

TEST DATA OF CBS3502412

Regulated DC Power Supply
Dec.10. 2004

Approved by : Kazuyoshi Shimano
Kazuyoshi Shimano Design Manager

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Kiyokazu Tajima Design Engineer

COSEL CO.,LTD.

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(Final Page 19)

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Model		CBS3502412	
Item		Input Current (by Input Voltage)	
Object			

1.Graph

—△—

Load 100%

---□---

Load 50%

---○---

Load 0%

Input Current [A]

25

20

15

10

5

0

0

10

20

30

40

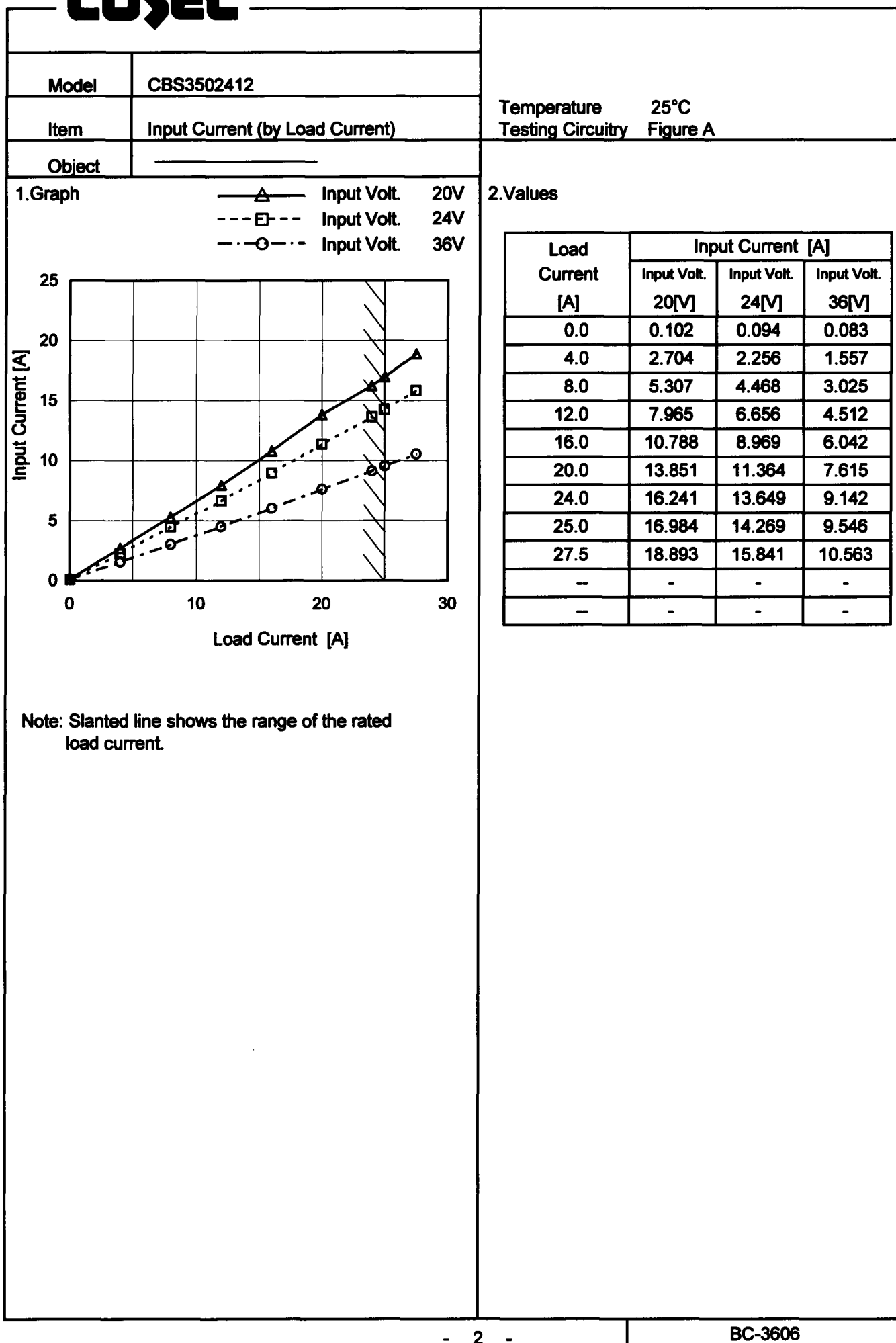
50

Input Voltage [V]

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

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
—	-	-	-
—	-	-	-

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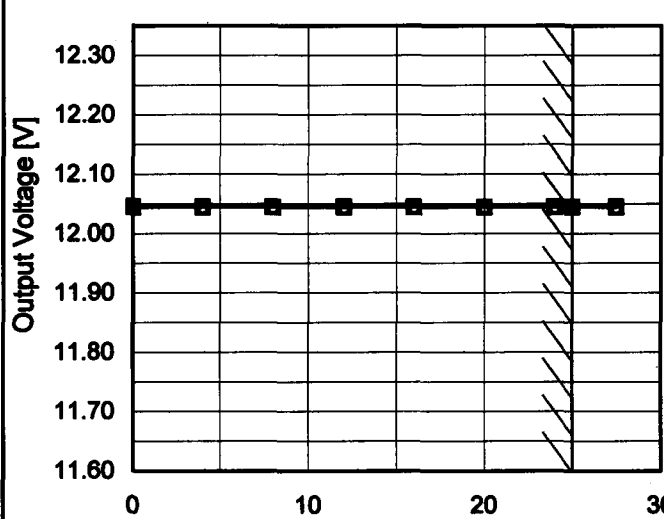
Model	CBS3502412																																																																
Item	Efficiency (by Input Voltage)	Temperature	25°C																																																														
Object		Testing Circuitry	Figure A																																																														
1.Graph		2.Values																																																															
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>---</div><div>△</div><div>---</div></div> <div>Load 100%</div> <table><thead><tr><th>Input Voltage [V]</th><th>Load 50% Efficiency [%]</th><th>Load 100% Efficiency [%]</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]	Load 50% Efficiency [%]	Load 100% Efficiency [%]	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	-	-	-	-	-	-	-	-	-	<table><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	-	-	-	-	-	-	-	-	-
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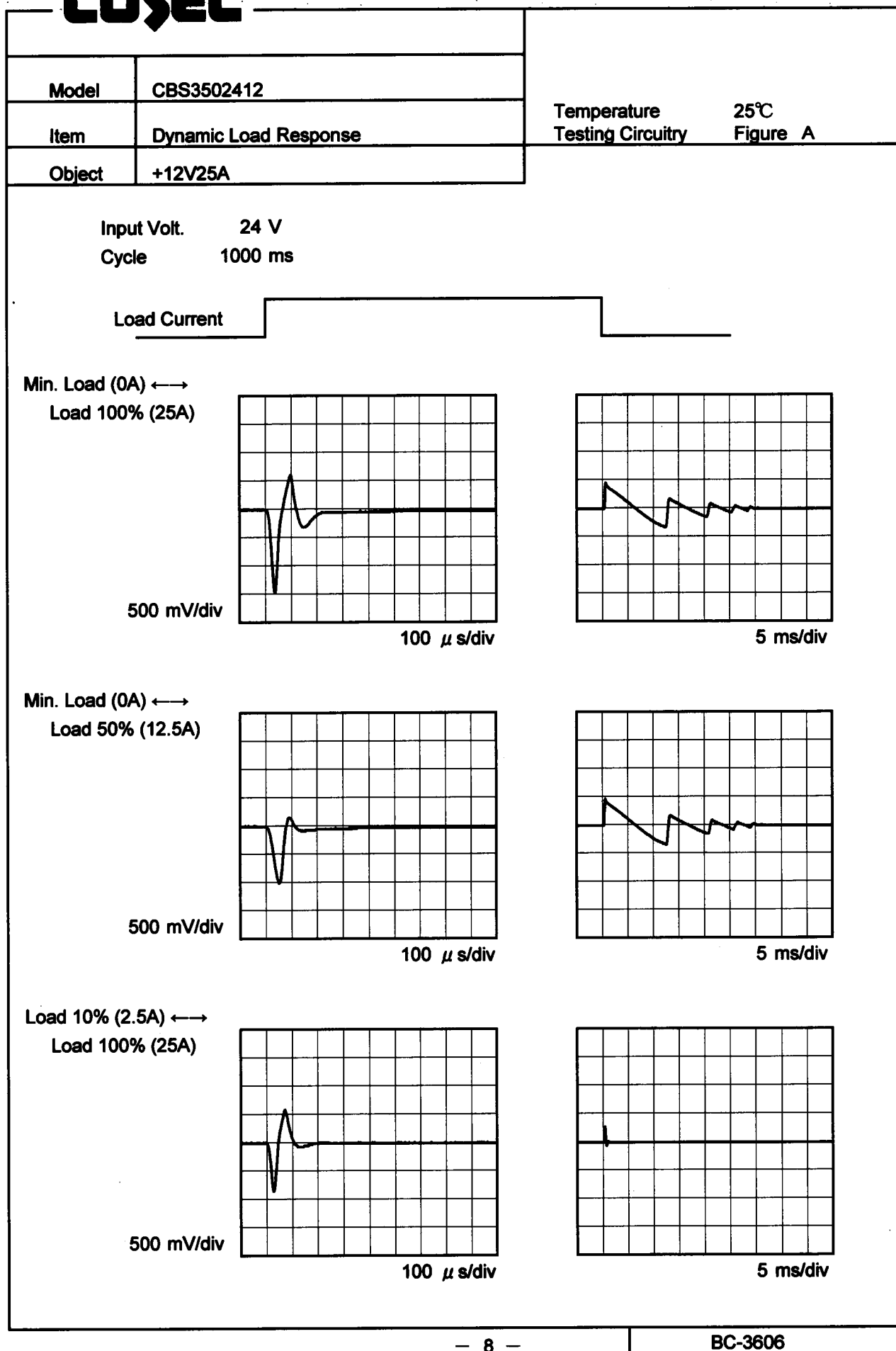
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Model	CBS3502412	Temperature 25°C Testing Circuitry Figure A																															
Item	Line Regulation																																
Object	+12V25A																																
1.Graph		2.Values																															
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>—</div><div>△</div><div>—</div></div> <div>Load 100%</div> <div><table><thead><tr><th>Input Voltage [V]</th><th>Output Voltage [V] (Load 50%)</th><th>Output Voltage [V] (Load 100%)</th></tr></thead><tbody><tr><td>19</td><td>12.046</td><td>12.047</td></tr><tr><td>20</td><td>12.046</td><td>12.047</td></tr><tr><td>22</td><td>12.047</td><td>12.046</td></tr><tr><td>24</td><td>12.047</td><td>12.047</td></tr><tr><td>30</td><td>12.047</td><td>12.046</td></tr><tr><td>36</td><td>12.047</td><td>12.046</td></tr><tr><td>40</td><td>12.047</td><td>12.046</td></tr><tr><td>—</td><td>—</td><td>—</td></tr><tr><td>—</td><td>—</td><td>—</td></tr></tbody></table></div> <div>Note: Slanted line shows the range of the rated input voltage.</div>		Input Voltage [V]	Output Voltage [V] (Load 50%)	Output Voltage [V] (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	—	—	—	—	—	—		
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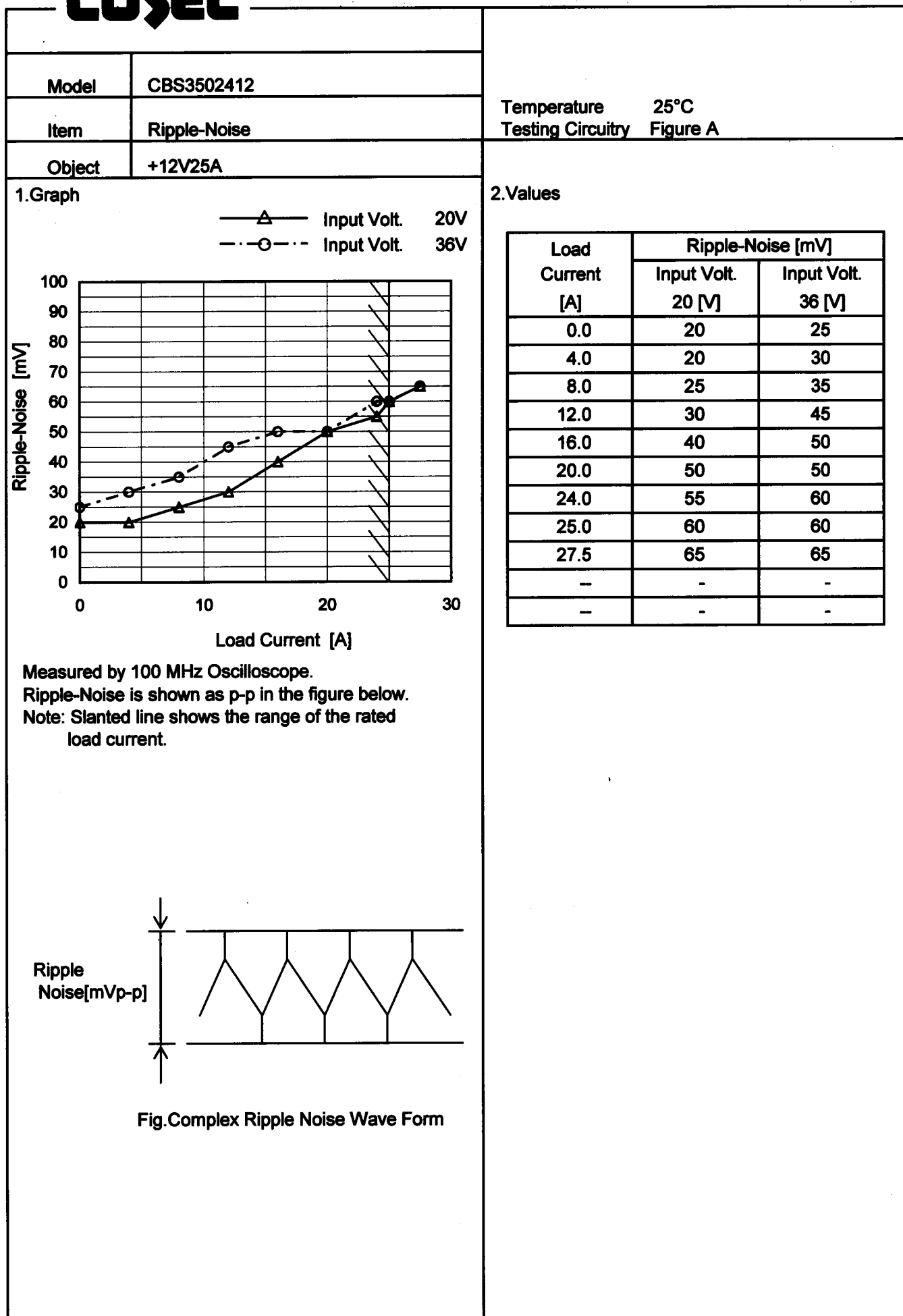
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<div><div>—△— Input Volt. 20V</div><div>---□--- Input Volt. 24V</div><div>---○--- Input Volt. 36V</div></div> 		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 20[V]</th><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><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></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	—	—	—	—	—	—	—	—
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Model		CBS3502412	
Item		Ripple Voltage (by Load Current)	
Object		+12V25A	
1.Graph			
<div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div>—△—</div><div>Input Volt.</div><div>20V</div></div><div><div>- - -○- - -</div><div>Input Volt.</div><div>36V</div></div></div> <div><div><div><div>50</div><div>40</div><div>30</div><div>20</div><div>10</div><div>0</div></div><div><div>Ripple Voltage [mV]</div></div></div><div><div><div><div>0</div><div>10</div><div>20</div><div>30</div></div><div><div>Load Current [A]</div></div></div><div><div><div><div>0.0</div><div>4.0</div><div>8.0</div><div>12.0</div><div>16.0</div><div>20.0</div><div>24.0</div><div>25.0</div><div>27.5</div><div>—</div><div>—</div></div><div><div>10</div><div>15</div><div>15</div><div>15</div><div>15</div><div>15</div><div>15</div><div>15</div><div>15</div><div>-</div><div>-</div></div><div><div>20</div><div>20</div><div>20</div><div>20</div><div>20</div><div>20</div><div>20</div><div>20</div><div>20</div><div>-</div><div>-</div></div></div></div></div></div> <div><div>Measured by 100 MHz Oscilloscope.</div><div>Ripple Voltage is shown as p-p in the figure below.</div><div>Note: Slanted line shows the range of the rated load current.</div></div> <div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div>Ripple [mVp-p]</div></div><div><div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div></div></div><div><div>Fig.Complex Ripple Wave Form</div></div></div>			

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COSEL**Model**

CBS3502412

Item

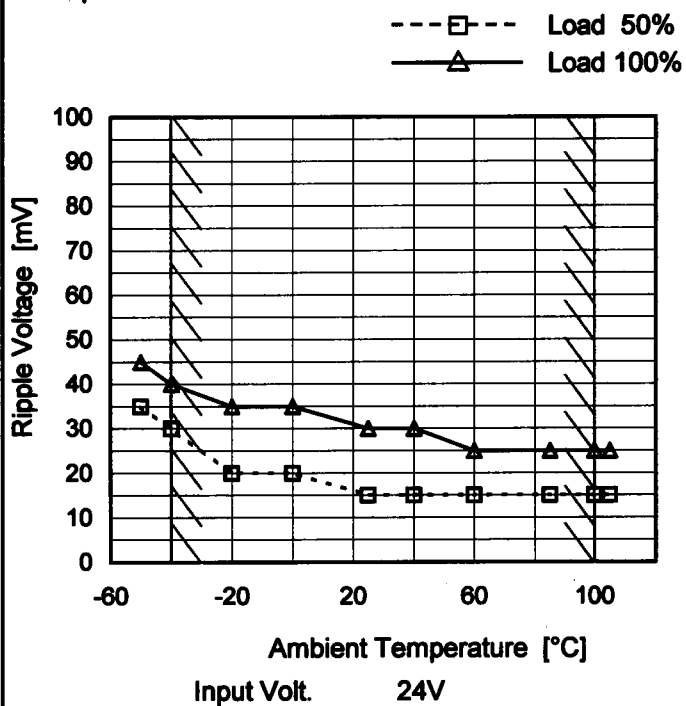
Ripple Voltage (by Ambient Temp.)

Object

+12V25A

Testing Circuitry Figure A

1. Graph



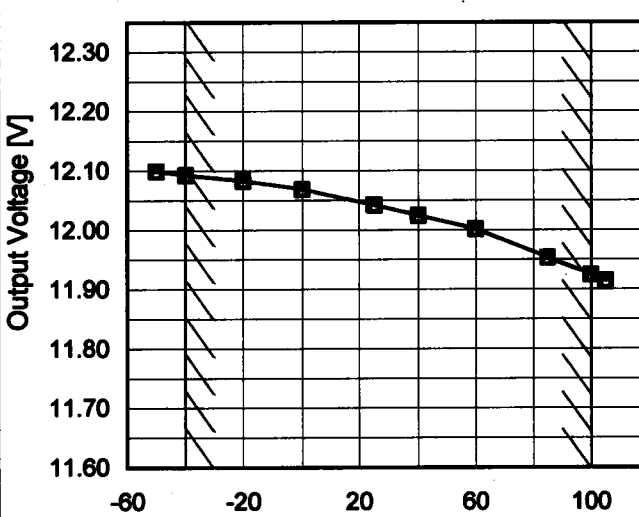
Measured by 100 MHz Oscilloscope.

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

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
—	-	-

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Model	CBS3502412																																																							
Item	Ambient Temperature Drift	Testing Circuitry Figure A																																																						
Object	+12V25A																																																							
1.Graph	<div><div>—△—</div>Input Volt. 20V</div> <div><div>---□---</div>Input Volt. 24V</div> <div><div>---○---</div>Input Volt. 36V</div>  <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																																							
2.Values	<table><tr><th rowspan="2">Ambient Temperature [°C]</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><tr><td>-50</td><td>12.099</td><td>12.099</td><td>12.099</td></tr><tr><td>-40</td><td>12.093</td><td>12.093</td><td>12.093</td></tr><tr><td>-20</td><td>12.083</td><td>12.083</td><td>12.083</td></tr><tr><td>0</td><td>12.069</td><td>12.069</td><td>12.069</td></tr><tr><td>25</td><td>12.043</td><td>12.043</td><td>12.043</td></tr><tr><td>40</td><td>12.025</td><td>12.024</td><td>12.025</td></tr><tr><td>60</td><td>12.002</td><td>12.002</td><td>12.002</td></tr><tr><td>85</td><td>11.954</td><td>11.953</td><td>11.953</td></tr><tr><td>100</td><td>11.925</td><td>11.925</td><td>11.924</td></tr><tr><td>105</td><td>11.915</td><td>11.915</td><td>11.914</td></tr><tr><td>—</td><td>-</td><td>-</td><td>-</td></tr></table>			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	—	-	-	-		
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		Testing Circuitry Figure A
Model	CBS3502412	
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 = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

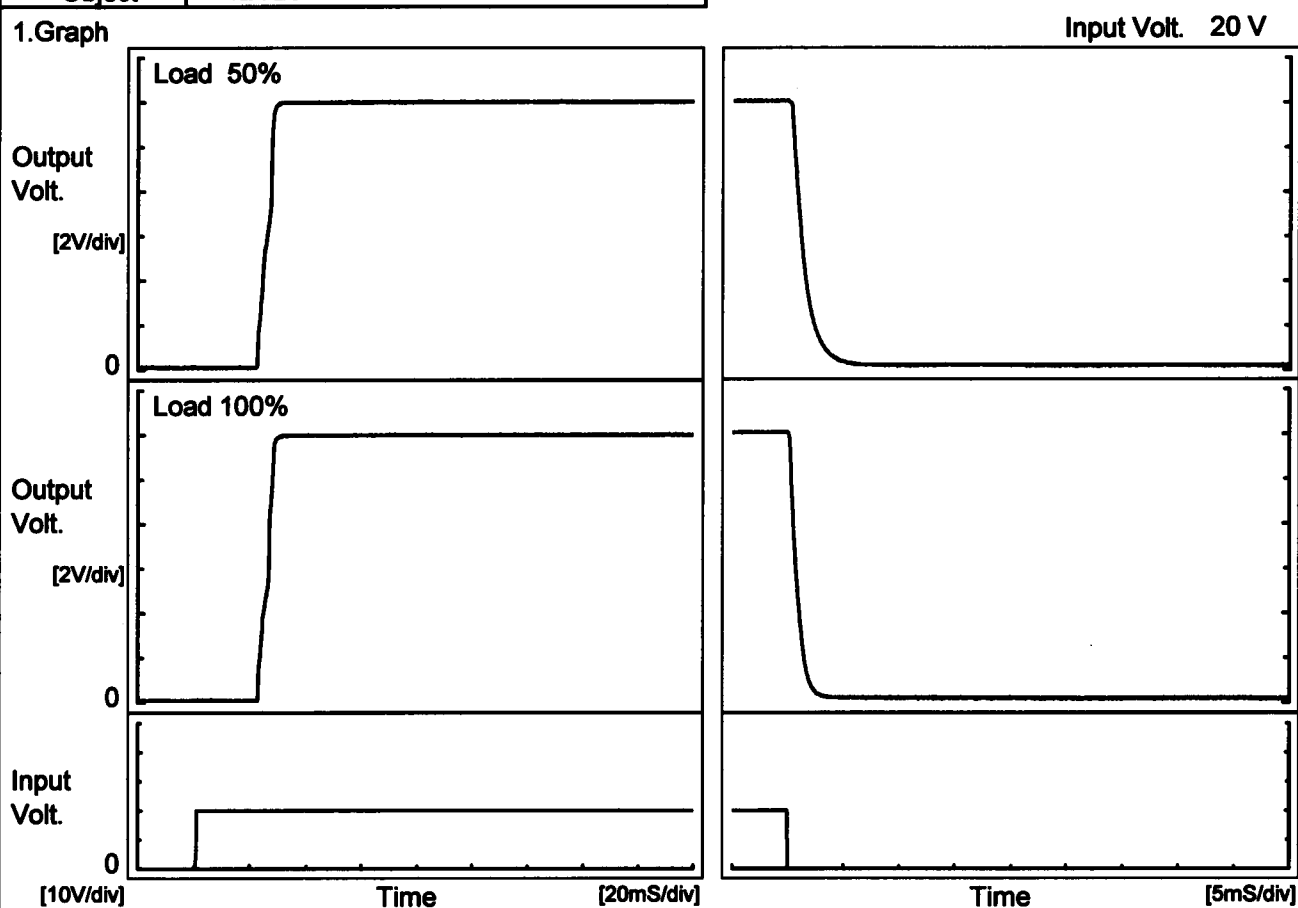
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Model	CBS3502412	Temperature 25°C Testing Circuitry Figure A																							
Item	Time Lapse Drift																								
Object	+12V25A																								
1.Graph		2.Values																							
<div><div><div>12.30</div><div>12.20</div><div>12.10</div><div>12.00</div><div>11.90</div><div>11.80</div><div>11.70</div><div>11.60</div></div><div><div>0</div><div>2</div><div>4</div><div>6</div><div>8</div><div>10</div></div><div><div>Output Voltage [V]</div><div>Time [H]</div></div><div><div>Input Volt. 24V</div><div>Load 100%</div></div></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><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></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
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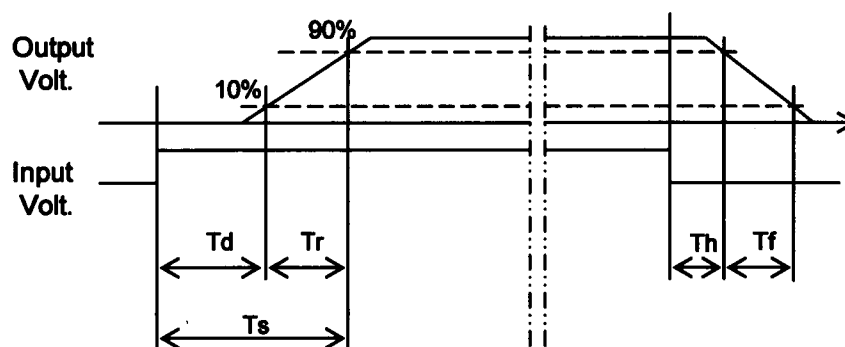
Model	CBS3502412	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V25A		

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



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

1.Graph

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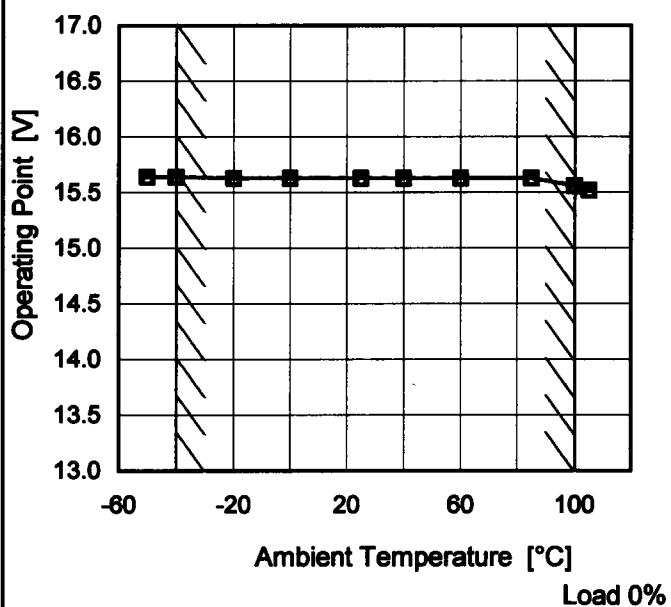
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Object		+12V25A																																																										
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<div><div>Output Voltage [V]</div><div><div>Load Current [A]</div></div></div>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 20[V]</th><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><tr><td>12.0</td><td>25.83</td><td>25.83</td><td>25.82</td></tr><tr><td>11.4</td><td>34.81</td><td>34.42</td><td>34.69</td></tr><tr><td>10.8</td><td>34.79</td><td>34.52</td><td>34.89</td></tr><tr><td>9.6</td><td>34.86</td><td>34.83</td><td>35.47</td></tr><tr><td>8.4</td><td>35.12</td><td>35.24</td><td>36.20</td></tr><tr><td>7.2</td><td>35.51</td><td>35.62</td><td>37.02</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></table>				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	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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<div>Note: Slanted line shows the range of the rated load current.</div> <div>Intermittent operation occurs when the output voltage is from 7.2V to 0V.</div>																																																												

COSEL

Model	CBS3502412
Item	Overvoltage Protection
Object	+12V25A

1. Graph

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



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

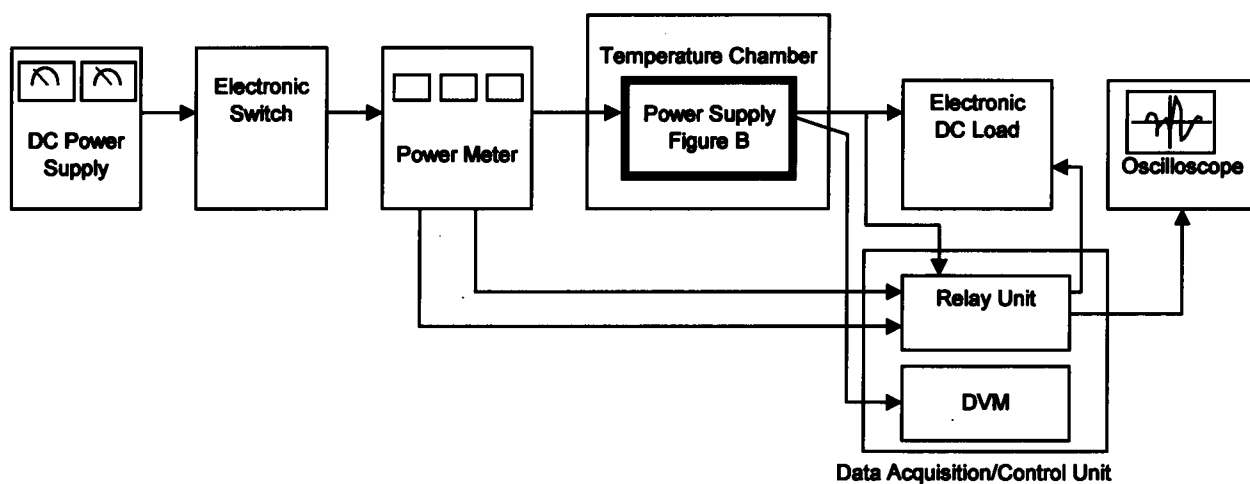


Figure A

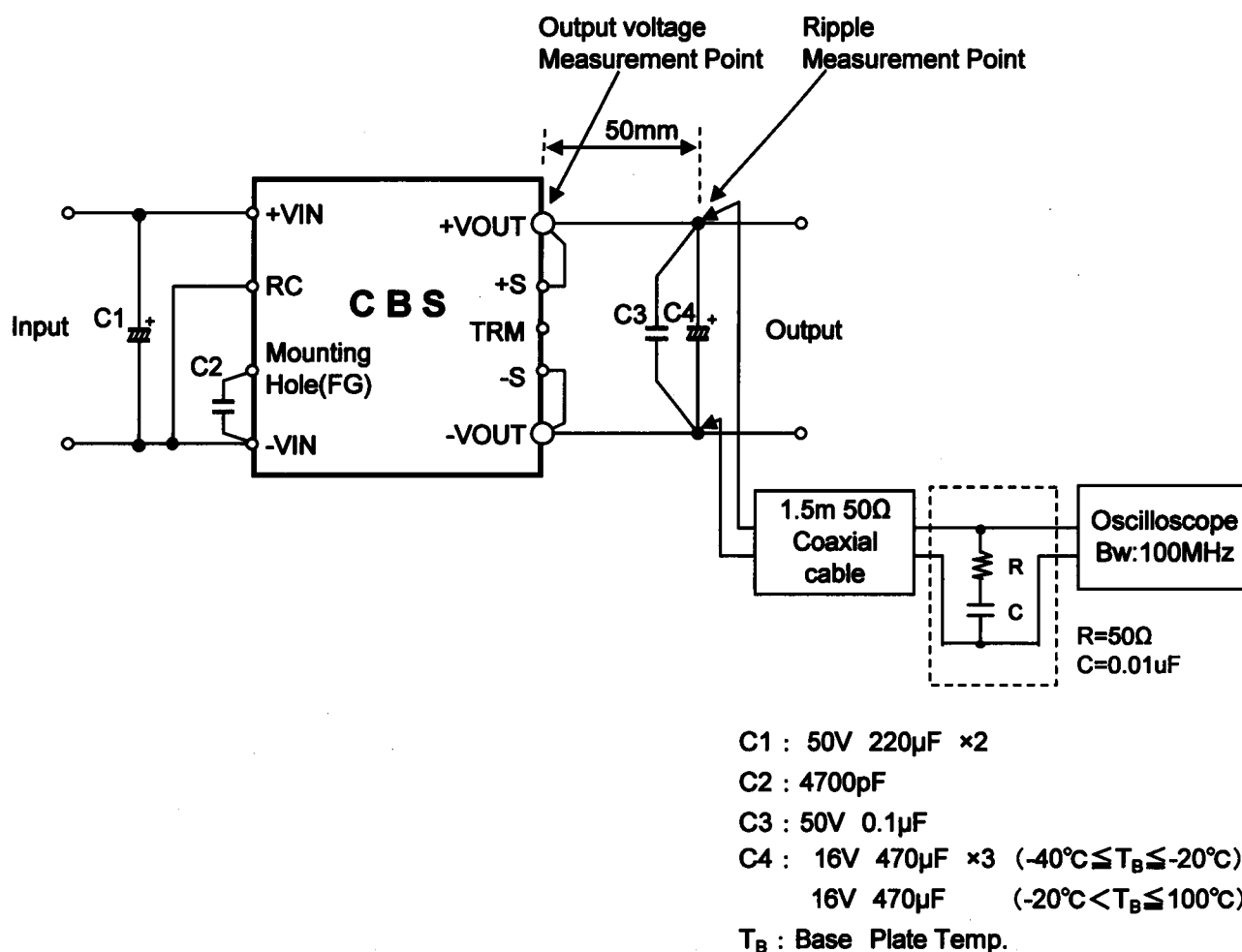


Figure B