

**COSEL**

TEST DATA OF LEA50F-24  
(100V INPUT)

Regulated DC Power Supply

Date : Feb. 15. 1999

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Design Manager

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Design Engineer

コーセル株式会社  
**COSEL CO., LTD.**



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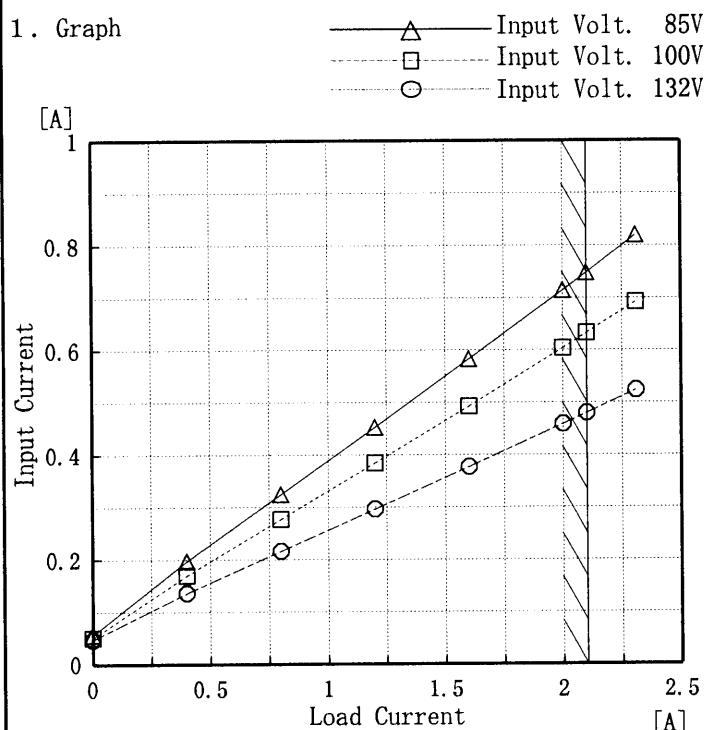
Model	LEA50F-24	Temperature	25°C																																
Item	Line Regulation 静的入力変動	Testing Circuitry	Figure A																																
Object	+24V 2.1A																																		
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Note: Slanted line shows the range of the rated input voltage.

(注)斜線は定格入力電圧範囲を示す。

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



Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.00	0.056	0.051	0.047
0.40	0.197	0.170	0.137
0.80	0.324	0.277	0.216
1.20	0.453	0.385	0.296
1.60	0.583	0.493	0.377
2.00	0.714	0.604	0.459
2.10	0.748	0.633	0.480
2.31	0.820	0.692	0.524
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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

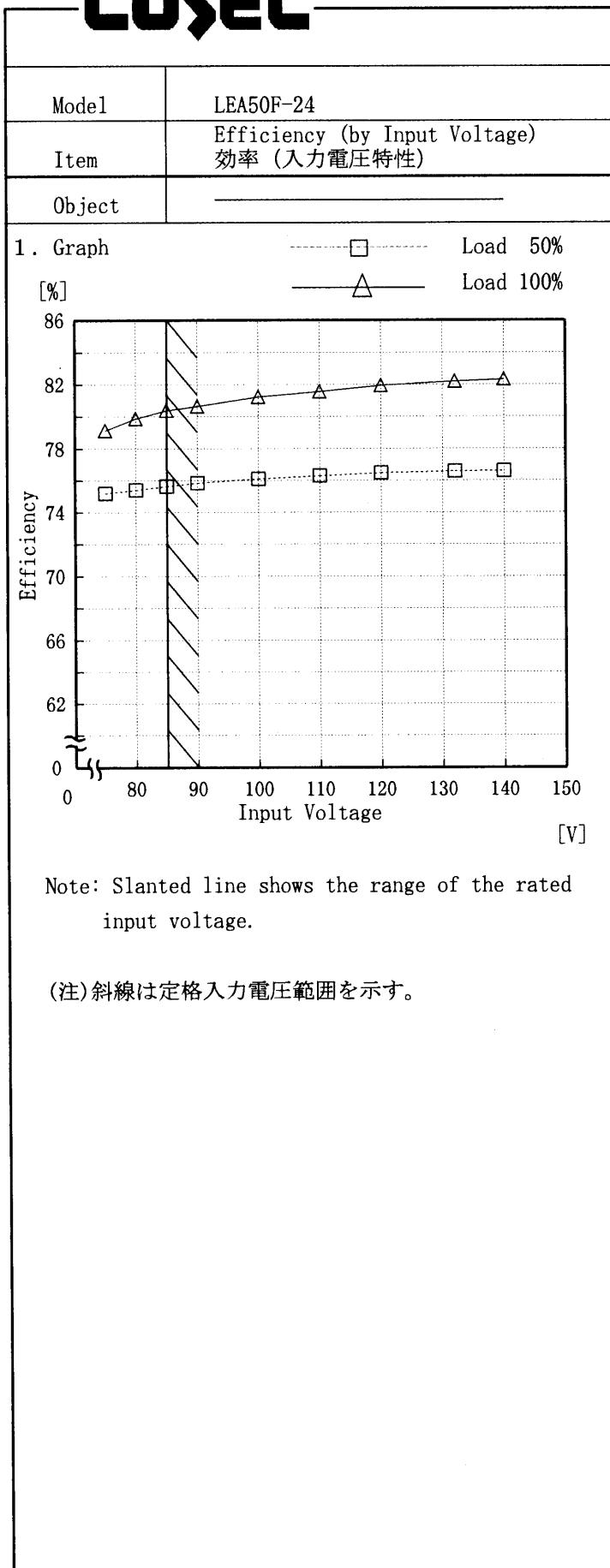
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Model	LEA50F-24	Temperature 25°C Testing Circuitry Figure A																																																									
Item	Input Power (by Load Current) 入力電力 (負荷特性)																																																										
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Note: Slanted line shows the range of the rated load current

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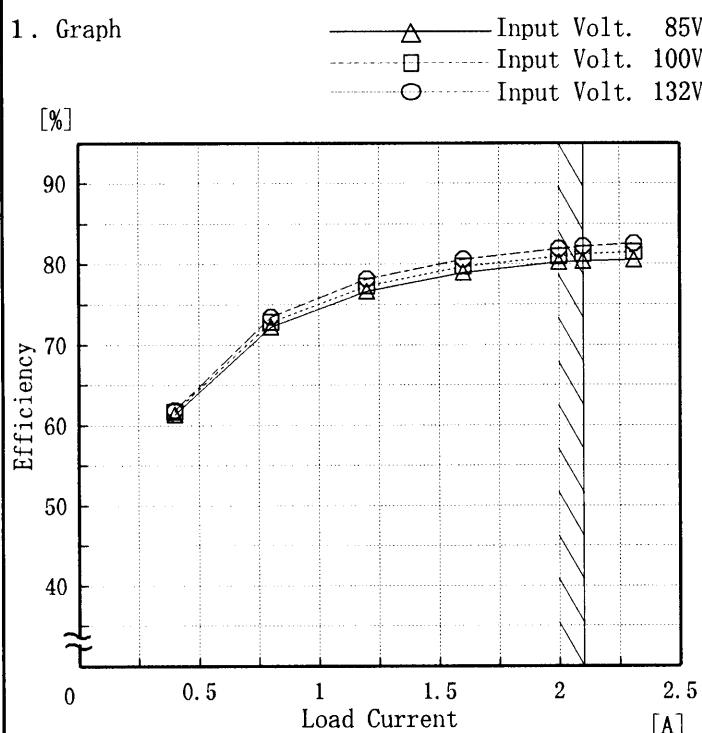
Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Input Voltage [V]	Load 50%	Load 100%
	Efficiency [%]	Efficiency [%]
75	75.2	79.1
80	75.4	79.9
85	75.6	80.4
90	75.8	80.6
100	76.1	81.2
110	76.3	81.6
120	76.5	81.9
132	76.6	82.2
140	76.6	82.3

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



Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.40	61.3	61.7	61.9
0.80	72.2	72.8	73.4
1.20	76.6	77.3	78.2
1.60	79.0	79.7	80.6
2.00	80.3	81.0	81.9
2.10	80.4	81.2	82.2
2.31	80.6	81.5	82.6
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
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Note: Slanted line shows the range of the rated load current

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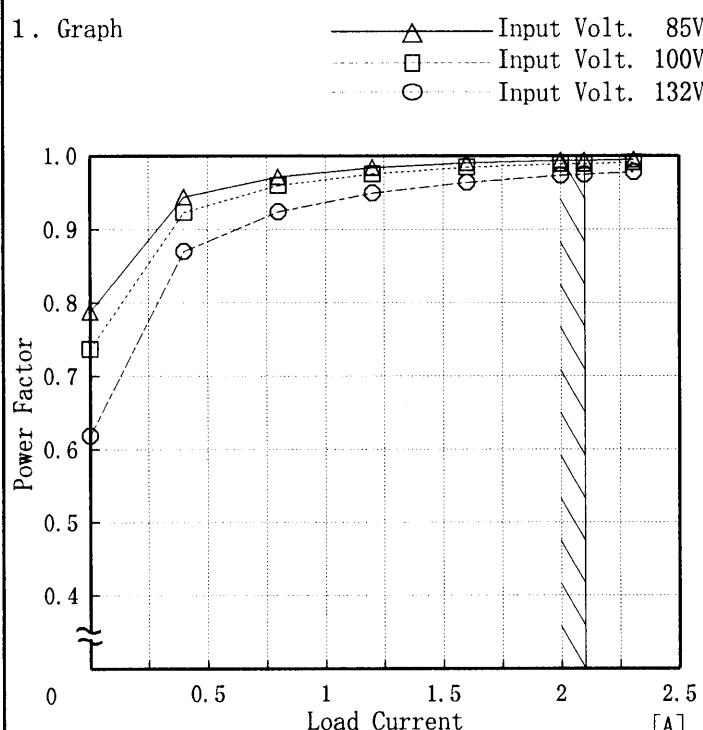
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Model	LEA50F-24																																	
Item	Power Factor (by Input Voltage) 力率(入力電圧特性)	Temperature 25°C Testing Circuitry Figure A																																
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Model	LEA50F-24
Item	Power Factor (by Load Current) 力率 (負荷電流特性)
Output	_____

## 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。

Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Load Current [A]	Power Factor		
	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.00	0.79	0.74	0.62
0.40	0.94	0.92	0.87
0.80	0.97	0.96	0.92
1.20	0.98	0.98	0.95
1.60	0.99	0.98	0.96
2.00	0.99	0.99	0.97
2.10	0.99	0.99	0.97
2.31	0.99	0.99	0.98
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

# COSEL

Model	LEA50F-24	Temperature Testing Circuitry	25°C Figure A																																
Item	Hold-Up Time 出力保持時間																																		
Object	+24V 2.1A																																		
1. Graph		2. Values																																	
<p>Graph showing Hold-Up Time [mS] vs Input Voltage [V]. The Y-axis is logarithmic, ranging from 1 to 1000 mS. The X-axis ranges from 0 to 150 V. Two data series are plotted: Load 50% (triangles) and Load 100% (squares). Both series show a slight increase in hold-up time as input voltage increases above 90V. A slanted line indicates the rated input voltage range.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th>Load 50%</th> <th>Load 100%</th> </tr> <tr> <th>Hold-Up Time [mS]</th> <th>Hold-Up Time [mS]</th> </tr> </thead> <tbody> <tr><td>75</td><td>—</td><td>—</td></tr> <tr><td>80</td><td>70</td><td>28</td></tr> <tr><td>85</td><td>71</td><td>30</td></tr> <tr><td>90</td><td>73</td><td>31</td></tr> <tr><td>100</td><td>75</td><td>33</td></tr> <tr><td>110</td><td>77</td><td>35</td></tr> <tr><td>120</td><td>78</td><td>36</td></tr> <tr><td>132</td><td>79</td><td>37</td></tr> <tr><td>140</td><td>80</td><td>38</td></tr> </tbody> </table>		Input Voltage [V]	Load 50%	Load 100%	Hold-Up Time [mS]	Hold-Up Time [mS]	75	—	—	80	70	28	85	71	30	90	73	31	100	75	33	110	77	35	120	78	36	132	79	37	140	80	38
Input Voltage [V]	Load 50%	Load 100%																																	
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<p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</p> <p>Note: Slanted line shows the range of the rated input voltage.</p> <p>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。</p>																																			

**COSSEL**

Model	LEA50F-24	Temperature 25°C Testing Circuitry Figure A		
Item	Instantaneous Interruption Compensation 瞬時停電保障			
Object	+24V 2.1A			
1. Graph				
2. Values	Load Current [A]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
		Time [mS]		
0.00	—	—	—	—
0.40	161	171	180	
0.80	78	87	91	
1.20	46	54	60	
1.60	36	38	45	
2.00	30	32	38	
2.10	28	31	35	
2.31	24	28	32	
—	—	—	—	—
—	—	—	—	—
—	—	—	—	—

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。

**COSEL**

Model	LEA50F-24	Temperature Testing Circuitry      25°C Figure A																																																		
Item	Load Regulation 静的負荷変動																																																			
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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																																																	
—	—	—	—																																																	
—	—	—	—																																																	

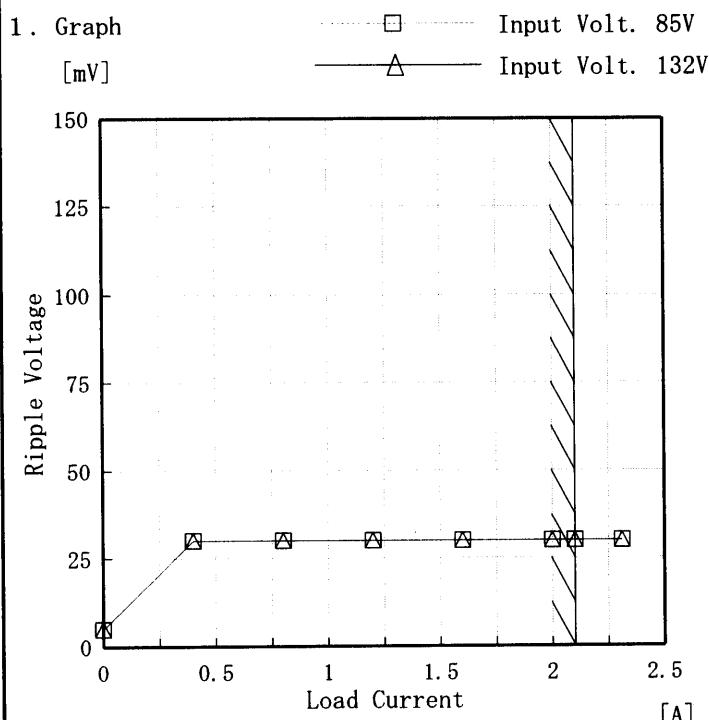
Note: Slanted line shows the range of the rated load current.

(注)斜線は定格負荷電流範囲を示す。

**COSEL**

Model	LEA50F-24
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+24V 2.1A

Temperature 25°C  
Testing Circuitry Figure A



## 2. Values

Load Current [A]	Input Volt. 85 [V]	Input Volt. 132 [V]
	Ripple Output Volt. [mV]	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
—	—	—
—	—	—
—	—	—

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  
スイッチング周期

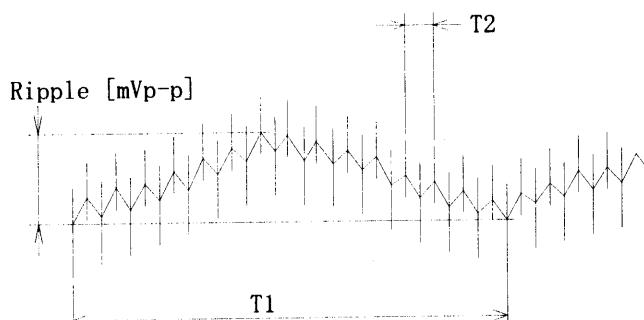


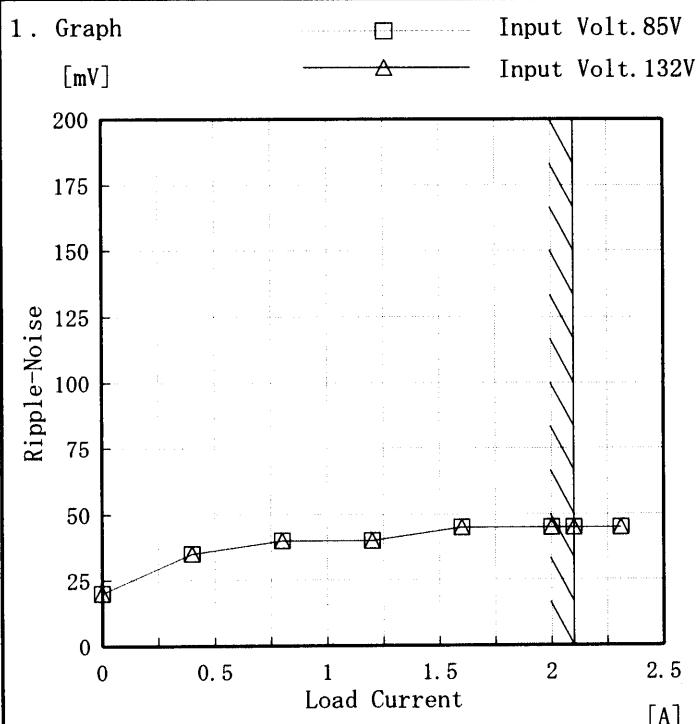
Fig. Complex Ripple Wave Form

図 リップル波形詳細図

**COSSEL**

Model	LEA50F-24
Item	Ripple-Noise リップルノイズ
Object	+24V 2.1A

Temperature 25°C  
Testing Circuitry Figure A



## 2. Values

Load current [A]	Input Volt. 85 [V]	Input Volt. 132 [V]
	Ripple-Noise [mV]	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
—	—	—
—	—	—
—	—	—

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  
スイッチング周期

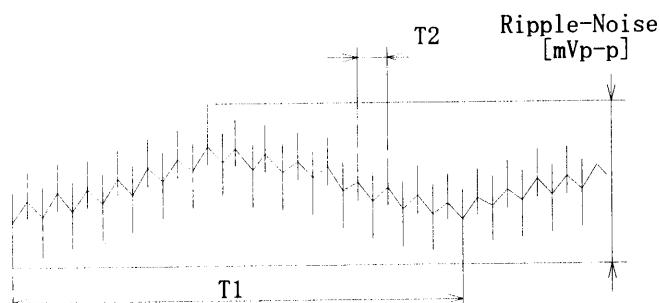


Fig. Complex Ripple Wave Form

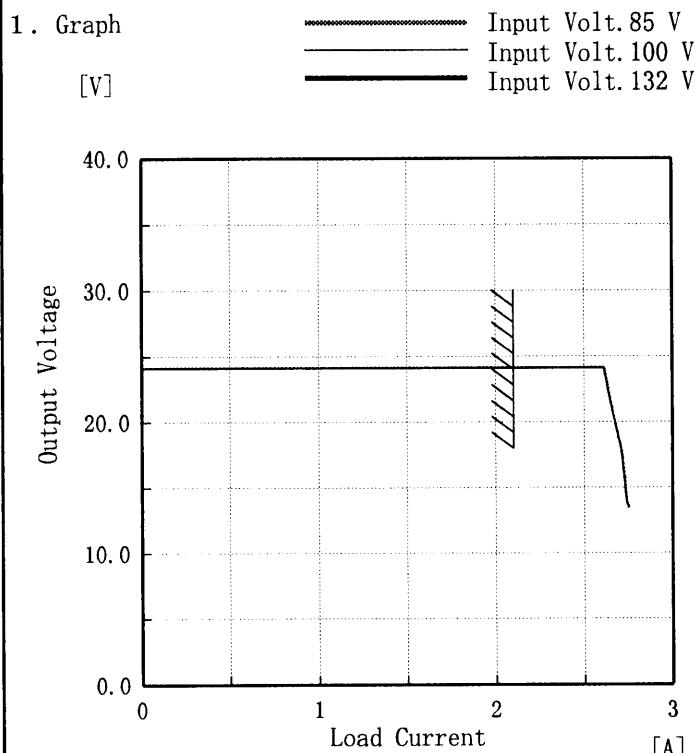
図 リップル波形詳細図

**COSEL**

Model LEA50F-24

Item Overcurrent Protection  
過電流保護

Object +24V 2.1A



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。

Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Output Voltage [V]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
	Load Current [A]	Load Current [A]	Load Current [A]
24.00	2.62	2.61	2.61
22.80	2.63	2.63	2.63
21.60	2.65	2.64	2.64
19.20	2.69	2.68	2.69
16.80	2.72	2.72	2.72
14.40	2.74	2.73	2.73
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

# COSEL

Model	LEA50F-24	Testing Circuitry      Figure A			
Item	Overvoltage Protection 過電圧保護				
Object	+24V 2.1A				
1. Graph	<p style="text-align: center;">—△— Input Volt. 85 V —□— Input Volt. 100 V —○— Input Volt. 132 V</p> <p style="text-align: center;">Operating Point [V]</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Load 0%</p>	2. Values			
		Ambient Temp.	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
		[°C]	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
		—	—	—	—

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。

**COSEL**

Model LEA50F-24

Item Inrush Current 突入電流

Object

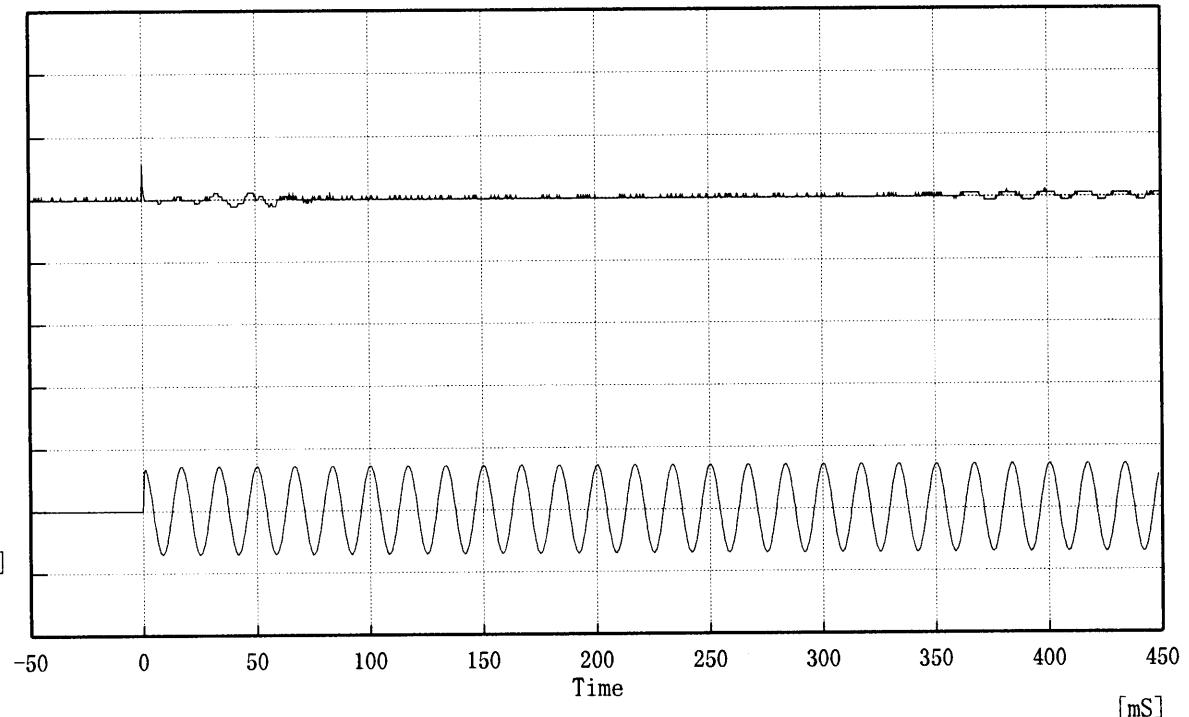
Temperature 25°C  
Testing Circuitry Figure A

Input Current

[20A/div]

Input Voltage

[200V/div]



Input Voltage 100 V

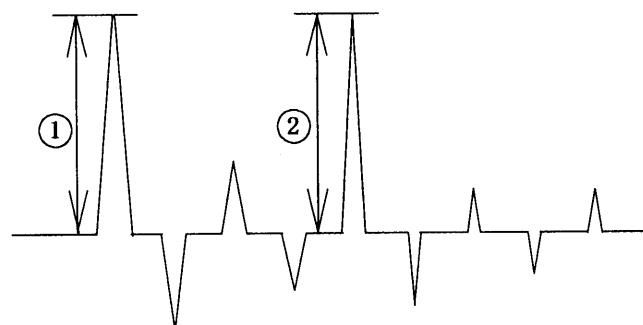
Frequency 60 Hz

Load 100 %

Inrush Current

① 11.20 [A]

② 2.26 [A]



**COSEL**

Model	LEA50F-24	Temperature Testing Circuitry 25°C Figure A
Item	Dynamic Load Response 動的負荷変動	
Object	+ 24 V 2.1 A	

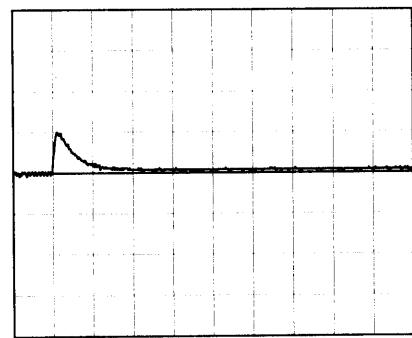
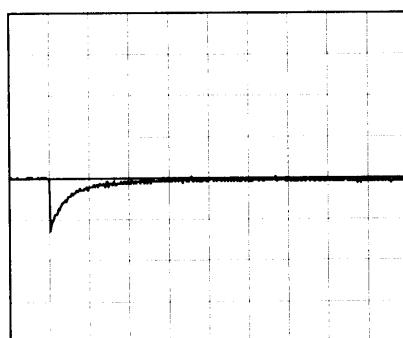
Input Volt. 100 V

Cycle 1000 mS

Load Current

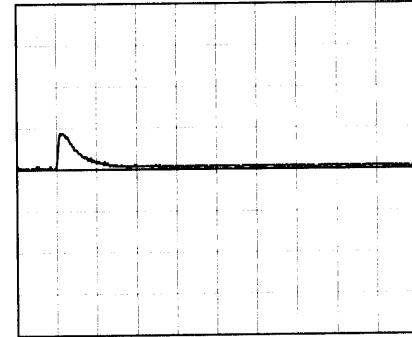
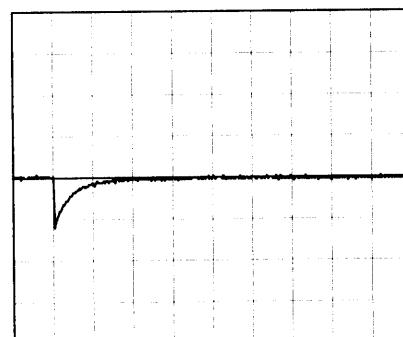
Min. Load ↔

Load 100 %



Min. Load ↔

Load 50 %



100 mV/div

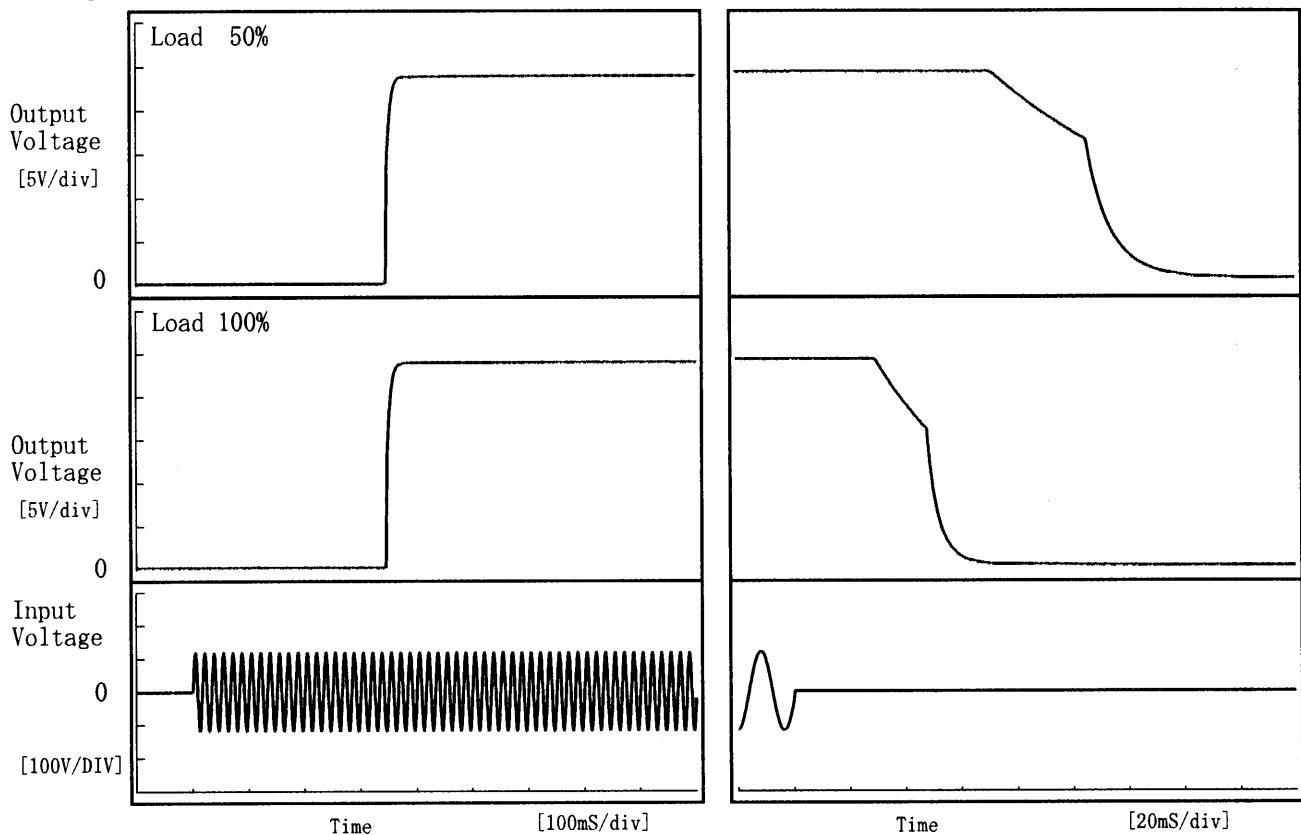
10 ms/div

COSEL

Model	LEA50F-24
Item	Rise and Fall Time 立上り、立下り時間
Object	+24V 2.1A

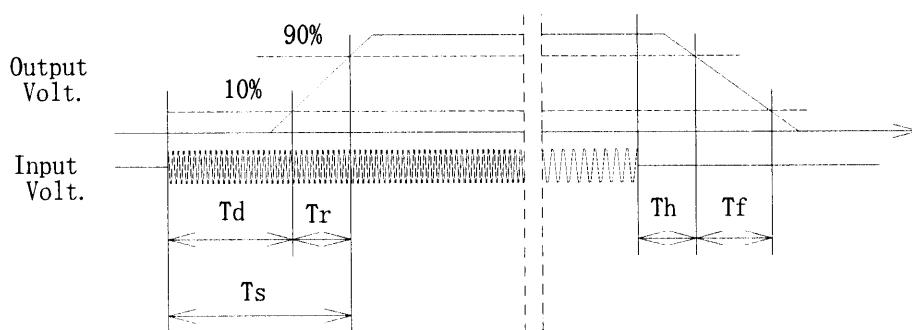
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	T d	T r	T s	T h	T f	[mS]
50 %		345.5	11.5	357.0	81.2	43.3	
100 %		346.0	11.0	357.0	34.3	22.6	



**COSEL**

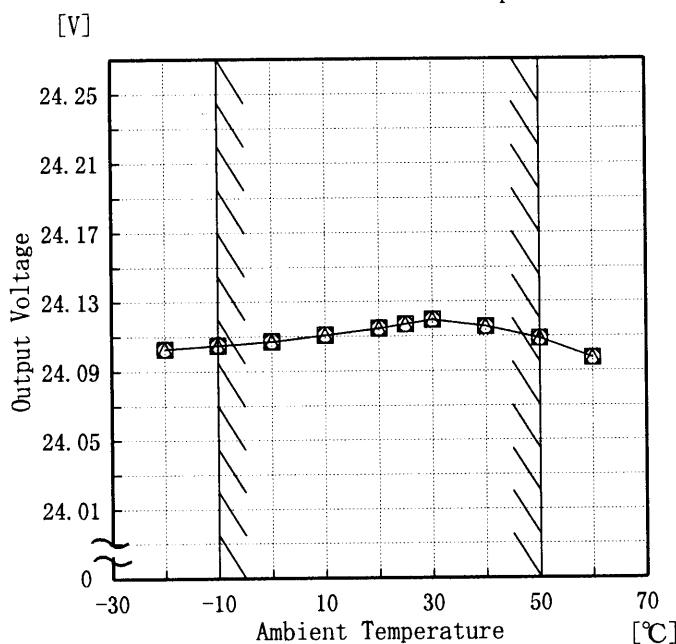
Model LEA50F-24

Item Ambient Temperature Drift  
周囲温度変動

Object +24V 2.1A

1. Graph

△ Input Volt. 85V  
□ Input Volt. 100V  
○ Input Volt. 132V



Load 100%

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。

Testing Circuitry Figure A

2. Values

Temperature [°C]	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-20	24.103	24.103	24.103
-10	24.105	24.105	24.105
0	24.107	24.107	24.107
10	24.111	24.111	24.111
20	24.114	24.115	24.115
25	24.117	24.117	24.117
30	24.119	24.120	24.119
40	24.116	24.115	24.115
50	24.109	24.109	24.109
60	24.097	24.097	24.097
—	—	—	—

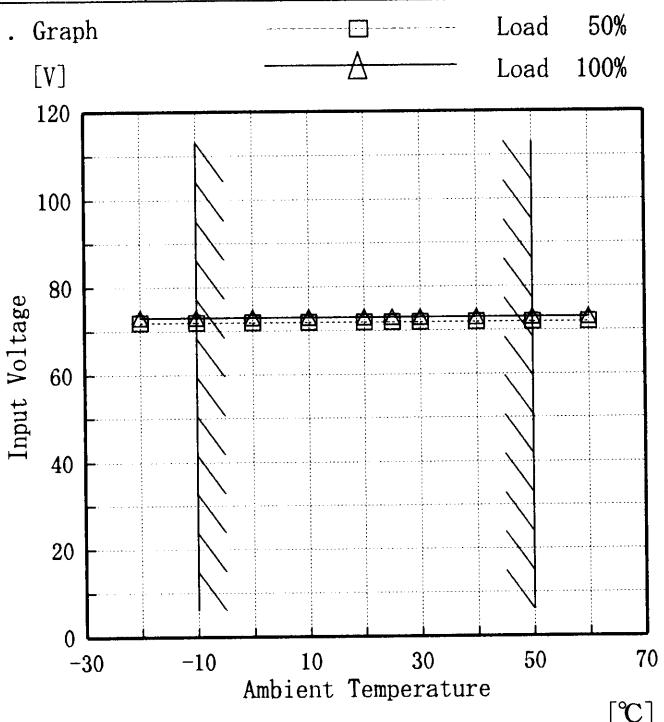
**COSEL**

Model LEA50F-24

Item Minimum Input Voltage for Regulated Output Voltage  
最低レギュレーション電圧

Object +24V 2.1A

## 1. Graph



Testing Circuitry Figure A

## 2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	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
—	—	—

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。

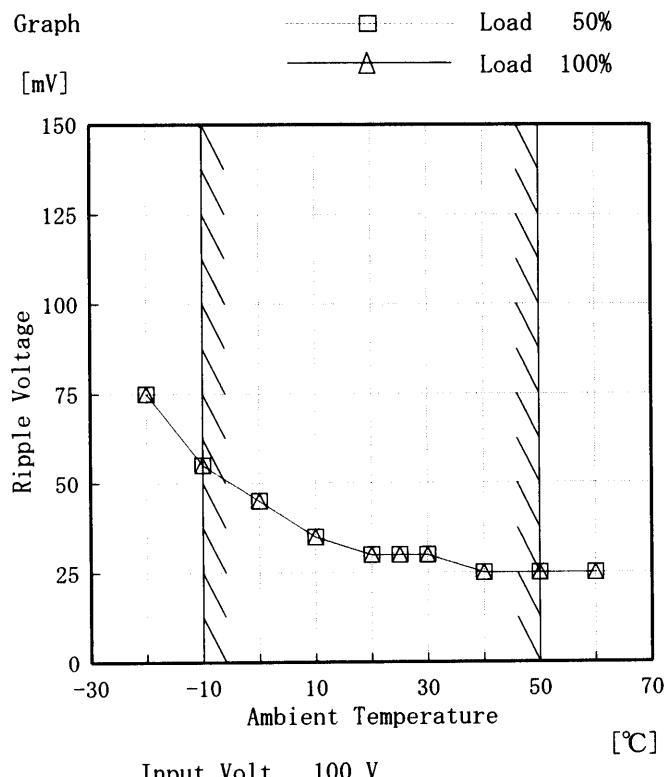
**COSEL**

Model LEA50F-24

Item Ripple Voltage (by Ambient Temp.)  
リップル電圧 (周囲温度特性)

Object +24V 2.1A

## 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。

Testing Circuitry Figure A

## 2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	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	Temperature Testing Circuitry	25 °C Figure A																						
Item	Time Lapse Drift 経時ドリフト																								
Object	+24V 2.1A																								
1. Graph			2. Values																						
<p>[V]</p> <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 100V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>24.121</td></tr> <tr><td>0.5</td><td>24.114</td></tr> <tr><td>1.0</td><td>24.114</td></tr> <tr><td>2.0</td><td>24.114</td></tr> <tr><td>3.0</td><td>24.114</td></tr> <tr><td>4.0</td><td>24.114</td></tr> <tr><td>5.0</td><td>24.114</td></tr> <tr><td>6.0</td><td>24.114</td></tr> <tr><td>7.0</td><td>24.114</td></tr> <tr><td>8.0</td><td>24.114</td></tr> </tbody> </table>	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
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																								



Model	LEA50F-24	Testing Circuitry Figure A
Item	Output Voltage Accuracy 定電圧精度	
Object	+24V 2.1A	

#### 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 °C

Input Voltage : 85~132 V

Load Current : 0.00~2.1 A

\* Output Voltage Accuracy =  $\pm (\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

#### 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 °C

入力電圧 85~132 V

負荷電流 0.00~2.1 A

\* 定電圧精度(変動値) =  $\pm (\text{出力電圧の最高値} - \text{出力電圧の最低値}) / 2$

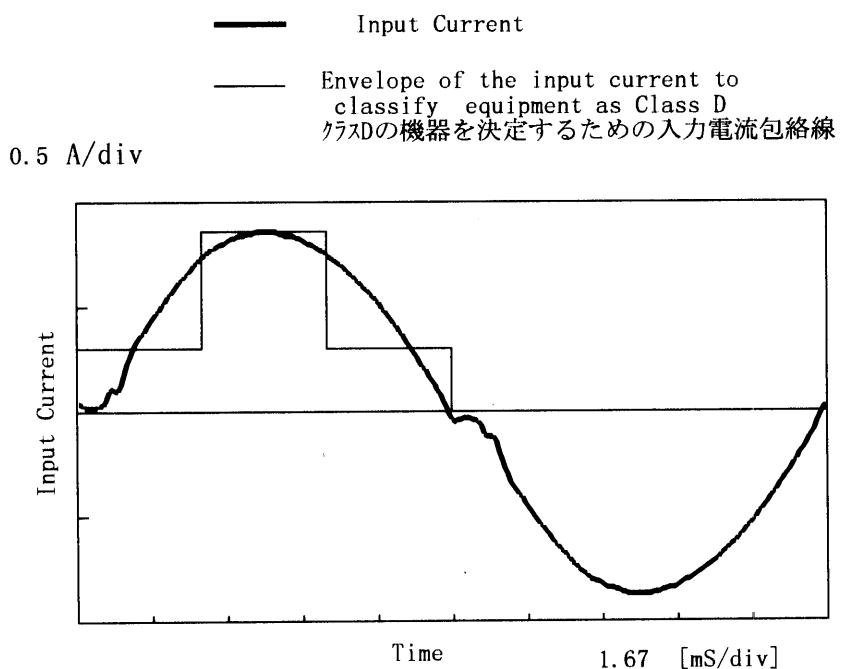
$$* \text{ 定電圧精度(変動率)} = \frac{\text{変動値}}{\text{定格出力電圧}} \times 100$$

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration) [%]
Maximum Voltage	25	85	0.00	24.125		
Minimum Voltage	-10	85	2.10	24.105	±11	±0.1

**COSEL**

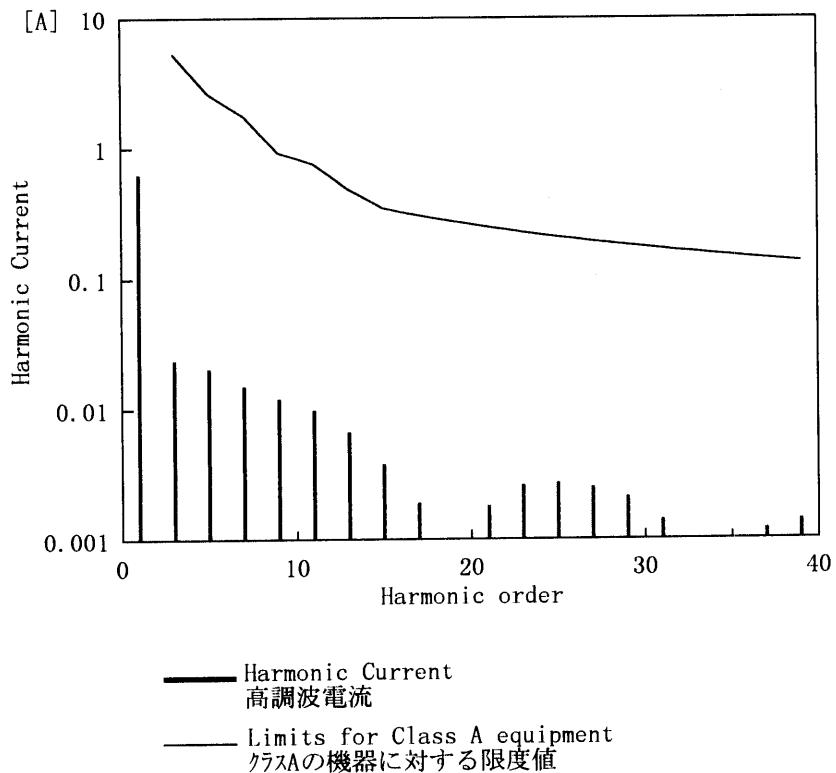
Model	LEA50F-24	Temperature Testing Circuitry	25°C Figure E
Item	Harmonic Current 高調波電流		
Object	——		

## 1. Input Current Waveform



Conditions	Values
Input Voltage [V]	100.1
Input Current [A]	0.633
Active Power [W]	63.2
Apparent Power [VA]	63.4
Frequency [Hz]	60
Power Factor	0.997
Output Power [W]	50.4

## 2. Harmonic Current

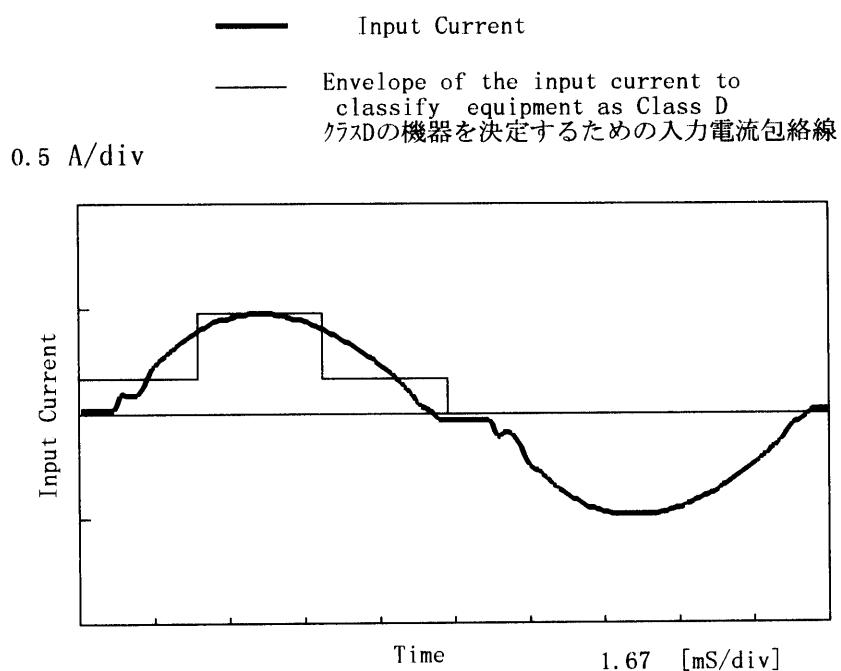


Harmonics order 高調波波次数	Limits 限度値 [A]	Values 測定値 [A]
1	—	0.63240
2	—	0.00030
3	5.28472	0.02360
4	—	0.00020
5	2.61938	0.02040
6	—	0.00010
7	1.76923	0.01500
8	—	0.00010
9	0.91908	0.01200
10	—	0.00010
11	0.75824	0.00980
12	—	0.00010
13	0.48252	0.00660
14	—	0.00010
15	0.34466	0.00380
16	—	0.00010
17	0.30411	0.00190
18	—	0.00010
19	0.27210	0.00050
20	—	0.00010
21	0.24618	0.00180
22	—	0.00010
23	0.22478	0.00260
24	—	0.00010
25	0.20679	0.00270
26	—	0.00010
27	0.19148	0.00250
28	—	0.00010
29	0.17827	0.00210
30	—	0.00010
31	0.16677	0.00140
32	—	0.00000
33	0.15666	0.00080
34	—	0.00010
35	0.14771	0.00090
36	—	0.00000
37	0.13973	0.00120
38	—	0.00000
39	0.13256	0.00140
40	—	0.00000

**COSEL**

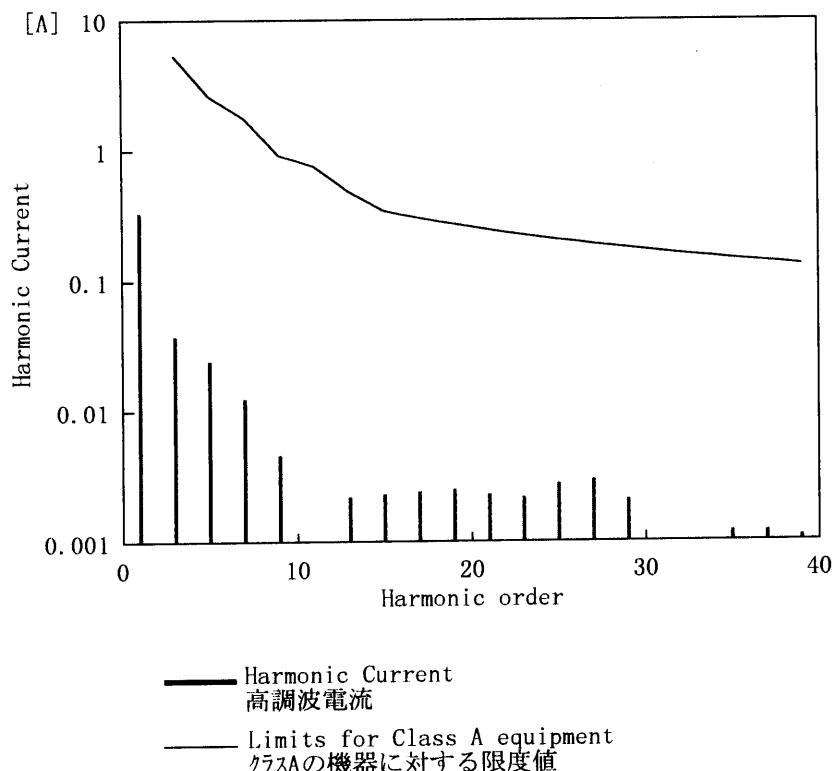
Model	LEA50F-24	Temperature Testing Circuitry	25°C Figure E
Item	Harmonic Current 高調波電流		
Object	_____		

## 1. Input Current Waveform



Conditions	Values
Input Voltage [V]	100.2
Input Current [A]	0.338
Active Power [W]	33.3
Apparent Power [VA]	33.9
Frequency [Hz]	60
Power Factor	0.982
Output Power [W]	25.2

## 2. Harmonic Current



Harmonics order 高調波次数	Limits 限度値 [A]	Values 測定値 [A]
1	—	0.33490
2	—	0.00030
3	5.27944	0.03770
4	—	0.00010
5	2.61677	0.02440
6	—	0.00010
7	1.76747	0.01240
8	—	0.00000
9	0.91816	0.00460
10	—	0.00010
11	0.75749	0.00080
12	—	0.00000
13	0.48204	0.00220
14	—	0.00000
15	0.34431	0.00230
16	—	0.00000
17	0.30380	0.00240
18	—	0.00000
19	0.27182	0.00250
20	—	0.00000
21	0.24594	0.00230
22	—	0.00010
23	0.22455	0.00220
24	—	0.00010
25	0.20659	0.00280
26	—	0.00010
27	0.19128	0.00300
28	—	0.00000
29	0.17809	0.00210
30	—	0.00000
31	0.16660	0.00100
32	—	0.00000
33	0.15651	0.00080
34	—	0.00000
35	0.14756	0.00120
36	—	0.00010
37	0.13959	0.00120
38	—	0.00010
39	0.13243	0.00110
40	—	0.00000



Model	LEA50F-24	
Item	Condensation 結露特性	Testing Circuitry Figure A
Object	+24V 2.1A	

### 1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at -10°C 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°C 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°C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°C、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.: 100V, Load Current: 2.1A
Line Regulation [mV]	1	Input Volt.: 85~132V, Load Current: 2.1A
Load Regulation [mV]	7	Input Volt.: 100V, Load Current: 0.0~2.1A



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

### 1. Results

Standards	Leakage Current [mA]		
	Input Volt.	Input Volt.	Input Volt.
(A) DENTORI	85 [V]	100 [V]	132 [V]
(B) IEC60950	0.16	0.18	0.24

### 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。

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



Model	LEA50F-24	Temperature Testing Circuitry	25°C Figure C
Item	Line Noise Tolerance 入力雑音耐量		
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 : 100 V  
 Pulse Voltage : 2000 V  
 Pulse Cycle : 10 mS  
 Pulse Input Duration: 1 min. or more  
 Load : 100 %

COSEL

Model	LEA50F-24	Temperature Testing Circuitry	25°C Figure D
Item	Conducted Emission 雜音端子電壓		
Object	<hr/>		

## 1. Graph

## Remarks

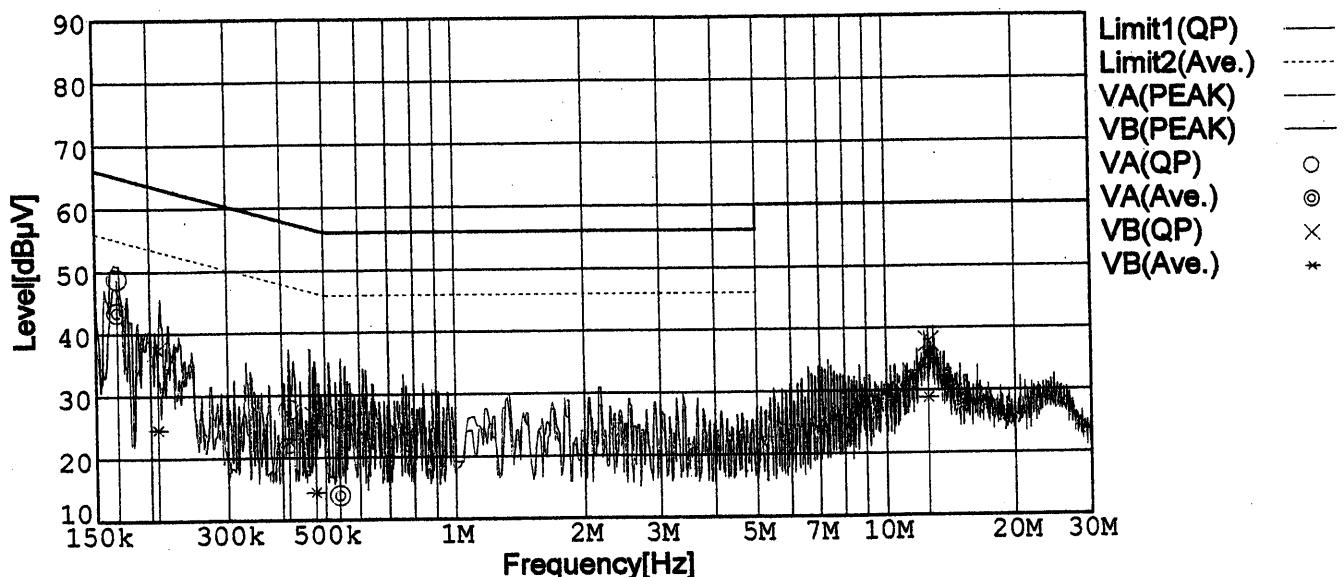
Input Volt. 100V ( VCCI Class B )

120V ( FCC Class B )

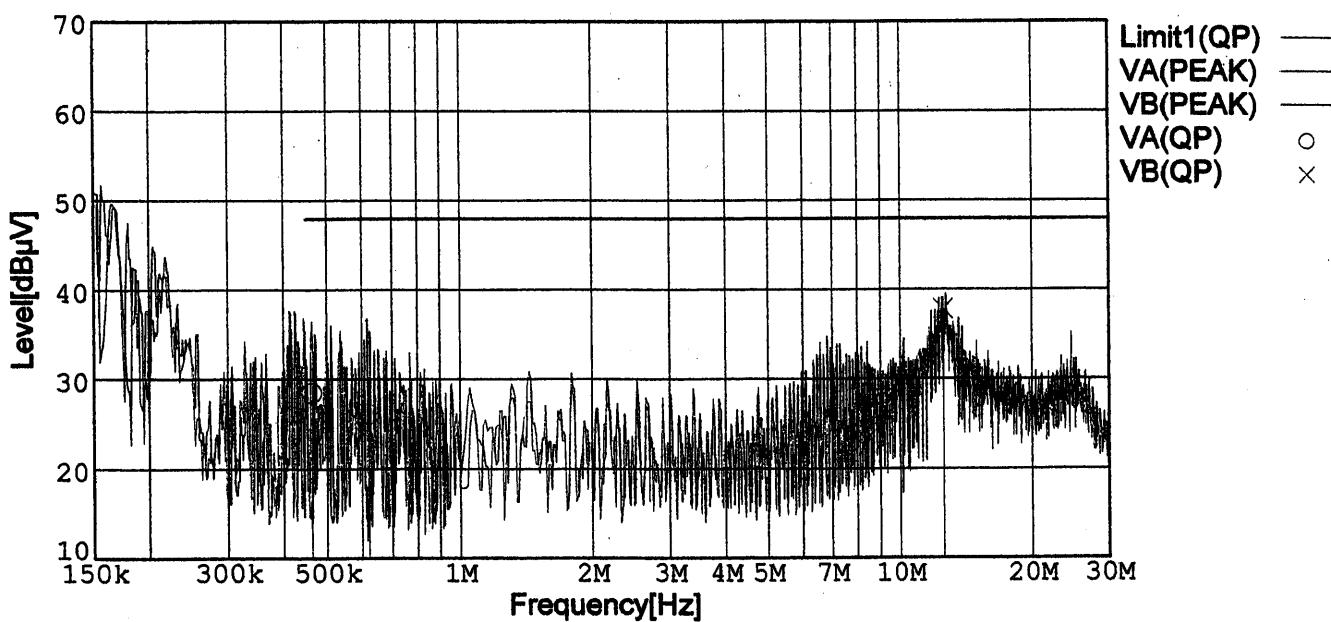
Load 100 %

Limit1: [VCCI] Class B(QP)

Limit2: [VCCI] Class B(Ave.)



Limit1: [FCC Part15] Class B



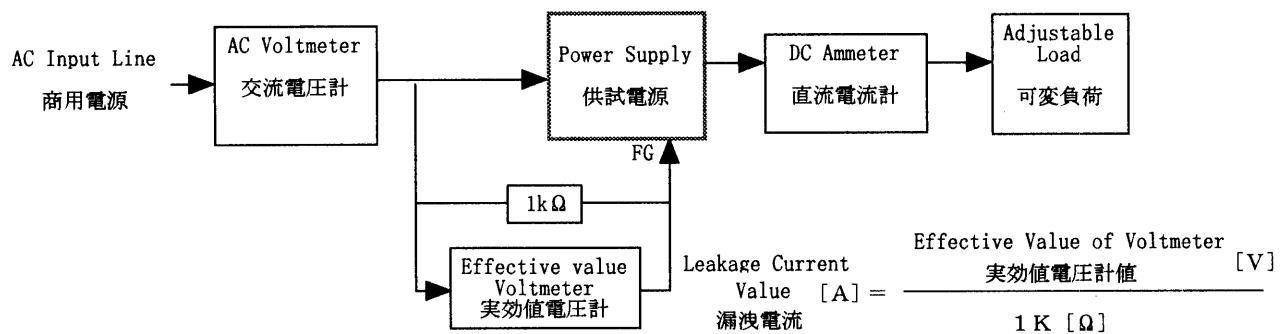
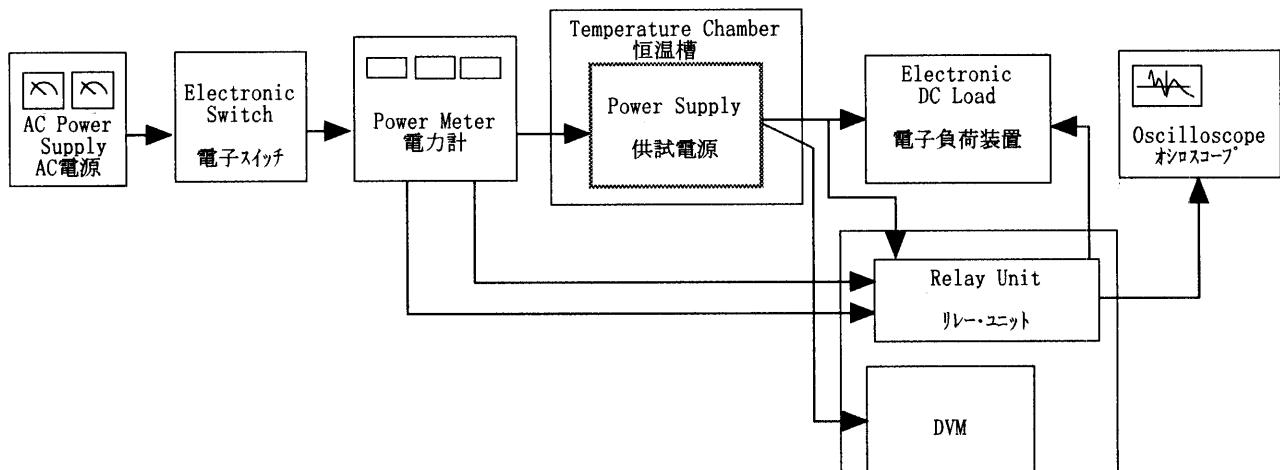


Figure B (DENTORI)

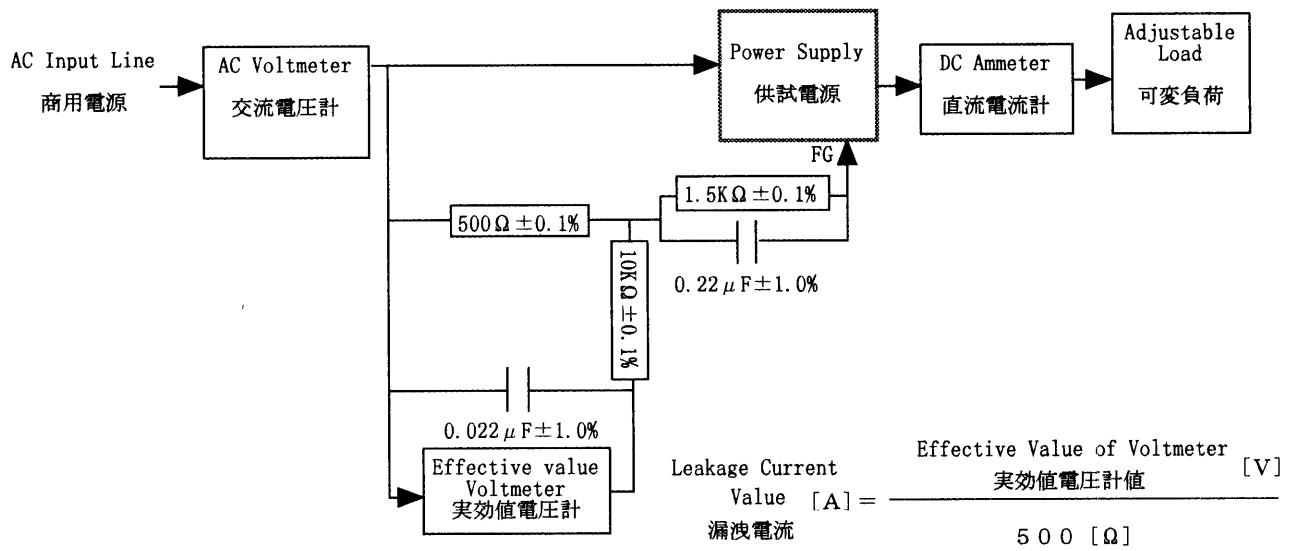


Figure B (IEC60950)

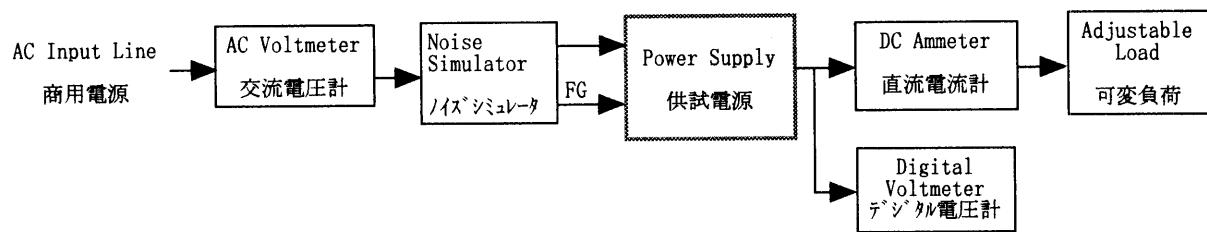


Figure C

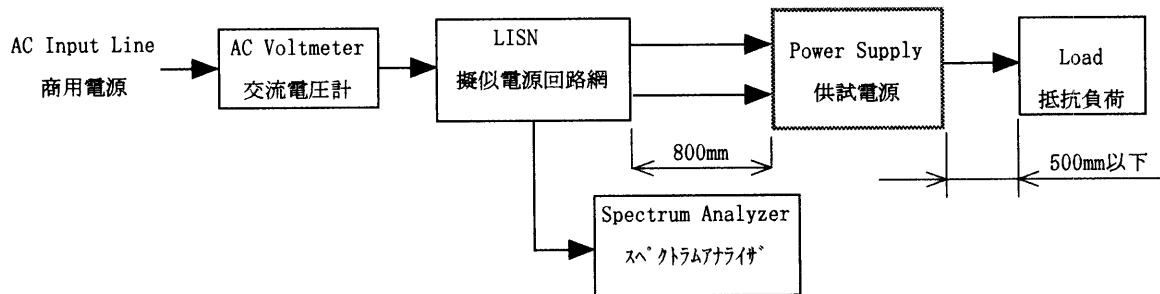


Figure D

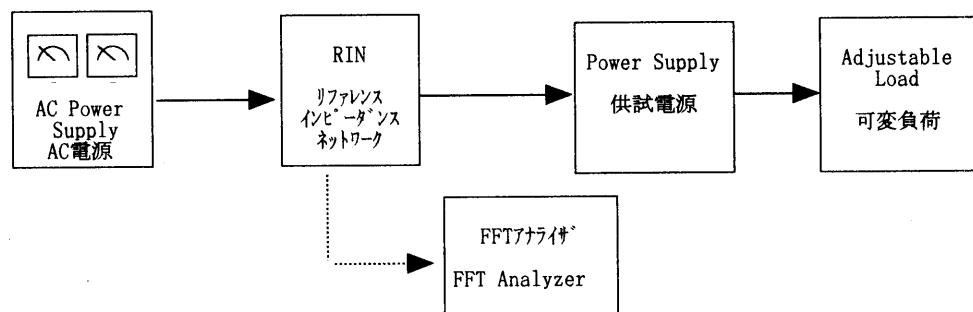


Figure E