



TEST DATA OF PBW30F-15

Regulated DC Power Supply
Sep 29, 2005

Approved by : Kuniaki Nagahara
Kuniaki Nagahara Design Manager

Prepared by : Akito Joboji
Akito Joboji Design Engineer

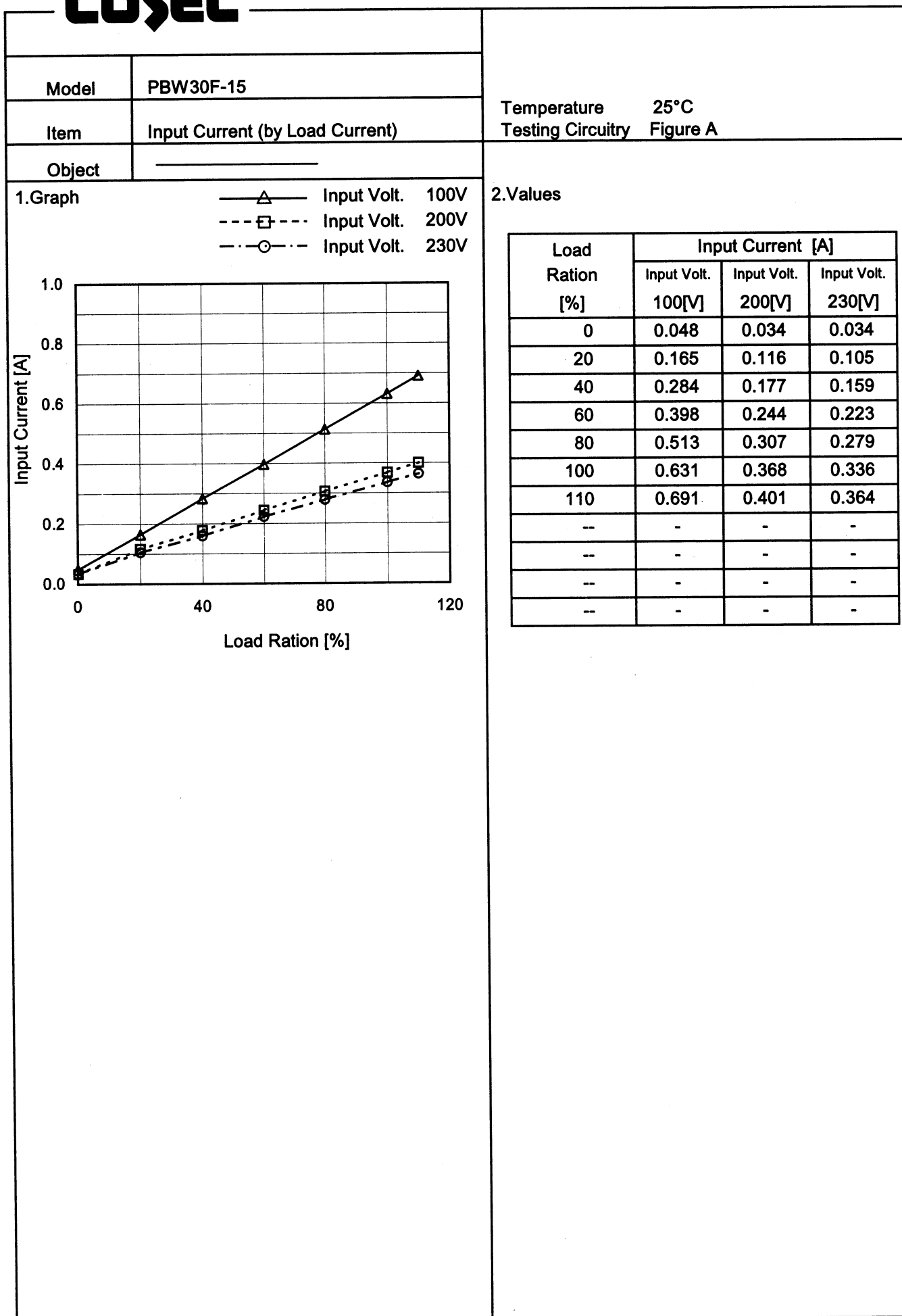
COSEL CO.,LTD.

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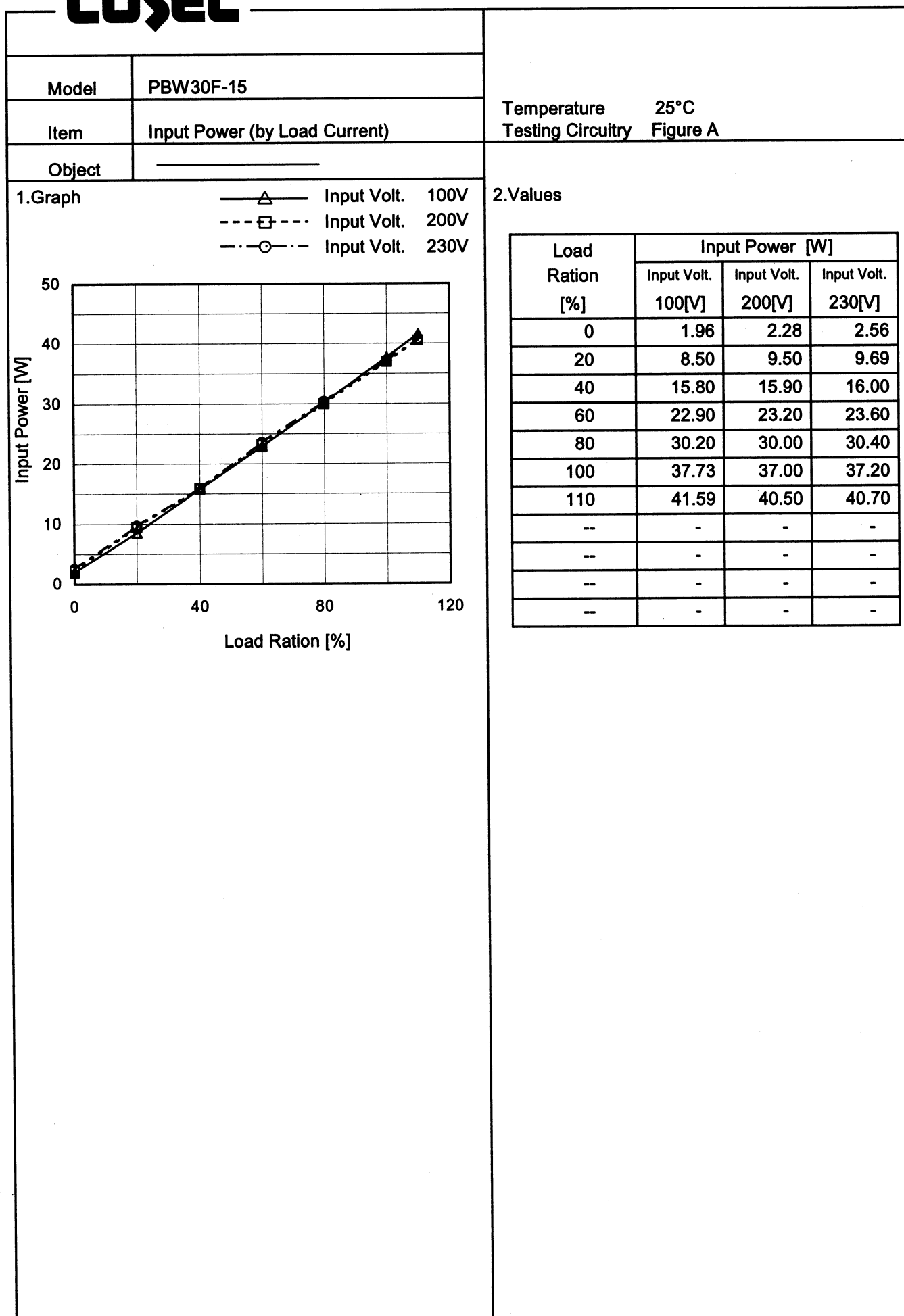
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Model		PBW30F-15	
Item		Efficiency (by Input Voltage)	
Object			

1.Graph

Load 50%

Load 100%

Efficiency [%]

86

78

70

62

54

46

38

30

50

100

150

200

250

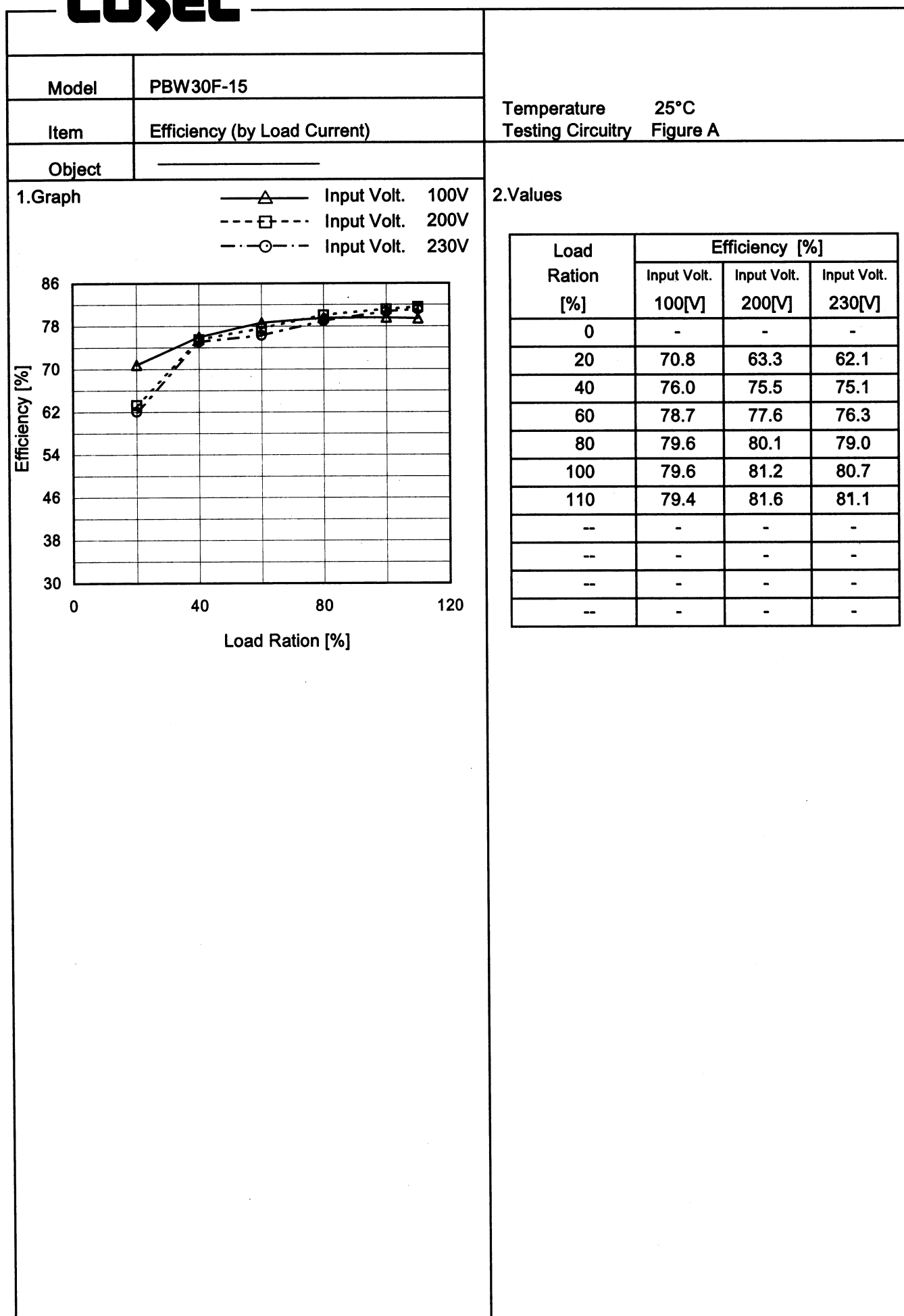
300

Input Voltage [V]

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

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
75	76.6	75.9
85	77.4	77.8
100	77.8	79.7
120	78.0	81.0
200	75.8	81.4
230	74.7	80.7
264	73.6	79.6
280	73.2	79.2
--	-	-

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Model		PBW30F-15	
Item		Power Factor (by Input Voltage)	
Object			

1.Graph

□

Load 50%

—

△

—

Load 100%

Power Factor

0.8

0.7

0.6

0.5

0.4

0.3

0.2

50

100

150

200

250

300

Input Voltage [V]

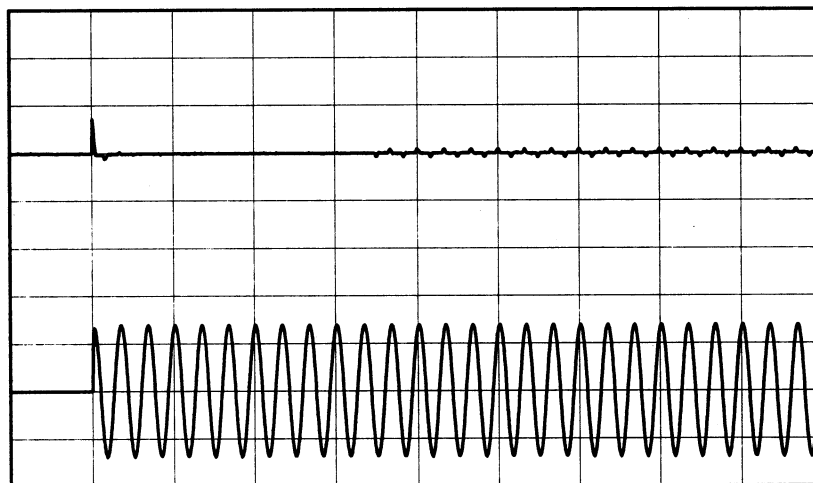
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Model		PBW30F-15		Temperature 25°C																																																	
Item		Power Factor (by Load Current)		Testing Circuitry Figure A																																																	
Object																																																					
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> <table><thead><tr><th>Load Ration [%]</th><th>100V</th><th>200V</th><th>230V</th></tr></thead><tbody><tr><td>0</td><td>0.407</td><td>0.336</td><td>0.328</td></tr><tr><td>20</td><td>0.516</td><td>0.409</td><td>0.402</td></tr><tr><td>40</td><td>0.556</td><td>0.449</td><td>0.437</td></tr><tr><td>60</td><td>0.576</td><td>0.475</td><td>0.461</td></tr><tr><td>80</td><td>0.588</td><td>0.489</td><td>0.474</td></tr><tr><td>100</td><td>0.598</td><td>0.502</td><td>0.481</td></tr><tr><td>110</td><td>0.602</td><td>0.505</td><td>0.486</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></tbody></table>		Load Ration [%]	100V	200V	230V	0	0.407	0.336	0.328	20	0.516	0.409	0.402	40	0.556	0.449	0.437	60	0.576	0.475	0.461	80	0.588	0.489	0.474	100	0.598	0.502	0.481	110	0.602	0.505	0.486	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	2.Values	
Load Ration [%]	100V	200V	230V																																																		
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Model PBW30F-15		Temperature 25°C Testing Circuitry Figure A
Item	Inrush Current	
Object		

Input
Current
[20A/div]Input
Voltage
[100V/div]

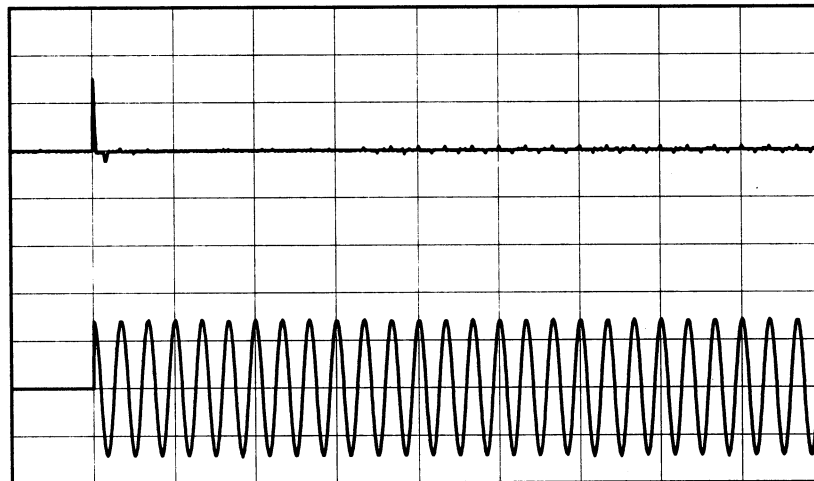
Time

[50mS/div]

Input Voltage 100 V

Frequency 60 Hz

Load 100 %

Primary inrush current :
14.6 ASecondary inrush current :
1.8 AInput
Current
[20A/div]Input
Voltage
[200V/div]

Time

[50mS/div]

Input Voltage 200 V

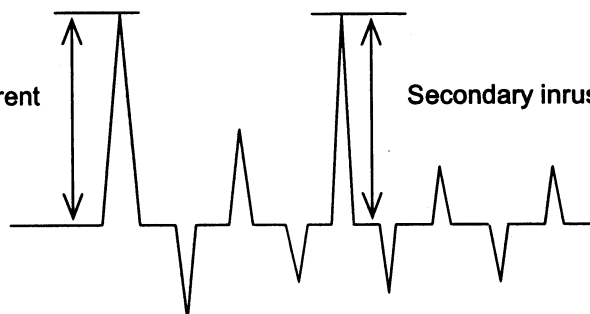
Frequency 60 Hz

Load 100 %

Primary inrush current :
30.0 ASecondary inrush current :
1.7 A

Primary inrush current

Secondary inrush current



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		Temperature 25°C Testing Circuitry Figure B
Model	PBW30F-15	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

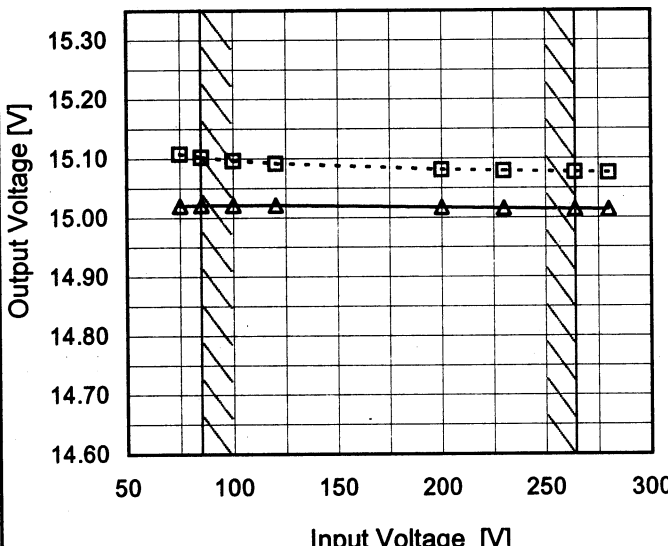
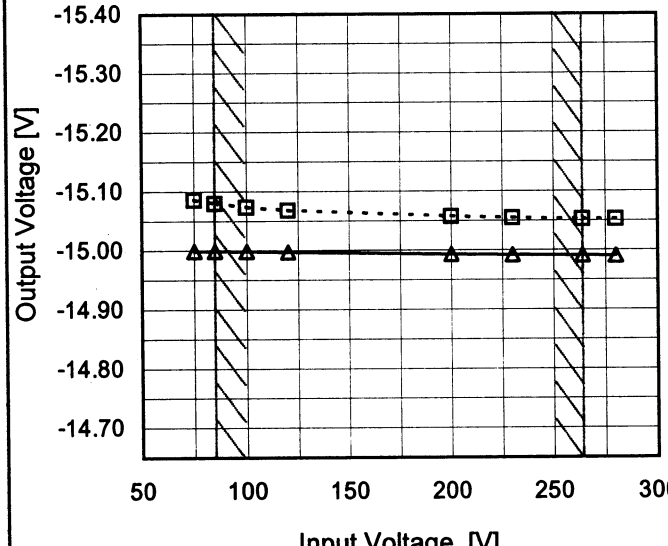
Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.15	0.32	0.39	Operation
	One of phase	0.30	0.64	0.79	stand by
IEC60950	Both phases	0.19	0.44	0.52	Operation
	One of phase	0.29	0.64	0.79	stand by

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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Model	PBW30F-15																																		
Item	Line Regulation	Temperature	25°C																																
Object	+15V1A	Testing Circuitry	Figure A																																
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<div><div>Output Voltage [V]</div><div></div><div>Load Current [A]</div></div>		<table><tr><th rowspan="2">Load Current [A]</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>0.0</td><td>15.022</td><td>15.024</td><td>15.023</td></tr><tr><td>0.2</td><td>14.922</td><td>14.922</td><td>14.920</td></tr><tr><td>0.4</td><td>14.870</td><td>14.865</td><td>14.866</td></tr><tr><td>0.6</td><td>14.825</td><td>14.823</td><td>14.820</td></tr><tr><td>0.8</td><td>14.784</td><td>14.787</td><td>14.784</td></tr><tr><td>1.0</td><td>14.739</td><td>14.750</td><td>14.746</td></tr><tr><td>1.1</td><td>14.715</td><td>14.732</td><td>14.730</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 Current [A]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	15.022	15.024	15.023	0.2	14.922	14.922	14.920	0.4	14.870	14.865	14.866	0.6	14.825	14.823	14.820	0.8	14.784	14.787	14.784	1.0	14.739	14.750	14.746	1.1	14.715	14.732	14.730	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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				+15V: Rated output current 1																																																		

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

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Model	PBW30F-15	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V1A		

Input Volt. 100 V

Cycle 1000 ms

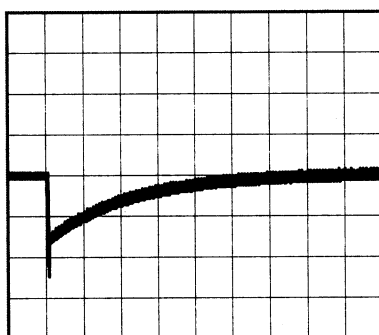
Load Current

Min. Load (0A) \longleftrightarrow

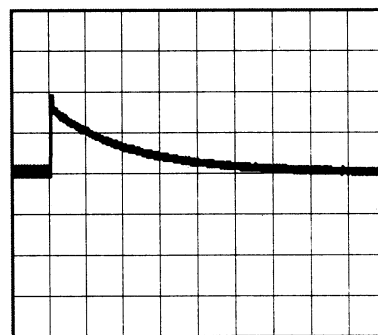
Output current 2 (1.4A)

* -15V: 0.6A

200 mV/div



100 ms/div



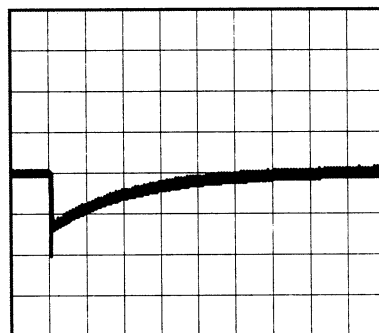
100 ms/div

Min. Load (0A) \longleftrightarrow

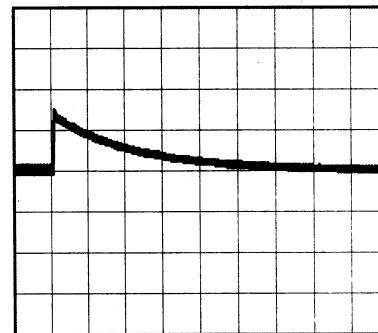
Output current 1 (1A)

* -15V: 1A

200 mV/div



100 ms/div



100 ms/div

* The characteristic of AC200V is equal.

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Model	PBW30F-15	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	-15V1A		

Input Volt. 100 V

Cycle 1000 ms

Load Current

Min. Load (0A) ←→

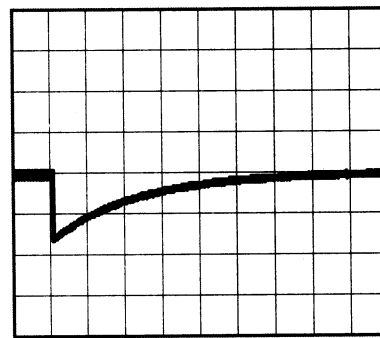
Output current 2 (1.4A)

* +15V: 0.6A

200 mV/div



100 ms/div



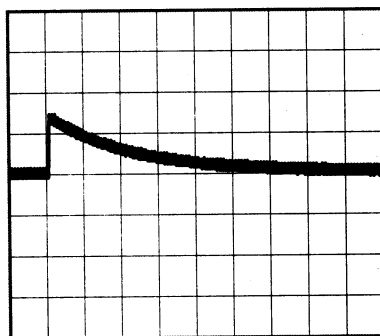
100 ms/div

Min. Load (0A) ←→

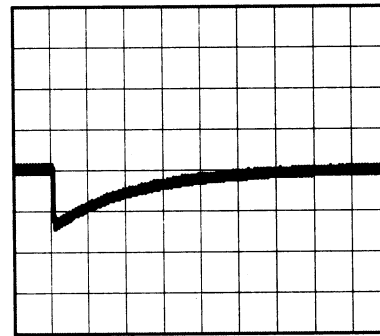
Output current 1 (1A)

* +15V: 1A

200 mV/div



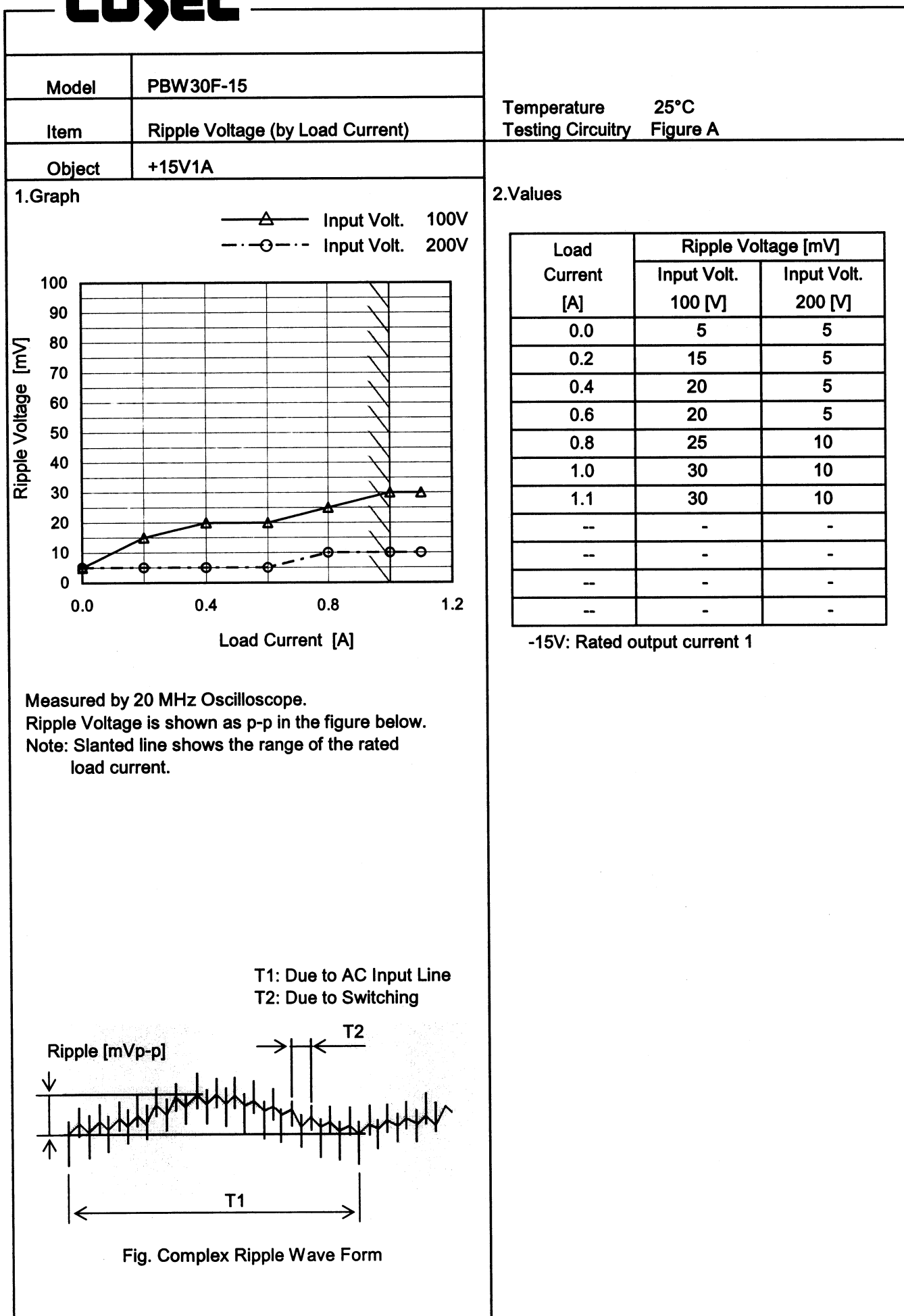
100 ms/div



100 ms/div

* The characteristic of AC200V is equal.

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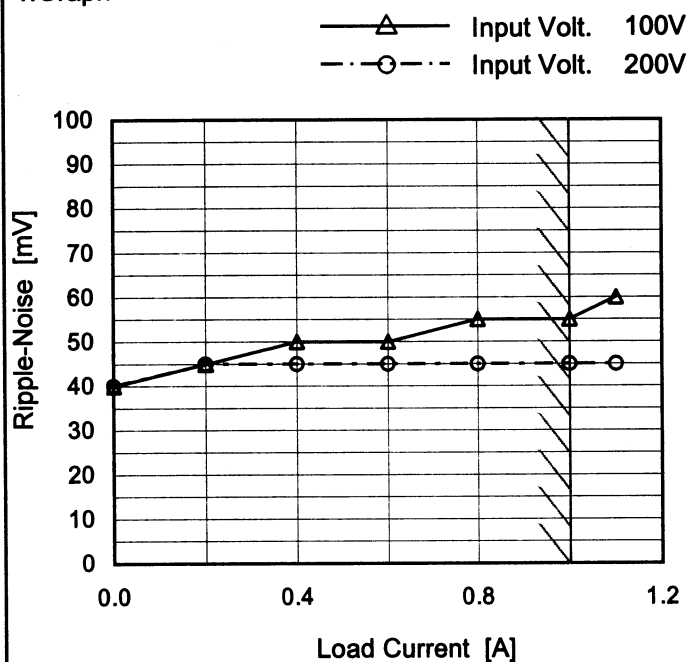
Model	PBW30F-15																																								
Item	Ripple Voltage (by Load Current)	Temperature	25°C																																						
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Fig. Complex Ripple Wave Form																																									

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Model	PBW30F-15
Item	Ripple-Noise
Object	+15V1A

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]
0.0	40	40
0.2	45	45
0.4	50	45
0.6	50	45
0.8	55	45
1.0	55	45
1.1	60	45
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current 1

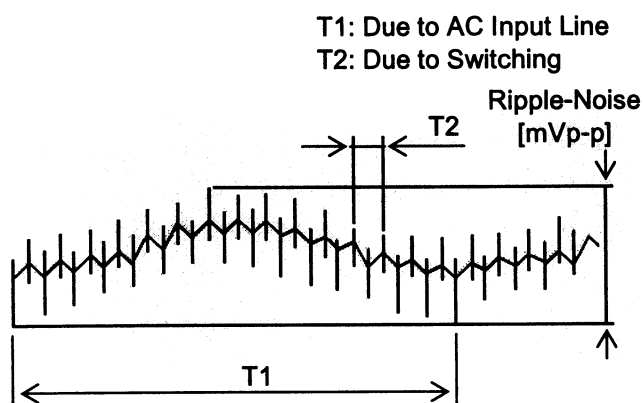
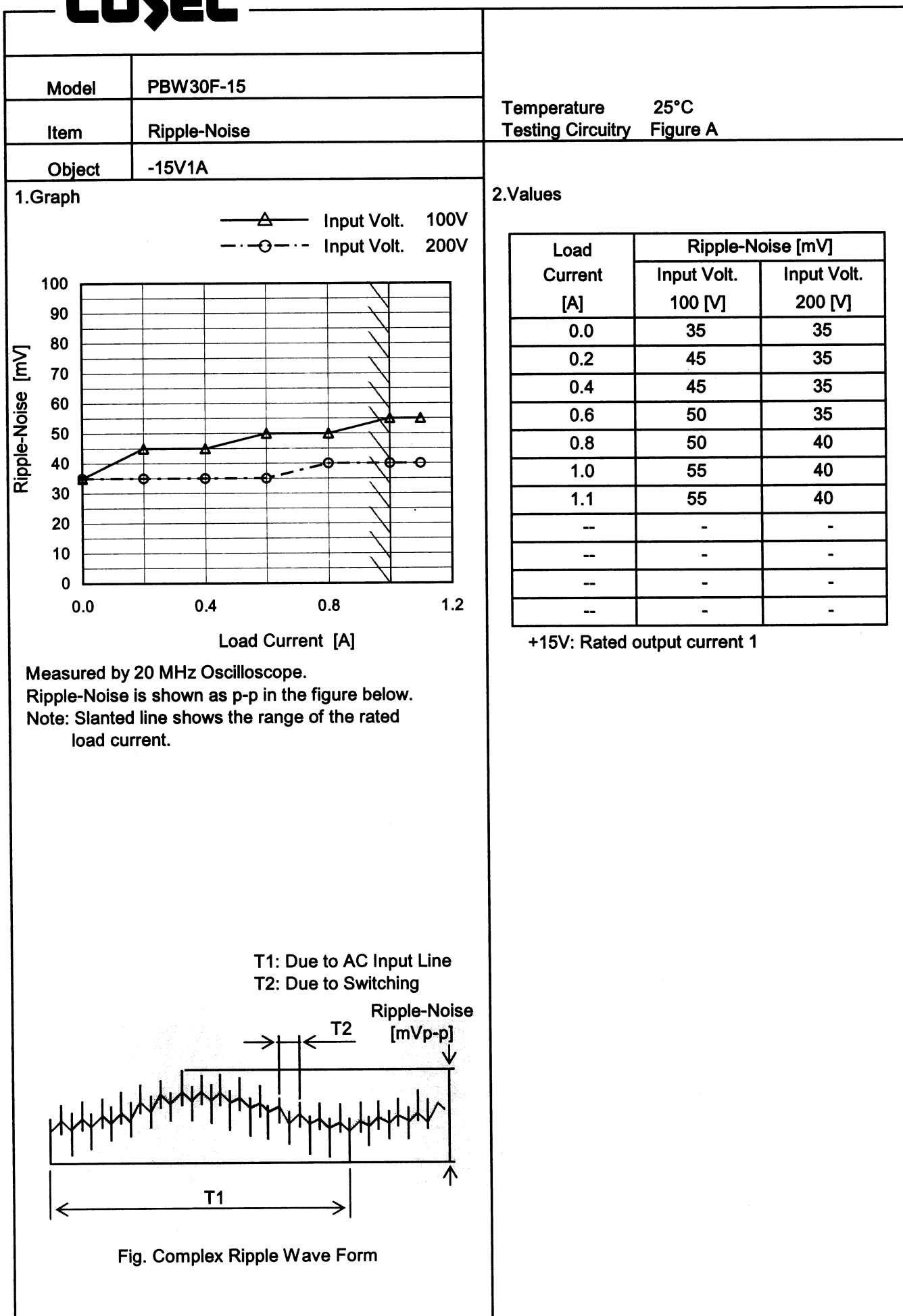


Fig. Complex Ripple Wave Form

COSEL



COSEL

Model	PBW30F-15																																											
Item	Ripple Voltage (by Ambient Temp.)																																											
Object	+15V1A																																											
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Model		PBW30F-15																																																				
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Note: Slanted line shows the range of the rated ambient temperature.

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

1. Output Voltage Accuracy

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

Temperature : -10 - 50°C

Input Voltage : 85 - 264V

Load Current (AVR 1) : 0 - 1A (AVR 2) : 0 - 1A

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

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

2. Values

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

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

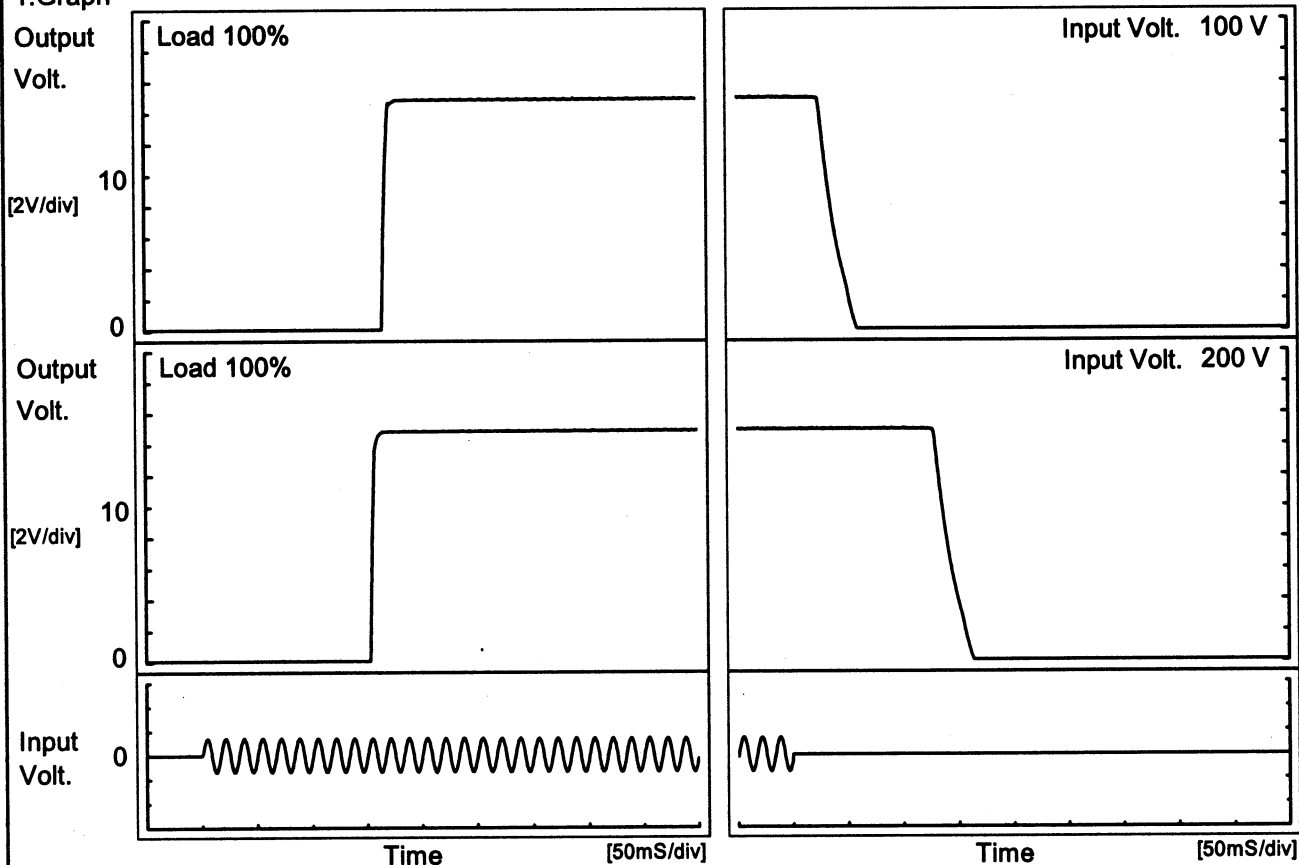
COSEL

Model	PBW30F-15		
Item	Time Lapse Drift	Temperature	25°C
Object	+15V1A	Testing Circuitry	Figure A
1.Graph		2.Values	
<div><div><div>Output Voltage [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></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><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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COSEL

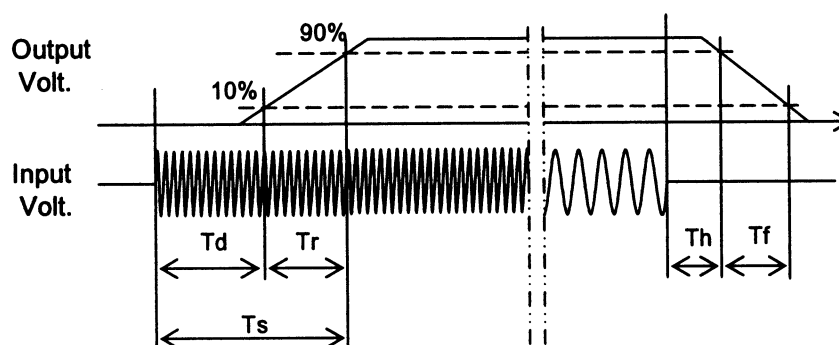
Model	PBW30F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V1A		

1. Graph



2. Values

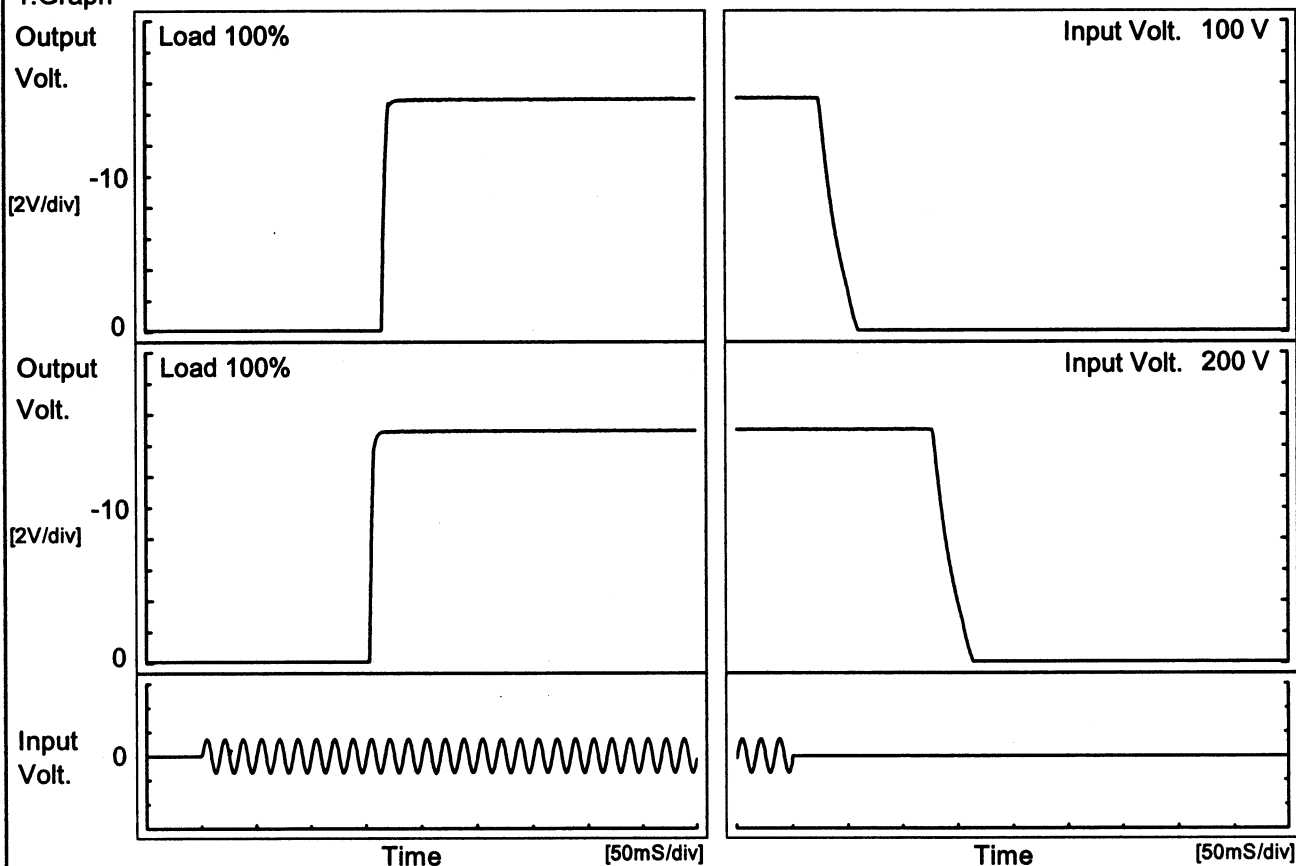
Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	165.3	5.5	170.8	26.0	27.5
200 V	153.8	4.0	157.8	129.5	28.0



COSEL

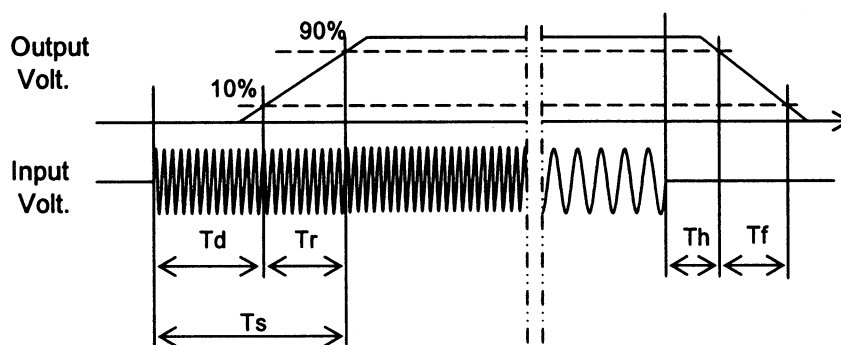
Model	PBW30F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	-15V1A		

1. Graph



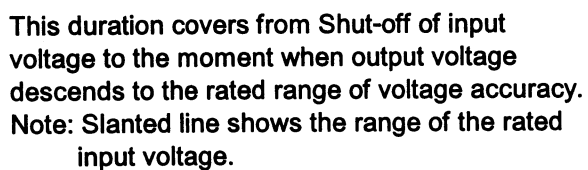
2. Values

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



Temperature 25°C
Testing Circuitry Figure A

2.Values



- 23 -

COSEL

Model		PBW30F-15	
Item		Hold-Up Time	
Object		-15V1A	

1.Graph

---□--- Load 50%

—△— Load 100%

Hold-Up Time [ms]

1000

100

10

1

50

100

150

200

250

300

Input Voltage [V]

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	24	10
85	34	15
100	52	24
120	81	39
200	252	129
230	338	175
264	453	236
280	514	268
--	-	-

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

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

COSEL

Model		PBW30F-15	
Item		Instantaneous Interruption Compensation	
Object		+15V1A	
1.Graph		2.Values	

—△— Input Volt. 100V

- - □ - - Input Volt. 200V

- · - ○ - · - Input Volt. 230V

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.2	48	223	261
0.4	39	196	245
0.6	36	166	231
0.8	31	127	206
1.0	27	137	182
1.1	23	129	174
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-15V: Rated output current 1

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

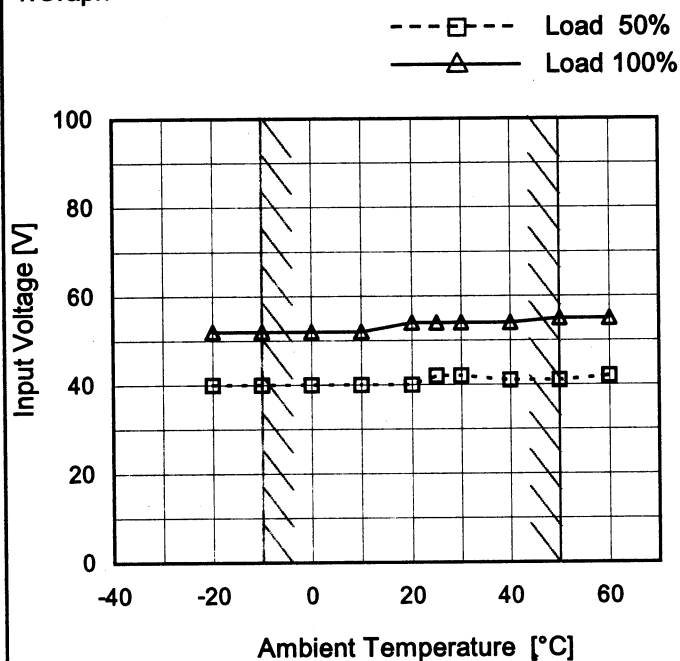
COSEL

Model		PBW30F-15	
Item		Instantaneous Interruption Compensation	
Object		-15V1A	
1.Graph		2.Values	

COSEL

Model	PBW30F-15
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V1A

1.Graph



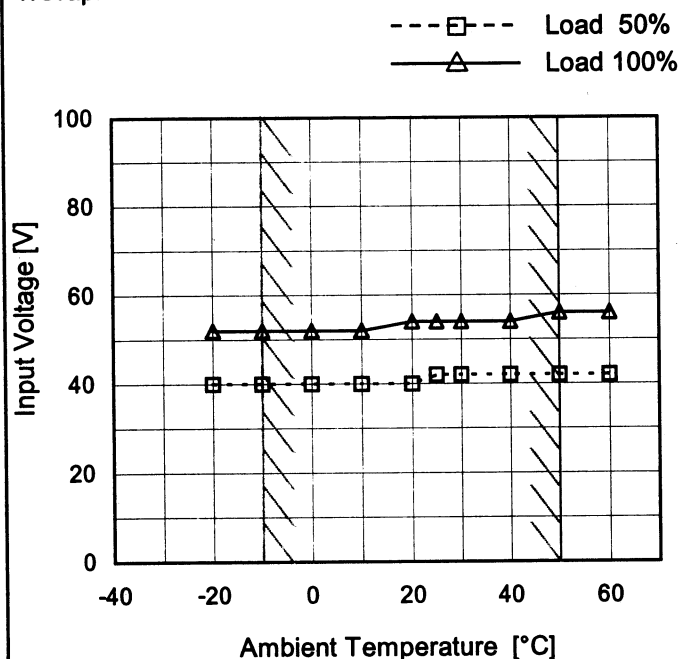
Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	40	52
-10	40	52
0	40	52
10	40	52
20	40	54
25	42	54
30	42	54
40	41	54
50	41	55
60	42	55
--	-	-

Object	-15V1A
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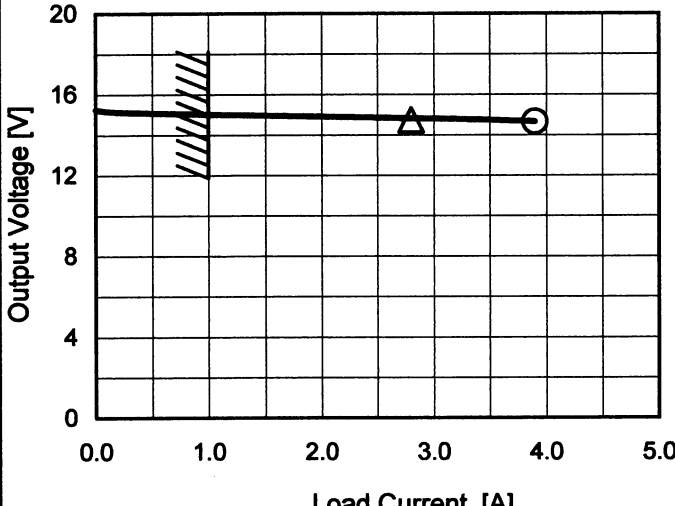
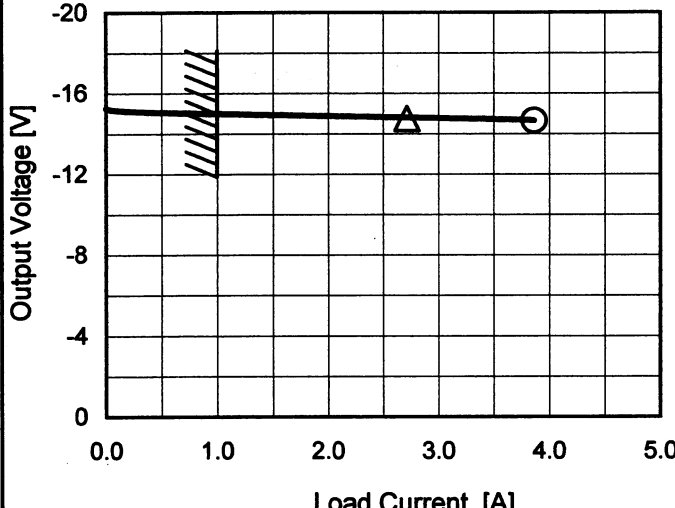
1.Graph



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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	40	52
-10	40	52
0	40	52
10	40	52
20	40	54
25	42	54
30	42	54
40	42	54
50	42	56
60	42	56
--	-	-

Model	PBW30F-15																																											
Item	Overcurrent Protection																																											
Object	+15V1A																																											
1.Graph		2.Values																																										
<div><div><div><div></div><div>Input Volt. 100V</div></div><div><div></div><div>Input Volt. 200V</div></div></div><p>Intermittent operation occurs when the output voltage is less than rated output voltage.</p></div>		<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>15.00</td><td>2.80</td><td>3.90</td></tr><tr><td>14.25</td><td>-</td><td>-</td></tr><tr><td>13.50</td><td>-</td><td>-</td></tr><tr><td>12.00</td><td>-</td><td>-</td></tr><tr><td>10.50</td><td>-</td><td>-</td></tr><tr><td>9.00</td><td>-</td><td>-</td></tr><tr><td>7.50</td><td>-</td><td>-</td></tr><tr><td>6.00</td><td>-</td><td>-</td></tr><tr><td>4.50</td><td>-</td><td>-</td></tr><tr><td>3.00</td><td>-</td><td>-</td></tr><tr><td>1.50</td><td>-</td><td>-</td></tr><tr><td>0.00</td><td>-</td><td>-</td></tr></table> <p>-15V: Rated output current 1</p>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	15.00	2.80	3.90	14.25	-	-	13.50	-	-	12.00	-	-	10.50	-	-	9.00	-	-	7.50	-	-	6.00	-	-	4.50	-	-	3.00	-	-	1.50	-	-	0.00	-	-
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<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Operating Point [V]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th></tr><tr><td>-20</td><td>25.26</td><td>25.26</td></tr><tr><td>-10</td><td>25.47</td><td>25.40</td></tr><tr><td>0</td><td>25.61</td><td>25.61</td></tr><tr><td>10</td><td>25.82</td><td>25.82</td></tr><tr><td>20</td><td>25.96</td><td>25.96</td></tr><tr><td>25</td><td>26.03</td><td>26.03</td></tr><tr><td>30</td><td>26.17</td><td>26.17</td></tr><tr><td>40</td><td>26.31</td><td>26.31</td></tr><tr><td>50</td><td>26.52</td><td>26.52</td></tr><tr><td>60</td><td>26.66</td><td>26.66</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>				Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 200[V]	-20	25.26	25.26	-10	25.47	25.40	0	25.61	25.61	10	25.82	25.82	20	25.96	25.96	25	26.03	26.03	30	26.17	26.17	40	26.31	26.31	50	26.52	26.52	60	26.66	26.66	--	-	-
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60	-25.97	-25.97																																							
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Note: Slanted line shows the range of the rated ambient temperature.

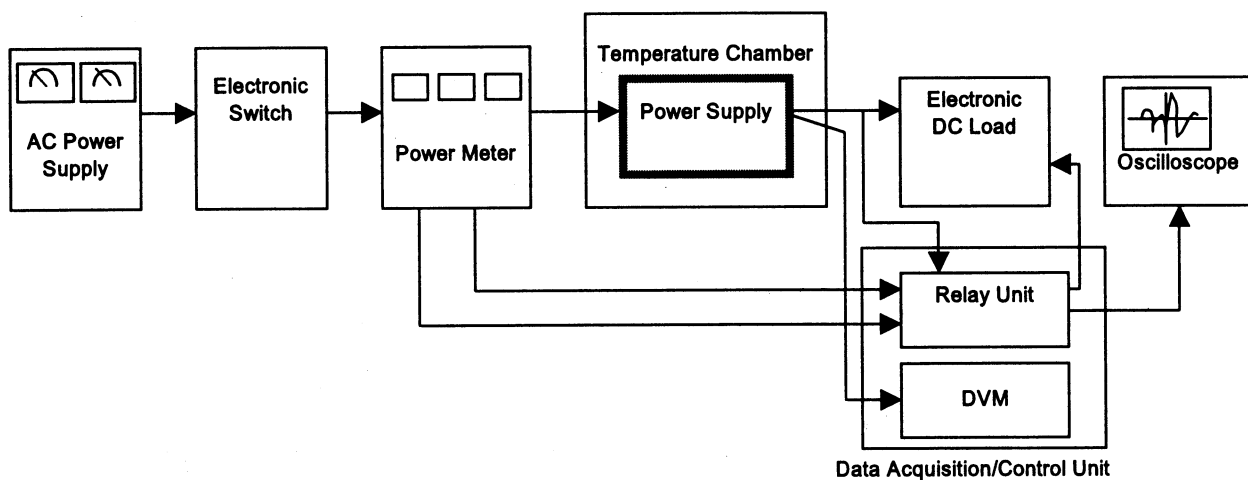


Figure A

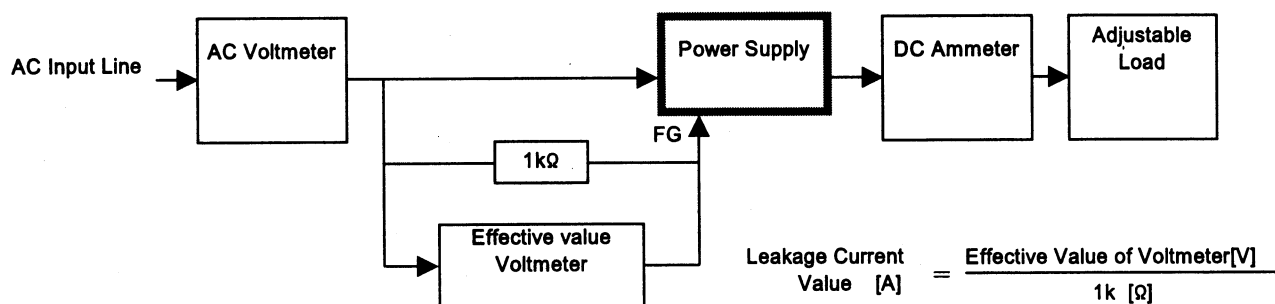


Figure B (DEN-AN)

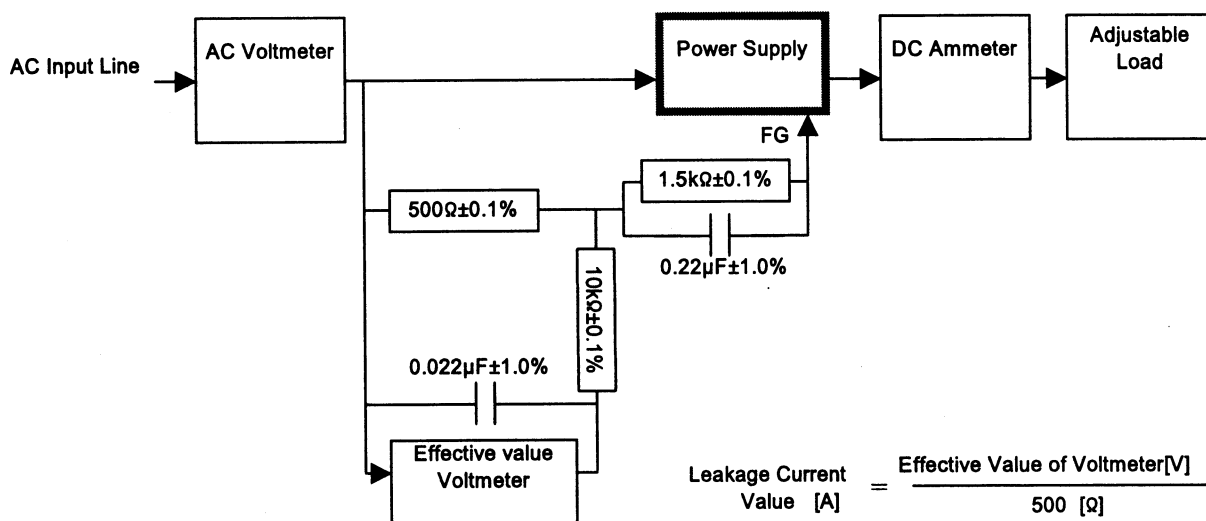


Figure B (IEC60950)