COSEL

TEST DATA OF LHA100F-15

Regulated DC Power Supply
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Approved by : _Junya Kaneda_

Junya Kaneda   Design Manager

Prepared by : _Shuto Takai_

Shuto Takai   Design Engineer

COSEL CO.,LTD.

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BC-11415

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Model	LHA100F-15
Item	Input Current (by Load Current)
Object	————————

Temperature　　25°C
Testing Circuitry　Figure A

1.Graph

————△———— Input Volt. 100V
- - -⊟- - - Input Volt. 200V
—·—○—·— Input Volt. 230V

Load Current [A]

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

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.052	0.091	0.103
1.40	0.277	0.203	0.202
2.80	0.512	0.309	0.295
4.20	0.748	0.417	0.389
5.60	0.988	0.532	0.486
6.70	1.181	0.621	0.565
7.37	1.301	0.676	0.613
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA100F-15
Item	Efficiency (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph

—△— Input Volt. 100V
---⊟--- Input Volt. 200V
—·—○—·— Input Volt. 230V

Efficiency [%] vs Load Current [A]

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

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
1.40	84.3	83.4	82.0
2.80	87.1	88.1	87.8
4.20	88.0	89.7	89.6
5.60	88.0	89.8	90.1
6.70	88.0	90.0	90.1
7.37	87.8	90.0	90.1
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA100F-15
Item	Power Factor (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph

— △ — Input Volt. 100V
- - - ⊟ - - - Input Volt. 200V
— · — ○ — · — Input Volt. 230V

Power Factor vs Load Current [A]

2.Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.245	0.072	0.062
1.40	0.912	0.628	0.560
2.80	0.953	0.782	0.714
4.20	0.970	0.853	0.796
5.60	0.977	0.889	0.844
6.70	0.978	0.909	0.868
7.37	0.979	0.918	0.880
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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

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Model	LHA100F-15
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A

Input Current [20A/div]

Input Voltage [100V/div]

Time [50ms/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
13.6 A
Secondary inrush current :
4.0 A

Input Current [20A/div]

Input Voltage [200V/div]

Time [50ms/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
34.0 A
Secondary inrush current :
2.8 A

Primary inrush current ⟷ Secondary inrush current

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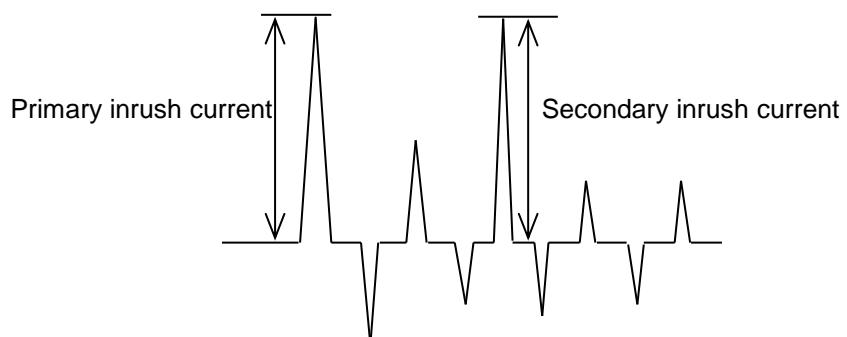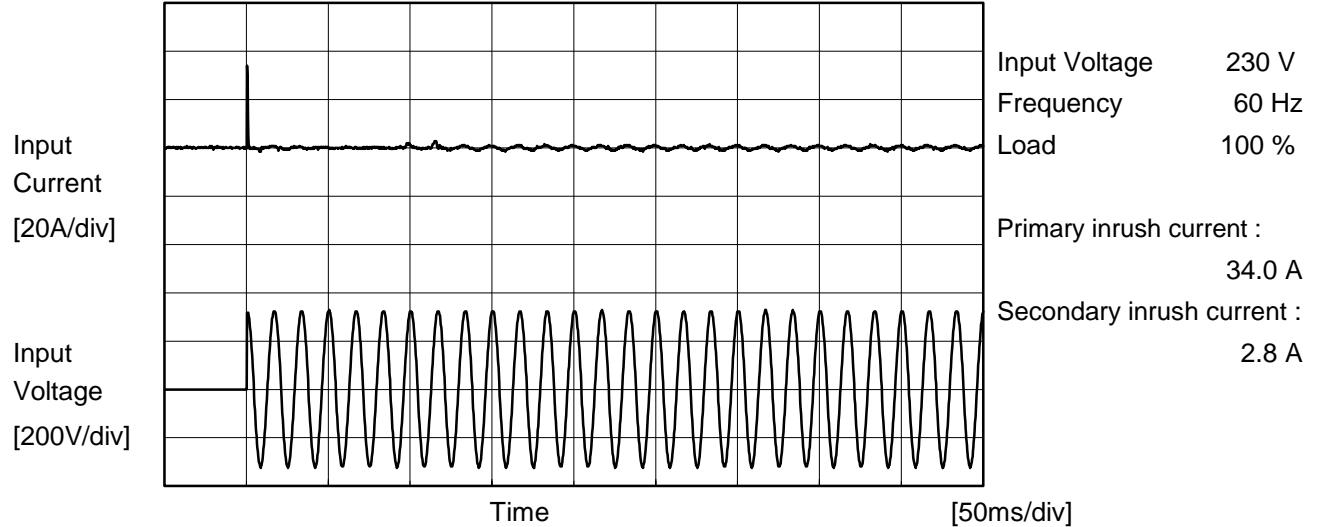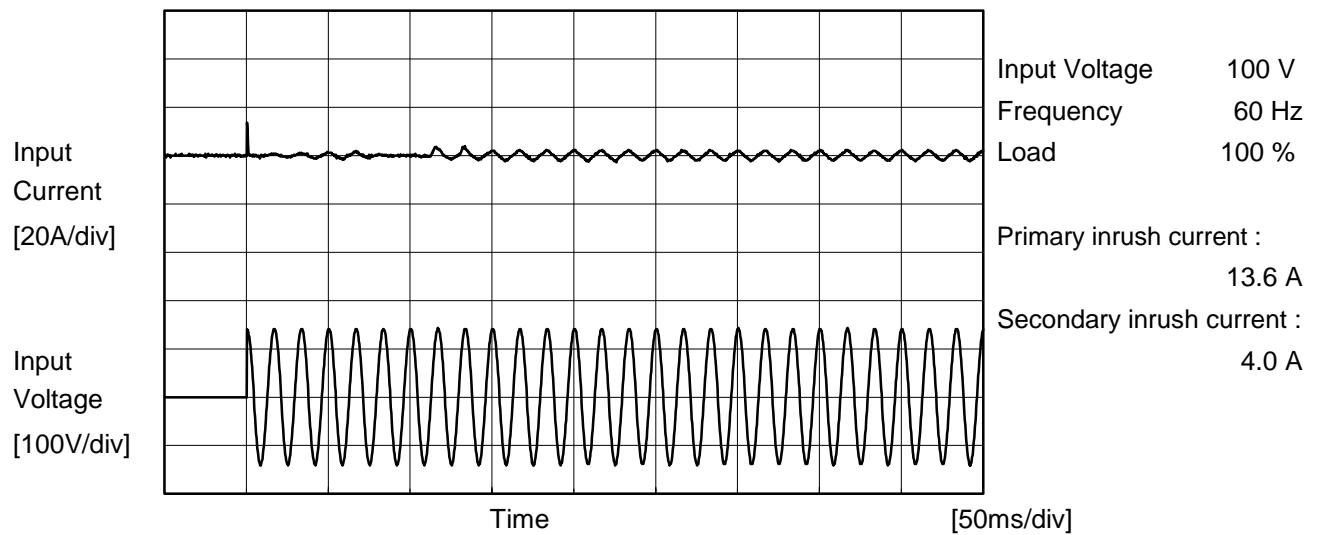
Model	LHA100F-15

Item	Leakage Current

Object	————————————

Temperature 25°C
Testing Circuitry Figure B

1.Results

[mA]

Standards	Testing Circuitry	Measuring Method	Input Volt.			Note
			100 [V]	230 [V]	240 [V]	
DEN-AN	Figure B-1	Both phases	0.16	0.33	0.34	Operation
		One of phases	0.25	0.65	0.67	Stand by
IEC62368-1	Figure B-2	Both phases	0.11	0.26	0.27	Operation
		One of phases	0.20	0.52	0.54	Stand by
	Figure B-3	Both phases	0.10	0.26	0.27	Operation
		One of phases	0.20	0.52	0.55	Stand by

The value for "One of phases" is the reference value only.

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

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Model	LHA100F-15
Item	Line Regulation
Object	+15V6.7A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%
——△—— Load 100%

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

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	15.158	-
90	15.158	15.156
100	15.158	15.156
120	15.158	15.156
200	15.158	15.156
230	15.158	15.156
264	15.158	15.156
280	15.158	15.156
--	-	-

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Model	LHA100F-15
Item	Load Regulation
Object	+15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

——△—— Input Volt. 100V
---□--- Input Volt. 200V
—·—○—·— Input Volt. 230V

Output Voltage [V]

Load Current [A]

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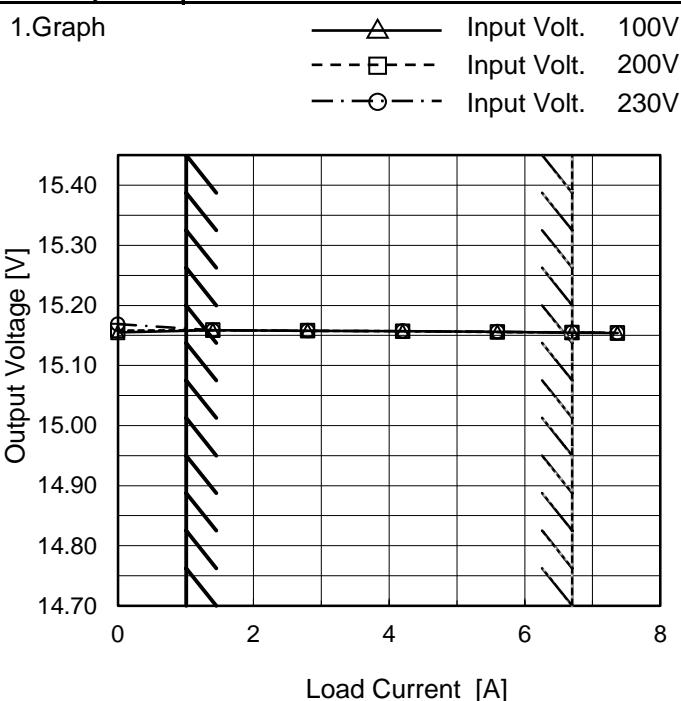
2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	15.155	15.158	15.169
1.40	15.159	15.159	15.159
2.80	15.158	15.158	15.158
4.20	15.157	15.157	15.157
5.60	15.156	15.156	15.156
6.70	15.155	15.155	15.155
7.37	15.154	15.154	15.154
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA100F-15
Item	Dynamic Load Response
Object	+15V6.7A

Temperature   25°C
Testing Circuitry   Figure A

Input Volt.   230 V
Cycle   1000 ms

t1,t2 = 50 μ s

Load Current

t1   t2

Min.Load (0A)←→
  Load 100% (6.7A)

200 mV/div

1 ms/div   10 ms/div

Min.Load (0A)←→
  Load 50% (3.35A)

200 mV/div

1 ms/div   10 ms/div

Load 50% (3.35A)←→
  Load 100% (6.7A)

200 mV/div

1 ms/div   10 ms/div

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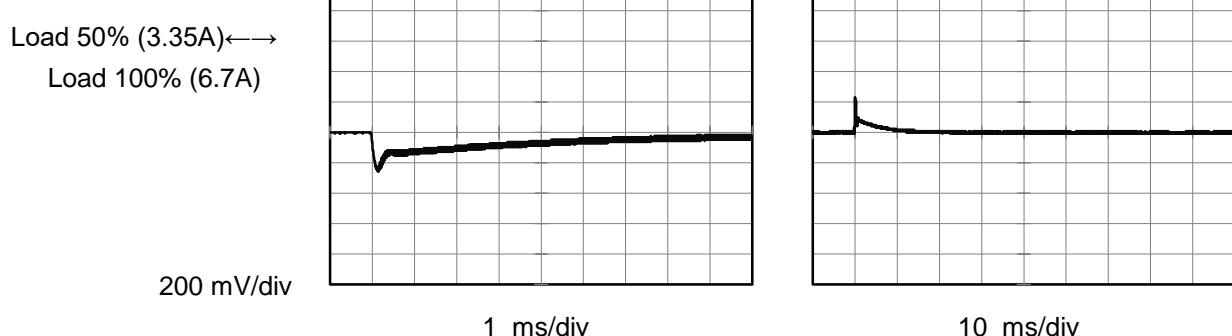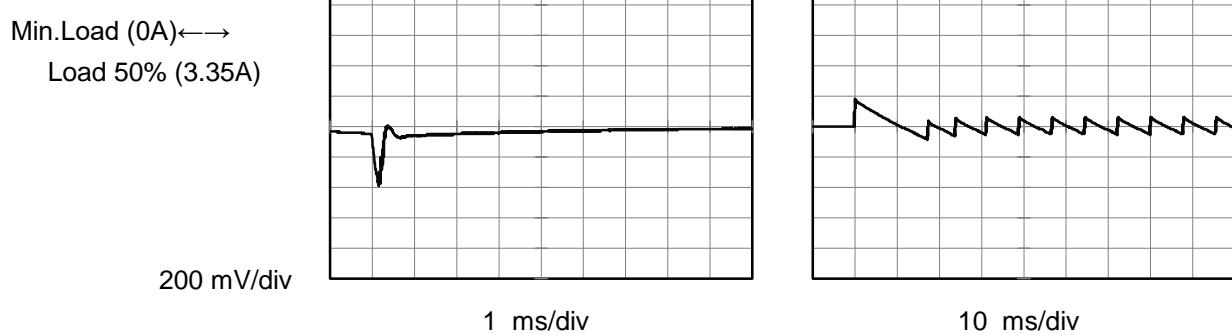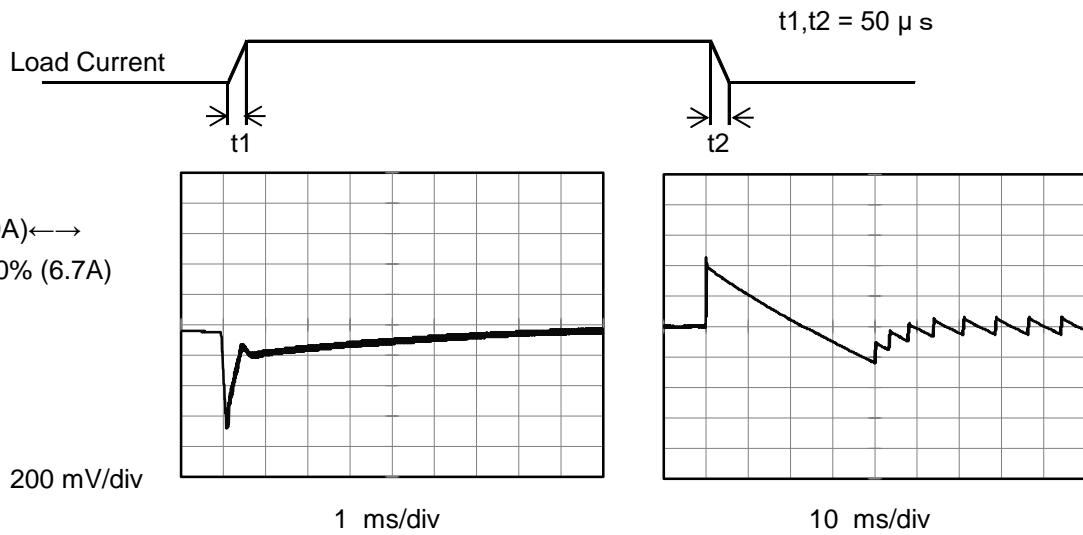
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Model	LHA100F-15
Item	Ripple-Noise （by Load Current）
Object	+15V6.7A

Temperature　　　25°C
Testing Circuitry　Figure C

1.Graph

```
————△———— Input Volt.  100V
—·—○—·—  Input Volt.  230V
```
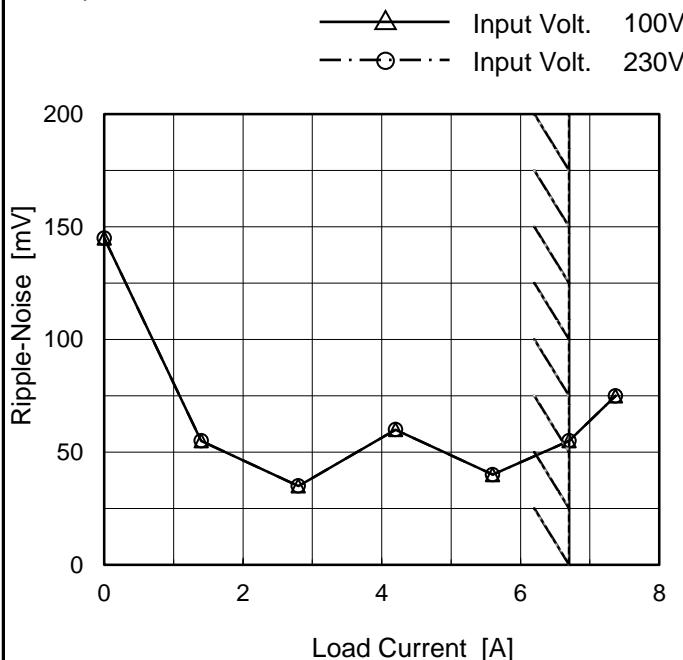

Load Current [A]

Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated
　　　load current.

T1: Due to AC Input Line
T2: Due to Switching

Ripple-Noise
[mVp-p]
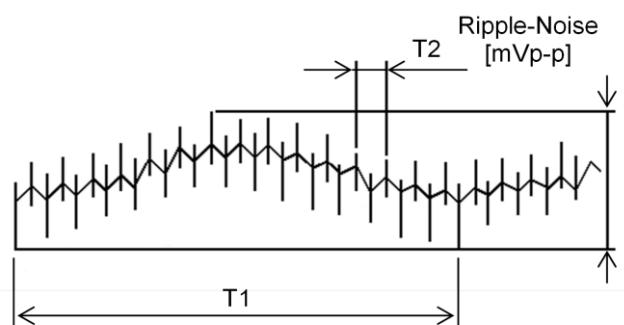
Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.00	145	145
1.40	55	55
2.80	35	35
4.20	60	60
5.60	40	40
6.70	55	55
7.37	75	75
--	-	-
--	-	-
--	-	-
--	-	-

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Model	LHA100F-15
Item	Ambient Temperature Drift
Object	+15V6.7A

Testing Circuitry   Figure A

1.Graph

```
———△——— Input Volt.  100V
- - -⊟- - - Input Volt.  200V
—·—○—·— Input Volt.  230V
```


Ambient Temperature [°C]

Load 100%

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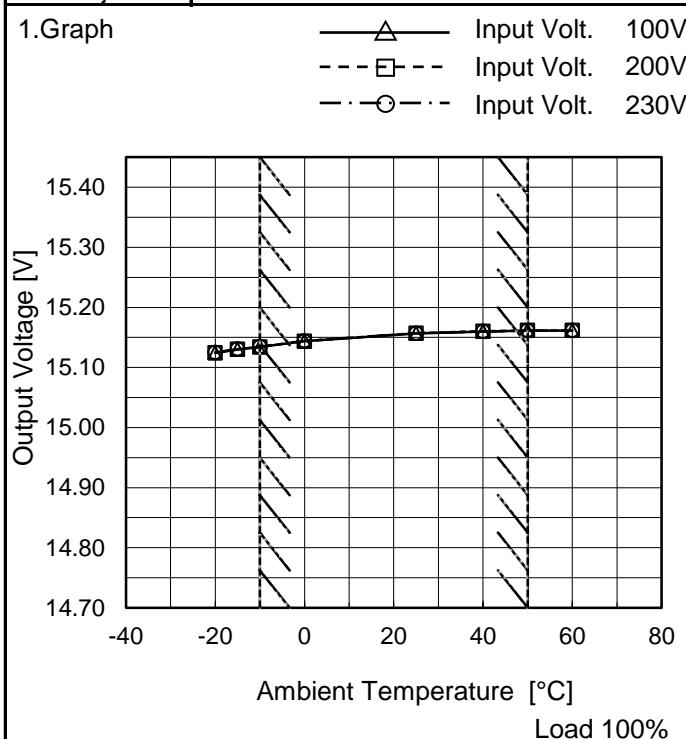
2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	15.124	15.125	15.125
-15	15.130	15.130	15.131
-10	15.134	15.134	15.135
0	15.144	15.144	15.144
25	15.157	15.157	15.157
40	15.160	15.160	15.160
50	15.161	15.162	15.161
60	15.162	15.162	15.161
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA100F-15
Item	Rise and Fall Time
Object	+15V6.7A

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

Load 100%

Output Volt.

[2V/div]

0

Load 100%

Output Volt.

[2V/div]

0

Input Volt.

0

Input Volt.   100 V

Input Volt.   230 V

Time   [100ms/div]

Time   [20ms/div]
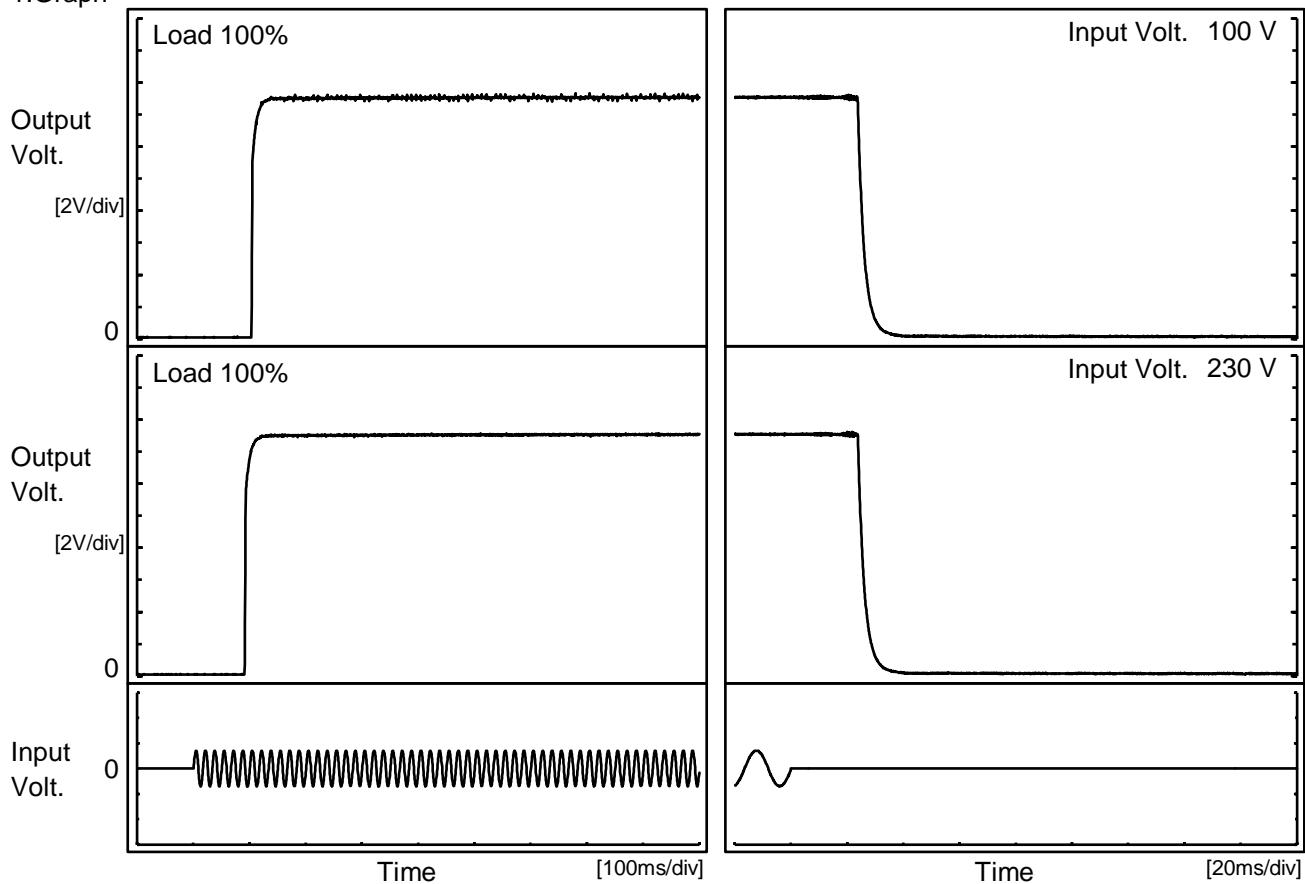
2.Values   [ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	104.0	9.0	113.0	23.9	5.2
230 V	92.0	8.5	100.5	24.0	5.2

Output Volt.

90%

10%

Input Volt.

Td   Tr

Th   Tf

Ts

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Model	LHA100F-15
Item	Hold-Up Time
Object	+15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

--- ⊟ --- Load 50%
——△—— Load 100%

Hold-Up Time [ms] vs Input Voltage [V]

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	47	-
90	48	24
100	48	24
120	48	24
200	48	24
230	48	24
264	48	24
280	49	25
--	-	-

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.

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Model	LHA100F-15
Item	Instantaneous Interruption Compensation
Object	+15V6.7A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

⟶△⟶ Input Volt. 100V
---☐--- Input Volt. 200V
—·—○—·— Input Volt. 230V

Instantaneous Compensation Time [ms]

Load Current [A]

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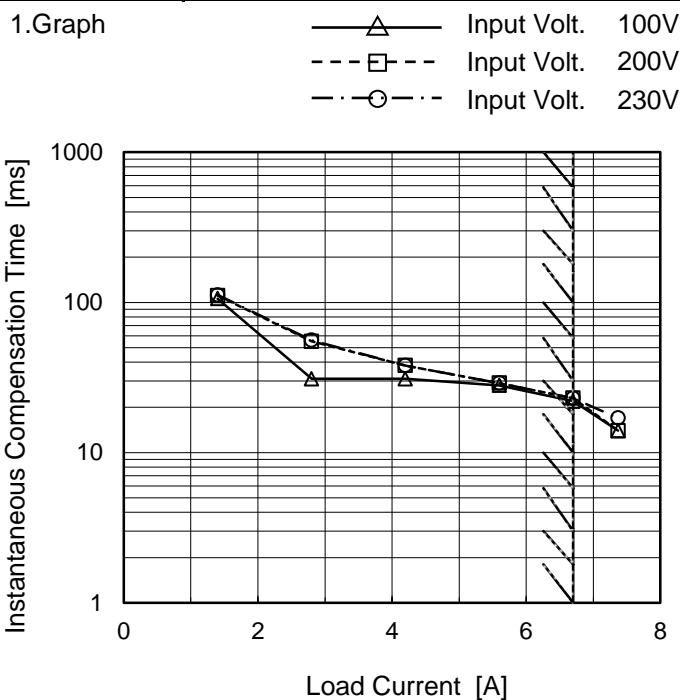
2.Values

Load Current	Time [ms]		
[A]	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
1.40	106	111	112
2.80	31	55	56
4.20	31	38	38
5.60	28	29	29
6.70	22	23	23
7.37	14	14	17
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA100F-15
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V6.7A

Testing Circuitry   Figure A

1.Graph

--- ⊟ --- Load 50%

——△—— Load 100%

Input Voltage [V] vs Ambient Temperature [°C]

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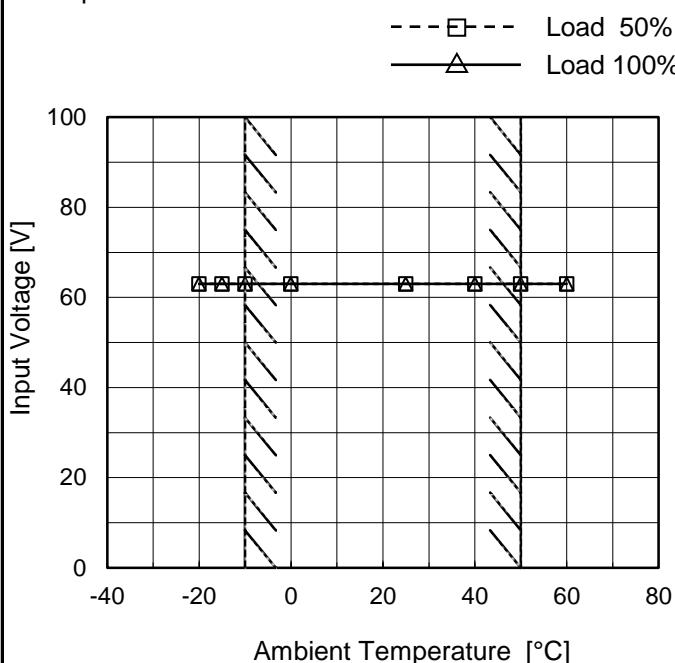
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	63	63
-15	63	63
-10	63	63
0	63	63
25	63	63
40	63	63
50	63	63
60	63	63
--	-	-
--	-	-
--	-	-

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COSEL

Model	LHA100F-15
Item	Overcurrent Protection
Object	+15V6.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

—————— Input Volt. 100V

——————— Input Volt. 230V
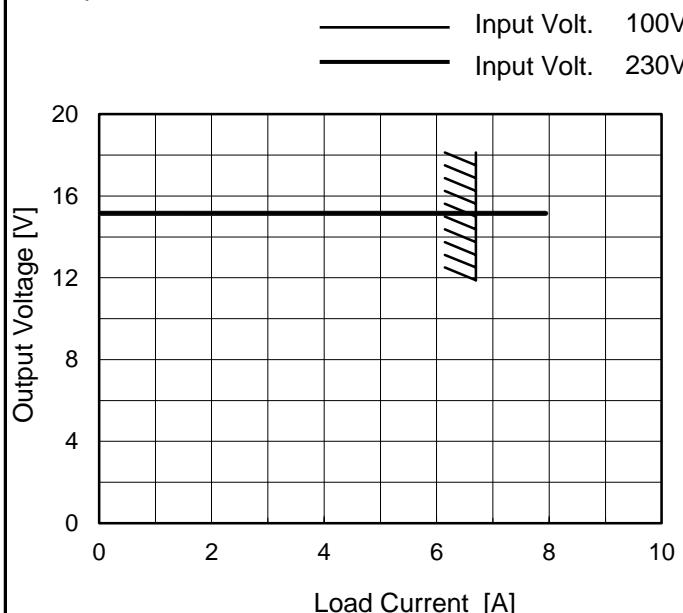
Load Current [A]

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

Overcurrent protection is Hiccup mode.

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
15.00	7.94	7.94
14.25	-	-
13.50	-	-
12.00	-	-
10.50	-	-
9.00	-	-
7.50	-	-
6.00	-	-
4.50	-	-
3.00	-	-
1.50	-	-
0.00	-	-

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COSEL

Model	LHA100F-15
Item	Overvoltage Protection
Object	+15V6.7A

Testing Circuitry   Figure A

1.Graph

——△—— Input Volt.   100V
- - -⊟- - - Input Volt.   230V

Ambient Temperature [°C]

Load 0%

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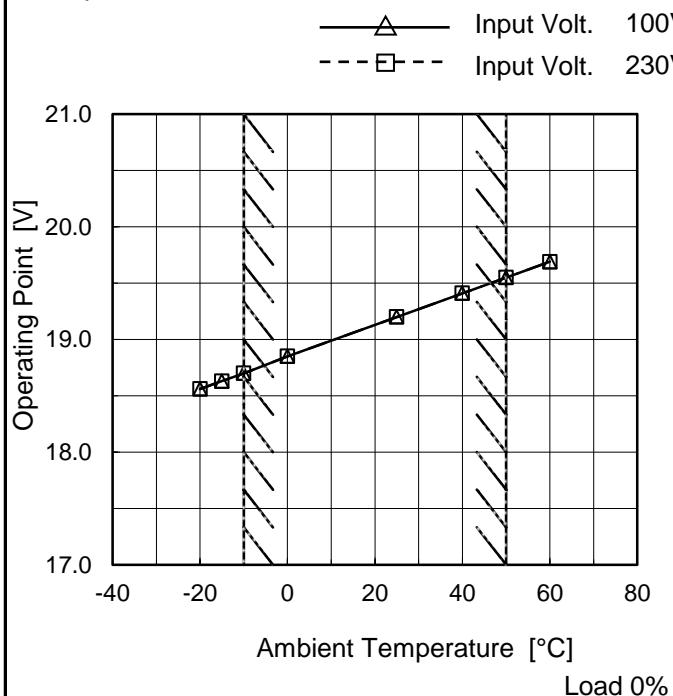
2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-20	18.56	18.56
-15	18.63	18.63
-10	18.70	18.70
0	18.85	18.85
25	19.20	19.20
40	19.41	19.41
50	19.55	19.55
60	19.69	19.69
--	-	-
--	-	-
--	-	-

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Figure A

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{1k\ [\Omega]}$$

Figure B-1 (DEN-AN)

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{500\ [\Omega]}$$
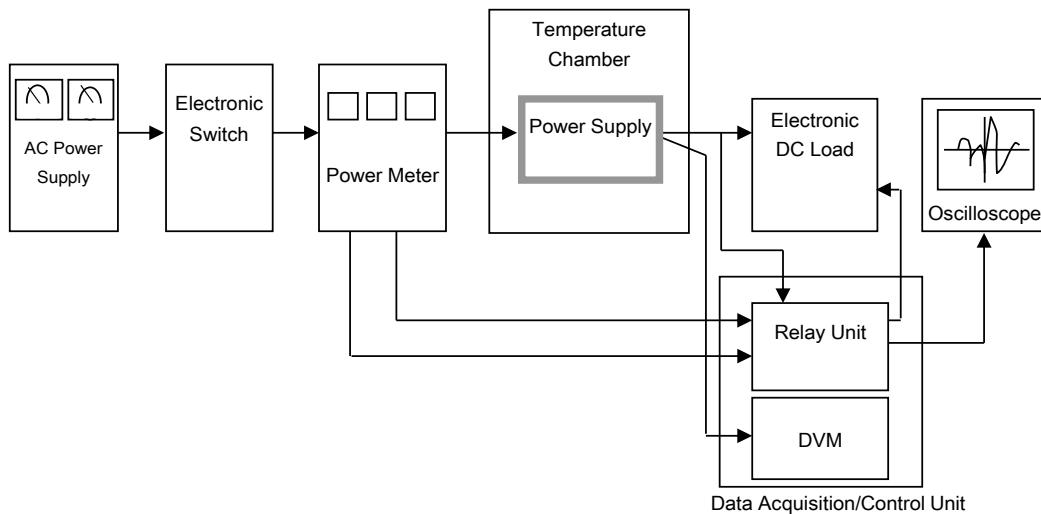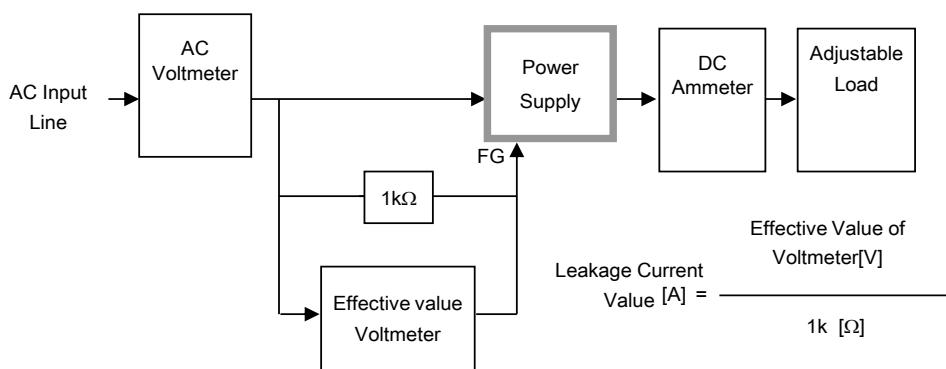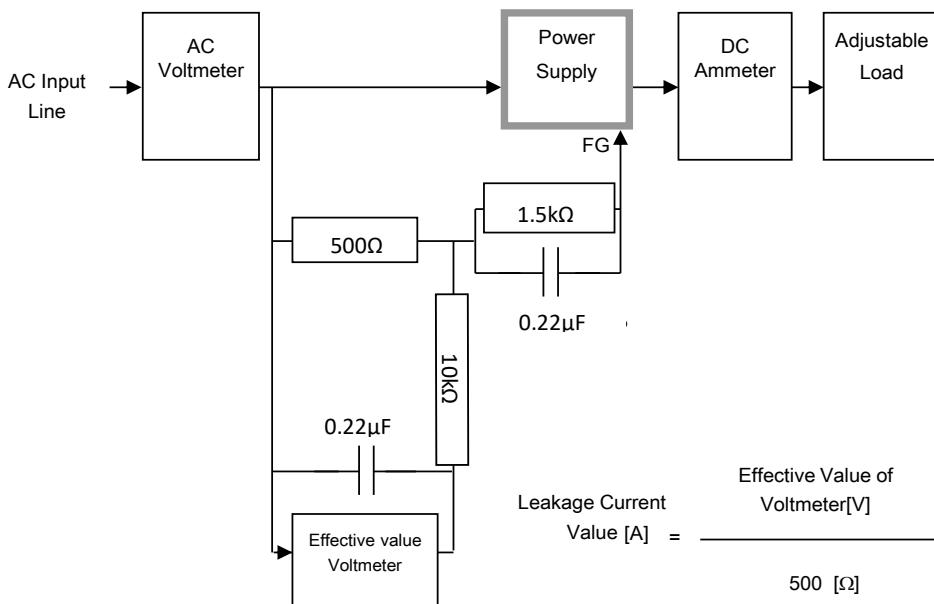
Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

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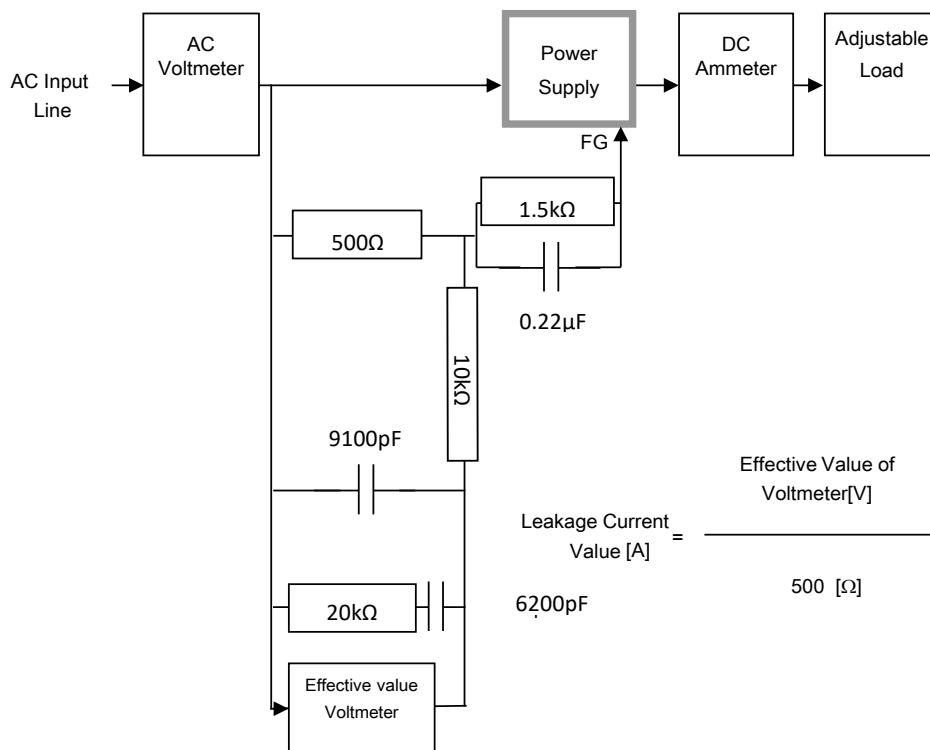
Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{500 \ [\Omega]}$$

C1= 0.1 µF

（ Film capacitor)

C2= 22 µF

(Electrolytic capacitor)

Figure C

BC-11415