

EVALUATION DATA

MODEL NAME : OFD1200A48-N

Tested by : *Shintaro Oki*
Shintaro Oki

Approved by : *Tomas Isaksson*
Tomas Isaksson

P R

B X

POWERBOX
A Cosel Group Company

Table of Contents

| | |
|--|----|
| 1. Input Current (by Load Current) | 3 |
| 2. Efficiency (by Load Current)..... | 3 |
| 3. Power Factor (by Load Current) | 4 |
| 4. Leakage Current | 4 |
| 5. Inrush Current | 5 |
| 6. Line Regulation | 6 |
| 7. Load Regulation | 6 |
| 8. Ripple Noise..... | 7 |
| 9. Dynamic Load Response | 7 |
| 10. Rise Time Characteristics by AC ON | 8 |
| 11. Rise Time Characteristics with RC Signal..... | 8 |
| 12. Fall Time / Hold-up Time | 9 |
| 13. Over Current Protection | 10 |
| 14. Minimum Input Voltage for Regulated Output Voltage | 11 |
| 15. Over Voltage Protection | 11 |
| 16. Conducted Emission | 12 |
| 17. Figure of Test Circuitry | 15 |

Remark:

Unless specified the test condition shall be

Input voltage / Frequency: 230 [Vac] / 50 [Hz]

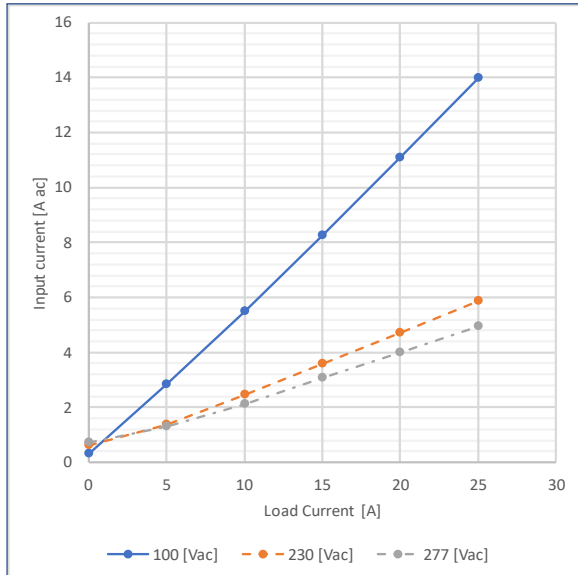
Load current: 25.0 [A]

Baseplate temperature: 25 [°C]

1. Input Current (by Load Current)

Test Circuitry : Figure A

Graph



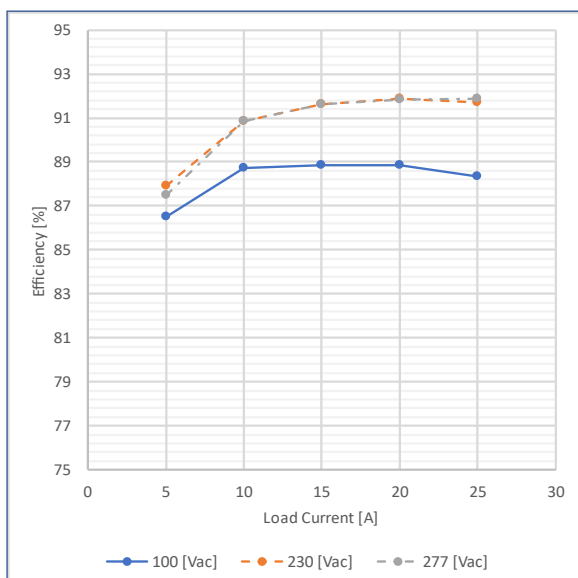
Value

| Load Current [A] | Input Current [Aac] | | |
|------------------|---------------------|-----------|-----------|
| | Input Voltage | | |
| | 100 [Vac] | 230 [Vac] | 277 [Vac] |
| 0.00 | 0.299 | 0.607 | 0.716 |
| 5.00 | 2.820 | 1.377 | 1.285 |
| 10.00 | 5.501 | 2.449 | 2.133 |
| 15.00 | 8.265 | 3.573 | 3.056 |
| 20.00 | 11.069 | 4.718 | 3.999 |
| 25.00 | 13.969 | 5.882 | 4.951 |
| | | | |

2. Efficiency (by Load Current)

Test Circuitry : Figure A

Graph



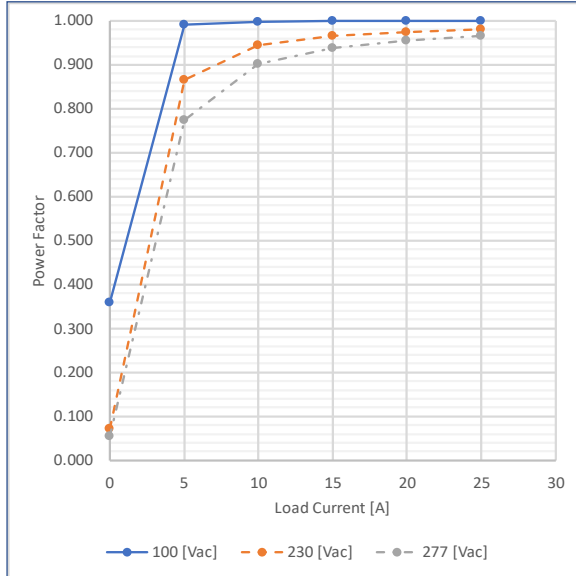
Value

| Load Current [A] | Efficiency [%] | | |
|------------------|----------------|-----------|-----------|
| | Input Voltage | | |
| | 100 [Vac] | 230 [Vac] | 277 [Vac] |
| 0.00 | - | - | - |
| 5.00 | 86.501 | 87.933 | 87.468 |
| 10.00 | 88.703 | 90.838 | 90.858 |
| 15.00 | 88.856 | 91.619 | 91.602 |
| 20.00 | 88.832 | 91.860 | 91.823 |
| 25.00 | 88.353 | 91.724 | 91.863 |
| | | | |

3. Power Factor (by Load Current)

Test Circuitry : Figure A

Graph



Value

| Load Current [A] | Power Factor | | |
|------------------|---------------|-----------|-----------|
| | Input Voltage | | |
| | 100 [Vac] | 230 [Vac] | 277 [Vac] |
| 0.00 | 0.359 | 0.072 | 0.056 |
| 5.00 | 0.991 | 0.865 | 0.774 |
| 10.00 | 0.997 | 0.945 | 0.901 |
| 15.00 | 0.999 | 0.966 | 0.938 |
| 20.00 | 0.999 | 0.975 | 0.955 |
| 25.00 | 0.999 | 0.981 | 0.965 |

4. Leakage Current

Test Circuitry : See table

Test Equipment: Simpson 228

Value

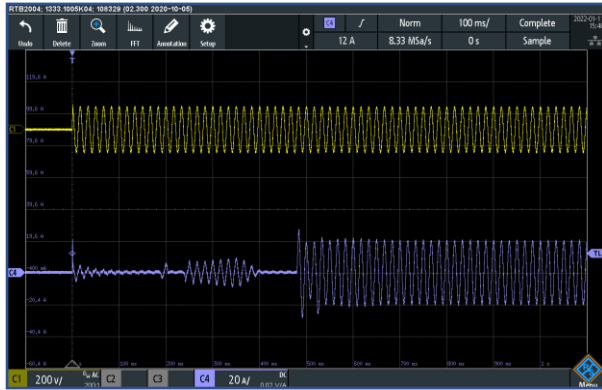
| Standard | Testing Circuitry | Measuring Method | Leakage Current [mA] | | | Note |
|------------|-------------------|------------------|----------------------|-----------|-----------|-----------|
| | | | Input Voltage | | | |
| | | | 100 [Vac] | 230 [Vac] | 277 [Vac] | |
| IEC62368-1 | Figure B-1 | Both phases | 0.25 | 0.60 | 0.74 | Operation |
| | | One of phases | 0.44 | 1.20 | 1.45 | Stand by |
| | Figure B-2 | Both phases | 0.25 | 0.60 | 0.74 | Operation |
| | | One of phases | 0.44 | 1.20 | 1.45 | Stand by |

5. Inrush Current

Test Circuitry : Figure A

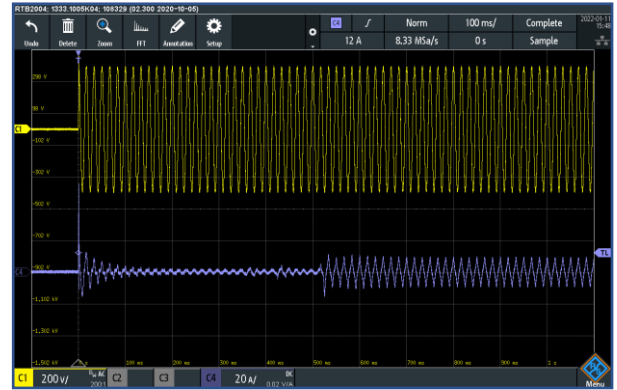
— C1: Input Voltage (200V/div)
— C4: Input Current (20A/div)

Waveform



Input Voltage : 100 [Vac]
(100ms/div)

- ① Primary Inrush Current : 11.7 [A]
- ② Secondary Inrush Current : 28.3 [A]

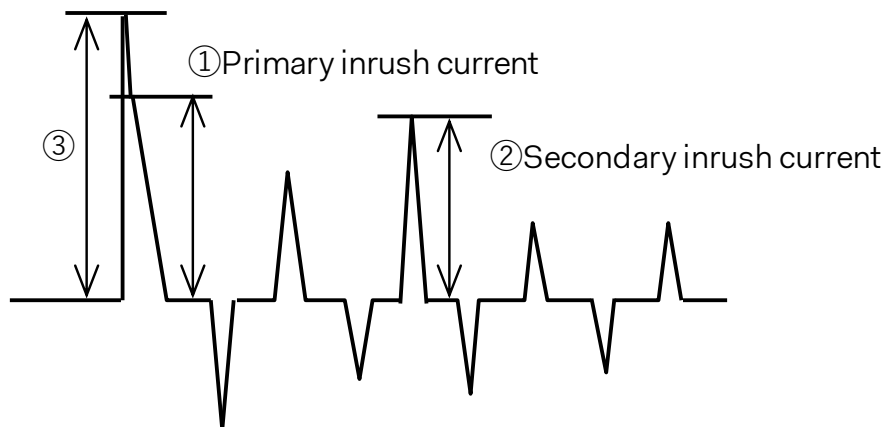


Input Voltage : 277 [Vac]
(100ms/div)

- ① Primary Inrush Current : 39.3 [A]
- ② Secondary Inrush Current : 14.8 [A]

Remark:

A surge current flown into Line-to-Line capacitor (③) would be excluded as primary inrush current (①).

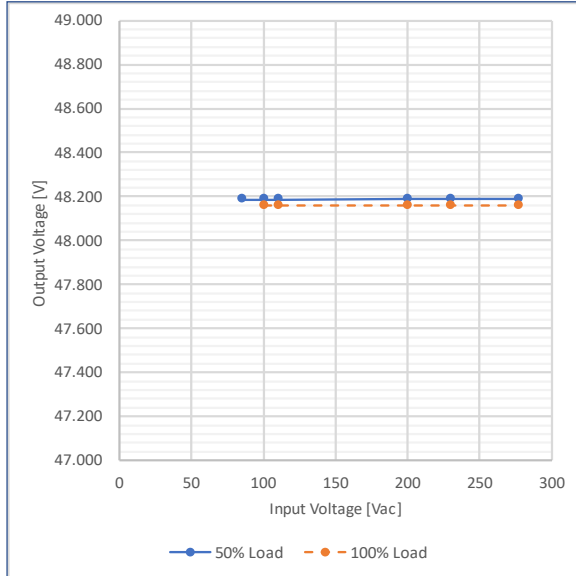


6. Line Regulation

Test Circuitry : Figure A

Change input voltage from 85 to 277 [Vac]

Graph



Value

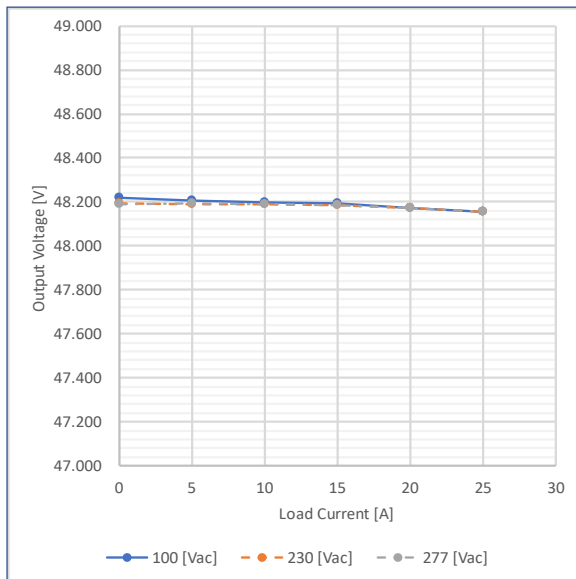
| Input Voltage [Vac] | Output Voltage [V] | |
|---------------------|--------------------|-----------|
| | Load Factor | |
| | 50% Load | 100% Load |
| 85.00 | 48.187 | - |
| 100.00 | 48.187 | 48.159 |
| 110.00 | 48.187 | 48.159 |
| 200.00 | 48.188 | 48.159 |
| 230.00 | 48.188 | 48.159 |
| 277.00 | 48.188 | 48.159 |

7. Load Regulation

Test Circuitry : Figure A

Change Load Current from 0 to 25.0 [A]

Graph



Value

| Load Current [A] | Output Voltage [V] | | |
|------------------|--------------------|-----------|-----------|
| | Input Voltage | | |
| | 100 [Vac] | 230 [Vac] | 277 [Vac] |
| 0.00 | 48.220 | 48.195 | 48.189 |
| 5.00 | 48.205 | 48.191 | 48.193 |
| 10.00 | 48.199 | 48.191 | 48.188 |
| 15.00 | 48.193 | 48.184 | 48.183 |
| 20.00 | 48.174 | 48.171 | 48.172 |
| 25.00 | 48.155 | 48.157 | 48.154 |

8. Ripple Noise

Test Circuitry : Figure C

— C2: Output voltage
 BW: 20MHz

Waveform



(5μs/div)
 (20mV/div)



(200ms/div)
 (50mV/div)

9. Dynamic Load Response

Test Circuitry : Figure A
 Load Current 2.5 [A] <-> 22.5 [A]

— C2: Output voltage (100mV/div)
 — C4: Output current (10A/div)

Waveform



(20ms/div)

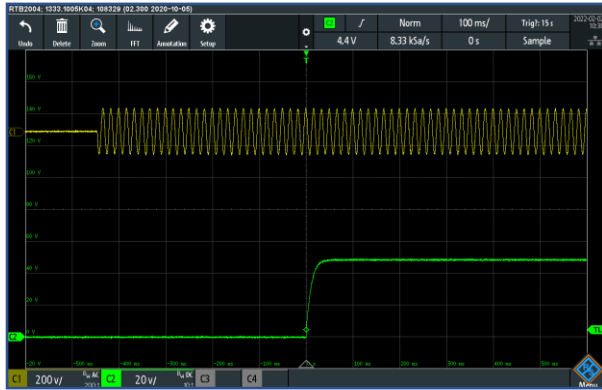
Load changes from 10% to 90% of rated current.

10. Rise Time Characteristics by AC ON

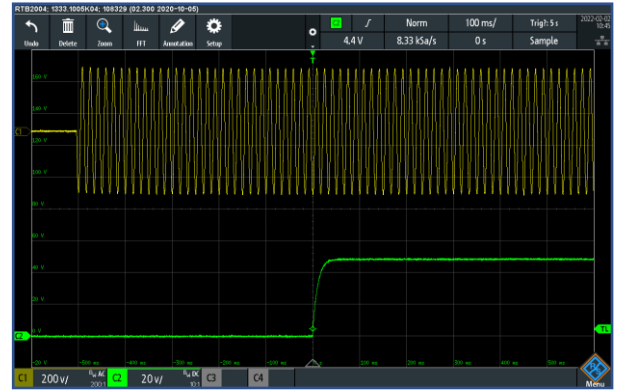
Test Circuitry : Figure A

— C1: Input voltage (200V/div)
— C2: Output voltage (20V/div)

Waveform



Input Voltage 100 [Vac]
Load Current 25.0 [A]
(100ms/div)



Input Voltage 277 [Vac]
Load Current 25.0 [A]
(100ms/div)

11. Rise Time Characteristics with RC Signal

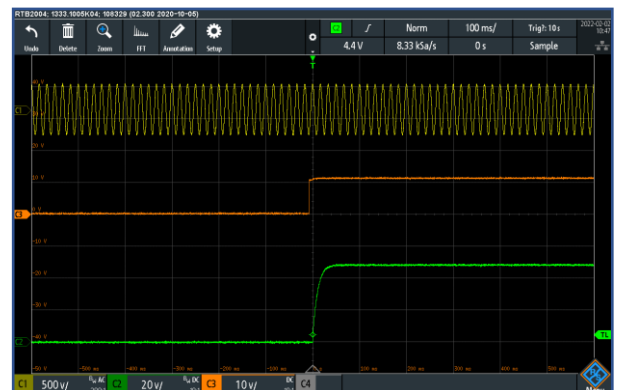
Test Circuitry : Figure D

— C1: Input voltage (500V/div)
— C2: Output voltage (20V/div)
— C3: RC signal (10V/div)

Waveform



Input Voltage 100 [Vac]
Load Current 25.0 [A]
(100ms/div)



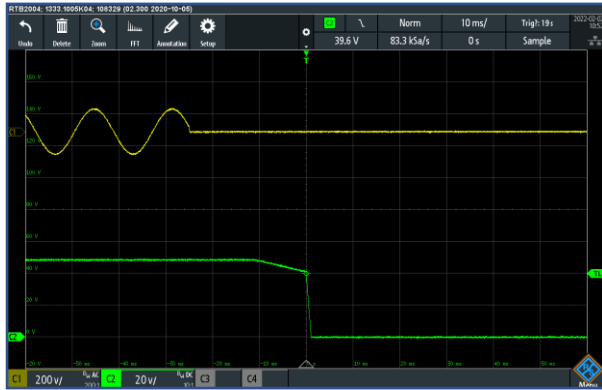
Input Voltage 277 [Vac]
Load Current 25.0 [A]
(100ms/div)

12. Fall Time / Hold-up Time

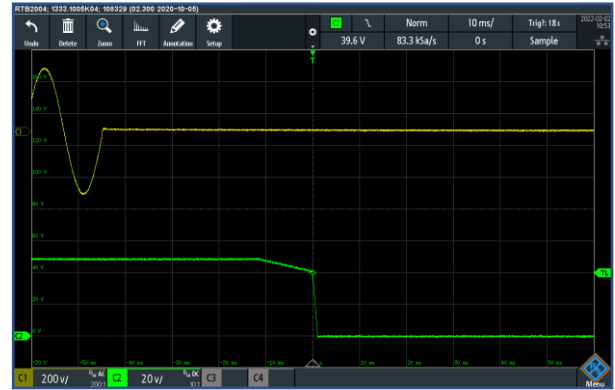
Test Circuitry : Figure A

— C1: Input voltage (200V/div)
— C2: Output voltage (20V/div)

Waveform

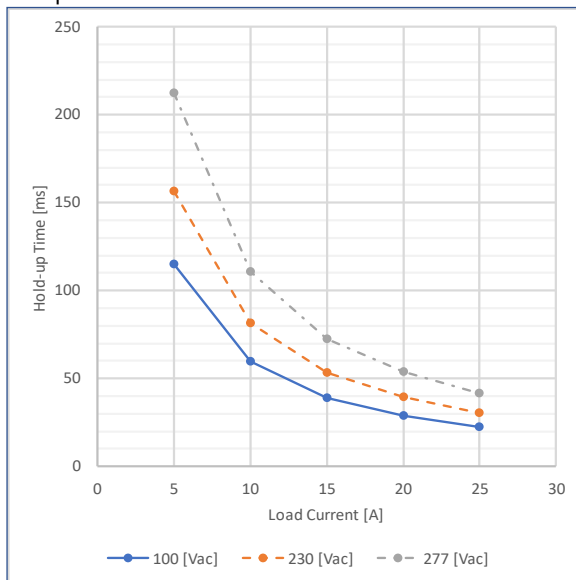


Input Voltage 100 [Vac]
Load Current 25.0 [A]
(10ms/div)



Input Voltage 277 [Vac]
Load Current 25.0 [A]
(10ms/div)

Graph



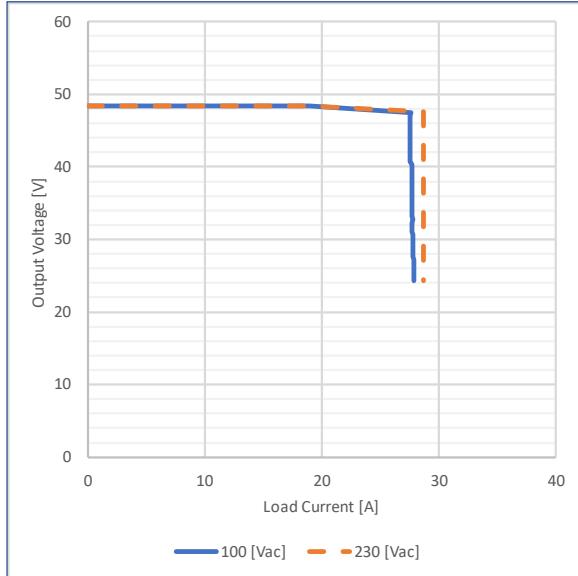
Value

| Load Current [A] | Hold-up Time [ms] | | |
|------------------|-------------------|-----------|-----------|
| | Input Voltage | | |
| | 100 [Vac] | 230 [Vac] | 277 [Vac] |
| 0.00 | - | - | - |
| 5.00 | 115.0 | 156.5 | 212.5 |
| 10.00 | 59.4 | 81.5 | 110.5 |
| 15.00 | 39.0 | 53.4 | 72.5 |
| 20.00 | 28.7 | 39.4 | 53.6 |
| 25.00 | 22.2 | 30.6 | 41.8 |

13. Over Current Protection

Test Circuitry : Figure A

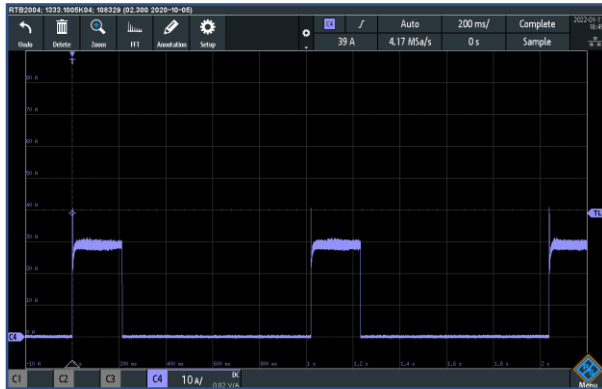
Graph



Value

| Output Voltage [V] | Load Current [A] | |
|--------------------|------------------|-----------|
| | Input Voltage | |
| | 100 [Vac] | 230 [Vac] |
| 48.00 | 27.592 | 28.664 |
| 45.60 | 27.530 | 28.663 |
| 43.20 | 27.536 | 28.662 |
| 38.40 | 27.658 | 28.662 |
| 33.60 | 27.656 | 28.668 |
| 28.80 | 27.782 | 28.667 |
| | | |

Waveform



— C4: Output Current (10A/div)

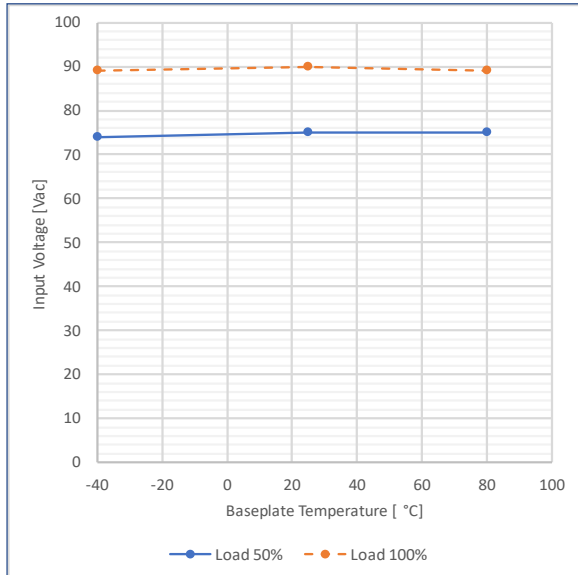
Intermittent operation occurs when the output voltage is from 24.0V to 0V.

Input Voltage 230 [Vac]
Output Short
(200ms/div)

14. Minimum Input Voltage for Regulated Output Voltage

Test Circuitry : Figure A

Graph



Value

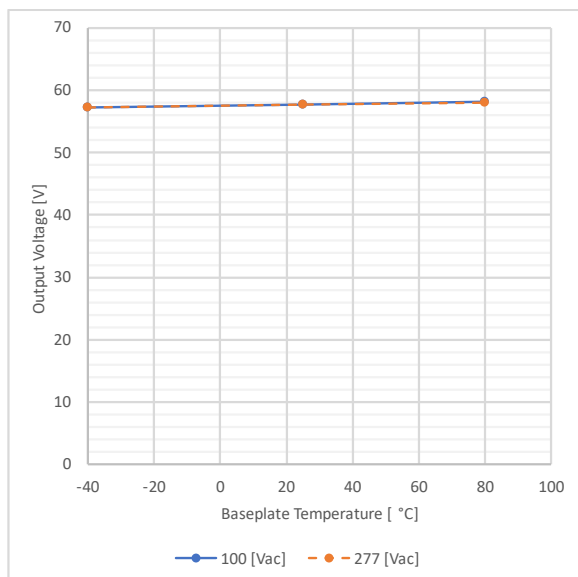
| Baseplate Temperature [°C] | Input Voltage [Vac] | |
|----------------------------|---------------------|-----------|
| | Load Current | |
| | Load 50% | Load 100% |
| -40 | 74 | 89 |
| 25 | 75 | 90 |
| 80 | 75 | 89 |
| | | |
| | | |
| | | |
| | | |

The low input voltage protection is activated on the condition of load 100%.

15. Over Voltage Protection

Test Circuitry : Figure A

Graph



Value

| Baseplate Temperature [°C] | Output Voltage [V] | |
|----------------------------|--------------------|-----------|
| | Input Voltage | |
| | 100 [Vac] | 277 [Vac] |
| -40 | 57.250 | 57.250 |
| 25 | 57.780 | 57.660 |
| 80 | 58.190 | 58.070 |
| | | |
| | | |
| | | |
| | | |

16. Conducted Emission

Input Voltage : 115Vac / 230Vac 50Hz Load : 100 %

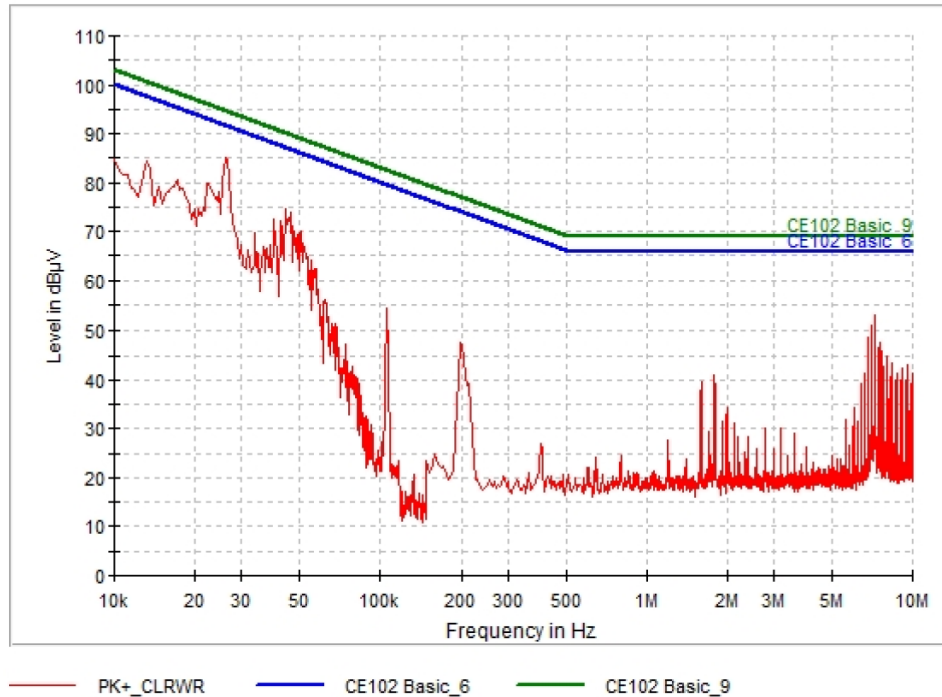


Fig. 16.1 MIL-STD-461F CE102 Result OFD1200A48, 115V, N

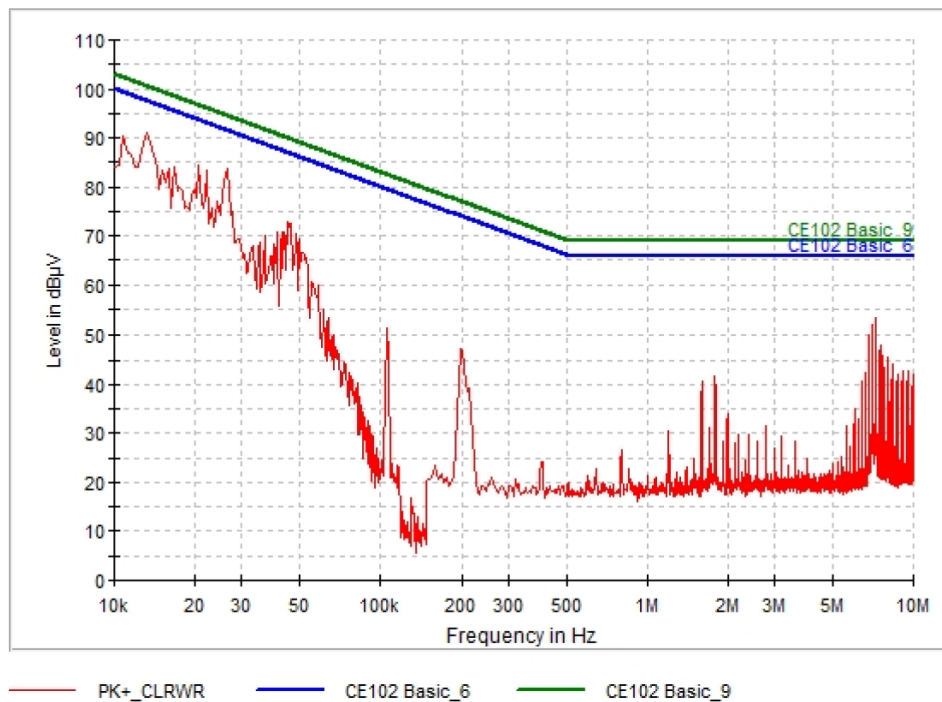


Fig. 16.2 MIL-STD-461F CE102 Result OFD1200A48, 115V, L1

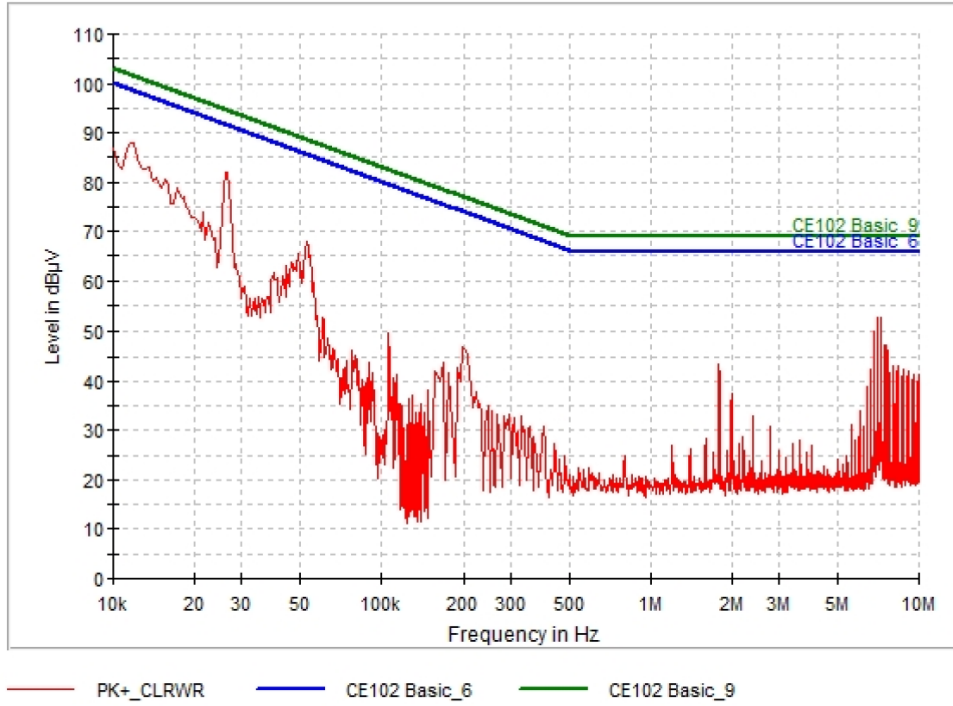


Fig. 16.3 MIL-STD-461F CE102 Result OFD1200A48, 230V, N

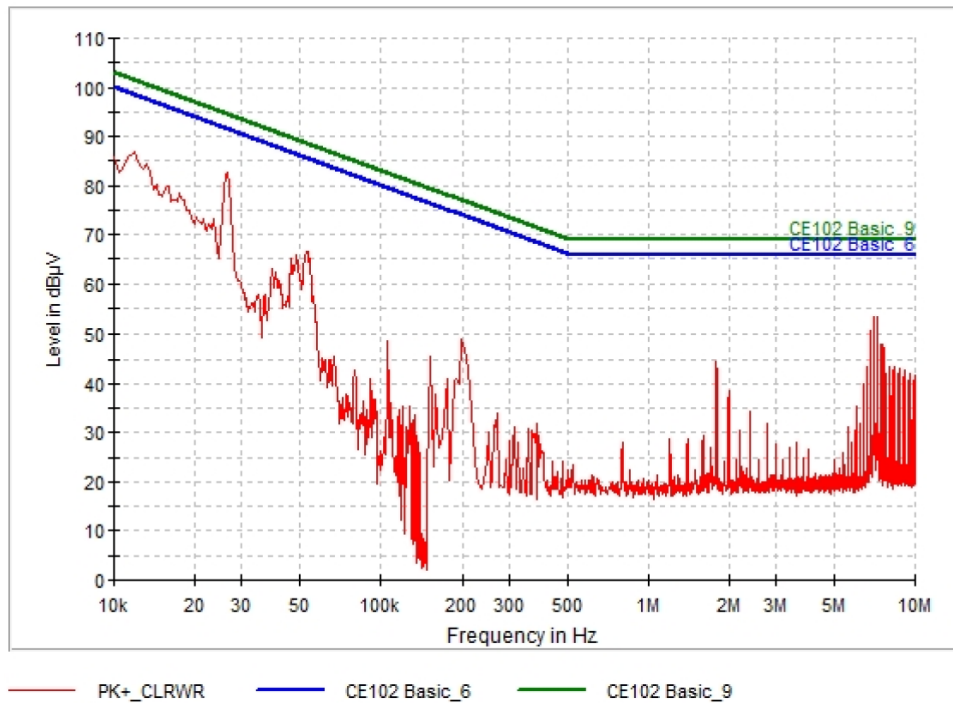


Fig. 16.4 MIL-STD-461F CE102 Result OFD1200A48, 230V, L1

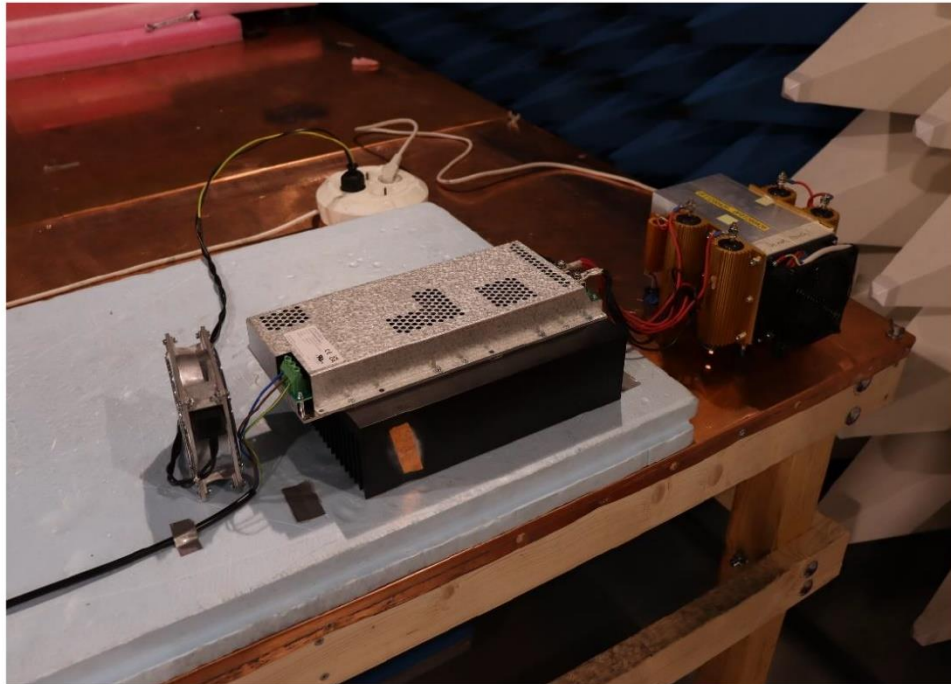


Fig. 16.5 MIL-STD-461F CE102 test environment

17. Figure of Test Circuitry

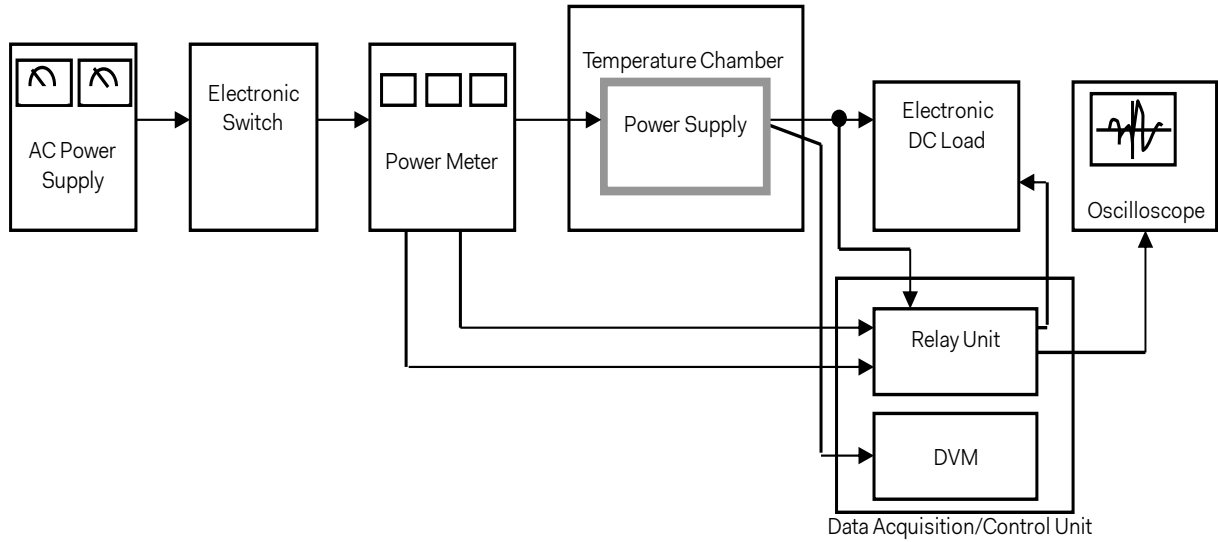


Figure A Test circuitry for general performance measurement

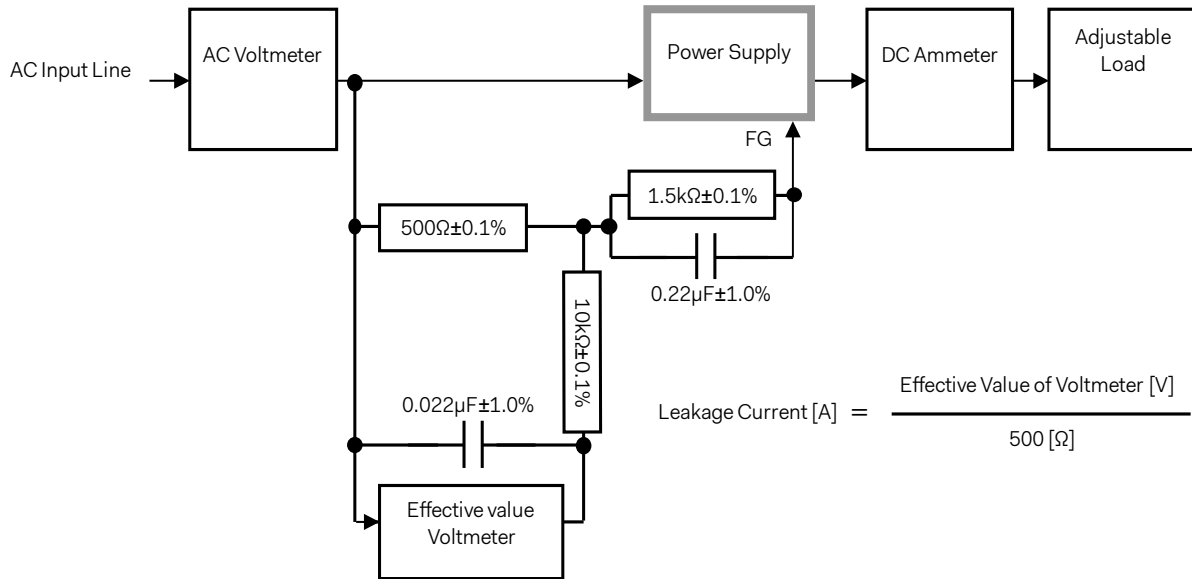


Figure B-1 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.4)

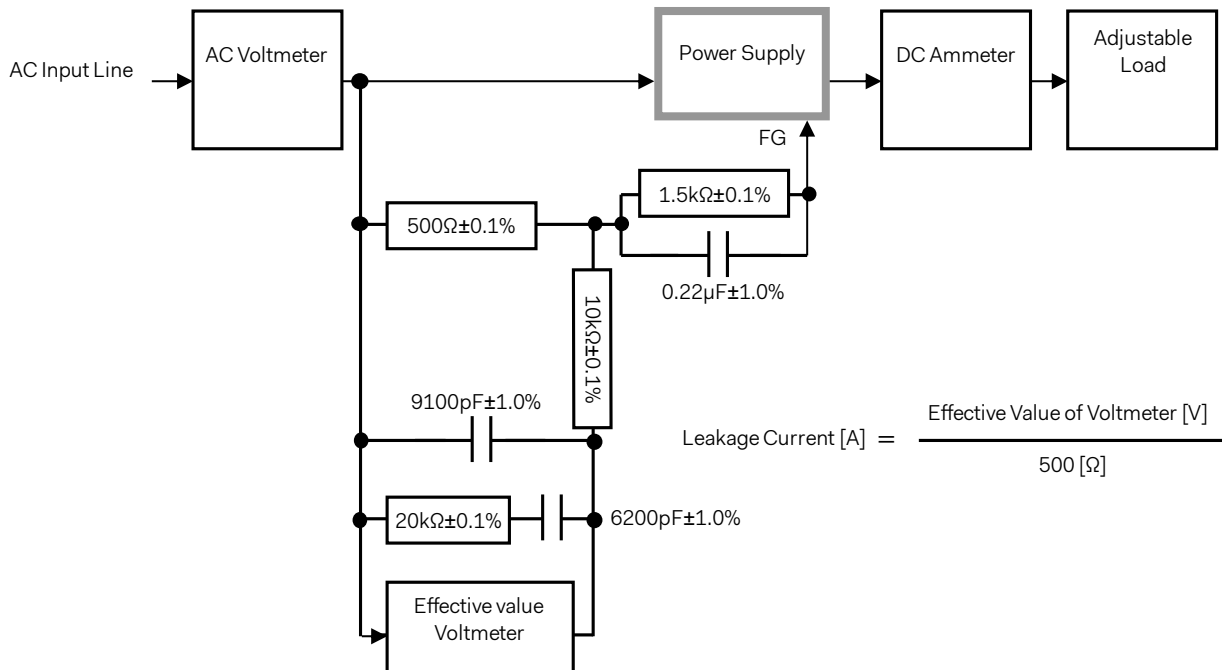


Figure B-2 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.5)

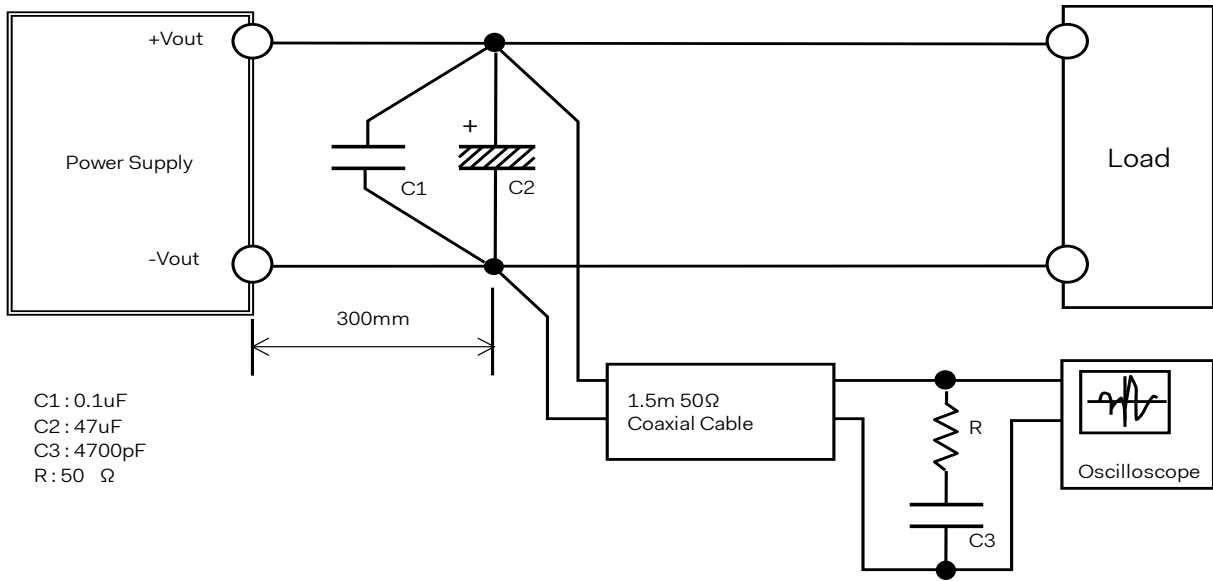


Figure C Ripple voltage measurement (JEITA RC-9131D)

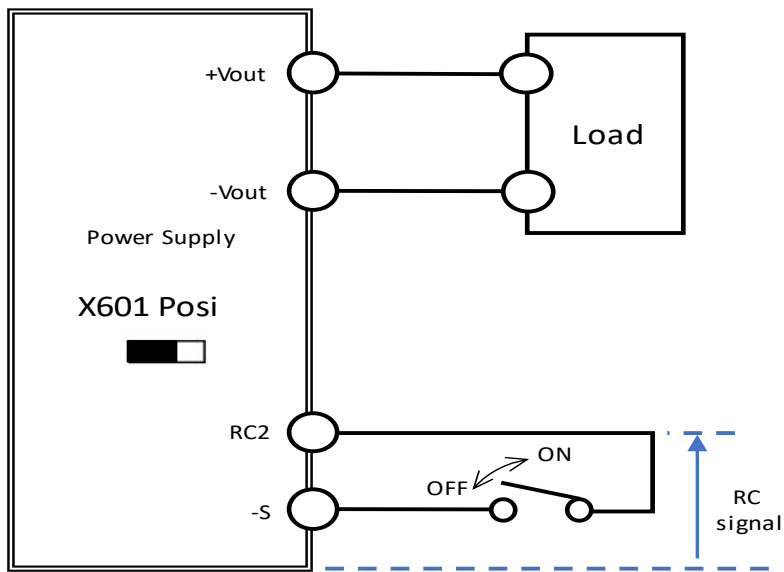


Figure D Turn on by RC measurement