

FEC PLS500 Tester



The PLS500 automatic tester is designed primarily to do SURGE testing either as single pulses or with Forward and Reverse bias, according to methods 4066-1 or 4066-2. In addition, it can also test VF with rectangular pulses and THERMAL RESPONSE either in DVF (mV) or degrees per watt. All three test types may be performed in a single test program.

When doing 4066-1 or -2 testing, the PLS500 can deliver up to 20 Amps I_o and up to 1300V V_R. The steady state I_o and V_{RM} are delivered for a user programmable number of cycles followed by a single half cycle of SURGE (up to 1000A peak) and a single half cycle of V_{RSM}. The above can then be repeated a programmable number of times.

The THERMAL RESPONSE tests can be done with heating currents up to 20A for long pulses and up to 100A for 10ms. The available IM current for these tests is programmable from 1 to 256mA in 1mA steps. All other relevant parameters for these tests are programmable.

- *Thermal Response Testing*
- *Peak Reverse Bias to 1300V*
- *Peak Forward Test to 1200 Amps*
- *Works with Automatic Handlers*
- *Micro Computer Controlled*
- *Digital Readout*
- *Go No-go Outputs*
- *Energy Storage Bank*
- *Will Not Cause Line Surges*
- *Local or Remote Programming*

The DC and rectangular pulse currents are accurate to $\pm 0.5\%$ and 0.05% of full scale. The peak amplitude of half-sine pulses is accurate to $\pm 1\%$ and 0.1% of full scale.

The accuracy of the voltage readout circuits is $\pm 0.25\%$ and 0.02% of full scale.

In its normal stand-alone operation the tester is controlled by a built-in microcontroller. It is programmed by a keypad and LCD display terminal (12 keys, 16x2 display).

A software package allows the tester to be controlled by a PC.

Of course the I_o for the -2 method is DC. However, the duty cycle is still programmed in equivalent 60HZ power line cycles.

The V_F corresponding to the peak surge current during the final pulse is measured and reported. This voltage can also be compared with both maximum and minimum limits. The half sine pulses produced by the tester are 8.3ms in duration, regardless of the local power line frequency. This is done by controlling a constant current source with the output of a Digital-Analog Converter (DAC). The DAC is being driven with data stored in tables in the controller's RAM.

The high voltage supply that delivers the VRM half sines is isolated from the low voltage forward supply by a large SCR that is turned on during the forward half cycle. The reverse supply can deliver roughly 10mA into a shorted load and is designed to tolerate this condition.

The user can easily monitor the 4066 operation with an oscilloscope with one channel watching the reverse voltage on the cathode and a second channel monitoring the forward current using the 200A/V output connector on the front panel (BNC).

V_F can be measured with a single rectangular pulse of programmable amplitude and width. The maximum current for short pulses is 1200A.

DVF and THETA are both THERMAL RESPONSE tests, and are performed in substantially the same way. The difference is that DVF reports the change in V_F at a low current before and after a heating pulse. THETA makes the same measurement but reports the results in Degrees Celsius per Watt of applied power. In order to do this, the tester must know the change in V_F per degree at the low current (I_M). The user must program in this value.

The PLS500 can be used as a stand-alone tester, programmed by the built-in keypad and LCD display. However, the tester comes bundled with our program VFS2, which can control the tester from a host PC. This is a much easier way to program the tester. More important than ease of programming is the variety of plots and statistical reports that can be created.

The tester comes with a built-in PC and with LCD monitor, keyboard and printer

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Tests Performed	
4066-1 and 4066-2	Io to 20A (up to 30V), SURGE to 1000A (up to 30V), VR to 1300V. Note: Io 100A for 3 cycles maximum. Duty Cycle and repetitions programmable. VF measured during final SURGE pulse.
SURGE (single pulse)	Peak current to 1200A
VF	Peak current to 1200A with 4ms pulse. Current is derated for longer pulses.
THERMAL RESPONSE	IH to 20A, readout in °C/W or DVF. TH programmable in ms.
THERMAL RESISTANCE	IH to 20A, readout in °C/W. Stops at time programmable in seconds or at thermal equilibrium.

Ranges (forcing)	
SURGE	0-1200A ±1% and ±0.1A
Io	0-3.0A ±1% and ±0.20mA 0-20A ±1% and ±0.1A
VF	0-300.0mA ±1% and ±0.1mA 0-3.000A ±1% and ±0.1mA 0-6.00A ±1% and ±0.10mA 0-1200.0A ±1% and ±0.1A
IH for Thermal Tests	Same as VF
IM	Programmable 1 to 256mA

Compliance Voltage

The tester will produce at least 30V at its terminals at any legal current. Out of compliance conditions are detected and readings marked "Invalid."

Timing

Pulses both rectangular and half sine are correct within $\pm 1\%$ except as noted below. TMD is correct $\pm 1\%$ and $\pm 2\mu\text{s}$ except as noted below.

Notes:

For all tests except Thermal and VF types, there is a large SCR in series with the Forward Current Supplies. The time for the supply to turn on and the SCR to fire is about $300\mu\text{s}$. For half sine pulses, this clips off a small part of the rising edge. Since this is the low current part of the wave, the effect on the total energy is very small.

The SCR is not used for Thermal or VF tests.

The TMD is measured from the time the IH is switched off. The time required for the switch from IH to IM is variable, a complex function of the DUT, the IH and IM programmed and variations in the power supplies. The "Cooling plot" function available in the software program "VFS2" is very useful in evaluating this effect.

Ranges (readout)	
Voltage (except Thermal)	0-20V or 200V $\pm 0.25\%$ and 0.01% of fs
Voltage for VF at IM	0-1.6383V or 16.383V $\pm 0.25\%$ and 0.01% fs

THETA (THERMAL RESPONSE)

The scales used for this output are just digital calculations using measurements taken on the ranges above and depend on these for their accuracy.