COSEL

参考資料

TEST DATA OF MGFW400512

Regulated DC Power Supply
November 28, 2018

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Junichi Hatagishi Design Manager

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Shohei Mukaide Design Engineer

COSEL CO.,LTD.

参考資料

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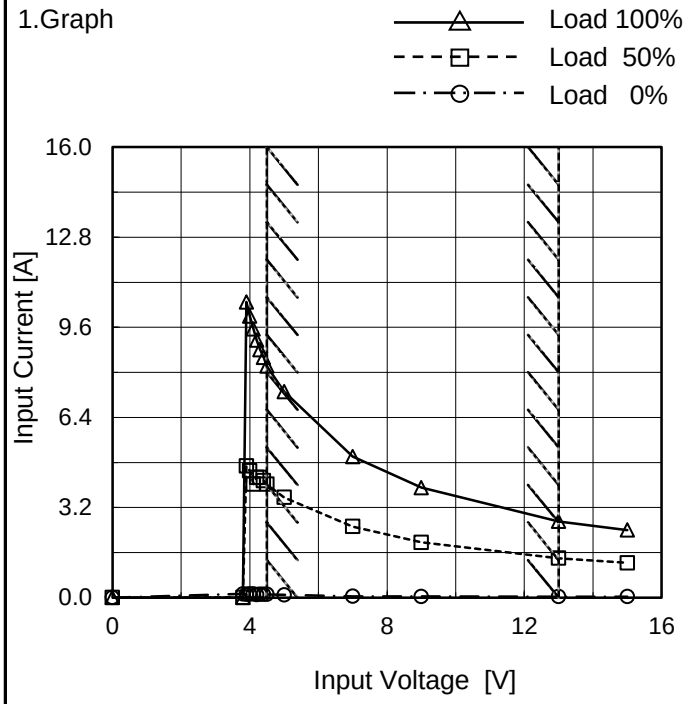
COSEL

Model	MGFW400512
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
3.8	0.133	0.004	0.004
3.9	0.115	4.673	10.498
4.0	0.128	4.503	9.995
4.1	0.126	4.030	9.546
4.2	0.110	4.269	9.146
4.3	0.121	4.267	8.807
4.4	0.119	4.155	8.536
4.5	0.116	4.026	8.223
5.0	0.095	3.557	7.318
7.0	0.049	2.525	5.009
9.0	0.040	1.962	3.904
13.0	0.035	1.399	2.705
15.0	0.035	1.234	2.400
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

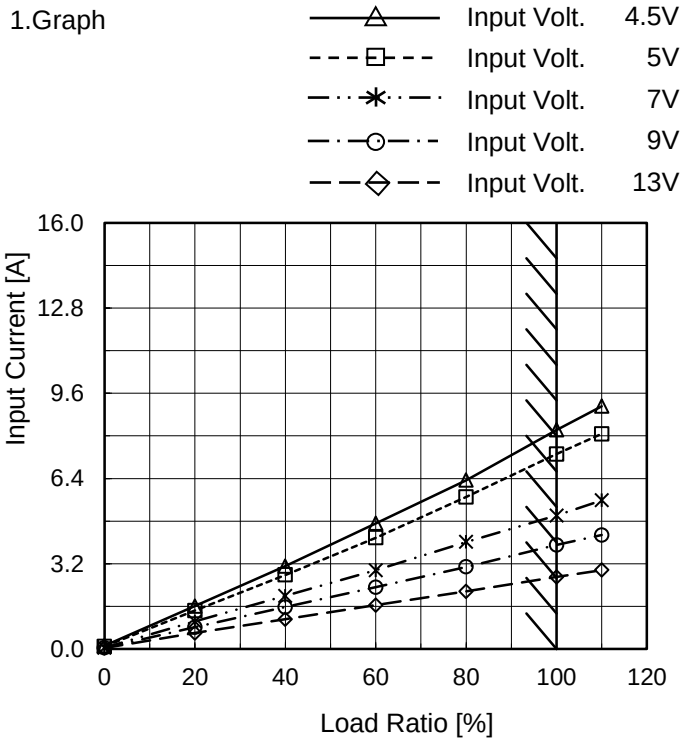
BC-11313

COSEL

Model	MGFW400512
Item	Input Current (by Load Current)
Object	――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

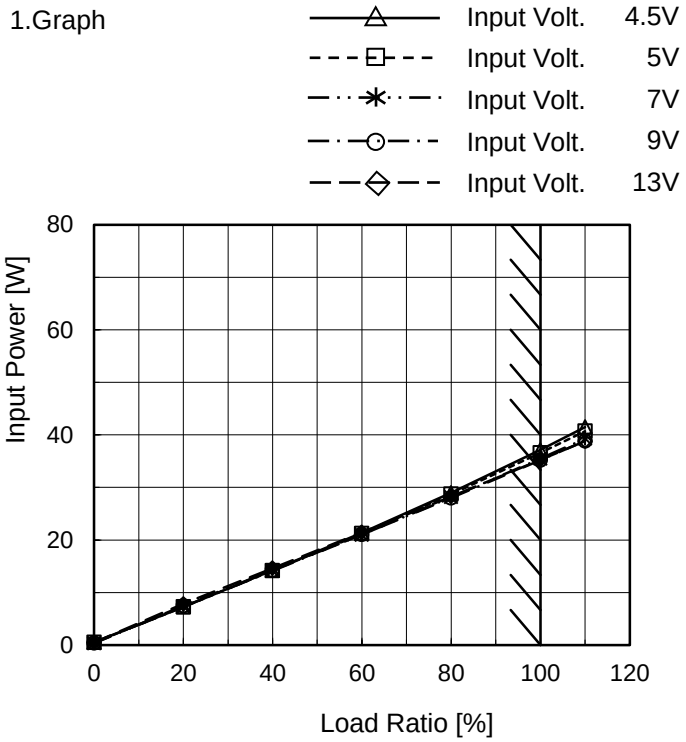
Load Ratio [%]	Input Current [A]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
0	0.116	0.095	0.049	0.040	0.035
20	1.609	1.441	1.032	0.819	0.600
40	3.112	2.779	1.995	1.576	1.118
60	4.715	4.177	2.957	2.318	1.646
80	6.338	5.706	4.018	3.083	2.163
100	8.223	7.318	5.009	3.904	2.705
110	9.111	8.072	5.580	4.274	2.963
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFW400512
Item	Input Power (by Load Current)
Object	――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

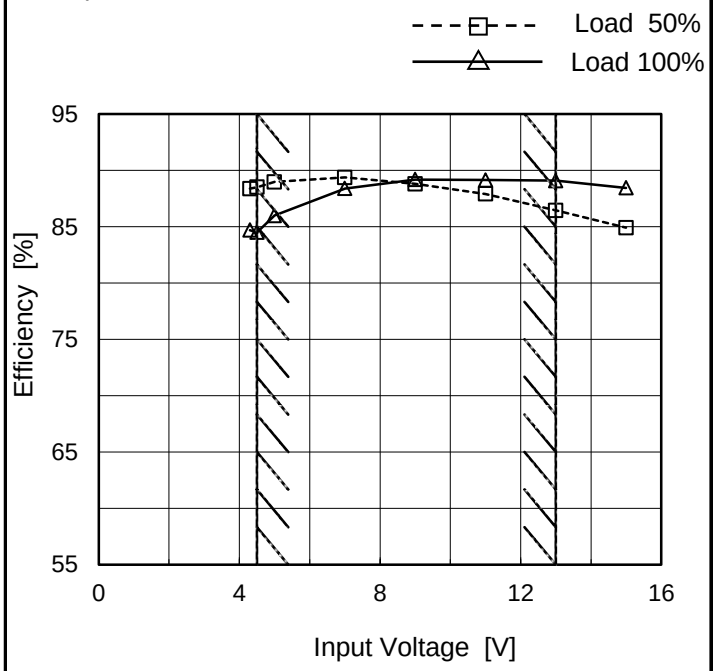
Load Ratio [%]	Input Power [W]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
0	0.53	0.48	0.35	0.36	0.45
20	7.26	7.26	7.32	7.45	7.82
40	14.23	14.18	14.15	14.23	14.62
60	21.35	21.20	20.99	21.03	21.44
80	28.96	28.69	28.14	28.01	28.27
100	37.15	36.58	35.50	35.19	35.24
110	41.51	40.69	39.29	38.83	38.80
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFW400512
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

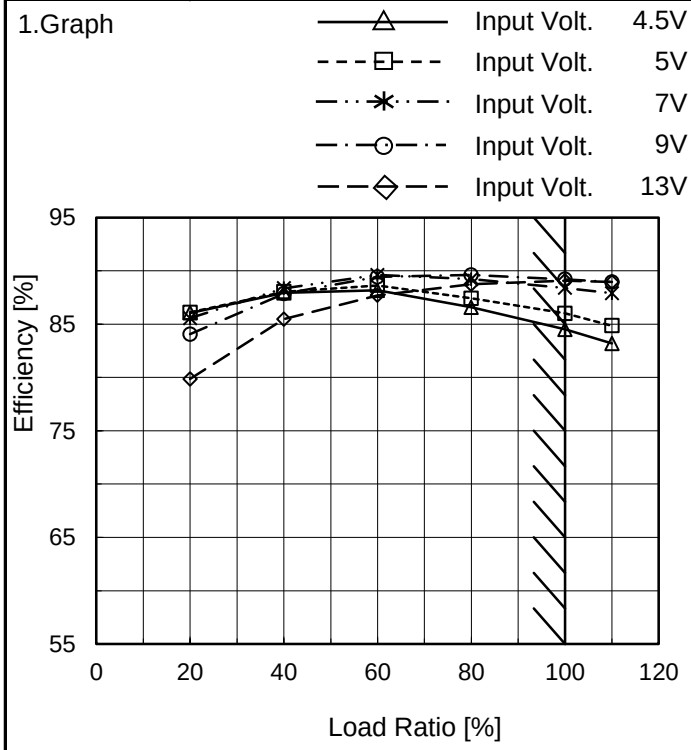
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
4.3	88.4	84.7
4.5	88.5	84.5
5.0	89.0	86.0
7.0	89.4	88.4
9.0	88.8	89.2
11.0	87.9	89.1
13.0	86.5	89.1
15.0	84.9	88.4
--	-	-

COSEL

Model	MGFW400512
Item	Efficiency (by Load Current)
Object	――――――――

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

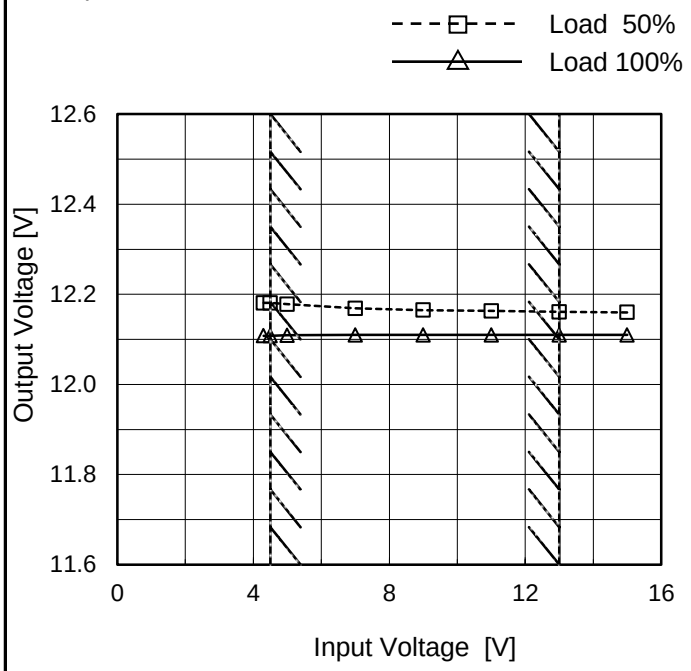
Load Ratio [%]	Efficiency [%]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
0	-	-	-	-	-
20	86.1	86.1	85.6	84.1	79.9
40	87.9	88.0	88.4	87.9	85.5
60	88.2	88.6	89.6	89.4	87.7
80	86.6	87.4	89.2	89.6	88.7
100	84.5	86.0	88.4	89.2	89.1
110	83.2	84.8	87.9	88.9	88.9
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFW400512
Item	Line Regulation
Object	+12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



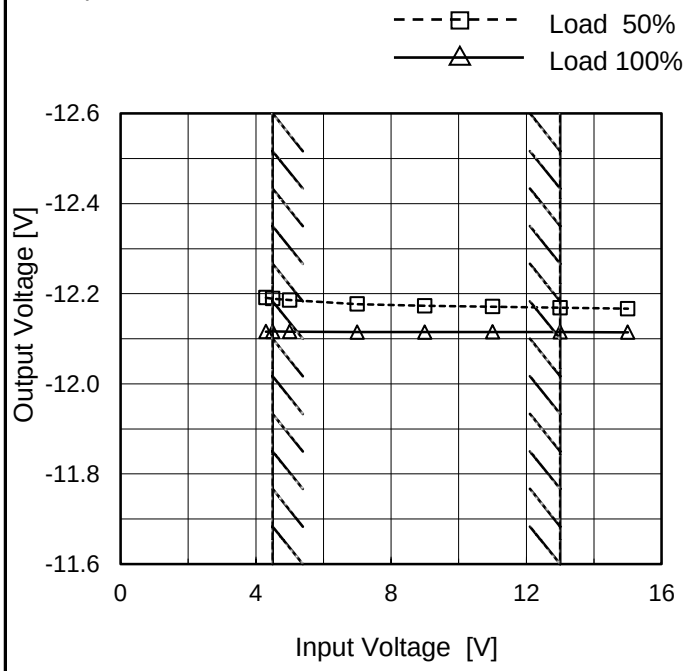
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.3	12.181	12.108
4.5	12.181	12.108
5.0	12.178	12.109
7.0	12.169	12.110
9.0	12.165	12.110
11.0	12.163	12.110
13.0	12.161	12.110
15.0	12.160	12.110
--	-	-

-12V: Rated Load Current

Object	-12V1.3A

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%
4.3	-12.191	-12.116
4.5	-12.189	-12.116
5.0	-12.186	-12.116
7.0	-12.177	-12.115
9.0	-12.173	-12.115
11.0	-12.171	-12.115
13.0	-12.169	-12.115
15.0	-12.167	-12.115
--	-	-

+12V: Rated Load Current

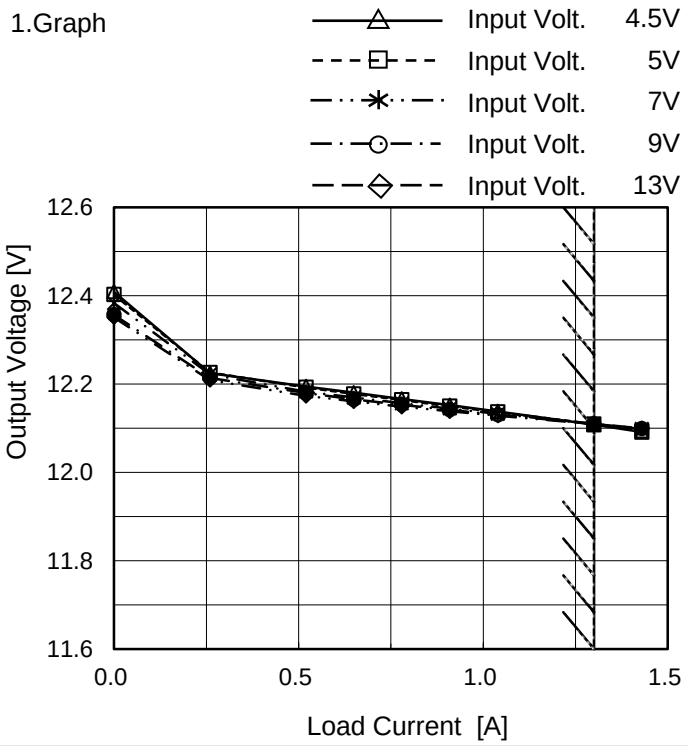
BC-11313

COSEL

Model	MGFW400512
Item	Load Regulation
Object	+12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



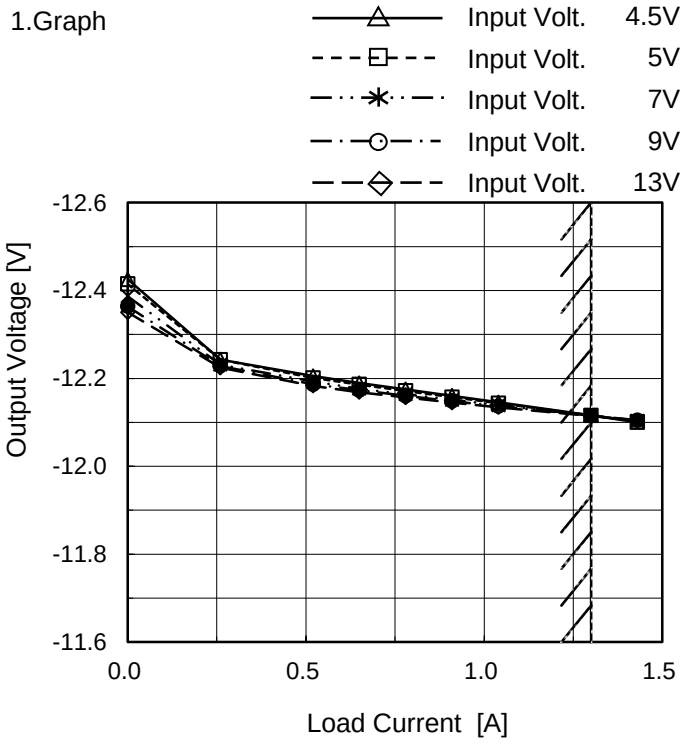
2.Values

Load Current [A]	Output Voltage [V] Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
0.00	12.409	12.403	12.384	12.357	12.351
0.26	12.225	12.226	12.222	12.214	12.209
0.52	12.195	12.193	12.183	12.180	12.173
0.65	12.181	12.178	12.169	12.165	12.161
0.78	12.166	12.164	12.156	12.153	12.149
0.91	12.152	12.150	12.144	12.142	12.138
1.04	12.138	12.137	12.133	12.131	12.129
1.30	12.108	12.109	12.110	12.110	12.110
1.43	12.091	12.094	12.098	12.099	12.100
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V1.3A

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. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
0.00	-12.425	-12.415	-12.387	-12.364	-12.350
0.26	-12.243	-12.242	-12.231	-12.228	-12.224
0.52	-12.205	-12.201	-12.193	-12.187	-12.183
0.65	-12.189	-12.186	-12.177	-12.173	-12.169
0.78	-12.175	-12.172	-12.164	-12.160	-12.157
0.91	-12.161	-12.157	-12.151	-12.148	-12.145
1.04	-12.146	-12.143	-12.139	-12.137	-12.134
1.30	-12.116	-12.116	-12.115	-12.115	-12.115
1.43	-12.100	-12.101	-12.103	-12.105	-12.104
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

COSEL

Model	MGFW400512	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+12V1.3A	

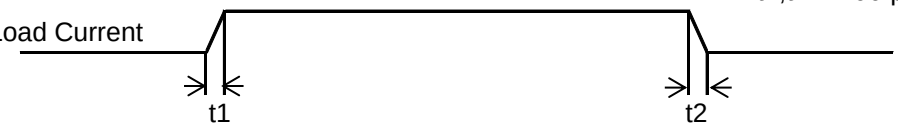
Input Volt. 5 V

-12V:rated load current.

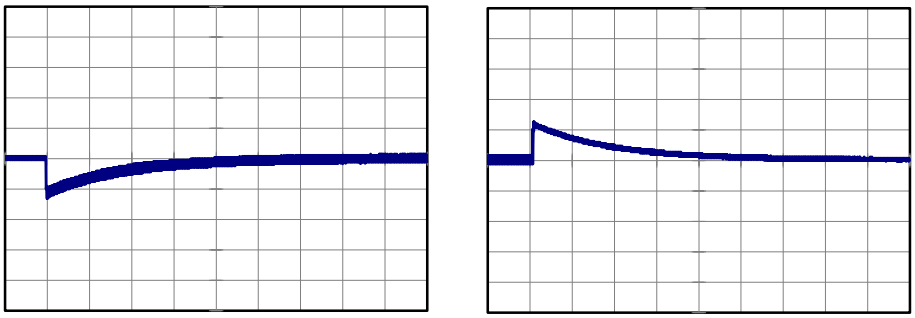
Cycle 100 ms

t1,t2 = 100 μ s

Load Current



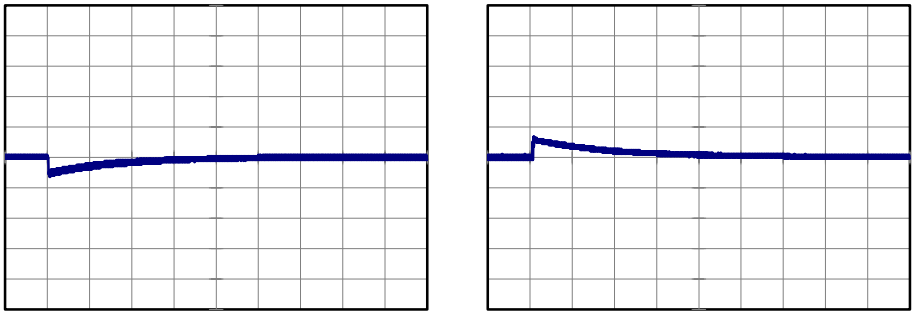
Min.Load (0A)←→
Load 100% (1.3A)



200 mV/div

2 ms/div 2 ms/div

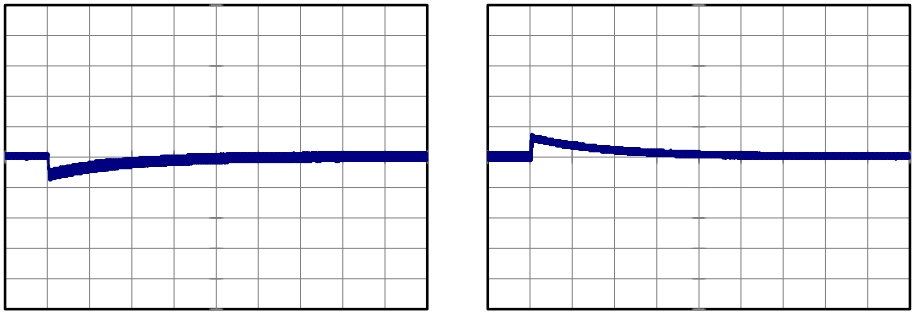
Min.Load (0A)←→
Load 50% (0.65A)



200 mV/div

2 ms/div 2 ms/div

Load 50% (0.65A)←→
Load 100% (1.3A)



200 mV/div

2 ms/div 2 ms/div

COSEL

Model	MGFW400512	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	-12V1.3A	

Input Volt. 5 V

+12V:rated load current.

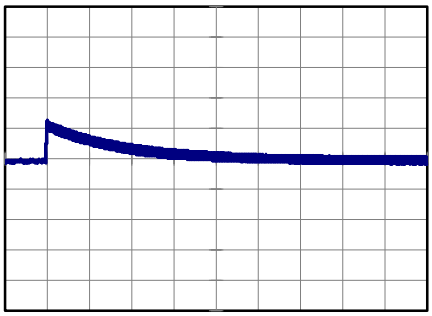
Cycle 100 ms

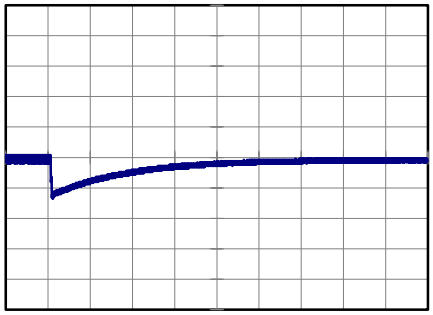
t1,t2 = 100 μ s

Load Current

t1 t2

Min.Load (0A)←→
Load 100% (1.3A)

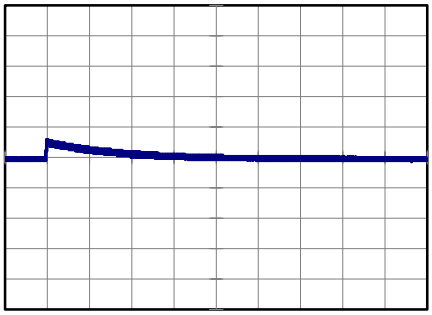


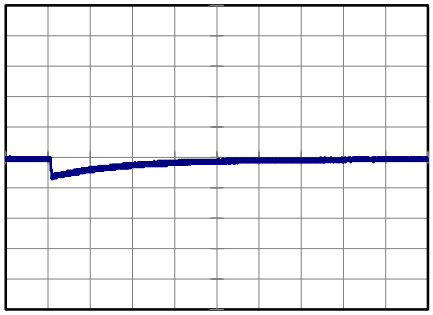


200 mV/div

2 ms/div 2 ms/div

Min.Load (0A)←→
Load 50% (0.65A)

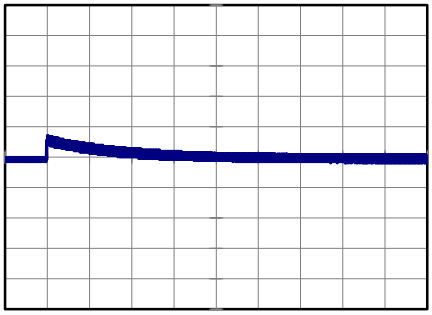


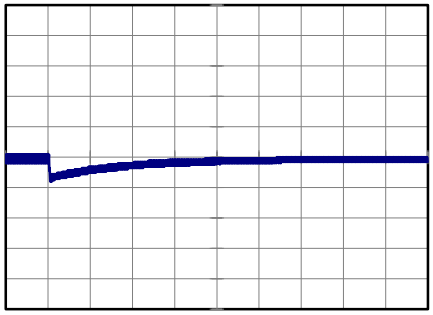


200 mV/div

2 ms/div 2 ms/div

Load 50% (0.65A)←→
Load 100% (1.3A)





200 mV/div

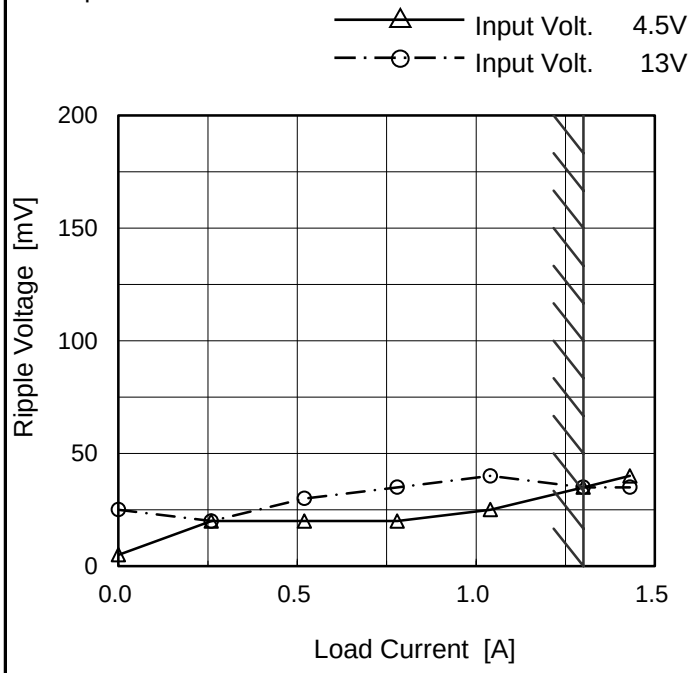
2 ms/div 2 ms/div

COSEL

Model	MGFW400512
Item	Ripple Voltage (by Load Current)
Object	+12V1.3A

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]

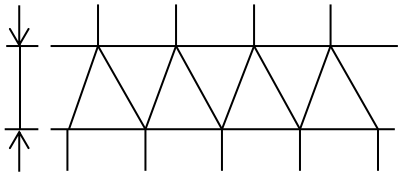


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 13 [V]
0.00	5	25
0.26	20	20
0.52	20	30
0.78	20	35
1.04	25	40
1.30	35	35
1.43	40	35
--	-	-
--	-	-
--	-	-
--	-	-

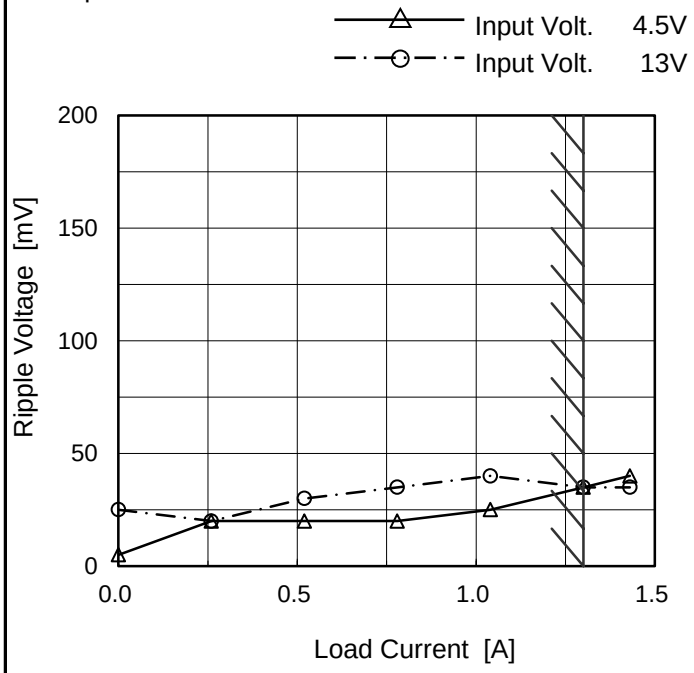
-12V: Rated Load Current

COSEL

Model	MGFW400512
Item	Ripple Voltage (by Load Current)
Object	-12V1.3A

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]

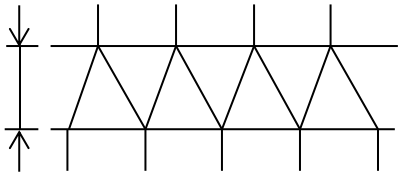


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 4.5 [V]	Input Volt. 13 [V]
0.00	5	25
0.26	20	20
0.52	20	30
0.78	20	35
1.04	25	40
1.30	35	35
1.43	40	35
--	-	-
--	-	-
--	-	-
--	-	-

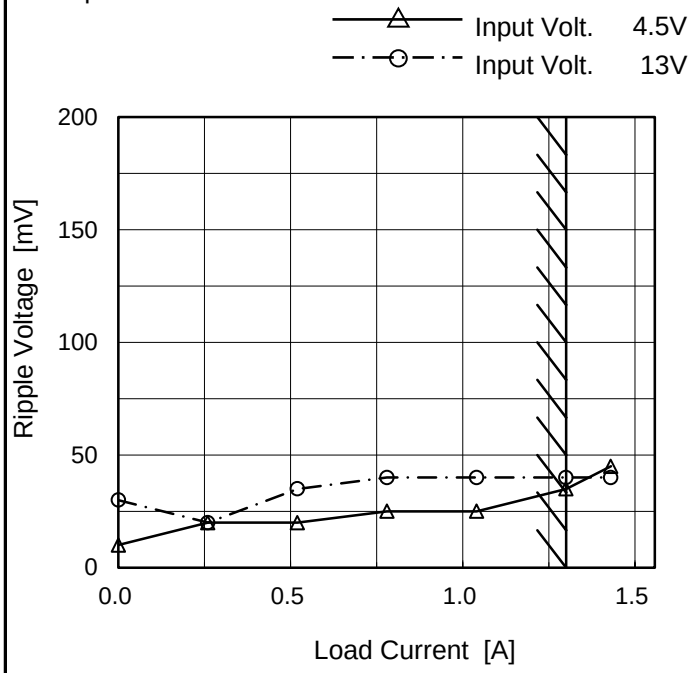
+12V: Rated Load Current

COSEL

Model	MGFW400512
Item	Ripple-Noise
Object	+12V1.3A

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]

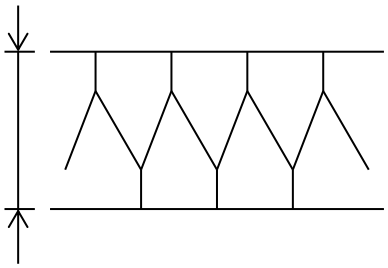


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 13 [V]
0.00	10	30
0.26	20	20
0.52	20	35
0.78	25	40
1.04	25	40
1.30	35	40
1.43	45	40
--	-	-
--	-	-
--	-	-
--	-	-

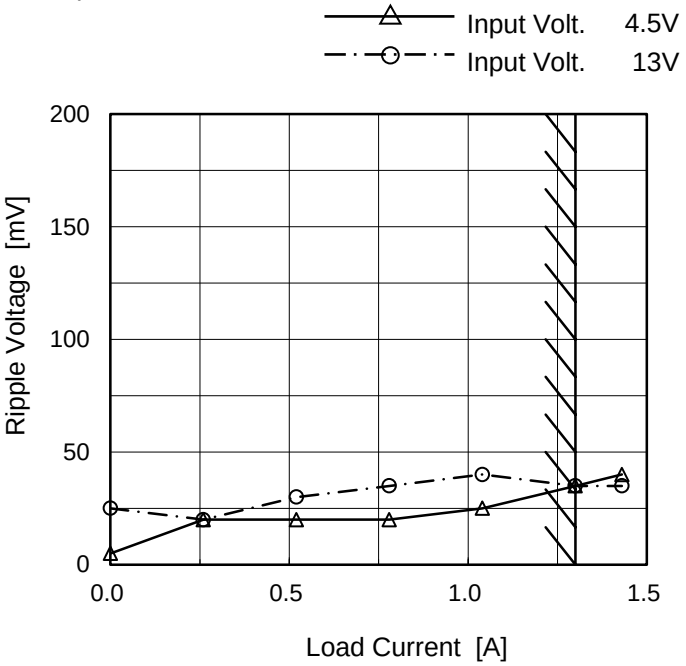
-12V: Rated Load Current

COSEL

Model	MGFW400512
Item	Ripple-Noise
Object	-12V1.3A

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]

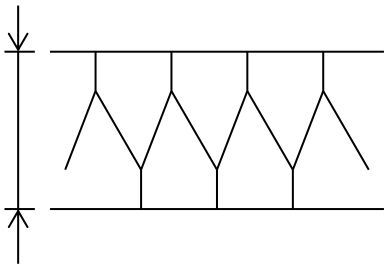


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 4.5 [V]	Input Volt. 13 [V]
0.00	5	25
0.26	20	20
0.52	20	30
0.78	20	35
1.04	25	40
1.30	35	35
1.43	40	35
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

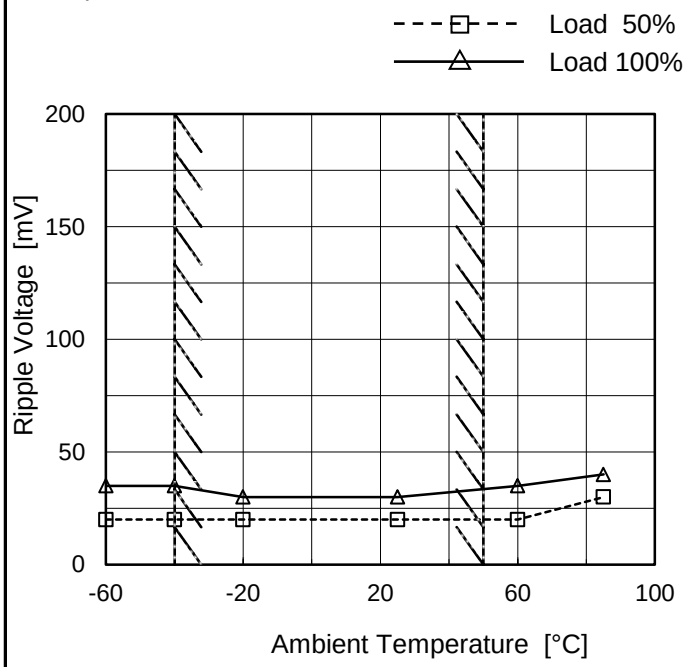
BC-11313

COSEL

Model	MGFW400512
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V1.3A

Testing Circuitry Figure B

1.Graph



Input Volt. 5V

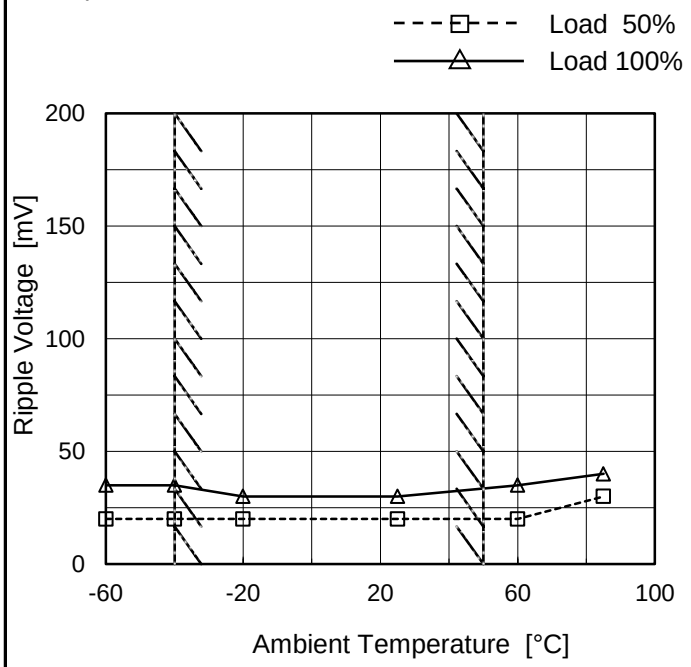
2.Values

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

-12V: Rated Load Current

Object	-12V1.3A

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	20	35
-40	20	35
-20	20	30
25	20	30
60	20	35
85	30	40
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

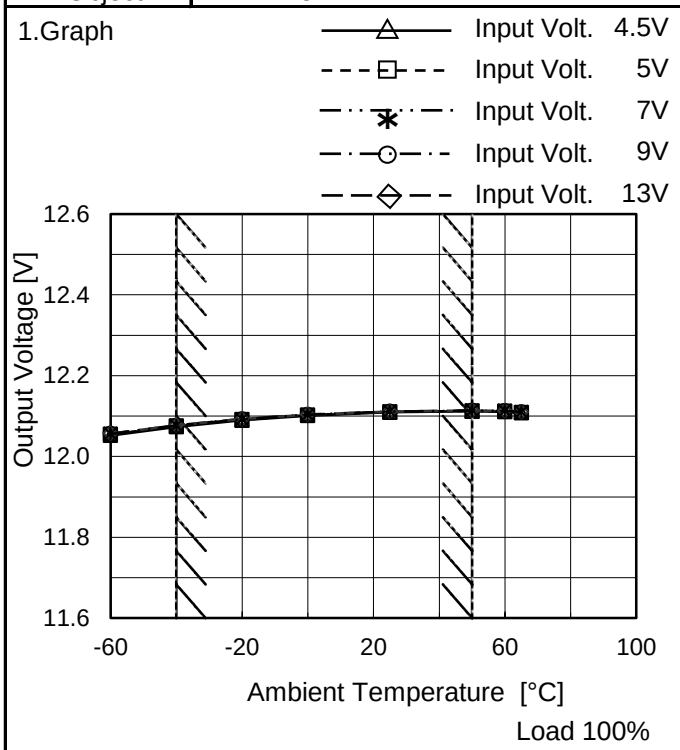
COSEL

Model	MGFW400512
Item	Ambient Temperature Drift

Testing Circuitry Figure A

Object +12V1.3A

1.Graph



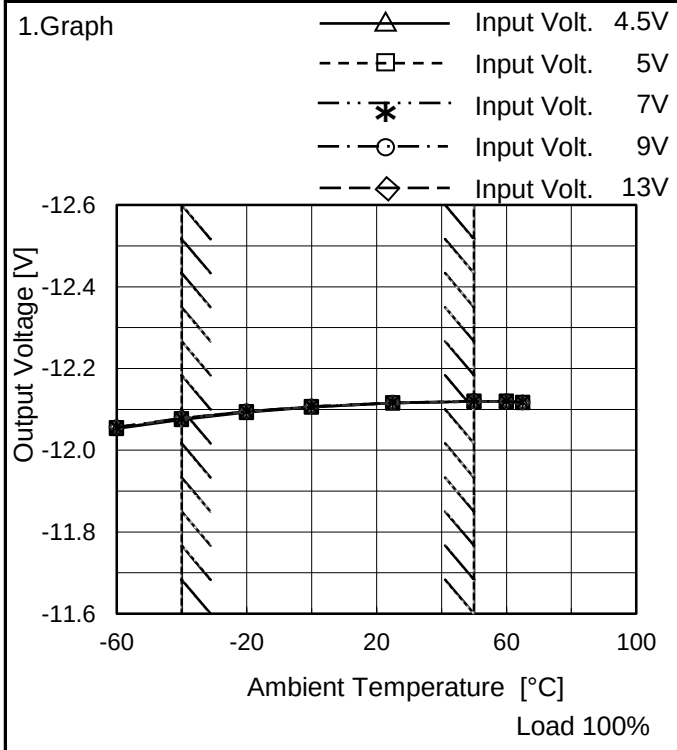
2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
-60	12.052	12.055	12.056	12.057	12.057
-40	12.073	12.075	12.076	12.077	12.077
-20	12.090	12.091	12.092	12.093	12.093
0	12.101	12.102	12.103	12.104	12.104
25	12.109	12.110	12.111	12.112	12.111
50	12.112	12.112	12.114	12.114	12.114
60	12.111	12.112	12.113	12.113	12.113
65	12.108	12.109	12.110	12.110	12.110
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object -12V1.3A

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. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
-60	-12.053	-12.055	-12.056	-12.056	-12.056
-40	-12.075	-12.077	-12.078	-12.078	-12.078
-20	-12.093	-12.094	-12.095	-12.095	-12.095
0	-12.106	-12.106	-12.107	-12.107	-12.107
25	-12.116	-12.116	-12.116	-12.117	-12.116
50	-12.120	-12.120	-12.120	-12.120	-12.119
60	-12.120	-12.120	-12.120	-12.120	-12.119
65	-12.117	-12.117	-12.117	-12.117	-12.116
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

COSEL

Model	MGFW400512	
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 - 13V

Load Current (AVR 1) : 0 - 1.3A (AVR 2) : 0 - 1.3A

* 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	+12V1.3A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	4.5	0	12.424	±333	±2.8
Minimum Voltage	-40	13	0	11.759		

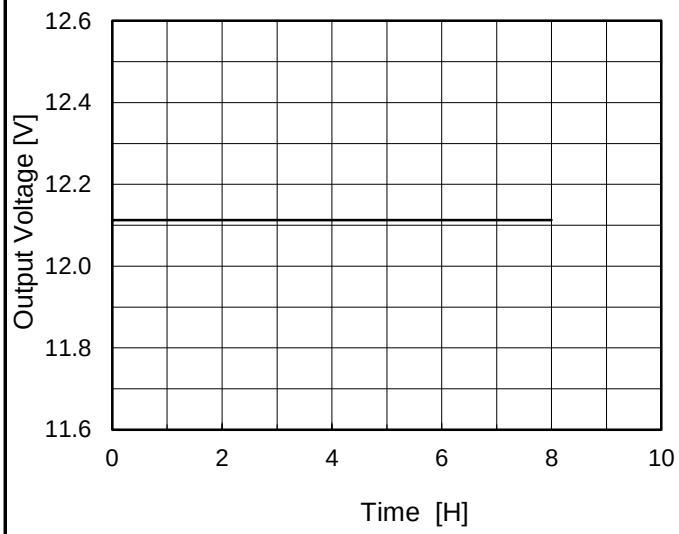
Object	-12V1.3A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	4.5	0	-12.439	±317	±2.6
Minimum Voltage	-40	4.5	1.3	-11.805		

COSEL

Model	MGFW400512
Item	Time Lapse Drift
Object	+12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 5V
Load 100%

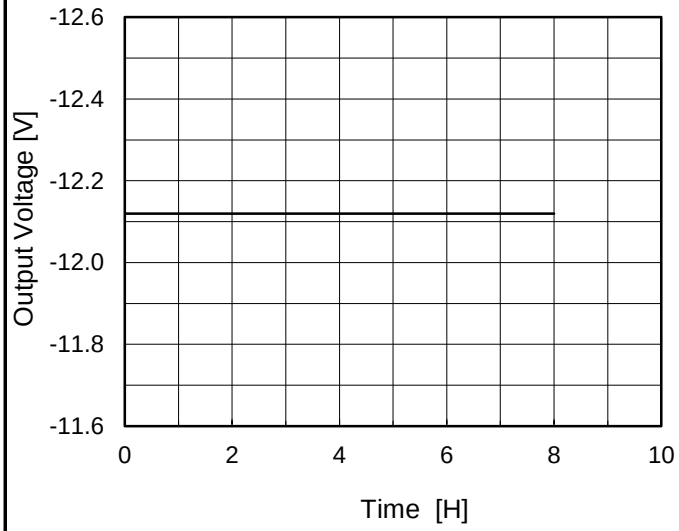
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.110
0.5	12.112
1.0	12.112
2.0	12.112
3.0	12.112
4.0	12.112
5.0	12.112
6.0	12.112
7.0	12.112
8.0	12.112

-12V: Rated Load Current

Object	-12V1.3A

1.Graph



Input Volt. 5V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-12.120
0.5	-12.120
1.0	-12.120
2.0	-12.120
3.0	-12.120
4.0	-12.120
5.0	-12.120
6.0	-12.120
7.0	-12.120
8.0	-12.120

+12V: Rated Load Current

BC-11313

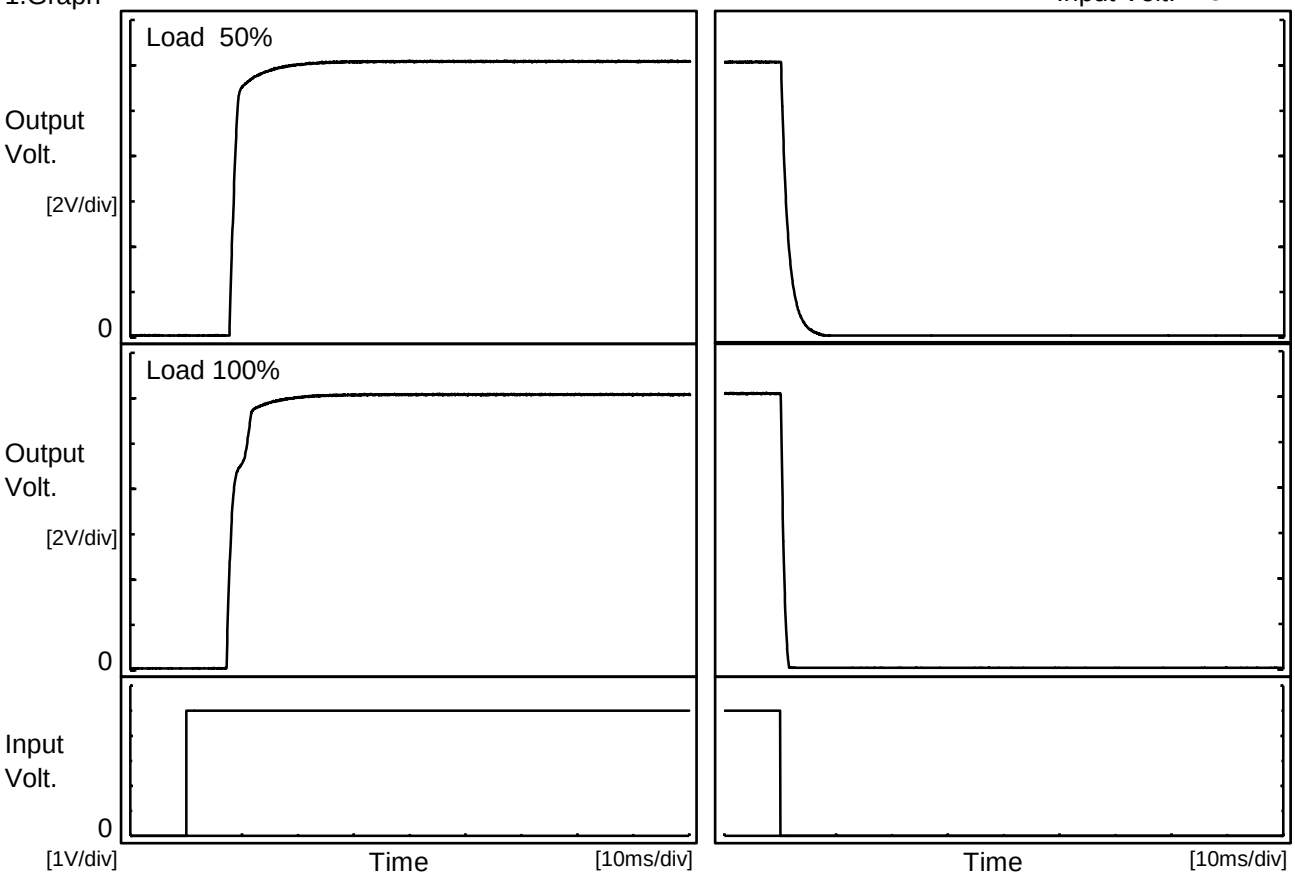
COSEL

Model	MGFW400512
Item	Rise and Fall Time
Object	+12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

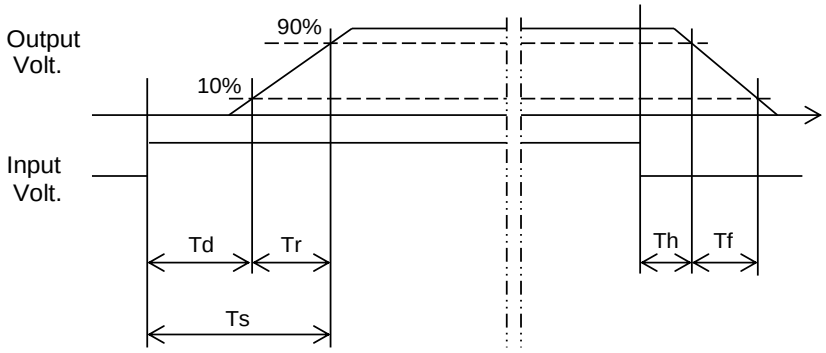
Input Volt. 5 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	7.9	1.8	9.7	0.3	2.8
100 %	7.4	4.0	11.4	0.2	1.0



BC-11313

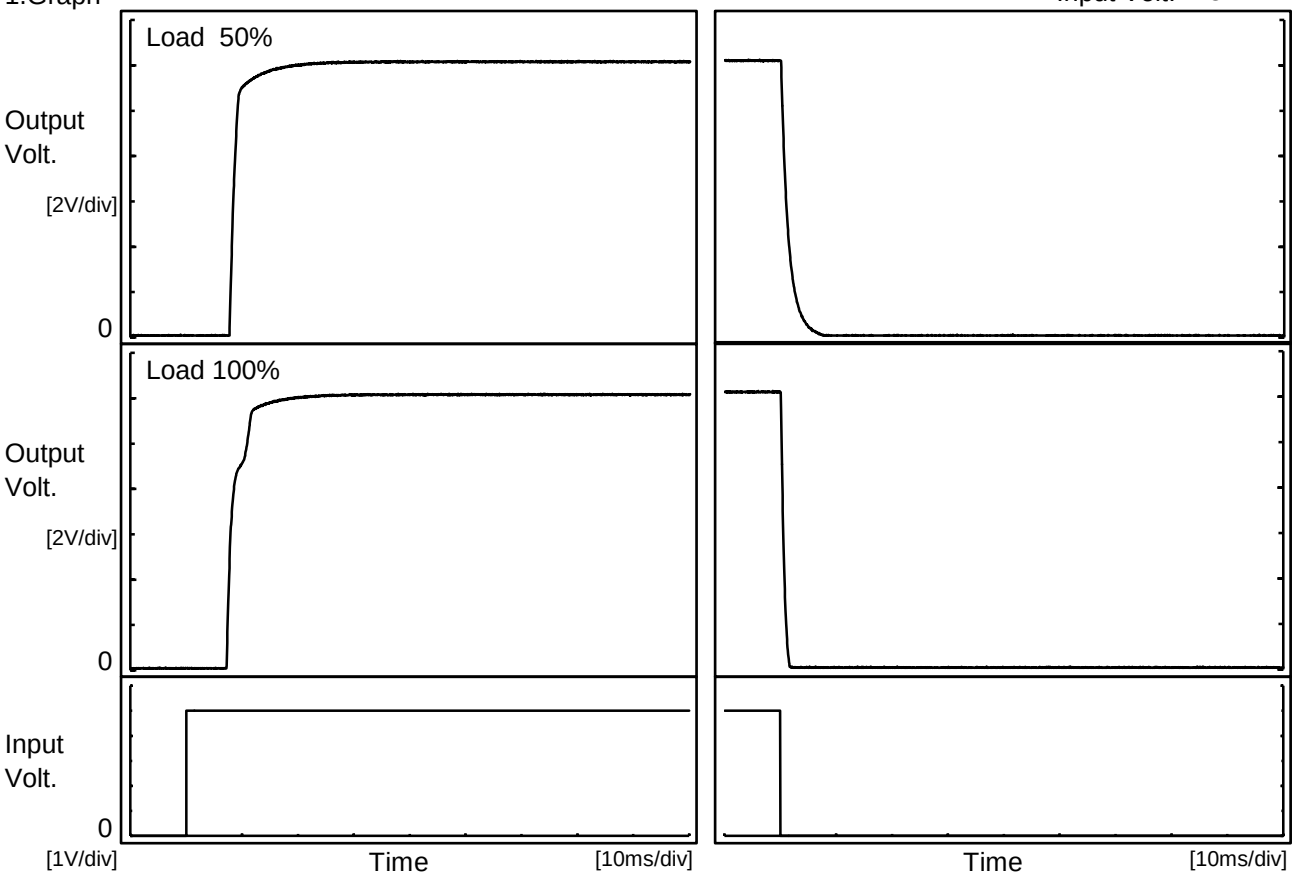
COSEL

Model	MGFW400512
Item	Rise and Fall Time
Object	-12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

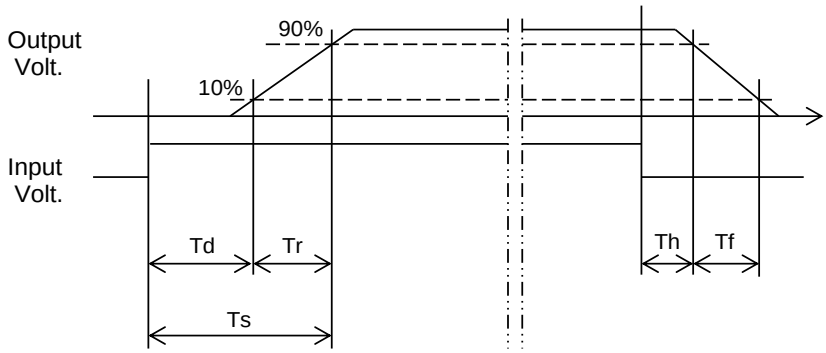
Input Volt. 5 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	7.9	1.8	9.7	0.3	3.0
100 %	7.4	4.0	11.4	0.2	1.1



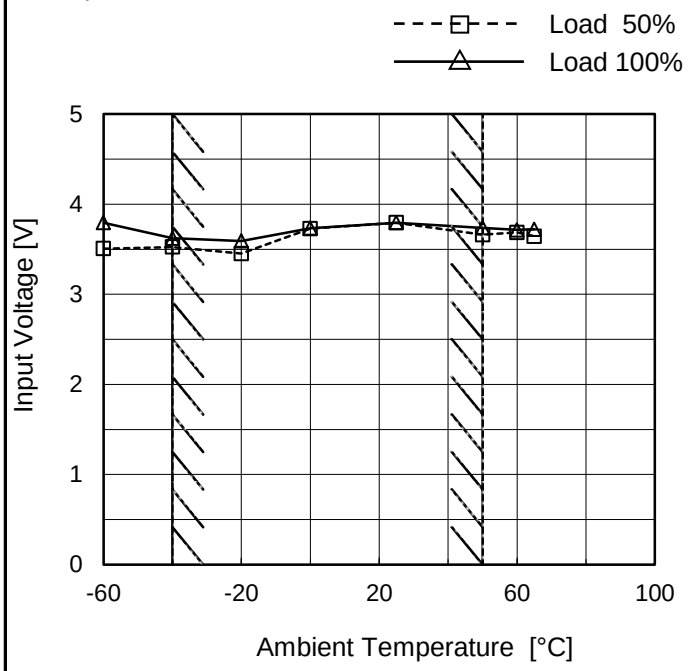
BC-11313

COSEL

Model	MGFW400512
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V1.3A

Testing Circuitry Figure A

1.Graph



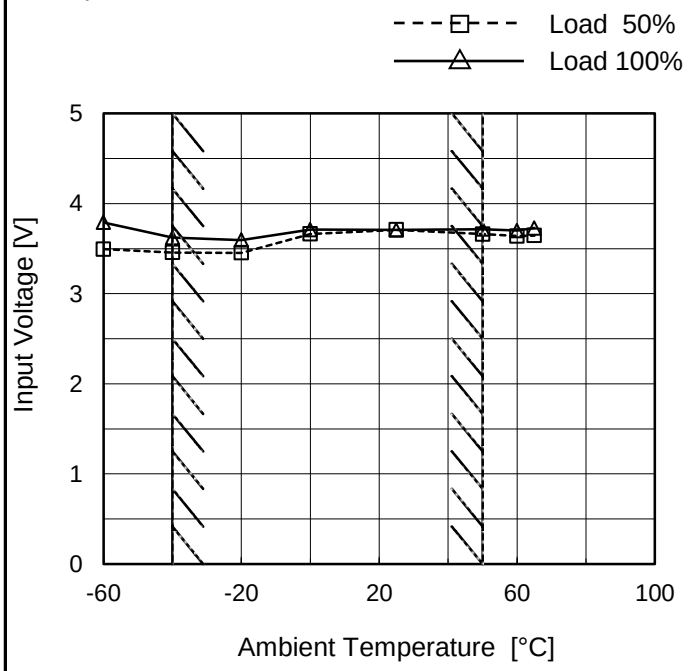
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	3.5	3.8
-40	3.6	3.7
-20	3.5	3.6
0	3.8	3.8
25	3.8	3.8
50	3.7	3.8
60	3.7	3.8
65	3.7	3.8
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

Object	-12V1.3A

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	3.5	3.8
-40	3.5	3.7
-20	3.5	3.6
0	3.7	3.8
25	3.7	3.7
50	3.7	3.8
60	3.7	3.7
65	3.7	3.8
--	-	-
--	-	-
--	-	-

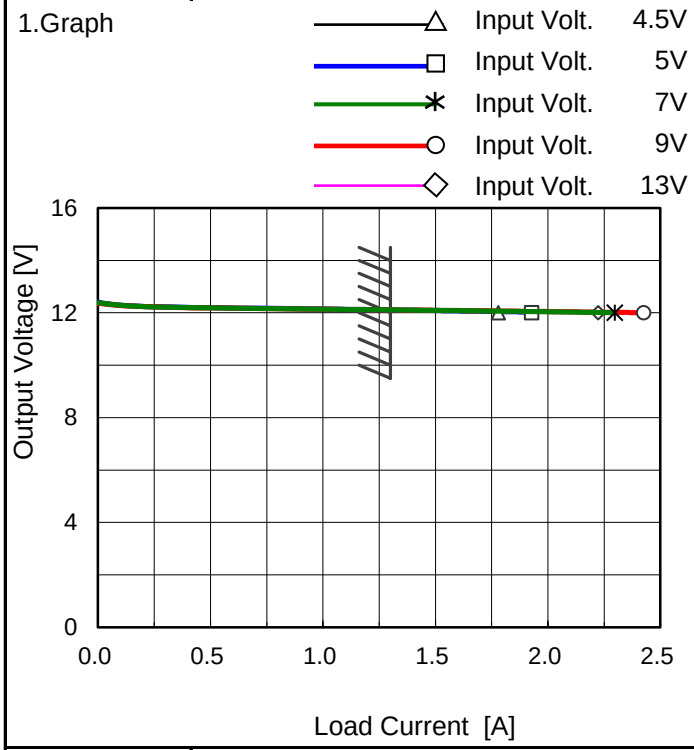
+12V: Rated Load Current

COSEL

Model	MGFW400512
Item	Overcurrent Protection
Object	+12V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



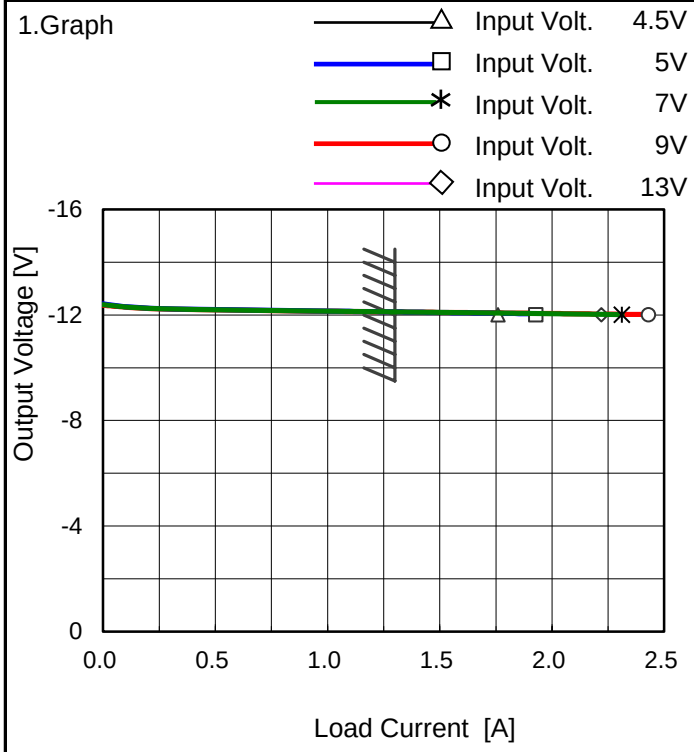
2.Values

Output Voltage [V]	Load Current [A]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
12.000	1.780	1.928	2.298	2.426	2.223
11.400	-	-	-	-	-
10.800	-	-	-	-	-
9.600	-	-	-	-	-
8.400	-	-	-	-	-
7.200	-	-	-	-	-
6.000	-	-	-	-	-
4.800	-	-	-	-	-
3.600	-	-	-	-	-
0.000	-	-	-	-	-

-12V: Rated Load Current

Object	-12V1.3A

1.Graph



Note: Slanted line shows the range of the rated load current.
Intermittent operation activates when overcurrent protection is activated.

2.Values

Output Voltage [V]	Load Current [A]				
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 7[V]	Input Volt. 9[V]	Input Volt. 13[V]
-12.000	1.761	1.928	2.312	2.430	2.220
-11.400	-	-	-	-	-
-10.800	-	-	-	-	-
-9.600	-	-	-	-	-
-8.400	-	-	-	-	-
-7.200	-	-	-	-	-
-6.000	-	-	-	-	-
-4.800	-	-	-	-	-
-3.600	-	-	-	-	-
0.000	-	-	-	-	-

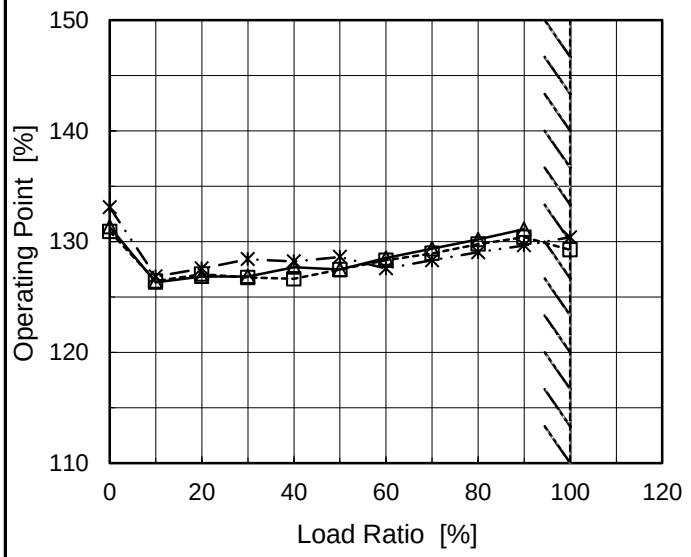
+12V: Rated Load Current

COSEL

Model	MGFW400512
Item	Overvoltage Protection
Object	+24V1.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured as a single output(+24V).

2.Values

Load Ratio [%]	Operating Point [%]		
	Input Volt. 4.5[V]	Input Volt. 5[V]	Input Volt. 13[V]
0	131	131	133
10	126	126	127
20	127	127	128
30	127	127	128
40	128	127	128
50	127	127	129
60	129	128	128
70	129	129	128
80	130	130	129
90	131	130	130
100	- ※	129	130

※During this area, overcurrent protection activates.

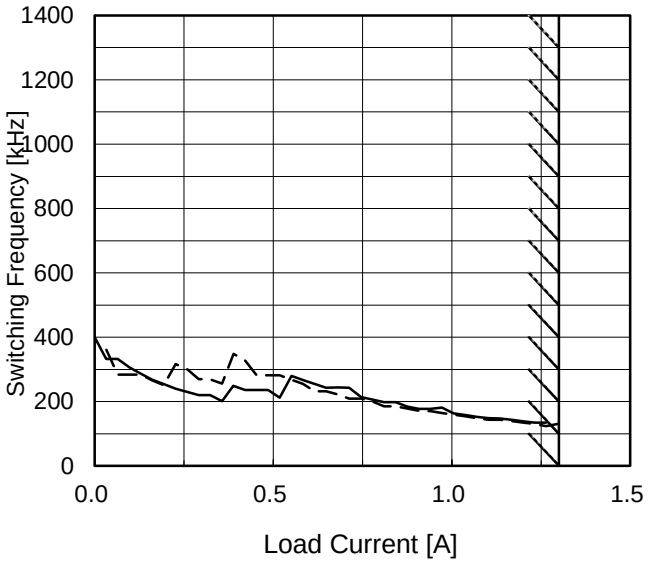
COSEL

Model	MGFW400512	
Item	Switching frequency (by Load Current)	Temperature 25°C Testing Circuitry Figure A
Object	+/-12V1.3A	

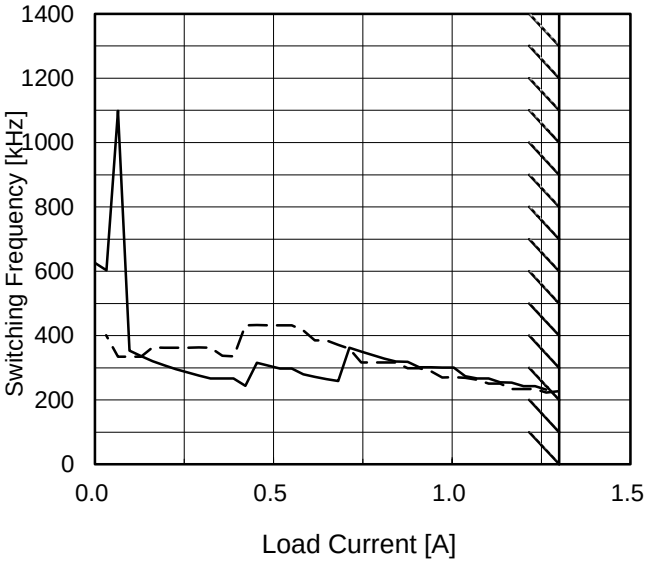
1.Graph

Load Increase
Load Decrease

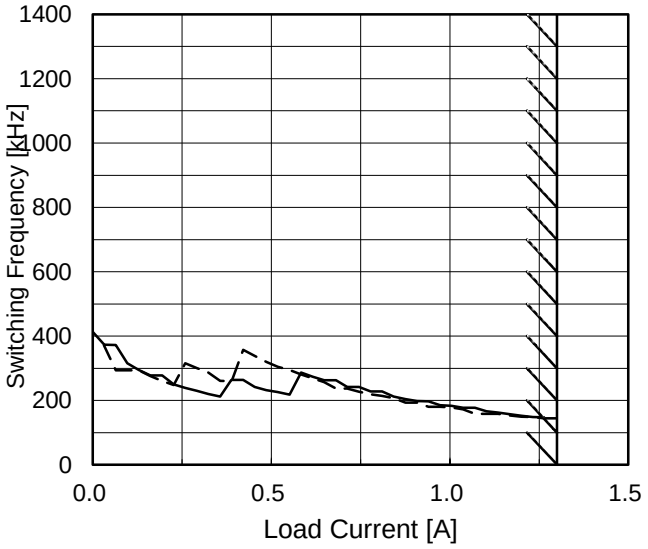
Input Volt: 4.5V



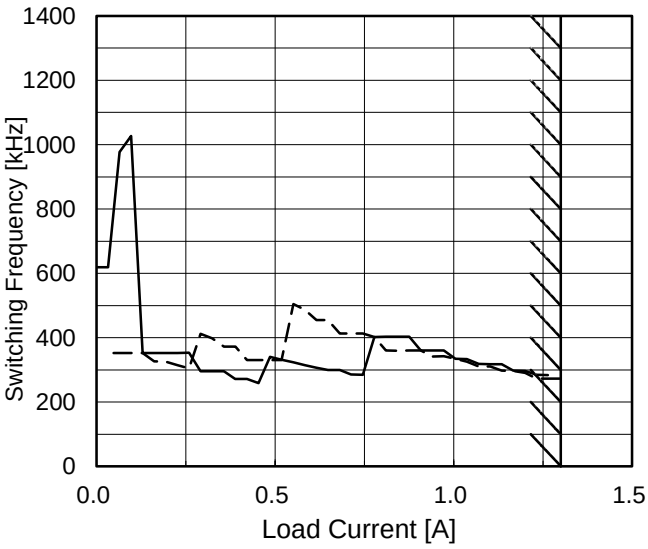
Input Volt: 9V



Input Volt: 7V



Input Volt: 13V



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

-switching frequency of MG40 changes depending on load current and input voltage.
When load current is low, switching frequency becomes high and step down to low frequency at certain point.
There is hysteresis, so characteristic is different between load increase (sweep from 0% to 100%) and load decrease (sweep from 100% to 0%).

-When load current is low, MG40 operates intermittently, so switching frequency can not be stable.

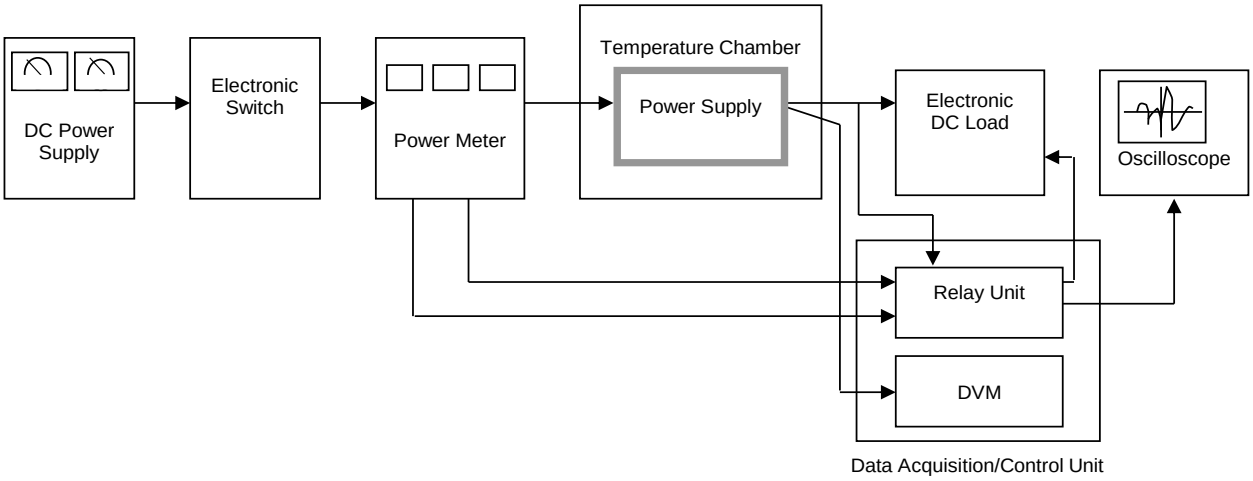


Figure A

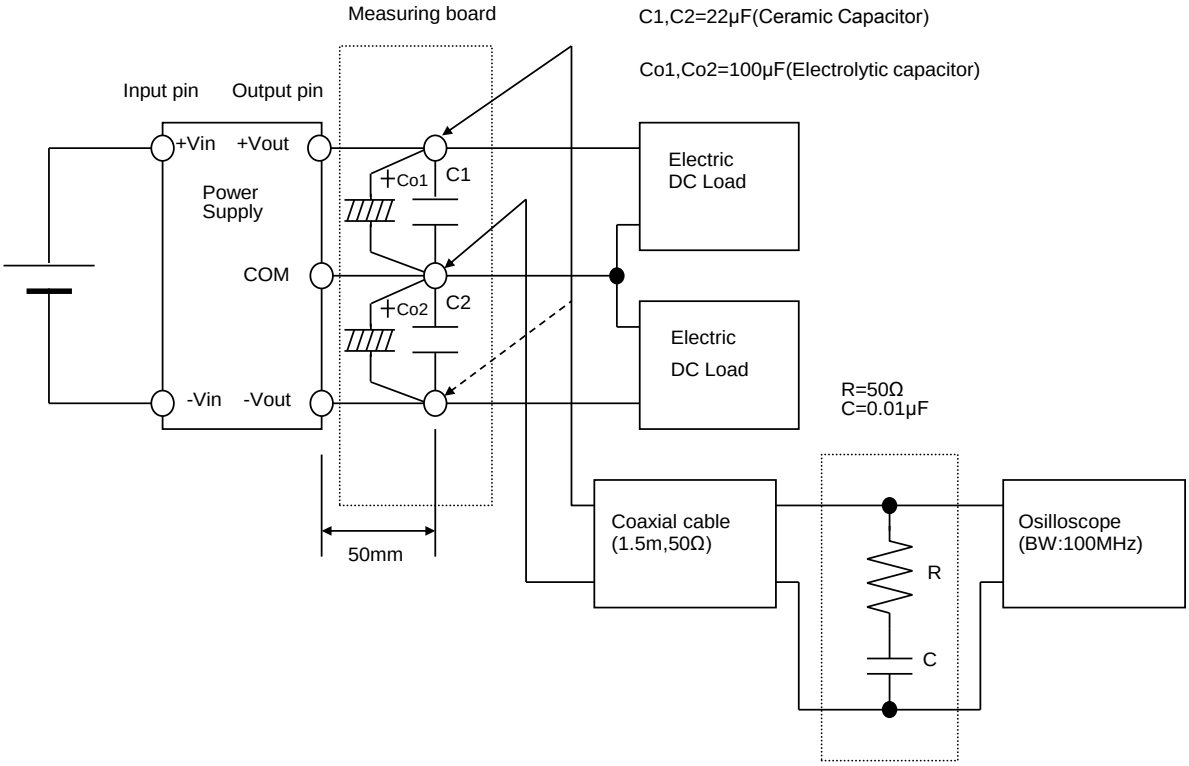


Figure B（Ripple and Ripple noise Characteristic）