

TEST DATA OF LFP150F-36-Y

Regulated DC Power Supply
February 4, 2013

Approved by : Yoshiaki Shimizu
Yoshiaki Shimizu Design Manager

Prepared by : Soshi Nakamura
Soshi Nakamura 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.Ovvervoltage Protection	23
24.Figure of Testing Circuitry	24

(Final Page 25)

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Item	Input Current (by Load Current)																																																					
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1.Graph	—△— Input Volt. 100V - -□--- Input Volt. 200V - -○--- Input Volt. 230V																																																					
	<p>The graph shows a non-linear relationship between input current and load current. For a given load current, the input current decreases as the input voltage increases. A slanted line is drawn through the data points, representing the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 100V [A]</th> <th>Input Volt. 200V [A]</th> <th>Input Volt. 230V [A]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>0.080</td><td>0.078</td><td>0.082</td></tr> <tr><td>0.80</td><td>0.420</td><td>0.250</td><td>0.233</td></tr> <tr><td>1.60</td><td>0.742</td><td>0.406</td><td>0.370</td></tr> <tr><td>2.40</td><td>1.062</td><td>0.563</td><td>0.508</td></tr> <tr><td>3.20</td><td>1.401</td><td>0.723</td><td>0.649</td></tr> <tr><td>4.00</td><td>1.725</td><td>0.885</td><td>0.789</td></tr> <tr><td>4.20</td><td>1.811</td><td>0.925</td><td>0.824</td></tr> <tr><td>4.62</td><td>1.993</td><td>1.009</td><td>0.898</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 100V [A]	Input Volt. 200V [A]	Input Volt. 230V [A]	0.00	0.080	0.078	0.082	0.80	0.420	0.250	0.233	1.60	0.742	0.406	0.370	2.40	1.062	0.563	0.508	3.20	1.401	0.723	0.649	4.00	1.725	0.885	0.789	4.20	1.811	0.925	0.824	4.62	1.993	1.009	0.898	--	-	-	-	--	-	-	-	--	-	-	-			
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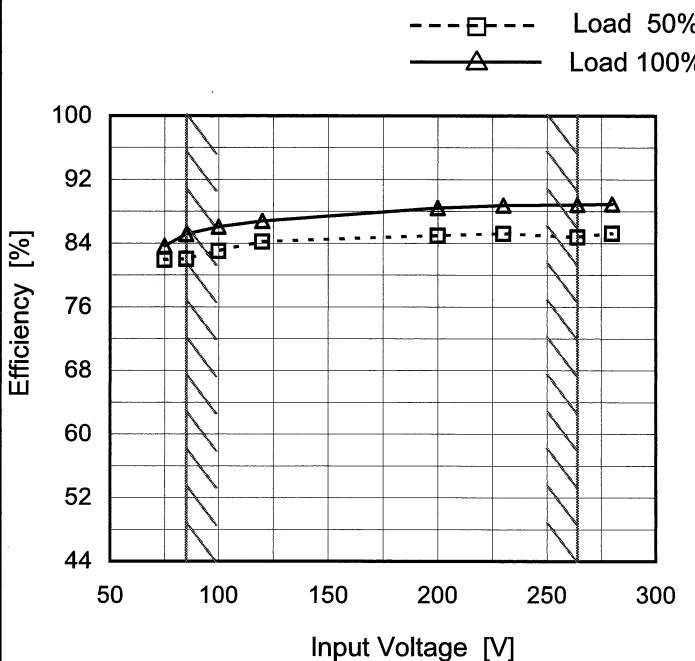
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Model LFP150F-36-Y

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%
75	81.9	83.6
85	82.0	85.2
100	83.0	86.1
120	84.2	86.8
200	84.9	88.4
230	85.2	88.8
264	84.7	88.8
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<p>Graph showing Power Factor vs Input Voltage for LFP150F-36-Y at 25°C. The Y-axis is Power Factor (0.4 to 1.0) and the X-axis is Input Voltage [V] (50 to 300). Two curves are shown: Load 50% (dashed line with squares) and Load 100% (solid line with triangles). Both curves show a decreasing trend as input voltage increases. A slanted line indicates the rated input voltage range.</p>																																		
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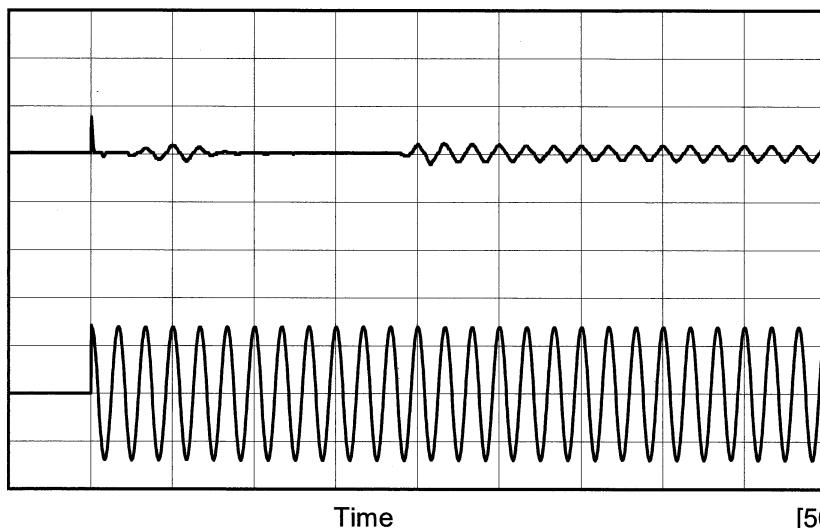
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COSEL

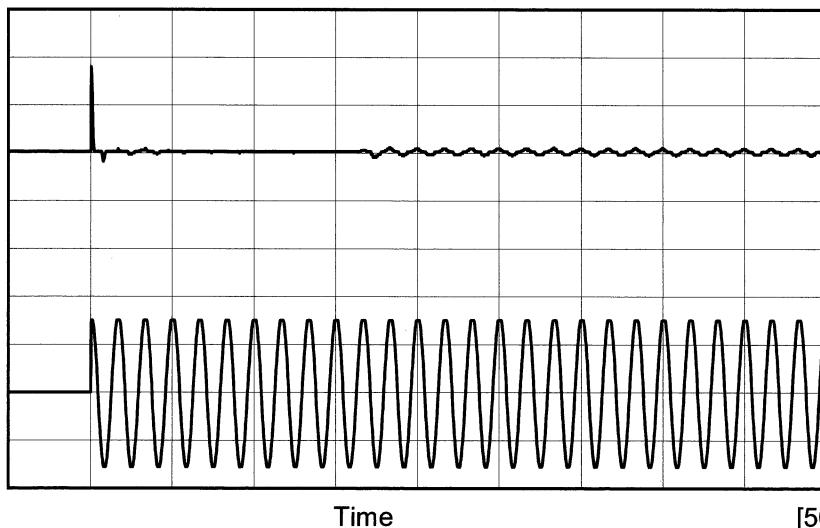
Model LFP150F-36-Y

Item Inrush Current

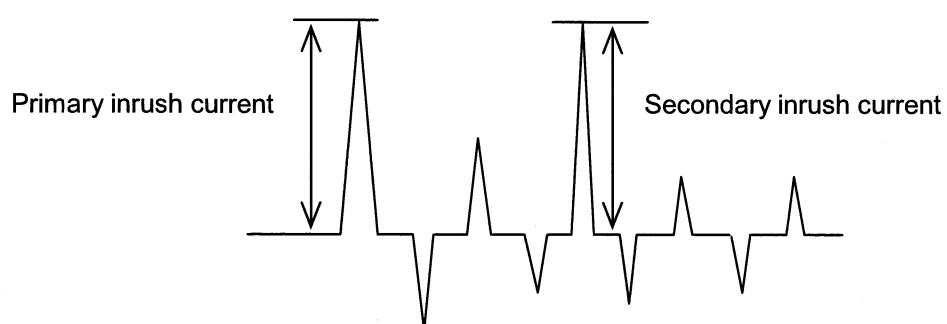
Object _____

Temperature 25°C
Testing Circuitry Figure AInput
Current
[20A/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %
Primary inrush current : 15.1 A
Secondary inrush current : 4.7 A

Input
Voltage
[100V/div]Input
Current
[20A/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %
Primary inrush current : 35.5 A
Secondary inrush current : 2.3 A

Input
Voltage
[200V/div]



Model	LFP150F-36-Y	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

1. Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.28	0.40	0.46	Operation
	One of phases	0.24	0.52	0.63	Stand by
IEC60950-1	Both phases	0.16	0.41	0.45	Operation
	One of phases	0.26	0.63	0.64	Stand by

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

2. Condition

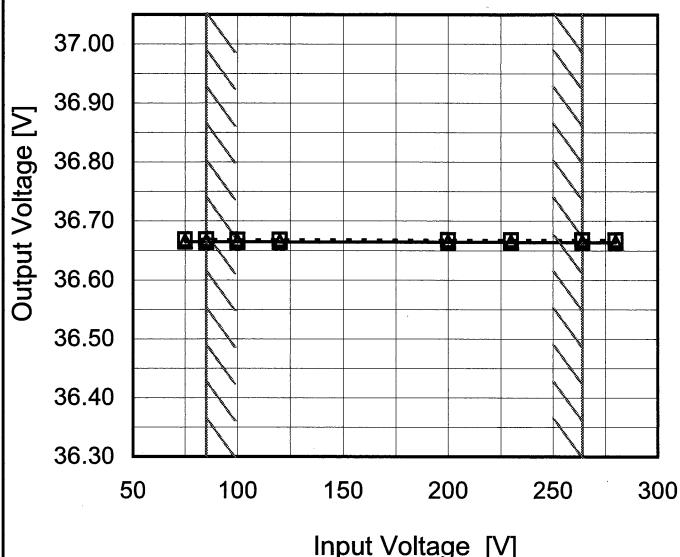
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

COSEL

Model	LFP150F-36-Y
Item	Line Regulation
Object	+36V4.2A

1. Graph

--- □ --- Load 50%
 —△— Load 100%



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

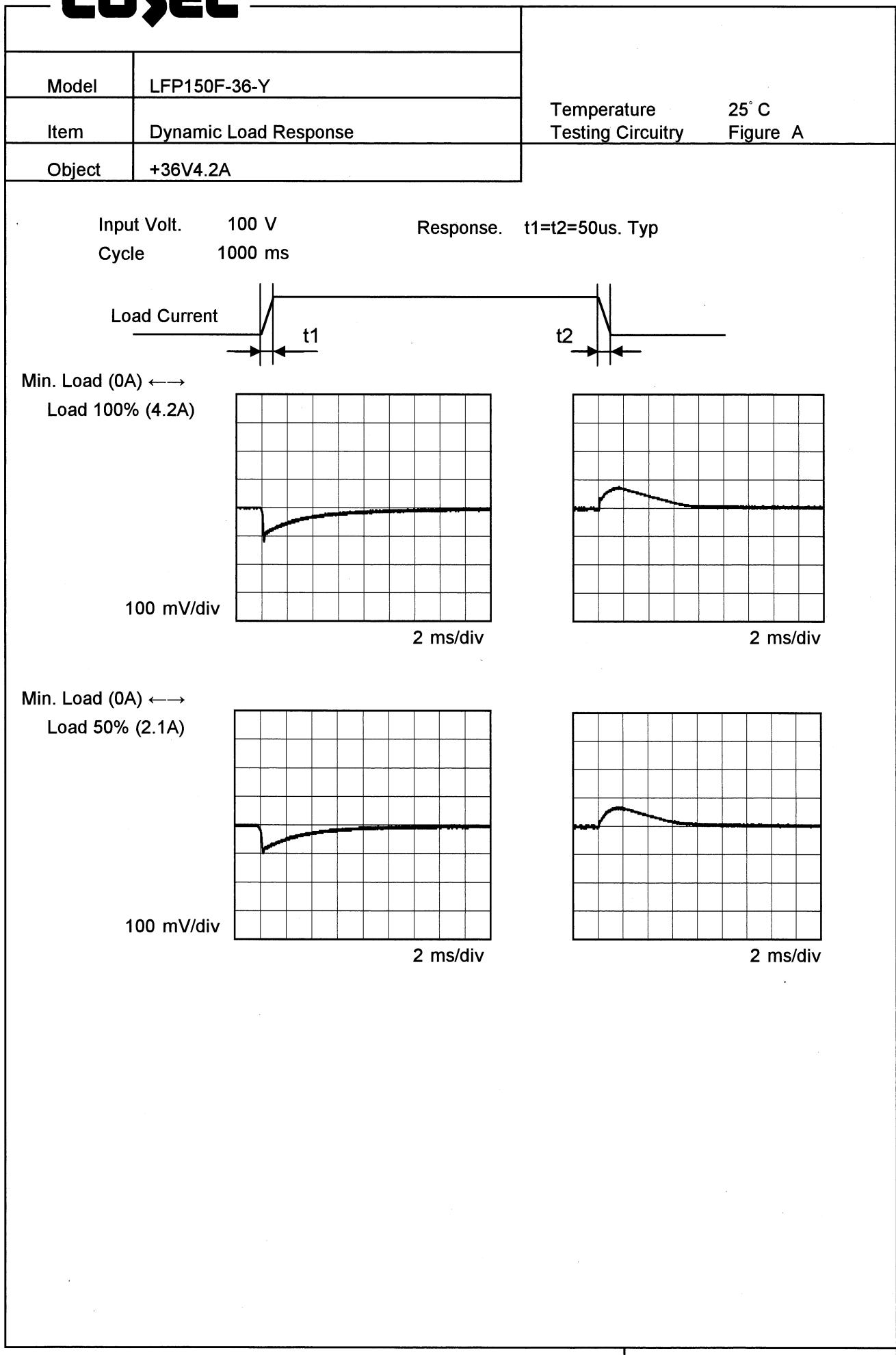
Temperature 25°C
 Testing Circuitry Figure A

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	36.669	36.665
85	36.669	36.665
100	36.668	36.665
120	36.668	36.665
200	36.667	36.664
230	36.668	36.664
264	36.667	36.664
280	36.667	36.664
--	-	-

COSEL

Model	LFP150F-36-Y	Temperature 25°C Testing Circuitry Figure A																																																					
Item	Load Regulation																																																						
Object	+36V4.2A																																																						
1.Graph	<p>Input Volt. 100V Input Volt. 200V Input Volt. 230V</p>																																																						
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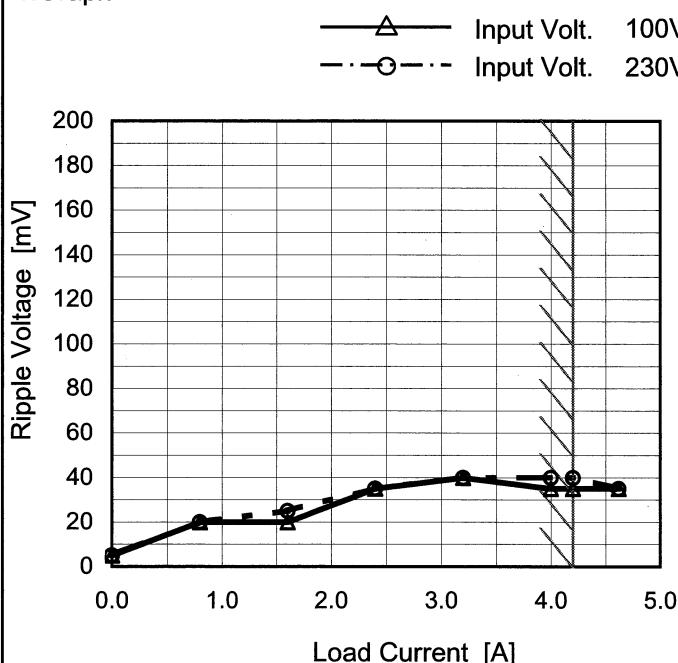
COSEL

COSEL

Model	LF150F-36-Y
Item	Ripple Voltage (by Load Current)
Object	+36V4.2A

 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]
0.00	5	5
0.80	20	20
1.60	20	25
2.40	35	35
3.20	40	40
4.00	35	40
4.20	35	40
4.62	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.

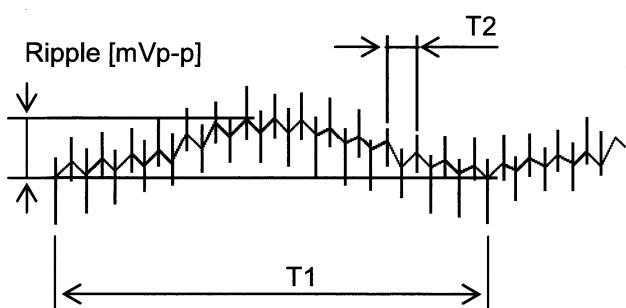
 T1: Due to AC Input Line
 T2: Due to Switching


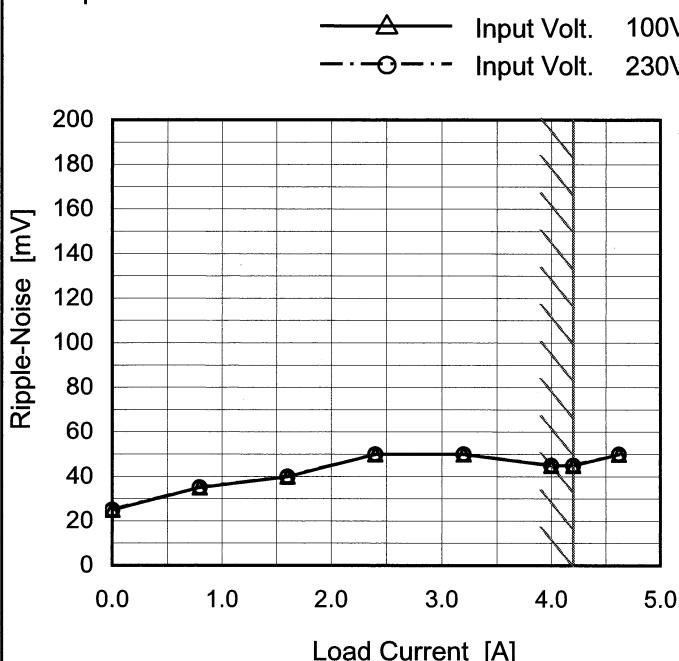
Fig. Complex Ripple Wave Form

COSEL

Model	LFP150F-36-Y
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. 100 [V]	Input Volt. 230 [V]
0.00	25	25
0.80	35	35
1.60	40	40
2.40	50	50
3.20	50	50
4.00	45	45
4.20	45	45
4.62	50	50
--	-	-
--	-	-
--	-	-

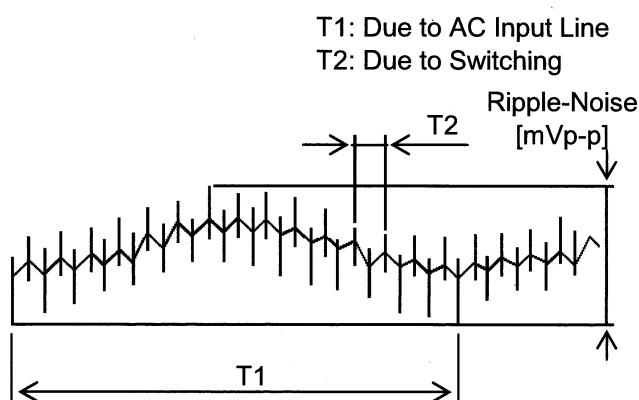


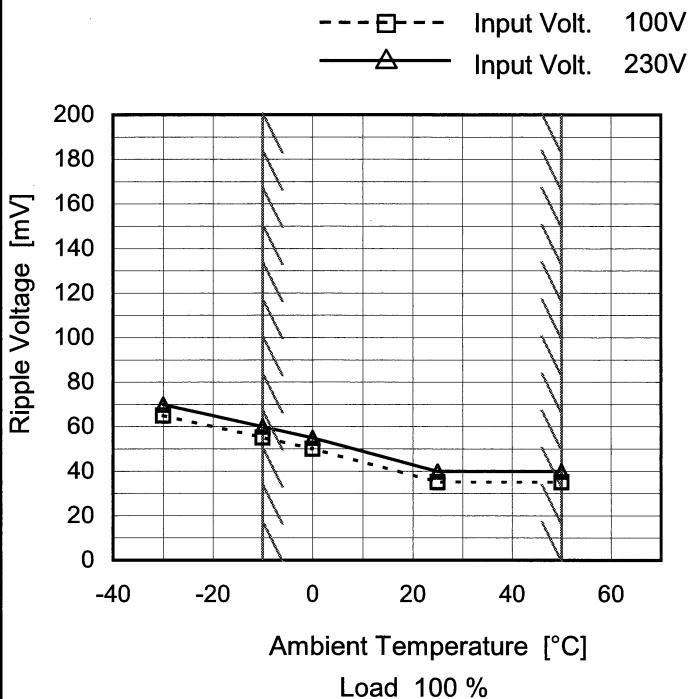
Fig. Complex Ripple Wave Form

COSEL

Model	LFP150F-36-Y
Item	Ripple Voltage (by Ambient Temp.)
Object	+36V4.2A

Testing Circuitry Figure C

1.Graph



2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
-30	65	70
-10	55	60
0	50	55
25	35	40
50	35	40
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

COSEL

Model	LFP150F-36-Y	Testing Circuitry Figure A																																																					
Item	Ambient Temperature Drift																																																						
Object	+36V4.2A																																																						
1.Graph	<p>Input Volt. 100V Input Volt. 200V Input Volt. 230V</p> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>	2.Values																																																					
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Ambient Temperature [°C]	Output Voltage [V]																																																						
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Note: Slanted line shows the range of the rated ambient temperature.



Model	LFP150F-36-Y	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 - 50°C

Input Voltage : 85 - 264V

Load Current : 0 - 4.2A

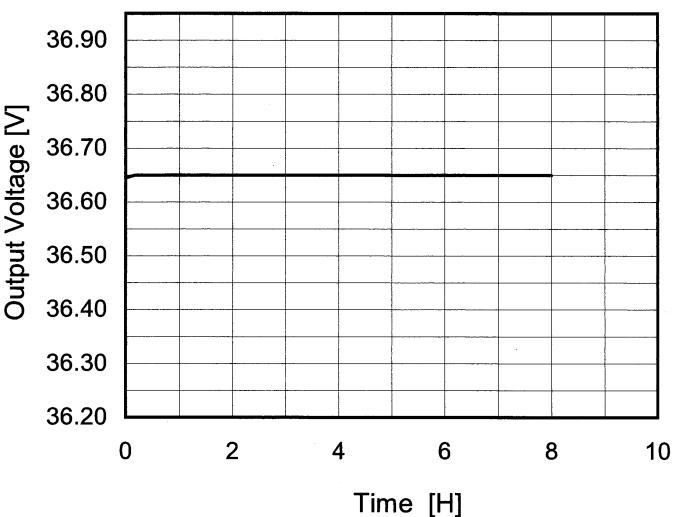
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	50	85	0	36.687	± 40	± 0.1
Minimum Voltage	-10	264	4.2	36.607		

COSEL

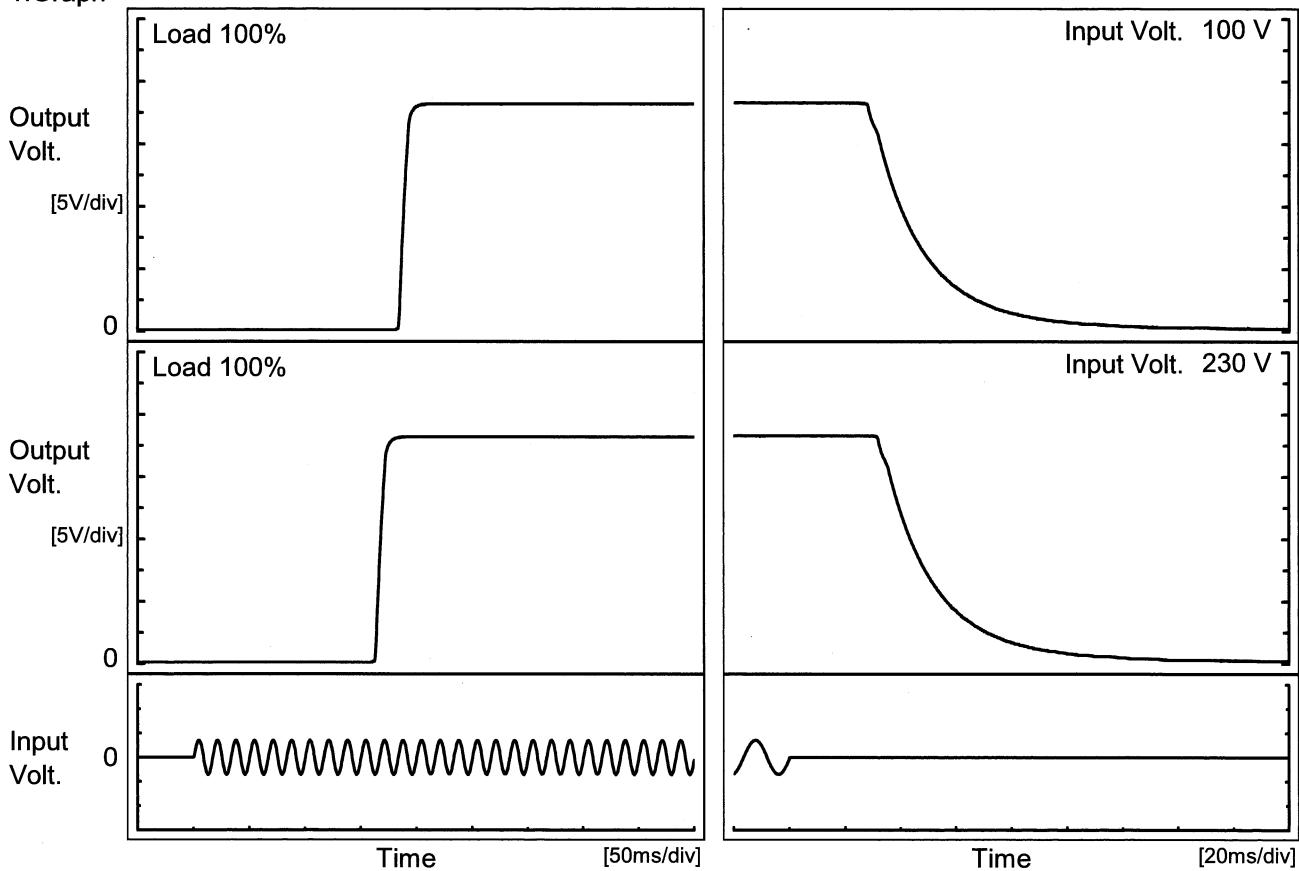
Model	LFP150F-36-Y	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+24V4.2A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 230V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>36.645</td></tr> <tr><td>0.5</td><td>36.650</td></tr> <tr><td>1.0</td><td>36.650</td></tr> <tr><td>2.0</td><td>36.650</td></tr> <tr><td>3.0</td><td>36.650</td></tr> <tr><td>4.0</td><td>36.650</td></tr> <tr><td>5.0</td><td>36.650</td></tr> <tr><td>6.0</td><td>36.650</td></tr> <tr><td>7.0</td><td>36.650</td></tr> <tr><td>8.0</td><td>36.650</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	36.645	0.5	36.650	1.0	36.650	2.0	36.650	3.0	36.650	4.0	36.650	5.0	36.650	6.0	36.650	7.0	36.650	8.0	36.650
Time since start [H]	Output Voltage [V]																								
0.0	36.645																								
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2.0	36.650																								
3.0	36.650																								
4.0	36.650																								
5.0	36.650																								
6.0	36.650																								
7.0	36.650																								
8.0	36.650																								

* The characteristic of AC230V is equal.

COSEL

Model	LFP150F-36-Y	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+36V4.2A		

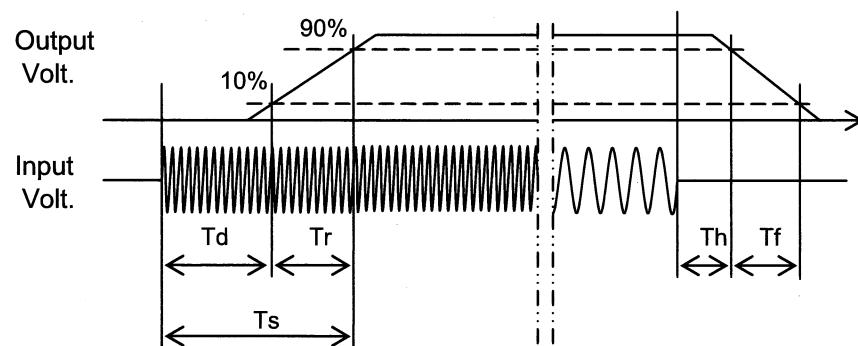
1.Graph



2.Values

[ms]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		185.0	8.3	193.3	30.7	42.6
230 V		164.0	8.3	172.3	34.4	42.9

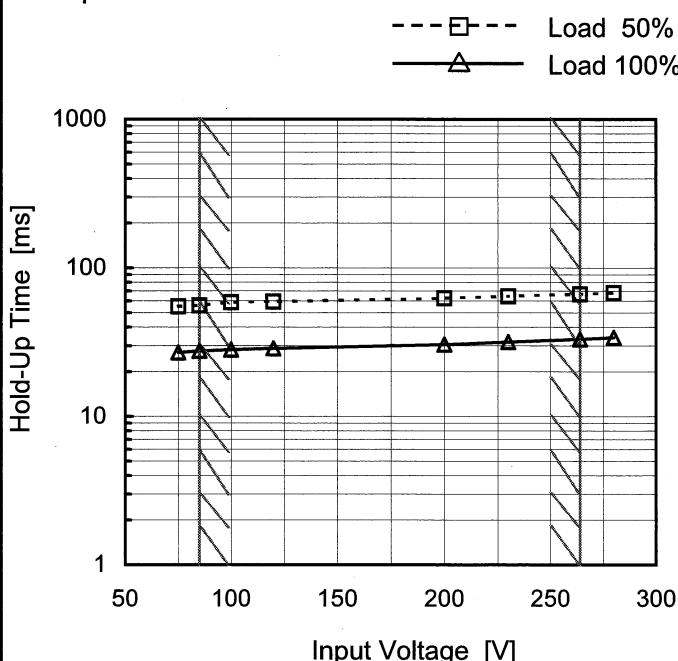


COSEL

Model	LFP150F-36-Y
Item	Hold-Up Time
Object	+36V4.2A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	55	27
85	56	28
100	58	28
120	59	29
200	63	31
230	64	32
264	67	33
280	68	34
--	-	-

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

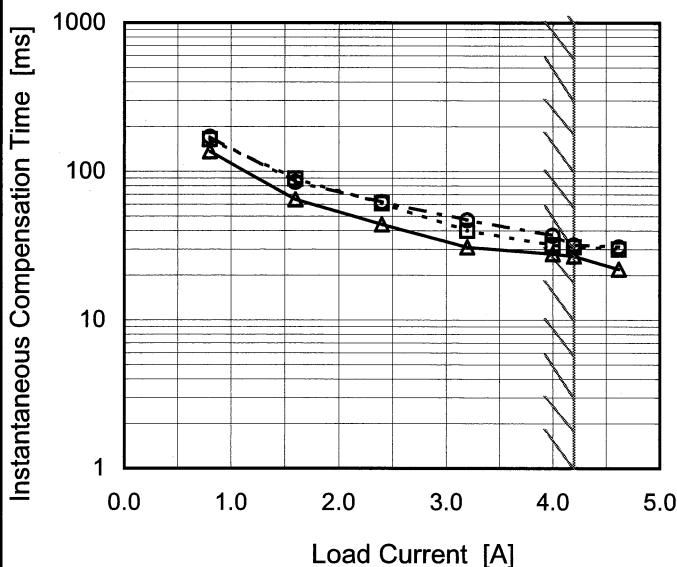
Model LFP150F-36-Y

Item Instantaneous Interruption Compensation

Object +36V4.2A

1. Graph

—△— Input Volt. 100V
 - - □ - - Input Volt. 200V
 - - ○ - - Input Volt. 230V



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

Temperature 25°C
 Testing Circuitry Figure A

2. Values

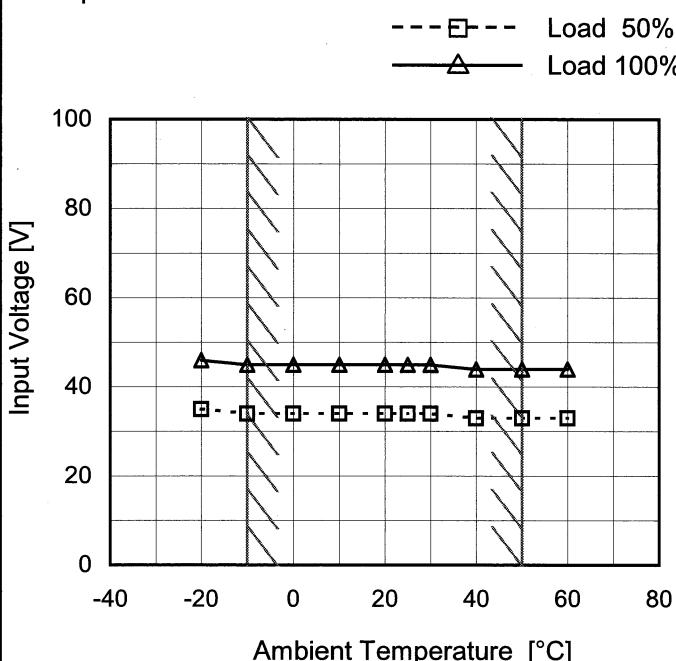
Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.80	137	164	171
1.60	65	89	85
2.40	44	61	62
3.20	31	40	47
4.00	28	32	37
4.20	27	31	32
4.62	22	30	31
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	LFP150F-36-Y
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

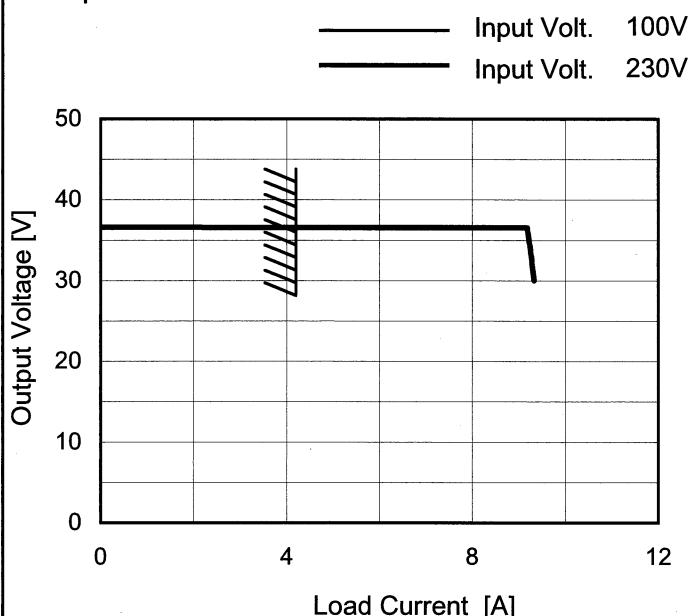
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	35	46
-10	34	45
0	34	45
10	34	45
20	34	45
25	34	45
30	34	45
40	33	44
50	33	44
60	33	44
--	-	-

COSEL

Model	LFP150F-36-Y
Item	Overcurrent Protection
Object	+36V4.2A

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



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

Intermittent operation occurs when the output voltage is from 30V to 0V.

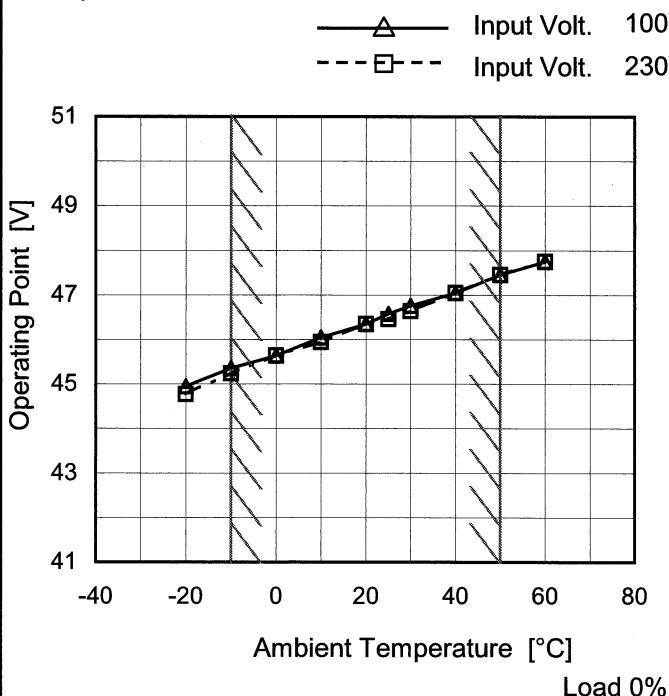
2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
34.2	9.27	9.25
32.4	9.30	9.29
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	LFP150F-36-Y
Item	Overvoltage 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. 100[V]	Input Volt. 230[V]
-20	44.95	44.77
-10	45.36	45.24
0	45.64	45.64
10	46.05	45.94
20	46.35	46.35
25	46.58	46.46
30	46.76	46.64
40	47.05	47.05
50	47.46	47.46
60	47.75	47.75
--	-	-

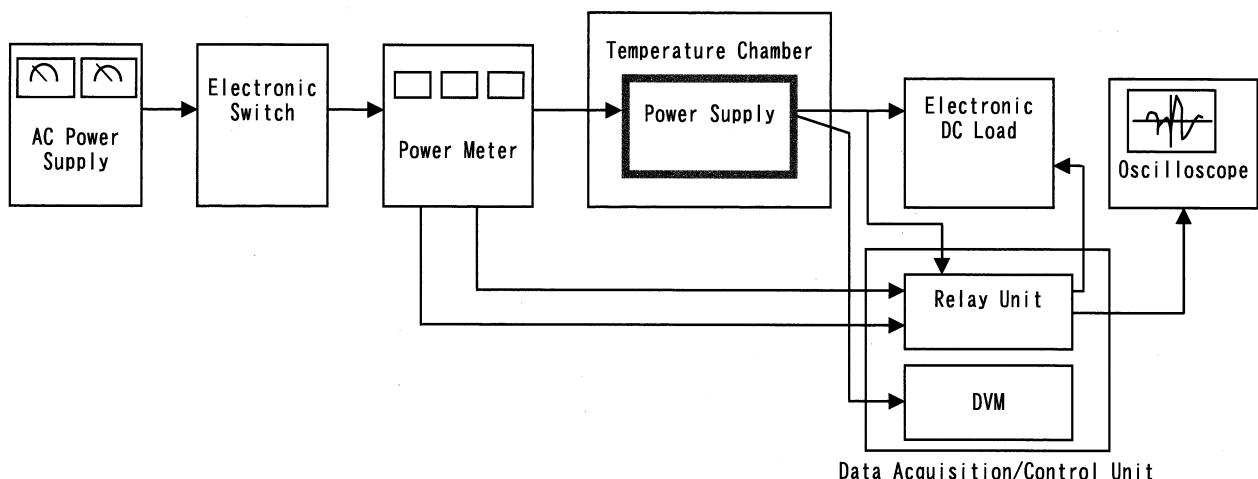


Figure A

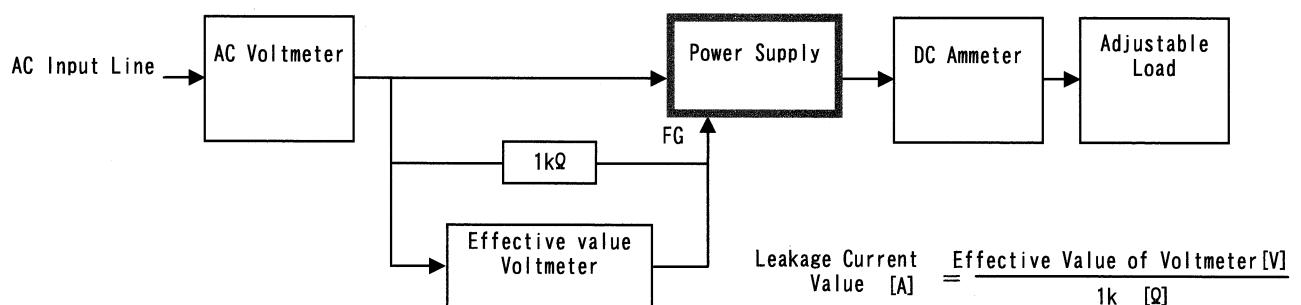


Figure B (DEN-AN)

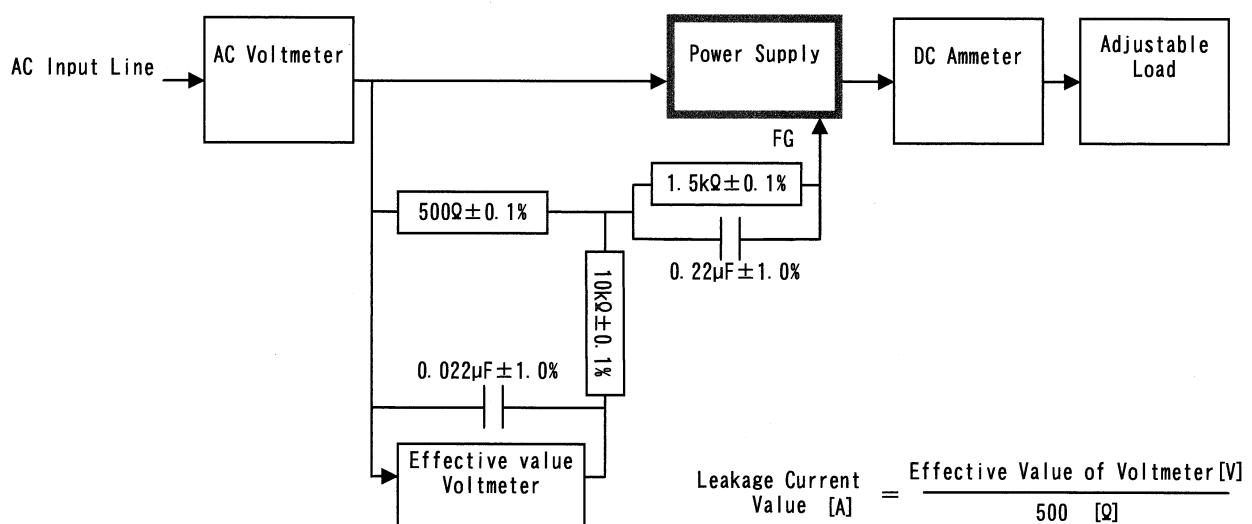


Figure B (IEC60950-1)

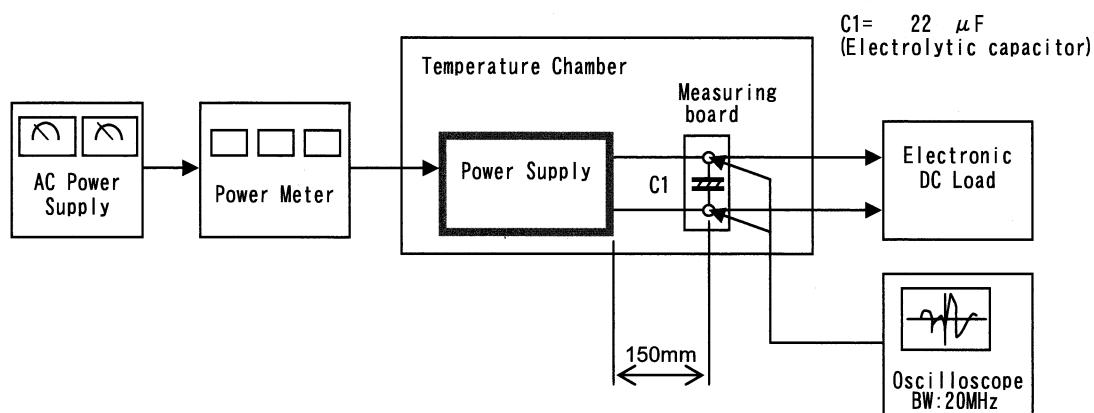
COSEL

Figure C