

TEST DATA OF MGFS404812

Regulated DC Power Supply
December 7, 2018

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Shohei Mukaide Design Engineer

COSEL CO.,LTD.

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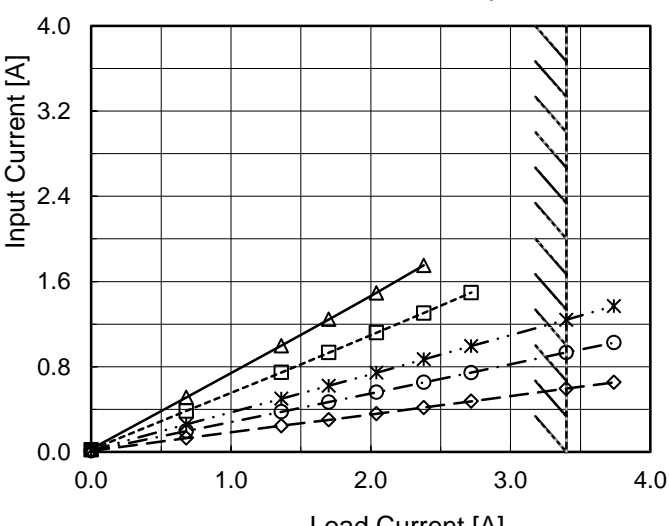
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(Final Page 20)

Model		MGFS404812		Temperature 25°C	
Item		Input Current (by Input Voltage)		Testing Circuitry Figure A	
Object					
1.Graph					
<div><div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div><div><div>Load 100%</div><div>Load 50%</div><div>Load 0%</div></div></div> <div><p>Note: Slanted line shows the range of the rated input voltage.</p></div>					
2.Values					
Input Voltage [V]		Input Current [A]			
		Load 0%	Load 50%	Load 100%	
0.0		0.000	0.000	0.000	
15.2		0.004	0.004	- ※	
15.6		0.004	0.004	- ※	
16.0		0.004	0.004	- ※	
16.4		0.028	1.371	- ※	
16.8		0.028	1.338	- ※	
17.2		0.027	1.303	- ※	
17.6		0.027	1.271	- ※	
18.0		0.026	1.245	- ※	
24.0		0.022	0.933	- ※	
36.0		0.017	0.622	1.241	
48.0		0.011	0.468	0.934	
76.0		0.011	0.302	0.594	
80.0		0.011	0.287	0.557	
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--		-	-	-	
--		-	-	-	
※During this area, overcurrent protection activates and power supply operates in hiccup mode.					

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BC-11323

Model		MGFS404812																																																																														
Item		Input Current (by Load Current)																																																																														
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1.Graph		<div><div><div><div>—△—</div><div>Input Volt.</div><div>18V</div></div><div><div>---□---</div><div>Input Volt.</div><div>24V</div></div><div><div>-·-·*-·-</div><div>Input Volt.</div><div>36V</div></div><div><div>-·-○-</div><div>Input Volt.</div><div>48V</div></div><div><div>---◇---</div><div>Input Volt.</div><div>76V</div></div></div></div>																																																																														
2.Values		<table><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><tr><td>0.00</td><td>0.026</td><td>0.022</td><td>0.017</td><td>0.011</td><td>0.011</td></tr><tr><td>0.68</td><td>0.512</td><td>0.384</td><td>0.258</td><td>0.196</td><td>0.130</td></tr><tr><td>1.36</td><td>0.996</td><td>0.746</td><td>0.500</td><td>0.377</td><td>0.246</td></tr><tr><td>1.70</td><td>1.245</td><td>0.933</td><td>0.622</td><td>0.468</td><td>0.302</td></tr><tr><td>2.04</td><td>1.492</td><td>1.118</td><td>0.744</td><td>0.560</td><td>0.359</td></tr><tr><td>2.38</td><td>1.752</td><td>1.303</td><td>0.869</td><td>0.653</td><td>0.418</td></tr><tr><td>2.72</td><td>- ※1</td><td>1.495</td><td>0.995</td><td>0.745</td><td>0.476</td></tr><tr><td>3.40</td><td>- ※1</td><td>- ※2</td><td>1.241</td><td>0.934</td><td>0.594</td></tr><tr><td>3.74</td><td>- ※1</td><td>- ※2</td><td>1.370</td><td>1.026</td><td>0.653</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></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]	0.00	0.026	0.022	0.017	0.011	0.011	0.68	0.512	0.384	0.258	0.196	0.130	1.36	0.996	0.746	0.500	0.377	0.246	1.70	1.245	0.933	0.622	0.468	0.302	2.04	1.492	1.118	0.744	0.560	0.359	2.38	1.752	1.303	0.869	0.653	0.418	2.72	- ※1	1.495	0.995	0.745	0.476	3.40	- ※1	- ※2	1.241	0.934	0.594	3.74	- ※1	- ※2	1.370	1.026	0.653	--	-	-	-	-	-	--	-	-	-	-	-
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Model		MGFS404812	
Item		Line Regulation	
Object		+12V3.4A	
1.Graph		2.Values	

Model

MGFS404812

Item

Load Regulation

Object

+12V3.4A

1.Graph

—△—

Input Volt.

18V

---□---

Input Volt.

24V

-·-·*-·-

Input Volt.

36V

-·-○-·-

Input Volt.

48V

---◇---

Input Volt.

76V

Output Voltage [V]

12.6

12.4

12.2

12.0

11.8

11.6

0.0

1.0

2.0

3.0

4.0

Load Current [A]

Note: Slanted line shows the range of the 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]
0.00	12.073	12.066	12.061	12.066	12.069
0.68	12.072	12.066	12.062	12.060	12.048
1.36	12.071	12.067	12.063	12.060	12.047
1.70	12.070	12.067	12.066	12.064	12.057
2.04	12.070	12.067	12.064	12.061	12.049
2.38	12.069	12.066	12.065	12.062	12.051
2.72	- ※1	12.066	12.065	12.062	12.053
3.40	- ※1	- ※2	12.066	12.065	12.062
3.74	- ※1	- ※2	12.065	12.063	12.054
--	-	-	-	-	-
--	-	-	-	-	-

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

※2 Maximum output current at 24V input Voltage is 80% of rated load current.

Refer to instruction manuals for details of input derating.

Temperature

25°C

Testing Circuitry

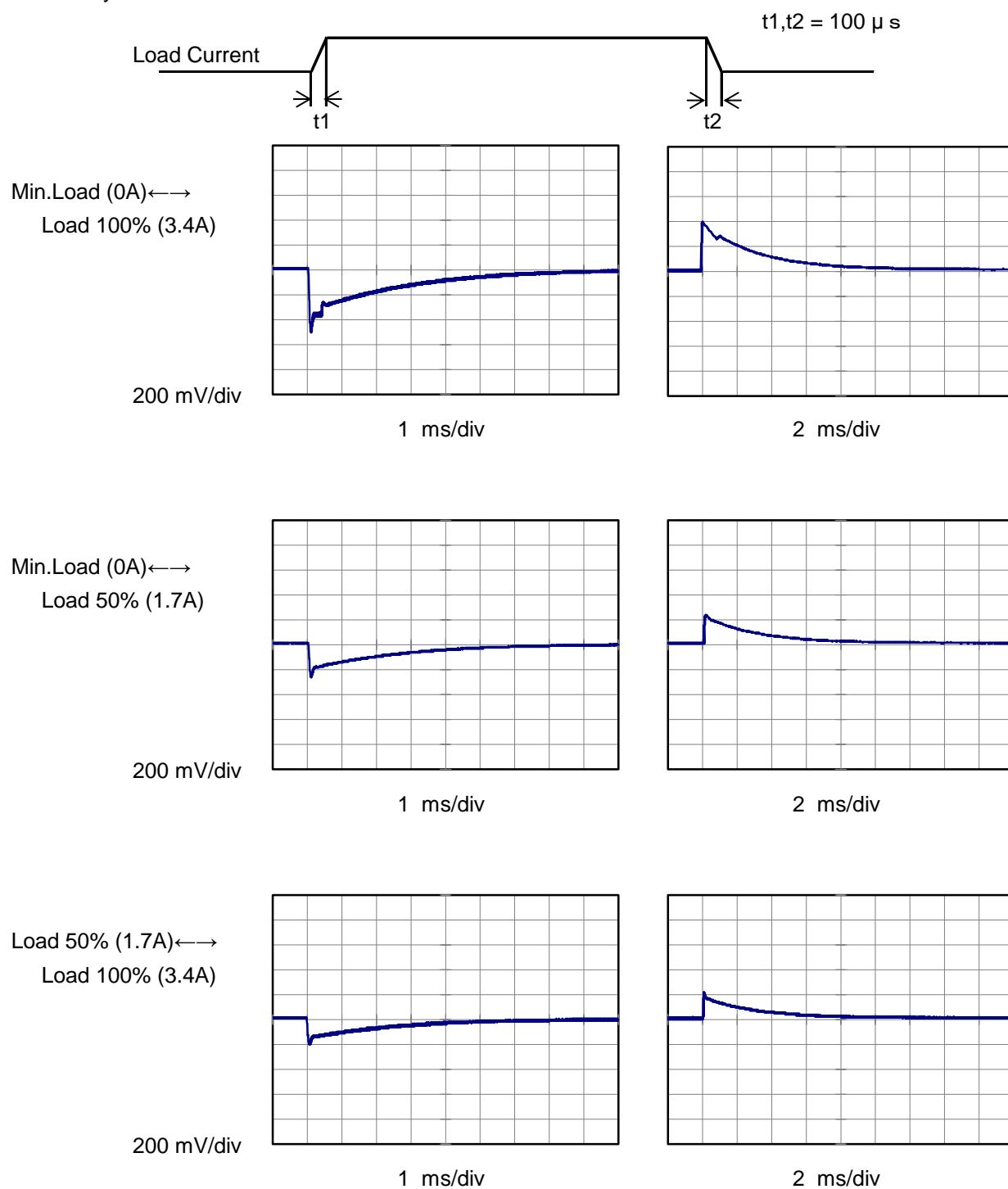
Figure A

BC-11323

COSEL

Model	MGFS404812	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+12V3.4A	

Input Volt. 48 V
Cycle 100 ms

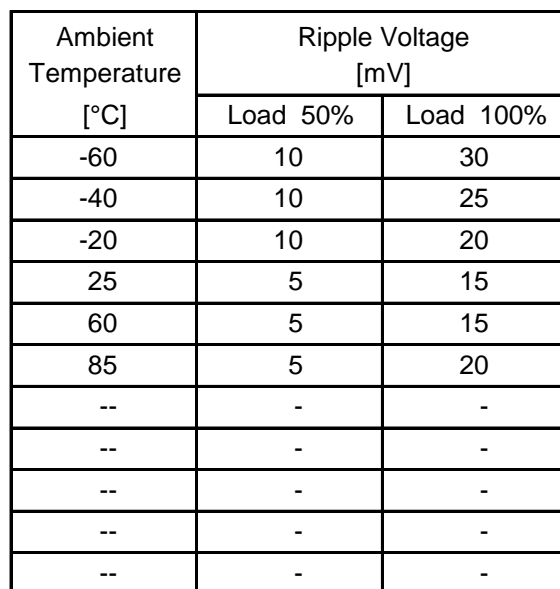


COSCEL																																									
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<div><div><div><div></div><div>Input Volt.</div><div>18V</div></div><div><div></div><div>Input Volt.</div><div>76V</div></div></div><div><p>Ripple Voltage [mV]</p><p>Load Current [A]</p></div></div>		<table><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><tr><td>0.00</td><td>30</td><td>15</td></tr><tr><td>0.68</td><td>5</td><td>10</td></tr><tr><td>1.36</td><td>10</td><td>10</td></tr><tr><td>2.04</td><td>25</td><td>10</td></tr><tr><td>2.38</td><td>40</td><td>10</td></tr><tr><td>2.72</td><td>- ※</td><td>10</td></tr><tr><td>3.40</td><td>- ※</td><td>10</td></tr><tr><td>3.74</td><td>- ※</td><td>15</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></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 18 [V]	Input Volt. 76 [V]	0.00	30	15	0.68	5	10	1.36	10	10	2.04	25	10	2.38	40	10	2.72	- ※	10	3.40	- ※	10	3.74	- ※	15	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 18 [V]	Input Volt. 76 [V]																																							
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<p>Measured by 100 MHz Oscilloscope.</p> <p>Ripple Voltage is shown as p-p in the figure below.</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>																																							
<p>Ripple [mVp-p]</p> <div></div> <p>Fig.Complex Ripple Wave Form</p>																																									

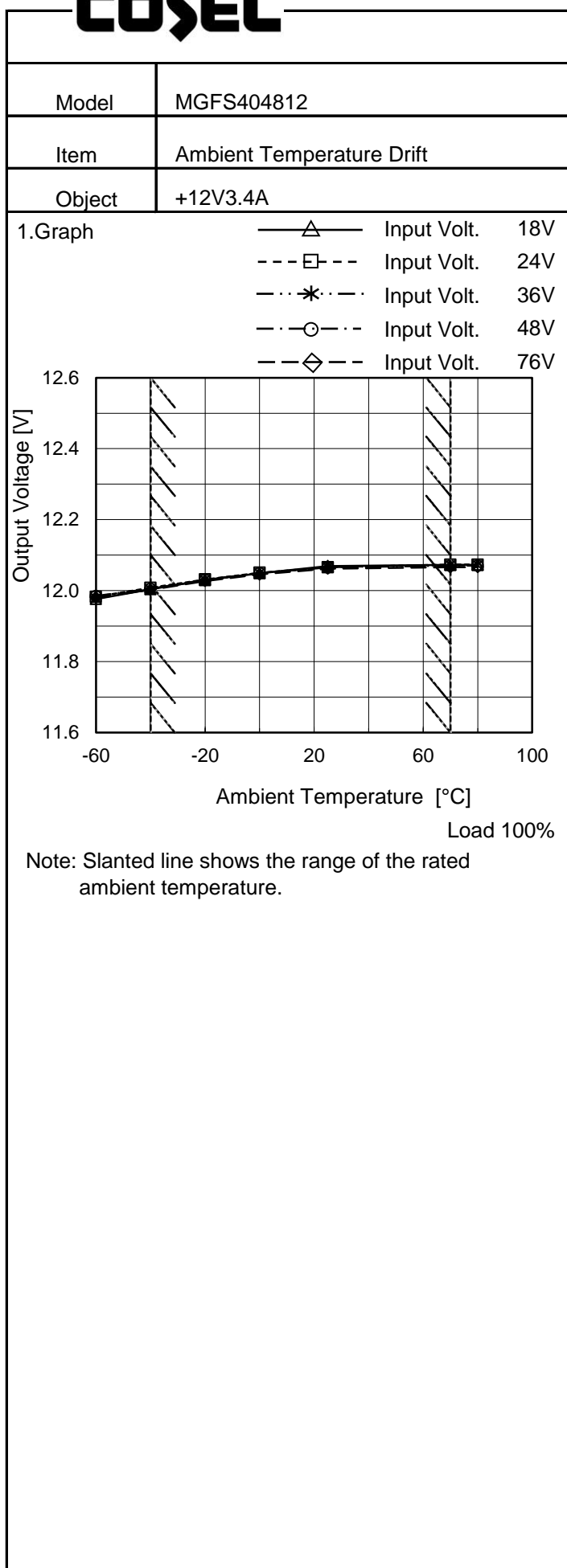
Model		MGFS404812																																							
Item		Ripple-Noise																																							
Object		+12V3.4A																																							
1.Graph		2.Values																																							
<div><div><div>△</div><div>Input Volt.</div><div>18V</div></div><div><div>○</div><div>Input Volt.</div><div>76V</div></div></div> <p>Ripple Voltage [mV]</p> <p>Load Current [A]</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 18 [V]</th><th>Input Volt. 76 [V]</th></tr><tr><td>0.00</td><td>35</td><td>20</td></tr><tr><td>0.68</td><td>30</td><td>30</td></tr><tr><td>1.36</td><td>30</td><td>30</td></tr><tr><td>2.04</td><td>40</td><td>35</td></tr><tr><td>2.38</td><td>45</td><td>35</td></tr><tr><td>2.72</td><td>- ※</td><td>40</td></tr><tr><td>3.40</td><td>- ※</td><td>45</td></tr><tr><td>3.74</td><td>- ※</td><td>45</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></table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 18 [V]	Input Volt. 76 [V]	0.00	35	20	0.68	30	30	1.36	30	30	2.04	40	35	2.38	45	35	2.72	- ※	40	3.40	- ※	45	3.74	- ※	45	--	-	-	--	-	-	--	-	-
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Testing Circuitry Figure B

2.Values



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	11.976	11.983	11.978	11.985	11.981
-40	12.004	12.008	12.003	12.005	12.002
-20	12.030	12.031	12.030	12.031	12.027
0	12.049	12.050	12.049	12.049	12.045
25	12.069	12.066	12.066	12.065	12.062
70	12.072	12.073	12.071	12.070	12.066
80	12.072	12.073	12.071	12.070	12.066
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

Note: In case of input Volt.18V, Load 70%.
 24V, Load 80%.
 Other case Load 100%.

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		Testing Circuitry Figure A
Model	MGFS404812	
Item	Output Voltage Accuracy	
Object	+12V3.4A	

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 - 70°C

Input Voltage : 18 - 76V

Load Current : 0 - 3.4A

* 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

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	70	76	0	12.081	±40	±0.3
Minimum Voltage	-40	36	0	12.001		

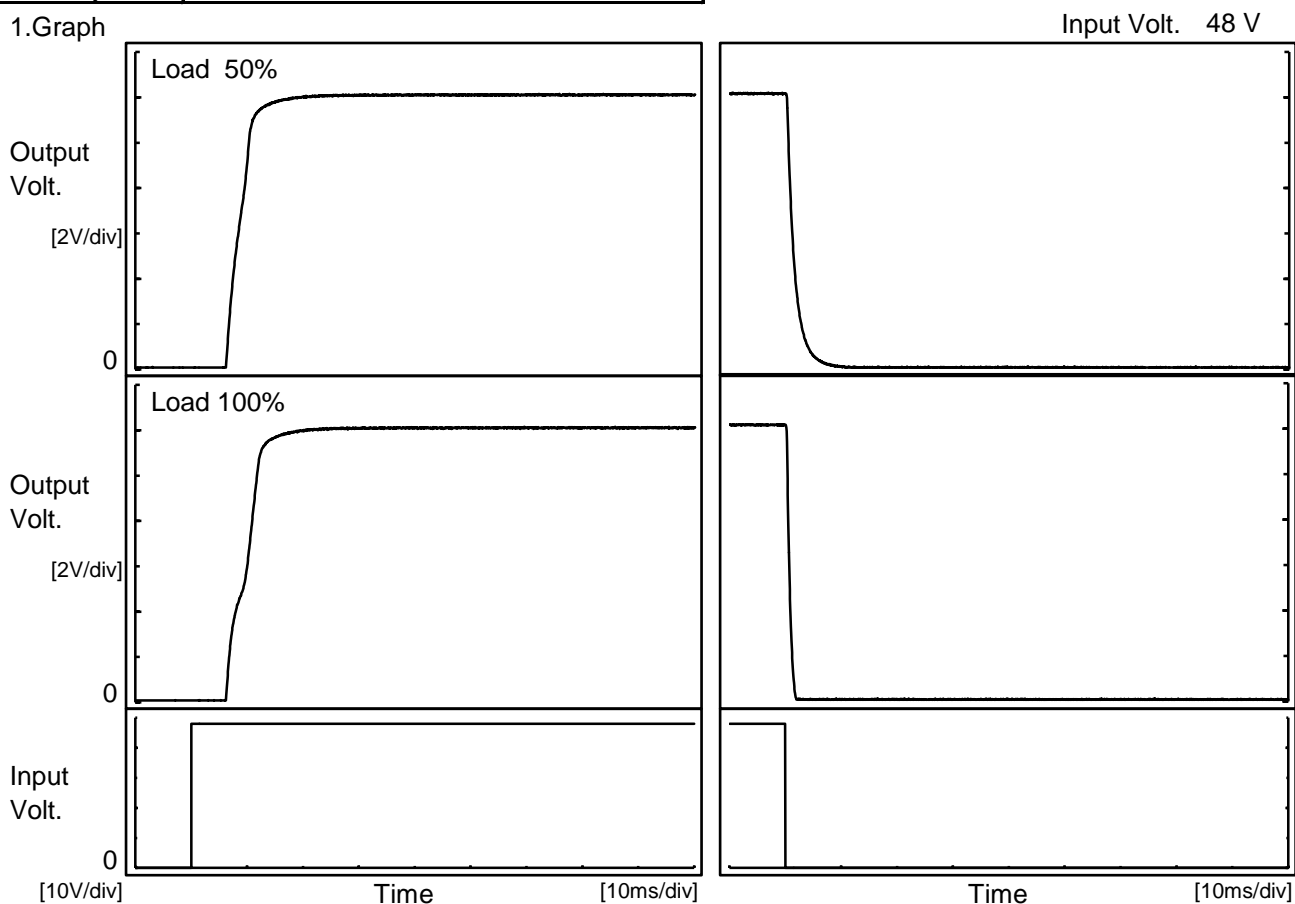


Model		MGFS404812	Temperature25°C Testing CircuitryFigure A
Item		Time Lapse Drift	
Object		+12V3.4A	
1.Graph			2.Values
<div><div><div><div>Output Voltage [V]</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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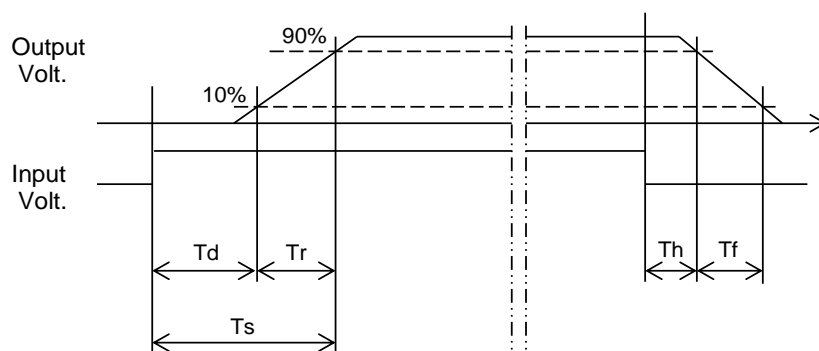
Model	MGFS404812	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V3.4A		

1.Graph

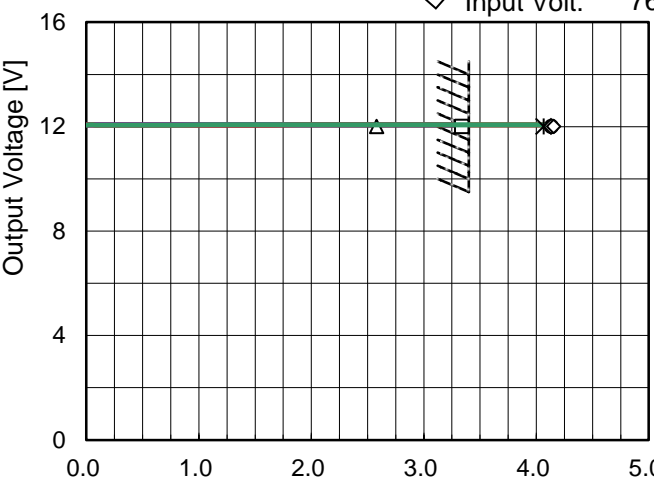


2.Values

		[ms]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		6.6	4.3	10.9	0.4	3.2
100 %		6.6	5.7	12.3	0.3	1.1



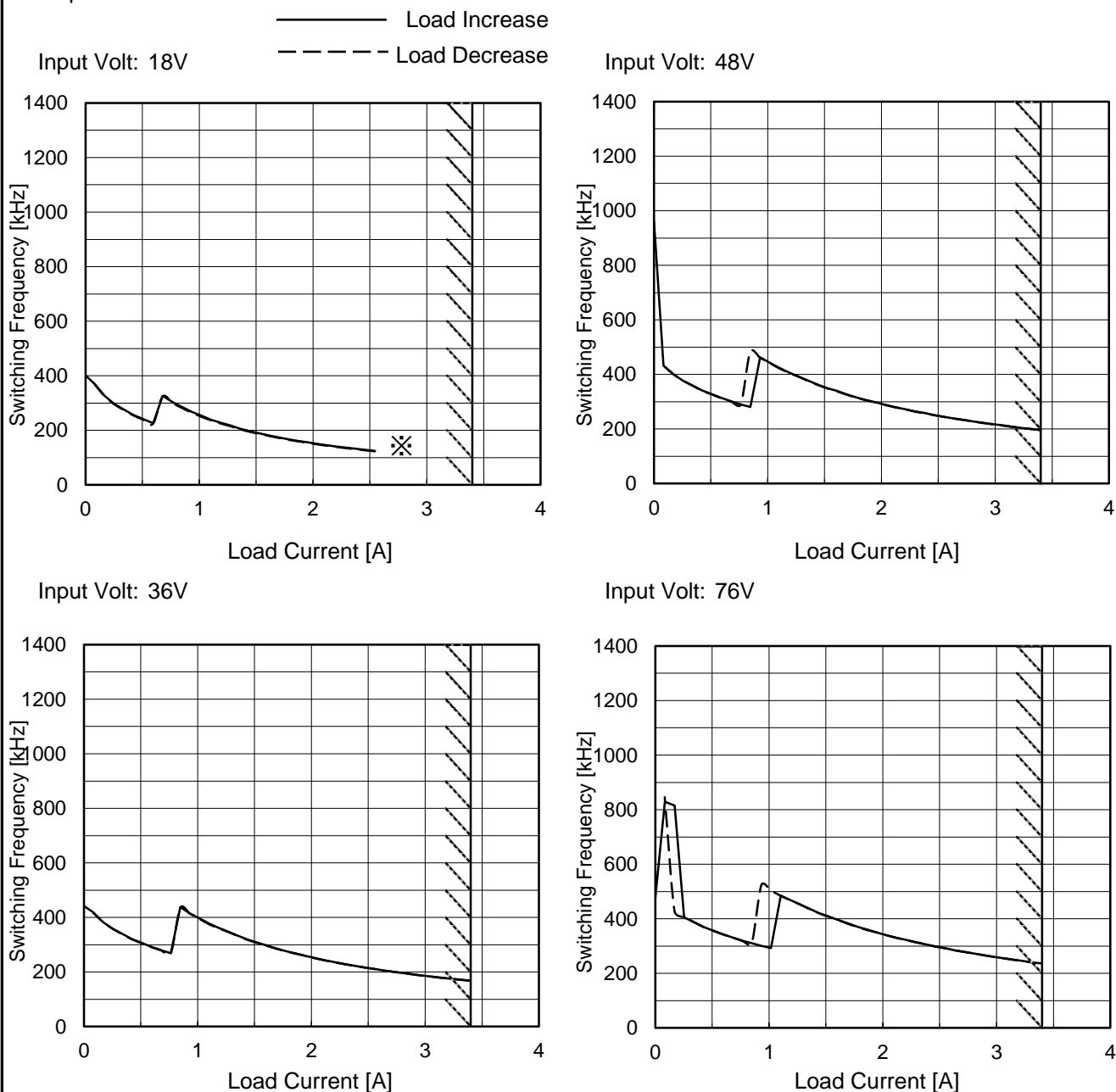
Model	MGFS404812																																								
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																							
Object	+12V3.4A																																								
1.Graph		2.Values																																							
<div><div>---□--- Load 50%</div><div>—△— Load 70%</div></div> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Input Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 70%</th></tr><tr><td>-60</td><td>15.4</td><td>17.1</td></tr><tr><td>-40</td><td>15.2</td><td>16.1</td></tr><tr><td>-20</td><td>15.3</td><td>15.9</td></tr><tr><td>0</td><td>15.2</td><td>15.8</td></tr><tr><td>25</td><td>15.3</td><td>15.6</td></tr><tr><td>70</td><td>15.3</td><td>15.2</td></tr><tr><td>80</td><td>15.2</td><td>15.3</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></table>		Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 70%	-60	15.4	17.1	-40	15.2	16.1	-20	15.3	15.9	0	15.2	15.8	25	15.3	15.6	70	15.3	15.2	80	15.2	15.3	--	-	-	--	-	-	--	-	-	--	-	-
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Model		MGFS404812		Temperature 25°C																																																																																				
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Note: Slanted line shows the range of the rated load current.		Intermittent operation activates when overcurrent protection is activated.																																																																																						
2.Values		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="5">Load 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><tr><td>12.0</td><td>2.580</td><td>3.338</td><td>4.066</td><td>4.135</td><td>4.154</td></tr><tr><td>11.4</td><td>- ※1</td><td>- ※2</td><td>-</td><td>-</td><td>-</td></tr><tr><td>10.8</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>9.6</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>8.4</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>7.2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>6.0</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>4.8</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>3.6</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>2.4</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>1.2</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.0</td><td>-</td><td>-</td><td>-</td><td>-</td><td>-</td></tr></table>		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]	12.0	2.580	3.338	4.066	4.135	4.154	11.4	- ※1	- ※2	-	-	-	10.8	-	-	-	-	-	9.6	-	-	-	-	-	8.4	-	-	-	-	-	7.2	-	-	-	-	-	6.0	-	-	-	-	-	4.8	-	-	-	-	-	3.6	-	-	-	-	-	2.4	-	-	-	-	-	1.2	-	-	-	-	-	0.0	-	-	-	-	-	<div>※1 Maximum output current at minimum input Voltage is 70% of rated load current.</div> <div>※2 Maximum output current at 24V input Voltage is 80% of rated load current.</div> <div>Refer to instruction manuals for details of input derating.</div>	
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Model	MGFS404812		
Item	Overvoltage Protection	Temperature	25°C
Object	+12V3.4A	Testing Circuitry	Figure A
<p>1.Graph</p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□* </p> <p> △□*</p>			

Model	MGFS404812	Temperature	25°C
Item	Switching frequency (by Load Current)	Testing Circuitry	Figure A
Object	12V3.4A		

1. Graph



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

-switching frequency of MG40 changes depending on load current and input voltage.
When load current is low, switching frequency becomes high and step down to low frequency at certain point.
There is hysteresis, so characteristic is different between load increase (sweep from 0% to 100%) and load decrease (sweep from 100% to 0%).

-When load current is low, MG40 operates intermittently, so switching frequency can not be stable.

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

Refer to instruction manuals for details of input derating.

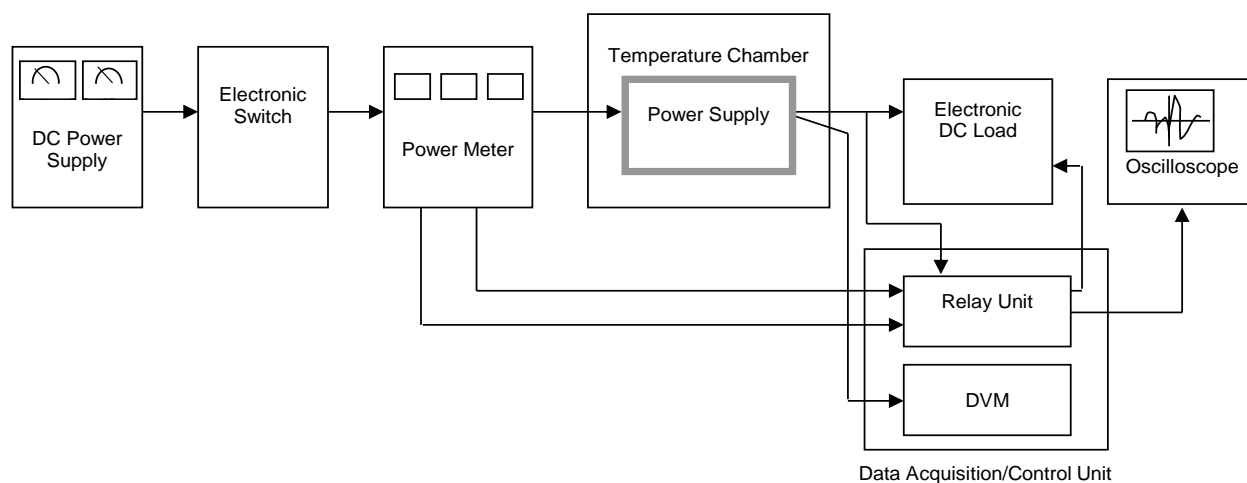


Figure A

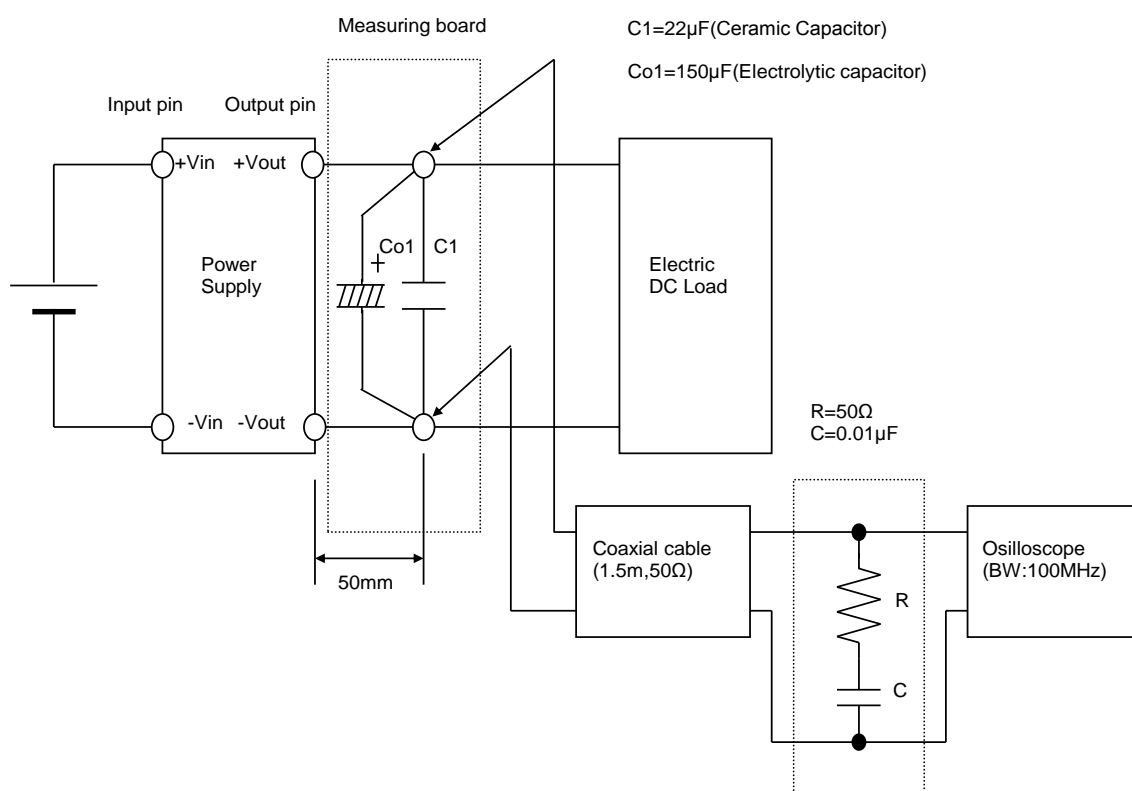


Figure B (Ripple and Ripple noise Characteristic)