

TEST DATA OF CES48120-6

Regulated DC Power Supply
Dec. 20, 2005

Approved by : Isao Yasuda Yasuda Design Manager

Prepared by : Takashi Mizuhara Mizuhara 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. Overvoltage Protection	18
19. Figure of Testing Circuitry	19

(Final Page 19)



Model CES48120-6		Temperature 25°C Testing Circuitry Figure A																																																																																
Item Input Current (by Input Voltage)																																																																																		
Object _____																																																																																		
1. Graph <div style="display: flex; justify-content: space-between; align-items: flex-start;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <p>—△— Load 100%</p> <p>- - -□- - Load 50%</p> <p>- · -○- · - Load 0%</p> </div> </div>		2. Values																																																																																
		<table border="1"> <thead> <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> </thead> <tbody> <tr><td>0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>8</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>16</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>24</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>33</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>34</td><td>0.089</td><td>1.167</td><td>2.303</td></tr> <tr><td>36</td><td>0.087</td><td>1.111</td><td>2.185</td></tr> <tr><td>40</td><td>0.079</td><td>1.002</td><td>1.966</td></tr> <tr><td>48</td><td>0.074</td><td>0.844</td><td>1.648</td></tr> <tr><td>60</td><td>0.070</td><td>0.688</td><td>1.330</td></tr> <tr><td>70</td><td>0.068</td><td>0.599</td><td>1.152</td></tr> <tr><td>76</td><td>0.067</td><td>0.557</td><td>1.066</td></tr> <tr><td>80</td><td>0.066</td><td>0.532</td><td>1.016</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>		Input Voltage [V]	Input Current [A]			Load 0%	Load 50%	Load 100%	0	0.000	0.000	0.000	8	0.000	0.000	0.000	16	0.000	0.000	0.000	24	0.000	0.000	0.000	33	0.000	0.000	0.000	34	0.089	1.167	2.303	36	0.087	1.111	2.185	40	0.079	1.002	1.966	48	0.074	0.844	1.648	60	0.070	0.688	1.330	70	0.068	0.599	1.152	76	0.067	0.557	1.066	80	0.066	0.532	1.016	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Input Voltage [V]	Input Current [A]																																																																																	
	Load 0%	Load 50%	Load 100%																																																																															
0	0.000	0.000	0.000																																																																															
8	0.000	0.000	0.000																																																																															
16	0.000	0.000	0.000																																																																															
24	0.000	0.000	0.000																																																																															
33	0.000	0.000	0.000																																																																															
34	0.089	1.167	2.303																																																																															
36	0.087	1.111	2.185																																																																															
40	0.079	1.002	1.966																																																																															
48	0.074	0.844	1.648																																																																															
60	0.070	0.688	1.330																																																																															
70	0.068	0.599	1.152																																																																															
76	0.067	0.557	1.066																																																																															
80	0.066	0.532	1.016																																																																															
-	-	-	-																																																																															
-	-	-	-																																																																															
-	-	-	-																																																																															
-	-	-	-																																																																															
-	-	-	-																																																																															
<p>Note: Slanted line shows the range of the rated input voltage.</p>																																																																																		



Model CES48120-6		Temperature 25°C Testing Circuitry Figure A																																																			
Item	Input Current (by Load Current)																																																				
Object																																																					
1. Graph <div style="margin-left: 20px;"> —△— Input Volt. 36V - - -□- - Input Volt. 48V - · -○- · - Input Volt. 76V </div>		2. Values <table border="1" style="margin-left: 20px; width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.087</td><td>0.073</td><td>0.066</td></tr> <tr><td>1.0</td><td>0.420</td><td>0.328</td><td>0.228</td></tr> <tr><td>2.0</td><td>0.764</td><td>0.584</td><td>0.393</td></tr> <tr><td>3.0</td><td>1.111</td><td>0.844</td><td>0.557</td></tr> <tr><td>4.0</td><td>1.460</td><td>1.110</td><td>0.724</td></tr> <tr><td>5.0</td><td>1.823</td><td>1.381</td><td>0.894</td></tr> <tr><td>6.0</td><td>2.185</td><td>1.649</td><td>1.067</td></tr> <tr><td>6.6</td><td>2.408</td><td>1.817</td><td>1.173</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>	Load Current [A]	Input Current [A]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	0.087	0.073	0.066	1.0	0.420	0.328	0.228	2.0	0.764	0.584	0.393	3.0	1.111	0.844	0.557	4.0	1.460	1.110	0.724	5.0	1.823	1.381	0.894	6.0	2.185	1.649	1.067	6.6	2.408	1.817	1.173	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Input Current [A]																																																				
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																		
0.0	0.087	0.073	0.066																																																		
1.0	0.420	0.328	0.228																																																		
2.0	0.764	0.584	0.393																																																		
3.0	1.111	0.844	0.557																																																		
4.0	1.460	1.110	0.724																																																		
5.0	1.823	1.381	0.894																																																		
6.0	2.185	1.649	1.067																																																		
6.6	2.408	1.817	1.173																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		
Note: Slanted line shows the range of the rated load current.																																																					



Model CES48120-6		Temperature 25°C Testing Circuitry Figure A																																																			
Item	Input Power (by Load Current)																																																				
Object	_____																																																				
<p>1. Graph</p> <p> </p> <p> △ Input Volt. 36V □ Input Volt. 48V ○ Input Volt. 76V </p> <p style="text-align: center;">Input Power [W]</p> <p style="text-align: center;">Load Current [A]</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>3.11</td><td>3.50</td><td>5.02</td></tr> <tr><td>1.0</td><td>15.10</td><td>15.69</td><td>17.34</td></tr> <tr><td>2.0</td><td>27.41</td><td>27.93</td><td>29.83</td></tr> <tr><td>3.0</td><td>39.93</td><td>40.51</td><td>42.25</td></tr> <tr><td>4.0</td><td>52.64</td><td>53.22</td><td>55.04</td></tr> <tr><td>5.0</td><td>65.52</td><td>66.10</td><td>67.98</td></tr> <tr><td>6.0</td><td>78.67</td><td>79.17</td><td>81.01</td></tr> <tr><td>6.6</td><td>86.72</td><td>87.12</td><td>89.01</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>	Load Current [A]	Input Power [W]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	3.11	3.50	5.02	1.0	15.10	15.69	17.34	2.0	27.41	27.93	29.83	3.0	39.93	40.51	42.25	4.0	52.64	53.22	55.04	5.0	65.52	66.10	67.98	6.0	78.67	79.17	81.01	6.6	86.72	87.12	89.01	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Input Power [W]																																																				
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																		
0.0	3.11	3.50	5.02																																																		
1.0	15.10	15.69	17.34																																																		
2.0	27.41	27.93	29.83																																																		
3.0	39.93	40.51	42.25																																																		
4.0	52.64	53.22	55.04																																																		
5.0	65.52	66.10	67.98																																																		
6.0	78.67	79.17	81.01																																																		
6.6	86.72	87.12	89.01																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		
<p>Note: Slanted line shows the range of the rated load current.</p>																																																					



<p>Model CES48120-6</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																
<p>Item Efficiency (by Input Voltage)</p>																																		
<p>Object _____</p>																																		
<p>1. Graph</p> <p> ---□--- Load 50% —△— Load 100% </p> <p>Efficiency [%]</p> <p>Input Voltage [V]</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>33</td><td>89.6</td><td>91.0</td></tr> <tr><td>36</td><td>89.7</td><td>91.1</td></tr> <tr><td>40</td><td>89.4</td><td>91.1</td></tr> <tr><td>48</td><td>88.5</td><td>90.6</td></tr> <tr><td>55</td><td>87.6</td><td>90.0</td></tr> <tr><td>60</td><td>87.0</td><td>89.7</td></tr> <tr><td>70</td><td>85.6</td><td>88.9</td></tr> <tr><td>76</td><td>84.7</td><td>88.5</td></tr> <tr><td>80</td><td>84.4</td><td>88.0</td></tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	33	89.6	91.0	36	89.7	91.1	40	89.4	91.1	48	88.5	90.6	55	87.6	90.0	60	87.0	89.7	70	85.6	88.9	76	84.7	88.5	80	84.4	88.0
Input Voltage [V]	Efficiency [%]																																	
	Load 50%	Load 100%																																
33	89.6	91.0																																
36	89.7	91.1																																
40	89.4	91.1																																
48	88.5	90.6																																
55	87.6	90.0																																
60	87.0	89.7																																
70	85.6	88.9																																
76	84.7	88.5																																
80	84.4	88.0																																



Model CES48120-6		Temperature 25°C Testing Circuitry Figure A																																																			
Item Efficiency (by Load Current)																																																					
Object _____																																																					
1. Graph		2. Values																																																			
<p> —△— Input Volt. 36V - - - □ - - - Input Volt. 48V - · - ○ - · - - Input Volt. 76V </p>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>1.0</td><td>79.5</td><td>76.5</td><td>69.2</td></tr> <tr><td>2.0</td><td>87.3</td><td>85.7</td><td>80.4</td></tr> <tr><td>3.0</td><td>89.9</td><td>88.6</td><td>85.0</td></tr> <tr><td>4.0</td><td>90.9</td><td>89.9</td><td>87.0</td></tr> <tr><td>5.0</td><td>91.3</td><td>90.5</td><td>88.0</td></tr> <tr><td>6.0</td><td>91.2</td><td>90.6</td><td>88.6</td></tr> <tr><td>6.6</td><td>91.0</td><td>90.6</td><td>88.7</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>	Load Current [A]	Efficiency [%]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	-	-	-	1.0	79.5	76.5	69.2	2.0	87.3	85.7	80.4	3.0	89.9	88.6	85.0	4.0	90.9	89.9	87.0	5.0	91.3	90.5	88.0	6.0	91.2	90.6	88.6	6.6	91.0	90.6	88.7	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Efficiency [%]																																																				
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																		
0.0	-	-	-																																																		
1.0	79.5	76.5	69.2																																																		
2.0	87.3	85.7	80.4																																																		
3.0	89.9	88.6	85.0																																																		
4.0	90.9	89.9	87.0																																																		
5.0	91.3	90.5	88.0																																																		
6.0	91.2	90.6	88.6																																																		
6.6	91.0	90.6	88.7																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		
<p>Note: Slanted line shows the range of the rated load current.</p>																																																					



Model CES48120-6		Temperature 25°C Testing Circuitry Figure A																																
Item	Line Regulation																																	
Object	+12V6A																																	
<p>1. Graph</p> <p>---□--- Load 50% —△— Load 100%</p> <p>Output Voltage [V]</p> <p>Input Voltage [V]</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Output Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>33</td><td>11.957</td><td>11.955</td></tr> <tr><td>36</td><td>11.957</td><td>11.955</td></tr> <tr><td>40</td><td>11.957</td><td>11.955</td></tr> <tr><td>48</td><td>11.956</td><td>11.954</td></tr> <tr><td>55</td><td>11.956</td><td>11.954</td></tr> <tr><td>60</td><td>11.956</td><td>11.954</td></tr> <tr><td>70</td><td>11.956</td><td>11.954</td></tr> <tr><td>76</td><td>11.956</td><td>11.954</td></tr> <tr><td>80</td><td>11.956</td><td>11.953</td></tr> </tbody> </table>	Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	33	11.957	11.955	36	11.957	11.955	40	11.957	11.955	48	11.956	11.954	55	11.956	11.954	60	11.956	11.954	70	11.956	11.954	76	11.956	11.954	80	11.956	11.953
Input Voltage [V]	Output Voltage [V]																																	
	Load 50%	Load 100%																																
33	11.957	11.955																																
36	11.957	11.955																																
40	11.957	11.955																																
48	11.956	11.954																																
55	11.956	11.954																																
60	11.956	11.954																																
70	11.956	11.954																																
76	11.956	11.954																																
80	11.956	11.953																																

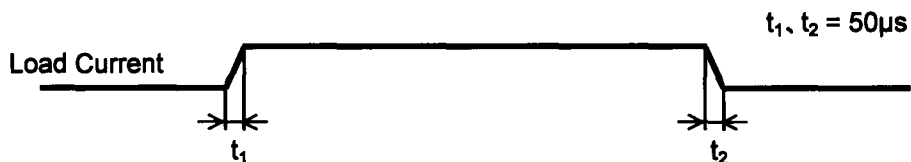


<p>Model CES48120-6</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																																			
<p>Item Load Regulation</p>																																																					
<p>Object +12V6A</p>																																																					
<p>1. Graph</p> <p> —△— Input Volt. 36V ---□--- Input Volt. 48V -·-○-·- Input Volt. 76V </p> <p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>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="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>11.954</td><td>11.954</td><td>11.955</td></tr> <tr><td>1.0</td><td>11.954</td><td>11.955</td><td>11.955</td></tr> <tr><td>2.0</td><td>11.954</td><td>11.955</td><td>11.955</td></tr> <tr><td>3.0</td><td>11.955</td><td>11.955</td><td>11.955</td></tr> <tr><td>4.0</td><td>11.955</td><td>11.955</td><td>11.955</td></tr> <tr><td>5.0</td><td>11.955</td><td>11.955</td><td>11.955</td></tr> <tr><td>6.0</td><td>11.955</td><td>11.955</td><td>11.955</td></tr> <tr><td>6.6</td><td>11.955</td><td>11.955</td><td>11.955</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>	Load Current [A]	Output Voltage [V]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	11.954	11.954	11.955	1.0	11.954	11.955	11.955	2.0	11.954	11.955	11.955	3.0	11.955	11.955	11.955	4.0	11.955	11.955	11.955	5.0	11.955	11.955	11.955	6.0	11.955	11.955	11.955	6.6	11.955	11.955	11.955	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Output Voltage [V]																																																				
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																		
0.0	11.954	11.954	11.955																																																		
1.0	11.954	11.955	11.955																																																		
2.0	11.954	11.955	11.955																																																		
3.0	11.955	11.955	11.955																																																		
4.0	11.955	11.955	11.955																																																		
5.0	11.955	11.955	11.955																																																		
6.0	11.955	11.955	11.955																																																		
6.6	11.955	11.955	11.955																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		

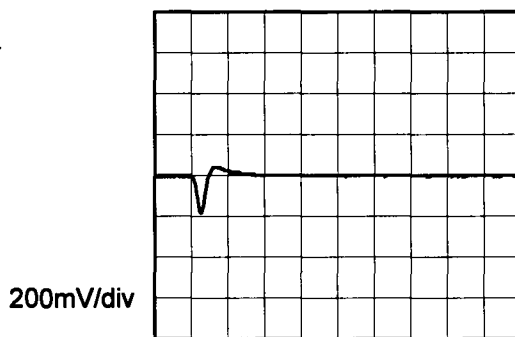


Model		CES48120-6	Temperature 25°C Testing Circuitry Figure A
Item		Dynamic Load Response	
Object		+12V6A	

Input Volt. 48 V
Cycle 100 mS



Min. Load (0A) ←→
Load 100% (6A)

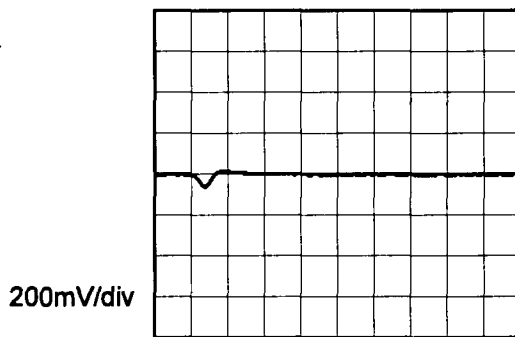


200µs/div

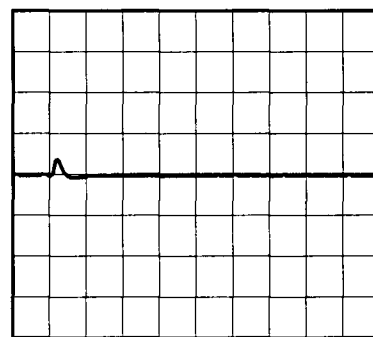


200µs/div

Min. Load (0A) ←→
Load 50% (3A)

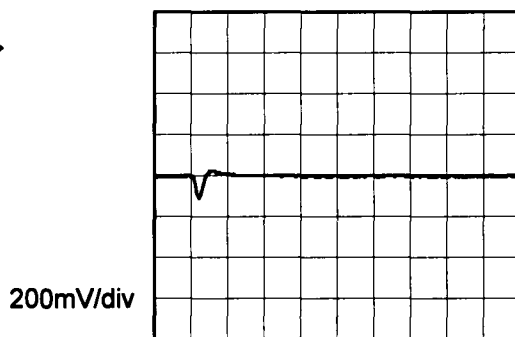


200µs/div

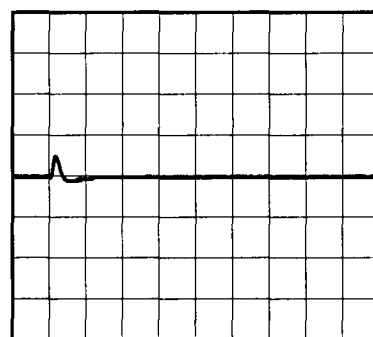


200µs/div

Load 50% (3A) ←→
Load 100% (6A)



200µs/div

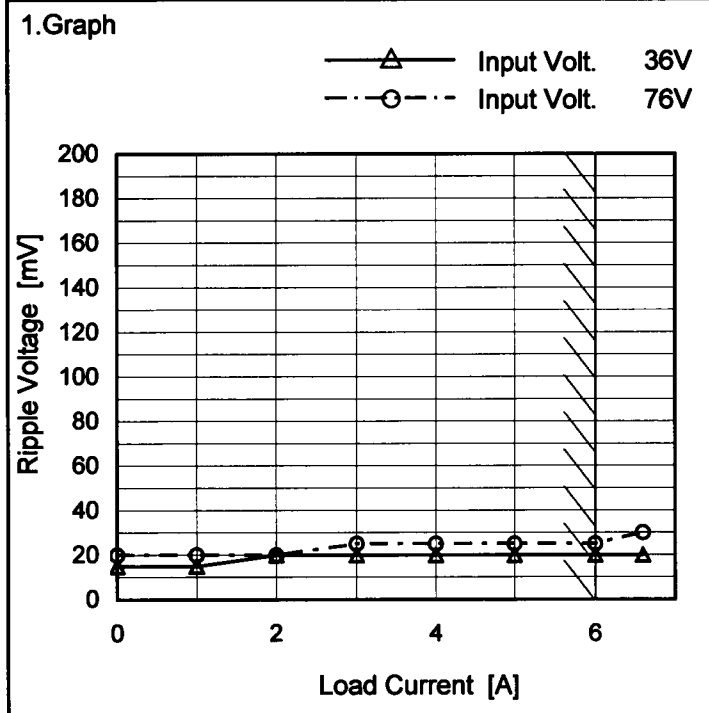


200µs/div



Model	CES48120-6
Item	Ripple Voltage (by Load Current)
Object	+12V6A

Temperature 25°C
Testing Circuitry Figure B



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	15	20
1.0	15	20
2.0	20	20
3.0	20	25
4.0	20	25
5.0	20	25
6.0	20	25
6.6	20	30
--	-	-
--	-	-
--	-	-

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.

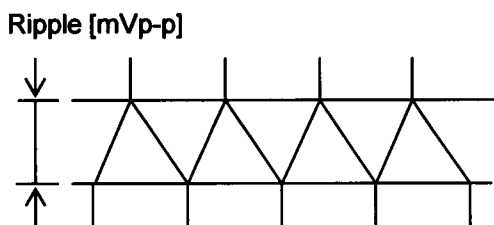


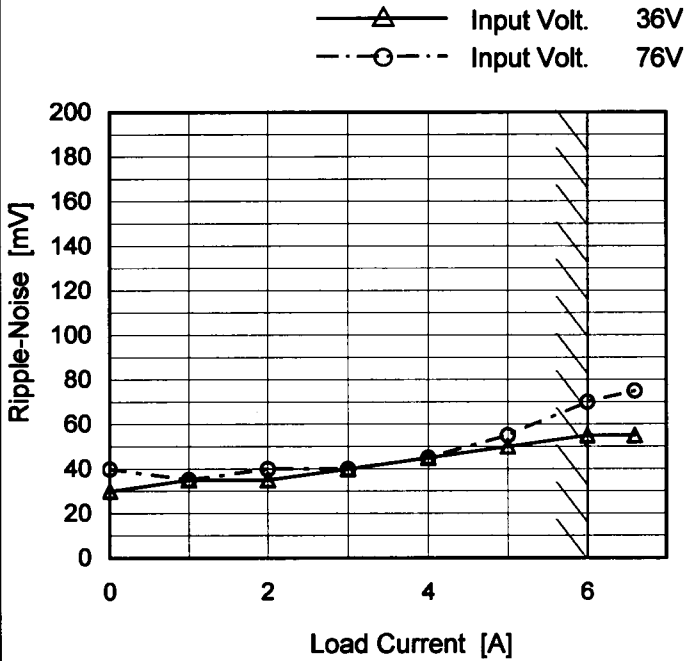
Fig. Complex Ripple Wave Form



Model	CES48120-6
Item	Ripple-Noise
Object	+12V6A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	30	40
1.0	35	35
2.0	35	40
3.0	40	40
4.0	45	45
5.0	50	55
6.0	55	70
6.6	55	75
--	-	-
--	-	-
--	-	-

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.

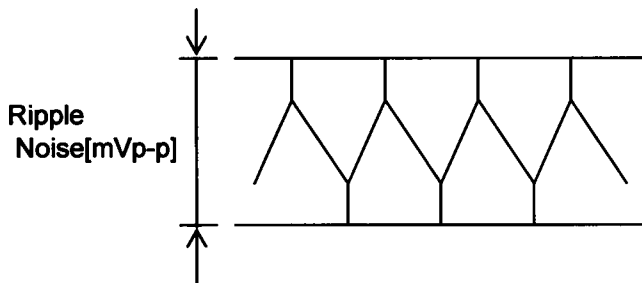


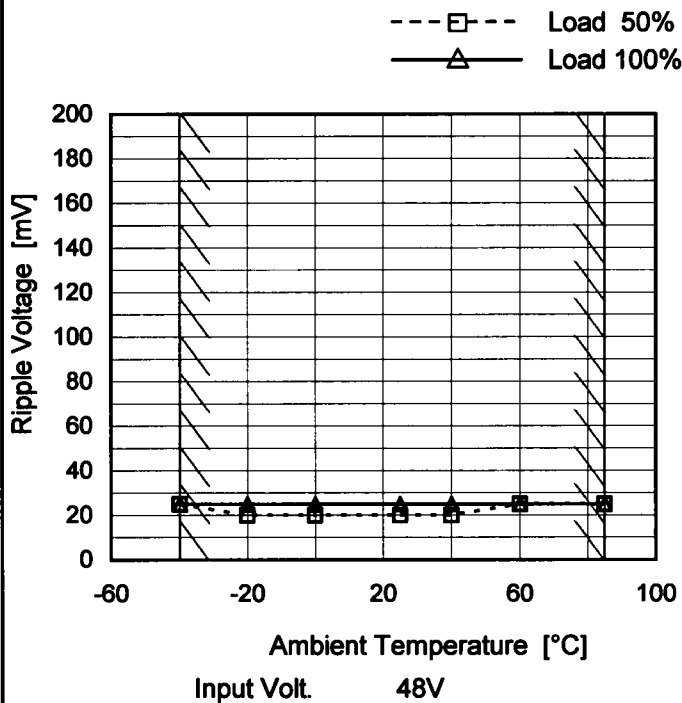
Fig.Complex Ripple Noise Wave Form



Model	CES48120-6
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V6A

Testing Circuitry Figure B

1. Graph



2. Values

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

Measured by 100 MHz Oscilloscope.

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



Model		CES48120-6																																																						
Item		Ambient Temperature Drift		Testing Circuitry Figure A																																																				
Object		+12V6A																																																						
1.Graph		—△— Input Volt. 36V ---□--- Input Volt. 48V -·-○-·- Input Volt. 76V		2.Values																																																				
Output Voltage [V]			<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>-40</td><td>11.978</td><td>11.978</td><td>11.978</td></tr> <tr><td>-20</td><td>11.974</td><td>11.974</td><td>11.974</td></tr> <tr><td>0</td><td>11.969</td><td>11.968</td><td>11.968</td></tr> <tr><td>25</td><td>11.957</td><td>11.956</td><td>11.956</td></tr> <tr><td>40</td><td>11.948</td><td>11.947</td><td>11.947</td></tr> <tr><td>60</td><td>11.934</td><td>11.932</td><td>11.932</td></tr> <tr><td>85</td><td>11.909</td><td>11.907</td><td>11.906</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. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	-40	11.978	11.978	11.978	-20	11.974	11.974	11.974	0	11.969	11.968	11.968	25	11.957	11.956	11.956	40	11.948	11.947	11.947	60	11.934	11.932	11.932	85	11.909	11.907	11.906	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	Ambient Temperature [°C]	Output Voltage [V]																																																						
		Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																				
	-40	11.978	11.978	11.978																																																				
	-20	11.974	11.974	11.974																																																				
	0	11.969	11.968	11.968																																																				
	25	11.957	11.956	11.956																																																				
	40	11.948	11.947	11.947																																																				
	60	11.934	11.932	11.932																																																				
	85	11.909	11.907	11.906																																																				
-	-	-	-																																																					
-	-	-	-																																																					
-	-	-	-																																																					
-	-	-	-																																																					
Ambient Temperature [°C]																																																								
Load 100%																																																								
Note: Slanted line shows the range of the rated ambient temperature.																																																								



COSEL		
Model	CES48120-6	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+12V6A	

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 : 36 - 76V

Load Current : 0 - 6A

* 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	-40	76	6	11.978	±36	±0.3
Minimum Voltage	85	76	6	11.906		

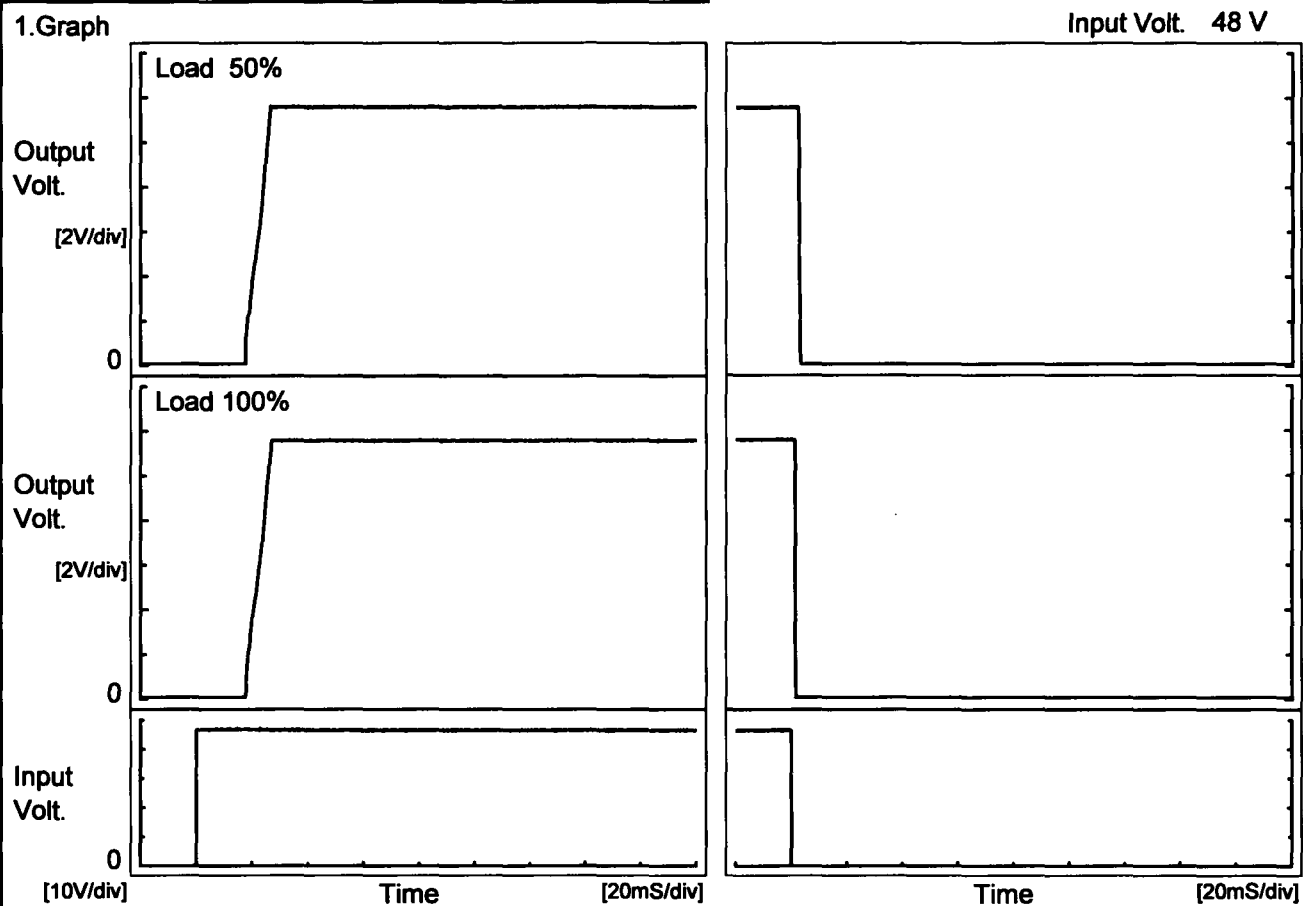


COSEL																									
Model	CES48120-6	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V6A																								
<p>1. Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 48V Load 100%</p>		<p>2. Values</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>11.957</td></tr> <tr><td>0.5</td><td>11.953</td></tr> <tr><td>1.0</td><td>11.953</td></tr> <tr><td>2.0</td><td>11.953</td></tr> <tr><td>3.0</td><td>11.953</td></tr> <tr><td>4.0</td><td>11.953</td></tr> <tr><td>5.0</td><td>11.953</td></tr> <tr><td>6.0</td><td>11.953</td></tr> <tr><td>7.0</td><td>11.953</td></tr> <tr><td>8.0</td><td>11.953</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	11.957	0.5	11.953	1.0	11.953	2.0	11.953	3.0	11.953	4.0	11.953	5.0	11.953	6.0	11.953	7.0	11.953	8.0	11.953
Time since start [H]	Output Voltage [V]																								
0.0	11.957																								
0.5	11.953																								
1.0	11.953																								
2.0	11.953																								
3.0	11.953																								
4.0	11.953																								
5.0	11.953																								
6.0	11.953																								
7.0	11.953																								
8.0	11.953																								



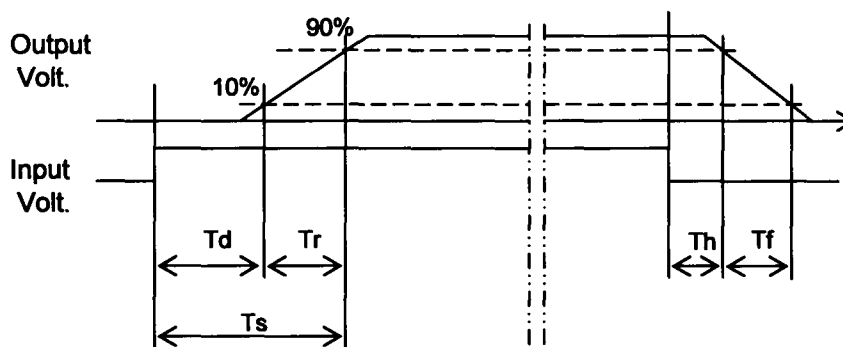
Model		CES48120-6	
Item		Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object		+12V6A	

1. Graph



2. Values

		[mS]				
Load	Time	Td	Tr	Ts	Th	Tf
50 %		17.9	8.4	26.3	2.4	0.6
100 %		18.0	8.5	26.5	1.2	0.3





Model CES48120-6		Testing Circuitry Figure A																																						
Item	Minimum Input Voltage for Regulated Output Voltage																																							
Object	+12V6A																																							
1.Graph <div style="text-align: right;"> ---□--- Load 50% —△— Load 100% </div> <p style="text-align: center;">Ambient Temperature [°C]</p>		2.Values <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Input Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>-40</td><td>30.9</td><td>31.0</td></tr> <tr><td>-20</td><td>31.1</td><td>31.2</td></tr> <tr><td>0</td><td>31.3</td><td>31.4</td></tr> <tr><td>25</td><td>31.5</td><td>31.6</td></tr> <tr><td>40</td><td>31.7</td><td>31.8</td></tr> <tr><td>60</td><td>31.9</td><td>32.0</td></tr> <tr><td>85</td><td>32.1</td><td>32.1</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>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-40	30.9	31.0	-20	31.1	31.2	0	31.3	31.4	25	31.5	31.6	40	31.7	31.8	60	31.9	32.0	85	32.1	32.1	—	-	-	—	-	-	—	-	-	—	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
	Load 50%	Load 100%																																						
-40	30.9	31.0																																						
-20	31.1	31.2																																						
0	31.3	31.4																																						
25	31.5	31.6																																						
40	31.7	31.8																																						
60	31.9	32.0																																						
85	32.1	32.1																																						
—	-	-																																						
—	-	-																																						
—	-	-																																						
—	-	-																																						
<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																								



<p>Model CES48120-6</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																																								
<p>Item Overcurrent Protection</p>																																																										
<p>Object +12V6A</p>																																																										
<p>1. Graph</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>————— Input Volt. 36V</p> <p>————— Input Volt. 48V</p> <p>————— Input Volt. 76V</p> </div> </div> <p>Note: Slanted line shows the range of the rated load current.</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>12.0</td><td>8.20</td><td>7.90</td><td>7.80</td></tr> <tr><td>11.4</td><td>8.19</td><td>7.84</td><td>7.79</td></tr> <tr><td>10.8</td><td>8.03</td><td>7.77</td><td>7.77</td></tr> <tr><td>9.6</td><td>7.78</td><td>7.66</td><td>7.78</td></tr> <tr><td>8.4</td><td>7.63</td><td>7.62</td><td>7.82</td></tr> <tr><td>7.2</td><td>7.53</td><td>7.59</td><td>7.86</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> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Output Voltage [V]	Load Current [A]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	12.0	8.20	7.90	7.80	11.4	8.19	7.84	7.79	10.8	8.03	7.77	7.77	9.6	7.78	7.66	7.78	8.4	7.63	7.62	7.82	7.2	7.53	7.59	7.86	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Output Voltage [V]	Load Current [A]																																																									
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																							
12.0	8.20	7.90	7.80																																																							
11.4	8.19	7.84	7.79																																																							
10.8	8.03	7.77	7.77																																																							
9.6	7.78	7.66	7.78																																																							
8.4	7.63	7.62	7.82																																																							
7.2	7.53	7.59	7.86																																																							
--	-	-	-																																																							
--	-	-	-																																																							
--	-	-	-																																																							
--	-	-	-																																																							
--	-	-	-																																																							
--	-	-	-																																																							



Model CES48120-6		Testing Circuitry Figure A																																																			
Item Overvoltage Protection																																																					
Object +12V6A																																																					
<p>1.Graph</p> <p> —△— Input Volt. 36V ---□--- Input Volt. 48V -·-○-·- Input Volt. 76V </p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: right;">Load 0%</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>-40</td><td>14.50</td><td>14.50</td><td>14.50</td></tr> <tr><td>-20</td><td>14.49</td><td>14.49</td><td>14.49</td></tr> <tr><td>0</td><td>14.49</td><td>14.49</td><td>14.49</td></tr> <tr><td>25</td><td>14.48</td><td>14.48</td><td>14.48</td></tr> <tr><td>40</td><td>14.48</td><td>14.48</td><td>14.47</td></tr> <tr><td>60</td><td>14.46</td><td>14.46</td><td>14.46</td></tr> <tr><td>85</td><td>14.42</td><td>14.42</td><td>14.42</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]	Operating Point [V]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	-40	14.50	14.50	14.50	-20	14.49	14.49	14.49	0	14.49	14.49	14.49	25	14.48	14.48	14.48	40	14.48	14.48	14.47	60	14.46	14.46	14.46	85	14.42	14.42	14.42	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ambient Temperature [°C]	Operating Point [V]																																																				
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]																																																		
-40	14.50	14.50	14.50																																																		
-20	14.49	14.49	14.49																																																		
0	14.49	14.49	14.49																																																		
25	14.48	14.48	14.48																																																		
40	14.48	14.48	14.47																																																		
60	14.46	14.46	14.46																																																		
85	14.42	14.42	14.42																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		
-	-	-	-																																																		
<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																																					

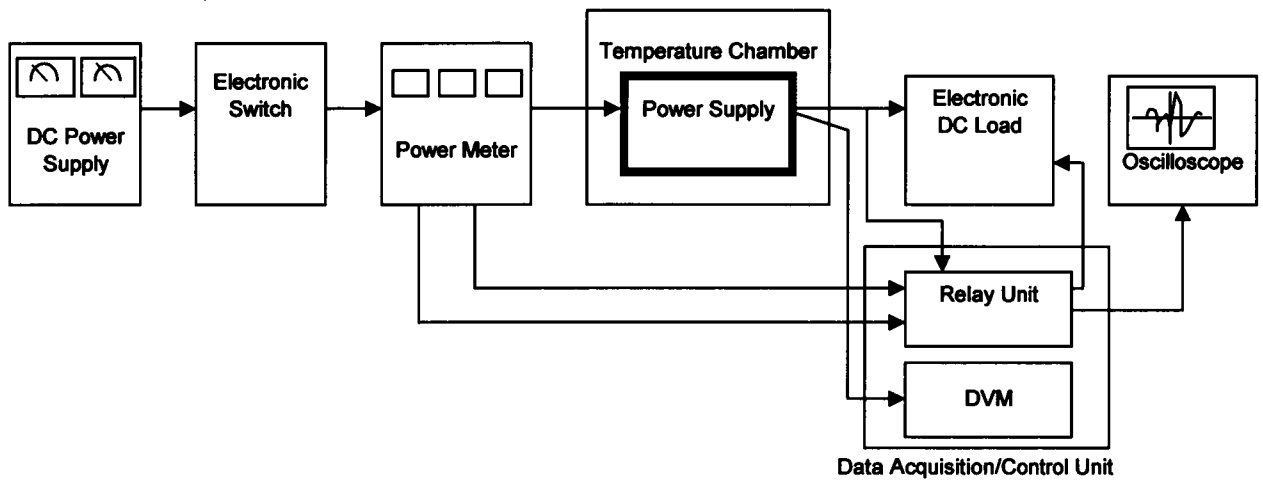


Figure A

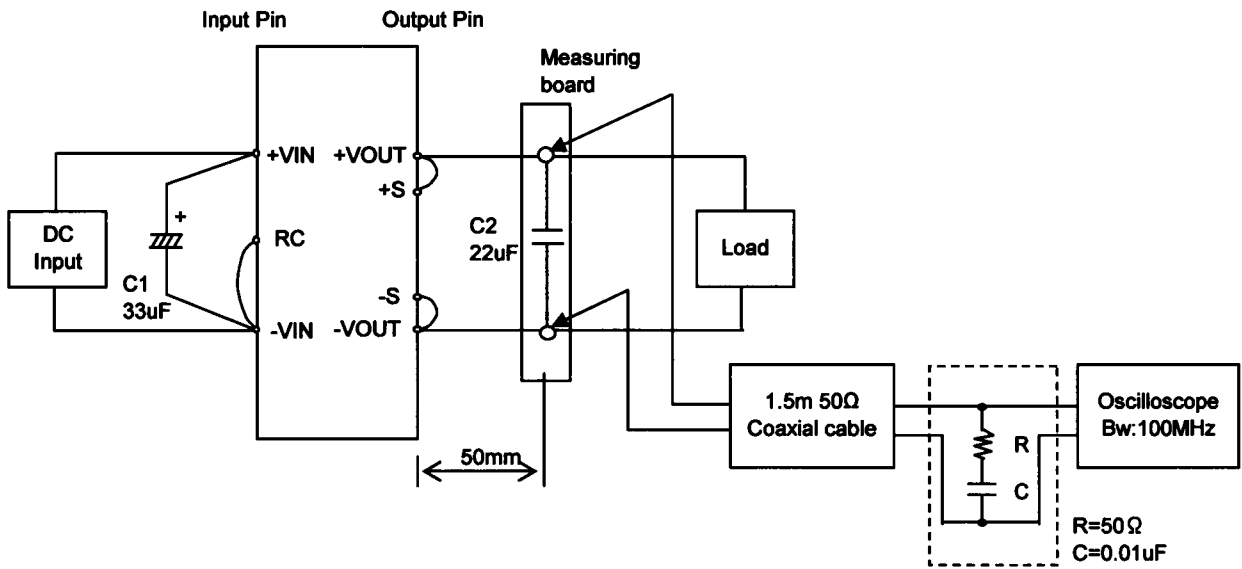


Figure B