

TEST DATA OF CHS4004812

Regulated DC Power Supply
March 26, 2013

Approved by :



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Design Manager

Prepared by :



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Design Engineer

COSEL CO.,LTD.



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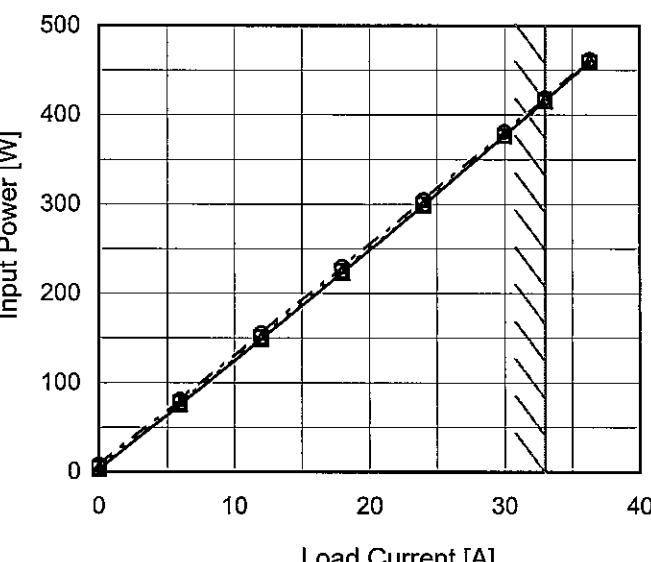
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<p>The graph plots Efficiency [%] on the y-axis (72 to 100) against Input Voltage [V] on the x-axis (20 to 80). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a slight decrease in efficiency as input voltage increases. Two slanted lines indicate the rated input voltage range.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Efficiency Load 50% [%]</th> <th>Efficiency Load 100% [%]</th> </tr> </thead> <tbody> <tr><td>34</td><td>96.5</td><td>94.9</td></tr> <tr><td>36</td><td>96.4</td><td>95.0</td></tr> <tr><td>40</td><td>96.2</td><td>95.2</td></tr> <tr><td>48</td><td>95.7</td><td>95.2</td></tr> <tr><td>55</td><td>95.5</td><td>95.1</td></tr> <tr><td>60</td><td>95.1</td><td>95.0</td></tr> <tr><td>70</td><td>94.2</td><td>94.5</td></tr> <tr><td>76</td><td>93.7</td><td>94.3</td></tr> <tr><td>80</td><td>93.5</td><td>94.0</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	34	96.5	94.9	36	96.4	95.0	40	96.2	95.2	48	95.7	95.2	55	95.5	95.1	60	95.1	95.0	70	94.2	94.5	76	93.7	94.3	80	93.5	94.0
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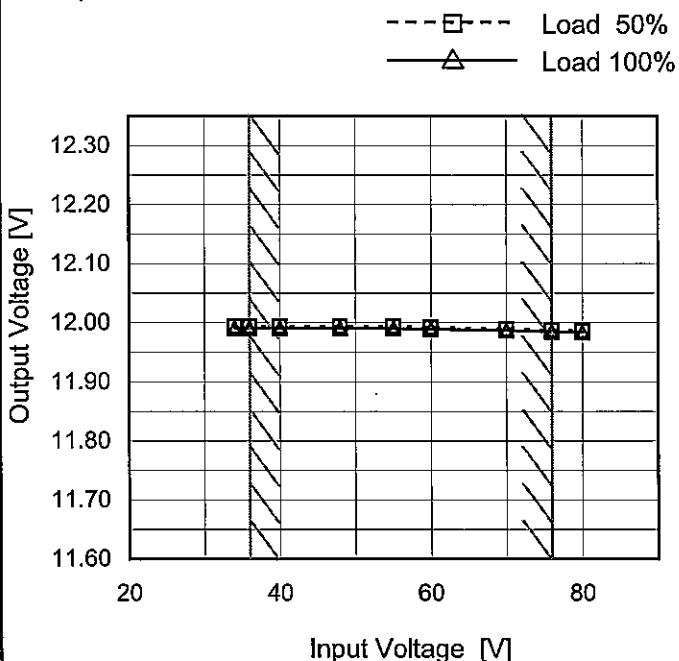
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Note: Slanted line shows the range of the rated load current.

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Model	CHS4004812
Item	Line Regulation
Object	+12V33A

1. Graph



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

Temperature 25°C
Testing Circuitry Figure A

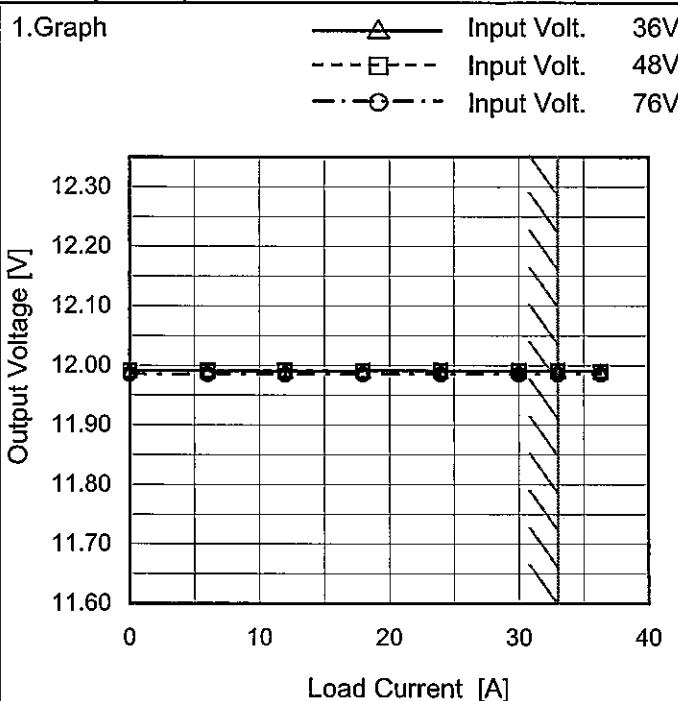
2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
34	11.994	11.991
36	11.994	11.991
40	11.994	11.991
48	11.994	11.991
55	11.994	11.991
60	11.992	11.990
70	11.989	11.987
76	11.988	11.985
80	11.986	11.984

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Model	CHS4004812
Item	Load Regulation
Object	+12V33A

Temperature 25°C
Testing Circuitry Figure A



2. Values

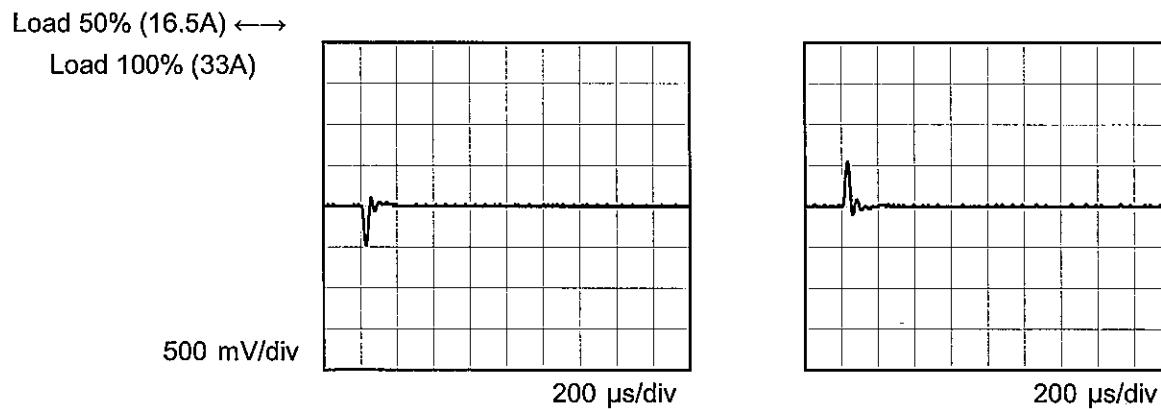
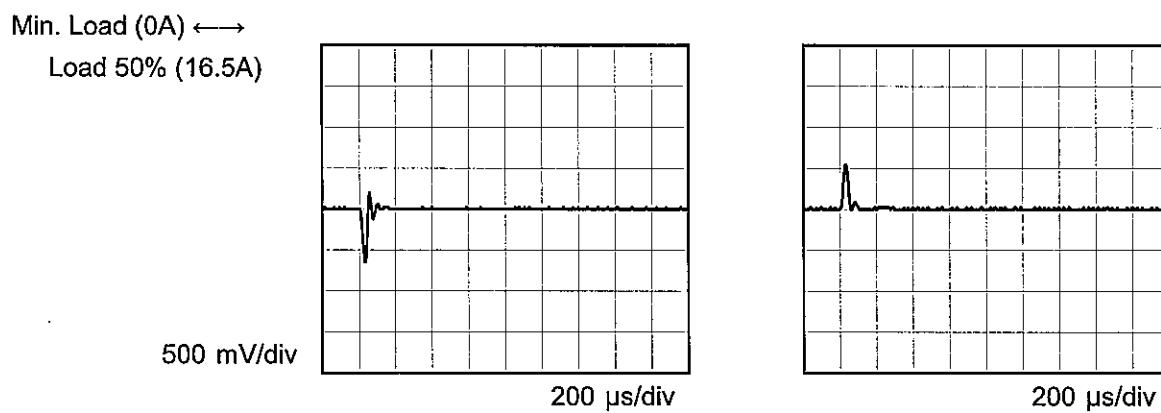
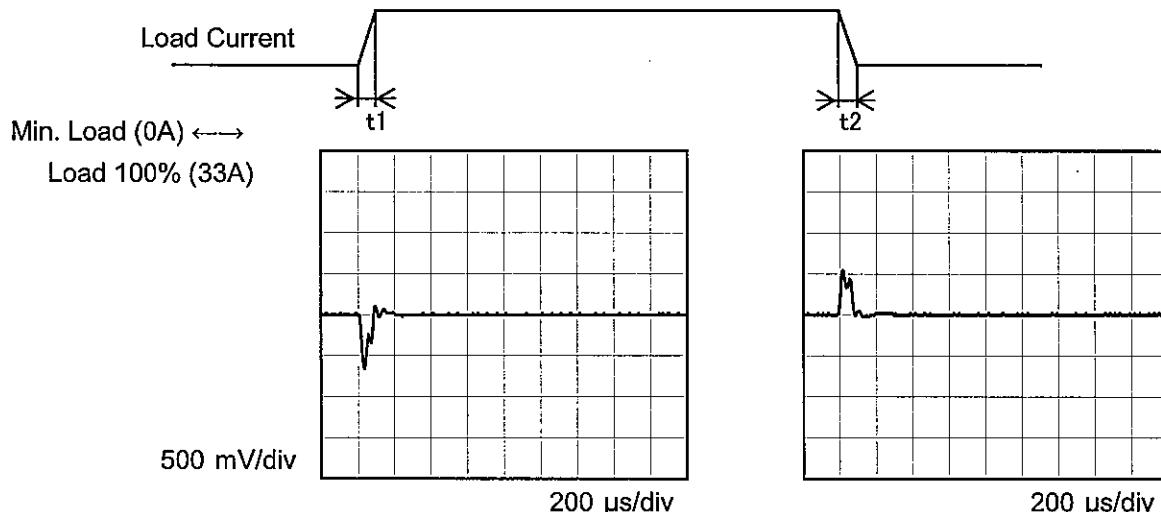
Load Current [A]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	11.991	11.991	11.985
6.0	11.991	11.991	11.985
12.0	11.991	11.991	11.985
18.0	11.991	11.991	11.985
24.0	11.991	11.991	11.985
30.0	11.991	11.991	11.985
33.0	11.991	11.991	11.985
36.3	11.990	11.989	11.985
--	-	-	-
--	-	-	-
--	-	-	-

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

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Model	CHS4004812	Temperature Testing Circuitry 25°C Figure A
Item	Dynamic Load Response	
Object	+12V33A	

Input Volt. 48 V
Cycle 5 ms

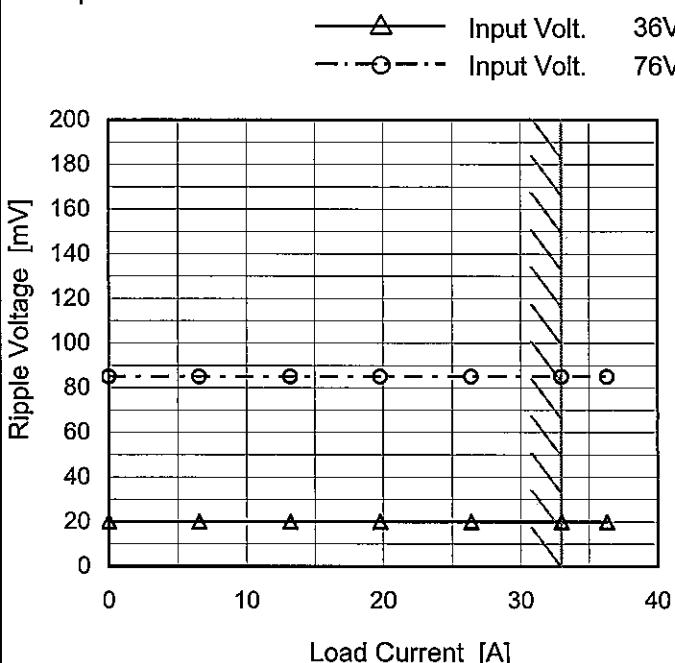


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Model	CHS4004812
Item	Ripple Voltage (by Load Current)
Object	+12V33A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



2.Values

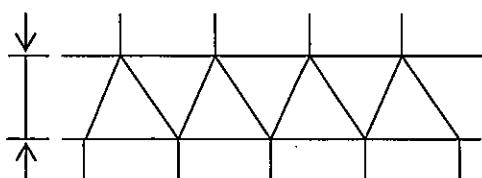
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	20	85
6.6	20	85
13.2	20	85
19.8	20	85
26.4	20	85
33.0	20	85
36.3	20	85
--	-	-
--	-	-
--	-	-
--	-	-

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]



COSEL

Model	CHS4004812																																							
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure B																																						
Object	+12V33A																																							
1. Graph																																								
<p>Y-axis: Ripple-Noise [mV] from 0 to 200. X-axis: Load Current [A] from 0 to 40.</p> <p>Legend: Input Volt. 36V (solid line with triangles), Input Volt. 76V (dashed line with circles).</p>		2. Values																																						
<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>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 36 [V]</th> <th>Input Volt. 76 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>25</td><td>90</td></tr> <tr><td>6.6</td><td>25</td><td>90</td></tr> <tr><td>13.2</td><td>25</td><td>90</td></tr> <tr><td>19.8</td><td>25</td><td>90</td></tr> <tr><td>26.4</td><td>25</td><td>90</td></tr> <tr><td>33.0</td><td>25</td><td>90</td></tr> <tr><td>36.3</td><td>25</td><td>90</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. 36 [V]	Input Volt. 76 [V]	0.0	25	90	6.6	25	90	13.2	25	90	19.8	25	90	26.4	25	90	33.0	25	90	36.3	25	90	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 36 [V]	Input Volt. 76 [V]																																						
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13.2	25	90																																						
19.8	25	90																																						
26.4	25	90																																						
33.0	25	90																																						
36.3	25	90																																						
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<p>Ripple Noise [mVp-p]</p>																																								
Fig.Complex Ripple Noise Wave Form																																								

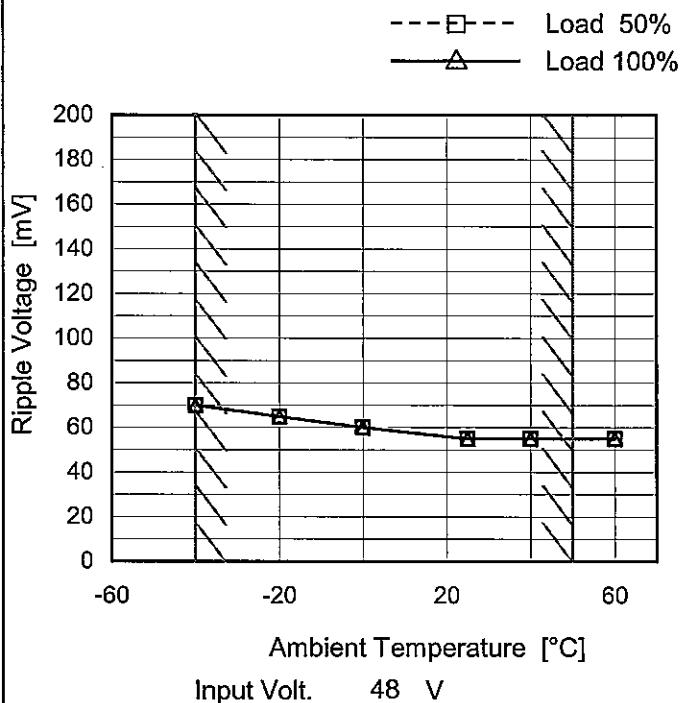
COSEL

Model CHS4004812

Item Ripple Voltage (by Ambient Temp.)

Object +12V33A

1. Graph



Measured by 100 MHz Oscilloscope.

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

Ripple [mVp-p]

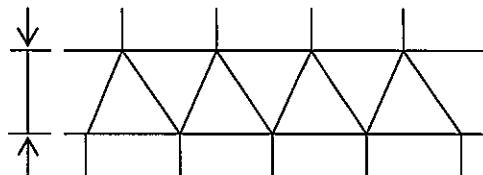


Fig.Complex Ripple Wave Form

Testing Circuitry Figure B

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	70	70
-20	65	65
0	60	60
25	55	55
40	55	55
60	55	55
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Model	CHS4004812	Testing Circuitry Figure A		
Item	Ambient Temperature Drift			
Object	+12V33A			
1.Graph	<p style="text-align: center;"> Input Volt. 36V Input Volt. 48V Input Volt. 76V </p> <p style="text-align: center;">Output Voltage [V]</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Load 100%</p>	2.Values		
		Ambient Temperature [°C]	Output Voltage [V]	
		36[V]	48[V]	76[V]
-40	12.003	12.002	11.996	
-20	11.995	11.995	11.989	
0	11.992	11.991	11.986	
25	11.991	11.991	11.985	
40	11.989	11.990	11.984	
55	11.992	11.993	11.988	
--	-	-	-	
--	-	-	-	
--	-	-	-	
--	-	-	-	
--	-	-	-	

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



Model	CHS4004812	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V33A	

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 - 55°C

Input Voltage : 36 - 76V

Load Current : 0 - 33A

* 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	36	0	12.003	± 9.5	± 0.1
Minimum Voltage	40	76	0	11.984		

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Model	CHS4004812	Temperature 25°C Testing Circuitry Figure A																						
Item	Time Lapse Drift																							
Object	+12V33A																							
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>11.995</td></tr> <tr><td>0.5</td><td>11.990</td></tr> <tr><td>1.0</td><td>11.991</td></tr> <tr><td>2.0</td><td>11.990</td></tr> <tr><td>3.0</td><td>11.990</td></tr> <tr><td>4.0</td><td>11.990</td></tr> <tr><td>5.0</td><td>11.991</td></tr> <tr><td>6.0</td><td>11.990</td></tr> <tr><td>7.0</td><td>11.990</td></tr> <tr><td>8.0</td><td>11.991</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	11.995	0.5	11.990	1.0	11.991	2.0	11.990	3.0	11.990	4.0	11.990	5.0	11.991	6.0	11.990	7.0	11.990	8.0	11.991
Time since start [H]	Output Voltage [V]																							
0.0	11.995																							
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7.0	11.990																							
8.0	11.991																							

COSEL

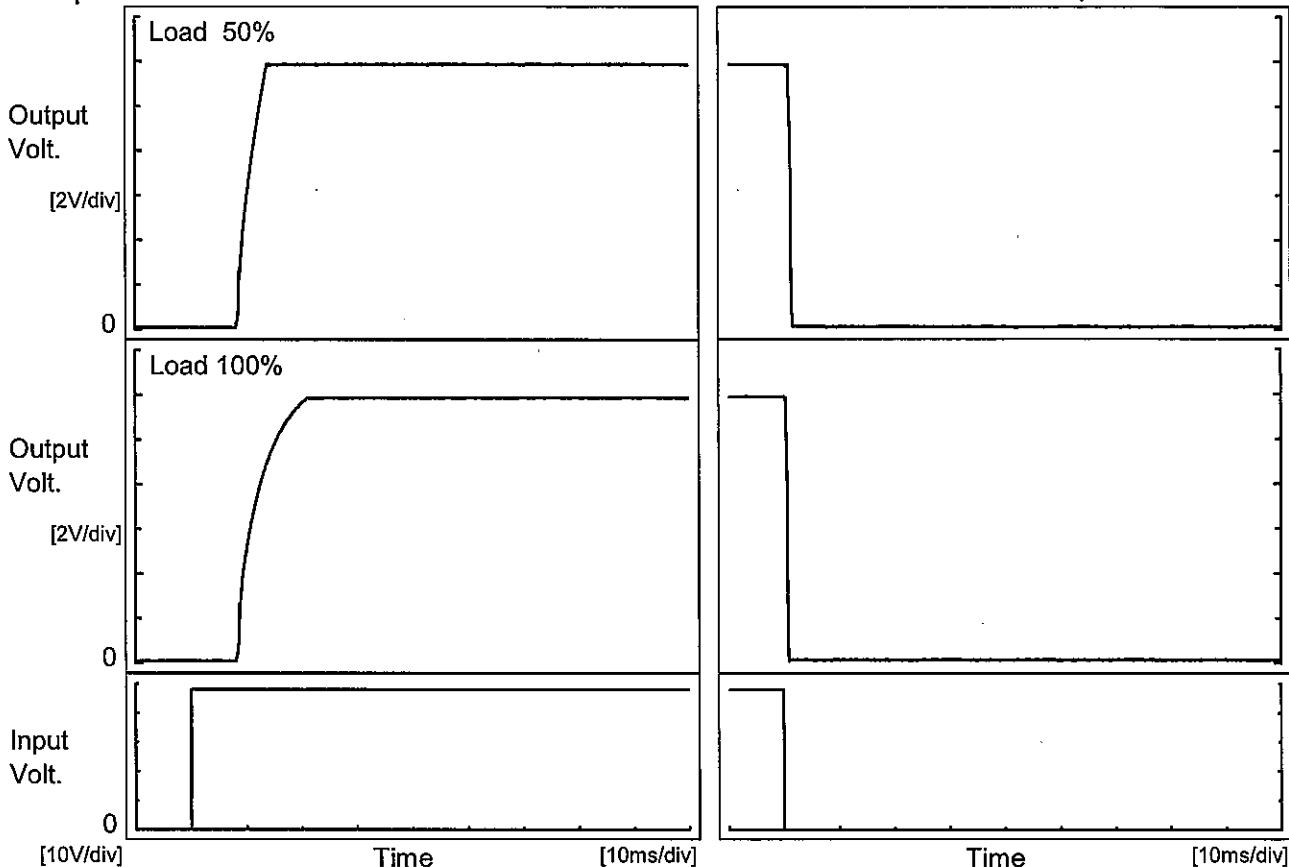
Model CHS4004812

Item Rise and Fall Time

Object +12V33A

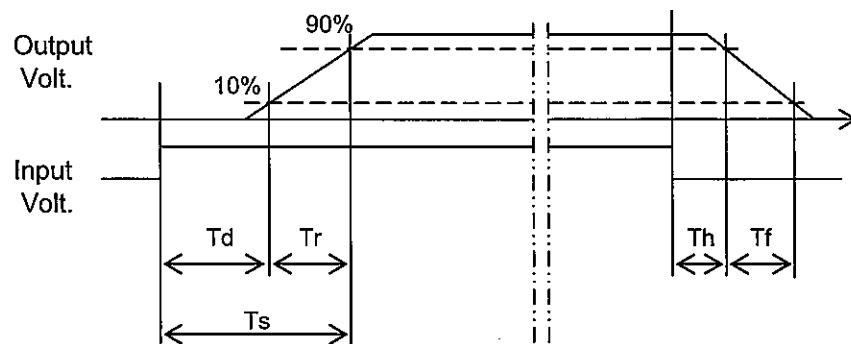
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		8.7	4.4	13.1	0.8	0.5	
100 %		8.7	8.8	17.5	0.4	0.4	



COSEL

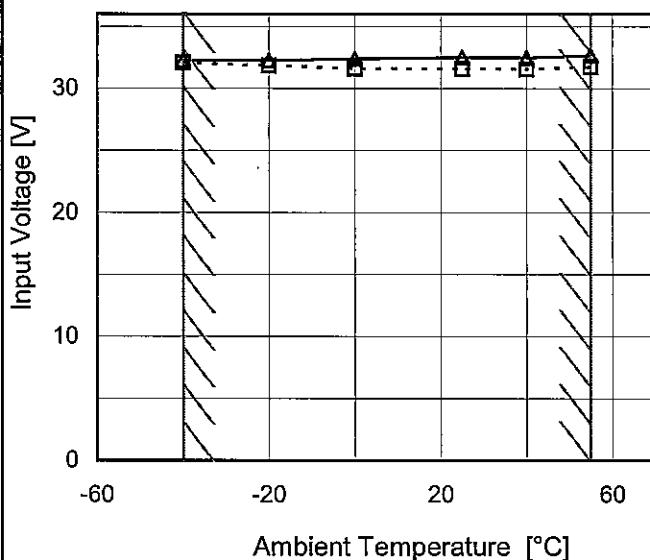
Model CHS4004812

Item Minimum Input Voltage
for Regulated Output Voltage

Object +12V33A

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%
-40	32.1	32.4
-20	31.9	32.3
0	31.7	32.5
25	31.6	32.6
40	31.6	32.5
55	31.8	32.7
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

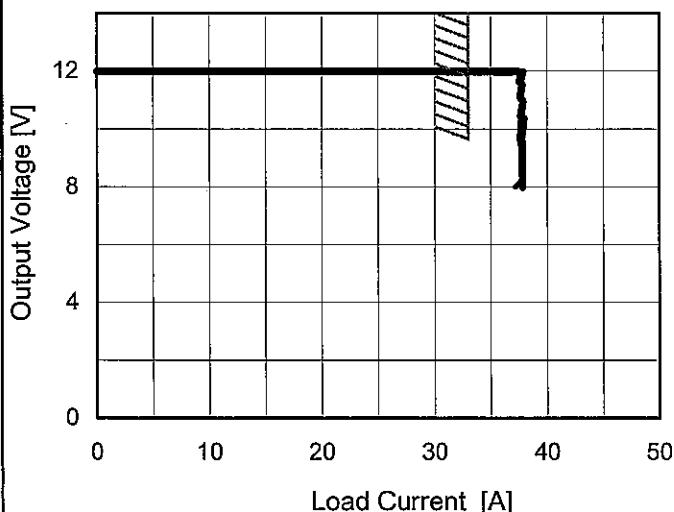
Model CHS4004812

Item Overcurrent Protection

Object +12V33A

1.Graph

— Input Volt. 36V
— Input Volt. 48V
— Input Volt. 76V



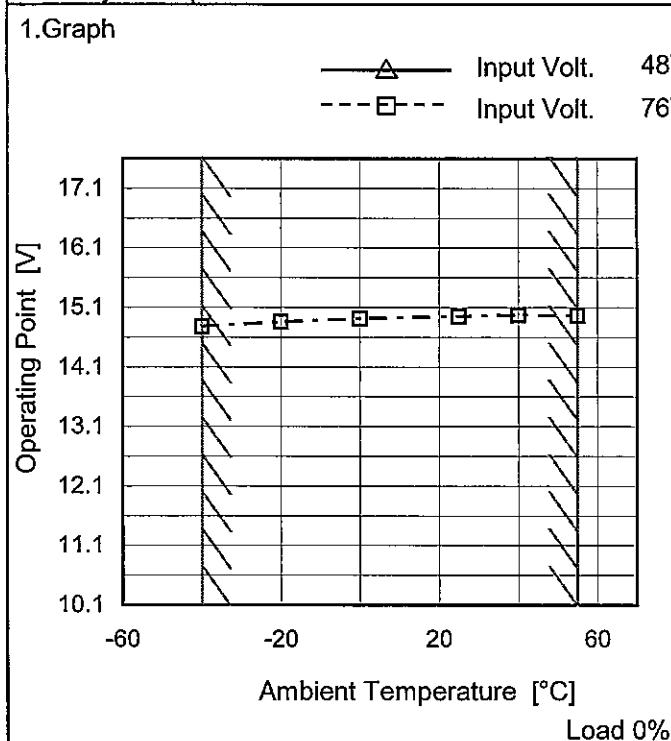
Note: Slanted line shows the range of the rated load current.

Temperature 25°C
Testing Circuitry Figure A

2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
11.4	37.99	37.76	37.76
10.8	37.74	37.87	37.92
9.6	37.90	37.62	37.78
8.4	37.73	37.79	37.73
8.0	37.75	37.79	37.72
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	CHS4004812	Testing Circuitry Figure A																																						
Item	Overvoltage Protection																																							
Object	+12V33A																																							
1.Graph		2.Values																																						
 <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. 48V (solid line with triangle) Input Volt. 76V (dashed line with square) 																																								
<p>Note: Slanted line shows the range of the rated ambient temperature.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr> <td>-40</td><td>14.79</td><td>14.78</td> </tr> <tr> <td>-20</td><td>14.87</td><td>14.86</td> </tr> <tr> <td>0</td><td>14.92</td><td>14.91</td> </tr> <tr> <td>25</td><td>14.99</td><td>14.95</td> </tr> <tr> <td>40</td><td>14.98</td><td>14.97</td> </tr> <tr> <td>55</td><td>14.98</td><td>14.96</td> </tr> <tr> <td>--</td><td>-</td><td>-</td> </tr> </tbody> </table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 48[V]	Input Volt. 76[V]	-40	14.79	14.78	-20	14.87	14.86	0	14.92	14.91	25	14.99	14.95	40	14.98	14.97	55	14.98	14.96	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Ambient Temperature [°C]	Operating Point [V]																																							
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COSEL

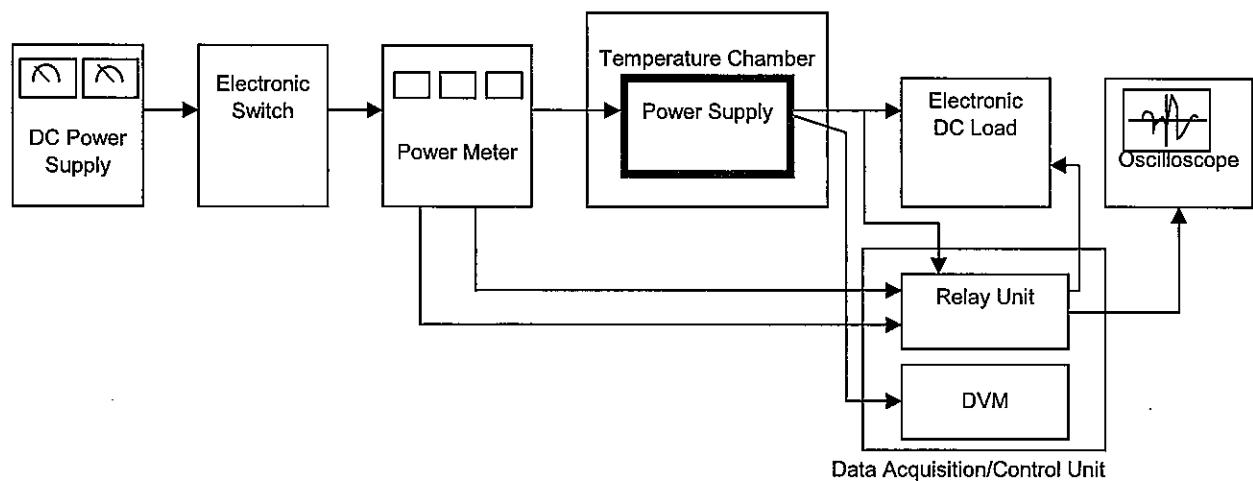


Figure A

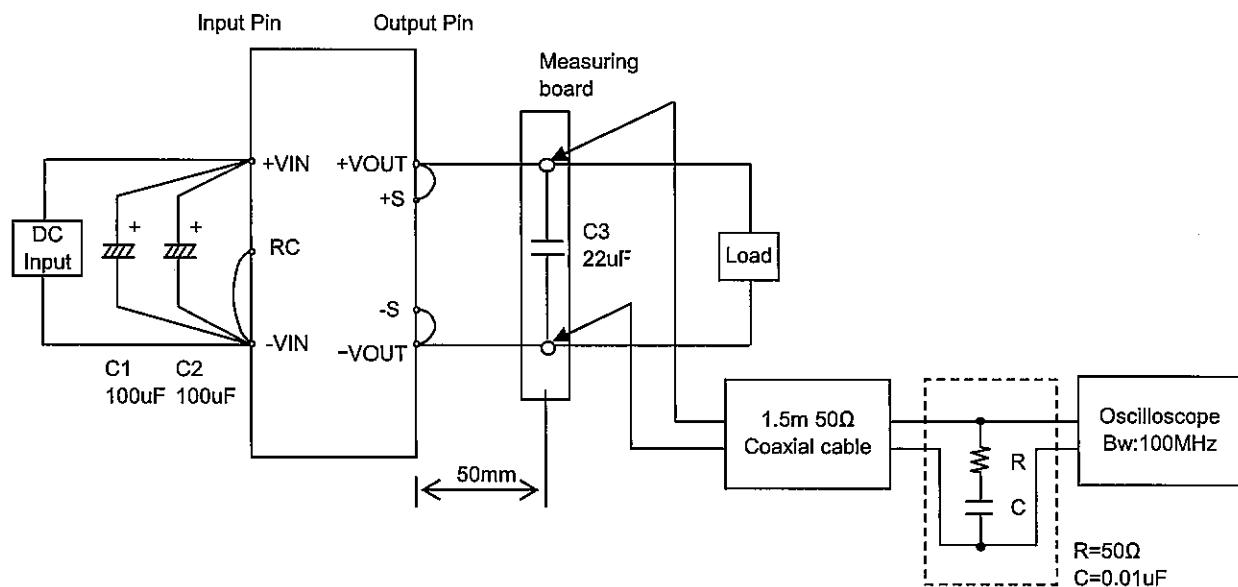


Figure B