

TEST DATA OF LFA100F-15

Regulated DC Power Supply
November 18, 2010

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Yoshiaki Shimizu Design Manager

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Daisuke Sumiwa Design Engineer

COSEL CO.,LTD.

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Model		LFA100F-15																																																				
Item		Input Current (by Load Current)																																																				
Object																																																						
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <p>Input Current [A]</p> <p>Load Current [A]</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.00</td><td>0.055</td><td>0.078</td><td>0.087</td></tr><tr><td>1.40</td><td>0.301</td><td>0.182</td><td>0.175</td></tr><tr><td>2.80</td><td>0.541</td><td>0.287</td><td>0.263</td></tr><tr><td>4.20</td><td>0.782</td><td>0.398</td><td>0.356</td></tr><tr><td>5.60</td><td>1.026</td><td>0.513</td><td>0.454</td></tr><tr><td>6.70</td><td>1.219</td><td>0.604</td><td>0.532</td></tr><tr><td>7.37</td><td>1.337</td><td>0.661</td><td>0.580</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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	0.055	0.078	0.087	1.40	0.301	0.182	0.175	2.80	0.541	0.287	0.263	4.20	0.782	0.398	0.356	5.60	1.026	0.513	0.454	6.70	1.219	0.604	0.532	7.37	1.337	0.661	0.580	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model

LFA100F-15

Item

Input Power (by Load Current)

Object

Temperature

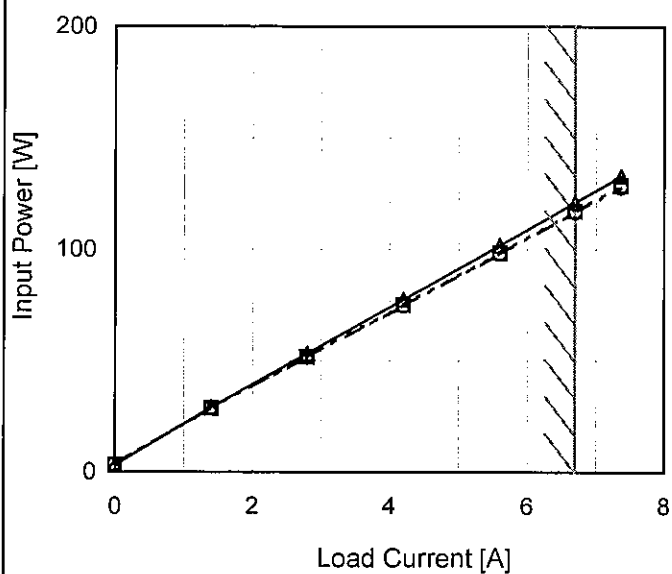
25°C

Testing Circuitry

Figure A

1. Graph

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



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	3.0	3.3	3.4
1.40	29.0	28.8	28.9
2.80	53.2	51.7	51.6
4.20	77.5	75.1	74.7
5.60	101.8	98.6	98.2
6.70	121.1	117.2	116.8
7.37	132.9	128.7	128.0
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model		LFA100F-15		Temperature		25°C	
Item		Efficiency (by Input Voltage)		Testing Circuitry		Figure A	
Object							
1.Graph				2.Values			
<div><div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></d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Model LFA100F-15

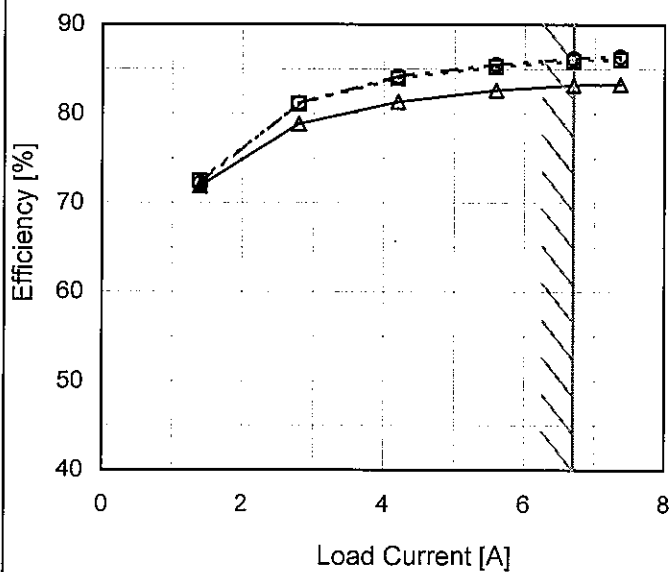
Item Efficiency (by Load Current)

Object

Temperature 25°C
Testing Circuitry Figure A

1. Graph

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



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	-	-	-
1.40	71.9	72.4	72.2
2.80	78.8	81.1	81.2
4.20	81.3	84.0	84.2
5.60	82.6	85.3	85.5
6.70	83.2	85.9	86.2
7.37	83.3	86.1	86.4
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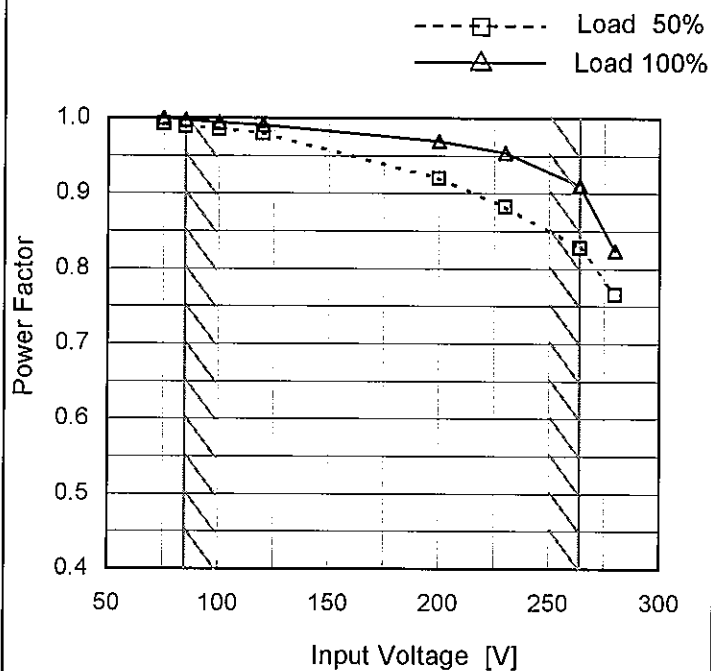
Model LFA100F-15

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	0.992	0.999
85	0.989	0.998
100	0.986	0.994
120	0.979	0.991
200	0.920	0.969
230	0.882	0.954
264	0.828	0.911
280	0.766	0.824
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COSEL

Model

LFA100F-15

Item

Power Factor (by Load Current)

Object

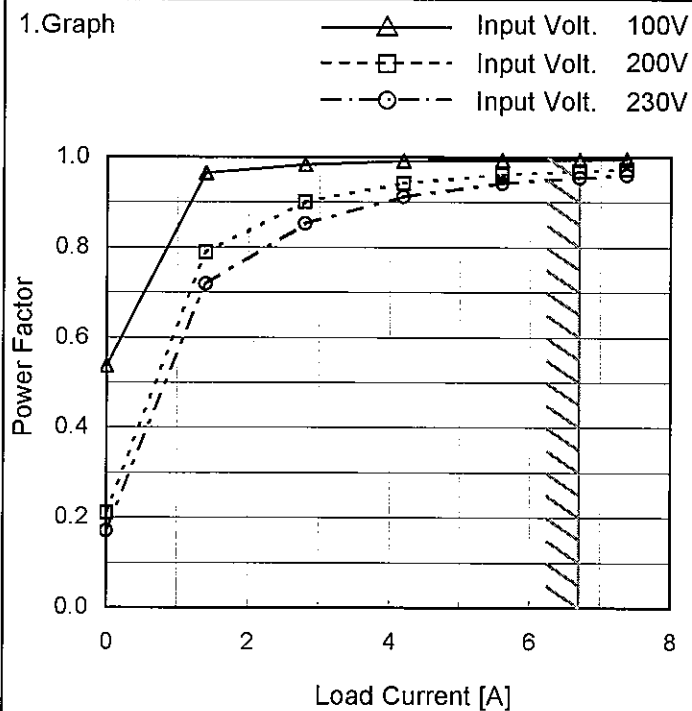
Temperature

25°C

Testing Circuitry

Figure A

1. Graph



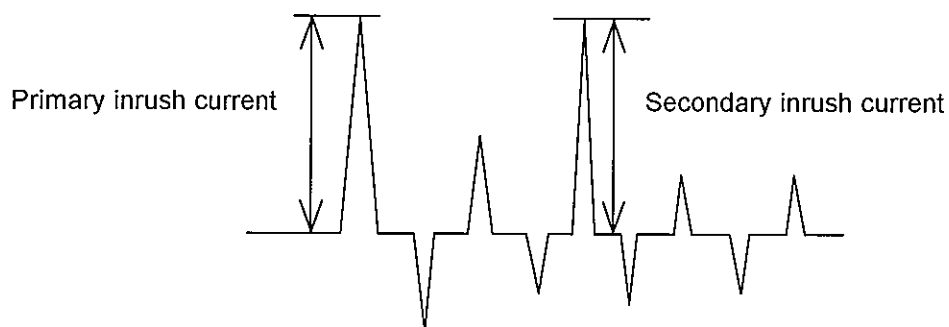
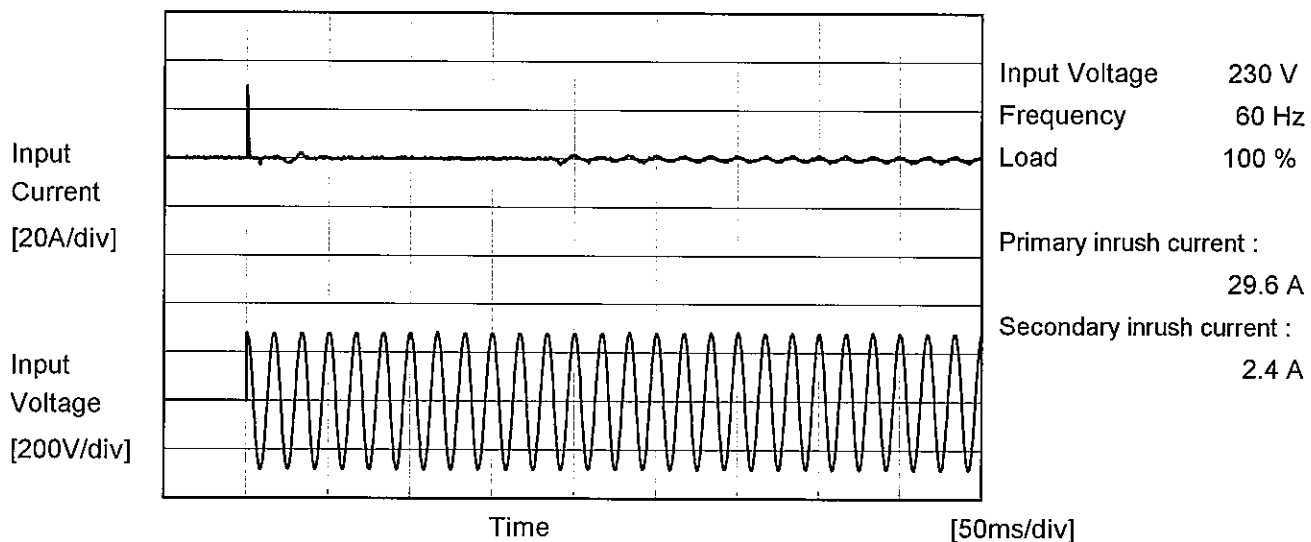
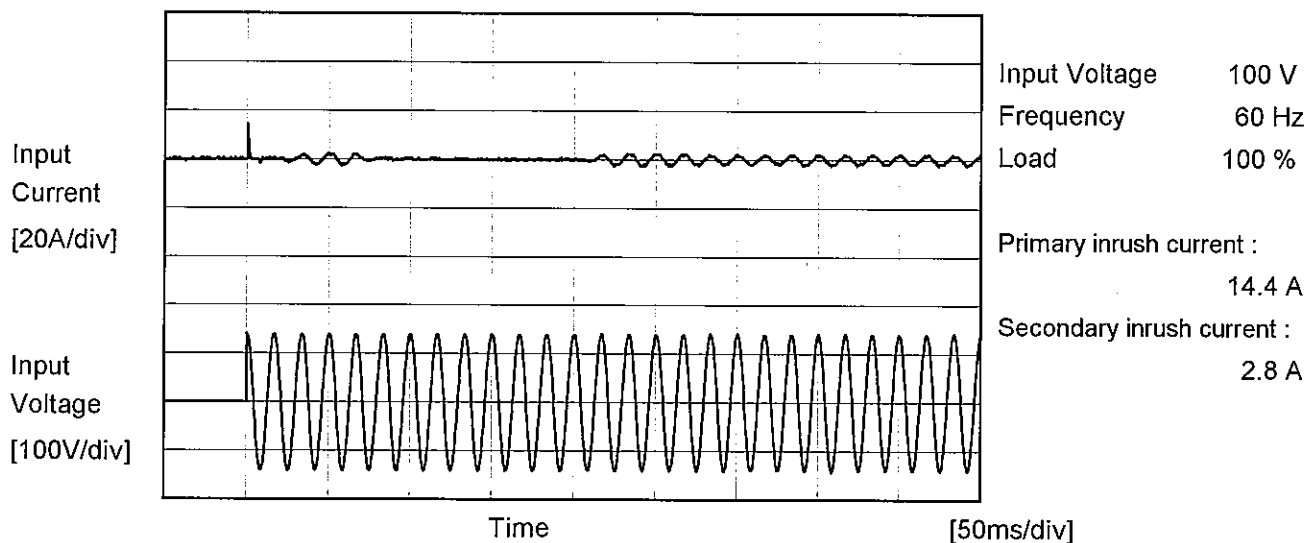
Note: Slanted line shows the range of the rated load current.

2. Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.537	0.210	0.171
1.40	0.964	0.789	0.719
2.80	0.983	0.901	0.853
4.20	0.991	0.942	0.912
5.60	0.993	0.961	0.942
6.70	0.994	0.969	0.954
7.37	0.996	0.973	0.960
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Model	LFA100F-15	Temperature Testing Circuitry	25°C Figure A
Item	Inrush Current		
Object			





		Temperature 25°C Testing Circuitry Figure B
Model	LFA100F-15	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.27	0.34	0.37	Operation
	One of phase	0.25	0.55	0.67	stand by
IEC60950-1	Both phases	0.13	0.28	0.33	Operation
	One of phase	0.25	0.52	0.64	stand by

The value for "One phase" 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.

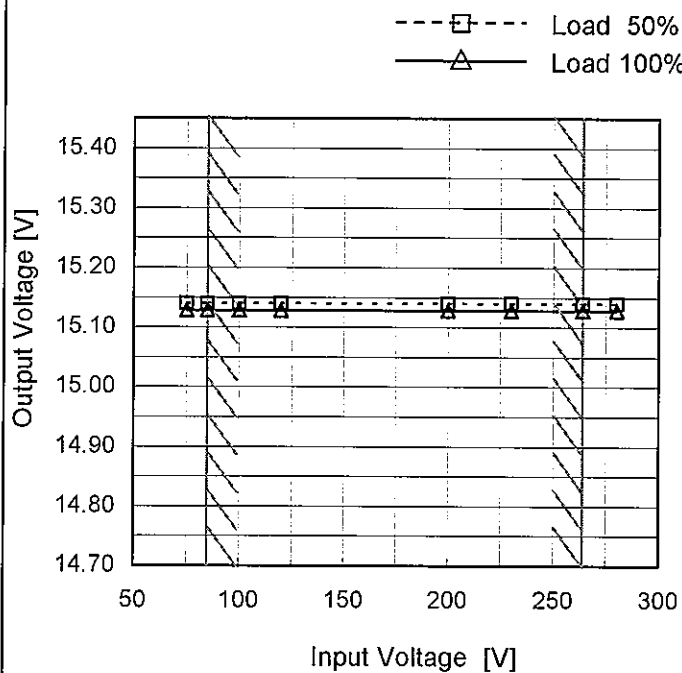
Model LFA100F-15

Item Line Regulation

Object +15V6.7A

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	15.140	15.129
85	15.140	15.128
100	15.140	15.128
120	15.140	15.128
200	15.140	15.128
230	15.140	15.128
264	15.140	15.128
280	15.140	15.128
--	-	-

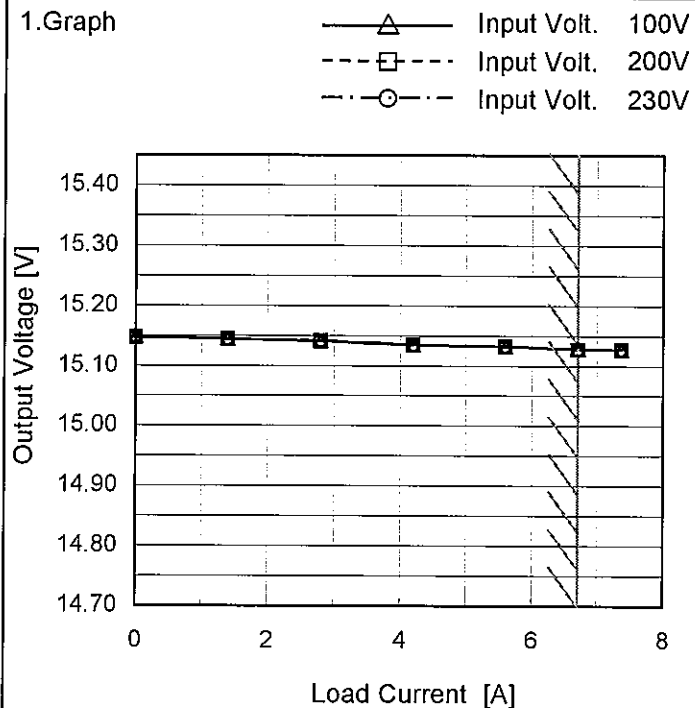
Model LFA100F-15

Item Load Regulation

Object +15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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

2. Values

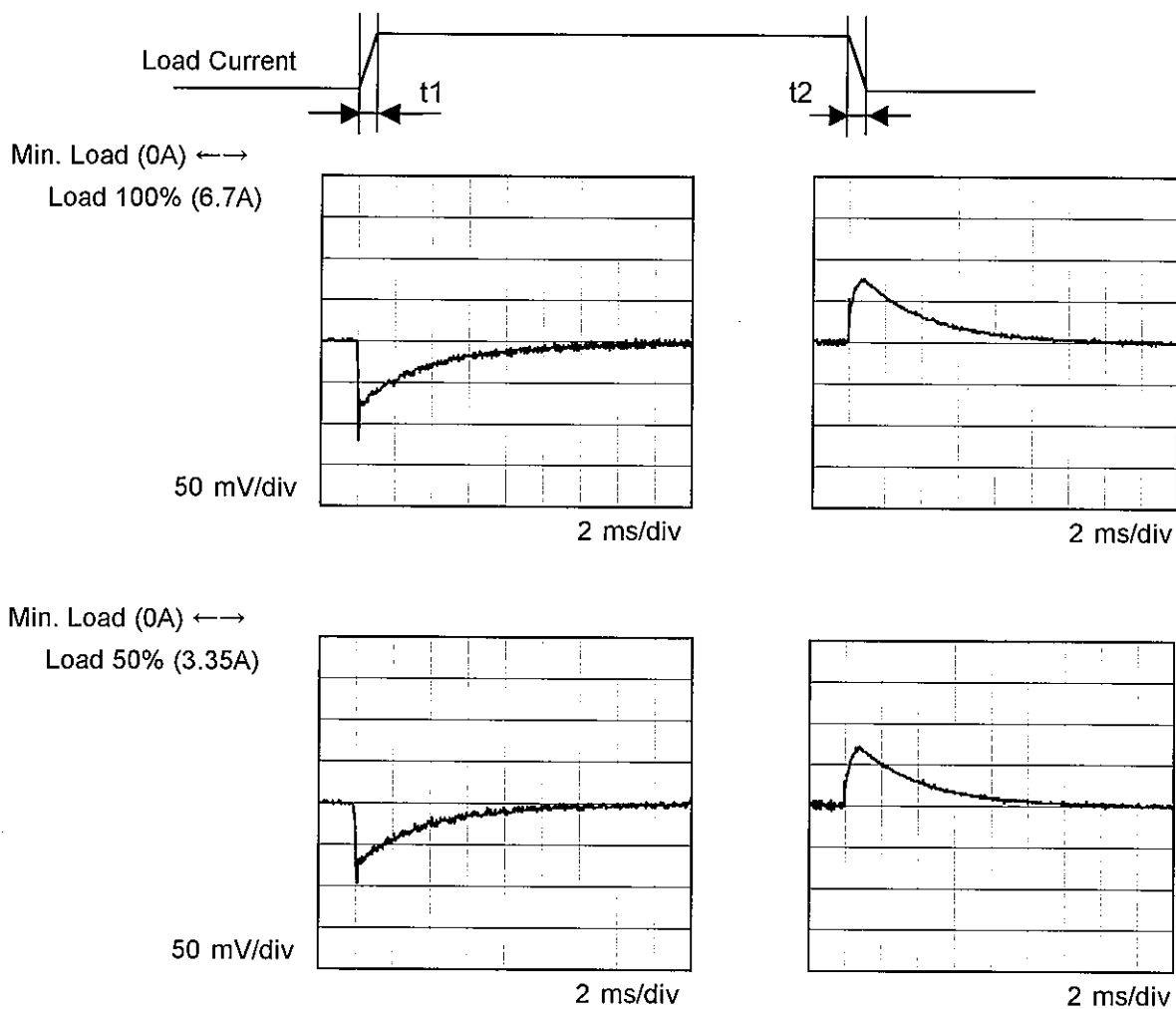
Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	15.147	15.147	15.147
1.40	15.144	15.144	15.144
2.80	15.141	15.141	15.141
4.20	15.135	15.135	15.135
5.60	15.133	15.133	15.133
6.70	15.128	15.128	15.128
7.37	15.127	15.127	15.127
--	-	-	-
--	-	-	-
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Model	LFA100F-15	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V6.7A		

Input Volt. 100 V
Cycle 1000 ms

Response. $t_1=t_2=50\mu\text{s}$. Typ



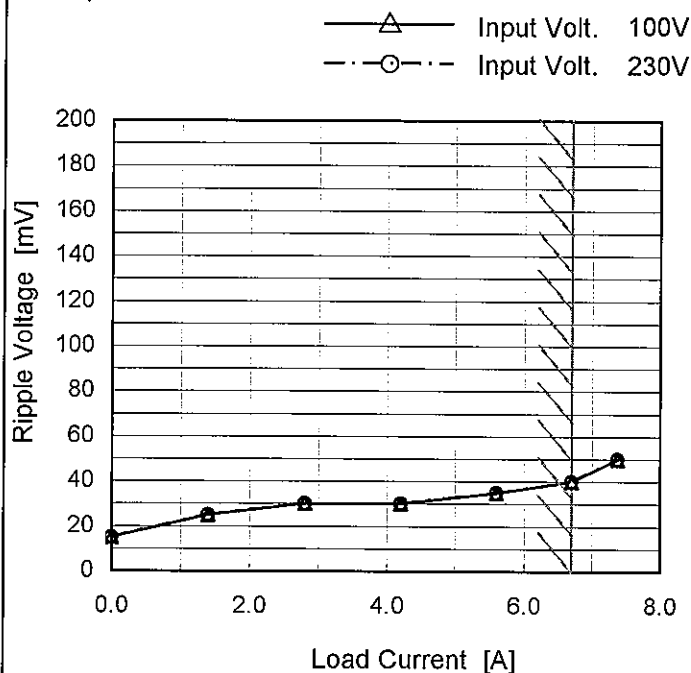
Model LFA100F-15

Item Ripple Voltage (by Load Current)

Object +15V6.7A

Temperature 25°C
Testing Circuitry Figure C

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.

2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.00	15	15
1.40	25	25
2.80	30	30
4.20	30	30
5.60	35	35
6.70	40	40
7.37	50	50
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--	-	-
--	-	-
--	-	-

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

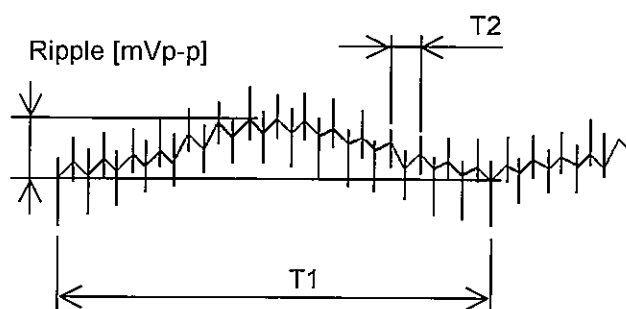


Fig. Complex Ripple Wave Form

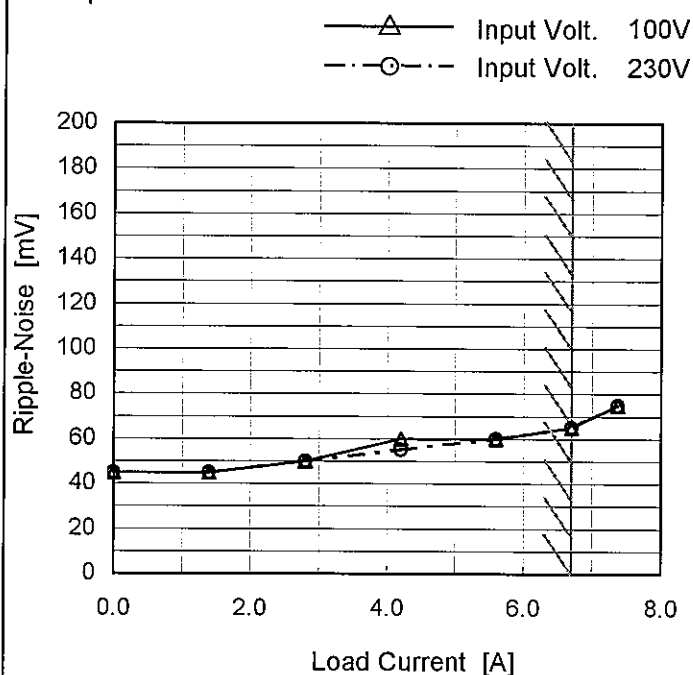
Model LFA100F-15

Item Ripple-Noise

Object +15V6.7A

 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	45	45
1.40	45	45
2.80	50	50
4.20	60	55
5.60	60	60
6.70	65	65
7.37	75	75
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--	-	-
--	-	-
--	-	-

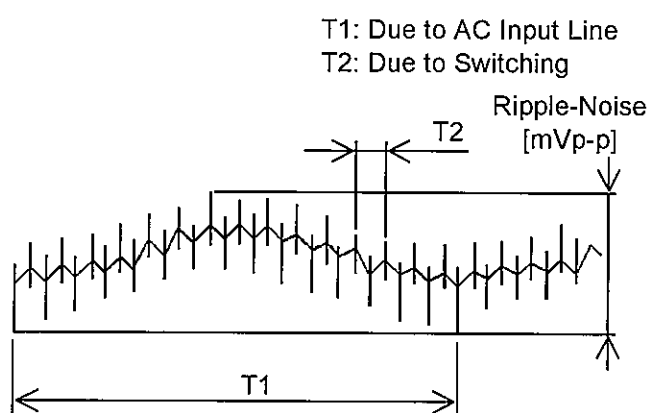


Fig. Complex Ripple Wave Form

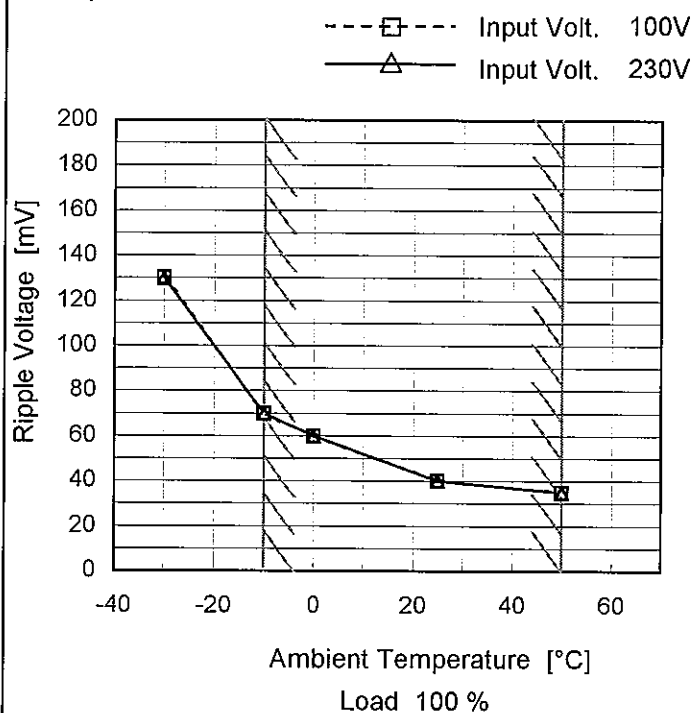
Model LFA100F-15

Item Ripple Voltage (by Ambient Temp.)

Object +15V6.7A

Testing Circuitry Figure C

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. 230 [V]
-30	130	130
-10	70	70
0	60	60
25	40	40
50	35	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Model LFA100F-15

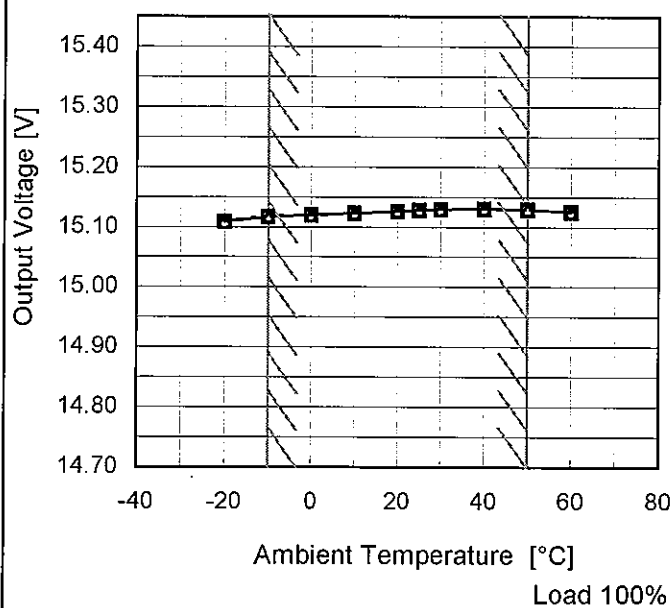
Item Ambient Temperature Drift

Object +15V6.7A

Testing Circuitry Figure A

1. Graph

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



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	15.109	15.108	15.109
-10	15.117	15.117	15.117
0	15.120	15.120	15.120
10	15.123	15.123	15.123
20	15.126	15.126	15.126
25	15.128	15.128	15.128
30	15.129	15.129	15.129
40	15.131	15.131	15.131
50	15.129	15.129	15.129
60	15.125	15.125	15.125
--	-	-	-



		Testing Circuitry Figure A
Model	LFA100F-15	
Item	Output Voltage Accuracy	
Object	+15V6.7A	

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 - 6.7A

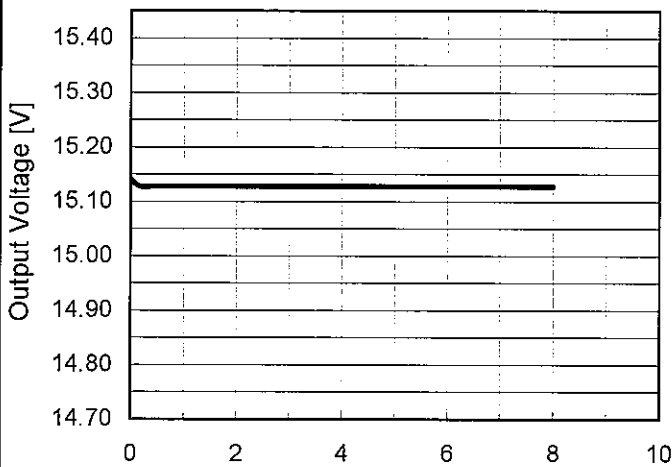
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

* 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	85	0	15.147	±15	±0.1
Minimum Voltage	-10	200	6.7	15.117		

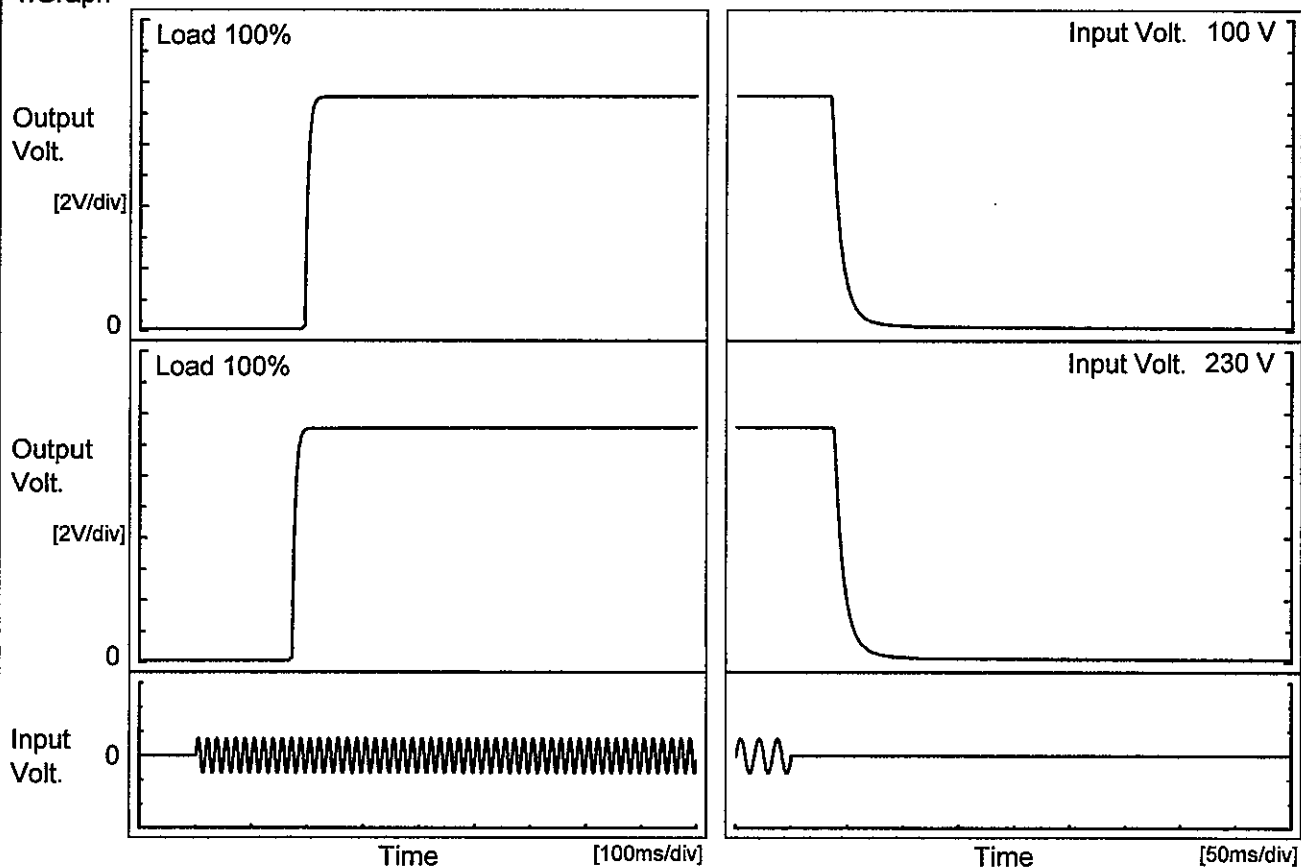
COSEL

Model	LFA100F-15	Temperature 25°C Testing Circuitry Figure A																							
Item	Time Lapse Drift																								
Object	+15V6.7A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100V Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>15.141</td></tr><tr><td>0.5</td><td>15.128</td></tr><tr><td>1.0</td><td>15.128</td></tr><tr><td>2.0</td><td>15.128</td></tr><tr><td>3.0</td><td>15.128</td></tr><tr><td>4.0</td><td>15.128</td></tr><tr><td>5.0</td><td>15.128</td></tr><tr><td>6.0</td><td>15.128</td></tr><tr><td>7.0</td><td>15.128</td></tr><tr><td>8.0</td><td>15.128</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.141	0.5	15.128	1.0	15.128	2.0	15.128	3.0	15.128	4.0	15.128	5.0	15.128	6.0	15.128	7.0	15.128	8.0	15.128
Time since start [H]	Output Voltage [V]																								
0.0	15.141																								
0.5	15.128																								
1.0	15.128																								
2.0	15.128																								
3.0	15.128																								
4.0	15.128																								
5.0	15.128																								
6.0	15.128																								
7.0	15.128																								
8.0	15.128																								
* The characteristic of AC230V is equal.																									

COSEL

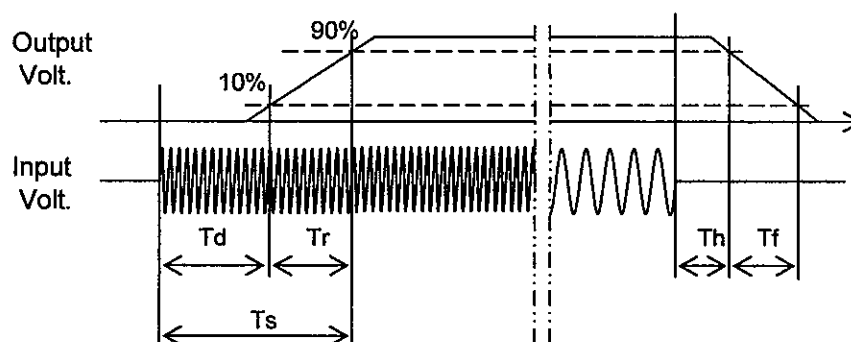
Model	LFA100F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V6.7A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		195.0	10.0	205.0	35.8	20.3
230 V		173.0	10.5	183.5	39.0	20.3



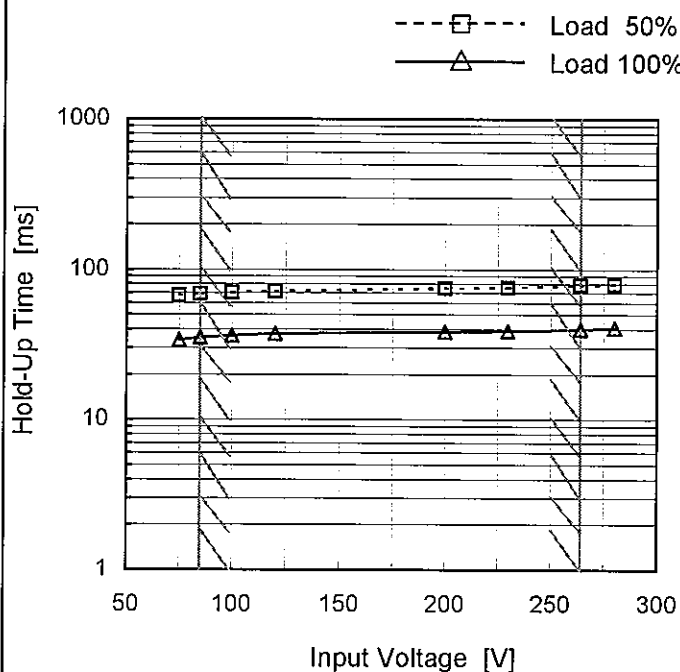
Model LFA100F-15

Item Hold-Up Time

Object +15V6.7A

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	67	34
85	69	35
100	70	36
120	72	37
200	75	38
230	76	39
264	79	40
280	80	41
--	-	-

Model LFA100F-15

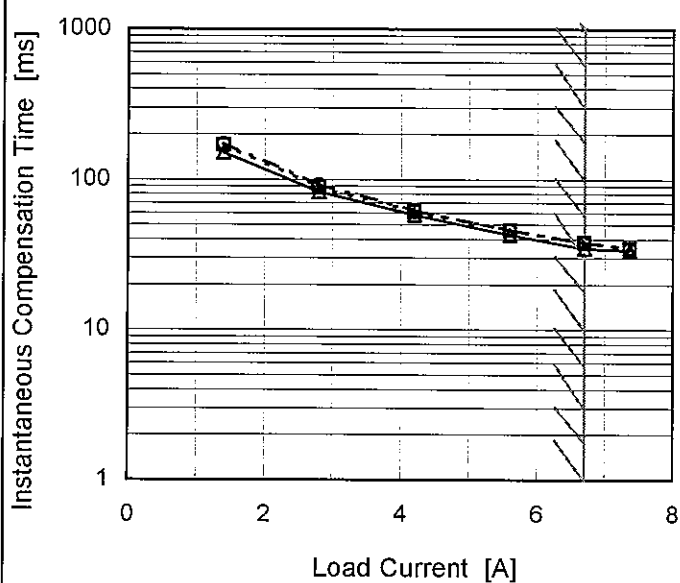
Item Instantaneous Interruption Compensation

Object +15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1. Graph

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



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	-	-	-
1.40	151	169	172
2.80	83	89	92
4.20	58	61	62
5.60	43	46	46
6.70	35	38	38
7.37	34	35	35
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

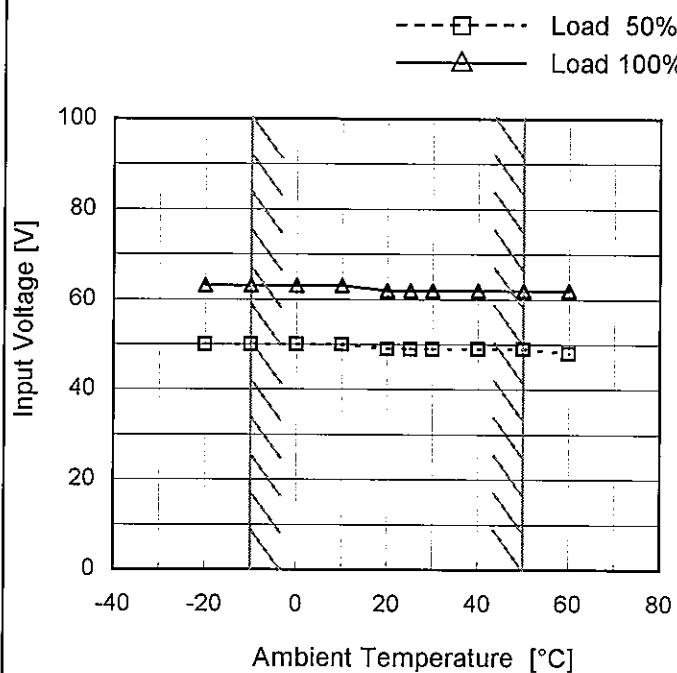
Model LFA100F-15

Item Minimum Input Voltage
for Regulated Output Voltage

Object +15V6.7A

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	50	63
-10	50	63
0	50	63
10	50	63
20	49	62
25	49	62
30	49	62
40	49	62
50	49	62
60	48	62
--	-	-

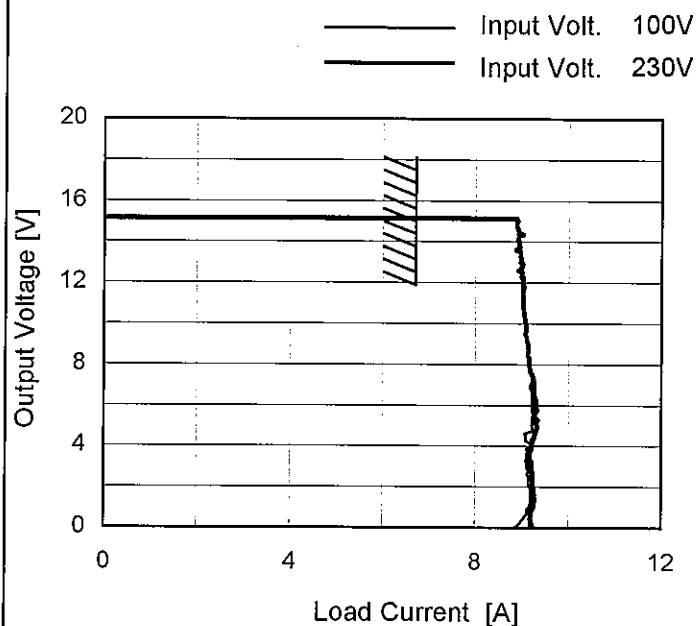
Model LFA100F-15

Item Overcurrent Protection

Object +15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
15.00	6.78	6.77
14.25	8.92	8.92
13.50	8.94	8.87
12.00	9.03	9.01
10.50	9.06	9.04
9.00	9.13	9.13
7.50	9.21	9.23
6.00	9.23	9.31
4.50	9.07	9.29
3.00	9.10	9.20
1.50	9.18	9.27
0.00	8.72	9.27

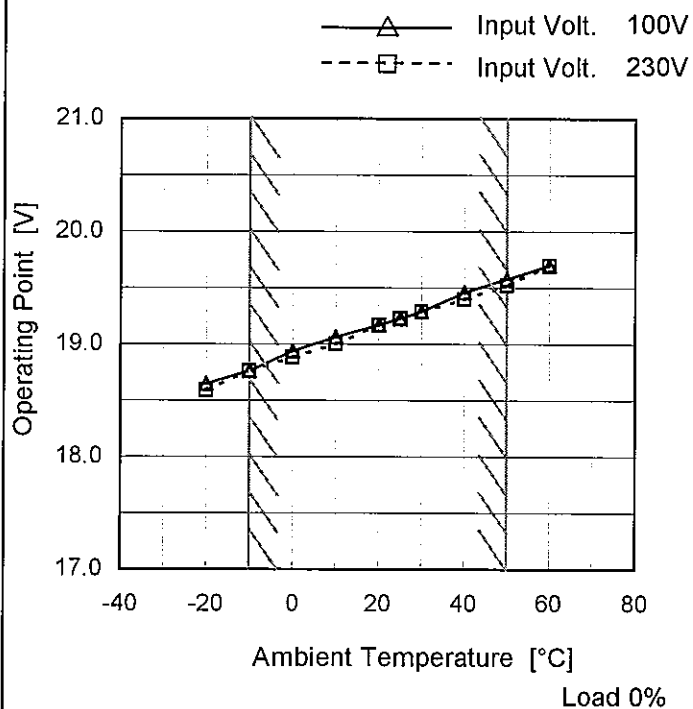
Model LFA100F-15

Item Overvoltage Protection

Object +15V6.7A

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	18.65	18.59
-10	18.76	18.76
0	18.94	18.88
10	19.06	19.00
20	19.17	19.17
25	19.23	19.23
30	19.29	19.29
40	19.46	19.40
50	19.58	19.52
60	19.70	19.70
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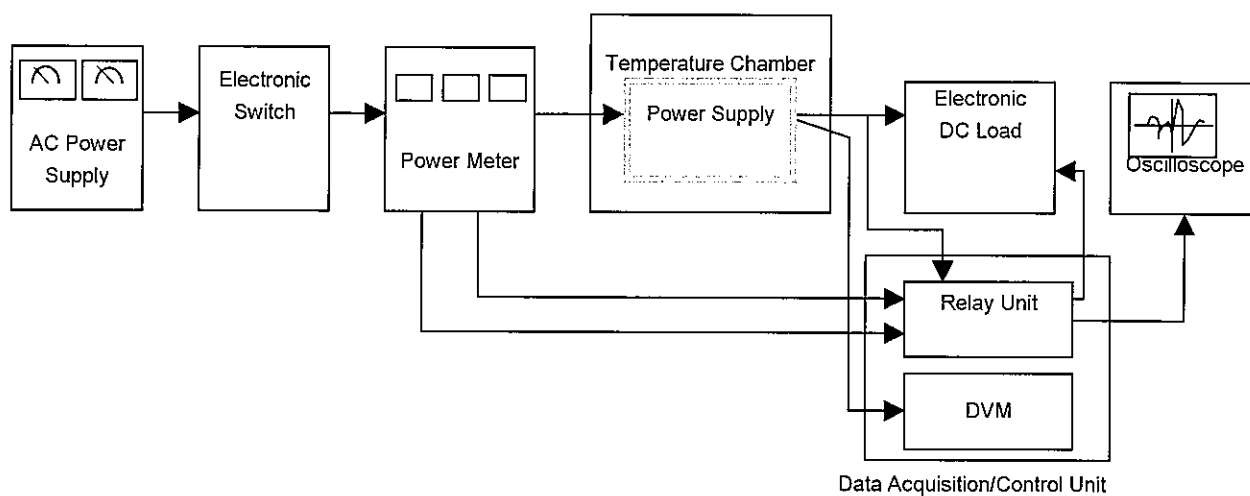


Figure A

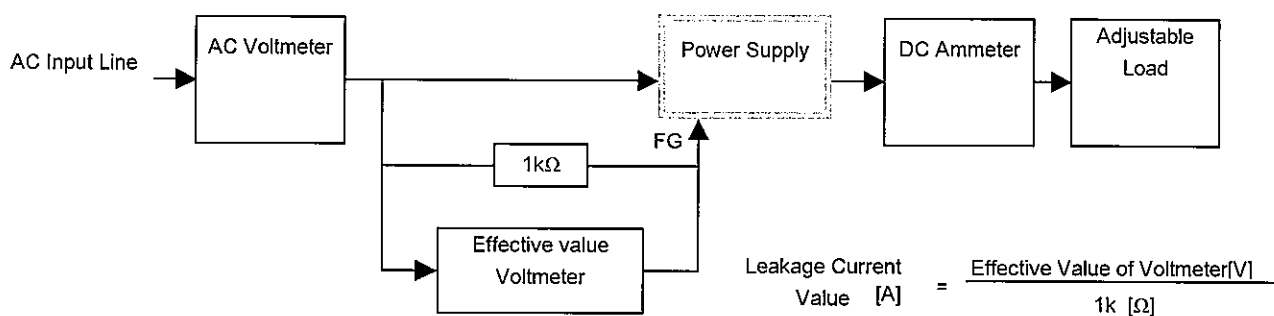


Figure B (DEN-AN)

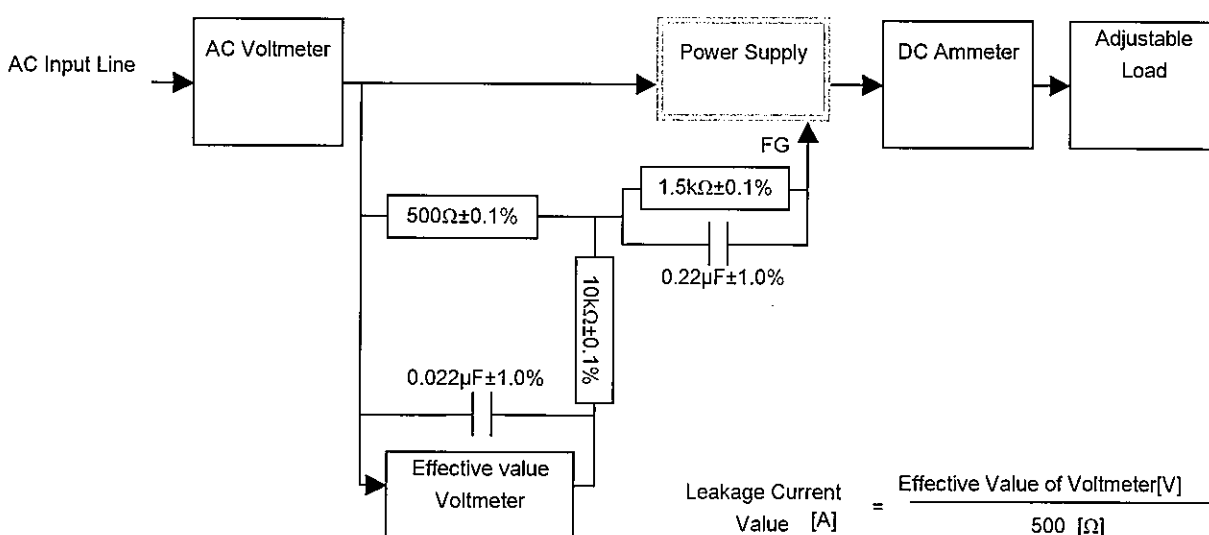


Figure B (IEC60950-1)

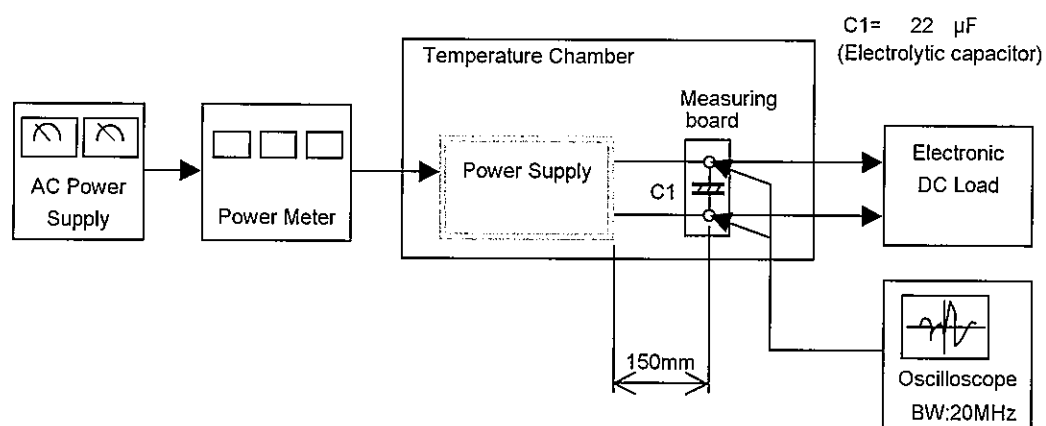


Figure C