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参考資料

# TEST DATA OF MGW34812

Regulated DC Power Supply
November 1, 2016

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Takaaki Sekiguchi Design Engineer

**COSEL CO.,LTD.**

参考資料

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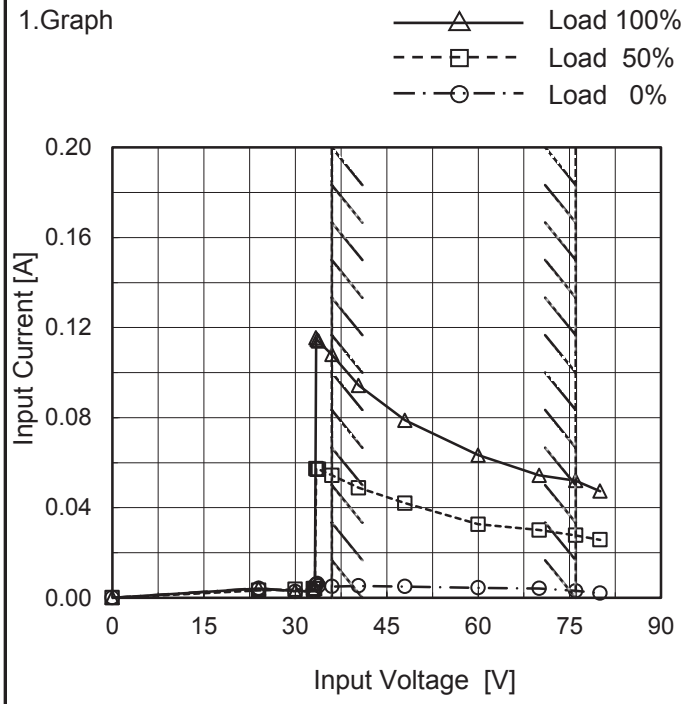
COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Input Current (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] | Input Current [A] | | |
|---|---|---|---|
| | Load 0% | Load 50% | Load 100% |
| 0.0 | 0.000 | 0.000 | 0.000 |
| 24.0 | 0.004 | 0.003 | 0.004 |
| 30.0 | 0.003 | 0.004 | 0.003 |
| 33.0 | 0.003 | 0.004 | 0.003 |
| 33.2 | 0.003 | 0.004 | 0.004 |
| 33.4 | 0.006 | 0.057 | 0.115 |
| 33.6 | 0.006 | 0.057 | 0.115 |
| 33.8 | 0.005 | 0.057 | 0.114 |
| 36.0 | 0.005 | 0.054 | 0.108 |
| 40.4 | 0.005 | 0.049 | 0.094 |
| 48.0 | 0.005 | 0.042 | 0.079 |
| 60.0 | 0.004 | 0.033 | 0.063 |
| 70.0 | 0.004 | 0.030 | 0.054 |
| 76.0 | 0.003 | 0.028 | 0.052 |
| 80.0 | 0.002 | 0.026 | 0.047 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |



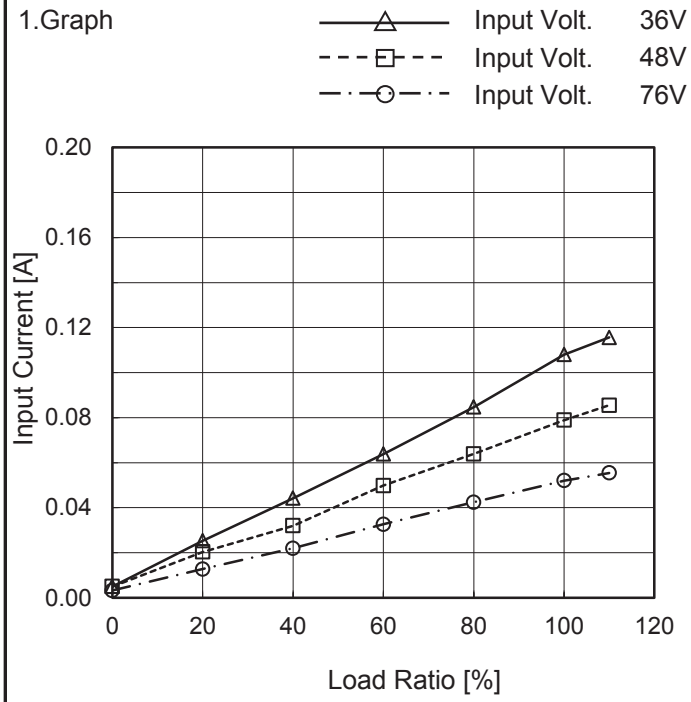
BC-10996

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Input Current (by Load Ratio) |
| Object | ―――――― |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

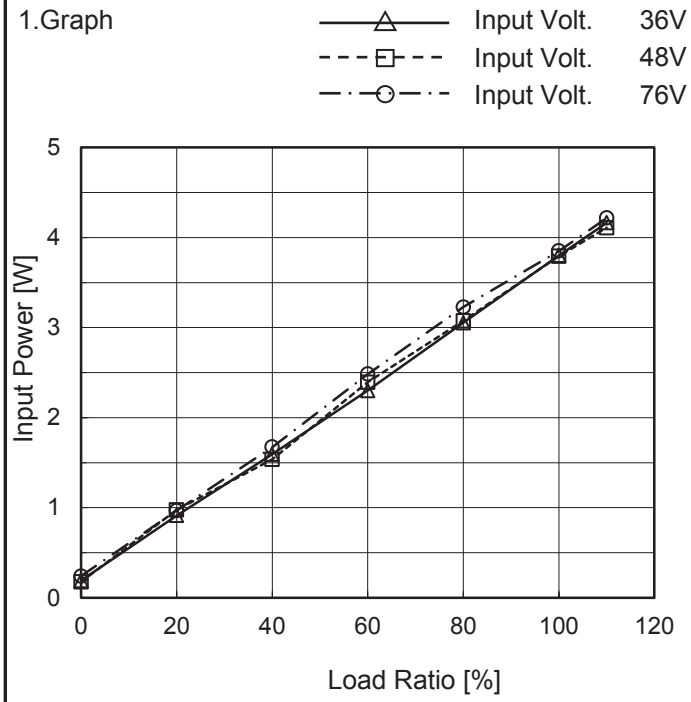
| Load Ratio [%] | Input Current [A] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0 | 0.005 | 0.005 | 0.003 |
| 20 | 0.025 | 0.020 | 0.013 |
| 40 | 0.044 | 0.032 | 0.022 |
| 60 | 0.064 | 0.050 | 0.033 |
| 80 | 0.085 | 0.064 | 0.042 |
| 100 | 0.108 | 0.079 | 0.052 |
| 110 | 0.116 | 0.086 | 0.055 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Input Power (by Load Ratio) |
| Object | ―――――― |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

| Load Ratio [%] | Input Power [W] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0 | 0.19 | 0.18 | 0.24 |
| 20 | 0.91 | 0.97 | 0.97 |
| 40 | 1.59 | 1.54 | 1.67 |
| 60 | 2.30 | 2.39 | 2.48 |
| 80 | 3.05 | 3.07 | 3.23 |
| 100 | 3.80 | 3.79 | 3.85 |
| 110 | 4.16 | 4.11 | 4.22 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |



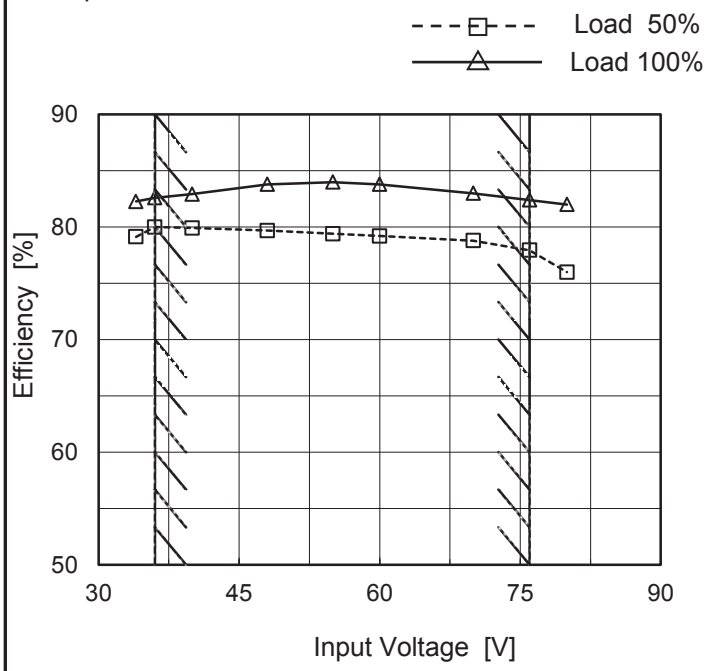
BC-10996

COSEL

| | |
|---|---|
| Model | MGW34812 |
| 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% |
| 34 | 79.1 | 82.3 |
| 36 | 80.0 | 82.6 |
| 40 | 79.9 | 82.9 |
| 48 | 79.7 | 83.8 |
| 55 | 79.4 | 84.0 |
| 60 | 79.2 | 83.8 |
| 70 | 78.8 | 83.0 |
| 76 | 77.9 | 82.4 |
| 80 | 76.0 | 82.0 |



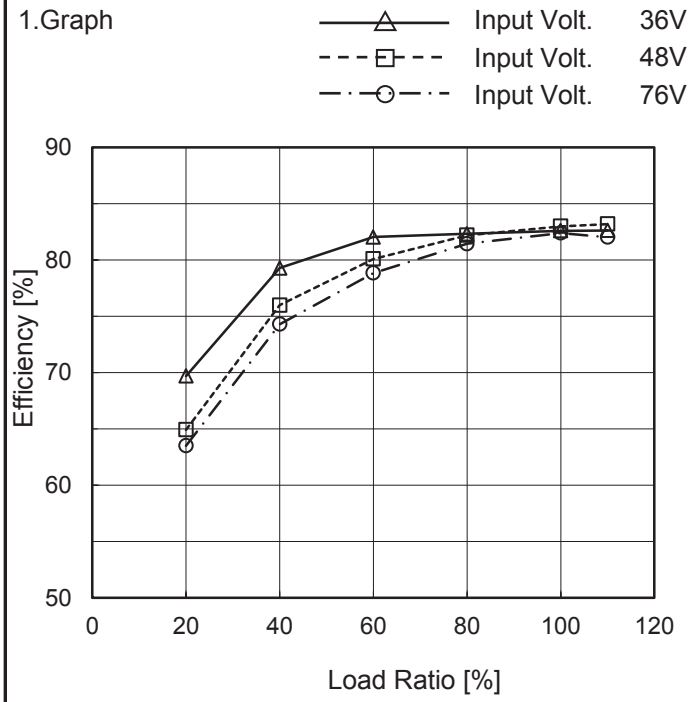
BC-10996

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Efficiency (by Load Ratio) |
| Object | ―――――― |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

| Load Ratio [%] | Efficiency [%] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0 | - | - | - |
| 20 | 69.7 | 64.9 | 63.5 |
| 40 | 79.3 | 76.0 | 74.3 |
| 60 | 82.0 | 80.1 | 78.9 |
| 80 | 82.3 | 82.2 | 81.5 |
| 100 | 82.6 | 83.0 | 82.4 |
| 110 | 82.6 | 83.2 | 82.0 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |



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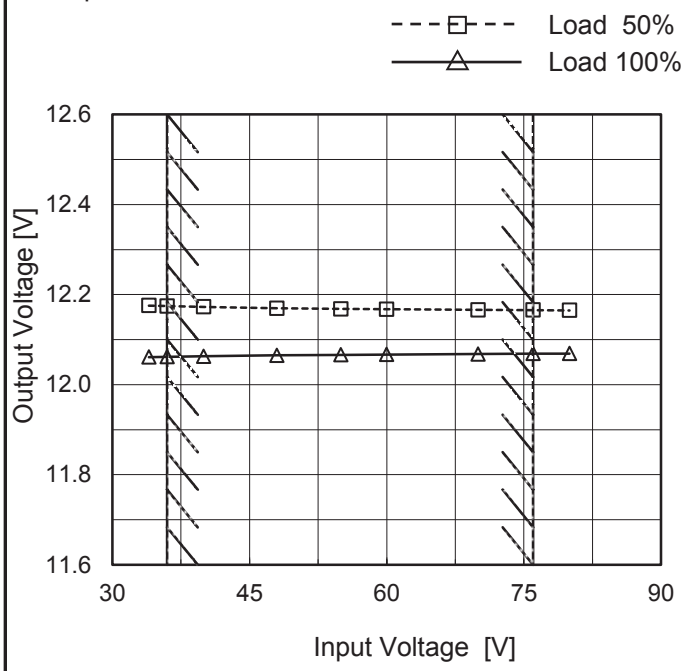
| | |
|---|---|
| Model | MGW34812 |
| Item | Line Regulation |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



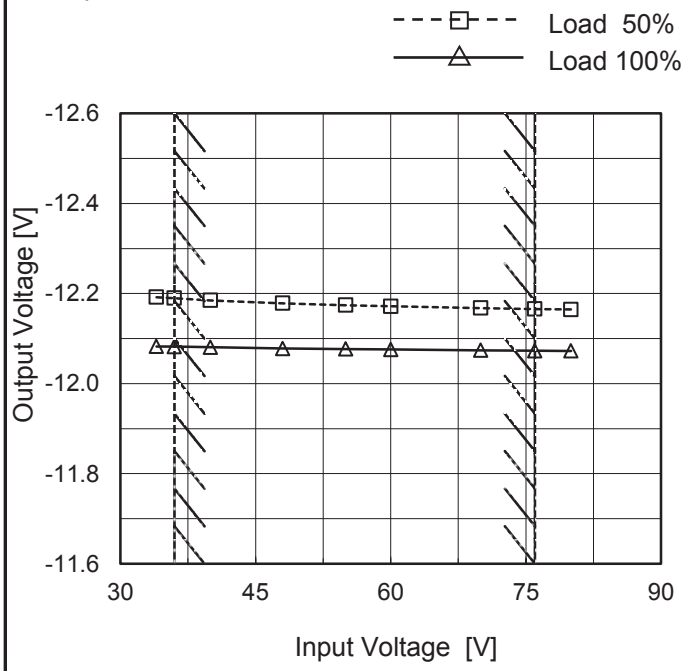

2.Values

| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| 34 | 12.176 | 12.061 |
| 36 | 12.175 | 12.062 |
| 40 | 12.173 | 12.063 |
| 48 | 12.170 | 12.065 |
| 55 | 12.168 | 12.066 |
| 60 | 12.167 | 12.067 |
| 70 | 12.166 | 12.068 |
| 76 | 12.166 | 12.069 |
| 80 | 12.165 | 12.069 |

-12V: Rated Load Current

| | |
|---|---|
| Object | -12V0.13A |

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% |
| 34 | -12.192 | -12.083 |
| 36 | -12.190 | -12.082 |
| 40 | -12.185 | -12.081 |
| 48 | -12.179 | -12.078 |
| 55 | -12.174 | -12.077 |
| 60 | -12.172 | -12.076 |
| 70 | -12.168 | -12.074 |
| 76 | -12.166 | -12.073 |
| 80 | -12.165 | -12.073 |

+12V: Rated Load Current



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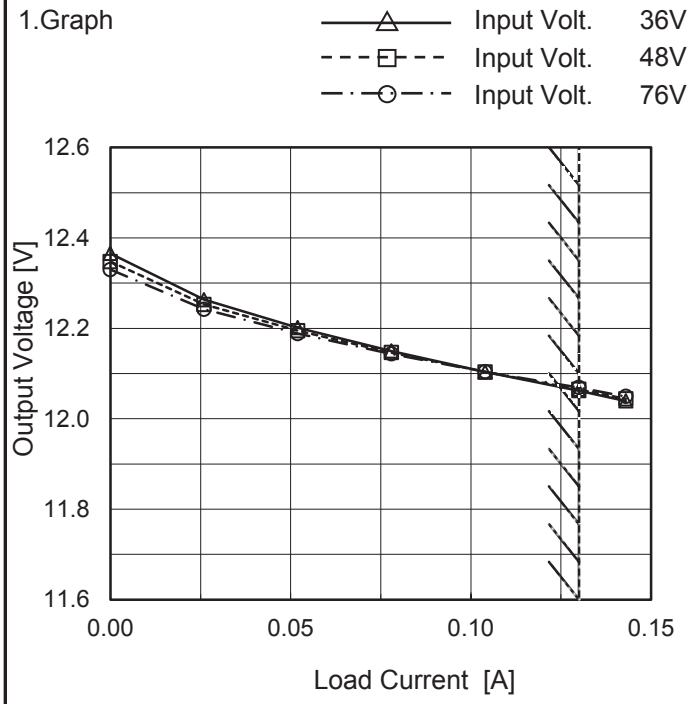
COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Load Regulation |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



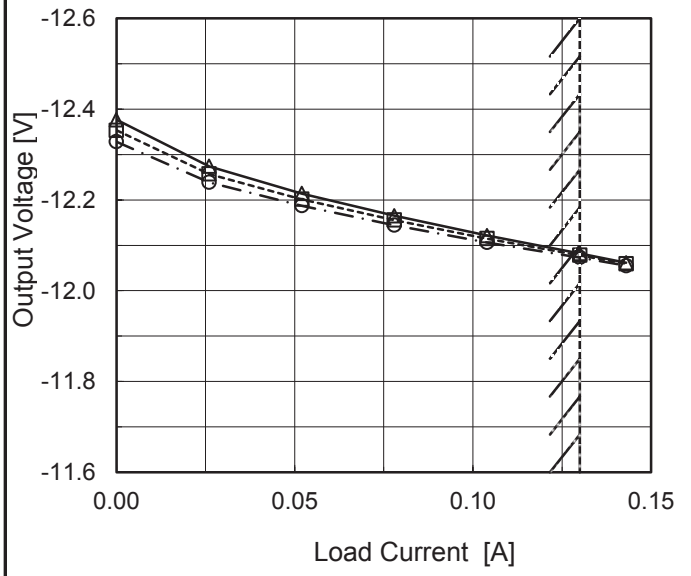

2.Values

| Load Current [A] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0.000 | 12.366 | 12.348 | 12.330 |
| 0.026 | 12.263 | 12.253 | 12.242 |
| 0.052 | 12.201 | 12.195 | 12.188 |
| 0.078 | 12.150 | 12.146 | 12.143 |
| 0.104 | 12.103 | 12.103 | 12.104 |
| 0.130 | 12.062 | 12.065 | 12.069 |
| 0.143 | 12.040 | 12.044 | 12.049 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

-12V: Rated Load Current

| | |
|---|---|
| Object | -12V0.13A |

1.Graph




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

2.Values

| Load Current [A] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0.000 | -12.377 | -12.353 | -12.328 |
| 0.026 | -12.274 | -12.257 | -12.239 |
| 0.052 | -12.214 | -12.202 | -12.187 |
| 0.078 | -12.165 | -12.156 | -12.144 |
| 0.104 | -12.122 | -12.115 | -12.106 |
| 0.130 | -12.082 | -12.078 | -12.073 |
| 0.143 | -12.062 | -12.059 | -12.055 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

+12V: Rated Load Current



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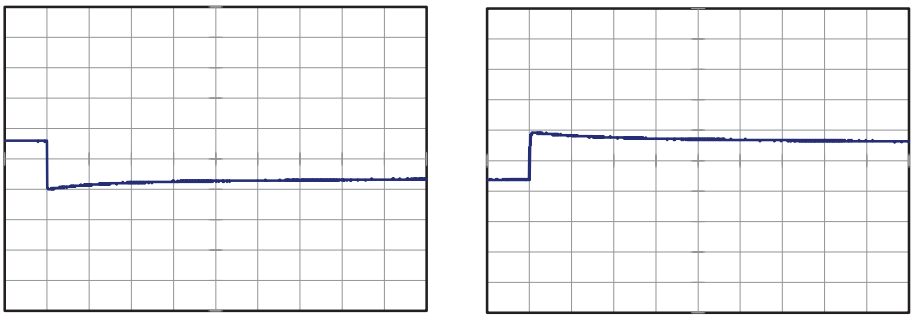
COSEL

| | | |
|---|---|---|
| Model | MGW34812 | |
| Item | Dynamic Load Response | Temperature 25°C<br>Testing Circuitry Figure A |
| Object | +12V0.13A | |

Input Volt. 48 V
-12V:rated load current.
Cycle 100 ms

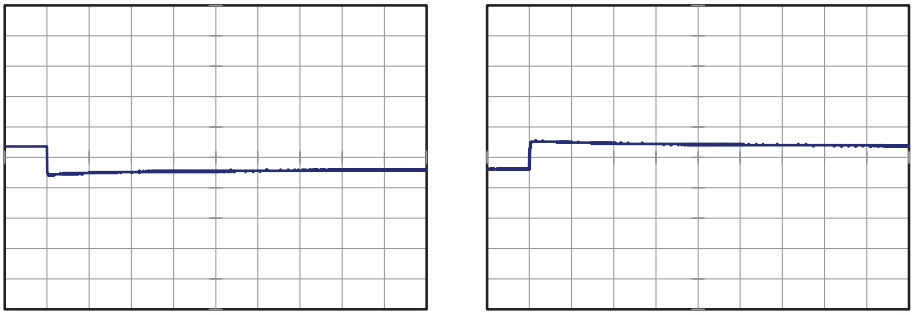
Min.Load (0A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

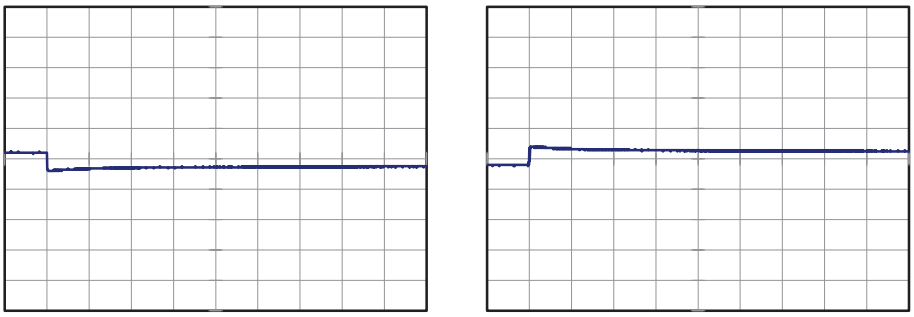
Min.Load (0A)←→
Load 50% (0.065A)



200 mV/div

4 ms/div 4 ms/div

Load 50% (0.065A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

COSEL

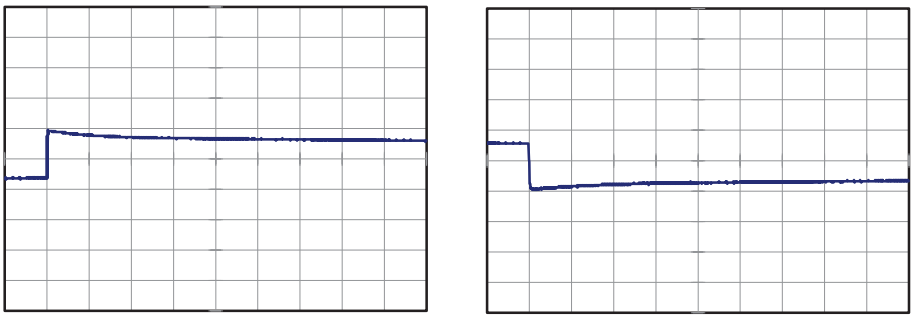
| | | |
|---|---|---|
| Model | MGW34812 | |
| Item | Dynamic Load Response | Temperature 25°C<br>Testing Circuitry Figure A |
| Object | -12V0.13A | |

Input Volt. 48 V

+12V:rated load current.

Cycle 100 ms

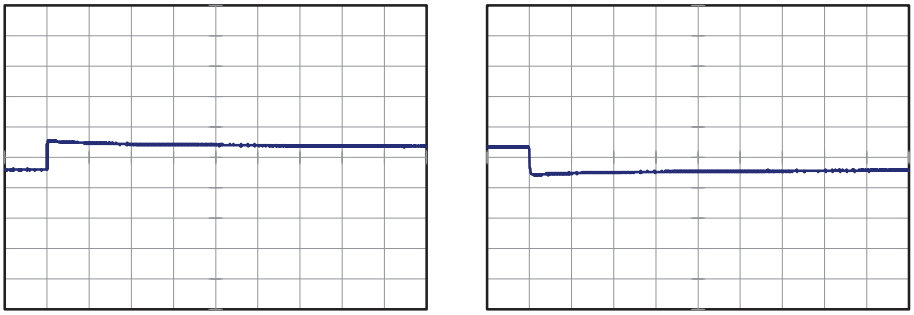
Min.Load (0A)←→
Load 100% (0.13A)



200 mV/div

4 ms/div 4 ms/div

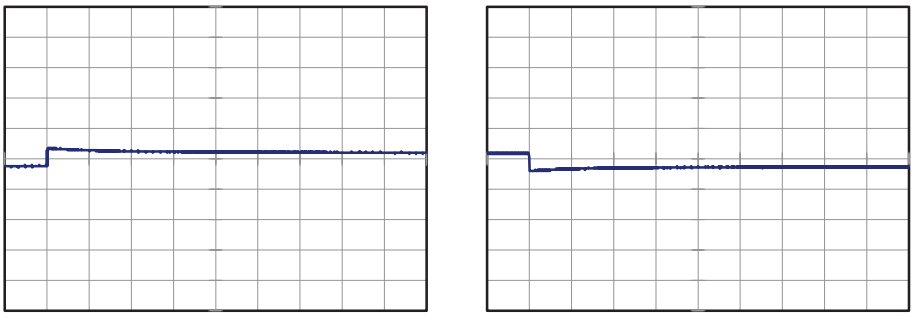
Min.Load (0A)←→
Load 50% (0.065A)



200 mV/div

4 ms/div 4 ms/div

Load 50% (0.065A)←→
Load 100% (0.13A)



200 mV/div

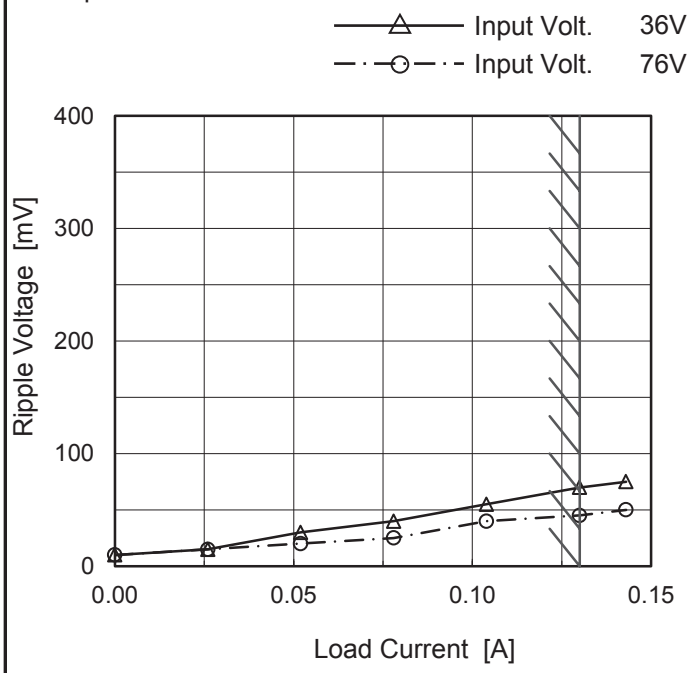
4 ms/div 4 ms/div

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Ripple Voltage (by Load Current) |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

Ripple [mVp-p]

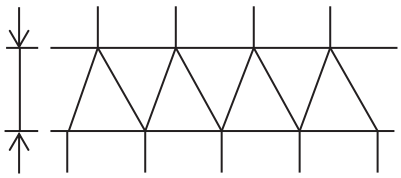


Fig.Complex Ripple Wave Form

2.Values

| Load Current [A] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 36 [V] | Input Volt. 76 [V] |
| 0.000 | 10 | 10 |
| 0.026 | 15 | 15 |
| 0.052 | 30 | 20 |
| 0.078 | 40 | 25 |
| 0.104 | 55 | 40 |
| 0.130 | 70 | 45 |
| 0.143 | 75 | 50 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

-12V: Rated Load Current



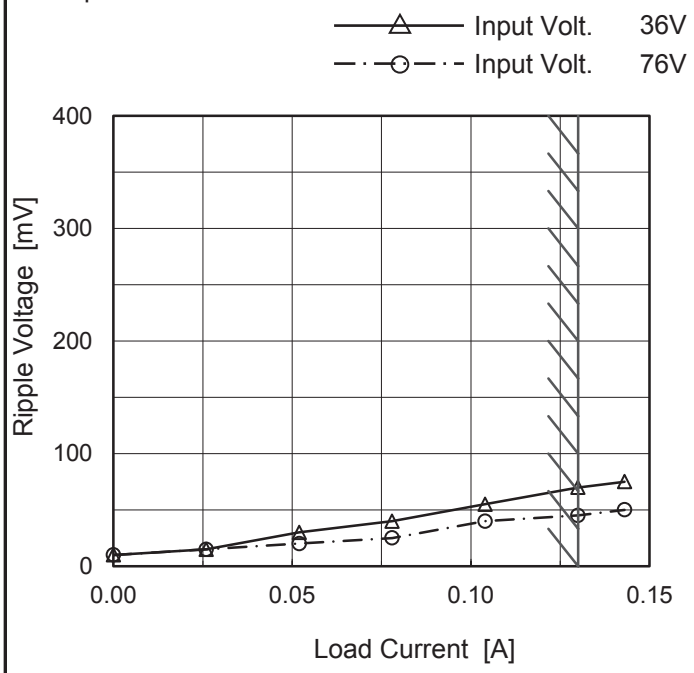
BC-10996

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Ripple Voltage (by Load Current) |
| Object | -12V0.13A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




Measured by 100 MHz Oscilloscope.
Ripple Voltage is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

Ripple [mVp-p]

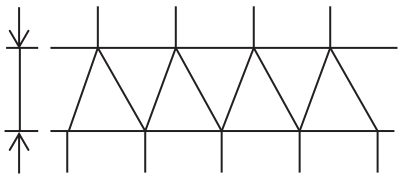


Fig.Complex Ripple Wave Form

2.Values

| Load Current [A] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 36 [V] | Input Volt. 76 [V] |
| 0.000 | 10 | 10 |
| 0.026 | 15 | 15 |
| 0.052 | 30 | 20 |
| 0.078 | 40 | 25 |
| 0.104 | 55 | 40 |
| 0.130 | 70 | 45 |
| 0.143 | 75 | 50 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

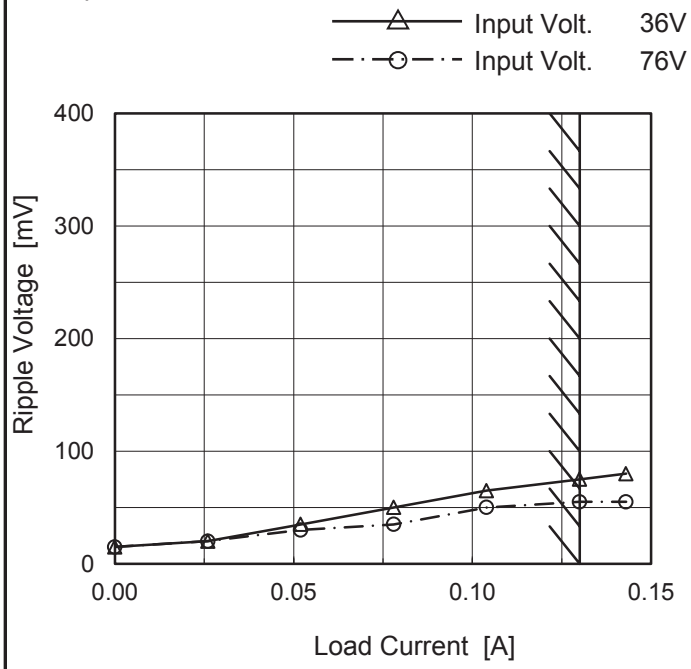
+12V: Rated Load Current

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Ripple-Noise |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




Measured by 100 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

Ripple Noise[mVp-p]

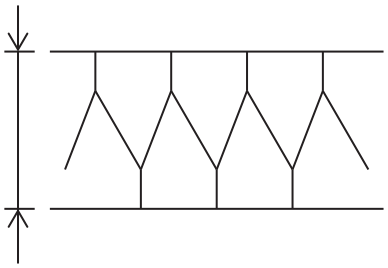


Fig.Complex Ripple Noise Wave Form

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 36 [V] | Input Volt. 76 [V] |
| 0.000 | 15 | 15 |
| 0.026 | 20 | 20 |
| 0.052 | 35 | 30 |
| 0.078 | 50 | 35 |
| 0.104 | 65 | 50 |
| 0.130 | 75 | 55 |
| 0.143 | 80 | 55 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

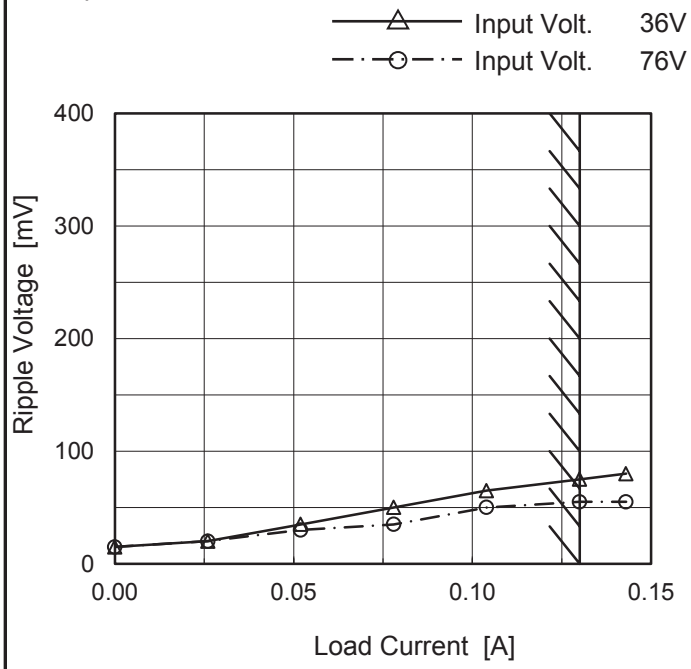
-12V: Rated Load Current

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Ripple-Noise |
| Object | -12V0.13A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




Measured by 100 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

Ripple Noise[mVp-p]

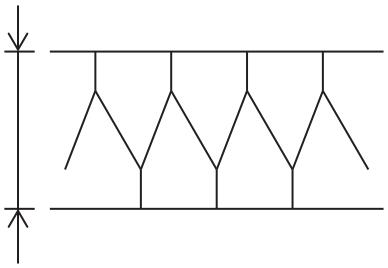


Fig.Complex Ripple Noise Wave Form

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 36 [V] | Input Volt. 76 [V] |
| 0.000 | 15 | 15 |
| 0.026 | 20 | 20 |
| 0.052 | 35 | 30 |
| 0.078 | 50 | 35 |
| 0.104 | 65 | 50 |
| 0.130 | 75 | 55 |
| 0.143 | 80 | 55 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

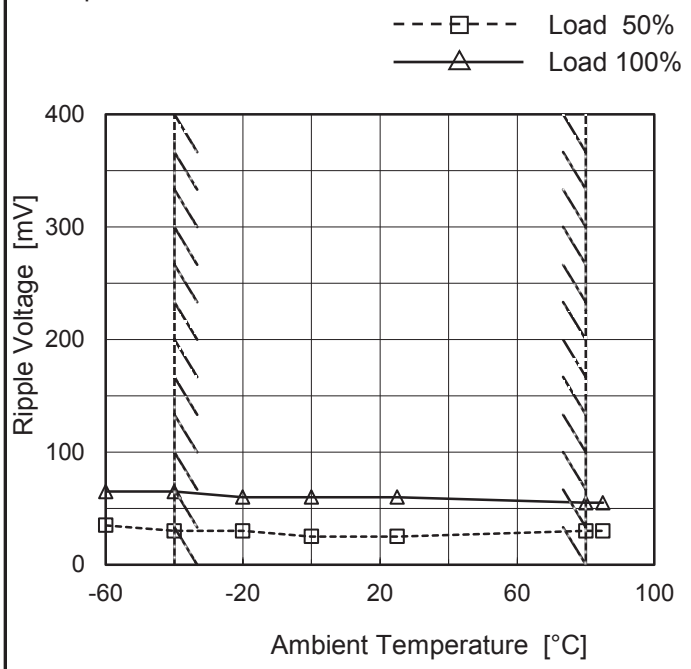
+12V: Rated Load Current

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Ripple Voltage (by Ambient Temp.) |
| Object | +12V0.13A |

Testing Circuitry Figure B

1.Graph




Input Volt. 48V

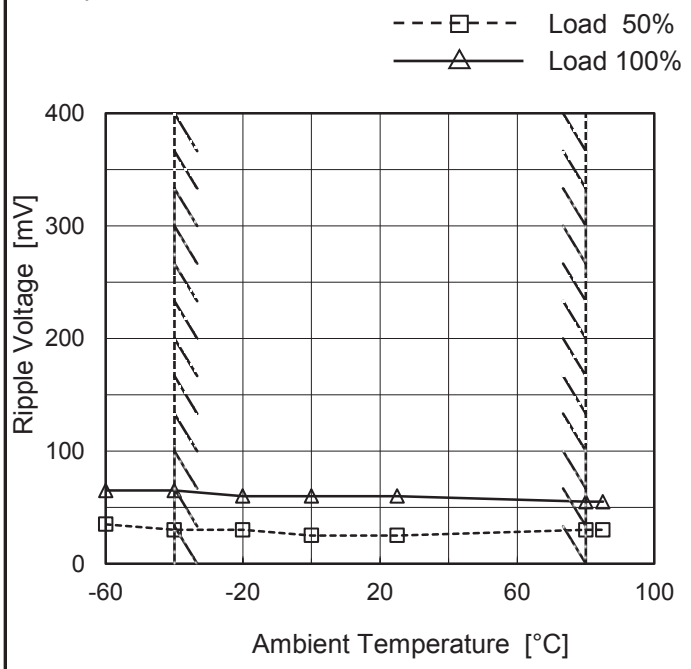
2.Values

| Ambient Temperature [°C] | Ripple Voltage [mV] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 35 | 65 |
| -40 | 30 | 65 |
| -20 | 30 | 60 |
| 0 | 25 | 60 |
| 25 | 25 | 60 |
| 80 | 30 | 55 |
| 85 | 30 | 55 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

-12V: Rated Load Current

| | |
|---|---|
| Object | -12V0.13A |

1.Graph




Input Volt. 48V

Measured by 100 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% |
| -60 | 35 | 65 |
| -40 | 30 | 65 |
| -20 | 30 | 60 |
| 0 | 25 | 60 |
| 25 | 25 | 60 |
| 80 | 30 | 55 |
| 85 | 30 | 55 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

+12V: Rated Load Current



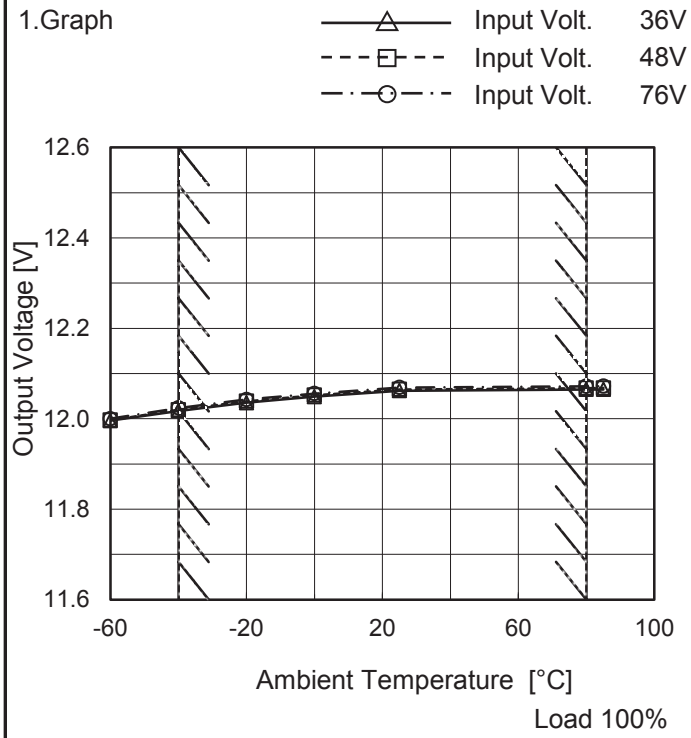
BC-10996

COSEL

| Model | MGW34812 |
|---|---|
| Item | Ambient Temperature Drift |
| Object | +12V0.13A |

Testing Circuitry Figure A

1.Graph



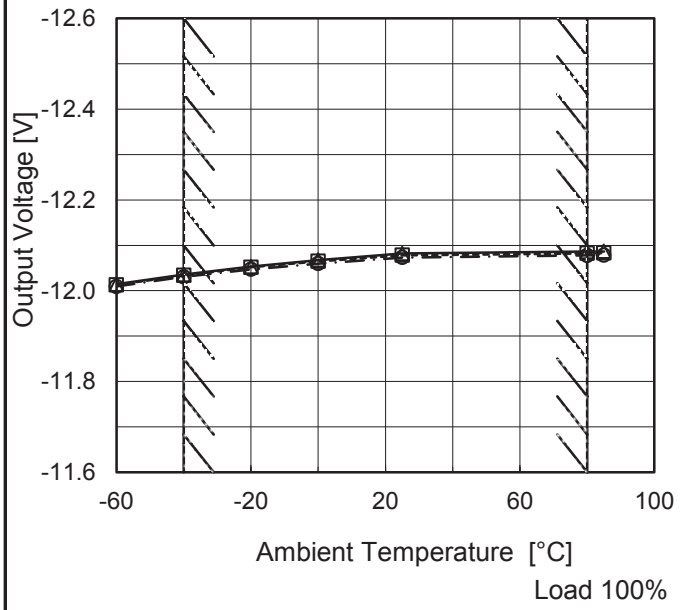

2.Values

| Ambient Temperature [°C] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| -60 | 11.996 | 11.997 | 12.000 |
| -40 | 12.018 | 12.020 | 12.024 |
| -20 | 12.035 | 12.039 | 12.043 |
| 0 | 12.049 | 12.052 | 12.056 |
| 25 | 12.062 | 12.065 | 12.069 |
| 80 | 12.065 | 12.068 | 12.072 |
| 85 | 12.065 | 12.068 | 12.072 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

-12V: Rated Load Current

| Object | -12V0.13A |
|---|---|

1.Graph




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

2.Values

| Ambient Temperature [°C] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| -60 | -12.014 | -12.013 | -12.009 |
| -40 | -12.035 | -12.034 | -12.030 |
| -20 | -12.053 | -12.052 | -12.047 |
| 0 | -12.068 | -12.065 | -12.060 |
| 25 | -12.082 | -12.078 | -12.073 |
| 80 | -12.086 | -12.082 | -12.078 |
| 85 | -12.087 | -12.083 | -12.078 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

+12V: Rated Load Current



BC-10996

COSEL

| Model | MGW34812 | |
|---|---|---|
| Item | Output Voltage Accuracy | Testing Circuitry Figure A |

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 : -40 - 80°C

Input Voltage : 36 - 76V

Load Current (AVR 1) : 0 - 0.13A (AVR 2) : 0 - 0.13A

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

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

2.Values

| Object | +12V0.13A | | | | | |
|---|---|---|---|---|---|---|
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
| | | | Current[A] | Voltage[V] | Value [mV] | Ratio [%] |
| Maximum Voltage | 80 | 36 | 0 | 12.387 | ±320 | ±2.7 |
| Minimum Voltage | -40 | 36 | 0.13 | 11.747 | | |

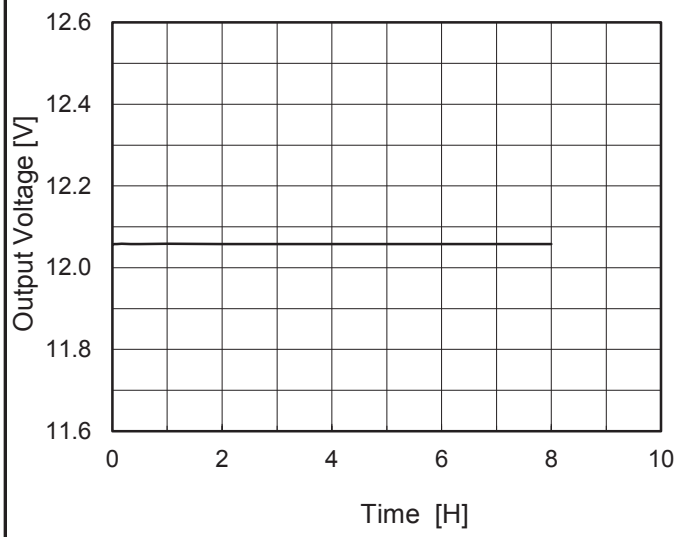
| Object | -12V0.13A | | | | | |
|---|---|---|---|---|---|---|
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
| | | | Current[A] | Voltage[V] | Value [mV] | Ratio [%] |
| Maximum Voltage | 80 | 36 | 0 | -12.396 | ±318 | ±2.7 |
| Minimum Voltage | -40 | 36 | 0.13 | -11.760 | | |

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Time Lapse Drift |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




Input Volt. 48V
Load 100%

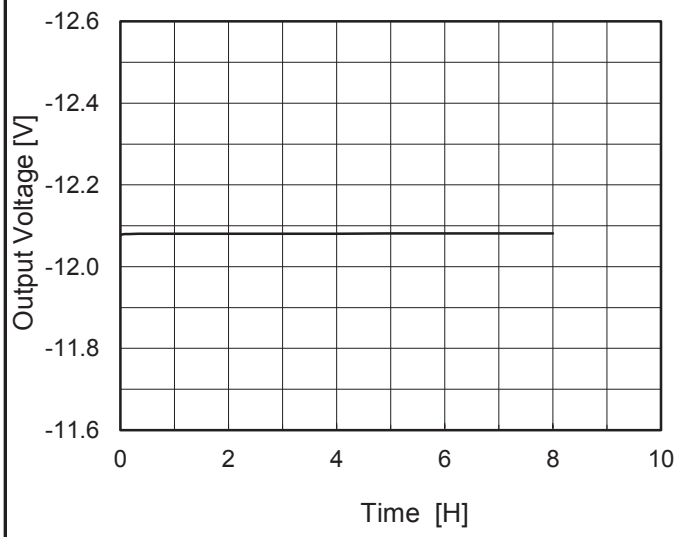
2.Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 12.055 |
| 0.5 | 12.058 |
| 1.0 | 12.058 |
| 2.0 | 12.058 |
| 3.0 | 12.058 |
| 4.0 | 12.058 |
| 5.0 | 12.058 |
| 6.0 | 12.058 |
| 7.0 | 12.058 |
| 8.0 | 12.058 |

-12V: Rated Load Current

| | |
|---|---|
| Object | -12V0.13A |

1.Graph




Input Volt. 48V
Load 100%

2.Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | -12.076 |
| 0.5 | -12.080 |
| 1.0 | -12.081 |
| 2.0 | -12.081 |
| 3.0 | -12.081 |
| 4.0 | -12.081 |
| 5.0 | -12.081 |
| 6.0 | -12.082 |
| 7.0 | -12.082 |
| 8.0 | -12.082 |

+12V: Rated Load Current



BC-10996

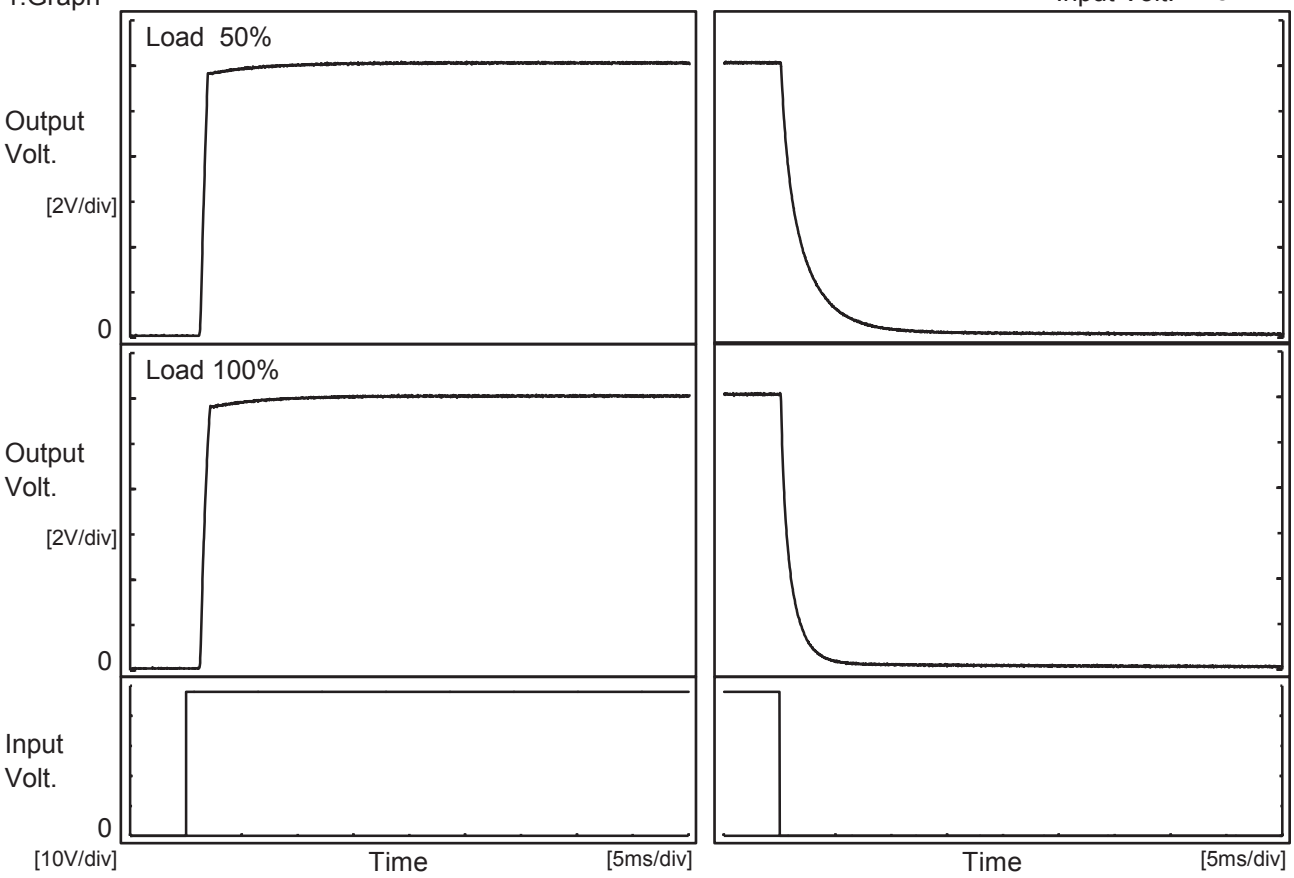
COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Rise and Fall Time |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph

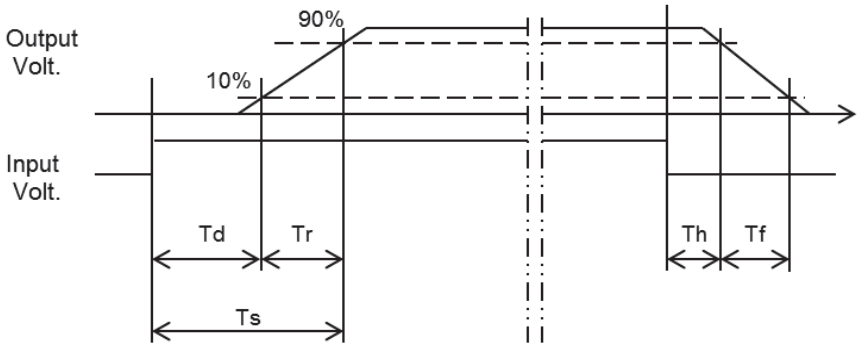
Input Volt. 48 V




2.Values

[ms]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 1.4 | 0.6 | 2.0 | 0.2 | 4.8 |
| 100 % | 1.4 | 0.7 | 2.1 | 0.2 | 2.3 |






BC-10996

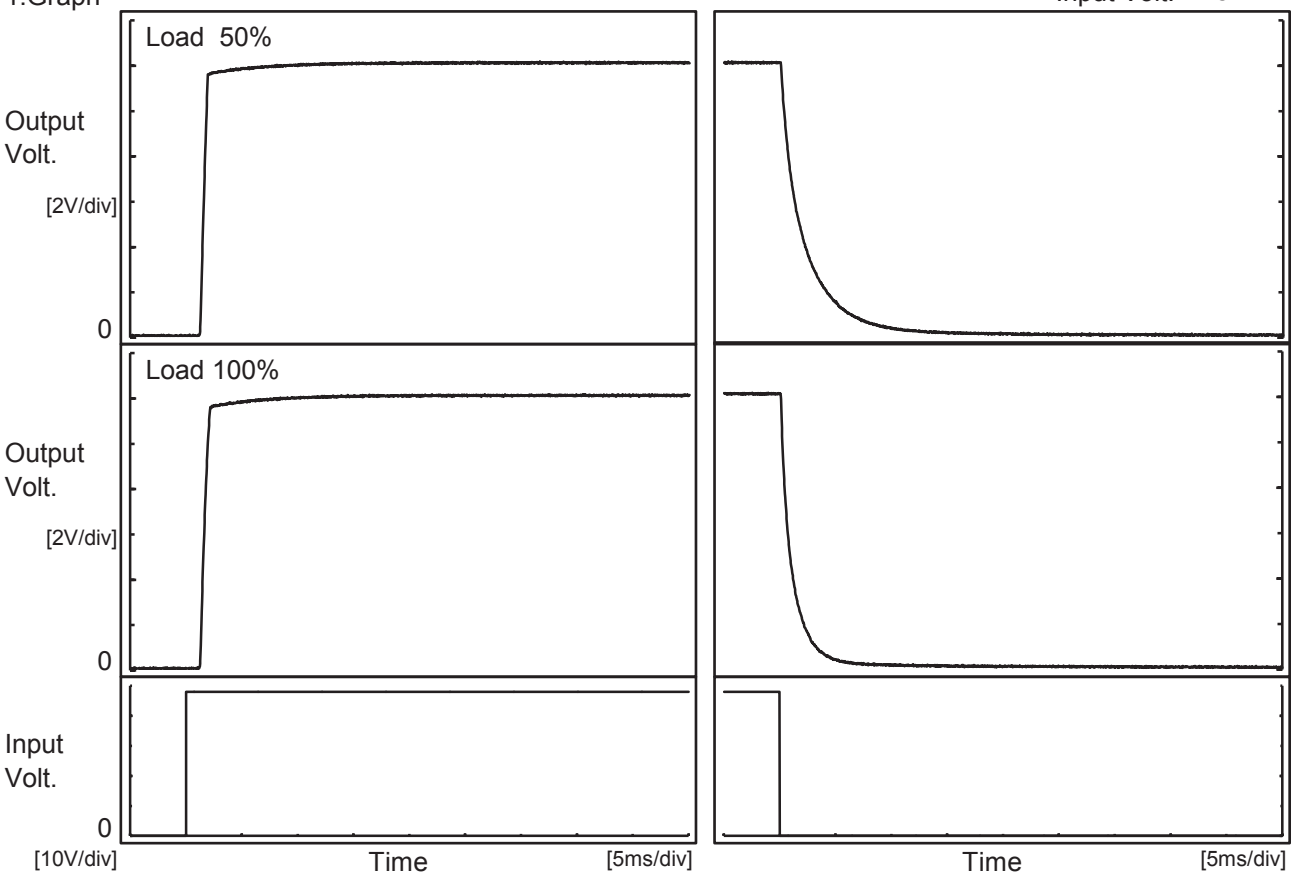
COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Rise and Fall Time |
| Object | -12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph

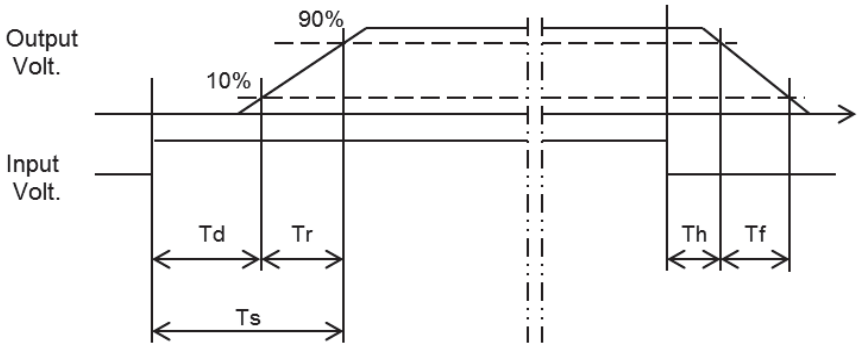
Input Volt. 48 V




2.Values

[ms]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 1.4 | 0.6 | 2.0 | 0.3 | 5.4 |
| 100 % | 1.4 | 0.7 | 2.1 | 0.2 | 2.6 |






BC-10996

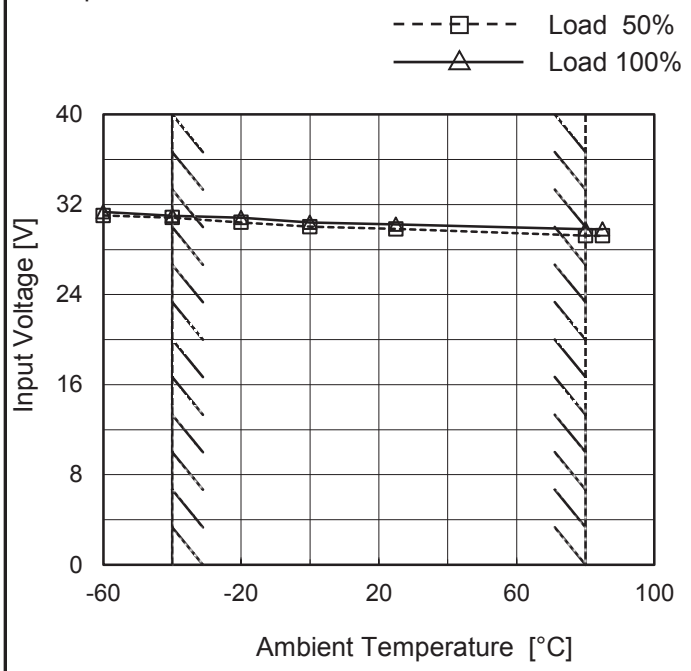
COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Minimum Input Voltage for Regulated Output Voltage |

Testing Circuitry Figure A

Object +12V0.13A

1.Graph

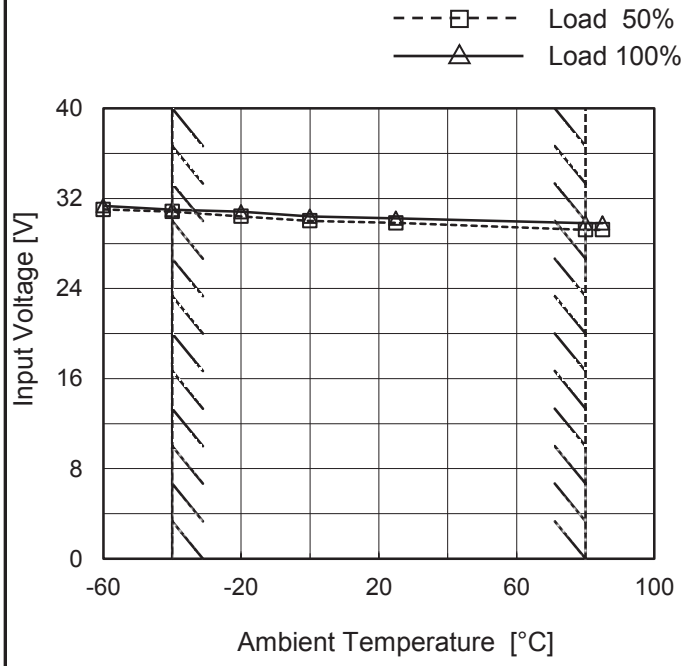



2.Values

| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 31.1 | 31.4 |
| -40 | 30.9 | 31.1 |
| -20 | 30.5 | 30.9 |
| 0 | 30.1 | 30.4 |
| 25 | 29.9 | 30.3 |
| 80 | 29.3 | 29.9 |
| 85 | 29.3 | 29.9 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

Object -12V0.13A

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% |
| -60 | 31.1 | 31.4 |
| -40 | 30.9 | 31.1 |
| -20 | 30.5 | 30.9 |
| 0 | 30.1 | 30.4 |
| 25 | 29.9 | 30.3 |
| 80 | 29.3 | 29.9 |
| 85 | 29.3 | 29.9 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |



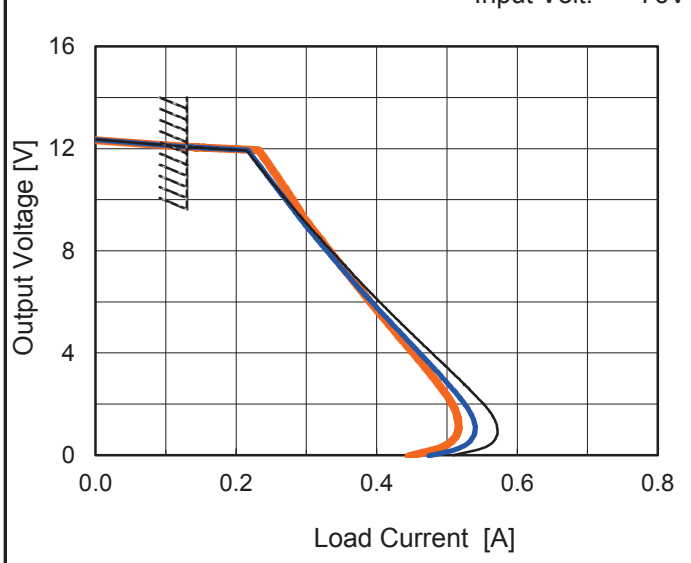
BC-10996

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Overcurrent Protection |
| Object | +12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



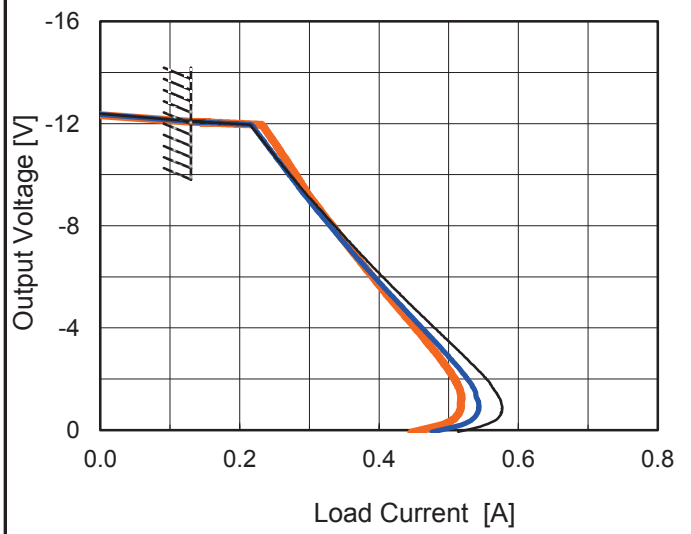

2.Values

| Output Voltage [V] | Load Current [A] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 11.4 | 0.23 | 0.23 | 0.25 |
| 10.8 | 0.25 | 0.25 | 0.26 |
| 9.6 | 0.28 | 0.28 | 0.29 |
| 8.4 | 0.32 | 0.32 | 0.32 |
| 7.2 | 0.36 | 0.35 | 0.35 |
| 6.0 | 0.40 | 0.39 | 0.39 |
| 4.8 | 0.45 | 0.43 | 0.43 |
| 3.6 | 0.49 | 0.47 | 0.46 |
| 2.4 | 0.54 | 0.51 | 0.50 |
| 1.2 | 0.57 | 0.54 | 0.52 |
| 0.0 | 0.51 | 0.47 | 0.45 |
| -- | - | - | - |

-12V: Rated Load Current

| | |
|---|---|
| Object | -12V0.13A |

1.Graph




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

2.Values

| Output Voltage [V] | Load Current [A] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| -11.4 | 0.23 | 0.23 | 0.25 |
| -10.8 | 0.25 | 0.25 | 0.26 |
| -9.6 | 0.28 | 0.28 | 0.29 |
| -8.4 | 0.32 | 0.32 | 0.32 |
| -7.2 | 0.36 | 0.35 | 0.36 |
| -6.0 | 0.41 | 0.39 | 0.39 |
| -4.8 | 0.45 | 0.43 | 0.43 |
| -3.6 | 0.49 | 0.48 | 0.46 |
| -2.4 | 0.54 | 0.51 | 0.50 |
| -1.2 | 0.57 | 0.54 | 0.52 |
| 0.0 | 0.51 | 0.48 | 0.45 |
| -- | - | - | - |

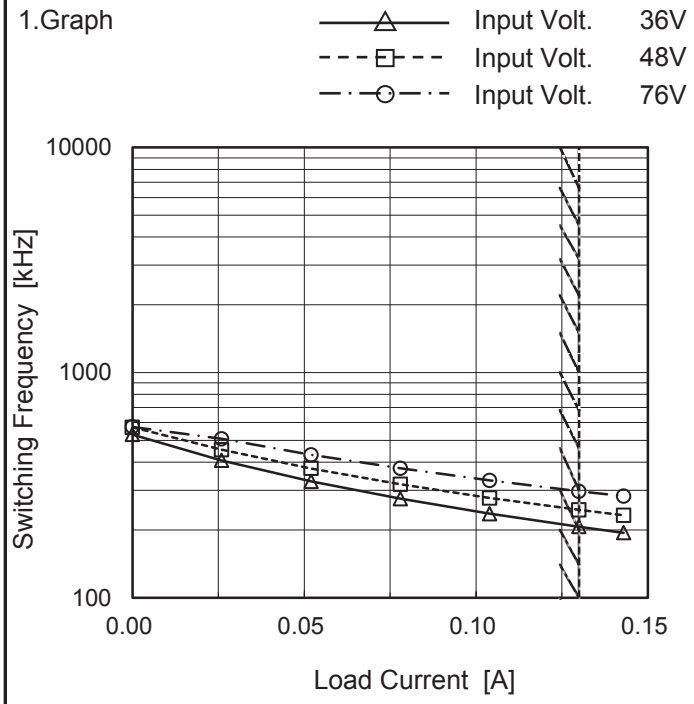
+12V: Rated Load Current

COSEL

| | |
|---|---|
| Model | MGW34812 |
| Item | Switching Frequency (by Load Current) |
| Object | +/-12V0.13A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

-When load current is low, MG operates intermittently, so switching frequency would not become constant.

2.Values

| Load Current [A] | Frequency [kHz] | | |
|---|---|---|---|
| | Input Volt. 36[V] | Input Volt. 48[V] | Input Volt. 76[V] |
| 0.000 | 531 | 571 | 574 |
| 0.026 | 407 | 454 | 508 |
| 0.052 | 329 | 375 | 431 |
| 0.078 | 275 | 319 | 376 |
| 0.104 | 236 | 277 | 332 |
| 0.130 | 207 | 246 | 297 |
| 0.143 | 194 | 232 | 283 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |



BC-10996

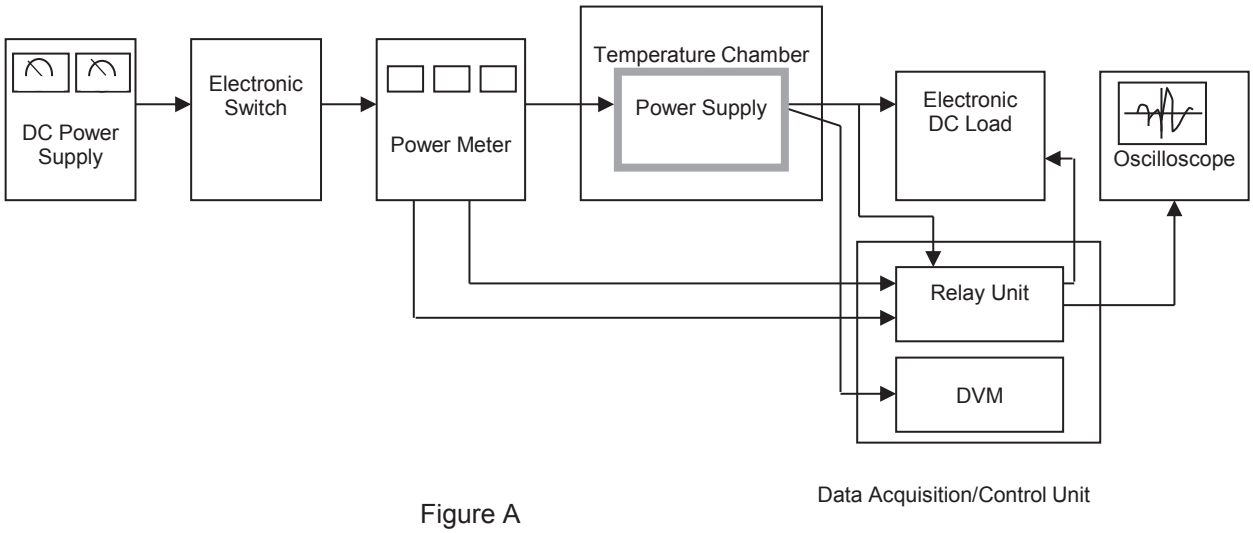



Figure A

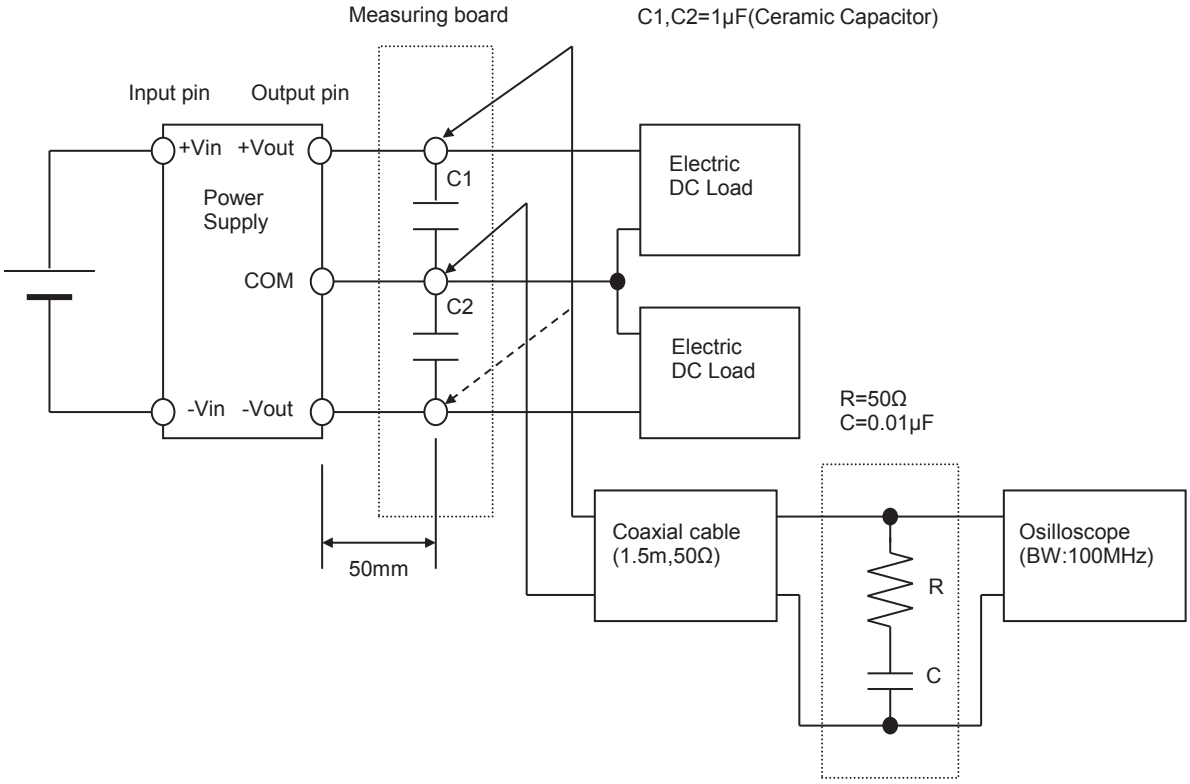



Figure B（Ripple and Ripple noise Characteristic）