

TEST DATA OF PLA150F-48

Regulated DC Power Supply
June 26, 2013

Approved by : Katsumi Ishikawa
Katsumi Ishikawa Design Manager

Prepared by : Naoki Fujita
Naoki Fujita Design Engineer

COSEL CO.,LTD.



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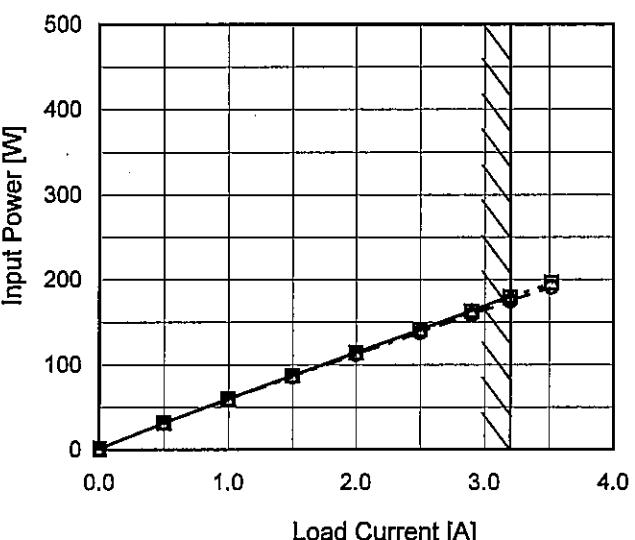
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Model	PLA150F-48																																																					
Item	Input Current (by Load Current)																																																					
Object	_____																																																					
1.Graph																																																						
<p style="text-align: center;"> —△— Input Volt. 100V ---□--- Input Volt. 115V -○- Input Volt. 230V </p> <p>The graph plots Input Current [A] on the y-axis (0.00 to 2.00) against Load Current [A] on the x-axis (0.0 to 4.0). Three curves are shown: a solid line with triangles for 100V, a dashed line with squares for 115V, and a dash-dot line with circles for 230V. All curves start at (0,0) and increase. A slanted line is drawn through the points (1.5, 1.4) and (3.2, 1.8), representing the rated load current range.</p>																																																						
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Model	PLA150F-48	Temperature	25°C																																																			
Item	Input Power (by Load Current)	Testing Circuitry	Figure A																																																			
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1.Graph	—△— Input Volt. 100V - -□-- Input Volt. 115V - -○-- Input Volt. 230V																																																					
	 <p>The graph plots Input Power [W] on the Y-axis (0 to 500) against Load Current [A] on the X-axis (0.0 to 4.0). Three data series are shown for different input voltages: 100V (solid line with triangle markers), 115V (dashed line with square markers), and 230V (dash-dot line with circle markers). All curves show a non-linear increase in power with load current. A diagonal hatched line represents the rated load current range, which is approximately between 2.5A and 3.5A.</p>	2.Values	<table border="1"> <thead> <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. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td><td>1.3</td><td>1.3</td><td>1.0</td></tr> <tr> <td>0.50</td><td>32.0</td><td>31.7</td><td>31.6</td></tr> <tr> <td>1.00</td><td>60.3</td><td>59.7</td><td>59.0</td></tr> <tr> <td>1.50</td><td>87.2</td><td>86.5</td><td>85.7</td></tr> <tr> <td>2.00</td><td>114.6</td><td>113.8</td><td>112.2</td></tr> <tr> <td>2.50</td><td>141.7</td><td>140.4</td><td>137.8</td></tr> <tr> <td>2.90</td><td>163.9</td><td>162.2</td><td>158.8</td></tr> <tr> <td>3.20</td><td>181.1</td><td>179.1</td><td>174.8</td></tr> <tr> <td>3.52</td><td>-</td><td>196.1</td><td>191.0</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]	Input Power [W]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.00	1.3	1.3	1.0	0.50	32.0	31.7	31.6	1.00	60.3	59.7	59.0	1.50	87.2	86.5	85.7	2.00	114.6	113.8	112.2	2.50	141.7	140.4	137.8	2.90	163.9	162.2	158.8	3.20	181.1	179.1	174.8	3.52	-	196.1	191.0	--	-	-	-	--	-	-	-
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	<p>The graph shows efficiency increasing with load current. For 100V, efficiency starts at ~74% at 0.5A and rises to ~85% at 3.5A. For 115V, it starts at ~77% at 0.5A and rises to ~85% at 3.5A. For 230V, it starts at ~78% at 0.5A and rises to ~85% at 3.5A. A slanted line from approximately (0.5, 74) to (3.5, 85) marks the rated load current range.</p>	2.Values	<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. 115[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>0.50</td><td>74.8</td><td>75.8</td><td>77.0</td></tr> <tr><td>1.00</td><td>79.5</td><td>80.2</td><td>82.3</td></tr> <tr><td>1.50</td><td>82.4</td><td>83.1</td><td>85.6</td></tr> <tr><td>2.00</td><td>85.4</td><td>85.8</td><td>87.3</td></tr> <tr><td>2.50</td><td>86.9</td><td>86.9</td><td>89.2</td></tr> <tr><td>2.90</td><td>87.0</td><td>87.2</td><td>89.7</td></tr> <tr><td>3.20</td><td>86.9</td><td>87.2</td><td>90.0</td></tr> <tr><td>3.52</td><td>-</td><td>87.1</td><td>90.1</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. 115[V]	Input Volt. 230[V]	0.00	-	-	-	0.50	74.8	75.8	77.0	1.00	79.5	80.2	82.3	1.50	82.4	83.1	85.6	2.00	85.4	85.8	87.3	2.50	86.9	86.9	89.2	2.90	87.0	87.2	89.7	3.20	86.9	87.2	90.0	3.52	-	87.1	90.1	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

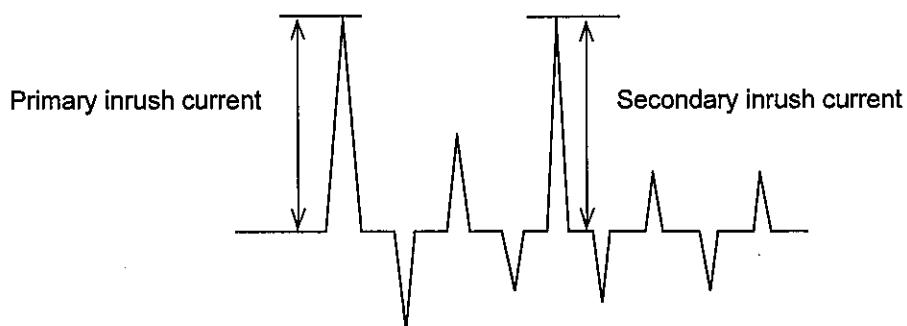
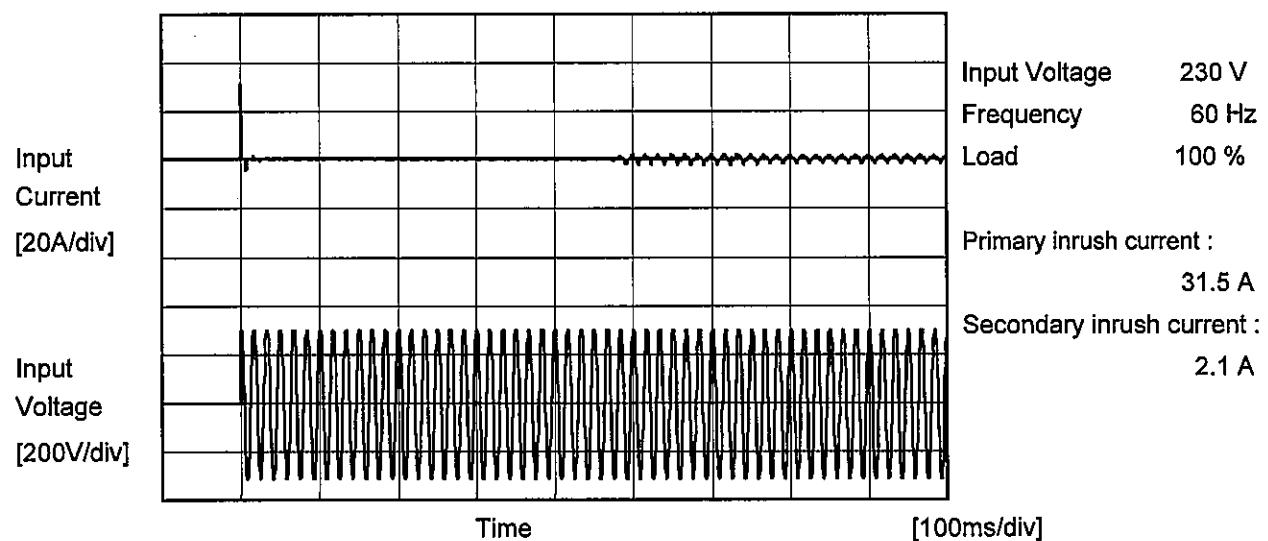
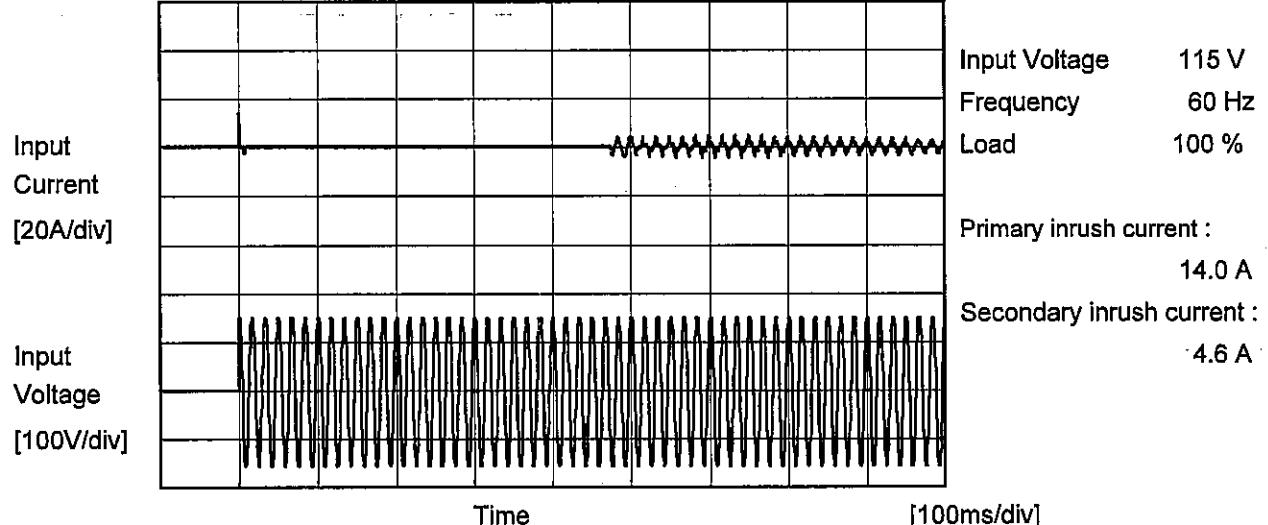
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Model	PLA150F-48						
Item	Power Factor (by Input Voltage)	Temperature 25°C Testing Circuitry Figure A					
Object	—	—					
1.Graph							
<p>Legend: - - - □ - - Load 50% — ▲ — Load 100%</p>							
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Input Voltage [V]	Power Factor						
	Load 50%	Load 100%					
85	0.990	0.995 ※1					
100	0.980	0.993 ※2					
115	0.971	0.992					
200	0.913	0.967					
230	0.894	0.952					
264	0.522	0.604					
280	0.474	0.501					
--	-	-					
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※1: Load 80% ※2: Load 90%							
Note: Slanted line shows the range of the rated input voltage.							

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Model	PLA150F-48	Temperature Testing Circuitry Figure A
Item	Inrush Current	
Object	_____	





Model	PLA150F-48	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

1. Results

[mA]

Standards		Input Volt.			Note
		100[V]	115[V]	240[V]	
DEN-AN	Both phases	0.45	0.50	0.65	Operation
	One of phases	0.30	0.35	0.78	Stand by
IEC60950-1	Both phases	0.30	0.31	0.55	Operation
	One of phases	0.27	0.31	0.72	Stand by

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

2. Condition

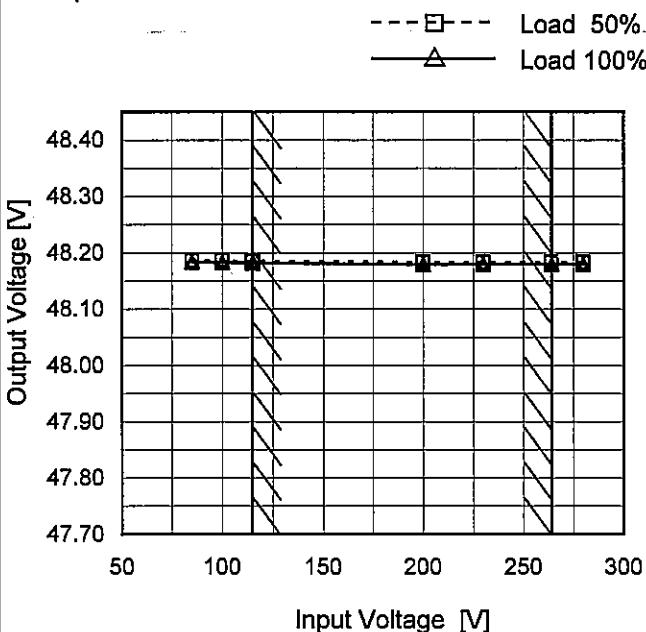
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

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Model	PLA150F-48
Item	Line Regulation
Object	+48V3.2A

 Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	48.186	48.184 ※1
100	48.186	48.183 ※2
115	48.185	48.182
200	48.183	48.180
230	48.183	48.180
264	48.183	48.180
280	48.183	48.180
--	-	-
--	-	-

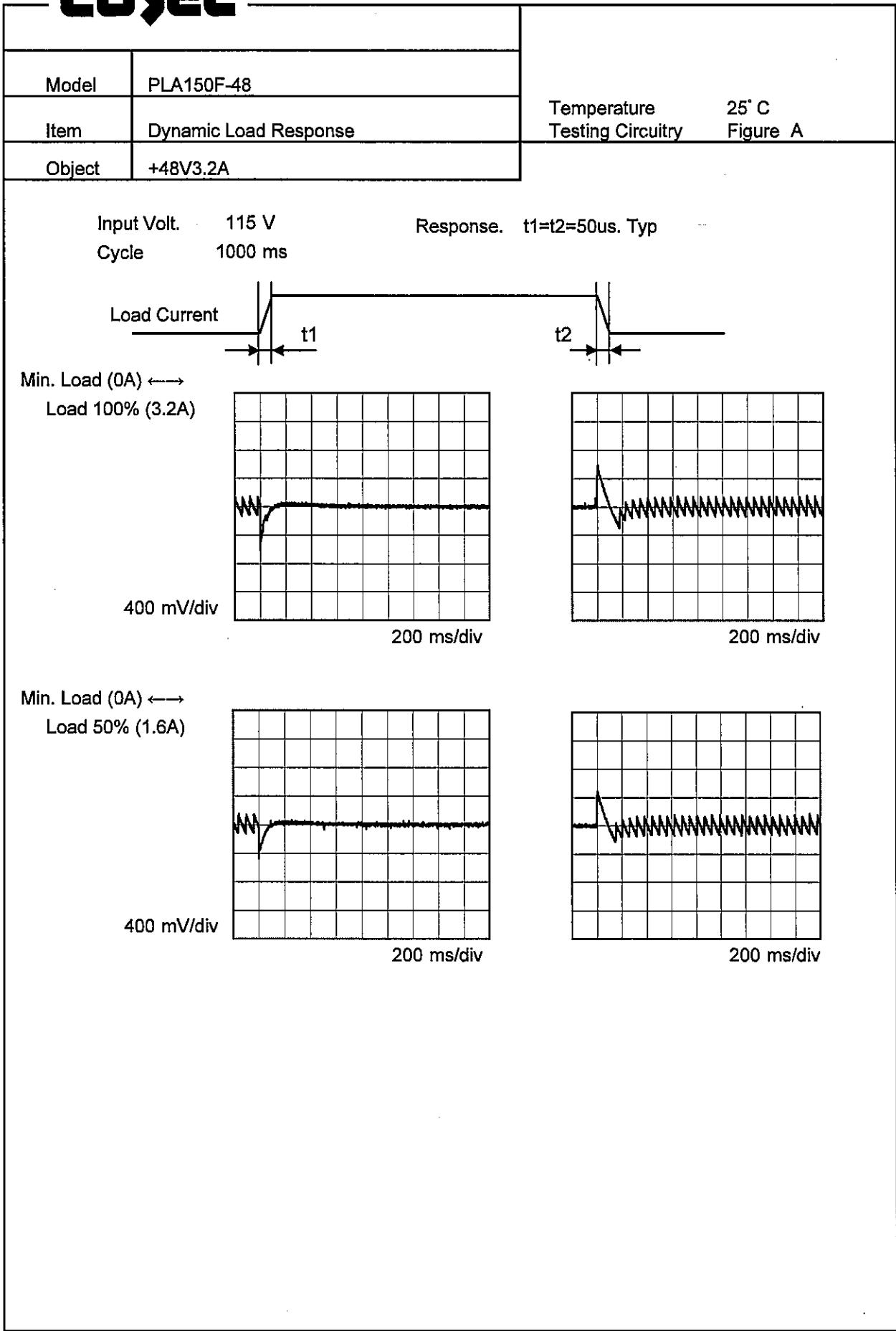
※1: Load 80%

※2: Load 90%

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

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<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V Input Volt. 115V Input Volt. 230V 		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>48.306</td> <td>48.304</td> <td>48.302</td> </tr> <tr> <td>0.50</td> <td>48.207</td> <td>48.205</td> <td>48.205</td> </tr> <tr> <td>1.00</td> <td>48.187</td> <td>48.185</td> <td>48.183</td> </tr> <tr> <td>1.50</td> <td>48.186</td> <td>48.184</td> <td>48.182</td> </tr> <tr> <td>2.00</td> <td>48.185</td> <td>48.183</td> <td>48.181</td> </tr> <tr> <td>2.50</td> <td>48.184</td> <td>48.183</td> <td>48.181</td> </tr> <tr> <td>2.90</td> <td>48.183</td> <td>48.182</td> <td>48.180</td> </tr> <tr> <td>3.20</td> <td>48.183</td> <td>48.182</td> <td>48.180</td> </tr> <tr> <td>3.52</td> <td>-</td> <td>48.182</td> <td>48.180</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]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.00	48.306	48.304	48.302	0.50	48.207	48.205	48.205	1.00	48.187	48.185	48.183	1.50	48.186	48.184	48.182	2.00	48.185	48.183	48.181	2.50	48.184	48.183	48.181	2.90	48.183	48.182	48.180	3.20	48.183	48.182	48.180	3.52	-	48.182	48.180	--	-	-	-	--	-	-	-
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

COSEL

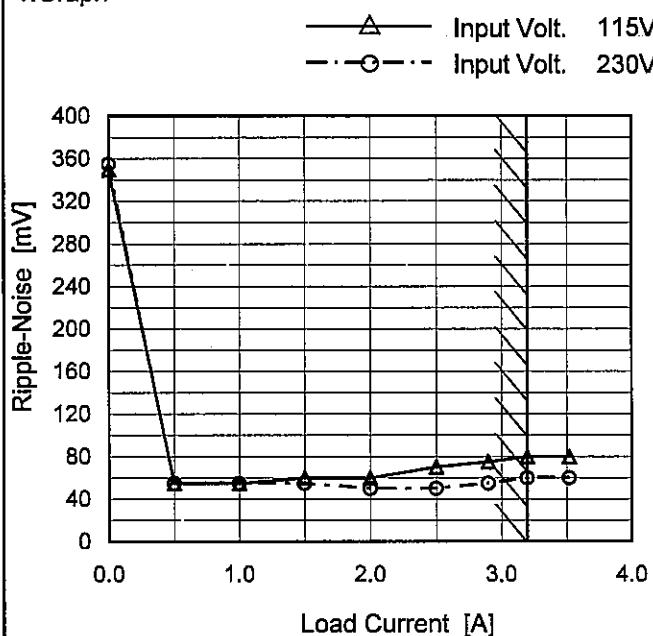
COSEL

Model	PLA150F-48	Temperature	25°C																																					
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure C																																					
Object	+48V3.2A																																							
1.Graph		2.Values																																						
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 400 mV, and the X-axis ranges from 0.0 to 4.0 A. Two curves are plotted: Input Volt. 115V (solid line with triangles) and Input Volt. 230V (dashed line with circles). Both curves show a sharp drop in ripple voltage from approximately 320 mV at 0.0 A to about 40 mV between 0.5 A and 1.0 A, then remain relatively constant up to 3.2 A. A slanted line indicates the rated load current range from 0.5 A to 3.2 A.</p>																																								
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 115 [V]</th> <th>Input Volt. 230 [V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>330</td> <td>330</td> </tr> <tr> <td>0.50</td> <td>35</td> <td>40</td> </tr> <tr> <td>1.00</td> <td>35</td> <td>40</td> </tr> <tr> <td>1.50</td> <td>35</td> <td>25</td> </tr> <tr> <td>2.00</td> <td>30</td> <td>25</td> </tr> <tr> <td>2.50</td> <td>30</td> <td>25</td> </tr> <tr> <td>2.90</td> <td>30</td> <td>25</td> </tr> <tr> <td>3.20</td> <td>30</td> <td>30</td> </tr> <tr> <td>3.52</td> <td>40</td> <td>40</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. 115 [V]	Input Volt. 230 [V]	0.00	330	330	0.50	35	40	1.00	35	40	1.50	35	25	2.00	30	25	2.50	30	25	2.90	30	25	3.20	30	30	3.52	40	40	--	-	-	--	-	-
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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>T1: Due to AC Input Line T2: Due to Switching</p> <p>Fig. Complex Ripple Wave Form</p>																																								

COSEL

Model	PLA150F-48
Item	Ripple-Noise
Object	+48V3.2A

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.

Temperature 25°C
Testing Circuitry Figure C

2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	350	355
0.50	55	55
1.00	55	55
1.50	60	55
2.00	60	50
2.50	70	50
2.90	75	55
3.20	80	60
3.52	80	60
--	-	-
--	-	-

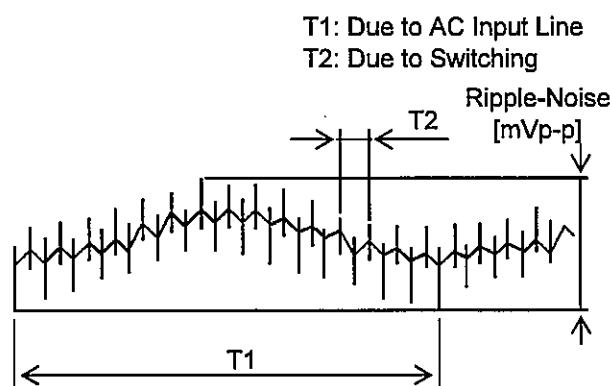
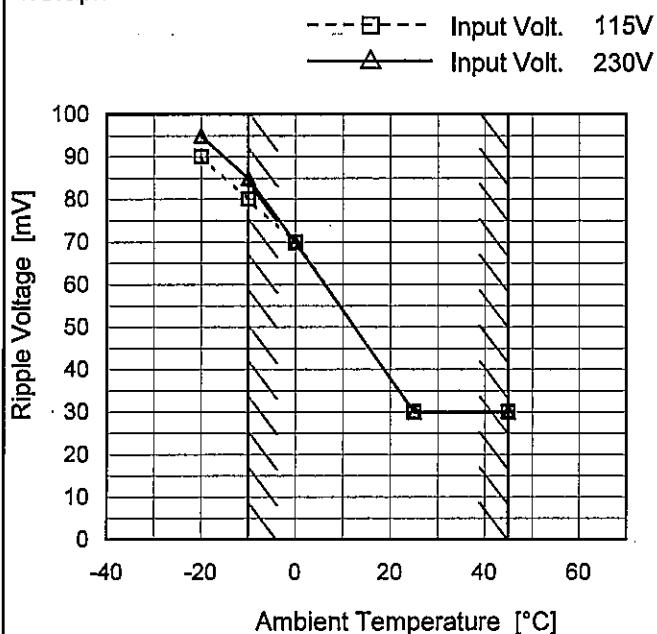


Fig. Complex Ripple Wave Form

Model	PLA150F-48
Item	Ripple Voltage (by Ambient Temp.)
Object	+48V3.2A

1. Graph



Measured by 20 MHz Oscilloscope.

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

Testing Circuitry Figure C

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
-20	90	95
-10	80	85
0	70	70
25	30	30
45	30	30
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PLA150F-48	Testing Circuitry Figure A																																															
Item	Ambient Temperature Drift																																																
Object	+48V3.2A																																																
1.Graph	<p style="text-align: center;"> △ Input Volt. 100V - - - □ - - - Input Volt. 115V - - - ○ - - - Input Volt. 230V </p> <table border="1"> <caption>Data points estimated from Graph</caption> <thead> <tr> <th>Ambient Temperature [°C]</th> <th>100V [V]</th> <th>115V [V]</th> <th>230V [V]</th> </tr> </thead> <tbody> <tr><td>-20</td><td>48.008</td><td>48.008</td><td>48.007</td></tr> <tr><td>-10</td><td>48.050</td><td>48.050</td><td>48.049</td></tr> <tr><td>0</td><td>48.090</td><td>48.090</td><td>48.089</td></tr> <tr><td>10</td><td>48.125</td><td>48.124</td><td>48.124</td></tr> <tr><td>20</td><td>48.166</td><td>48.166</td><td>48.165</td></tr> <tr><td>25</td><td>48.183</td><td>48.182</td><td>48.180</td></tr> <tr><td>35</td><td>48.215</td><td>48.215</td><td>48.214</td></tr> <tr><td>45</td><td>48.232</td><td>48.232</td><td>48.231</td></tr> <tr><td>55</td><td>48.247</td><td>48.247</td><td>48.245</td></tr> <tr><td>65</td><td>48.243</td><td>48.242</td><td>48.242</td></tr> <tr><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	100V [V]	115V [V]	230V [V]	-20	48.008	48.008	48.007	-10	48.050	48.050	48.049	0	48.090	48.090	48.089	10	48.125	48.124	48.124	20	48.166	48.166	48.165	25	48.183	48.182	48.180	35	48.215	48.215	48.214	45	48.232	48.232	48.231	55	48.247	48.247	48.245	65	48.243	48.242	48.242	-	-	-	-
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-	-	-	-																																														
2.Values																																																	

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

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-20	48.008	48.008	48.007
-10	48.050	48.050	48.049
0	48.090	48.090	48.089
10	48.125	48.124	48.124
20	48.166	48.166	48.165
25	48.183	48.182	48.180
35	48.215	48.215	48.214
45	48.232	48.232	48.231
55	48.247	48.247	48.245
65	48.243	48.242	48.242
-	-	-	-

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



Model	PLA150F-48	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+48V3.2A	

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 : 0.96 ~ 3.2A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - 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	45	115	0.96	48.237	±94	±0.2
Minimum Voltage	-10	264	3.2	48.049		

COSEL

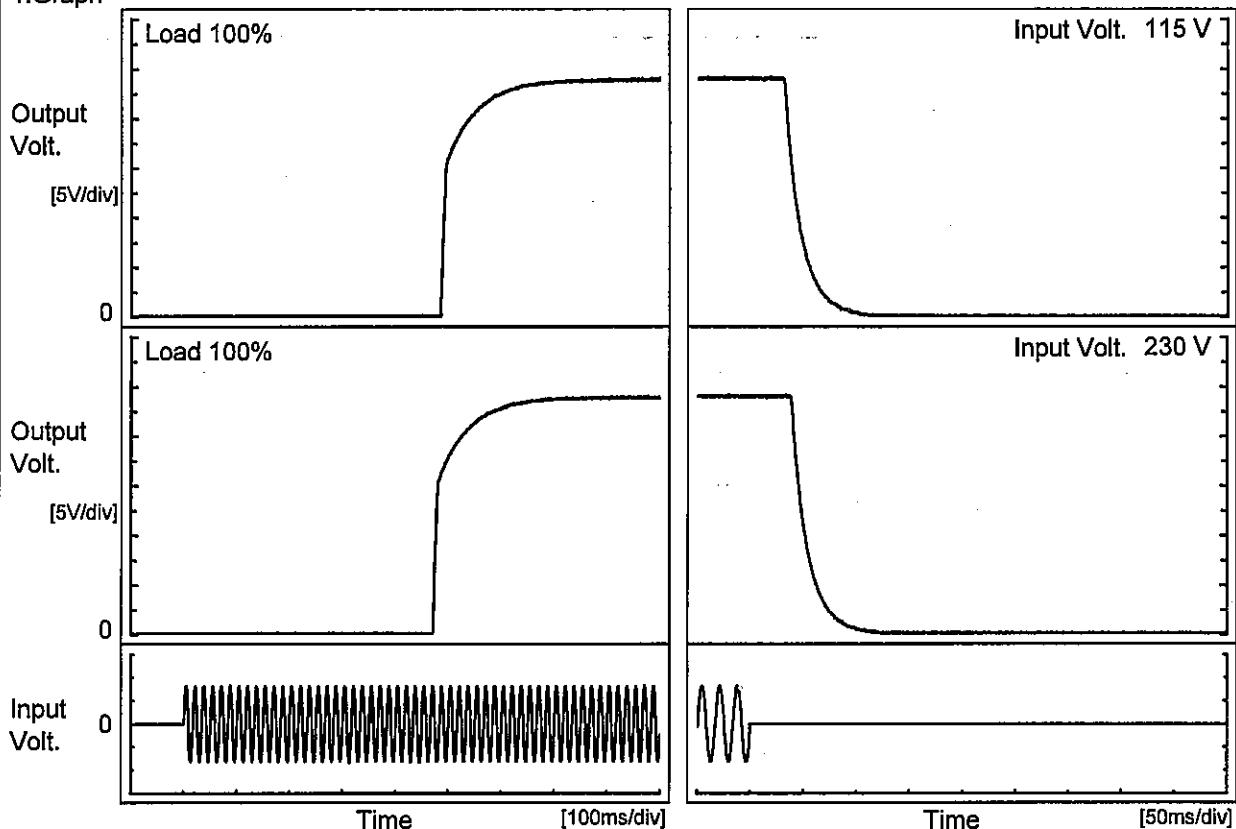
Model	PLA150F-48	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+48V3.2A																								
1. Graph			2. Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 230V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>48.180</td></tr> <tr><td>0.5</td><td>48.179</td></tr> <tr><td>1.0</td><td>48.179</td></tr> <tr><td>2.0</td><td>48.179</td></tr> <tr><td>3.0</td><td>48.178</td></tr> <tr><td>4.0</td><td>48.178</td></tr> <tr><td>5.0</td><td>48.178</td></tr> <tr><td>6.0</td><td>48.178</td></tr> <tr><td>7.0</td><td>48.178</td></tr> <tr><td>8.0</td><td>48.178</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	48.180	0.5	48.179	1.0	48.179	2.0	48.179	3.0	48.178	4.0	48.178	5.0	48.178	6.0	48.178	7.0	48.178	8.0	48.178
Time since start [H]	Output Voltage [V]																								
0.0	48.180																								
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6.0	48.178																								
7.0	48.178																								
8.0	48.178																								

* The characteristic of AC115V is equal.

COSEL

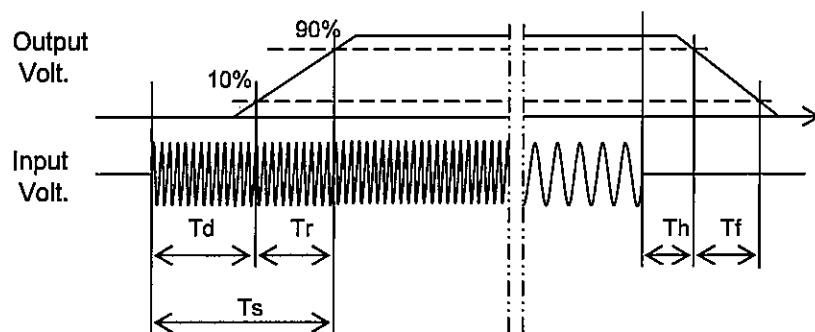
Model	PLA150F-48	Temperature Testing Circuitry	25°C Figure A	
Item	Rise and Fall Time			
Object	+48V3.2A			

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
115 V		486.5	86.5	573.0	33.8	33.8	
230 V		473.5	82.5	556.0	34.0	37.3	

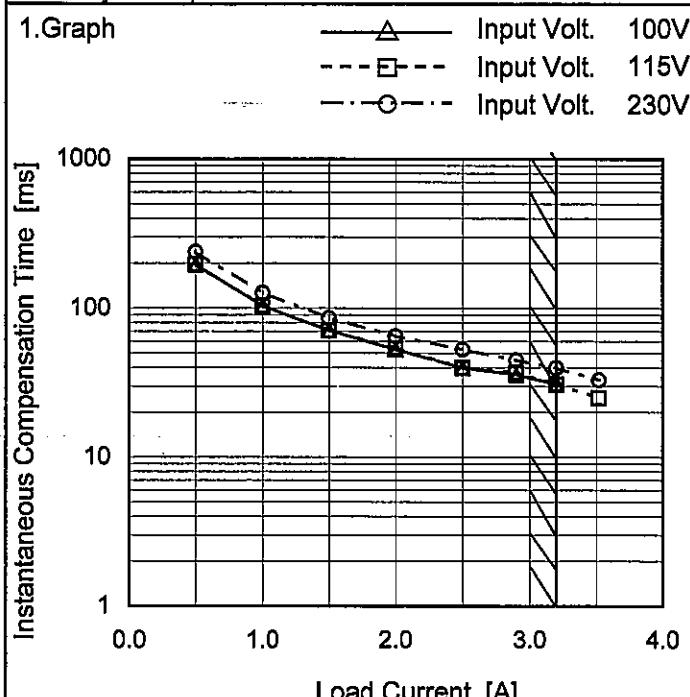


COSEL

Model	PLA150F-48	Temperature Testing Circuitry 25°C Figure A																																
Item	Hold-Up Time																																	
Object	+48V3.2A																																	
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>64</td> <td>40 ※1</td> </tr> <tr> <td>100</td> <td>64</td> <td>36 ※2</td> </tr> <tr> <td>115</td> <td>64</td> <td>34</td> </tr> <tr> <td>200</td> <td>64</td> <td>34</td> </tr> <tr> <td>230</td> <td>78</td> <td>39</td> </tr> <tr> <td>264</td> <td>85</td> <td>41</td> </tr> <tr> <td>280</td> <td>89</td> <td>43</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>※1: Load 80% ※2: Load 90%</p>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	64	40 ※1	100	64	36 ※2	115	64	34	200	64	34	230	78	39	264	85	41	280	89	43	--	-	-	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																	
	Load 50%	Load 100%																																
85	64	40 ※1																																
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264	85	41																																
280	89	43																																
--	-	-																																
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<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	PLA150F-48
Item	Instantaneous Interruption Compensation
Object	+48V3.2A


 Temperature 25°C
 Testing Circuitry Figure A

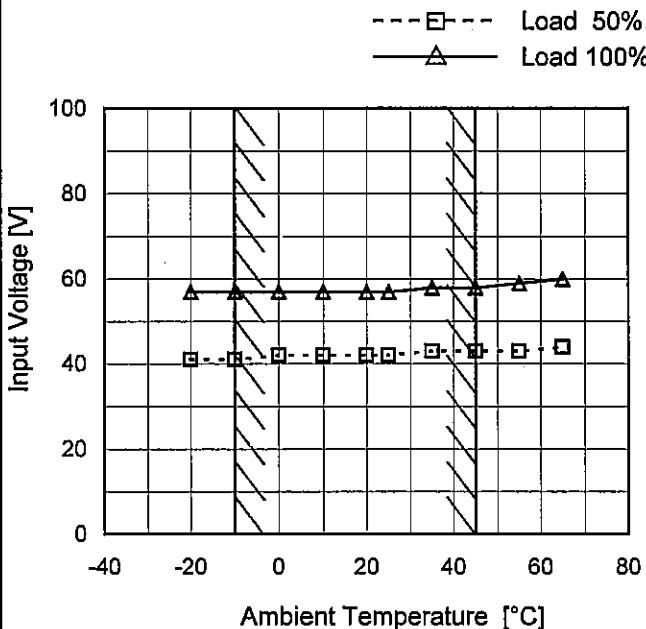
2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
0.50	196	197	240
1.00	104	104	127
1.50	71	71	86
2.00	53	54	65
2.50	40	40	53
2.90	36	37	45
3.20	31	31	40
3.52	-	25	33
--	-	-	-
--	-	-	-

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

Model	PLA150F-48
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+48V3.2A

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	41	57
-10	41	57
0	42	57
10	42	57
20	42	57
25	42	57
35	43	58
45	43	58
55	43	59
65	44	60
--	-	-

COSEL

Model	PLA150F-48
Item	Overcurrent Protection
Object	+48V3.2A

1. Graph

Input Volt. 115V
Input Volt. 230V

Output Voltage [V]	Load Current [A] (115[V])	Load Current [A] (230[V])
45.6	3.93	4.07
43.2	3.86	4.13
38.4	4.10	4.25
33.6	4.23	4.39
28.8	4.36	4.53
24.0	4.51	4.70
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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

 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 115[V]	Input Volt. 230[V]
45.6	3.93	4.07
43.2	3.86	4.13
38.4	4.10	4.25
33.6	4.23	4.39
28.8	4.36	4.53
24.0	4.51	4.70
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	PLA150F-48
Item	Overvoltage Protection
Object	+48V3.2A

1.Graph

Operating Point [V]

Ambient Temperature [°C]

Load 0%

Legend:

- Input Volt. 115V (Solid Line with ▲)
- Input Volt. 230V (Dashed Line with □)

Ambient Temperature [°C]	Input Volt. 115[V]	Input Volt. 230[V]
-20	57.08	57.08
-10	57.07	57.07
0	57.07	57.07
10	57.07	57.07
20	57.13	57.13
25	57.37	57.37
35	57.83	57.83
45	58.36	58.36
55	58.77	58.77
65	59.24	59.24
--	-	-

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	57.08	57.08
-10	57.07	57.07
0	57.07	57.07
10	57.07	57.07
20	57.13	57.13
25	57.37	57.37
35	57.83	57.83
45	58.36	58.36
55	58.77	58.77
65	59.24	59.24
--	-	-

COSEL

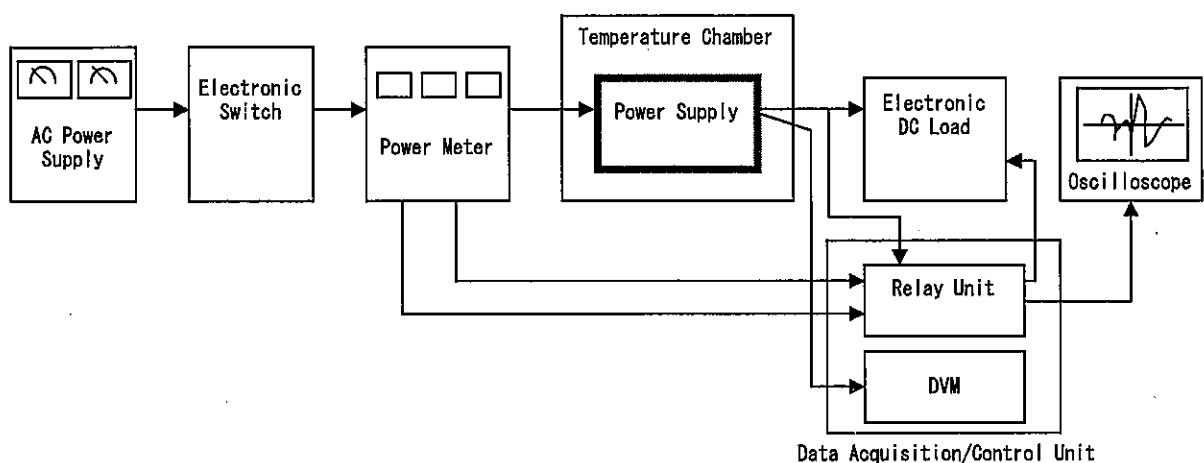


Figure A

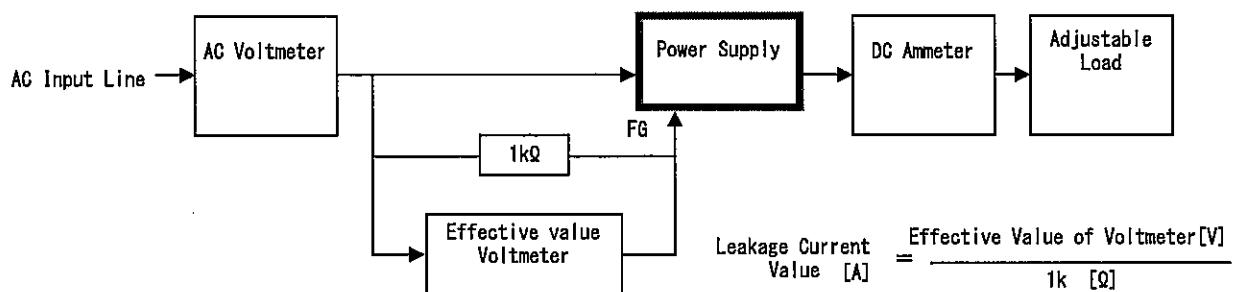


Figure B (DEN-AN)

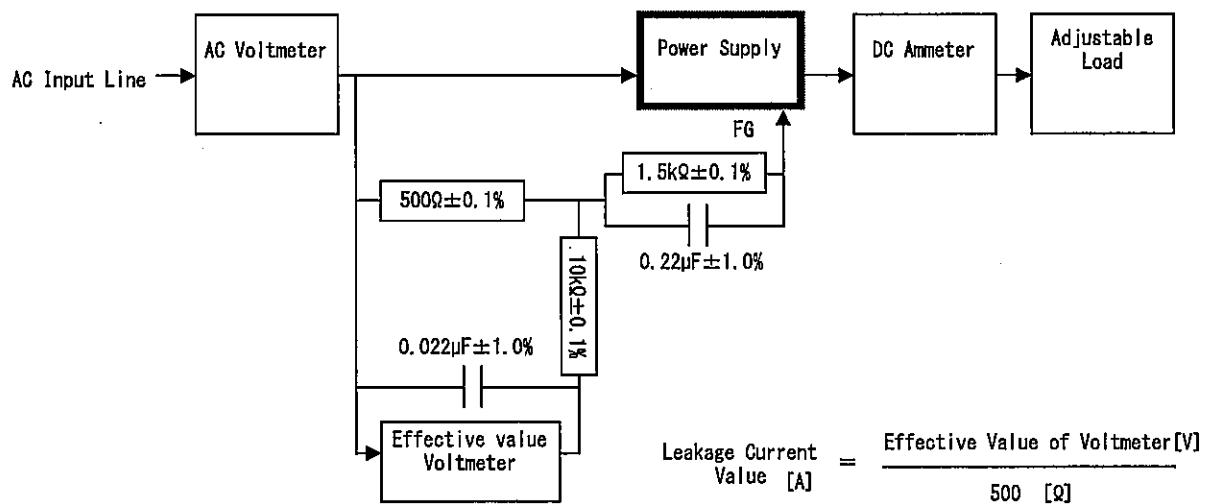


Figure B (IEC60950-1)

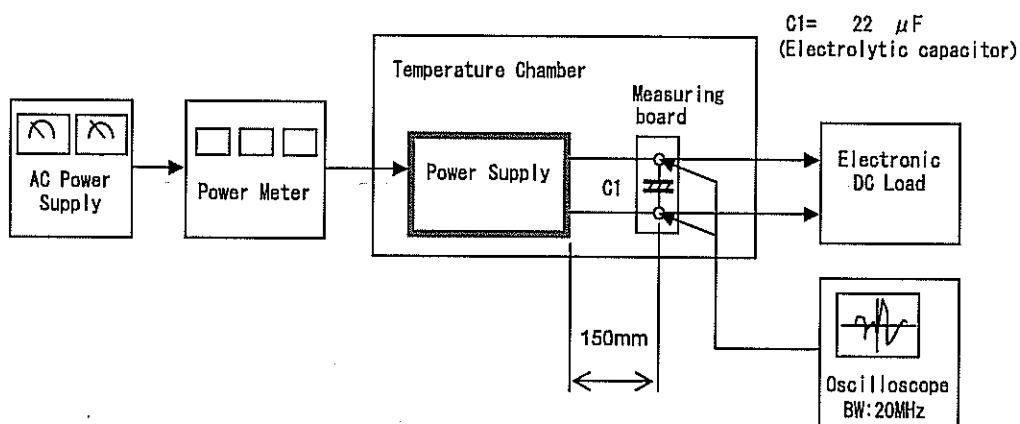
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Figure C