

TEST DATA OF PJA150F-15

Regulated DC Power Supply
August 30, 2016

Approved by : Yukihiro Takehashi
Yukihiro Takehashi Design Manager

Prepared by : Atsushi Nishikawa
Atsushi Nishikawa Design Engineer

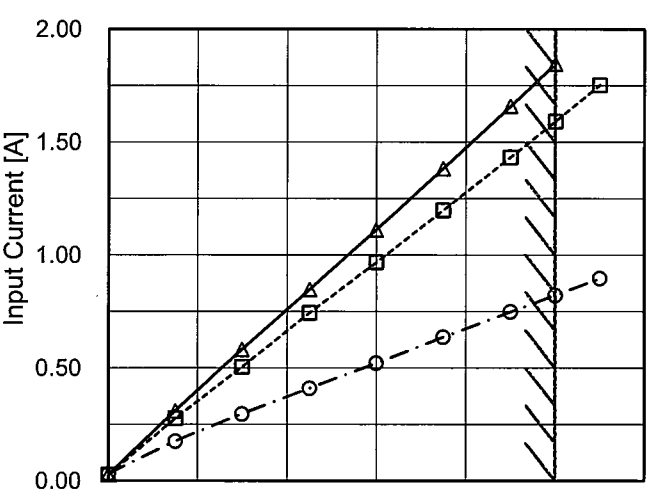
COSEL CO.,LTD.

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Model		PJA150F-15																																																				
Item		Input Current (by Load Current)																																																				
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1.Graph		<div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 115V</div></div><div><div>-○-</div><div>Input Volt. 230V</div></div></div>  <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. 115[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>0.027</td><td>0.026</td><td>0.031</td></tr><tr><td>1.5</td><td>0.309</td><td>0.276</td><td>0.176</td></tr><tr><td>3.0</td><td>0.582</td><td>0.505</td><td>0.296</td></tr><tr><td>4.5</td><td>0.847</td><td>0.743</td><td>0.410</td></tr><tr><td>6.0</td><td>1.112</td><td>0.968</td><td>0.522</td></tr><tr><td>7.5</td><td>1.383</td><td>1.198</td><td>0.637</td></tr><tr><td>9.0</td><td>1.660</td><td>1.433</td><td>0.749</td></tr><tr><td>10.0</td><td>1.846</td><td>1.592</td><td>0.822</td></tr><tr><td>11.0</td><td>-</td><td>1.753</td><td>0.897</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. 115[V]	Input Volt. 230[V]	0.0	0.027	0.026	0.031	1.5	0.309	0.276	0.176	3.0	0.582	0.505	0.296	4.5	0.847	0.743	0.410	6.0	1.112	0.968	0.522	7.5	1.383	1.198	0.637	9.0	1.660	1.433	0.749	10.0	1.846	1.592	0.822	11.0	-	1.753	0.897	--	-	-	-	--	-	-	-
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Efficiency [%]

100

92

84

76

68

60

52

44

50

100

150

200

250

300

Input Voltage [V]

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



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0.0	-	-	-																																																			
1.5	81.1	81.4	80.5																																																			
3.0	83.3	83.9	84.5																																																			
4.5	84.2	84.9	85.9																																																			
6.0	84.6	85.3	86.8																																																			
7.5	84.6	85.4	87.1																																																			
9.0	84.4	85.3	87.2																																																			
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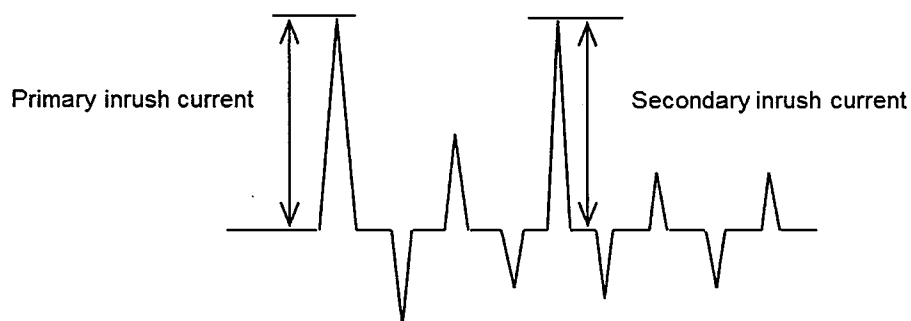
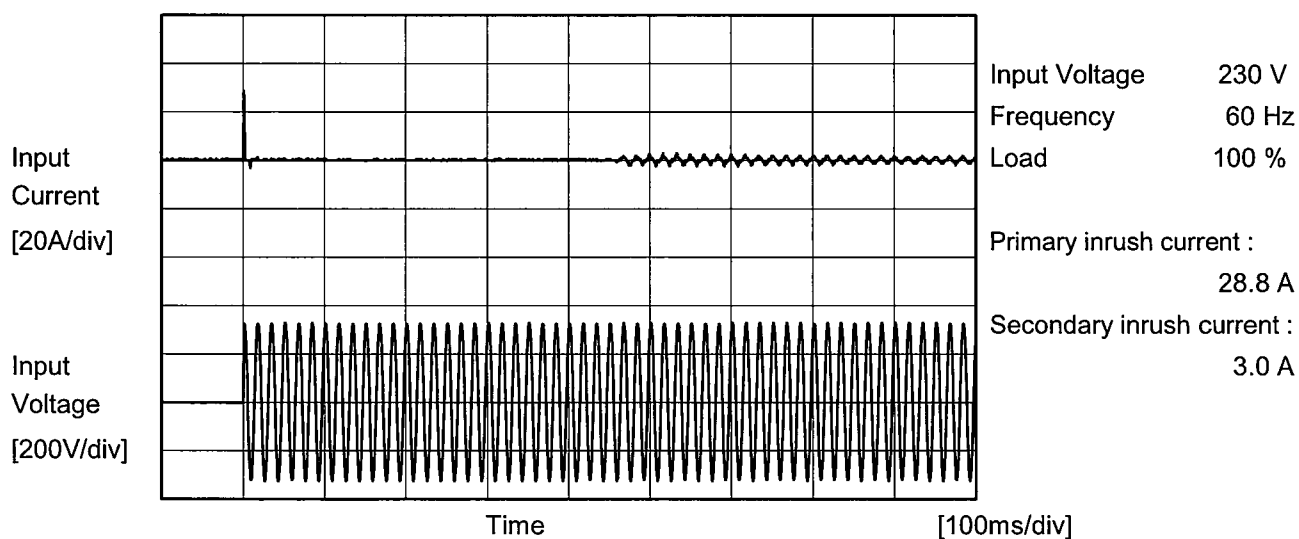
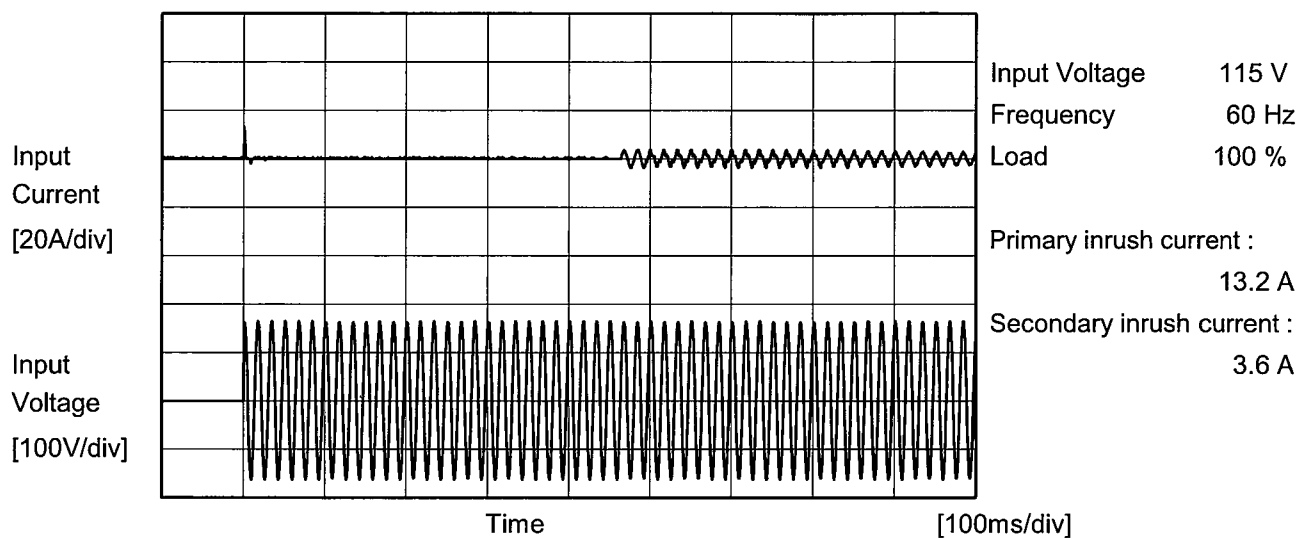
Model		PJA150F-15		Temperature Testing Circuitry	25°C Figure A																																
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Object																																					
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Model		PJA150F-15	Temperature 25°C Testing Circuitry Figure A																																																			
Item		Power Factor (by Load Current)																																																				
Object		_____																																																				
1.Graph		<div><div>—△—</div><div>---□---</div><div>---○---</div></div> <div><div>Input Volt. 100V</div><div>Input Volt. 115V</div><div>Input Volt. 230V</div></div>	2.Values																																																			
<div><div><div>Power Factor</div><div><div>1.0 0.9 0.8 0.7 0.6 0.5 0.4 0.3 0.2 0.1 0.0</div></div><div><div>Load Current [A]</div><div>04812</div></div></div></div>		<table><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. 115[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>0.425</td><td>0.370</td><td>0.150</td></tr><tr><td>1.5</td><td>0.925</td><td>0.896</td><td>0.709</td></tr><tr><td>3.0</td><td>0.957</td><td>0.953</td><td>0.806</td></tr><tr><td>4.5</td><td>0.975</td><td>0.959</td><td>0.858</td></tr><tr><td>6.0</td><td>0.986</td><td>0.975</td><td>0.889</td></tr><tr><td>7.5</td><td>0.990</td><td>0.984</td><td>0.908</td></tr><tr><td>9.0</td><td>0.992</td><td>0.988</td><td>0.924</td></tr><tr><td>10.0</td><td>0.993</td><td>0.990</td><td>0.934</td></tr><tr><td>11.0</td><td>-</td><td>0.991</td><td>0.942</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]	Power Factor			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.0	0.425	0.370	0.150	1.5	0.925	0.896	0.709	3.0	0.957	0.953	0.806	4.5	0.975	0.959	0.858	6.0	0.986	0.975	0.889	7.5	0.990	0.984	0.908	9.0	0.992	0.988	0.924	10.0	0.993	0.990	0.934	11.0	-	0.991	0.942	--	-	-	-	--	-	-	-
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Model	PJA150F-15	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		



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		Temperature 25°C Testing Circuitry Figure B
Model	PJA150F-15	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
DEN-AN	Both phases	0.20	0.21	0.43	Operation
	One of phases	0.27	0.31	0.69	Stand by
IEC60950-1	Both phases	0.14	0.16	0.44	Operation
	One of phases	0.26	0.30	0.68	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.



Model		PJA150F-15	
Item		Line Regulation	
Object		+15V10A	

1.Graph

□

Load 50%

—

△

—

Load 100%

Output Voltage [V]

15.40

15.30

15.20

15.10

15.00

14.90

14.80

14.70

Input Voltage [V]

50

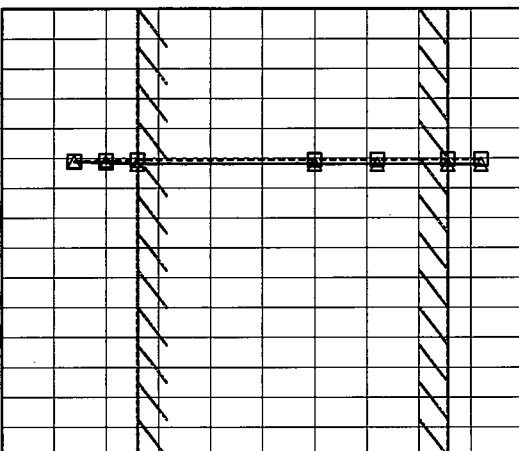
100

150

200

250

300



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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	15.195	15.194 ※1
100	15.196	15.193 ※2
115	15.197	15.191
200	15.197	15.191
230	15.198	15.190
264	15.198	15.190
280	15.198	15.190
--	-	-
--	-	-

※1:Load 80%

※2:Load 90%



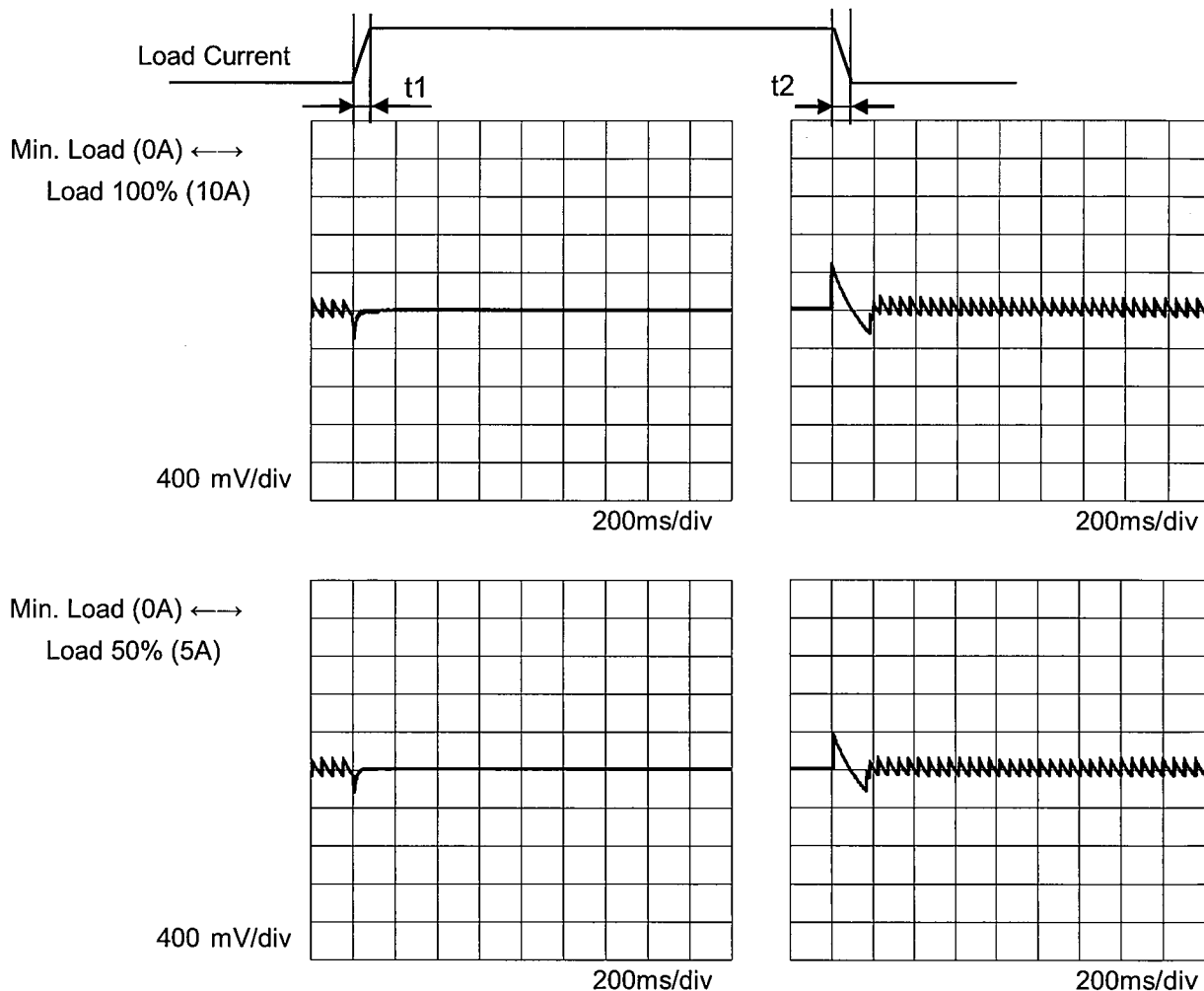
Model		PJA150F-15	Temperature25°C																																																				
Item		Load Regulation	Testing CircuitryFigure A																																																				
Object		+15V10A																																																					
1.Graph		2.Values																																																					
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Load Current [A]	Output Voltage [V]																																																						
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Model	PJA150F-15	Temperature	25° C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V10A		

Input Volt. 115 V
Cycle 1000 ms

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



Model		PJA150F-15	Temperature Testing Circuitry	25°C Figure C																																						
Item		Ripple Voltage (by Load Current)																																								
Object		+15V10A																																								
1.Graph			2.Values																																							
<div><div><div><div></div><div>—△—</div><div>Input Volt. 115V</div></div><div><div>---○---</div><div>Input Volt. 230V</div></div></div><div><p>Ripple Voltage [mV]</p><p>Load Current [A]</p></div></div>			<table><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><tr><td>0.0</td><td>200</td><td>200</td></tr><tr><td>1.5</td><td>20</td><td>20</td></tr><tr><td>3.0</td><td>20</td><td>20</td></tr><tr><td>4.5</td><td>15</td><td>15</td></tr><tr><td>6.0</td><td>15</td><td>15</td></tr><tr><td>7.5</td><td>20</td><td>20</td></tr><tr><td>9.0</td><td>20</td><td>25</td></tr><tr><td>10.0</td><td>25</td><td>25</td></tr><tr><td>11.0</td><td>25</td><td>25</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 115 [V]	Input Volt. 230 [V]	0.0	200	200	1.5	20	20	3.0	20	20	4.5	15	15	6.0	15	15	7.5	20	20	9.0	20	25	10.0	25	25	11.0	25	25	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																									
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<p>Measured by 20 MHz Oscilloscope.</p> <p>Ripple Voltage is shown as p-p in the figure below.</p> <p>Note: Slanted line shows the range of the rated load current.</p>																																										
<div><div><div><div></div><div>T1: Due to AC Input Line</div></div><div><div></div><div>T2: Due to Switching</div></div></div><div><p>Ripple [mVp-p]</p><p>T1</p><p>T2</p></div></div> <p>Fig. Complex Ripple Wave Form</p>																																										

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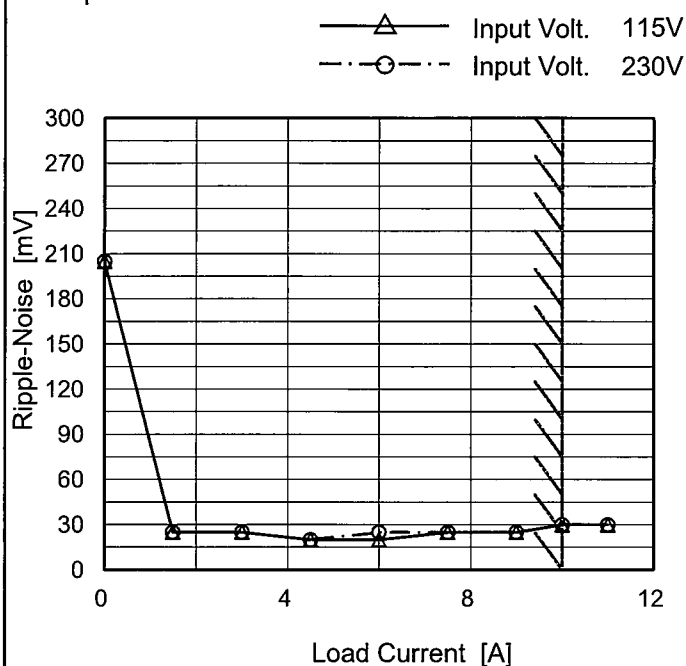
Model PJA150F-15

Item Ripple-Noise

Object +15V10A

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. 115 [V]	Input Volt. 230 [V]
0.0	205	205
1.5	25	25
3.0	25	25
4.5	20	20
6.0	20	25
7.5	25	25
9.0	25	25
10.0	30	30
11.0	30	30
--	-	-
--	-	-

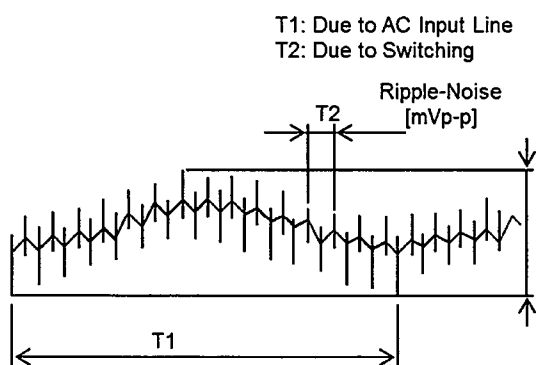


Fig. Complex Ripple Wave Form

Model		PJA150F-15	Testing Circuitry Figure C																																						
Item		Ripple Voltage (by Ambient Temp.)																																							
Object		+15V10A																																							
1.Graph			2.Values																																						
<div><div><div>---□---</div><div>Input Volt. 115V</div></div><div><div>—△—</div><div>Input Volt. 230V</div></div></div> <p>Measured by 20 MHz Oscilloscope. Note: Slanted line shows the range of the rated ambient temperature.</p>			<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 115 [V]</th><th>Input Volt. 230 [V]</th></tr><tr><td>-20</td><td>90</td><td>90</td></tr><tr><td>-10</td><td>70</td><td>70</td></tr><tr><td>0</td><td>60</td><td>60</td></tr><tr><td>25</td><td>30</td><td>30</td></tr><tr><td>40</td><td>25</td><td>25</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>	Ambient Temperature [°C]	Ripple Voltage [mV]		Input Volt. 115 [V]	Input Volt. 230 [V]	-20	90	90	-10	70	70	0	60	60	25	30	30	40	25	25	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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25	30	30																																							
40	25	25																																							
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Model		PJA150F-15	
Item		Ambient Temperature Drift	
Object		+15V10A	

1.Graph

—△—

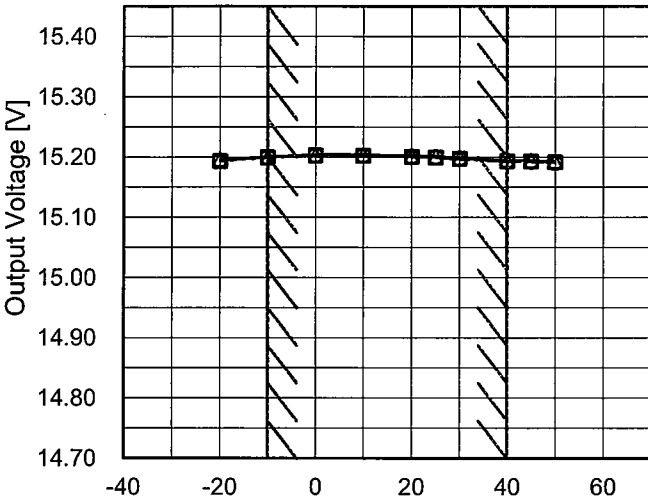
Input Volt. 100V

---□---

Input Volt. 115V

---○---

Input Volt. 230V



Ambient Temperature [°C]

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. 115[V]	Input Volt. 230[V]
-20	15.196	15.193	15.194
-10	15.200	15.200	15.200
0	15.204	15.203	15.203
10	15.204	15.202	15.202
20	15.202	15.201	15.200
25	15.201	15.200	15.199
30	15.199	15.197	15.197
40	15.195	15.193	15.193
45	15.195	15.193	15.192
50	15.193	15.191	15.191
--	-	-	-

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

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		Testing Circuitry Figure A
Model	PJA150F-15	
Item	Output Voltage Accuracy	
Object	+15V10A	

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 - 40°C

Input Voltage : 115 - 264V

Load Current : 3 - 10A

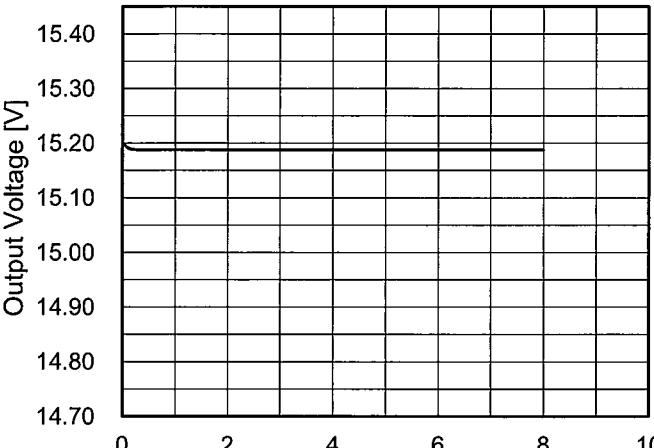
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	25	115	3	15.210	±9	±0.1
Minimum Voltage	40	230	10	15.193		

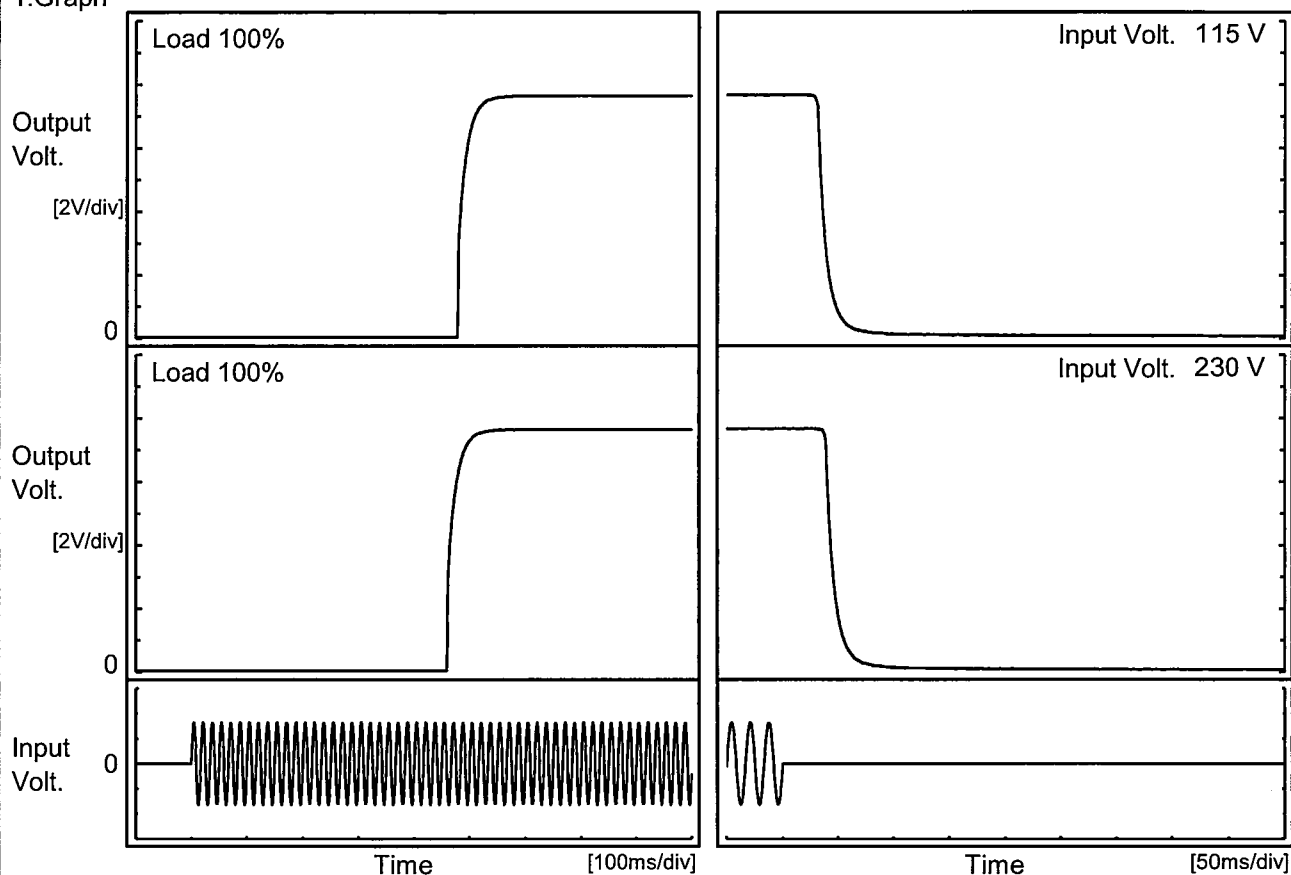
COSEL

Model	PJA150F-15																								
Item	Time Lapse Drift	Temperature	25°C																						
Object	+15V10A	Testing Circuitry	Figure A																						
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 230V</p><p>Load 100%</p></div>		<table><thead><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr></thead><tbody><tr><td>0.0</td><td>15.189</td></tr><tr><td>0.5</td><td>15.188</td></tr><tr><td>1.0</td><td>15.188</td></tr><tr><td>2.0</td><td>15.188</td></tr><tr><td>3.0</td><td>15.188</td></tr><tr><td>4.0</td><td>15.188</td></tr><tr><td>5.0</td><td>15.188</td></tr><tr><td>6.0</td><td>15.188</td></tr><tr><td>7.0</td><td>15.188</td></tr><tr><td>8.0</td><td>15.188</td></tr></tbody></table>		Time since start [H]	Output Voltage [V]	0.0	15.189	0.5	15.188	1.0	15.188	2.0	15.188	3.0	15.188	4.0	15.188	5.0	15.188	6.0	15.188	7.0	15.188	8.0	15.188
Time since start [H]	Output Voltage [V]																								
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5.0	15.188																								
6.0	15.188																								
7.0	15.188																								
8.0	15.188																								
* The characteristic of AC115V is equal.																									

COSEL

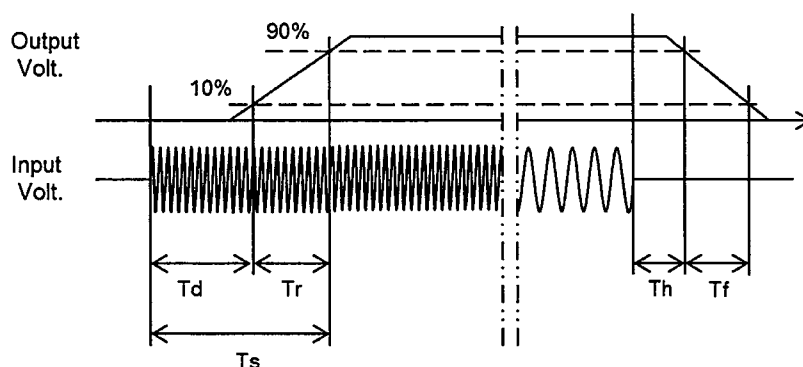
Model	PJA150F-15	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time	
Object	+15V10A	

1.Graph



2.Values

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
115 V	479.5	26.5	506.0	32.0	18.8
230 V	460.5	26.5	487.0	39.3	18.5

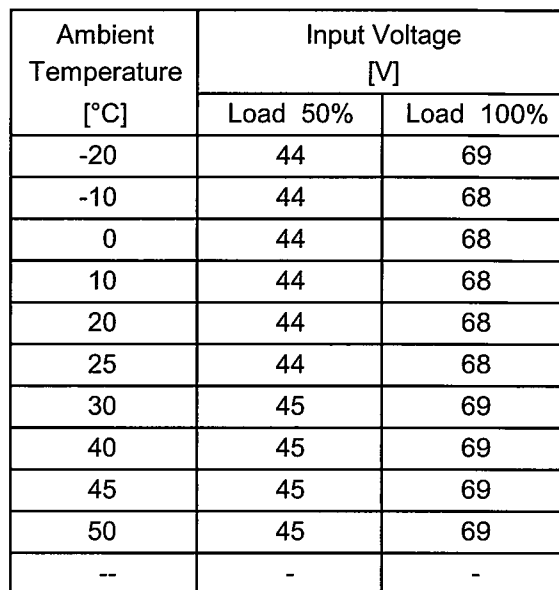


BC - 11137

Model		PJA150F-15		Temperature 25°C																																																				
Item		Instantaneous Interruption Compensation		Testing Circuitry Figure A																																																				
Object		+15V10A																																																						
1.Graph		<div><div>—△—</div>Input Volt. 100V</div> <div><div>---□---</div>Input Volt. 115V</div> <div><div>-○-</div>Input Volt. 230V</div>		2.Values																																																				
<div>Instantaneous Compensation Time [ms]</div> <div>Load Current [A]</div>		<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. 115[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr><tr><td>1.5</td><td>76</td><td>76</td><td>123</td></tr><tr><td>3.0</td><td>71</td><td>71</td><td>87</td></tr><tr><td>4.5</td><td>71</td><td>71</td><td>87</td></tr><tr><td>6.0</td><td>53</td><td>53</td><td>65</td></tr><tr><td>7.5</td><td>40</td><td>40</td><td>52</td></tr><tr><td>9.0</td><td>35</td><td>35</td><td>43</td></tr><tr><td>10.0</td><td>29</td><td>29</td><td>36</td></tr><tr><td>11.0</td><td>-</td><td>22</td><td>30</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. 115[V]	Input Volt. 230[V]	0.0	-	-	-	1.5	76	76	123	3.0	71	71	87	4.5	71	71	87	6.0	53	53	65	7.5	40	40	52	9.0	35	35	43	10.0	29	29	36	11.0	-	22	30	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																							
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]																																																					
0.0	-	-	-																																																					
1.5	76	76	123																																																					
3.0	71	71	87																																																					
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6.0	53	53	65																																																					
7.5	40	40	52																																																					
9.0	35	35	43																																																					
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11.0	-	22	30																																																					
--	-	-	-																																																					
--	-	-	-																																																					
Note: Slanted line shows the range of the rated load current.																																																								

Testing Circuitry Figure A

2.Values



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

Model		PJA150F-15		Temperature 25°C Testing Circuitry Figure A																																									
Item		Overcurrent Protection																																											
Object		+15V10A																																											
1.Graph																																													
<div><div><div></div><div>Input Volt. 115V</div></div><div><div></div><div>Input Volt. 230V</div></div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is from 7.2V to 0V.</p>																																													
2.Values																																													
<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="2">Load Current [A]</th></tr><tr><th>Input Volt. 115[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>14.25</td><td>12.24</td><td>12.52</td></tr><tr><td>13.50</td><td>12.39</td><td>12.68</td></tr><tr><td>12.00</td><td>12.78</td><td>13.07</td></tr><tr><td>10.50</td><td>13.41</td><td>13.70</td></tr><tr><td>9.00</td><td>13.84</td><td>14.13</td></tr><tr><td>7.50</td><td>14.23</td><td>14.49</td></tr><tr><td>6.00</td><td>14.35</td><td>14.60</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>					Output Voltage [V]	Load Current [A]		Input Volt. 115[V]	Input Volt. 230[V]	14.25	12.24	12.52	13.50	12.39	12.68	12.00	12.78	13.07	10.50	13.41	13.70	9.00	13.84	14.13	7.50	14.23	14.49	6.00	14.35	14.60	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																												
	Input Volt. 115[V]	Input Volt. 230[V]																																											
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Model		PJA150F-15
Item		Overvoltage Protection
Object		+15V10A

1.Graph

—△—

Input Volt. 115V

---□---

Input Volt. 230V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

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

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 115[V]	Input Volt. 230[V]
-20	19.84	19.84
-10	19.84	19.84
0	19.84	19.84
10	19.84	19.84
20	19.83	19.83
25	19.80	19.80
30	19.80	19.80
40	19.80	19.80
45	19.80	19.80
50	19.80	19.80
--	-	-

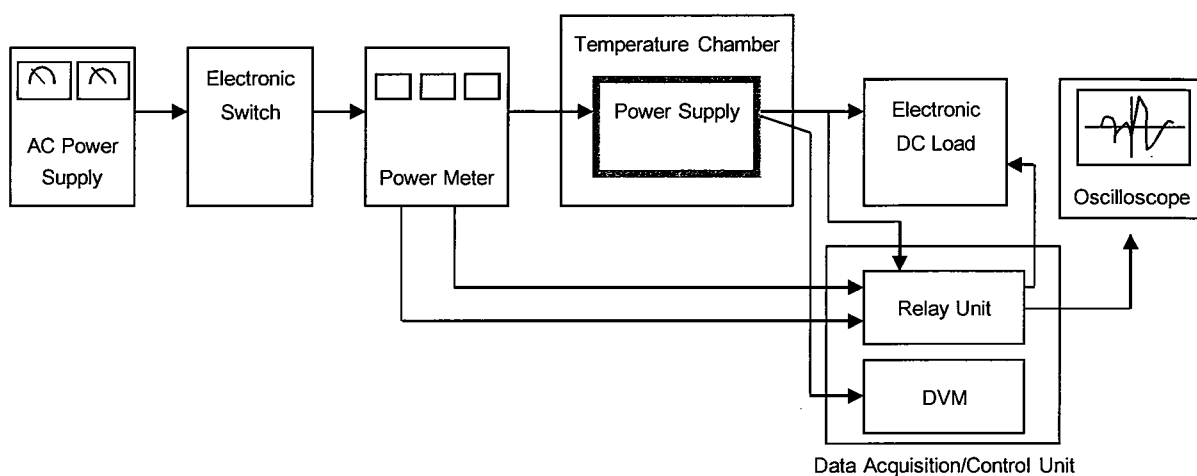


Figure A

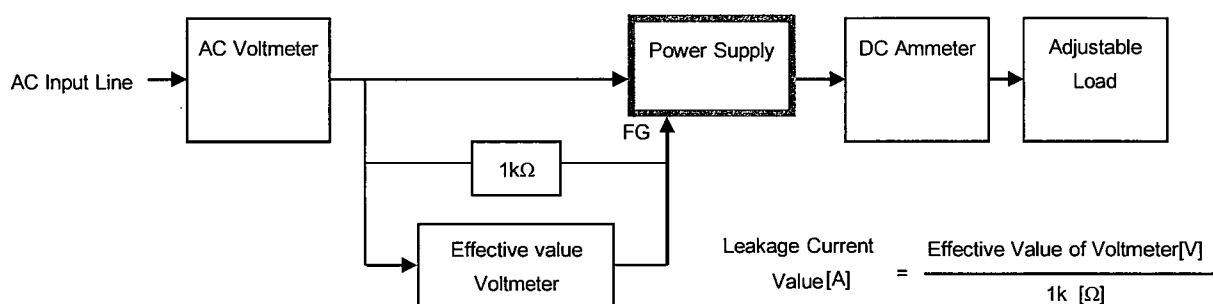


Figure B (DEN-AN)

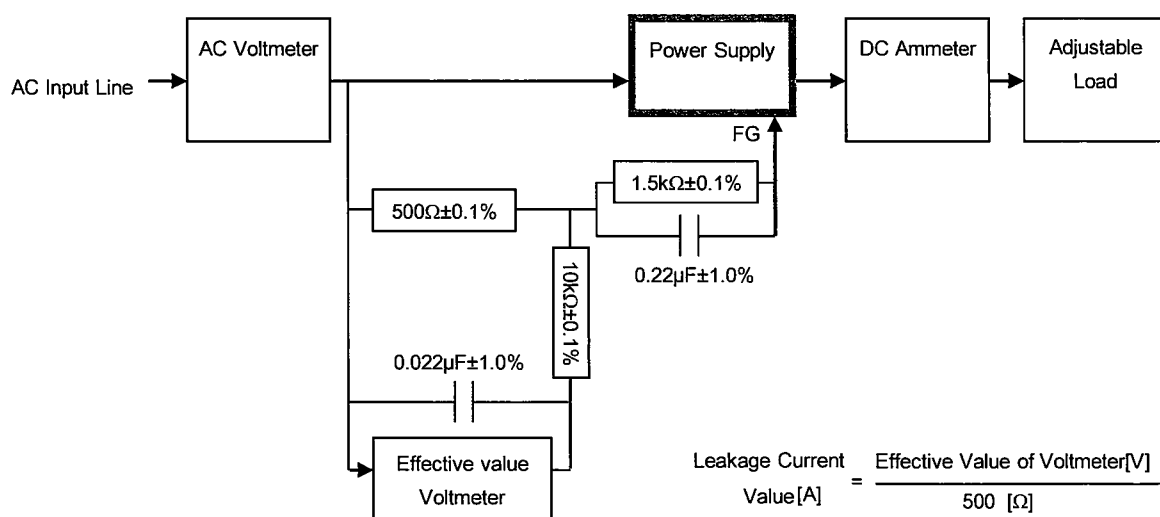


Figure B (IEC60950-1)

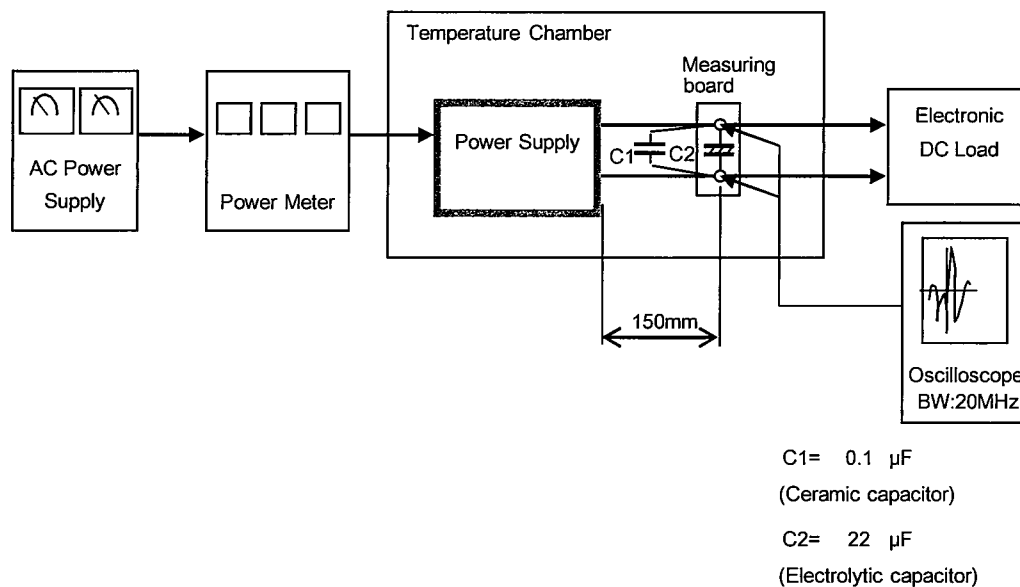


Figure C