参考資料

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# TEST DATA OF LHA75F-36

Regulated DC Power Supply
September 25, 2019

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Shuto Takai — Design Engineer

**COSEL CO.,LTD.**

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# CONTENTS

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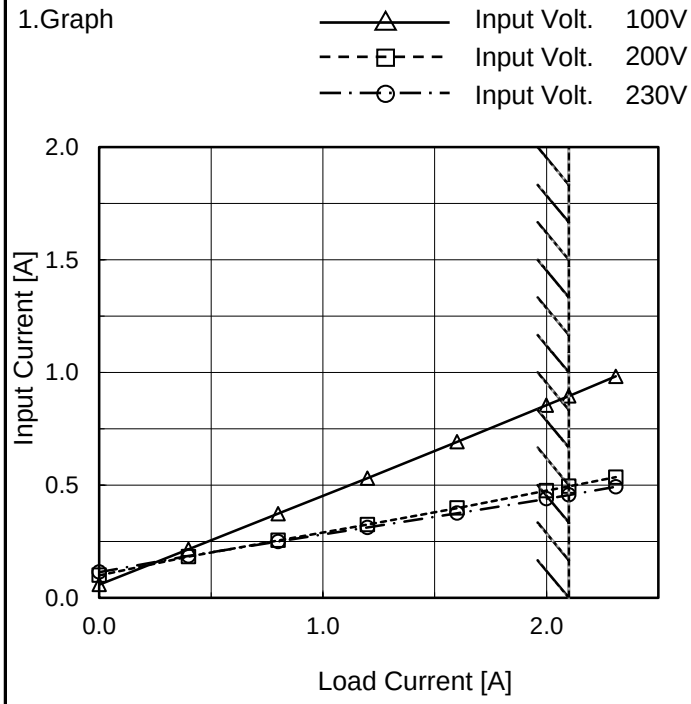
| | |
|---|---|
| Model | LHA75F-36 |
| Item | Input Current (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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 | 0.058 | 0.100 | 0.114 |
| 0.40 | 0.216 | 0.183 | 0.185 |
| 0.80 | 0.373 | 0.255 | 0.249 |
| 1.20 | 0.531 | 0.325 | 0.312 |
| 1.60 | 0.692 | 0.398 | 0.375 |
| 2.00 | 0.855 | 0.476 | 0.440 |
| 2.10 | 0.895 | 0.495 | 0.456 |
| 2.31 | 0.983 | 0.535 | 0.492 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |



BC-11411

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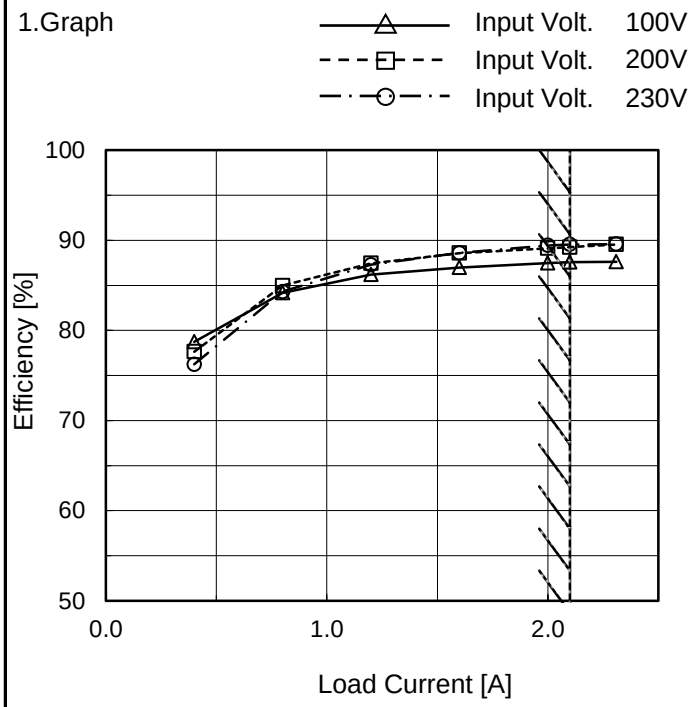
| | |
|---|---|
| Model | LHA75F-36 |
| Item | Efficiency (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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 | - | - | - |
| 0.40 | 78.7 | 77.6 | 76.2 |
| 0.80 | 84.2 | 85.0 | 84.3 |
| 1.20 | 86.2 | 87.4 | 87.3 |
| 1.60 | 87.0 | 88.6 | 88.6 |
| 2.00 | 87.5 | 89.1 | 89.4 |
| 2.10 | 87.6 | 89.2 | 89.5 |
| 2.31 | 87.6 | 89.5 | 89.6 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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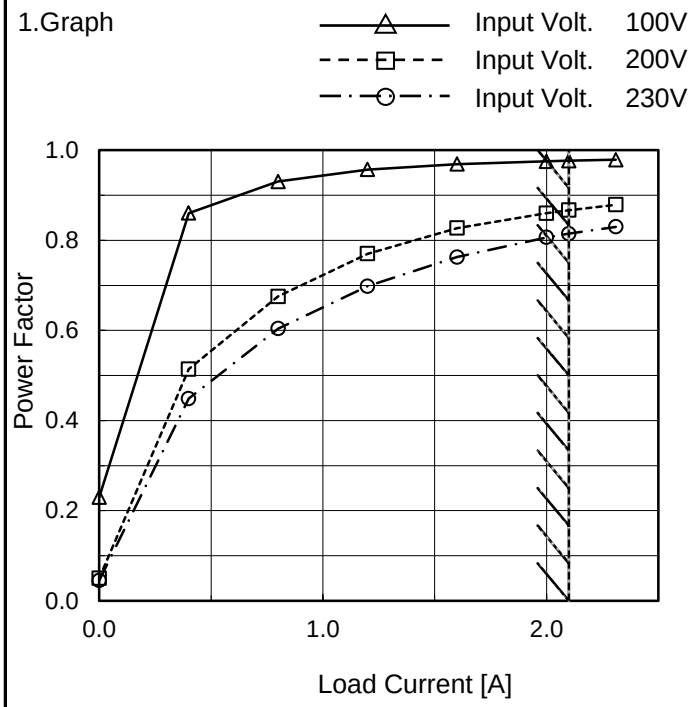
| | |
|---|---|
| Model | LHA75F-36 |
| Item | Power Factor (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

| Load Current [A] | Power Factor | | |
|---|---|---|---|
| | Input Volt. 100[V] | Input Volt. 200[V] | Input Volt. 230[V] |
| 0.00 | 0.230 | 0.050 | 0.045 |
| 0.40 | 0.861 | 0.514 | 0.449 |
| 0.80 | 0.931 | 0.676 | 0.604 |
| 1.20 | 0.957 | 0.770 | 0.698 |
| 1.60 | 0.969 | 0.827 | 0.763 |
| 2.00 | 0.975 | 0.860 | 0.806 |
| 2.10 | 0.977 | 0.867 | 0.815 |
| 2.31 | 0.979 | 0.879 | 0.830 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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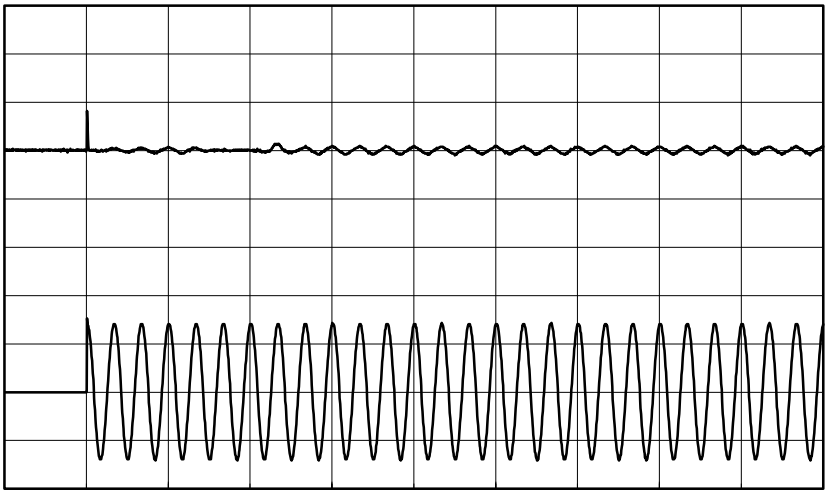
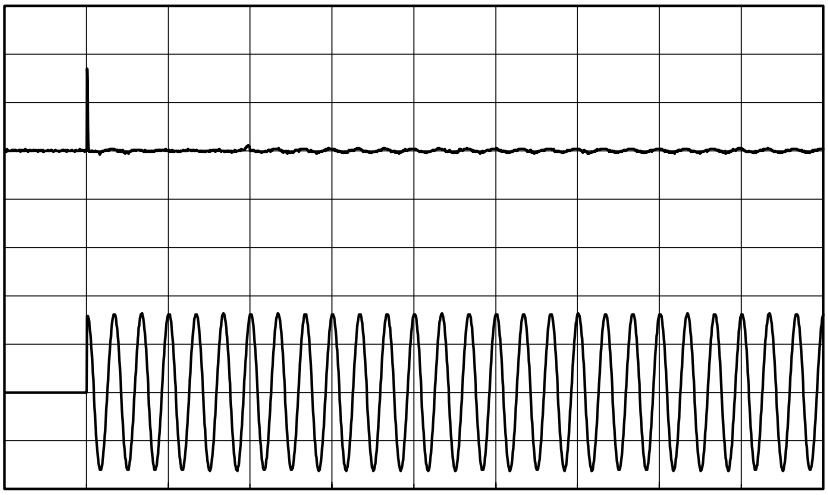
|---|---|
| Model | LHA75F-36 |
| Item | Inrush Current |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A



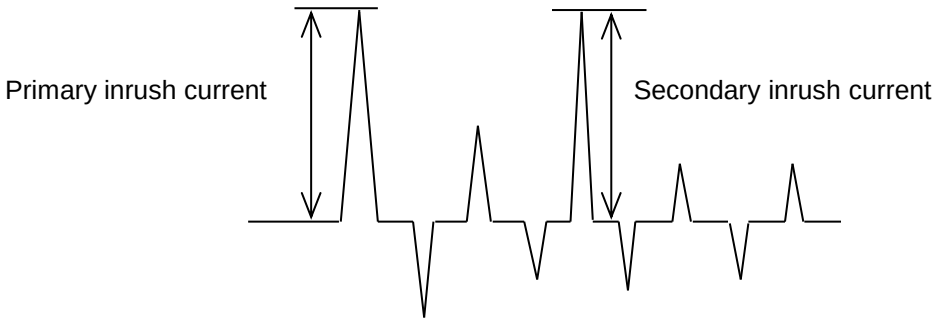

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
16.4 A
Secondary inrush current :
2.8 A




Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
34.0 A
Secondary inrush current :
2.4 A



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| | | |
|---|---|---|
| Model | LHA75F-36 | |
| Item | Leakage Current | Temperature 25°C<br>Testing Circuitry Figure B |
| Object | ―――――――――― | |

1.Results

[mA]

| Standards | Testing Circuitry | Measuring Method | Input Volt. | | | Note |
|---|---|---|---|---|---|---|
| | | | 100 [V] | 230 [V] | 240 [V] | |
| DEN-AN | Figure B-1 | Both phases | 0.13 | 0.34 | 0.36 | Operation |
| | | One of phases | 0.26 | 0.67 | 0.71 | Stand by |
| IEC62368-1 | Figure B-2 | Both phases | 0.11 | 0.28 | 0.29 | Operation |
| | | One of phases | 0.21 | 0.56 | 0.58 | Stand by |
| | Figure B-3 | Both phases | 0.11 | 0.28 | 0.30 | Operation |
| | | One of phases | 0.21 | 0.55 | 0.58 | 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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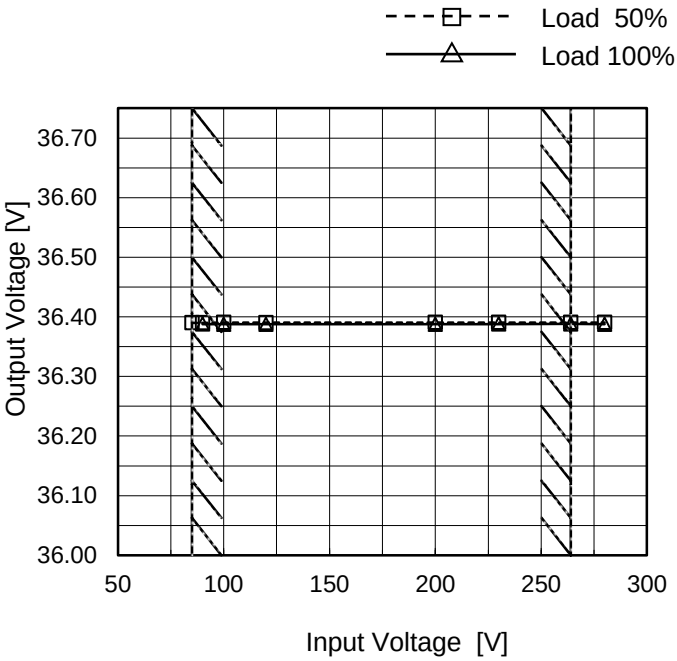
| | |
|---|---|
| Model | LHA75F-36 |
| Item | Line Regulation |
| Object | +36V2.1A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

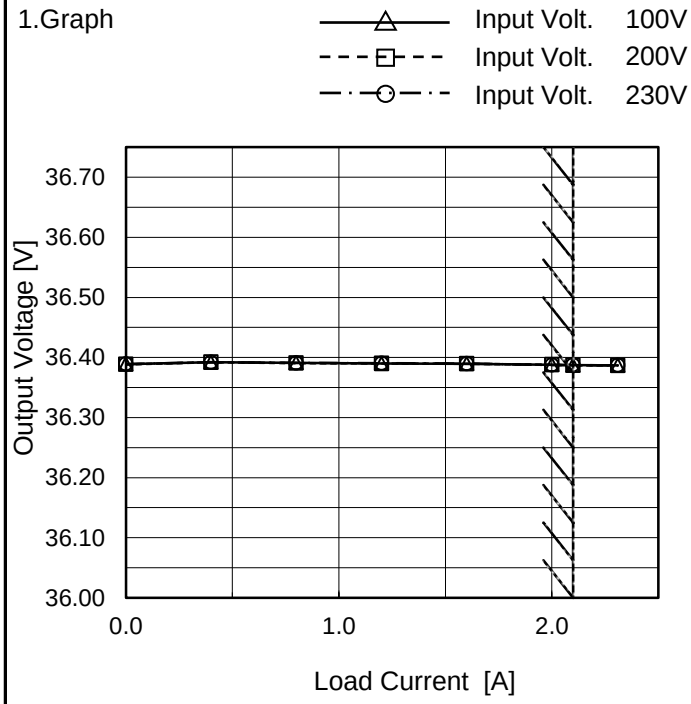
| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| 85 | 36.390 | - |
| 90 | 36.390 | 36.388 |
| 100 | 36.390 | 36.388 |
| 120 | 36.390 | 36.388 |
| 200 | 36.390 | 36.388 |
| 230 | 36.390 | 36.388 |
| 264 | 36.390 | 36.388 |
| 280 | 36.390 | 36.388 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Load Regulation |
| Object | +36V2.1A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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 | 36.389 | 36.389 | 36.389 |
| 0.40 | 36.392 | 36.392 | 36.392 |
| 0.80 | 36.391 | 36.391 | 36.391 |
| 1.20 | 36.390 | 36.390 | 36.390 |
| 1.60 | 36.390 | 36.390 | 36.390 |
| 2.00 | 36.388 | 36.388 | 36.388 |
| 2.10 | 36.387 | 36.387 | 36.387 |
| 2.31 | 36.387 | 36.387 | 36.387 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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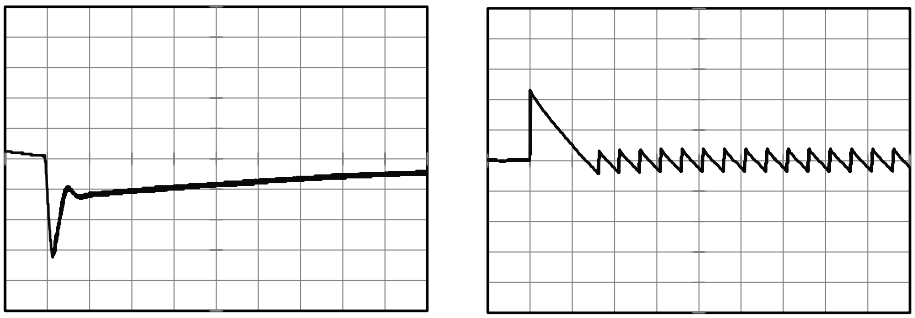
|---|---|---|
| Model | LHA75F-36 | |
| Item | Dynamic Load Response | Temperature 25°C<br>Testing Circuitry Figure A |
| Object | +36V2.1A | |

Input Volt. 230 V
Cycle 1000 ms

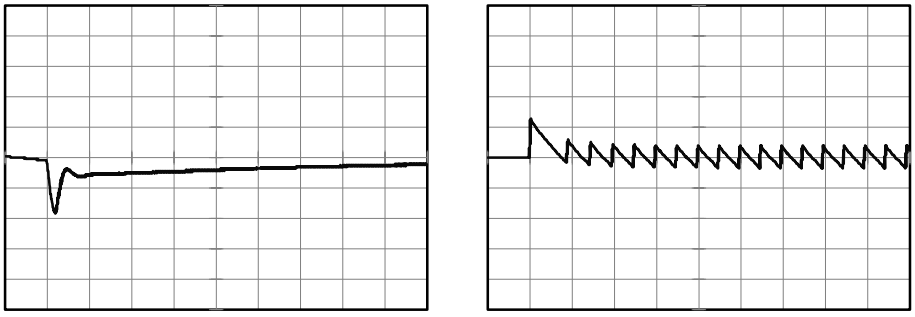

Min.Load (0A)←→
Load 100% (2.1A)



200 mV/div

1 ms/div 10 ms/div

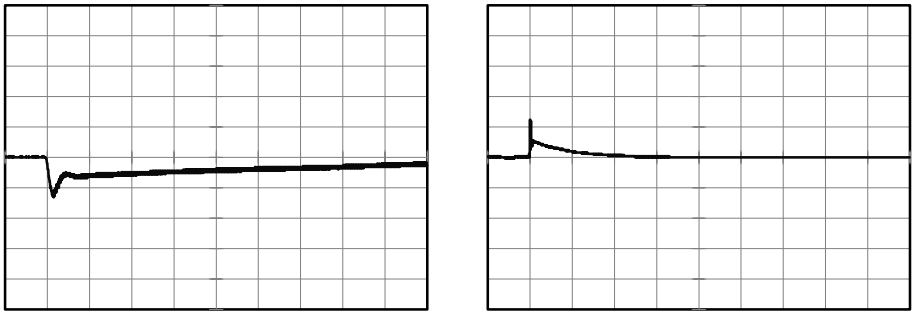
Min.Load (0A)←→
Load 50% (1.05A)



200 mV/div

1 ms/div 10 ms/div

Load 50% (1.05A)←→
Load 100% (2.1A)



200 mV/div

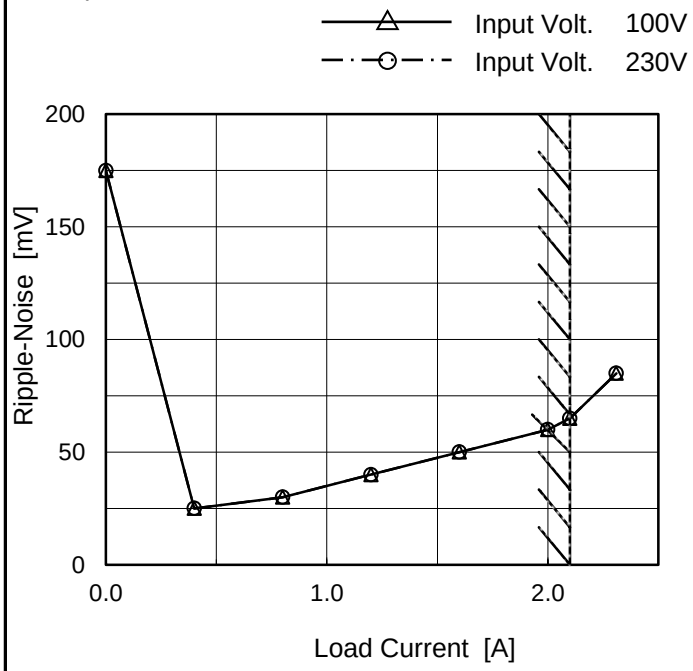
1 ms/div 10 ms/div

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Ripple-Noise（by Load Current） |
| Object | +36V2.1A |

Temperature 25°C
Testing Circuitry Figure C

1.Graph




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

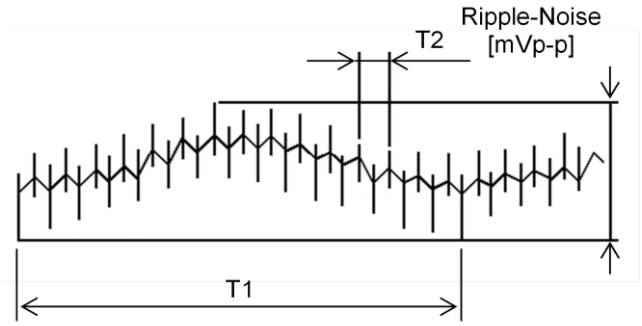



Fig. Complex Ripple Wave Form

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 100 [V] | Input Volt. 230 [V] |
| 0.00 | 175 | 175 |
| 0.40 | 25 | 25 |
| 0.80 | 30 | 30 |
| 1.20 | 40 | 40 |
| 1.60 | 50 | 50 |
| 2.00 | 60 | 60 |
| 2.10 | 65 | 65 |
| 2.31 | 85 | 85 |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

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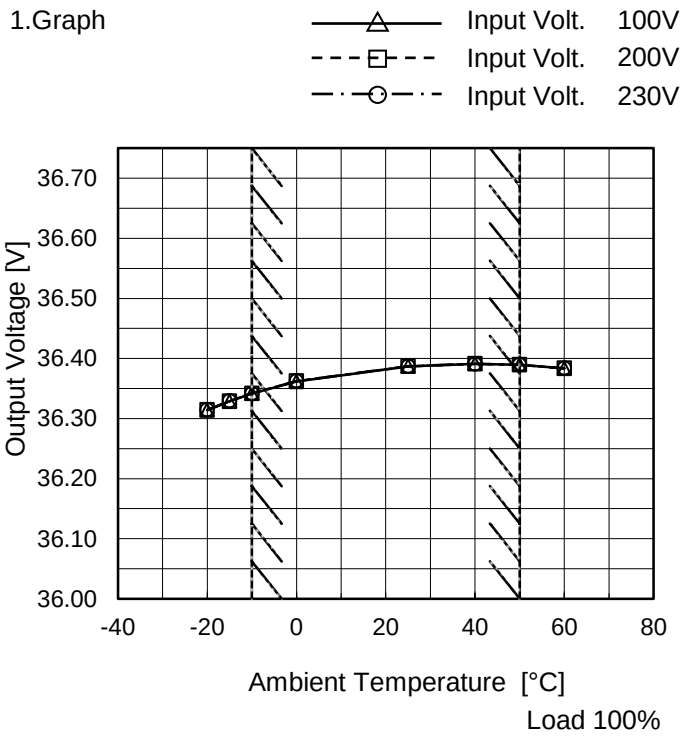
|---|---|
| Model | LHA75F-36 |
| Item | Ambient Temperature Drift |
| Object | +36V2.1A |

Testing Circuitry Figure A

1.Graph




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

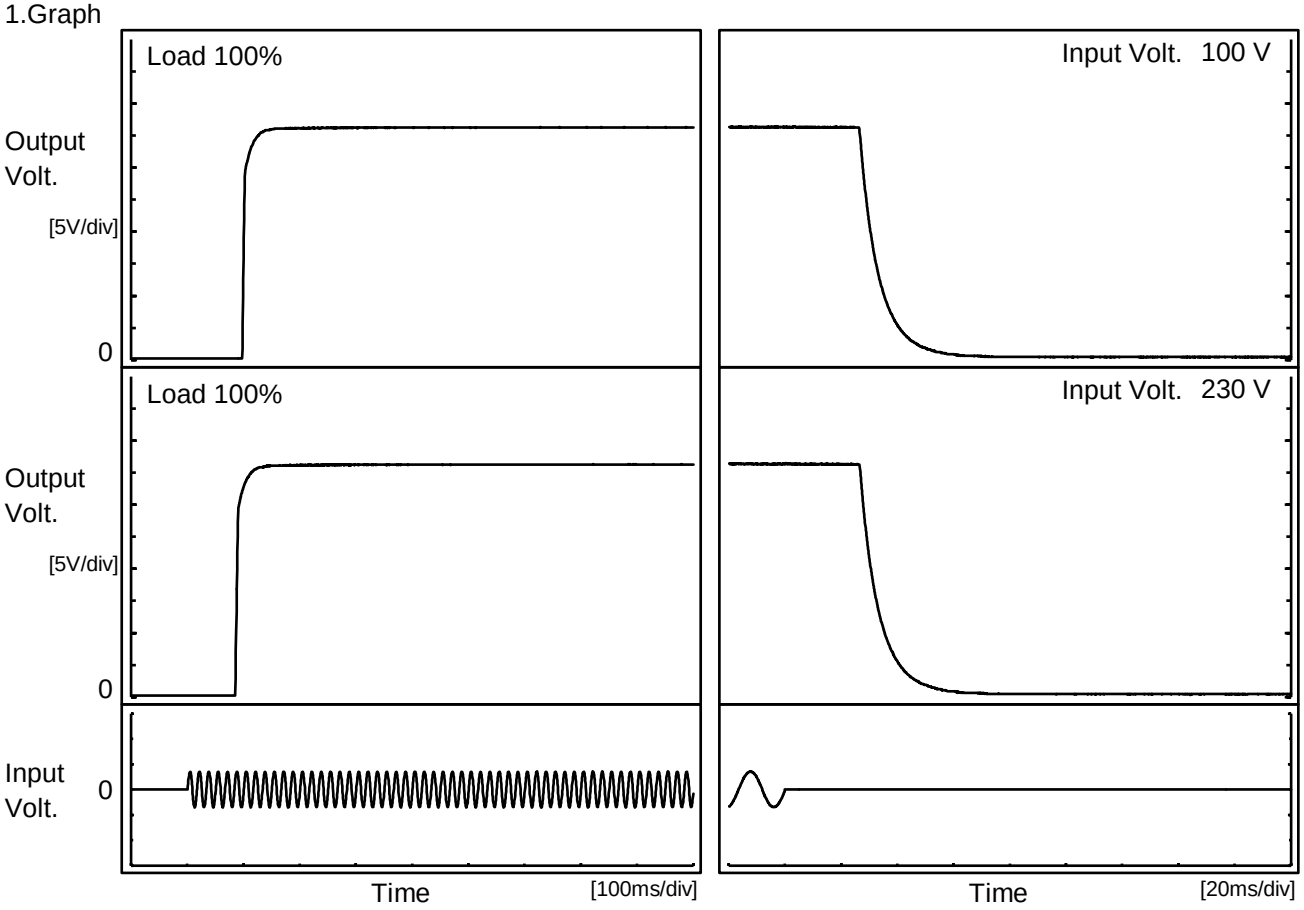
2.Values

| Ambient Temperature [°C] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 100[V] | Input Volt. 200[V] | Input Volt. 230[V] |
| -20 | 36.314 | 36.314 | 36.314 |
| -15 | 36.329 | 36.329 | 36.329 |
| -10 | 36.342 | 36.342 | 36.342 |
| 0 | 36.362 | 36.362 | 36.362 |
| 25 | 36.387 | 36.387 | 36.387 |
| 40 | 36.391 | 36.391 | 36.391 |
| 50 | 36.390 | 36.390 | 36.390 |
| 60 | 36.384 | 36.384 | 36.384 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | | |
|---|---|---|
| Model | LHA75F-36 | |
| Item | Rise and Fall Time | Temperature 25°C<br>Testing Circuitry Figure A |
| Object | +36V2.1A | |

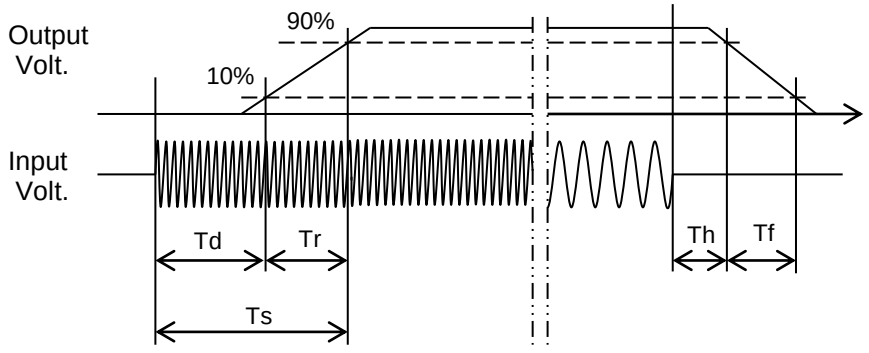
1.Graph




2.Values

[ms]

| Input Volt. \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 100 V | 98.5 | 13.5 | 112.0 | 27.1 | 16.0 |
| 230 V | 86.5 | 13.5 | 100.0 | 27.2 | 16.0 |

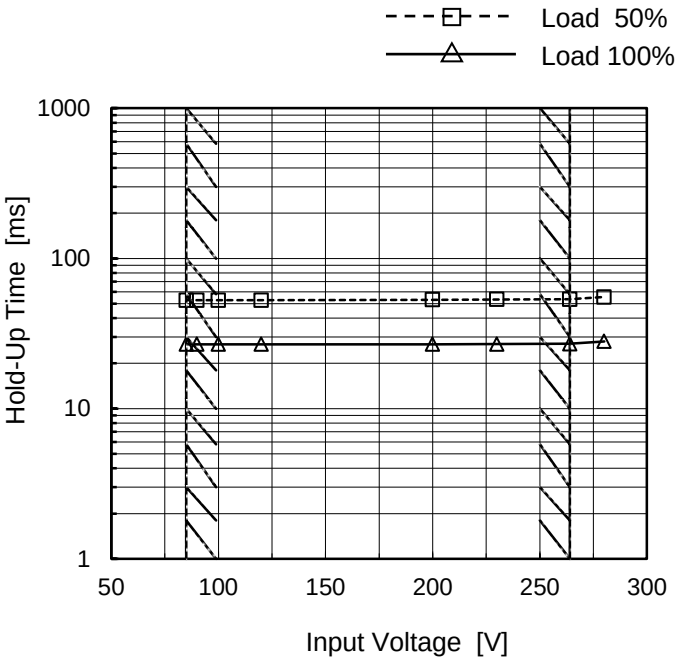


COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Hold-Up Time |
| Object | +36V2.1A |

Temperature 25°C
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.

2.Values

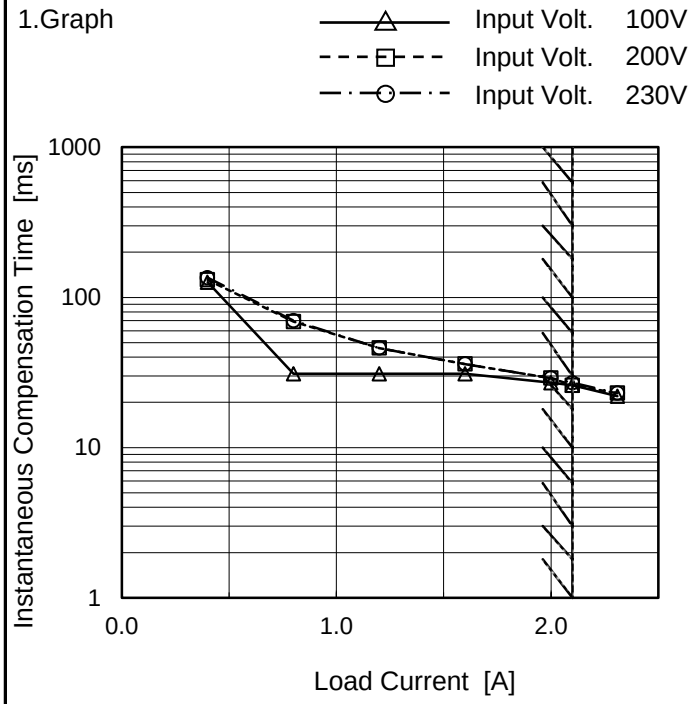
| Input Voltage [V] | Hold-Up Time [ms] | |
|---|---|---|
| | Load 50% | Load 100% |
| 85 | 53 | - |
| 90 | 53 | 27 |
| 100 | 53 | 27 |
| 120 | 53 | 27 |
| 200 | 53 | 27 |
| 230 | 53 | 27 |
| 264 | 53 | 27 |
| 280 | 55 | 28 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Instantaneous Interruption Compensation |
| Object | +36V2.1A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

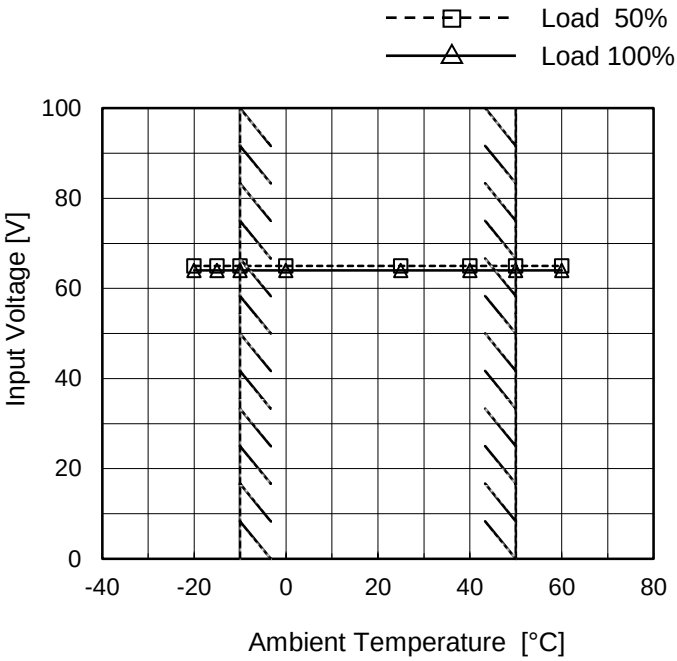
| Load Current [A] | Time [ms] | | |
|---|---|---|---|
| | Input Volt. 100[V] | Input Volt. 200[V] | Input Volt. 230[V] |
| 0.00 | - | - | - |
| 0.40 | 126 | 131 | 135 |
| 0.80 | 31 | 69 | 70 |
| 1.20 | 31 | 46 | 46 |
| 1.60 | 31 | 36 | 36 |
| 2.00 | 27 | 29 | 29 |
| 2.10 | 26 | 26 | 27 |
| 2.31 | 22 | 23 | 23 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Minimum Input Voltage for Regulated Output Voltage |
| Object | +36V2.1A |

Testing Circuitry Figure A

1.Graph




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

2.Values

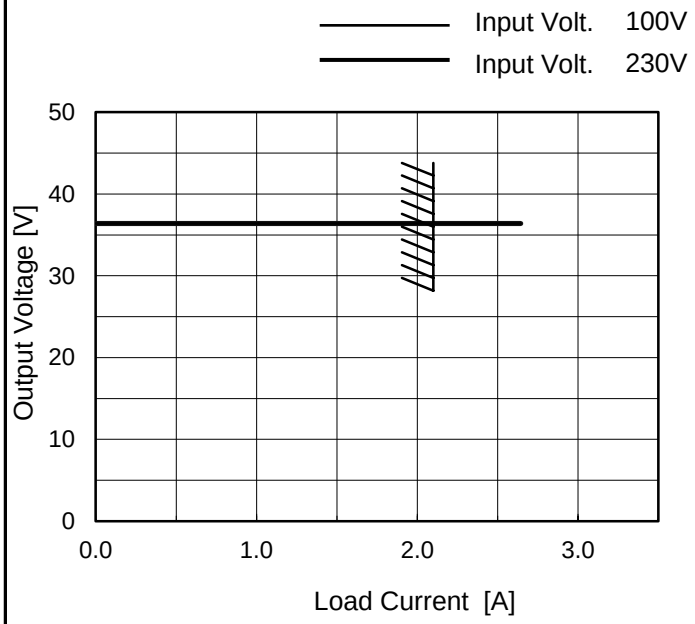
| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -20 | 65 | 64 |
| -15 | 65 | 64 |
| -10 | 65 | 64 |
| 0 | 65 | 64 |
| 25 | 65 | 64 |
| 40 | 65 | 64 |
| 50 | 65 | 64 |
| 60 | 65 | 64 |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Overcurrent Protection |
| Object | +36V2.1A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

Overcurrent protection is Hiccup mode.

2.Values

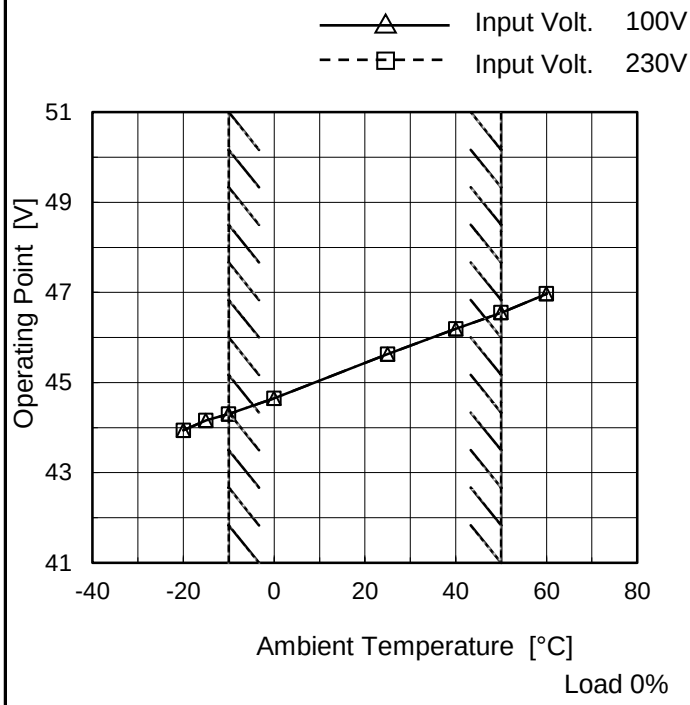
| Output Voltage [V] | Load Current [A] | |
|---|---|---|
| | Input Volt. 100[V] | Input Volt. 230[V] |
| 36.0 | 2.64 | 2.64 |
| 34.2 | - | - |
| 32.4 | - | - |
| 28.8 | - | - |
| 25.2 | - | - |
| 21.6 | - | - |
| 18.0 | - | - |
| 14.4 | - | - |
| 10.8 | - | - |
| 7.2 | - | - |
| 3.6 | - | - |
| 0.0 | - | - |

COSEL

| | |
|---|---|
| Model | LHA75F-36 |
| Item | Overvoltage Protection |
| Object | +36V2.1A |

Testing Circuitry Figure A

1.Graph




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 | 43.94 | 43.94 |
| -15 | 44.16 | 44.16 |
| -10 | 44.30 | 44.30 |
| 0 | 44.65 | 44.65 |
| 25 | 45.63 | 45.63 |
| 40 | 46.19 | 46.19 |
| 50 | 46.55 | 46.55 |
| 60 | 46.97 | 46.97 |
| -- | - | - |
| -- | - | - |
| -- | - | - |

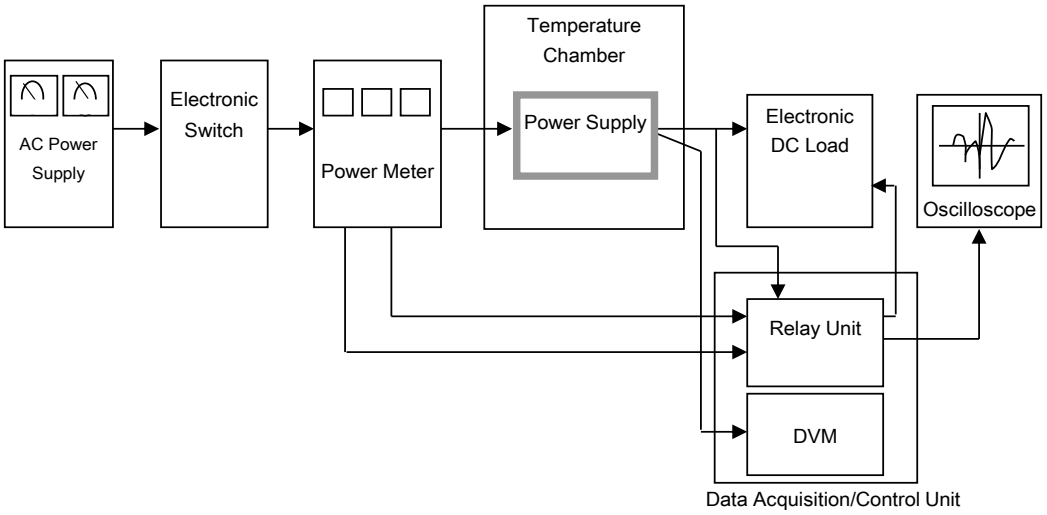



Figure A

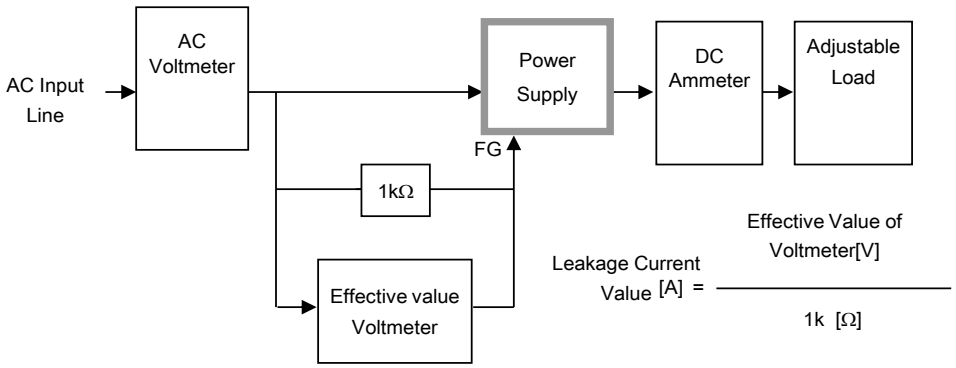



Figure B-1 ( DEN-AN )

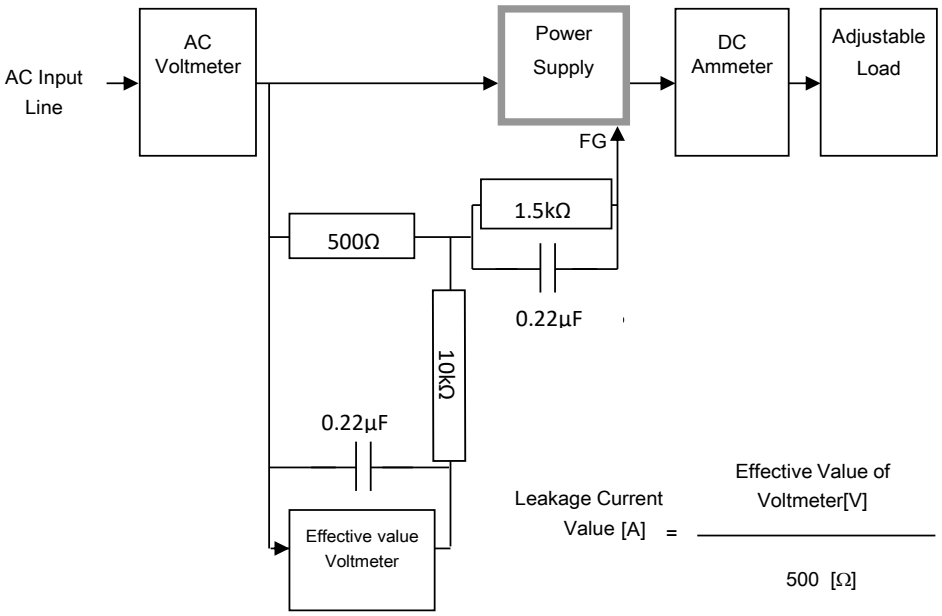



Figure B-2 ( IEC62368-1 refer to IEC60990 Fig.4 )

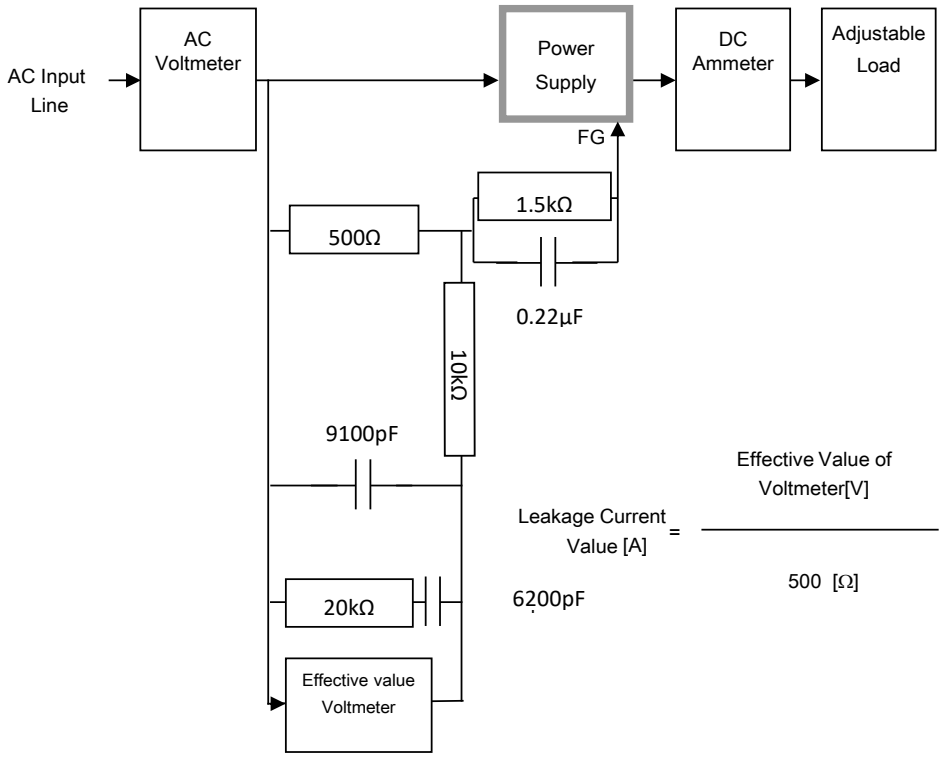
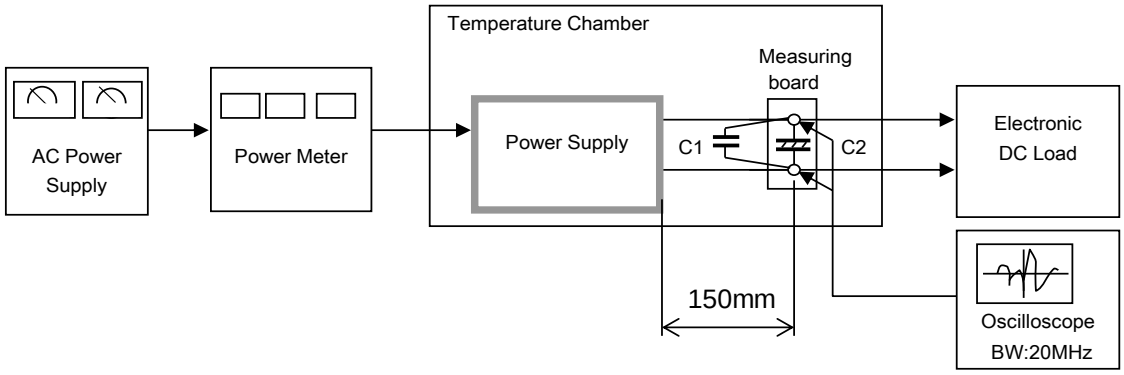



Figure B-3 ( IEC62368-1 refer to IEC60990 Fig.5 )




C1= 0.1 μF
( Film capacitor)
C2= 22 μF
(Electrolytic capacitor)

Figure C