers, return to Kentech Instruments Ltd. or its appointed agent for servicing.
If cleaning is necessary this should be performed with a soft dry cloth or tissue only.

RF emissions and EC directive 89/336/EEC

This equipment is a research tool that has been intentionally designed to generate short high energy electromagnetic pulses and the EM emissions will be highly sensitive to the load applied by the user, for example the radiation just from some types of output cable may exceed EC permitted levels.
The level of RF radiation generated by the circuit boards within the instrument is inevitably high but the emissions are contained by the instrument enclosure. It is therefore very important that all fasteners are secure, do not operate the pulser with the covers removed. The pulser may still interfere with sensitive equipment at short range.
We believe that with this type of unit it has to be the system builder's responsibility to verify that his pulser/load system complies with the EC directive unless the system is used in a screened electromagnetic environment.
We are not able to guarantee compliance with arbitrary loads but to minimise emissions we recommend:-
1) That any load is fully contained within a conductive metal screened box, with all joint surfaces gasketed or fitted with conductive fasteners at less than 5cm intervals.
2) That the load is connected to the pulser output with screened cable, the cable outer must be carefully connected to the N type output connector at one end, and must be connected directly to the screened box containing the load at the point of entry. Flexible cables may need additional screening to control emissions.

Operation

The high PRF demonstrator pulser produces a negative fast rising pulse into a 50ohms load at a repetition rate up to 100MHz. The maximum voltage is >=120V and the rise time is typically 150ps.

The pulser has an internal rate generator which will operate up to 100MHz and has an external trigger mode which will operate from single shot to 100MHz.

The trigger pulse for external triggering should be >2.5V (5V typical) into 50ohms with a duration in the range 5ns - 100nsecs.

The pulser operates from a DC power supply of nominally 20-36V. The red terminal is +ve. Observe polarity or damage may be caused to the instrument. The maximum power consumption is approximately 60 watts.

The pulser will operate at a supply voltage down to 12V at which the current consumption will approach 5A at maximum rep rate and amplitude. This may be used with a 12V lead acid battery for field operation.

The trigger source is selected by the front panel rotary switch. This switch allows inhibit, external trigger and internal trigger modes with various division ratios. There is a fine rate control which adjusts the internal rate over a range of approximately 3:1. Note that the internal generator is a simple oscillator and if narrow band frequency operation is required an external trigger source should be used.

For optimum pulse shape the load should be 50ohms however the pulser can tolerate certain mis-matched loads. The pulser has been tested into open and short circuit loads however a highly resonant load may cause excessive power dissipation or over voltage. It is suggested that when first applying the output to a load such as an antenna the rate is started at a low value and the amplitude at the low setting. These may be increased and if maximum amplitude and rate are achieved without a trip then the pulser is operating correctly.

Do not operate the pulser into a short circuit, open circuit or badly mismatched load at maximum amplitude and repetiton rate for continuous periods longer than 30 seconds.

If a trip condition cannot be cleared even when the rate is set to a low value then the pulser should be returned to the factory.

There is a power indicator LED to show that DC power is present and the unit is switched on.

At power up the unit starts in a trip condition and the red trip indicator is illuminated. To enable the output the user must press the reset button.

There are two amplitude levels which are selected by the amplitude toggle control. See scope traces below for the effect of this control.

There is a low level trigger monitor output which may be used to trigger an oscilloscope.

There is a trigger active LED which shows that the pulse is receiving trigger events.

IMPORTANT

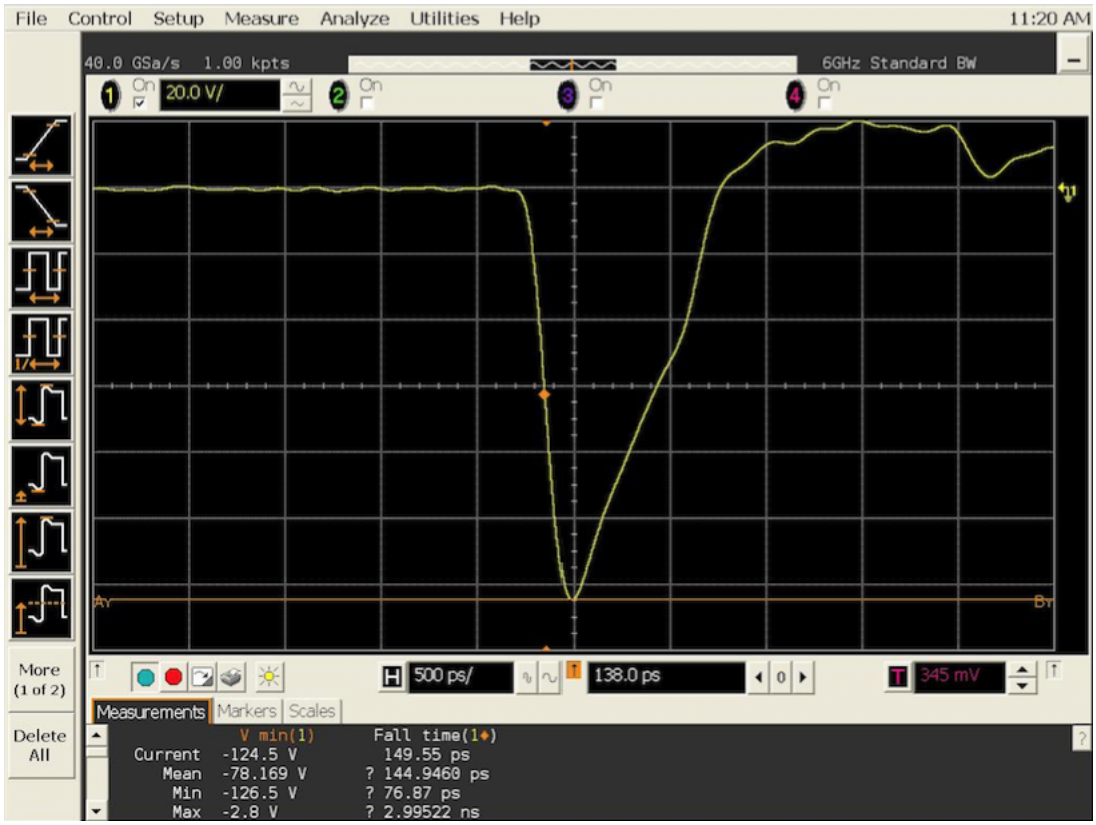
At maximum amplitude and repetition rate the average power output will be ~25 watts. If an external attenuator is being used for monitoring ensure that it has an adequate power rating.

Specification

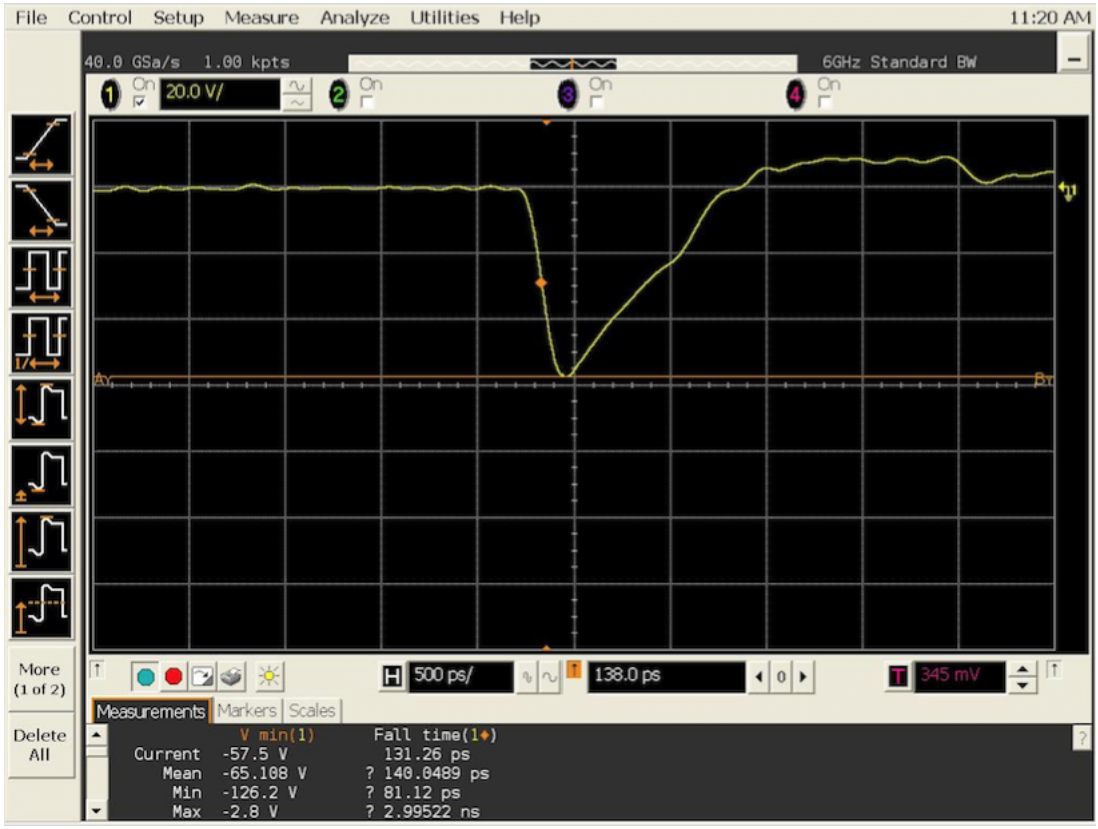
Output	>= 60/120V into 50ohms, negative polarity, low/high amplitude setting
Rise time	<200 ps 10-90%, 150psecs typical
Fall time	Slower decay
Pulse width	Approx 750ps FWHM fixed
Trigger modes	
	Internal 100MHz max, adjustable via front panel controls External Single shot to 100MHz continuously triggered, typical trigger threshold 2V into 50ohms. Maximum trigger amplitude 5V into 50 ohms.
Output connector	N type
Protection	Tested into open and short circuit loads, internal trip in the event of excessive current
Power supply	DC, 20-36V, 2.5A typical at 24V, maximum rate and amplitude All internal voltages are derived from the single supply
Indicators	DC power
Operating temp	-10°C to + 30°C
Packaging	Enclosed in a metal box with connectors for all signals

Test data

Test equipment
Agilent DSO81004B scope, Radial 20dB SMA/SMA attenuator. Tenuline 8340-200 25 watt attenuator for high power characterisation, Barth 142B, 20dB for low power characterisation.

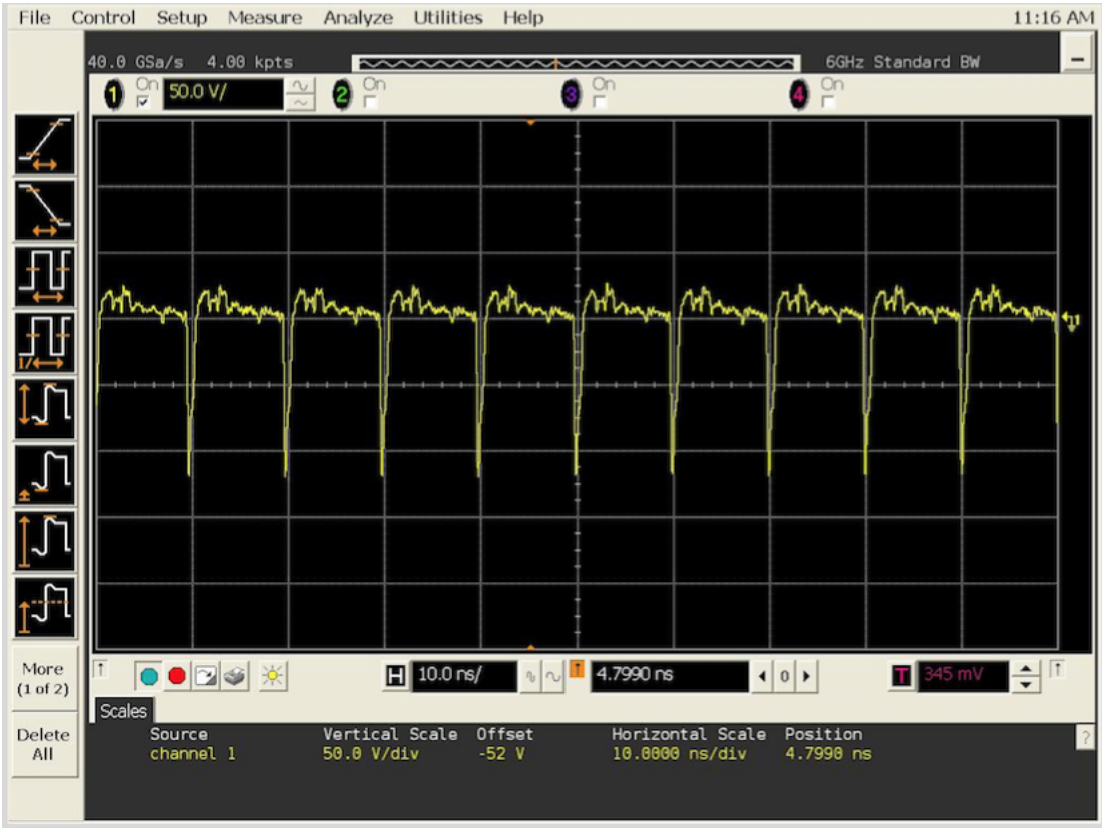


Max amplitude, 10MHz internal trigger, Barth 142



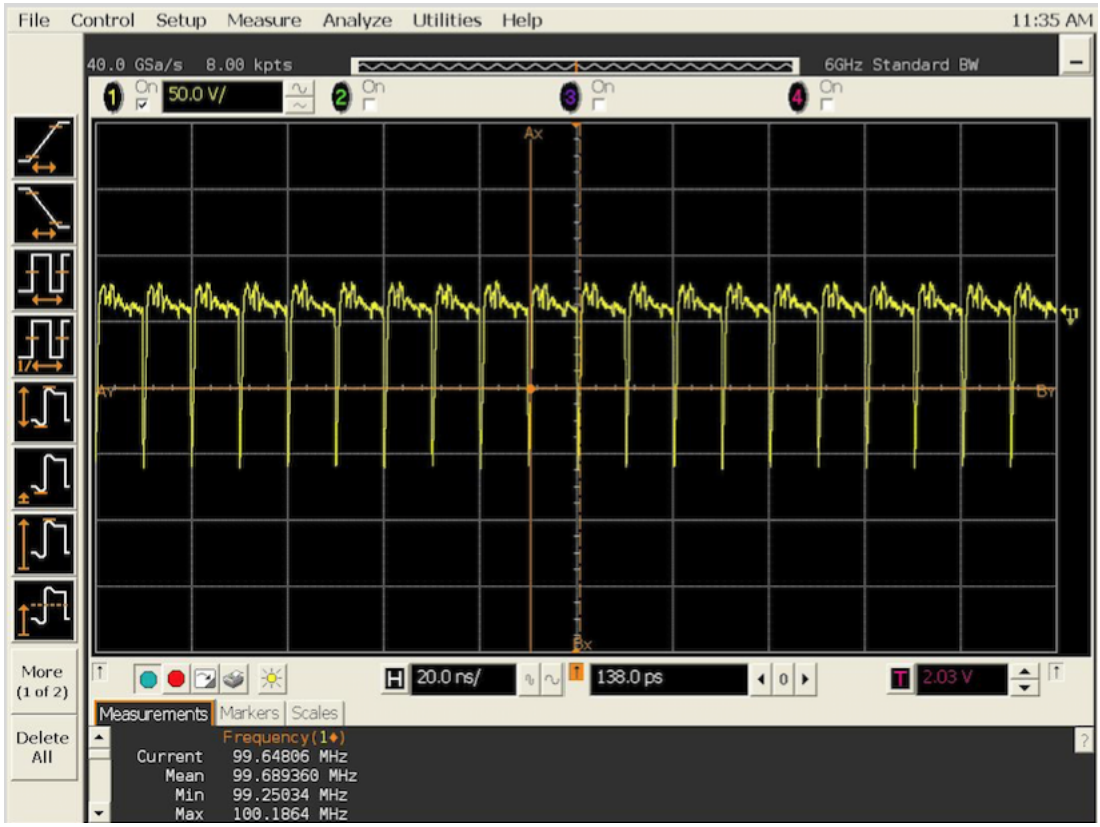
Min amplitude, 10MHz internal trigger, Barth 142

Maximum power output ~25 watts

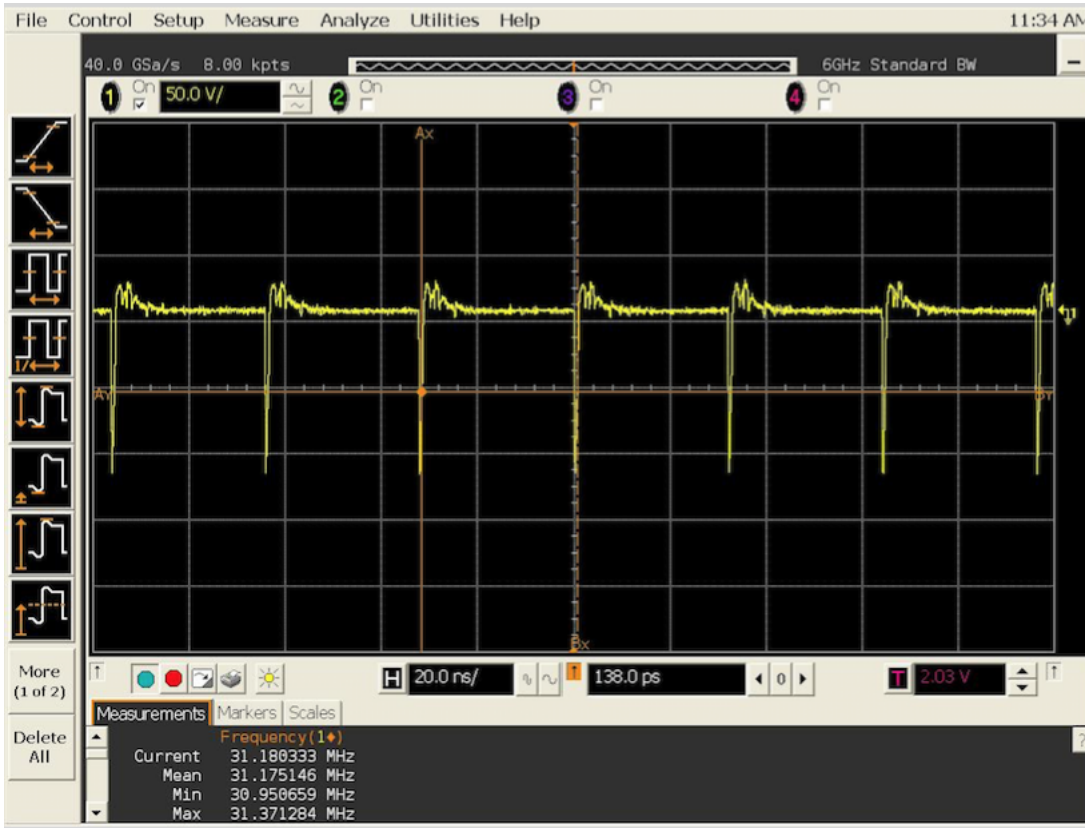


Max amplitude, 100MHz internal trigger, Tenuline 8340-200

Effect of fine rate control



Internal /1 mode, maximum fine rate (~100MHz)



Internal /1 mode, minimum fine rate (~31MHz)