

TEST DATA OF SPLFA150F-24

Regulated DC Power Supply
October 19, 2011

Approved by : Takahiro Yoneda
Takahiro Yoneda Design Manager

Prepared by : Satoshi Kinoshita
Satoshi Kinoshita Design Engineer

COSEL CO.,LTD.

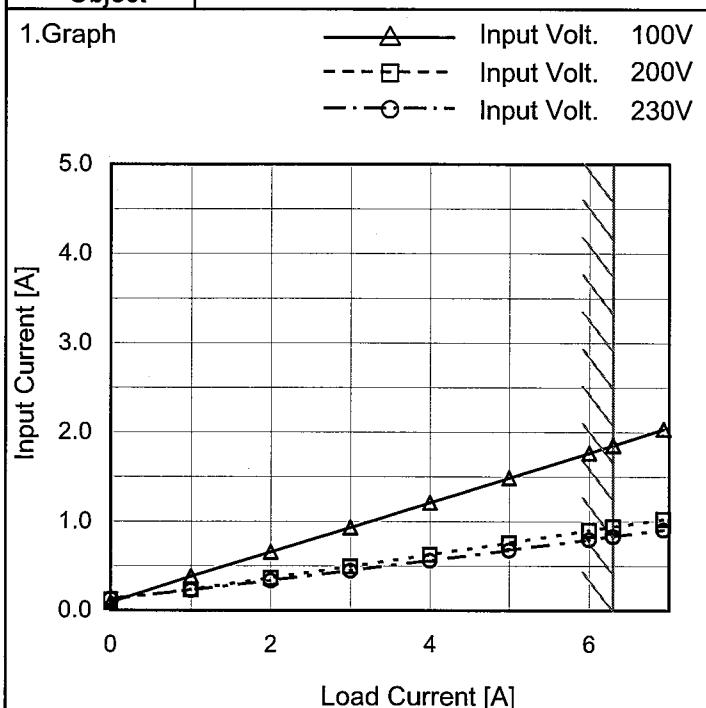
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(Final Page 25)

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Model	SPLFA150F-24
Item	Input Current (by Load Current)
Object	_____



Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.091	0.117	0.130
1.00	0.385	0.235	0.226
2.00	0.657	0.362	0.334
3.00	0.932	0.491	0.447
4.00	1.210	0.625	0.561
5.00	1.487	0.759	0.677
6.00	1.768	0.897	0.795
6.30	1.853	0.937	0.831
6.93	2.037	1.023	0.905
--	-	-	-
--	-	-	-

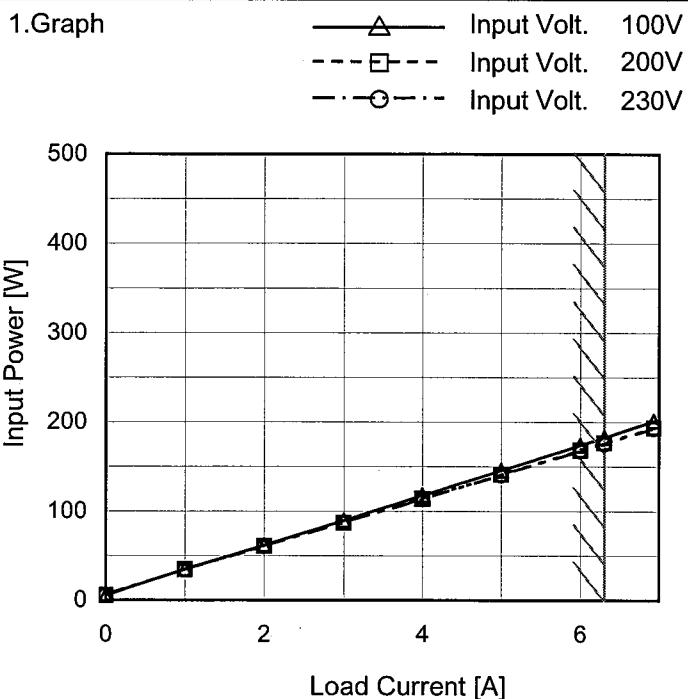
Note: Slanted line shows the range of the rated load current.

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Model SPLFA150F-24

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

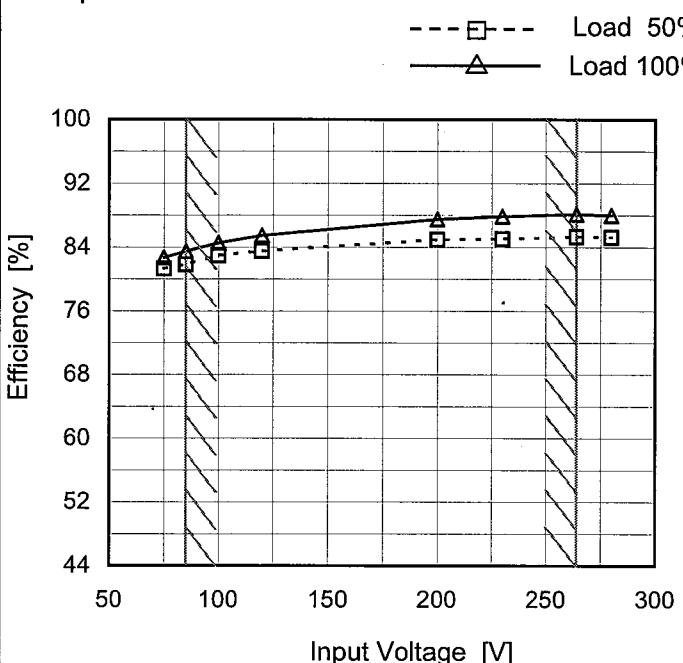
2. Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	5.4	5.5	5.7
1.00	35.0	34.4	34.3
2.00	61.9	60.7	60.5
3.00	89.5	87.1	86.9
4.00	117.7	113.9	113.6
5.00	145.9	141.0	140.4
6.00	174.2	168.3	167.6
6.30	182.8	176.6	175.8
6.93	201.3	193.7	192.8
--	-	-	-
--	-	-	-

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Model	SPLFA150F-24
Item	Efficiency (by Input Voltage)
Object	—

1. Graph



Temperature 25°C
Testing Circuitry Figure A

2. Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
75	81.3	82.7
85	81.8	83.5
100	82.9	84.6
120	83.5	85.5
200	85.0	87.5
230	85.0	87.9
264	85.3	88.2
280	85.2	88.0
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Note: Slanted line shows the range of the rated input voltage.

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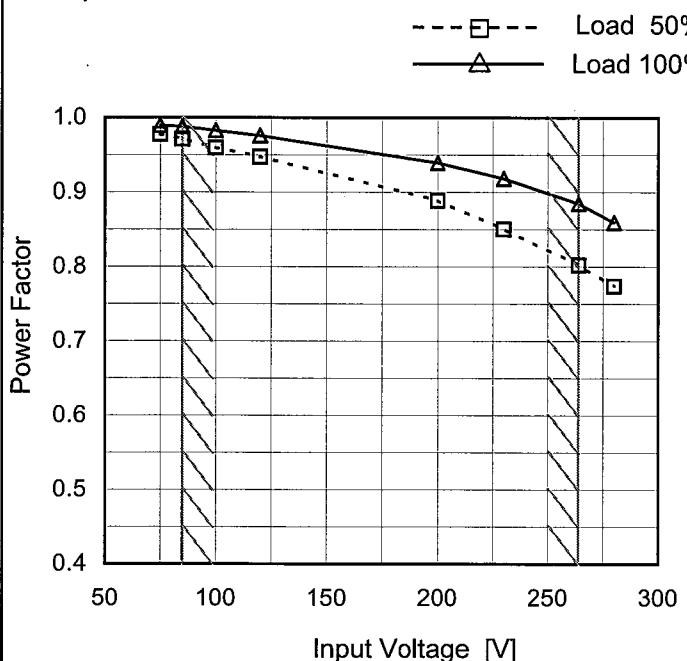
Model	SPLFA150F-24	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Efficiency (by Load Current)																																																					
Object	_____																																																					
1.Graph		2.Values																																																				
<p>The graph plots Efficiency [%] on the Y-axis (44 to 100) against Load Current [A] on the X-axis (0 to 6). Three data series are shown: Input Volt. 100V (solid line with open triangle markers), Input Volt. 200V (dashed line with open square markers), and Input Volt. 230V (dash-dot line with open circle markers). All series show an initial increase in efficiency with load current, followed by a slight plateau or slight decrease at higher currents. A vertical slanted line is drawn through the graph, starting from approximately (1.5, 68) and ending at (6.0, 88), indicating the rated load current range.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>1.00</td><td>70.9</td><td>72.1</td><td>72.3</td></tr> <tr> <td>2.00</td><td>79.6</td><td>81.2</td><td>81.5</td></tr> <tr> <td>3.00</td><td>82.4</td><td>84.7</td><td>84.9</td></tr> <tr> <td>4.00</td><td>83.5</td><td>86.3</td><td>86.5</td></tr> <tr> <td>5.00</td><td>84.1</td><td>87.1</td><td>87.4</td></tr> <tr> <td>6.00</td><td>84.5</td><td>87.5</td><td>87.8</td></tr> <tr> <td>6.30</td><td>84.5</td><td>87.5</td><td>87.9</td></tr> <tr> <td>6.93</td><td>84.3</td><td>87.6</td><td>88.0</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]	Efficiency [%]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	1.00	70.9	72.1	72.3	2.00	79.6	81.2	81.5	3.00	82.4	84.7	84.9	4.00	83.5	86.3	86.5	5.00	84.1	87.1	87.4	6.00	84.5	87.5	87.8	6.30	84.5	87.5	87.9	6.93	84.3	87.6	88.0	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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Model	SPLFA150F-24
Item	Power Factor (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]	Power Factor	
	Load 50%	Load 100%
75	0.977	0.990
85	0.971	0.988
100	0.959	0.983
120	0.948	0.976
200	0.889	0.940
230	0.851	0.918
264	0.802	0.885
280	0.774	0.859
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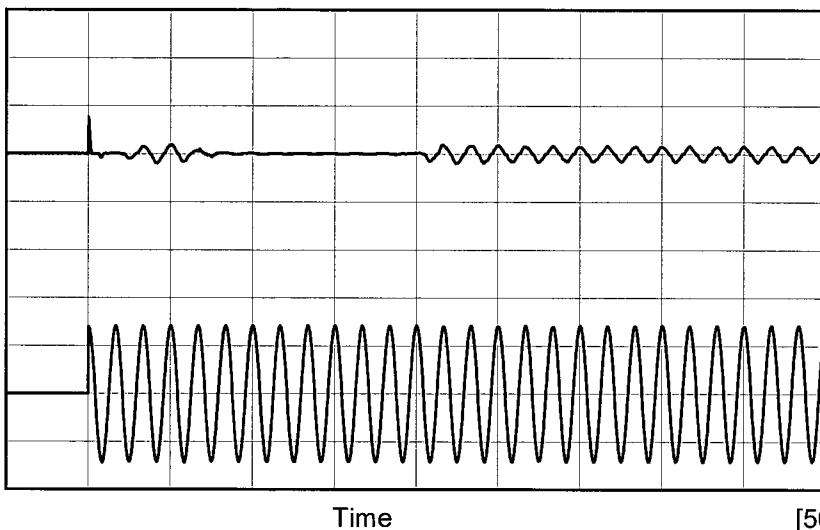
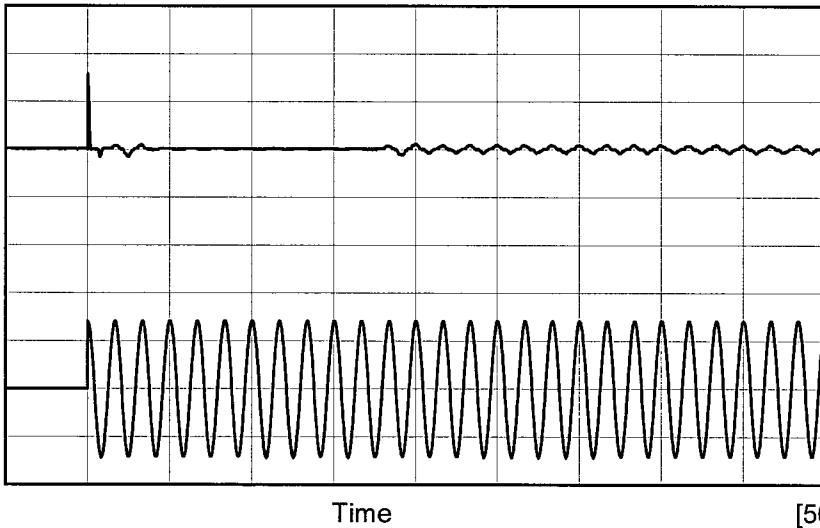
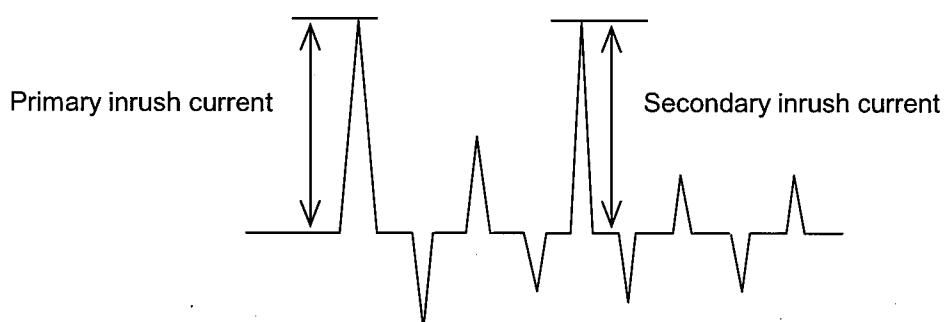
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Item	Power Factor (by Load Current)																																																						
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1.Graph		<p>The graph plots Power Factor (Y-axis, 0.4 to 1.0) against Load Current [A] (X-axis, 0 to 6). Three curves are shown for Input Voltages: 100V (solid line with triangles), 200V (dashed line with squares), and 230V (dash-dot line with circles). All curves show an increasing trend. A slanted line is drawn across the graph, starting from approximately (0.5, 0.55) and ending at (6.5, 0.98), representing the rated load current range.</p>																																																					
2.Values		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Power Factor</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>0.583</td> <td>0.234</td> <td>0.191</td> </tr> <tr> <td>1.00</td> <td>0.905</td> <td>0.730</td> <td>0.658</td> </tr> <tr> <td>2.00</td> <td>0.939</td> <td>0.837</td> <td>0.787</td> </tr> <tr> <td>3.00</td> <td>0.958</td> <td>0.885</td> <td>0.845</td> </tr> <tr> <td>4.00</td> <td>0.969</td> <td>0.910</td> <td>0.879</td> </tr> <tr> <td>5.00</td> <td>0.978</td> <td>0.927</td> <td>0.901</td> </tr> <tr> <td>6.00</td> <td>0.982</td> <td>0.937</td> <td>0.915</td> </tr> <tr> <td>6.30</td> <td>0.983</td> <td>0.940</td> <td>0.918</td> </tr> <tr> <td>6.93</td> <td>0.985</td> <td>0.945</td> <td>0.925</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]	Power Factor			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	0.583	0.234	0.191	1.00	0.905	0.730	0.658	2.00	0.939	0.837	0.787	3.00	0.958	0.885	0.845	4.00	0.969	0.910	0.879	5.00	0.978	0.927	0.901	6.00	0.982	0.937	0.915	6.30	0.983	0.940	0.918	6.93	0.985	0.945	0.925	--	-	-	-	--	-	-	-
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Model SPLFA150F-24

Item Inrush Current

Object _____

Temperature 25°C
Testing Circuitry Figure AInput
Current
[20A/div]Input
Voltage
[100V/div]Input
Current
[20A/div]Input
Voltage
[200V/div]



Model	SPLFA150F-24	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

1. Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	230 [V]	
DEN-AN	Both phases	0.27	0.40	0.44	Operation
	One of phases	0.23	0.51	0.60	Stand by
IEC60950-1	Both phases	0.16	0.35	0.41	Operation
	One of phases	0.24	0.52	0.61	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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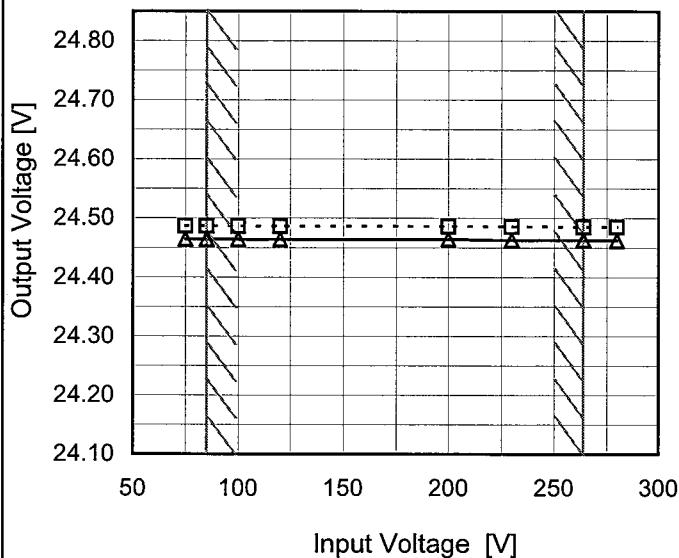
Model SPLFA150F-24

Item Line Regulation

Object +24V6.3A

1. Graph

--- □ --- Load 50%
 —△— Load 100%



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

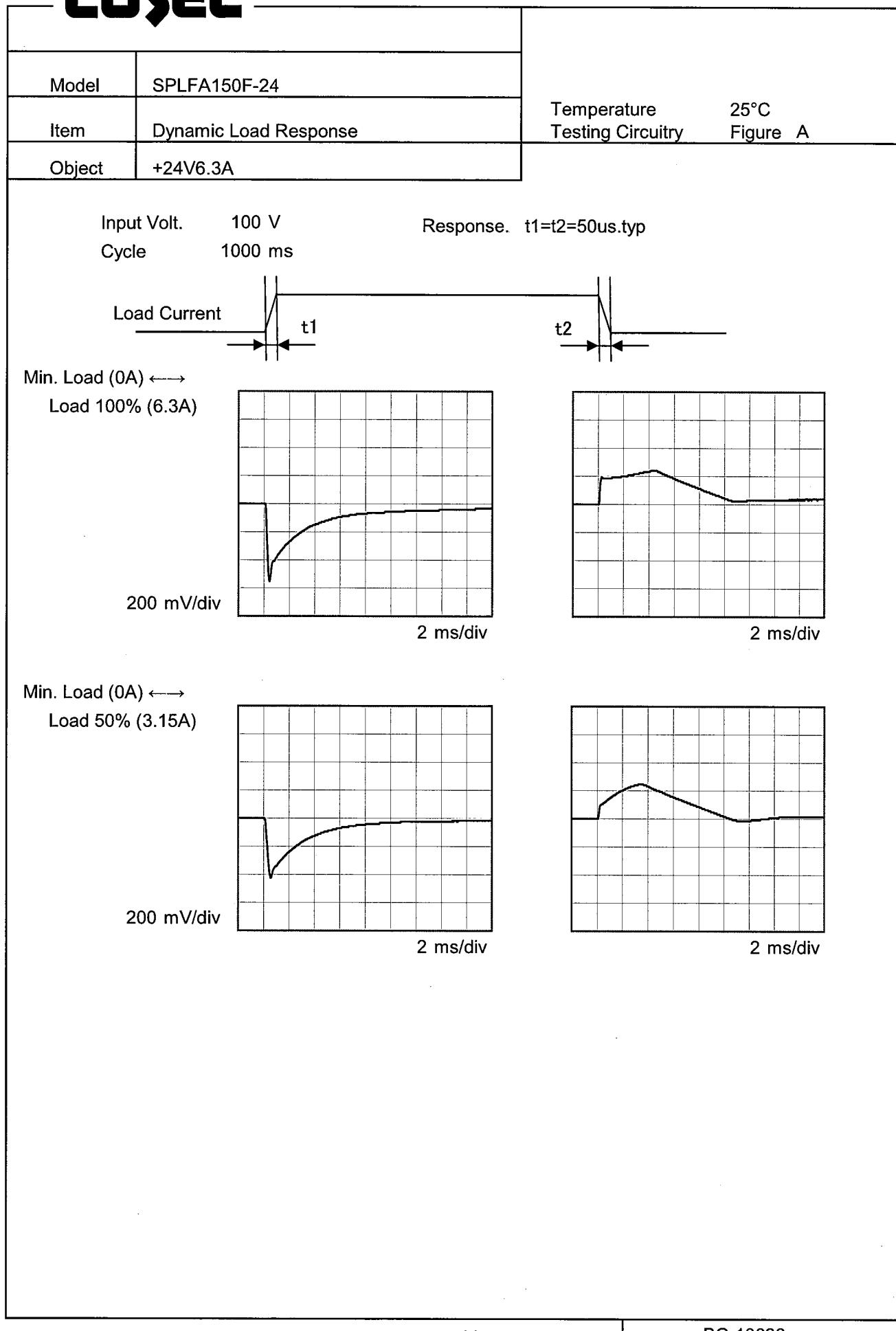
Temperature 25°C
 Testing Circuitry Figure A

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	24.487	24.465
85	24.487	24.465
100	24.487	24.464
120	24.486	24.464
200	24.486	24.464
230	24.486	24.463
264	24.485	24.463
280	24.485	24.462
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Model	SPLFA150F-24	Temperature	25°C																																																			
Item	Load Regulation	Testing Circuitry	Figure A																																																			
Object	+24V6.3A																																																					
1.Graph	<p>—▲— Input Volt. 100V - - - □ - - Input Volt. 200V - - ○ - - Input Volt. 230V</p>																																																					
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Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C																																						
Object	+24V6.3A																																							
1. Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 200 mV, and the X-axis ranges from 0 to 8 A. Two curves are plotted: Input Volt. 100V (solid line with open circles) and Input Volt. 200V (dashed line with open triangles). Both curves show a slight increase in ripple voltage as load current increases. A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 100V)</th> <th>Ripple Voltage [mV] (Input Volt. 200V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>10</td><td>10</td></tr> <tr><td>1.00</td><td>15</td><td>15</td></tr> <tr><td>2.00</td><td>20</td><td>20</td></tr> <tr><td>3.00</td><td>25</td><td>25</td></tr> <tr><td>4.00</td><td>30</td><td>30</td></tr> <tr><td>5.00</td><td>30</td><td>30</td></tr> <tr><td>6.00</td><td>30</td><td>30</td></tr> <tr><td>6.30</td><td>30</td><td>30</td></tr> <tr><td>6.93</td><td>35</td><td>35</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	0.00	10	10	1.00	15	15	2.00	20	20	3.00	25	25	4.00	30	30	5.00	30	30	6.00	30	30	6.30	30	30	6.93	35	35	--	-	-	--	-	-		
Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)																																						
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<p>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> <p>The diagram shows a complex ripple waveform labeled "Ripple [mVp-p]". Two time intervals are indicated: T1, which is the full width of the waveform, and T2, which is the width of one cycle of the switching component. Arrows point to the corresponding points on the waveform.</p> <p>T1: Due to AC Input Line T2: Due to Switching</p>																																								
<p>Fig. Complex Ripple Wave Form</p>																																								

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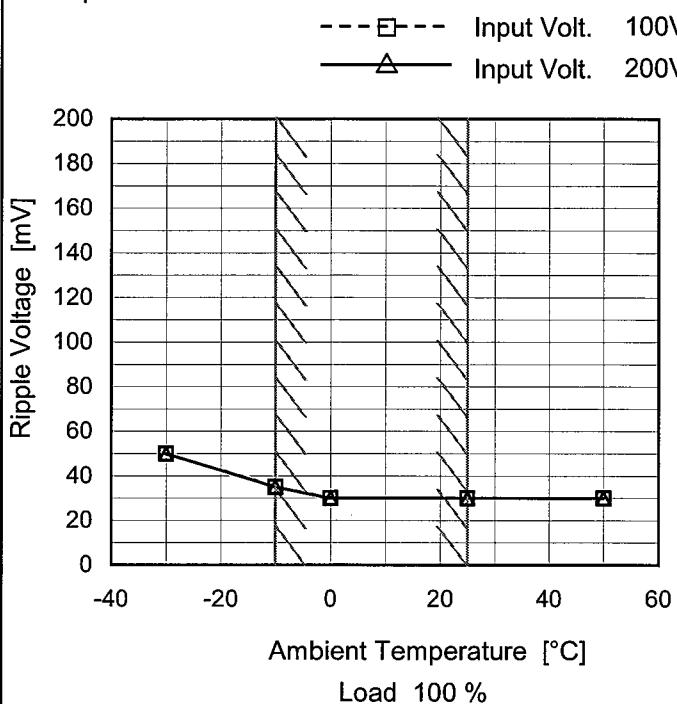
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Item	Ripple-Noise																																						
Object	+24V6.3A																																						
1. Graph			2. Values																																				
<p>Input Volt. 100V Input Volt. 200V</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple-Noise [mV] (100V)</th> <th>Ripple-Noise [mV] (200V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>30</td><td>30</td></tr> <tr><td>1.00</td><td>35</td><td>35</td></tr> <tr><td>2.00</td><td>40</td><td>40</td></tr> <tr><td>3.00</td><td>40</td><td>40</td></tr> <tr><td>4.00</td><td>40</td><td>40</td></tr> <tr><td>5.00</td><td>40</td><td>40</td></tr> <tr><td>6.00</td><td>45</td><td>45</td></tr> <tr><td>6.30</td><td>45</td><td>45</td></tr> <tr><td>6.93</td><td>50</td><td>50</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>				Load Current [A]	Ripple-Noise [mV] (100V)	Ripple-Noise [mV] (200V)	0.00	30	30	1.00	35	35	2.00	40	40	3.00	40	40	4.00	40	40	5.00	40	40	6.00	45	45	6.30	45	45	6.93	50	50	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV] (100V)	Ripple-Noise [mV] (200V)																																					
0.00	30	30																																					
1.00	35	35																																					
2.00	40	40																																					
3.00	40	40																																					
4.00	40	40																																					
5.00	40	40																																					
6.00	45	45																																					
6.30	45	45																																					
6.93	50	50																																					
--	-	-																																					
--	-	-																																					
<p>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.</p>																																							
<p>T1: Due to AC Input Line T2: Due to Switching</p> <p>Ripple-Noise [mVp-p]</p> <p>T1</p>																																							
<p>Fig. Complex Ripple Wave Form</p>																																							

COSEL

Model	SPLFA150F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V6.3A

Testing Circuitry Figure C

1. Graph



2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	50	50
-10	35	35
0	30	30
25	30	30
50	30	30
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

COSEL

Model	SPLFA150F-24	Testing Circuitry Figure A			
Item	Ambient Temperature Drift				
Object	+24V6.3A				
1.Graph	<p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V Input Volt. 200V Input Volt. 230V 	2.Values			
		Ambient Temperature [°C]	Output Voltage [V]		
			Input Volt.	Input Volt.	Input Volt.
			100[V]	200[V]	230[V]
-20	24.469	24.469	24.469		
-10	24.469	24.468	24.469		
0	24.483	24.483	24.483		
10	24.485	24.485	24.486		
20	24.487	24.487	24.488		
25	24.486	24.486	24.485		
30	24.484	24.483	24.483		
40	24.482	24.481	24.481		
50	24.472	24.471	24.471		
60	24.459	24.459	24.458		
--	-	-	-	-	-

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



Model	SPLFA150F-24
Item	Output Voltage Accuracy
Object	+24V6.3A

Testing Circuitry Figure A

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 - 6.3A

* 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	25	85	0	24.533	± 33	± 0.1
Minimum Voltage	-10	200	6.3	24.468		

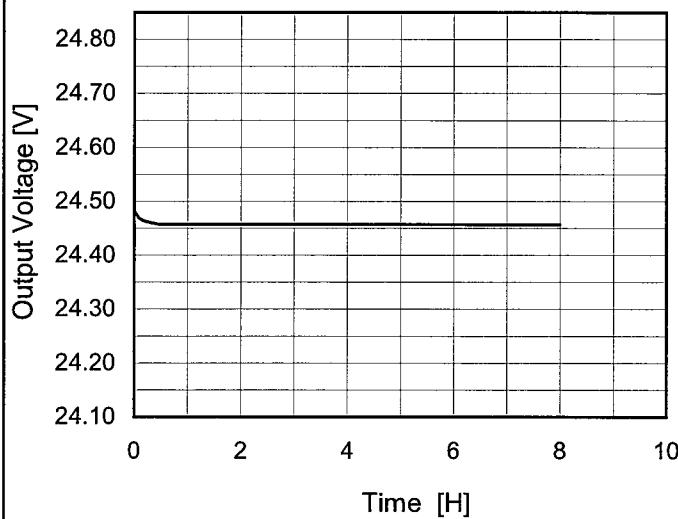
COSEL

Model SPLFA150F-24

Item Time Lapse Drift

Object +24V6.3A

1. Graph



Input Volt. 100V

Load 100%

* The characteristic of AC200V is equal.

Temperature 25°C
Testing Circuitry Figure A

2. Values

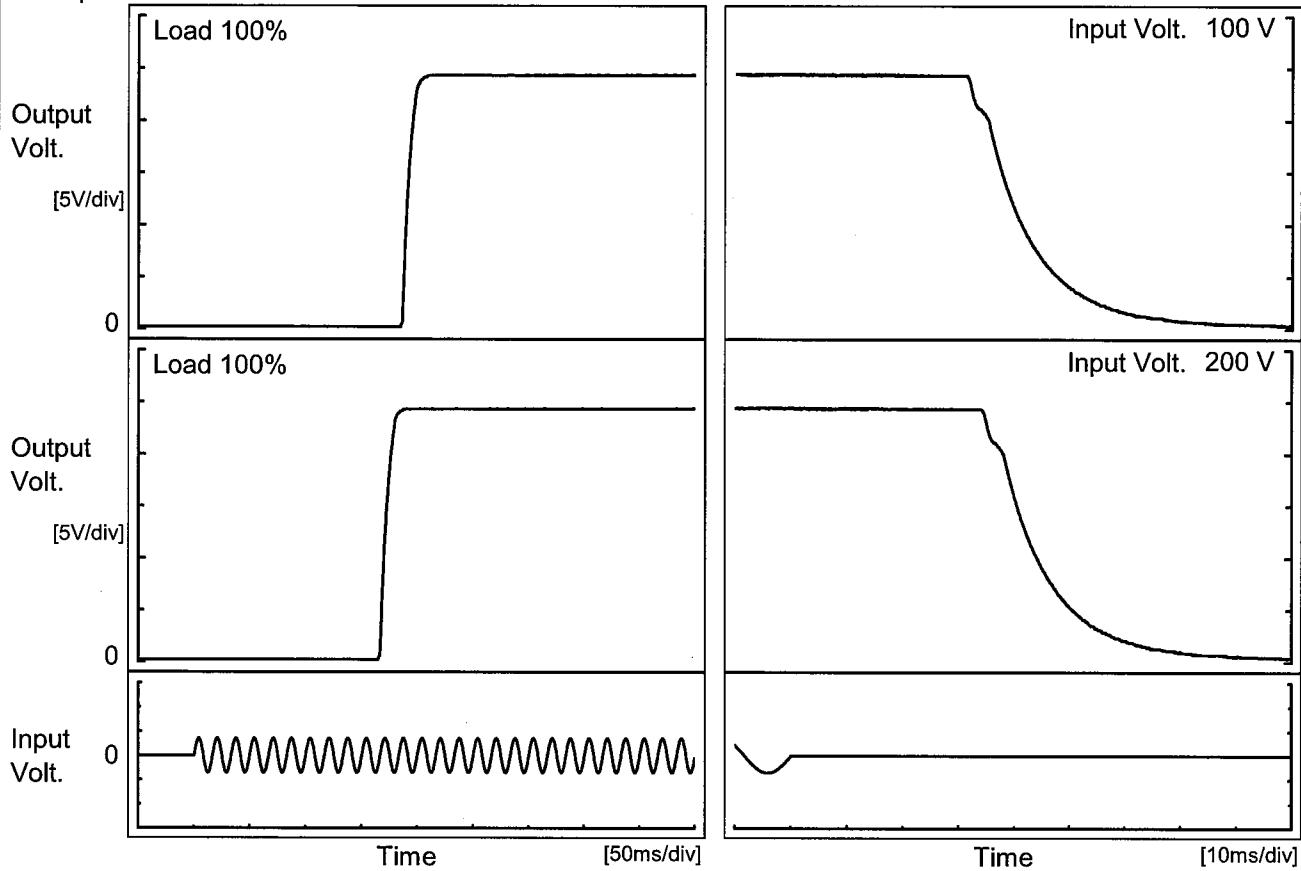
Time since start [H]	Output Voltage [V]
0.0	24.484
0.5	24.457
1.0	24.457
2.0	24.457
3.0	24.457
4.0	24.457
5.0	24.457
6.0	24.457
7.0	24.457
8.0	24.457

COSEL

Model	SPLFA150F-24
Item	Rise and Fall Time
Object	+24V6.3A

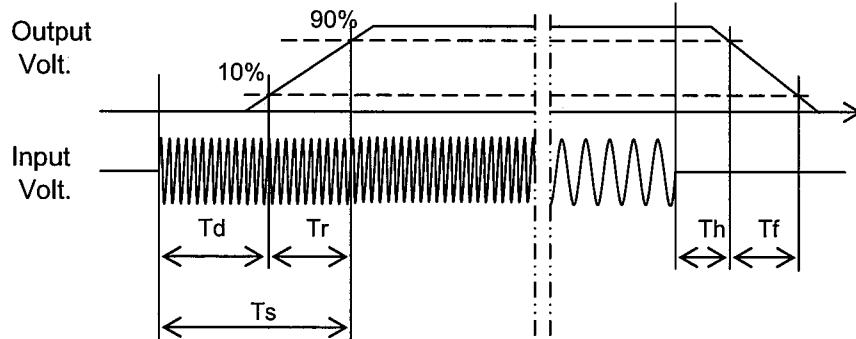
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

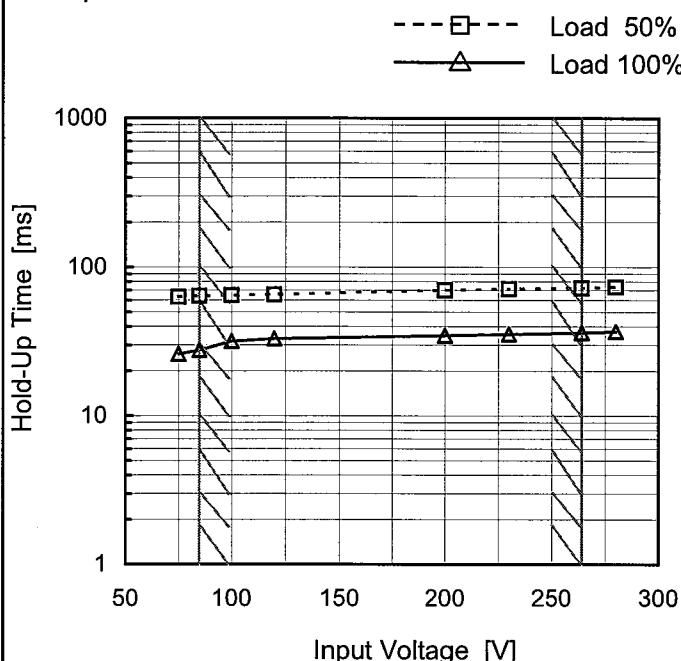
Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
100 V		187.5	10.8	198.3	32.9	21.9	
200 V		167.5	10.8	178.3	35.6	21.9	



COSEL

Model	SPLFA150F-24
Item	Hold-Up Time
Object	+24V6.3A

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.

 Temperature 25°C
 Testing Circuitry Figure A

2.Values

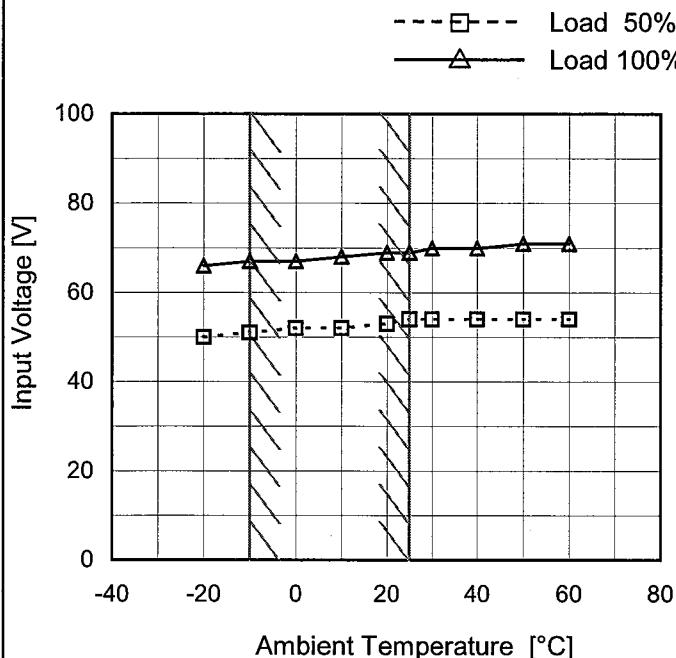
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	63	26
85	64	28
100	65	32
120	65	33
200	70	35
230	71	36
264	73	36
280	73	37
--	-	-

Model	SPLFA150F-24																																																					
Item	Instantaneous Interruption Compensation	Temperature Testing Circuitry	25°C Figure A																																																			
Object	+24V6.3A																																																					
1.Graph	<p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V Input Volt. 200V Input Volt. 230V <p>Y-axis: Instantaneous Compensation Time [ms]</p> <p>X-axis: Load Current [A]</p>																																																					
2.Values	<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>0.00</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>1.00</td><td>172</td><td>203</td><td>205</td></tr> <tr> <td>2.00</td><td>89</td><td>111</td><td>112</td></tr> <tr> <td>3.00</td><td>63</td><td>75</td><td>77</td></tr> <tr> <td>4.00</td><td>47</td><td>56</td><td>58</td></tr> <tr> <td>5.00</td><td>38</td><td>45</td><td>46</td></tr> <tr> <td>6.00</td><td>35</td><td>37</td><td>38</td></tr> <tr> <td>6.30</td><td>29</td><td>34</td><td>35</td></tr> <tr> <td>6.93</td><td>27</td><td>31</td><td>31</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]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	1.00	172	203	205	2.00	89	111	112	3.00	63	75	77	4.00	47	56	58	5.00	38	45	46	6.00	35	37	38	6.30	29	34	35	6.93	27	31	31	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
0.00	-	-	-																																																			
1.00	172	203	205																																																			
2.00	89	111	112																																																			
3.00	63	75	77																																																			
4.00	47	56	58																																																			
5.00	38	45	46																																																			
6.00	35	37	38																																																			
6.30	29	34	35																																																			
6.93	27	31	31																																																			
--	-	-	-																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

COSEL

Model	SPLFA150F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V6.3A

1.Graph



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

Testing Circuitry Figure A

2.Values

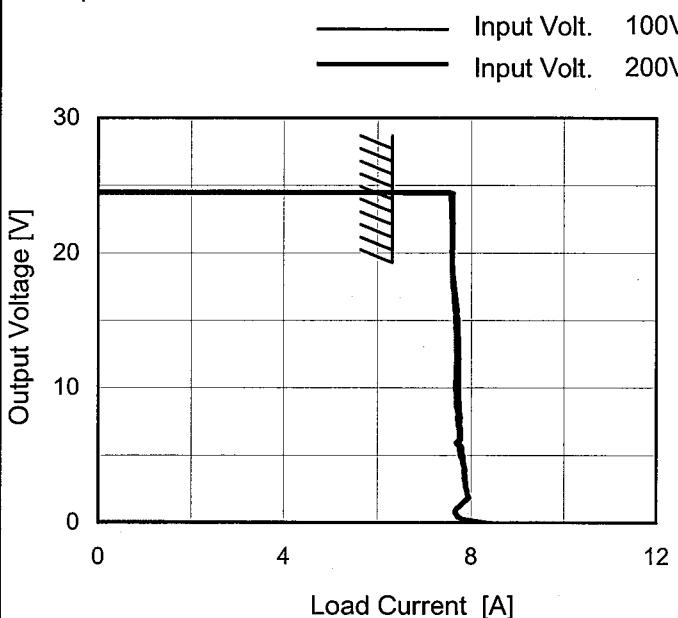
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	50	66
-10	51	67
0	52	67
10	52	68
20	53	69
25	54	69
30	54	70
40	54	70
50	54	71
60	54	71
--	-	-

COSEL

Model	SPLFA150F-24
Item	Overcurrent Protection
Object	+24V6.3A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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

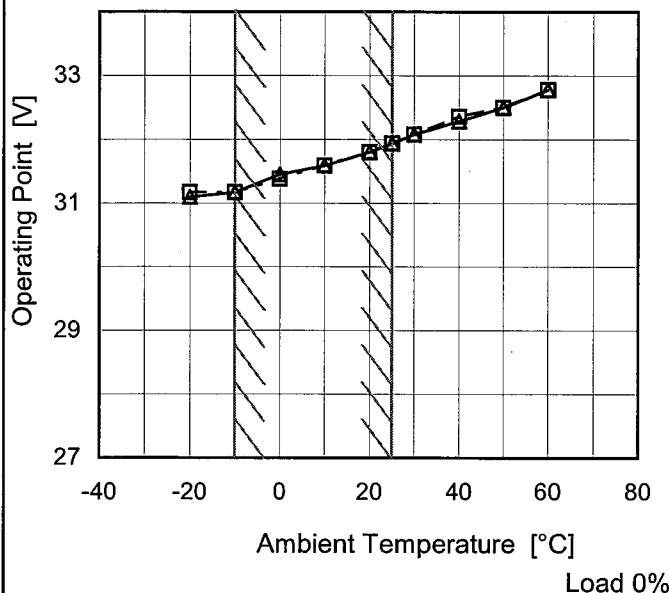
2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
22.8	7.63	7.59
21.6	7.64	7.60
19.2	7.63	7.60
16.8	7.69	7.64
14.4	7.75	7.68
12.0	7.76	7.70
9.6	7.76	7.69
7.2	7.78	7.73
4.8	7.85	7.79
2.4	7.93	7.91
0.0	8.73	8.60
--	-	-

Model	SPLFA150F-24
Item	Overvoltage Protection
Object	+24V6.3A

1. Graph

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



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. 200[V]
-20	31.10	31.17
-10	31.17	31.17
0	31.45	31.38
10	31.59	31.59
20	31.80	31.80
25	31.94	31.94
30	32.08	32.08
40	32.29	32.36
50	32.50	32.50
60	32.78	32.78
--	-	-

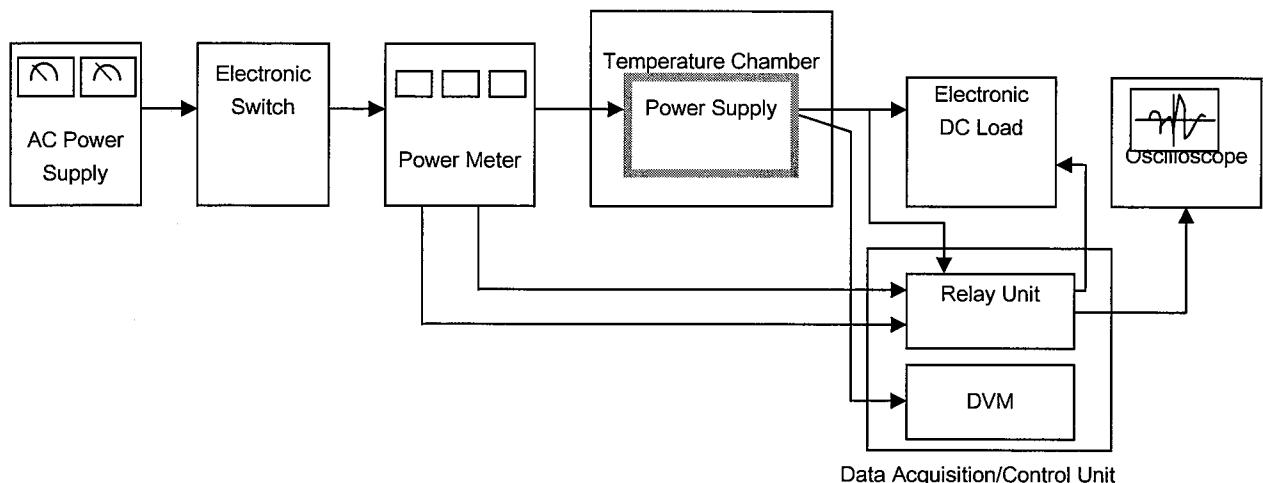


Figure A

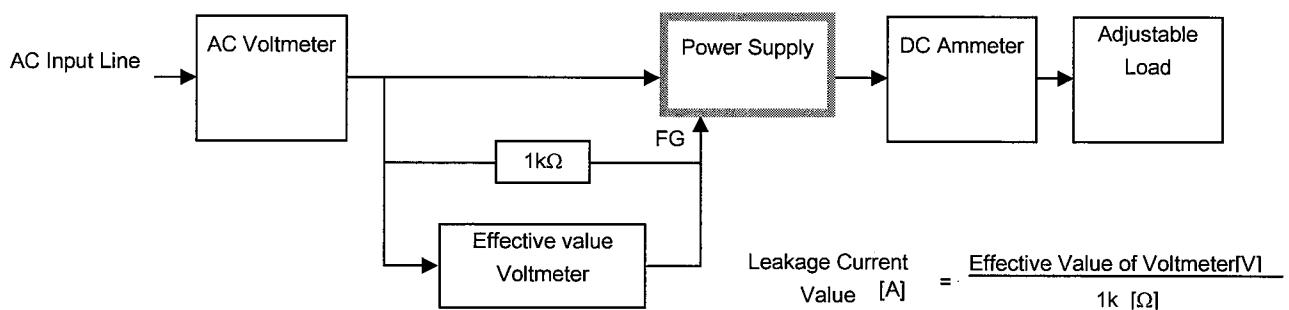


Figure B (DEN-AN)

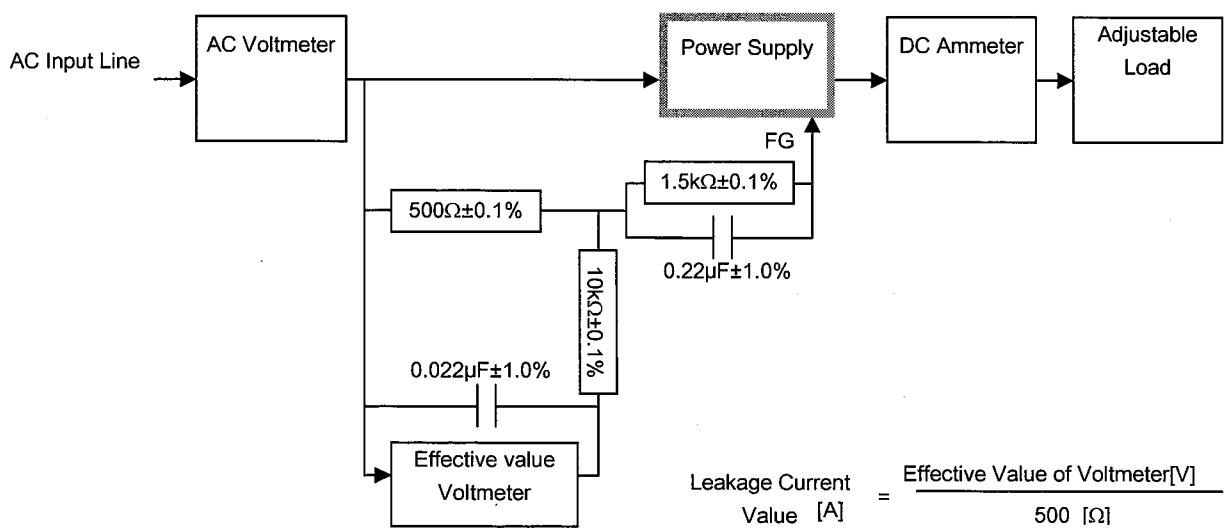


Figure B (IEC60950-1)

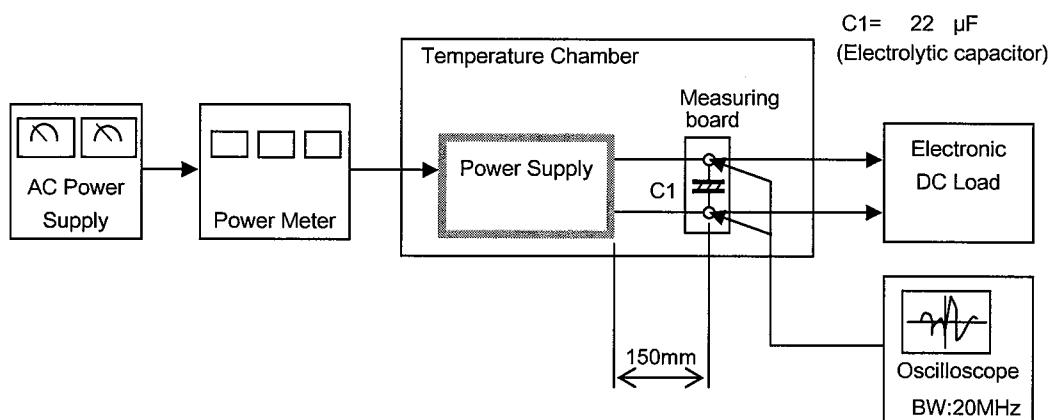
COSEL

Figure C