

COSEL

TEST DATA OF CHS4002412

Regulated DC Powew Supply
June 22,2018

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Eisu Ushitan
Eisu Ushitan Design Engineer

COSEL CO.,LTD.



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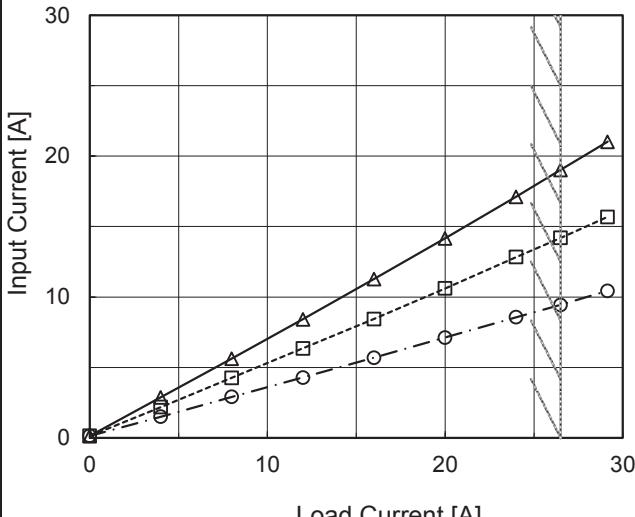
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<p>The graph plots Efficiency [%] on the Y-axis (44 to 100) against Load Current [A] on the X-axis (0 to 30). Three data series are shown for Input Volt. 18V (solid line with triangles), Input Volt. 24V (dashed line with squares), and Input Volt. 36V (dash-dot line with circles). All series show efficiency starting around 90% at 0A and remaining high until approximately 25A, after which it slightly decreases. A vertical slanted line is drawn through the data points at approximately 29.15A, indicating the rated load current.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</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>0.00</td><td>-</td><td>-</td><td>-</td></tr> <tr> <td>4.00</td><td>93.0</td><td>91.9</td><td>88.9</td></tr> <tr> <td>8.00</td><td>95.0</td><td>93.9</td><td>91.9</td></tr> <tr> <td>12.00</td><td>95.2</td><td>94.7</td><td>93.3</td></tr> <tr> <td>16.00</td><td>94.9</td><td>94.7</td><td>93.8</td></tr> <tr> <td>20.00</td><td>94.4</td><td>94.4</td><td>93.8</td></tr> <tr> <td>24.00</td><td>93.9</td><td>94.0</td><td>93.6</td></tr> <tr> <td>26.50</td><td>93.4</td><td>93.7</td><td>93.5</td></tr> <tr> <td>29.15</td><td>92.8</td><td>93.3</td><td>93.3</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 [%]			Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.00	-	-	-	4.00	93.0	91.9	88.9	8.00	95.0	93.9	91.9	12.00	95.2	94.7	93.3	16.00	94.9	94.7	93.8	20.00	94.4	94.4	93.8	24.00	93.9	94.0	93.6	26.50	93.4	93.7	93.5	29.15	92.8	93.3	93.3	--	-	-	-	--	-	-	-
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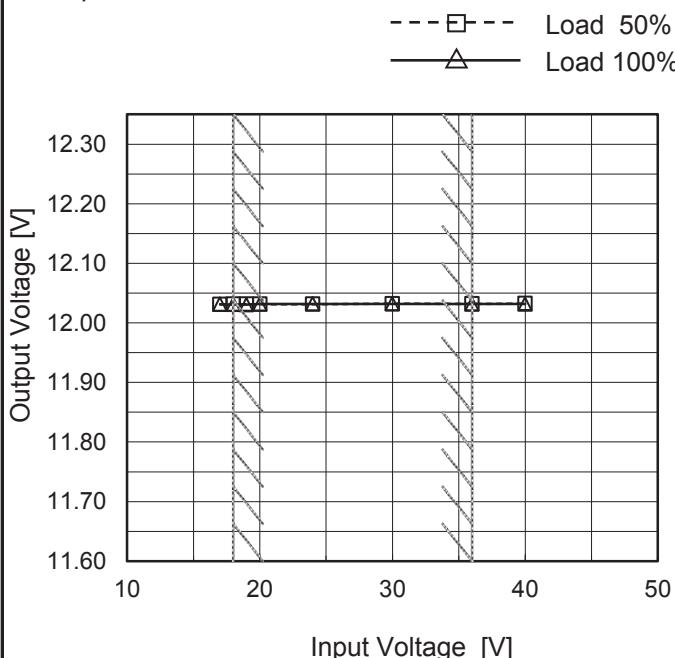
Note: Slanted line shows the range of the rated load current.

COSEL

Model	CHS4002412
Item	Line Regulation
Object	+12V26.5A

 Temperature 25°C
 Testing Circuitry Figure A

1.Graph



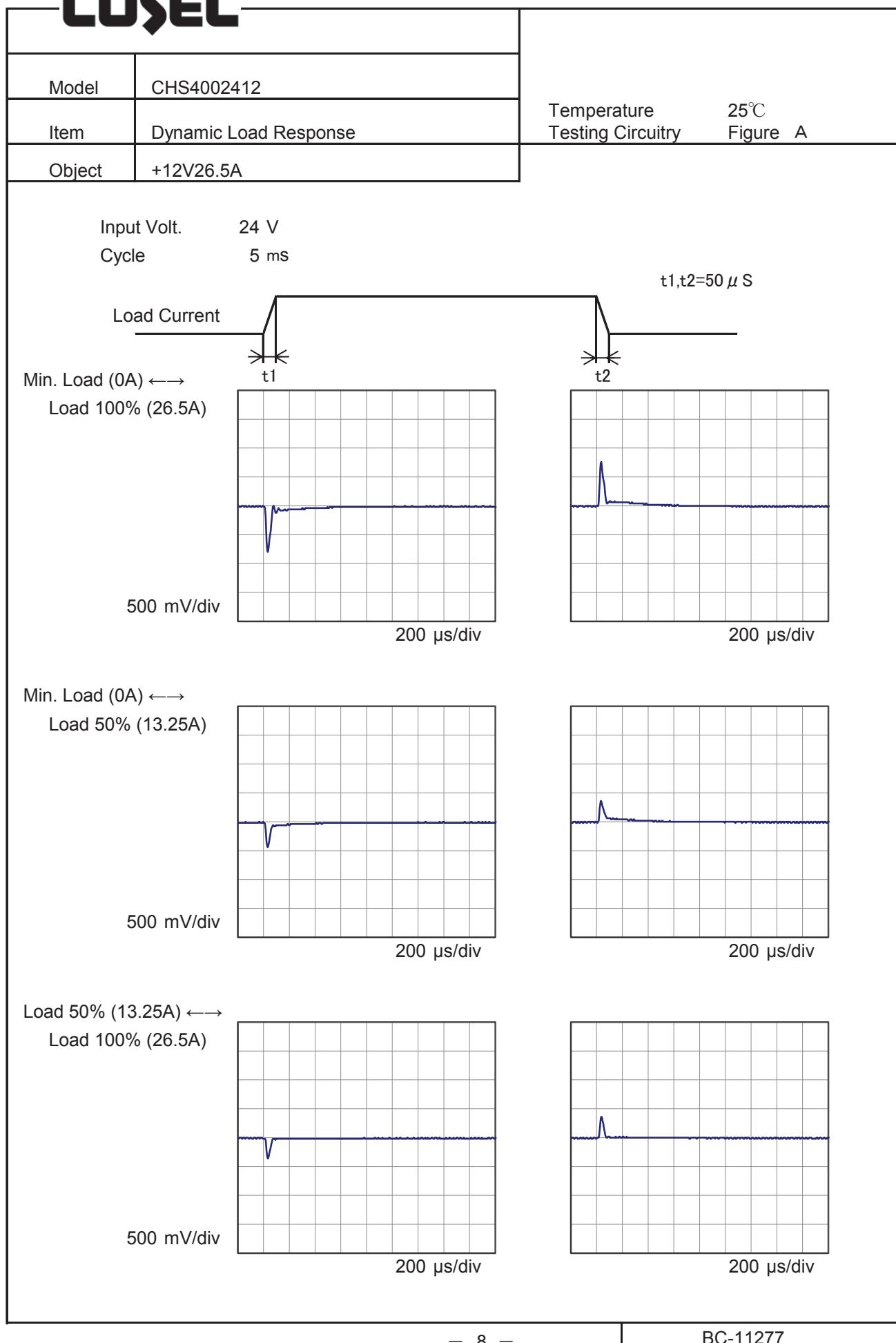
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
17	12.031	12.031
18	12.031	12.031
19	12.031	12.031
20	12.031	12.032
24	12.031	12.032
30	12.032	12.032
36	12.032	12.032
40	12.032	12.032
--	-	-

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

COSEL

Model	CHS4002412	Temperature	25°C																																																			
Item	Load Regulation	Testing Circuitry	Figure A																																																			
Object	+12V26.5A																																																					
1.Graph		2.Values																																																				
<p>The graph plots Output Voltage [V] on the Y-axis (11.60 to 12.30) against Load Current [A] on the X-axis (0 to 30). Three data series are shown for Input Voltages of 18V, 24V, and 36V. All series show a flat output voltage curve until approximately 26.5A, after which the output voltage drops sharply. A vertical dashed line marks the rated load current of 26.5A.</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>0.00</td><td>12.030</td><td>12.030</td><td>12.030</td></tr> <tr><td>4.00</td><td>12.030</td><td>12.030</td><td>12.031</td></tr> <tr><td>8.00</td><td>12.031</td><td>12.031</td><td>12.031</td></tr> <tr><td>12.00</td><td>12.031</td><td>12.031</td><td>12.031</td></tr> <tr><td>16.00</td><td>12.031</td><td>12.031</td><td>12.032</td></tr> <tr><td>20.00</td><td>12.031</td><td>12.031</td><td>12.032</td></tr> <tr><td>24.00</td><td>12.031</td><td>12.031</td><td>12.032</td></tr> <tr><td>26.50</td><td>12.031</td><td>12.032</td><td>12.032</td></tr> <tr><td>29.15</td><td>12.031</td><td>12.032</td><td>12.032</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]	0.00	12.030	12.030	12.030	4.00	12.030	12.030	12.031	8.00	12.031	12.031	12.031	12.00	12.031	12.031	12.031	16.00	12.031	12.031	12.032	20.00	12.031	12.031	12.032	24.00	12.031	12.031	12.032	26.50	12.031	12.032	12.032	29.15	12.031	12.032	12.032	--	-	-	-	--	-	-	-
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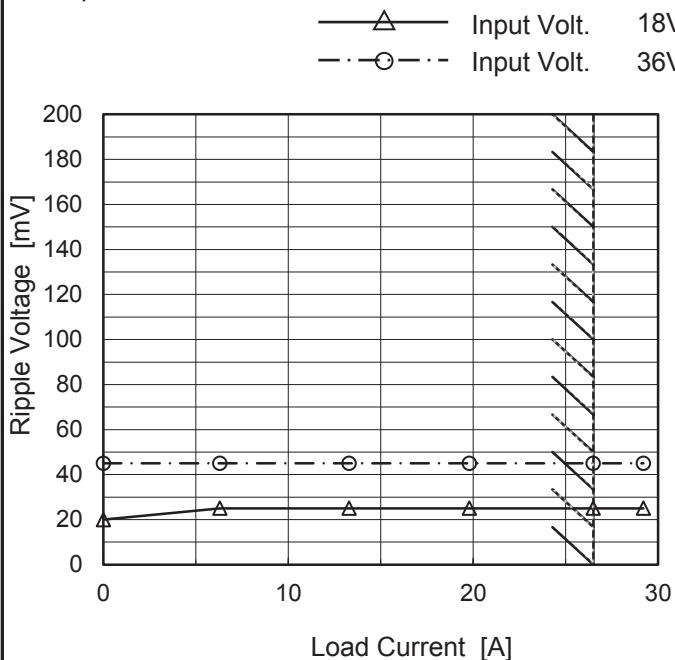
COSEL

COSEL

Model	CHS4002412
Item	Ripple Voltage (by Load Current)
Object	+12V26.5A

 Temperature 25°C
 Testing Circuitry Figure B

1.Graph



2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.0	20	45
6.3	25	45
13.3	25	45
19.8	25	45
26.5	25	45
29.2	25	45
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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]

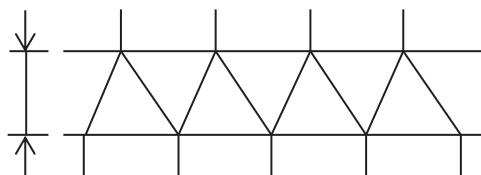


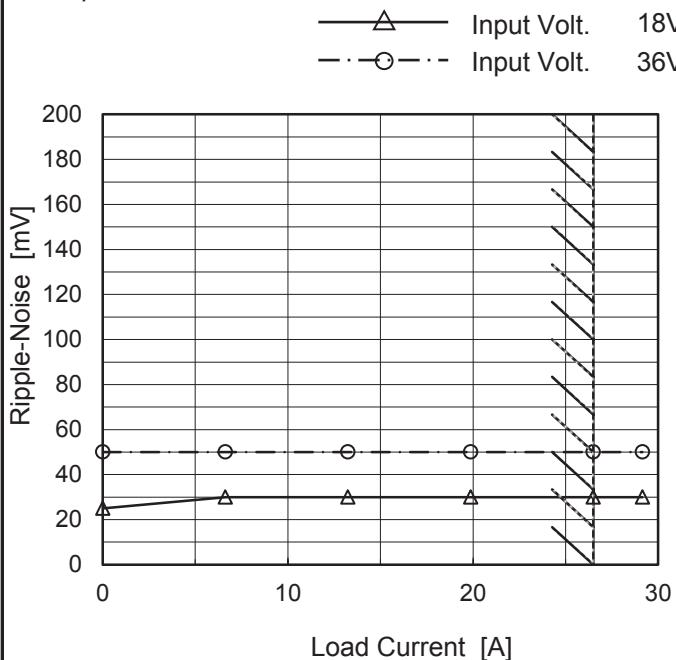
Fig.Complex Ripple Wave Form

COSEL

Model	CHS4002412
Item	Ripple-Noise
Object	+12V26.5A

Temperature 25°C
Testing Circuitry Figure B

1.Graph



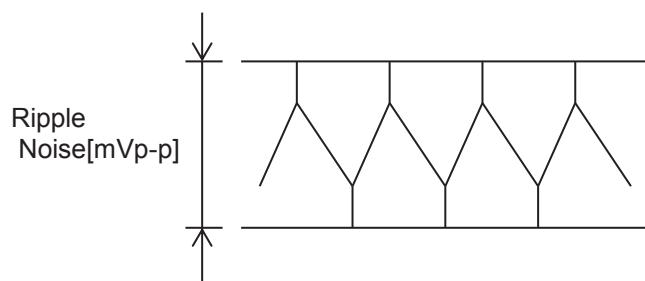
Measured by 100 MHz Oscilloscope.

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. 18 [V]	Input Volt. 36 [V]
0.0	25	50
6.6	30	50
13.3	30	50
19.9	30	50
26.5	30	50
29.2	30	50
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

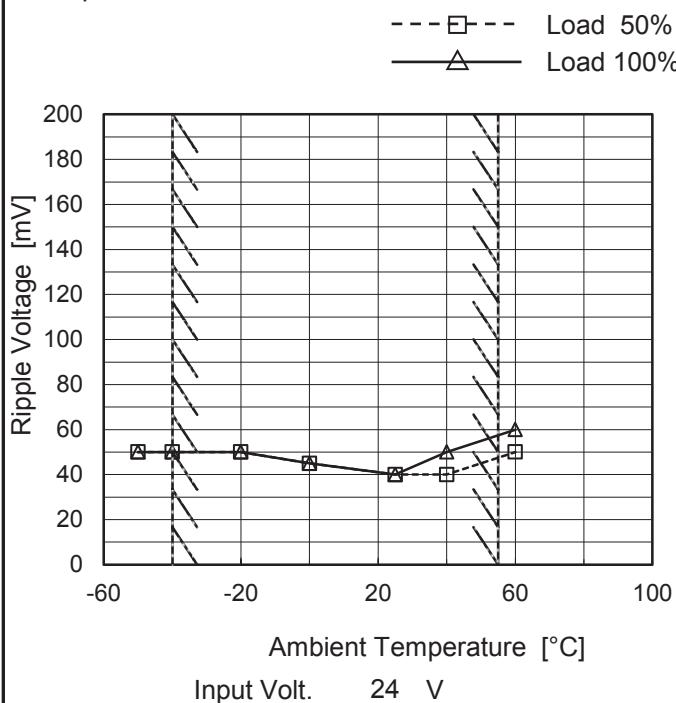


COSEL

Model	CHS4002412
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V26.5A

Testing Circuitry Figure B

1.Graph



2.Values

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

Measured by 100 MHz Oscilloscope.

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

Ripple [mVp-p]

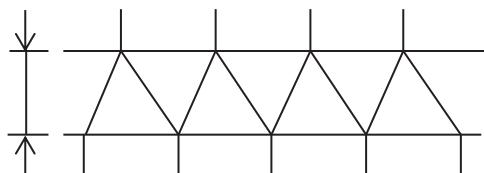
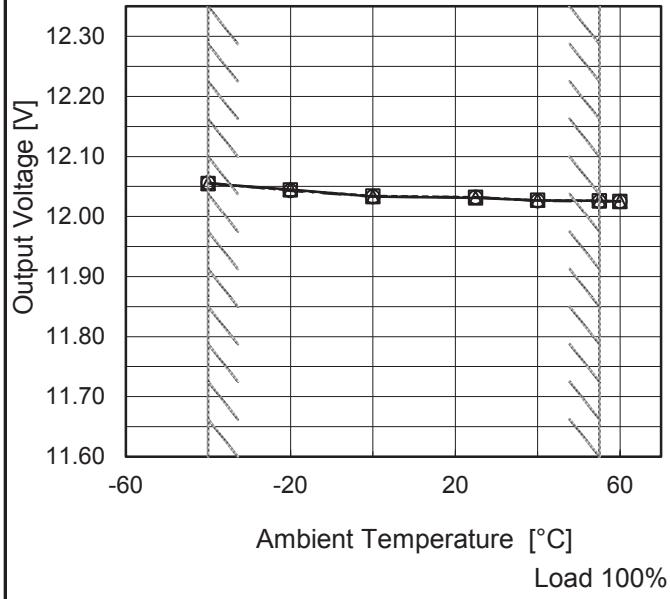


Fig.Complex Ripple Wave Form

COSEL

Model	CHS4002412	Testing Circuitry Figure A		
Item	Ambient Temperature Drift			
Object	+12V26.5A			
1.Graph	<p>—△— Input Volt. 18V - - - □ - - Input Volt. 24V - - ○ - - Input Volt. 36V</p>  <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>	2.Values		
		Ambient Temperature [°C]	Output Voltage [V]	
			Input Volt.	Input Volt.
			18[V]	24[V]
	-40		12.055	12.055
	-20		12.045	12.044
	0		12.033	12.034
	25		12.031	12.032
	40		12.027	12.027
	55		12.026	12.026
	60		12.025	12.025
	--		-	-
	--		-	-
	--		-	-
	--		-	-

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



Model	CHS4002412	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V26.5A	

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 : 18 - 36V

Load Current : 0 - 26.5A

* 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	24	0	12.055	±14	±0.1
Minimum Voltage	55	18	0	12.027		

COSEL

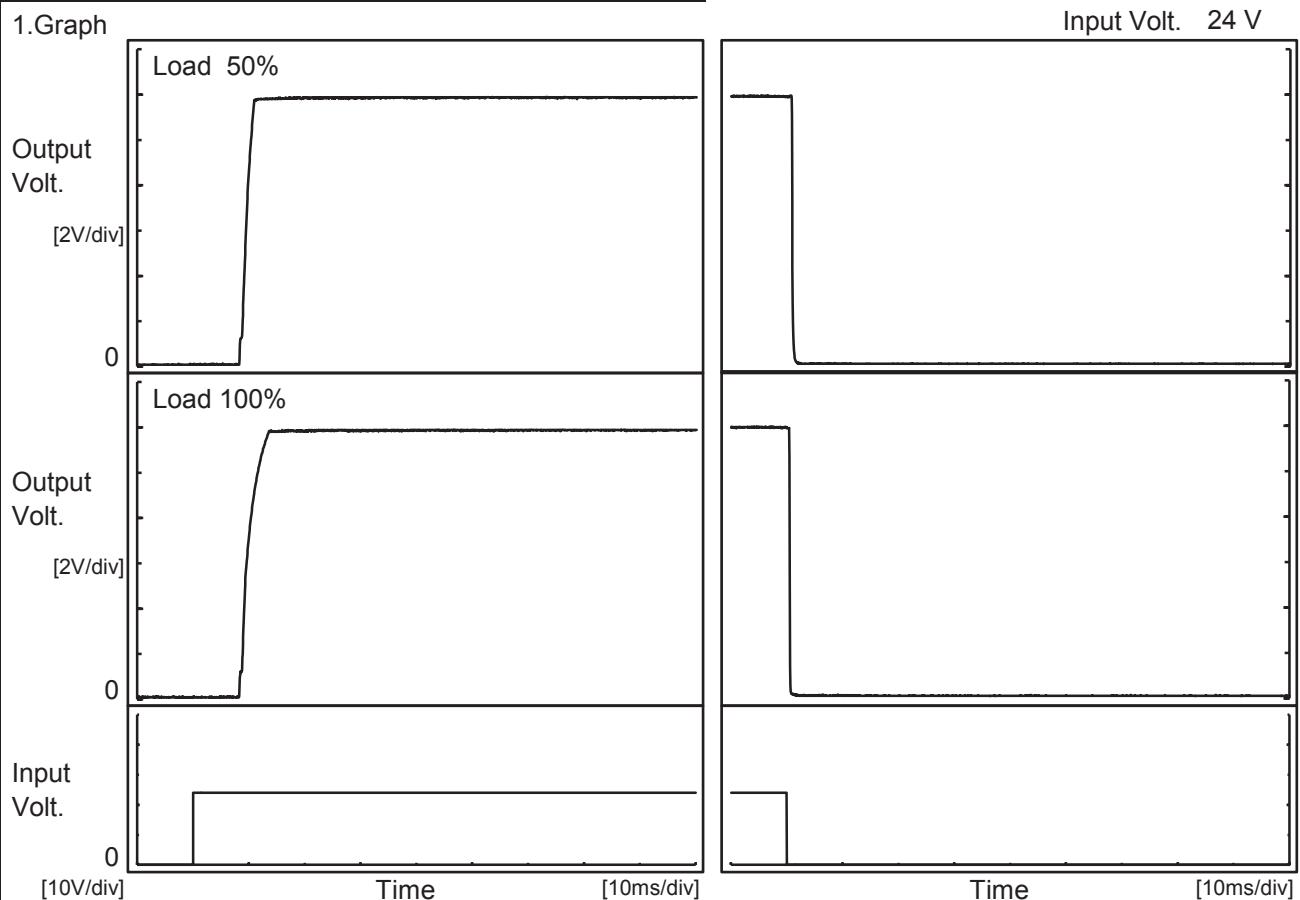
Model	CHS4002412	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V26.5A																								
1. Graph			2. Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 24V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th><th>Output Voltage [V]</th></tr> </thead> <tbody> <tr><td>0.0</td><td>12.032</td></tr> <tr><td>0.5</td><td>12.032</td></tr> <tr><td>1.0</td><td>12.031</td></tr> <tr><td>2.0</td><td>12.031</td></tr> <tr><td>3.0</td><td>12.031</td></tr> <tr><td>4.0</td><td>12.031</td></tr> <tr><td>5.0</td><td>12.031</td></tr> <tr><td>6.0</td><td>12.031</td></tr> <tr><td>7.0</td><td>12.031</td></tr> <tr><td>8.0</td><td>12.031</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	12.032	0.5	12.032	1.0	12.031	2.0	12.031	3.0	12.031	4.0	12.031	5.0	12.031	6.0	12.031	7.0	12.031	8.0	12.031
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7.0	12.031																								
8.0	12.031																								

COSSEL

Model	CHS4002412
Item	Rise and Fall Time
Object	+12V26.5A

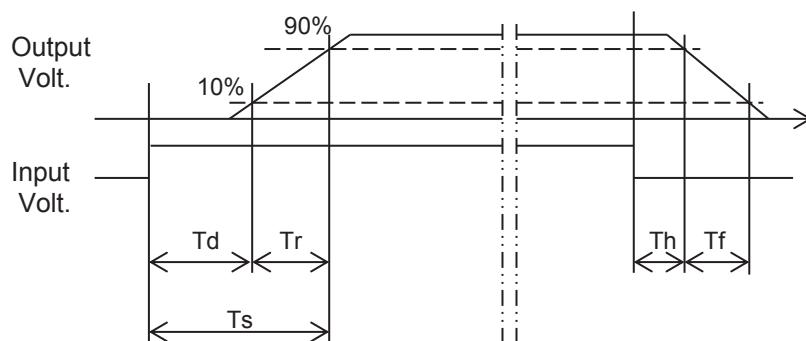
Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		8.7	2.0	10.7	0.9	0.2	
100 %		8.8	3.7	12.5	0.5	0.2	

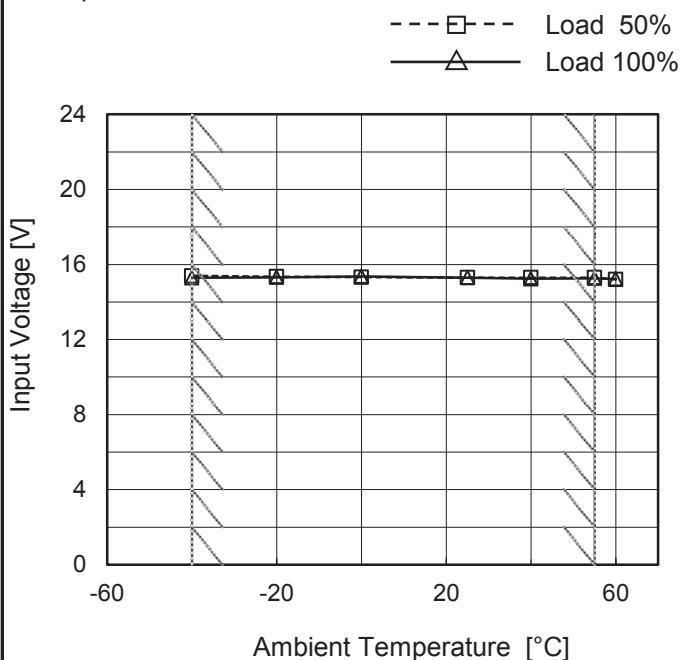


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Model	CHS4002412
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V26.5A

Testing Circuitry Figure A

1.Graph



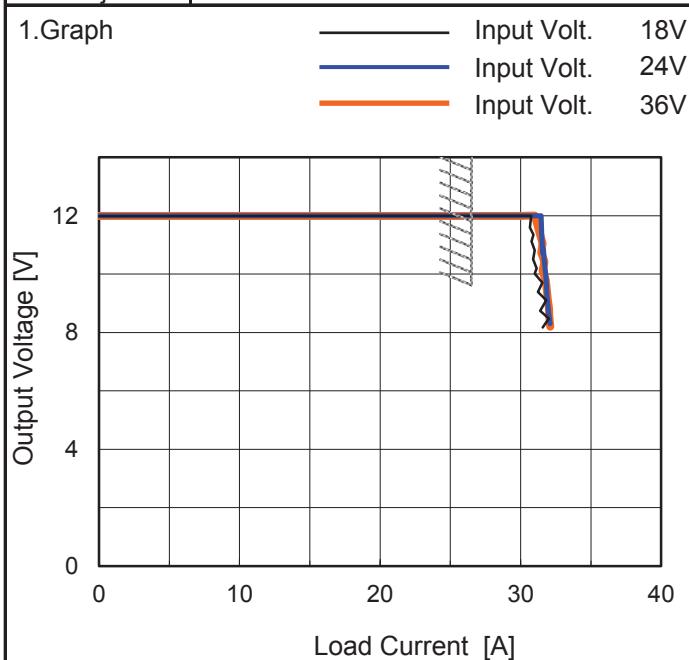
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	15.4	15.3
-20	15.4	15.4
0	15.4	15.4
25	15.3	15.3
40	15.3	15.3
55	15.3	15.3
60	15.2	15.3
--	-	-
--	-	-
--	-	-
--	-	-

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

COSEL

Model	CHS4002412
Item	Overcurrent Protection
Object	+12V26.5A



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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
11.4	31.18	30.95	30.40
10.8	31.28	31.02	30.58
9.6	31.42	31.39	30.91
8.4	31.86	31.84	31.22
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
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Model	CHS4002412																																							
Item	Overvoltage Protection																																							
Object	+12V26.5A																																							
1.Graph																																								
<p style="text-align: center;"> - - - □ - - - Input Volt. 24V - - - ○ - - - Input Volt. 36V </p> <p style="text-align: center;">Operating Point [V]</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Load 0%</p>																																								
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COSEL

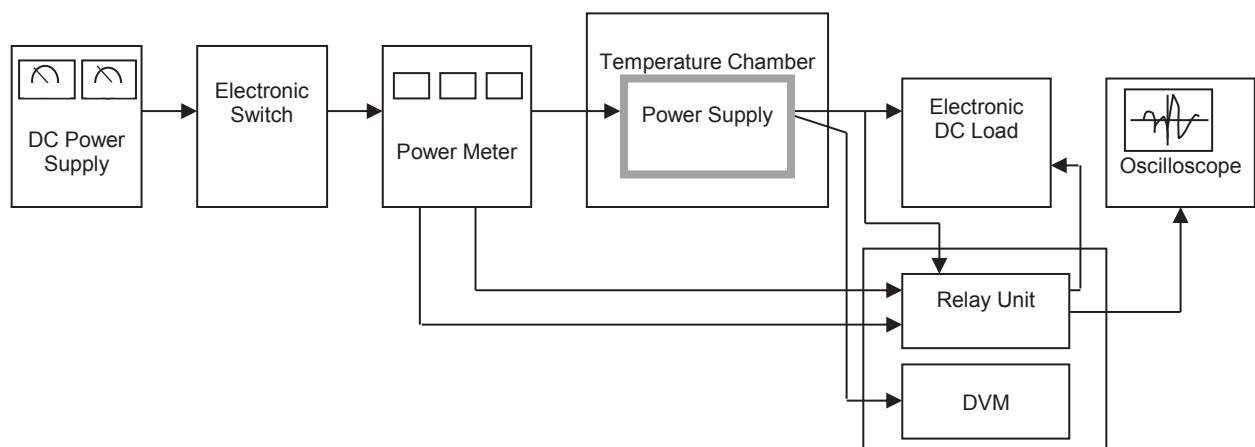


Figure A

Data Acquisition/Control Unit

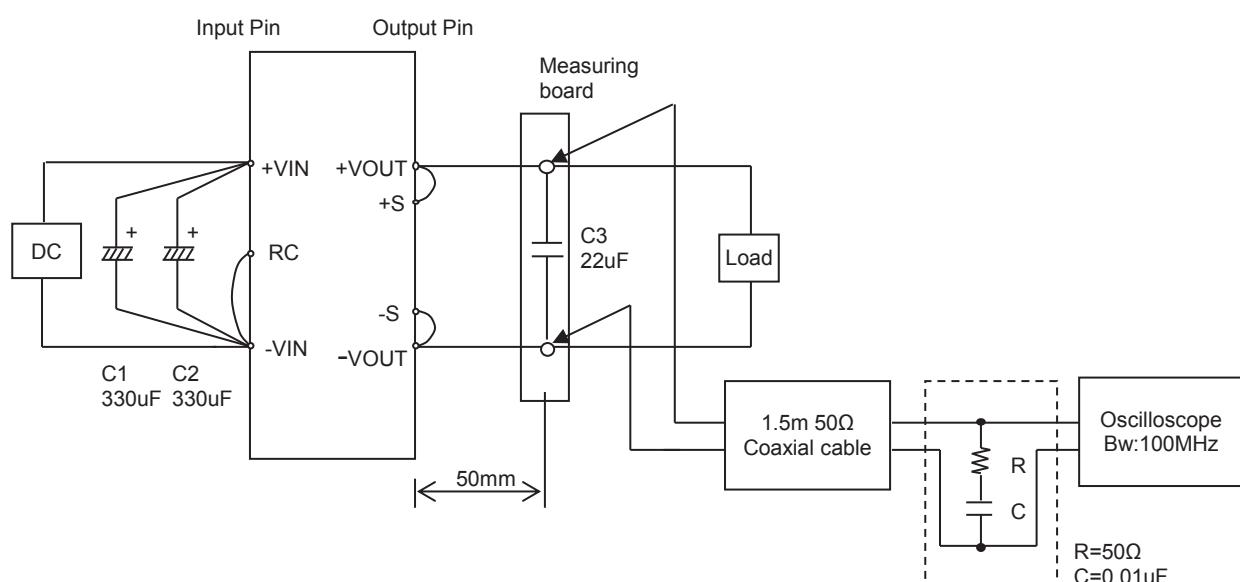


Figure B