

TEST DATA OF PMA15F-15

Regulated DC Power Supply
June 4, 2010

Approved by : Katsumi Ishikawa
Katsumi Ishikawa Design Manager

Prepared by : Tsutomu Okano
Tsutomu Okano Design Engineer

COSEL CO.,LTD.

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(Final Page 24)

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Model		PMA15F-15		Temperature 25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph				2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <p>Input Current [A]</p> <p>Load Current [A]</p>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>0.023</td><td>0.019</td><td>0.018</td></tr><tr><td>0.2</td><td>0.085</td><td>0.056</td><td>0.052</td></tr><tr><td>0.4</td><td>0.140</td><td>0.089</td><td>0.082</td></tr><tr><td>0.6</td><td>0.195</td><td>0.121</td><td>0.110</td></tr><tr><td>0.8</td><td>0.251</td><td>0.150</td><td>0.136</td></tr><tr><td>1.0</td><td>0.305</td><td>0.180</td><td>0.164</td></tr><tr><td>1.1</td><td>0.333</td><td>0.194</td><td>0.176</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.023	0.019	0.018	0.2	0.085	0.056	0.052	0.4	0.140	0.089	0.082	0.6	0.195	0.121	0.110	0.8	0.251	0.150	0.136	1.0	0.305	0.180	0.164	1.1	0.333	0.194	0.176	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model		PMA15F-15	
Item		Efficiency (by Input Voltage)	
Object			
1.Graph		2.Values	

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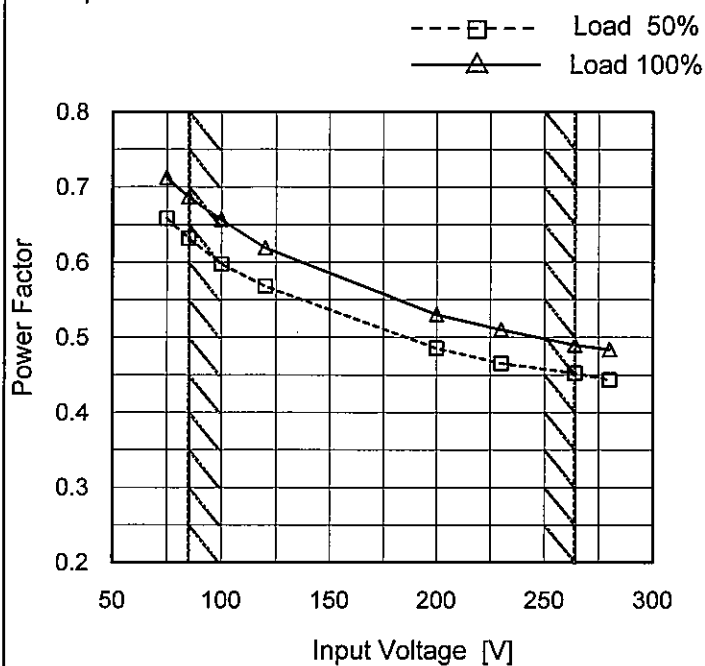
Model PMA15F-15

Item Power Factor (by Input Voltage)

Object

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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

2. Values

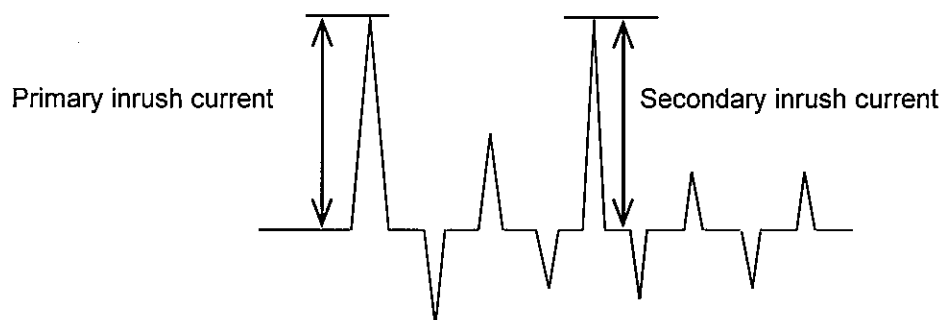
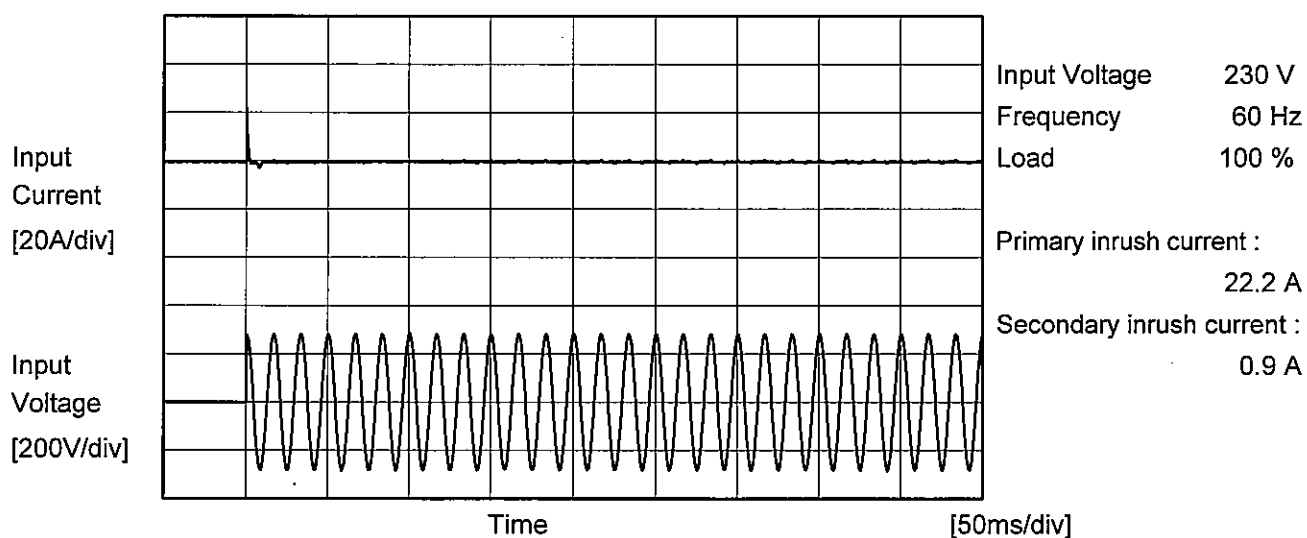
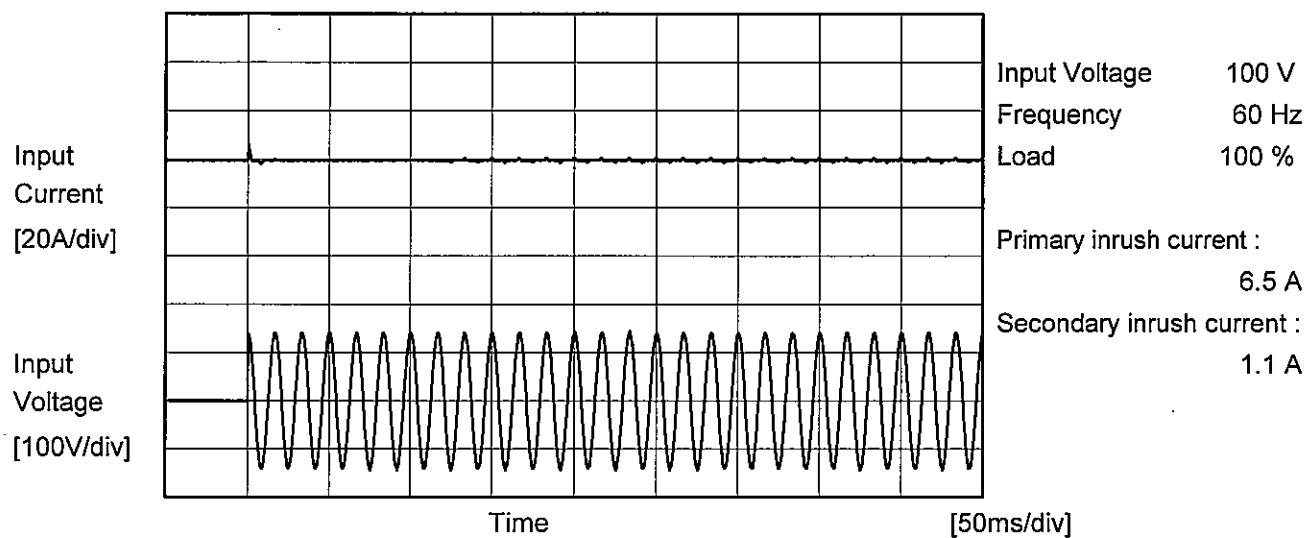
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.658	0.712
85	0.632	0.687
100	0.598	0.657
120	0.568	0.619
200	0.486	0.530
230	0.466	0.511
264	0.453	0.490
280	0.444	0.484
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Model		PMA15F-15		Temperature 25°C																																																				
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<div><div><div>Power Factor</div><div>0.8</div><div>0.7</div><div>0.6</div><div>0.5</div><div>0.4</div><div>0.3</div><div>0.2</div></div><div><div>0.0</div><div>0.4</div><div>0.8</div><div>1.2</div></div><div><div>Load Current [A]</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. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>0.435</td><td>0.395</td><td>0.286</td></tr><tr><td>0.2</td><td>0.541</td><td>0.429</td><td>0.425</td></tr><tr><td>0.4</td><td>0.589</td><td>0.472</td><td>0.455</td></tr><tr><td>0.6</td><td>0.621</td><td>0.500</td><td>0.482</td></tr><tr><td>0.8</td><td>0.637</td><td>0.520</td><td>0.497</td></tr><tr><td>1.0</td><td>0.657</td><td>0.536</td><td>0.513</td></tr><tr><td>1.1</td><td>0.662</td><td>0.540</td><td>0.520</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Power Factor			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.435	0.395	0.286	0.2	0.541	0.429	0.425	0.4	0.589	0.472	0.455	0.6	0.621	0.500	0.482	0.8	0.637	0.520	0.497	1.0	0.657	0.536	0.513	1.1	0.662	0.540	0.520	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-		
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Model	PMA15F-15	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		



		Temperature 25°C Testing Circuitry Figure B
Model	PMA15F-15	
Item	Leakage Current	
Object		

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
IEC60601	Both phases	0.02	0.04	0.05	Operation
	One of phases	0.03	0.07	0.08	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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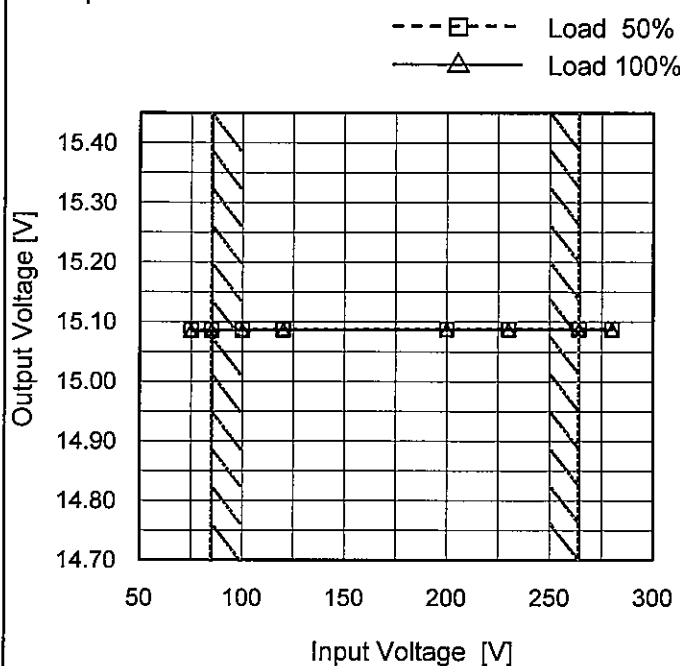
Model PMA15F-15

Item Line Regulation

Object +15V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	15.087	15.085
85	15.087	15.086
100	15.087	15.086
120	15.088	15.086
200	15.088	15.087
230	15.088	15.087
264	15.088	15.087
280	15.088	15.087
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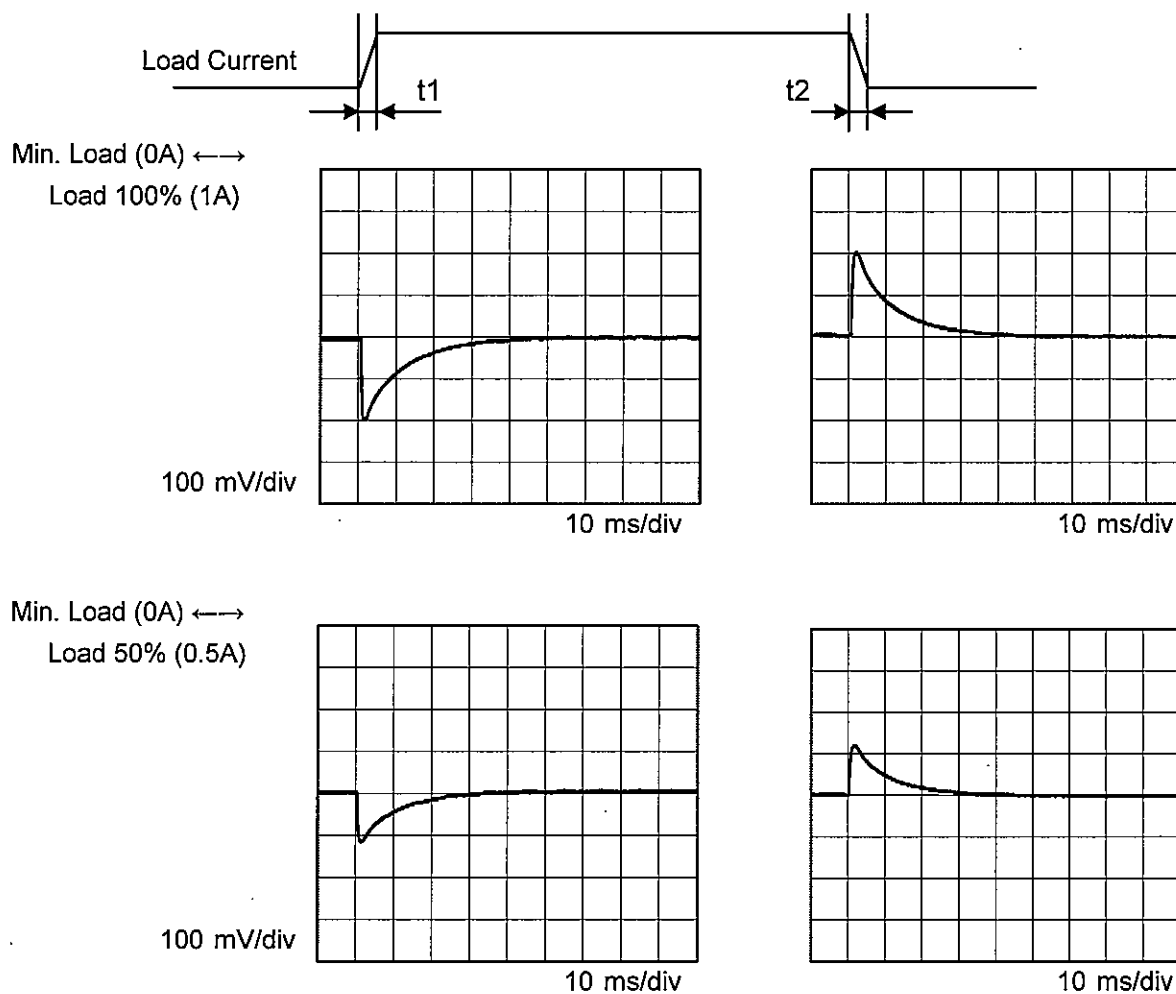
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Object	+15V1A	Testing Circuitry	Figure A																																																			
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Model	PMA15F-15	Temperature Testing Circuitry	25° C Figure A
Item	Dynamic Load Response		
Object	+15V1A		

Input Volt. 100 V
Cycle 1000 ms

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



Model	PMA15F-15																																								
Item	Ripple Voltage (by Load Current)	Temperature	25°C																																						
		Testing Circuitry	Figure A																																						
Object	+15V1A																																								
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<div>Measured by 20 MHz Oscilloscope.</div> <div>Ripple Voltage is shown as p-p in the figure below.</div> <div>Note: Slanted line shows the range of the rated load current.</div>																																									
<div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div><div>Ripple [mVp-p]</div><div>T1</div><div>T2</div></div>																																									
Fig. Complex Ripple Wave Form																																									

Model	PMA15F-15		
Item	Ripple-Noise	Temperature	25°C
Object	+15V1A	Testing Circuitry	Figure A
1.Graph		2.Values	
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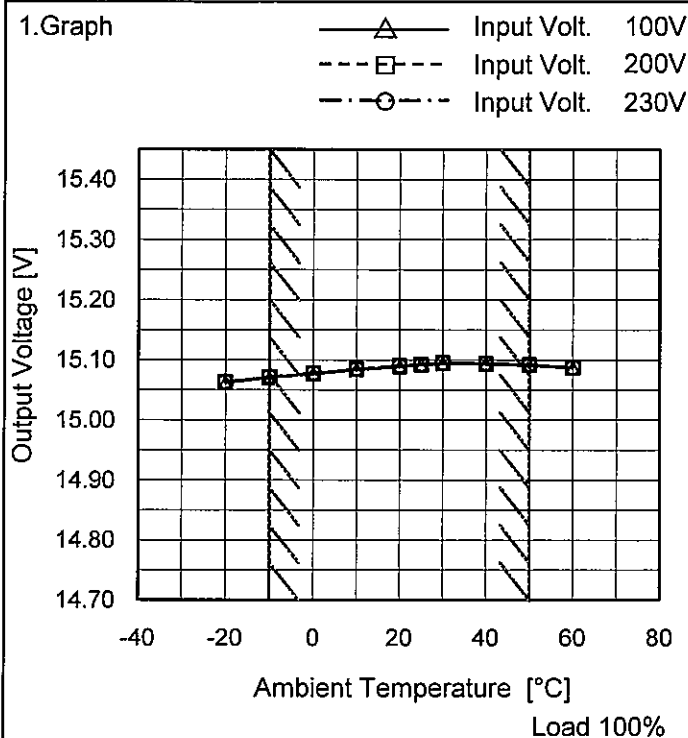
Model PMA15F-15

Item Ambient Temperature Drift

Object +15V1A

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	15.062	15.064	15.064
-10	15.070	15.072	15.072
0	15.077	15.078	15.078
10	15.084	15.085	15.086
20	15.089	15.091	15.091
25	15.092	15.093	15.093
30	15.094	15.096	15.096
40	15.094	15.095	15.095
50	15.092	15.093	15.093
60	15.087	15.088	15.088
--	-	-	-

		Testing Circuitry Figure A
Model	PMA15F-15	
Item	Output Voltage Accuracy	
Object	+15V1A	

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 - 1A

* 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	15.098	±14	±0.1
Minimum Voltage	-10	85	1	15.070		

COSEL

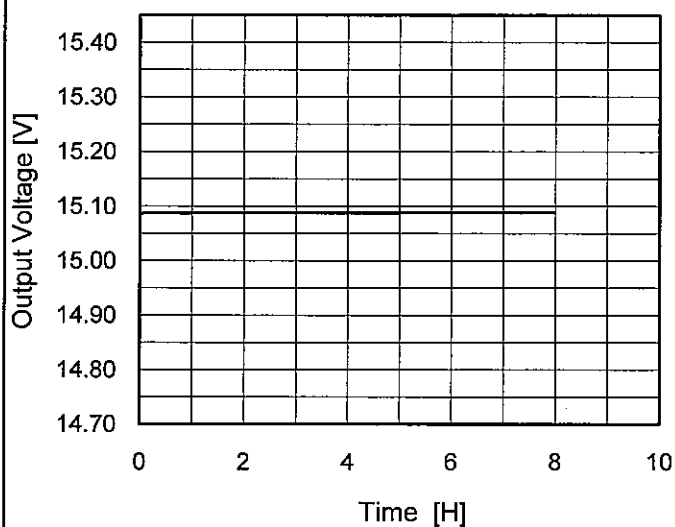
Model PMA15F-15

Item Time Lapse Drift

Object +15V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



Input Volt. 230V

Load 100%

* The characteristic of AC100V is equal.

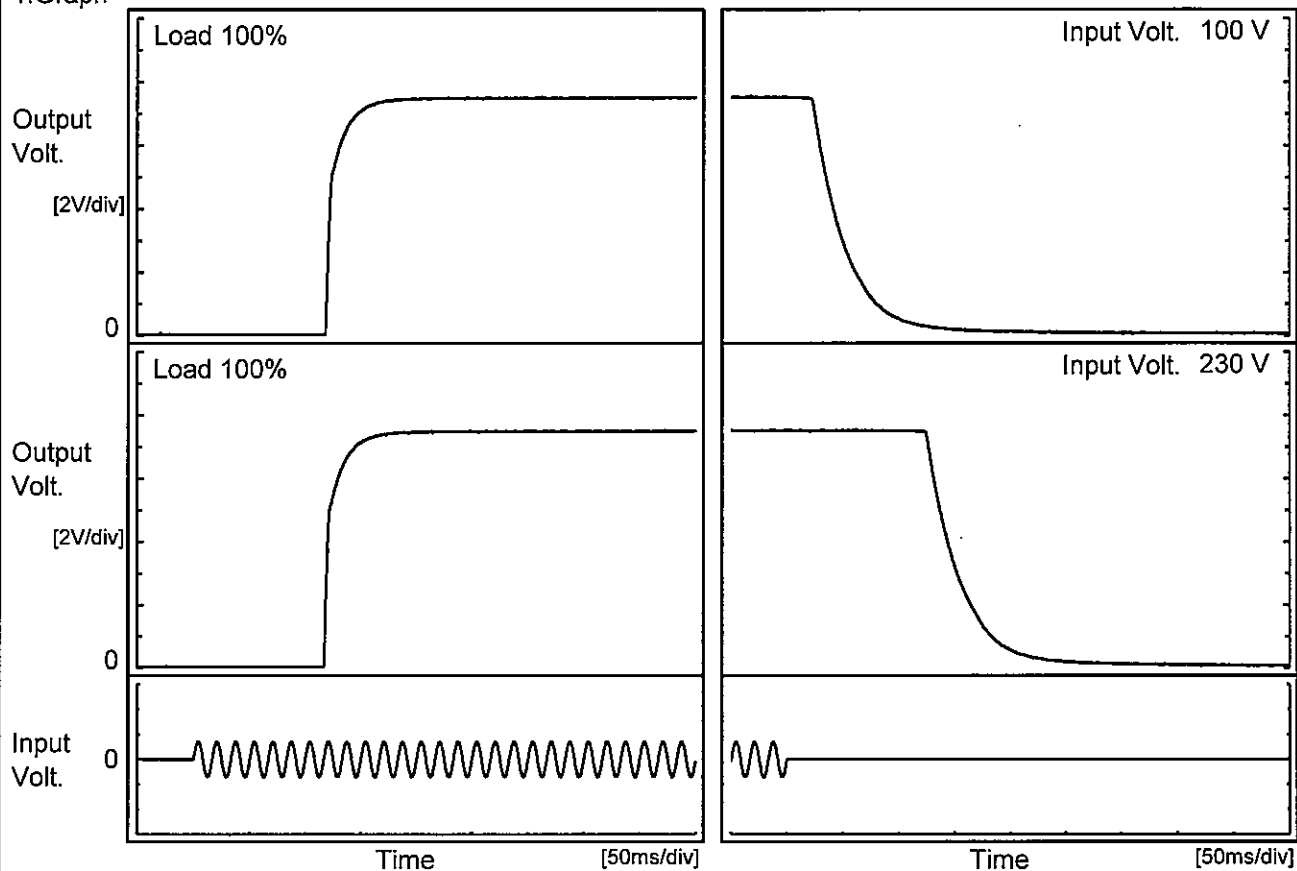
2. Values

Time since start [H]	Output Voltage [V]
0.0	15.087
0.5	15.087
1.0	15.087
2.0	15.088
3.0	15.088
4.0	15.088
5.0	15.088
6.0	15.088
7.0	15.088
8.0	15.088

COSEL

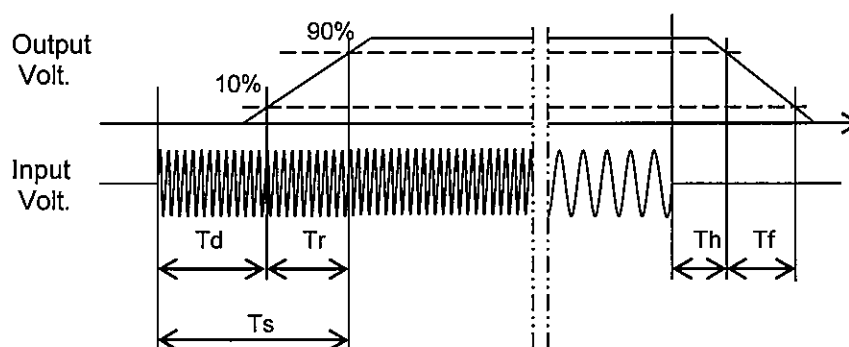
Model	PMA15F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V1A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		119.0	22.8	141.8	26.0	61.8
230 V		117.8	22.0	139.8	127.5	62.8



Model		PMA15F-15	
Item		Hold-Up Time	
Object		+15V1A	

1.Graph

COSEL

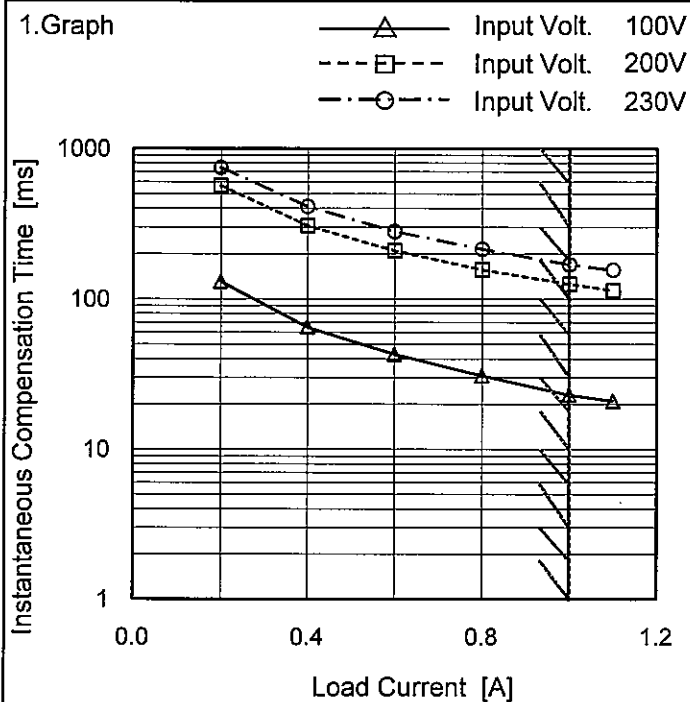
Model PMA15F-15

Item Instantaneous Interruption Compensation

Object +15V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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

2. Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.2	131	568	748
0.4	65	308	413
0.6	43	210	282
0.8	31	157	215
1.0	23	126	170
1.1	21	114	156
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--	-	-	-
--	-	-	-
--	-	-	-

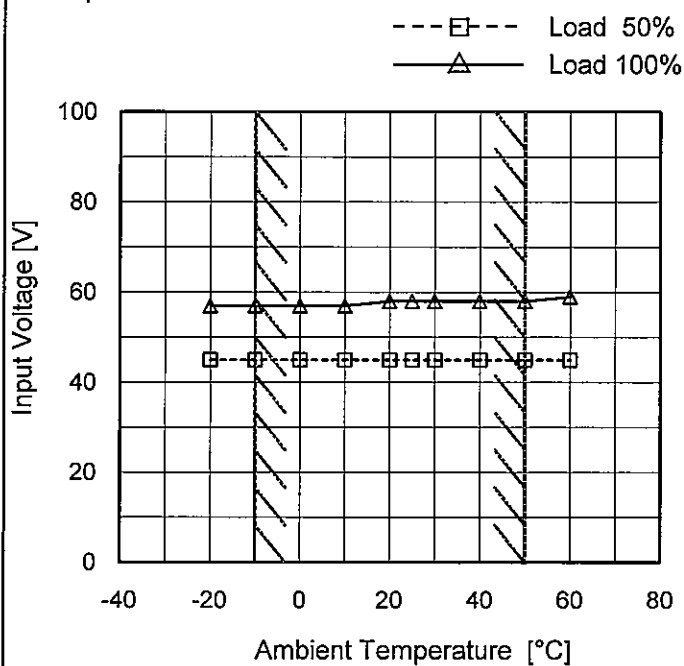
Model PMA15F-15

Item Minimum Input Voltage
for Regulated Output Voltage

Object +15V1A

Testing Circuitry Figure A

1. Graph



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

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	45	57
-10	45	57
0	45	57
10	45	57
20	45	58
25	45	58
30	45	58
40	45	58
50	45	58
60	45	59
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COSEL

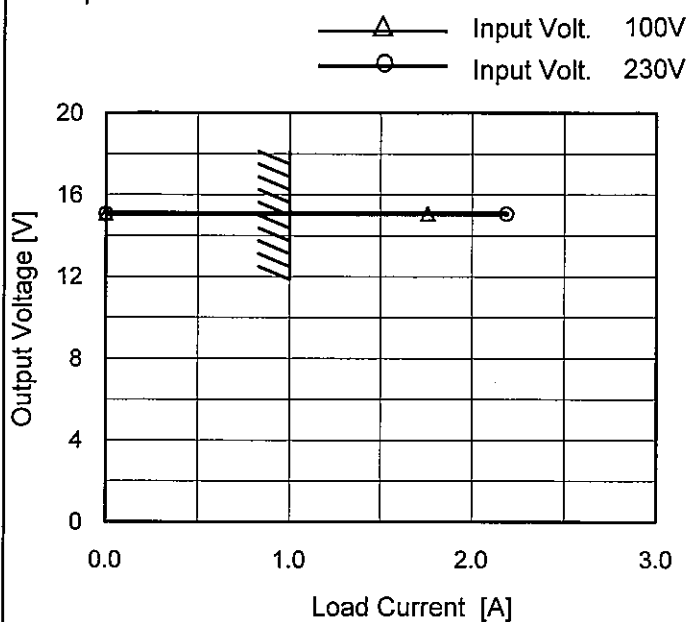
Model PMA15F-15

Item Overcurrent Protection

Object +15V1A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
15.00	1.76	2.19
14.25	-	-
13.50	-	-
12.00	-	-
10.50	-	-
9.00	-	-
7.50	-	-
6.00	-	-
4.50	-	-
3.00	-	-
1.50	-	-
0.00	-	-

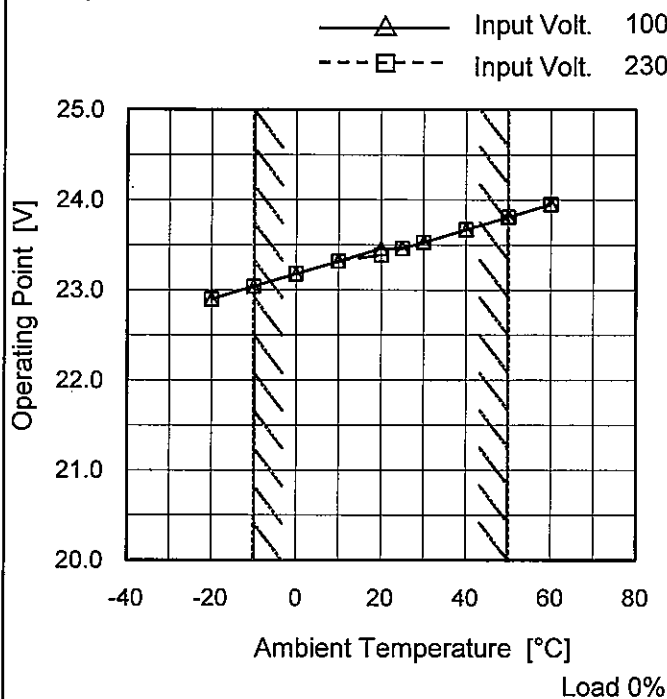
Model PMA15F-15

Item Overvoltage Protection

Object +15V1A

Testing Circuitry Figure A

1. Graph



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

2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-20	22.90	22.90
-10	23.04	23.04
0	23.18	23.18
10	23.32	23.32
20	23.46	23.39
25	23.46	23.46
30	23.53	23.53
40	23.67	23.67
50	23.81	23.81
60	23.95	23.95
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COSEL

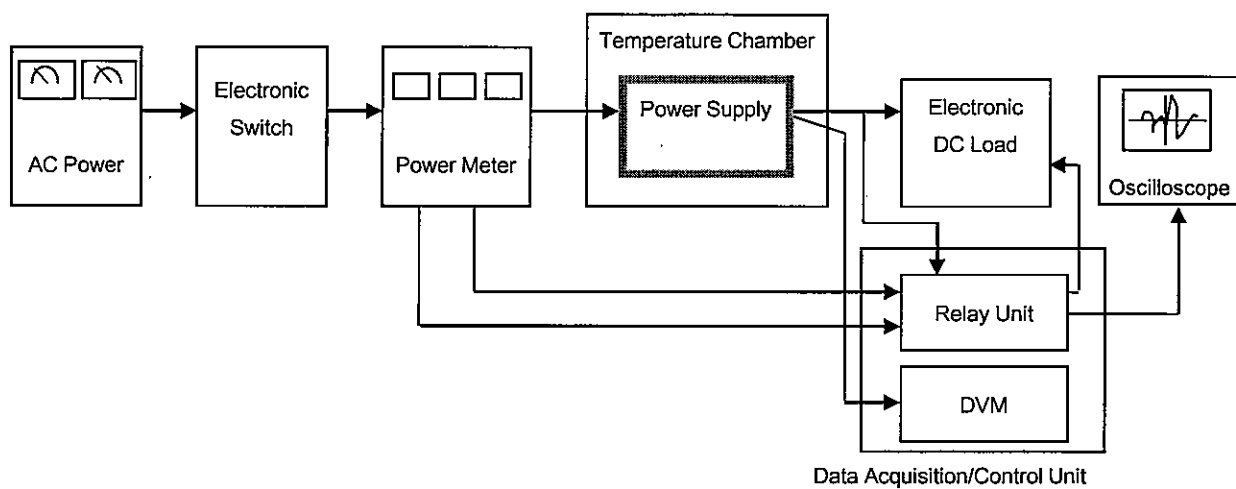


Figure A

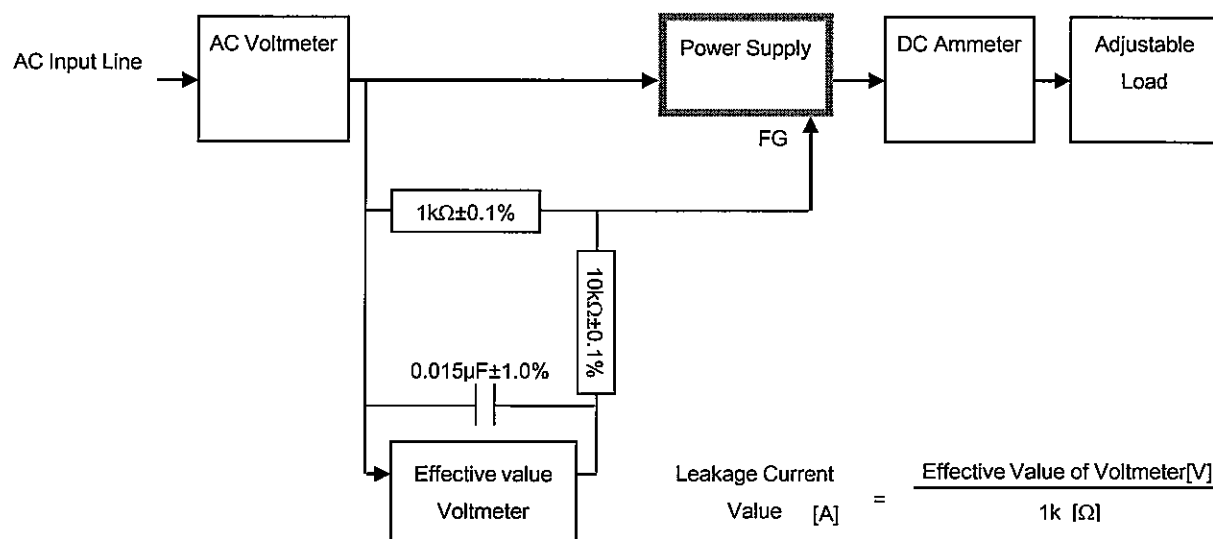


Figure B (IEC60601-1)