COSEL

参考資料

TEST DATA OF MGW100512

Regulated DC Power Supply
November 4, 2016

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Takaaki Sekiguchi
Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

参考資料

COSEL

CONTENTS

1.Input Current (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Ratio (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Input Power (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Efficiency (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Line Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 6
7.Load Regulation ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 7
8.Dynamic Load Response ・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 8
9.Ripple Voltage (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・ 10
10.Ripple-Noise ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 12
11.Ripple Voltage (by Ambient Temperature) ・・・・・・・・・・・・・・・・・・ 14
12.Ambient Temperature Drift ・・・・・・・・・・・・・・・・・・・・・・・・・・ 15
13.Output Voltage Accuracy ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 16
14.Time Lapse Drift ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 17
15.Rise and Fall Time ・・・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 18
16.Minimum Input Voltage for Regulated Output Voltage ・・・・・・・・・・・・ 20
17.Overcurrent Protection ・・・・・・・・・・・・・・・・・・・・・・・・・・・・ 21
18.Switching Frequency (by Load Current) ・・・・・・・・・・・・・・・・・・・ 22
19.Figure of Testing Circuitry ・・・・・・・・・・・・・・・・・・・・・・・・・・ 23

(Final Page 23)

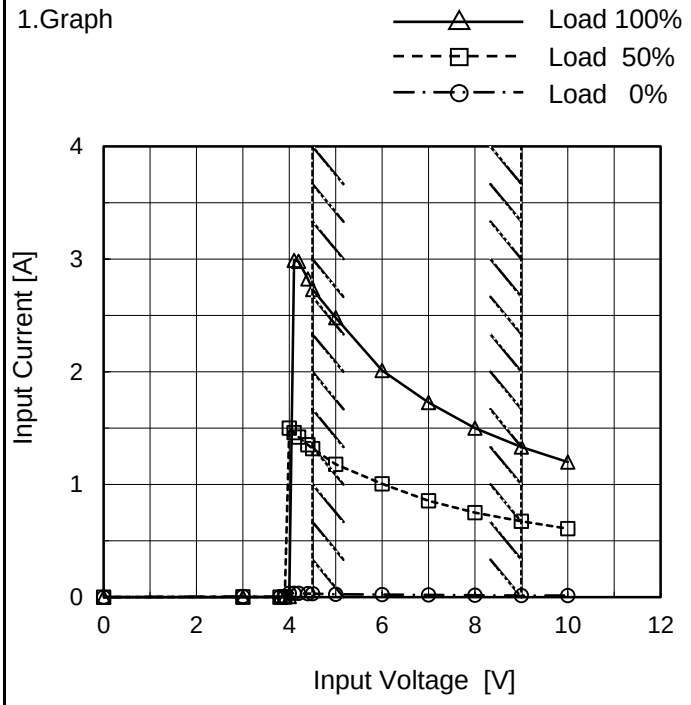
参考資料

COSEL

Model	MGW100512
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
3.0	0.004	0.001	0.000
3.8	0.003	0.001	0.004
3.9	0.002	0.002	0.003
4.0	0.035	1.500	0.004
4.1	0.033	1.459	2.990
4.2	0.033	1.421	2.982
4.4	0.031	1.352	2.825
4.5	0.030	1.319	2.730
5.0	0.026	1.178	2.482
6.0	0.022	1.005	2.013
7.0	0.019	0.854	1.728
8.0	0.016	0.750	1.501
9.0	0.015	0.673	1.333
10.0	0.015	0.606	1.198
--	-	-	-
--	-	-	-
--	-	-	-

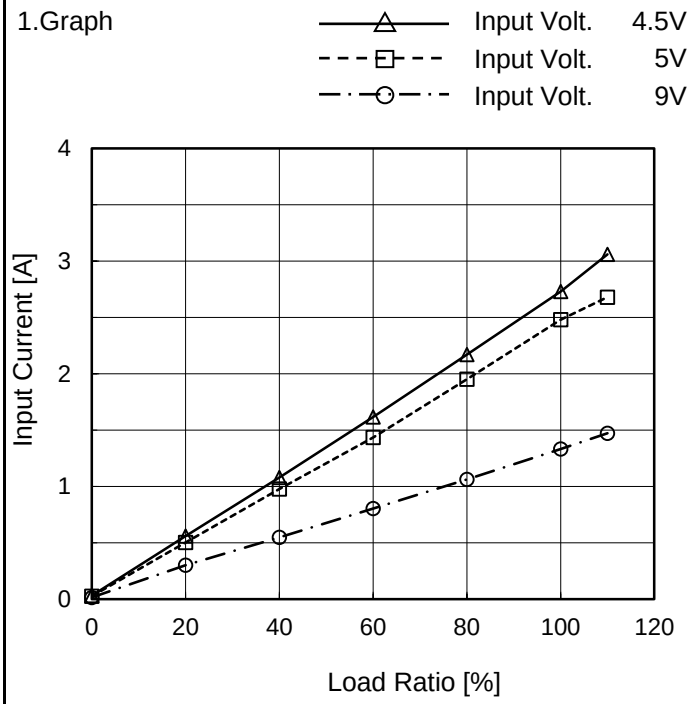
BC-11062

COSEL

Model	MGW100512
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. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.030	0.026	0.015
20	0.558	0.502	0.300
40	1.081	0.977	0.547
60	1.617	1.434	0.803
80	2.171	1.952	1.062
100	2.730	2.482	1.333
110	3.059	2.681	1.473
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

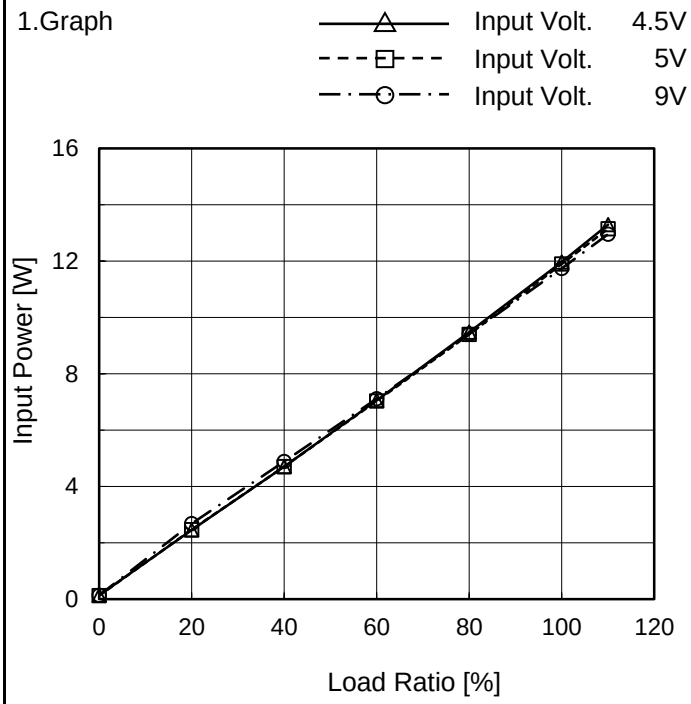
BC-11062

COSEL

Model	MGW100512
Item	Input Power (by Load Ratio)
Object	――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

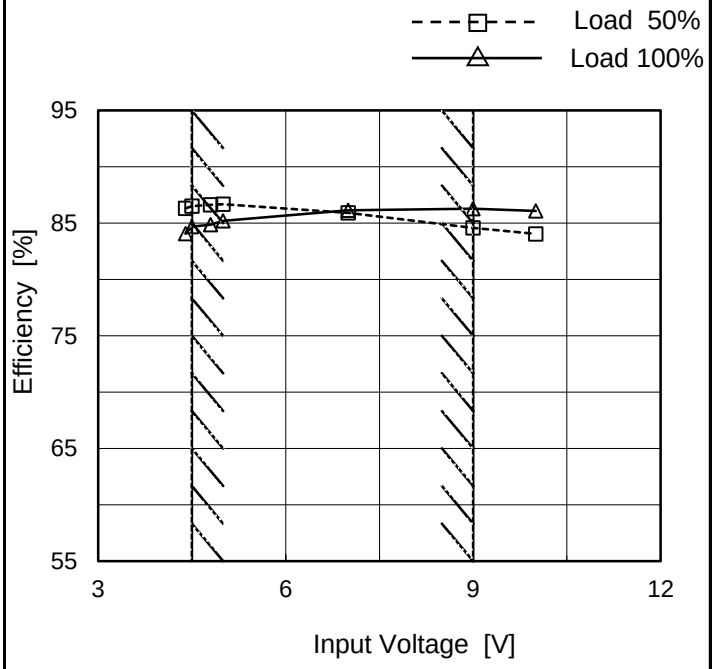
Load Ratio [%]	Input Power [W]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	0.13	0.12	0.14
20	2.46	2.47	2.68
40	4.71	4.70	4.88
60	7.06	7.04	7.12
80	9.47	9.41	9.41
100	11.97	11.90	11.75
110	13.30	13.15	12.96
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW100512
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%
4.4	86.3	84.1
4.5	86.5	84.7
4.8	86.6	84.9
5.0	86.7	85.2
7.0	85.9	86.2
9.0	84.6	86.3
10.0	84.1	86.1
--	-	-
--	-	-

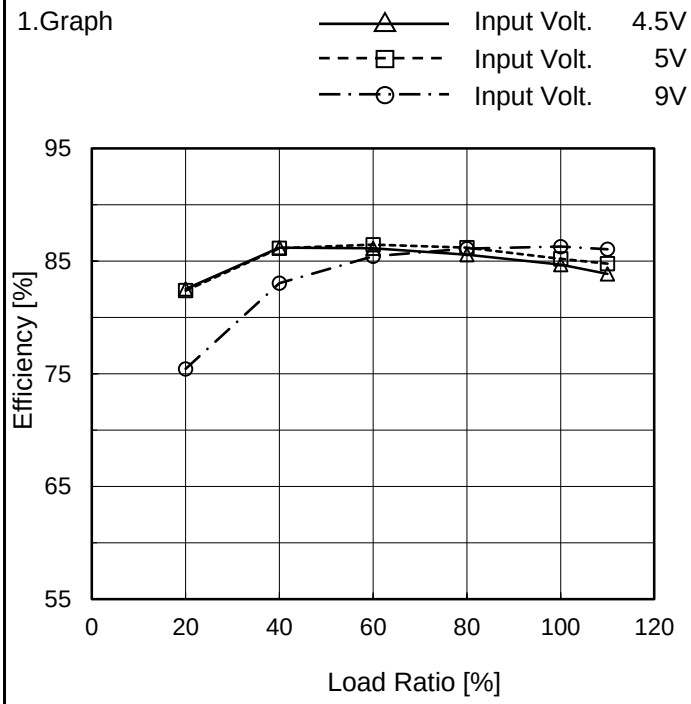
BC-11062

COSEL

Model	MGW100512
Item	Efficiency (by Load Ratio)
Object	――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Efficiency [%]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0	-	-	-
20	82.5	82.4	75.4
40	86.2	86.1	83.0
60	86.1	86.5	85.4
80	85.6	86.2	86.1
100	84.7	85.2	86.3
110	83.9	84.8	86.0
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

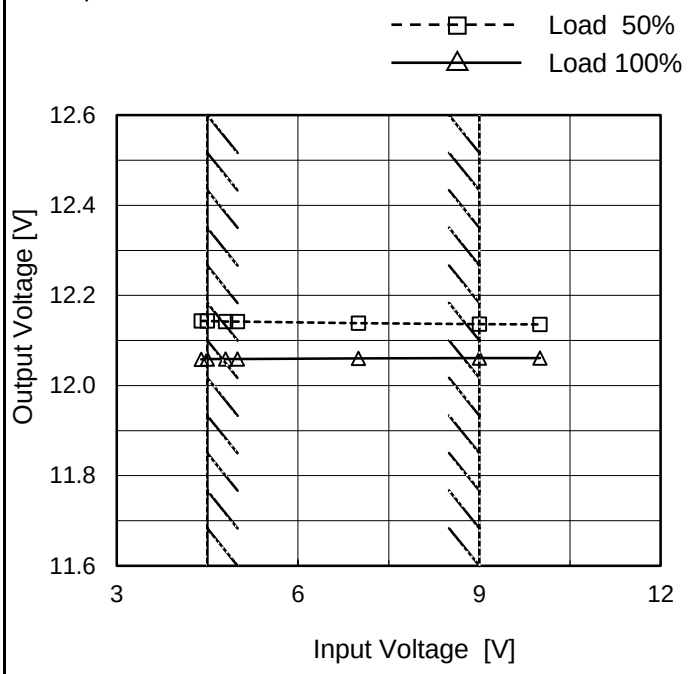
BC-11062

COSEL

Model	MGW100512
Item	Line Regulation
Object	+12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



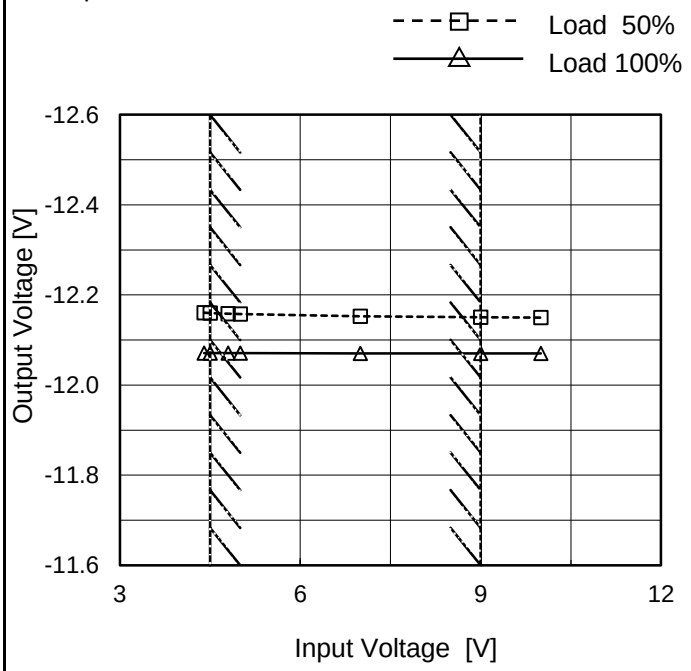
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.4	12.143	12.059
4.5	12.143	12.059
4.8	12.142	12.059
5.0	12.142	12.059
7.0	12.138	12.060
9.0	12.136	12.061
10.0	12.136	12.061
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.42A

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%
4.4	-12.161	-12.071
4.5	-12.160	-12.071
4.8	-12.159	-12.071
5.0	-12.158	-12.071
7.0	-12.153	-12.070
9.0	-12.151	-12.070
10.0	-12.150	-12.070
--	-	-
--	-	-

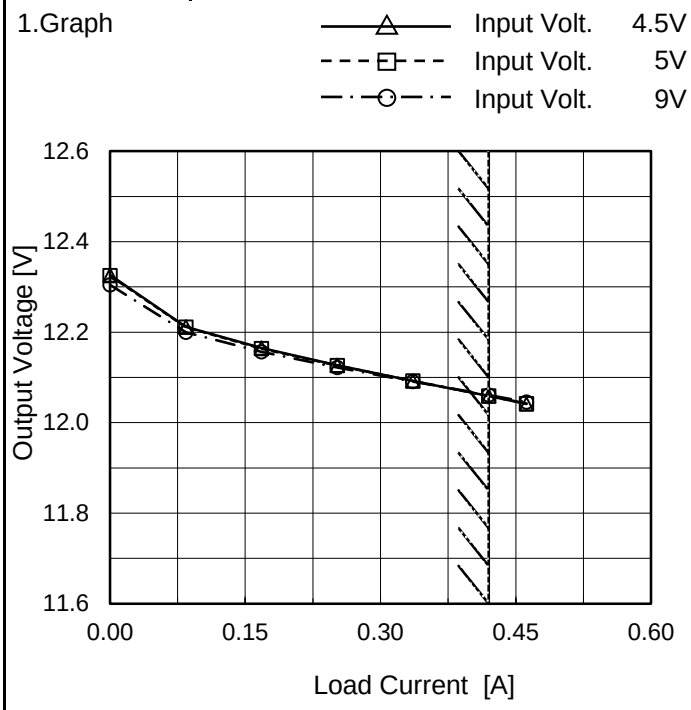
+12V: Rated Load Current

COSEL

Model	MGW100512
Item	Load Regulation
Object	+12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



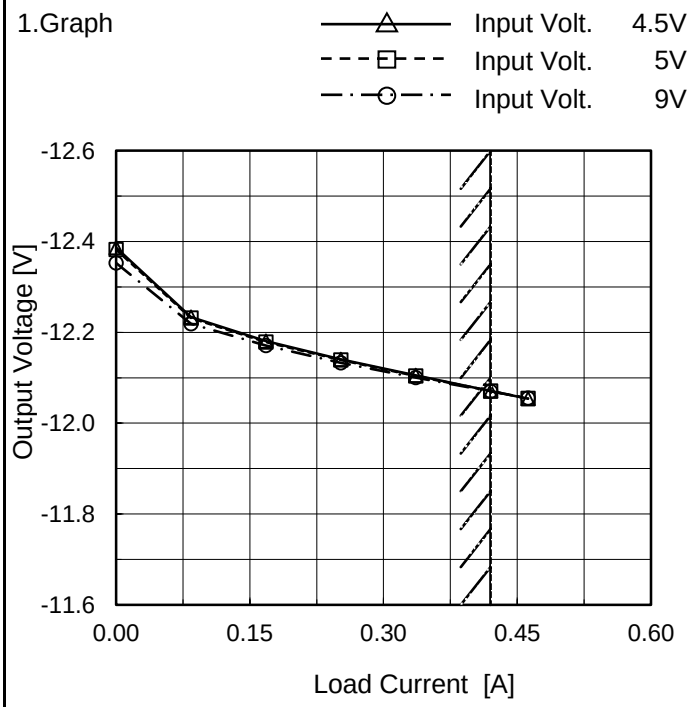
2.Values

Load Current [A]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	12.327	12.325	12.305
0.084	12.212	12.211	12.200
0.168	12.165	12.164	12.157
0.252	12.127	12.126	12.122
0.336	12.092	12.092	12.091
0.420	12.059	12.059	12.061
0.462	12.041	12.042	12.046
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-12V: Rated Load Current

Object	-12V0.42A

1.Graph



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]
0.000	-12.387	-12.382	-12.353
0.084	-12.234	-12.232	-12.219
0.168	-12.181	-12.179	-12.171
0.252	-12.141	-12.139	-12.133
0.336	-12.105	-12.104	-12.101
0.420	-12.071	-12.071	-12.070
0.462	-12.054	-12.054	-12.055
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

COSEL

Model	MGW100512	Temperature 25°C
Item	Dynamic Load Response	Testing Circuitry Figure A
Object	+12V0.42A	

Input Volt. 5 V

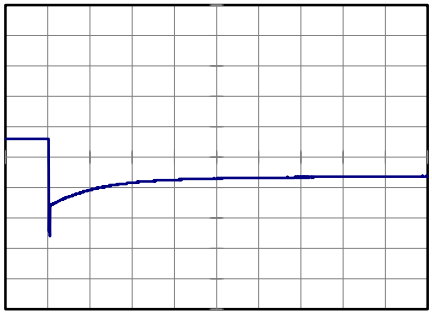
-12V:rated load current.

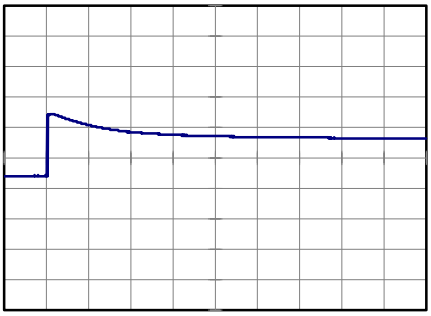
Cycle 100 ms

t1,t2 = 100 μs

Load Current

Min.Load (0A)←→
Load 100% (0.42A)



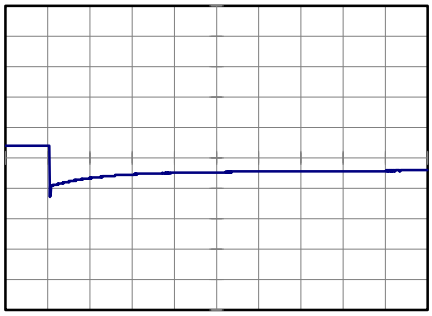


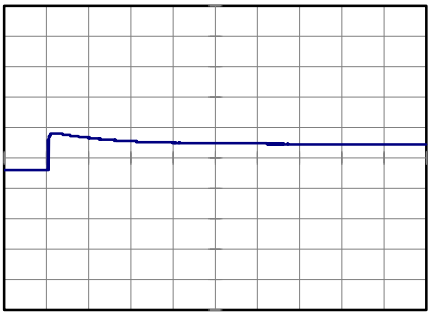
200 mV/div

4 ms/div

4 ms/div

Min.Load (0A)←→
Load 50% (0.21A)



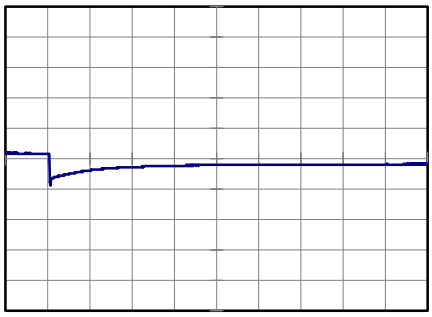


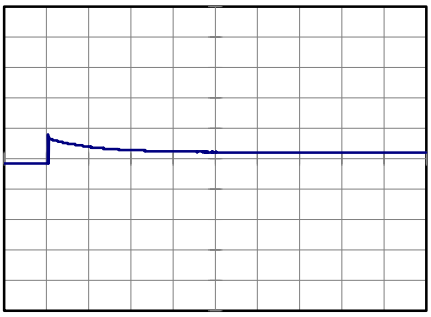
200 mV/div

4 ms/div

4 ms/div

Load 50% (0.21A)←→
Load 100% (0.42A)





200 mV/div

4 ms/div

4 ms/div

COSEL

Model	MGW100512	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	-12V0.42A	

Input Volt. 5 V

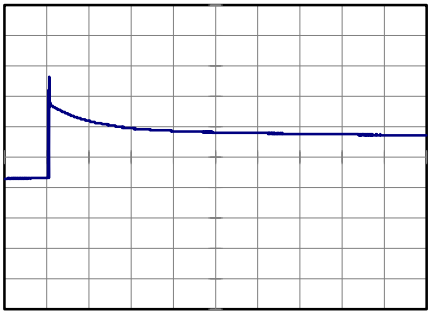
+12V:rated load current.

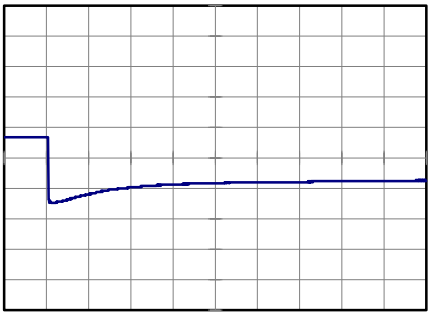
Cycle 100 ms

t1,t2 = 100 μs

Load Current

Min.Load (0A)←→
Load 100% (0.42A)



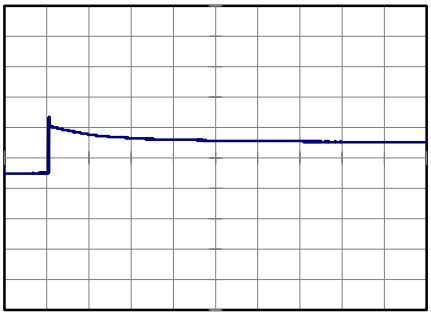


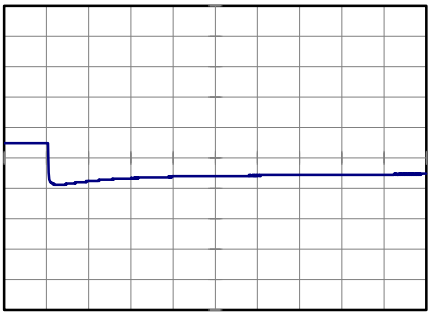
200 mV/div

4 ms/div

4 ms/div

Min.Load (0A)←→
Load 50% (0.21A)



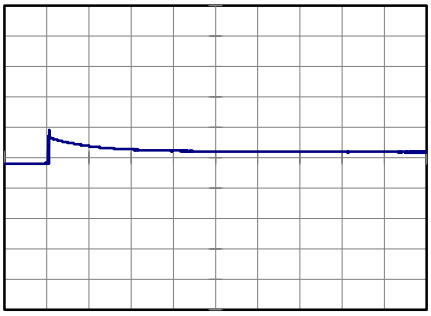


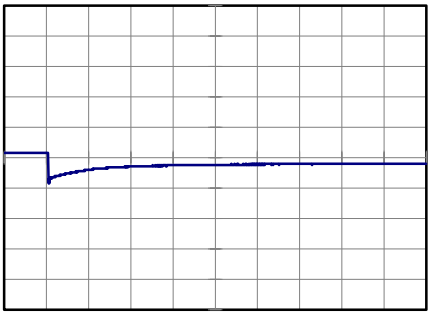
200 mV/div

4 ms/div

4 ms/div

Load 50% (0.21A)←→
Load 100% (0.42A)





200 mV/div

4 ms/div

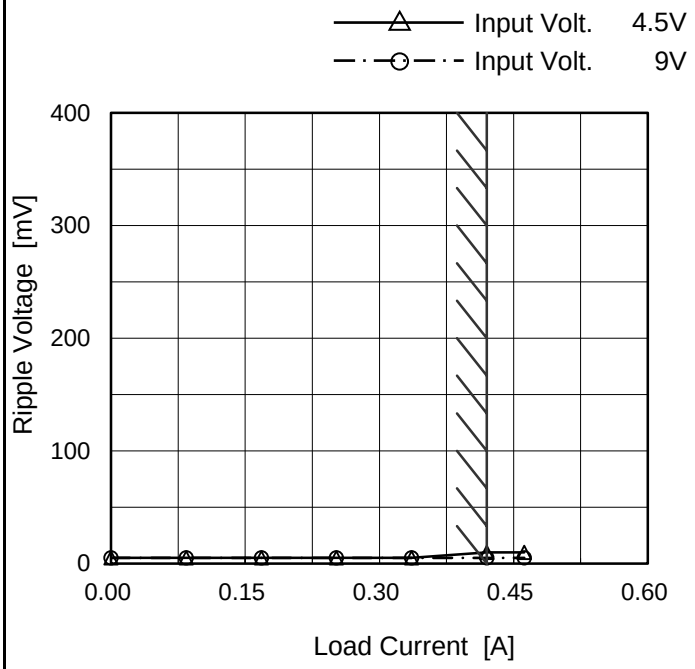
4 ms/div

COSEL

Model	MGW100512
Item	Ripple Voltage (by Load Current)
Object	+12V0.42A

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]

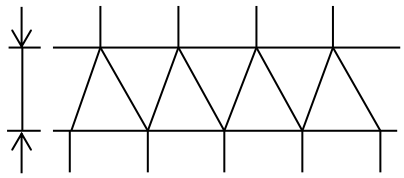


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	5	5
0.084	5	5
0.168	5	5
0.252	5	5
0.336	5	5
0.420	10	5
0.462	10	5
--	-	-
--	-	-
--	-	-
--	-	-

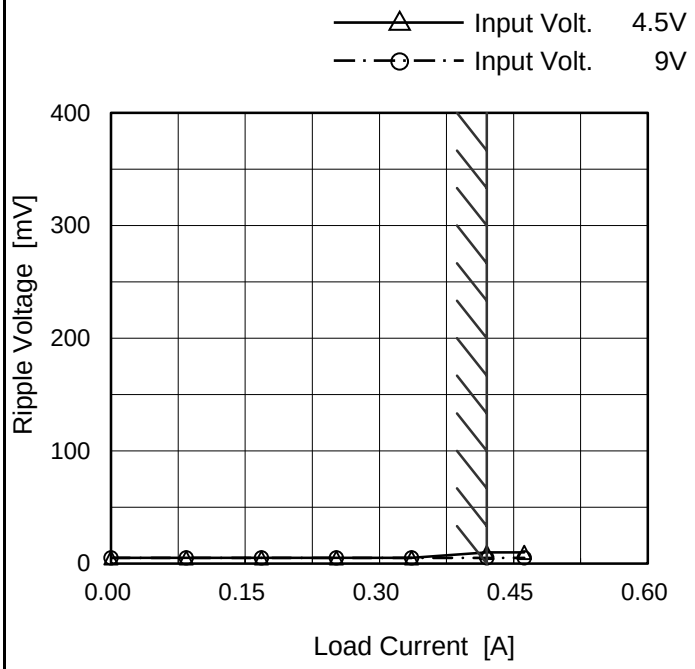
-12V: Rated Load Current

COSEL

Model	MGW100512
Item	Ripple Voltage (by Load Current)
Object	-12V0.42A

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]

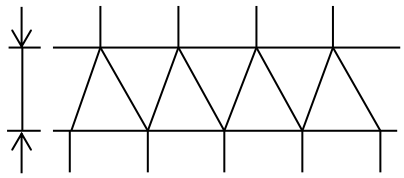


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	5	5
0.084	5	5
0.168	5	5
0.252	5	5
0.336	5	5
0.420	10	5
0.462	10	5
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

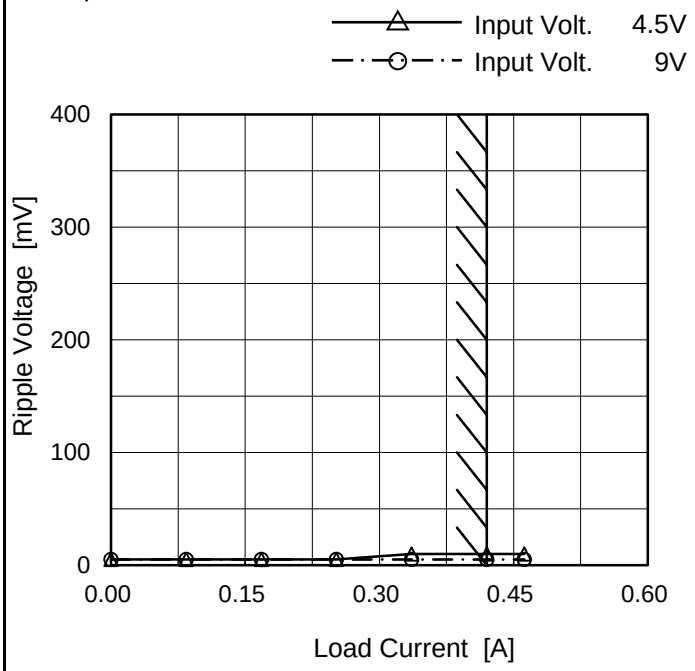
BC-11062

COSEL

Model	MGW100512
Item	Ripple-Noise
Object	+12V0.42A

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]

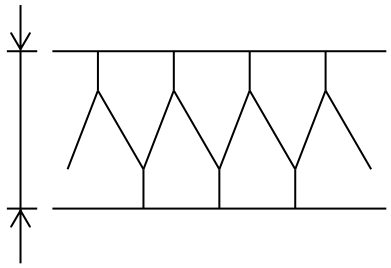


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	5	5
0.084	5	5
0.168	5	5
0.252	5	5
0.336	10	5
0.420	10	5
0.462	10	5
--	-	-
--	-	-
--	-	-
--	-	-

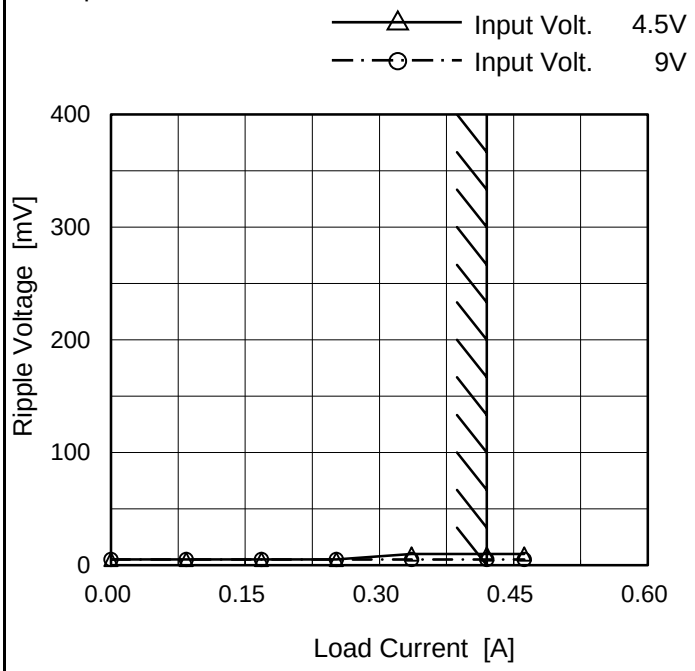
-12V: Rated Load Current

COSEL

Model	MGW100512
Item	Ripple-Noise
Object	-12V0.42A

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]

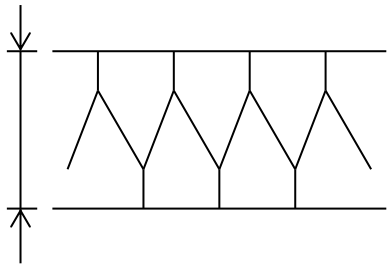


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 9 [V]
0.000	5	5
0.084	5	5
0.168	5	5
0.252	5	5
0.336	10	5
0.420	10	5
0.462	10	5
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

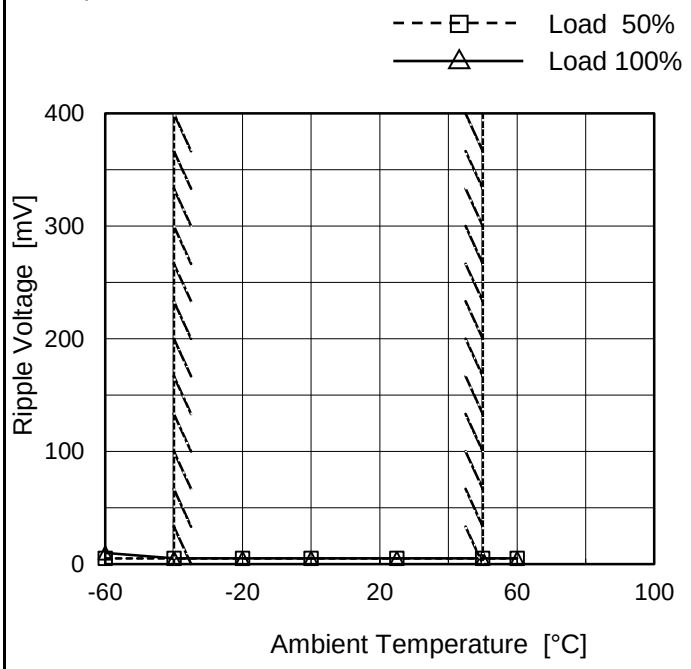
BC-11062

COSEL

Model	MGW100512
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.42A

Testing Circuitry Figure B

1.Graph



Input Volt. 5V

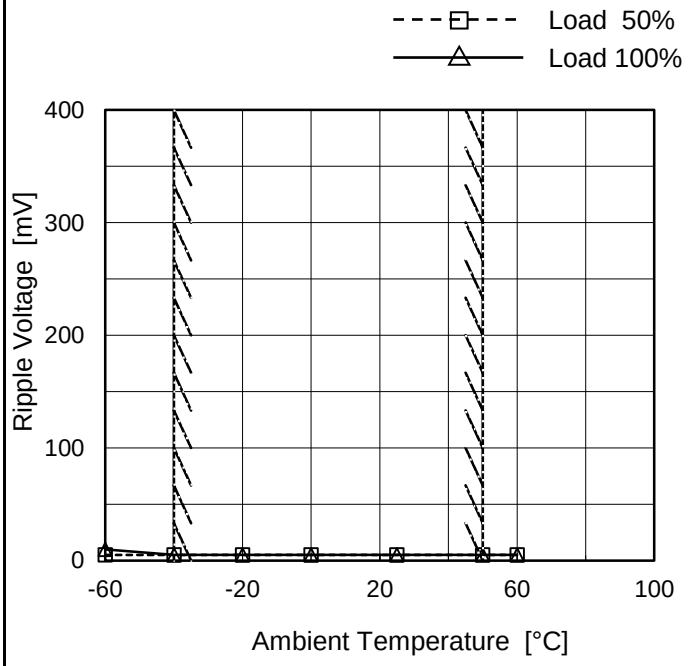
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	5	10
-40	5	5
-20	5	5
0	5	5
25	5	5
50	5	5
60	5	5
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.42A

1.Graph



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	10
-40	5	5
-20	5	5
0	5	5
25	5	5
50	5	5
60	5	5
--	-	-
--	-	-
--	-	-
--	-	-

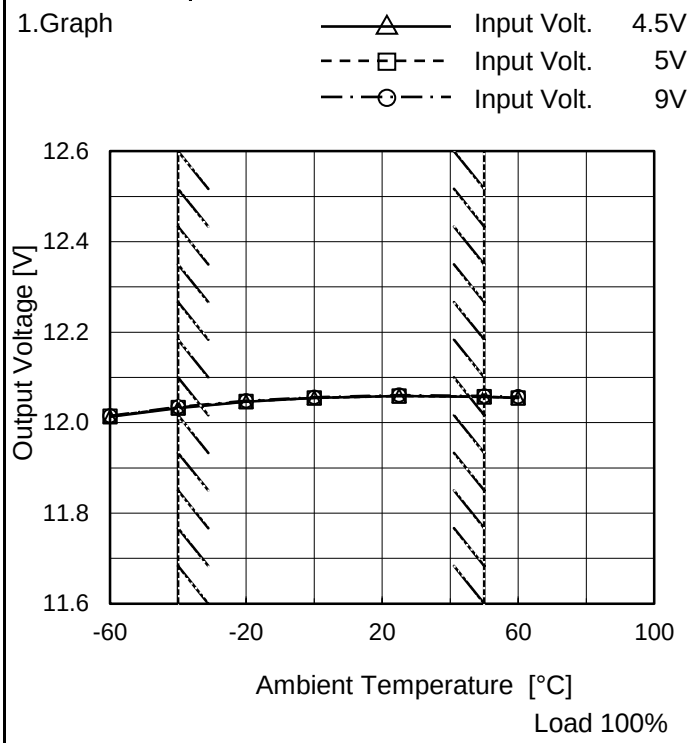
+12V: Rated Load Current

COSEL

Model	MGW100512
Item	Ambient Temperature Drift
Object	+12V0.42A

Testing Circuitry Figure A

1.Graph



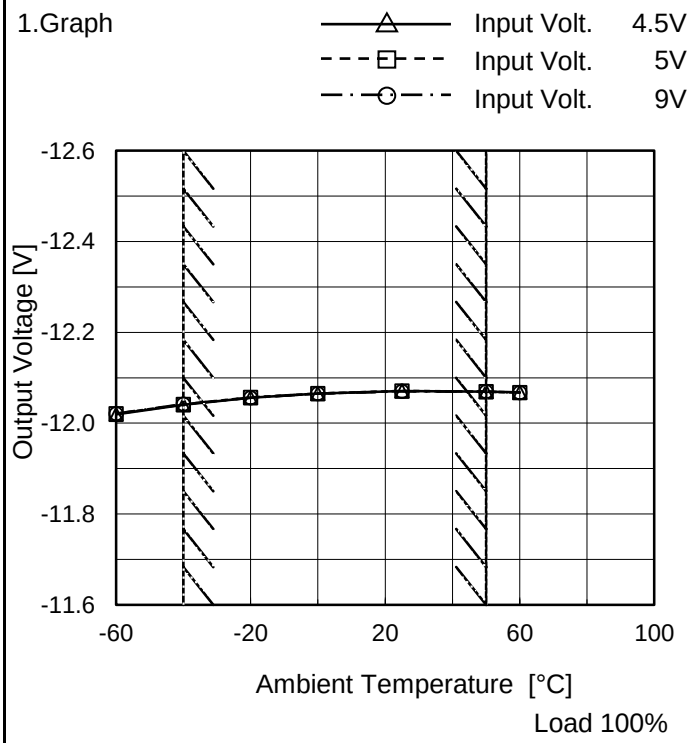
2.Values

Ambient Temperature [°C]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
-60	12.013	12.014	12.015
-40	12.032	12.033	12.035
-20	12.046	12.047	12.048
0	12.055	12.055	12.057
25	12.059	12.059	12.061
50	12.057	12.057	12.059
60	12.055	12.055	12.057
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-12V: Rated Load Current

Object	-12V0.42A

1.Graph



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	-12.019	-12.021	-12.021
-40	-12.041	-12.041	-12.042
-20	-12.056	-12.056	-12.056
0	-12.065	-12.065	-12.065
25	-12.071	-12.071	-12.070
50	-12.070	-12.069	-12.069
60	-12.068	-12.068	-12.068
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

COSEL

Model	MGW100512	
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 - 50°C

Input Voltage : 4.5 - 9V

Load Current (AVR 1) : 0 - 0.42A (AVR 2) : 0 - 0.42A

* 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	+12V0.42A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	4.5	0	12.343	±302	±2.5
Minimum Voltage	50	4.5	0.42	11.739		

Object	-12V0.42A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	4.5	0	-12.398	±302	±2.5
Minimum Voltage	50	4.5	0.42	-11.794		

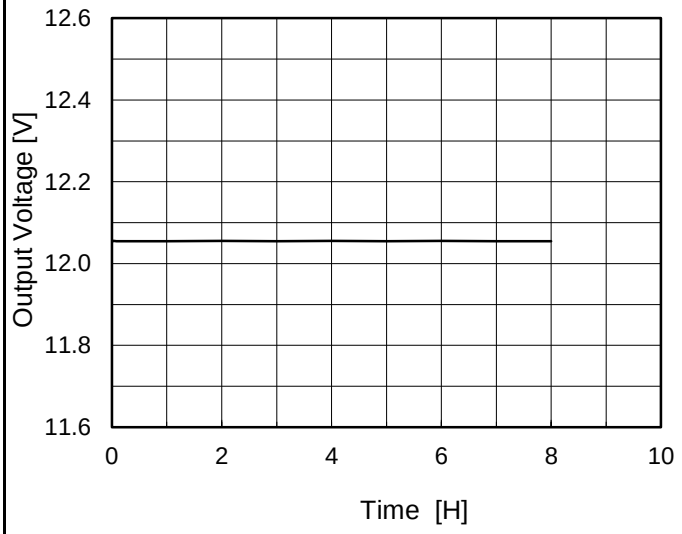
COSEL

Model	MGW100512
Item	Time Lapse Drift

Temperature 25°C
Testing Circuitry Figure A

Object +12V0.42A

1.Graph



Input Volt. 5V
Load 100%

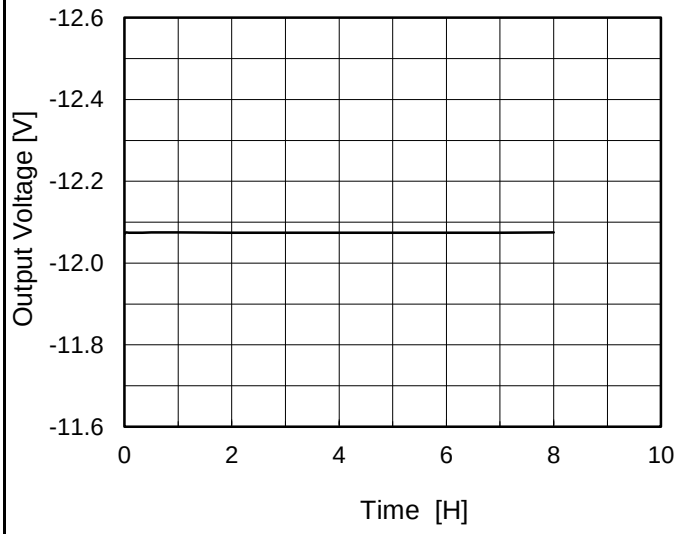
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.054
0.5	12.055
1.0	12.055
2.0	12.055
3.0	12.055
4.0	12.055
5.0	12.055
6.0	12.055
7.0	12.055
8.0	12.055

-12V: Rated Load Current

Object -12V0.42A

1.Graph



Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.072
0.5	-12.075
1.0	-12.075
2.0	-12.074
3.0	-12.074
4.0	-12.074
5.0	-12.074
6.0	-12.074
7.0	-12.074
8.0	-12.075

+12V: Rated Load Current

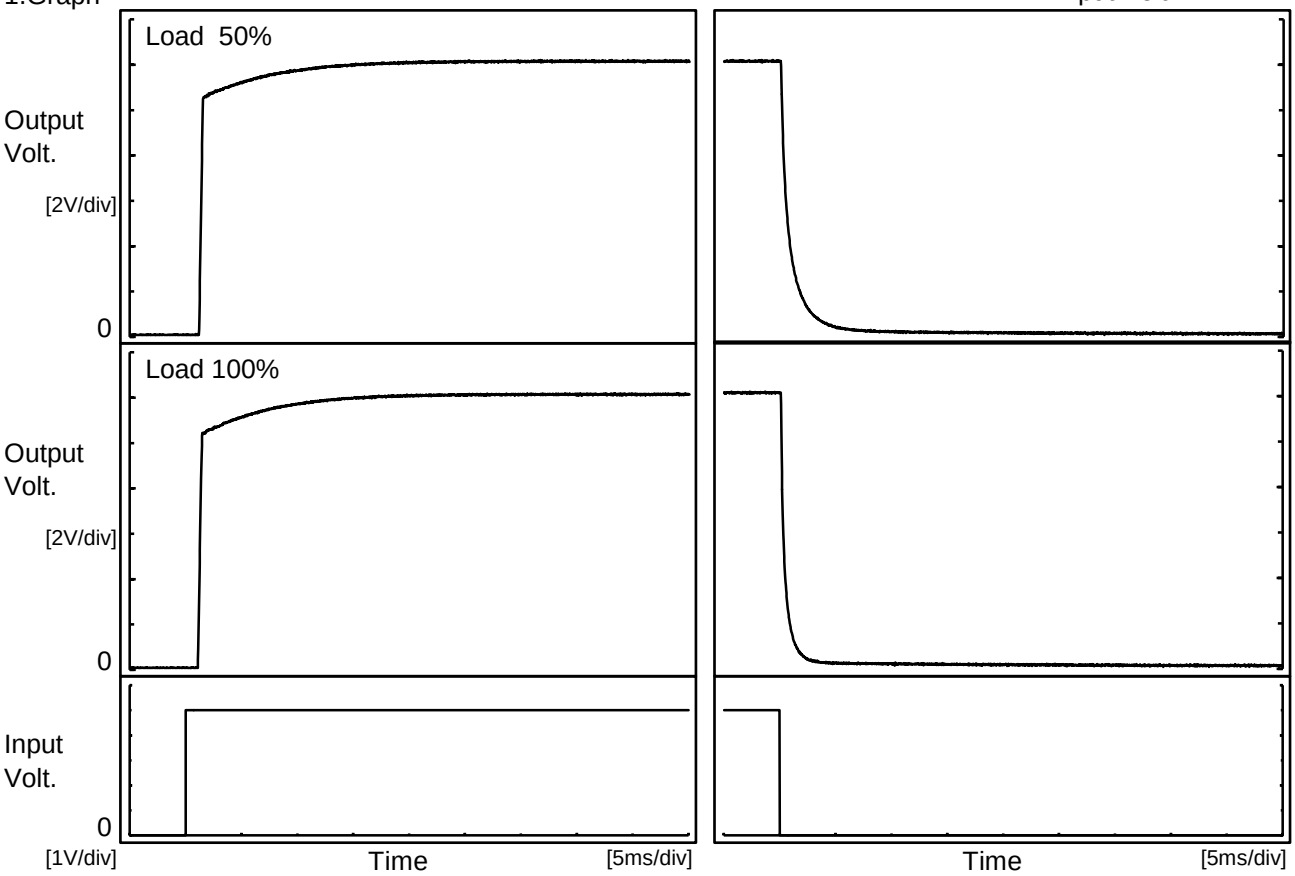
COSEL

Model	MGW100512
Item	Rise and Fall Time
Object	+12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

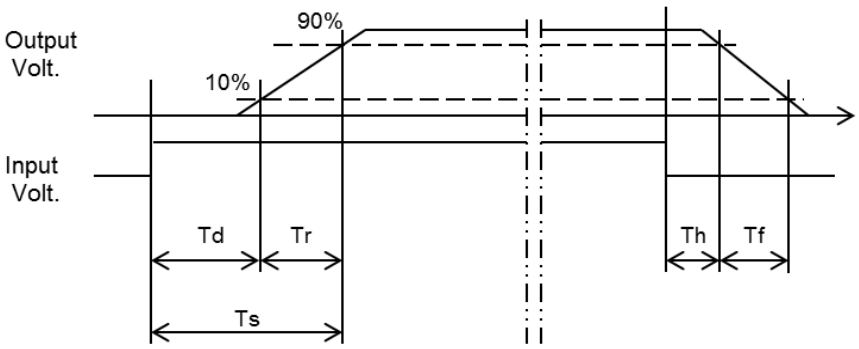
Input Volt. 5 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.3	1.6	2.9	0.2	2.3
100 %	1.2	2.3	3.5	0.1	1.1



BC-11062

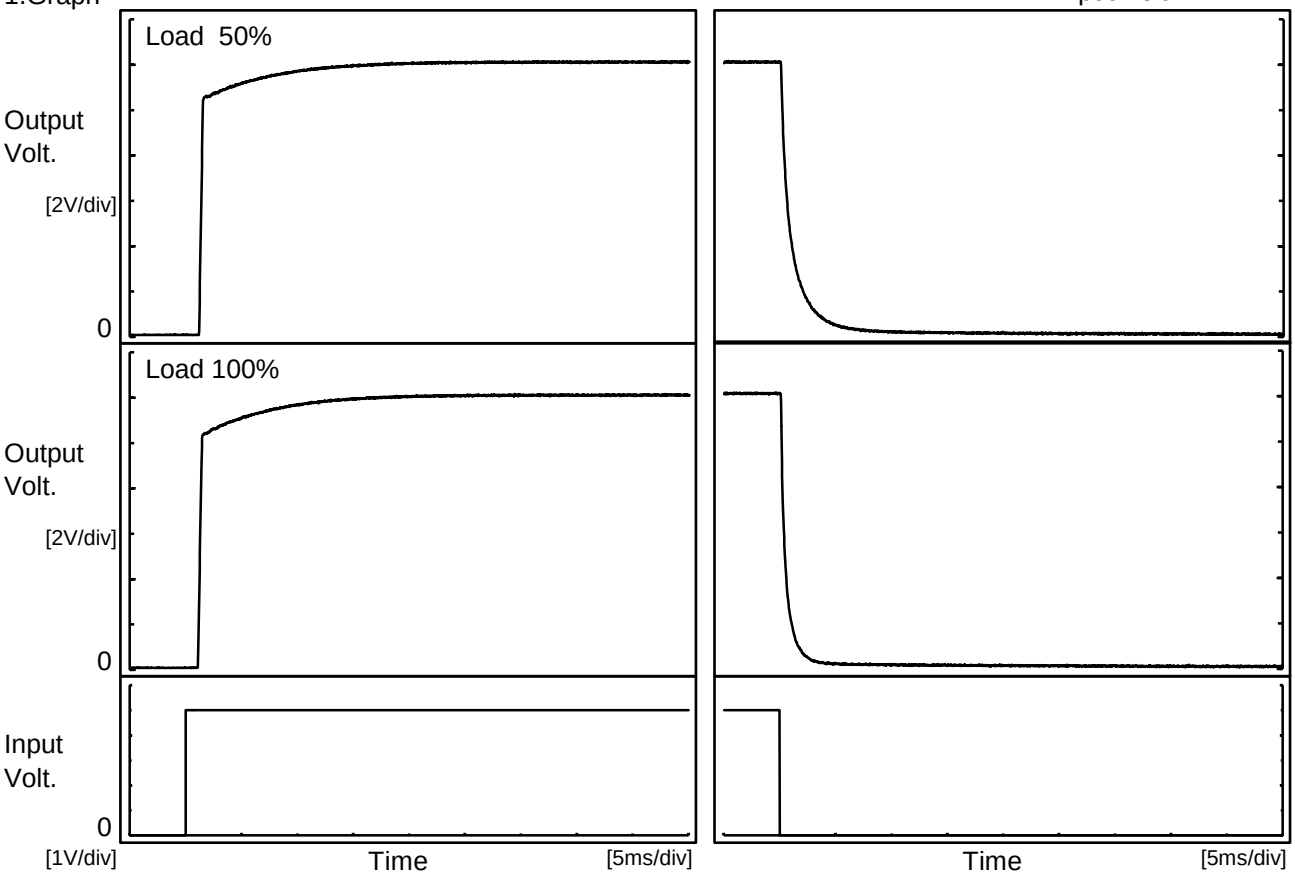
COSEL

Model	MGW100512
Item	Rise and Fall Time
Object	-12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

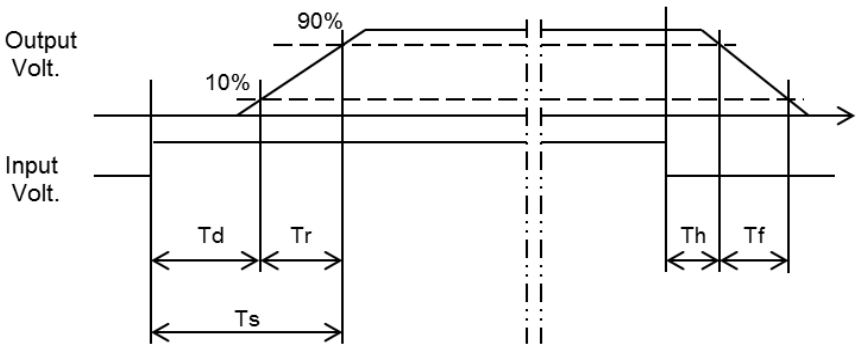
Input Volt. 5 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.3	2.0	3.3	0.2	2.7
100 %	1.2	2.5	3.7	0.1	1.3



BC-11062

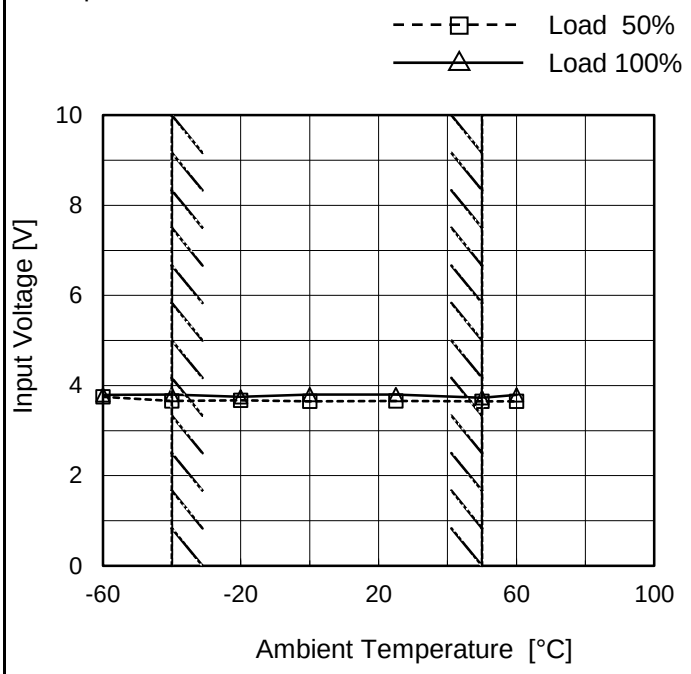
COSEL

Model	MGW100512
Item	Minimum Input Voltage for Regulated Output Voltage

Testing Circuitry Figure A

Object: +12V0.42A

1.Graph

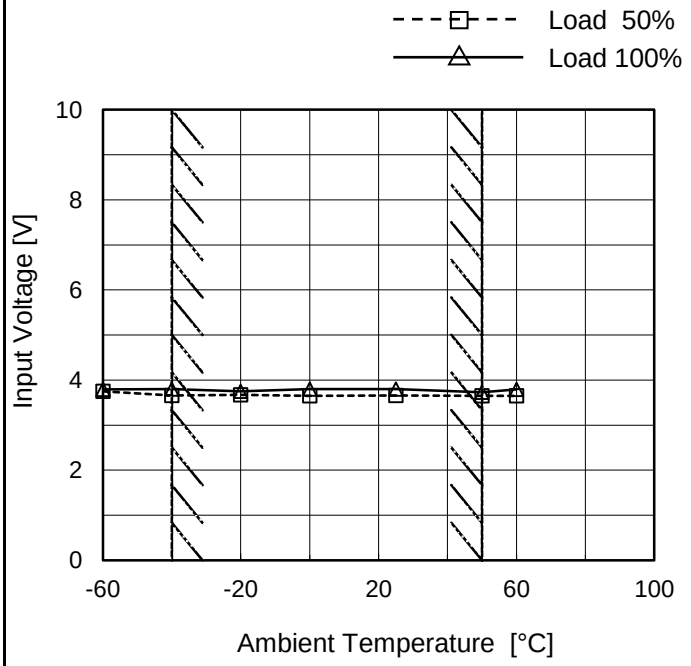


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.8	3.8
-40	3.7	3.8
-20	3.7	3.8
0	3.7	3.8
25	3.7	3.8
50	3.7	3.8
60	3.7	3.8
--	-	-
--	-	-
--	-	-
--	-	-

Object: -12V0.42A

1.Graph



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

2.Values

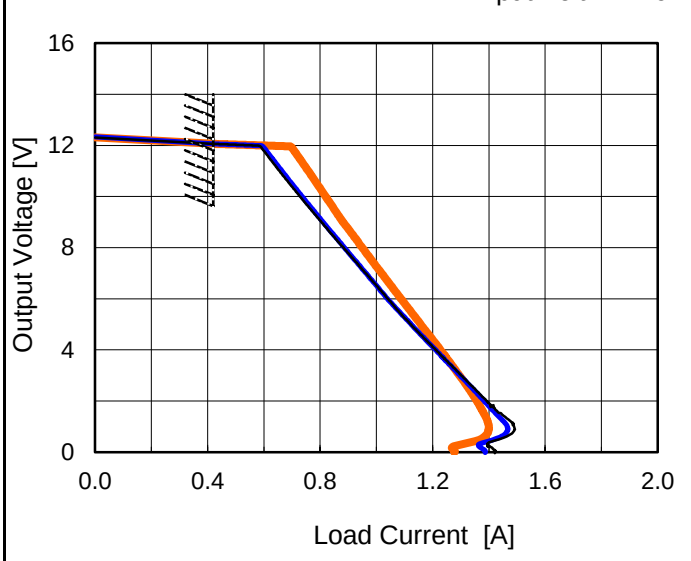
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.8	3.8
-40	3.7	3.8
-20	3.7	3.8
0	3.7	3.8
25	3.7	3.8
50	3.7	3.8
60	3.7	3.8
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGW100512
Item	Overcurrent Protection
Object	+12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



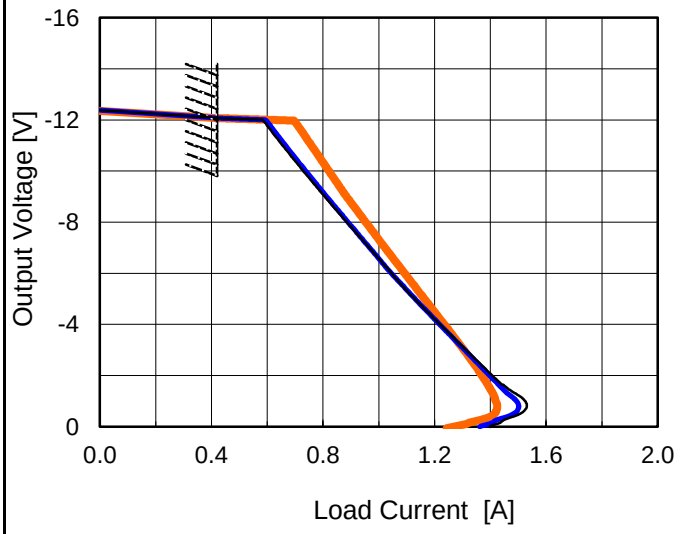
2.Values

Output Voltage [V]	Load Current [A] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
11.4	0.63	0.64	0.73
10.8	0.67	0.68	0.77
9.6	0.76	0.76	0.84
8.4	0.85	0.85	0.92
7.2	0.94	0.95	1.00
6.0	1.04	1.04	1.09
4.8	1.14	1.14	1.17
3.6	1.24	1.24	1.25
2.4	1.36	1.35	1.33
1.2	1.48	1.45	1.40
0.0	1.42	1.39	1.28
--	-	-	-

-12V: Rated Load Current

Object	-12V0.42A

1.Graph



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]
-11.4	0.63	0.64	0.73
-10.8	0.67	0.68	0.77
-9.6	0.76	0.77	0.85
-8.4	0.85	0.86	0.92
-7.2	0.95	0.95	1.01
-6.0	1.04	1.04	1.09
-4.8	1.14	1.15	1.18
-3.6	1.26	1.25	1.26
-2.4	1.37	1.36	1.34
-1.2	1.50	1.47	1.41
0.0	1.40	1.36	1.24
--	-	-	-

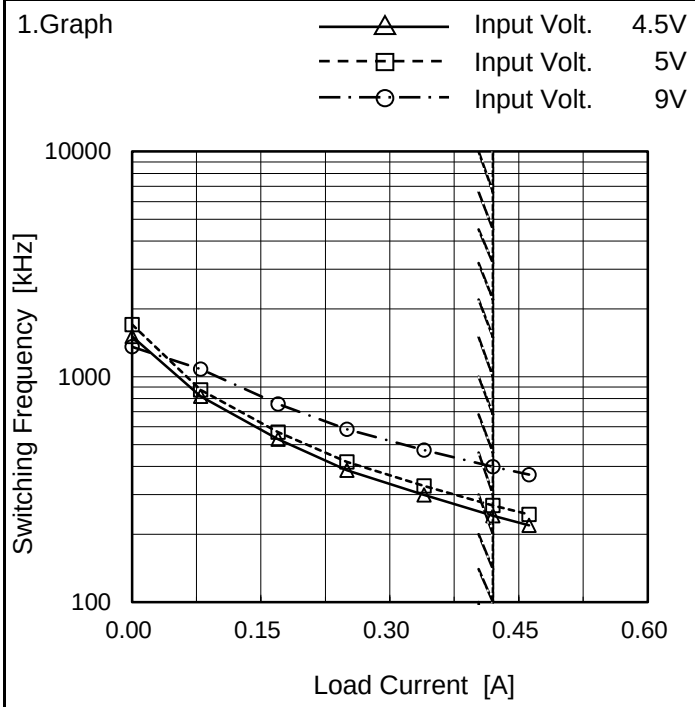
+12V: Rated Load Current

COSEL

Model	MGW100512
Item	Switching Frequency (by Load Current)
Object	+/-12V0.42A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

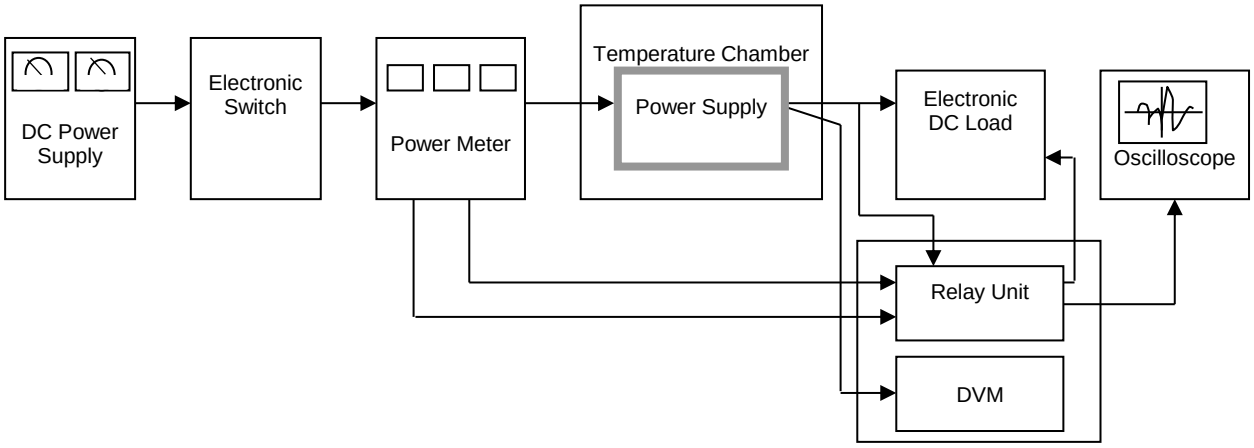


Note: Slanted line shows the range of the rated load current.

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

2.Values

Load Current [A]	Frequency [kHz]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 9[V]
0.000	1510	1708	1359
0.080	821	874	1082
0.170	528	568	758
0.250	385	419	585
0.340	299	328	473
0.420	242	268	398
0.462	219	245	368
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-



Data Acquisition/Control Unit

Figure A

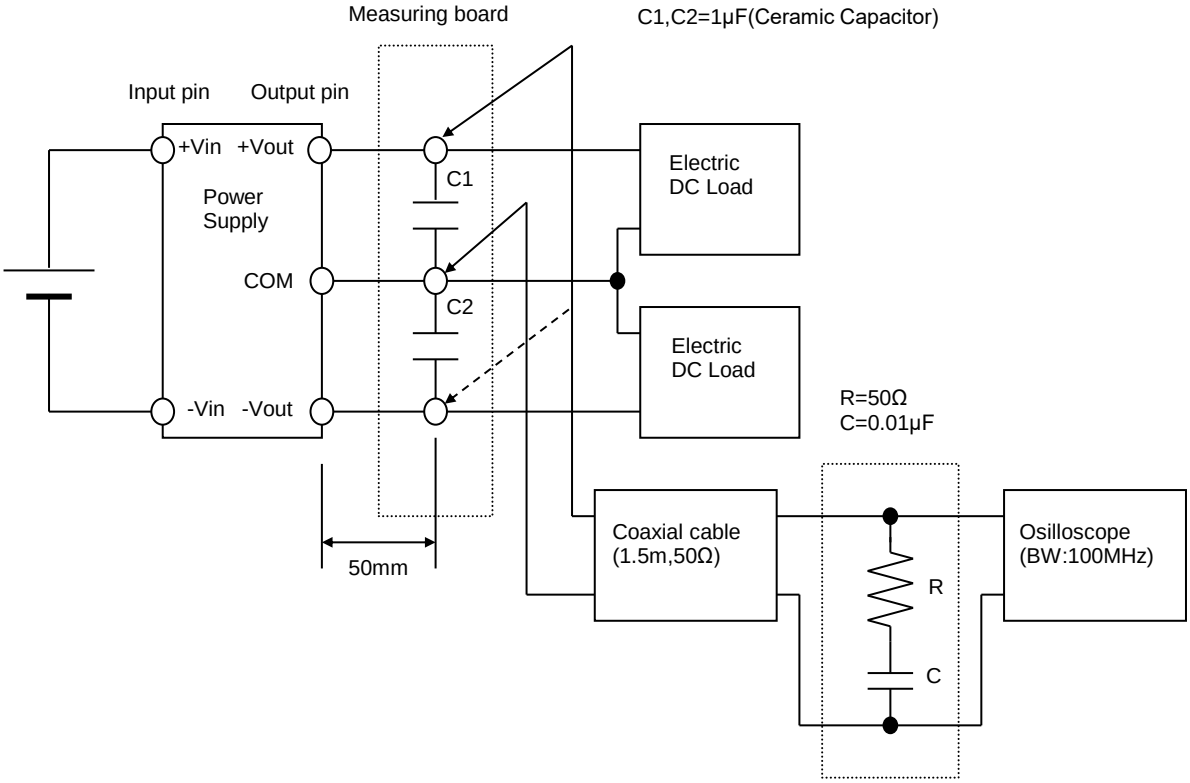


Figure B（Ripple and Ripple noise Characteristic）