参考資料

COSEL

TEST DATA OF PAA50F-5

(200V INPUT)

Regulated DC Power Supply

Date : Sep. 1. 1996

Approved by : M. Tanikawa
Design Manager

Prepared by : M. Nakata
Design Engineer

コーセル株式会社

COSEL CO., LTD.

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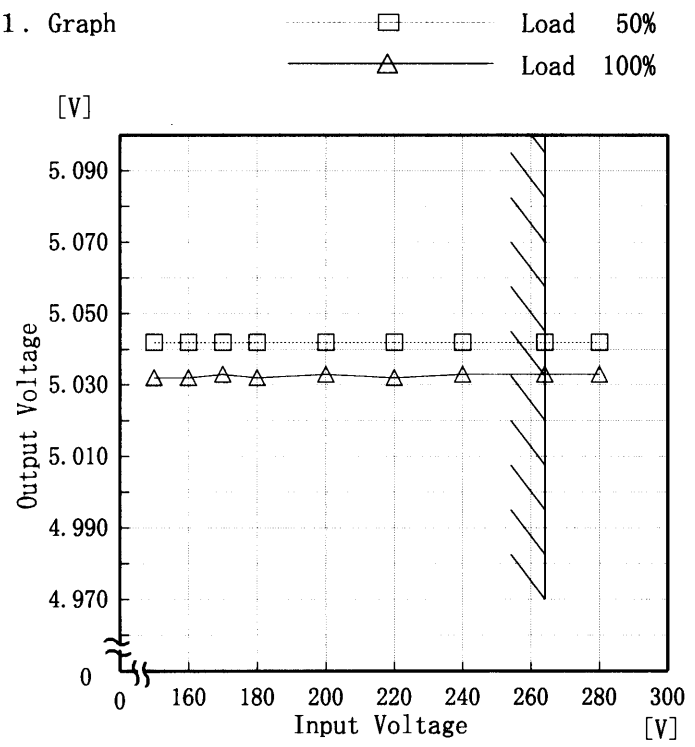
Temperature　25℃
Testing Circuitry　Figure A

1. Graph



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

(注)斜線は定格入力電圧範囲を示す。

2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
150	5.042	5.032
160	5.042	5.032
170	5.042	5.033
180	5.042	5.032
200	5.042	5.033
220	5.042	5.032
240	5.042	5.033
264	5.042	5.033
280	5.042	5.033

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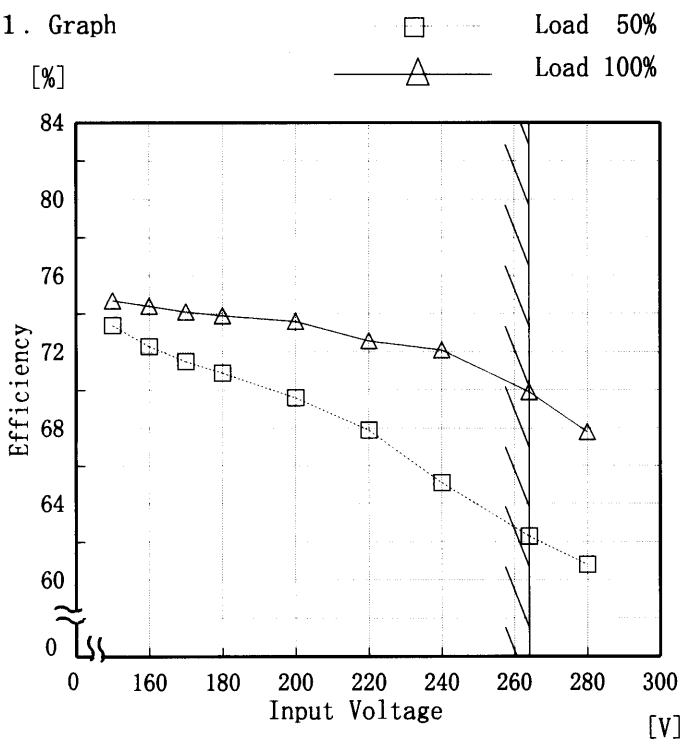
Model	PAA50F-5
Item	Efficiency 効率
Object	———————————

Temperature 25℃
Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格入力電圧範囲を示す。

2. Values

Input Voltage [V]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
150	73.4	74.7
160	72.3	74.4
170	71.5	74.1
180	70.9	73.9
200	69.6	73.6
220	67.9	72.6
240	65.1	72.1
264	62.3	69.9
280	60.8	67.8

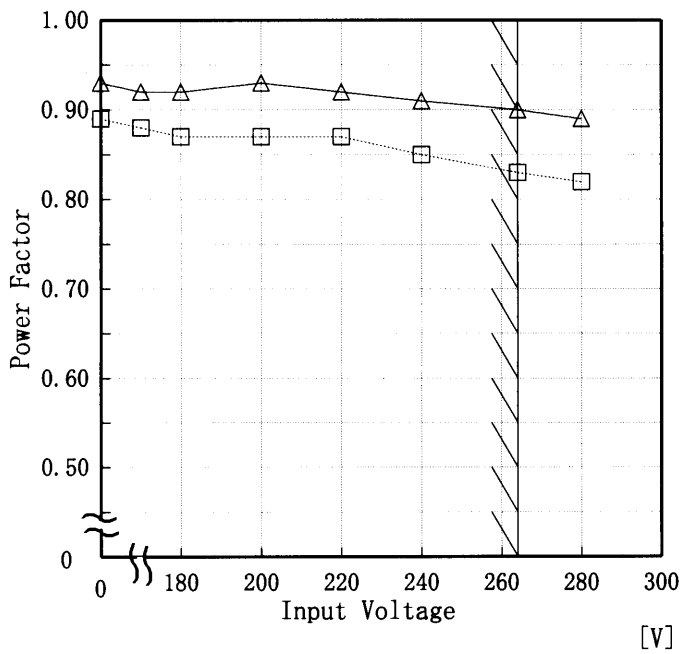
COSEL

Model	PAA50F-5
Item	Power Factor 力率
Object	———————————

Temperature 25℃
Testing Circuitry Figure A

1. Graph

load 50%
load 100%



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

(注)斜線は定格入力電圧範囲を示す。

2. Values

Input Voltage [V]	load 50% Power Factor	load 100% Power Factor
150	0.89	0.93
160	0.89	0.93
170	0.88	0.92
180	0.87	0.92
200	0.87	0.93
220	0.87	0.92
240	0.85	0.91
264	0.83	0.90
280	0.82	0.89

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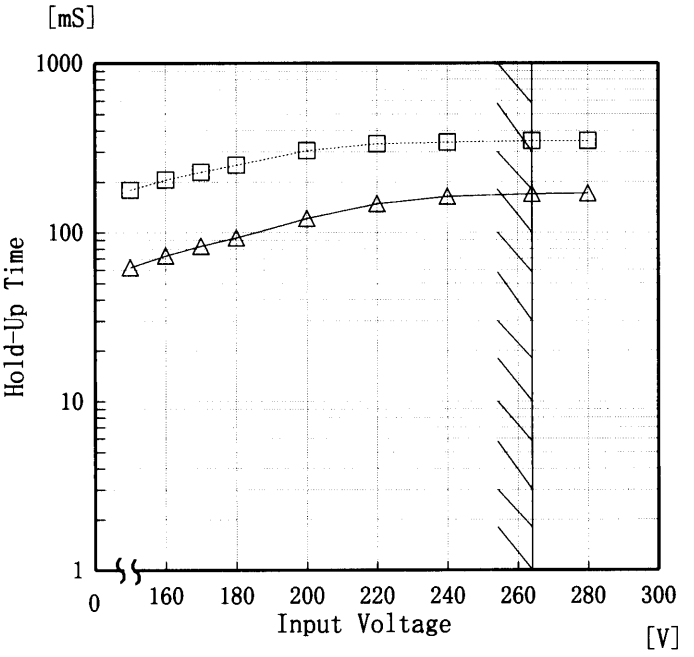
Model	PAA50F-5
Item	Hold-Up Time　出力保持時間
Object	＋５Ｖ１０Ａ

Temperature　25℃
Testing Circuitry　Figure A

1. Graph

Load　50%
Load　100%



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.

出力保持時間とは、ＡＣ入力断から出力電圧が、定電圧精度の規格範囲を保持しているところまでの時間。

(注)斜線は定格入力電圧範囲を示す。

2. Values

Input Voltage [V]	Load 50% Hold-Up Time [mS]	Load 100% Hold-Up Time [mS]
150	179	62
160	206	73
170	229	83
180	252	93
200	305	121
220	335	148
240	343	164
264	348	169
280	348	171

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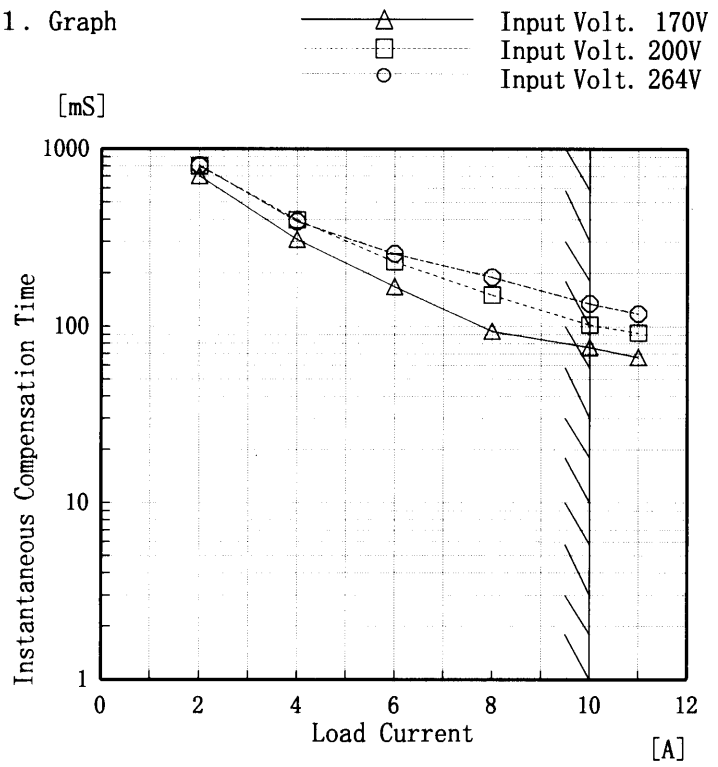
Model	PAA50F-5
Item	Instantaneous Interruption Compensation 瞬時停電保障
Object	＋５Ｖ１０Ａ

Testing Circuitry　Figure A

1. Graph



This duration counts between Shut-off and on of input voltage automatically.

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

瞬時停電保障時間とは、出力電圧が定格値の９５％になる時の瞬時停電時間をいう。

(注)斜線は定格負荷電流範囲を示す。

2. Values

Load Current [A]	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
	Time [mS]		
0.0		—	—
2.0	702	799	806
4.0	309	398	389
6.0	168	231	256
8.0	94	151	189
10.0	76	102	135
11.0	67	92	118
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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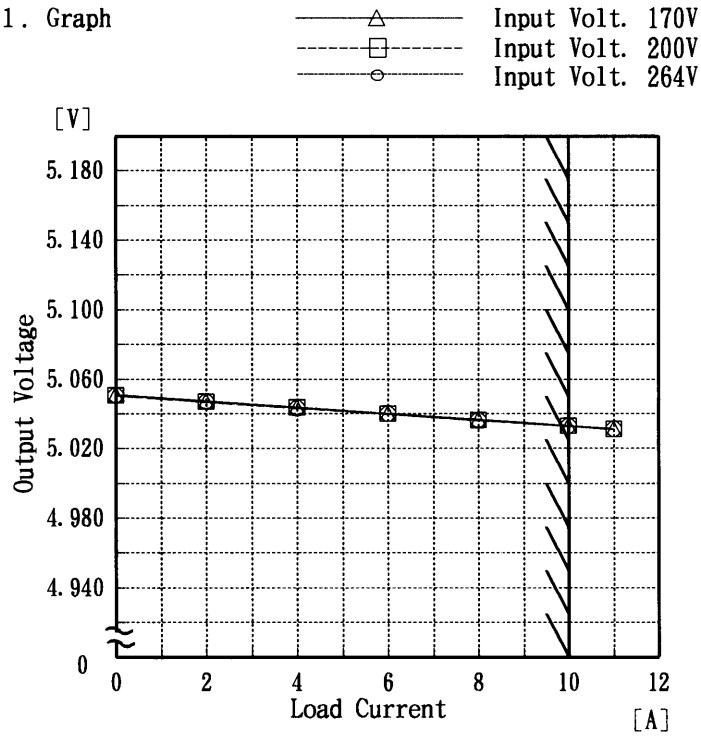
Model	PAA50F-5
Item	Load Regulation 静的負荷変動
Object	+5V10.0A

Temperature 25℃
Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格負荷電流範囲を示す。

2. Values

Load Current [A]	Input Volt. 170[V] Output Volt. [V]	Input Volt. 200[V] Output Volt. [V]	Input Volt. 264[V] Output Volt. [V]
0.0	5.051	5.051	5.051
2.0	5.047	5.047	5.047
4.0	5.044	5.043	5.043
6.0	5.040	5.040	5.040
8.0	5.037	5.036	5.036
10.0	5.033	5.033	5.033
11.0	5.031	5.031	5.031
—	—	—	—
—	—	—	—
—	—	—	—

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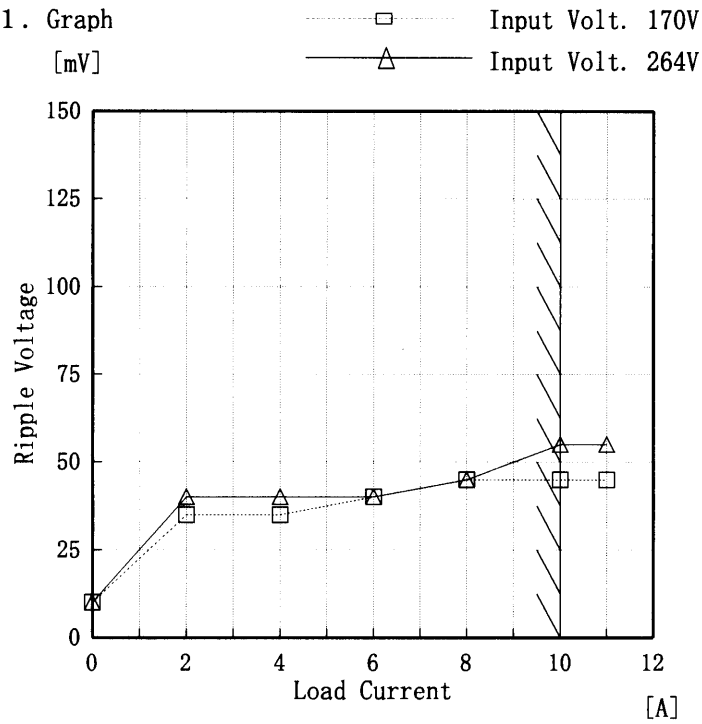
Model	PAA50F-5	Temperature 25℃
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)	Testing Circuitry Figure A
Object	＋５Ｖ１０Ａ	

1. Graph



Ripple Voltage is shown as p-p in the figure below.

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

リップル電圧は、下図ｐ－ｐ値で示される。

(注)斜線は定格負荷電流範囲を示す。

T1: Due to AC Input Line
入力商用周期
T2: Due to Switching
ｽｲｯﾁﾝｸﾞ周期

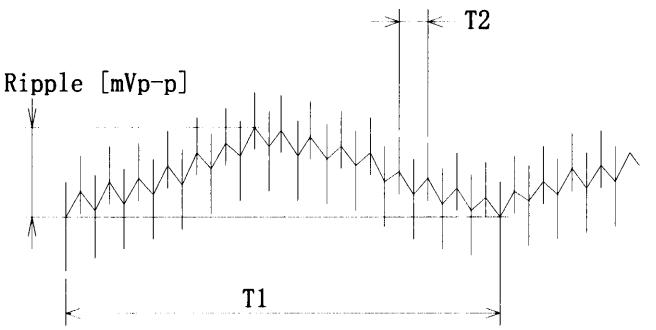


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

Load Current [A]	Input Volt. 170 [V] Ripple Output Volt. [mV]	Input Volt. 264 [V] Ripple Output Volt. [mV]
0.0	10	10
2.0	35	40
4.0	35	40
6.0	40	40
8.0	45	45
10.0	45	55
11.0	45	55
—	—	—
—	—	—
—	—	—
—	—	—

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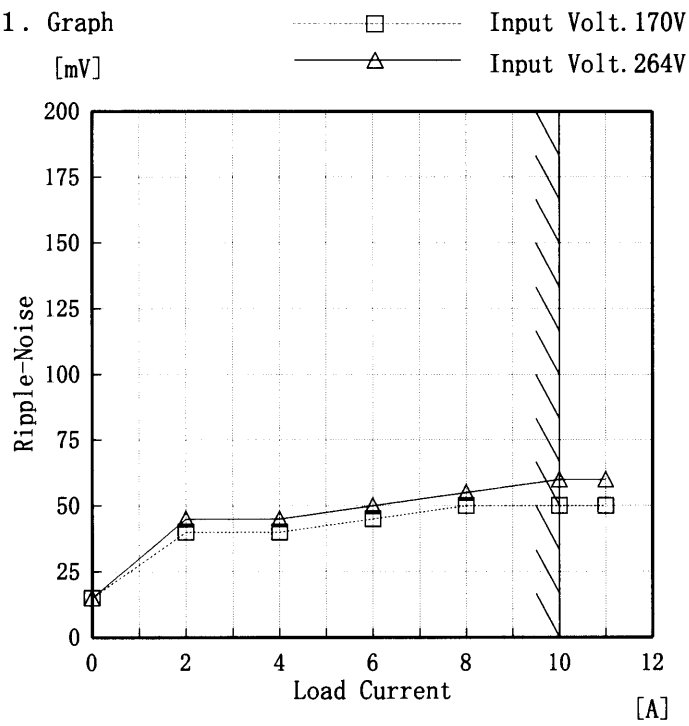
Model	PAA50F-5
Item	Ripple-Noise　リップルノイズ
Object	＋５Ｖ１０Ａ

Temperature　25℃
Testing Circuitry　Figure A

1. Graph



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

リップルノイズは、下図ｐ－ｐ値で示される。
(注)斜線は定格負荷電流範囲を示す。

T1: Due to AC Input Line
入力商用周期
T2: Due to Switching
ｽｲｯﾁﾝｸﾞ周期

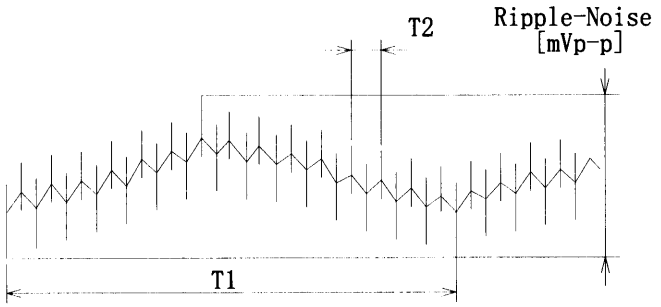


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

Load current [A]	Input Volt. 170 [V] Ripple-Noise [mV]	Input Volt. 264 [V] Ripple-Noise [mV]
0.0	15	15
2.0	40	45
4.0	40	45
6.0	45	50
8.0	50	55
10.0	50	60
11.0	50	60
—	—	—
—	—	—
—	—	—
—	—	—

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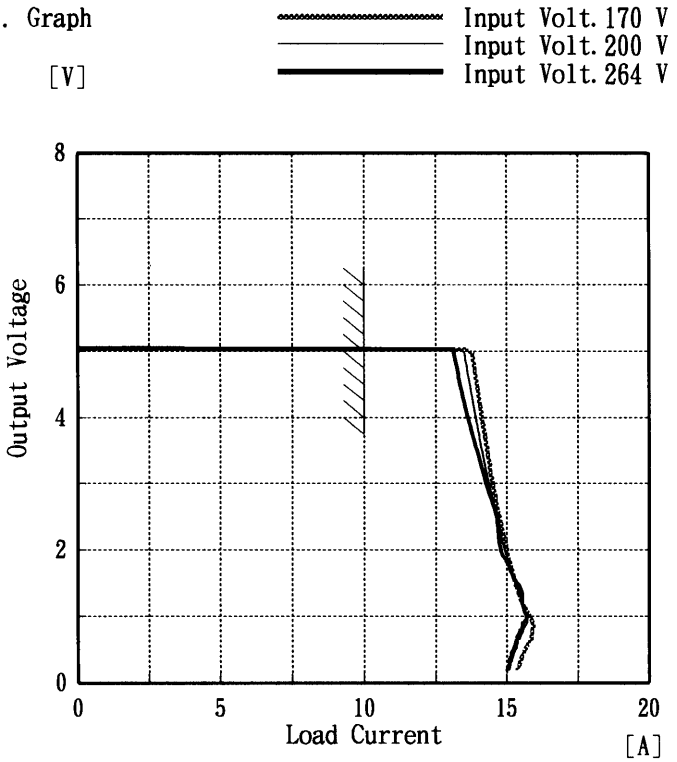
Model	PAA50F-5
Item	Overcurrent Protection 過電流保護
Object	+5V10.0A

Temperature 25℃
Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格負荷電流範囲を示す。

2. Values

Output Voltage [V]	Input Volt. 170[V] Load Current [A]	Input Volt. 200[V] Load Current [A]	Input Volt. 264[V] Load Current [A]
5.00	13.79	13.51	13.12
4.75	13.86	13.60	13.25
4.50	13.94	13.69	13.37
4.00	14.12	13.90	13.64
3.50	14.31	14.12	13.96
3.00	14.50	14.37	14.27
2.50	14.72	14.65	14.64
2.00	14.98	14.91	14.78
1.50	15.28	15.28	15.35
1.00	15.80	15.66	15.69
0.50	15.66	15.33	15.26
0.00	15.34	15.07	15.01

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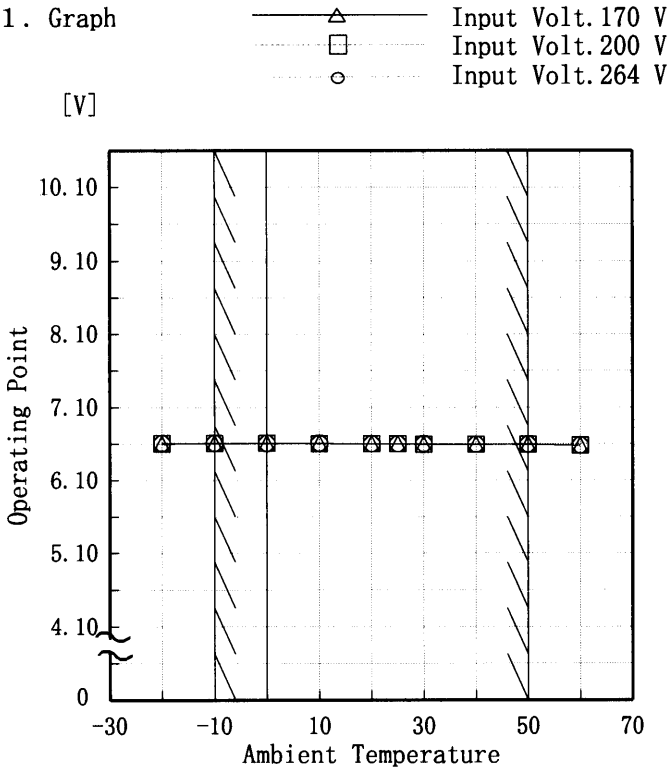
Model	PAA50F-5
Item	Overvoltage Protection 過電圧保護
Object	＋５Ｖ１０Ａ

Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格周囲温度範囲を示す。

2. Values

Ambient Temp. [℃]	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
	Operating Point [V]		
-20	6.60	6.61	6.61
-10	6.61	6.61	6.61
0	6.61	6.61	6.61
10	6.61	6.60	6.61
20	6.60	6.60	6.60
25	6.60	6.60	6.60
30	6.59	6.59	6.60
40	6.59	6.59	6.59
50	6.59	6.59	6.59
60	6.58	6.58	6.58
—	—	—	—

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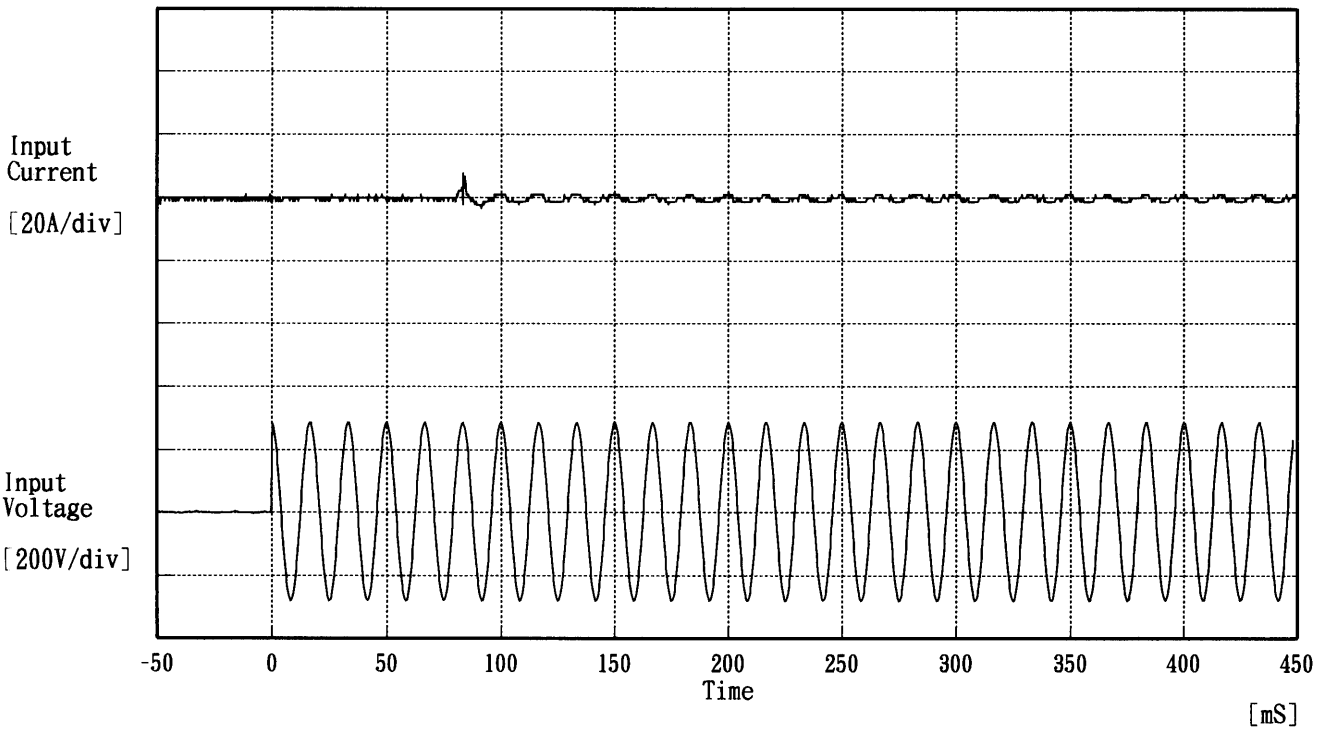
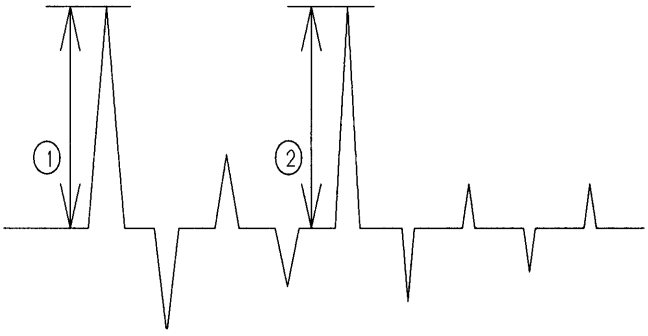
Model	PAA50F-5
Item	Inrush Current 突入電流
Object	――――――――

Temperature 25℃
Testing Circuitry Figure A



Input Voltage 200 V
Frequency 60 Hz
Load 100 %
Inrush Current
① 2.24 [A]
② 7.86 [A]



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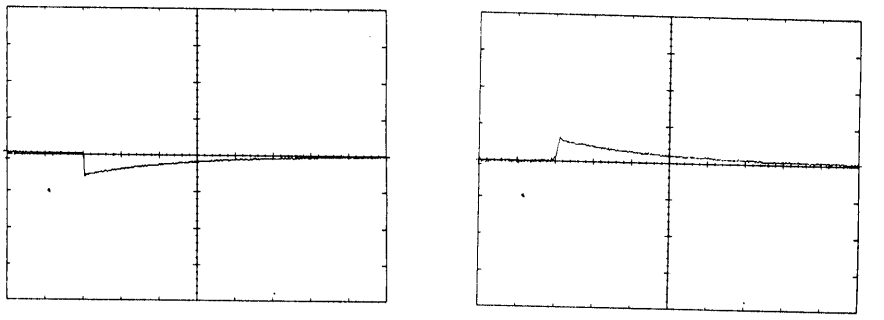
Model	PAA50F-5		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	＋５Ｖ１０Ａ		

Input Volt. 200 V

Cycle 200 mS

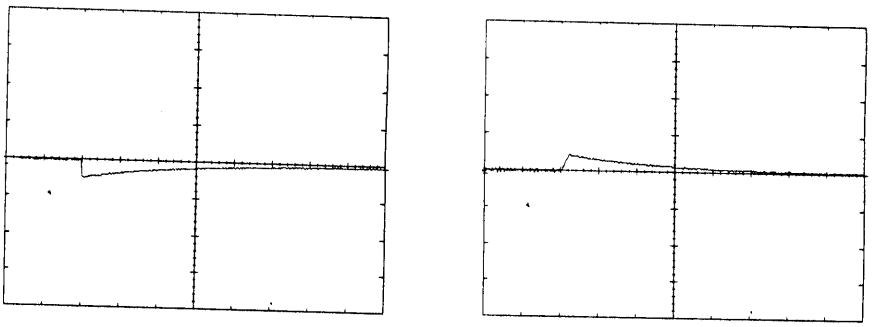
Min. Load ←→

Load 100 %



Min. Load ←→

Load 50 %



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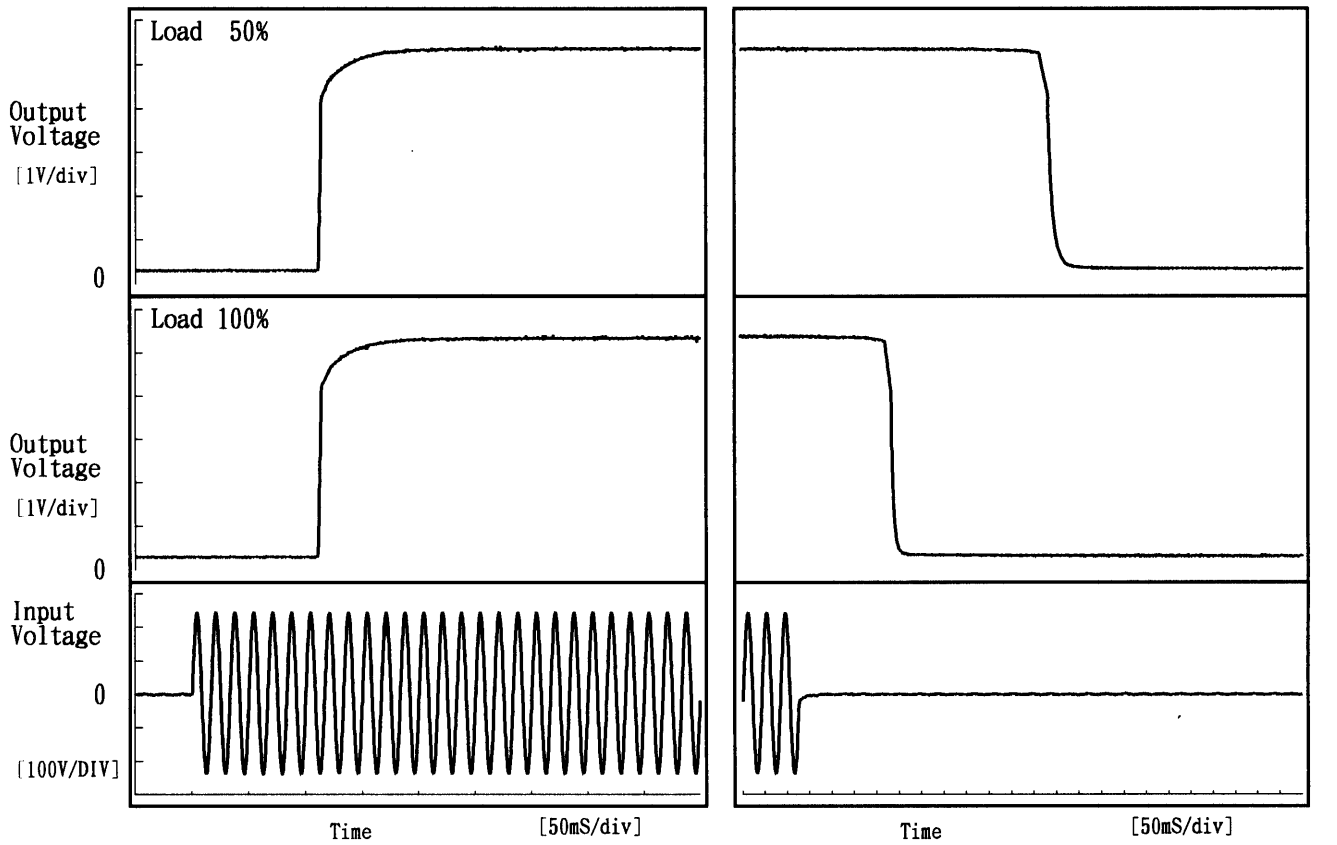
Model	PAA50F-5		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+5V10.0A		

1. Graph

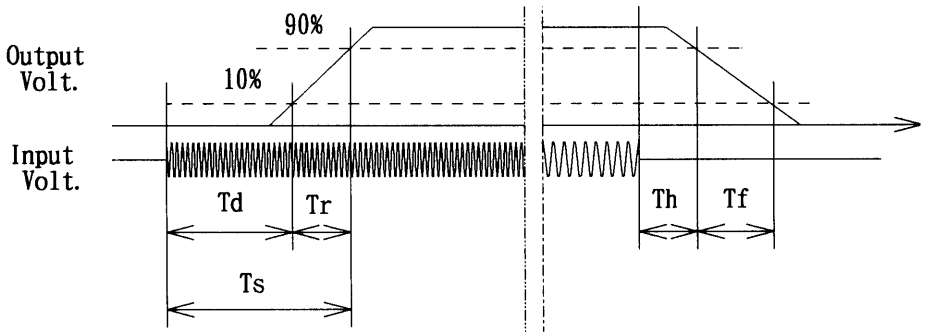
Input Volt. 170 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	111.3	14.8	126.0	219.0	13.3
100 %	111.3	15.5	126.8	80.5	8.3



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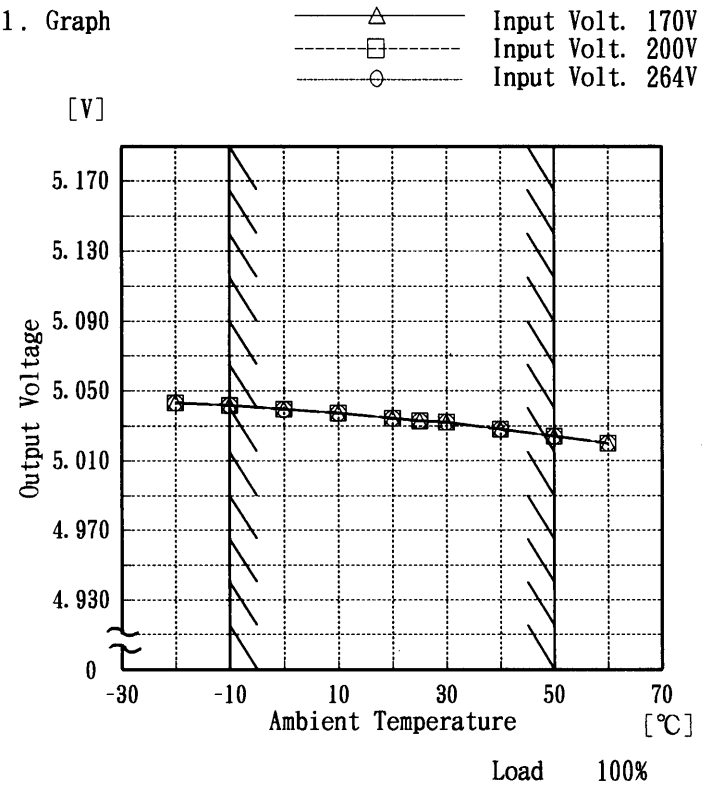
Model	PAA50F-5
Item	Ambient Temperature Drift 周囲温度変動
Object	+5V10.0A

Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格周囲温度範囲を示す。

2. Values

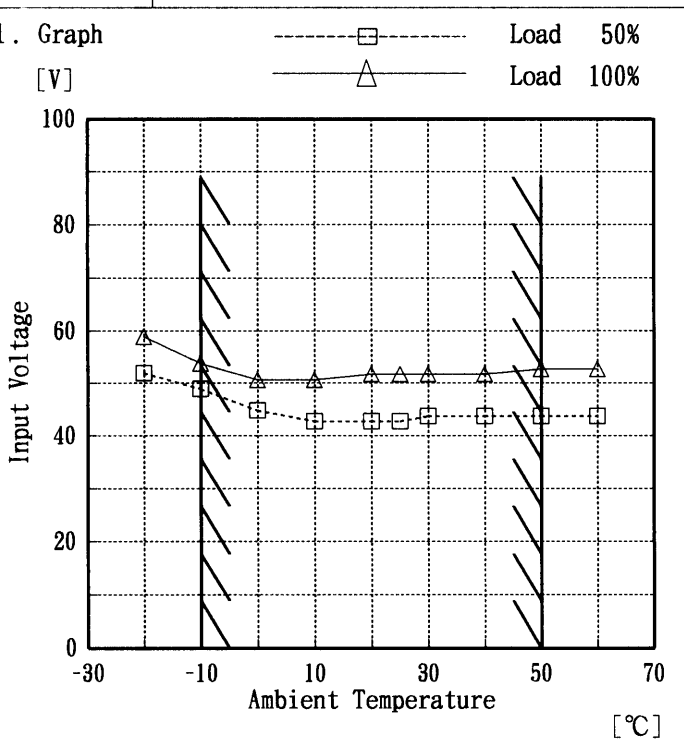
Temperature [℃]	Input Volt. 170[V] Output Volt. [V]	Input Volt. 200[V] Output Volt. [V]	Input Volt. 264[V] Output Volt. [V]
-20	5.043	5.043	5.043
-10	5.041	5.041	5.041
0	5.039	5.039	5.039
10	5.037	5.037	5.037
20	5.034	5.034	5.034
25	5.033	5.033	5.033
30	5.032	5.032	5.032
40	5.028	5.028	5.028
50	5.024	5.024	5.024
60	5.020	5.020	5.020
—	—	—	—

COSEL

Model	PAA50F-5
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+5V10.0A

Testing Circuitry Figure A

1. Graph



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

(注)斜線は定格周囲温度範囲を示す。

2. Values

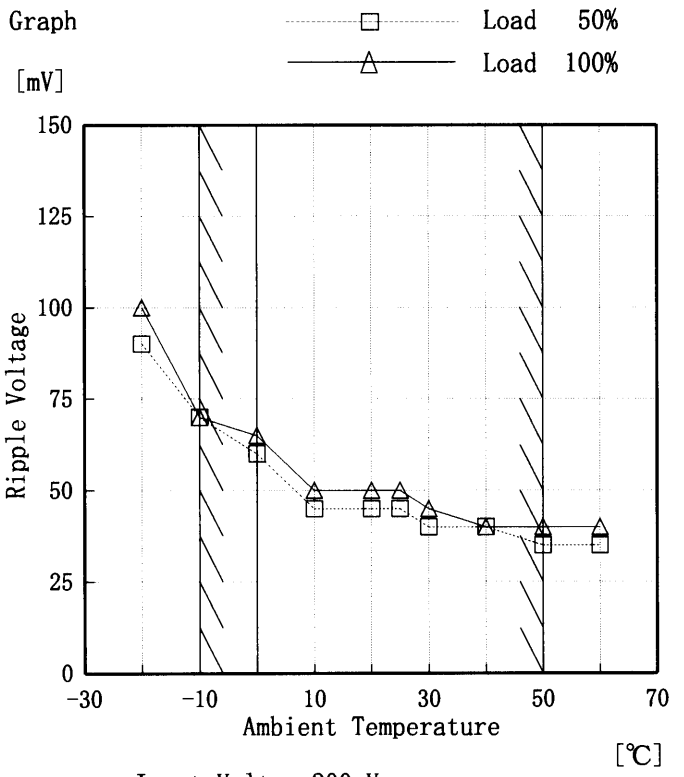
Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-20	52	59
-10	49	54
0	45	51
10	43	51
20	43	52
25	43	52
30	44	52
40	44	52
50	44	53
60	44	53
—	—	—

COSEL

Model	PAA50F-5
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）
Object	＋５Ｖ１０Ａ

Testing Circuitry　Figure A

1. Graph



Input Volt.　200 V

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

(注)斜線は定格周囲温度範囲を示す。

2. Values

Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-20	90	100
-10	70	70
0	60	65
10	45	50
20	45	50
25	45	50
30	40	45
40	40	40
50	35	40
60	35	40
—	—	—

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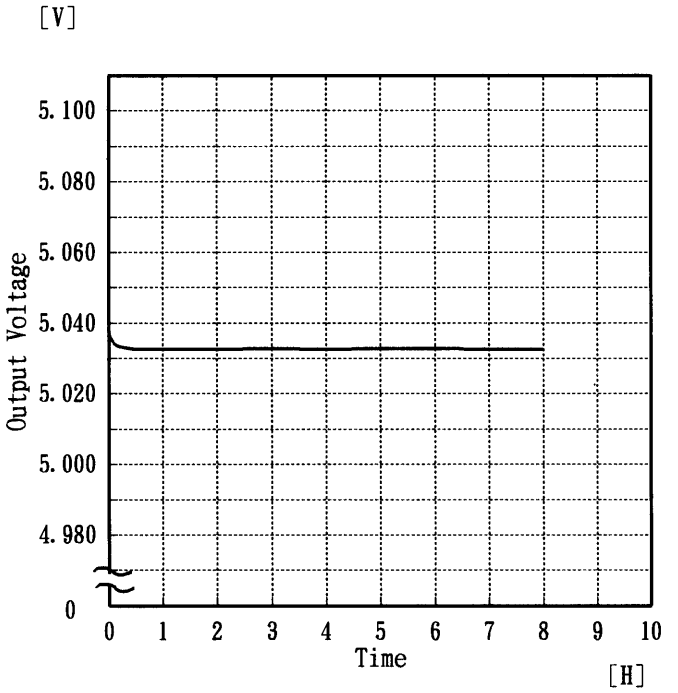
Model	PAA50F-5
Item	Time Lapse Drift 経時ドリフト
Object	+5V10.0A

Temperature 25 ℃
Testing Circuitry Figure A

1. Graph



Input Volt. 200V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	5.037
0.5	5.033
1.0	5.033
2.0	5.033
3.0	5.033
4.0	5.033
5.0	5.033
6.0	5.033
7.0	5.033
8.0	5.033

COSEL

Model	PAA50F-5	
Item	Output Voltage Accuracy 定電圧精度	Testing Circuitry Figure A
Object	+5V10.0A	

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 ℃
Input Voltage : 170～264 V
Load Current : 0.0～10.0 A

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

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

定電圧精度

周囲温度、入力電圧、負荷を下記仕様内で、任意に変動させたときの出力電圧の変動をいう。

周囲温度 -10～50 ℃
入力電圧 170～264 V
負荷電流 0.0～10.0 A

* 定電圧精度(変動値) = ±(出力電圧の最高値－出力電圧の最低値)／2

$$\text{* 定電圧精度(変動率)} = \frac{\text{変動値}}{\text{定格出力電圧}} \times 100$$

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	-10	200	0.0	5.058	±17	±0.3
Minimum Voltage	50	264	10.0	5.024		

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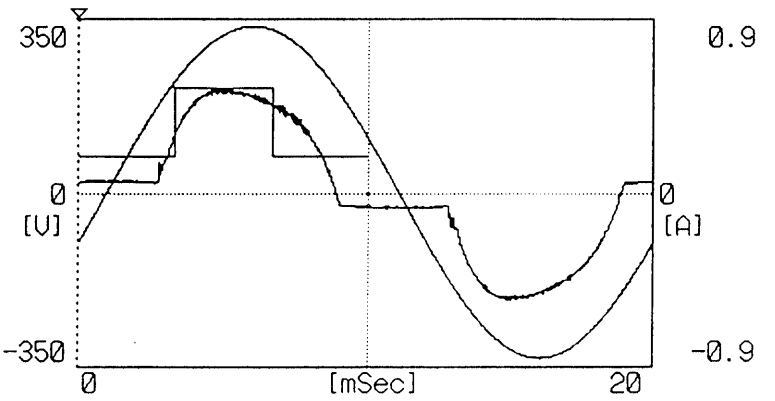
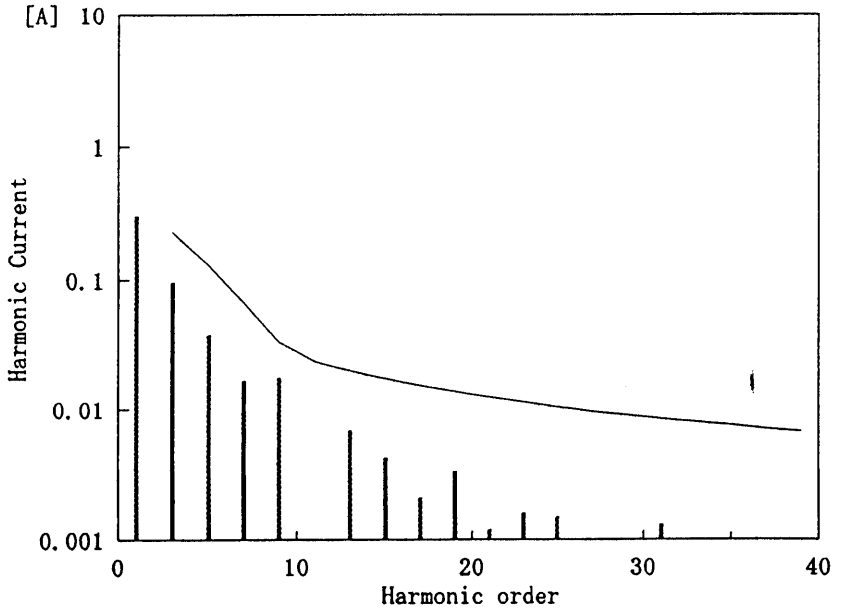
Model	PAA50F-5		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	————		

1. Input Current Waveform



Conditions	Values
Input Voltage [V]	232.1
Input Current [A]	0.32
Active Power [W]	68.5
Apparent Power[VA]	74.2
Frequency [Hz]	50
Power Factor	0.923
Output Power [W]	50

2. Harmonic Current



——— Harmonic Current
高調波電流

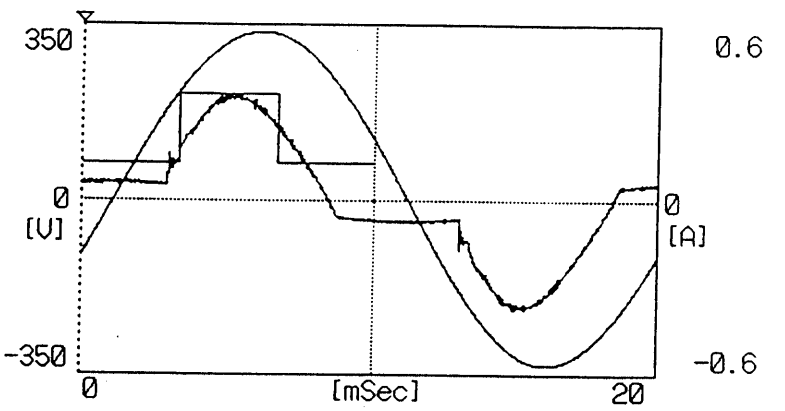
——— Limits for Class D equipment
ｸﾗｽDの機器に対する限度値

Harmonics order 高調波次数	Limits 限度値 [A]	Values 測定値 [A]
1	—	0.304
2	—	0.000
3	0.231	0.097
4	—	0.000
5	0.129	0.039
6	—	0.000
7	0.068	0.017
8	—	0.000
9	0.034	0.018
10	—	0.000
11	0.024	0.001
12	—	0.000
13	0.020	0.007
14	—	0.000
15	0.017	0.004
16	—	0.000
17	0.015	0.002
18	—	0.000
19	0.014	0.003
20	—	0.000
21	0.012	0.001
22	—	0.000
23	0.011	0.002
24	—	0.000
25	0.010	0.002
26	—	0.000
27	0.010	0.001
28	—	0.000
29	0.009	0.001
30	—	0.000
31	0.008	0.001
32	—	0.000
33	0.008	0.000
34	—	0.000
35	0.007	0.001
36	—	0.000
37	0.007	0.001
38	—	0.000
39	0.007	0.000
40	—	0.000

COSEL

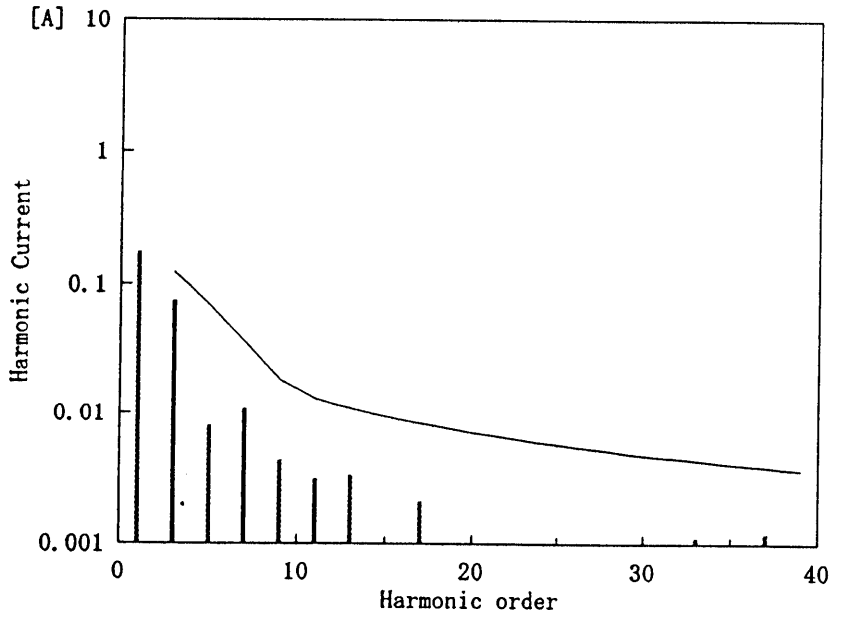
Model	PAA50F-5		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	———		

1. Input Current Waveform



Conditions	Values
Input Voltage [V]	232.1
Input Current [A]	0.19
Active Power [W]	37
Apparent Power[VA]	43.9
Frequency [Hz]	50
Power Factor	0.843
Output Power [W]	25

2. Harmonic Current



——— Harmonic Current
高調波電流

——— Limits for Class D equipment
ｸﾗｽDの機器に対する限度値

Harmonics order 高調波次数	Limits 限度値 [A]	Values 測定値 [A]
1	—	0.175
2	—	0.000
3	0.125	0.075
4	—	0.000
5	0.070	0.008
6	—	0.000
7	0.037	0.011
8	—	0.000
9	0.018	0.004
10	—	0.000
11	0.013	0.003
12	—	0.000
13	0.011	0.003
14	—	0.000
15	0.009	0.001
16	—	0.000
17	0.008	0.002
18	—	0.000
19	0.007	0.000
20	—	0.000
21	0.007	0.001
22	—	0.000
23	0.006	0.001
24	—	0.000
25	0.006	0.000
26	—	0.000
27	0.005	0.001
28	—	0.000
29	0.005	0.001
30	—	0.000
31	0.005	0.001
32	—	0.000
33	0.004	0.001
34	—	0.000
35	0.004	0.001
36	—	0.000
37	0.004	0.001
38	—	0.000
39	0.004	0.001
40	—	0.000

COSEL

Model	PAA50F-5
Item	Condensation　結露特性
Object	＋５Ｖ１０Ａ

Testing Circuitry　Figure A

1. Condensation test

Testing procedure is as follows.

① Keeping and cooling the unit in a tank at -10℃ for an hour with the input off.

② Taking it out of the tank and dewing itself in a room where the temperature is 25℃ and the humidity is 40%RH.

③ Testing electrical characteristics(Output Voltage, Ripple Voltage, Ripple noise) of the unit to confirm there be no fault.

④ Repeating ①, ② and ③ three times.

１．結露特性試験

入力を切った状態で、恒温槽で－１０℃に冷却しておき、約１時間後に恒温槽から取り出し、室温２５℃、湿度４０%RHの状態におき結露させ、その電気的特性（出力電圧、ﾘｯﾌﾟﾙ、ﾘｯﾌﾟﾙﾉｲｽﾞ）の測定を３度行い、異常のないことを確認する。

2. Values

	Times	Output Voltage [V]	Ripple Voltage [mV]	Ripple Noise [mV]
Load 50 %	1	5.042	40	45
	2	5.042	40	45
	3	5.042	40	45
Load 100 %	1	5.032	50	55
	2	5.032	50	55
	3	5.032	50	55

Input Volt. 200　V

COSEL

Model	PAA50F-5
Item	Leakage Current 漏洩電流
Object	――――――――

Testing Circuitry Figure A

1. Results

Standards	Leakage Current [mA]		
	Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132[V]
(A) DENTORI	―	―	―
(B) UL	―	―	―
(C) CSA	―	―	―

Standards	Leakage Current [mA]		
	Input Volt. 170 [V]	Input Volt. 220 [V]	Input Volt. 264 [V]
(D) VDE	0.25	0.34	0.42

2. Condition

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

交流入力の両相について測定し、その大きい方を漏洩電流測定値とする。

Load 100 %

(A) Input Resistance :1KΩ

(B) Input Resistance :1.5KΩ
Input Capacitance :0.15μF

(C) Input Resistance :1.5KΩ
Input Capacitance :0.15μF

(D) Input Resistance :2KΩ
Input Capacitance :0.1μF

COSEL

Model	PAA50F-5
Item	Line Noise Tolerance 入力雑音耐量
Object	＋５Ｖ１０Ａ

Testing Circuitry Figure C

1. Results

Pulse Width [nS]	MODE	Operating Point of Overvoltage Protection [V] 過電圧保護動作値	DC-like Regulation of Output Voltage 出力電圧の直流的変動
50	COMMON	6.60	no regulation
	NORMAL	6.60	no regulation
1000	COMMON	6.60	no regulation
	NORMAL	6.60	no regulation

Conditions

Input Voltage :200 V
Pulse Voltage :2000 V
Pulse Cycle :10 mS
Pulse Input Duration:1 min. or more
Load :100 %

COSEL

Model	PAA50F-5	
Item	Conducted Emission 雑音端子電圧	Testing Circuitry Figure D
Object	————————	

1. Graph

Remarks

Input Volt. 230 V

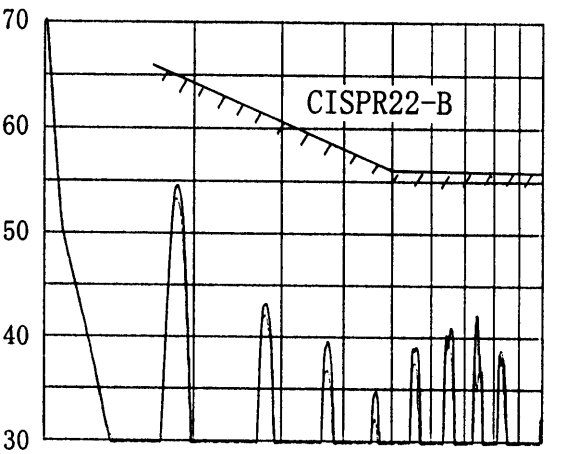
Load 100 %

Note: Slanted line shows the range of Tolerance.

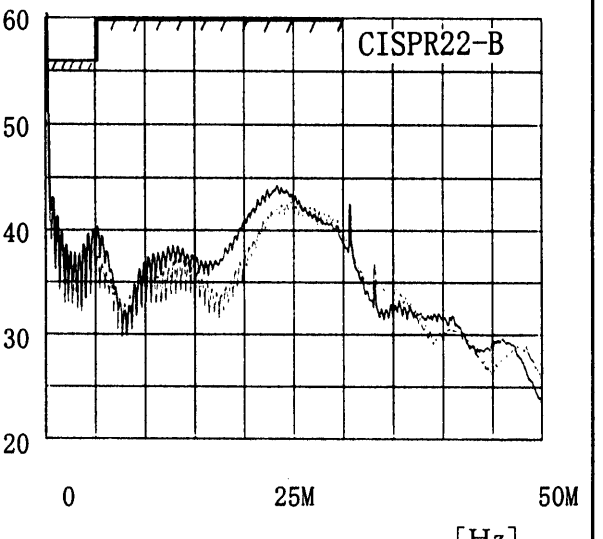
(注)斜線は許容値を示す。

NO	Standards	Standards Complied	Frequency [MHz]	Tolerance [dBμV]
1	FCC class A		0.45～1.6	60
			1.6～30	69.5
2	FCC class B		0.45～30	48
3	VCCI -1		0.15～0.5	79
			0.5～30	73
4	VCCI -2		0.15～0.5	66-56
			0.5～5	56
			5～30	60
5	VDE class A		0.01～0.15	91-69.5
			0.15～0.5	66
			0.5～30	60
6	CISPR 22 class B	○	0.15～0.5	66-56
			0.5～5	56
			5～30	60

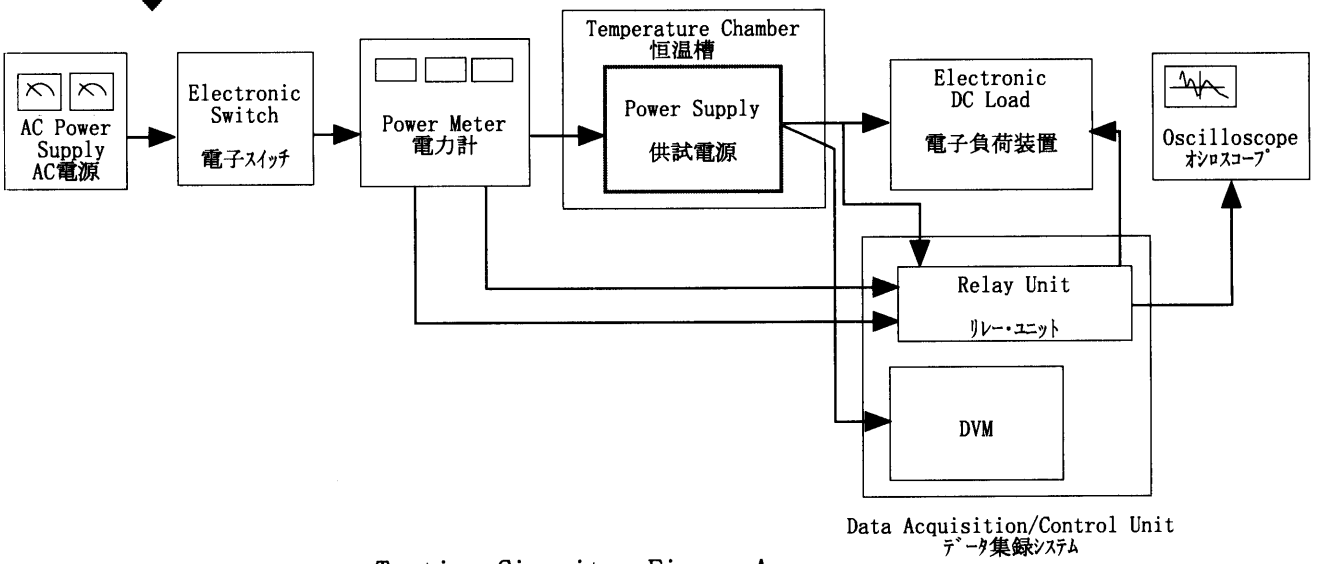
[dBμV]



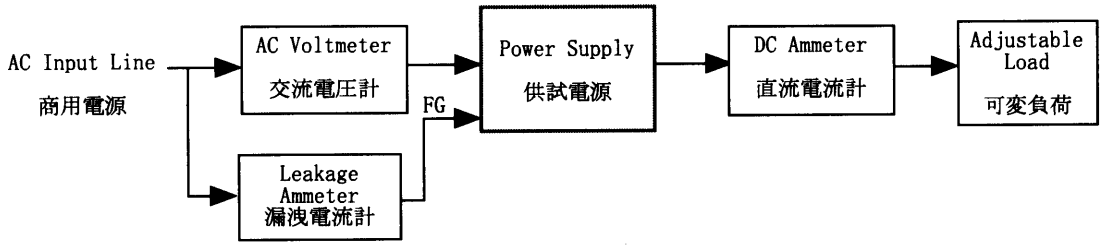
[dBμV]



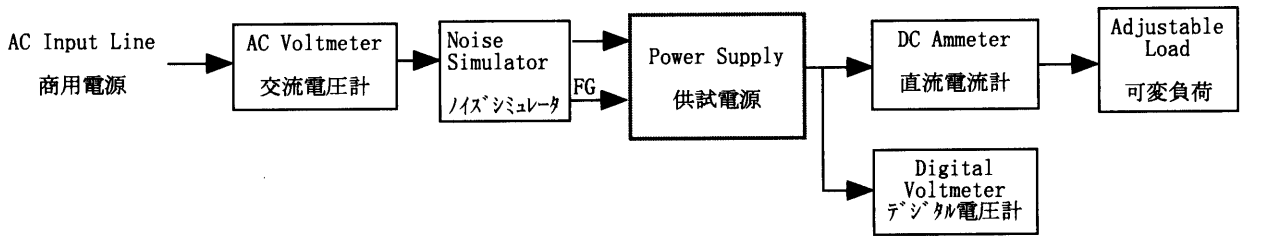
COSEL



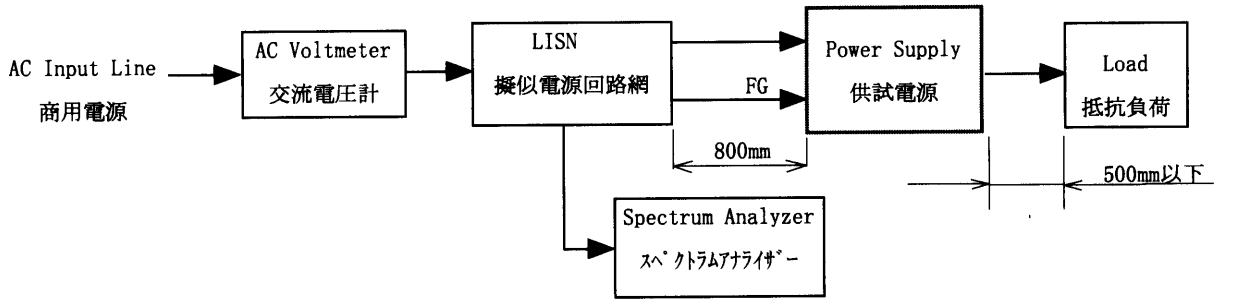
Testing Circuitry Figure A



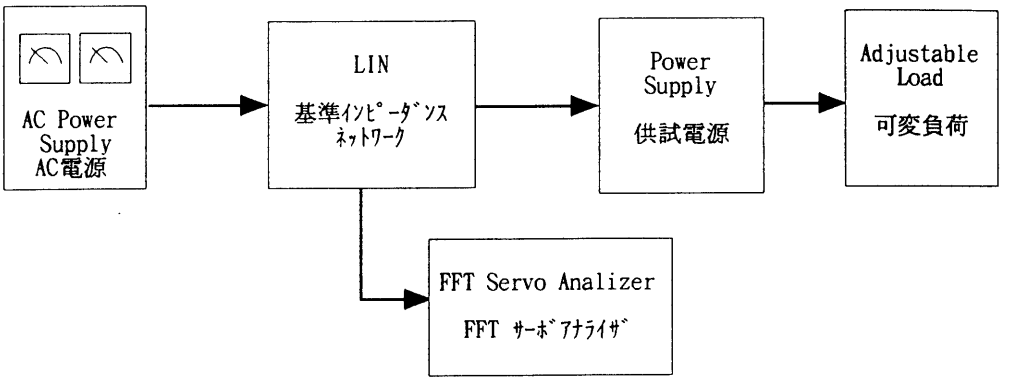
Testing Circuitry Figure B



Testing Circuitry Figure C



Testing Circuitry Figure D



Testing Circuitry Figure E