# TEST DATA OF MGS60515

Regulated DC Power Supply
August 3, 2016

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# COSEL CO.,LTD.

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| | |
|---|---|
| Model | MGS60515 |
| Item | Input Current (by Input Voltage) |
| Object | |

Temperature　　25°C
Testing Circuitry　Figure A

1.Graph

───△─── Load 100%
- - -⊟- - - Load 50%
—·—○—·— Load 0%



Input Voltage [V]

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 |
| 3.0 | 0.002 | 0.002 | 0.003 |
| 3.8 | 0.003 | 0.003 | 0.002 |
| 3.9 | 0.003 | 0.003 | 0.003 |
| 4.0 | 0.030 | 0.872 | 0.111 |
| 4.1 | 0.030 | 0.849 | 1.692 |
| 4.2 | 0.029 | 0.823 | 1.652 |
| 4.3 | 0.028 | 0.797 | 1.611 |
| 4.5 | 0.025 | 0.766 | 1.566 |
| 5.0 | 0.022 | 0.688 | 1.396 |
| 6.0 | 0.018 | 0.571 | 1.123 |
| 7.0 | 0.015 | 0.493 | 0.977 |
| 8.0 | 0.014 | 0.434 | 0.855 |
| 9.0 | 0.012 | 0.395 | 0.760 |
| 10.0 | 0.012 | 0.360 | 0.686 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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| Model | MGS60515 |
|---|---|
| Item | Input Current (by Load Current) |
| Object | |
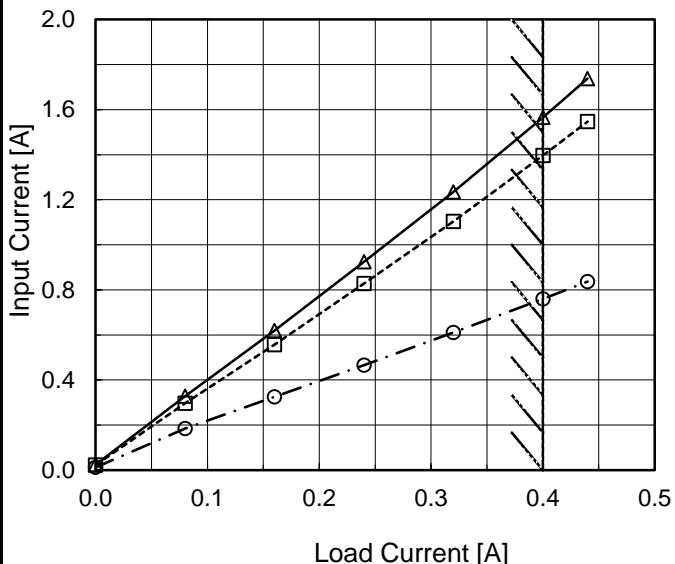
Temperature  25°C
Testing Circuitry  Figure A

1.Graph

———△——— Input Volt.  4.5V
- - -⊟- - - Input Volt.  5V
—·—⊙—·— Input Volt.  9V



Load Current [A]

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

2.Values

| Load Current [A] | Input Current [A] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 0.00 | 0.025 | 0.022 | 0.012 |
| 0.08 | 0.328 | 0.297 | 0.184 |
| 0.16 | 0.619 | 0.556 | 0.325 |
| 0.24 | 0.925 | 0.828 | 0.466 |
| 0.32 | 1.235 | 1.104 | 0.611 |
| 0.40 | 1.566 | 1.396 | 0.760 |
| 0.44 | 1.737 | 1.547 | 0.837 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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# COSEL

| Model | MGS60515 |
|---|---|
| Item | Input Power (by Load Current) |
| Object | |

| Temperature | 25°C |
|---|---|
| Testing Circuitry | Figure A |
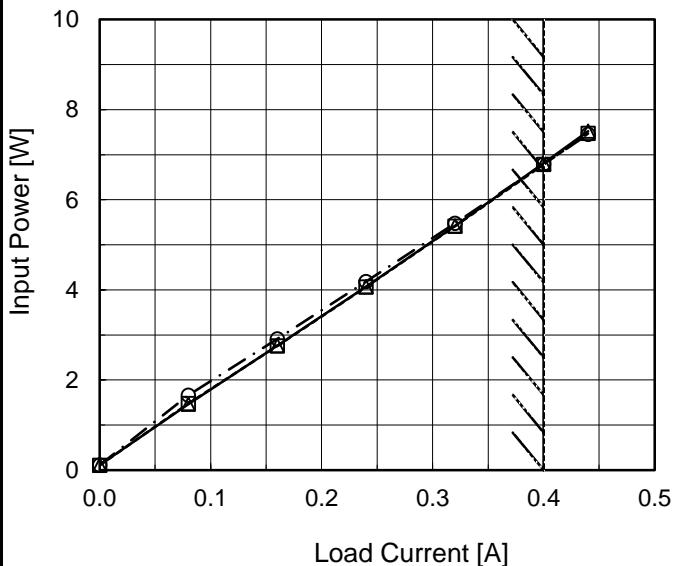
1.Graph

——△—— Input Volt. 4.5V
- - -⊟- - - Input Volt. 5V
—·—○—·— Input Volt. 9V



Load Current [A]

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

2.Values

| Load Current [A] | Input Power [W] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 0.00 | 0.11 | 0.10 | 0.11 |
| 0.08 | 1.46 | 1.48 | 1.66 |
| 0.16 | 2.76 | 2.76 | 2.91 |
| 0.24 | 4.07 | 4.06 | 4.18 |
| 0.32 | 5.42 | 5.41 | 5.47 |
| 0.40 | 6.81 | 6.78 | 6.79 |
| 0.44 | 7.52 | 7.47 | 7.45 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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| Model | MGS60515 |
|---|---|
| Item | Efficiency (by Input Voltage) |
| Object | |
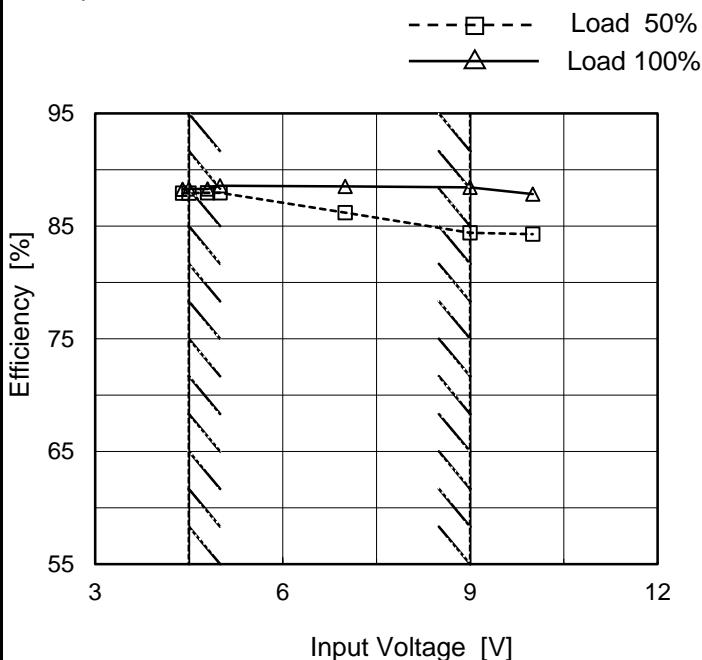
Temperature      25°C
Testing Circuitry    Figure A

## 1.Graph

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



Efficiency [%] vs Input Voltage [V]

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

## 2.Values

| Input Voltage [V] | Efficiency [%] | |
|---|---|---|
| | Load 50% | Load 100% |
| 4.4 | 87.9 | 88.3 |
| 4.5 | 87.9 | 88.3 |
| 4.8 | 88.0 | 88.3 |
| 5.0 | 88.0 | 88.6 |
| 7.0 | 86.2 | 88.5 |
| 9.0 | 84.4 | 88.5 |
| 10.0 | 84.3 | 87.9 |
| -- | - | - |
| -- | - | - |

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# COSEL

| Model | MGS60515 |
|---|---|
| Item | Efficiency (by Load Current) |
| Object | |

Temperature          25°C
Testing Circuitry     Figure A

1.Graph

——△—— Input Volt. 4.5V
- - -⊟- - - Input Volt. 5V
—·—⊖—·— Input Volt. 9V



Efficiency [%] vs Load Current [A]

Load Current [A]

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

2.Values

| Load Current [A] | Efficiency [%] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 0.00 | - | - | - |
| 0.08 | 81.9 | 81.2 | 72.3 |
| 0.16 | 87.0 | 87.1 | 82.3 |
| 0.24 | 88.5 | 88.7 | 86.1 |
| 0.32 | 88.7 | 88.9 | 87.7 |
| 0.40 | 88.3 | 88.6 | 88.5 |
| 0.44 | 87.9 | 88.6 | 88.7 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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| | |
|---|---|
| Model | MGS60515 |
| Item | Line Regulation |
| Object | +15V0.4A |

Temperature        25°C
Testing Circuitry    Figure A

## 1.Graph

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



Input Voltage  [V]

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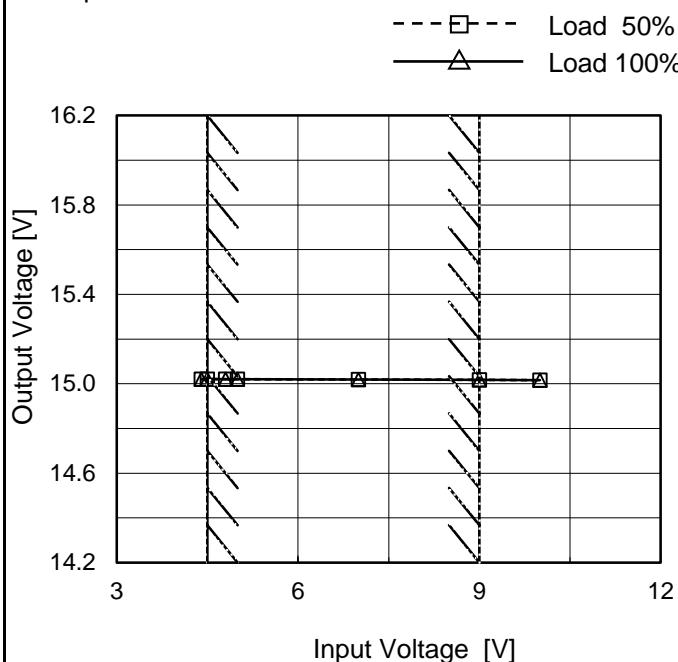
## 2.Values

| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load  50% | Load  100% |
| 4.4 | 15.021 | 15.020 |
| 4.5 | 15.021 | 15.022 |
| 4.8 | 15.020 | 15.021 |
| 5.0 | 15.020 | 15.020 |
| 7.0 | 15.019 | 15.019 |
| 9.0 | 15.017 | 15.018 |
| 10.0 | 15.016 | 15.017 |
| -- | - | - |
| -- | - | - |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Load Regulation |
| Object | +15V0.4A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph

———△——— Input Volt. 4.5V
- - -⊟- - - Input Volt. 5V
—·—○—·· Input Volt. 9V



Output Voltage [V] vs Load Current [A]

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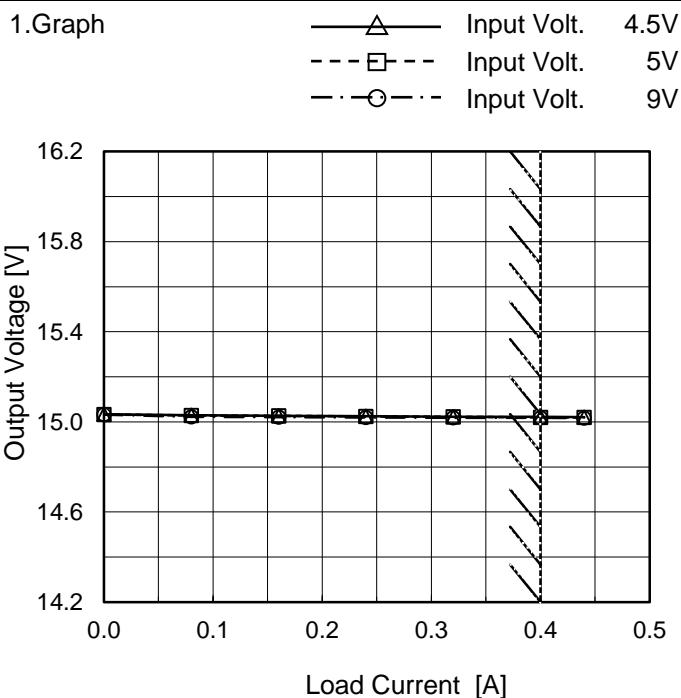
2.Values

| Load Current [A] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 0.00 | 15.034 | 15.033 | 15.032 |
| 0.08 | 15.029 | 15.028 | 15.022 |
| 0.16 | 15.027 | 15.026 | 15.021 |
| 0.24 | 15.025 | 15.024 | 15.020 |
| 0.32 | 15.023 | 15.023 | 15.019 |
| 0.40 | 15.022 | 15.020 | 15.018 |
| 0.44 | 15.021 | 15.020 | 15.017 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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# COSEL

| Model | MGS60515 |
|---|---|
| Item | Dynamic Load Response |
| Object | +15V0.4A |

Temperature　　25°C
Testing Circuitry　Figure A

Input Volt.　　　5 V
Cycle　　　　　100 ms

t1,t2 = 100 μs

Load Current

t1　　　　　　　　　　t2

Min.Load (0A)←→
　Load 100% (0.4A)

500 mV/div
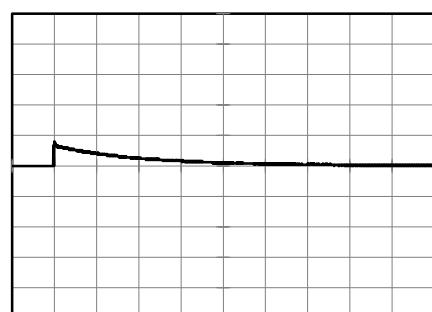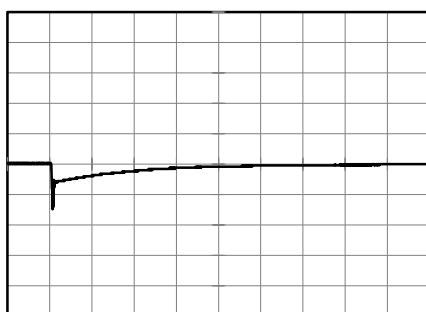
2 ms/div　　　　　　　2 ms/div

Min.Load (0A)←→
　Load 50% (0.2A)

500 mV/div

2 ms/div　　　　　　　2 ms/div
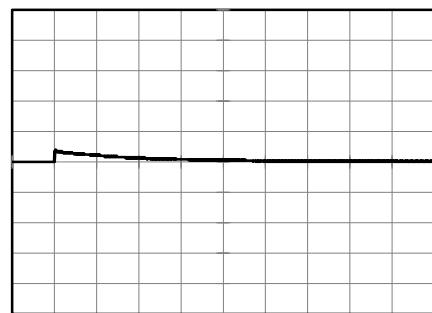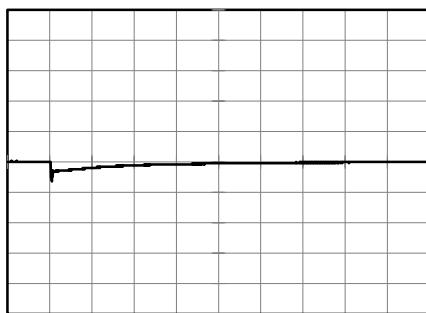
Load 50% (0.2A)←→
　Load 100% (0.4A)

500 mV/div

2 ms/div　　　　　　　2 ms/div

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| Model | MGS60515 |
|---|---|
| Item | Ripple Voltage (by Load Current) |
| Object | +15V0.4A |

Temperature 25°C
Testing Circuitry Figure B

## 1.Graph

```
———△——— Input Volt.    4.5V
—·—○—·— Input Volt.    9V
```



Ripple Voltage [mV] vs Load Current [A]

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. 4.5 [V] | Input Volt. 9 [V] |
| 0.00 | 20 | 50 |
| 0.08 | 5 | 10 |
| 0.16 | 5 | 5 |
| 0.24 | 5 | 5 |
| 0.32 | 5 | 5 |
| 0.40 | 5 | 5 |
| 0.44 | 5 | 5 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Ripple-Noise |
| Object | +15V0.4A |

Temperature 25°C
Testing Circuitry Figure B

## 1.Graph

———△——— Input Volt. 4.5V
— · —○— · — Input Volt. 9V



Ripple Voltage [mV] vs Load Current [A]

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]
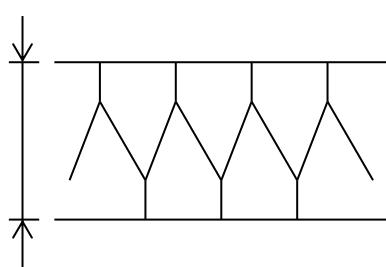


Fig.Complex Ripple Noise Wave
Form

## 2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 4.5 [V] | Input Volt. 9 [V] |
| 0.00 | 25 | 55 |
| 0.08 | 10 | 15 |
| 0.16 | 5 | 5 |
| 0.24 | 10 | 10 |
| 0.32 | 10 | 10 |
| 0.40 | 10 | 10 |
| 0.44 | 10 | 10 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

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# COSEL

| Model | MGS60515 |
|---|---|
| Item | Ripple Voltage (by Ambient Temp.) |
| Object | +15V0.4A |

Testing Circuitry    Figure B

## 1.Graph



Legend:
- --- ⊟ --- Load 50%
- —△— Load 100%

Ambient Temperature [°C]

Input Volt.          5V
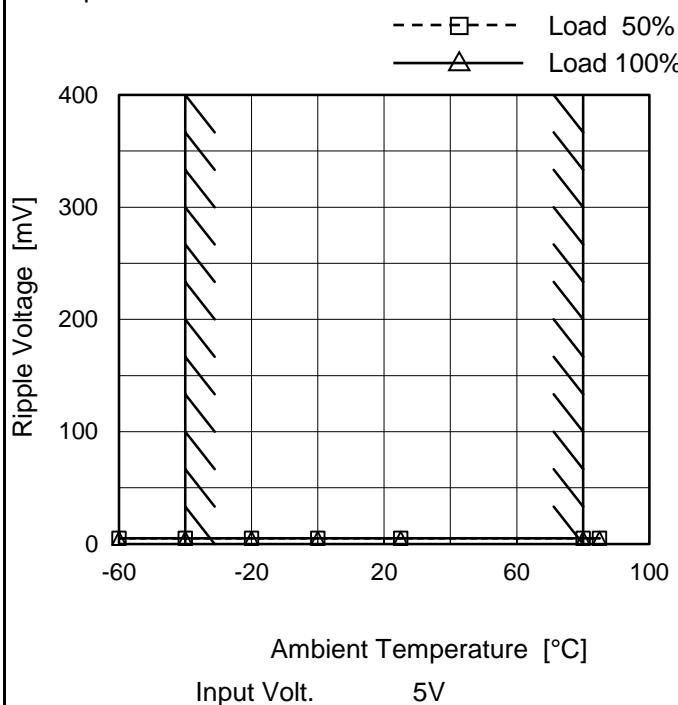
Measured by 100 MHz Oscilloscope.
Note: Slanted line shows the range of the rated
      ambient temperature.

## 2.Values

| Ambient Temperature [°C] | Ripple Voltage [mV] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 5 | 5 |
| -40 | 5 | 5 |
| -20 | 5 | 5 |
| 0 | 5 | 5 |
| 25 | 5 | 5 |
| 80 | 5 | 5 |
| 85 | 5 | 5 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Ambient Temperature Drift |
| Object | +15V0.4A |
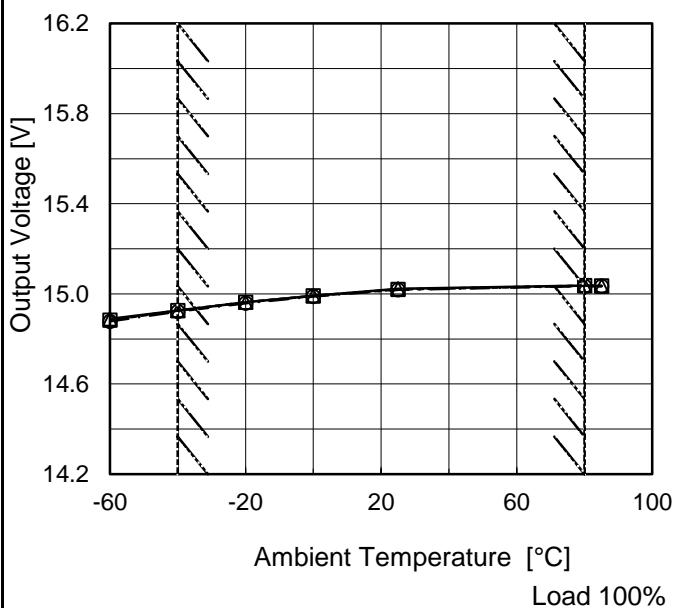
Testing Circuitry    Figure A

1.Graph

——△—— Input Volt. 4.5V
---⊟--- Input Volt. 5V
—·—○—·— Input Volt. 9V



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. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| -60 | 14.888 | 14.883 | 14.878 |
| -40 | 14.926 | 14.926 | 14.922 |
| -20 | 14.963 | 14.963 | 14.959 |
| 0 | 14.991 | 14.992 | 14.989 |
| 25 | 15.022 | 15.020 | 15.018 |
| 80 | 15.036 | 15.036 | 15.035 |
| 85 | 15.036 | 15.036 | 15.034 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Output Voltage Accuracy |
| Object | +15V0.4A |

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  :  4.5  -  9V

      Load Current   :  0  -  0.4A

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

* Output Voltage Accuracy (Ratio)  = $\dfrac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}}$ × 100

2.Values

| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
|---|---|---|---|---|---|---|
| | | | Current[A] | Voltage[V] | Value [mV] | Ratio [%] |
| Maximum Voltage | 80 | 9 | 0 | 15.048 | ±63 | ±0.4 |
| Minimum Voltage | -40 | 9 | 0.4 | 14.922 | | |

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| | |
|---|---|
| Model | MGS60515 |
| Item | Time Lapse Drift |
| Object | +15V0.4A |

Temperature 25°C
Testing Circuitry Figure A

## 1.Graph



Input Volt. 5V
Load 100%
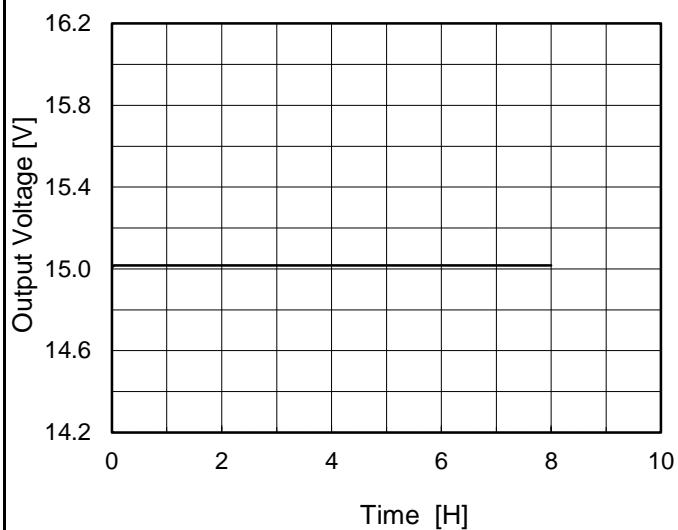
## 2.Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 15.008 |
| 0.5 | 15.017 |
| 1.0 | 15.017 |
| 2.0 | 15.017 |
| 3.0 | 15.017 |
| 4.0 | 15.017 |
| 5.0 | 15.017 |
| 6.0 | 15.017 |
| 7.0 | 15.017 |
| 8.0 | 15.017 |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Rise and Fall Time |
| Object | +15V0.4A |

Temperature      25°C
Testing Circuitry    Figure A

1.Graph

Input Volt.    5 V

Load 50%

Output Volt.

[2V/div]

0

Load 100%

Output Volt.

[2V/div]

0

Input Volt.

0

[1V/div]      Time      [5ms/div]      Time      [1ms/div]
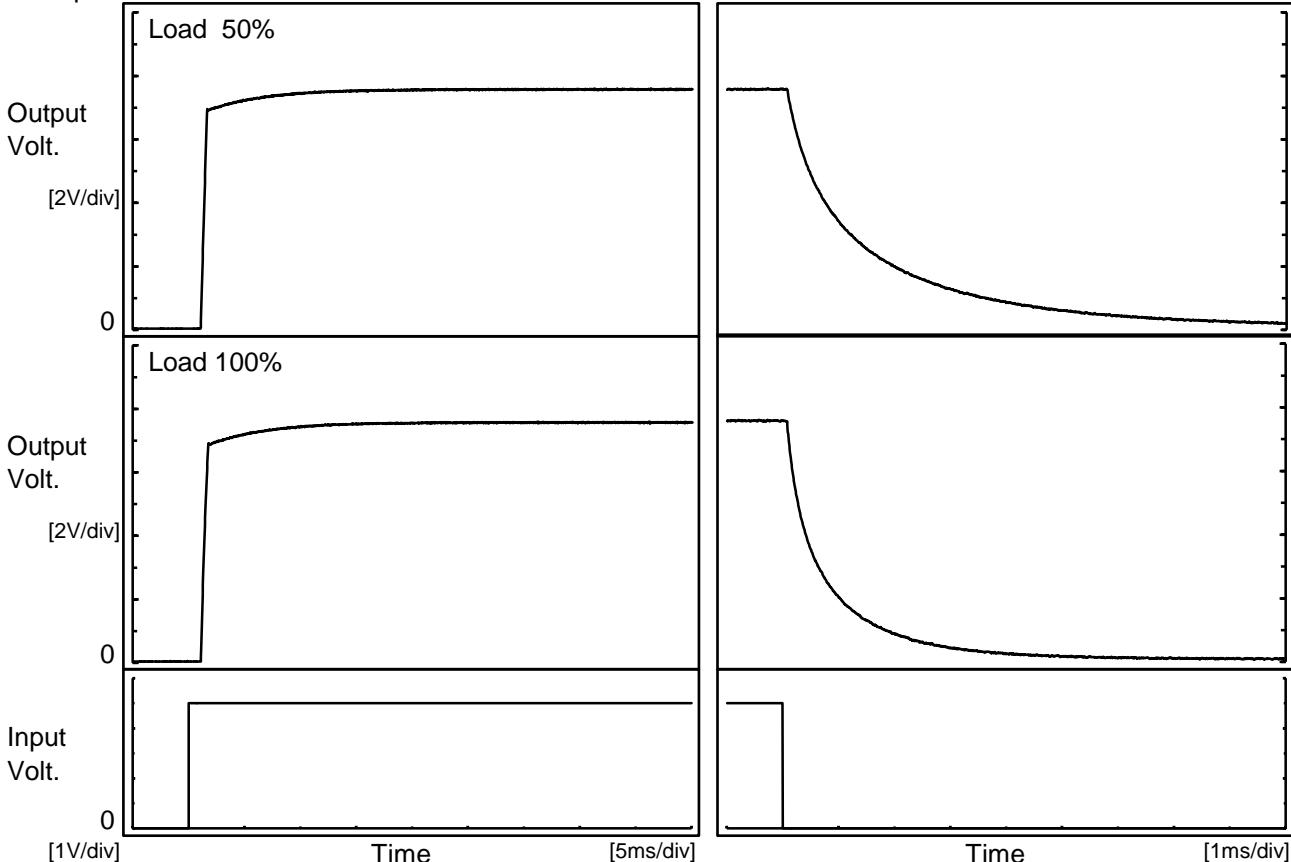
2.Values

[ms]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 1.2 | 0.5 | 1.7 | 0.2 | 4.1 |
| 100 % | 1.2 | 0.6 | 1.8 | 0.1 | 2.1 |

Output Volt.

90%

10%

Input Volt.

Td   Tr      Th   Tf

Ts

- 15 -

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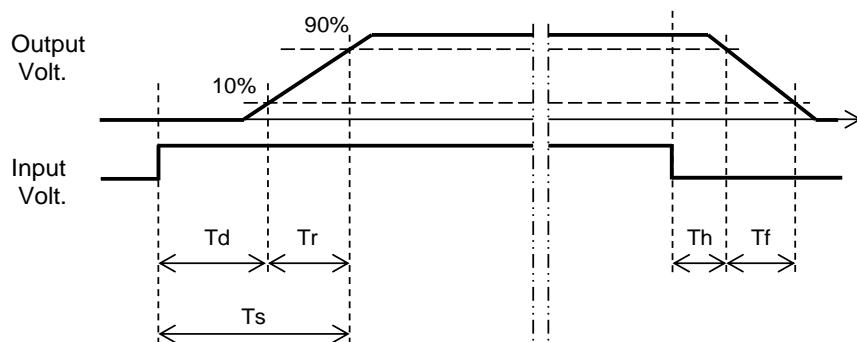
# COSEL

| Model | MGS60515 |
|---|---|
| Item | Minimum Input Voltage<br> for Regulated Output Voltage |
| Object | +15V0.4A |
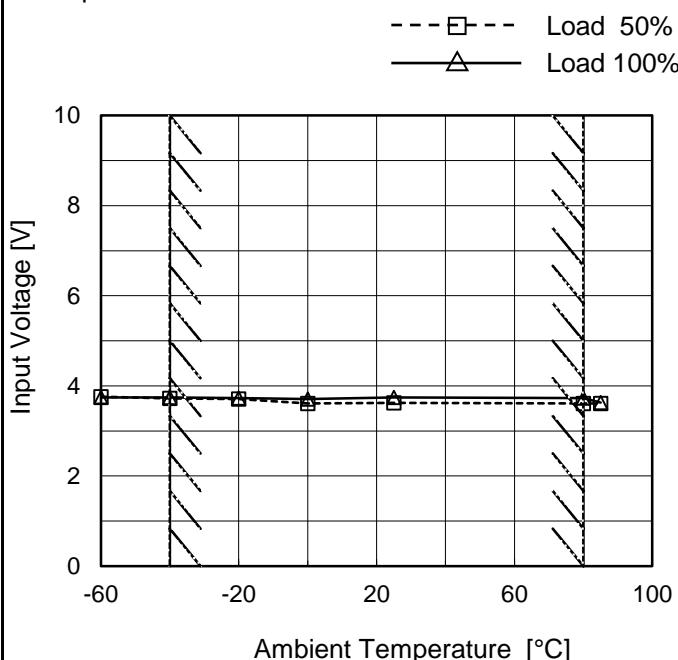
Testing Circuitry    Figure A

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<br>Temperature<br>[°C] | Input Voltage<br>[V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 3.8 | 3.8 |
| -40 | 3.8 | 3.8 |
| -20 | 3.8 | 3.8 |
| 0 | 3.7 | 3.8 |
| 25 | 3.7 | 3.8 |
| 80 | 3.7 | 3.8 |
| 85 | 3.7 | 3.7 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

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| Model | MGS60515 |
|---|---|
| Item | Overcurrent Protection |
| Object | +15V0.4A |
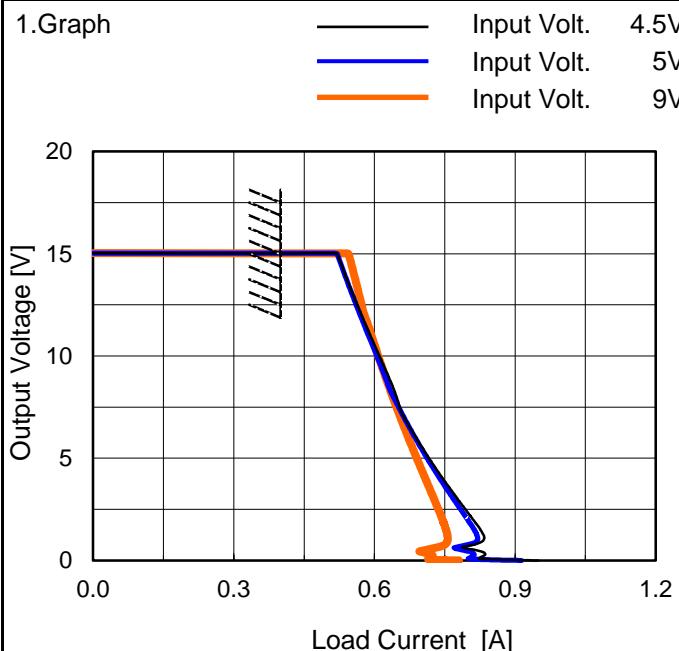
Temperature    25°C
Testing Circuitry    Figure A

1.Graph

——— Input Volt.    4.5V
——— Input Volt.    5V
——— Input Volt.    9V



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

2.Values

| Output Voltage [V] | Load Current [A] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 15.0 | 0.40 | 0.40 | 0.40 |
| 14.3 | 0.53 | 0.53 | 0.55 |
| 13.5 | 0.55 | 0.54 | 0.56 |
| 12.0 | 0.57 | 0.57 | 0.58 |
| 10.5 | 0.60 | 0.60 | 0.60 |
| 9.0 | 0.63 | 0.62 | 0.62 |
| 7.5 | 0.65 | 0.65 | 0.65 |
| 6.0 | 0.69 | 0.69 | 0.67 |
| 4.5 | 0.73 | 0.73 | 0.70 |
| 3.0 | 0.78 | 0.77 | 0.73 |
| 1.5 | 0.83 | 0.81 | 0.75 |
| 0.0 | 0.95 | 0.91 | 0.78 |

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# COSEL

| | |
|---|---|
| Model | MGS60515 |
| Item | Switching Frequency (by Load Current) |
| Object | +15V0.4A |

Temperature    25°C
Testing Circuitry    Figure A

1.Graph

———△——— Input Volt.    4.5V
- - -⊟- - - Input Volt.    5V
—·—○—·— Input Volt.    9V



Switching Frequency [kHz] vs Load Current [A]

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.
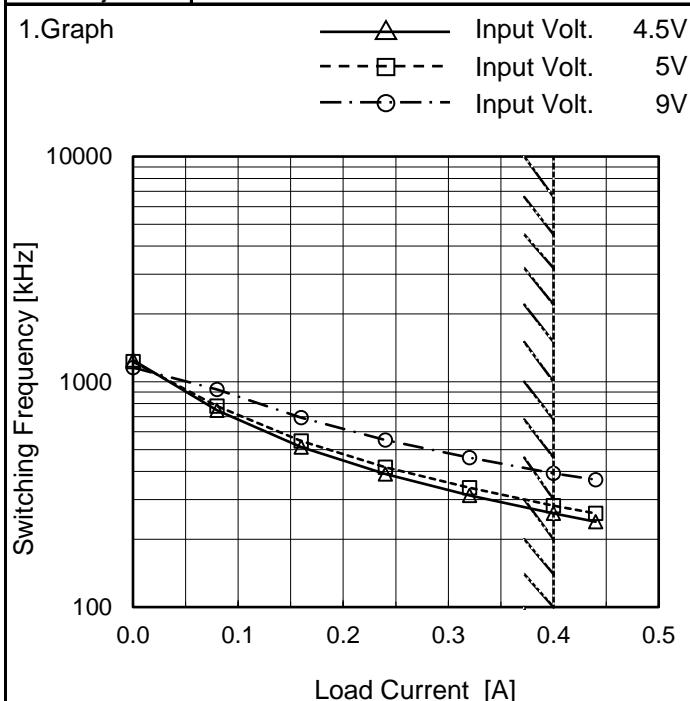
2.Values

| Load Current [A] | Frequency [kHz] | | |
|---|---|---|---|
| | Input Volt. 4.5[V] | Input Volt. 5[V] | Input Volt. 9[V] |
| 0.00 | 1249 | 1228 | 1157 |
| 0.08 | 747 | 779 | 925 |
| 0.16 | 514 | 546 | 693 |
| 0.24 | 390 | 418 | 551 |
| 0.32 | 313 | 339 | 460 |
| 0.40 | 261 | 282 | 393 |
| 0.44 | 239 | 261 | 368 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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# COSEL



Figure A

Data Acquisition/Control Unit
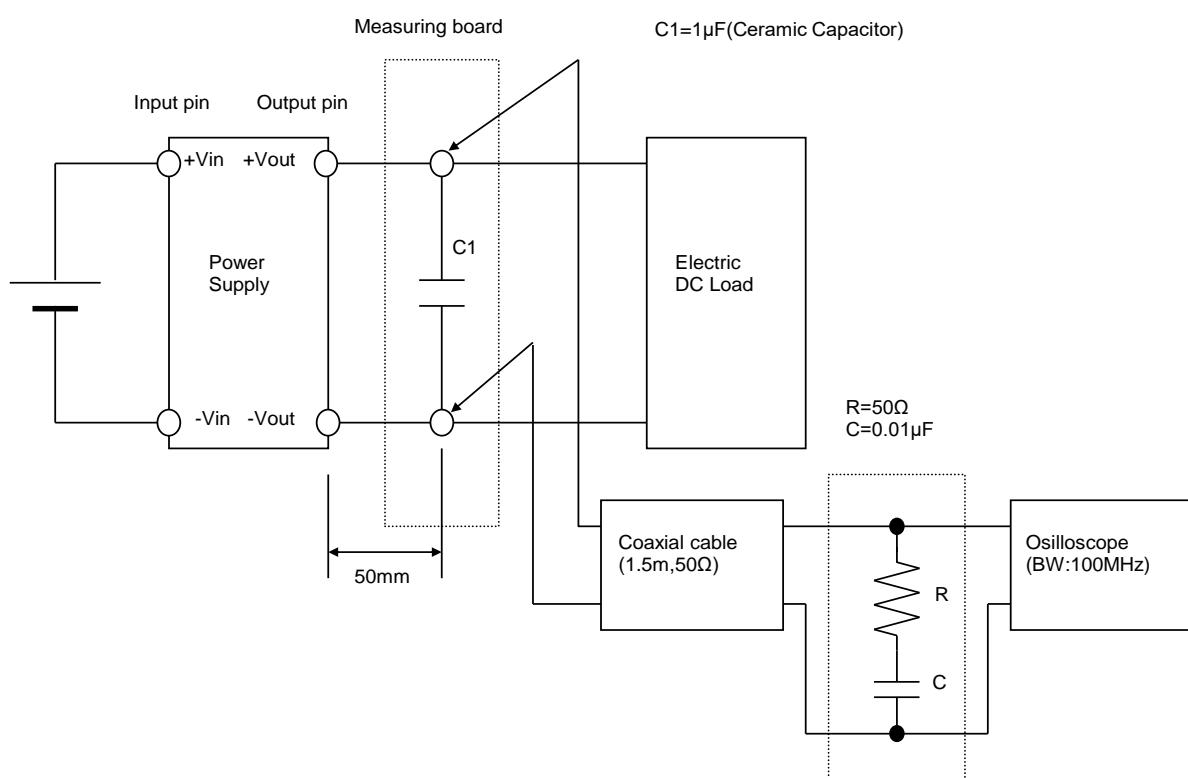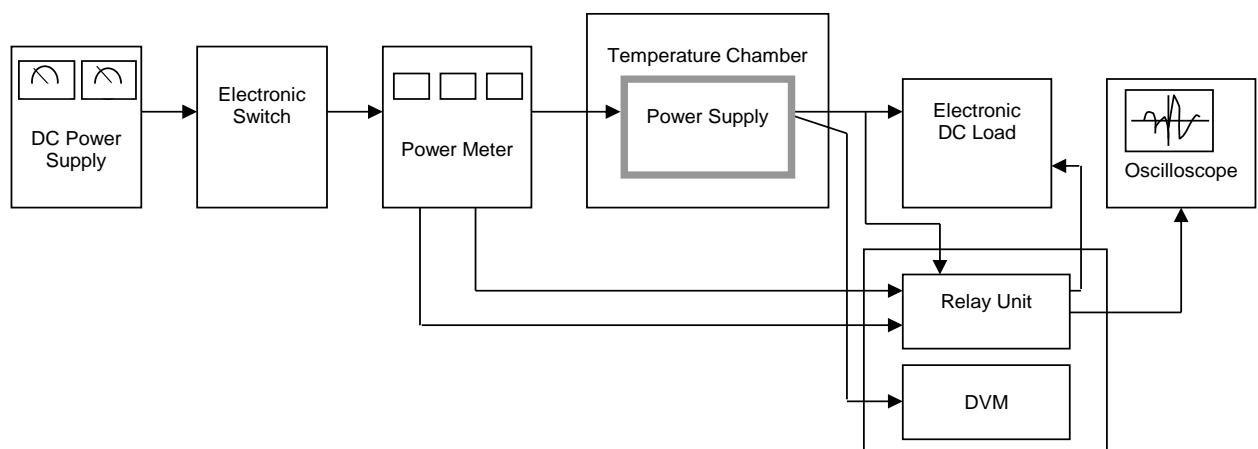


Figure B（Ripple and Ripple noise Characteristic）

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