Reference

COSEL

TEST DATA OF PJMA1000F-48

Regulated DC Power Supply
January 22, 2021

Approved by : Takashi Kajii

Takashi Kajii Design Manager

Prepared by : Ryo Takahashi

Ryo Takahashi Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

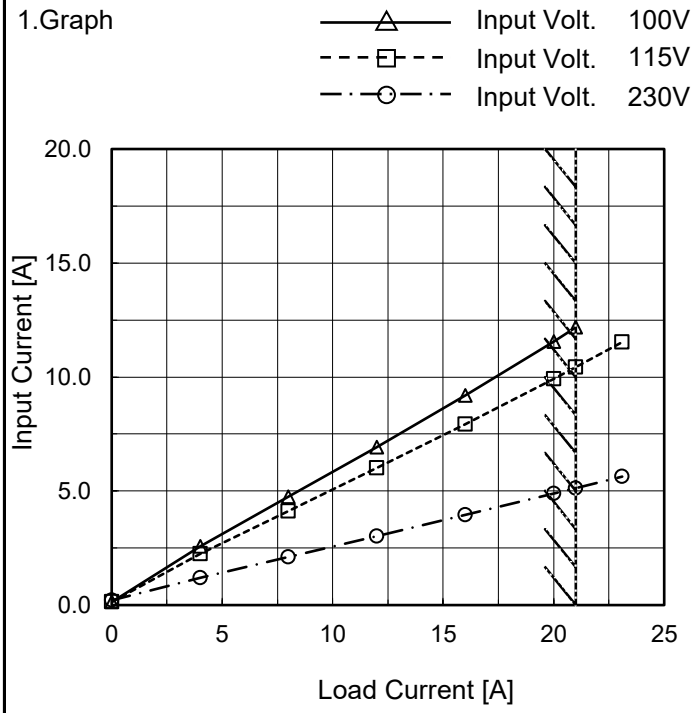
1.Input Current (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Power (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Power Factor (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Power Factor (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 6
7.Inrush Current ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 7
8.Leakage Current ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 8
9.Line Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 9
10.Load Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 10
11.Dynamic Load Response ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 11
12.Ripple Voltage (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・ 12
13.Ripple-Noise ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 13
14.Ripple Voltage (by Ambient Temperature) ・・・・・・・・・・・・・・・・・・ 14
15.Ambient Temperature Drift ・・・・・・・・・・・・・・・・・・・・・・・・・ 15
16.Output Voltage Accuracy ・・・・・・・・・・・・・・・・・・・・・・・・・・ 16
17.Time Lapse Drift ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 17
18.Rise and Fall Time ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 18
19.Hold-Up Time ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 19
20.Instantaneous Interruption Compensation ・・・・・・・・・・・・・・・・・・ 20
21.Minimum Input Voltage for Regulated Output Voltage ・・・・・・・・・・・・ 21
22.Overcurrent Protection ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 22
23.Overvoltage Protection ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 23
24.Figure of Testing Circuitry ・・・・・・・・・・・・・・・・・・・・・・・・・ 24
(Final Page 24)

COSEL

Model	PJMA1000F-48
Item	Input Current (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	0.134	0.139	0.210
4.0	2.568	2.240	1.207
8.0	4.744	4.122	2.118
12.0	6.934	6.005	3.027
16.0	9.200	7.930	3.950
20.0	11.550	9.910	4.889
21.0	12.180	10.430	5.130
23.1	-	11.530	5.634
--	-	-	-
--	-	-	-
--	-	-	-

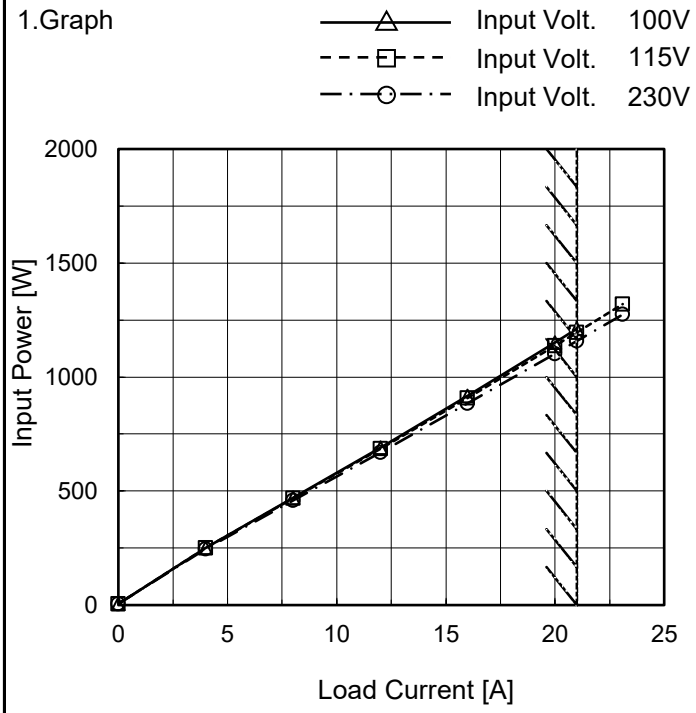
BC-11658

COSEL

Model	PJMA1000F-48
Item	Input Power (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

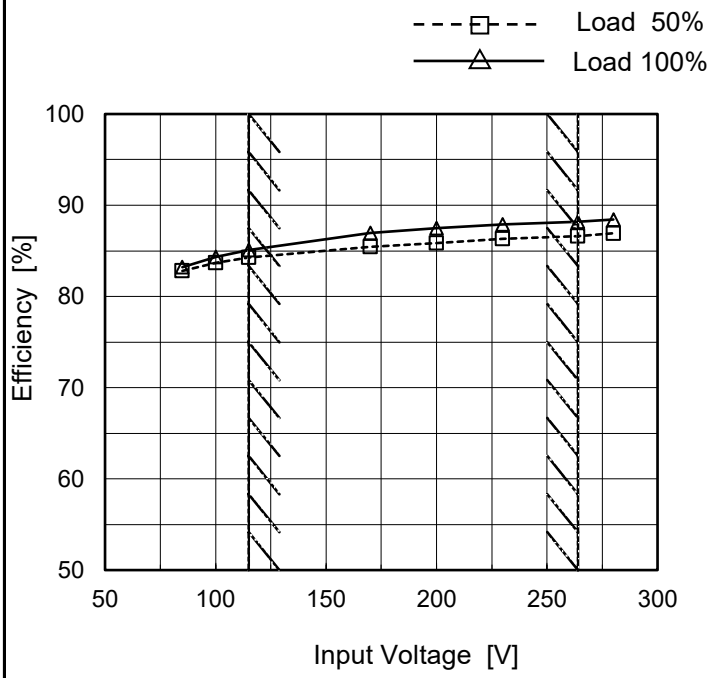
Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	6	5	6
4.0	251	250	245
8.0	470	468	458
12.0	691	686	670
16.0	917	908	884
20.0	1151	1137	1102
21.0	1212	1196	1157
23.1	-	1320	1274
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	PJMA1000F-48
Item	Efficiency (by Input Voltage)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	82.8	83.2 ※1
100	83.7	84.4 ※2
115	84.3	85.1
170	85.4	87.0
200	85.8	87.5
230	86.3	87.9
264	86.6	88.2
280	86.9	88.4
--	-	-

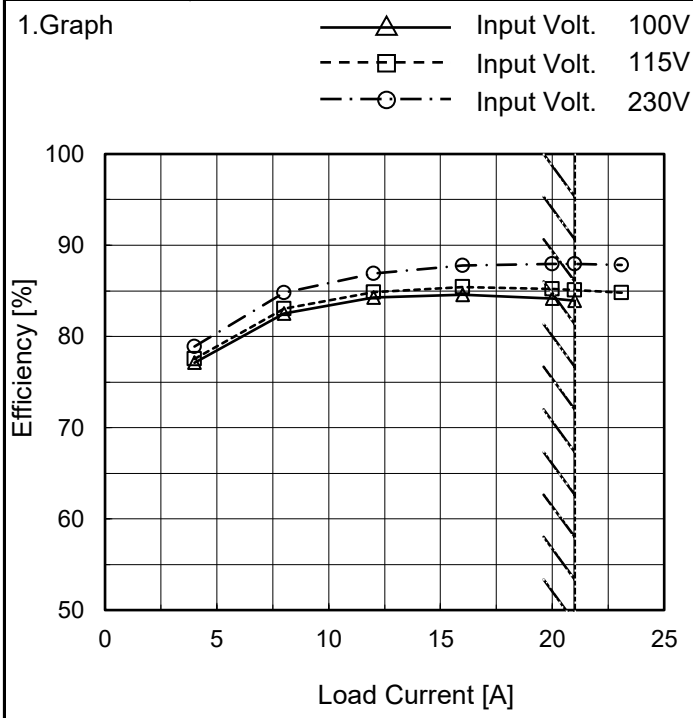
※1:Load 80%
※2:Load 90%

COSEL

Model	PJMA1000F-48
Item	Efficiency (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

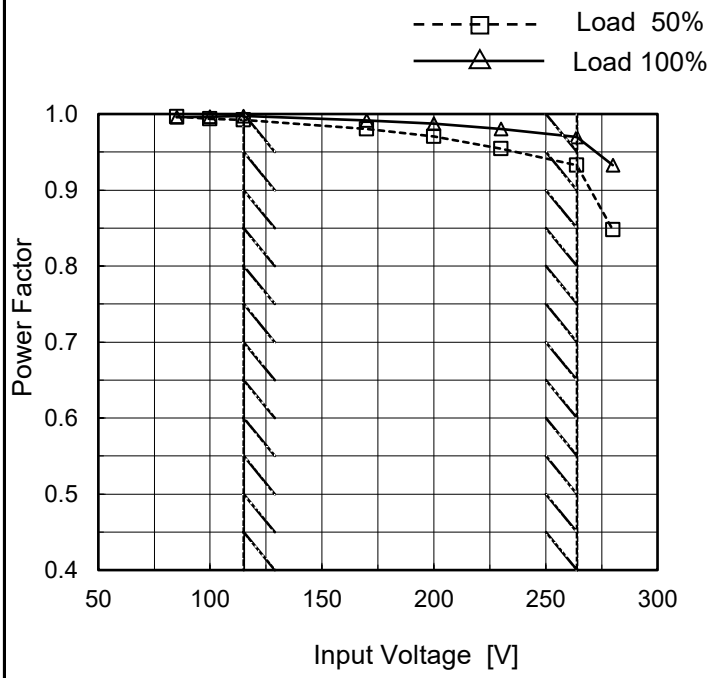
Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	77.1	77.5	78.9
8.0	82.5	83.1	84.8
12.0	84.3	84.8	86.9
16.0	84.6	85.4	87.8
20.0	84.2	85.2	88.0
21.0	83.9	85.1	88.0
23.1	-	84.8	87.9
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	PJMA1000F-48
Item	Power Factor (by Input Voltage)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
85	0.997	0.996 ※1
100	0.994	0.996 ※2
115	0.992	0.997
170	0.980	0.992
200	0.971	0.987
230	0.955	0.981
264	0.933	0.970
280	0.848	0.933
--	-	-

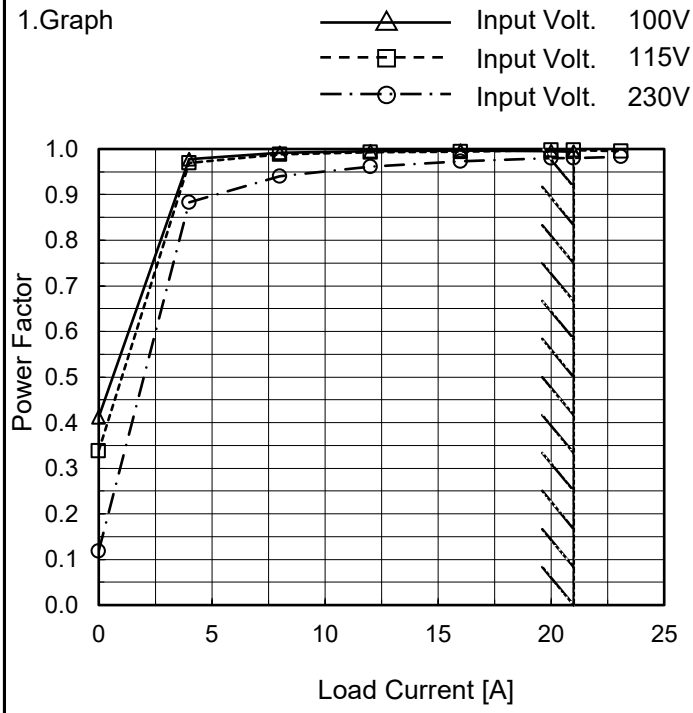
※1:Load 80%
※2:Load 90%

COSEL

Model	PJMA1000F-48
Item	Power Factor (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph

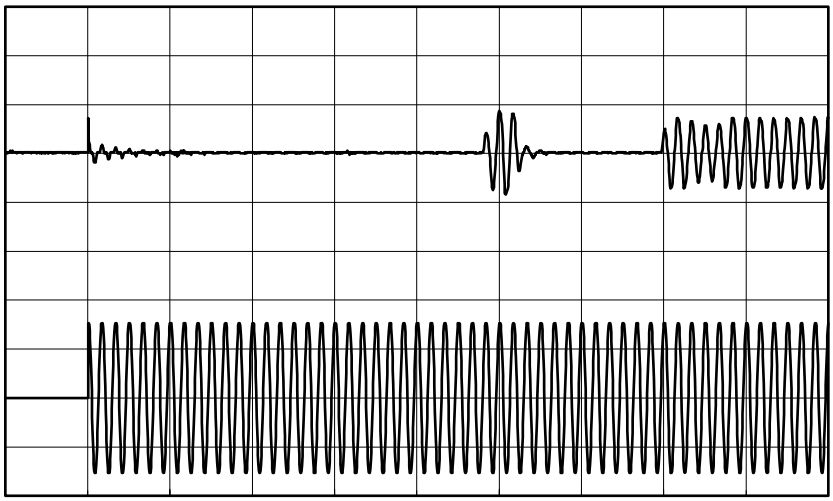


Note: Slanted line shows the range of the rated load current.

2.Values

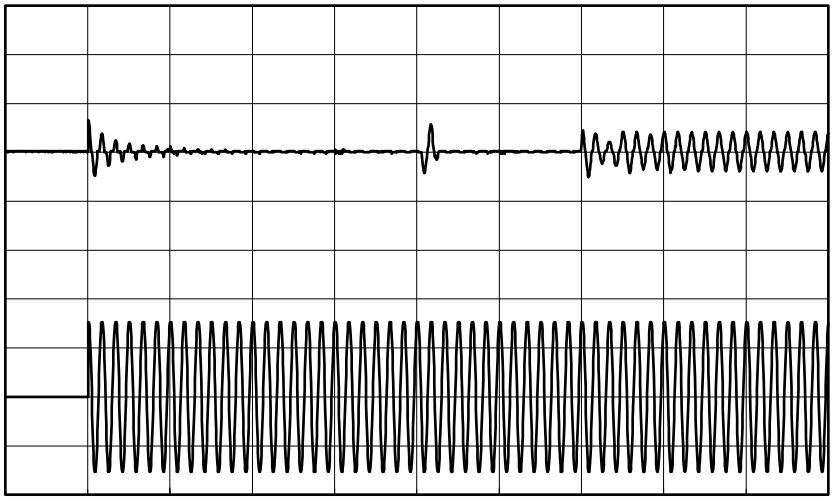
Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	0.412	0.339	0.119
4.0	0.978	0.970	0.884
8.0	0.992	0.988	0.940
12.0	0.995	0.993	0.961
16.0	0.997	0.995	0.974
20.0	0.996	0.997	0.980
21.0	0.994	0.997	0.981
23.1	-	0.995	0.983
--	-	-	-
--	-	-	-
--	-	-	-

Model	PJMA1000F-48		
Item	Inrush Current	Temperature	25°C
		Testing Circuitry	Figure A
Object	———————		



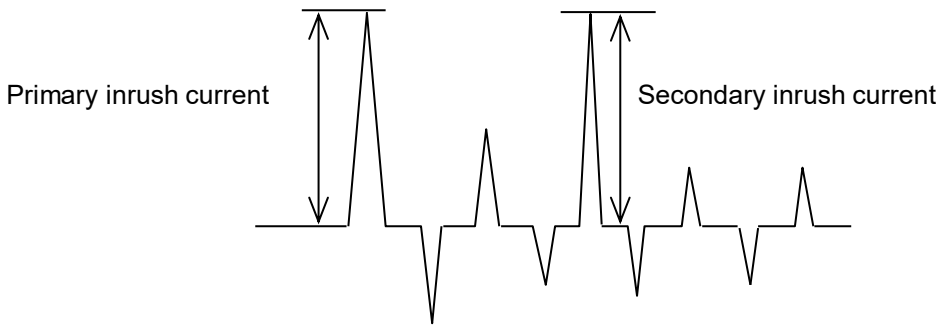
Input Voltage 115 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
14.3 A
Secondary inrush current :
17.3 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
13.1 A
Secondary inrush current :
11.3 A



Model	PJMA1000F-48	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	———————	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
IEC60601-1	Both phases	0.11	0.10	0.25	Operation
	One of phases	0.18	0.22	0.49	Stand by

The value for "One of phases" is the reference value only.

2.Condition

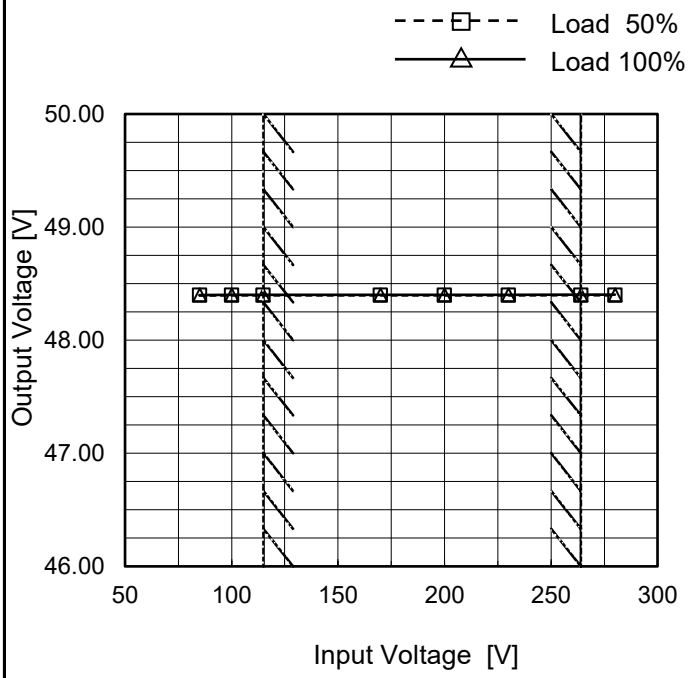
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

COSEL

Model	PJMA1000F-48
Item	Line Regulation
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated input voltage.

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	48.395	48.399 ※1
100	48.396	48.400 ※2
115	48.397	48.401
170	48.397	48.401
200	48.398	48.402
230	48.398	48.403
264	48.398	48.403
280	48.398	48.403
--	-	-

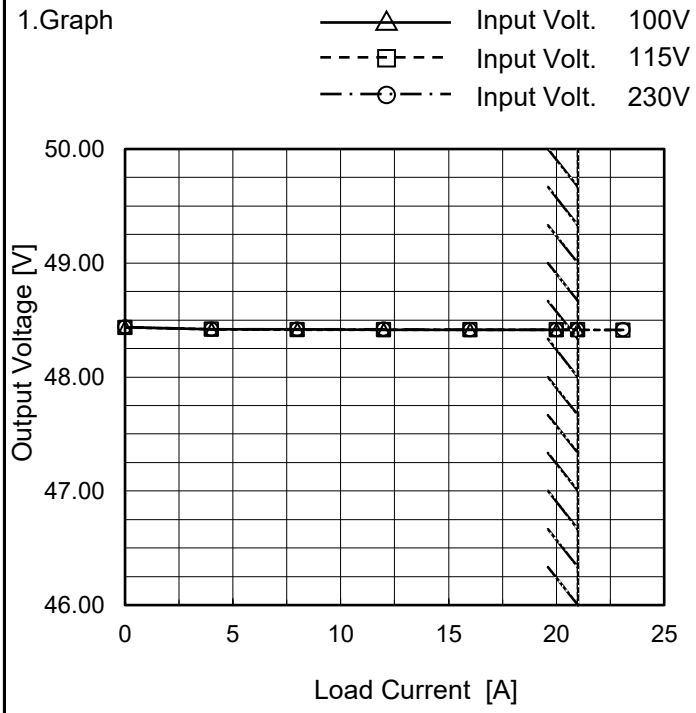
※1:Load 80%
※2:Load 90%

COSEL

Model	PJMA1000F-48
Item	Load Regulation
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	48.437	48.435	48.439
4.0	48.421	48.418	48.421
8.0	48.418	48.416	48.419
12.0	48.417	48.415	48.417
16.0	48.415	48.414	48.416
20.0	48.414	48.413	48.415
21.0	48.414	48.412	48.414
23.1	-	48.412	48.414
--	-	-	-
--	-	-	-
--	-	-	-

Model	PJMA1000F-48	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+48V21A	

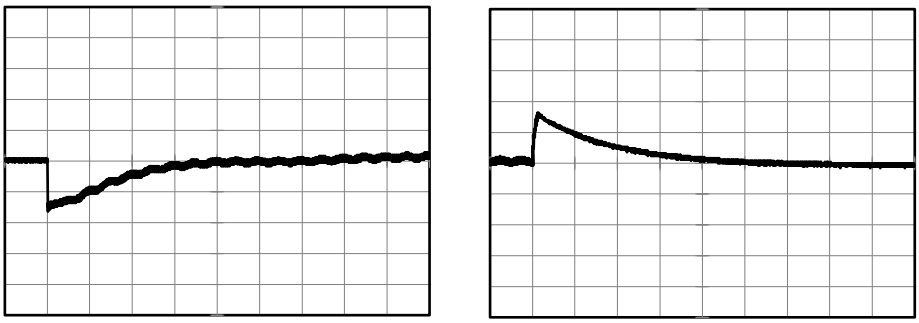
Input Volt. 115 V
Cycle 1000 ms

t1,t2 = 50 μ s

Load Current

t1 t2

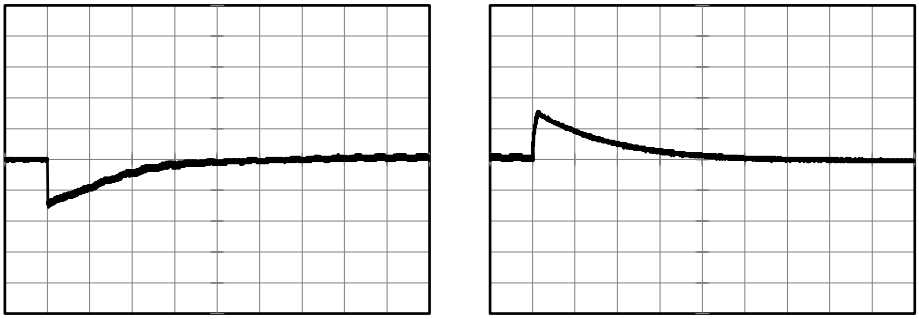
Min.Load (0A)←→
Load 100% (21A)



500mV/div

20 ms/div 20 ms/div

Min.Load (0A)←→
Load 50% (10.5A)



500mV/div

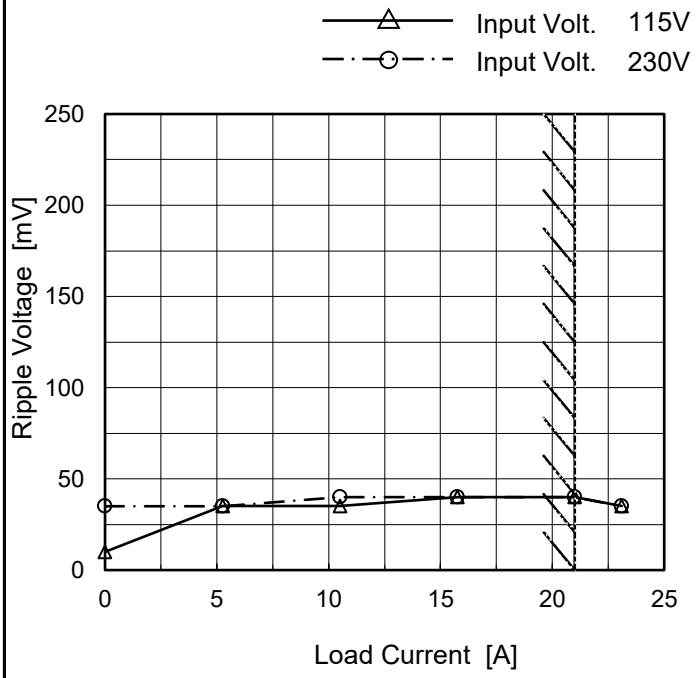
20 ms/div 20 ms/div

COSEL

Model	PJMA1000F-48
Item	Ripple Voltage (by Load Current)
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



Measured by 20 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

T1: Due to AC Input Line
T2: Due to Switching

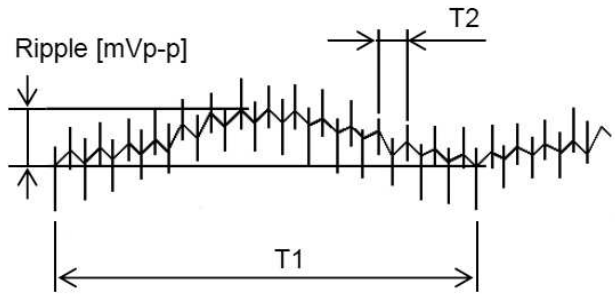


Fig. Complex Ripple Wave Form

2.Values

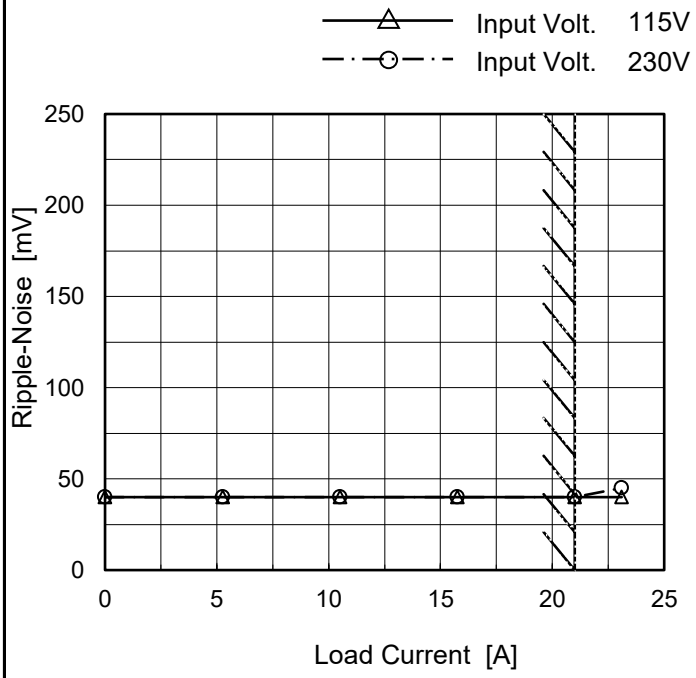
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	10	35
5.25	35	35
10.50	35	40
15.75	40	40
21.00	40	40
23.10	35	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PJMA1000F-48
Item	Ripple-Noise
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	40	40
5.25	40	40
10.50	40	40
15.75	40	40
21.00	40	40
23.10	40	45
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

T1: Due to AC Input Line
T2: Due to Switching

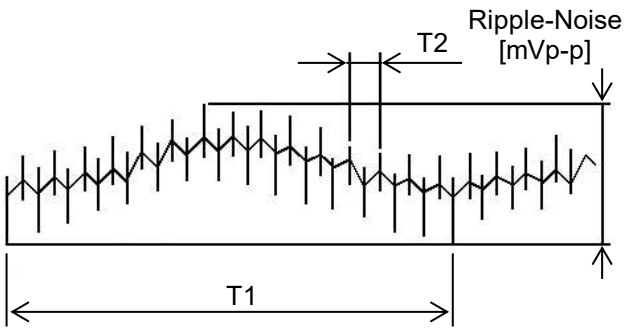


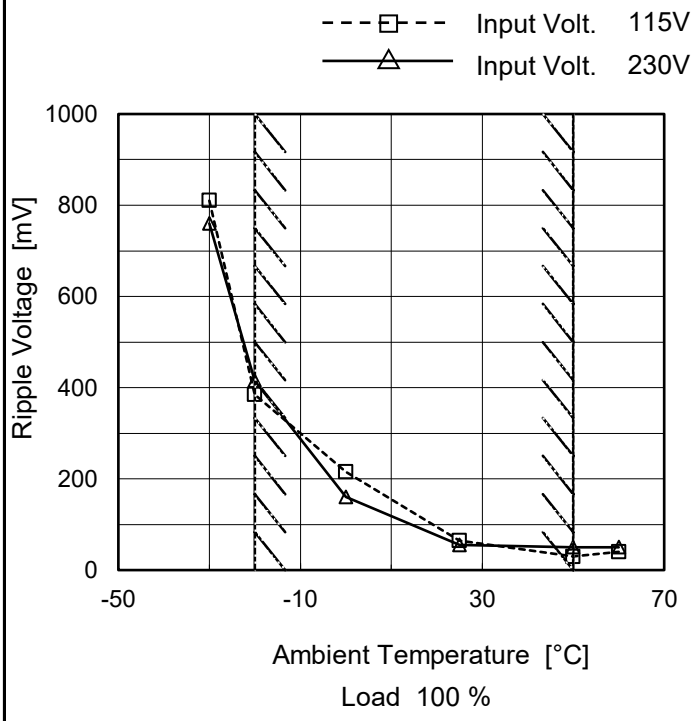
Fig. Complex Ripple Wave Form

COSEL

Model	PJMA1000F-48
Item	Ripple Voltage (by Ambient Temp.)
Object	+48V21A

Testing Circuitry Figure C

1.Graph



Measured by 20 MHz Oscilloscope.

Note: Slanted line shows the range of the rated ambient temperature.

2.Values

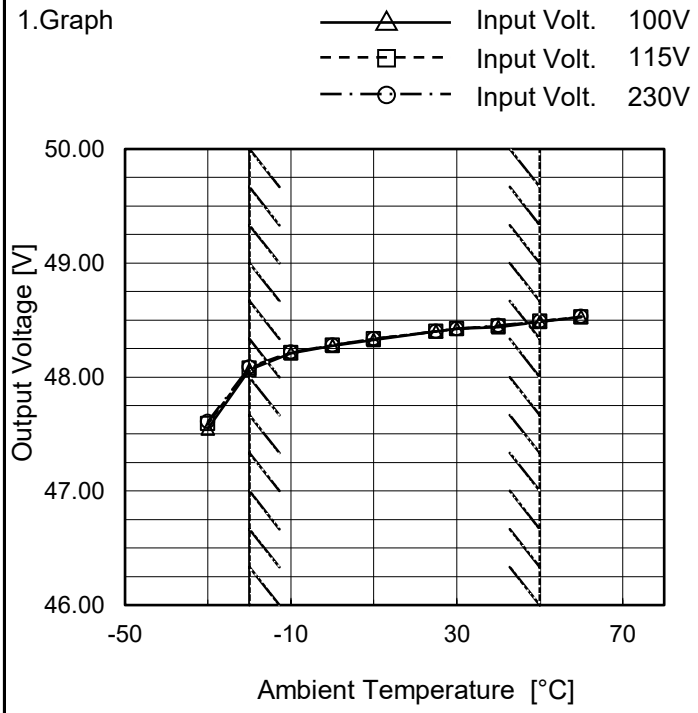
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
-30	810	760
-20	385	415
0	215	160
25	65	55
50	30	50
60	40	50
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PJMA1000F-48
Item	Ambient Temperature Drift
Object	+48V21A

Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated ambient temperature.

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-30	47.549	47.591	47.611
-20	48.062	48.078	48.086
-10	48.206	48.213	48.216
0	48.276	48.277	48.278
10	48.326	48.335	48.336
25	48.399	48.401	48.402
30	48.422	48.422	48.423
40	48.437	48.449	48.450
50	48.483	48.489	48.491
60	48.526	48.527	48.530
--	-	-	-

Note: In case of Input Volt. 100V, Load 90%.
Other case Load 100%.

Model	PJMA1000F-48	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+48V21A	

1.Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -20 - 50°C
Input Voltage : 115 - 230V
Load Current : 0 - 21A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

2.Values

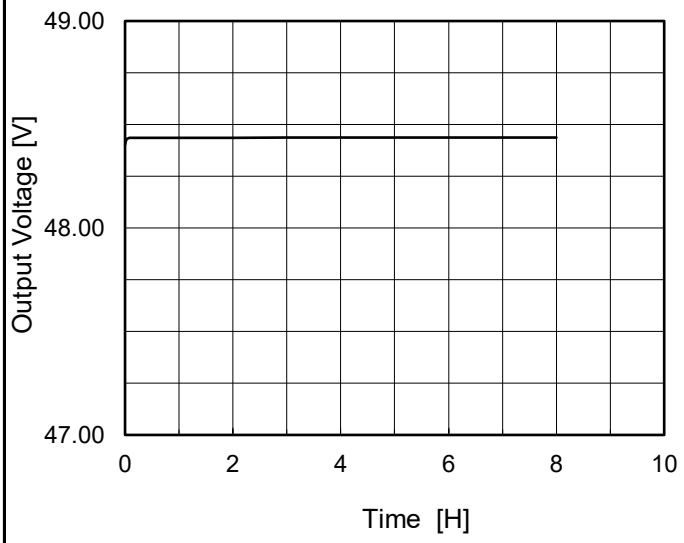
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	264	0	48.538	±230	±0.5
Minimum Voltage	-20	115	21	48.079		

COSEL

Model	PJMA1000F-48
Item	Time Lapse Drift
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



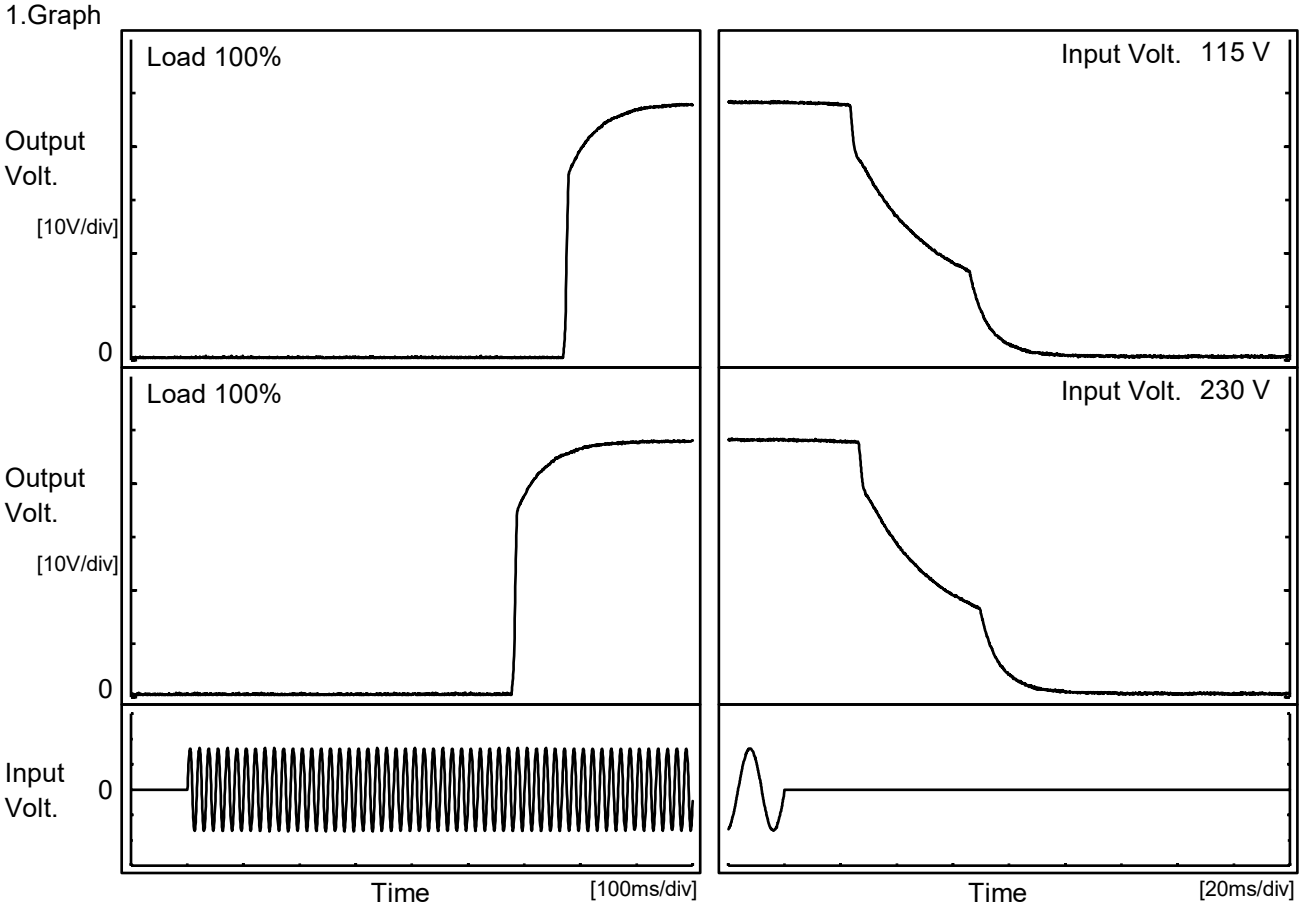
Input Volt. 115V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	48.403
0.5	48.436
1.0	48.436
2.0	48.436
3.0	48.437
4.0	48.437
5.0	48.437
6.0	48.437
7.0	48.437
8.0	48.437

Model	PJMA1000F-48	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+48V21A	

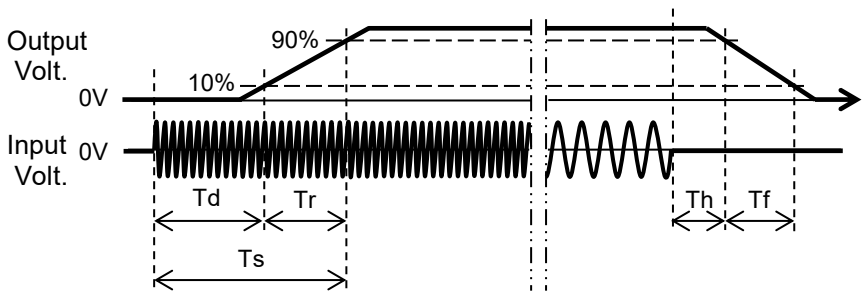
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
115 V	673.0	63.0	736.0	24.1	50.6
230 V	581.5	63.0	644.5	27.1	51.1

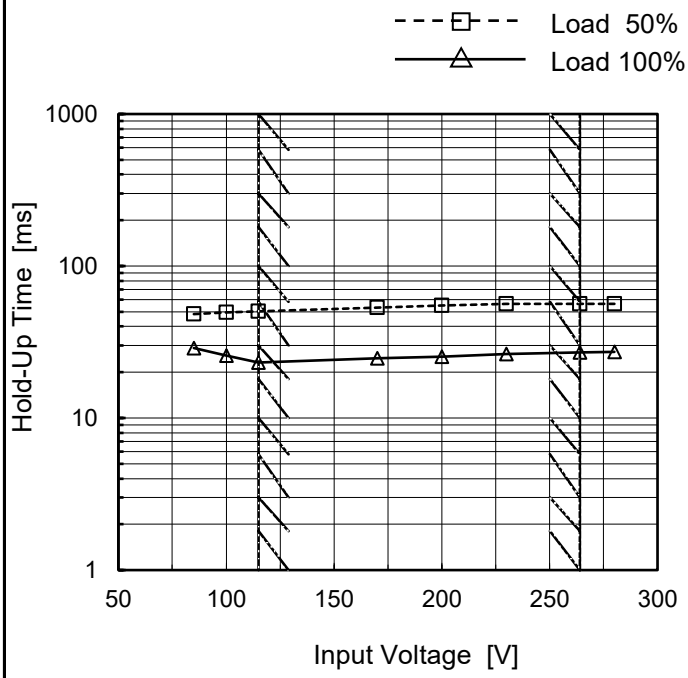


COSEL

Model	PJMA1000F-48
Item	Hold-Up Time
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.
Note: Slanted line shows the range of the rated input voltage.

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	48	29 ※1
100	50	26 ※2
115	50	23
170	53	25
200	55	25
230	56	26
264	56	27
280	56	27
--	-	-

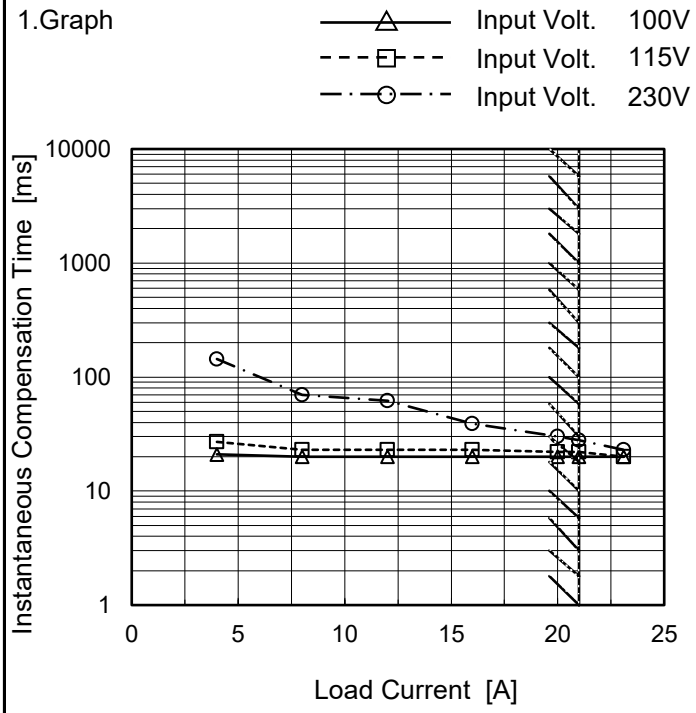
※1:Load 80%
※2:Load 90%

COSEL

Model	PJMA1000F-48
Item	Instantaneous Interruption Compensation
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

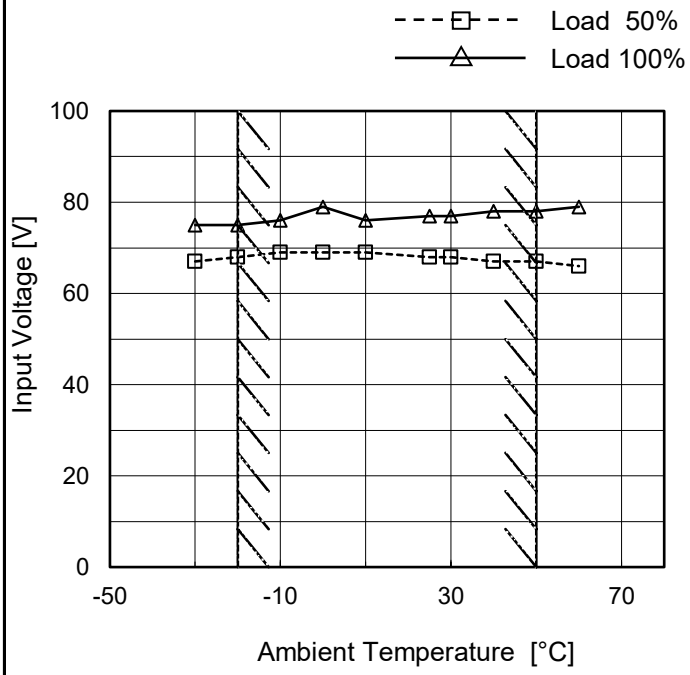
2.Values

Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	21	27	144
8.0	20	23	70
12.0	20	23	62
16.0	20	23	39
20.0	20	22	30
21.0	20	22	28
23.1	20	20	23
--	-	-	-
--	-	-	-
--	-	-	-

Model	PJMA1000F-48
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+48V21A

Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated ambient temperature.

2.Values

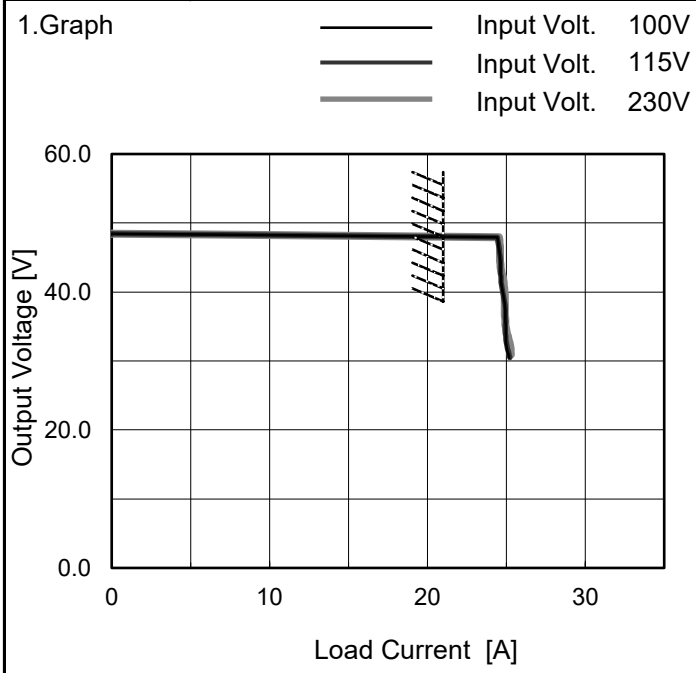
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	67	75
-20	68	75
-10	69	76
0	69	79
10	69	76
25	68	77
30	68	77
40	67	78
50	67	78
60	66	79
--	-	-

COSEL

Model	PJMA1000F-48
Item	Overcurrent Protection
Object	+48V21A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Note: Slanted line shows the range of the rated load current.

2.Values

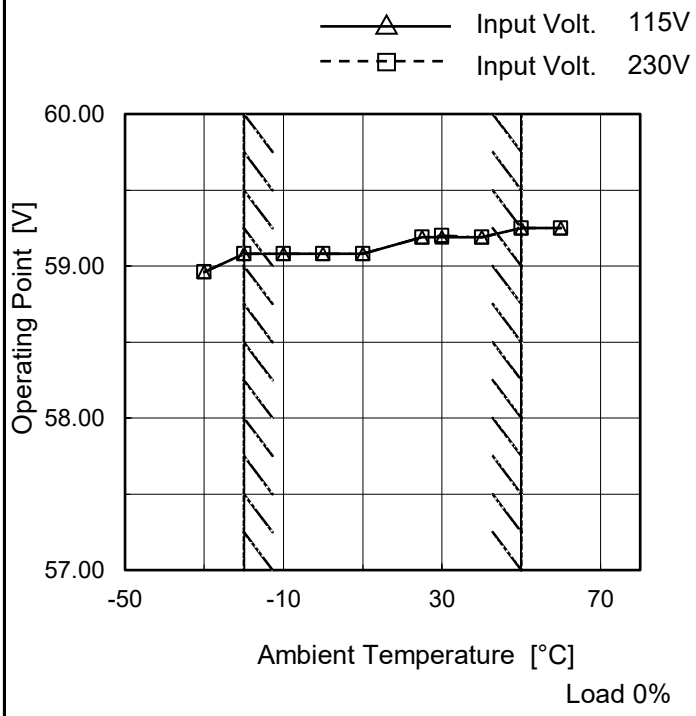
Output Voltage [V]	Load Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
45.6	24.57	24.58	24.60
43.2	24.64	24.64	24.64
38.4	24.86	24.87	24.90
33.6	24.96	24.95	25.05
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	PJMA1000F-48
Item	Overvoltage Protection
Object	+48V21A

Testing Circuitry Figure A

1.Graph



Load 0%

Note: Slanted line shows the range of the rated ambient temperature.

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 115[V]	Input Volt. 230[V]
-30	58.96	58.96
-20	59.08	59.08
-10	59.08	59.08
0	59.08	59.08
10	59.08	59.08
25	59.19	59.19
30	59.19	59.20
40	59.20	59.19
50	59.25	59.25
60	59.25	59.25
--	-	-

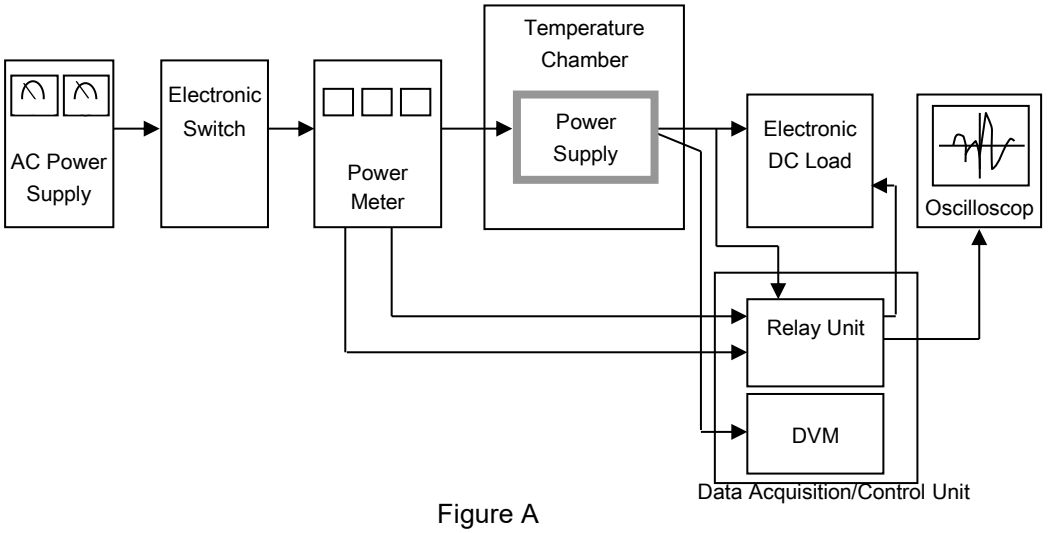


Figure A

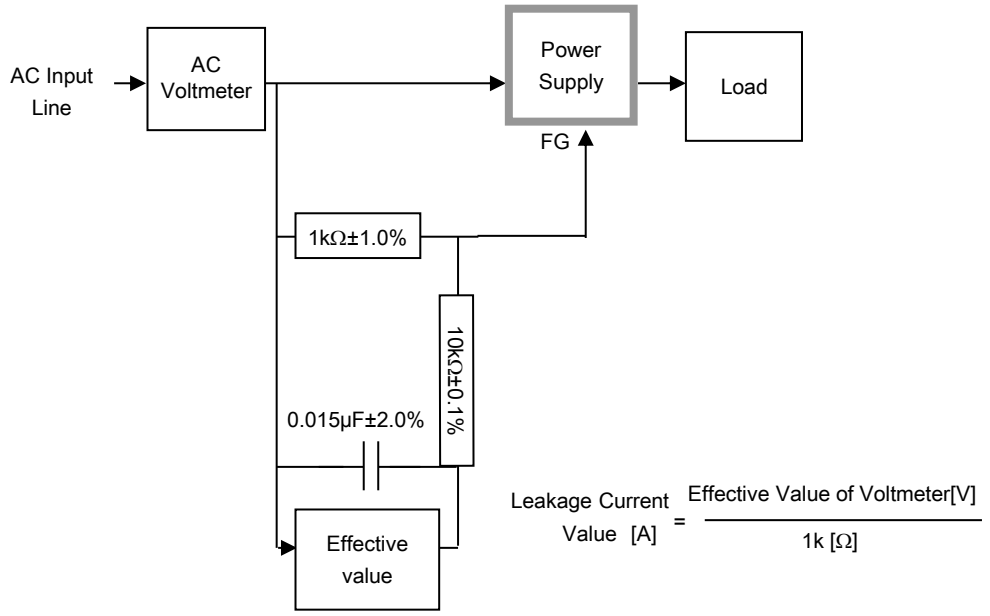
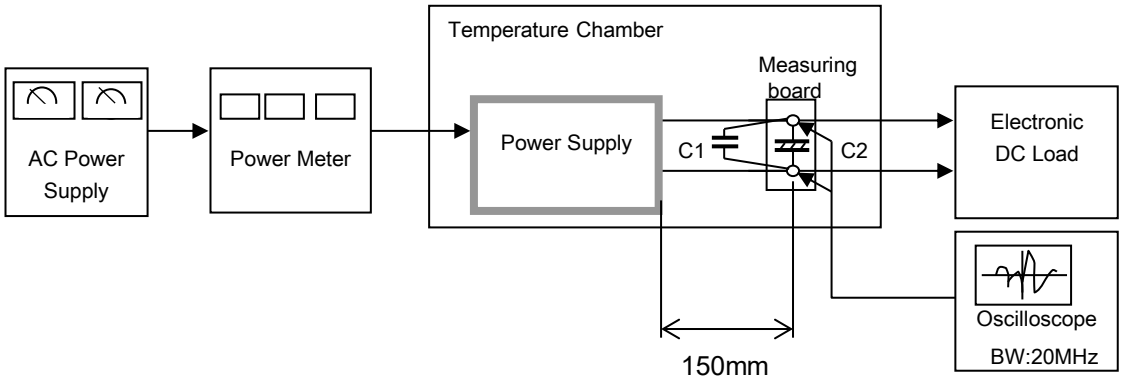


Figure B (IEC60601-1)



(Ceramic capacitor)
C1= 0.1 μF

(Electrolytic capacitor)
C2= 22 μF

Figure C