参考資料

COSEL

TEST DATA OF PMA60F-24

Regulated DC Power Supply
June 4, 2010

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COSEL CO.,LTD.

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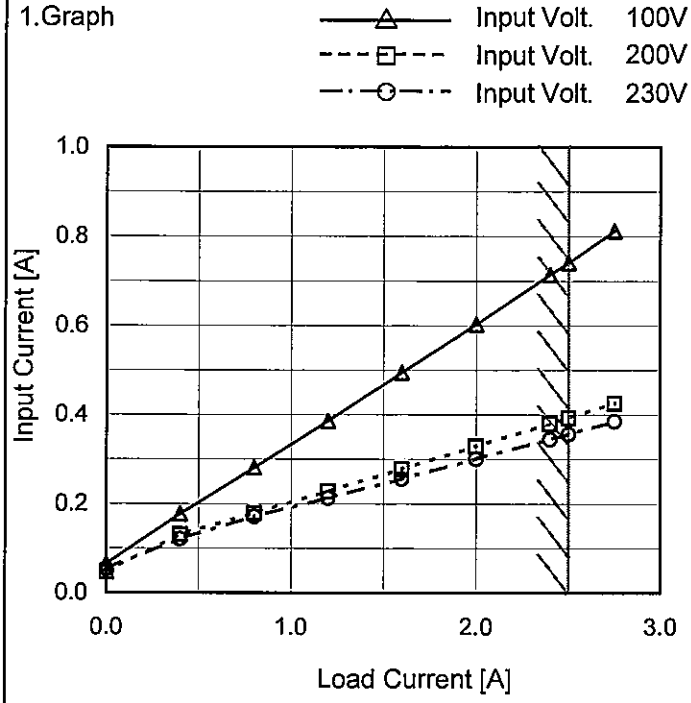


Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.065	0.046	0.053
0.40	0.177	0.131	0.121
0.80	0.281	0.179	0.171
1.20	0.386	0.228	0.213
1.60	0.494	0.278	0.256
2.00	0.603	0.329	0.301
2.40	0.714	0.380	0.345
2.50	0.741	0.393	0.356
2.75	0.812	0.426	0.385
--	-	-	-
--	-	-	-

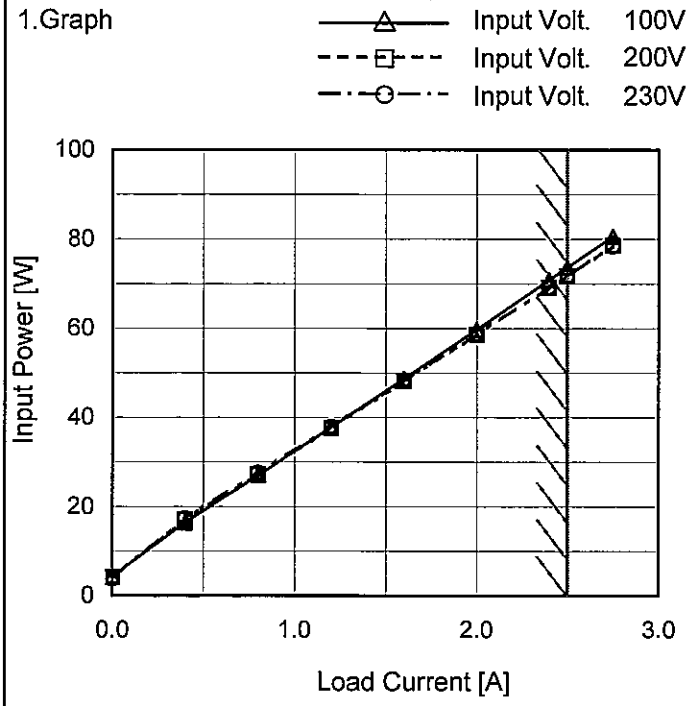
BC-10429

COSEL

Model	PMA60F-24
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. 200[V]	Input Volt. 230[V]
0.00	4.30	4.10	3.70
0.40	16.40	17.10	17.40
0.80	27.00	27.30	27.60
1.20	37.80	37.60	37.90
1.60	48.70	48.10	48.30
2.00	59.70	58.60	58.70
2.40	70.80	69.20	69.10
2.50	73.60	71.80	71.70
2.75	80.60	78.50	78.40
--	-	-	-
--	-	-	-

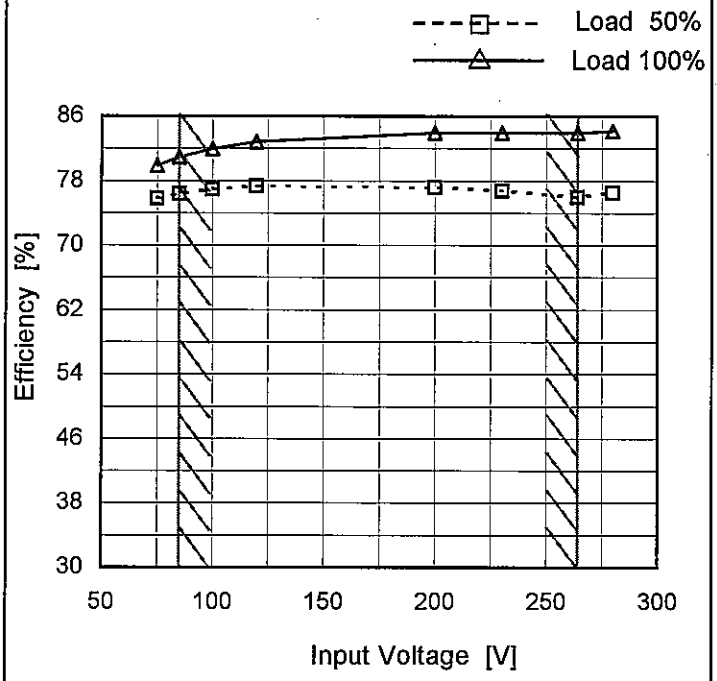
BC-10429

COSEL

Model	PMA60F-24
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%
75	75.8	79.8
85	76.4	80.9
100	77.0	81.9
120	77.4	82.8
200	77.2	84.0
230	76.8	84.0
264	76.0	84.0
280	76.6	84.2
--	-	-

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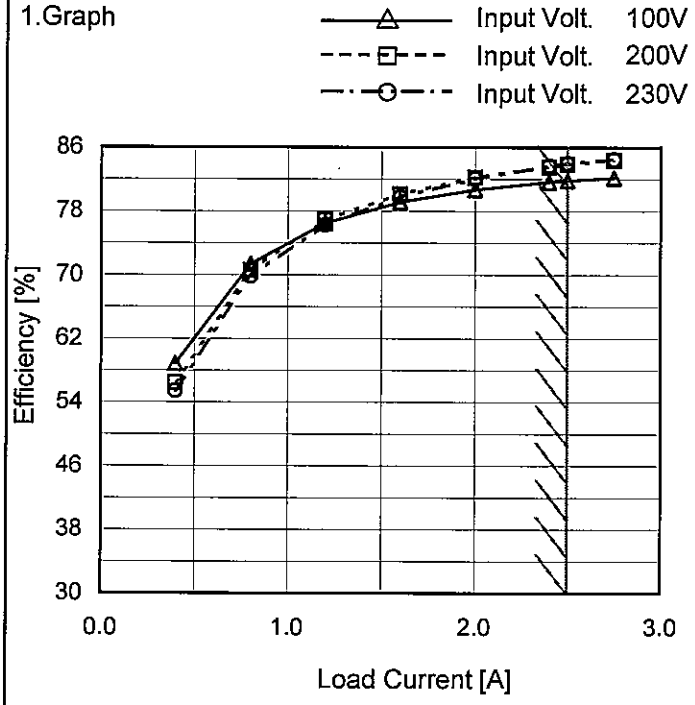
Model	PMA60F-24
Item	Efficiency (by Load Current)
Object	———————

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. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.40	58.8	56.4	55.4
0.80	71.4	70.6	69.8
1.20	76.4	76.9	76.3
1.60	79.1	80.1	79.8
2.00	80.7	82.2	82.1
2.40	81.7	83.5	83.7
2.50	81.8	83.9	84.0
2.75	82.2	84.4	84.5
--	-	-	-
--	-	-	-

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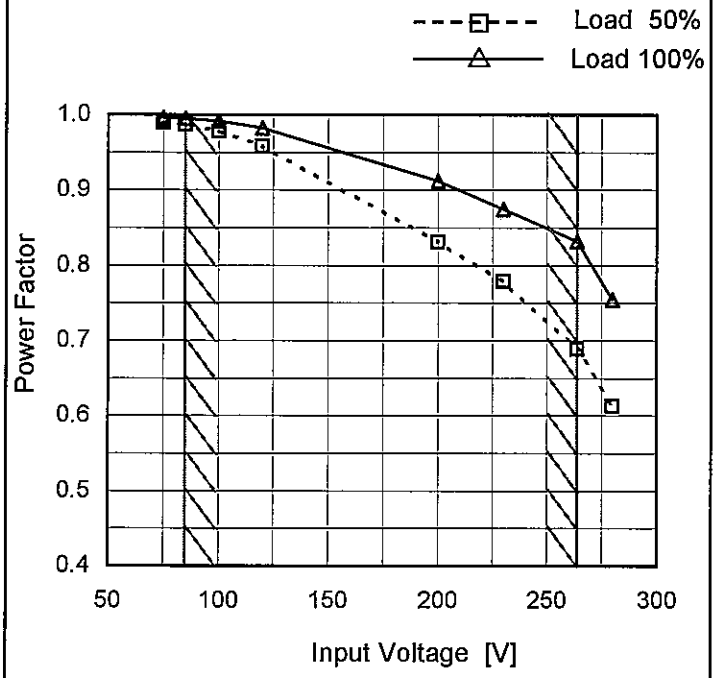
Model	PMA60F-24
Item	Power Factor (by Input Voltage)
Object	———————

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%
75	0.990	0.996
85	0.987	0.995
100	0.978	0.992
120	0.958	0.982
200	0.832	0.912
230	0.779	0.874
264	0.689	0.832
280	0.613	0.754
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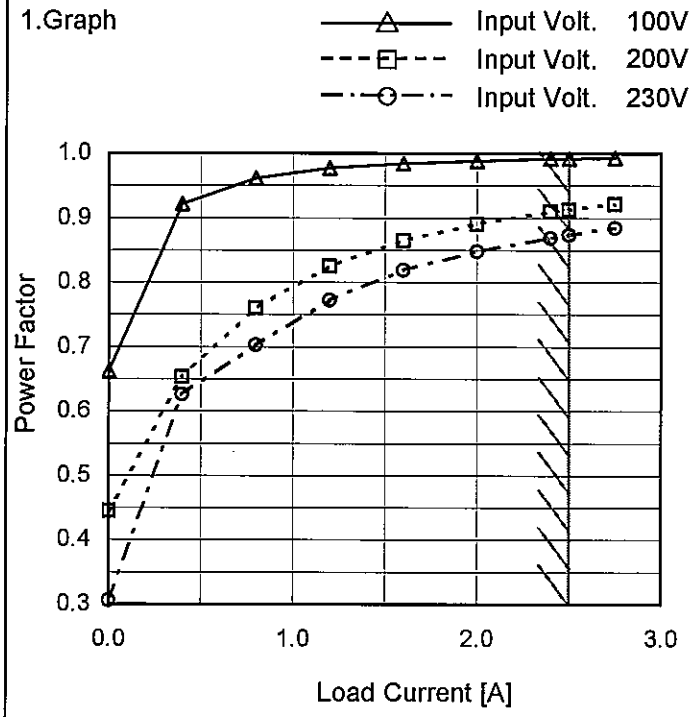
Model	PMA60F-24
Item	Power Factor (by Load Current)
Object	———————

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. 200[V]	Input Volt. 230[V]
0.00	0.662	0.446	0.306
0.40	0.921	0.653	0.626
0.80	0.961	0.760	0.702
1.20	0.977	0.825	0.772
1.60	0.984	0.865	0.819
2.00	0.988	0.891	0.848
2.40	0.992	0.909	0.869
2.50	0.992	0.912	0.873
2.75	0.993	0.921	0.885
--	-	-	-
--	-	-	-

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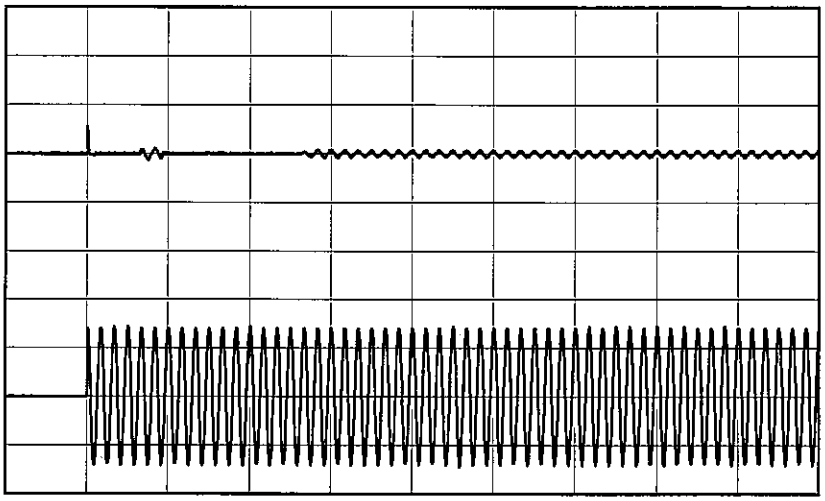
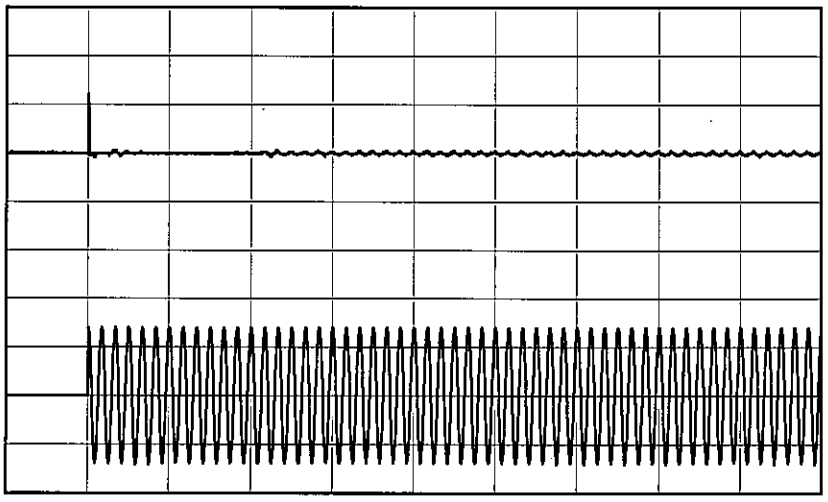
Model	PMA60F-24		
Item	Inrush Current	Temperature	25°C
Object	————	Testing Circuitry	Figure A



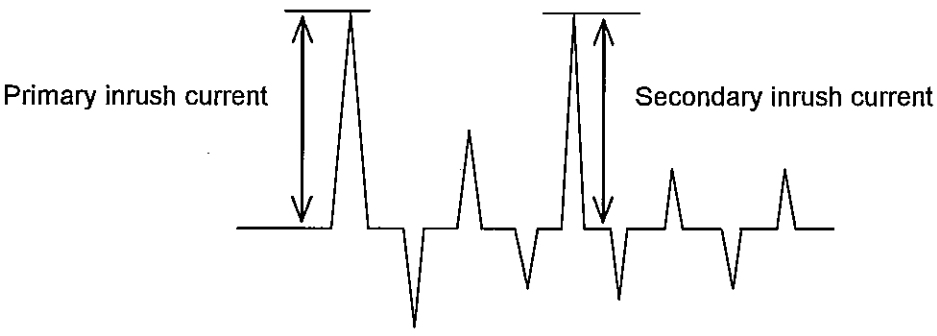
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
11.2 A
Secondary inrush current :
2.5 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
24.3 A
Secondary inrush current :
1.3 A



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Model	PMA60F-24	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	———————	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
IEC60601	Both phases	0.05	0.12	0.14	Operation
	One of phases	0.08	0.19	0.21	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.

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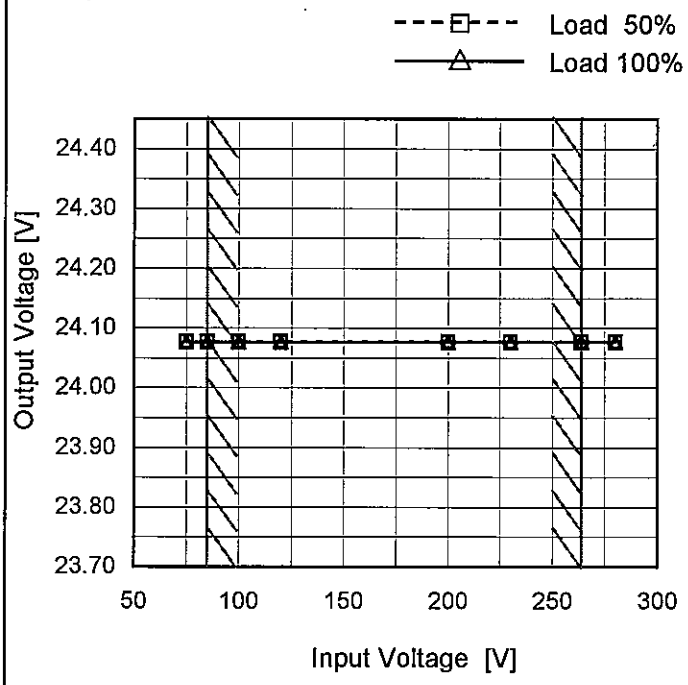
Model	PMA60F-24
Item	Line Regulation
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

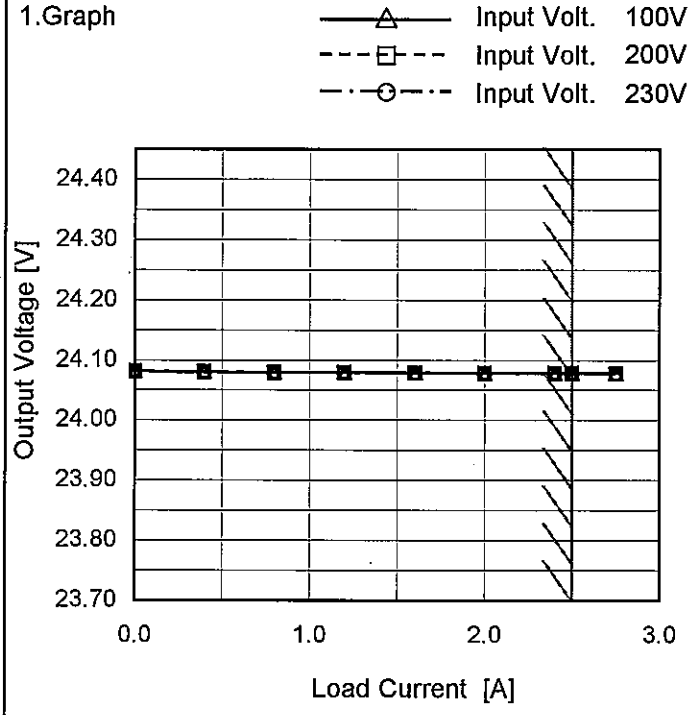
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	24.078	24.077
85	24.078	24.077
100	24.078	24.077
120	24.078	24.077
200	24.078	24.077
230	24.078	24.077
264	24.078	24.077
280	24.078	24.077
--	-	-

COSEL

Model	PMA60F-24
Item	Load Regulation
Object	+24V2.5A

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. 200[V]	Input Volt. 230[V]
0.00	24.082	24.082	24.081
0.40	24.080	24.080	24.080
0.80	24.080	24.079	24.079
1.20	24.079	24.079	24.079
1.60	24.079	24.079	24.079
2.00	24.079	24.078	24.078
2.40	24.078	24.078	24.078
2.50	24.078	24.078	24.078
2.75	24.078	24.078	24.077
--	-	-	-
--	-	-	-

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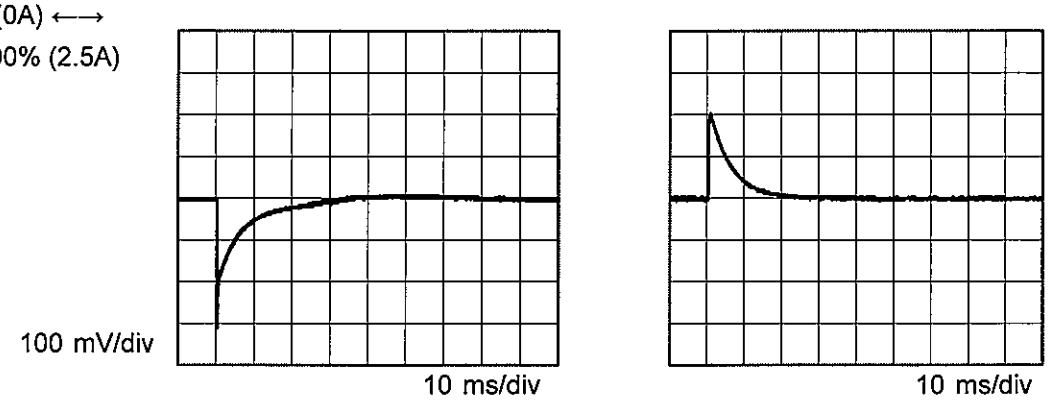
Model	PMA60F-24		
Item	Dynamic Load Response	Temperature Testing Circuitry	25˚C Figure A
Object	+24V2.5A		

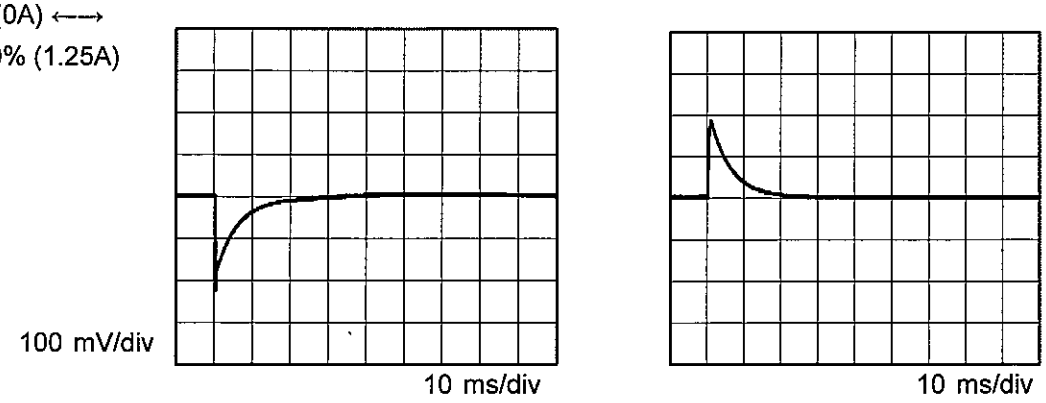
Input Volt. 100 V
Cycle 1000 ms

Response. t1=t2=50us. Typ

Min. Load (0A) ⟷
Load 100% (2.5A)



Min. Load (0A) ⟷
Load 50% (1.25A)



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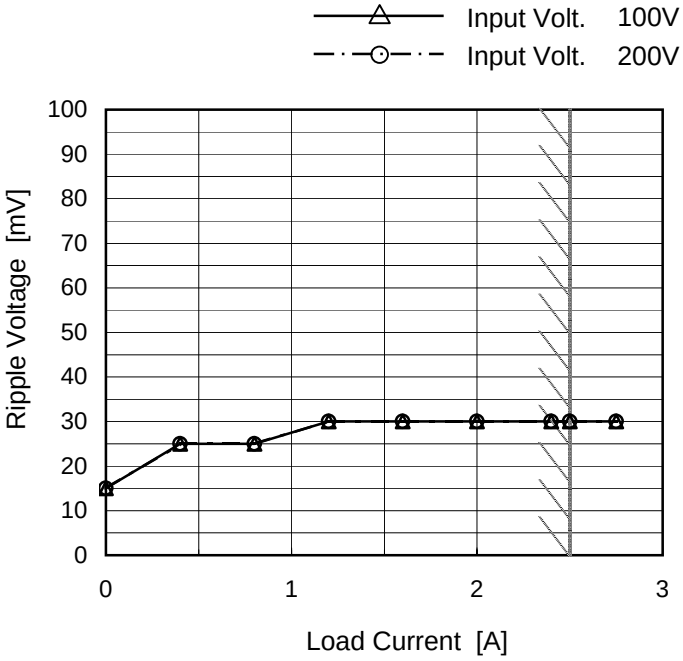
Model	PMA60F-24
Item	Ripple Voltage (by Load Current)
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

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

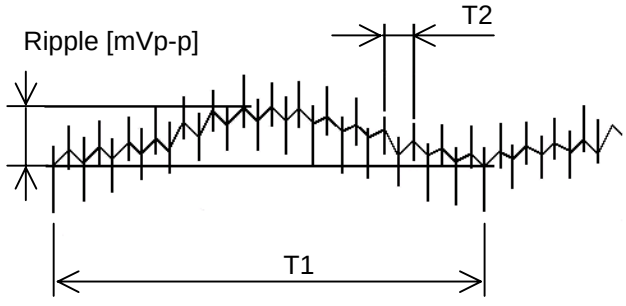


Fig. Complex Ripple Wave Form

2.Values

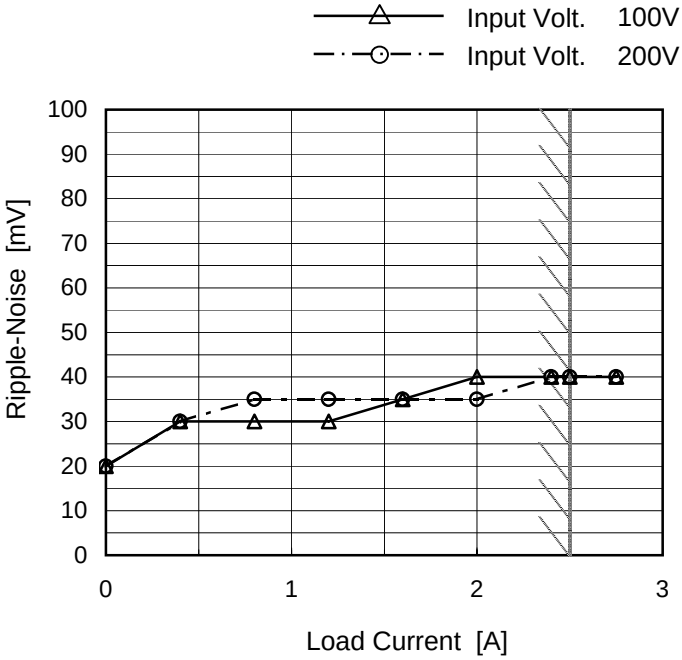
Load Current [A]	Ripple Voltage [mV] Input Volt. 100 [V]	Ripple Voltage [mV] Input Volt. 200 [V]
0.00	15	15
0.40	25	25
0.80	25	25
1.20	30	30
1.60	30	30
2.00	30	30
2.40	30	30
2.50	30	30
2.75	30	30
--	-	-
--	-	-

COSEL

Model	PMA60F-24
Item	Ripple-Noise
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

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.

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

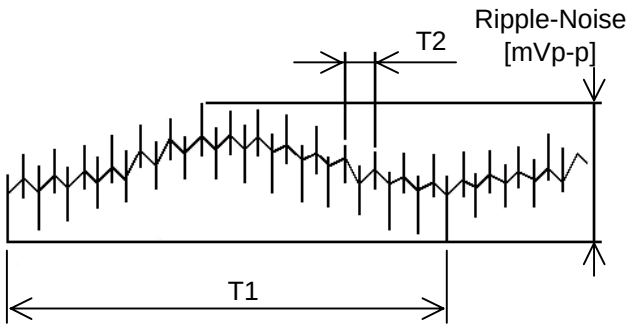


Fig. Complex Ripple Wave Form

2.Values

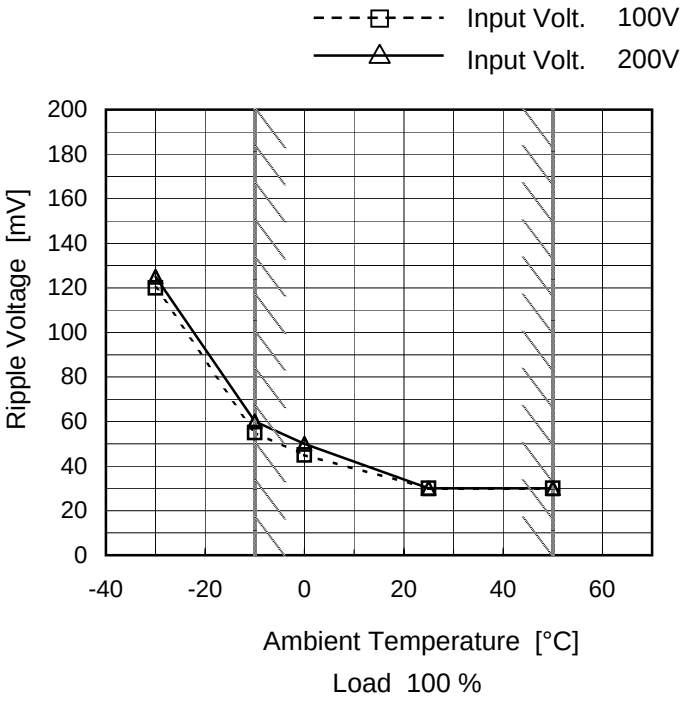
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.00	20	20
0.40	30	30
0.80	30	35
1.20	30	35
1.60	35	35
2.00	40	35
2.40	40	40
2.50	40	40
2.75	40	40
--	-	-
--	-	-

COSEL

Model	PMA60F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V2.5A

Testing Circuitry Figure A

1.Graph



Measured by 20 MHz Oscilloscope.

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

2.Values

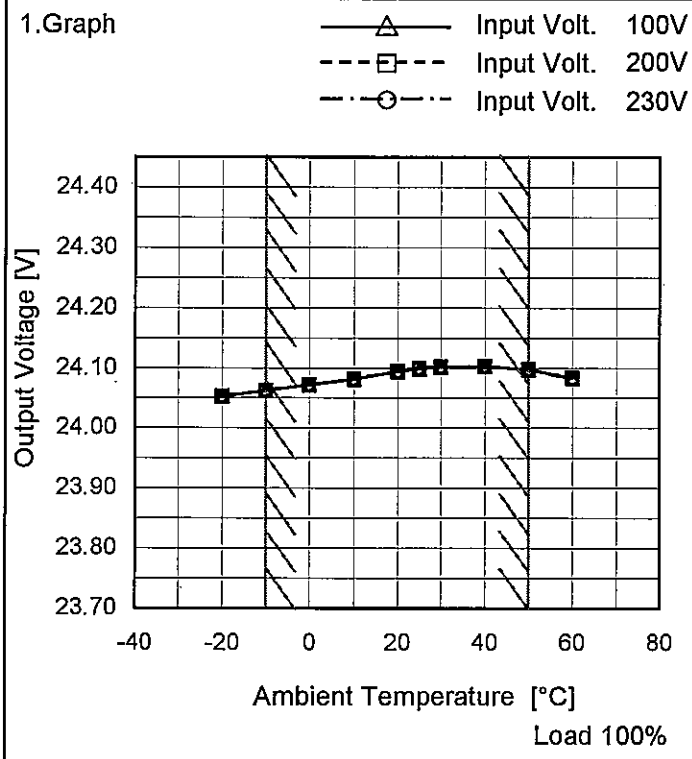
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	120	125
-10	55	60
0	45	50
25	30	30
50	30	30
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PMA60F-24
Item	Ambient Temperature Drift
Object	+24V2.5A

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. 200[V]	Input Volt. 230[V]
-20	24.052	24.053	24.053
-10	24.062	24.062	24.062
0	24.071	24.071	24.072
10	24.082	24.082	24.082
20	24.094	24.094	24.095
25	24.099	24.099	24.099
30	24.102	24.102	24.102
40	24.103	24.103	24.103
50	24.097	24.097	24.097
60	24.083	24.083	24.083
--	-	-	-

COSEL

Model	PMA60F-24	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+24V2.5A	

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 : -10 - 50°C
Input Voltage : 85 - 264V
Load Current : 0 - 2.5A

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

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

2.Values

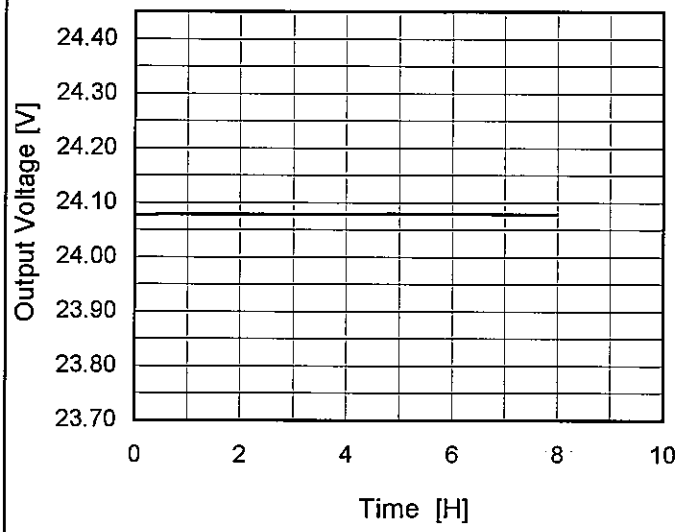
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	40	264	0	24.106	±22	±0.1
Minimum Voltage	-10	85	2.5	24.062		

COSEL

Model	PMA60F-24
Item	Time Lapse Drift
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC200V is equal.

2.Values

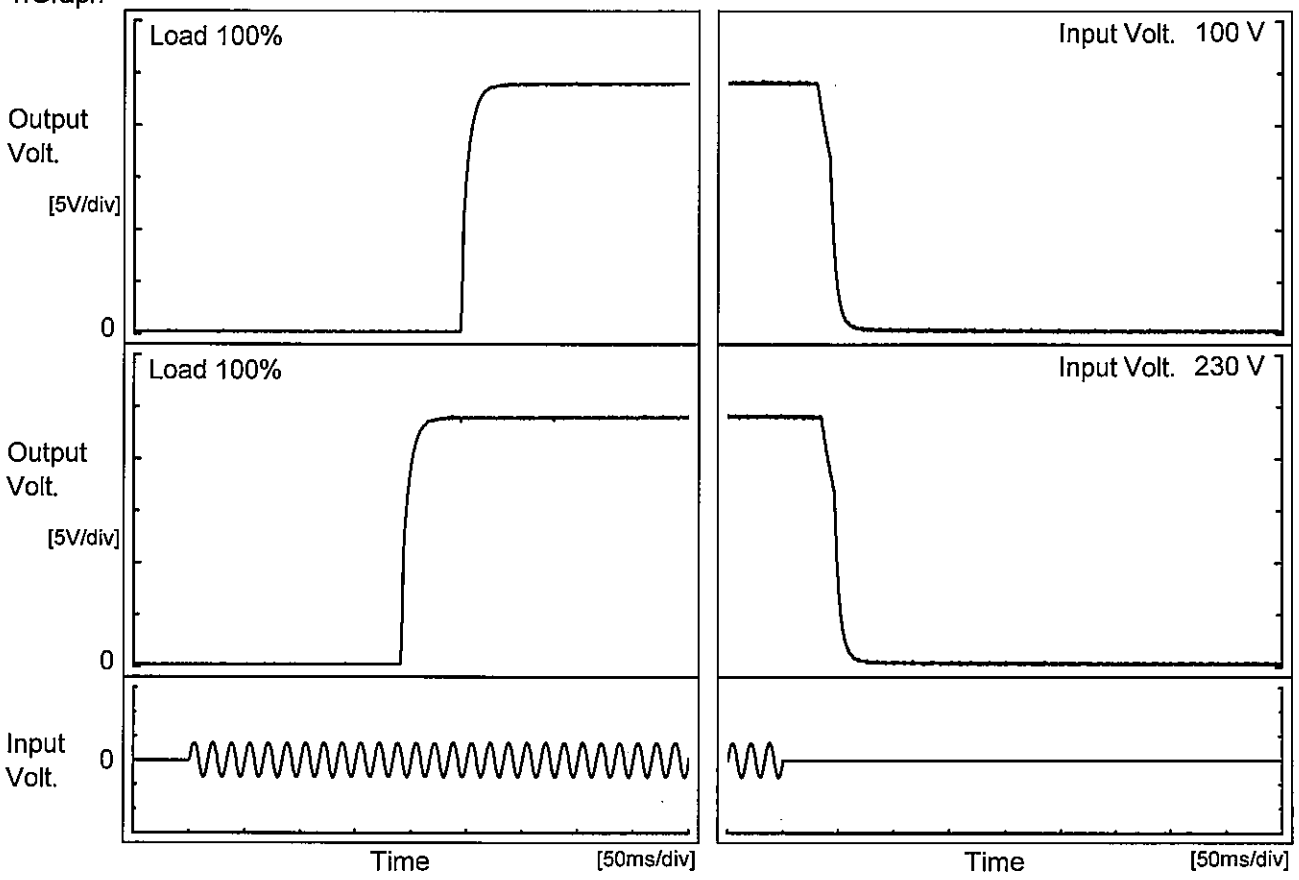
Time since start [H]	Output Voltage [V]
0.0	24.078
0.5	24.078
1.0	24.078
2.0	24.079
3.0	24.079
4.0	24.079
5.0	24.079
6.0	24.079
7.0	24.079
8.0	24.079

COSEL

Model	PMA60F-24
Item	Rise and Fall Time
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

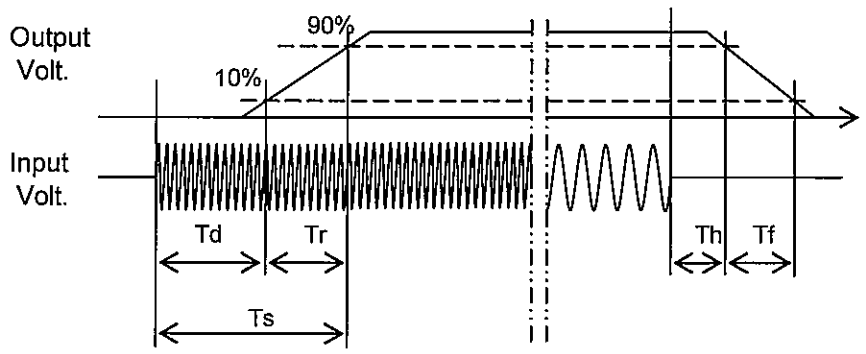
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	245.5	13.5	259.0	33.5	18.5
230 V	192.0	13.5	205.5	37.8	18.5

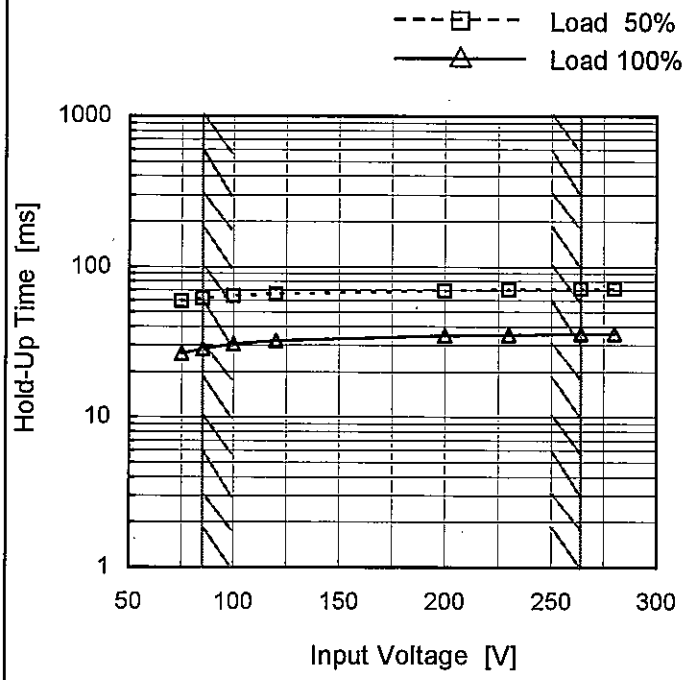


COSEL

Model	PMA60F-24
Item	Hold-Up Time
Object	+24V2.5A

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

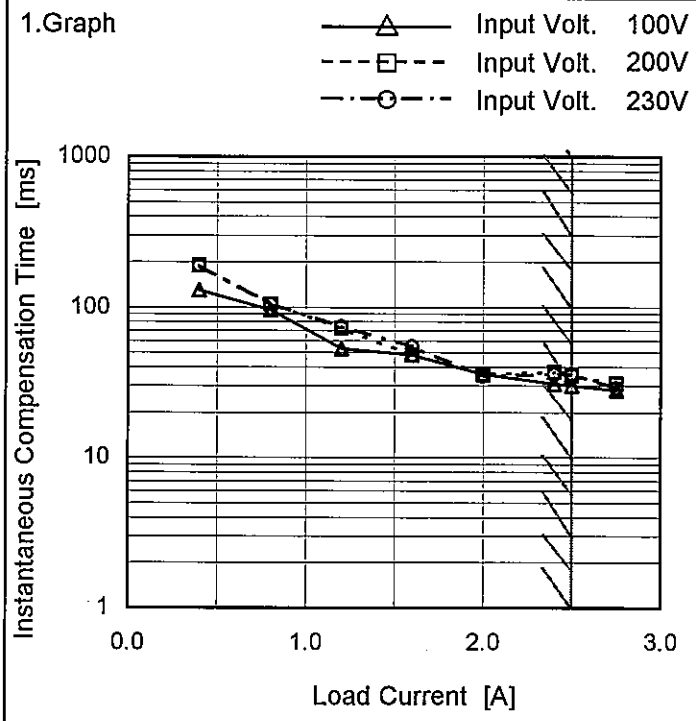
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	59	27
85	62	29
100	64	31
120	66	32
200	70	35
230	71	35
264	72	36
280	71	36
--	-	-

COSEL

Model	PMA60F-24
Item	Instantaneous Interruption Compensation
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

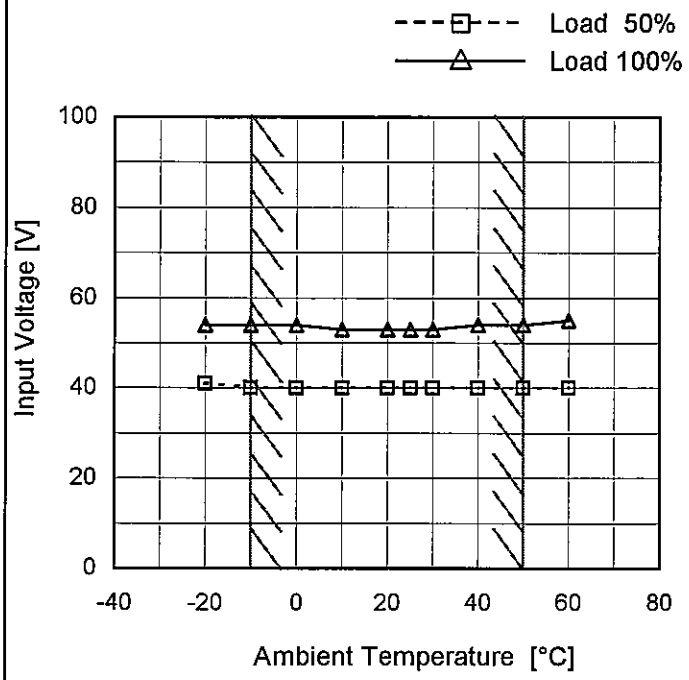
Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.40	130	189	189
0.80	96	105	105
1.20	53	72	74
1.60	48	48	55
2.00	36	36	35
2.40	31	37	36
2.50	30	35	36
2.75	28	31	29
--	-	-	-
--	-	-	-

COSEL

Model	PMA60F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V2.5A

Testing Circuitry Figure A

1.Graph



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

2.Values

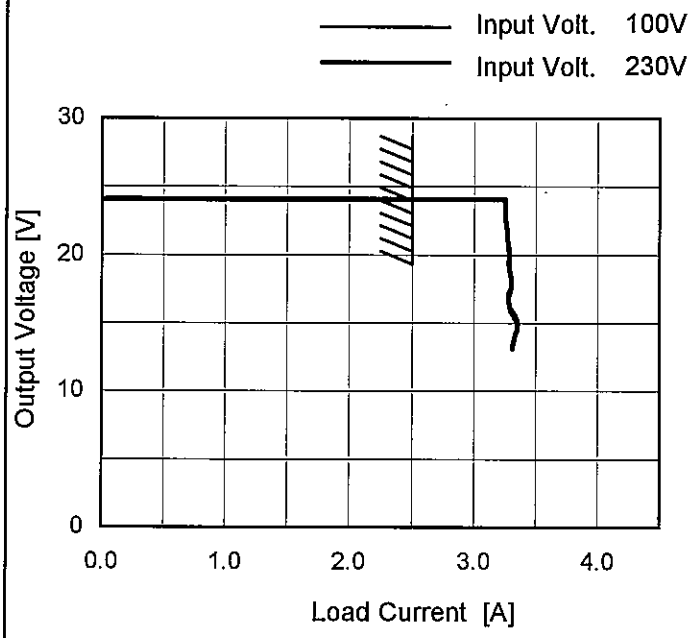
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	41	54
-10	40	54
0	40	54
10	40	53
20	40	53
25	40	53
30	40	53
40	40	54
50	40	54
60	40	55
--	-	-

COSEL

Model	PMA60F-24
Item	Overcurrent Protection
Object	+24V2.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

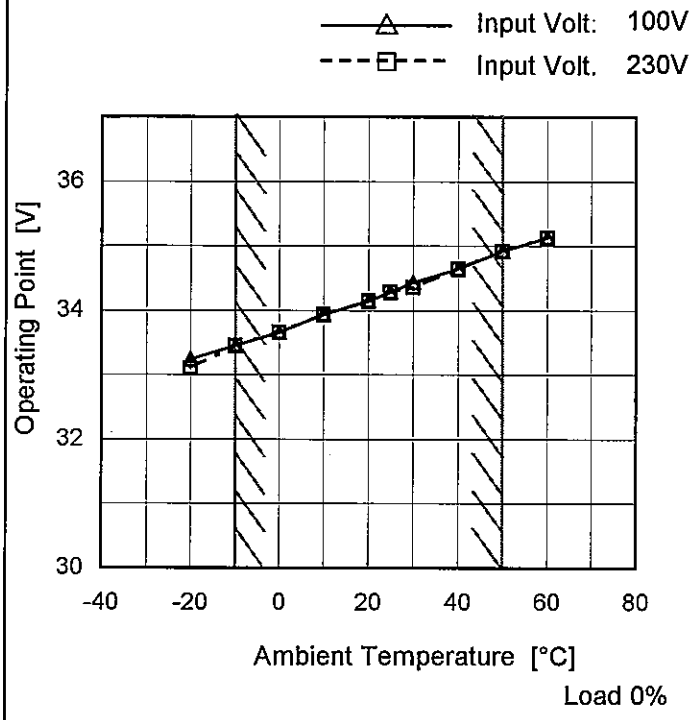
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
24.0	3.24	3.25
22.8	3.25	3.26
21.6	3.27	3.27
19.2	3.29	3.29
16.8	3.29	3.28
14.4	3.35	3.35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PMA60F-24
Item	Overvoltage Protection
Object	+24V2.5A

Testing Circuitry Figure A

1.Graph



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

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-20	33.24	33.10
-10	33.45	33.45
0	33.66	33.66
10	33.94	33.94
20	34.15	34.15
25	34.29	34.29
30	34.43	34.36
40	34.64	34.64
50	34.92	34.92
60	35.13	35.13
--	-	-

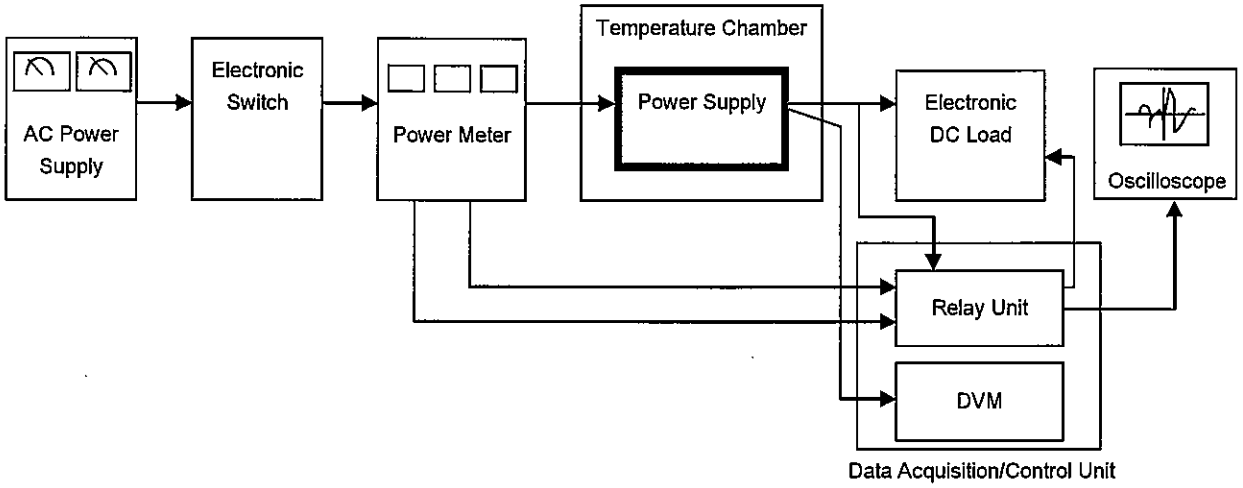


Figure A

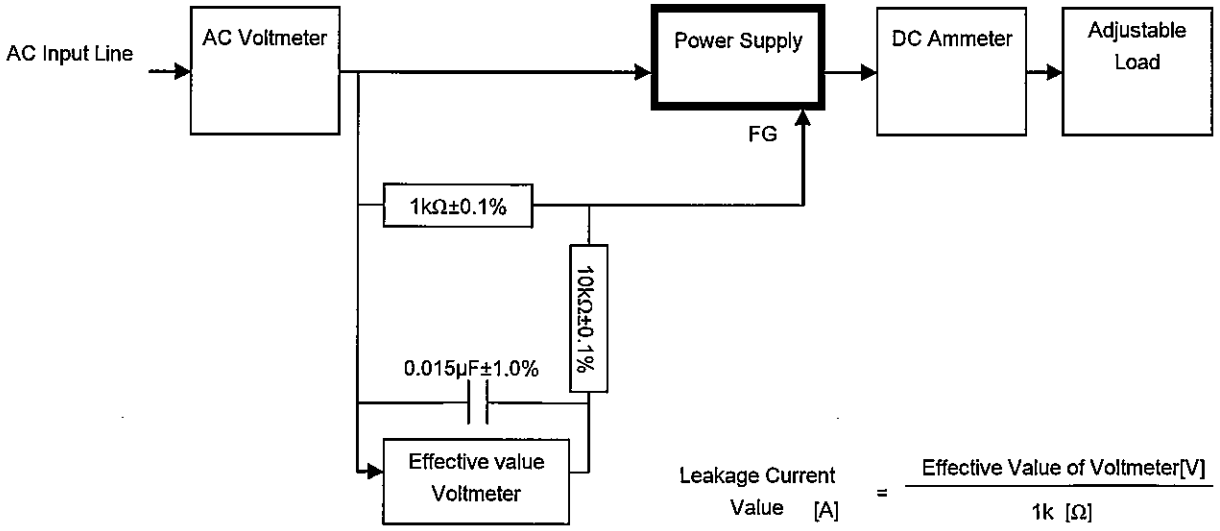


Figure B (IEC60601-1)