



TEST DATA OF LCA10S-15 (100V INPUT)

Regulated DC Power Supply

Date : June 16. 1999

Approved by : H. Yamaguchi
Design Manager

Prepared by : S. Taniguchi
Design Engineer

コーセル株式会社
COSEL CO., LTD.

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Model		LCA10S-15		Temperature		25℃																																	
Item		Line Regulation 静的入力変動		Testing Circuitry		Figure A																																	
Object		+15.0V0.7A																																					
1. Graph				2. Values																																			
<div><div><div>□</div><div>Load 50%</div></div><div><div>△</div><div>Load 100%</div></div></div> <p>Note: Slanted line shows the range of the rated input voltage.</p> <p>(注)斜線は定格入力電圧範囲を示す。</p>				<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Output Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>75</td><td>15.100</td><td>15.098</td></tr><tr><td>80</td><td>15.100</td><td>15.099</td></tr><tr><td>85</td><td>15.099</td><td>15.099</td></tr><tr><td>90</td><td>15.099</td><td>15.099</td></tr><tr><td>100</td><td>15.099</td><td>15.099</td></tr><tr><td>110</td><td>15.099</td><td>15.099</td></tr><tr><td>120</td><td>15.099</td><td>15.099</td></tr><tr><td>132</td><td>15.099</td><td>15.098</td></tr><tr><td>140</td><td>15.099</td><td>15.098</td></tr></table>				Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	75	15.100	15.098	80	15.100	15.099	85	15.099	15.099	90	15.099	15.099	100	15.099	15.099	110	15.099	15.099	120	15.099	15.099	132	15.099	15.098	140	15.099	15.098
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Model		LCA10S-15	
Item	Input Current (by Load Current) 入力電流 (負荷特性)		Temperature 25℃ Testing Circuitry Figure A
Output			

1. Graph

—△— Input Volt. 85V

—□— Input Volt. 100V

—○— Input Volt. 132V

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. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.00	0.051	0.053	0.059
0.10	0.092	0.088	0.086
0.20	0.129	0.121	0.112
0.30	0.164	0.152	0.137
0.40	0.197	0.181	0.160
0.50	0.229	0.210	0.184
0.60	0.261	0.238	0.206
0.70	0.290	0.264	0.228
0.77	0.311	0.282	0.243
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model		LCA10S-15		Temperature		25℃																																																								
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<div><div><div>△</div><div>□</div><div>○</div></div><div><div>Input Volt. 85V</div><div>Input Volt. 100V</div><div>Input Volt. 132V</div></div></div> <div><div><div><div>[W]</div><div>20</div><div>15</div><div>10</div><div>5</div><div>0</div><div>Input Power</div></div><div><div>0</div><div>0.2</div><div>0.4</div><div>0.6</div><div>0.8</div><div>1</div><div>Load Current</div><div>[A]</div></div></div><div></div></div>				<table><tr><th rowspan="2">Load Current</th><th colspan="3">Input Power [W]</th></tr><tr><th>Input Volt. 85 [V]</th><th>Input Volt. 100 [V]</th><th>Input Volt. 132 [V]</th></tr><tr><td>0.00</td><td>1.75</td><td>2.09</td><td>2.93</td></tr><tr><td>0.10</td><td>3.55</td><td>3.86</td><td>4.63</td></tr><tr><td>0.20</td><td>5.34</td><td>5.63</td><td>6.34</td></tr><tr><td>0.30</td><td>7.12</td><td>7.38</td><td>8.05</td></tr><tr><td>0.40</td><td>8.87</td><td>9.14</td><td>9.76</td></tr><tr><td>0.50</td><td>10.68</td><td>10.93</td><td>11.52</td></tr><tr><td>0.60</td><td>12.47</td><td>12.69</td><td>13.29</td></tr><tr><td>0.70</td><td>14.21</td><td>14.41</td><td>14.96</td></tr><tr><td>0.77</td><td>15.46</td><td>15.63</td><td>16.17</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table>				Load Current	Input Power [W]			Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]	0.00	1.75	2.09	2.93	0.10	3.55	3.86	4.63	0.20	5.34	5.63	6.34	0.30	7.12	7.38	8.05	0.40	8.87	9.14	9.76	0.50	10.68	10.93	11.52	0.60	12.47	12.69	13.29	0.70	14.21	14.41	14.96	0.77	15.46	15.63	16.17	—	—	—	—	—	—	—	—	—	—	—	—
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Model LCA10S-15		Temperature 25°C Testing Circuitry Figure A																																
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Input Voltage [V]	Efficiency [%]																																	
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Model		LCA10S-15	
Item		Efficiency (by Load Current) 効率（負荷電流特性）	
Output		_____	

1. Graph

—△—

Input Volt. 85V

—□—

Input Volt. 100V

—○—

Input Volt. 132V

Efficiency [%]

80

70

60

50

40

30

0

0.2

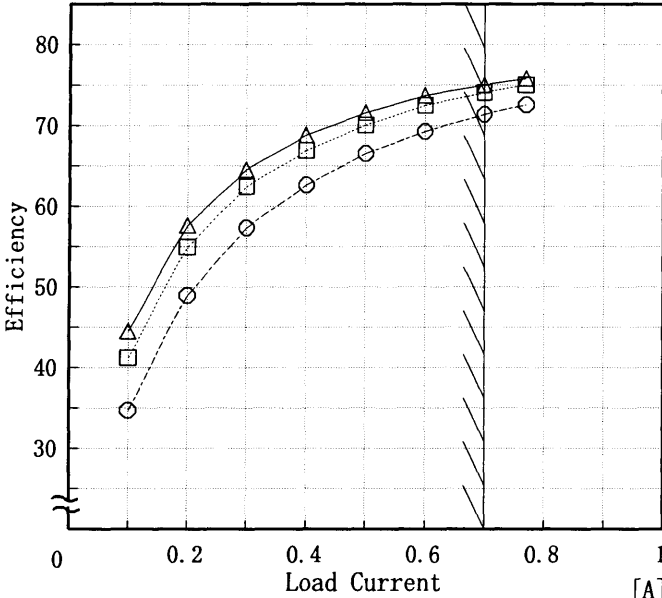
0.4

0.6

0.8

1

Load Current [A]



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. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]
0.10	44.5	41.2	34.7
0.20	57.7	55.0	49.0
0.30	64.5	62.4	57.4
0.40	68.8	66.9	62.6
0.50	71.6	70.1	66.5
0.60	73.7	72.5	69.3
0.70	75.0	74.1	71.4
0.77	75.8	75.1	72.6
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

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<div><div><div>□</div><div>Load 50%</div></div><div><div>△</div><div>Load 100%</div></div></div> <div><div>Hold-Up Time [mS]</div><div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div>0</div><div>80</div><div>90</div><div>100</div><div>110</div><div>120</div><div>130</div><div>140</div><div>150</div></div><div>Input Voltage [V]</div></div>				<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Hold-Up Time [mS]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>75</td><td>33</td><td>14</td></tr><tr><td>80</td><td>37</td><td>16</td></tr><tr><td>85</td><td>43</td><td>19</td></tr><tr><td>90</td><td>48</td><td>22</td></tr><tr><td>100</td><td>59</td><td>29</td></tr><tr><td>110</td><td>71</td><td>36</td></tr><tr><td>120</td><td>85</td><td>44</td></tr><tr><td>132</td><td>102</td><td>54</td></tr><tr><td>140</td><td>115</td><td>62</td></tr></table>				Input Voltage [V]	Hold-Up Time [mS]		Load 50%	Load 100%	75	33	14	80	37	16	85	43	19	90	48	22	100	59	29	110	71	36	120	85	44	132	102	54	140	115	62
Input Voltage [V]	Hold-Up Time [mS]																																						
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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。</p> <p>(注)斜線は定格入力電圧範囲を示す。</p>																																							

Input Voltage [V]

75

80

85

90

100

110

120

132

140

Hold-Up Time [mS]

Load 50%

Load 100%

33

37

43

48

59

71

85

102

115

14

16

19

22

29

36

44

54

62

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

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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。

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Model LCA10S-15

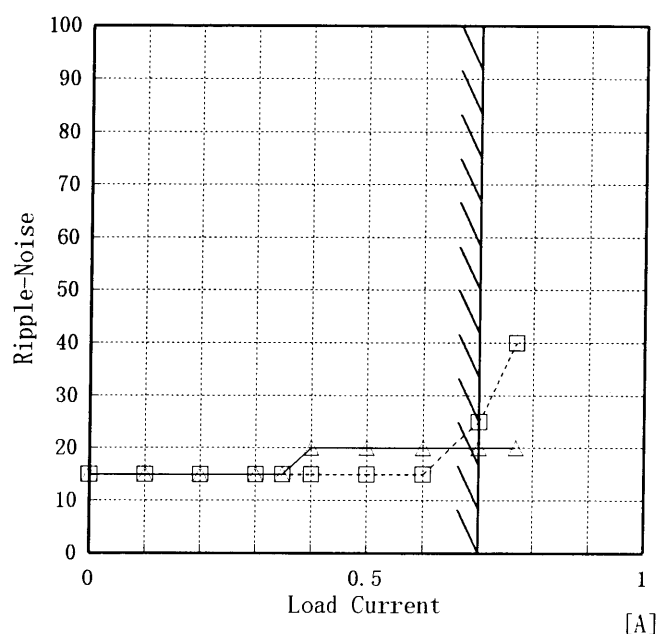
Item Ripple-Noise リップルノイズ

Object +15.0V0.7A

Temperature 25°C
Testing Circuitry Figure A

1. Graph

-----□----- Input Volt. 85V
 -----△----- Input Volt. 132V



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

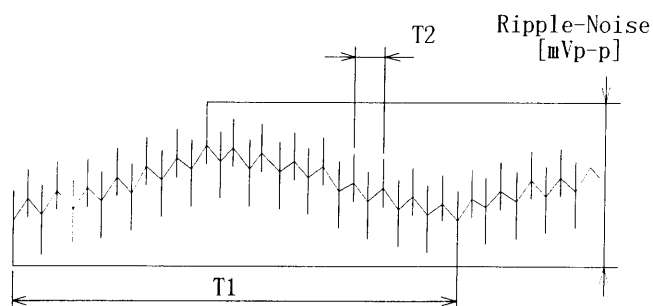


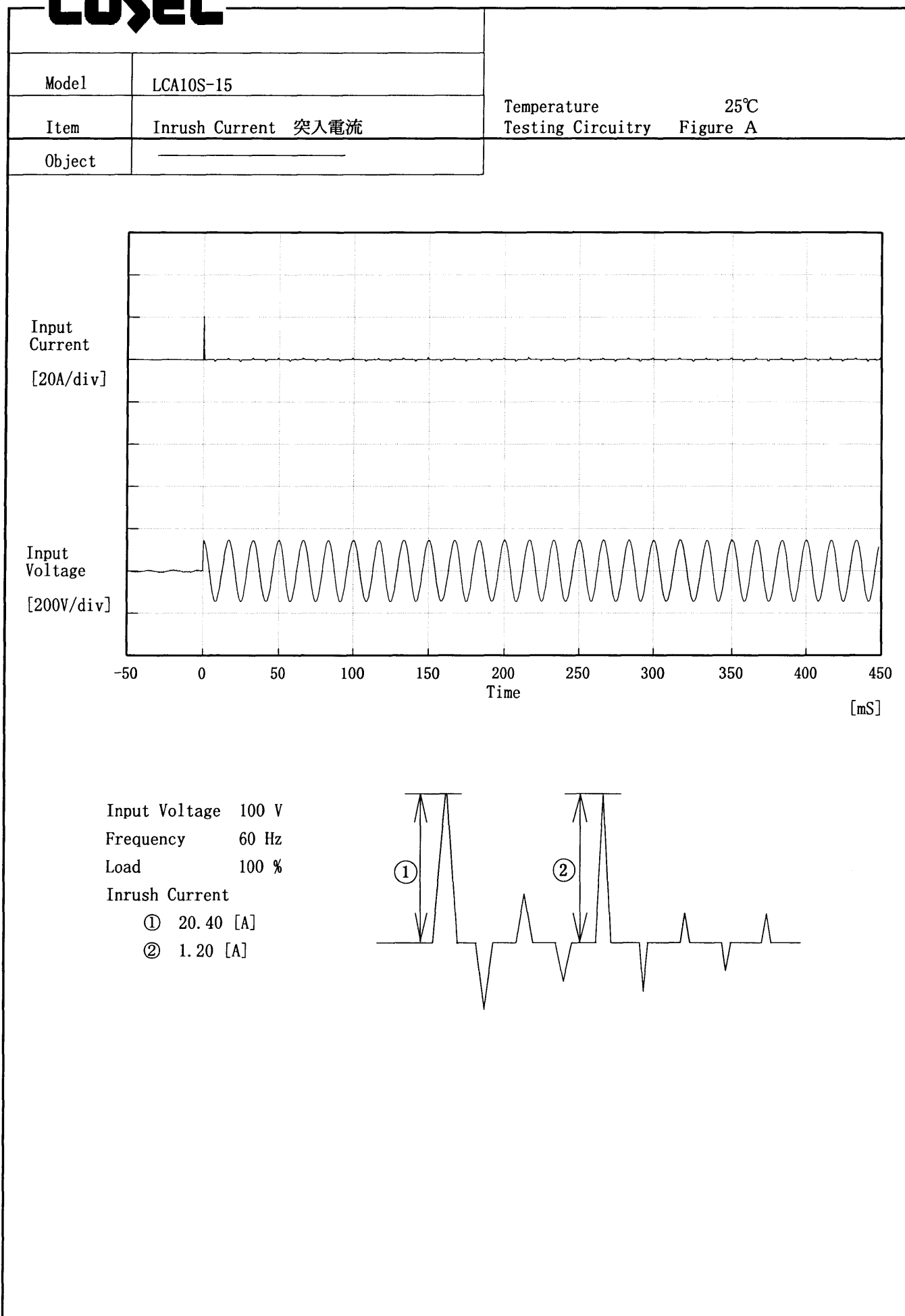
Fig. Complex Ripple Wave Form
 図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 85 [V]	Input Volt. 132 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.00	15	15
0.10	15	15
0.20	15	15
0.30	15	15
0.35	15	15
0.40	15	20
0.50	15	20
0.60	15	20
0.70	25	20
0.77	40	20
—	—	—

COSEL

COSEL																																																										
Model	LCA10S-15																																																									
Item	Overcurrent Protection 過電流保護	Temperature	25℃																																																							
Object	+15.0V0.7A	Testing Circuitry	Figure A																																																							
1. Graph		2. Values																																																								
<div><div><div></div><div></div><div></div></div><div><div>Input Volt. 85 V</div><div>Input Volt. 100 V</div><div>Input Volt. 132 V</div></div></div> <div><div>[V]</div><div>20.0</div><div>15.0</div><div>10.0</div><div>5.0</div><div>0.0</div></div> <div><div>Output Voltage</div><div>[V]</div></div> <div><div>0</div><div>0.2</div><div>0.4</div><div>0.6</div><div>0.8</div><div>1</div></div> <div><div>Load Current</div><div>[A]</div></div>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 85[V]</th><th>Input Volt. 100[V]</th><th>Input Volt. 132[V]</th></tr><tr><td>15.00</td><td>0.91</td><td>0.94</td><td>0.91</td></tr><tr><td>14.25</td><td>0.91</td><td>0.94</td><td>0.91</td></tr><tr><td>13.50</td><td>0.91</td><td>0.94</td><td>0.90</td></tr><tr><td>12.00</td><td>0.91</td><td>0.93</td><td>0.89</td></tr><tr><td>10.50</td><td>0.91</td><td>0.91</td><td>0.86</td></tr><tr><td>9.00</td><td>0.89</td><td>0.89</td><td>0.84</td></tr><tr><td>7.50</td><td>0.86</td><td>0.85</td><td>0.81</td></tr><tr><td>6.00</td><td>0.82</td><td>0.81</td><td>0.77</td></tr><tr><td>4.50</td><td>0.77</td><td>0.75</td><td>0.73</td></tr><tr><td>3.00</td><td>0.69</td><td>0.69</td><td>0.68</td></tr><tr><td>1.50</td><td>0.61</td><td>0.62</td><td>0.62</td></tr><tr><td>0.00</td><td>0.50</td><td>0.52</td><td>0.64</td></tr></table>		Output Voltage [V]	Load Current [A]			Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]	15.00	0.91	0.94	0.91	14.25	0.91	0.94	0.91	13.50	0.91	0.94	0.90	12.00	0.91	0.93	0.89	10.50	0.91	0.91	0.86	9.00	0.89	0.89	0.84	7.50	0.86	0.85	0.81	6.00	0.82	0.81	0.77	4.50	0.77	0.75	0.73	3.00	0.69	0.69	0.68	1.50	0.61	0.62	0.62	0.00	0.50	0.52	0.64
Output Voltage [V]	Load Current [A]																																																									
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COSEL

COSEL

Model	LCA10S-15	Temperature 25℃ Testing Circuitry Figure A
Item	Dynamic Load Responce 動的負荷変動	
Object	+15.0V0.7A	

Input Volt. 100 V

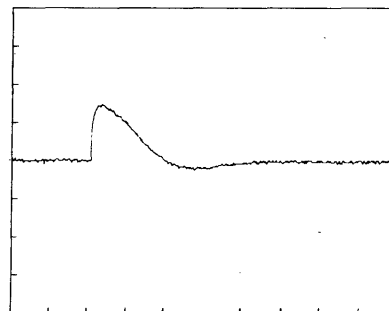
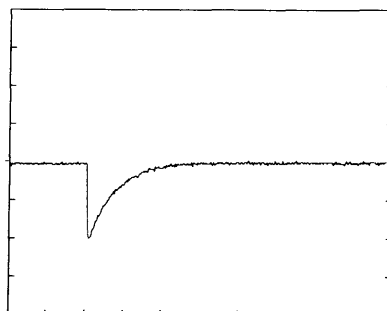
Cycle 1000 mS

Load Current



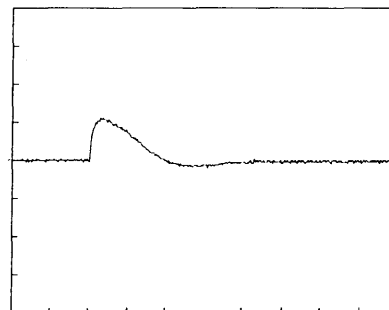
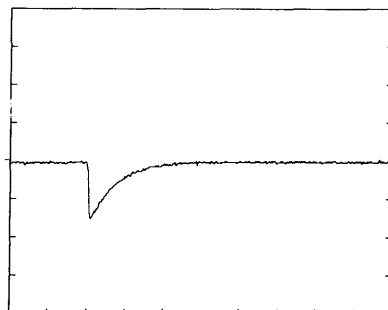
Load 0% ↔

Load 100 %



Load 0% ↔

Load 50 %



200 mV/div

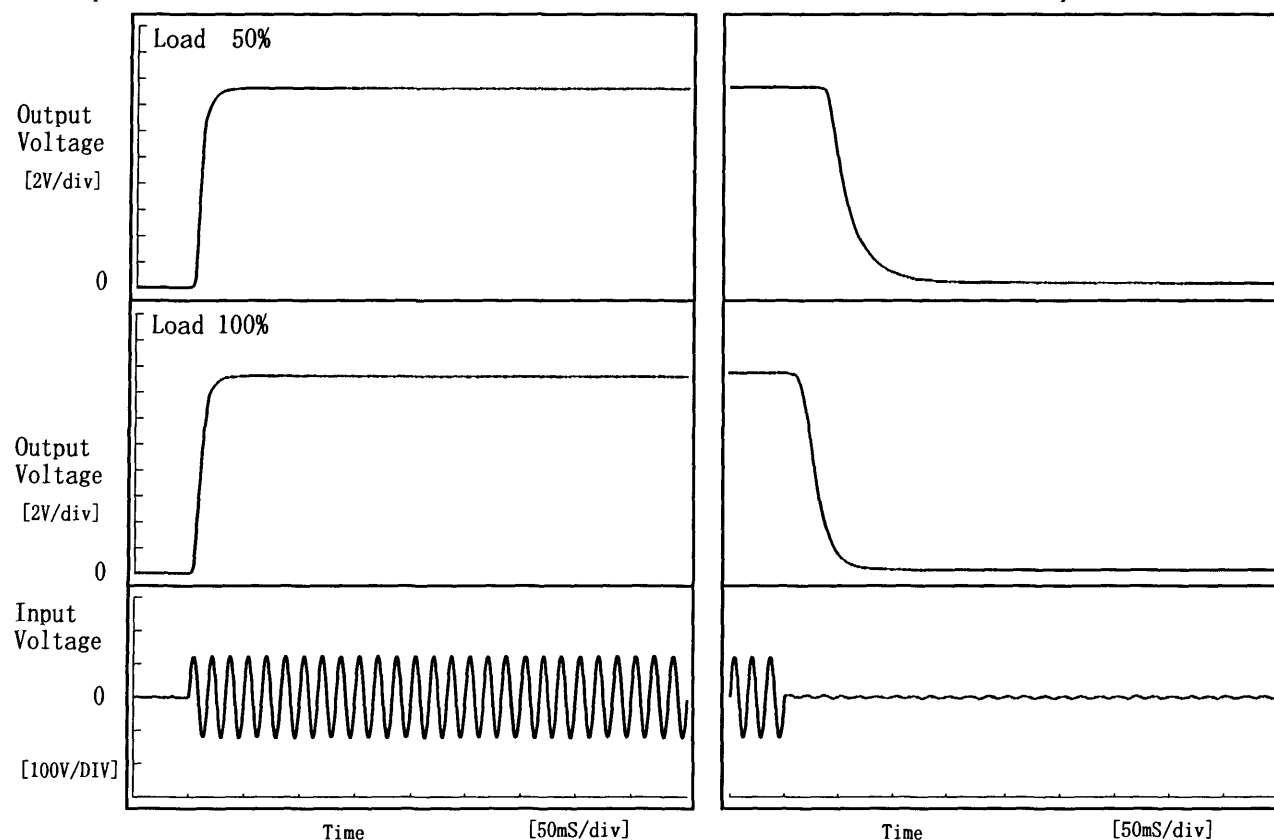
10 mS/div

COSEL

Model	LCA10S-15	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	+15.0V0.7A		

1. Graph

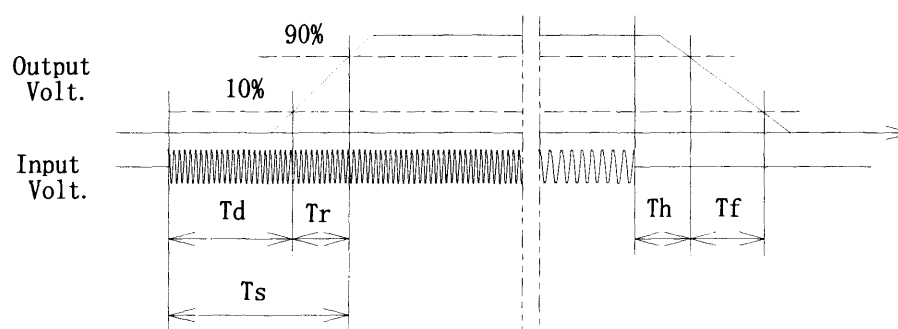
Input Volt. 85 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	3.8	12.0	15.8	42.5	51.0
100 %	3.8	12.8	16.5	18.5	32.3



COSEL

Model LCA10S-15		Testing Circuitry Figure A																																						
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧																																							
Object	+15.0V0.7A																																							
<p>1. Graph</p> <p>[V]</p> <p>100</p> <p>80</p> <p>60</p> <p>40</p> <p>20</p> <p>0</p> <p>Input Voltage</p> <p>-30 -10 10 30 50 70</p> <p>Ambient Temperature [°C]</p> <p>Load 50% (dotted line with square markers)</p> <p>Load 100% (solid line with triangle markers)</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p> <p>(注) 斜線は定格周囲温度範囲を示す。</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Input Voltage [V]</th></tr> <tr> <th>Load 50%</th><th>Load 100%</th></tr> </thead> <tbody> <tr><td>-20</td><td>36</td><td>63</td></tr> <tr><td>-10</td><td>36</td><td>63</td></tr> <tr><td>0</td><td>35</td><td>63</td></tr> <tr><td>10</td><td>35</td><td>62</td></tr> <tr><td>20</td><td>35</td><td>62</td></tr> <tr><td>25</td><td>35</td><td>62</td></tr> <tr><td>30</td><td>35</td><td>62</td></tr> <tr><td>40</td><td>35</td><td>61</td></tr> <tr><td>50</td><td>35</td><td>61</td></tr> <tr><td>60</td><td>35</td><td>60</td></tr> <tr><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	36	63	-10	36	63	0	35	63	10	35	62	20	35	62	25	35	62	30	35	62	40	35	61	50	35	61	60	35	60	—	—	—
Ambient Temperature [°C]	Input Voltage [V]																																							
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50	35	61																																						
60	35	60																																						
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COSEL

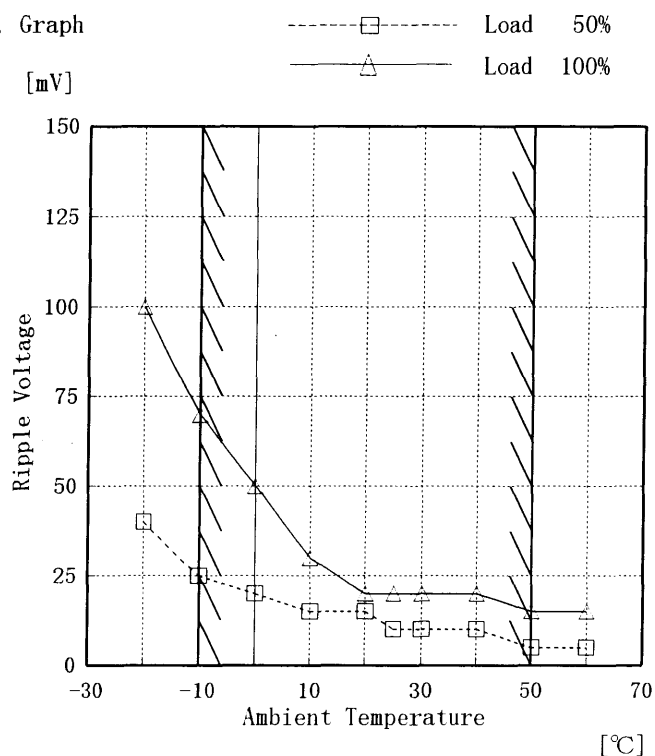
Model LCA10S-15

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

Object +15.0V0.7A

Testing Circuitry Figure A

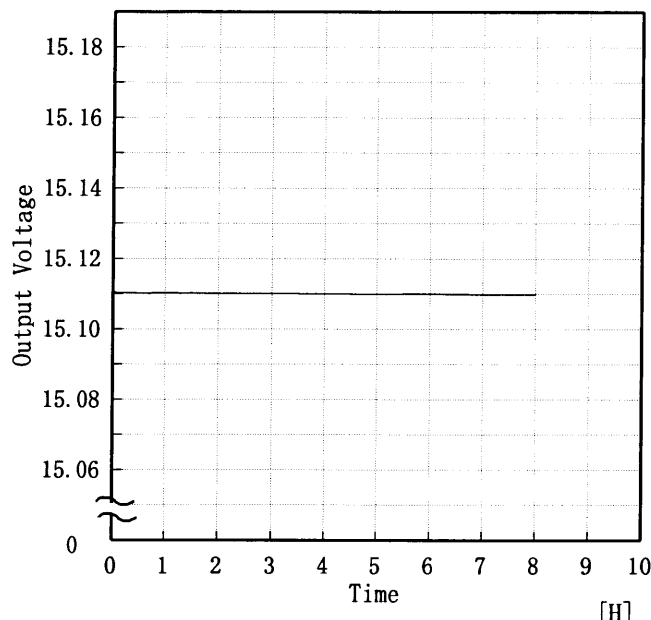
1. Graph



2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-20	40	100
-10	25	70
0	20	50
10	15	30
20	15	20
25	10	20
30	10	20
40	10	20
50	5	15
60	5	15
—	—	—

COSEL

COSEL																									
Model	LCA10S-15	Temperature 25℃ Testing Circuitry Figure A																							
Item	Time Lapse Drift 経時ドリフト																								
Object	+15.0V0.7A																								
1. Graph		2.Values																							
<div>[V]</div> <div></div> <div>Output Voltage</div> <div>Time [H]</div> <div>Input Volt. 100V</div> <div>Load 100%</div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>15.111</td></tr><tr><td>0.5</td><td>15.110</td></tr><tr><td>1.0</td><td>15.110</td></tr><tr><td>2.0</td><td>15.110</td></tr><tr><td>3.0</td><td>15.110</td></tr><tr><td>4.0</td><td>15.110</td></tr><tr><td>5.0</td><td>15.110</td></tr><tr><td>6.0</td><td>15.110</td></tr><tr><td>7.0</td><td>15.110</td></tr><tr><td>8.0</td><td>15.110</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.111	0.5	15.110	1.0	15.110	2.0	15.110	3.0	15.110	4.0	15.110	5.0	15.110	6.0	15.110	7.0	15.110	8.0	15.110
Time since start [H]	Output Voltage [V]																								
0.0	15.111																								
0.5	15.110																								
1.0	15.110																								
2.0	15.110																								
3.0	15.110																								
4.0	15.110																								
5.0	15.110																								
6.0	15.110																								
7.0	15.110																								
8.0	15.110																								

Model		LCA10S-15	Testing Circuitry Figure A
Item		Output Voltage Accuracy 定電圧精度	
Object		+15.0V0.7A	

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 : 0~0.7 A

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

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

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 °C

入力電圧 85~132 V

負荷電流 0~0.7 A

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

* 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 (Ratio) [%]
Maximum Voltage	-10	132	0.0	15.111	±13	±0.1
Minimum Voltage	50	132	0.7	15.085		

COSEL

		Testing Circuitry Figure A
Model	LCA10S-15	
Item	Condensation 結露特性	
Object	+15.0V0.7A	

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]	15.111	Input Volt.:100V, Load Current:0.7A
Line Regulation [mV]	2	Input Volt.:85~132V, Load Current:0.7A
Load Regulation [mV]	6	Input Volt.:100V, Load Current:0~0.7A

COSEL

Model		LCA10S-15		Temperature	25℃
Item		Leakage Current 漏洩電流		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	0.07	0.09	0.10
(B) IEC60950	0.07	0.09	0.11

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

2. Condition

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

交流入力 of 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	LCA10S-15	Temperature Testing Circuitry	25℃ Figure C
Item	Line Noise Tolerance 入力雑音耐量		
Object	+15.0V0.7A		

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

2. Conditions

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

COSEL

Model	LCA10S-15	Temperature	25°C
Item	Conducted Emission 雑音端子電圧	Testing Circuitry	Figure D
Object			

1. Graph

Remarks

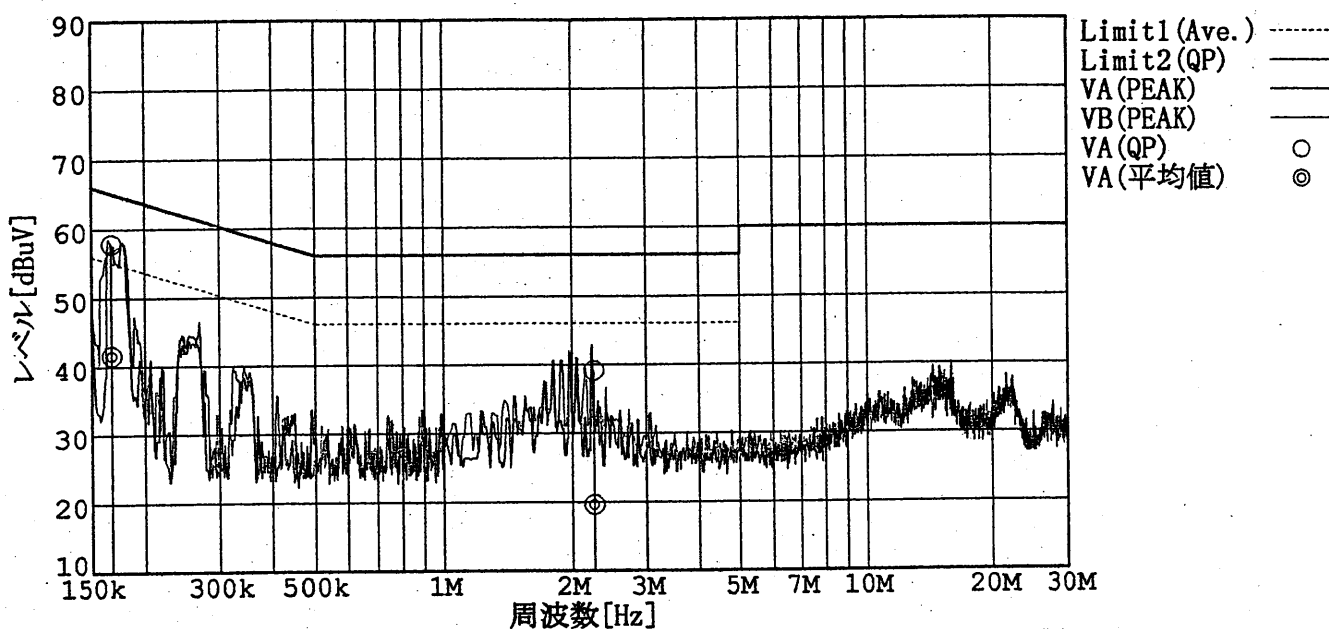
Input Volt. 100 V (VCCI Class B)

120 V (FCC Class B)

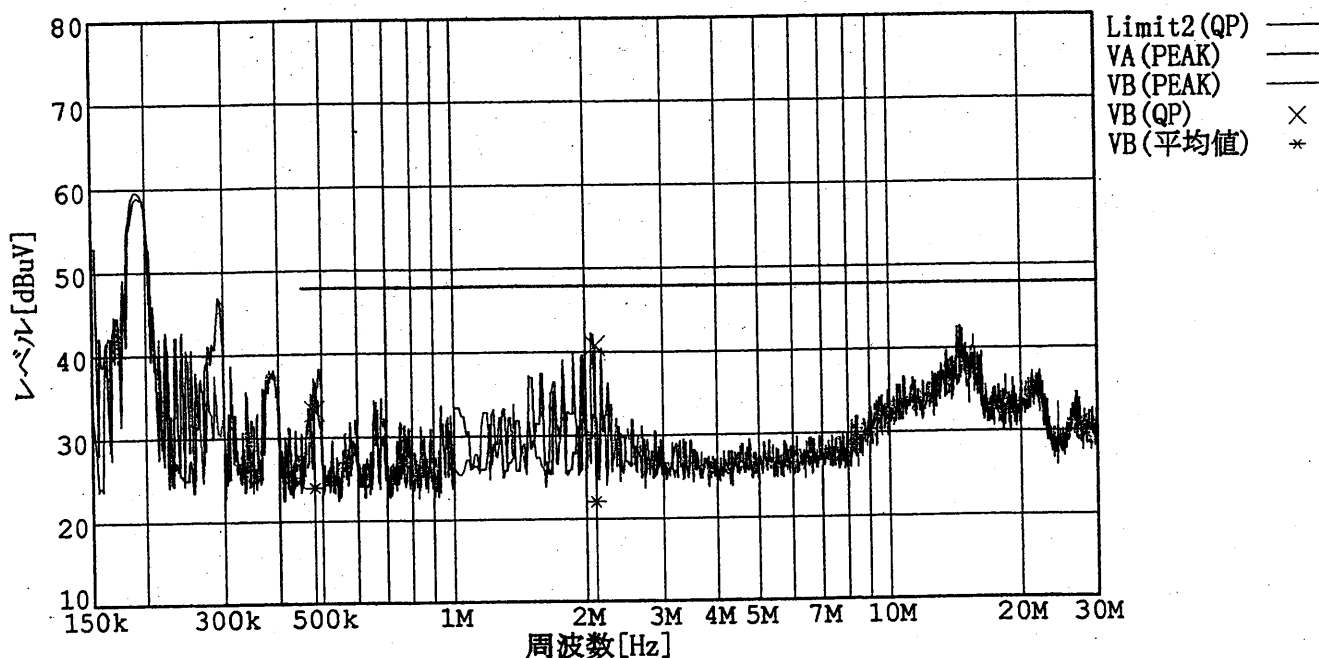
Load 100 %

規格 1: [VCCI] Class B(平均値)

規格 2: [VCCI] Class B(QP)



規格 2: [FCC Part15] Class B



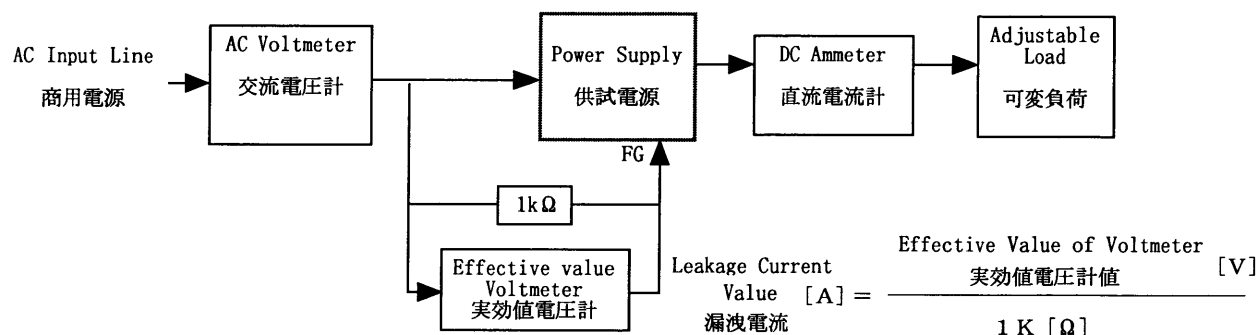
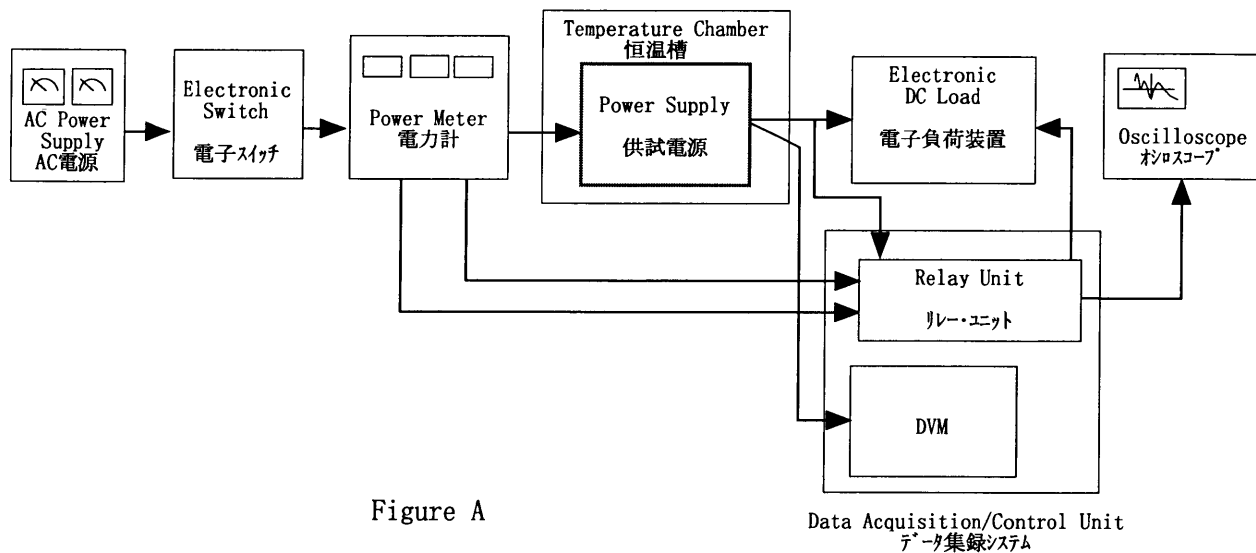


Figure B (DENTORI)

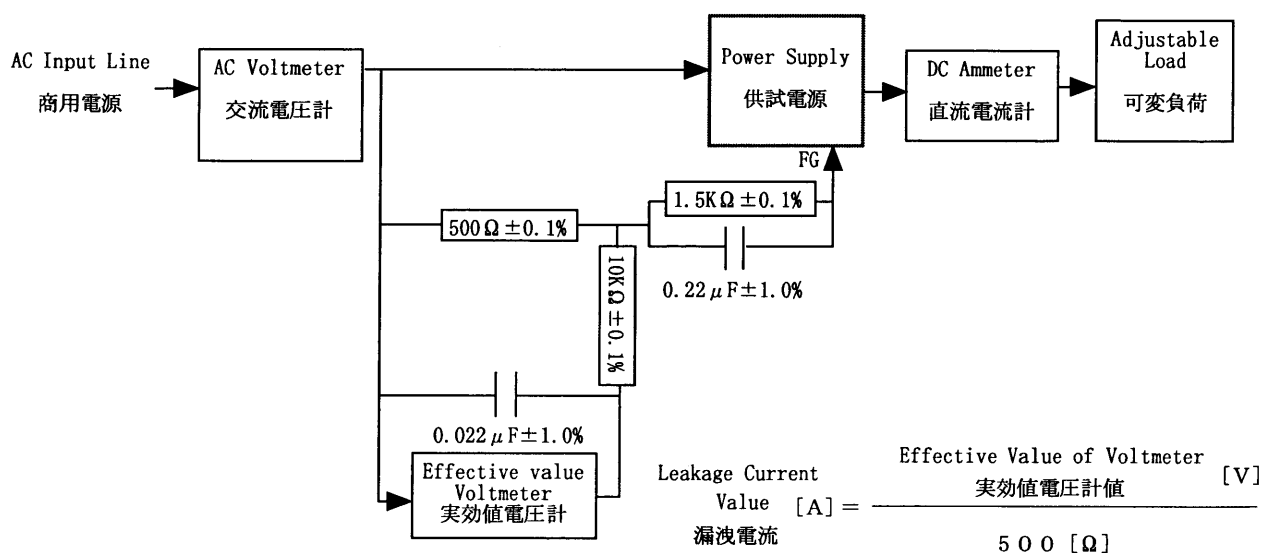


Figure B (IEC 60950)

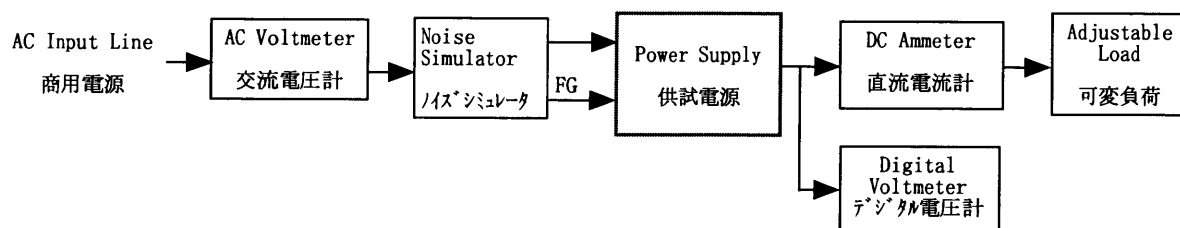


Figure C

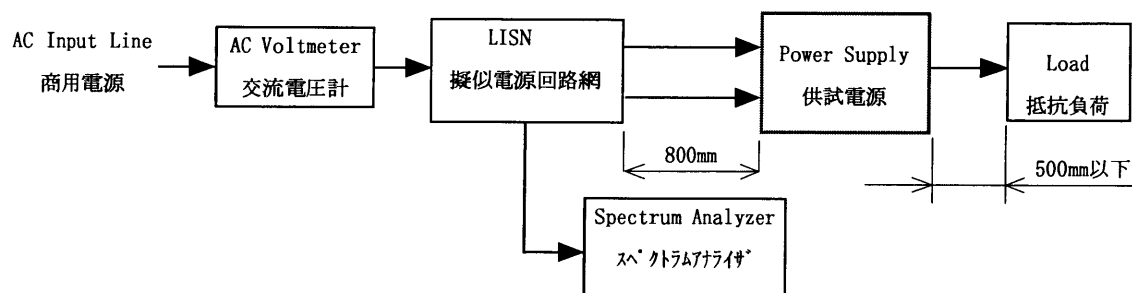


Figure D

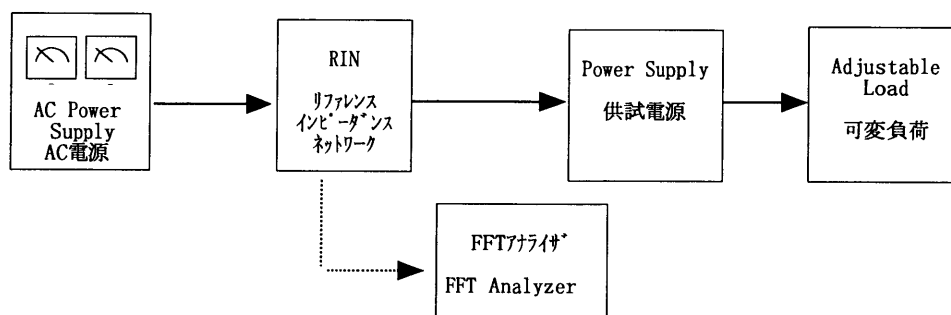


Figure E