EVALUATION DATA

MODEL NAME : ECD500A28

Tested by : Shintaro Oki

Approved by : Tomas Isaksson

Tomas Isaksson

POWERBOX

A Cosel Group Company

Table of Contents

Remark:

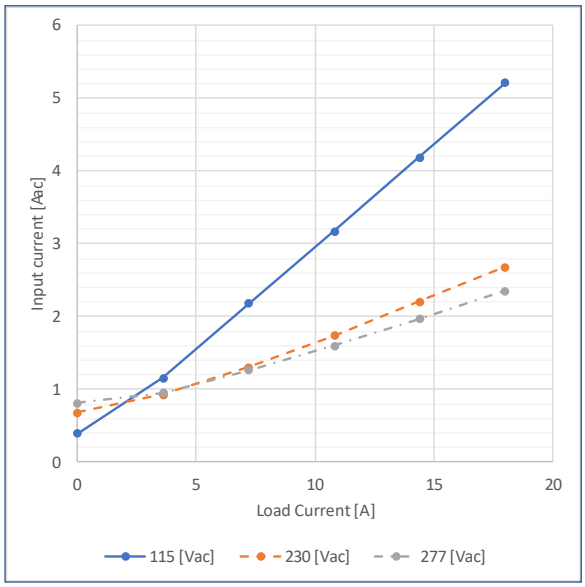
Unless specified the test condition shall be

Input voltage / Frequency:	230 [Vac] / 50 [Hz]
Load current:	18.0 [A]
Baseplate temperature:	25 [°C]

1. Input Current (by Load Current)

Test Circuitry : Figure A

Graph



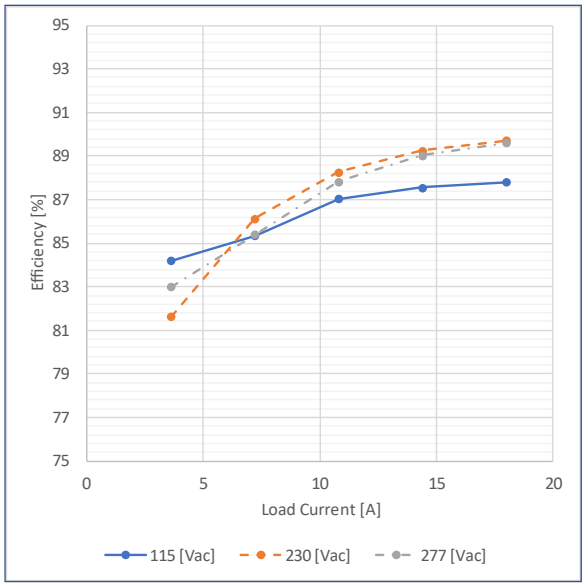
Value

Load Current [A]	Input Current [Aac]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	0.393	0.685	0.812
3.60	1.160	0.930	0.956
7.20	2.182	1.304	1.262
10.80	3.177	1.742	1.604
14.40	4.190	2.207	1.971
18.00	5.212	2.685	2.356

2. Efficiency (by Load Current)

Test Circuitry : Figure A

Graph



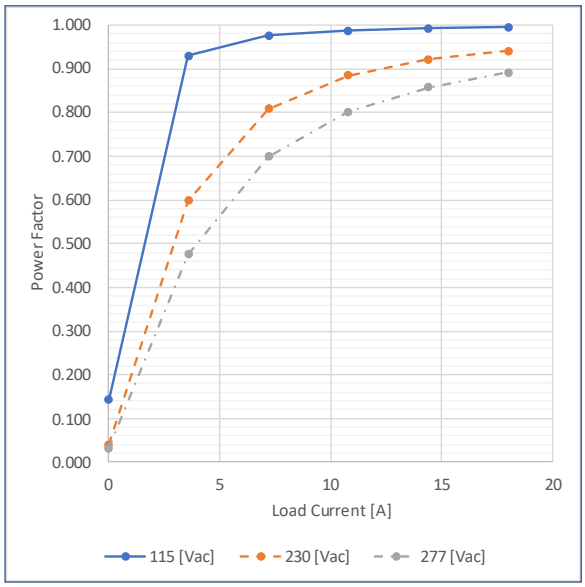
Value

Load Current [A]	Efficiency [%]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	-	-	-
3.60	84.196	81.619	82.994
7.20	85.354	86.129	85.399
10.80	87.030	88.261	87.827
14.40	87.565	89.244	89.033
18.00	87.798	89.704	89.614

3. Power Factor (by Load Current)

Test Circuitry : Figure A

Graph



Value

Load Current [A]	Power Factor Input Voltage 115 [Vac]	230 [Vac]	277 [Vac]
0.00	0.142	0.040	0.032
3.60	0.930	0.598	0.475
7.20	0.976	0.808	0.699
10.80	0.987	0.885	0.802
14.40	0.992	0.921	0.858
18.00	0.995	0.941	0.891

4. Leakage Current

Test Circuitry : See table Test Equipment: Simpson 228

Value

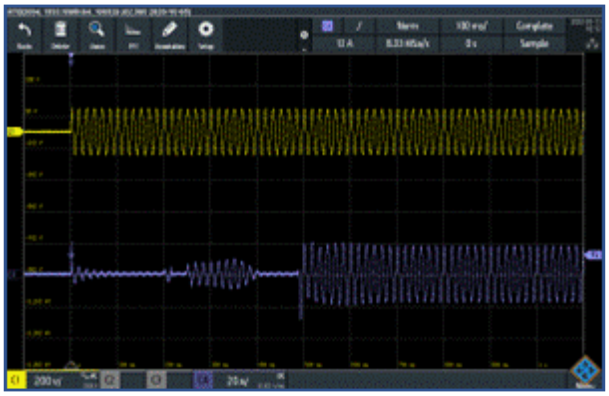
Standard	Testing Circuitry	Measuring Method	Leakage Current [mA] Input Voltage 100 [Vac]	230 [Vac]	277 [Vac]	Note
IEC62368-1	Figure B-1	Both phases	0.25	0.60	0.74	Operation
		One of phases	0.44	1.20	1.45	Stand by
	Figure B-2	Both phases	0.25	0.60	0.74	Operation
		One of phases	0.44	1.20	1.45	Stand by

5. Inrush Current

Test Circuitry : Figure A

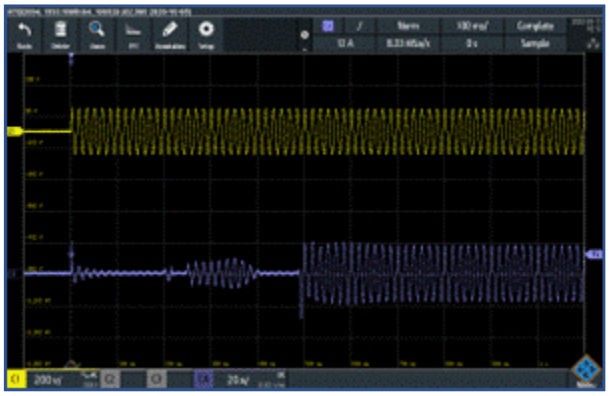
C1: Input Voltage (200V/div)
C4: Input Current (20A/div)

Waveform



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

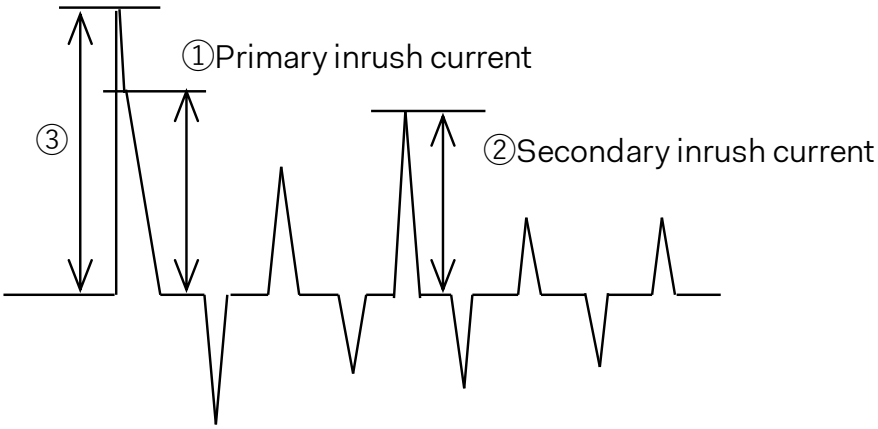
① Primary Inrush Current : 12.5 [A]
② Secondary Inrush Current : 28.3 [A]



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

① Primary Inrush Current : 37.1 [A]
② Secondary Inrush Current : 14.0 [A]

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

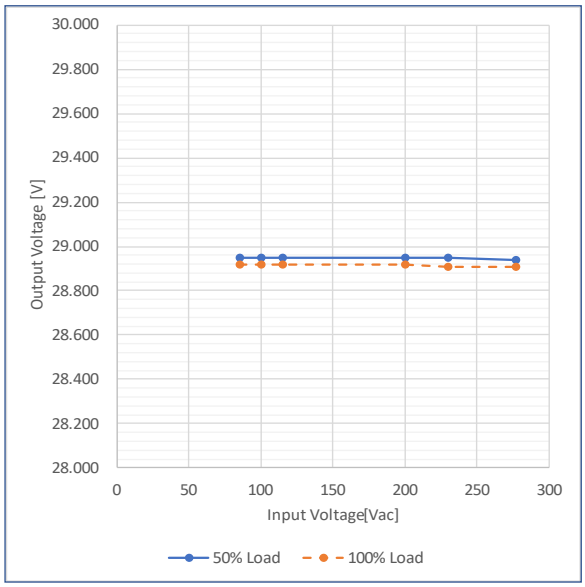


6. Line Regulation

Test Circuitry : Figure A

Change input voltage from 85 to 277 [Vac]

Graph



Value

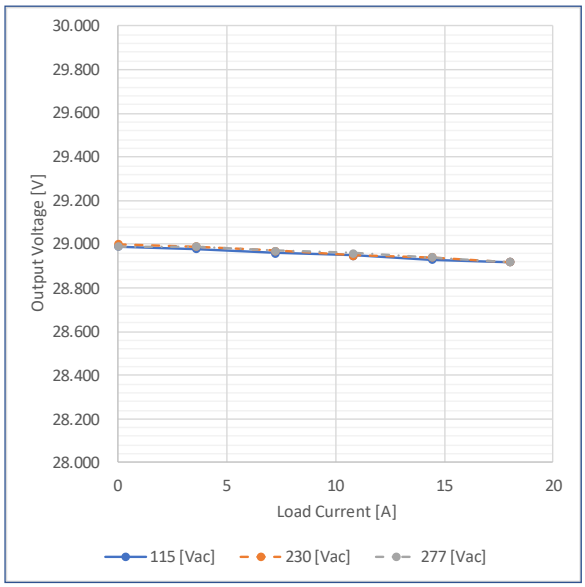
Input Voltage [Vac]	Output Voltage [V]	
	Load Factor	
	50% Load	100% Load
85.00	28.950	28.920
100.00	28.950	28.920
115.00	28.950	28.920
200.00	28.950	28.920
230.00	28.950	28.910
277.00	28.940	28.910

7. Load Regulation

Test Circuitry : Figure A

Change Load Current from 0 to 58.0 [A]

Graph



Value

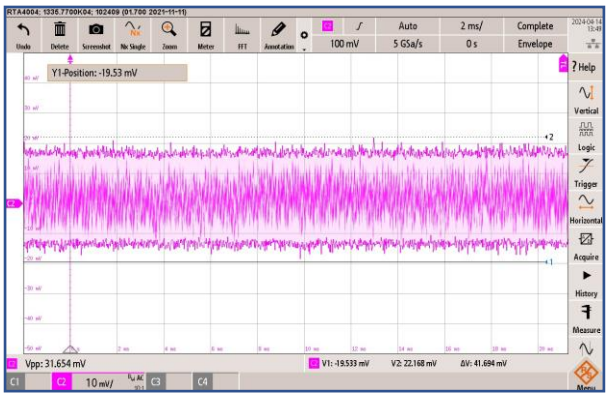
Load Current [A]	Output Voltage [V]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	28.990	29.000	28.990
3.60	28.980	28.990	28.990
7.20	28.960	28.970	28.970
10.80	28.950	28.950	28.960
14.40	28.930	28.940	28.940
18.00	28.920	28.920	28.920

8. Ripple Noise

Test Circuitry : Figure C

C2: Output voltage (10mV/div)
BW: 20MHz

Waveform



(2ms/div)

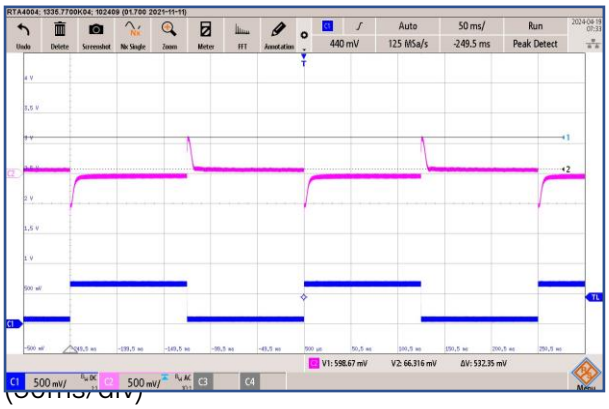
9. Dynamic Load Response

Test Circuitry : Figure A
Load Current 1.7 [A]<-> 16 [A]

C2: Output voltage (500mV/div)
C4: Output current (12A/div)

Waveform

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



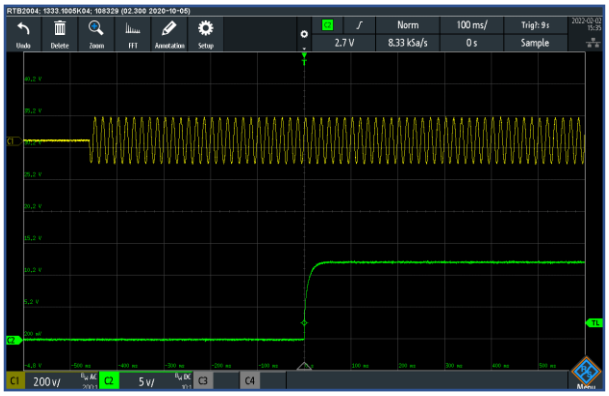
(50ms/div)

10. Rise Time Characteristics by AC ON

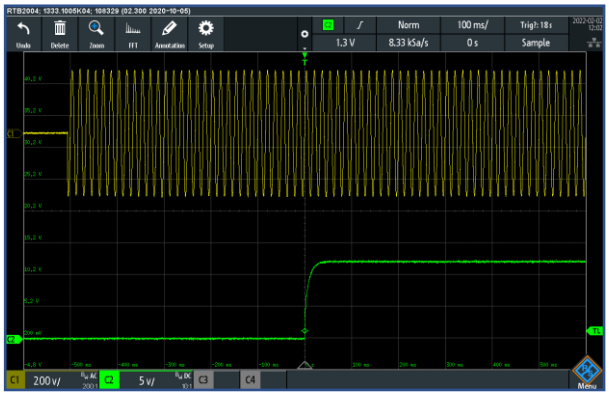
Test Circuitry : Figure A

C1: Input voltage (200V/div)
C2: Output voltage (5V/div)

Waveform



Input Voltage 100 [Vac]
Load Current 18.0 [A]
(100ms/div)



Input Voltage 277 [Vac]
Load Current 18.0 [A]
(100ms/div)

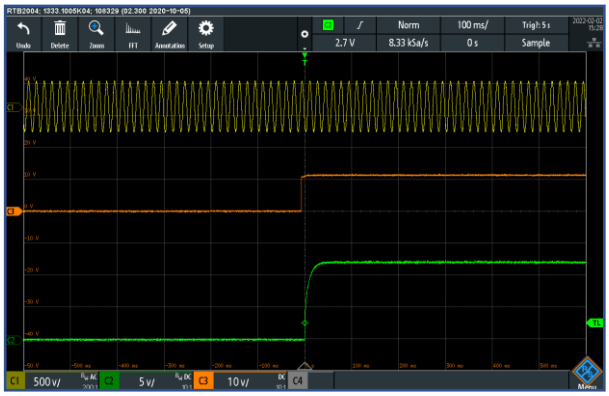
11. Rise Time Characteristics with RC Signal

Test Circuitry : Figure D

C1: Input voltage (500V/div)
C2: Output voltage (5V/div)
C3: RC signal (10V/div)

Waveform

Input Voltage 100 [Vac]
Load Current 18.0 [A]
(100ms/div)



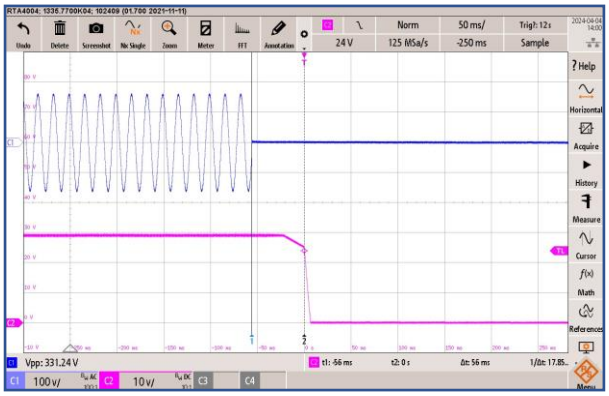
Input Voltage 277 [Vac]
Load Current 18.0 [A]
(100ms/div)

12. Fall Time / Hold-up Time

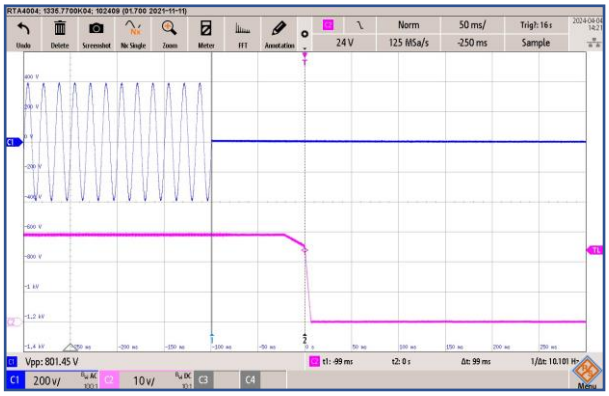
Test Circuitry : Figure A

C1: Input voltage (200V/div)
C2: Output voltage (5V/div)

Waveform

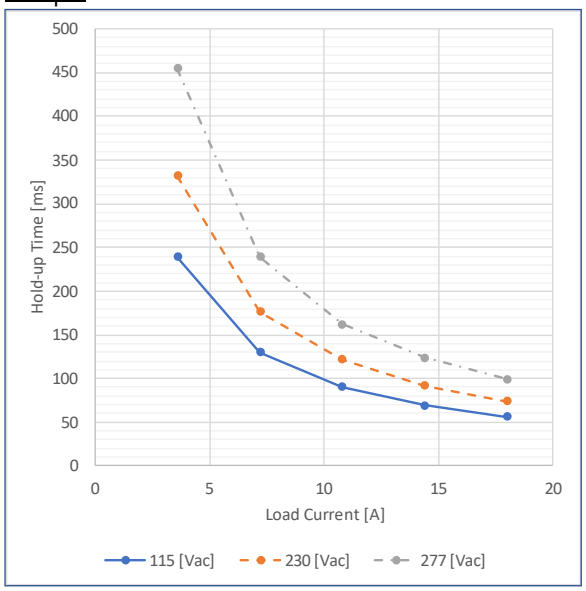


Input Voltage 115 [Vac]
Load Current 18.0 [A]
(10ms/div)



Input Voltage 277 [Vac]
Load Current 18.0 [A]
(10ms/div)

Graph



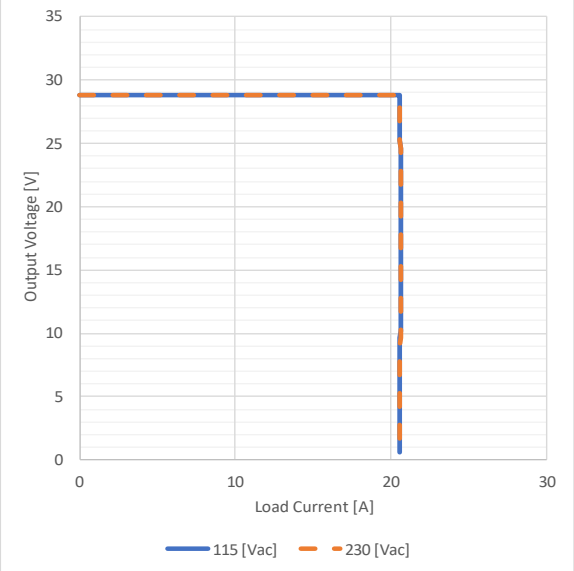
Value

Load Current [A]	Hold-up Time [ms] Input Voltage 115 [Vac]	230 [Vac]	277 [Vac]
0.00	-	-	-
3.60	239.0	332.0	455.0
7.20	130.0	176.0	239.0
10.80	90.0	122.0	162.0
14.40	69.0	92.0	124.0
18.00	56.0	74.0	99.0

13. Over Current Protection

Test Circuitry : Figure A

Graph



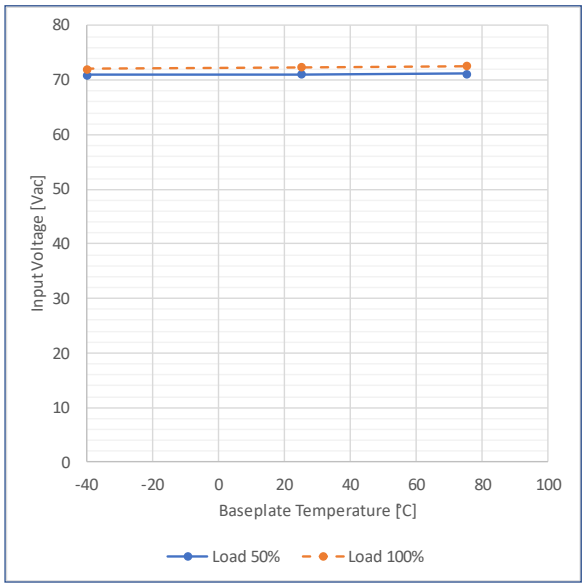
Value

Output Voltage [V]	Load Current [A]	
	Input Voltage	
	115 [Vac]	230 [Vac]
28.00	20.570	20.580
23.33	20.590	20.600
18.67	20.620	20.630
14.00	20.640	20.650
9.33	20.570	20.580
4.67	20.550	20.550
0.00		

14. Minimum Input Voltage for Regulated Output Voltage

Test Circuitry : Figure A

Graph



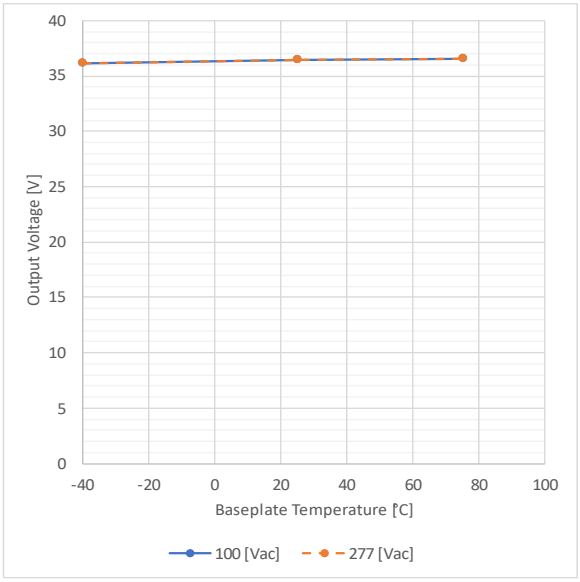
Value

Baseplate Temperature [°C]	Input Voltage [Vac]	
	Load Current	
	Load 50%	Load 100%
-40	71.0	72.0
25	71.1	72.4
75	71.2	72.6

15. Over Voltage Protection

Test Circuitry : Figure A

Graph



Value

Baseplate Temperature [°C]	Output Voltage [V]	
	Input Voltage	
	100 [Vac]	277 [Vac]
-40	36.160	36.160
25	36.450	36.460
75	36.570	36.570

16. Conducted Emission

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

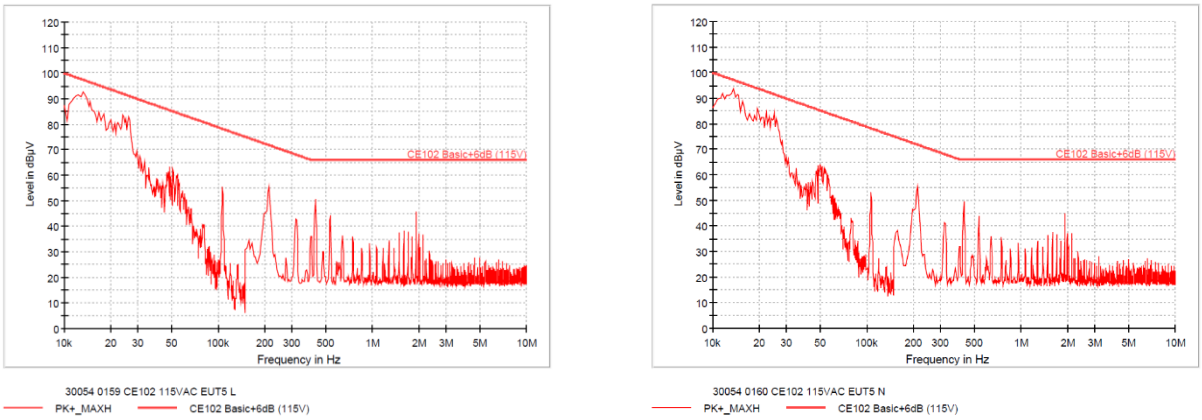


Fig. 16.1 MIL-STD-461F CE102 Result, ECD500A28, 115V, Line and Neutral

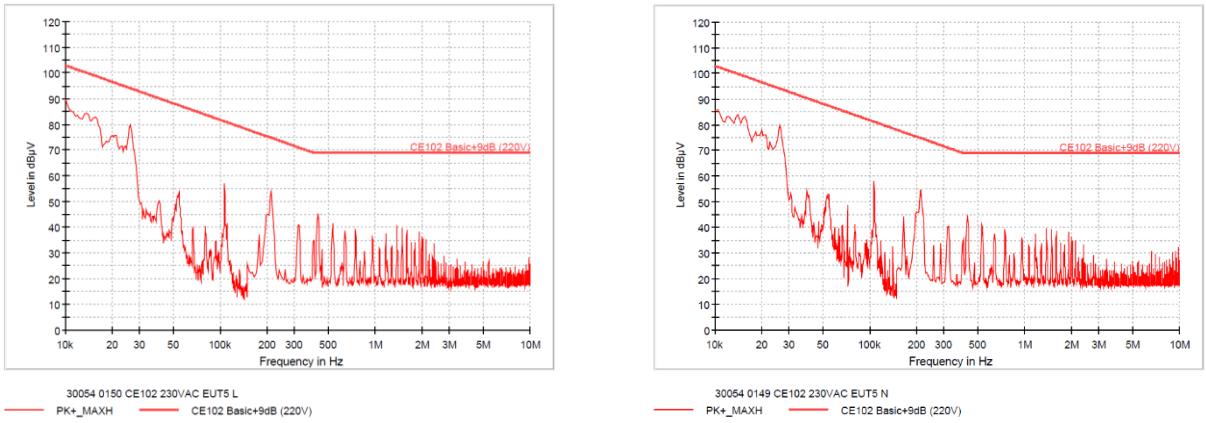
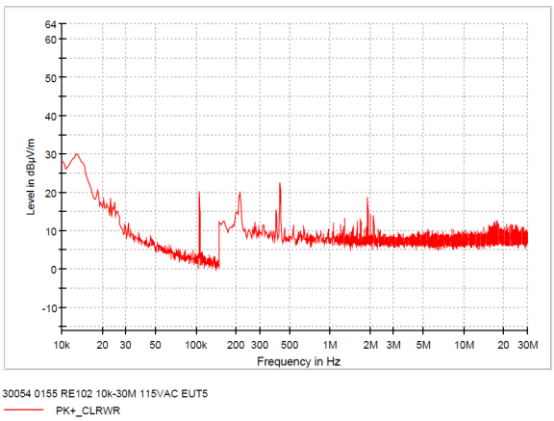


Fig. 16.2 MIL-STD-461F CE102 Result, ECD500A28, 230V, Line and Neutral

17. Radiated Emission

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



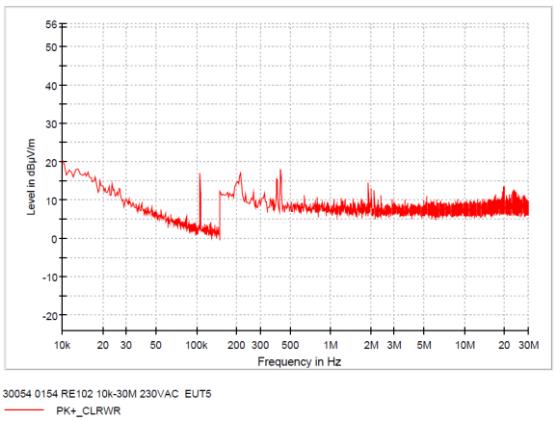
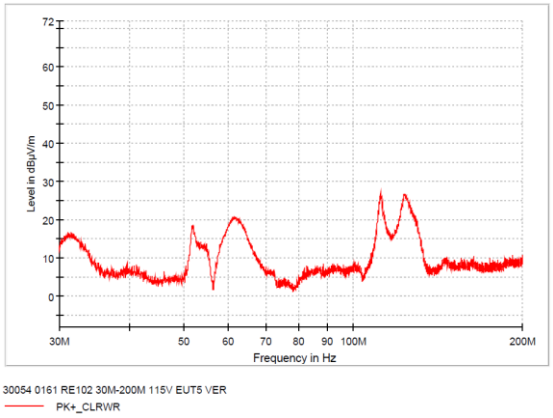


Fig. 17.1 MIL-STD-461F RE102 10kHz to 30MHz Result, ECD500A28, 115V and 230V



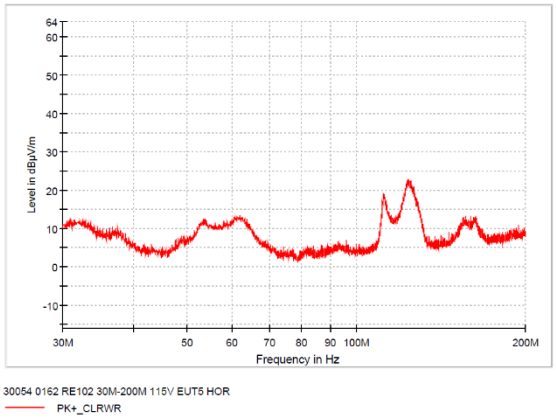
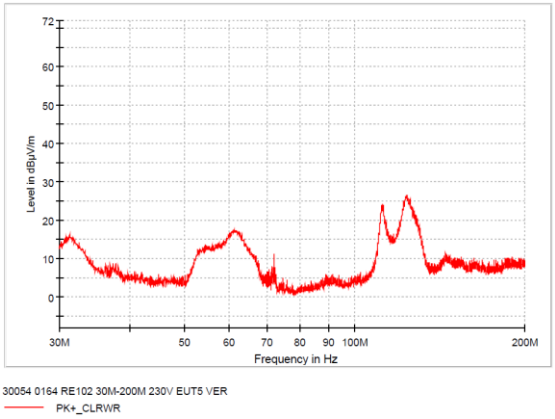


Fig. 17.2 MIL-STD-461F RE102 30MHz to 200MHz Result, ECD500A28, 115V, Vertical and Horizontal



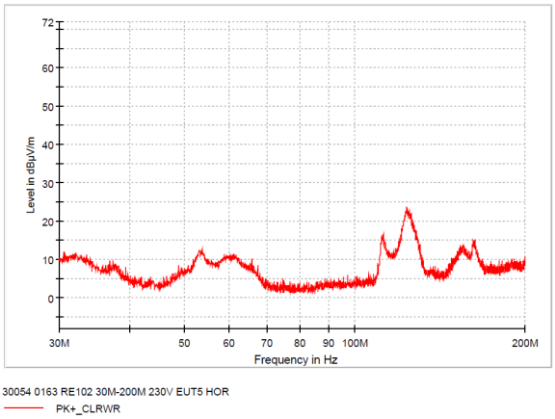


Fig. 17.3 MIL-STD-461F RE102 30MHz to 200MHz Result, ECD500A28, 230V, Vertical and Horizontal

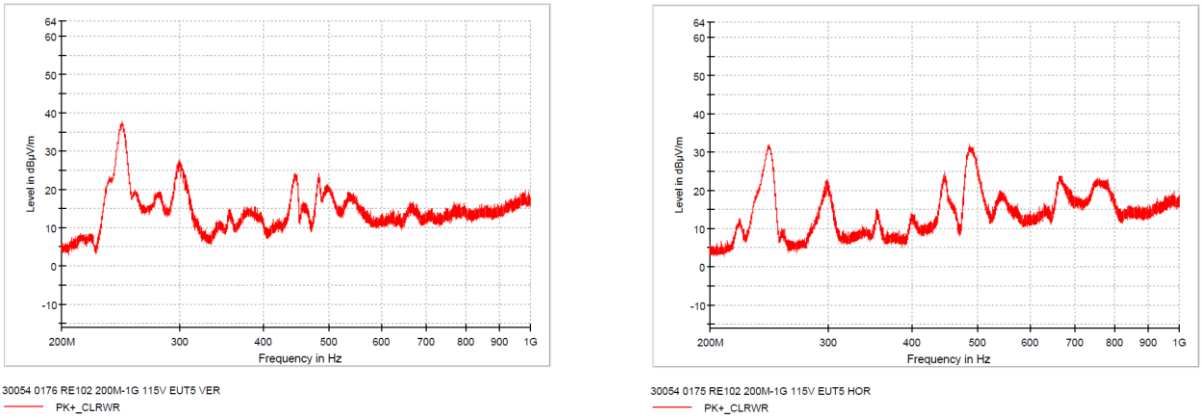


Fig. 17.4 MIL-STD-461F RE102 200MHz to 1GHz Result, ECD500A28, 115V, Vertical and Horizontal

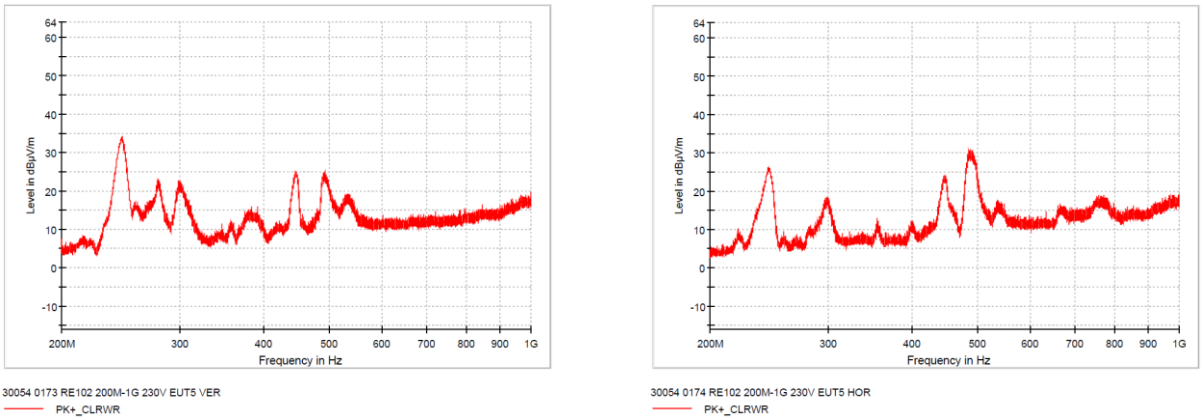


Fig. 17.5 MIL-STD-461F RE102 200MHz to 1GHz Result, ECD500A28, 230V, Vertical and Horizontal

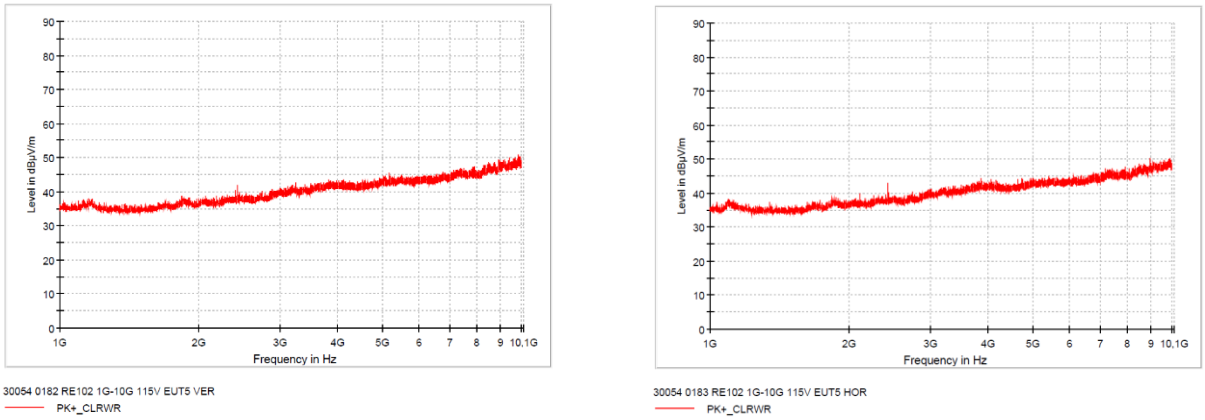
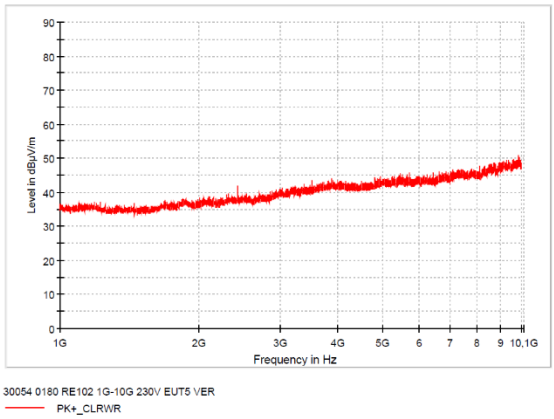


Fig. 17.6 MIL-STD-461F RE102 1GHz to 10GHz Result, ECD500A28, 115V, Vertical and Horizontal



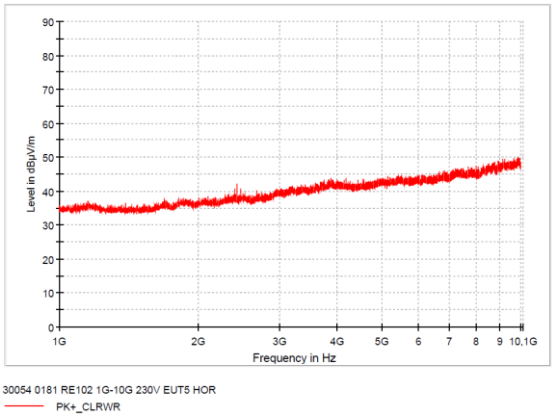
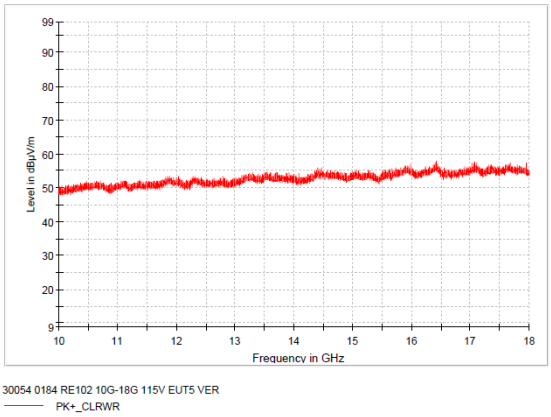


Fig. 17.7 MIL-STD-461F RE102 1GHz to 10GHz Result, ECD500A28, 230V, Vertical and Horizontal



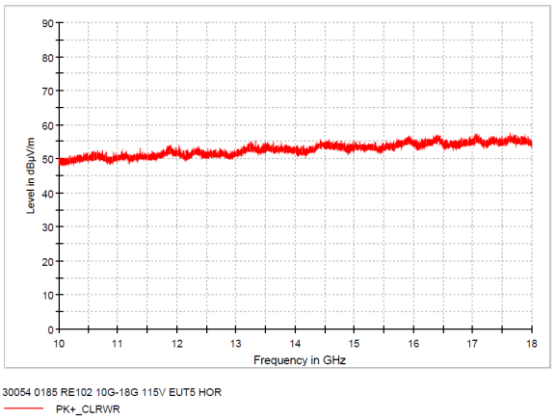
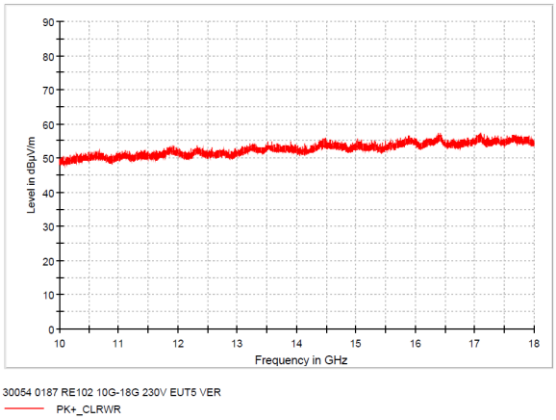


Fig. 17.8 MIL-STD-461F RE102 10GHz to 18GHz Result, ECD500A28, 115V, Vertical and Horizontal



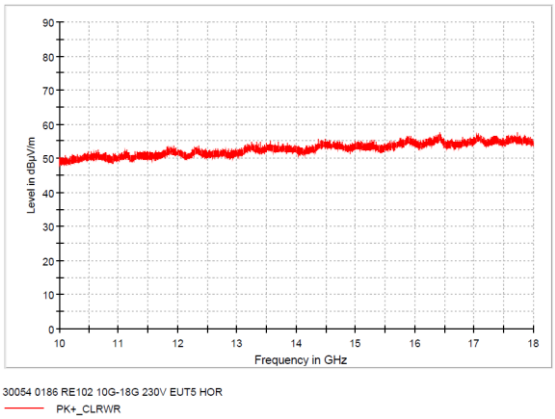


Fig. 17.9 MIL-STD-461F RE102 10GHz to 18GHz Result, ECD500A28, 230V, Vertical and Horizontal

Fig. 17.10 MIL-STD-461F CE102 and RE102test set-up

18. Figure of Test Circuitry

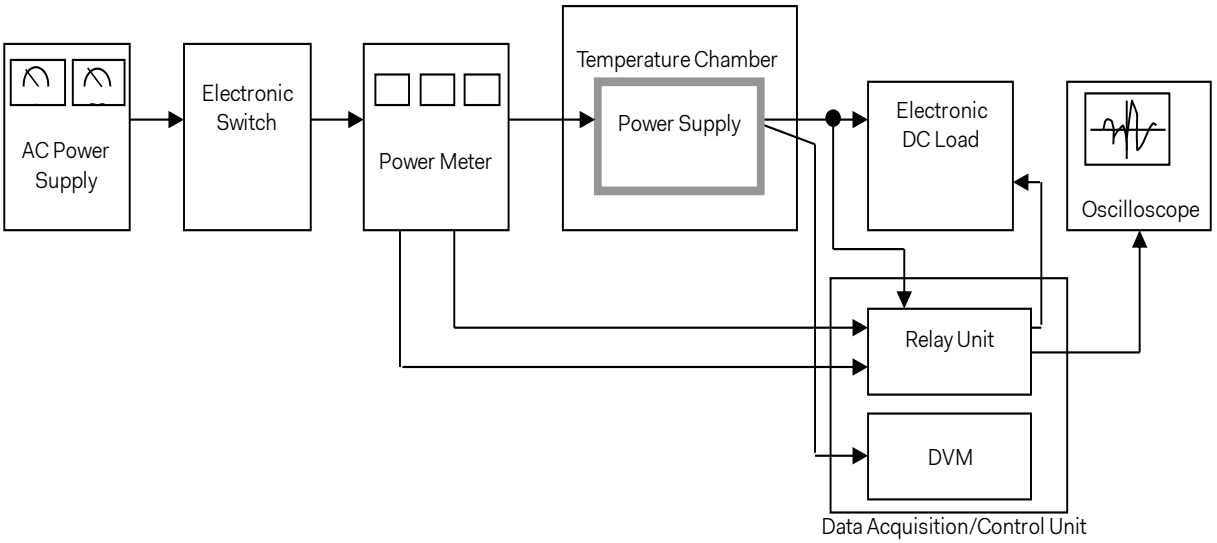


Figure A Test circuity for general performance measurement

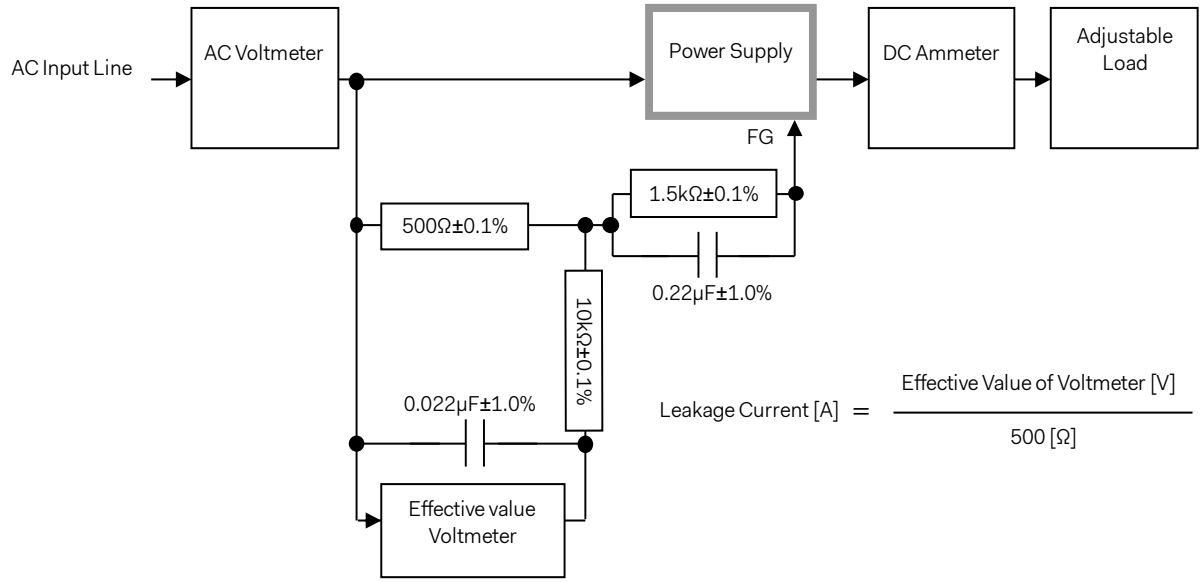


Figure B-1 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.4)

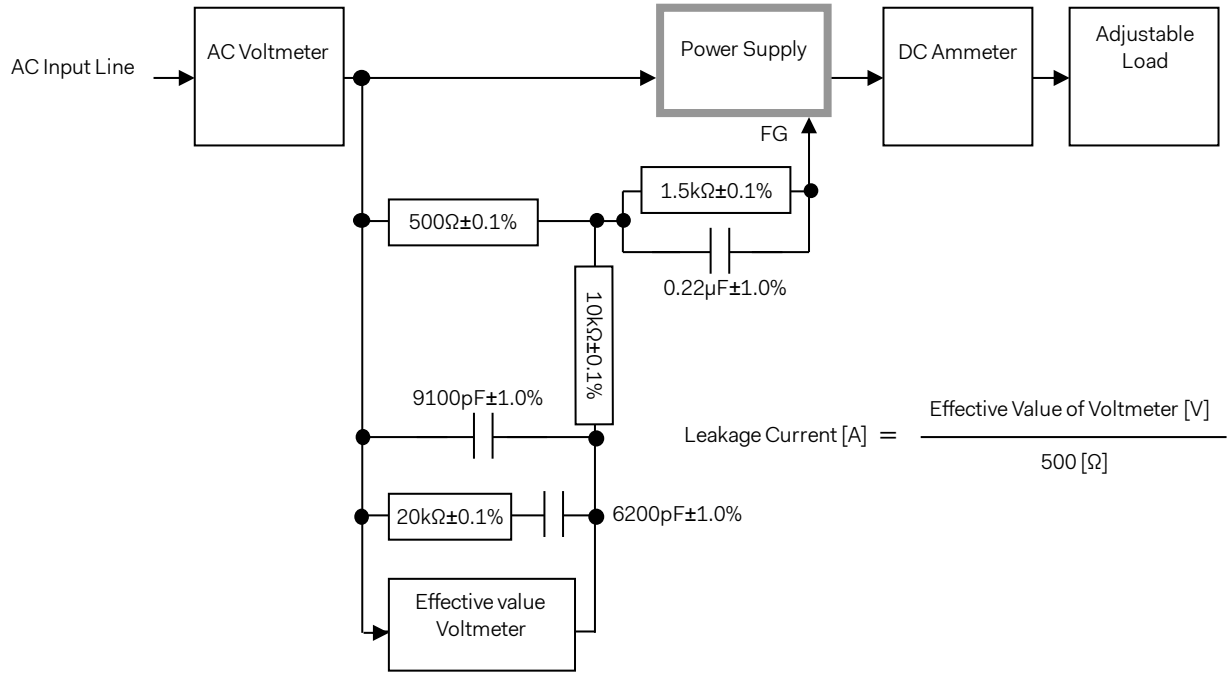


Figure B-2 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.5)

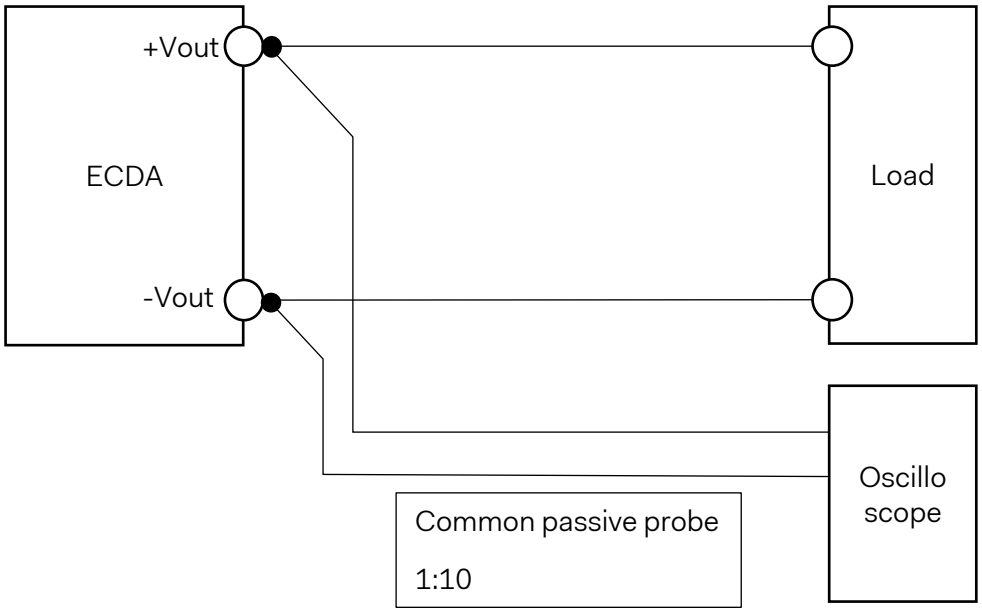


Figure C Ripple voltage measurement

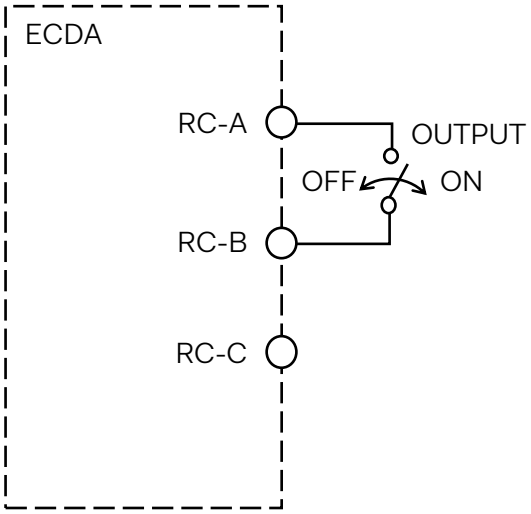


Figure D Turn on by RC measurement