

TEST DATA OF MGFW1R54815

Regulated DC Power Supply
January 5, 2017

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Takaaki Sekiguchi
Takaaki Sekiguchi Design Engineer

COSEL CO.,LTD.

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Model		MGFW1R54815		Temperature	25°C																																																																															
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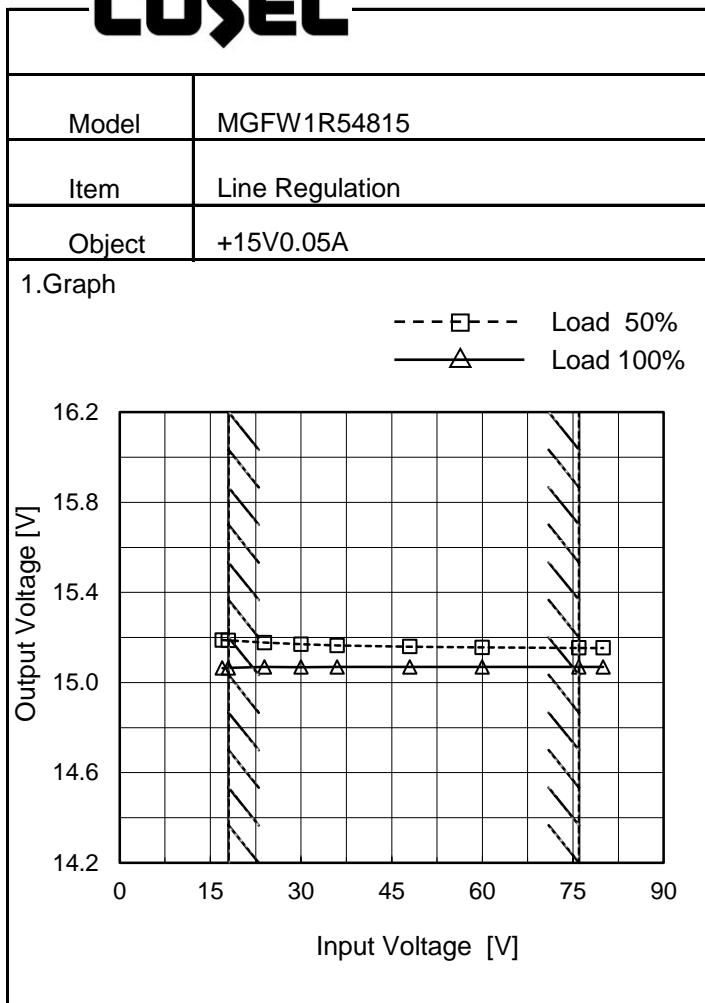
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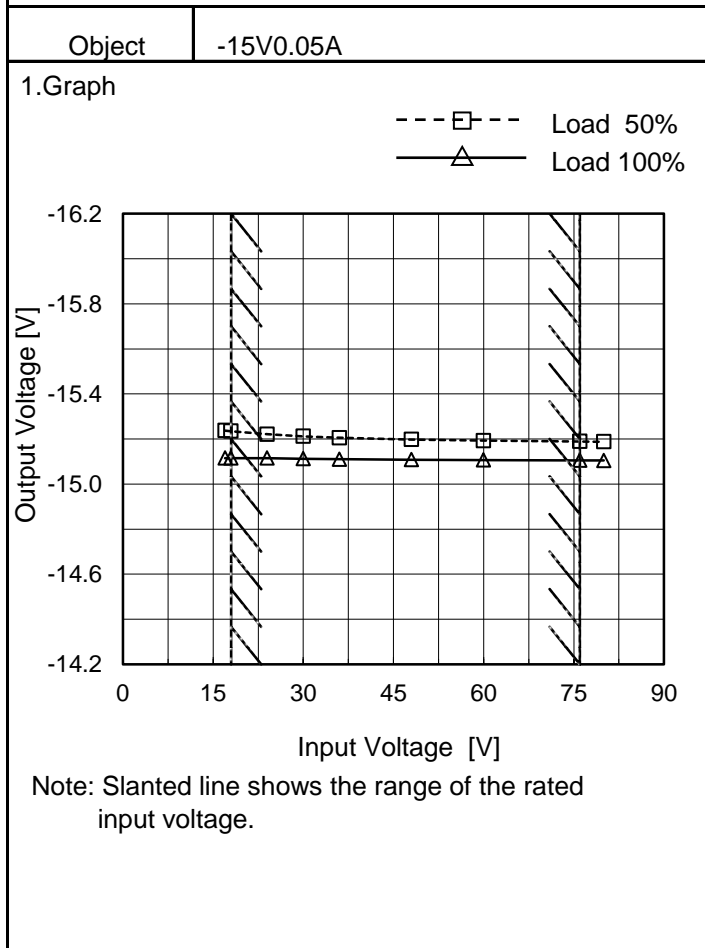


Temperature 25°C
Testing Circuitry Figure A

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	15.189	15.064
18	15.187	15.065
24	15.177	15.069
30	15.170	15.069
36	15.165	15.069
48	15.159	15.069
60	15.156	15.069
76	15.154	15.069
80	15.153	15.069

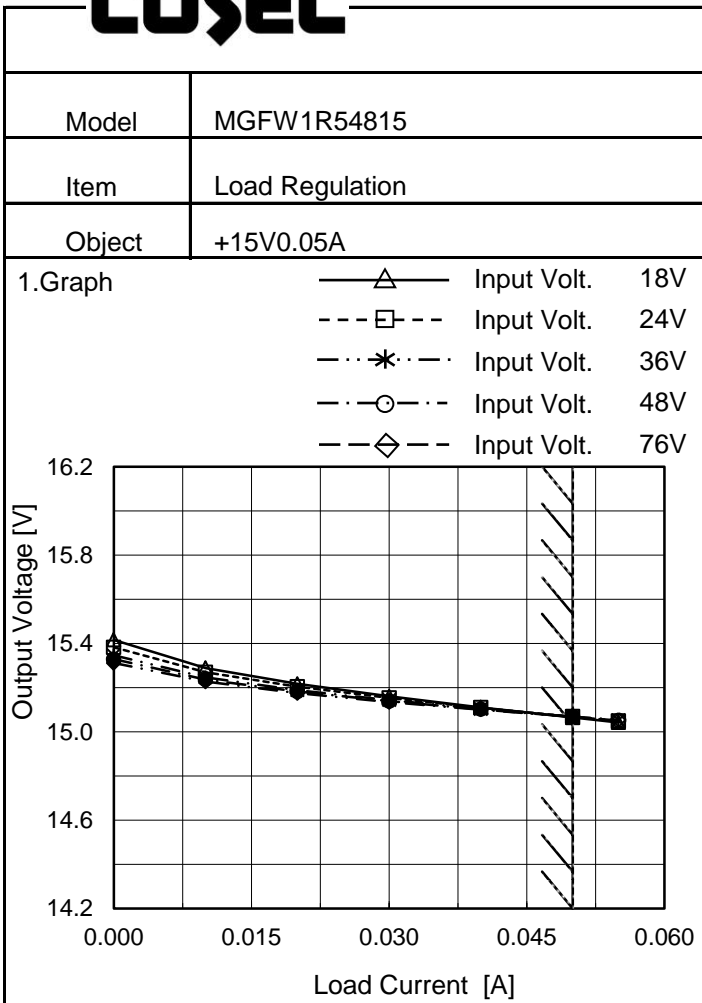
-15V : Rated Load Current



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	-15.237	-15.115
18	-15.234	-15.115
24	-15.222	-15.115
30	-15.212	-15.113
36	-15.205	-15.110
48	-15.197	-15.108
60	-15.193	-15.107
76	-15.189	-15.105
80	-15.188	-15.104

+15V : Rated Load Current

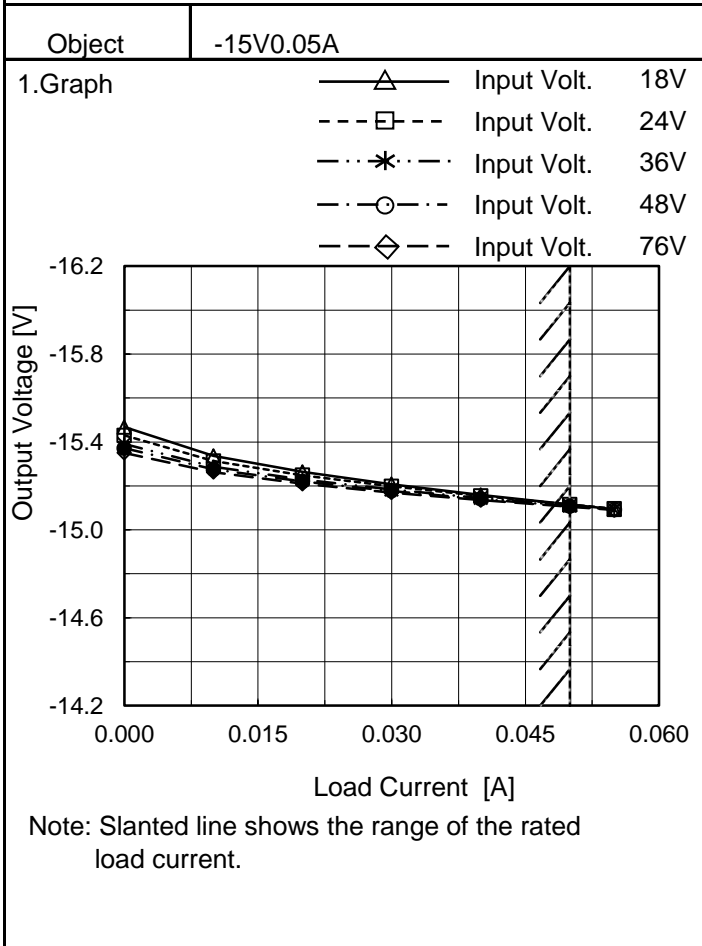


Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Output Voltage [V]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.000	15.417	15.382	15.346	15.329	15.312
0.010	15.289	15.269	15.247	15.237	15.227
0.020	15.217	15.204	15.189	15.182	15.175
0.030	15.161	15.154	15.144	15.139	15.135
0.040	15.111	15.109	15.104	15.102	15.101
0.050	15.065	15.069	15.069	15.069	15.069
0.055	15.042	15.049	15.051	15.052	15.054
--	-	-	-	-	-
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-15V : Rated Load Current



2.Values

Load Current [A]	Output Voltage [V]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.000	-15.467	-15.430	-15.390	-15.371	-15.350
0.010	-15.336	-15.313	-15.288	-15.276	-15.263
0.020	-15.264	-15.248	-15.229	-15.220	-15.210
0.030	-15.208	-15.198	-15.184	-15.177	-15.170
0.040	-15.159	-15.154	-15.145	-15.141	-15.135
0.050	-15.115	-15.115	-15.110	-15.108	-15.105
0.055	-15.093	-15.096	-15.093	-15.092	-15.090
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+15V : Rated Load Current



Model	MGFW1R54815	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+15V0.05A		

Input Volt. 48 V
 -15V:rated load current.
 Cycle 100 ms

$t_1, t_2 = 100 \mu s$



Min.Load (0A) ←→
 Load 100% (0.05A)

200 mV/div

4 ms/div

4 ms/div

Min.Load (0A) ←→
 Load 50% (0.025A)

200 mV/div

4 ms/div

4 ms/div

Load 50% (0.025A) ←→
 Load 100% (0.05A)

200 mV/div

4 ms/div

4 ms/div



Model	MGFW1R54815	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	-15V0.05A		

Input Volt. 48 V
 +15V:rated load current.
 Cycle 100 ms

t1,t2 = 100 μs



Min.Load (0A) ←→
 Load 100% (0.05A)

200 mV/div

4 ms/div

4 ms/div

Min.Load (0A) ←→
 Load 50% (0.025A)

200 mV/div

4 ms/div

4 ms/div

Load 50% (0.025A) ←→
 Load 100% (0.05A)

200 mV/div

4 ms/div

4 ms/div



<p>Model MGFW1R54815</p> <p>Item Ripple Voltage (by Load Current)</p> <p>Object +15V0.05A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure B</p>																																						
<p>1.Graph</p> <p> —△— Input Volt. 18V - - ○ - - Input Volt. 76V </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. 18 [V]</th> <th>Input Volt. 76 [V]</th> </tr> </thead> <tbody> <tr><td>0.000</td><td>10</td><td>10</td></tr> <tr><td>0.010</td><td>15</td><td>10</td></tr> <tr><td>0.020</td><td>25</td><td>15</td></tr> <tr><td>0.030</td><td>35</td><td>15</td></tr> <tr><td>0.040</td><td>45</td><td>20</td></tr> <tr><td>0.050</td><td>60</td><td>20</td></tr> <tr><td>0.055</td><td>65</td><td>25</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table> <p>-15V: Rated Load Current</p>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 18 [V]	Input Volt. 76 [V]	0.000	10	10	0.010	15	10	0.020	25	15	0.030	35	15	0.040	45	20	0.050	60	20	0.055	65	25	--	-	-	--	-	-	--	-	-	--	-	-
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<p>Model MGFW1R54815</p> <p>Item Ripple Voltage (by Load Current)</p> <p>Object -15V0.05A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure B</p>																																						
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<p>Model MGFW1R54815</p> <p>Item Ripple-Noise</p> <p>Object +15V0.05A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure B</p>																																						
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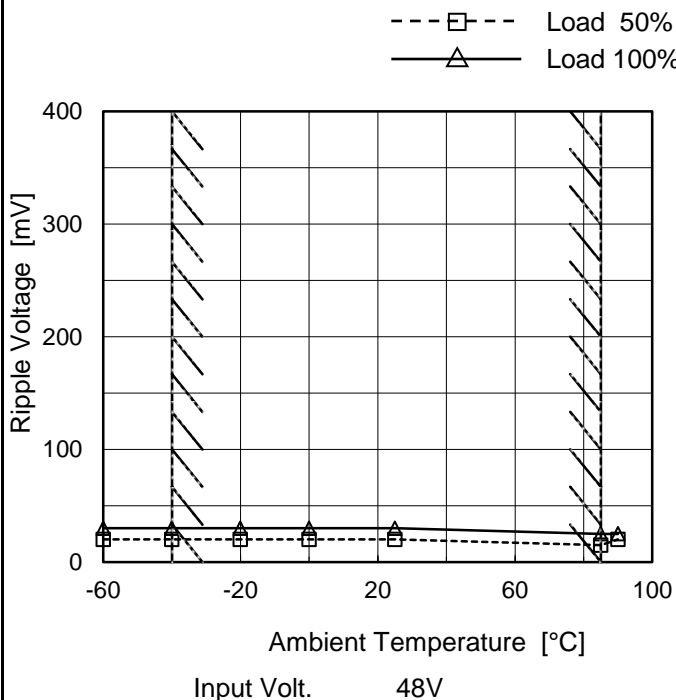
<p>Model MGFW1R54815</p> <p>Item Ripple-Noise</p> <p>Object -15V0.05A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure B</p>																																						
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Model	MGFW1R54815
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V0.05A

Testing Circuitry Figure B

1.Graph



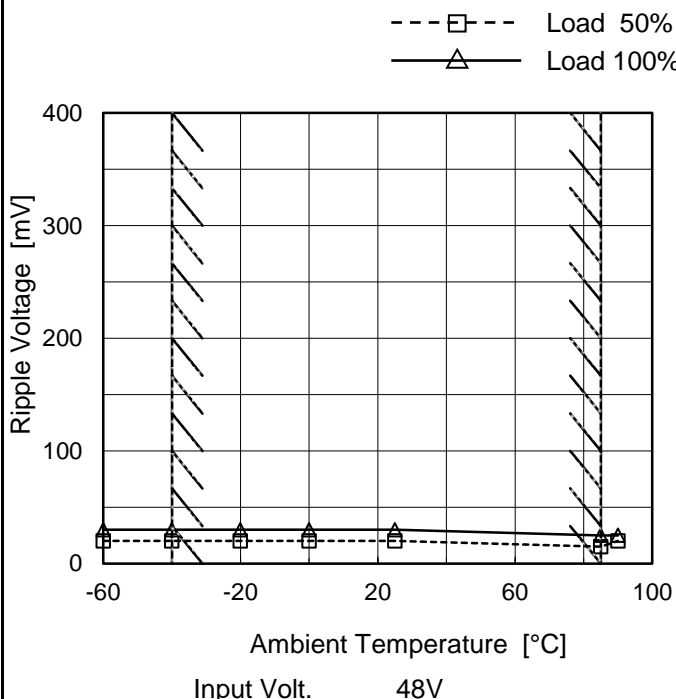
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	20	30
-40	20	30
-20	20	30
0	20	30
25	20	30
85	15	25
90	20	25
--	-	-
--	-	-
--	-	-
--	-	-

-15V: Rated Load Current

Object	-15V0.05A
--------	-----------

1.Graph



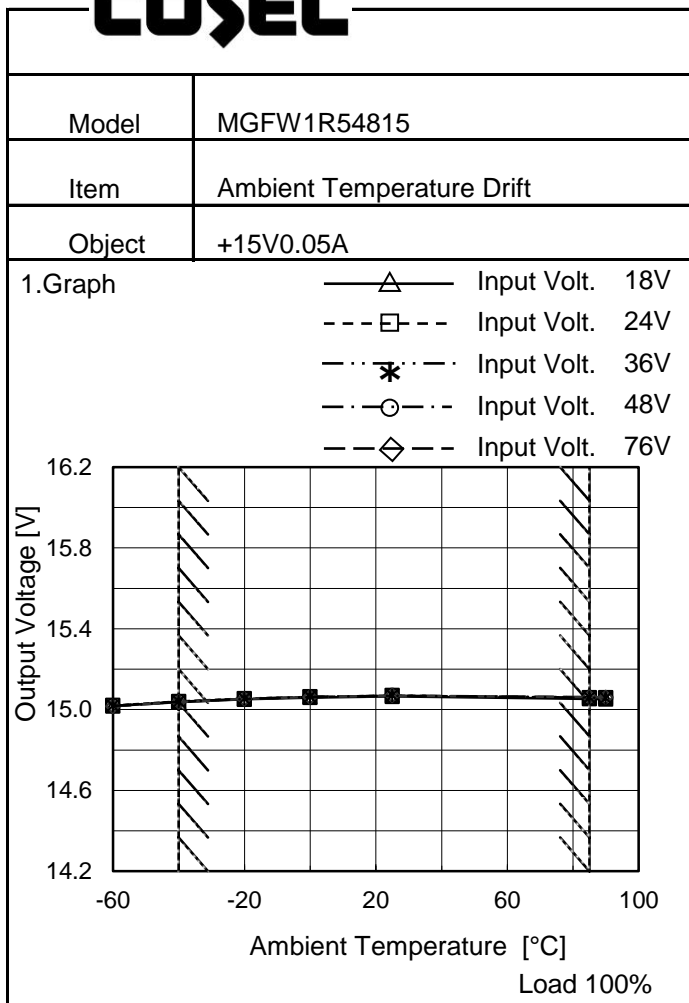
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-60	20	30
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0	20	30
25	20	30
85	15	25
90	20	25
--	-	-
--	-	-
--	-	-
--	-	-

+15V: Rated Load Current

Measured by 100 MHz Oscilloscope.

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

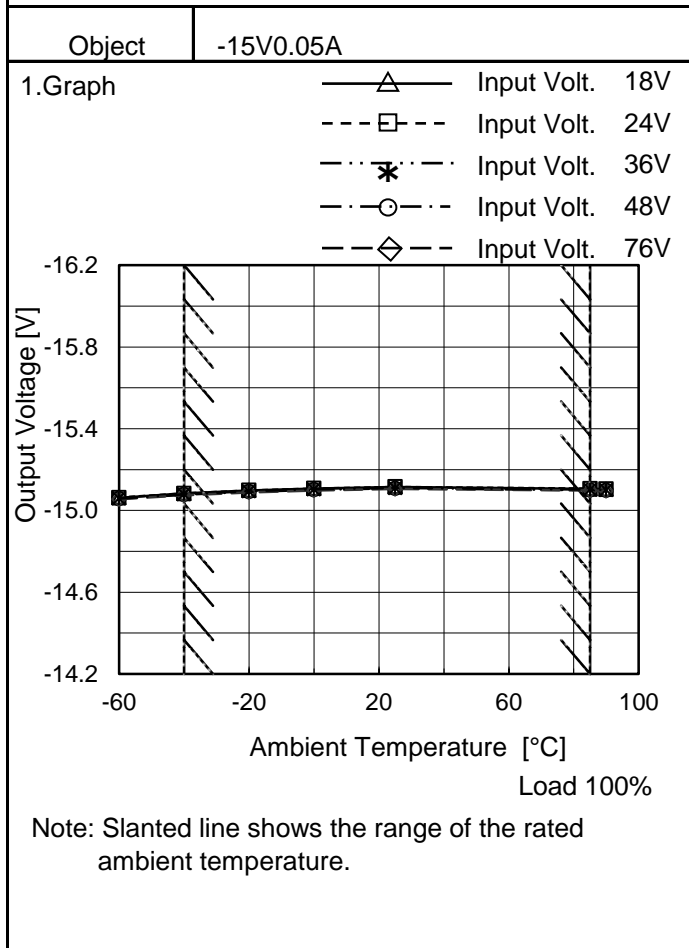


Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-60	15.017	15.020	15.019	15.018	15.016
-40	15.037	15.040	15.039	15.039	15.038
-20	15.051	15.054	15.054	15.053	15.052
0	15.059	15.063	15.063	15.062	15.062
25	15.065	15.069	15.069	15.069	15.069
85	15.054	15.059	15.059	15.060	15.062
90	15.051	15.058	15.057	15.058	15.060
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

-15V : Rated Load Current



2.Values

Ambient Temperature [°C]	Output Voltage [V]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-60	-15.062	-15.063	-15.059	-15.058	-15.055
-40	-15.083	-15.083	-15.079	-15.078	-15.075
-20	-15.098	-15.098	-15.094	-15.092	-15.089
0	-15.108	-15.108	-15.103	-15.101	-15.098
25	-15.115	-15.115	-15.110	-15.108	-15.105
85	-15.105	-15.107	-15.102	-15.100	-15.097
90	-15.104	-15.105	-15.100	-15.098	-15.096
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

+15V : Rated Load Current



COSEL		Testing Circuitry Figure A
Model	MGFW1R54815	
Item	Output Voltage Accuracy	

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -40 - 85°C

Input Voltage : 18 - 76V

Load Current (AVR 1) : 0 - 0.05A (AVR 2) : 0 - 0.05A

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

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

2. Values

Object		+15V0.05A				
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18	0	15.451	±387	±2.6
Minimum Voltage	85	18	0.05	14.678		

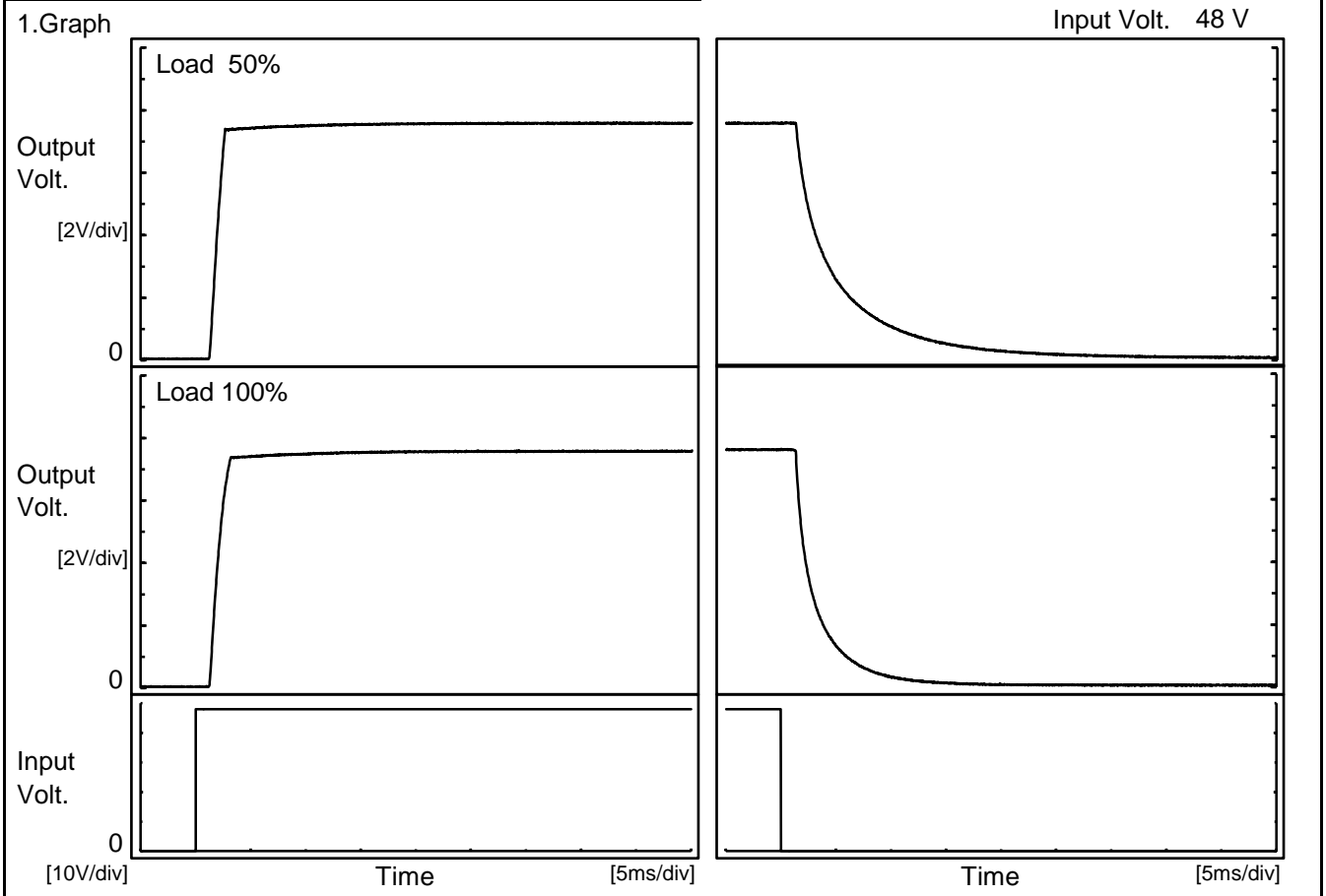
Object		-15V0.05A				
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	85	18	0	-15.501	±386	±2.6
Minimum Voltage	85	18	0.05	-14.729		



COSEL																									
Model	MGFW1R54815	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V0.05A																								
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 48V Load 100%</p>		<p>2.Values</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>15.062</td></tr> <tr><td>0.5</td><td>15.062</td></tr> <tr><td>1.0</td><td>15.062</td></tr> <tr><td>2.0</td><td>15.062</td></tr> <tr><td>3.0</td><td>15.062</td></tr> <tr><td>4.0</td><td>15.063</td></tr> <tr><td>5.0</td><td>15.062</td></tr> <tr><td>6.0</td><td>15.062</td></tr> <tr><td>7.0</td><td>15.062</td></tr> <tr><td>8.0</td><td>15.063</td></tr> </tbody> </table> <p style="text-align: center;">-15V: Rated Load Current</p>		Time since start [H]	Output Voltage [V]	0.0	15.062	0.5	15.062	1.0	15.062	2.0	15.062	3.0	15.062	4.0	15.063	5.0	15.062	6.0	15.062	7.0	15.062	8.0	15.063
Time since start [H]	Output Voltage [V]																								
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Time since start [H]	Output Voltage [V]																								
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0.5	-15.111																								
1.0	-15.111																								
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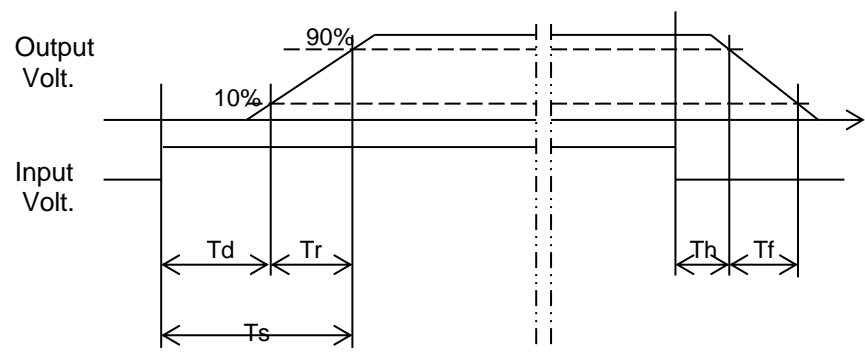
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Item		Rise and Fall Time	Testing Circuitry Figure A	
Object		+15V0.05A		



2.Values

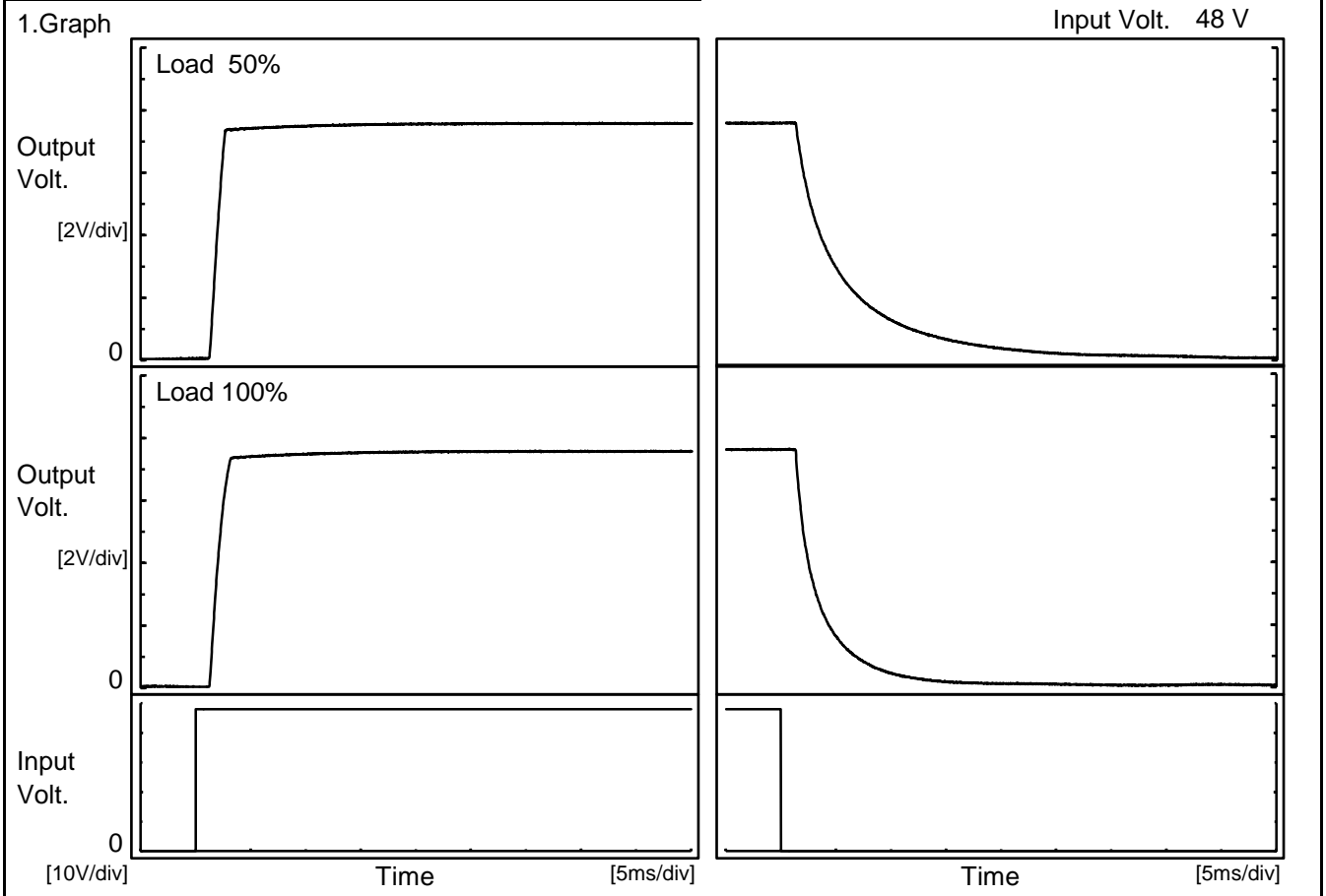
Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.4	1.1	2.5	1.6	10.6
100 %	1.4	1.5	2.9	1.5	5.3

[ms]



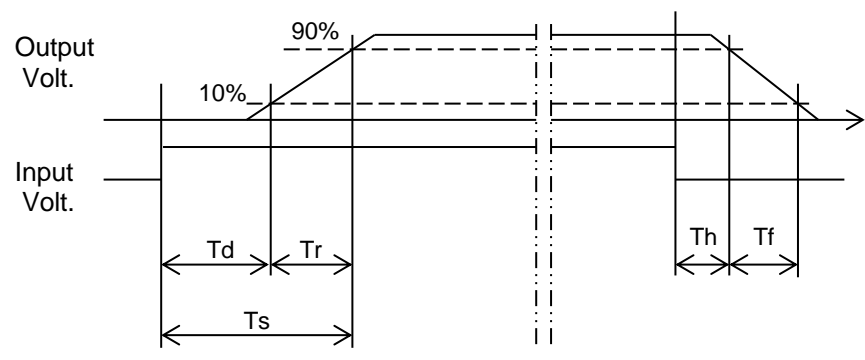


Model		MGFW1R54815	Temperature	25°C
Item		Rise and Fall Time	Testing Circuitry	Figure A
Object		-15V0.05A		



2.Values [ms]

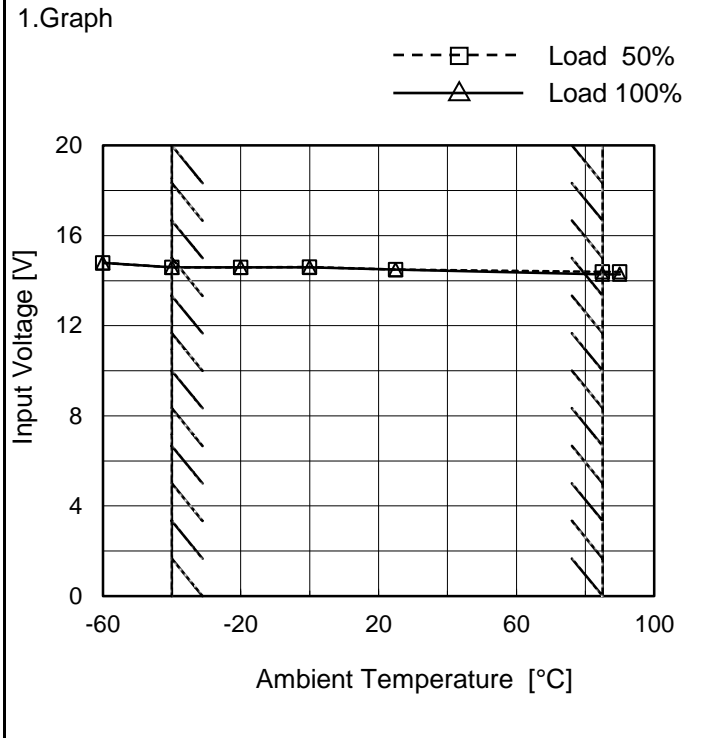
Load \ Time	Td	Tr	Ts	Th	Tf
50 %	1.4	1.1	2.5	1.7	12.1
100 %	1.4	1.5	2.9	1.5	6.2





Model	MGFW1R54815
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V0.05A

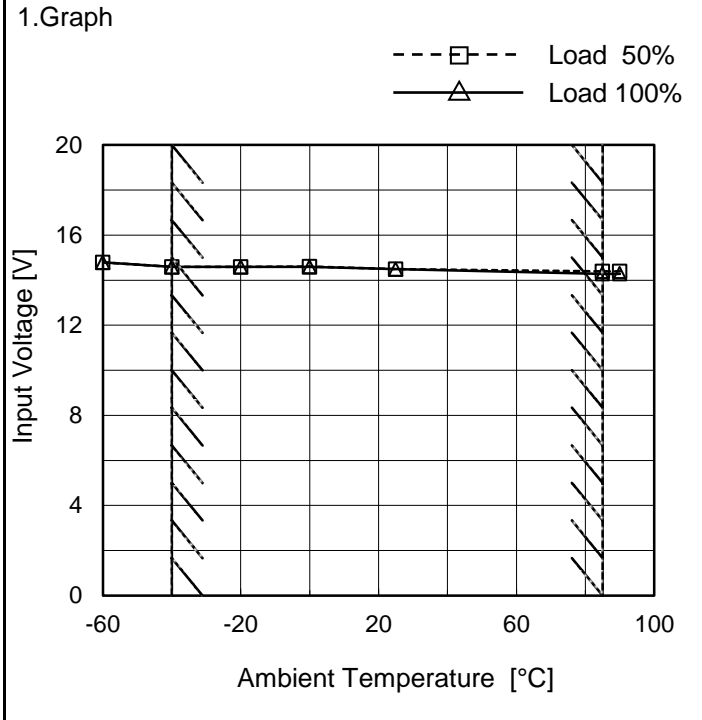
Testing Circuitry Figure A



2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	14.8	14.8
-40	14.6	14.6
-20	14.6	14.6
0	14.6	14.6
25	14.5	14.5
85	14.4	14.3
90	14.4	14.3
--	-	-
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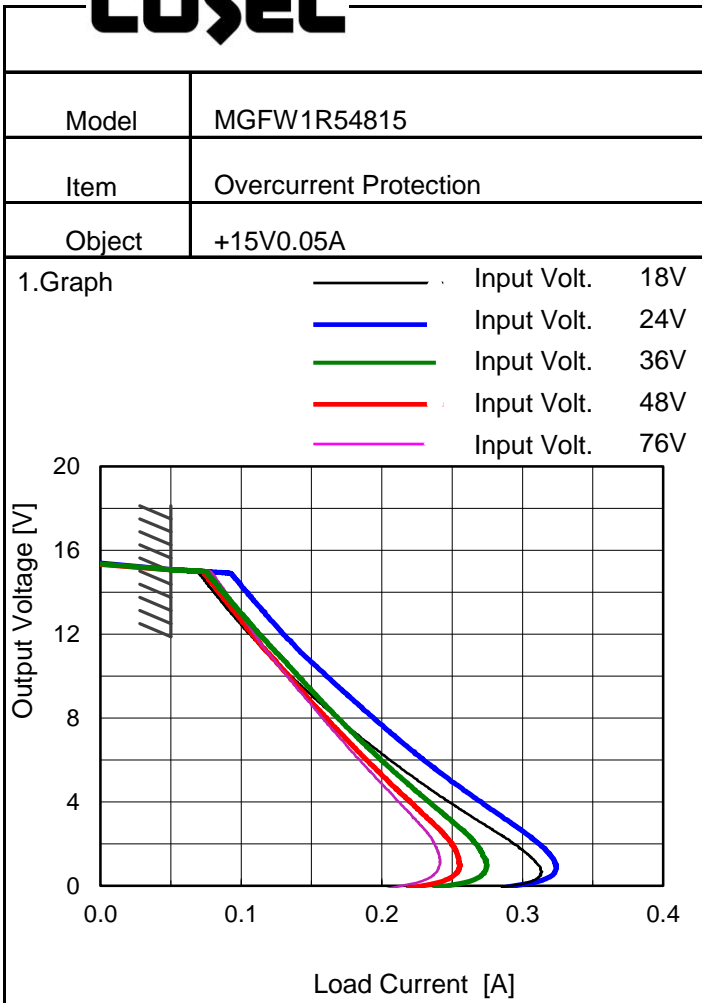
Object	-15V0.05A
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2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-60	14.8	14.8
-40	14.6	14.6
-20	14.6	14.6
0	14.6	14.6
25	14.5	14.5
85	14.4	14.3
90	14.4	14.3
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--	-	-
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Note: Slanted line shows the range of the rated ambient temperature.

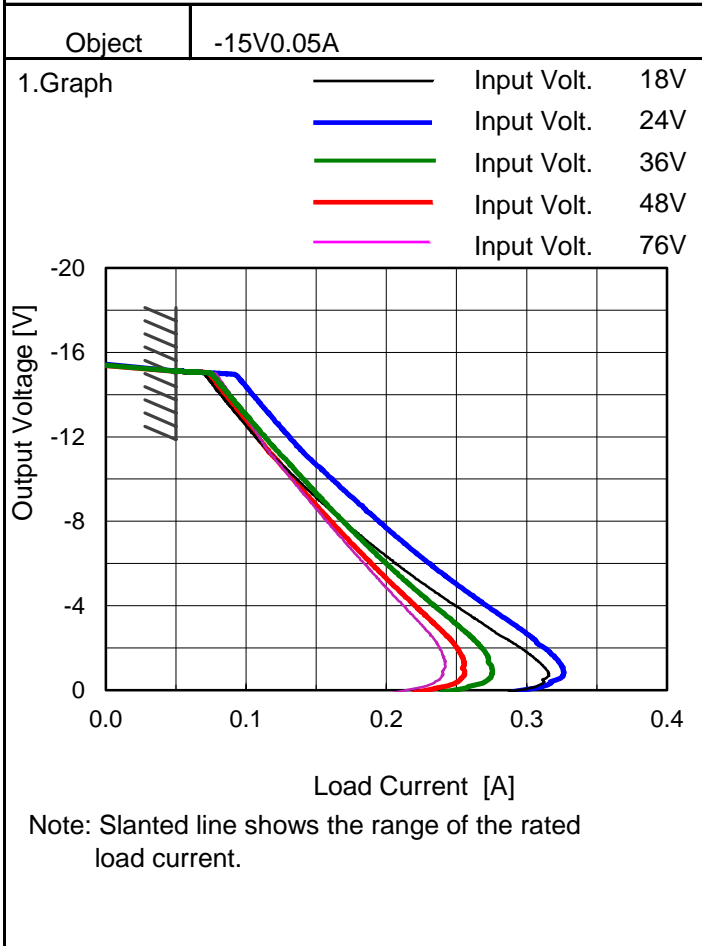


Temperature 25°C
Testing Circuitry Figure A

2.Values

Output Voltage [V]	Load Current [A]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
14.3	0.077	0.101	0.084	0.082	0.087
13.5	0.086	0.110	0.093	0.090	0.094
12.0	0.106	0.130	0.112	0.108	0.109
10.5	0.127	0.152	0.133	0.127	0.126
9.0	0.151	0.177	0.154	0.146	0.145
7.5	0.177	0.202	0.176	0.167	0.164
6.0	0.205	0.229	0.199	0.189	0.184
4.5	0.236	0.259	0.224	0.212	0.205
3.0	0.271	0.292	0.251	0.236	0.226
1.5	0.304	0.319	0.272	0.253	0.241
0.0	0.285	0.289	0.238	0.219	0.204
--	-	-	-	-	-

-15V: Rated Load Current



2.Values

Output Voltage [V]	Load Current [A]				
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-14.3	0.078	0.101	0.085	0.081	0.086
-13.5	0.088	0.111	0.093	0.090	0.094
-12.0	0.107	0.131	0.114	0.108	0.109
-10.5	0.128	0.153	0.133	0.127	0.126
-9.0	0.152	0.177	0.154	0.147	0.145
-7.5	0.179	0.203	0.176	0.167	0.164
-6.0	0.207	0.230	0.200	0.189	0.184
-4.5	0.238	0.260	0.225	0.212	0.205
-3.0	0.271	0.293	0.252	0.236	0.226
-1.5	0.306	0.321	0.273	0.255	0.241
0.0	0.287	0.291	0.239	0.220	0.204
--	-	-	-	-	-

+15V: Rated Load Current



<p>Model MGFW1R54815</p>		<p>Temperature 25°C</p>																																																																													
<p>Item Switching frequency (by Load Current)</p>		<p>Testing Circuitry Figure A</p>																																																																													
<p>Object +/-15V0.05A</p>																																																																															
<p>1.Graph</p> <p> —△— Input Volt. 18V - - - □ - - Input Volt. 24V - · · * · · - · Input Volt. 36V - · · ○ · · - · Input Volt. 48V - - ◇ - - Input Volt. 76V </p> <p>Switching Frequency [kHz]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p> <p>When load current is low, MG operates intermittently, so switching frequency would not become constant.</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="5">Input Current [A]</th> </tr> <tr> <th>Input Volt. 18[V]</th> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.000</td><td>342</td><td>393</td><td>460</td><td>500</td><td>553</td></tr> <tr><td>0.010</td><td>275</td><td>330</td><td>401</td><td>444</td><td>491</td></tr> <tr><td>0.020</td><td>230</td><td>283</td><td>354</td><td>398</td><td>450</td></tr> <tr><td>0.030</td><td>197</td><td>248</td><td>317</td><td>360</td><td>414</td></tr> <tr><td>0.040</td><td>172</td><td>220</td><td>287</td><td>330</td><td>384</td></tr> <tr><td>0.050</td><td>153</td><td>198</td><td>262</td><td>304</td><td>357</td></tr> <tr><td>0.055</td><td>145</td><td>189</td><td>251</td><td>292</td><td>346</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	Input Current [A]					Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.000	342	393	460	500	553	0.010	275	330	401	444	491	0.020	230	283	354	398	450	0.030	197	248	317	360	414	0.040	172	220	287	330	384	0.050	153	198	262	304	357	0.055	145	189	251	292	346	--	-	-	-	-	-	--	-	-	-	-	-	--	-	-	-	-	-	--	-	-	-	-	-
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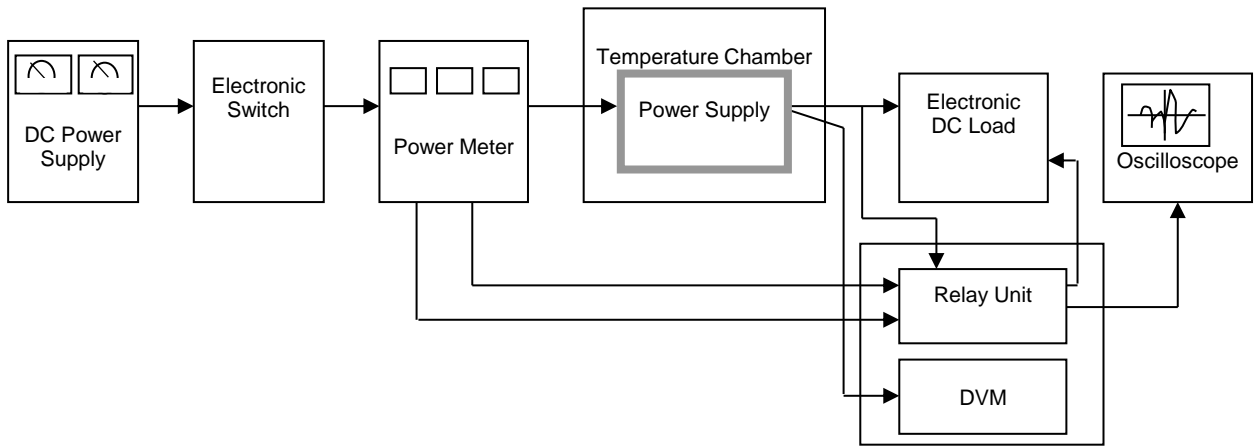


Figure A

Data Acquisition/Control Unit

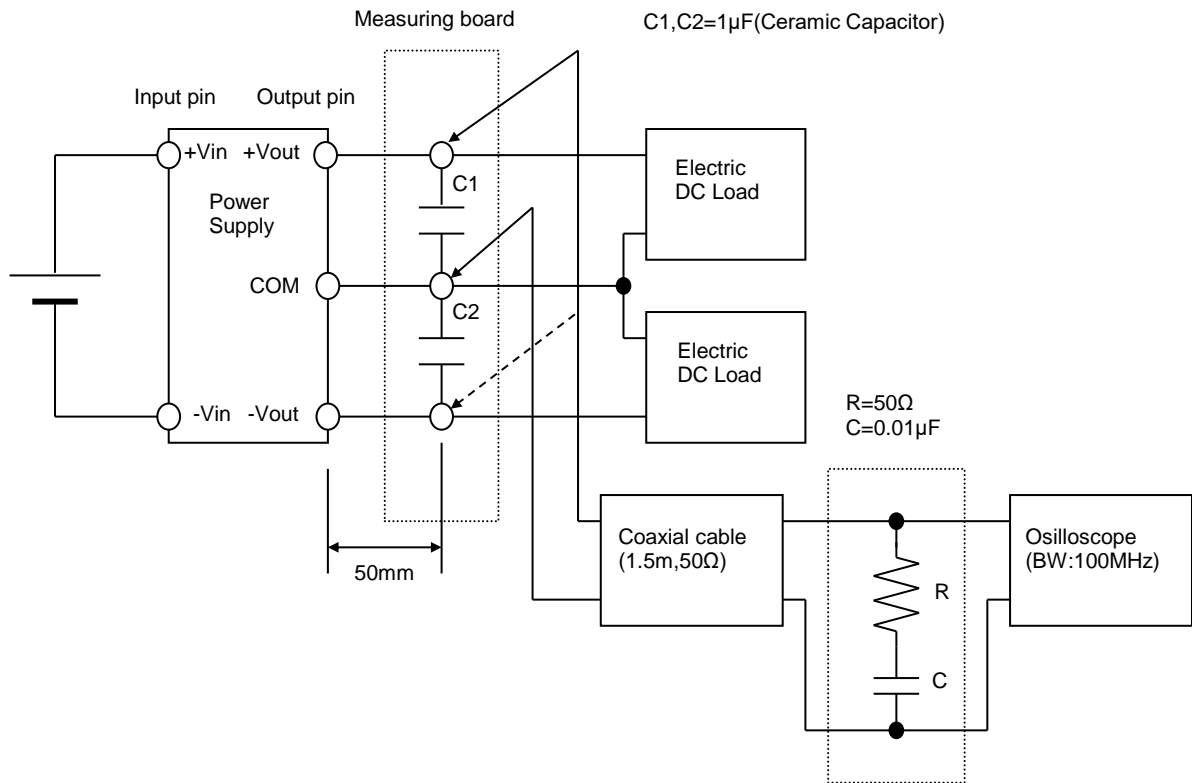


Figure B (Ripple and Ripple noise Characteristic)