

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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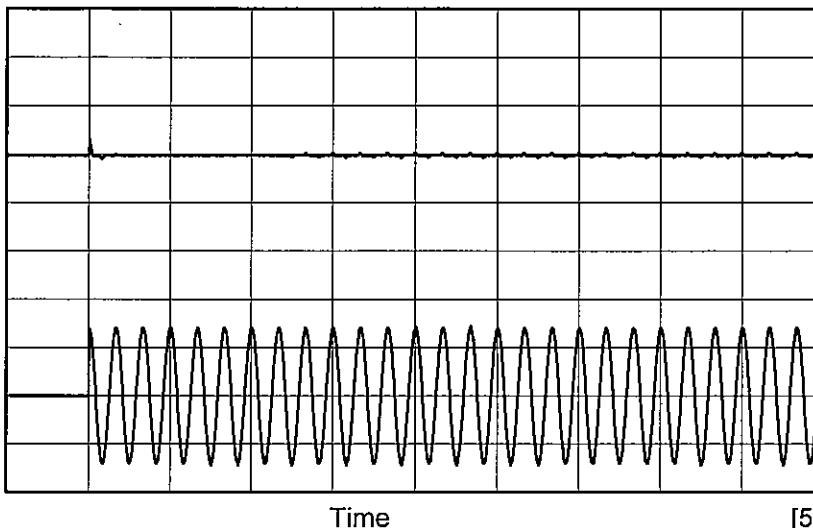
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2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Power Factor</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><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> </tbody> </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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COSEL

Model PMA15F-15

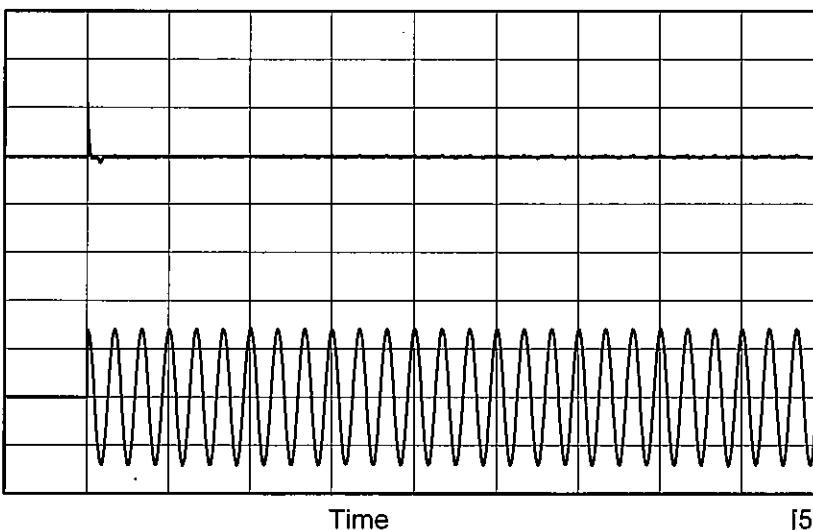
Item Inrush Current

Object

Temperature 25°C
Testing Circuitry Figure AInput
Current
[20A/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 6.5 A
Secondary inrush current : 1.1 A

Input
Current
[20A/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 22.2 A
Secondary inrush current : 0.9 A

Primary inrush current

Secondary inrush current



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

1. Results

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.

COSEL

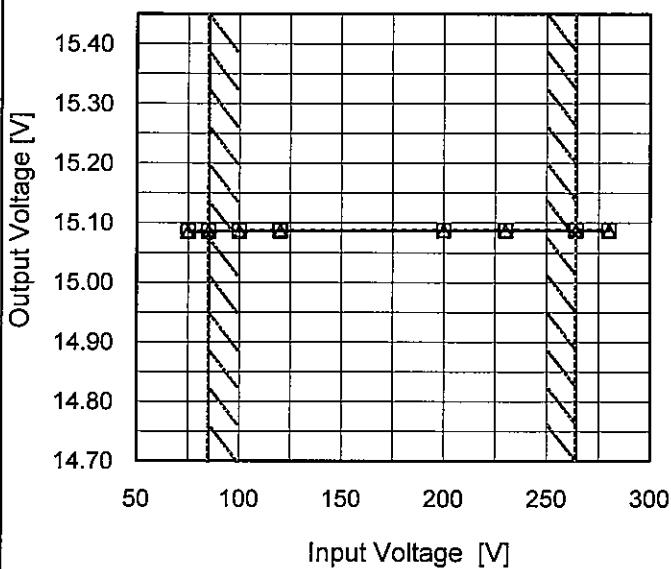
Model PMA15F-15

Item Line Regulation

Object +15V1A

1. Graph

--- □ --- Load 50%
 —△— Load 100%



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

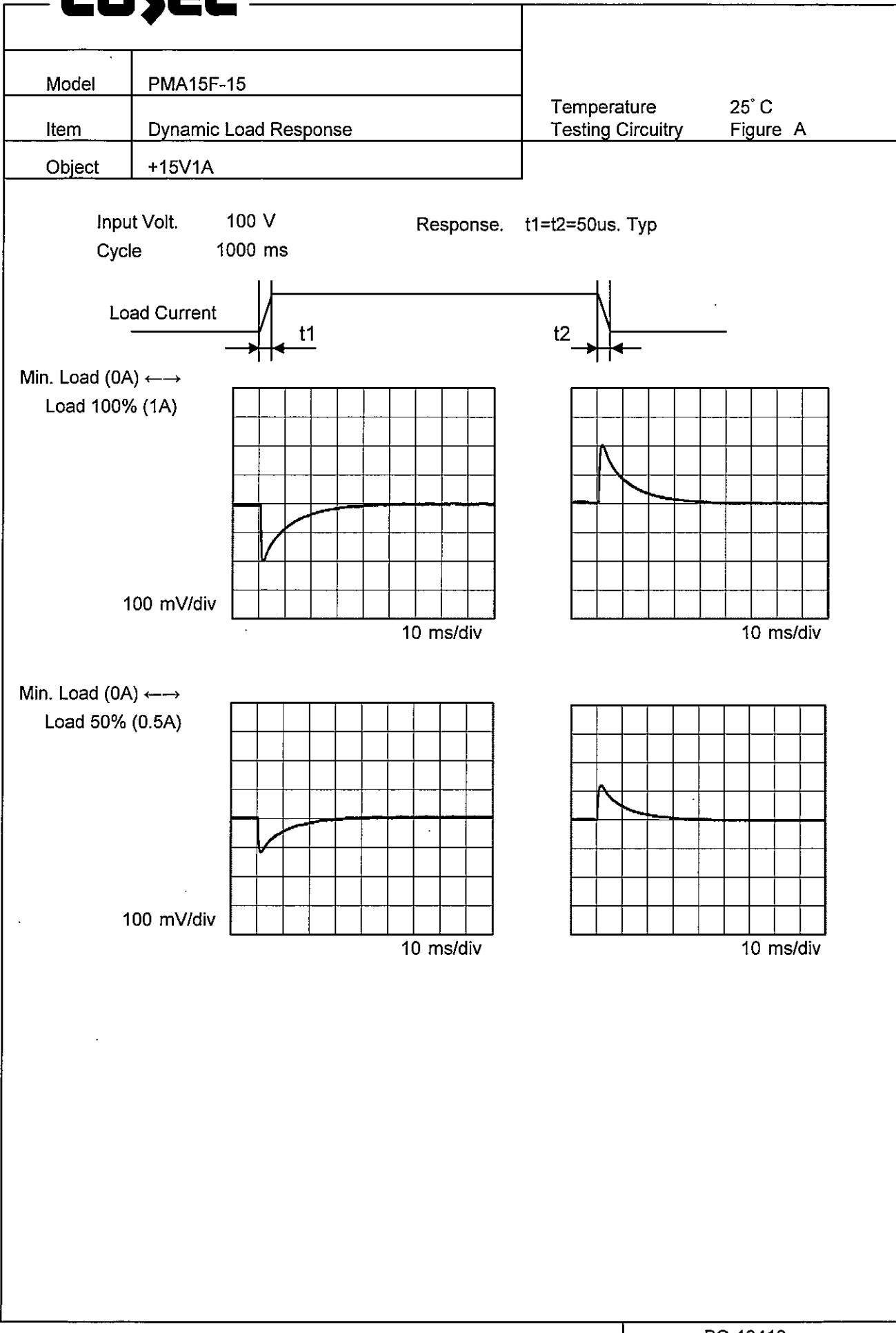
Temperature 25°C
 Testing Circuitry Figure A

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	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
--	-	-



Model	PMA15F-15																																																					
Item	Load Regulation																																																					
Object	+15V1A																																																					
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<p style="text-align: center;"> —△— Input Volt. 100V ---□--- Input Volt. 200V ---○--- Input Volt. 230V </p> <p>Output Voltage [V]</p> <p>Load Current [A]</p>																																																						
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COSEL

COSEL

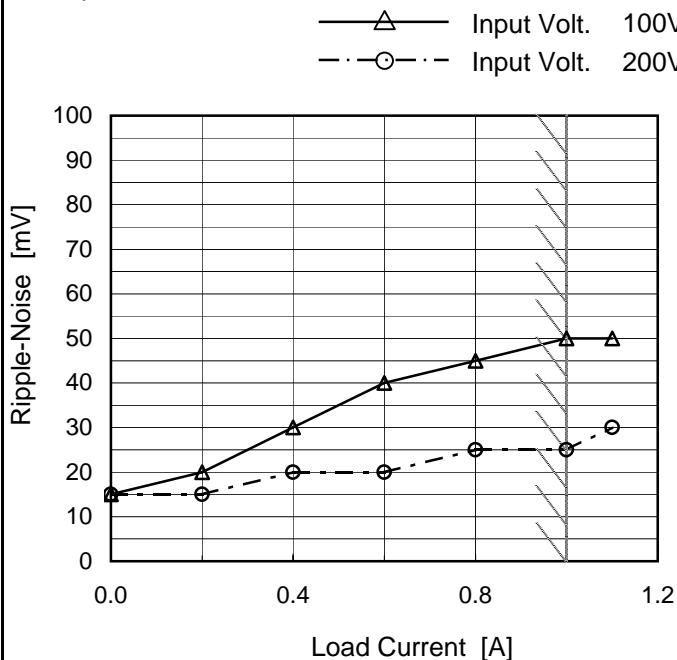
Model	PMA15F-15																																						
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure A																																					
Object	+15V1A																																						
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<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 100 mV, and the X-axis ranges from 0.0 to 1.2 A. Two sets of data points are plotted: Input Volt. 100V (solid triangles) and Input Volt. 200V (open circles). 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>0.0</td><td>10</td><td>10</td></tr> <tr><td>0.2</td><td>15</td><td>15</td></tr> <tr><td>0.4</td><td>20</td><td>15</td></tr> <tr><td>0.6</td><td>25</td><td>15</td></tr> <tr><td>0.8</td><td>30</td><td>15</td></tr> <tr><td>1.0</td><td>35</td><td>15</td></tr> <tr><td>1.1</td><td>35</td><td>15</td></tr> </tbody> </table>		Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	0.0	10	10	0.2	15	15	0.4	20	15	0.6	25	15	0.8	30	15	1.0	35	15	1.1	35	15														
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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	PMA15F-15
Item	Ripple-Noise
Object	+15V1A

 Temperature 25°C
 Testing Circuitry Figure A

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. 100 [V]	Input Volt. 200 [V]
0.0	15	15
0.2	20	15
0.4	30	20
0.6	40	20
0.8	45	25
1.0	50	25
1.1	50	30
--	-	-
--	-	-
--	-	-
--	-	-

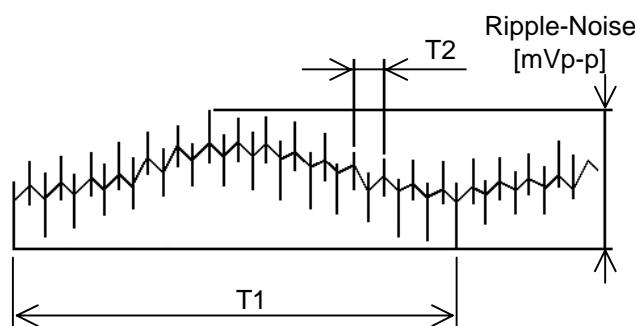
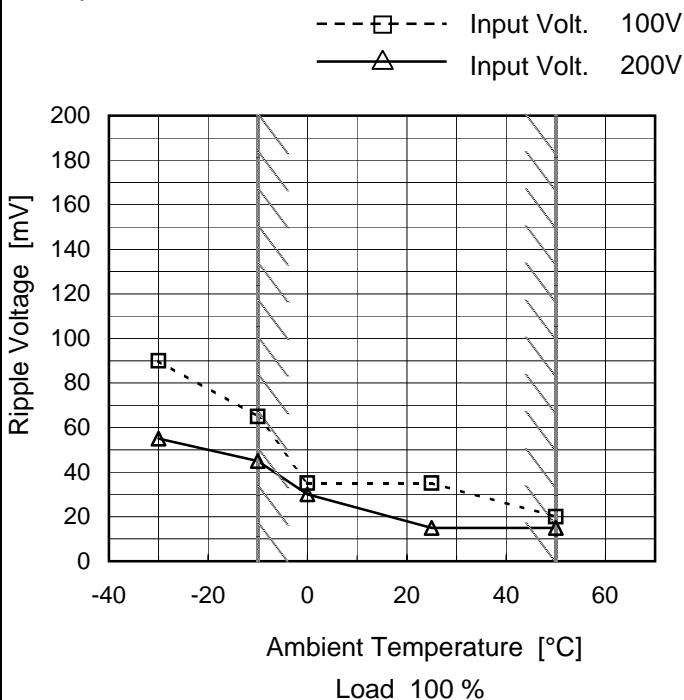
 T1: Due to AC Input Line
 T2: Due to Switching


Fig. Complex Ripple Wave Form

COSEL

Model	PMA15F-15
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V1A

1. Graph



Measured by 20 MHz Oscilloscope.

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

Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	90	55
-10	65	45
0	35	30
25	35	15
50	20	15
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

<p>Model PMA15F-15</p> <p>Item Ambient Temperature Drift</p> <p>Object +15V1A</p>	Testing Circuitry Figure A																																																				
	1. Graph	—△— Input Volt. 100V	—□— Input Volt. 200V																																																		
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<p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>																																																					
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--	-	-	-																																																		



Model	PMA15F-15	Testing Circuitry Figure A
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 = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

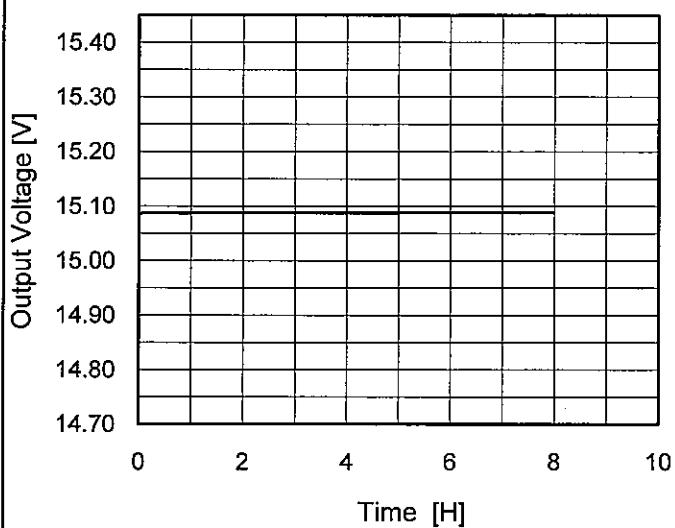
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	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

1.Graph



* The characteristic of AC100V is equal.

Temperature 25°C
Testing Circuitry Figure A

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

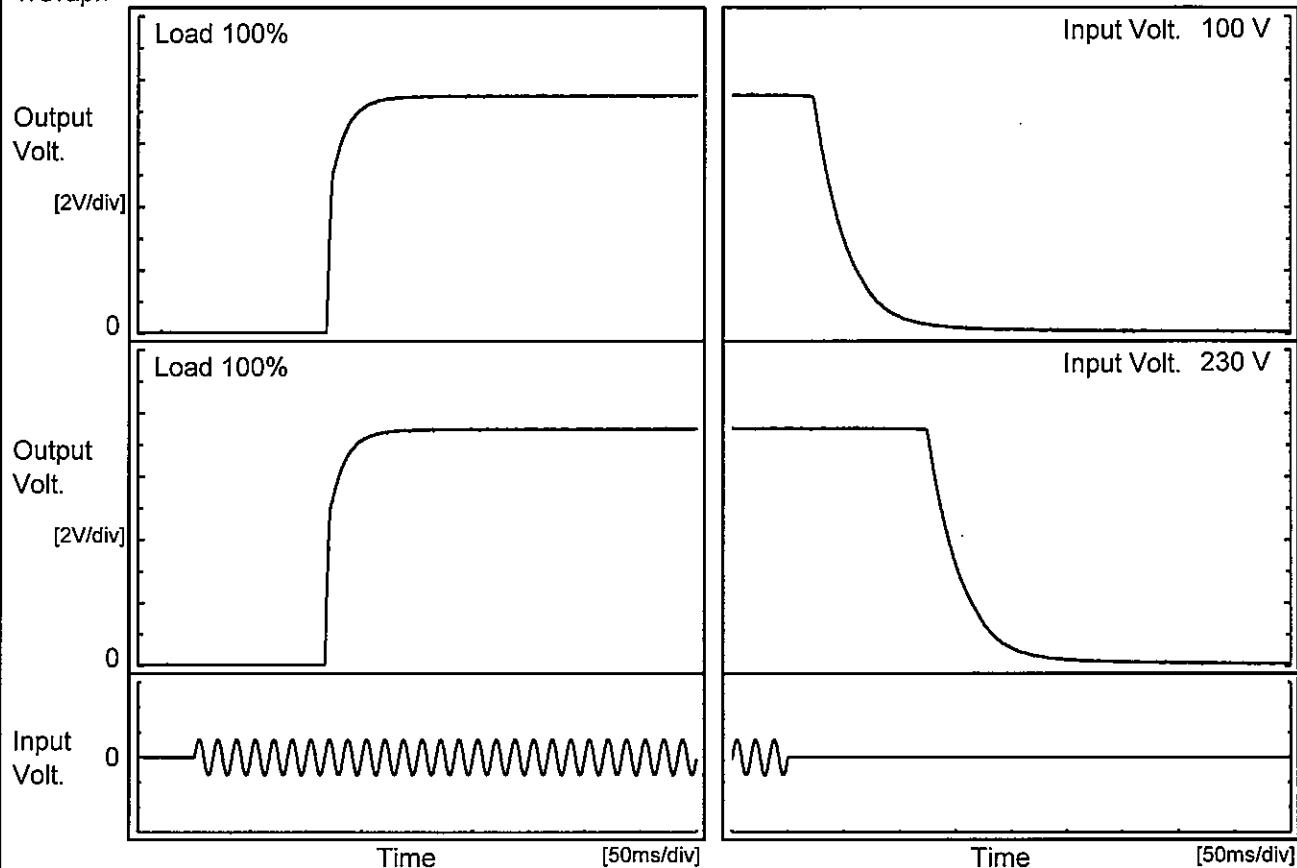
Model PMA15F-15

Item Rise and Fall Time

Object +15V1A

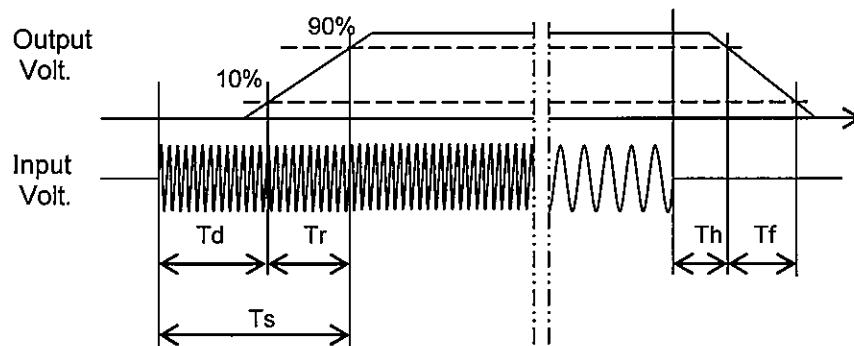
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

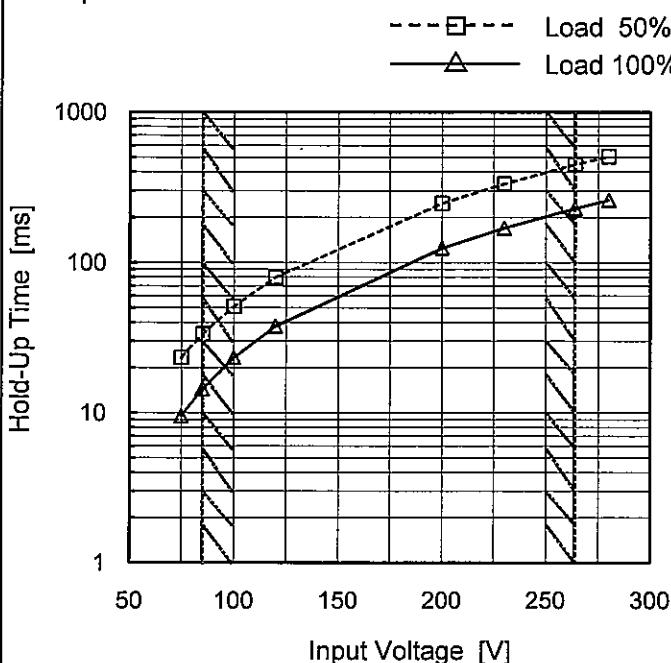
Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
100 V		119.0	22.8	141.8	26.0	61.8	
230 V		117.8	22.0	139.8	127.5	62.8	



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

Temperature 25°C
Testing Circuitry Figure A

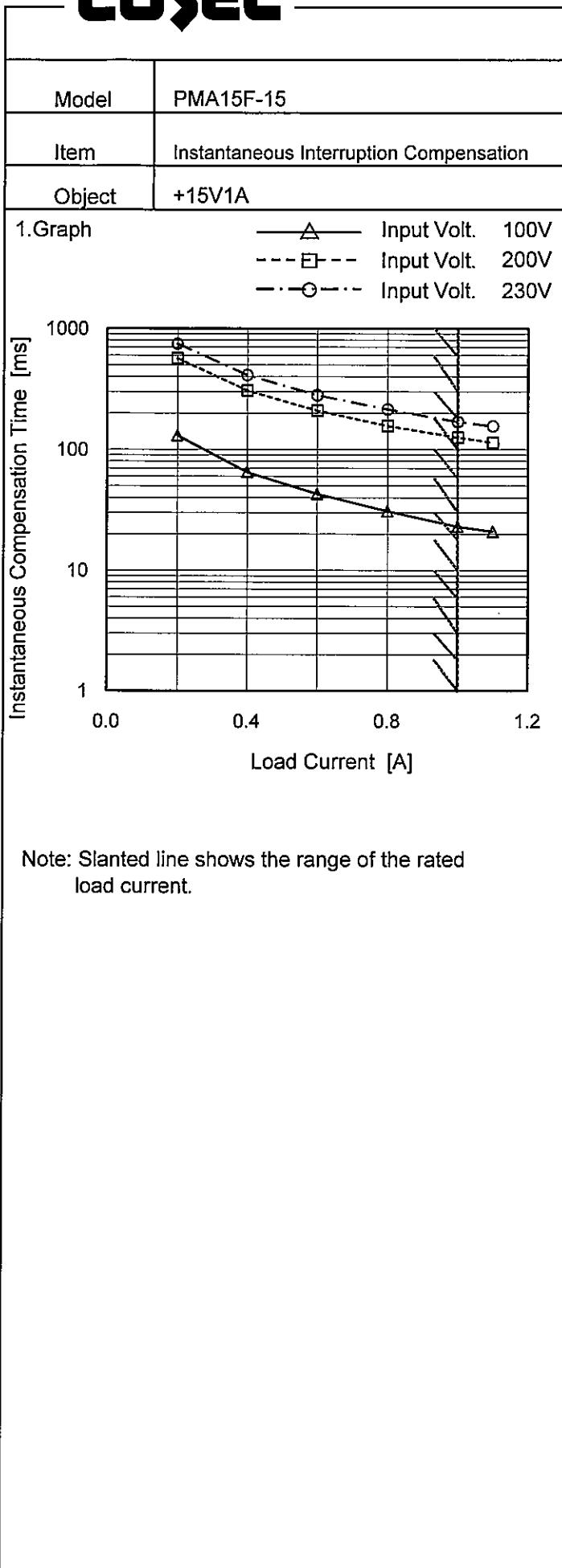
1. Graph



2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	23	10
85	33	14
100	51	23
120	80	38
200	248	125
230	335	170
264	448	229
280	508	261
--	-	-

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.



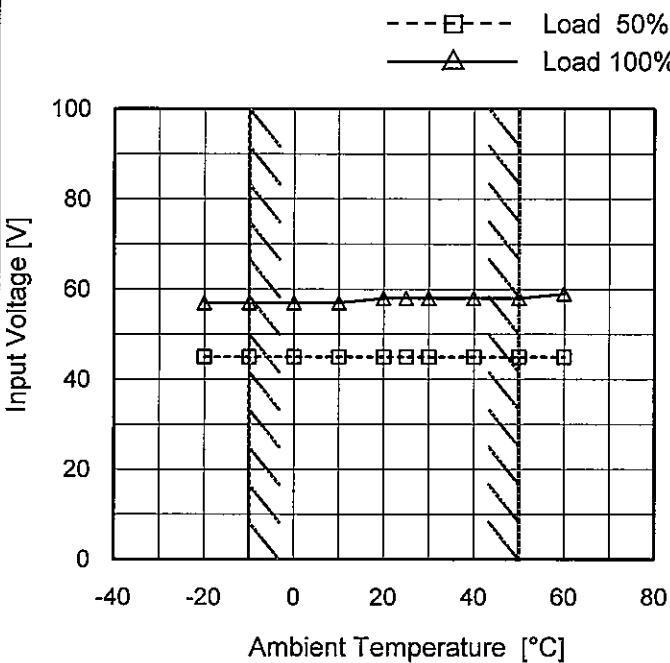
Temperature 25°C
Testing Circuitry Figure A

2. Values

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
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model	PMA15F-15
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V1A

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	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
--	-	-

COSEL

Model	PMA15F-15
Item	Overcurrent Protection
Object	+15V1A

1. Graph

Output Voltage [V]

Load Current [A]

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

Temperature 25°C
Testing Circuitry Figure A

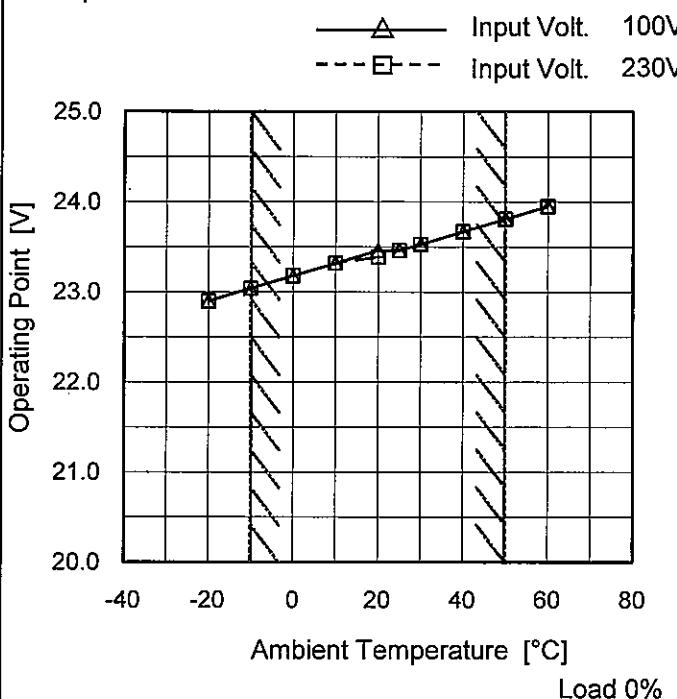
2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 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	Ovvoltage Protection
Object	+15V1A

1. Graph



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. 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
--	-	-

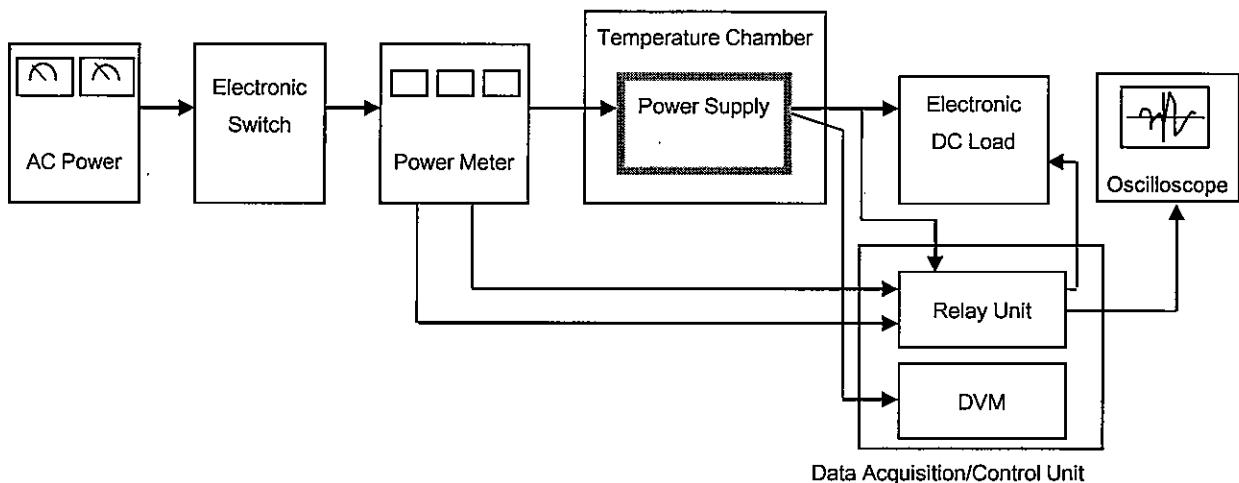


Figure A

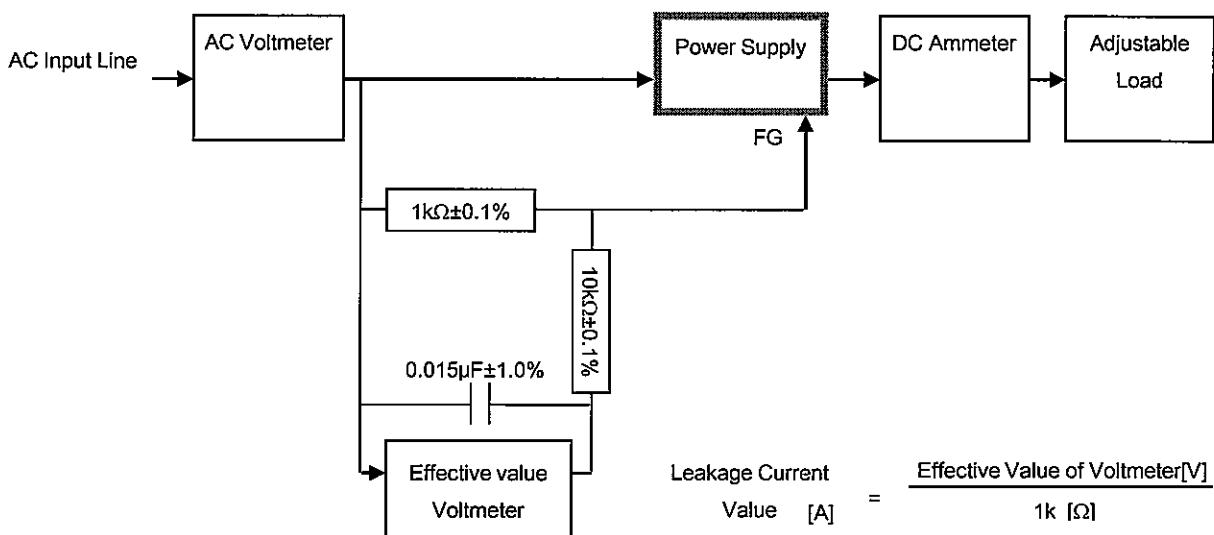


Figure B (IEC60601-1)