参考資料

TEST DATA OF MGFS1R52412

Regulated DC Power Supply
December 29, 2016

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Takaaki Sekiguchi
Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

COSEL

CONTENTS

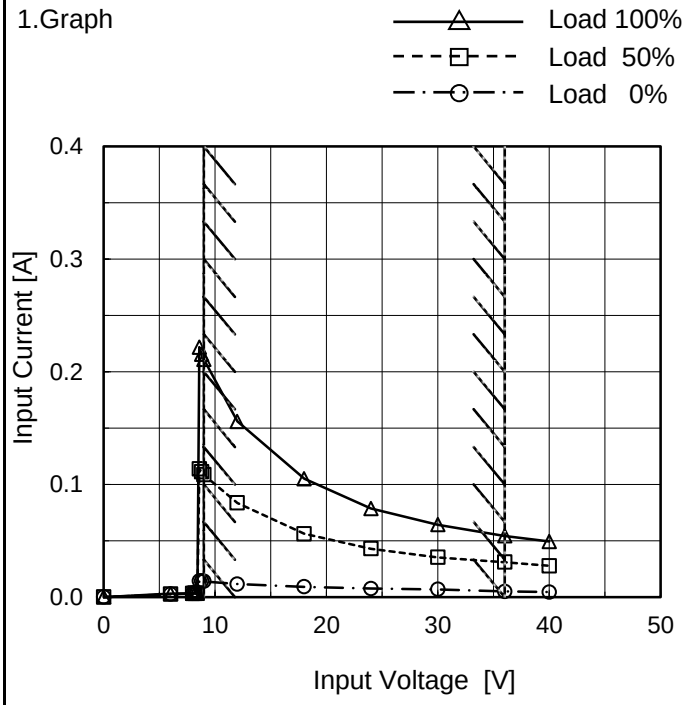
1.Input Current (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・ 1
2.Input Current (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・ 2
3.Input Power (by Load Current) ・・・・・・・・・・・・・・・・・・・・・・・・・ 3
4.Efficiency (by Input Voltage) ・・・・・・・・・・・・・・・・・・・・・・・・・ 4
5.Efficiency (by Load Current)・・・・・・・・・・・・・・・・・・・・・・・・・・ 5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

COSEL

Model	MGFS1R52412
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	0.003	0.003	0.003
8.0	0.003	0.003	0.003
8.2	0.004	0.004	0.003
8.4	0.003	0.003	0.004
8.6	0.014	0.114	0.222
8.8	0.014	0.111	0.216
9.0	0.014	0.109	0.211
12.0	0.012	0.084	0.156
18.0	0.009	0.056	0.105
24.0	0.008	0.043	0.079
30.0	0.007	0.035	0.064
36.0	0.005	0.031	0.054
40.0	0.004	0.028	0.049
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

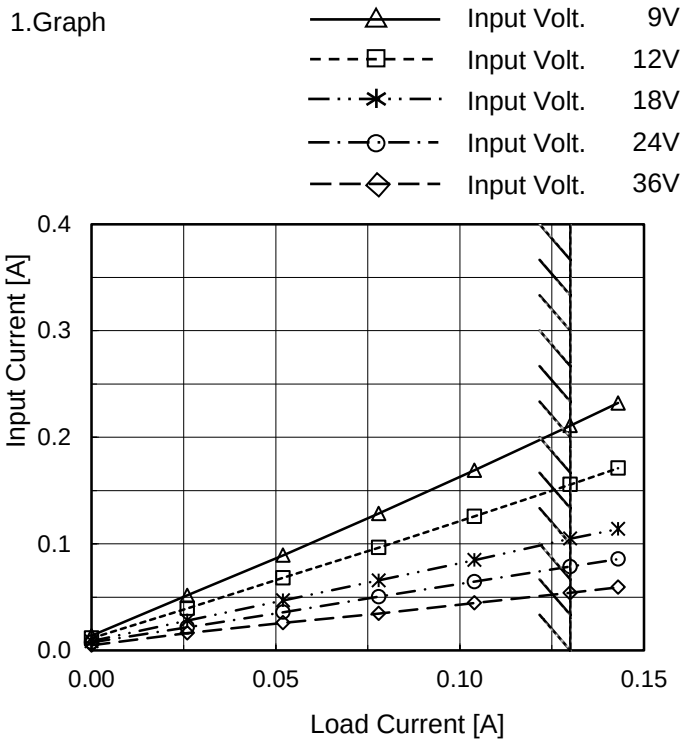
BC-10964

COSEL

Model	MGFS1R52412
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

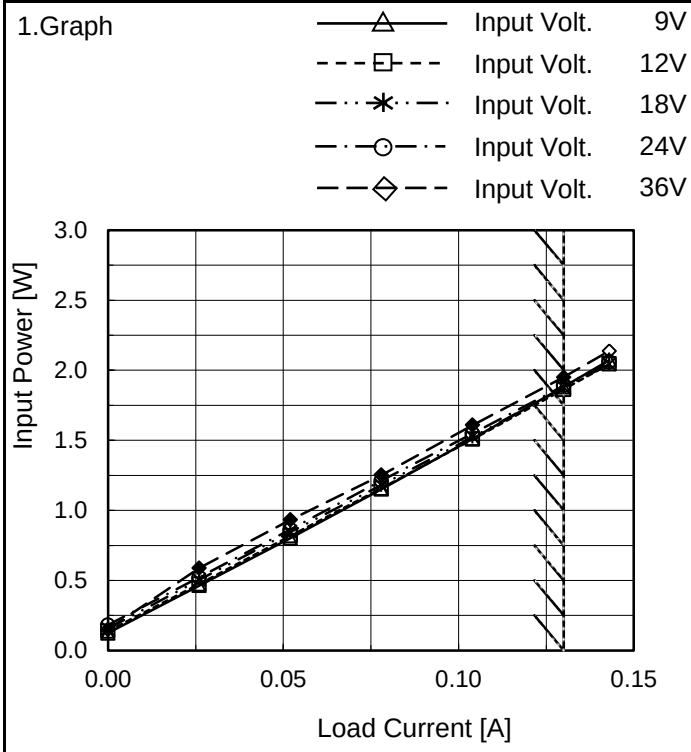
Load Current [A]	Input Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	0.014	0.012	0.009	0.008	0.005
0.026	0.052	0.040	0.028	0.022	0.016
0.052	0.089	0.068	0.047	0.036	0.026
0.078	0.129	0.097	0.066	0.051	0.035
0.104	0.169	0.126	0.085	0.065	0.045
0.130	0.211	0.156	0.105	0.079	0.054
0.143	0.232	0.171	0.114	0.086	0.059
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFS1R52412
Item	Input Power (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

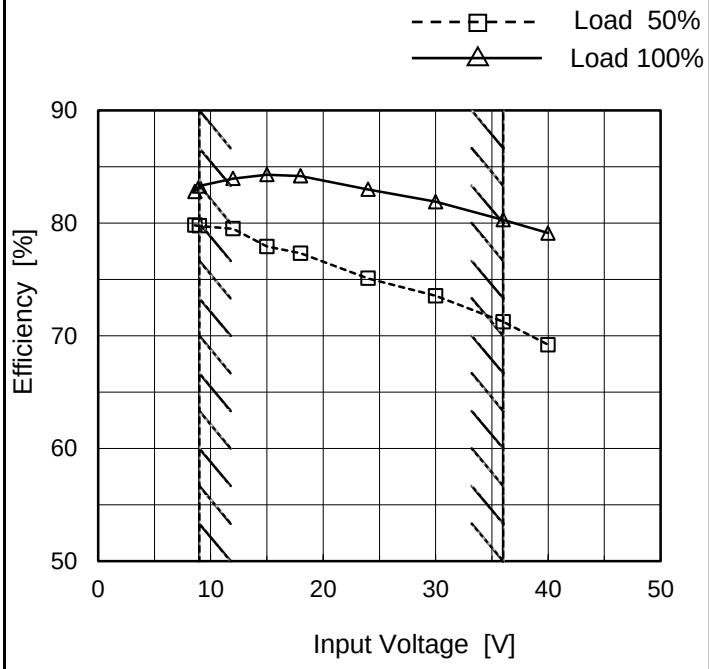
Load Current [A]	Input Power [W]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	0.12	0.14	0.16	0.18	0.15
0.026	0.46	0.47	0.50	0.52	0.59
0.052	0.80	0.82	0.85	0.86	0.93
0.078	1.15	1.16	1.18	1.21	1.25
0.104	1.51	1.51	1.52	1.55	1.61
0.130	1.88	1.86	1.88	1.89	1.95
0.143	2.07	2.04	2.04	2.06	2.14
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFS1R52412
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

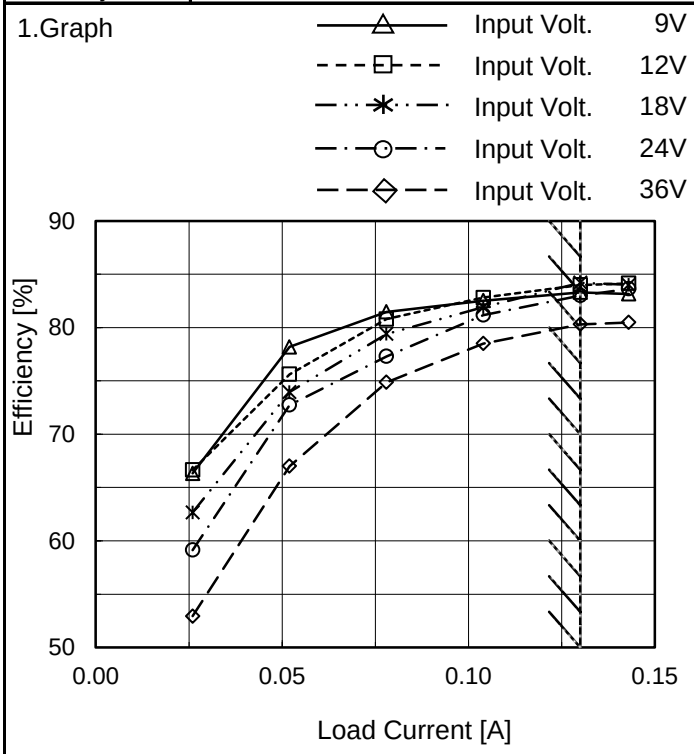
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
8.6	79.8	82.8
9.0	79.8	83.3
12.0	79.5	84.0
15.0	77.9	84.3
18.0	77.3	84.2
24.0	75.1	83.0
30.0	73.6	81.9
36.0	71.2	80.3
40.0	69.2	79.1

COSEL

Model	MGFS1R52412
Item	Efficiency (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

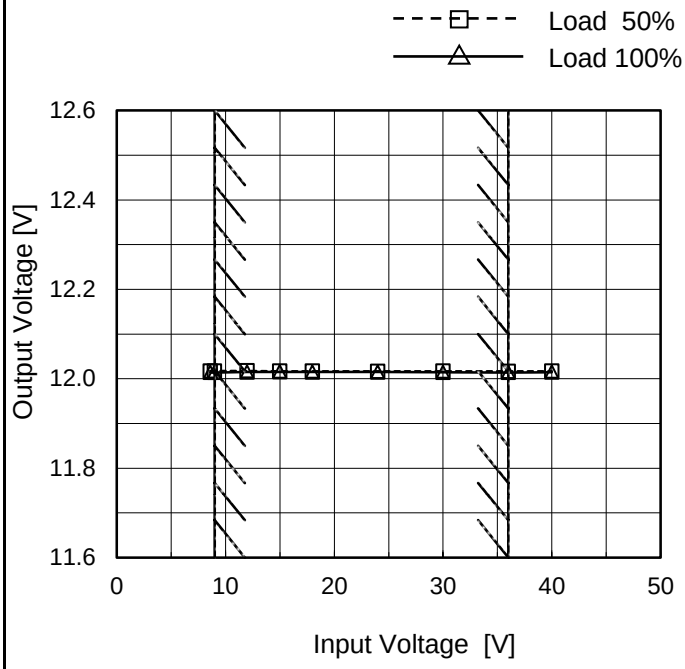
Load Current [A]	Efficiency [%]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	-	-	-	-	-
0.026	66.3	66.6	62.7	59.1	52.9
0.052	78.2	75.6	73.9	72.7	67.0
0.078	81.5	80.8	79.4	77.3	74.9
0.104	82.5	82.8	81.9	81.2	78.5
0.130	83.3	84.0	84.2	83.0	80.3
0.143	83.2	84.1	84.0	83.6	80.5
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFS1R52412
Item	Line Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

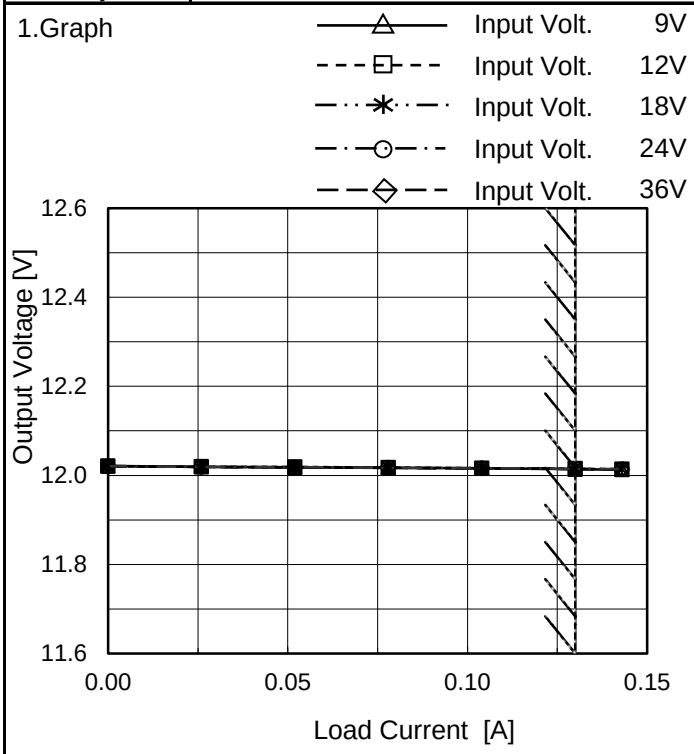
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.6	12.017	12.014
9.0	12.017	12.014
12.0	12.017	12.015
15.0	12.017	12.015
18.0	12.017	12.015
24.0	12.017	12.015
30.0	12.017	12.015
36.0	12.016	12.014
40.0	12.017	12.015

COSEL

Model	MGFS1R52412
Item	Load Regulation
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

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]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	12.021	12.021	12.021	12.020	12.021
0.026	12.019	12.019	12.019	12.019	12.019
0.052	12.018	12.019	12.018	12.018	12.018
0.078	12.017	12.017	12.017	12.017	12.017
0.104	12.016	12.016	12.016	12.016	12.015
0.130	12.014	12.015	12.015	12.015	12.014
0.143	12.013	12.014	12.014	12.014	12.014
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFS1R52412
Item	Dynamic Load Response
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

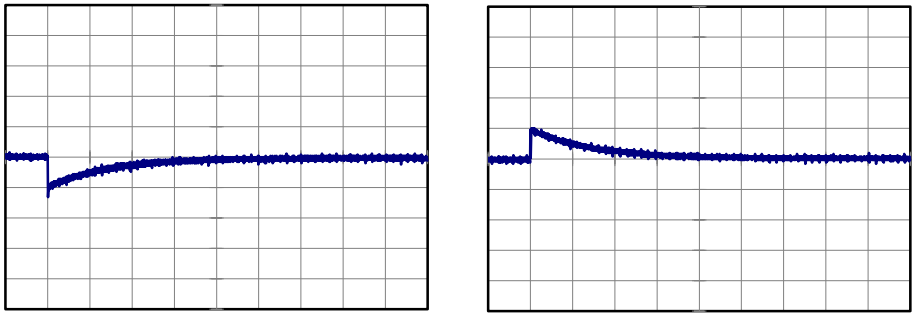
Input Volt. 24 V
Cycle 100 ms

t1,t2 = 100 μs

Load Current

t1 t2

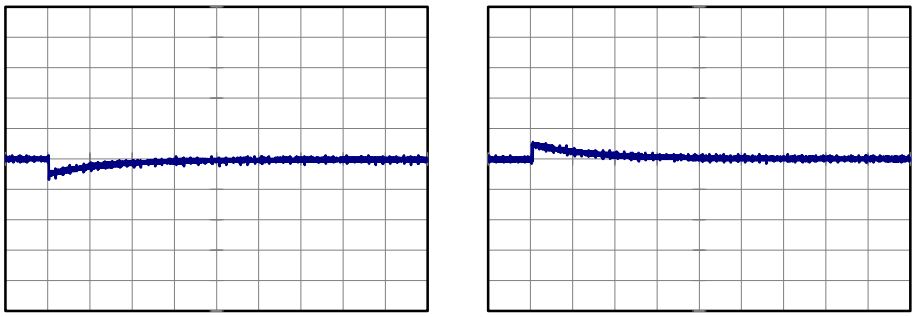
Min.Load (0A)←→
Load 100% (0.13A)



100 mV/div

4 ms/div 4 ms/div

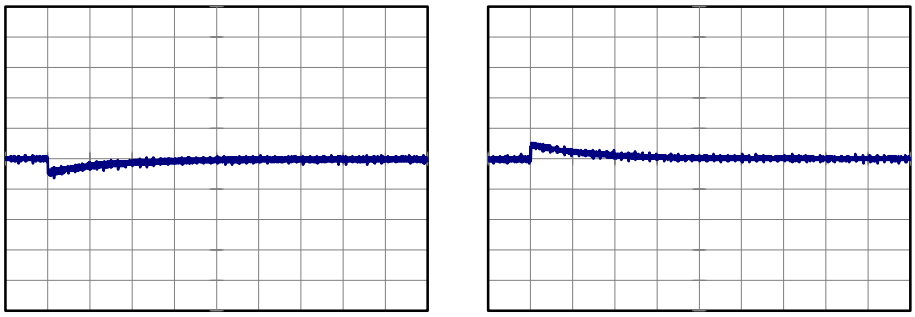
Min.Load (0A)←→
Load 50% (0.065A)



100 mV/div

4 ms/div 4 ms/div

Load 50% (0.065A)←→
Load 100% (0.13A)



100 mV/div

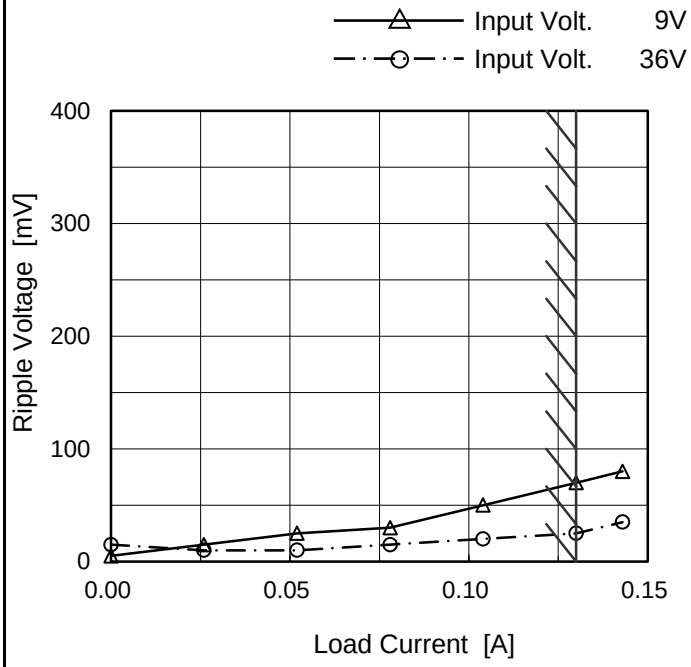
4 ms/div 4 ms/div

COSEL

Model	MGFS1R52412
Item	Ripple Voltage (by Load Current)
Object	+12V0.13A

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]

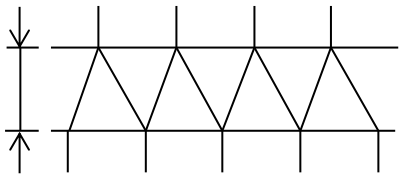


Fig.Complex Ripple Wave Form

2.Values

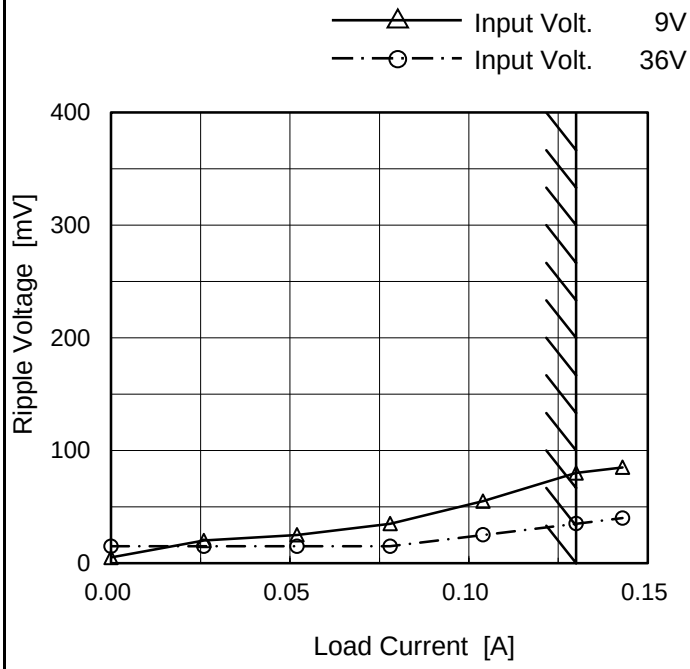
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 9 [V]	Input Volt. 36 [V]
0.000	5	15
0.026	15	10
0.052	25	10
0.078	30	15
0.104	50	20
0.130	70	25
0.143	80	35
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGFS1R52412
Item	Ripple-Noise
Object	+12V0.13A

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]

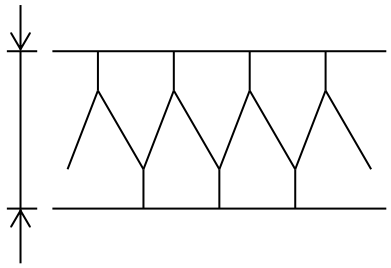


Fig.Complex Ripple Noise Wave Form

2.Values

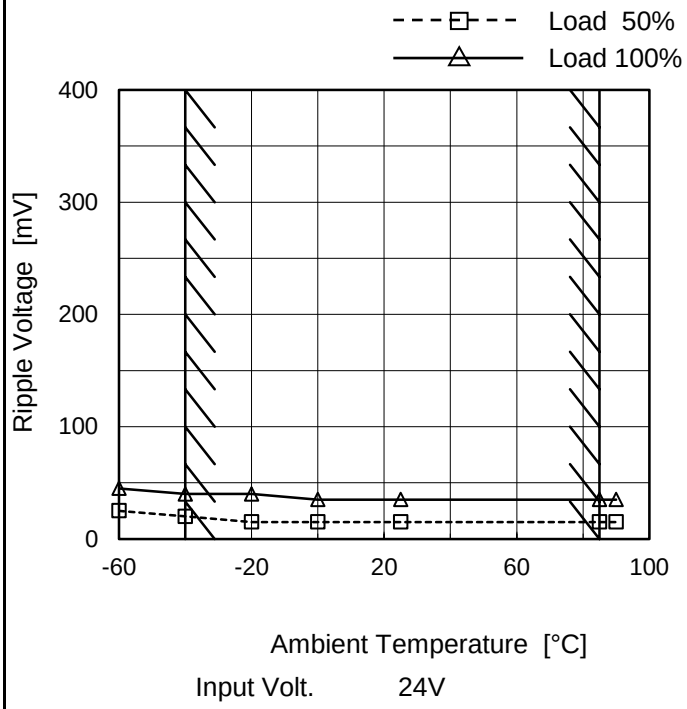
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 36 [V]
0.000	5	15
0.026	20	15
0.052	25	15
0.078	35	15
0.104	55	25
0.130	80	35
0.143	85	40
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGFS1R52412
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.13A

Testing Circuitry Figure B

1.Graph



Input Volt. 24V

Measured by 100 MHz Oscilloscope.

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

2.Values

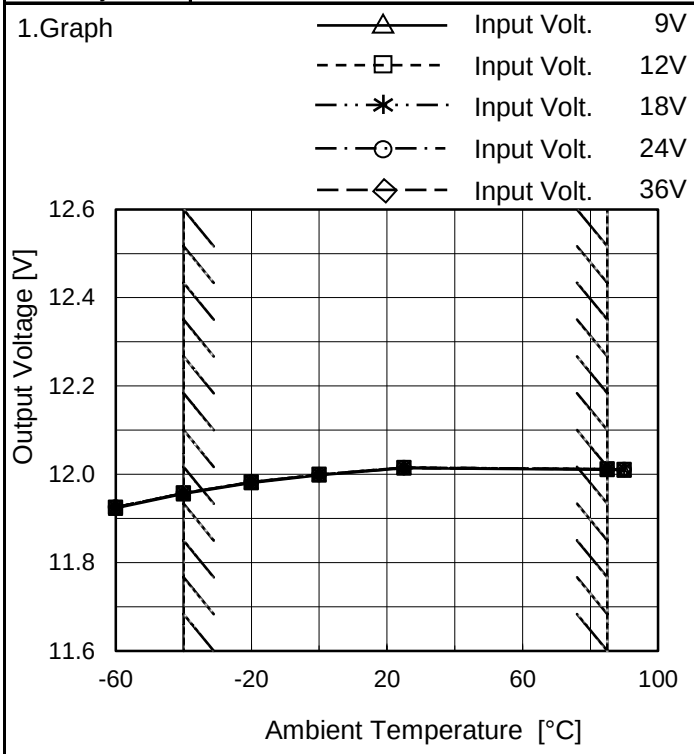
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	25	45
-40	20	40
-20	15	40
0	15	35
25	15	35
85	15	35
90	15	35
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGFS1R52412
Item	Ambient Temperature Drift
Object	+12V0.13A

Testing Circuitry Figure A

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]	Input Volt. 24[V]	Input Volt. 36[V]
-60	11.923	11.925	11.925	11.925	11.926
-40	11.956	11.957	11.957	11.957	11.957
-20	11.981	11.983	11.982	11.982	11.982
0	11.998	11.999	11.999	11.999	11.999
25	12.014	12.015	12.015	12.015	12.014
85	12.011	12.012	12.012	12.012	12.012
90	12.009	12.010	12.010	12.010	12.010
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

Model	MGFS1R52412	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+12V0.13A	

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 - 36V
Load Current : 0 - 0.13A

* 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

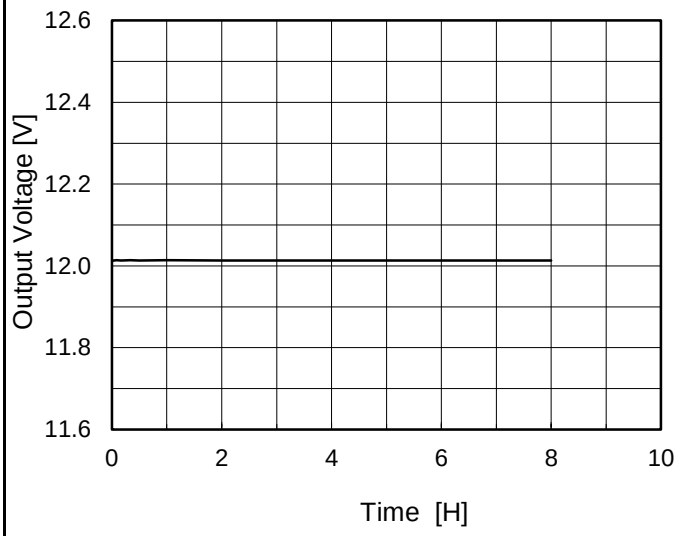
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	75	36	0	12.023	±34	±0.3
Minimum Voltage	-40	9	0.13	11.956		

COSEL

Model	MGFS1R52412
Item	Time Lapse Drift
Object	+12V0.13A

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	12.012
0.5	12.014
1.0	12.014
2.0	12.014
3.0	12.013
4.0	12.014
5.0	12.013
6.0	12.013
7.0	12.013
8.0	12.013

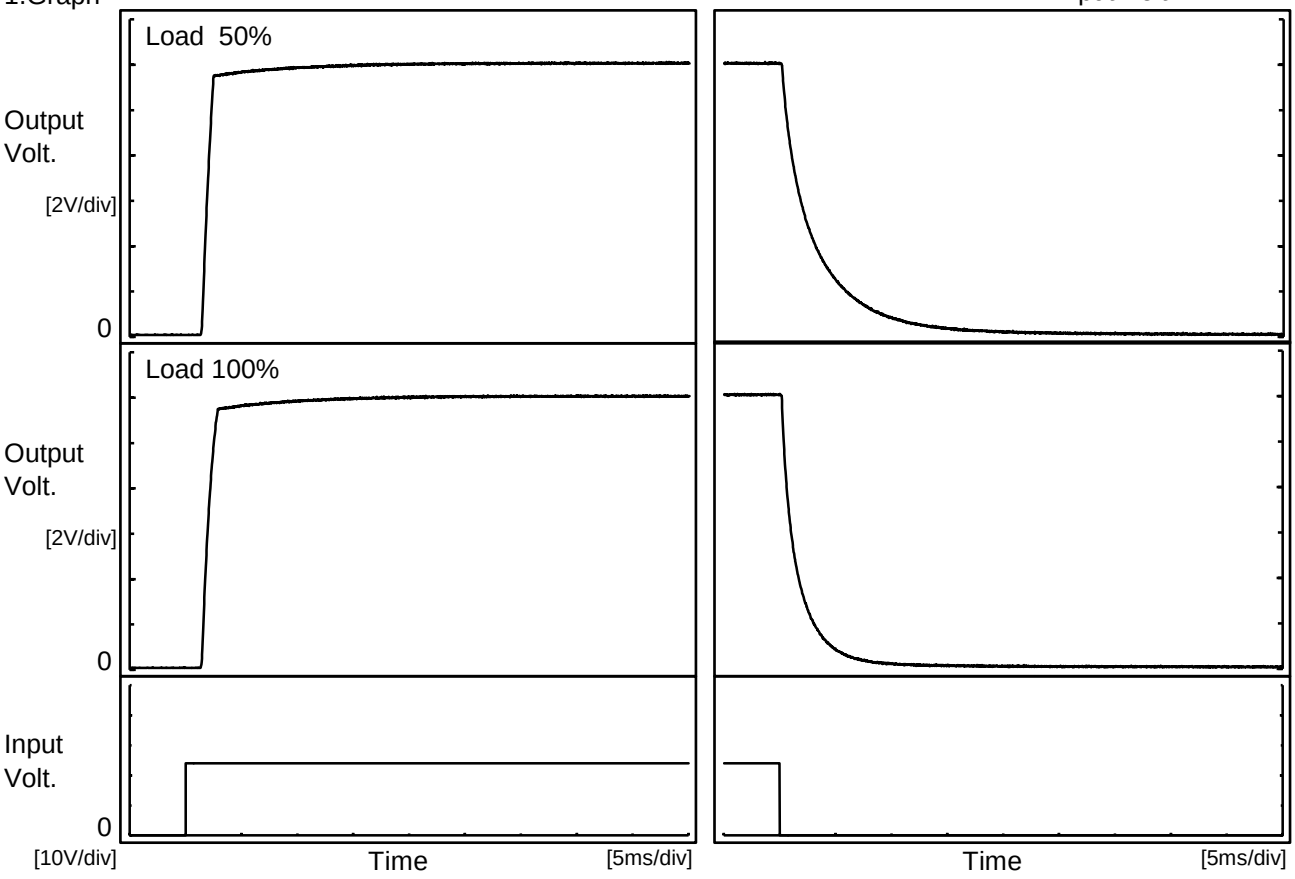
COSEL

Model	MGFS1R52412
Item	Rise and Fall Time
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

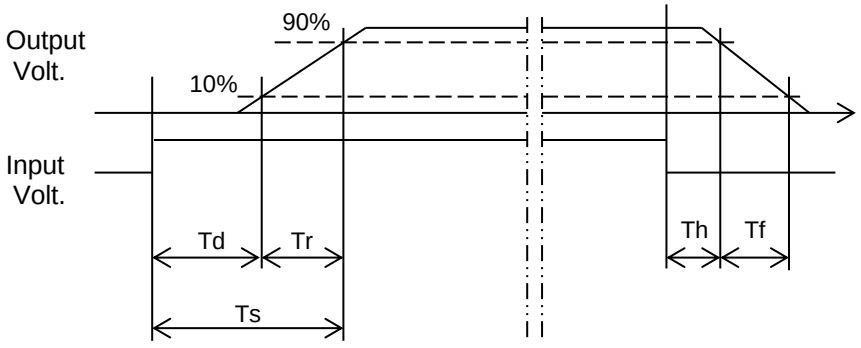
Input Volt. 24 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.6	0.9	2.5	0.4	7.6
100 %	1.6	1.2	2.8	0.3	3.8

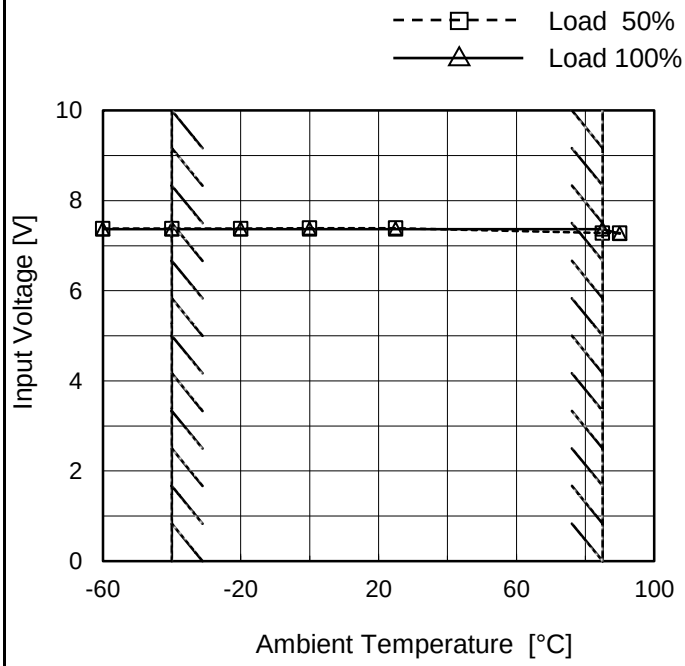


COSEL

Model	MGFS1R52412
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.13A

Testing Circuitry Figure A

1.Graph



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

2.Values

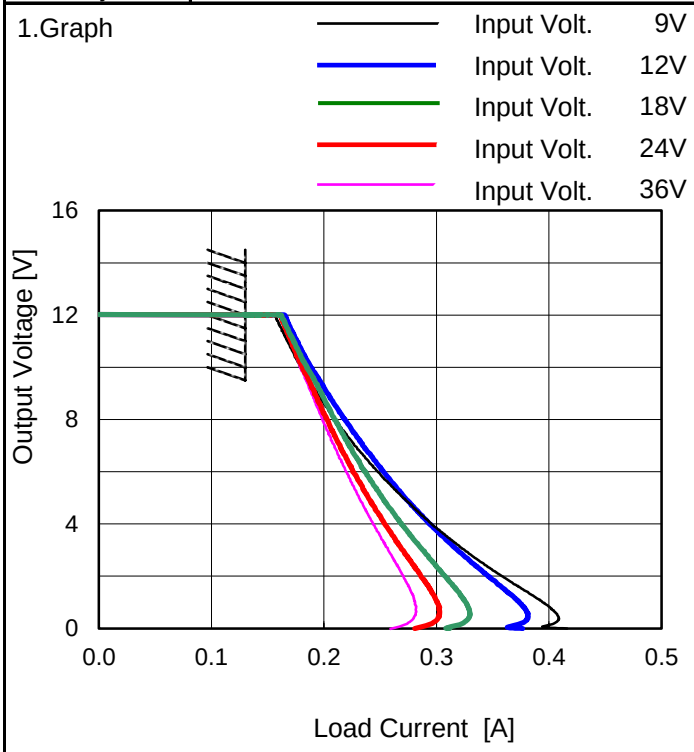
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	7.4	7.4
-40	7.4	7.4
-20	7.4	7.4
0	7.4	7.4
25	7.4	7.4
85	7.3	7.4
90	7.3	7.3
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	MGFS1R52412
Item	Overcurrent Protection
Object	+12V0.13A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

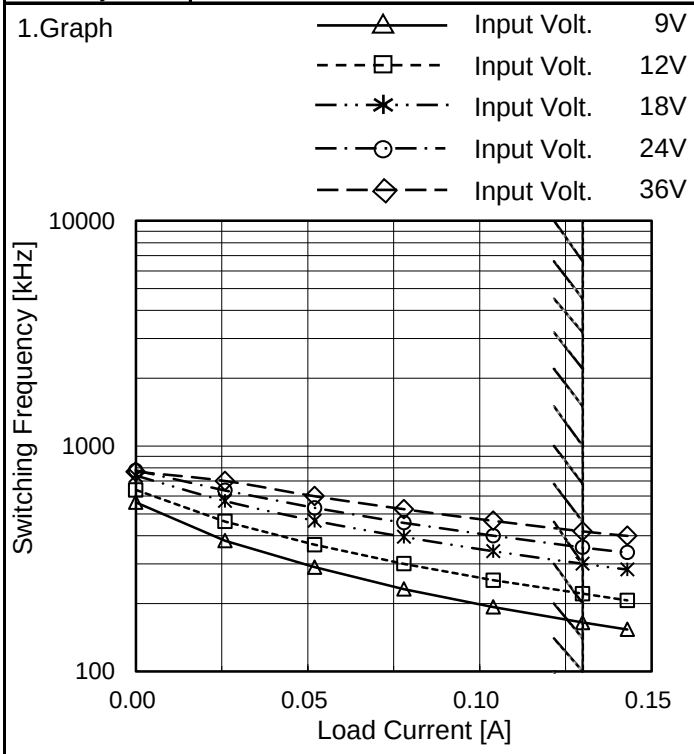
Output Voltage [V]	Load Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
11.4	0.162	0.171	0.168	0.167	0.168
10.8	0.170	0.178	0.175	0.173	0.172
9.6	0.185	0.194	0.191	0.185	0.183
8.4	0.204	0.212	0.205	0.198	0.195
7.2	0.224	0.232	0.220	0.212	0.206
6.0	0.248	0.253	0.237	0.226	0.219
4.8	0.276	0.276	0.255	0.243	0.234
3.6	0.307	0.303	0.276	0.260	0.249
2.4	0.344	0.334	0.299	0.280	0.265
1.2	0.387	0.369	0.323	0.299	0.280
0.0	0.416	0.377	0.312	0.281	0.259
--	-	-	-	-	-

COSEL

Model	MGFS1R52412
Item	Switching frequency (by Load Current)
Object	+12V0.13A

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]	Input Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.000	563	638	740	780	770
0.026	380	463	570	636	700
0.052	290	365	466	532	599
0.078	232	300	395	457	525
0.104	193	254	342	400	466
0.130	165	221	301	355	418
0.143	153	206	283	337	399
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

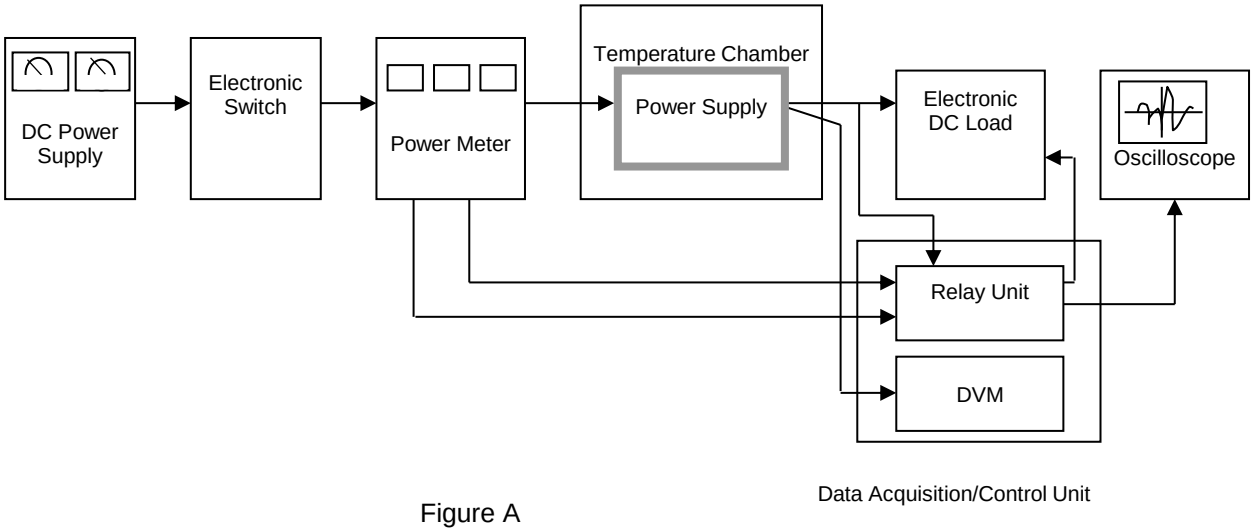


Figure A

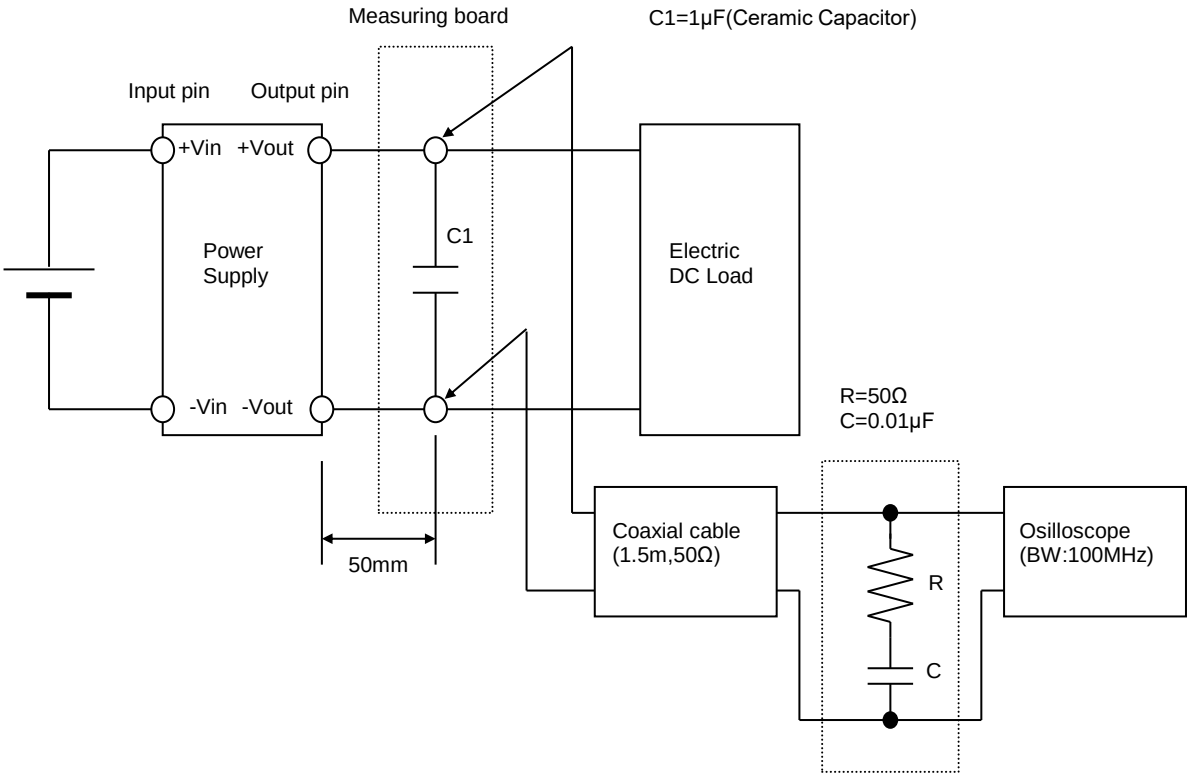


Figure B（Ripple and Ripple noise Characteristic）