

TEST DATA OF MGFW152415

Regulated DC Power Supply
September 16, 2010

Approved by : Kazunari Asano
Kazunari Asano Design Manager

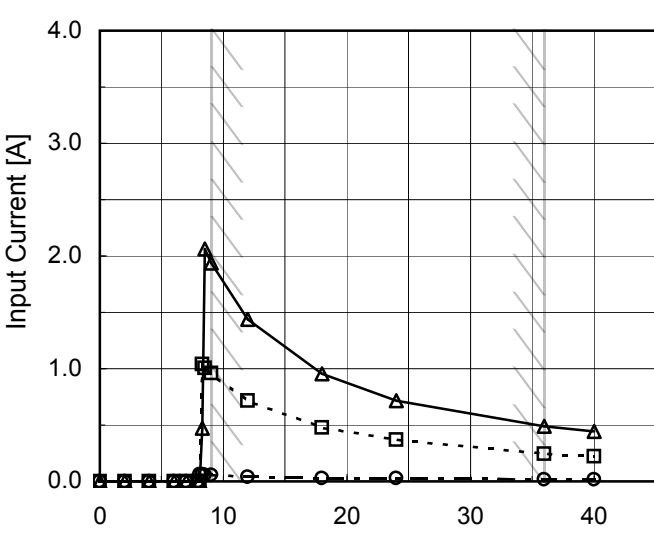
Prepared by : Ryoko Ueda
Ryoko Ueda Design Engineer

COSEL CO.,LTD.

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Model	MGFW152415																																																																																	
Item	Input Current (by Input Voltage)	Temperature	25°C																																																																															
Object		Testing Circuitry	Figure A																																																																															
1.Graph		2.Values																																																																																
<div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div><div><div></div><div></div><div></div></div></div>  <p>Note: Slanted line shows the range of the rated input voltage.</p>		<table><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><tr><td>0.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>2.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>4.0</td><td>0.002</td><td>0.001</td><td>0.001</td></tr><tr><td>6.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>7.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr><tr><td>8.0</td><td>0.003</td><td>0.003</td><td>0.002</td></tr><tr><td>8.1</td><td>0.061</td><td>0.003</td><td>0.002</td></tr><tr><td>8.3</td><td>0.060</td><td>1.038</td><td>0.470</td></tr><tr><td>8.5</td><td>0.059</td><td>1.006</td><td>2.062</td></tr><tr><td>9.0</td><td>0.056</td><td>0.958</td><td>1.935</td></tr><tr><td>12.0</td><td>0.042</td><td>0.715</td><td>1.440</td></tr><tr><td>18.0</td><td>0.029</td><td>0.477</td><td>0.957</td></tr><tr><td>24.0</td><td>0.027</td><td>0.367</td><td>0.719</td></tr><tr><td>36.0</td><td>0.018</td><td>0.245</td><td>0.490</td></tr><tr><td>40.0</td><td>0.016</td><td>0.223</td><td>0.443</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></table>		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	0.002	0.001	0.001	6.0	0.002	0.002	0.002	7.0	0.002	0.002	0.002	8.0	0.003	0.003	0.002	8.1	0.061	0.003	0.002	8.3	0.060	1.038	0.470	8.5	0.059	1.006	2.062	9.0	0.056	0.958	1.935	12.0	0.042	0.715	1.440	18.0	0.029	0.477	0.957	24.0	0.027	0.367	0.719	36.0	0.018	0.245	0.490	40.0	0.016	0.223	0.443	--	-	-	-	--	-	-	-	--	-	-	-
Input Voltage [V]	Input Current [A]																																																																																	
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Model

MGFW152415

Item

Input Current (by Load Current)

Object

1.Graph

△

Input Volt.

9V

□

Input Volt.

12V

*

Input Volt.

18V

○

Input Volt.

24V

◇

Input Volt.

36V

Input Current [A]

2.50

2.00

1.50

1.00

0.50

0.00

0

20

40

60

80

100

120

Load Ratio [%]

2.Values

Load Ration [%]	Input Current [A]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.057	0.042	0.030	0.028	0.017
20	0.412	0.319	0.216	0.164	0.113
40	0.780	0.592	0.395	0.299	0.206
60	1.140	0.862	0.584	0.429	0.299
80	1.529	1.137	0.754	0.577	0.382
100	1.905	1.417	0.939	0.703	0.483
110	2.111	1.563	1.023	0.787	0.526
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

Temperature

25°C

Testing Circuitry

Figure A

BC-10470

Model

MGFW152415

Item

Input Power (by Load Current)

Object

1.Graph

△

Input Volt.

9V

□

Input Volt.

12V

*

Input Volt.

18V

○

Input Volt.

24V

◇

Input Volt.

36V

Input Power [W]

25

20

15

10

5

0

0

20

40

60

80

100

120

Load Ratio [%]

2.Values

Load Ration [%]	Input Power [W]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	0.51	0.50	0.54	0.66	0.61
20	3.71	3.80	3.86	3.93	4.05
40	7.04	7.07	7.11	7.15	7.40
60	10.33	10.33	10.40	10.28	10.73
80	13.73	13.59	13.57	13.76	13.75
100	17.17	17.01	16.94	16.89	17.33
110	18.94	18.72	18.46	18.73	18.91
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

- 3 -

BC-10470

Model	MGFW152415																																		
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Input Voltage [V]	Efficiency [%]																																		
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36.0	84.4	86.4																																	
40.0	84.1	86.0																																	

Model

MGFW152415

Item

Efficiency (by Load Current)

Object

1.Graph

Input Volt. 9V

Input Volt. 12V

Input Volt. 18V

Input Volt. 24V

Input Volt. 36V

Load Ration [%]	9V	12V	18V	24V	36V
0	-	-	-	-	-
20	80.8	78.9	77.7	76.4	74.2
40	85.3	84.7	84.3	84.0	81.1
60	87.1	87.0	86.4	87.4	83.8
80	87.3	88.2	88.4	87.1	87.2
100	87.3	88.1	88.5	88.8	86.5
110	87.1	88.1	89.3	88.1	87.2
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

2.Values

Load Ration [%]	Efficiency [%]				
	Input Volt. 9[V]	Input Volt. 12[V]	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0	-	-	-	-	-
20	80.8	78.9	77.7	76.4	74.2
40	85.3	84.7	84.3	84.0	81.1
60	87.1	87.0	86.4	87.4	83.8
80	87.3	88.2	88.4	87.1	87.2
100	87.3	88.1	88.5	88.8	86.5
110	87.1	88.1	89.3	88.1	87.2
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-
--	-	-	-	-	-

Model	MGFW152415	Temperature 25°C Testing Circuitry Figure A																																	
Item	Line Regulation																																		
Object	+15V0.5A																																		
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Note: Slanted line shows the range of the rated input voltage.																																			

COSEL

Model	MGFW152415						
Item	Load Regulation						
Object	+15V0.5A						
1.Graph		<div><div><div>—△—</div><div>Input Volt.</div><div>9V</div></div><div><div>---□---</div><div>Input Volt.</div><div>12V</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>				2.Values	
<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		MGFW152415	Temperature 25°C Testing Circuitry Figure A
Item		Dynamic Load Response	
Object		+15V0.5A	

Input Volt. 24 V

Other output current rated

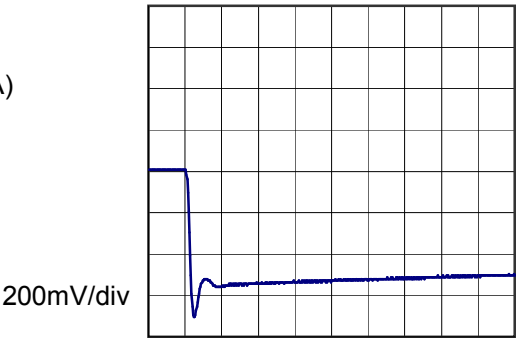
Cycle 1000 ms

$t_1, t_2 = 50\mu\text{s}$

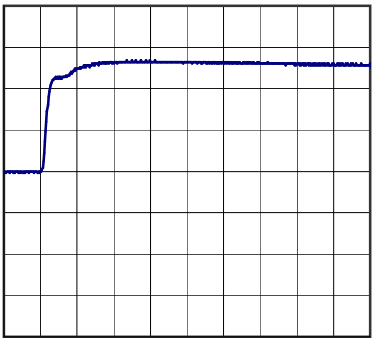


Min. Load (0A) \longleftrightarrow

Load 100% (0.5A)



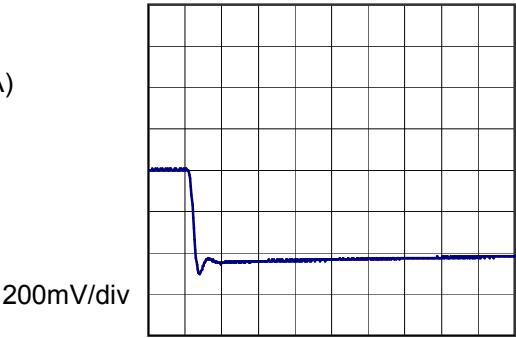
200μs/div



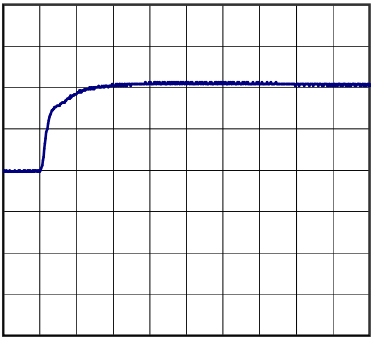
200μs/div

Min. Load (0A) \longleftrightarrow

Load 50% (0.25A)



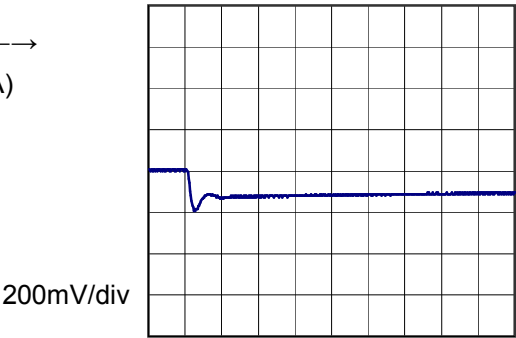
200μs/div



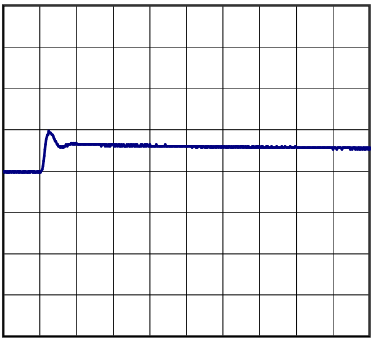
200μs/div

Load 50% (0.25A) \longleftrightarrow

Load 100% (0.5A)



200μs/div



200μs/div

COSEL

Model	MGFW152415	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	-15V0.5A	

Input Volt. 24 V

Other output current rated

Cycle 1000 ms

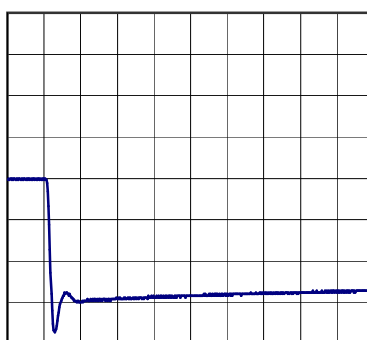
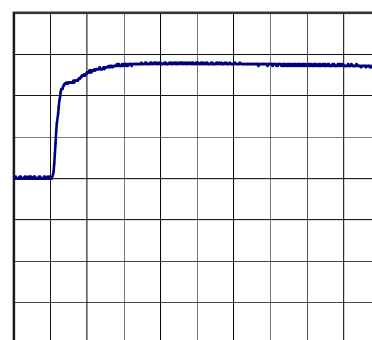
 $t_1, t_2 = 50\mu\text{s}$

Load Current

Min. Load (0A) \longleftrightarrow

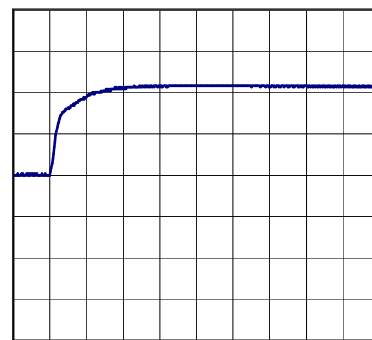
Load 100% (0.5A)

200mV/div

200 μs /div200 μs /divMin. Load (0A) \longleftrightarrow

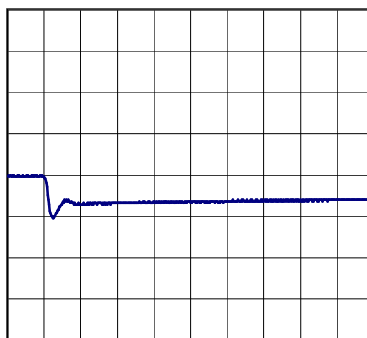
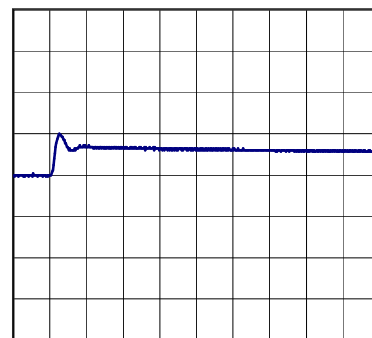
Load 50% (0.25A)

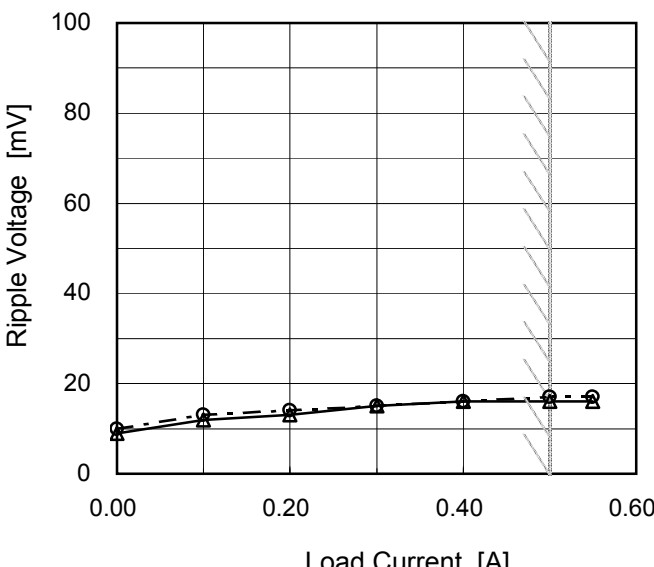
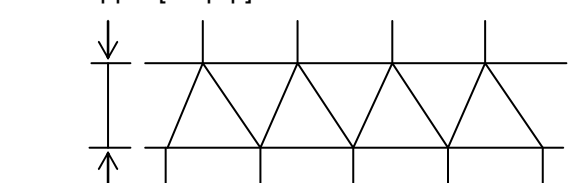
200mV/div

200 μs /div200 μs /divLoad 50% (0.25A) \longleftrightarrow

Load 100% (0.5A)

200mV/div

200 μs /div200 μs /div

Model	MGFW152415																																								
Item	Ripple Voltage (by Load Current)	Temperature	25°C																																						
		Testing Circuitry	Figure B																																						
Object	+15V0.5A																																								
1.Graph		2.Values																																							
<div><div><div>—△—</div><div>Input Volt.</div><div>9V</div></div><div><div>-.-○-.-</div><div>Input Volt.</div><div>36V</div></div></div>  <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>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 9 [V]</th><th>Input Volt. 36 [V]</th></tr><tr><td>0.00</td><td>9</td><td>10</td></tr><tr><td>0.10</td><td>12</td><td>13</td></tr><tr><td>0.20</td><td>13</td><td>14</td></tr><tr><td>0.30</td><td>15</td><td>15</td></tr><tr><td>0.40</td><td>16</td><td>16</td></tr><tr><td>0.50</td><td>16</td><td>17</td></tr><tr><td>0.55</td><td>16</td><td>17</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> <p>-15V: Rated output current</p>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 9 [V]	Input Volt. 36 [V]	0.00	9	10	0.10	12	13	0.20	13	14	0.30	15	15	0.40	16	16	0.50	16	17	0.55	16	17	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 9 [V]	Input Volt. 36 [V]																																							
0.00	9	10																																							
0.10	12	13																																							
0.20	13	14																																							
0.30	15	15																																							
0.40	16	16																																							
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--	-	-																																							
<div>Ripple [mVp-p]</div>  <p>Fig.Complex Ripple Wave Form</p>																																									

Model		MGFW152415		Temperature 25°C																																							
Item		Ripple Voltage (by Load Current)		Testing Circuitry Figure B																																							
Object		-15V0.5A																																									
1.Graph				2.Values																																							
<div><div><div>—△— Input Volt. 9V</div><div>- -○- - Input Volt. 36V</div></div><div>Ripple Voltage [mV]</div><div>Load Current [A]</div></div> <div>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.</div> <div><div>Ripple [mVp-p]</div><div>Fig.Complex Ripple Wave Form</div></div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 9 [V]</th><th>Input Volt. 36 [V]</th></tr><tr><td>0.00</td><td>6</td><td>6</td></tr><tr><td>0.10</td><td>8</td><td>9</td></tr><tr><td>0.20</td><td>12</td><td>12</td></tr><tr><td>0.30</td><td>15</td><td>15</td></tr><tr><td>0.40</td><td>18</td><td>17</td></tr><tr><td>0.50</td><td>20</td><td>19</td></tr><tr><td>0.55</td><td>22</td><td>20</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> <div>+15V: Rated output current</div>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 9 [V]	Input Volt. 36 [V]	0.00	6	6	0.10	8	9	0.20	12	12	0.30	15	15	0.40	18	17	0.50	20	19	0.55	22	20	--	-	-	--	-	-	--	-	-	--	-	-
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Model	MGFW152415																																								
Item	Ripple-Noise	Temperature	25°C																																						
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Model	MGFW152415																																								
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Model	MGFW152415	Testing Circuitry Figure B																																							
Item	Ripple Voltage (by Ambient Temp.)																																								
Object	+15V0.5A																																								
1.Graph		2.Values																																							
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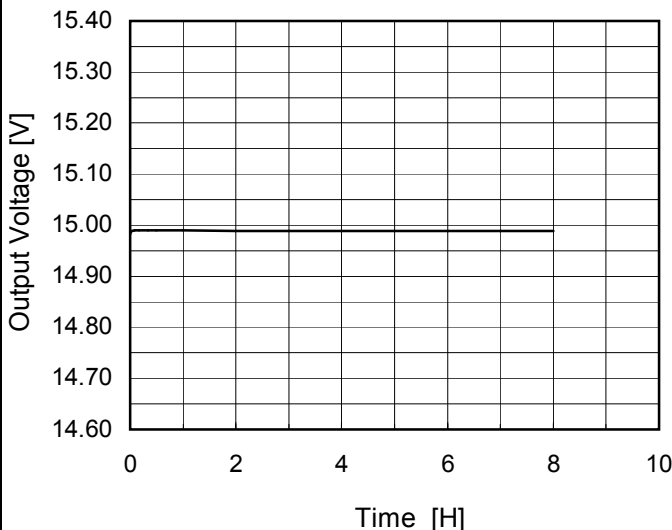
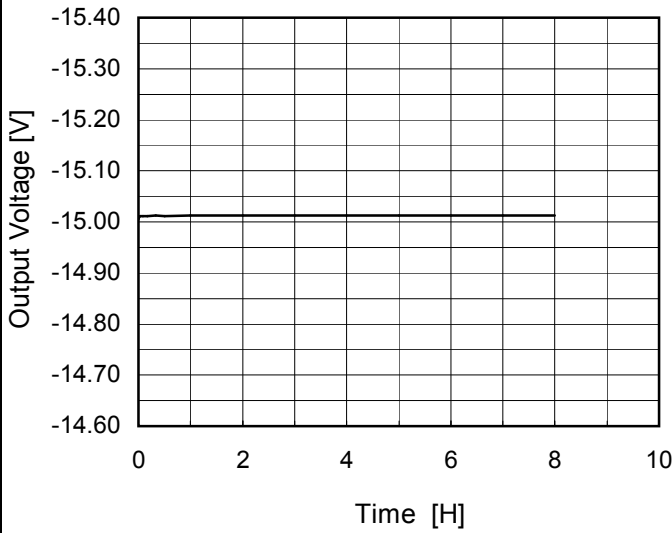
BC-10470

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

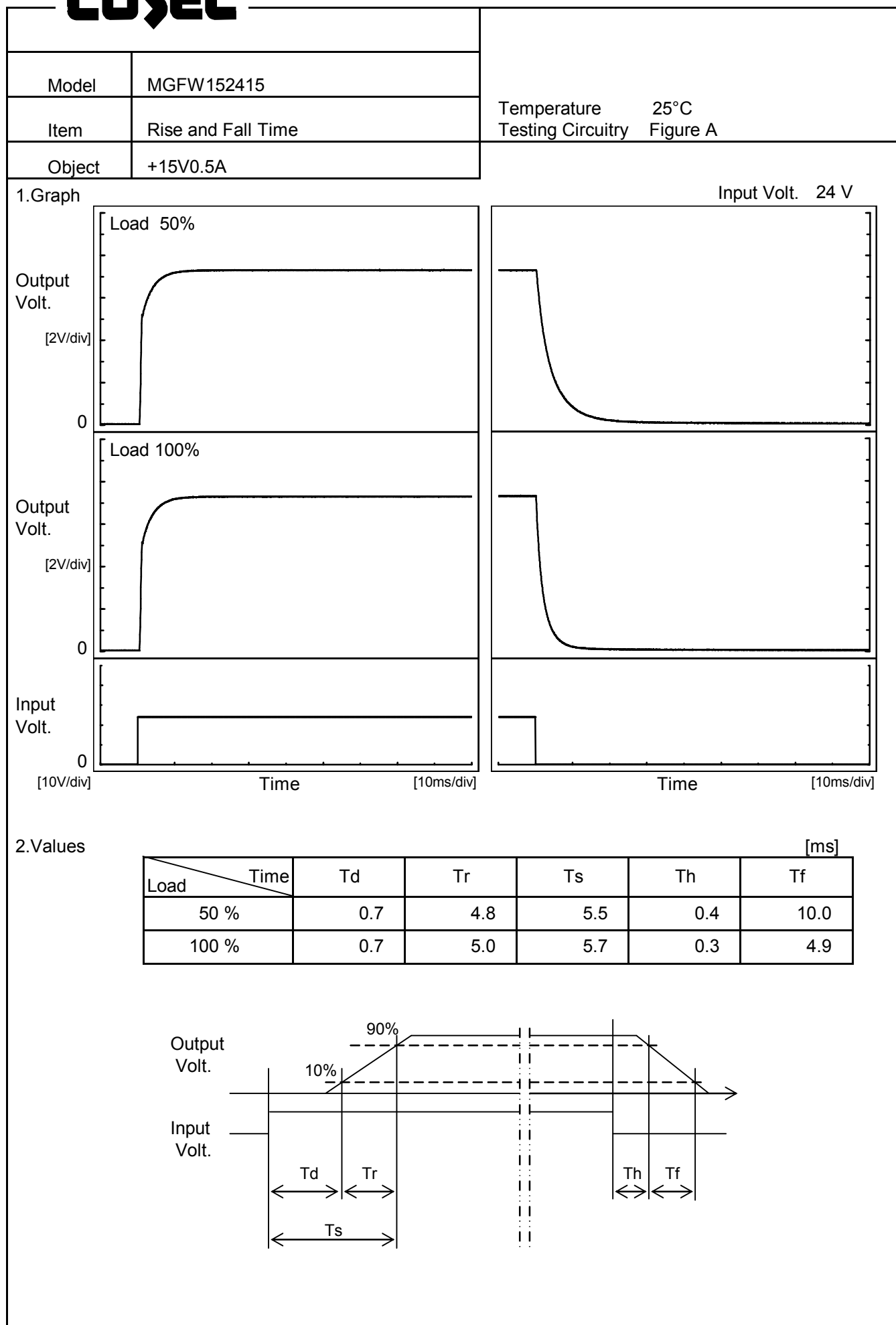
Object	+15V0.5A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	9	0	15.540	±299	±2.0
Minimum Voltage	-40	9	0.5	14.942		

Object	-15V0.5A					
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	9	0	-15.567	±310	±2.1
Minimum Voltage	-40	9	0.5	-14.948		

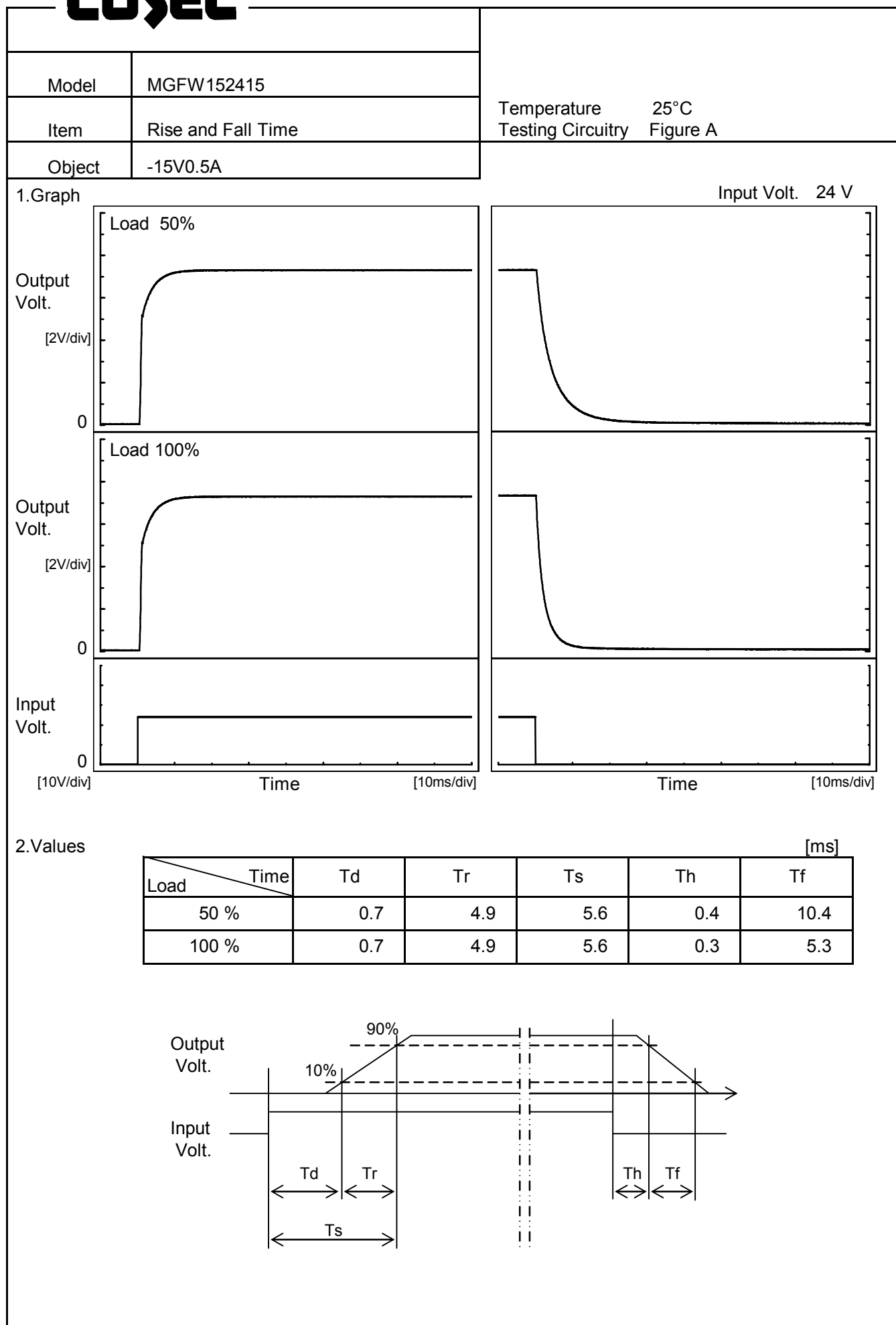
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Model	MGFW152415																								
Item	Time Lapse Drift																								
Object	+15V0.5A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 24V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>14.983</td></tr><tr><td>0.5</td><td>14.990</td></tr><tr><td>1.0</td><td>14.989</td></tr><tr><td>2.0</td><td>14.989</td></tr><tr><td>3.0</td><td>14.989</td></tr><tr><td>4.0</td><td>14.989</td></tr><tr><td>5.0</td><td>14.989</td></tr><tr><td>6.0</td><td>14.989</td></tr><tr><td>7.0</td><td>14.989</td></tr><tr><td>8.0</td><td>14.989</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	14.983	0.5	14.990	1.0	14.989	2.0	14.989	3.0	14.989	4.0	14.989	5.0	14.989	6.0	14.989	7.0	14.989	8.0	14.989
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COSEL



COSEL



Model	MGFW152415	Testing Circuitry Figure A																																							
Item	Minimum Input Voltage for Regulated Output Voltage																																								
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BC-10470

Model	MGFW152415																																																																																								
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Note: Slanted line shows the range of the rated load current. Intermittent operation occurs when overcurrent protection is activated.																																																																																									

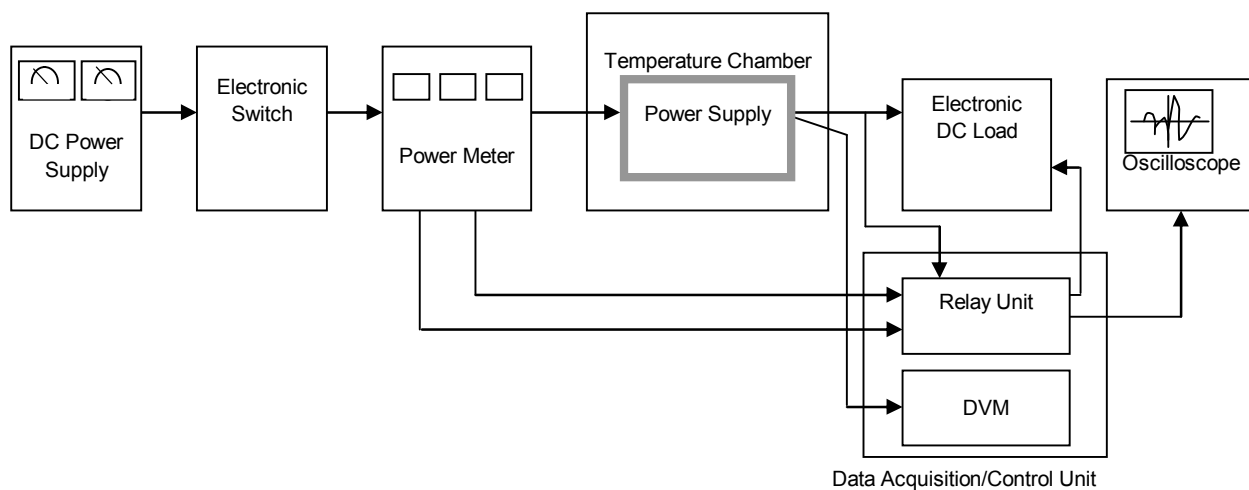


Figure A

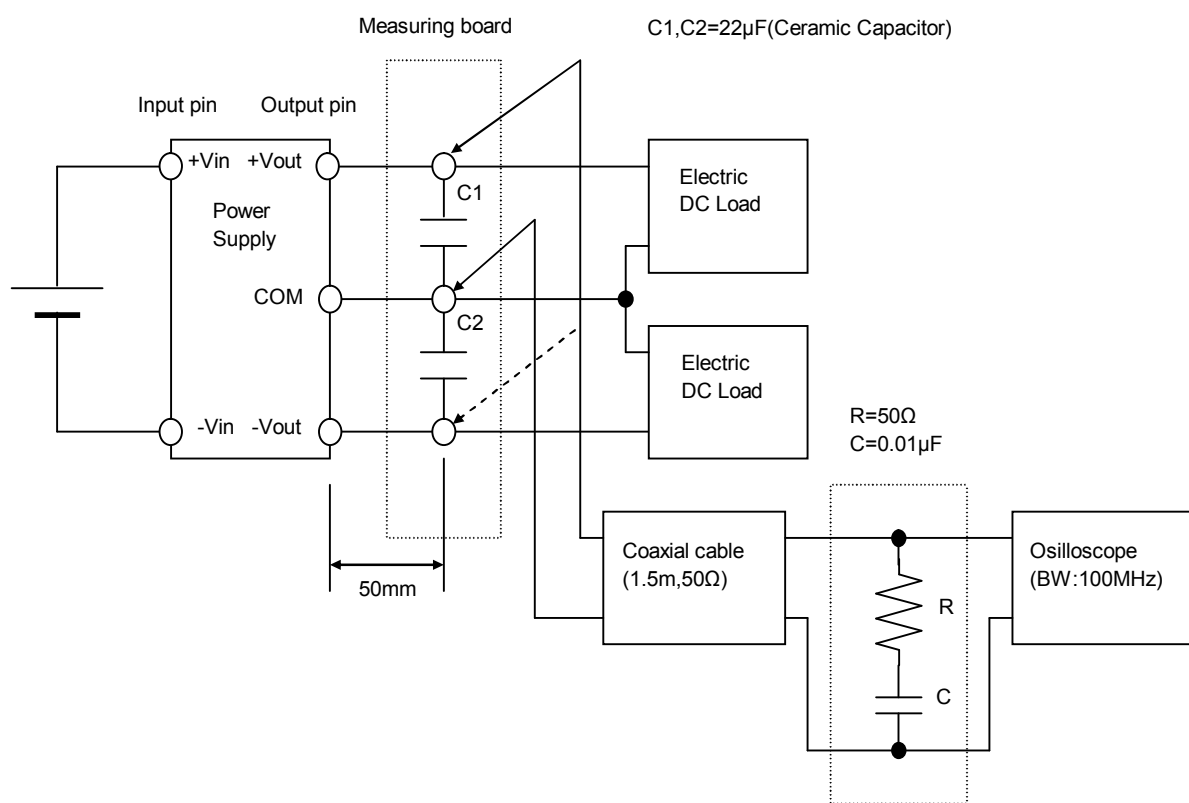


Figure B (Ripple and Ripple noise Characteristic)