COSEL

TEST DATA OF LHA300F-48-Y

Regulated DC Power Supply
August 28, 2019

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COSEL CO.,LTD.

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Model	LHA300F-48-Y
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]

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.079	0.102	0.113
1.00	0.610	0.366	0.349
2.00	1.130	0.620	0.570
3.00	1.647	0.872	0.782
4.00	2.173	1.132	1.004
5.00	2.698	1.379	1.224
6.00	3.223	1.644	1.445
6.30	3.380	1.722	1.513
6.93	3.712	1.926	1.654
--	-	-	-
--	-	-	-

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

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Model	LHA300F-48-Y
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	-	-	-
1.00	87.4	86.9	86.0
2.00	90.9	91.6	91.2
3.00	92.0	92.9	92.7
4.00	92.2	93.4	93.4
5.00	92.1	93.6	93.8
6.00	92.1	93.7	93.9
6.30	92.2	93.7	93.9
6.93	92.1	93.6	94.0
--	-	-	-
--	-	-	-

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Model	LHA300F-48-Y
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

Load Current [A]

2.Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.461	0.129	0.095
1.00	0.906	0.761	0.700
2.00	0.946	0.856	0.814
3.00	0.962	0.900	0.873
4.00	0.972	0.919	0.900
5.00	0.978	0.940	0.920
6.00	0.982	0.945	0.933
6.30	0.983	0.947	0.935
6.93	0.985	0.933	0.940
--	-	-	-
--	-	-	-

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

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Model	LHA300F-48-Y
Item	Inrush Current
Object	

Temperature   25℃
Testing Circuitry   Figure A

Input
Current
[20A/div]

Input
Voltage
[100V/div]

Time   [100ms/div]

Input Voltage   100 V
Frequency   60 Hz
Load   100 %

Primary inrush current :
                            15.4 A
Secondary inrush current :
                            11.4 A

Input
Current
[20A/div]

Input
Voltage
[200V/div]

Time   [100ms/div]

Input Voltage   230 V
Frequency   60 Hz
Load   100 %

Primary inrush current :
                            36.7 A
Secondary inrush current :
                            7.3 A

Primary inrush current   Secondary inrush current

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Model	LHA300F-48-Y	
Item	Leakage Current	Temperature 25°C
Object	————————	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	0.39	0.41	Operation
		One of phases	0.27	0.69	0.72	Stand by
IEC62368-1	Figure B-2	Both phases	0.16	0.38	0.39	Operation
		One of phases	0.27	0.67	0.70	Stand by
	Figure B-3	Both phases	0.16	0.38	0.39	Operation
		One of phases	0.27	0.66	0.70	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	LHA300F-48-Y
Item	Line Regulation
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

```
          - - - ⊟ - - -   Load  50%
          —△—           Load 100%
```


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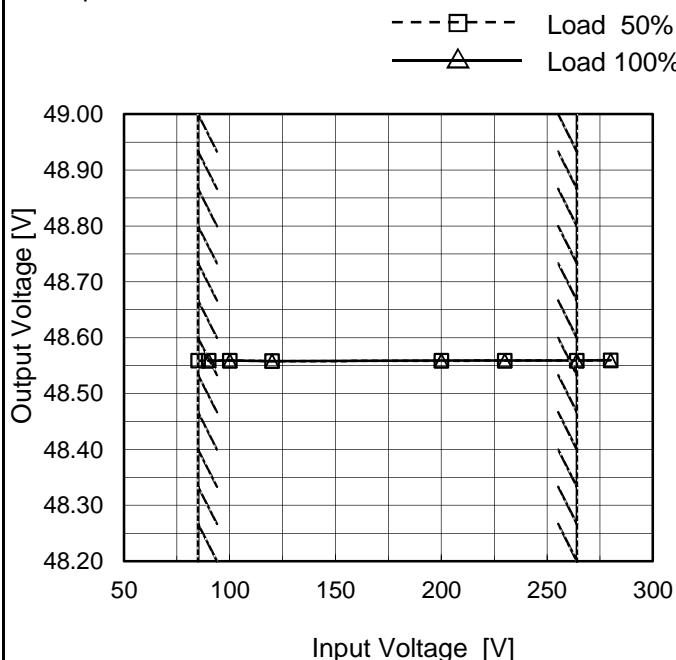
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	48.559	-
90	48.559	48.559
100	48.559	48.559
120	48.558	48.558
200	48.559	48.559
230	48.559	48.559
264	48.559	48.559
280	48.559	48.560
--	-	-

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Model	LHA300F-48-Y
Item	Load Regulation
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

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

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	48.565	48.563	48.565
1.00	48.563	48.563	48.563
2.00	48.563	48.562	48.563
3.00	48.562	48.562	48.562
4.00	48.562	48.562	48.562
5.00	48.562	48.562	48.562
6.00	48.561	48.561	48.561
6.30	48.560	48.561	48.561
6.93	48.561	48.561	48.561
--	-	-	-
--	-	-	-

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Model	LHA300F-48-Y
Item	Dynamic Load Response
Object	+48V6.3A

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% (6.3A)

500 mV/div

400 μs/div

10 ms/div

Min.Load (0A)←→
Load 50% (3.15A)

500 mV/div

400 μs/div

10 ms/div

Load 50% (3.15A)←→
Load 100% (6.3A)

500 mV/div

400 μs/div

10 ms/div

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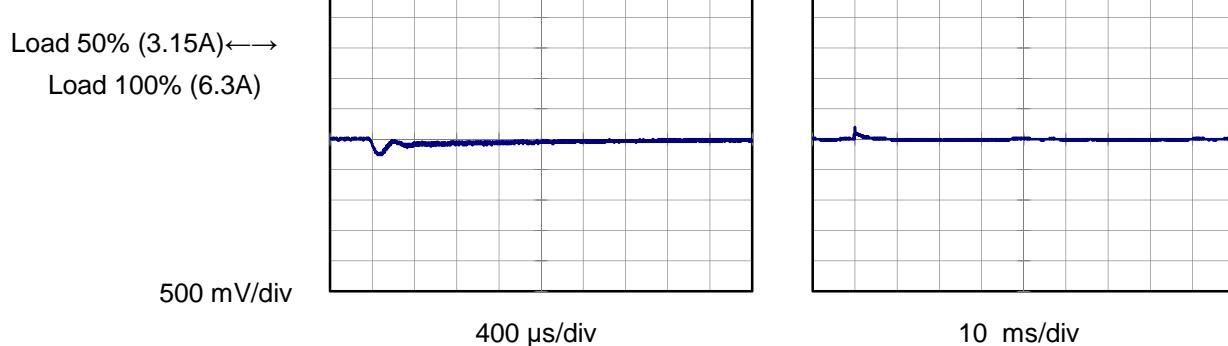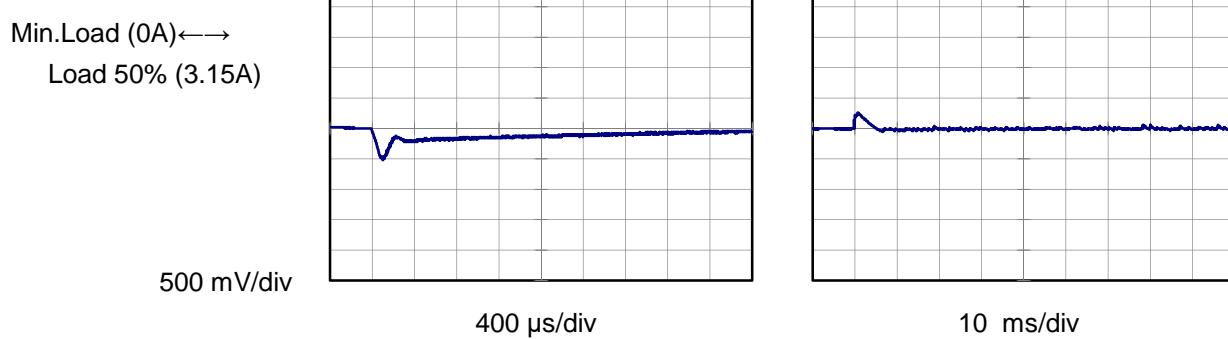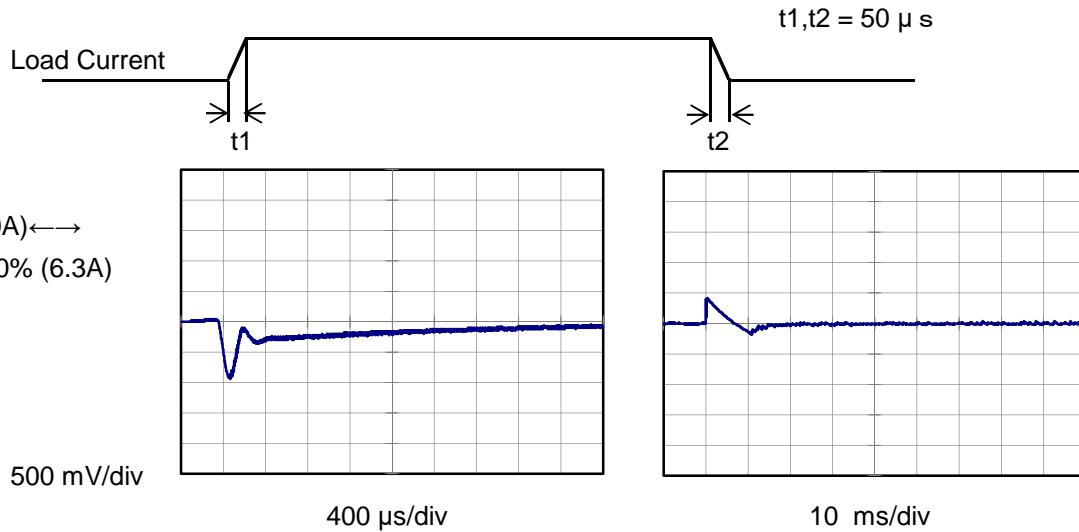
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Model	LHA300F-48-Y
Item	Ripple-Noise (by Load Current)
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure C

1.Graph

△——— Input Volt. 100V
— · —O— · — Input Volt. 230V

Ripple-Noise [mV] vs Load Current [A]
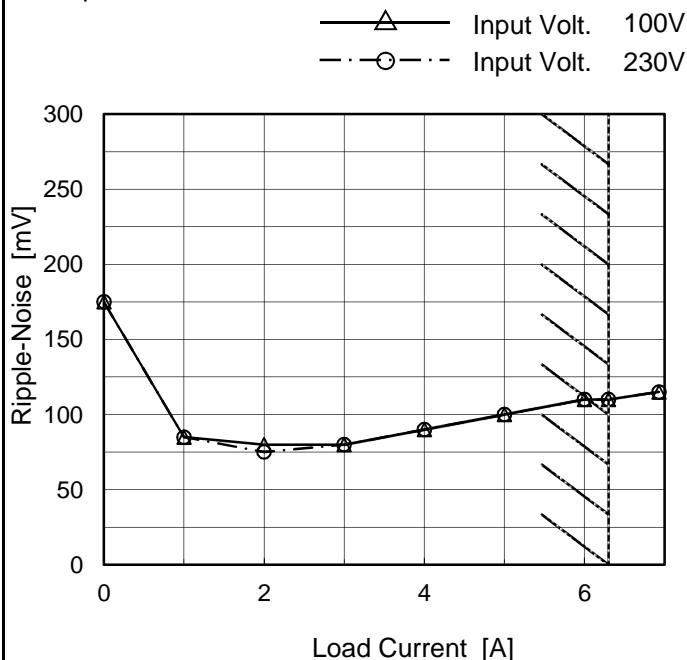
Load Current [A]

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
T2 [mVp-p]

T1
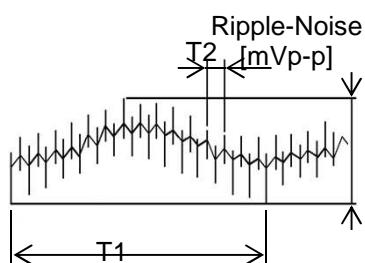
Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.00	175	175
1.00	85	85
2.00	80	75
3.00	80	80
4.00	90	90
5.00	100	100
6.00	110	110
6.30	110	110
6.93	115	115
--	-	-
--	-	-

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Model	LHA300F-48-Y
Item	Ambient Temperature Drift
Object	+48V6.3A

Testing Circuitry   Figure A

1.Graph

———△——— Input Volt.   100V
— — —▭— — — Input Volt.   200V
— · —○— · — Input Volt.   230V

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

Load 100%

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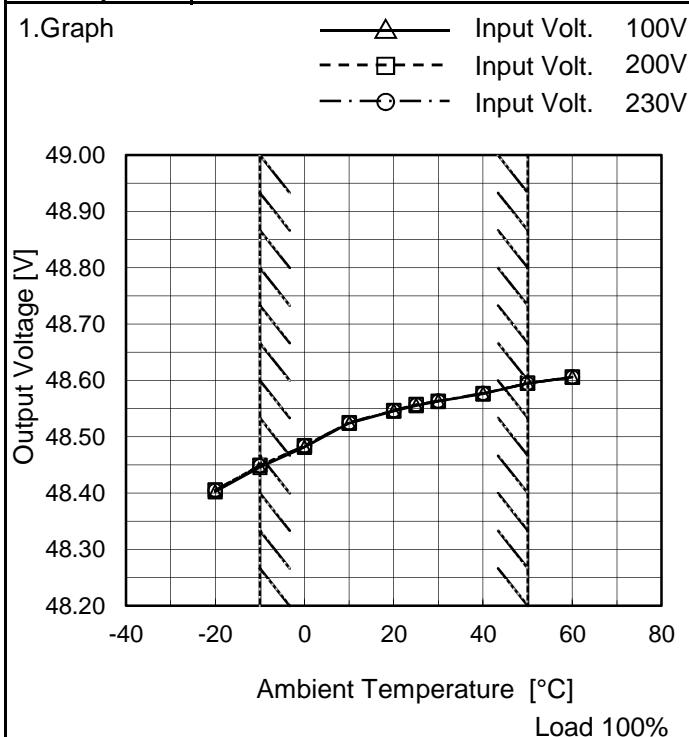
2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	48.402	48.405	48.405
-10	48.446	48.449	48.449
0	48.482	48.484	48.484
10	48.524	48.525	48.525
20	48.546	48.546	48.547
25	48.555	48.557	48.557
30	48.563	48.563	48.564
40	48.576	48.577	48.577
50	48.595	48.595	48.595
60	48.606	48.606	48.606
--	-	-	-

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Model	LHA300F-48-Y
Item	Rise and Fall Time
Object	+48V6.3A

Temperature 25℃
Testing Circuitry Figure A

1.Graph

Load 100%

Output Volt.

[10V/div]

0

Input Volt. 100 V

Load 100%

Output Volt.

[10V/div]

0

Input Volt. 230 V

Input Volt.

0

Time [200ms/div]

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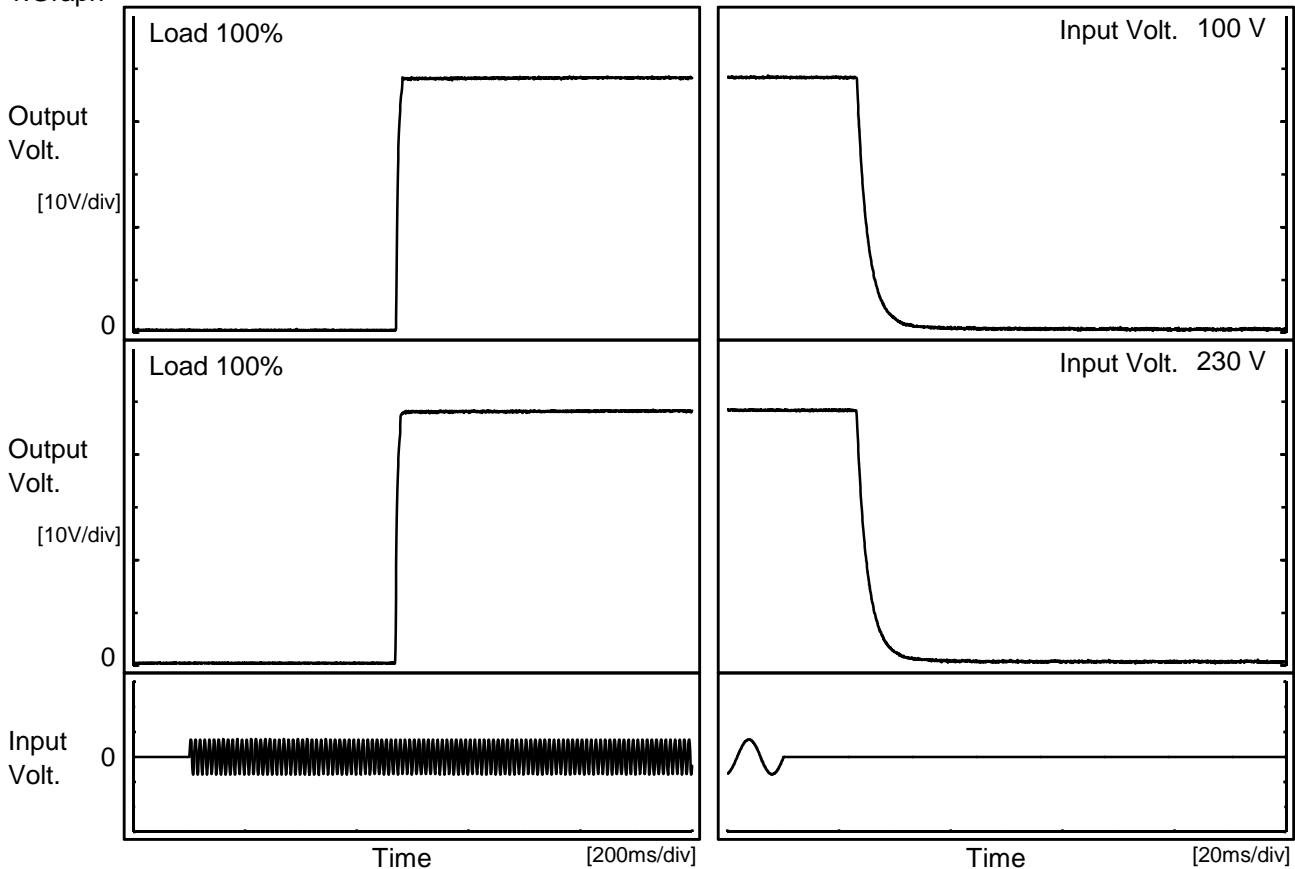
2.Values [ms]

Input Volt. ╲ Time	Td	Tr	Ts	Th	Tf
100 V	739.0	15.0	754.0	26.7	9.3
230 V	737.0	16.0	753.0	26.6	9.2

Output Volt.

90%

10%

Input Volt.

Td Tr

Th Tf

Ts

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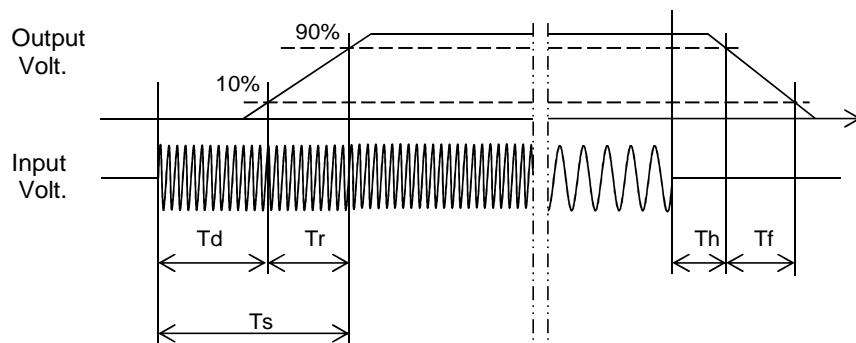
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Model	LHA300F-48-Y
Item	Hold-Up Time
Object	+48V6.3A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

2.Values

```
            - - - ⊟ - - -   Load  50%
            ——— △ ———   Load 100%
```


Hold-Up Time [ms] vs Input Voltage [V]
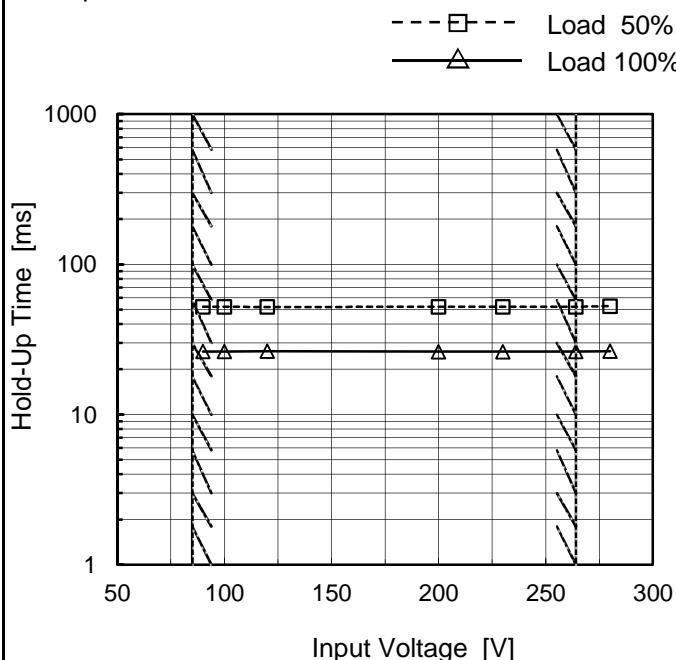
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	52	-
90	52	26
100	52	26
120	52	26
200	52	26
230	52	26
264	52	26
280	53	26
--	-	-

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	LHA300F-48-Y
Item	Instantaneous Interruption Compensation
Object	+48V6.3A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

Input Volt.   100V
Input Volt.   200V
Input Volt.   230V

Instantaneous Compensation Time [ms] vs Load Current [A]

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

2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
1.00	140	154	155
2.00	78	80	80
3.00	54	55	54
4.00	39	39	40
5.00	31	31	31
6.00	27	26	27
6.30	24	25	25
6.93	19	20	20
--	-	-	-
--	-	-	-

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Model	LHA300F-48-Y
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+48V6.3A
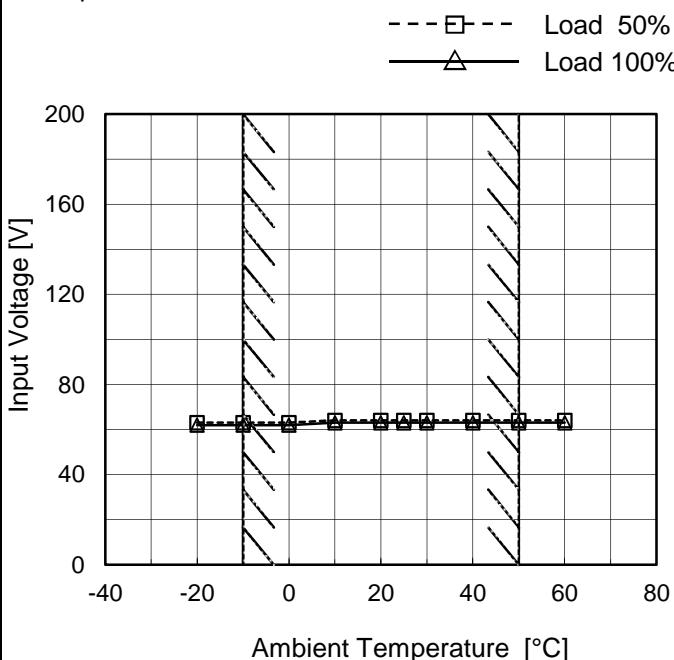
Testing Circuitry   Figure A

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	62
-10	63	62
0	63	62
10	64	63
20	64	63
25	64	63
30	64	63
40	64	63
50	64	63
60	64	63
--	-	-

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Model	LHA300F-48-Y
Item	Overcurrent Protection
Object	+48V6.3A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

———— Input Volt.   100V
———— Input Volt.   230V
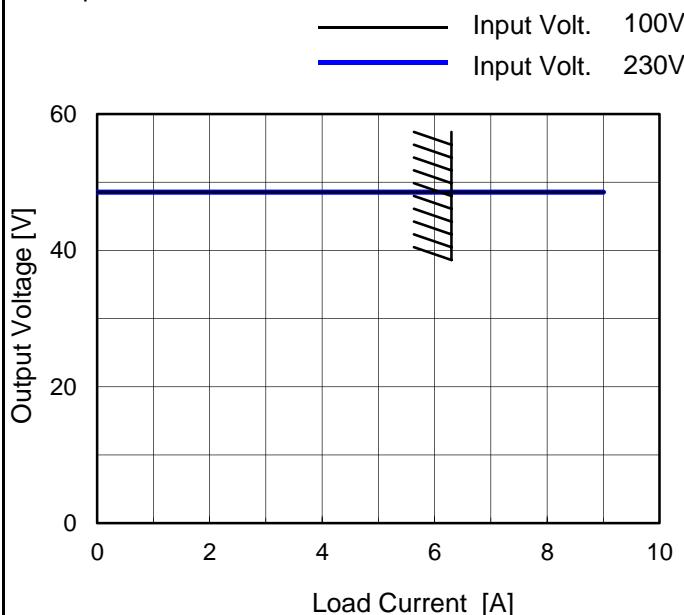
Note: Slanted line shows the range of the rated
load current.

Overcurrent protection is Hiccup mode.

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
48	9.00	9.00
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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Model	LHA300F-48-Y
Item	Overvoltage Protection
Object	+48V6.3A

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	62.83	62.83
-10	63.00	63.00
0	62.94	62.94
10	62.41	62.41
20	62.53	62.53
25	62.24	62.24
30	62.42	62.42
40	62.82	62.82
50	63.41	63.41
60	63.94	63.94
--	-	-

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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)

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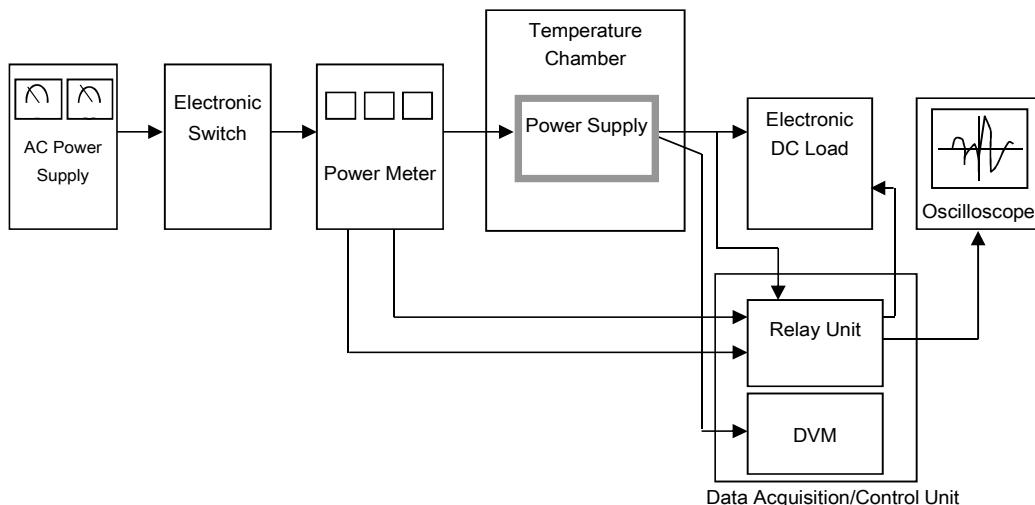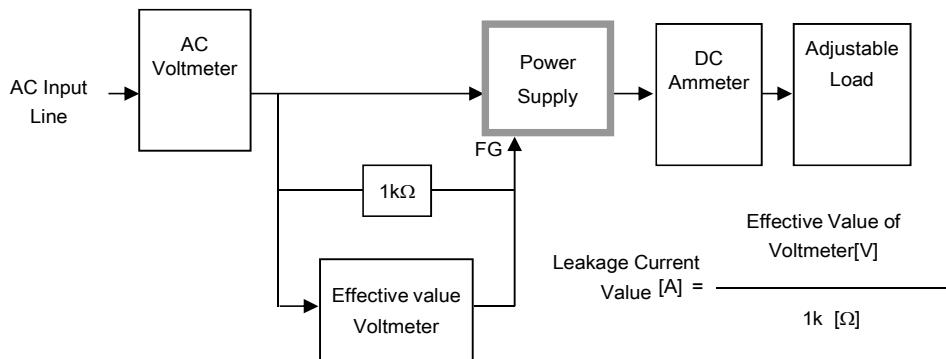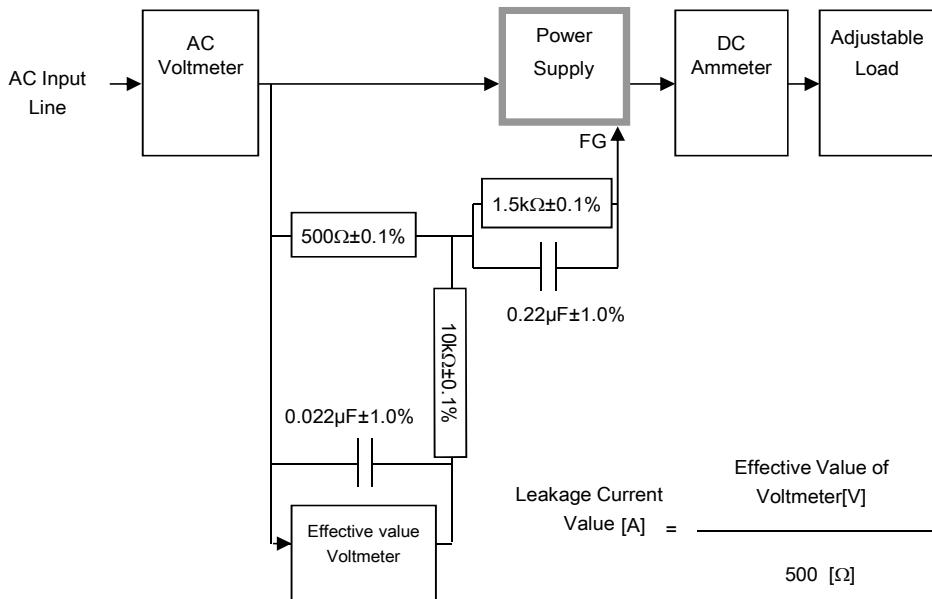
Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

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AC Input Line → AC Voltmeter → Power Supply (FG) → DC Ammeter → Adjustable Load

500Ω±0.1%

1.5kΩ±0.1%

0.22µF±1.0%

10kΩ±0.1%

9100pF±1.0%

20kΩ±0.1%   6200pF±1.0%

Effective value Voltmeter

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{500 \ [\Omega]}$$
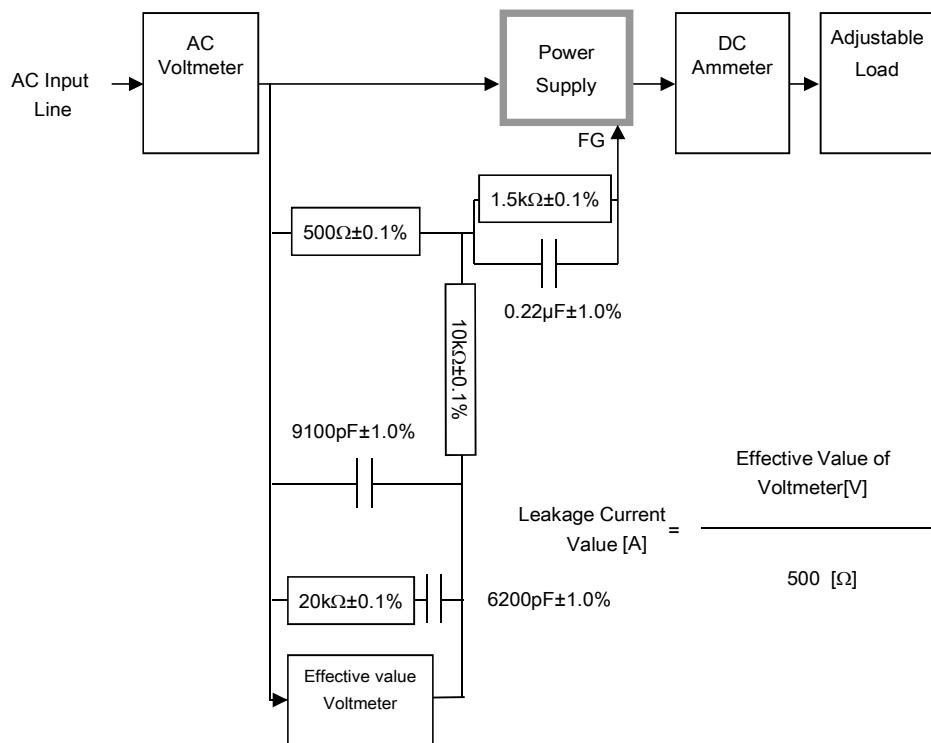
Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

Temperature Chamber

AC Power Supply → Power Meter → Power Supply — C1 — Measuring board — C2 → Electronic DC Load

Oscilloscope BW:20MHz

150mm
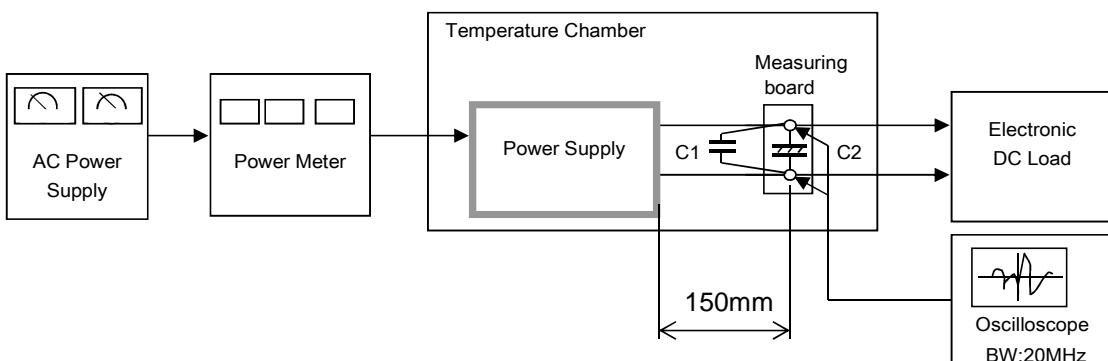
C1= 0.1 µF
(Ceramic capacitor)

C2= 22 µF
(Electrolytic capacitor)

Figure C

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