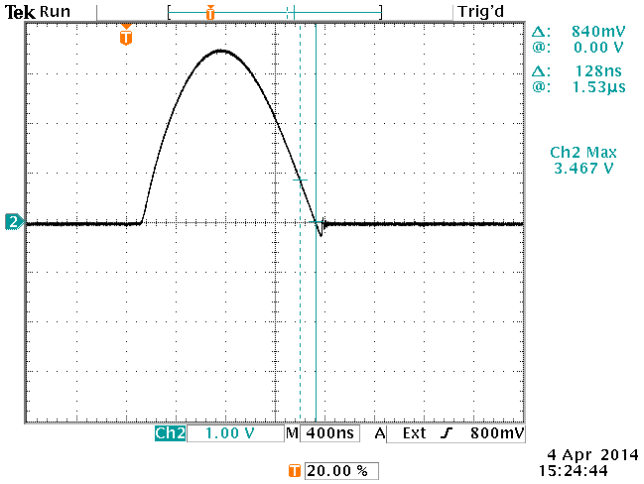
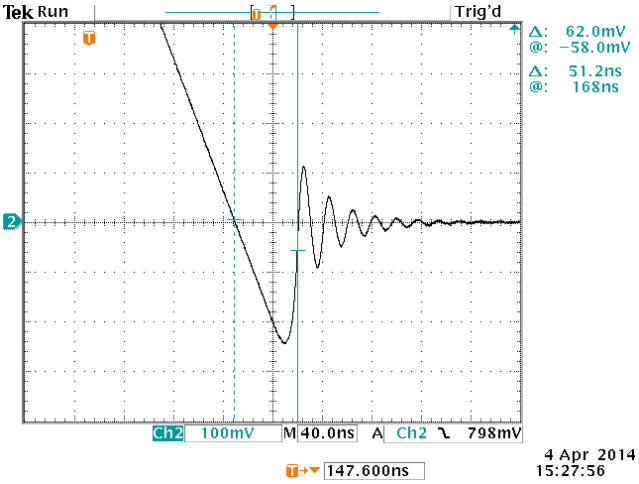
AVR-CC SERIES

REVERSE RECOVERY TIME TESTERS
FOR HIGH POWER DIODES
MIL-STD-750-4 Method 4031.5 Condition C

- Ideal for diode reverse recovery time tests (t_{RR})
- MIL-STD-750-4 Method 4031.5 Condition C
- Customized test jigs available
- IEEE-488.2 GPIB and RS-232 interfaces included
- Optional ethernet port for VXI-11.3 support



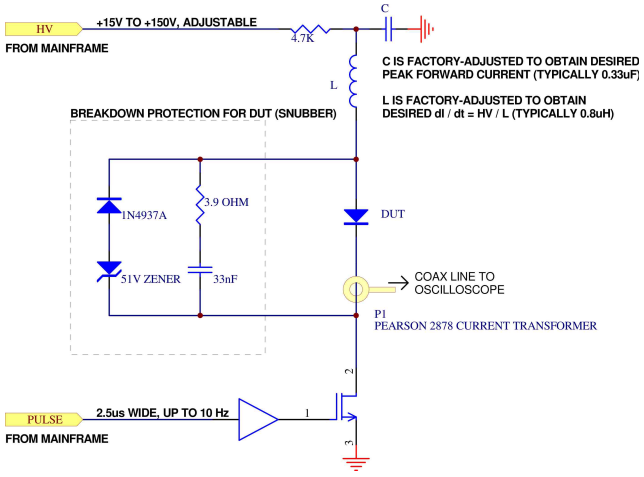
20 A/div (= 1V/div ÷ 50 mV/A), 200 ns/div.
Output for a 1N6306 diode with I_{FM} = +70A and di/dt = -130 A/us.



2 A/div (= 100 mV/div ÷ 50 mV/A), 40 ns/div.
Same waveform, scaled to show reverse transient.
The measured t_{RR} is 51.2 ns.

The AVR-CC2-B is a high performance, GPIB and RS232-equipped instrument intended for MIL-STD-750-4 Method 4031.5 Condition C reverse recovery time tests of diodes and other semiconductor devices. This test uses a high-current impulse shaped by an inductor/capacitor network and a MOSFET switch.

An instrument mainframe provides the high-voltage power and timing control signals to a test jig. The basic equivalent circuit of the jig is illustrated below:



This approach uses a DC-biased MOSFET (with intrinsic body diode) as the switching element, rather than the AC-biased SCR approach shown in MIL-STD-750-4 Figure 4031-6. This is not expected to affect the results in any significant way.

The maximum allowed forward current through DUT is +80A, and the maximum reverse current is -40A.

The output of a Pearson 2878 current transformer is provided. This waveform provides a voltage that is proportional to the current through the DUT. The user must observe this waveform on a user-supplied calibrated oscilloscope, and extract the desired measurements from the waveform. The AVR-CC2-B-MSB itself does not report any measurements, and it should not be relied upon for any particular degree of accuracy. The DUT dynamics and parasitics can influence the amplitude and ramp rate. For calibrated results, rely on calibrated oscilloscope measurements and adjust the pulser settings (and possibly L and C) as needed to obtain the desired values.

One or more test jigs are supplied with the instrument, depending on the customizations requested by the user at the time of ordering. Each jig implements different values of L and C, to achieve specific forward peak currents and dI/dt ramp rates for particular diodes. These currents and ramp rates are typically specified in mil slash sheets. (L and C can be desoldered and changed by the user for calibration adjustment purposes, but is not otherwise recommended.) The value of L will include a certain amount of parasitic inductance in the jig. The governing equations are:

$$I_{FM} \approx HV / \sqrt{(L/C)}$$

$$dI/dt \approx HV / L$$

The instrument mainframe is connected to the test jig using a DB-9 control cable and two coaxial cables (on for the trigger signal, and one for the high voltage

power).

The AVR-CC2-B includes an internal trigger source, but it can also be triggered or gated by an external source. A front-panel pushbutton can also be used to trigger the instrument.

The AVR-CC2-B features front panel keyboard and adjust knob control of the output pulse parameters along with a four line by 40-character backlit LCD display of the output amplitude, pulse repetition frequency, and delay. The instrument includes memory to store up to four complete instrument setups. The operator may use the front panel or the computer interface to store a complete "snapshot" of all key instrument settings, and recall this setup at a later time.

All models include IEEE-488.2 GPIB and RS-232 computer-control ports. The -VXI option adds a rear-panel Ethernet connector, allowing an instrument to be remotely controlled using the VXI-11.3, ssh, telnet, and web protocols. In particular, the VXI-11.3 features allows software like LabView to control an instrument using standard VISA communications drivers and network cabling, instead of using older-style GPIB cabling and GPIB controller cards. For details, see http://www.avtechpulse.com/options/vxi.

The AVR-CC2-B can be adapted to meet specific test requirements. Contact us (info@avtechpulse.com) with your special application!

Actual test waveforms from shipped units and commercial DUTs are available online at:

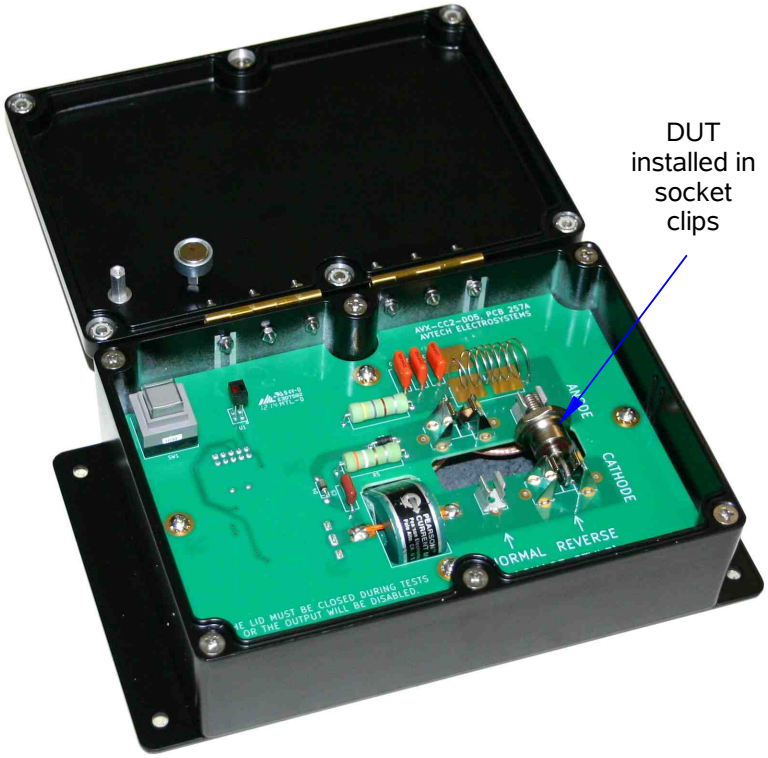
http://www.avtechpulse.com/semiconductor/avr-cc2/#testresults

The operating manuals for most instruments are available for download from their online product pages, available at:

http://www.avtechpulse.com/semiconductor.

These manuals contain a wealth of information, including actual test results.

Instrument Mainframe



A typical test jig is shown at the left, with clip socketing for normal and reverse-polarity DO-5 stud packages. Test jigs are normally customized to meet specific customer requirements.

Model:	AVR-CC2-B
Intended application:	Reverse recovery time tests, as per MIL-STD-750-4 Method 4031.5 Condition C
Basic waveform:	MOSFET-switched LC impulse
High-voltage bias (HV):	+15V to +150V, adjustable
MOSFET switch on time:	2.5 us, approximately. Not adjustable.
Pulse repetition frequency:	1 to 10 Hz, adjustable
Maximum allowed forward current through DUT (D1) and/or MOSFET (Q1):	+80A
Maximum allowed reverse current through DUT (D1) and/or MOSFET (Q1):	-40A
Output waveform:	The output of a Pearson 2878 current transformer is provided. This waveform provides a voltage that is proportional to the current through the DUT (D1). The user must observe this waveform on a user-supplied calibrated oscilloscope, and extract the desired measurements from the waveform. The AVR-CC2-B-MSB itself does not report any measurements.
Calibration:	Not calibrated. The DUT dynamics and parasitics can influence the amplitude and ramp rate. For calibrated results, rely on calibrated oscilloscope measurements and adjust the pulser settings (and possibly L and C) as needed to obtain the desired values.
Supplied test jig(s), and values of L and C:	Customer-specific. Contact us with your requirements! info@avtechpulse.com
Mainframe to jig cables:	Control: DB9 male/male, 2m, straight-through. Pulse: SMA-to-SMA coaxial cable, 2m. HV: BNC-to-BNC coaxial cable, 2m.
Mainframe connectors:	TRIG, SYNC, GATE: BNC female
Jig output connector:	SMA female.
Output waveform:	When the output is terminated with the provided 50 Ohm terminator, the output voltage is proportional to the DUT current: $V_{OUT} = I_{DUT} \times 50$ mV / Amp, The output is generated internally by a Pearson 2878 current transformer (bandwidth 30 Hz to 70 MHz).
GPIB and RS-232 control:	Standard on -B units. See http://www.avtechpulse.com/gpib for details.
Ethernet port, for remote control using VXI-11.3, ssh, telnet, & web:	Optional[1]. Recommended as a modern alternative to GPIB / RS-232. See http://www.avtechpulse.com/options/vxi for details.
LabView driver:	Check http://www.avtechpulse.com/labview for availability and downloads
Trigger modes:	Internal trigger, external trigger (TTL level pulse, > 10 ns, 1 kΩ input impedance), front-panel “Single Pulse” pushbutton, or single pulse trigger via computer command.
Variable delay:	Sync to main out: 0 to 1.0 seconds, for all trigger modes (including external trigger).
Sync output:	> +3 Volts, 100 ns, will drive 50 Ohm loads
Gate input:	Active high or low, switchable. Suppresses triggering when active.
Power requirements:	100 - 240 Volts, 50 - 60 Hz
Dimensions:	H x W x D: 100 mm x 430 mm x 375 mm (3.9” x 17” x 14.8”)
Chassis material:	Cast aluminum frame and handles, blue vinyl on aluminum cover plates
Temperature range:	+5°C to +40°C

1) Add the suffix -VXI to the model number to specify the Ethernet port.