

# TEST DATA OF CES24050-16

Regulated DC Power Supply  
Aug 10, 2007

Approved by : Tatsuya Mano  
Tatsuya Mano Design Manager

Prepared by : Masahiro Miyake  
Masahiro Miyake Design Engineer

**COSEL CO.,LTD.**

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Model		CES24050-16		Temperature		25°C																																																																																
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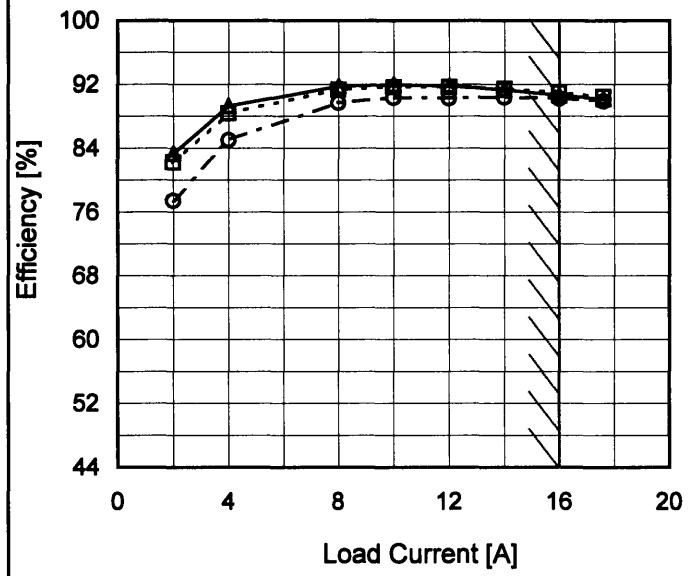


Model	CES24050-16
Item	Efficiency (by Load Current)
Object	_____

Temperature 25°C  
Testing Circuitry Figure A

1.Graph

- △— Input Volt. 18V
- - -□- - Input Volt. 24V
- · -○- · - Input Volt. 36V



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

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.0	-	-	-
2.0	83.3	82.2	77.4
4.0	89.3	88.4	85.0
8.0	91.8	91.3	89.7
10.0	92.0	91.7	90.3
12.0	91.8	91.7	90.3
14.0	91.3	91.5	90.4
16.0	90.6	91.0	90.2
17.6	90.2	90.5	89.9
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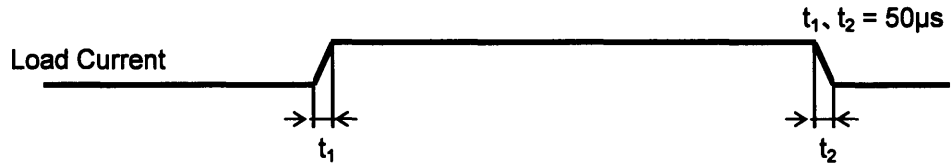




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<p> <span style="border-bottom: 1px solid black; margin-right: 5px;">—△—</span> Input Volt. 18V  <span style="border-bottom: 1px dashed black; margin-right: 5px;">---□---</span> Input Volt. 24V  <span style="border-bottom: 1px dash-dot black; margin-right: 5px;">-·-○-·-</span> Input Volt. 36V                 </p> <p style="text-align: center;">Load Current [A]</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. 18[V]</th> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5.006</td><td>5.007</td><td>5.007</td></tr> <tr><td>2.0</td><td>5.006</td><td>5.007</td><td>5.007</td></tr> <tr><td>4.0</td><td>5.006</td><td>5.007</td><td>5.007</td></tr> <tr><td>8.0</td><td>5.006</td><td>5.007</td><td>5.006</td></tr> <tr><td>10.0</td><td>5.006</td><td>5.007</td><td>5.006</td></tr> <tr><td>12.0</td><td>5.006</td><td>5.006</td><td>5.006</td></tr> <tr><td>14.0</td><td>5.006</td><td>5.006</td><td>5.006</td></tr> <tr><td>16.0</td><td>5.005</td><td>5.006</td><td>5.006</td></tr> <tr><td>17.6</td><td>5.005</td><td>5.005</td><td>5.005</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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.0	5.006	5.007	5.007	2.0	5.006	5.007	5.007	4.0	5.006	5.007	5.007	8.0	5.006	5.007	5.006	10.0	5.006	5.007	5.006	12.0	5.006	5.006	5.006	14.0	5.006	5.006	5.006	16.0	5.005	5.006	5.006	17.6	5.005	5.005	5.005	--	-	-	-	--	-	-	-
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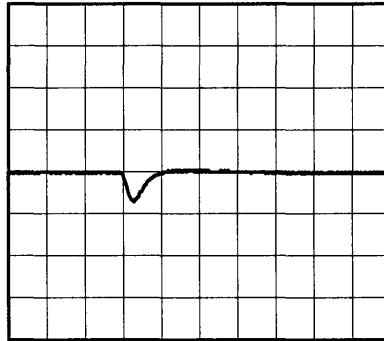
Model	CES24050-16	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+5V16A		

Input Volt. 24 V  
 Cycle 5 mS

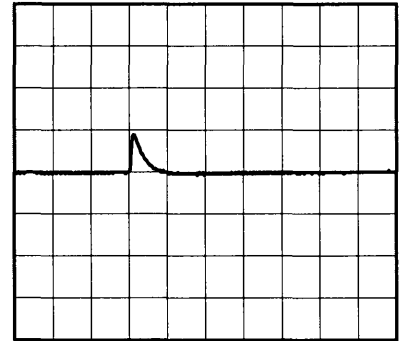


Min. Load (0A) ←→  
 Load 100% (16A)

100mV/div



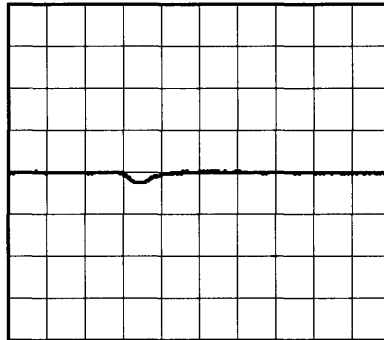
200µs/div



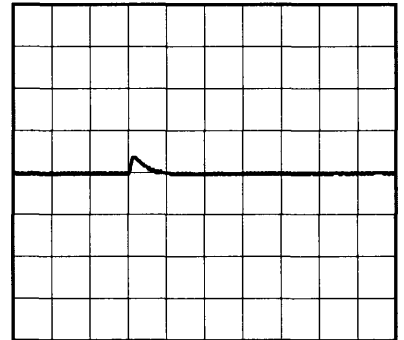
200µs/div

Min. Load (0A) ←→  
 Load 50% (8A)

100mV/div



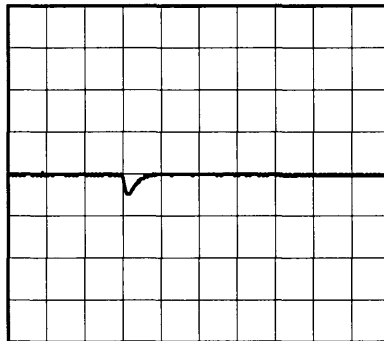
200µs/div



200µs/div

Load 50% (8A) ←→  
 Load 100% (16A)

100mV/div



200µs/div



200µs/div

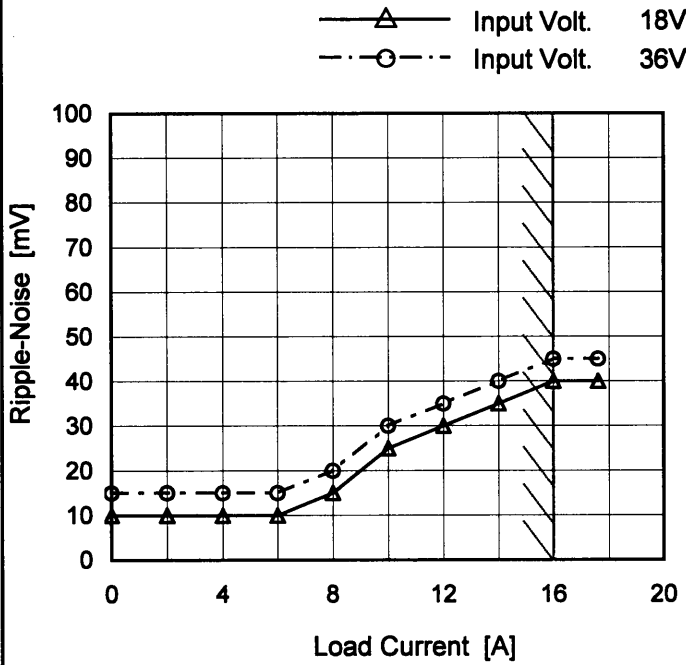


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Model	CES24050-16																																							
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<p>1. Graph</p> <div style="text-align: right;">                     —△— Input Volt. 18V                      - -○- - Input Volt. 36V                 </div> <p>Measured by 100 MHz Oscilloscope.                  Ripple Voltage is shown as p-p in the figure below.                  Note: Slanted line shows the range of the rated load current.</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 18 [V]</th> <th>Input Volt. 36 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5</td><td>5</td></tr> <tr><td>2.0</td><td>5</td><td>5</td></tr> <tr><td>4.0</td><td>5</td><td>5</td></tr> <tr><td>6.0</td><td>5</td><td>5</td></tr> <tr><td>8.0</td><td>5</td><td>5</td></tr> <tr><td>10.0</td><td>5</td><td>5</td></tr> <tr><td>12.0</td><td>5</td><td>5</td></tr> <tr><td>14.0</td><td>5</td><td>5</td></tr> <tr><td>16.0</td><td>5</td><td>5</td></tr> <tr><td>17.6</td><td>5</td><td>5</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 18 [V]	Input Volt. 36 [V]	0.0	5	5	2.0	5	5	4.0	5	5	6.0	5	5	8.0	5	5	10.0	5	5	12.0	5	5	14.0	5	5	16.0	5	5	17.6	5	5	--	-	-
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<p>Ripple [mVp-p]</p> <p>Fig. Complex Ripple Wave Form</p>																																								



Model	CES24050-16	Temperature	25°C
Item	Ripple-Noise	Testing Circuitry	Figure B
Object	+5V16A		

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.

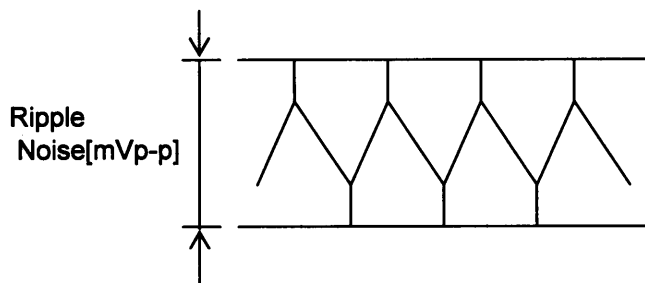


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.0	10	15
2.0	10	15
4.0	10	15
6.0	10	15
8.0	15	20
10.0	25	30
12.0	30	35
14.0	35	40
16.0	40	45
17.6	40	45
-	-	-



<b>Model</b>		CES24050-16		Testing Circuitry Figure B																																						
<b>Item</b>		Ripple Voltage (by Ambient Temp.)																																								
<b>Object</b>		+5V16A																																								
<p>1. Graph</p> <div style="text-align: right; margin-bottom: 10px;"> <p>---□--- Load 50%</p> <p>—△— Load 100%</p> </div> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Input Volt. 24V</p>			<p>2. Values</p> <table border="1" style="width: 100%; border-collapse: collapse; text-align: center;"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>-40</td><td>5</td><td>5</td></tr> <tr><td>-20</td><td>5</td><td>5</td></tr> <tr><td>0</td><td>5</td><td>5</td></tr> <tr><td>25</td><td>5</td><td>5</td></tr> <tr><td>40</td><td>5</td><td>5</td></tr> <tr><td>60</td><td>5</td><td>5</td></tr> <tr><td>85</td><td>5</td><td>5</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]	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	--	-	-	--	-	-	--	-	-	--	-	-
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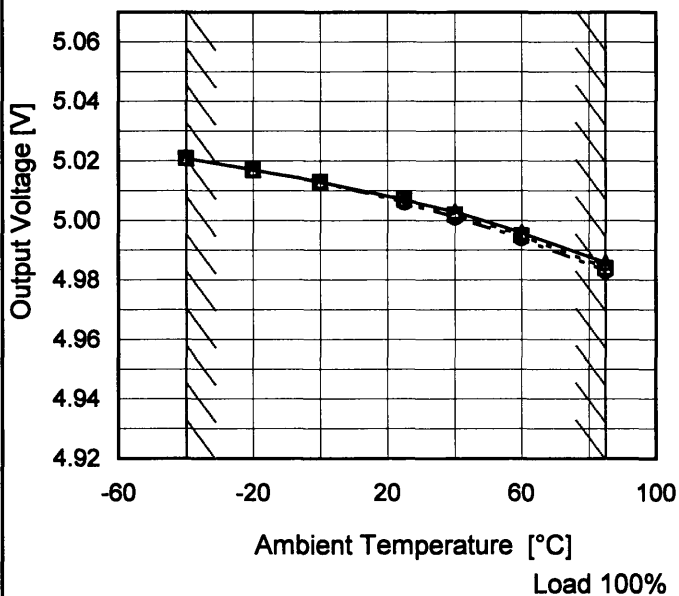


Model	CES24050-16
Item	Ambient Temperature Drift
Object	+5V16A

Testing Circuitry Figure A

1. Graph

- △— Input Volt. 18V
- Input Volt. 24V
- Input Volt. 36V



2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-40	5.021	5.021	5.021
-20	5.017	5.017	5.017
0	5.013	5.013	5.013
25	5.007	5.007	5.006
40	5.003	5.002	5.001
60	4.996	4.995	4.994
85	4.986	4.984	4.983
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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



<b>COSEL</b>		
Model	CES24050-16	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+5V16A	

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 : 18 - 36V

Load Current : 0 - 16A

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

\* 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	36	0	5.021	±19	±0.4
Minimum Voltage	85	36	16	4.983		



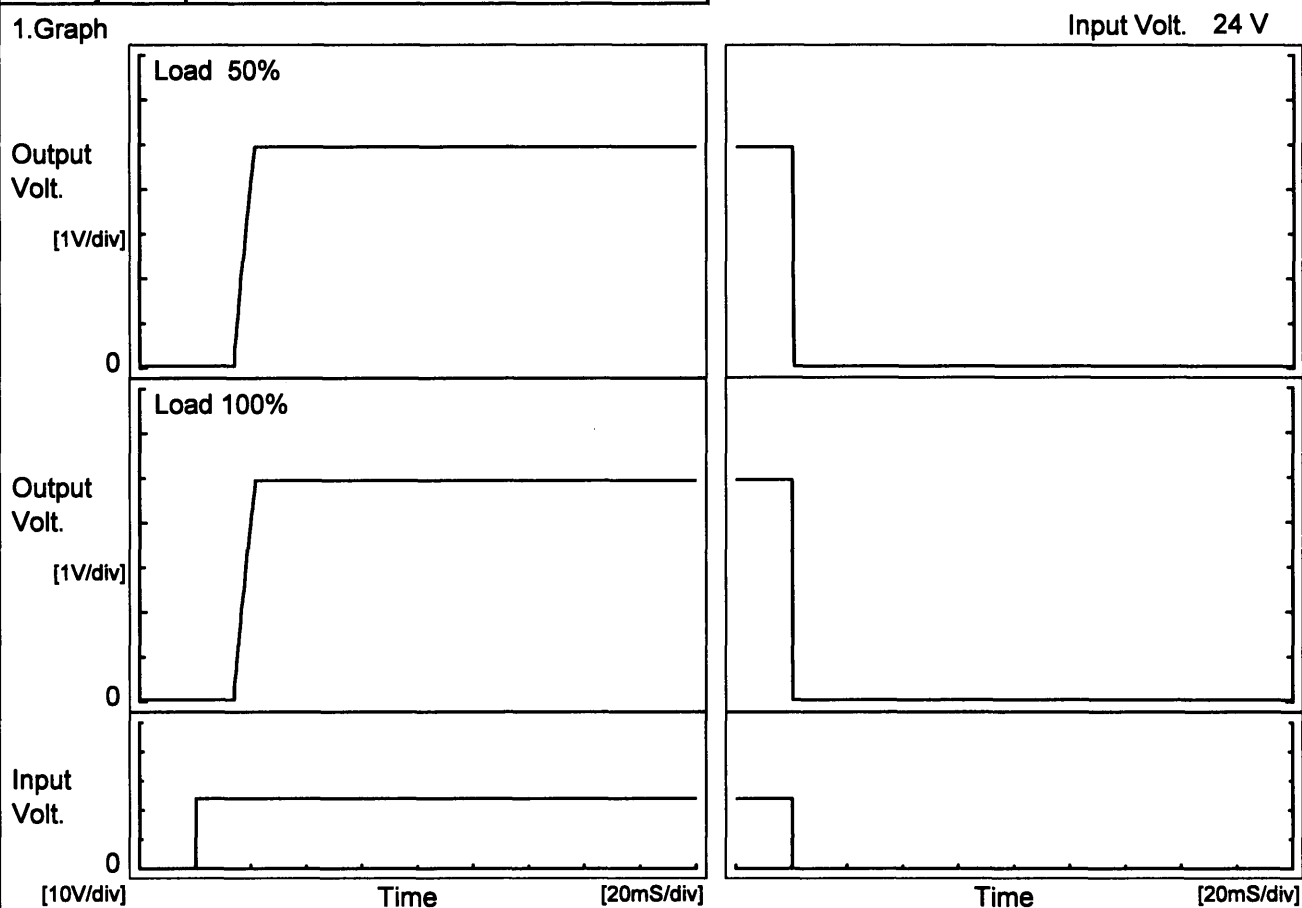
<b>COSEL</b>																									
Model	CES24050-16	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+5V16A																								
<p>1. Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt.     24V Load             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>5.009</td></tr> <tr><td>0.5</td><td>5.003</td></tr> <tr><td>1.0</td><td>5.003</td></tr> <tr><td>2.0</td><td>5.003</td></tr> <tr><td>3.0</td><td>5.003</td></tr> <tr><td>4.0</td><td>5.003</td></tr> <tr><td>5.0</td><td>5.003</td></tr> <tr><td>6.0</td><td>5.003</td></tr> <tr><td>7.0</td><td>5.004</td></tr> <tr><td>8.0</td><td>5.004</td></tr> </tbody> </table>		Time since start [H]	Output Voltage [V]	0.0	5.009	0.5	5.003	1.0	5.003	2.0	5.003	3.0	5.003	4.0	5.003	5.0	5.003	6.0	5.003	7.0	5.004	8.0	5.004
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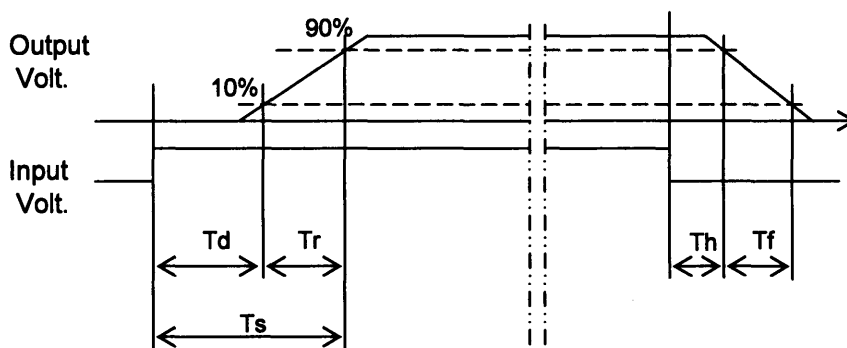
Model	CES24050-16	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+5V16A		

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		14.3	6.6	20.9	0.2	0.3
100 %		14.3	6.8	21.1	0.2	0.1





<b>COSEL</b>																																								
Model	CES24050-16																																							
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																						
Object	+5V16A																																							
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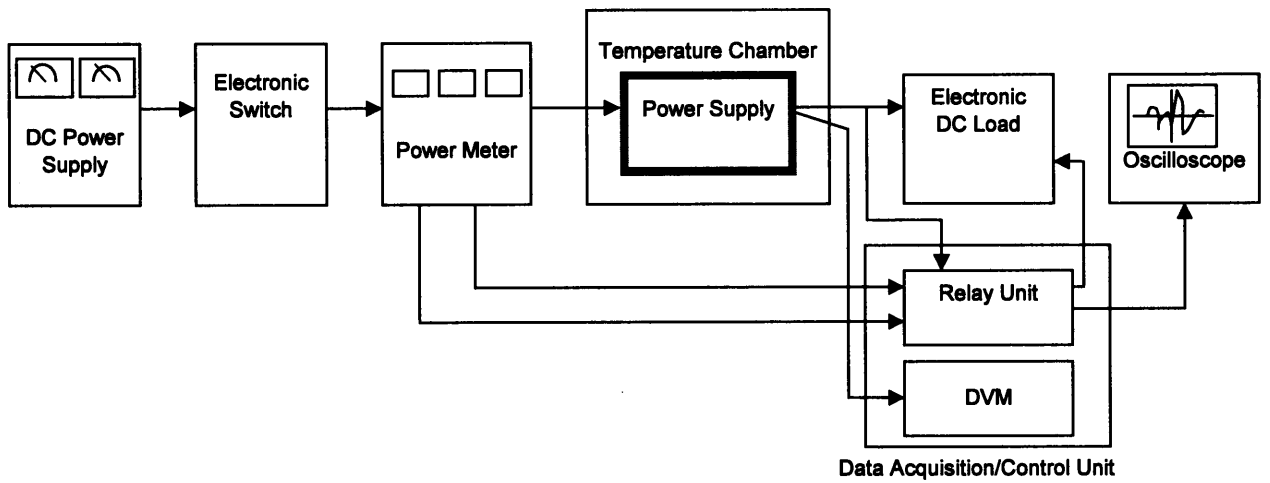


Figure A

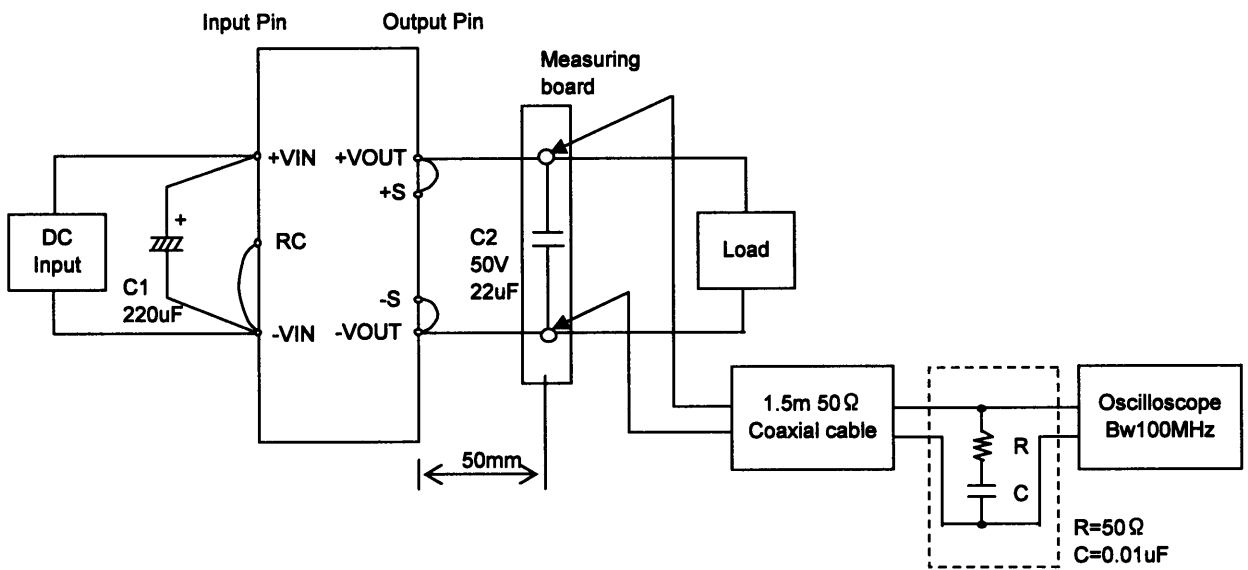


Figure B