

# TEST DATA OF SNDHS100B28

Regulated DC Power Supply  
June 30, 2011

Approved by : Takahiro Yoneda  
Takahiro Yoneda Design Manager

Prepared by : Tadashi Arai  
Tadashi Arai Design Engineer

**COSEL CO.,LTD.**



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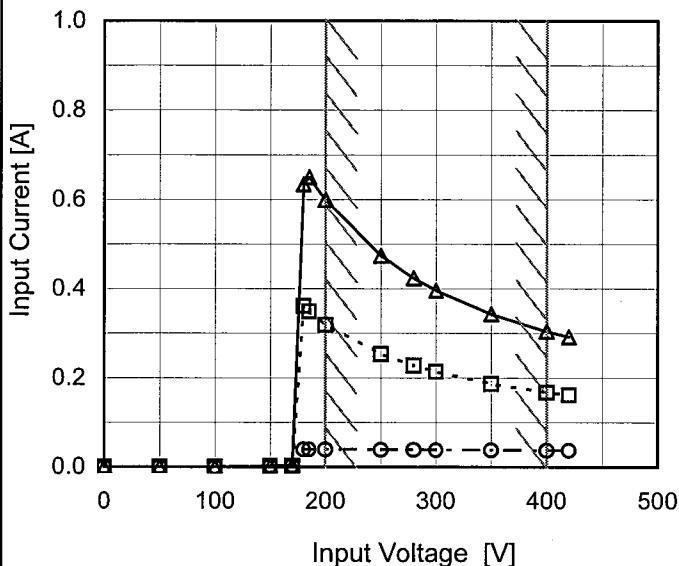
Model SNDHS100B28

Item Input Current (by Input Voltage)

Object \_\_\_\_\_

1.Graph

—△— Load 100%  
 - - -□--- Load 50%  
 - - -○--- Load 0%



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

 Temperature 25°C  
 Testing Circuitry Figure A

2.Values

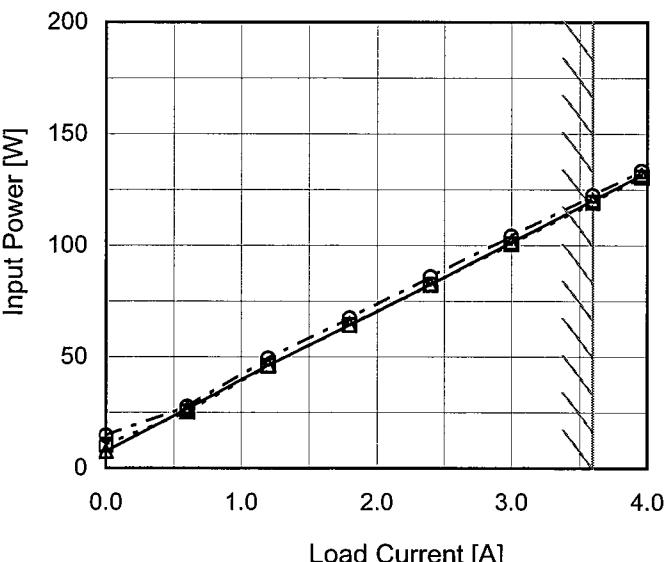
Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0	0.000	0.000	0.000
50	0.000	0.000	0.000
100	0.000	0.000	0.000
150	0.002	0.002	0.002
170	0.003	0.003	0.003
180	0.040	0.361	0.634
185	0.040	0.349	0.650
200	0.039	0.319	0.599
250	0.039	0.254	0.474
280	0.039	0.228	0.424
300	0.038	0.214	0.397
350	0.038	0.187	0.344
400	0.037	0.167	0.305
420	0.037	0.162	0.292
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Model	SNDHS100B28	Temperature Testing Circuitry 25°C Figure A																																																			
Item	Input Current (by Load Current)																																																				
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1.Graph	<p>—△— Input Volt. 200V        - - -□- - Input Volt. 280V        - - ○ - - Input Volt. 400V</p> <table border="1"> <caption>Data points estimated from Figure A graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 200V [A]</th> <th>Input Volt. 280V [A]</th> <th>Input Volt. 400V [A]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>0.038</td><td>0.037</td><td>0.037</td></tr> <tr><td>0.60</td><td>0.134</td><td>0.090</td><td>0.069</td></tr> <tr><td>1.20</td><td>0.231</td><td>0.164</td><td>0.123</td></tr> <tr><td>1.80</td><td>0.322</td><td>0.229</td><td>0.168</td></tr> <tr><td>2.40</td><td>0.413</td><td>0.294</td><td>0.214</td></tr> <tr><td>3.00</td><td>0.507</td><td>0.359</td><td>0.260</td></tr> <tr><td>3.60</td><td>0.602</td><td>0.425</td><td>0.306</td></tr> <tr><td>3.96</td><td>0.659</td><td>0.466</td><td>0.333</td></tr> </tbody> </table>	Load Current [A]	Input Volt. 200V [A]	Input Volt. 280V [A]	Input Volt. 400V [A]	0.00	0.038	0.037	0.037	0.60	0.134	0.090	0.069	1.20	0.231	0.164	0.123	1.80	0.322	0.229	0.168	2.40	0.413	0.294	0.214	3.00	0.507	0.359	0.260	3.60	0.602	0.425	0.306	3.96	0.659	0.466	0.333																
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1.Graph		2.Values																																																				
<p>—△— Input Volt. 200V        - - -□- - Input Volt. 280V        - - ○ - - Input Volt. 400V</p>  <p>The graph plots Input Power [W] on the Y-axis (0 to 200) against Load Current [A] on the X-axis (0.0 to 4.0). Three curves are shown for input voltages of 200V (solid line with triangles), 280V (dashed line with squares), and 400V (dash-dot line with circles). A vertical slanted line is drawn through the curves at approximately 3.96A, indicating the rated load current range.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <th>Input Volt. 200[V]</th> <th>Input Volt. 280[V]</th> <th>Input Volt. 400[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>7.6</td><td>10.4</td><td>14.7</td></tr> <tr><td>0.60</td><td>26.7</td><td>25.3</td><td>27.6</td></tr> <tr><td>1.20</td><td>46.3</td><td>46.0</td><td>49.3</td></tr> <tr><td>1.80</td><td>64.3</td><td>64.2</td><td>67.4</td></tr> <tr><td>2.40</td><td>82.6</td><td>82.3</td><td>85.9</td></tr> <tr><td>3.00</td><td>101.4</td><td>100.6</td><td>104.2</td></tr> <tr><td>3.60</td><td>120.3</td><td>119.2</td><td>122.4</td></tr> <tr><td>3.96</td><td>131.8</td><td>130.6</td><td>133.4</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. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]	0.00	7.6	10.4	14.7	0.60	26.7	25.3	27.6	1.20	46.3	46.0	49.3	1.80	64.3	64.2	67.4	2.40	82.6	82.3	85.9	3.00	101.4	100.6	104.2	3.60	120.3	119.2	122.4	3.96	131.8	130.6	133.4	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Input Voltage [V] on the x-axis (100 to 500). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a general downward trend as input voltage increases. A slanted line on the graph indicates 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>200</td><td>78</td><td>84</td></tr> <tr><td>250</td><td>78</td><td>85</td></tr> <tr><td>300</td><td>78</td><td>85</td></tr> <tr><td>350</td><td>76</td><td>84</td></tr> <tr><td>400</td><td>76</td><td>83</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	200	78	84	250	78	85	300	78	85	350	76	84	400	76	83	<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>195</td><td>79.9</td><td>85.4</td></tr> <tr><td>200</td><td>80.4</td><td>85.7</td></tr> <tr><td>240</td><td>80.9</td><td>86.4</td></tr> <tr><td>280</td><td>80.4</td><td>86.4</td></tr> <tr><td>320</td><td>79.4</td><td>85.9</td></tr> <tr><td>360</td><td>78.1</td><td>85.2</td></tr> <tr><td>400</td><td>76.6</td><td>84.1</td></tr> <tr><td>420</td><td>75.6</td><td>83.7</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	195	79.9	85.4	200	80.4	85.7	240	80.9	86.4	280	80.4	86.4	320	79.4	85.9	360	78.1	85.2	400	76.6	84.1	420	75.6	83.7	--	-	-
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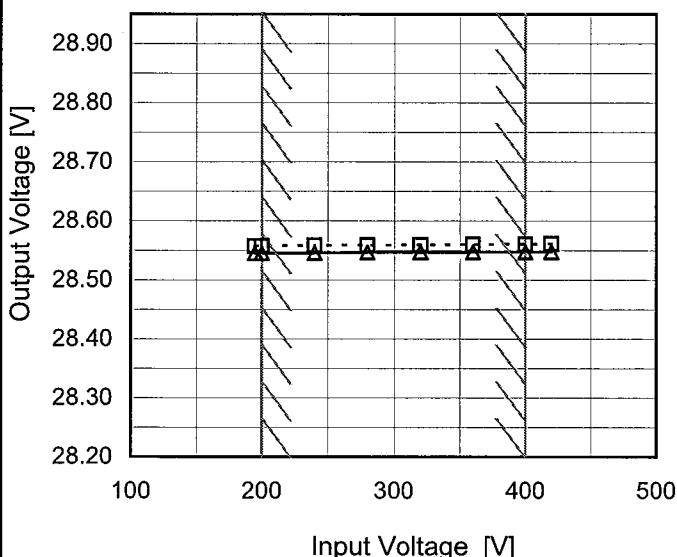
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Model	SNDHS100B28
Item	Line Regulation
Object	+28V3.6A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph

---□--- Load 50%  
 —△— Load 100%



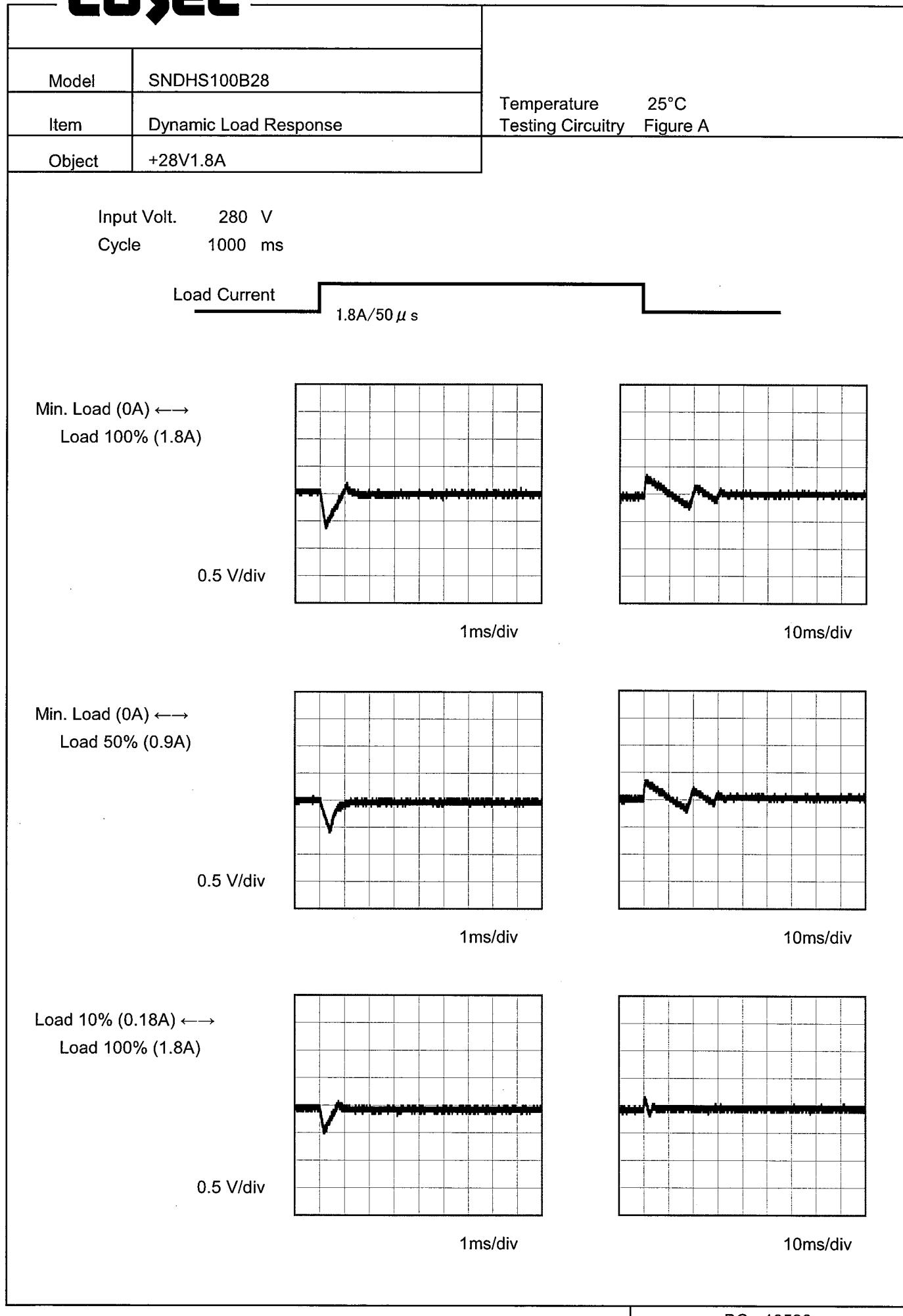
## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
195	28.558	28.545
200	28.558	28.546
240	28.558	28.546
280	28.559	28.547
320	28.560	28.547
360	28.560	28.548
400	28.561	28.548
420	28.561	28.548
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Note: Slanted line shows the range of the rated input voltage.

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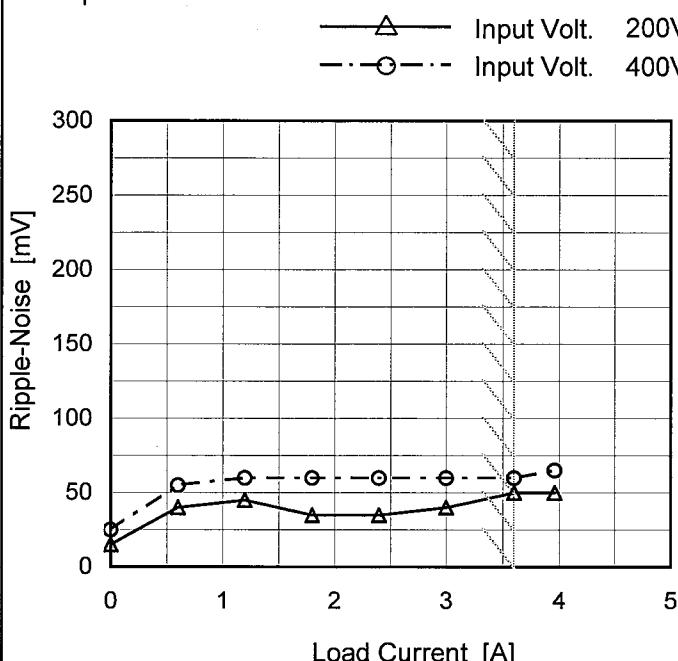
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<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 300 mV, and the X-axis ranges from 0 to 5 A. Two curves are plotted: Input Volt. 200V (solid line with open circles) and Input Volt. 400V (dashed line with open triangles). Both curves show a slight increase in ripple voltage as load current increases. A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 200V)</th> <th>Ripple Voltage [mV] (Input Volt. 400V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>5</td><td>5</td></tr> <tr><td>0.60</td><td>35</td><td>40</td></tr> <tr><td>1.20</td><td>30</td><td>40</td></tr> <tr><td>1.80</td><td>30</td><td>40</td></tr> <tr><td>2.40</td><td>30</td><td>40</td></tr> <tr><td>3.00</td><td>30</td><td>40</td></tr> <tr><td>3.60</td><td>30</td><td>40</td></tr> <tr><td>3.96</td><td>30</td><td>40</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. 200V)	Ripple Voltage [mV] (Input Volt. 400V)	0.00	5	5	0.60	35	40	1.20	30	40	1.80	30	40	2.40	30	40	3.00	30	40	3.60	30	40	3.96	30	40	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV] (Input Volt. 200V)	Ripple Voltage [mV] (Input Volt. 400V)																																				
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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>Ripple [mVp-p]</p> <p>Fig. Complex Ripple Wave Form</p>																																						

**COSEL**

Model	SNDHS100B28
Item	Ripple-Noise
Object	+28V3.6A

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. 200 [V]	Input Volt. 400 [V]
0.00	15	25
0.60	40	55
1.20	45	60
1.80	35	60
2.40	35	60
3.00	40	60
3.60	50	60
3.96	50	65
--	-	-
--	-	-
--	-	-

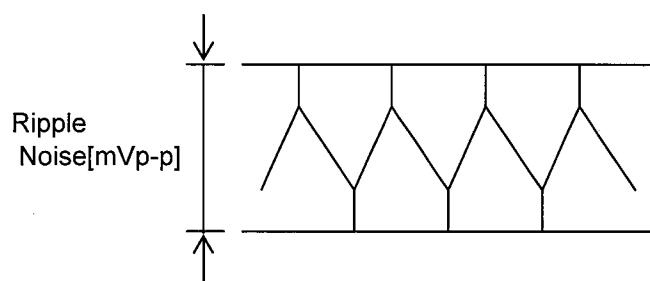


Fig.Complex Ripple Noise Wave Form

**COSEL**

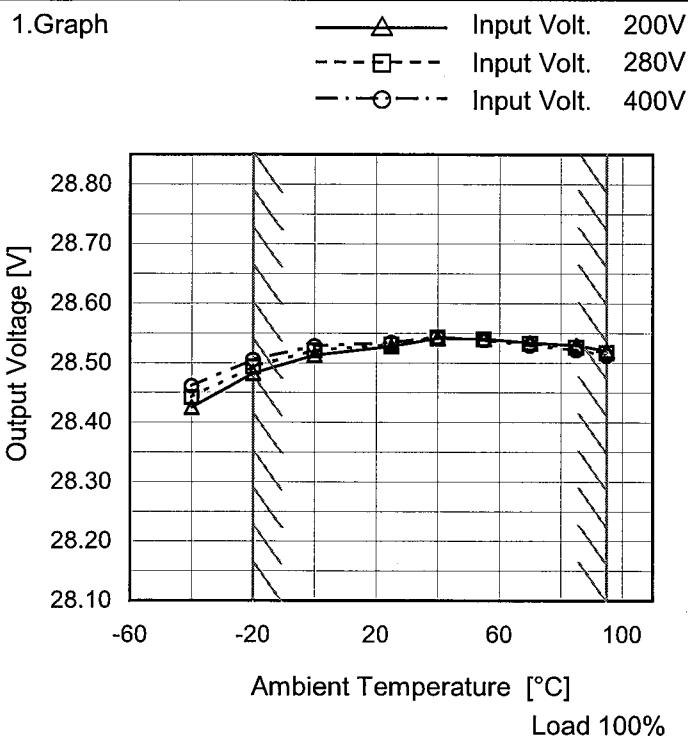
Model	SNDHS100B28	Testing Circuitry Figure B																																							
Item	Ripple Voltage (by Ambient Temp.)																																								
Object	+28V3.6A																																								
1.Graph		2.Values																																							
<p>Graph showing Ripple Voltage [mV] vs Ambient Temperature [°C]. The Y-axis ranges from 0 to 300 mV, and the X-axis ranges from -60 to 100 °C. Two data series are plotted: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show a slight decrease in ripple voltage as ambient temperature increases. A slanted line indicates the rated ambient temperature range from -20°C to 70°C.</p> <p>Ambient Temperature [°C]</p> <p>Input Volt. 280V</p>																																									
<p>Measured by 100 MHz Oscilloscope. 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">Ripple Voltage [mV]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>-40</td><td>75</td><td>75</td> </tr> <tr> <td>-20</td><td>60</td><td>55</td> </tr> <tr> <td>0</td><td>55</td><td>55</td> </tr> <tr> <td>25</td><td>50</td><td>50</td> </tr> <tr> <td>40</td><td>40</td><td>45</td> </tr> <tr> <td>55</td><td>45</td><td>45</td> </tr> <tr> <td>70</td><td>40</td><td>40</td> </tr> <tr> <td>85</td><td>40</td><td>40</td> </tr> <tr> <td>95</td><td>35</td><td>35</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%	-40	75	75	-20	60	55	0	55	55	25	50	50	40	40	45	55	45	45	70	40	40	85	40	40	95	35	35	--	-	-	--	-	-	
Ambient Temperature [°C]	Ripple Voltage [mV]																																								
	Load 50%	Load 100%																																							
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55	45	45																																							
70	40	40																																							
85	40	40																																							
95	35	35																																							
--	-	-																																							
--	-	-																																							

**COSEL**

Model SNDHS100B28

Item Ambient Temperature Drift

Object +28V3.6A



Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
-40	28.425	28.442	28.461
-20	28.482	28.493	28.505
0	28.513	28.521	28.528
25	28.528	28.531	28.534
40	28.542	28.543	28.543
55	28.541	28.540	28.539
70	28.535	28.533	28.530
85	28.530	28.526	28.522
95	28.521	28.517	28.513
--	-	-	-
--	-	-	-

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



Model	SNDHS100B28	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+28V3.6A	

### 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 : -20 - 95°C

Input Voltage : 200 - 400V

Load Current : 0 - 3.6A

\* 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	55	280	0	28.586	±52	±0.2
Minimum Voltage	-20	200	3.6	28.482		

**COSEL**

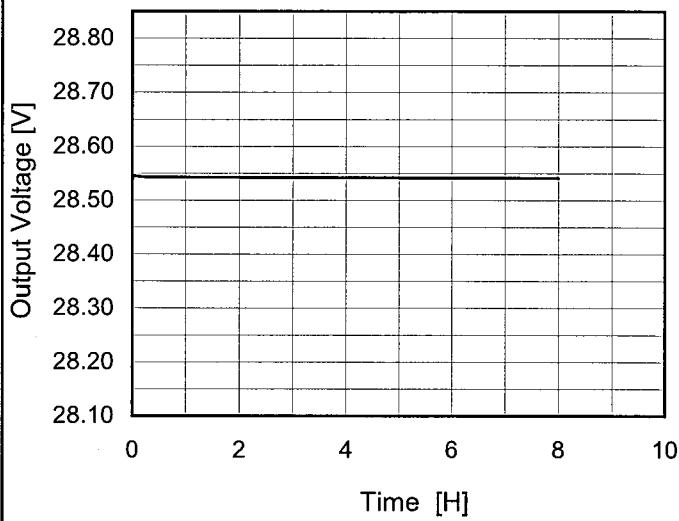
Model SNDHS100B28

Item Time Lapse Drift

Object +28V3.6A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



## 2.Values

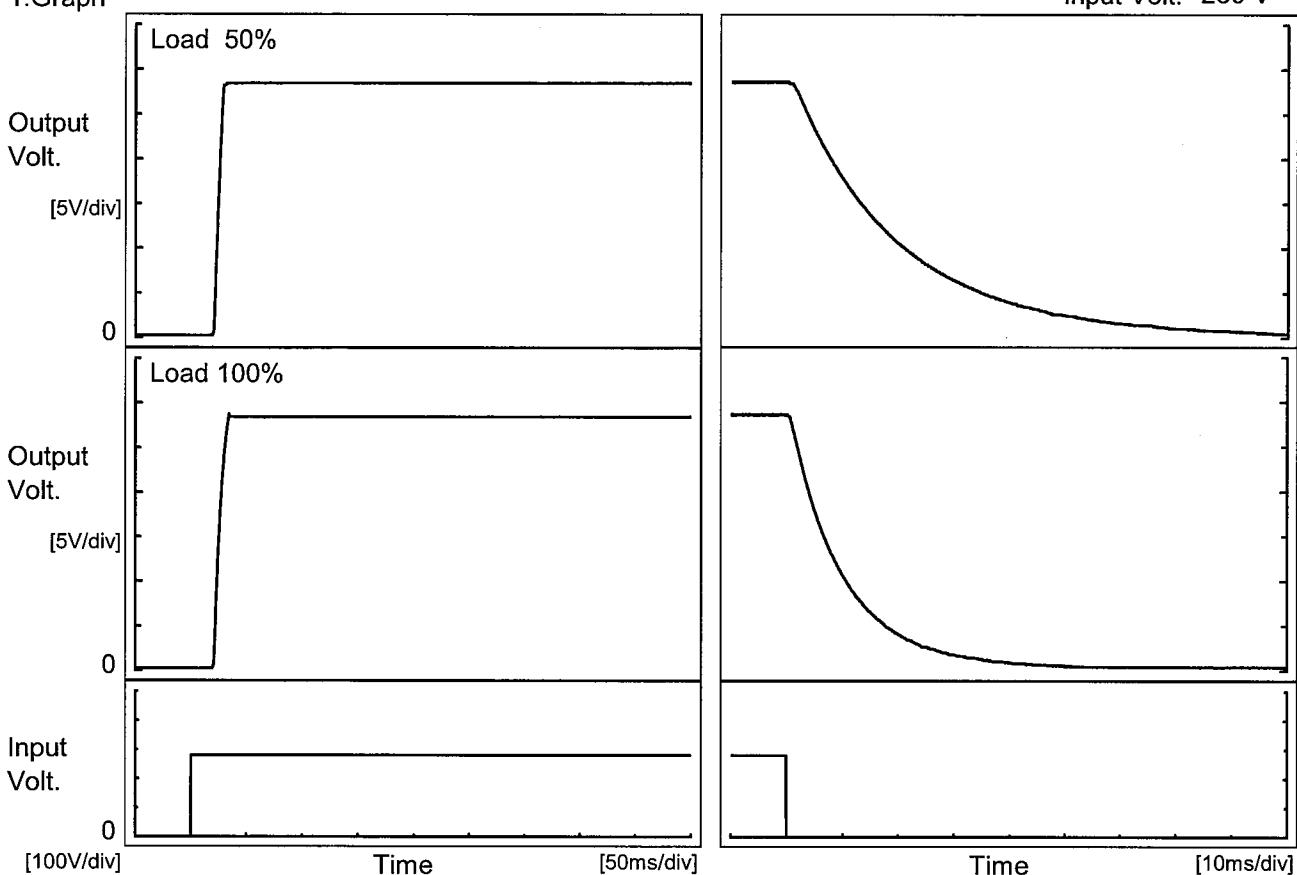
Time since start [H]	Output Voltage [V]
0.0	28.539
0.5	28.543
1.0	28.543
2.0	28.543
3.0	28.542
4.0	28.542
5.0	28.542
6.0	28.542
7.0	28.542
8.0	28.542

**COSEL**

Model	SNDHS100B28
Item	Rise and Fall Time
Object	+28V3.6A

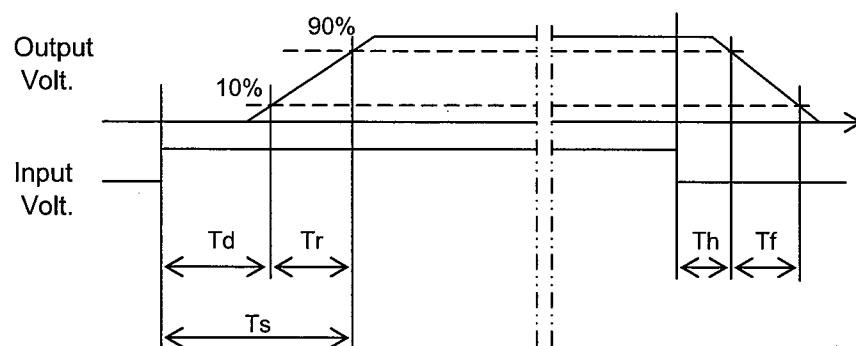
Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



## 2.Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		21.3	6.8	28.1	3.3	43.0	
100 %		21.5	9.5	31.0	1.7	21.8	



**COSEL**

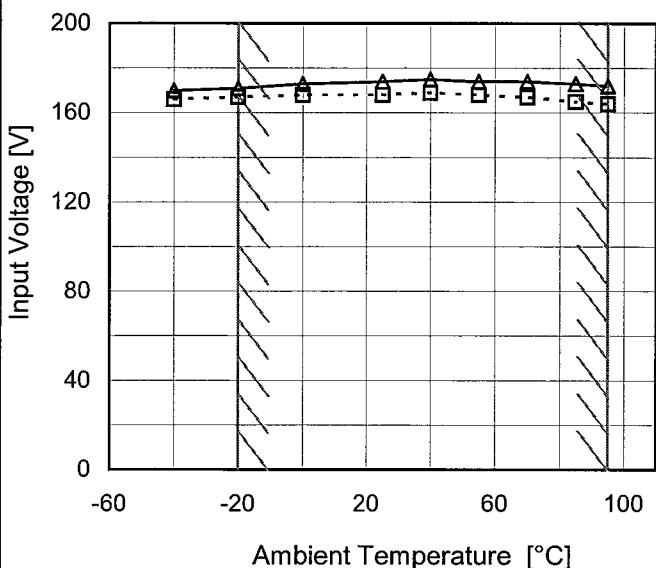
Model SNDHS100B28

Item Minimum Input Voltage  
for Regulated Output Voltage

Object +28V3.6A

## 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	166	170
-20	167	171
0	168	173
25	168	174
40	169	175
55	168	174
70	167	174
85	165	173
95	164	172
--	-	-
--	-	-

**COSEL**

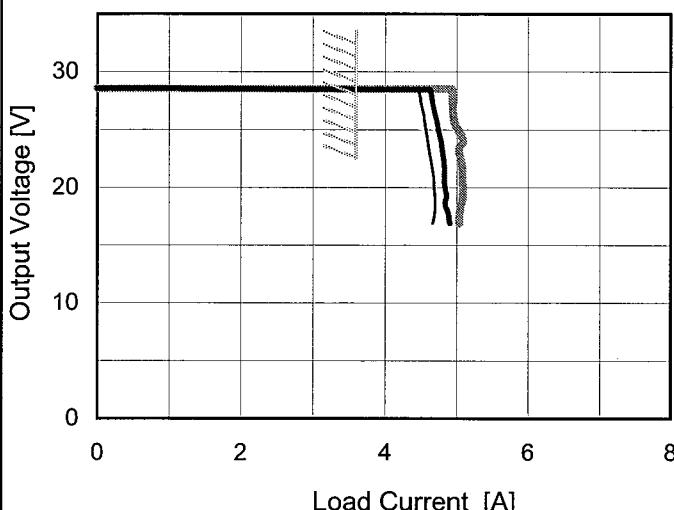
Model SNDHS100B28

Item Overcurrent Protection

Object +28V3.6A

## 1. Graph

— Input Volt. 200V  
 — Input Volt. 280V  
 - - - Input Volt. 400V



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

Intermittent operation occurs when the output voltage is from 16.8V to 0V.

Temperature 25°C  
 Testing Circuitry Figure A

## 2. Values

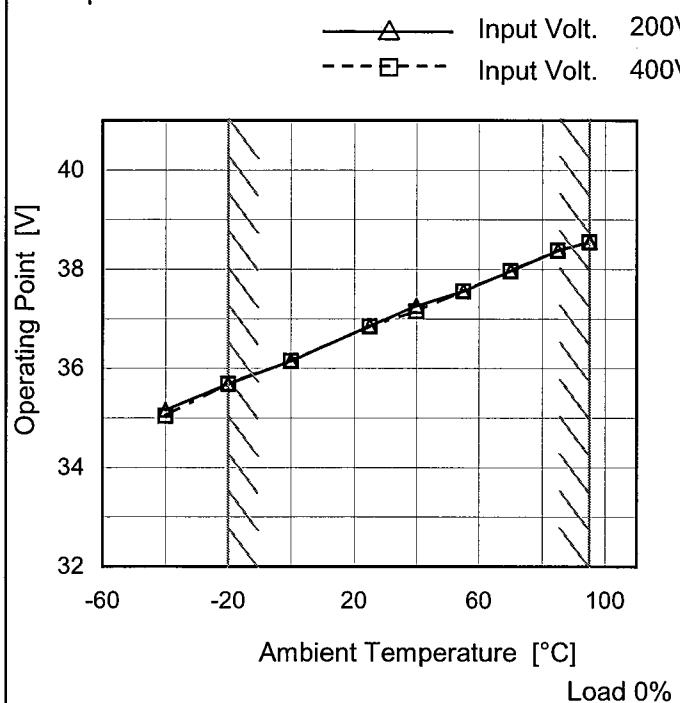
Output Voltage [V]	Load Current [A]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
26.6	4.52	4.69	4.95
25.2	4.55	4.73	4.98
22.4	4.63	4.82	5.05
19.6	4.69	4.85	5.09
16.8	4.66	4.91	5.04
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

Model	SNDHS100B28
Item	Overshoot Protection
Object	+28V3.6A

Testing Circuitry Figure A

## 1. Graph



## 2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 200[V]	Input Volt. 400[V]
-40	35.16	35.04
-20	35.69	35.69
0	36.15	36.15
25	36.86	36.85
40	37.26	37.15
55	37.56	37.56
70	37.97	37.97
85	38.38	38.38
95	38.55	38.55
--	-	-
--	-	-

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

COSEL

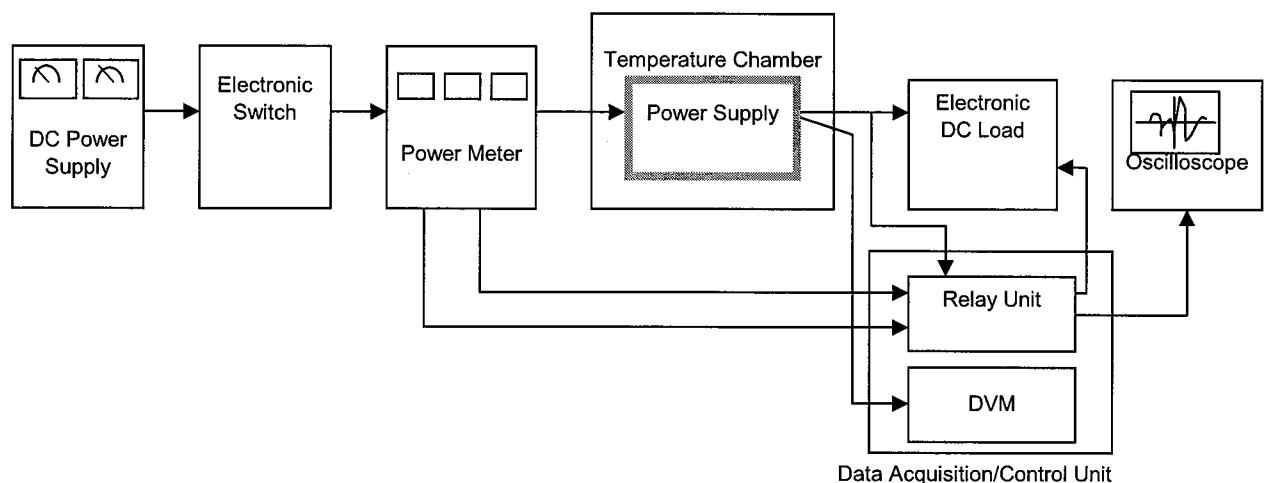


Figure A

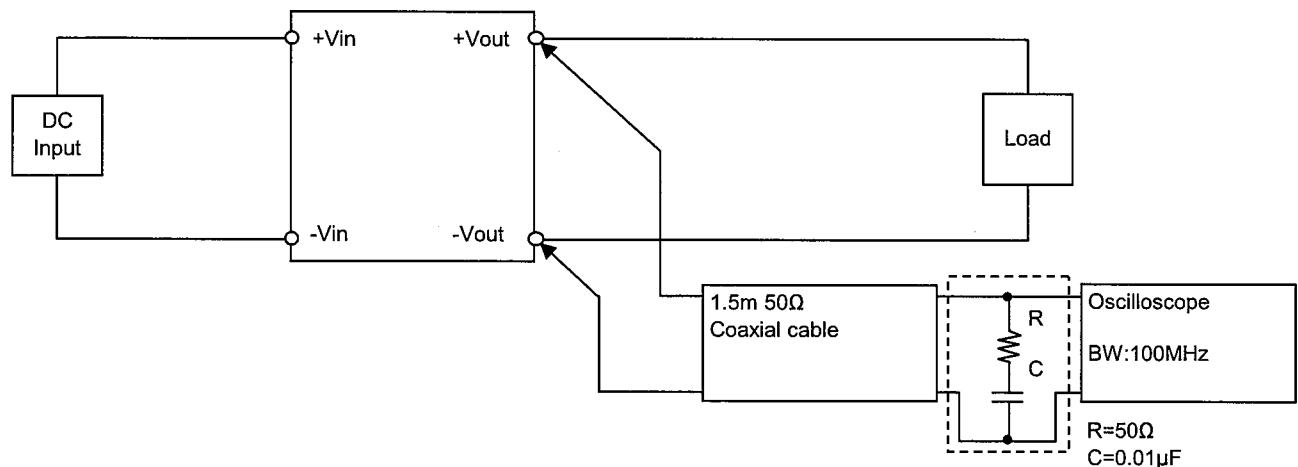


Figure B (Ripple and Ripple noise Characteristic)