参考資料

TEST DATA OF MGW1R51212

Regulated DC Power Supply
October 28, 2016

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Takaaki Sekiguchi
Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

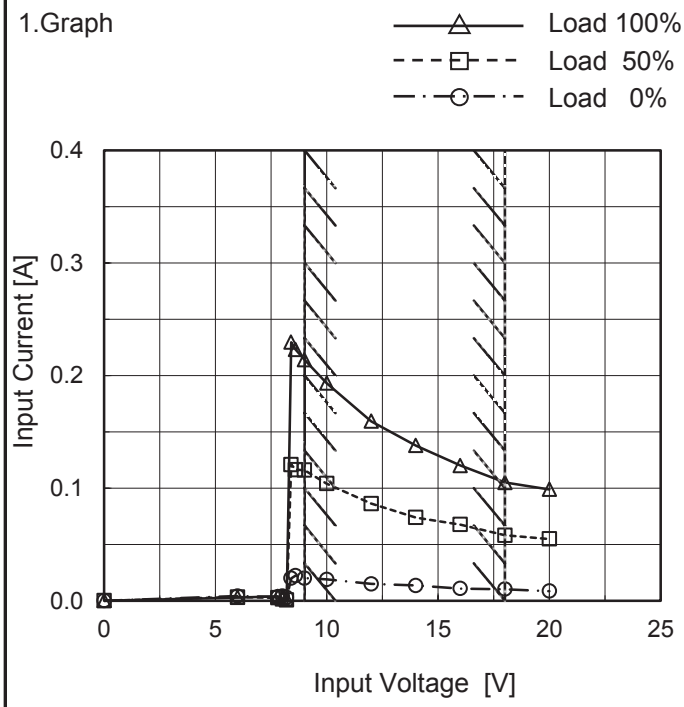
1.Input Current (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Ratio (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Input Power (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Efficiency (by Load Ratio) ・・・・・・・・・・・・・・・・・・・・・・・・・・・ 5
6.Line 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	MGW1R51212
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
6.0	0.004	0.003	0.003
7.8	0.004	0.003	0.004
8.0	0.004	0.000	0.002
8.2	0.003	0.001	0.002
8.4	0.020	0.121	0.230
8.6	0.022	0.116	0.223
9.0	0.020	0.116	0.214
10.0	0.019	0.104	0.193
12.0	0.015	0.086	0.159
14.0	0.014	0.074	0.138
16.0	0.011	0.068	0.120
18.0	0.010	0.058	0.105
20.0	0.009	0.055	0.099
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

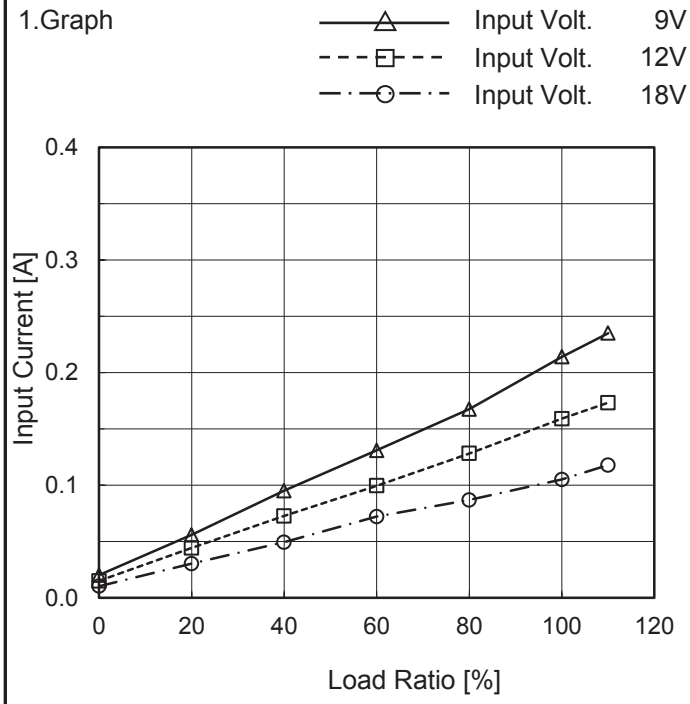
BC-10956

COSEL

Model	MGW1R51212
Item	Input Current (by Load Ratio)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

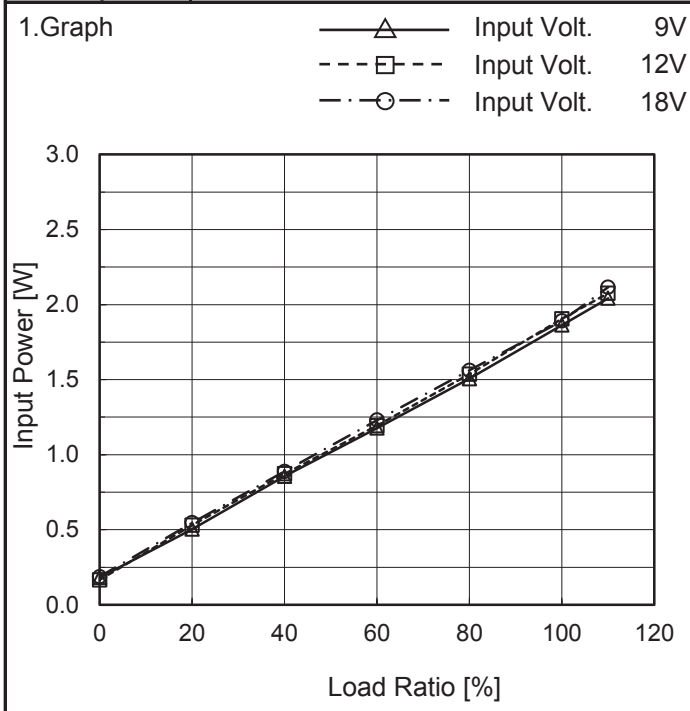
Load Ratio [%]	Input Current [A]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	0.020	0.015	0.010
20	0.056	0.044	0.030
40	0.095	0.073	0.049
60	0.131	0.100	0.072
80	0.168	0.128	0.087
100	0.214	0.159	0.105
110	0.235	0.173	0.118
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW1R51212
Item	Input Power (by Load Ratio)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

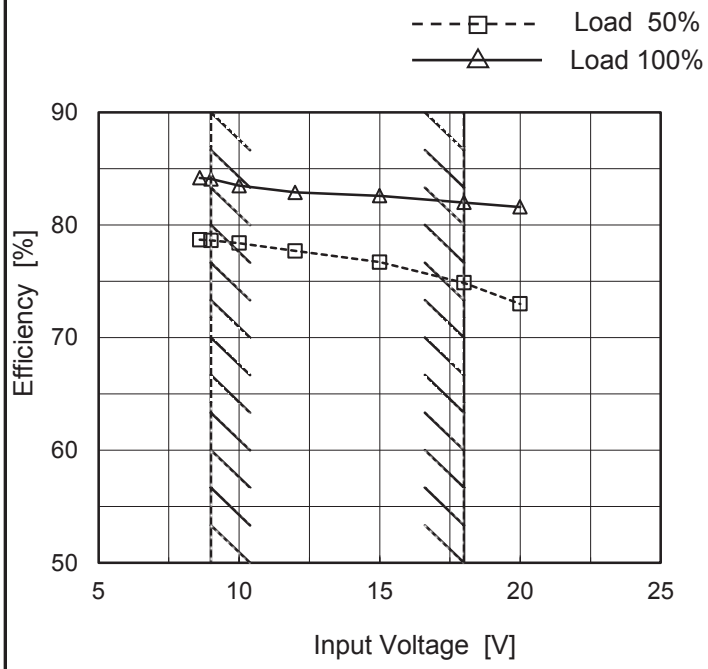
Load Ratio [%]	Input Power [W]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	0.18	0.17	0.19
20	0.50	0.53	0.55
40	0.86	0.87	0.89
60	1.18	1.19	1.23
80	1.51	1.54	1.56
100	1.86	1.90	1.89
110	2.04	2.08	2.12
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW1R51212
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

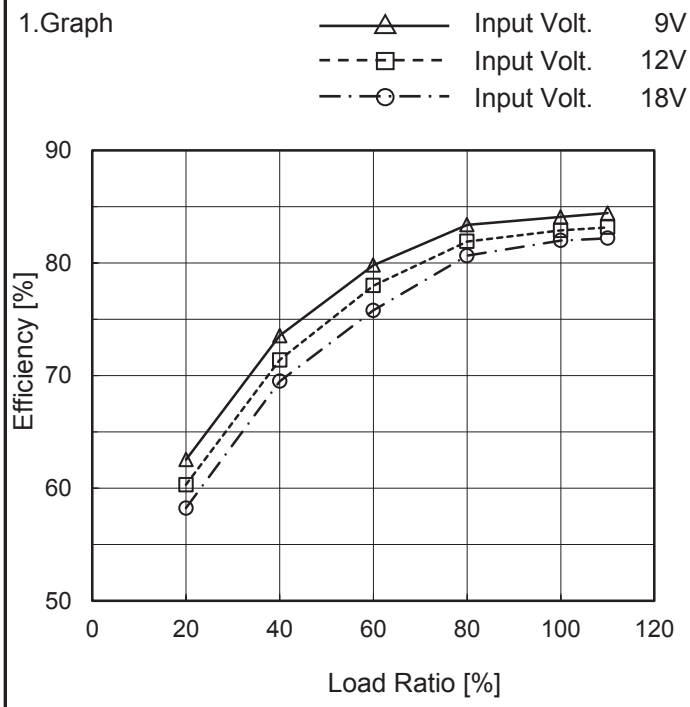
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
8.6	78.7	84.2
9.0	78.6	84.1
10.0	78.4	83.5
12.0	77.7	82.9
15.0	76.7	82.6
18.0	74.9	82.0
20.0	73.0	81.6
--	-	-
--	-	-

COSEL

Model	MGW1R51212
Item	Efficiency (by Load Ratio)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

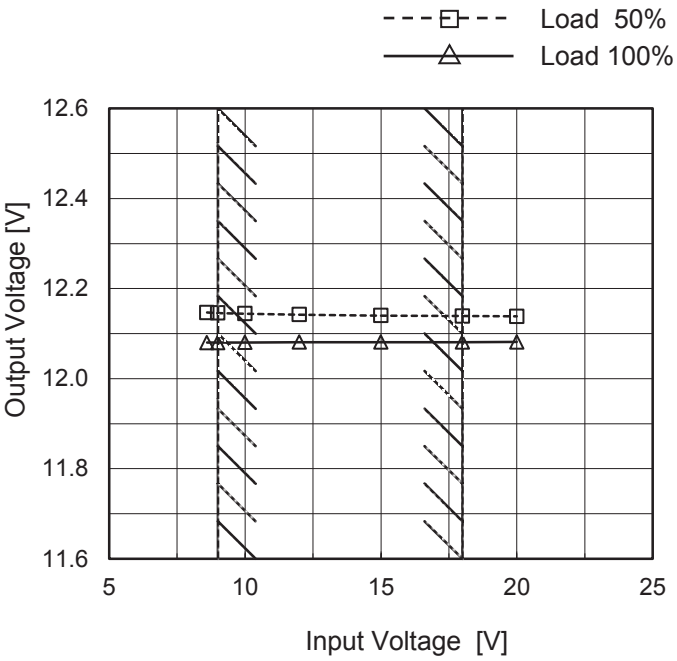
Load Ratio [%]	Efficiency [%] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	-	-	-
20	62.5	60.3	58.2
40	73.6	71.4	69.5
60	79.8	78.0	75.8
80	83.4	81.9	80.6
100	84.1	82.9	82.0
110	84.4	83.2	82.2
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGW1R51212
Item	Line Regulation
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



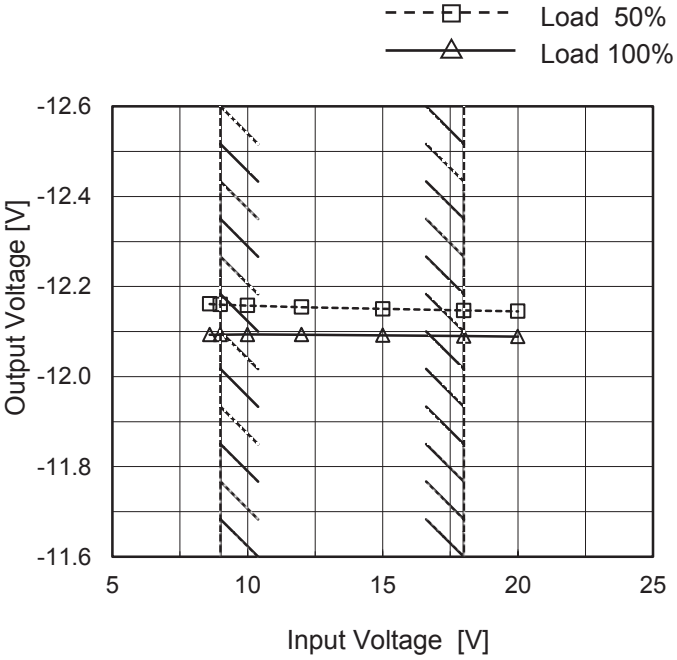
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.6	12.147	12.080
9.0	12.146	12.080
10.0	12.144	12.080
12.0	12.142	12.081
15.0	12.140	12.081
18.0	12.139	12.081
20.0	12.138	12.082
--	-	-
--	-	-

-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%
8.6	-12.161	-12.093
9.0	-12.160	-12.093
10.0	-12.158	-12.093
12.0	-12.154	-12.093
15.0	-12.150	-12.092
18.0	-12.147	-12.090
20.0	-12.145	-12.089
--	-	-
--	-	-

+12V: Rated Load Current

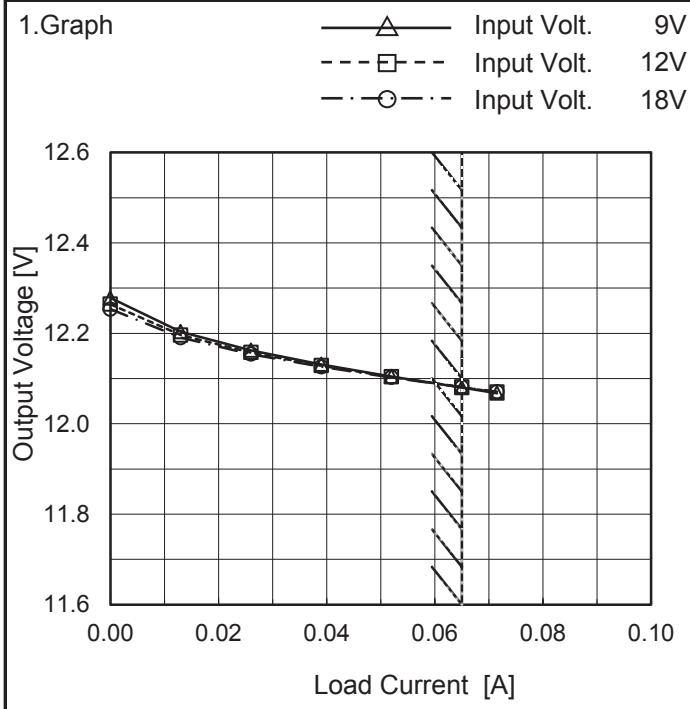
BC-10956

COSEL

Model	MGW1R51212
Item	Load Regulation
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



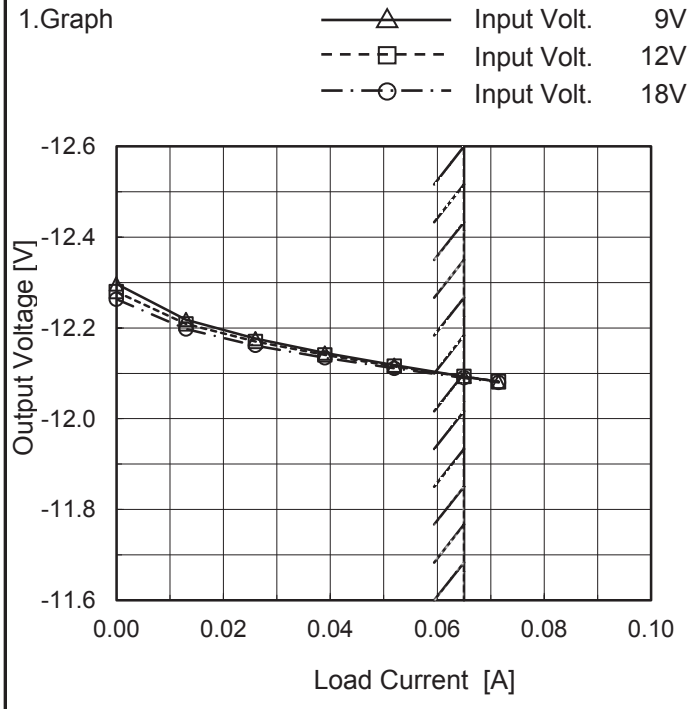
2.Values

Load Current [A]	Output Voltage [V] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0.000	12.278	12.264	12.254
0.013	12.203	12.196	12.191
0.026	12.163	12.158	12.154
0.039	12.131	12.129	12.126
0.052	12.105	12.104	12.103
0.065	12.080	12.081	12.081
0.072	12.068	12.070	12.071
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-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. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0.000	-12.297	-12.280	-12.263
0.013	-12.218	-12.209	-12.198
0.026	-12.176	-12.170	-12.161
0.039	-12.145	-12.140	-12.134
0.052	-12.118	-12.115	-12.111
0.065	-12.093	-12.093	-12.090
0.072	-12.081	-12.082	-12.080
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

BC-10956

COSEL

Model	MGW1R51212	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.065A	

Input Volt. 12 V

-12V:rated load current.

Cycle 100 ms

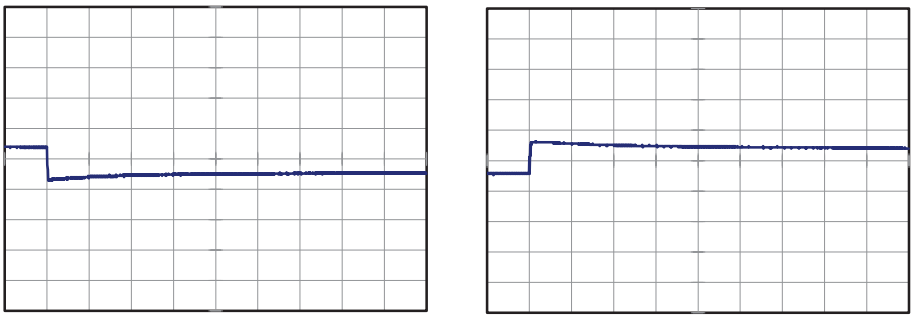
t1,t2 = 100 μ s

Load Current

t1

t2

Min.Load (0A)←→
Load 100% (0.065A)

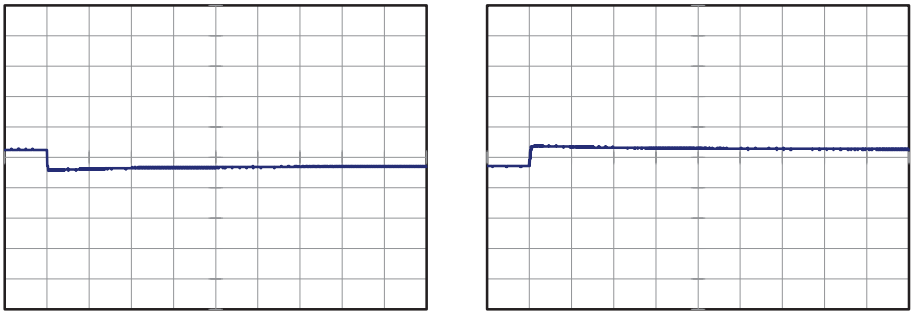


200 mV/div

4 ms/div

4 ms/div

Min.Load (0A)←→
Load 50% (0.0325A)

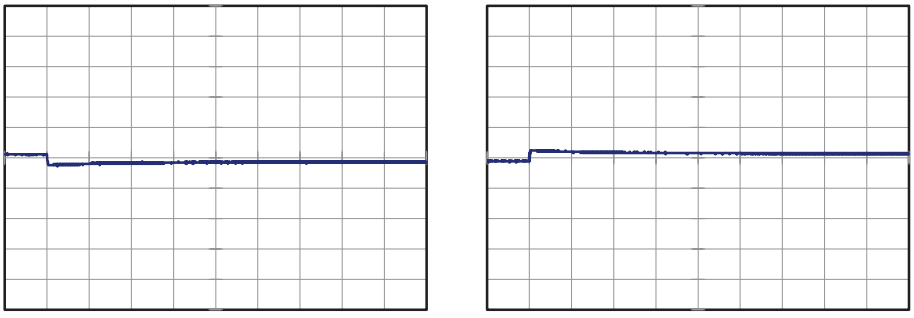


200 mV/div

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	MGW1R51212
Item	Dynamic Load Response
Object	-12V0.065A

Temperature 25°C
Testing Circuitry Figure A

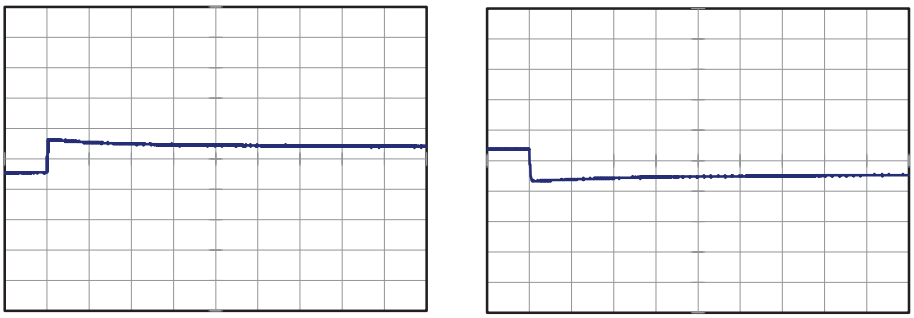
Input Volt. 12 V
+12V:rated load current.
Cycle 100 ms

t1,t2 = 100 μ s

Load Current

t1 t2

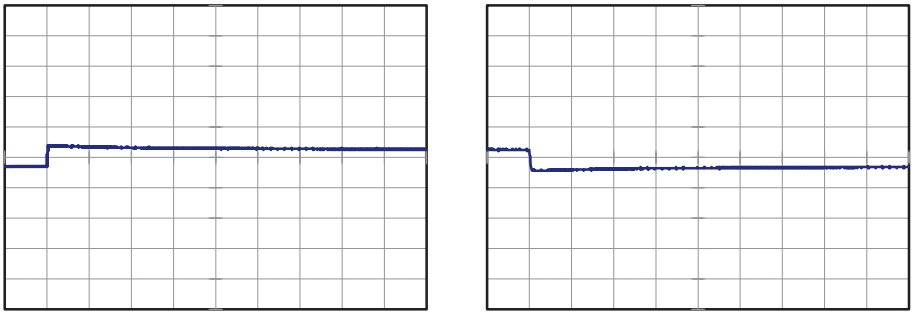
Min.Load (0A)←→
Load 100% (0.065A)



200 mV/div

4 ms/div 4 ms/div

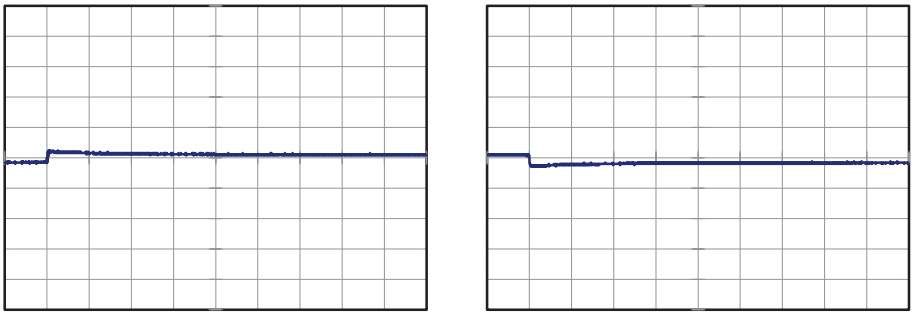
Min.Load (0A)←→
Load 50% (0.0325A)



200 mV/div

4 ms/div 4 ms/div

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



200 mV/div

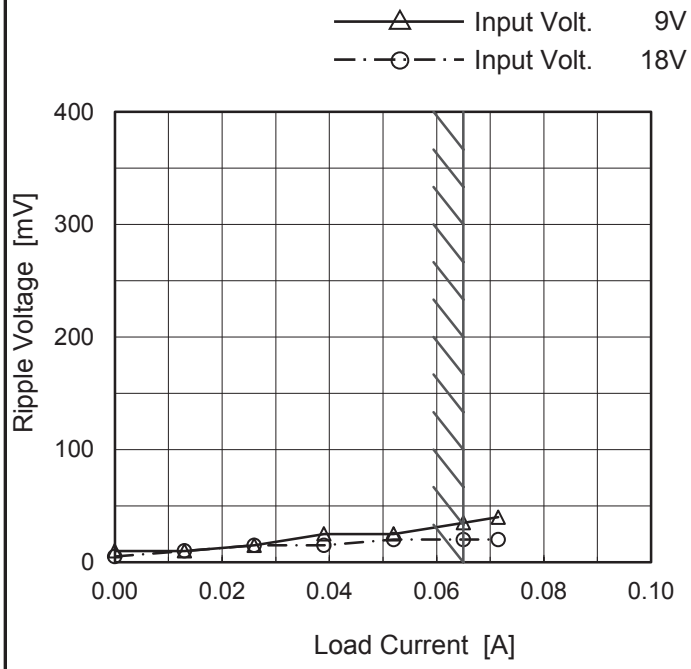
4 ms/div 4 ms/div

COSEL

Model	MGW1R51212
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]

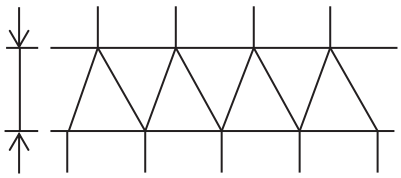


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV] Input Volt. 9 [V]	Ripple Voltage [mV] Input Volt. 18 [V]
0.000	10	5
0.013	10	10
0.026	15	15
0.039	25	15
0.052	25	20
0.065	35	20
0.072	40	20
--	-	-
--	-	-
--	-	-
--	-	-

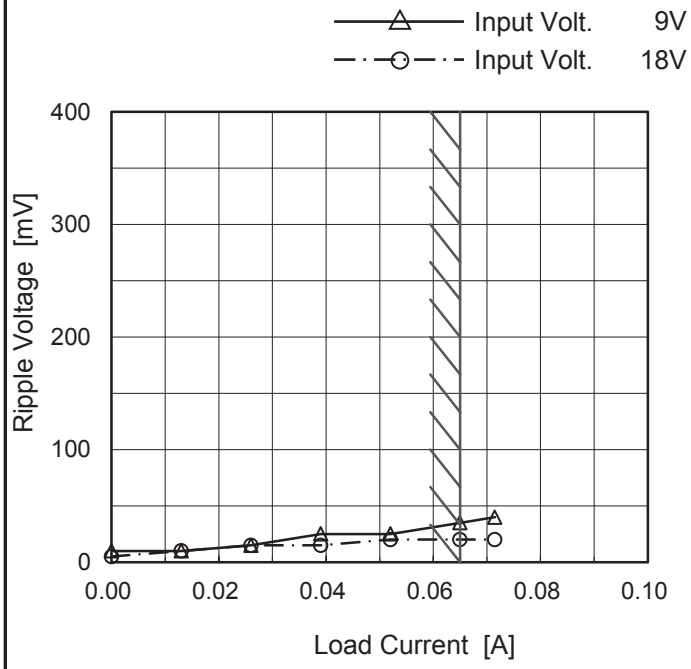
-12V: Rated Load Current

COSEL

Model	MGW1R51212
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]

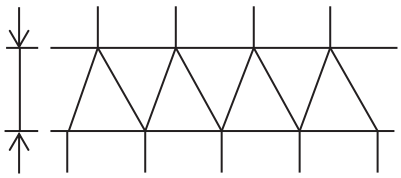


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0.000	10	5
0.013	10	10
0.026	15	15
0.039	25	15
0.052	25	20
0.065	35	20
0.072	40	20
--	-	-
--	-	-
--	-	-
--	-	-

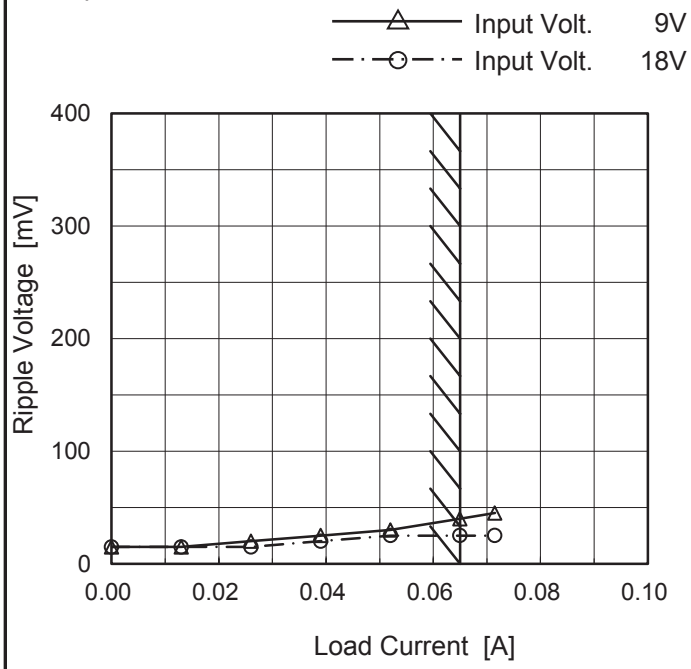
+12V: Rated Load Current

COSEL

Model	MGW1R51212
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]

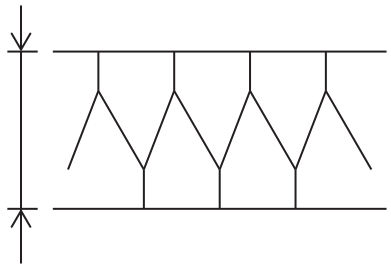


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0.000	15	15
0.013	15	15
0.026	20	15
0.039	25	20
0.052	30	25
0.065	40	25
0.072	45	25
--	-	-
--	-	-
--	-	-
--	-	-

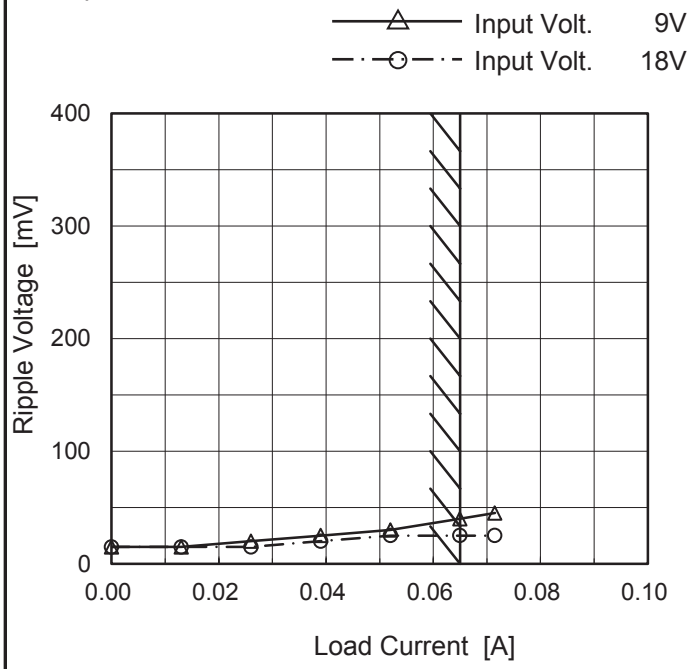
-12V: Rated Load Current

COSEL

Model	MGW1R51212
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]

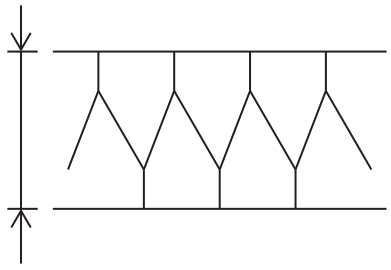


Fig.Complex Ripple Noise Wave Form

2.Values

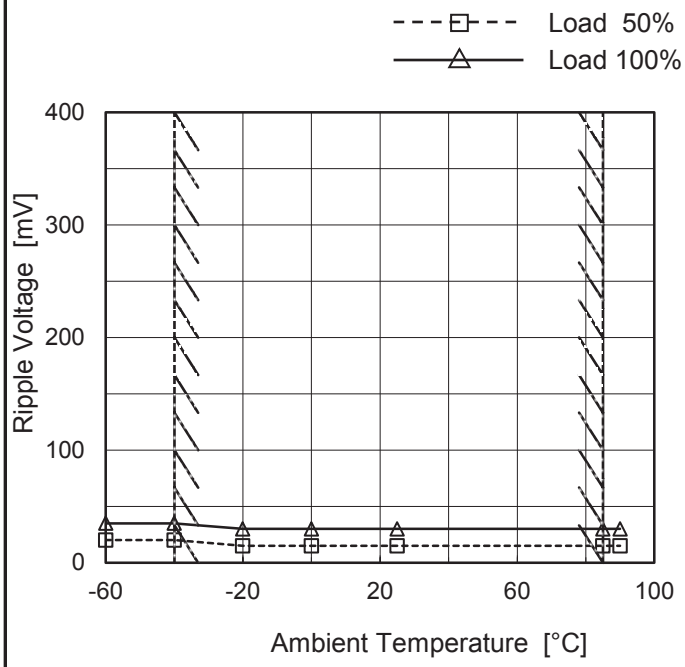
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0.000	15	15
0.013	15	15
0.026	20	15
0.039	25	20
0.052	30	25
0.065	40	25
0.072	45	25
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

COSEL

Model	MGW1R51212	
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B
Object	+12V0.065A	

1.Graph



Input Volt. 12V

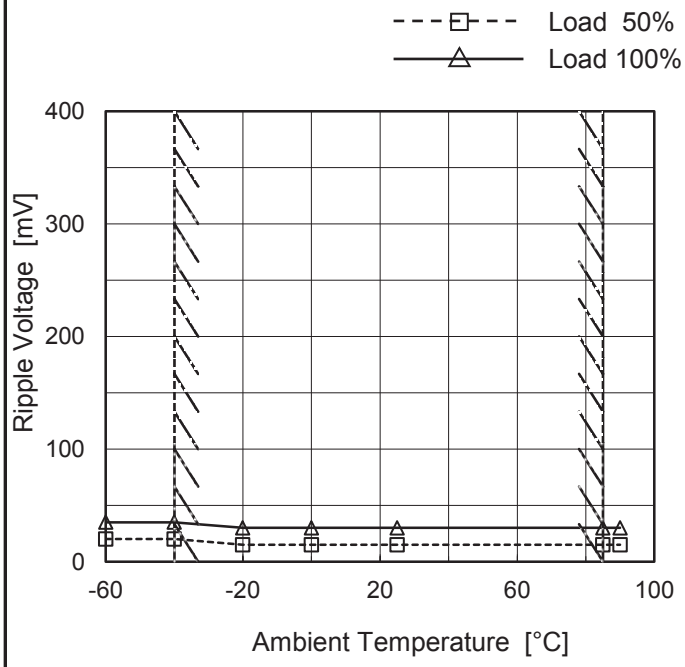
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	20	35
-40	20	35
-20	15	30
0	15	30
25	15	30
85	15	30
90	15	30
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V0.065A

1.Graph



Input Volt. 12V

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	20	35
-40	20	35
-20	15	30
0	15	30
25	15	30
85	15	30
90	15	30
--	-	-
--	-	-
--	-	-
--	-	-

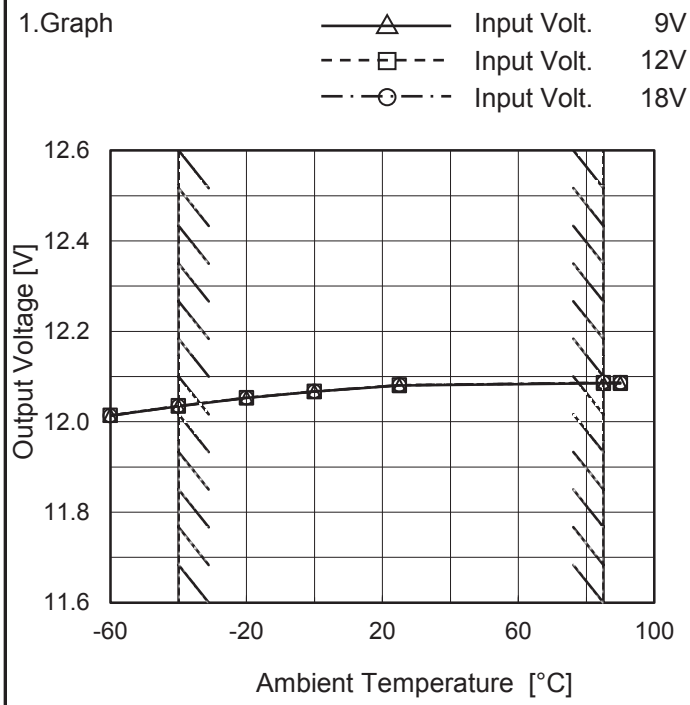
+12V: Rated Load Current

COSEL

Model	MGW1R51212
Item	Ambient Temperature Drift
Object	+12V0.065A

Testing Circuitry Figure A

1.Graph



Load 100%

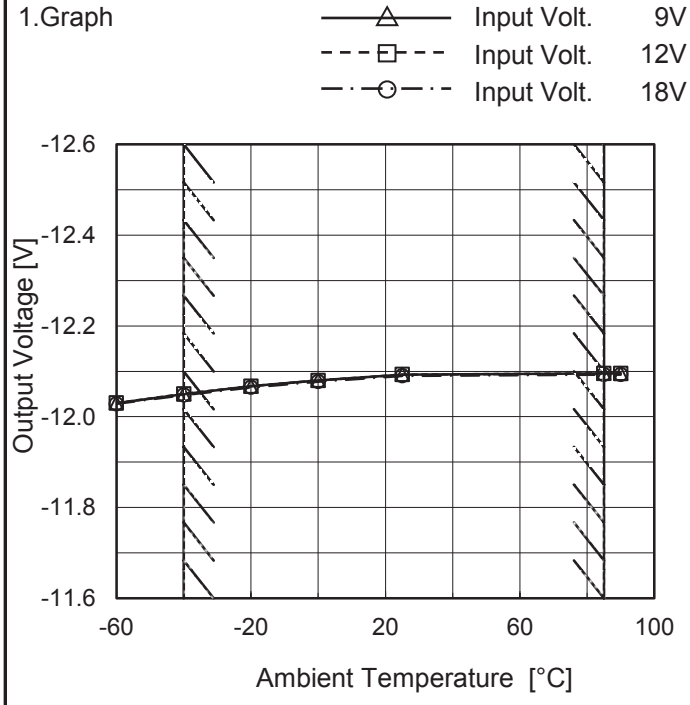
2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	12.014	12.014	12.013
-40	12.035	12.035	12.035
-20	12.053	12.053	12.053
0	12.067	12.067	12.067
25	12.080	12.081	12.081
85	12.085	12.086	12.087
90	12.085	12.086	12.087
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

-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. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	-12.030	-12.030	-12.028
-40	-12.050	-12.050	-12.048
-20	-12.067	-12.067	-12.065
0	-12.080	-12.080	-12.077
25	-12.093	-12.093	-12.090
85	-12.096	-12.095	-12.093
90	-12.095	-12.095	-12.093
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

+12V: Rated Load Current

COSEL

Model	MGW1R51212	
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 : 9 - 18V
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	9	0	12.310	±228	±1.9
Minimum Voltage	-40	9	0.065	11.855		

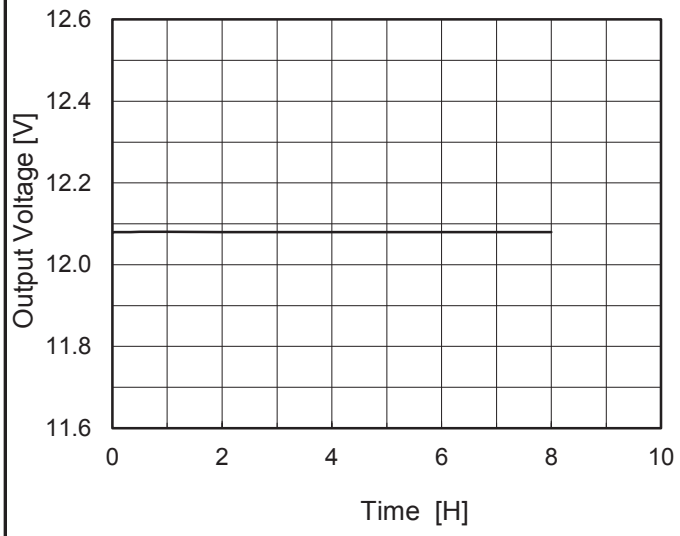
Object	-12V0.065A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	9	0	-12.324	±222	±1.9
Minimum Voltage	-40	9	0.065	-11.880		

COSEL

Model	MGW1R51212
Item	Time Lapse Drift
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 12V
Load 100%

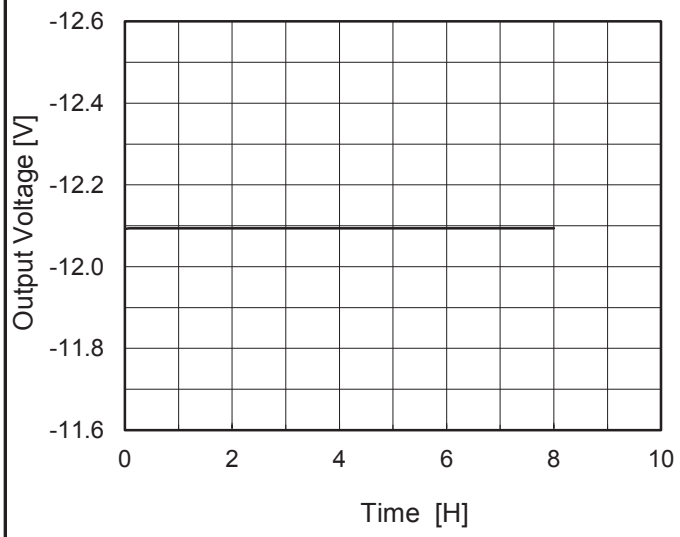
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.079
0.5	12.080
1.0	12.080
2.0	12.080
3.0	12.080
4.0	12.080
5.0	12.080
6.0	12.080
7.0	12.080
8.0	12.080

-12V: Rated Load Current

Object	-12V0.065A

1.Graph



Input Volt. 12V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.092
0.5	-12.094
1.0	-12.094
2.0	-12.094
3.0	-12.094
4.0	-12.094
5.0	-12.094
6.0	-12.094
7.0	-12.094
8.0	-12.094

+12V: Rated Load Current

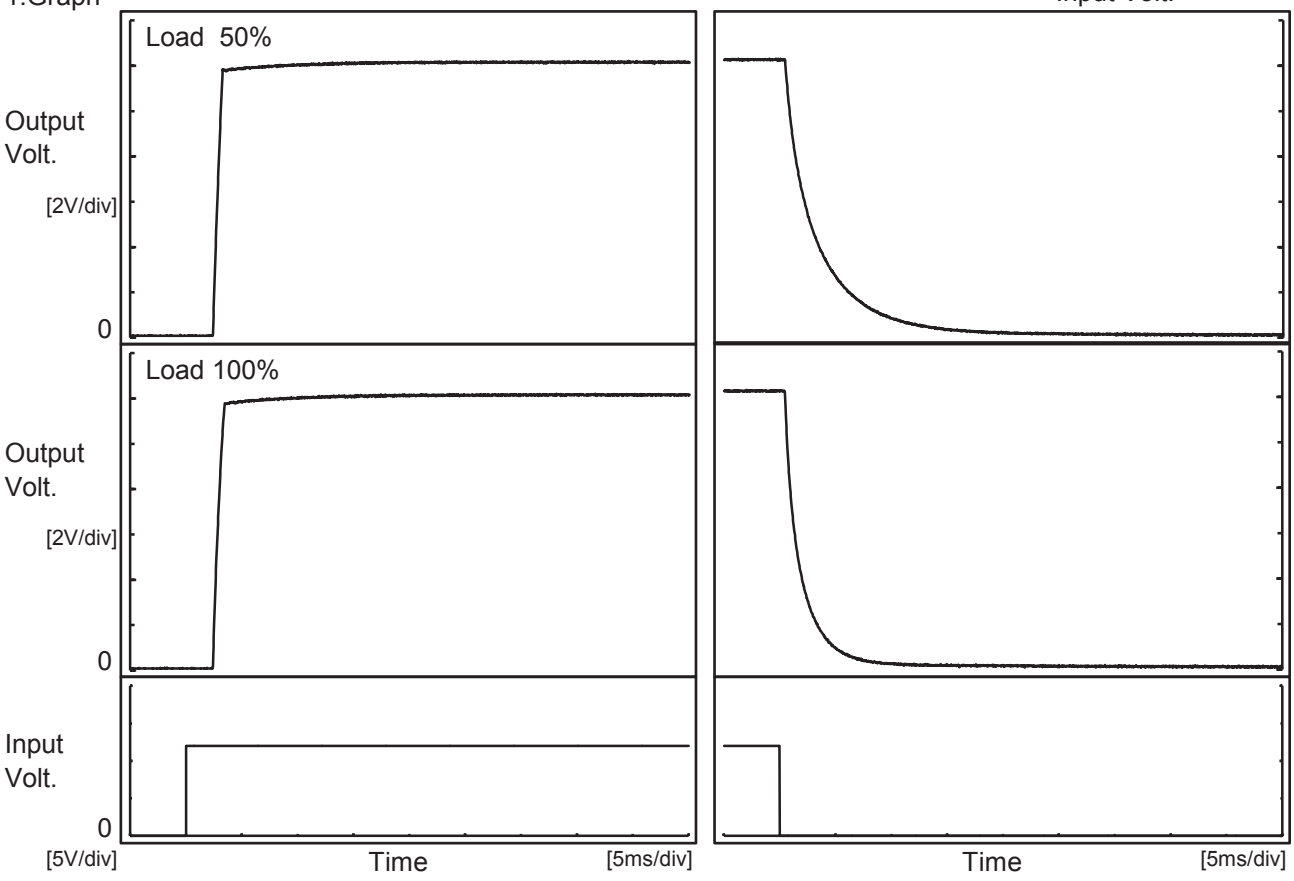
COSEL

Model	MGW1R51212
Item	Rise and Fall Time
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

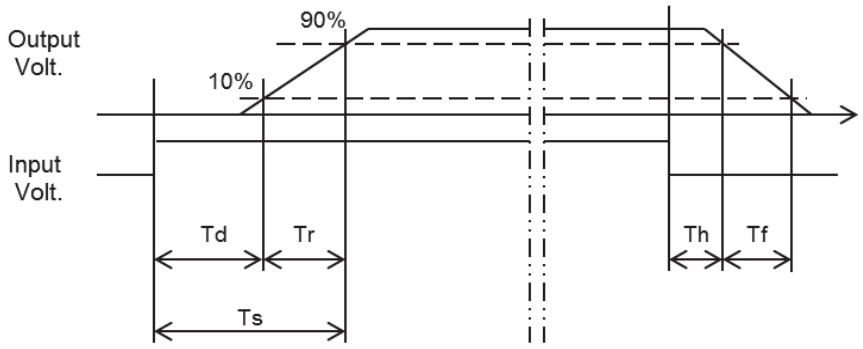
Input Volt. 12 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	2.5	0.7	3.2	0.7	7.4
100 %	2.5	0.9	3.4	0.6	3.7



BC-10956

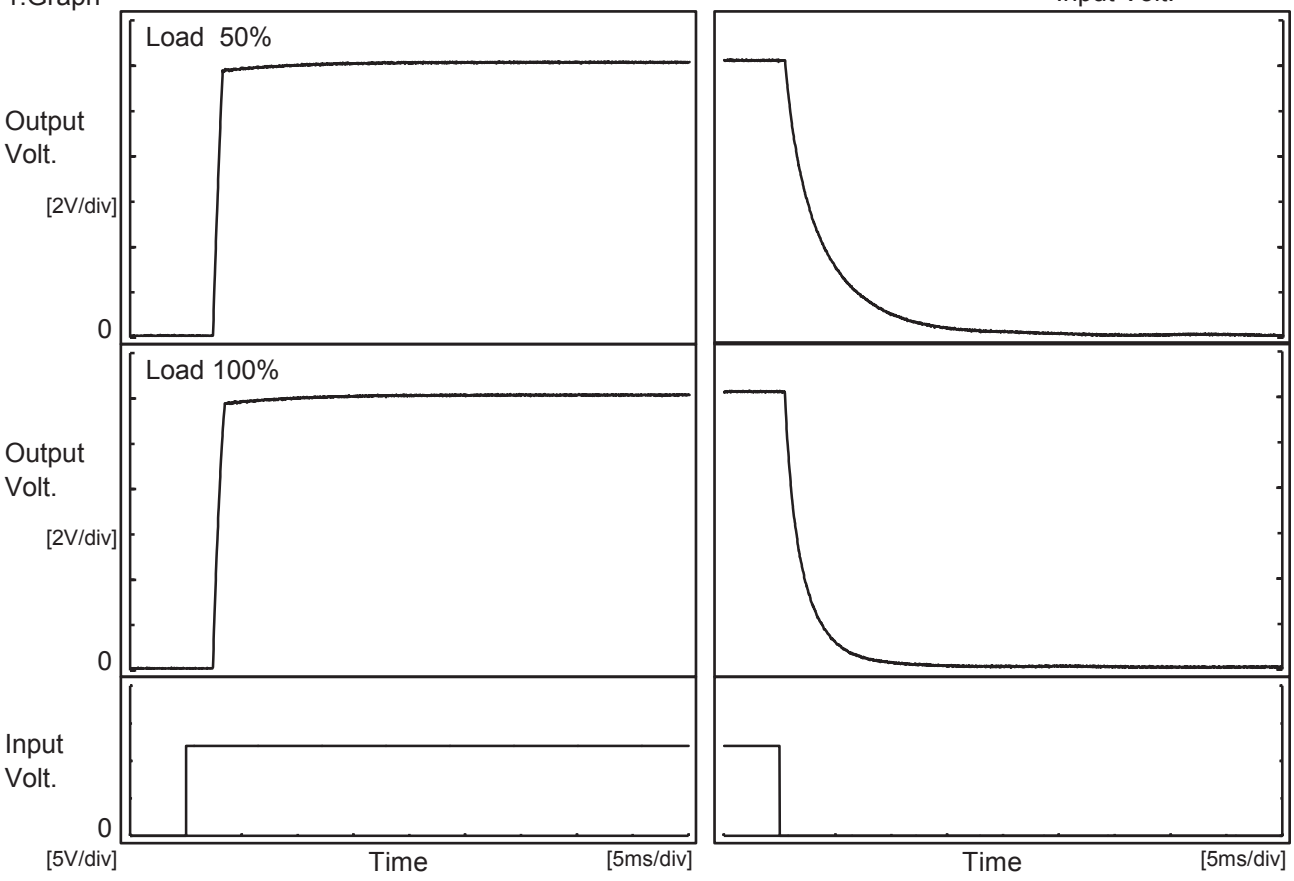
COSEL

Model	MGW1R51212
Item	Rise and Fall Time
Object	-12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

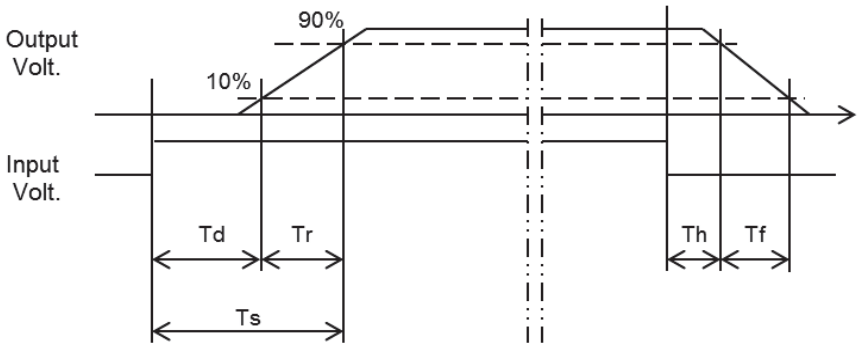
Input Volt. 12 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	2.5	0.7	3.2	0.7	8.3
100 %	2.5	0.9	3.4	0.6	4.3

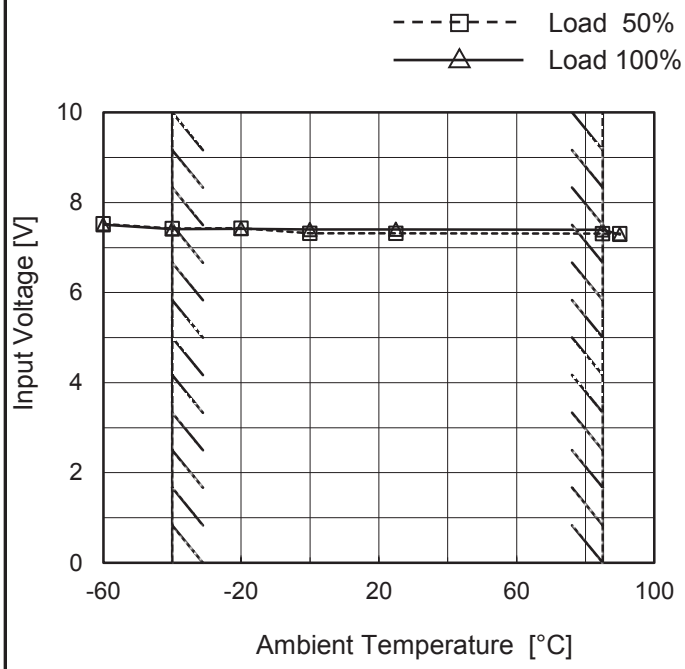


COSEL

Model	MGW1R51212
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.065A

Testing Circuitry Figure A

1.Graph

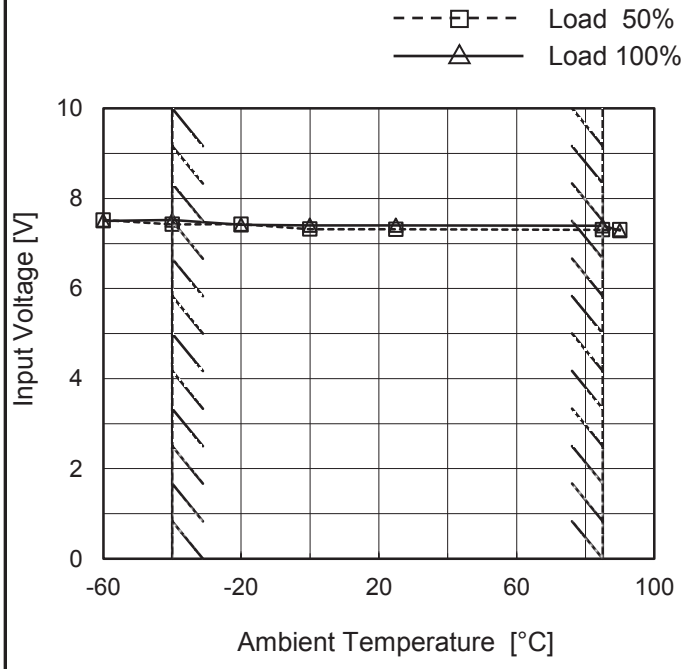


2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	7.6	7.5
-40	7.5	7.5
-20	7.5	7.5
0	7.4	7.4
25	7.4	7.4
85	7.4	7.4
90	7.3	7.3
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.065A

1.Graph



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

2.Values

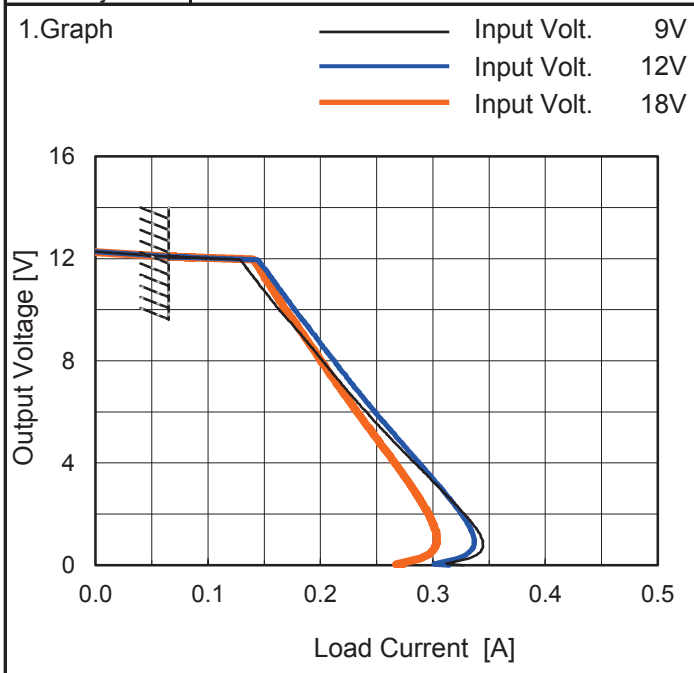
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	7.6	7.5
-40	7.5	7.6
-20	7.5	7.5
0	7.4	7.4
25	7.4	7.4
85	7.3	7.4
90	7.3	7.3
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGW1R51212
Item	Overcurrent Protection
Object	+12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



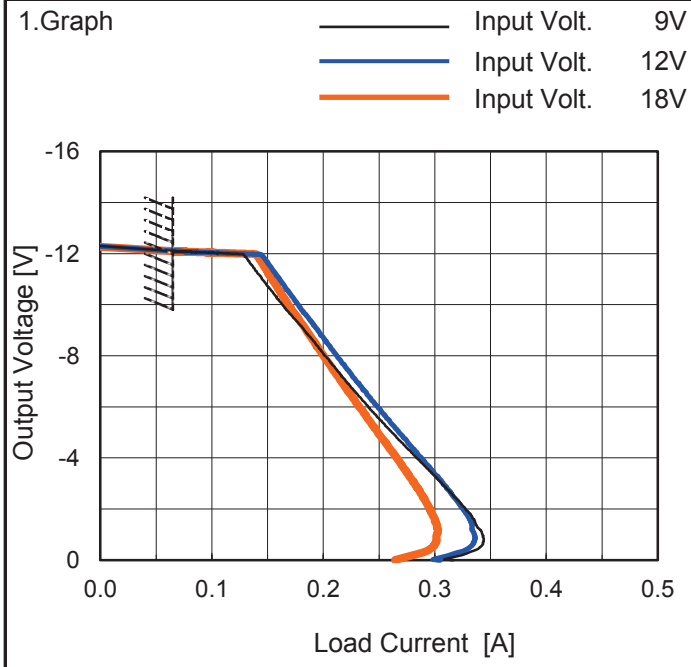
2.Values

Output Voltage [V]	Load Current [A] Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
11.4	0.14	0.15	0.15
10.8	0.15	0.16	0.16
9.6	0.17	0.18	0.18
8.4	0.19	0.20	0.19
7.2	0.22	0.23	0.21
6.0	0.24	0.25	0.23
4.8	0.27	0.27	0.25
3.6	0.29	0.30	0.27
2.4	0.32	0.32	0.29
1.2	0.34	0.34	0.30
0.0	0.33	0.31	0.27
--	-	-	-

-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. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-11.4	0.14	0.15	0.15
-10.8	0.15	0.16	0.16
-9.6	0.17	0.18	0.17
-8.4	0.19	0.21	0.19
-7.2	0.22	0.23	0.21
-6.0	0.24	0.25	0.23
-4.8	0.27	0.27	0.25
-3.6	0.29	0.30	0.27
-2.4	0.32	0.32	0.29
-1.2	0.34	0.33	0.30
0.0	0.32	0.30	0.27
--	-	-	-

+12V: Rated Load Current

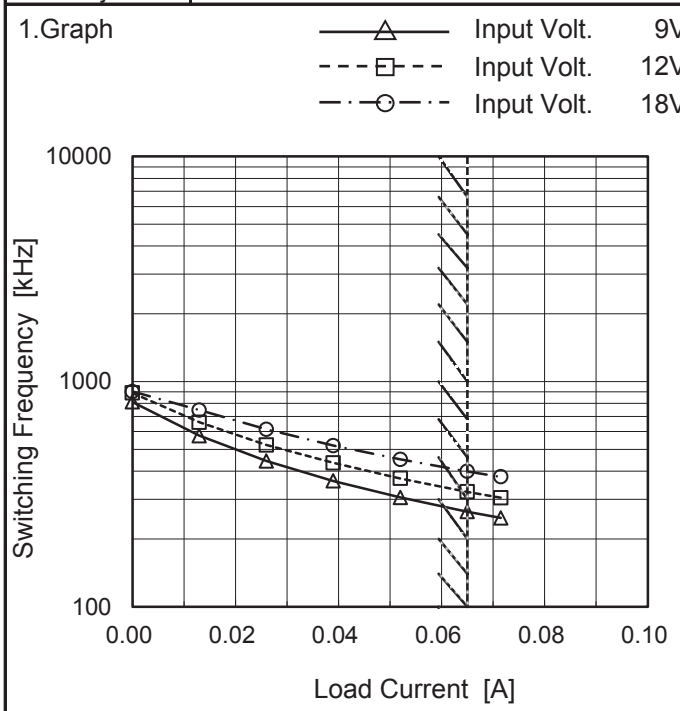
BC-10956

COSEL

Model	MGW1R51212
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. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0.000	812	890	903
0.013	575	660	747
0.026	444	523	614
0.039	362	435	520
0.052	306	372	452
0.065	264	324	399
0.072	248	305	377
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

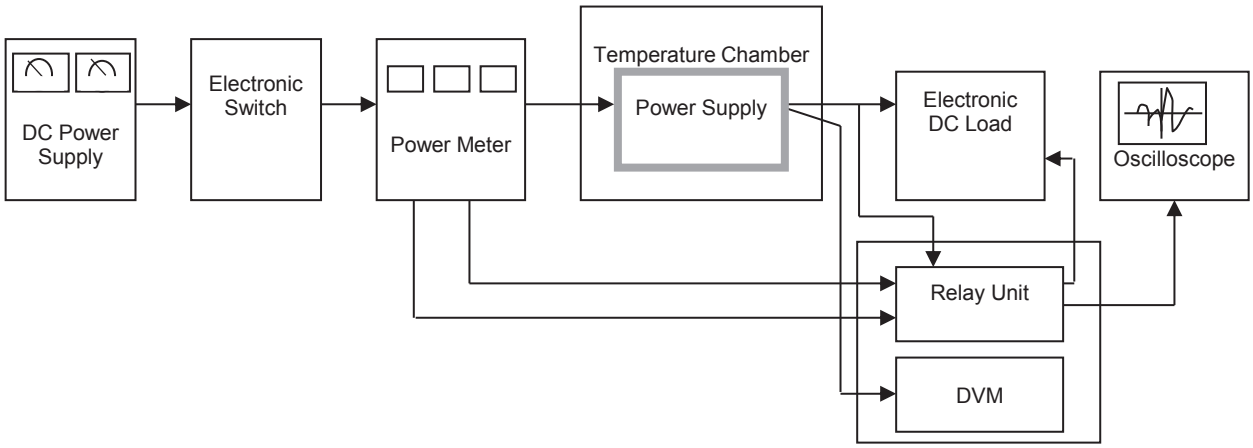


Figure A

Data Acquisition/Control Unit

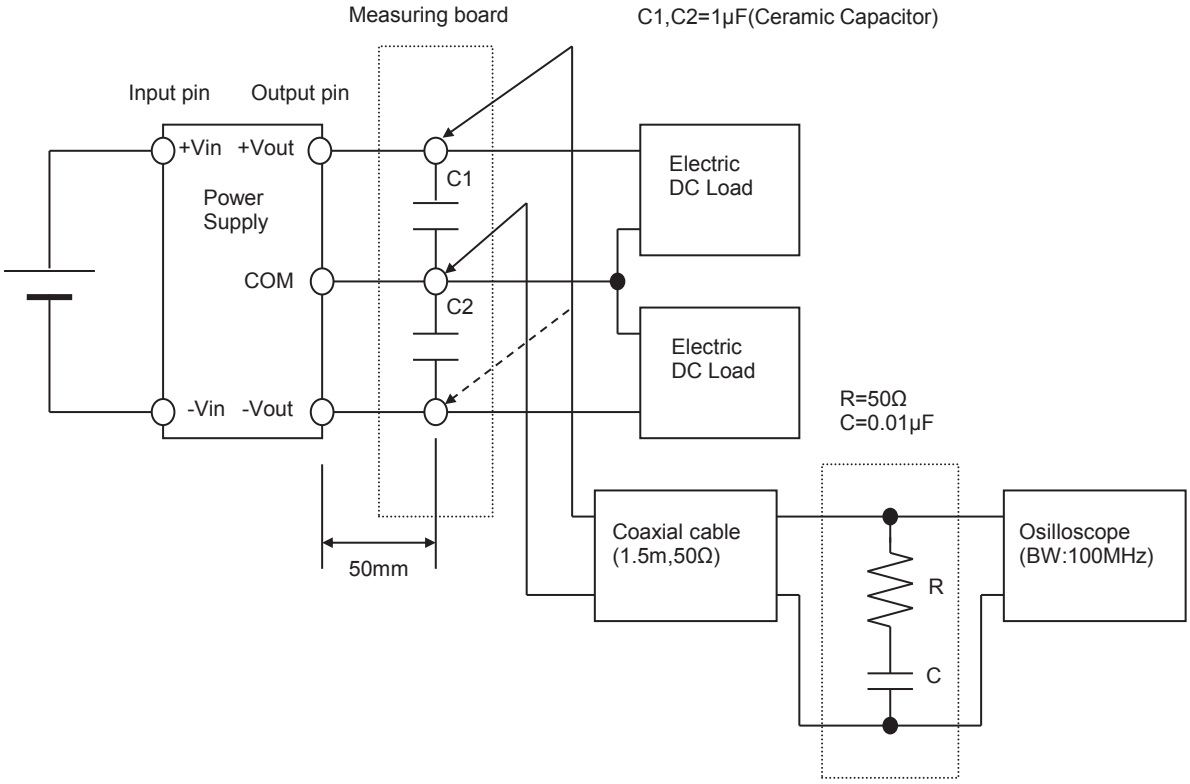


Figure B（Ripple and Ripple noise Characteristic）