参考資料

COSEL

TEST DATA OF PBW50F-5

Regulated DC Power Supply
Sep 29, 2005

Approved by : Kuniaki Nagahara
Kuniaki Nagahara Design Manager

Prepared by : Atsushi Yoshiyama
Atsushi Yoshiyama Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

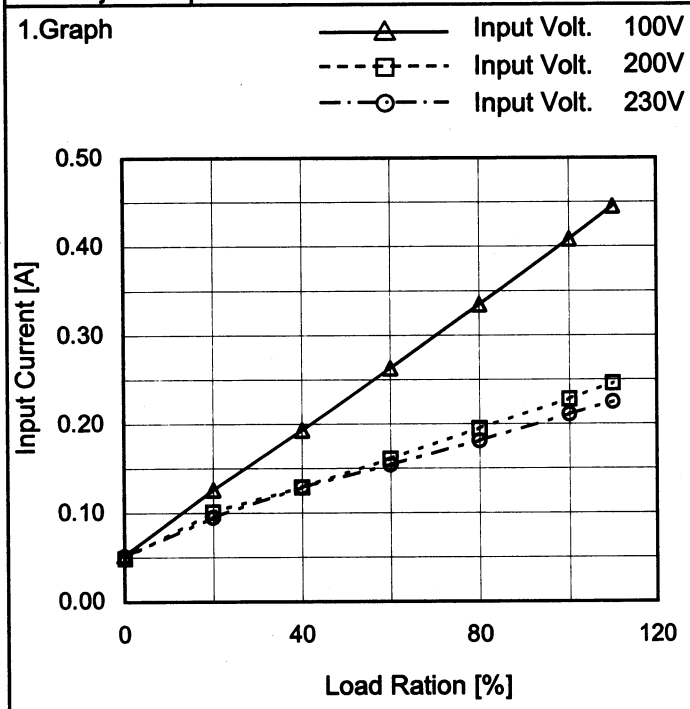
(Final Page 30)

COSEL

Model	PBW50F-5
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	0.053	0.049	0.051
20	0.126	0.101	0.095
40	0.193	0.129	0.129
60	0.263	0.161	0.154
80	0.335	0.195	0.181
100	0.408	0.228	0.211
110	0.446	0.246	0.225
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

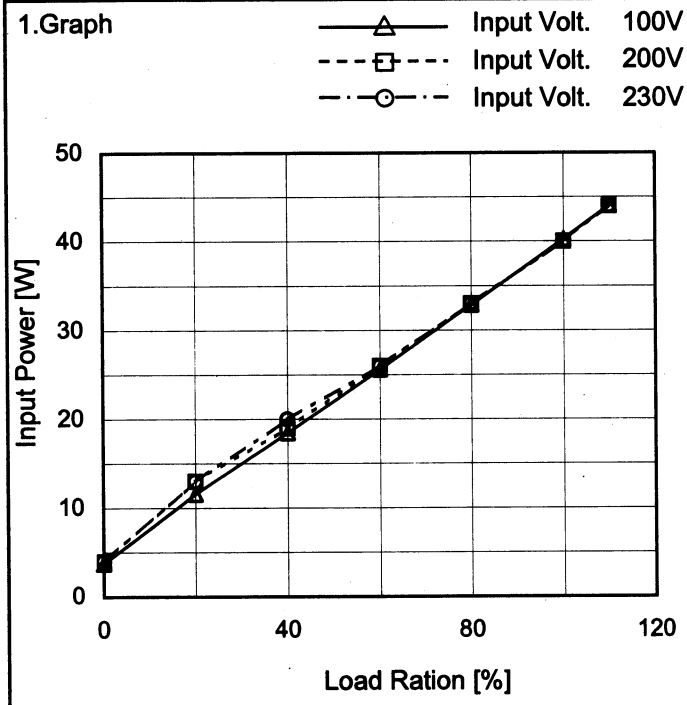
BC-10003

COSEL

Model	PBW50F-5
Item	Input Power (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

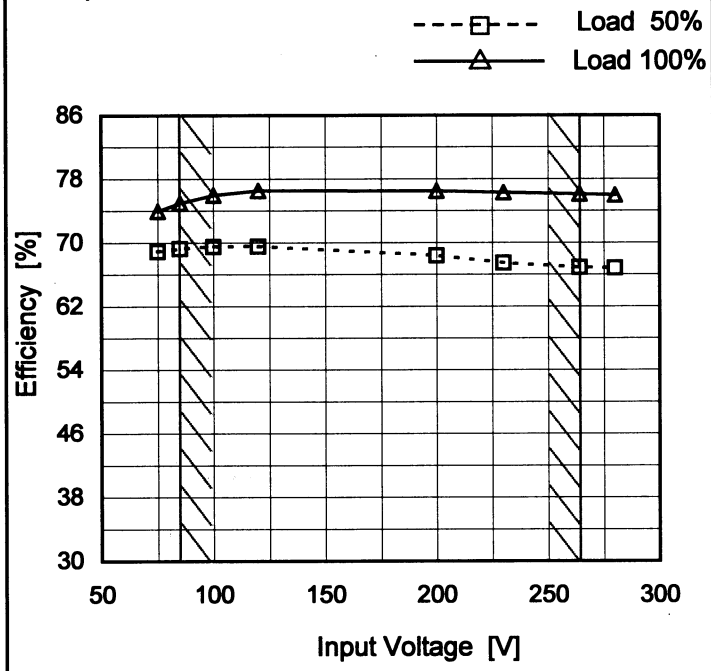
Load Ration [%]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	3.73	4.00	4.00
20	11.55	13.00	13.00
40	18.47	19.00	20.00
60	25.60	26.00	26.00
80	32.86	33.00	33.00
100	40.26	40.00	40.00
110	44.03	44.00	44.00
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	PBW50F-5
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

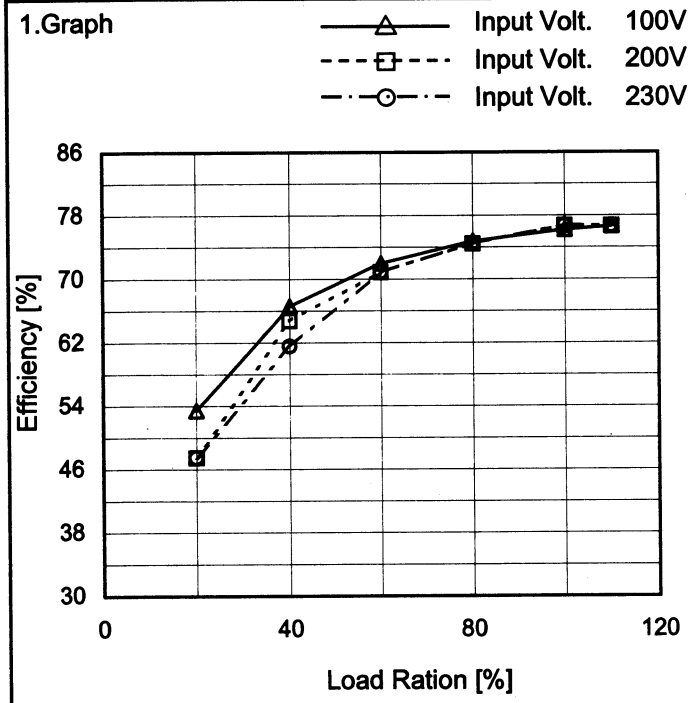
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
75	68.9	74.0
85	69.3	75.0
100	69.5	76.0
120	69.5	76.6
200	68.4	76.5
230	67.5	76.3
264	66.9	76.1
280	66.8	76.0
–	-	-

COSEL

Model	PBW50F-5
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	53.5	47.5	47.5
40	66.6	64.8	61.5
60	72.0	70.9	70.9
80	74.8	74.4	74.4
100	76.2	76.7	76.7
110	76.7	76.7	76.7
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

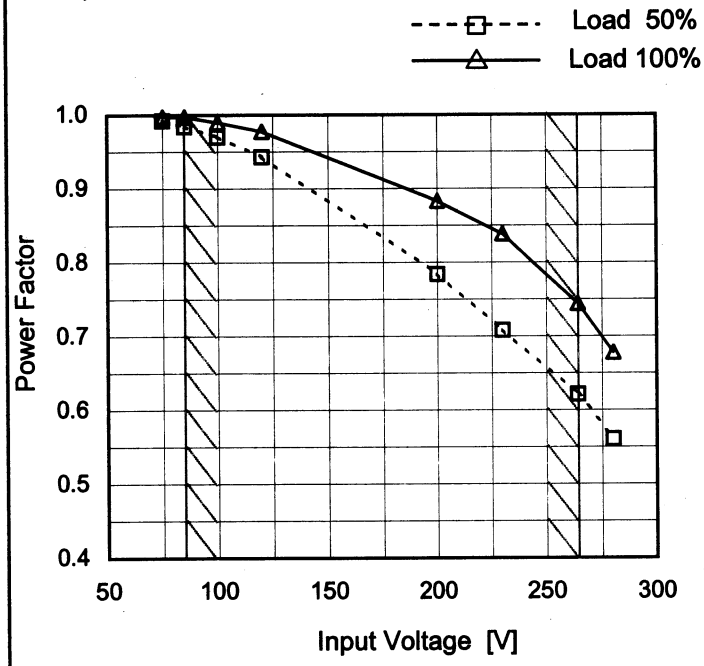
BC-10003

COSEL

Model	PBW50F-5
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

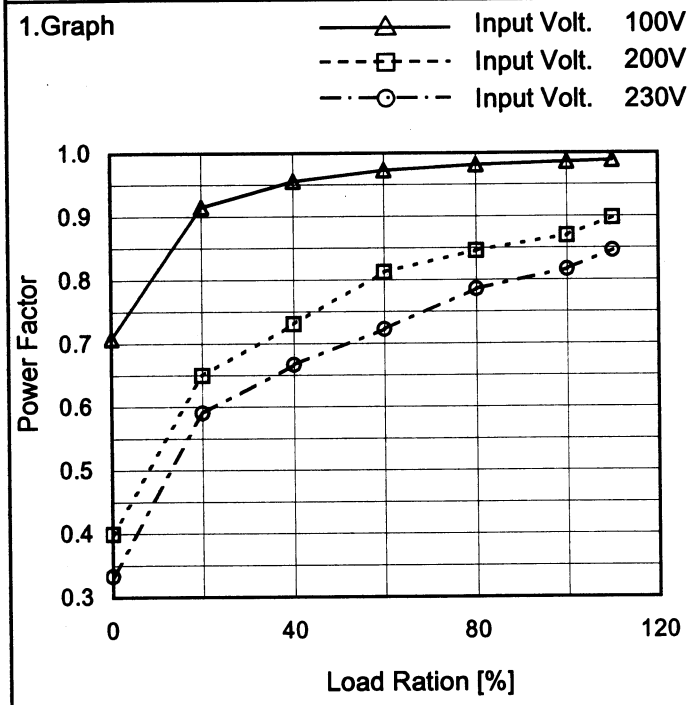
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
75	0.992	0.998
85	0.984	0.998
100	0.970	0.990
120	0.943	0.978
200	0.784	0.883
230	0.708	0.839
264	0.622	0.744
280	0.561	0.678
--	-	-

COSEL

Model	PBW50F-5
Item	Power Factor (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

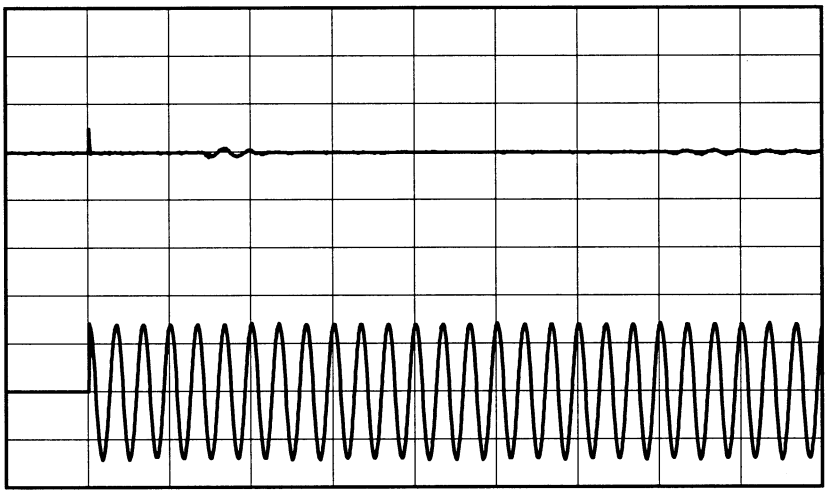
Load Ration [%]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0	0.708	0.400	0.333
20	0.915	0.650	0.591
40	0.956	0.731	0.667
60	0.973	0.813	0.722
80	0.981	0.846	0.786
100	0.986	0.870	0.816
110	0.989	0.898	0.846
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

BC-10003

COSEL

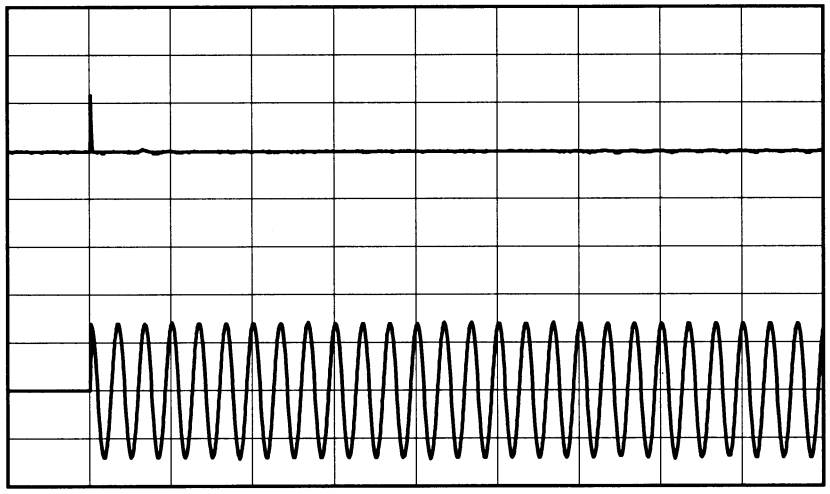
Model	PBW50F-5
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A



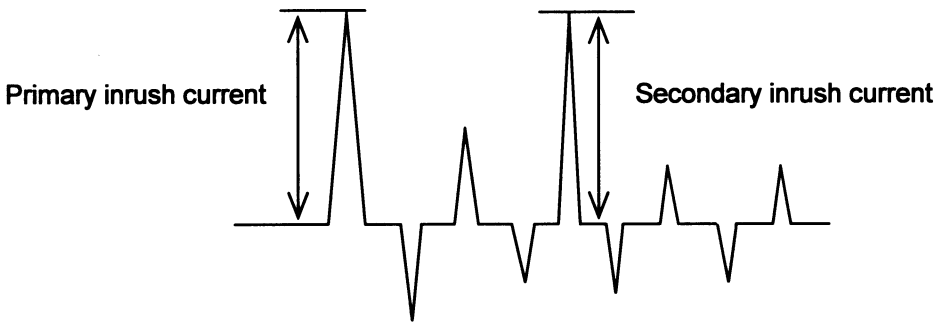
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
9.9 A
Secondary inrush current :
0.0 A



Input Voltage 200 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
23.5 A
Secondary inrush current :
0.0 A



BC-10003

COSEL

Model	PBW50F-5	
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	0.18	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.

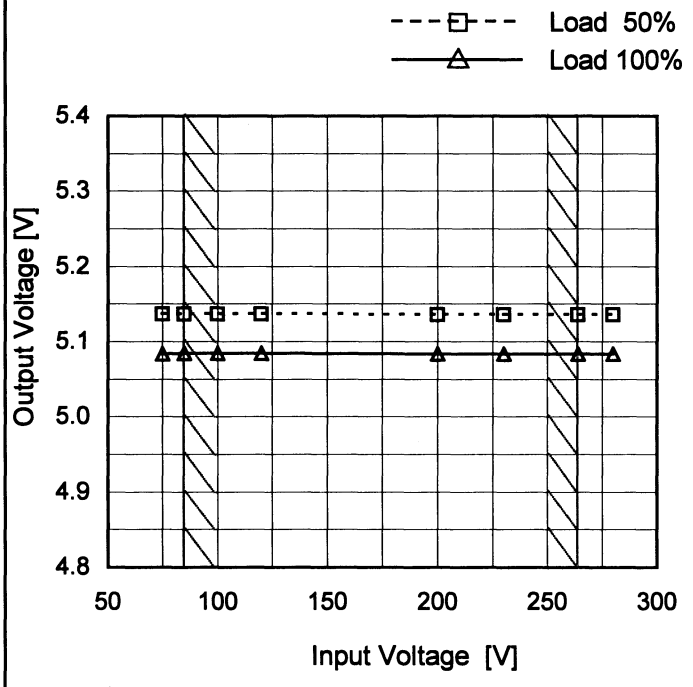
COSEL

Model	PBW50F-5
Item	Line Regulation

Temperature 25°C
Testing Circuitry Figure A

Object +5V3A

1.Graph

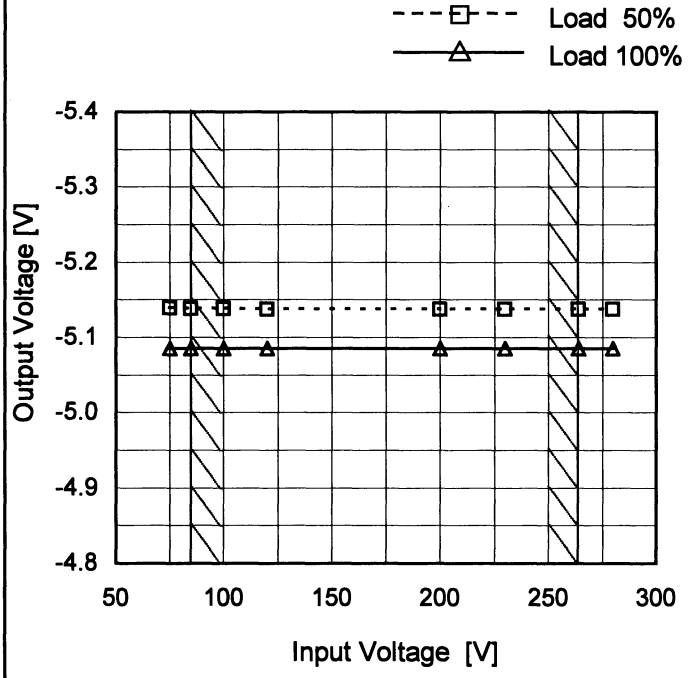


2.Values

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

Object -5V3A

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	-5.139	-5.085
85	-5.138	-5.085
100	-5.138	-5.086
120	-5.138	-5.086
200	-5.138	-5.086
230	-5.138	-5.086
264	-5.138	-5.086
280	-5.138	-5.086
--	-	-

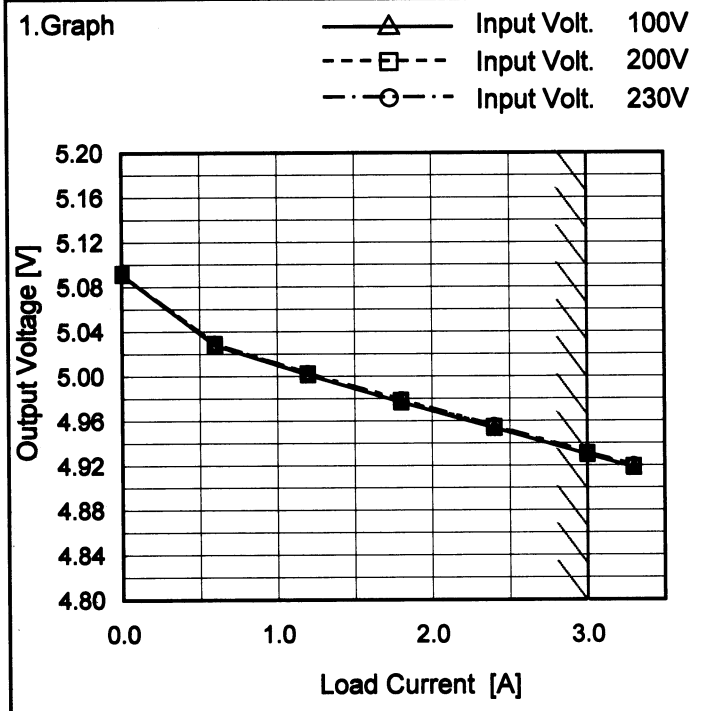
BC-10003

COSEL

Model	PBW50F-5
Item	Load Regulation
Object	+5V3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



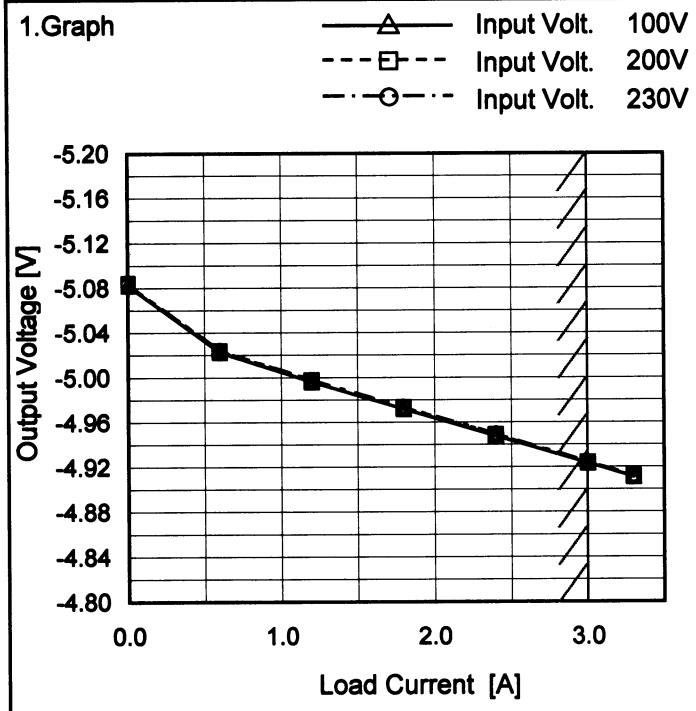
2.Values

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

-5V : Rated output current 1

Object	-5V3A

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]
0.0	-5.082	-5.084	-5.084
0.6	-5.023	-5.024	-5.024
1.2	-4.996	-4.998	-4.998
1.8	-4.972	-4.973	-4.974
2.4	-4.948	-4.949	-4.949
3.0	-4.923	-4.924	-4.924
3.3	-4.911	-4.912	-4.912
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+5V : Rated output current 1

COSEL

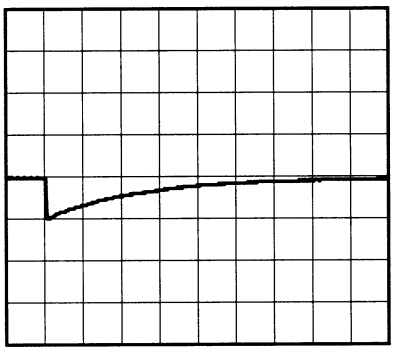
Model	PBW50F-5		
Item	Dynamic Load Response	Temperature Testing Circuitry	25℃ Figure A
Object	+5V3A		

Input Volt. 100 V
Cycle 1000 ms

Load Current

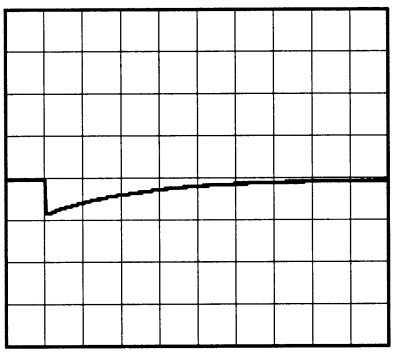
Min. Load (0A) ⟷
Output current 2 (4A)

★-5V : 2A



Min. Load (0A) ⟷
Output current 1 (3A)

★-5V : 3A



★The characteristic of AC200V is equal.

COSEL

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

Input Volt. 100 V
Cycle 1000 ms

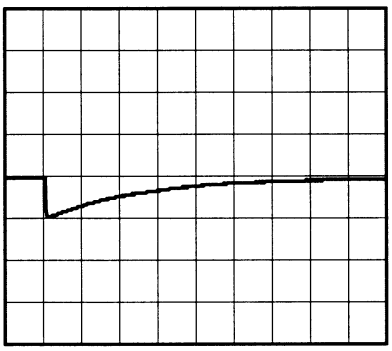
Load Current

Min. Load (0A) ⟷
Output current 2 (4A)

★+5V : 2A

200 mV/div

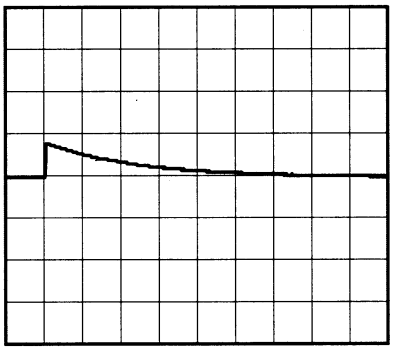
100 ms/div



100 ms/div

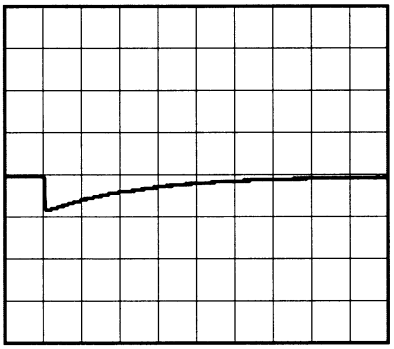
Min. Load (0A) ⟷
Output current 1 (3A)

★+5V : 3A



200 mV/div

100 ms/div



100 ms/div

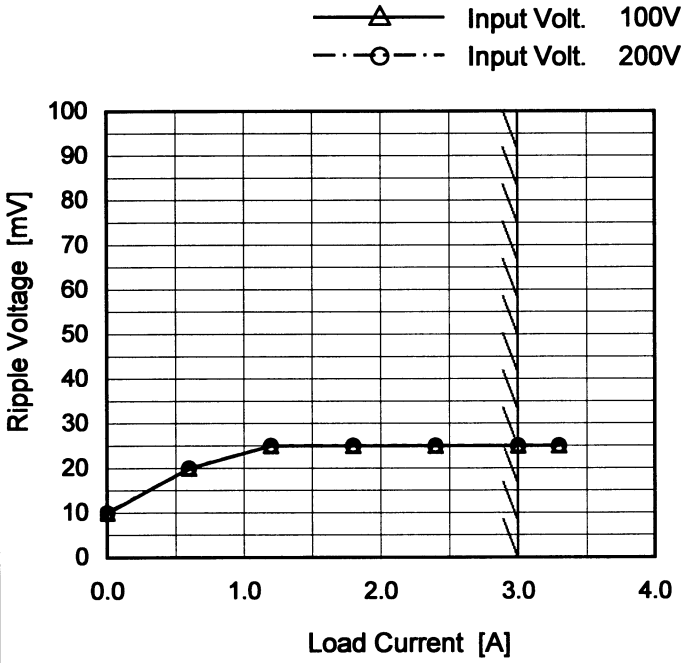
★The characteristic of AC200V is equal.

COSEL

Model	PBW50F-5
Item	Ripple Voltage (by Load Current)
Object	+5V3A

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

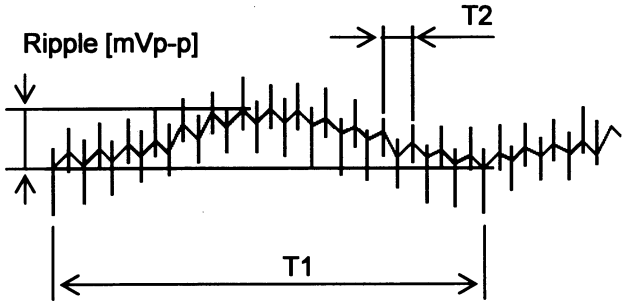


Fig. Complex Ripple Wave Form

2.Values

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

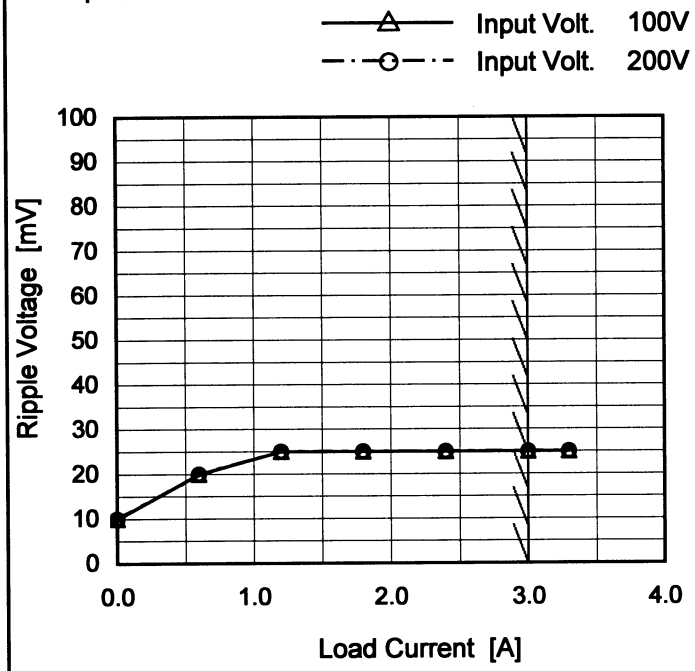
-5V : Rated output current 1

COSEL

Model	PBW50F-5
Item	Ripple Voltage (by Load Current)
Object	-5V3A

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

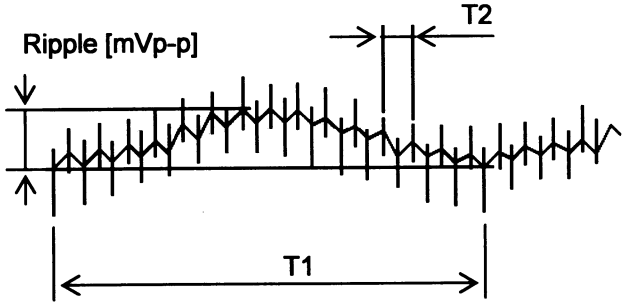


Fig. Complex Ripple Wave Form

2.Values

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

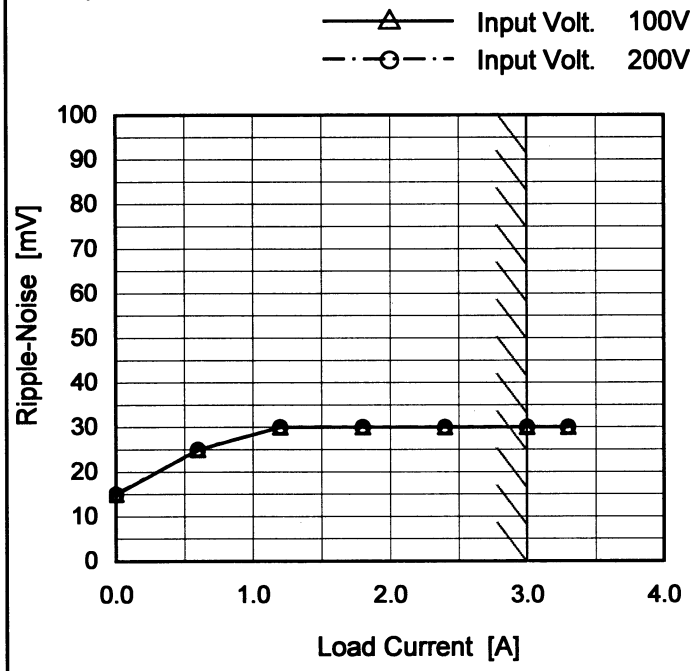
+5V : Rated output current 1

COSEL

Model	PBW50F-5
Item	Ripple-Noise
Object	+5V3A

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	15	15
0.6	25	25
1.2	30	30
1.8	30	30
2.4	30	30
3.0	30	30
3.3	30	30
–	-	-
–	-	-
–	-	-
–	-	-

-5V : Rated output current 1

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

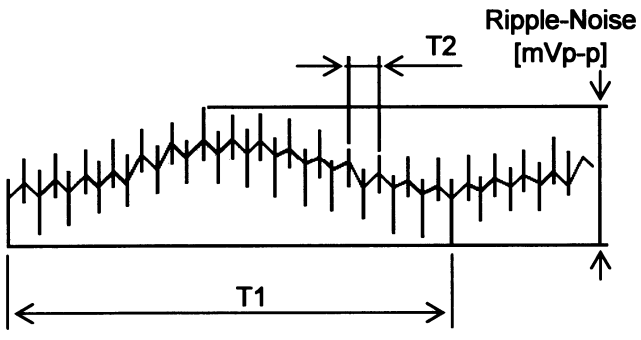


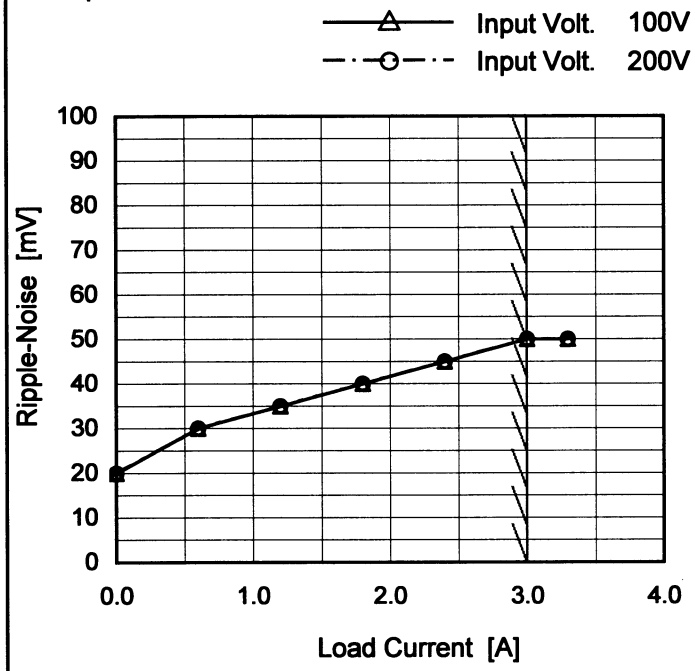
Fig. Complex Ripple Wave Form

COSEL

Model	PBW50F-5
Item	Ripple-Noise
Object	-5V3A

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]
0.0	20	20
0.6	30	30
1.2	35	35
1.8	40	40
2.4	45	45
3.0	50	50
3.3	50	50
—	-	-
—	-	-
—	-	-
—	-	-

+5V : Rated output current 1

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

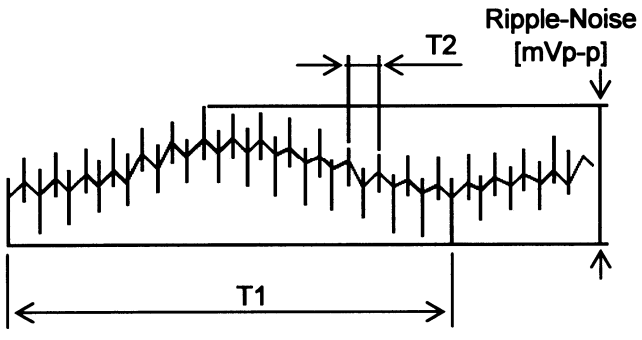


Fig. Complex Ripple Wave Form

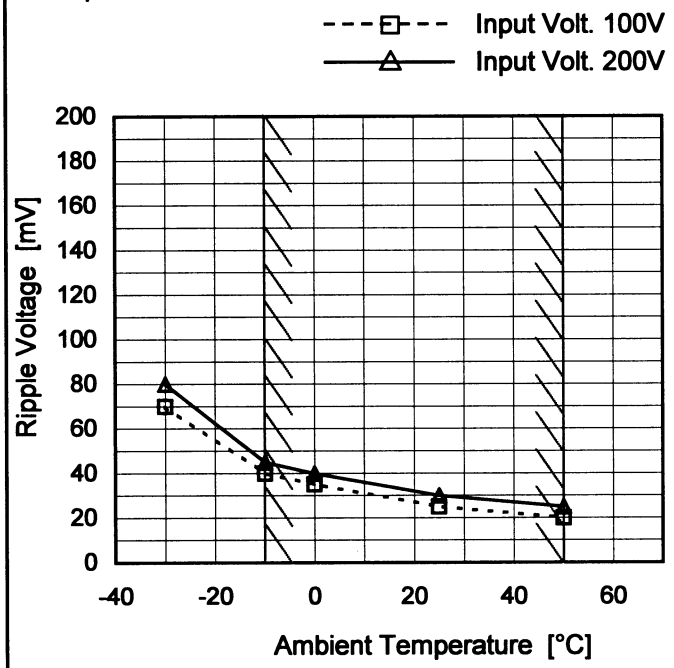
BC-10003

COSEL

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

Testing Circuitry Figure A

1.Graph



Lord 100%

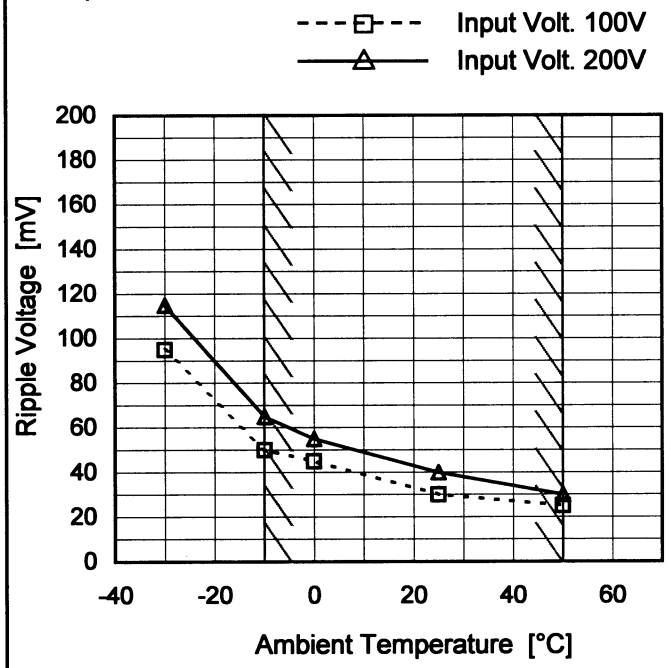
2.Values

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

-5V : Rated output current 1

Object	-5V3A

1.Graph



Lord 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	95	115
-10	50	65
0	45	55
25	30	40
50	25	30
—	-	-
—	-	-
—	-	-
—	-	-
—	-	-
—	-	-

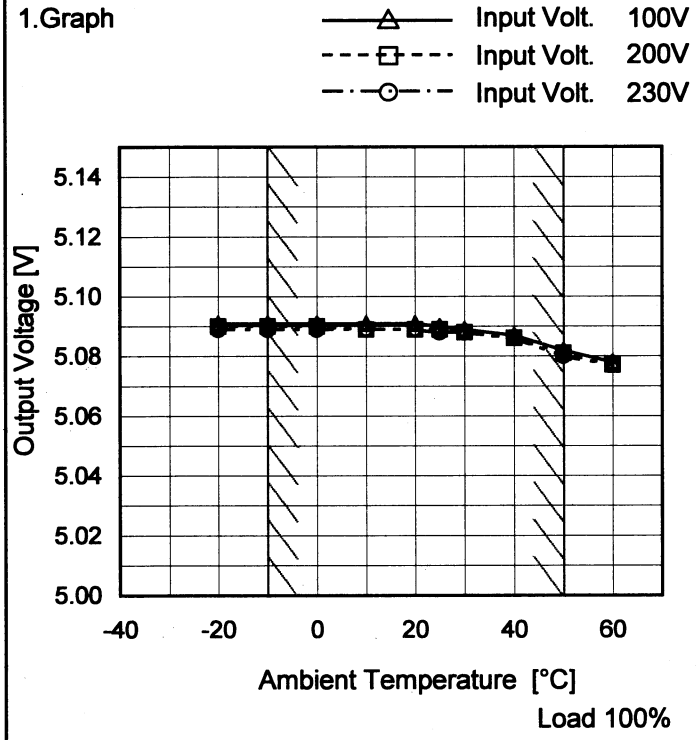
+5V : Rated output current 1

COSEL

Model	PBW50F-5
Item	Ambient Temperature Drift
Object	+5V3A

Testing Circuitry Figure A

1.Graph

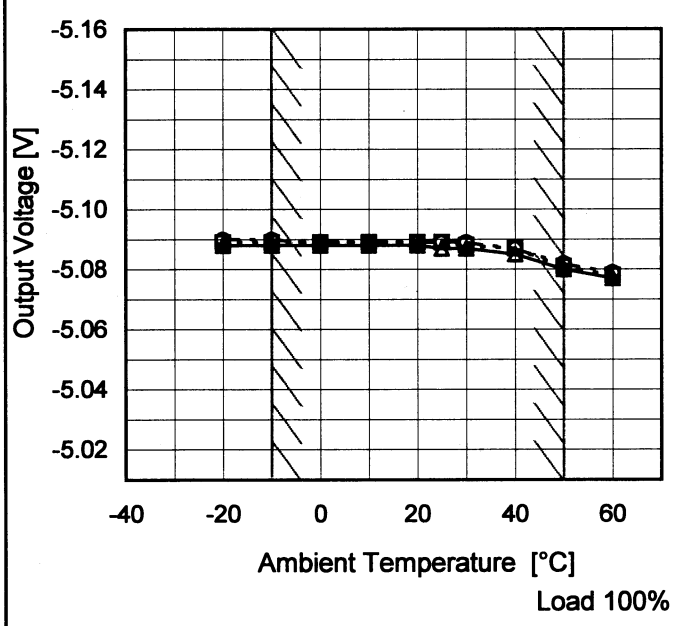


2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	5.091	5.090	5.089
-10	5.091	5.090	5.089
0	5.091	5.090	5.089
10	5.091	5.089	5.089
20	5.091	5.089	5.089
25	5.090	5.089	5.088
30	5.089	5.088	5.088
40	5.087	5.086	5.086
50	5.082	5.081	5.080
60	5.078	5.077	5.077
—	-	-	-

Object	-5V3A

1.Graph



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	-5.088	-5.089	-5.090
-10	-5.088	-5.089	-5.090
0	-5.088	-5.089	-5.089
10	-5.088	-5.089	-5.089
20	-5.088	-5.089	-5.089
25	-5.087	-5.089	-5.089
30	-5.087	-5.088	-5.089
40	-5.085	-5.087	-5.087
50	-5.080	-5.081	-5.082
60	-5.077	-5.078	-5.079
—	-	-	-

COSEL

Model	PBW50F-5	
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 - 3A (AVR 2) : 0 - 3A

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

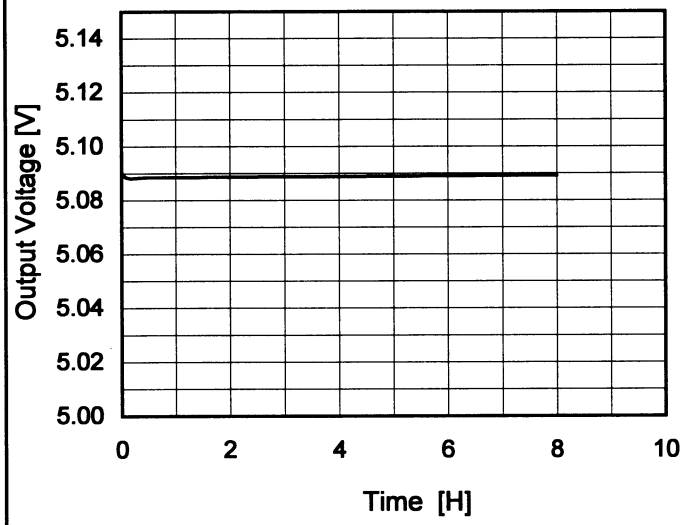
Object	-5V3A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	50	200	0	-5.256	±86	±1.7
Minimum Voltage	50	85	3	-5.084		

COSEL

Model	PBW50F-5
Item	Time Lapse Drift
Object	+5V3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



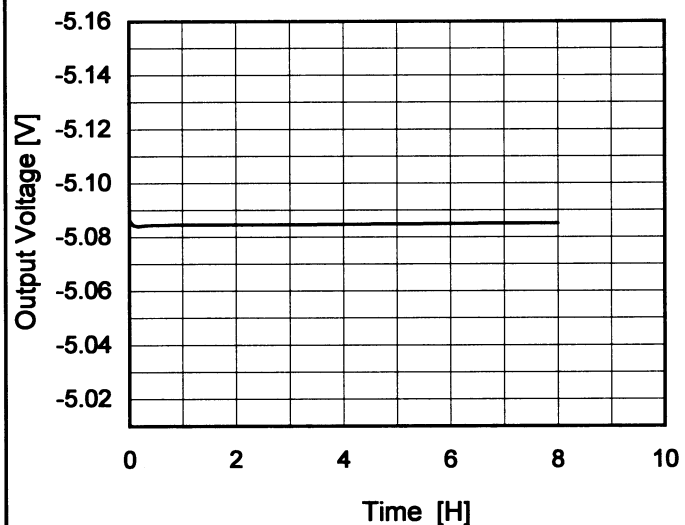
Input Volt. 100V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	5.091
0.5	5.089
1.0	5.089
2.0	5.089
3.0	5.089
4.0	5.089
5.0	5.089
6.0	5.089
7.0	5.089
8.0	5.089

Object	-5V3A

1.Graph



Input Volt. 100V
Load 100%

★The characteristic of AC200V is equal.

2.Values

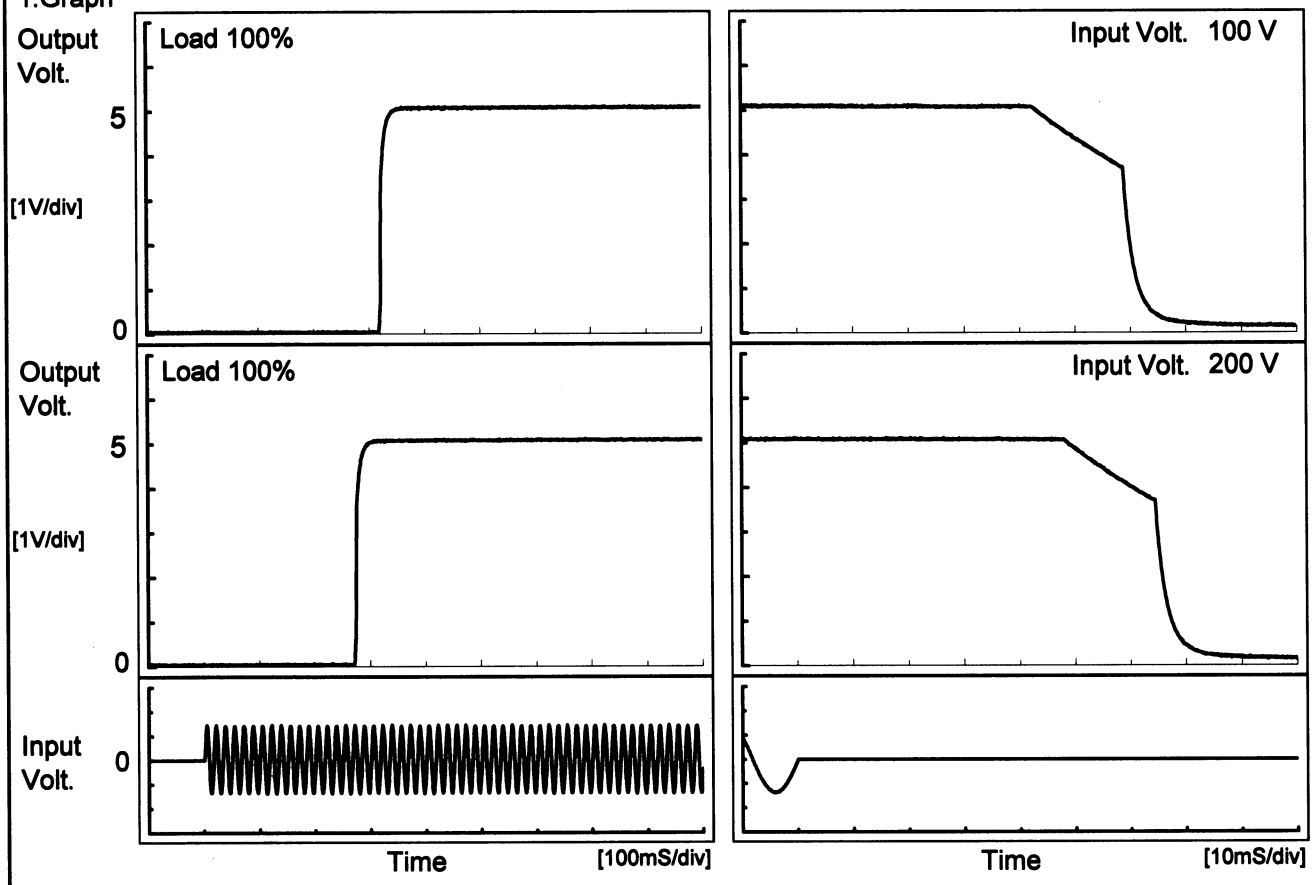
Time since start [H]	Output Voltage [V]
0.0	-5.086
0.5	-5.085
1.0	-5.085
2.0	-5.085
3.0	-5.085
4.0	-5.085
5.0	-5.085
6.0	-5.085
7.0	-5.085
8.0	-5.085

COSEL

Model	PBW50F-5
Item	Rise and Fall Time
Object	+5V3A

Temperature 25°C
Testing Circuitry Figure A

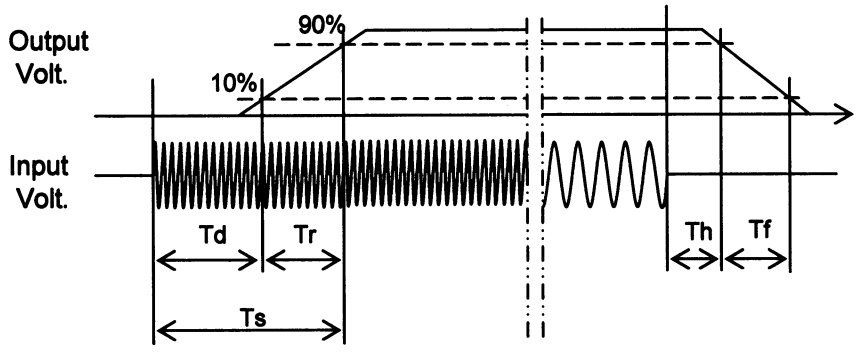
1.Graph



2.Values

[mS]

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

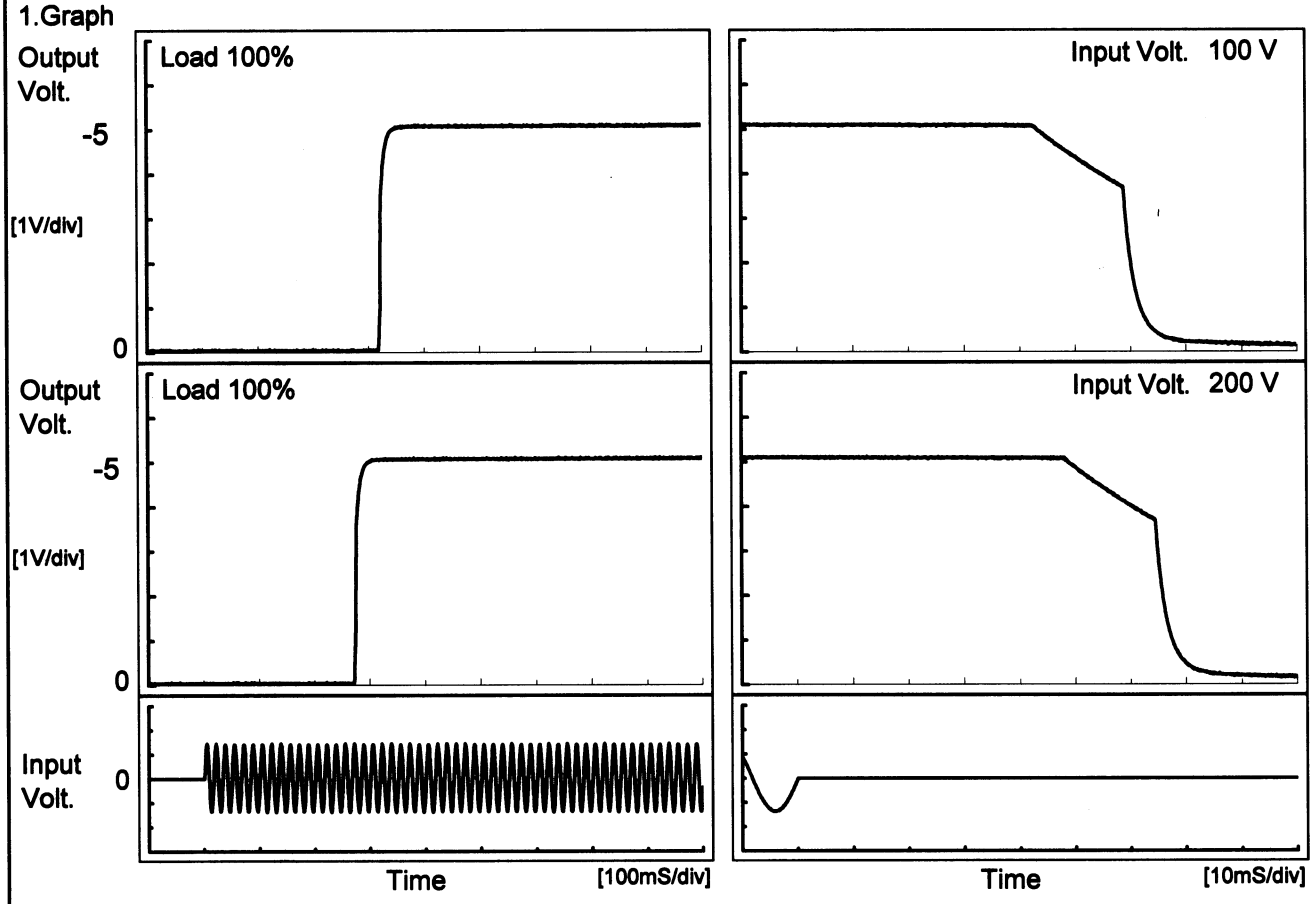


COSEL

Model	PBW50F-5
Item	Rise and Fall Time
Object	-5V3A

Temperature 25°C
Testing Circuitry Figure A

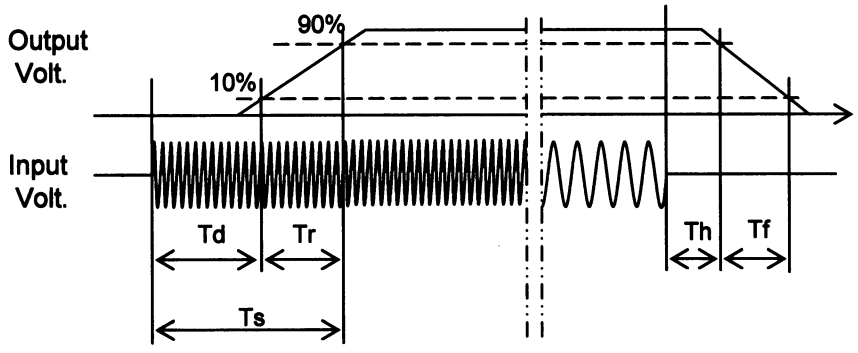
1.Graph



2.Values

[mS]

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

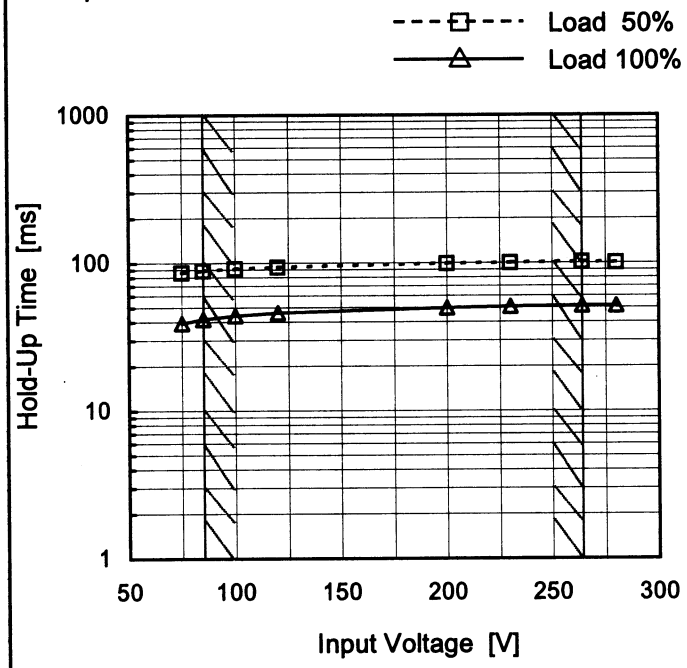


COSEL

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

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

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

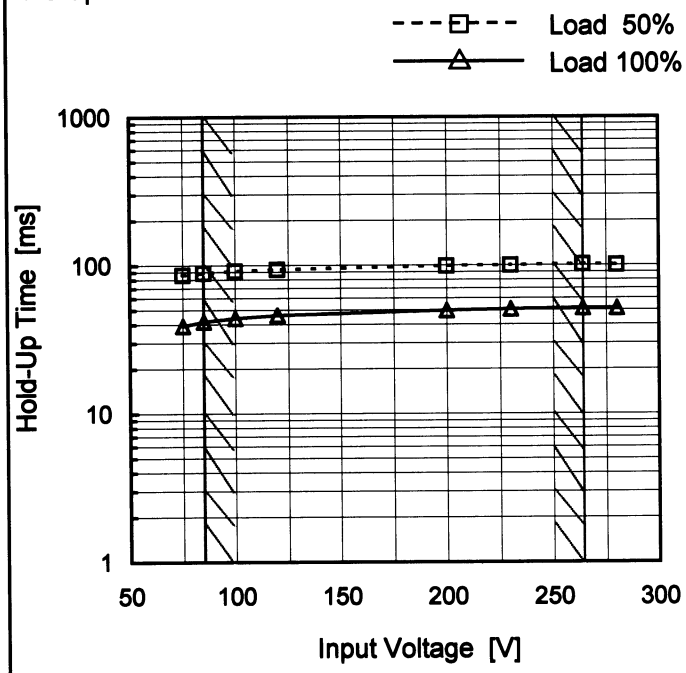
BC-10003

COSEL

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

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

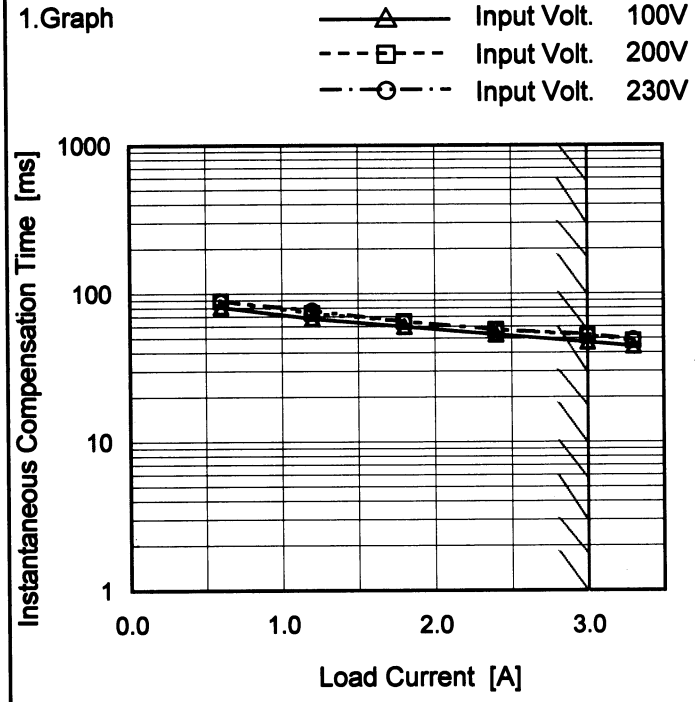
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	86	39
85	89	42
100	91	44
120	94	46
200	99	50
230	100	51
264	101	51
280	101	51
--	-	-

COSEL

Model	PBW50F-5
Item	Instantaneous Interruption Compensation
Object	+5V3A

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]
0.0	-	-	-
0.6	81	89	89
1.2	68	74	77
1.8	60	65	65
2.4	53	57	57
3.0	47	52	53
3.3	44	48	49
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

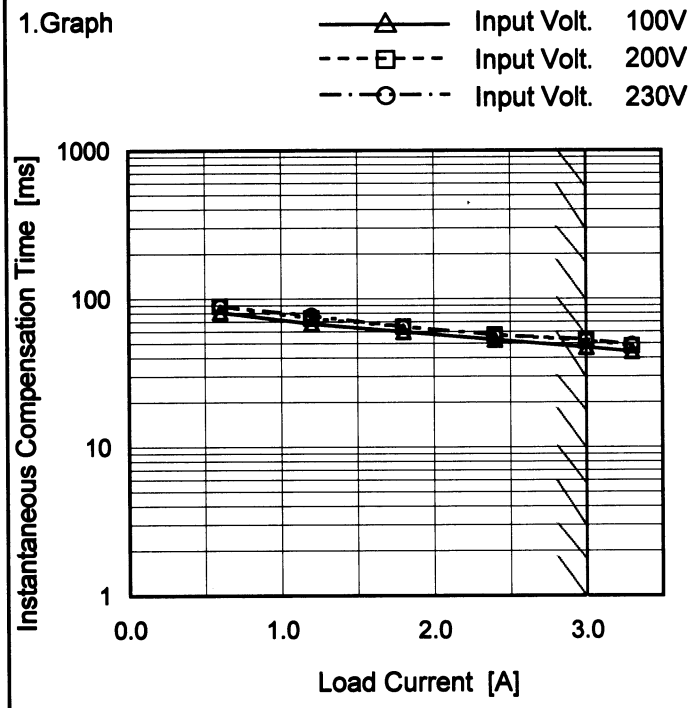
-5V : Rated output current 1

COSEL

Model	PBW50F-5
Item	Instantaneous Interruption Compensation
Object	-5V3A

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]
0.0	-	-	-
0.6	81	89	89
1.2	68	74	77
1.8	60	65	65
2.4	53	57	57
3.0	47	52	53
3.3	44	48	49
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

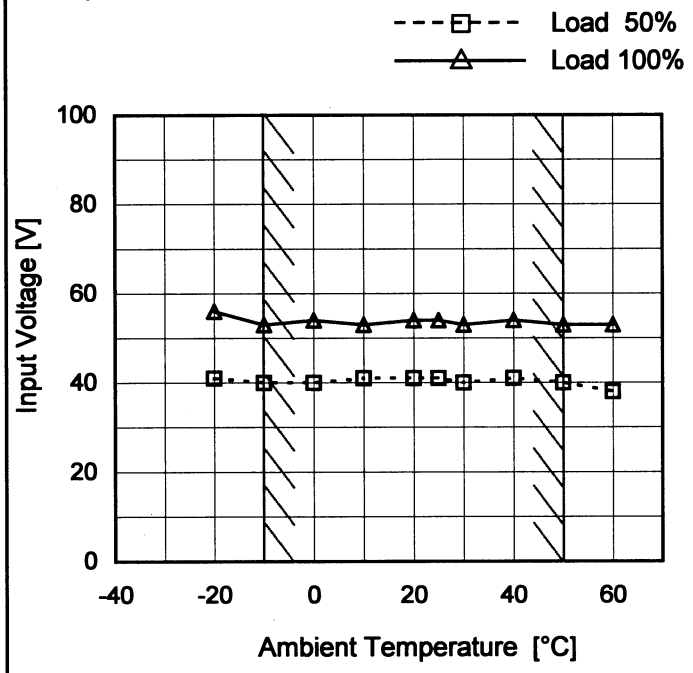
+5V : Rated output current 1

COSEL

Model	PBW50F-5
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V3A

Testing Circuitry Figure A

1.Graph

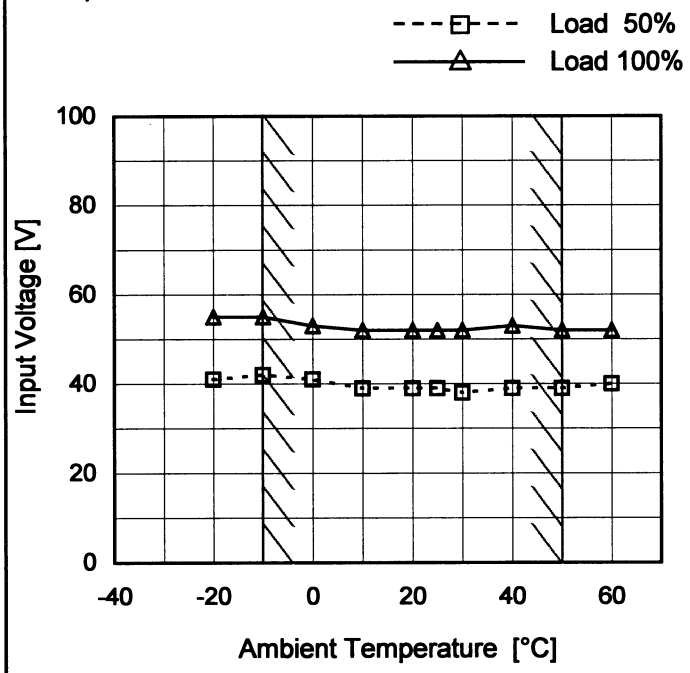


2.Values

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

Object	-5V3A

1.Graph



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

2.Values

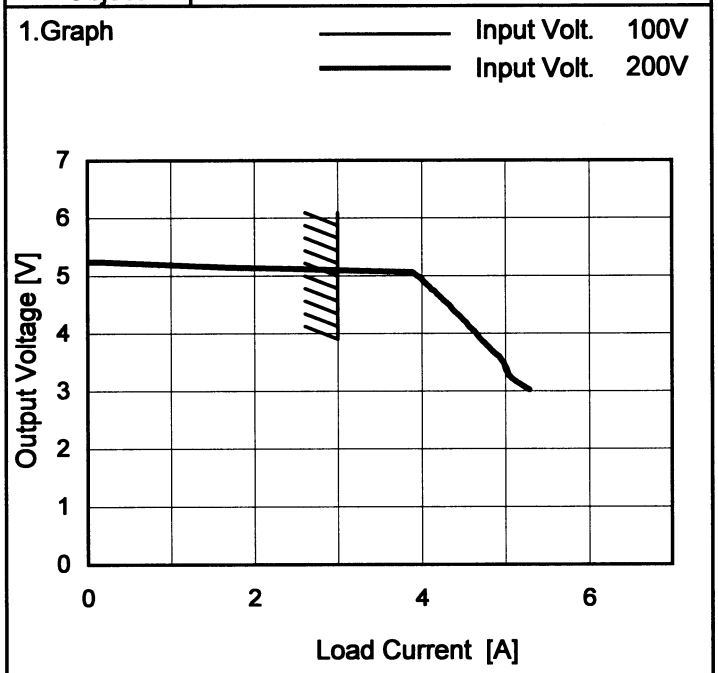
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	41	55
-10	42	55
0	41	53
10	39	52
20	39	52
25	39	52
30	38	52
40	39	53
50	39	52
60	40	52
—	-	-

COSEL

Model	PBW50F-5
Item	Overcurrent Protection
Object	+5V3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



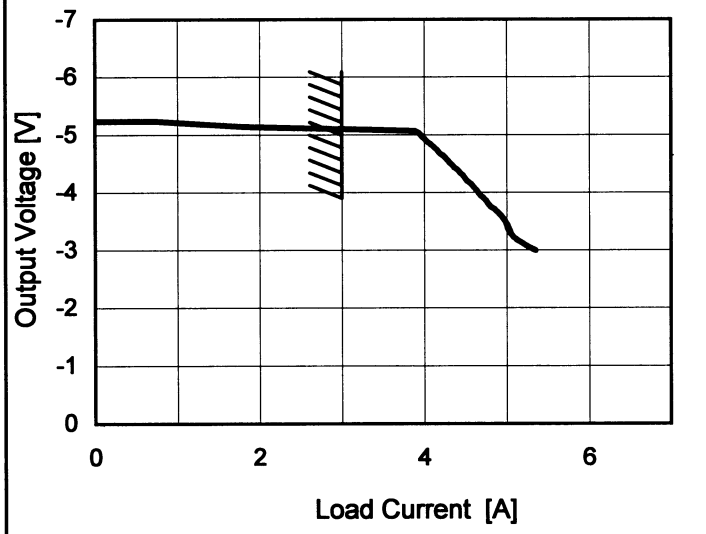
Intermittent operation occurs when the output voltage is from 3V to 0V.

2.Values

Output Voltage [V]	Load Current [A] Input Volt. 100[V]	Load Current [A] Input Volt. 200[V]
5.0	3.89	3.89
4.8	4.11	4.15
4.5	4.32	4.33
4.0	4.66	4.66
3.5	4.99	4.98
3.0	5.32	5.34
–	-	-
–	-	-
–	-	-
–	-	-
–	-	-
–	-	-

Object	-5V3A

1.Graph



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

Intermittent operation occurs when the output voltage is from -3V to 0V.

2.Values

Output Voltage [V]	Load Current [A] Input Volt. 100[V]	Load Current [A] Input Volt. 200[V]
-5.0	3.89	3.89
-4.8	4.15	4.16
-4.5	4.33	4.33
-4.0	4.66	4.66
-3.5	5.00	4.98
-3.0	5.33	5.35
–	-	-
–	-	-
–	-	-
–	-	-
–	-	-
–	-	-

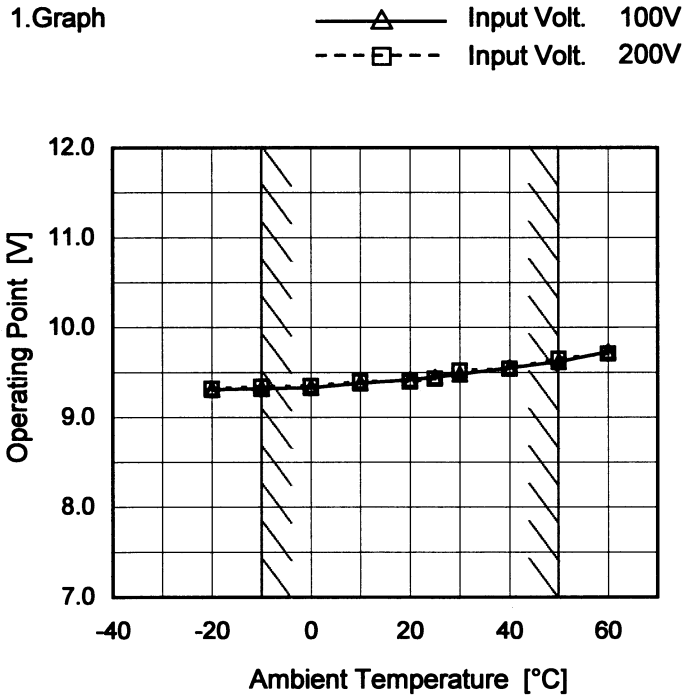
BC-10003

COSEL

Model	PBW50F-5
Item	Overvoltage Protection
Object	+5V3A

Testing Circuitry Figure A

1.Graph

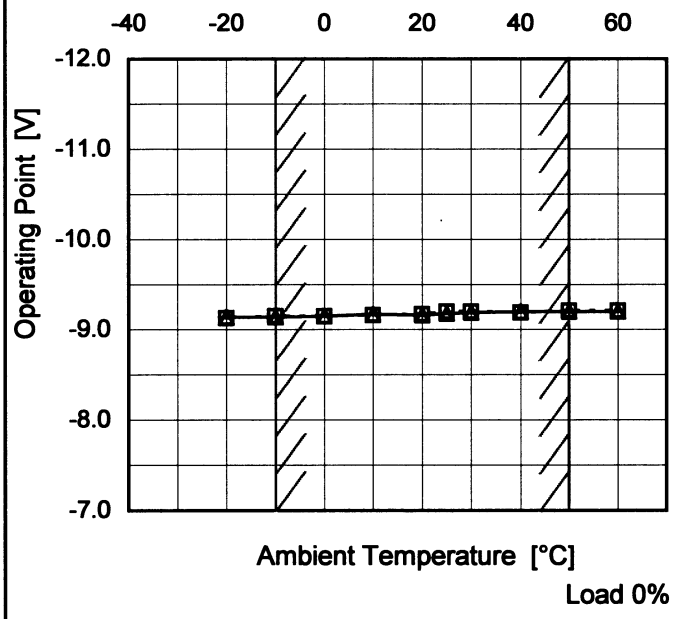


2.Values

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

Object	-5V3A

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

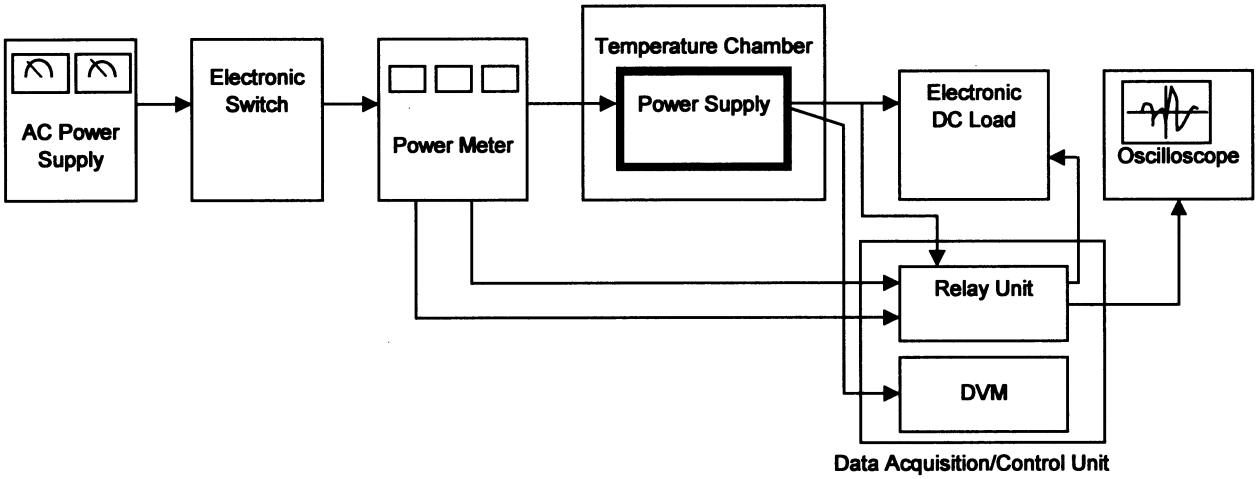


Figure A

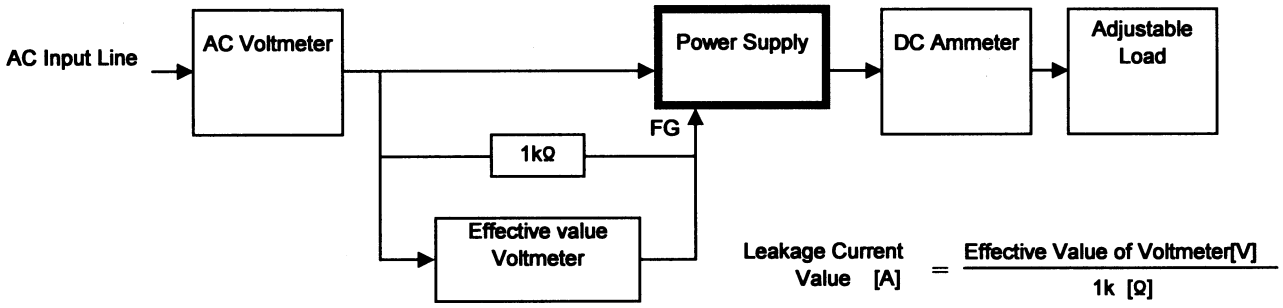


Figure B (DEN-AN)

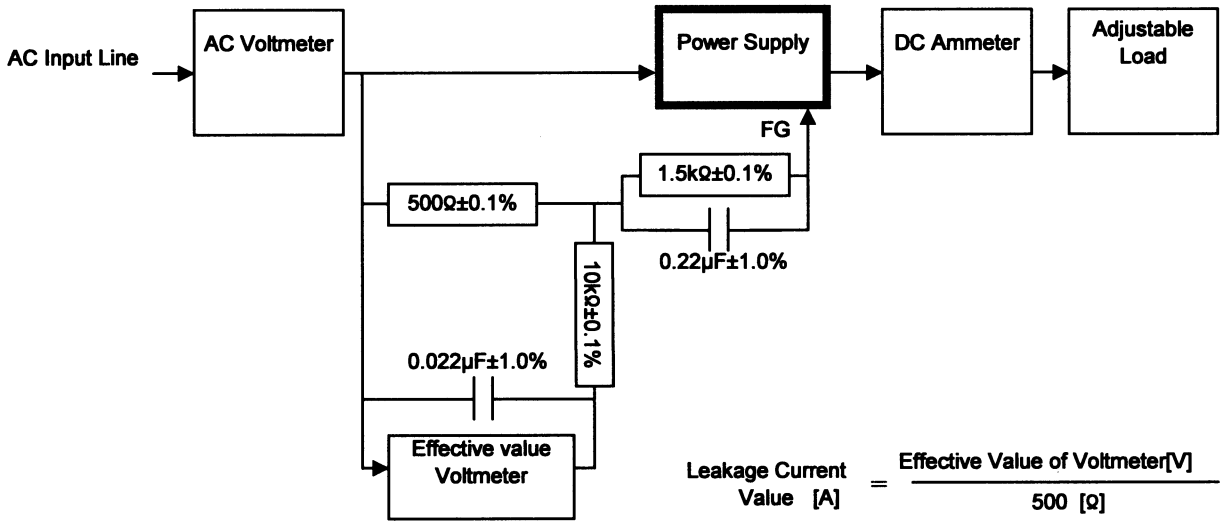


Figure B (IEC60950)