



# TEST DATA OF CHS3004815

Regulated DC Power Supply  
September 26, 2019

Approved by : Yukihiro Takehashi  
Yukihiro Takehashi                                  Design Manager

Prepared by : Tatsuya Nakagawa  
Tatsuya Nakagawa                                  Design Engineer

**COSEL CO.,LTD.**



## CONTENTS

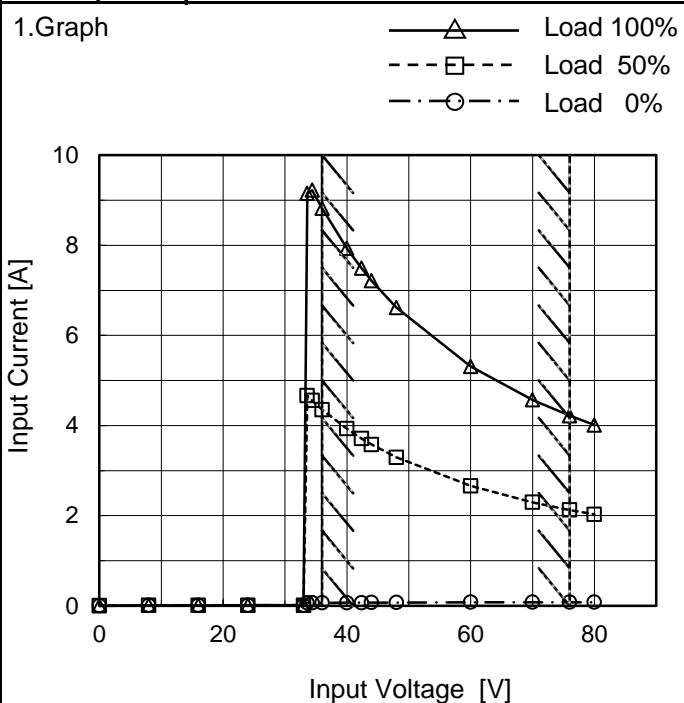
1.Input Current (by Input Voltage) . . . . .	1
2.Input Current (by Load Current) . . . . .	2
3.Input Power (by Load Current) . . . . .	3
4.Efficiency (by Input Voltage) . . . . .	4
5.Efficiency (by Load Current) . . . . .	5
6.Line Regulation . . . . .	6
7.Load Regulation . . . . .	7
8.Dynamic Load Response . . . . .	8
9.Ripple Voltage (by Load Current) . . . . .	9
10.Ripple-Noise . . . . .	10
11.Ripple Voltage (by Ambient Temperature) . . . . .	11
12.Ambient Temperature Drift . . . . .	12
13.Output Voltage Accuracy . . . . .	13
14.Time Lapse Drift . . . . .	14
15.Rise and Fall Time . . . . .	15
16.Minimum Input Voltage for Regulated Output Voltage . . . . .	16
17.Overcurrent Protection . . . . .	17
18.Overvoltage Protection . . . . .	18
19.Figure of Testing Circuitry . . . . .	19

(Final Page 19)

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Model	CHS3004815
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

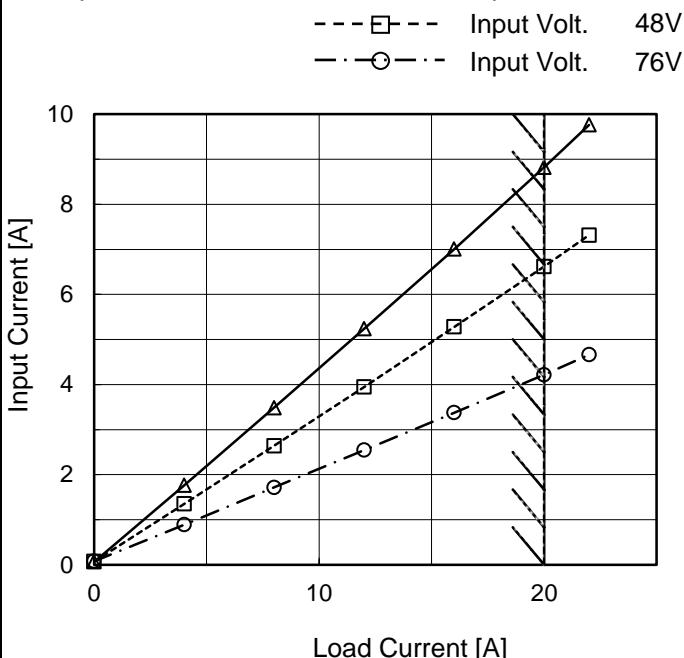
## 2.Values

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
33.6	0.064	4.662	9.151
34.4	0.064	4.554	9.223
36.0	0.065	4.351	8.821
40.0	0.068	3.930	7.931
42.4	0.069	3.711	7.491
44.0	0.070	3.579	7.214
48.0	0.073	3.295	6.619
60.0	0.077	2.661	5.313
70.0	0.079	2.297	4.570
76.0	0.080	2.126	4.217
80.0	0.080	2.028	4.013
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**COSEL**

Model	CHS3004815
Item	Input Current (by Load Current)
Object	_____

## 1.Graph



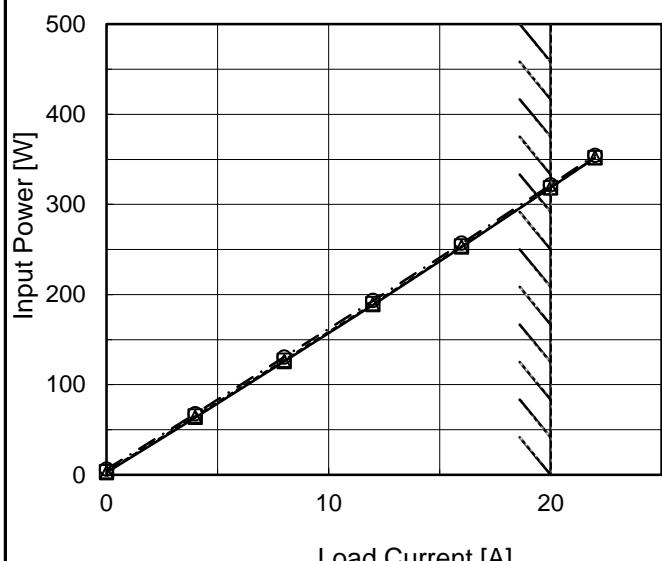
Note: Slanted line shows the range of the rated load current.

 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0	0.065	0.073	0.080
4	1.764	1.352	0.890
8	3.486	2.642	1.717
12	5.239	3.945	2.543
16	7.005	5.279	3.376
20	8.821	6.619	4.217
22	9.762	7.315	4.663
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

Model	CHS3004815																																																					
Item	Input Power (by Load Current)																																																					
Object	_____																																																					
1.Graph	<p style="text-align: center;"> <span style="display: inline-block; width: 1em; height: 1em; vertical-align: middle;"></span> Input Volt. 36V  <span style="display: inline-block; width: 1em; height: 1em; vertical-align: middle; border: 1px dashed black; margin-right: 0.2em;"></span> Input Volt. 48V  <span style="display: inline-block; width: 1em; height: 1em; vertical-align: middle; border: 1px dashed black; border-radius: 50%; margin-right: 0.2em;"></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 Power [W]</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</td><td>2.3</td><td>3.5</td><td>6.0</td></tr> <tr><td>4</td><td>63.6</td><td>65.0</td><td>67.6</td></tr> <tr><td>8</td><td>125.6</td><td>127.0</td><td>130.5</td></tr> <tr><td>12</td><td>188.7</td><td>189.8</td><td>193.3</td></tr> <tr><td>16</td><td>252.9</td><td>253.6</td><td>256.9</td></tr> <tr><td>20</td><td>318.5</td><td>318.6</td><td>321.6</td></tr> <tr><td>22</td><td>351.8</td><td>351.8</td><td>354.5</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> </tbody> </table>			Load Current [A]	Input Power [W]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0	2.3	3.5	6.0	4	63.6	65.0	67.6	8	125.6	127.0	130.5	12	188.7	189.8	193.3	16	252.9	253.6	256.9	20	318.5	318.6	321.6	22	351.8	351.8	354.5	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Note:	Slanted line shows the range of the rated load current.																																																					

**COSEL**

Model	CHS3004815	Temperature	25°C																																
Item	Efficiency (by Input Voltage)	Testing Circuitry	Figure A																																
Object	_____																																		
1.Graph			2.Values																																
<p>The graph plots Efficiency [%] on the y-axis (44 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 efficiency remaining high (above 90%) across the tested input voltage range. Two slanted lines on the graph indicate the rated input voltage range, which is between approximately 35V and 48V.</p>			<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>35</td><td>95.8</td><td>94.4</td></tr> <tr><td>36</td><td>95.8</td><td>94.4</td></tr> <tr><td>40</td><td>95.6</td><td>94.4</td></tr> <tr><td>48</td><td>95.0</td><td>94.4</td></tr> <tr><td>55</td><td>94.5</td><td>94.1</td></tr> <tr><td>60</td><td>94.1</td><td>93.9</td></tr> <tr><td>70</td><td>93.4</td><td>93.6</td></tr> <tr><td>76</td><td>92.9</td><td>93.5</td></tr> <tr><td>80</td><td>92.6</td><td>93.2</td></tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	35	95.8	94.4	36	95.8	94.4	40	95.6	94.4	48	95.0	94.4	55	94.5	94.1	60	94.1	93.9	70	93.4	93.6	76	92.9	93.5	80	92.6	93.2
Input Voltage [V]	Efficiency [%]																																		
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Note: Slanted line shows the range of the rated input voltage.

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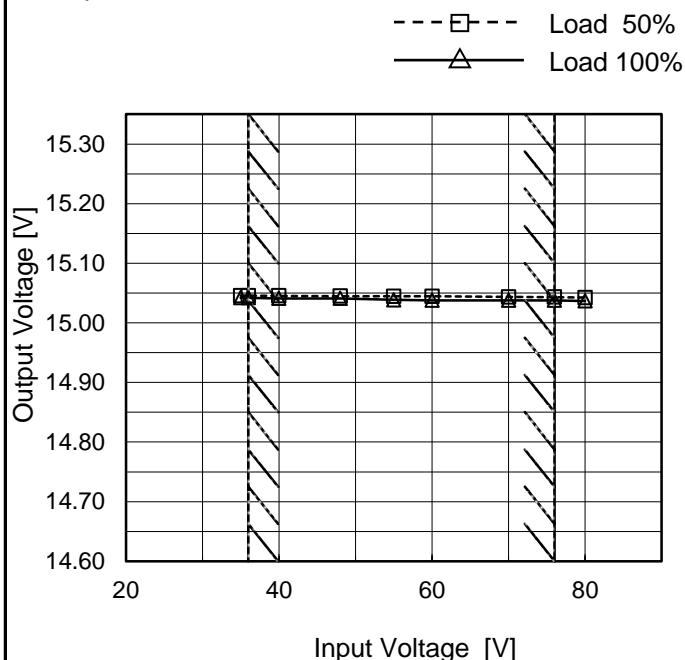
Model	CHS3004815																																																					
Item	Efficiency (by Load Current)																																																					
Object	<hr/>																																																					
1.Graph	<p>Efficiency [%]</p> <p>Load Current [A]</p> <p>Legend:</p> <ul style="list-style-type: none"> <li>Input Volt. 36V</li> <li>Input Volt. 48V</li> <li>Input Volt. 76V</li> </ul>																																																					
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Note:	Slanted line shows the range of the rated load current.																																																					

**COSEL**

Model	CHS3004815
Item	Line Regulation
Object	+15V20A

 Temperature 25°C  
 Testing Circuitry Figure A

## 1.Graph



## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
35	15.046	15.042
36	15.046	15.042
40	15.045	15.041
48	15.045	15.041
55	15.044	15.039
60	15.044	15.038
70	15.043	15.038
76	15.043	15.038
80	15.042	15.037

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

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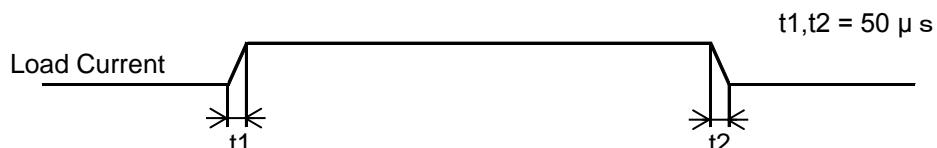
Model	CHS3004815																																																					
Item	Load Regulation																																																					
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1.Graph	—△— Input Volt. 36V ---□--- Input Volt. 48V —○— Input Volt. 76V	Temperature 25°C Testing Circuitry Figure A	2.Values																																																			
	<p>Output Voltage [V]</p> <p>Load Current [A]</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</td><td>15.047</td><td>15.046</td><td>15.045</td></tr> <tr><td>4</td><td>15.047</td><td>15.046</td><td>15.045</td></tr> <tr><td>8</td><td>15.047</td><td>15.046</td><td>15.044</td></tr> <tr><td>12</td><td>15.045</td><td>15.045</td><td>15.042</td></tr> <tr><td>16</td><td>15.044</td><td>15.043</td><td>15.040</td></tr> <tr><td>20</td><td>15.042</td><td>15.041</td><td>15.038</td></tr> <tr><td>22</td><td>15.038</td><td>15.038</td><td>15.036</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> </tbody> </table>	Load Current [A]	Output Voltage [V]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0	15.047	15.046	15.045	4	15.047	15.046	15.045	8	15.047	15.046	15.044	12	15.045	15.045	15.042	16	15.044	15.043	15.040	20	15.042	15.041	15.038	22	15.038	15.038	15.036	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

**COSEL**

Model	CHS3004815	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+15V20A		

Input Volt. 48 V  
 Cycle 10 ms

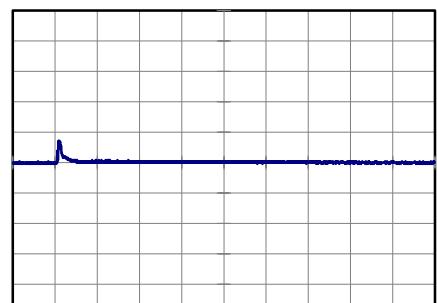
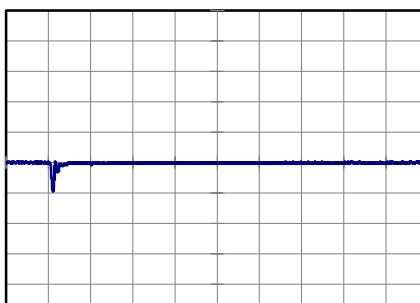


Min.Load (0A)↔  
 Load 100% (20A)

1 V/div

400 us/div

400 us/div



Min.Load (0A)↔  
 Load 50% (10A)

1 V/div

400 us/div

400 us/div

Load 50% (10A)↔  
 Load 100% (20A)

1 V/div

400 us/div

400 us/div

**COSEL**

Model	CHS3004815																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure B																																						
Object	+15V20A																																							
1.Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 200 mV with major grid lines every 40 mV. The X-axis ranges from 0 to 20 A with major grid lines every 5 A. Two data series are plotted: Input Volt. 36V (solid line with open triangle markers) and Input Volt. 76V (dashed line with open circle markers). Both series show a slight decrease in ripple voltage as load current increases. A slanted line at approximately 18A indicates the rated load current range.</p>																																								
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<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 36 [V]</th> <th>Input Volt. 76 [V]</th> </tr> </thead> <tbody> <tr> <td>0</td><td>25</td><td>55</td></tr> <tr> <td>5</td><td>20</td><td>55</td></tr> <tr> <td>10</td><td>20</td><td>55</td></tr> <tr> <td>15</td><td>20</td><td>55</td></tr> <tr> <td>20</td><td>20</td><td>55</td></tr> <tr> <td>22</td><td>20</td><td>55</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. 36 [V]	Input Volt. 76 [V]	0	25	55	5	20	55	10	20	55	15	20	55	20	20	55	22	20	55	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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<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>																																								

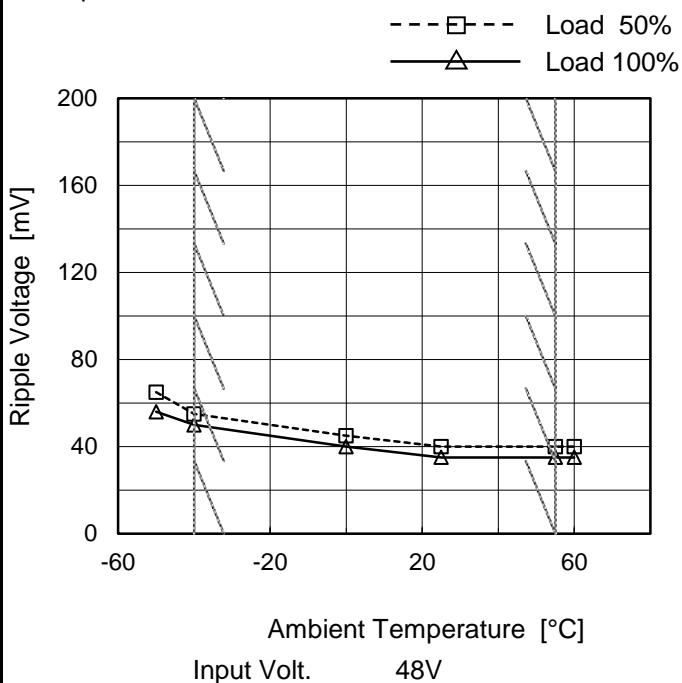
**COSEL**

Model	CHS3004815																																							
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure B																																						
Object	+15V20A																																							
1.Graph																																								
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Load Current [A]	Ripple-Noise [mV]																																							
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Fig.Complex Ripple Noise Wave Form																																								
- 10 -																																								
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**COSEL**

Model	CHS3004815
Item	Ripple Voltage (by Ambient Temp.)
Object	+15V20A

## 1.Graph



Measured by 100 MHz Oscilloscope.

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

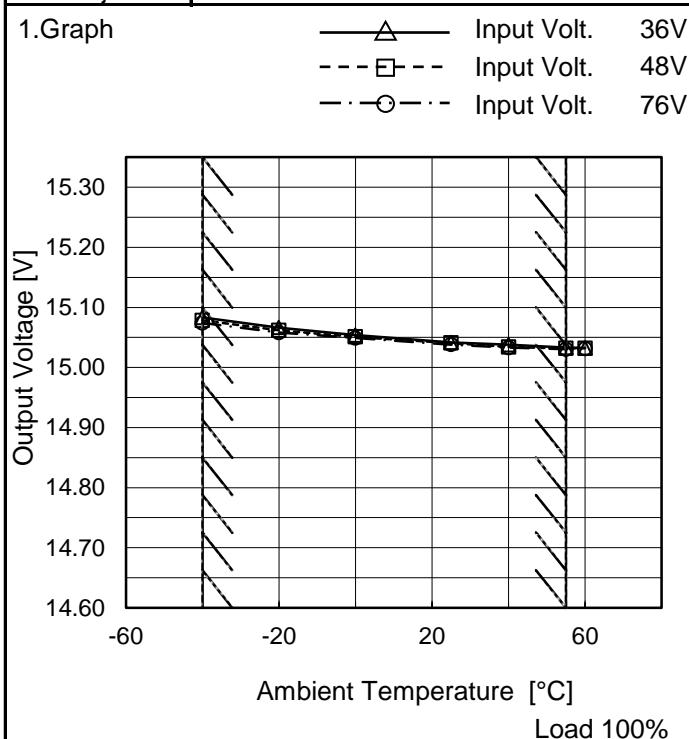
Testing Circuitry Figure B

## 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	65	56
-40	55	50
0	45	40
25	40	35
55	40	35
60	40	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

**COSEL**

Model	CHS3004815
Item	Ambient Temperature Drift
Object	+15V20A



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	15.083	15.078	15.074
-20	15.066	15.062	15.058
0	15.054	15.051	15.049
25	15.042	15.041	15.038
40	15.038	15.034	15.033
55	15.033	15.032	15.030
60	15.033	15.032	15.031
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Note: Slanted line shows the range of the rated ambient temperature.



Model	CHS3004815	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+15V20A	

### 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 - 20A

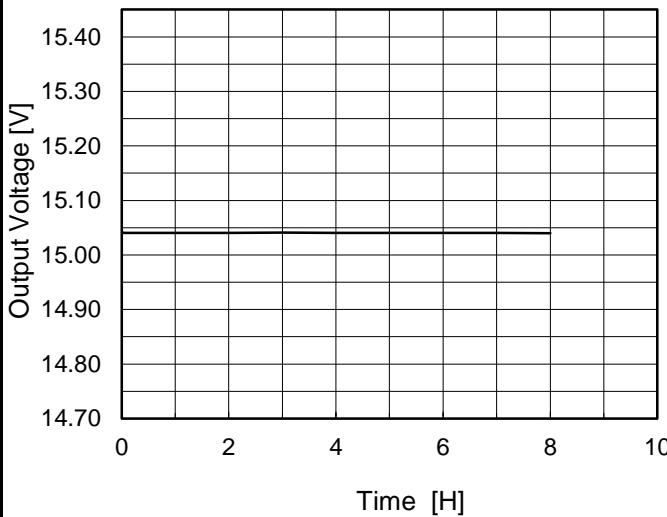
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	-40	36	0	15.088	±29	±0.2
Minimum Voltage	55	76	20	15.030		

**COSEL**

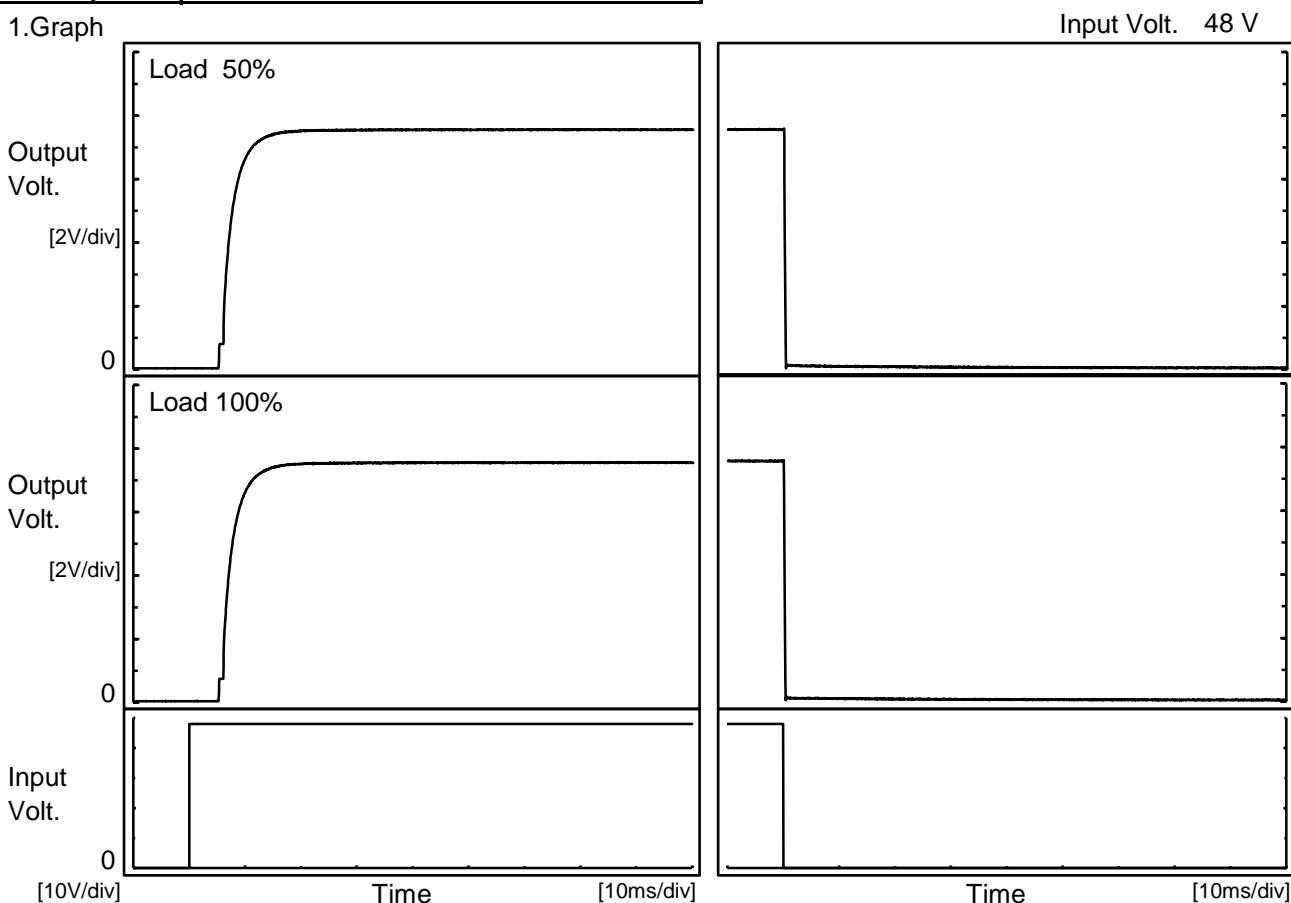
Model	CHS3004815	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+15V20A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>15.041</td></tr> <tr><td>0.5</td><td>15.041</td></tr> <tr><td>1.0</td><td>15.040</td></tr> <tr><td>2.0</td><td>15.040</td></tr> <tr><td>3.0</td><td>15.041</td></tr> <tr><td>4.0</td><td>15.040</td></tr> <tr><td>5.0</td><td>15.041</td></tr> <tr><td>6.0</td><td>15.040</td></tr> <tr><td>7.0</td><td>15.040</td></tr> <tr><td>8.0</td><td>15.040</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	15.041	0.5	15.041	1.0	15.040	2.0	15.040	3.0	15.041	4.0	15.040	5.0	15.041	6.0	15.040	7.0	15.040	8.0	15.040
Time since start [H]	Output Voltage [V]																								
0.0	15.041																								
0.5	15.041																								
1.0	15.040																								
2.0	15.040																								
3.0	15.041																								
4.0	15.040																								
5.0	15.041																								
6.0	15.040																								
7.0	15.040																								
8.0	15.040																								

**COSEL**

Model	CHS3004815
Item	Rise and Fall Time
Object	+15V20A

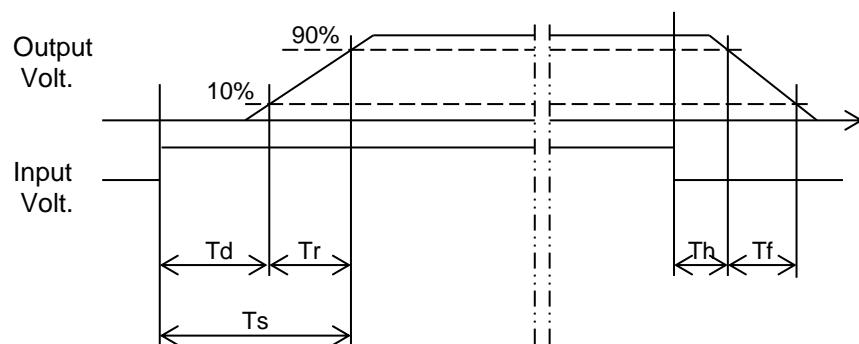
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		5.5	5.0	10.5	0.2	0.3	
100 %		6.1	4.4	10.5	0.1	0.2	

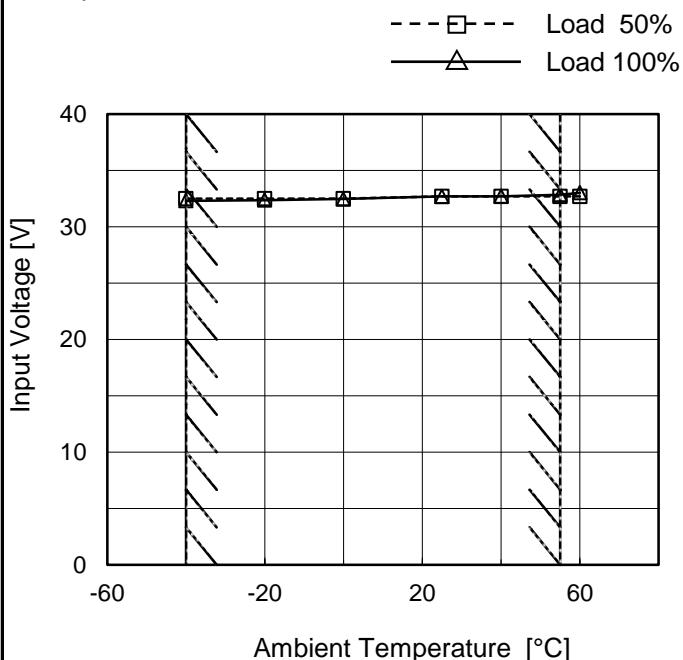


**COSEL**

Model	CHS3004815
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V20A

Testing Circuitry Figure A

## 1. Graph



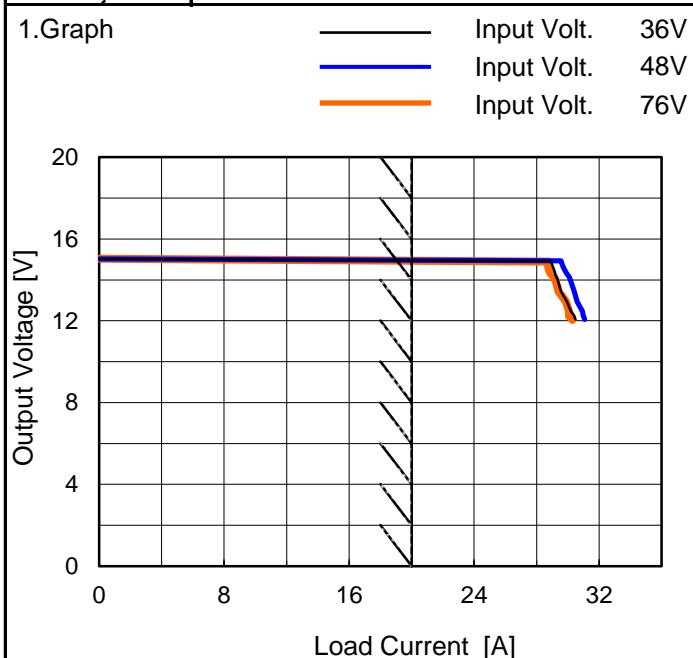
## 2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	32.5	32.4
-20	32.5	32.4
0	32.5	32.5
25	32.7	32.7
40	32.7	32.8
55	32.7	32.9
60	32.7	33.1
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Note: Slanted line shows the range of the rated ambient temperature.

**COSEL**

Model	CHS3004815
Item	Overcurrent Protection
Object	+15V20A



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

Temperature 25°C  
Testing Circuitry Figure A

2.Values

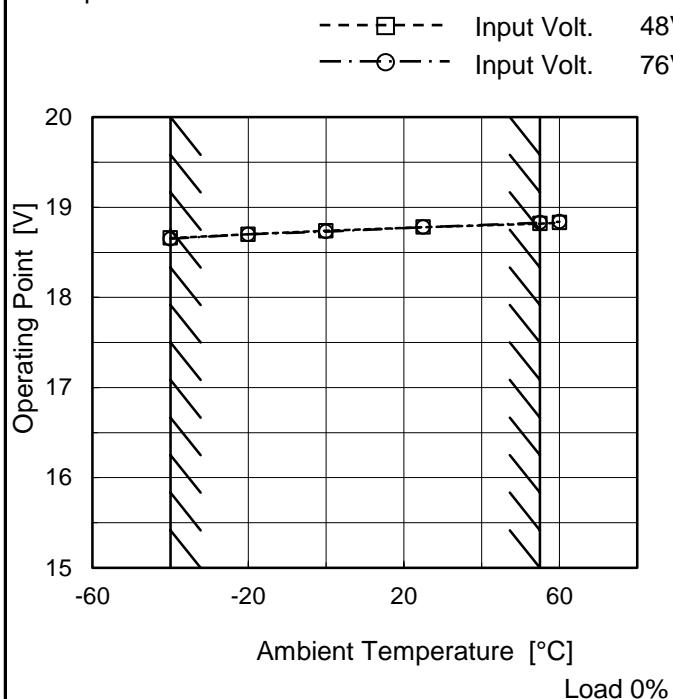
Output Voltage [V]	Load Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
14.25	29.21	29.91	28.89
13.50	29.57	30.40	29.41
12.75	30.04	30.74	29.96
12.00	30.49	31.08	30.29
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--	-	-	-
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**COSEL**

Model	CHS3004815
Item	Overvoltage Protection
Object	+15V20A

Testing Circuitry Figure A

## 1. Graph



## 2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 48[V]	Input Volt. 76[V]
-40	18.66	18.65
-20	18.70	18.70
0	18.74	18.73
25	18.78	18.78
55	18.82	18.83
60	18.83	18.84
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Note: Slanted line shows the range of the rated ambient temperature.

COSEL

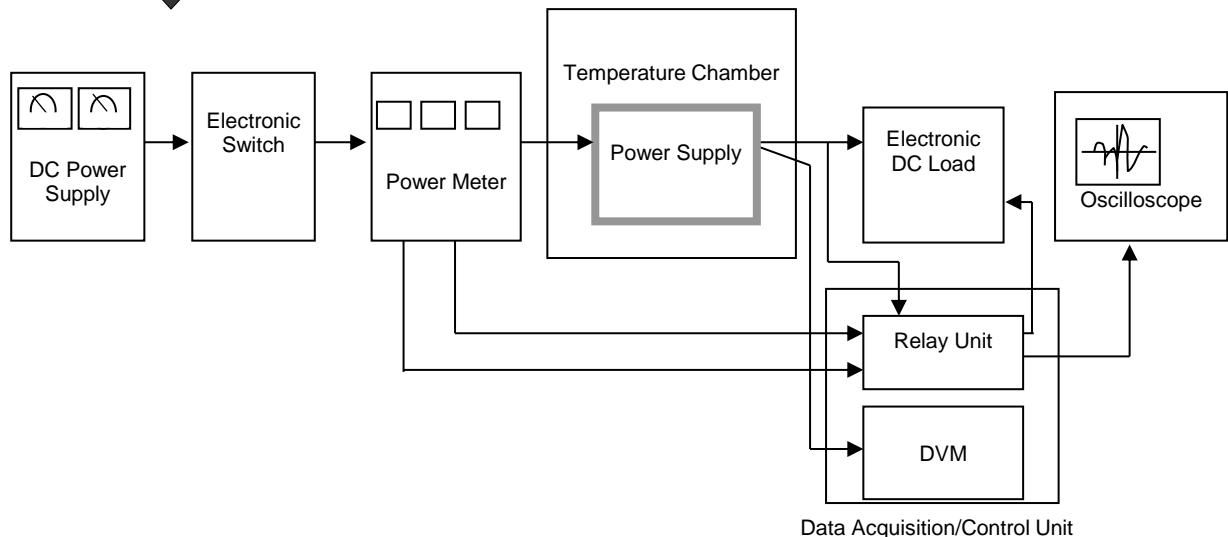


Figure A

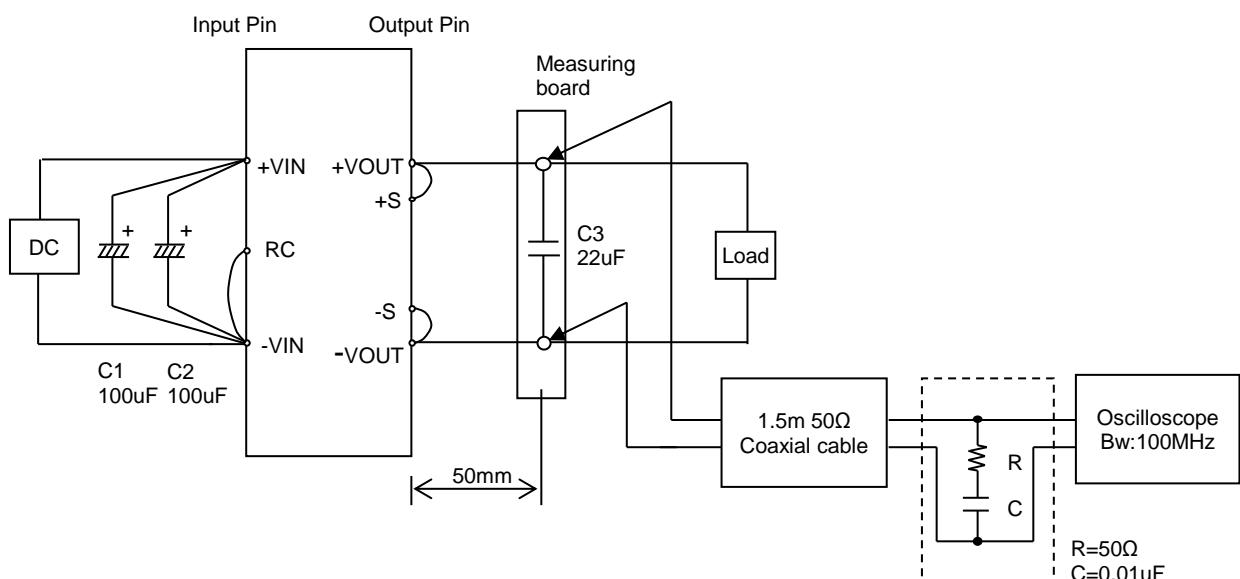


Figure B