



TEST DATA OF PBW30F-5

Regulated DC Power Supply
Sep 29, 2005

Approved by : Kuniaki Nagahara Design Manager
Kuniaki Nagahara

Prepared by : Akito Joboji Design Engineer
Akito Joboji

COSEL CO.,LTD.



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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 efficiency increasing with input voltage, with the Load 100% curve generally higher than the Load 50% curve. 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">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>75</td> <td>70.0</td> <td>71.4</td> </tr> <tr> <td>85</td> <td>70.5</td> <td>73.1</td> </tr> <tr> <td>100</td> <td>70.8</td> <td>74.5</td> </tr> <tr> <td>120</td> <td>70.8</td> <td>75.4</td> </tr> <tr> <td>200</td> <td>67.8</td> <td>75.2</td> </tr> <tr> <td>230</td> <td>66.6</td> <td>74.5</td> </tr> <tr> <td>264</td> <td>64.9</td> <td>73.0</td> </tr> <tr> <td>280</td> <td>64.0</td> <td>72.3</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	75	70.0	71.4	85	70.5	73.1	100	70.8	74.5	120	70.8	75.4	200	67.8	75.2	230	66.6	74.5	264	64.9	73.0	280	64.0	72.3	--	-	-
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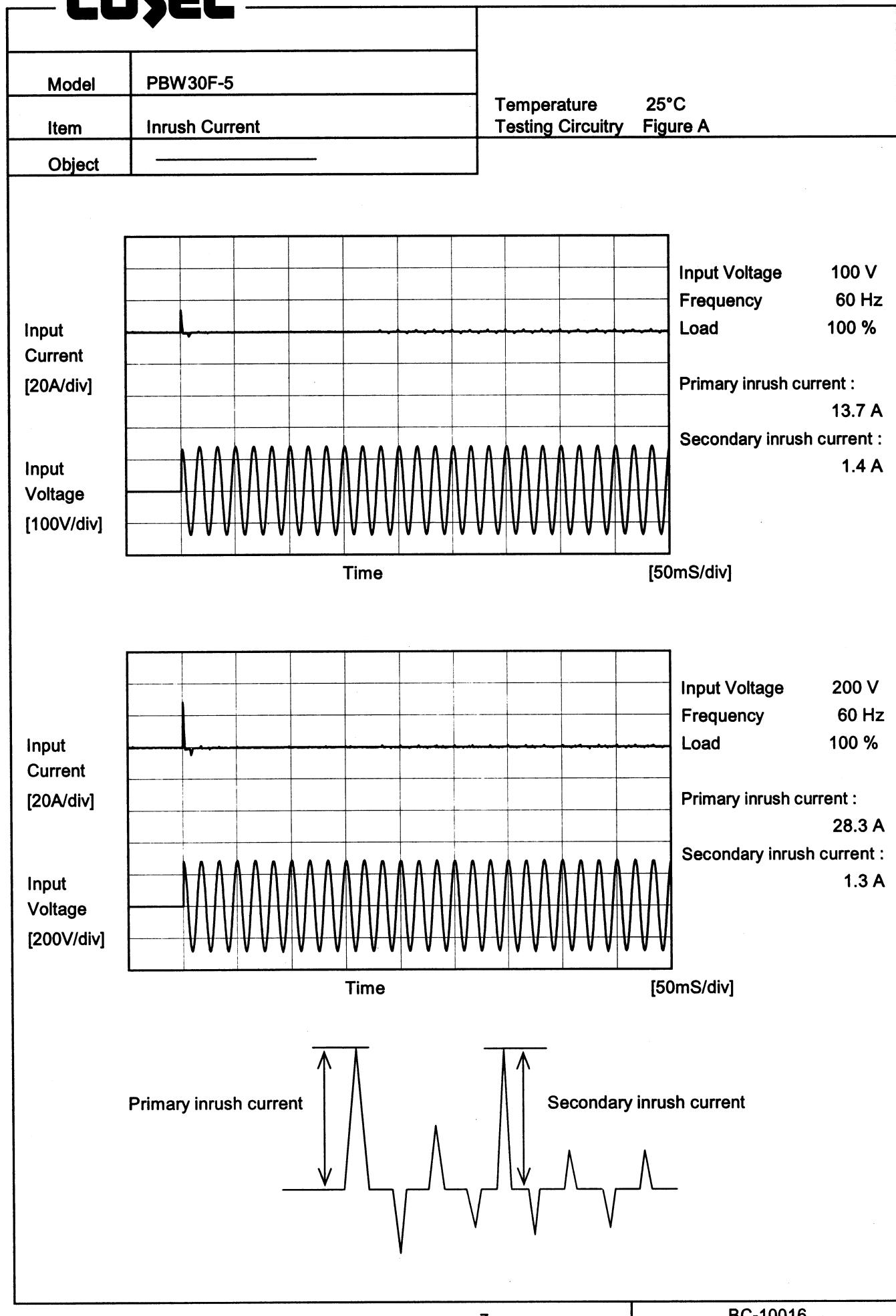
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Model	PBW30F-5	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

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

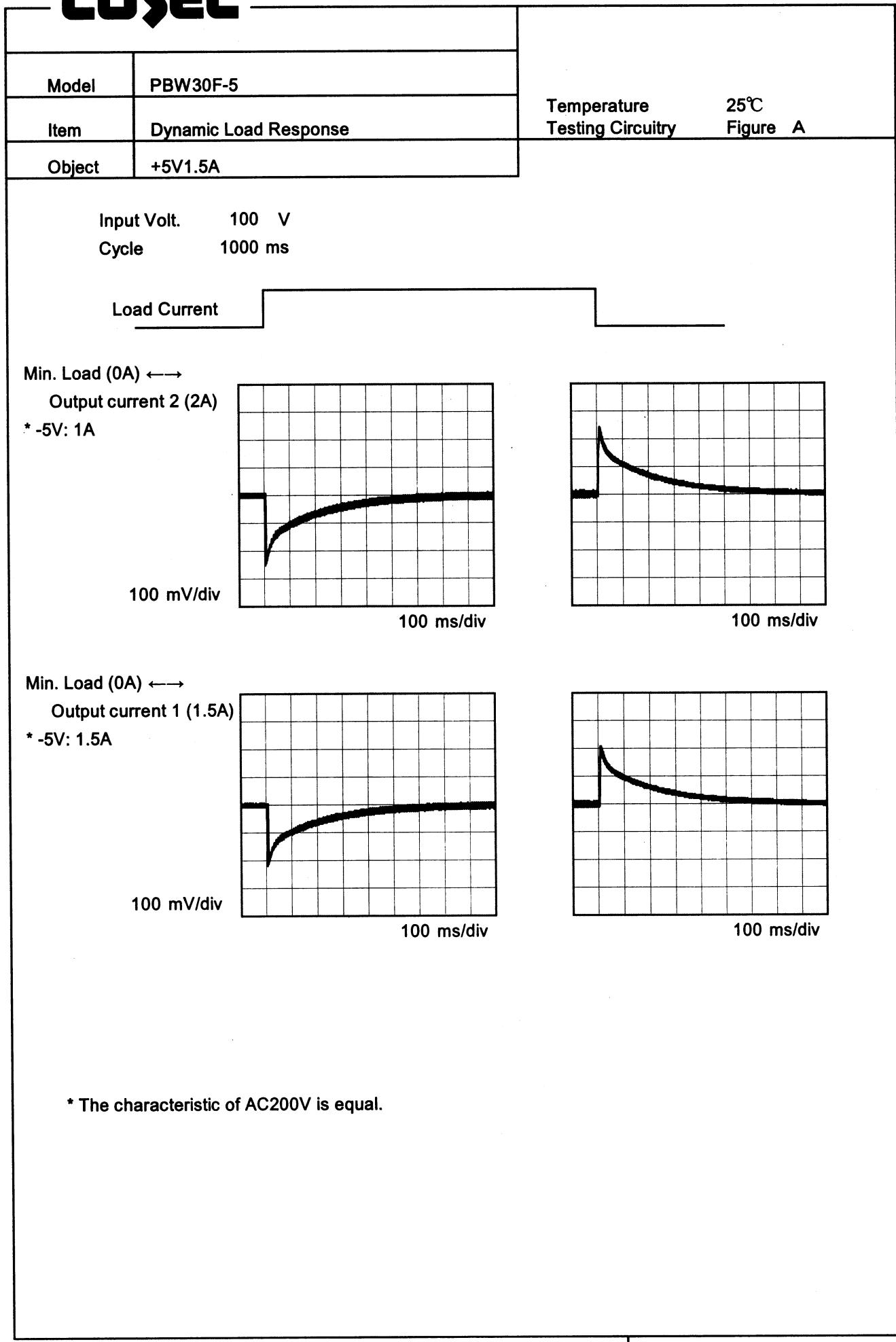
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

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75	5.118	5.066																																	
85	5.116	5.067																																	
100	5.114	5.068																																	
120	5.112	5.068																																	
200	5.104	5.065																																	
230	5.103	5.064																																	
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Note: Slanted line shows the range of the rated input voltage.																																			

COSEL

Model	PBW30F-5	Temperature	25°C																																																		
Item	Load Regulation	Testing Circuitry	Figure A																																																		
Object	+5V1.5A	2. Values																																																			
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Model PBW30F-5

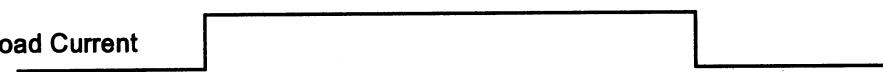
Item Dynamic Load Response

Object -5V1.5A

Temperature
Testing Circuitry25°C
Figure A

Input Volt. 100 V
 Cycle 1000 ms

Load Current



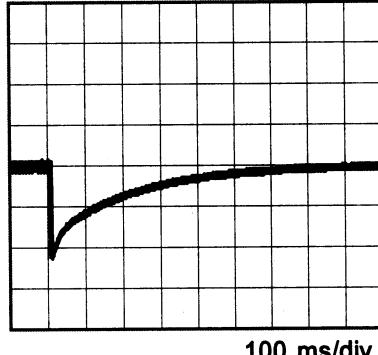
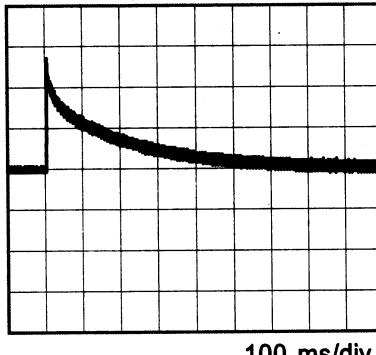
Min. Load (0A) ←→

Output current 2 (2A)

* +5V: 1A

100 mV/div

100 ms/div



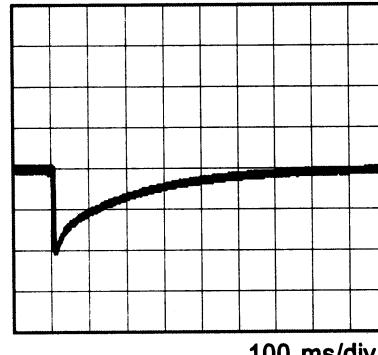
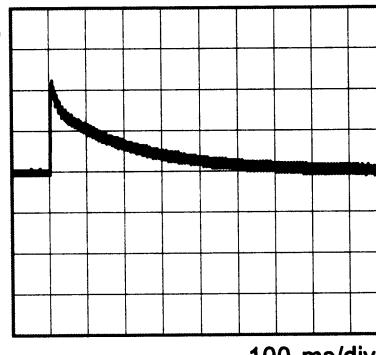
Min. Load (0A) ←→

Output current 1 (1.5A)

* +5V: 1.5A

100 mV/div

100 ms/div



* The characteristic of AC200V is equal.

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Model	PBW30F-5	Temperature Testing Circuitry Figure A	25°C																																					
Item	Ripple Voltage (by Load Current)		Figure A																																					
Object	+5V1.5A																																							
1.Graph	<p>—△— Input Volt. 100V -○- Input Volt. 200V</p> <table border="1"> <caption>Data points estimated from Graph 1</caption> <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>5</td><td>5</td></tr> <tr><td>0.4</td><td>5</td><td>5</td></tr> <tr><td>0.8</td><td>8</td><td>5</td></tr> <tr><td>1.2</td><td>10</td><td>5</td></tr> <tr><td>1.4</td><td>10</td><td>5</td></tr> <tr><td>1.6</td><td>10</td><td>5</td></tr> </tbody> </table>		Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	0.0	5	5	0.4	5	5	0.8	8	5	1.2	10	5	1.4	10	5	1.6	10	5																	
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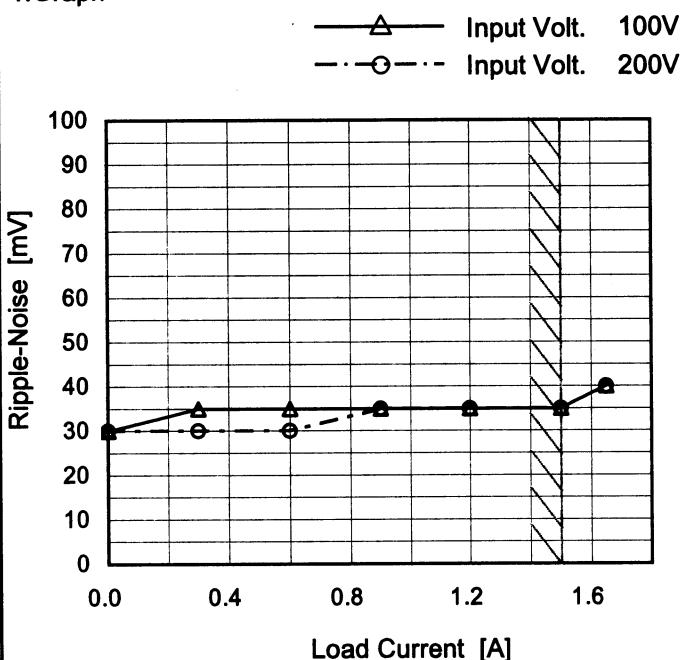
Model	PBW30F-5	Temperature	25°C																																						
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure A																																						
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Load Current [A]	Ripple Voltage [mV]																																								
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<p>Fig. Complex Ripple Wave Form</p>																																									

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Model	PBW30F-5
Item	Ripple-Noise
Object	+5V1.5A

 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]
0.00	30	30
0.30	35	30
0.60	35	30
0.90	35	35
1.20	35	35
1.50	35	35
1.65	40	40
--	-	-
--	-	-
--	-	-
--	-	-

-5V: Rated output current 1

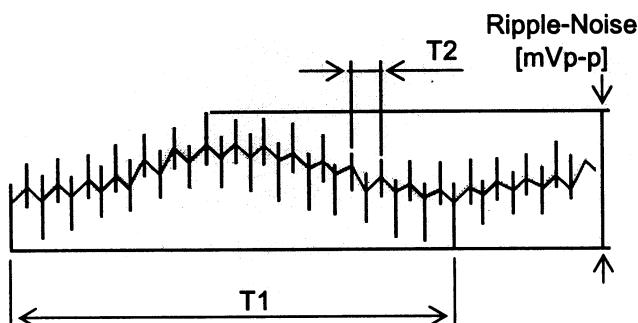
 T1: Due to AC Input Line
 T2: Due to Switching


Fig. Complex Ripple Wave Form

COSEL

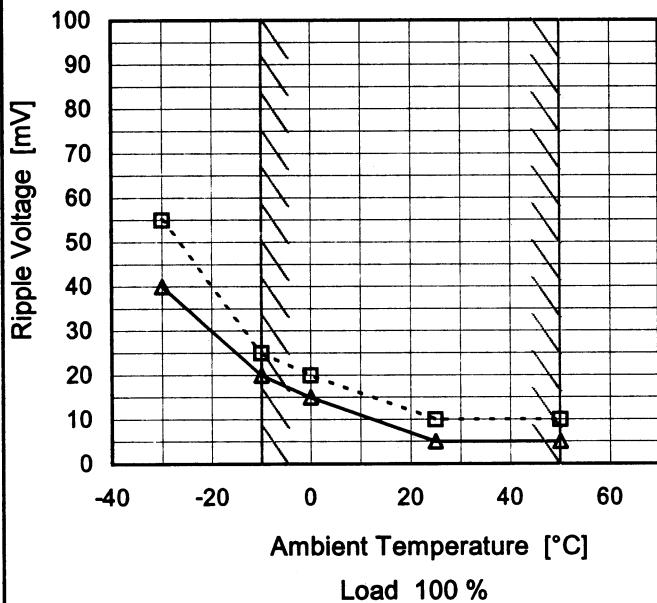
Model	PBW30F-5	Temperature	25°C																																						
Item	Ripple-Noise	Testing Circuitry	Figure A																																						
Object	-5V1.5A																																								
1. Graph			2. Values																																						
<p>Graph showing Ripple-Noise [mV] vs Load Current [A]. The Y-axis ranges from 0 to 100 mV, and the X-axis ranges from 0.0 to 1.6 A. Two curves are shown: one for Input Volt. 100V (solid line with open circles) and one for Input Volt. 200V (dashed line with open circles). Both curves remain relatively flat until a load current of about 1.2A, after which they rise sharply. A diagonal line from (0,0) to (1.6, 40) represents the rated load current range.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 100 [V]</th> <th>Input Volt. 200 [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>35</td><td>35</td></tr> <tr><td>0.30</td><td>35</td><td>35</td></tr> <tr><td>0.60</td><td>35</td><td>35</td></tr> <tr><td>0.90</td><td>35</td><td>35</td></tr> <tr><td>1.20</td><td>35</td><td>35</td></tr> <tr><td>1.50</td><td>40</td><td>35</td></tr> <tr><td>1.65</td><td>40</td><td>35</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> </tbody> </table> <p>+5V: Rated output current 1</p>	Load Current [A]	Ripple-Noise [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.00	35	35	0.30	35	35	0.60	35	35	0.90	35	35	1.20	35	35	1.50	40	35	1.65	40	35	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																								
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<p>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.</p>																																									
<p>Fig. Complex Ripple Wave Form</p> <p>The diagram illustrates a complex ripple waveform. It features two horizontal arrows indicating time intervals: T1, which spans the entire duration of the visible waveform, and T2, which is a shorter segment within T1. A vertical double-headed arrow between the baseline and the peak of the waveform is labeled "Ripple-Noise [mVp-p]", representing the peak-to-peak voltage of the noise component.</p>																																									

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Model	PBW30F-5
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V1.5A

1.Graph

--□-- Input Volt. 100V
 —△— Input Volt. 200V



Testing Circuitry Figure A

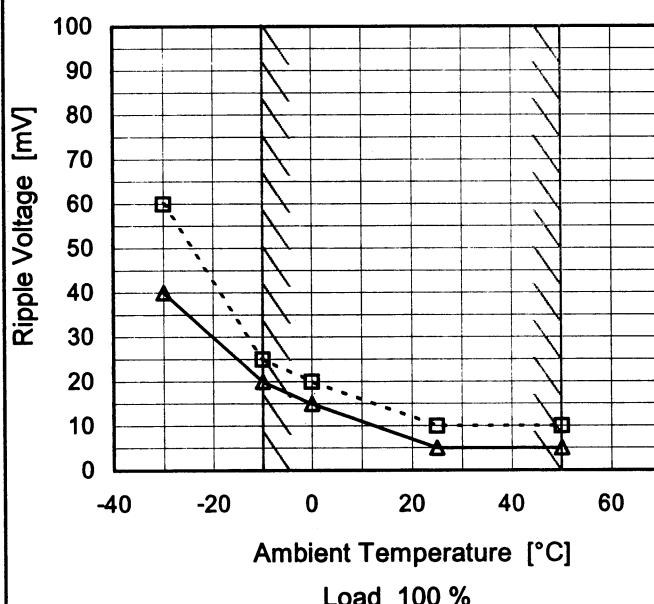
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	55	40
-10	25	20
0	20	15
25	10	5
50	10	5
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

-5V: Rated output current 1

1.Graph

--□-- Input Volt. 100V
 —△— Input Volt. 200V



2.Values

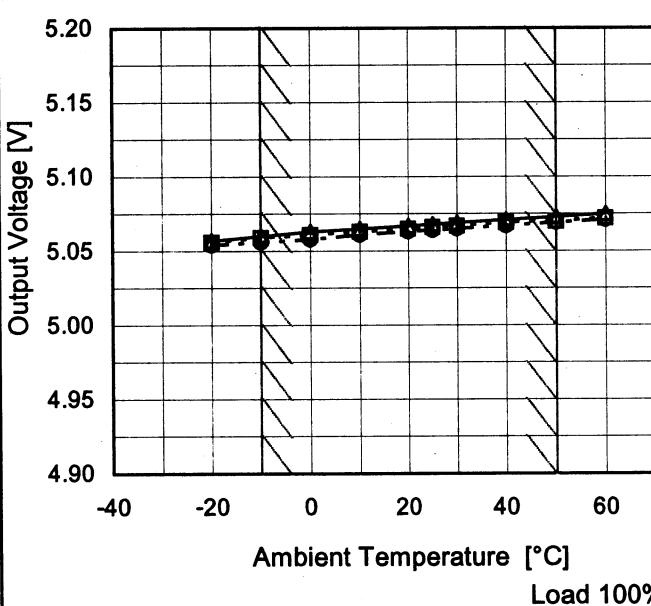
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	60	40
-10	25	20
0	20	15
25	10	5
50	10	5
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

+5V: Rated output current 1

Measured by 20 MHz Oscilloscope.

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

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Model	PBW30F-5	Testing Circuitry Figure A																																																					
Item	Ambient Temperature Drift																																																						
Object	+5V1.5A																																																						
1.Graph	<p style="text-align: center;"> —△— Input Volt. 100V ---□--- Input Volt. 200V ---○--- Input Volt. 230V </p>  <p style="text-align: center;">Load 100%</p>	2.Values																																																					
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		<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																																					



Model	PBW30F-5	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 - 1.5A (AVR 2) : 0 - 1.5A

* 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	+5V1.5A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	50	85		0	5.235	± 90
Minimum Voltage	-10	264		1.5	5.056	

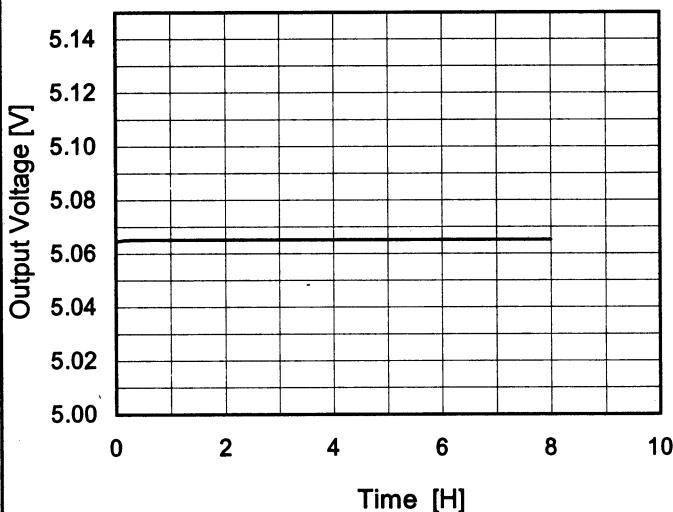
Object	-5V1.5A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	50	85		0	-5.232	± 96
Minimum Voltage	-10	264		1.5	-5.041	

COSEL

Model	PBW30F-5
Item	Time Lapse Drift
Object	+5V1.5A

Temperature 25°C
Testing Circuitry Figure A

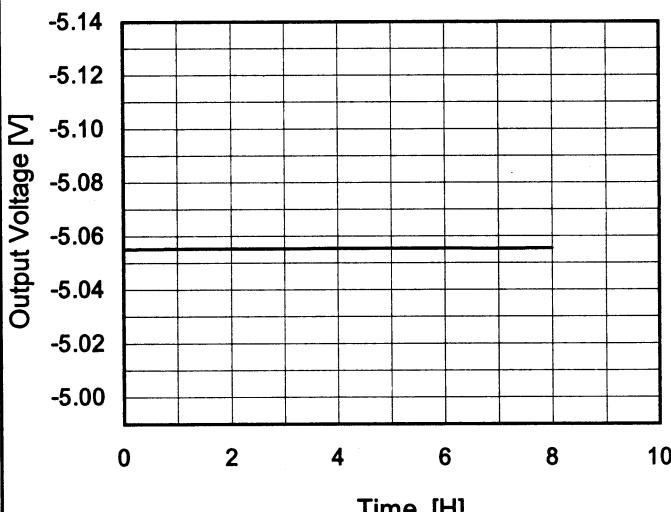
1.Graph



Object

-5V1.5A

1.Graph



* The characteristic of AC200V is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	5.064
0.5	5.065
1.0	5.065
2.0	5.065
3.0	5.065
4.0	5.065
5.0	5.065
6.0	5.065
7.0	5.065
8.0	5.065

2.Values

Time since start [H]	Output Voltage [V]
0.0	-5.055
0.5	-5.055
1.0	-5.055
2.0	-5.055
3.0	-5.055
4.0	-5.056
5.0	-5.056
6.0	-5.056
7.0	-5.055
8.0	-5.056

COSEL

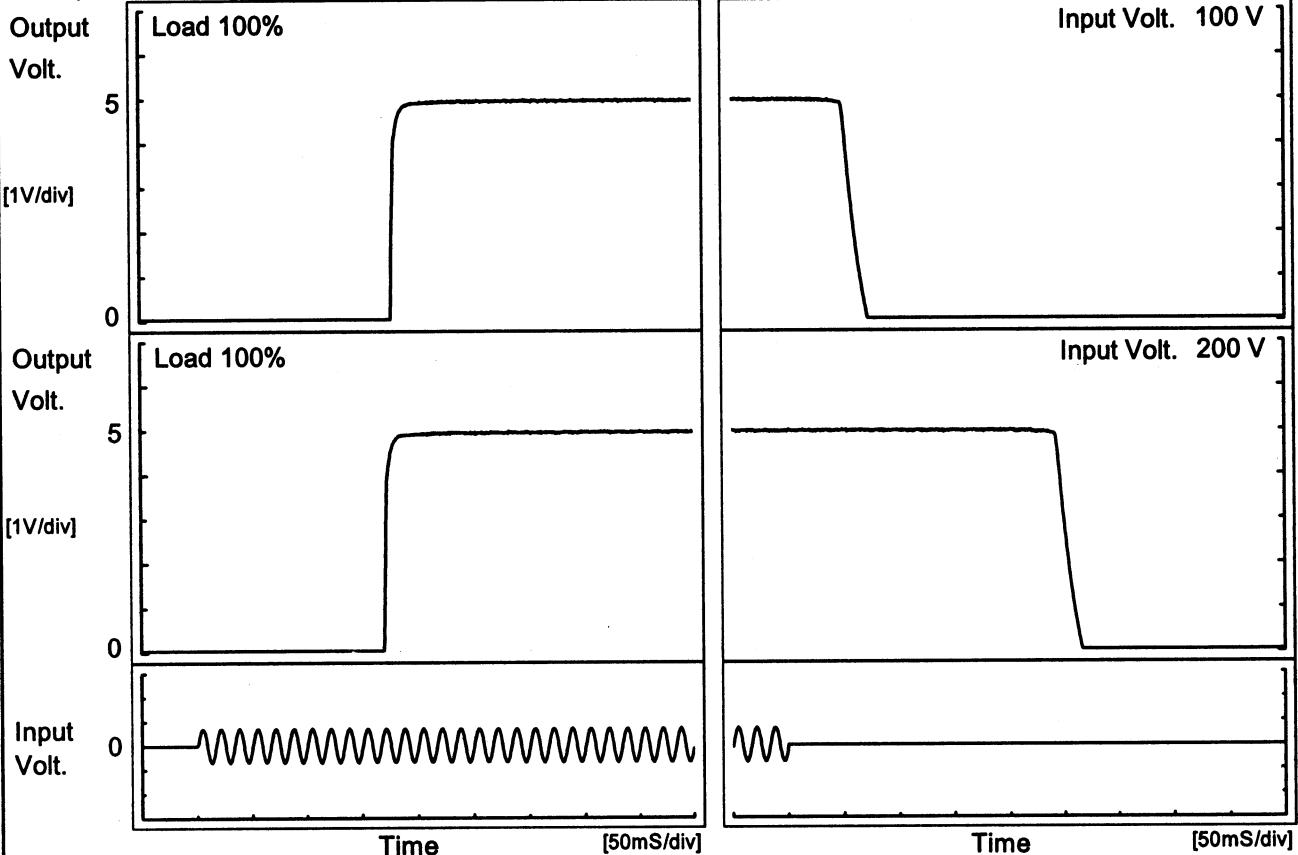
Model PBW30F-5

Item Rise and Fall Time

Temperature 25°C
Testing Circuitry Figure A

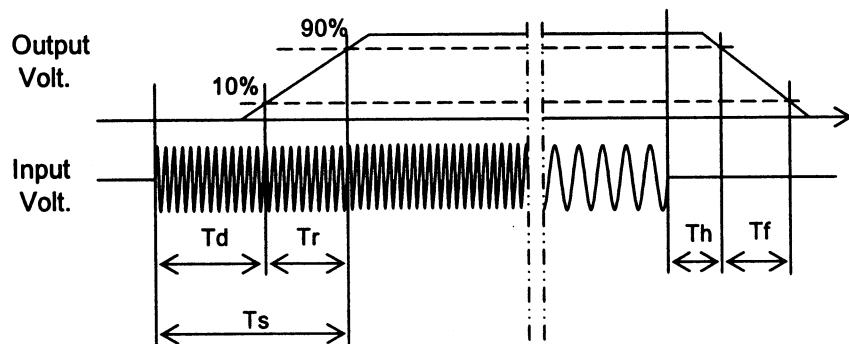
Object +5V1.5A

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[mS]
100 V		177.0	6.5	183.5	50.3	18.5	
200 V		170.5	6.0	176.5	243.8	19.0	



COSEL

Model PBW30F-5

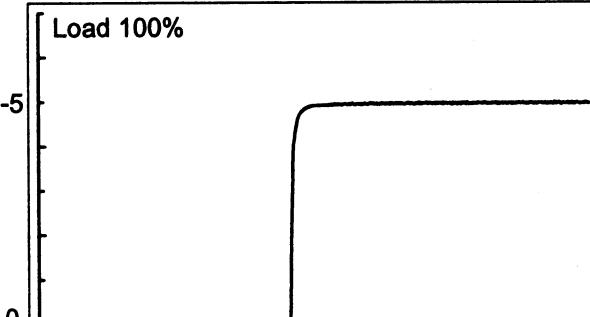
Item Rise and Fall Time

Temperature 25°C
Testing Circuitry Figure A

Object -5V1.5A

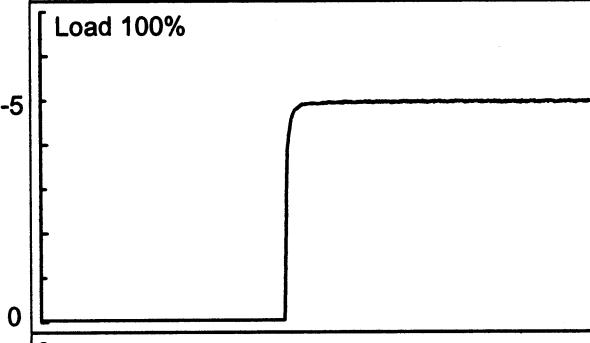
1. Graph

Output Volt.



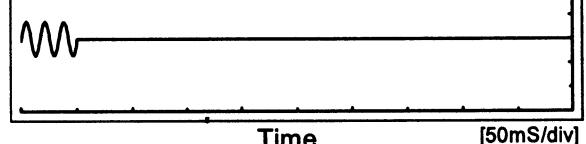
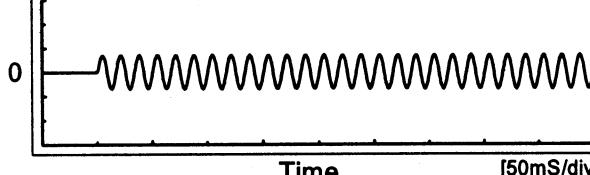
Input Volt. 100 V

Output Volt.



Input Volt. 200 V

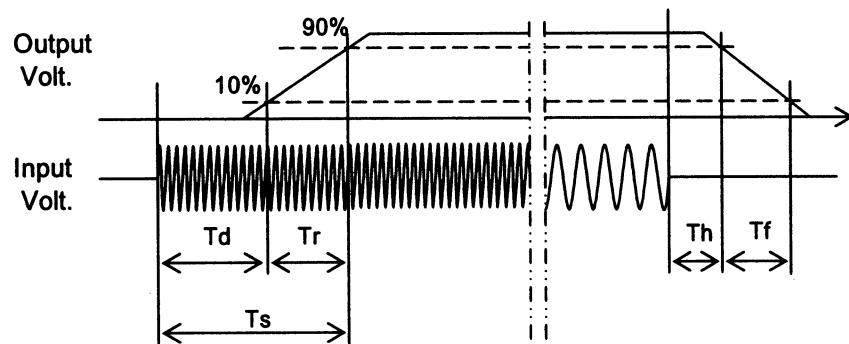
Input Volt.



2. Values

[mS]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		177.3	6.5	183.8	50.3	18.8
200 V		170.3	6.5	176.8	243.8	19.0



COSEL

Model	PBW30F-5	Temperature Testing Circuitry Figure A	25°C																																	
Item	Hold-Up Time		Figure A																																	
Object	+5V1.5A																																			
1.Graph			2.Values																																	
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COSEL

Model	PBW30F-5	Temperature Testing Circuitry 25°C Figure A																																
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Object	-5V1.5A																																	
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COSEL

Model	PBW30F-5	Temperature 25°C Testing Circuitry Figure A																																																					
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Object	+5V1.5A																																																						
1.Graph	<p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V Input Volt. 200V Input Volt. 230V <p>Y-axis: Instantaneous Compensation Time [ms]</p> <p>X-axis: Load Current [A]</p>	2.Values																																																					
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COSEL

Model	PBW30F-5	Temperature 25°C Testing Circuitry Figure A																																																					
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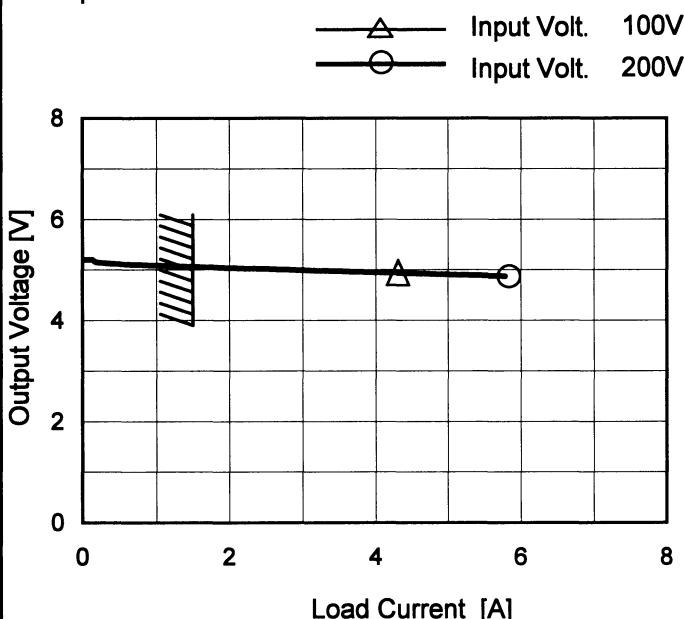
COSEL

Model	PBW30F-5																																								
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																							
Object	+5V1.5A																																								
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Object -5V1.5A		2.Values																																							
		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Input Voltage [V]</th></tr> <tr> <th>Load 50%</th><th>Load 100%</th></tr> </thead> <tbody> <tr><td>-20</td><td>36</td><td>44</td></tr> <tr><td>-10</td><td>34</td><td>44</td></tr> <tr><td>0</td><td>34</td><td>44</td></tr> <tr><td>10</td><td>34</td><td>46</td></tr> <tr><td>20</td><td>34</td><td>46</td></tr> <tr><td>25</td><td>34</td><td>46</td></tr> <tr><td>30</td><td>34</td><td>46</td></tr> <tr><td>40</td><td>36</td><td>48</td></tr> <tr><td>50</td><td>36</td><td>48</td></tr> <tr><td>60</td><td>36</td><td>50</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	36	44	-10	34	44	0	34	44	10	34	46	20	34	46	25	34	46	30	34	46	40	36	48	50	36	48	60	36	50	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																								
	Load 50%	Load 100%																																							
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40	36	48																																							
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60	36	50																																							
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<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																									

COSEL

Model	PBW30F-5
Item	Overcurrent Protection
Object	+5V1.5A

1.Graph



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

Temperature 25°C
Testing Circuitry Figure A

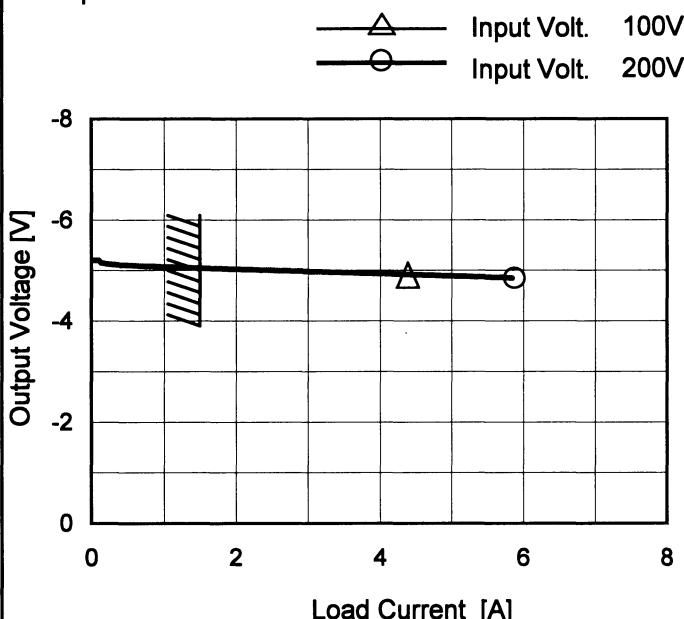
2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
5	4.42	5.83
4.75	-	-
4.50	-	-
4.00	-	-
3.50	-	-
3.00	-	-
2.50	-	-
2.00	-	-
1.50	-	-
1.00	-	-
0.50	-	-
0.00	-	-

-5V: Rated output current 1

Object -5V1.5A

1.Graph



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]
-5	4.41	5.84
-4.75	-	-
-4.50	-	-
-4.00	-	-
-3.50	-	-
-3.00	-	-
-2.50	-	-
-2.00	-	-
-1.50	-	-
-1.00	-	-
-0.50	-	-
0.00	-	-

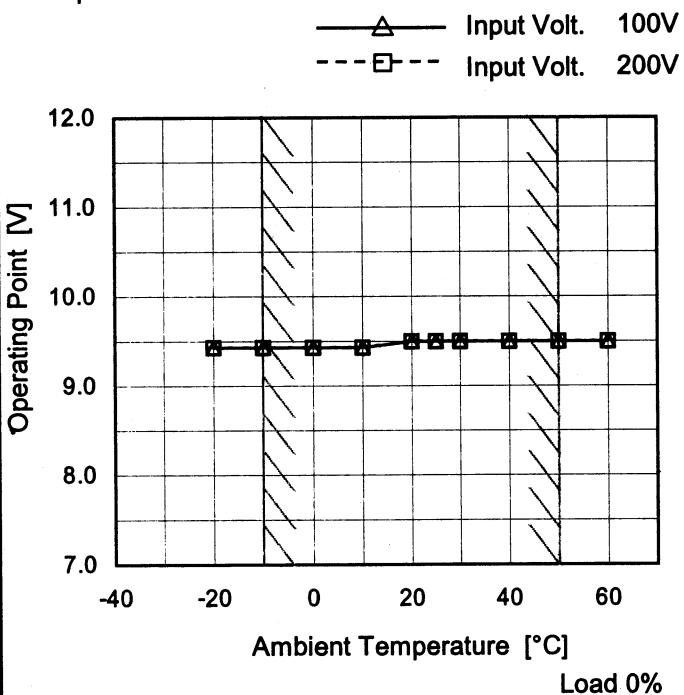
+5V: Rated output current 1

COSEL

Model	PBW30F-5
Item	Overvoltage Protection
Object	+5V1.5A

Testing Circuitry Figure A

1.Graph

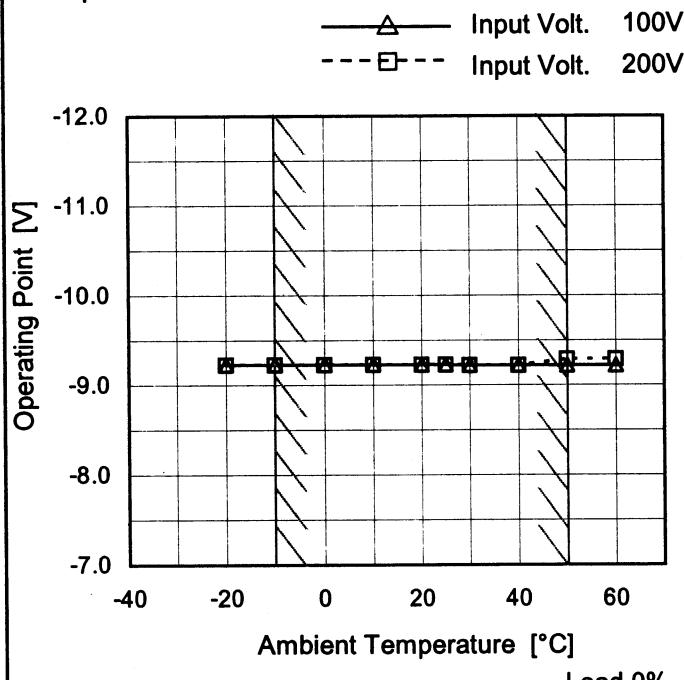


2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	9.43	9.43
-10	9.43	9.43
0	9.43	9.43
10	9.43	9.43
20	9.50	9.50
25	9.50	9.50
30	9.50	9.50
40	9.50	9.50
50	9.50	9.50
60	9.50	9.50
--	-	-

Object	-5V1.5A
--------	---------

1.Graph



2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	-9.23	-9.23
-10	-9.23	-9.23
0	-9.23	-9.23
10	-9.23	-9.23
20	-9.23	-9.23
25	-9.23	-9.23
30	-9.22	-9.22
40	-9.22	-9.22
50	-9.22	-9.29
60	-9.22	-9.29
--	-	-

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

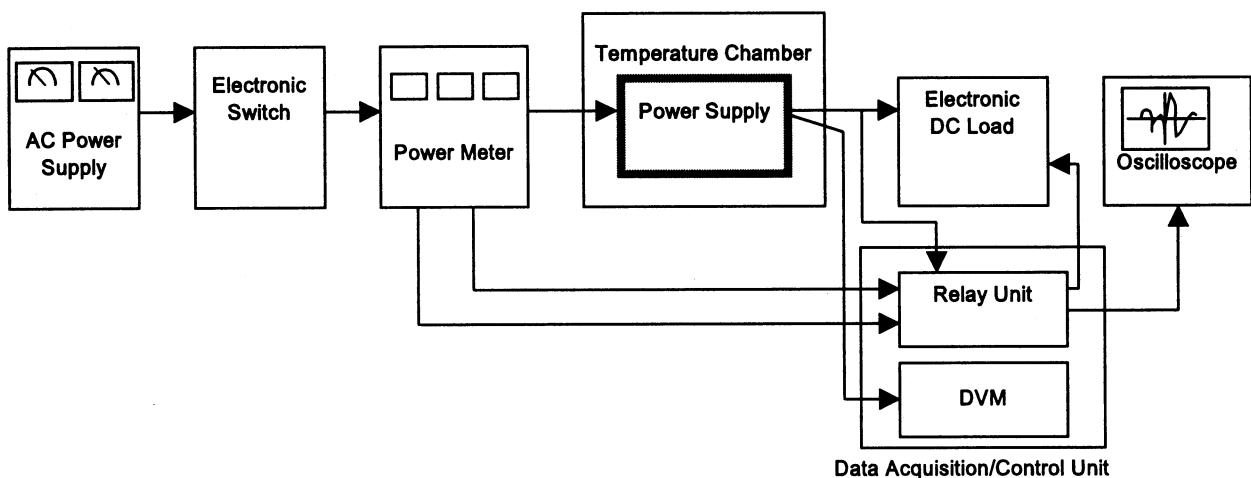


Figure A

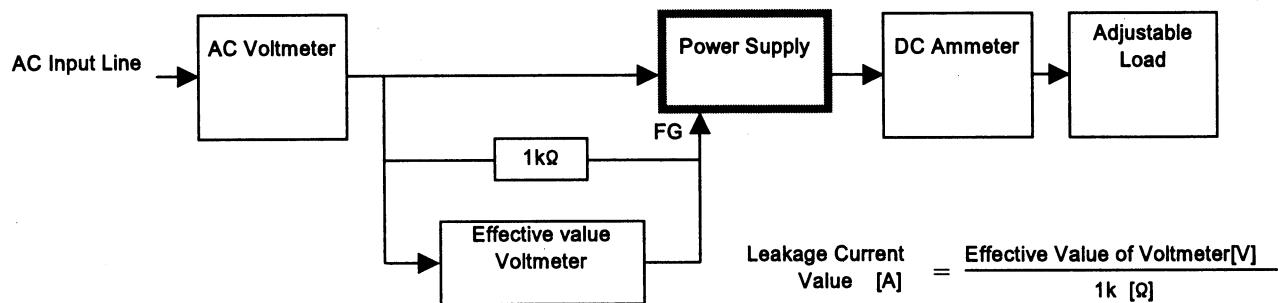


Figure B (DEN-AN)

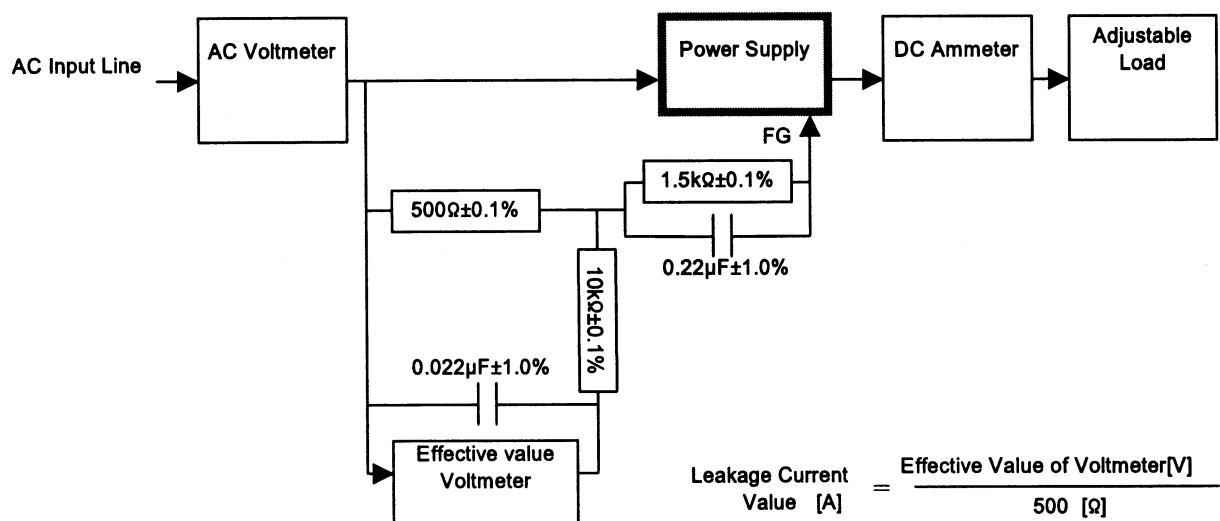


Figure B (IEC60950)