

TEST DATA OF MGFW1R54812

Regulated DC Power Supply
January 5, 2017

Approved by :

Takayuki Fukuda

Design Manager

Prepared by :

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Takaaki Sekiguchi

Design Engineer

COSEL CO.,LTD.



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(Final Page 23)

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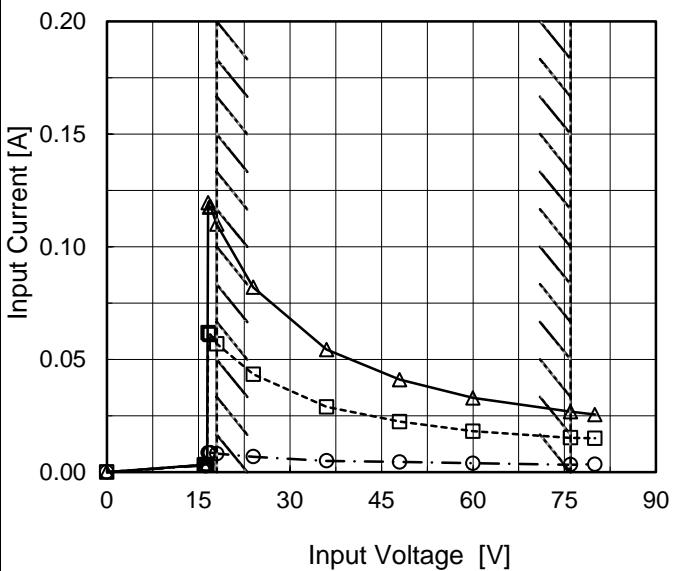
Model MGFW1R54812

Item Input Current (by Input Voltage)

Object _____

1.Graph

—△— Load 100%
 - - □ - - Load 50%
 - - ○ - - Load 0%



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

 Temperature 25°C
 Testing Circuitry Figure A

2.Values

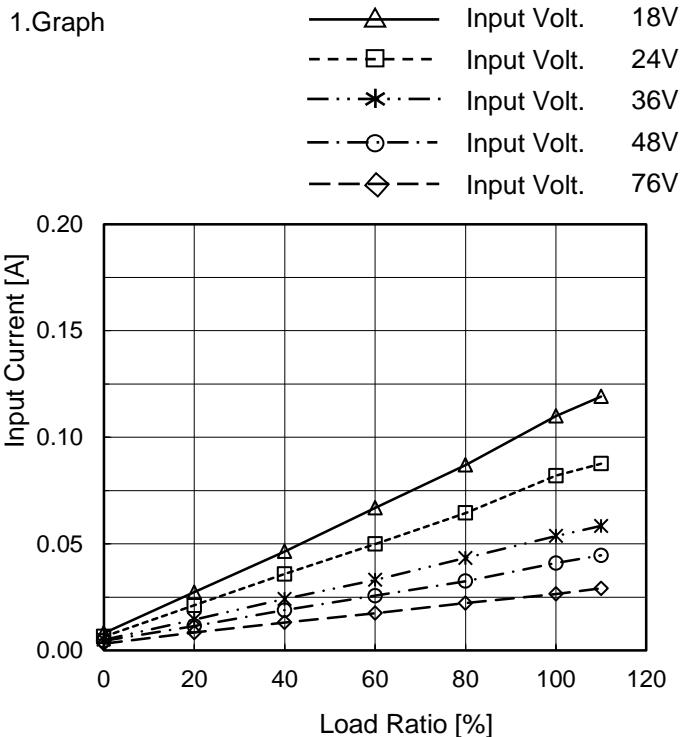
Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
16.0	0.003	0.003	0.003
16.2	0.003	0.003	0.004
16.4	0.003	0.003	0.003
16.6	0.009	0.062	0.120
16.8	0.008	0.061	0.118
17.0	0.009	0.061	0.118
18.0	0.008	0.057	0.110
24.0	0.007	0.043	0.082
36.0	0.005	0.029	0.054
48.0	0.005	0.022	0.041
60.0	0.004	0.018	0.033
76.0	0.003	0.015	0.027
80.0	0.004	0.015	0.026
--	-	-	-
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Model MGFW1R54812

Item Input Current (by Load Ratio)

Object _____

Temperature 25°C
Testing Circuitry Figure A

2.Values

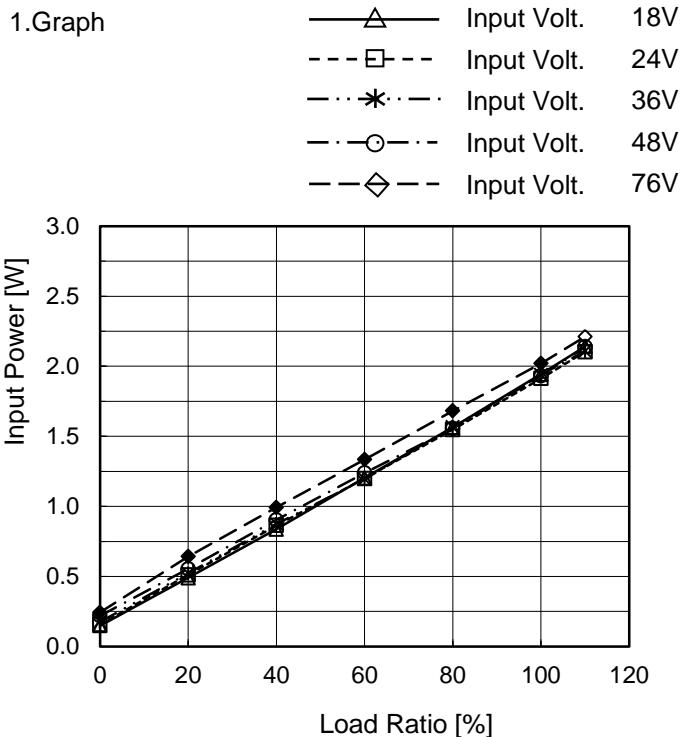
Load Ratio [%]	Input Current [A]				
	18[V]	24[V]	36[V]	48[V]	76[V]
0	0.008	0.007	0.005	0.005	0.003
20	0.027	0.021	0.015	0.012	0.008
40	0.047	0.036	0.024	0.019	0.013
60	0.067	0.050	0.033	0.026	0.018
80	0.087	0.065	0.043	0.033	0.022
100	0.110	0.082	0.054	0.041	0.027
110	0.119	0.088	0.058	0.045	0.029
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model MGFW1R54812

Item Input Power (by Load Ratio)

Object _____

Temperature 25°C
Testing Circuitry Figure A

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	0.15	0.16	0.18	0.22	0.24
20	0.49	0.51	0.52	0.55	0.64
40	0.84	0.86	0.88	0.90	0.99
60	1.20	1.20	1.19	1.24	1.33
80	1.56	1.55	1.56	1.56	1.68
100	1.94	1.91	1.94	1.93	2.02
110	2.14	2.10	2.11	2.14	2.21
--	-	-	-	-	-
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--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFW1R54812																																	
Item	Efficiency (by Input Voltage)	Temperature 25°C Testing Circuitry Figure A																																
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1.Graph																																		
<p>The graph plots Efficiency [%] on the y-axis (45 to 85) against Input Voltage [V] on the x-axis (0 to 90). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a general downward trend as input voltage increases. Vertical slanted lines indicate the rated input voltage range, which is approximately between 17V and 75V.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Efficiency Load 50% [%]</th> <th>Efficiency Load 100% [%]</th> </tr> </thead> <tbody> <tr><td>17</td><td>75.8</td><td>79.8</td></tr> <tr><td>18</td><td>75.9</td><td>81.3</td></tr> <tr><td>24</td><td>76.0</td><td>82.6</td></tr> <tr><td>30</td><td>75.7</td><td>82.5</td></tr> <tr><td>36</td><td>75.1</td><td>81.9</td></tr> <tr><td>48</td><td>73.5</td><td>81.0</td></tr> <tr><td>60</td><td>71.1</td><td>80.0</td></tr> <tr><td>76</td><td>68.0</td><td>78.7</td></tr> <tr><td>80</td><td>67.7</td><td>78.0</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	17	75.8	79.8	18	75.9	81.3	24	76.0	82.6	30	75.7	82.5	36	75.1	81.9	48	73.5	81.0	60	71.1	80.0	76	68.0	78.7	80	67.7	78.0		
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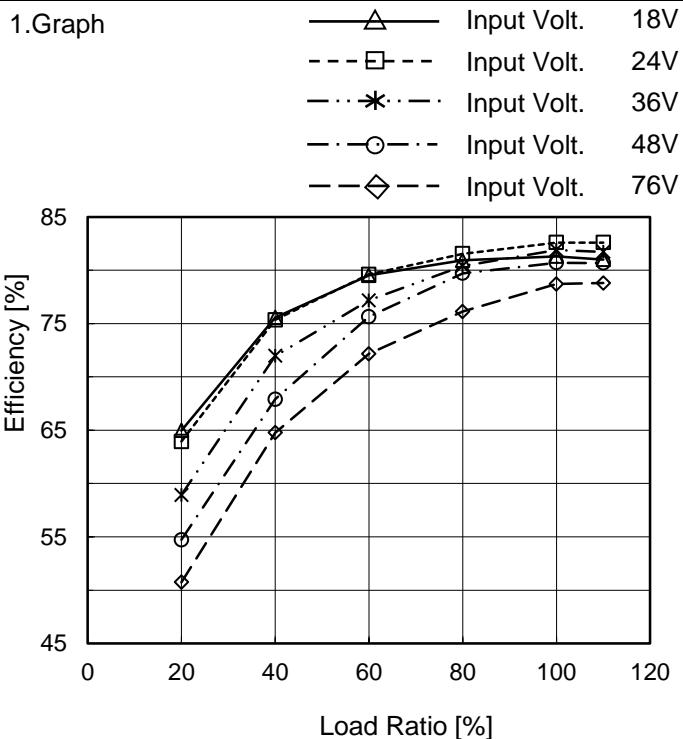
Note: Slanted line shows the range of the rated input voltage.

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Model MGFW1R54812

Item Efficiency (by Load Ratio)

Object _____

Temperature 25°C
Testing Circuitry Figure A

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	65.0	63.9	58.9	54.7	50.7
40	75.6	75.4	72.0	67.9	64.8
60	79.5	79.6	77.2	75.6	72.2
80	80.9	81.6	80.4	79.7	76.1
100	81.3	82.6	81.9	80.7	78.7
110	81.0	82.6	81.7	80.7	78.8
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

COSEL

Model	MGFW1R54812	Temperature Testing Circuitry	25°C Figure A																																
Item	Line Regulation																																		
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COSEL

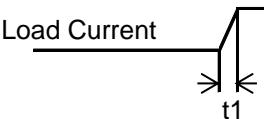
Model	MGFW1R54812	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+12V0.065A		

Input Volt. 48 V

-12V:rated load current.

Cycle 100 ms

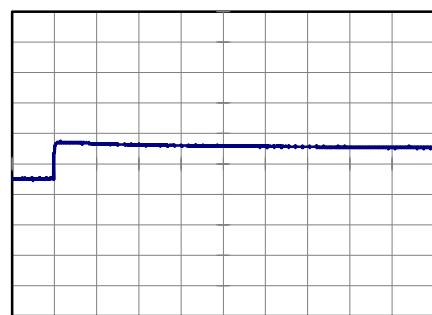
t₁,t₂ = 100 μ s

Load Current

 t₁ < t < t₂

Min.Load (0A)↔
 Load 100% (0.065A)

200 mV/div

4 ms/div

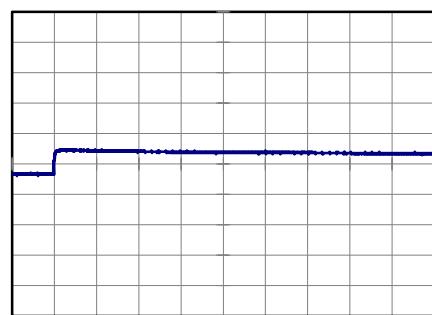


4 ms/div

Min.Load (0A)↔
 Load 50% (0.0325A)

200 mV/div

4 ms/div

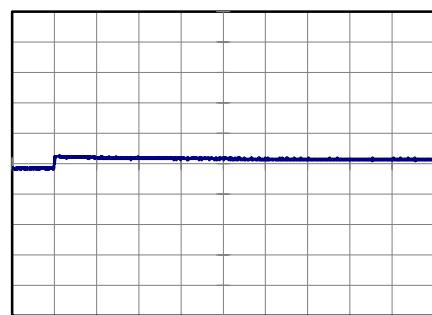


4 ms/div

Load 50% (0.0325A)↔
 Load 100% (0.065A)

200 mV/div

4 ms/div

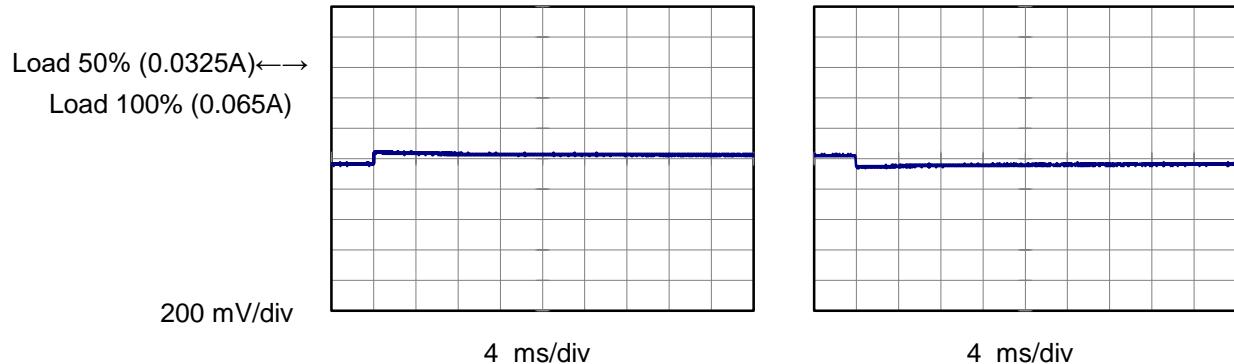
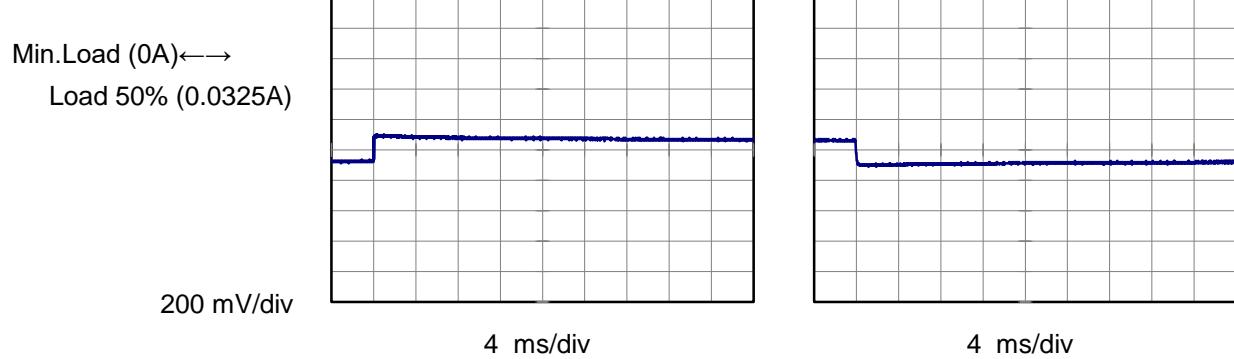
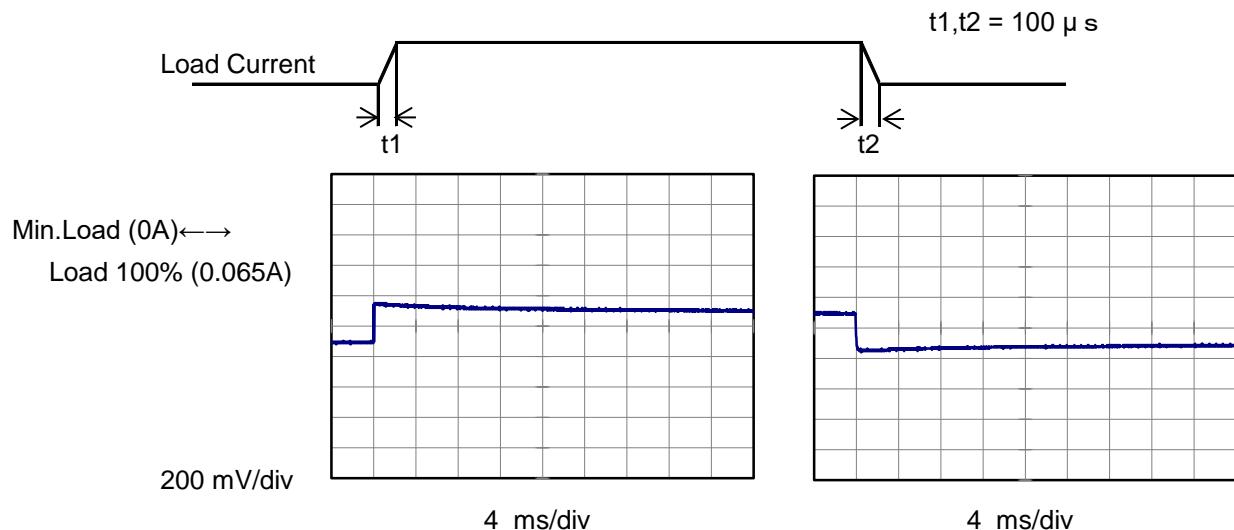


4 ms/div

COSEL

Model	MGFW1R54812	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	-12V0.065A		

Input Volt. 48 V
+12V:rated load current.
Cycle 100 ms



COSEL

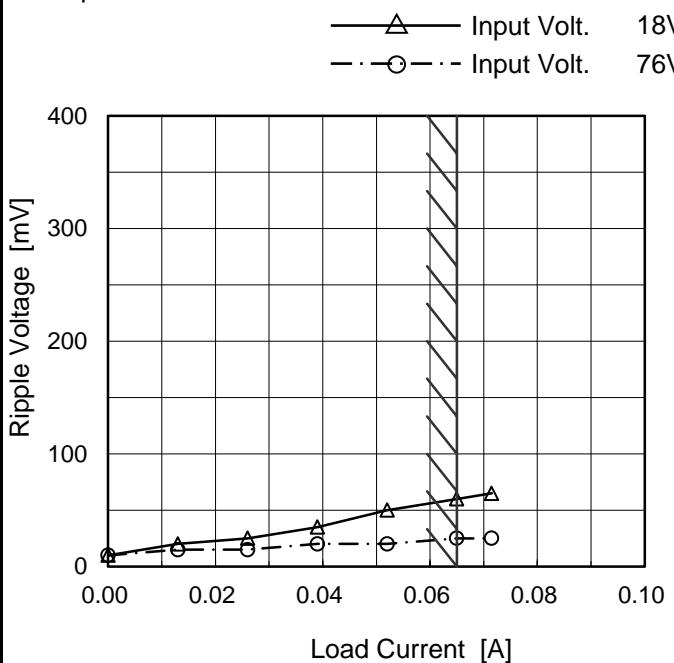
Model	MGFW1R54812																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure B																																						
Object	+12V0.065A																																							
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<p>The graph plots Ripple Voltage [mV] on the Y-axis (0 to 400) against Load Current [A] on the X-axis (0.00 to 0.10). Two sets of data points are shown: one for Input Volt. 18V (solid line with open triangle markers) and one for Input Volt. 76V (dashed line with open circle markers). A slanted line is drawn through the data points at approximately 0.065A, indicating the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (18V)</th> <th>Ripple Voltage [mV] (76V)</th> </tr> </thead> <tbody> <tr><td>0.000</td><td>10</td><td>10</td></tr> <tr><td>0.013</td><td>20</td><td>15</td></tr> <tr><td>0.026</td><td>25</td><td>15</td></tr> <tr><td>0.039</td><td>35</td><td>20</td></tr> <tr><td>0.052</td><td>50</td><td>20</td></tr> <tr><td>0.065</td><td>60</td><td>25</td></tr> <tr><td>0.072</td><td>65</td><td>25</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple Voltage [mV] (18V)	Ripple Voltage [mV] (76V)	0.000	10	10	0.013	20	15	0.026	25	15	0.039	35	20	0.052	50	20	0.065	60	25	0.072	65	25	--	-	-	--	-	-	--	-	-	--	-	-			
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<p>Ripple [mVp-p]</p> <p>The diagram illustrates a complex ripple wave form consisting of multiple triangular cycles, representing the periodic nature of the measured voltage.</p>																																								
<p>Fig.Complex Ripple Wave Form</p>																																								

COSEL

Model	MGFW1R54812
Item	Ripple Voltage (by Load Current)
Object	-12V0.065A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 76 [V]
0.000	10	10
0.013	20	15
0.026	25	15
0.039	35	20
0.052	50	20
0.065	60	25
0.072	65	25
--	-	-
--	-	-
--	-	-
--	-	-

+12V: Rated Load Current

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]

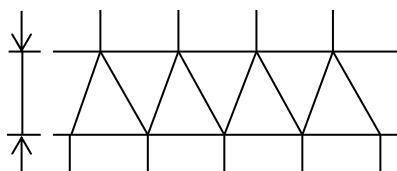


Fig.Complex Ripple Wave Form

COSEL

Model	MGFW1R54812																																							
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure B																																						
Object	+12V0.065A																																							
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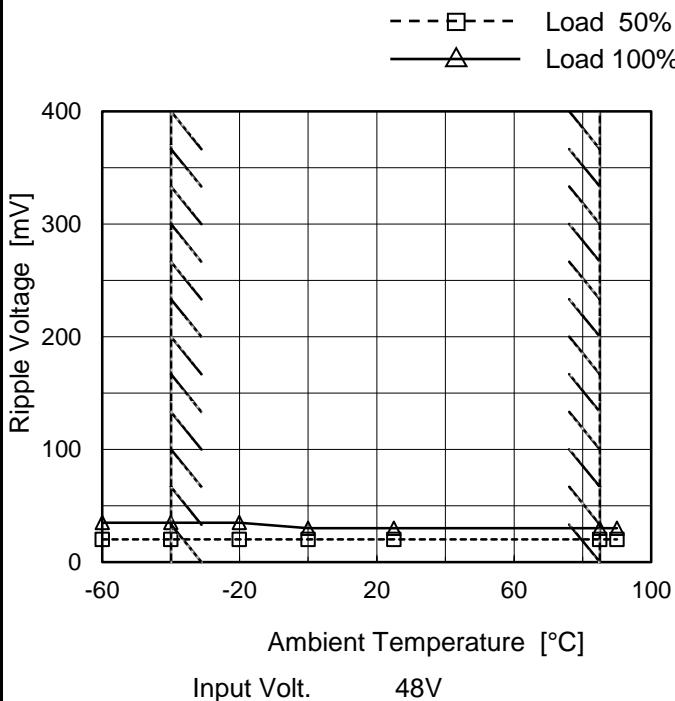
COSEL

Model	MGFW1R54812																																							
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure B																																						
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Model	MGFW1R54812
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.065A

1.Graph



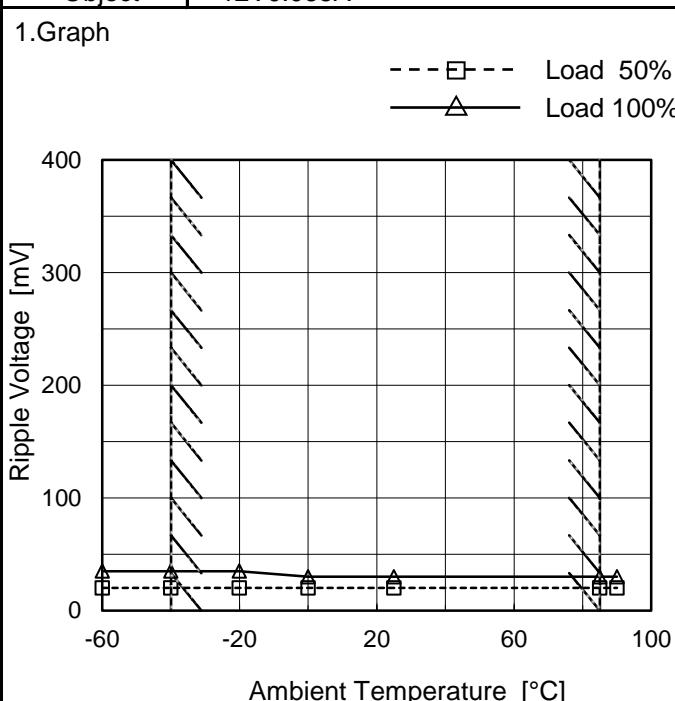
Testing Circuitry Figure B

2.Values

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

-12V: Rated Load Current

1.Graph



2.Values

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

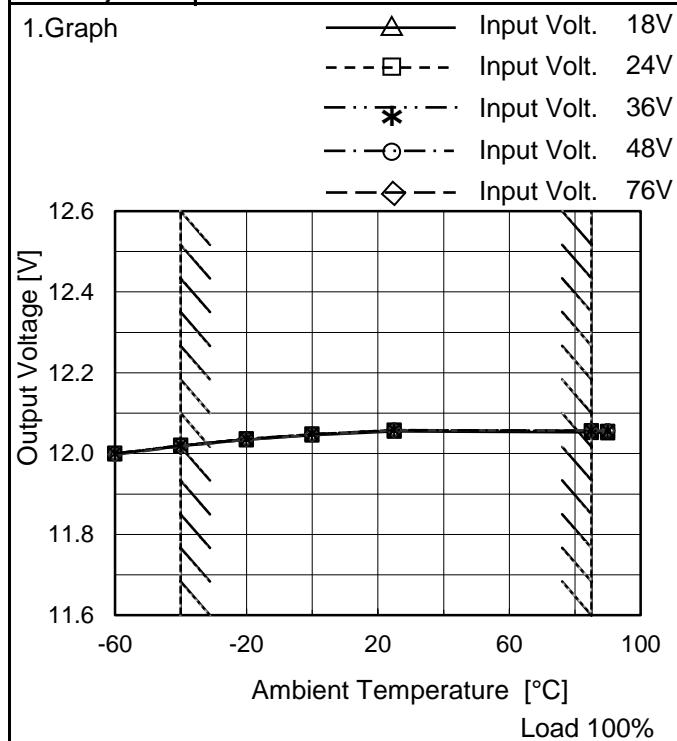
+12V: Rated Load Current

Measured by 100 MHz Oscilloscope.

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

COSEL

Model	MGFW1R54812
Item	Ambient Temperature Drift
Object	+12V0.065A

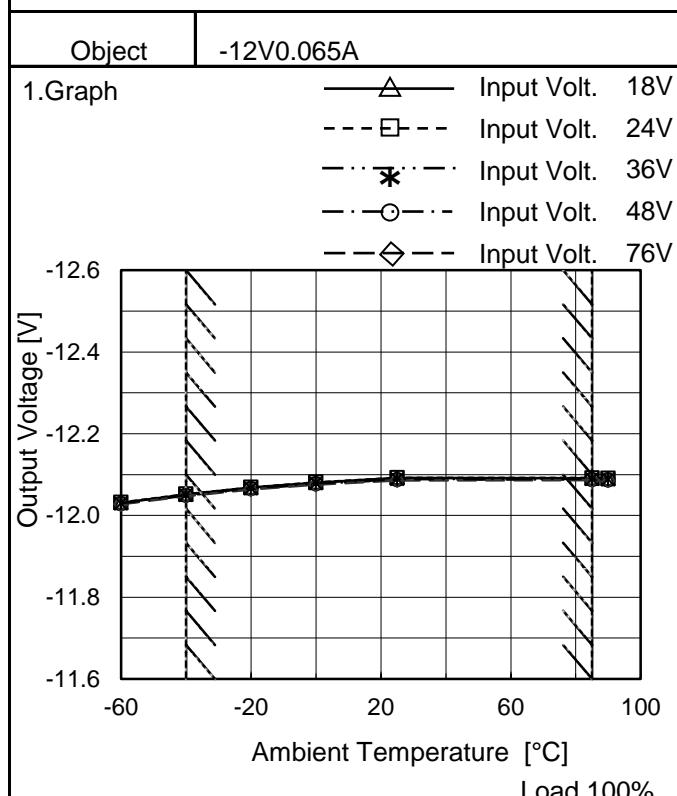


Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	18[V]	24[V]	36[V]	48[V]	76[V]
-60	11.999	12.001	12.000	11.999	11.997
-40	12.018	12.020	12.020	12.019	12.018
-20	12.034	12.036	12.036	12.036	12.034
0	12.046	12.048	12.048	12.048	12.047
25	12.055	12.058	12.058	12.058	12.057
85	12.052	12.056	12.057	12.057	12.057
90	12.051	12.055	12.056	12.056	12.056
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current



2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	18[V]	24[V]	36[V]	48[V]	76[V]
-60	-12.031	-12.032	-12.030	-12.029	-12.027
-40	-12.052	-12.052	-12.050	-12.049	-12.048
-20	-12.068	-12.069	-12.067	-12.066	-12.064
0	-12.080	-12.081	-12.079	-12.077	-12.076
25	-12.092	-12.092	-12.089	-12.088	-12.086
85	-12.091	-12.092	-12.089	-12.088	-12.086
90	-12.090	-12.091	-12.088	-12.087	-12.085
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

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



Model	MGFW1R54812	Testing Circuitry Figure A
Item	Output Voltage Accuracy	

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 : 18 - 76V

Load Current (AVR 1) : 0 - 0.065A (AVR 2) : 0 - 0.065A

* Output Voltage Accuracy = \pm (Maximum of Output Voltage - Minimum of Output Voltage) / 2

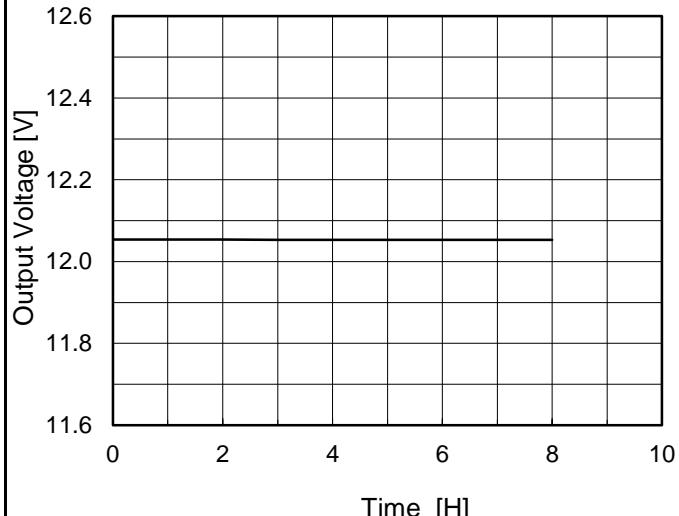
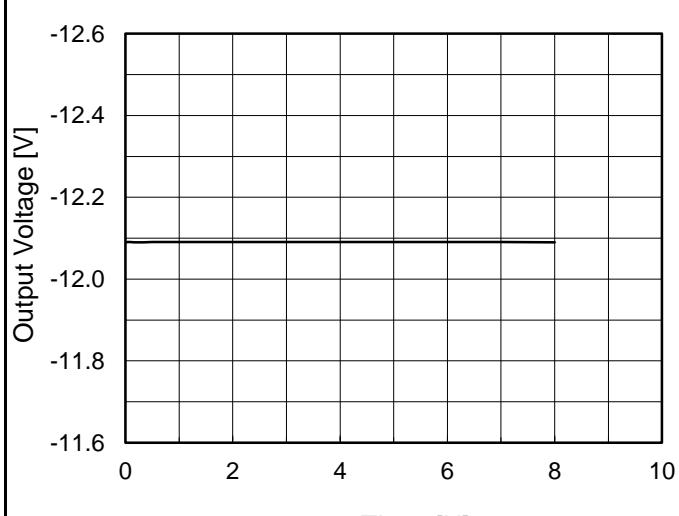
$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

2. Values

Object	+12V0.065A			Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]		Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18		0	12.401	±344	±2.9
Minimum Voltage	85	18		0.065	11.713		

Object	-12V0.065A			Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]		Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18		0	-12.444	±344	±2.9
Minimum Voltage	85	18		0.065	-11.756		

COSEL

Model	MGFW1R54812	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V0.065A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12.053</td></tr> <tr><td>0.5</td><td>12.054</td></tr> <tr><td>1.0</td><td>12.054</td></tr> <tr><td>2.0</td><td>12.054</td></tr> <tr><td>3.0</td><td>12.054</td></tr> <tr><td>4.0</td><td>12.053</td></tr> <tr><td>5.0</td><td>12.053</td></tr> <tr><td>6.0</td><td>12.053</td></tr> <tr><td>7.0</td><td>12.053</td></tr> <tr><td>8.0</td><td>12.053</td></tr> </tbody> </table> <p>-12V: Rated Load Current</p>	Time since start [H]	Output Voltage [V]	0.0	12.053	0.5	12.054	1.0	12.054	2.0	12.054	3.0	12.054	4.0	12.053	5.0	12.053	6.0	12.053	7.0	12.053	8.0	12.053
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COSEL

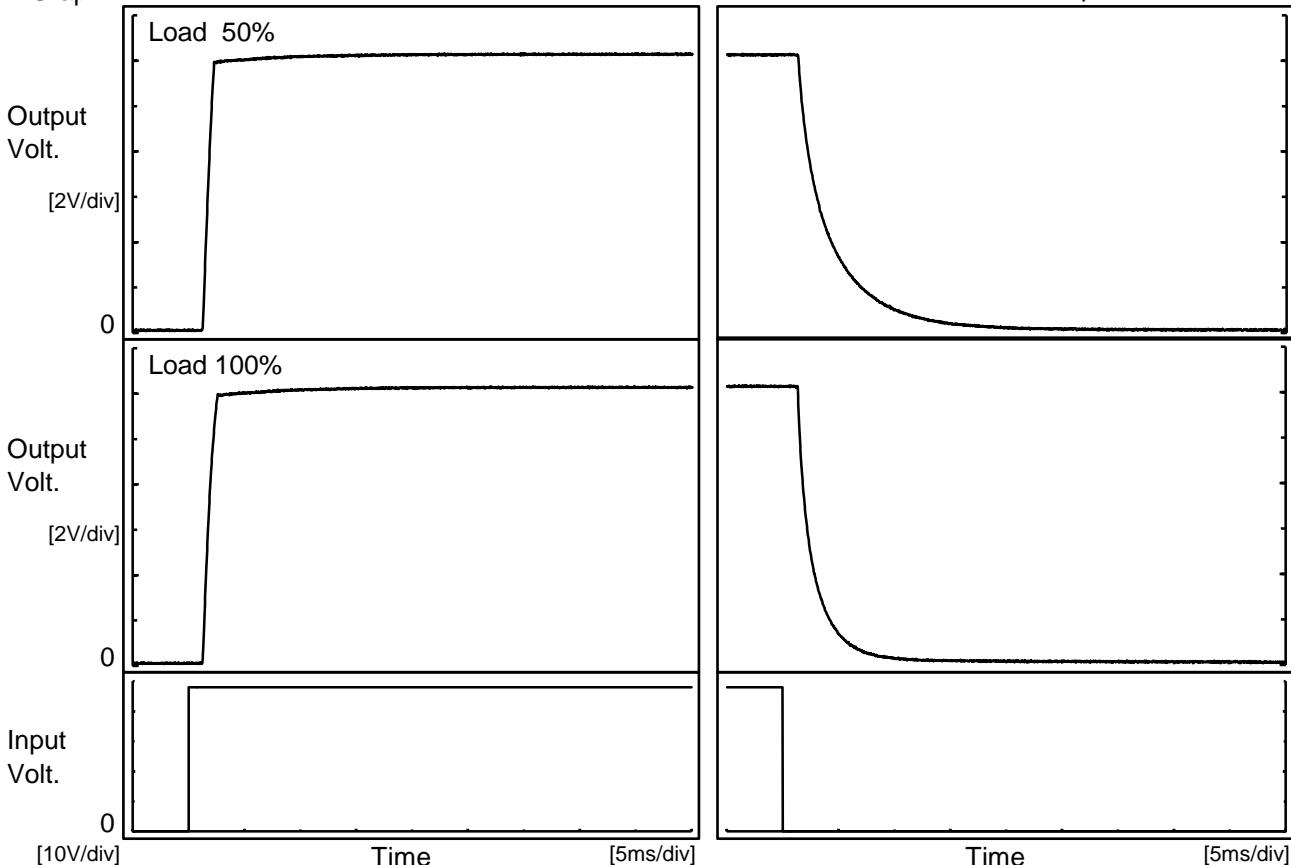
Model MGFW1R54812

Item Rise and Fall Time

Object +12V0.065A

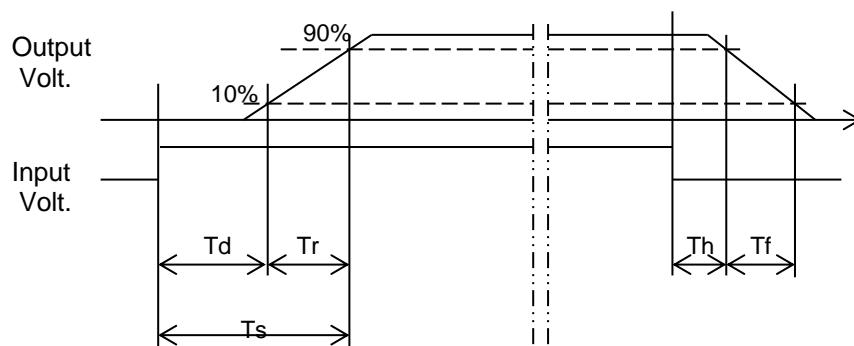
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

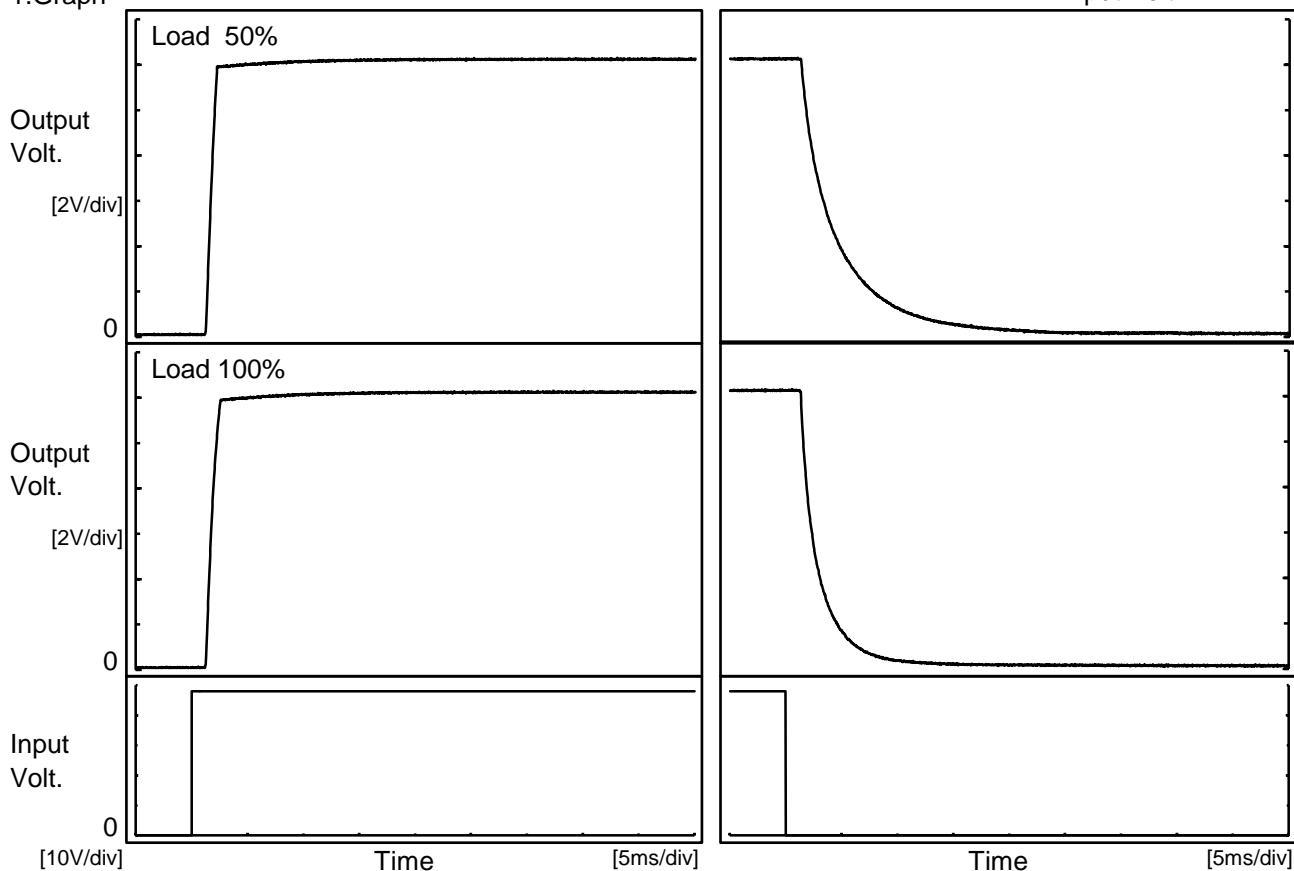
Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		1.4	0.8	2.2	1.6	7.4	
100 %		1.4	1.0	2.4	1.5	3.7	



COSEL

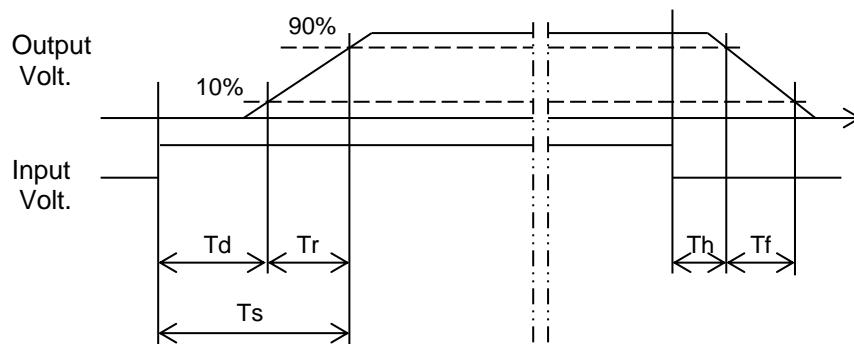
Model	MGFW1R54812	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	-12V0.065A		

1. Graph



2. Values

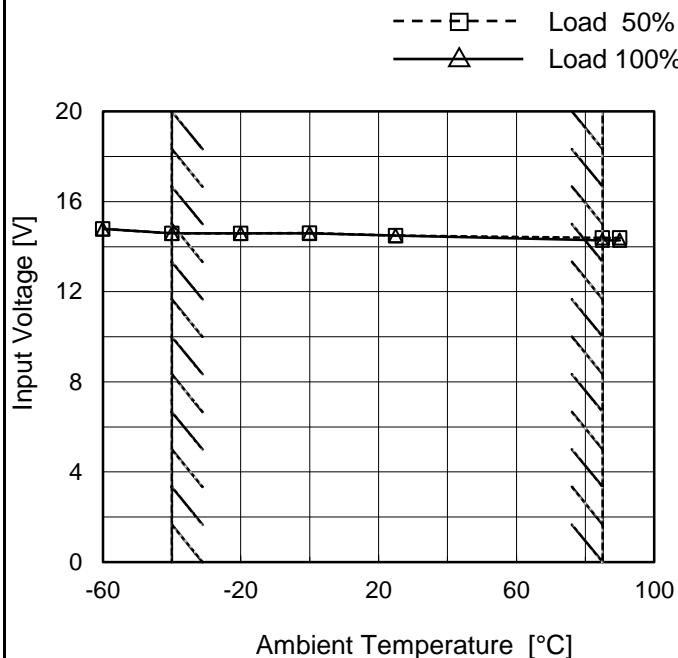
Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		1.4	0.8	2.2	1.6	8.4	
100 %		1.4	1.0	2.4	1.5	4.3	



COSEL

Model	MGFW1R54812
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.065A

1.Graph



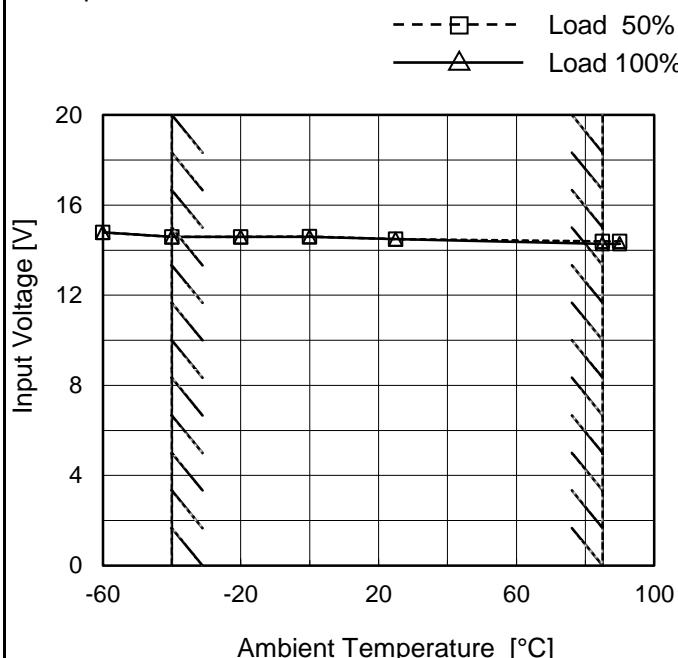
Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	14.8	14.8
-40	14.6	14.6
-20	14.6	14.6
0	14.6	14.6
25	14.5	14.5
85	14.4	14.3
90	14.4	14.3
--	-	-
--	-	-
--	-	-
--	-	-

Object	-12V0.065A
--------	------------

1.Graph



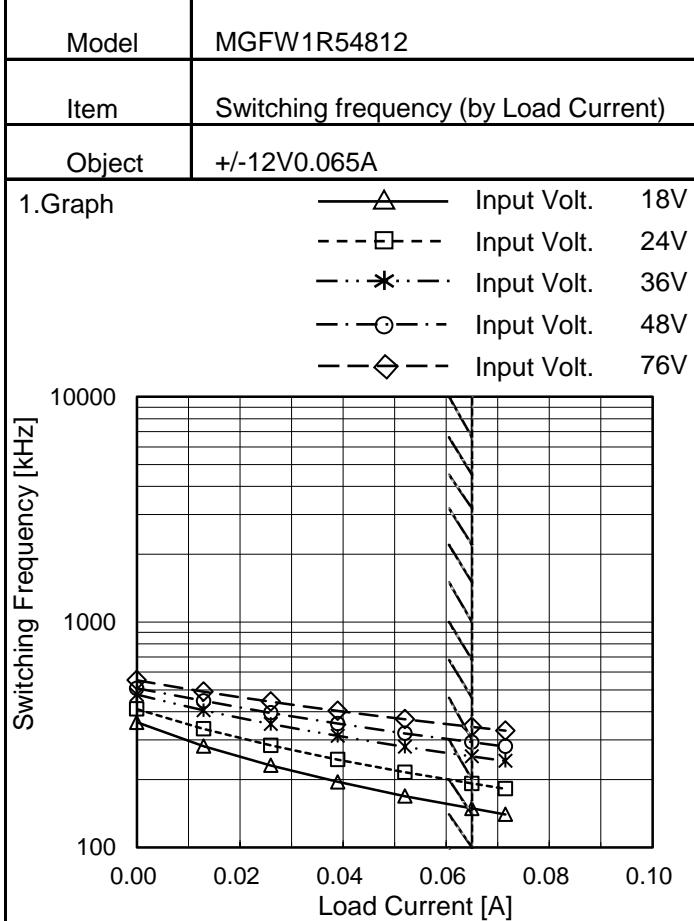
2.Values

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--	-	-
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--	-	-

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

COSEL

Model	MGFW1R54812	Temperature Testing Circuitry	25°C Figure A																																																																																		
Item	Overcurrent Protection																																																																																				
Object	+12V0.065A																																																																																				
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																																																					

COSEL

Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Input Current [A]				
	18[V]	24[V]	36[V]	48[V]	76[V]
0.000	359	411	477	508	552
0.013	281	336	406	447	491
0.026	231	284	353	395	443
0.039	195	245	313	354	404
0.052	169	215	280	321	371
0.065	149	192	254	293	343
0.072	140	182	242	280	330
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

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.

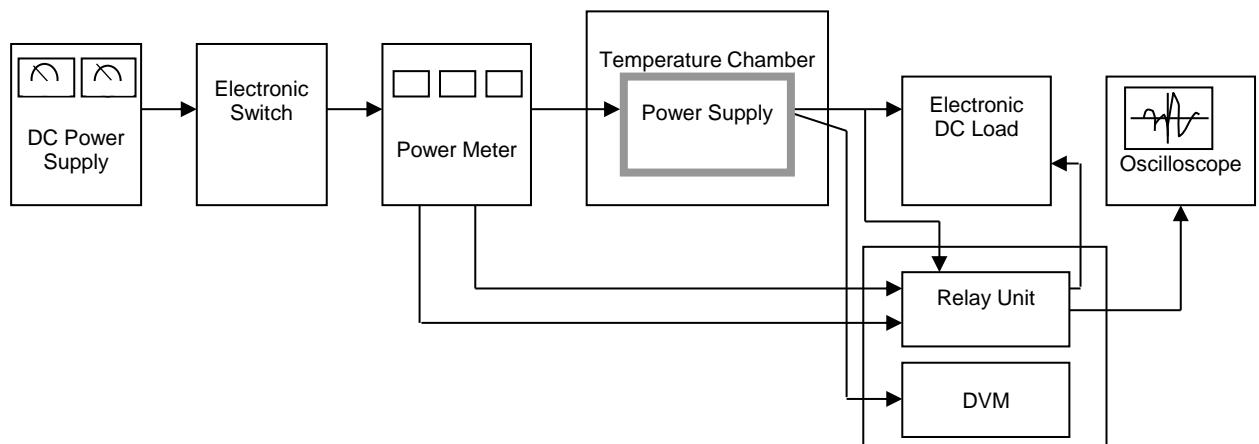


Figure A

Data Acquisition/Control Unit

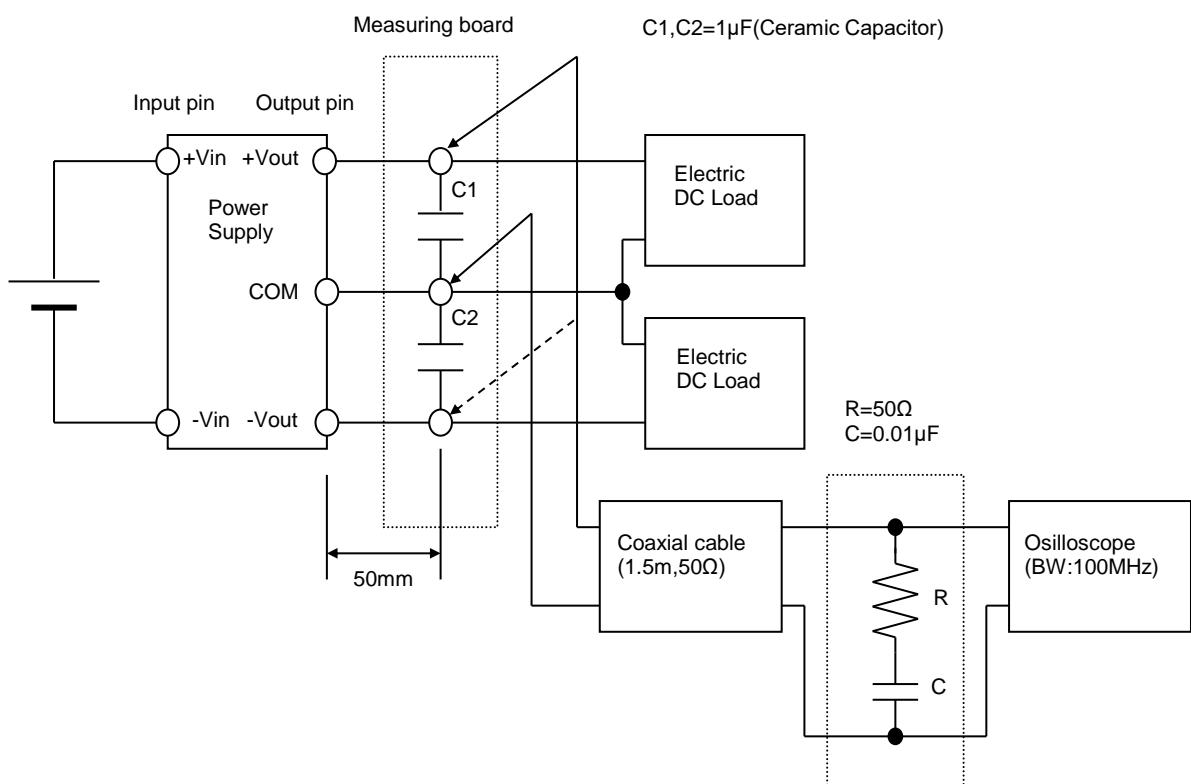


Figure B (Ripple and Ripple noise Characteristic)