SEMI F47
Voltage Sag Immunity Test Report
for
Power Supply PIC480.241D

Other devices covered by this report:

PIC480.241D-ww

ww	blank	Standard units 24V, 20A, 480W
	Q	Version with alternate input and output terminal
	C1	Version with conformal coated pc-boards
	DC	Version with additional d.c. input voltage rating

PIC480.361D-ww

ww	blank	Standard units 36V, 13.3A, 480W
	C1	Version with conformal coated pc-boards

PIC480.481D-ww

ww	blank	Standard units 48V, 10A, 480W
	C1	Version with conformal coated pc-boards

SEMI F47 Test Report

Document number	PIC480.241D Semi F47 Rev2
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	Silvester Maierhofer
Test Date	04.11.2025
Description of Test Device:	Built-in power supplies for DIN-Rail mounting
Devices under Evaluation:	PIC480.241D-Q Input: AC 100-240V, Output: DC 24-28V, 480W
S/N of Devices:	PIC480.241D-Q: S/N: 1 100 079 112
Application Details:	Input voltage: 1-Phase AC 208V Input frequency: 50 or 60Hz Output load: 480W

PASS/FAIL Criterions:	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	13.11.2025

Copy of marking plate

List of Test Equipment

Type	Model	Inventory number
Test generator	Chroma 6560	10007
Load	Hewlett Packard 6050A 4B	10028
Oscilloscope	Siglent SDS3034X HD	10564
Diffential probe	Siglent CP6150	10589
Current Probe	Siglent DPB5150A	10588

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:

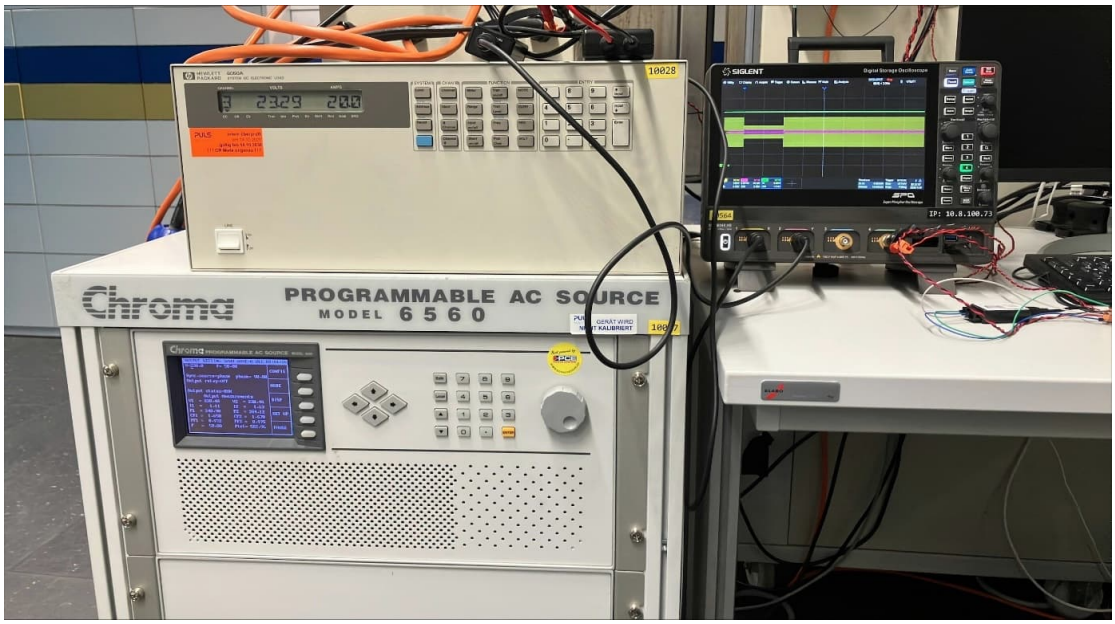
Sag depth#1	Duration	Duration at 50 Hz	Duration at 60 Hz
50%	200ms	10 cycles	12 cycles
70%	500ms	25 cycles	30 cycles
80%	1000ms	50 cycles	60 cycles

#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.

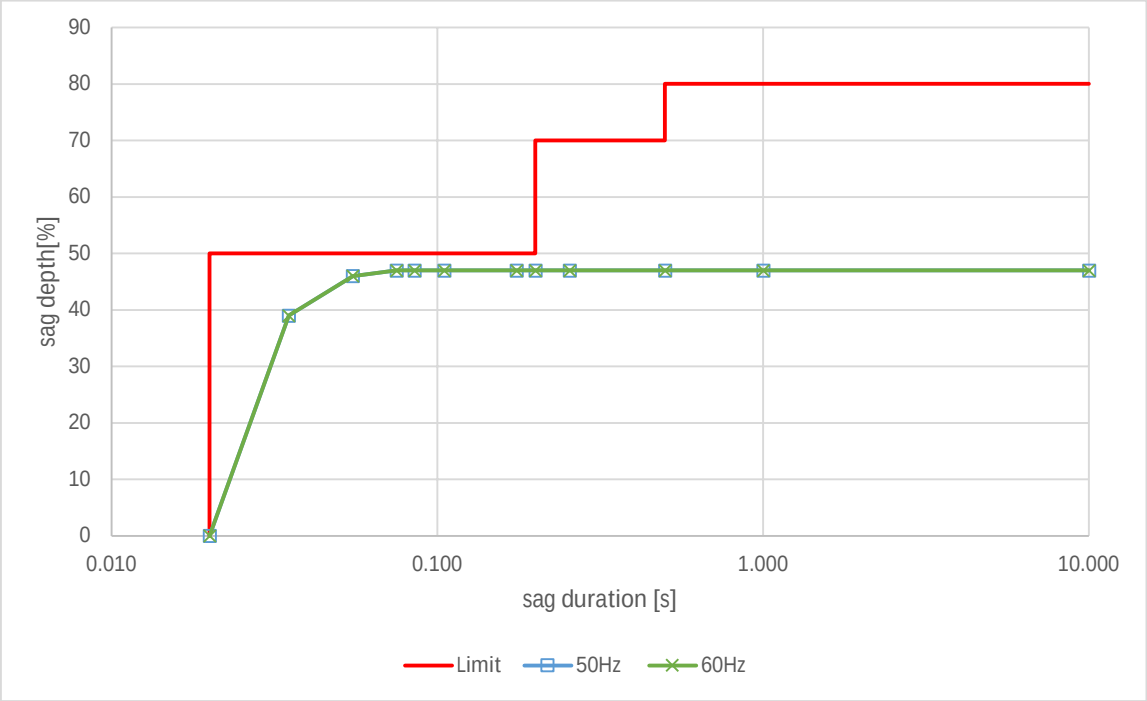
Test Setup

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 500:1 differential probe and the input current is measured with a current probe. These probes are connected to oscilloscope.

The output is connected to an active load. The output voltage is connected directly to the oscilloscope.
"DC-OK" signal is monitored with a logicanalyzer.



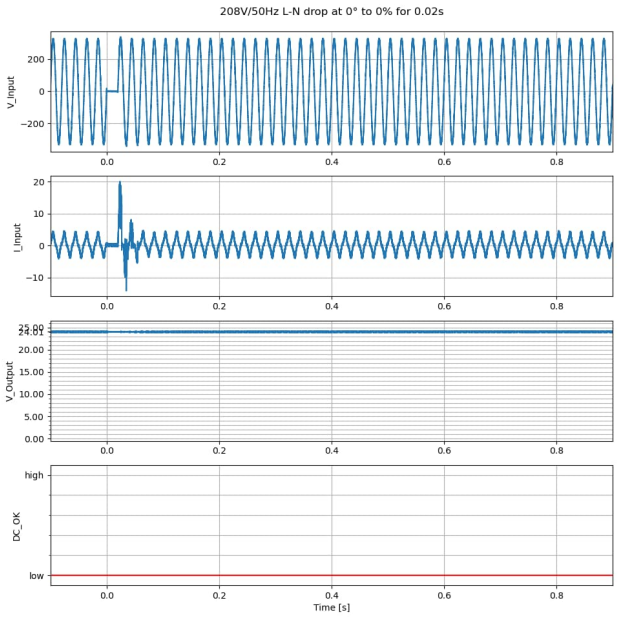
Voltage Sag Results L-N @ 208VAC; 24VDC/20A



Conducted Tests at 208V 50Hz

Input voltage	208Vac
Input Frequency	50Hz
Output voltage	24V
Output current	20A
Ambient temperature	25°C

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.020	0	20.14
0.200	50	12.61
0.500	70	8.09
1	80	8.09
10	80	8.00



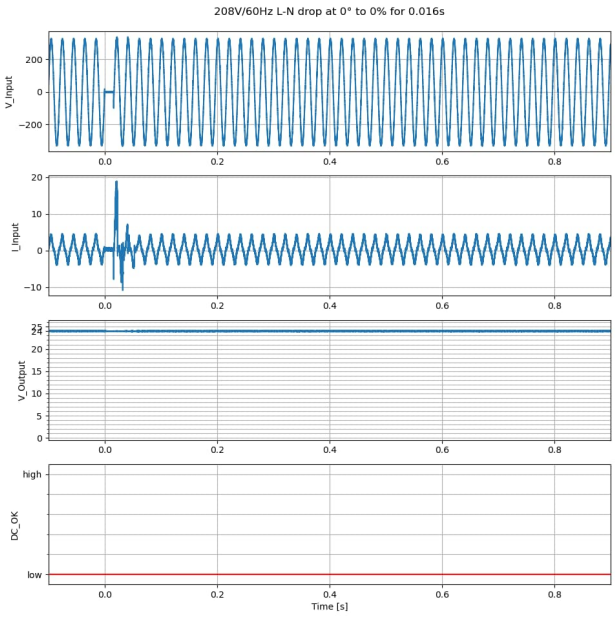
Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.020	0	20.05
0.035	39	67.67
0.055	46	60.24
0.075	47	60.24
0.085	47	62.59
0.105	47	57.69
0.175	47	32.66
0.200	47	22.68
0.255	47	34.54
0.500	47	14.02
1	47	14.12
10	47	13.46

Conducted Tests at 208V 60Hz

Input voltage	208Vac
Input Frequency	60Hz
Output voltage	24V
Output current	20A
Ambient temperature	25°C

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.016	0	19.58
0.200	50	13.27
0.500	70	8.56
1	80	7.34
10	80	7.15



Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.016	0	18.92
0.035	39	21.18
0.055	46	46.31
0.075	47	25.60
0.085	47	25.51
0.105	47	39.44
0.175	47	25.60
0.200	47	24.56
0.255	47	33.51
0.500	47	14.78
1	47	14.59
10	47	13.74

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

Input voltage	208Vac
Input Frequency	50Hz
Output voltage	24V
Output current	20A
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°: 27.2 A

Measure peak input current when AC turned on at 270°: 29.4 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°: 29.4 A

Measure peak input current when AC turned on at 270°: 29.5 A

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

Input voltage	208Vac
Input Frequency	60Hz
Output voltage	24V
Output current	20A
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°: 25.1 A

Measure peak input current when AC turned on at 270°: 21.4 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°: 28.7 A

Measure peak input current when AC turned on at 270°: 28.5 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.
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 -25°C and up to +60°C, a test at such low or high 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 and variants with different output voltage (36V-42V, 48V-56V):
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.

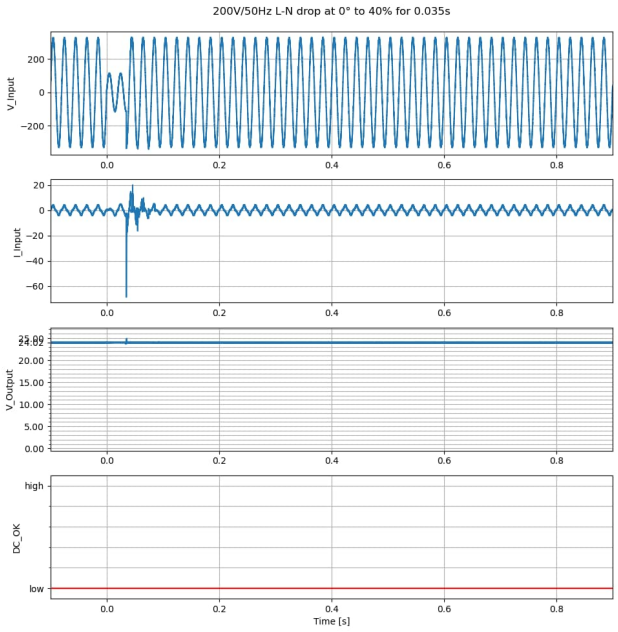
APPENDIX

Informational measurements at 200V

Input voltage	200Vac
Input Frequency	50Hz
Output voltage	24V
Output current	20A
Ambient temperature	25°C

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.020	0	20.24
0.035	40	68.61
0.055	48	59.58
0.075	49	60.71
0.085	49	60.61
0.105	49	56.28
0.175	49	33.98
0.200	49	22.87
0.255	49	34.54
0.500	49	14.31
1	49	14.40
10	49	13.65



Informational measurements at 230V

Input voltage	230Vac
Input Frequency	50Hz
Output voltage	24V
Output current	20A
Ambient temperature	25°C

Informational measurements:

Sag duration [s]	Voltage remaining [%]	Peak current [A]
0.020	0	19.95
0.035	35	68.99
0.055	42	58.16
0.075	43	56.94
0.085	43	56.56
0.105	43	51.20
0.175	43	30.68
0.200	43	20.99
0.255	43	33.32
0.500	43	14.78
1	43	14.21
10	43	13.74