COSEL

TEST DATA OF PJA300F-24

Regulated DC Power Supply
August 4, 2017

Approved by : *Yukihiro Takehashi*
      Yukihiro Takehashi   Design Manager

Prepared by : *Atsushi Nishikawa*
      Atsushi Nishikawa   Design Engineer

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Model	PJA300F-24
Item	Input Current (by Load Current)
Object	

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

—△— Input Volt. 100V
---☐--- Input Volt. 115V
—·—○—·— Input Volt. 230V

Load Current [A]

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	0.126	0.116	0.107
2.00	0.773	0.678	0.384
4.00	1.315	1.142	0.607
6.00	1.874	1.621	0.837
8.00	2.452	2.104	1.071
10.00	3.029	2.609	1.305
12.00	3.605	3.108	1.544
12.50	3.747	3.235	1.604
13.75	4.134	3.569	1.759
--	-	-	-
--	-	-	-

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

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Model	PJA300F-24
Item	Input Power (by Load Current)
Object	————————

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

—— △ —— Input Volt.   100V
- - - ◻ - - - Input Volt.   115V
— · —○— · - Input Volt.   230V

Input Power [W] vs Load Current [A]

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]
0.00	9.7	9.7	9.6
2.00	74.2	73.2	73.3
4.00	129.0	127.3	125.5
6.00	185.1	183.4	178.7
8.00	242.4	239.2	232.7
10.00	300.2	297.0	287.0
12.00	357.8	354.2	342.2
12.50	371.9	368.7	356.3
13.75	410.4	406.9	392.5
--	-	-	-
--	-	-	-

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Model	PJA300F-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.
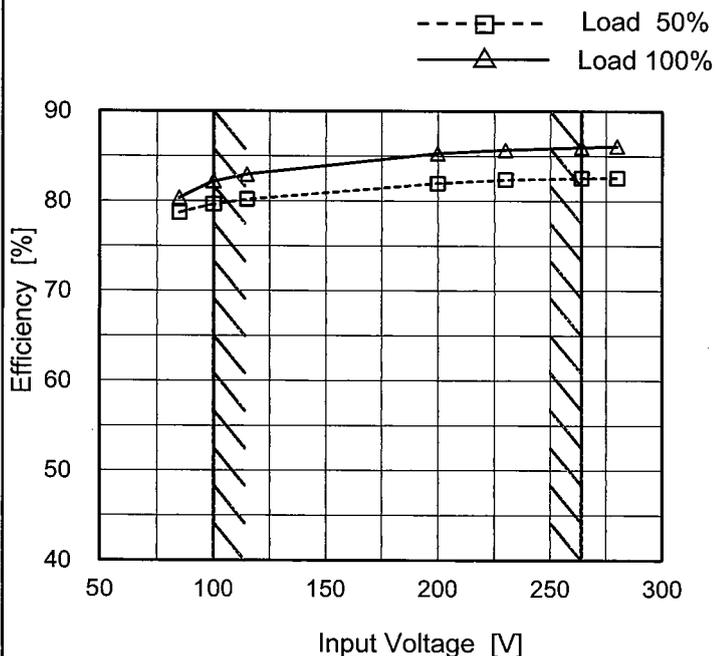
2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	78.7	80.4 ※1
100	79.6	82.2
115	80.2	83.0
200	82.0	85.3
230	82.4	85.7
264	82.6	86.0
280	82.6	86.1
--	-	-
--	-	-

※1:Load 80%

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Model	PJA300F-24
Item	Efficiency (by Load Current)
Object	————

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

——△—— Input Volt. 100V
- - -⊟- - - Input Volt. 115V
—·—○—·— Input Volt. 230V

Load Current [A]

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]
0.00	-	-	-
2.00	65.8	66.5	66.7
4.00	75.7	76.7	77.9
6.00	79.1	79.8	81.9
8.00	80.6	81.6	83.9
10.00	81.3	82.1	85.0
12.00	81.8	82.6	85.6
12.50	82.0	82.7	85.6
13.75	81.7	82.4	85.5
--	-	-	-
--	-	-	-

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Model	PJA300F-24
Item	Power Factor (by Input Voltage)
Object	

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

- - -☐- - -   Load 50%
———△———   Load 100%

Input Voltage [V]

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

2.Values

Input Voltage	Power Factor	
[V]	Load 50%	Load 100%
85	0.990	0.995 ※1
100	0.987	0.993
115	0.982	0.991
200	0.947	0.973
230	0.928	0.964
264	0.910	0.949
280	0.899	0.942
--	-	-
--	-	-

※1：Load 80%

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Model	PJA300F-24
Item	Power Factor (by Load Current)
Object	

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

— △ — Input Volt. 100V
- - - ⊟ - - - Input Volt. 115V
— · —O— · — Input Volt. 230V

Load Current [A]

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]
0.00	0.770	0.467	0.393
2.00	0.958	0.864	0.830
4.00	0.979	0.914	0.898
6.00	0.987	0.947	0.928
8.00	0.990	0.958	0.944
10.00	0.992	0.967	0.955
12.00	0.993	0.973	0.963
12.50	0.993	0.974	0.965
13.75	0.994	0.977	0.969
--	-	-	-
--	-	-	-

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Model	PJA300F-24
Item	Inrush Current
Object	————————

Temperature   25°C
Testing Circuitry   Figure A

Input Current [20A/div]

Input Voltage [100V/div]

Time   [100ms/div]

Input Voltage   100 V
Frequency   60 Hz
Load   100 %

Primary inrush current :
12.9 A
Secondary inrush current :
8.7 A

Input Current [20A/div]

Input Voltage [200V/div]

Time   [100ms/div]

Input Voltage   230 V
Frequency   60 Hz
Load   100 %

Primary inrush current :
29.1 A
Secondary inrush current :
3.3 A

Primary inrush current   Secondary inrush current

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Model	PJA300F-24	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	————————	

1.Results

[mA]

Standards	Testing Circuitry	Measuring Method	Input Volt.			Note
			100 [V]	115 [V]	240 [V]	
DEN-AN	Figure B-1	Both phases	0.13	0.15	0.33	Operation
		One of phases	0.24	0.27	0.60	Stand by
IEC62368-1	Figure B-2	Both phases	0.14	0.16	0.35	Operation
		One of phases	0.25	0.29	0.65	Stand by
	Figure B-3	Both phases	0.14	0.16	0.32	Operation
		One of phases	0.24	0.27	0.59	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	PJA300F-24
Item	Line Regulation
Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%
——— △ ——— Load 100%

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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	24.451	24.452 ※1
100	24.452	24.452
115	24.452	24.452
200	24.453	24.452
230	24.454	24.452
264	24.455	24.454
280	24.456	24.454
--	-	-
--	-	-

※1：Load 80%

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Model	PJA300F-24
Item	Load Regulation
Object	+24V12.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

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

Load Current [A]

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]
0.00	24.463	24.459	24.470
2.00	24.457	24.454	24.464
4.00	24.455	24.451	24.461
6.00	24.453	24.449	24.459
8.00	24.451	24.447	24.456
10.00	24.449	24.445	24.455
12.00	24.447	24.443	24.453
12.50	24.447	24.443	24.453
13.75	24.445	24.442	24.452
--	-	-	-
--	-	-	-

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Model	PJA300F-24		Temperature	25° C
Item	Dynamic Load Response		Testing Circuitry	Figure A
Object	+24V12.5A			

Input Volt.   100 V   Response.   t1=t2=50us. Typ

Cycle   1000 ms

Load Current   t1   t2

Min. Load (0A) ←→
Load 100% (12.5A)

200 mV/div
20ms/div   20ms/div

Min. Load (0A) ←→
Load 50% (6.25A)

200 mV/div
20ms/div   20ms/div

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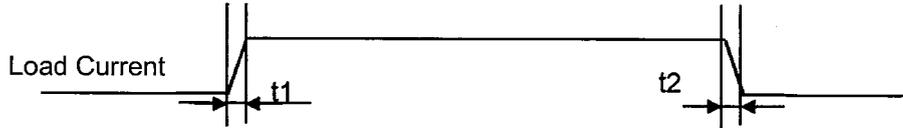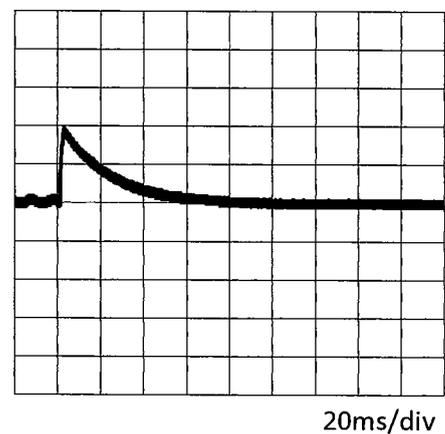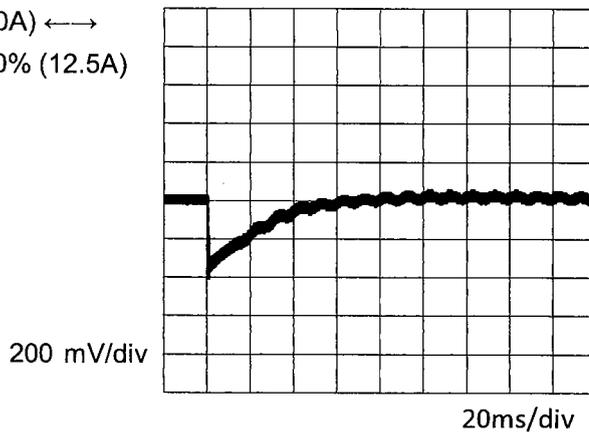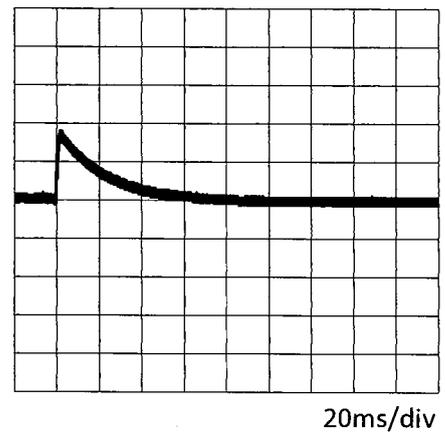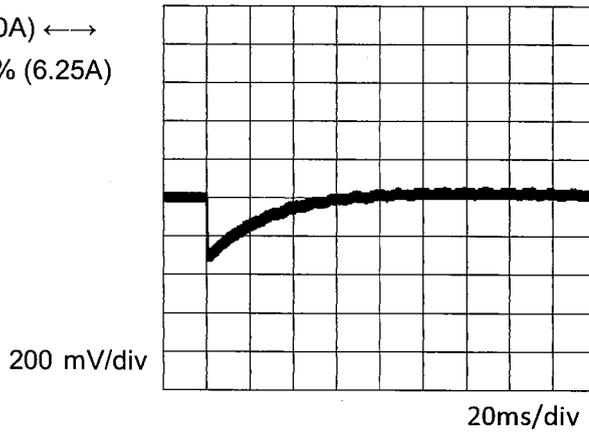
Model	PJA300F-24
Item	Ripple Voltage (by Load Current)
Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure C

1.Graph

———△——— Input Volt.   100V
—·—○—·— Input Volt.   230V

Load Current [A]

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.
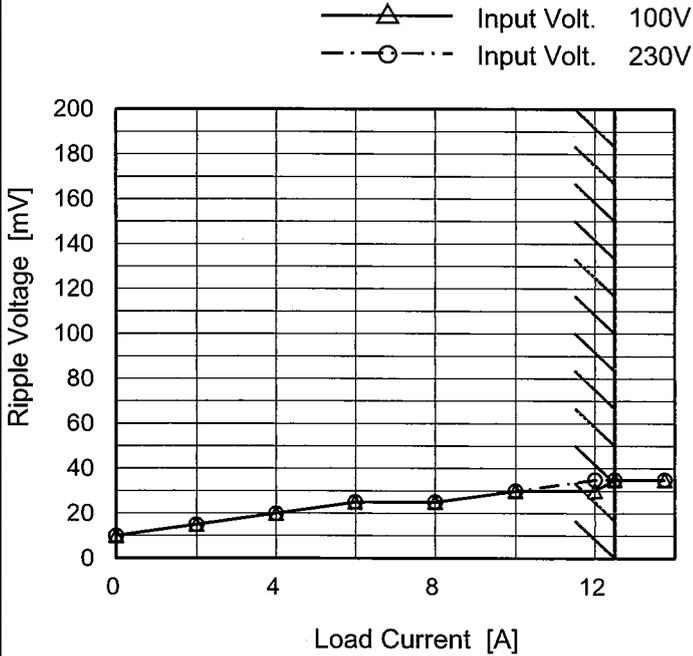
2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.00	10	10
2.00	15	15
4.00	20	20
6.00	25	25
8.00	25	25
10.00	30	30
12.00	30	35
12.50	35	35
13.75	35	35
--	-	-
--	-	-

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

Fig. Complex Ripple Wave Form

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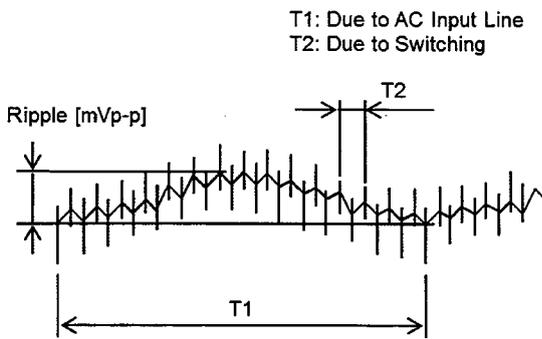
Model	PJA300F-24
Item	Ripple-Noise
Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure C

1.Graph

———△——— Input Volt.   100V
—·—○—·· Input Volt.   230V

Load Current [A]

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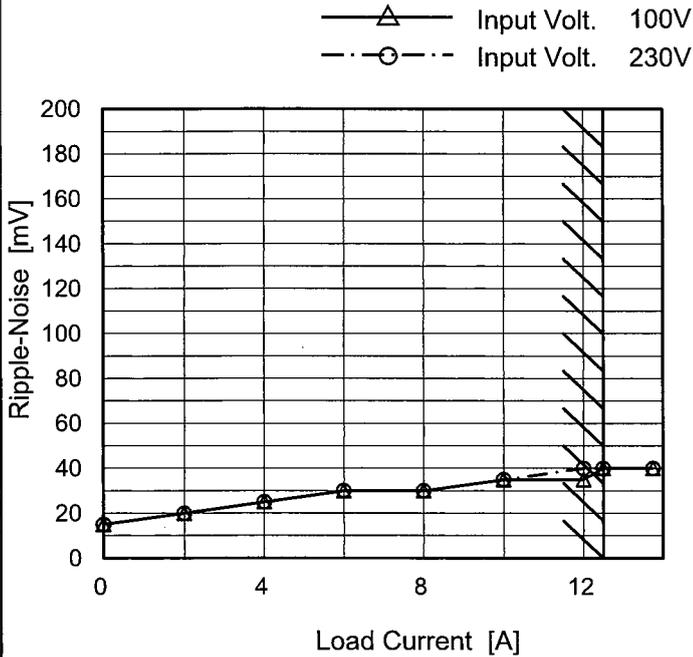
2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.00	15	15
2.00	20	20
4.00	25	25
6.00	30	30
8.00	30	30
10.00	35	35
12.00	35	40
12.50	40	40
13.75	40	40
--	-	-
--	-	-

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

Ripple-Noise
[mVp-p]

Fig. Complex Ripple Wave Form

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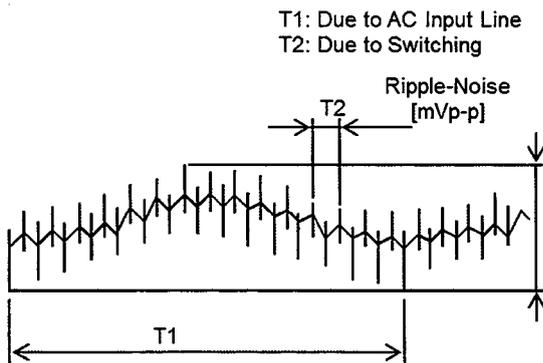
Model	PJA300F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V12.5A

Testing Circuitry   Figure C

1.Graph

- - -▣- - - Input Volt.   100V
———△——— Input Volt.   230V

Ambient Temperature [°C]

Load 100%

Measured by 20 MHz Oscilloscope.
Note: Slanted line shows the range of the rated
      load current.

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
-30	95	100
-10	55	55
0	45	45
25	40	40
50	40	40
60	35	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Model	PJA300F-24
Item	Ambient Temperature Drift
Object	+24V12.5A

Testing Circuitry   Figure A

1.Graph

—△— Input Volt.   100V
--- ⊟--- Input Volt.   115V
—·—○—·· Input Volt.   230V
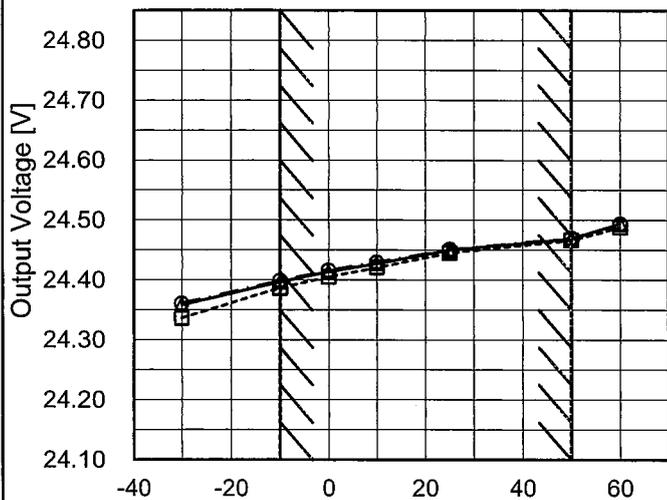
Ambient Temperature [°C]

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	24.359	24.336	24.361
-10	24.397	24.387	24.399
0	24.414	24.405	24.416
10	24.427	24.421	24.430
25	24.450	24.445	24.451
50	24.469	24.467	24.471
60	24.494	24.488	24.494
---	-	-	-
---	-	-	-
---	-	-	-
---	-	-	-

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Model	PJA300F-24

Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+24V12.5A	

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 : 100 - 264V

Load Current   : 0 - 12.5A

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

* Output Voltage Accuracy (Ratio) = $\dfrac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}}$ × 100

2.Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	230	12.5	24.471	±42	±0.2
Minimum Voltage	-10	115	12.5	24.387		

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Model	PJA300F-24
Item	Time Lapse Drift
Object	+24V12.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Time [H]

Input Volt. 230V
Load 100%

* The characteristic of AC100V is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	24.407
0.5	24.434
1.0	24.434
2.0	24.435
3.0	24.435
4.0	24.435
5.0	24.435
6.0	24.435
7.0	24.435
8.0	24.436

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Model	PJA300F-24

Item	Rise and Fall Time

Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

Load 100%

Output Volt.
[5V/div]

0

Input Volt.   100 V

Load 100%

Output Volt.
[5V/div]

0

Input Volt.   230 V

Input Volt.

0

Time   [100ms/div]

Time   [10ms/div]
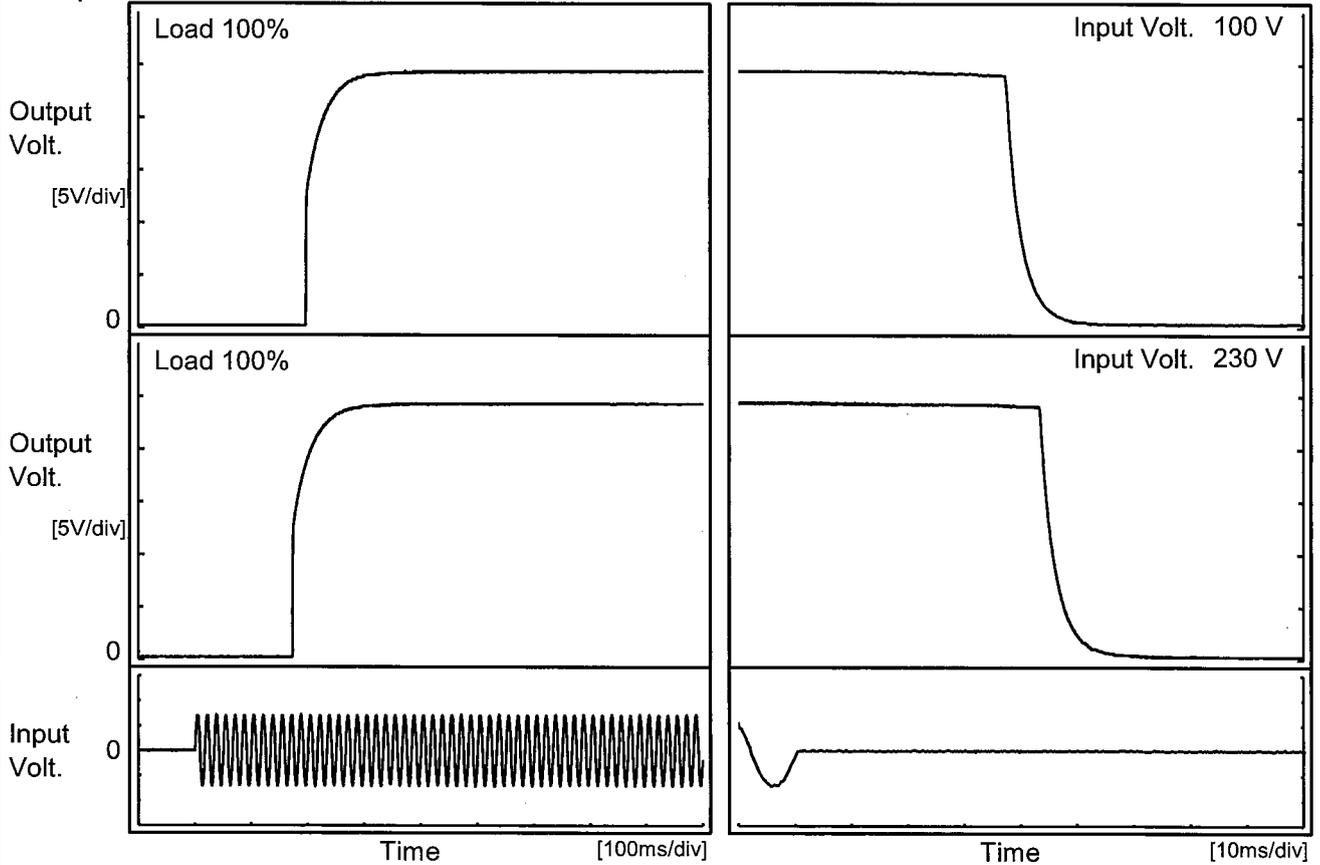
2.Values

[ms]

Input Volt. Time	Td	Tr	Ts	Th	Tf
100 V	196.5	50.0	246.5	37.8	6.0
230 V	173.5	50.5	224.0	43.7	6.1

Output Volt.

90%

10%

Input Volt.

Td   Tr   Th   Tf

Ts

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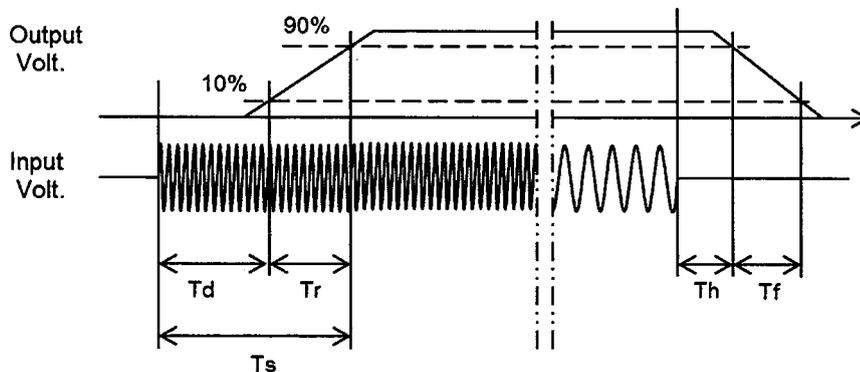
Model	PJA300F-24
Item	Hold-Up Time
Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%
——— △ ——— Load 100%

Hold-Up Time [ms] vs Input Voltage [V]

Input Voltage [V]

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	67	34 ※1
100	68	35
115	70	35
200	79	39
230	81	40
264	84	42
280	85	43
--	-	-
--	-	-

※1：Load 80%

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.

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Model	PJA300F-24
Item	Instantaneous Interruption Compensation
Object	+24V12.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

———△——— Input Volt. 100V
---☐--- Input Volt. 115V
—·—○—·· Input Volt. 230V

Load Current [A]

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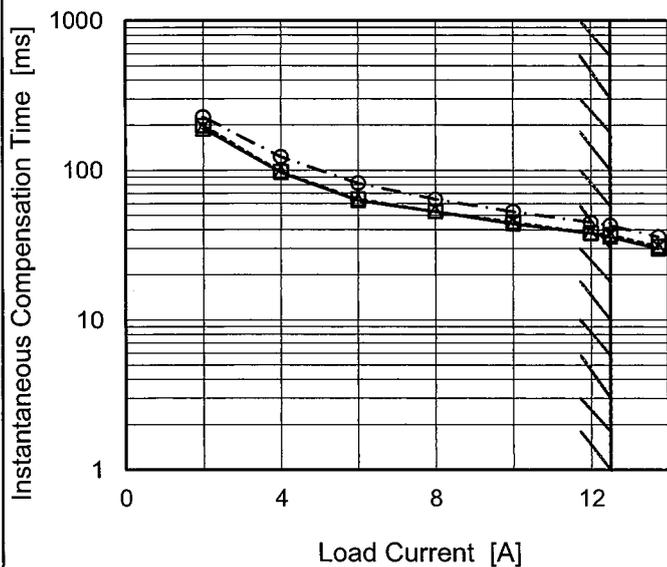
2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
2.00	189	198	227
4.00	97	98	123
6.00	63	64	82
8.00	53	53	64
10.00	44	45	53
12.00	38	38	45
12.50	36	37	43
13.75	30	31	36
--	-	-	-
--	-	-	-

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Model	PJA300F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V12.5A

Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%

——△—— Load 100%

Ambient Temperature [°C]

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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	37	54
-10	37	54
0	37	54
25	37	54
50	38	56
60	38	56
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Model	PJA300F-24
Item	Overcurrent Protection
Object	+24V12.5A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

——————— Input Volt.   100V

——————— Input Volt.   230V

Load Current [A]

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]
22.8	16.10	15.97
21.6	16.15	16.02
19.2	16.26	16.14
16.8	16.38	16.26
14.4	16.49	16.37
12.0	16.58	16.47
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Model	PJA300F-24
Item	Overvoltage Protection
Object	+24V12.5A

Testing Circuitry   Figure A

1.Graph

———△——— Input Volt.   100V

‐ ‐ ‐ ◻ ‐ ‐ ‐ Input Volt.   230V

Ambient Temperature [°C]

Load 0%

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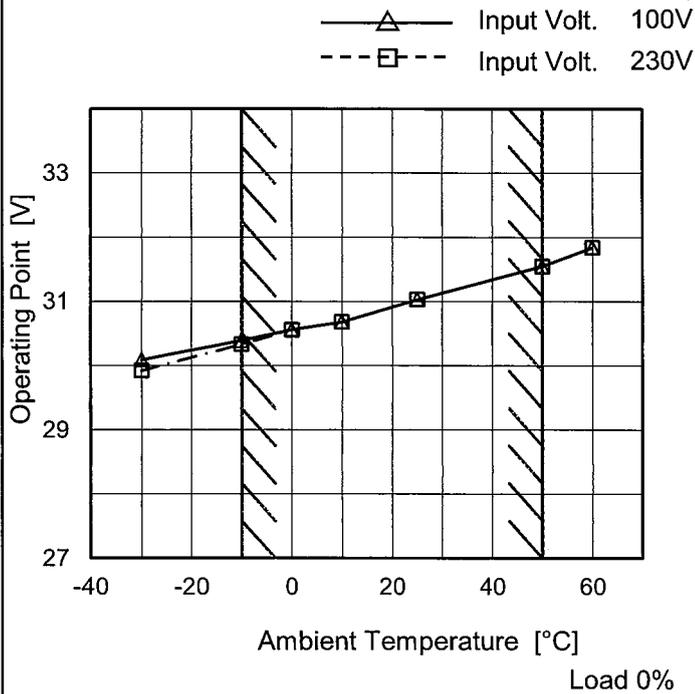
2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-30	30.09	29.92
-10	30.39	30.33
0	30.56	30.56
10	30.68	30.68
25	31.03	31.03
50	31.55	31.55
60	31.84	31.84
--	-	-
--	-	-
--	-	-
--	-	-

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Figure A

AC Power Supply → Electronic Switch → Power Meter → Temperature Chamber [Power Supply] → Electronic DC Load → Oscilloscope

Relay Unit

DVM

Data Acquisition/Control Unit

Figure A

Figure B-1 (DEN-AN)

AC Input Line → AC Voltmeter → Power Supply → DC Ammeter → Adjustable Load

FG

1kΩ

Effective value Voltmeter

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{1\text{k [}\Omega\text{]}}$$
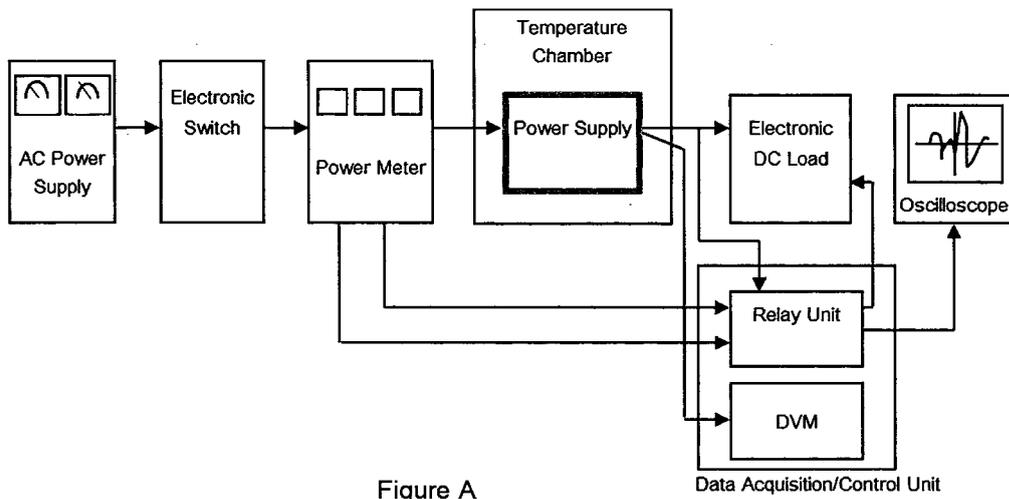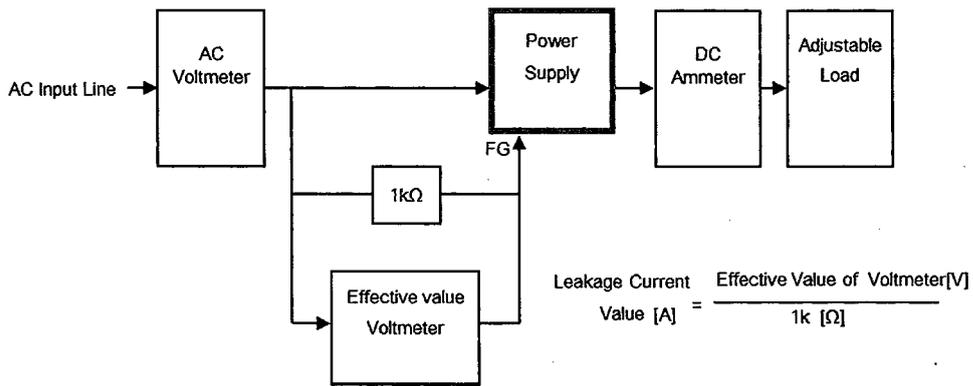
Figure B-1 (DEN-AN)

Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

AC Input Line → AC Voltmeter → Power Supply → DC Ammeter → Adjustable Load

FG

1.5kΩ±0.1%

500Ω±0.1%

10kΩ±0.1%

0.22μF±1.0%

0.022μF±1.0%

Effective value Voltmeter

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{500\text{ [}\Omega\text{]}}$$

Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

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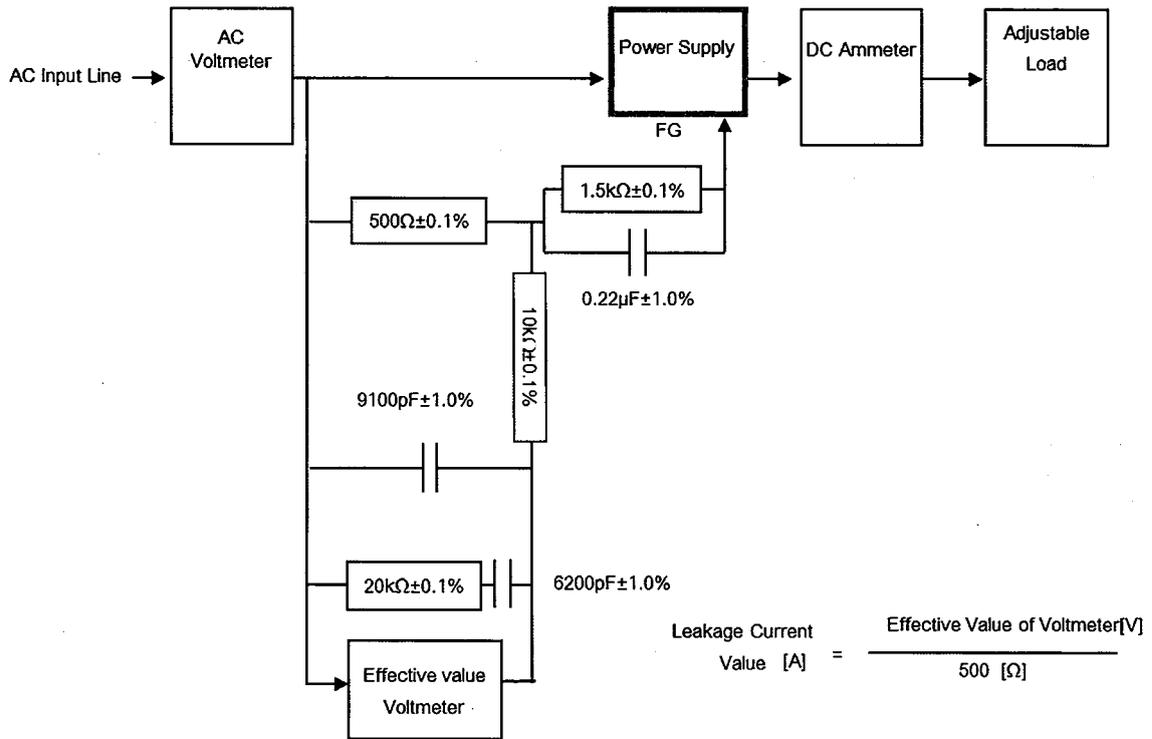
Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

$$\text{Leakage Current Value } [A] = \frac{\text{Effective Value of Voltmeter[V]}}{500 \ [\Omega]}$$

C1 = 0.1 µF
(Ceramic capacitor)

C2 = 22 µF
(Electrolytic capacitor)

Figure C

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