参考資料

COSEL

TEST DATA OF PBW15F-15

Regulated DC Power Supply
Sep 29, 2005

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Yoshiaki Shimizu Design Engineer

COSEL CO.,LTD.

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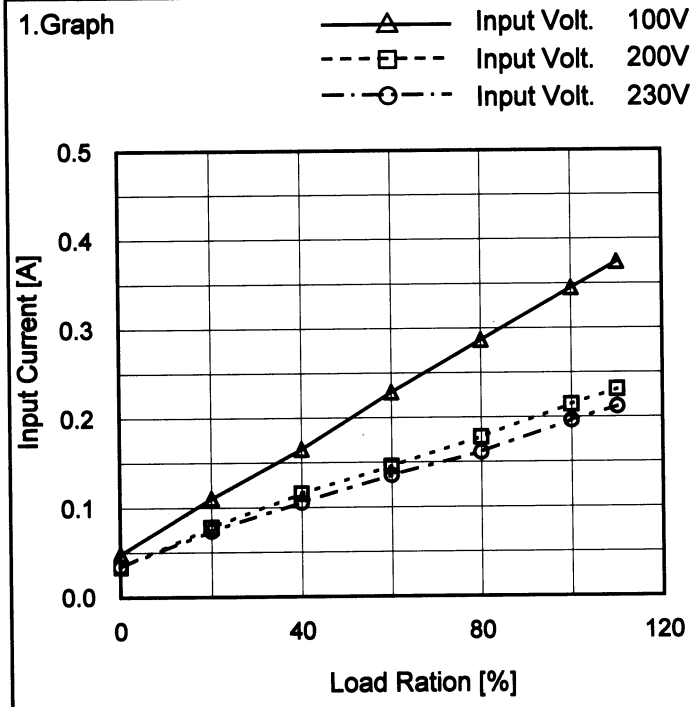
Model	PBW15F-15
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ration [%]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	0.048	0.034	0.034
20	0.110	0.078	0.074
40	0.165	0.116	0.106
60	0.229	0.146	0.136
80	0.287	0.178	0.161
100	0.345	0.215	0.196
110	0.374	0.231	0.212
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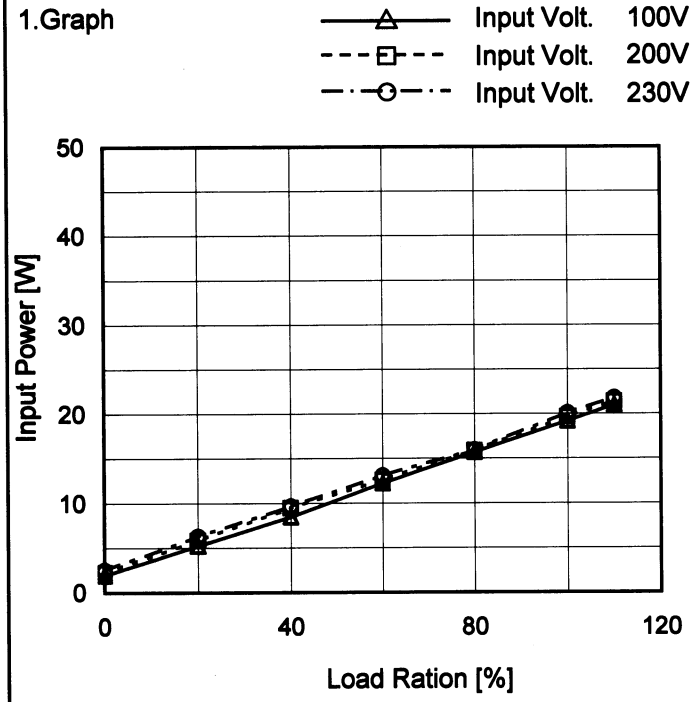
BC-10027

COSEL

Model	PBW15F-15
Item	Input Power (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

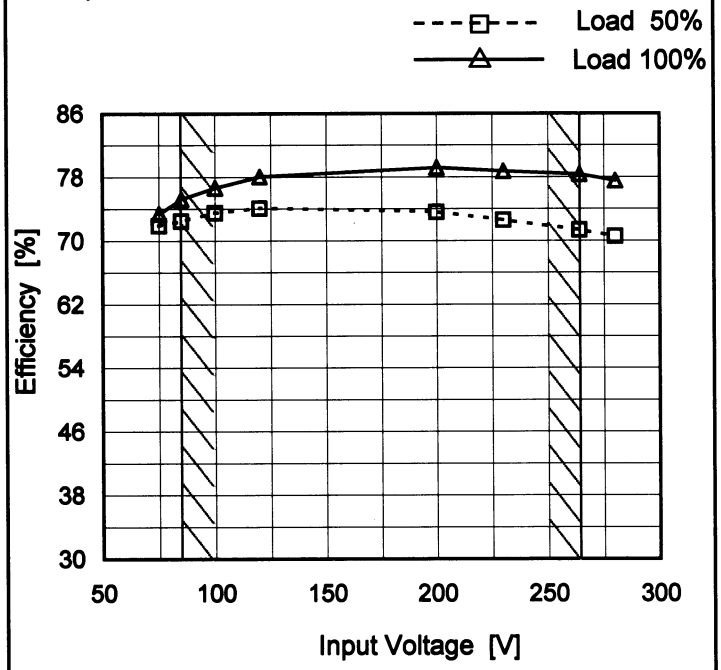
Load Ration [%]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	1.95	2.25	2.52
20	5.25	5.85	6.29
40	8.46	9.50	9.67
60	12.25	12.60	13.10
80	15.73	15.90	16.00
100	19.23	19.70	20.10
110	21.00	21.40	21.80
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	PBW15F-15
Item	Efficiency (by Input Voltage)
Object	———————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

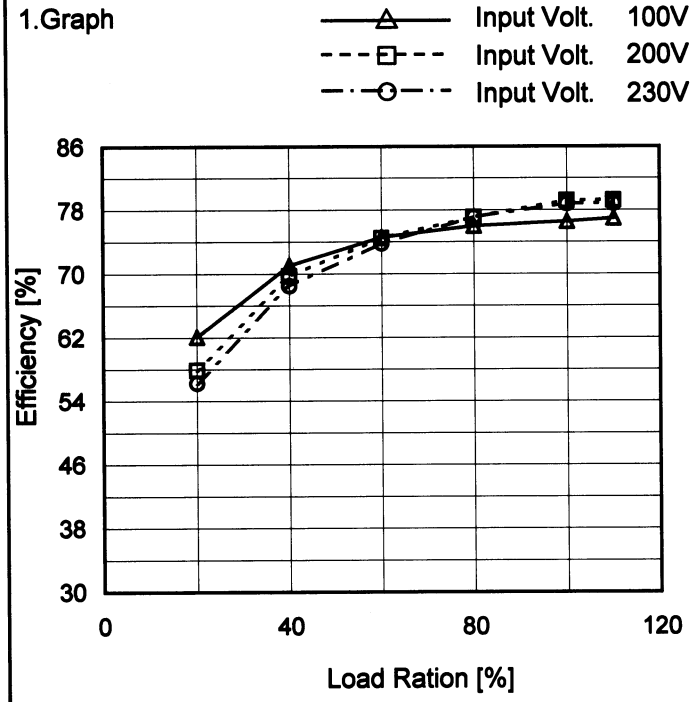
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
75	71.9	73.4
85	72.5	75.2
100	73.5	76.7
120	74.1	78.1
200	73.6	79.2
230	72.6	78.8
264	71.4	78.4
280	70.6	77.6
--	-	-

COSEL

Model	PBW15F-15
Item	Efficiency (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ration [%]	Efficiency [%] Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	-	-	-
20	62.1	57.9	56.3
40	71.1	69.8	68.5
60	74.6	74.5	73.8
80	76.0	77.1	77.1
100	76.6	79.2	78.8
110	77.0	79.2	78.8
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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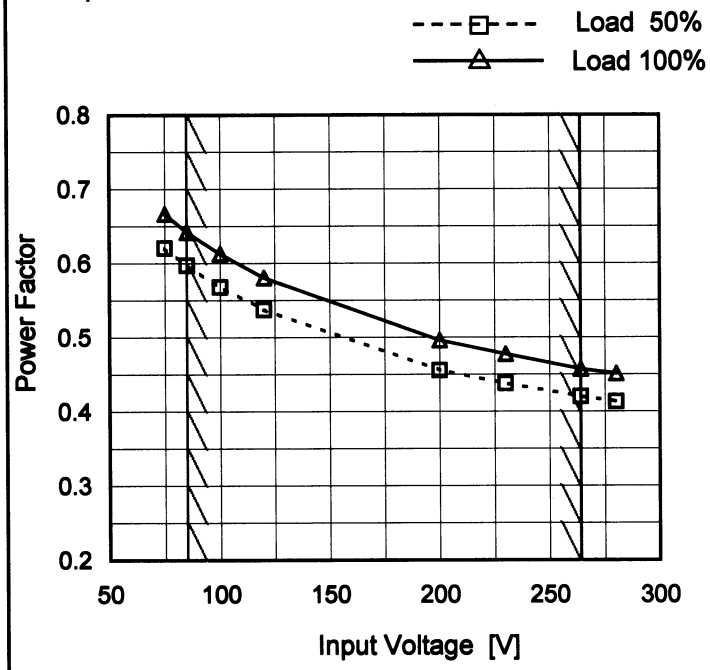
COSEL

Model	PBW15F-15
Item	Power Factor (by Input Voltage)
Object	———

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

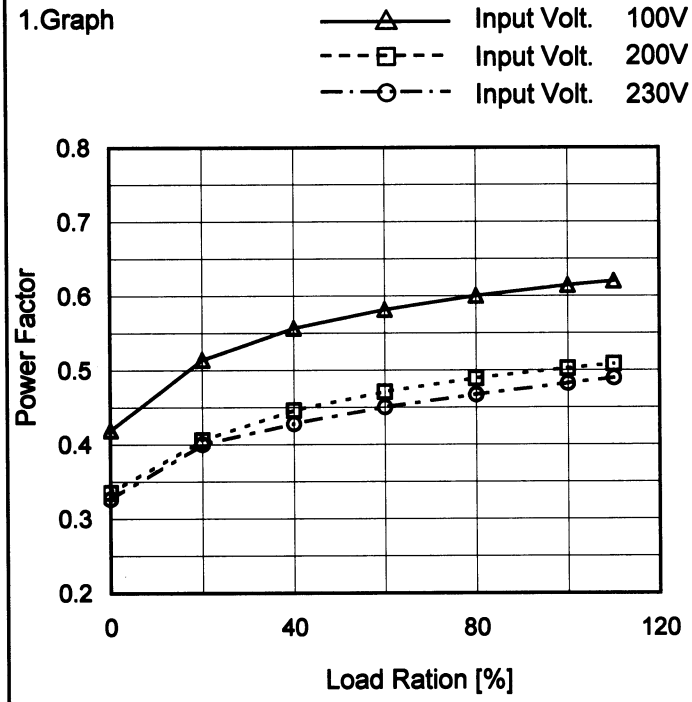
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.621	0.667
85	0.597	0.642
100	0.568	0.613
120	0.537	0.580
200	0.456	0.496
230	0.438	0.478
264	0.420	0.457
280	0.413	0.451
--	-	-

COSEL

Model	PBW15F-15
Item	Power Factor (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ration [%]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	0.420	0.335	0.327
20	0.514	0.406	0.400
40	0.557	0.446	0.428
60	0.582	0.471	0.451
80	0.601	0.489	0.467
100	0.614	0.503	0.482
110	0.620	0.508	0.490
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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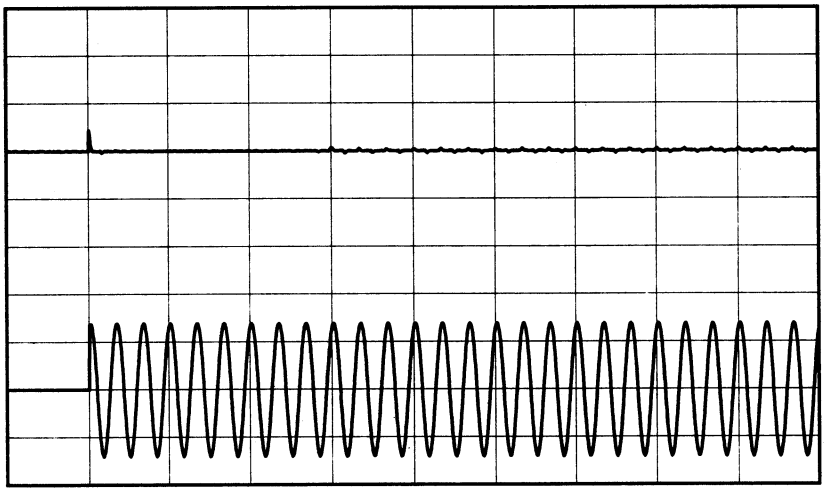
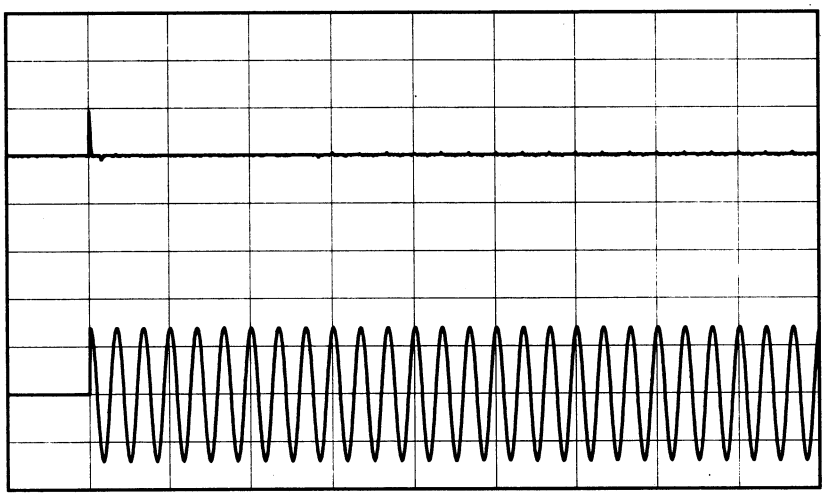
Model	PBW15F-15
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A



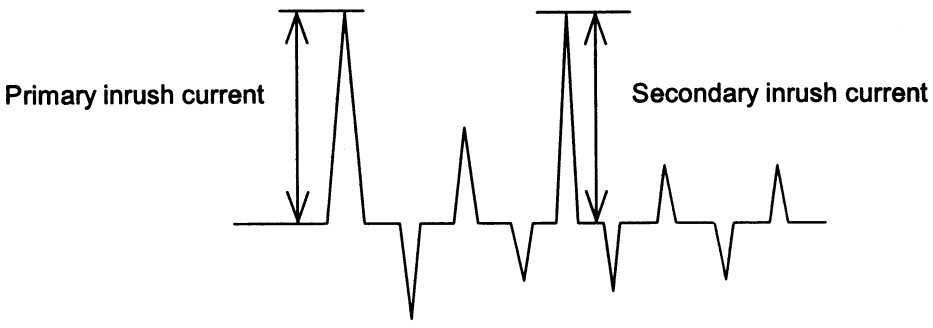
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
8.7 A
Secondary inrush current :
1.2 A



Input Voltage 200 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
18.5 A
Secondary inrush current :
1.1 A



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Model	PBW15F-15	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	———————————	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.06	0.12	0.14	Operation
	One of phase	0.10	0.22	0.27	stand by
IEC60950	Both phases	0.07	0.15	0.18	Operation
	One of phase	0.10	0.22	0.27	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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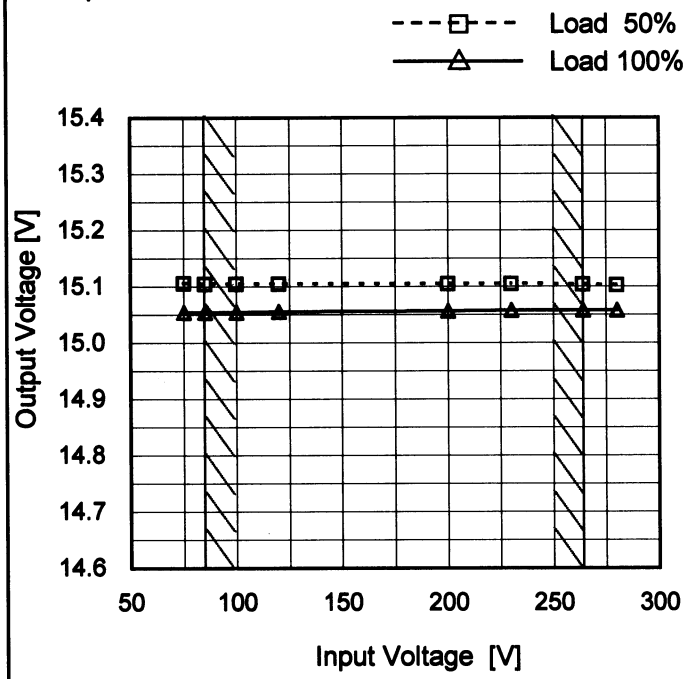
Model	PBW15F-15
Item	Line Regulation
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

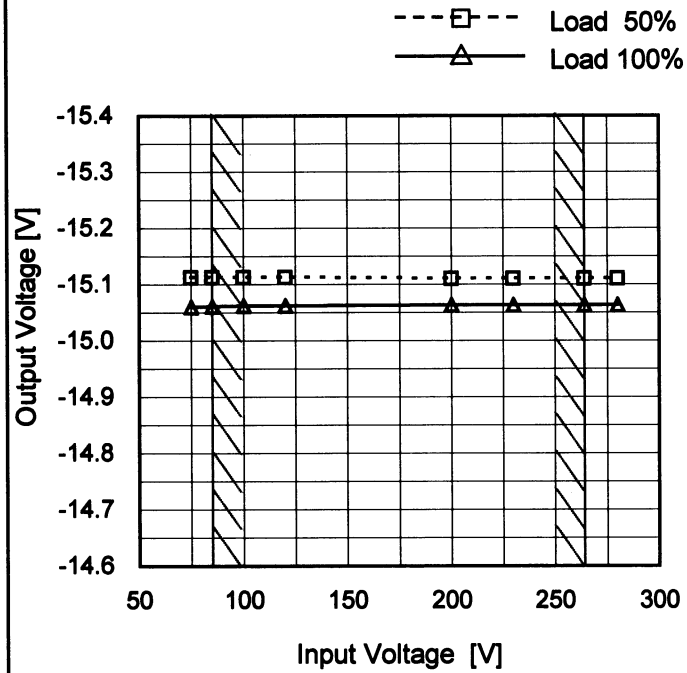


2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	15.106	15.054
85	15.105	15.055
100	15.104	15.055
120	15.104	15.055
200	15.105	15.057
230	15.105	15.058
264	15.103	15.058
280	15.103	15.058
--	-	-

Object	-15V0.5A

1.Graph



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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	-15.113	-15.060
85	-15.112	-15.061
100	-15.112	-15.062
120	-15.112	-15.063
200	-15.111	-15.063
230	-15.110	-15.064
264	-15.110	-15.064
280	-15.110	-15.064
--	-	-

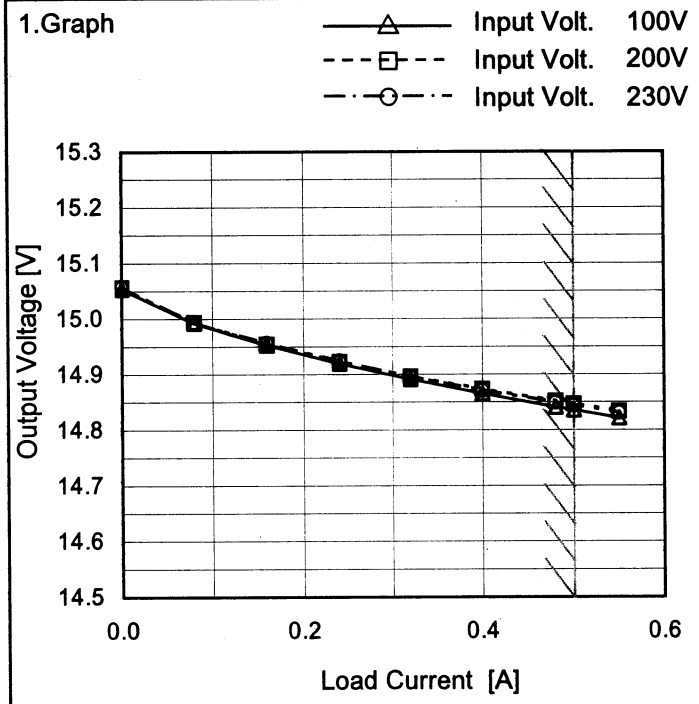
BC-10027

COSEL

Model	PBW15F-15
Item	Load Regulation
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



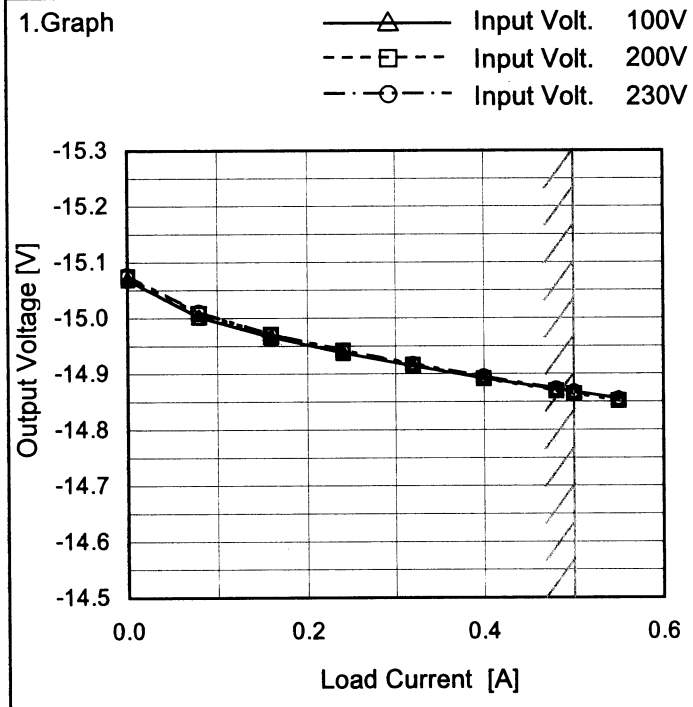
2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	15.054	15.057	15.057
0.08	14.993	14.994	14.993
0.16	14.952	14.955	14.956
0.24	14.920	14.923	14.924
0.32	14.892	14.897	14.896
0.40	14.865	14.874	14.872
0.48	14.841	14.852	14.849
0.50	14.836	14.847	14.844
0.55	14.822	14.834	14.832
--	-	-	-
--	-	-	-

-15V: Rated output current 1

Object	-15V0.5A

1.Graph



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

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-15.070	-15.075	-15.077
0.08	-15.002	-15.008	-15.011
0.16	-14.966	-14.971	-14.971
0.24	-14.938	-14.942	-14.942
0.32	-14.914	-14.916	-14.918
0.40	-14.892	-14.892	-14.895
0.48	-14.872	-14.870	-14.873
0.50	-14.868	-14.865	-14.868
0.55	-14.856	-14.852	-14.855
--	-	-	-
--	-	-	-

+15V: Rated output current 1

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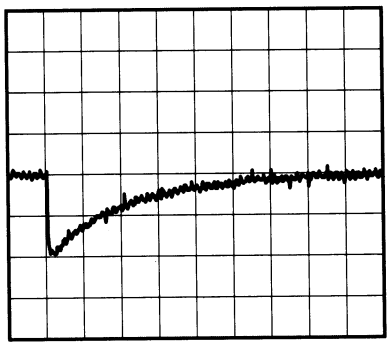
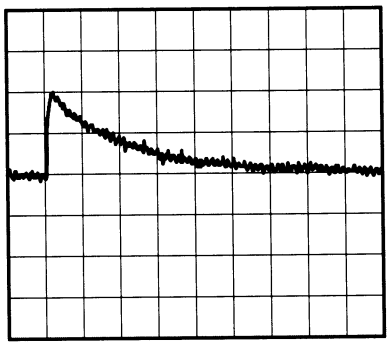
Model	PBW15F-15		
Item	Dynamic Load Response	Temperature	25℃
		Testing Circuitry	Figure A
Object	+15V0.5A		

Input Volt. 100 V
Cycle 1000 ms

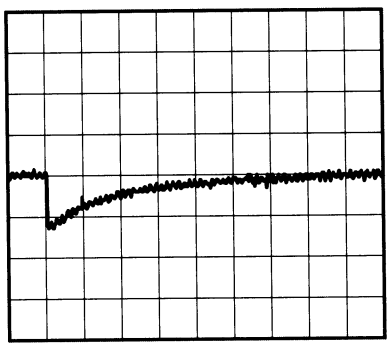
Load Current

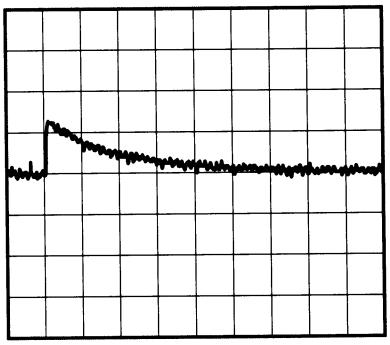
Min. Load (0A) ⟷
Output current 2 (1A)
* -15V: 0A





Min. Load (0A) ⟷
Output current 1 (0.5A)
* -15V: 0.5A





* The characteristic of AC200V is equal.

COSEL

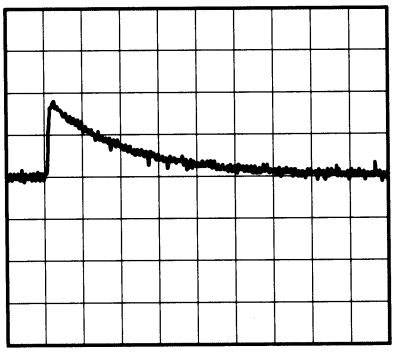
Model	PBW15F-15
Item	Dynamic Load Response
Object	-15V0.5A

Temperature 25℃
Testing Circuitry Figure A

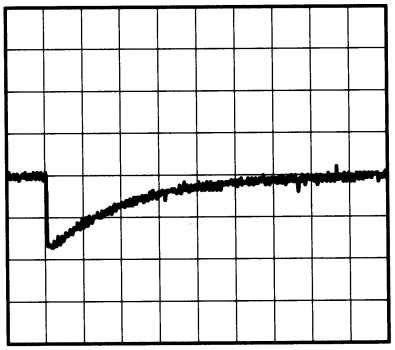
Input Volt. 100 V
Cycle 1000 ms

Load Current

Min. Load (0A) ⟷
Output current 2 (1A)
* +15V: 0A

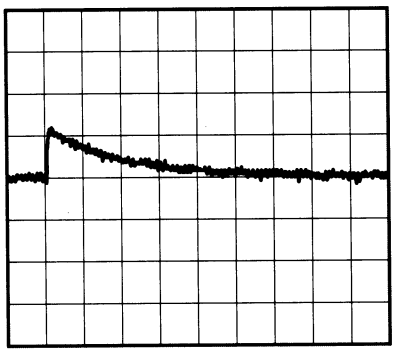


200 mV/div
100 ms/div

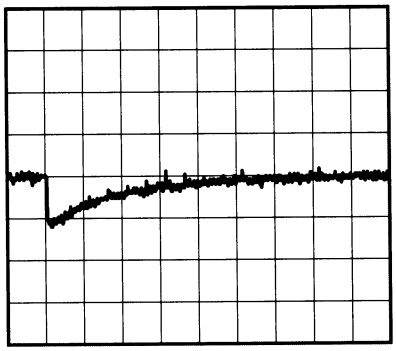


100 ms/div

Min. Load (0A) ⟷
Output current 1 (0.5A)
* +15V: 0.5A



200 mV/div
100 ms/div



100 ms/div

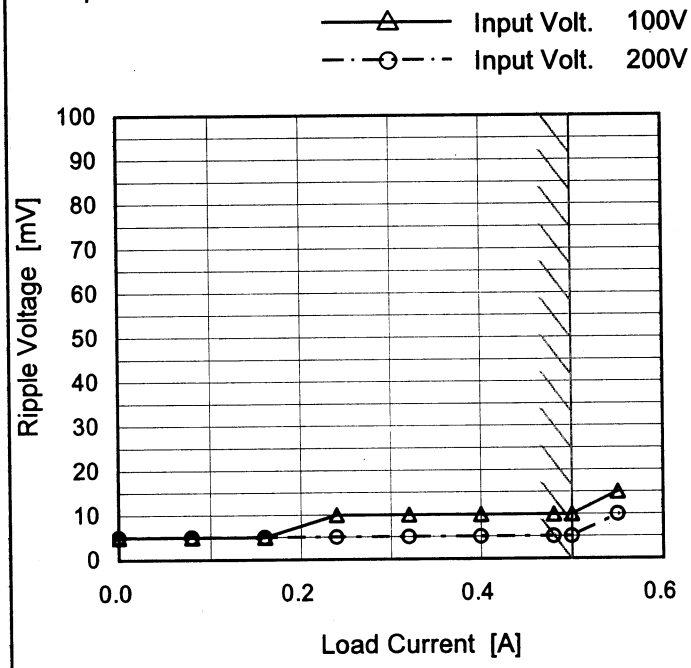
* The characteristic of AC200V is equal.

COSEL

Model	PBW15F-15
Item	Ripple Voltage (by Load Current)
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured by 20 MHz Qscilloscope.
Ripple Voltage 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 Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.00	5	5
0.08	5	5
0.16	5	5
0.24	10	5
0.32	10	5
0.40	10	5
0.48	10	5
0.50	10	5
0.55	15	10
--	-	-
--	-	-

-15V: Rated output current 1

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

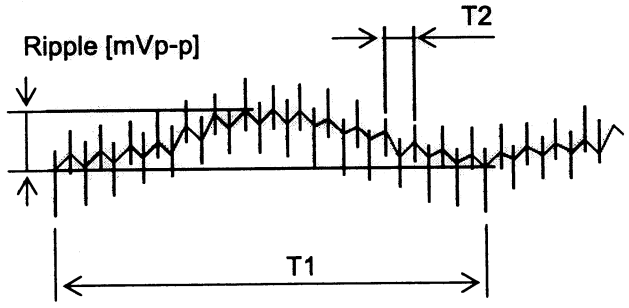


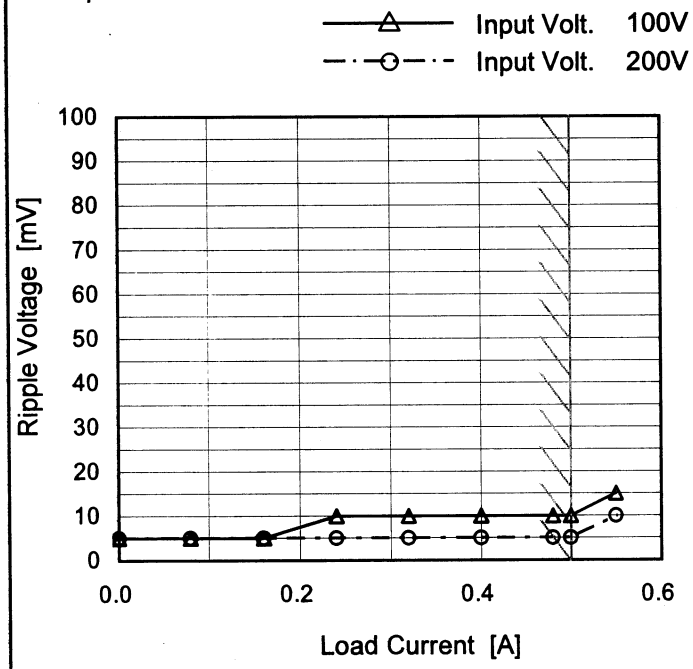
Fig. Complex Ripple Wave Form

COSEL

Model	PBW15F-15
Item	Ripple Voltage (by Load Current)
Object	-15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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.

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

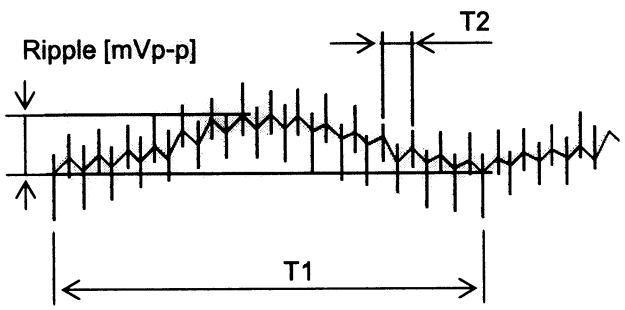


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.00	5	5
0.08	5	5
0.16	5	5
0.24	10	5
0.32	10	5
0.40	10	5
0.48	10	5
0.50	10	5
0.55	15	10
--	-	-
--	-	-

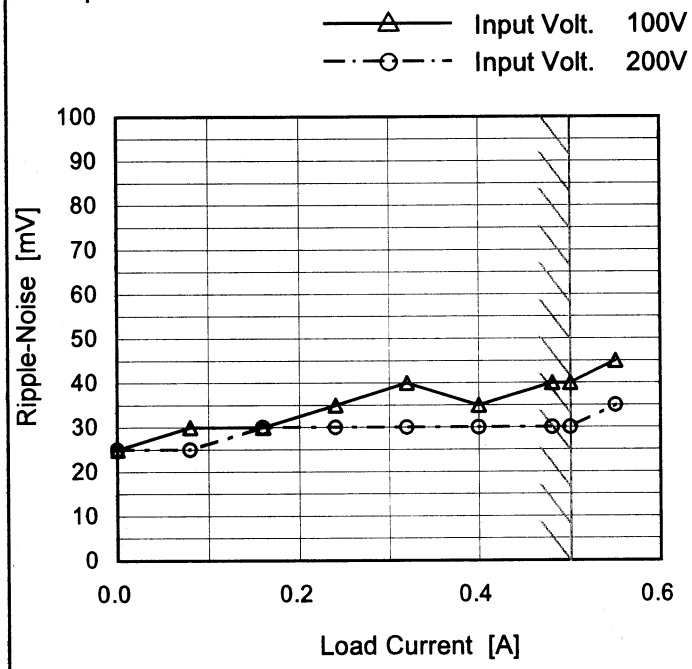
+15V: Rated output current 1

COSEL

Model	PBW15F-15
Item	Ripple-Noise
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Ripple-Noise [mV] Input Volt. 100 [V]	Ripple-Noise [mV] Input Volt. 200 [V]
0.00	25	25
0.08	30	25
0.16	30	30
0.24	35	30
0.32	40	30
0.40	35	30
0.48	40	30
0.50	40	30
0.55	45	35
--	-	-
--	-	-

-15V: Rated output current 1

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

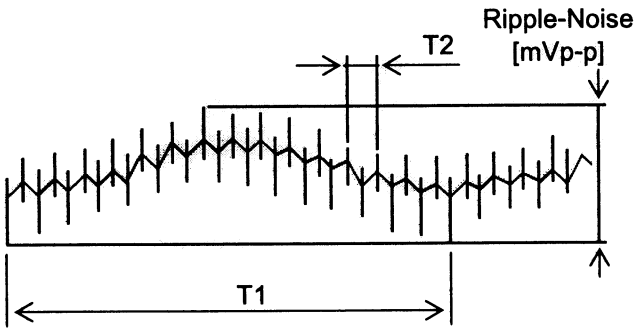


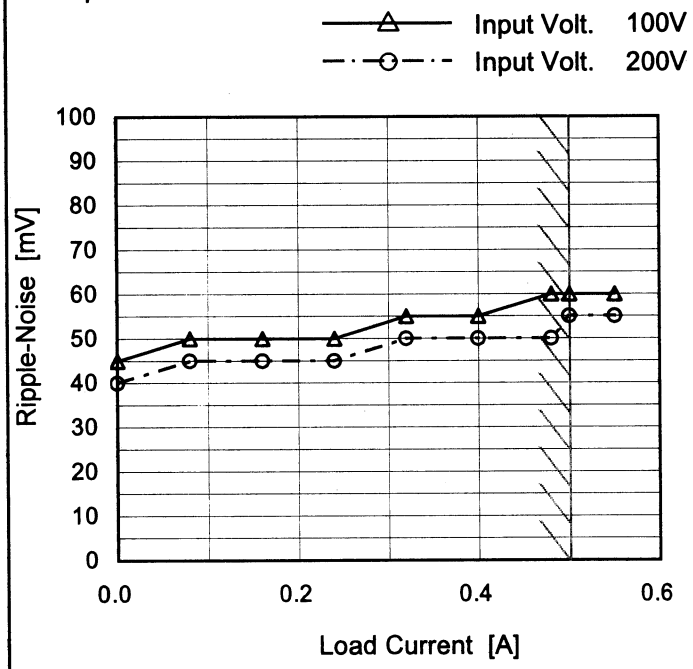
Fig. Complex Ripple Wave Form

COSEL

Model	PBW15F-15
Item	Ripple-Noise
Object	-15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured by MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.00	45	40
0.08	50	45
0.16	50	45
0.24	50	45
0.32	55	50
0.40	55	50
0.48	60	50
0.50	60	55
0.55	60	55
--	-	-
--	-	-

+15V: Rated output current 1

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

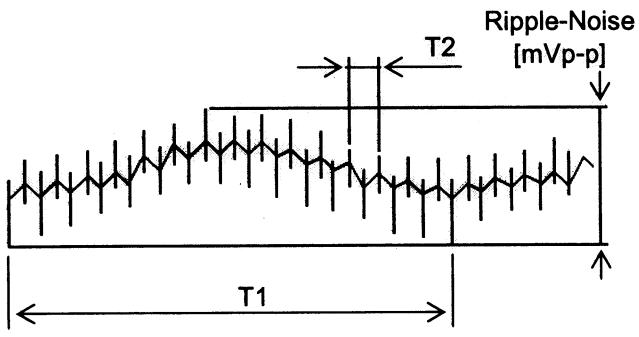


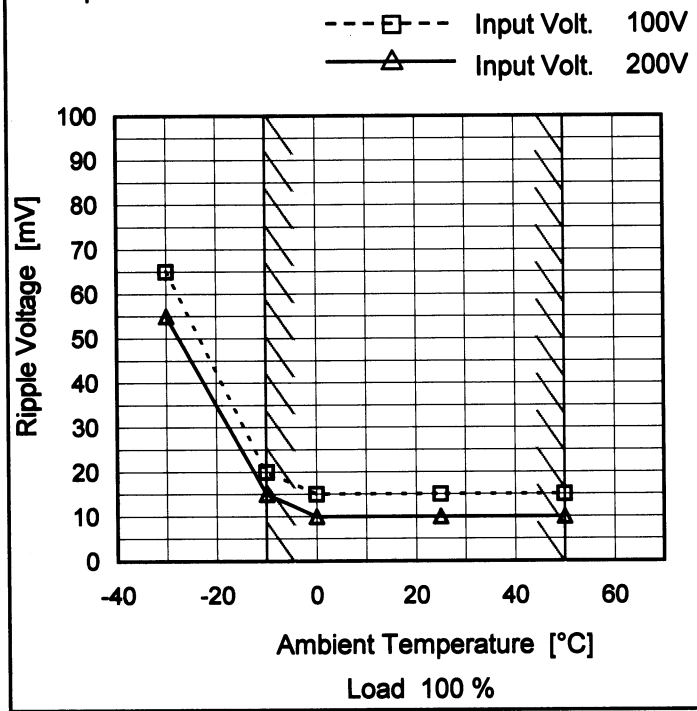
Fig. Complex Ripple Wave Form

COSEL

Model	PBW15F-15
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V0.5A

Testing Circuitry Figure A

1.Graph



Load 100 %

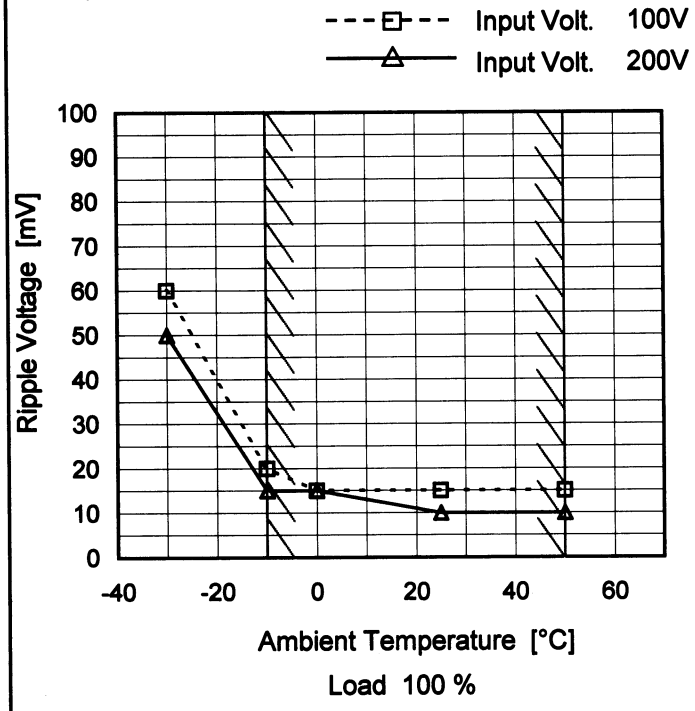
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	65	55
-10	20	15
0	15	10
25	15	10
50	15	10
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current 1

Object	-15V0.5A

1.Graph



Load 100 %

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	60	50
-10	20	15
0	15	15
25	15	10
50	15	10
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

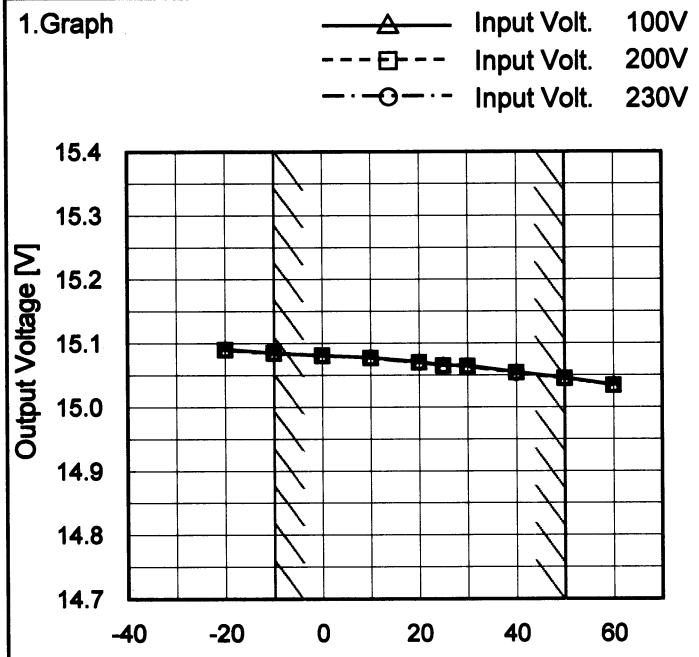
+15V: Rated output current 1

COSEL

Model	PBW15F-15
Item	Ambient Temperature Drift
Object	+15V0.5A

Testing Circuitry Figure A

1.Graph



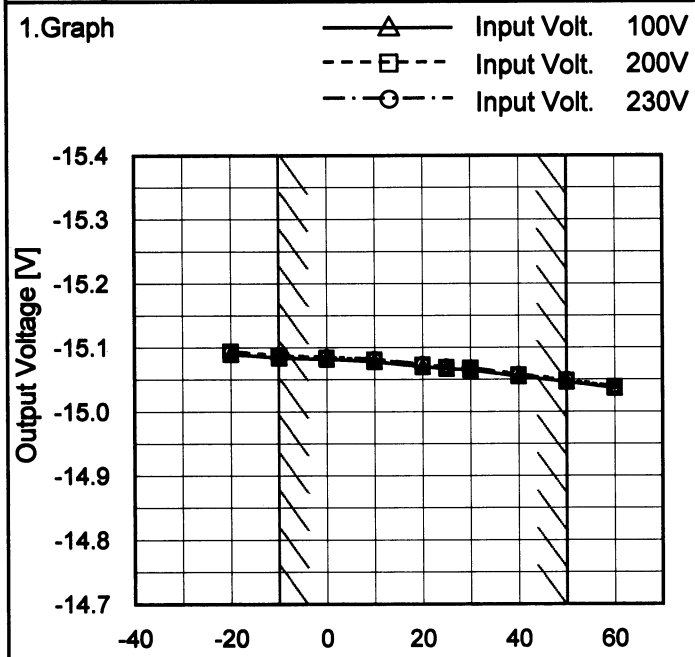
Load 100%

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	15.091	15.090	15.090
-10	15.085	15.085	15.084
0	15.081	15.081	15.081
10	15.078	15.077	15.077
20	15.071	15.070	15.070
25	15.066	15.065	15.065
30	15.065	15.064	15.064
40	15.055	15.054	15.053
50	15.046	15.045	15.045
60	15.035	15.034	15.034
--	-	-	-

Object -15V0.5A

1.Graph



Load 100%

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

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	-15.090	-15.094	-15.094
-10	-15.084	-15.087	-15.088
0	-15.082	-15.084	-15.085
10	-15.078	-15.081	-15.082
20	-15.070	-15.073	-15.074
25	-15.067	-15.069	-15.070
30	-15.065	-15.068	-15.068
40	-15.055	-15.057	-15.058
50	-15.047	-15.049	-15.050
60	-15.037	-15.039	-15.039
--	-	-	-

COSEL

Model	PBW15F-15	
Item	Output Voltage Accuracy	Testing Circuitry Figure A

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 - 0.5A (AVR 2) : 0 - 0.5A

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

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

2.Values

Object	+15V0.5A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-10	200	0	15.299	±127	±0.8
Minimum Voltage	50	264	0.5	15.045		

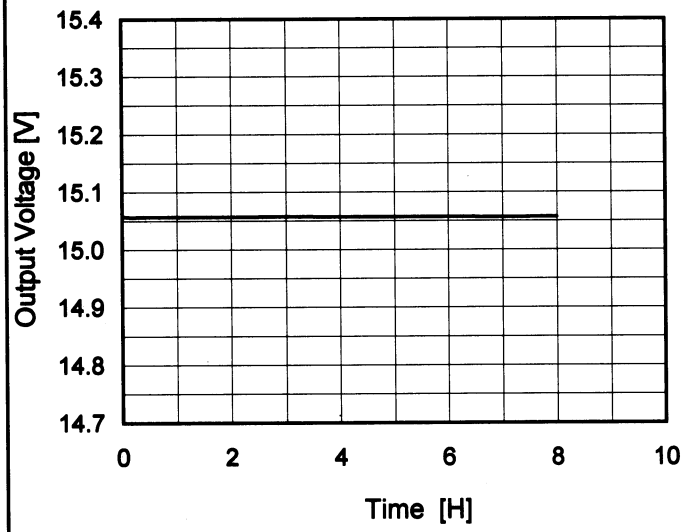
Object	-15V0.5A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-10	85	0	-15.334	±144	±1.0
Minimum Voltage	50	85	0.5	-15.047		

COSEL

Model	PBW15F-15
Item	Time Lapse Drift
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



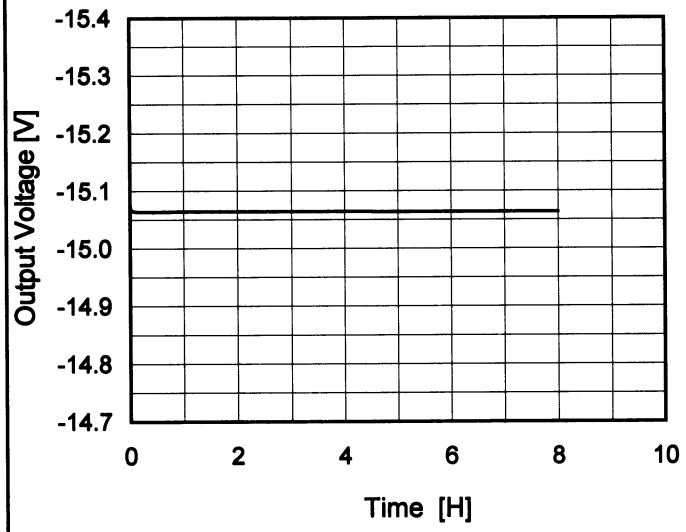
Input Volt. 100V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	15.061
0.5	15.057
1.0	15.057
2.0	15.057
3.0	15.058
4.0	15.057
5.0	15.057
6.0	15.057
7.0	15.057
8.0	15.057

Object	-15V0.5A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC200V is equal.

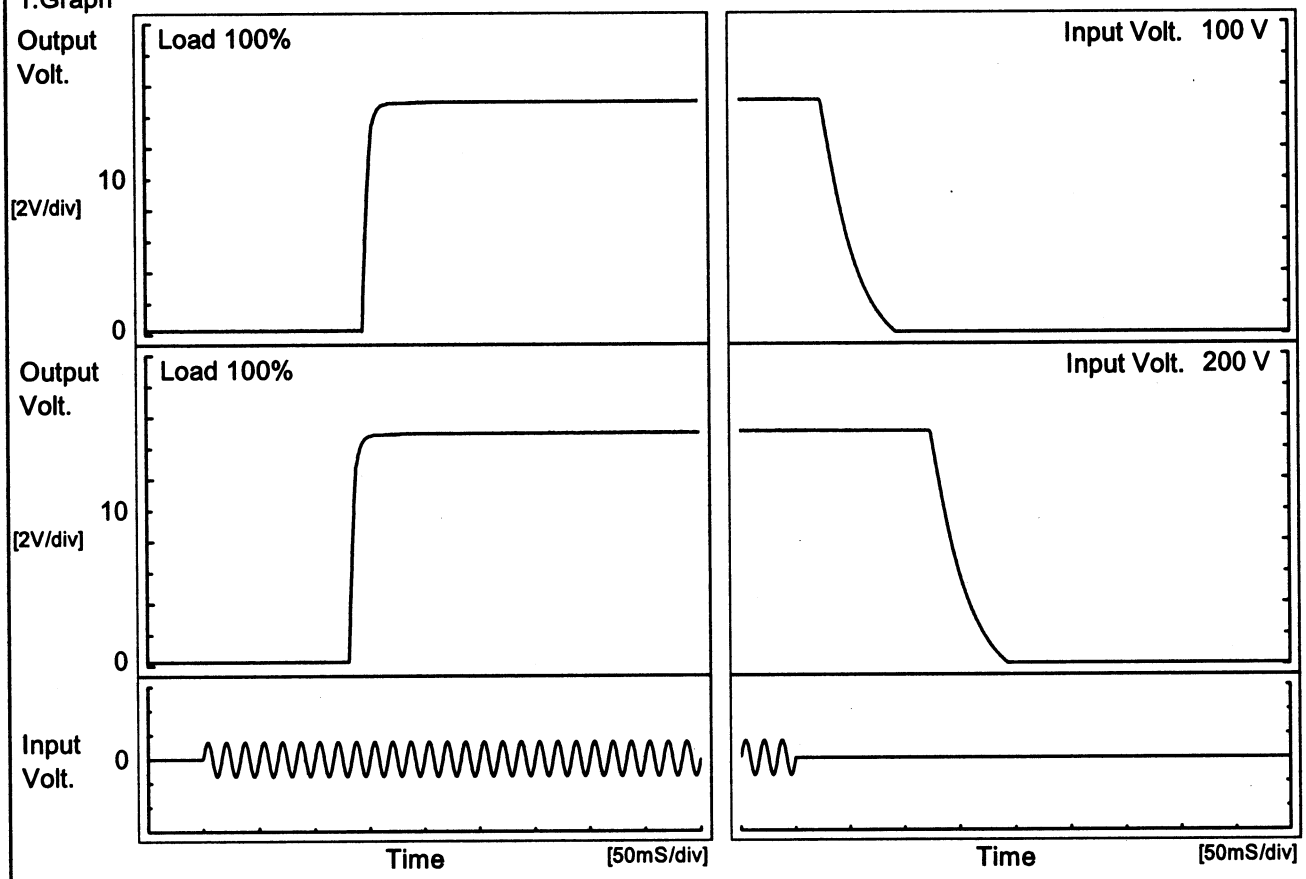
2.Values

Time since start [H]	Output Voltage [V]
0.0	-15.072
0.5	-15.064
1.0	-15.064
2.0	-15.064
3.0	-15.064
4.0	-15.064
5.0	-15.064
6.0	-15.064
7.0	-15.064
8.0	-15.064

COSEL

Model	PBW15F-15	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+15V0.5A	

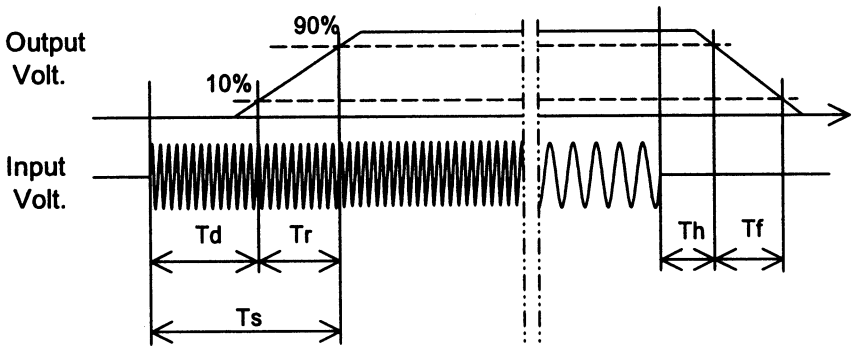
1.Graph



2.Values

[mS]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	145.3	9.8	155.1	28.0	47.3
200 V	131.8	9.0	140.8	127.8	47.8

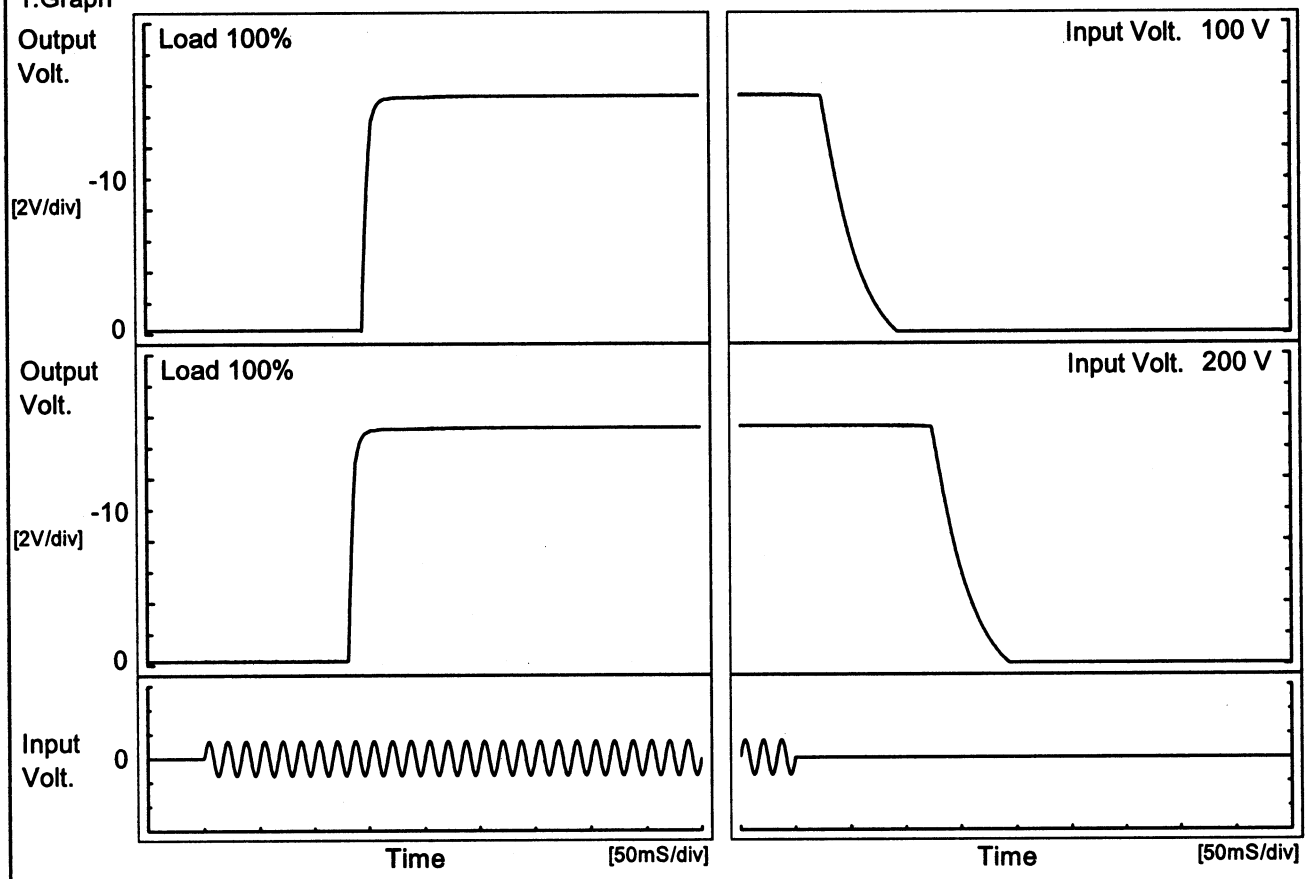


COSEL

Model	PBW15F-15
Item	Rise and Fall Time
Object	-15V0.5A

Temperature 25°C
Testing Circuitry Figure A

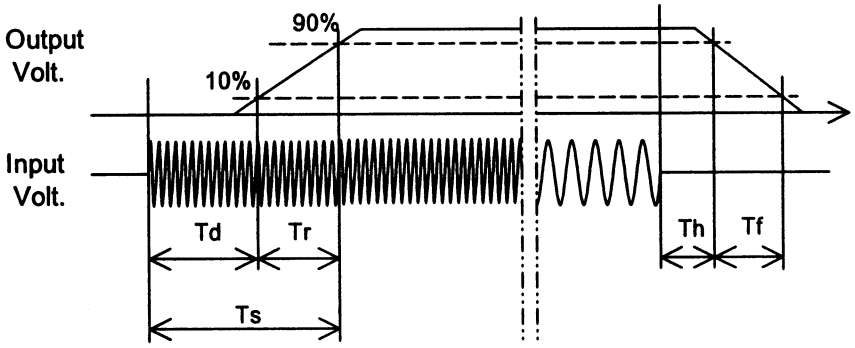
1.Graph



2.Values

[mS]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	145.3	9.8	155.1	28.0	47.3
200 V	131.8	9.0	140.8	127.8	47.8



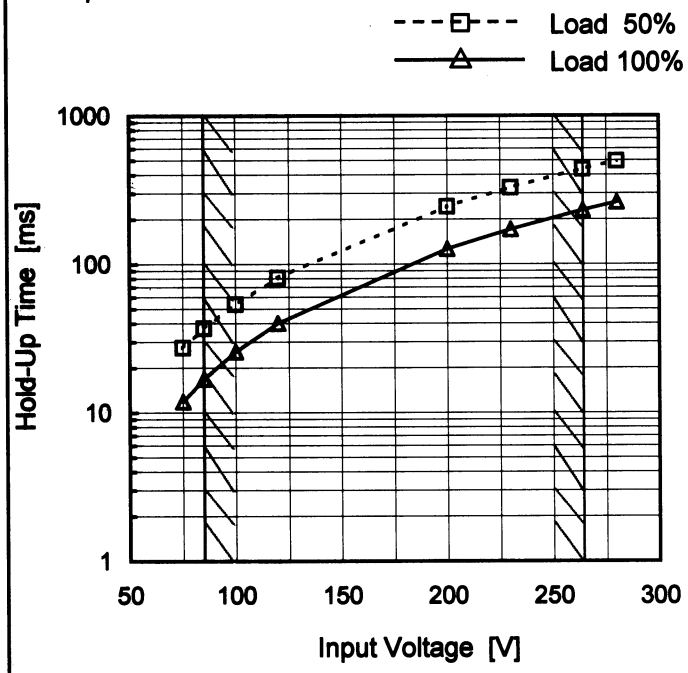
BC-10027

COSEL

Model	PBW15F-15
Item	Hold-Up Time
Object	+15V0.5A

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

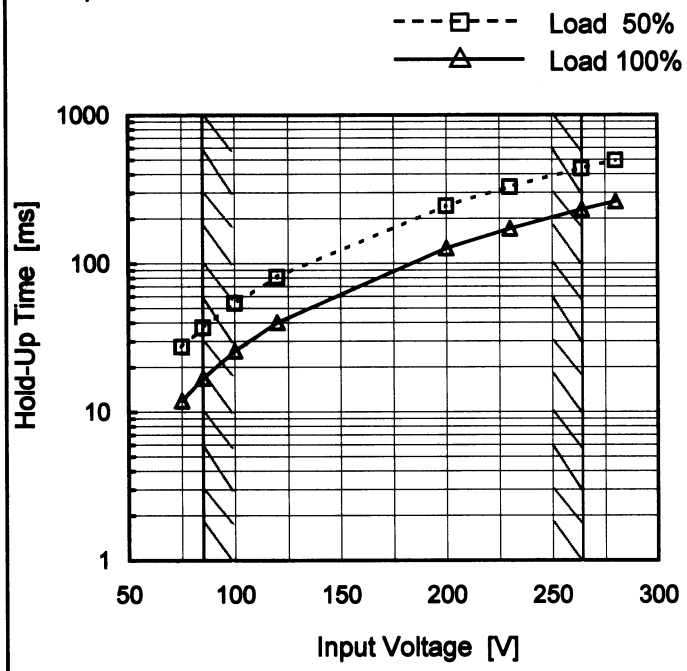
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	27	12
85	37	17
100	54	26
120	81	40
200	244	127
230	328	172
264	438	231
280	495	263
--	-	-

COSEL

Model	PBW15F-15
Item	Hold-Up Time
Object	-15V0.5A

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

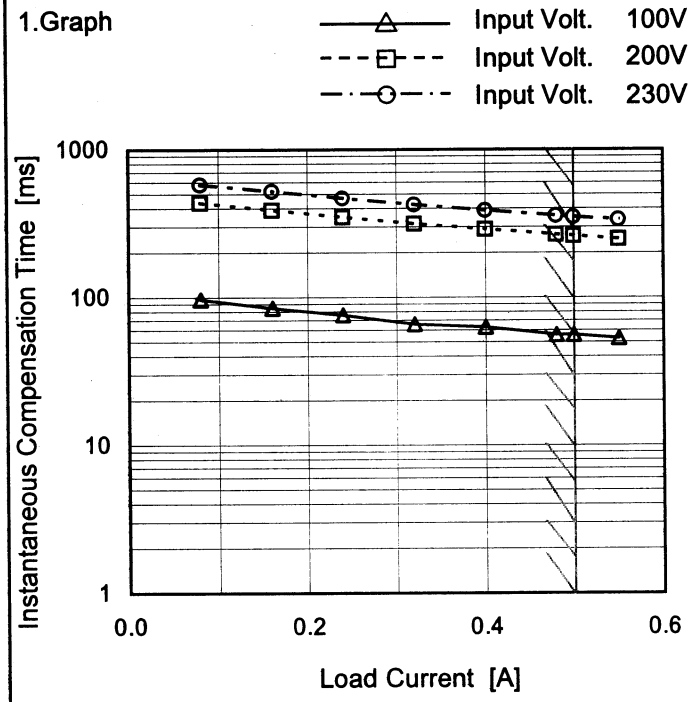
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	28	12
85	37	17
100	54	26
120	81	40
200	244	127
230	328	172
264	438	231
280	495	263
--	-	-

COSEL

Model	PBW15F-15
Item	Instantaneous Interruption Compensation
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.08	97	437	580
0.16	85	389	522
0.24	76	349	469
0.32	66	315	423
0.40	63	289	388
0.48	56	266	357
0.50	56	261	350
0.55	53	248	335
--	-	-	-
--	-	-	-

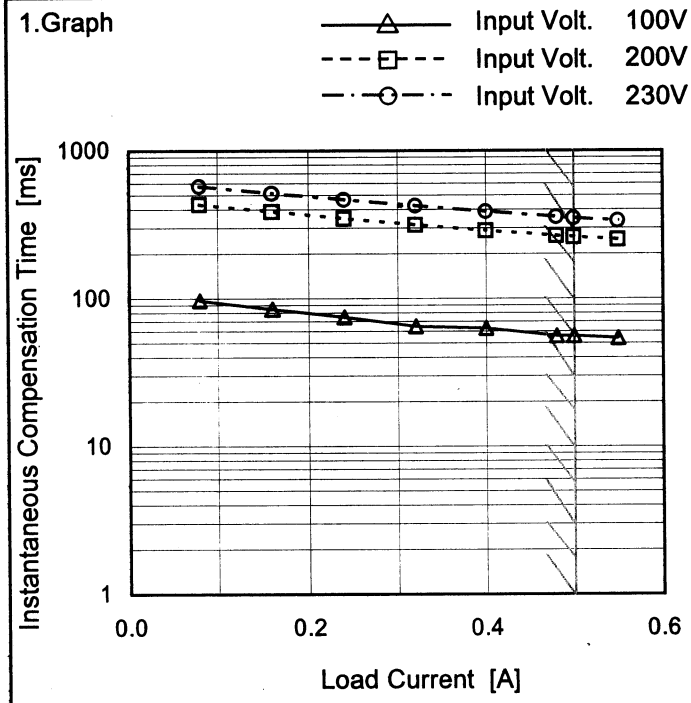
-15V: Rated output current 1

COSEL

Model	PBW15F-15
Item	Instantaneous Interruption Compensation
Object	-15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.08	97	433	574
0.16	85	387	515
0.24	75	347	465
0.32	65	314	423
0.40	63	288	387
0.48	56	266	357
0.50	56	261	350
0.55	54	250	335
--	-	-	-
--	-	-	-

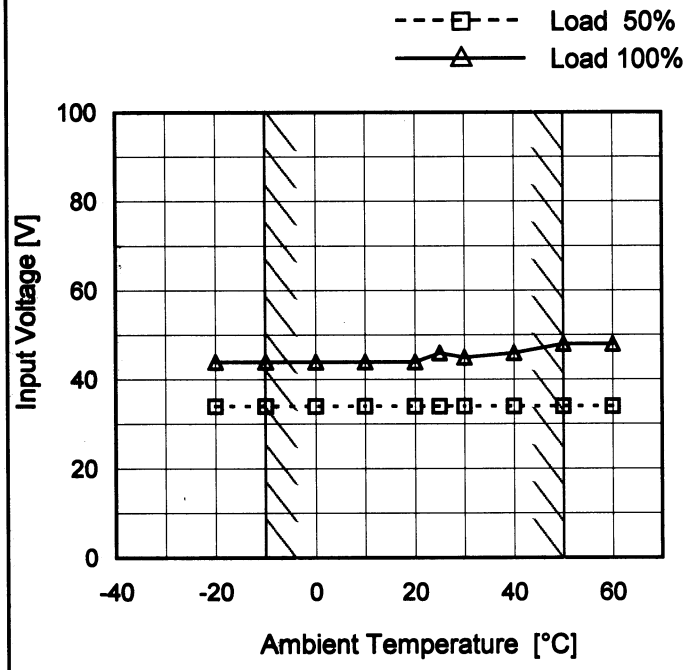
+15V: Rated output current 1

COSEL

Model	PBW15F-15
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V0.5A

Testing Circuitry Figure A

1.Graph

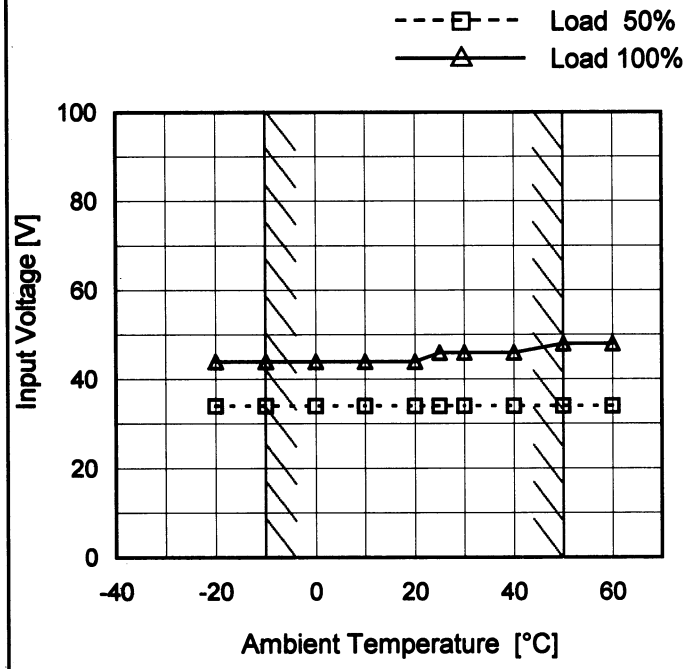


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	34	44
-10	34	44
0	34	44
10	34	44
20	34	44
25	34	46
30	34	45
40	34	46
50	34	48
60	34	48
--	-	-

Object	-15V0.5A

1.Graph



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

2.Values

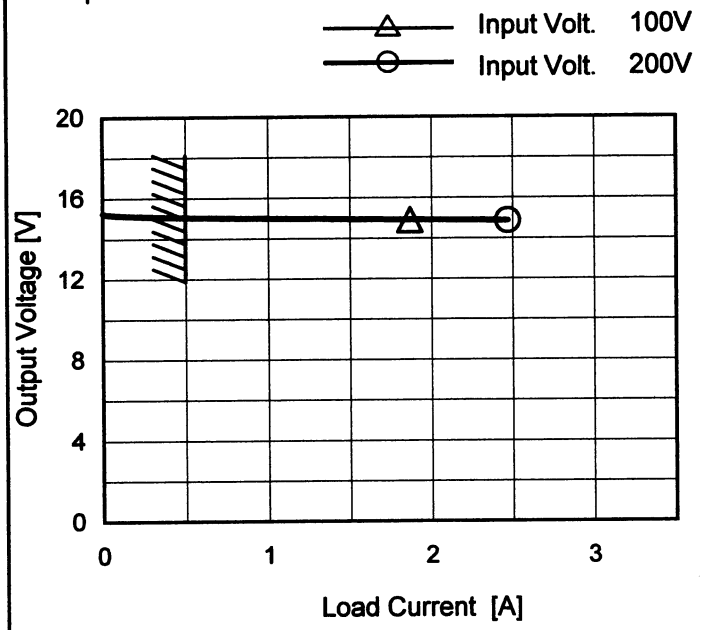
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	34	44
-10	34	44
0	34	44
10	34	44
20	34	44
25	34	46
30	34	46
40	34	46
50	34	48
60	34	48
--	-	-

COSEL

Model	PBW15F-15
Item	Overcurrent Protection
Object	+15V0.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

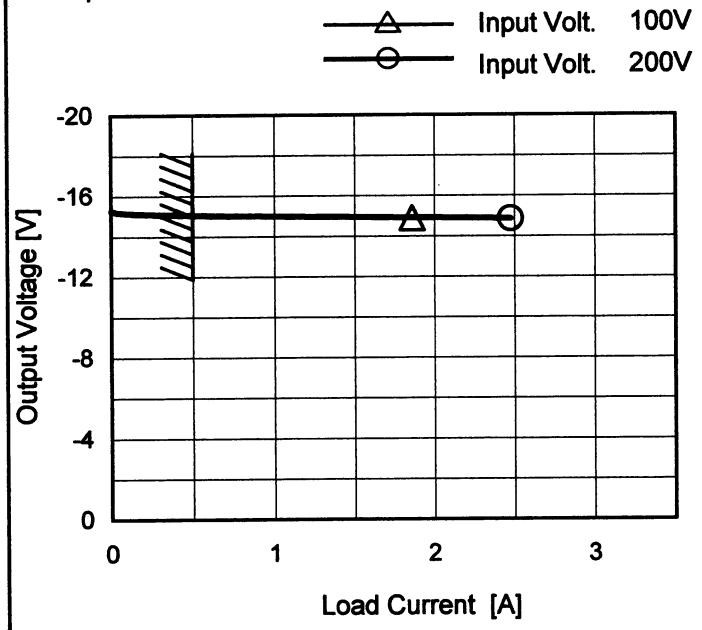
2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
15.00	1.87	2.47
14.25	-	-
13.50	-	-
12.00	-	-
10.50	-	-
9.00	-	-
7.50	-	-
6.00	-	-
4.50	-	-
3.00	-	-
1.50	-	-
0.00	-	-

-15V: Rated output current 1

Object	-15V0.5A

1.Graph



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

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

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
-15.00	1.90	2.48
-14.25	-	-
-13.50	-	-
-12.00	-	-
-10.50	-	-
-9.00	-	-
-7.50	-	-
-6.00	-	-
-4.50	-	-
-3.00	-	-
-1.50	-	-
0.00	-	-

+15V: Rated output current 1

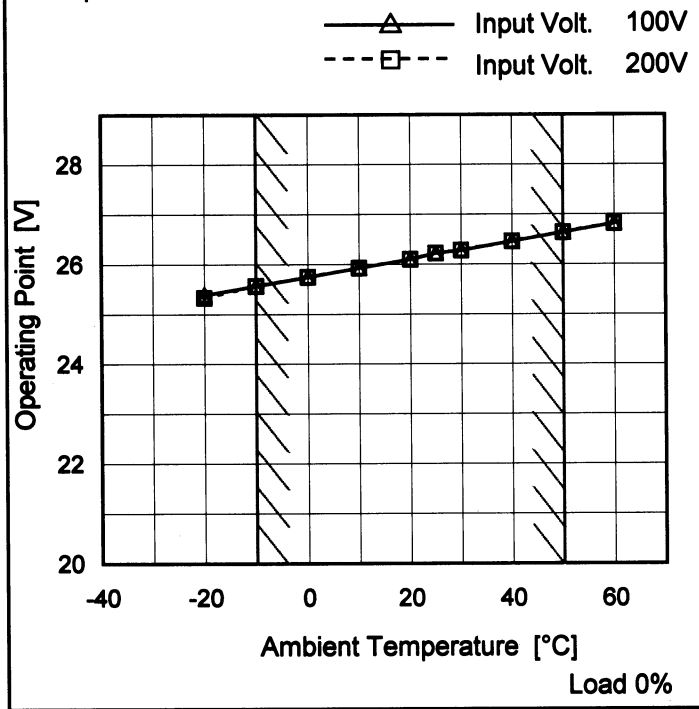
BC-10027

COSEL

Model	PBW15F-15
Item	Overvoltage Protection
Object	+15V0.5A

Testing Circuitry Figure A

1.Graph

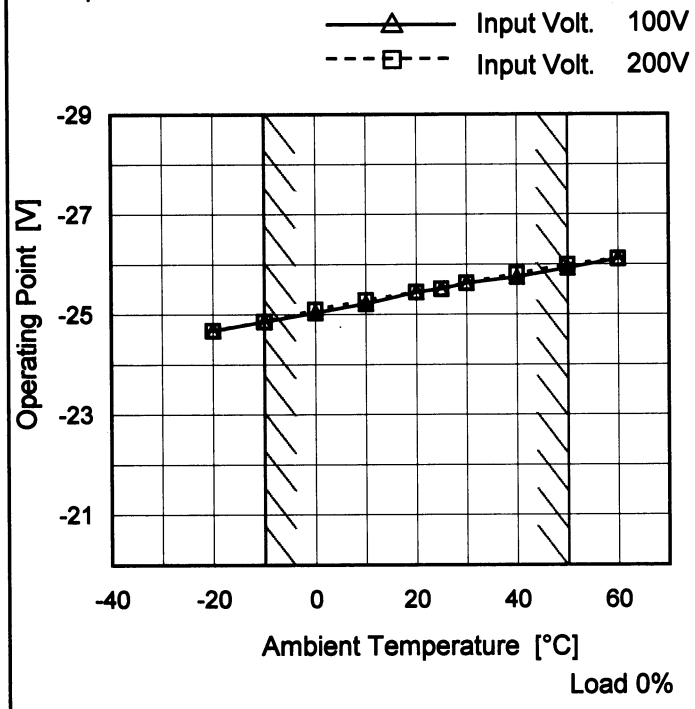


2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-20	25.39	25.33
-10	25.57	25.57
0	25.75	25.75
10	25.93	25.93
20	26.10	26.10
25	26.22	26.22
30	26.28	26.28
40	26.46	26.46
50	26.64	26.64
60	26.82	26.82
--	-	-

Object	-15V0.5A

1.Graph



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	-24.68	-24.68
-10	-24.86	-24.86
0	-25.04	-25.10
10	-25.22	-25.28
20	-25.45	-25.45
25	-25.51	-25.51
30	-25.63	-25.63
40	-25.75	-25.81
50	-25.93	-25.99
60	-26.11	-26.11
--	-	-

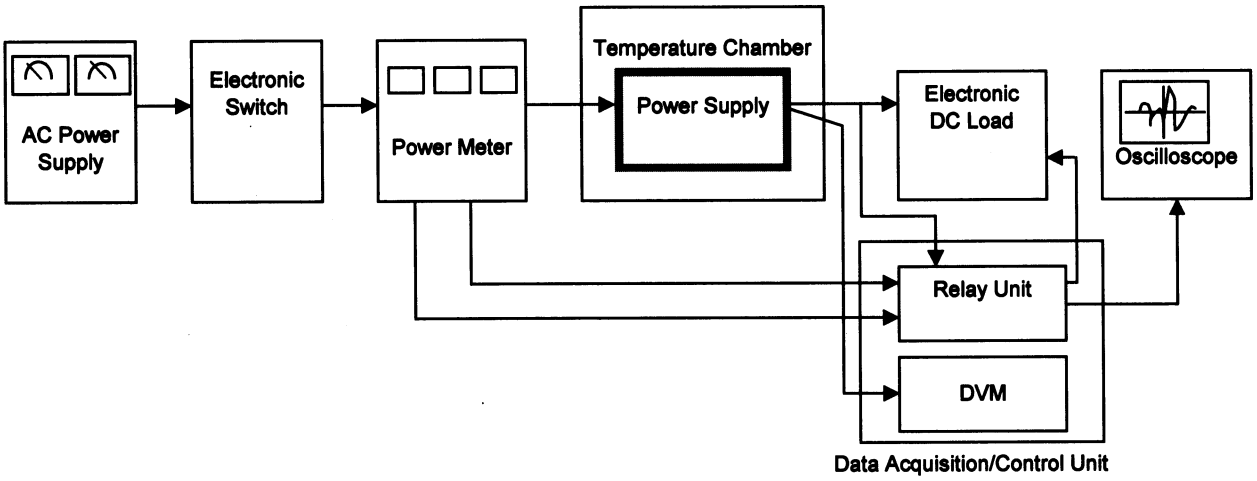


Figure A

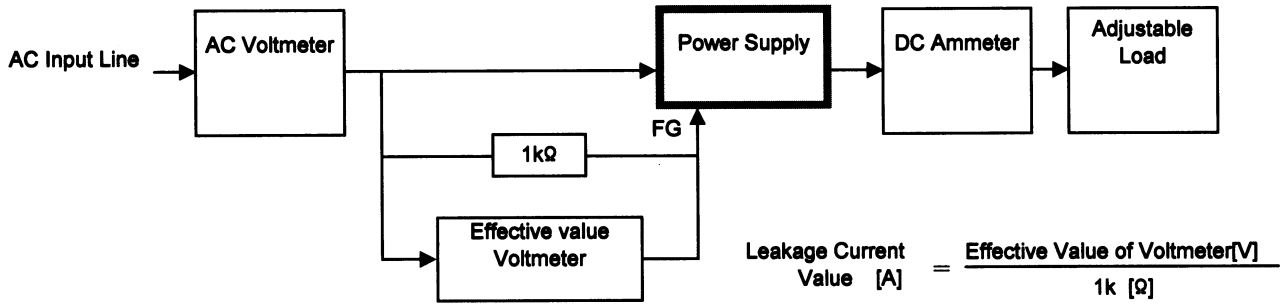


Figure B (DEN-AN)

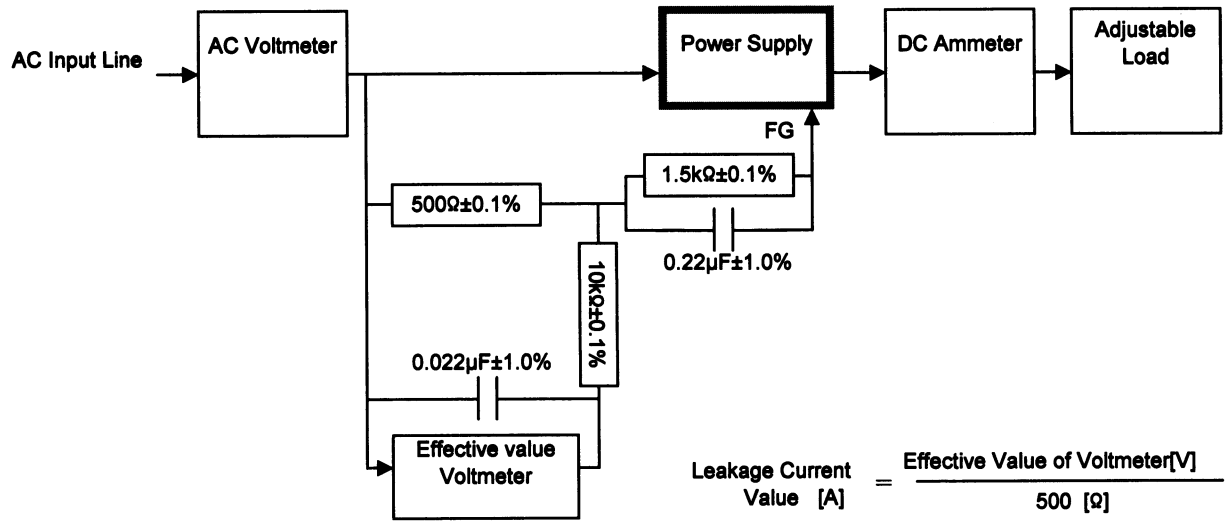


Figure B (IEC60950)