

TEST DATA OF CBS3502412

Regulated DC Power Supply
Dec.10. 2004

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COSEL CO.,LTD.



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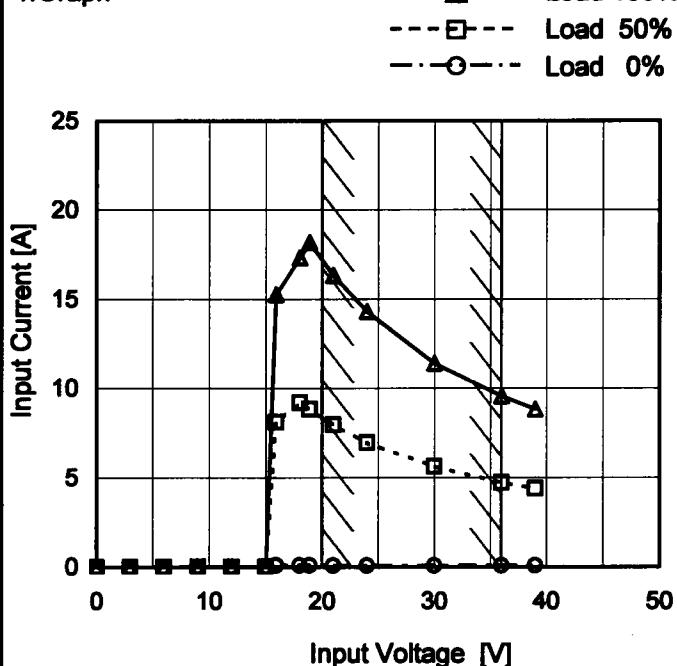
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(Final Page 19)

COSEL

Model	CBS3502412
Item	Input Current (by Input Voltage)
Object	_____

1.Graph



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

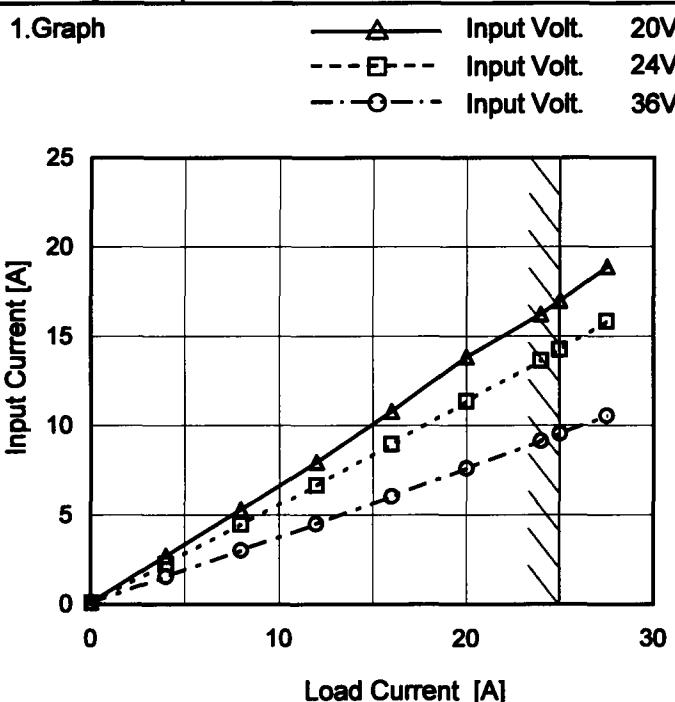
Temperature 25°C
Testing Circuitry Figure A

2.Values

Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0	0.000	0.000	0.000
3.0	0.000	0.000	0.000
6.0	0.000	0.000	0.000
9.0	0.018	0.018	0.016
12.0	0.016	0.015	0.017
15.0	0.011	0.013	0.012
15.9	0.109	8.110	15.261
18.0	0.102	9.211	17.333
18.9	0.102	8.847	18.193
21.0	0.097	7.968	16.350
24.0	0.092	6.977	14.314
30.0	0.083	5.631	11.408
36.0	0.084	4.722	9.565
39.0	0.084	4.395	8.843
-	-	-	-
-	-	-	-

COSEL

Model	CBS3502412
Item	Input Current (by Load Current)
Object	_____



Temperature 25°C
 Testing Circuitry Figure A

2. Values

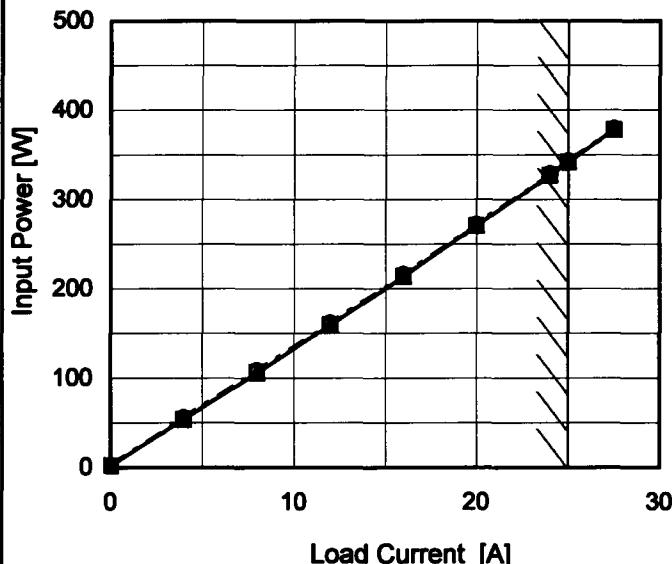
Load Current [A]	Input Current [A]		
	Input Volt. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.0	0.102	0.094	0.083
4.0	2.704	2.256	1.557
8.0	5.307	4.468	3.025
12.0	7.965	6.656	4.512
16.0	10.788	8.969	6.042
20.0	13.851	11.364	7.615
24.0	16.241	13.649	9.142
25.0	16.984	14.269	9.546
27.5	18.893	15.841	10.563
—	-	-	-
—	-	-	-

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

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Model	CBS3502412
Item	Input Power (by Load Current)
Object	—

1. Graph
- △ — Input Volt. 20V
 - - □ - - Input Volt. 24V
 - - ○ - - Input Volt. 36V



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

Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Input Power [W]		
	Input Volt. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.0	2.0	2.3	3.0
4.0	53.8	54.0	56.1
8.0	105.9	106.5	108.9
12.0	159.4	160.0	162.1
16.0	214.1	214.6	216.6
20.0	270.8	270.6	272.4
24.0	327.3	327.3	329.0
25.0	341.9	341.8	343.4
27.5	378.6	378.1	379.5
—	-	-	-
—	-	-	-

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Model	CBS3502412	Temperature 25°C																																
Item	Efficiency (by Input Voltage)	Testing Circuitry Figure A																																
Object	_____	_____																																
1. Graph																																		
<p>Efficiency [%]</p> <p>Input Voltage [V]</p> <p>Legend: ---□--- Load 50% —△— Load 100%</p>																																		
2. Values																																		
<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>19</td><td>89.3</td><td>86.9</td></tr> <tr> <td>20</td><td>90.3</td><td>87.4</td></tr> <tr> <td>24</td><td>89.4</td><td>87.3</td></tr> <tr> <td>30</td><td>88.9</td><td>87.2</td></tr> <tr> <td>36</td><td>88.2</td><td>86.9</td></tr> <tr> <td>40</td><td>87.8</td><td>86.7</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>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	19	89.3	86.9	20	90.3	87.4	24	89.4	87.3	30	88.9	87.2	36	88.2	86.9	40	87.8	86.7	-	-	-	-	-	-	-	-	-
Input Voltage [V]	Efficiency [%]																																	
	Load 50%	Load 100%																																
19	89.3	86.9																																
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<p>Note: Slanted line shows the range of the rated input voltage.</p>																																		

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Model	CBS3502412	Temperature	25°C																										
Item	Efficiency (by Load Current)	Testing Circuitry	Figure A																										
Object	_____																												
1.Graph	<p>—△— Input Volt. 20V - - - E - - - Input Volt. 24V - - O - - - Input Volt. 36V</p> <table border="1"> <caption>Data points estimated from Figure A graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>Efficiency [20V] [%]</th> <th>Efficiency [24V] [%]</th> <th>Efficiency [36V] [%]</th> </tr> </thead> <tbody> <tr><td>5</td><td>88.5</td><td>88.5</td><td>88.5</td></tr> <tr><td>10</td><td>89.0</td><td>89.0</td><td>88.5</td></tr> <tr><td>15</td><td>88.5</td><td>88.5</td><td>88.0</td></tr> <tr><td>20</td><td>88.0</td><td>88.0</td><td>87.5</td></tr> <tr><td>25</td><td>87.5</td><td>87.5</td><td>87.0</td></tr> <tr><td>30</td><td>87.0</td><td>87.0</td><td>86.5</td></tr> </tbody> </table>	Load Current [A]	Efficiency [20V] [%]	Efficiency [24V] [%]	Efficiency [36V] [%]	5	88.5	88.5	88.5	10	89.0	89.0	88.5	15	88.5	88.5	88.0	20	88.0	88.0	87.5	25	87.5	87.5	87.0	30	87.0	87.0	86.5
Load Current [A]	Efficiency [20V] [%]	Efficiency [24V] [%]	Efficiency [36V] [%]																										
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2.Values																													
Load Current [A]	Efficiency [%]																												
	Input Volt. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]																										
0.0	-	-	-																										
4.0	88.6	88.3	84.9																										
8.0	90.1	89.5	87.6																										
12.0	89.8	89.5	88.3																										
16.0	89.2	88.9	88.1																										
20.0	88.3	88.3	87.7																										
24.0	87.6	87.6	87.1																										
25.0	87.4	87.4	87.0																										
27.5	86.8	86.9	86.6																										
-	-	-	-																										
-	-	-	-																										

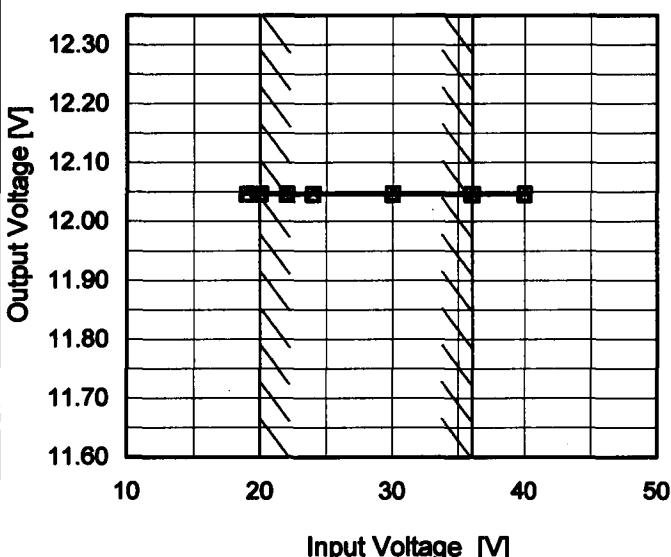
Note: Slanted line shows the range of the rated load current.

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Model	CBS3502412
Item	Line Regulation
Object	+12V25A

1. Graph

--- □ --- Load 50%
 —△— Load 100%



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

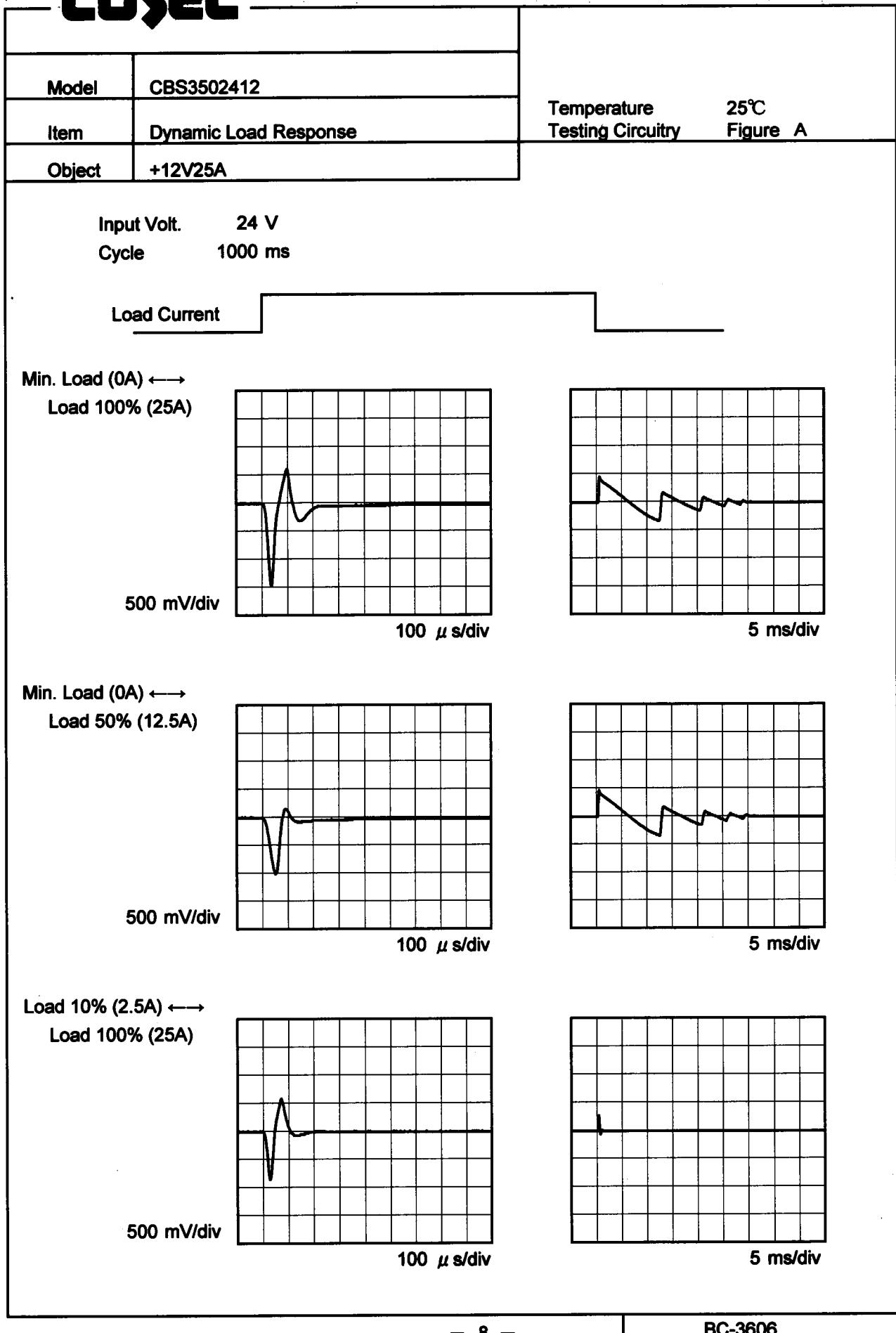
 Temperature 25°C
 Testing Circuitry Figure A

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
19	12.046	12.047
20	12.046	12.047
22	12.047	12.046
24	12.047	12.047
30	12.047	12.046
36	12.047	12.046
40	12.047	12.046
-	-	-
-	-	-

COSEL

Model	CBS3502412	Temperature	25°C																																																			
Item	Load Regulation	Testing Circuitry	Figure A																																																			
Object	+12V25A																																																					
1.Graph	<p>—△— Input Volt. 20V - - □ - - Input Volt. 24V - - ○ - - Input Volt. 36V</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. 20[V]</th> <th>Input Volt. 24[V]</th> <th>Input Volt. 36[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12.045</td><td>12.046</td><td>12.045</td></tr> <tr><td>4.0</td><td>12.045</td><td>12.045</td><td>12.045</td></tr> <tr><td>8.0</td><td>12.045</td><td>12.045</td><td>12.045</td></tr> <tr><td>12.0</td><td>12.045</td><td>12.045</td><td>12.045</td></tr> <tr><td>16.0</td><td>12.045</td><td>12.045</td><td>12.045</td></tr> <tr><td>20.0</td><td>12.046</td><td>12.045</td><td>12.045</td></tr> <tr><td>24.0</td><td>12.045</td><td>12.045</td><td>12.045</td></tr> <tr><td>25.0</td><td>12.046</td><td>12.045</td><td>12.045</td></tr> <tr><td>27.5</td><td>12.045</td><td>12.045</td><td>12.045</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. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.0	12.045	12.046	12.045	4.0	12.045	12.045	12.045	8.0	12.045	12.045	12.045	12.0	12.045	12.045	12.045	16.0	12.045	12.045	12.045	20.0	12.046	12.045	12.045	24.0	12.045	12.045	12.045	25.0	12.046	12.045	12.045	27.5	12.045	12.045	12.045	--	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																					
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16.0	12.045	12.045	12.045																																																			
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27.5	12.045	12.045	12.045																																																			
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	<p>Note: Slanted line shows the range of the rated load current.</p>																																																					

COSEL

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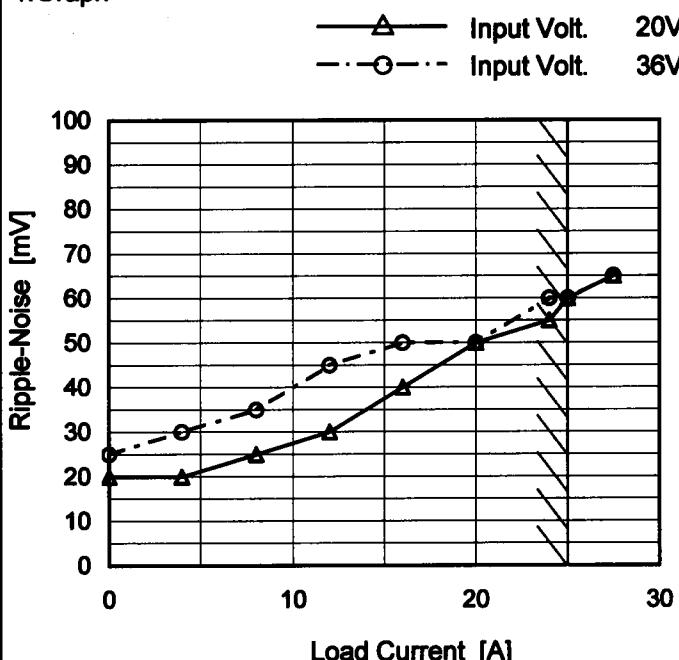
Model	CBS3502412	Temperature	25°C																																			
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure A																																			
Object	+12V25A																																					
1. Graph		2. Values																																				
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 50 mV, and the X-axis ranges from 0 to 30 A. Two sets of data points are plotted: Input Volt. 20V (solid triangles) and Input Volt. 36V (open circles). A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 20V)</th> <th>Ripple Voltage [mV] (Input Volt. 36V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>10</td><td>20</td></tr> <tr><td>4.0</td><td>15</td><td>20</td></tr> <tr><td>8.0</td><td>15</td><td>20</td></tr> <tr><td>12.0</td><td>15</td><td>20</td></tr> <tr><td>16.0</td><td>15</td><td>20</td></tr> <tr><td>20.0</td><td>15</td><td>20</td></tr> <tr><td>24.0</td><td>15</td><td>20</td></tr> <tr><td>25.0</td><td>15</td><td>20</td></tr> <tr><td>27.5</td><td>15</td><td>20</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. 20V)	Ripple Voltage [mV] (Input Volt. 36V)	0.0	10	20	4.0	15	20	8.0	15	20	12.0	15	20	16.0	15	20	20.0	15	20	24.0	15	20	25.0	15	20	27.5	15	20	-	-	-	-	-	-
Load Current [A]	Ripple Voltage [mV] (Input Volt. 20V)	Ripple Voltage [mV] (Input Volt. 36V)																																				
0.0	10	20																																				
4.0	15	20																																				
8.0	15	20																																				
12.0	15	20																																				
16.0	15	20																																				
20.0	15	20																																				
24.0	15	20																																				
25.0	15	20																																				
27.5	15	20																																				
-	-	-																																				
-	-	-																																				
<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>Fig. Complex Ripple Wave Form</p>																																				

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Model	CBS3502412
Item	Ripple-Noise
Object	+12V25A

 Temperature 25°C
 Testing Circuitry Figure A

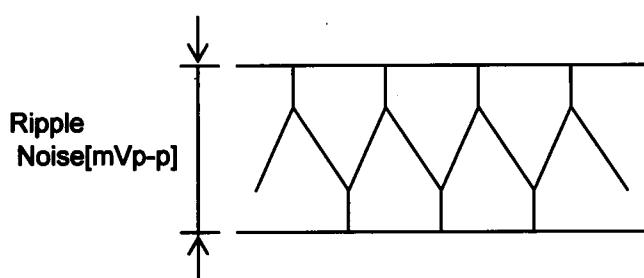
1. Graph



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.

2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 20 [V]	Input Volt. 36 [V]
0.0	20	25
4.0	20	30
8.0	25	35
12.0	30	45
16.0	40	50
20.0	50	50
24.0	55	60
25.0	60	60
27.5	65	65
-	-	-
-	-	-



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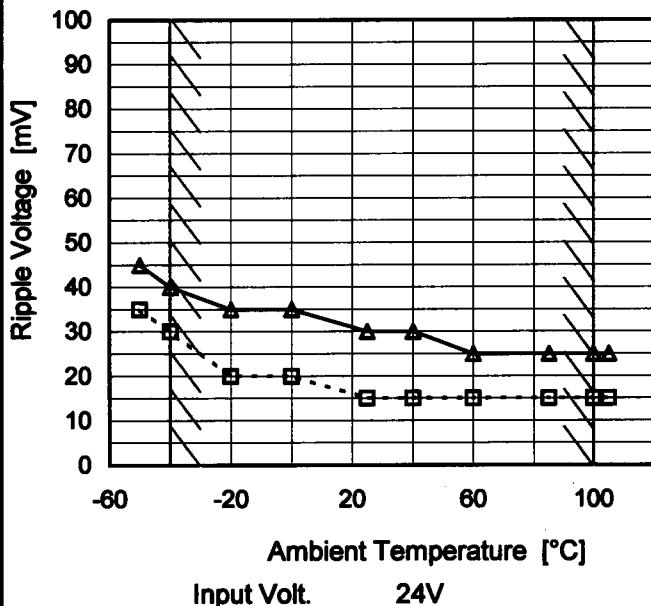
Model CBS3502412

Item Ripple Voltage (by Ambient Temp.)

Object +12V25A

1. Graph

---□--- Load 50%
 —△— Load 100%



Testing Circuitry Figure A

2. Values

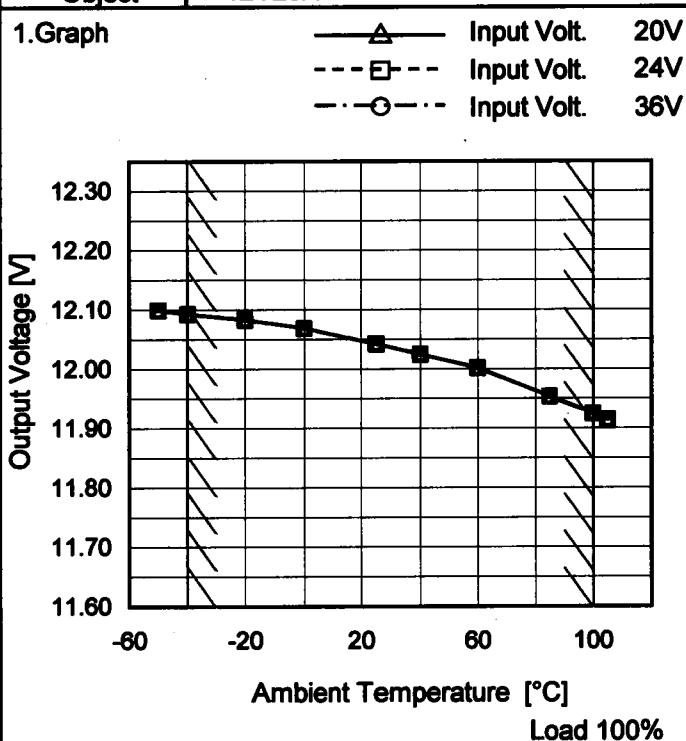
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	35	45
-40	30	40
-20	20	35
0	20	35
25	15	30
40	15	30
60	15	25
85	15	25
100	15	25
105	15	25
-	-	-

Measured by 100 MHz Oscilloscope.

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

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Model	CBS3502412
Item	Ambient Temperature Drift
Object	+12V25A



Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]
-50	12.099	12.099	12.099
-40	12.093	12.093	12.093
-20	12.083	12.083	12.083
0	12.069	12.069	12.069
25	12.043	12.043	12.043
40	12.025	12.024	12.025
60	12.002	12.002	12.002
85	11.954	11.953	11.953
100	11.925	11.925	11.924
105	11.915	11.915	11.914
-	-	-	-

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



Model	CBS3502412	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V25A	

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 - 100°C

Input Voltage : 20 - 36V

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	20	0	12.093	±87	±0.7
Minimum Voltage	100	36	25	11.920		

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Model	CBS3502412	Temperature 25°C Testing Circuitry Figure A																						
Item	Time Lapse Drift																							
Object	+12V25A																							
1.Graph		2.Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 24V 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>12.051</td></tr> <tr><td>0.5</td><td>12.045</td></tr> <tr><td>1.0</td><td>12.045</td></tr> <tr><td>2.0</td><td>12.043</td></tr> <tr><td>3.0</td><td>12.044</td></tr> <tr><td>4.0</td><td>12.044</td></tr> <tr><td>5.0</td><td>12.043</td></tr> <tr><td>6.0</td><td>12.043</td></tr> <tr><td>7.0</td><td>12.044</td></tr> <tr><td>8.0</td><td>12.044</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	12.051	0.5	12.045	1.0	12.045	2.0	12.043	3.0	12.044	4.0	12.044	5.0	12.043	6.0	12.043	7.0	12.044	8.0	12.044
Time since start [H]	Output Voltage [V]																							
0.0	12.051																							
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7.0	12.044																							
8.0	12.044																							

COSEL

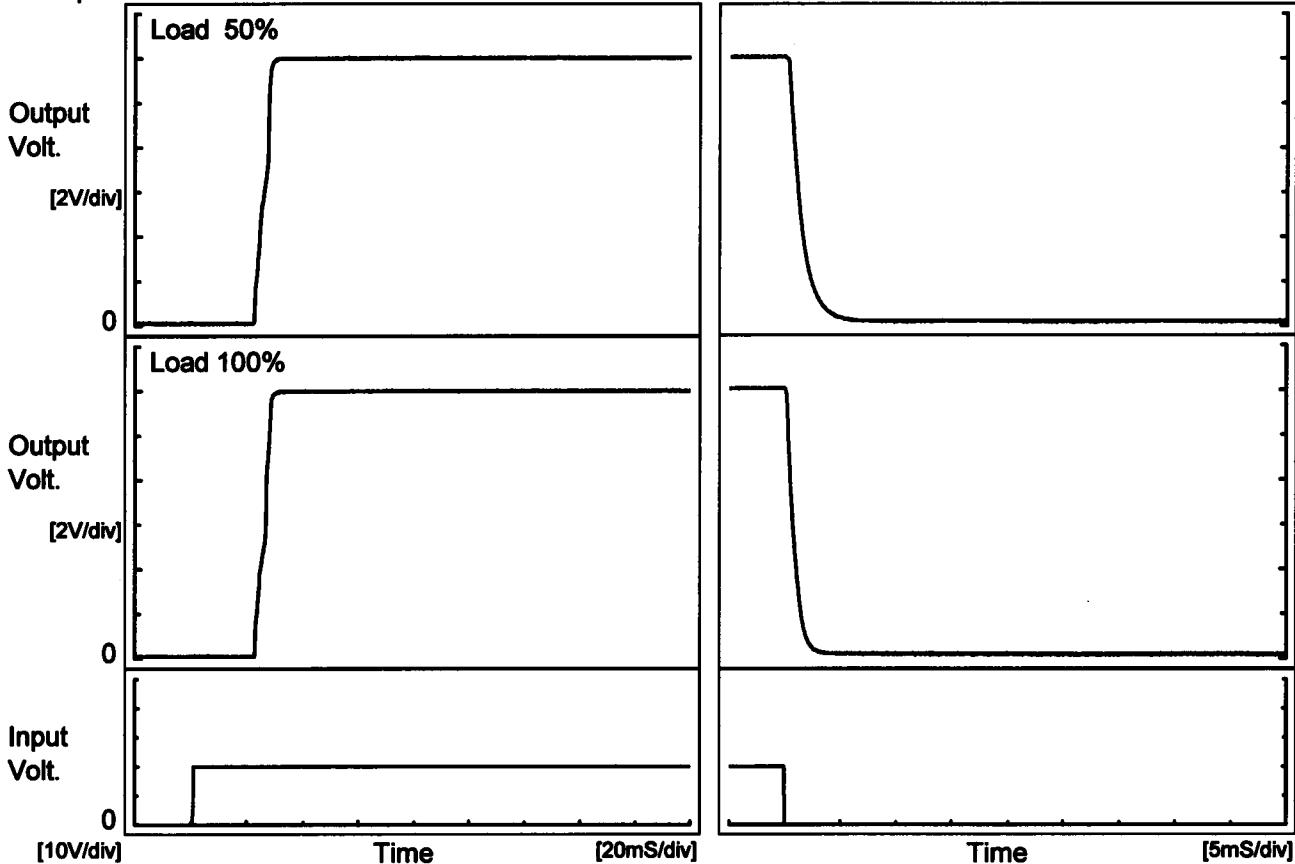
Model CBS3502412

Item Rise and Fall Time

Object +12V25A

Temperature 25°C
Testing Circuitry Figure A

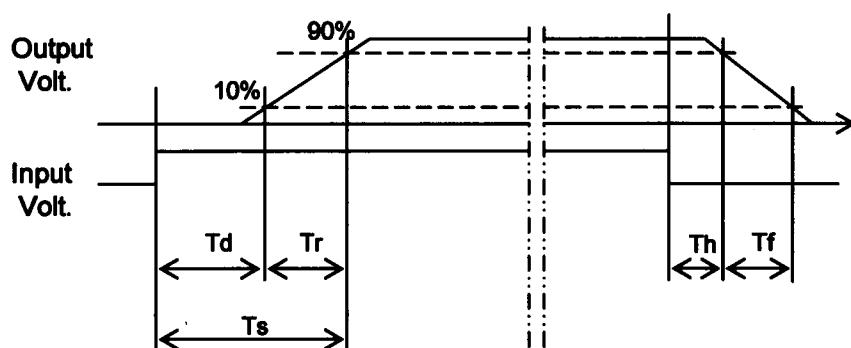
1. Graph



2. Values

[mS]

Load	Time	Td	Tr	Ts	Th	Tf
50 %		22.6	5.5	28.1	0.5	2.4
100 %		22.5	5.8	28.3	0.3	1.5

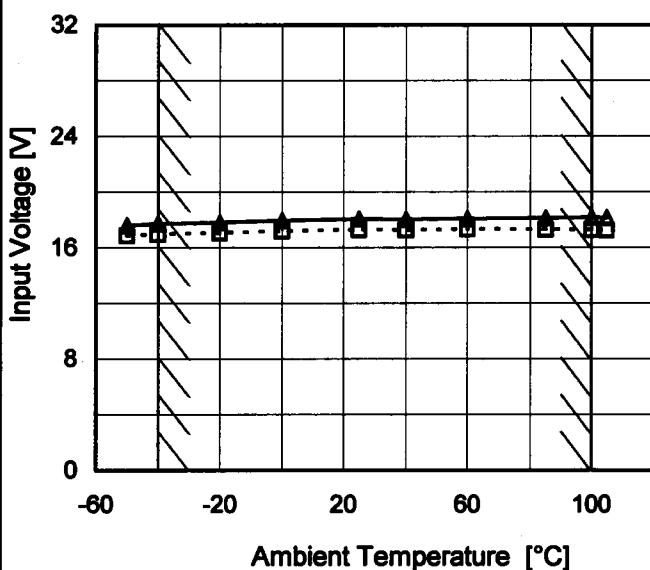


COSEL

Model	CBS3502412
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V25A

1. Graph

---□--- Load 50%
—△— Load 100%



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

Testing Circuitry Figure A

2. Values

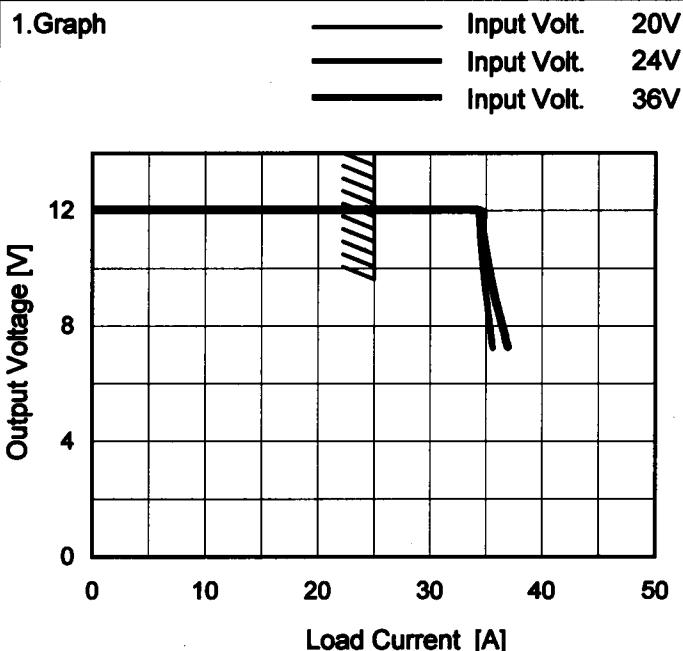
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	16.9	17.7
-40	17.0	17.8
-20	17.1	17.9
0	17.2	18.0
25	17.3	18.1
40	17.3	18.1
60	17.4	18.1
85	17.4	18.2
100	17.3	18.2
105	17.3	18.2
-	-	-

COSEL

Model	CBS3502412
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Item	Overcurrent Protection
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Object	+12V25A
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Note: Slanted line shows the range of the rated load current.

Intermittent operation occurs when the output voltage is from 7.2V to 0V.

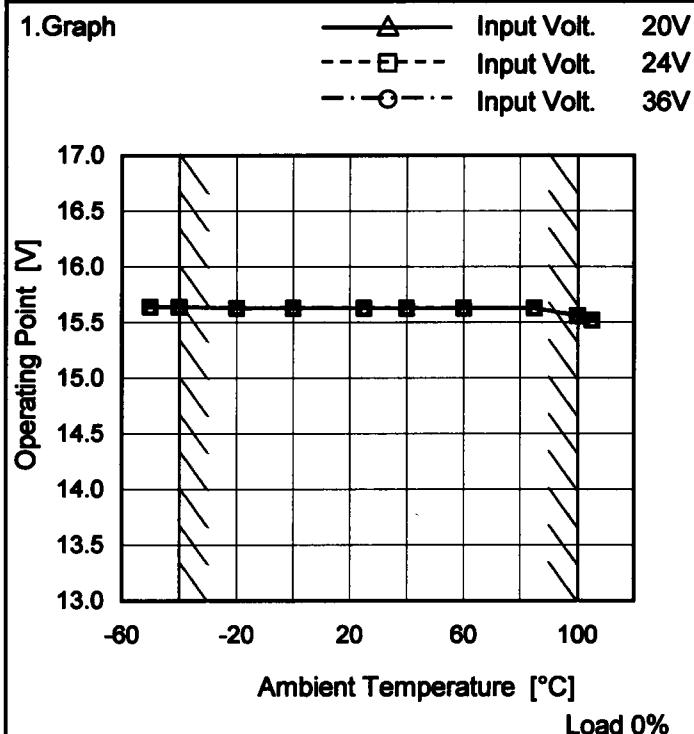
Temperature 25°C
Testing Circuitry Figure A

2. Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]
12.0	25.83	25.83	25.82
11.4	34.81	34.42	34.69
10.8	34.79	34.52	34.89
9.6	34.86	34.83	35.47
8.4	35.12	35.24	36.20
7.2	35.51	35.62	37.02
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-
-	-	-	-



Model	CBS3502412
Item	Oversupply Protection
Object	+12V25A



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. 20[V]	Input Volt. 24[V]	Input Volt. 36[V]
-50	15.64	15.64	15.64
-40	15.64	15.64	15.64
-20	15.63	15.63	15.63
0	15.63	15.63	15.63
25	15.63	15.63	15.63
40	15.63	15.63	15.63
60	15.63	15.63	15.63
85	15.63	15.63	15.63
100	15.56	15.56	15.56
105	15.52	15.52	15.52
-	-	-	-

COSEL

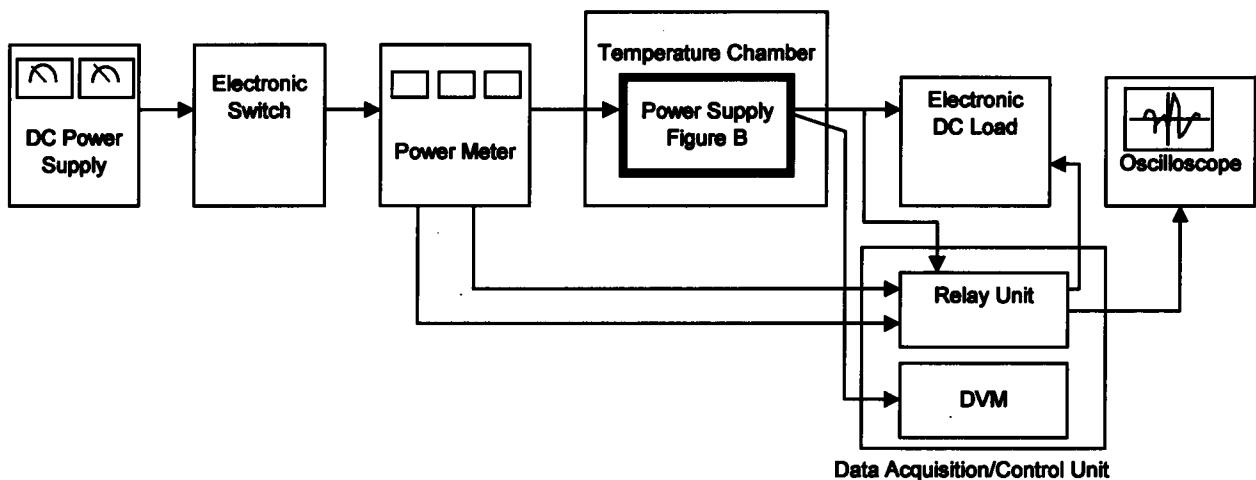
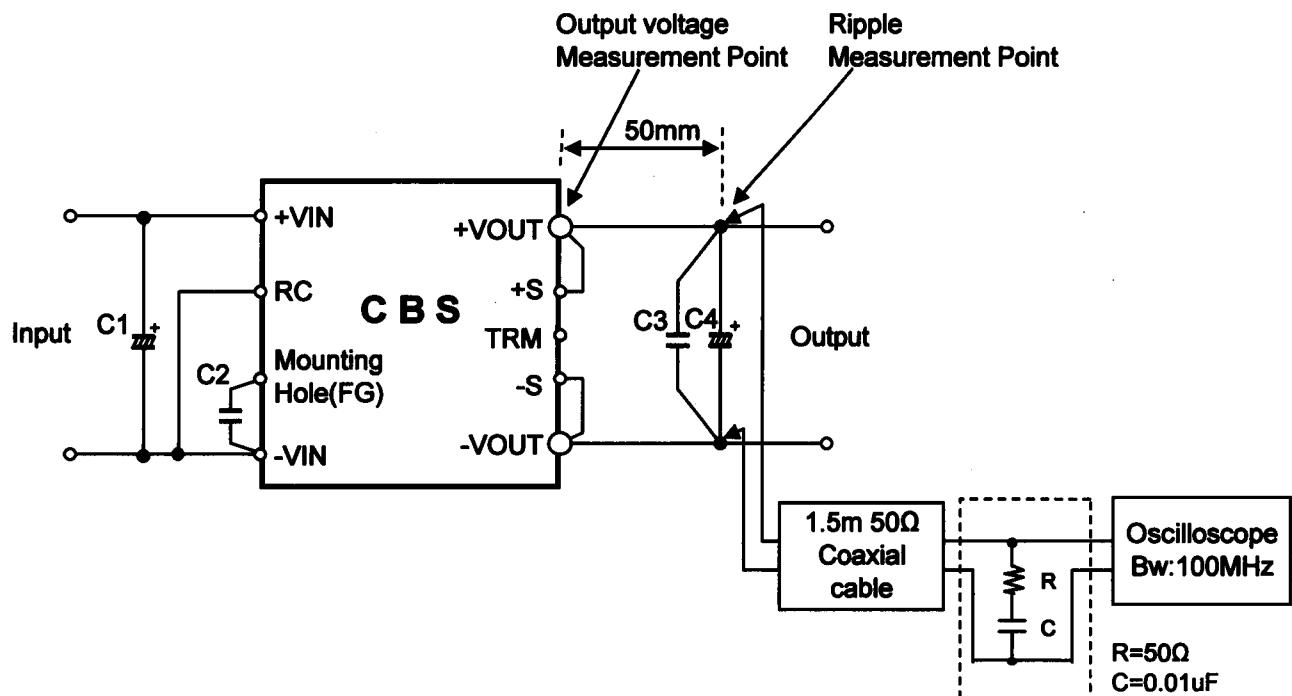


Figure A



C1 : 50V 220 μ F ×2
 C2 : 4700pF
 C3 : 50V 0.1 μ F
 C4 : 16V 470 μ F ×3 (-40°C ≤ T_B ≤ -20°C)
 16V 470 μ F (-20°C < T_B ≤ 100°C)
 T_B : Base Plate Temp.

Figure B