



# TEST DATA OF PJMA600F-24

Regulated DC Power Supply  
July 6, 2020

Approved by :   
Takashi Kajii

Design Manager

Prepared by :   
Ryo Takahashi

Design Engineer

**COSEL CO.,LTD.**



## 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.Ovvoltage Protection .....	23
24.Figure of Testing Circuitry .....	24

(Final Page 24)

**COSEL**

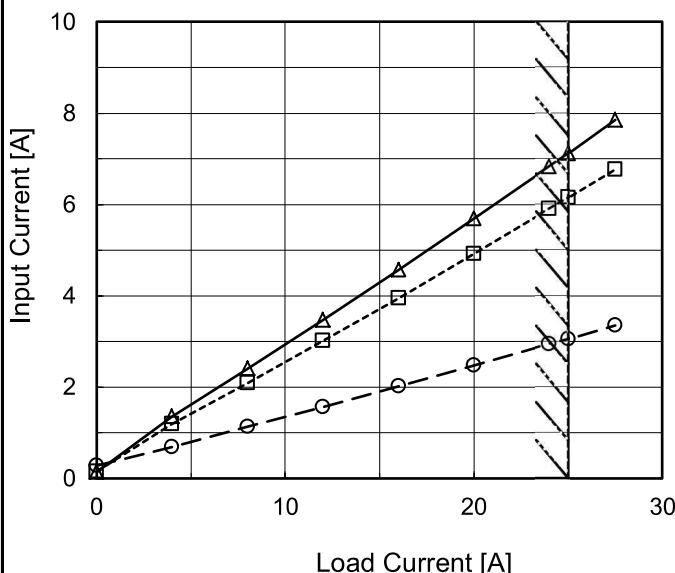
Model PJMA600F-24

Item Input Current (by Load Current)

Object \_\_\_\_\_

## 1. Graph

—△— Input Volt. 100V  
 - -□--- Input Volt. 115V  
 - -○--- Input Volt. 230V



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

 Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	0.142	0.154	0.279
4.0	1.353	1.188	0.687
8.0	2.402	2.093	1.126
12.0	3.473	3.012	1.567
16.0	4.566	3.954	2.018
20.0	5.687	4.916	2.475
24.0	6.829	5.897	2.938
25.0	7.120	6.146	3.053
27.5	7.850	6.770	3.347
--	-	-	-
--	-	-	-

**COSEL**

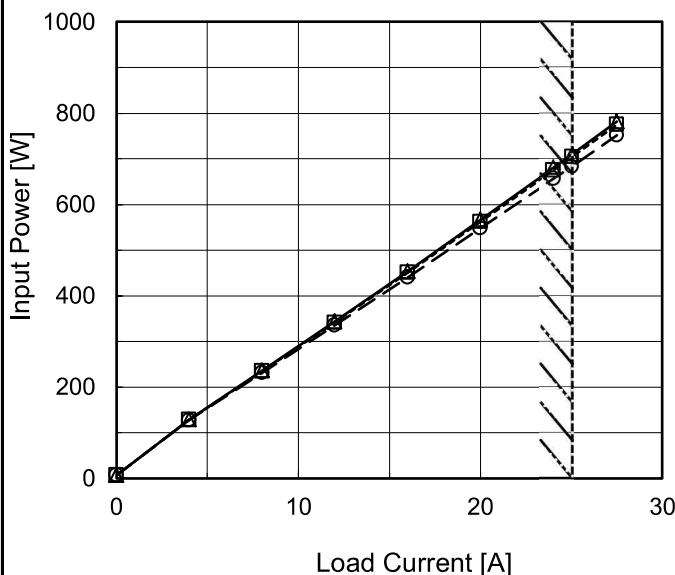
Model PJMA600F-24

Item Input Power (by Load Current)

Object \_\_\_\_\_

## 1. Graph

—△— Input Volt. 100V  
 - -□--- Input Volt. 115V  
 - -⊖--- Input Volt. 230V



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

 Temperature 25°C  
 Testing Circuitry Figure A

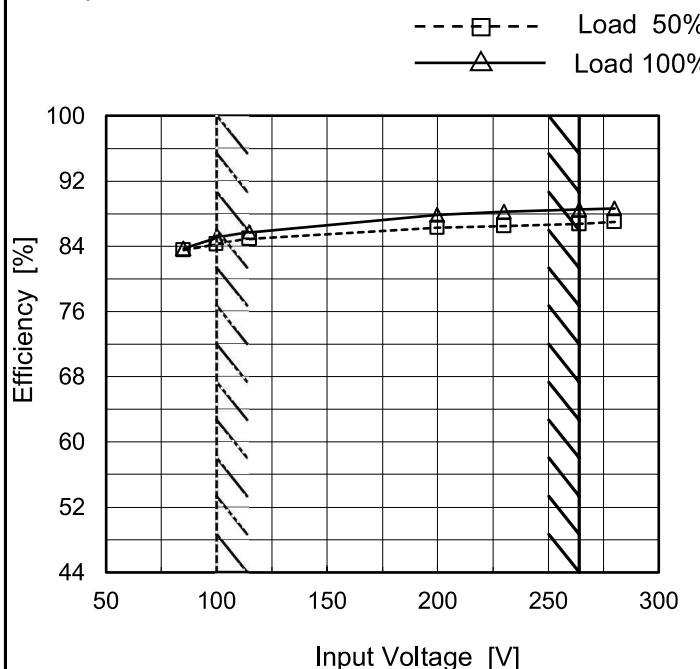
## 2. Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	6.4	6.4	6.9
4.0	128.6	128.0	126.8
8.0	235.6	234.4	230.9
12.0	343.8	341.5	335.2
16.0	453.8	450.6	440.7
20.0	566.3	561.7	548.0
24.0	680.5	674.9	656.0
25.0	709.0	703.3	683.0
27.5	782.0	775.1	752.0
--	-	-	-
--	-	-	-

# COSEL

Model	PJMA600F-24
Item	Efficiency (by Input Voltage)
Object	_____

## 1.Graph



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

Temperature 25°C  
Testing Circuitry Figure A

## 2.Values

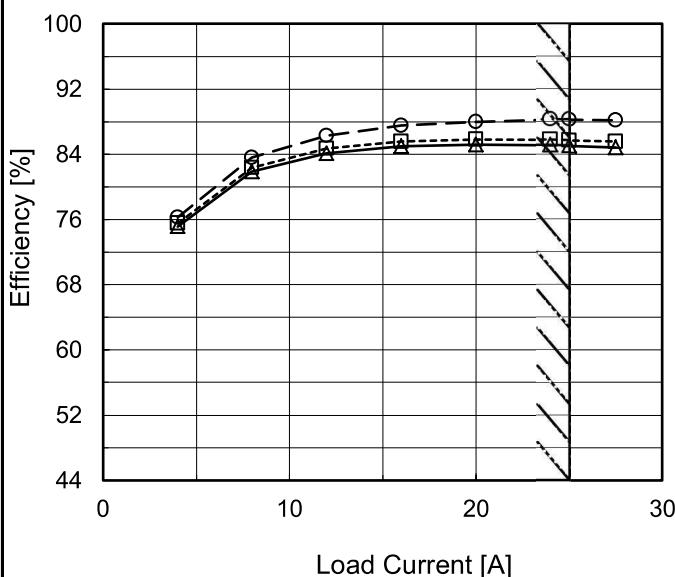
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	83.5	83.7
100	84.3	85.0
115	84.9	85.7
200	86.3	87.9
230	86.5	88.3
264	86.8	88.5
280	87.0	88.7
--	-	-
--	-	-

# COSEL

Model	PJMA600F-24
Item	Efficiency (by Load Current)
Object	_____

## 1.Graph

—△— Input Volt. 100V  
 -□--- Input Volt. 115V  
 -○--- Input Volt. 230V



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

Temperature 25°C  
Testing Circuitry Figure A

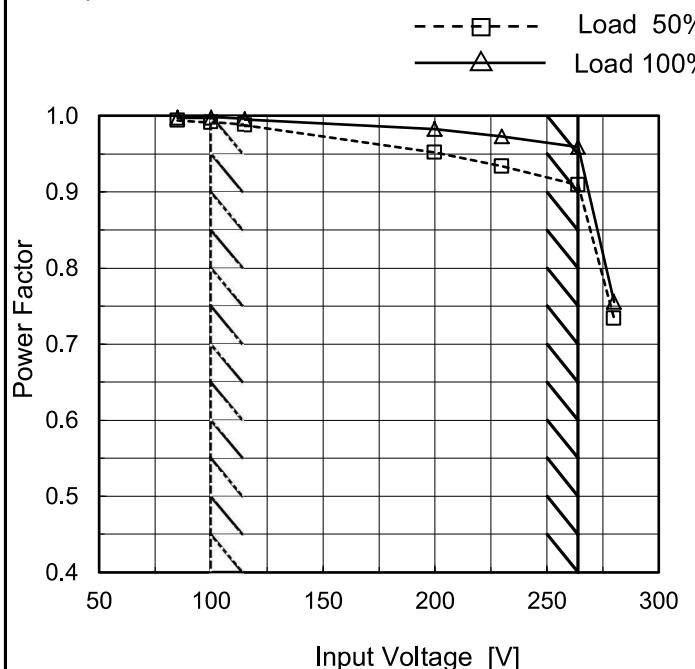
## 2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	75.1	75.5	76.2
8.0	81.9	82.3	83.6
12.0	84.1	84.7	86.3
16.0	85.0	85.6	87.5
20.0	85.1	85.8	88.0
24.0	85.1	85.8	88.3
25.0	85.0	85.7	88.3
27.5	84.8	85.6	88.2
--	-	-	-
--	-	-	-

**COSEL**

Model	PJMA600F-24
Item	Power Factor (by Input Voltage)
Object	—

## 1.Graph



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

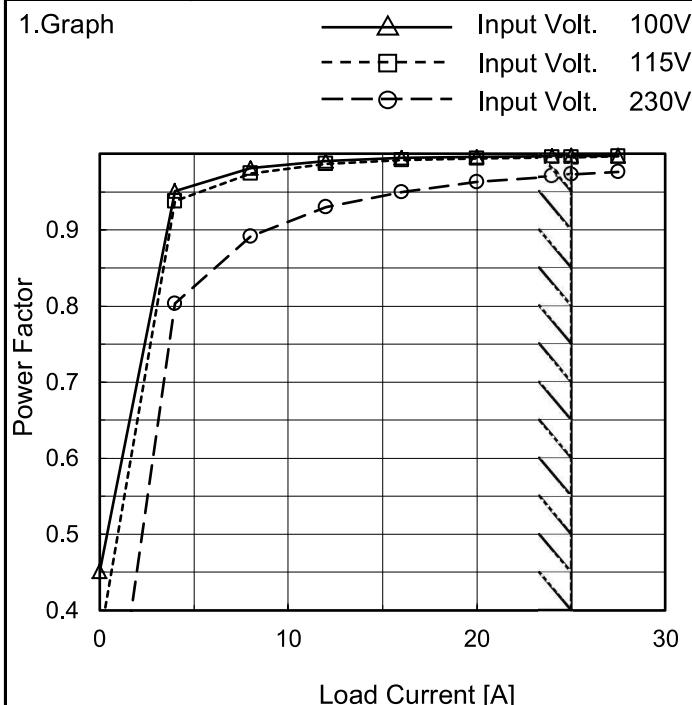
 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
85	0.994	0.997
100	0.991	0.997
115	0.988	0.996
200	0.952	0.983
230	0.934	0.973
264	0.909	0.959
280	0.734	0.756
--	-	-
--	-	-

**COSEL**

Model	PJMA600F-24
Item	Power Factor (by Load Current)
Object	_____



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

 Temperature 25°C  
 Testing Circuitry Figure A

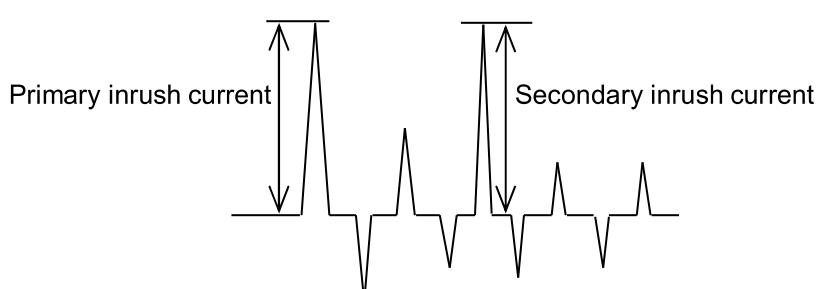
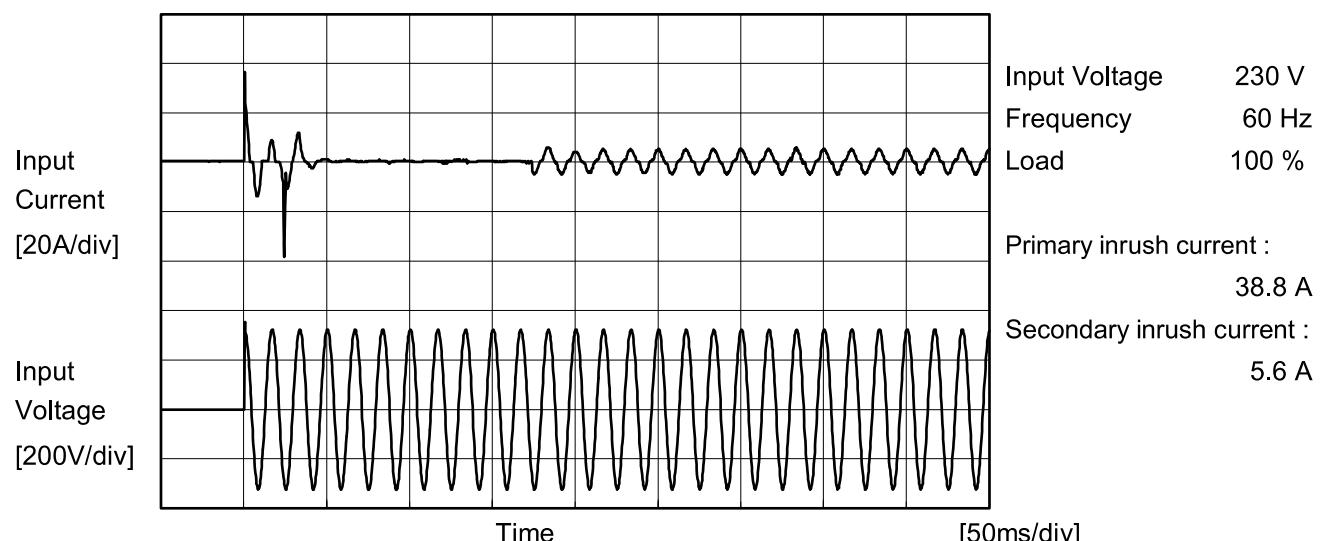
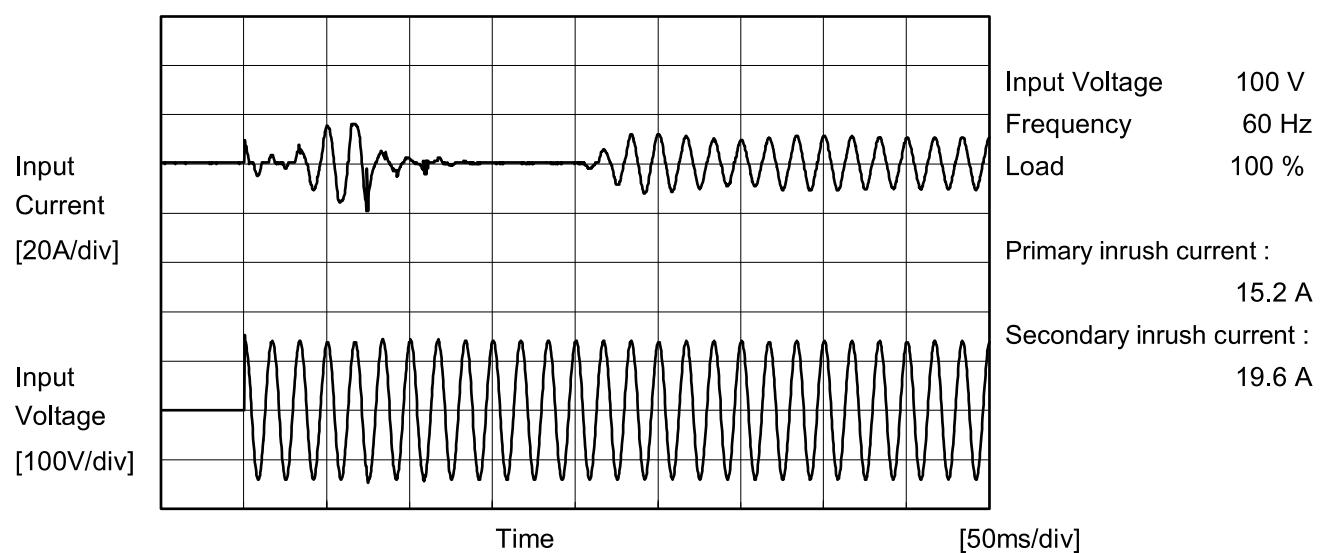
## 2. Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	0.451	0.362	0.107
4.0	0.951	0.938	0.803
8.0	0.982	0.975	0.892
12.0	0.990	0.987	0.930
16.0	0.995	0.992	0.950
20.0	0.996	0.994	0.963
24.0	0.997	0.996	0.970
25.0	0.997	0.996	0.973
27.5	0.997	0.997	0.977
--	-	-	-
--	-	-	-

# COSEL

Model	PJMA600F-24
Item	Inrush Current
Object	_____

Temperature 25°C  
Testing Circuitry Figure A





Model	PJMA600F-24	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	<hr/>		

### 1. Results

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
IEC60601-1	Both phases	0.09	0.10	0.23	Operation
	One of phases	0.16	0.19	0.43	Stand by

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

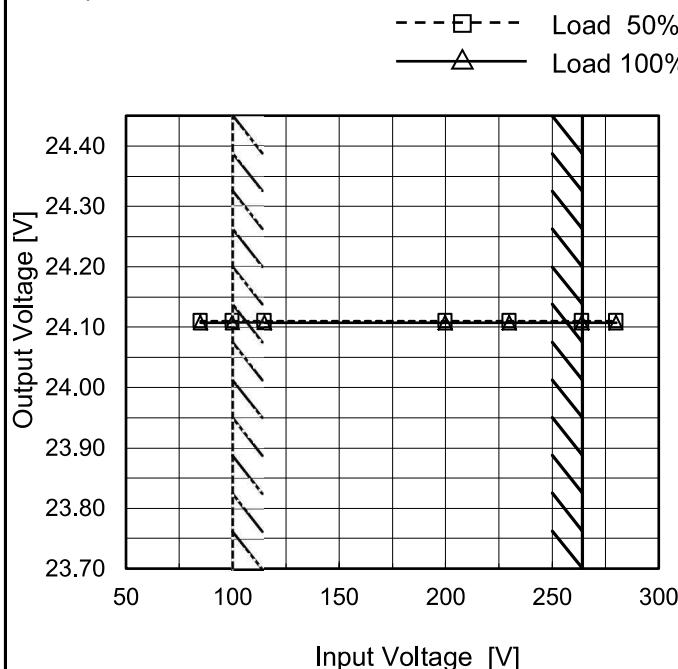
### 2. Condition

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

**COSEL**

Model	PJMA600F-24
Item	Line Regulation
Object	+24V25A

## 1.Graph



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

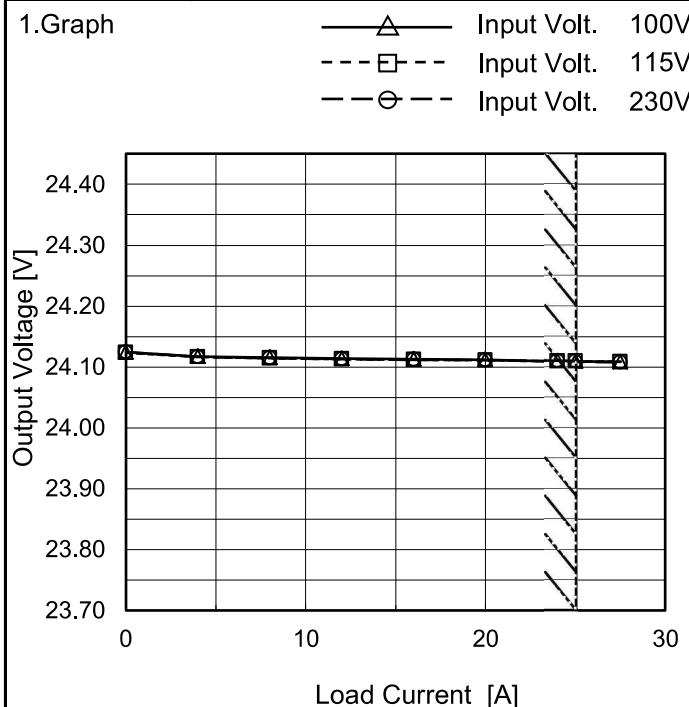
 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	24.110	24.108
100	24.110	24.107
115	24.110	24.107
200	24.110	24.108
230	24.110	24.108
264	24.110	24.107
280	24.110	24.107
--	-	-
--	-	-

**COSEL**

Model	PJMA600F-24
Item	Load Regulation
Object	+24V25A


 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	24.125	24.124	24.124
4.0	24.117	24.117	24.117
8.0	24.115	24.115	24.115
12.0	24.114	24.113	24.113
16.0	24.113	24.112	24.112
20.0	24.112	24.111	24.111
24.0	24.110	24.109	24.109
25.0	24.109	24.109	24.109
27.5	24.108	24.108	24.108
--	-	-	-
--	-	-	-

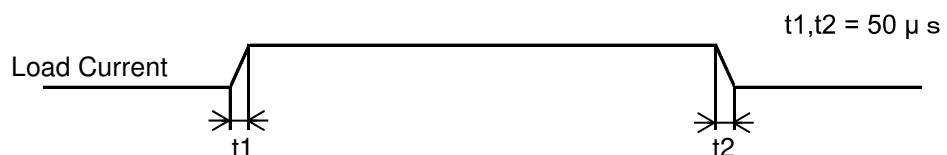
Note: Slanted line shows the range of the rated load current.

# COSEL

Model	PJMA600F-24
Item	Dynamic Load Response
Object	+24V25A

Temperature 25°C  
Testing Circuitry Figure A

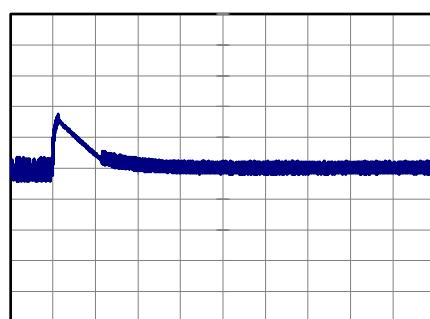
Input Volt. 100 V  
Cycle 1000 ms



Min.Load (0A)↔  
Load 100% (25A)

200 mV/div

20 ms/div

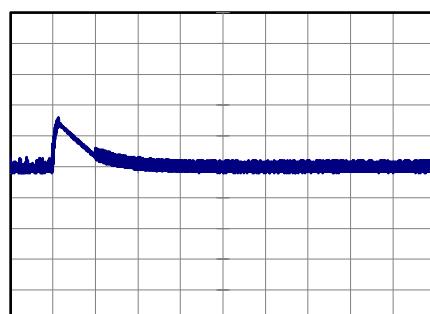


20 ms/div

Min.Load (0A)↔  
Load 50% (12.5A)

200 mV/div

20 ms/div



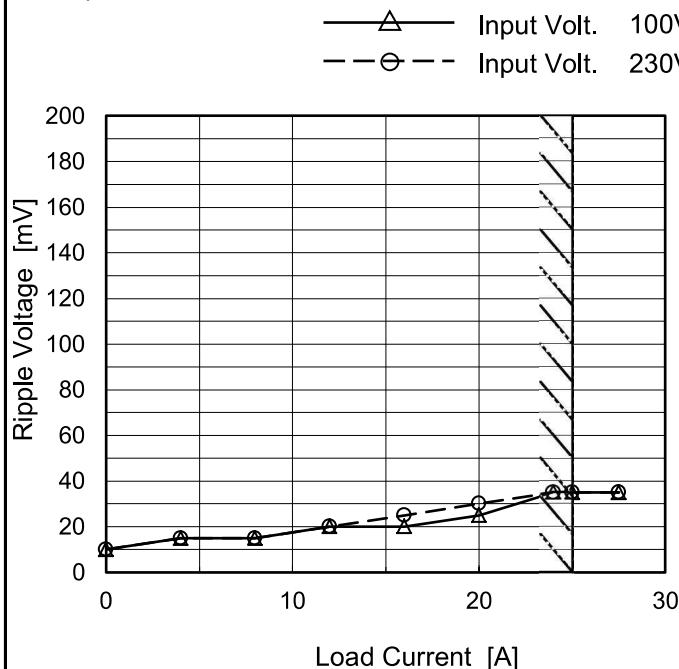
20 ms/div

# COSEL

Model	PJMA600F-24
Item	Ripple Voltage (by Load Current)
Object	+24V25A

Temperature 25°C  
Testing Circuitry Figure C

## 1. Graph



## 2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.0	10	10
4.0	15	15
8.0	15	15
12.0	20	20
16.0	20	25
20.0	25	30
24.0	35	35
25.0	35	35
27.5	35	35
--	-	-
--	-	-

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

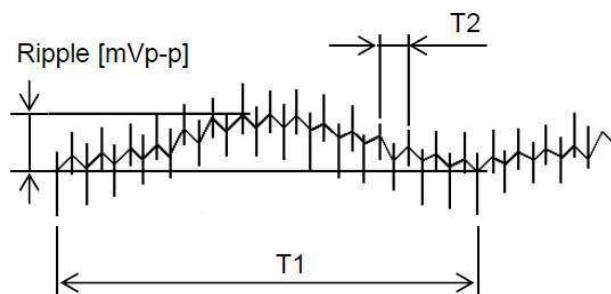


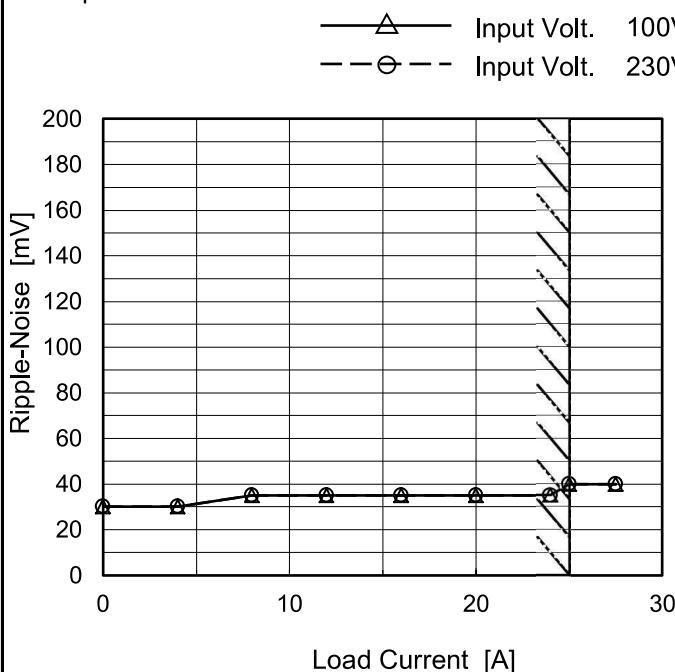
Fig. Complex Ripple Wave Form

# COSEL

Model	PJMA600F-24
Item	Ripple-Noise
Object	+24V25A

Temperature 25°C  
Testing Circuitry Figure C

## 1. Graph



## 2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.0	30	30
4.0	30	30
8.0	35	35
12.0	35	35
16.0	35	35
20.0	35	35
24.0	35	35
25.0	40	40
27.5	40	40
--	-	-
--	-	-

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

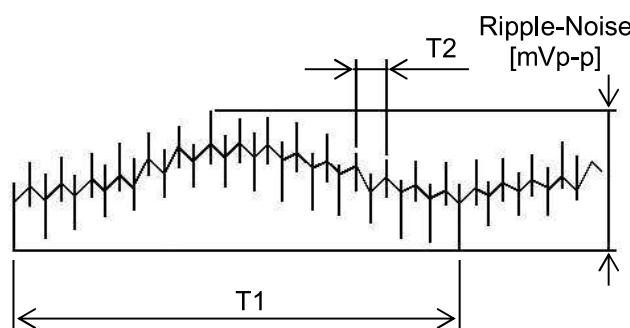
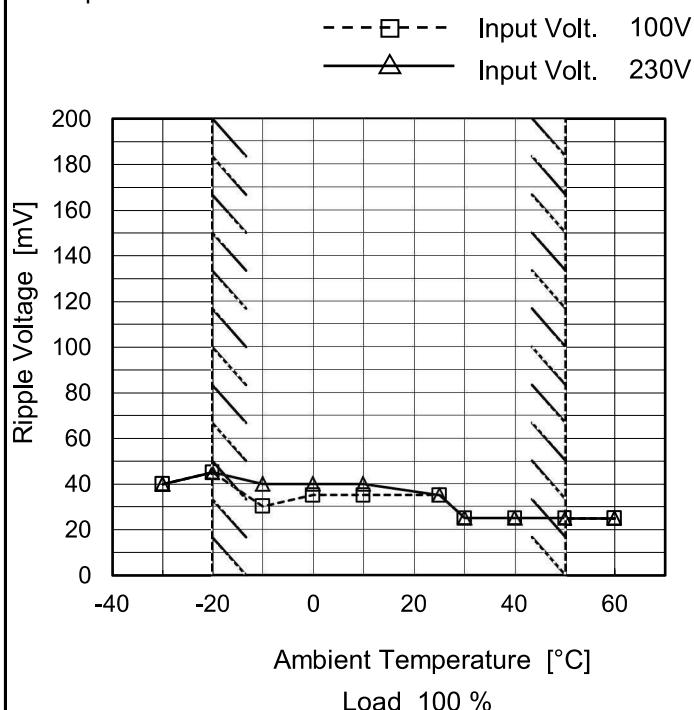


Fig. Complex Ripple Wave Form

# COSEL

Model	PJMA600F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V25A

## 1. Graph



Measured by 20 MHz Oscilloscope.

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

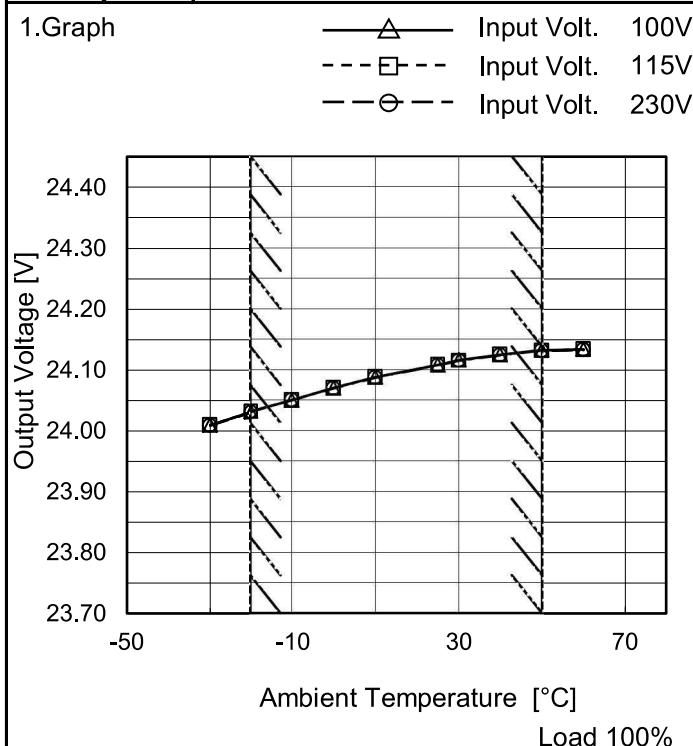
## Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
-30	40	40
-20	45	45
-10	30	40
0	35	40
10	35	40
25	35	35
30	25	25
40	25	25
50	25	25
60	25	25
--	-	-

**COSEL**

Model	PJMA600F-24
Item	Ambient Temperature Drift
Object	+24V25A



Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-30	24.009	24.009	24.009
-20	24.031	24.031	24.031
-10	24.050	24.050	24.050
0	24.070	24.069	24.069
10	24.087	24.087	24.087
25	24.107	24.107	24.107
30	24.115	24.115	24.115
40	24.124	24.124	24.124
50	24.132	24.131	24.131
60	24.134	24.134	24.133
--	-	-	-

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



Model	PJMA600F-24	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+24V25A	

### 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 : 100 - 230V

Load Current : 0 - 25A

\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

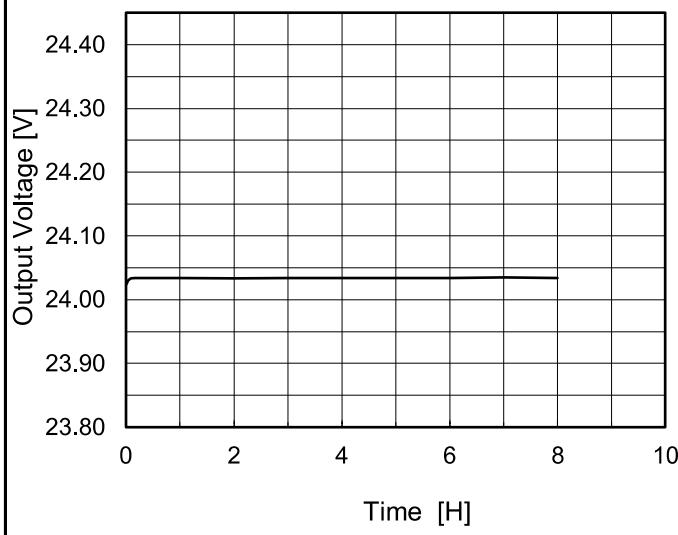
### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	100	0	24.147	±58	±0.2
Minimum Voltage	-20	230	25	24.031		

**COSEL**

Model	PJMA600F-24
Item	Time Lapse Drift
Object	+24V25A

## 1.Graph



Input Volt.      230V  
Load            100%

Temperature      25°C  
Testing Circuitry      Figure A

## 2.Values

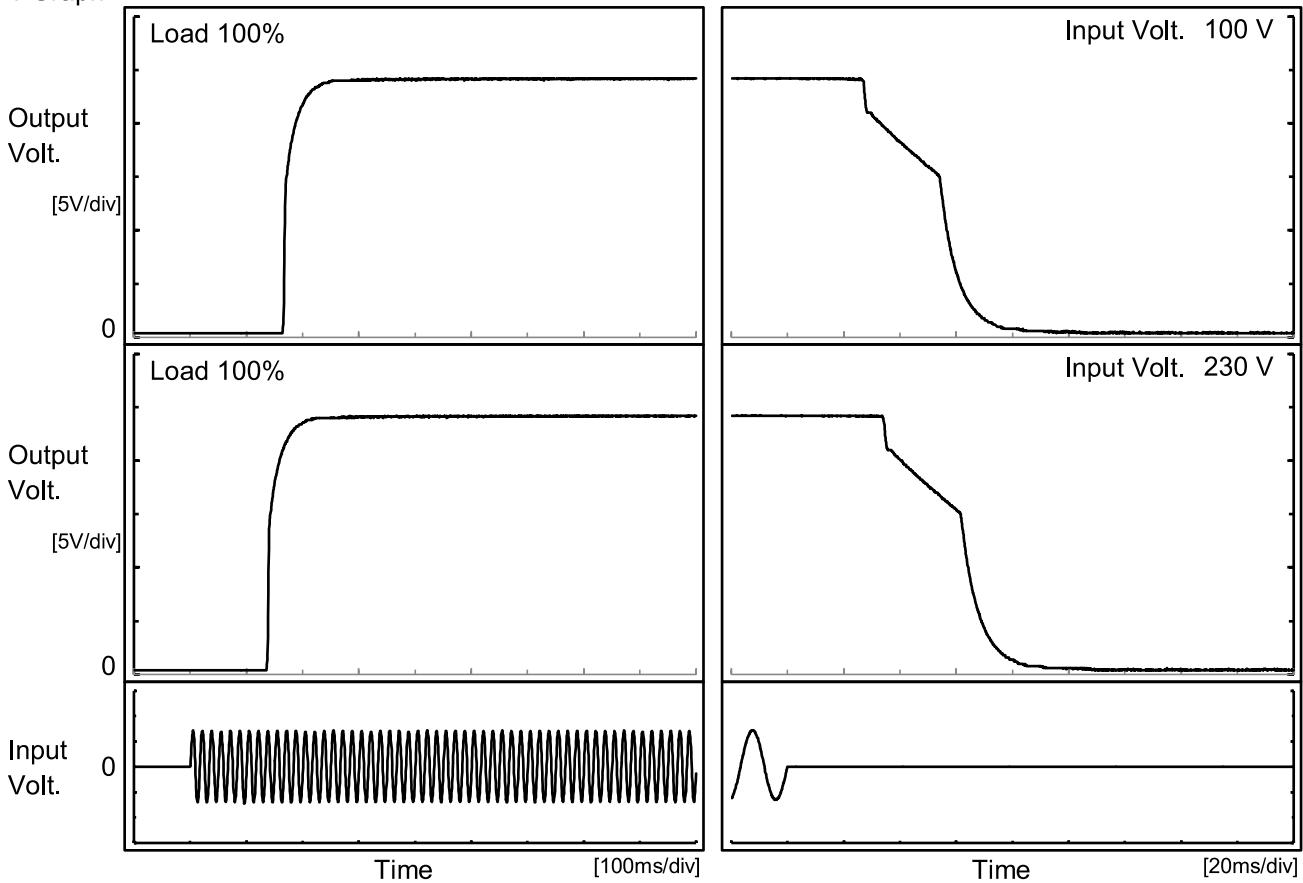
Time since start [H]	Output Voltage [V]
0.0	24.023
0.5	24.034
1.0	24.034
2.0	24.033
3.0	24.034
4.0	24.034
5.0	24.034
6.0	24.034
7.0	24.035
8.0	24.034

# COSEL

Model	PJMA600F-24
Item	Rise and Fall Time
Object	+24V25A

Temperature  
Testing Circuitry      25°C  
Figure A

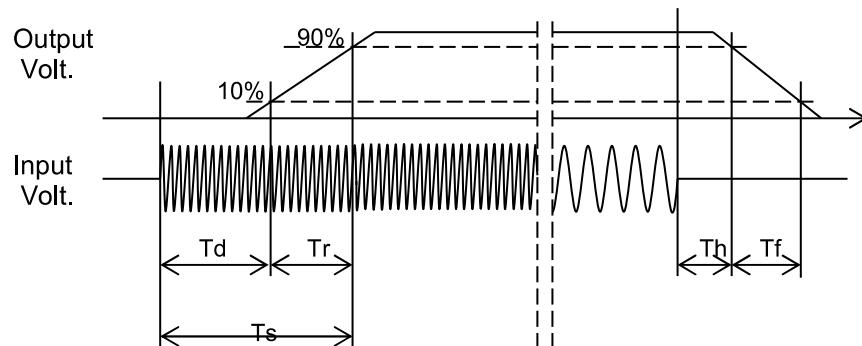
## 1.Graph



## 2.Values

[ms]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		166.5	36.0	202.5	27.6	38.1
230 V		136.5	35.0	171.5	34.8	38.5

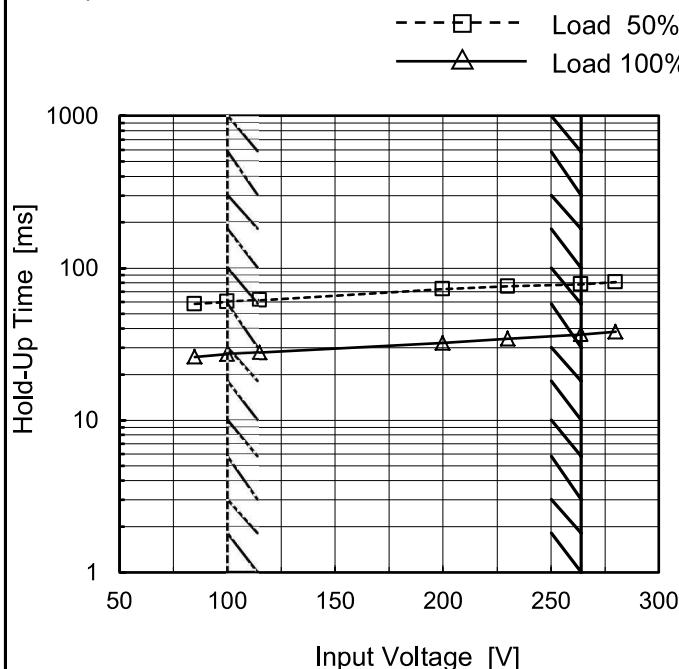


**COSEL**

Model	PJMA600F-24
Item	Hold-Up Time
Object	+24V25A

 Temperature 25°C  
 Testing Circuitry Figure A

## 1.Graph



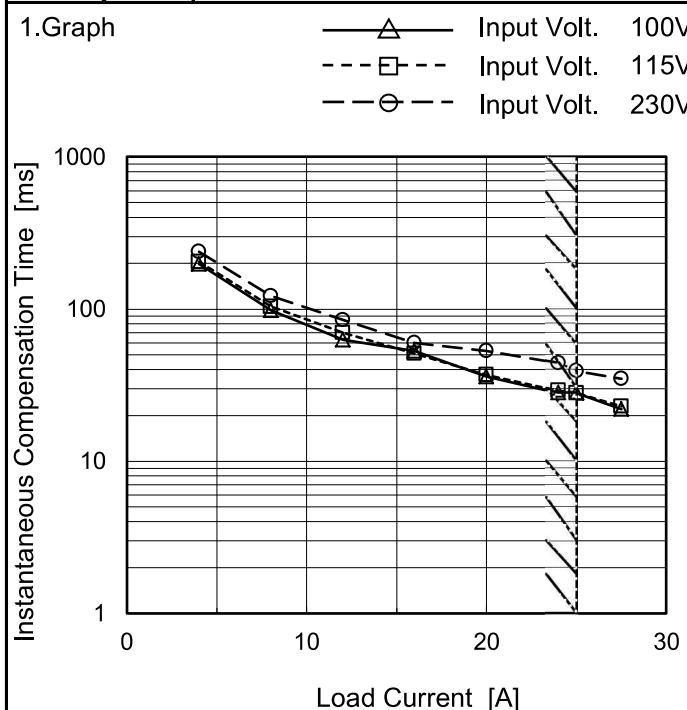
## 2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	58	26
100	60	27
115	61	28
200	73	32
230	76	34
264	79	37
280	81	38
--	-	-
--	-	-

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.

**COSEL**

Model	PJMA600F-24
Item	Instantaneous Interruption Compensation
Object	+24V25A


 Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

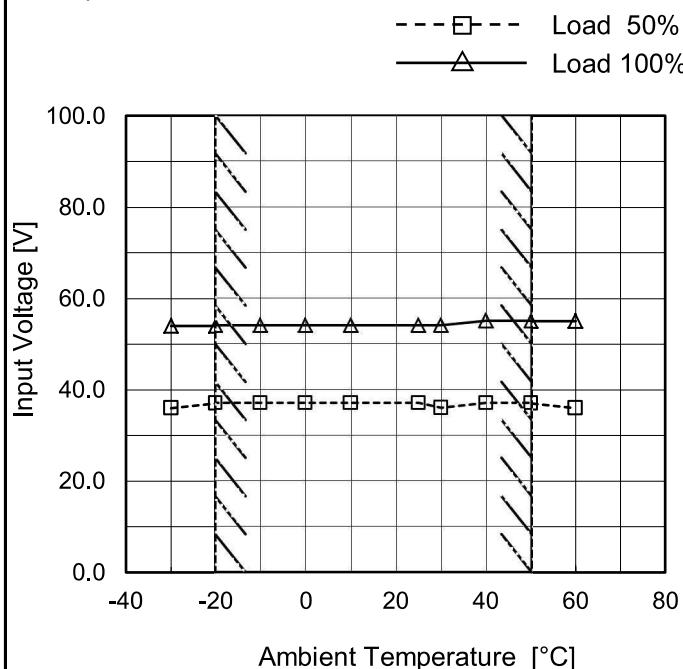
Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	198	205	238
8.0	98	104	122
12.0	63	70	85
16.0	53	51	60
20.0	36	37	53
24.0	28	29	44
25.0	28	28	39
27.5	22	23	35
--	-	-	-
--	-	-	-

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

**COSEL**

Model	PJMA600F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V25A

## 1.Graph



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

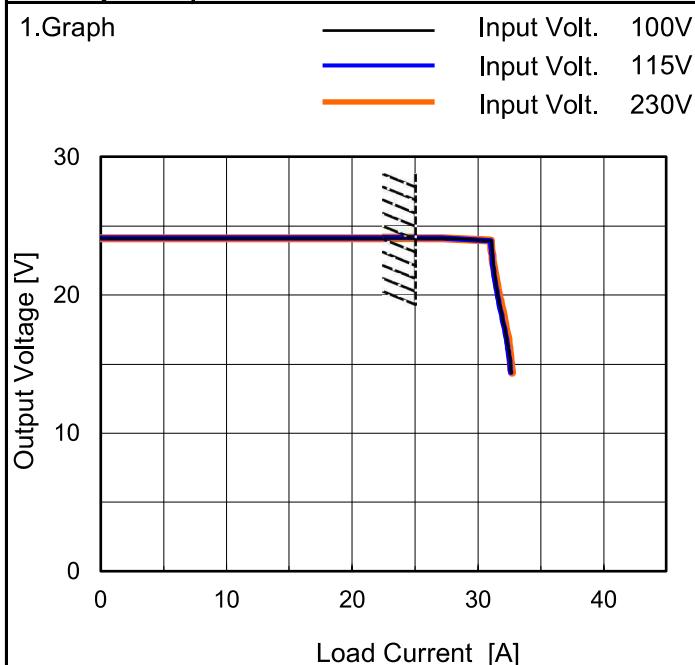
## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	36.0	54.0
-20	37.0	54.0
-10	37.0	54.0
0	37.0	54.0
10	37.0	54.0
25	37.0	54.0
30	36.0	54.0
40	37.0	55.0
50	37.0	55.0
60	36.0	55.0
--	-	-

**COSEL**

Model	PJMA600F-24
Item	Overcurrent Protection
Object	+24V25A



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

Temperature 25°C  
Testing Circuitry Figure A

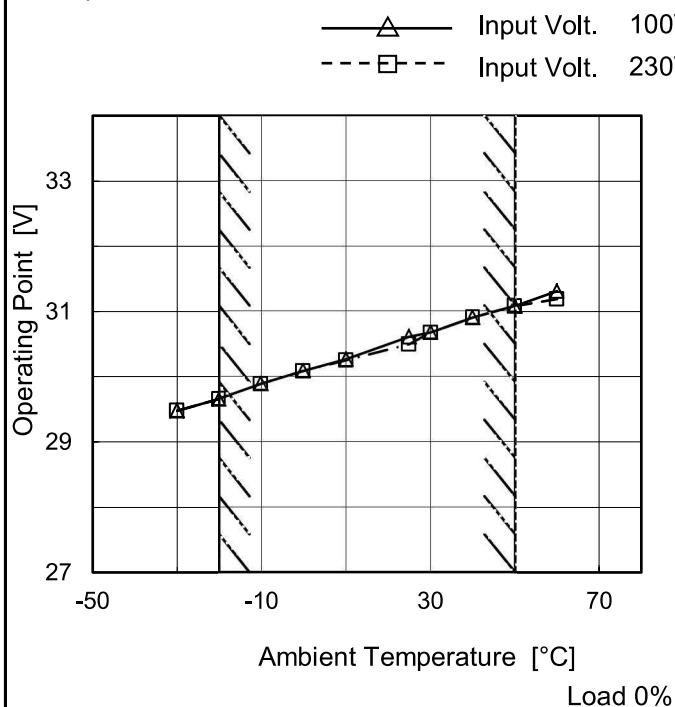
## 2. Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
22.8	31.16	31.11	31.14
21.6	27.78	27.15	27.19
19.2	31.72	31.69	31.83
16.8	32.26	32.22	32.36
14.4	32.61	32.58	32.68
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

Model	PJMA600F-24
Item	Overshoot Protection
Object	+24V25A

## 1.Graph



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

## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-30	29.48	29.48
-20	29.66	29.66
-10	29.89	29.89
0	30.08	30.08
10	30.26	30.25
25	30.61	30.49
30	30.67	30.67
40	30.90	30.90
50	31.08	31.08
60	31.31	31.19
--	-	-

# COSEL

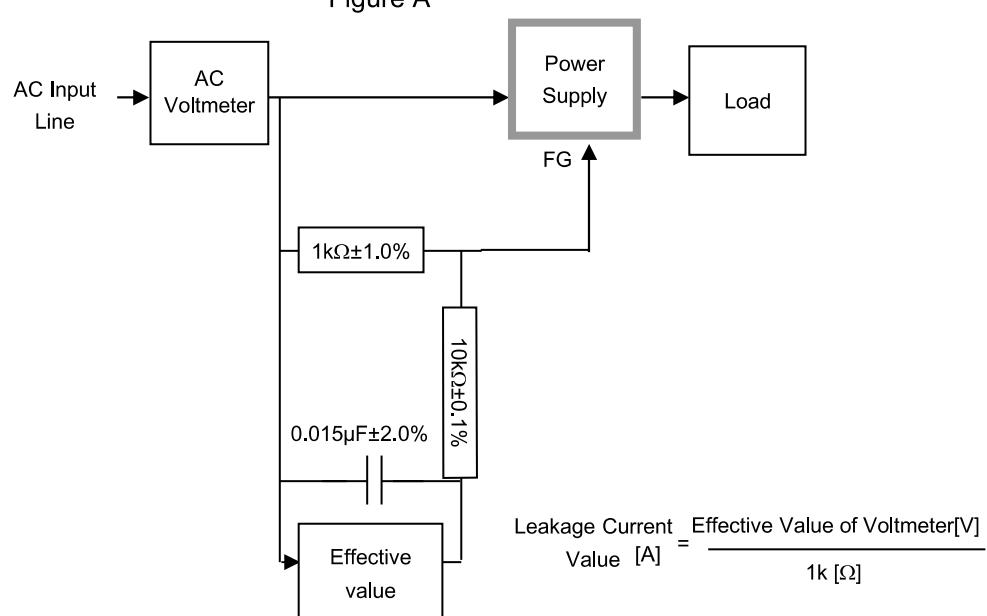
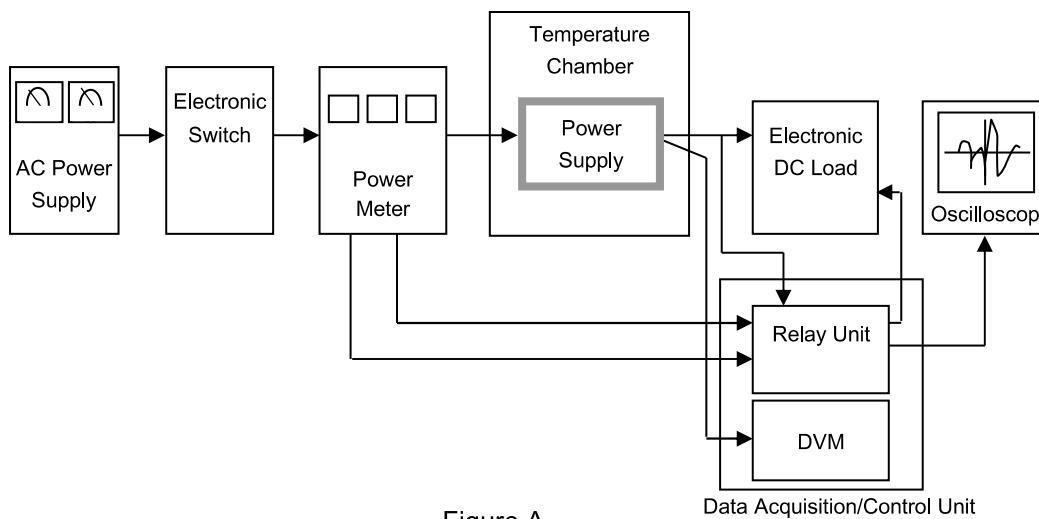
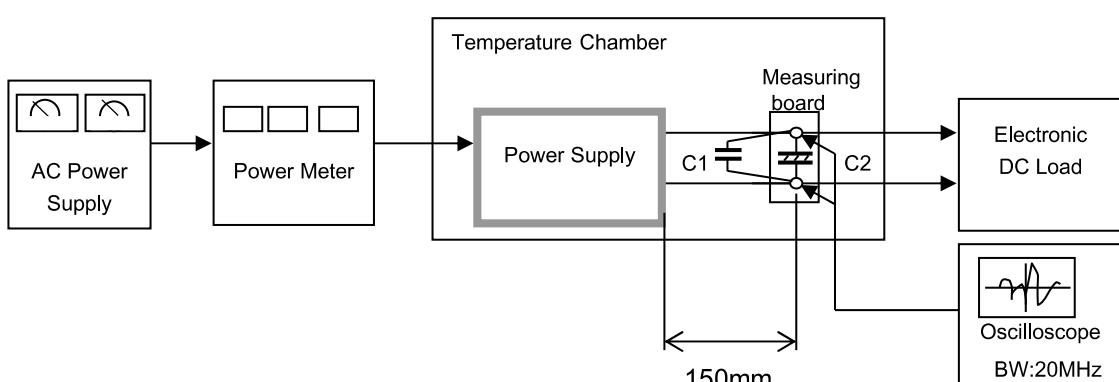


Figure B (IEC60601-1)



(Ceramic capacitor)  
C1= 0.1  $\mu F$

(Electrolytic capacitor)  
C2= 47  $\mu F$

Figure C