参考資料

COSEL

# TEST DATA OF R150-9

Regulated DC Power Supply
Mar 14, 2005

Approved by : K. Shiho
K. Shiho — Design Manager

Prepared by : M. Fujii
M. Fujii — Design Engineer

**COSEL CO.,LTD.**

COSEL

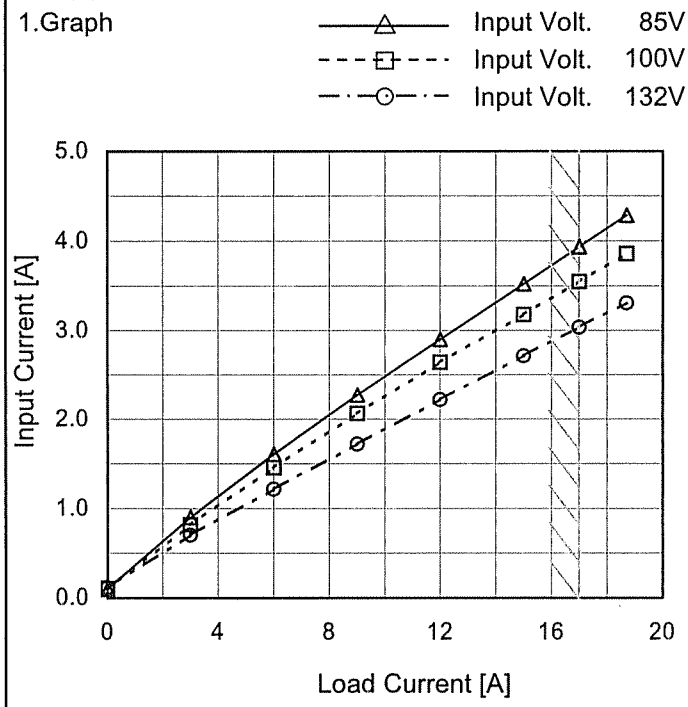
# CONTENTS

COSEL

| | |
|---|---|
| Model | R150-9 |
| 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

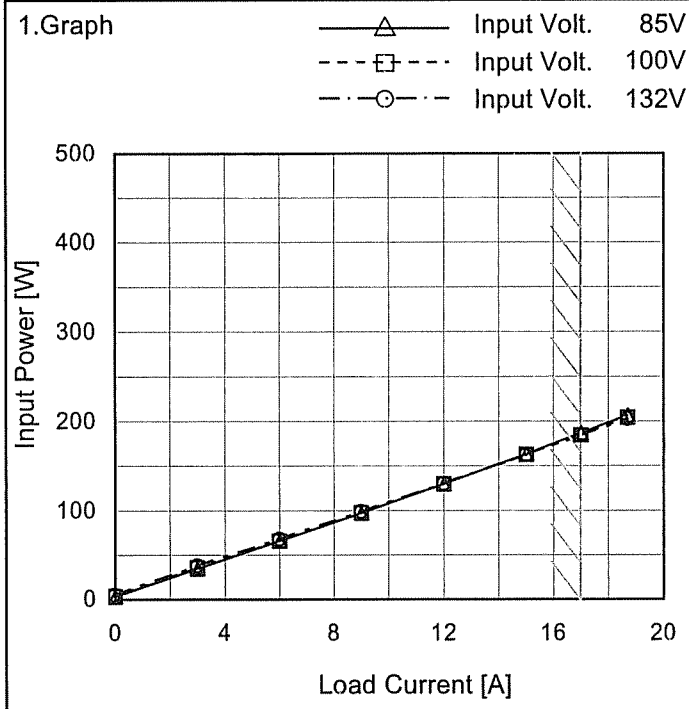
| Load Current [A] | Input Current [A] | | |
|---|---|---|---|
| | Input Volt. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| 0.0 | 0.101 | 0.105 | 0.115 |
| 3.0 | 0.900 | 0.820 | 0.704 |
| 6.0 | 1.608 | 1.460 | 1.216 |
| 9.0 | 2.274 | 2.064 | 1.722 |
| 12.0 | 2.900 | 2.640 | 2.220 |
| 15.0 | 3.525 | 3.180 | 2.712 |
| 17.0 | 3.940 | 3.549 | 3.036 |
| 18.7 | 4.290 | 3.862 | 3.308 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| 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

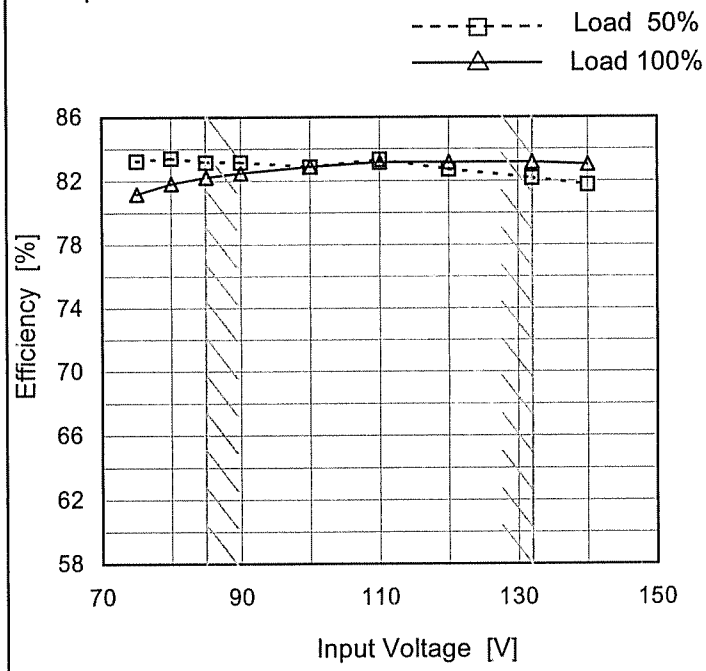
| Load Current [A] | Input Power [W] | | |
|---|---|---|---|
| | Input Volt. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| 0.0 | 3.1 | 3.6 | 4.9 |
| 3.0 | 35.0 | 35.8 | 38.1 |
| 6.0 | 66.0 | 66.0 | 68.4 |
| 9.0 | 97.5 | 97.8 | 99.3 |
| 12.0 | 130.2 | 129.9 | 130.5 |
| 15.0 | 163.5 | 162.6 | 162.6 |
| 17.0 | 187.0 | 184.8 | 184.4 |
| 18.7 | 207.0 | 204.3 | 203.1 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| 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

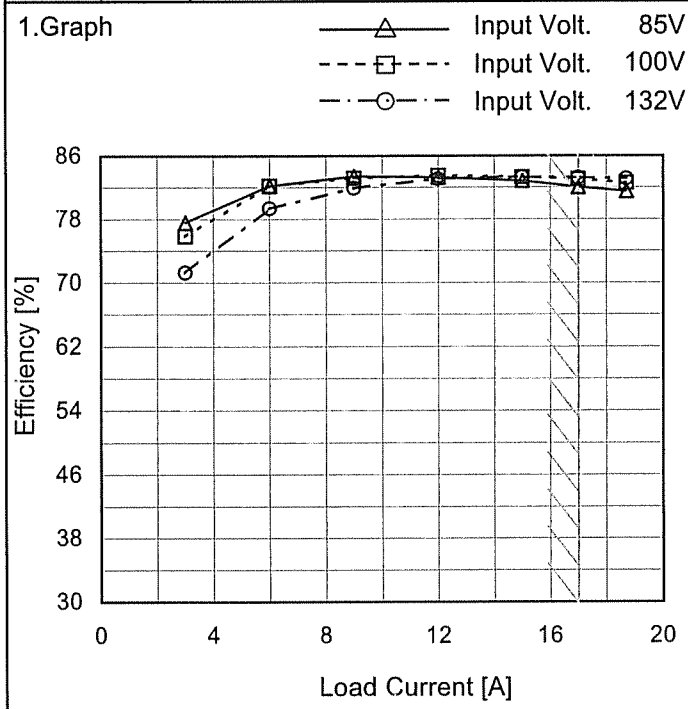
| Input Voltage [V] | Efficiency [%] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 83.2 | 81.2 |
| 80 | 83.4 | 81.8 |
| 85 | 83.2 | 82.2 |
| 90 | 83.2 | 82.5 |
| 100 | 82.9 | 82.9 |
| 110 | 83.3 | 83.2 |
| 120 | 82.7 | 83.2 |
| 132 | 82.2 | 83.2 |
| 140 | 81.7 | 83.0 |

COSEL

| | |
|---|---|
| Model | R150-9 |
| 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.

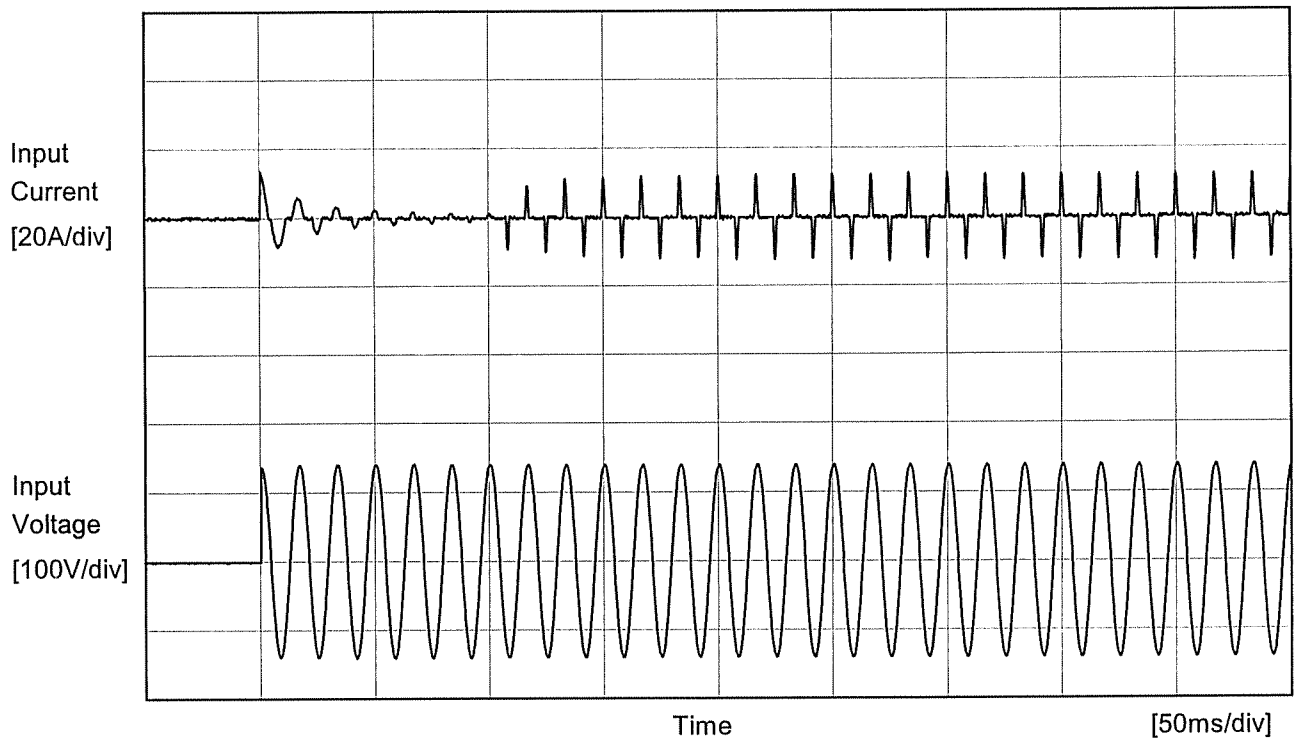
2.Values

| Load Current [A] | Efficiency [%] | | |
|---|---|---|---|
| | Input Volt. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| 0.0 | - | - | - |
| 3.0 | 77.6 | 75.9 | 71.3 |
| 6.0 | 82.2 | 82.2 | 79.4 |
| 9.0 | 83.4 | 83.2 | 81.9 |
| 12.0 | 83.3 | 83.5 | 83.1 |
| 15.0 | 82.8 | 83.3 | 83.3 |
| 17.0 | 82.1 | 83.0 | 83.2 |
| 18.7 | 81.5 | 82.6 | 83.1 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

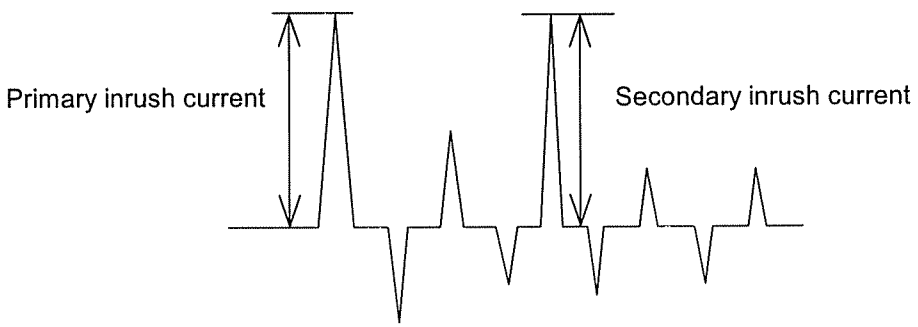
COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Inrush Current |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A




| | |
|---|---|
| Input Voltage | 100 V |
| Frequency | 60 Hz |
| Load | 100 % |
| Primary inrush current | 13.5 A |
| Secondary inrush current | 12.9 A |

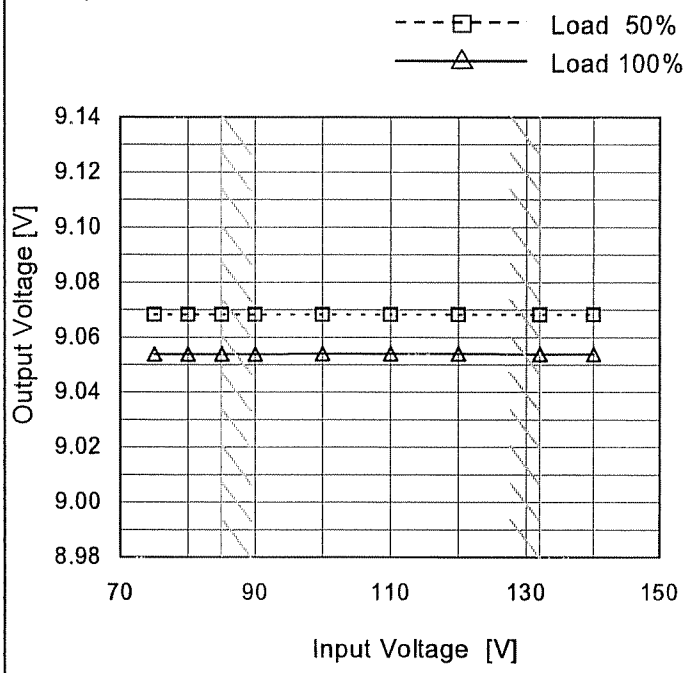


COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Line Regulation |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

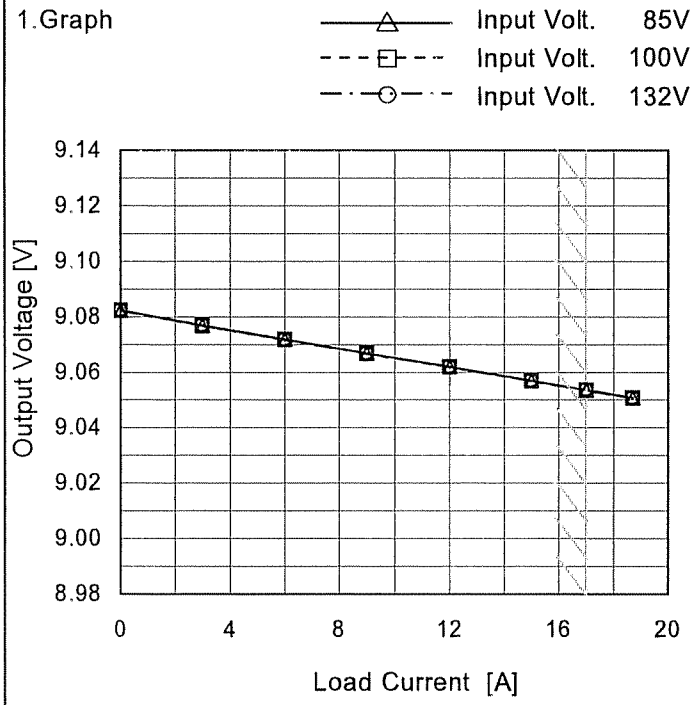
| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 9.068 | 9.054 |
| 80 | 9.068 | 9.054 |
| 85 | 9.068 | 9.054 |
| 90 | 9.068 | 9.054 |
| 100 | 9.068 | 9.054 |
| 110 | 9.068 | 9.054 |
| 120 | 9.068 | 9.054 |
| 132 | 9.068 | 9.054 |
| 140 | 9.068 | 9.054 |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Load Regulation |
| Object | +9V17A |

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. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
|---|---|---|---|
| 0.0 | 9.082 | 9.082 | 9.082 |
| 3.0 | 9.077 | 9.077 | 9.077 |
| 6.0 | 9.072 | 9.072 | 9.072 |
| 9.0 | 9.067 | 9.067 | 9.067 |
| 12.0 | 9.062 | 9.062 | 9.062 |
| 15.0 | 9.057 | 9.057 | 9.057 |
| 17.0 | 9.054 | 9.054 | 9.054 |
| 18.7 | 9.051 | 9.051 | 9.051 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

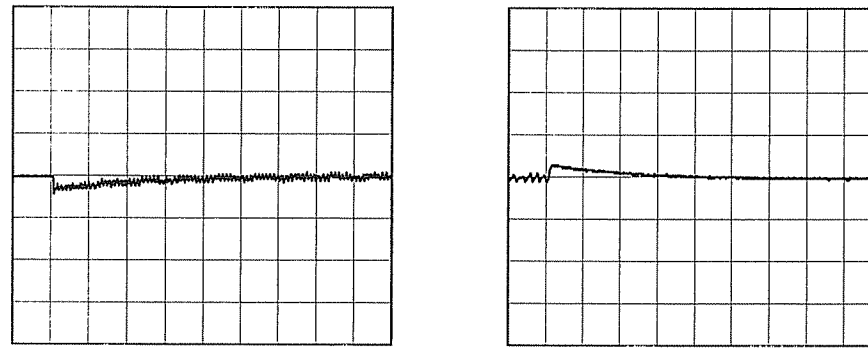
| | |
|---|---|
| Model | R150-9 |
| Item | Dynamic Load Response |
| Object | +9V17A |

Temperature 25℃
Testing Circuitry Figure A

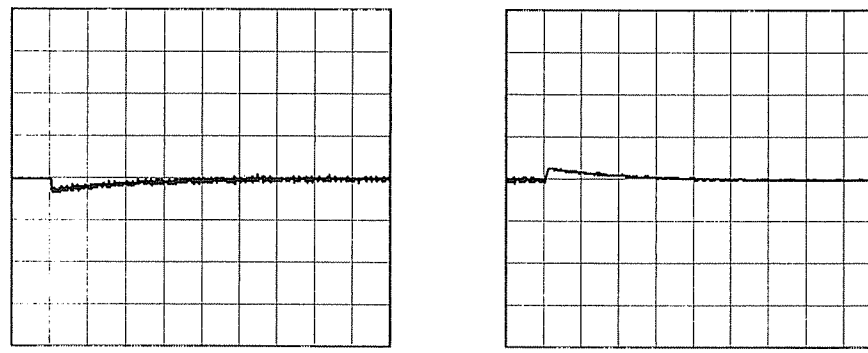
Input Volt. 100 V
Cycle 1000 ms

Load Current

Min. Load (0A) ⟷
Load 100% (17A)




Min. Load (0A) ⟷
Load 50% (8.5A)

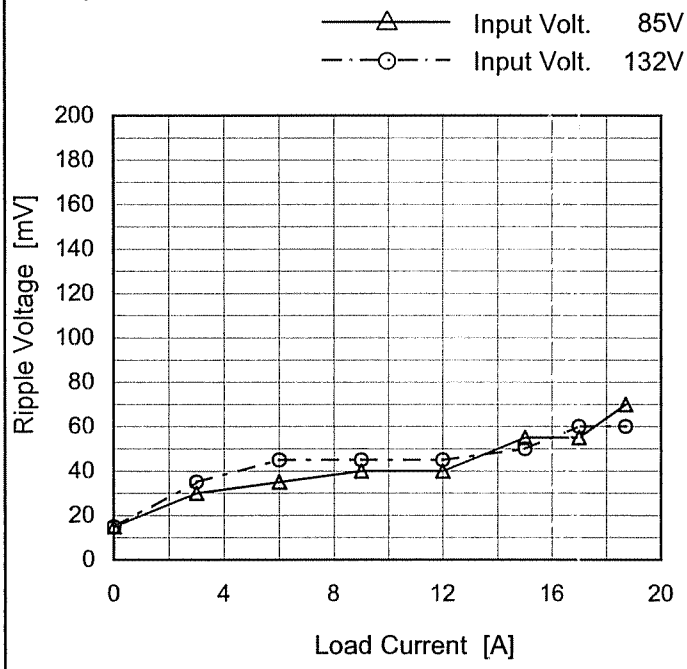


COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Ripple Voltage (by Load Current) |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

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

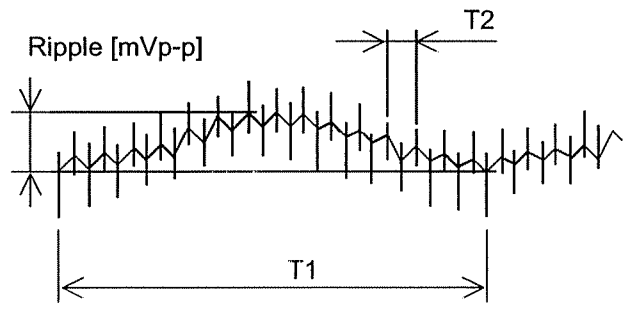



Fig. Complex Ripple Wave Form

2.Values

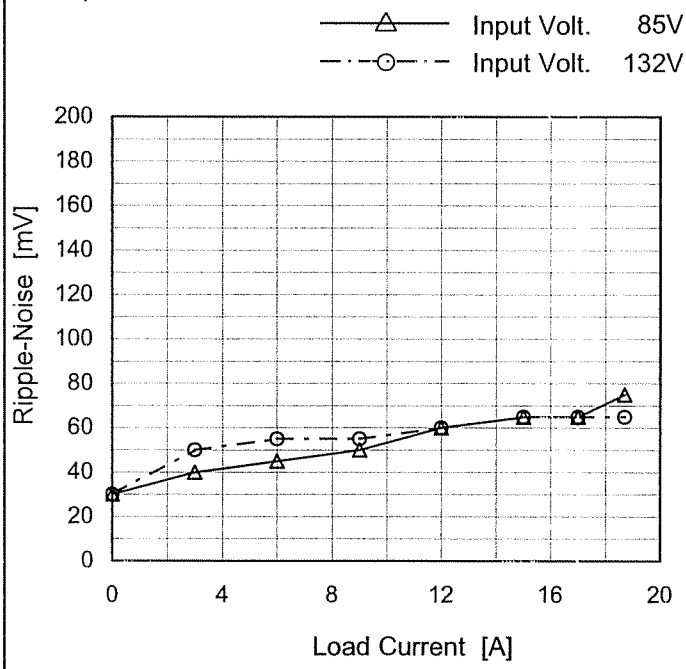
| Load Current [A] | Ripple Voltage [mV] Input Volt. 85 [V] | Ripple Voltage [mV] Input Volt. 132 [V] |
|---|---|---|
| 0.0 | 15 | 15 |
| 3.0 | 30 | 35 |
| 6.0 | 35 | 45 |
| 9.0 | 40 | 45 |
| 12.0 | 40 | 45 |
| 15.0 | 55 | 50 |
| 17.0 | 55 | 60 |
| 18.7 | 70 | 60 |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Ripple-Noise |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

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

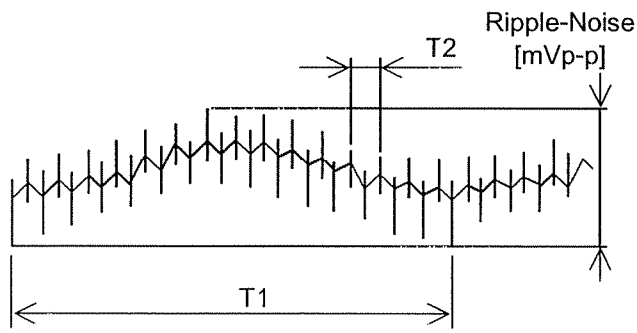



Fig. Complex Ripple Wave Form

2.Values

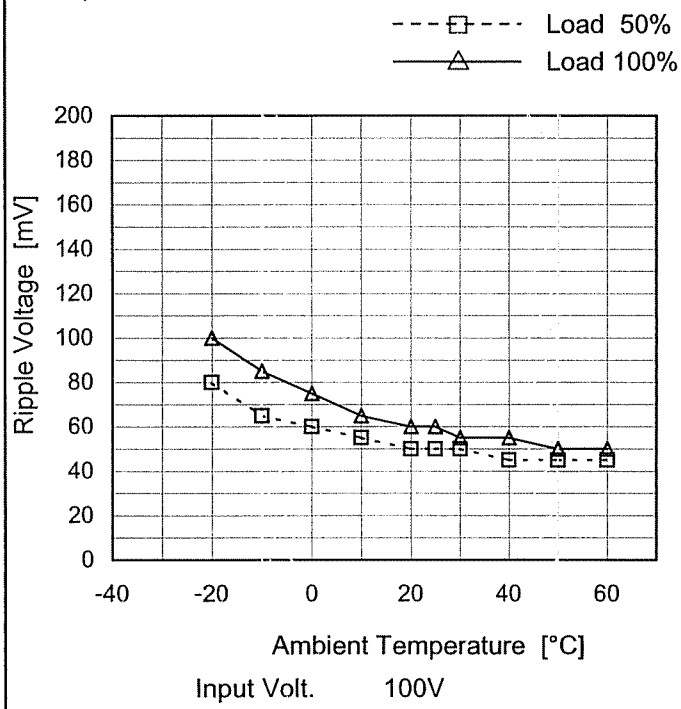
| Load Current [A] | Ripple-Noise [mV] Input Volt. 85 [V] | Ripple-Noise [mV] Input Volt. 132 [V] |
|---|---|---|
| 0.0 | 30 | 30 |
| 3.0 | 40 | 50 |
| 6.0 | 45 | 55 |
| 9.0 | 50 | 55 |
| 12.0 | 60 | 60 |
| 15.0 | 65 | 65 |
| 17.0 | 65 | 65 |
| 18.7 | 75 | 65 |
| -- | - | - |
| -- | - | - |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Ripple Voltage (by Ambient Temp.) |
| Object | +9V17A |

Testing Circuitry Figure A

1.Graph




Input Volt. 100V

Measured by 20 MHz Oscilloscope.

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

2.Values

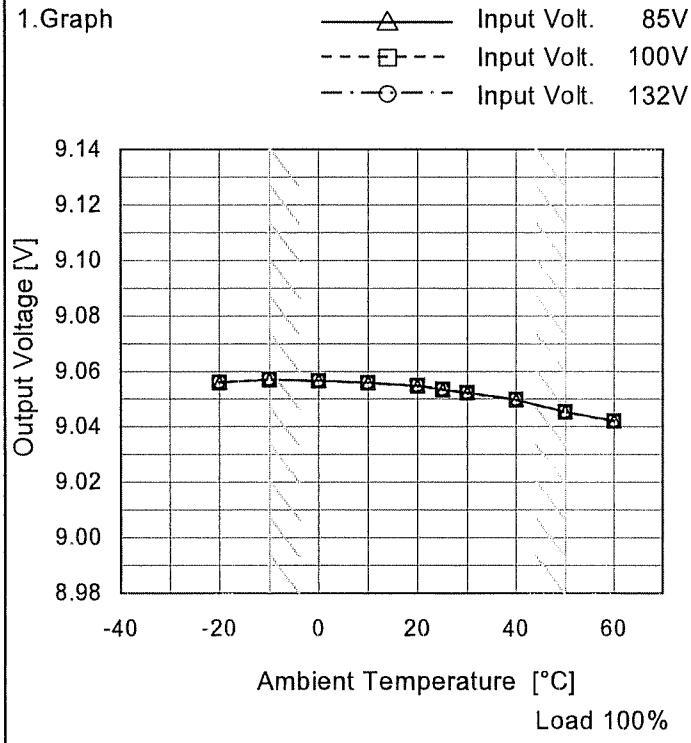
| Ambient Temperature [°C] | Ripple Voltage [mV] | |
|---|---|---|
| | Load 50% | Load 100% |
| -20 | 80 | 100 |
| -10 | 65 | 85 |
| 0 | 60 | 75 |
| 10 | 55 | 65 |
| 20 | 50 | 60 |
| 25 | 50 | 60 |
| 30 | 50 | 55 |
| 40 | 45 | 55 |
| 50 | 45 | 50 |
| 60 | 45 | 50 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Ambient Temperature Drift |
| Object | +9V17A |

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. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| -20 | 9.056 | 9.056 | 9.056 |
| -10 | 9.057 | 9.057 | 9.057 |
| 0 | 9.057 | 9.057 | 9.057 |
| 10 | 9.056 | 9.056 | 9.056 |
| 20 | 9.055 | 9.055 | 9.055 |
| 25 | 9.053 | 9.054 | 9.054 |
| 30 | 9.052 | 9.052 | 9.052 |
| 40 | 9.050 | 9.050 | 9.050 |
| 50 | 9.045 | 9.045 | 9.045 |
| 60 | 9.042 | 9.042 | 9.042 |
| -- | - | - | - |

COSEL

| | | |
|---|---|---|
| Model | R150-9 | |
| Item | Output Voltage Accuracy | Testing Circuitry Figure A |
| Object | +9V17A | |

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 - 132V
Load Current : 0 - 17A

* 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

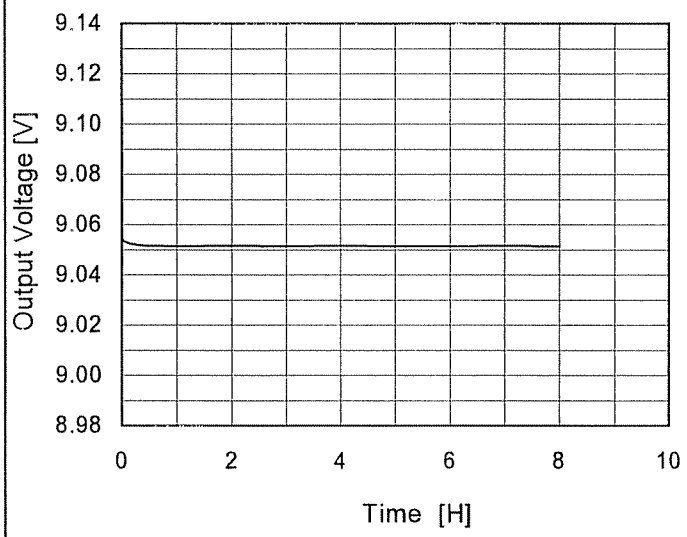
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
|---|---|---|---|---|---|---|
| | | | Current[A] | Voltage[V] | Value [mV] | Ration [%] |
| Maximum Voltage | -10 | 132 | 0 | 9.084 | ±20 | ±0.2 |
| Minimum Voltage | 50 | 85 | 17 | 9.044 | | |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Time Lapse Drift |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




Input Volt. 100V
Load 100%

2.Values

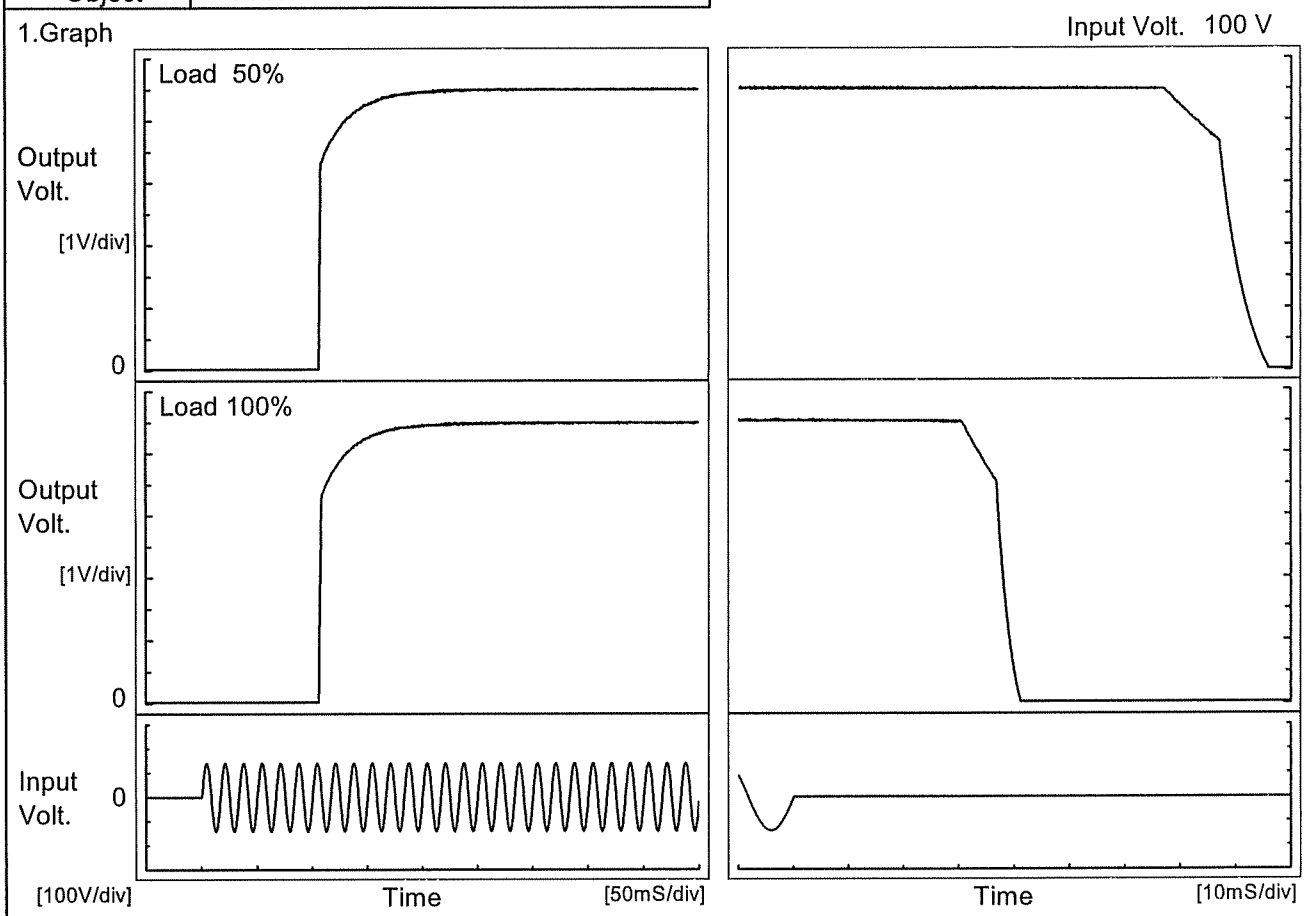
| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 9.055 |
| 0.5 | 9.052 |
| 1.0 | 9.052 |
| 2.0 | 9.052 |
| 3.0 | 9.052 |
| 4.0 | 9.052 |
| 5.0 | 9.052 |
| 6.0 | 9.052 |
| 7.0 | 9.052 |
| 8.0 | 9.052 |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Rise and Fall Time |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

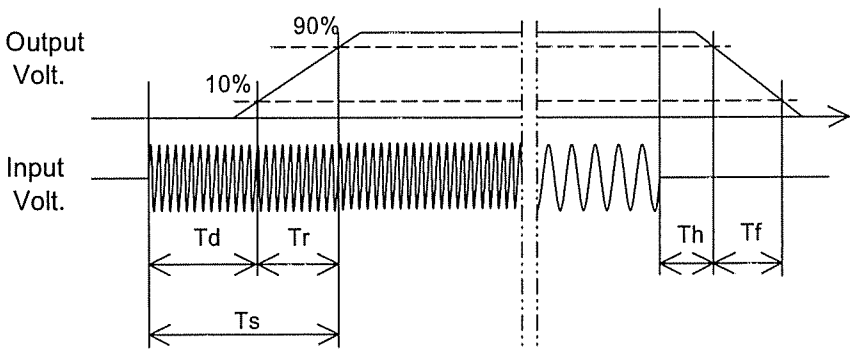
1.Graph




2.Values

[mS]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 106.5 | 28.8 | 135.3 | 71.7 | 12.0 |
| 100 % | 106.3 | 29.3 | 135.6 | 33.1 | 7.1 |

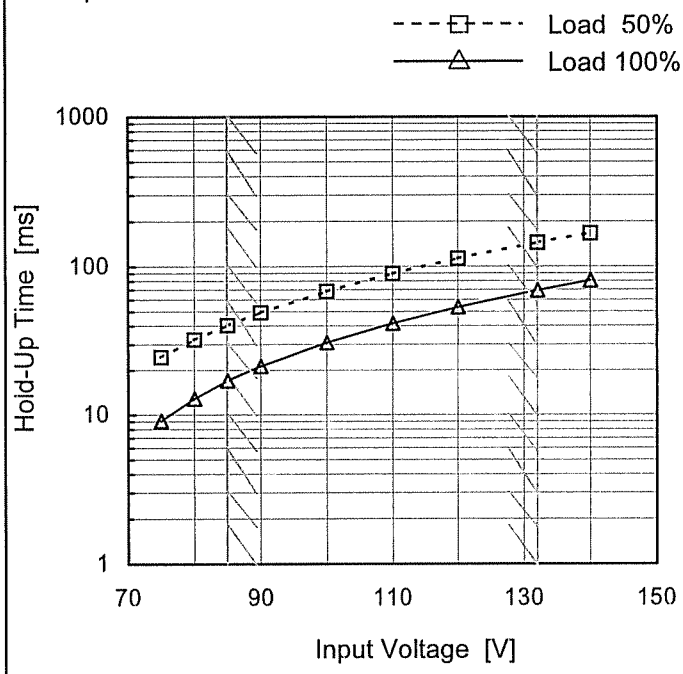


COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Hold-Up Time |
| Object | +9V17A |

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

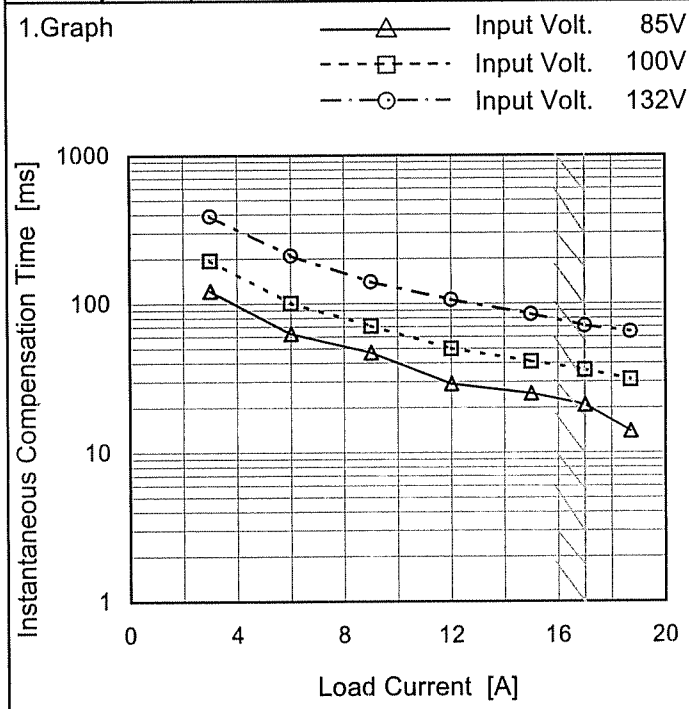
| Input Voltage [V] | Hold-Up Time [ms] | |
|---|---|---|
| | Load 50% | Load 100% |
| 75 | 25 | 9 |
| 80 | 32 | 13 |
| 85 | 40 | 17 |
| 90 | 49 | 21 |
| 100 | 68 | 31 |
| 110 | 90 | 42 |
| 120 | 113 | 54 |
| 132 | 145 | 69 |
| 140 | 167 | 81 |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Instantaneous Interruption Compensation |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

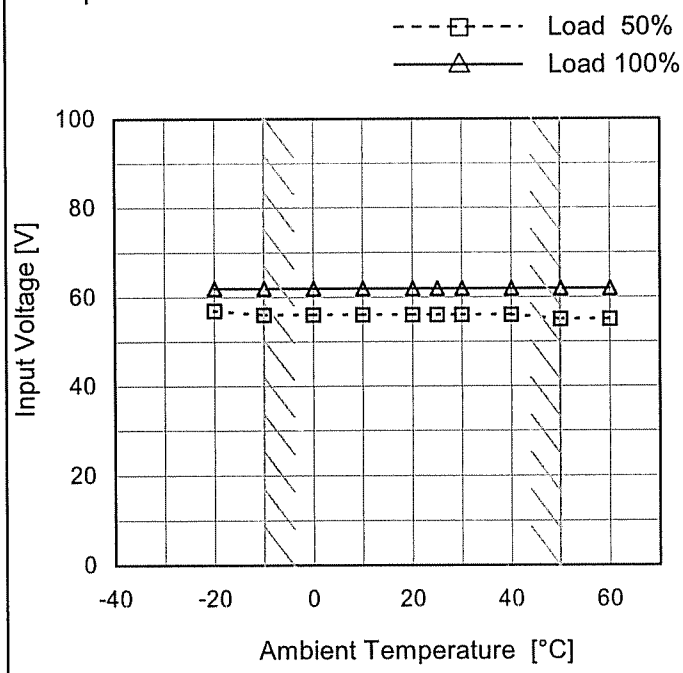
| Load Current [A] | Time [ms] Input Volt. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
|---|---|---|---|
| 0.0 | - | - | - |
| 3.0 | 122 | 195 | 389 |
| 6.0 | 63 | 101 | 210 |
| 9.0 | 47 | 71 | 140 |
| 12.0 | 29 | 50 | 106 |
| 15.0 | 25 | 41 | 85 |
| 17.0 | 21 | 36 | 71 |
| 18.7 | 14 | 31 | 65 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Minimum Input Voltage for Regulated Output Voltage |
| Object | +9V17A |

Testing Circuitry Figure A

1.Graph




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

2.Values

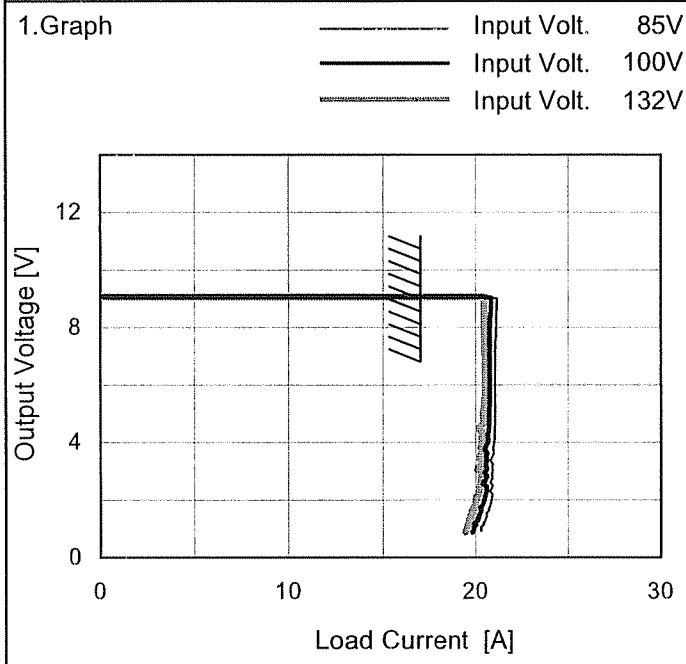
| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -20 | 57 | 62 |
| -10 | 56 | 62 |
| 0 | 56 | 62 |
| 10 | 56 | 62 |
| 20 | 56 | 62 |
| 25 | 56 | 62 |
| 30 | 56 | 62 |
| 40 | 56 | 62 |
| 50 | 55 | 62 |
| 60 | 55 | 62 |
| -- | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Overcurrent Protection |
| Object | +9V17A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

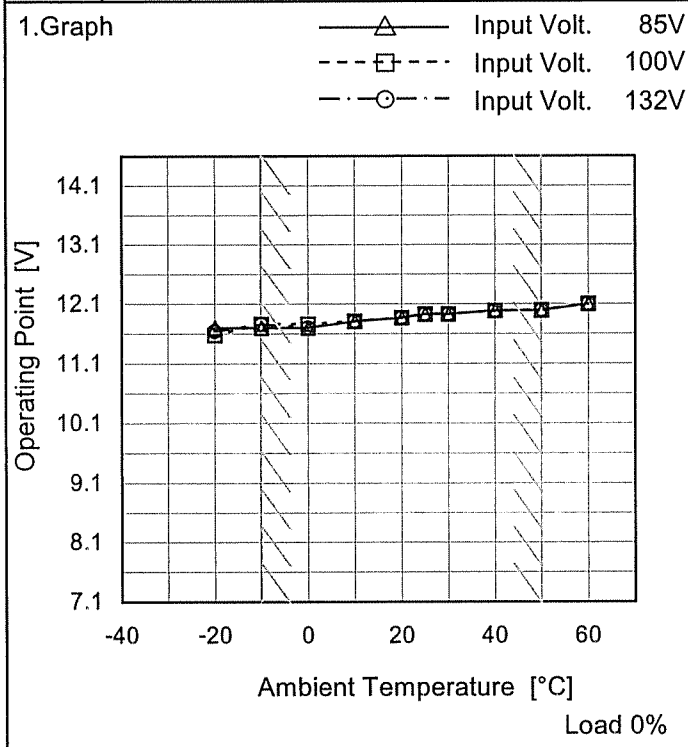
| Output Voltage [V] | Load Current [A] | | |
|---|---|---|---|
| | Input Volt. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| 9.00 | 17.87 | 19.23 | 18.02 |
| 8.55 | 21.12 | 20.82 | 20.46 |
| 8.10 | 21.12 | 20.77 | 20.47 |
| 7.20 | 21.06 | 20.76 | 20.49 |
| 6.30 | 21.05 | 20.76 | 20.51 |
| 5.40 | 21.05 | 20.76 | 20.49 |
| 4.50 | 21.04 | 20.72 | 20.18 |
| 3.60 | 20.95 | 20.62 | 20.35 |
| 2.70 | 20.87 | 20.53 | 20.30 |
| 1.80 | 20.78 | 20.37 | 19.92 |
| 0.90 | 20.28 | 19.83 | 19.42 |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | R150-9 |
| Item | Overvoltage Protection |
| Object | +9V17A |

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. 85[V] | Input Volt. 100[V] | Input Volt. 132[V] |
| -20 | 11.66 | 11.54 | 11.60 |
| -10 | 11.66 | 11.72 | 11.72 |
| 0 | 11.66 | 11.72 | 11.66 |
| 10 | 11.77 | 11.77 | 11.77 |
| 20 | 11.83 | 11.83 | 11.83 |
| 25 | 11.89 | 11.89 | 11.89 |
| 30 | 11.89 | 11.89 | 11.89 |
| 40 | 11.95 | 11.94 | 11.94 |
| 50 | 11.95 | 11.95 | 11.95 |
| 60 | 12.06 | 12.06 | 12.06 |
| -- | - | - | - |

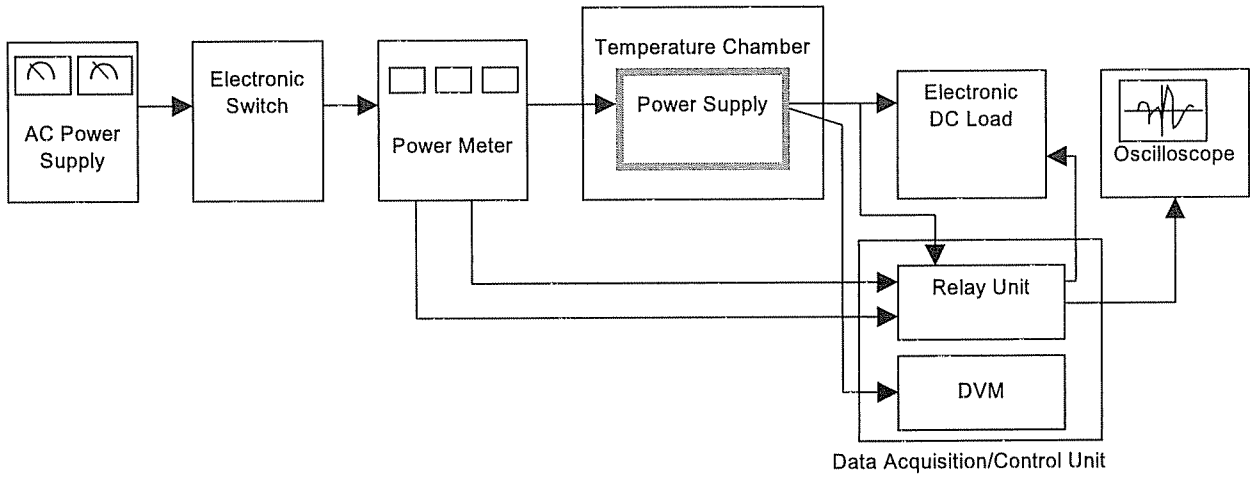



Figure A

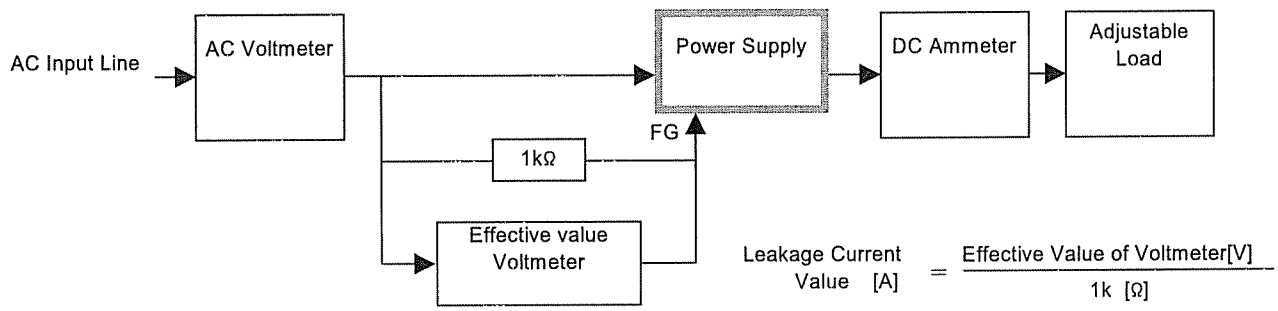



Figure B ( DEN-AN )

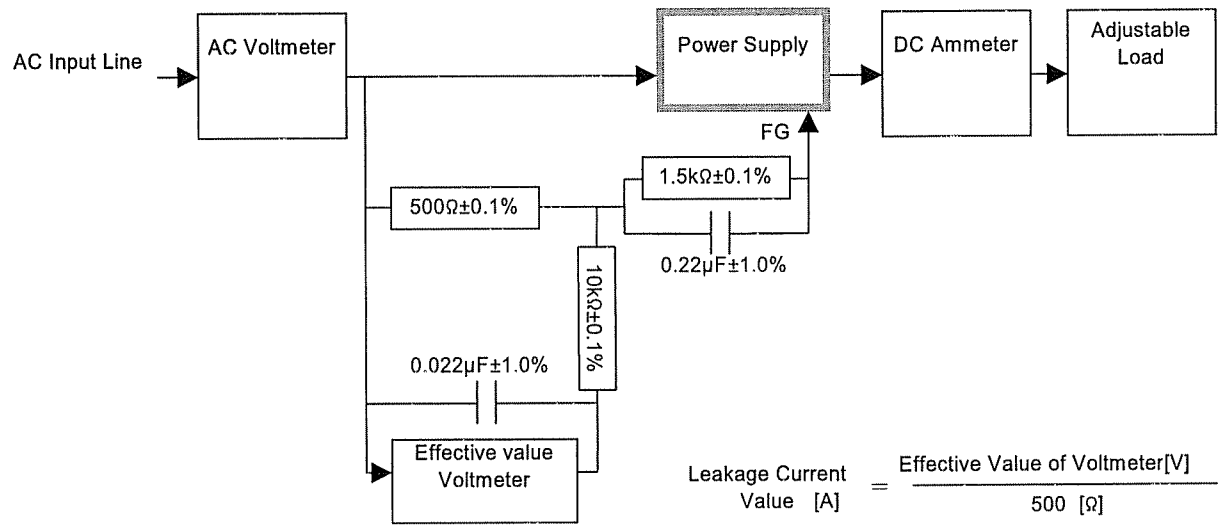



Figure B ( IEC60950 )