

TEST DATA OF LFA240F-36

Regulated DC Power Supply
November 18, 2010

Approved by : *Yoshiaki Shimizu*
Yoshiaki Shimizu Design Manager

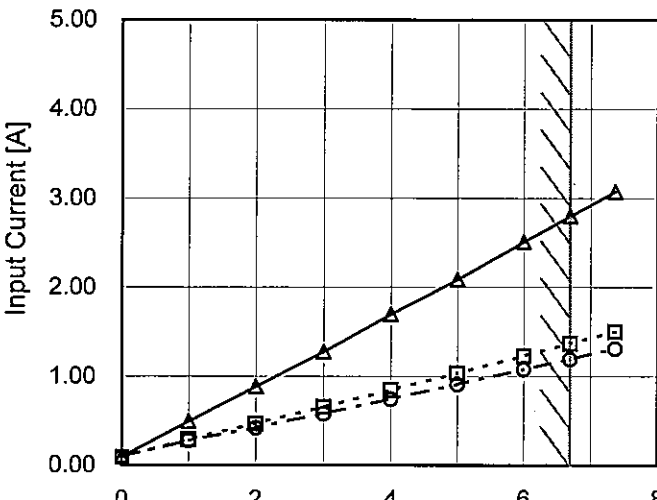
Prepared by : *Shouta Imamura*
Shouta Imamura Design Engineer

COSEL CO.,LTD.

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(Final Page 25)

Model		LFA240F-36		Temperature 25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph		<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> <p>Note: Slanted line shows the range of the rated load current.</p>		2.Values																																																				
		<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>0.094</td><td>0.089</td><td>0.094</td></tr><tr><td>1.00</td><td>0.492</td><td>0.292</td><td>0.276</td></tr><tr><td>2.00</td><td>0.882</td><td>0.468</td><td>0.421</td></tr><tr><td>3.00</td><td>1.276</td><td>0.654</td><td>0.580</td></tr><tr><td>4.00</td><td>1.694</td><td>0.844</td><td>0.742</td></tr><tr><td>5.00</td><td>2.086</td><td>1.034</td><td>0.908</td></tr><tr><td>6.00</td><td>2.512</td><td>1.230</td><td>1.076</td></tr><tr><td>6.70</td><td>2.797</td><td>1.368</td><td>1.194</td></tr><tr><td>7.37</td><td>3.074</td><td>1.502</td><td>1.310</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	0.094	0.089	0.094	1.00	0.492	0.292	0.276	2.00	0.882	0.468	0.421	3.00	1.276	0.654	0.580	4.00	1.694	0.844	0.742	5.00	2.086	1.034	0.908	6.00	2.512	1.230	1.076	6.70	2.797	1.368	1.194	7.37	3.074	1.502	1.310	--	-	-	-	--	-	-	-
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Model	LFA240F-36																																																					
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<div><div>—△— Input Volt. 100V</div><div>---□--- Input Volt. 200V</div><div>---○--- Input Volt. 230V</div></div> <p>Input Power [W]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Power [W]</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>5.2</td><td>5.6</td><td>5.6</td></tr><tr><td>1.00</td><td>47.4</td><td>46.0</td><td>47.0</td></tr><tr><td>2.00</td><td>86.7</td><td>85.0</td><td>85.0</td></tr><tr><td>3.00</td><td>126.6</td><td>123.0</td><td>122.0</td></tr><tr><td>4.00</td><td>168.3</td><td>162.0</td><td>161.0</td></tr><tr><td>5.00</td><td>207.6</td><td>201.0</td><td>200.0</td></tr><tr><td>6.00</td><td>250.2</td><td>241.0</td><td>239.0</td></tr><tr><td>6.70</td><td>278.7</td><td>269.0</td><td>268.0</td></tr><tr><td>7.37</td><td>306.6</td><td>296.0</td><td>294.0</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 Power [W]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	5.2	5.6	5.6	1.00	47.4	46.0	47.0	2.00	86.7	85.0	85.0	3.00	126.6	123.0	122.0	4.00	168.3	162.0	161.0	5.00	207.6	201.0	200.0	6.00	250.2	241.0	239.0	6.70	278.7	269.0	268.0	7.37	306.6	296.0	294.0	--	-	-	-	--	-	-	-
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Model

LFA240F-36

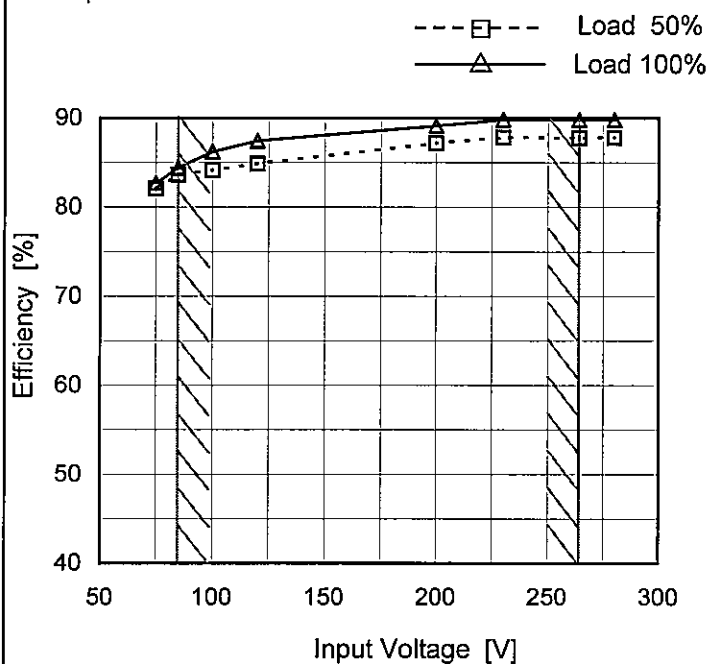
Item

Efficiency (by Input Voltage)

Object

Temperature
Testing Circuitry25°C
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%
75	82.1	82.7
85	83.6	84.4
100	84.2	86.2
120	84.9	87.5
200	87.2	89.2
230	87.8	89.8
264	87.8	89.8
280	87.8	89.8
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Model

LFA240F-36

Item

Efficiency (by Load Current)

Object

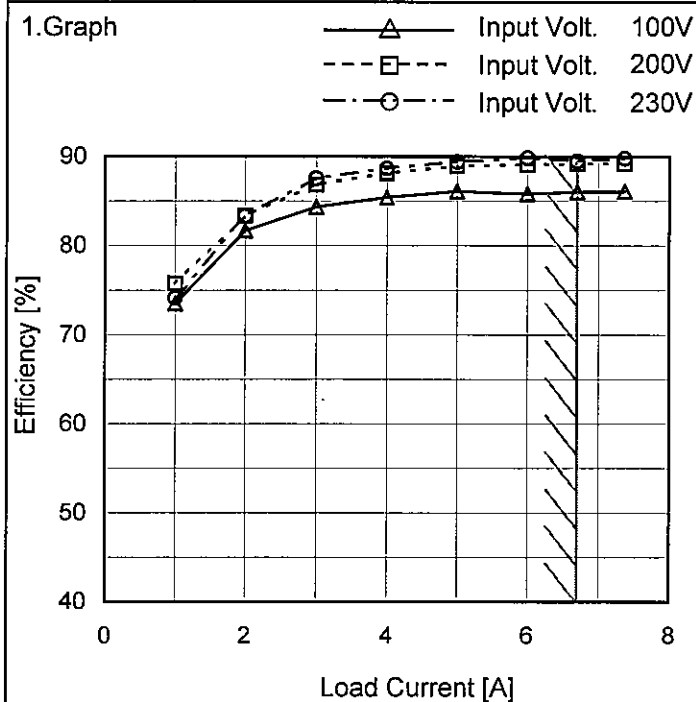
Temperature

25°C

Testing Circuitry

Figure A

1. Graph



2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
1.00	73.5	75.8	74.1
2.00	81.7	83.3	83.3
3.00	84.4	86.9	87.5
4.00	85.4	88.1	88.7
5.00	86.1	88.9	89.4
6.00	85.8	89.1	89.8
6.70	86.1	89.2	89.5
7.37	86.1	89.2	89.8
--	-	-	-
--	-	-	-

Model

LFA240F-36

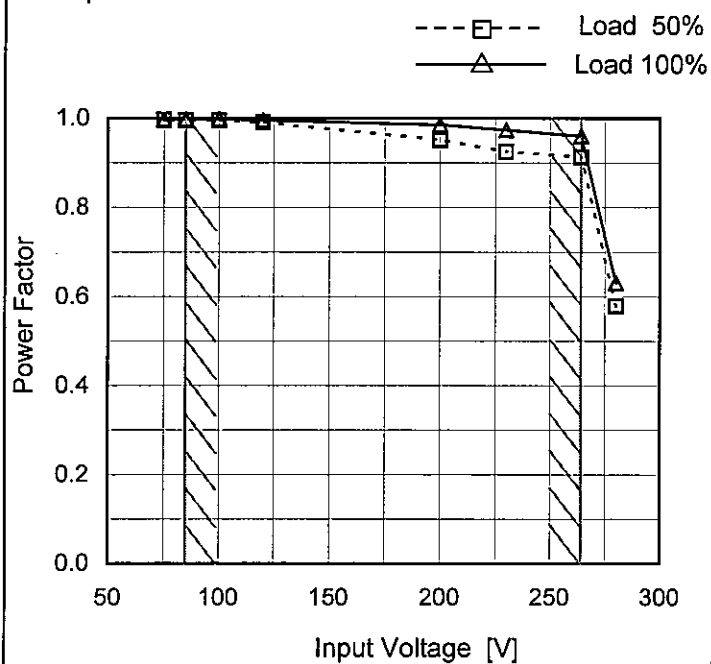
Item

Power Factor (by Input Voltage)

Object

Temperature
Testing Circuitry25°C
Figure A

1. Graph



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

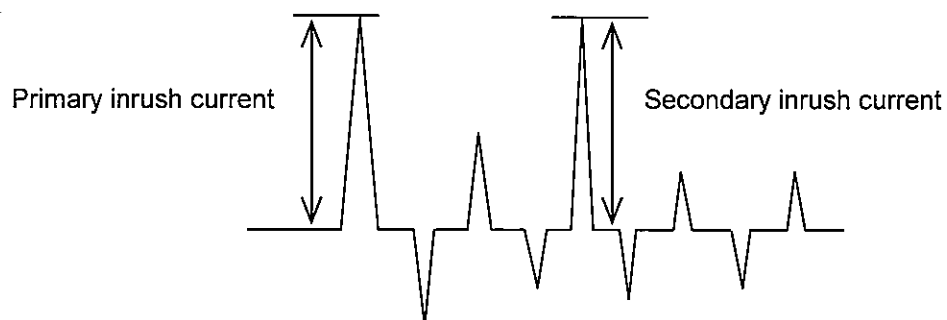
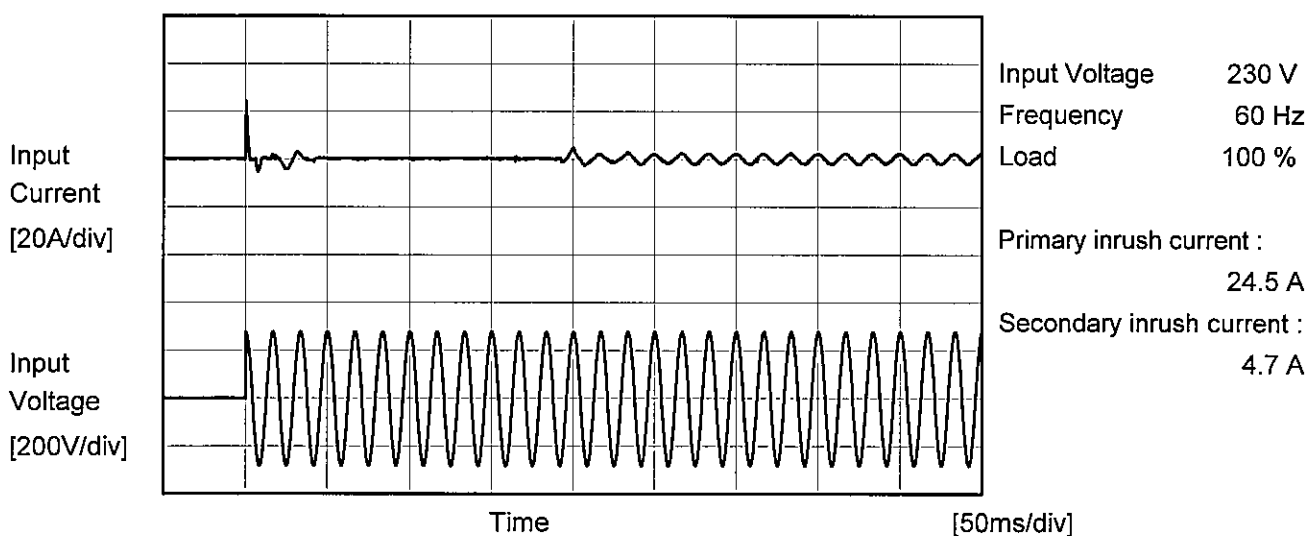
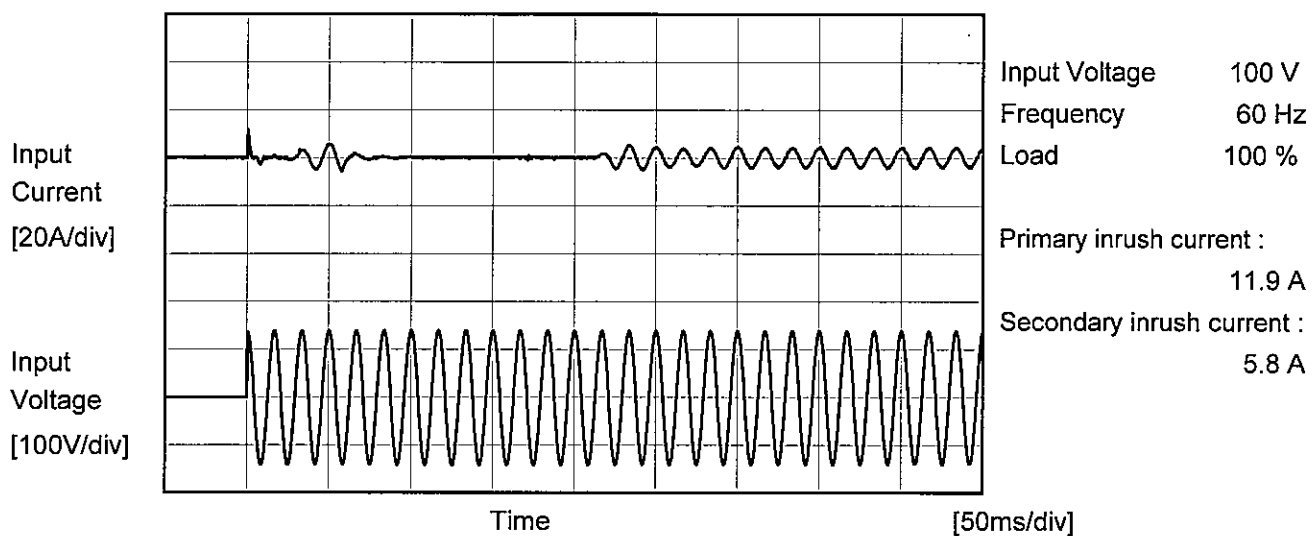
2. Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.997	0.997
85	0.996	0.998
100	0.995	0.998
120	0.991	0.996
200	0.951	0.985
230	0.925	0.974
264	0.913	0.960
280	0.579	0.631
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Model		LFA240F-36																																																				
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Note: Slanted line shows the range of the rated load current.																																																						

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Model	LFA240F-36	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





		Temperature 25°C Testing Circuitry Figure B
Model	LFA240F-36	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.23	0.28	0.30	Operation
	One of phase	0.17	0.38	0.46	stand by
IEC60950-1	Both phases	0.09	0.20	0.24	Operation
	One of phase	0.17	0.36	0.44	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.

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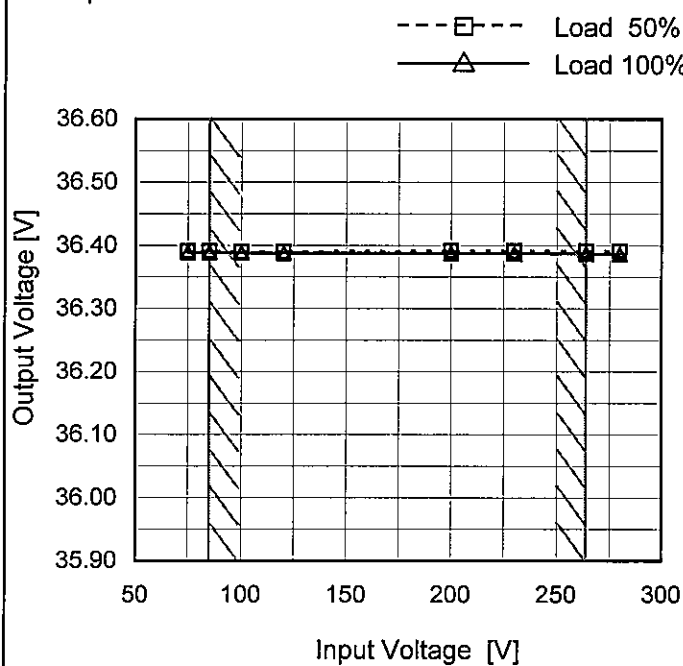
Model LFA240F-36

Item Line Regulation

Object +36V6.7A

 Temperature 25°C
 Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	36.391	36.389
85	36.391	36.389
100	36.390	36.388
120	36.390	36.388
200	36.391	36.388
230	36.391	36.387
264	36.391	36.387
280	36.391	36.387
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Model	LFA240F-36																																																					
Item	Load Regulation	Temperature	25°C																																																			
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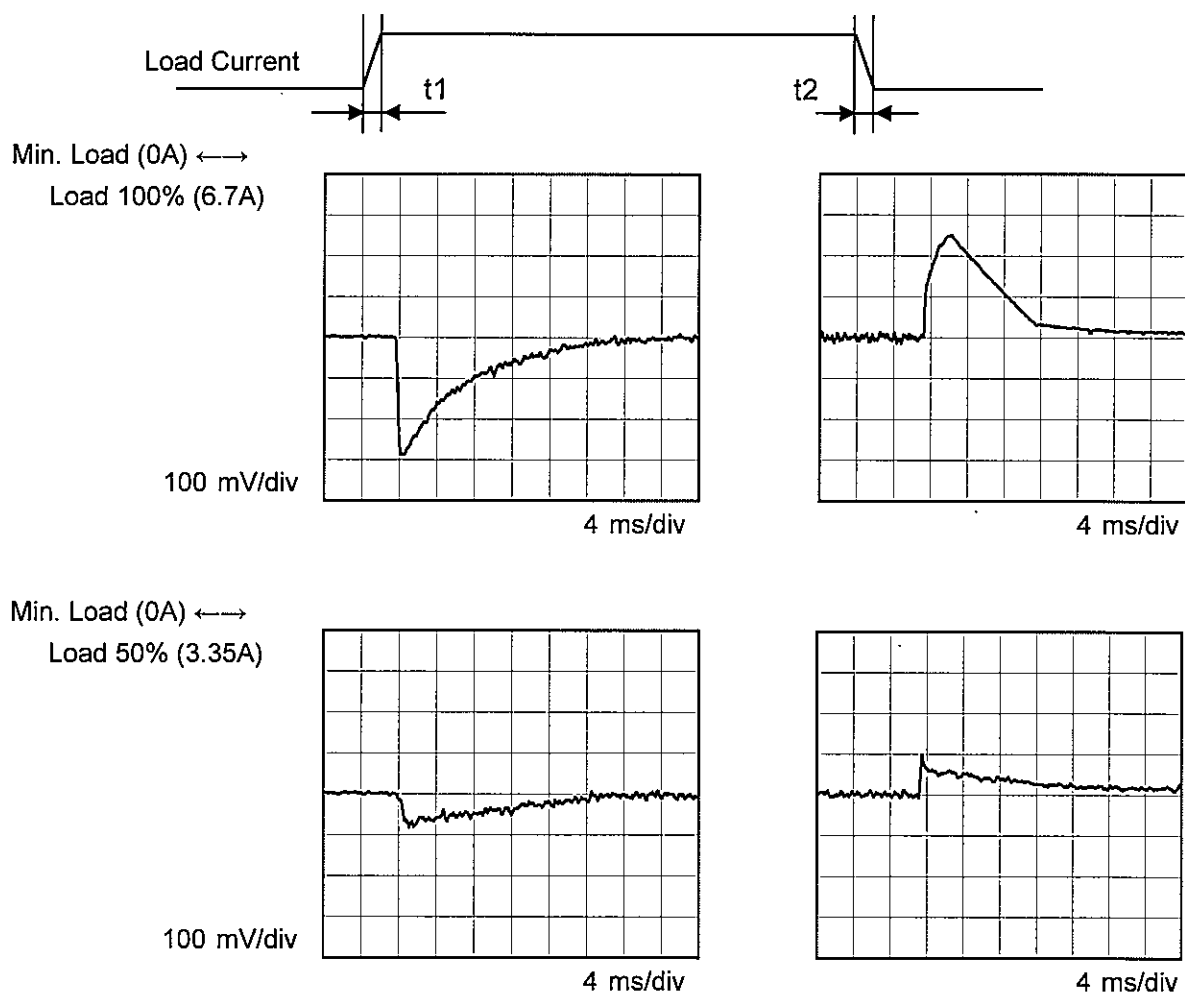
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Model	LFA240F-36	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+36V6.7A		

Input Volt. 100 V
Cycle 1000 ms

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



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Model

LFA240F-36

Item

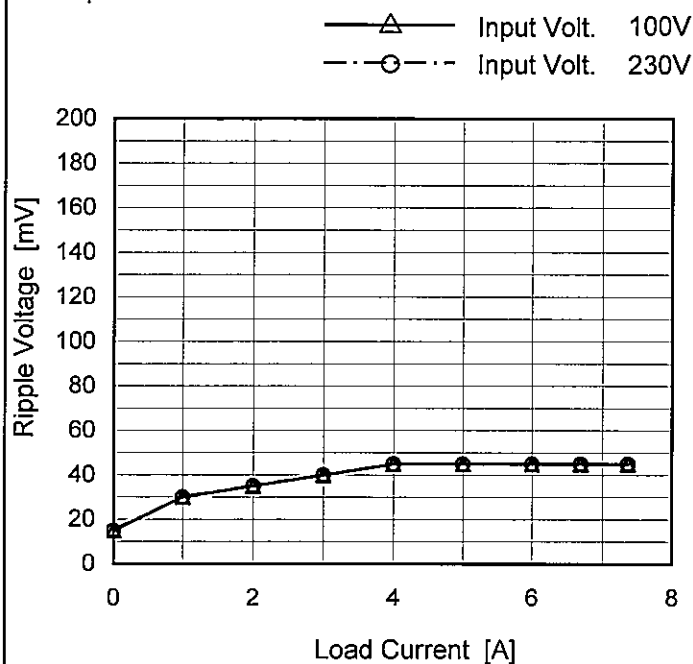
Ripple Voltage (by Load Current)

Object

+36V6.7A

Temperature
Testing Circuitry25°C
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
1.00	30	30
2.00	35	35
3.00	40	40
4.00	45	45
5.00	45	45
6.00	45	45
6.70	45	45
7.37	45	45
--	-	-
--	-	-

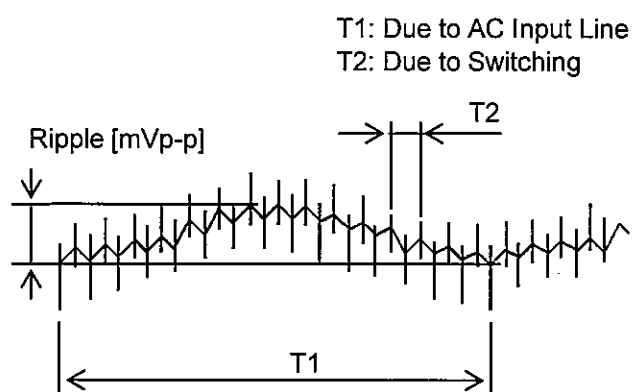


Fig. Complex Ripple Wave Form

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Model		LFA240F-36	Temperature Testing Circuitry	25°C Figure C
Item		Ripple-Noise		
Object		+36V6.7A		

1.Graph

—△—

Input Volt.

100V

-·-○-·-

Input Volt.

230V

Ripple-Noise [mV]

200

180

160

140

120

100

80

60

40

20

0

0

2

4

6

8

Load Current [A]

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

Ripple-Noise [mVp-p]

Model LFA240F-36

Item Ripple Voltage (by Ambient Temp.)

Object +36V6.7A

Testing Circuitry Figure C

1.Graph

The graph plots Ripple Voltage [mV] on the Y-axis (0 to 200) against Ambient Temperature [°C] on the X-axis (-40 to 80). Two data series are shown: Input Volt. 100V (dashed line with square markers) and Input Volt. 230V (solid line with triangle markers). A slanted shaded region indicates the rated ambient temperature range from approximately -10°C to 40°C.

Ambient Temperature [°C]	Ripple Voltage [mV] (100V)	Ripple Voltage [mV] (230V)
-30	95	
-10	60	60
0	55	45
25	45	
40		45

2.Values

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

Measured by 20 MHz Oscilloscope.
Note: Slanted line shows the range of the rated ambient temperature.

COSEL

Model

LFA240F-36

Item

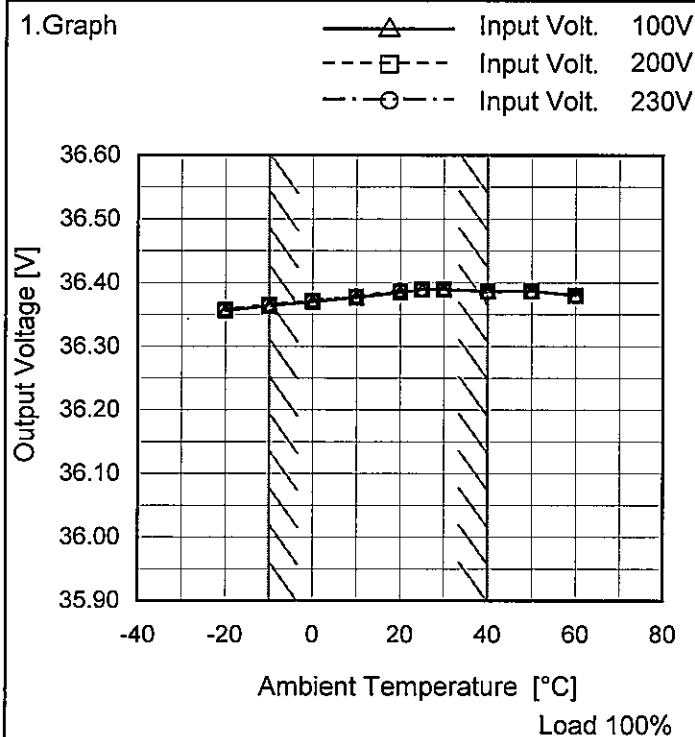
Ambient Temperature Drift

Object

+36V6.7A

Testing Circuitry Figure A

1. Graph



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	36.356	36.357	36.357
-10	36.364	36.365	36.365
0	36.370	36.371	36.372
10	36.377	36.378	36.379
20	36.385	36.386	36.387
25	36.389	36.390	36.390
30	36.390	36.390	36.390
40	36.387	36.386	36.385
50	36.387	36.387	36.386
60	36.381	36.380	36.379
--	-	-	-



		Testing Circuitry Figure A
Model	LFA240F-36	
Item	Output Voltage Accuracy	
Object	+36V6.7A	

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 : -20 - 60°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	30	264	0	36.399	±22	±0.1
Minimum Voltage	-20	85	6.7	36.355		

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Model		LFA240F-36																							
Item		Time Lapse Drift																							
Object		+36V6.7A																							
1.Graph		2.Values																							
<div><div><div>36.60</div><div>36.50</div><div>36.40</div><div>36.30</div><div>36.20</div><div>36.10</div><div>36.00</div><div>35.90</div></div><div><div>0</div><div>2</div><div>4</div><div>6</div><div>8</div><div>10</div></div><div><div>Output Voltage [V]</div><div>Time [H]</div></div><div><div>Input Volt.</div><div>100V</div></div><div><div>Load</div><div>100%</div></div></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>36.123</td></tr><tr><td>0.5</td><td>36.078</td></tr><tr><td>1.0</td><td>36.078</td></tr><tr><td>2.0</td><td>36.078</td></tr><tr><td>3.0</td><td>36.077</td></tr><tr><td>4.0</td><td>36.077</td></tr><tr><td>5.0</td><td>36.077</td></tr><tr><td>6.0</td><td>36.077</td></tr><tr><td>7.0</td><td>36.077</td></tr><tr><td>8.0</td><td>36.077</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	36.123	0.5	36.078	1.0	36.078	2.0	36.078	3.0	36.077	4.0	36.077	5.0	36.077	6.0	36.077	7.0	36.077	8.0	36.077
Time since start [H]	Output Voltage [V]																								
0.0	36.123																								
0.5	36.078																								
1.0	36.078																								
2.0	36.078																								
3.0	36.077																								
4.0	36.077																								
5.0	36.077																								
6.0	36.077																								
7.0	36.077																								
8.0	36.077																								
* The characteristic of AC230V is equal.																									

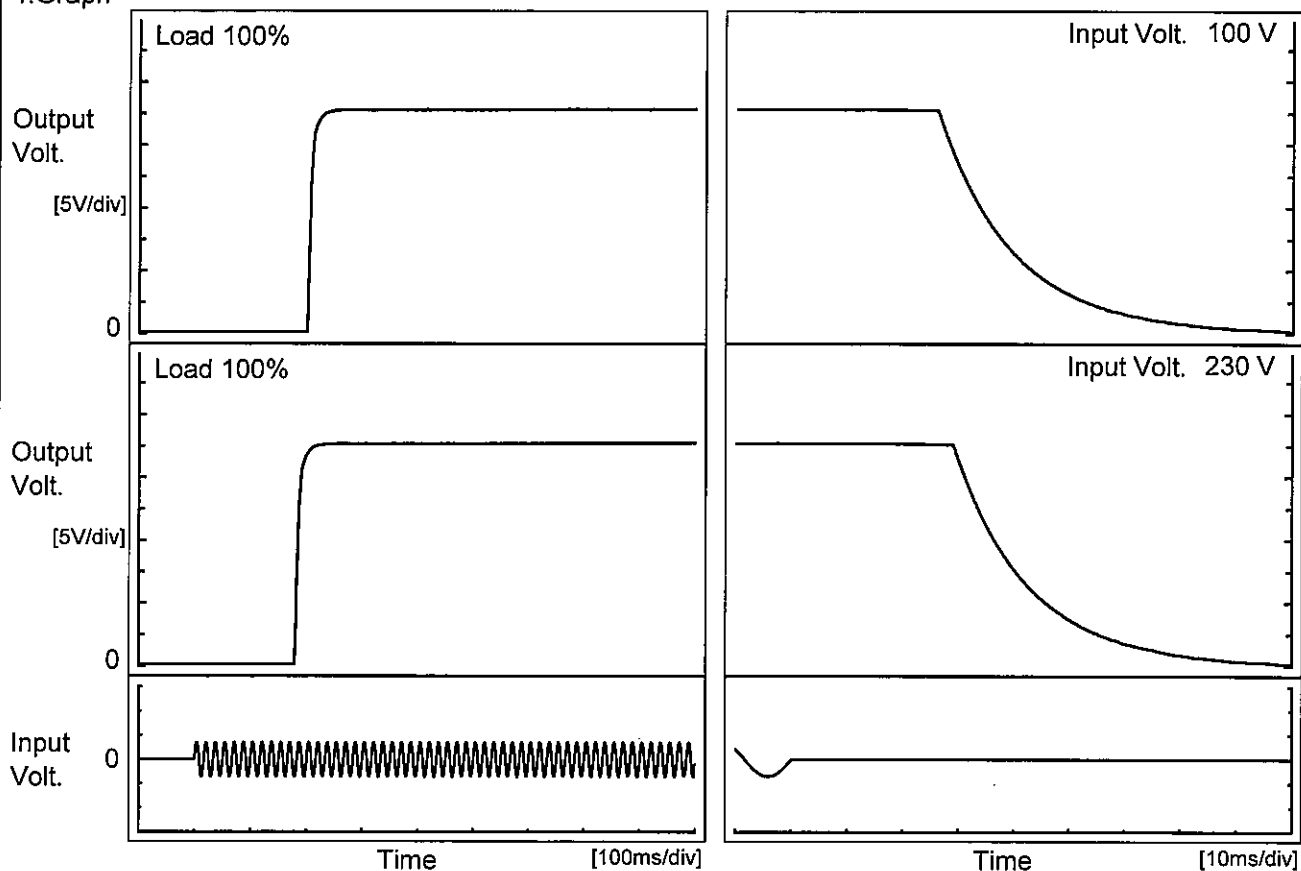
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COSEL

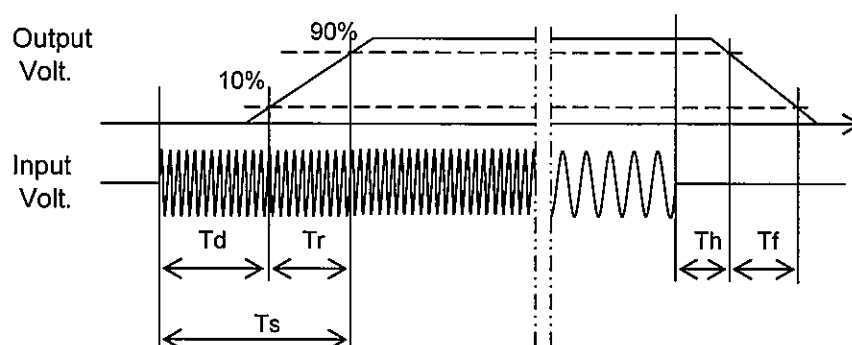
Model	LFA240F-36	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+36V6.7A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		201.0	13.0	214.0	27.6	32.5
230 V		180.5	13.0	193.5	30.5	32.6



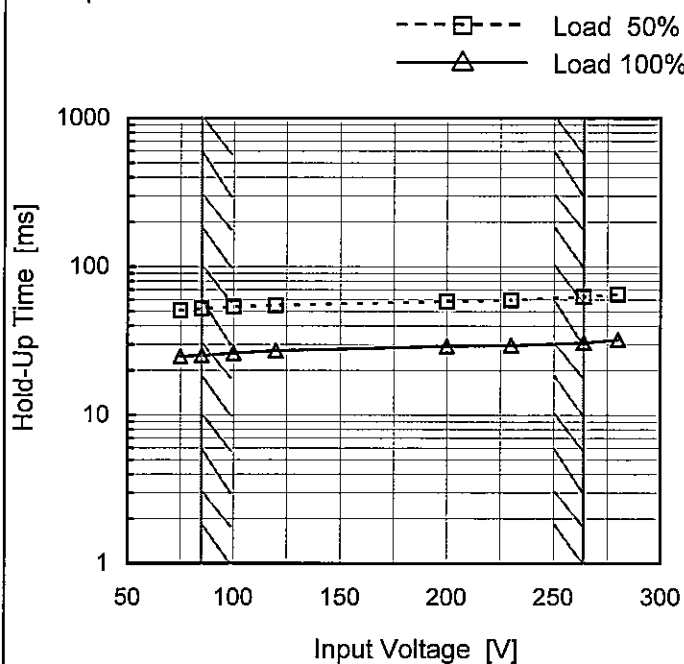
Model LFA240F-36

Item Hold-Up Time

Object +36V6.7A

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

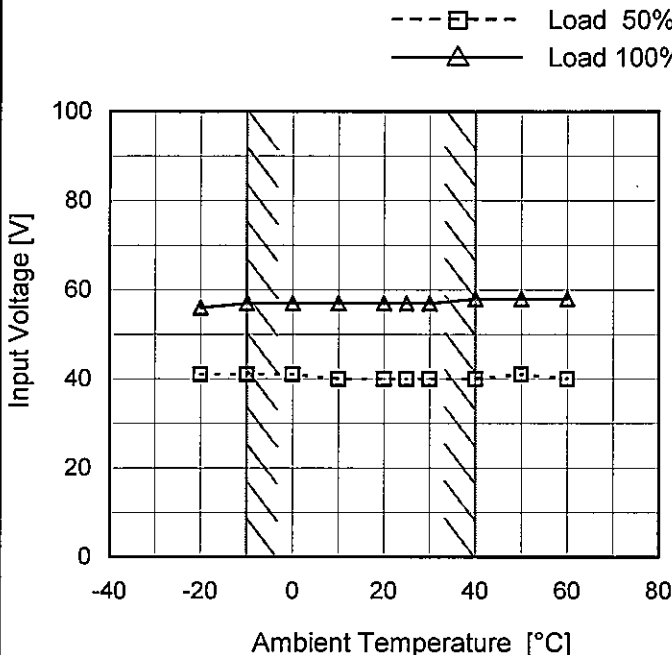
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	51	25
85	52	25
100	53	26
120	55	27
200	58	29
230	60	30
264	63	31
280	65	32
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Model		LFA240F-36		Temperature		25°C																																																				
Item		Instantaneous Interruption Compensation		Testing Circuitry		Figure A																																																				
Object		+36V6.7A																																																								
1.Graph				2.Values																																																						
<div><div><div>—△—</div><div>---□---</div><div>-·-○-·-</div></div><div><div>Input Volt.</div><div>Input Volt.</div><div>Input Volt.</div></div><div><div>100V</div><div>200V</div><div>230V</div></div></div> <p>Instantaneous Compensation Time [ms]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Time [ms]</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>-</td><td>-</td><td>-</td></tr><tr><td>1.00</td><td>126</td><td>188</td><td>190</td></tr><tr><td>2.00</td><td>65</td><td>97</td><td>98</td></tr><tr><td>3.00</td><td>45</td><td>63</td><td>64</td></tr><tr><td>4.00</td><td>31</td><td>47</td><td>47</td></tr><tr><td>5.00</td><td>27</td><td>38</td><td>39</td></tr><tr><td>6.00</td><td>22</td><td>29</td><td>30</td></tr><tr><td>6.70</td><td>19</td><td>22</td><td>29</td></tr><tr><td>7.37</td><td>15</td><td>20</td><td>22</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]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	1.00	126	188	190	2.00	65	97	98	3.00	45	63	64	4.00	31	47	47	5.00	27	38	39	6.00	22	29	30	6.70	19	22	29	7.37	15	20	22	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																									
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																							
0.00	-	-	-																																																							
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5.00	27	38	39																																																							
6.00	22	29	30																																																							
6.70	19	22	29																																																							
7.37	15	20	22																																																							
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COSEL

		Testing Circuitry Figure A																																						
Model	LFA240F-36																																							
Item	Minimum Input Voltage for Regulated Output Voltage																																							
Object	+36V6.7A																																							
1.Graph		2.Values																																						
<div><div><div>---□--- Load 50%</div><div>—△— Load 100%</div></div></div>																																								
Note: Slanted line shows the range of the rated ambient temperature.																																								
		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Input Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>-20</td><td>41</td><td>56</td></tr><tr><td>-10</td><td>41</td><td>57</td></tr><tr><td>0</td><td>41</td><td>57</td></tr><tr><td>10</td><td>40</td><td>57</td></tr><tr><td>20</td><td>40</td><td>57</td></tr><tr><td>25</td><td>40</td><td>57</td></tr><tr><td>30</td><td>40</td><td>57</td></tr><tr><td>40</td><td>40</td><td>58</td></tr><tr><td>50</td><td>41</td><td>58</td></tr><tr><td>60</td><td>40</td><td>58</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	41	56	-10	41	57	0	41	57	10	40	57	20	40	57	25	40	57	30	40	57	40	40	58	50	41	58	60	40	58	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
	Load 50%	Load 100%																																						
-20	41	56																																						
-10	41	57																																						
0	41	57																																						
10	40	57																																						
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40	40	58																																						
50	41	58																																						
60	40	58																																						
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COSEL

Model		LFA240F-36	
Item		Overcurrent Protection	
Object		+36V6.7A	

1.Graph

Input Volt. 100V

Input Volt. 230V

Output Voltage [V]

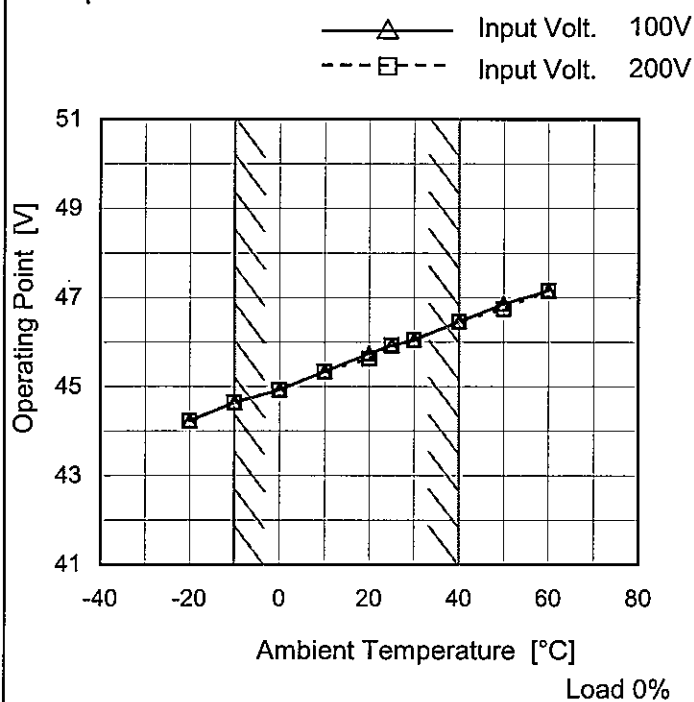
Model LFA240F-36

Item Overvoltage Protection

Object +36V6.7A

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. 200[V]
-20	44.23	44.23
-10	44.64	44.64
0	44.93	44.93
10	45.34	45.34
20	45.75	45.63
25	45.93	45.93
30	46.05	46.05
40	46.46	46.46
50	46.86	46.75
60	47.16	47.16
--	-	-

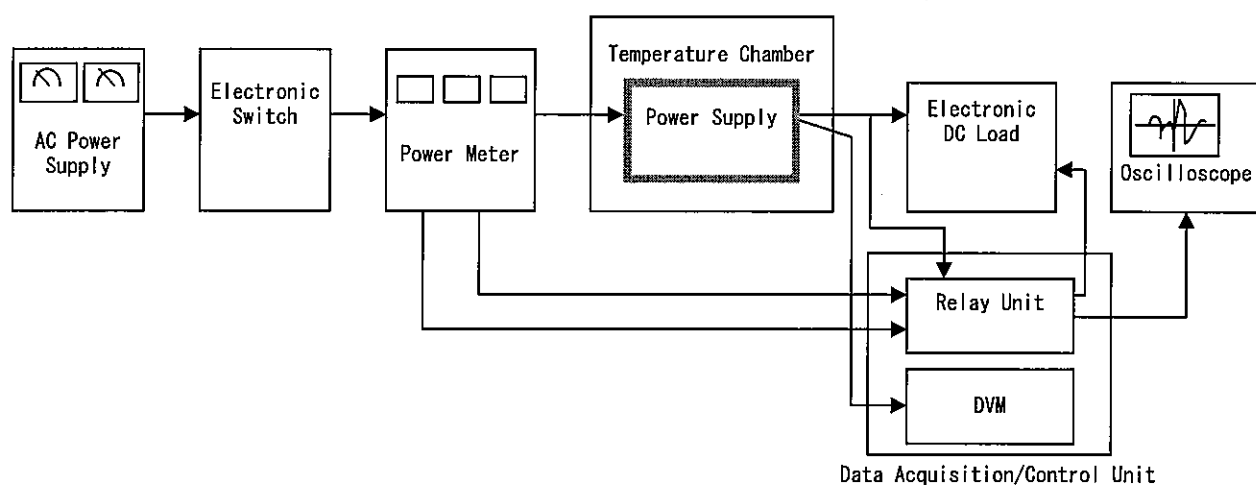


Figure A

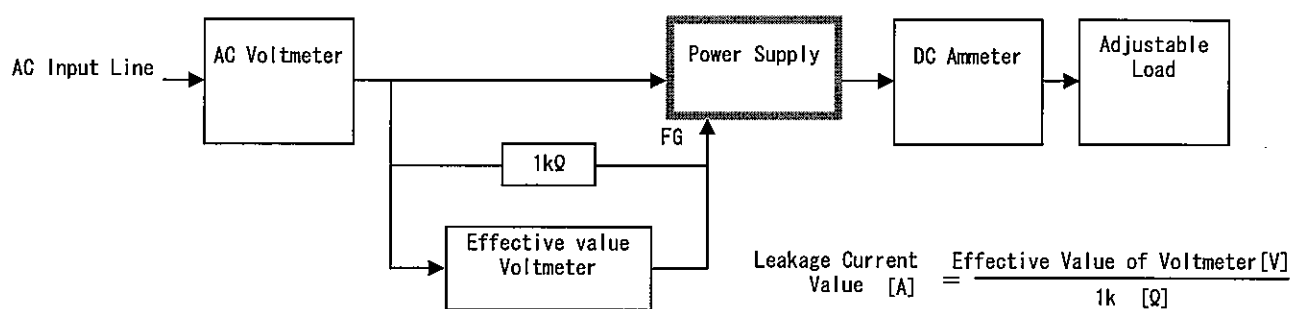


Figure B (DEN-AN)

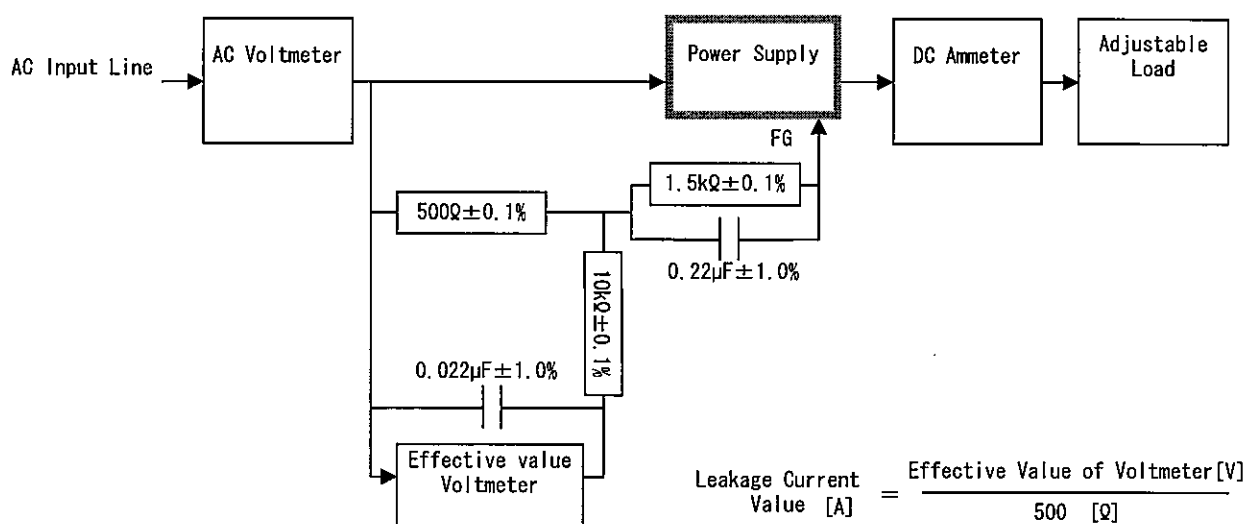


Figure B (IEC60950-1)

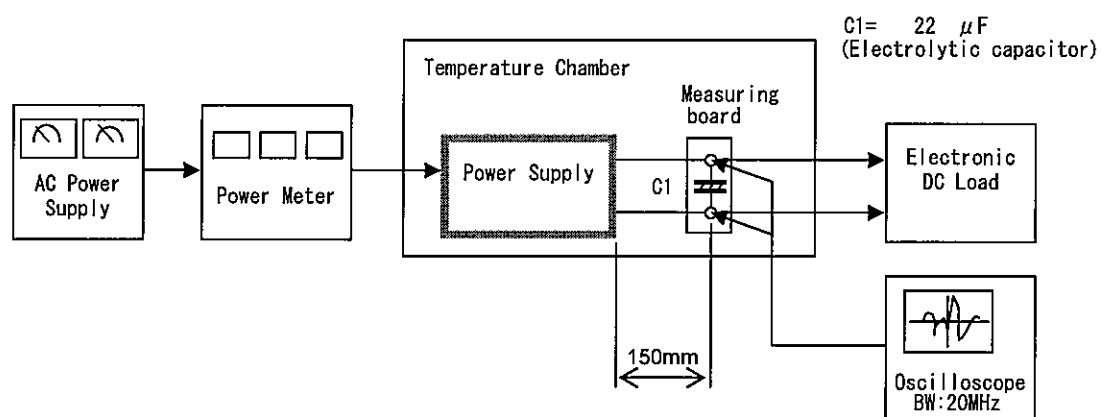


Figure C