

TEST DATA OF MGXS62415

Regulated DC Power Supply

February 19, 2018

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Masumi Kitamura Masumi Kitamura Design Engineer

COSEL CO.,LTD.



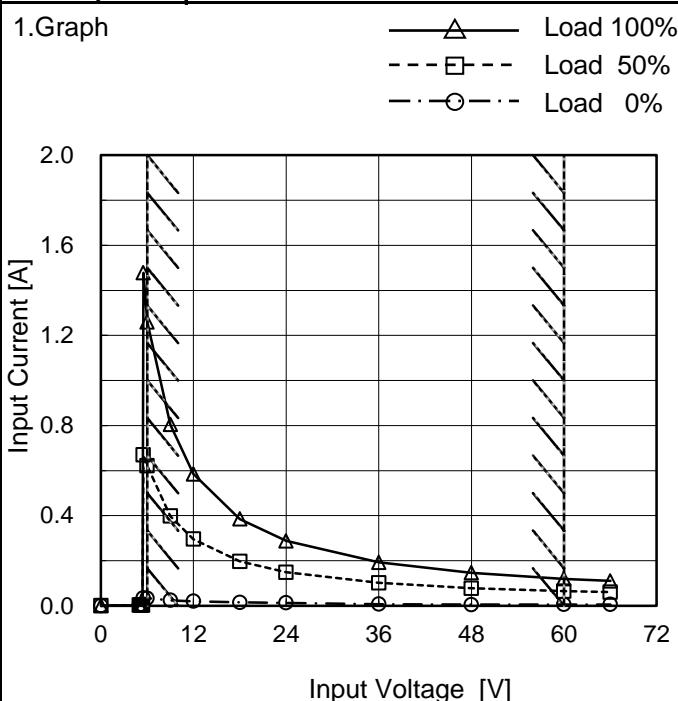
CONTENTS

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)	9
10.Ripple-Noise	10
11.Ripple Voltage (by Ambient Temperature)	11
12.Ambient Temperature Drift	12
13.Output Voltage Accuracy	13
14.Time Lapse Drift	14
15.Rise and Fall Time	15
16.Minimum Input Voltage for Regulated Output Voltage	16
17.Overcurrent Protection	17
18.Switching frequency (by Load Current)	18
19.Figure of Testing Circuitry	19

(Final Page 19)

COSEL

Model	MGXS62415
Item	Input Current (by Input Voltage)
Object	_____



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

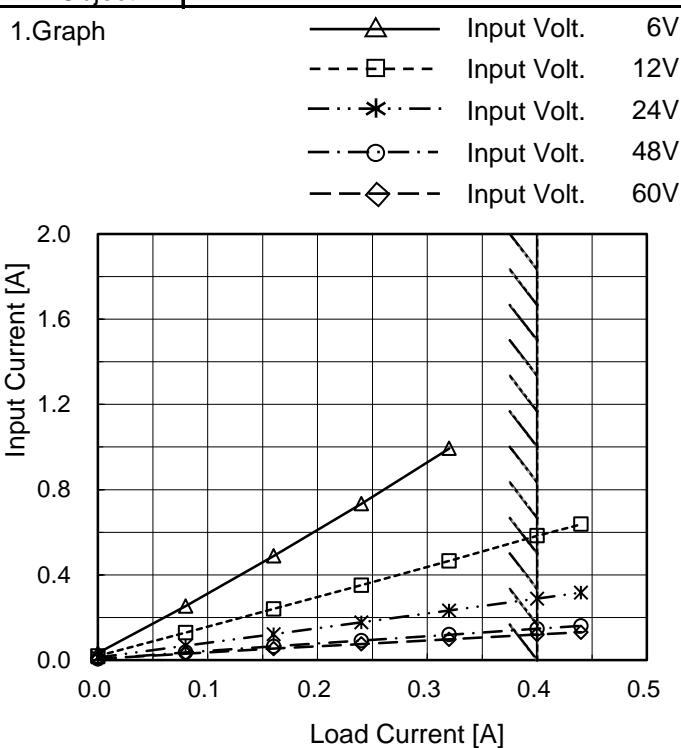
Temperature 25°C
Testing Circuitry Figure A

2.Values

Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0.0	0.000	0.000	0.000
5.0	0.003	0.003	0.003
5.2	0.003	0.003	0.003
5.4	0.003	0.003	0.003
5.5	0.035	0.670	1.478
6.0	0.034	0.621	1.260
9.0	0.025	0.398	0.805
12.0	0.020	0.296	0.585
18.0	0.015	0.197	0.385
24.0	0.013	0.149	0.288
36.0	0.007	0.102	0.193
48.0	0.005	0.078	0.147
60.0	0.006	0.065	0.120
66.0	0.006	0.060	0.110
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	MGXS62415
Item	Input Current (by Load Current)
Object	_____



Note: Slanted line shows the range of the rated load current.

Temperature 25°C
Testing Circuitry Figure A

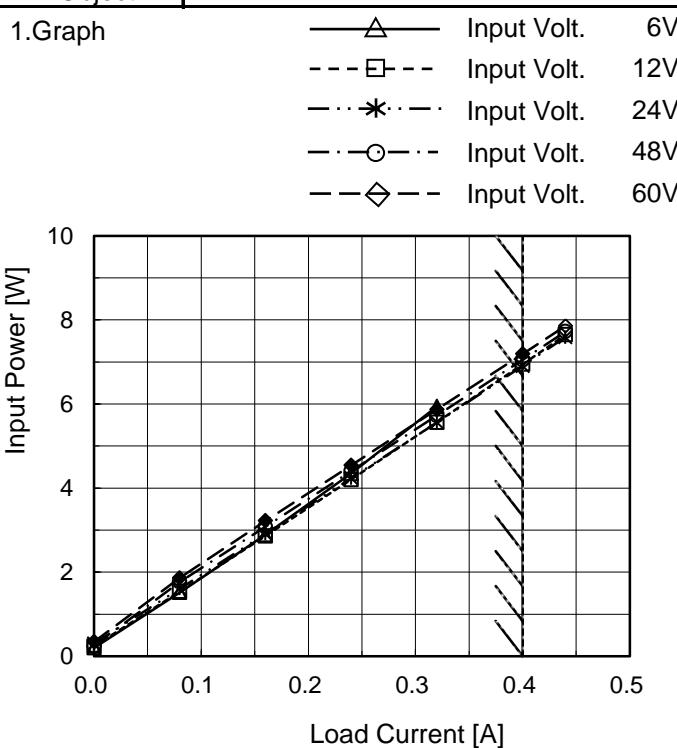
2.Values

Load Current [A]	Input Current [A]				
	6[V]	12[V]	24[V]	48[V]	60[V]
0.00	0.033	0.020	0.013	0.005	0.006
0.08	0.254	0.129	0.067	0.037	0.031
0.16	0.489	0.240	0.122	0.064	0.054
0.24	0.733	0.351	0.177	0.092	0.076
0.32	0.994	0.466	0.233	0.119	0.098
0.40	-※	0.583	0.288	0.147	0.120
0.44	-※	0.638	0.317	0.161	0.131
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

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

COSEL

Model	MGXS62415
Item	Input Power (by Load Current)
Object	_____



Note: Slanted line shows the range of the rated load current.

Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Input Power [W]				
	6[V]	12[V]	24[V]	48[V]	60[V]
0.00	0.20	0.24	0.30	0.25	0.34
0.08	1.52	1.54	1.61	1.77	1.86
0.16	2.89	2.86	2.91	3.08	3.22
0.24	4.34	4.20	4.23	4.40	4.54
0.32	5.94	5.56	5.56	5.72	5.87
0.40	-※	6.94	6.90	7.05	7.19
0.44	-※	7.65	7.59	7.72	7.86
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

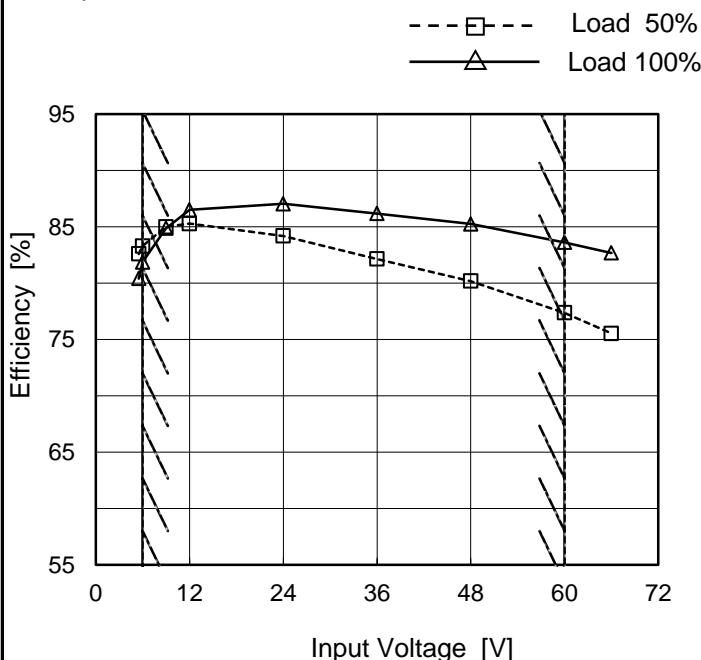
※ Maximum output current at minimum input Voltage is 70% of rated load current.
Refer to instruction manuals for details of input derating.

COSEL

Model	MGXS62415
Item	Efficiency (by Input Voltage)
Object	_____

 Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

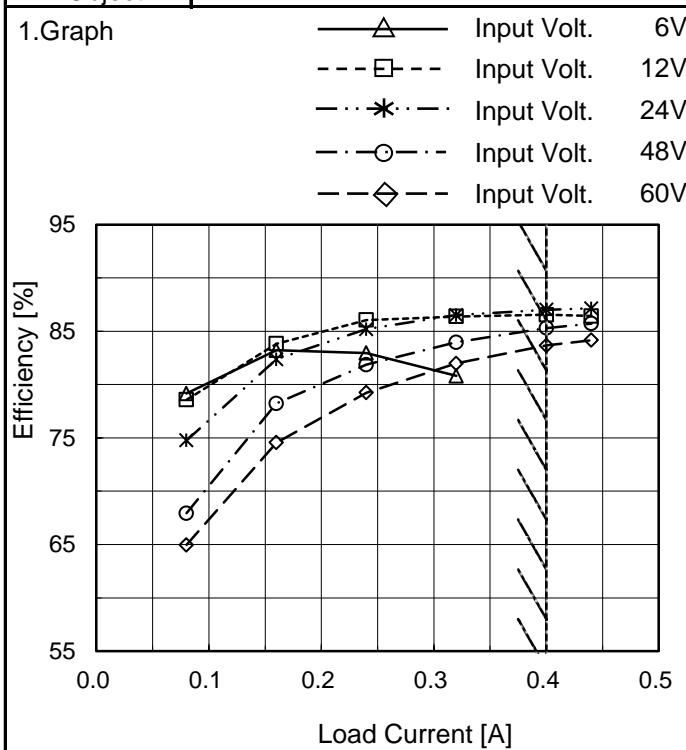
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
5.5	82.6	80.4 ※1
6.0	83.3	81.9 ※1
9.0	85.0	84.9
12.0	85.3	86.5
24.0	84.2	87.1
36.0	82.1	86.2
48.0	80.2	85.3
60.0	77.4	83.6
66.0	75.5	82.7

※1: Load 70%

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

COSEL

Model	MGXS62415
Item	Efficiency (by Load Current)
Object	_____



Note: Slanted line shows the range of the rated load current.

Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Efficiency [%]				
	Input Volt. 6[V]	Input Volt. 12[V]	Input Volt. 24[V]	Input Volt. 48[V]	Input Volt. 60[V]
0.00	-	-	-	-	-
0.08	79.2	78.6	74.8	67.9	65.0
0.16	83.2	83.8	82.4	78.2	74.6
0.24	83.0	86.0	85.2	81.9	79.2
0.32	80.8	86.4	86.5	84.0	82.0
0.40	-※	86.6	87.0	85.3	83.7
0.44	-※	86.4	87.1	85.7	84.2
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

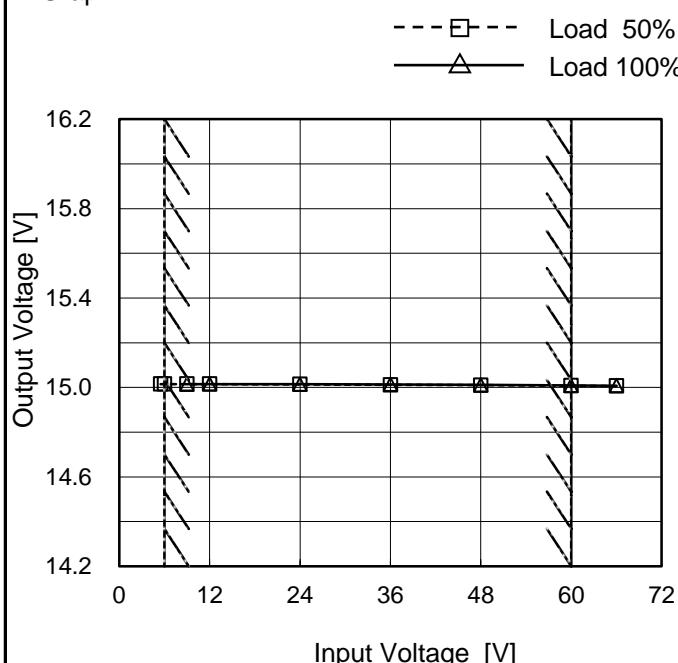
※ Maximum output current at minimum input Voltage is 70% of rated load current.
Refer to instruction manuals for details of input derating.

COSEL

Model	MGXS62415
Item	Line Regulation
Object	+15V0.4A

 Temperature 25°C
 Testing Circuitry Figure A

1.Graph



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

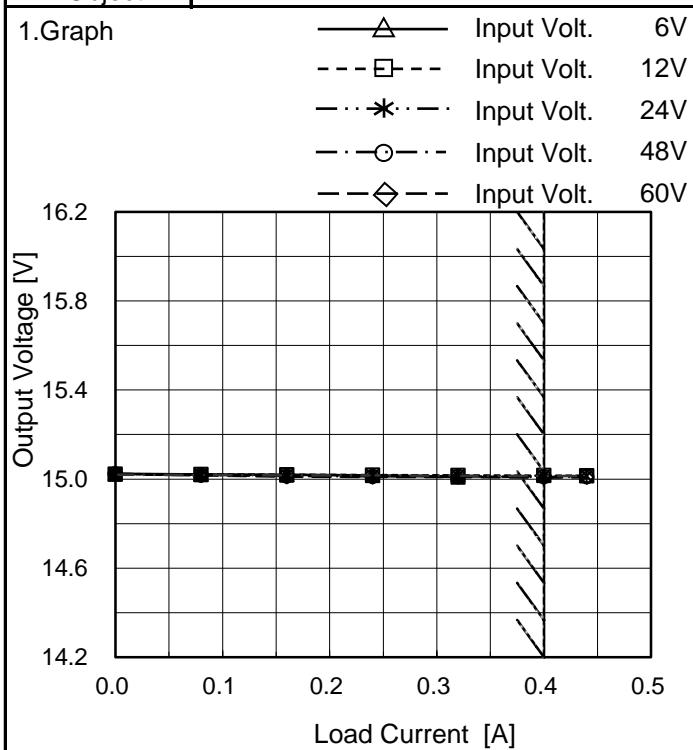
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
5.5	15.015	-※
6.0	15.015	-※
9.0	15.015	15.015
12.0	15.015	15.015
24.0	15.014	15.015
36.0	15.012	15.013
48.0	15.010	15.012
60.0	15.008	15.009
66.0	15.006	15.008

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

COSEL

Model	MGXS62415
Item	Load Regulation
Object	+15V0.4A



Note: Slanted line shows the range of the rated load current.

Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Output Voltage [V]				
	6[V]	12[V]	24[V]	48[V]	60[V]
0.00	15.023	15.022	15.020	15.023	15.023
0.08	15.021	15.020	15.018	15.017	15.017
0.16	15.019	15.019	15.017	15.013	15.010
0.24	15.016	15.018	15.016	15.012	15.009
0.32	15.009	15.017	15.015	15.012	15.009
0.40	-※	15.015	15.014	15.010	15.007
0.44	-※	15.015	15.013	15.010	15.008
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

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

COSEL

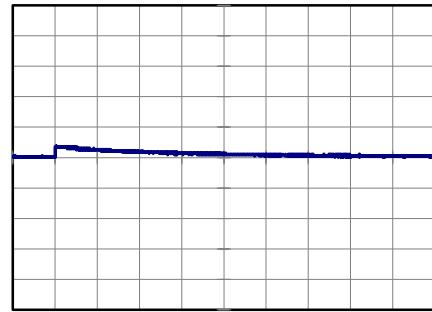
Model	MGXS62415
Item	Dynamic Load Response
Object	+15V0.4A

Temperature 25°C
Testing Circuitry Figure AInput Volt. 24 V
Cycle 100 msMin.Load (0A)↔
Load 100% (0.4A)

500 mV/div

2 ms/div

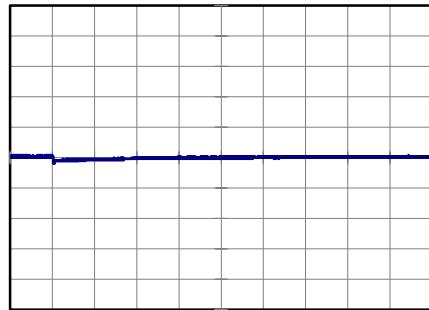
2 ms/div

Min.Load (0A)↔
Load 50% (0.2A)

500 mV/div

2 ms/div

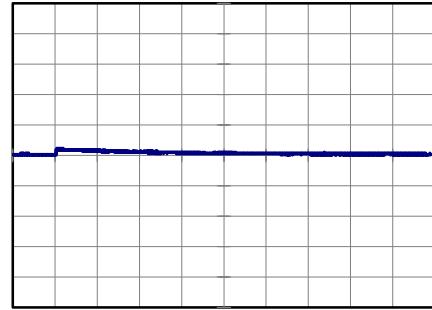
2 ms/div

Load 50% (0.2A)↔
Load 100% (0.4A)

500 mV/div

2 ms/div

2 ms/div



COSEL

Model	MGXS62415																																								
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure B																																							
Object	+15V0.4A																																								
1.Graph																																									
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 400 mV, and the X-axis ranges from 0.0 to 0.5 A. Two curves are plotted: one for Input Volt. 6V (solid line with triangle markers) and one for Input Volt. 60V (dashed line with circle markers). 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. 6V)</th> <th>Ripple Voltage [mV] (Input Volt. 60V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>4</td><td>109</td></tr> <tr><td>0.08</td><td>6</td><td>113</td></tr> <tr><td>0.16</td><td>11</td><td>5</td></tr> <tr><td>0.20</td><td>19</td><td>6</td></tr> <tr><td>0.24</td><td>31</td><td>4</td></tr> <tr><td>0.32</td><td>52</td><td>7</td></tr> <tr><td>0.40</td><td>-※</td><td>6</td></tr> <tr><td>0.44</td><td>-※</td><td>5</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] (Input Volt. 6V)	Ripple Voltage [mV] (Input Volt. 60V)	0.00	4	109	0.08	6	113	0.16	11	5	0.20	19	6	0.24	31	4	0.32	52	7	0.40	-※	6	0.44	-※	5	--	-	-	--	-	-	--	-	-				
Load Current [A]	Ripple Voltage [mV] (Input Volt. 6V)	Ripple Voltage [mV] (Input Volt. 60V)																																							
0.00	4	109																																							
0.08	6	113																																							
0.16	11	5																																							
0.20	19	6																																							
0.24	31	4																																							
0.32	52	7																																							
0.40	-※	6																																							
0.44	-※	5																																							
--	-	-																																							
--	-	-																																							
--	-	-																																							
<p>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.</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 6 [V]</th> <th>Input Volt. 60 [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>4</td><td>109</td></tr> <tr><td>0.08</td><td>6</td><td>113</td></tr> <tr><td>0.16</td><td>11</td><td>5</td></tr> <tr><td>0.20</td><td>19</td><td>6</td></tr> <tr><td>0.24</td><td>31</td><td>4</td></tr> <tr><td>0.32</td><td>52</td><td>7</td></tr> <tr><td>0.40</td><td>-※</td><td>6</td></tr> <tr><td>0.44</td><td>-※</td><td>5</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> <p>※ Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.</p>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 6 [V]	Input Volt. 60 [V]	0.00	4	109	0.08	6	113	0.16	11	5	0.20	19	6	0.24	31	4	0.32	52	7	0.40	-※	6	0.44	-※	5	--	-	-	--	-	-	--	-	-	
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 6 [V]	Input Volt. 60 [V]																																							
0.00	4	109																																							
0.08	6	113																																							
0.16	11	5																																							
0.20	19	6																																							
0.24	31	4																																							
0.32	52	7																																							
0.40	-※	6																																							
0.44	-※	5																																							
--	-	-																																							
--	-	-																																							
--	-	-																																							
<p>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</p>																																									

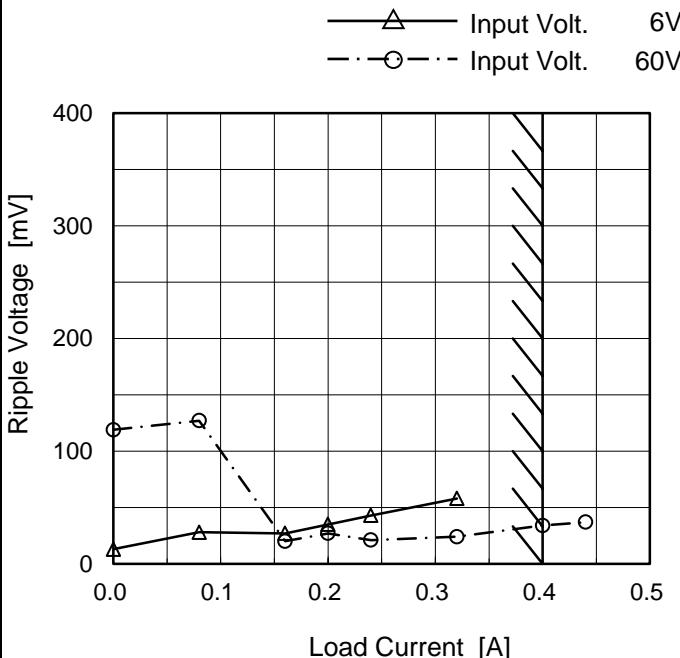
COSEL

Model MGXS62415

Item Ripple-Noise

Object +15V0.4A

1. Graph



Measured by 100 MHz Oscilloscope.

Ripple-Noise is shown as p-p in the figure below.

Note: Slanted line shows the range of the rated load current.

Ripple Noise[mVp-p]

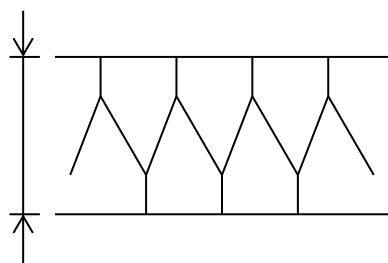


Fig.Complex Ripple Noise Wave Form

Temperature 25°C
Testing Circuitry Figure B

2. Values

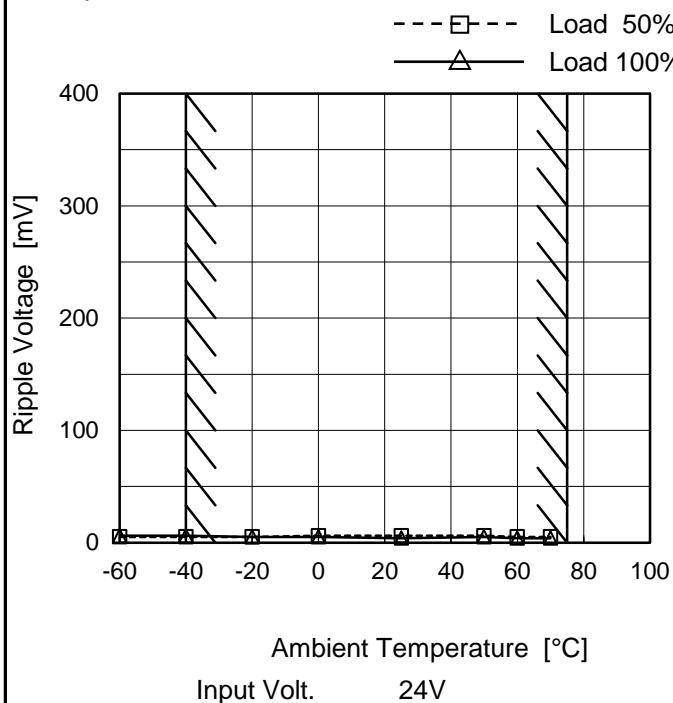
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 6 [V]	Input Volt. 60 [V]
0.00	13	119
0.08	28	127
0.16	27	20
0.20	35	27
0.24	43	21
0.32	58	24
0.40	-	34
0.44	-	37
--	-	-
--	-	-
--	-	-

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

COSEL

Model	MGXS62415
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V0.4A

1. Graph



Measured by 100 MHz Oscilloscope.

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

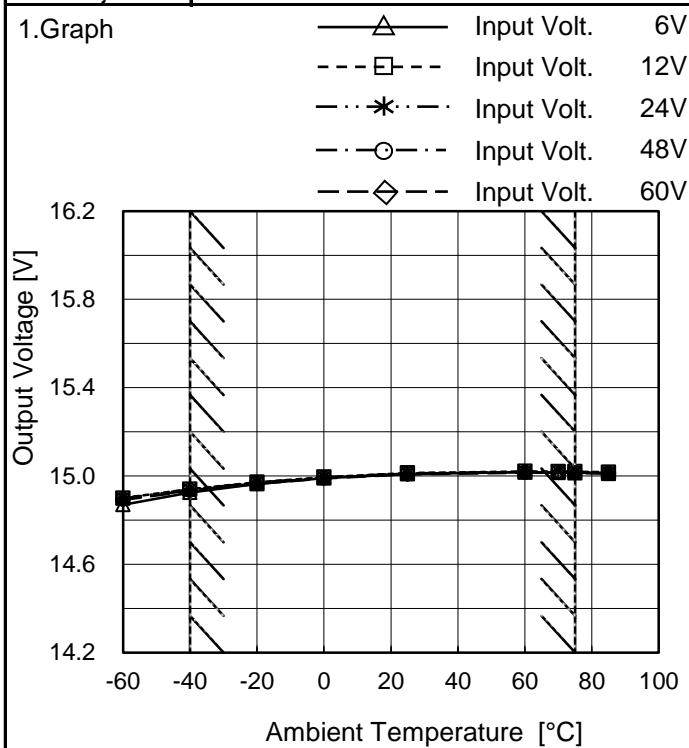
Testing Circuitry Figure B

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	5	6
-40	5	6
-20	5	5
0	6	5
25	6	4
50	6	5
60	5	4
70	5	4
--	-	-
--	-	-
--	-	-

COSEL

Model	MGXS62415
Item	Ambient Temperature Drift
Object	+15V0.4A



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

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	6[V]	12[V]	24[V]	48[V]	60[V]
-60	14.870	14.900	14.898	14.895	14.892
-40	14.925	14.940	14.939	14.935	14.932
-20	14.964	14.971	14.970	14.967	14.964
0	14.991	14.995	14.994	14.991	14.989
25	15.009	15.013	15.012	15.010	15.007
60	15.017	15.020	15.020	15.017	15.015
70	15.015	15.020	15.019	15.017	15.015
75	15.014	15.019	15.019	15.016	15.013
85	15.011	15.017	15.016	15.013	15.011
--	-	-	-	-	-
--	-	-	-	-	-

Note: In case of input Volt. 6V, Load 70%.
Other case Load 100%.



Model	MGXS62415	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+15V0.4A	

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 - 75°C

Input Voltage : 6 - 60V

Load Current : 0 - 0.4A

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

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

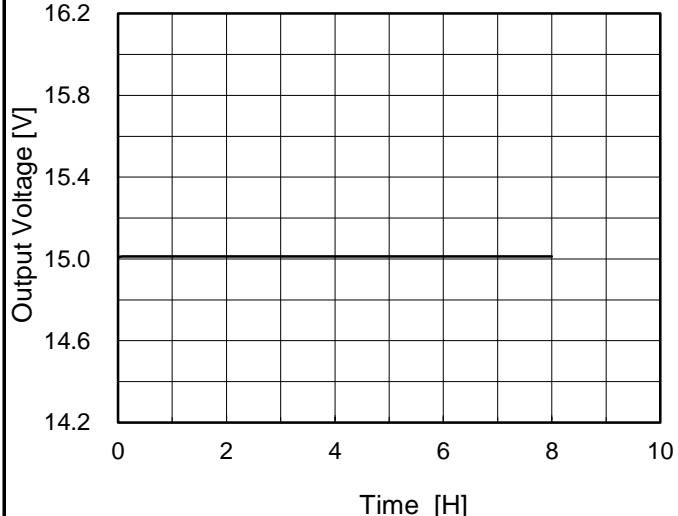
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	75	60	0	15.031	±51	±0.3
Minimum Voltage	-40	60	0.28 ※	14.929		

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

Refer to instruction manuals for details of input derating.

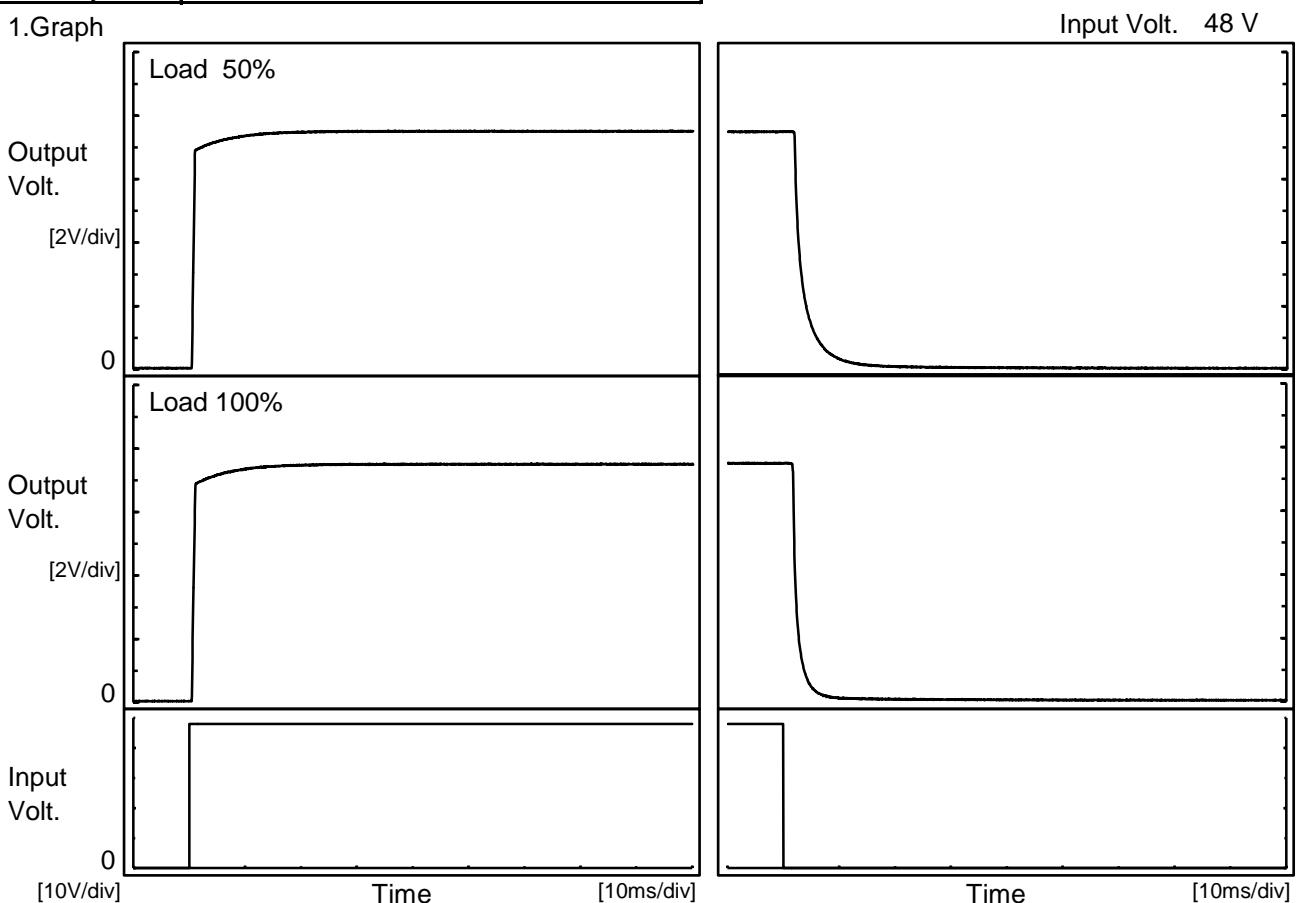
COSEL

Model	MGXS62415	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V0.4A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 24V 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>15.005</td></tr> <tr><td>0.5</td><td>15.012</td></tr> <tr><td>1.0</td><td>15.012</td></tr> <tr><td>2.0</td><td>15.012</td></tr> <tr><td>3.0</td><td>15.012</td></tr> <tr><td>4.0</td><td>15.012</td></tr> <tr><td>5.0</td><td>15.012</td></tr> <tr><td>6.0</td><td>15.012</td></tr> <tr><td>7.0</td><td>15.012</td></tr> <tr><td>8.0</td><td>15.012</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	15.005	0.5	15.012	1.0	15.012	2.0	15.012	3.0	15.012	4.0	15.012	5.0	15.012	6.0	15.012	7.0	15.012	8.0	15.012
Time since start [H]	Output Voltage [V]																								
0.0	15.005																								
0.5	15.012																								
1.0	15.012																								
2.0	15.012																								
3.0	15.012																								
4.0	15.012																								
5.0	15.012																								
6.0	15.012																								
7.0	15.012																								
8.0	15.012																								

COSEL

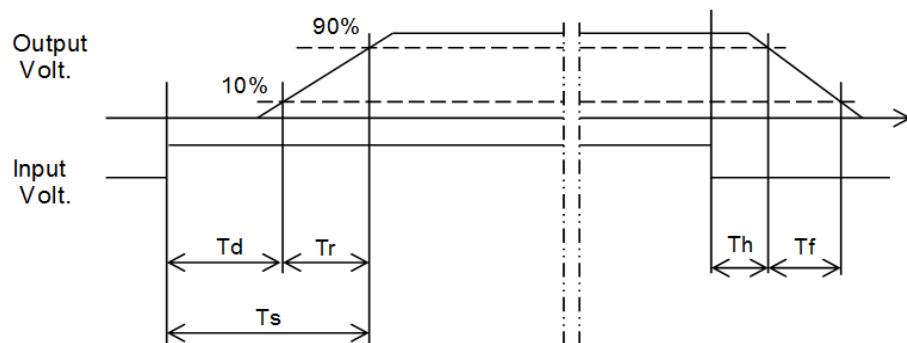
Model	MGXS62415	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V0.4A		

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		0.6	0.5	1.1	2.1	4.6
100 %		0.6	0.6	1.2	1.8	2.3

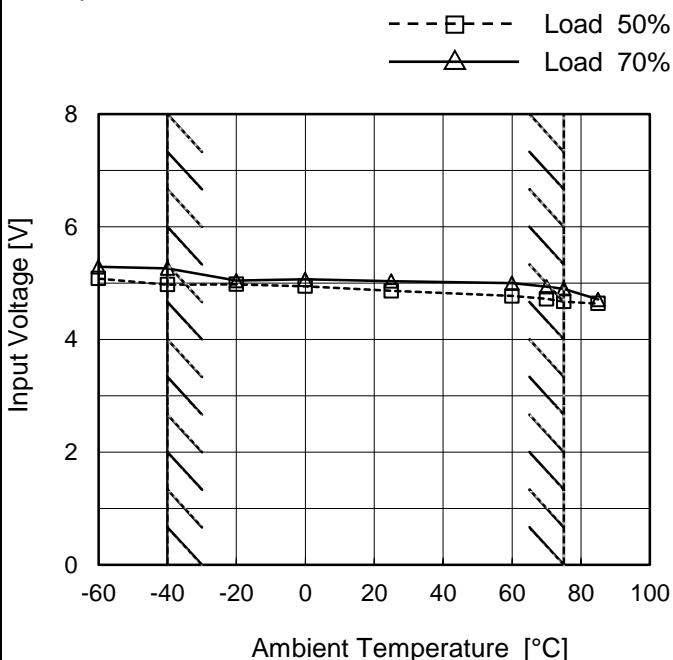


COSEL

Model	MGXS62415
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V0.4A

Testing Circuitry Figure A

1. Graph



2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 70%
-60	5.1	5.3
-40	5.0	5.3
-20	5.0	5.1
0	5.0	5.1
25	4.9	5.1
60	4.8	5.0
70	4.8	5.0
75	4.7	4.9
85	4.7	4.7
--	-	-
--	-	-

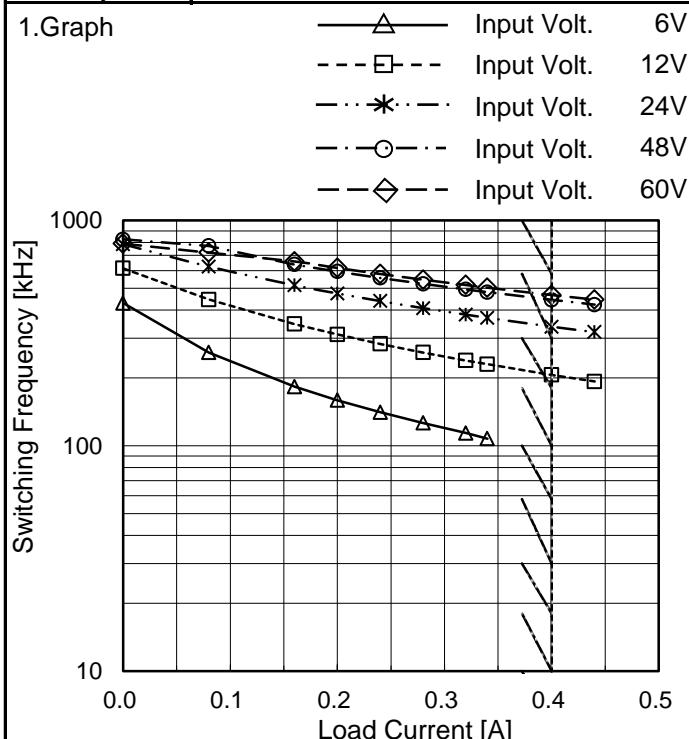
Note: Slanted line shows the range of the rated ambient temperature.

COSEL

Model	MGXS62415																																																																																							
Item	Overcurrent Protection																																																																																							
Object	+15V0.4A																																																																																							
1.Graph																																																																																								
<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Input Volt. 6V Input Volt. 12V Input Volt. 24V Input Volt. 48V Input Volt. 60V</p>																																																																																								
<p>Note: Slanted line shows the range of the rated load current.</p> <p>Maximum output current at minimum input Voltage is 70% of rated load current. Refer to instruction manuals for details of input derating.</p>																																																																																								
Temperature 25°C Testing Circuitry Figure A																																																																																								
2.Values																																																																																								
<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="5">Load Current [A]</th> </tr> <tr> <th>6[V]</th> <th>12[V]</th> <th>24[V]</th> <th>48[V]</th> <th>60[V]</th> </tr> </thead> <tbody> <tr><td>14.3</td><td>0.395</td><td>0.533</td><td>0.577</td><td>0.581</td><td>0.580</td></tr> <tr><td>13.5</td><td>0.412</td><td>0.554</td><td>0.601</td><td>0.598</td><td>0.596</td></tr> <tr><td>12.0</td><td>0.452</td><td>0.602</td><td>0.650</td><td>0.632</td><td>0.628</td></tr> <tr><td>10.5</td><td>0.472</td><td>0.658</td><td>0.700</td><td>0.668</td><td>0.662</td></tr> <tr><td>9.0</td><td>0.511</td><td>0.722</td><td>0.752</td><td>0.705</td><td>0.698</td></tr> <tr><td>7.5</td><td>0.570</td><td>0.796</td><td>0.802</td><td>0.743</td><td>0.735</td></tr> <tr><td>6.0</td><td>0.654</td><td>0.877</td><td>0.854</td><td>0.786</td><td>0.775</td></tr> <tr><td>4.5</td><td>0.772</td><td>0.965</td><td>0.912</td><td>0.829</td><td>0.815</td></tr> <tr><td>3.0</td><td>0.909</td><td>1.053</td><td>0.977</td><td>0.873</td><td>0.855</td></tr> <tr><td>1.5</td><td>1.070</td><td>1.120</td><td>1.020</td><td>0.898</td><td>0.875</td></tr> <tr><td>0.0</td><td>1.235</td><td>1.205</td><td>0.956</td><td>0.795</td><td>0.774</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>						Output Voltage [V]	Load Current [A]					6[V]	12[V]	24[V]	48[V]	60[V]	14.3	0.395	0.533	0.577	0.581	0.580	13.5	0.412	0.554	0.601	0.598	0.596	12.0	0.452	0.602	0.650	0.632	0.628	10.5	0.472	0.658	0.700	0.668	0.662	9.0	0.511	0.722	0.752	0.705	0.698	7.5	0.570	0.796	0.802	0.743	0.735	6.0	0.654	0.877	0.854	0.786	0.775	4.5	0.772	0.965	0.912	0.829	0.815	3.0	0.909	1.053	0.977	0.873	0.855	1.5	1.070	1.120	1.020	0.898	0.875	0.0	1.235	1.205	0.956	0.795	0.774	--	-	-	-	-	-
Output Voltage [V]	Load Current [A]																																																																																							
	6[V]	12[V]	24[V]	48[V]	60[V]																																																																																			
14.3	0.395	0.533	0.577	0.581	0.580																																																																																			
13.5	0.412	0.554	0.601	0.598	0.596																																																																																			
12.0	0.452	0.602	0.650	0.632	0.628																																																																																			
10.5	0.472	0.658	0.700	0.668	0.662																																																																																			
9.0	0.511	0.722	0.752	0.705	0.698																																																																																			
7.5	0.570	0.796	0.802	0.743	0.735																																																																																			
6.0	0.654	0.877	0.854	0.786	0.775																																																																																			
4.5	0.772	0.965	0.912	0.829	0.815																																																																																			
3.0	0.909	1.053	0.977	0.873	0.855																																																																																			
1.5	1.070	1.120	1.020	0.898	0.875																																																																																			
0.0	1.235	1.205	0.956	0.795	0.774																																																																																			
--	-	-	-	-	-																																																																																			

COSEL

Model	MGXS62415
Item	Switching frequency (by Load Current)
Object	+15V0.4A



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.

Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Input Current [A]				
	6[V]	12[V]	24[V]	48[V]	60[V]
0.00	430	614	785	825	789
0.08	260	446	625	772	720
0.16	183	347	516	638	658
0.20	159	312	475	594	616
0.24	141	283	439	557	579
0.28	126	259	408	524	546
0.32	114	239	382	494	517
0.34	108	230	370	481	503
0.40	-	206	338	445	467
0.44	-	193	320	423	446
--	-	-	-	-	-

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

COSEL

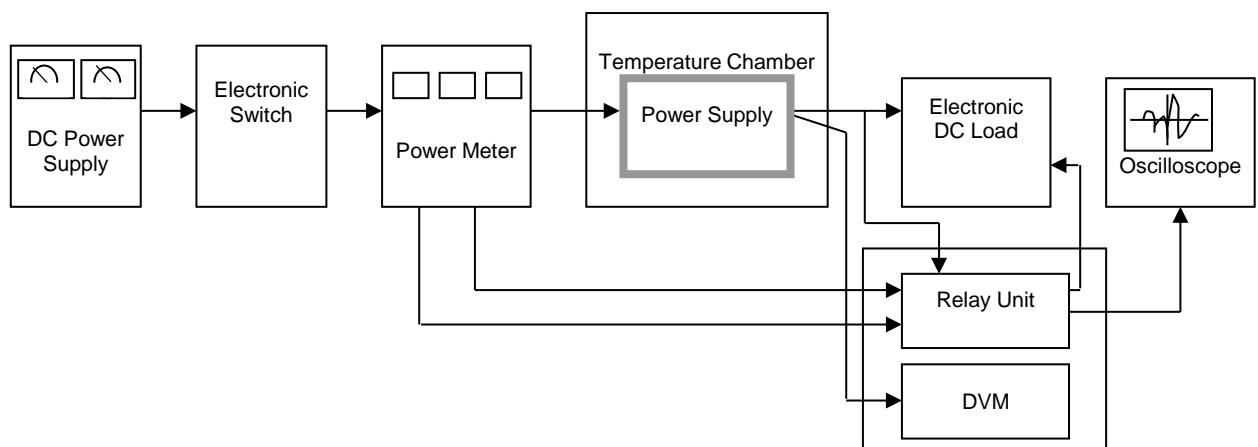


Figure A

Data Acquisition/Control Unit

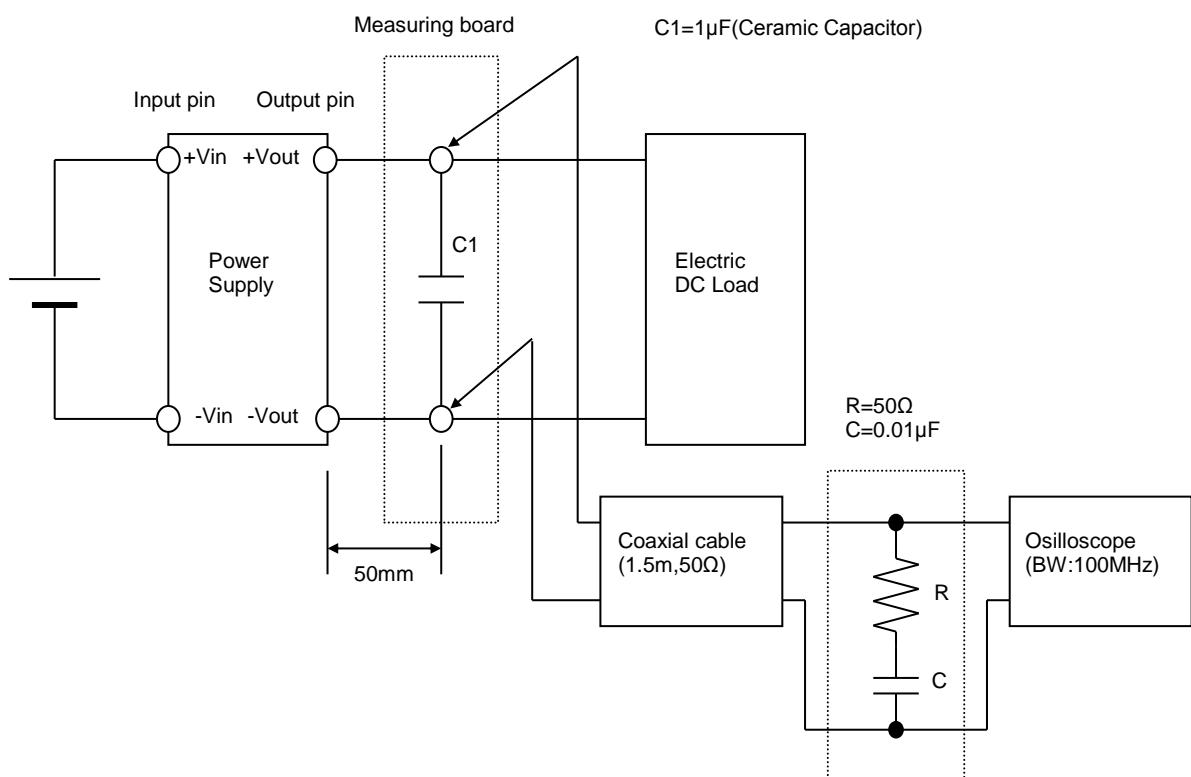


Figure B (Ripple and Ripple noise Characteristic)