COSEL

参考資料

TEST DATA OF MGFW404815

Regulated DC Power Supply

Approved by : Junichi Hatagishi

Junichi Hatagishi Design Manager

Prepared by : Shohei Mukaide

Shohei Mukaide Design Engineer

COSEL CO.,LTD.

参考資料

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参考資料

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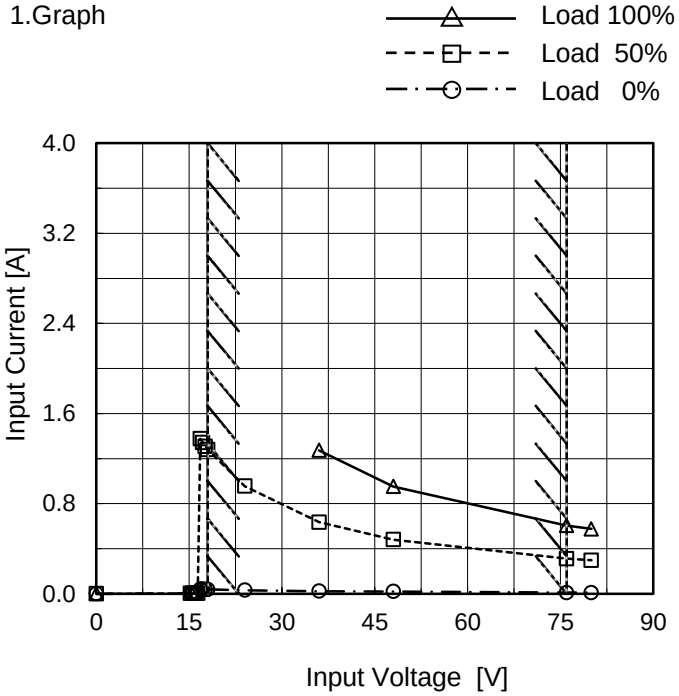
Model	MGFW404815
Item	Input Current (by Input Voltage)
Object	――――――――

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	0.004	0.004	- ※
16.8	0.041	1.376	- ※
17.2	0.040	1.342	- ※
17.6	0.039	1.310	- ※
18.0	0.038	1.280	- ※
24.0	0.031	0.956	- ※
36.0	0.023	0.635	1.273
48.0	0.020	0.480	0.953
76.0	0.010	0.311	0.605
80.0	0.010	0.297	0.576
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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

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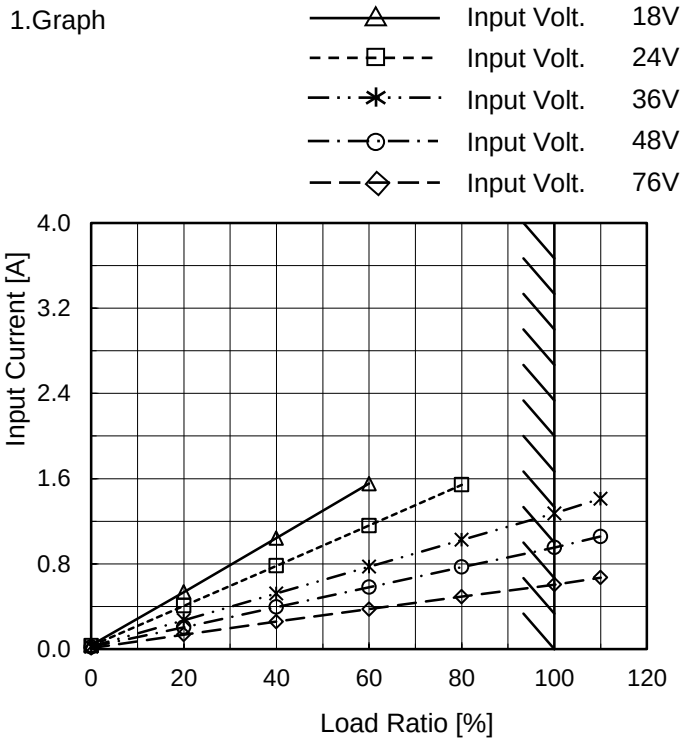
Model	MGFW404815
Item	Input Current (by Load Current)
Object	――――――

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	0.038	0.031	0.023	0.020	0.010
20	0.537	0.406	0.271	0.206	0.137
40	1.042	0.782	0.523	0.395	0.258
60	1.554	1.159	0.773	0.582	0.375
80	- ※1	1.543	1.025	0.770	0.492
100	- ※1	- ※2	1.273	0.953	0.605
110	- ※1	- ※2	1.412	1.057	0.671
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※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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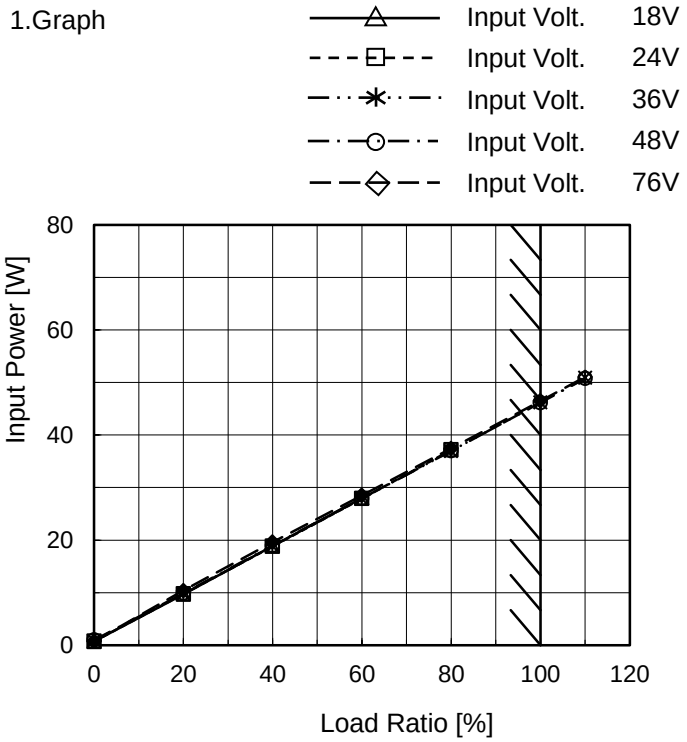
Model	MGFW404815
Item	Input Power (by Load Current)
Object	――――――

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	0.70	0.74	0.84	0.97	0.74
20	9.68	9.75	9.77	9.89	10.40
40	18.86	18.82	18.85	19.00	19.63
60	28.04	27.92	27.87	27.94	28.50
80	- ※1	37.15	36.95	37.00	37.43
100	- ※1	- ※2	46.18	46.14	46.49
110	- ※1	- ※2	50.87	50.76	51.05
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※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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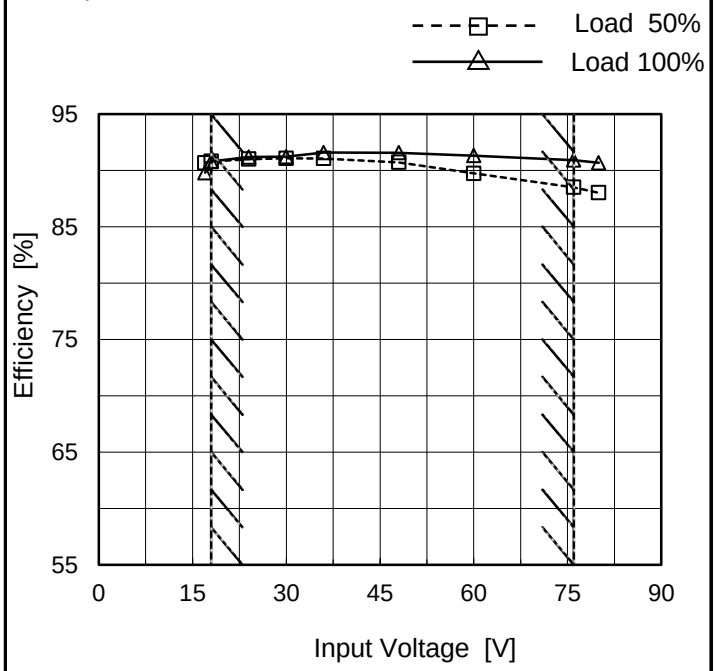
Model	MGFW404815
Item	Efficiency (by Input Voltage)
Object	――――――――――――

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	90.7	89.8 ※1
18	90.8	90.8 ※1
24	91.0	91.2 ※2
30	91.1	91.2
36	91.1	91.6
48	90.7	91.6
60	89.8	91.3
76	88.5	90.9
80	88.0	90.7

※1：Load 70%
※2：Load 80%

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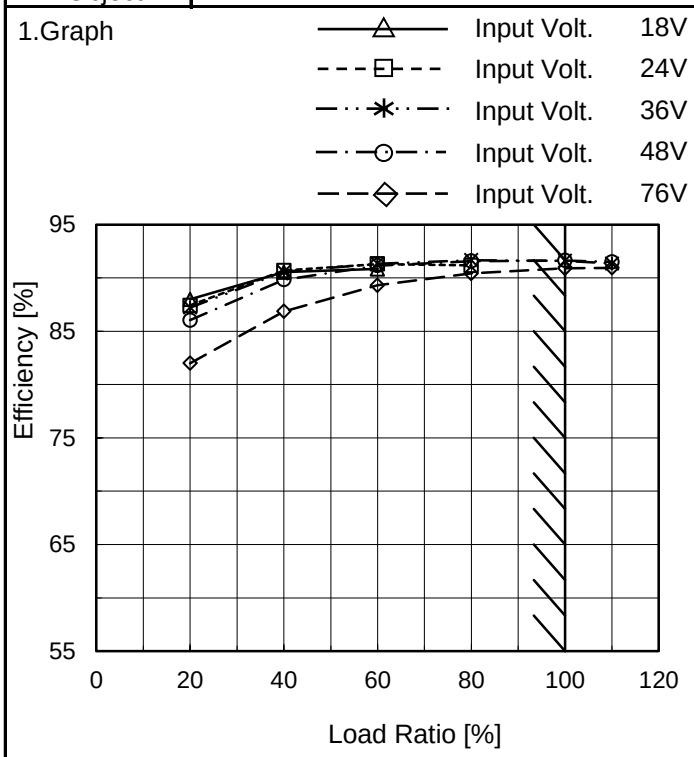
Model	MGFW404815
Item	Efficiency (by Load Current)
Object	――――――――

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	88.0	87.4	87.2	86.0	82.0
40	90.5	90.7	90.6	89.8	86.9
60	90.8	91.3	91.3	91.2	89.3
80	- ※1	91.2	91.7	91.6	90.4
100	- ※1	- ※2	91.6	91.6	90.9
110	- ※1	- ※2	91.3	91.5	90.9
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

※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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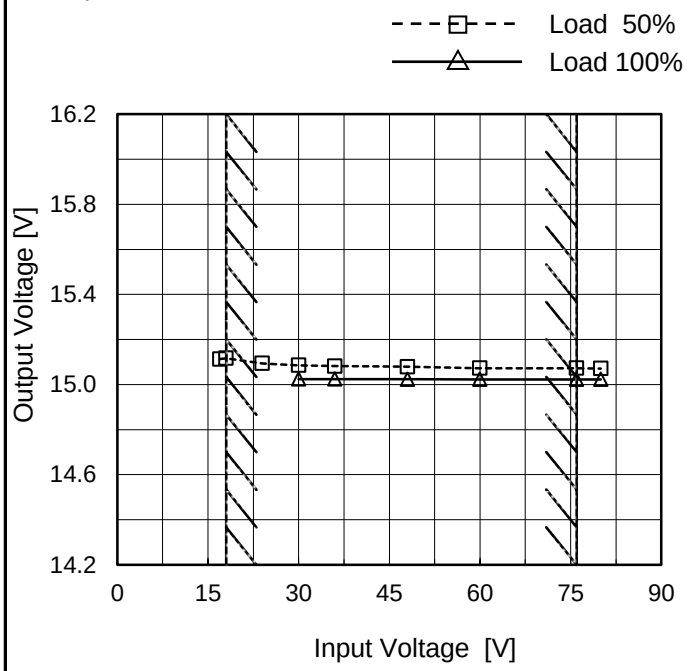
Model	MGFW404815
Item	Line Regulation
Object	+15V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



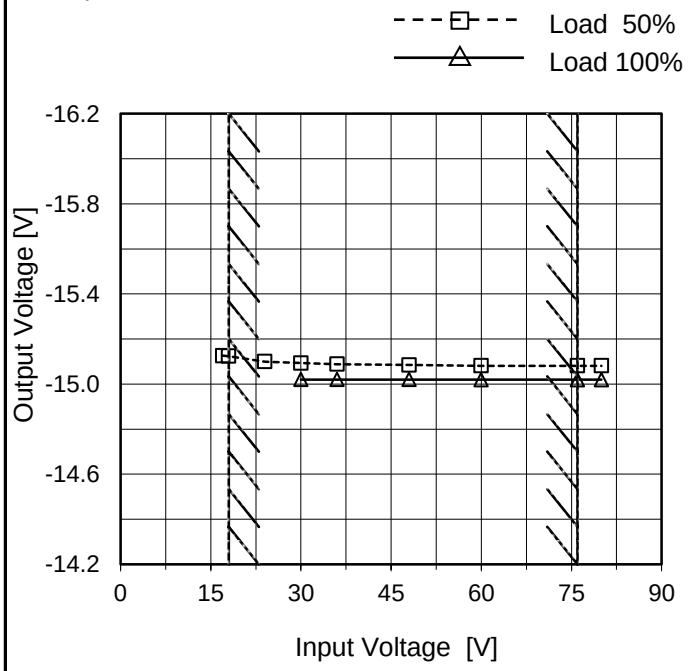
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	15.114	- ※1
18	15.117	- ※1
24	15.094	- ※2
30	15.085	15.024
36	15.082	15.024
48	15.079	15.024
60	15.073	15.023
76	15.073	15.023
80	15.071	15.023

-15V: Rated Load Current

Object	-15V1.4A

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	-15.126	- ※1
18	-15.124	- ※1
24	-15.100	- ※2
30	-15.093	-15.020
36	-15.088	-15.020
48	-15.085	-15.020
60	-15.081	-15.020
76	-15.081	-15.020
80	-15.081	-15.019

+15V: 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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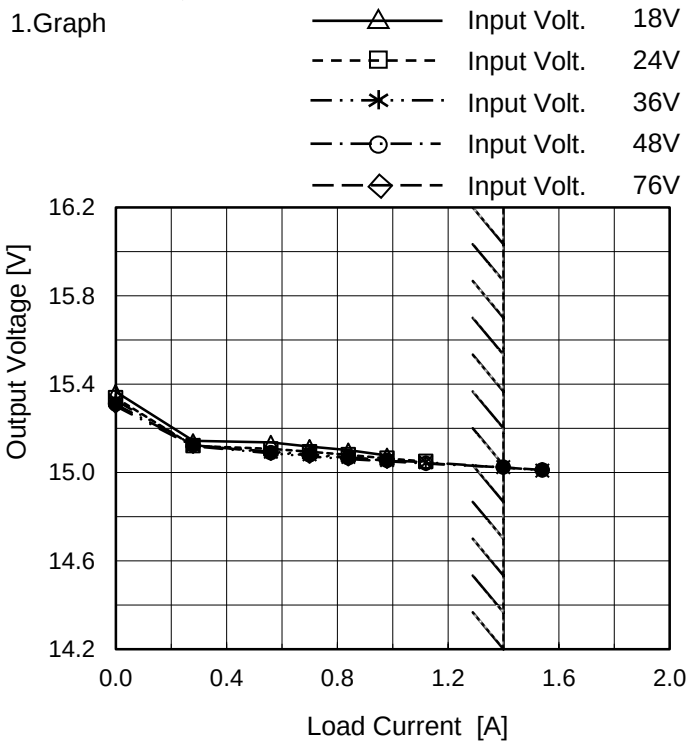
COSEL

Model	MGFW404815
Item	Load Regulation
Object	+15V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



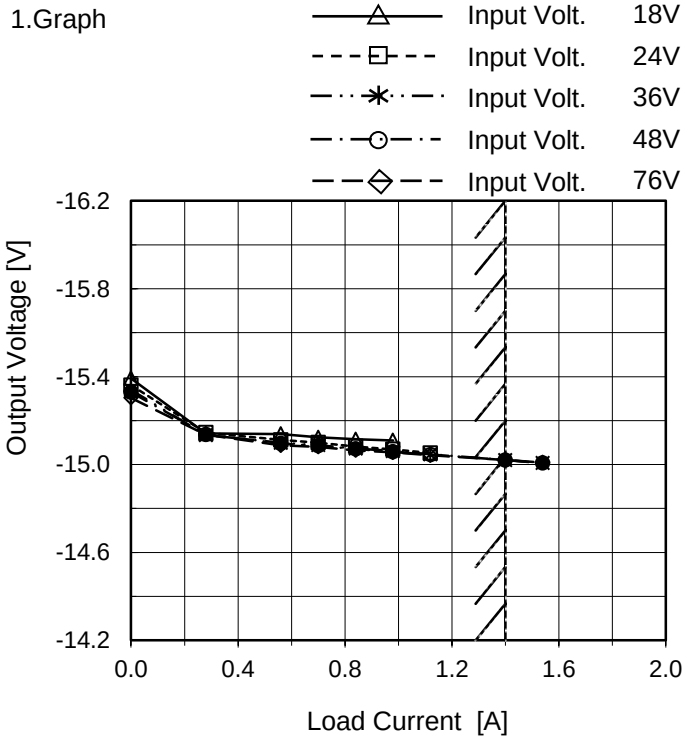
2.Values

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	15.366	15.338	15.326	15.309	15.300
0.28	15.143	15.121	15.124	15.125	15.119
0.56	15.136	15.107	15.094	15.090	15.087
0.70	15.117	15.094	15.082	15.079	15.073
0.84	15.101	15.080	15.070	15.067	15.062
0.98	15.077	15.064	15.056	15.054	15.051
1.12	- ※1	15.050	15.046	15.042	15.040
1.40	- ※1	- ※2	15.024	15.024	15.023
1.54	- ※1	- ※2	15.009	15.010	15.012
--	-	-	-	-	-
--	-	-	-	-	-

-15V: Rated Load Current

Object	-15V1.4A

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	-15.393	-15.361	-15.340	-15.329	-15.304
0.28	-15.141	-15.145	-15.134	-15.137	-15.136
0.56	-15.139	-15.112	-15.099	-15.096	-15.088
0.70	-15.124	-15.100	-15.088	-15.085	-15.081
0.84	-15.115	-15.082	-15.073	-15.071	-15.065
0.98	-15.110	-15.069	-15.061	-15.057	-15.055
1.12	- ※1	-15.053	-15.047	-15.046	-15.042
1.40	- ※1	- ※2	-15.020	-15.020	-15.020
1.54	- ※1	- ※2	-15.006	-15.007	-15.009
--	-	-	-	-	-
--	-	-	-	-	-

+15V: 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	MGFW404815	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+15V1.4A	

Input Volt. 48 V

-15V:rated load current.

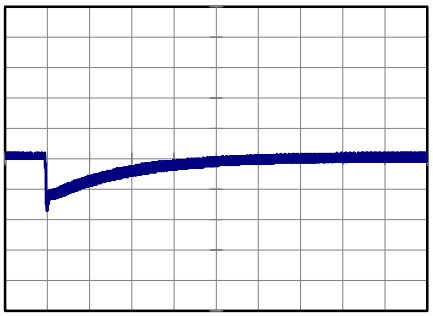
Cycle 100 ms

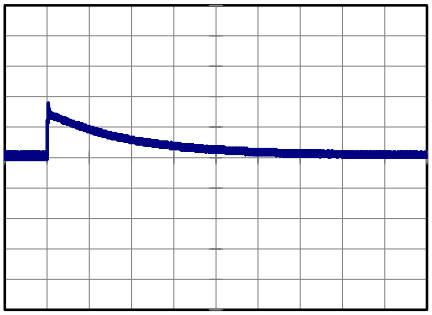
t1,t2 = 100 μ s

Load Current

t1 t2

Min.Load (0A)←→
Load 100% (1.4A)

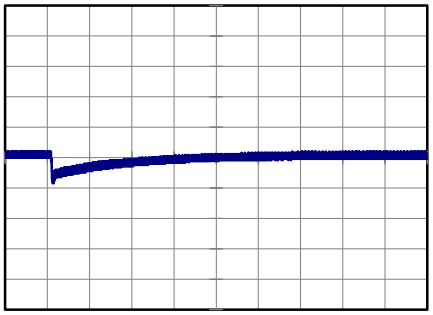


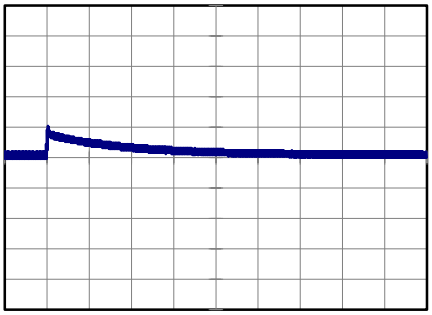


200 mV/div

2 ms/div 2 ms/div

Min.Load (0A)←→
Load 50% (0.7A)

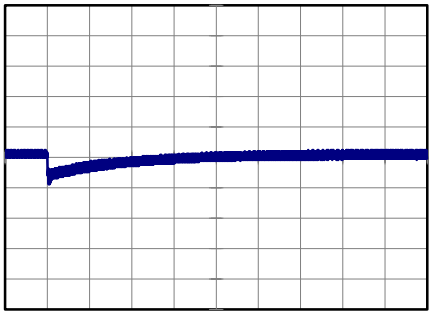


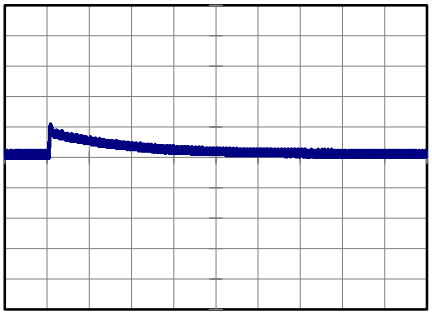


200 mV/div

2 ms/div 2 ms/div

Load 50% (0.7A)←→
Load 100% (1.4A)





200 mV/div

2 ms/div 2 ms/div

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Model	MGFW404815	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	-15V1.4A	

Input Volt. 48 V

+15V:rated load current.

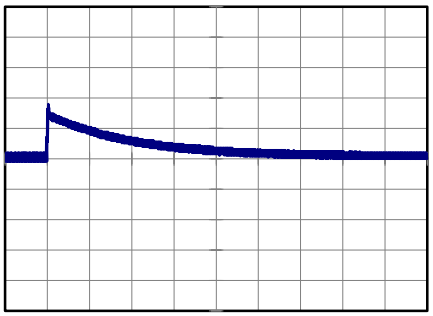
Cycle 100 ms

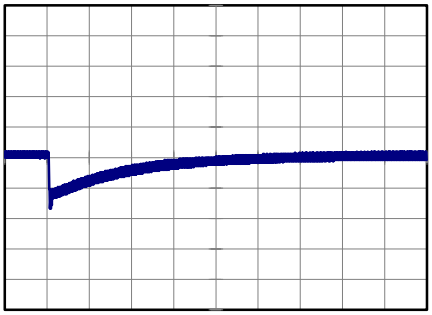
t1,t2 = 100 μ s

Load Current

t1 t2

Min.Load (0A)←→
Load 100% (1.4A)

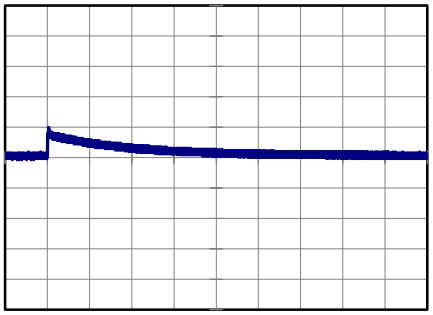


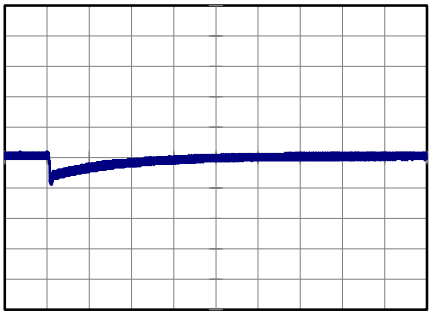


200 mV/div

2 ms/div 2 ms/div

Min.Load (0A)←→
Load 50% (0.7A)

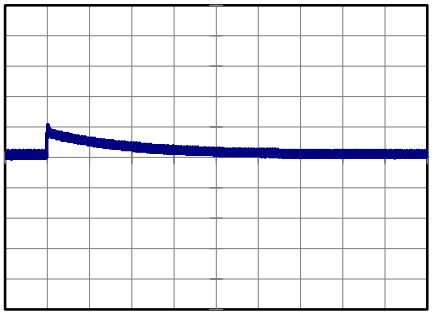


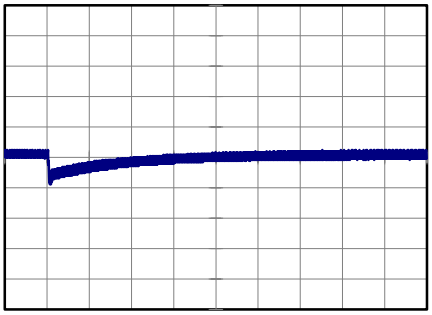


200 mV/div

2 ms/div 2 ms/div

Load 50% (0.7A)←→
Load 100% (1.4A)





200 mV/div

2 ms/div 2 ms/div

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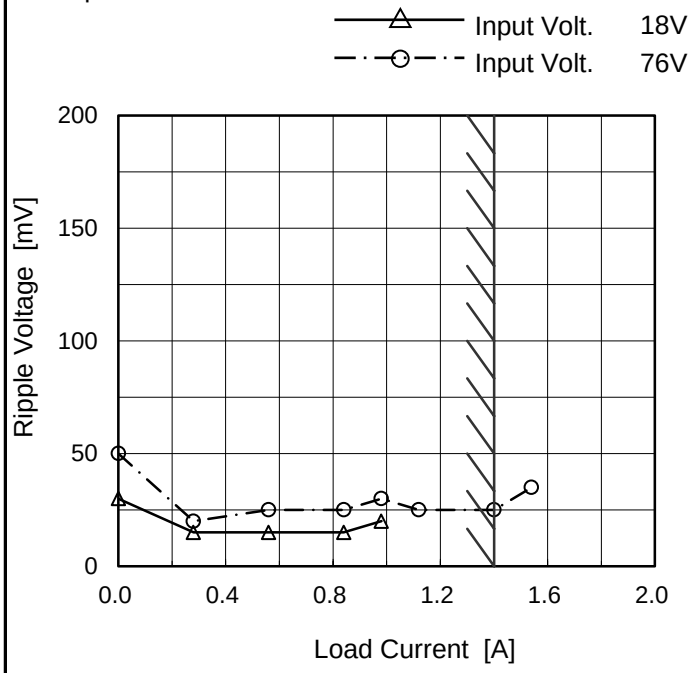
Model	MGFW404815
Item	Ripple Voltage (by Load Current)
Object	+15V1.4A

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]

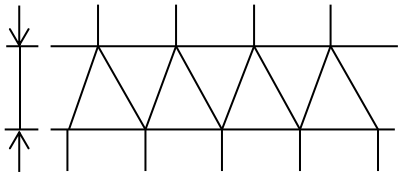


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	30	50
0.28	15	20
0.56	15	25
0.84	15	25
0.98	20	30
1.12	- ※	25
1.40	- ※	25
1.54	- ※	35
--	-	-
--	-	-
--	-	-

-15V: 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.

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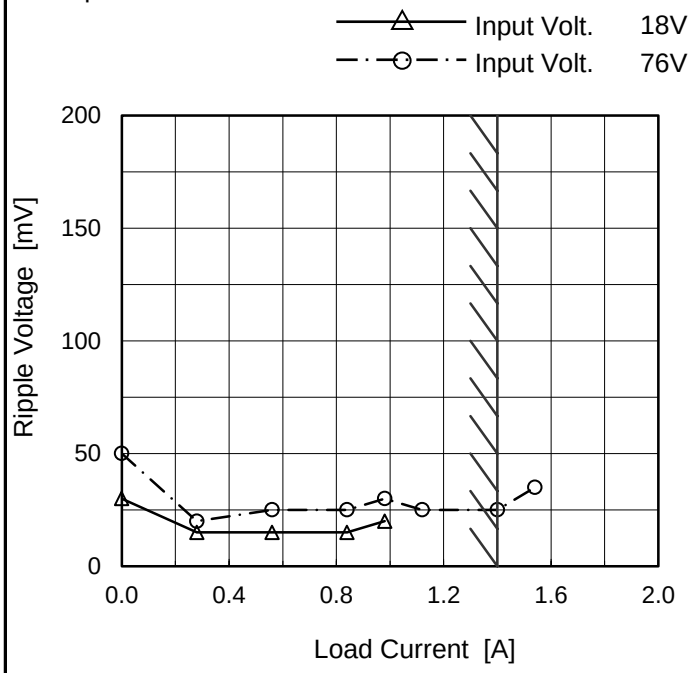
COSEL

Model	MGFW404815
Item	Ripple Voltage (by Load Current)
Object	-15V1.4A

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]

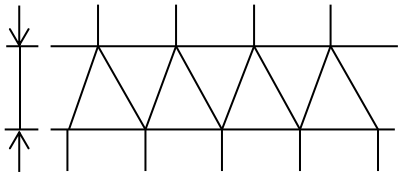


Fig.Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	30	50
0.28	15	20
0.56	15	25
0.84	15	25
0.98	20	30
1.12	- ※	25
1.40	- ※	25
1.54	- ※	35
--	-	-
--	-	-
--	-	-

+15V: Rated Load Current

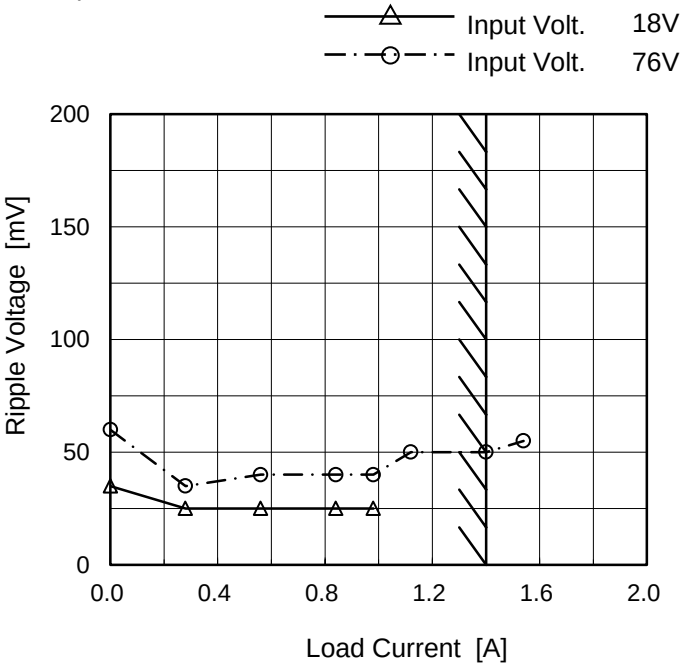
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404815
Item	Ripple-Noise
Object	+15V1.4A

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]

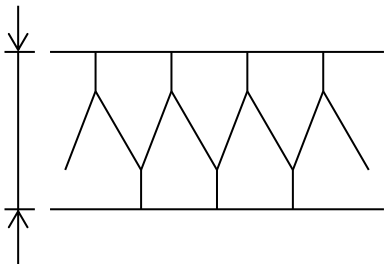


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	35	60
0.28	25	35
0.56	25	40
0.84	25	40
0.98	25	40
1.12	- ※	50
1.40	- ※	50
1.54	- ※	55
--	-	-
--	-	-
--	-	-

-15V: Rated Load Current

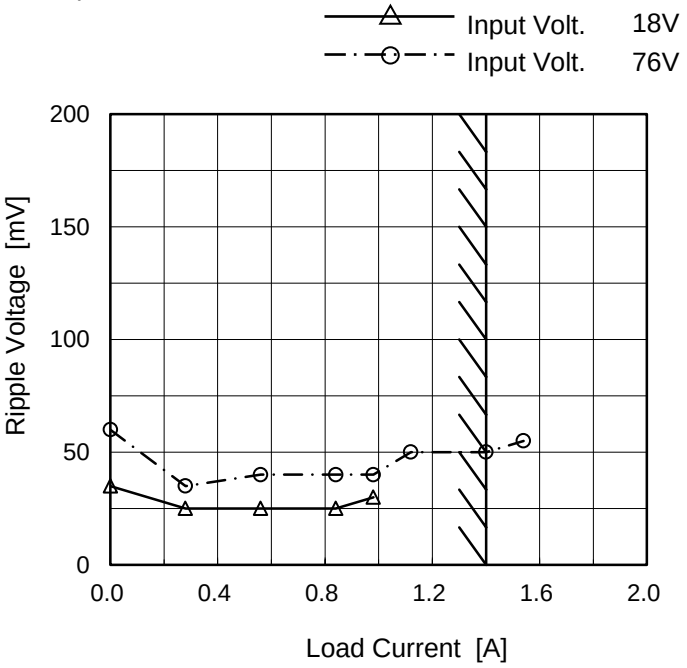
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404815
Item	Ripple-Noise
Object	-15V1.4A

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]

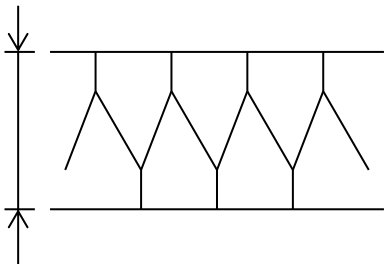


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.00	35	60
0.28	25	35
0.56	25	40
0.84	25	40
0.98	30	40
1.12	- ※	50
1.40	- ※	50
1.54	- ※	55
--	-	-
--	-	-
--	-	-

+15V: Rated Load Current

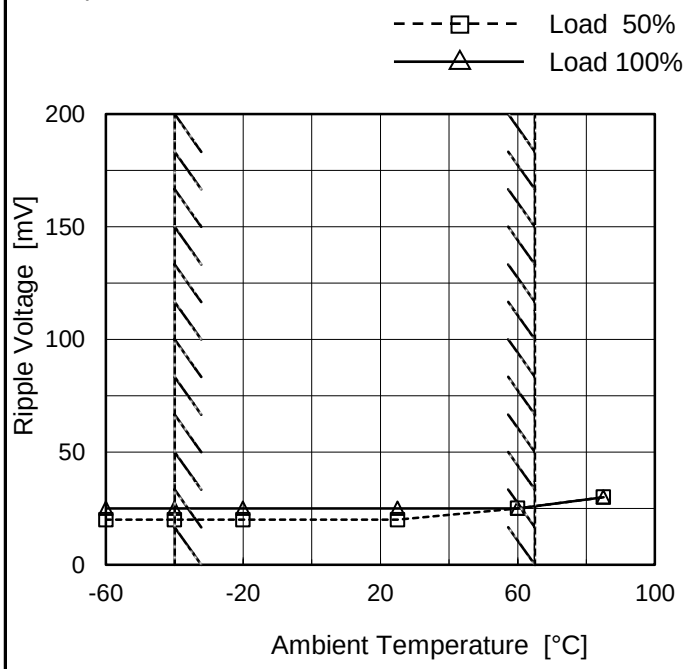
※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404815
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V1.4A

Testing Circuitry Figure B

1.Graph



Input Volt. 48V

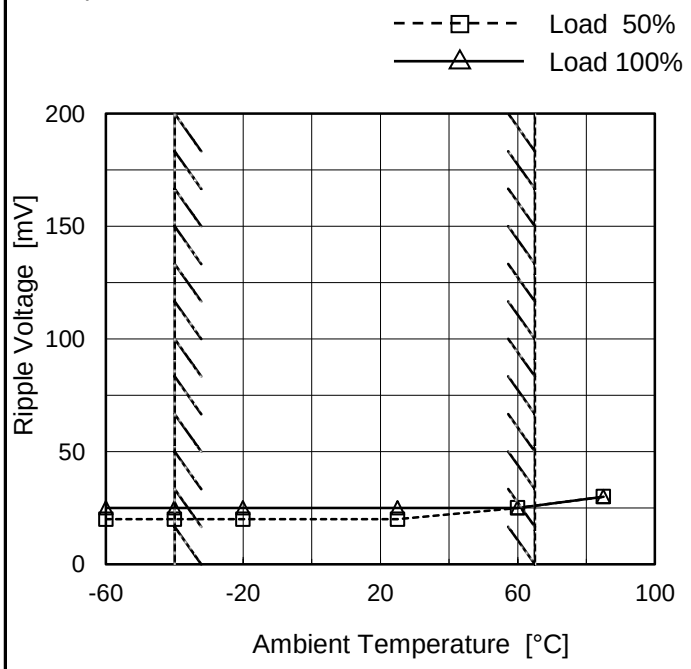
2.Values

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

-15V: Rated Load Current

Object	-15V1.4A

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

+15V: Rated Load Current

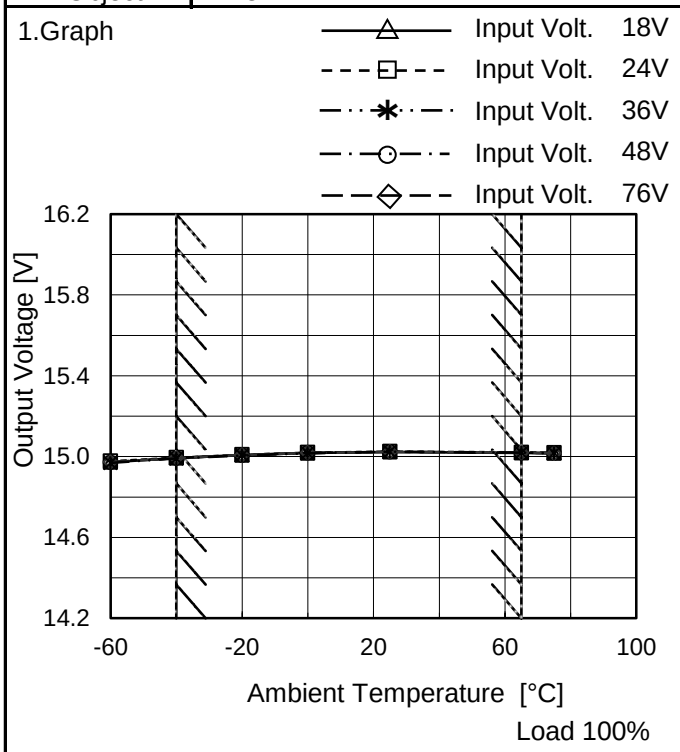
COSEL

Model	MGFW404815
Item	Ambient Temperature Drift

Testing Circuitry Figure A

Object +15V1.4A

1.Graph



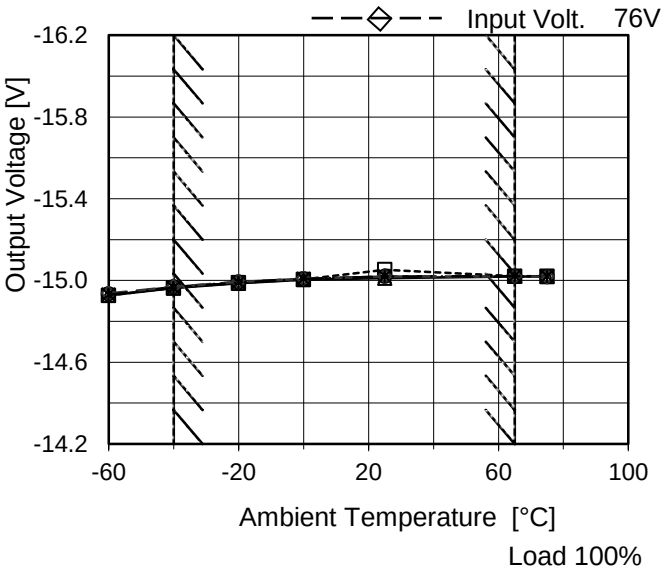
2.Values

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	14.972	14.977	14.969	14.972	14.972
-40	14.993	14.994	14.991	14.992	14.993
-20	15.008	15.009	15.006	15.007	15.008
0	15.018	15.020	15.017	15.018	15.018
25	15.023	15.025	15.024	15.024	15.023
65	15.018	15.020	15.019	15.019	15.019
75	15.017	15.019	15.016	15.017	15.016
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-15V: Rated Load Current

Object -15V1.4A

1.Graph



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	-14.927	-14.926	-14.931	-14.934	-14.937
-40	-14.962	-14.964	-14.964	-14.968	-14.970
-20	-14.986	-14.989	-14.990	-14.992	-14.993
0	-15.004	-15.005	-15.007	-15.008	-15.009
25	-15.011	-15.053	-15.020	-15.020	-15.020
65	-15.019	-15.021	-15.021	-15.020	-15.020
75	-15.019	-15.021	-15.020	-15.019	-15.018
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+15V: Rated Load Current

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

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COSEL

Model	MGFW404815	
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 - 1.4A (AVR 2) : 0 - 1.4A

* 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	+15V1.4A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	18	0	15.379	±352	±2.3
Minimum Voltage	-40	48	1.4	14.675		

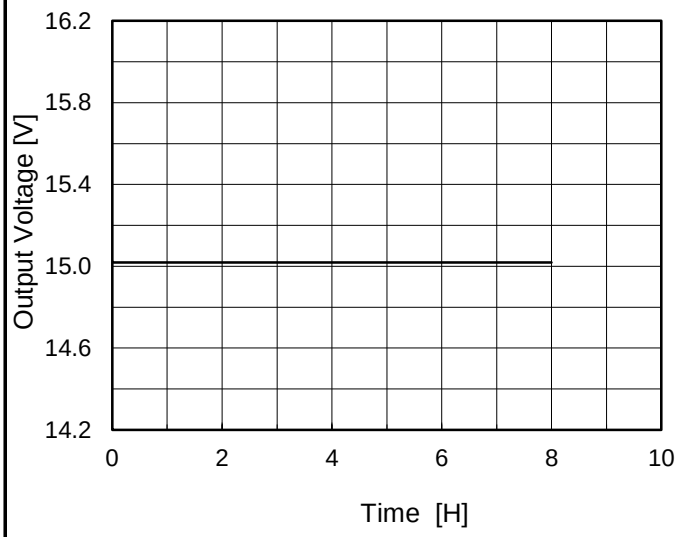
Object	-15V1.4A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	36	0	-15.357	±374	±2.5
Minimum Voltage	-40	18	1.4	-14.610		

COSEL

Model	MGFW404815
Item	Time Lapse Drift
Object	+15V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 48V
Load 100%

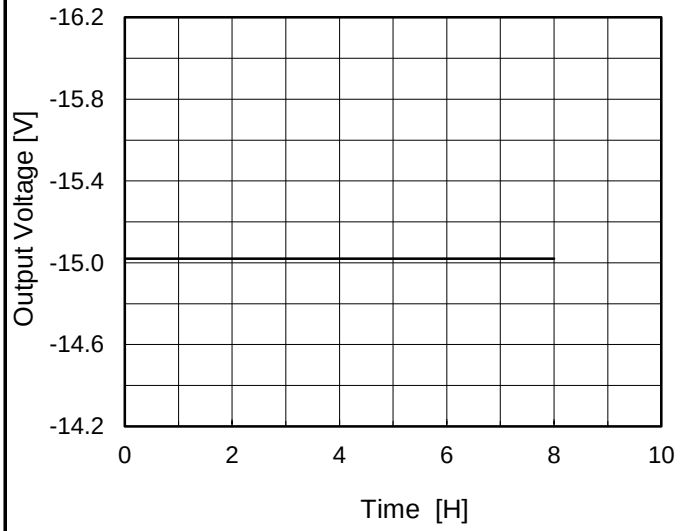
2.Values

Time since start [H]	Output Voltage [V]
0.0	15.024
0.5	15.019
1.0	15.019
2.0	15.019
3.0	15.019
4.0	15.019
5.0	15.019
6.0	15.019
7.0	15.019
8.0	15.019

-15V: Rated Load Current

Object	-15V1.4A

1.Graph



Input Volt. 48V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	-15.019
0.5	-15.020
1.0	-15.020
2.0	-15.020
3.0	-15.020
4.0	-15.020
5.0	-15.020
6.0	-15.020
7.0	-15.020
8.0	-15.020

+15V: Rated Load Current

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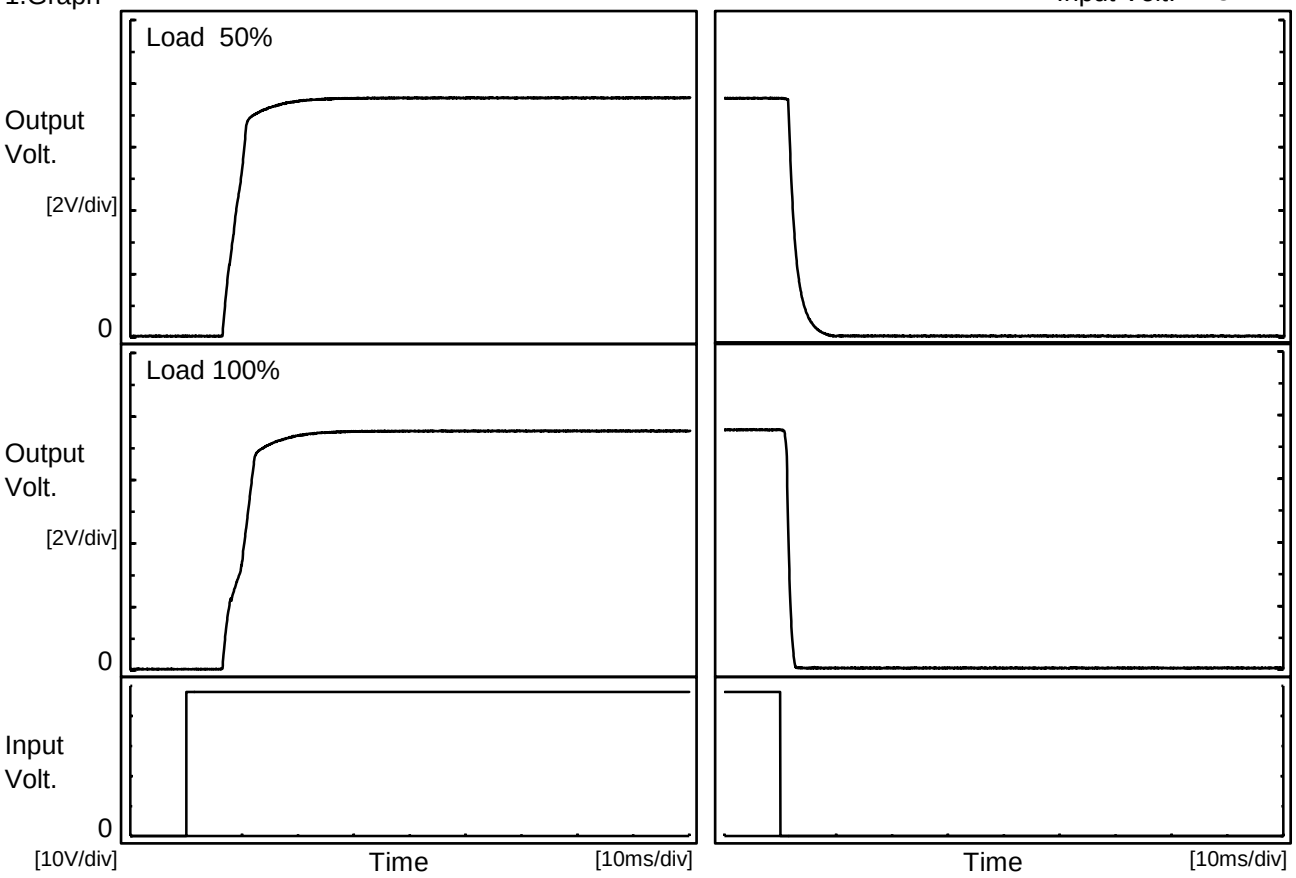
COSEL

Model	MGFW404815	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+15V1.4A	

1.Graph

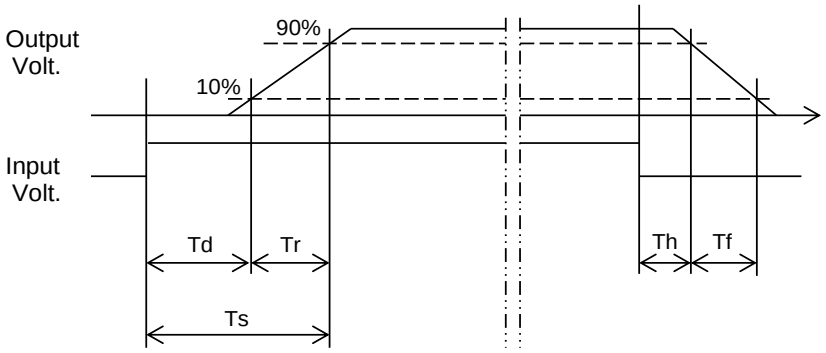
Input Volt. 48 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	6.8	4.1	10.9	1.5	3.1
100 %	6.9	5.5	12.4	1.1	1.1



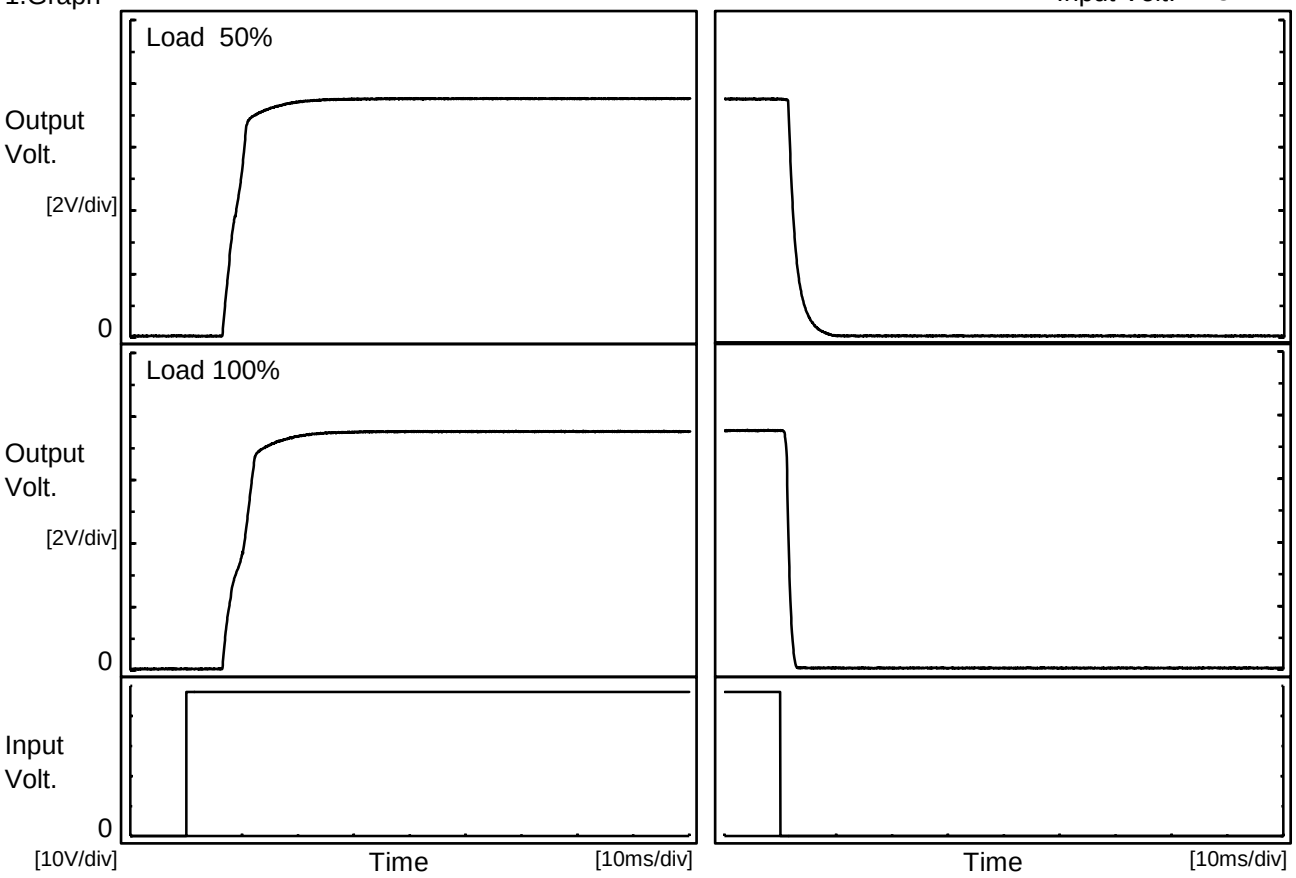
COSEL

Model	MGFW404815
Item	Rise and Fall Time
Object	-15V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

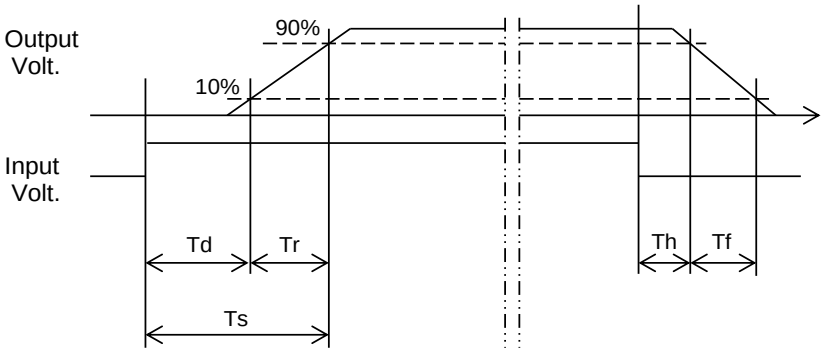
Input Volt. 48 V



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	6.8	4.2	11.0	1.5	3.2
100 %	6.8	5.7	12.5	1.1	1.2



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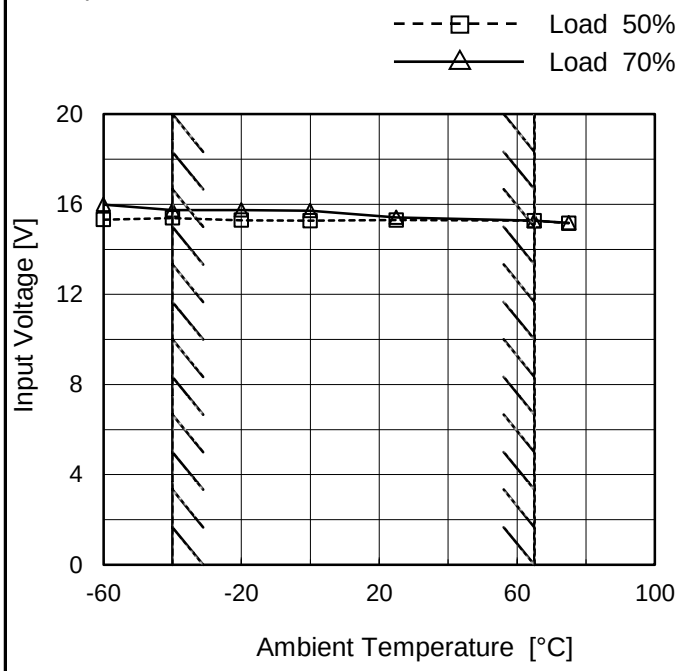
COSEL

Model	MGFW404815
Item	Minimum Input Voltage for Regulated Output Voltage

Testing Circuitry Figure A

Object: +15V1.4A

1.Graph



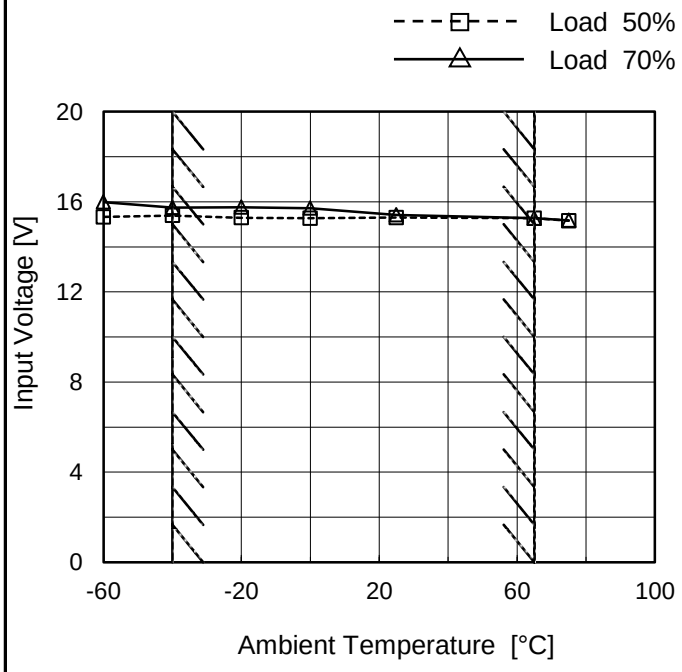
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	15.4	16.0
-40	15.4	15.8
-20	15.3	15.8
0	15.3	15.8
25	15.3	15.5
65	15.3	15.3
75	15.2	15.2
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Load Current is same as well as +15V

Object: -15V1.4A

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	15.4	16.0
-40	15.4	15.8
-20	15.3	15.8
0	15.3	15.8
25	15.3	15.5
65	15.3	15.3
75	15.2	15.2
--	-	-
--	-	-
--	-	-
--	-	-

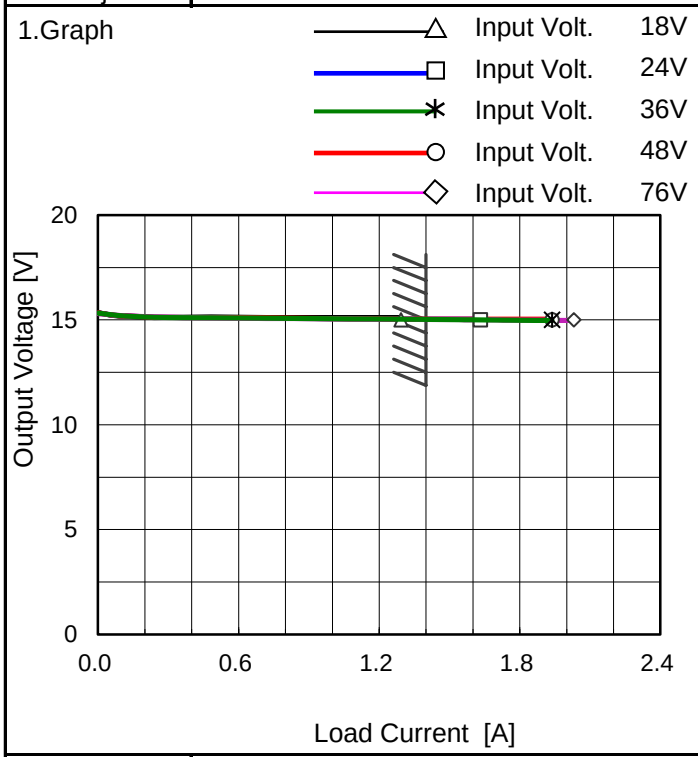
+15V: Load Current is same as well as -15V

COSEL

Model	MGFW404815
Item	Overcurrent Protection
Object	+15V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



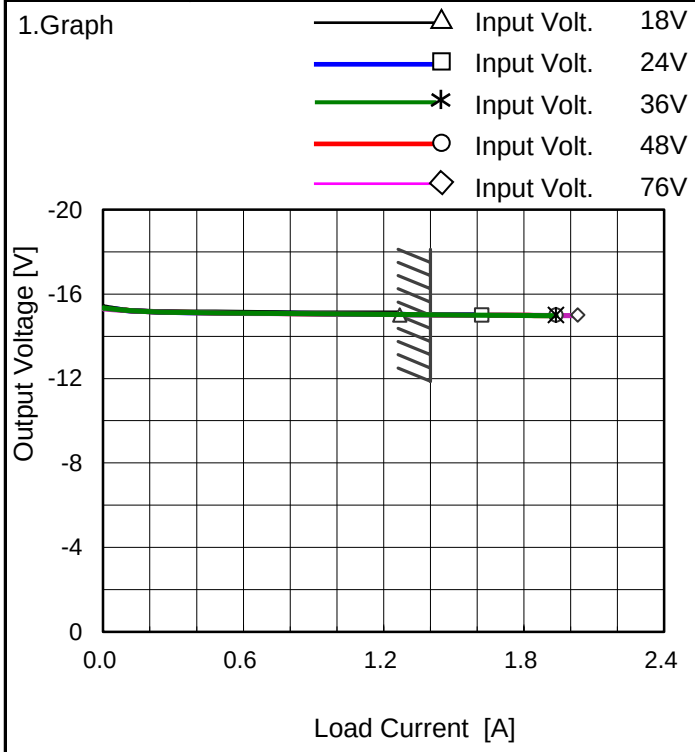
2.Values

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]
15.0	1.293	1.633	1.938	1.938	2.031
14.3	- ※1	- ※2	-	-	-
13.5	-	-	-	-	-
12.0	-	-	-	-	-
10.5	-	-	-	-	-
9.0	-	-	-	-	-
7.5	-	-	-	-	-
6.0	-	-	-	-	-
4.5	-	-	-	-	-
0.0	-	-	-	-	-

-15V: Rated Load Current

Object	-15V1.4A

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]
-15.0	1.269	1.620	1.938	1.938	2.031
-14.3	- ※1	- ※2	-	-	-
-13.5	-	-	-	-	-
-12.0	-	-	-	-	-
-10.5	-	-	-	-	-
-9.0	-	-	-	-	-
-7.5	-	-	-	-	-
-6.0	-	-	-	-	-
-4.5	-	-	-	-	-
0.0	-	-	-	-	-

+15V: Rated Load Current

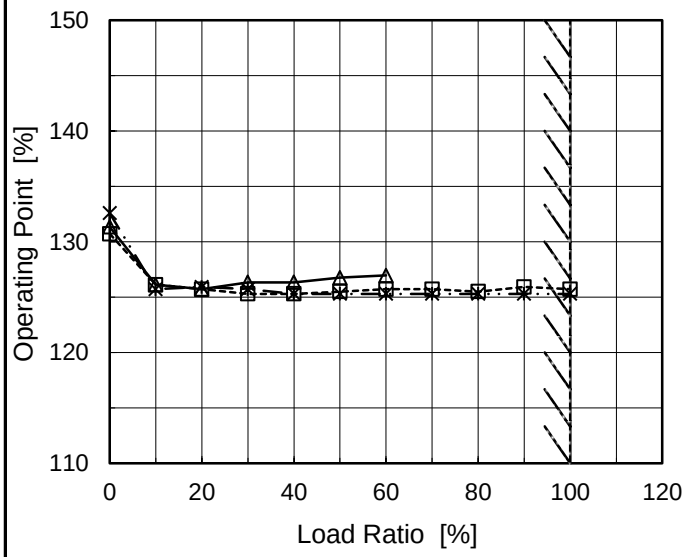
※1 Maximum output current at minimum input Voltage is 70% of rated load current.
※2 Maximum output current at 24V input Voltage is 80% of rated load current.
Refer to instruction manuals for details of input derating.

COSEL

Model	MGFW404815
Item	Overvoltage Protection
Object	+30V1.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Measured as a single output(+30V).

2.Values

Load Ratio [%]	Operating Point [%]		
	Input Volt. 18[V]	Input Volt. 48[V]	Input Volt. 76[V]
0	131	131	133
10	126	126	126
20	126	126	126
30	126	125	126
40	126	125	125
50	127	126	125
60	127	126	125
70	- ※	126	125
80	- ※	126	125
90	- ※	126	125
100	- ※	126	125

※During this area, overcurrent protection activates.

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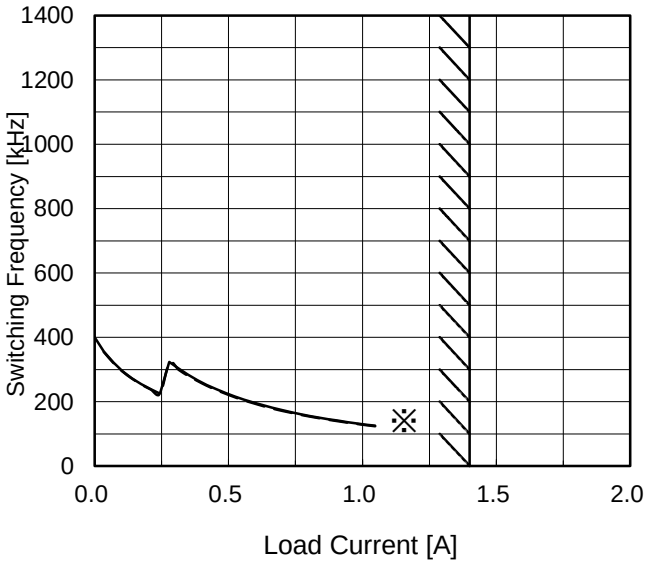
COSEL

Model	MGFW404815	
Item	Switching frequency (by Load Current)	Temperature 25°C Testing Circuitry Figure A
Object	+/-15V1.4A	

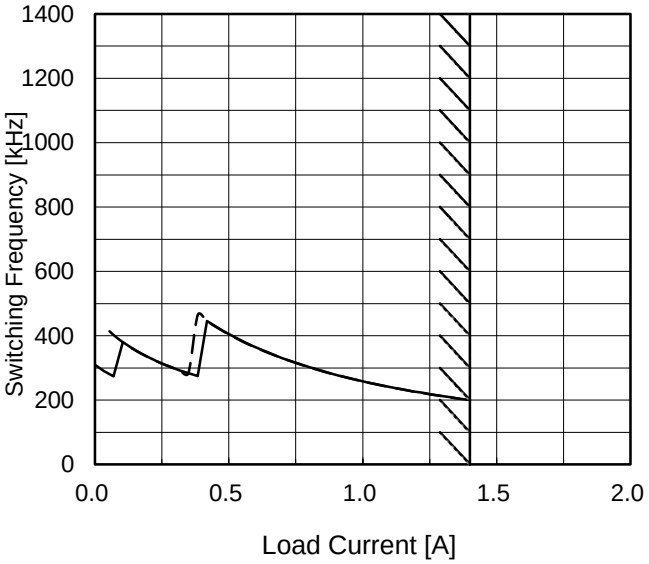
1.Graph

Load Increase
Load Decrease

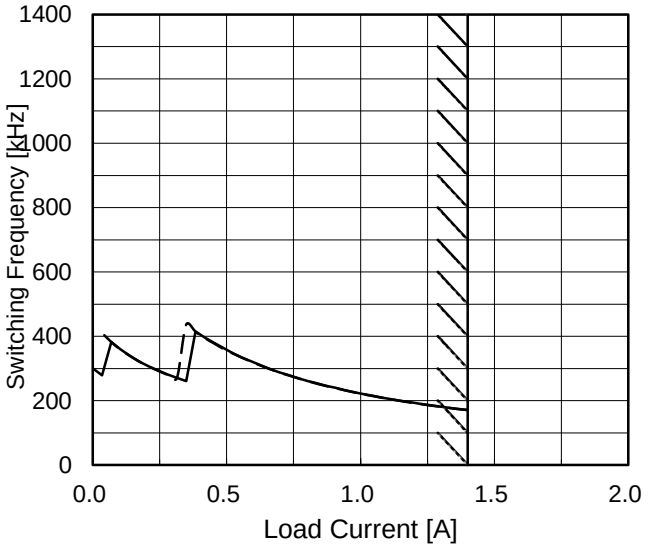
Input Volt: 18V



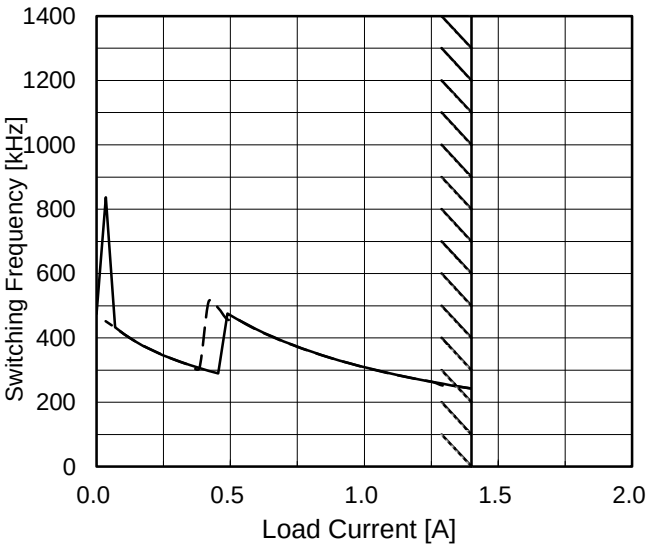
Input Volt: 48V



Input Volt: 36V



Input Volt: 76V



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.

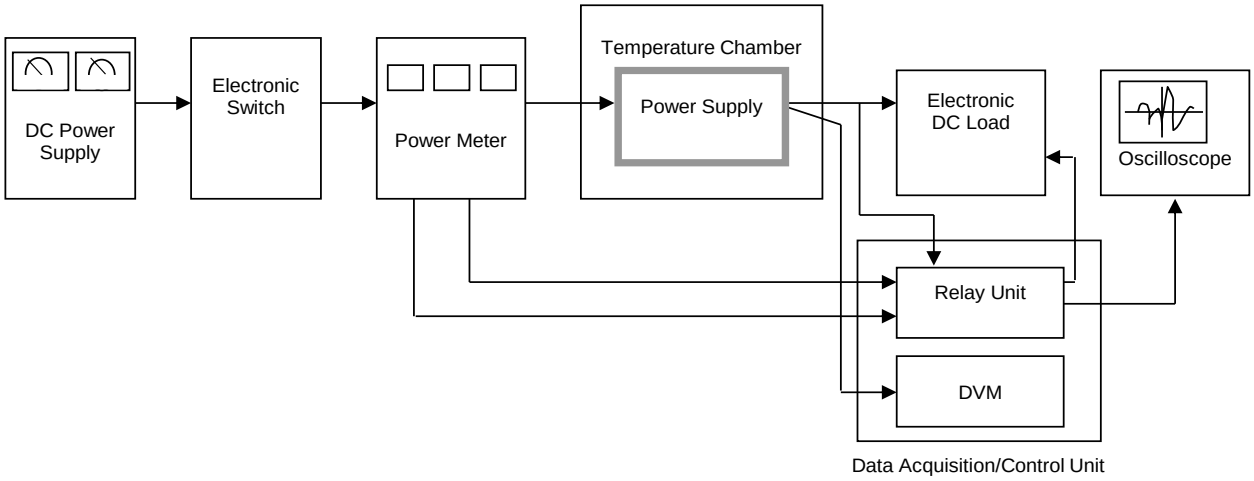


Figure A

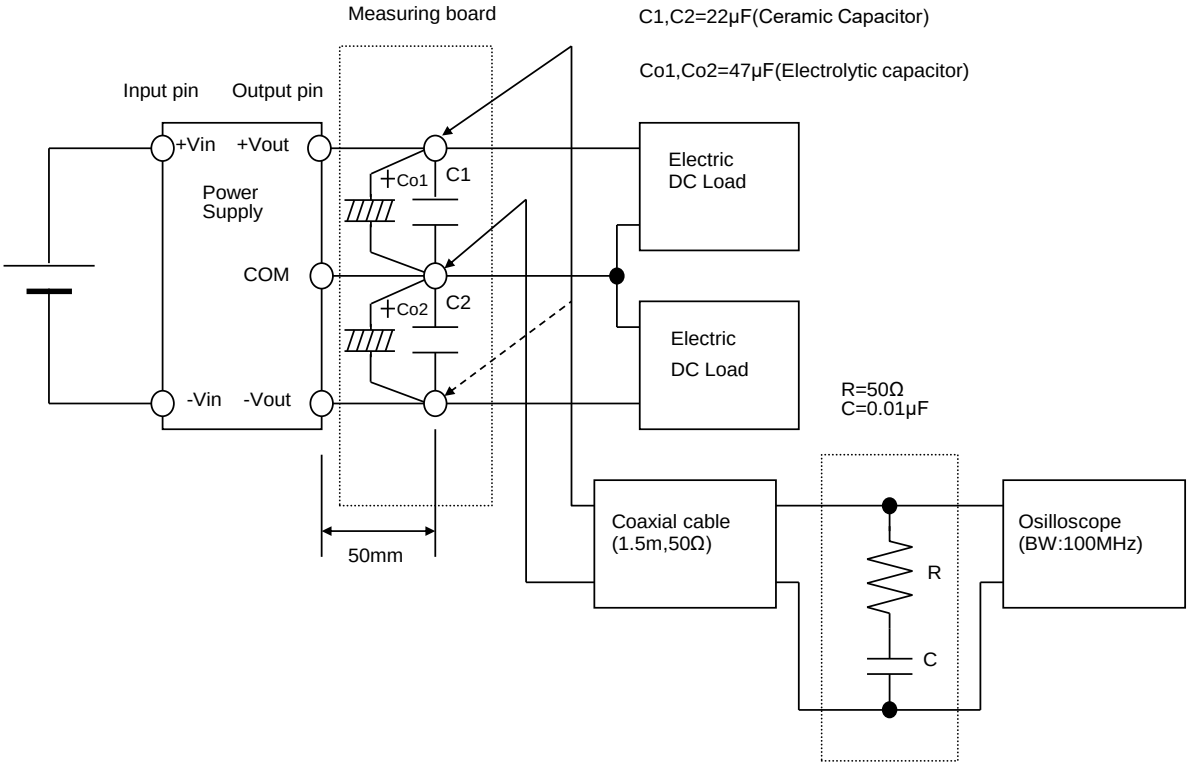


Figure B（Ripple and Ripple noise Characteristic）