

# TEST DATA OF BRFS50L

Regulated DC Power Supply  
November 21, 2013

Approved by : Yoshimichi Hirokawa  
Yoshimichi Hirokawa                                  Design Manager

Prepared by : Shohei Mukaide  
Shohei Mukaide                                  Design Engineer

**COSEL CO.,LTD.**



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Model	BRFS50L	Temperature	25°C																																																																															
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<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Input Voltage [V] on the x-axis (4 to 14). 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. A vertical slanted line indicates 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>4.5</td><td>91.7</td><td>88.3</td></tr> <tr><td>5.0</td><td>91.7</td><td>88.4</td></tr> <tr><td>8.0</td><td>90.6</td><td>88.5</td></tr> <tr><td>10.0</td><td>89.8</td><td>88.2</td></tr> <tr><td>12.0</td><td>88.9</td><td>88.0</td></tr> <tr><td>14.0</td><td>87.9</td><td>87.4</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	4.5	91.7	88.3	5.0	91.7	88.4	8.0	90.6	88.5	10.0	89.8	88.2	12.0	88.9	88.0	14.0	87.9	87.4
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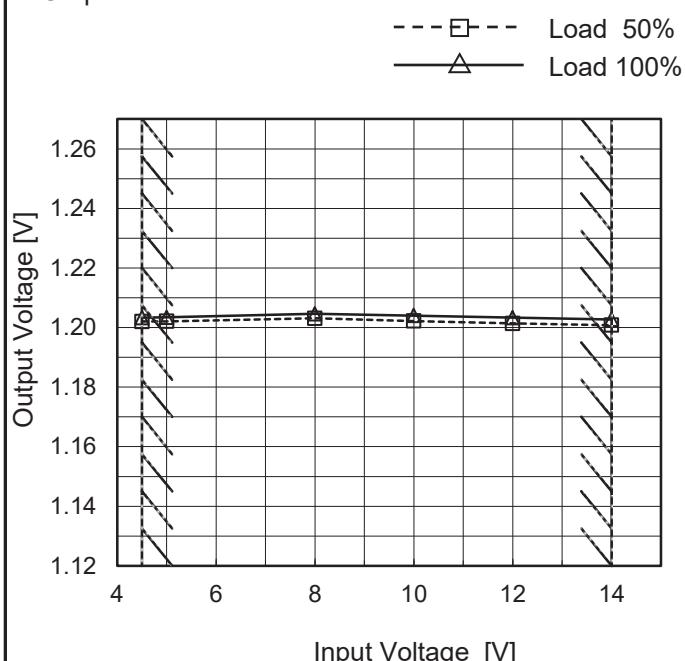
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Model	BRFS50L
Item	Line Regulation
Object	+1.2V50A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



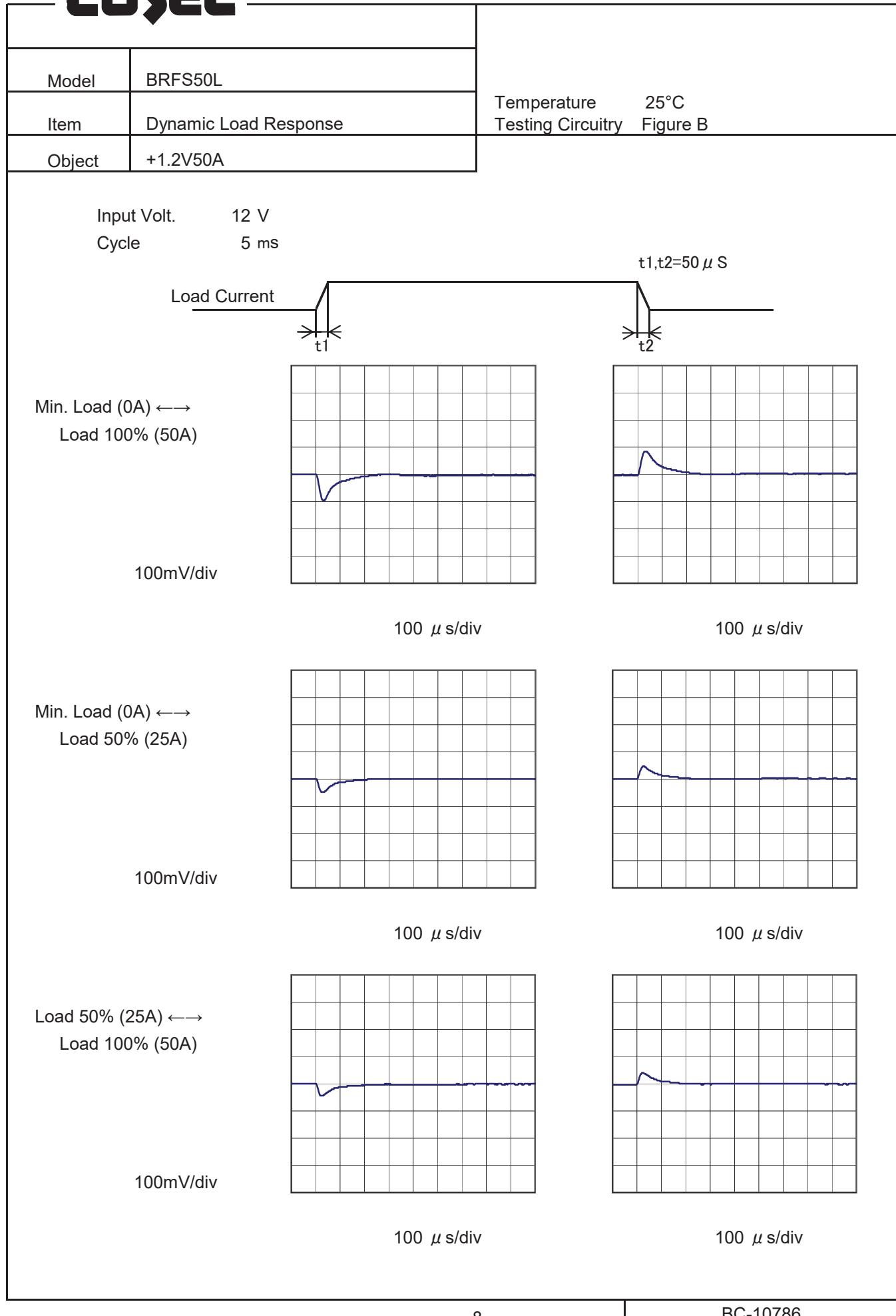
## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
4.5	1.202	1.203
5.0	1.202	1.203
8.0	1.203	1.205
10.0	1.202	1.204
12.0	1.201	1.203
14.0	1.201	1.203
--	-	-
--	-	-
--	-	-

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

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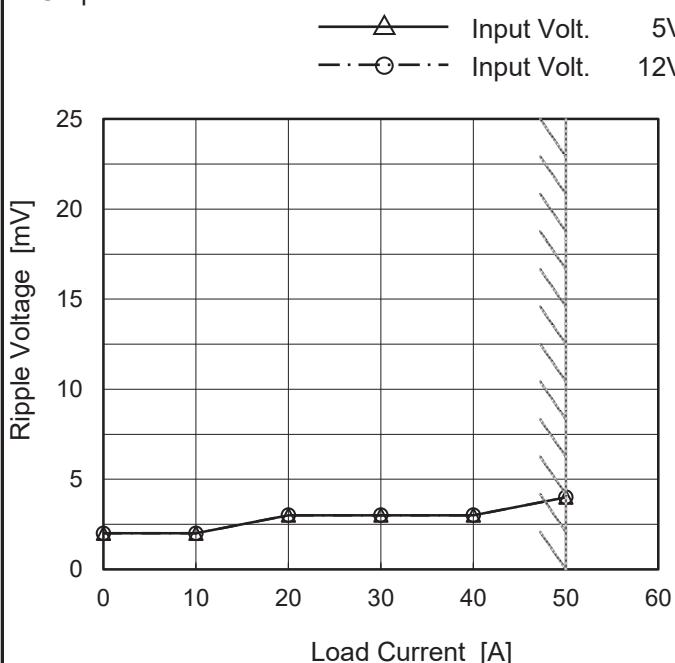
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Model	BRFS50L
Item	Ripple Voltage (by Load Current)
Object	+1.2V50A

Temperature 25°C  
Testing Circuitry Figure C

## 1.Graph



## 2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 5 [V]	Input Volt. 12 [V]
0	2	2
10	2	2
20	3	3
30	3	3
40	3	3
50	4	4
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

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

Ripple [mVp-p]

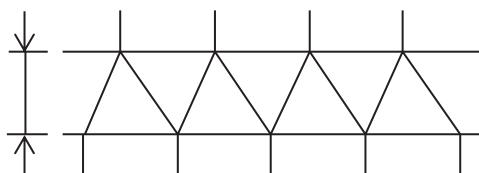


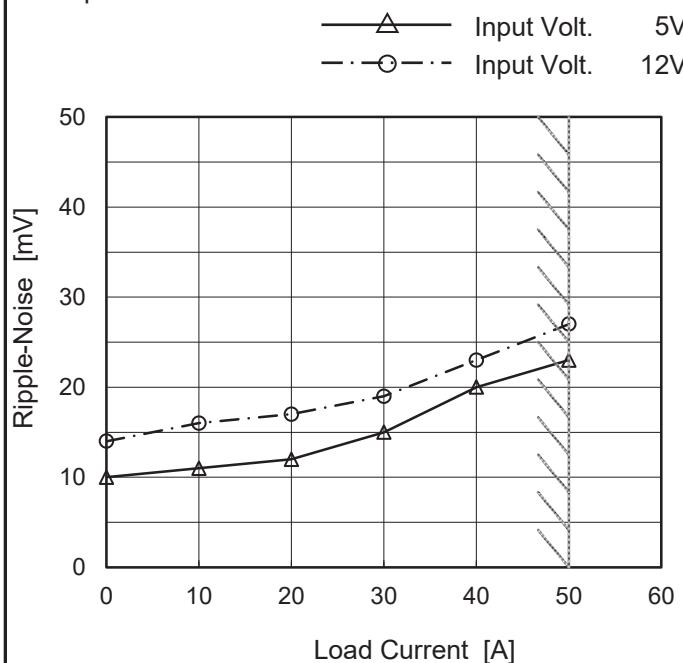
Fig.Complex Ripple Wave Form

**COSEL**

Model	BRFS50L
Item	Ripple-Noise
Object	+1.2V50A

Temperature 25°C  
Testing Circuitry Figure C

## 1.Graph



## 2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 5 [V]	Input Volt. 12 [V]
0	10	14
10	11	16
20	12	17
30	15	19
40	20	23
50	23	27
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

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

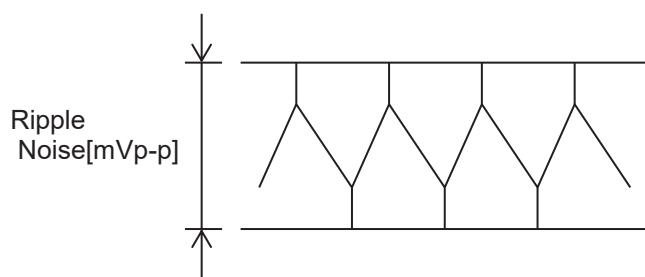


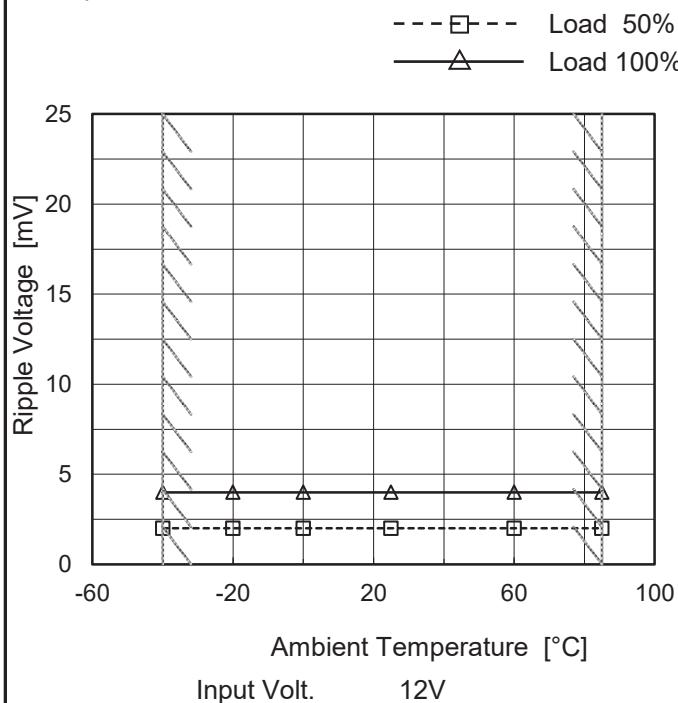
Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	BRFS50L
Item	Ripple Voltage (by Ambient Temp.)
Object	+1.2V50A

Testing Circuitry Figure C

## 1. Graph



## 2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	2	4
-20	2	4
0	2	4
25	2	4
60	2	4
85	2	4
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

Ripple [mVp-p]

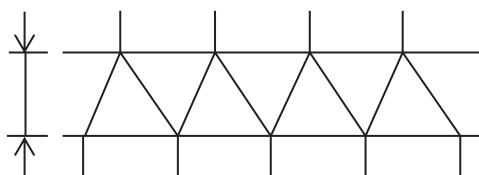


Fig.Complex Ripple Wave Form

**COSEL**

Model	BRFS50L	Testing Circuitry Figure A																																																					
Item	Ambient Temperature Drift																																																						
Object	+1.2V50A																																																						
1.Graph	<p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> <ul style="list-style-type: none"> <li>— △ — Input Volt. 4.5V</li> <li>- - □ - - Input Volt. 12V</li> <li>- · ○ - - Input Volt. 14V</li> </ul>																																																						
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 14[V]</th> </tr> </thead> <tbody> <tr> <td>-40</td><td>1.200</td><td>1.199</td><td>1.199</td></tr> <tr> <td>-20</td><td>1.202</td><td>1.201</td><td>1.201</td></tr> <tr> <td>0</td><td>1.203</td><td>1.202</td><td>1.201</td></tr> <tr> <td>25</td><td>1.204</td><td>1.204</td><td>1.204</td></tr> <tr> <td>60</td><td>1.208</td><td>1.208</td><td>1.208</td></tr> <tr> <td>85</td><td>1.209</td><td>1.209</td><td>1.209</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> <tr> <td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>				Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 4.5[V]	Input Volt. 12[V]	Input Volt. 14[V]	-40	1.200	1.199	1.199	-20	1.202	1.201	1.201	0	1.203	1.202	1.201	25	1.204	1.204	1.204	60	1.208	1.208	1.208	85	1.209	1.209	1.209	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Note:	Slanted line shows the range of the rated ambient temperature.																																																						



Model	BRFS50L	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+1.2V50A	

### 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 : 4.5 - 14V

Load Current : 0 - 50A

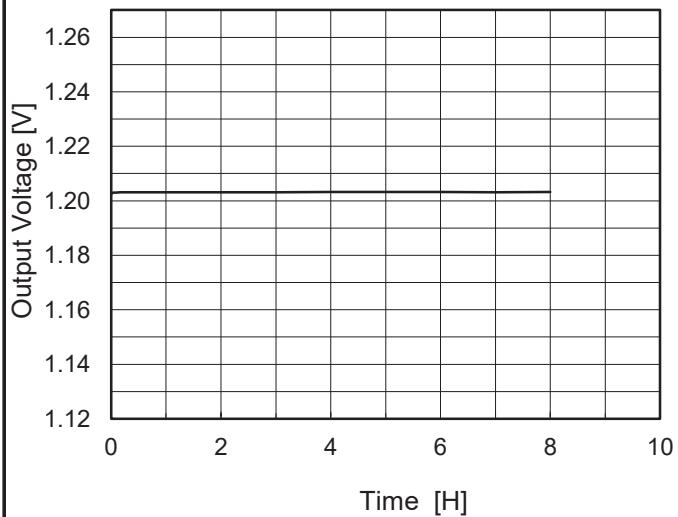
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	85	14	50	1.209	$\pm 6$	$\pm 0.5$
Minimum Voltage	-40	14	0	1.197		

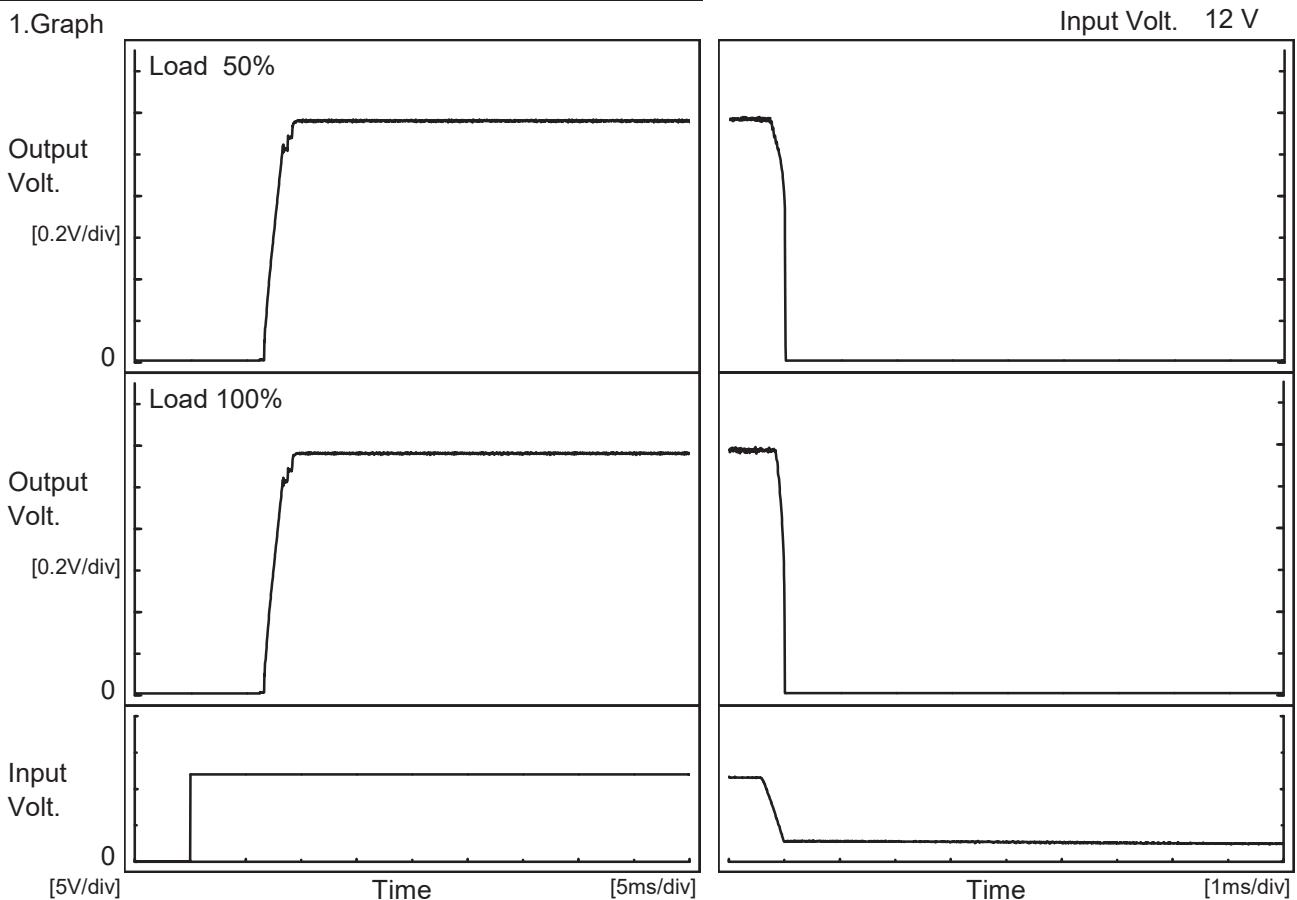
**COSEL**

Model	BRFS50L	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+1.2V50A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 12V 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>1.203</td></tr> <tr><td>0.5</td><td>1.203</td></tr> <tr><td>1.0</td><td>1.203</td></tr> <tr><td>2.0</td><td>1.203</td></tr> <tr><td>3.0</td><td>1.203</td></tr> <tr><td>4.0</td><td>1.203</td></tr> <tr><td>5.0</td><td>1.203</td></tr> <tr><td>6.0</td><td>1.203</td></tr> <tr><td>7.0</td><td>1.203</td></tr> <tr><td>8.0</td><td>1.203</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	1.203	0.5	1.203	1.0	1.203	2.0	1.203	3.0	1.203	4.0	1.203	5.0	1.203	6.0	1.203	7.0	1.203	8.0	1.203
Time since start [H]	Output Voltage [V]																								
0.0	1.203																								
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8.0	1.203																								

**COSEL**

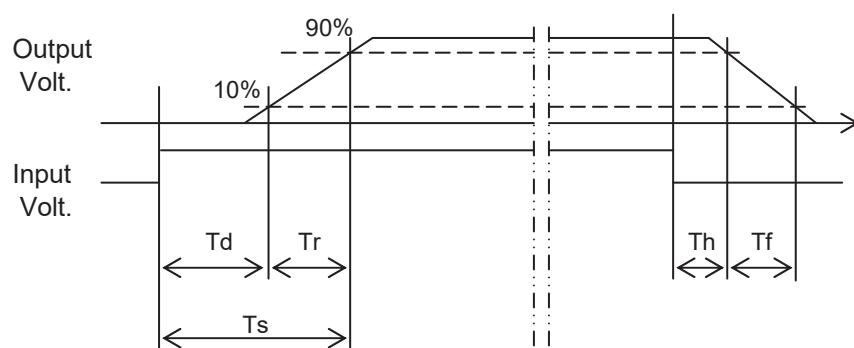
Model	BRFS50L	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+1.2V50A		

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		6.8	2.1	8.9	0.1	0.2	
100 %		6.8	2.1	8.9	0.1	0.2	

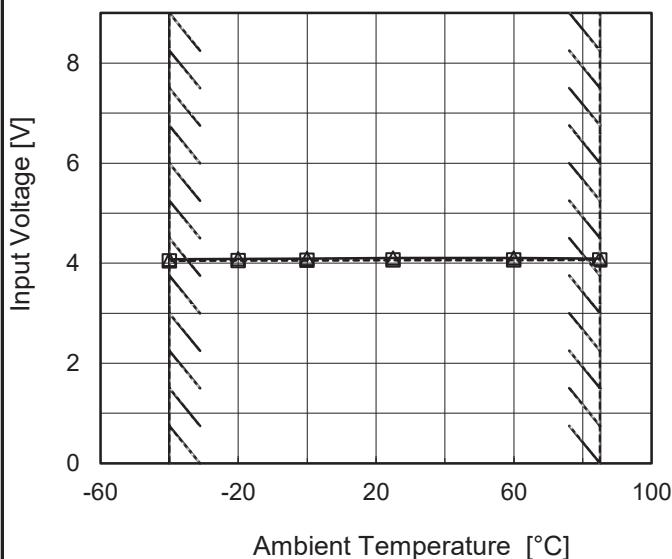


**COSEL**

Model	BRFS50L
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+1.2V50A

## 1.Graph

--- □ --- Load 50%  
— ▲ — Load 100%



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

## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	4.05	4.08
-20	4.06	4.09
0	4.06	4.10
25	4.06	4.11
60	4.07	4.11
85	4.07	4.10
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



Model	BRFS50L	Temperature	25°C																																																								
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																								
Object	+1.2V50A																																																										
1.Graph		—△— Input Volt. 4.5V —□— Input Volt. 12V —○— Input Volt. 14V																																																									
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<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 4.5[V]</th> <th>Input Volt. 12[V]</th> <th>Input Volt. 14[V]</th> </tr> </thead> <tbody> <tr> <td>1.20</td><td>57.10</td><td>56.98</td><td>56.91</td></tr> <tr> <td>1.14</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>1.08</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.96</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.84</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.72</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.60</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.48</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.36</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.24</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>0.12</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. 4.5[V]	Input Volt. 12[V]	Input Volt. 14[V]	1.20	57.10	56.98	56.91	1.14	-	-	-	1.08	-	-	-	0.96	-	-	-	0.84	-	-	-	0.72	-	-	-	0.60	-	-	-	0.48	-	-	-	0.36	-	-	-	0.24	-	-	-	0.12	-	-	-	0.00	-	-	-		
Output Voltage [V]		Load Current [A]																																																									
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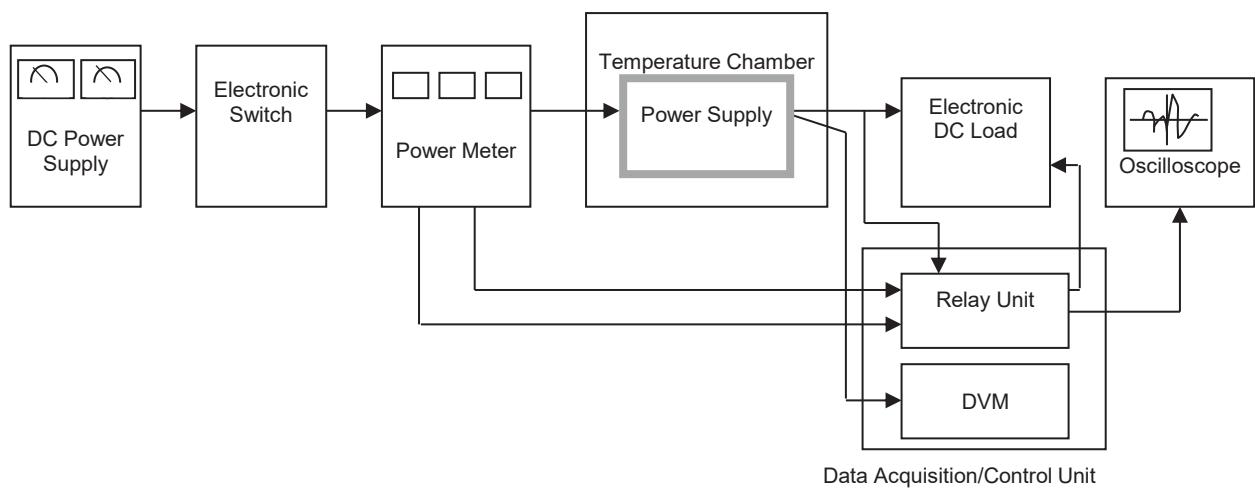


Figure A

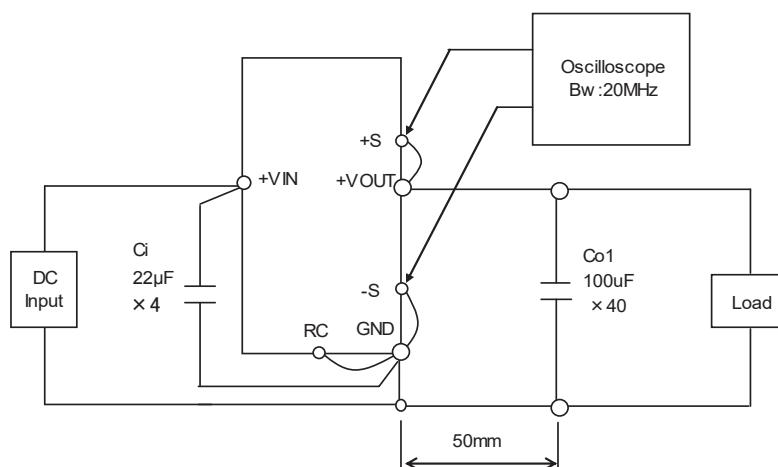


Figure B

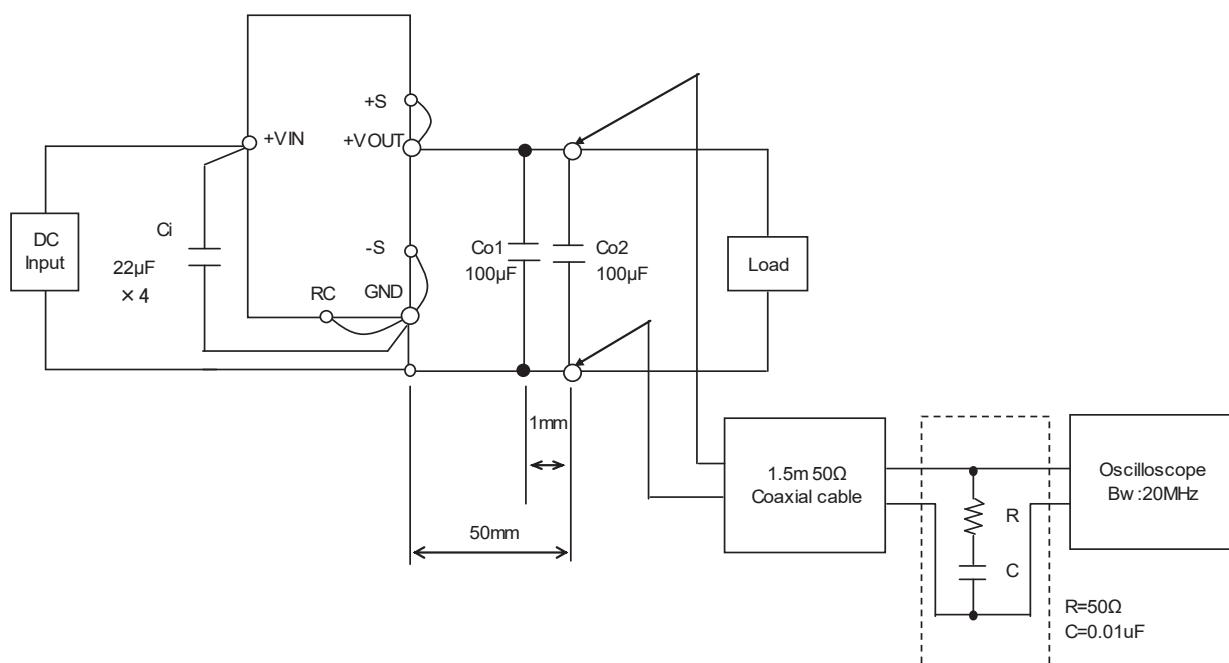


Figure C