



# TEST DATA OF PBW30F-15

Regulated DC Power Supply  
Sep 29, 2005

Approved by : Kuniaki Nagahara  
Kuniaki Nagahara Design Manager

Prepared by : Akito Joboji  
Akito Joboji Design Engineer

**COSEL CO.,LTD.**



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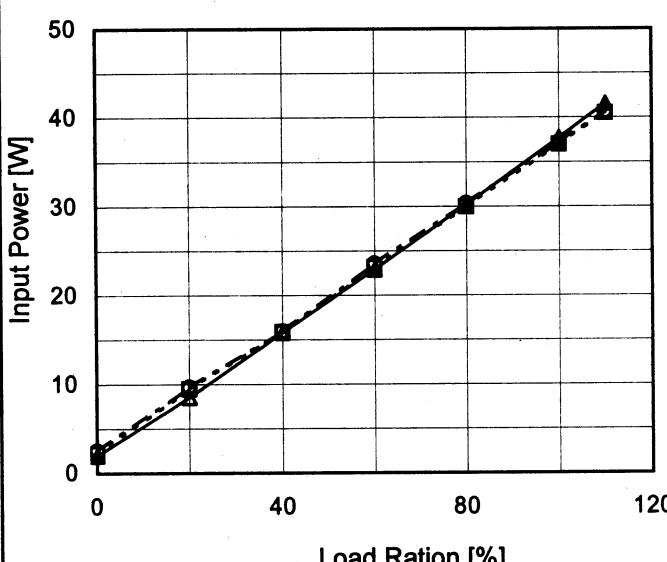
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Model	PBW30F-15	Temperature 25°C Testing Circuitry Figure A																																																					
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1.Graph	—△— Input Volt. 100V - -□-- Input Volt. 200V - -○-- Input Volt. 230V																																																						
	<p>The graph plots Input Current [A] on the Y-axis (0.0 to 1.0) against Load Ration [%] on the X-axis (0 to 120). Three data series are shown for input voltages of 100V, 200V, and 230V. The 100V series (solid line with triangles) has the highest current values, reaching about 0.7A at 110% load. The 230V series (dashed line with circles) reaches about 0.4A at 110% load. The 200V series (dash-dot line with squares) reaches about 0.35A at 110% load.</p> <table border="1"> <caption>Data points estimated from Figure A</caption> <thead> <tr> <th>Load Ration [%]</th> <th>100V [A]</th> <th>200V [A]</th> <th>230V [A]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.048</td><td>0.034</td><td>0.034</td></tr> <tr><td>20</td><td>0.165</td><td>0.116</td><td>0.105</td></tr> <tr><td>40</td><td>0.284</td><td>0.177</td><td>0.159</td></tr> <tr><td>60</td><td>0.398</td><td>0.244</td><td>0.223</td></tr> <tr><td>80</td><td>0.513</td><td>0.307</td><td>0.279</td></tr> <tr><td>100</td><td>0.631</td><td>0.368</td><td>0.336</td></tr> <tr><td>110</td><td>0.691</td><td>0.401</td><td>0.364</td></tr> </tbody> </table>	Load Ration [%]	100V [A]	200V [A]	230V [A]	0	0.048	0.034	0.034	20	0.165	0.116	0.105	40	0.284	0.177	0.159	60	0.398	0.244	0.223	80	0.513	0.307	0.279	100	0.631	0.368	0.336	110	0.691	0.401	0.364	2.Values																					
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<p>The graph plots Efficiency [%] on the y-axis (30 to 86) against Input Voltage [V] on the x-axis (50 to 300). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a slight decrease in efficiency as input voltage increases. A slanted line on the graph indicates the rated input voltage range.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Efficiency Load 50% [%]</th> <th>Efficiency Load 100% [%]</th> </tr> </thead> <tbody> <tr><td>75</td><td>76.6</td><td>75.9</td></tr> <tr><td>85</td><td>77.4</td><td>77.8</td></tr> <tr><td>100</td><td>77.8</td><td>79.7</td></tr> <tr><td>120</td><td>78.0</td><td>81.0</td></tr> <tr><td>200</td><td>75.8</td><td>81.4</td></tr> <tr><td>230</td><td>74.7</td><td>80.7</td></tr> <tr><td>264</td><td>73.6</td><td>79.6</td></tr> <tr><td>280</td><td>73.2</td><td>79.2</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	75	76.6	75.9	85	77.4	77.8	100	77.8	79.7	120	78.0	81.0	200	75.8	81.4	230	74.7	80.7	264	73.6	79.6	280	73.2	79.2	--	-	-
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<p>The graph plots Efficiency [%] on the Y-axis (30 to 86) against Load Ration [%] on the X-axis (0 to 120). 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 efficiency increasing from approximately 70% at 20% load to about 80% at 100% load.</p> <table border="1"> <thead> <tr> <th>Load Ration [%]</th> <th>Input Volt. 100V [%]</th> <th>Input Volt. 200V [%]</th> <th>Input Volt. 230V [%]</th> </tr> </thead> <tbody> <tr><td>20</td><td>70.5</td><td>62.5</td><td>-</td></tr> <tr><td>40</td><td>76.5</td><td>72.5</td><td>75.5</td></tr> <tr><td>60</td><td>78.5</td><td>76.5</td><td>78.5</td></tr> <tr><td>80</td><td>79.5</td><td>78.5</td><td>80.5</td></tr> <tr><td>100</td><td>79.5</td><td>81.2</td><td>80.7</td></tr> <tr><td>110</td><td>79.4</td><td>81.6</td><td>81.1</td></tr> </tbody> </table>				Load Ration [%]	Input Volt. 100V [%]	Input Volt. 200V [%]	Input Volt. 230V [%]	20	70.5	62.5	-	40	76.5	72.5	75.5	60	78.5	76.5	78.5	80	79.5	78.5	80.5	100	79.5	81.2	80.7	110	79.4	81.6	81.1																							
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<p>Graph showing Power Factor vs Input Voltage for PBW30F-15 at 25°C. The Y-axis is Power Factor (0.2 to 0.8) and the X-axis is Input Voltage [V] (50 to 300). Two curves are shown: Load 50% (dashed line with squares) and Load 100% (solid line with triangles). Both curves show a decreasing trend as input voltage increases. A slanted line indicates the rated input voltage range.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Power Factor</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>75</td><td>0.609</td><td>0.642</td> </tr> <tr> <td>85</td><td>0.588</td><td>0.619</td> </tr> <tr> <td>100</td><td>0.563</td><td>0.596</td> </tr> <tr> <td>120</td><td>0.536</td><td>0.566</td> </tr> <tr> <td>200</td><td>0.459</td><td>0.489</td> </tr> <tr> <td>230</td><td>0.445</td><td>0.473</td> </tr> <tr> <td>264</td><td>0.429</td><td>0.456</td> </tr> <tr> <td>280</td><td>0.423</td><td>0.450</td> </tr> <tr> <td>--</td><td>-</td><td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Power Factor		Load 50%	Load 100%	75	0.609	0.642	85	0.588	0.619	100	0.563	0.596	120	0.536	0.566	200	0.459	0.489	230	0.445	0.473	264	0.429	0.456	280	0.423	0.450	--	-	-
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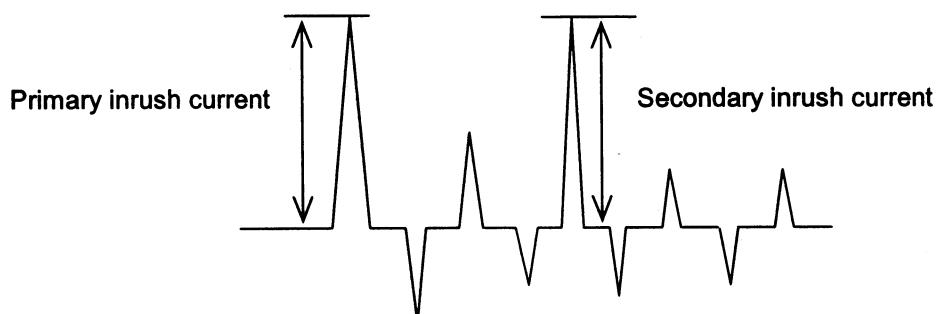
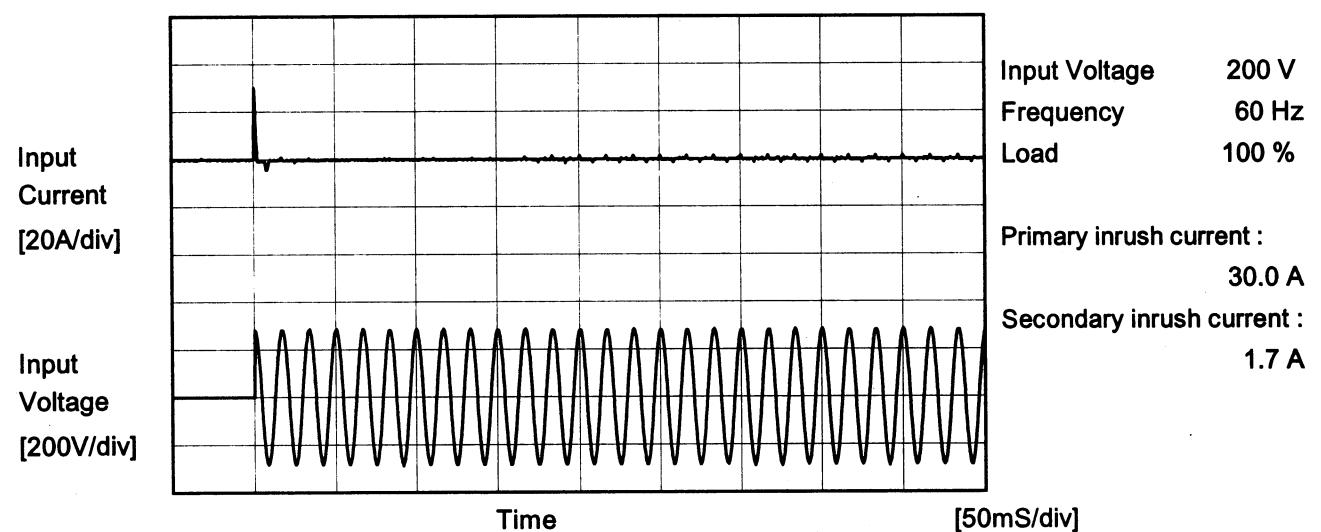
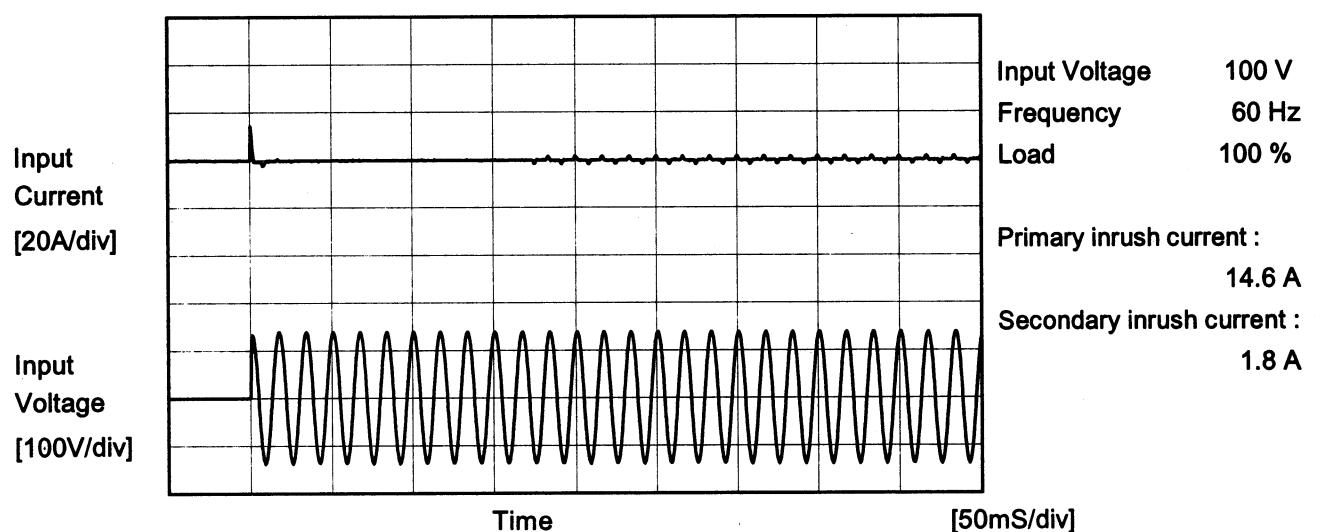
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COSEL

Model	PBW30F-15	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





Model	PBW30F-15	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	<hr/>		

### 1. Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.15	0.32	0.39	Operation
	One of phase	0.30	0.64	0.79	stand by
IEC60950	Both phases	0.19	0.44	0.52	Operation
	One of phase	0.29	0.64	0.79	stand by

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

### 2. Condition

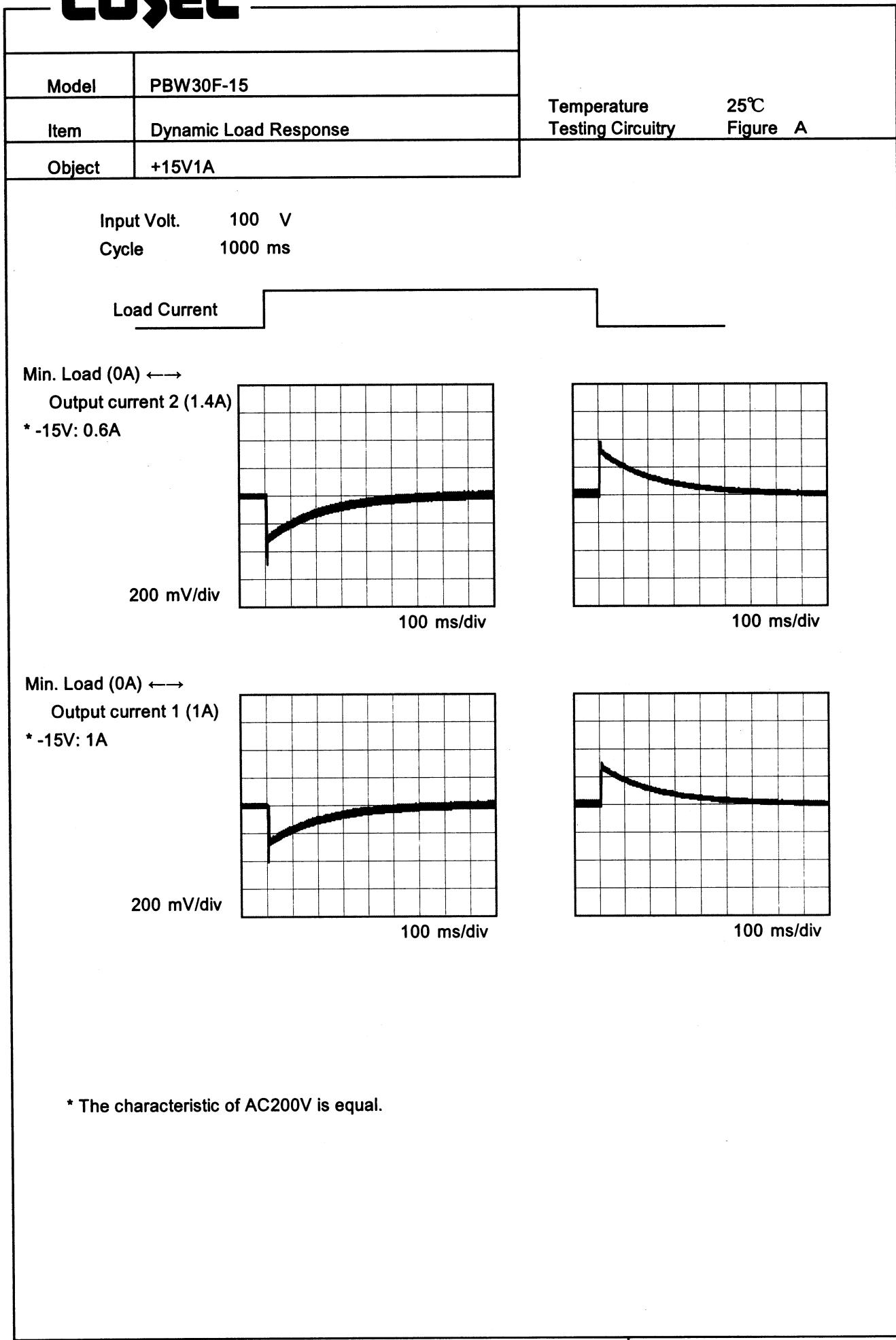
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

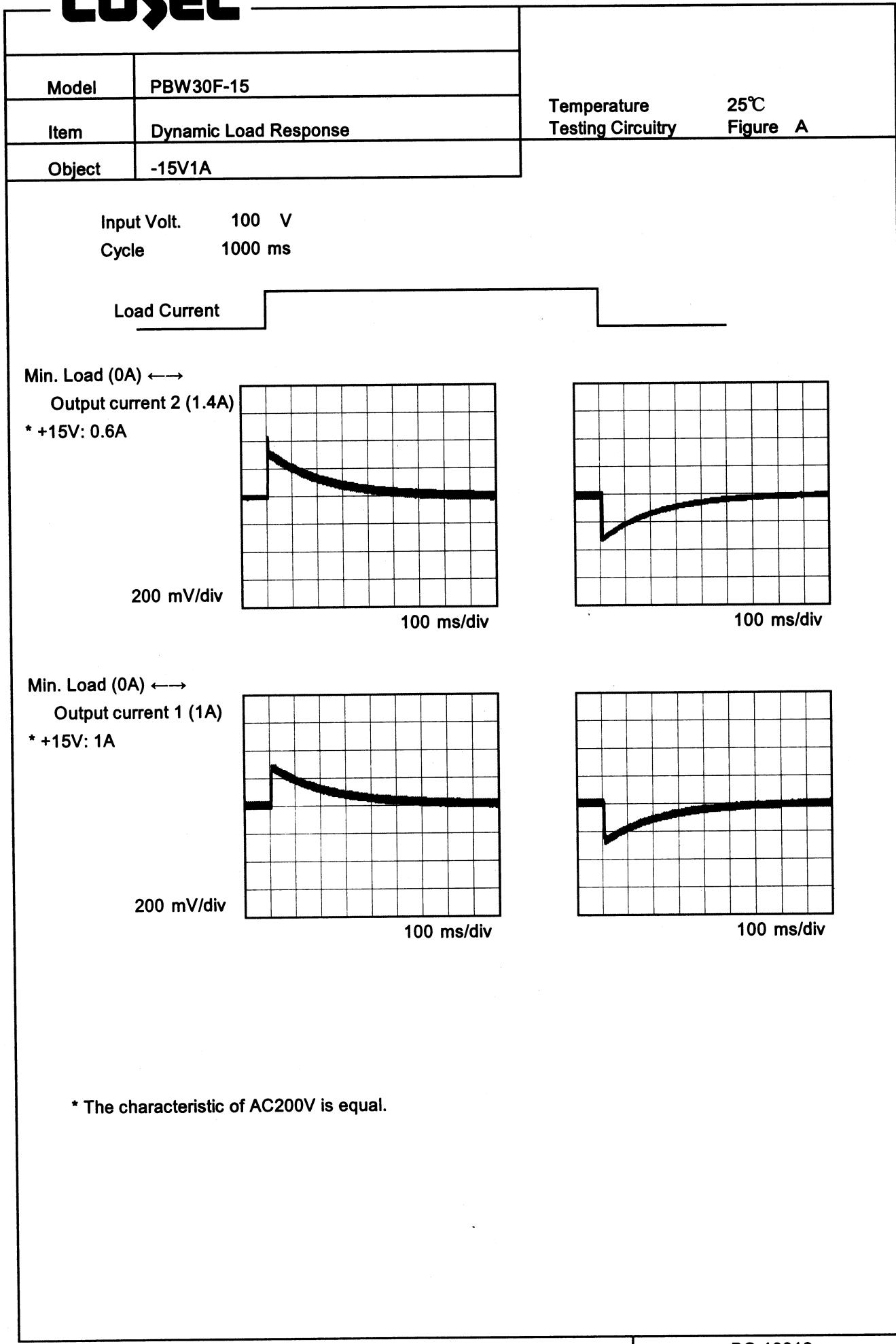
**COSEL**

Model	PBW30F-15	Temperature	25°C																																
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**COSEL**

<p><b>Model</b> PBW30F-15</p> <p><b>Item</b> Load Regulation</p> <p><b>Object</b> +15V1A</p>	<p>Temperature 25°C Testing Circuitry Figure A</p>																																																			
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**COSEL**

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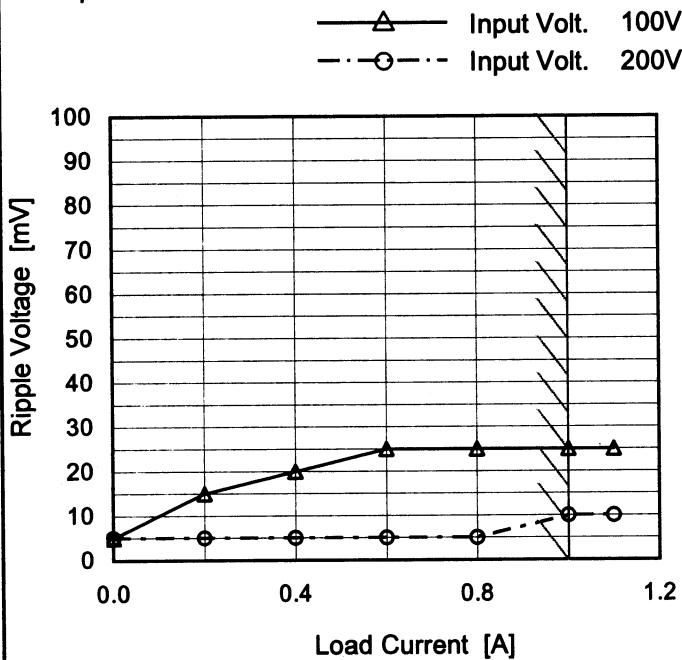
**COSEL**

Model	PBW30F-15	Temperature Testing Circuitry	25°C Figure A																																																													
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<b>Model</b>	PBW30F-15
<b>Item</b>	Ripple Voltage (by Load Current)
<b>Object</b>	-15V1A

**Temperature** 25°C  
**Testing Circuitry** Figure A

## 1. Graph



Measured by 20 MHz Oscilloscope.

Ripple Voltage is shown as p-p in the figure below.

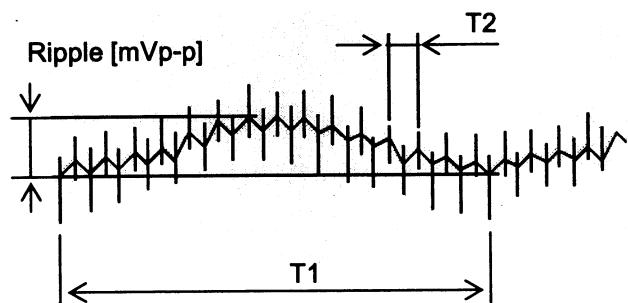
**Note:** Slanted line shows the range of the rated load current.

## 2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	5	5
0.2	15	5
0.4	20	5
0.6	25	5
0.8	25	5
1.0	25	10
1.1	25	10
--	-	-
--	-	-
--	-	-
--	-	-

+15V: Rated output current 1

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



## **Fig. Complex Ripple Wave Form**

# COSEL

Model	PBW30F-15	Temperature Testing Circuitry Figure A	25°C																																						
Item	Ripple-Noise																																								
Object	+15V1A																																								
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<p>Graph showing Ripple-Noise [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 curves are plotted: one for Input Volt. 100V (solid line with triangles) and one for Input Volt. 200V (dashed line with circles). Both curves show a slight increase in noise as load current increases, with a slanted line indicating the range of rated load current.</p>																																									
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<p>Diagram illustrating a Complex Ripple Wave Form. The diagram shows a waveform with two types of noise components: T1 (due to AC input line) and T2 (due to switching). The total noise is labeled as Ripple-Noise [mVp-p].</p>																																									
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**COSEL**

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**COSEL**

<p>Model      PBW30F-15</p> <p>Item      Ripple Voltage (by Ambient Temp.)</p> <p>Object    +15V1A</p>	Testing Circuitry    Figure A																																						
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**COSEL**

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Model	PBW30F-15	Testing Circuitry Figure A
Item	Output Voltage Accuracy	

### 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 (AVR 1) : 0 - 1A (AVR 2) : 0 - 1A

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

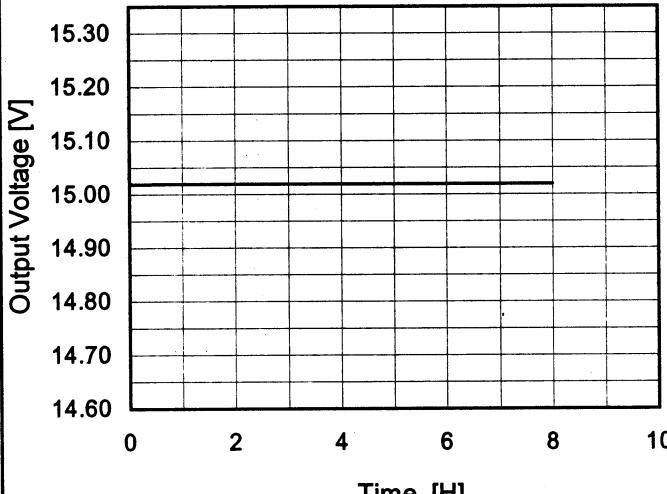
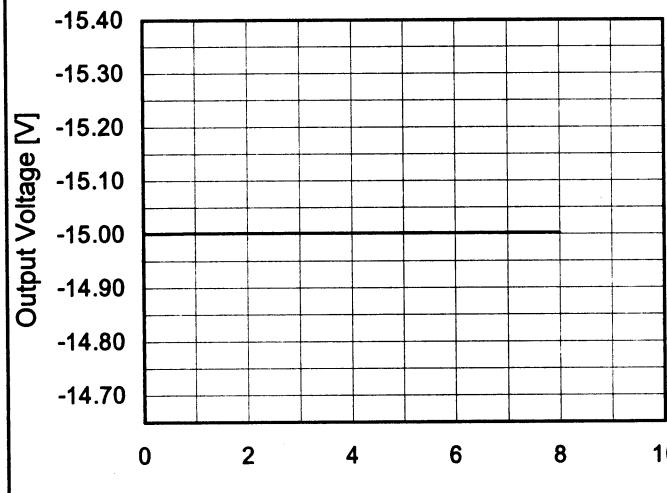
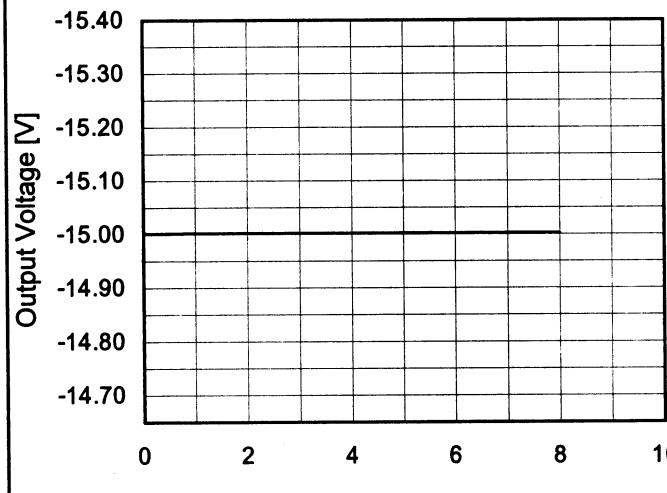
$$* \text{ Output Voltage Accuracy (Ration)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

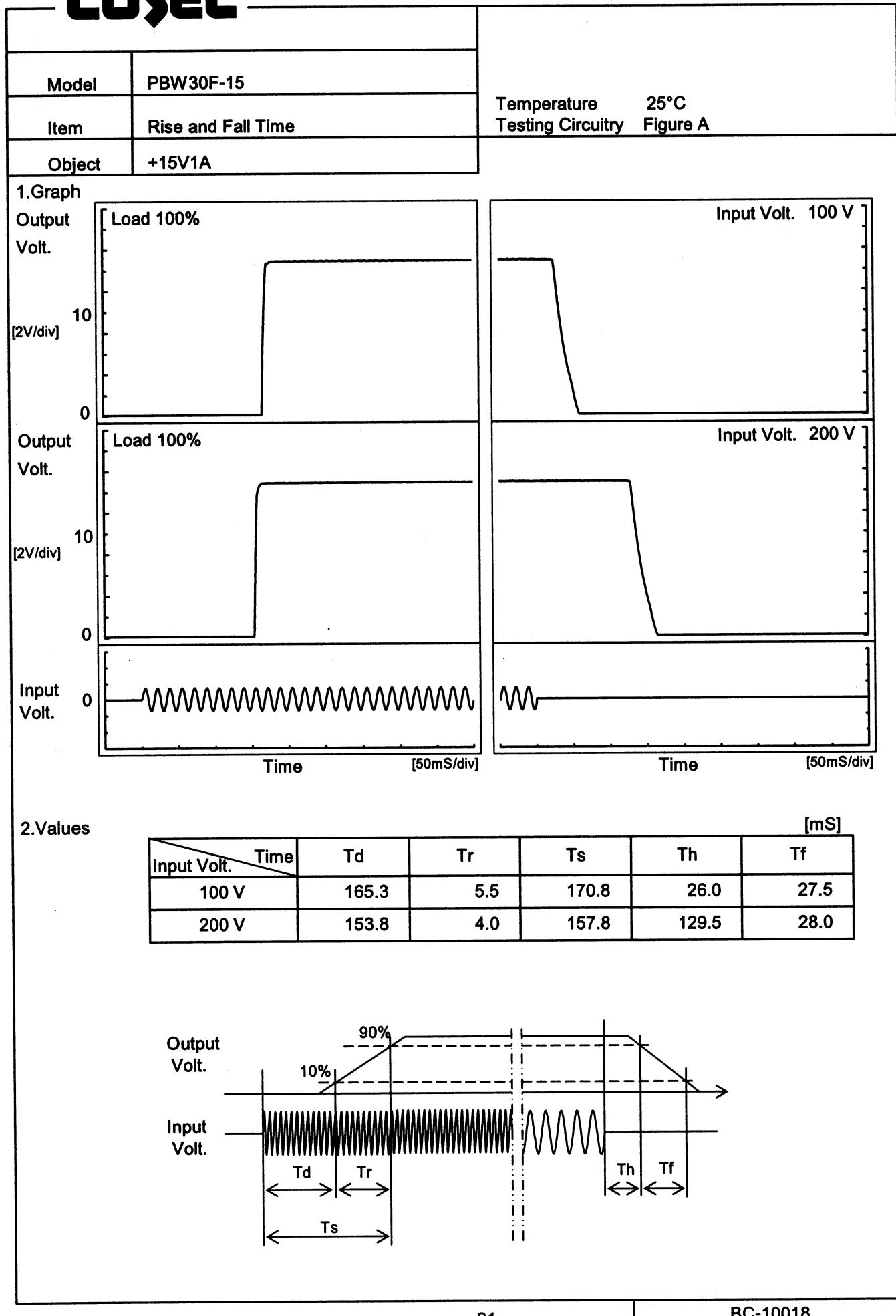
### 2. Values

Object	+15V1A			Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	-10	85	0	15.311	±151	±1.0	
Minimum Voltage	50	264	1	15.009			

Object	-15V1A			Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	-10	85	0	-15.313	±164	±1.1	
Minimum Voltage	50	264	1	-14.985			

**COSEL**

Model	PBW30F-15	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V1A																								
1.Graph			2.Values																						
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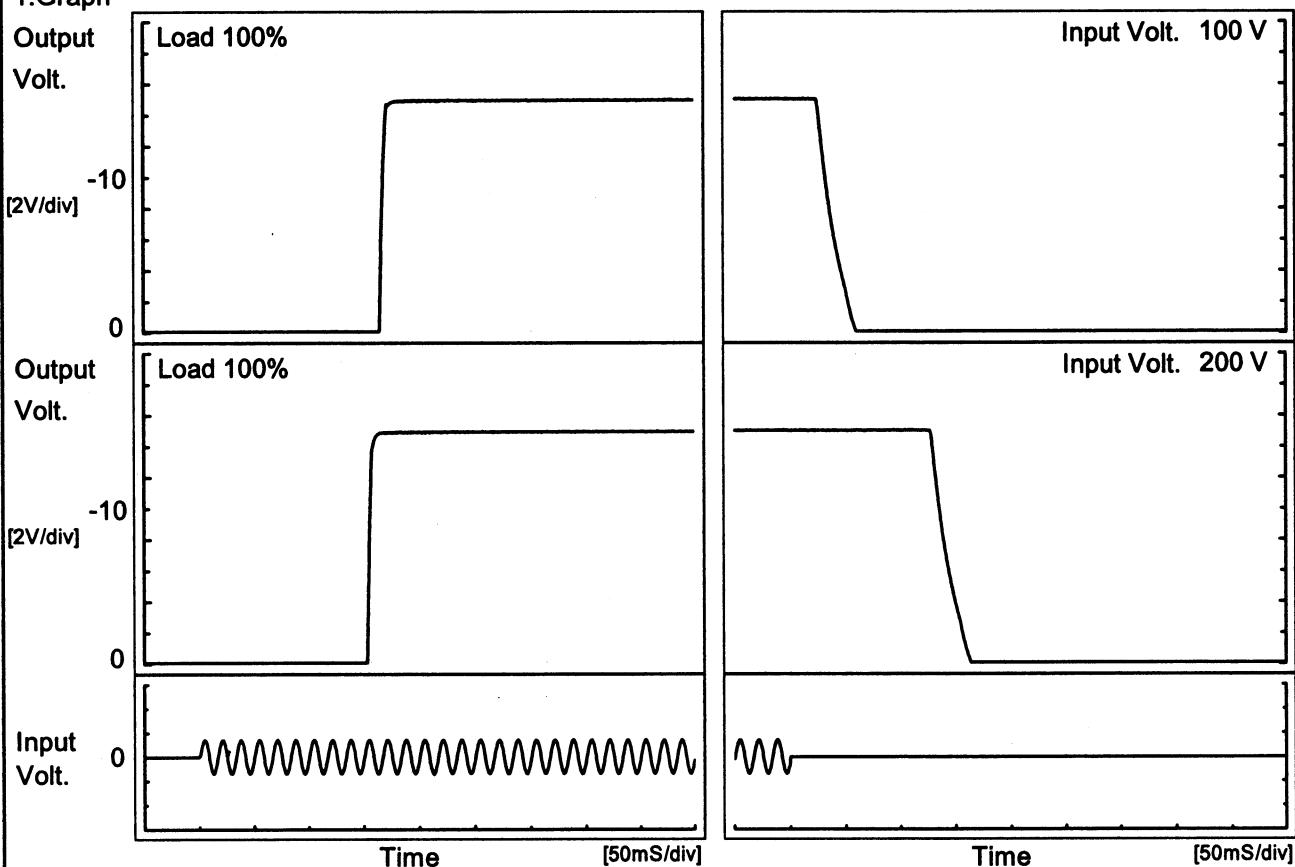
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**COSEL**

Model PBW30F-15

Temperature 25°C  
Testing Circuitry Figure AItem Rise and Fall Time  
Object -15V1A

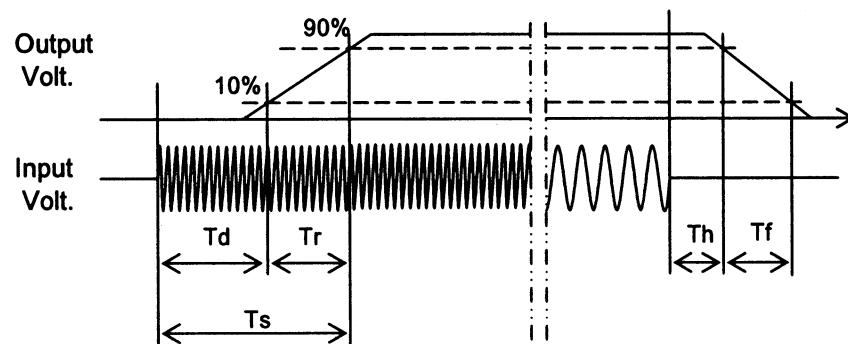
## 1. Graph



## 2. Values

[mS]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		165.0	6.0	171.0	26.0	27.5
200 V		154.0	4.0	158.0	129.5	28.0



**COSEL**

Model	PBW30F-15	Temperature Testing Circuitry	25°C Figure A																																
Item	Hold-Up Time																																		
Object	+15V1A																																		
1.Graph			2.Values																																
<p>Legend:</p> <ul style="list-style-type: none"> <li>--□-- Load 50%</li> <li>—△— Load 100%</li> </ul> <p>Y-axis: Hold-Up Time [ms]</p> <p>X-axis: Input Voltage [V]</p>			<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>75</td> <td>24</td> <td>10</td> </tr> <tr> <td>85</td> <td>34</td> <td>15</td> </tr> <tr> <td>100</td> <td>52</td> <td>24</td> </tr> <tr> <td>120</td> <td>81</td> <td>39</td> </tr> <tr> <td>200</td> <td>252</td> <td>128</td> </tr> <tr> <td>230</td> <td>338</td> <td>175</td> </tr> <tr> <td>264</td> <td>453</td> <td>236</td> </tr> <tr> <td>280</td> <td>514</td> <td>268</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	75	24	10	85	34	15	100	52	24	120	81	39	200	252	128	230	338	175	264	453	236	280	514	268	--	-	-
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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.

**COSEL**

Model	PBW30F-15	Temperature Testing Circuitry	25°C Figure A																																
Item	Hold-Up Time																																		
Object	-15V1A																																		
1.Graph			2.Values																																
<p>The graph illustrates the relationship between Input Voltage (V) on the x-axis and Hold-Up Time [ms] on the y-axis. The y-axis is logarithmic, ranging from 1 to 1000 ms. The x-axis ranges from 50 to 300 V. Two data series are plotted: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show an increasing trend of hold-up time with increasing input voltage. A slanted line on the graph indicates the rated input voltage range.</p>			<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>75</td> <td>24</td> <td>10</td> </tr> <tr> <td>85</td> <td>34</td> <td>15</td> </tr> <tr> <td>100</td> <td>52</td> <td>24</td> </tr> <tr> <td>120</td> <td>81</td> <td>39</td> </tr> <tr> <td>200</td> <td>252</td> <td>129</td> </tr> <tr> <td>230</td> <td>338</td> <td>175</td> </tr> <tr> <td>264</td> <td>453</td> <td>236</td> </tr> <tr> <td>280</td> <td>514</td> <td>268</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	75	24	10	85	34	15	100	52	24	120	81	39	200	252	129	230	338	175	264	453	236	280	514	268	--	-	-
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**COSEL**

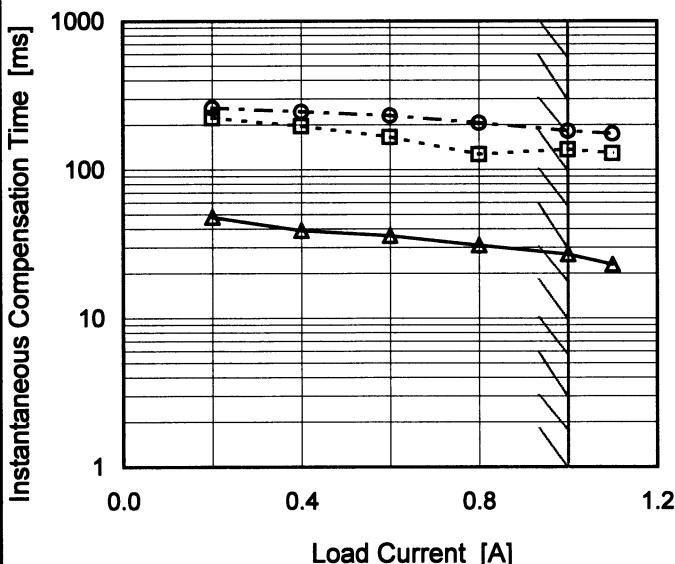
Model PBW30F-15

Item Instantaneous Interruption Compensation

Object +15V1A

## 1. Graph

—▲— Input Volt. 100V  
 - - □--- Input Volt. 200V  
 - - ○--- Input Volt. 230V



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

 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	48	223	261
0.4	39	196	245
0.6	36	166	231
0.8	31	127	206
1.0	27	137	182
1.1	23	129	174
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-15V: Rated output current 1

**COSEL**

Model	PBW30F-15	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Instantaneous Interruption Compensation																																																					
Object	-15V1A																																																					
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Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
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Note: Slanted line shows the range of the rated load current.

**COSEL**

Model	PBW30F-15	Testing Circuitry Figure A																																							
Item	Minimum Input Voltage for Regulated Output Voltage																																								
Object	+15V1A																																								
1.Graph		2.Values																																							
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<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																									

COSEL

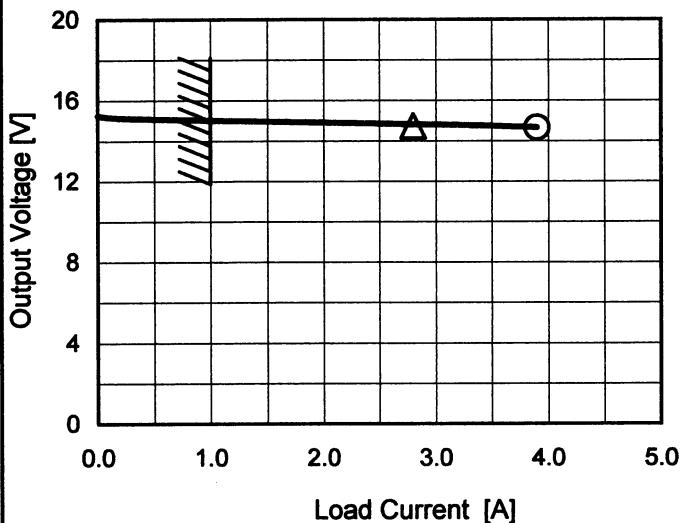
Model PBW30F-15

Item Overcurrent Protection

Object +15V1A

## 1. Graph

—△— Input Volt. 100V  
 —○— Input Volt. 200V



Intermittent operation occurs when the output voltage is less than rated output voltage.

Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

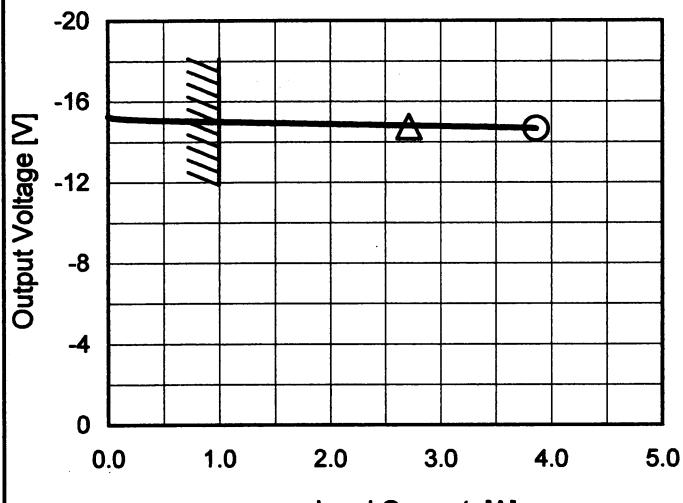
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
15.00	2.80	3.90
14.25	-	-
13.50	-	-
12.00	-	-
10.50	-	-
9.00	-	-
7.50	-	-
6.00	-	-
4.50	-	-
3.00	-	-
1.50	-	-
0.00	-	-

-15V: Rated output current 1

Object -15V1A

## 1. Graph

—△— Input Volt. 100V  
 —○— Input Volt. 200V



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

Intermittent operation occurs when the output voltage is less than rated output voltage.

## 2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
-15.00	2.72	3.86
-14.25	-	-
-13.50	-	-
-12.00	-	-
-10.50	-	-
-9.00	-	-
-7.50	-	-
-6.00	-	-
-4.50	-	-
-3.00	-	-
-1.50	-	-
0.00	-	-

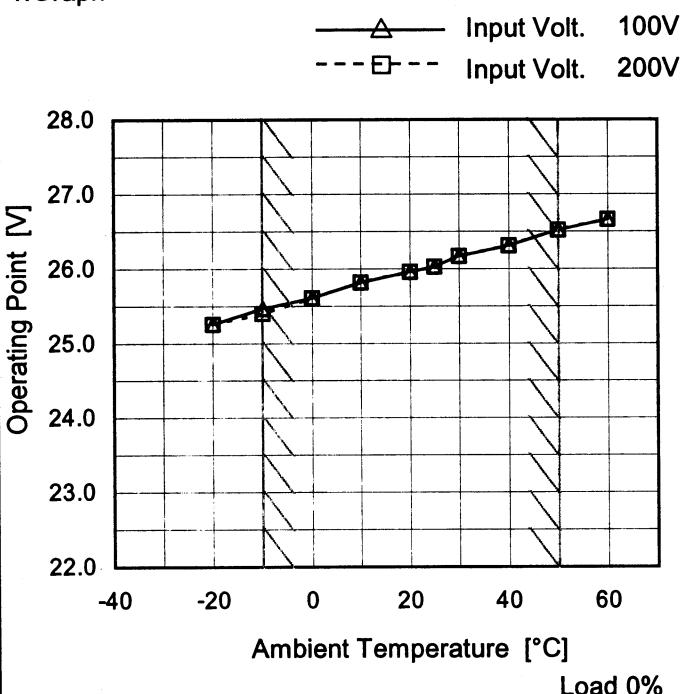
+15V: Rated output current 1

**COSEL**

Model	PBW30F-15
Item	Overvoltage Protection
Object	+15V1A

## Testing Circuitry Figure A

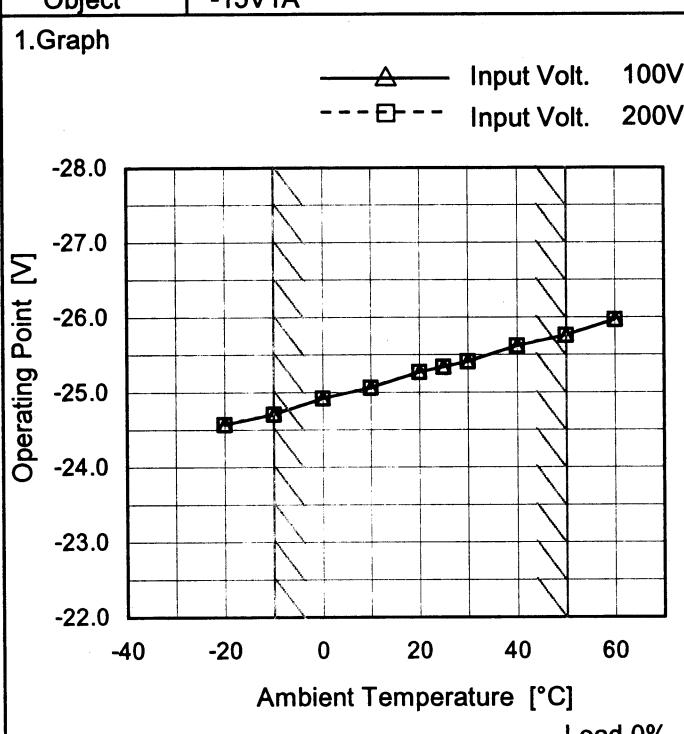
## 1.Graph



## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	25.26	25.26
-10	25.47	25.40
0	25.61	25.61
10	25.82	25.82
20	25.96	25.96
25	26.03	26.03
30	26.17	26.17
40	26.31	26.31
50	26.52	26.52
60	26.66	26.66
--	-	-

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	-24.57	-24.57
-10	-24.71	-24.71
0	-24.92	-24.92
10	-25.06	-25.06
20	-25.27	-25.27
25	-25.34	-25.34
30	-25.41	-25.41
40	-25.62	-25.62
50	-25.76	-25.76
60	-25.97	-25.97
--	-	-

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

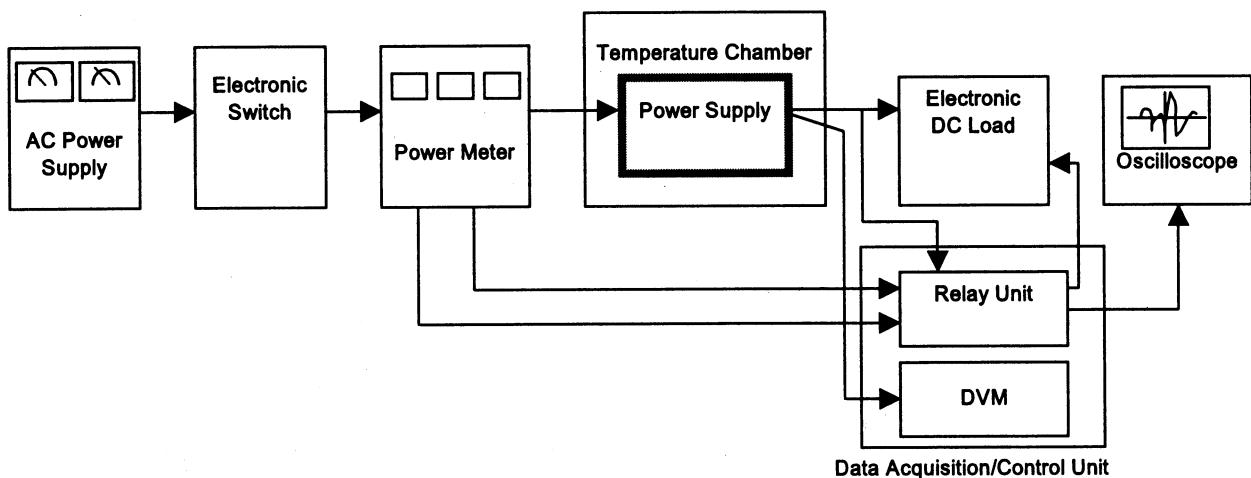


Figure A

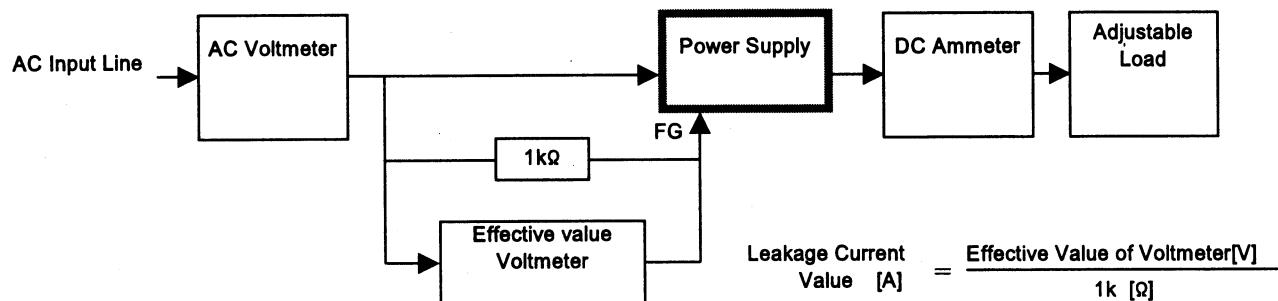


Figure B ( DEN-AN )

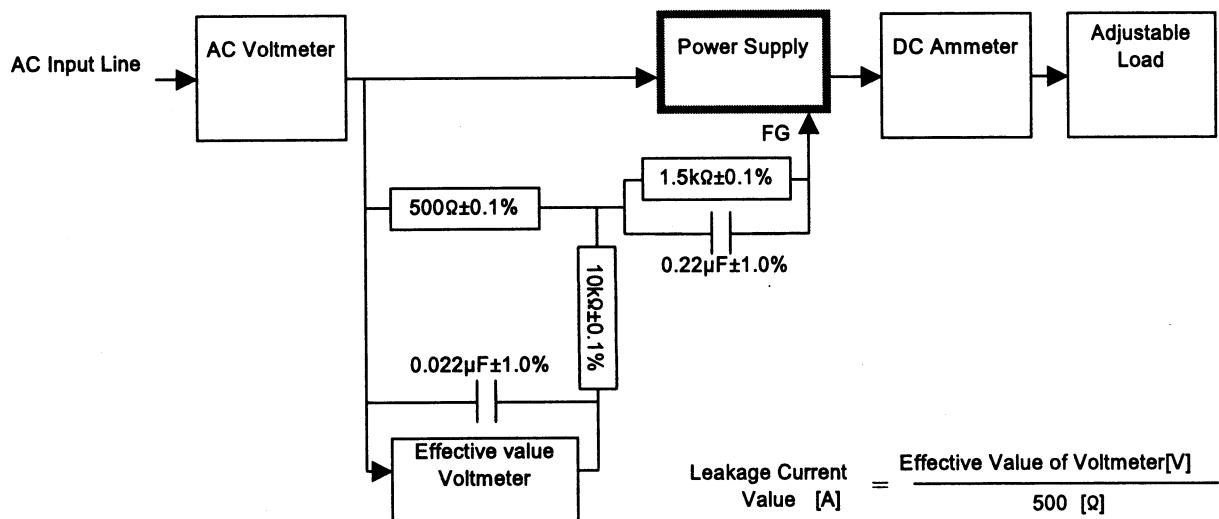


Figure B ( IEC60950 )