



TEST DATA OF PBW50F-15

Regulated DC Power Supply
Sep 29, 2005

Approved by : Kuniaki Nagahara Design Manager

Prepared by : Atsushi Yoshiyama Design Engineer

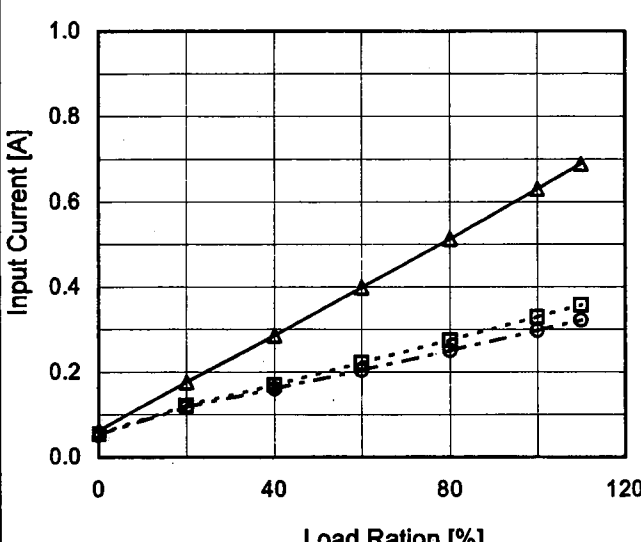
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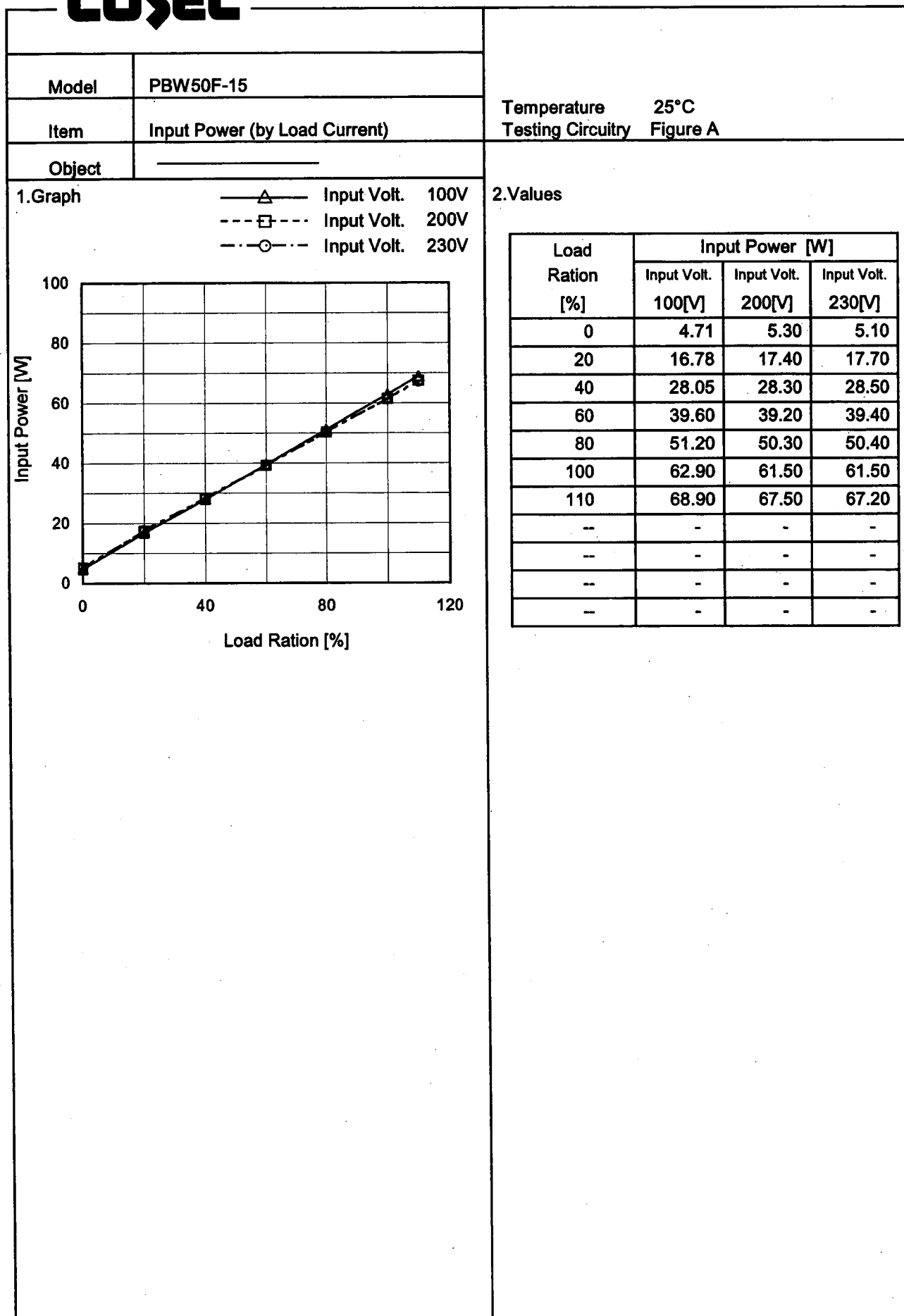
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Model		PBW50F-15																																																				
Item		Input Current (by Load Current)																																																				
Object																																																						
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 200V</div></div><div><div>---○---</div><div>Input Volt. 230V</div></div></div> 		<table><tr><th rowspan="2">Load Ration [%]</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</td><td>0.062</td><td>0.055</td><td>0.052</td></tr><tr><td>20</td><td>0.176</td><td>0.121</td><td>0.118</td></tr><tr><td>40</td><td>0.286</td><td>0.170</td><td>0.161</td></tr><tr><td>60</td><td>0.399</td><td>0.222</td><td>0.204</td></tr><tr><td>80</td><td>0.513</td><td>0.275</td><td>0.250</td></tr><tr><td>100</td><td>0.630</td><td>0.329</td><td>0.298</td></tr><tr><td>110</td><td>0.689</td><td>0.358</td><td>0.322</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 Ration [%]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0	0.062	0.055	0.052	20	0.176	0.121	0.118	40	0.286	0.170	0.161	60	0.399	0.222	0.204	80	0.513	0.275	0.250	100	0.630	0.329	0.298	110	0.689	0.358	0.322	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model		PBW50F-15	
Item		Efficiency (by Input Voltage)	
Object			

1.Graph

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ModelPBW50F-15		Temperature25°C																																																				
Item	Efficiency (by Load Current)	Testing CircuitryFigure A																																																				
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Model		PBW50F-15	
Item		Power Factor (by Input Voltage)	
Object			

1.Graph

□

Load 50%

△

Load 100%

Power Factor

1.0

0.9

0.8

0.7

0.6

0.5

0.4

50

100

150

200

250

300

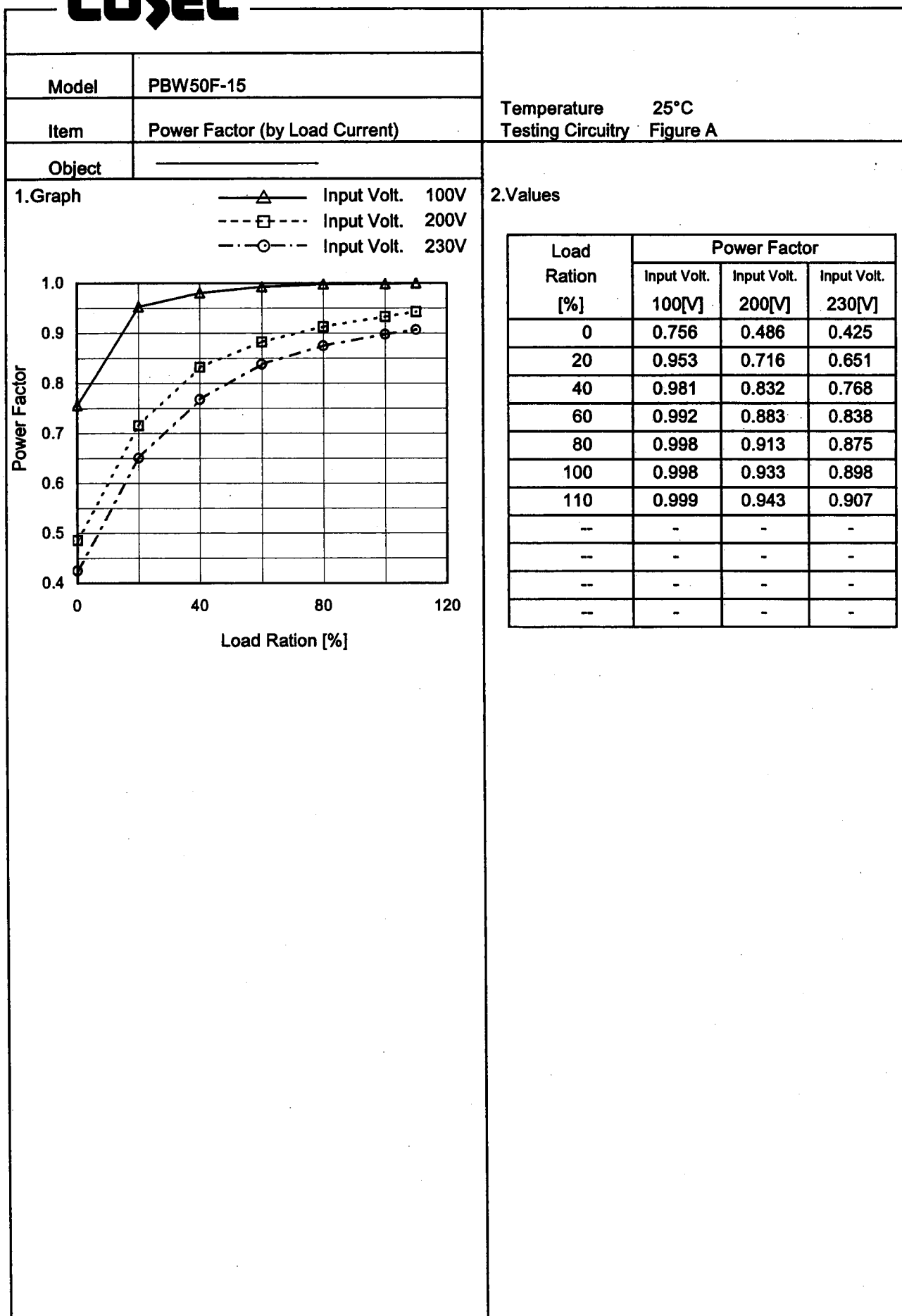
Input Voltage [V]

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

2.Values

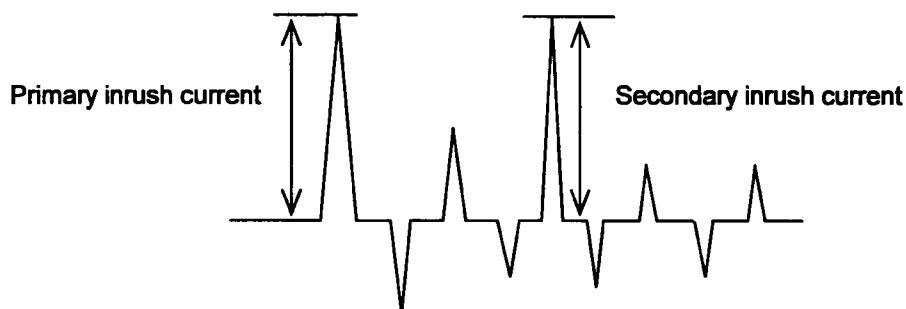
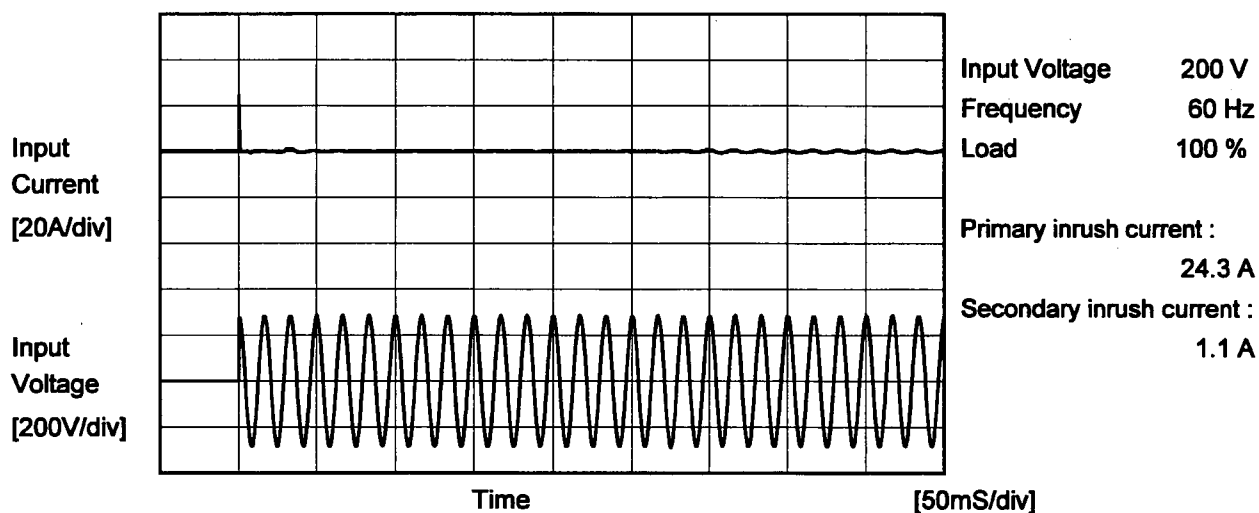
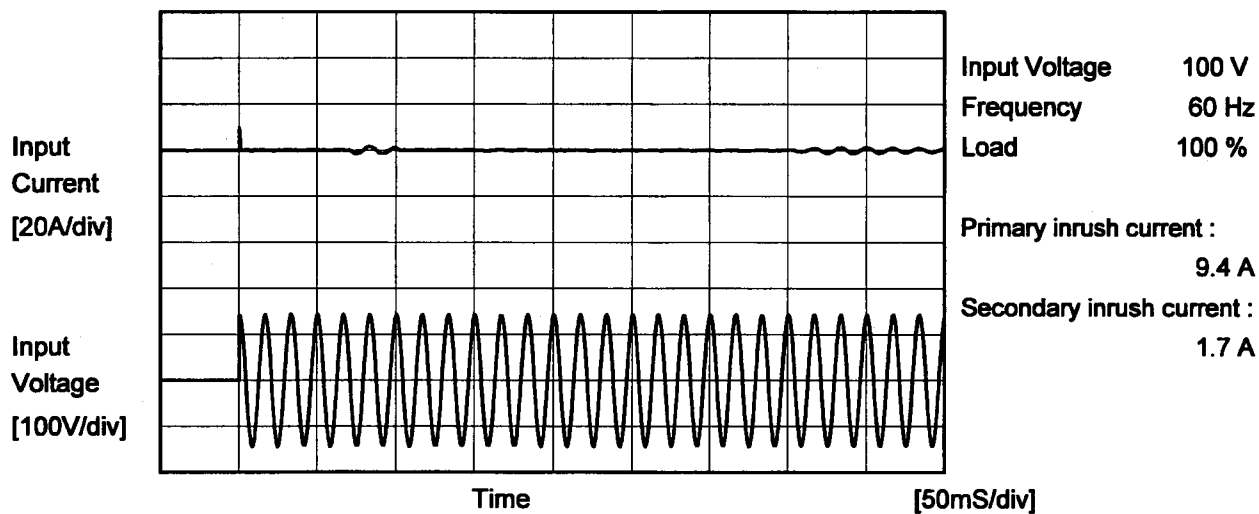
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.997	0.999
85	0.997	0.999
100	0.987	0.998
120	0.973	0.992
200	0.860	0.933
230	0.811	0.896
264	0.733	0.858
280	0.684	0.844
--	-	-

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Model	PBW50F-15	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		



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		Temperature 25°C Testing Circuitry Figure B
Model	PBW50F-15	
Item	Leakage Current	
Object		

1.Results

[mA]

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.

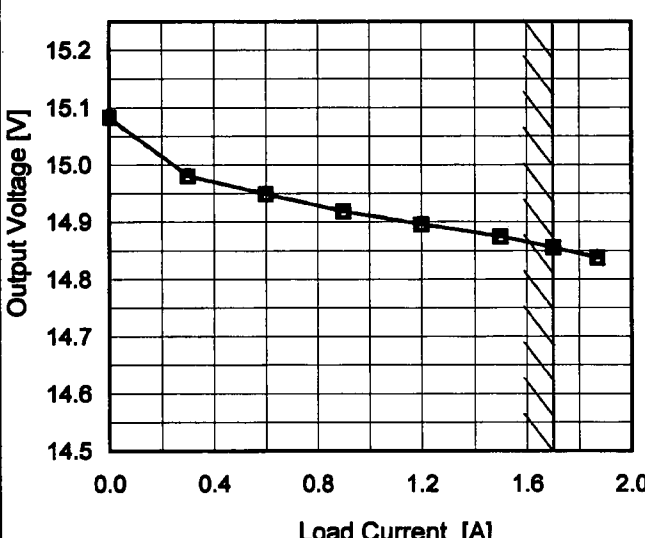
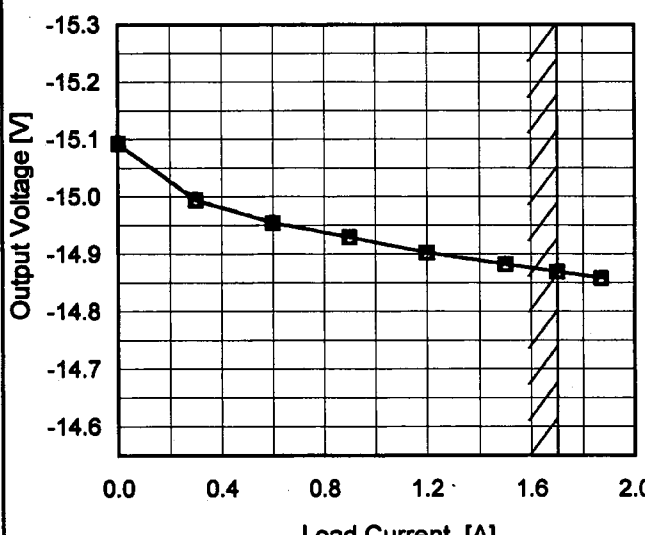
2.Condition

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

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ModelPBW50F-15		Temperature25°C Testing CircuitryFigure A																															
Item	Line Regulation																																
Object	+15V1.7A																																
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Note: Slanted line shows the range of the rated load current.																																																						

- 10 -

BC-10005

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Model	PBW50F-15	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V1.7A		

Input Volt. 100 V
Cycle 1000 ms

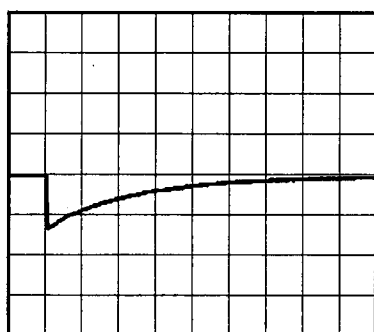
Load Current

Min. Load (0A) ←→

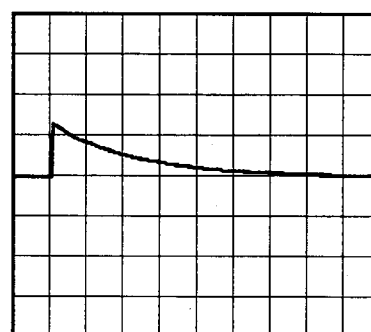
Output current 2 (2.4A)

★-15V : 1.0A

200 mV/div



100 ms/div



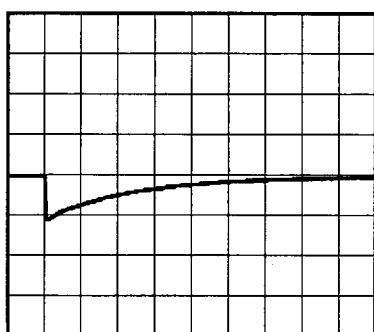
100 ms/div

Min. Load (0A) ←→

Output current 1 (1.7A)

★-15V : 1.7A

200 mV/div



100 ms/div



100 ms/div

★The characteristic of AC200V is equal.

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Model	PBW50F-15	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	-15V1.7A		

Input Volt. 100 V
Cycle 1000 ms

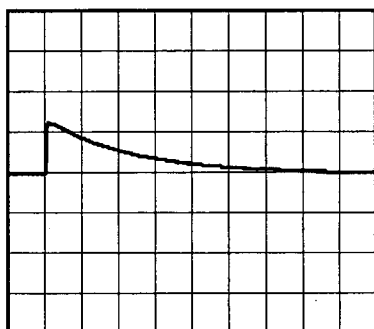
Load Current

Min. Load (0A) ↔

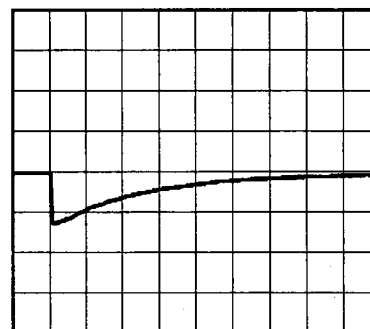
Output current 2 (2.4A)

*+15V : 1.0A

200 mV/div



100 ms/div



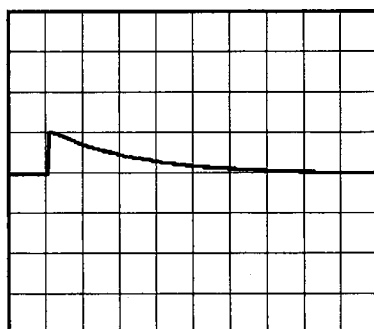
100 ms/div

Min. Load (0A) ↔

Output current 1 (1.7A)

*+15V : 1.7A

200 mV/div



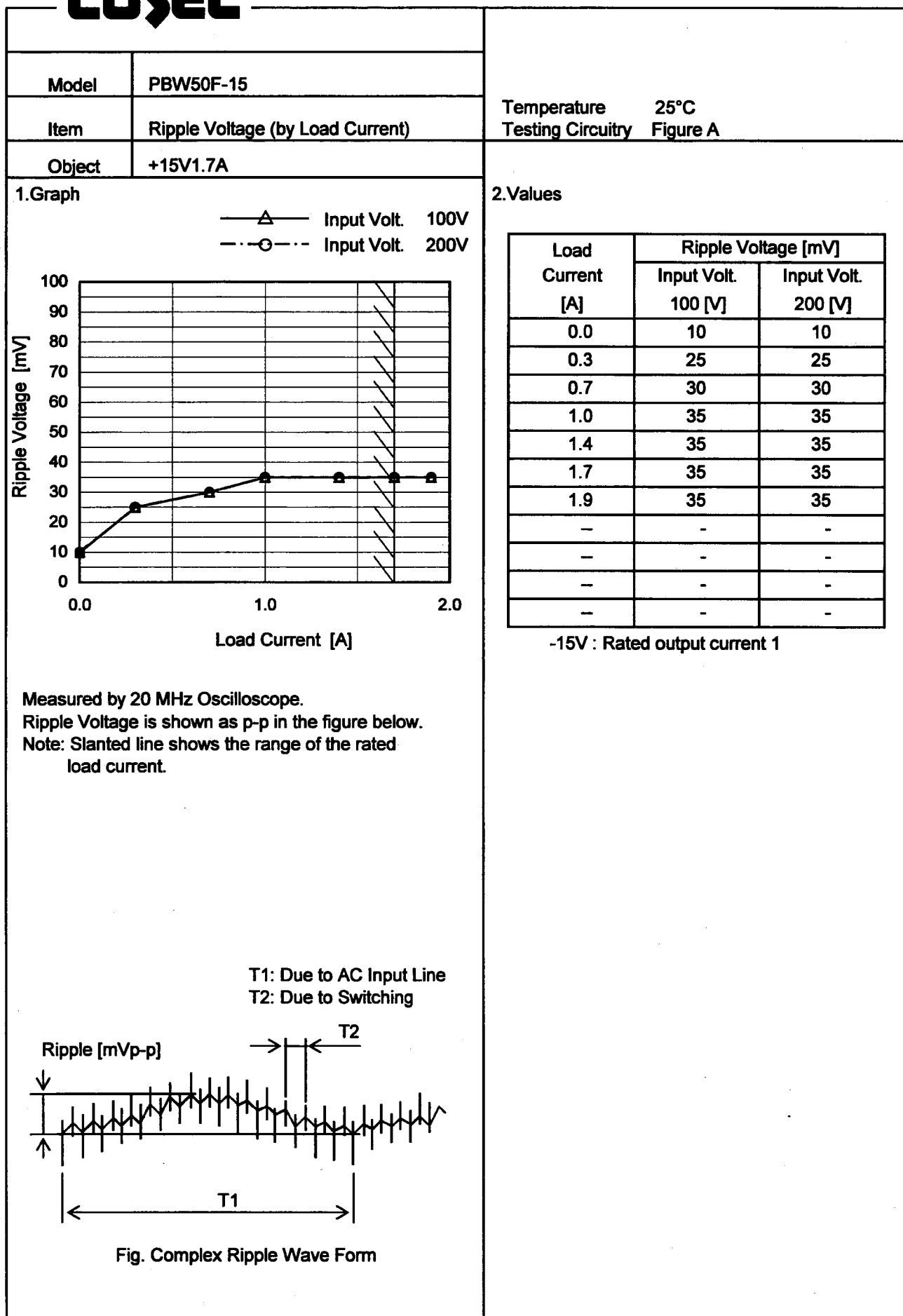
100 ms/div



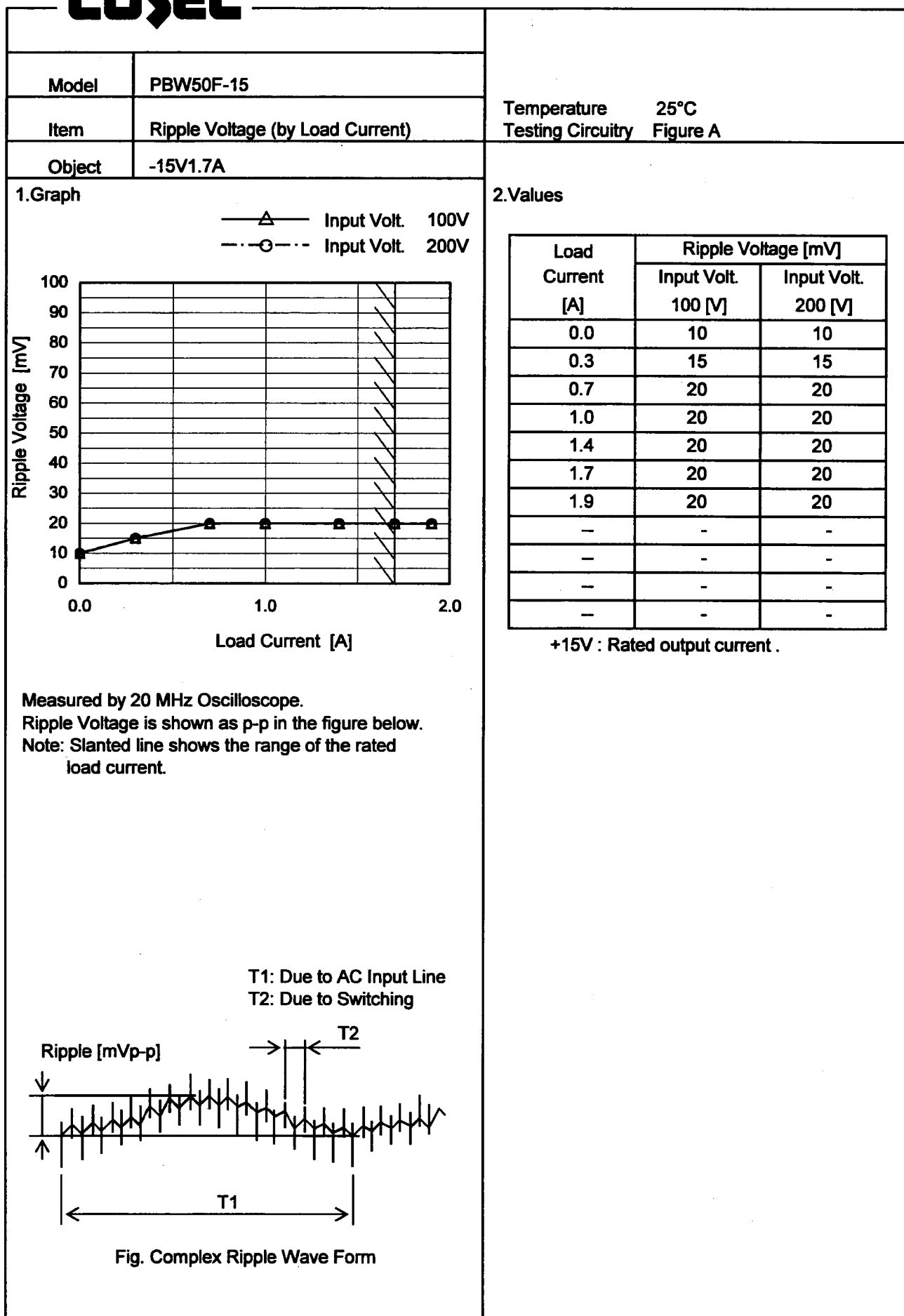
100 ms/div

*The characteristic of AC200V is equal.

COSEL



COSEL



COSEL

Model		PBW50F-15	
Item		Ripple-Noise	
Object		+15V1.7A	

1.Graph

—△— Input Volt. 100V

---○--- Input Volt. 200V

Ripple-Noise [mV]

100

90

80

70

60

50

40

30

20

10

0

0.0

1.0

2.0

Load Current [A]

0.0

1.0

2.0

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.

T1: Due to AC Input Line

T2: Due to Switching

Ripple-Noise [mVp-p]

T2

T1

Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	20	20
0.3	30	30
0.7	40	40
1.0	45	45
1.4	50	50
1.7	55	55
1.9	60	60
—	-	-
—	-	-
—	-	-
—	-	-

-15V : Rated output current 1

COSEL

Model		PBW50F-15	
Item		Ripple-Noise	
Object		-15V1.7A	

1.Graph

—△—

Input Volt.

100V

- - -○- - -

Input Volt.

200V

Ripple-Noise [mV]

100

90

80

70

60

50

40

30

20

10

0

0.0

1.0

2.0

Load Current [A]

</

COSEL

Model		PBW50F-15	
Item		Ripple Voltage (by Ambient Temp.)	
Object		+15V1.7A	
1.Graph			
<div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div>Input Volt. 100 [V]</div></div></div><div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div>Input Volt. 200 [V]</div></div></div></div><div><div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div></div><div></div><div></div></div></div><div><div></div><div></div><div></div></div></div><div><div></div><div></div><div></div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> <div><div></div><div></div><div></div></div> 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COSEL

Model		PBW50F-15																																																				
Item		Ambient Temperature Drift																																																				
Object		+15V1.7A																																																				
1.Graph		<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>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>																																																				
2.Values		<table><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><tr><td>-20</td><td>15.068</td><td>15.067</td><td>15.067</td></tr><tr><td>-10</td><td>15.073</td><td>15.072</td><td>15.072</td></tr><tr><td>0</td><td>15.077</td><td>15.076</td><td>15.076</td></tr><tr><td>10</td><td>15.082</td><td>15.081</td><td>15.082</td></tr><tr><td>20</td><td>15.085</td><td>15.084</td><td>15.084</td></tr><tr><td>25</td><td>15.086</td><td>15.085</td><td>15.085</td></tr><tr><td>30</td><td>15.086</td><td>15.085</td><td>15.085</td></tr><tr><td>40</td><td>15.084</td><td>15.084</td><td>15.084</td></tr><tr><td>50</td><td>15.079</td><td>15.078</td><td>15.078</td></tr><tr><td>60</td><td>15.073</td><td>15.073</td><td>15.073</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-20	15.068	15.067	15.067	-10	15.073	15.072	15.072	0	15.077	15.076	15.076	10	15.082	15.081	15.082	20	15.085	15.084	15.084	25	15.086	15.085	15.085	30	15.086	15.085	15.085	40	15.084	15.084	15.084	50	15.079	15.078	15.078	60	15.073	15.073	15.073	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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1.Graph		<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>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>																																																				
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-10	-15.113	-15.114	-15.115																																																			
0	-15.116	-15.117	-15.117																																																			
10	-15.121	-15.122	-15.122																																																			
20	-15.123	-15.124	-15.124																																																			
25	-15.124	-15.125	-15.125																																																			
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40	-15.123	-15.124	-15.124																																																			
50	-15.117	-15.118	-15.117																																																			
60	-15.111	-15.112	-15.112																																																			
--	-	-	-																																																			
Note: Slanted line shows the range of the rated ambient temperature.																																																						

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BC-10005

COSEL

Model		PBW50F-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 - 1.7A (AVR 2) : 0 - 1.7A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2.Values

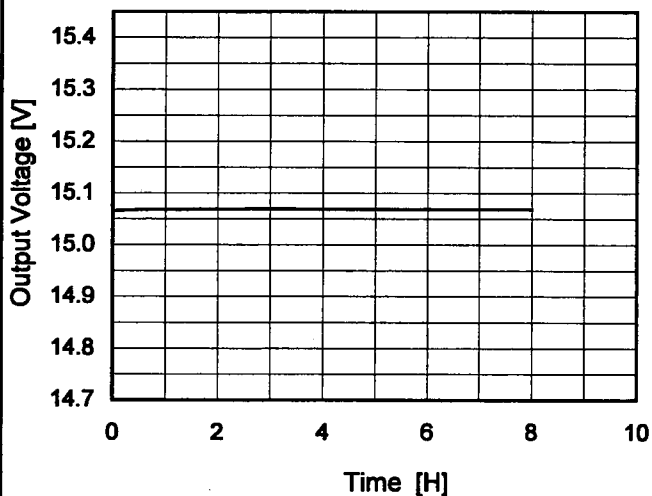
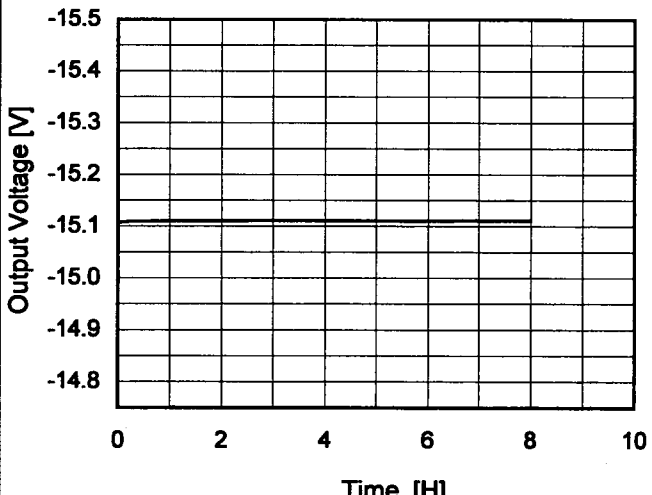
Object		+15V1.7A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy		
			Current[A]	Voltage[V]	Value [mV]	Ration [%]	
Maximum Voltage	50	264	0	15.328	±123	±0.9	
Minimum Voltage	-10	200	1.7	15.083			

Object		-15V1.7A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy		
			Current[A]	Voltage[V]	Value [mV]	Ration [%]	
Maximum Voltage	50	264	0	-15.330	±118	±0.8	
Minimum Voltage	-10	85	1.7	-15.094			

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BC-10005

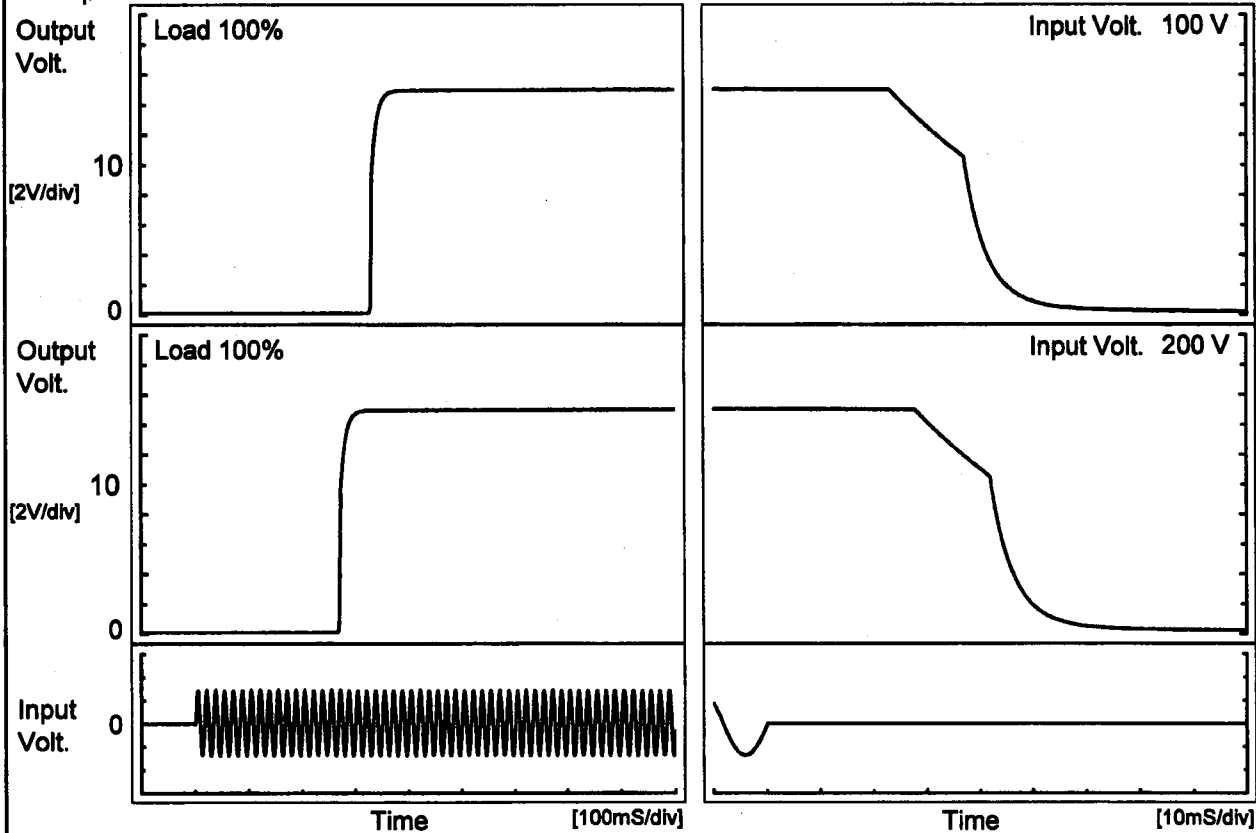
COSEL

Model	PBW50F-15																								
Item	Time Lapse Drift		Temperature 25°C																						
Object	+15V1.7A		Testing Circuitry Figure A																						
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>15.065</td></tr><tr><td>0.5</td><td>15.068</td></tr><tr><td>1.0</td><td>15.069</td></tr><tr><td>2.0</td><td>15.069</td></tr><tr><td>3.0</td><td>15.069</td></tr><tr><td>4.0</td><td>15.069</td></tr><tr><td>5.0</td><td>15.069</td></tr><tr><td>6.0</td><td>15.069</td></tr><tr><td>7.0</td><td>15.069</td></tr><tr><td>8.0</td><td>15.069</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.065	0.5	15.068	1.0	15.069	2.0	15.069	3.0	15.069	4.0	15.069	5.0	15.069	6.0	15.069	7.0	15.069	8.0	15.069
Time since start [H]	Output Voltage [V]																								
0.0	15.065																								
0.5	15.068																								
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2.0	15.069																								
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★The characteristic of AC200V is equal.																									

COSEL

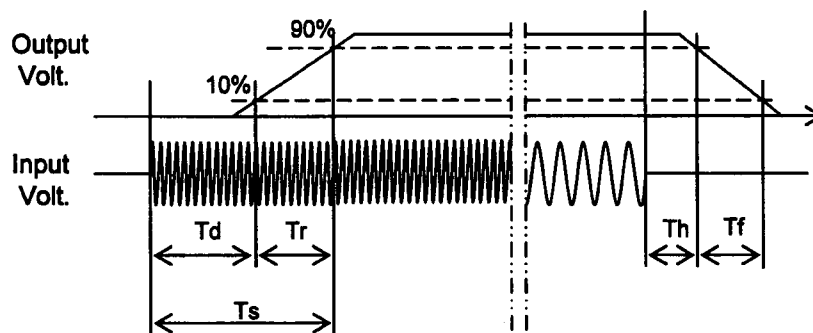
Model	PBW50F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V1.7A		

1. Graph



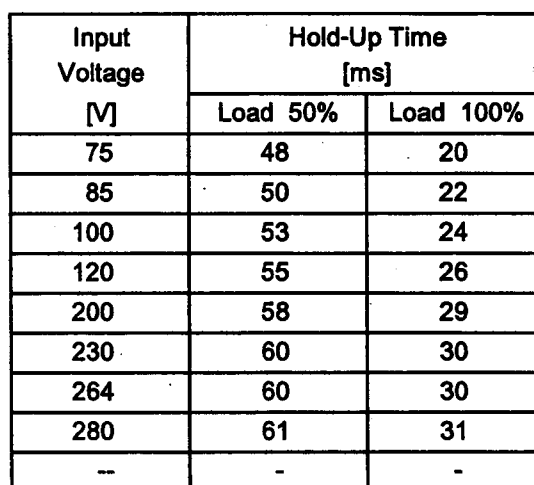
2. Values

		[mS]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		330.5	15.5	346.0	27.0	19.3
200 V		269.5	16.0	285.5	31.8	19.5



Temperature 25°C
Testing Circuitry Figure A

2.Values



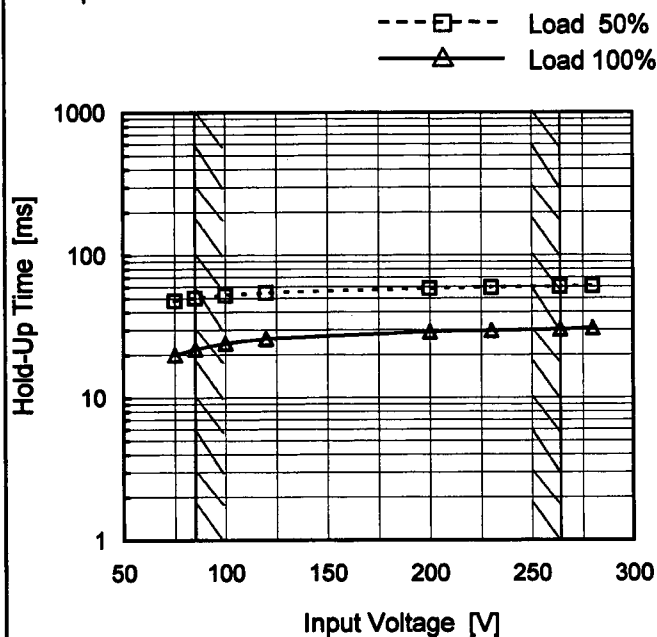
This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy. Note: Slanted line shows the range of the rated input voltage.

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Model	PBW50F-15
Item	Hold-Up Time
Object	-15V1.7A

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.

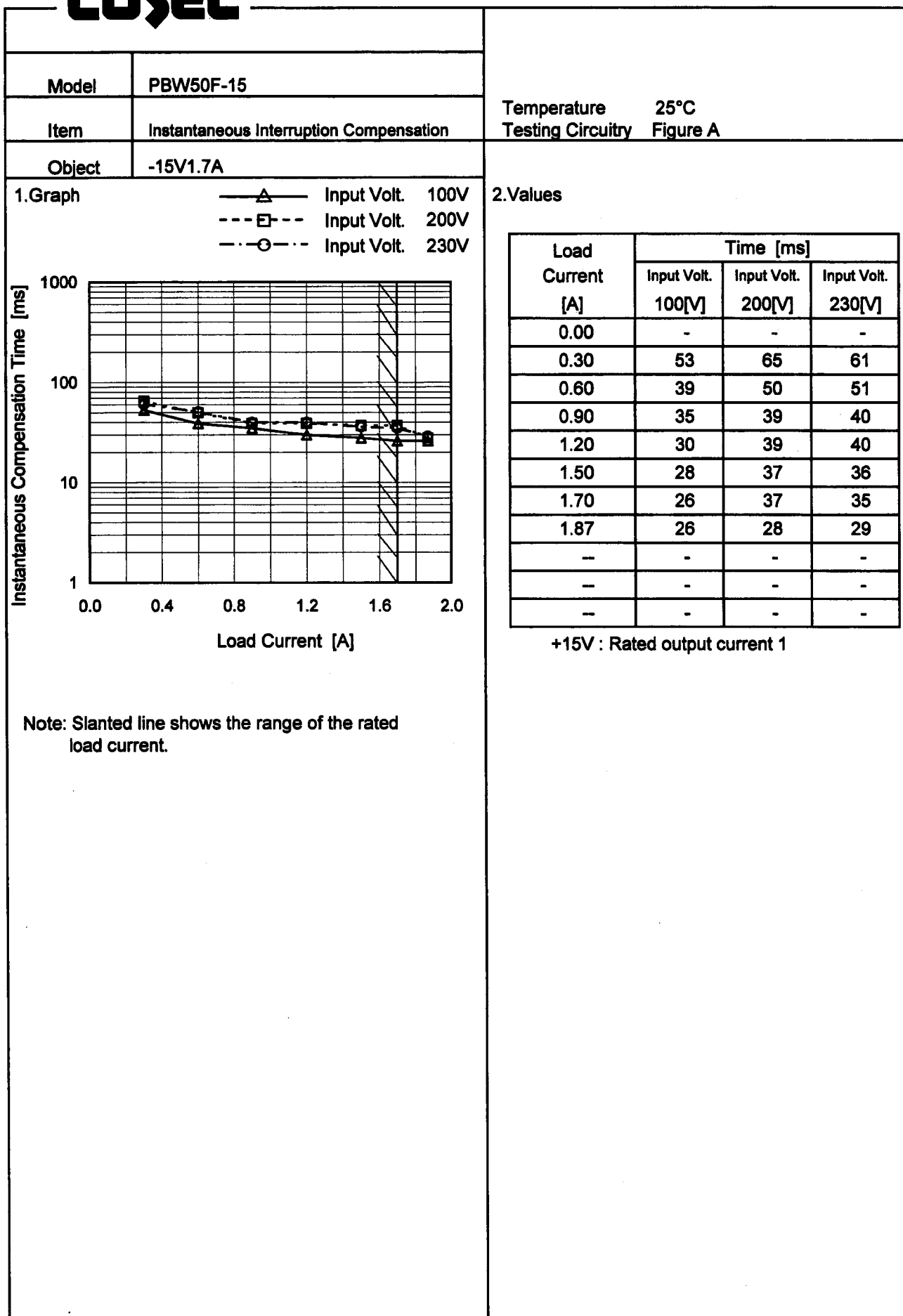
2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	48	20
85	50	22
100	53	24
120	55	26
200	58	29
230	60	30
264	60	30
280	61	31
—	-	-

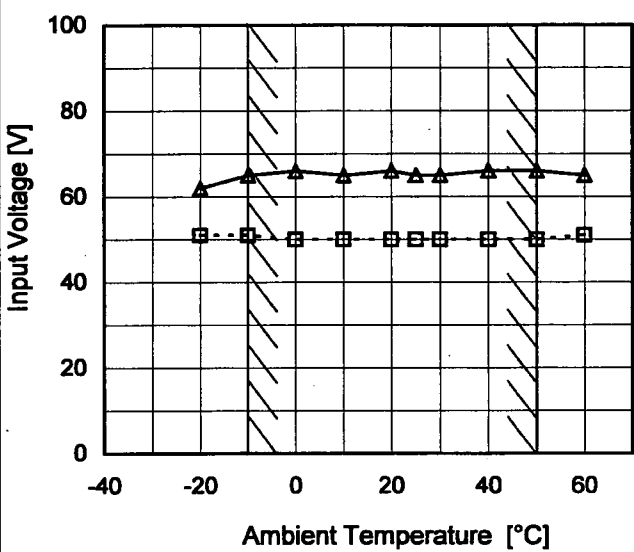
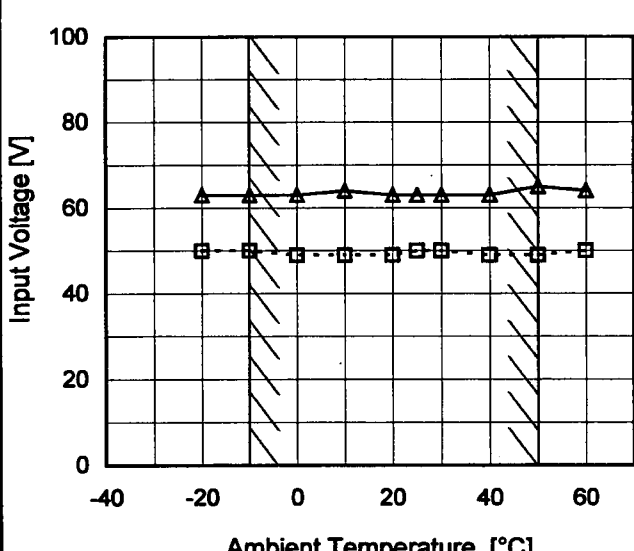
COSEL

Model	PBW50F-15																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+15V1.7A	Testing Circuitry	Figure A																																																			
1.Graph		2.Values																																																				
<div><div>—△—</div>Input Volt. 100V</div> <div><div>---□---</div>Input Volt. 200V</div> <div><div>---○---</div>Input Volt. 230V</div> <div><div><div>Instantaneous Compensation Time [ms]</div><div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div>0.0</div><div>0.4</div><div>0.8</div><div>1.2</div><div>1.6</div><div>2.0</div></div><div>Load Current [A]</div></div></div> <div>Note: Slanted line shows the range of the rated load current.</div>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Time [ms]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.00</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.30</td><td>53</td><td>65</td><td>61</td></tr><tr><td>0.60</td><td>39</td><td>50</td><td>51</td></tr><tr><td>0.90</td><td>35</td><td>39</td><td>40</td></tr><tr><td>1.20</td><td>30</td><td>39</td><td>40</td></tr><tr><td>1.50</td><td>28</td><td>37</td><td>36</td></tr><tr><td>1.70</td><td>26</td><td>37</td><td>35</td></tr><tr><td>1.87</td><td>26</td><td>28</td><td>29</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> <div>-15V : Rated output current 1</div>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	0.30	53	65	61	0.60	39	50	51	0.90	35	39	40	1.20	30	39	40	1.50	28	37	36	1.70	26	37	35	1.87	26	28	29	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
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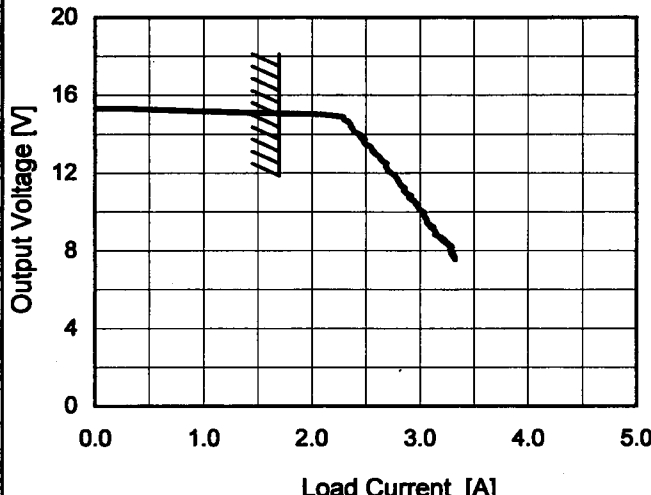
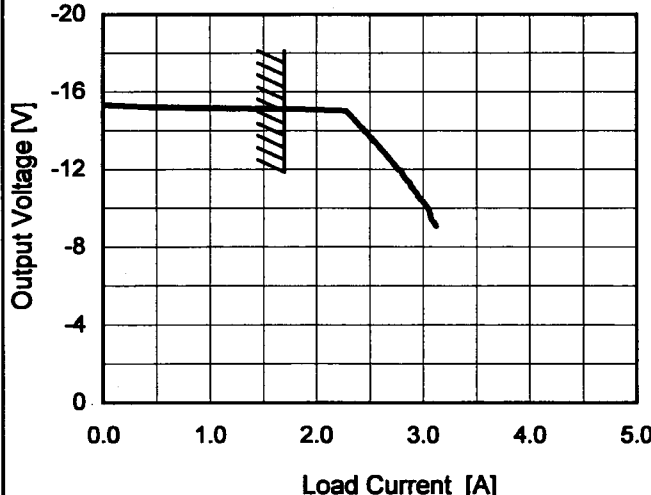
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Model		PBW50F-15		Testing Circuitry Figure A																																							
Item		Minimum Input Voltage for Regulated Output Voltage																																									
Object		+15V1.7A																																									
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<div><div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div></div>				<table><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><tr><td>-20</td><td>51</td><td>62</td></tr><tr><td>-10</td><td>51</td><td>65</td></tr><tr><td>0</td><td>50</td><td>66</td></tr><tr><td>10</td><td>50</td><td>65</td></tr><tr><td>20</td><td>50</td><td>66</td></tr><tr><td>25</td><td>50</td><td>65</td></tr><tr><td>30</td><td>50</td><td>65</td></tr><tr><td>40</td><td>50</td><td>66</td></tr><tr><td>50</td><td>50</td><td>66</td></tr><tr><td>60</td><td>51</td><td>65</td></tr><tr><td>—</td><td>-</td><td>-</td></tr></table>		Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	51	62	-10	51	65	0	50	66	10	50	65	20	50	66	25	50	65	30	50	65	40	50	66	50	50	66	60	51	65	—	-	-
Ambient Temperature [°C]	Input Voltage [V]																																										
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				BC-10005																																							

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Model		PBW50F-15		Temperature 25°C																																										
Item		Overcurrent Protection		Testing Circuitry Figure A																																										
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BC-10005

COSEL

Model		PBW50F-15																																							
Item		Overvoltage Protection																																							
Object		+15V1.7A																																							
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<table border="1"><caption>Operating Point [V] vs Ambient Temperature [°C] for -15V1.7A (Load 0%)</caption><thead><tr><th>Ambient Temperature [°C]</th><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th></tr></thead><tbody><tr><td>-20</td><td>-25.22</td><td>-25.22</td></tr><tr><td>-10</td><td>-25.26</td><td>-25.34</td></tr><tr><td>0</td><td>-25.46</td><td>-25.45</td></tr><tr><td>10</td><td>-25.54</td><td>-25.62</td></tr><tr><td>20</td><td>-25.69</td><td>-25.82</td></tr><tr><td>25</td><td>-25.88</td><td>-25.83</td></tr><tr><td>30</td><td>-26.02</td><td>-26.01</td></tr><tr><td>40</td><td>-26.09</td><td>-26.14</td></tr><tr><td>50</td><td>-26.29</td><td>-26.27</td></tr><tr><td>60</td><td>-26.40</td><td>-26.44</td></tr></tbody></table>				Ambient Temperature [°C]	Input Volt. 100[V]	Input Volt. 200[V]	-20	-25.22	-25.22	-10	-25.26	-25.34	0	-25.46	-25.45	10	-25.54	-25.62	20	-25.69	-25.82	25	-25.88	-25.83	30	-26.02	-26.01	40	-26.09	-26.14	50	-26.29	-26.27	60	-26.40	-26.44					
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Note: Slanted line shows the range of the rated ambient temperature.

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BC-10005

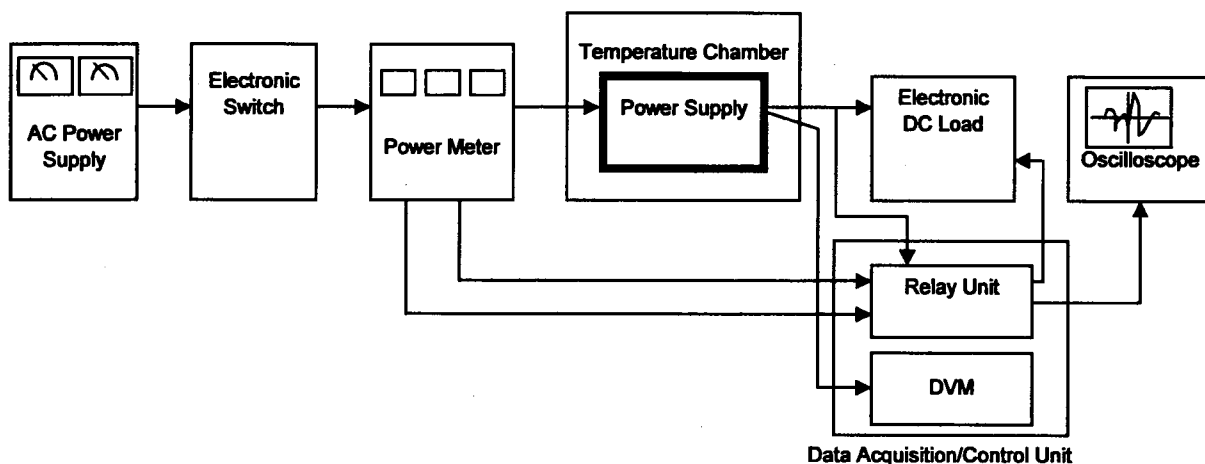


Figure A

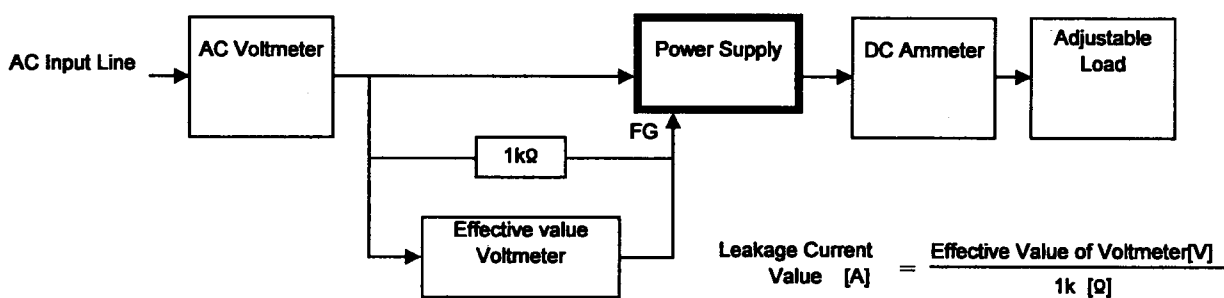


Figure B (DEN-AN)

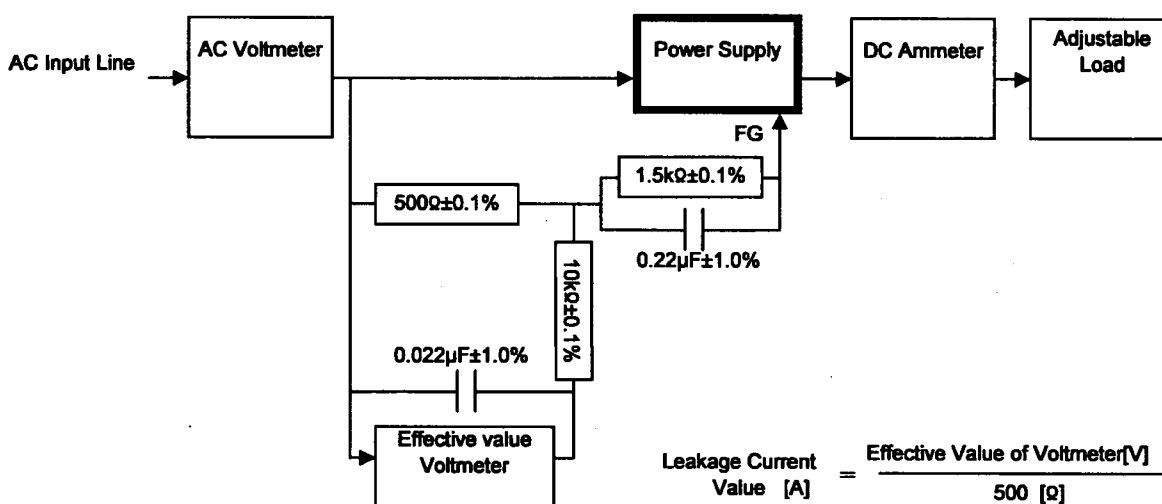


Figure B (IEC60950)