

# TEST DATA OF MGW301215

Regulated DC Power Supply  
December 4, 2010

Approved by : Kazunari Asano  
Kazunari Asano Design Manager

Prepared by : Sho Saito  
Sho Saito 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.Figure of Testing Circuitry . . . . .	23

(Final Page 23)

Model	MGW301215	Temperature Testing Circuitry      25°C Figure A																																							
Item	Input Current (by Input Voltage)																																								
Object	_____	2.Values																																							
1.Graph	<p style="text-align: center;">—△— Load 100%        - - -□- - Load 50%        - -○--- Load 0%</p> <table border="1"> <caption>Data points estimated from Graph</caption> <thead> <tr> <th>Input Voltage [V]</th> <th>Load 0% [A]</th> <th>Load 50% [A]</th> <th>Load 100% [A]</th> </tr> </thead> <tbody> <tr><td>8.0</td><td>0.000</td><td>0.000</td><td>4.000</td></tr> <tr><td>8.5</td><td>0.000</td><td>0.000</td><td>3.500</td></tr> <tr><td>9.0</td><td>0.000</td><td>0.000</td><td>2.800</td></tr> <tr><td>10.0</td><td>0.000</td><td>0.000</td><td>2.200</td></tr> <tr><td>12.0</td><td>0.000</td><td>0.000</td><td>1.800</td></tr> <tr><td>14.0</td><td>0.000</td><td>0.000</td><td>1.500</td></tr> <tr><td>16.0</td><td>0.000</td><td>0.000</td><td>1.200</td></tr> <tr><td>18.0</td><td>0.000</td><td>0.000</td><td>1.000</td></tr> <tr><td>20.0</td><td>0.000</td><td>0.000</td><td>0.800</td></tr> </tbody> </table>	Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]	8.0	0.000	0.000	4.000	8.5	0.000	0.000	3.500	9.0	0.000	0.000	2.800	10.0	0.000	0.000	2.200	12.0	0.000	0.000	1.800	14.0	0.000	0.000	1.500	16.0	0.000	0.000	1.200	18.0	0.000	0.000	1.000	20.0	0.000	0.000	0.800
Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]																																						
8.0	0.000	0.000	4.000																																						
8.5	0.000	0.000	3.500																																						
9.0	0.000	0.000	2.800																																						
10.0	0.000	0.000	2.200																																						
12.0	0.000	0.000	1.800																																						
14.0	0.000	0.000	1.500																																						
16.0	0.000	0.000	1.200																																						
18.0	0.000	0.000	1.000																																						
20.0	0.000	0.000	0.800																																						

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

Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
2.0	0.000	0.000	0.000
4.0	0.000	0.000	0.000
6.0	0.002	0.000	0.002
7.0	0.002	0.002	0.002
8.0	0.002	0.002	0.002
8.4	0.059	2.009	4.102
8.5	0.060	1.984	4.053
9.0	0.061	1.866	3.804
9.6	0.062	1.745	3.561
10.0	0.063	1.674	3.430
12.0	0.065	1.409	2.848
14.0	0.061	1.220	2.446
16.0	0.055	1.074	2.150
18.0	0.052	0.988	1.910
20.0	0.050	0.875	1.730
--	-	-	-
--	-	-	-

Model	MGW301215																																																						
Item	Input Current (by Load Current)	Temperature Testing Circuitry	25°C Figure A																																																				
Object	_____																																																						
1.Graph	<p>—△— Input Volt. 9V        - - -□- - Input Volt. 12V        - - ○- - Input Volt. 18V</p> <table border="1"> <caption>Data points estimated from Figure A</caption> <thead> <tr> <th>Load Ration [%]</th> <th>9V [A]</th> <th>12V [A]</th> <th>18V [A]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.060</td><td>0.063</td><td>0.054</td></tr> <tr><td>20</td><td>0.797</td><td>0.615</td><td>0.430</td></tr> <tr><td>40</td><td>1.522</td><td>1.154</td><td>0.793</td></tr> <tr><td>60</td><td>2.252</td><td>1.690</td><td>1.154</td></tr> <tr><td>80</td><td>3.028</td><td>2.270</td><td>1.521</td></tr> <tr><td>100</td><td>3.817</td><td>2.826</td><td>1.906</td></tr> <tr><td>110</td><td>4.188</td><td>3.134</td><td>2.092</td></tr> </tbody> </table>	Load Ration [%]	9V [A]	12V [A]	18V [A]	0	0.060	0.063	0.054	20	0.797	0.615	0.430	40	1.522	1.154	0.793	60	2.252	1.690	1.154	80	3.028	2.270	1.521	100	3.817	2.826	1.906	110	4.188	3.134	2.092																						
Load Ration [%]	9V [A]	12V [A]	18V [A]																																																				
0	0.060	0.063	0.054																																																				
20	0.797	0.615	0.430																																																				
40	1.522	1.154	0.793																																																				
60	2.252	1.690	1.154																																																				
80	3.028	2.270	1.521																																																				
100	3.817	2.826	1.906																																																				
110	4.188	3.134	2.092																																																				
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Ration [%]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.060</td><td>0.063</td><td>0.054</td></tr> <tr><td>20</td><td>0.797</td><td>0.615</td><td>0.430</td></tr> <tr><td>40</td><td>1.522</td><td>1.154</td><td>0.793</td></tr> <tr><td>60</td><td>2.252</td><td>1.690</td><td>1.154</td></tr> <tr><td>80</td><td>3.028</td><td>2.270</td><td>1.521</td></tr> <tr><td>100</td><td>3.817</td><td>2.826</td><td>1.906</td></tr> <tr><td>110</td><td>4.188</td><td>3.134</td><td>2.092</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Ration [%]	Input Current [A]			Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	0	0.060	0.063	0.054	20	0.797	0.615	0.430	40	1.522	1.154	0.793	60	2.252	1.690	1.154	80	3.028	2.270	1.521	100	3.817	2.826	1.906	110	4.188	3.134	2.092	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-			
Load Ration [%]	Input Current [A]																																																						
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]																																																				
0	0.060	0.063	0.054																																																				
20	0.797	0.615	0.430																																																				
40	1.522	1.154	0.793																																																				
60	2.252	1.690	1.154																																																				
80	3.028	2.270	1.521																																																				
100	3.817	2.826	1.906																																																				
110	4.188	3.134	2.092																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				

**COSEL**

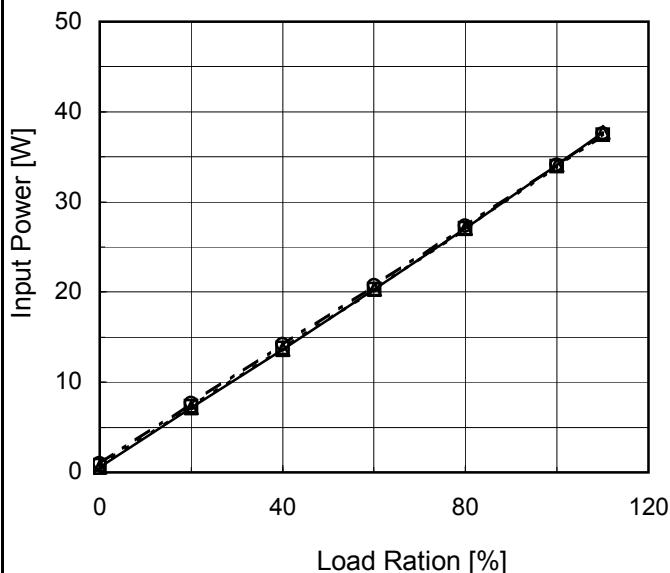
Model MGW301215

Item Input Power (by Load Current)

Object \_\_\_\_\_

1.Graph

—△— Input Volt. 9V  
 - - -□--- Input Volt. 12V  
 - - ○ - - Input Volt. 18V


 Temperature 25°C  
 Testing Circuitry Figure A

2.Values

Load Ration [%]	Input Power [W]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
0	0.54	0.76	0.97
20	7.17	7.35	7.70
40	13.63	13.76	14.22
60	20.28	20.33	20.71
80	27.09	27.06	27.34
100	34.10	33.93	34.10
110	37.71	37.44	37.60
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

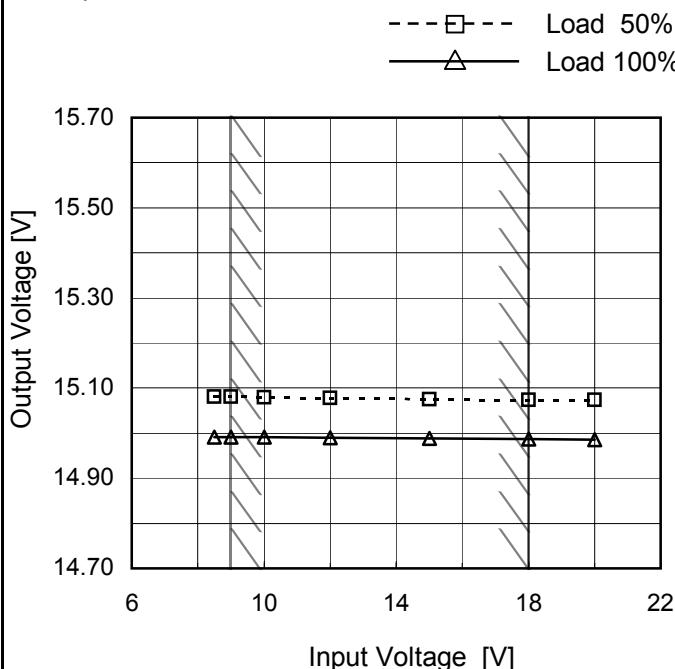
Model	MGW301215																																	
Item	Efficiency (by Input Voltage)	Temperature Testing Circuitry      25°C      Figure A																																
Object	—	—																																
1. Graph																																		
<p>The graph plots Efficiency [%] on the y-axis (50 to 100) against Input Voltage [V] on the x-axis (6 to 22). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a slight decrease in efficiency as input voltage increases beyond 10V. A slanted line on the graph indicates the rated input voltage range.</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>8.5</td><td>88.2</td><td>87.5</td></tr> <tr><td>9.0</td><td>88.5</td><td>87.8</td></tr> <tr><td>10.0</td><td>88.6</td><td>88.2</td></tr> <tr><td>12.0</td><td>88.1</td><td>88.3</td></tr> <tr><td>15.0</td><td>87.2</td><td>88.2</td></tr> <tr><td>18.0</td><td>85.9</td><td>87.5</td></tr> <tr><td>20.0</td><td>85.0</td><td>87.5</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	8.5	88.2	87.5	9.0	88.5	87.8	10.0	88.6	88.2	12.0	88.1	88.3	15.0	87.2	88.2	18.0	85.9	87.5	20.0	85.0	87.5	--	-	-	--	-	-		
Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]																																
8.5	88.2	87.5																																
9.0	88.5	87.8																																
10.0	88.6	88.2																																
12.0	88.1	88.3																																
15.0	87.2	88.2																																
18.0	85.9	87.5																																
20.0	85.0	87.5																																
--	-	-																																
--	-	-																																
2. Values																																		
<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>8.5</td><td>88.2</td><td>87.5</td></tr> <tr><td>9.0</td><td>88.5</td><td>87.8</td></tr> <tr><td>10.0</td><td>88.6</td><td>88.2</td></tr> <tr><td>12.0</td><td>88.1</td><td>88.3</td></tr> <tr><td>15.0</td><td>87.2</td><td>88.2</td></tr> <tr><td>18.0</td><td>85.9</td><td>87.5</td></tr> <tr><td>20.0</td><td>85.0</td><td>87.5</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	8.5	88.2	87.5	9.0	88.5	87.8	10.0	88.6	88.2	12.0	88.1	88.3	15.0	87.2	88.2	18.0	85.9	87.5	20.0	85.0	87.5	--	-	-	--	-	-
Input Voltage [V]	Efficiency [%]																																	
	Load 50%	Load 100%																																
8.5	88.2	87.5																																
9.0	88.5	87.8																																
10.0	88.6	88.2																																
12.0	88.1	88.3																																
15.0	87.2	88.2																																
18.0	85.9	87.5																																
20.0	85.0	87.5																																
--	-	-																																
--	-	-																																
<p>Note: Slanted line shows the range of the rated input voltage.</p>																																		

Model	MGW301215																																																						
Item	Efficiency (by Load Current)	Temperature Testing Circuitry	25°C Figure A																																																				
Object	_____																																																						
1.Graph	<p>Legend:</p> <ul style="list-style-type: none"> <li>—△— Input Volt. 9V</li> <li>- -□-- Input Volt. 12V</li> <li>- -○-- Input Volt. 18V</li> </ul> <table border="1"> <thead> <tr> <th>Load Ration [%]</th> <th>9V [%]</th> <th>12V [%]</th> <th>18V [%]</th> </tr> </thead> <tbody> <tr><td>20</td><td>83.7</td><td>81.7</td><td>77.9</td></tr> <tr><td>40</td><td>88.0</td><td>87.2</td><td>84.4</td></tr> <tr><td>60</td><td>88.8</td><td>88.5</td><td>86.9</td></tr> <tr><td>80</td><td>88.6</td><td>88.7</td><td>87.8</td></tr> <tr><td>100</td><td>88.0</td><td>88.5</td><td>88.0</td></tr> <tr><td>110</td><td>87.6</td><td>88.2</td><td>87.8</td></tr> </tbody> </table>	Load Ration [%]	9V [%]	12V [%]	18V [%]	20	83.7	81.7	77.9	40	88.0	87.2	84.4	60	88.8	88.5	86.9	80	88.6	88.7	87.8	100	88.0	88.5	88.0	110	87.6	88.2	87.8	2.Values																									
Load Ration [%]	9V [%]	12V [%]	18V [%]																																																				
20	83.7	81.7	77.9																																																				
40	88.0	87.2	84.4																																																				
60	88.8	88.5	86.9																																																				
80	88.6	88.7	87.8																																																				
100	88.0	88.5	88.0																																																				
110	87.6	88.2	87.8																																																				
	<table border="1"> <thead> <tr> <th rowspan="2">Load Ration [%]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>20</td><td>83.7</td><td>81.7</td><td>77.9</td></tr> <tr><td>40</td><td>88.0</td><td>87.2</td><td>84.4</td></tr> <tr><td>60</td><td>88.8</td><td>88.5</td><td>86.9</td></tr> <tr><td>80</td><td>88.6</td><td>88.7</td><td>87.8</td></tr> <tr><td>100</td><td>88.0</td><td>88.5</td><td>88.0</td></tr> <tr><td>110</td><td>87.6</td><td>88.2</td><td>87.8</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Ration [%]	Efficiency [%]			Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	0	-	-	-	20	83.7	81.7	77.9	40	88.0	87.2	84.4	60	88.8	88.5	86.9	80	88.6	88.7	87.8	100	88.0	88.5	88.0	110	87.6	88.2	87.8	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-			
Load Ration [%]	Efficiency [%]																																																						
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]																																																				
0	-	-	-																																																				
20	83.7	81.7	77.9																																																				
40	88.0	87.2	84.4																																																				
60	88.8	88.5	86.9																																																				
80	88.6	88.7	87.8																																																				
100	88.0	88.5	88.0																																																				
110	87.6	88.2	87.8																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				

Model	MGW301215
Item	Line Regulation
Object	+15V1A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



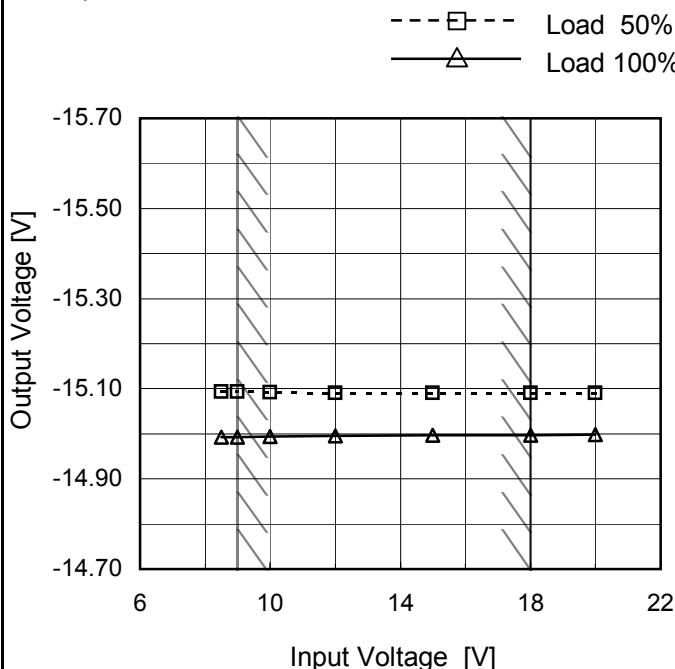
## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.5	15.081	14.991
9.0	15.081	14.991
10.0	15.080	14.991
12.0	15.078	14.989
15.0	15.075	14.988
18.0	15.074	14.987
20.0	15.074	14.986
--	-	-
--	-	-

-15V: Rated output current

## Object -15V1A

## 1.Graph

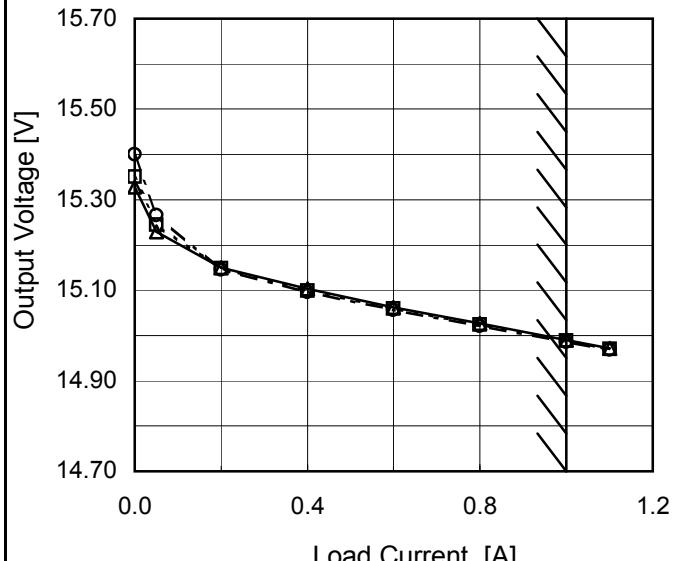
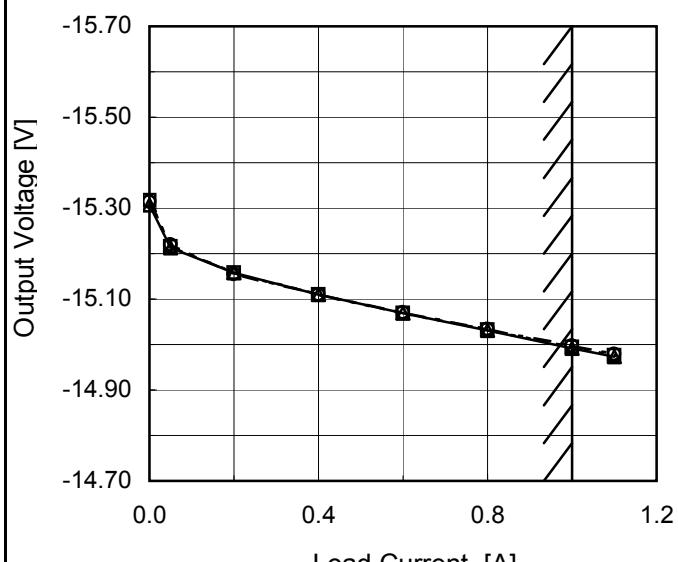


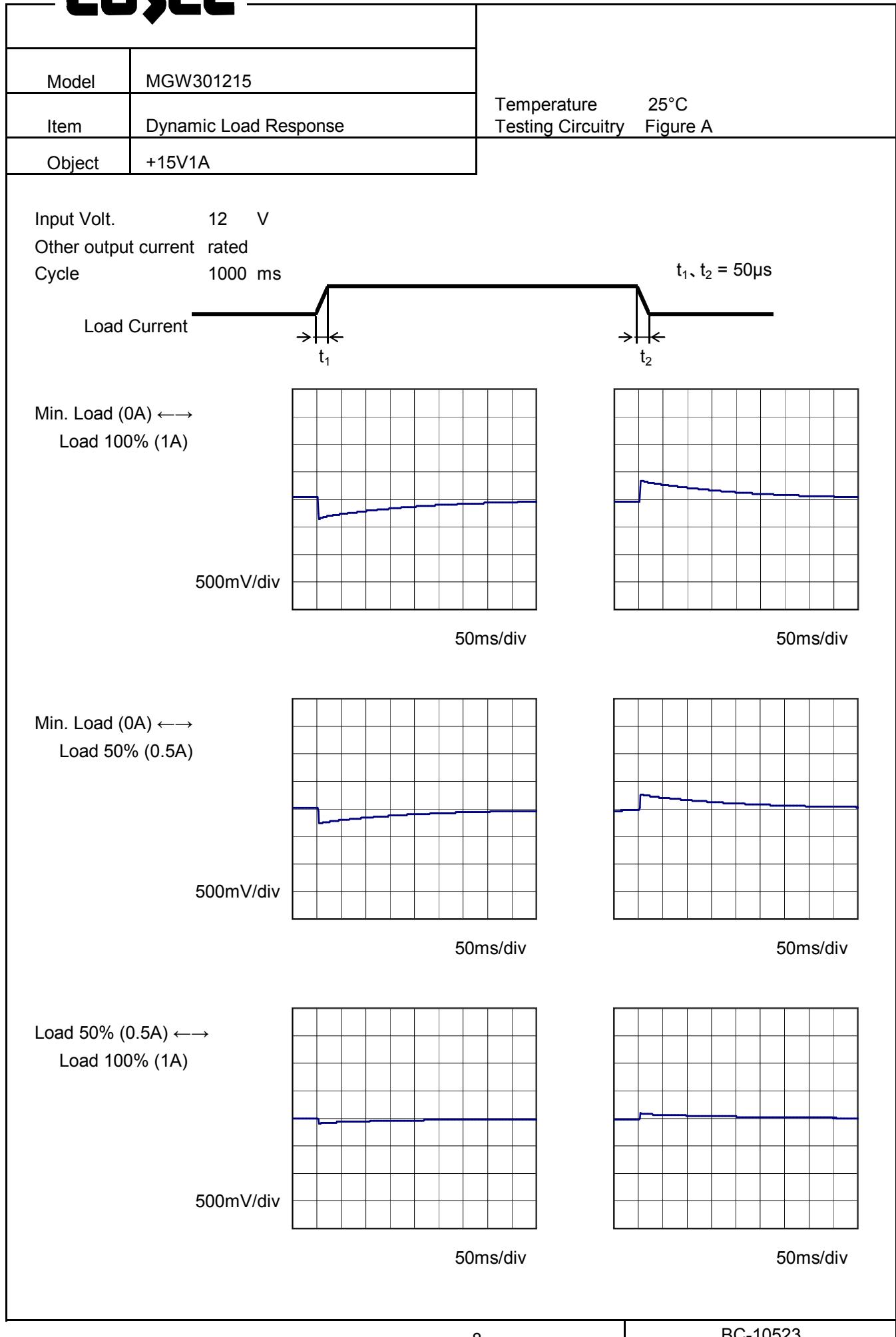
## 2.Values

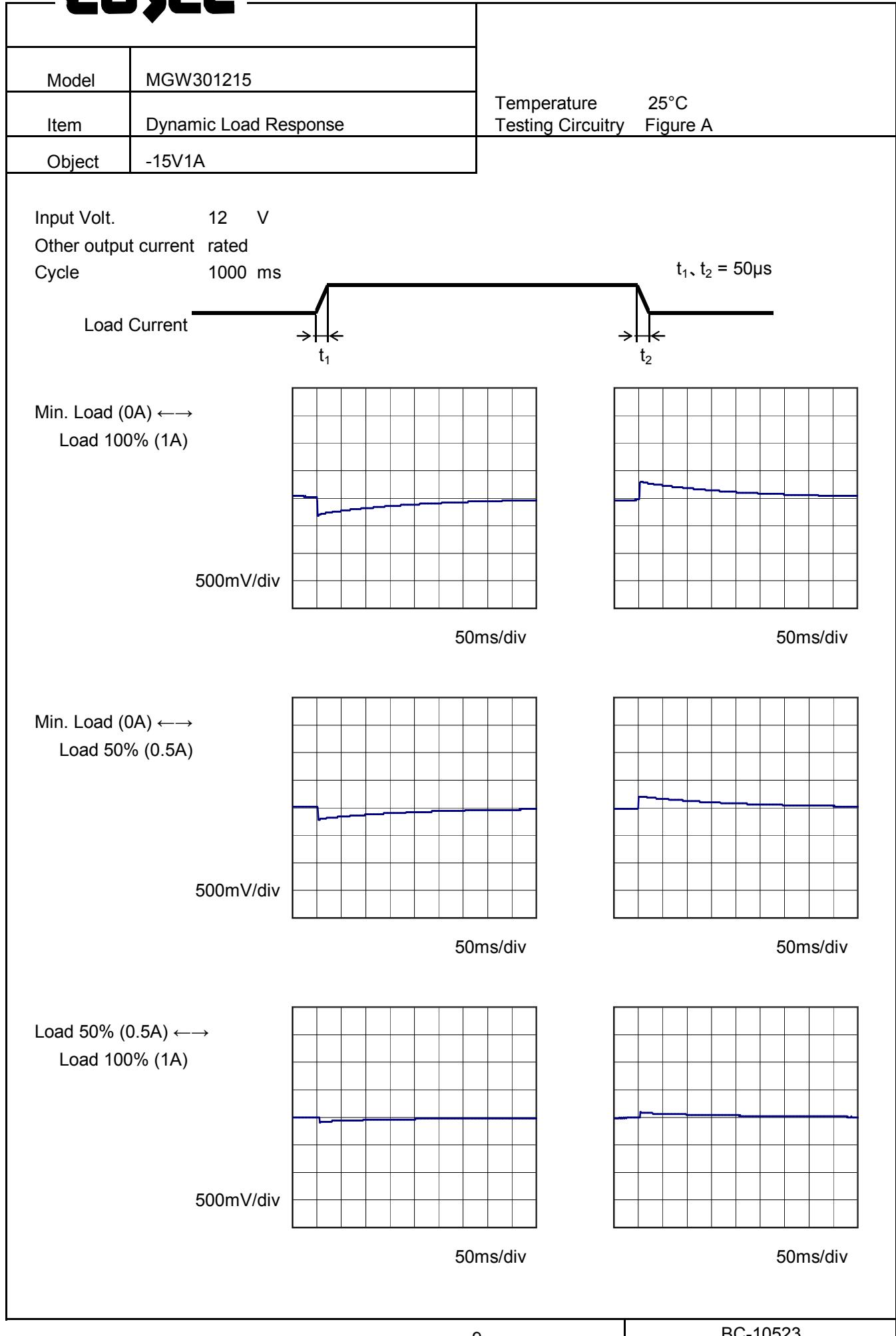
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
8.5	-15.094	-14.992
9.0	-15.093	-14.993
10.0	-15.092	-14.994
12.0	-15.091	-14.995
15.0	-15.091	-14.997
18.0	-15.091	-14.998
20.0	-15.091	-14.998
--	-	-
--	-	-

+15V: Rated output current

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

Model	MGW301215	Temperature Testing Circuitry      25°C Figure A																																																				
Item	Load Regulation																																																					
Object	+15V1A																																																					
1.Graph	<p>—△— Input Volt. 9V        - - -□- - Input Volt. 12V        - · -○- - Input Volt. 18V</p>  <table border="1"> <caption>Data for Graph 1: +15V1A at 25°C</caption> <thead> <tr> <th>Load Current [A]</th> <th>9V [V]</th> <th>12V [V]</th> <th>18V [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>15.327</td><td>15.350</td><td>15.401</td></tr> <tr><td>0.05</td><td>15.229</td><td>15.245</td><td>15.265</td></tr> <tr><td>0.20</td><td>15.150</td><td>15.148</td><td>15.145</td></tr> <tr><td>0.40</td><td>15.103</td><td>15.100</td><td>15.096</td></tr> <tr><td>0.60</td><td>15.062</td><td>15.060</td><td>15.057</td></tr> <tr><td>0.80</td><td>15.027</td><td>15.024</td><td>15.021</td></tr> <tr><td>1.00</td><td>14.990</td><td>14.988</td><td>14.986</td></tr> <tr><td>1.10</td><td>14.972</td><td>14.970</td><td>14.968</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	9V [V]	12V [V]	18V [V]	0.00	15.327	15.350	15.401	0.05	15.229	15.245	15.265	0.20	15.150	15.148	15.145	0.40	15.103	15.100	15.096	0.60	15.062	15.060	15.057	0.80	15.027	15.024	15.021	1.00	14.990	14.988	14.986	1.10	14.972	14.970	14.968	--	-	-	-	--	-	-	-	--	-	-	-					
Load Current [A]	9V [V]	12V [V]	18V [V]																																																			
0.00	15.327	15.350	15.401																																																			
0.05	15.229	15.245	15.265																																																			
0.20	15.150	15.148	15.145																																																			
0.40	15.103	15.100	15.096																																																			
0.60	15.062	15.060	15.057																																																			
0.80	15.027	15.024	15.021																																																			
1.00	14.990	14.988	14.986																																																			
1.10	14.972	14.970	14.968																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
2.Values																																																						
	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>15.327</td><td>15.350</td><td>15.401</td></tr> <tr><td>0.05</td><td>15.229</td><td>15.245</td><td>15.265</td></tr> <tr><td>0.20</td><td>15.150</td><td>15.148</td><td>15.145</td></tr> <tr><td>0.40</td><td>15.103</td><td>15.100</td><td>15.096</td></tr> <tr><td>0.60</td><td>15.062</td><td>15.060</td><td>15.057</td></tr> <tr><td>0.80</td><td>15.027</td><td>15.024</td><td>15.021</td></tr> <tr><td>1.00</td><td>14.990</td><td>14.988</td><td>14.986</td></tr> <tr><td>1.10</td><td>14.972</td><td>14.970</td><td>14.968</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Output Voltage [V]			Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	0.00	15.327	15.350	15.401	0.05	15.229	15.245	15.265	0.20	15.150	15.148	15.145	0.40	15.103	15.100	15.096	0.60	15.062	15.060	15.057	0.80	15.027	15.024	15.021	1.00	14.990	14.988	14.986	1.10	14.972	14.970	14.968	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																					
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]																																																			
0.00	15.327	15.350	15.401																																																			
0.05	15.229	15.245	15.265																																																			
0.20	15.150	15.148	15.145																																																			
0.40	15.103	15.100	15.096																																																			
0.60	15.062	15.060	15.057																																																			
0.80	15.027	15.024	15.021																																																			
1.00	14.990	14.988	14.986																																																			
1.10	14.972	14.970	14.968																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
	-15V: Rated output current																																																					
Object	-15V1A	2.Values																																																				
1.Graph	<p>—△— Input Volt. 9V        - - -□- - Input Volt. 12V        - · -○- - Input Volt. 18V</p>  <table border="1"> <caption>Data for Graph 1: -15V1A at 25°C</caption> <thead> <tr> <th>Load Current [A]</th> <th>9V [V]</th> <th>12V [V]</th> <th>18V [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>-15.308</td><td>-15.317</td><td>-15.314</td></tr> <tr><td>0.05</td><td>-15.212</td><td>-15.216</td><td>-15.220</td></tr> <tr><td>0.20</td><td>-15.158</td><td>-15.157</td><td>-15.156</td></tr> <tr><td>0.40</td><td>-15.111</td><td>-15.110</td><td>-15.110</td></tr> <tr><td>0.60</td><td>-15.069</td><td>-15.070</td><td>-15.070</td></tr> <tr><td>0.80</td><td>-15.030</td><td>-15.032</td><td>-15.033</td></tr> <tr><td>1.00</td><td>-14.992</td><td>-14.995</td><td>-14.997</td></tr> <tr><td>1.10</td><td>-14.974</td><td>-14.976</td><td>-14.979</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	9V [V]	12V [V]	18V [V]	0.00	-15.308	-15.317	-15.314	0.05	-15.212	-15.216	-15.220	0.20	-15.158	-15.157	-15.156	0.40	-15.111	-15.110	-15.110	0.60	-15.069	-15.070	-15.070	0.80	-15.030	-15.032	-15.033	1.00	-14.992	-14.995	-14.997	1.10	-14.974	-14.976	-14.979	--	-	-	-	--	-	-	-	--	-	-	-					
Load Current [A]	9V [V]	12V [V]	18V [V]																																																			
0.00	-15.308	-15.317	-15.314																																																			
0.05	-15.212	-15.216	-15.220																																																			
0.20	-15.158	-15.157	-15.156																																																			
0.40	-15.111	-15.110	-15.110																																																			
0.60	-15.069	-15.070	-15.070																																																			
0.80	-15.030	-15.032	-15.033																																																			
1.00	-14.992	-14.995	-14.997																																																			
1.10	-14.974	-14.976	-14.979																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>-15.308</td><td>-15.317</td><td>-15.314</td></tr> <tr><td>0.05</td><td>-15.212</td><td>-15.216</td><td>-15.220</td></tr> <tr><td>0.20</td><td>-15.158</td><td>-15.157</td><td>-15.156</td></tr> <tr><td>0.40</td><td>-15.111</td><td>-15.110</td><td>-15.110</td></tr> <tr><td>0.60</td><td>-15.069</td><td>-15.070</td><td>-15.070</td></tr> <tr><td>0.80</td><td>-15.030</td><td>-15.032</td><td>-15.033</td></tr> <tr><td>1.00</td><td>-14.992</td><td>-14.995</td><td>-14.997</td></tr> <tr><td>1.10</td><td>-14.974</td><td>-14.976</td><td>-14.979</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Output Voltage [V]			Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	0.00	-15.308	-15.317	-15.314	0.05	-15.212	-15.216	-15.220	0.20	-15.158	-15.157	-15.156	0.40	-15.111	-15.110	-15.110	0.60	-15.069	-15.070	-15.070	0.80	-15.030	-15.032	-15.033	1.00	-14.992	-14.995	-14.997	1.10	-14.974	-14.976	-14.979	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																					
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]																																																			
0.00	-15.308	-15.317	-15.314																																																			
0.05	-15.212	-15.216	-15.220																																																			
0.20	-15.158	-15.157	-15.156																																																			
0.40	-15.111	-15.110	-15.110																																																			
0.60	-15.069	-15.070	-15.070																																																			
0.80	-15.030	-15.032	-15.033																																																			
1.00	-14.992	-14.995	-14.997																																																			
1.10	-14.974	-14.976	-14.979																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
	+15V: Rated output current																																																					
<p>Note: Slanted line shows the range of the rated load current.</p>																																																						



**COSSEL**

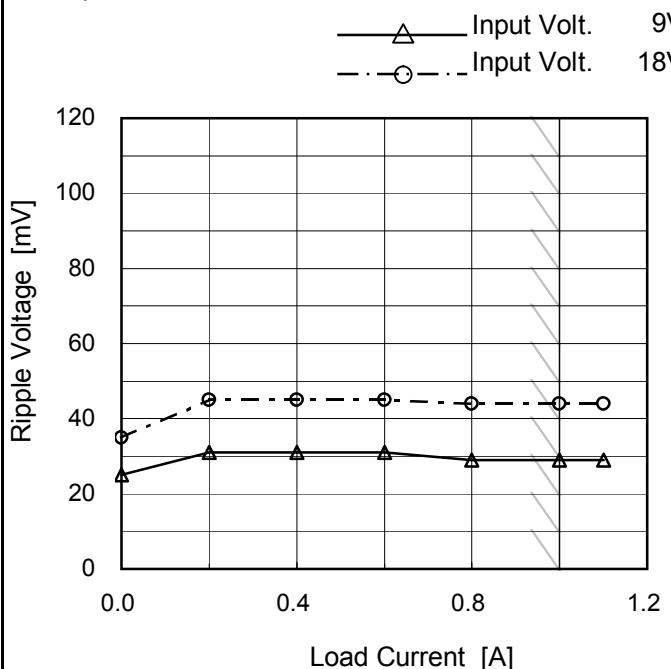
**COSSEL**

Model MGW301215

Item Ripple Voltage (by Load Current)

Object +15V1A

## 1. Graph

Temperature 25°C  
Testing Circuitry Figure B

## 2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0.0	25	35
0.2	31	45
0.4	31	45
0.6	31	45
0.8	29	44
1.0	29	44
1.1	29	44
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

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]

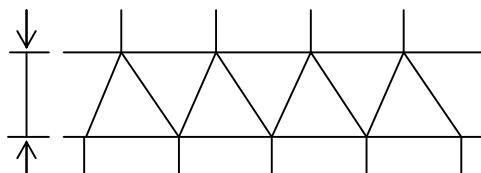


Fig.Complex Ripple Wave Form

**COSSEL**

Model	MGW301215	Temperature	25°C																								
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure B																								
Object	-15V1A																										
1. Graph			2. Values																								
<p>The graph plots Ripple Voltage [mV] on the Y-axis (0 to 120) against Load Current [A] on the X-axis (0.0 to 1.1). Two sets of data points are shown: Input Volt. 9V (triangles) and Input Volt. 18V (circles). A slanted line indicates the range of rated load current.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 9V)</th> <th>Ripple Voltage [mV] (Input Volt. 18V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>22</td><td>33</td></tr> <tr><td>0.2</td><td>20</td><td>31</td></tr> <tr><td>0.4</td><td>20</td><td>31</td></tr> <tr><td>0.6</td><td>20</td><td>31</td></tr> <tr><td>0.8</td><td>18</td><td>29</td></tr> <tr><td>1.0</td><td>18</td><td>29</td></tr> <tr><td>1.1</td><td>18</td><td>29</td></tr> </tbody> </table>				Load Current [A]	Ripple Voltage [mV] (Input Volt. 9V)	Ripple Voltage [mV] (Input Volt. 18V)	0.0	22	33	0.2	20	31	0.4	20	31	0.6	20	31	0.8	18	29	1.0	18	29	1.1	18	29
Load Current [A]	Ripple Voltage [mV] (Input Volt. 9V)	Ripple Voltage [mV] (Input Volt. 18V)																									
0.0	22	33																									
0.2	20	31																									
0.4	20	31																									
0.6	20	31																									
0.8	18	29																									
1.0	18	29																									
1.1	18	29																									
			+15V: Rated output current																								
<p>Ripple Voltage is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.</p> <p>The diagram shows a complex ripple wave form with multiple triangular cycles. The vertical axis is labeled "Ripple [mVp-p]" with arrows indicating the peak-to-peak measurement.</p>																											
<p>Fig.Complex Ripple Wave Form</p>																											

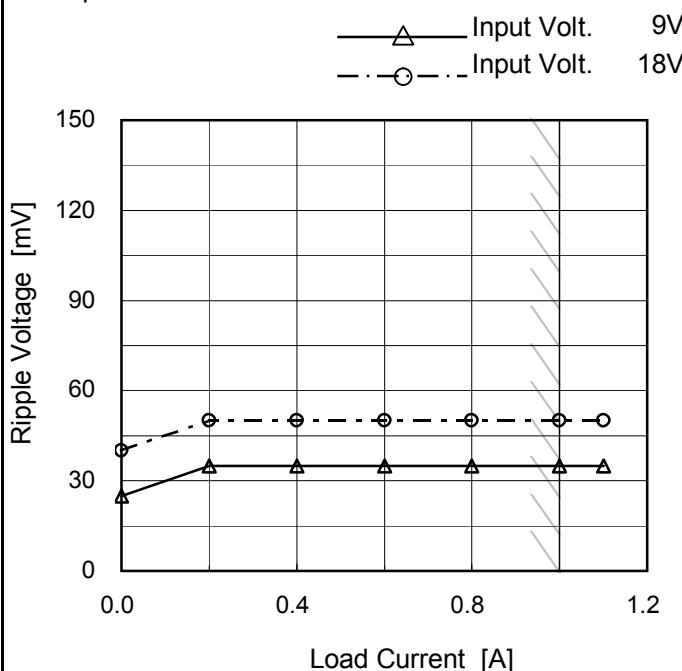
**COSEL**

Model MGW301215

Item Ripple-Noise

Object +15V1A

## 1. Graph

Temperature 25°C  
Testing Circuitry Figure B

## 2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 9 [V]	Input Volt. 18 [V]
0.0	25	40
0.2	35	50
0.4	35	50
0.6	35	50
0.8	35	50
1.0	35	50
1.1	35	50
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

Ripple-Noise is shown as p-p in the figure below.  
Note: Slanted line shows the range of the rated load current.

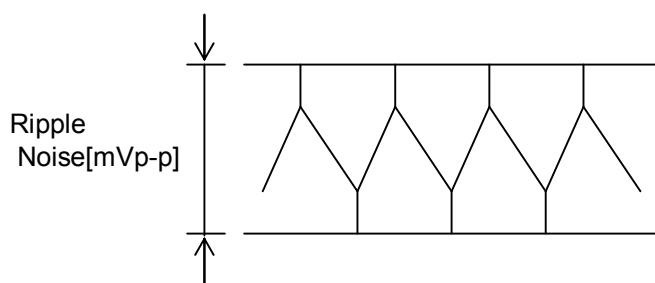


Fig.Complex Ripple Noise Wave Form

Model	MGW301215																																							
Item	Ripple-Noise	Temperature      25°C Testing Circuitry      Figure B																																						
Object	-15V1A																																							
1. Graph																																								
<p>Y-axis: Ripple Voltage [mV] (0 to 150)  X-axis: Load Current [A] (0.00 to 1.20)</p> <p>Legend:  — ▲ Input Volt. 9V  - - ○ Input Volt. 18V </p>																																								
2. Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 9 [V]</th> <th>Input Volt. 18 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>25</td><td>35</td></tr> <tr><td>0.2</td><td>25</td><td>35</td></tr> <tr><td>0.4</td><td>25</td><td>35</td></tr> <tr><td>0.6</td><td>25</td><td>35</td></tr> <tr><td>0.8</td><td>25</td><td>35</td></tr> <tr><td>1.0</td><td>25</td><td>35</td></tr> <tr><td>1.1</td><td>25</td><td>35</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-Noise [mV]		Input Volt. 9 [V]	Input Volt. 18 [V]	0.0	25	35	0.2	25	35	0.4	25	35	0.6	25	35	0.8	25	35	1.0	25	35	1.1	25	35	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 9 [V]	Input Volt. 18 [V]																																						
0.0	25	35																																						
0.2	25	35																																						
0.4	25	35																																						
0.6	25	35																																						
0.8	25	35																																						
1.0	25	35																																						
1.1	25	35																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						
+15V: Rated output current																																								
<p>Ripple-Noise is shown as p-p in the figure below.  Note: Slanted line shows the range of the rated load current.</p> <p>Y-axis: Ripple Noise[mVp-p]</p>																																								
Fig.Complex Ripple Noise Wave Form																																								

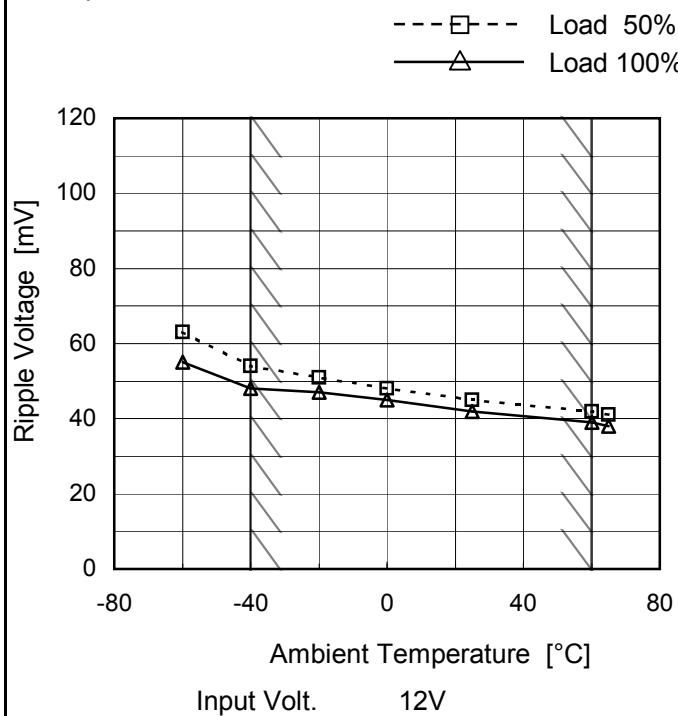
**COSEL**

Model MGW301215

Item Ripple Voltage (by Ambient Temp.)

Object +15V1A

## 1.Graph



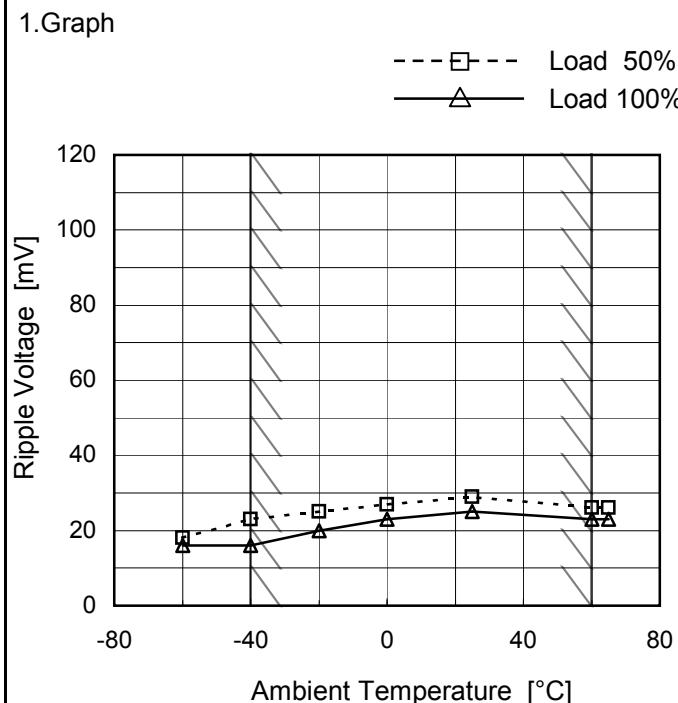
Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	63	55
-40	54	48
-20	51	47
0	48	45
25	45	42
60	42	39
65	41	38
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	18	16
-40	23	16
-20	25	20
0	27	23
25	29	25
60	26	23
65	26	23
--	-	-
--	-	-
--	-	-
--	-	-

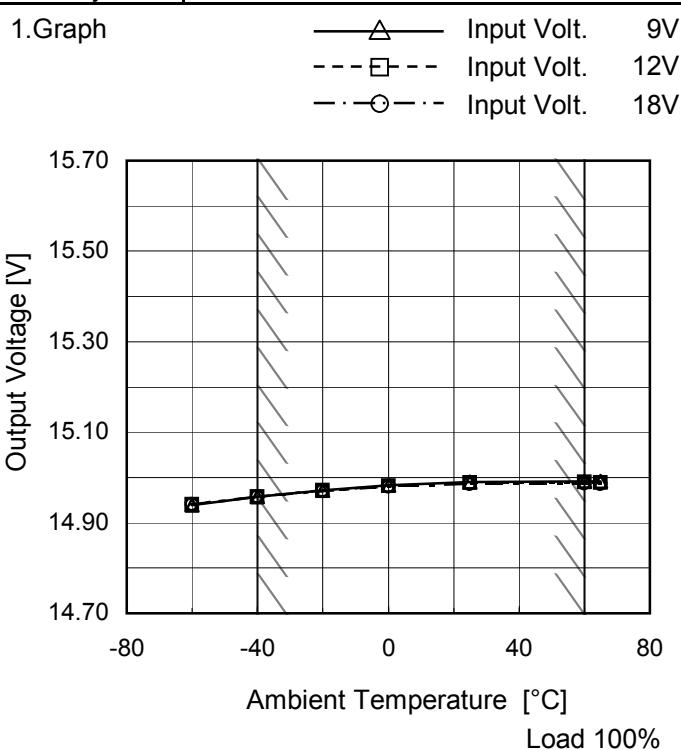
+15V: Rated output current

Measured by 100 MHz Oscilloscope.

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

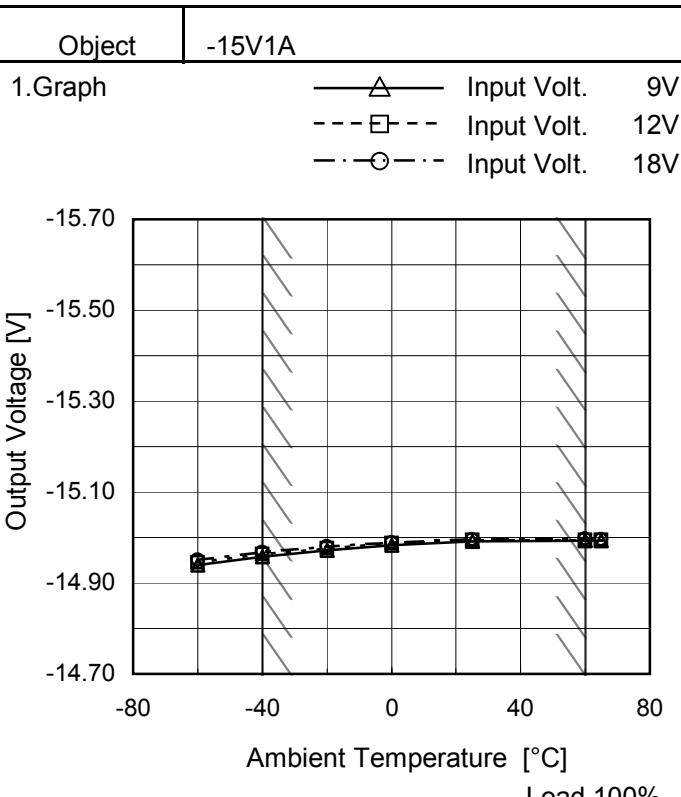
Model	MGW301215
Item	Ambient Temperature Drift
Object	+15V1A

Testing Circuitry Figure A



## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	14.940	14.941	14.941
-40	14.958	14.958	14.958
-20	14.972	14.971	14.971
0	14.983	14.981	14.980
25	14.990	14.988	14.986
60	14.991	14.989	14.987
65	14.991	14.989	14.986
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-



## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]
-60	-14.940	-14.945	-14.951
-40	-14.958	-14.963	-14.968
-20	-14.972	-14.977	-14.981
0	-14.984	-14.987	-14.989
25	-14.991	-14.994	-14.996
60	-14.993	-14.995	-14.997
65	-14.993	-14.994	-14.996
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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



Model	MGW301215	
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 - 60°C

Input Voltage : 9 - 18V

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

\* Other Output : Rated Load

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

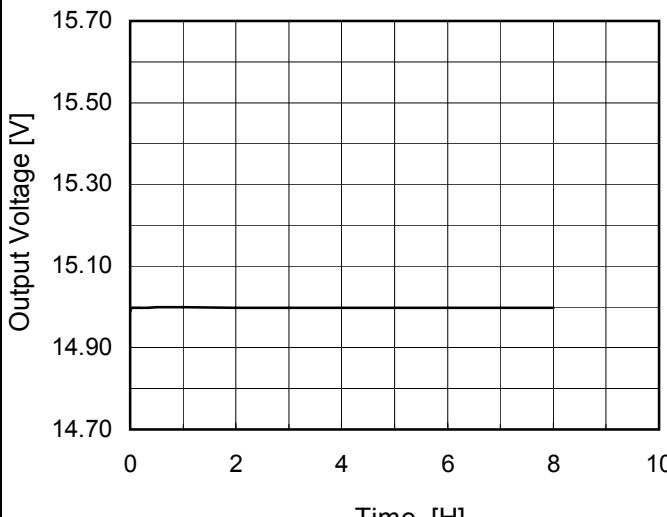
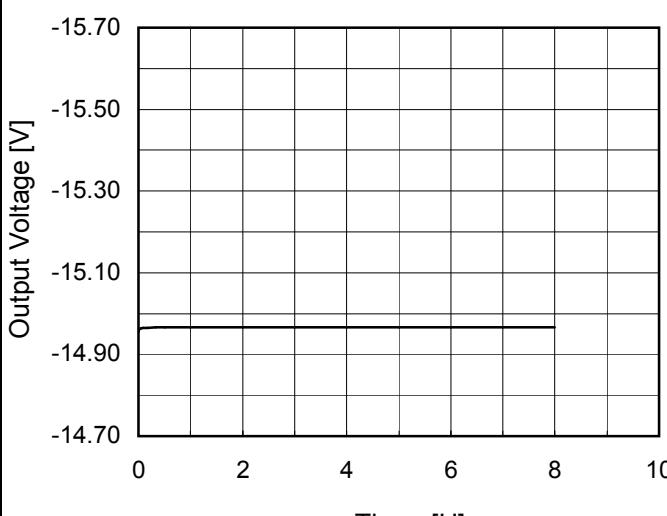
$$\text{* Output Voltage Accuracy (Ration)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

### 2. Values

Object	+15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	18		0	15.411	
Minimum Voltage	-40	18	1	14.958	±227	±1.5

Object	-15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	12	0	-15.325		
Minimum Voltage	-40	18	1	-14.958	±184	±1.2

**COSEL**

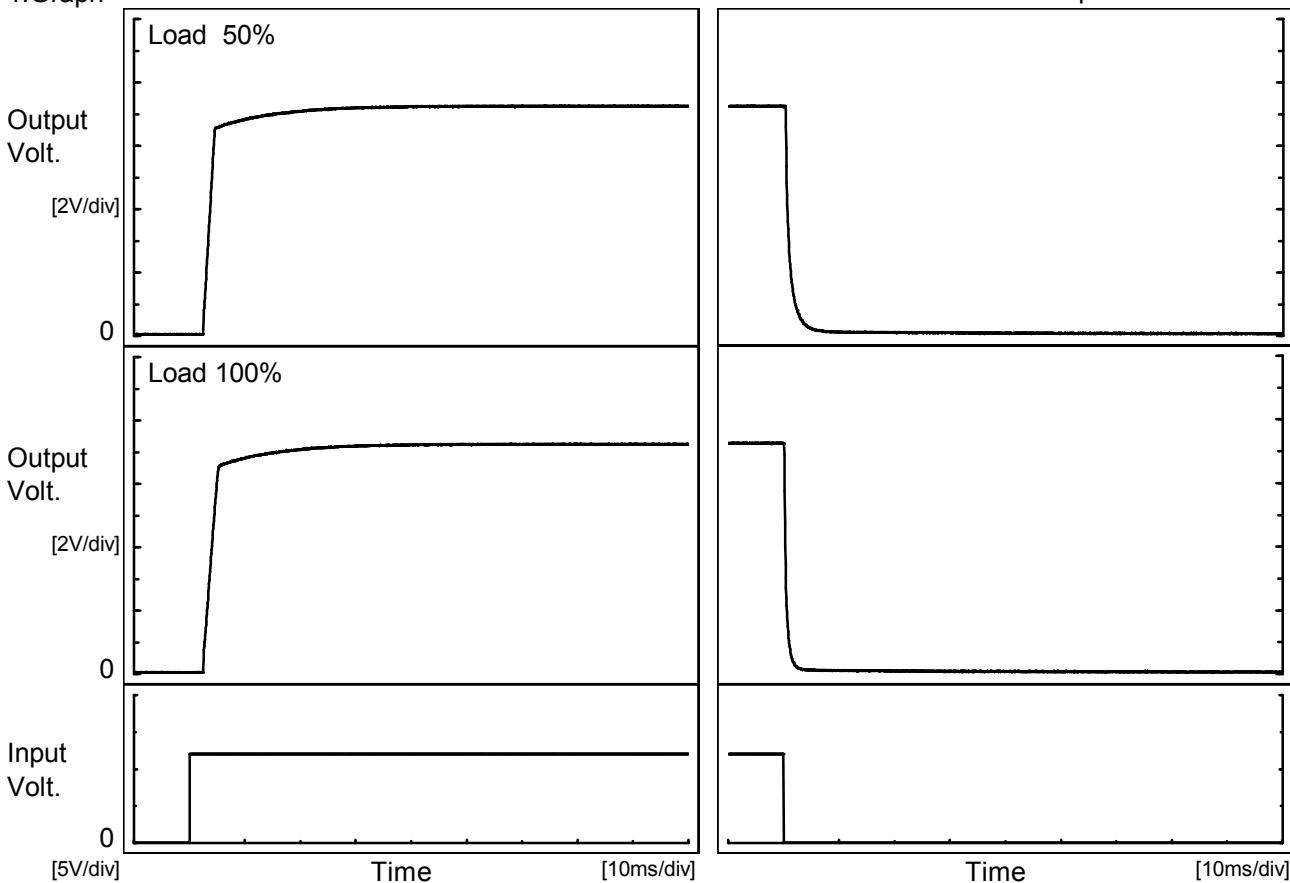
Model	MGW301215	Temperature Testing Circuitry	25°C Figure A																						
Item	Time Lapse Drift																								
Object	+15V1A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 12V</p> <p>Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>14.988</td></tr> <tr><td>0.5</td><td>14.999</td></tr> <tr><td>1.0</td><td>14.999</td></tr> <tr><td>2.0</td><td>14.999</td></tr> <tr><td>3.0</td><td>14.998</td></tr> <tr><td>4.0</td><td>14.998</td></tr> <tr><td>5.0</td><td>14.998</td></tr> <tr><td>6.0</td><td>14.998</td></tr> <tr><td>7.0</td><td>14.998</td></tr> <tr><td>8.0</td><td>14.998</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	14.988	0.5	14.999	1.0	14.999	2.0	14.999	3.0	14.998	4.0	14.998	5.0	14.998	6.0	14.998	7.0	14.998	8.0	14.998
Time since start [H]	Output Voltage [V]																								
0.0	14.988																								
0.5	14.999																								
1.0	14.999																								
2.0	14.999																								
3.0	14.998																								
4.0	14.998																								
5.0	14.998																								
6.0	14.998																								
7.0	14.998																								
8.0	14.998																								
Object			2.Values																						
1.Graph			 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 12V</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>-14.955</td></tr> <tr><td>0.5</td><td>-14.966</td></tr> <tr><td>1.0</td><td>-14.966</td></tr> <tr><td>2.0</td><td>-14.966</td></tr> <tr><td>3.0</td><td>-14.966</td></tr> <tr><td>4.0</td><td>-14.966</td></tr> <tr><td>5.0</td><td>-14.966</td></tr> <tr><td>6.0</td><td>-14.966</td></tr> <tr><td>7.0</td><td>-14.966</td></tr> <tr><td>8.0</td><td>-14.966</td></tr> </tbody> </table>			Time since start [H]	Output Voltage [V]	0.0	-14.955	0.5	-14.966	1.0	-14.966	2.0	-14.966	3.0	-14.966	4.0	-14.966	5.0	-14.966	6.0	-14.966	7.0	-14.966	8.0	-14.966	
Time since start [H]	Output Voltage [V]																								
0.0	-14.955																								
0.5	-14.966																								
1.0	-14.966																								
2.0	-14.966																								
3.0	-14.966																								
4.0	-14.966																								
5.0	-14.966																								
6.0	-14.966																								
7.0	-14.966																								
8.0	-14.966																								

**COSEL**

Model	MGW301215
Item	Rise and Fall Time
Object	+15V1A

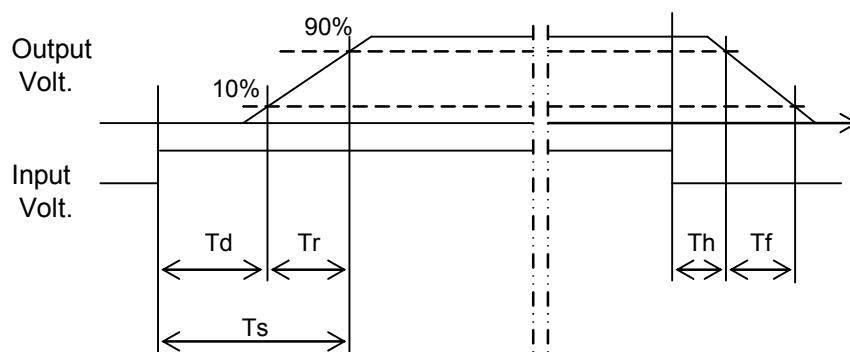
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		2.6	6.3	8.9	0.3	2.1
100 %		2.7	6.6	9.3	0.2	1.0

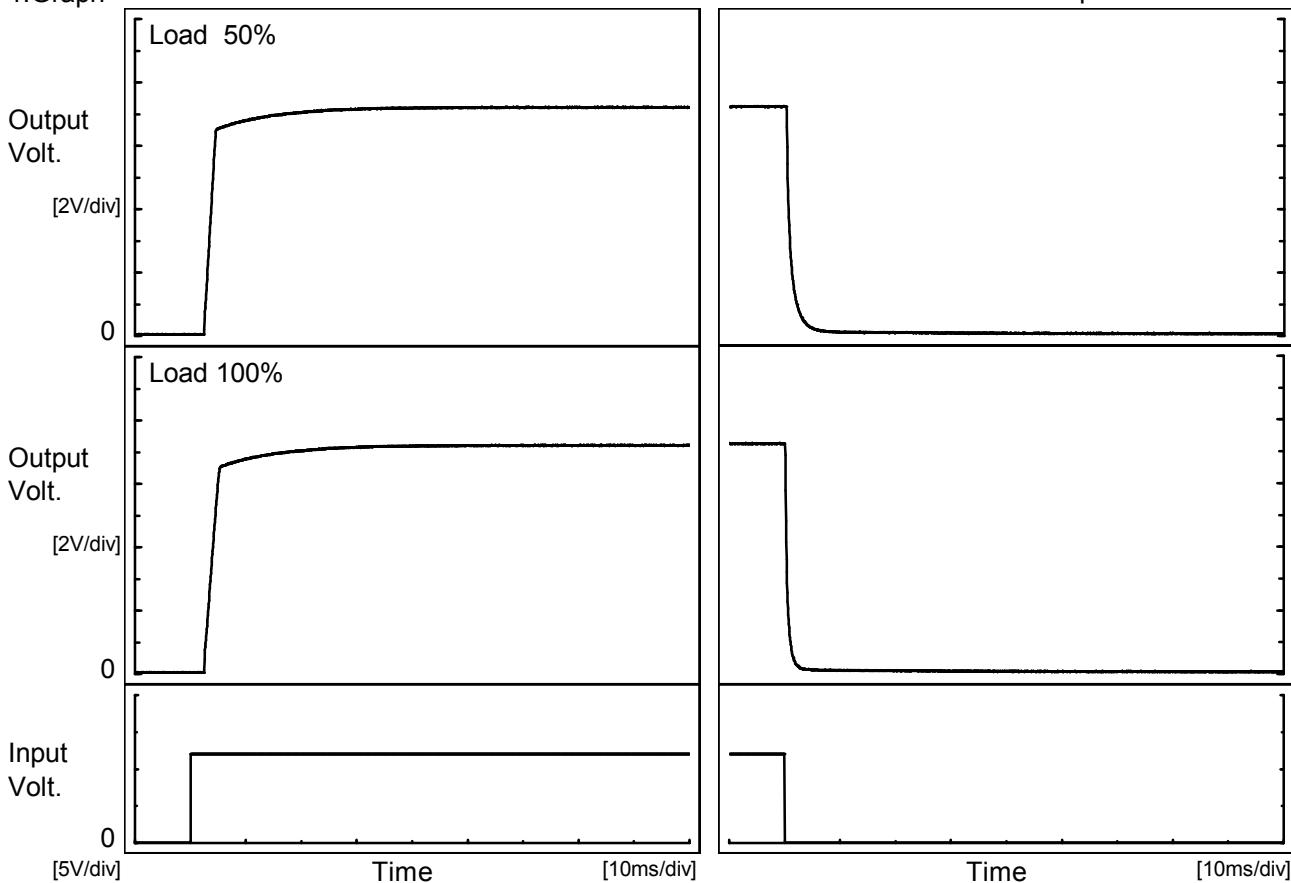


**COSEL**

Model	MGW301215
Item	Rise and Fall Time
Object	-15V1A

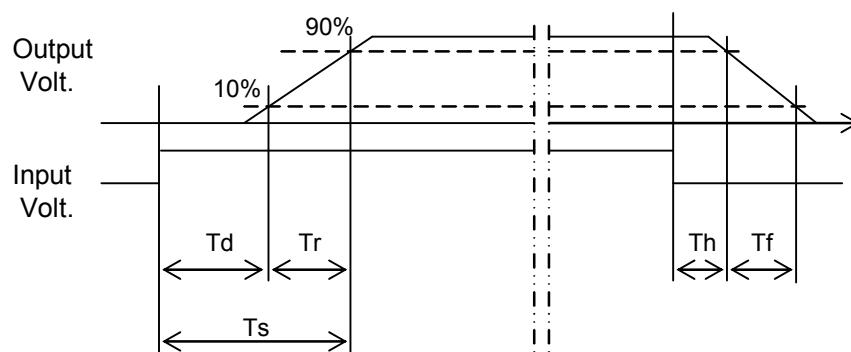
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

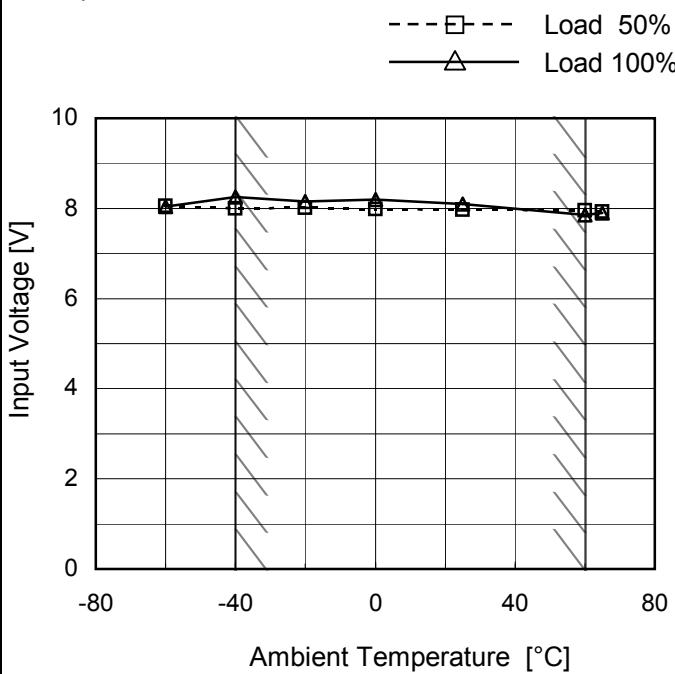
Load	Time	Td	Tr	Ts	Th	Tf
50 %		2.7	7.1	9.8	0.3	2.2
100 %		2.7	7.4	10.1	0.2	1.1



Model	MGW301215
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V1A

Testing Circuitry Figure A

## 1.Graph

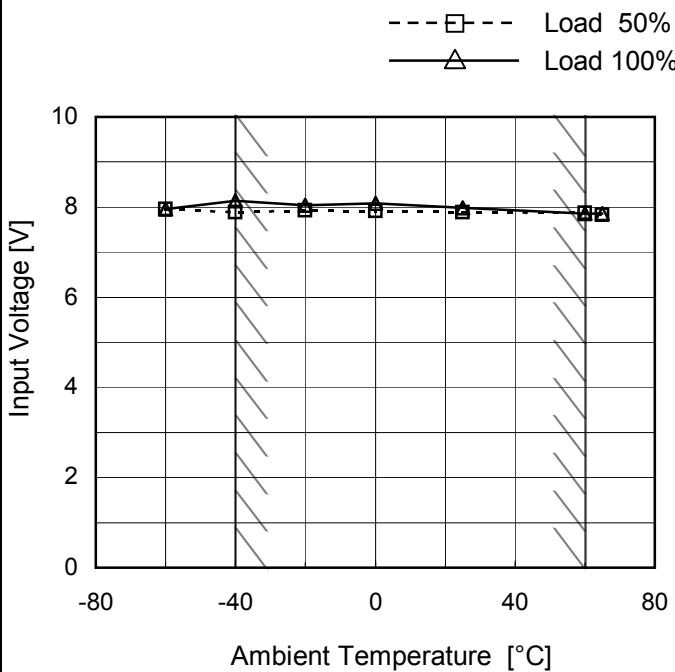


## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	8.1	8.1
-40	8.0	8.3
-20	8.1	8.2
0	8.0	8.2
25	8.0	8.1
60	8.0	7.9
65	8.0	7.9
--	-	-
--	-	-
--	-	-
--	-	-

Object	-15V1A
--------	--------

## 1.Graph



## 2.Values

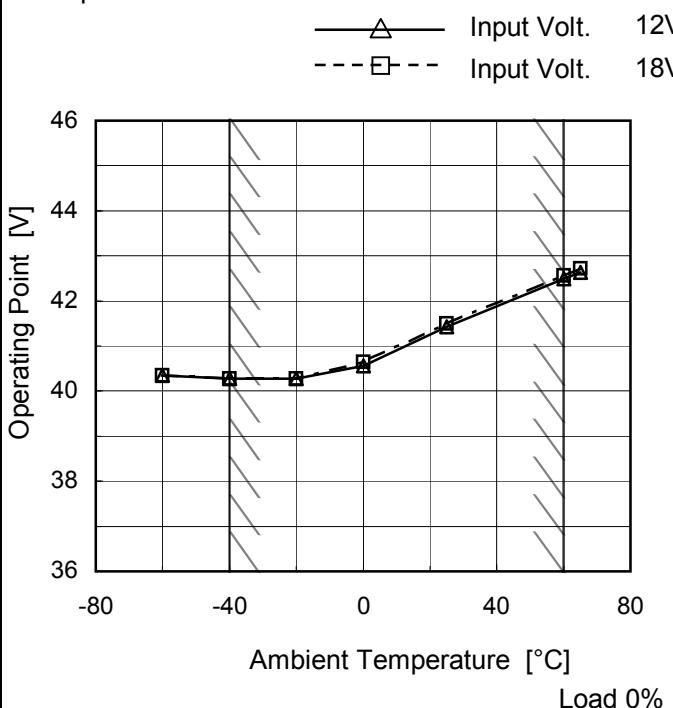
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	8.0	8.0
-40	7.9	8.2
-20	8.0	8.1
0	8.0	8.1
25	7.9	8.0
60	7.9	7.9
65	7.9	7.9
--	-	-
--	-	-
--	-	-
--	-	-

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

Model	MGW301215	Temperature Testing Circuitry      25°C Figure A																																																									
Item	Overcurrent Protection																																																										
Object	+15V1A																																																										
1.Graph	<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Input Volt. 9V</p> <p>Input Volt. 12V</p> <p>Input Volt. 18V</p>	2.Values																																																									
Object	-15V1A	2.Values																																																									
1.Graph	<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Input Volt. 9V</p> <p>Input Volt. 12V</p> <p>Input Volt. 18V</p>																																																										
Note:	Slanted line shows the range of the rated load current.	<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 9[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 18[V]</th> </tr> </thead> <tbody> <tr><td>15.00</td><td>1.63</td><td>1.80</td><td>1.58</td></tr> <tr><td>14.25</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>13.50</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>12.00</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>10.50</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>9.00</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>7.50</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>6.00</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>4.50</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>3.00</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>1.50</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>0.00</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Output Voltage [V]	Load Current [A]			Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	15.00	1.63	1.80	1.58	14.25	-	-	-	13.50	-	-	-	12.00	-	-	-	10.50	-	-	-	9.00	-	-	-	7.50	-	-	-	6.00	-	-	-	4.50	-	-	-	3.00	-	-	-	1.50	-	-	-	0.00	-	-	-
Output Voltage [V]	Load Current [A]																																																										
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]																																																								
15.00	1.63	1.80	1.58																																																								
14.25	-	-	-																																																								
13.50	-	-	-																																																								
12.00	-	-	-																																																								
10.50	-	-	-																																																								
9.00	-	-	-																																																								
7.50	-	-	-																																																								
6.00	-	-	-																																																								
4.50	-	-	-																																																								
3.00	-	-	-																																																								
1.50	-	-	-																																																								
0.00	-	-	-																																																								
Intermittent operation occurs when overcurrent protection is activated.																																																											

Model	MGW301215
Item	Oversupply Protection
Object	+30V1A

## 1. Graph



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

Measured as a single output(+30V).

## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 12[V]	Input Volt. 18[V]
-60	40.34	40.34
-40	40.27	40.27
-20	40.27	40.27
0	40.56	40.64
25	41.43	41.50
60	42.50	42.57
65	42.64	42.72
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

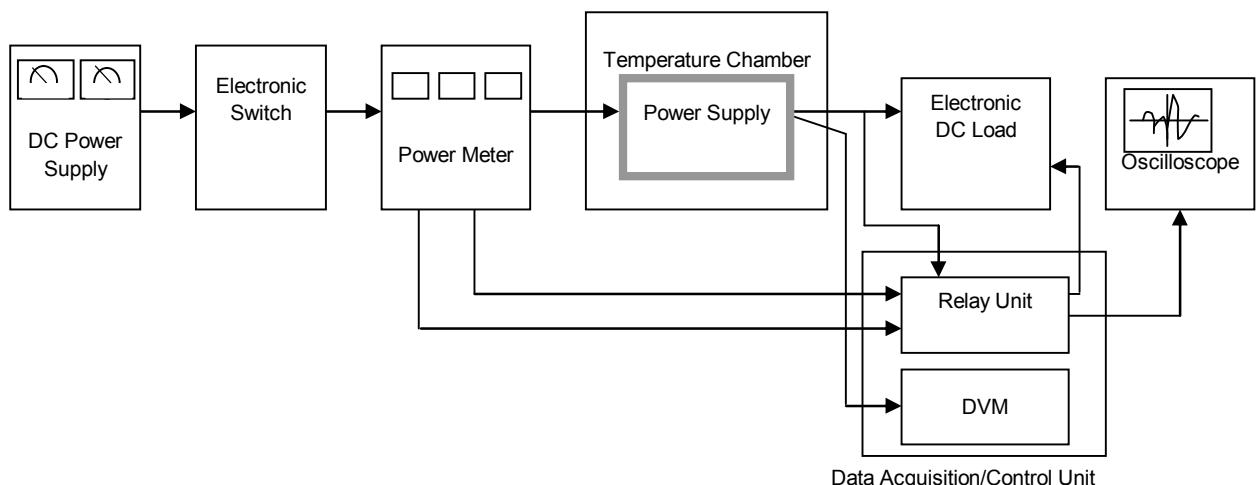


Figure A

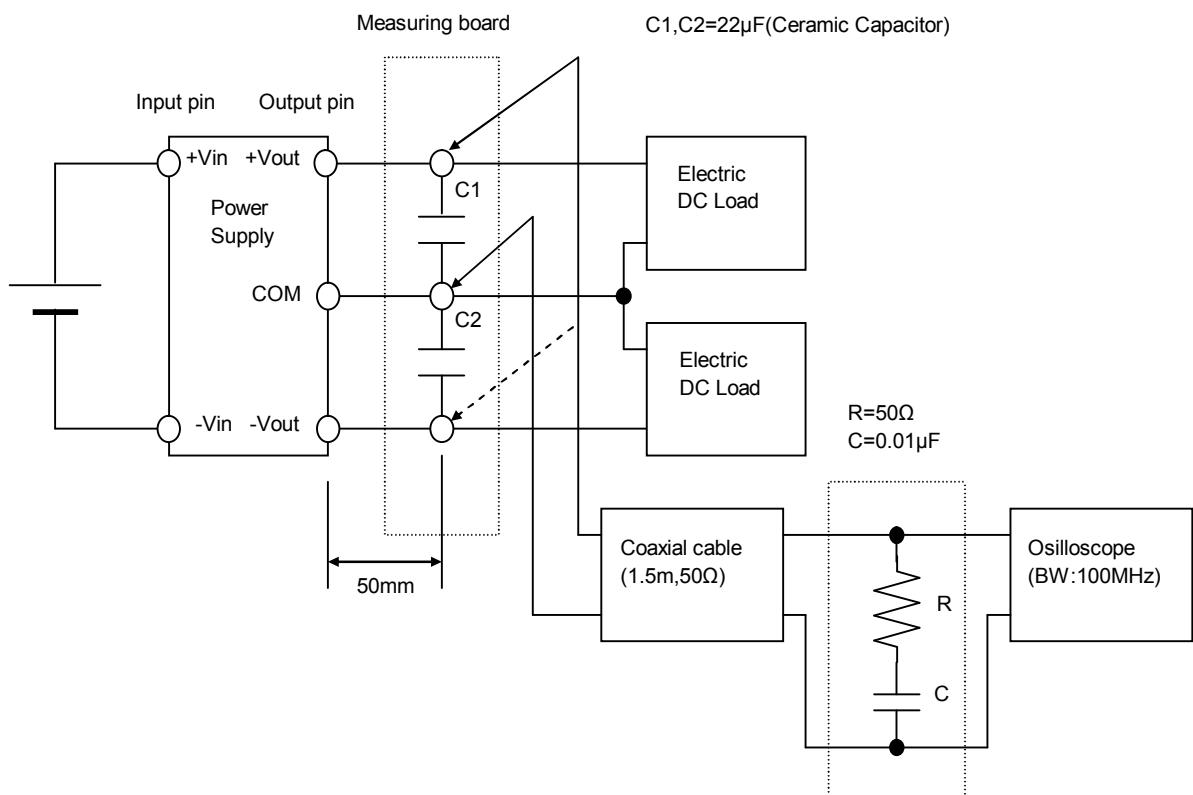


Figure B (Ripple and Ripple noise Characteristic)