



TEST DATA OF CES48150-4

Regulated DC Power Supply
May 16, 2008

Approved by : Tatsuya Mano
Tatsuya Mano Design Manager

Prepared by : Yoshimichi Hirokawa
Yoshimichi Hirokawa 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)

COSEL

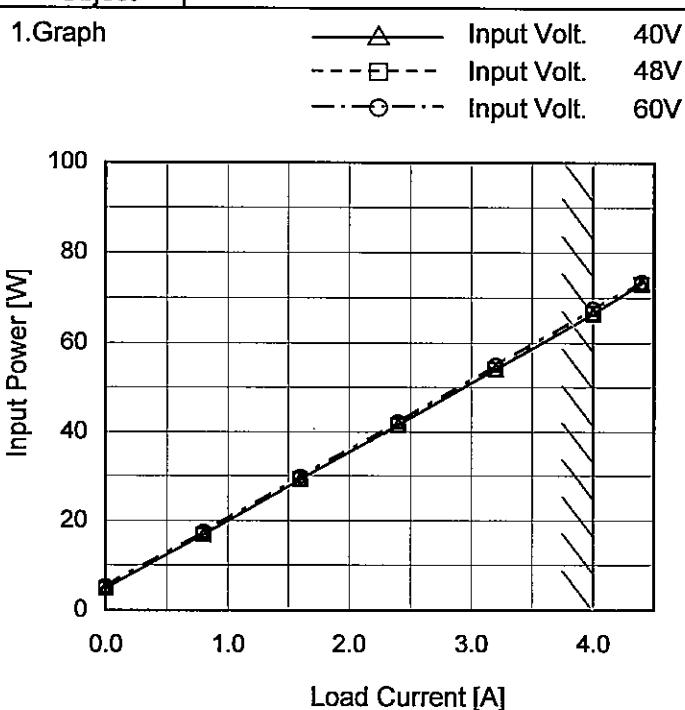
Model	CES48150-4	Temperature	25°C																																																																							
Item	Input Current (by Input Voltage)	Testing Circuitry	Figure A																																																																							
Object																																																																										
1.Graph		2.Values																																																																								
<p>The graph plots Input Current [A] on the Y-axis (0.00 to 2.00) against Input Voltage [V] on the X-axis (0 to 80). Three curves are shown: Load 100% (triangles), Load 50% (squares), and Load 0% (circles). A slanted line indicates the rated input voltage range.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Load 0% [A]</th> <th>Load 50% [A]</th> <th>Load 100% [A]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>8.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>16.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>24.0</td><td>0.002</td><td>0.002</td><td>0.000</td></tr> <tr><td>32.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>36.0</td><td>0.002</td><td>0.002</td><td>0.002</td></tr> <tr><td>37.6</td><td>0.136</td><td>0.944</td><td>1.776</td></tr> <tr><td>40.0</td><td>0.123</td><td>0.882</td><td>1.663</td></tr> <tr><td>48.0</td><td>0.100</td><td>0.735</td><td>1.389</td></tr> <tr><td>56.0</td><td>0.090</td><td>0.637</td><td>1.198</td></tr> <tr><td>66.0</td><td>0.087</td><td>0.566</td><td>1.056</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>	Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]	0.0	0.000	0.000	0.000	8.0	0.000	0.000	0.000	16.0	0.000	0.000	0.000	24.0	0.002	0.002	0.000	32.0	0.002	0.002	0.002	36.0	0.002	0.002	0.002	37.6	0.136	0.944	1.776	40.0	0.123	0.882	1.663	48.0	0.100	0.735	1.389	56.0	0.090	0.637	1.198	66.0	0.087	0.566	1.056	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-		
Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]																																																																							
0.0	0.000	0.000	0.000																																																																							
8.0	0.000	0.000	0.000																																																																							
16.0	0.000	0.000	0.000																																																																							
24.0	0.002	0.002	0.000																																																																							
32.0	0.002	0.002	0.002																																																																							
36.0	0.002	0.002	0.002																																																																							
37.6	0.136	0.944	1.776																																																																							
40.0	0.123	0.882	1.663																																																																							
48.0	0.100	0.735	1.389																																																																							
56.0	0.090	0.637	1.198																																																																							
66.0	0.087	0.566	1.056																																																																							
-	-	-	-																																																																							
-	-	-	-																																																																							
-	-	-	-																																																																							
-	-	-	-																																																																							
-	-	-	-																																																																							
-	-	-	-																																																																							
<p>Note: Slanted line shows the range of the rated input voltage.</p>																																																																										

COSEL

Model	CES48150-4	Temperature	25°C																																																			
Item	Input Current (by Load Current)	Testing Circuitry	Figure A																																																			
Object	_____																																																					
1.Graph	<p>—△— Input Volt. 40V - - -□- Input Volt. 48V - - -○- Input Volt. 60V</p> <table border="1"> <caption>Data points estimated from Figure A</caption> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 40V [A]</th> <th>Input Volt. 48V [A]</th> <th>Input Volt. 60V [A]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.121</td><td>0.100</td><td>0.088</td></tr> <tr><td>0.8</td><td>0.422</td><td>0.351</td><td>0.291</td></tr> <tr><td>1.6</td><td>0.729</td><td>0.607</td><td>0.497</td></tr> <tr><td>2.4</td><td>1.041</td><td>0.866</td><td>0.705</td></tr> <tr><td>3.2</td><td>1.354</td><td>1.128</td><td>0.914</td></tr> <tr><td>4.0</td><td>1.663</td><td>1.389</td><td>1.126</td></tr> <tr><td>4.4</td><td>1.831</td><td>1.525</td><td>1.232</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 40V [A]	Input Volt. 48V [A]	Input Volt. 60V [A]	0.0	0.121	0.100	0.088	0.8	0.422	0.351	0.291	1.6	0.729	0.607	0.497	2.4	1.041	0.866	0.705	3.2	1.354	1.128	0.914	4.0	1.663	1.389	1.126	4.4	1.831	1.525	1.232																			
Load Current [A]	Input Volt. 40V [A]	Input Volt. 48V [A]	Input Volt. 60V [A]																																																			
0.0	0.121	0.100	0.088																																																			
0.8	0.422	0.351	0.291																																																			
1.6	0.729	0.607	0.497																																																			
2.4	1.041	0.866	0.705																																																			
3.2	1.354	1.128	0.914																																																			
4.0	1.663	1.389	1.126																																																			
4.4	1.831	1.525	1.232																																																			
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 40[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 60[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.121</td><td>0.100</td><td>0.088</td></tr> <tr><td>0.8</td><td>0.422</td><td>0.351</td><td>0.291</td></tr> <tr><td>1.6</td><td>0.729</td><td>0.607</td><td>0.497</td></tr> <tr><td>2.4</td><td>1.041</td><td>0.866</td><td>0.705</td></tr> <tr><td>3.2</td><td>1.354</td><td>1.128</td><td>0.914</td></tr> <tr><td>4.0</td><td>1.663</td><td>1.389</td><td>1.126</td></tr> <tr><td>4.4</td><td>1.831</td><td>1.525</td><td>1.232</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>			Load Current [A]	Input Current [A]			Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]	0.0	0.121	0.100	0.088	0.8	0.422	0.351	0.291	1.6	0.729	0.607	0.497	2.4	1.041	0.866	0.705	3.2	1.354	1.128	0.914	4.0	1.663	1.389	1.126	4.4	1.831	1.525	1.232	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Input Current [A]																																																					
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]																																																			
0.0	0.121	0.100	0.088																																																			
0.8	0.422	0.351	0.291																																																			
1.6	0.729	0.607	0.497																																																			
2.4	1.041	0.866	0.705																																																			
3.2	1.354	1.128	0.914																																																			
4.0	1.663	1.389	1.126																																																			
4.4	1.831	1.525	1.232																																																			
-	-	-	-																																																			
-	-	-	-																																																			
-	-	-	-																																																			
-	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

COSEL

Model	CES48150-4
Item	Input Power (by Load Current)
Object	—

Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]
0.0	4.91	4.80	5.31
0.8	16.90	16.90	17.51
1.6	29.22	29.21	29.89
2.4	41.70	41.60	42.30
3.2	54.10	54.20	55.00
4.0	66.52	66.70	67.60
4.4	73.20	73.00	73.50
—	—	—	—
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	CES48150-4	Temperature	25°C																																
Item	Efficiency (by Input Voltage)	Testing Circuitry	Figure A																																
Object	—	—	—																																
1.Graph			2.Values																																
<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Input Voltage [V] on the x-axis (20 to 80). 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 slanted line on the graph indicates the rated input voltage range.</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>—</td><td>-</td><td>-</td></tr> <tr> <td>39</td><td>85.4</td><td>90.3</td></tr> <tr> <td>40</td><td>85.5</td><td>90.4</td></tr> <tr> <td>48</td><td>85.6</td><td>90.6</td></tr> <tr> <td>52</td><td>85.1</td><td>90.2</td></tr> <tr> <td>60</td><td>83.8</td><td>89.1</td></tr> <tr> <td>66</td><td>82.6</td><td>88.4</td></tr> <tr> <td>—</td><td>-</td><td>-</td></tr> <tr> <td>—</td><td>-</td><td>-</td></tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	—	-	-	39	85.4	90.3	40	85.5	90.4	48	85.6	90.6	52	85.1	90.2	60	83.8	89.1	66	82.6	88.4	—	-	-	—	-	-
Input Voltage [V]	Efficiency [%]																																		
	Load 50%	Load 100%																																	
—	-	-																																	
39	85.4	90.3																																	
40	85.5	90.4																																	
48	85.6	90.6																																	
52	85.1	90.2																																	
60	83.8	89.1																																	
66	82.6	88.4																																	
—	-	-																																	
—	-	-																																	

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

COSEL

Model	CES48150-4	Temperature	25°C																																																			
Item	Efficiency (by Load Current)	Testing Circuitry	Figure A																																																			
Object	<hr/>																																																					
1.Graph	—△— Input Volt. 40V - - -□--- Input Volt. 48V - - -○--- Input Volt. 60V																																																					
	<p>The graph shows efficiency increasing with load current. For 40V, efficiency starts at ~72% at 0.8A and rises to ~90.5% at 4.4A. For 48V, it starts at ~69.7% at 0.8A and rises to ~89.0% at 4.4A. For 60V, it starts at ~68.5% at 0.8A and rises to ~87.7% at 4.4A. A slanted line from (0.8, 72) to (4.4, 90.5) marks the rated load current range.</p>	2.Values																																																				
		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 40[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 60[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>0.8</td><td>72.2</td><td>72.3</td><td>69.7</td></tr> <tr><td>1.6</td><td>82.9</td><td>83.0</td><td>81.1</td></tr> <tr><td>2.4</td><td>87.0</td><td>87.1</td><td>85.7</td></tr> <tr><td>3.2</td><td>89.2</td><td>89.0</td><td>87.7</td></tr> <tr><td>4.0</td><td>90.4</td><td>90.6</td><td>89.1</td></tr> <tr><td>4.4</td><td>90.5</td><td>90.8</td><td>90.1</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>		Load Current [A]	Efficiency [%]			Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]	0.0	-	-	-	0.8	72.2	72.3	69.7	1.6	82.9	83.0	81.1	2.4	87.0	87.1	85.7	3.2	89.2	89.0	87.7	4.0	90.4	90.6	89.1	4.4	90.5	90.8	90.1	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Efficiency [%]																																																					
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]																																																			
0.0	-	-	-																																																			
0.8	72.2	72.3	69.7																																																			
1.6	82.9	83.0	81.1																																																			
2.4	87.0	87.1	85.7																																																			
3.2	89.2	89.0	87.7																																																			
4.0	90.4	90.6	89.1																																																			
4.4	90.5	90.8	90.1																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			

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

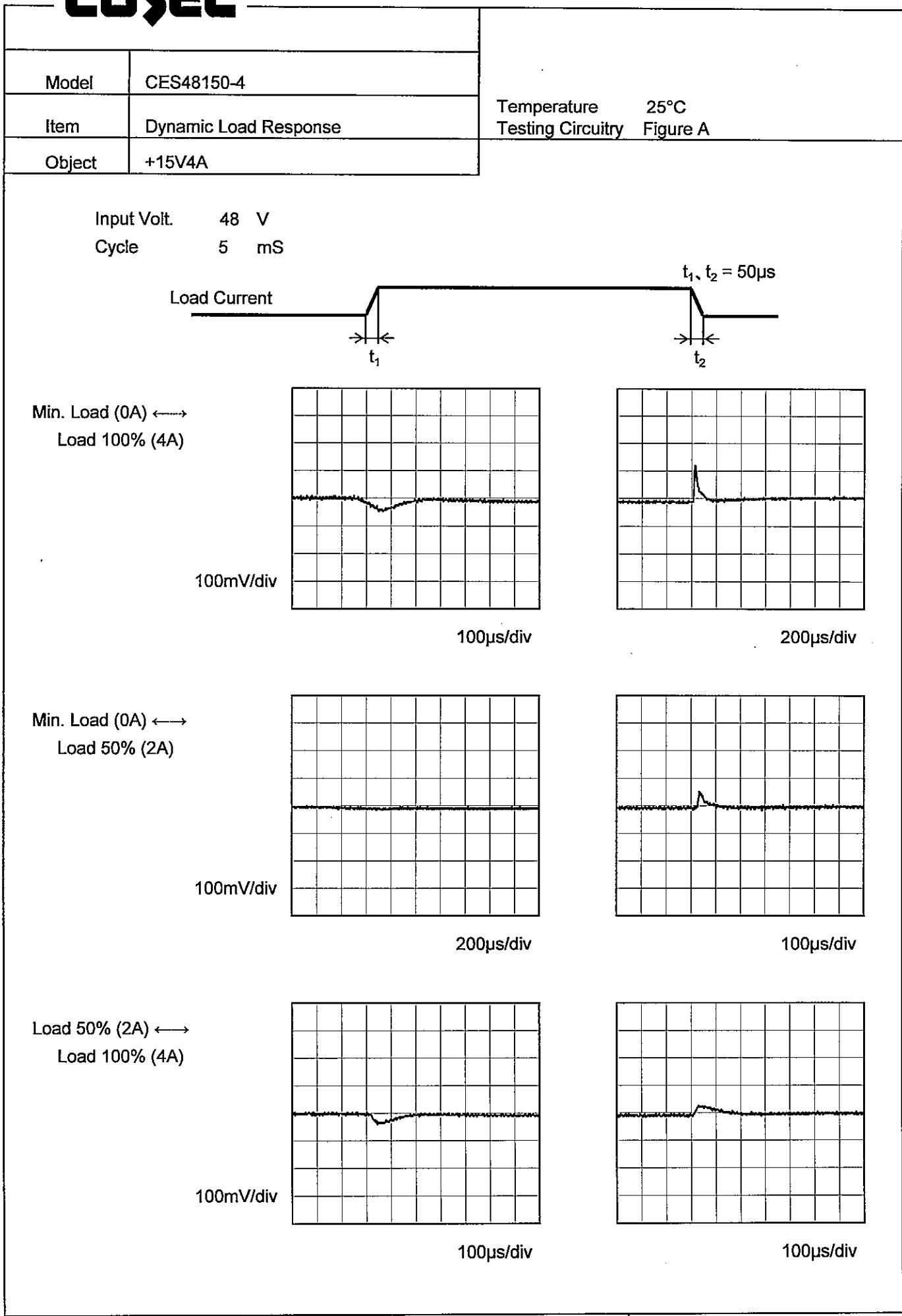
COSEL

Model	CES48150-4	Temperature	25°C																																
Item	Line Regulation	Testing Circuitry	Figure A																																
Object	+15V4A																																		
1.Graph		2.Values																																	
<p>Output Voltage [V]</p> <p>Input Voltage [V]</p> <p>Legend: Load 50% (Squares), Load 100% (Triangles)</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>38</td><td>15.053</td><td>15.053</td></tr> <tr><td>39</td><td>15.053</td><td>15.053</td></tr> <tr><td>40</td><td>15.053</td><td>15.053</td></tr> <tr><td>48</td><td>15.053</td><td>15.053</td></tr> <tr><td>52</td><td>15.053</td><td>15.053</td></tr> <tr><td>60</td><td>15.053</td><td>15.053</td></tr> <tr><td>66</td><td>15.053</td><td>15.053</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	38	15.053	15.053	39	15.053	15.053	40	15.053	15.053	48	15.053	15.053	52	15.053	15.053	60	15.053	15.053	66	15.053	15.053	--	-	-	--	-	-
Input Voltage [V]	Output Voltage [V]																																		
	Load 50%	Load 100%																																	
38	15.053	15.053																																	
39	15.053	15.053																																	
40	15.053	15.053																																	
48	15.053	15.053																																	
52	15.053	15.053																																	
60	15.053	15.053																																	
66	15.053	15.053																																	
--	-	-																																	
--	-	-																																	

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

COSEL

Model	CES48150-4	Temperature	25°C																																																			
Item	Load Regulation	Testing Circuitry	Figure A																																																			
Object	+15V4A																																																					
1.Graph	<p>—△— Input Volt. 40V - - □ - - Input Volt. 48V - - ○ - - Input Volt. 60V</p>																																																					
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 40[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 60[V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>15.052</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>0.8</td> <td>15.053</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>1.6</td> <td>15.053</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>2.4</td> <td>15.053</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>3.2</td> <td>15.053</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>4.0</td> <td>15.053</td> <td>15.053</td> <td>15.053</td> </tr> <tr> <td>4.4</td> <td>15.053</td> <td>15.053</td> <td>15.053</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>			Load Current [A]	Output Voltage [V]			Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]	0.0	15.052	15.053	15.053	0.8	15.053	15.053	15.053	1.6	15.053	15.053	15.053	2.4	15.053	15.053	15.053	3.2	15.053	15.053	15.053	4.0	15.053	15.053	15.053	4.4	15.053	15.053	15.053	--	-	-	-	--	-	-	-	--	-	-	-	-	-	-	-
Load Current [A]	Output Voltage [V]																																																					
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]																																																			
0.0	15.052	15.053	15.053																																																			
0.8	15.053	15.053	15.053																																																			
1.6	15.053	15.053	15.053																																																			
2.4	15.053	15.053	15.053																																																			
3.2	15.053	15.053	15.053																																																			
4.0	15.053	15.053	15.053																																																			
4.4	15.053	15.053	15.053																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
-	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

COSEL

COSEL

Model	CES48150-4	Temperature 25°C Testing Circuitry Figure A																																						
Item	Ripple Voltage (by Load Current)																																							
Object	+15V4A																																							
1.Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The graph displays two sets of data points corresponding to Input Voltages of 40V and 60V. The x-axis represents Load Current [A] from 0.0 to 4.0, and the y-axis represents Ripple Voltage [mV] from 0 to 100. A slanted line at approximately 3.5A indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 40V)</th> <th>Ripple Voltage [mV] (Input Volt. 60V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12</td><td>18</td></tr> <tr><td>1.0</td><td>13</td><td>18</td></tr> <tr><td>2.0</td><td>14</td><td>19</td></tr> <tr><td>3.0</td><td>14</td><td>19</td></tr> <tr><td>4.0</td><td>14</td><td>19</td></tr> <tr><td>4.4</td><td>14</td><td>19</td></tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV] (Input Volt. 40V)	Ripple Voltage [mV] (Input Volt. 60V)	0.0	12	18	1.0	13	18	2.0	14	19	3.0	14	19	4.0	14	19	4.4	14	19																	
Load Current [A]	Ripple Voltage [mV] (Input Volt. 40V)	Ripple Voltage [mV] (Input Volt. 60V)																																						
0.0	12	18																																						
1.0	13	18																																						
2.0	14	19																																						
3.0	14	19																																						
4.0	14	19																																						
4.4	14	19																																						
2.Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 40 [V]</th> <th>Input Volt. 60 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12</td><td>18</td></tr> <tr><td>1.0</td><td>13</td><td>18</td></tr> <tr><td>2.0</td><td>14</td><td>19</td></tr> <tr><td>3.0</td><td>14</td><td>19</td></tr> <tr><td>4.0</td><td>14</td><td>19</td></tr> <tr><td>4.4</td><td>14</td><td>19</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> <tr><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV]		Input Volt. 40 [V]	Input Volt. 60 [V]	0.0	12	18	1.0	13	18	2.0	14	19	3.0	14	19	4.0	14	19	4.4	14	19	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 40 [V]	Input Volt. 60 [V]																																						
0.0	12	18																																						
1.0	13	18																																						
2.0	14	19																																						
3.0	14	19																																						
4.0	14	19																																						
4.4	14	19																																						
-	-	-																																						
-	-	-																																						
-	-	-																																						
-	-	-																																						
-	-	-																																						
<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> <p>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</p>																																								

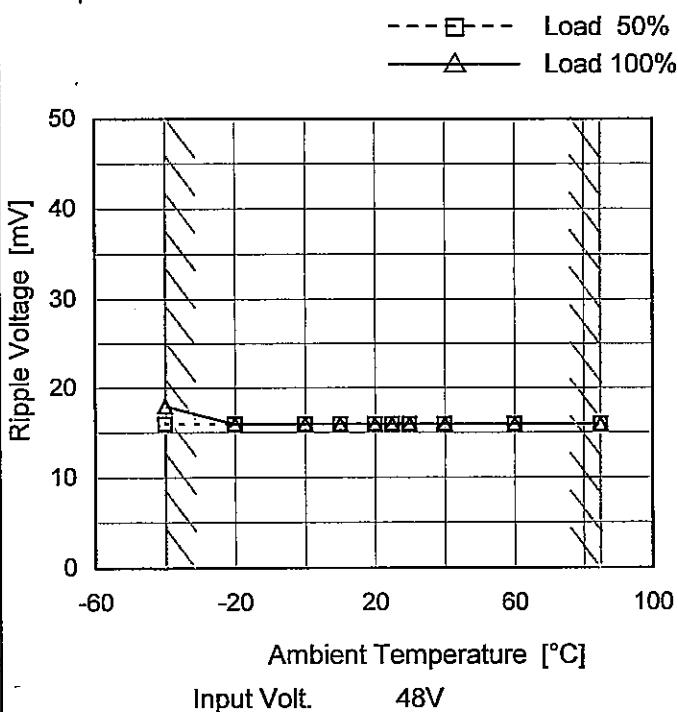
COSEL

Model	CES48150-4																																						
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure A																																					
Object	+15V4A																																						
1. Graph																																							
		2. Values																																					
<p>—△— Input Volt. 40V -○- Input Volt. 60V</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 40 [V]</th> <th>Input Volt. 60 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>16</td><td>24</td></tr> <tr><td>1.0</td><td>18</td><td>24</td></tr> <tr><td>2.0</td><td>20</td><td>24</td></tr> <tr><td>3.0</td><td>22</td><td>25</td></tr> <tr><td>4.0</td><td>24</td><td>28</td></tr> <tr><td>4.4</td><td>24</td><td>31</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> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 40 [V]	Input Volt. 60 [V]	0.0	16	24	1.0	18	24	2.0	20	24	3.0	22	25	4.0	24	28	4.4	24	31	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																						
	Input Volt. 40 [V]	Input Volt. 60 [V]																																					
0.0	16	24																																					
1.0	18	24																																					
2.0	20	24																																					
3.0	22	25																																					
4.0	24	28																																					
4.4	24	31																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
<p>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.</p>																																							
<p>Fig. Complex Ripple Wave Form</p>																																							

COSEL

Model	CES48150-4
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V4A

1.Graph



Measured by 100 MHz Oscilloscope.

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

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	16	18
-20	16	16
0	16	16
10	16	16
20	16	16
25	16	16
30	16	16
40	16	16
60	16	16
85	16	16
—	-	-



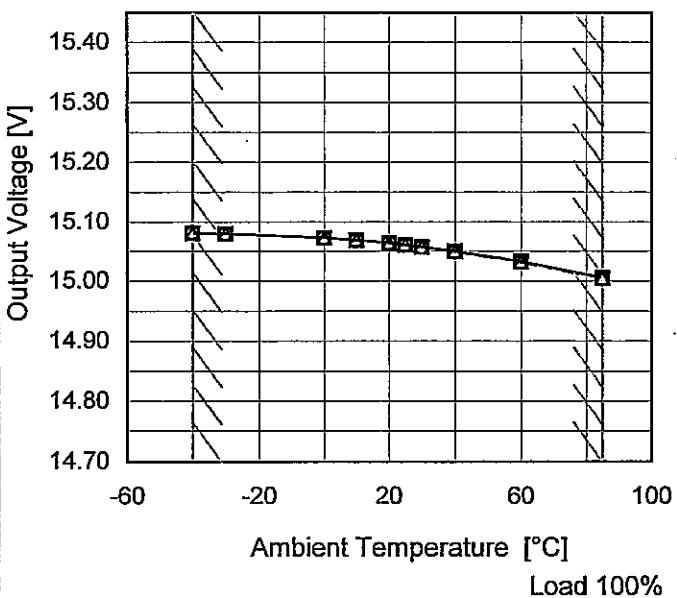
Model CES48150-4

Item Ambient Temperature Drift

Object +15V4A

1.Graph

—△— Input Volt. 40V
 - - -□--- Input Volt. 48V
 - - -○--- Input Volt. 60V



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. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]
-40	15.081	15.081	15.082
-30	15.080	15.080	15.080
0	15.073	15.073	15.073
10	15.069	15.069	15.069
20	15.064	15.064	15.064
25	15.061	15.061	15.061
30	15.058	15.057	15.057
40	15.050	15.050	15.049
60	15.033	15.033	15.032
85	15.006	15.005	15.004
-	-	-	-



Model	CES48150-4	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+15V4A	

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 : 40 - 60V

Load Current : 0 - 4A

* 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

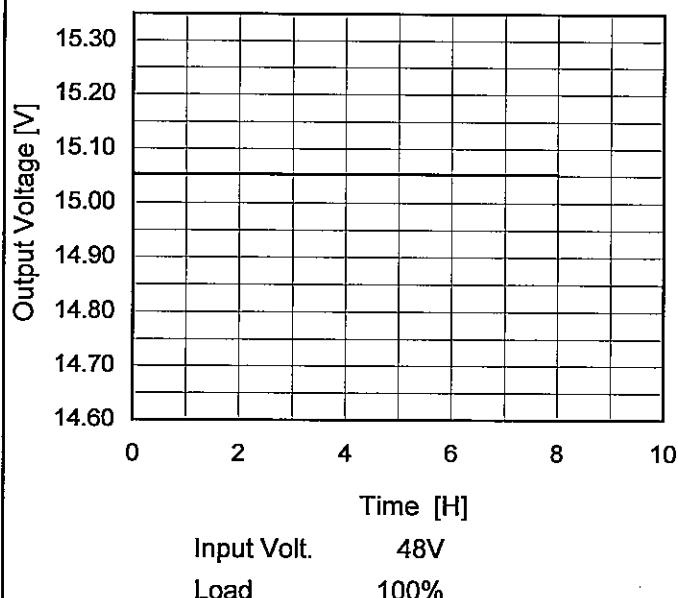
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	60	4	15.082	±39	±0.3
Minimum Voltage	85	60	4	15.004		

COSEL

Model	CES48150-4
Item	Time Lapse Drift
Object	+15V4A

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



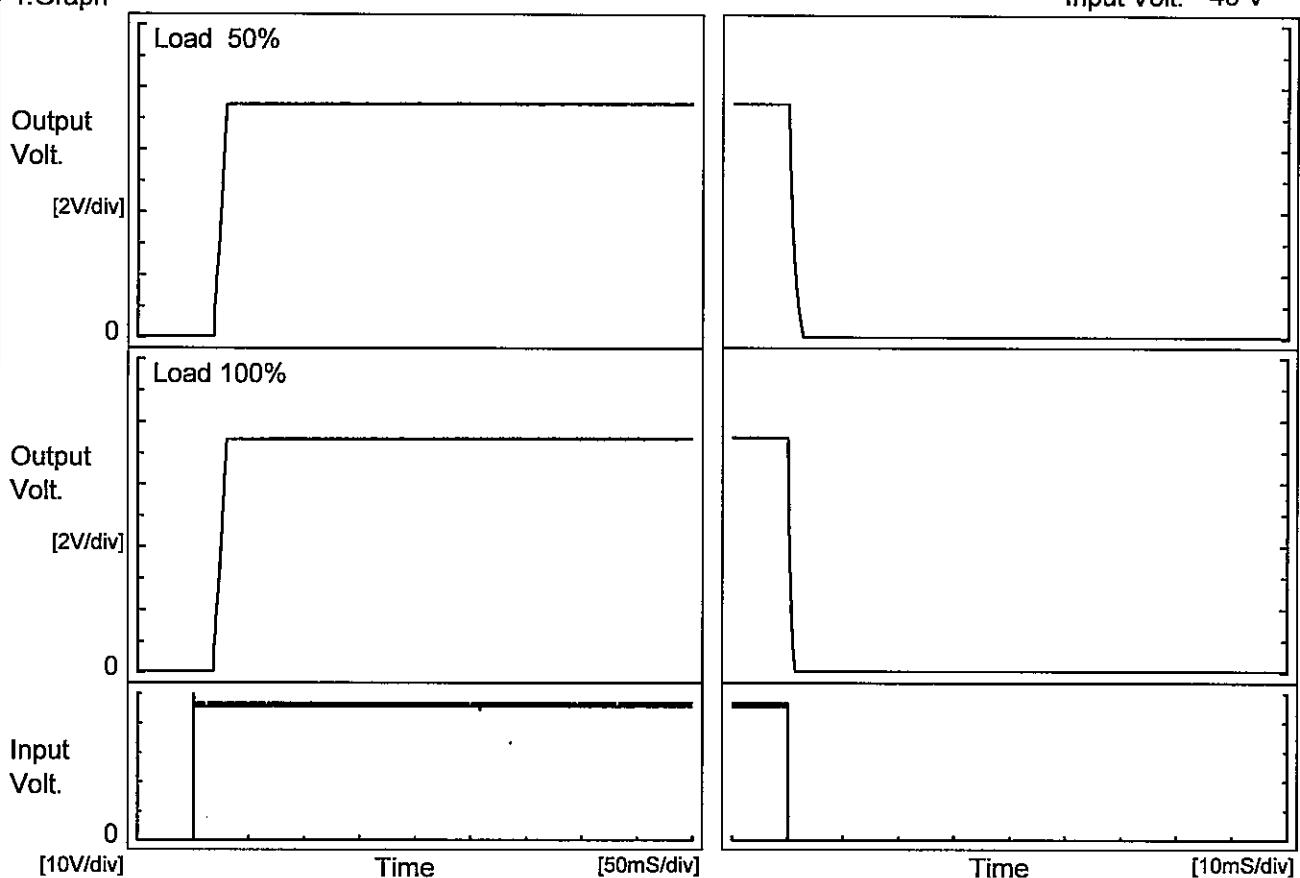
2.Values

Time since start [H]	Output Voltage [V]
0.0	15.058
0.5	15.053
1.0	15.053
2.0	15.053
3.0	15.053
4.0	15.053
5.0	15.053
6.0	15.053
7.0	15.053
8.0	15.053

COSEL

Model	CES48150-4	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V4A		

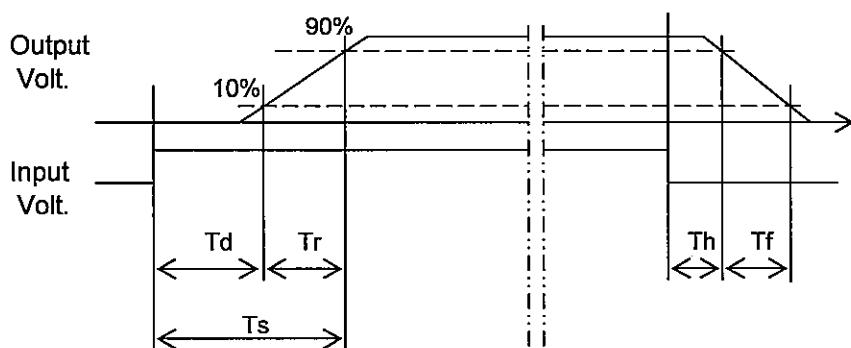
1. Graph



2. Values

[mS]

Load	Time	Td	Tr	Ts	Th	Tf
50 %		18.8	10.0	28.8	0.2	1.9
100 %		18.8	10.3	29.1	0.1	0.9



COSEL

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	35.2	35.4
-30	35.5	35.4
0	35.7	35.6
10	35.7	35.9
20	35.9	36.1
25	36.1	36.1
30	36.1	36.1
40	36.3	36.2
60	36.5	36.7
85	36.9	36.9
--	-	-

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

COSEL

Model	CES48150-4	Temperature	25°C																																																							
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																							
Object	+15V4A																																																									
1.Graph	Input Volt. 40V Input Volt. 48V Input Volt. 60V																																																									
	<p>Output Voltage [V]</p> <p>Load Current [A]</p>	2.Values																																																								
Note:	Slanted line shows the range of the rated load current.																																																									
		<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 40[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 60[V]</th> </tr> </thead> <tbody> <tr><td>15.0</td><td>5.57</td><td>5.33</td><td>5.54</td></tr> <tr><td>14.3</td><td>5.31</td><td>5.06</td><td>5.25</td></tr> <tr><td>13.5</td><td>5.57</td><td>5.33</td><td>5.54</td></tr> <tr><td>12.0</td><td>4.82</td><td>4.73</td><td>4.81</td></tr> <tr><td>10.5</td><td>4.67</td><td>4.65</td><td>4.74</td></tr> <tr><td>9.0</td><td>4.62</td><td>4.65</td><td>4.84</td></tr> <tr><td>7.5</td><td>4.61</td><td>4.72</td><td>4.90</td></tr> <tr><td>6.0</td><td>4.65</td><td>4.79</td><td>4.94</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. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]	15.0	5.57	5.33	5.54	14.3	5.31	5.06	5.25	13.5	5.57	5.33	5.54	12.0	4.82	4.73	4.81	10.5	4.67	4.65	4.74	9.0	4.62	4.65	4.84	7.5	4.61	4.72	4.90	6.0	4.65	4.79	4.94	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Output Voltage [V]	Load Current [A]																																																									
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]																																																							
15.0	5.57	5.33	5.54																																																							
14.3	5.31	5.06	5.25																																																							
13.5	5.57	5.33	5.54																																																							
12.0	4.82	4.73	4.81																																																							
10.5	4.67	4.65	4.74																																																							
9.0	4.62	4.65	4.84																																																							
7.5	4.61	4.72	4.90																																																							
6.0	4.65	4.79	4.94																																																							
-	-	-	-																																																							
-	-	-	-																																																							
-	-	-	-																																																							
-	-	-	-																																																							

COSEL

Model	CES48150-4																																																					
Item	Overvoltage Protection																																																					
Object	+15V4A																																																					
1.Graph	<p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 40V Input Volt. 48V Input Volt. 60V 																																																					
Testing Circuitry	Figure A																																																					
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 40[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 60[V]</th> </tr> </thead> <tbody> <tr><td>-40</td><td>18.28</td><td>18.28</td><td>18.28</td></tr> <tr><td>-30</td><td>18.27</td><td>18.27</td><td>18.27</td></tr> <tr><td>0</td><td>18.18</td><td>18.18</td><td>18.18</td></tr> <tr><td>10</td><td>18.17</td><td>18.17</td><td>18.17</td></tr> <tr><td>20</td><td>18.13</td><td>18.13</td><td>18.13</td></tr> <tr><td>25</td><td>18.13</td><td>18.13</td><td>18.13</td></tr> <tr><td>30</td><td>18.12</td><td>18.12</td><td>18.12</td></tr> <tr><td>40</td><td>18.07</td><td>18.07</td><td>18.07</td></tr> <tr><td>60</td><td>18.03</td><td>18.03</td><td>18.03</td></tr> <tr><td>85</td><td>17.94</td><td>17.94</td><td>17.94</td></tr> <tr><td>—</td><td>—</td><td>—</td><td>—</td></tr> </tbody> </table>			Ambient Temperature [°C]	Operating Point [V]			Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]	-40	18.28	18.28	18.28	-30	18.27	18.27	18.27	0	18.18	18.18	18.18	10	18.17	18.17	18.17	20	18.13	18.13	18.13	25	18.13	18.13	18.13	30	18.12	18.12	18.12	40	18.07	18.07	18.07	60	18.03	18.03	18.03	85	17.94	17.94	17.94	—	—	—	—
Ambient Temperature [°C]	Operating Point [V]																																																					
	Input Volt. 40[V]	Input Volt. 48[V]	Input Volt. 60[V]																																																			
-40	18.28	18.28	18.28																																																			
-30	18.27	18.27	18.27																																																			
0	18.18	18.18	18.18																																																			
10	18.17	18.17	18.17																																																			
20	18.13	18.13	18.13																																																			
25	18.13	18.13	18.13																																																			
30	18.12	18.12	18.12																																																			
40	18.07	18.07	18.07																																																			
60	18.03	18.03	18.03																																																			
85	17.94	17.94	17.94																																																			
—	—	—	—																																																			
Note:	Slanted line shows the range of the rated ambient temperature.																																																					

COSEL

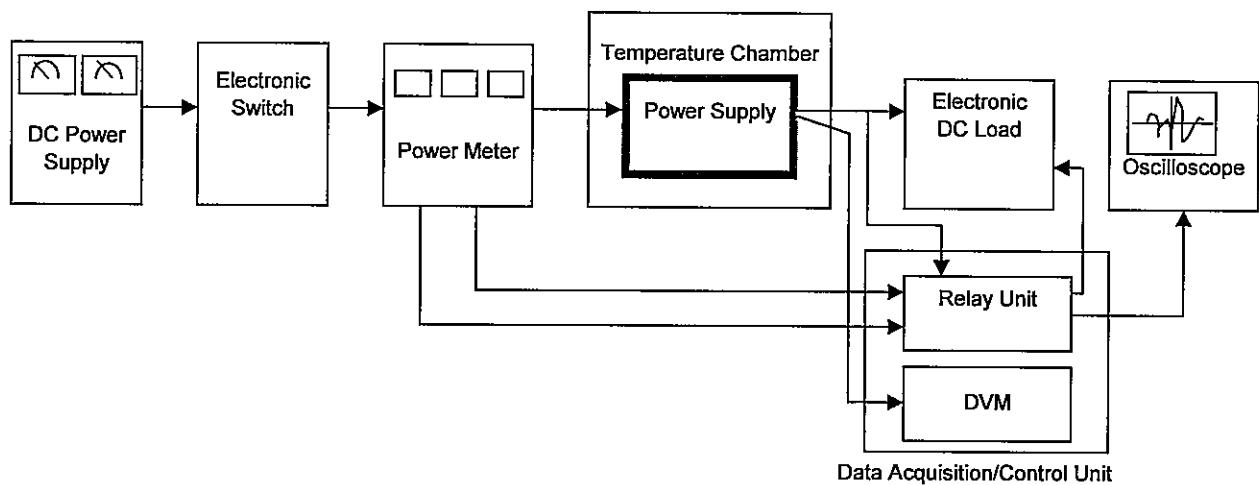


Figure A

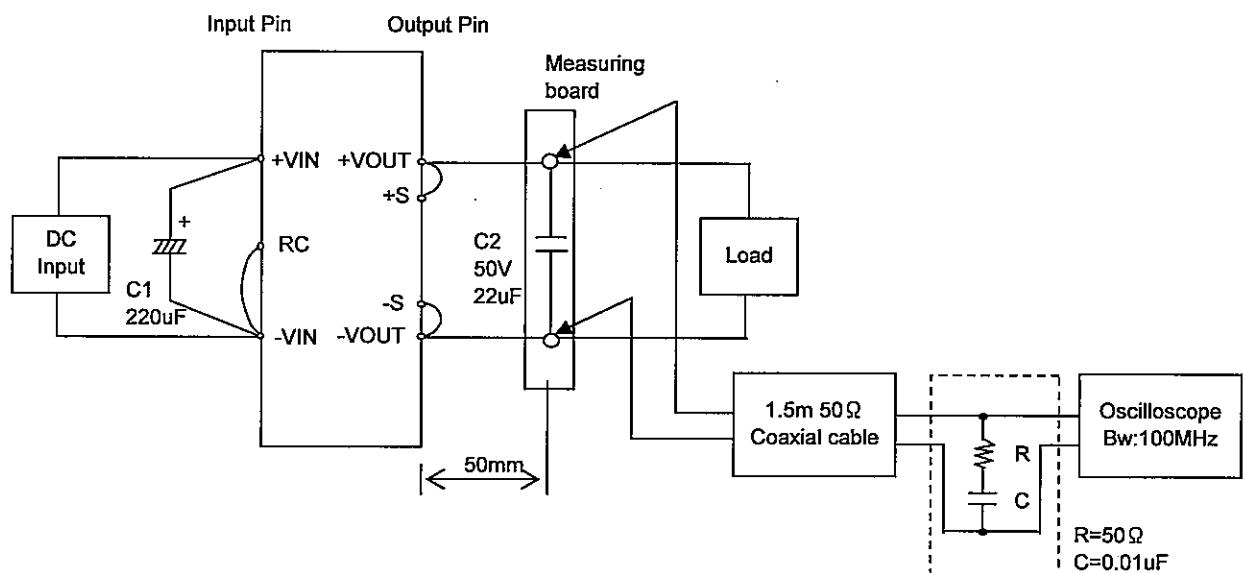


Figure B