参考資料

TEST DATA OF MGFW404812

Regulated DC Power Supply

Approved by : Junichi Hatagishi

Junichi Hatagishi Design Manager

Prepared by : Shohei Mukaide

Shohei Mukaide Design Engineer

COSEL CO.,LTD.

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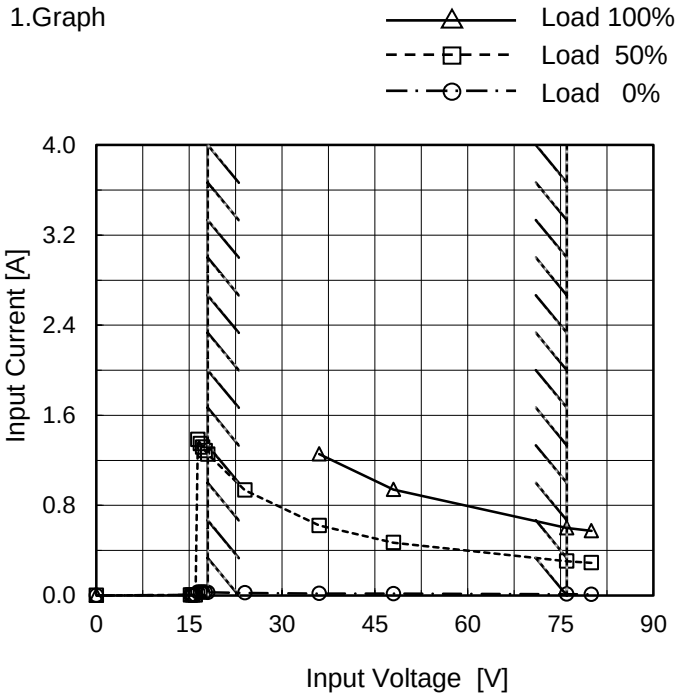
Model	MGFW404812
Item	Input Current (by Input Voltage)
Object	――――――――

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
15.2	0.004	0.004	- ※
15.6	0.004	0.004	- ※
16.0	0.004	0.004	- ※
16.4	0.030	1.384	- ※
16.8	0.029	1.349	- ※
17.2	0.029	1.316	- ※
17.6	0.028	1.285	- ※
18.0	0.028	1.255	- ※
24.0	0.023	0.935	- ※
36.0	0.018	0.621	1.257
48.0	0.016	0.470	0.941
76.0	0.011	0.304	0.600
80.0	0.011	0.291	0.575
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

※During this area, overcurrent protection activates and power supply operates in hiccup mode.

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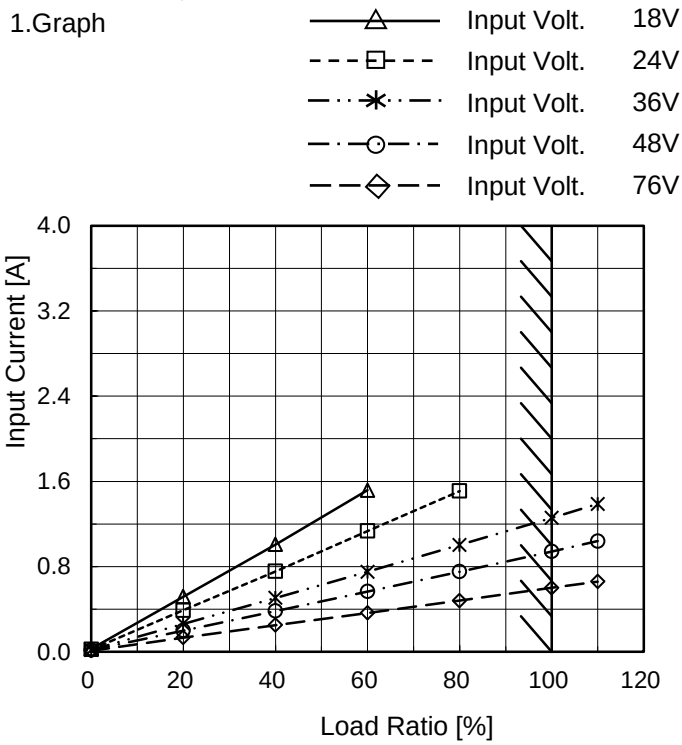
Model	MGFW404812
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Input Current [A]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0	0.028	0.023	0.018	0.016	0.011
20	0.517	0.390	0.262	0.199	0.133
40	1.008	0.756	0.505	0.382	0.250
60	1.517	1.133	0.751	0.566	0.364
80	- ※1	1.510	1.003	0.752	0.481
100	- ※1	- ※2	1.257	0.941	0.600
110	- ※1	- ※2	1.388	1.038	0.659
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

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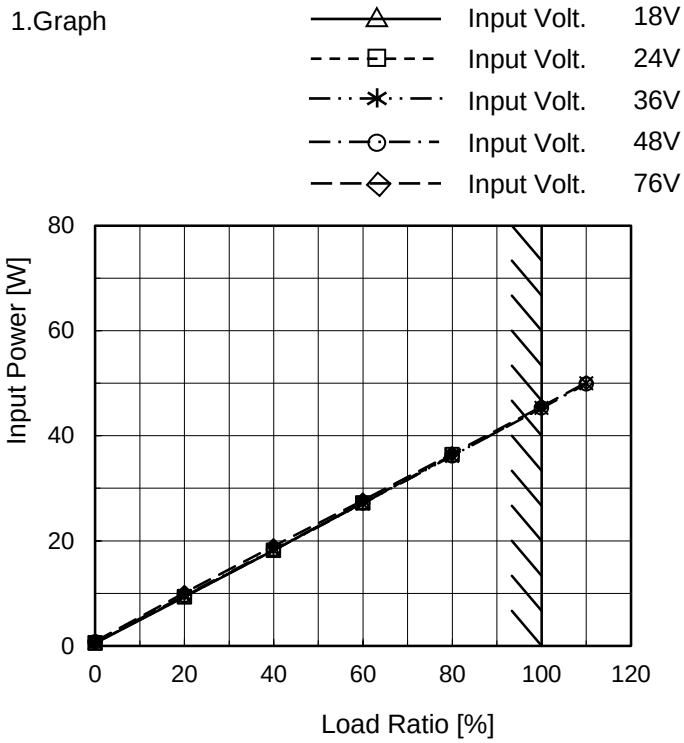
Model	MGFW404812
Item	Input Power (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Ratio [%]	Input Power [W]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0	0.50	0.55	0.64	0.77	0.83
20	9.33	9.37	9.45	9.58	10.11
40	18.23	18.19	18.22	18.38	19.01
60	27.37	27.19	27.08	27.17	27.71
80	- ※1	36.37	36.15	36.16	36.58
100	- ※1	- ※2	45.31	45.26	45.58
110	- ※1	- ※2	49.99	49.87	50.13
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

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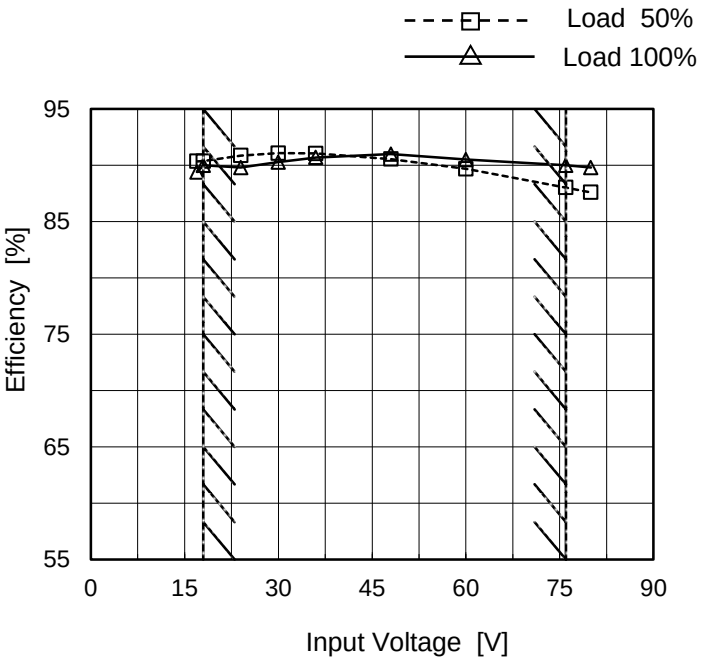
Model	MGFW404812
Item	Efficiency (by Input Voltage)
Object	――――――――――

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	90.4	89.4 ※1
18	90.4	90.0 ※1
24	90.9	90.5 ※2
30	91.1	90.3
36	91.1	90.7
48	90.6	91.0
60	89.7	90.5
76	88.0	90.0
80	87.6	89.8

※1:Load 70%
※2:Load 80%

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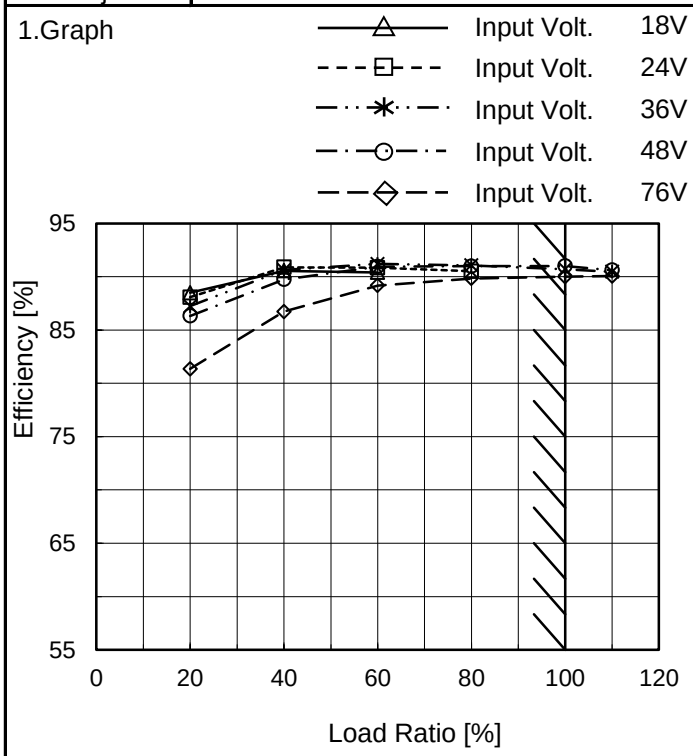
Model	MGFW404812
Item	Efficiency (by Load Current)
Object	————————

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]	Input Volt. 48[V]	Input Volt. 76[V]
0	-	-	-	-	-
20	88.5	88.1	87.2	86.3	81.3
40	90.6	90.9	90.6	89.7	86.7
60	90.4	90.8	91.2	90.9	89.2
80	- ※1	90.5	91.1	91.0	89.8
100	- ※1	- ※2	90.7	91.0	90.0
110	- ※1	- ※2	90.5	90.6	90.1
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

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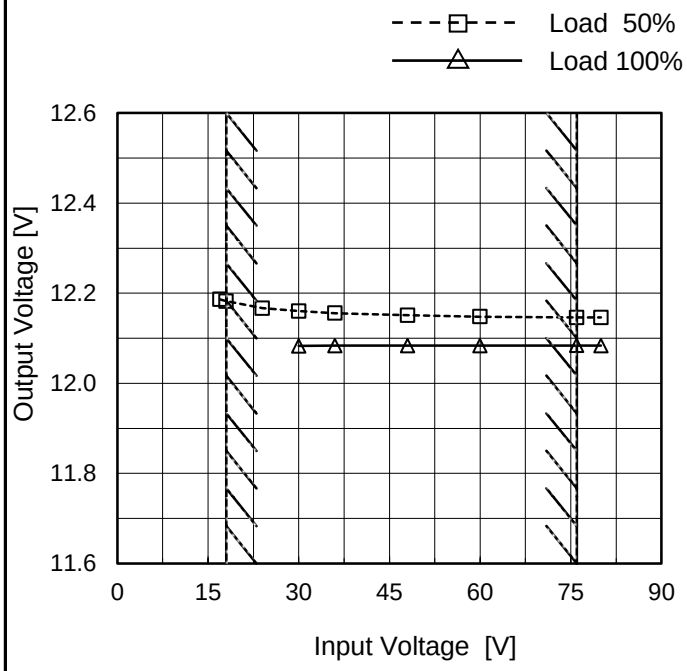
Model	MGFW404812
Item	Line Regulation

Temperature 25°C
Testing Circuitry Figure A

Object +12V1.7A

1.Graph



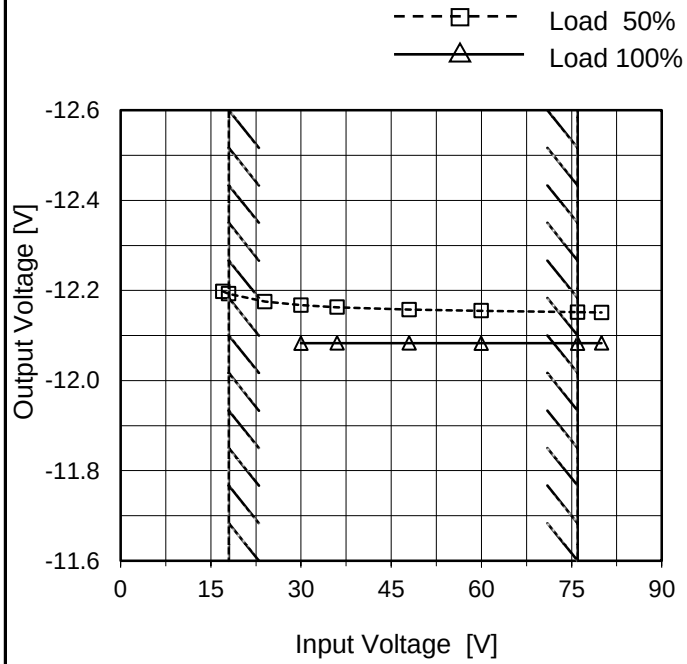
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	12.186	- ※1
18	12.182	- ※1
24	12.167	- ※2
30	12.160	12.083
36	12.156	12.084
48	12.151	12.084
60	12.148	12.084
76	12.146	12.084
80	12.146	12.084

-12V: Rated Load Current

Object -12V1.7A

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	-12.198	- ※1
18	-12.193	- ※1
24	-12.175	- ※2
30	-12.168	-12.083
36	-12.163	-12.083
48	-12.157	-12.083
60	-12.155	-12.083
76	-12.152	-12.083
80	-12.151	-12.083

+12V: Rated Load Current

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

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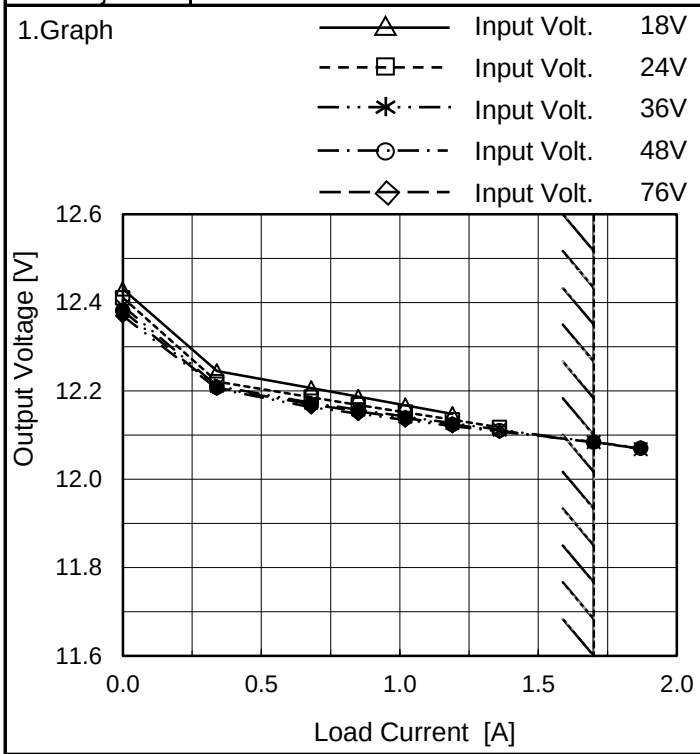
Model	MGFW404812
Item	Load Regulation
Object	+12V1.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



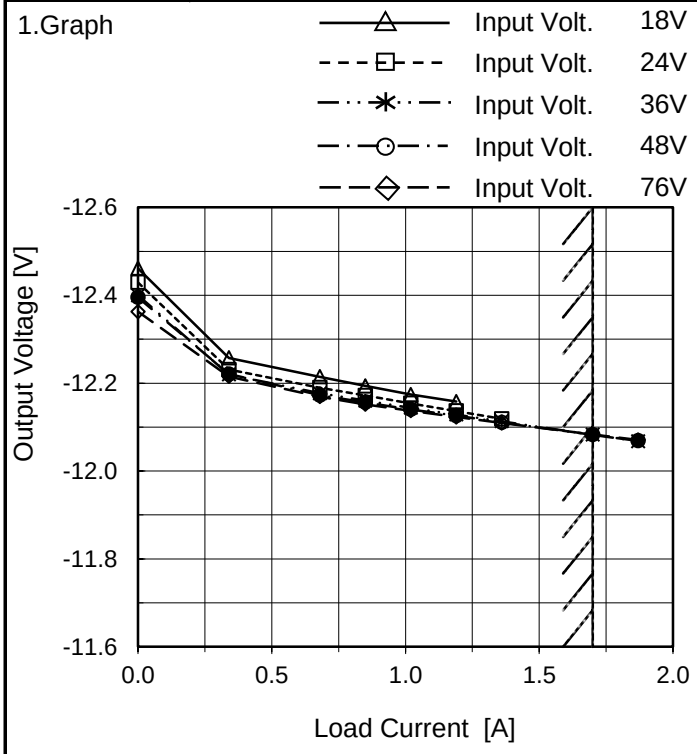
2.Values

Load Current [A]	Output Voltage [V] Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.00	12.431	12.411	12.392	12.382	12.370
0.34	12.245	12.221	12.211	12.208	12.205
0.68	12.207	12.186	12.173	12.170	12.164
0.85	12.187	12.168	12.158	12.154	12.148
1.02	12.168	12.152	12.142	12.138	12.134
1.19	12.148	12.135	12.127	12.124	12.121
1.36	- ※1	12.118	12.112	12.111	12.108
1.70	- ※1	- ※2	12.084	12.084	12.084
1.87	- ※1	- ※2	12.068	12.070	12.071
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V1.7A

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]	Input Volt. 48[V]	Input Volt. 76[V]
0.00	-12.461	-12.429	-12.400	-12.395	-12.363
0.34	-12.257	-12.231	-12.220	-12.221	-12.215
0.68	-12.215	-12.190	-12.177	-12.173	-12.169
0.85	-12.194	-12.172	-12.160	-12.156	-12.152
1.02	-12.174	-12.154	-12.144	-12.140	-12.137
1.19	-12.158	-12.137	-12.128	-12.126	-12.123
1.36	- ※1	-12.119	-12.113	-12.111	-12.109
1.70	- ※1	- ※2	-12.083	-12.083	-12.083
1.87	- ※1	- ※2	-12.068	-12.069	-12.071
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

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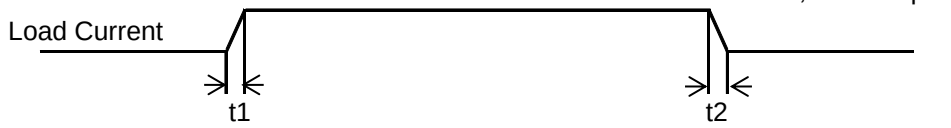
Model	MGFW404812	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+12V1.7A	

Input Volt. 48 V

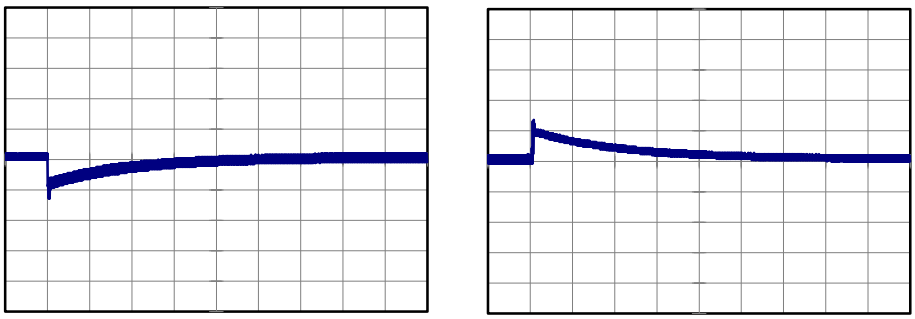
-12V:rated load current.

Cycle 100 ms

t1,t2 = 100 μs



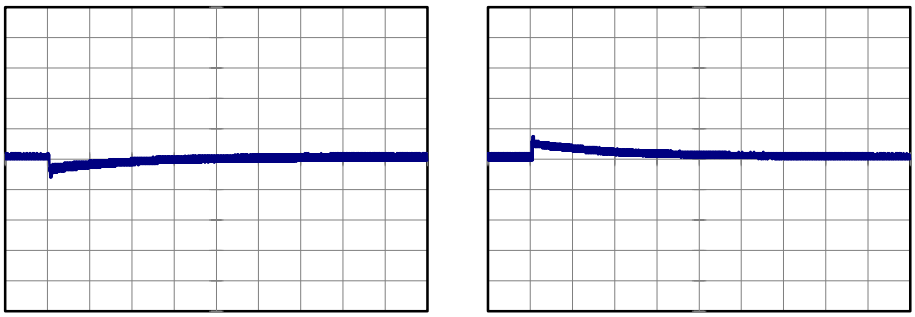
Min.Load (0A)←→
Load 100% (1.7A)



200 mV/div

2 ms/div 2 ms/div

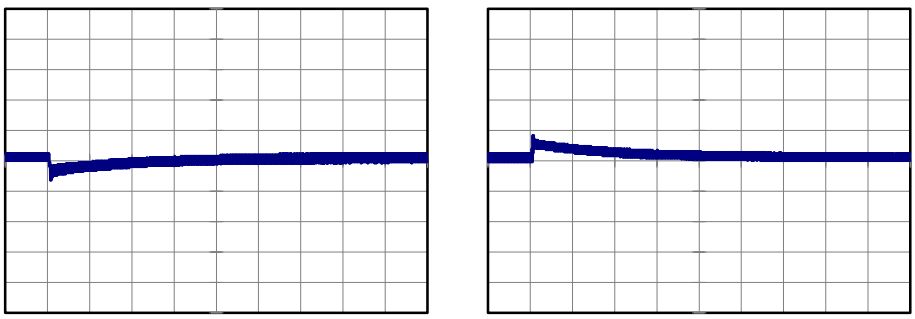
Min.Load (0A)←→
Load 50% (0.85A)



200 mV/div

2 ms/div 2 ms/div

Load 50% (0.85A)←→
Load 100% (1.7A)



200 mV/div

2 ms/div 2 ms/div

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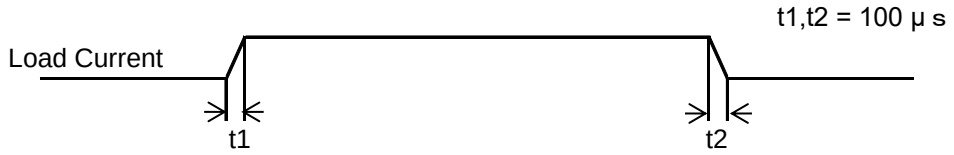
Model	MGFW404812	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	-12V1.7A	

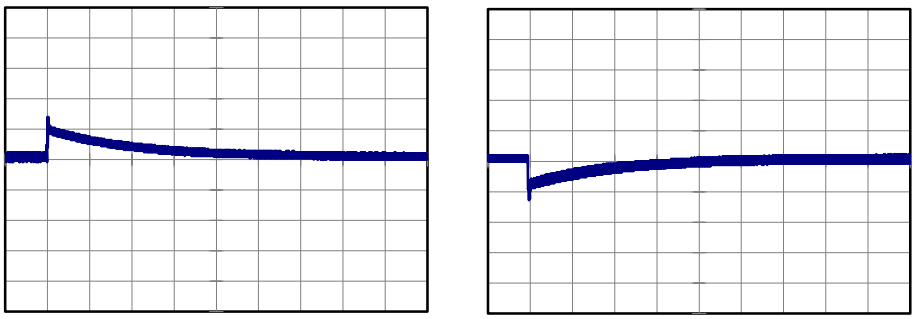
Input Volt. 48 V

+12V:rated load current.

Cycle 100 ms



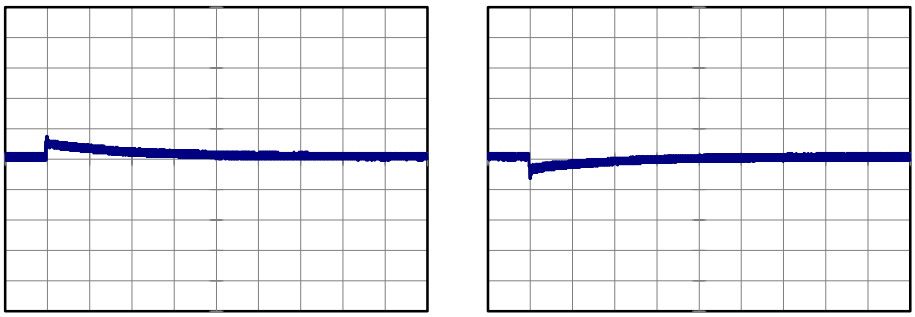
Min.Load (0A)←→
Load 100% (1.7A)



200 mV/div

2 ms/div 2 ms/div

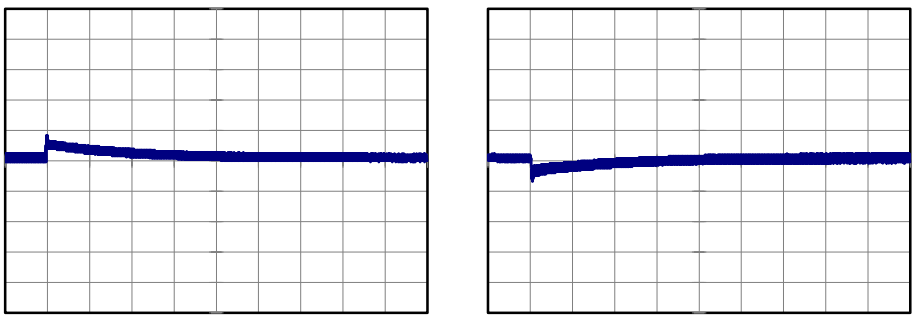
Min.Load (0A)←→
Load 50% (0.85A)



200 mV/div

2 ms/div 2 ms/div

Load 50% (0.85A)←→
Load 100% (1.7A)



200 mV/div

2 ms/div 2 ms/div

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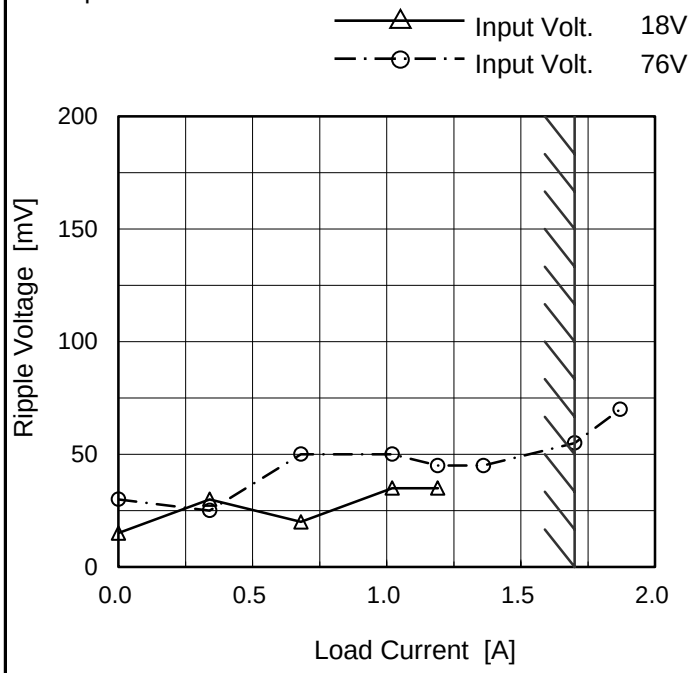
Model	MGFW404812
Item	Ripple Voltage (by Load Current)
Object	+12V1.7A

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]

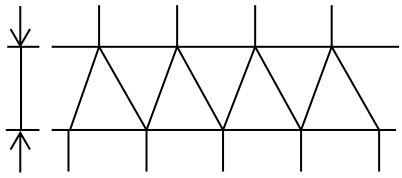


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	15	30
0.34	30	25
0.68	20	50
1.02	35	50
1.19	35	45
1.36	- ※	45
1.70	- ※	55
1.87	- ※	70
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

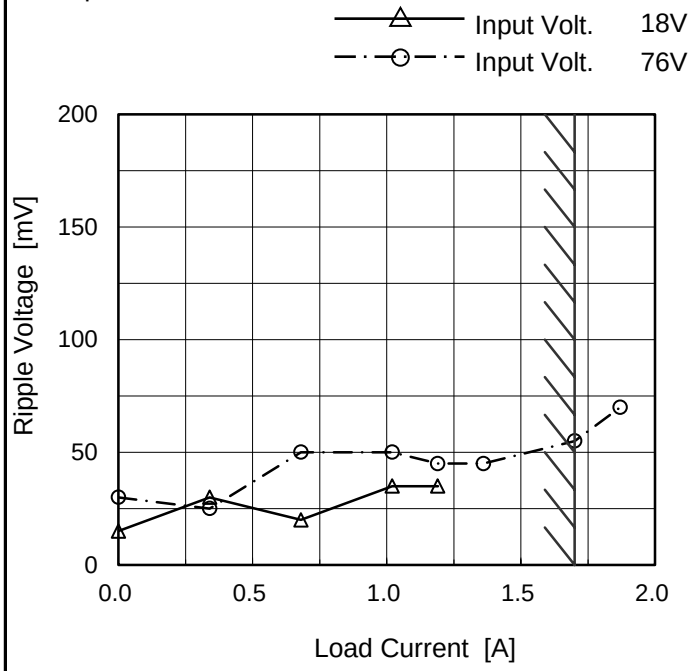
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404812
Item	Ripple Voltage (by Load Current)
Object	-12V1.7A

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]

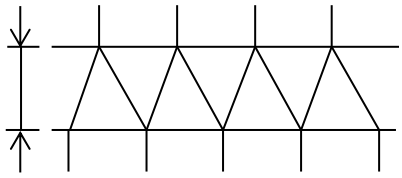


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	15	30
0.34	30	25
0.68	20	50
1.02	35	50
1.19	35	45
1.36	- ※	45
1.70	- ※	55
1.87	- ※	70
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

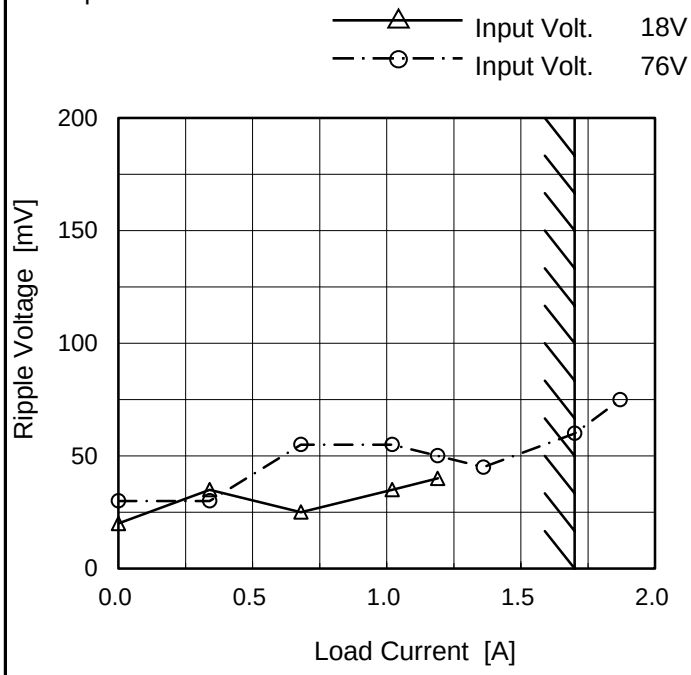
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404812
Item	Ripple-Noise
Object	+12V1.7A

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]

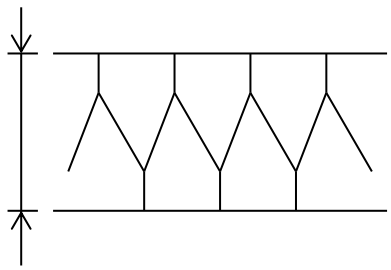


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	20	30
0.34	35	30
0.68	25	55
1.02	35	55
1.19	40	50
1.36	- ※	45
1.70	- ※	60
1.87	- ※	75
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

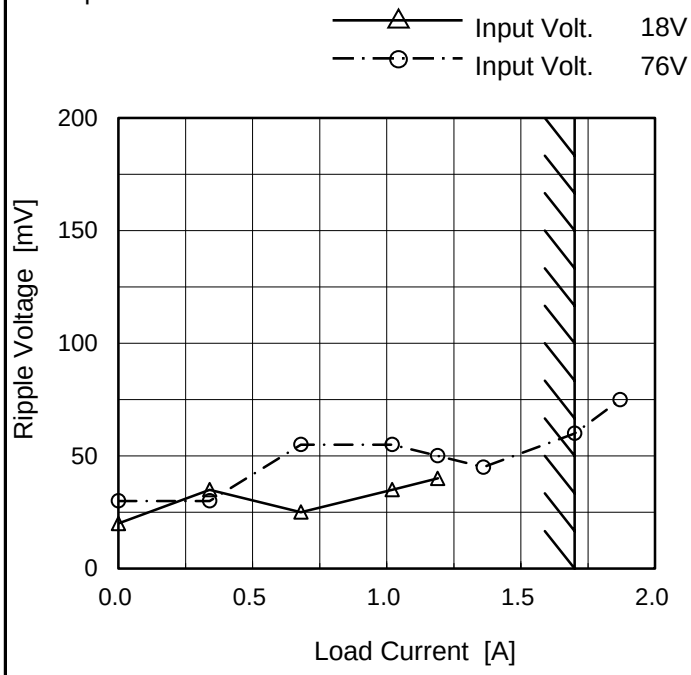
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404812
Item	Ripple-Noise
Object	-12V1.7A

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]

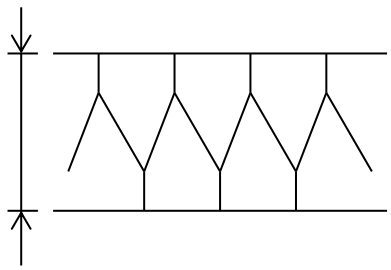


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	20	30
0.34	35	30
0.68	25	55
1.02	35	55
1.19	40	50
1.36	- ※	45
1.70	- ※	60
1.87	- ※	75
--	-	-
--	-	-
--	-	-

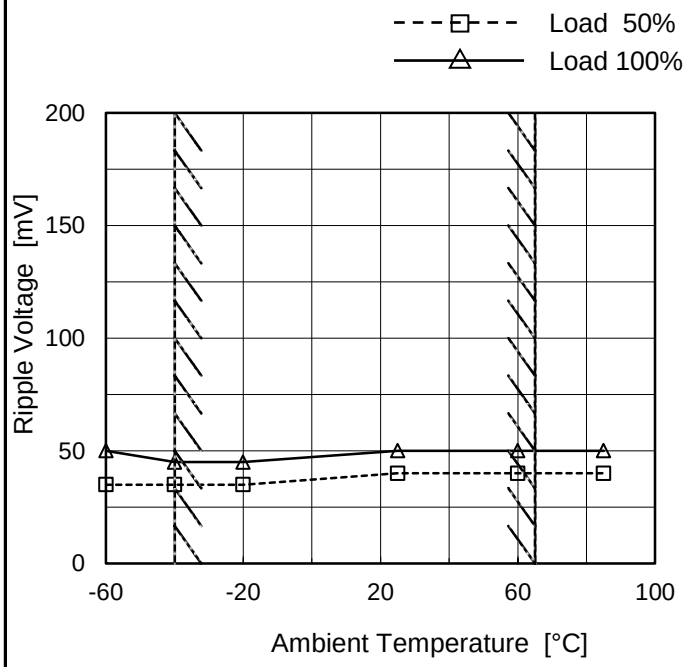
+12V: Rated Load Current

※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404812	
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure B
Object	+12V1.7A	

1.Graph



Input Volt. 48V

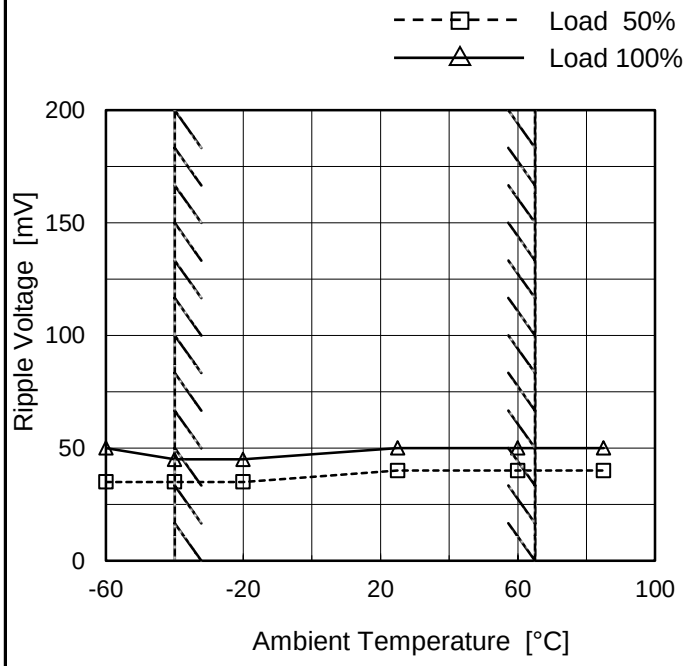
2.Values

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

-12V: Rated Load Current

Object	-12V1.7A

1.Graph



Input Volt. 48V

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	35	50
-40	35	45
-20	35	45
25	40	50
60	40	50
85	40	50
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

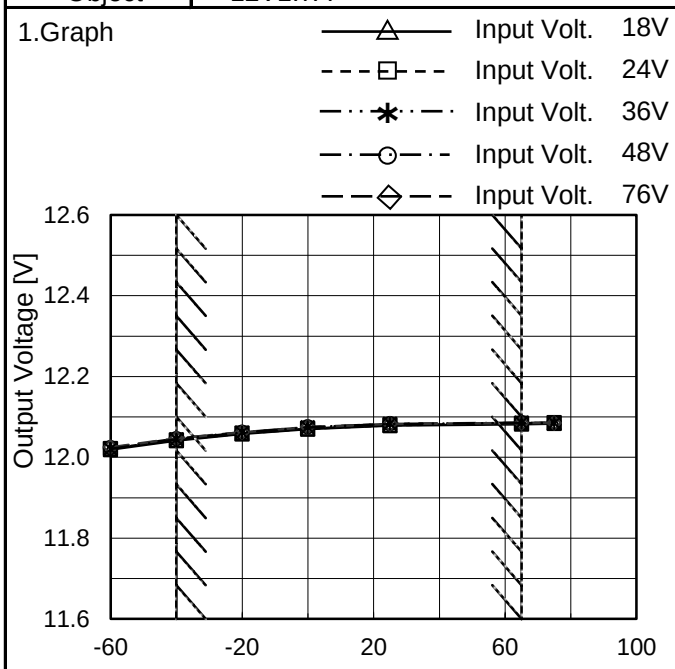
+12V: Rated Load Current

COSEL

Model	MGFW404812
Item	Ambient Temperature Drift
Object	+12V1.7A

Testing Circuitry Figure A

1.Graph



Load 100%

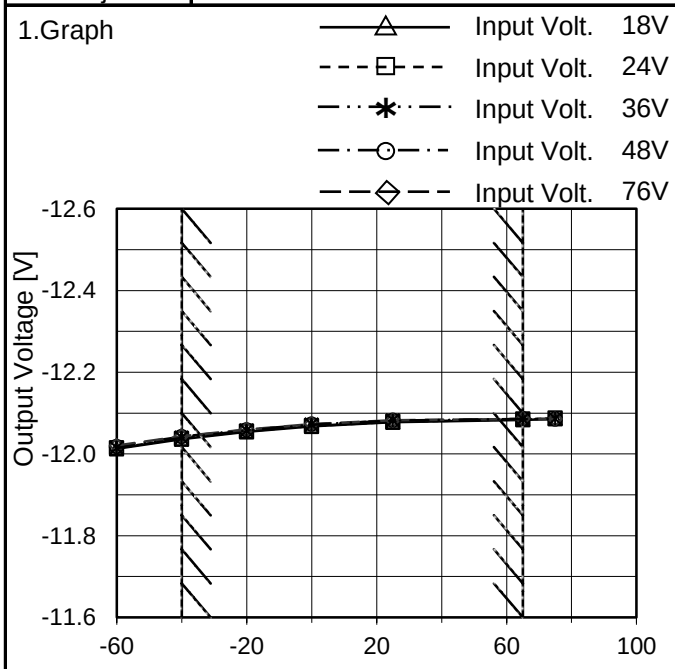
2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-60	12.019	12.021	12.021	12.024	12.025
-40	12.041	12.043	12.045	12.046	12.047
-20	12.058	12.059	12.061	12.062	12.062
0	12.070	12.071	12.074	12.075	12.075
25	12.078	12.080	12.083	12.083	12.082
65	12.082	12.084	12.085	12.085	12.085
75	12.084	12.086	12.085	12.085	12.085
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current

Object	-12V1.7A

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]	Input Volt. 48[V]	Input Volt. 76[V]
-60	-12.013	-12.014	-12.015	-12.018	-12.020
-40	-12.036	-12.038	-12.040	-12.042	-12.044
-20	-12.054	-12.056	-12.057	-12.059	-12.060
0	-12.068	-12.069	-12.072	-12.073	-12.074
25	-12.078	-12.079	-12.082	-12.082	-12.082
65	-12.084	-12.085	-12.086	-12.086	-12.086
75	-12.086	-12.087	-12.086	-12.085	-12.086
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

Note: In case of input Volt.18V, Load 70%.
24V, Load 80%.
Other case Load 100%.

Model	MGFW404812	
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 - 65°C

Input Voltage : 18 - 76V

Load Current (AVR 1) : 0 - 1.7A (AVR 2) : 0 - 1.7A

* 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	+12V1.7A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	18	0	12.455	±350	±2.9
Minimum Voltage	65	76	1.7	11.755		

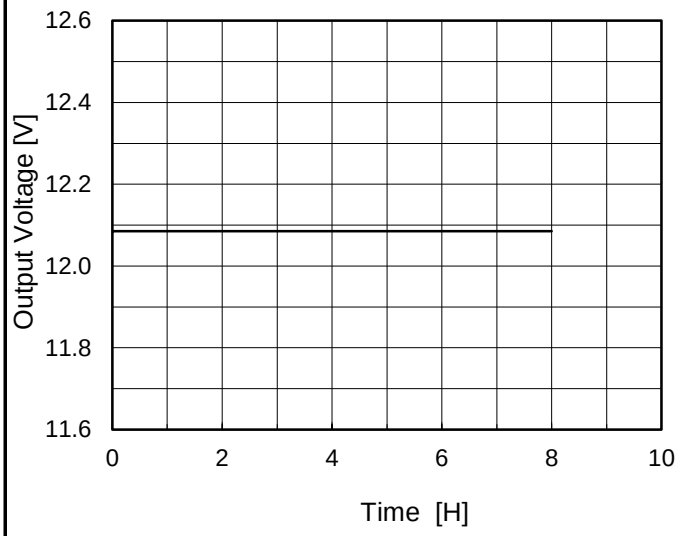
Object	-12V1.7A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	36	0	-12.425	±353	±2.9
Minimum Voltage	65	18	1.7	-11.720		

COSEL

Model	MGFW404812
Item	Time Lapse Drift
Object	+12V1.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 48V
Load 100%

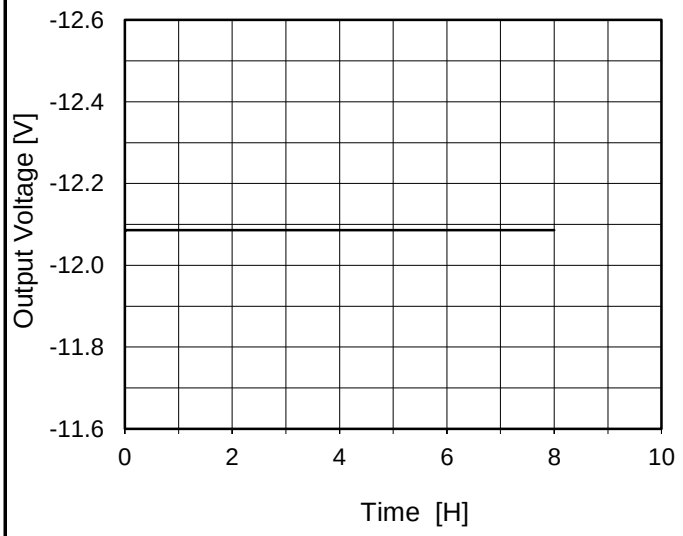
2.Values

Time since start [H]	Output Voltage [V]
0.0	12.083
0.5	12.085
1.0	12.085
2.0	12.085
3.0	12.085
4.0	12.085
5.0	12.085
6.0	12.085
7.0	12.085
8.0	12.085

-12V: Rated Load Current

Object	-12V1.7A

1.Graph



Input Volt. 48V
Load 100%

2.Values

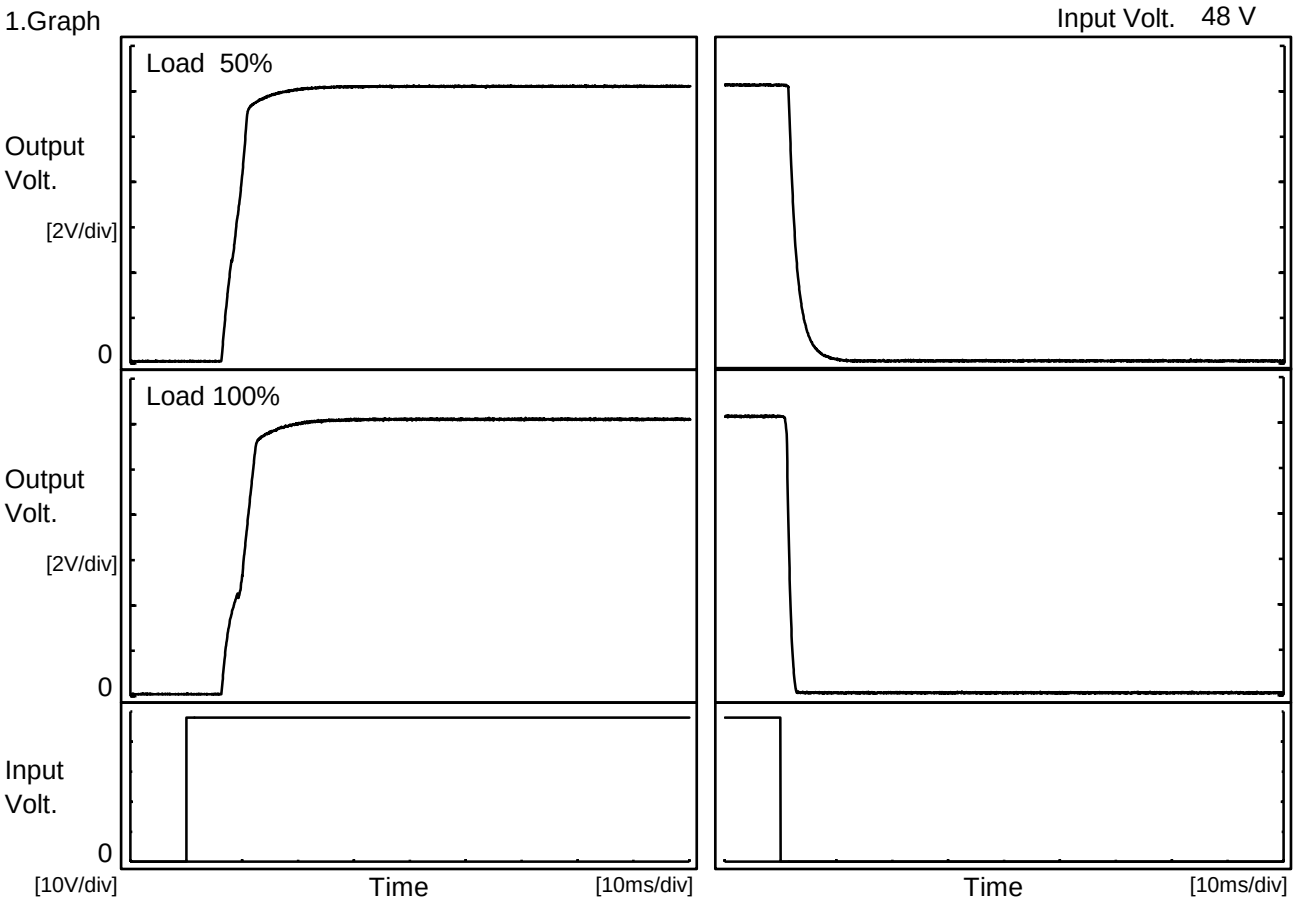
Time since start [H]	Output Voltage [V]
0.0	-12.082
0.5	-12.086
1.0	-12.086
2.0	-12.086
3.0	-12.086
4.0	-12.086
5.0	-12.086
6.0	-12.086
7.0	-12.086
8.0	-12.086

+12V: Rated Load Current

COSEL

Model	MGFW404812	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+12V1.7A	

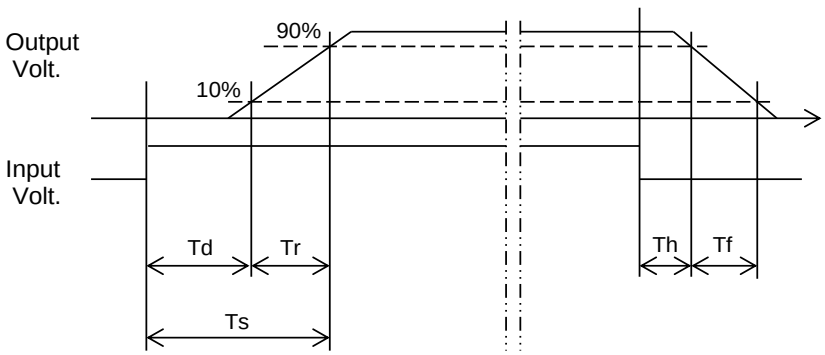
1.Graph



2.Values

[ms]

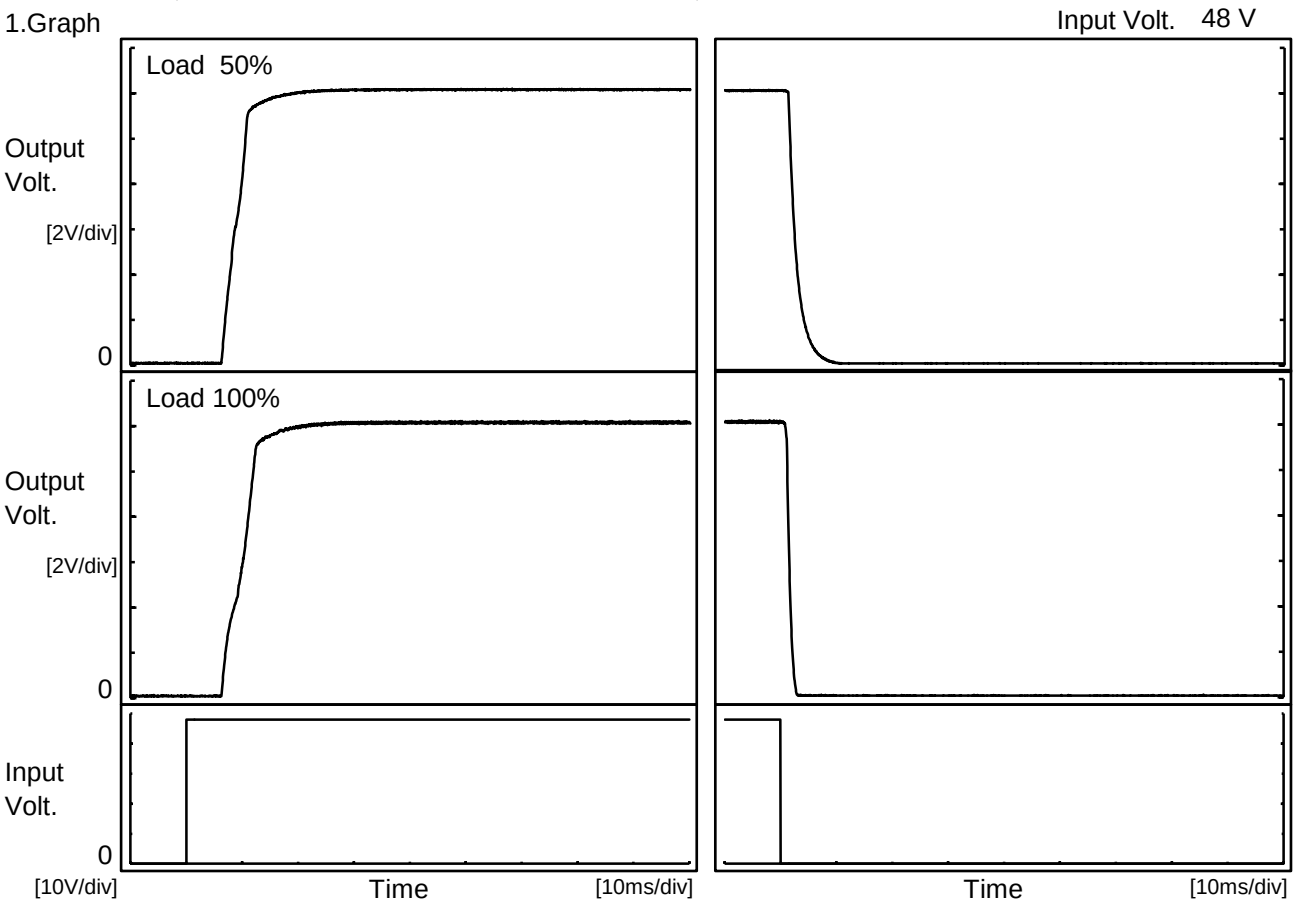
Load \ Time	Td	Tr	Ts	Th	Tf
50 %	6.7	4.2	10.9	1.6	3.4
100 %	6.7	5.7	12.4	1.2	1.1



COSEL

Model	MGFW404812	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	-12V1.7A	

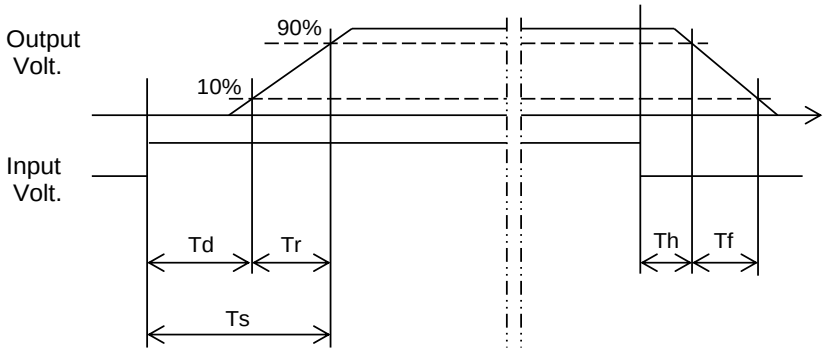
1.Graph



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	6.7	4.2	10.9	1.6	3.4
100 %	6.7	5.7	12.4	1.2	1.1

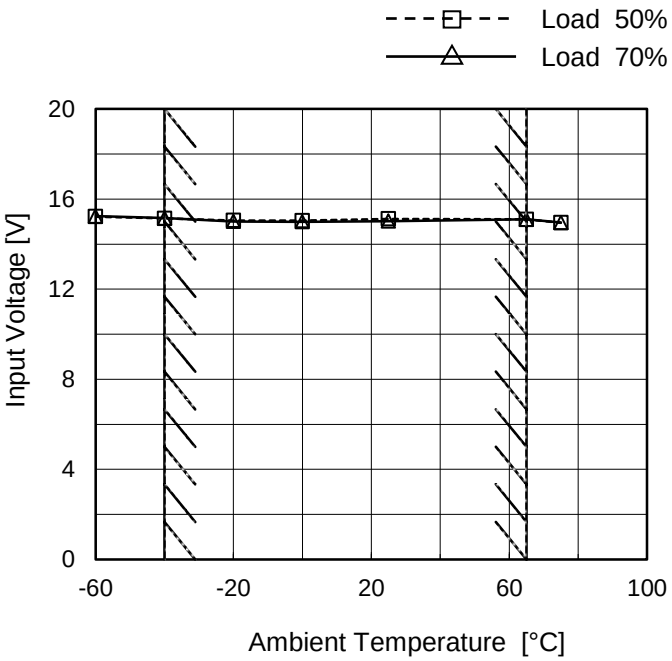


COSEL

Model	MGFW404812
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V1.7A

Testing Circuitry Figure A

1.Graph



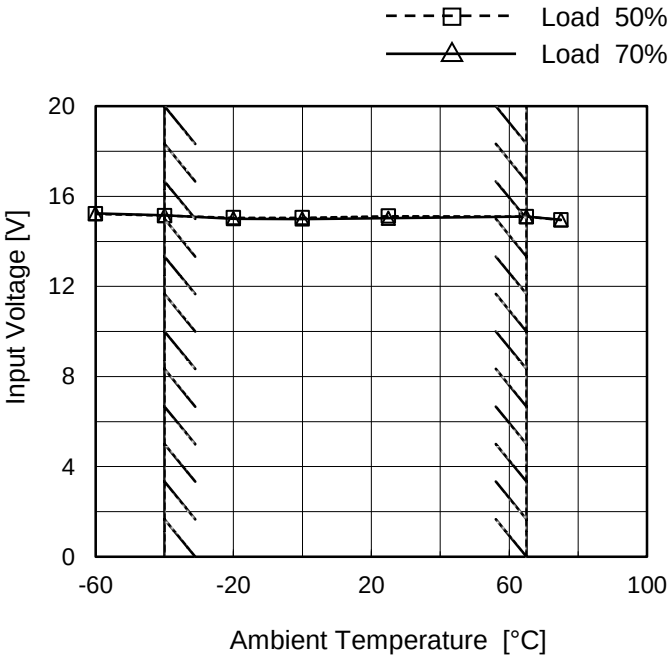
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	15.3	15.3
-40	15.2	15.2
-20	15.1	15.1
0	15.1	15.0
25	15.2	15.1
65	15.1	15.1
75	15.0	15.0
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Load Current is same as well as +12V

Object	-12V1.7A

1.Graph



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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	15.3	15.3
-40	15.2	15.2
-20	15.1	15.1
0	15.1	15.0
25	15.2	15.1
65	15.1	15.1
75	15.0	15.0
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Load Current is same as well as -12V

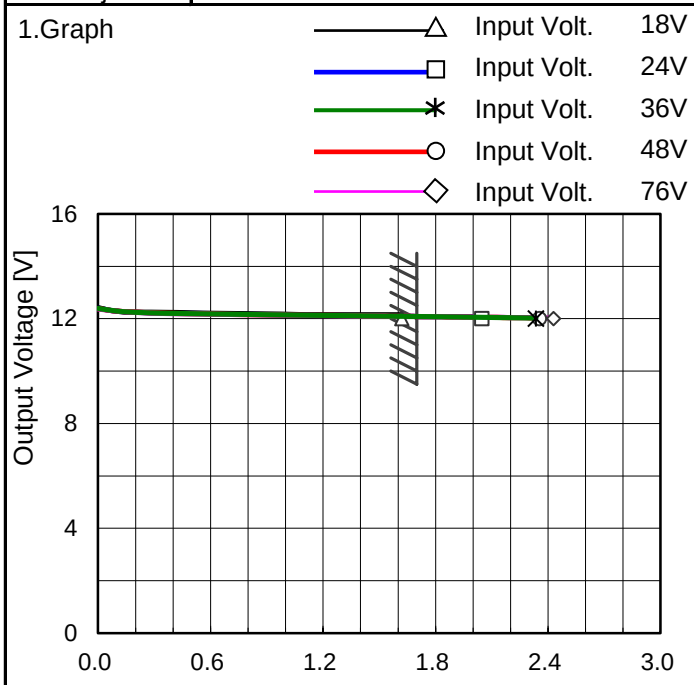
BC-11325

COSEL

Model	MGFW404812
Item	Overcurrent Protection
Object	+12V1.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



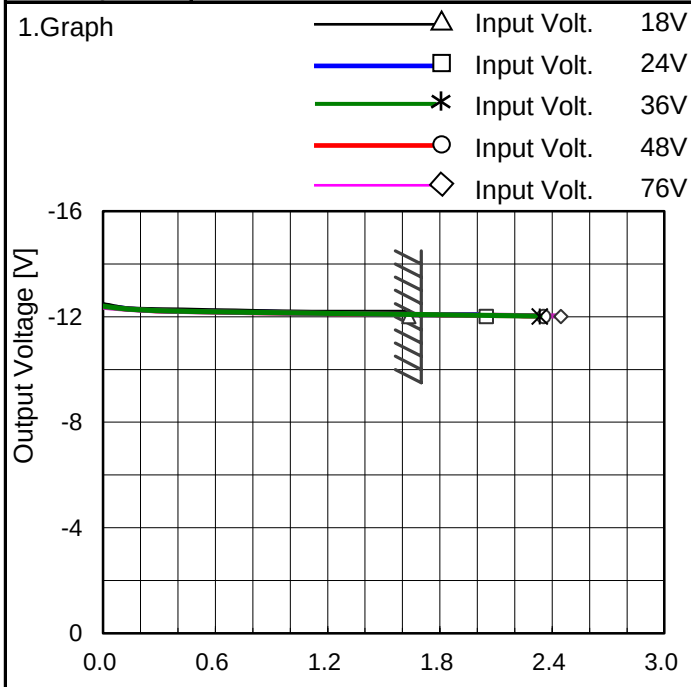
2.Values

Output Voltage [V]	Load Current [A]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
12.000	1.621	2.048	2.335	2.354	2.429
11.400	- ※1	- ※2	-	-	-
10.800	-	-	-	-	-
9.600	-	-	-	-	-
8.400	-	-	-	-	-
7.200	-	-	-	-	-
6.000	-	-	-	-	-
4.800	-	-	-	-	-
3.600	-	-	-	-	-
0.000	-	-	-	-	-

-12V: Rated Load Current

Object	-12V1.7A

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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-12.000	1.634	2.048	2.335	2.354	2.448
-11.400	- ※1	- ※2	-	-	-
-10.800	-	-	-	-	-
-9.600	-	-	-	-	-
-8.400	-	-	-	-	-
-7.200	-	-	-	-	-
-6.000	-	-	-	-	-
-4.800	-	-	-	-	-
-3.600	-	-	-	-	-
0.000	-	-	-	-	-

+12V: Rated Load Current

※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

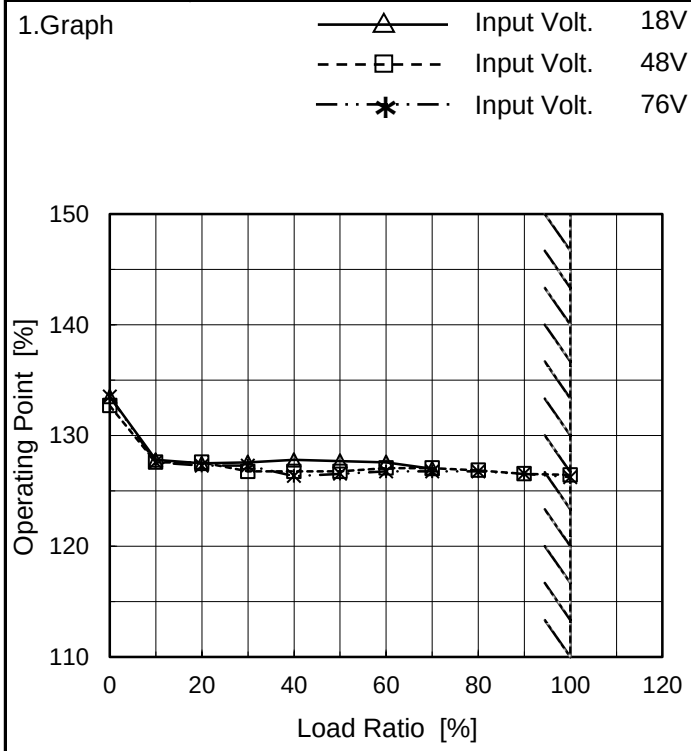
BC-11325

COSEL

Model	MGFW404812
Item	Overvoltage Protection
Object	+24V1.7A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured as a single output(+24V).

2.Values

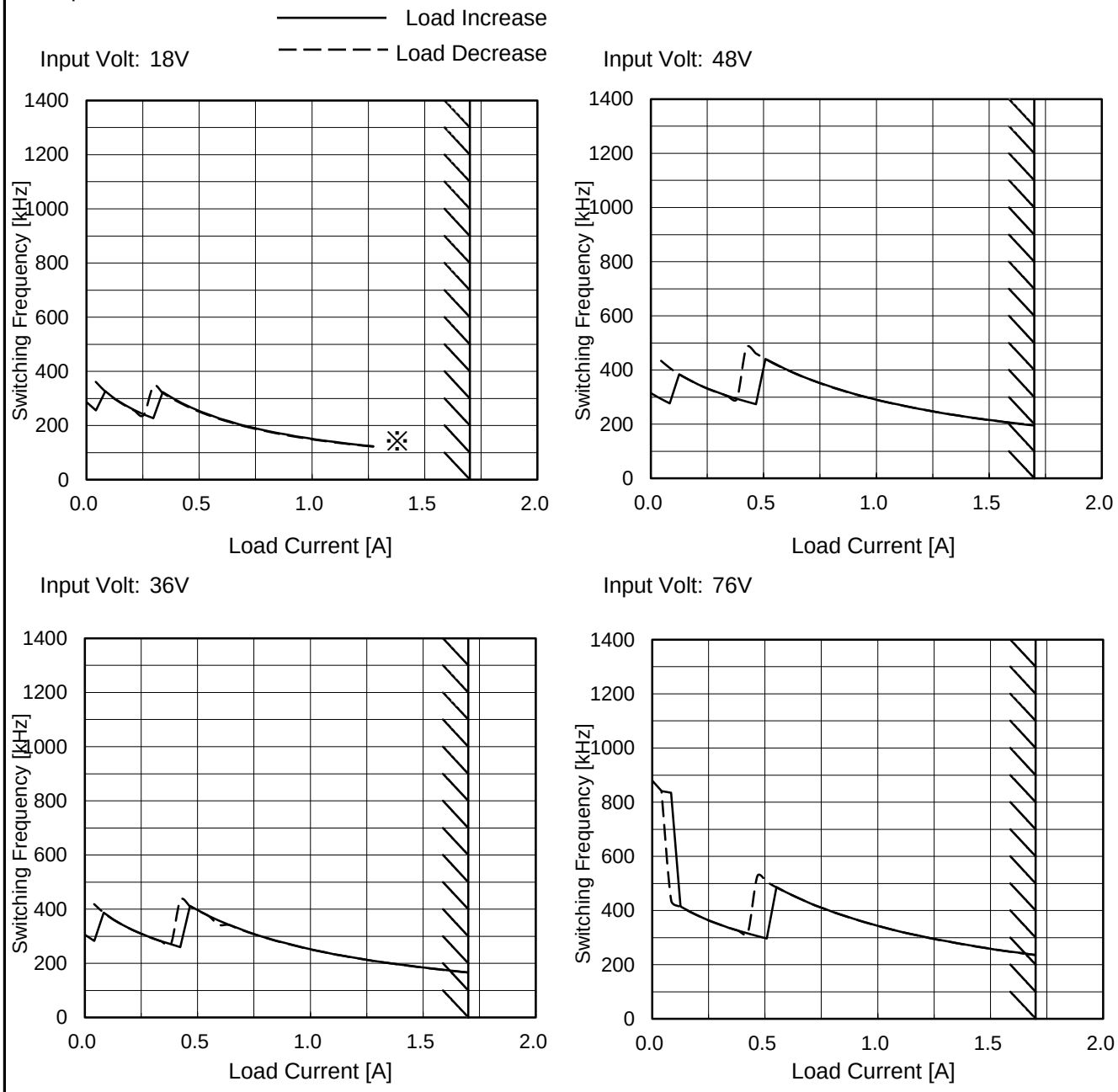
Load Ratio [%]	Operating Point [%] Input Volt. 18[V]	Input Volt. 48[V]	Input Volt. 76[V]
0	134	133	134
10	128	128	128
20	127	128	127
30	128	127	127
40	128	127	126
50	128	127	127
60	128	127	127
70	127	127	127
80	- ※	127	127
90	- ※	127	127
100	- ※	126	126

※During this area, overcurrent protection activates.

COSEL

Model	MGFW404812	
Item	Switching frequency (by Load Current)	Temperature 25°C Testing Circuitry Figure A
Object	+/-12V1.7A	

1.Graph



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.
※ Maximum output current at minimum input Voltage is 70% of rated load current.
Refer to instruction manuals for details of input derating.

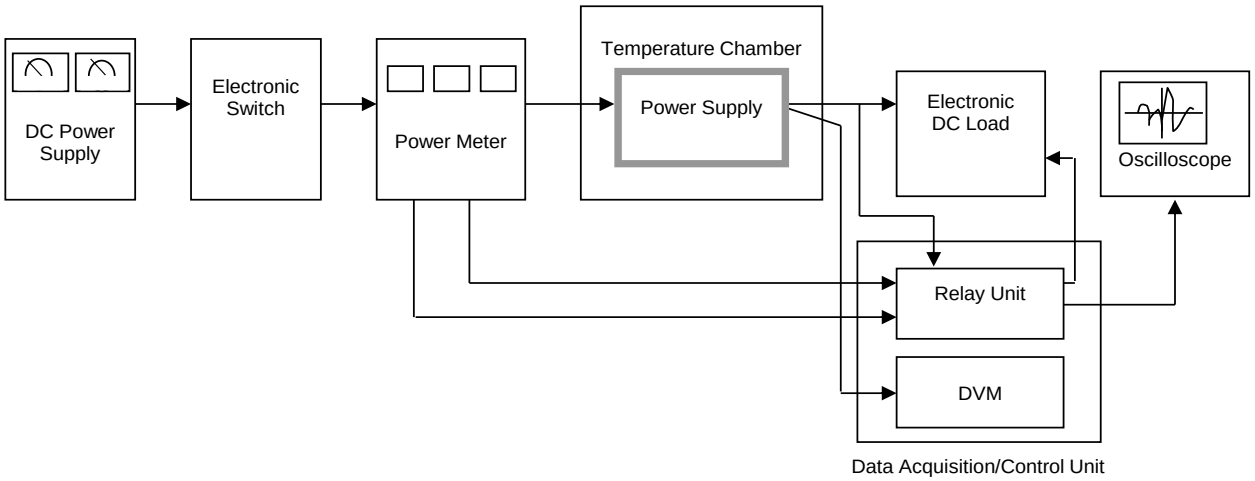


Figure A

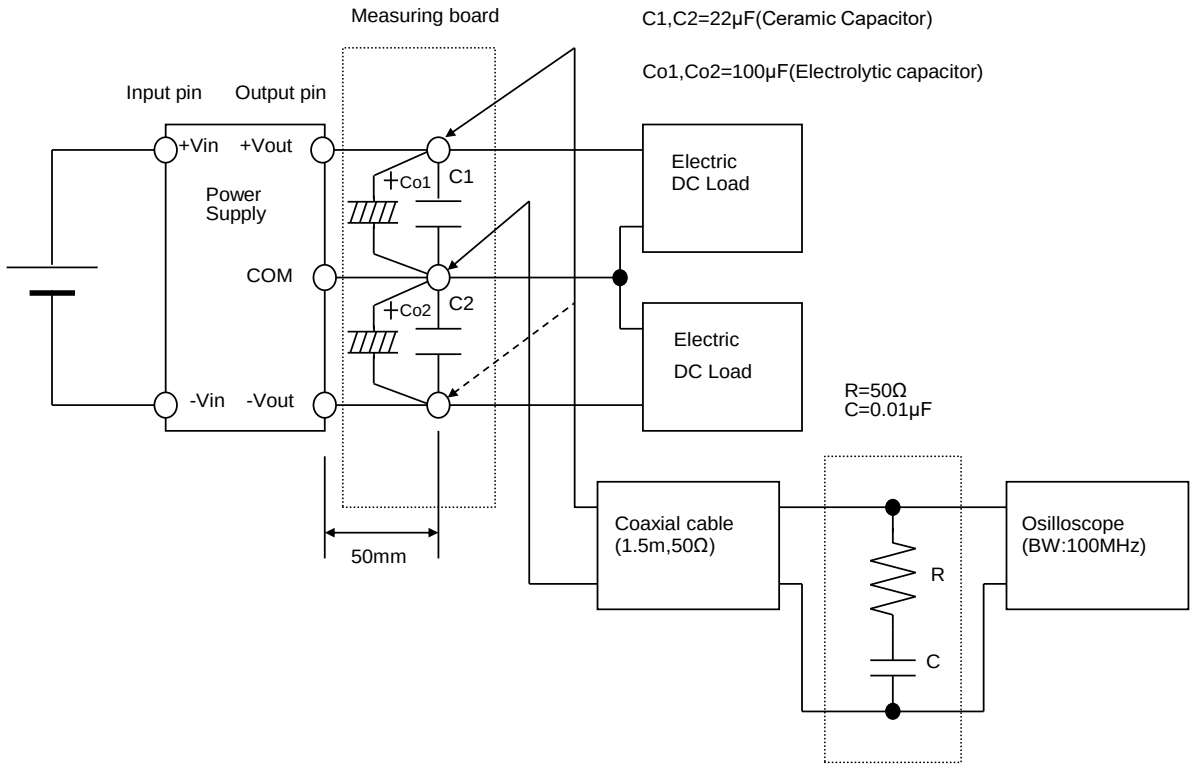


Figure B（Ripple and Ripple noise Characteristic）