参考資料

COSEL

TEST DATA OF FCA200F-24

(240V INPUT)

Regulated DC Power Supply

July 21, 2001

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コーセル株式会社

COSEL CO.,LTD.

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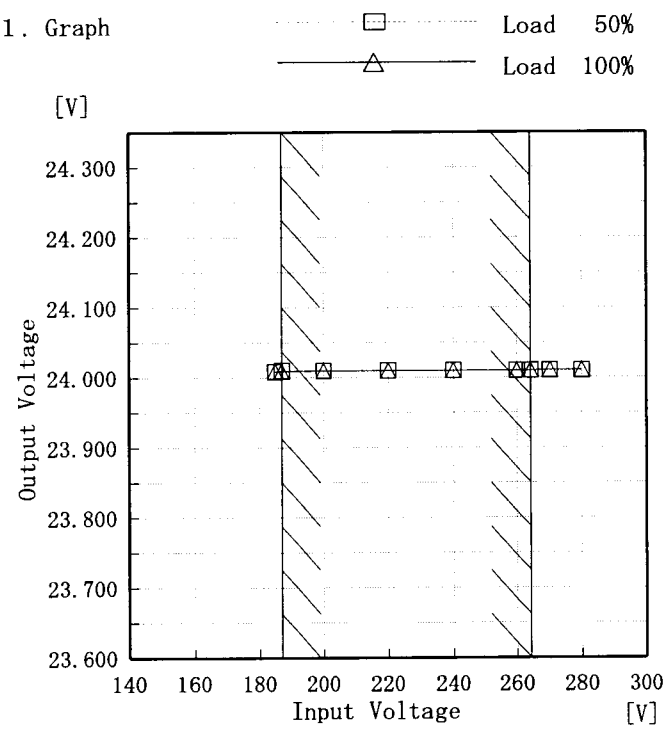
Model	FCA200F-24
Item	Line Regulation 静的入力変動
Object	+24.0V8.4A

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]	Output Voltage [V]	
	Load 50%	Load 100%
185	24.008	24.009
187	24.010	24.009
200	24.010	24.010
220	24.010	24.010
240	24.010	24.010
260	24.010	24.010
264	24.010	24.010
270	24.010	24.011
280	24.010	24.011

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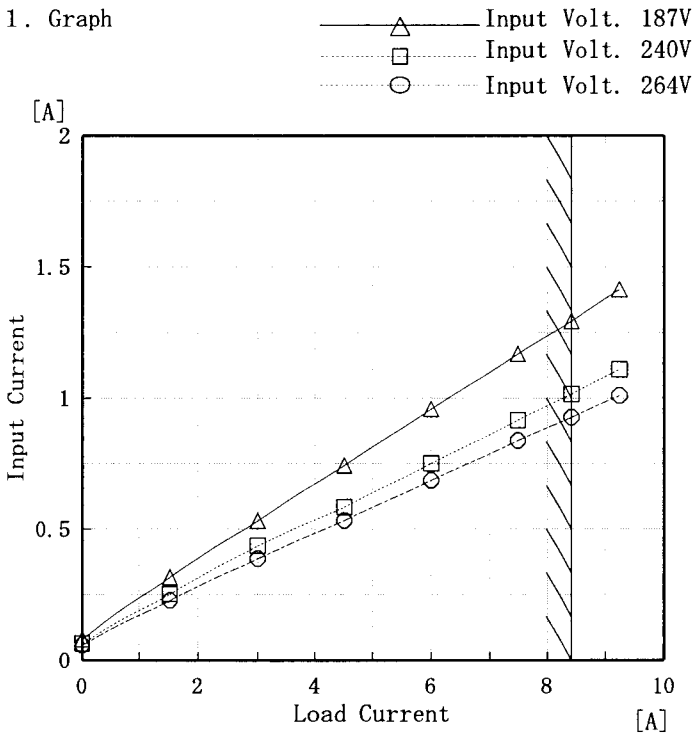
Model	FCA200F-24
Item	Input Current (by Load Current) 入力電流 (負荷特性)
Object	————

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

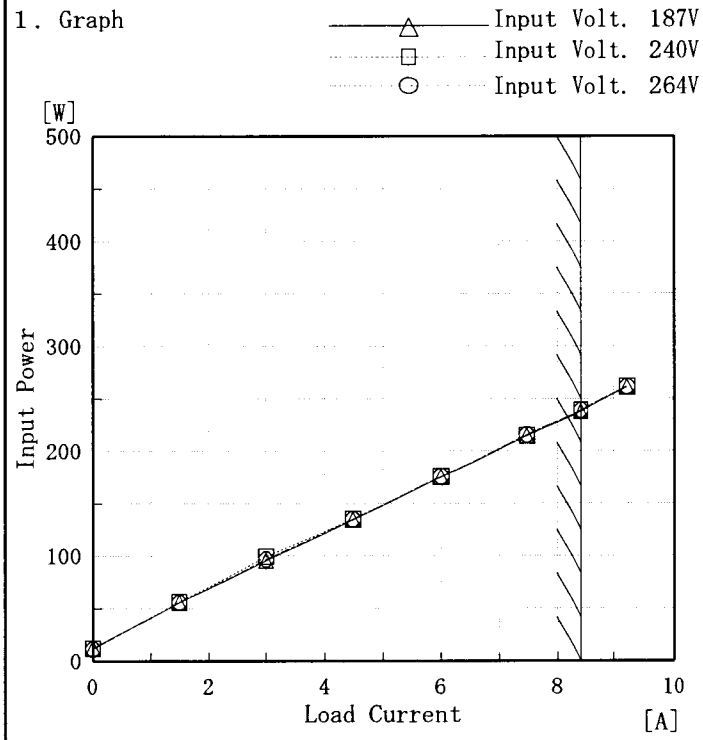
Load Current [A]	Input Current [A]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
0.00	0.080	0.064	0.058
1.50	0.317	0.252	0.228
3.00	0.532	0.437	0.388
4.50	0.743	0.584	0.533
6.00	0.958	0.751	0.686
7.50	1.169	0.916	0.838
8.40	1.294	1.015	0.926
9.24	1.414	1.109	1.010
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	FCA200F-24
Item	Input Power (by Load Current) 入力電力 (負荷特性)
Object	————

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 Power [W]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
0.00	12.50	12.00	11.60
1.50	55.60	56.10	55.60
3.00	95.80	99.60	96.80
4.50	134.60	135.40	135.00
6.00	175.10	175.70	175.90
7.50	214.40	214.90	215.60
8.40	237.80	238.90	238.90
9.24	260.70	261.80	261.50
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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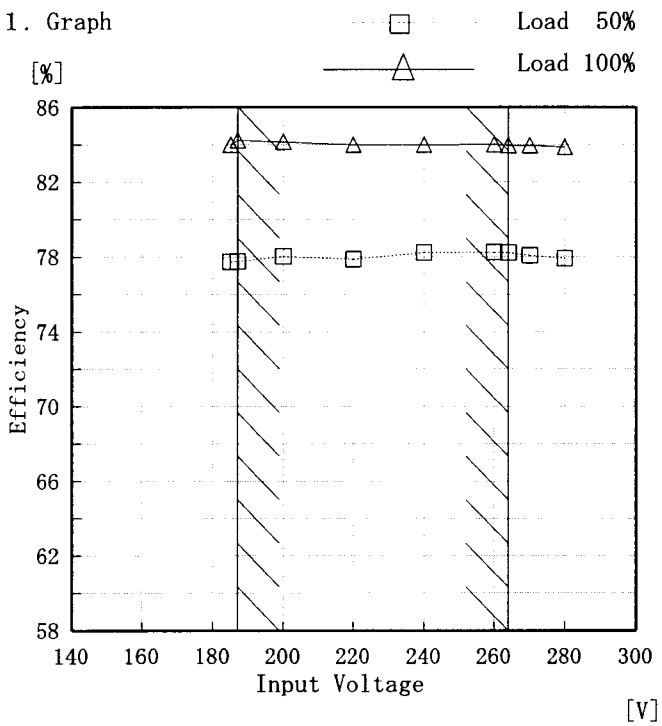
Model	FCA200F-24
Item	Efficiency (by Input Voltage) 効率（入力電圧特性）
Object	――――――――――

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]	Efficiency [%]	
	Load 50%	Load 100%
185	77.7	84.0
187	77.8	84.2
200	78.0	84.1
220	77.9	84.0
240	78.2	84.0
260	78.3	84.0
264	78.2	84.0
270	78.1	84.0
280	77.9	83.9

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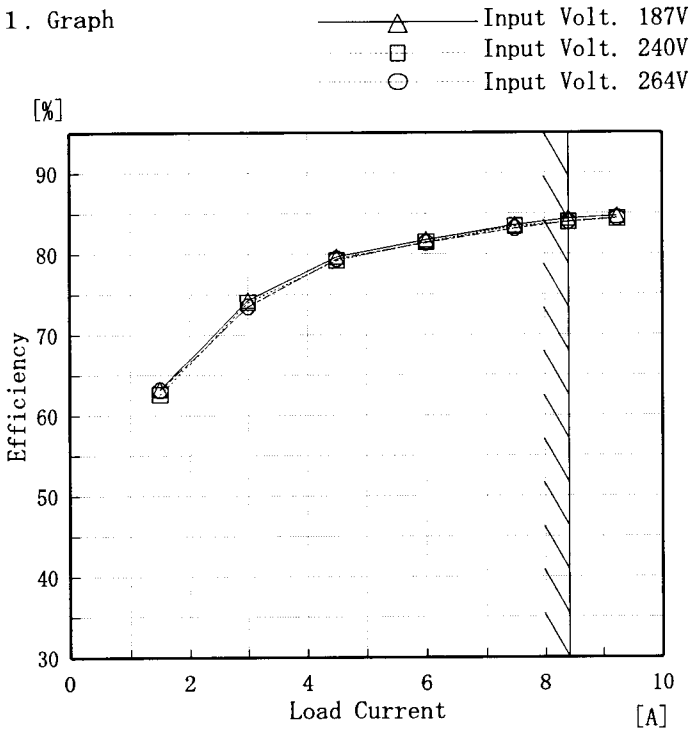
Model	FCA200F-24
Item	Efficiency (by Load Current) 効率 (負荷特性)
Object	————

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

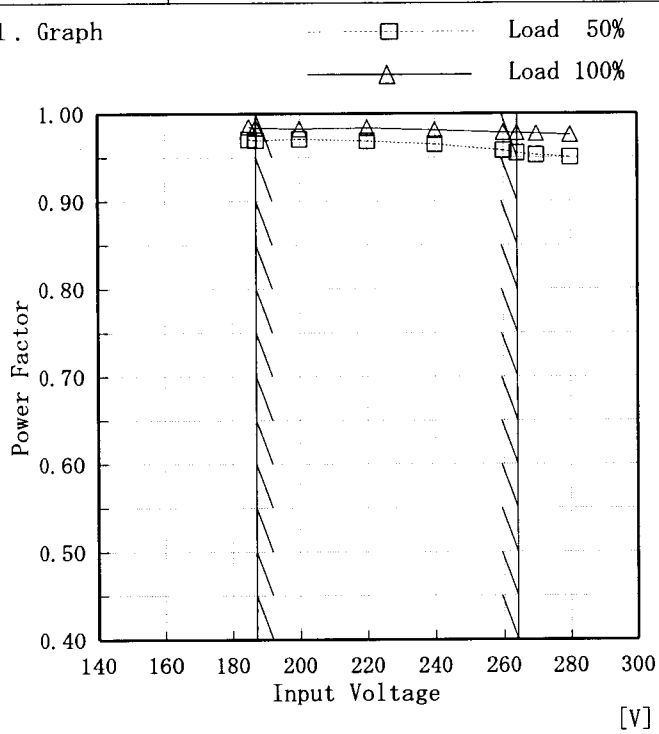
Load Current [A]	Efficiency [%]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
1.50	63.3	62.6	63.2
3.00	74.3	74.0	73.5
4.50	79.6	79.2	79.4
6.00	81.7	81.5	81.4
7.50	83.6	83.4	83.1
8.40	84.3	83.9	84.0
9.24	84.7	84.3	84.4
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	FCA200F-24
Item	Power Factor (by Input Voltage) 力率（入力電圧特性）
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]	Power Factor	
	Load 50%	Load 100%
185	0.97	0.98
187	0.97	0.98
200	0.97	0.98
220	0.97	0.98
240	0.97	0.98
260	0.96	0.98
264	0.96	0.98
270	0.95	0.98
280	0.95	0.98

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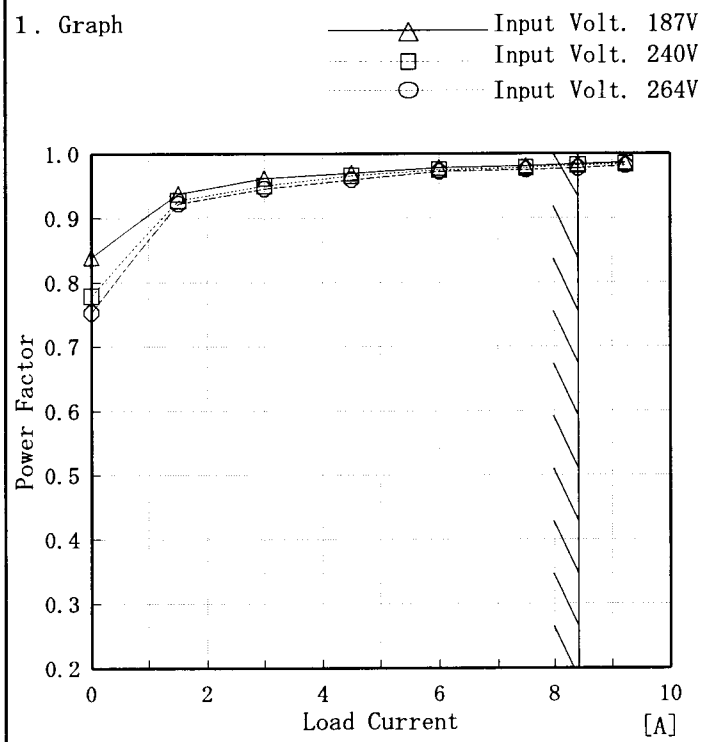
Model	FCA200F-24
Item	Power Factor (by Load Current) 力率 (負荷特性)
Object	————

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]	Power Factor		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
0.00	0.84	0.78	0.75
1.50	0.94	0.93	0.92
3.00	0.96	0.95	0.95
4.50	0.97	0.97	0.96
6.00	0.98	0.97	0.97
7.50	0.98	0.98	0.97
8.40	0.98	0.98	0.98
9.24	0.99	0.98	0.98
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

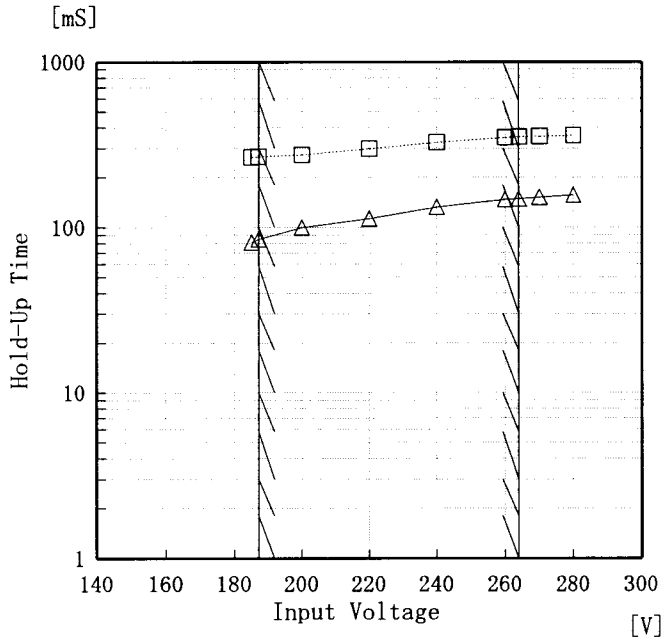
COSEL

Model	FCA200F-24
Item	Hold-Up Time 出力保持時間
Object	+24.0V8.4A

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、入力電圧断から出力電圧が、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]	Hold-Up Time [mS]	
	Load 50%	Load 100%
185	266	81
187	268	85
200	275	100
220	299	113
240	327	133
260	349	147
264	351	149
270	355	152
280	360	157

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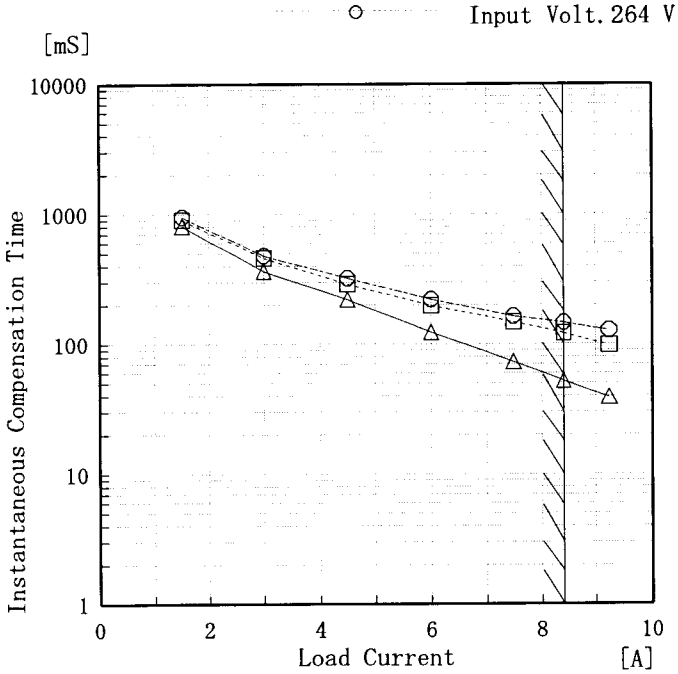
Model	FCA200F-24
Item	Instantaneous Interruption Compensation 瞬時停電保障
Object	+24.0V8.4A

Temperature 25℃
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 load current.

瞬時停電保障時間とは、出力電圧が定電圧精度の規格範囲を保持している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

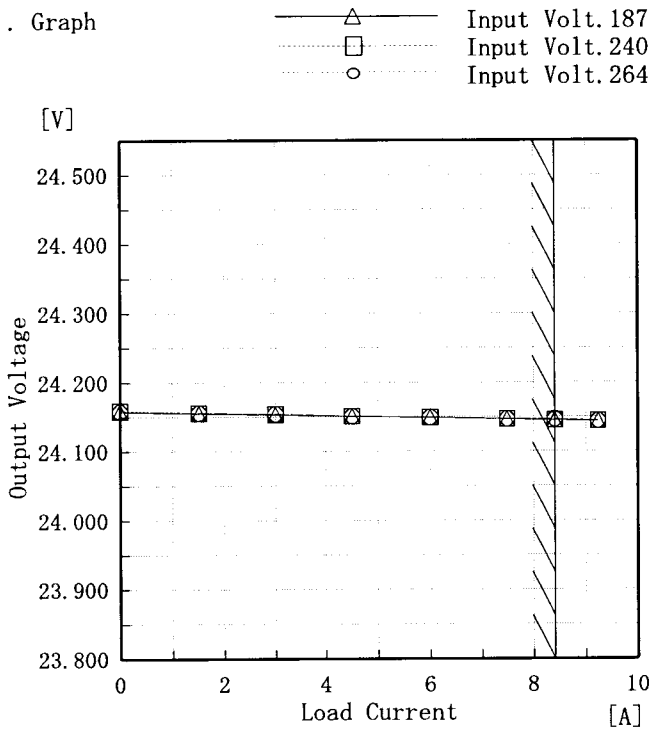
Load Current [A]	Time [mS]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
0.00	—	—	—
1.50	813	903	953
3.00	365	462	480
4.50	220	289	321
6.00	123	198	221
7.50	73	148	164
8.40	52	121	146
9.24	39	98	128
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	FCA200F-24
Item	Load Regulation 静的負荷変動
Object	+24.0V8.4A

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]	Output Voltage [V]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
0.00	24.158	24.159	24.158
1.50	24.155	24.156	24.156
3.00	24.153	24.154	24.154
4.50	24.151	24.151	24.151
6.00	24.149	24.149	24.149
7.50	24.147	24.147	24.147
8.40	24.145	24.145	24.146
9.24	24.144	24.144	24.144
—	—	—	—
—	—	—	—

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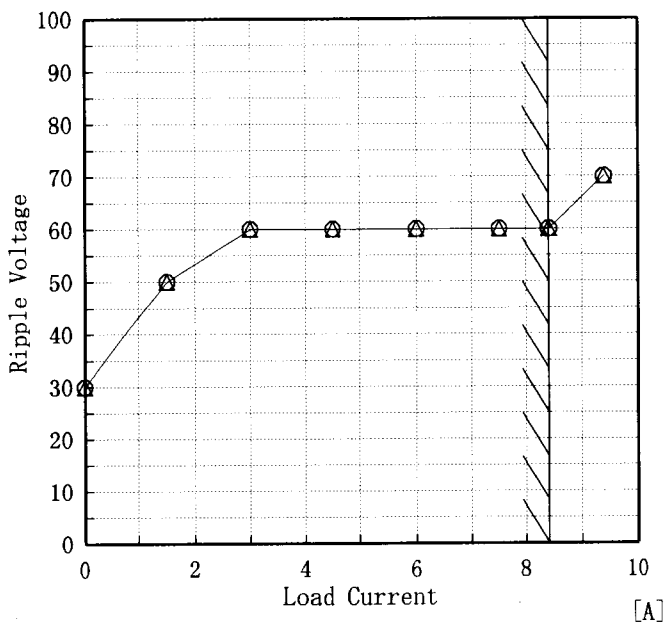
Model	FCA200F-24
Item	Ripple Voltage(by Load Current) リップル電圧(負荷特性)
Object	+24.0V8.4A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

△ Input Volt. 187V
○ Input Volt. 264V



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

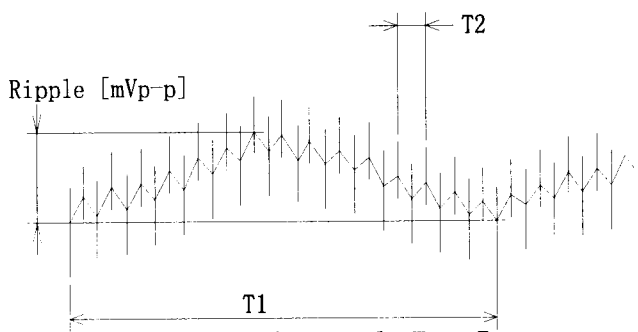


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

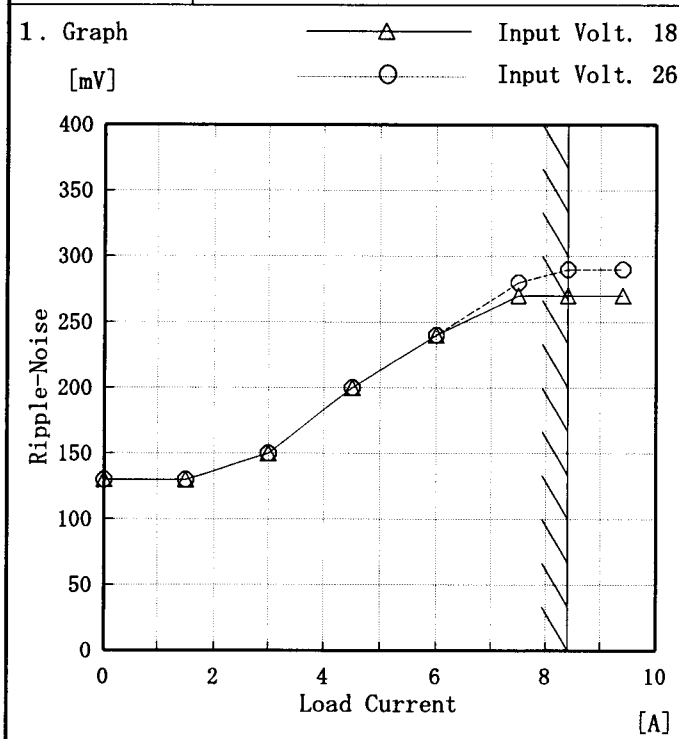
Load Current [A]	Ripple Output Voltage [mV]	
	Input Volt. 187 [V]	Input Volt. 264 [V]
0.0	30	30
1.5	50	50
3.0	60	60
4.5	60	60
6.0	60	60
7.5	60	60
8.4	60	60
9.4	70	70
—	—	—
—	—	—
—	—	—

COSEL

Model	FCA200F-24
Item	Ripple-Noise リップルノイズ
Object	+24.0V8.4A

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

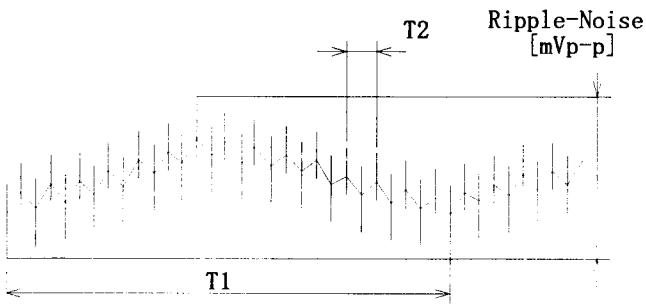


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

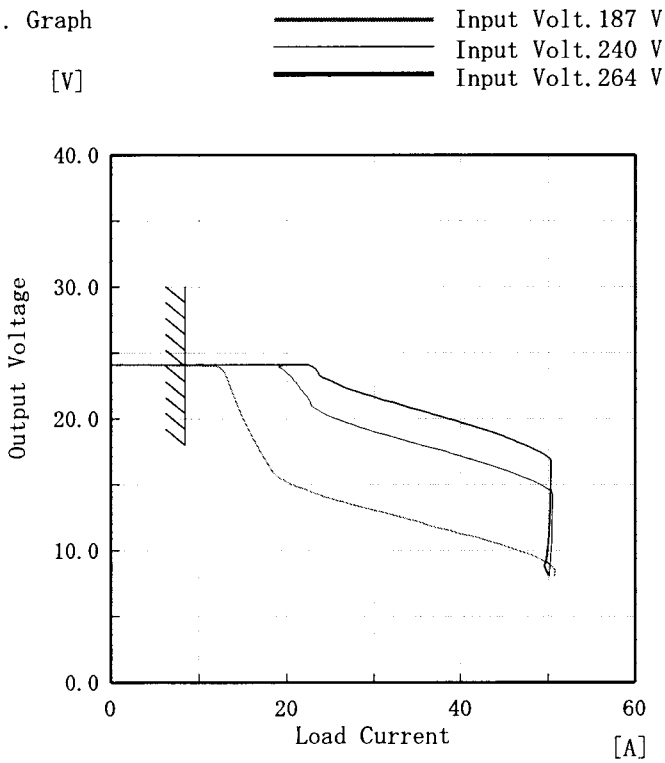
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 187 [V]	Input Volt. 264 [V]
0.0	130	130
1.5	130	130
3.0	150	150
4.5	200	200
6.0	240	240
7.5	270	280
8.4	270	290
9.4	270	290
—	—	—
—	—	—
—	—	—

COSEL

Model	FCA200F-24
Item	Overcurrent Protection 過電流保護
Object	+24.0V8.4A

Temperature 25℃
Testing Circuitry Figure A

1. Graph



Note: Slanted line shows the range of the rated load current.
Intermittent operation occurs when the output voltage is from 9.6V to 0V.

(注)斜線は定格負荷電流範囲を示す。
9.6V～0V間は、間欠モードとなる。

2. Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
24.00	11.812	19.031	22.944
22.80	13.274	20.982	25.267
21.60	14.028	22.320	30.488
19.20	15.617	29.142	42.585
16.80	17.626	42.223	50.319
14.40	23.107	50.358	50.262
12.00	36.040	50.429	50.116
9.60	48.215	50.286	49.816
7.20	—	—	—
4.80	—	—	—
2.40	—	—	—
0.00	—	—	—

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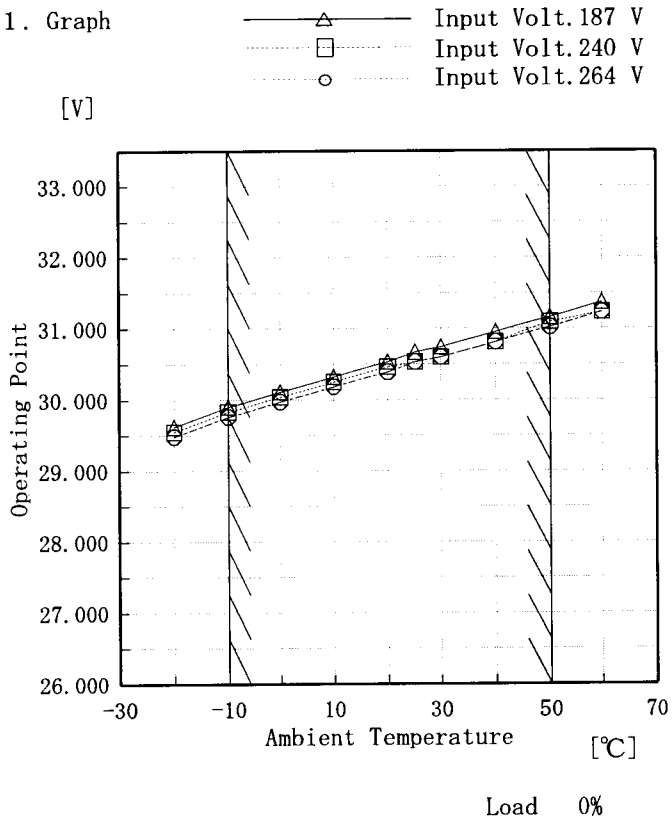
Model	FCA200F-24
Item	Overvoltage Protection 過電圧保護
Object	+24.0V8.4A

Testing Circuitry Figure A

1. Graph



Load 0%

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

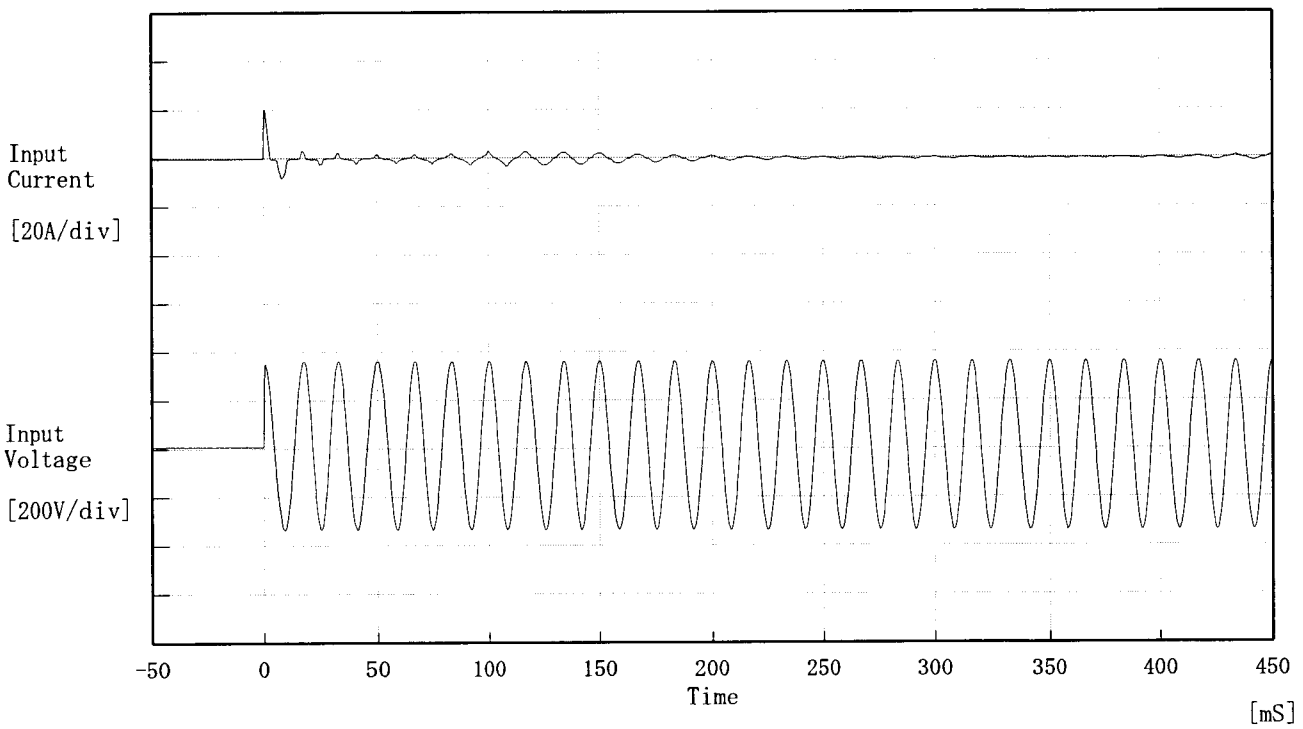
(注)斜線は定格周囲温度範囲を示す。

2. Values

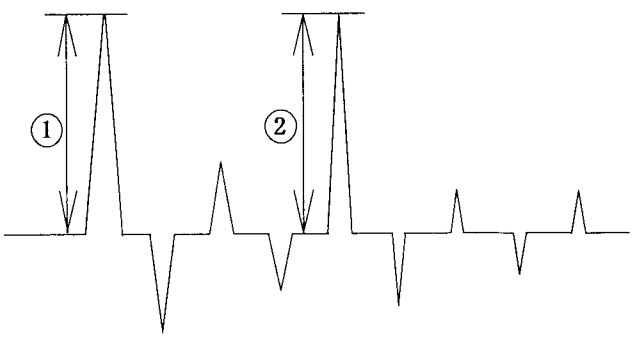
Ambient Temperature [℃]	Operating Point [V]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
-20	29.62	29.55	29.48
-10	29.90	29.83	29.76
0	30.11	30.04	29.97
10	30.32	30.25	30.18
20	30.53	30.46	30.39
25	30.67	30.53	30.53
30	30.74	30.60	30.60
40	30.95	30.81	30.81
50	31.16	31.09	31.02
60	31.37	31.23	31.23
—	—	—	—

COSEL

Model	FCA200F-24		
Item	Inrush Current 突入電流	Temperature Testing Circuitry	25℃ Figure A
Object	――――――――		



Input Voltage 240 V
Frequency 60 Hz
Load 100 %
Inrush Current
① 19.98 [A]
② 3.30 [A]



COSEL

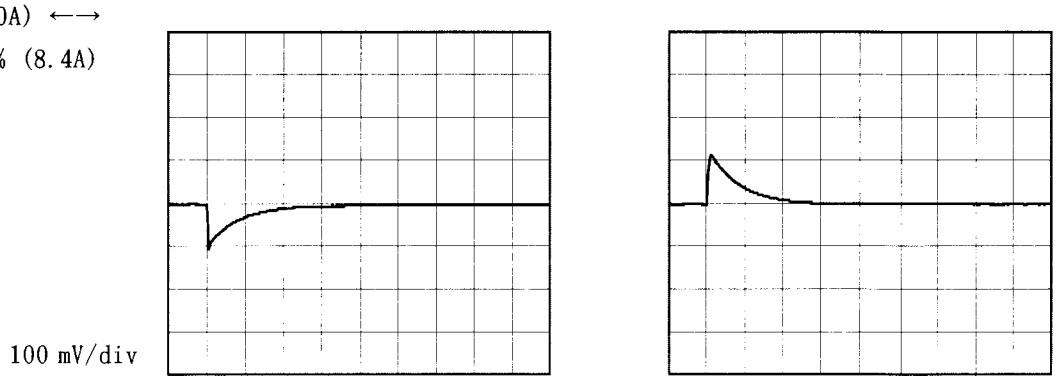
Model	FCA200F-24		
Item	Dynamic Load Response 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+24V8.4A		

Input Volt. 240 V

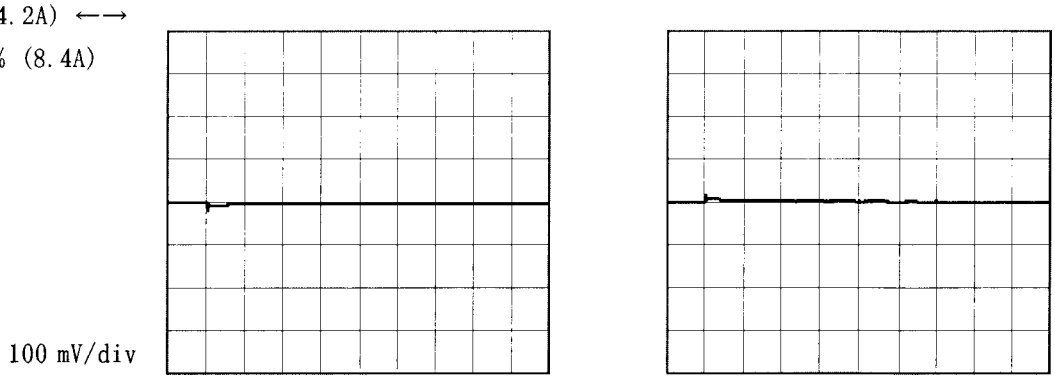
Cycle 1000 ms

Load Current

Min. Load (0A) ⟷
Load 100% (8.4A)



Min. Load (4.2A) ⟷
Load 100% (8.4A)

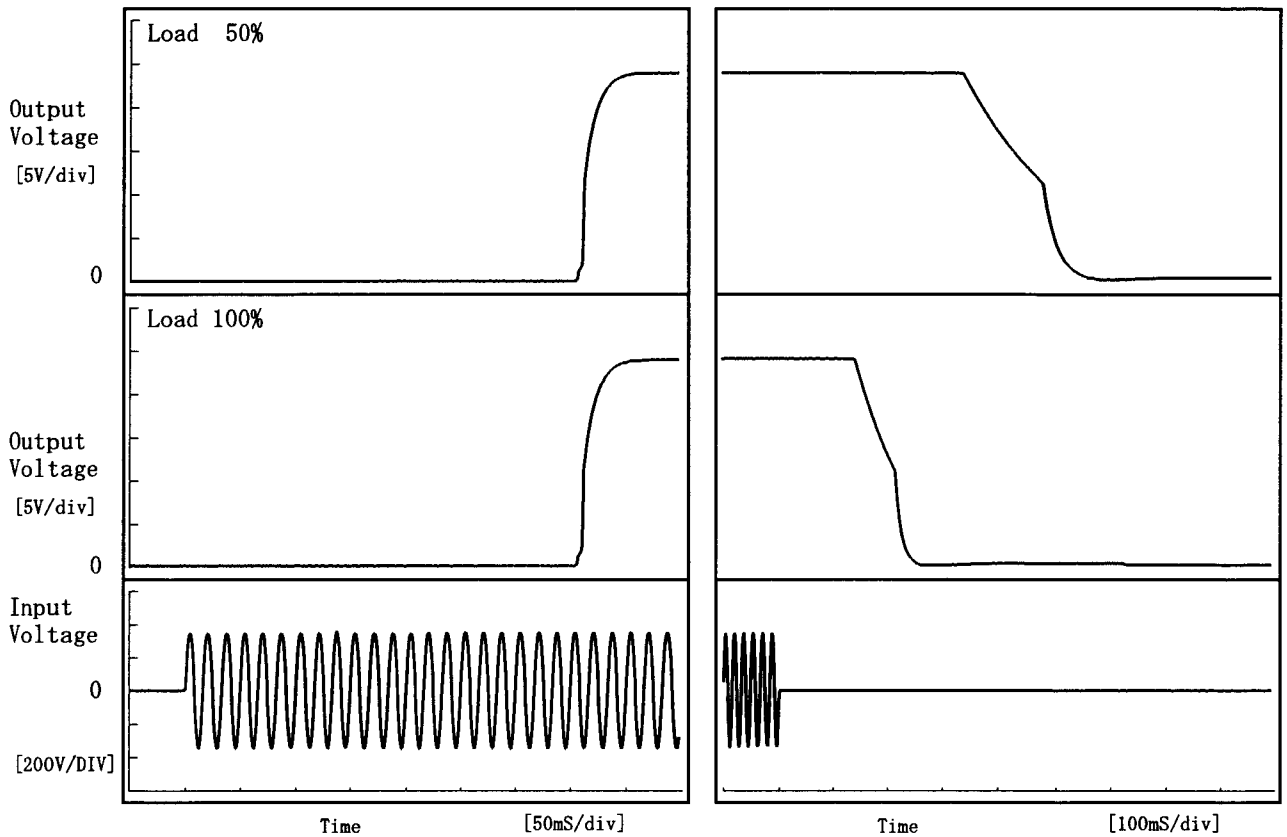


COSEL

Model	FCA200F-24		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+24.0V8.4A		

1. Graph

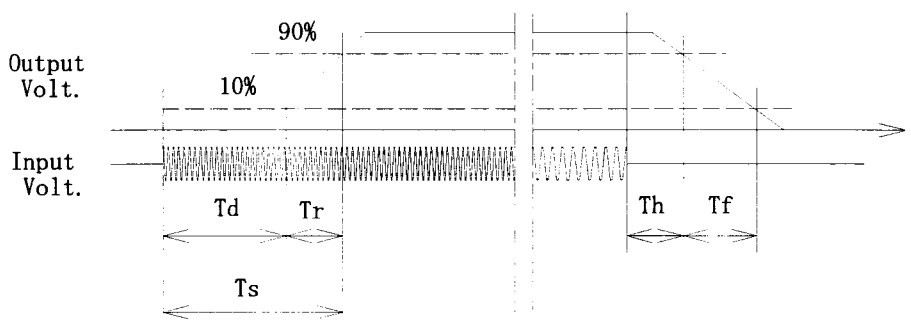
Input Volt. 240 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	361.0	20.0	381.0	358.5	156.0
100 %	360.8	19.8	380.5	151.5	83.5

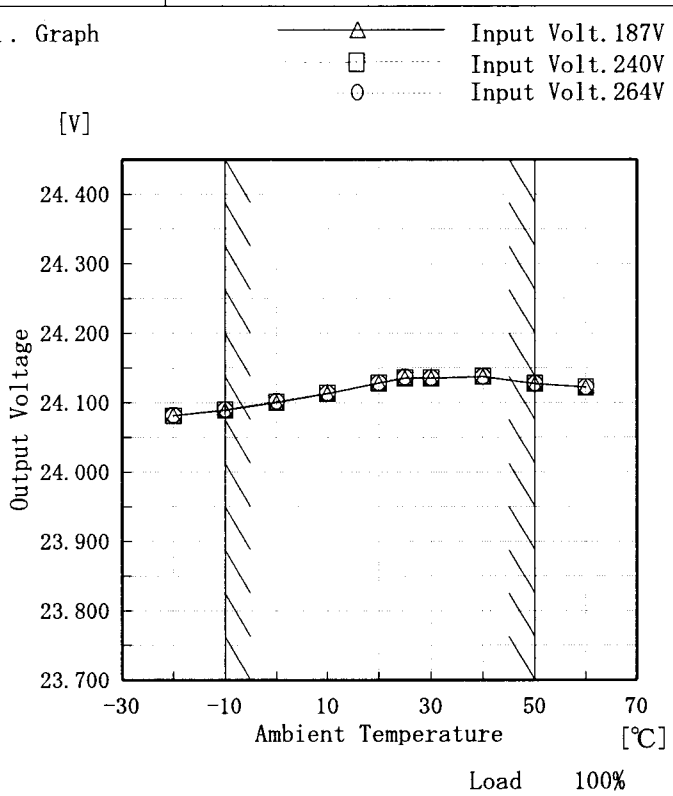


COSEL

Model	FCA200F-24
Item	Ambient Temperature Drift 周囲温度変動
Object	+24.0V8.4A

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

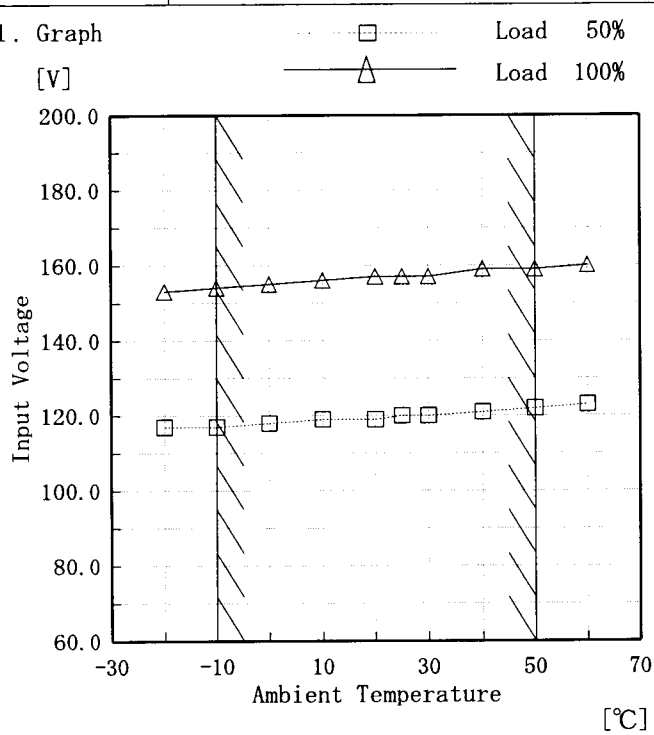
Ambient Temperature [℃]	Output Voltage [V]		
	Input Volt. 187[V]	Input Volt. 240[V]	Input Volt. 264[V]
-20	24.081	24.081	24.082
-10	24.089	24.090	24.090
0	24.100	24.101	24.102
10	24.113	24.114	24.114
20	24.128	24.129	24.129
25	24.135	24.136	24.137
30	24.135	24.136	24.136
40	24.137	24.138	24.138
50	24.127	24.128	24.128
60	24.122	24.123	24.123
—	—	—	—

COSEL

Model	FCA200F-24
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+24.0V8.4A

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

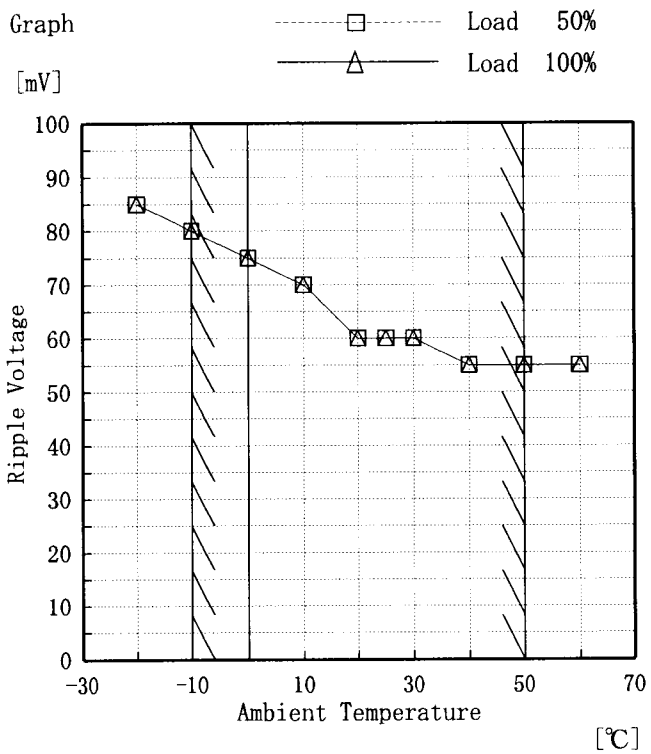
Ambient Temperature [℃]	Input Voltage [V]	
	Load 50%	Load 100%
-20	117	153
-10	117	154
0	118	155
10	119	156
20	119	157
25	120	157
30	120	157
40	121	159
50	122	159
60	123	160
—	—	—

COSEL

Model	FCA200F-24
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)
Object	+24.0V8.4A

Testing Circuitry Figure A

1. Graph



Input Volt. 240 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

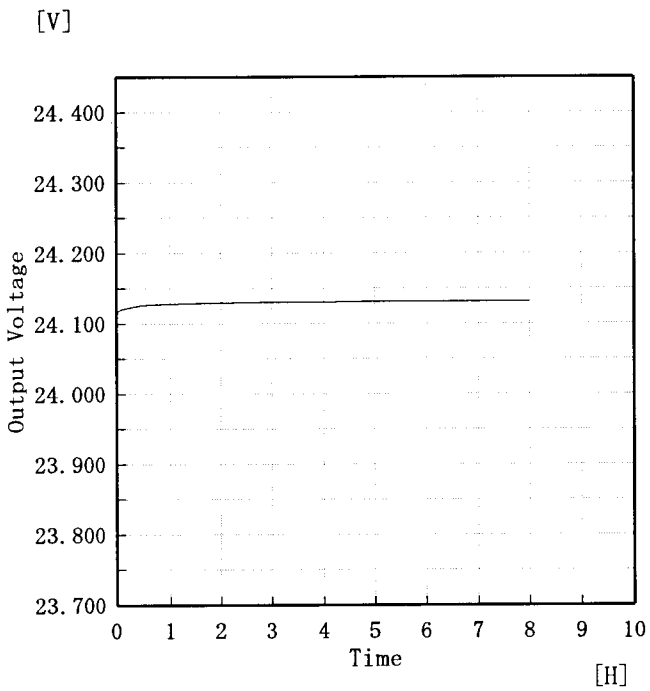
Ambient Temperature [℃]	Ripple Output Voltage [mV]	
	Load 50%	Load 100%
-20	85	85
-10	80	80
0	75	75
10	70	70
20	60	60
25	60	60
30	60	60
40	55	55
50	55	55
60	55	55
—	—	—

COSEL

Model	FCA200F-24
Item	Time Lapse Drift 経時ドリフト
Object	+24.0V8.4A

Temperature 25℃
Testing Circuitry Figure A

1. Graph



Input Volt. 240V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	24.105
0.5	24.126
1.0	24.128
2.0	24.129
3.0	24.130
4.0	24.130
5.0	24.131
6.0	24.131
7.0	24.131
8.0	24.131

COSEL

Model	FCA200F-24	
Item	Output Voltage Accuracy 定電圧精度	Testing Circuitry Figure A
Object	+24.0V8.4A	

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 ℃

Input Voltage : 187～264 V

Load Current : 0～8.4 A

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

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

1. 定電圧精度

周囲温度、入力電圧、負荷電流を下記仕様内で、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 187～264 V

負荷電流 0～8.4 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

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

2. Values

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	25	187	0.0	24.155	±27	±0.2
Minimum Voltage	-10	187	8.4	24.102		

COSEL

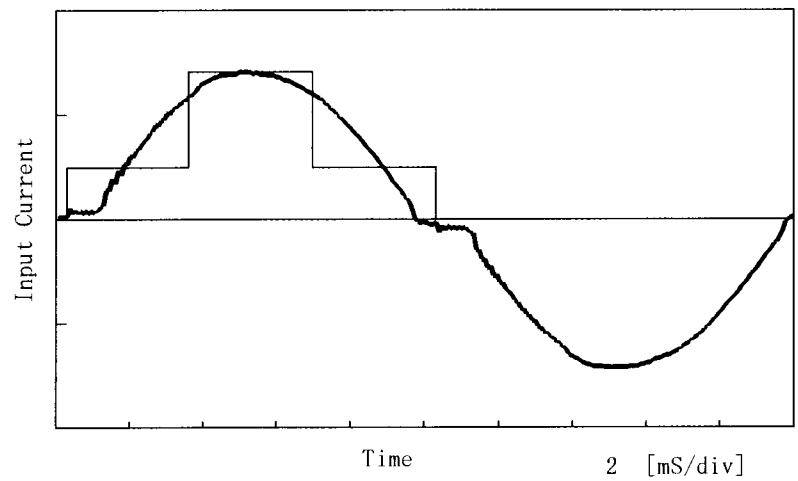
Model	FCA200F-24		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	————		

1. Input Current Waveform

——— Input Current

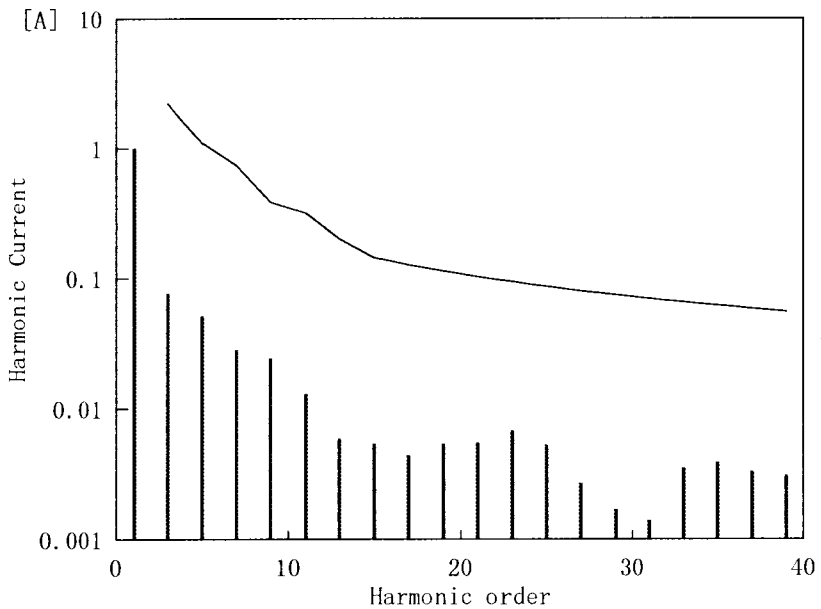
——— Envelope of the input current to classify equipment as Class D
ｸﾗｽDの機器を決定するための入力電流包絡線

1 A/div



Conditions	Values
Input Voltage [V]	240
Input Current [A]	1.014
Active Power [W]	238.1
Apparent Power[VA]	242.9
Frequency [Hz]	50
Power Factor	0.980
Output Power [W]	200

2. Harmonic Current



——— Harmonic Current
高調波電流

——— Limits for Class A equipment
ｸﾗｽA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	—	1.00840
2	—	0.00060
3	2.20417	0.07700
4	—	0.00030
5	1.09250	0.05130
6	—	0.00010
7	0.73792	0.02850
8	—	0.00010
9	0.38333	0.02450
10	—	0.00010
11	0.31625	0.01300
12	—	0.00010
13	0.20125	0.00590
14	—	0.00030
15	0.14375	0.00540
16	—	0.00010
17	0.12684	0.00440
18	—	0.00010
19	0.11349	0.00540
20	—	0.00010
21	0.10268	0.00550
22	—	0.00000
23	0.09375	0.00680
24	—	0.00010
25	0.08625	0.00530
26	—	0.00010
27	0.07986	0.00270
28	—	0.00010
29	0.07435	0.00170
30	—	0.00010
31	0.06956	0.00140
32	—	0.00010
33	0.06534	0.00350
34	—	0.00010
35	0.06161	0.00390
36	—	0.00000
37	0.05828	0.00330
38	—	0.00000
39	0.05529	0.00310
40	—	0.00000

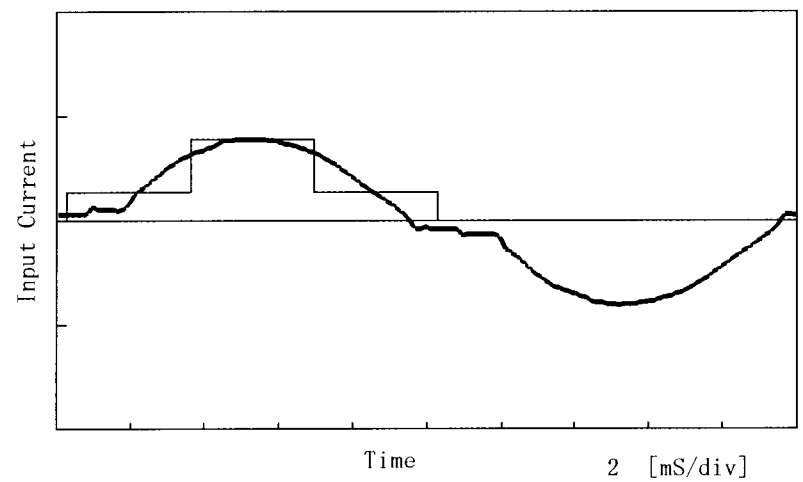
COSEL

Model	FCA200F-24		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	———		

1. Input Current Waveform

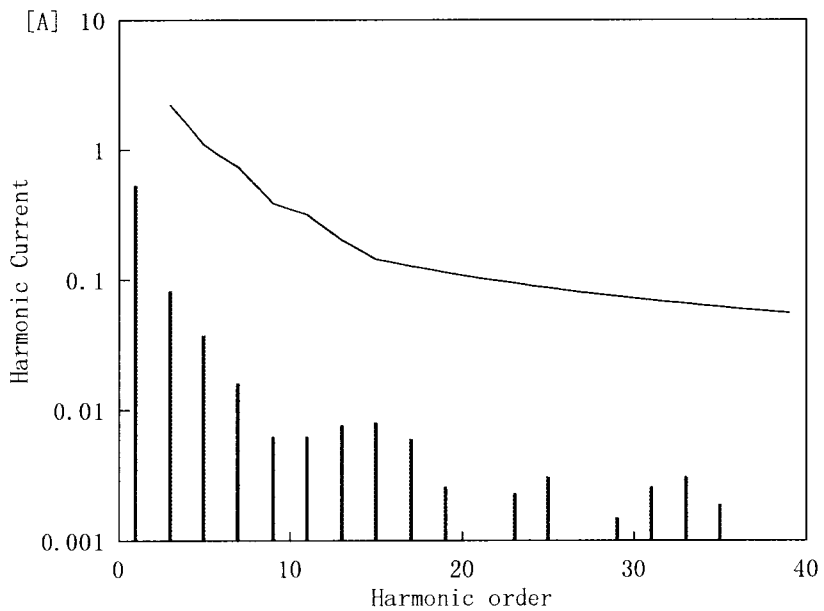
——— Input Current

——— Envelope of the input current to classify equipment as Class D
ｸﾗｽDの機器を決定するための入力電流包絡線



Conditions	Values
Input Voltage [V]	240
Input Current [A]	0.517
Active Power [W]	135.5
Apparent Power[VA]	139.7
Frequency [Hz]	50
Power Factor	0.970
Output Power [W]	100

2. Harmonic Current



——— Harmonic Current
高調波電流

——— Limits for Class A equipment
ｸﾗｽA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	—	0.53340
2	—	0.00050
3	2.20233	0.08250
4	—	0.00010
5	1.09159	0.03750
6	—	0.00010
7	0.73730	0.01610
8	—	0.00010
9	0.38301	0.00630
10	—	0.00010
11	0.31599	0.00630
12	—	0.00010
13	0.20108	0.00770
14	—	0.00010
15	0.14363	0.00800
16	—	0.00000
17	0.12673	0.00600
18	—	0.00000
19	0.11339	0.00260
20	—	0.00000
21	0.10259	0.00100
22	—	0.00000
23	0.09367	0.00230
24	—	0.00000
25	0.08618	0.00310
26	—	0.00000
27	0.07979	0.00100
28	—	0.00010
29	0.07429	0.00150
30	—	0.00010
31	0.06950	0.00260
32	—	0.00000
33	0.06529	0.00310
34	—	0.00000
35	0.06156	0.00190
36	—	0.00000
37	0.05823	0.00050
38	—	0.00000
39	0.05524	0.00090
40	—	0.00000

COSEL

Model	FCA200F-24
Item	Condensation 結露特性
Object	+24.0V8.4A

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 of the unit to confirm there be no fault.

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、その電気的特性の測定を行い、異常のないことを確認する。

2．Values

Item	Data	Testing Conditions
Output Voltage [V]	24.011	Input Volt.: 240V, Load Current:8.4A
Line Regulation [mV]	2	Input Volt.: 187～264V, Load Current:8.4A
Load Regulation [mV]	14	Input Volt.: 240V, Load Current:0.0～8.4A

COSEL

Model	FCA200F-24		
Item	Leakage Current 漏洩電流	Temperature Testing Circuitry	25℃ Figure B
Object	————————		

1. Results

Standards	Leakage Current [mA]		
	Input Volt. 187 [V]	Input Volt. 240 [V]	Input Volt. 264 [V]
(B) IEC60950	0.20	0.32	0.34

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。

COSEL

Model	FCA200F-24		
Item	Line Noise Tolerance 入力雑音耐量	Temperature Testing Circuitry	25℃ Figure C
Object	+24.0V8.4A		

1. Results

Pulse Width [nS]	MODE	POLARITY	No protection failure should occur 保護回路の誤動作がない	DC-like Regulation of Output Voltage 出力電圧の直流的変動
50	COMMON	+	OK	no fluctuation
		−	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		−	OK	no fluctuation
1000	COMMON	+	OK	no fluctuation
		−	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		−	OK	no fluctuation

2. Conditions

Input Voltage : 240 V
Pulse Voltage : 2000 V
Pulse Cycle : 10 mS
Pulse Input Duration : 1 min. or more
Load : 100 %

COSEL

Model	FCA200F-24		
Item	Conducted Emission 雑音端子電圧	Temperature Testing Circuitry	25℃ Figure D
Object	———————		

1. Graph

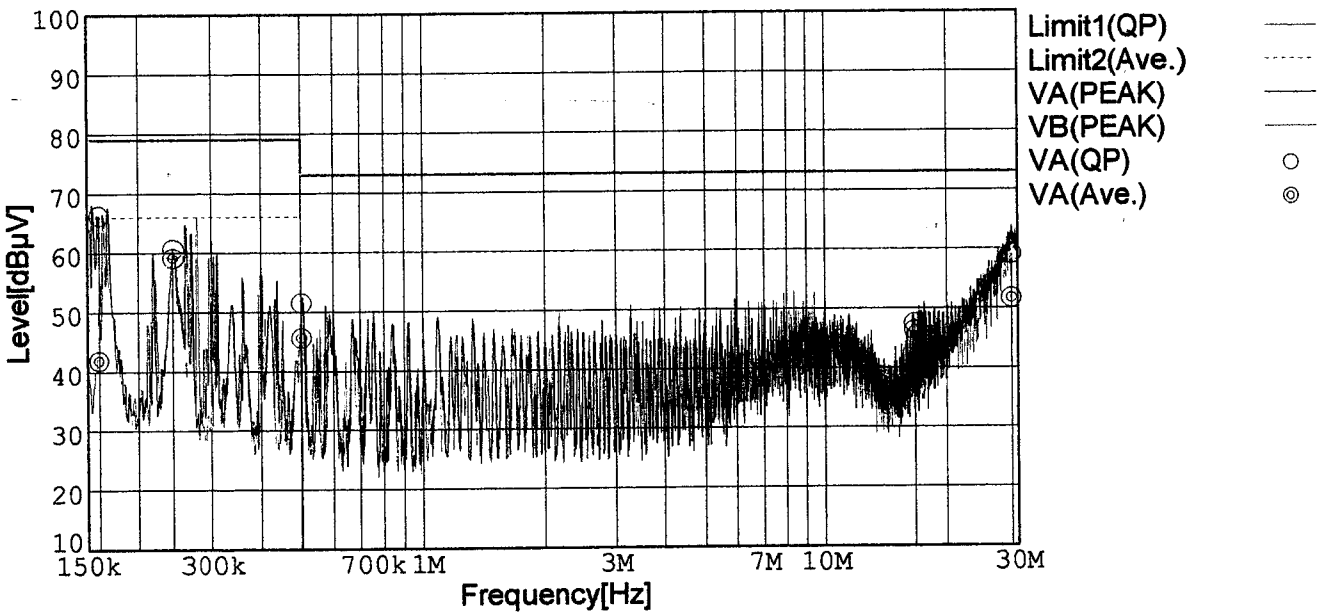
Remarks

Input Volt. 240 V (CISPR Pub11 Class A)

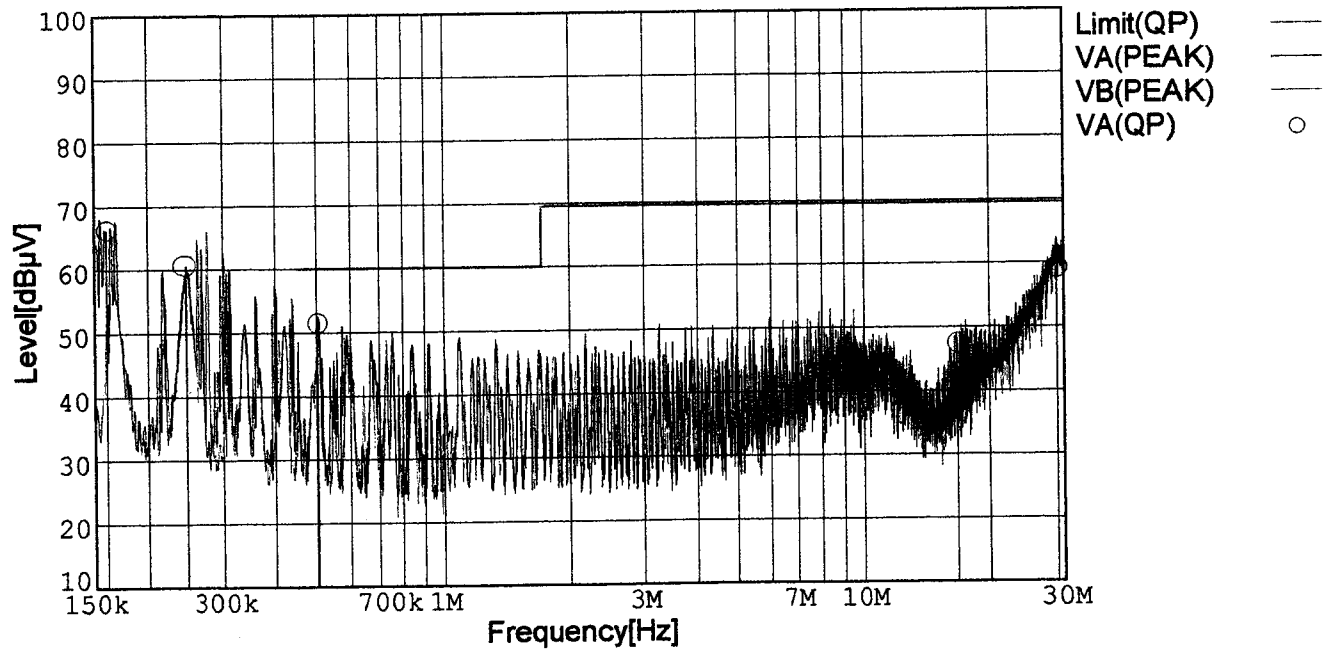
240 V (FCC Part15 Class A)

Load 100 %

Limit1: [CISPR Pub11] Class A Gr.1(QP)
Limit2: [CISPR Pub11] Class A Gr.1(Ave.)



Limit: [FCC Part15] Class A



COSEL

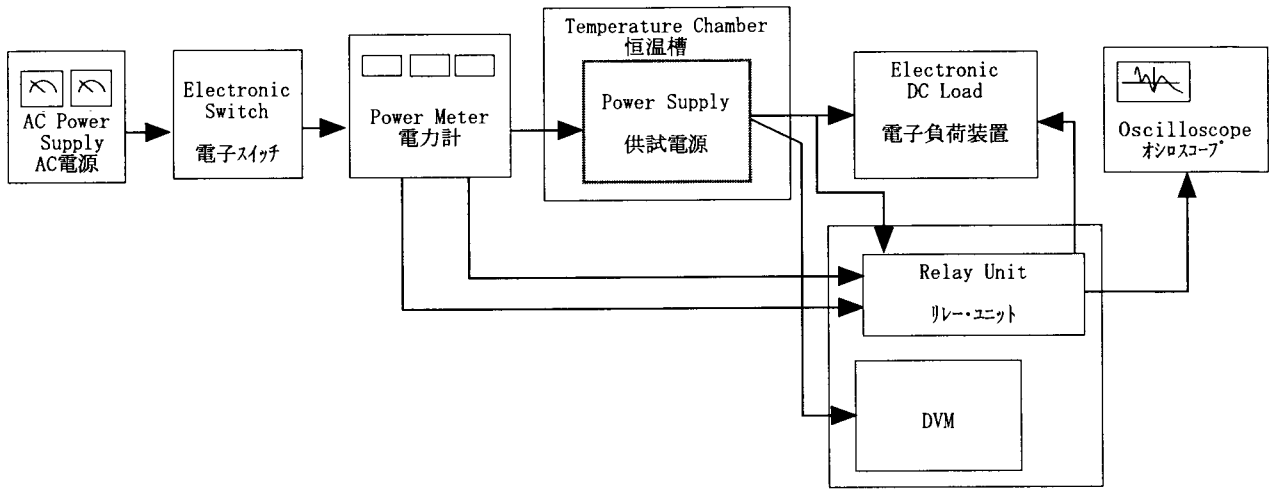


Figure A

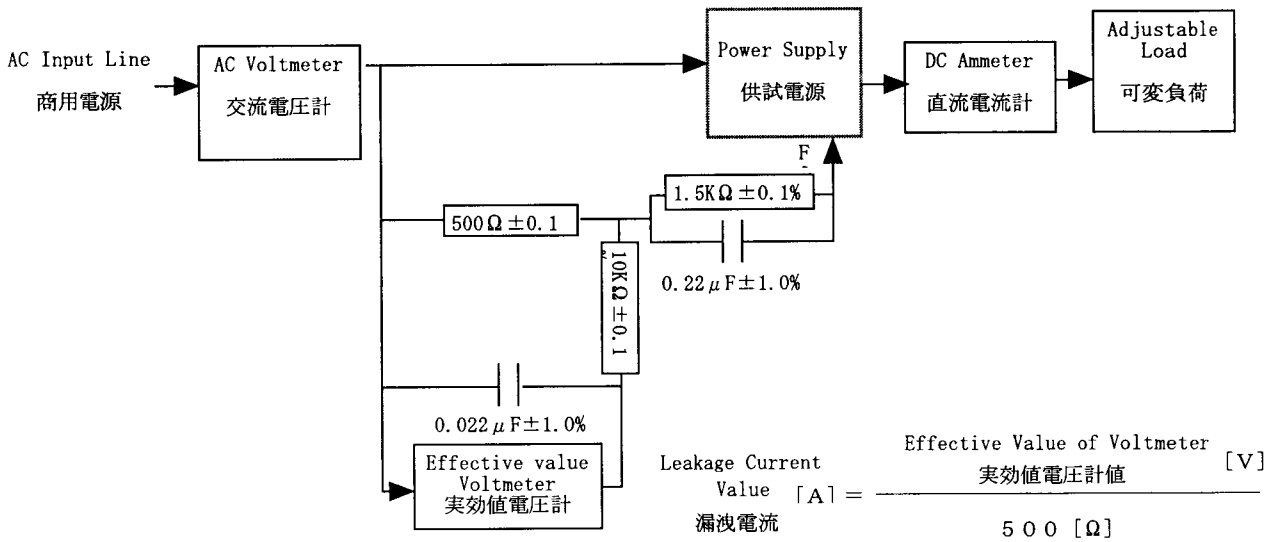


Figure B（ＩＥＣ６０９５０）

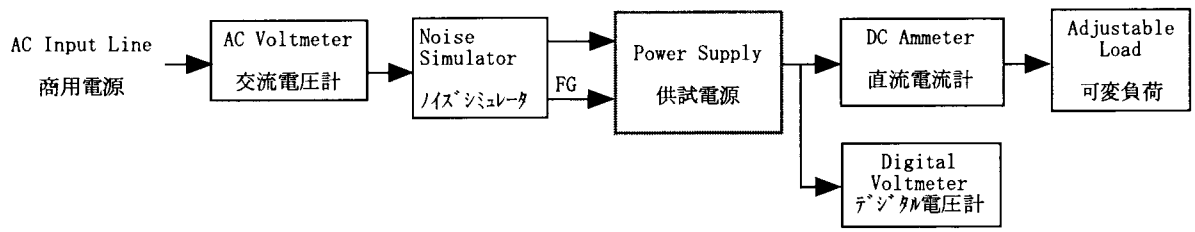


Figure C

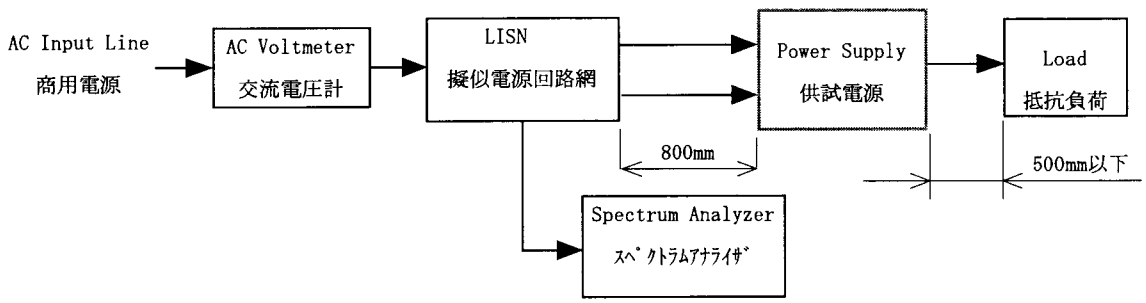


Figure D

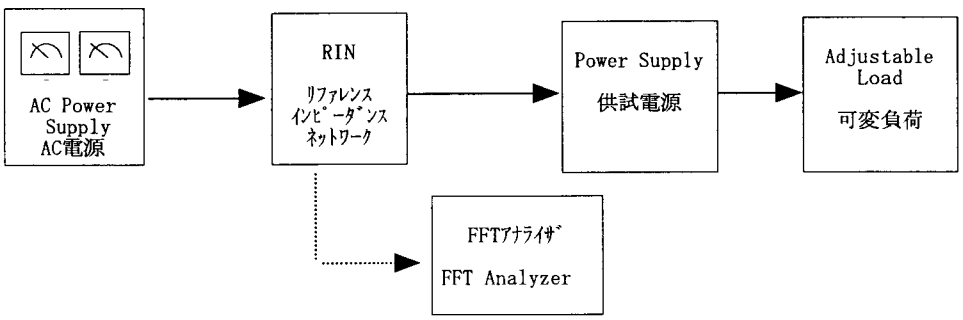


Figure E