

TEST DATA OF PJA150F-36

Regulated DC Power Supply
August 30, 2016

Approved by : Yukihiro Takehashi
Yukihiro Takehashi Design Manager

Prepared by : Atsushi Nishikawa
Atsushi Nishikawa Design Engineer

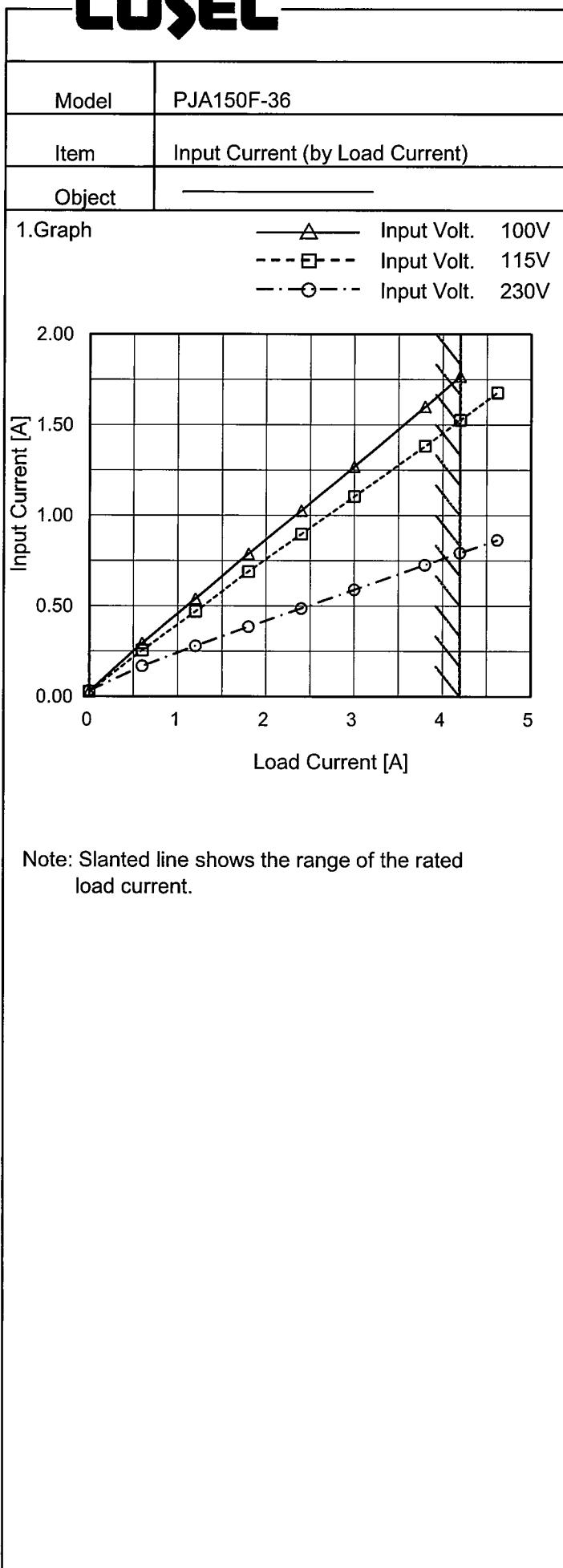
COSEL CO.,LTD.



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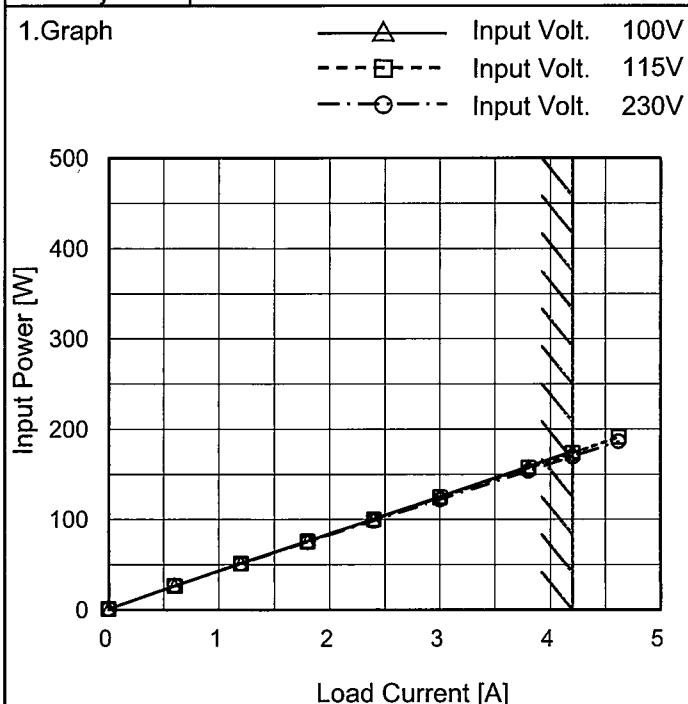
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 Temperature 25°C
 Testing Circuitry Figure A

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Model	PJA150F-36
Item	Input Power (by Load Current)
Object	_____



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

Temperature 25°C
Testing Circuitry Figure A

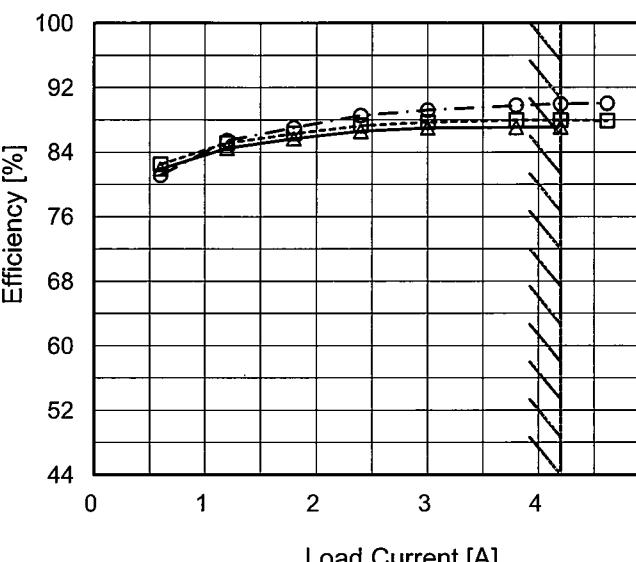
2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	1.2	1.1	1.1
0.60	26.7	26.5	27.0
1.20	51.6	51.3	51.1
1.80	76.4	75.8	75.2
2.40	100.8	100.0	98.6
3.00	125.4	124.4	122.3
3.80	158.7	157.1	153.9
4.20	175.3	173.6	169.7
4.62	-	191.1	186.5
--	-	-	-
--	-	-	-

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Model	PJA150F-36																																	
Item	Efficiency (by Input Voltage)	Temperature 25°C Testing Circuitry Figure A																																
Object	—																																	
1.Graph																																		
<p>Efficiency [%]</p> <p>Input Voltage [V]</p> <p>Legend: Load 50% (dashed line with squares), Load 100% (solid line with triangles)</p>																																		
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Note: Slanted line shows the range of the rated load current.

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Model PJA150F-36

Item Inrush Current

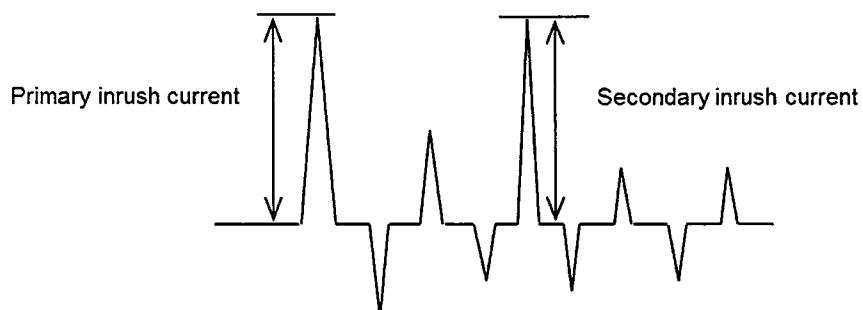
Object

Temperature 25°C
Testing Circuitry Figure AInput
Current
[20A/div]Input
Voltage
[100V/div]Input Voltage 115 V
Frequency 60 Hz
Load 100 %Primary inrush current :
13.6 A
Secondary inrush current :
3.4 A

Time [100ms/div]

Input
Current
[20A/div]Input
Voltage
[200V/div]Input Voltage 230 V
Frequency 60 Hz
Load 100 %Primary inrush current :
28.6 A
Secondary inrush current :
2.2 A

Time [100ms/div]





Model	PJA150F-36	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

1. Results

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
DEN-AN	Both phases	0.20	0.21	0.43	Operation
	One of phases	0.27	0.31	0.69	Stand by
IEC60950-1	Both phases	0.14	0.16	0.44	Operation
	One of phases	0.26	0.30	0.68	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.

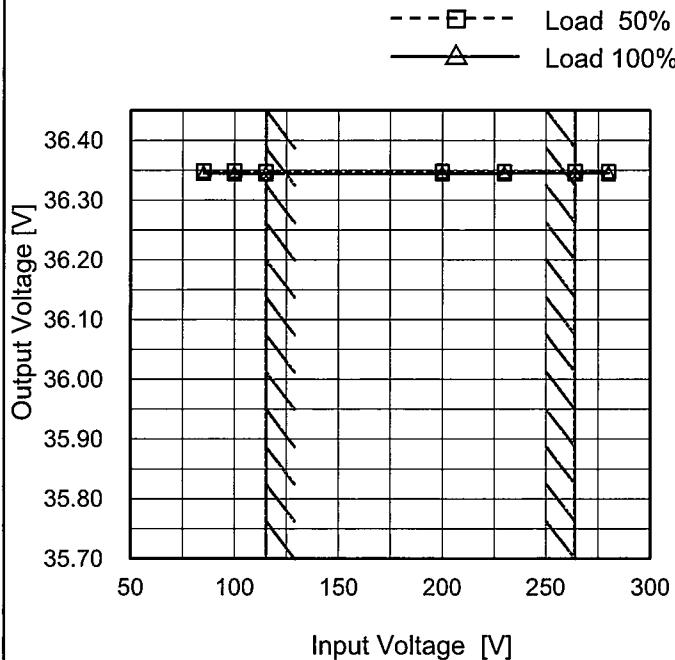
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Model PJA150F-36

Item Line Regulation

Object +36V4.2A

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	36.348	36.345
100	36.348	36.345
115	36.348	36.344
200	36.348	36.345
230	36.348	36.345
264	36.348	36.345
280	36.348	36.345
--	-	-
--	-	-

※1: Load 80%

※2: Load 90%

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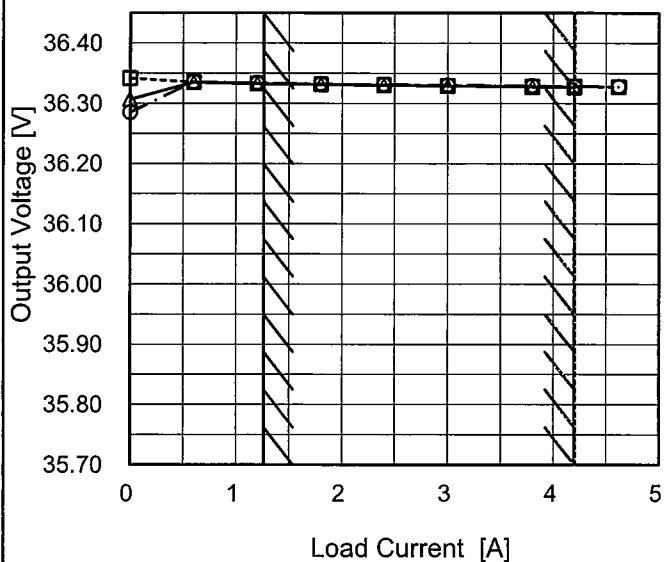
Model PJA150F-36

Item Load Regulation

Object +36V4.2A

1.Graph

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



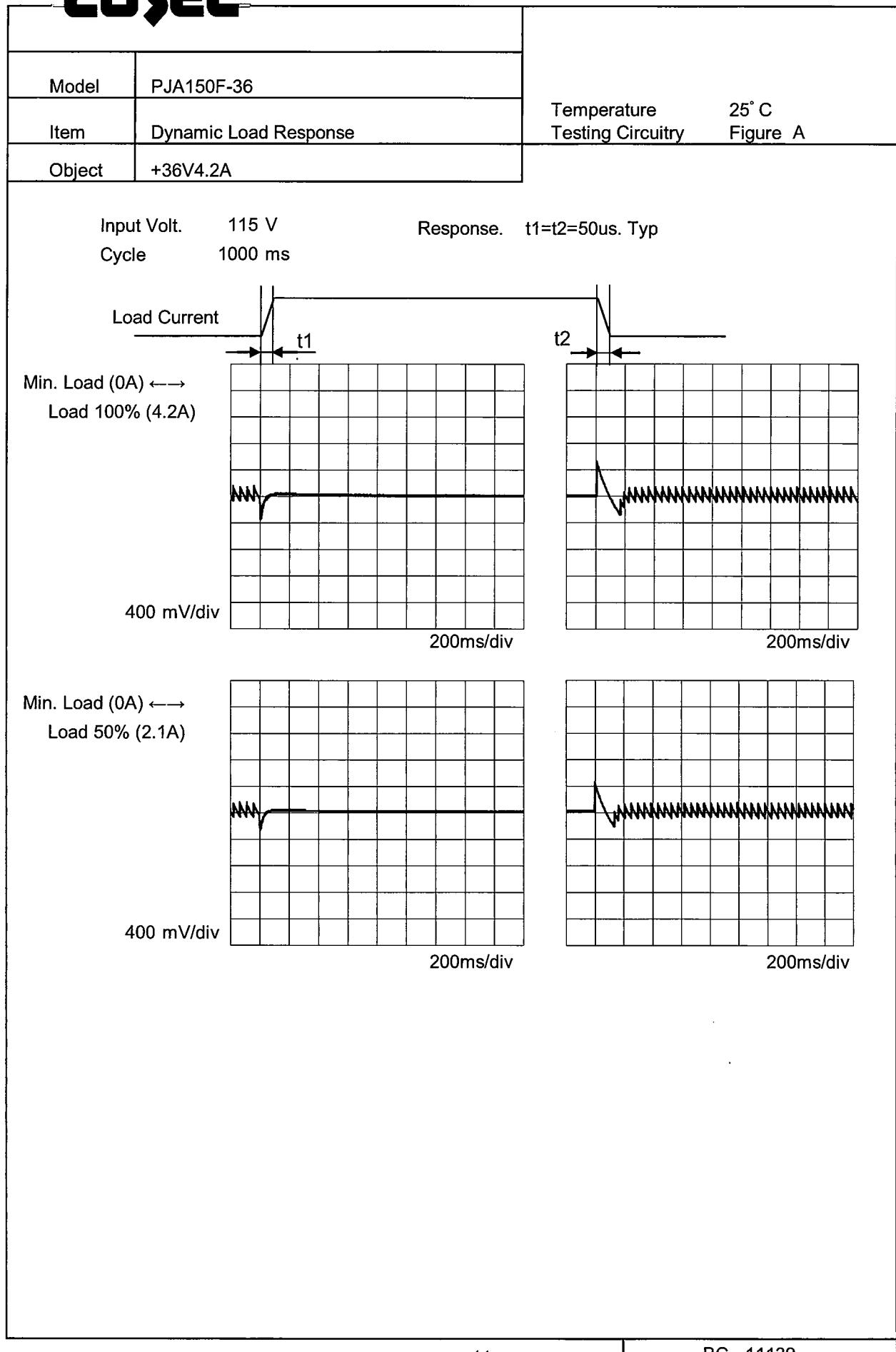
Note: Slanted line shows the range of the rated load current.

 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	36.307	36.342	36.285
0.60	36.335	36.336	36.336
1.20	36.333	36.333	36.334
1.80	36.332	36.332	36.333
2.40	36.330	36.331	36.332
3.00	36.329	36.330	36.331
3.80	36.328	36.329	36.330
4.20	36.327	36.328	36.329
4.62	-	36.328	36.328
--	-	-	-
--	-	-	-

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Model	PJA150F-36	
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C
Object	+36V4.2A	
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.		
<p style="text-align: center;">T1: Due to AC Input Line T2: Due to Switching</p>		
Fig. Complex Ripple Wave Form		
2. Values		
Load Current [A]	Ripple Voltage [mV]	
Input Volt. 115 [V]	Input Volt. 230 [V]	
0.00	260	260
0.60	30	30
1.20	30	25
1.80	25	25
2.40	25	25
3.00	25	25
3.80	25	25
4.20	25	25
4.62	25	25
--	-	-
--	-	-

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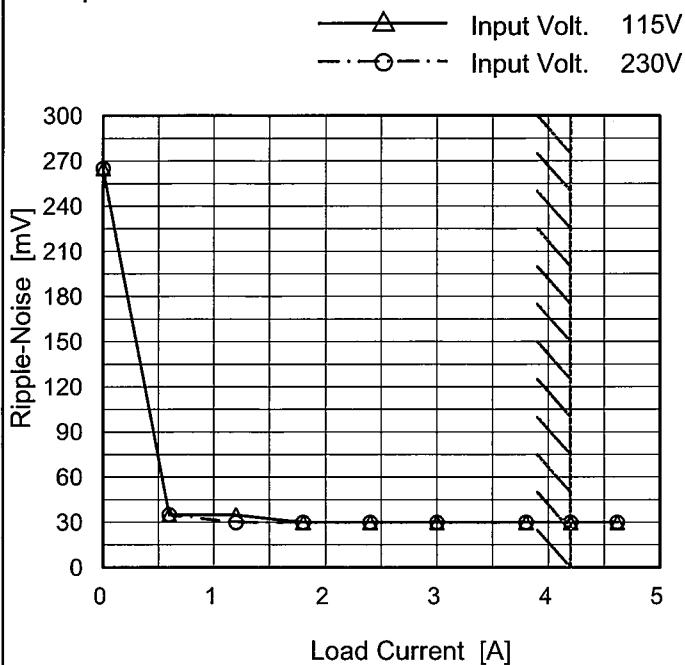
Model PJA150F-36

Item Ripple-Noise

Object +36V4.2A

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	265	265
0.60	35	35
1.20	35	30
1.80	30	30
2.40	30	30
3.00	30	30
3.80	30	30
4.20	30	30
4.62	30	30
--	-	-
--	-	-

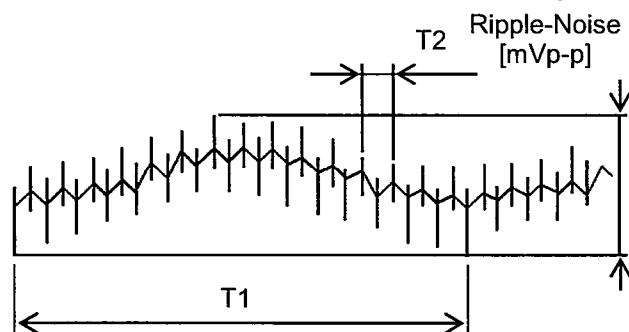
T1: Due to AC Input Line
T2: Due to Switching

Fig. Complex Ripple Wave Form

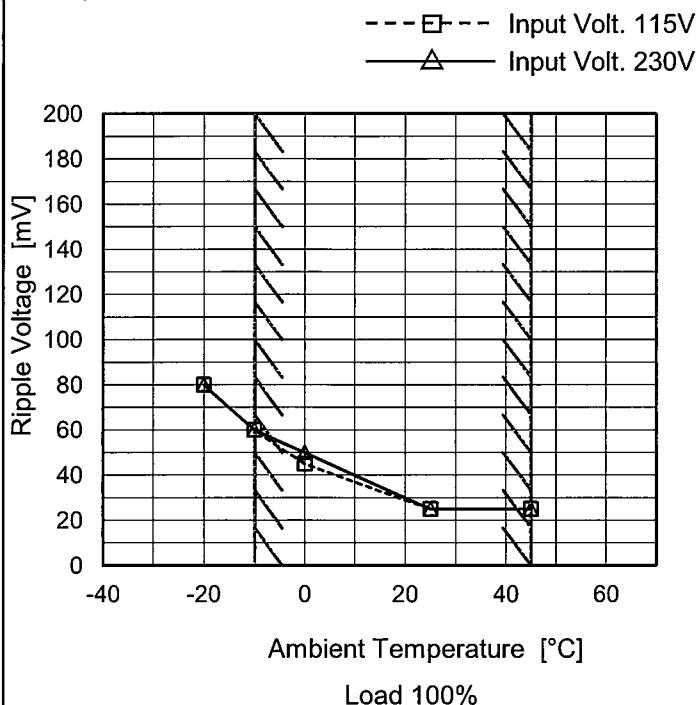
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Model PJA150F-36

Item Ripple Voltage (by Ambient Temp.)

Object +36V4.2A

1. Graph



Testing Circuitry Figure C

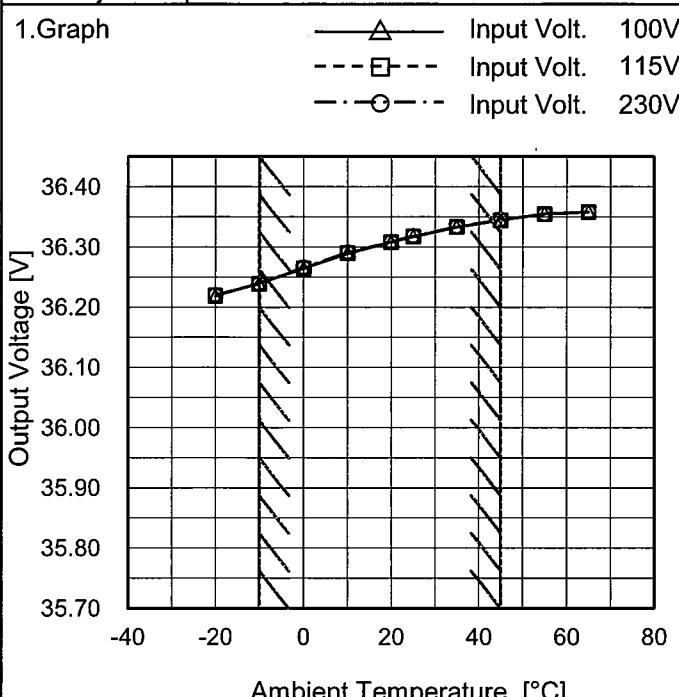
2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
-20	80	80
-10	60	60
0	45	50
25	25	25
45	25	25
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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

COSEL

Model	PJA150F-36
Item	Ambient Temperature Drift
Object	+36V4.2A



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

Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-20	36.219	36.219	36.220
-10	36.240	36.239	36.240
0	36.265	36.265	36.266
10	36.289	36.290	36.291
20	36.308	36.308	36.309
25	36.317	36.317	36.318
35	36.333	36.333	36.334
45	36.345	36.345	36.345
55	36.356	36.355	36.355
65	36.358	36.358	36.358
--	-	-	-

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



Model	PJA150F-36	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+36V4.2A	

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 - 45°C

Input Voltage : 115 - 264V

Load Current : 1.26 - 4.2A

* 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	45	115	4.2	36.345	± 53	± 0.1
Minimum Voltage	-10	230	4.2	36.239		

COSEL

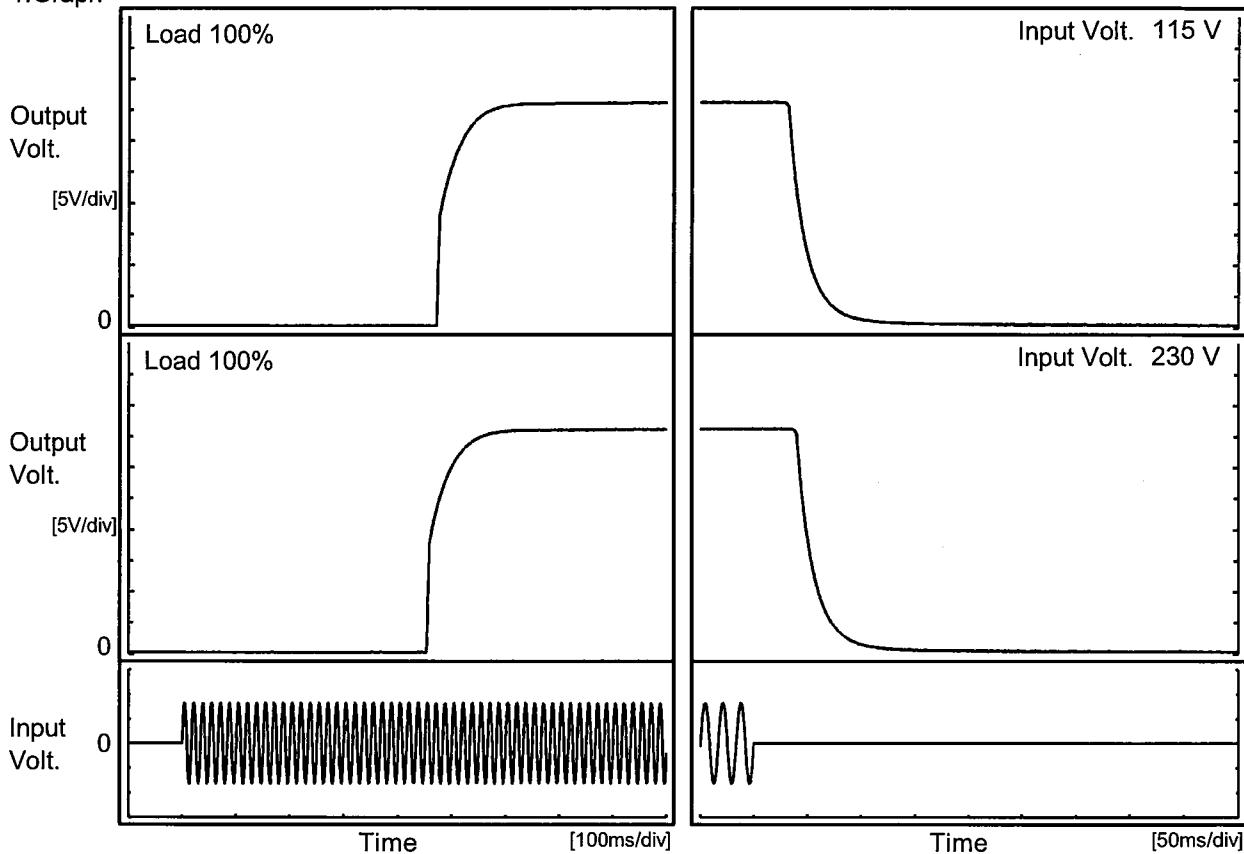
Model	PJA150F-36	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+36V4.2A																								
1.Graph			2.Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 230V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>36.317</td></tr> <tr><td>0.5</td><td>36.316</td></tr> <tr><td>1.0</td><td>36.316</td></tr> <tr><td>2.0</td><td>36.316</td></tr> <tr><td>3.0</td><td>36.316</td></tr> <tr><td>4.0</td><td>36.316</td></tr> <tr><td>5.0</td><td>36.316</td></tr> <tr><td>6.0</td><td>36.316</td></tr> <tr><td>7.0</td><td>36.315</td></tr> <tr><td>8.0</td><td>36.315</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	36.317	0.5	36.316	1.0	36.316	2.0	36.316	3.0	36.316	4.0	36.316	5.0	36.316	6.0	36.316	7.0	36.315	8.0	36.315
Time since start [H]	Output Voltage [V]																								
0.0	36.317																								
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2.0	36.316																								
3.0	36.316																								
4.0	36.316																								
5.0	36.316																								
6.0	36.316																								
7.0	36.315																								
8.0	36.315																								

* The characteristic of AC115V is equal.

COSEL

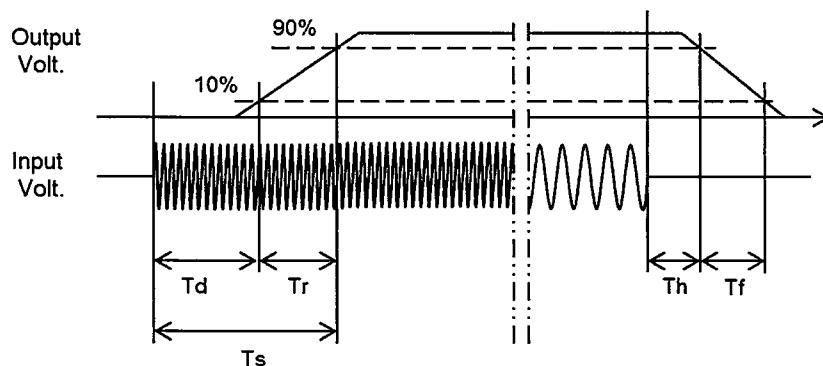
Model	PJA150F-36	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+36V4.2A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
115 V		473.5	65.0	538.5	33.8	36.8	
230 V		454.5	64.5	519.0	41.0	37.0	



COSEL

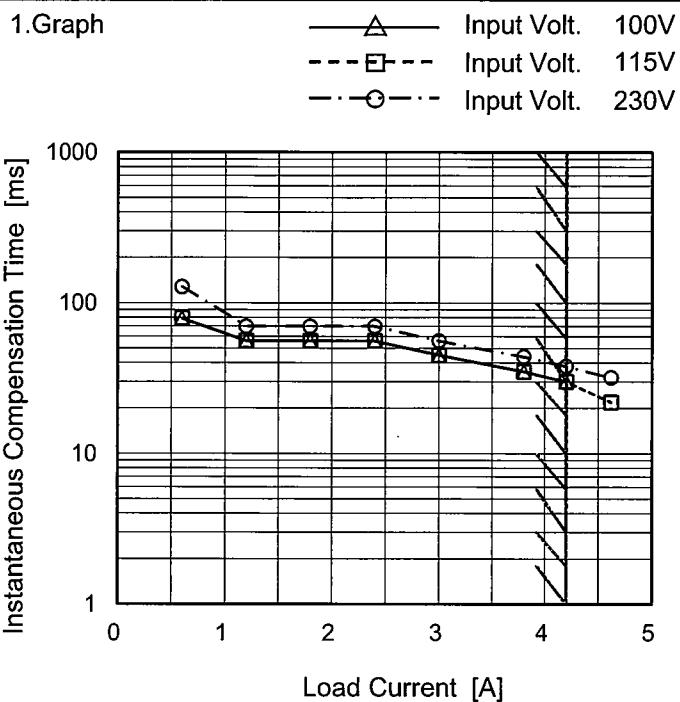
Model	PJA150F-36	Temperature Testing Circuitry Figure A																																
Item	Hold-Up Time																																	
Object	+36V4.2A																																	
1. Graph		2.Values																																
		<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Hold-Up Time [ms]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>85</td> <td>71</td> <td>45 ※1</td> </tr> <tr> <td>100</td> <td>72</td> <td>40 ※2</td> </tr> <tr> <td>115</td> <td>72</td> <td>37</td> </tr> <tr> <td>200</td> <td>77</td> <td>37</td> </tr> <tr> <td>230</td> <td>89</td> <td>44</td> </tr> <tr> <td>264</td> <td>92</td> <td>45</td> </tr> <tr> <td>280</td> <td>92</td> <td>46</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	71	45 ※1	100	72	40 ※2	115	72	37	200	77	37	230	89	44	264	92	45	280	92	46	--	-	-	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																	
	Load 50%	Load 100%																																
85	71	45 ※1																																
100	72	40 ※2																																
115	72	37																																
200	77	37																																
230	89	44																																
264	92	45																																
280	92	46																																
--	-	-																																
--	-	-																																
		※1: Load 80% ※2: Load 90%																																
<p>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.</p>																																		

COSEL

Model PJA150F-36

Item Instantaneous Interruption Compensation

Object +36V4.2A



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

Temperature 25°C
Testing Circuitry Figure A

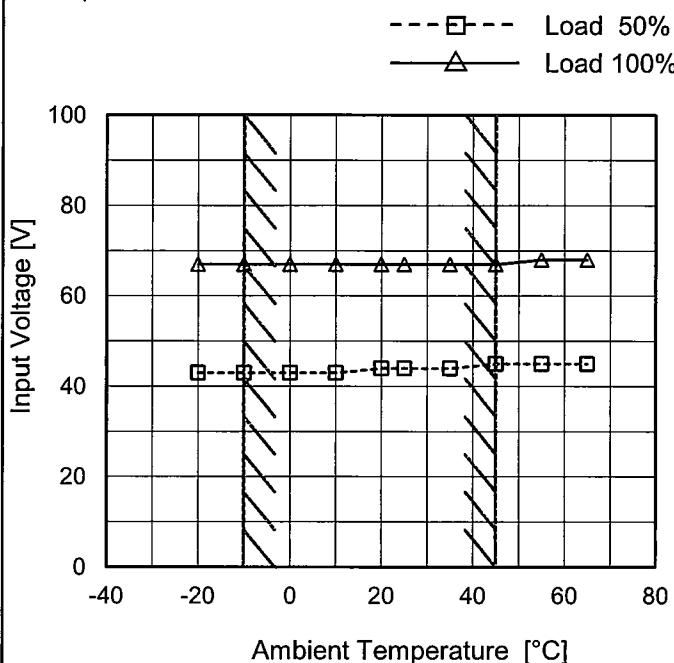
2. Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
0.60	79	79	128
1.20	56	56	70
1.80	56	56	70
2.40	56	56	70
3.00	45	45	56
3.80	35	35	44
4.20	30	30	38
4.62	-	22	32
--	-	-	-
--	-	-	-

Model	PJA150F-36
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+36V4.2A

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	43	67
-10	43	67
0	43	67
10	43	67
20	44	67
25	44	67
35	44	67
45	45	67
55	45	68
65	45	68
--	-	-

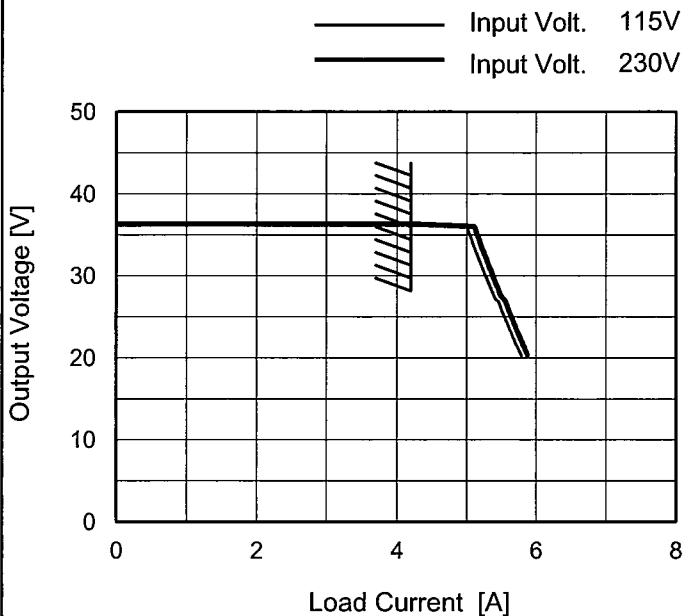
COSEL

Model PJA150F-36

Item Overcurrent Protection

Object +36V4.2A

1. Graph



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

Intermittent operation occurs when the output voltage is from 20.3V to 0V.

Temperature 25°C
Testing Circuitry Figure A

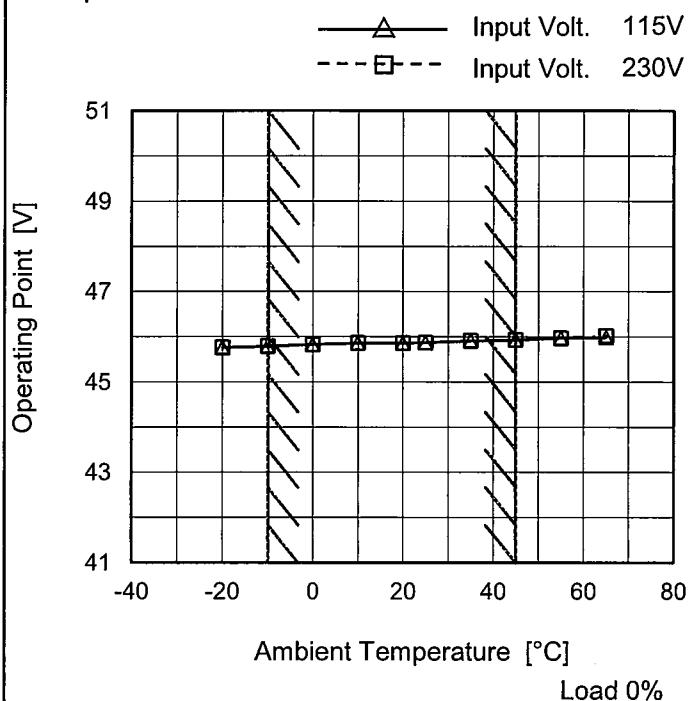
2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 115[V]	Input Volt. 230[V]
34.2	5.08	5.19
32.4	5.00	5.27
28.8	5.32	5.43
25.2	5.59	5.71
21.6	5.77	5.87
18.0	5.94	6.03
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PJA150F-36
Item	Oversupply Protection
Object	+36V4.2A

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. 115[V]	Input Volt. 230[V]
-20	45.76	45.76
-10	45.79	45.79
0	45.83	45.83
10	45.86	45.86
20	45.86	45.86
25	45.87	45.87
35	45.91	45.91
45	45.93	45.93
55	45.97	45.97
65	45.99	46.02
--	-	-

COSEL

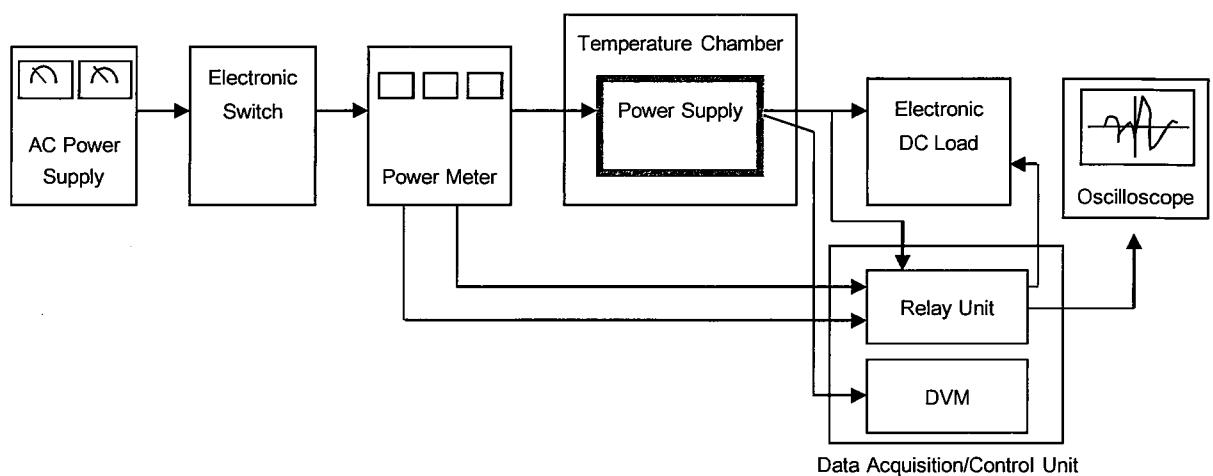


Figure A

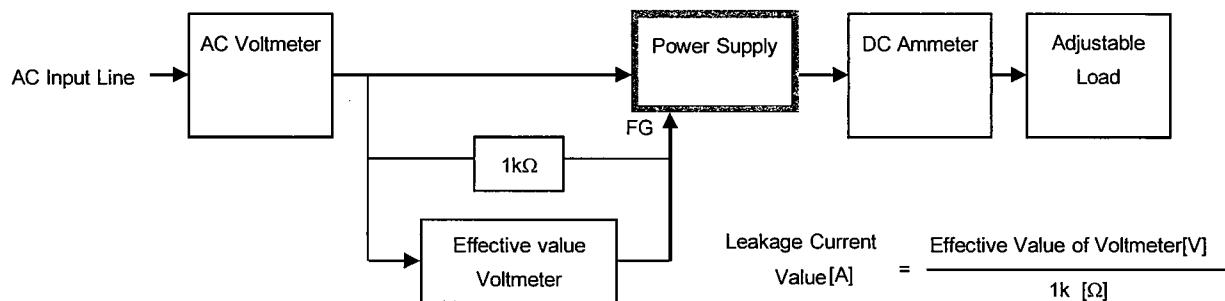


Figure B (DEN-AN)

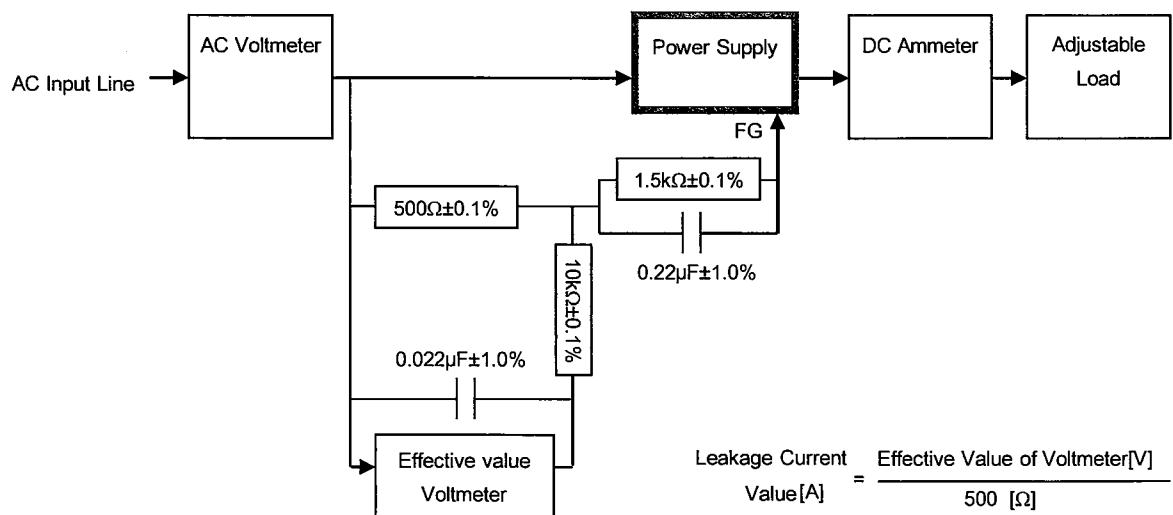
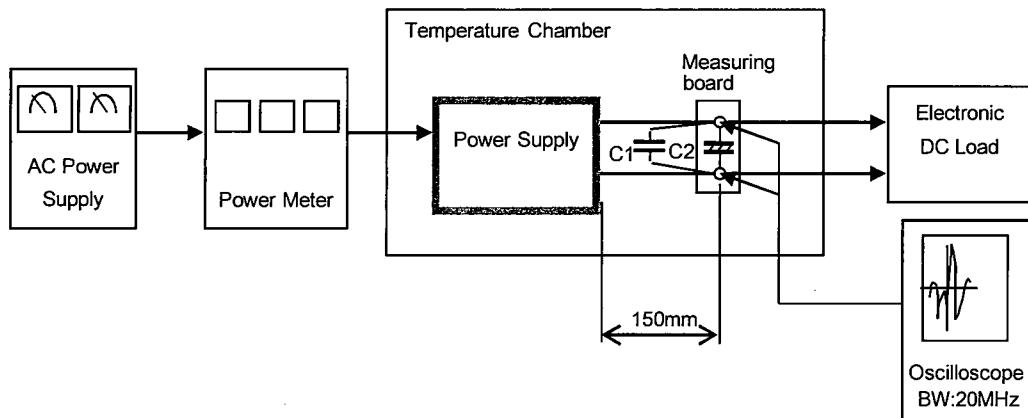


Figure B (IEC60950-1)

coSEL $C1 = 0.1 \mu F$

(Ceramic capacitor)

 $C2 = 22 \mu F$

(Electrolytic capacitor)

Figure C