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参考資料

# TEST DATA OF LFA300F-12-TY

Regulated DC Power Supply
December 20, 2010

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Tomoyuki Mukaiyama Design Engineer

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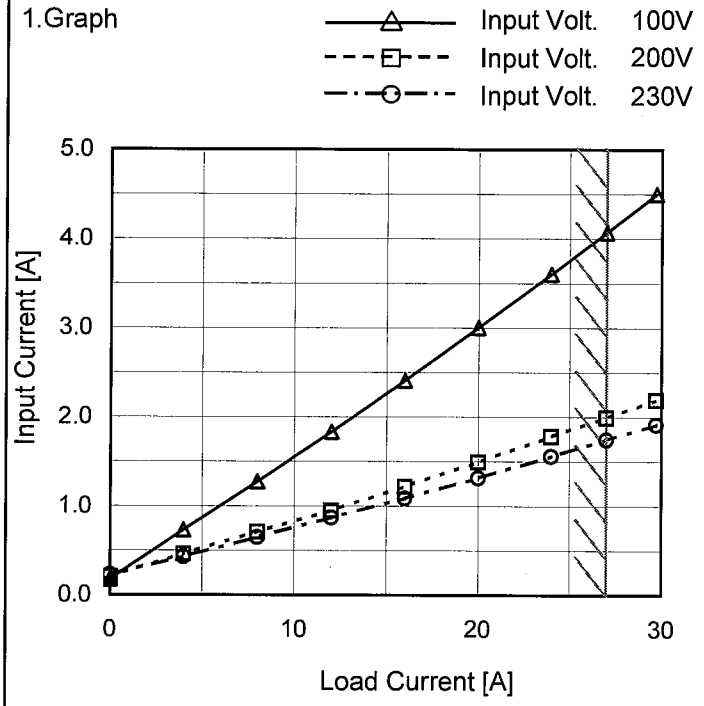
| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Input Current (by Load Current) |
| Object | ———————— |

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] |
| 0.0 | 0.176 | 0.206 | 0.226 |
| 4.0 | 0.730 | 0.458 | 0.428 |
| 8.0 | 1.272 | 0.708 | 0.646 |
| 12.0 | 1.832 | 0.948 | 0.870 |
| 16.0 | 2.408 | 1.218 | 1.084 |
| 20.0 | 3.004 | 1.496 | 1.316 |
| 24.0 | 3.604 | 1.780 | 1.560 |
| 27.0 | 4.070 | 1.994 | 1.745 |
| 29.7 | 4.500 | 2.190 | 1.914 |
| -- | - | - | - |
| -- | - | - | - |



BC-10493

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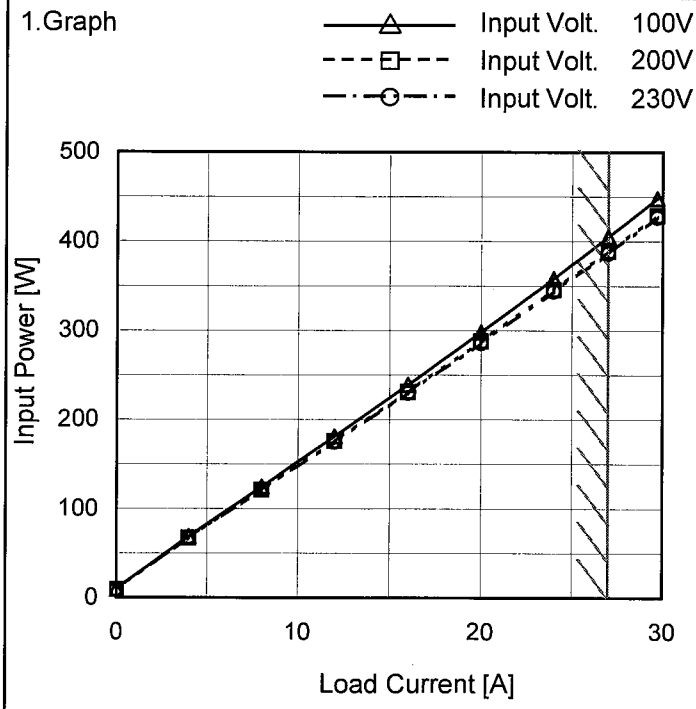
| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Input Power (by Load Current) |
| Object | ———————— |

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 Power [W] | | |
|---|---|---|---|
| | Input Volt. 100[V] | Input Volt. 200[V] | Input Volt. 230[V] |
| 0.0 | 9.6 | 9.0 | 9.0 |
| 4.0 | 68.7 | 67.0 | 67.0 |
| 8.0 | 124.2 | 121.0 | 121.0 |
| 12.0 | 180.9 | 176.0 | 175.0 |
| 16.0 | 238.7 | 231.0 | 230.0 |
| 20.0 | 298.0 | 288.0 | 286.0 |
| 24.0 | 358.2 | 346.0 | 344.0 |
| 27.0 | 405.0 | 389.0 | 387.0 |
| 29.7 | 448.0 | 429.0 | 427.0 |
| -- | - | - | - |
| -- | - | - | - |



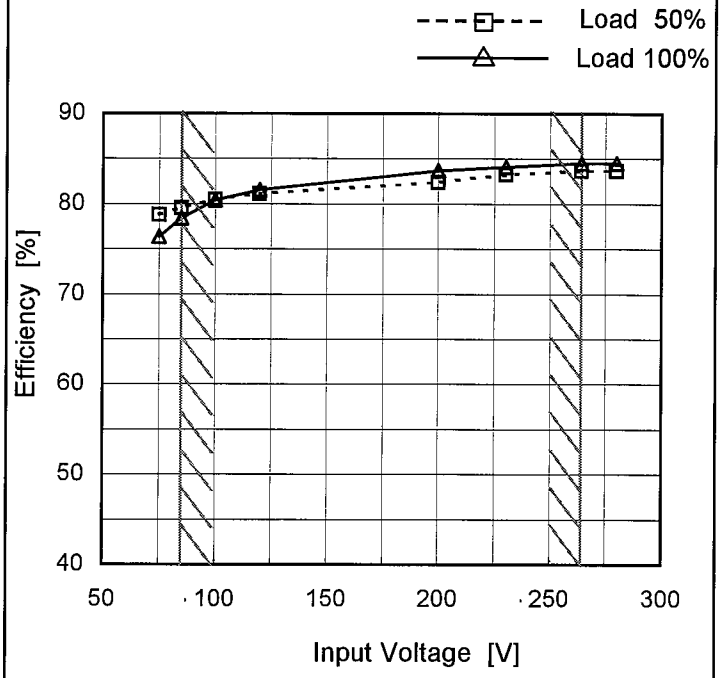
BC-10493

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Efficiency (by Input Voltage) |
| Object | ——————————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

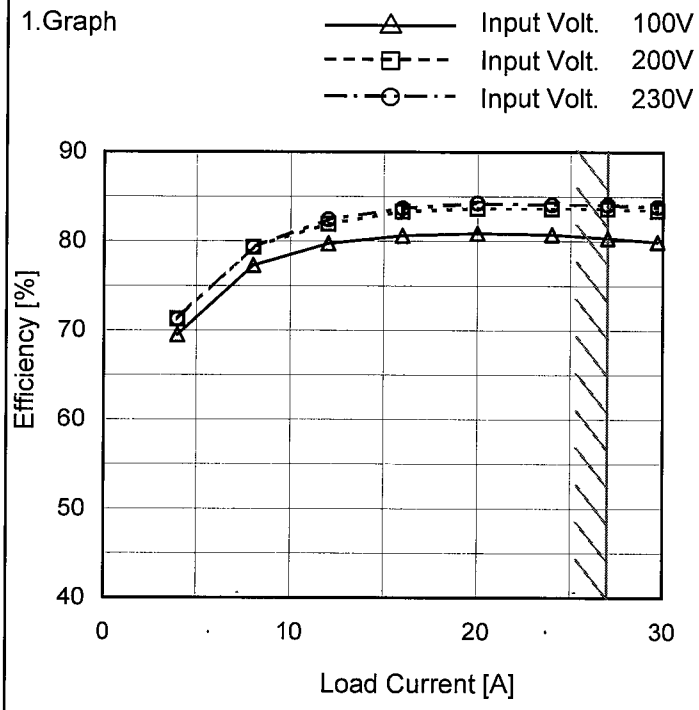
| Input Voltage [V] | Efficiency [%] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 78.7 | 76.4 |
| 85 | 79.6 | 78.4 |
| 100 | 80.5 | 80.4 |
| 120 | 81.1 | 81.5 |
| 200 | 82.4 | 83.6 |
| 230 | 83.2 | 84.1 |
| 264 | 83.7 | 84.5 |
| 280 | 83.7 | 84.5 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| 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] |
| 0.0 | - | - | - |
| 4.0 | 69.5 | 71.3 | 71.3 |
| 8.0 | 77.3 | 79.3 | 79.3 |
| 12.0 | 79.7 | 81.9 | 82.4 |
| 16.0 | 80.6 | 83.3 | 83.7 |
| 20.0 | 80.9 | 83.7 | 84.3 |
| 24.0 | 80.7 | 83.6 | 84.1 |
| 27.0 | 80.4 | 83.6 | 84.1 |
| 29.7 | 79.9 | 83.4 | 83.8 |
| -- | - | - | - |
| -- | - | - | - |



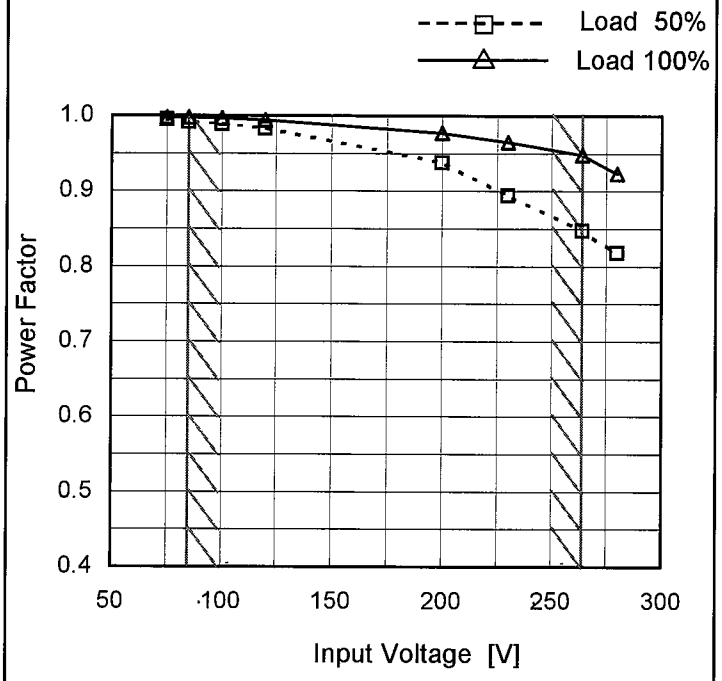
BC-10493

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Power Factor (by Input Voltage) |
| Object | ——————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

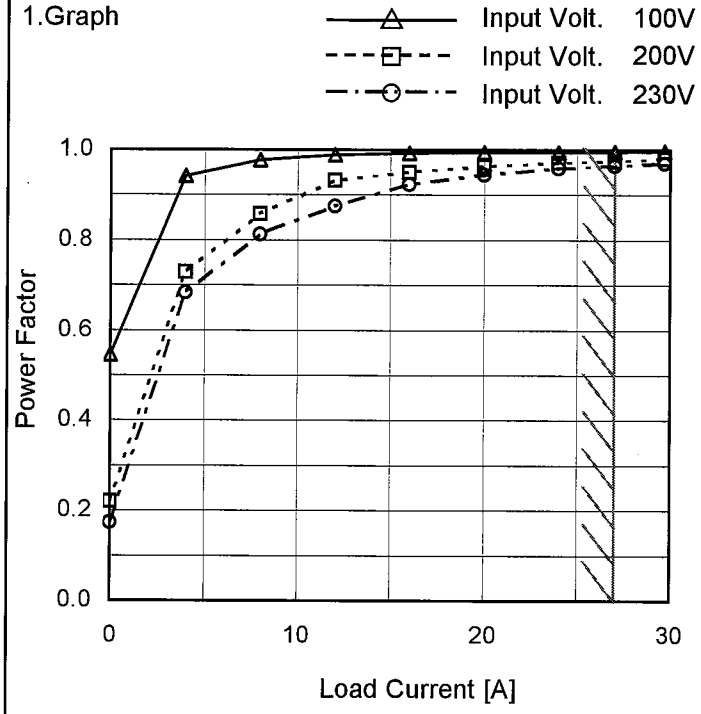
| Input Voltage [V] | Power Factor | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 0.995 | 0.998 |
| 85 | 0.992 | 0.998 |
| 100 | 0.989 | 0.995 |
| 120 | 0.983 | 0.994 |
| 200 | 0.938 | 0.975 |
| 230 | 0.894 | 0.965 |
| 264 | 0.847 | 0.948 |
| 280 | 0.819 | 0.923 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| 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] |
| 0.0 | 0.545 | 0.220 | 0.173 |
| 4.0 | 0.942 | 0.728 | 0.684 |
| 8.0 | 0.977 | 0.858 | 0.812 |
| 12.0 | 0.989 | 0.931 | 0.875 |
| 16.0 | 0.993 | 0.951 | 0.924 |
| 20.0 | 0.994 | 0.963 | 0.944 |
| 24.0 | 0.995 | 0.972 | 0.958 |
| 27.0 | 0.995 | 0.975 | 0.965 |
| 29.7 | 0.998 | 0.979 | 0.970 |
| -- | - | - | - |
| -- | - | - | - |

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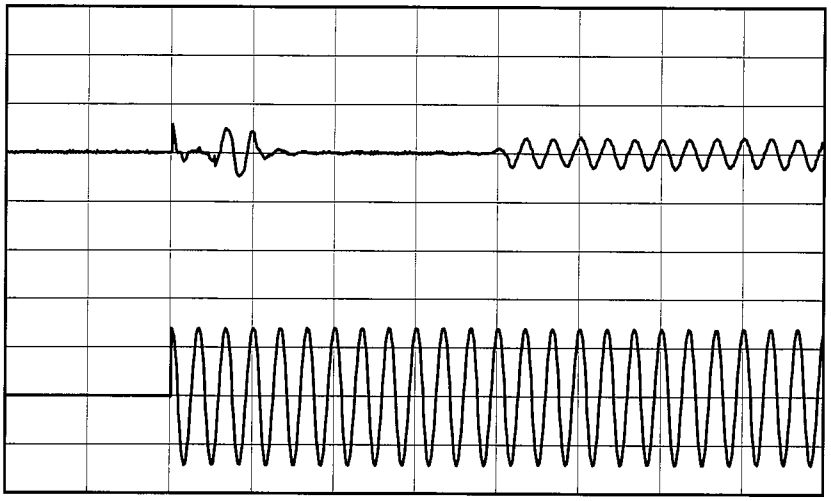
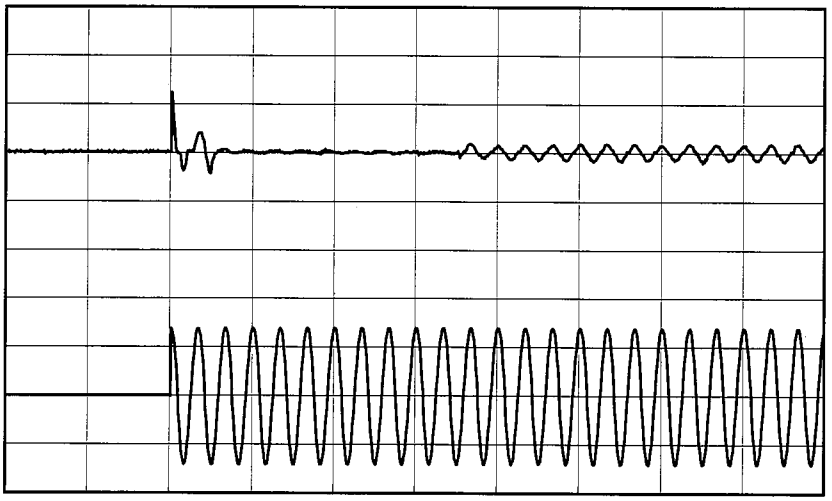
| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Inrush Current |
| Object | ——————— |

Temperature 25°C
Testing Circuitry Figure A



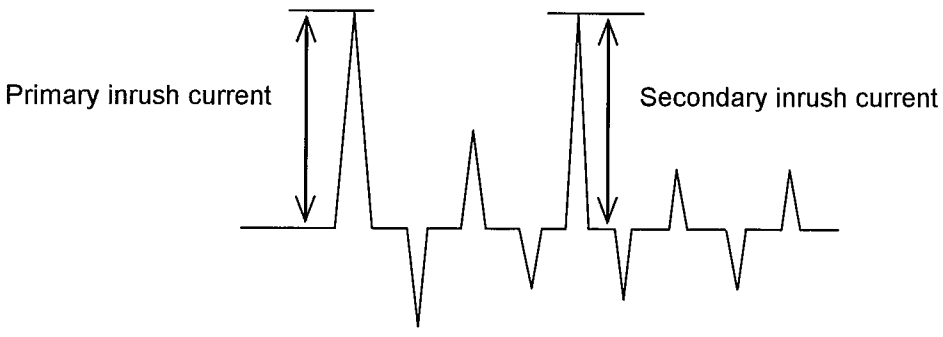

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
11.4 A
Secondary inrush current :
8.4 A




Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
24.6 A
Secondary inrush current :
3.9 A



COSEL

| | | |
|---|---|---|
| Model | LFA300F-12-TY | |
| Item | Leakage Current | Temperature 25°C<br>Testing Circuitry Figure B |
| Object | ——————————— | |

1.Results

[mA]

| Standards | | Input Volt. | | | Note |
|---|---|---|---|---|---|
| | | 100 [V] | 200 [V] | 240 [V] | |
| DEN-AN | Both phases | 0.33 | 0.53 | 0.60 | Operation |
| | One of phases | 0.34 | 0.70 | 0.83 | Stand by |
| IEC60950-1 | Both phases | 0.24 | 0.50 | 0.57 | Operation |
| | One of phases | 0.32 | 0.68 | 0.74 | 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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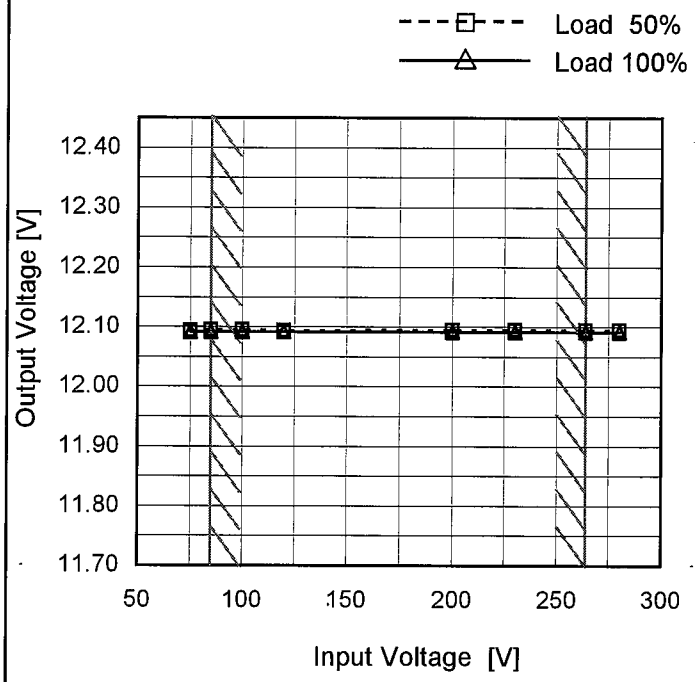
| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Line Regulation |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

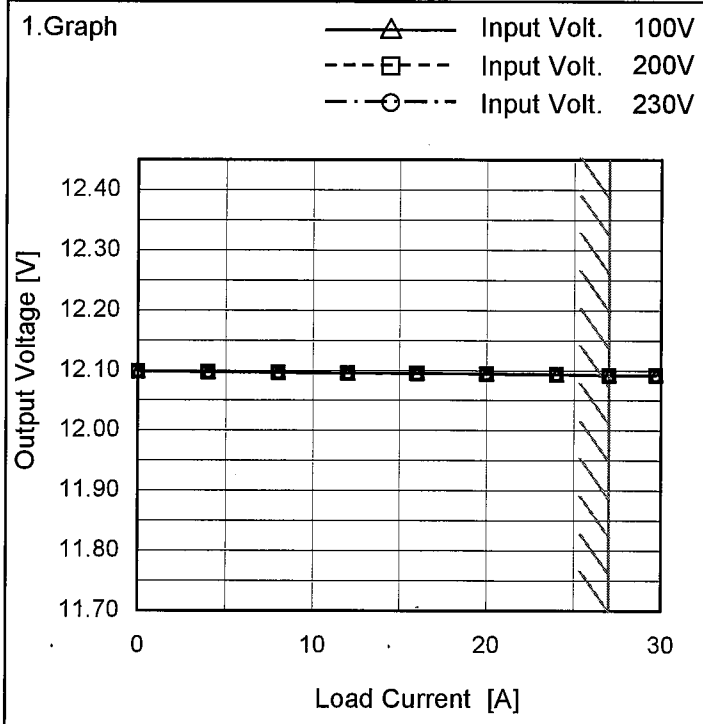
| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 12.094 | 12.093 |
| 85 | 12.095 | 12.093 |
| 100 | 12.095 | 12.093 |
| 120 | 12.094 | 12.092 |
| 200 | 12.095 | 12.093 |
| 230 | 12.095 | 12.093 |
| 264 | 12.095 | 12.093 |
| 280 | 12.095 | 12.092 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Load Regulation |
| Object | +12V27A |

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] |
| 0.0 | 12.099 | 12.099 | 12.099 |
| 4.0 | 12.097 | 12.097 | 12.097 |
| 8.0 | 12.096 | 12.096 | 12.096 |
| 12.0 | 12.095 | 12.096 | 12.095 |
| 16.0 | 12.095 | 12.095 | 12.095 |
| 20.0 | 12.094 | 12.094 | 12.094 |
| 24.0 | 12.093 | 12.093 | 12.093 |
| 27.0 | 12.093 | 12.093 | 12.093 |
| 29.7 | 12.092 | 12.092 | 12.092 |
| -- | - | - | - |
| -- | - | - | - |

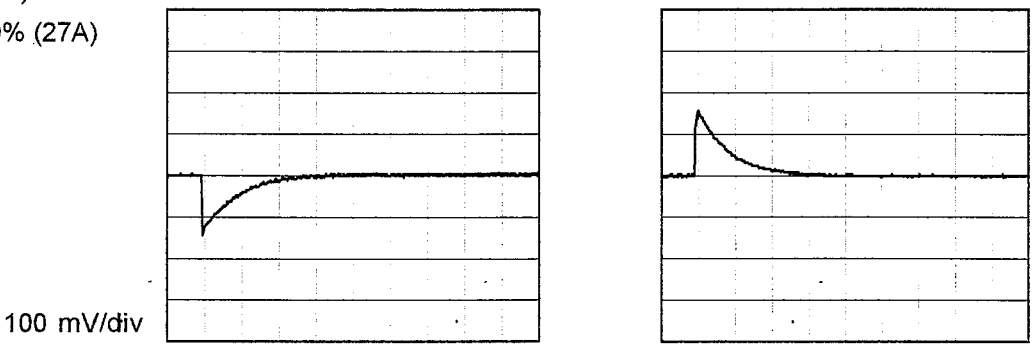
COSEL

| | | | |
|---|---|---|---|
| Model | LFA300F-12-TY | | |
| Item | Dynamic Load Response | Temperature<br>Testing Circuitry | 25°C<br>Figure A |
| Object | +12V27A | | |

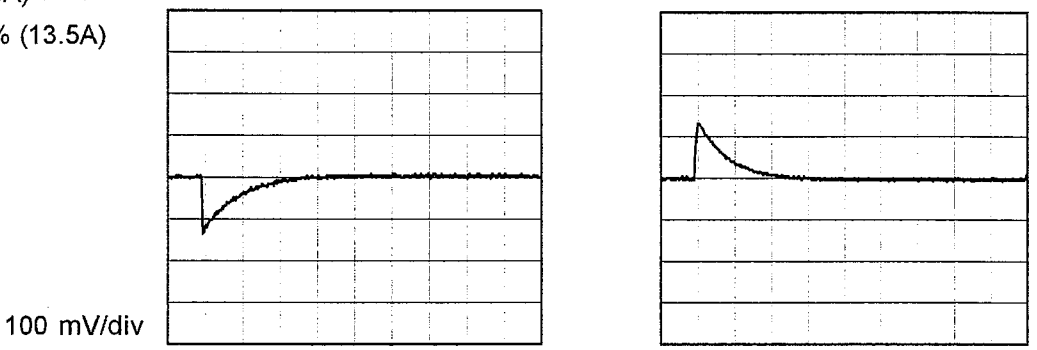
Input Volt. 100 V
Cycle 1000 ms

Response. t1=t2=50us. Typ

Min. Load (0A) ⟷
Load 100% (27A)




Min. Load (0A) ⟷
Load 50% (13.5A)

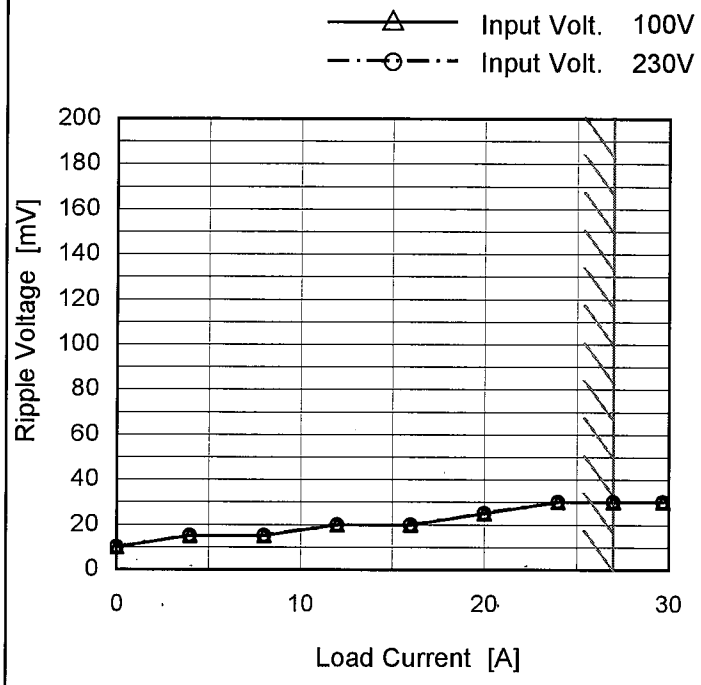


COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Ripple Voltage (by Load Current) |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure C

1.Graph




Measured by 20 MHz Oscilloscope.
Ripple Voltage 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

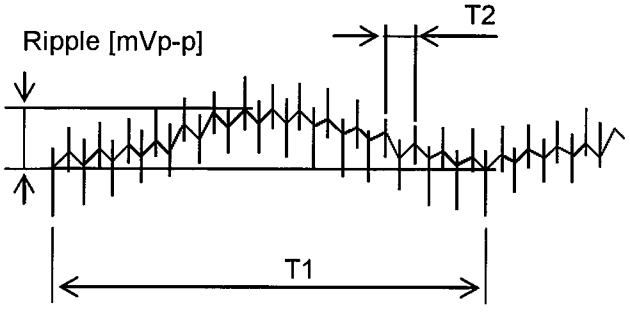



Fig. Complex Ripple Wave Form

2.Values

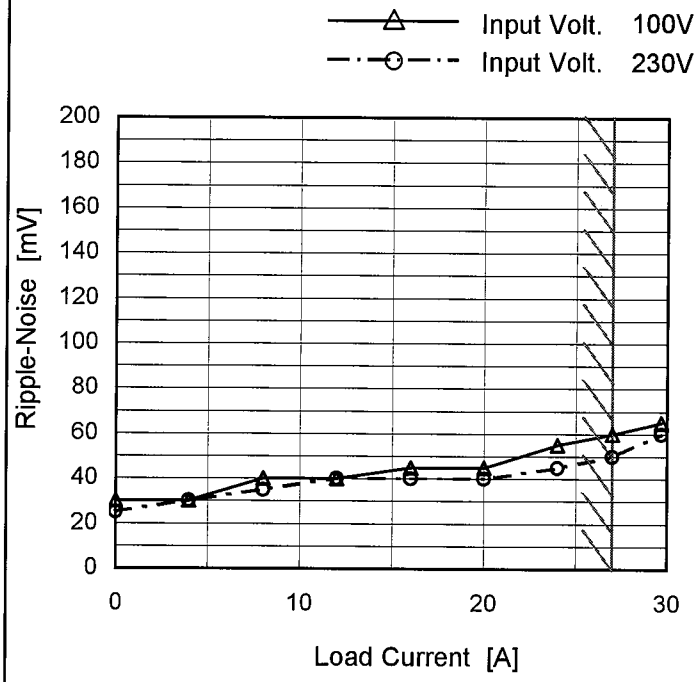
| Load Current [A] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 100 [V] | Input Volt. 230 [V] |
| 0.0 | 10 | 10 |
| 4.0 | 15 | 15 |
| 8.0 | 15 | 15 |
| 12.0 | 20 | 20 |
| 16.0 | 20 | 20 |
| 20.0 | 25 | 25 |
| 24.0 | 30 | 30 |
| 27.0 | 30 | 30 |
| 29.7 | 30 | 30 |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Ripple-Noise |
| Object | +12V27A |

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.

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 100 [V] | Input Volt. 230 [V] |
| 0.0 | 30 | 25 |
| 4.0 | 30 | 30 |
| 8.0 | 40 | 35 |
| 12.0 | 40 | 40 |
| 16.0 | 45 | 40 |
| 20.0 | 45 | 40 |
| 24.0 | 55 | 45 |
| 27.0 | 60 | 50 |
| 29.7 | 65 | 60 |
| -- | - | - |
| -- | - | - |

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

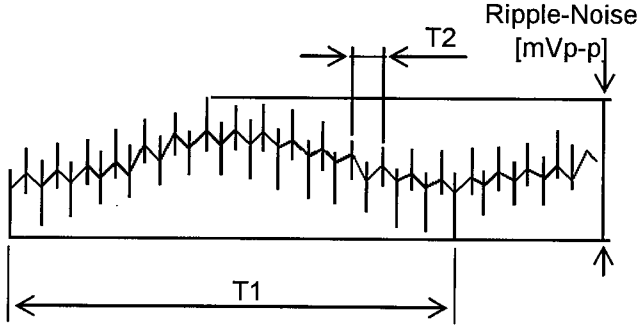



Fig. Complex Ripple Wave Form



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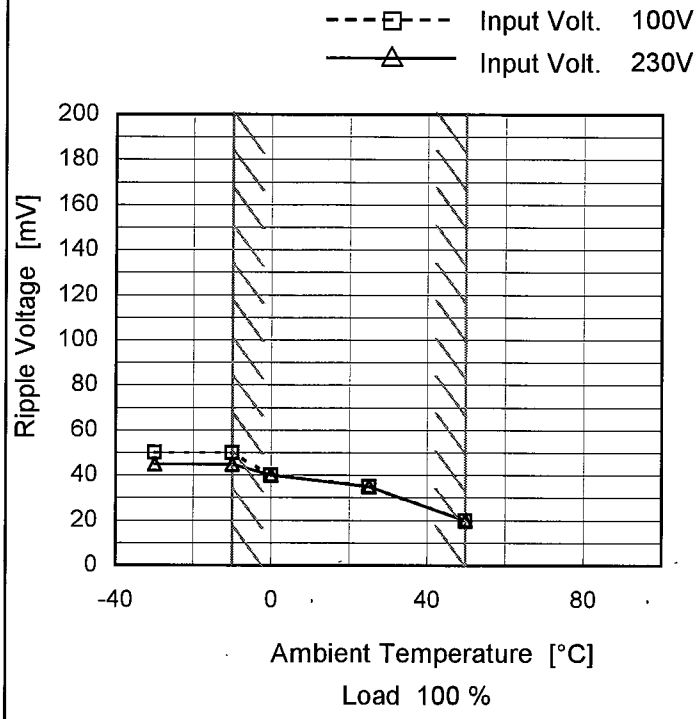
COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Ripple Voltage (by Ambient Temp.) |
| Object | +12V27A |

Testing Circuitry Figure C

1.Graph




Load 100 %

Measured by 20 MHz Oscilloscope.

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

2.Values

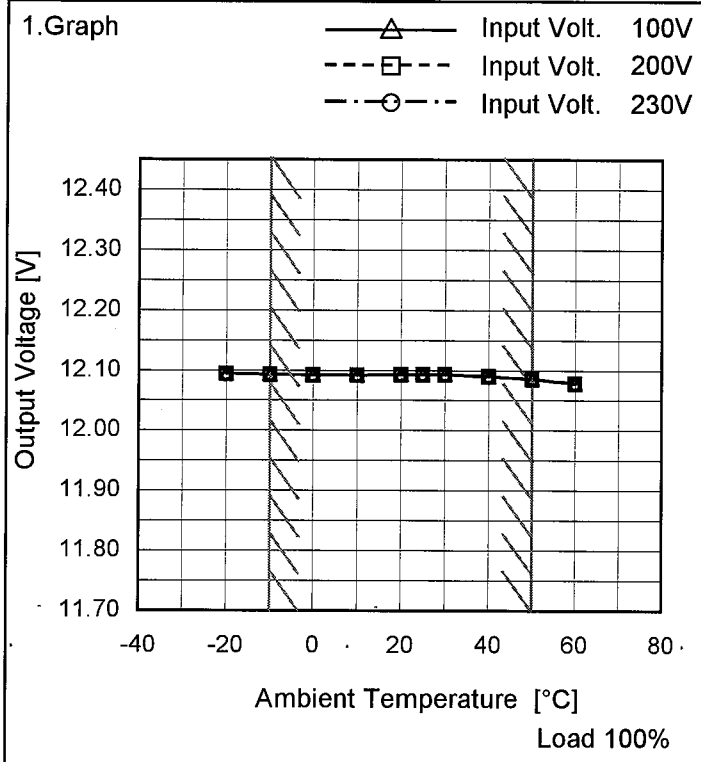
| Ambient Temperature [°C] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 100 [V] | Input Volt. 230 [V] |
| -30 | 50 | 45 |
| -10 | 50 | 45 |
| 0 | 40 | 40 |
| 25 | 35 | 35 |
| 50 | 20 | 20 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Ambient Temperature Drift |
| Object | +12V27A |

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 | 12.094 | 12.094 | 12.094 |
| -10 | 12.094 | 12.093 | 12.093 |
| 0 | 12.092 | 12.093 | 12.092 |
| 10 | 12.092 | 12.092 | 12.093 |
| 20 | 12.093 | 12.093 | 12.093 |
| 25 | 12.093 | 12.093 | 12.093 |
| 30 | 12.093 | 12.093 | 12.093 |
| 40 | 12.090 | 12.090 | 12.090 |
| 50 | 12.085 | 12.085 | 12.086 |
| 60 | 12.078 | 12.079 | 12.079 |
| -- | - | - | - |

COSEL

| | | |
|---|---|---|
| Model | LFA300F-12-TY | |
| Item | Output Voltage Accuracy | Testing Circuitry Figure A |
| Object | +12V27A | |

1.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 - 264V
Load Current : 0 - 27A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2.Values

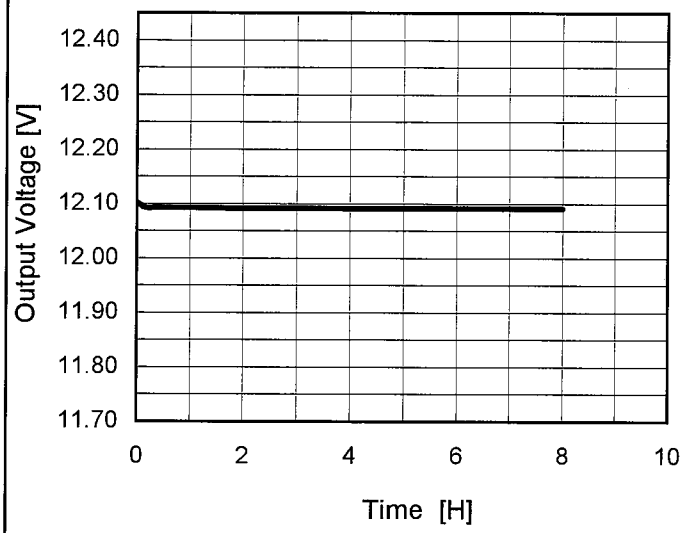
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
|---|---|---|---|---|---|---|
| | | | Current[A] | Voltage[V] | Value [mV] | Ration [%] |
| Maximum Voltage | 20 | 264 | 0 | 12.100 | ±8 | ±0.1 |
| Minimum Voltage | 50 | 200 | 27 | 12.085 | | |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Time Lapse Drift |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




Input Volt. 100V
Load 100%

* The characteristic of AC230V is equal.

2.Values

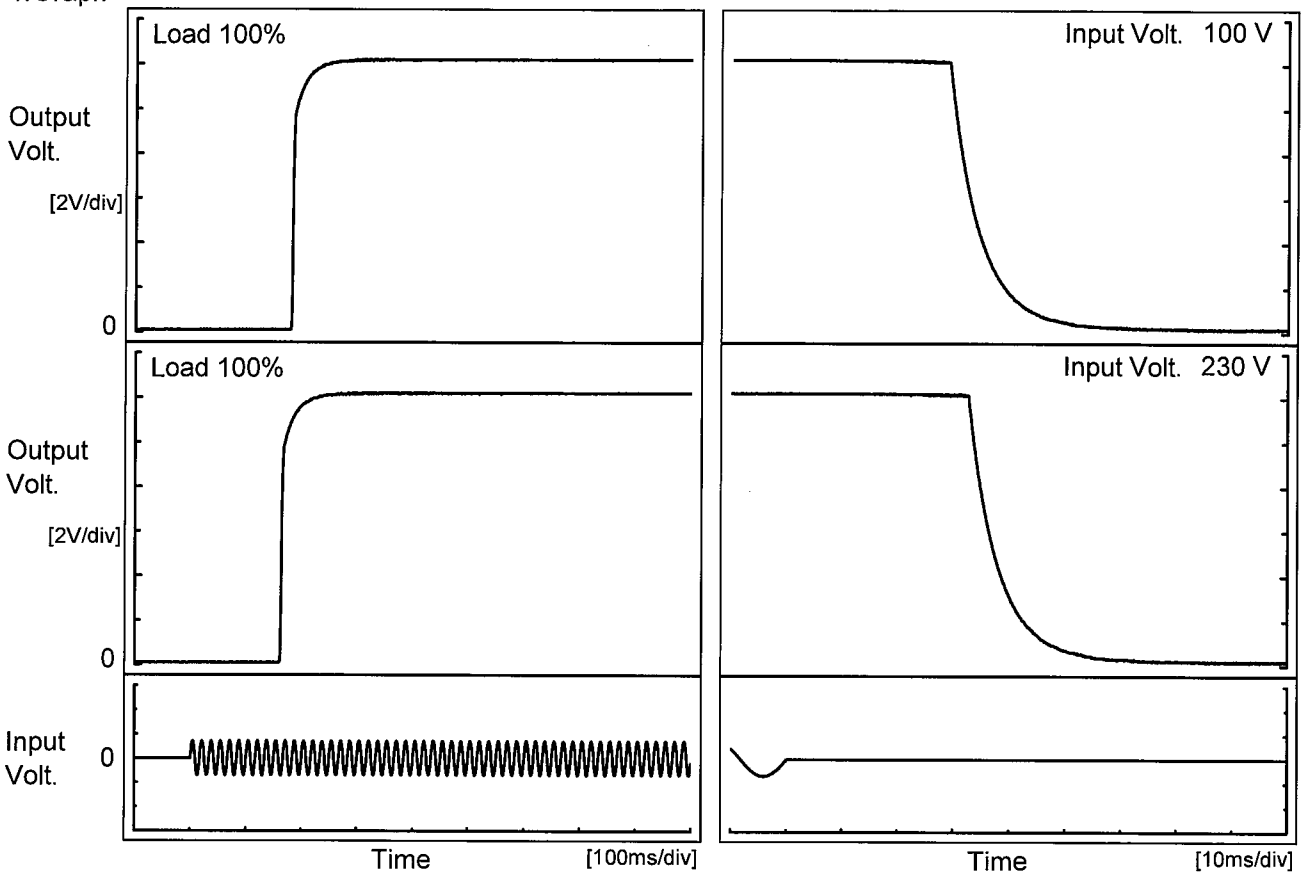
| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 12.102 |
| 0.5 | 12.093 |
| 1.0 | 12.093 |
| 2.0 | 12.092 |
| 3.0 | 12.092 |
| 4.0 | 12.092 |
| 5.0 | 12.092 |
| 6.0 | 12.092 |
| 7.0 | 12.092 |
| 8.0 | 12.091 |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Rise and Fall Time |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure A

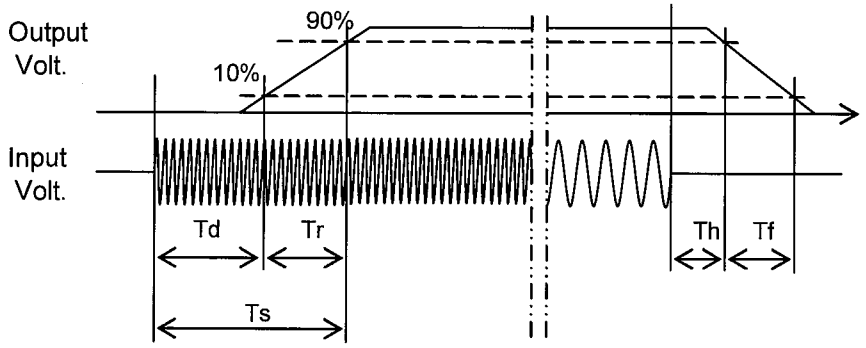
1.Graph




2.Values

[ms]

| Input Volt. \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 100 V | 181.0 | 18.5 | 199.5 | 29.8 | 12.2 |
| 230 V | 162.5 | 18.5 | 181.0 | 33.5 | 12.1 |

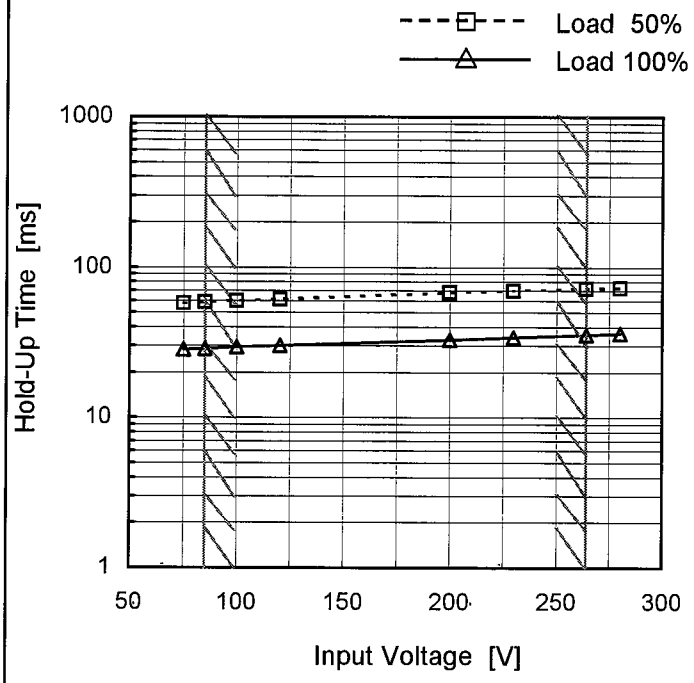


COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Hold-Up Time |
| Object | +12V27A |

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

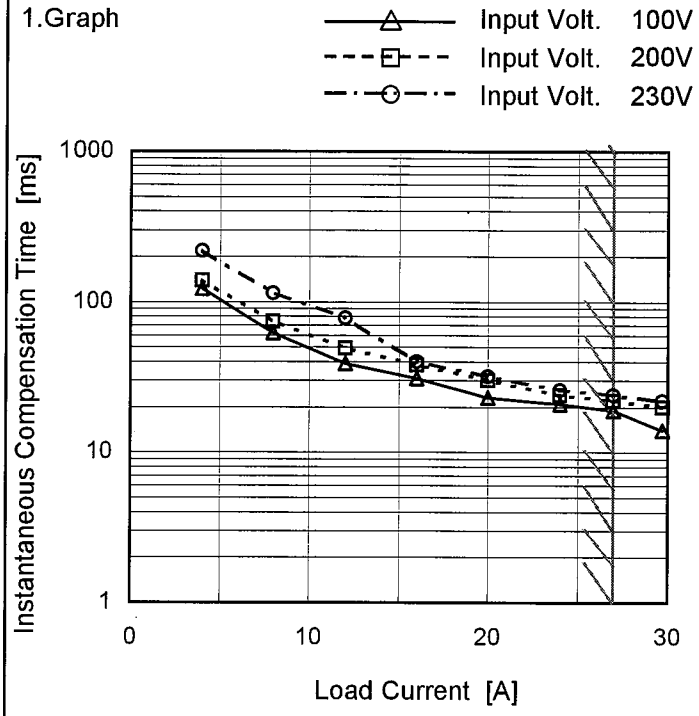
| Input Voltage [V] | Hold-Up Time [ms] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 57 | 29 |
| 85 | 59 | 30 |
| 100 | 60 | 29 |
| 120 | 61 | 30 |
| 200 | 68 | 33 |
| 230 | 70 | 34 |
| 264 | 72 | 36 |
| 280 | 73 | 36 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Instantaneous Interruption Compensation |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

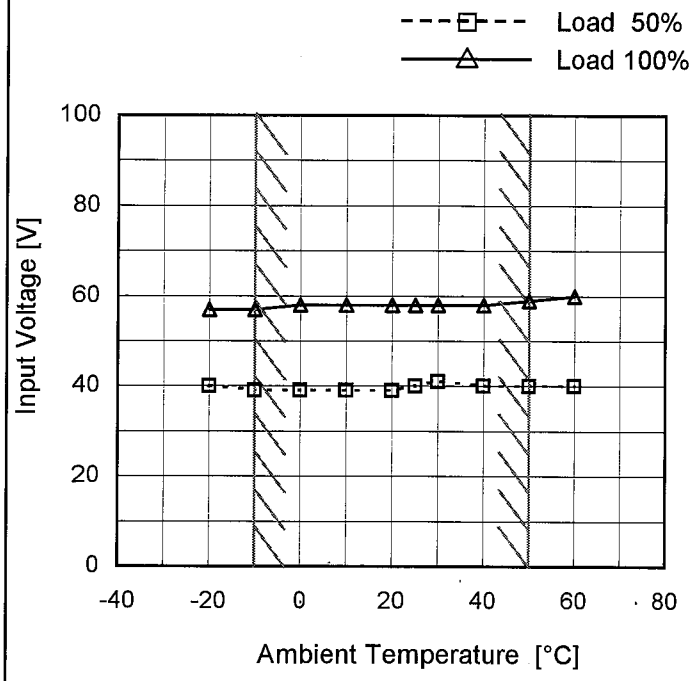
| Load Current [A] | Time [ms] | | |
|---|---|---|---|
| | Input Volt. 100[V] | Input Volt. 200[V] | Input Volt. 230[V] |
| 0.0 | - | - | - |
| 4.0 | 123 | 139 | 218 |
| 8.0 | 62 | 74 | 114 |
| 12.0 | 39 | 49 | 78 |
| 16.0 | 31 | 38 | 40 |
| 20.0 | 23 | 30 | 32 |
| 24.0 | 21 | 24 | 26 |
| 27.0 | 19 | 22 | 24 |
| 29.7 | 14 | 20 | 22 |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Minimum Input Voltage for Regulated Output Voltage |
| Object | +12V27A |

Testing Circuitry Figure A

1.Graph




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

2.Values

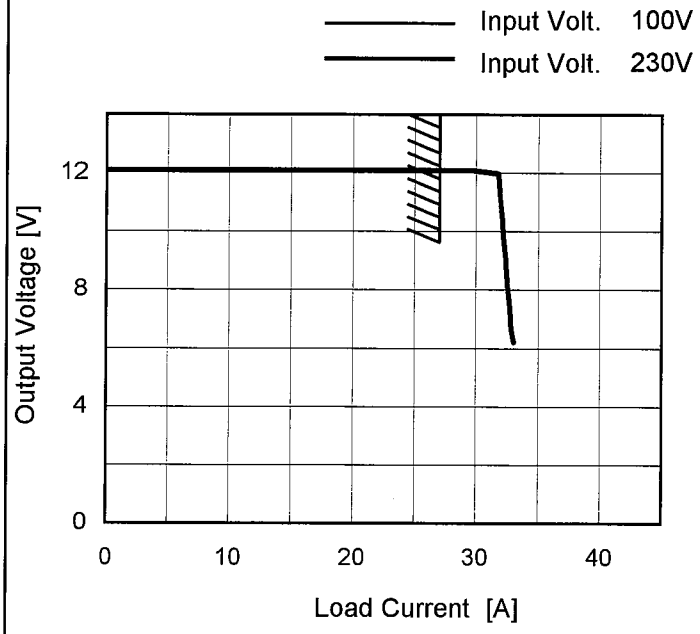
| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -20 | 40 | 57 |
| -10 | 39 | 57 |
| 0 | 39 | 58 |
| 10 | 39 | 58 |
| 20 | 39 | 58 |
| 25 | 40 | 58 |
| 30 | 41 | 58 |
| 40 | 40 | 58 |
| 50 | 40 | 59 |
| 60 | 40 | 60 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Overcurrent Protection |
| Object | +12V27A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

Intermittent operation occurs when the output voltage is from 6V to 0V.

2.Values

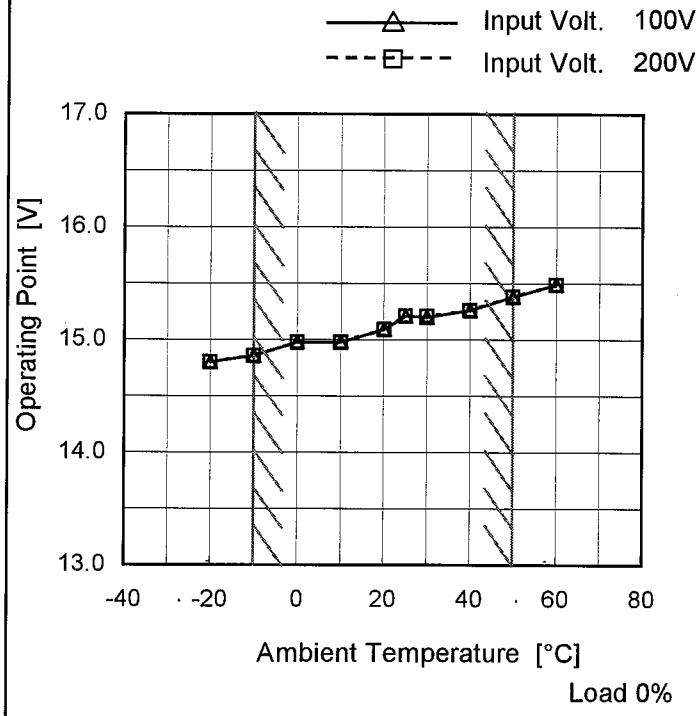
| Output Voltage [V] | Load Current [A] | |
|---|---|---|
| | Input Volt. 100[V] | Input Volt. 230[V] |
| 12.0 | 31.81 | 31.80 |
| 11.4 | 31.92 | 31.91 |
| 10.8 | 31.79 | 29.68 |
| 9.6 | 32.28 | 32.26 |
| 8.4 | 32.51 | 32.49 |
| 7.2 | 32.80 | 32.80 |
| 6.0 | 33.07 | 33.09 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | LFA300F-12-TY |
| Item | Overvoltage Protection |
| Object | +12V27A |

Testing Circuitry Figure A

1.Graph




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. 200[V] |
| -20 | 14.80 | 14.80 |
| -10 | 14.86 | 14.86 |
| 0 | 14.98 | 14.98 |
| 10 | 14.98 | 14.98 |
| 20 | 15.09 | 15.09 |
| 25 | 15.21 | 15.21 |
| 30 | 15.20 | 15.21 |
| 40 | 15.26 | 15.26 |
| 50 | 15.38 | 15.38 |
| 60 | 15.49 | 15.49 |
| -- | - | - |

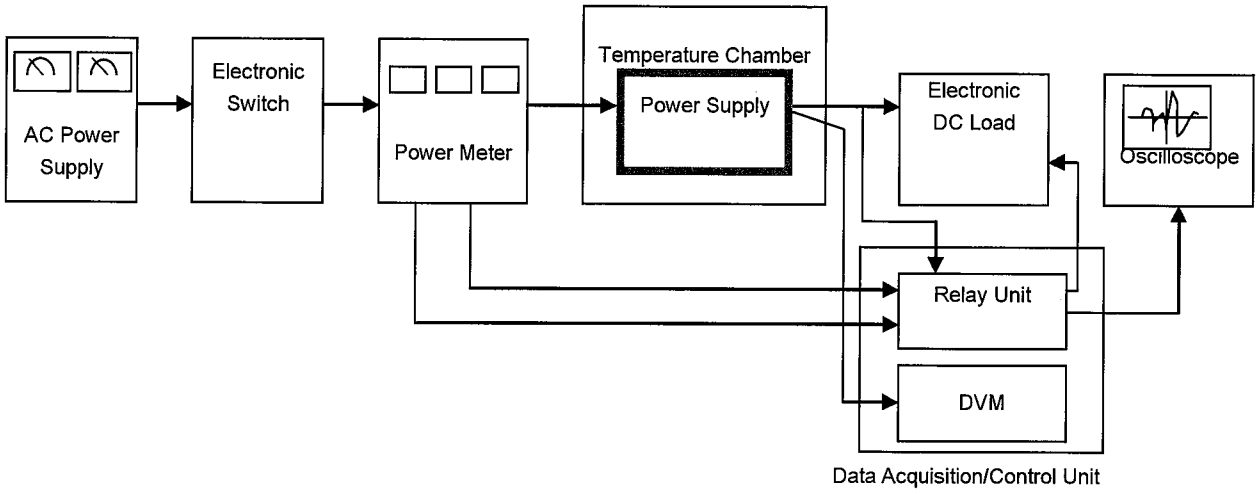



Figure A

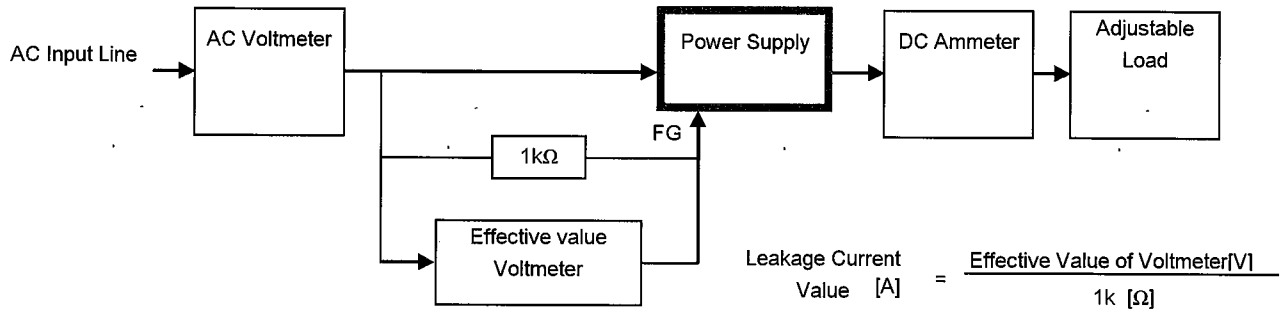



Figure B ( DEN-AN )

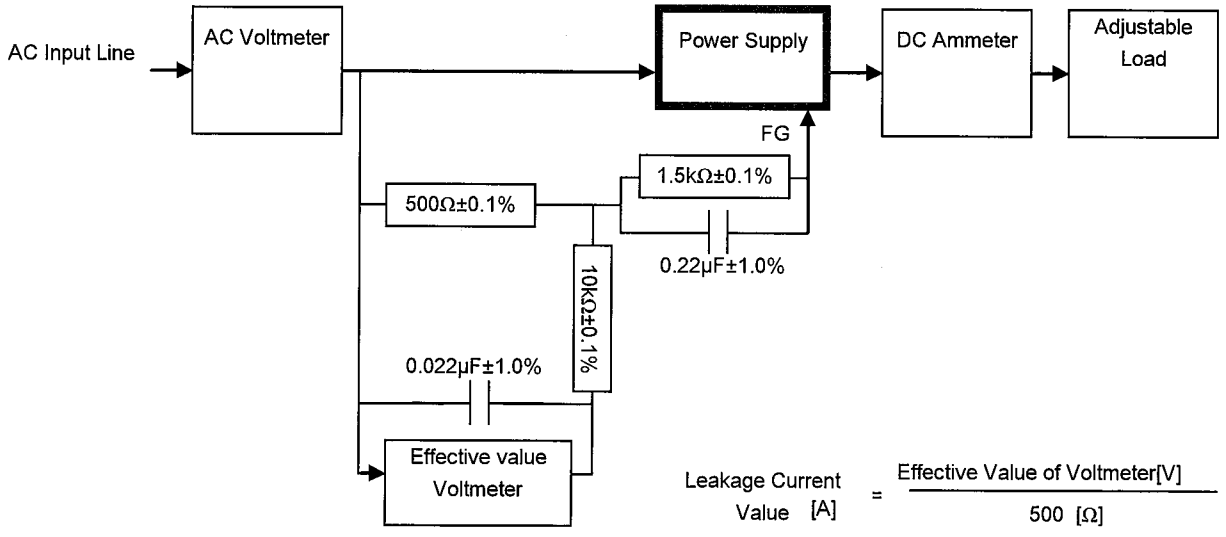



Figure B ( IEC60950-1 )

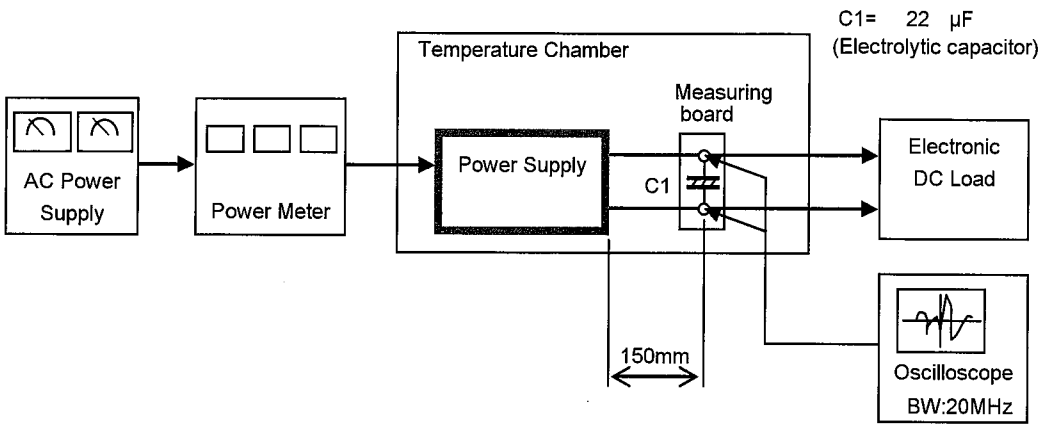

C1= 22 μF
(Electrolytic capacitor)
Temperature Chamber
Measuring board
AC Power Supply
Power Meter
Power Supply
C1
Electronic DC Load
150mm
Oscilloscope
BW:20MHz

Figure C