参考資料

TEST DATA OF MGW1R52412

Regulated DC Power Supply
October 29, 2016

Approved by : Takayuki Fukuda — Design Manager

Prepared by : Takaaki Sekiguchi — Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

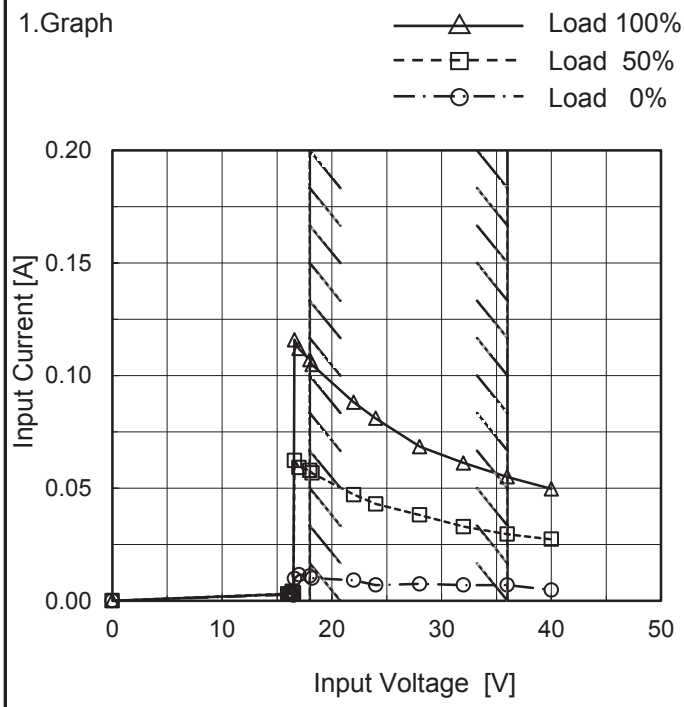
1.Input Current (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Ratio (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Input Power (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Efficiency (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Line 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)

COSEL

Model	MGW1R52412
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

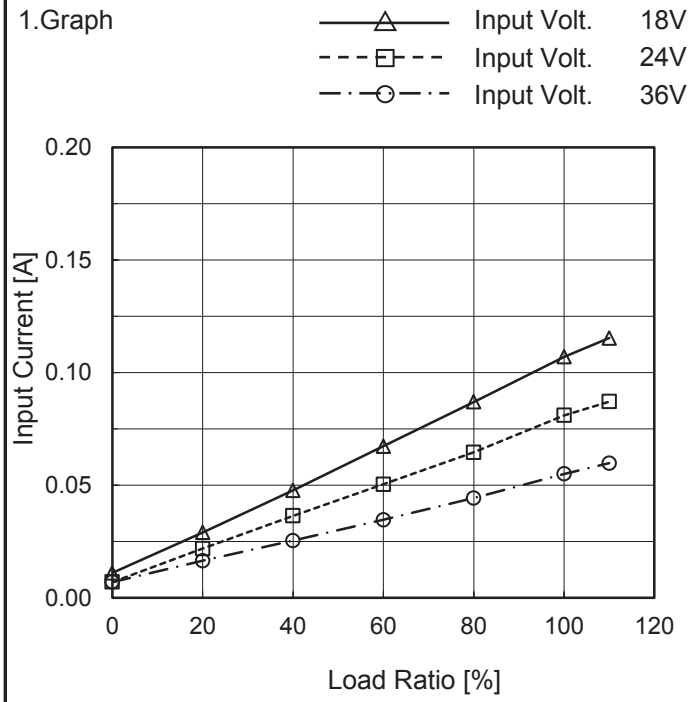
Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
16.0	0.003	0.003	0.003
16.2	0.003	0.003	0.004
16.4	0.003	0.004	0.004
16.5	0.003	0.003	0.005
16.6	0.010	0.062	0.116
17.0	0.012	0.059	0.112
18.0	0.011	0.058	0.107
18.2	0.010	0.057	0.105
22.0	0.009	0.047	0.088
24.0	0.007	0.043	0.081
28.0	0.008	0.038	0.068
32.0	0.007	0.033	0.061
36.0	0.007	0.030	0.055
40.0	0.005	0.027	0.050
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW1R52412
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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.011	0.007	0.007
20	0.029	0.022	0.016
40	0.048	0.036	0.025
60	0.067	0.050	0.035
80	0.087	0.065	0.044
100	0.107	0.081	0.055
110	0.115	0.087	0.060
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

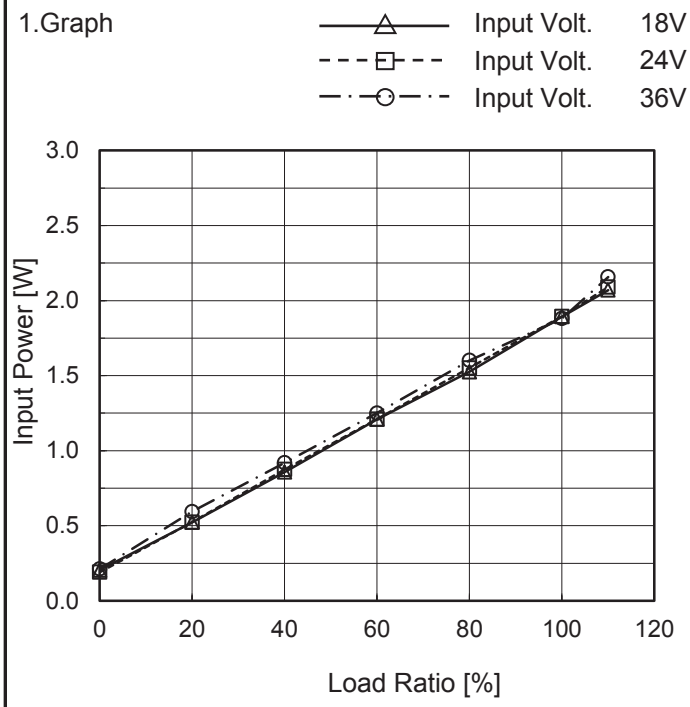
BC-10958

COSEL

Model	MGW1R52412
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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.20	0.19	0.21
20	0.52	0.52	0.59
40	0.86	0.87	0.92
60	1.21	1.21	1.25
80	1.53	1.55	1.60
100	1.89	1.89	1.88
110	2.07	2.09	2.16
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

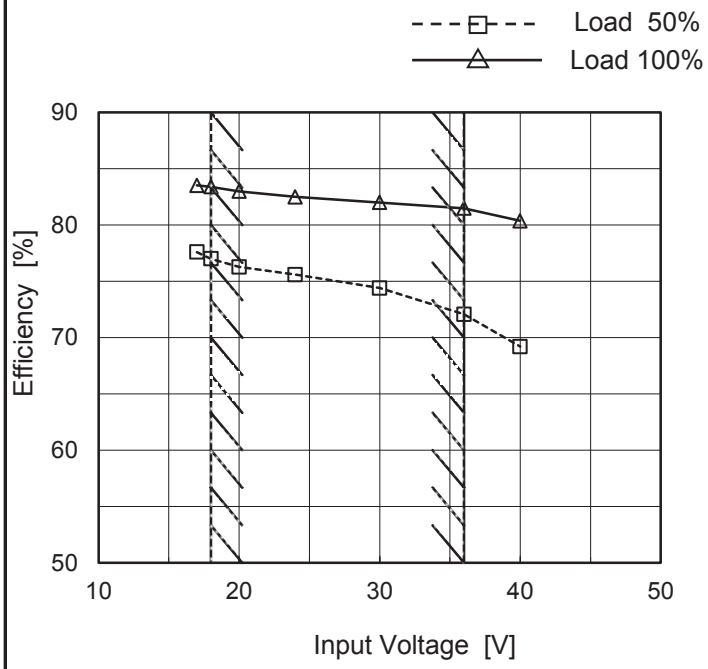
BC-10958

COSEL

Model	MGW1R52412
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

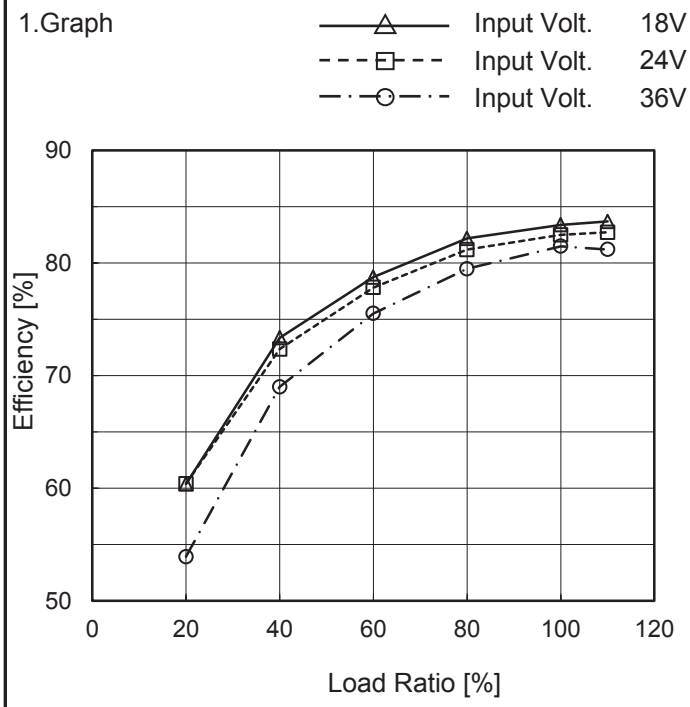
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
17	77.6	83.5
18	77.0	83.4
20	76.3	83.0
24	75.6	82.5
30	74.4	82.0
36	72.1	81.5
40	69.2	80.4
--	-	-
--	-	-

COSEL

Model	MGW1R52412
Item	Efficiency (by Load Ratio)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

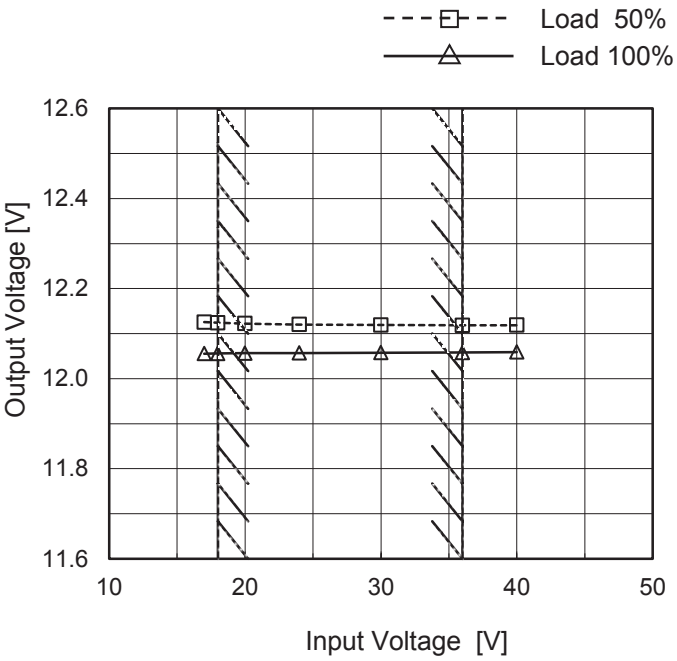
Load Ratio [%]	Efficiency [%]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	-	-	-
20	60.4	60.4	53.9
40	73.4	72.4	69.0
60	78.7	77.8	75.5
80	82.2	81.2	79.5
100	83.4	82.5	81.5
110	83.7	82.7	81.2
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW1R52412
Item	Line Regulation
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



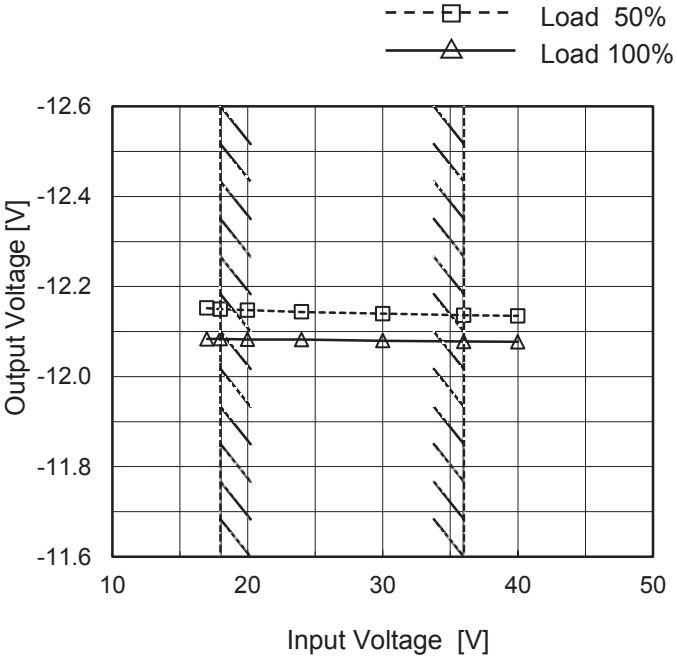
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	12.125	12.056
18	12.124	12.056
20	12.122	12.057
24	12.120	12.057
30	12.119	12.058
36	12.118	12.058
40	12.119	12.059
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.065A

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	-12.152	-12.083
18	-12.150	-12.084
20	-12.148	-12.083
24	-12.144	-12.082
30	-12.140	-12.080
36	-12.136	-12.078
40	-12.135	-12.077
--	-	-
--	-	-

+12V: Rated Load Current

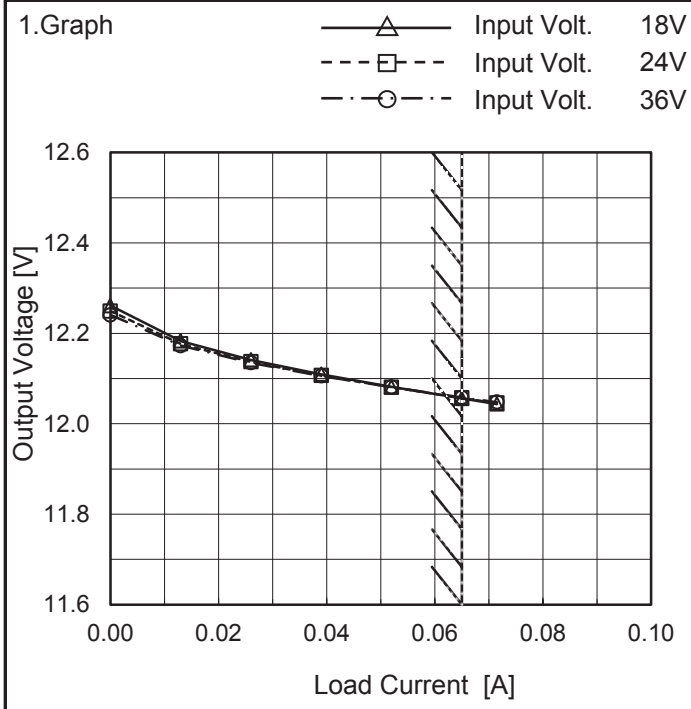
BC-10958

COSEL

Model	MGW1R52412
Item	Load Regulation
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



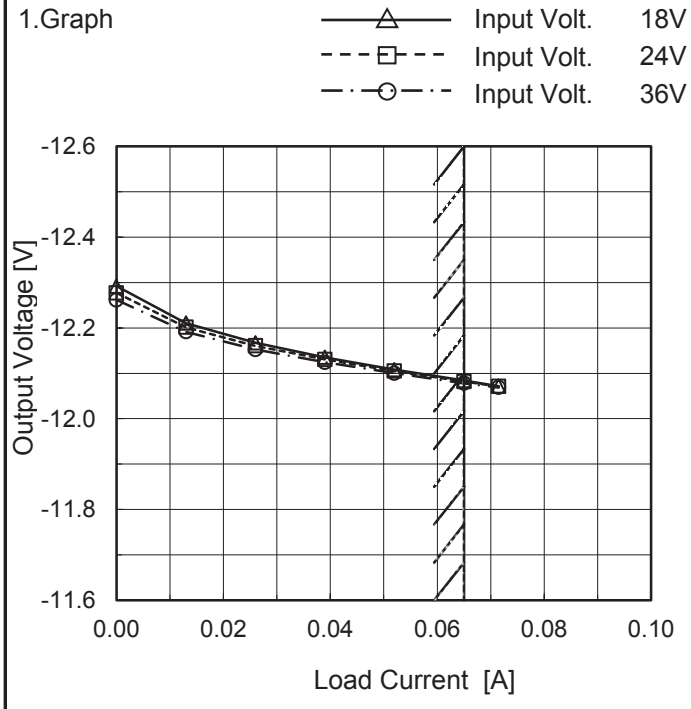
2.Values

Load Current [A]	Output Voltage [V] Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	12.261	12.249	12.241
0.013	12.183	12.177	12.173
0.026	12.141	12.137	12.135
0.039	12.109	12.107	12.106
0.052	12.082	12.081	12.081
0.065	12.056	12.057	12.058
0.072	12.044	12.046	12.048
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-12V: Rated Load Current

Object	-12V0.065A

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	-12.292	-12.277	-12.262
0.013	-12.211	-12.201	-12.192
0.026	-12.167	-12.160	-12.153
0.039	-12.135	-12.131	-12.124
0.052	-12.108	-12.105	-12.100
0.065	-12.084	-12.082	-12.078
0.072	-12.072	-12.071	-12.069
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

BC-10958

COSEL

Model	MGW1R52412	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.065A	

Input Volt. 24 V

-12V:rated load current.

Cycle 100 ms

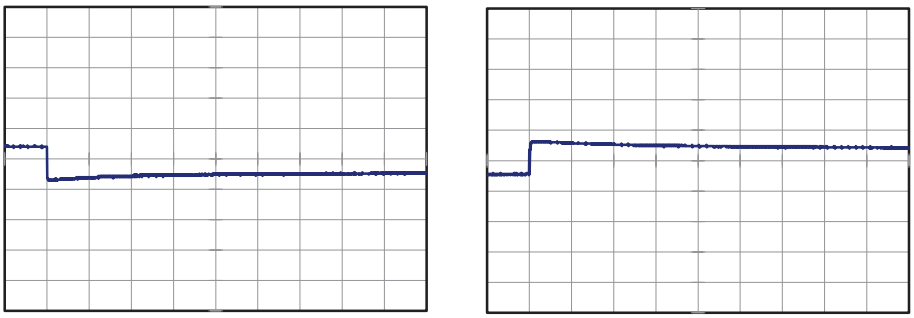
t1,t2 = 100 μ s

Load Current

t1

t2

Min.Load (0A)←→
Load 100% (0.065A)

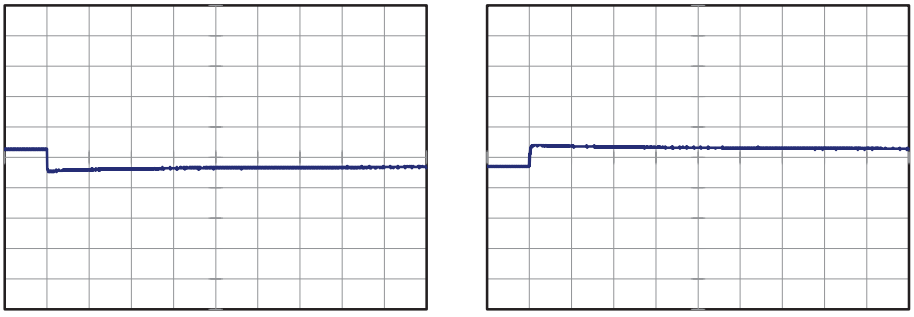


200 mV/div

4 ms/div

4 ms/div

Min.Load (0A)←→
Load 50% (0.0325A)

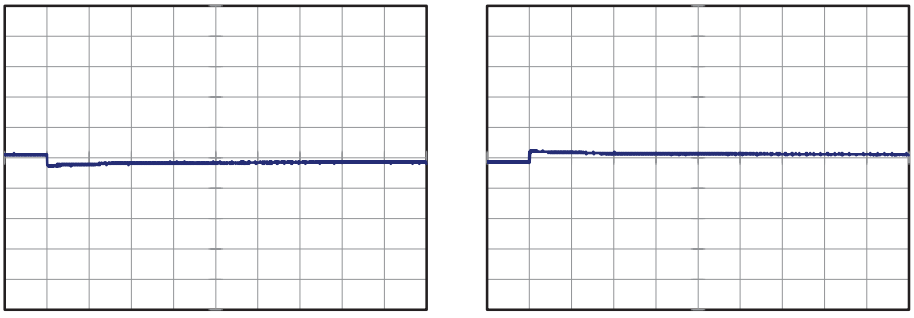


200 mV/div

4 ms/div

4 ms/div

Load 50% (0.0325A)←→
Load 100% (0.065A)



200 mV/div

4 ms/div

4 ms/div

COSEL

Model	MGW1R52412
Item	Dynamic Load Response
Object	-12V0.065A

Temperature 25°C
Testing Circuitry Figure A

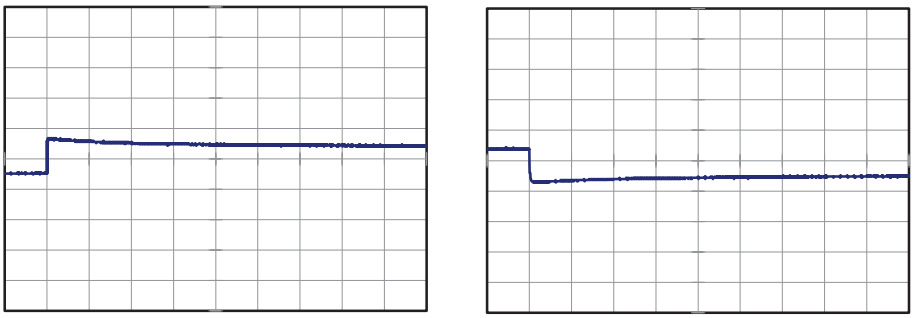
Input Volt. 24 V
+12V:rated load current.
Cycle 100 ms

t1,t2 = 100 μ s

Load Current

t1 t2

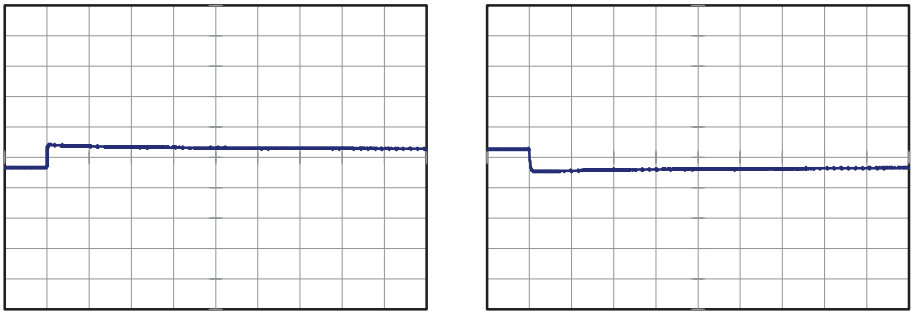
Min.Load (0A)←→
Load 100% (0.065A)



200 mV/div

4 ms/div 4 ms/div

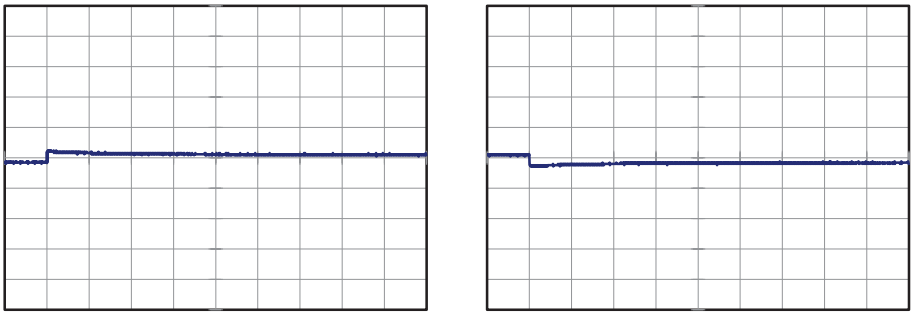
Min.Load (0A)←→
Load 50% (0.0325A)



200 mV/div

4 ms/div 4 ms/div

Load 50% (0.0325A)←→
Load 100% (0.065A)



200 mV/div

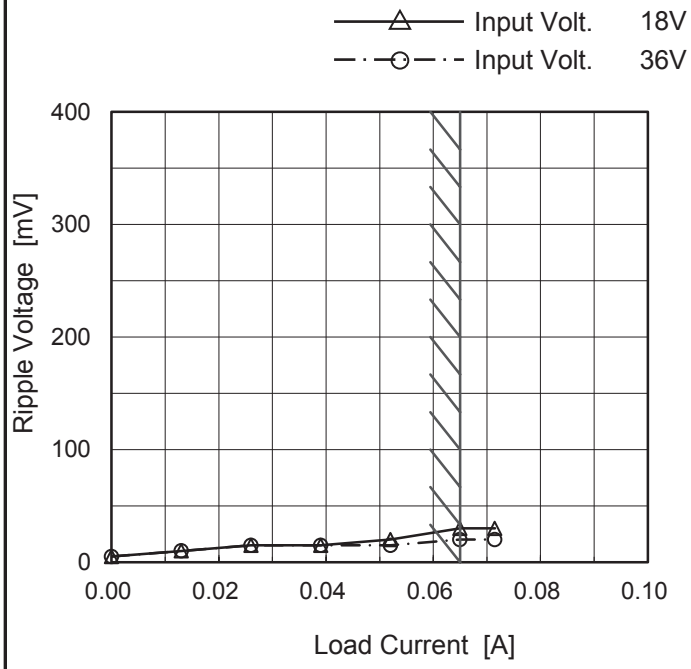
4 ms/div 4 ms/div

COSEL

Model	MGW1R52412
Item	Ripple Voltage (by Load Current)
Object	+12V0.065A

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]

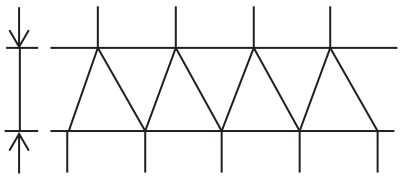


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.000	5	5
0.013	10	10
0.026	15	15
0.039	15	15
0.052	20	15
0.065	30	20
0.072	30	20
--	-	-
--	-	-
--	-	-
--	-	-

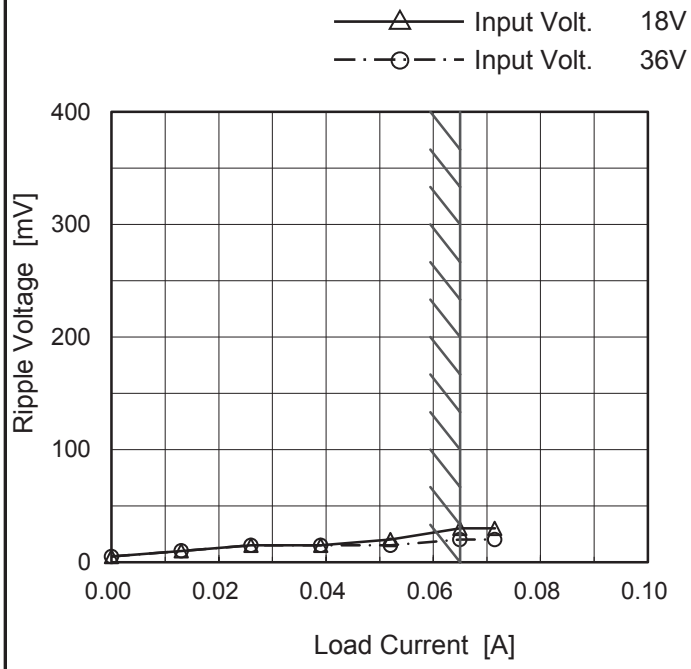
-12V: Rated Load Current

COSEL

Model	MGW1R52412
Item	Ripple Voltage (by Load Current)
Object	-12V0.065A

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]

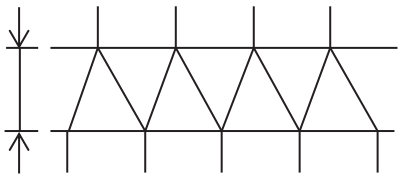


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.000	5	5
0.013	10	10
0.026	15	15
0.039	15	15
0.052	20	15
0.065	30	20
0.072	30	20
--	-	-
--	-	-
--	-	-
--	-	-

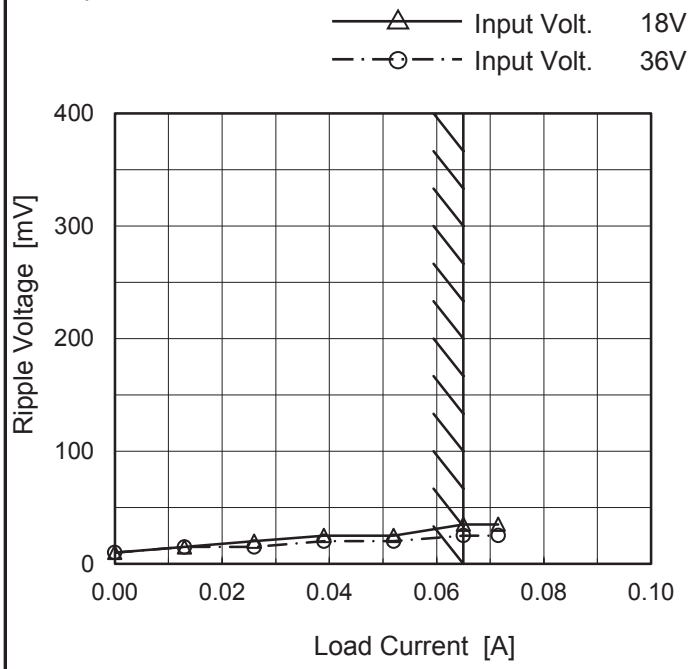
+12V: Rated Load Current

COSEL

Model	MGW1R52412
Item	Ripple-Noise
Object	+12V0.065A

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.

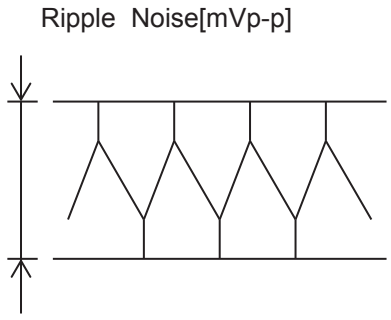


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.000	10	10
0.013	15	15
0.026	20	15
0.039	25	20
0.052	25	20
0.065	35	25
0.072	35	25
--	-	-
--	-	-
--	-	-
--	-	-

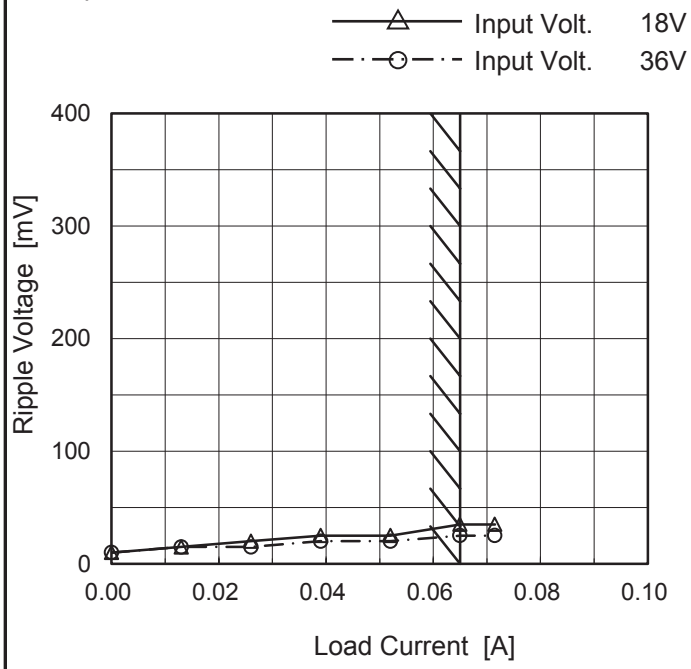
-12V: Rated Load Current

COSEL

Model	MGW1R52412
Item	Ripple-Noise
Object	-12V0.065A

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]

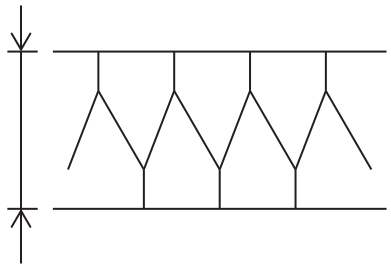


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.000	10	10
0.013	15	15
0.026	20	15
0.039	25	20
0.052	25	20
0.065	35	25
0.072	35	25
--	-	-
--	-	-
--	-	-
--	-	-

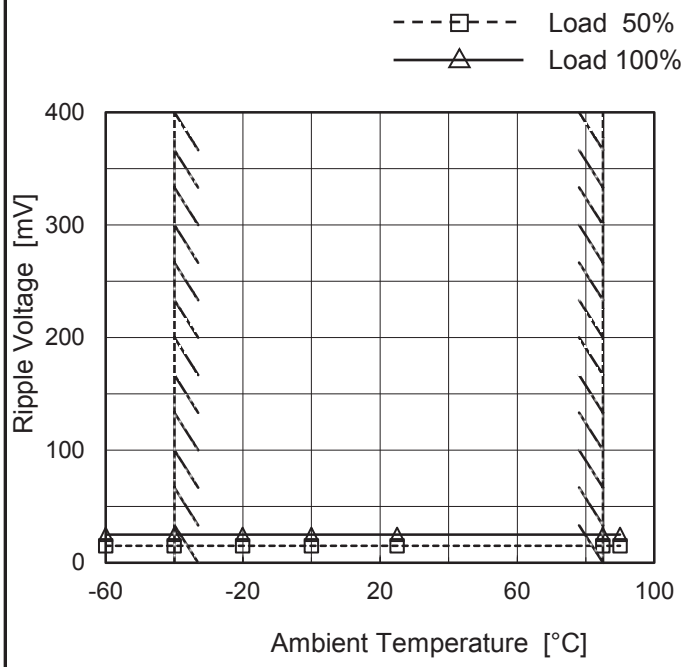
+12V: Rated Load Current

COSEL

Model	MGW1R52412
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.065A

Testing Circuitry Figure B

1.Graph



Input Volt. 24V

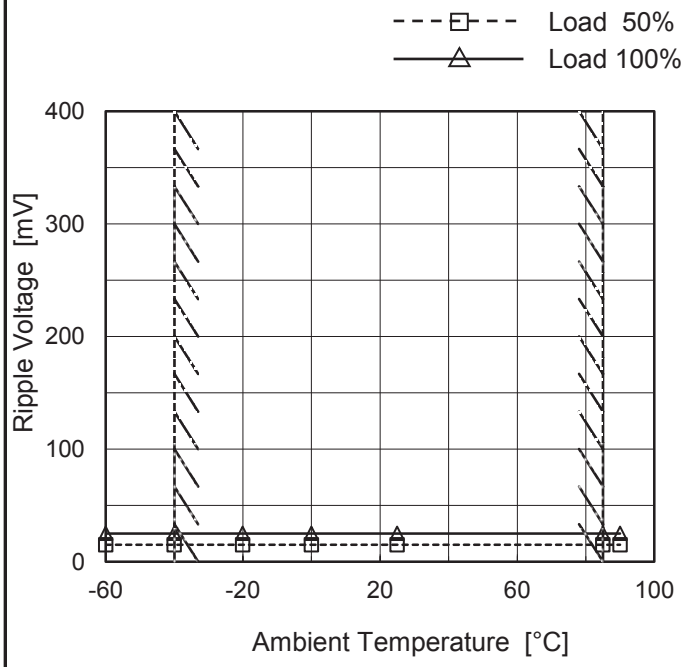
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	15	25
-40	15	25
-20	15	25
0	15	25
25	15	25
85	15	25
90	15	25
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.065A

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	15	25
-40	15	25
-20	15	25
0	15	25
25	15	25
85	15	25
90	15	25
--	-	-
--	-	-
--	-	-
--	-	-

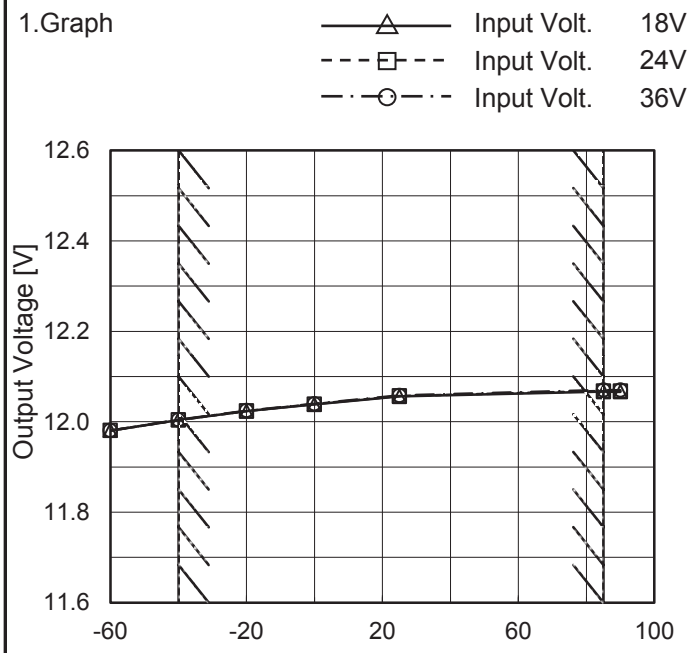
+12V: Rated Load Current

COSEL

Model	MGW1R52412
Item	Ambient Temperature Drift
Object	+12V0.065A

Testing Circuitry Figure A

1.Graph



Load 100%

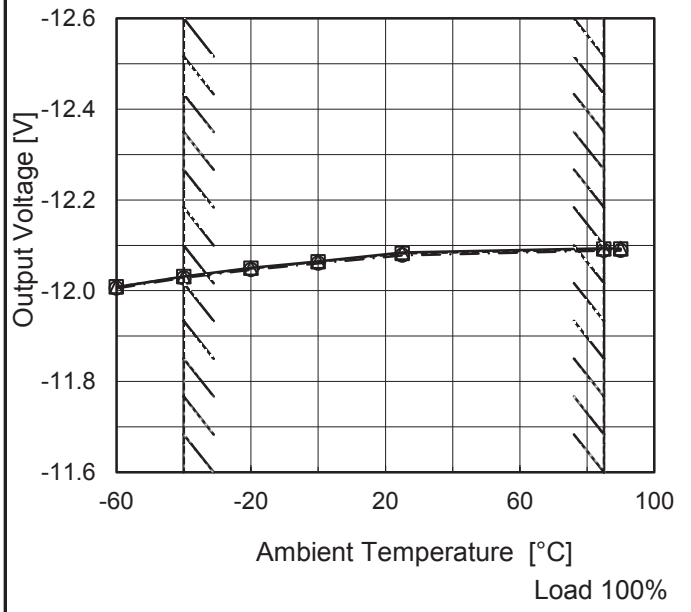
2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-60	11.981	11.981	11.981
-40	12.004	12.004	12.005
-20	12.024	12.024	12.024
0	12.038	12.039	12.040
25	12.056	12.057	12.058
85	12.067	12.068	12.070
90	12.066	12.068	12.070
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-12V: Rated Load Current

Object	-12V0.065A

1.Graph



Load 100%

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	-12.008	-12.008	-12.005
-40	-12.031	-12.031	-12.028
-20	-12.050	-12.049	-12.046
0	-12.065	-12.064	-12.061
25	-12.084	-12.082	-12.078
85	-12.093	-12.092	-12.089
90	-12.093	-12.091	-12.089
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

COSEL

Model	MGW1R52412	
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 - 85°C
Input Voltage : 18 - 36V
Load Current (AVR 1) : 0 - 0.065A (AVR 2) : 0 - 0.065A

* 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	+12V0.065A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18	0	12.298	±239	±2.0
Minimum Voltage	-40	18	0.065	11.821		

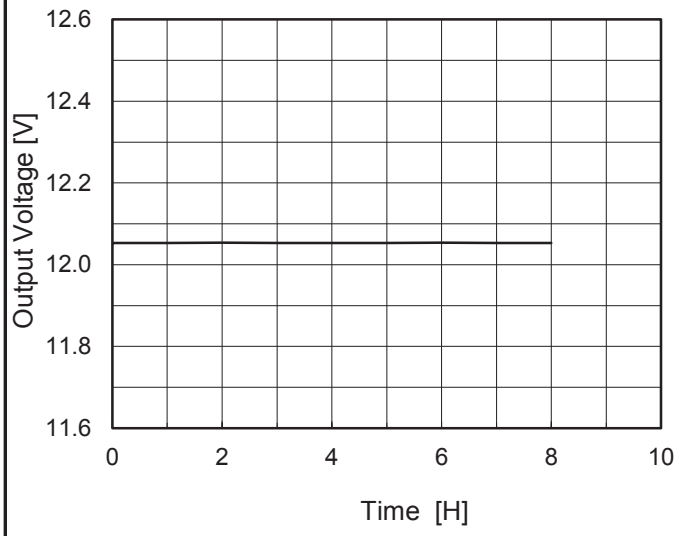
Object	-12V0.065A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18	0	-12.324	±233	±1.9
Minimum Voltage	-40	18	0.065	-11.858		

COSEL

Model	MGW1R52412
Item	Time Lapse Drift
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 24V
Load 100%

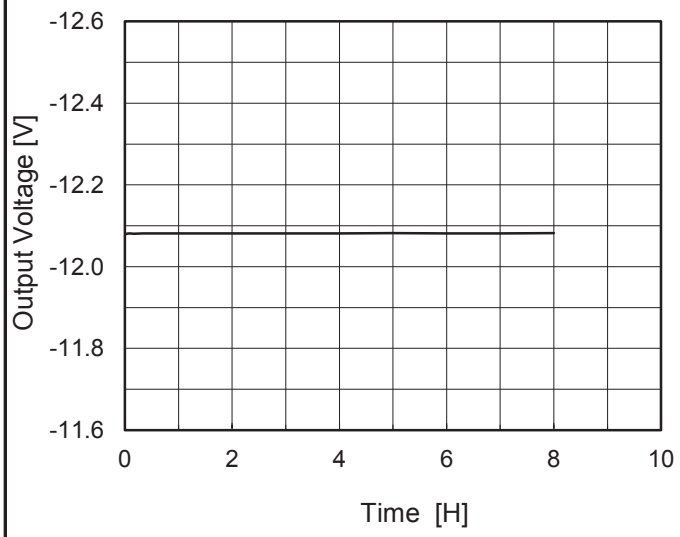
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.051
0.5	12.054
1.0	12.054
2.0	12.054
3.0	12.053
4.0	12.054
5.0	12.054
6.0	12.054
7.0	12.053
8.0	12.054

-12V: Rated Load Current

Object	-12V0.065A

1.Graph



Input Volt. 24V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.078
0.5	-12.081
1.0	-12.081
2.0	-12.082
3.0	-12.082
4.0	-12.082
5.0	-12.082
6.0	-12.082
7.0	-12.082
8.0	-12.082

+12V: Rated Load Current

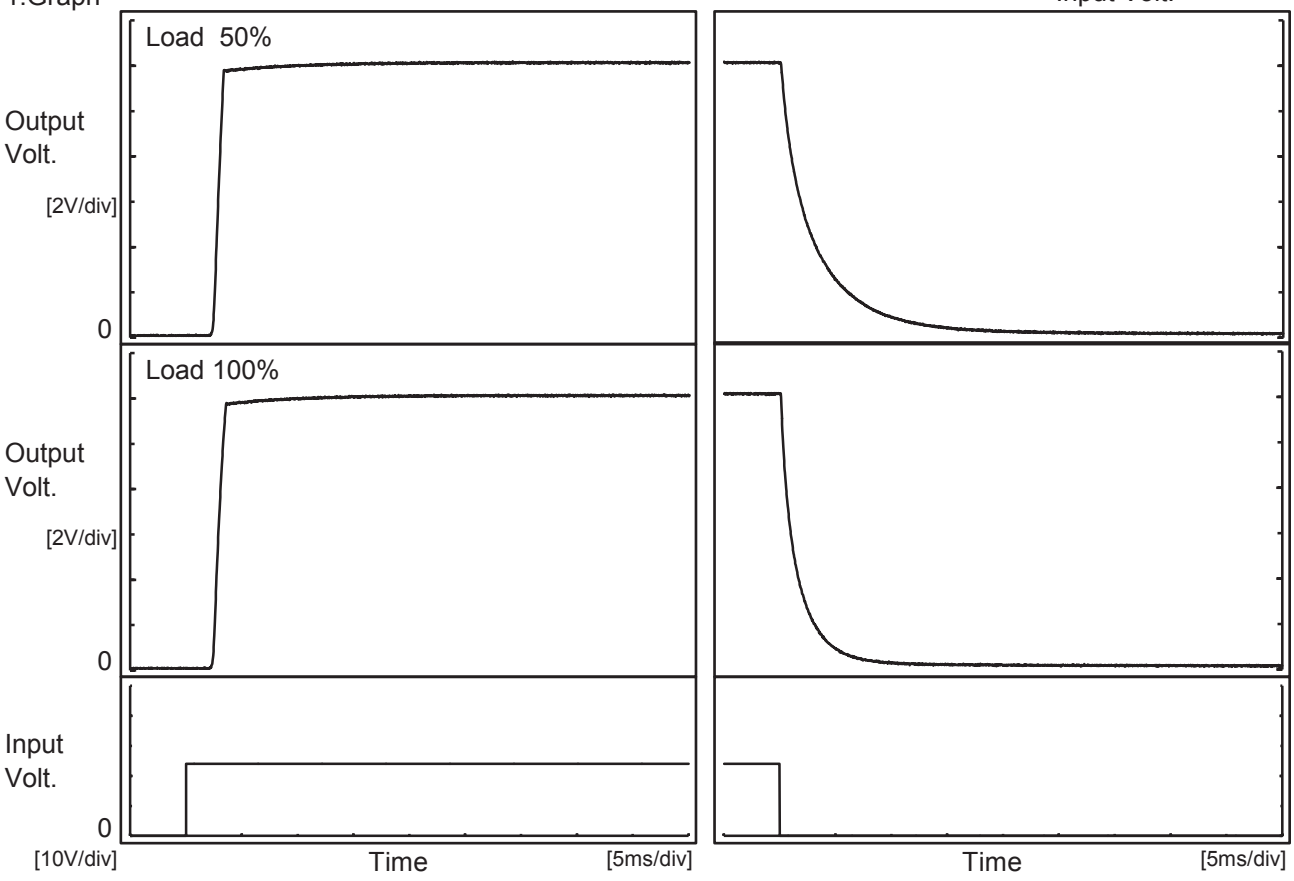
COSEL

Model	MGW1R52412
Item	Rise and Fall Time
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

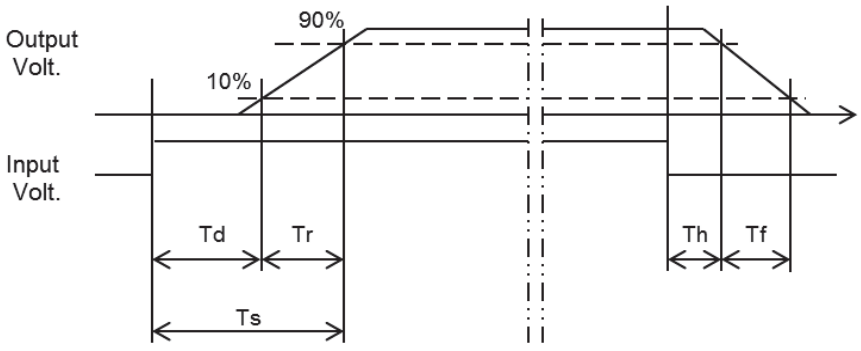
Input Volt. 24 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	2.5	0.8	3.3	0.3	7.9
100 %	2.5	1.0	3.5	0.2	4.0



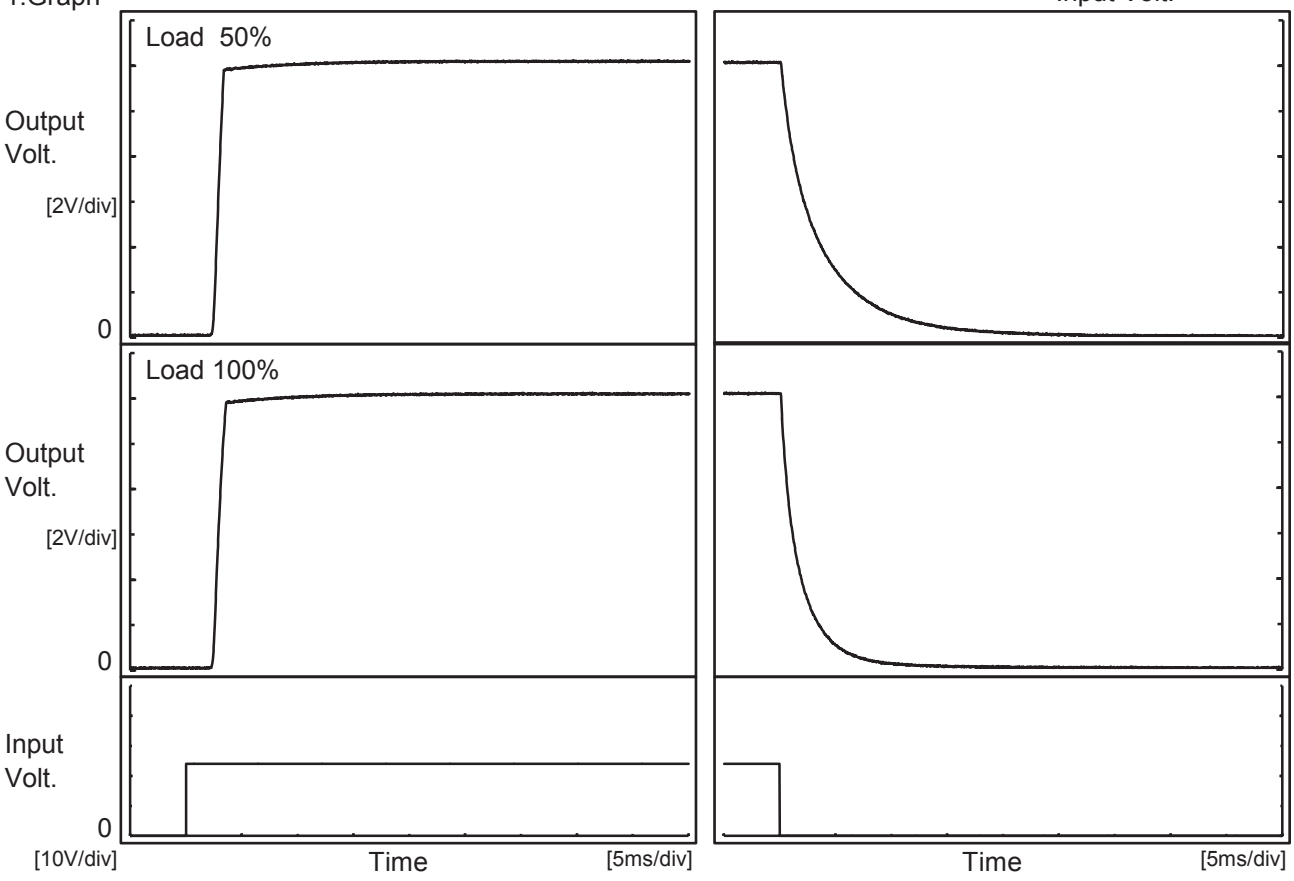
COSEL

Model	MGW1R52412
Item	Rise and Fall Time
Object	-12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

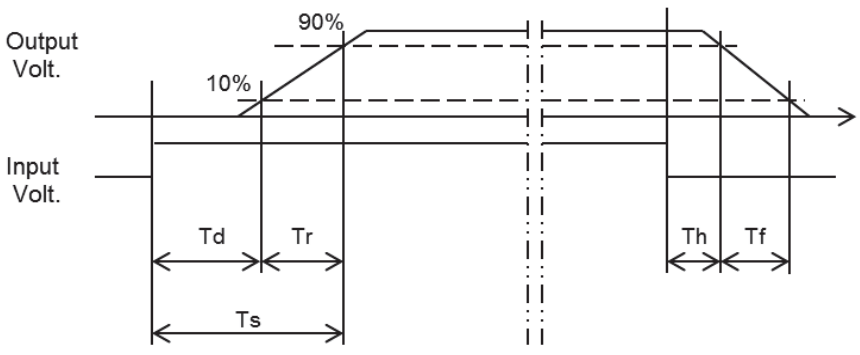
Input Volt. 24 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	2.5	0.8	3.3	0.4	8.5
100 %	2.5	0.9	3.4	0.2	4.3



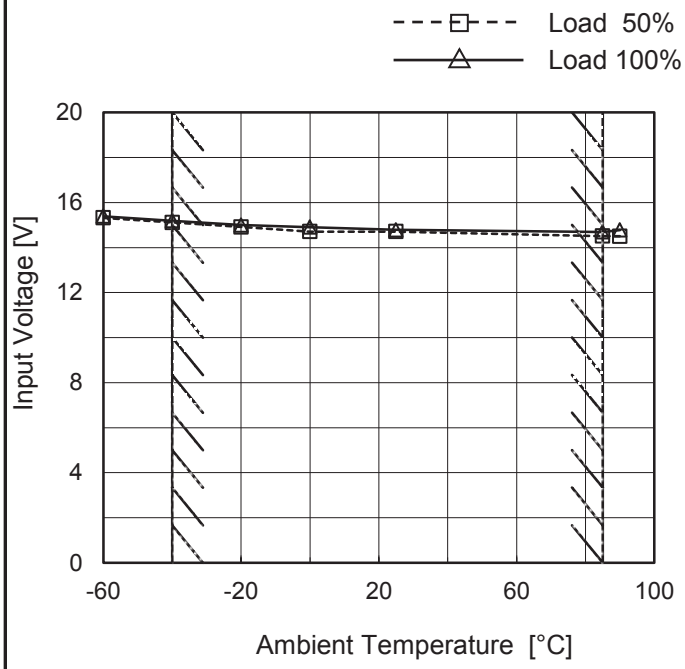
BC-10958

COSEL

Model	MGW1R52412
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.065A

Testing Circuitry Figure A

1.Graph

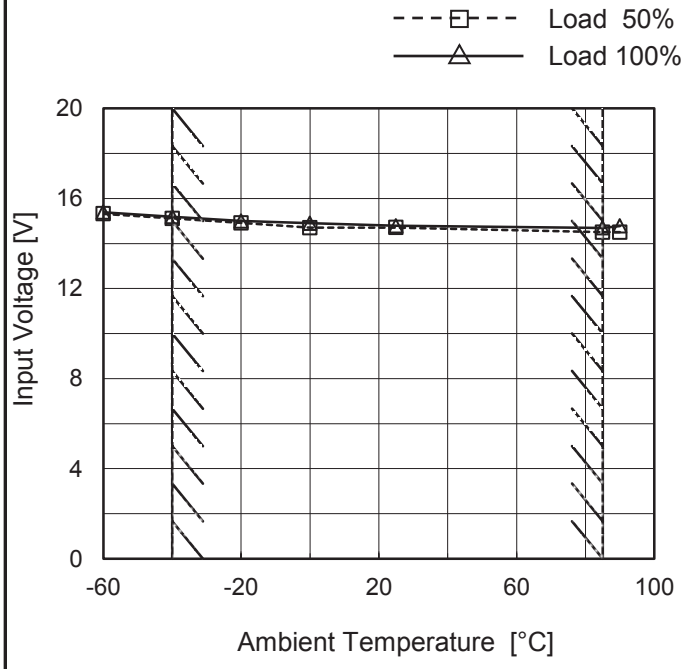


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	15.4	15.4
-40	15.2	15.2
-20	15.0	15.0
0	14.7	14.9
25	14.7	14.8
85	14.5	14.7
90	14.5	14.8
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.065A

1.Graph



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

2.Values

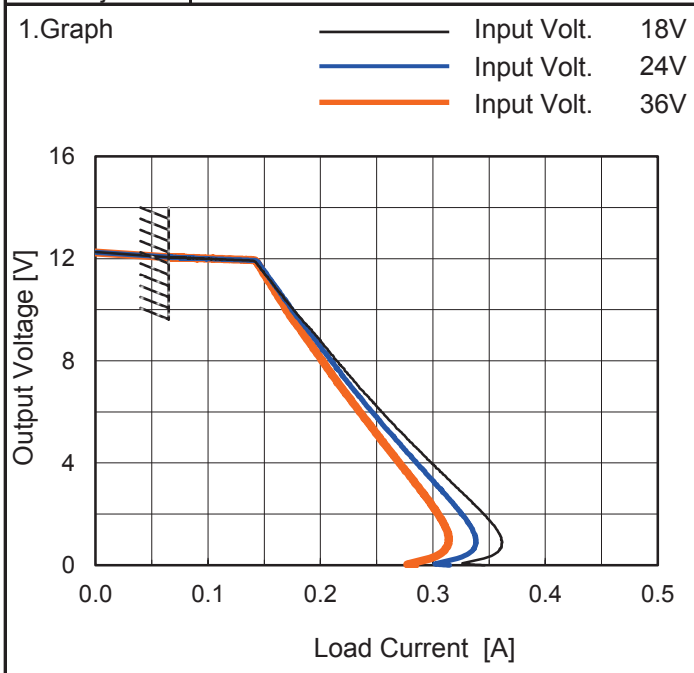
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	15.4	15.4
-40	15.2	15.2
-20	15.0	15.0
0	14.7	14.9
25	14.7	14.8
85	14.5	14.7
90	14.5	14.8
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGW1R52412
Item	Overcurrent Protection
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



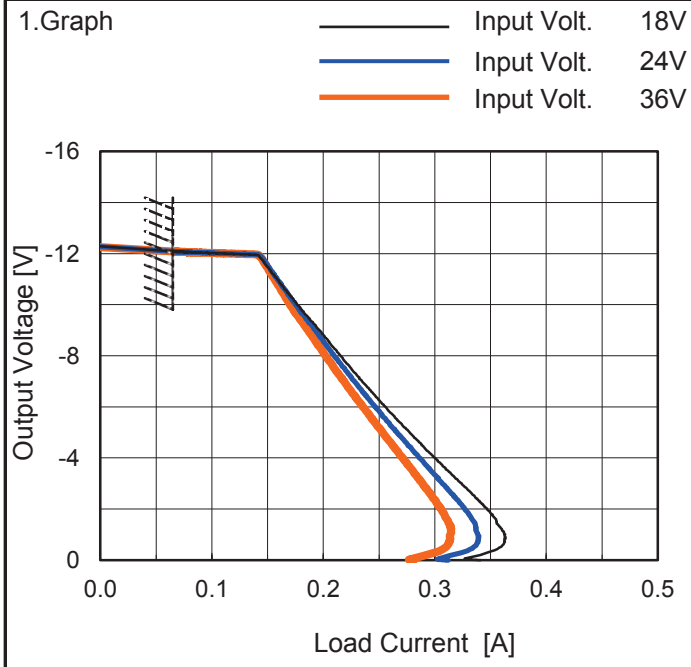
2.Values

Output Voltage [V]	Load Current [A] Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
11.40	0.15	0.15	0.15
10.80	0.16	0.16	0.16
9.60	0.18	0.18	0.18
8.40	0.21	0.20	0.19
7.20	0.23	0.22	0.21
6.00	0.25	0.25	0.23
4.80	0.28	0.27	0.26
3.60	0.31	0.29	0.28
2.40	0.34	0.32	0.30
1.20	0.36	0.34	0.31
0.00	0.35	0.31	0.28
--	-	-	-

-12V: Rated Load Current

Object	-12V0.065A

1.Graph



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

2.Values

Output Voltage [V]	Load Current [A] Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-11.40	0.15	0.15	0.15
-10.80	0.16	0.16	0.16
-9.60	0.18	0.18	0.18
-8.40	0.21	0.20	0.20
-7.20	0.23	0.22	0.21
-6.00	0.26	0.25	0.23
-4.80	0.28	0.27	0.26
-3.60	0.31	0.29	0.28
-2.40	0.34	0.32	0.30
-1.20	0.36	0.34	0.31
0.00	0.34	0.31	0.28
--	-	-	-

+12V: Rated Load Current

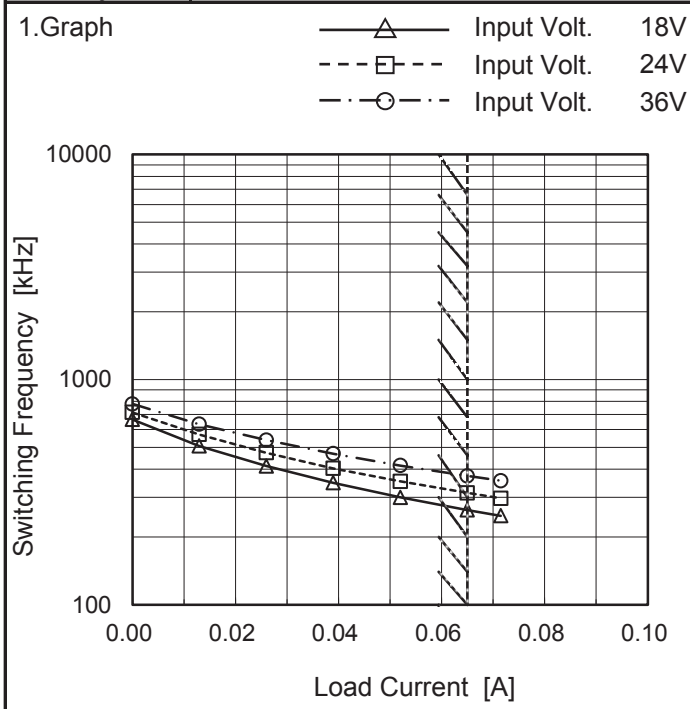
BC-10958

COSEL

Model	MGW1R52412
Item	Switching Frequency (by Load Current)
Object	+/-12V0.065A

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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	665	715	780
0.013	507	570	633
0.026	414	473	538
0.039	348	403	469
0.052	300	353	415
0.065	264	314	373
0.072	248	297	355
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

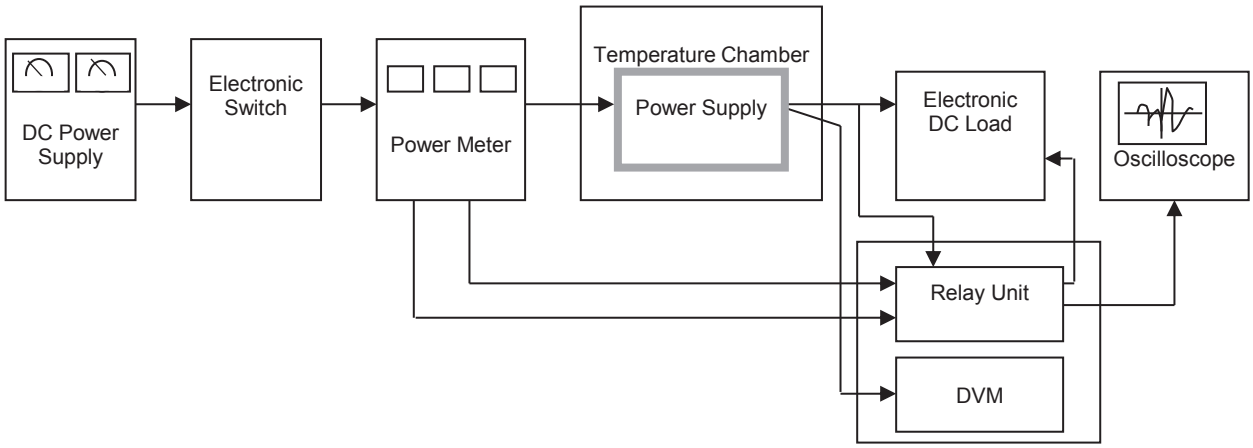


Figure A

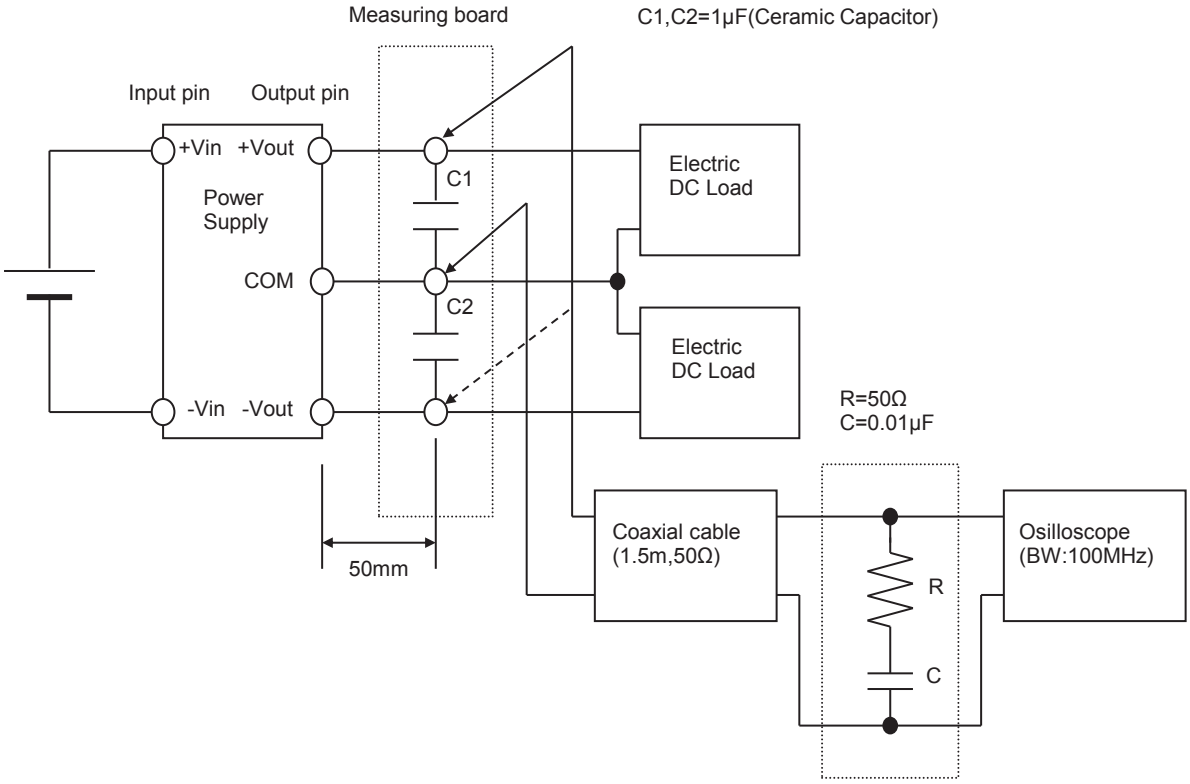


Figure B（Ripple and Ripple noise Characteristic）