COSEL

参考資料

# TEST DATA OF MGW302405

Regulated DC Power Supply
December 7, 2010

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**COSEL CO.,LTD.**

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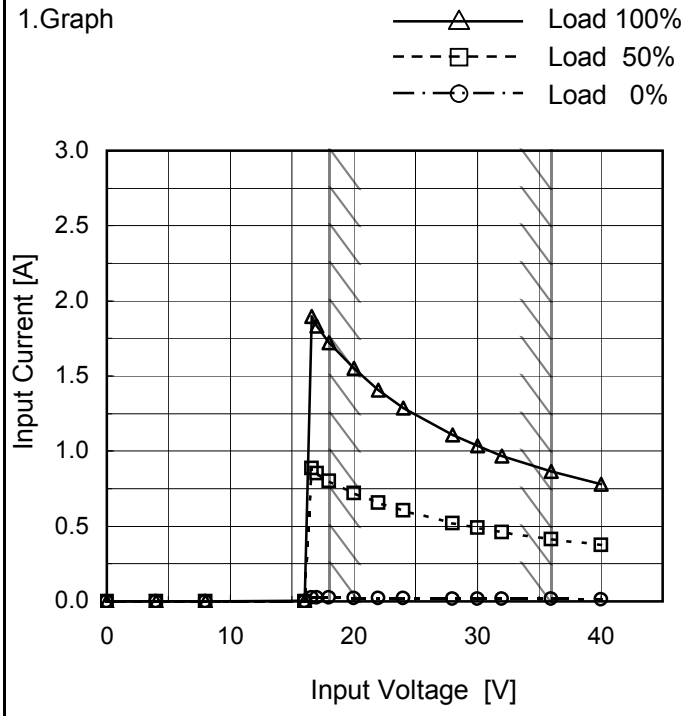
| | |
|---|---|
| Model | MGW302405 |
| Item | Input Current (by Input Voltage) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




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

2.Values

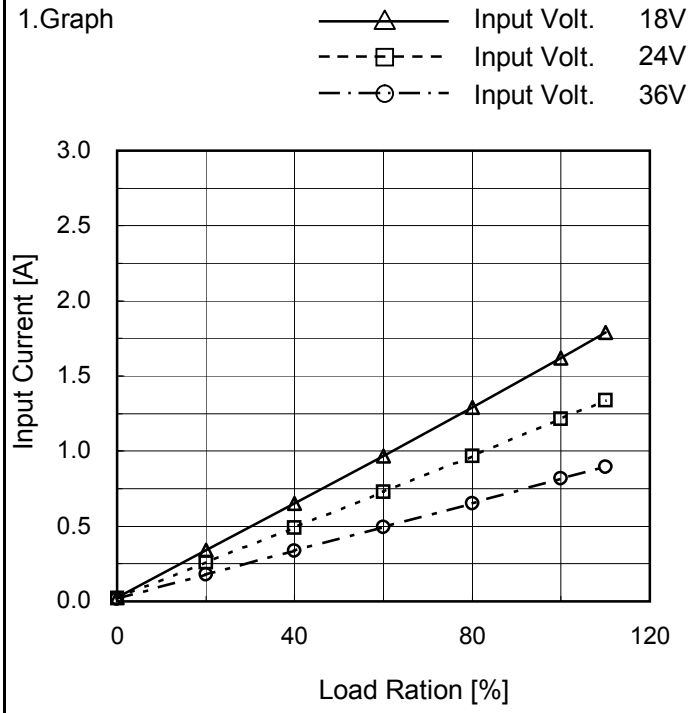
| Input Voltage [V] | Input Current [A] | | |
|---|---|---|---|
| | Load 0% | Load 50% | Load 100% |
| 0.0 | 0.000 | 0.000 | 0.000 |
| 4.0 | 0.001 | 0.001 | 0.001 |
| 8.0 | 0.002 | 0.002 | 0.002 |
| 16.0 | 0.002 | 0.002 | 0.002 |
| 16.6 | 0.027 | 0.885 | 1.897 |
| 17.0 | 0.027 | 0.853 | 1.833 |
| 18.0 | 0.025 | 0.801 | 1.720 |
| 20.0 | 0.023 | 0.720 | 1.552 |
| 22.0 | 0.022 | 0.655 | 1.406 |
| 24.0 | 0.021 | 0.604 | 1.289 |
| 28.0 | 0.017 | 0.521 | 1.107 |
| 30.0 | 0.017 | 0.488 | 1.034 |
| 32.0 | 0.016 | 0.458 | 0.969 |
| 36.0 | 0.015 | 0.411 | 0.866 |
| 40.0 | 0.015 | 0.373 | 0.780 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Input Current (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

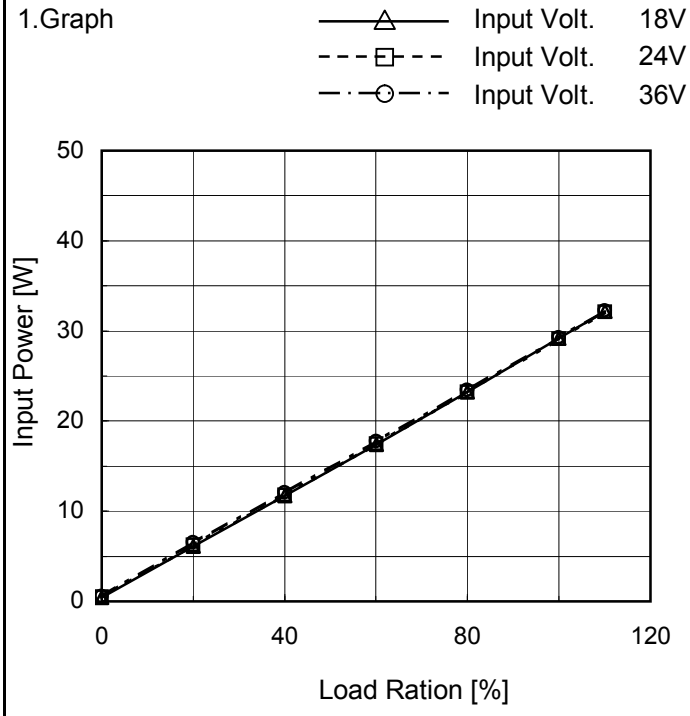
| Load Ration [%] | Input Current [A] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| 0 | 0.025 | 0.021 | 0.016 |
| 20 | 0.339 | 0.260 | 0.181 |
| 40 | 0.651 | 0.492 | 0.337 |
| 60 | 0.967 | 0.727 | 0.493 |
| 80 | 1.293 | 0.967 | 0.651 |
| 100 | 1.619 | 1.214 | 0.818 |
| 110 | 1.790 | 1.339 | 0.896 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Input Power (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

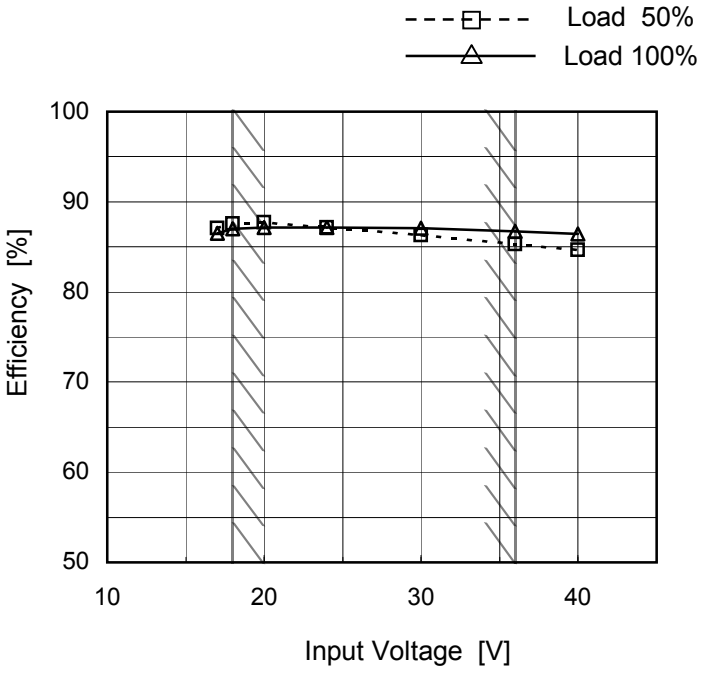
| Load Ration [%] | Input Power [W] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| 0 | 0.45 | 0.49 | 0.56 |
| 20 | 6.12 | 6.22 | 6.51 |
| 40 | 11.71 | 11.78 | 12.08 |
| 60 | 17.41 | 17.45 | 17.73 |
| 80 | 23.24 | 23.22 | 23.45 |
| 100 | 29.18 | 29.13 | 29.29 |
| 110 | 32.20 | 32.12 | 32.24 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| | |
|---|---|
| Model | MGW302405 |
| 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% |
| 17 | 87.1 | 86.5 |
| 18 | 87.5 | 87.0 |
| 20 | 87.7 | 87.1 |
| 24 | 87.1 | 87.1 |
| 30 | 86.3 | 87.1 |
| 36 | 85.3 | 86.7 |
| 40 | 84.6 | 86.4 |
| -- | - | - |
| -- | - | - |

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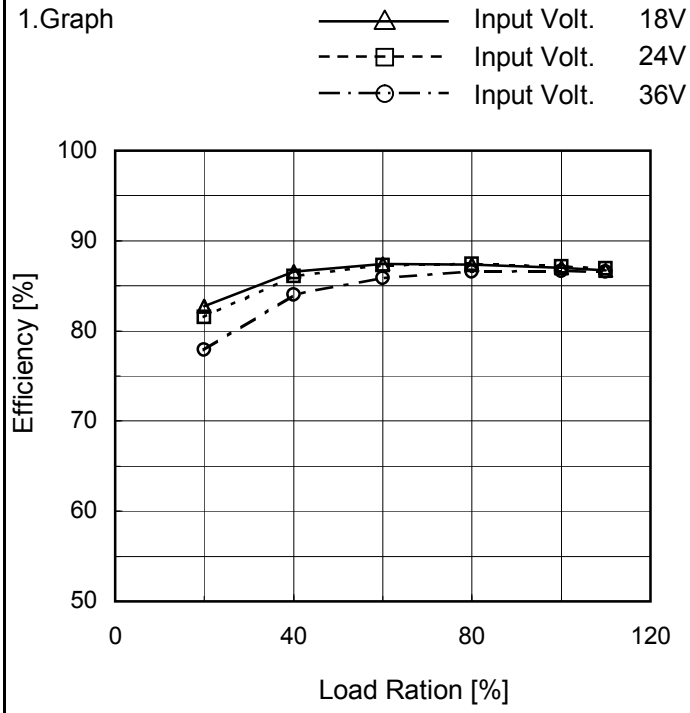
| | |
|---|---|
| Model | MGW302405 |
| Item | Efficiency (by Load Current) |
| Object | ———————— |

Temperature 25°C
Testing Circuitry Figure A

1.Graph




2.Values

| Load Ration [%] | Efficiency [%] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| 0 | - | - | - |
| 20 | 82.7 | 81.5 | 77.9 |
| 40 | 86.6 | 86.1 | 84.0 |
| 60 | 87.5 | 87.3 | 85.9 |
| 80 | 87.3 | 87.4 | 86.6 |
| 100 | 87.0 | 87.1 | 86.7 |
| 110 | 86.7 | 86.9 | 86.6 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

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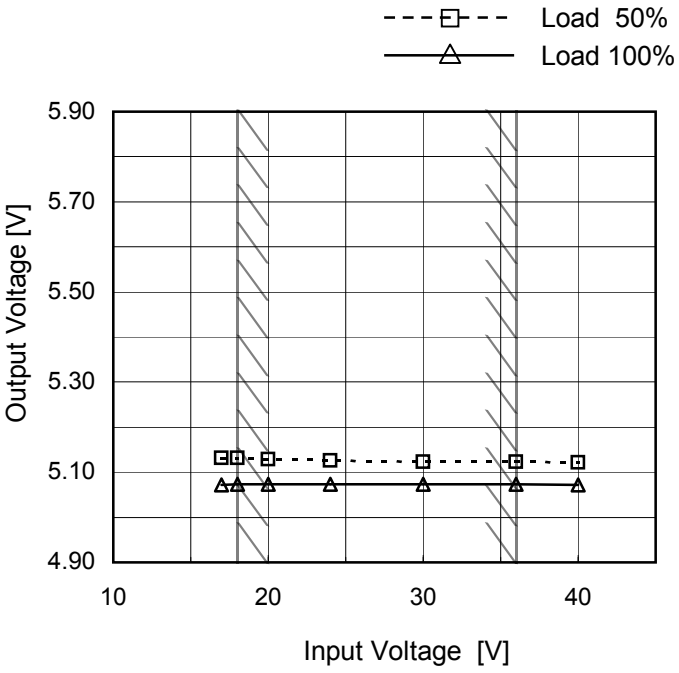
| | |
|---|---|
| Model | MGW302405 |
| Item | Line Regulation |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



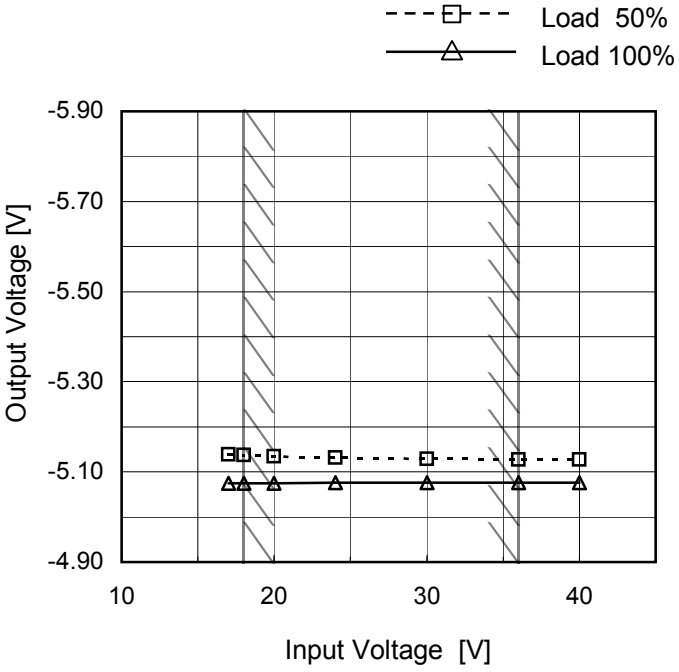

2.Values

| Input Voltage [V] | Output Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| 17 | 5.132 | 5.072 |
| 18 | 5.131 | 5.073 |
| 20 | 5.129 | 5.073 |
| 24 | 5.126 | 5.073 |
| 30 | 5.124 | 5.073 |
| 36 | 5.122 | 5.073 |
| 40 | 5.122 | 5.072 |
| -- | - | - |
| -- | - | - |

-5V: Rated output current

| | |
|---|---|
| Object | -5V2.5A |

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% |
| 17 | -5.139 | -5.075 |
| 18 | -5.137 | -5.075 |
| 20 | -5.134 | -5.075 |
| 24 | -5.131 | -5.076 |
| 30 | -5.129 | -5.076 |
| 36 | -5.128 | -5.076 |
| 40 | -5.127 | -5.076 |
| -- | - | - |
| -- | - | - |

+5V: Rated output current

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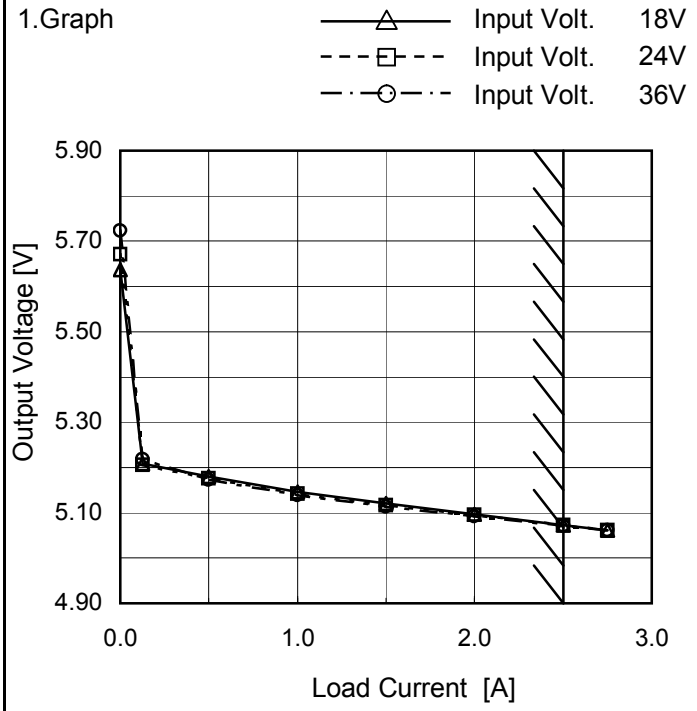
| Model | MGW302405 |
|---|---|
| Item | Load Regulation |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



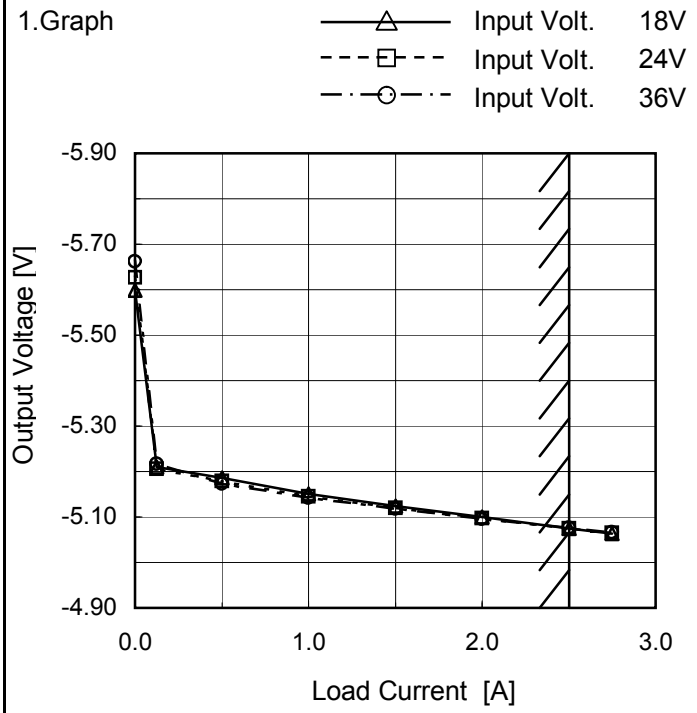

2.Values

| Load Current [A] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
| 0.000 | 5.638 | 5.671 | 5.724 |
| 0.125 | 5.209 | 5.206 | 5.218 |
| 0.500 | 5.180 | 5.176 | 5.173 |
| 1.000 | 5.146 | 5.142 | 5.139 |
| 1.500 | 5.120 | 5.117 | 5.114 |
| 2.000 | 5.096 | 5.095 | 5.093 |
| 2.500 | 5.073 | 5.073 | 5.072 |
| 2.750 | 5.061 | 5.062 | 5.062 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

-5V: Rated output current

| Object | -5V2.5A |
|---|---|

1.Graph




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

2.Values

| Load Current [A] | Output Voltage [V] | | |
|---|---|---|---|
| | Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
| 0.000 | -5.598 | -5.627 | -5.662 |
| 0.125 | -5.210 | -5.206 | -5.217 |
| 0.500 | -5.185 | -5.178 | -5.174 |
| 1.000 | -5.151 | -5.146 | -5.142 |
| 1.500 | -5.124 | -5.120 | -5.118 |
| 2.000 | -5.099 | -5.098 | -5.096 |
| 2.500 | -5.075 | -5.075 | -5.076 |
| 2.750 | -5.063 | -5.065 | -5.066 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

+5V: Rated output current

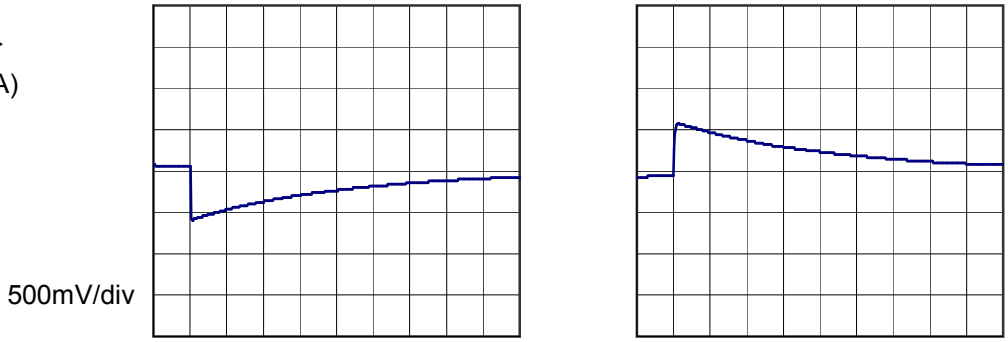
COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Dynamic Load Response |
| Object | +5V2.5A |

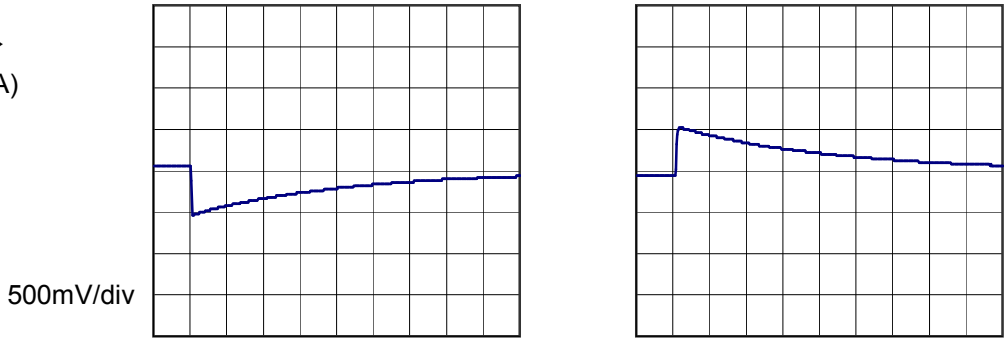
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 24 V
Other output current rated
Cycle 1000 ms

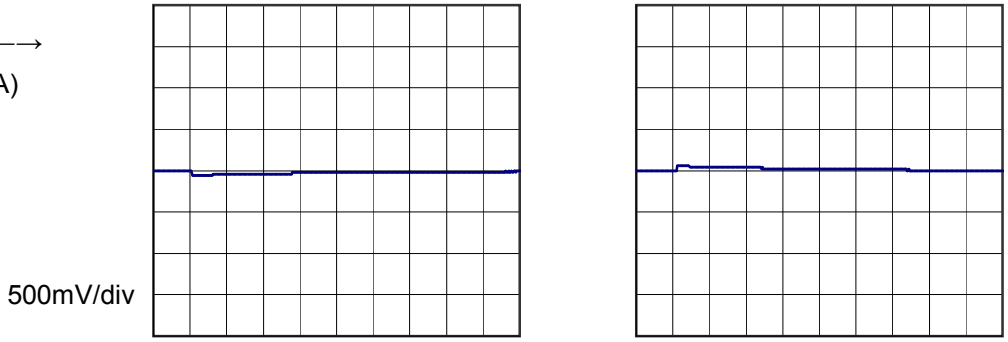

Min. Load (0A) ⟷
Load 100% (2.5A)




Min. Load (0A) ⟷
Load 50% (1.25A)




Load 50% (1.25A) ⟷
Load 100% (2.5A)



COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Dynamic Load Response |
| Object | -5V2.5A |

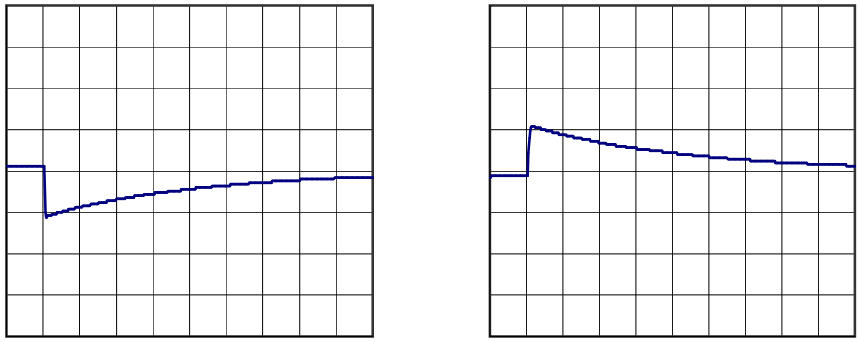
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 24 V
Other output current rated
Cycle 1000 ms

$t_1$、$t_2$ = 50μs

Load Current

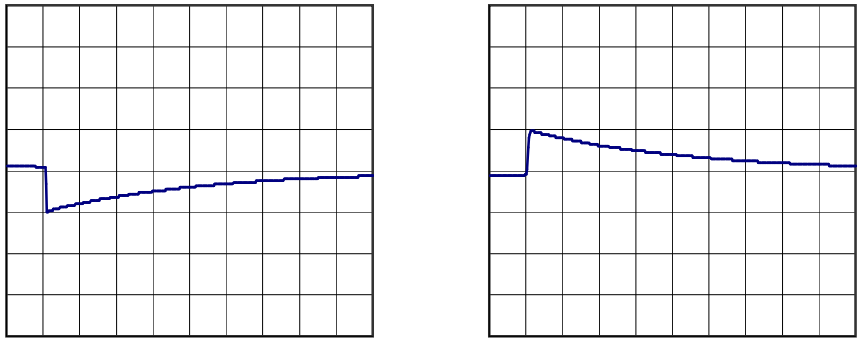

Min. Load (0A) ⟷
Load 100% (2.5A)



500mV/div

50ms/div 50ms/div

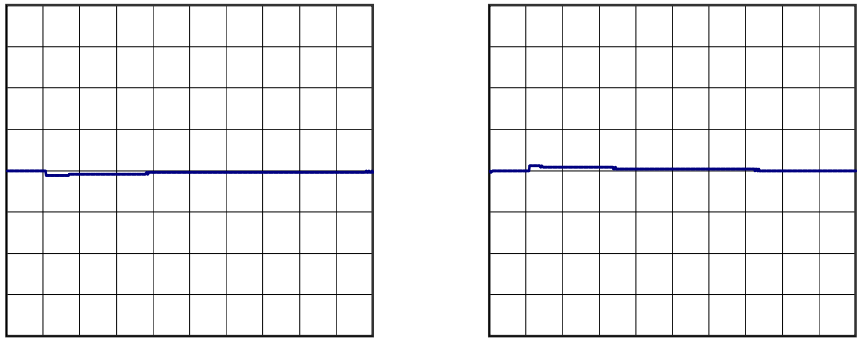
Min. Load (0A) ⟷
Load 50% (1.25A)



500mV/div

50ms/div 50ms/div

Load 50% (1.25A) ⟷
Load 100% (2.5A)



500mV/div

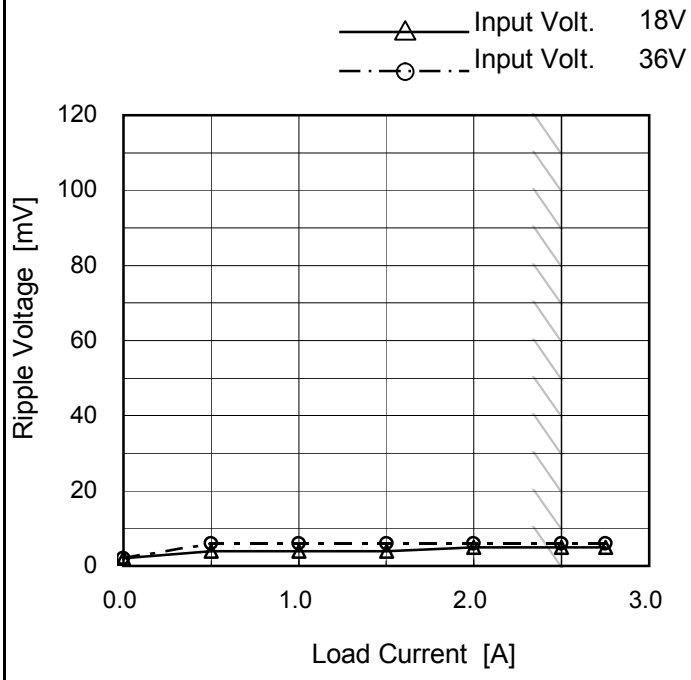
50ms/div 50ms/div

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Ripple Voltage (by Load Current) |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




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]

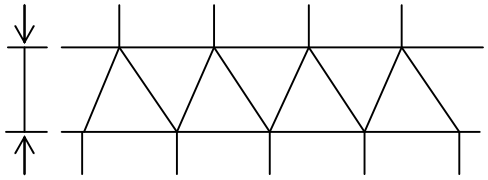


Fig.Complex Ripple Wave Form

2.Values

| Load Current [A] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 18 [V] | Input Volt. 36 [V] |
| 0.00 | 2 | 2 |
| 0.50 | 4 | 6 |
| 1.00 | 4 | 6 |
| 1.50 | 4 | 6 |
| 2.00 | 5 | 6 |
| 2.50 | 5 | 6 |
| 2.75 | 5 | 6 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

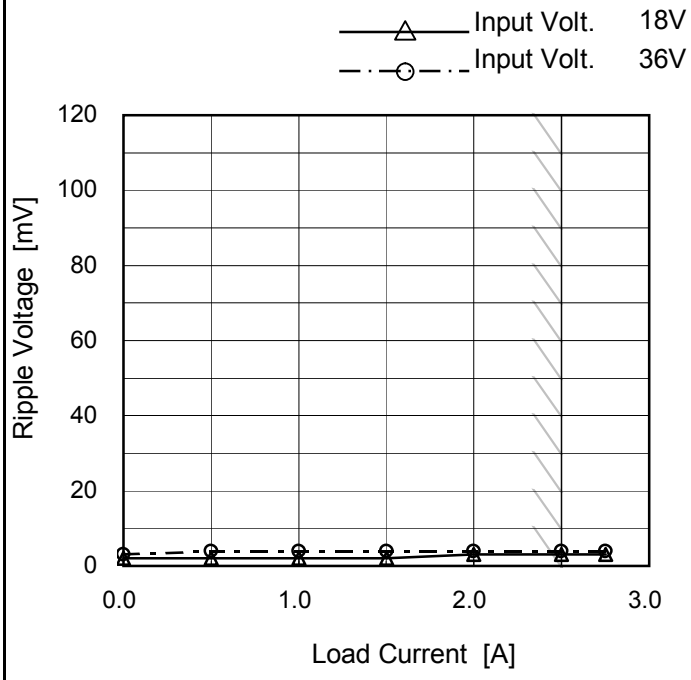
-5V: Rated output current

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Ripple Voltage (by Load Current) |
| Object | -5V2.5A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




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

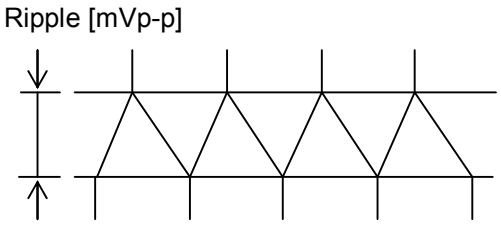



Fig.Complex Ripple Wave Form

2.Values

| Load Current [A] | Ripple Voltage [mV] | |
|---|---|---|
| | Input Volt. 18 [V] | Input Volt. 36 [V] |
| 0.00 | 2 | 3 |
| 0.50 | 2 | 4 |
| 1.00 | 2 | 4 |
| 1.50 | 2 | 4 |
| 2.00 | 3 | 4 |
| 2.50 | 3 | 4 |
| 2.75 | 3 | 4 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

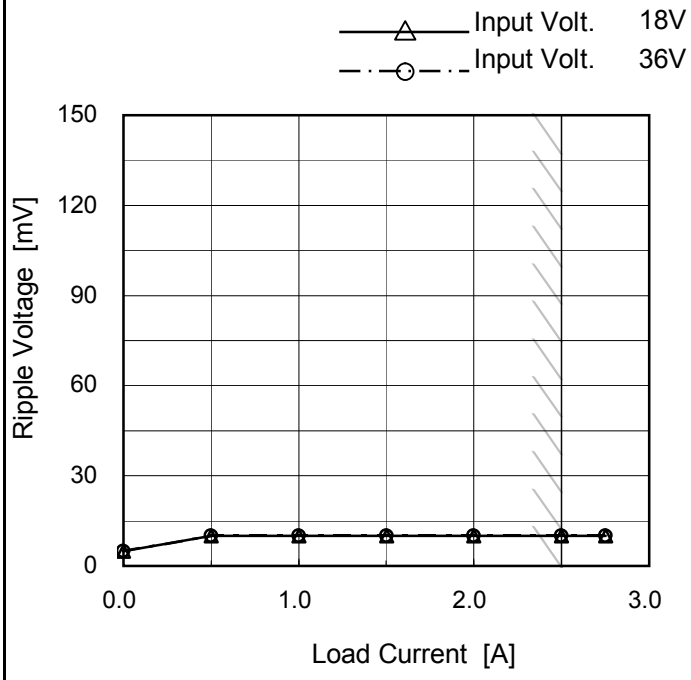
+5V: Rated output current

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Ripple-Noise |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




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

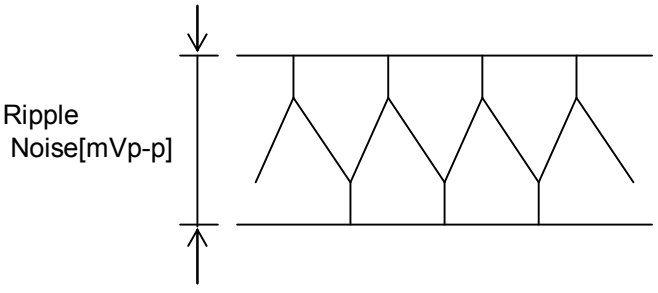



Fig.Complex Ripple Noise Wave Form

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 18 [V] | Input Volt. 36 [V] |
| 0.00 | 5 | 5 |
| 0.50 | 10 | 10 |
| 1.00 | 10 | 10 |
| 1.50 | 10 | 10 |
| 2.00 | 10 | 10 |
| 2.50 | 10 | 10 |
| 2.75 | 10 | 10 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

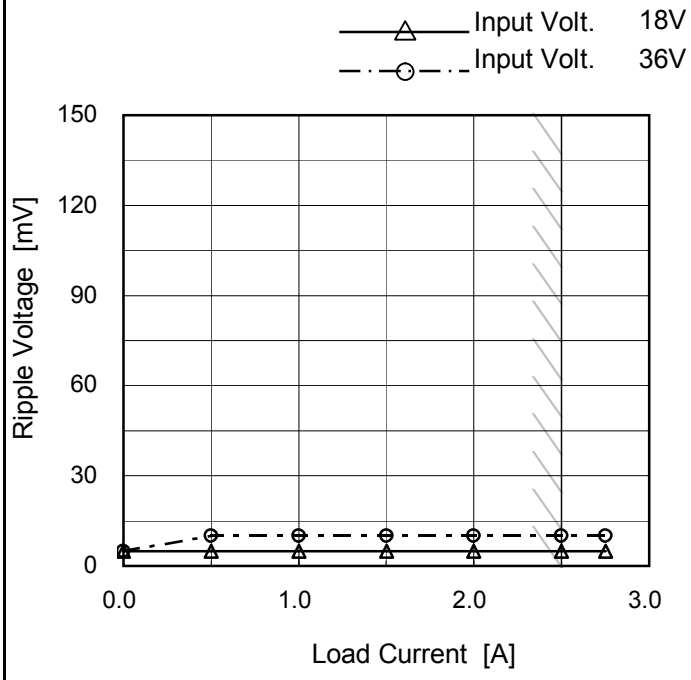
-5V: Rated output current

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Ripple-Noise |
| Object | -5V2.5A |

Temperature 25°C
Testing Circuitry Figure B

1.Graph




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

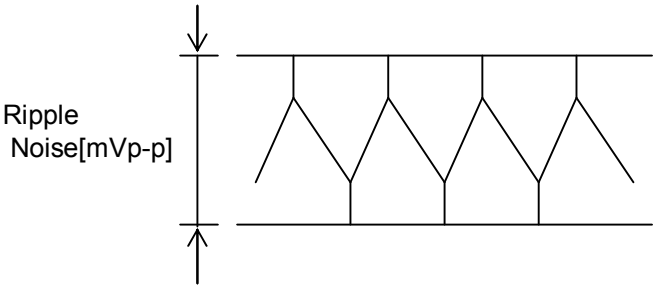



Fig.Complex Ripple Noise Wave Form

2.Values

| Load Current [A] | Ripple-Noise [mV] | |
|---|---|---|
| | Input Volt. 18 [V] | Input Volt. 36 [V] |
| 0.00 | 5 | 5 |
| 0.50 | 5 | 10 |
| 1.00 | 5 | 10 |
| 1.50 | 5 | 10 |
| 2.00 | 5 | 10 |
| 2.50 | 5 | 10 |
| 2.75 | 5 | 10 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

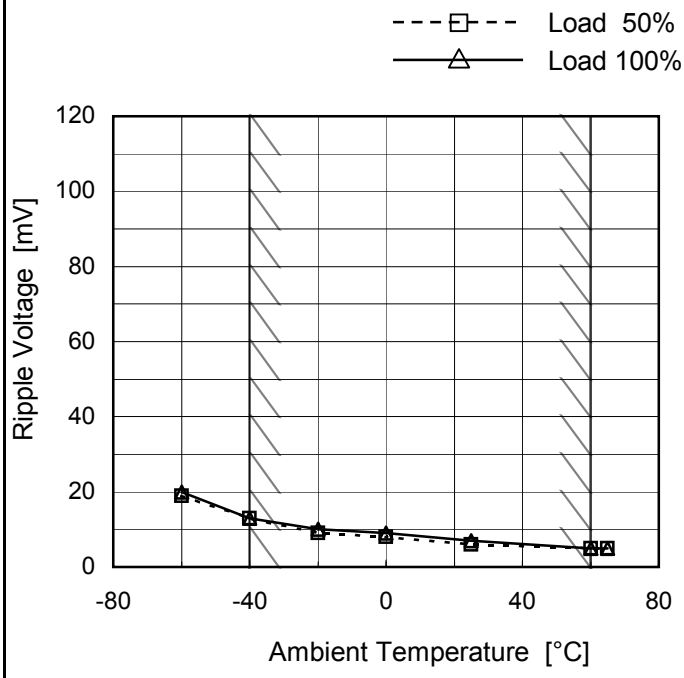
+5V: Rated output current

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Ripple Voltage (by Ambient Temp.) |
| Object | +5V2.5A |

Testing Circuitry Figure A

1.Graph




Input Volt. 24V

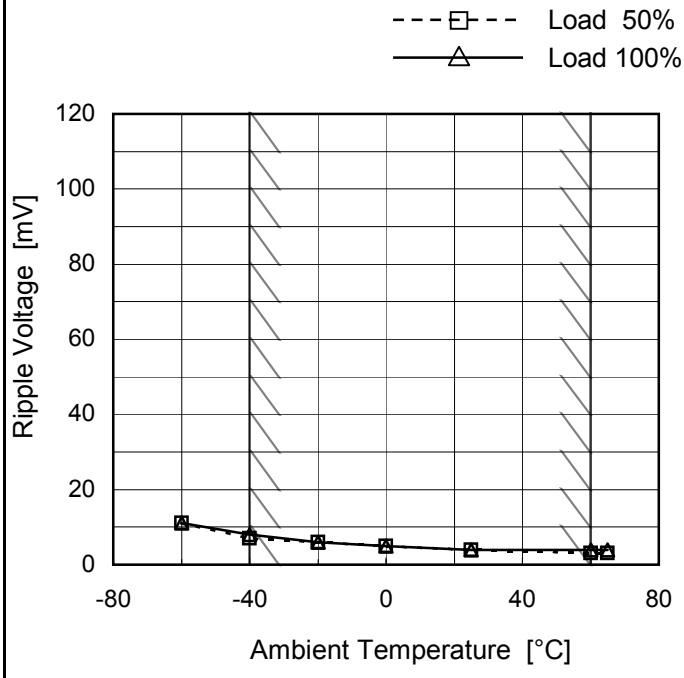
2.Values

| Ambient Temperature [°C] | Ripple Voltage [mV] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 19 | 20 |
| -40 | 13 | 13 |
| -20 | 9 | 10 |
| 0 | 8 | 9 |
| 25 | 6 | 7 |
| 60 | 5 | 5 |
| 65 | 5 | 5 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

-5V: Rated output current

| | |
|---|---|
| Object | -5V2.5A |

1.Graph




Input Volt. 24V

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 | 11 | 11 |
| -40 | 7 | 8 |
| -20 | 6 | 6 |
| 0 | 5 | 5 |
| 25 | 4 | 4 |
| 60 | 3 | 4 |
| 65 | 3 | 4 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

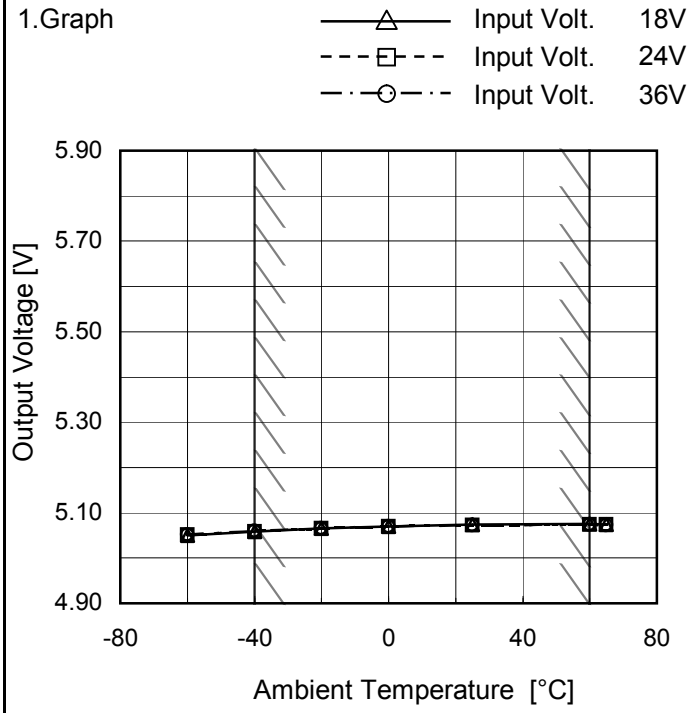
+5V: Rated output current

COSEL

| Model | MGW302405 |
|---|---|
| Item | Ambient Temperature Drift |
| Object | +5V2.5A |

Testing Circuitry Figure A

1.Graph

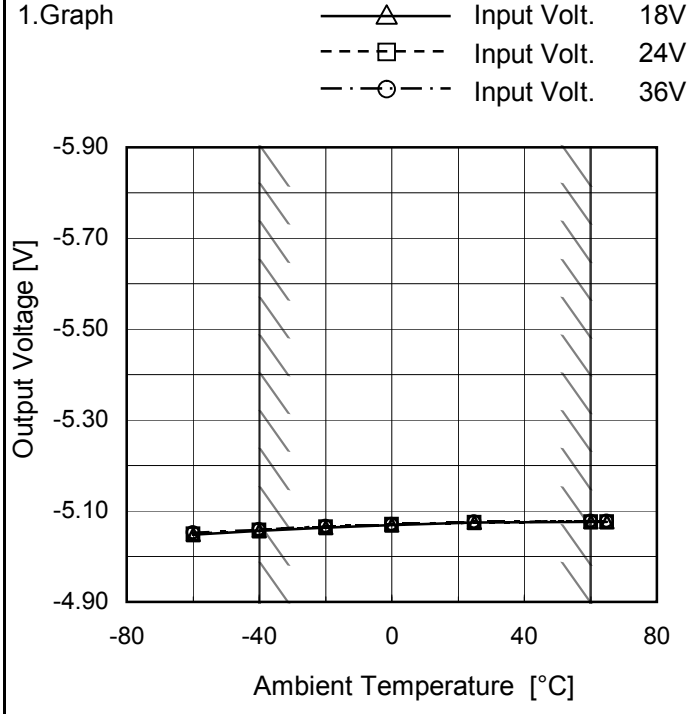



2.Values

| Ambient Temperature [°C] | Output Voltage [V] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| -60 | 5.050 | 5.051 | 5.052 |
| -40 | 5.059 | 5.059 | 5.060 |
| -20 | 5.065 | 5.065 | 5.066 |
| 0 | 5.070 | 5.070 | 5.070 |
| 25 | 5.073 | 5.073 | 5.072 |
| 60 | 5.075 | 5.075 | 5.074 |
| 65 | 5.075 | 5.074 | 5.073 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

| Object | -5V2.5A |
|---|---|

1.Graph




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

2.Values

| Ambient Temperature [°C] | Output Voltage [V] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| -60 | -5.047 | -5.050 | -5.052 |
| -40 | -5.057 | -5.058 | -5.060 |
| -20 | -5.063 | -5.065 | -5.066 |
| 0 | -5.069 | -5.070 | -5.071 |
| 25 | -5.075 | -5.075 | -5.076 |
| 60 | -5.076 | -5.077 | -5.077 |
| 65 | -5.076 | -5.076 | -5.077 |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |
| -- | - | - | - |

COSEL

| Model | MGW302405 | |
|---|---|---|
| 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 - 60°C
Input Voltage : 18 - 36V
Load Current (AVR 1) : 0 - 2.5A (AVR 2) : 0 - 2.5A

* Other Output : Rated Load

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

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

2.Values

| Object | +5V2.5A | | | | | |
|---|---|---|---|---|---|---|
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
| | | | Current[A] | Voltage[V] | Value [mV] | Ration [%] |
| Maximum Voltage | -40 | 36 | 0 | 5.757 | ±349 | ±7.0 |
| Minimum Voltage | -40 | 18 | 2.5 | 5.059 | | |

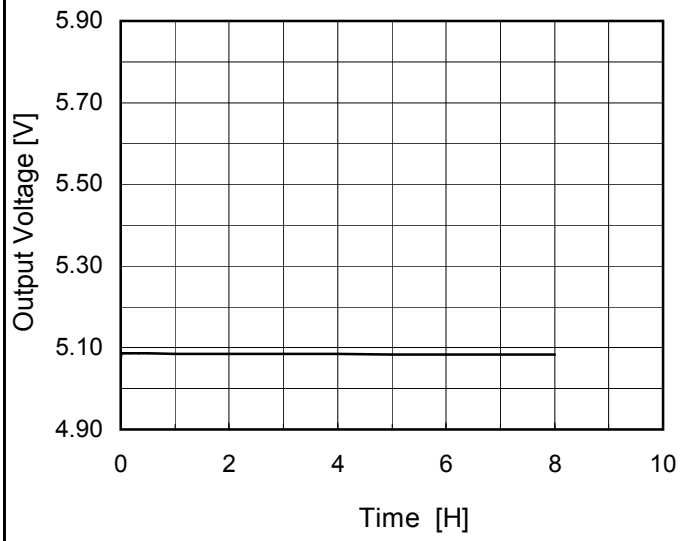
| Object | -5V2.5A | | | | | |
|---|---|---|---|---|---|---|
| Item | Temperature [°C] | Input Voltage[V] | Output | | Output Voltage Accuracy | |
| | | | Current[A] | Voltage[V] | Value [mV] | Ration [%] |
| Maximum Voltage | -20 | 36 | 0 | -5.687 | ±315 | ±6.3 |
| Minimum Voltage | -40 | 18 | 2.5 | -5.057 | | |

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Time Lapse Drift |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph



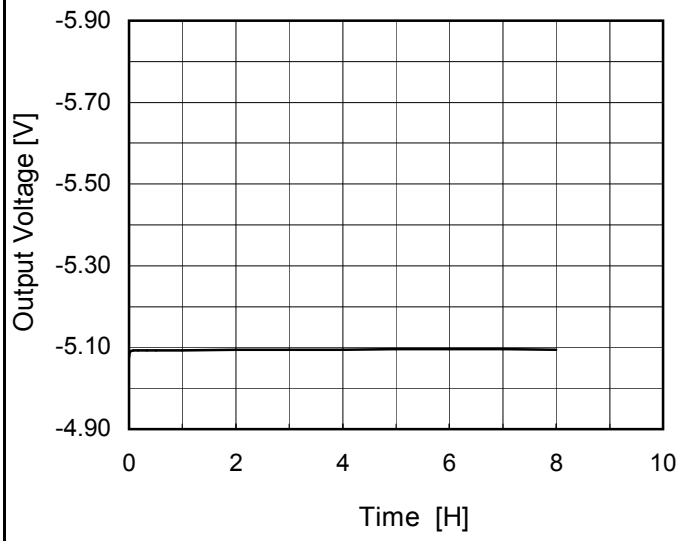

Input Volt. 24V
Load 100%

2.Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 5.073 |
| 0.5 | 5.086 |
| 1.0 | 5.085 |
| 2.0 | 5.085 |
| 3.0 | 5.085 |
| 4.0 | 5.084 |
| 5.0 | 5.083 |
| 6.0 | 5.083 |
| 7.0 | 5.083 |
| 8.0 | 5.083 |

| | |
|---|---|
| Object | -5V2.5A |

1.Graph




Input Volt. 24V
Load 100%

2.Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | -5.075 |
| 0.5 | -5.093 |
| 1.0 | -5.094 |
| 2.0 | -5.094 |
| 3.0 | -5.094 |
| 4.0 | -5.094 |
| 5.0 | -5.096 |
| 6.0 | -5.095 |
| 7.0 | -5.096 |
| 8.0 | -5.095 |

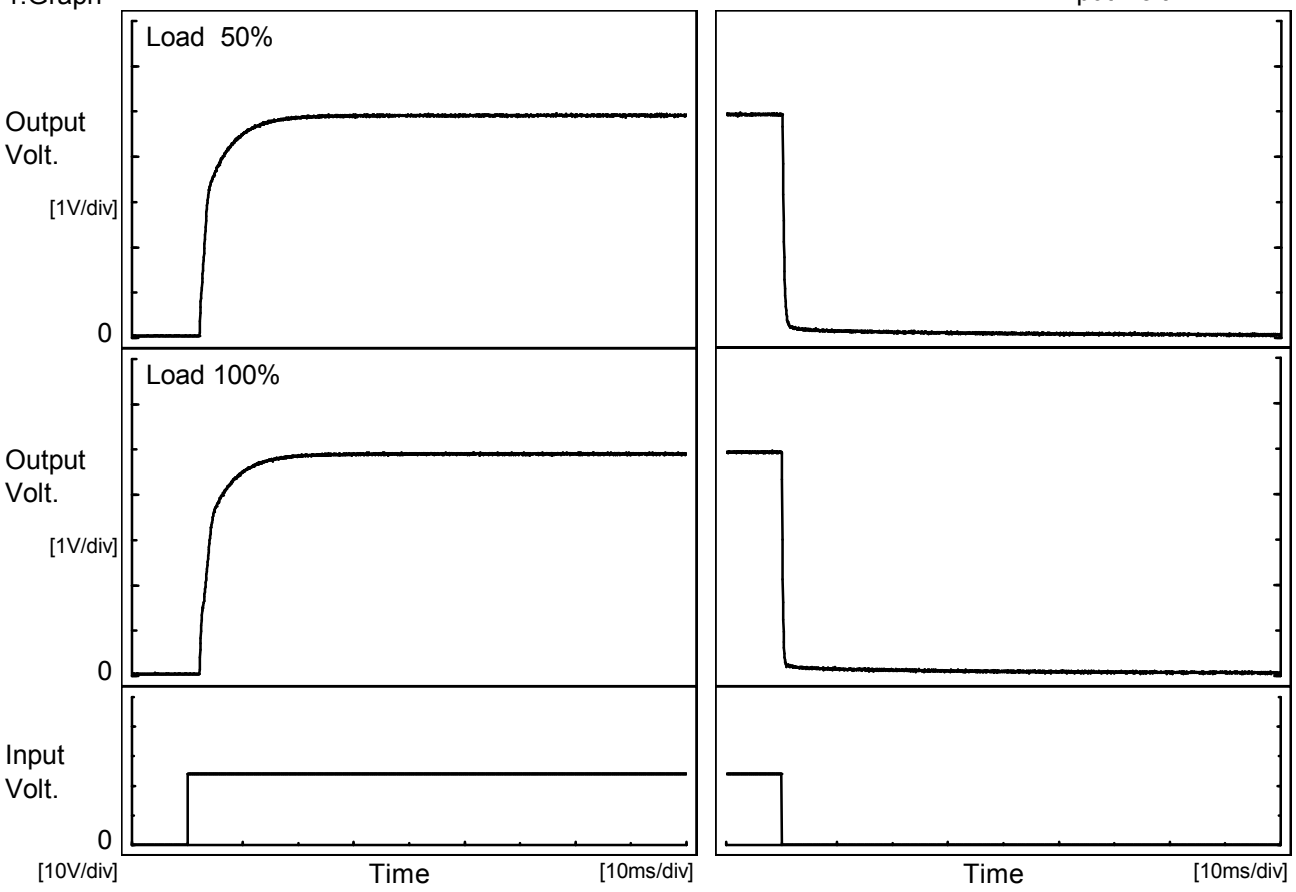
COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Rise and Fall Time |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph

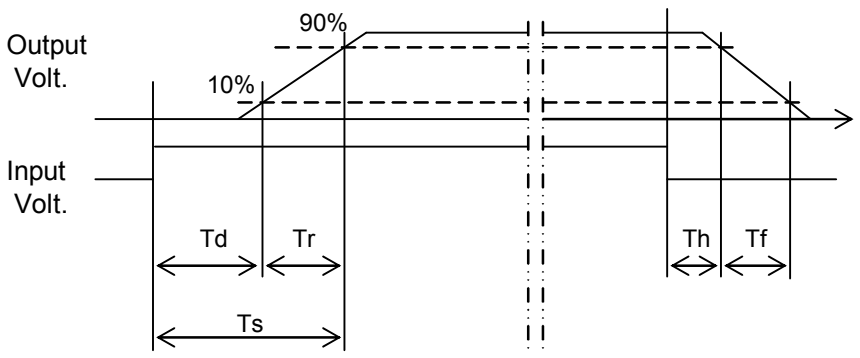
Input Volt. 24 V




2.Values

[ms]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 2.3 | 8.2 | 10.5 | 0.1 | 0.6 |
| 100 % | 2.3 | 8.0 | 10.3 | 0.1 | 0.4 |

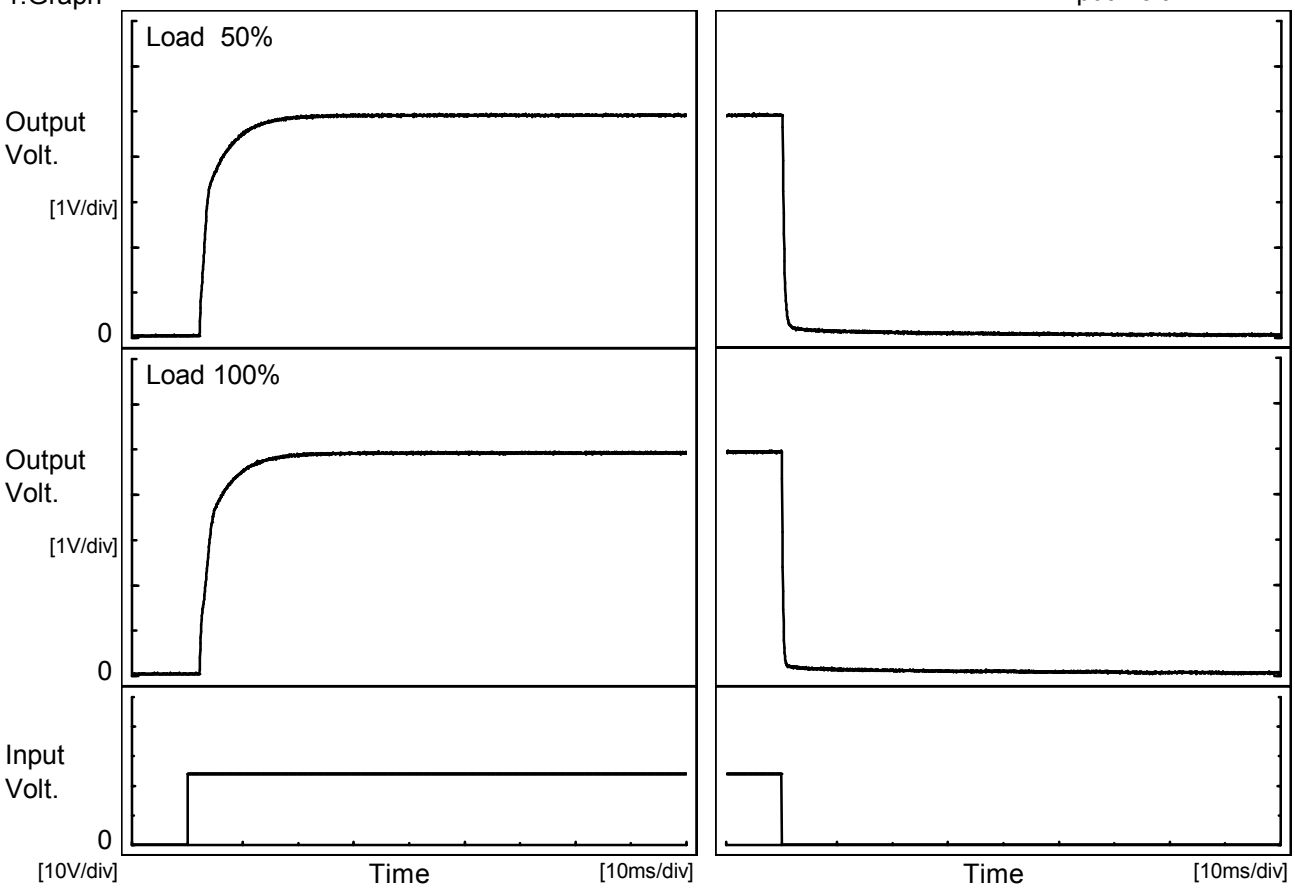


COSEL

| | | |
|---|---|---|
| Model | MGW302405 | |
| Item | Rise and Fall Time | Temperature 25°C<br>Testing Circuitry Figure A |
| Object | -5V2.5A | |

1.Graph

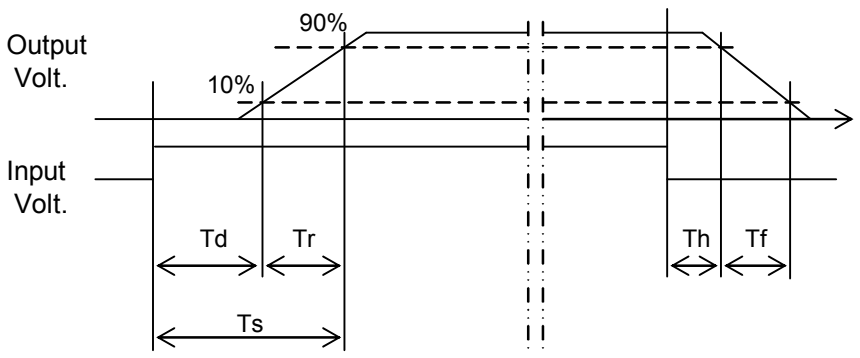
Input Volt. 24 V




2.Values

[ms]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 2.3 | 7.9 | 10.2 | 0.1 | 0.8 |
| 100 % | 2.3 | 7.8 | 10.1 | 0.1 | 0.5 |

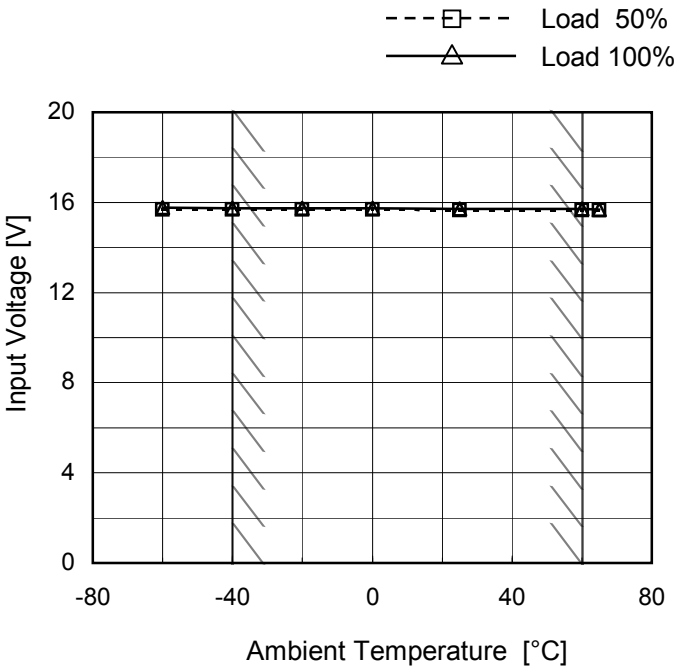


COSEL

| Model | MGW302405 |
|---|---|
| Item | Minimum Input Voltage for Regulated Output Voltage |
| Object | +5V2.5A |

Testing Circuitry Figure A

1.Graph

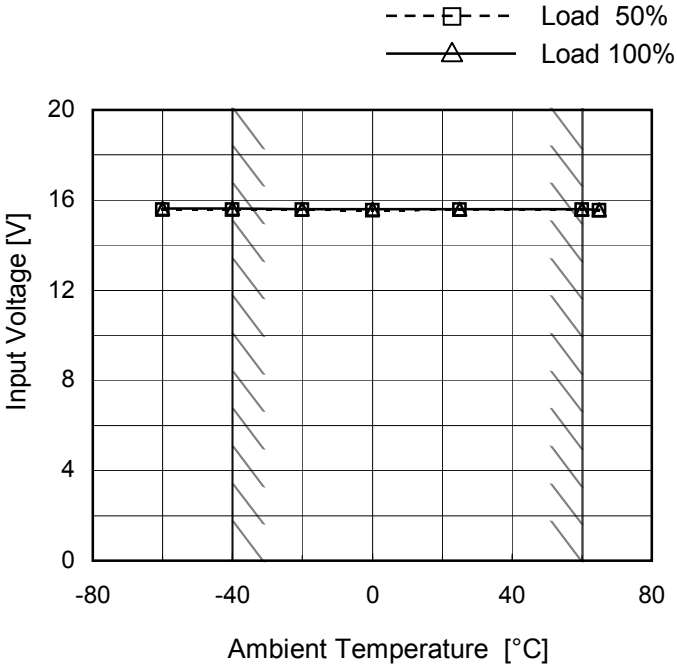



2.Values

| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 15.7 | 15.8 |
| -40 | 15.7 | 15.8 |
| -20 | 15.7 | 15.8 |
| 0 | 15.7 | 15.8 |
| 25 | 15.7 | 15.8 |
| 60 | 15.7 | 15.8 |
| 65 | 15.7 | 15.7 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

| Object | -5V2.5A |
|---|---|

1.Graph




2.Values

| Ambient Temperature [°C] | Input Voltage [V] | |
|---|---|---|
| | Load 50% | Load 100% |
| -60 | 15.6 | 15.7 |
| -40 | 15.6 | 15.7 |
| -20 | 15.6 | 15.6 |
| 0 | 15.6 | 15.7 |
| 25 | 15.6 | 15.7 |
| 60 | 15.6 | 15.6 |
| 65 | 15.6 | 15.6 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

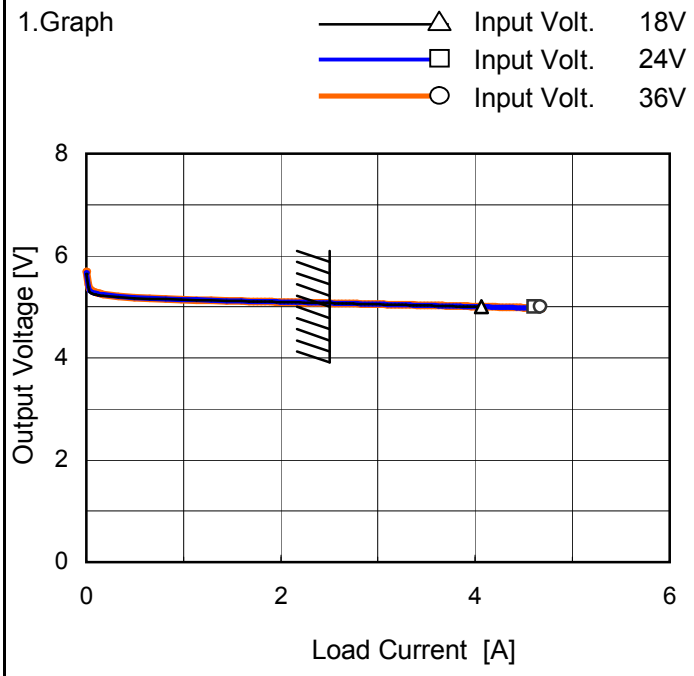
Note: Slanted line shows the range of the rated ambient temperature.

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Overcurrent Protection |
| Object | +5V2.5A |

Temperature 25°C
Testing Circuitry Figure A

1.Graph

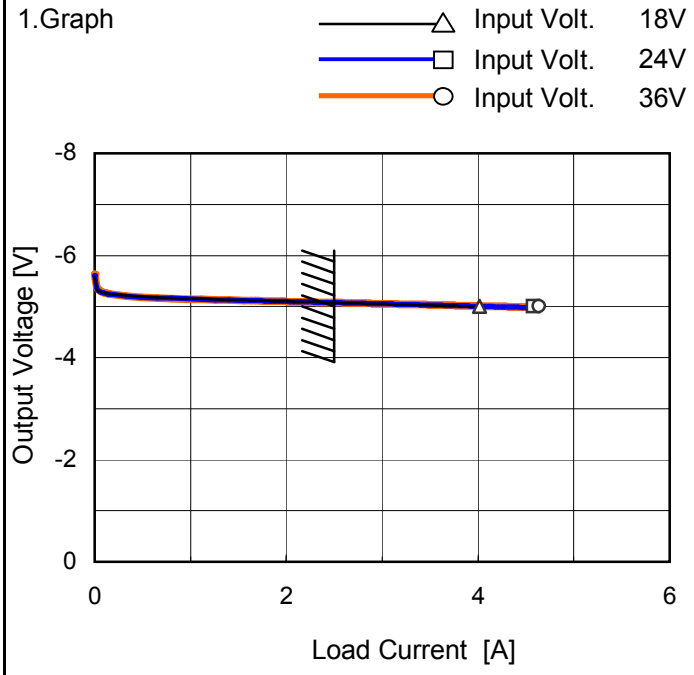



2.Values

| Output Voltage [V] | Load Current [A] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| 5.00 | 4.06 | 4.60 | 4.67 |
| 4.75 | - | - | - |
| 4.50 | - | - | - |
| 4.00 | - | - | - |
| 3.50 | - | - | - |
| 3.00 | - | - | - |
| 2.50 | - | - | - |
| 2.00 | - | - | - |
| 1.50 | - | - | - |
| 1.00 | - | - | - |
| 0.50 | - | - | - |
| 0.00 | - | - | - |

| | |
|---|---|
| Object | -5V2.5A |

1.Graph




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

Intermittent operation occurs when overcurrent protection is activated.

2.Values

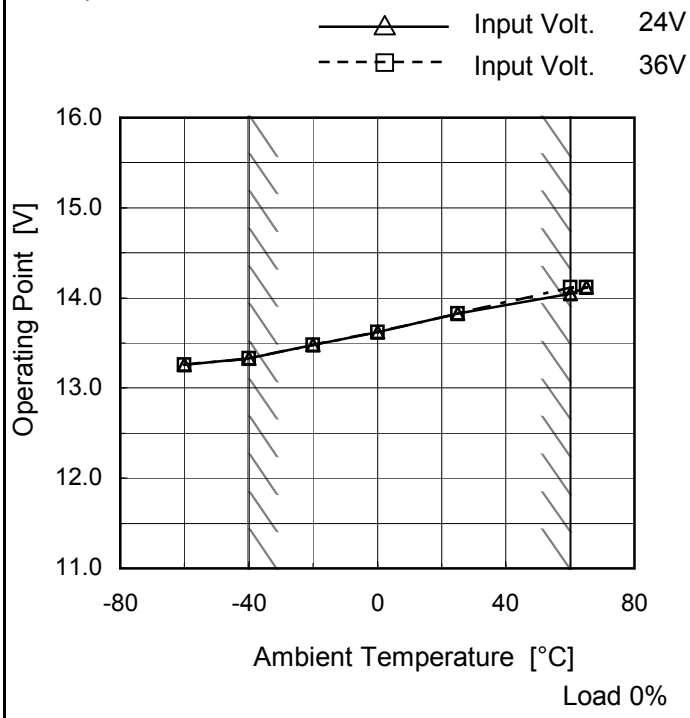
| Output Voltage [V] | Load Current [A] Input Volt. 18[V] | Input Volt. 24[V] | Input Volt. 36[V] |
|---|---|---|---|
| -5.00 | 4.02 | 4.58 | 4.64 |
| -4.75 | - | - | - |
| -4.50 | - | - | - |
| -4.00 | - | - | - |
| -3.50 | - | - | - |
| -3.00 | - | - | - |
| -2.50 | - | - | - |
| -2.00 | - | - | - |
| -1.50 | - | - | - |
| -1.00 | - | - | - |
| -0.50 | - | - | - |
| 0.00 | - | - | - |

COSEL

| | |
|---|---|
| Model | MGW302405 |
| Item | Overvoltage Protection |
| Object | +10V2.5A |

Testing Circuitry Figure A

1.Graph




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

Measured as a single output(+10V).

2.Values

| Ambient Temperature [°C] | Operating Point [V] | |
|---|---|---|
| | Input Volt. 24[V] | Input Volt. 36[V] |
| -60 | 13.26 | 13.26 |
| -40 | 13.33 | 13.33 |
| -20 | 13.48 | 13.48 |
| 0 | 13.62 | 13.62 |
| 25 | 13.83 | 13.83 |
| 60 | 14.05 | 14.12 |
| 65 | 14.12 | 14.12 |
| -- | - | - |
| -- | - | - |
| -- | - | - |
| -- | - | - |

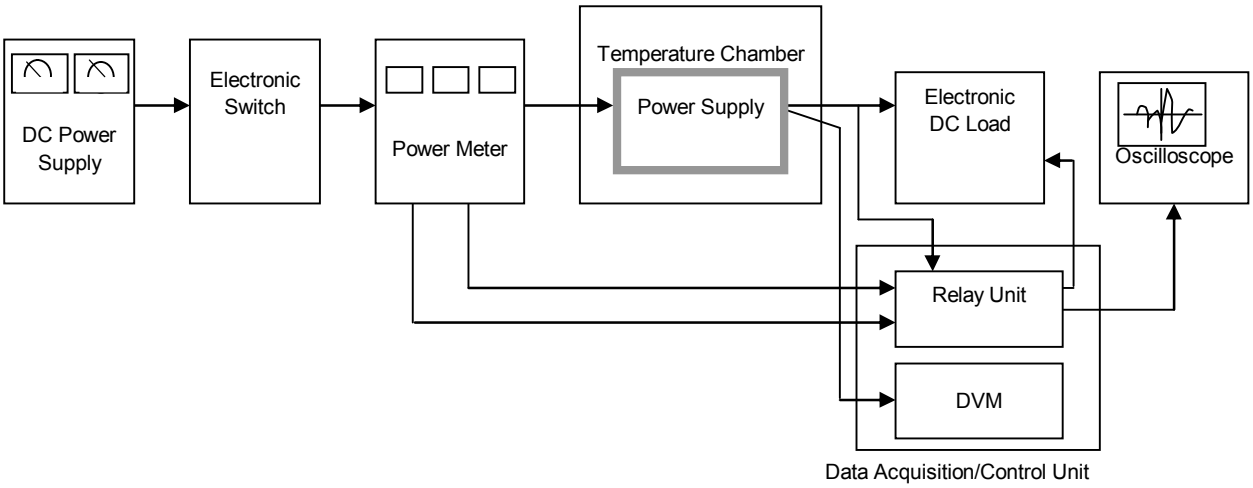



Figure A

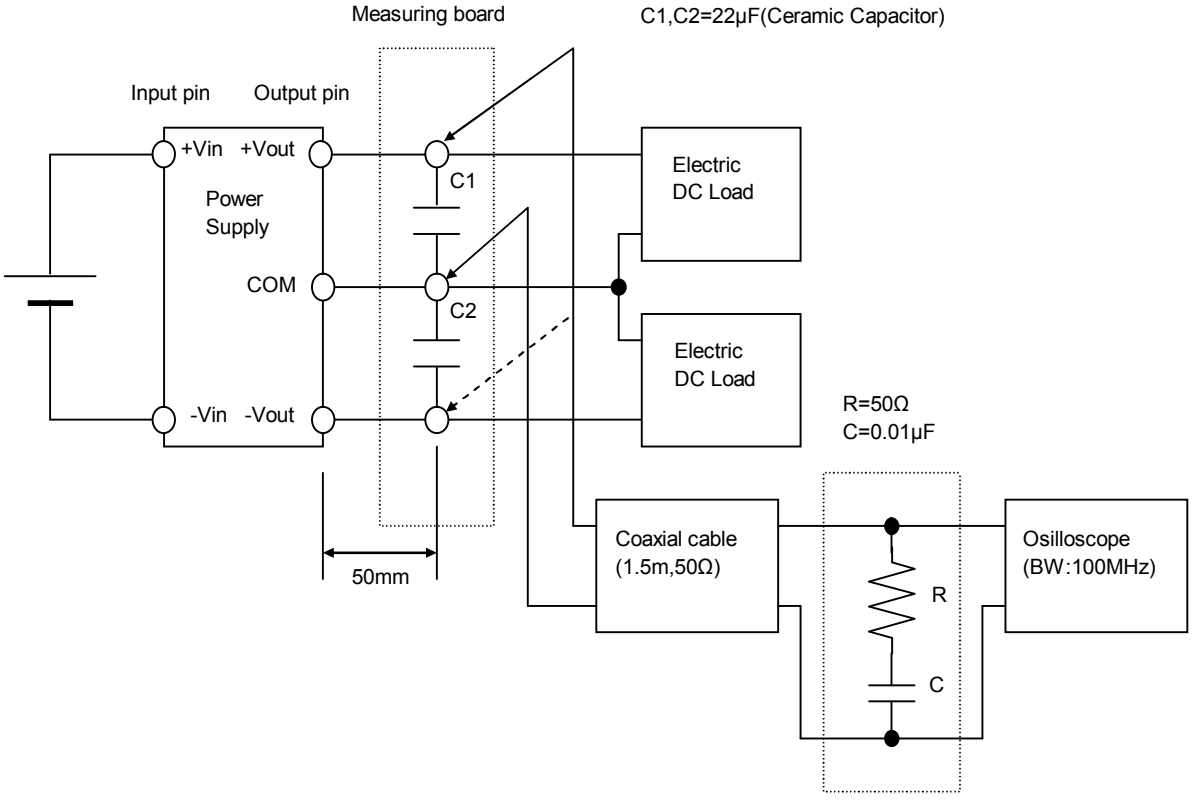



Figure B（Ripple and Ripple noise Characteristic）