

# TEST DATA OF MGFW402412

Regulated DC Power Supply  
November 29, 2018

Approved by : Junichi Hatagishi  
Junichi Hatagishi Design Manager

Prepared by : Shohei Mukaide  
Shohei Mukaide Design Engineer

**COSEL CO.,LTD.**



## CONTENTS

1.Input Current (by Input Voltage) · · · · ·	1
2.Input Current (by Load Current) · · · · ·	2
3.Input Power (by Load Current) · · · · ·	3
4.Efficiency (by Input Voltage) · · · · ·	4
5.Efficiency (by Load Current) · · · · ·	5
6.Line Regulation · · · · ·	6
7.Load Regulation · · · · ·	7
8.Dynamic Load Response · · · · ·	8
9.Ripple Voltage (by Load Current) · · · · ·	10
10.Ripple-Noise · · · · ·	12
11.Ripple Voltage (by Ambient Temperature) · · · · ·	14
12.Ambient Temperature Drift · · · · ·	15
13.Output Voltage Accuracy · · · · ·	16
14.Time Lapse Drift · · · · ·	17
15.Rise and Fall Time · · · · ·	18
16.Minimum Input Voltage for Regulated Output Voltage · · · · ·	20
17.Overcurrent Protection · · · · ·	21
18.Overvoltage Protection · · · · ·	22
19.Switching frequency (by Load Current) · · · · ·	23
20.Figure of Testing Circuitry · · · · ·	24

(Final Page 24)

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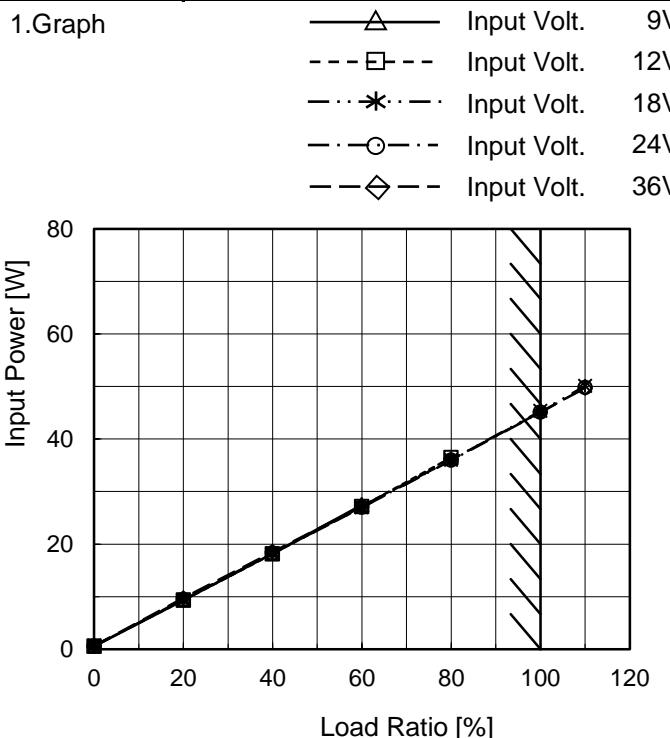
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Item	Input Power (by Load Current)
Object	_____


 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Load Ratio [%]	Input Power [W]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.56	0.59	0.68	0.56	0.60
20	9.31	9.32	9.38	9.47	9.71
40	18.22	18.13	18.21	18.27	18.52
60	27.47	27.15	26.98	26.99	27.22
80	-※1 36.47	36.05	35.95	36.08	
100	-※1 -※2 45.33	45.10	45.10		
110	-※1 -※2 50.09	49.77	49.68		
--	-	-	-	-	-
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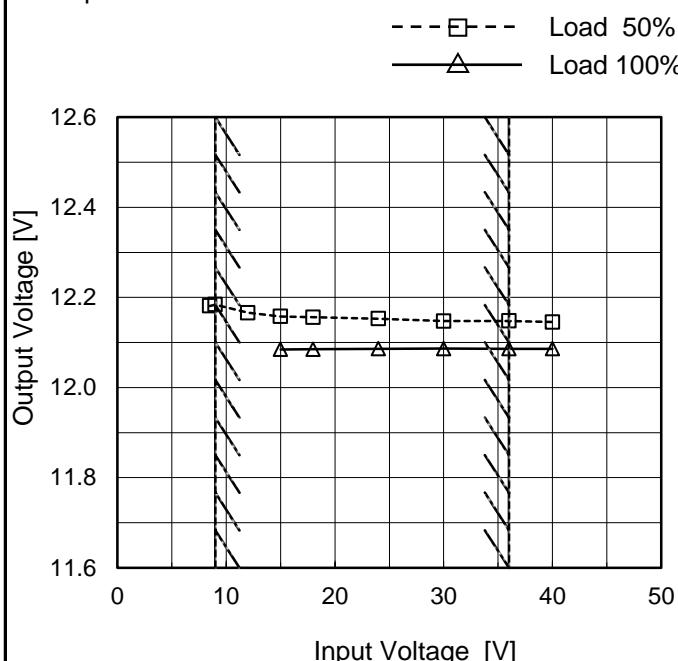
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20	87.8	87.8	87.2	86.5	84.2																																																																													
40	90.0	90.4	90.2	89.7	88.6																																																																													
60	89.6	90.6	91.2	91.3	90.3																																																																													
80	-※1	89.9	91.0	91.3	90.9																																																																													
100	-※1	-※2	90.5	91.0	91.0																																																																													
110	-※1	-※2	90.1	90.7	90.8																																																																													
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<p>※1 Maximum output current at minimum input Voltage is 70% of rated load current.</p> <p>※2 Maximum output current at 12V input Voltage is 80% of rated load current.</p> <p>Refer to instruction manuals for details of input derating.</p>																																																																																		

**COSEL**

Model	MGFW402412
Item	Line Regulation
Object	+12V1.7A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



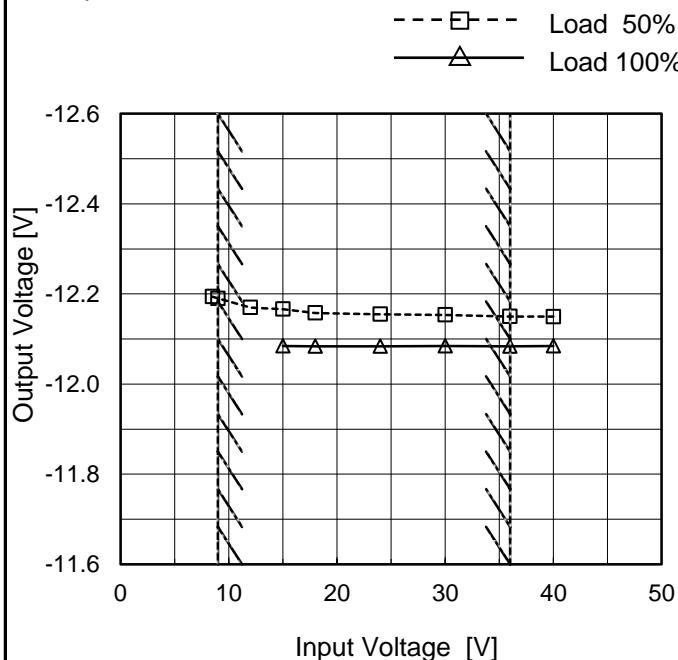
## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.5	12.181	- ⋆1
9.0	12.184	- ⋆1
12.0	12.166	- ⋆2
15.0	12.158	12.085
18.0	12.156	12.085
24.0	12.153	12.086
30.0	12.147	12.086
36.0	12.148	12.086
40.0	12.145	12.086

-12V: Rated Load Current

## Object -12V1.7A

## 1.Graph



## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.5	-12.194	- ⋆1
9.0	-12.190	- ⋆1
12.0	-12.170	- ⋆2
15.0	-12.167	-12.085
18.0	-12.158	-12.084
24.0	-12.155	-12.084
30.0	-12.154	-12.085
36.0	-12.150	-12.084
40.0	-12.150	-12.085

+12V: Rated Load Current

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

※1 Maximum output current at minimum input Voltage is 70% of rated load current.

※2 Maximum output current at 12V input Voltage is 80% of rated load current.

Refer to instruction manuals for details of input derating.

**COSEL**

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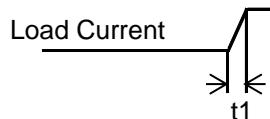
**COSEL**

Model	MGFW402412	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+12V1.7A		

Input Volt. 24 V

-12V:rated load current.

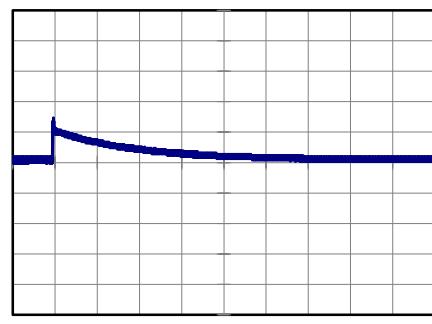
Cycle 100 ms

t1,t2 = 100  $\mu$  s

Min.Load (0A)↔  
Load 100% (1.7A)

200 mV/div

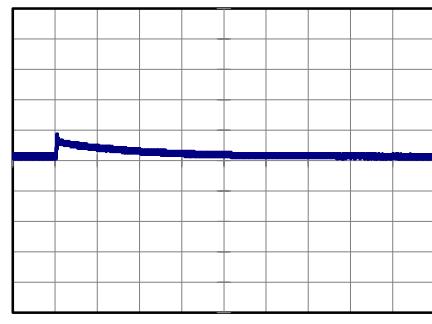
2 ms/div



Min.Load (0A)↔  
Load 50% (0.85A)

200 mV/div

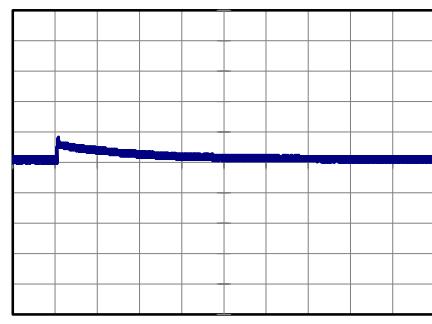
2 ms/div



Load 50% (0.85A)↔  
Load 100% (1.7A)

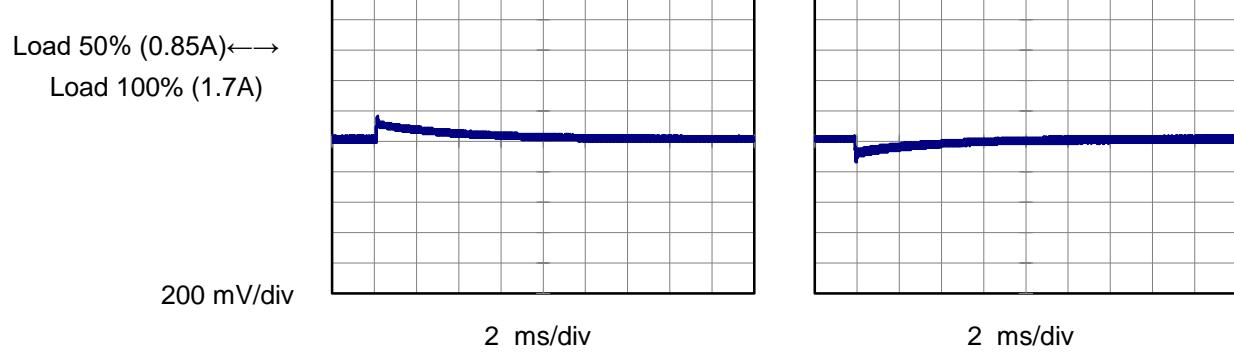
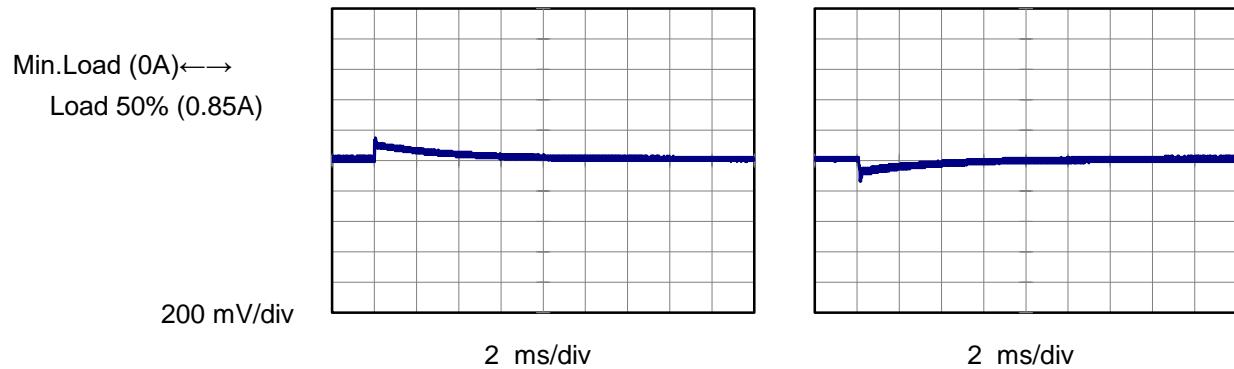
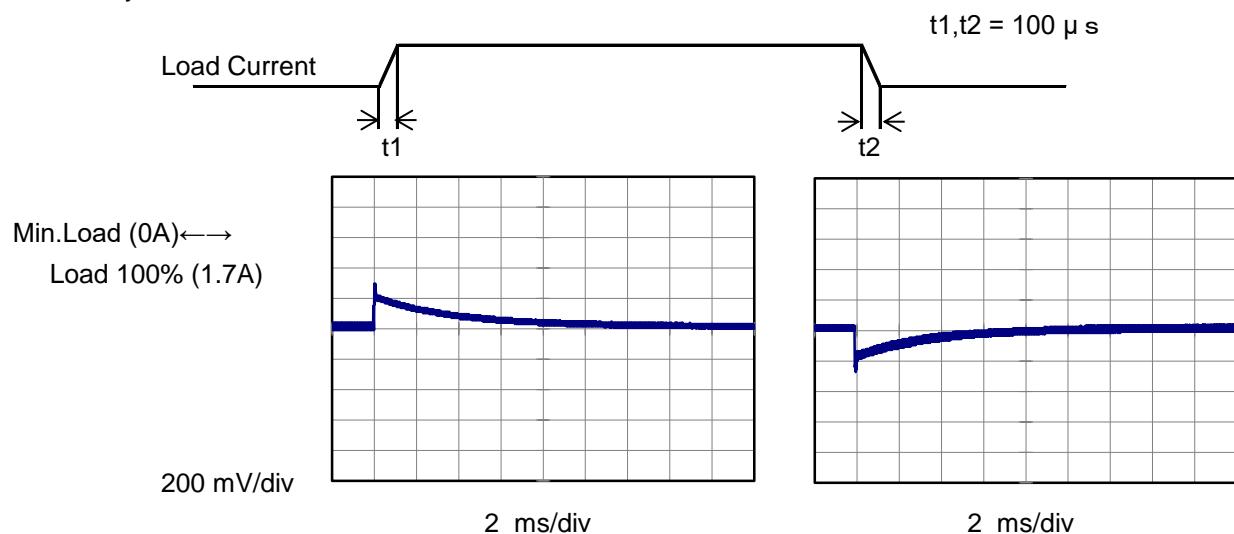
200 mV/div

2 ms/div



**COSEL**

Model	MGFW402412
Item	Dynamic Load Response
Object	-12V1.7A

Temperature 25°C  
Testing Circuitry Figure AInput Volt. 24 V  
+12V:rated load current.  
Cycle 100 ms

# COSEL

Model	MGFW402412																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure B																																						
Object	+12V1.7A																																							
1.Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 200 mV, and the X-axis ranges from 0.0 to 2.0 A. Two curves are plotted: one for Input Volt. 9V (solid line with open circles) and one for Input Volt. 36V (dashed line with open circles). A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (9V)</th> <th>Ripple Voltage [mV] (36V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>30</td><td>30</td></tr> <tr><td>0.34</td><td>20</td><td>30</td></tr> <tr><td>0.68</td><td>25</td><td>30</td></tr> <tr><td>1.02</td><td>30</td><td>35</td></tr> <tr><td>1.19</td><td>35</td><td>40</td></tr> <tr><td>1.36</td><td>-</td><td>45</td></tr> <tr><td>1.70</td><td>-</td><td>45</td></tr> <tr><td>1.87</td><td>-</td><td>50</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] (9V)	Ripple Voltage [mV] (36V)	0.00	30	30	0.34	20	30	0.68	25	30	1.02	30	35	1.19	35	40	1.36	-	45	1.70	-	45	1.87	-	50	--	-	-	--	-	-	--	-	-			
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**COSEL**

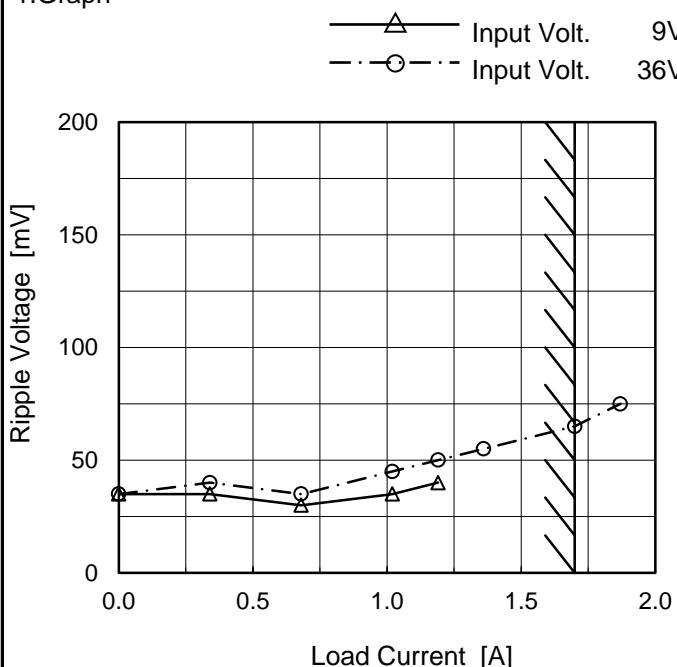
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<p>Fig.Complex Ripple Wave Form</p>																																								

**COSEL**

Model	MGFW402412
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.

## 2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 36 [V]
0.00	35	35
0.34	35	40
0.68	30	35
1.02	35	45
1.19	40	50
1.36	-	55
1.70	-	65
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.

Ripple Noise[mVp-p]

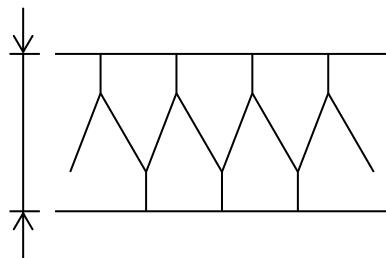


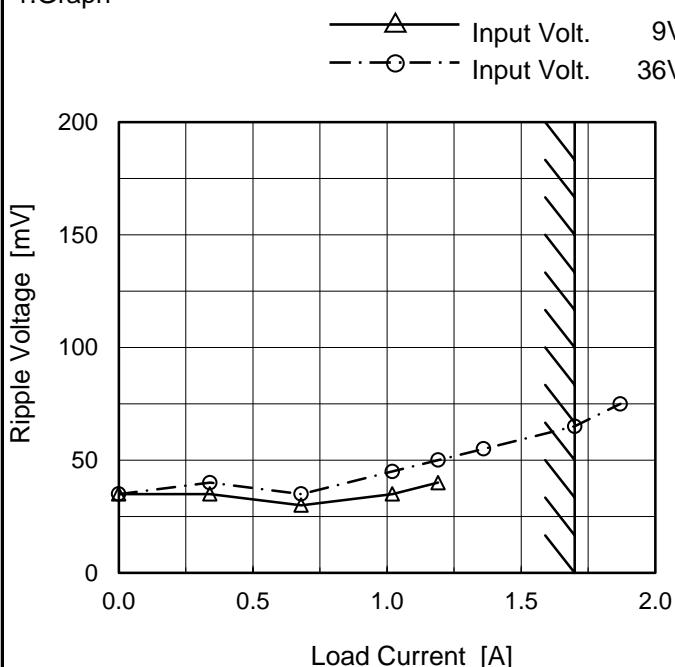
Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	MGFW402412
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.

## 2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 36 [V]
0.00	35	35
0.34	35	40
0.68	30	35
1.02	35	45
1.19	40	50
1.36	-	55
1.70	-	65
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.

Ripple Noise[mVp-p]

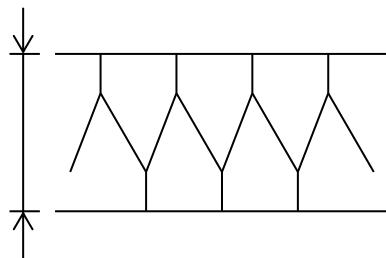
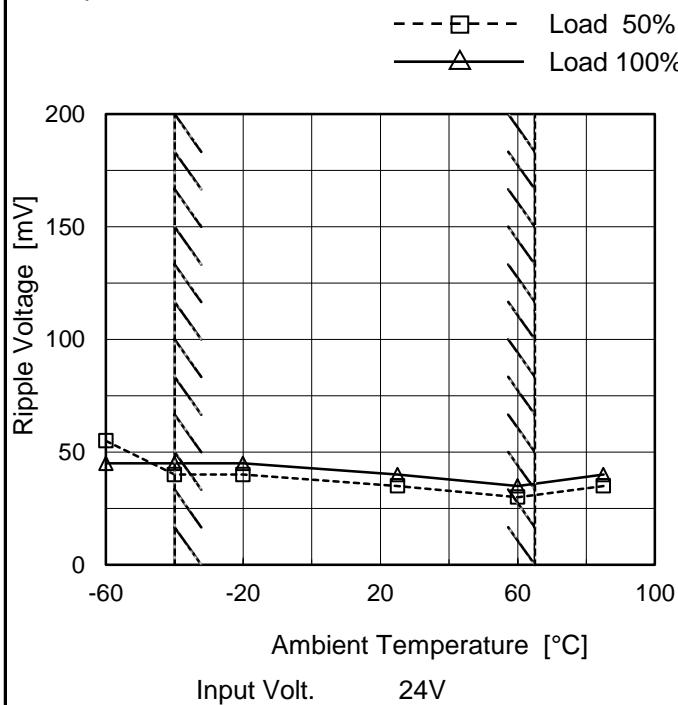


Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	MGFW402412
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V1.7A

## 1.Graph



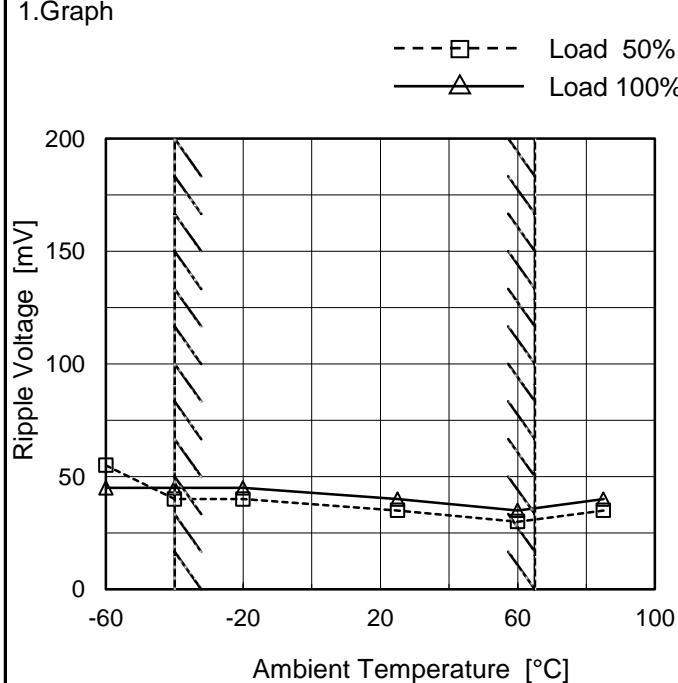
Testing Circuitry Figure B

## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	55	45
-40	40	45
-20	40	45
25	35	40
60	30	35
85	35	40
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

-12V: Rated Load Current

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	55	45
-40	40	45
-20	40	45
25	35	40
60	30	35
85	35	40
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

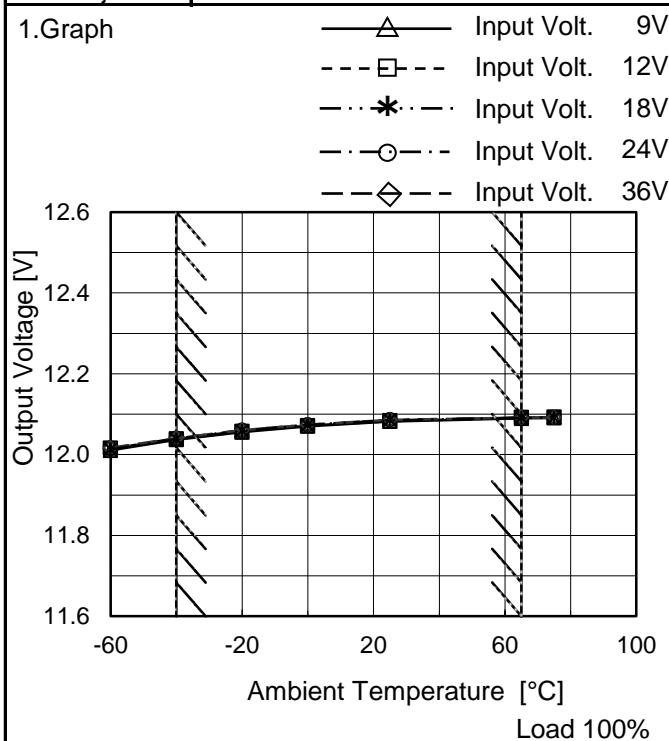
+12V: Rated Load Current

Measured by 100 MHz Oscilloscope.

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

**COSEL**

Model	MGFW402412
Item	Ambient Temperature Drift
Object	+12V1.7A

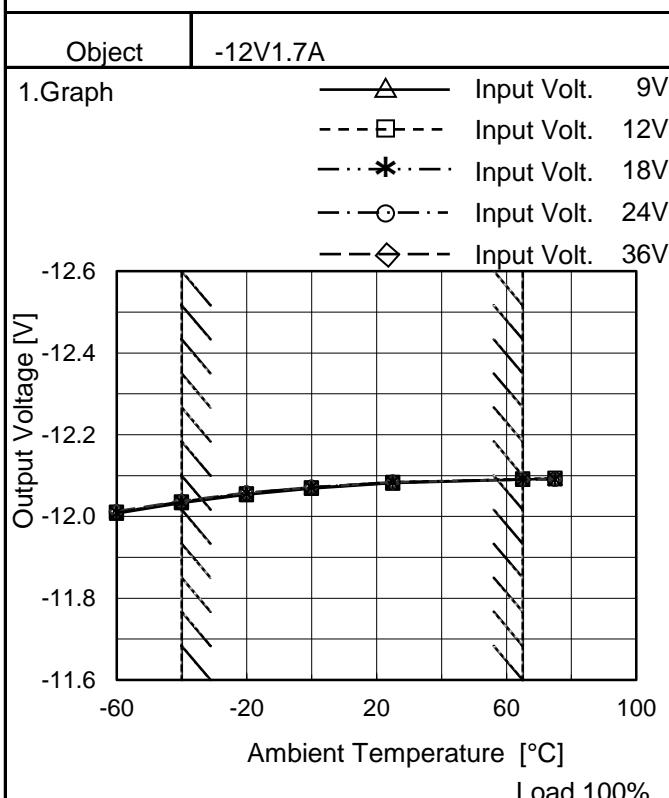


Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	9[V]	12[V]	18[V]	24[V]	36[V]
-60	12.010	12.016	12.013	12.015	12.017
-40	12.037	12.039	12.038	12.040	12.041
-20	12.056	12.057	12.059	12.060	12.060
0	12.070	12.071	12.073	12.074	12.074
25	12.082	12.083	12.085	12.086	12.086
65	12.089	12.091	12.091	12.091	12.091
75	12.091	12.093	12.091	12.092	12.091
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-12V: Rated Load Current



## 2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	9[V]	12[V]	18[V]	24[V]	36[V]
-60	-12.007	-12.010	-12.009	-12.011	-12.013
-40	-12.033	-12.035	-12.035	-12.036	-12.038
-20	-12.053	-12.055	-12.057	-12.057	-12.058
0	-12.069	-12.070	-12.071	-12.071	-12.072
25	-12.082	-12.083	-12.084	-12.084	-12.084
65	-12.091	-12.092	-12.090	-12.090	-12.090
75	-12.093	-12.093	-12.091	-12.091	-12.091
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+12V: Rated Load Current

Note: In case of input Volt.9V, Load 70%.

12V, Load 80%.

Other case Load 100%.

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



Model	MGFW402412	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 - 65°C

Input Voltage : 9 - 36V

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

\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

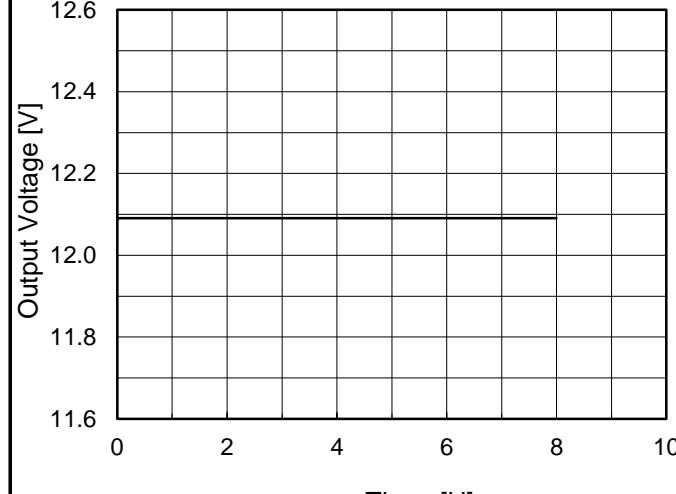
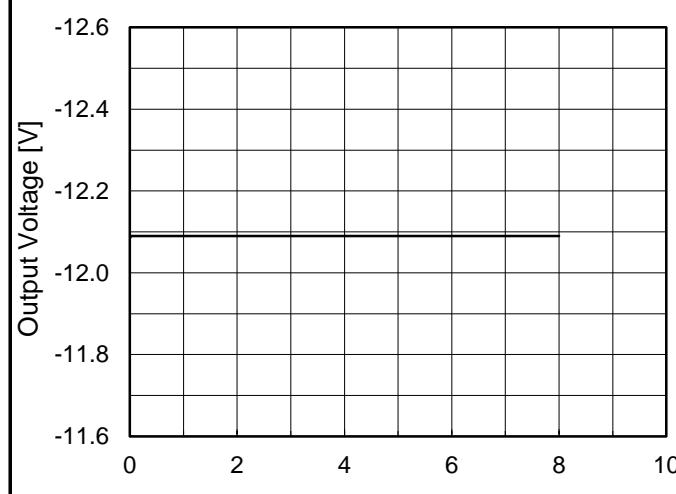
$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

### 2. Values

Object	+12V1.7A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	9	0	12.469	±351	±2.9
Minimum Voltage	65	36	1.7	11.768		

Object	-12V1.7A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	65	18	0	-12.422	±354	±3.0
Minimum Voltage	65	9	1.7	-11.715		

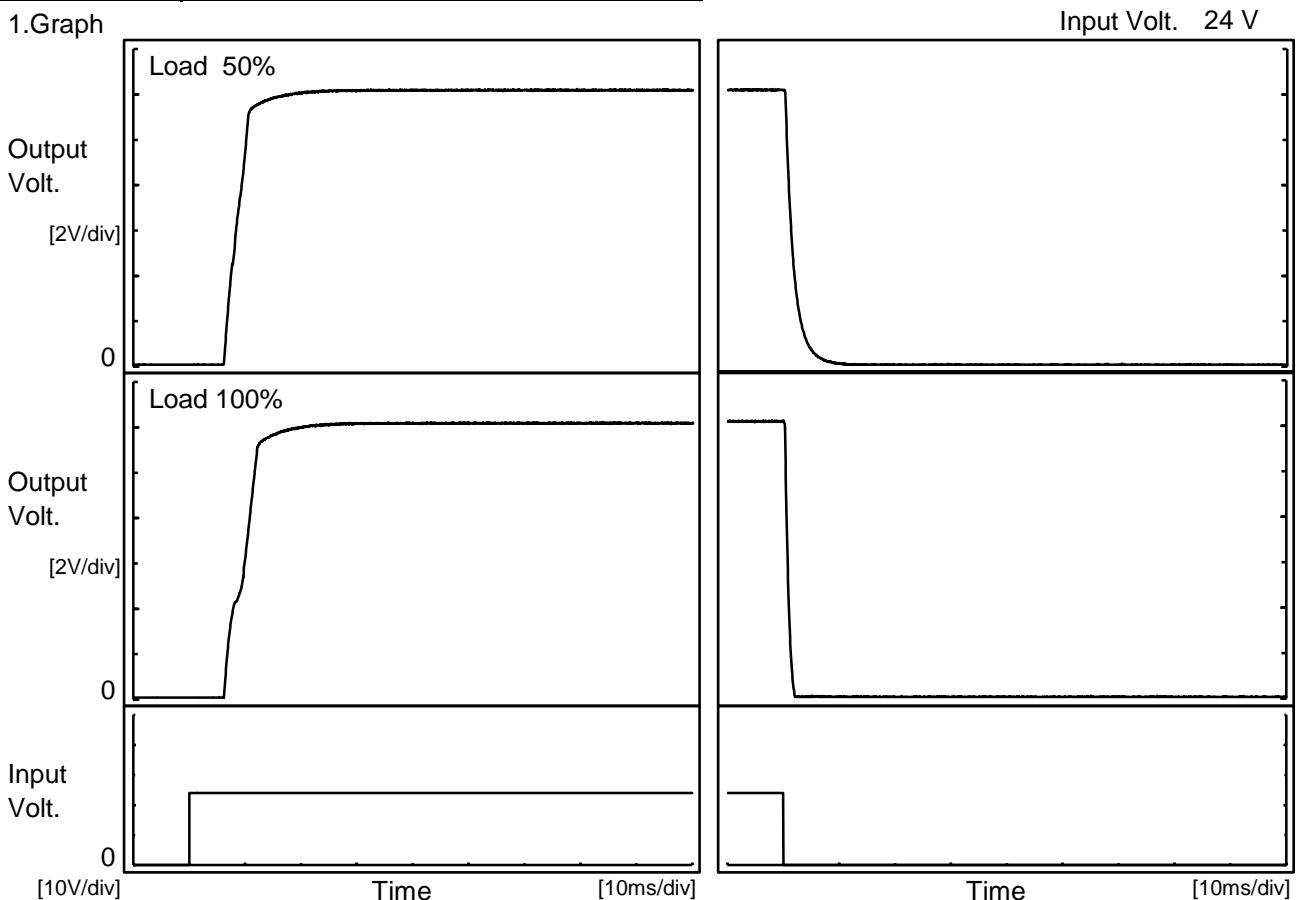
**COSEL**

Model	MGFW402412	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V1.7A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 24V</p> <p>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>12.086</td></tr> <tr><td>0.5</td><td>12.091</td></tr> <tr><td>1.0</td><td>12.091</td></tr> <tr><td>2.0</td><td>12.091</td></tr> <tr><td>3.0</td><td>12.091</td></tr> <tr><td>4.0</td><td>12.091</td></tr> <tr><td>5.0</td><td>12.091</td></tr> <tr><td>6.0</td><td>12.091</td></tr> <tr><td>7.0</td><td>12.091</td></tr> <tr><td>8.0</td><td>12.091</td></tr> </tbody> </table> <p>-12V: Rated Load Current</p>	Time since start [H]	Output Voltage [V]	0.0	12.086	0.5	12.091	1.0	12.091	2.0	12.091	3.0	12.091	4.0	12.091	5.0	12.091	6.0	12.091	7.0	12.091	8.0	12.091
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8.0	-12.090																								

**COSSEL**

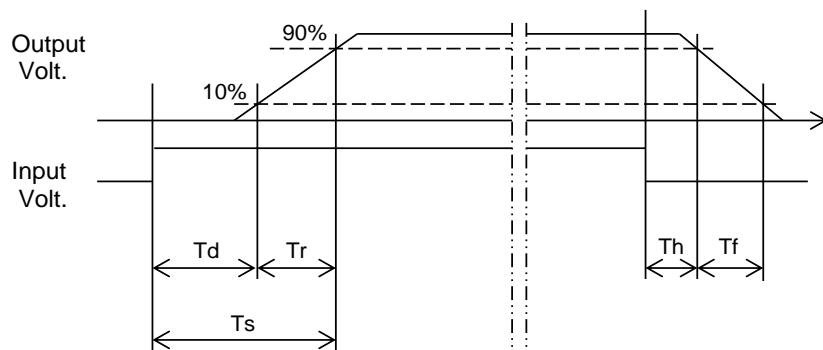
Model	MGFW402412	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V1.7A		

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		6.6	4.0	10.6	0.5	3.3	
100 %		6.6	5.6	12.2	0.4	1.2	

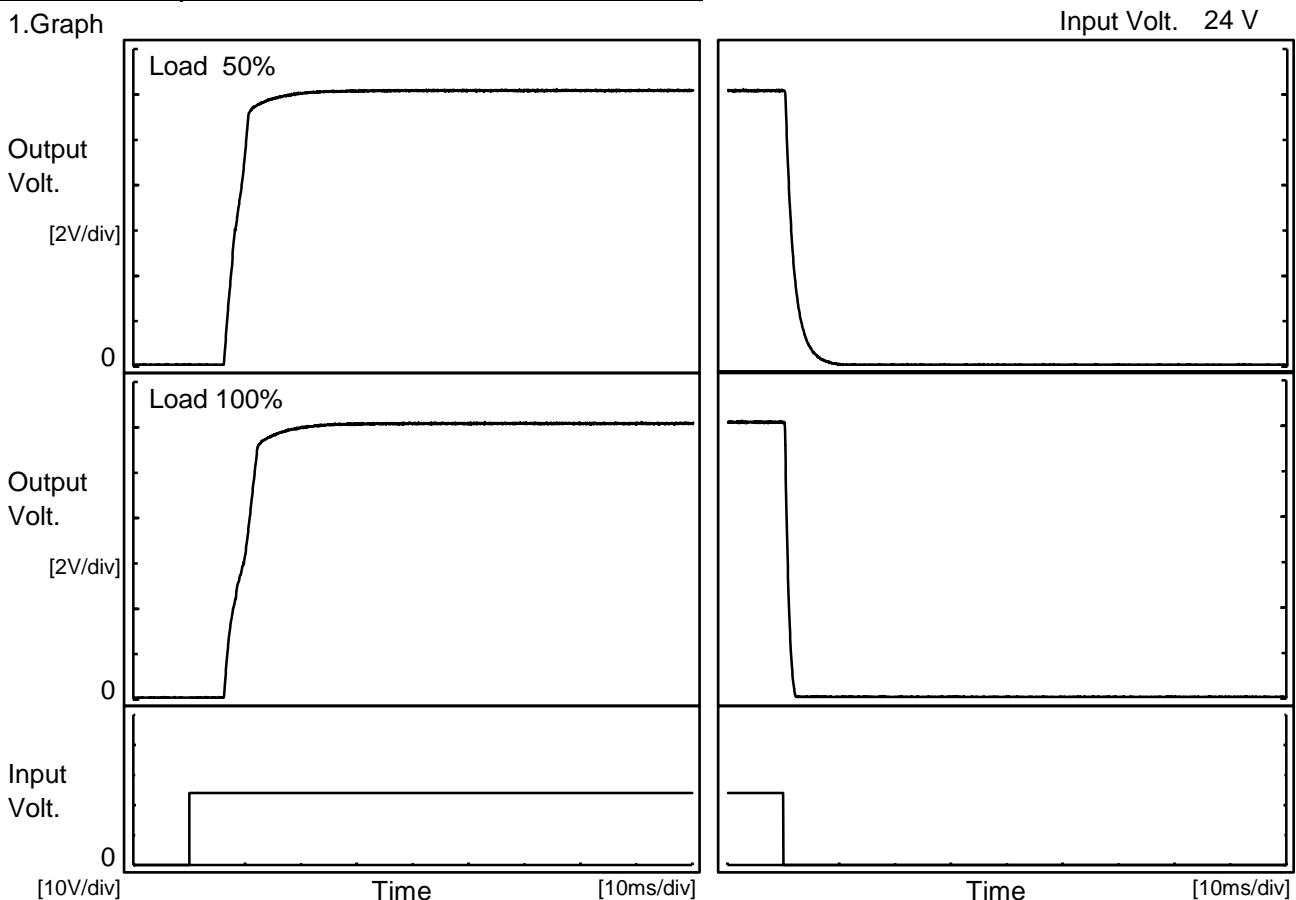


**COSSEL**

Model	MGFW402412
Item	Rise and Fall Time
Object	-12V1.7A

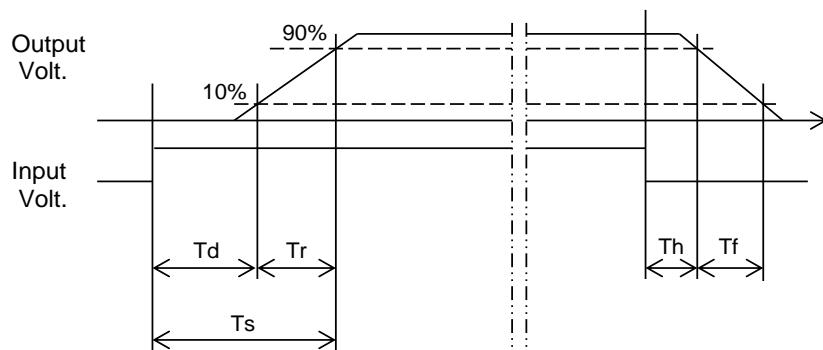
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		6.6	4.0	10.6	0.5	3.5	
100 %		6.6	5.6	12.2	0.4	1.2	

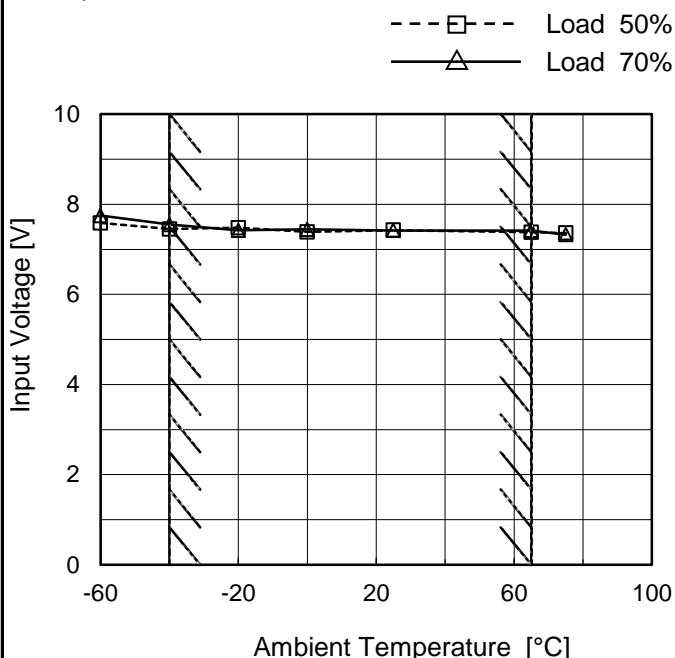


**COSEL**

Model	MGFW402412
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V1.7A

Testing Circuitry Figure A

## 1.Graph



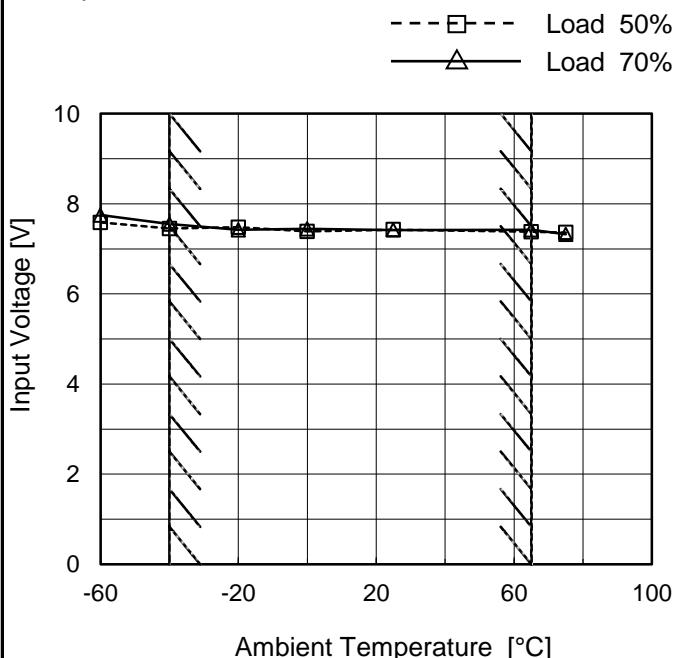
## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	7.6	7.8
-40	7.5	7.6
-20	7.5	7.5
0	7.4	7.5
25	7.5	7.5
65	7.4	7.5
75	7.4	7.4
--	-	-
--	-	-
--	-	-
--	-	-

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

Object	-12V1.7A
--------	----------

## 1.Graph



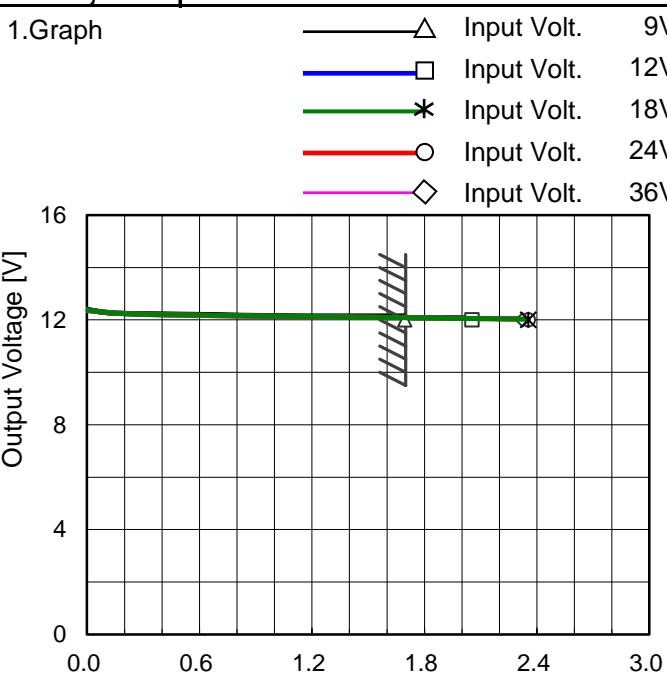
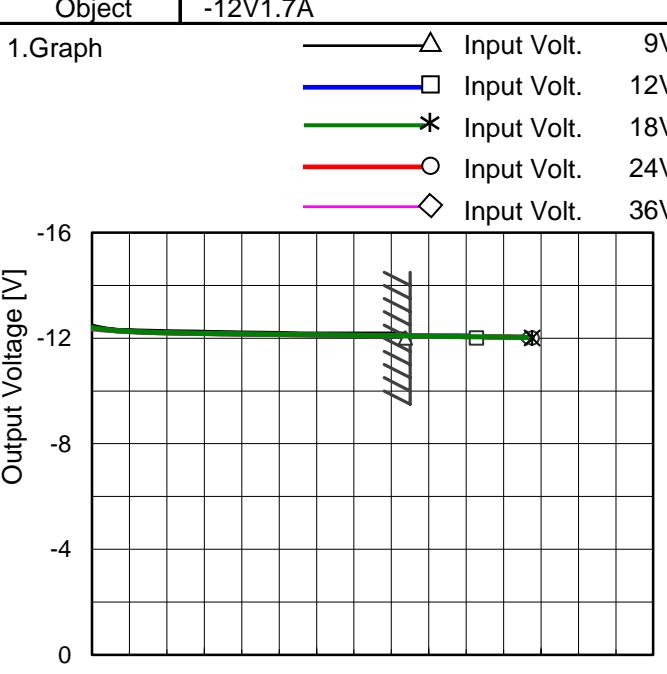
## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	7.6	7.8
-40	7.5	7.6
-20	7.5	7.5
0	7.4	7.5
25	7.5	7.5
65	7.4	7.5
75	7.4	7.4
--	-	-
--	-	-
--	-	-
--	-	-

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

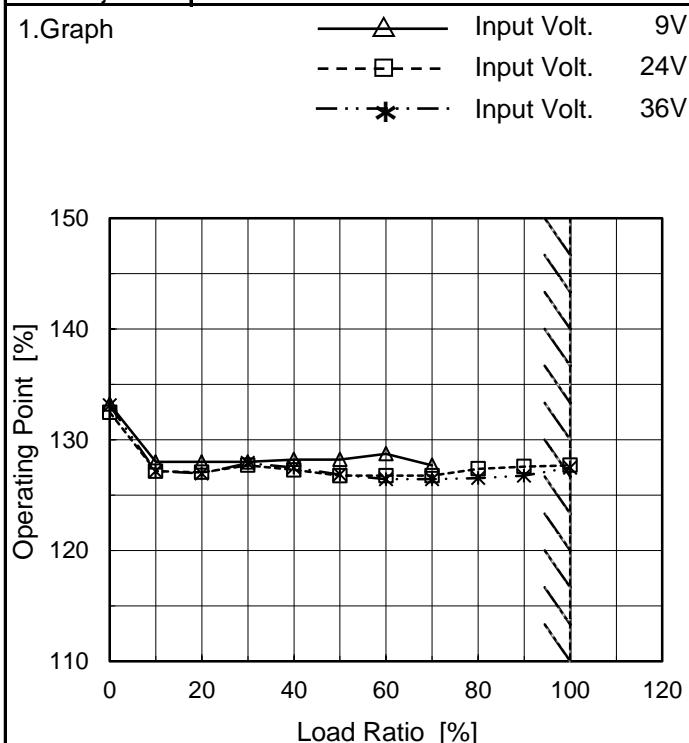
Note: Slanted line shows the range of the rated ambient temperature.

**COSEL**

Model	MGFW402412	Temperature 25°C Testing Circuitry Figure A																																																																							
Item	Overcurrent Protection																																																																								
Object	+12V1.7A																																																																								
1.Graph	 <p>Output Voltage [V]</p> <p>Load Current [A]</p>	2.Values																																																																							
	<p>Input Volt. 9V</p> <p>Input Volt. 12V</p> <p>Input Volt. 18V</p> <p>Input Volt. 24V</p> <p>Input Volt. 36V</p>	<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="5">Load Current [A]</th> </tr> <tr> <th>9[V]</th> <th>12[V]</th> <th>18[V]</th> <th>24[V]</th> <th>36[V]</th> </tr> </thead> <tbody> <tr> <td>12.000</td> <td>1.696</td> <td>2.055</td> <td>2.354</td> <td>2.354</td> <td>2.324</td> </tr> <tr> <td>11.400</td> <td>-※1</td> <td>-※2</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>10.800</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>9.600</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>8.400</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>7.200</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>6.000</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>4.800</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>3.600</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> <tr> <td>0.000</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table> <p>-12V: Rated Load Current</p>	Output Voltage [V]	Load Current [A]					9[V]	12[V]	18[V]	24[V]	36[V]	12.000	1.696	2.055	2.354	2.354	2.324	11.400	-※1	-※2	-	-	-	10.800	-	-	-	-	-	9.600	-	-	-	-	-	8.400	-	-	-	-	-	7.200	-	-	-	-	-	6.000	-	-	-	-	-	4.800	-	-	-	-	-	3.600	-	-	-	-	-	0.000	-	-	-	-	-
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Note:	Slanted line shows the range of the rated load current.	※1 Maximum output current at minimum input Voltage is 70% of rated load current. ※2 Maximum output current at 12V input Voltage is 80% of rated load current. Refer to instruction manuals for details of input derating.																																																																							
	Intermittent operation activates when overcurrent protection is activated.																																																																								

**COSEL**

Model	MGFW402412
Item	Overvoltage Protection
Object	+24V1.7A



Measured as a single output(+24V).

Temperature 25°C  
Testing Circuitry Figure A

## 2.Values

Load Ratio [%]	Operating Point [%]		
	Input Volt. 9[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	133	132	133
10	128	127	127
20	128	127	127
30	128	128	128
40	128	127	127
50	128	127	127
60	129	127	126
70	128	127	126
80	-	127	127
90	-	128	127
100	-	128	127

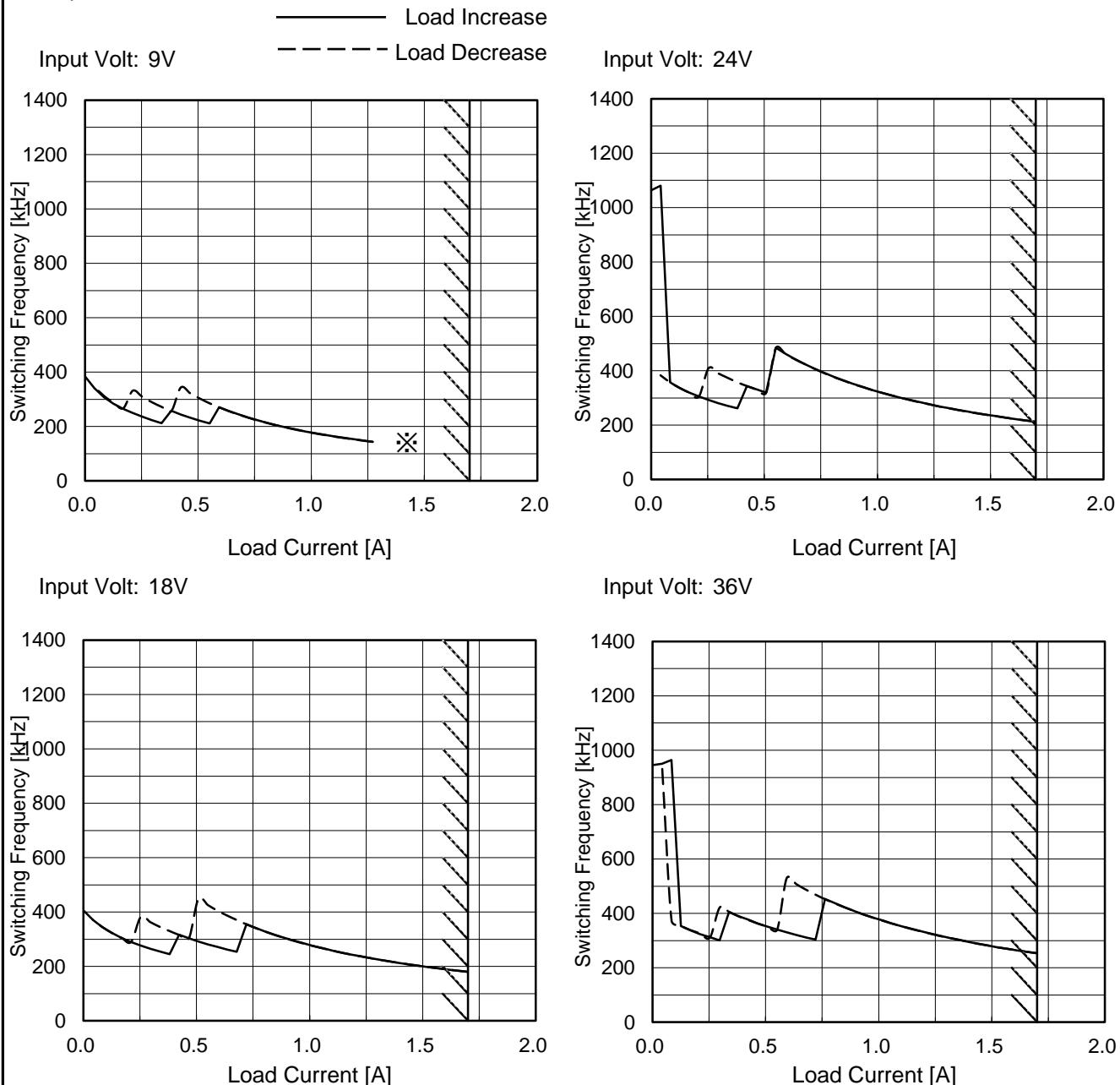
※During this area, overcurrent protection activates.

# COSEL

Model	MGFW402412
Item	Switching frequency (by Load Current)
Object	+/-12V1.7A

Temperature 25°C  
Testing Circuitry Figure A

### 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.

COSEL

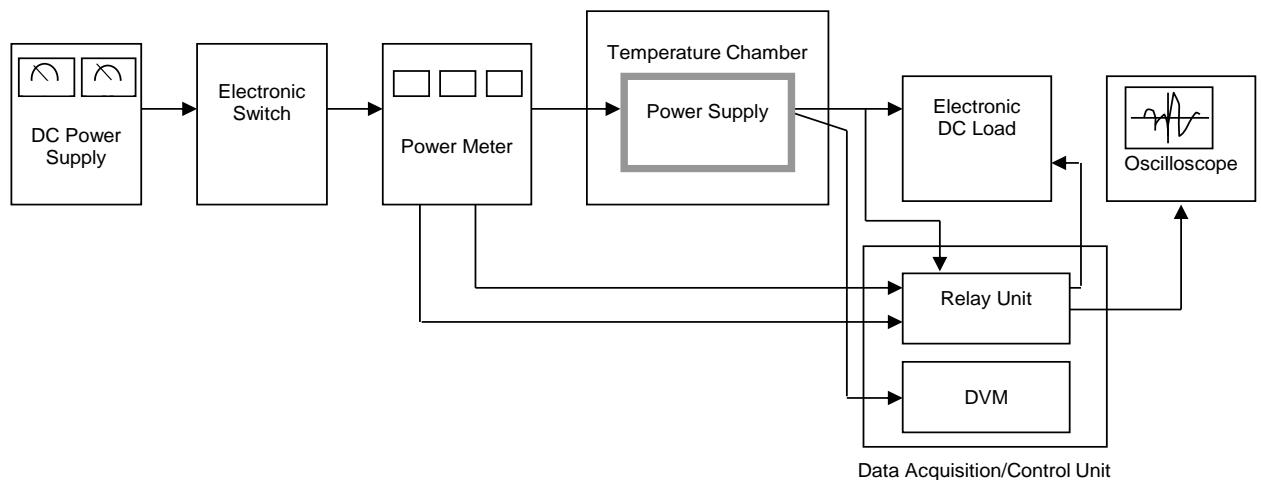


Figure A

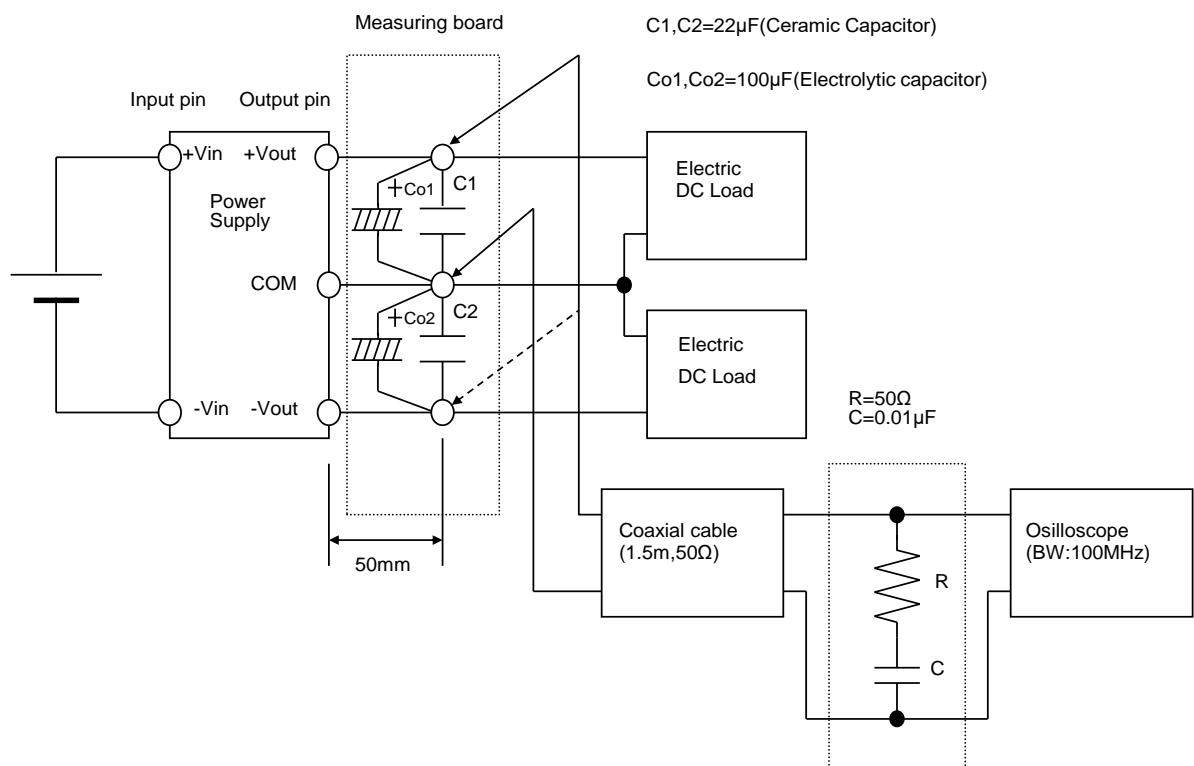


Figure B (Ripple and Ripple noise Characteristic)