

# TEST DATA OF MGW304815

Regulated DC Power Supply

November 18, 2010

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Kazunari Asano

Design Manager

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Sho Saito

Design Engineer

**COSEL CO.,LTD.**

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Model	MGW304815	Temperature Testing Circuitry      25°C Figure A																																																																																		
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1.Graph	<p style="text-align: center;"> <span style="color: black;">△</span> Load 100%  <span style="color: gray;">□</span> Load 50%  <span style="color: gray;">○</span> Load 0%     </p> <p>Input Current [A]</p> <p>Input Voltage [V]</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>	<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Load 0%</th> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>8.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>16.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>24.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>28.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>32.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>33.2</td><td>0.022</td><td>0.507</td><td>1.033</td></tr> <tr><td>34.0</td><td>0.022</td><td>0.493</td><td>1.004</td></tr> <tr><td>36.0</td><td>0.021</td><td>0.465</td><td>0.944</td></tr> <tr><td>40.0</td><td>0.020</td><td>0.419</td><td>0.846</td></tr> <tr><td>48.0</td><td>0.020</td><td>0.353</td><td>0.706</td></tr> <tr><td>60.0</td><td>0.018</td><td>0.287</td><td>0.567</td></tr> <tr><td>70.0</td><td>0.017</td><td>0.250</td><td>0.490</td></tr> <tr><td>76.0</td><td>0.017</td><td>0.232</td><td>0.454</td></tr> <tr><td>80.0</td><td>0.016</td><td>0.222</td><td>0.433</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>	Input Voltage [V]	Input Current [A]			Load 0%	Load 50%	Load 100%	0.0	0.000	0.000	0.000	8.0	0.002	0.002	0.002	16.0	0.002	0.002	0.002	24.0	0.002	0.002	0.002	28.0	0.002	0.002	0.002	32.0	0.002	0.002	0.002	33.2	0.022	0.507	1.033	34.0	0.022	0.493	1.004	36.0	0.021	0.465	0.944	40.0	0.020	0.419	0.846	48.0	0.020	0.353	0.706	60.0	0.018	0.287	0.567	70.0	0.017	0.250	0.490	76.0	0.017	0.232	0.454	80.0	0.016	0.222	0.433	--	-	-	-	--	-	-	-	--	-	-	-			
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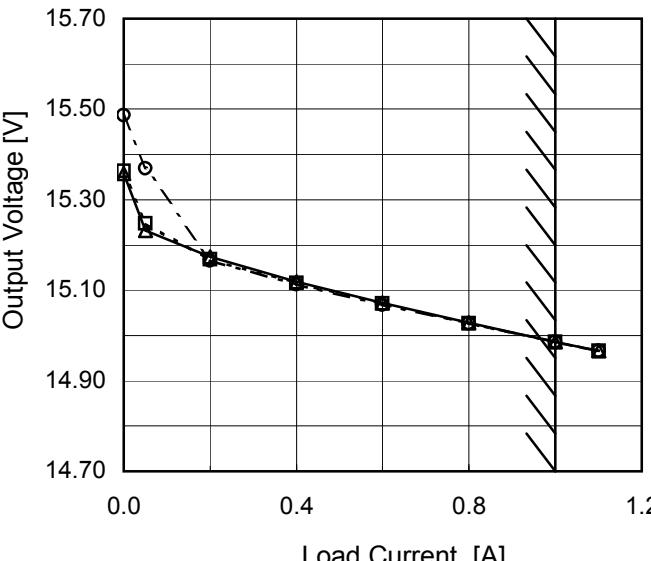
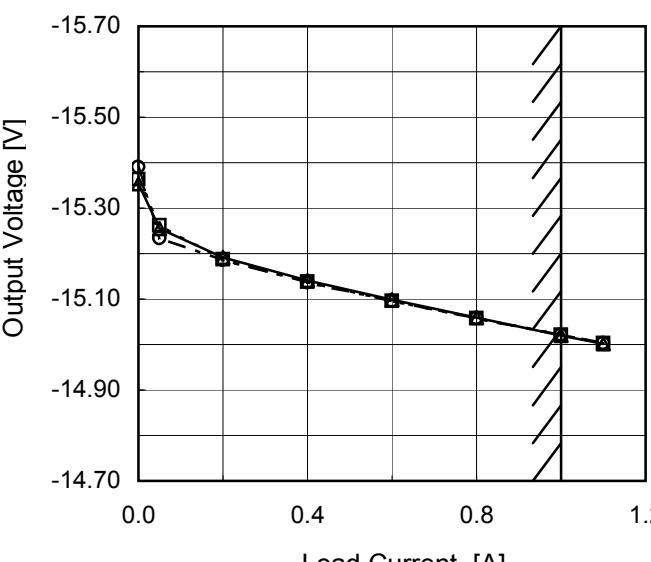
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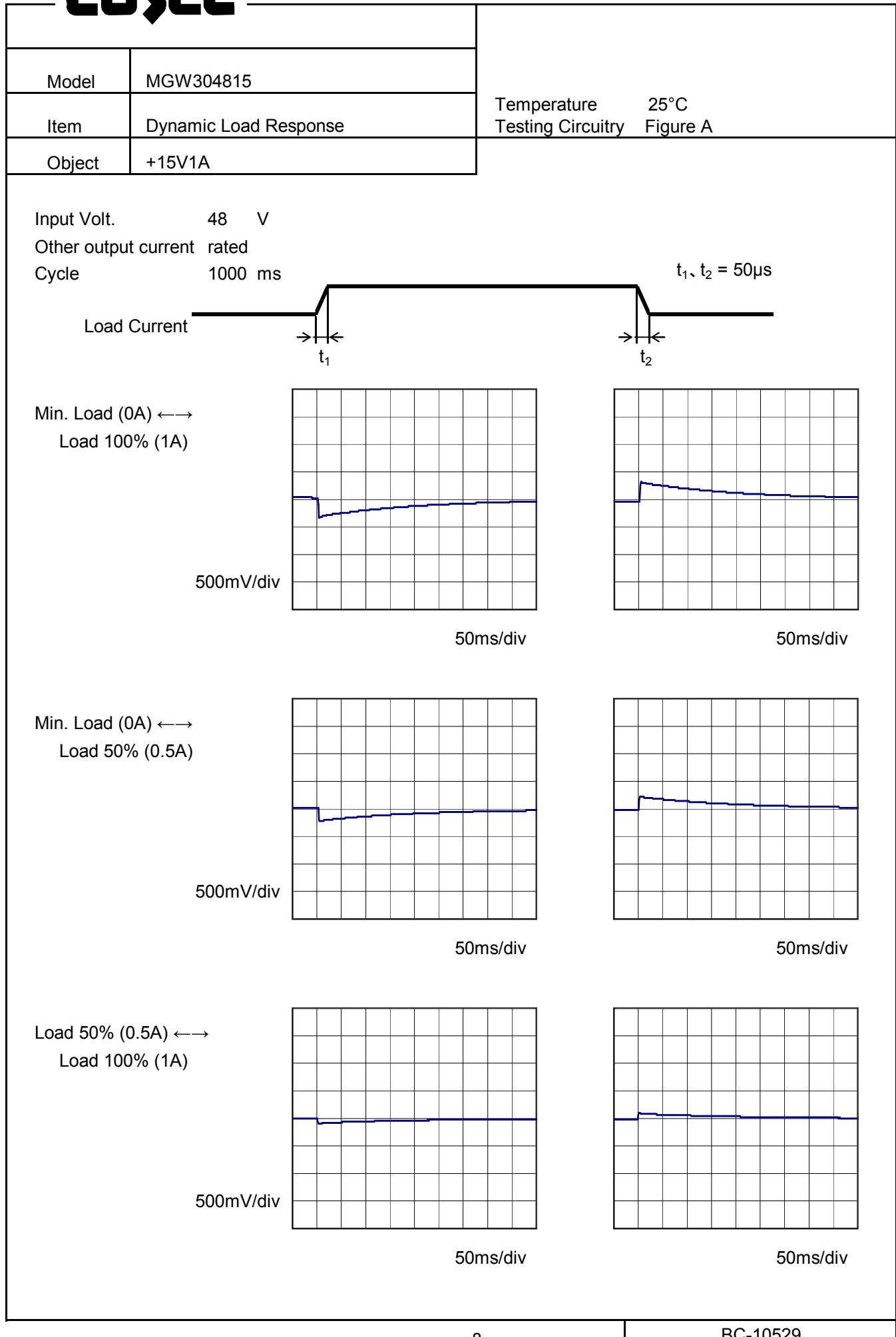
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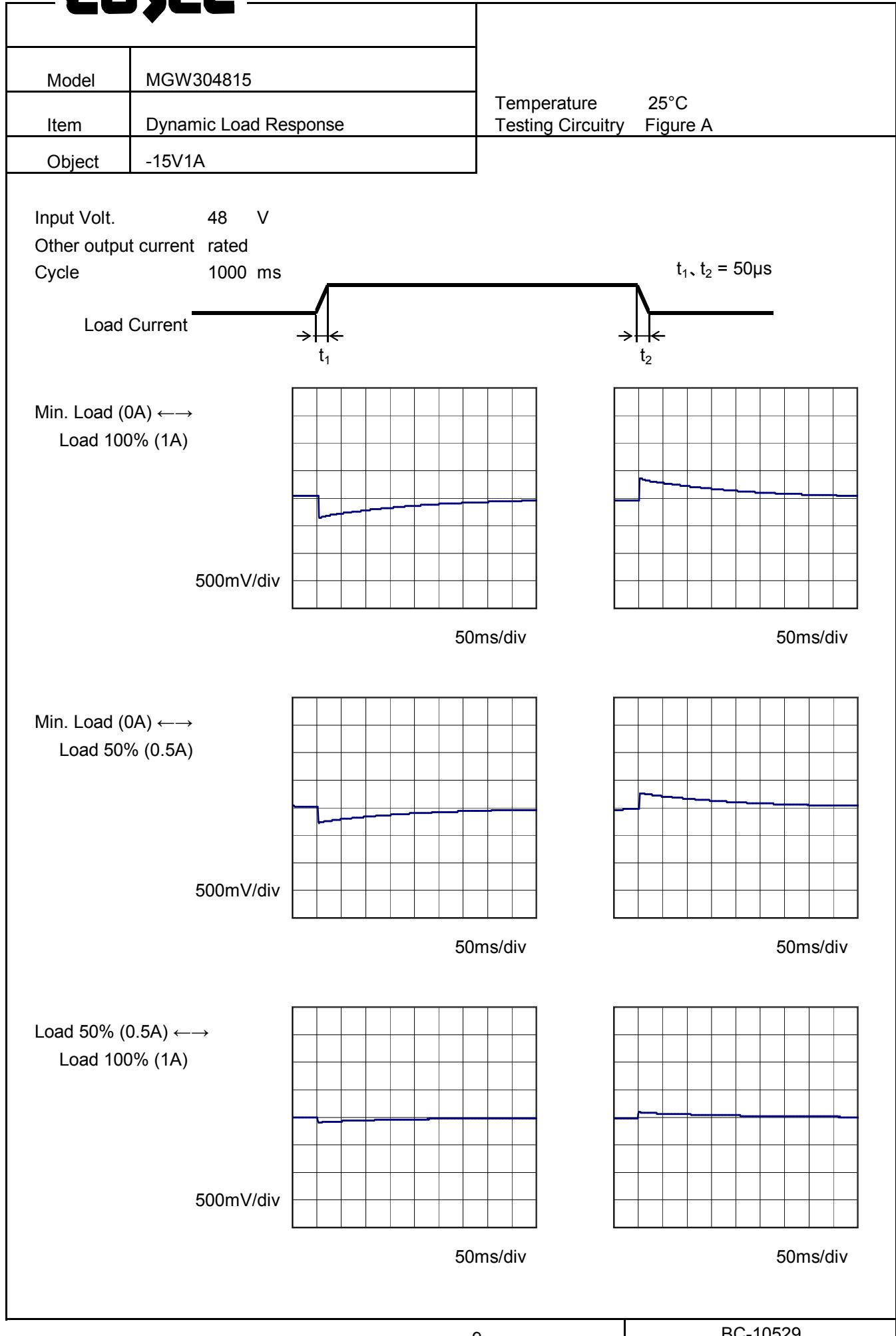
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<p>The graph plots Efficiency [%] on the y-axis (50 to 100) against Input Voltage [V] on the x-axis (20 to 80). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a slight decrease in efficiency as input voltage increases. Two vertical slanted lines indicate 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>33</td><td>88.4</td><td>88.1</td></tr> <tr><td>36</td><td>89.1</td><td>88.9</td></tr> <tr><td>40</td><td>89.1</td><td>89.3</td></tr> <tr><td>48</td><td>88.2</td><td>89.3</td></tr> <tr><td>55</td><td>87.4</td><td>89.1</td></tr> <tr><td>60</td><td>86.8</td><td>88.8</td></tr> <tr><td>70</td><td>85.4</td><td>88.2</td></tr> <tr><td>76</td><td>84.4</td><td>87.6</td></tr> <tr><td>80</td><td>83.9</td><td>87.4</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	33	88.4	88.1	36	89.1	88.9	40	89.1	89.3	48	88.2	89.3	55	87.4	89.1	60	86.8	88.8	70	85.4	88.2	76	84.4	87.6	80	83.9	87.4		
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1.Graph	<p style="text-align: center;"> <span style="display: inline-block; width: 15px; height: 10px; border-left: 2px solid black; border-bottom: 2px solid black; transform: rotate(-45deg); margin-right: 5px;"></span> Input Volt. 36V  <span style="display: inline-block; width: 15px; height: 10px; border-top: 2px solid black; border-bottom: 2px solid black; transform: rotate(45deg); margin-right: 5px;"></span> Input Volt. 76V         </p> <table border="1"> <caption>Data points estimated from Graph 1</caption> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (36V)</th> <th>Ripple Voltage [mV] (76V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>15</td><td>25</td></tr> <tr><td>0.2</td><td>20</td><td>25</td></tr> <tr><td>0.4</td><td>20</td><td>25</td></tr> <tr><td>0.6</td><td>20</td><td>25</td></tr> <tr><td>0.8</td><td>15</td><td>20</td></tr> <tr><td>1.0</td><td>15</td><td>20</td></tr> <tr><td>1.1</td><td>15</td><td>20</td></tr> </tbody> </table>	Load Current [A]	Ripple Voltage [mV] (36V)	Ripple Voltage [mV] (76V)	0.0	15	25	0.2	20	25	0.4	20	25	0.6	20	25	0.8	15	20	1.0	15	20	1.1	15	20	2.Values														
Load Current [A]	Ripple Voltage [mV] (36V)	Ripple Voltage [mV] (76V)																																						
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Load Current [A]	Ripple-Noise [mV]																																							
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--	-	-																																						
		+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>Fig.Complex Ripple Noise Wave Form</p>																																								

**COSEL**

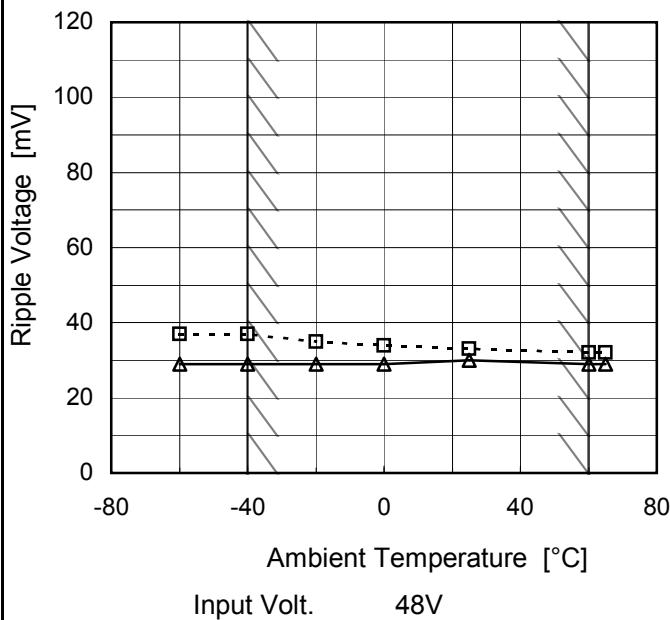
Model MGW304815

Item Ripple Voltage (by Ambient Temp.)

Object +15V1A

## 1.Graph

--- □ --- Load 50%  
 —△— Load 100%



Input Volt. 48V

Testing Circuitry Figure A

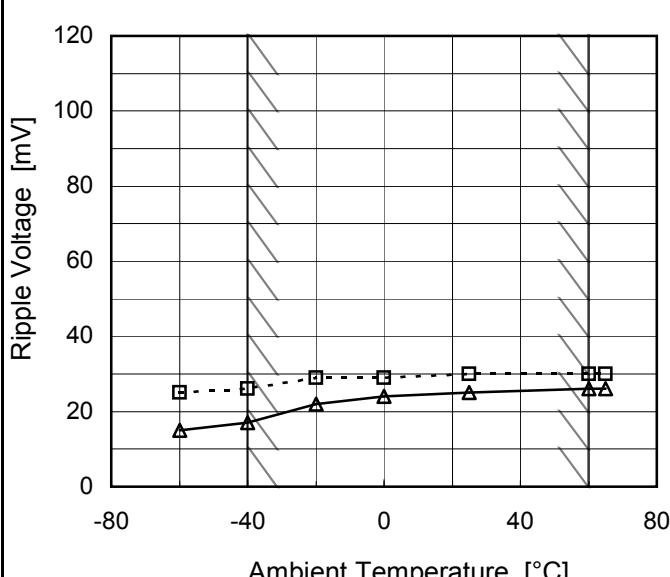
## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	37	29
-40	37	29
-20	35	29
0	34	29
25	33	30
60	32	29
65	32	29
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated output current

## 1.Graph

--- □ --- Load 50%  
 —△— Load 100%



Input Volt. 48V

## 2.Values

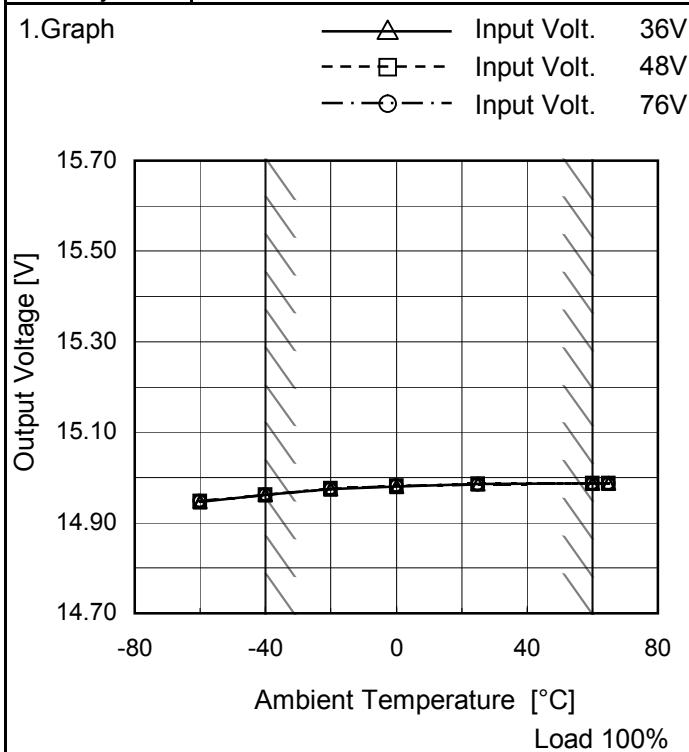
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	25	15
-40	26	17
-20	29	22
0	29	24
25	30	25
60	30	26
65	30	26
--	-	-
--	-	-
--	-	-
--	-	-

+15V: Rated output current

Measured by 100 MHz Oscilloscope.

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

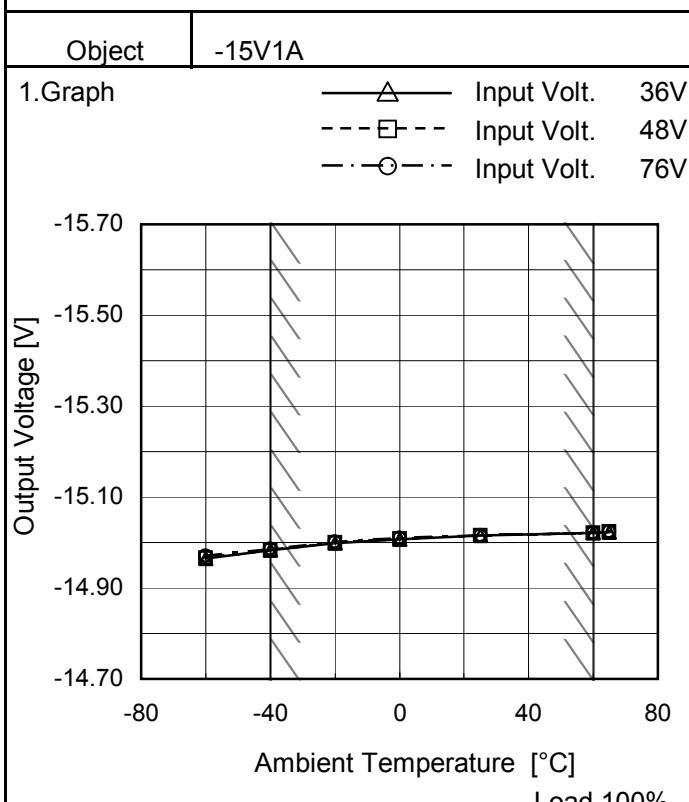
Model	MGW304815
Item	Ambient Temperature Drift
Object	+15V1A



Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-60	14.946	14.948	14.947
-40	14.961	14.962	14.962
-20	14.974	14.976	14.975
0	14.980	14.981	14.982
25	14.985	14.985	14.985
60	14.987	14.987	14.986
65	14.987	14.987	14.986
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-



## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-60	-14.965	-14.967	-14.970
-40	-14.984	-14.984	-14.986
-20	-14.999	-15.000	-15.002
0	-15.008	-15.009	-15.009
25	-15.015	-15.015	-15.015
60	-15.021	-15.022	-15.022
65	-15.023	-15.023	-15.024
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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



Model	MGW304815	
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 : 36 - 76V

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

\* Other Output : Rated Load

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

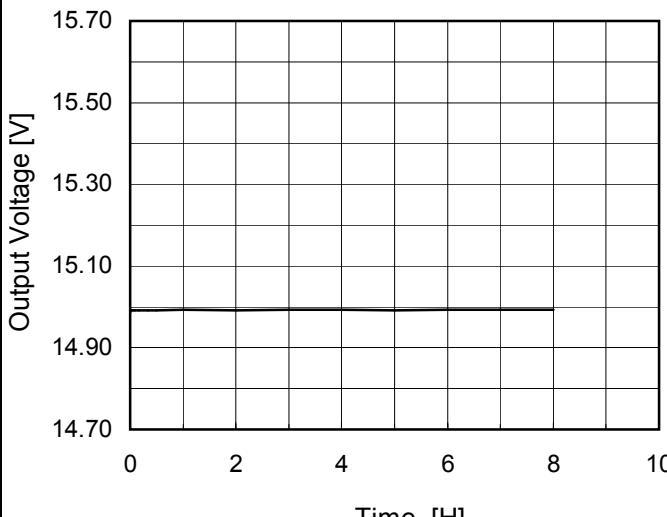
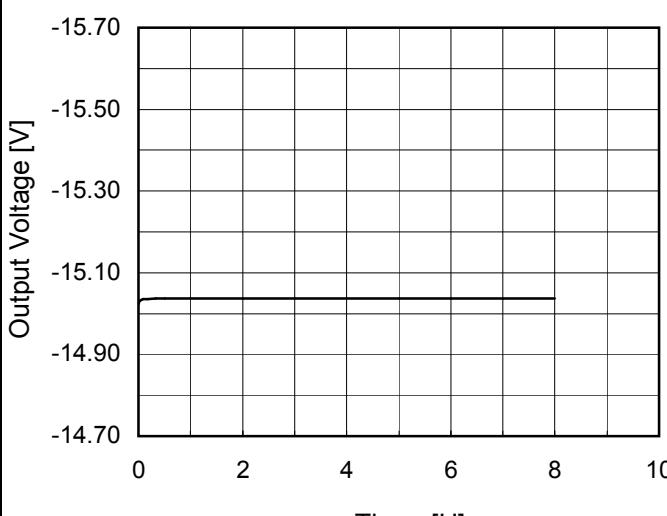
$$\text{* Output Voltage Accuracy (Ration)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

### 2. Values

Object	+15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	0	76		0	15.592	
Minimum Voltage	-40	36		1	14.961	±316 ±2.1

Object	-15V1A		Output		Output Voltage Accuracy	
Item	Temperature [°C]	Input Voltage[V]	Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	76		0	-15.386	
Minimum Voltage	-40	36		1	-14.984	±201 ±1.3

**COSEL**

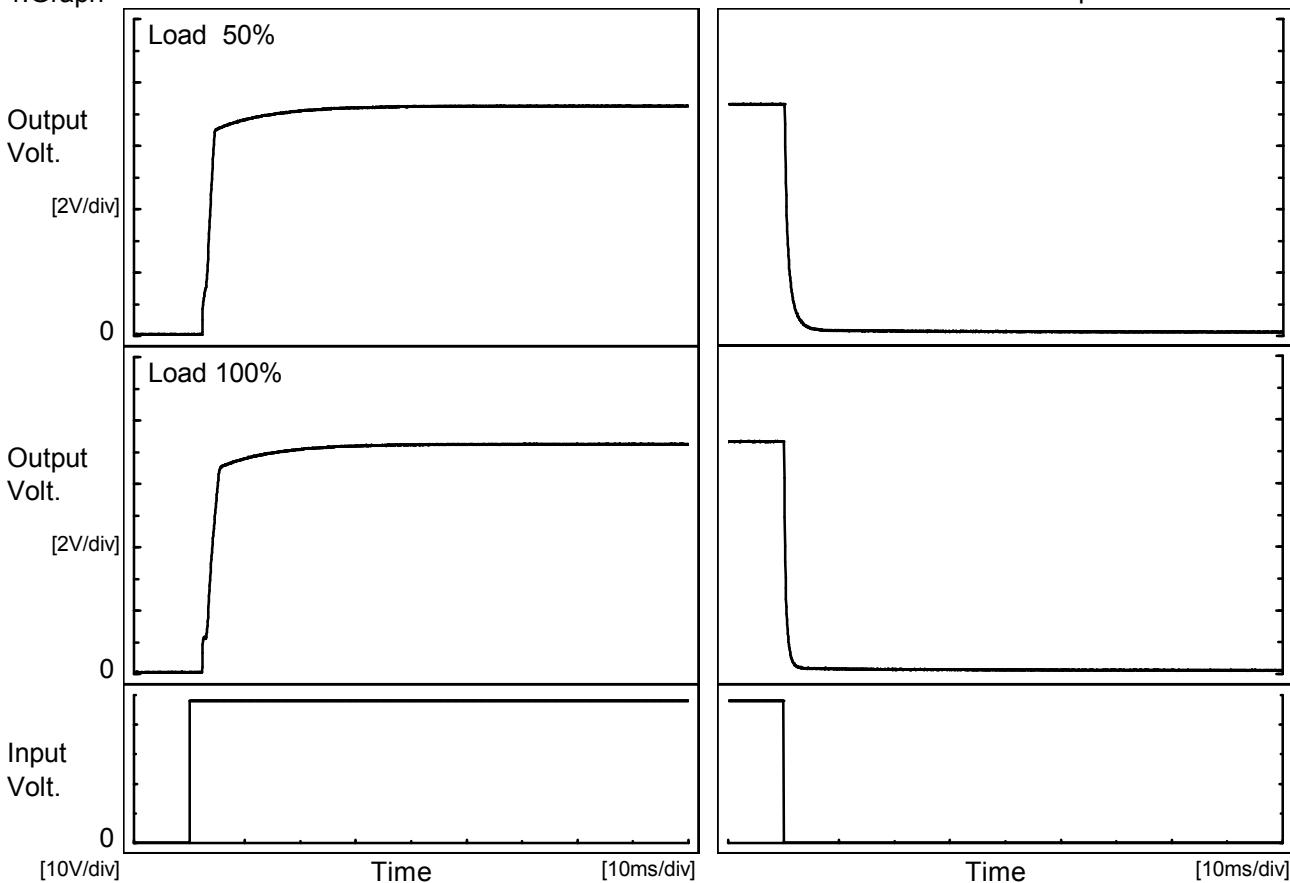
Model	MGW304815	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V1A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>14.986</td></tr> <tr><td>0.5</td><td>14.992</td></tr> <tr><td>1.0</td><td>14.992</td></tr> <tr><td>2.0</td><td>14.992</td></tr> <tr><td>3.0</td><td>14.992</td></tr> <tr><td>4.0</td><td>14.992</td></tr> <tr><td>5.0</td><td>14.992</td></tr> <tr><td>6.0</td><td>14.993</td></tr> <tr><td>7.0</td><td>14.992</td></tr> <tr><td>8.0</td><td>14.993</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	14.986	0.5	14.992	1.0	14.992	2.0	14.992	3.0	14.992	4.0	14.992	5.0	14.992	6.0	14.993	7.0	14.992	8.0	14.993
Time since start [H]	Output Voltage [V]																								
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7.0	-15.037																								
8.0	-15.037																								

**COSEL**

Model	MGW304815
Item	Rise and Fall Time
Object	+15V1A

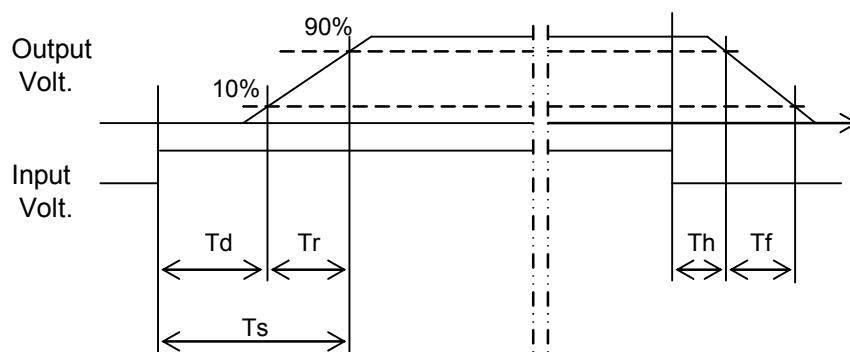
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		2.4	6.8	9.2	0.1	1.9
100 %		2.4	7.3	9.7	0.1	0.9

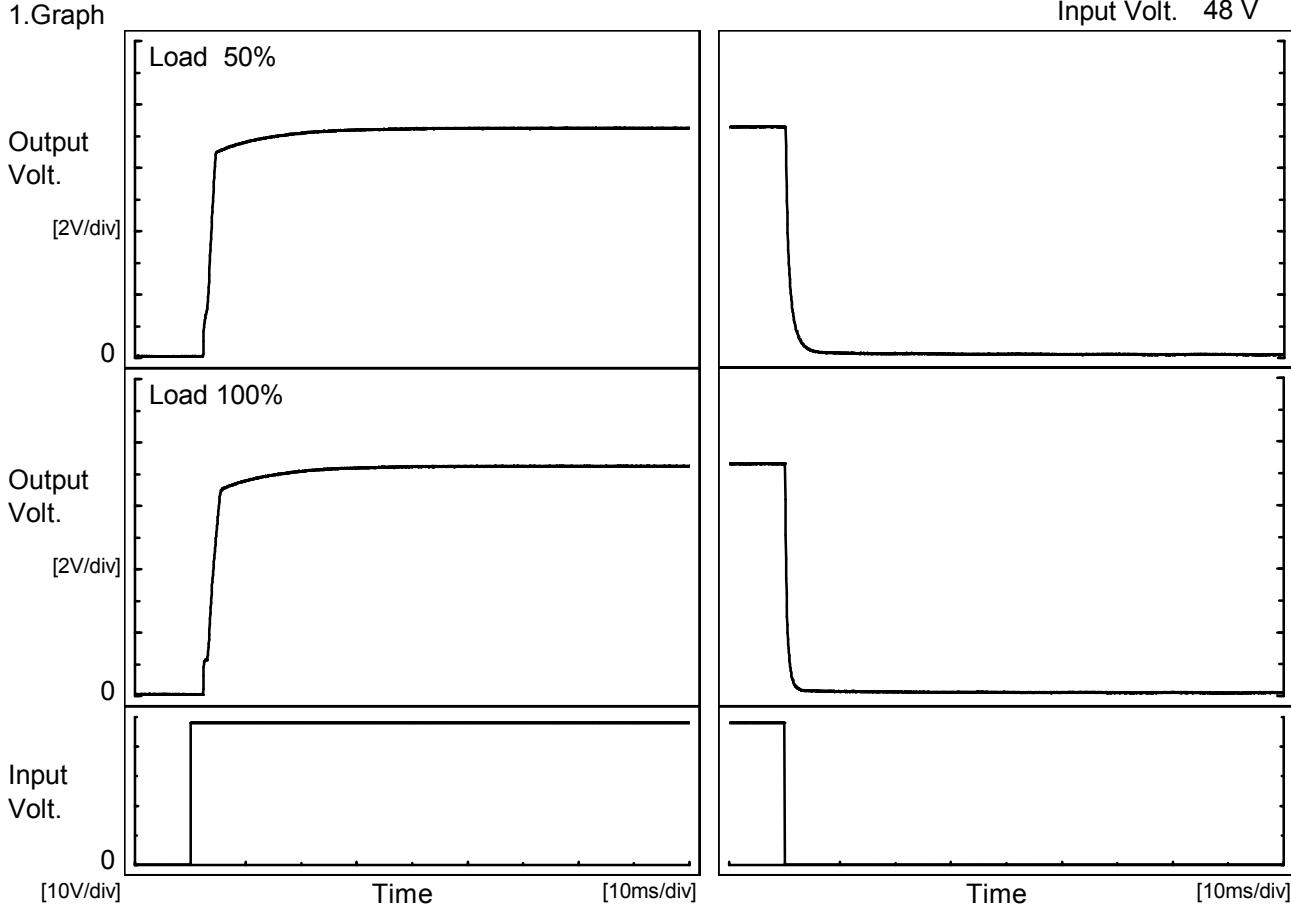


**COSEL**

Model	MGW304815
Item	Rise and Fall Time
Object	-15V1A

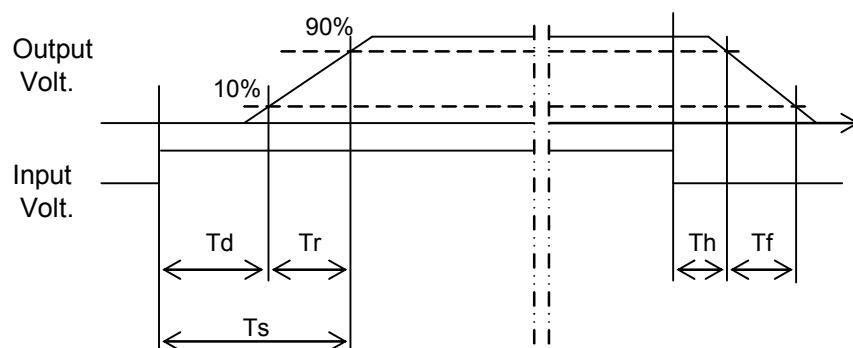
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

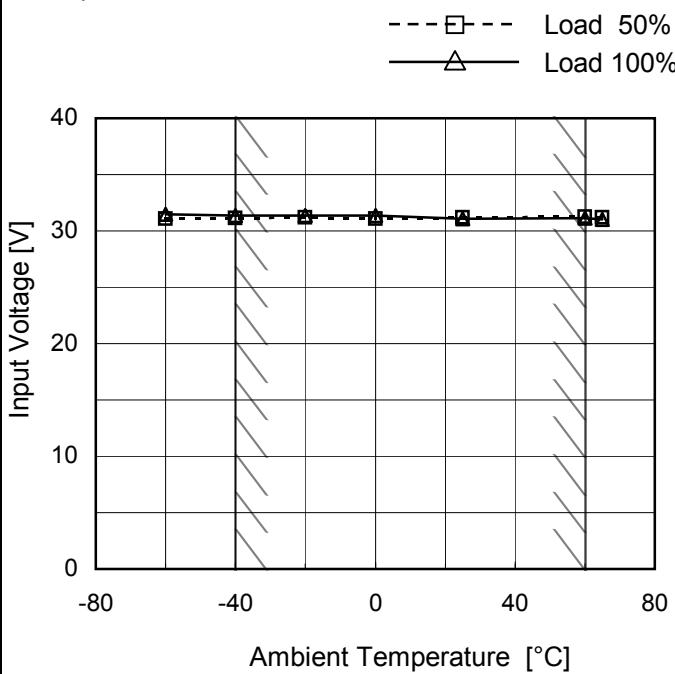
Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		2.4	7.2	9.6	0.1	2.0	
100 %		2.4	7.5	9.9	0.1	0.9	



Model	MGW304815
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V1A

## Testing Circuitry Figure A

## 1.Graph

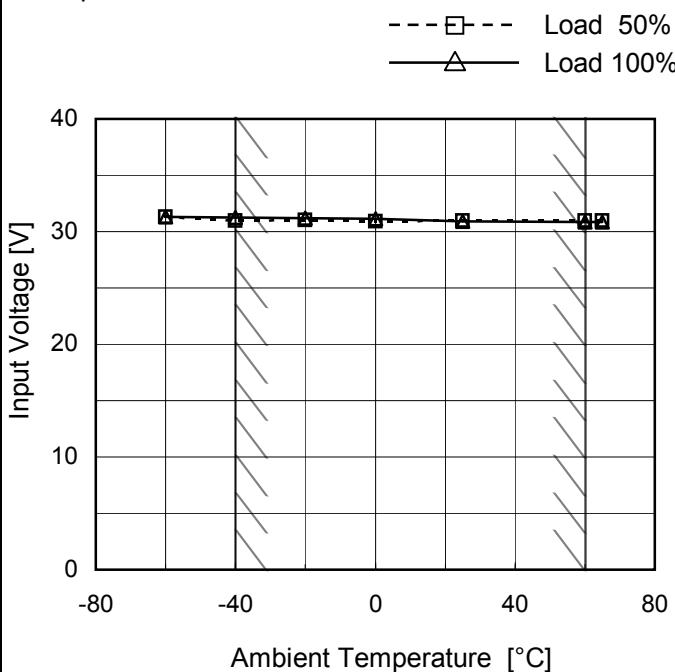


## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	31.1	31.5
-40	31.2	31.4
-20	31.3	31.4
0	31.1	31.4
25	31.2	31.1
60	31.3	31.2
65	31.2	31.1
--	-	-
--	-	-
--	-	-
--	-	-

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

## 1.Graph



## 2.Values

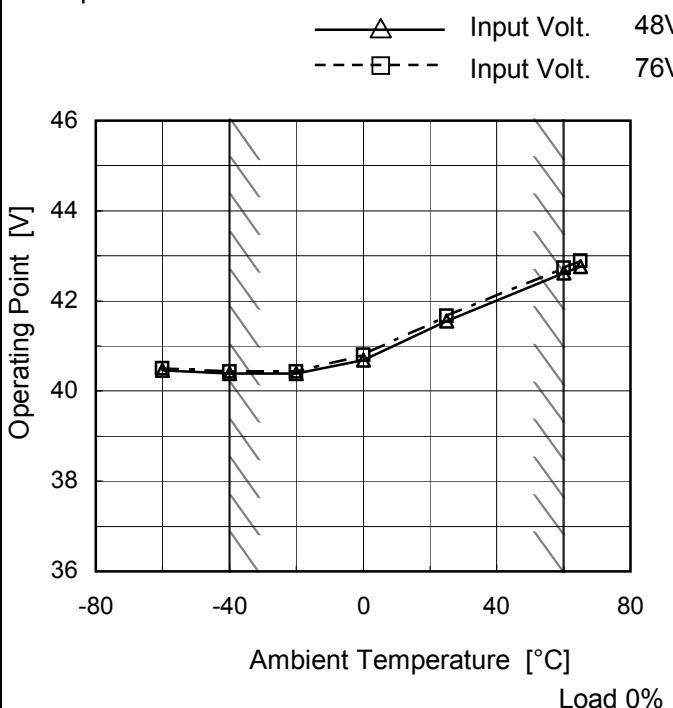
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	31.3	31.4
-40	31.0	31.3
-20	31.1	31.2
0	31.0	31.2
25	31.0	30.9
60	31.0	30.9
65	31.0	30.9
--	-	-
--	-	-
--	-	-
--	-	-

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

Model	MGW304815	Temperature	25°C																																																							
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																							
Object	+15V1A																																																									
1.Graph		2.Values																																																								
<p>Output Voltage [V]</p>		<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr> <tr> <th>Input Volt. 36[V]</th><th>Input Volt. 48[V]</th><th>Input Volt. 76[V]</th></tr> </thead> <tbody> <tr><td>15.00</td><td>1.52</td><td>1.66</td><td>1.57</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. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	15.00	1.52	1.66	1.57	14.25	-	-	-	13.50	-	-	-	12.00	-	-	-	10.50	-	-	-	9.00	-	-	-	7.50	-	-	-	6.00	-	-	-	4.50	-	-	-	3.00	-	-	-	1.50	-	-	-	0.00	-	-	-
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-3.00	-	-	-																																																							
-1.50	-	-	-																																																							
0.00	-	-	-																																																							
<p>Output Voltage [V]</p>																																																										
<p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when overcurrent protection is activated.</p>																																																										

Model	MGW304815
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. 48[V]	Input Volt. 76[V]
-60	40.46	40.50
-40	40.39	40.43
-20	40.39	40.43
0	40.68	40.80
25	41.55	41.66
60	42.62	42.74
65	42.77	42.89
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

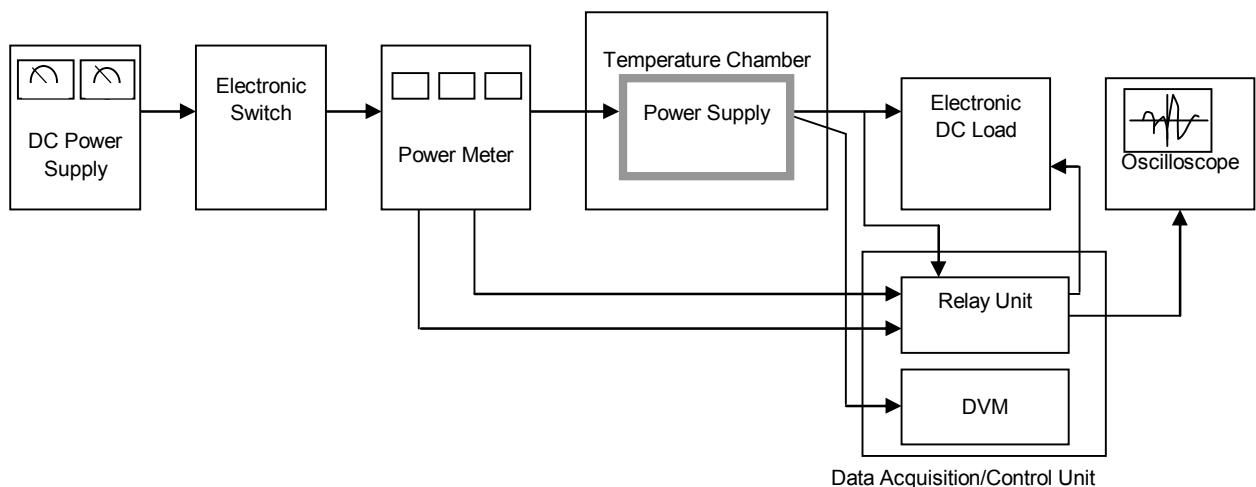


Figure A

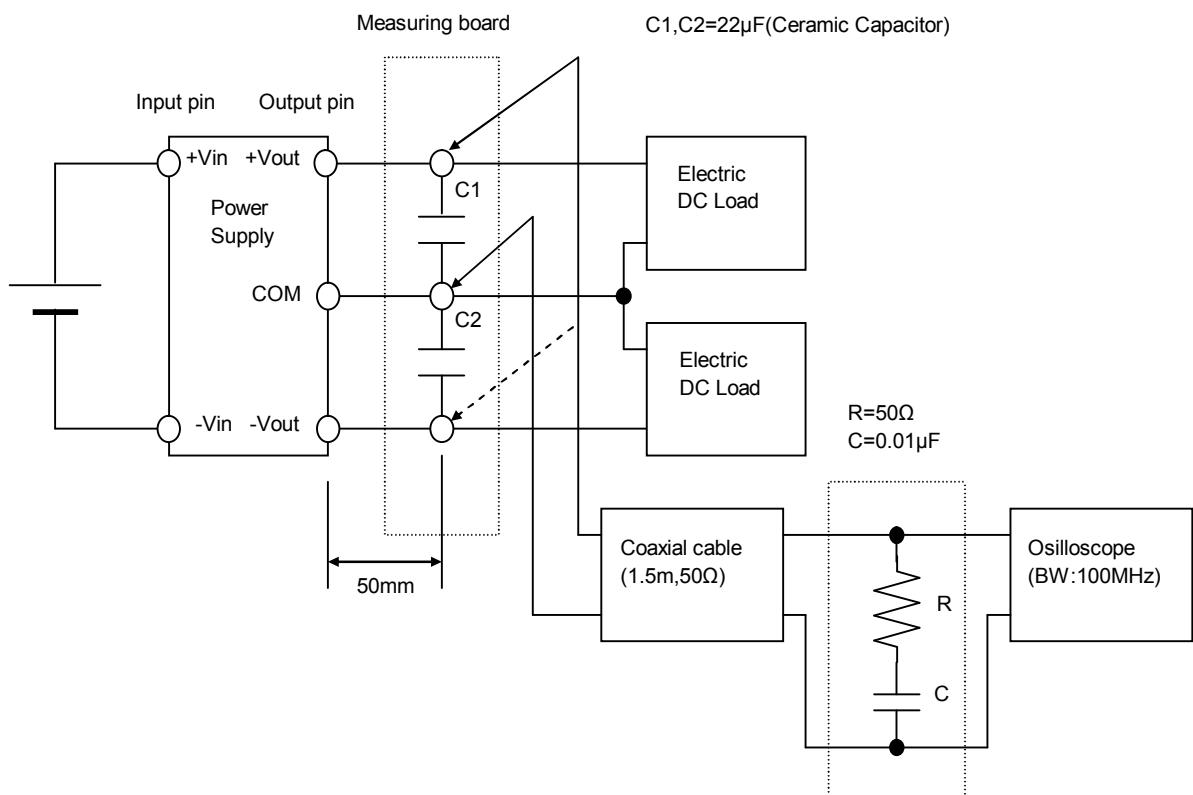


Figure B (Ripple and Ripple noise Characteristic)