



TEST DATA OF CES48033-25

Regulated DC Power Supply
Jul.18. 2003

Approved by :

A handwritten signature in black ink that reads "Kazuyoshi Shimano".

Kazuyoshi Shimano

Design Manager

Prepared by :

A handwritten signature in black ink that reads "Junichi Hatagishi".

Junichi Hatagishi

Design Engineer

COSEL CO.,LTD.



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Model	CES48033-25	Temperature	25°C																																																																					
Item	Input Current (by Input Voltage)	Testing Circuitry	Figure A																																																																					
Object	_____	2.Values																																																																						
1.Graph	<p>The graph plots Input Current [A] on the y-axis (0.0 to 5.0) against Input Voltage [V] on the x-axis (0 to 80). Three data series are shown: Load 100% (triangles), Load 50% (squares), and Load 0% (circles). All series show a sharp increase in current from 0V to approximately 30V, followed by a gradual decrease. A slanted line is drawn through the peak of the Load 100% curve, indicating 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</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>32</td><td>0.069</td><td>1.408</td><td>2.833</td></tr> <tr><td>33</td><td>0.065</td><td>1.364</td><td>2.740</td></tr> <tr><td>36</td><td>0.056</td><td>1.244</td><td>2.508</td></tr> <tr><td>40</td><td>0.054</td><td>1.123</td><td>2.253</td></tr> <tr><td>48</td><td>0.053</td><td>0.943</td><td>1.876</td></tr> <tr><td>60</td><td>0.052</td><td>0.764</td><td>1.512</td></tr> <tr><td>70</td><td>0.051</td><td>0.662</td><td>1.302</td></tr> <tr><td>76</td><td>0.051</td><td>0.614</td><td>1.202</td></tr> <tr><td>80</td><td>0.051</td><td>0.586</td><td>1.144</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	0.000	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	32	0.069	1.408	2.833	33	0.065	1.364	2.740	36	0.056	1.244	2.508	40	0.054	1.123	2.253	48	0.053	0.943	1.876	60	0.052	0.764	1.512	70	0.051	0.662	1.302	76	0.051	0.614	1.202	80	0.051	0.586	1.144	-	-	-	-	-	-	-	-	-	-	-	-
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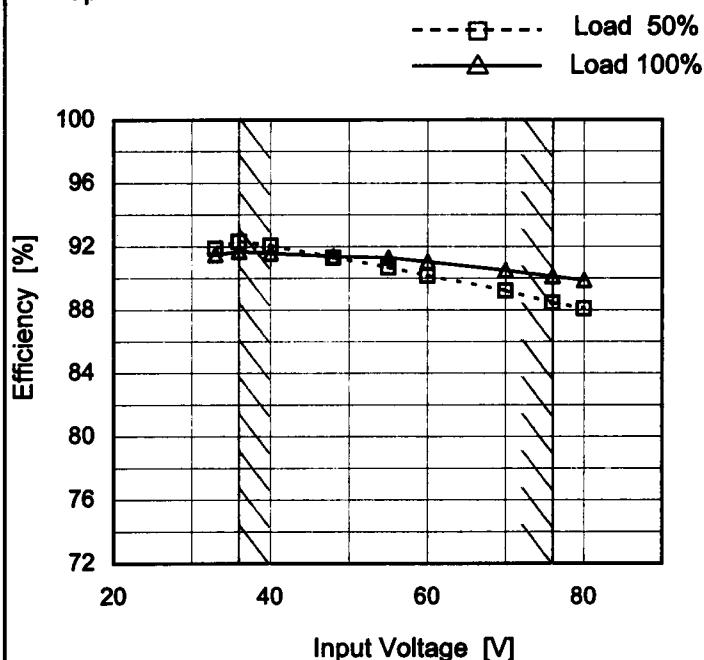
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Model	CES48033-25
Item	Efficiency (by Input Voltage)
Object	—

1. Graph


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

Temperature 25°C
Testing Circuitry Figure A

2. Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
33	91.9	91.5
36	92.3	91.7
40	92.1	91.6
48	91.3	91.4
55	90.7	91.3
60	90.2	91.0
70	89.2	90.5
76	88.5	90.1
80	88.1	89.9

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	<p>The graph shows efficiency increasing with load current for all input voltages. A slanted line is drawn through the data points, representing the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Efficiency [36V] (%)</th> <th>Efficiency [48V] (%)</th> <th>Efficiency [76V] (%)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>4.0</td><td>85.5</td><td>82.9</td><td>76.5</td></tr> <tr><td>8.0</td><td>90.7</td><td>89.2</td><td>85.4</td></tr> <tr><td>12.0</td><td>92.2</td><td>91.1</td><td>88.4</td></tr> <tr><td>16.0</td><td>92.6</td><td>91.8</td><td>89.6</td></tr> <tr><td>20.0</td><td>92.3</td><td>91.9</td><td>90.1</td></tr> <tr><td>24.0</td><td>91.9</td><td>91.5</td><td>90.3</td></tr> <tr><td>25.0</td><td>91.8</td><td>91.4</td><td>90.2</td></tr> <tr><td>27.5</td><td>91.4</td><td>91.2</td><td>90.0</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 [36V] (%)	Efficiency [48V] (%)	Efficiency [76V] (%)	0.0	-	-	-	4.0	85.5	82.9	76.5	8.0	90.7	89.2	85.4	12.0	92.2	91.1	88.4	16.0	92.6	91.8	89.6	20.0	92.3	91.9	90.1	24.0	91.9	91.5	90.3	25.0	91.8	91.4	90.2	27.5	91.4	91.2	90.0	--	-	-	-	--	-	-	-	2.Values						
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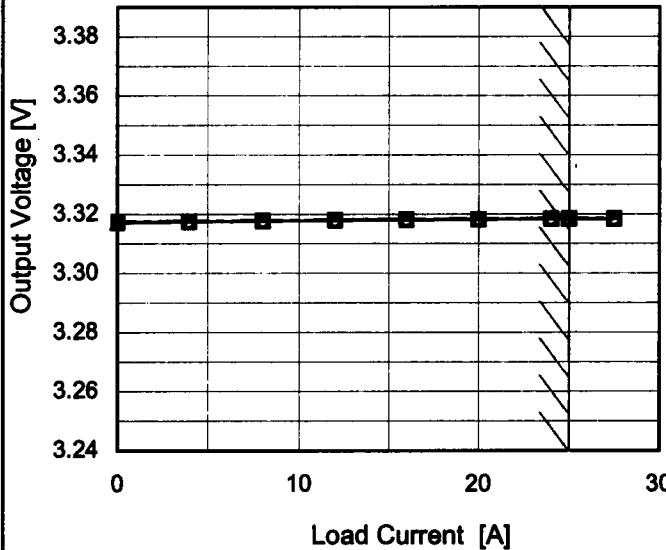
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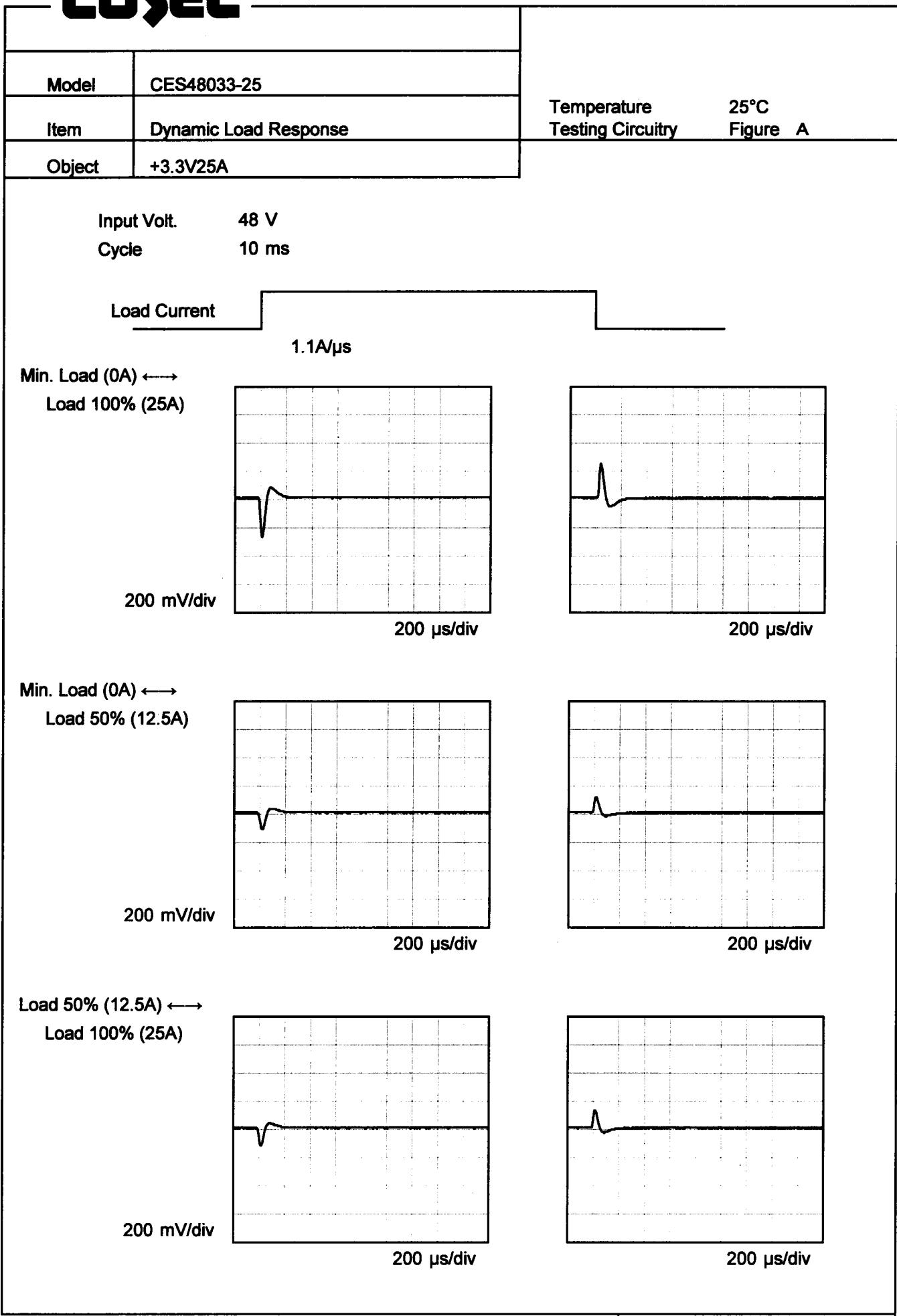
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<p>—△— Input Volt. 36V - - + - - Input Volt. 48V - - ○ - - Input Volt. 76V</p> 		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>3.317</td><td>3.318</td><td>3.318</td></tr> <tr><td>4.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>8.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>12.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>16.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>20.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>24.0</td><td>3.318</td><td>3.319</td><td>3.318</td></tr> <tr><td>25.0</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr><td>27.5</td><td>3.319</td><td>3.319</td><td>3.319</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	3.317	3.318	3.318	4.0	3.318	3.318	3.318	8.0	3.318	3.318	3.318	12.0	3.318	3.318	3.318	16.0	3.318	3.318	3.318	20.0	3.318	3.318	3.318	24.0	3.318	3.319	3.318	25.0	3.318	3.318	3.318	27.5	3.319	3.319	3.319	-	-	-	-	-	-	-	-
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

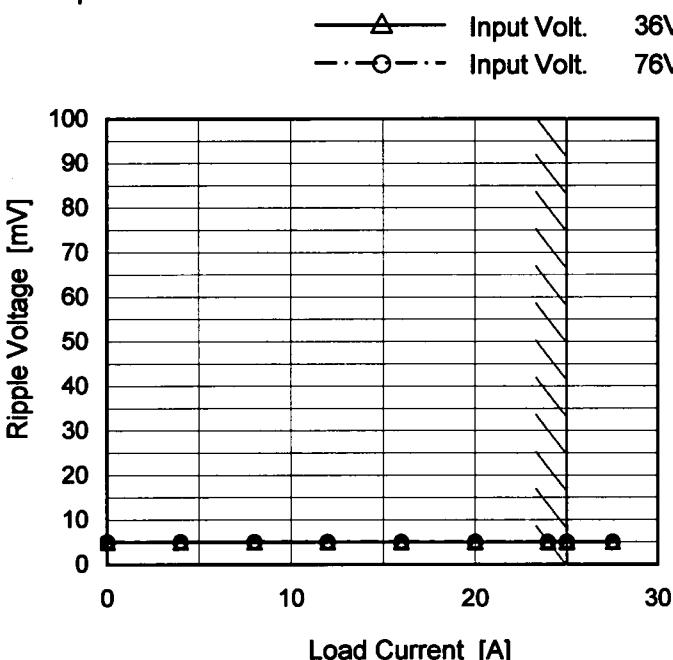
COSEL

COSEL

Model	CES48033-25
Item	Ripple Voltage (by Load Current)
Object	+3.3V25A

 Temperature 25°C
 Testing Circuitry Figure B

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	5	5
4.0	5	5
8.0	5	5
12.0	5	5
16.0	5	5
20.0	5	5
24.0	5	5
25.0	5	5
27.5	5	5
--	-	-
--	-	-

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.

Ripple [mVp-p]

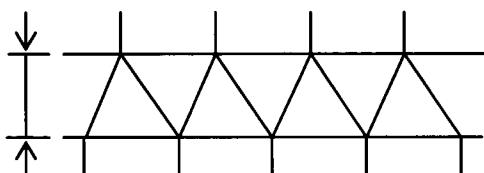


Fig.Complex Ripple Wave Form

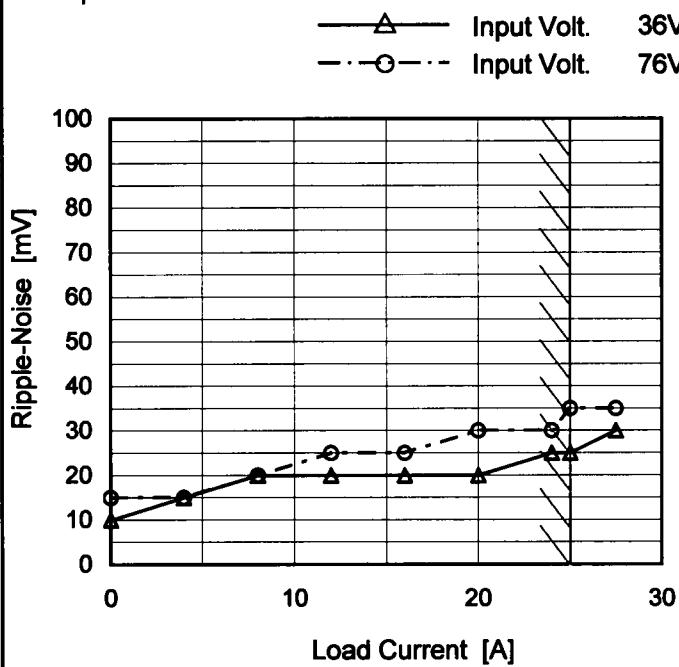
COSEL

Model CES48033-25

Item Ripple-Noise

Object +3.3V25A

1. Graph



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.

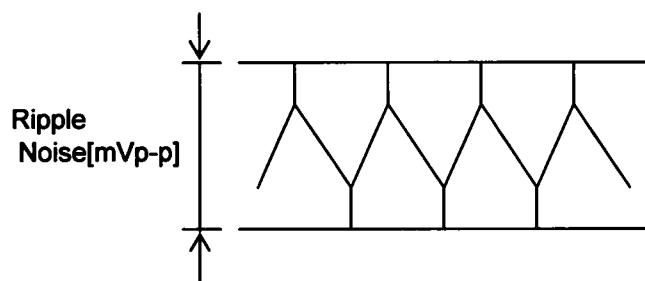


Fig.Complex Ripple Noise Wave Form

Temperature 25°C
Testing Circuitry Figure B

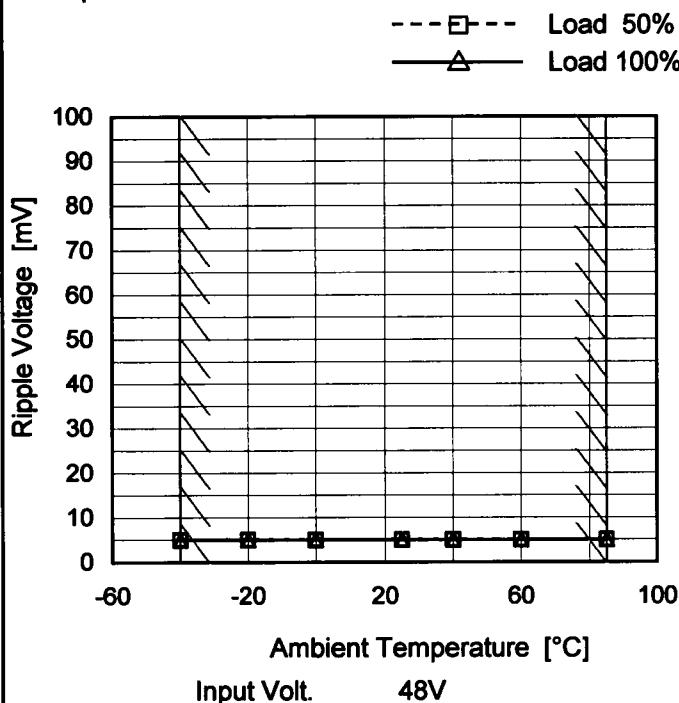
2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	10	15
4.0	15	15
8.0	20	20
12.0	20	25
16.0	20	25
20.0	20	30
24.0	25	30
25.0	25	35
27.5	30	35
--	-	-
--	-	-

COSEL

Model	CES48033-25
Item	Ripple Voltage (by Ambient Temp.)
Object	+3.3V25A

1. Graph



Measured by 100 MHz Oscilloscope.

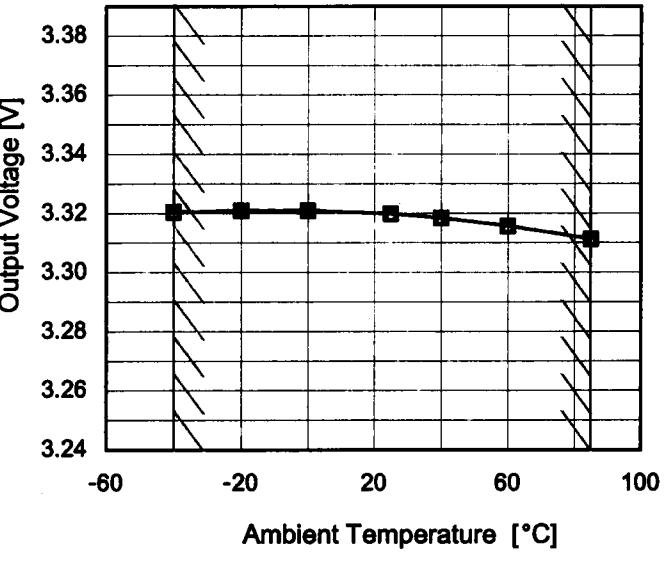
Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure B

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	5	5
-20	5	5
0	5	5
25	5	5
40	5	5
60	5	5
85	5	5
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model CES48033-25																																																				
Item Ambient Temperature Drift	Testing Circuitry Figure A																																																			
Object +3.3V25A																																																				
1.Graph  <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> <ul style="list-style-type: none"> — ▲ — Input Volt. 36V - - - □ - - Input Volt. 48V - - ○ - - Input Volt. 76V 	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. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr> <td>-40</td><td>3.320</td><td>3.321</td><td>3.321</td></tr> <tr> <td>-20</td><td>3.321</td><td>3.321</td><td>3.321</td></tr> <tr> <td>0</td><td>3.321</td><td>3.321</td><td>3.321</td></tr> <tr> <td>25</td><td>3.320</td><td>3.320</td><td>3.320</td></tr> <tr> <td>40</td><td>3.318</td><td>3.318</td><td>3.318</td></tr> <tr> <td>60</td><td>3.316</td><td>3.316</td><td>3.316</td></tr> <tr> <td>85</td><td>3.311</td><td>3.311</td><td>3.311</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	3.320	3.321	3.321	-20	3.321	3.321	3.321	0	3.321	3.321	3.321	25	3.320	3.320	3.320	40	3.318	3.318	3.318	60	3.316	3.316	3.316	85	3.311	3.311	3.311	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																			
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60	3.316	3.316	3.316																																																	
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Note: Slanted line shows the range of the rated ambient temperature.



Model	CES48033-25	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+3.3V25A	

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 - 25A

* 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	76	25	3.320	± 5	± 0.2
Minimum Voltage	85	36	0	3.311		

COSEL

Model	CES48033-25	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+3.3V25A																								
1.Graph			2.Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V 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>3.319</td></tr> <tr><td>0.5</td><td>3.318</td></tr> <tr><td>1.0</td><td>3.318</td></tr> <tr><td>2.0</td><td>3.318</td></tr> <tr><td>3.0</td><td>3.318</td></tr> <tr><td>4.0</td><td>3.318</td></tr> <tr><td>5.0</td><td>3.318</td></tr> <tr><td>6.0</td><td>3.318</td></tr> <tr><td>7.0</td><td>3.318</td></tr> <tr><td>8.0</td><td>3.318</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	3.319	0.5	3.318	1.0	3.318	2.0	3.318	3.0	3.318	4.0	3.318	5.0	3.318	6.0	3.318	7.0	3.318	8.0	3.318
Time since start [H]	Output Voltage [V]																								
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COSEL

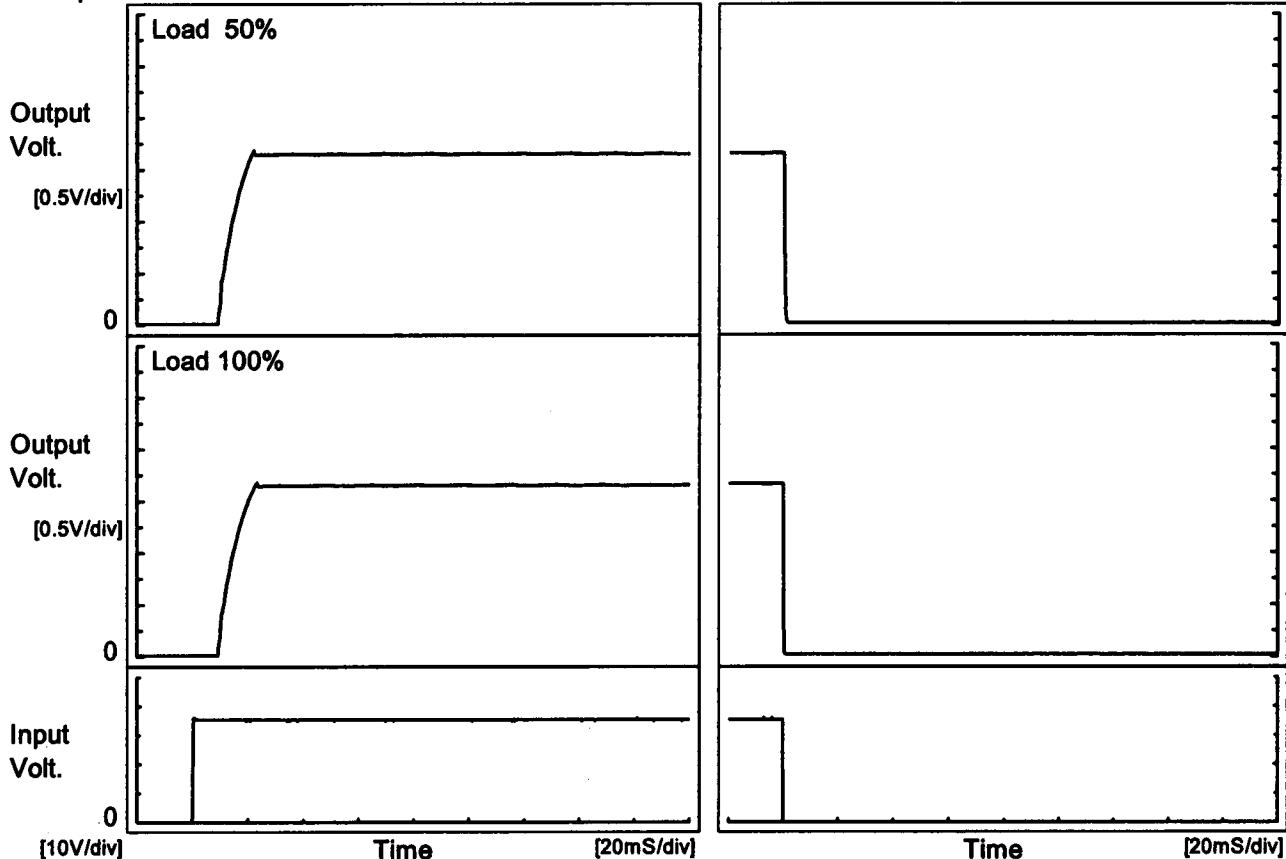
Model CES48033-25

Item Rise and Fall Time

Object +3.3V25A

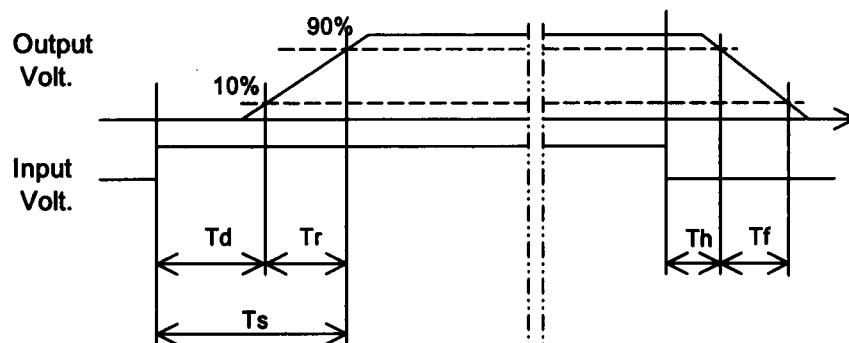
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[mS]
50 %		10.1	9.3	19.4	0.1	0.6	
100 %		10.1	10.1	20.2	0.1	0.3	



COSEL

Model	CES48033-25	Testing Circuitry Figure A
Item	Minimum Input Voltage for Regulated Output Voltage	
Object	+3.3V25A	
1. Graph		
<p style="text-align: center;"> Load 50% Load 100% </p>		
Note: Slanted line shows the range of the rated ambient temperature.		
2. Values		
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	30.5	30.5
-20	30.5	30.5
0	30.5	30.5
25	30.7	30.7
40	30.7	30.7
60	30.7	30.7
85	30.7	30.7
--	-	-
--	-	-
--	-	-
--	-	-

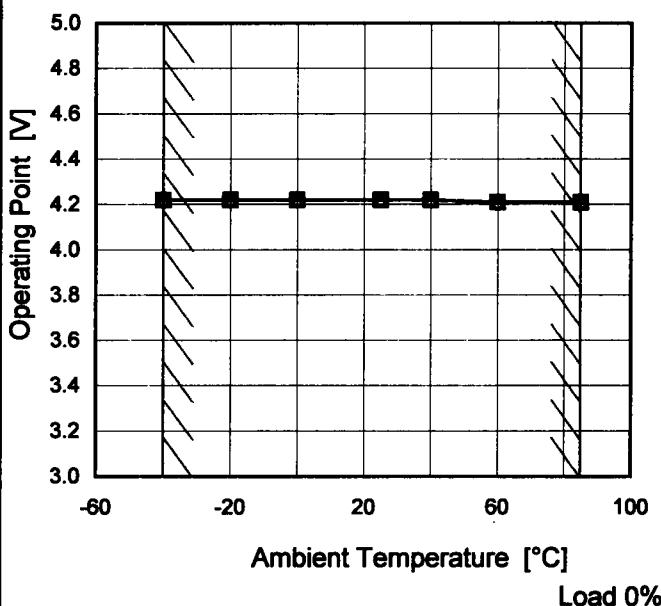
COSEL

Model	CES48033-25	Temperature	25°C																																																																				
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																																				
Object	+3.3V25A																																																																						
1. Graph		2. Values																																																																					
<p>The graph plots Output Voltage [V] on the Y-axis (0.0 to 4.0) against Load Current [A] on the X-axis (0 to 40). Three curves are shown for different input voltages: 36V (top), 48V (middle), and 76V (bottom). A slanted line highlights a specific range of load currents between approximately 25A and 30A.</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.</th> <th>Input Volt.</th> <th>Input Volt.</th> </tr> </thead> <tbody> <tr> <td>36[V]</td> <td>27.08</td> <td>25.00</td> <td>26.60</td> </tr> <tr> <td>48[V]</td> <td>31.46</td> <td>29.23</td> <td>30.23</td> </tr> <tr> <td>76[V]</td> <td>31.40</td> <td>29.33</td> <td>30.69</td> </tr> <tr> <td>3.30</td> <td>30.92</td> <td>29.66</td> <td>31.03</td> </tr> <tr> <td>3.16</td> <td>30.42</td> <td>30.09</td> <td>30.27</td> </tr> <tr> <td>2.97</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>2.64</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>2.31</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>1.98</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>1.65</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>1.32</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>0.99</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>0.66</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>0.33</td> <td>30.47</td> <td>30.03</td> <td>29.89</td> </tr> <tr> <td>0.00</td> <td>30.47</td> <td>30.02</td> <td>29.89</td> </tr> </tbody> </table>			Output Voltage [V]	Load Current [A]			Input Volt.	Input Volt.	Input Volt.	36[V]	27.08	25.00	26.60	48[V]	31.46	29.23	30.23	76[V]	31.40	29.33	30.69	3.30	30.92	29.66	31.03	3.16	30.42	30.09	30.27	2.97	30.47	30.03	29.89	2.64	30.47	30.03	29.89	2.31	30.47	30.03	29.89	1.98	30.47	30.03	29.89	1.65	30.47	30.03	29.89	1.32	30.47	30.03	29.89	0.99	30.47	30.03	29.89	0.66	30.47	30.03	29.89	0.33	30.47	30.03	29.89	0.00	30.47	30.02	29.89
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Note: Slanted line shows the range of the rated load current.

COSEL
Model CES48033-25
Item Overvoltage Protection
Object +3.3V25A
1. Graph

—△— Input Volt. 36V
 - - -□- - Input Volt. 48V
 - - ○- - Input Volt. 76V



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

Testing Circuitry Figure A
2. Values

Ambient Temperature [°C]	Operating Point [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-40	4.22	4.22	4.22
-20	4.22	4.22	4.22
0	4.22	4.22	4.22
25	4.22	4.22	4.22
40	4.22	4.22	4.22
60	4.21	4.21	4.21
85	4.21	4.21	4.21
0	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-

COSEL

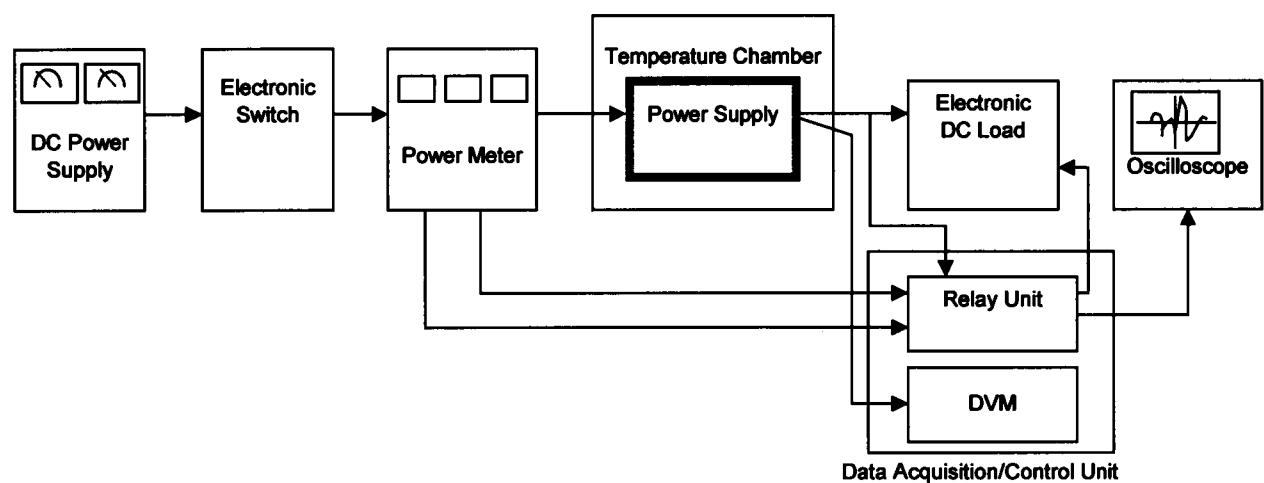


Figure A

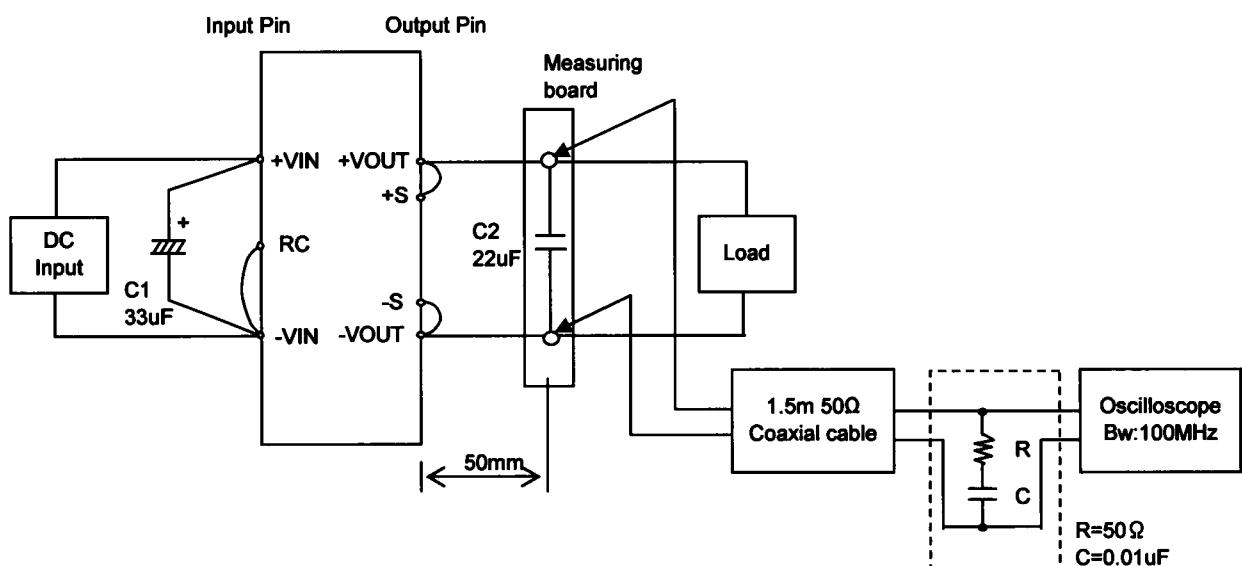


Figure B