参考資料

COSEL

TEST DATA OF LEA50F-24

(200V INPUT)

Regulated DC Power Supply

Date : Feb. 15. 1999

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Design Engineer

コーセル株式会社

COSEL CO., LTD.

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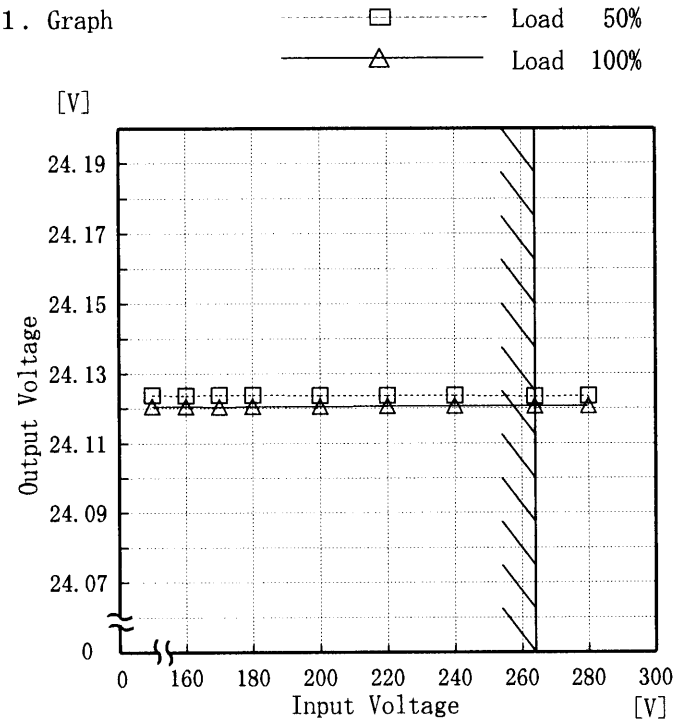
1. Graph



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	24.124	24.121
160	24.124	24.121
170	24.124	24.121
180	24.124	24.121
200	24.124	24.121
220	24.124	24.121
240	24.124	24.121
264	24.124	24.121
280	24.124	24.121

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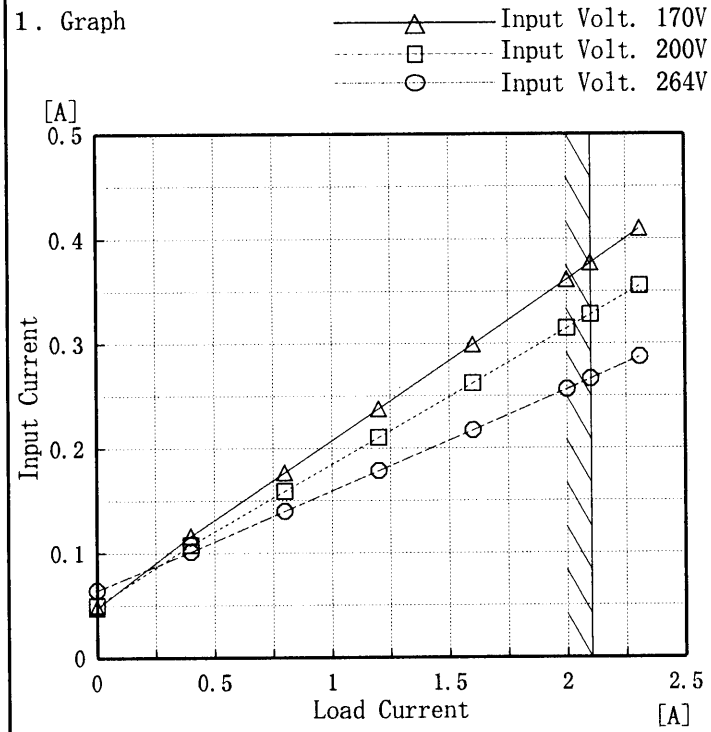
COSEL

Model	LEA50F-24
Item	Input Current (by Load Current) 入力電流 (負荷特性)
Output	————

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

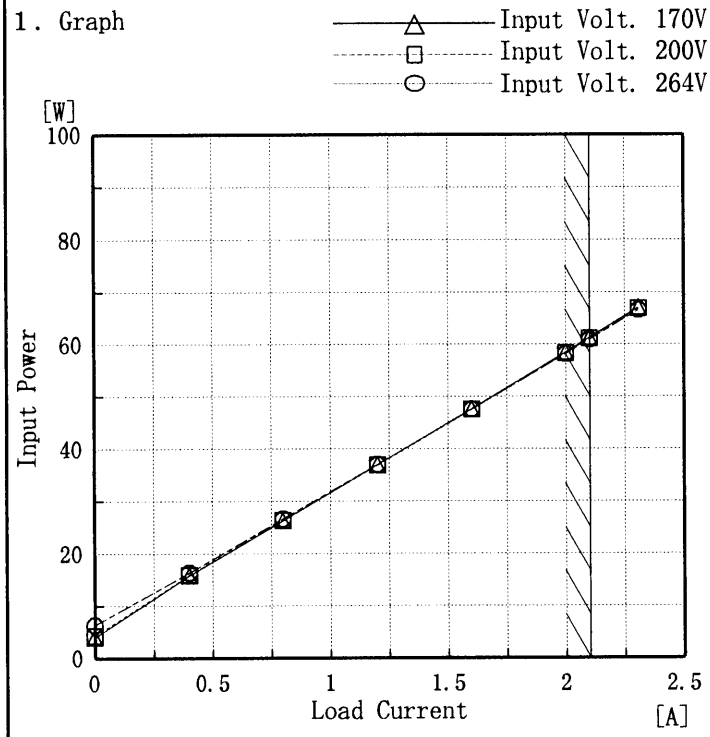
Load Current [A]	Input Current [A]		
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
0.00	0.048	0.050	0.064
0.40	0.116	0.108	0.101
0.80	0.177	0.159	0.140
1.20	0.238	0.210	0.179
1.60	0.299	0.262	0.217
2.00	0.361	0.315	0.257
2.10	0.377	0.328	0.267
2.31	0.410	0.355	0.287
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	LEA50F-24
Item	Input Power (by Load Current) 入力電力 (負荷特性)
Output	————

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. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
0.00	4.00	4.20	6.30
0.40	15.80	15.90	16.30
0.80	26.30	26.40	26.60
1.20	37.00	36.90	37.00
1.60	47.70	47.60	47.60
2.00	58.50	58.30	58.20
2.10	61.30	61.10	60.90
2.31	67.00	66.80	66.60
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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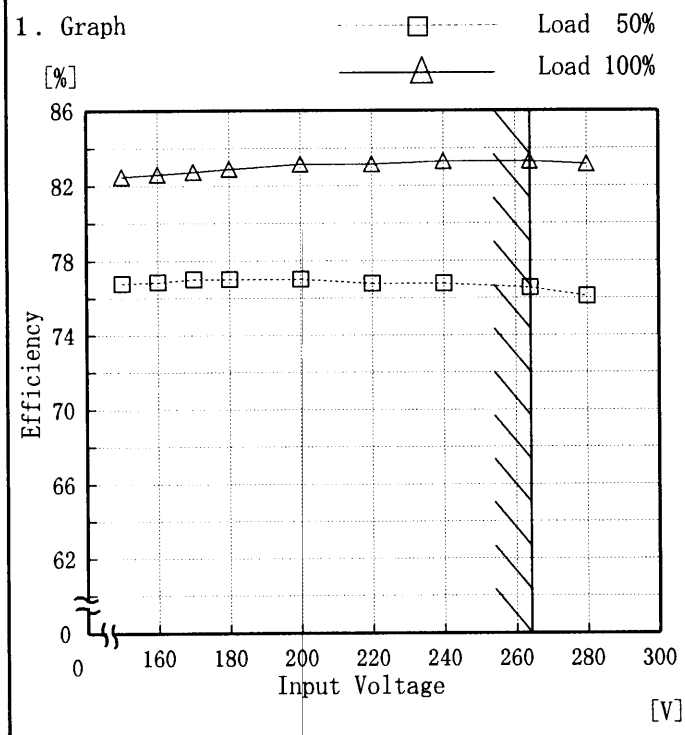
COSEL

Model	LEA50F-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]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
150	76.8	82.5
160	76.9	82.6
170	77.0	82.7
180	77.0	82.9
200	77.0	83.2
220	76.8	83.2
240	76.8	83.3
264	76.6	83.3
280	76.1	83.2

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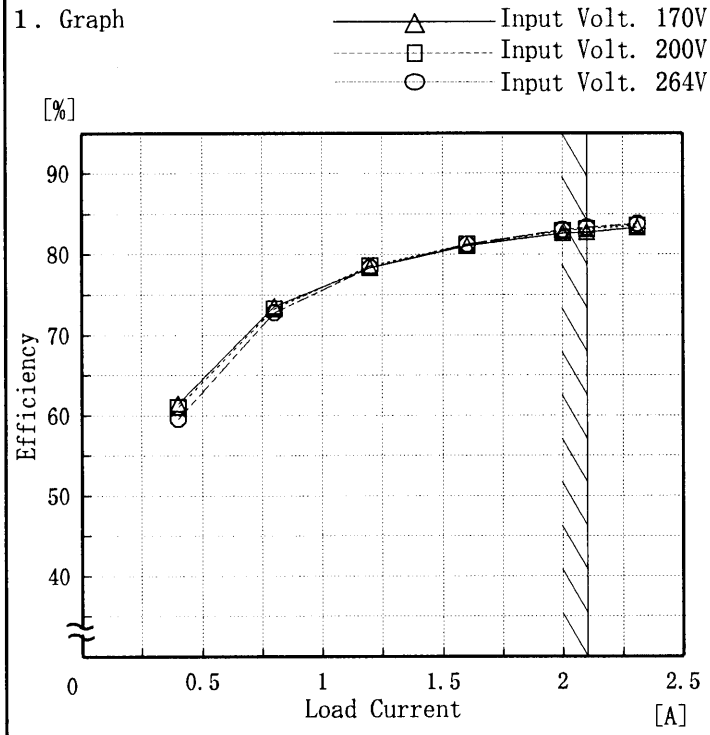
Model	LEA50F-24
Item	Efficiency (by Load Current) 効率 (負荷電流特性)
Output	————

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. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
0.40	61.5	61.0	59.5
0.80	73.6	73.3	72.8
1.20	78.4	78.6	78.4
1.60	81.1	81.3	81.3
2.00	82.6	82.9	83.0
2.10	82.7	83.2	83.3
2.31	83.3	83.6	83.8
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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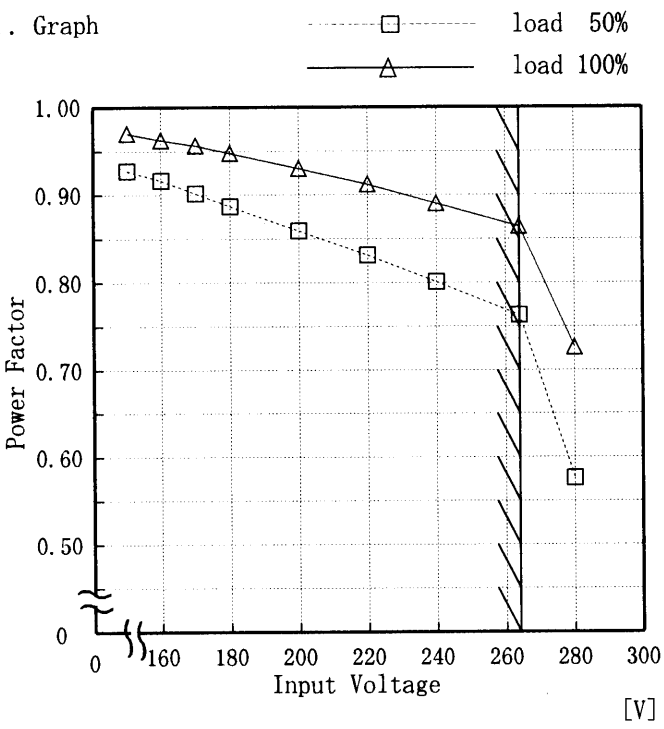
Model	LEA50F-24
Item	Power Factor (by Input Voltage) 力率（入力電圧特性）
Object	———

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]	load 50% Power Factor	load 100% Power Factor
150	0.93	0.97
160	0.92	0.96
170	0.90	0.96
180	0.89	0.95
200	0.86	0.93
220	0.83	0.91
240	0.80	0.89
264	0.76	0.86
280	0.58	0.73

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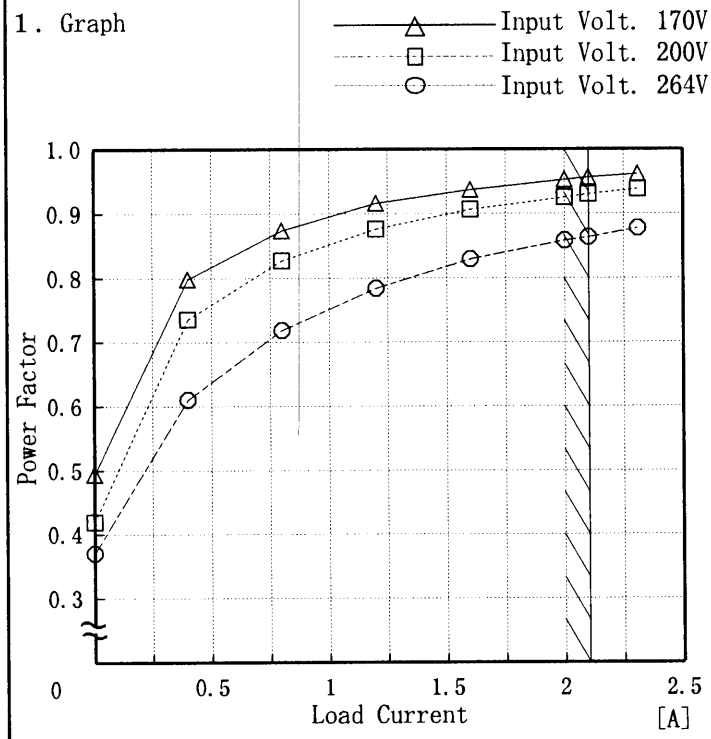
Model	LEA50F-24
Item	Power Factor (by Load Current) 力率（負荷電流特性）
Output	————

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. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
0.00	0.49	0.42	0.37
0.40	0.80	0.74	0.61
0.80	0.87	0.83	0.72
1.20	0.92	0.88	0.78
1.60	0.94	0.91	0.83
2.00	0.95	0.93	0.86
2.10	0.96	0.93	0.86
2.31	0.96	0.94	0.88
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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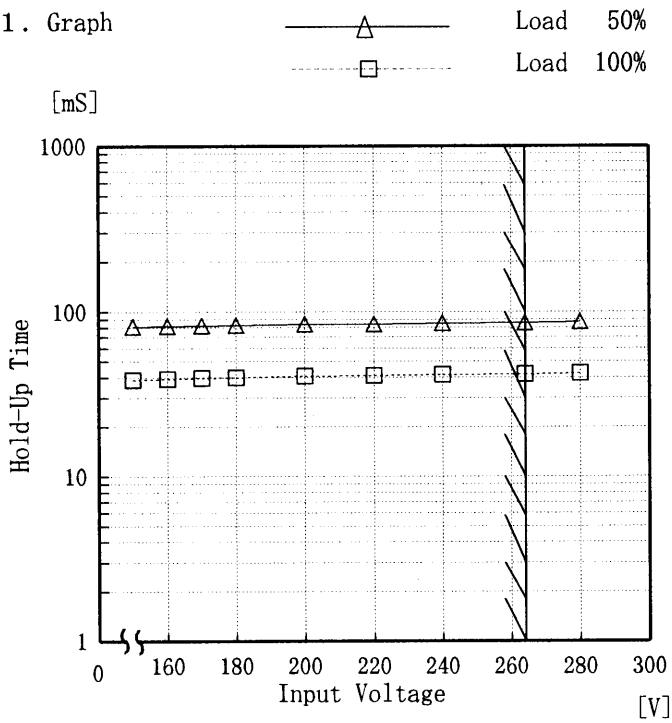
Model	LEA50F-24
Item	Hold-Up Time　出力保持時間
Object	+24V2.1A

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 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]	Load 50% Hold-Up Time [mS]	Load 100% Hold-Up Time [mS]
150	81	39
160	82	39
170	82	40
180	83	40
200	84	41
220	84	41
240	85	42
264	85	42
280	87	42

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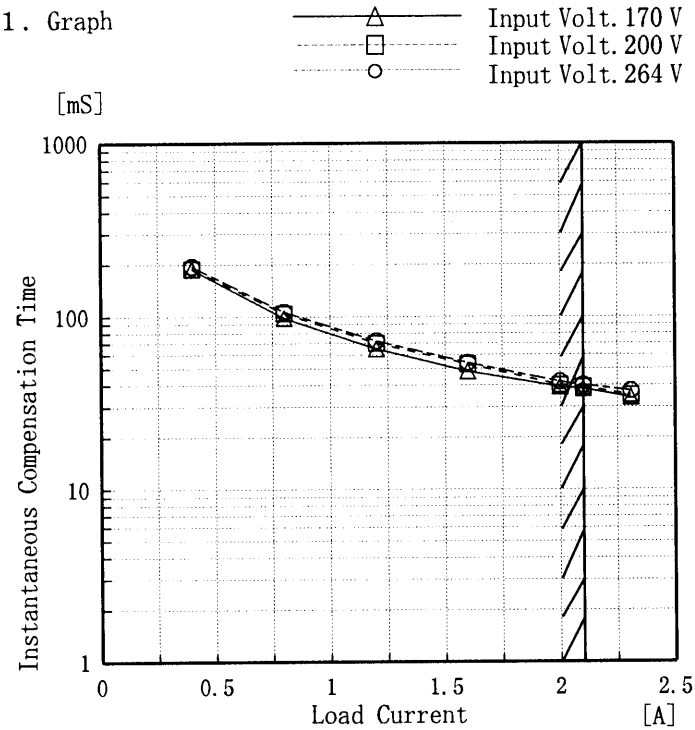
Model	LEA50F-24
Item	Instantaneous Interruption Compensation 瞬時停電保障
Object	+24V2.1A

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]	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
	Time [mS]		
0.00	—	—	—
0.40	188	189	195
0.80	98	104	106
1.20	65	70	72
1.60	48	53	54
2.00	39	40	42
2.10	38	39	40
2.31	34	35	37
—	—	—	—
—	—	—	—
—	—	—	—

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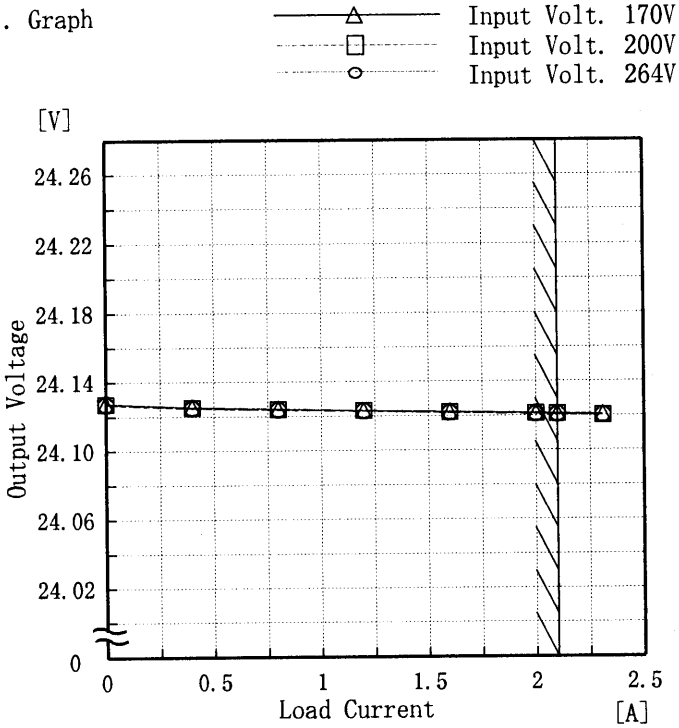
Model	LEA50F-24
Item	Load Regulation 静的負荷変動
Object	+24V2.1A

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]
0.00	24.128	24.127	24.127
0.40	24.125	24.125	24.125
0.80	24.124	24.124	24.124
1.20	24.123	24.123	24.123
1.60	24.122	24.122	24.122
2.00	24.121	24.121	24.121
2.10	24.121	24.121	24.121
2.31	24.121	24.120	24.120
—	—	—	—
—	—	—	—

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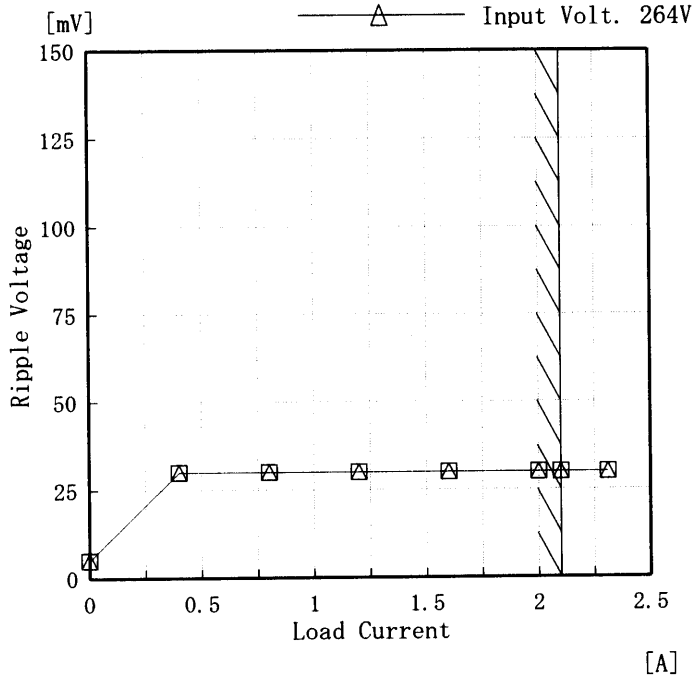
Model	LEA50F-24
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+24V2.1A

Temperature 25℃
Testing Circuitry Figure A

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

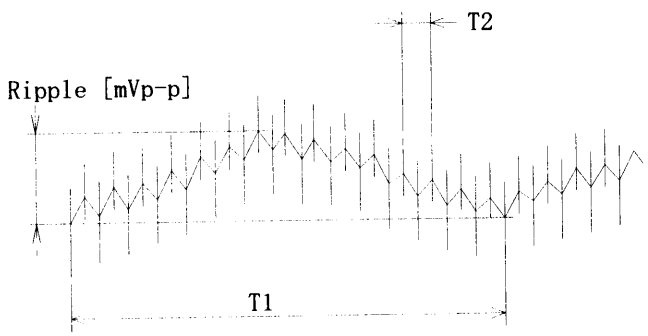


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load Current [A]	Input Volt. 170 [V] Ripple Output Volt. [mV]	Input Volt. 264 [V] Ripple Output Volt. [mV]
0.00	5	5
0.40	30	30
0.80	30	30
1.20	30	30
1.60	30	30
2.00	30	30
2.10	30	30
2.31	30	30
—	—	—
—	—	—
—	—	—

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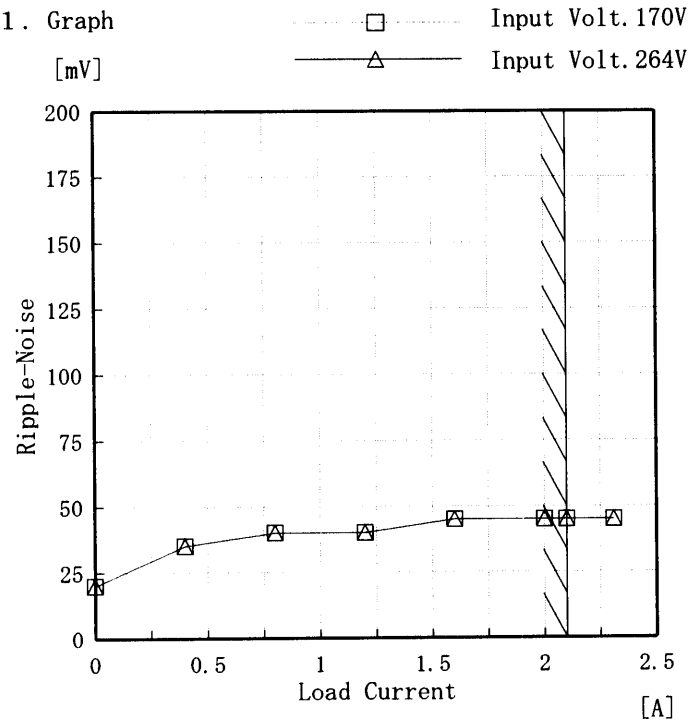
Model	LEA50F-24
Item	Ripple-Noise　リップルノイズ
Object	+24V2.1A

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

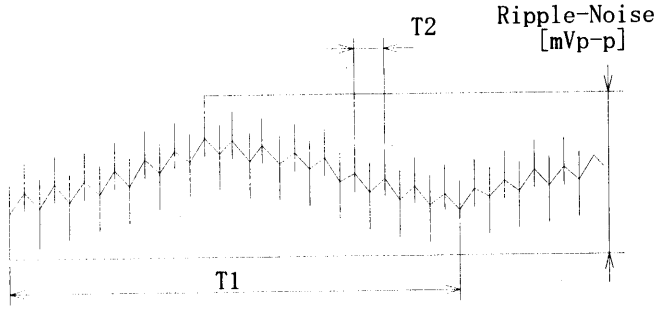


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

Load current [A]	Input Volt. 170 [V] Ripple-Noise [mV]	Input Volt. 264 [V] Ripple-Noise [mV]
0.00	20	20
0.40	35	35
0.80	40	40
1.20	40	40
1.60	45	45
2.00	45	45
2.10	45	45
2.31	45	45
—	—	—
—	—	—
—	—	—

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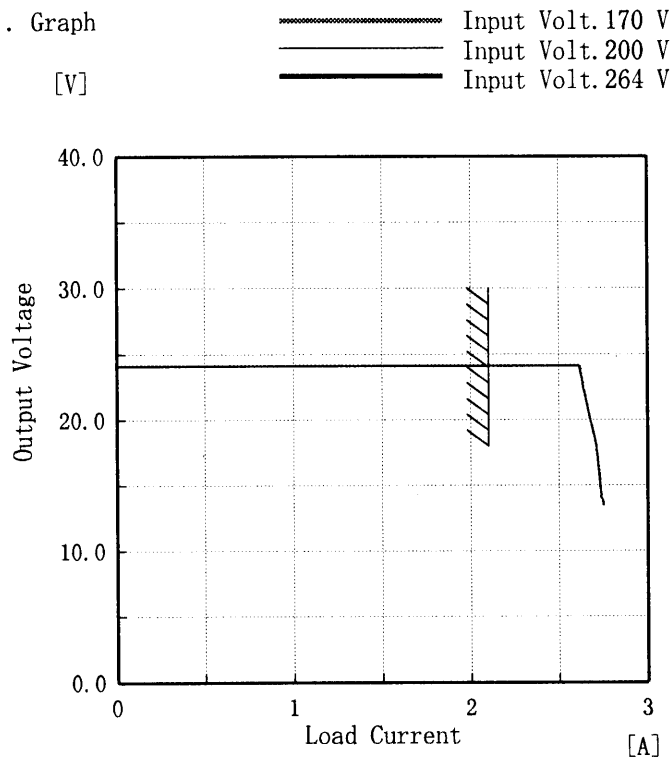
Model	LEA50F-24
Item	Overcurrent Protection 過電流保護
Object	+24V2.1A

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。
14.4V以下は間欠状態。

2. Values

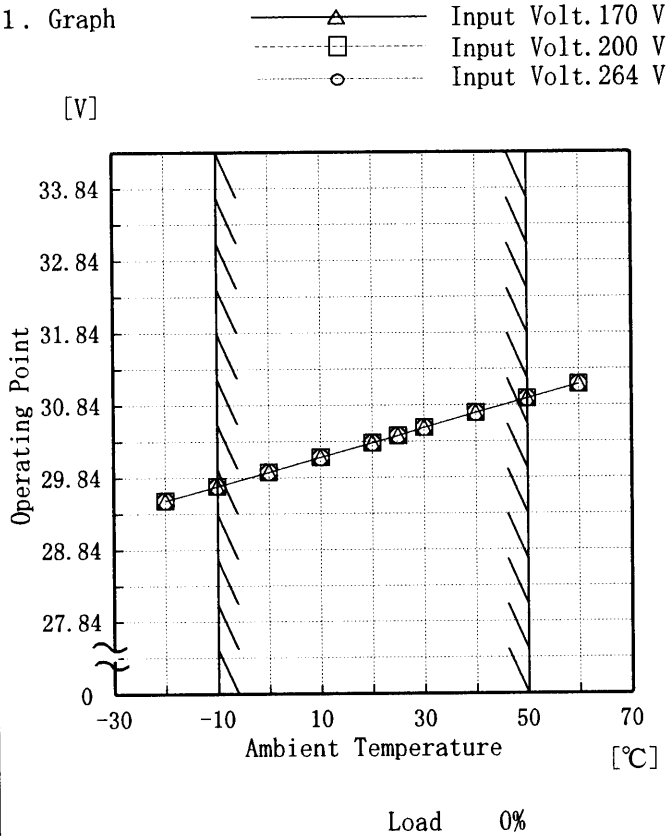
Output Voltage [V]	Input Volt. 170[V] Load Current [A]	Input Volt. 200[V] Load Current [A]	Input Volt. 264[V] Load Current [A]
24.00	2.62	2.61	2.61
22.80	2.64	2.63	2.63
21.60	2.65	2.65	2.65
19.20	2.69	2.69	2.69
16.80	2.72	2.72	2.72
14.40	2.74	2.74	2.73
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	LEA50F-24
Item	Overvoltage Protection 過電圧保護
Object	+24V2.1A

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 Temp. [℃]	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
	Operating Point [V]		
-20	29.5	29.5	29.5
-10	29.7	29.7	29.7
0	29.9	29.9	29.9
10	30.1	30.1	30.1
20	30.3	30.3	30.3
25	30.4	30.4	30.4
30	30.5	30.5	30.5
40	30.7	30.7	30.7
50	30.9	30.9	30.9
60	31.1	31.1	31.1
—	—	—	—

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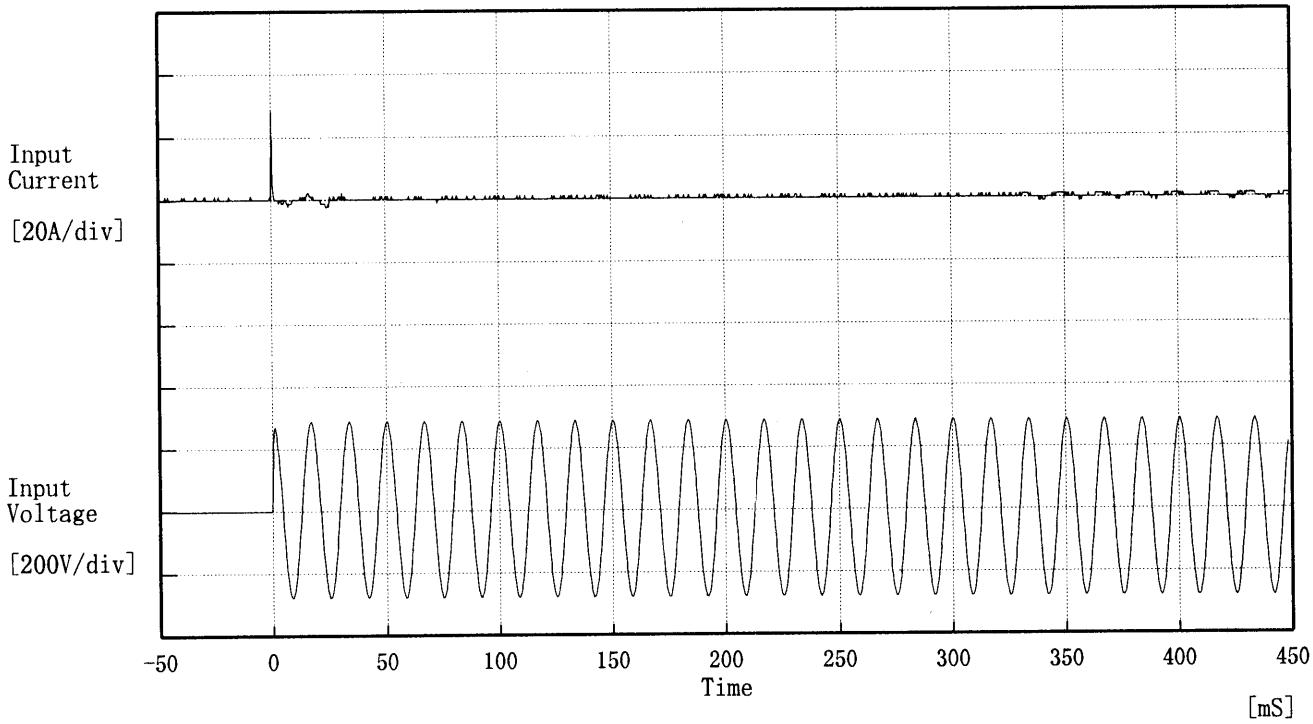
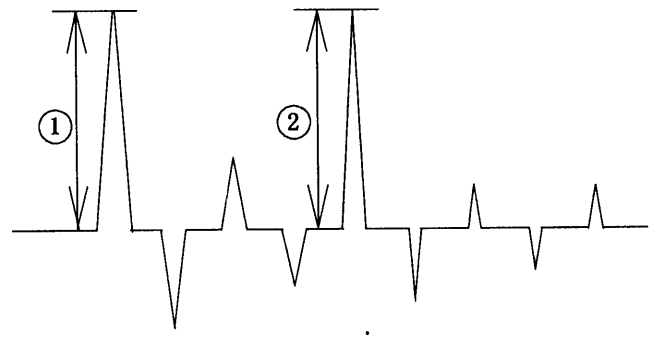
Model	LEA50F-24	
Item	Inrush Current 突入電流	Temperature 25℃ Testing Circuitry Figure A
Object	――――――――	



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



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Model	LEA50F-24		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	＋２４Ｖ２．１Ａ		

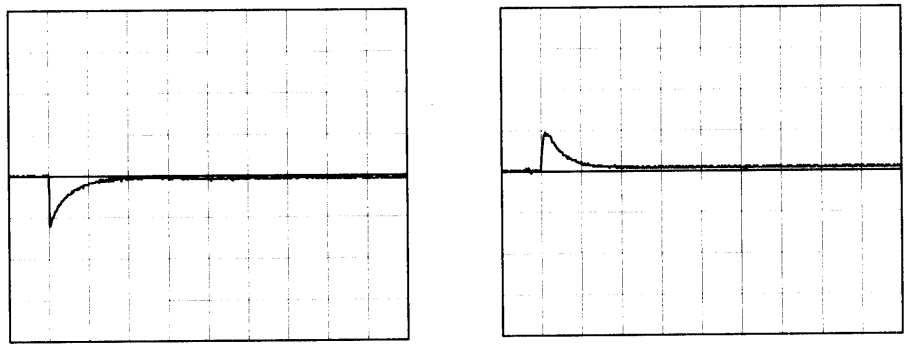
Input Volt. 200 V

Cycle 1000 mS

Load Current

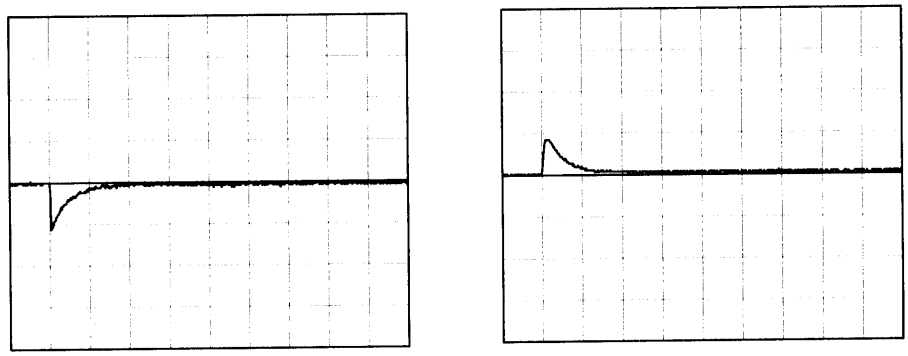
Min. Load ⟷

Load 100 %



Min. Load ⟷

Load 50 %



100 mV/div

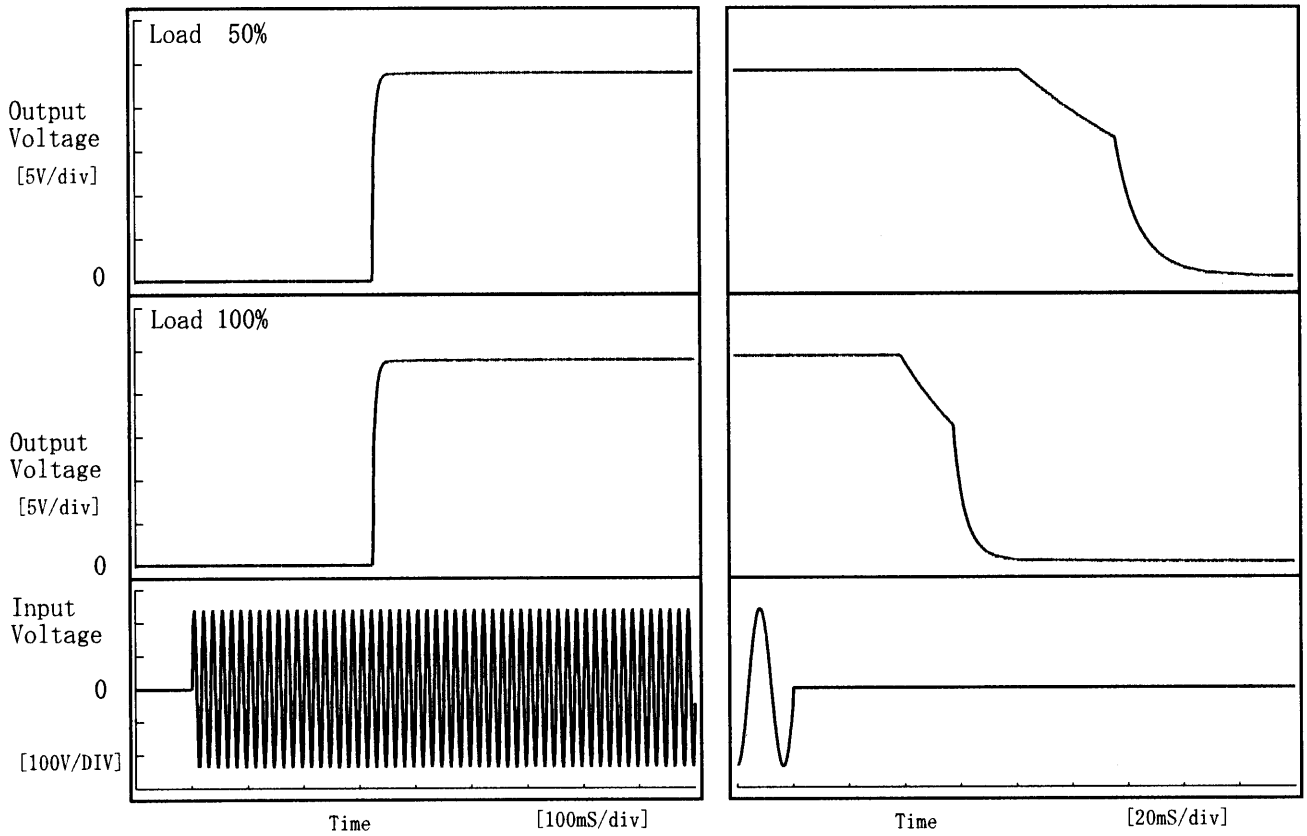
10 ms/div

COSEL

Model	LEA50F-24		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+24V2.1A		

1. Graph

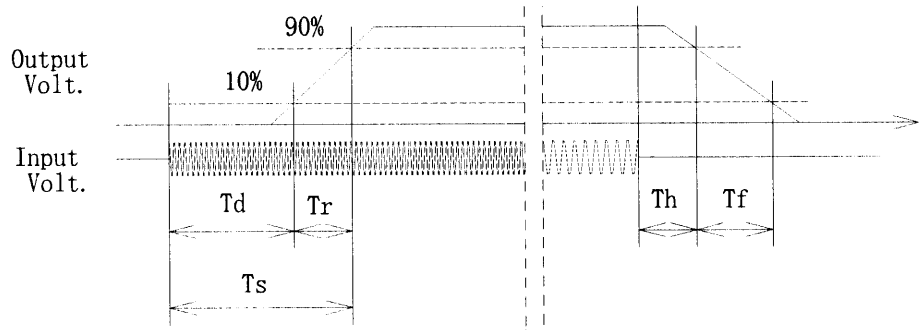
Input Volt. 170 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	324.5	11.0	335.5	91.4	43.2
100 %	324.0	11.5	335.5	43.9	22.8

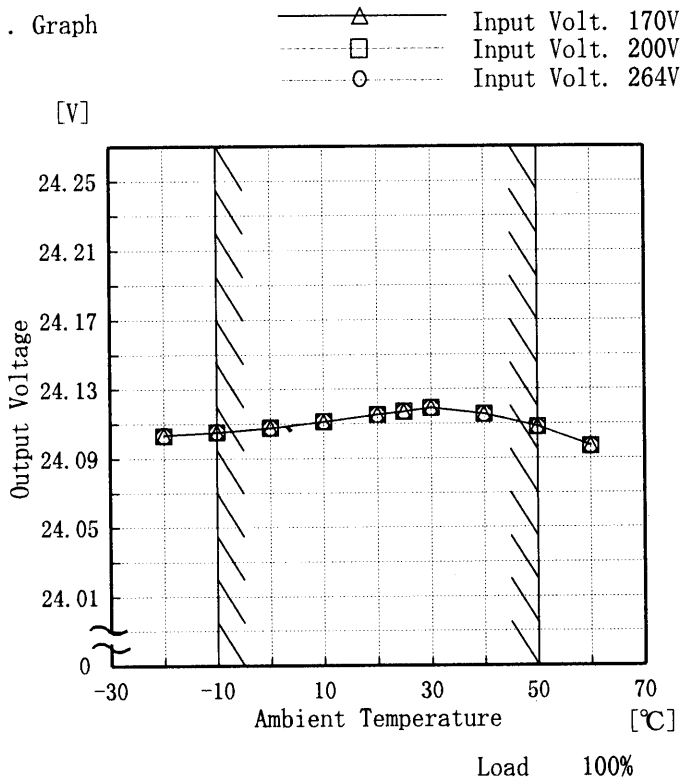


COSEL

Model	LEA50F-24
Item	Ambient Temperature Drift 周囲温度変動
Object	+24V2.1A

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

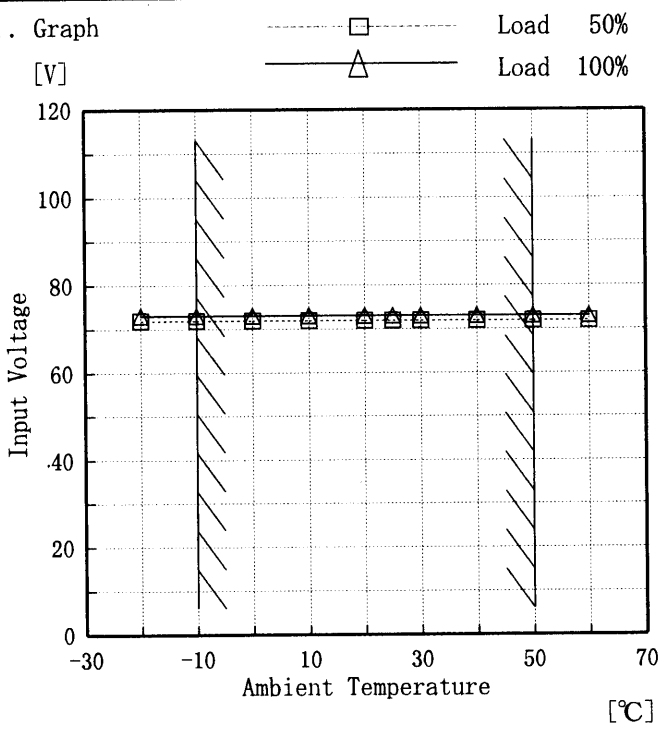
Temperature [℃]	Input Volt. 170[V] Output Volt. [V]	Input Volt. 200[V] Output Volt. [V]	Input Volt. 264[V] Output Volt. [V]
-20	24.103	24.103	24.103
-10	24.105	24.105	24.105
0	24.108	24.108	24.108
10	24.111	24.111	24.111
20	24.115	24.115	24.115
25	24.117	24.117	24.117
30	24.119	24.119	24.119
40	24.116	24.116	24.115
50	24.108	24.108	24.108
60	24.097	24.097	24.097
—	—	—	—

COSEL

Model	LEA50F-24
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+24V2.1A

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

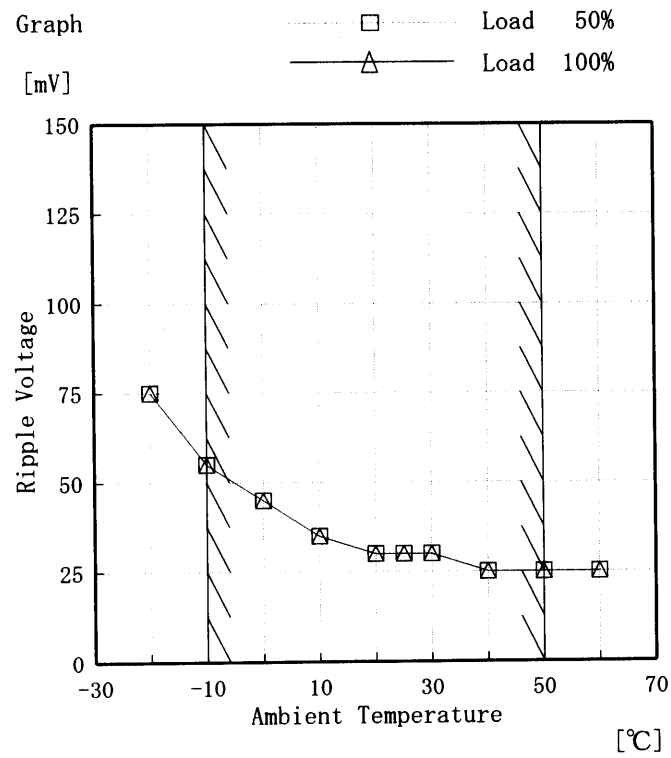
Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-20	72	73
-10	72	73
0	72	73
10	72	73
20	72	73
25	72	73
30	72	73
40	72	73
50	72	73
60	72	73
—	—	—

COSEL

Model	LEA50F-24
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）
Object	+24V2.1A

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

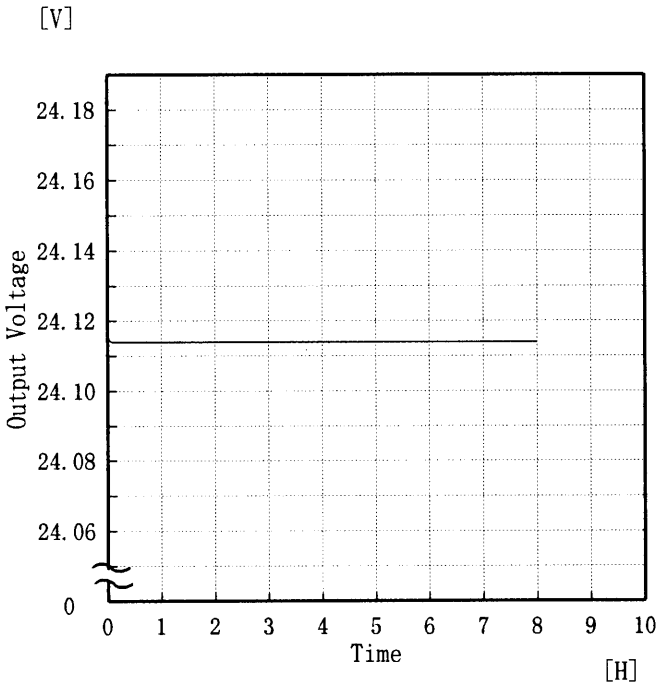
Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-20	75	75
-10	55	55
0	45	45
10	35	35
20	30	30
25	30	30
30	30	30
40	25	25
50	25	25
60	25	25
—	—	—

COSEL

Model	LEA50F-24
Item	Time Lapse Drift 経時ドリフト
Object	+24V2.1A

Temperature 25 ℃
Testing Circuitry Figure A

1. Graph



Input Volt. 200V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	24.121
0.5	24.114
1.0	24.114
2.0	24.114
3.0	24.114
4.0	24.114
5.0	24.114
6.0	24.114
7.0	24.114
8.0	24.114

COSEL

Model	LEA50F-24	
Item	Output Voltage Accuracy 定電圧精度	Testing Circuitry Figure A
Object	+24V2.1A	

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 : 0.00～2.1 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 0.00～2.1 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	25	264	0.00	24.125	±10	±0.1
Minimum Voltage	-10	170	2.10	24.106		

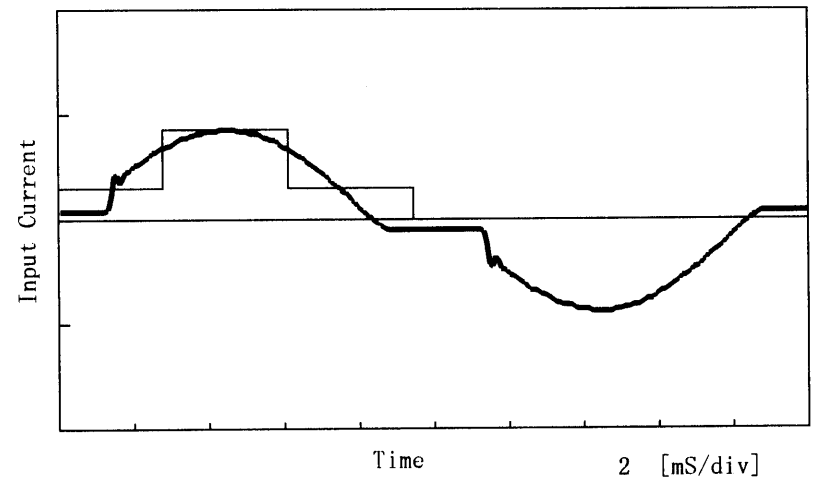
COSEL

Model	LEA50F-24		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	———		

1. Input Current Waveform

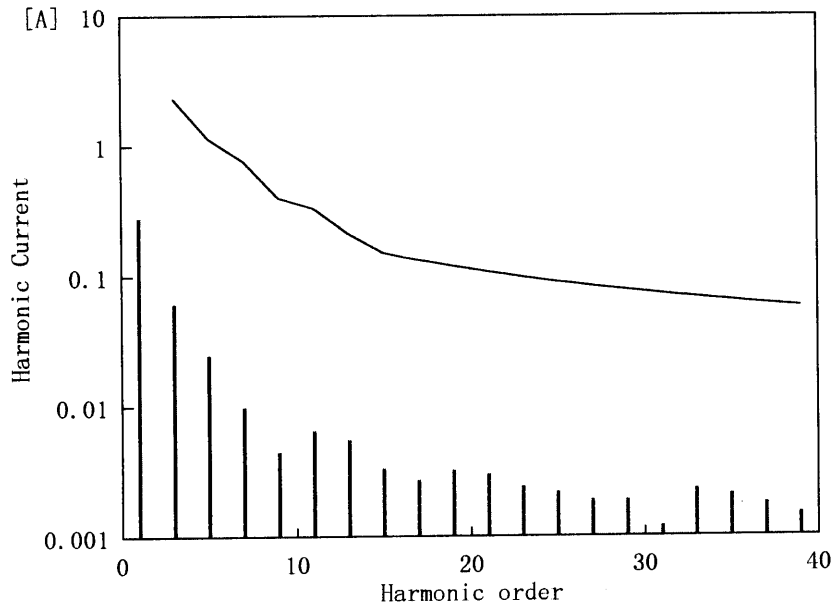
——— Input Current

——— 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]	230.5
Input Current [A]	0.287
Active Power [W]	61.1
Apparent Power[VA]	66.2
Frequency [Hz]	50
Power Factor	0.923
Output Power [W]	50.4

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	—	0.27860
2	—	0.00030
3	2.29501	0.06180
4	—	0.00010
5	1.13753	0.02480
6	—	0.00000
7	0.76833	0.00980
8	—	0.00000
9	0.39913	0.00440
10	—	0.00010
11	0.32928	0.00650
12	—	0.00010
13	0.20954	0.00550
14	—	0.00010
15	0.14967	0.00330
16	—	0.00010
17	0.13207	0.00270
18	—	0.00010
19	0.11816	0.00320
20	—	0.00010
21	0.10691	0.00300
22	—	0.00000
23	0.09761	0.00240
24	—	0.00010
25	0.08980	0.00220
26	—	0.00010
27	0.08315	0.00190
28	—	0.00010
29	0.07742	0.00190
30	—	0.00010
31	0.07242	0.00120
32	—	0.00000
33	0.06803	0.00230
34	—	0.00000
35	0.06415	0.00210
36	—	0.00010
37	0.06068	0.00180
38	—	0.00000
39	0.05757	0.00150
40	—	0.00010

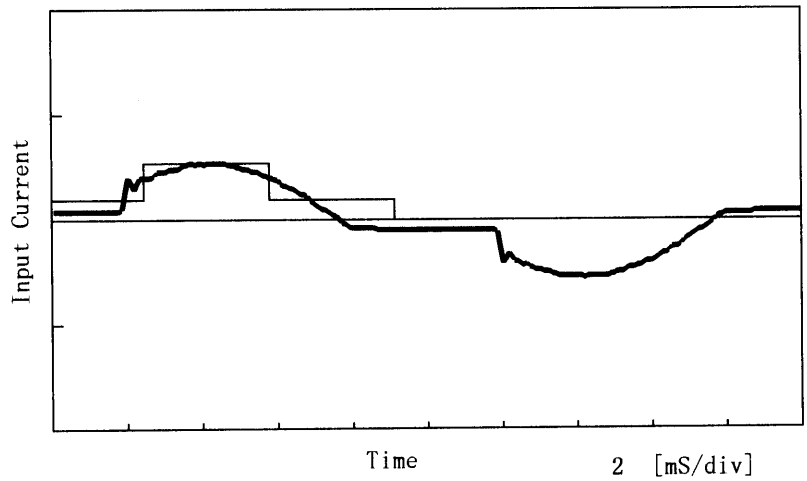
COSEL

Model	LEA50F-24		
Item	Harmonic Current 高調波電流	Temperature Testing Circuitry	25℃ Figure E
Object	———		

1. Input Current Waveform

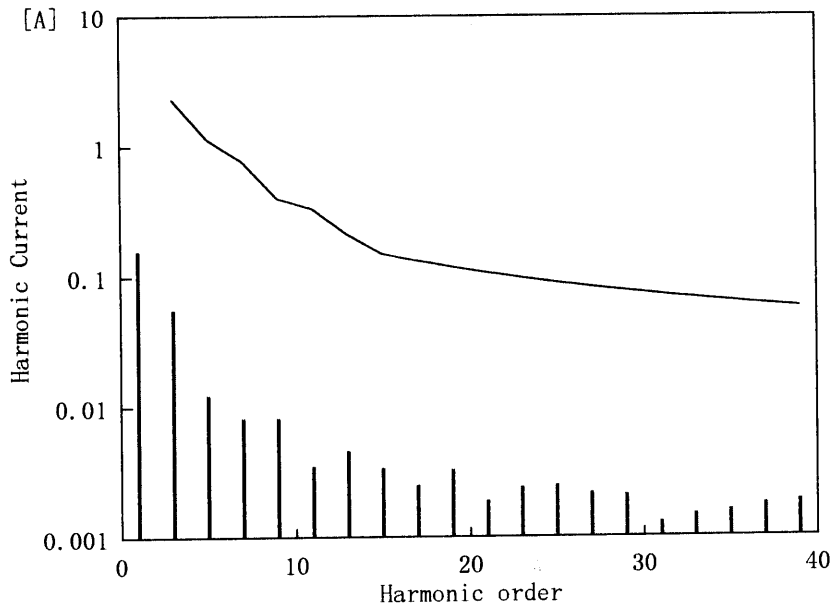
——— Input Current

——— 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]	230.5
Input Current [A]	0.169
Active Power [W]	33.2
Apparent Power[VA]	39.1
Frequency [Hz]	50
Power Factor	0.849
Output Power [W]	25.2

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	—	0.15890
2	—	0.00030
3	2.29501	0.05570
4	—	0.00010
5	1.13753	0.01230
6	—	0.00010
7	0.76833	0.00820
8	—	0.00010
9	0.39913	0.00820
10	—	0.00000
11	0.32928	0.00350
12	—	0.00010
13	0.20954	0.00460
14	—	0.00010
15	0.14967	0.00340
16	—	0.00010
17	0.13207	0.00250
18	—	0.00000
19	0.11816	0.00330
20	—	0.00010
21	0.10691	0.00190
22	—	0.00010
23	0.09761	0.00240
24	—	0.00010
25	0.08980	0.00250
26	—	0.00010
27	0.08315	0.00220
28	—	0.00000
29	0.07742	0.00210
30	—	0.00000
31	0.07242	0.00130
32	—	0.00000
33	0.06803	0.00150
34	—	0.00000
35	0.06415	0.00160
36	—	0.00010
37	0.06068	0.00180
38	—	0.00010
39	0.05757	0.00190
40	—	0.00000

BC−3191

COSEL

Model	LEA50F-24
Item	Condensation 結露特性
Object	+24V2.1A

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]	24.131	Input Volt.: 200V, Load Current:2.1A
Line Regulation [mV]	1	Input Volt.: 170～264V, Load Current:2.1A
Load Regulation [mV]	7	Input Volt.: 200V, Load Current:0.0～2.1A

COSEL

Model	LEA50F-24	
Item	Leakage Current 漏洩電流	Temperature 25℃ Testing Circuitry Figure B
Object	――――――	

1. Results

Standards	Leakage Current [mA]		
	Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]
(A) DENTORI	—	—	—
(B) IEC60950	—	—	—

Standards	Leakage Current [mA]		
	Input Volt. 170 [V]	Input Volt. 230 [V]	Input Volt. 264 [V]
(B) IEC60950	0.32	0.44	0.52

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	LEA50F-24		
Item	Line Noise Tolerance 入力雑音耐量	Temperature Testing Circuitry	25℃ Figure C
Object	+24V2.1A		

1. Results

Pulse Width [nS]	MODE	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
	NORMAL	OK	no fluctuation
1000	COMMON	OK	no fluctuation
	NORMAL	OK	no fluctuation

Conditions

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

COSEL

Model	LEA50F-24		
Item	Conducted Emission 雑音端子電圧	Temperature Testing Circuitry	25℃ Figure D
Object	————————		

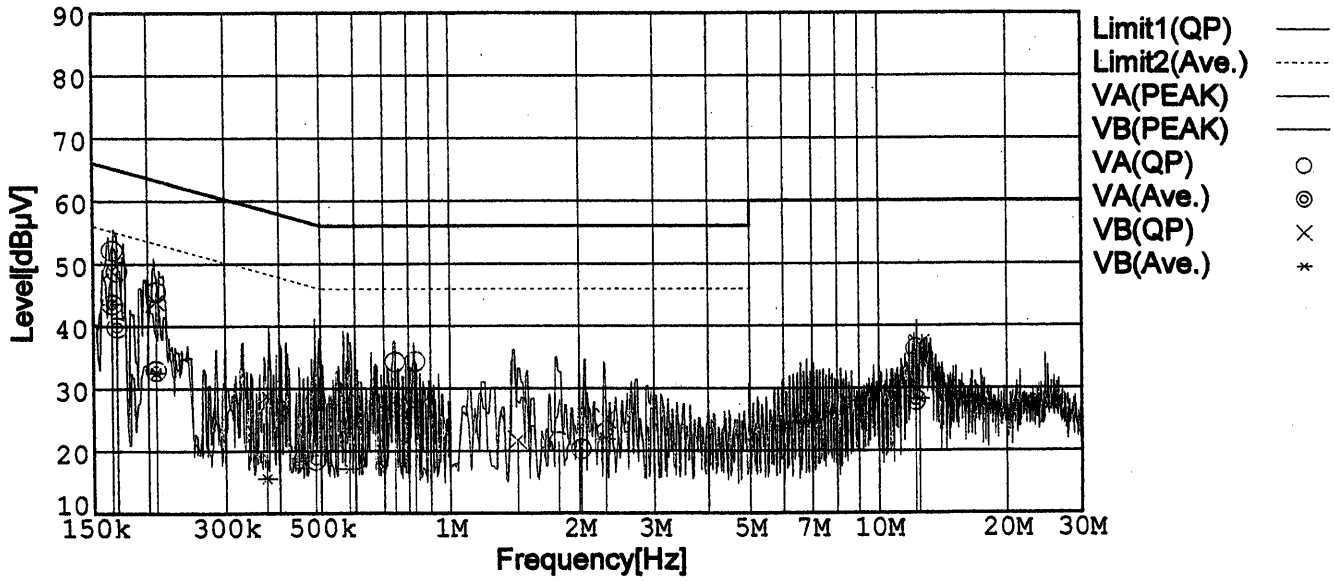
1. Graph

Remarks

Input Volt. 230V (CISPR Pub22 Class B)

Load 100 %

Limit1: [CISPR Pub22] Class B(QP)
Limit2: [CISPR Pub22] Class B(Ave.)



COSEL

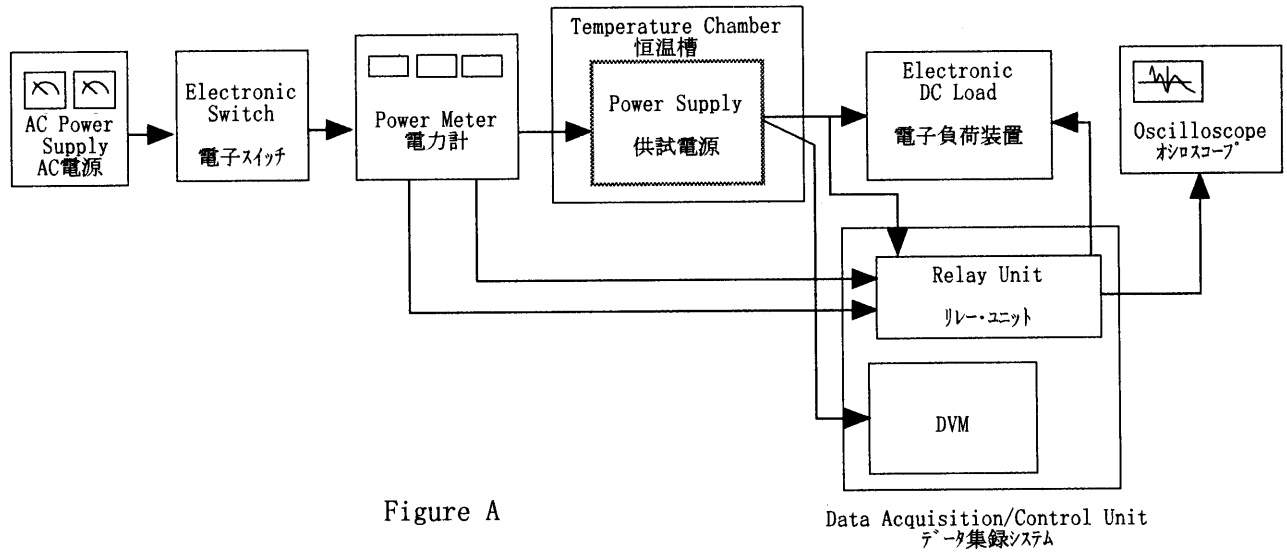


Figure A

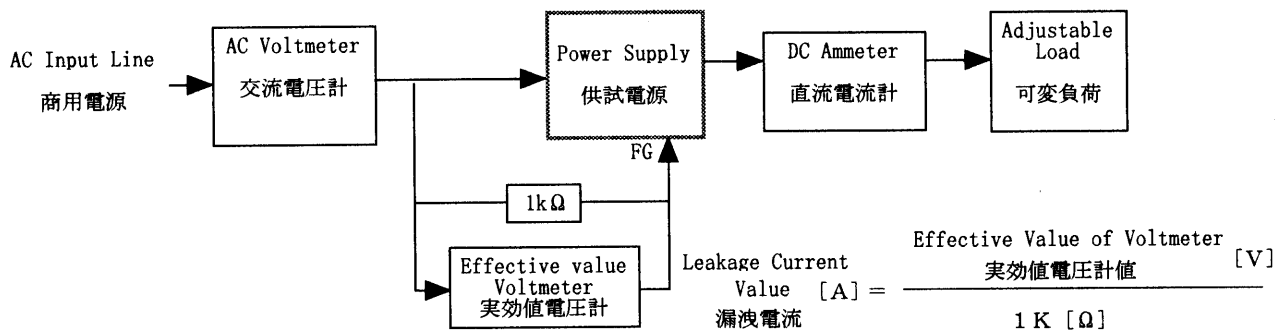


Figure B(DENTORI)

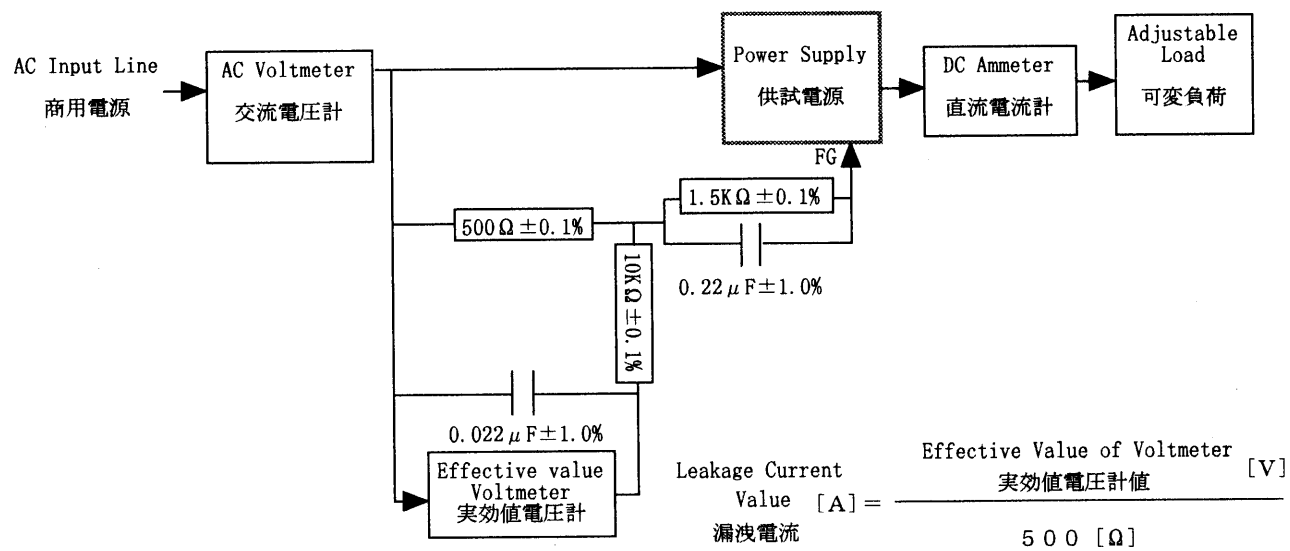


Figure B (IEC60950)

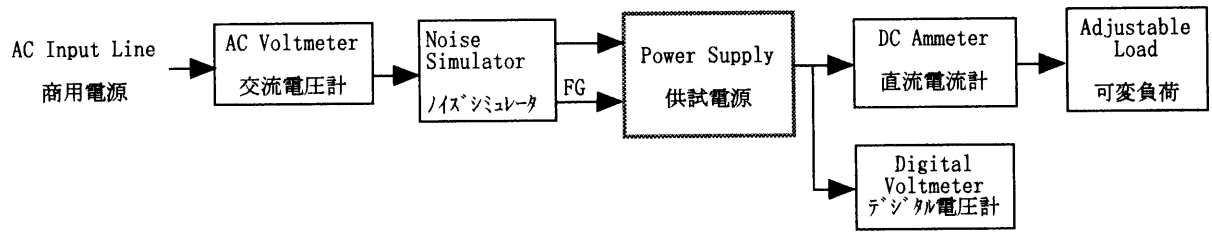


Figure C

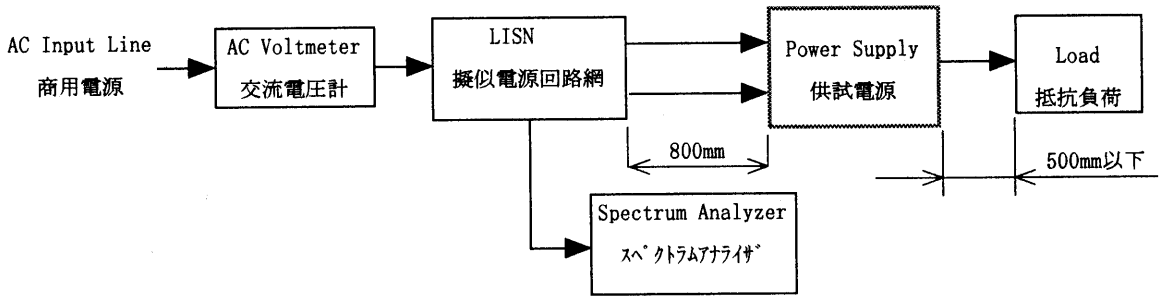


Figure D

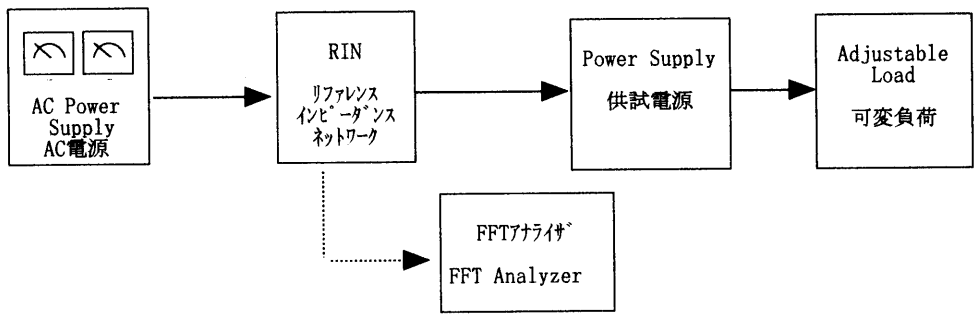


Figure E