



TEST DATA OF PBW50F-5

Regulated DC Power Supply
Sep 29, 2005

Approved by : *Kuniaki Nagahara*
Kuniaki Nagahara Design Manager

Prepared by : *Atsushi Yoshiyama*
Atsushi Yoshiyama Design Engineer

COSEL CO.,LTD.

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(Final Page 30)



Model		PBW50F-5		Temperature 25°C																																																				
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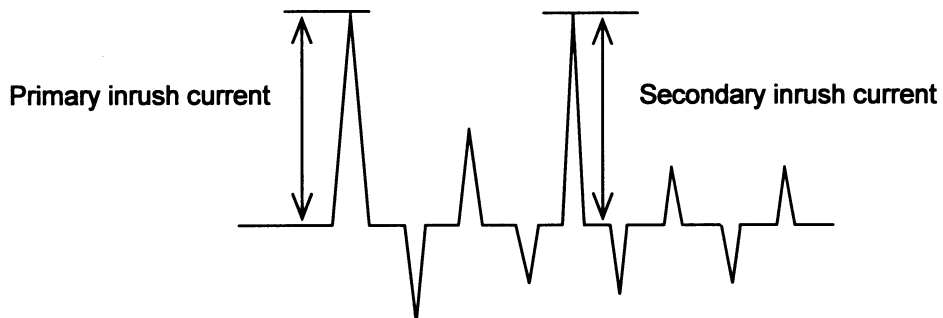
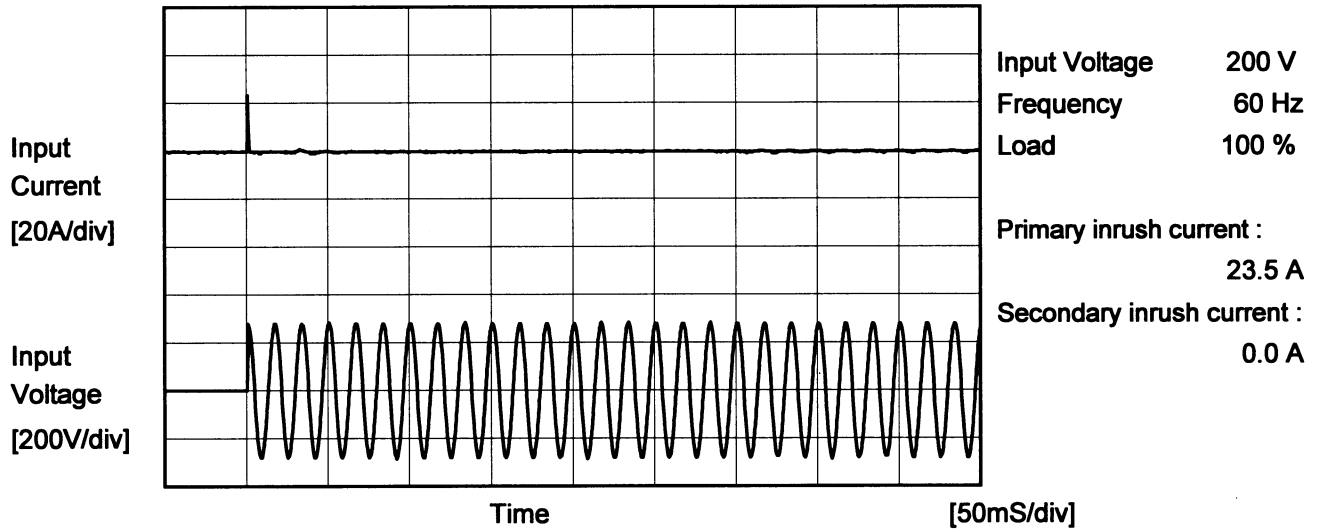
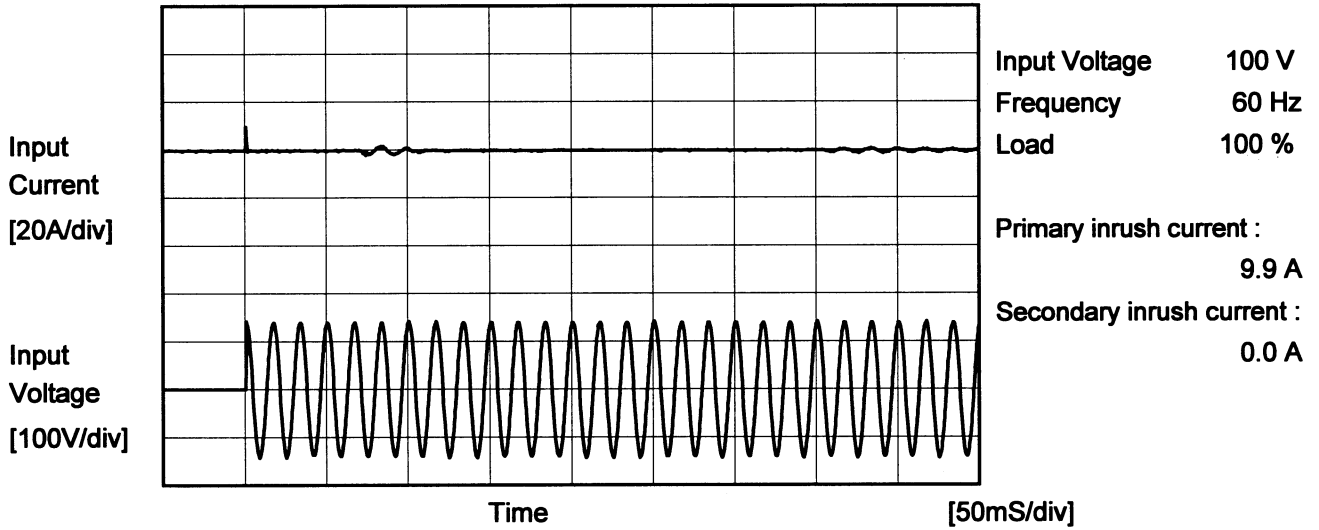
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Model		PBW50F-5	
Item		Inrush Current	
Object		_____	
		Temperature	25°C
		Testing Circuitry	Figure A





Model		PBW50F-5	Temperature 25°C Testing Circuitry Figure B
Item		Leakage Current	
Object		_____	

1.Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.18	0.40	0.54	Operation
	One of phase	0.27	0.54	0.63	stand by
IEC60950	Both phases	0.18	0.40	0.54	Operation
	One of phase	0.27	0.54	0.63	stand by

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

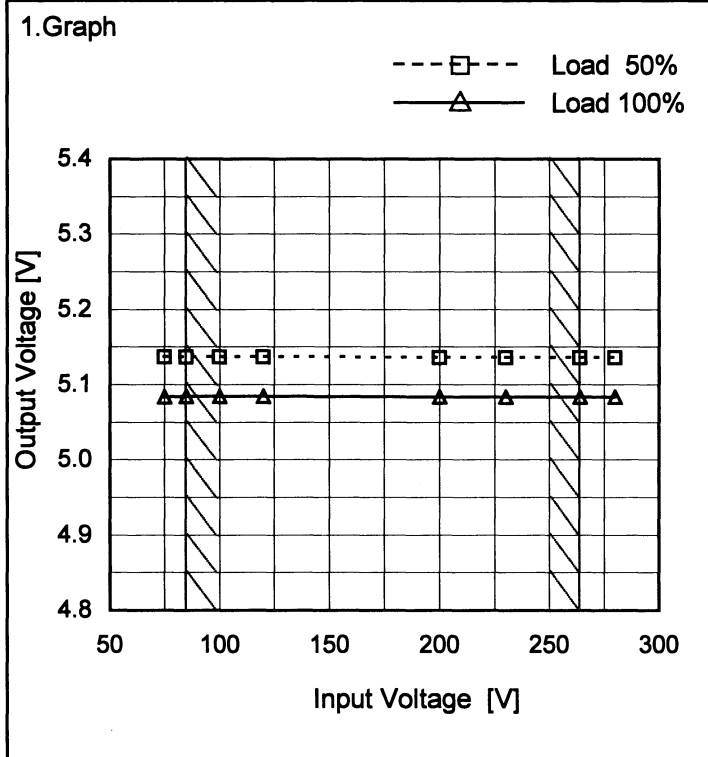
2.Condition

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



Model	PBW50F-5
Item	Line Regulation
Object	+5V3A

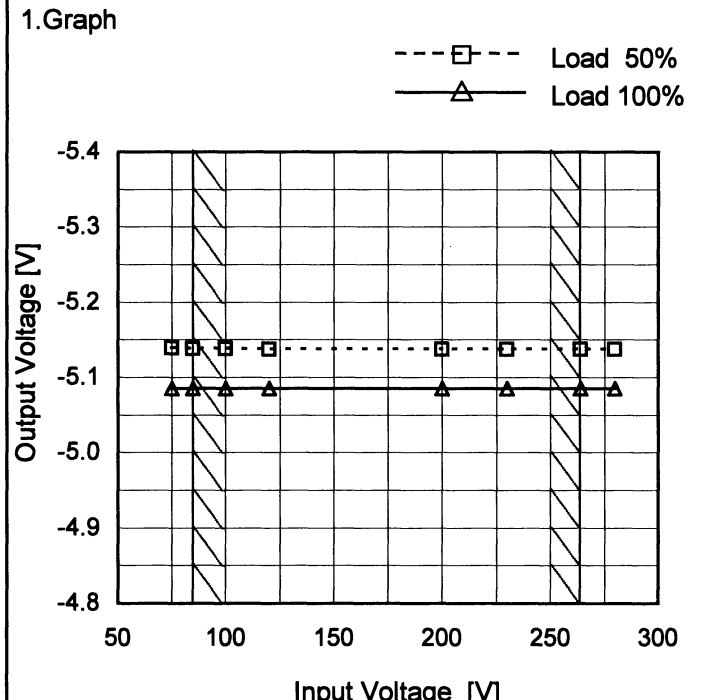
Temperature 25°C
Testing Circuitry Figure A



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	5.137	5.084
85	5.137	5.084
100	5.137	5.084
120	5.136	5.084
200	5.136	5.084
230	5.136	5.084
264	5.136	5.084
280	5.136	5.084
--	-	-

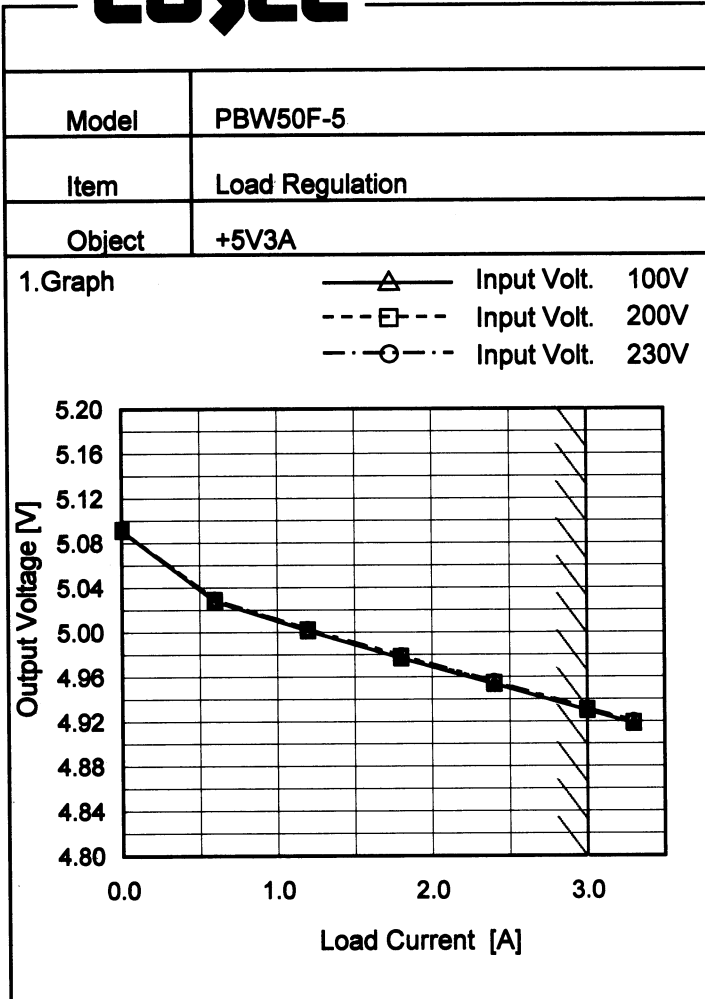
Object	-5V3A
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2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	-5.139	-5.085
85	-5.138	-5.085
100	-5.138	-5.086
120	-5.138	-5.086
200	-5.138	-5.086
230	-5.138	-5.086
264	-5.138	-5.086
280	-5.138	-5.086
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Note: Slanted line shows the range of the rated input voltage.

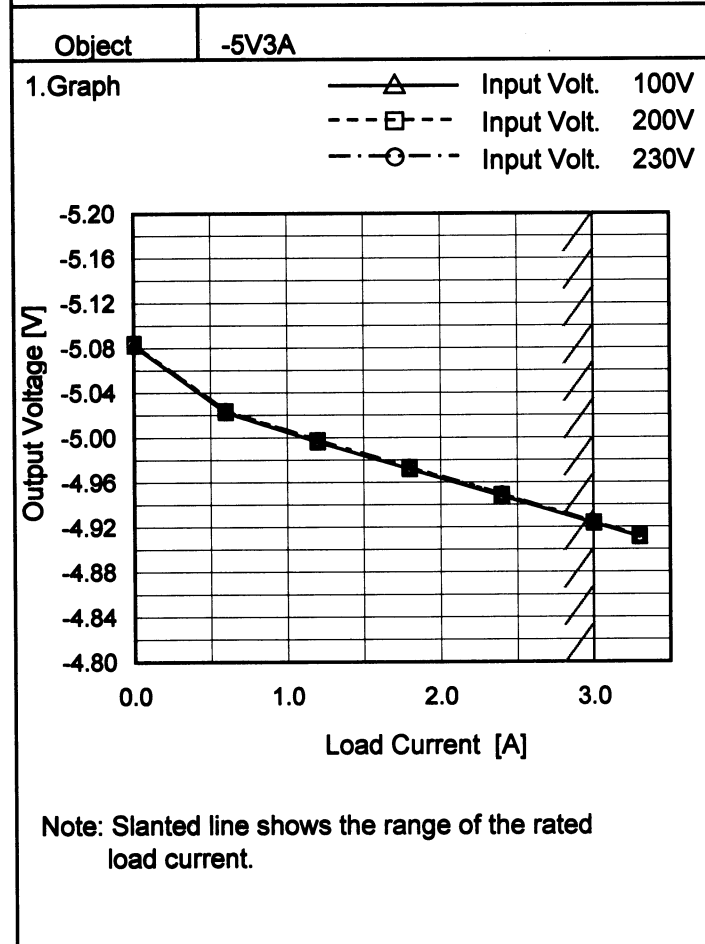


Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	5.091	5.092	5.092
0.6	5.028	5.029	5.030
1.2	5.001	5.003	5.003
1.8	4.977	4.979	4.979
2.4	4.954	4.955	4.956
3.0	4.930	4.931	4.932
3.3	4.918	4.919	4.920
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-5V : Rated output current 1



2. Values

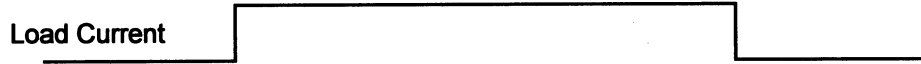
Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-5.082	-5.084	-5.084
0.6	-5.023	-5.024	-5.024
1.2	-4.996	-4.998	-4.998
1.8	-4.972	-4.973	-4.974
2.4	-4.948	-4.949	-4.949
3.0	-4.923	-4.924	-4.924
3.3	-4.911	-4.912	-4.912
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+5V : Rated output current 1



Model		PBW50F-5	
Item		Dynamic Load Response	
Object		+5V3A	
		Temperature	25°C
		Testing Circuitry	Figure A

Input Volt. 100 V
Cycle 1000 ms

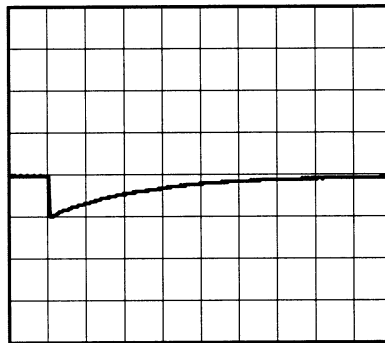


Min. Load (0A) ←→

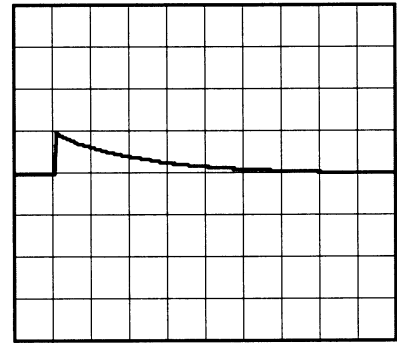
Output current 2 (4A)

*-5V : 2A

200 mV/div



100 ms/div



100 ms/div

Min. Load (0A) ←→

Output current 1 (3A)

*-5V : 3A

200 mV/div



100 ms/div



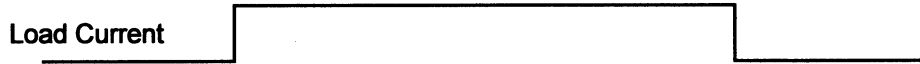
100 ms/div

*The characteristic of AC200V is equal.



Model		PBW50F-5	
Item		Dynamic Load Response	
Object		-5V3A	
		Temperature	25°C
		Testing Circuitry	Figure A

Input Volt. 100 V
Cycle 1000 ms



Min. Load (0A) ←→

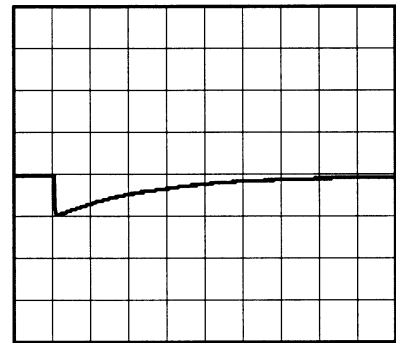
Output current 2 (4A)

*+5V : 2A

200 mV/div



100 ms/div



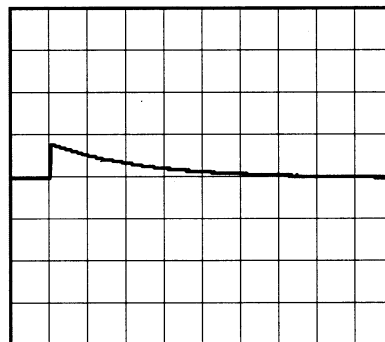
100 ms/div

Min. Load (0A) ←→

Output current 1 (3A)

*+5V : 3A

200 mV/div



100 ms/div



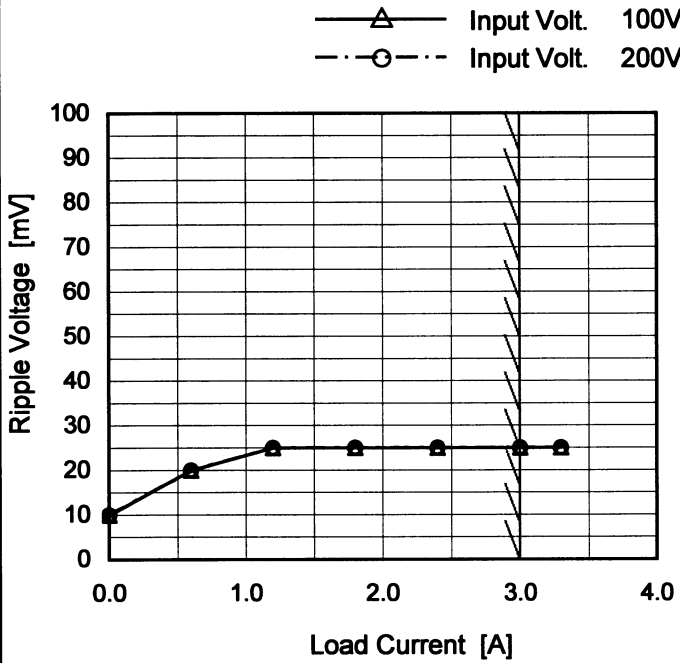
100 ms/div

*The characteristic of AC200V is equal.



Model	PBW50F-5	Temperature	25°C
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure A
Object	+5V3A		

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	10	10
0.6	20	20
1.2	25	25
1.8	25	25
2.4	25	25
3.0	25	25
3.3	25	25
-	-	-
-	-	-
-	-	-
-	-	-

-5V : Rated output current 1

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.

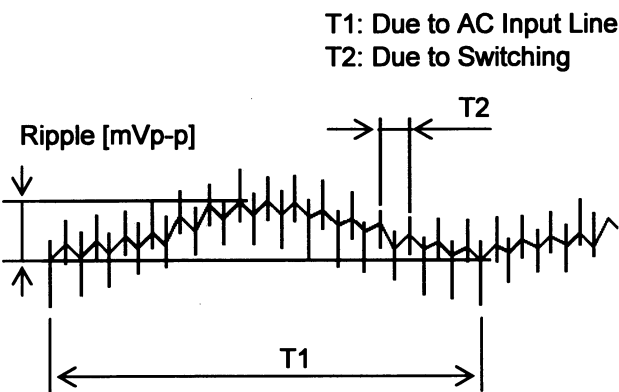


Fig. Complex Ripple Wave Form

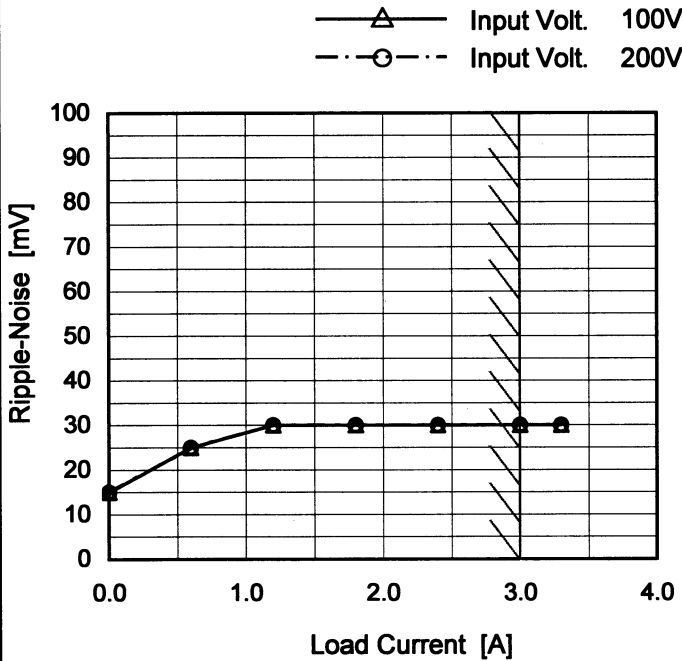


<p>Model PBW50F-5</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																						
<p>Item Ripple Voltage (by Load Current)</p>																																								
<p>Object -5V3A</p>																																								
<p>1. Graph</p> <div style="text-align: center;"> <p>—△— Input Volt. 100V - - -○- - - Input Volt. 200V</p> </div> <p style="text-align: center;">Ripple Voltage [mV]</p> <p style="text-align: center;">Load Current [A]</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 100 [V]</th> <th>Input Volt. 200 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>10</td><td>10</td></tr> <tr><td>0.6</td><td>20</td><td>20</td></tr> <tr><td>1.2</td><td>25</td><td>25</td></tr> <tr><td>1.8</td><td>25</td><td>25</td></tr> <tr><td>2.4</td><td>25</td><td>25</td></tr> <tr><td>3.0</td><td>25</td><td>25</td></tr> <tr><td>3.3</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> </tbody> </table> <p style="text-align: center;">+5V : Rated output current 1</p>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	10	10	0.6	20	20	1.2	25	25	1.8	25	25	2.4	25	25	3.0	25	25	3.3	25	25	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Ripple Voltage [mV]																																							
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3.0	25	25																																						
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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>																																								
<div style="text-align: center;"> <p>T1: Due to AC Input Line T2: Due to Switching</p> <p style="text-align: center;">Ripple [mVp-p]</p> <p style="text-align: center;">T1</p> <p style="text-align: center;">T2</p> </div> <p style="text-align: center;">Fig. Complex Ripple Wave Form</p>																																								



Model	PBW50F-5	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure A
Object	+5V3A		

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
0.6	25	25
1.2	30	30
1.8	30	30
2.4	30	30
3.0	30	30
3.3	30	30
-	-	-
-	-	-
-	-	-
-	-	-

-5V : Rated output current 1

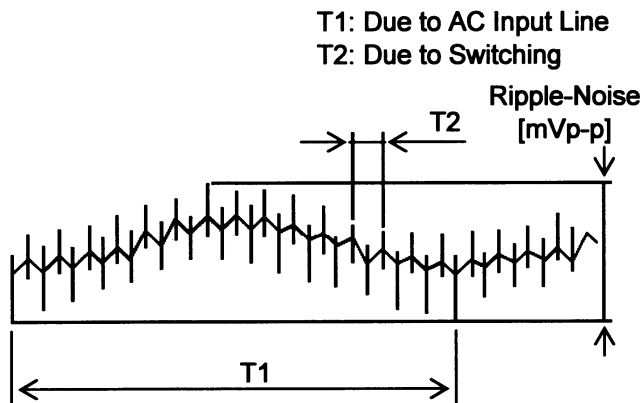
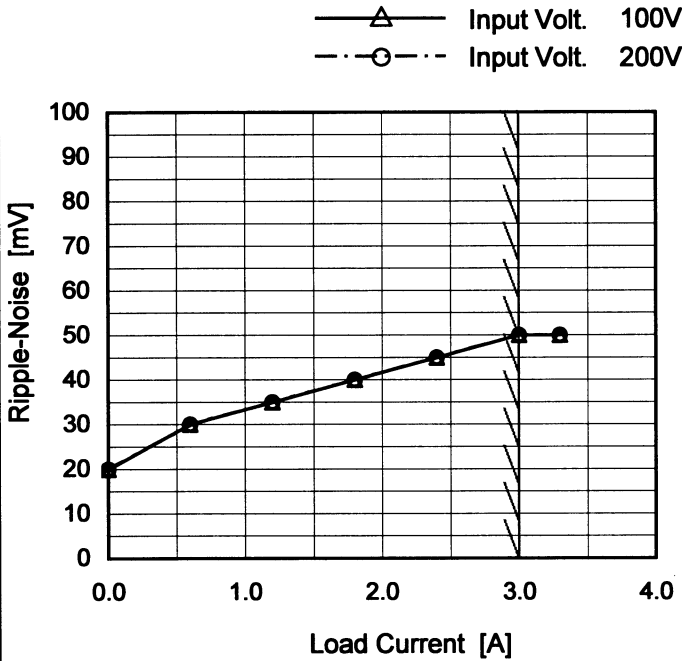


Fig. Complex Ripple Wave Form



Model	PBW50F-5	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure A
Object	-5V3A		

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	20	20
0.6	30	30
1.2	35	35
1.8	40	40
2.4	45	45
3.0	50	50
3.3	50	50
--	-	-
--	-	-
--	-	-
--	-	-

+5V : Rated output current 1

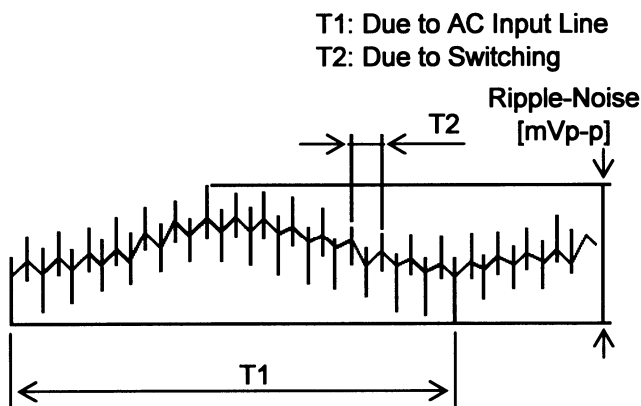


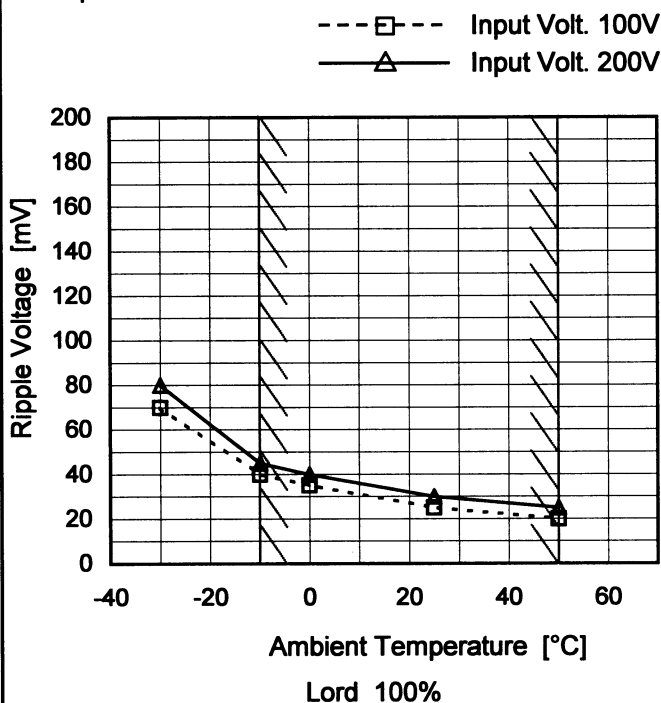
Fig. Complex Ripple Wave Form



Model	PBW50F-5
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V3A

Testing Circuitry Figure A

1. Graph



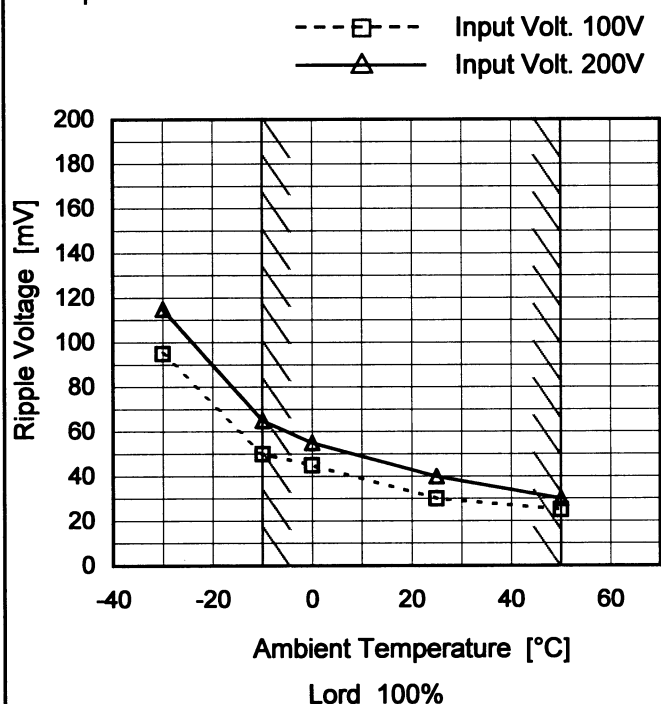
2. Values

Ambient Temperature [°C]	Ripple Voltage[mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	70	80
-10	40	45
0	35	40
25	25	30
50	20	25
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

-5V : Rated output current 1

Object	-5V3A
--------	-------

1. Graph



2. Values

Ambient Temperature [°C]	Ripple Voltage[mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	95	115
-10	50	65
0	45	55
25	30	40
50	25	30
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

+5V : Rated output current 1

Measured by 20 MHz Oscilloscope.

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



Model PBW50F-5		Testing Circuitry Figure A																																																				
Item Ambient Temperature Drift																																																						
Object +5V3A																																																						
1.Graph <div style="display: flex; justify-content: space-between; margin-top: 10px;"> —△— Input Volt. 100V 2.Values </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> ---□--- Input Volt. 200V </div> <div style="display: flex; justify-content: space-between; margin-top: 10px;"> -·-○-·- Input Volt. 230V </div> <p style="text-align: center;">Ambient Temperature [°C] Load 100%</p>		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</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>-20</td><td>5.091</td><td>5.090</td><td>5.089</td></tr> <tr><td>-10</td><td>5.091</td><td>5.090</td><td>5.089</td></tr> <tr><td>0</td><td>5.091</td><td>5.090</td><td>5.089</td></tr> <tr><td>10</td><td>5.091</td><td>5.089</td><td>5.089</td></tr> <tr><td>20</td><td>5.091</td><td>5.089</td><td>5.089</td></tr> <tr><td>25</td><td>5.090</td><td>5.089</td><td>5.088</td></tr> <tr><td>30</td><td>5.089</td><td>5.088</td><td>5.088</td></tr> <tr><td>40</td><td>5.087</td><td>5.086</td><td>5.086</td></tr> <tr><td>50</td><td>5.082</td><td>5.081</td><td>5.080</td></tr> <tr><td>60</td><td>5.078</td><td>5.077</td><td>5.077</td></tr> <tr><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-20	5.091	5.090	5.089	-10	5.091	5.090	5.089	0	5.091	5.090	5.089	10	5.091	5.089	5.089	20	5.091	5.089	5.089	25	5.090	5.089	5.088	30	5.089	5.088	5.088	40	5.087	5.086	5.086	50	5.082	5.081	5.080	60	5.078	5.077	5.077	-	-	-	-	
Ambient Temperature [°C]	Output Voltage [V]																																																					
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Note: Slanted line shows the range of the rated ambient temperature.																																																						



COSEL		Testing Circuitry Figure A
Model	PBW50F-5	
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 - 3A (AVR 2) : 0 - 3A

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

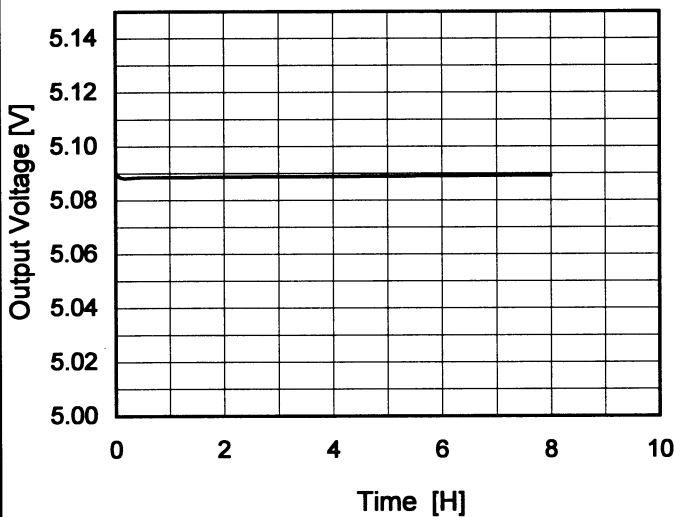
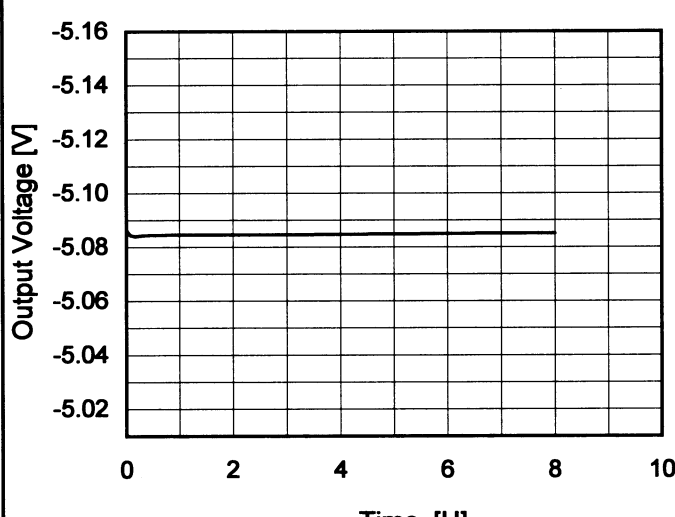
* Output Voltage Accuracy (Ration) = $\frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

2. Values

Object		+5V3A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	50	264	0	5.266	±87	±1.7	
Minimum Voltage	-10	85	3	5.092			

Object		-5V3A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Output		Value [mV]	Ration [%]	
			Current[A]	Voltage[V]			
Maximum Voltage	50	200	0	-5.256	±86	±1.7	
Minimum Voltage	50	85	3	-5.084			

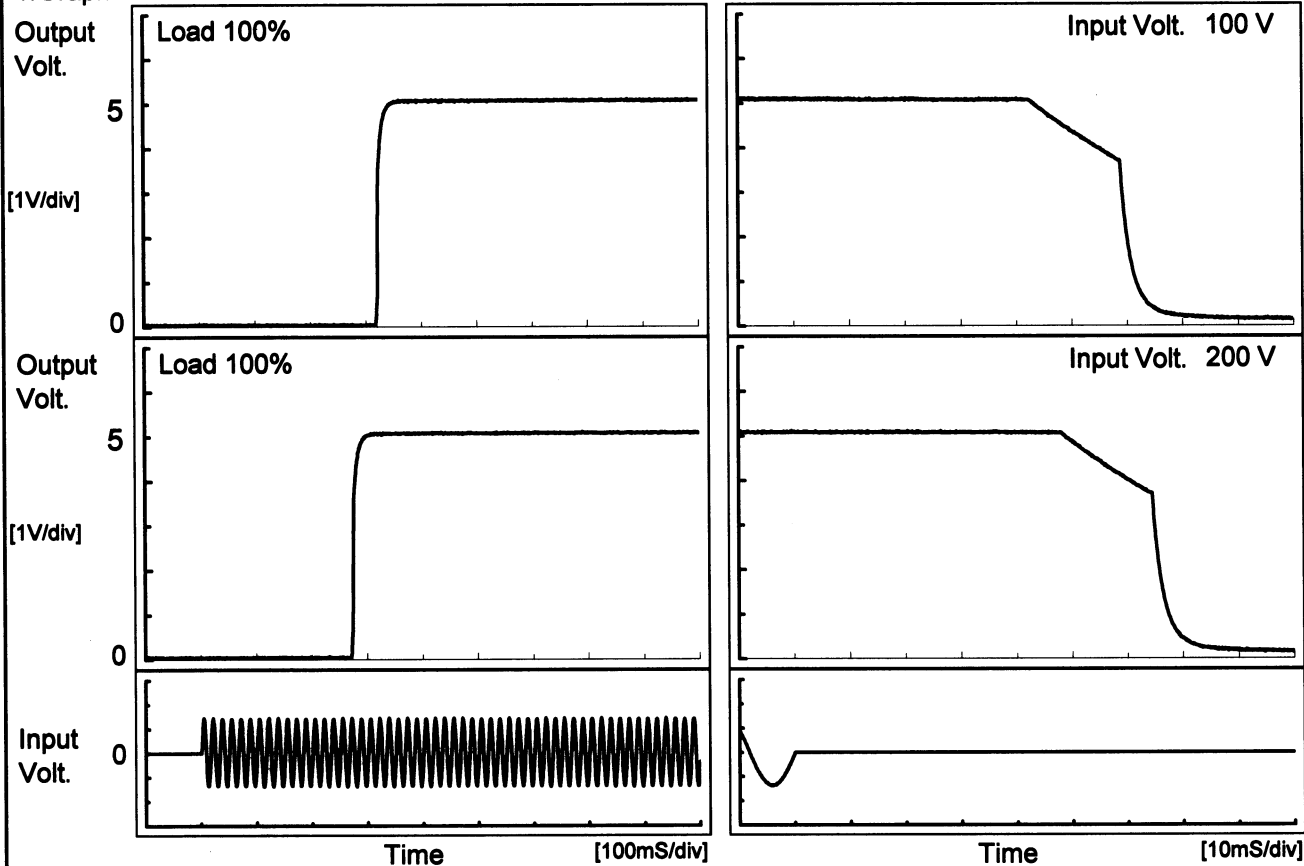


Model PBW50F-5		Temperature 25°C Testing Circuitry Figure A																							
Item Time Lapse Drift																									
Object +5V3A																									
1.Graph  <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">Input Volt. 100V Load 100%</p>		2.Values <table border="1" data-bbox="925 492 1300 1041"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5.091</td></tr> <tr><td>0.5</td><td>5.089</td></tr> <tr><td>1.0</td><td>5.089</td></tr> <tr><td>2.0</td><td>5.089</td></tr> <tr><td>3.0</td><td>5.089</td></tr> <tr><td>4.0</td><td>5.089</td></tr> <tr><td>5.0</td><td>5.089</td></tr> <tr><td>6.0</td><td>5.089</td></tr> <tr><td>7.0</td><td>5.089</td></tr> <tr><td>8.0</td><td>5.089</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	5.091	0.5	5.089	1.0	5.089	2.0	5.089	3.0	5.089	4.0	5.089	5.0	5.089	6.0	5.089	7.0	5.089	8.0	5.089	
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Time since start [H]	Output Voltage [V]																								
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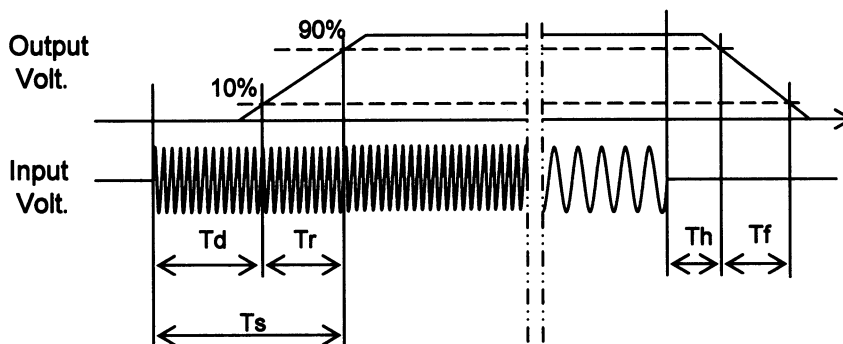
Model		PBW50F-5	
Item		Rise and Fall Time	
Object		+5V3A	
		Temperature	25°C
		Testing Circuitry	Figure A

1. Graph



2. Values

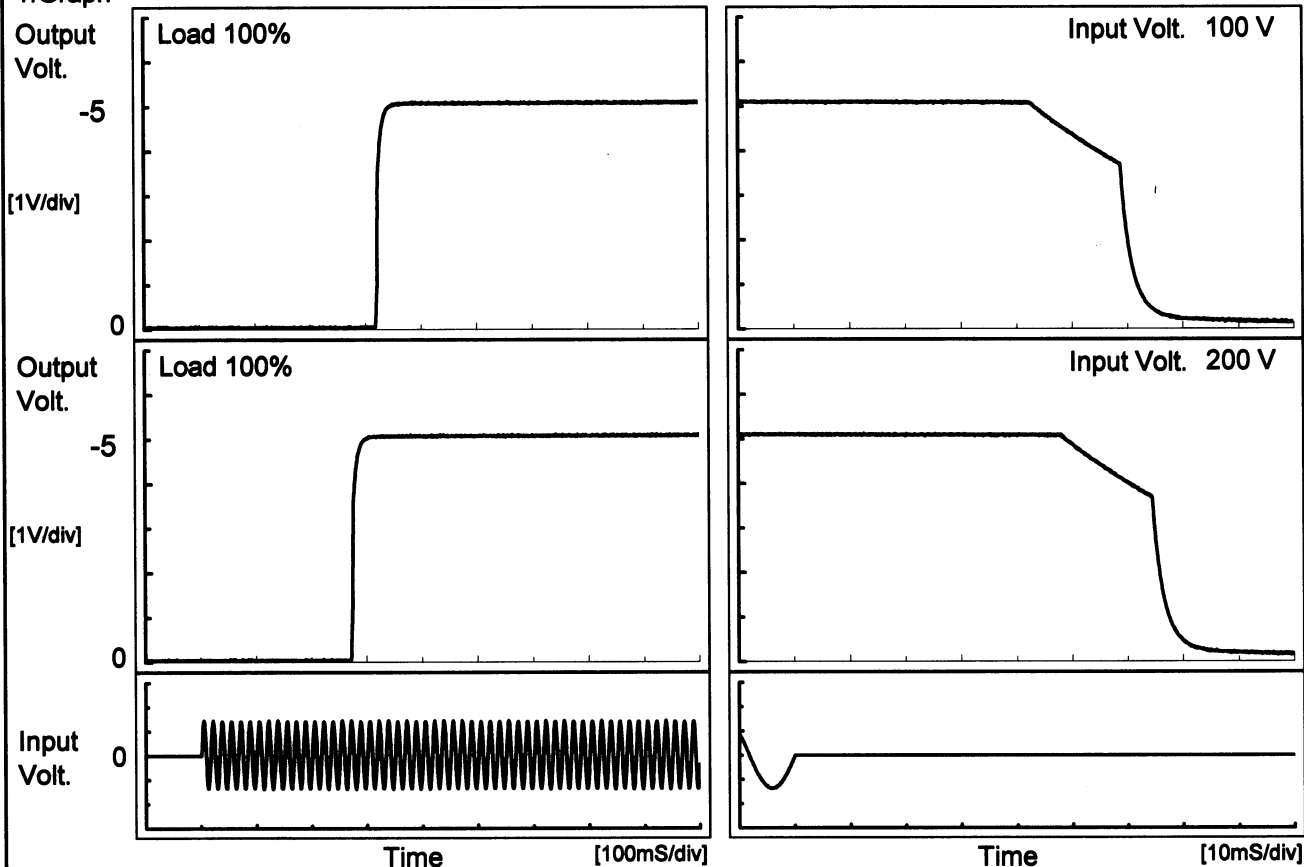
		[mS]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		320.0	9.5	329.5	48.0	15.5
200 V		273.5	10.0	283.5	53.8	15.6





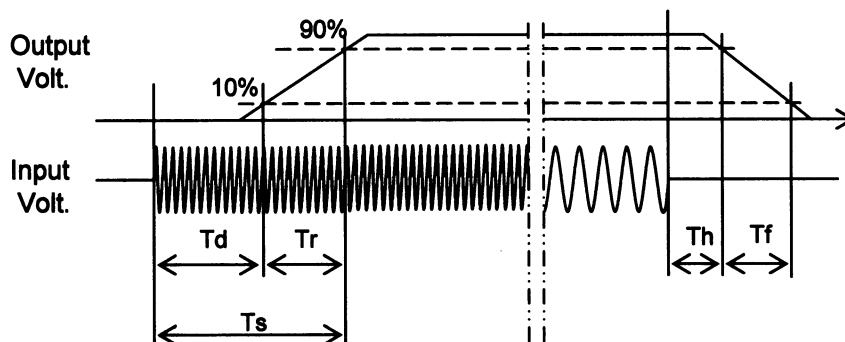
Model		PBW50F-5	Temperature 25°C	
Item		Rise and Fall Time	Testing Circuitry Figure A	
Object		-5V3A		

1. Graph



2. Values

		[mS]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		319.0	10.5	329.5	48.1	15.8
200 V		273.0	10.5	283.5	53.6	15.9





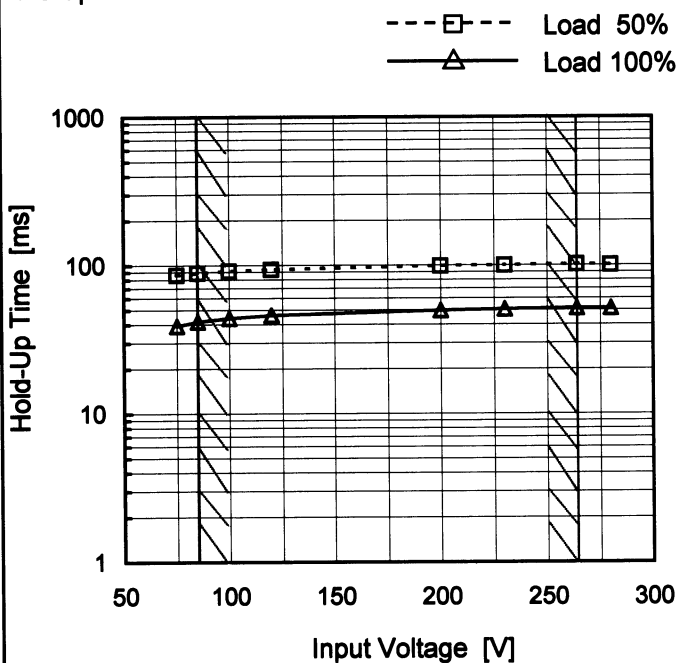
<p>Model PBW50F-5</p> <p>Item Hold-Up Time</p> <p>Object +5V3A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure A</p>																																
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Input Voltage [V]	Hold-Up Time [ms]																																	
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230	100	51																																
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<p>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.</p>																																		



Model	PBW50F-5
Item	Hold-Up Time
Object	-5V3A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



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.

2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	86	39
85	89	42
100	91	44
120	94	46
200	99	50
230	100	51
264	101	51
280	101	51
--	-	-



Model PBW50F-5		Temperature 25°C Testing Circuitry Figure A																																																				
Item Instantaneous Interruption Compensation																																																						
Object +5V3A																																																						
1. Graph <div style="display: flex; justify-content: space-between; margin-top: 10px;"> <div style="width: 60%;"> </div> <div style="width: 35%;"> <p>—△— Input Volt. 100V - - □ - - Input Volt. 200V · · ○ · · Input Volt. 230V</p> </div> </div>		2. Values																																																				
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Load Current [A]	Time [ms]																																																					
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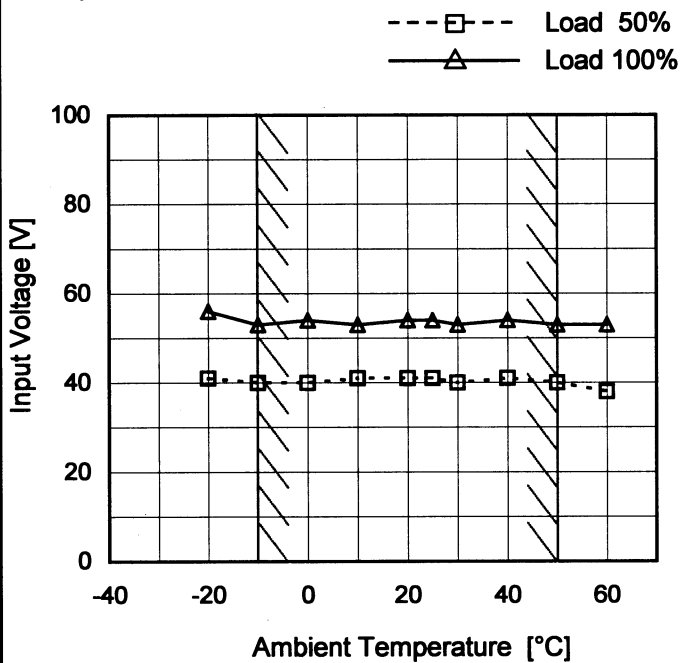
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Model	PBW50F-5
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V3A

Testing Circuitry Figure A

1. Graph

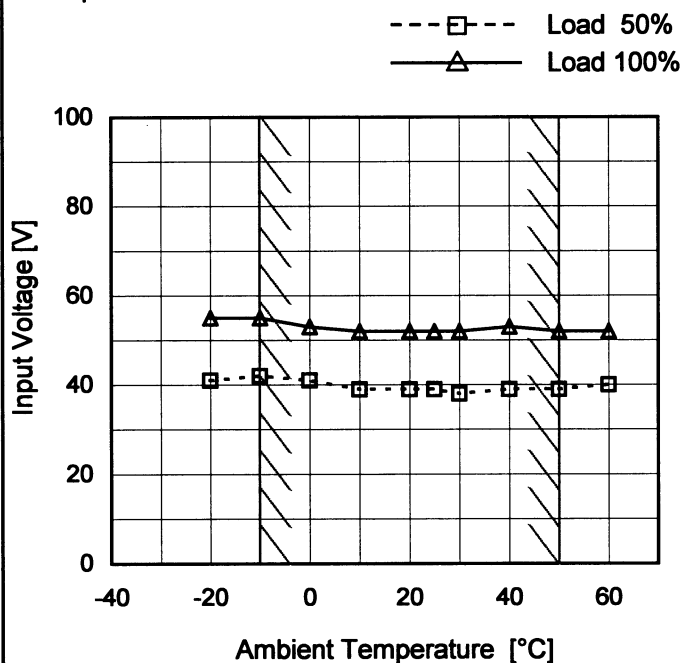


2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	41	56
-10	40	53
0	40	54
10	41	53
20	41	54
25	41	54
30	40	53
40	41	54
50	40	53
60	38	53
-	-	-

Object	-5V3A
--------	-------

1. Graph



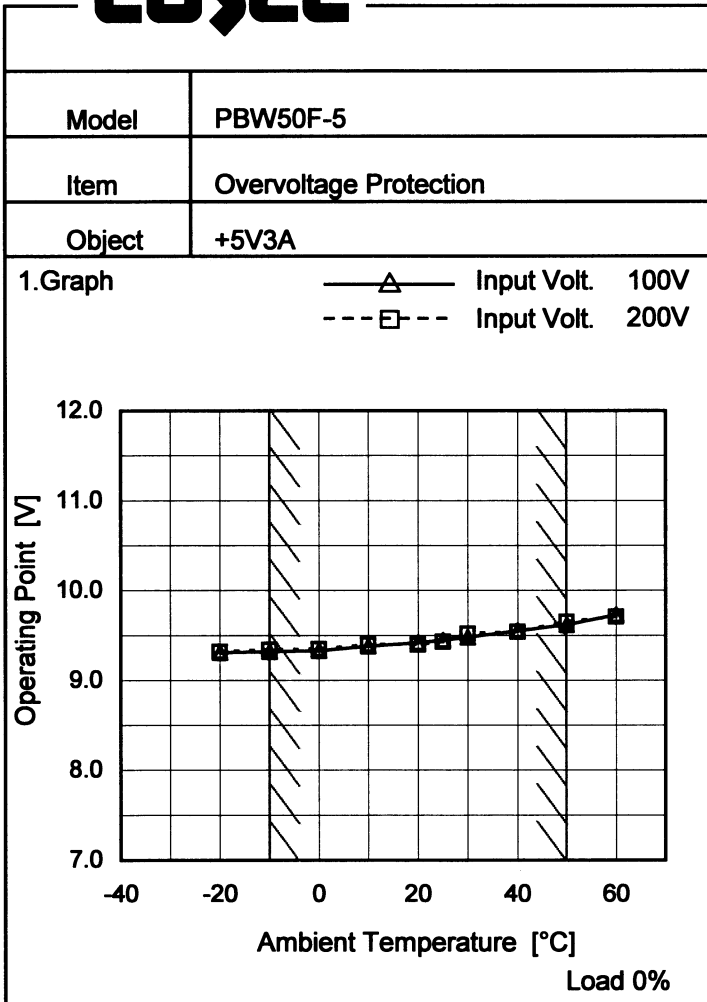
2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	41	55
-10	42	55
0	41	53
10	39	52
20	39	52
25	39	52
30	38	52
40	39	53
50	39	52
60	40	52
-	-	-

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



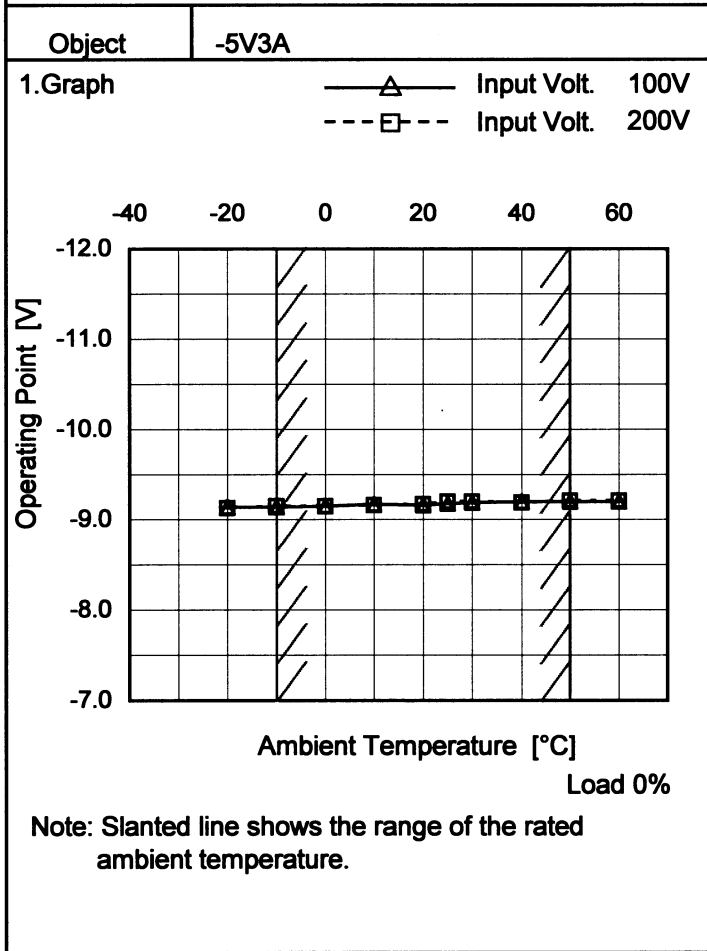
Model PBW50F-5		Temperature 25°C Testing Circuitry Figure A																																												
Item Overcurrent Protection																																														
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Output Voltage [V]	Load Current [A]																																													
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Note: Slanted line shows the range of the rated load current. Intermittent operation occurs when the output voltage is from -3V to 0V.																																														



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	9.31	9.32
-10	9.32	9.34
0	9.33	9.35
10	9.38	9.40
20	9.42	9.40
25	9.45	9.43
30	9.48	9.52
40	9.55	9.54
50	9.62	9.65
60	9.73	9.71
-	-	-



2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	-9.14	-9.13
-10	-9.14	-9.15
0	-9.15	-9.15
10	-9.17	-9.16
20	-9.16	-9.17
25	-9.18	-9.20
30	-9.19	-9.20
40	-9.20	-9.19
50	-9.20	-9.21
60	-9.20	-9.21
-	-	-

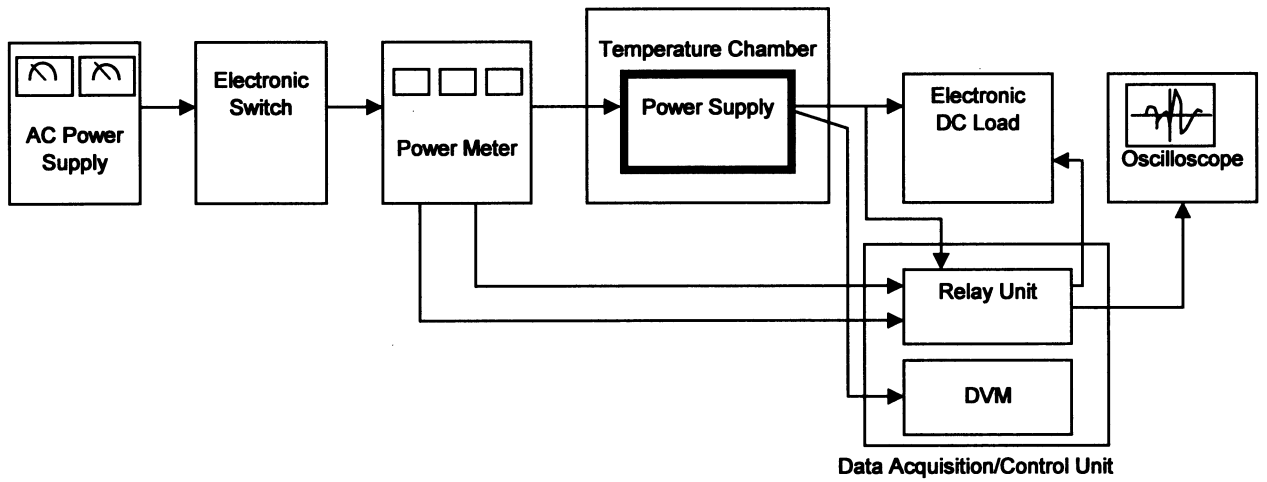


Figure A

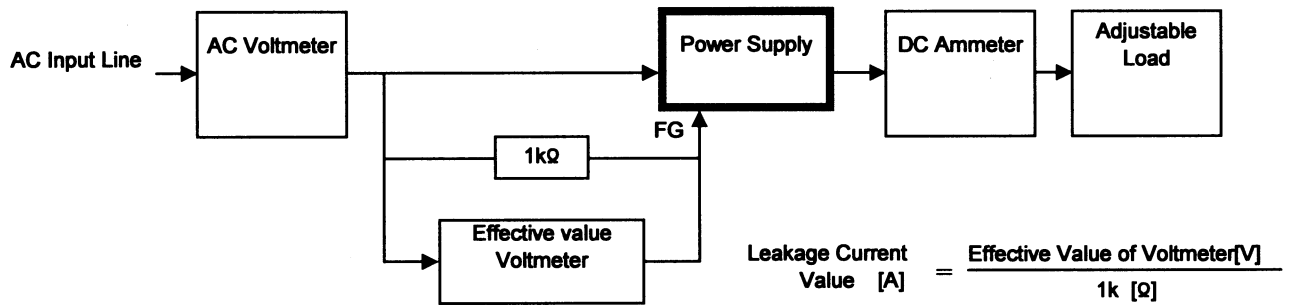


Figure B (DEN-AN)

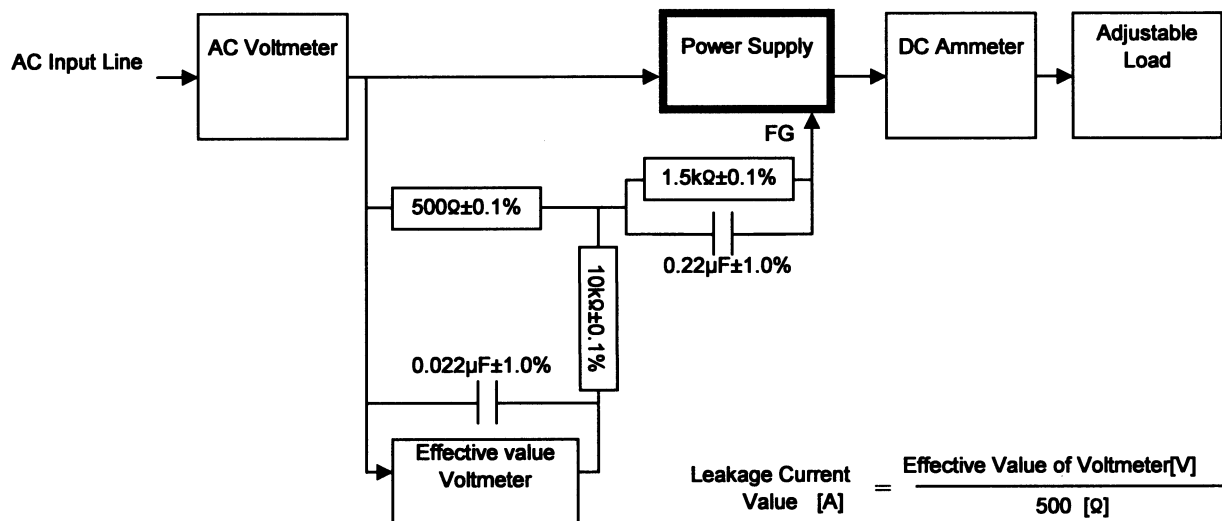


Figure B (IEC60950)