



TEST DATA OF PBA50F-12

Regulated DC Power Supply
Apr.1. 2004

Approved by : Kuniaki Nagahara
Kuniaki Nagahara Design Manager

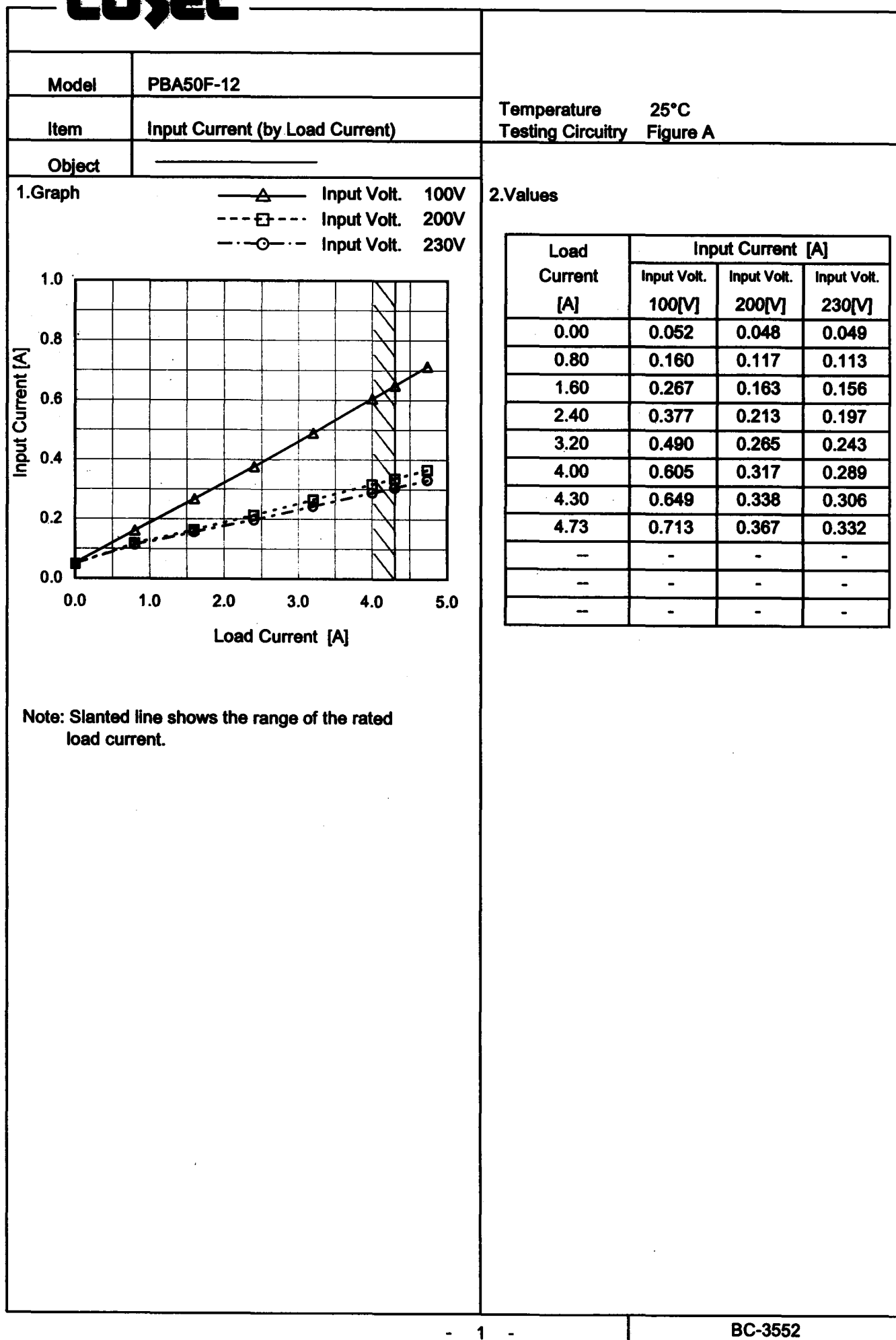
Prepared by : Koji Todo
Koji Todo Design Engineer

COSEL CO.,LTD.

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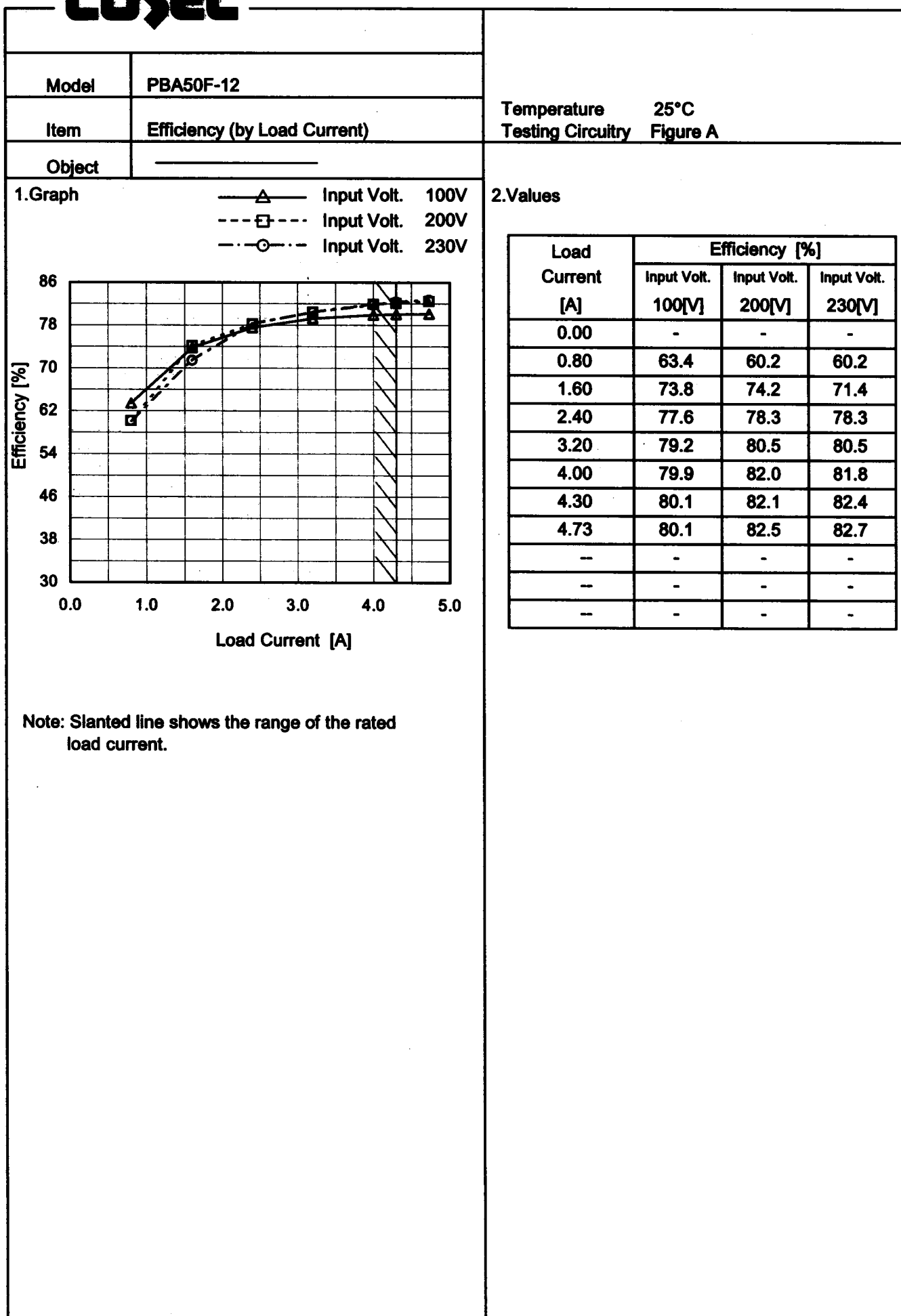
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Model		PBA50F-12		Temperature Testing Circuitry	25°C Figure A
Item		Input Power (by Load Current)			
Object		_____			
1.Graph		<div><div>—△—</div>Input Volt. 100V</div> <div><div>---□---</div>Input Volt. 200V</div> <div><div>---○---</div>Input Volt. 230V</div>		2.Values	
<div><div><div>Input Power [W]</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><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></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><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></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><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></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><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></di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Model		PBA50F-12																																	
Item		Efficiency (by Input Voltage)																																	
Object																																			
1.Graph		2.Values																																	
<div><div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div><div><div>---</div><div>△</div><div>---</div></div><div>Load 100%</div></div> <table><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>75.6</td><td>77.5</td></tr><tr><td>85</td><td>76.3</td><td>78.9</td></tr><tr><td>100</td><td>76.3</td><td>80.1</td></tr><tr><td>120</td><td>76.3</td><td>81.0</td></tr><tr><td>200</td><td>76.3</td><td>82.3</td></tr><tr><td>230</td><td>76.3</td><td>82.4</td></tr><tr><td>264</td><td>76.3</td><td>82.4</td></tr><tr><td>280</td><td>76.3</td><td>82.4</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table> <div>Note: Slanted line shows the range of the rated input voltage.</div>		Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	75	75.6	77.5	85	76.3	78.9	100	76.3	80.1	120	76.3	81.0	200	76.3	82.3	230	76.3	82.4	264	76.3	82.4	280	76.3	82.4	--	-	-		
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230	76.3	82.4																																	
264	76.3	82.4																																	
280	76.3	82.4																																	
--	-	-																																	

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Model		PBA50F-12	
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]

Input Voltage [V]	Load 50% Power Factor	Load 100% Power Factor
75	0.993	0.987
85	0.988	0.995
100	0.981	0.993
120	0.971	0.988
200	0.850	0.932
230	0.791	0.887
264	0.723	0.851
280	0.642	0.778

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

2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.993	0.987
85	0.988	0.995
100	0.981	0.993
120	0.971	0.988
200	0.850	0.932
230	0.791	0.887
264	0.723	0.851
280	0.642	0.778
—	—	—

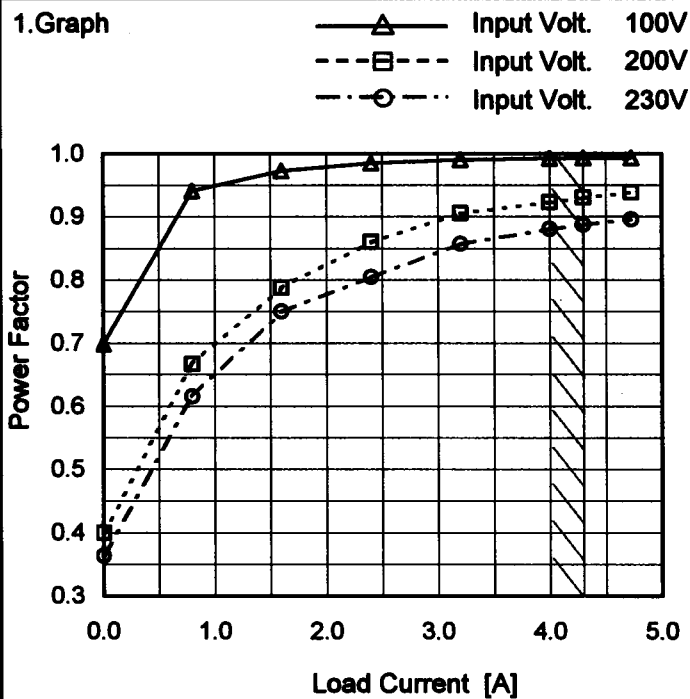
- 5 -

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Model	PBA50F-12
Item	Power Factor (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A



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

2. Values

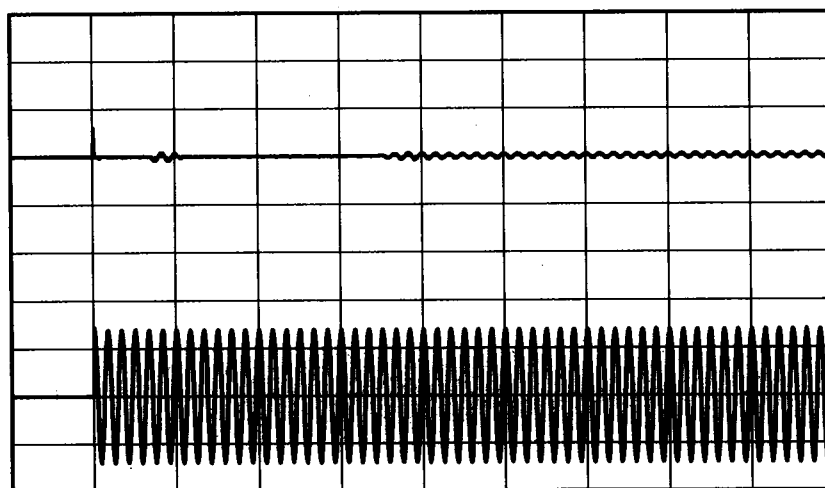
Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.699	0.400	0.364
0.80	0.941	0.667	0.615
1.60	0.973	0.788	0.750
2.40	0.985	0.860	0.804
3.20	0.990	0.906	0.857
4.00	0.993	0.923	0.881
4.30	0.993	0.931	0.887
4.73	0.993	0.939	0.896
—	—	—	—
—	—	—	—
—	—	—	—

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Model	PBA50F-12	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object			

Input
Current
[20A/div]

Input
Voltage
[100V/div]



Time

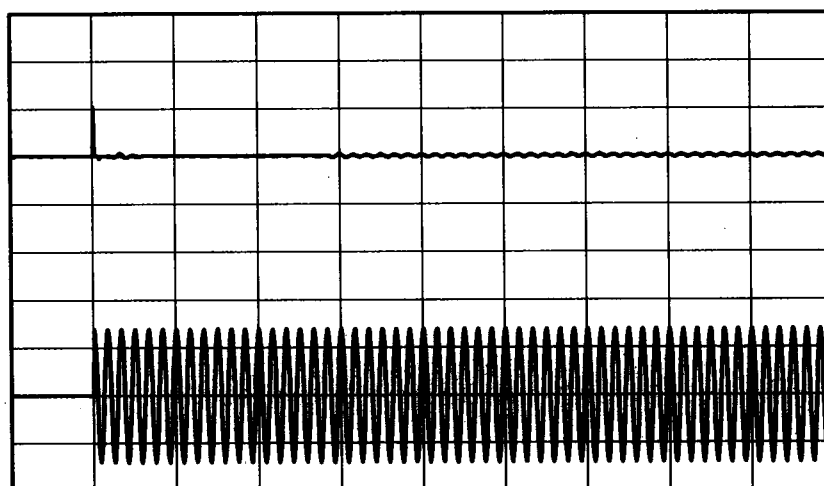
[100mS/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
12.1 A
Secondary inrush current :
1.8 A

Input
Current
[20A/div]

Input
Voltage
[200V/div]



Time

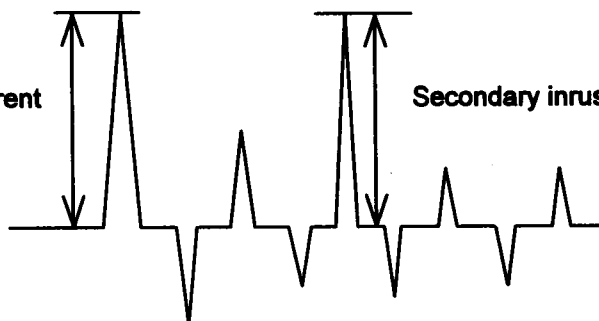
[100mS/div]

Input Voltage 200 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
21.7 A
Secondary inrush current :
0.9 A

Primary inrush current

Secondary inrush current



		Temperature 25°C Testing Circuitry Figure B
Model	PBA50F-12	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	230 [V]	
DEN-AN	Both phases	0.18	0.30	0.34	Operation
	One of phase	0.22	0.48	0.55	stand by
IEC60950	Both phases	0.18	0.32	0.36	Operation
	One of phase	0.22	0.48	0.55	stand by

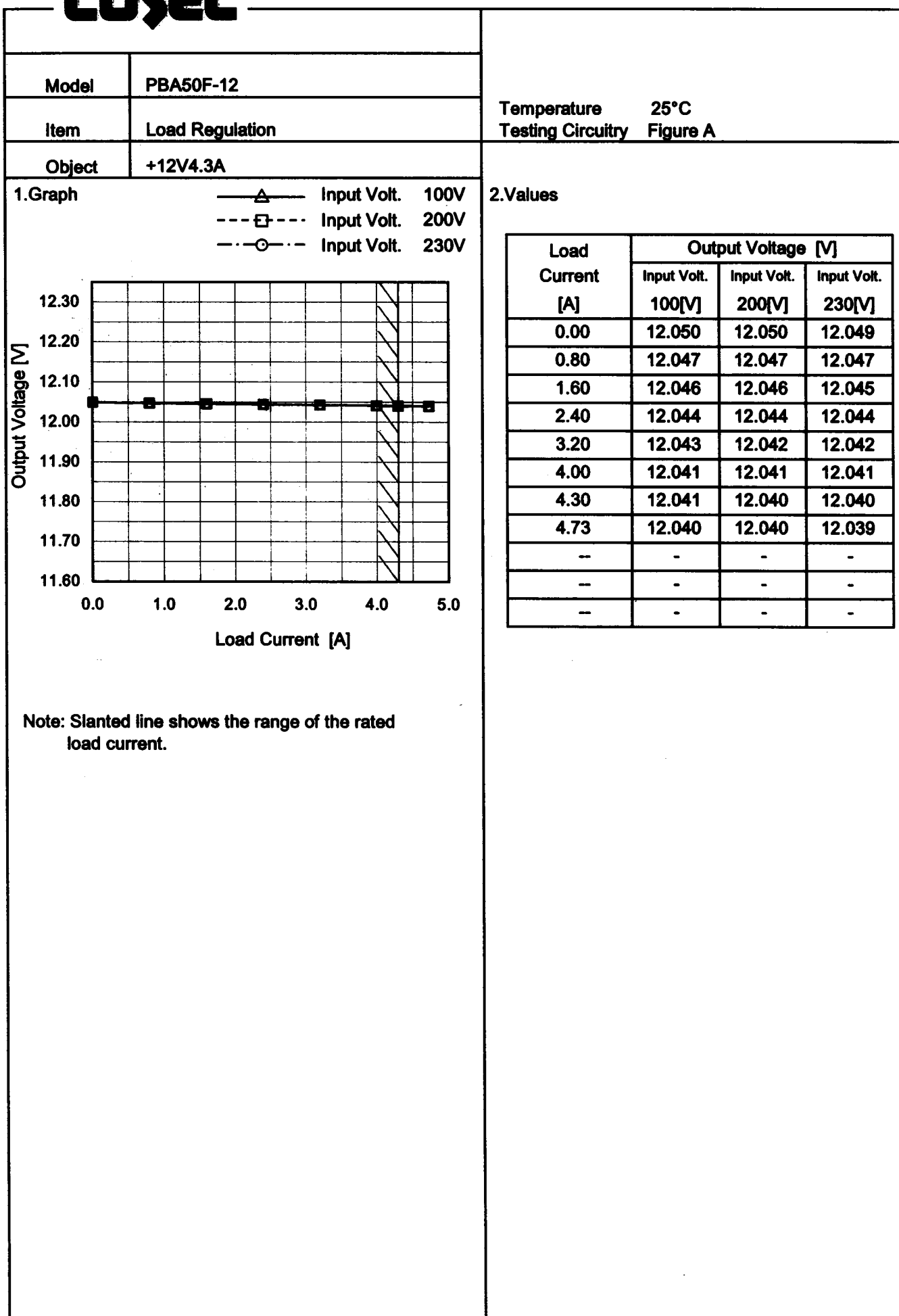
The value for "One phase" is the reference value only.

2.Condition

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

COSEL

Model	PBA50F-12	Temperature 25°C Testing Circuitry Figure A																															
Item	Line Regulation																																
Object	+12V4.3A																																
1.Graph		2.Values																															
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>—</div><div>△</div><div>—</div></div> <div>Load 100%</div> <div><table><thead><tr><th>Input Voltage [V]</th><th>Output Voltage [V] (Load 50%)</th><th>Output Voltage [V] (Load 100%)</th></tr></thead><tbody><tr><td>75</td><td>12.042</td><td>12.039</td></tr><tr><td>85</td><td>12.042</td><td>12.039</td></tr><tr><td>100</td><td>12.043</td><td>12.039</td></tr><tr><td>120</td><td>12.043</td><td>12.039</td></tr><tr><td>200</td><td>12.043</td><td>12.039</td></tr><tr><td>230</td><td>12.043</td><td>12.039</td></tr><tr><td>264</td><td>12.043</td><td>12.038</td></tr><tr><td>280</td><td>12.043</td><td>12.039</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table></div>		Input Voltage [V]	Output Voltage [V] (Load 50%)	Output Voltage [V] (Load 100%)	75	12.042	12.039	85	12.042	12.039	100	12.043	12.039	120	12.043	12.039	200	12.043	12.039	230	12.043	12.039	264	12.043	12.038	280	12.043	12.039	--	-	-		
Input Voltage [V]	Output Voltage [V] (Load 50%)	Output Voltage [V] (Load 100%)																															
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230	12.043	12.039																															
264	12.043	12.038																															
280	12.043	12.039																															
--	-	-																															
Note: Slanted line shows the range of the rated input voltage.																																	

COSEL

COSEL

Model	PBA50F-12	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+12V4.3A		

Input Volt. 100 V
Cycle 1000 ms

Load Current

Min. Load (0A) ←→
Load 100% (4.3A)

100 mV/div



5 ms/div



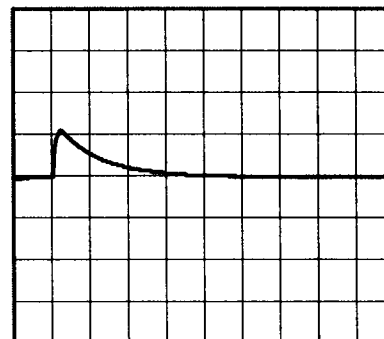
5 ms/div

Min. Load (0A) ←→
Load 50% (2.15A)

100 mV/div

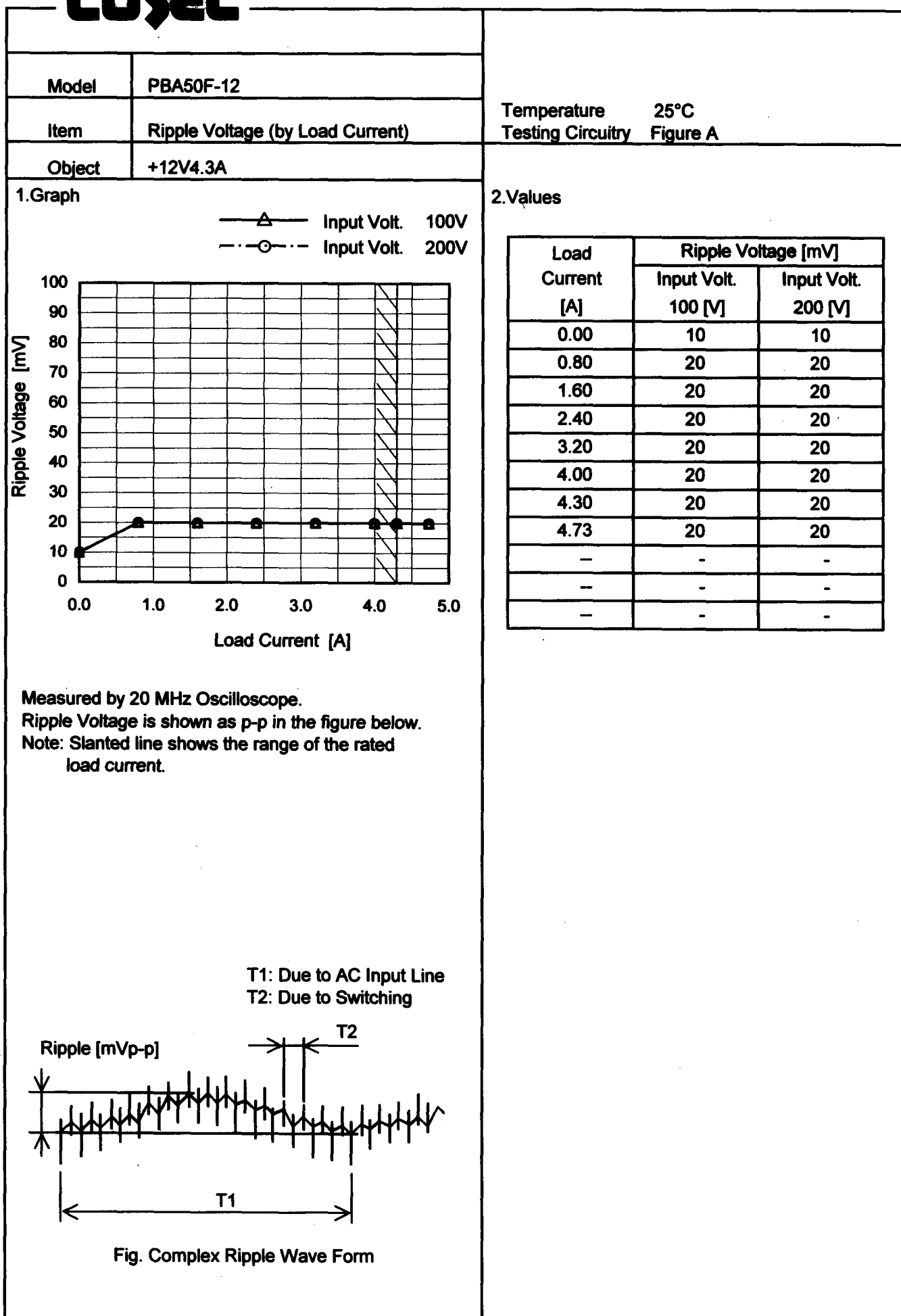


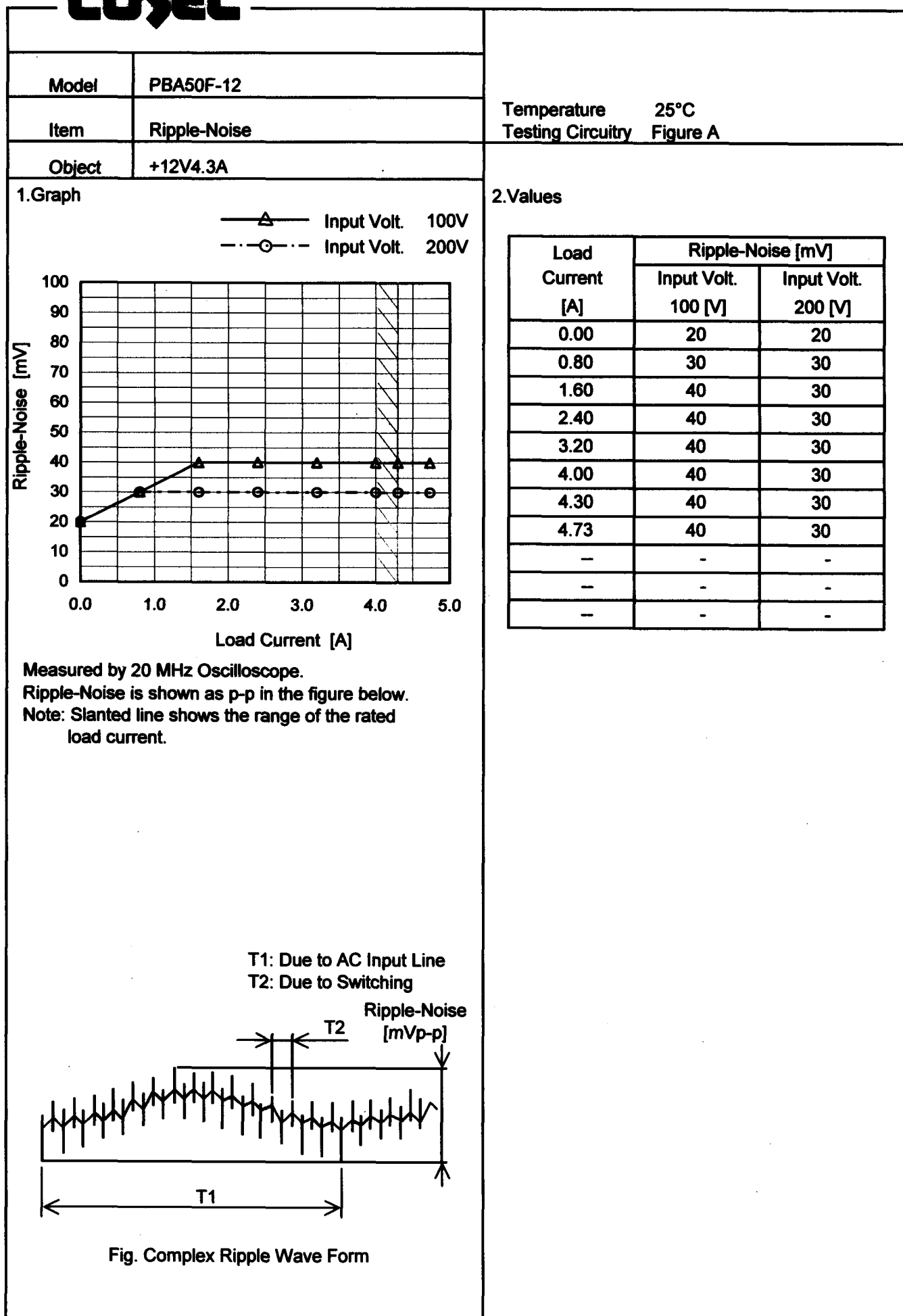
5 ms/div



5 ms/div

* The characteristic of AC200V is equal.

COSEL

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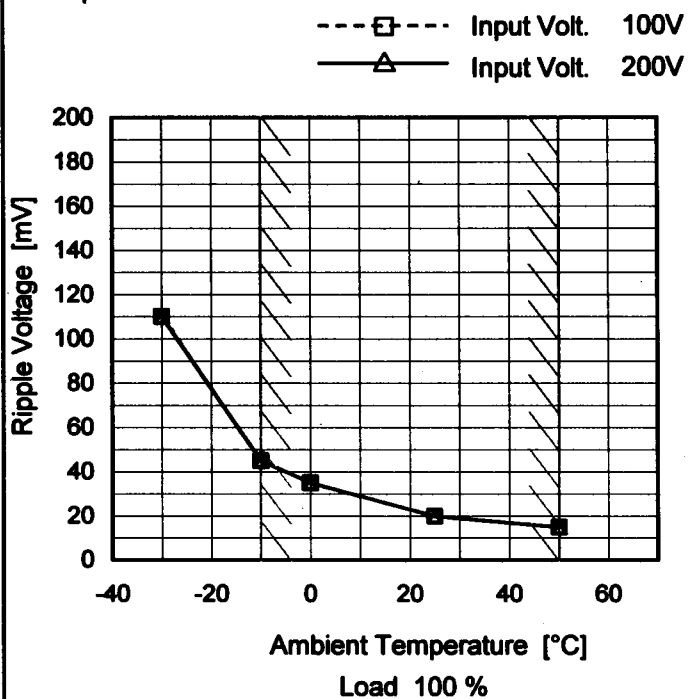
Model PBA50F-12

Item Ripple Voltage (by Ambient Temp.)

Object +12V4.3A

Testing Circuitry Figure A

1. Graph



Measured by 20 MHz Oscilloscope.

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

2. Values

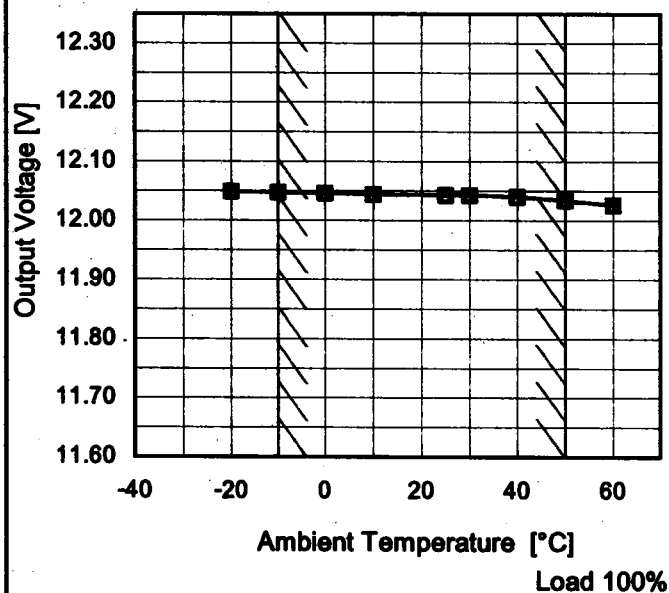
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	110	110
-10	45	45
0	35	35
25	20	20
50	15	15
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	PBA50F-12
Item	Ambient Temperature Drift
Object	+12V4.3A

1. Graph

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



Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	12.049	12.049	12.049
-10	12.047	12.047	12.047
0	12.046	12.046	12.046
10	12.044	12.044	12.044
25	12.043	12.043	12.043
30	12.043	12.043	12.043
40	12.040	12.040	12.040
50	12.034	12.034	12.033
60	12.026	12.026	12.026
--	-	-	-
--	-	-	-

COSEL

		Testing Circuitry Figure A
Model	PBA50F-12	
Item	Output Voltage Accuracy	
Object	+12V4.3A	

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -10 - 50°C

Input Voltage : 85 - 264V

Load Current : 0 - 4.3A

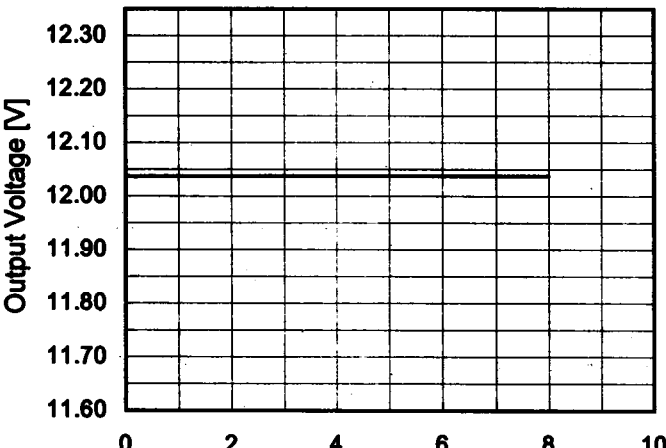
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	-10	264	0	12.056	±12	±0.1
Minimum Voltage	50	264	4.3	12.033		

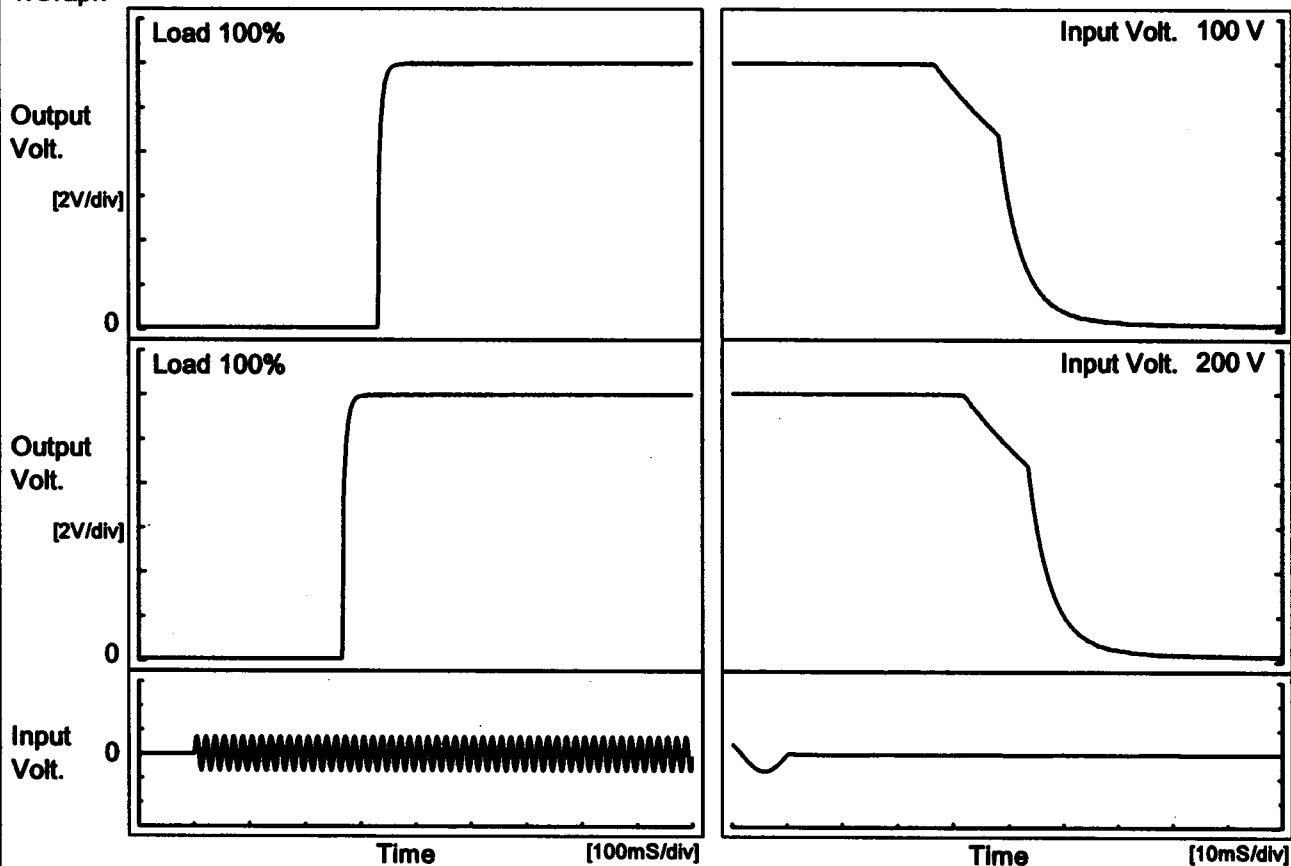
COSEL

Model	PBA50F-12	Temperature 25°C Testing Circuitry Figure A																							
Item	Time Lapse Drift																								
Object	+12V4.3A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100V Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>12.042</td></tr><tr><td>0.5</td><td>12.037</td></tr><tr><td>1.0</td><td>12.038</td></tr><tr><td>2.0</td><td>12.038</td></tr><tr><td>3.0</td><td>12.038</td></tr><tr><td>4.0</td><td>12.038</td></tr><tr><td>5.0</td><td>12.038</td></tr><tr><td>6.0</td><td>12.038</td></tr><tr><td>7.0</td><td>12.038</td></tr><tr><td>8.0</td><td>12.038</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	12.042	0.5	12.037	1.0	12.038	2.0	12.038	3.0	12.038	4.0	12.038	5.0	12.038	6.0	12.038	7.0	12.038	8.0	12.038
Time since start [H]	Output Voltage [V]																								
0.0	12.042																								
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7.0	12.038																								
8.0	12.038																								
* The characteristic of AC200V is equal.																									

COSEL

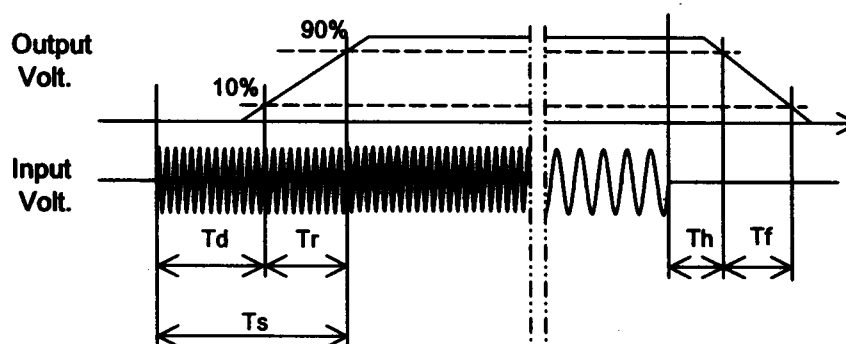
Model	PBA50F-12	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time	
Object	+12V4.3A	

1. Graph



2. Values

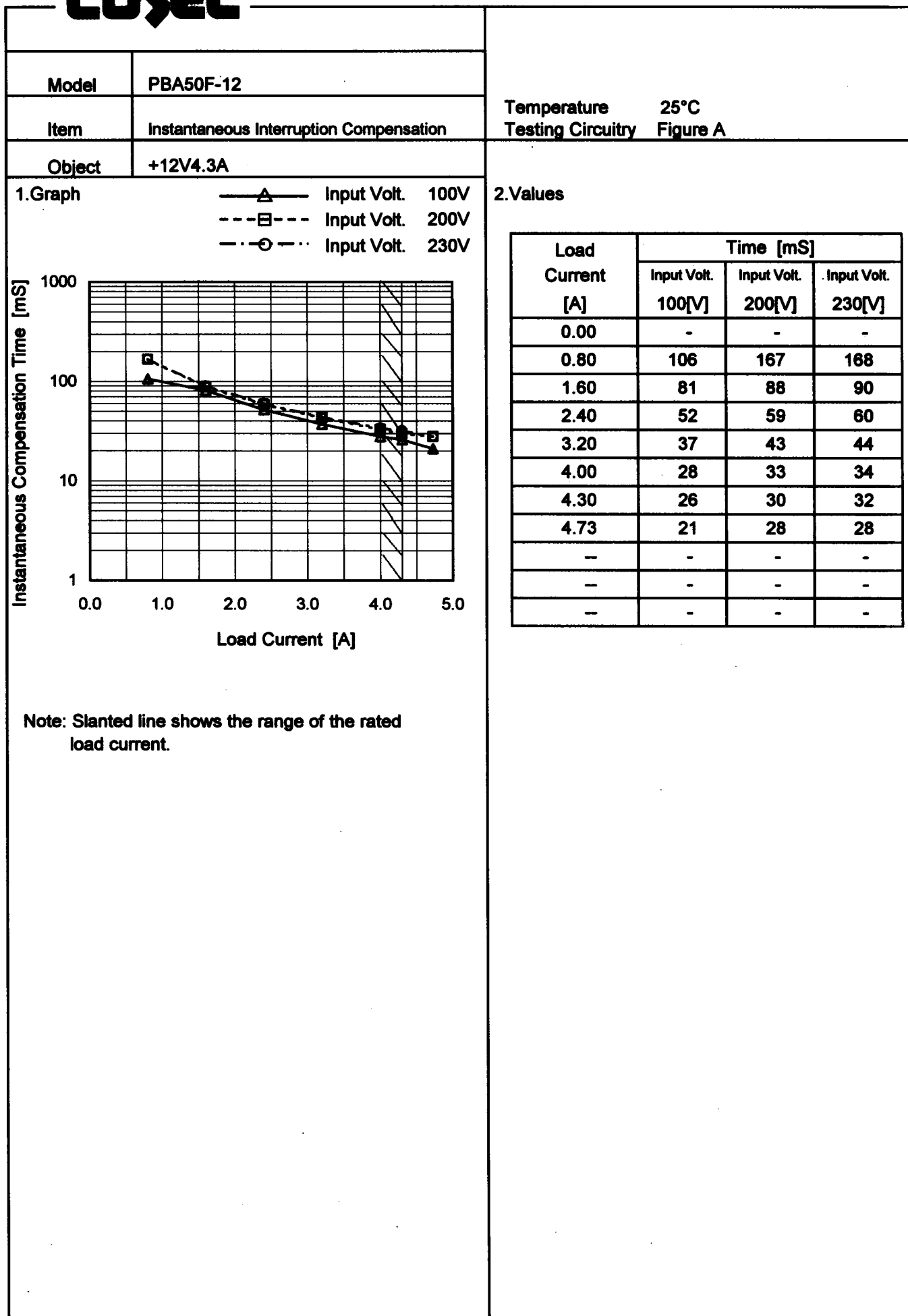
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		331.5	11.5	343.0	30.2	17.2
200 V		266.5	12.0	278.5	35.6	17.2



COSEL

Model	PBA50F-12																																		
Item	Hold-Up Time	Temperature	25°C																																
Object	+12V4.3A	Testing Circuitry	Figure A																																
1.Graph		2.Values																																	
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>—</div><div>△</div><div>—</div></div> <div>Load 100%</div> <div><div>Hold-Up Time [mS]</div><div></div><div>Input Voltage [V]</div></div> <table><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><tr><td>75</td><td>56</td><td>22</td></tr><tr><td>85</td><td>58</td><td>25</td></tr><tr><td>100</td><td>61</td><td>27</td></tr><tr><td>120</td><td>63</td><td>29</td></tr><tr><td>200</td><td>68</td><td>33</td></tr><tr><td>230</td><td>69</td><td>33</td></tr><tr><td>264</td><td>69</td><td>34</td></tr><tr><td>280</td><td>69</td><td>34</td></tr><tr><td>—</td><td>-</td><td>-</td></tr></table> <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>		Input Voltage [V]	Hold-Up Time [mS]		Load 50%	Load 100%	75	56	22	85	58	25	100	61	27	120	63	29	200	68	33	230	69	33	264	69	34	280	69	34	—	-	-		
Input Voltage [V]	Hold-Up Time [mS]																																		
	Load 50%	Load 100%																																	
75	56	22																																	
85	58	25																																	
100	61	27																																	
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200	68	33																																	
230	69	33																																	
264	69	34																																	
280	69	34																																	
—	-	-																																	

COSEL



COSEL

Model

PBA50F-12

Item

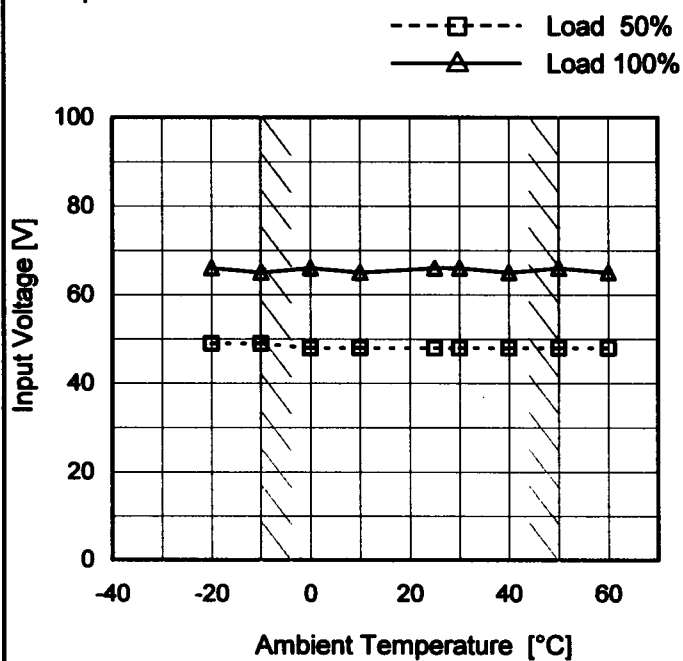
Minimum Input Voltage
for Regulated Output Voltage

Object

+12V4.3A

Testing Circuitry Figure A

1. Graph



2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	49	66
-10	49	65
0	48	66
10	48	65
25	48	66
30	48	66
40	48	65
50	48	66
60	48	65
—	—	—
—	—	—

COSEL

Model	PBA50F-12																																														
Item	Overcurrent Protection	Temperature	25°C																																												
Object	+12V4.3A	Testing Circuitry	Figure A																																												
1.Graph		2.Values																																													
<div><div><div></div>Input Volt. 100V</div><div><div></div>Input Volt. 200V</div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is from 6V to 0V.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="2">Load Current [A]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th></tr><tr><td>12.0</td><td>4.60</td><td>4.60</td></tr><tr><td>11.4</td><td>5.34</td><td>5.34</td></tr><tr><td>10.8</td><td>5.37</td><td>5.37</td></tr><tr><td>9.6</td><td>5.41</td><td>5.41</td></tr><tr><td>8.4</td><td>5.45</td><td>5.45</td></tr><tr><td>7.2</td><td>5.49</td><td>5.52</td></tr><tr><td>6.0</td><td>5.46</td><td>5.46</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><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	12.0	4.60	4.60	11.4	5.34	5.34	10.8	5.37	5.37	9.6	5.41	5.41	8.4	5.45	5.45	7.2	5.49	5.52	6.0	5.46	5.46	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																														
	Input Volt. 100[V]	Input Volt. 200[V]																																													
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COSEL

Model		PBA50F-12	
Item		Overvoltage Protection	
Object		+12V4.3A	

1.Graph

—△—

Input Volt. 100V

---□---

Input Volt. 200V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

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

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	15.86	15.86
-10	15.93	15.93
0	16.07	16.07
10	16.14	16.14
25	16.28	16.28
30	16.35	16.35
40	16.49	16.49
50	16.56	16.56
60	16.63	16.63
--	-	-
--	-	-

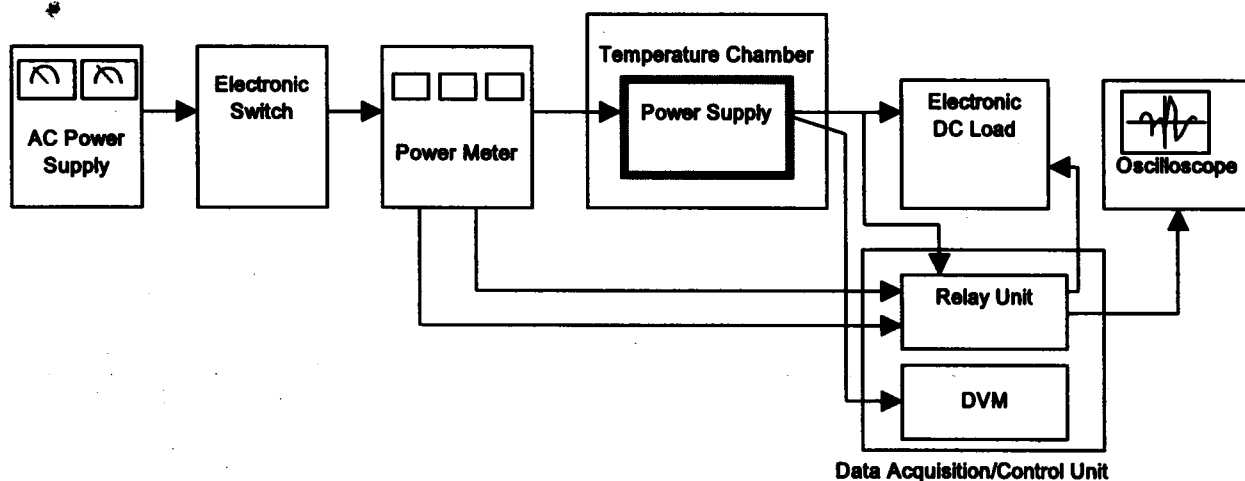


Figure A

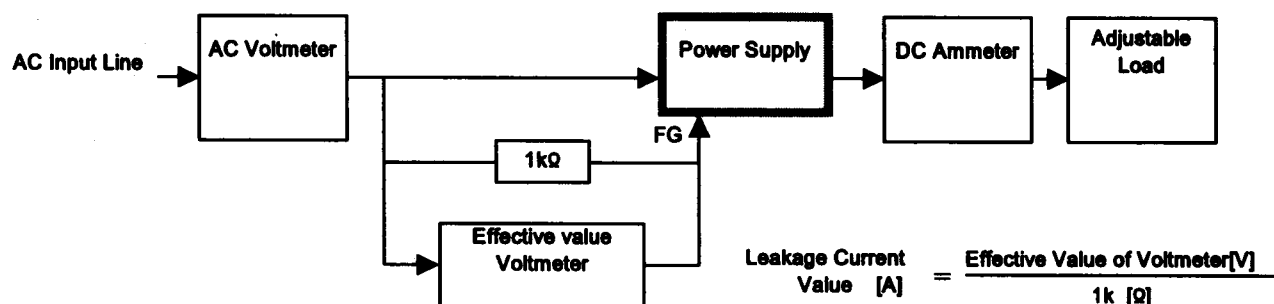


Figure B (DEN-AN)

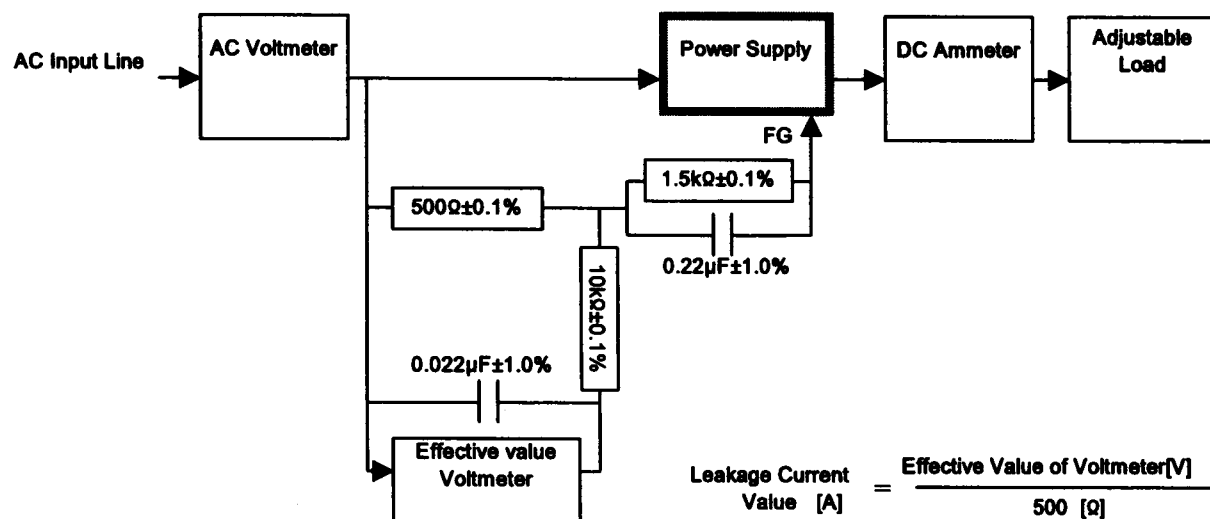


Figure B (IEC60950)