

EVALUATION DATA

MODEL NAME : ECD700A12

Tested by : *Shintaro Oki*
Shintaro Oki

Approved by : *Tomas Isaksson*
Tomas Isaksson

P R

B X

POWERBOX
A Cosel Group Company

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Remark:

Unless specified the test condition shall be

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

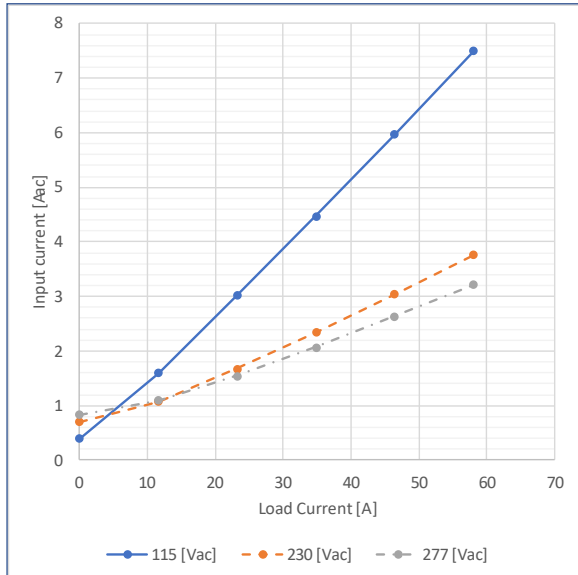
Load current: 58.0 [A]

Baseplate temperature: 25 [°C]

1. Input Current (by Load Current)

Test Circuitry : Figure A

Graph



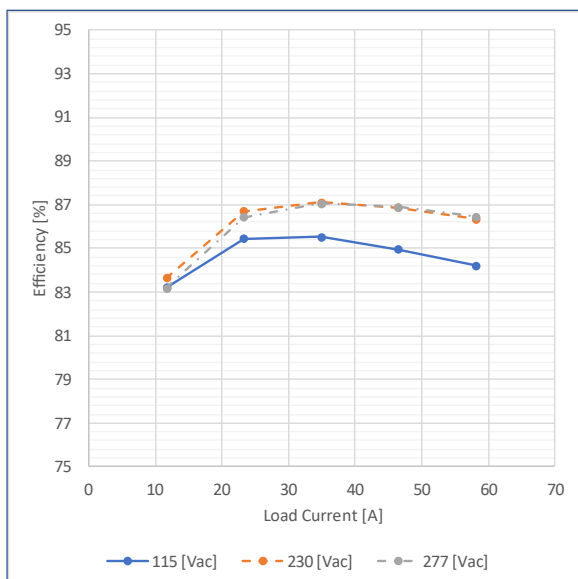
Value

Load Current [A]	Input Current [Aac]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	0.401	0.701	0.832
11.60	1.595	1.072	1.094
23.20	3.015	1.672	1.546
34.80	4.476	2.340	2.073
46.40	5.969	3.043	2.636
58.00	7.495	3.762	3.219

2. Efficiency (by Load Current)

Test Circuitry : Figure A

Graph



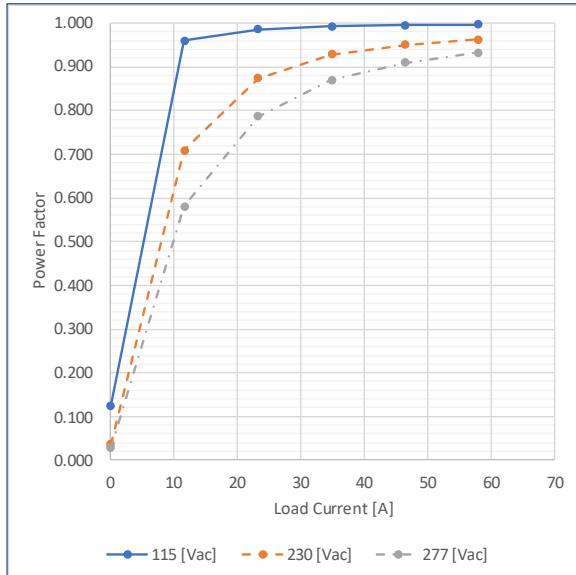
Value

Load Current [A]	Efficiency [%]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	-	-	-
11.60	83.215	83.650	83.179
23.20	85.456	86.699	86.441
34.80	85.528	87.121	87.071
46.40	84.944	86.872	86.892
58.00	84.216	86.355	86.446

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	0.125	0.036	0.028
11.60	0.960	0.709	0.580
23.20	0.986	0.874	0.787
34.80	0.993	0.928	0.870
46.40	0.996	0.950	0.910
58.00	0.997	0.962	0.932

4. Leakage Current

Test Circuitry : See table

Test Equipment: Simpson 228

Value

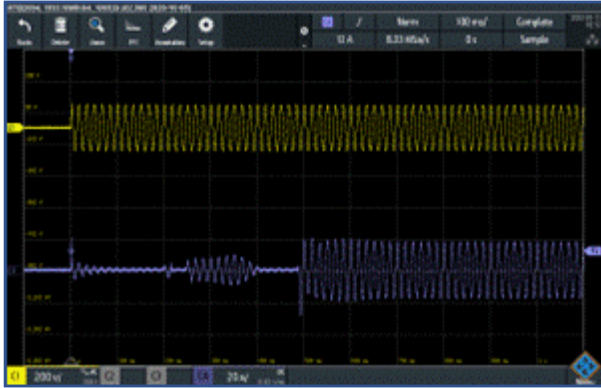
Standard	Testing Circuitry	Measuring Method	Leakage Current [mA]			Note
			Input Voltage			
			100 [Vac]	230 [Vac]	277 [Vac]	
IEC62368-1	Figure B-1	Both phases	0.25	0.60	0.74	Operation
		One of phases	0.44	1.20	1.45	Stand by
	Figure B-2	Both phases	0.25	0.60	0.74	Operation
		One of phases	0.44	1.20	1.45	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 : 12.5 [A]
- ② Secondary Inrush Current : 28.3 [A]

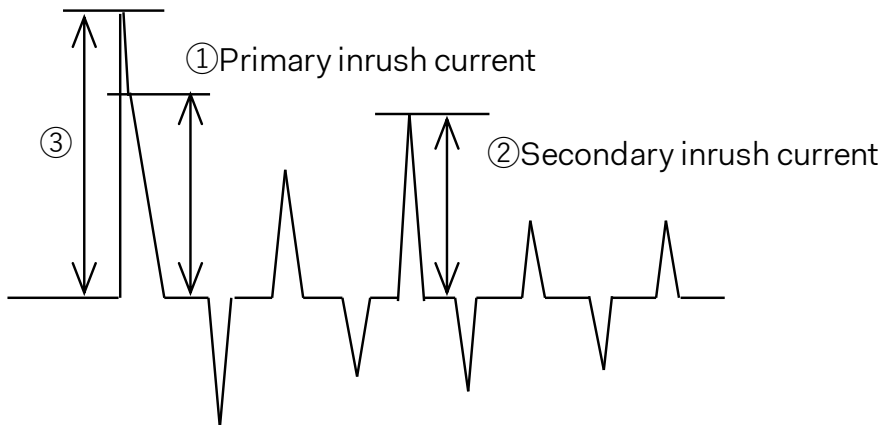


Input Voltage : 277 [Vac]
 (100ms/div)

- 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).

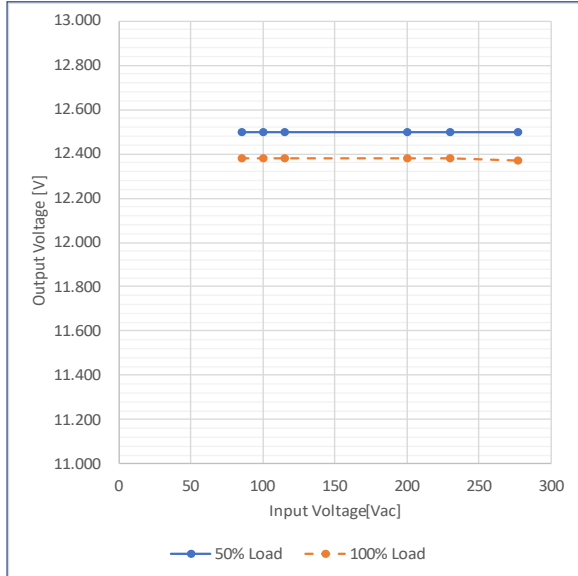


6. Line Regulation

Test Circuitry : Figure A

Change input voltage from 85 to 277 [Vac]

Graph



Value

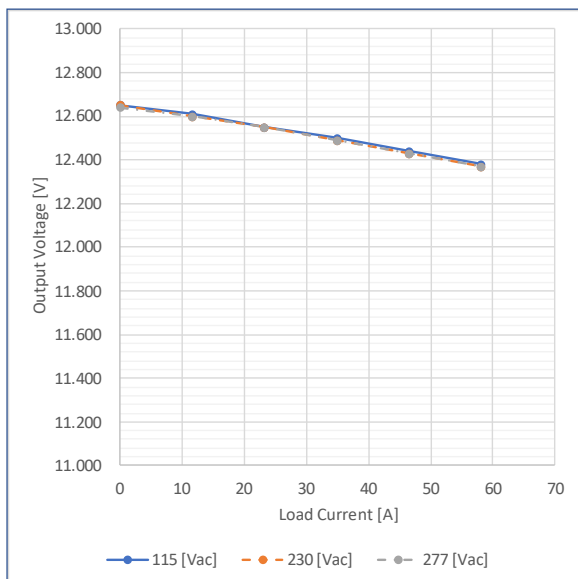
Input Voltage [Vac]	Output Voltage [V]	
	Load Factor	
	50% Load	100% Load
85.00	12.500	12.380
100.00	12.500	12.380
115.00	12.500	12.380
200.00	12.500	12.380
230.00	12.500	12.380
277.00	12.500	12.370

7. Load Regulation

Test Circuitry : Figure A

Change Load Current from 0 to 58.0 [A]

Graph



Value

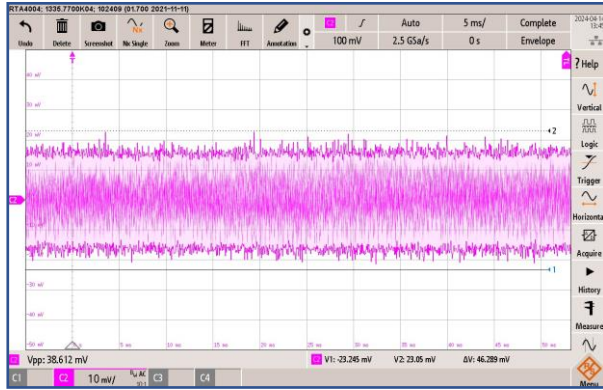
Load Current [A]	Output Voltage [V]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	12.650	12.650	12.640
11.60	12.610	12.600	12.600
23.20	12.550	12.550	12.550
34.80	12.500	12.490	12.490
46.40	12.440	12.430	12.430
58.00	12.380	12.370	12.370

8. Ripple Noise

Test Circuitry : Figure C

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

Waveform



(5ms/div)

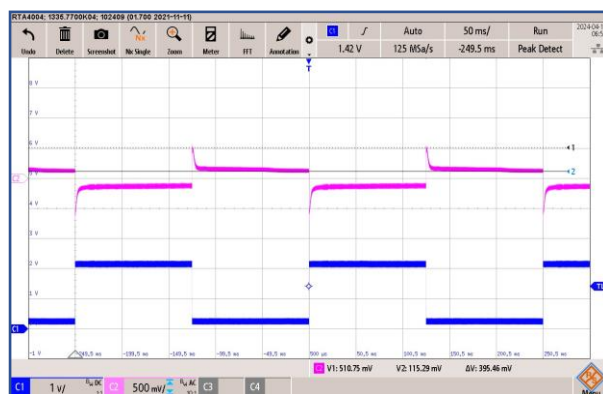
9. Dynamic Load Response

Test Circuitry : Figure A
Load Current 5.8 [A] <-> 52.5 [A]

— C2: Output voltage (500mV/div)
— C4: Output current (25A/div)

Waveform

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

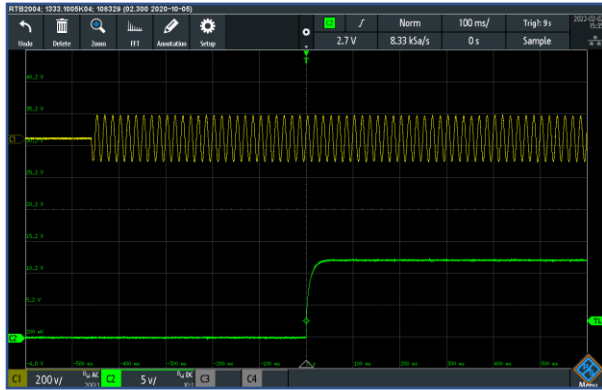


10. Rise Time Characteristics by AC ON

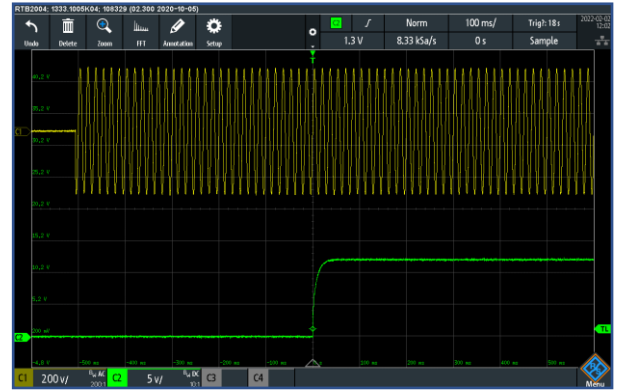
Test Circuitry : Figure A

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

Waveform



Input Voltage 100 [Vac]
Load Current 58.0 [A]
(100ms/div)



Input Voltage 277 [Vac]
Load Current 58.0 [A]
(100ms/div)

11. Rise Time Characteristics with RC Signal

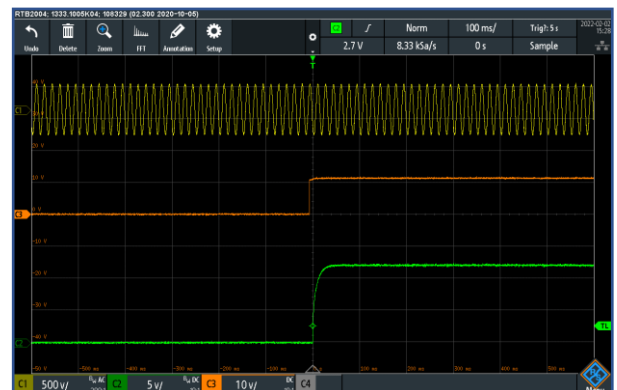
Test Circuitry : Figure D

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

Waveform



Input Voltage 100 [Vac]
Load Current 58.0 [A]
(100ms/div)



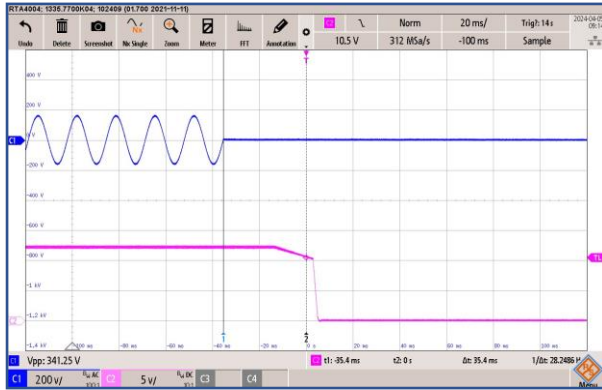
Input Voltage 277 [Vac]
Load Current 58.0 [A]
(100ms/div)

12. Fall Time / Hold-up Time

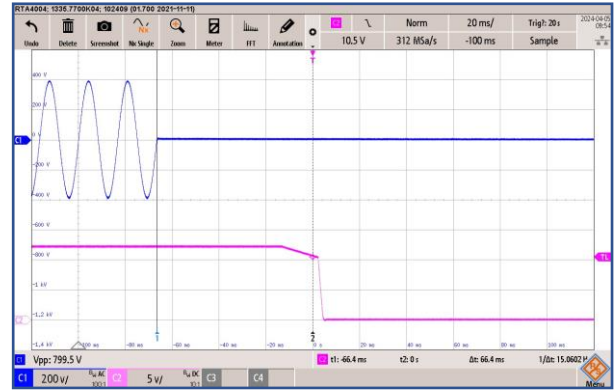
Test Circuitry : Figure A

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

Waveform

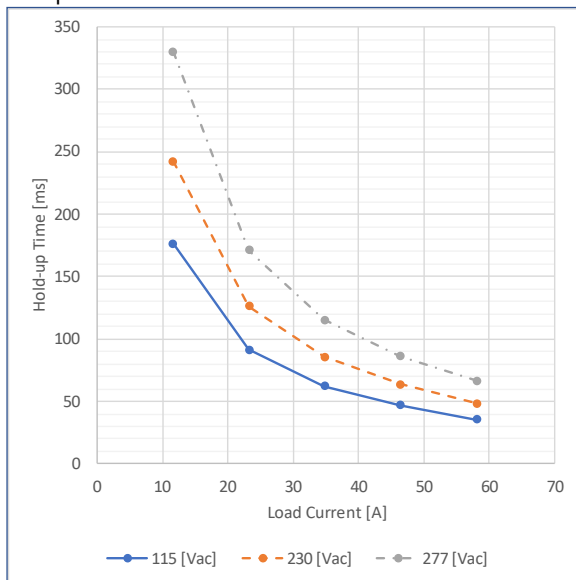


Input Voltage 115 [Vac]
Load Current 58.0 [A]
(10ms/div)



Input Voltage 277 [Vac]
Load Current 58.0 [A]
(10ms/div)

Graph



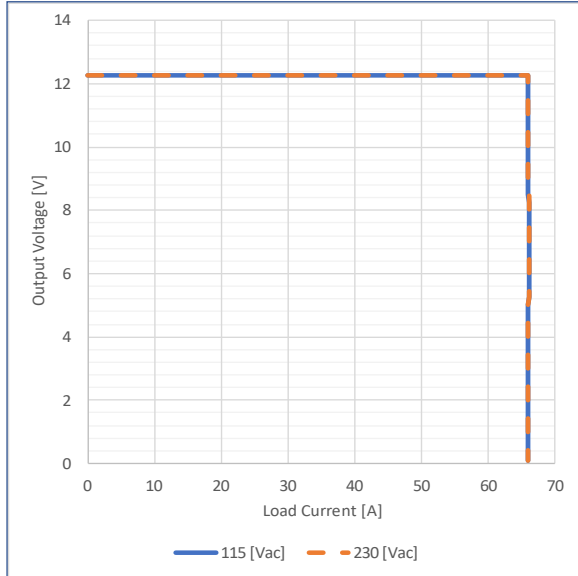
Value

Load Current [A]	Hold-up Time [ms]		
	Input Voltage		
	115 [Vac]	230 [Vac]	277 [Vac]
0.00	-	-	-
11.60	176.5	242.5	330.0
23.20	91.2	126.5	171.0
34.80	62.4	85.8	115.5
46.40	47.2	63.6	86.2
58.00	35.4	48.6	66.4

13. Over Current Protection

Test Circuitry : Figure A

Graph



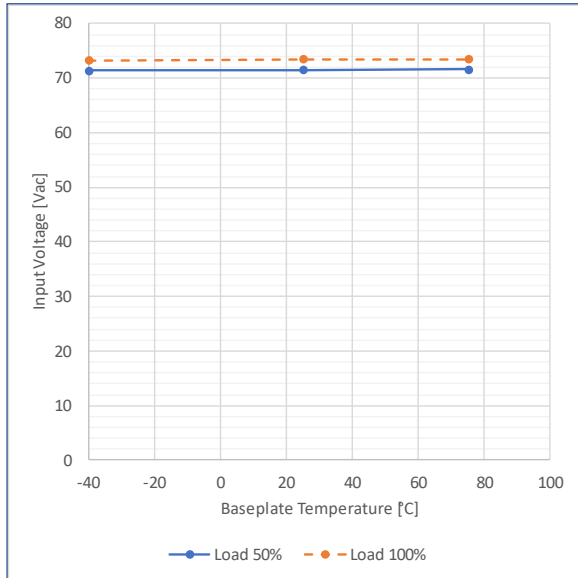
Value

Output Voltage [V]	Load Current [A]	
	Input Voltage	
	115 [Vac]	230 [Vac]
12.00	66.000	66.000
10.00	66.000	66.000
8.00	66.100	66.100
6.00	66.100	66.100
4.00	66.000	66.000
2.00	66.000	66.000
0.00		

14. Minimum Input Voltage for Regulated Output Voltage

Test Circuitry : Figure A

Graph



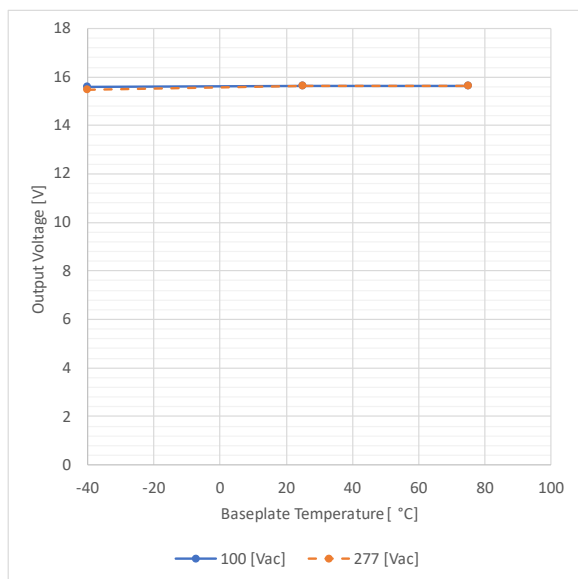
Value

Baseplate Temperature [°C]	Input Voltage [Vac]	
	Load Current	
	Load 50%	Load 100%
-40	71.4	73.3
25	71.5	73.5
75	71.6	73.5

15. Over Voltage Protection

Test Circuitry : Figure A

Graph



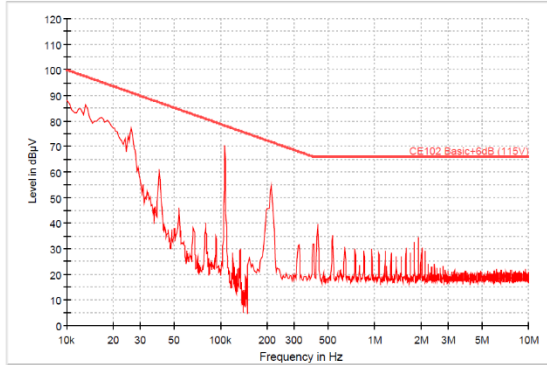
Value

Baseplate Temperature [°C]	Output Voltage [V]	
	Input Voltage	
	100 [Vac]	277 [Vac]
-40	15.580	15.460
25	15.640	15.640
75	15.640	15.640

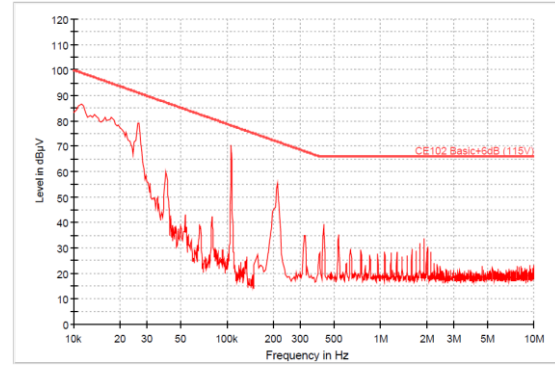
16. Conducted Emission

Input Voltage : 115Vac / 230Vac 50Hz

Load : 100 %

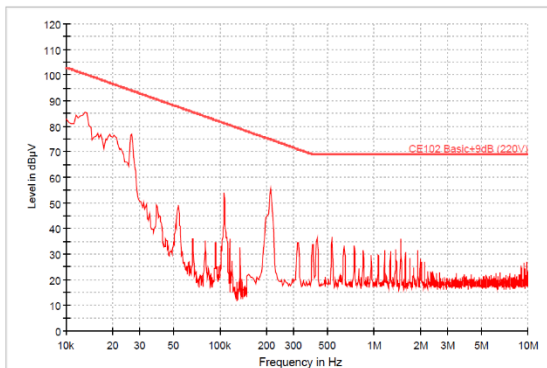


30054 0157 CE102 115VAC EUT6 L
PK+_MAXH CE102 Basic+6dB (115V)

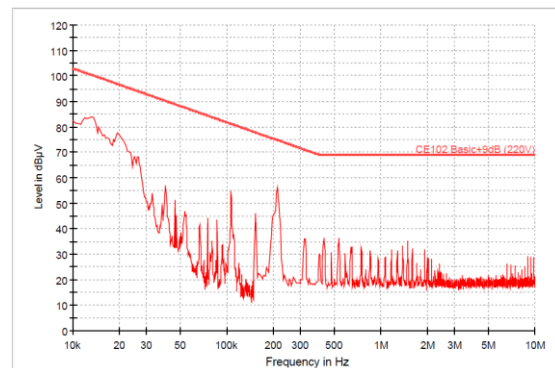


30054 0157 CE102 115VAC EUT6 N
PK+_MAXH CE102 Basic+6dB (115V)

Fig. 16.1 MIL-STD-461F CE102 Result, ECD700A12, 115V, Line and Neutral



30054 0151 CE102 230VAC EUT6 L
PK+_MAXH CE102 Basic+9dB (220V)



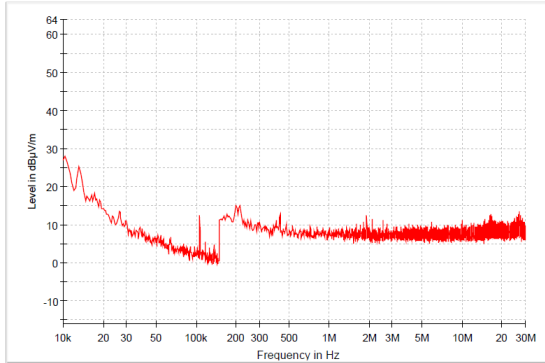
30054 0152 CE102 230VAC EUT6 N
PK+_MAXH CE102 Basic+9dB (220V)

Fig. 16.2 MIL-STD-461F CE102 Result, ECD700A12, 230V, Line and Neutral

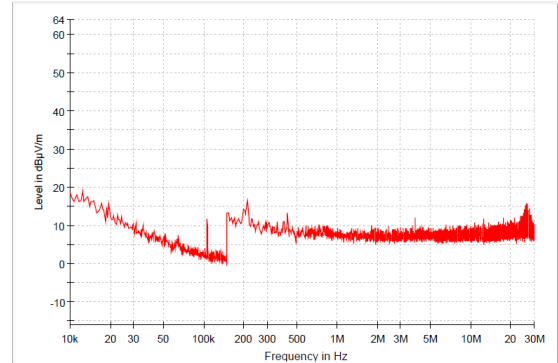
17. Radiated Emission

Input Voltage : 115Vac / 230Vac 50Hz

Load : 100 %

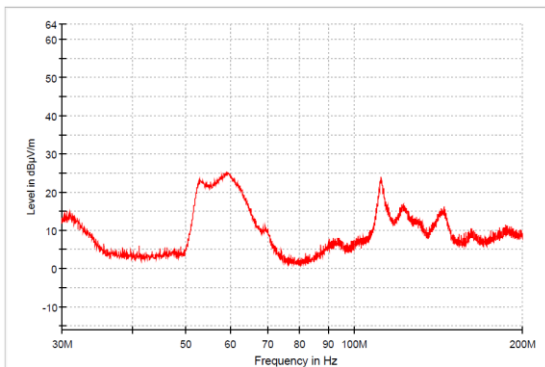


30054 0156 RE102 10k-30M 115VAC EUT6
PK+_CLRWR

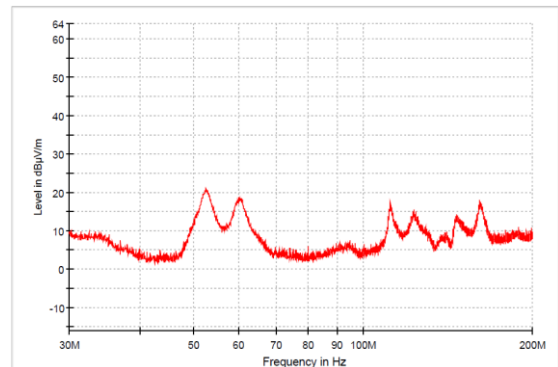


30054 0153 RE102 10k-30M 230VAC EUT6
PK+_CLRWR

Fig. 17.1 MIL-STD-461F RE102 10kHz to 30MHz Result, ECD700A12, 115V and 230V

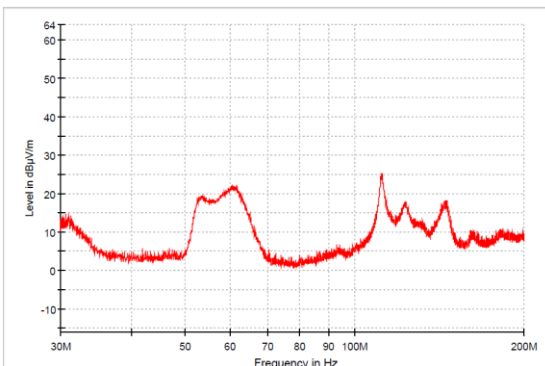


30054 0168 RE102 30M-200M 115V EUT6 V ER
PK+_CLRWR

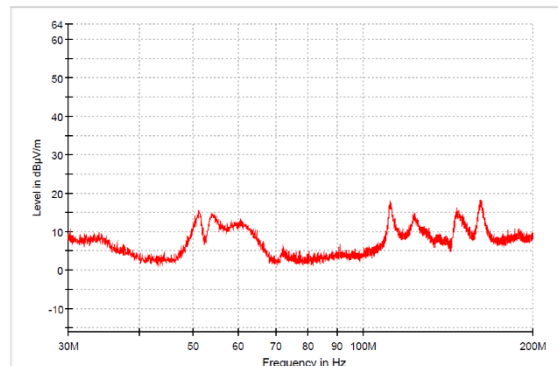


30054 0167 RE102 30M-200M 115V EUT6 HOR
PK+_CLRWR

Fig. 17.2 MIL-STD-461F RE102 30MHz to 200MHz Result, ECD700A12, 115V, Vertical and Horizontal

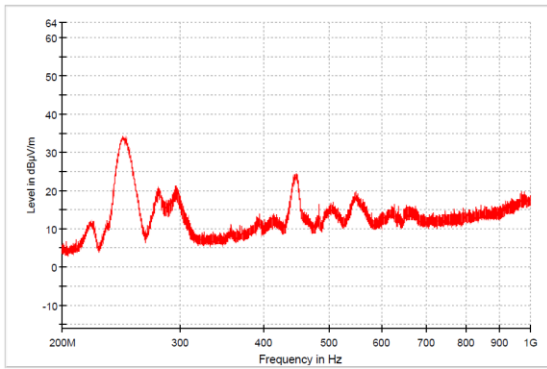


30054 0165 RE102 30M-200M 230V EUT6 V ER
PK+_CLRWR

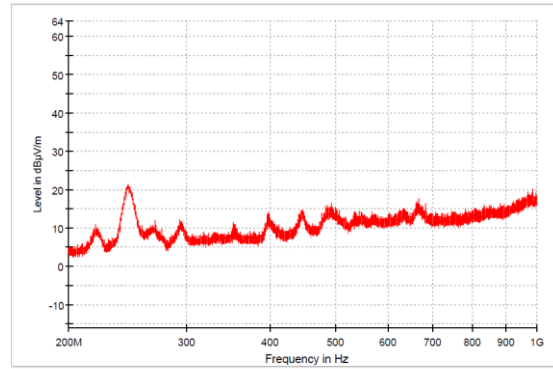


30054 0166 RE102 30M-200M 230V EUT6 HOR
PK+_CLRWR

Fig. 17.3 MIL-STD-461F RE102 30MHz to 200MHz Result, ECD700A12, 230V, Vertical and Horizontal

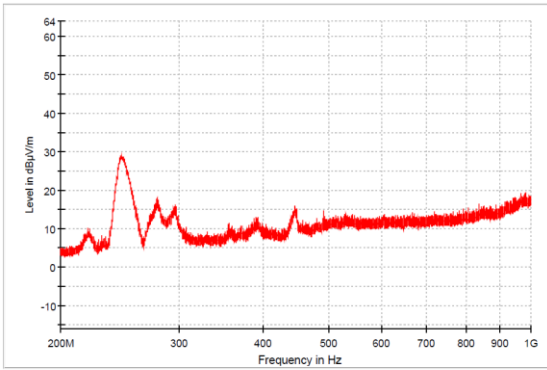


30054 0169 RE102 200M-1G 115V EUT6 VER
 PK+_CLRWR

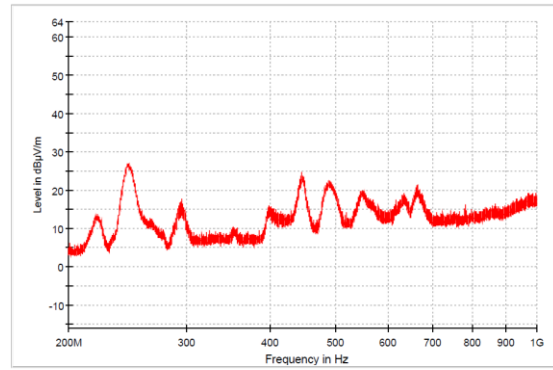


30054 0171 RE102 200M-1G 230V EUT6 HOR
 PK+_CLRWR

Fig. 17.4 MIL-STD-461F RE102 200MHz to 1GHz Result, ECD700A12, 115V, Vertical and Horizontal

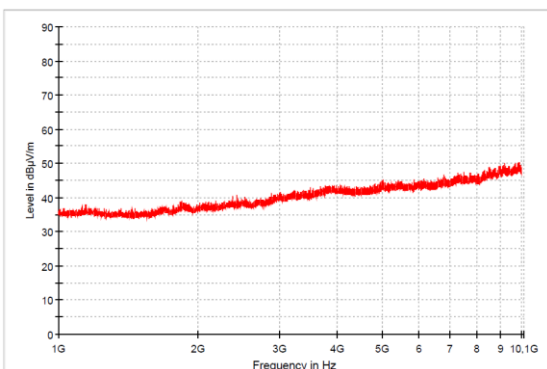


30054 0172 RE102 200M-1G 230V EUT6 VER
 PK+_CLRWR

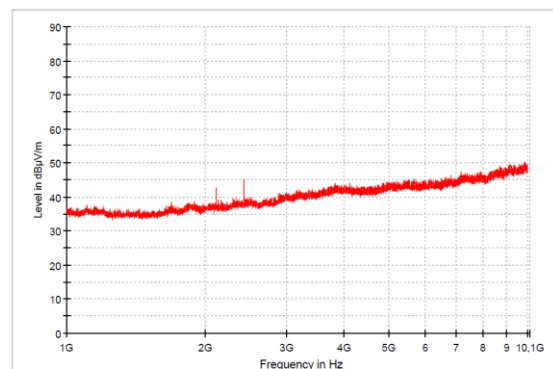


30054 0170 RE102 200M-1G 115V EUT6 HOR
 PK+_CLRWR

Fig. 17.5 MIL-STD-461F RE102 200MHz to 1GHz Result, ECD700A12, 230V, Vertical and Horizontal

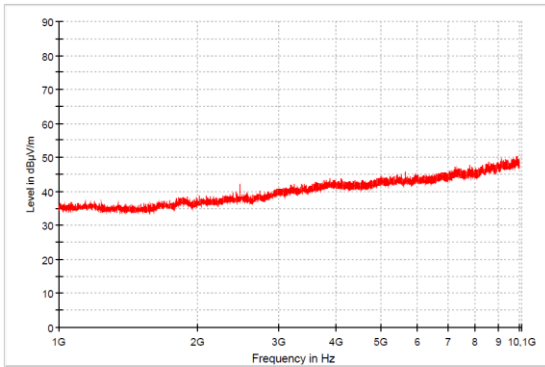


30054 0192 RE102 1G-10G 115V EUT6 VER
 PK+_CLRWR

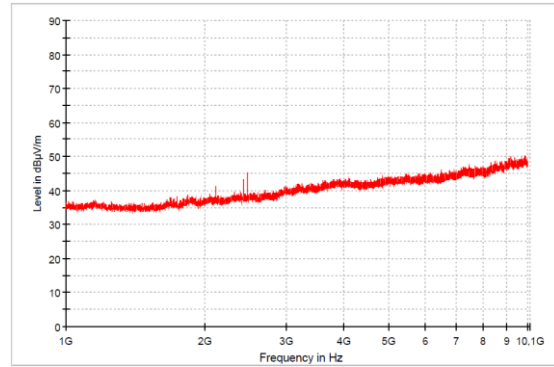


30054 0193 RE102 1G-10G 115V EUT6 HOR
 PK+_CLRWR

Fig. 17.6 MIL-STD-461F RE102 1GHz to 10GHz Result, ECD700A12, 115V, Vertical and Horizontal

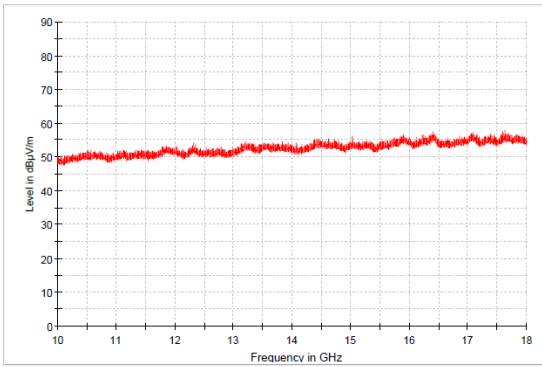


30054 0195 RE102 1G-10G 230V EUT6 VER
PK+_CLRWR

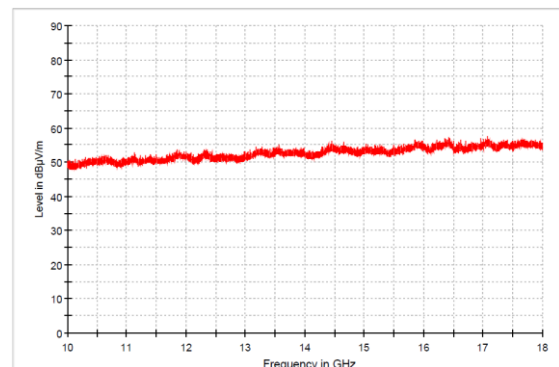


30054 0194 RE102 1G-10G 230V EUT6 HOR
PK+_CLRWR

Fig. 17.7 MIL-STD-461F RE102 1GHz to 10GHz Result, ECD700A12, 230V, Vertical and Horizontal

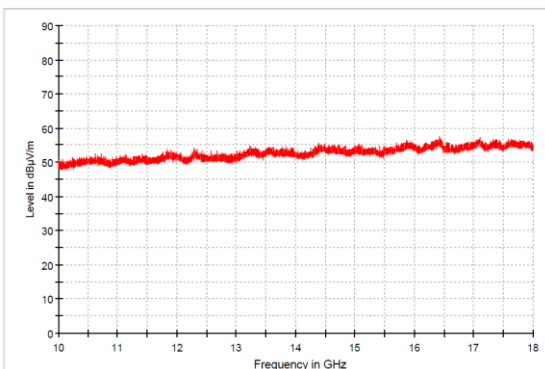


30054 0191 RE102 10G-18G 115V EUT6 VER
PK+_CLRWR

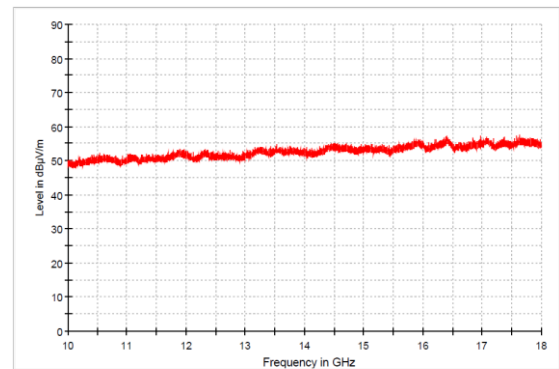


30054 0190 RE102 10G-18G 115V EUT6 HOR
PK+_CLRWR

Fig. 17.8 MIL-STD-461F RE102 10GHz to 18GHz Result, ECD700A12, 115V, Vertical and Horizontal



30054 0188 RE102 10G-18G 230V EUT6 VER
PK+_CLRWR



30054 0189 RE102 10G-18G 230V EUT6 HOR
PK+_CLRWR

Fig. 17.9 MIL-STD-461F RE102 10GHz to 18GHz Result, ECD700A12, 230V, Vertical and Horizontal



Fig. 17.10 MIL-STD-461F CE102 and RE102 test set-up

18. Figure of Test Circuitry

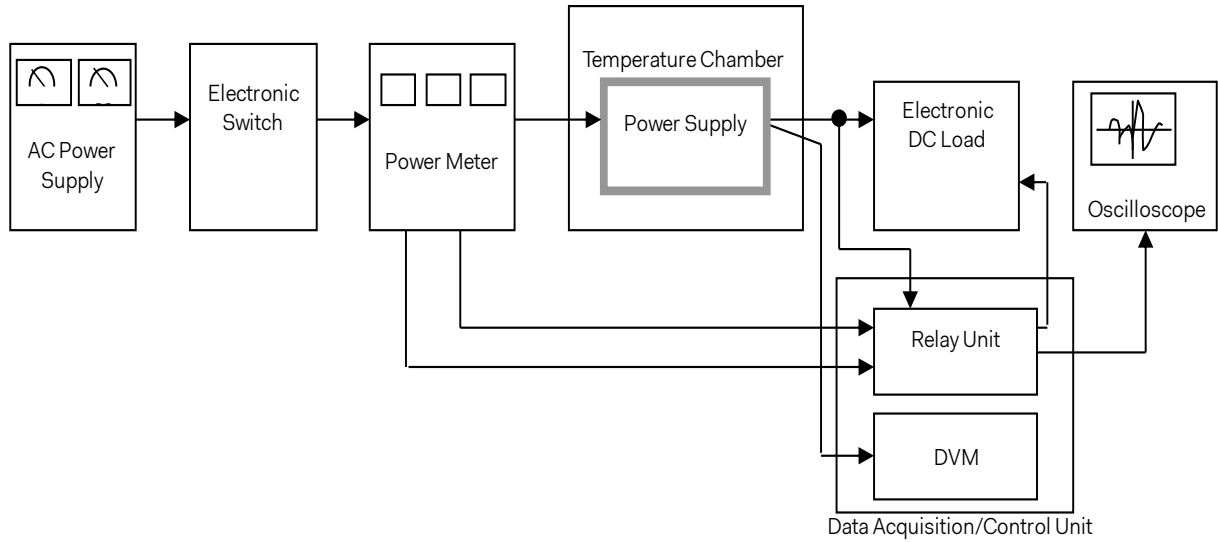


Figure A Test circuitry for general performance measurement

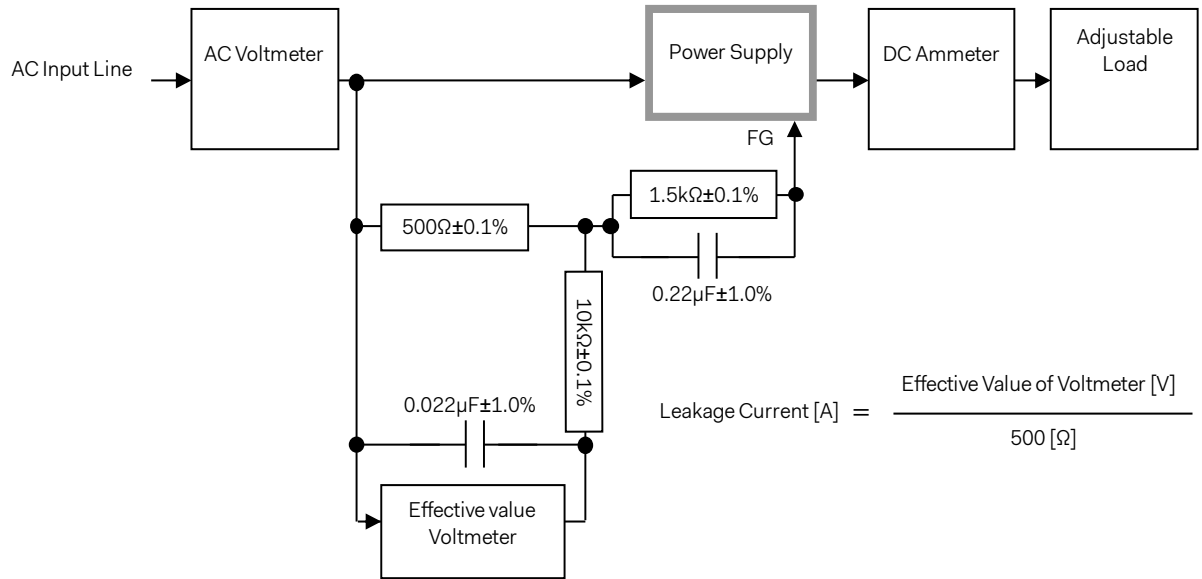


Figure B-1 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.4)

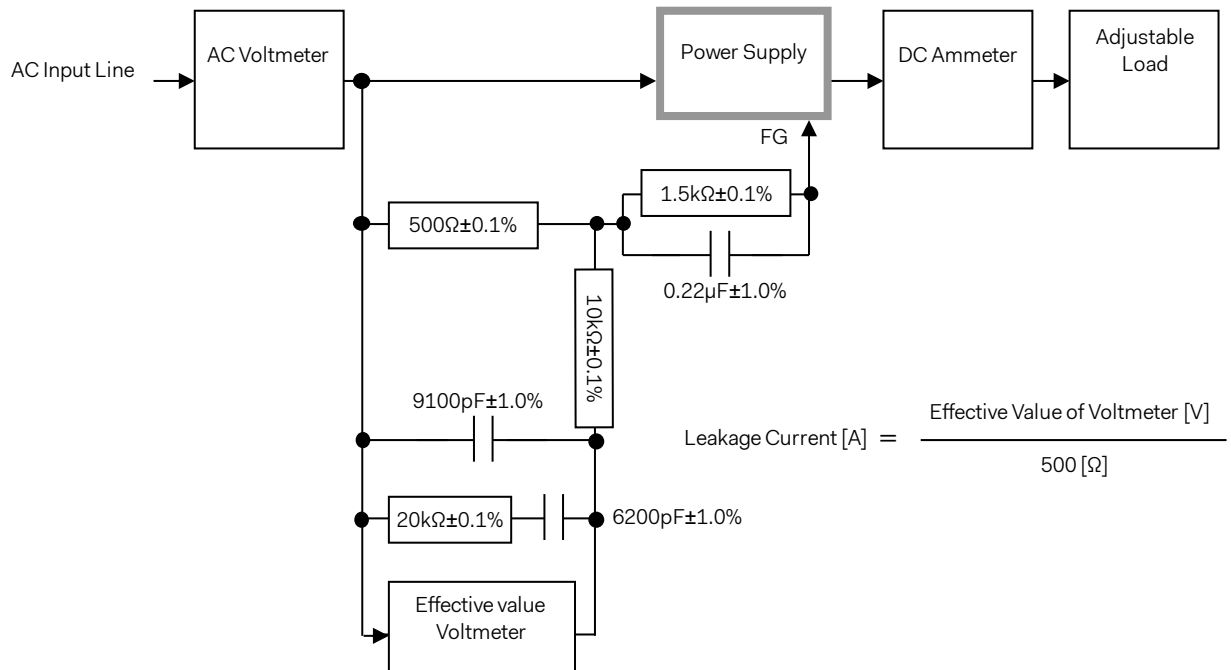


Figure B-2 Leakage current measurement (IEC62368-1, refer to IEC60990 Fig.5)

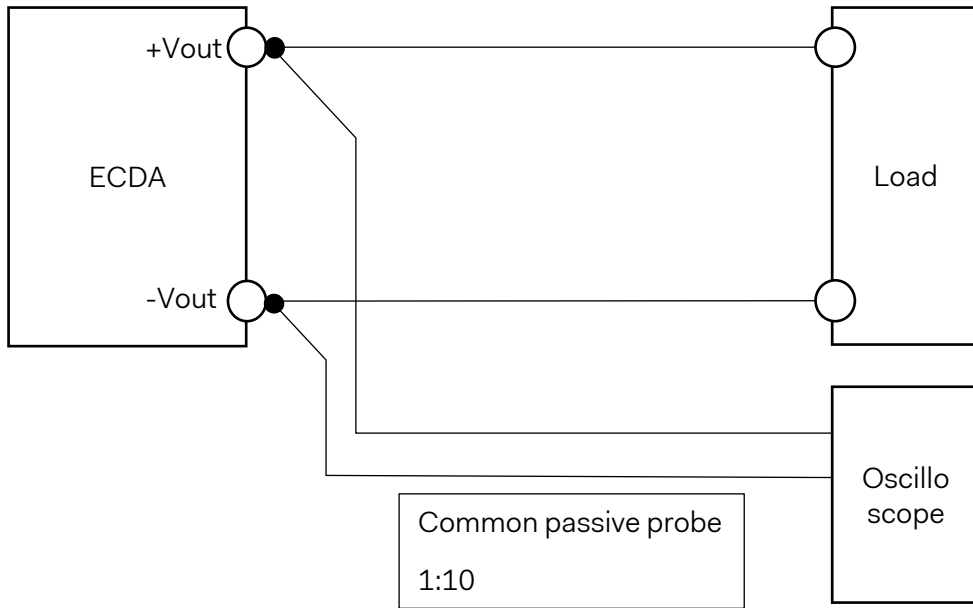


Figure C Ripple voltage measurement

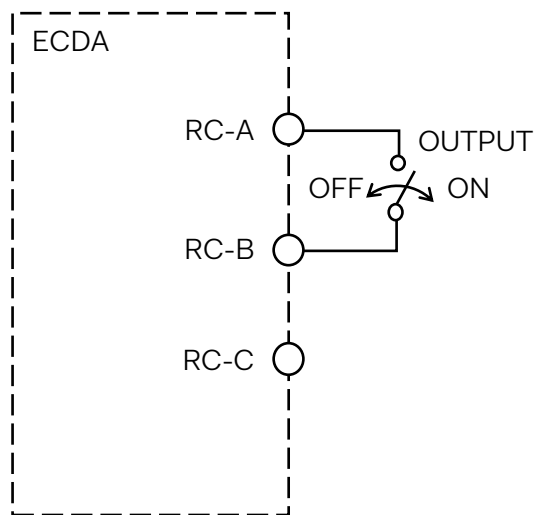


Figure D Turn on by RC measurement