

SEMI F47
Voltage Sag Immunity Test Report
for
Power Supply
FPS202.241-50-DCOK



Other devices covered by this report:

FPS202.24b-ccc-ddd

b: 1	Basic device - not adjustable, fixed current limitation
2	Device with adjustable voltage and/or current limited outputs and individual switch off
ccc: 00-999	Consecutive Number
ddd: blank	No communication provided
IOL	IO-Link
DCOK	DC-OK relay contact

SEMI F47 Test Report

Document number	FPS202.241-50-DCOK Semi F47 Rev2
PCTM number	-
Standards	SEMI F47-0706 (July 2006) SPECIFICATION FOR SEMICONDUCTOR PROCESSING EQUIPMENT - Voltage Sag Immunity Compliance Tests IEC 61000-4-11 2004 +A1:2017 Electromagnetic compatibility (EMC) - Part 4-11: Testing and measurement techniques - Voltage dips, short interruptions and voltage variations immunity tests for equipment with input current up to 16 A per phase
Applicant	PULS GmbH Elektrastraße 6 81925 Munich, Germany
Test Laboratory	PULS Vario GmbH Kranichberggasse 6 1120 Vienna, Austria
Test Engineer	Thomas Ramel
Test Date	30.9.2025
Description of Test Device:	Stand-alone power supply
Devices under Evaluation:	FPS202.241-50-DCOK Input: AC 100-240V, Output: DC 24V, 2x95W
S/N of Devices:	FPS202.241-50-DCOK: S/N: 29 709 646
Application Details:	Input voltage: 1-Phase AC 208V Input frequency: 50 or 60Hz Output load: 2x95W

PASS/FAIL Criteria:

In accordance with paragraph 7.8.2 a) of SEMI F47-0706
The output voltage is not allowed to deviated more than 5% of the initial value.
DC OK contact is not allowed to trigger during and after the test.

Test Result:

PASS

The test device passed all essential SEMI F47-0706 tests according to the defined application details without any limitations and is qualified to bear the following approval mark:



Since DC power supplies, as covered in this test report, are only components of a semiconductor processing equipment, the tests of the SEMI F47 standard were conducted with selected rated characteristics of the DC power supply.

The system integrator of the final semiconductor processing equipment needs to judge if the results of this test report are compatible with the SEMI F47 requirements of his system or if test data under other operating conditions are additionally required.

The system integrator also needs to judge if the results of the inrush current peaks are compatible with the selected external fuses for input protection.

The system integrator also needs to be aware about aging effects. It is expected that the ride through time can be reduced by 15% at end of the specified lifetime expectancy.

A SEMI F47 certificate is not intended for this type of component, however the product fulfils the general requirements and can be marked with the symbol above.

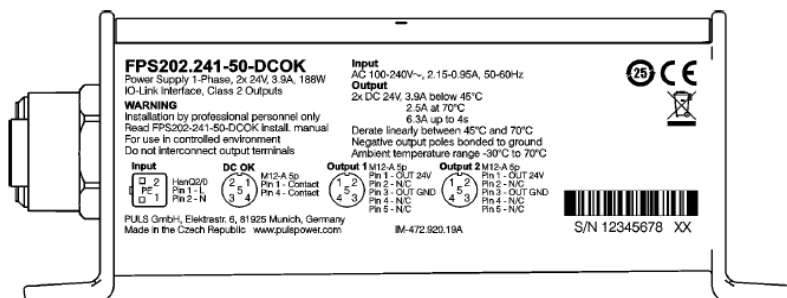
Approved

Milan Maksimovic
Team Leader DVT
PULS Vario GmbH, Vienna

Date of Approval

21.04.2026

Copy of marking plate



List of Test Equipment

Type	Model	Inventory number
Test generator	Chroma 6560	10007
Load	Chroma 63201	10046
Load	Chroma 63201	10108
Oscilloscope	Siglent SDS3034X HD	10567
Differential probe	pico TA041	10518
Current Probe	LeCroy CP150	10243

The test equipment complies with the requirements of IEC 61000-4-11.

The peak current capability of the test generator was evaluated according Annex A of IEC 61000-4-11 and is able to deliver minimum 134A.

Test Specification for SEMI F47 compliance

Voltage Sag Immunity according to the following table:

Sag depth#1	Duration	Duration at 50 Hz	Duration at 60 Hz
50%	200ms	10 cycles	12 cycles
70%	500ms	25 cycles	30 cycles
80%	1000ms	50 cycles	60 cycles

#1 Sag depth is expressed in percent of remaining nominal voltage. For example, during a 70% voltage sag on a 200 volt nominal system, the voltage is reduced during the sag to 140 volts and not 60 volts.

Test Setup

The unit under test in normal operating condition is mounted in a climate chamber.

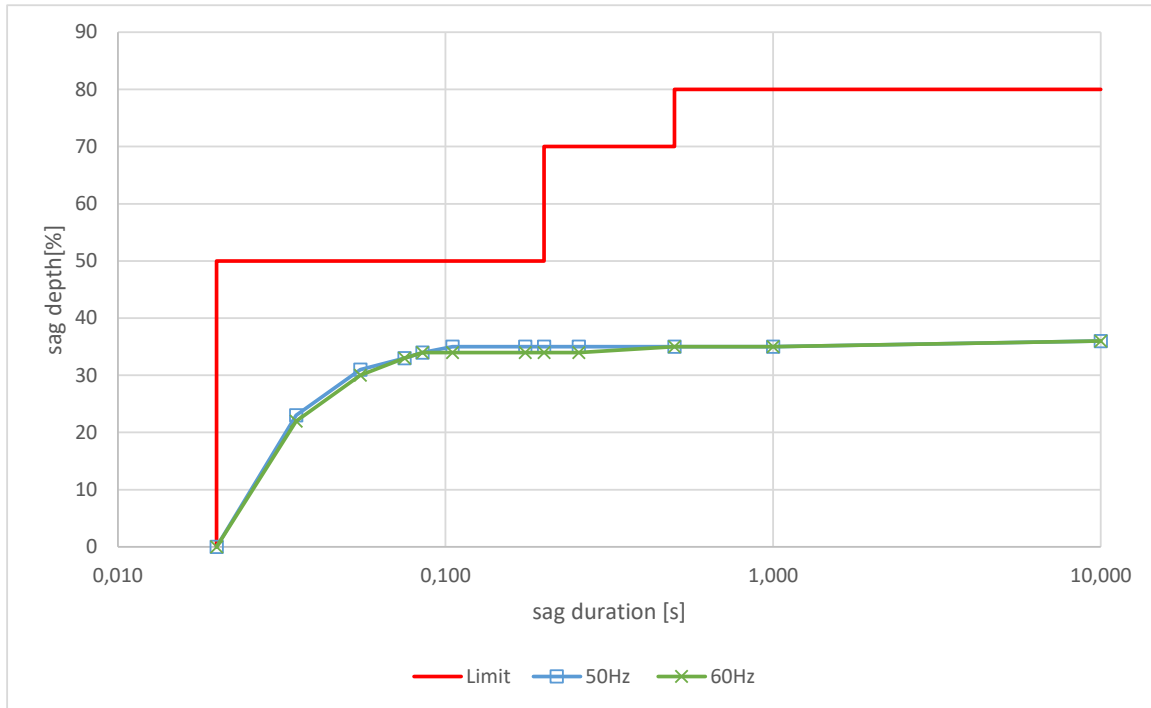
The input is connected to an AC Source. The input voltage is measured with a 100:1 differential probe and the input current is measured with a current probe. These probes are connected to oscilloscope.

The outputs are connected to an active load. The output voltages are connected directly to the oscilloscope.

“DC-OK” signal is monitored with a logicanalyzer.



Voltage Sag Results L-N @ 208VAC; 24VDC/2x3.96A



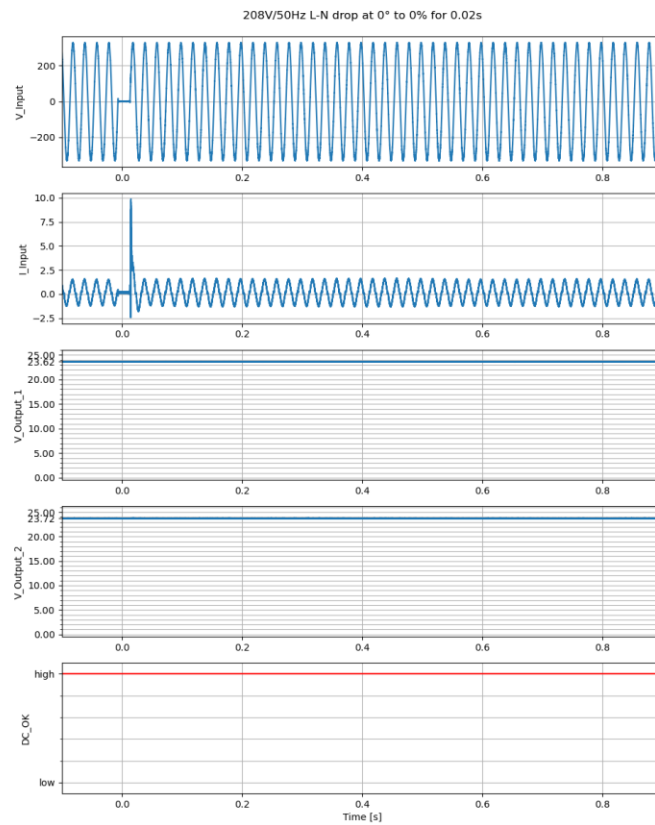
Conducted Tests at 208V 50Hz

Input voltage 208Vac
 Input Frequency 50Hz
 Output voltage 24V
 Output current 2x3.96A
 Ambient temperature 25°C

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,020	0	9,88
0,200	50	6,12
0,500	70	4,47
1	80	3,39
10	80	3,11

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,020	0	6,00
0,035	23	21,15
0,055	31	21,39
0,075	33	23,95
0,085	34	25,25
0,105	35	24,64
0,175	35	22,02
0,200	35	8,49
0,255	35	23,72
0,500	35	7,51
1	35	7,32
10	36	6,35



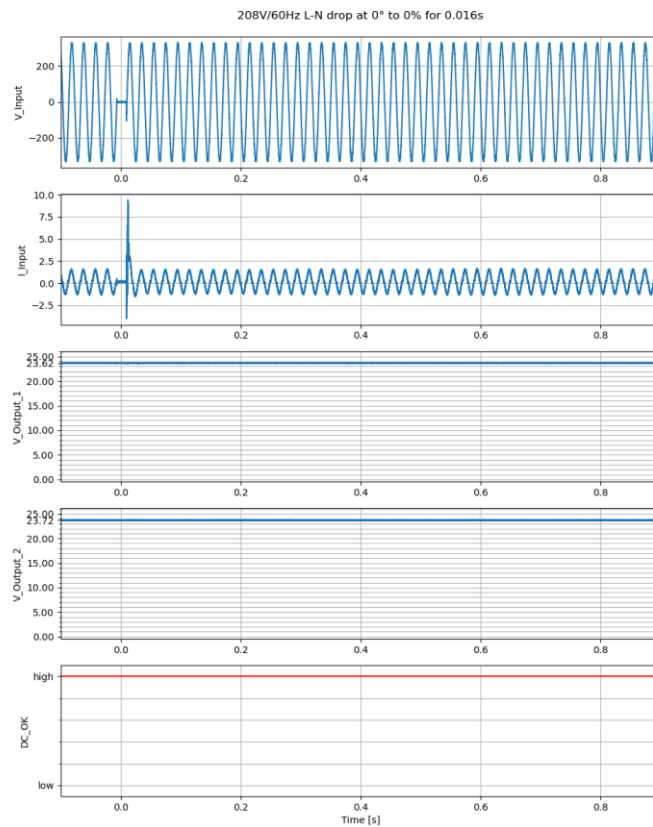
Conducted Tests at 208V 60Hz

Input voltage 208Vac
 Input Frequency 60Hz
 Output voltage 24V
 Output current 2x3.96A
 Ambient temperature 25°C

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,016	0	9,44
0,200	50	5,65
0,500	70	4,96
1	80	3,51
10	80	2,54

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,016	0	9,34
0,035	22	19,20
0,055	30	21,41
0,075	33	9,60
0,085	34	19,46
0,105	34	20,45
0,175	34	9,29
0,200	34	9,62
0,255	34	16,85
0,500	35	8,56
1	35	6,71
10	36	7,13



Inrush current measurements according 61000-4-11 at 208V 50Hz

Input voltage	208Vac
Input Frequency	50Hz
Output voltage	24V
Output current	2x3.96A
Ambient temperature	25°C

Peak input current measurements on unit under test:

First two measurements turn off input power for EUT for 5 minutes and then

Measure peak input current when AC turned on at 90°: 2,5 A

Measure peak input current when AC turned on at 270°: 8,7 A

Next two measurements turn on the input power for EUT for at least 1 minute then turn off input power for 5s and on again.

Measure peak input current when AC turned on at 90°: 2,2 A

Measure peak input current when AC turned on at 270°: 5,0 A

Inrush current measurements according 61000-4-11 at 208V 60Hz

Input voltage	208Vac
Input Frequency	60Hz
Output voltage	24V
Output current	2x3.96A
Ambient temperature	25°C

Peak input current measurements on unit under test:

First two measurements turn off input power for EUT for 5 minutes and then

Measure peak input current when AC turned on at 90°: 2,8 A

Measure peak input current when AC turned on at 270°: 2,6 A

Next two measurements turn on the input power for EUT for at least 1 minute then turn off input power for 5s and on again.

Measure peak input current when AC turned on at 90°: 3,7 A

Measure peak input current when AC turned on at 270°: 3,9 A

Operating conditions and their influence in test results:

a) Ambient temperature:

Control measurements show that the ambient temperature has only a minor influence in the ride-through time test results.

Depending on the used topology to reduce the input inrush current, the ambient temperature can have a major influence in the arising peak current after the sag test. Therefore, tests were performed at ambient temperatures of 25°C and 45°C.

It is assumed that semiconductor processing equipment is never used at lower temperatures than +25°C. Although the power supply itself is specified down to -30°C, a test at such low temperatures is not performed.

b) Mains frequency 50Hz vs. 60Hz:

Control measurements show that 50Hz testing is more critical than 60Hz testing.

Therefore, unless otherwise noted, all tests were performed with a mains frequency of 50Hz.

c) Output voltage 24V vs. 28V:

The ride-through time depends on the stored energy in the input capacitors and the amount of output power. The output voltage is not essential as long as the output power is constant.

The adjusted output voltage has no influence in input currents peaks after input voltage sags.

Therefore, unless otherwise noted, all tests were performed with an output voltage of 24Vdc.

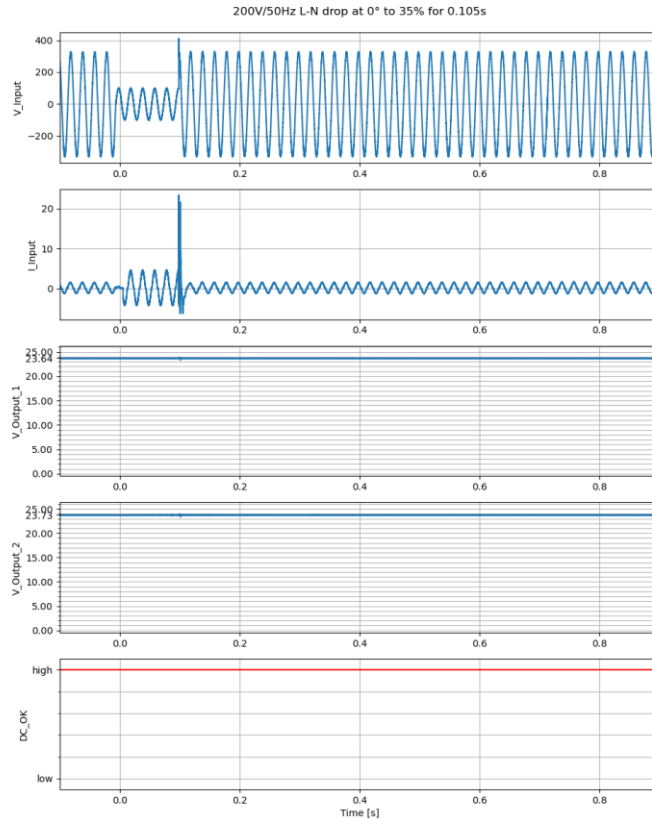
APPENDIX

Informational measurements at 200V

Input voltage 200Vac
 Input Frequency 50Hz
 Output voltage 24V
 Output current 2x3.96A
 Ambient temperature 25°C

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,020	0	10,09
0,035	26	20,19
0,055	32	21,88
0,075	35	22,33
0,085	35	20,40
0,105	35	23,36
0,175	35	22,33
0,200	35	9,34
0,255	36	23,27
0,500	36	8,14
1	36	7,20
10	38	5,69



Informational measurements at 230V

Input voltage 230Vac
 Input Frequency 50Hz
 Output voltage 24V
 Output current 2x3.96A
 Ambient temperature 25°C

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0,020	0	9,81
0,035	19	19,74
0,055	28	23,65
0,075	29	24,78
0,085	31	24,09
0,105	31	23,93
0,175	32	22,82
0,200	32	6,68
0,255	32	20,26
0,500	32	7,60
1	32	7,44
10	33	5,79

