



# TEST DATA OF CHS3004828

Regulated DC Power Supply  
September 26, 2019

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Yukihiro Takehashi                                  Design Manager

Prepared by : Tatsuya Nakagawa  
Tatsuya Nakagawa                                  Design Engineer

**COSEL CO.,LTD.**



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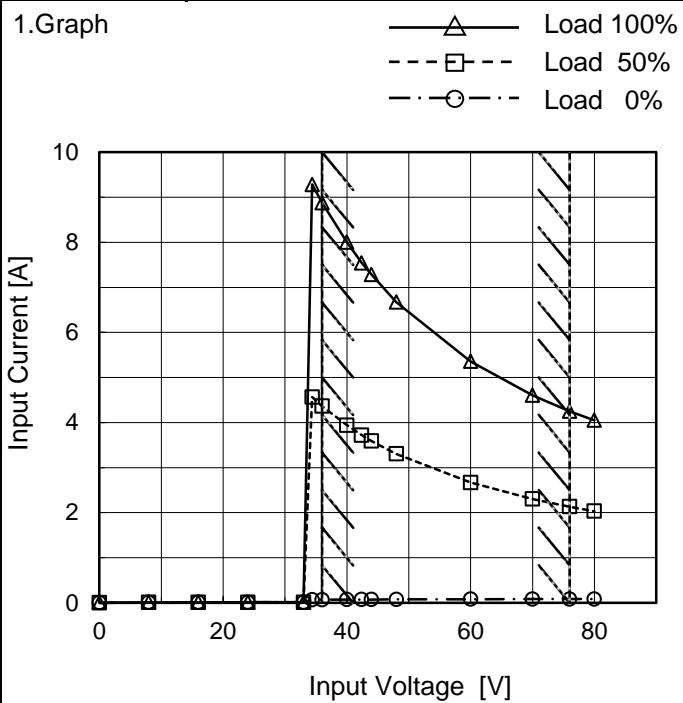
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Model	CHS3004828
Item	Input Current (by Input Voltage)
Object	_____

## 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	0.000	0.000	0.000
8.0	0.008	0.008	0.008
16.0	0.009	0.009	0.009
24.0	0.010	0.010	0.010
33.0	0.010	0.010	0.010
34.4	0.068	4.565	9.283
36.0	0.068	4.363	8.877
40.0	0.071	3.940	8.002
42.4	0.072	3.721	7.544
44.0	0.073	3.588	7.285
48.0	0.075	3.303	6.672
60.0	0.079	2.667	5.356
70.0	0.081	2.304	4.606
76.0	0.082	2.132	4.249
80.0	0.083	2.034	4.051
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Model	CHS3004828																																																					
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Object	<hr/>																																																					
1.Graph	<p style="text-align: center;"> <span style="color: black;">—△—</span> Input Volt. 36V  <span style="color: gray;">- -□-</span> Input Volt. 48V  <span style="color: gray;">- -○-</span> Input Volt. 76V         </p>																																																					
2.Values	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td><td>0.068</td><td>0.075</td><td>0.082</td></tr> <tr> <td>2.00</td><td>1.643</td><td>1.256</td><td>0.835</td></tr> <tr> <td>4.00</td><td>3.232</td><td>2.457</td><td>1.599</td></tr> <tr> <td>6.00</td><td>4.852</td><td>3.665</td><td>2.364</td></tr> <tr> <td>8.00</td><td>6.502</td><td>4.899</td><td>3.139</td></tr> <tr> <td>10.00</td><td>8.193</td><td>6.149</td><td>3.927</td></tr> <tr> <td>10.80</td><td>8.877</td><td>6.672</td><td>4.249</td></tr> <tr> <td>11.88</td><td>9.841</td><td>7.369</td><td>4.684</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> </tbody> </table>			Load Current [A]	Input Current [A]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.00	0.068	0.075	0.082	2.00	1.643	1.256	0.835	4.00	3.232	2.457	1.599	6.00	4.852	3.665	2.364	8.00	6.502	4.899	3.139	10.00	8.193	6.149	3.927	10.80	8.877	6.672	4.249	11.88	9.841	7.369	4.684	--	-	-	-	--	-	-	-	--	-	-	-
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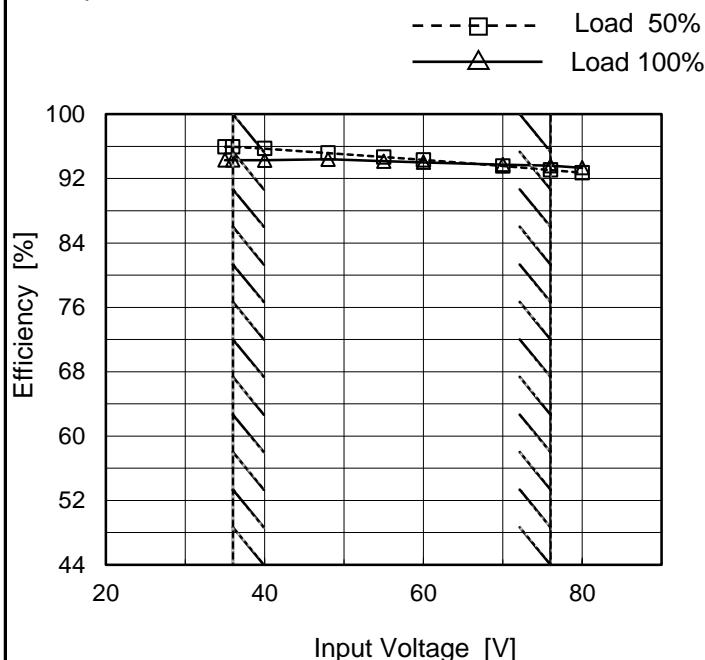
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Model	CHS3004828
Item	Efficiency (by Input Voltage)
Object	_____

 Temperature 25°C  
 Testing Circuitry Figure A

## 1.Graph



## 2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
35	95.9	94.3
36	95.9	94.3
40	95.7	94.3
48	95.2	94.4
55	94.7	94.2
60	94.3	94.0
70	93.6	93.7
76	93.1	93.6
80	92.7	93.3

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

**COSEL**

Model	CHS3004828	Temperature	25°C																																																			
Item	Efficiency (by Load Current)	Testing Circuitry	Figure A																																																			
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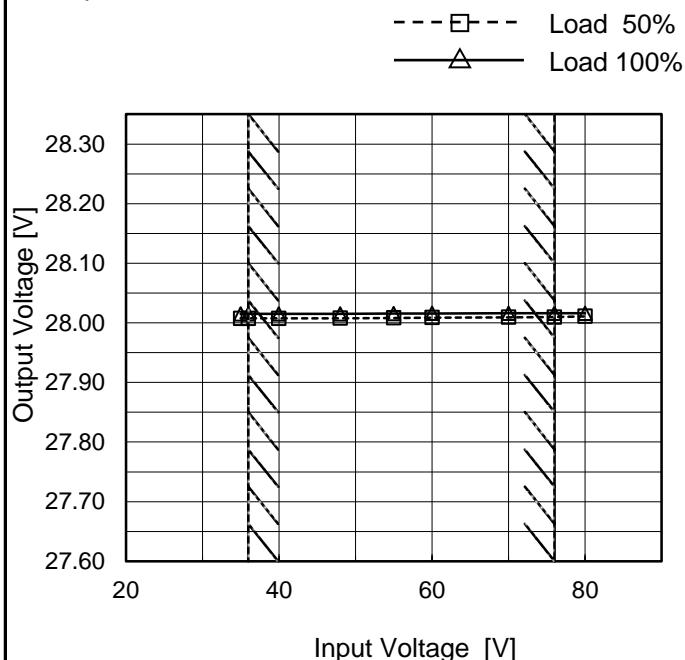
Note: Slanted line shows the range of the rated load current.

**COSEL**

Model	CHS3004828
Item	Line Regulation
Object	+28V10.8A

 Temperature 25°C  
 Testing Circuitry Figure A

## 1.Graph



## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
35	28.007	28.015
36	28.008	28.015
40	28.008	28.015
48	28.008	28.015
55	28.008	28.015
60	28.009	28.016
70	28.009	28.016
76	28.010	28.016
80	28.011	28.016

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

**COSEL**

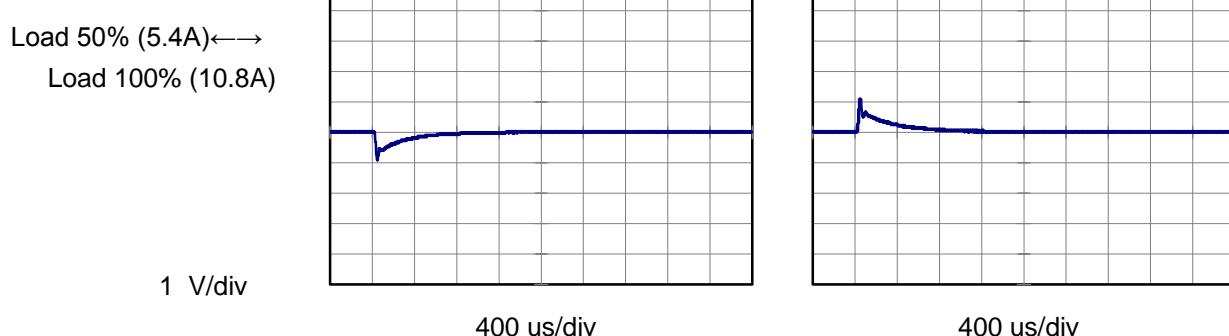
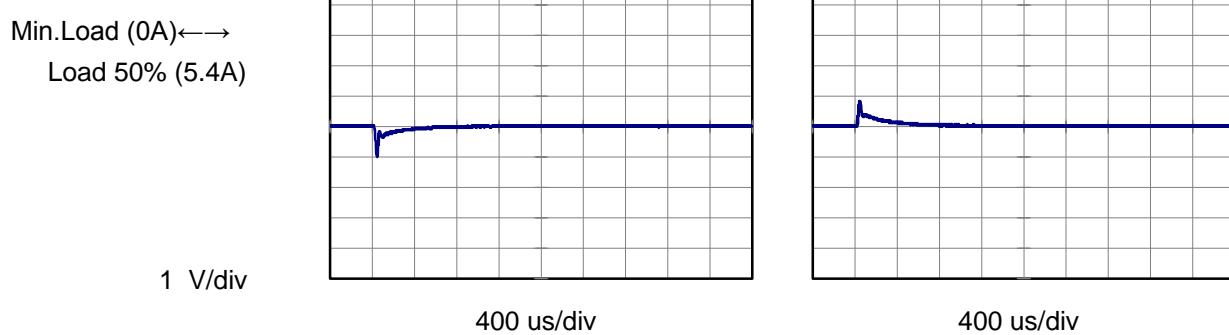
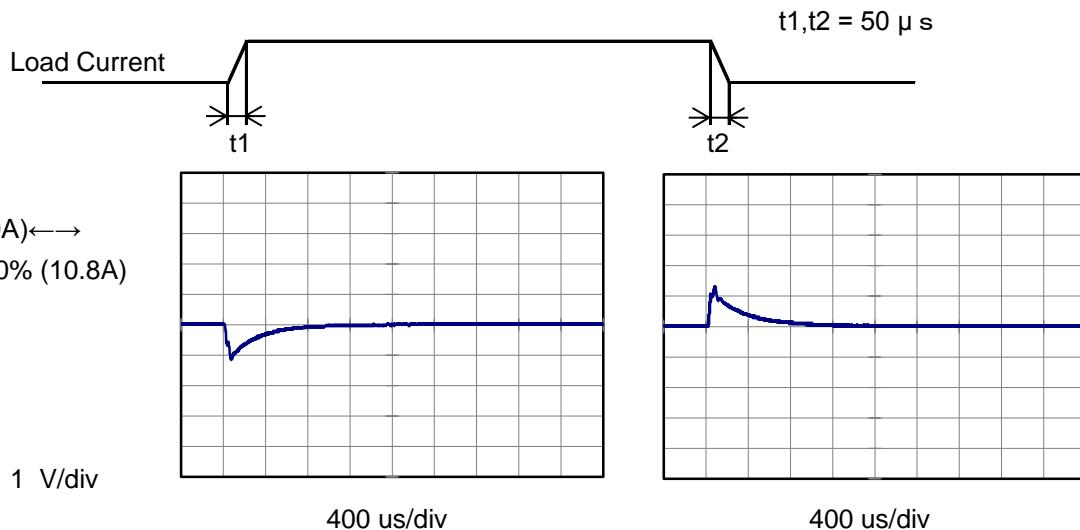
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Item	Load Regulation																																																					
Object	+28V10.8A																																																					
1.Graph	—△— Input Volt. 36V ---□--- Input Volt. 48V —○— Input Volt. 76V	2.Values																																																				
	<p>The graph plots Output Voltage [V] on the Y-axis (27.60 to 28.30) against Load Current [A] on the X-axis (0 to 12). Three horizontal lines represent the output voltage for different input voltages: 36V (solid triangle), 48V (dashed square), and 76V (dash-dot circle). All three lines are nearly horizontal and close to 28.00V. A vertical dashed line is drawn at a load current of approximately 11.88A, indicating the rated load current range.</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. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>28.009</td> <td>28.010</td> <td>28.011</td> </tr> <tr> <td>2.00</td> <td>28.007</td> <td>28.007</td> <td>28.009</td> </tr> <tr> <td>4.00</td> <td>28.006</td> <td>28.008</td> <td>28.010</td> </tr> <tr> <td>6.00</td> <td>28.008</td> <td>28.009</td> <td>28.011</td> </tr> <tr> <td>8.00</td> <td>28.009</td> <td>28.011</td> <td>28.013</td> </tr> <tr> <td>10.00</td> <td>28.013</td> <td>28.013</td> <td>28.015</td> </tr> <tr> <td>10.80</td> <td>28.015</td> <td>28.015</td> <td>28.016</td> </tr> <tr> <td>11.88</td> <td>28.016</td> <td>28.017</td> <td>28.016</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> </tbody> </table>	Load Current [A]	Output Voltage [V]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.00	28.009	28.010	28.011	2.00	28.007	28.007	28.009	4.00	28.006	28.008	28.010	6.00	28.008	28.009	28.011	8.00	28.009	28.011	28.013	10.00	28.013	28.013	28.015	10.80	28.015	28.015	28.016	11.88	28.016	28.017	28.016	--	-	-	-	--	-	-	-	--	-	-	-	
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Note: Slanted line shows the range of the rated load current.

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Model	CHS3004828	Temperature Testing Circuitry 25°C Figure A
Item	Dynamic Load Response	
Object	+28V10.8A	

Input Volt. 48 V  
 Cycle 10 ms



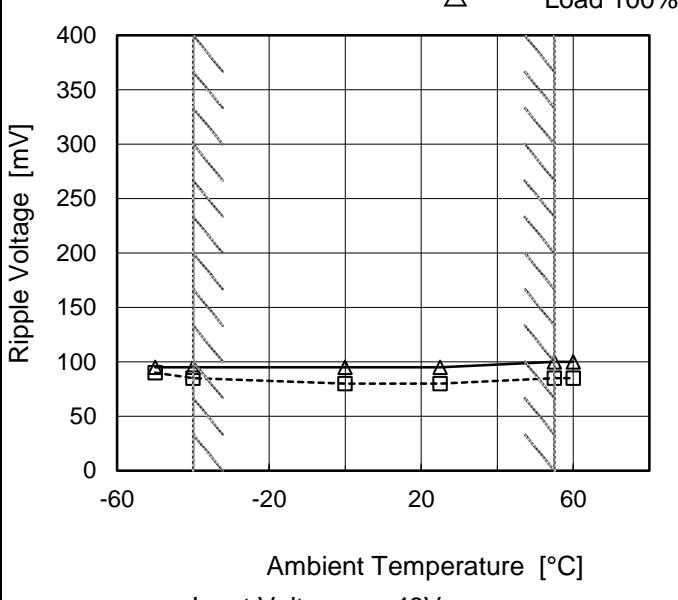
**COSEL**

Model	CHS3004828	Temperature	25°C																																				
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure B																																				
Object	+28V10.8A																																						
1.Graph			2.Values																																				
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The graph displays two sets of data points: one for Input Volt. 36V (solid line with triangle markers) and one for Input Volt. 76V (dashed line with circle markers). The x-axis represents Load Current [A] from 0 to 15. The y-axis represents Ripple Voltage [mV] from 0 to 400. A vertical dashed line is drawn at approximately 11.88 A, indicating the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 36V)</th> <th>Ripple Voltage [mV] (Input Volt. 76V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>75</td><td>175</td></tr> <tr><td>2.70</td><td>70</td><td>165</td></tr> <tr><td>5.40</td><td>70</td><td>160</td></tr> <tr><td>8.10</td><td>70</td><td>160</td></tr> <tr><td>10.80</td><td>70</td><td>160</td></tr> <tr><td>11.88</td><td>75</td><td>170</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> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>				Load Current [A]	Ripple Voltage [mV] (Input Volt. 36V)	Ripple Voltage [mV] (Input Volt. 76V)	0.00	75	175	2.70	70	165	5.40	70	160	8.10	70	160	10.80	70	160	11.88	75	170	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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<p>Fig.Complex Ripple Wave Form</p>																																							

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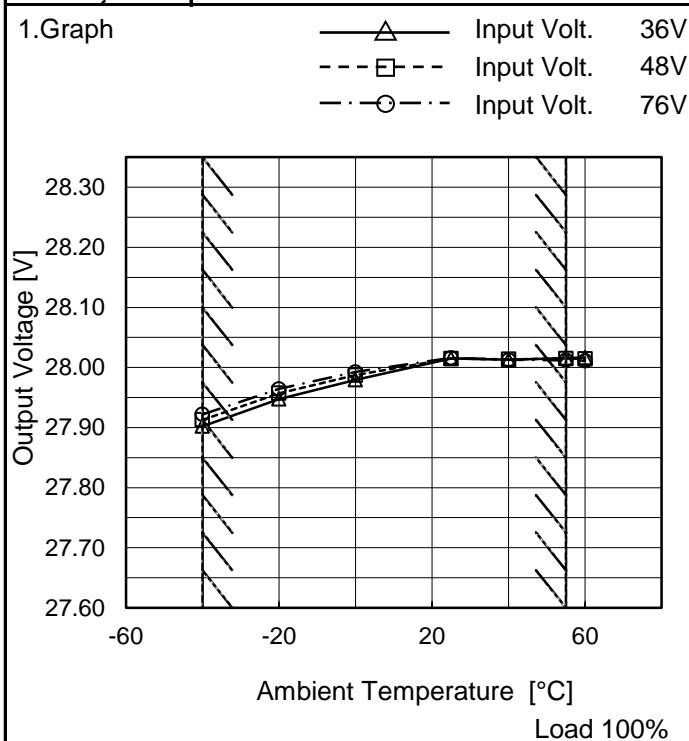
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<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 400 mV, and the X-axis ranges from 0 to 15 A. Two curves are plotted: one for Input Volt. 36V (solid line with triangle markers) and one for Input Volt. 76V (dashed line with circle markers). Both curves show a slight increase in ripple voltage as load current increases, with a sharp rise starting around 10.8A. A vertical dashed line marks the rated load current range at approximately 11.88A.</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>0.00</td><td>95</td><td>190</td> </tr> <tr> <td>2.70</td><td>90</td><td>180</td> </tr> <tr> <td>5.40</td><td>85</td><td>180</td> </tr> <tr> <td>8.10</td><td>85</td><td>180</td> </tr> <tr> <td>10.80</td><td>90</td><td>180</td> </tr> <tr> <td>11.88</td><td>95</td><td>185</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]	0.00	95	190	2.70	90	180	5.40	85	180	8.10	85	180	10.80	90	180	11.88	95	185	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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8.10	85	180																																							
10.80	90	180																																							
11.88	95	185																																							
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<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> <p>Fig.Complex Ripple Noise Wave Form</p>																																									

**COSEL**

Model	CHS3004828	Testing Circuitry    Figure B																																						
Item	Ripple Voltage (by Ambient Temp.)																																							
Object	+28V10.8A																																							
1.Graph		2.Values																																						
 <p>Ambient Temperature [°C]</p> <p>Input Volt. 48V</p>		<table border="1"> <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>-50</td><td>90</td><td>95</td></tr> <tr><td>-40</td><td>85</td><td>95</td></tr> <tr><td>0</td><td>80</td><td>95</td></tr> <tr><td>25</td><td>80</td><td>95</td></tr> <tr><td>55</td><td>85</td><td>100</td></tr> <tr><td>60</td><td>85</td><td>100</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> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-50	90	95	-40	85	95	0	80	95	25	80	95	55	85	100	60	85	100	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Ambient Temperature [°C]	Ripple Voltage [mV]																																							
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<p>Measured by 100 MHz Oscilloscope.</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																								

**COSEL**

Model	CHS3004828
Item	Ambient Temperature Drift
Object	+28V10.8A



Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-40	27.902	27.913	27.922
-20	27.948	27.957	27.964
0	27.980	27.987	27.992
25	28.015	28.015	28.016
40	28.013	28.014	28.013
55	28.016	28.015	28.012
60	28.017	28.015	28.011
--	-	-	-
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--	-	-	-
--	-	-	-

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



Model	CHS3004828	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+28V10.8A	

### 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 - 10.8A

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

$$\text{* Output Voltage Accuracy (Ratio)} = \frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$$

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	55	36	10.8	28.016	±66	±0.2
Minimum Voltage	-40	48	0	27.885		

**COSEL**

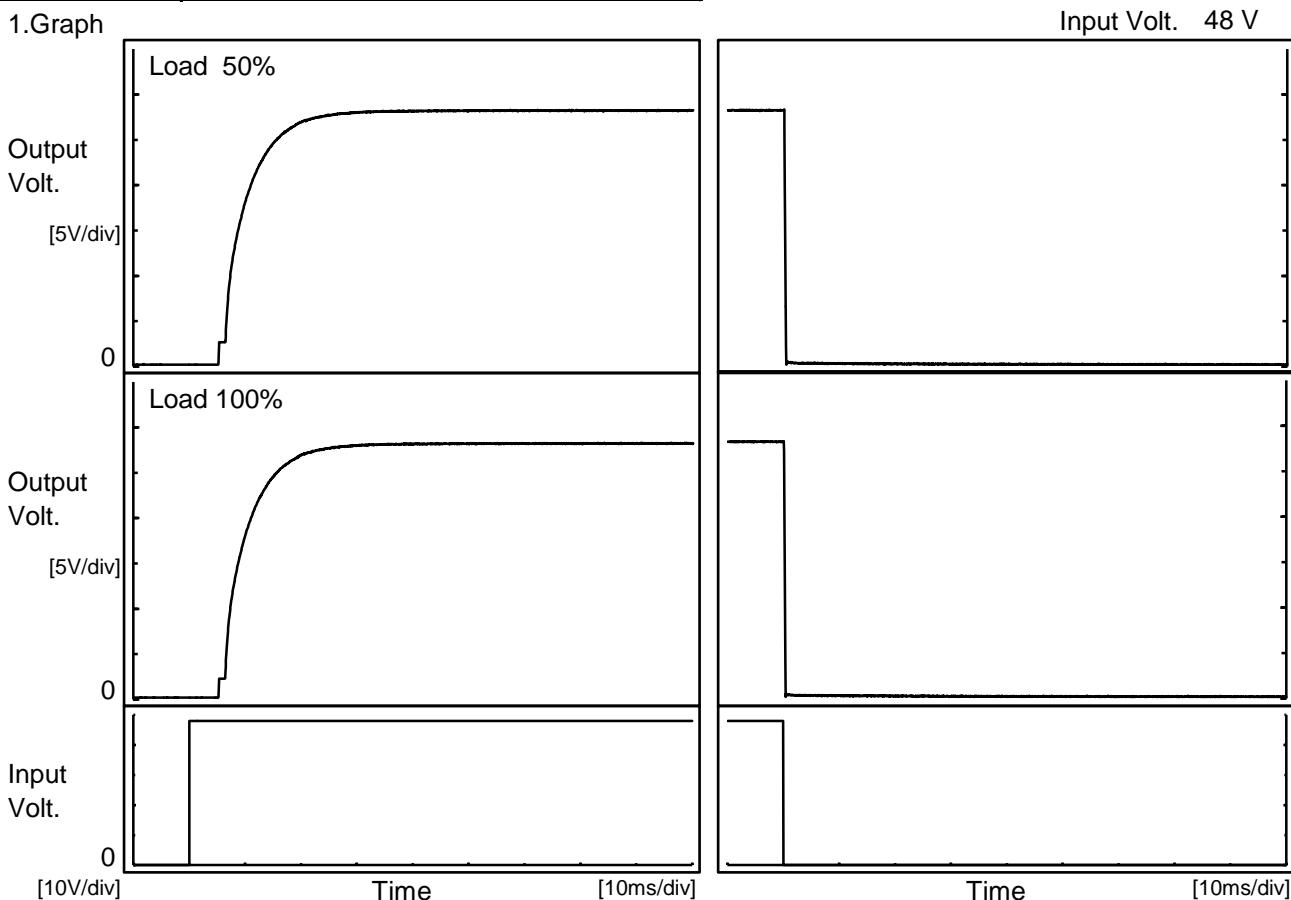
Model	CHS3004828	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+28V10.8A																								
1. Graph			2. Values																						
<p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>28.015</td></tr> <tr><td>0.5</td><td>28.018</td></tr> <tr><td>1.0</td><td>28.019</td></tr> <tr><td>2.0</td><td>28.019</td></tr> <tr><td>3.0</td><td>28.020</td></tr> <tr><td>4.0</td><td>28.020</td></tr> <tr><td>5.0</td><td>28.020</td></tr> <tr><td>6.0</td><td>28.020</td></tr> <tr><td>7.0</td><td>28.019</td></tr> <tr><td>8.0</td><td>28.020</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	28.015	0.5	28.018	1.0	28.019	2.0	28.019	3.0	28.020	4.0	28.020	5.0	28.020	6.0	28.020	7.0	28.019	8.0	28.020
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**COSEL**

Model	CHS3004828
Item	Rise and Fall Time
Object	+28V10.8A

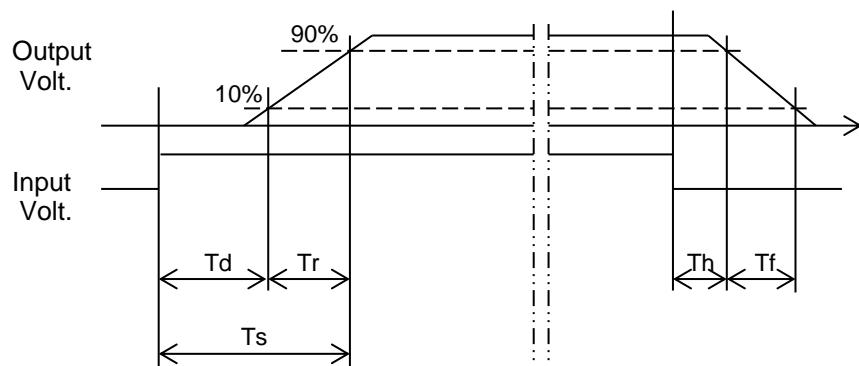
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		5.4	10.9	16.3	0.2	0.2	
100 %		5.5	10.8	16.3	0.2	0.2	

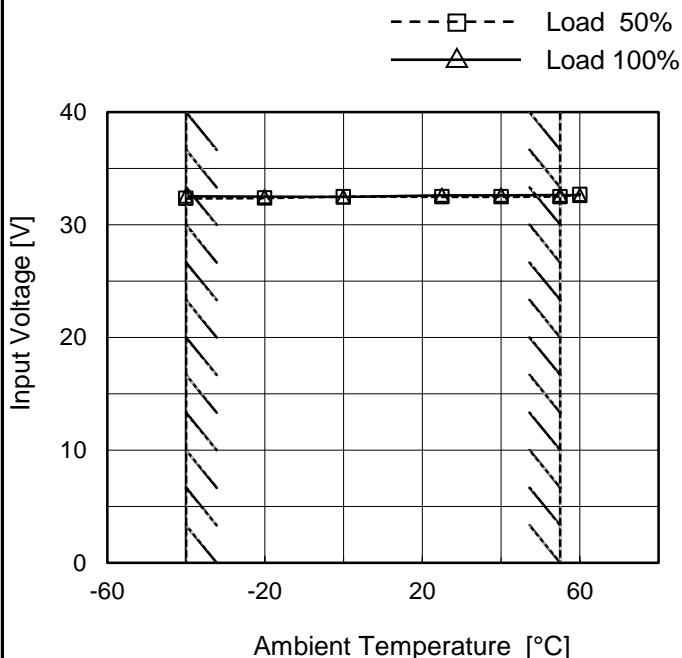


**COSEL**

Model	CHS3004828
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+28V10.8A

Testing Circuitry Figure A

## 1. Graph



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

## 2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	32.4	32.6
-20	32.4	32.5
0	32.5	32.5
25	32.5	32.7
40	32.5	32.7
55	32.5	32.7
60	32.7	32.7
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--	-	-

**COSEL**

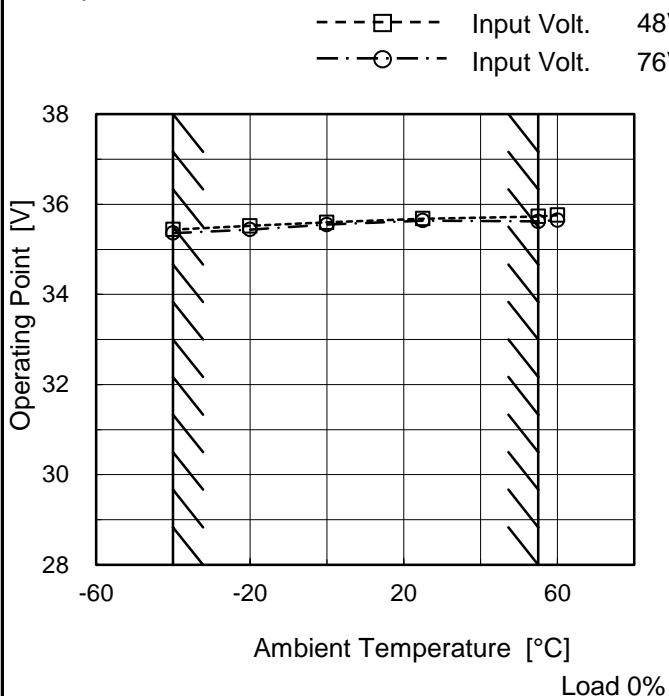
Model	CHS3004828																																																																	
Item	Overcurrent Protection																																																																	
Object	+28V10.8A																																																																	
1.Graph	<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Input Volt. 36V Input Volt. 48V Input Volt. 76V</p>																																																																	
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Temperature	25°C																																																																	
Testing Circuitry	Figure A																																																																	
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>26.6</td><td>15.65</td><td>16.22</td><td>15.89</td></tr> <tr><td>25.2</td><td>15.73</td><td>16.14</td><td>16.00</td></tr> <tr><td>23.8</td><td>15.94</td><td>16.41</td><td>16.39</td></tr> <tr><td>22.4</td><td>16.09</td><td>16.63</td><td>16.49</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Output Voltage [V]	Load Current [A]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	26.6	15.65	16.22	15.89	25.2	15.73	16.14	16.00	23.8	15.94	16.41	16.39	22.4	16.09	16.63	16.49	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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**COSEL**

Model	CHS3004828
Item	Overvoltage Protection
Object	+28V10.8A

## Testing Circuitry Figure A

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 48[V]	Input Volt. 76[V]
-40	35.44	35.36
-20	35.52	35.44
0	35.60	35.55
25	35.68	35.64
55	35.73	35.62
60	35.76	35.65
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Note: Slanted line shows the range of the rated ambient temperature.

COSEL

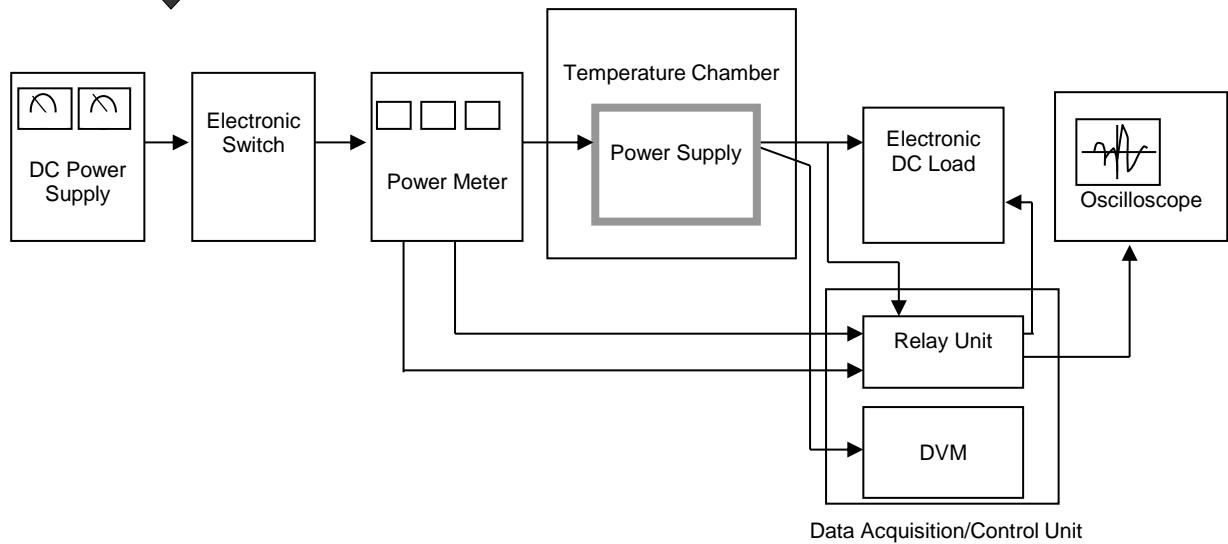


Figure A

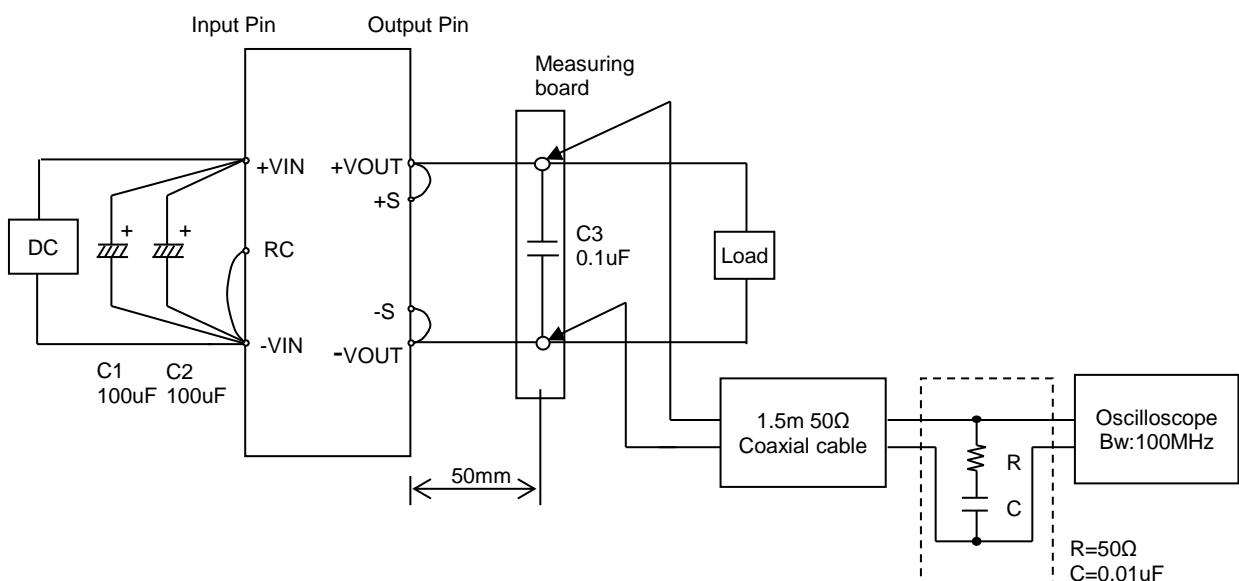


Figure B