

TEST DATA OF SNDHS50B05

Regulated DC Power Supply
June 30, 2011

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Takahiro Yoneda Design Manager

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Tadashi Arai 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	SNDHS50B05	Temperature 25°C Testing Circuitry Figure A																																																																												
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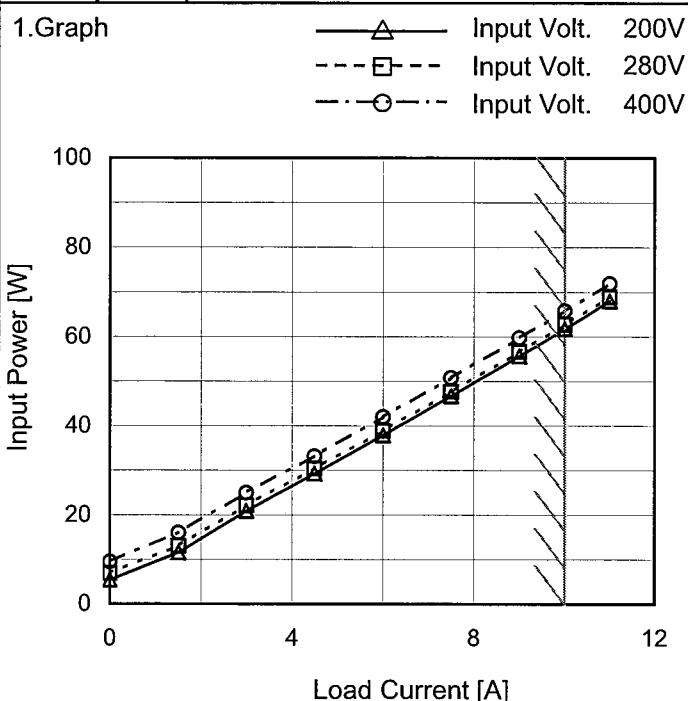
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Note: Slanted line shows the range of the rated load current.

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Model	SNDHS50B05
Item	Input Power (by Load Current)
Object	—



Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Input Power [W]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.0	5.40	6.90	9.50
1.5	11.60	13.00	16.00
3.0	20.90	22.10	25.00
4.5	29.30	30.40	33.20
6.0	37.90	38.90	42.00
7.5	46.70	47.60	50.80
9.0	55.70	56.60	59.80
10.0	61.80	62.70	65.80
11.0	68.00	68.90	71.90
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--	-	-	-

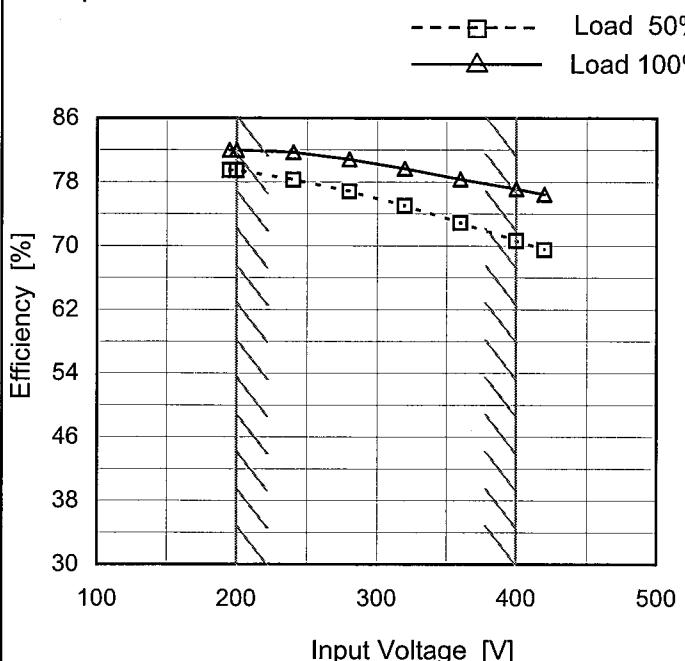
Note: Slanted line shows the range of the rated load current.

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Model	SNDHS50B05
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%
195	79.5	82.0
200	79.5	82.0
240	78.3	81.8
280	76.8	80.8
320	75.0	79.7
360	72.9	78.3
400	70.6	77.2
420	69.5	76.5
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<p>The graph shows efficiency increasing with load current for all input voltages. The 200V curve is the highest, followed by 280V, and then 400V. A vertical slanted line is drawn through the curves at approximately 10.5A, indicating the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 200V [%]</th> <th>Input Volt. 280V [%]</th> <th>Input Volt. 400V [%]</th> </tr> </thead> <tbody> <tr><td>2.0</td><td>70.0</td><td>65.0</td><td>55.0</td></tr> <tr><td>3.0</td><td>73.0</td><td>68.0</td><td>60.0</td></tr> <tr><td>4.0</td><td>75.0</td><td>70.0</td><td>62.0</td></tr> <tr><td>5.0</td><td>77.0</td><td>72.0</td><td>65.0</td></tr> <tr><td>6.0</td><td>78.0</td><td>73.0</td><td>68.0</td></tr> <tr><td>7.0</td><td>78.5</td><td>73.5</td><td>70.0</td></tr> <tr><td>8.0</td><td>79.0</td><td>74.0</td><td>72.0</td></tr> <tr><td>9.0</td><td>79.0</td><td>74.0</td><td>73.0</td></tr> <tr><td>10.0</td><td>79.0</td><td>74.0</td><td>74.0</td></tr> <tr><td>11.0</td><td>79.0</td><td>74.0</td><td>75.0</td></tr> </tbody> </table>		Load Current [A]	Input Volt. 200V [%]	Input Volt. 280V [%]	Input Volt. 400V [%]	2.0	70.0	65.0	55.0	3.0	73.0	68.0	60.0	4.0	75.0	70.0	62.0	5.0	77.0	72.0	65.0	6.0	78.0	73.0	68.0	7.0	78.5	73.5	70.0	8.0	79.0	74.0	72.0	9.0	79.0	74.0	73.0	10.0	79.0	74.0	74.0	11.0	79.0	74.0	75.0
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Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.0	-	-	-
1.5	67.5	60.3	49.0
3.0	73.8	69.8	61.7
4.5	78.5	75.7	69.3
6.0	80.6	78.6	72.8
7.5	81.6	80.1	75.0
9.0	81.9	80.6	76.3
10.0	82.0	80.8	77.0
11.0	81.8	80.8	77.4
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Note: Slanted line shows the range of the rated load current.

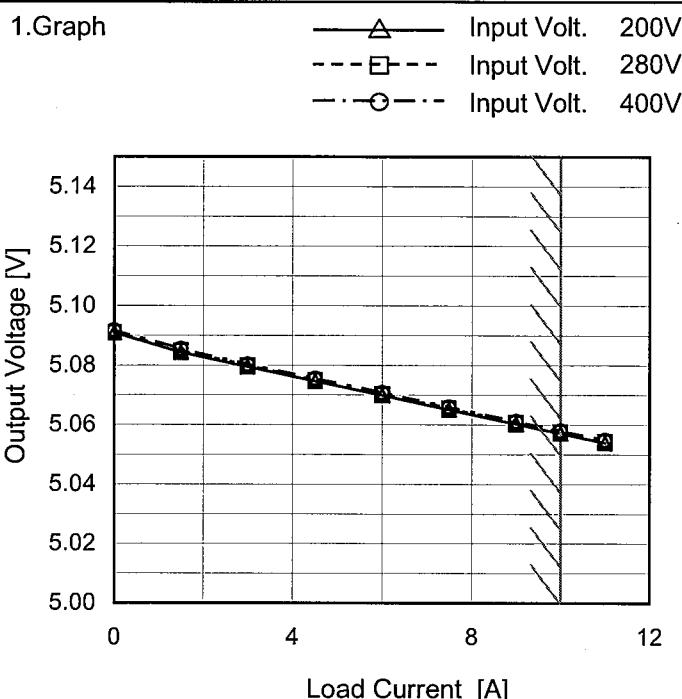
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Model	SNDHS50B05	Temperature Testing Circuitry	25°C Figure A																																
Item	Line Regulation																																		
Object	+5V10A																																		
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<p>Output Voltage [V]</p> <p>Input Voltage [V]</p> <p>Legend:</p> <ul style="list-style-type: none"> Load 50% (Dashed line with squares) Load 100% (Solid line with triangles) 			<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Output Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>195</td> <td>5.074</td> <td>5.059</td> </tr> <tr> <td>200</td> <td>5.075</td> <td>5.059</td> </tr> <tr> <td>240</td> <td>5.074</td> <td>5.059</td> </tr> <tr> <td>280</td> <td>5.075</td> <td>5.059</td> </tr> <tr> <td>320</td> <td>5.075</td> <td>5.059</td> </tr> <tr> <td>360</td> <td>5.075</td> <td>5.059</td> </tr> <tr> <td>400</td> <td>5.075</td> <td>5.060</td> </tr> <tr> <td>420</td> <td>5.075</td> <td>5.060</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>	Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	195	5.074	5.059	200	5.075	5.059	240	5.074	5.059	280	5.075	5.059	320	5.075	5.059	360	5.075	5.059	400	5.075	5.060	420	5.075	5.060	--	-	-
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Note: Slanted line shows the range of the rated input voltage.

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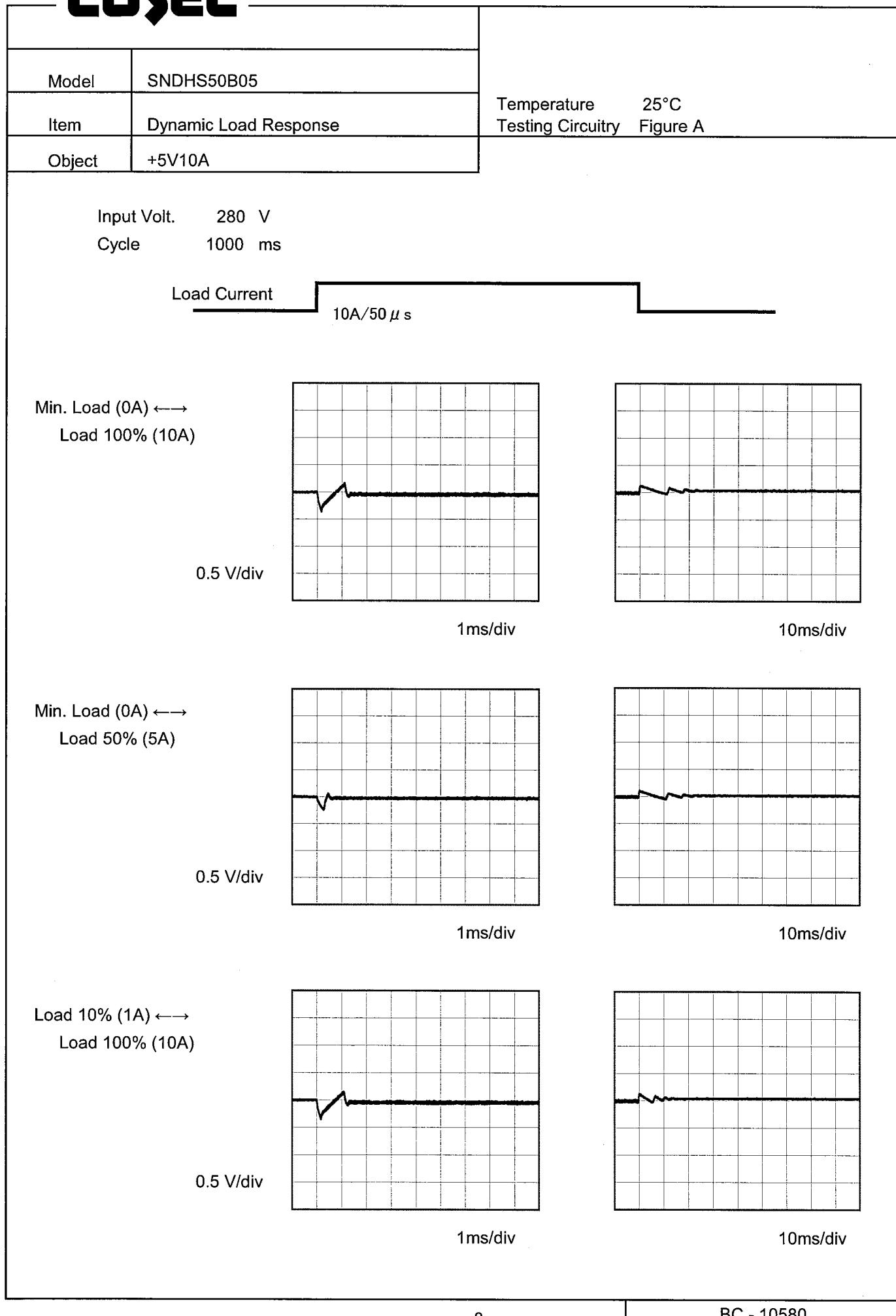
Model	SNDHS50B05
Item	Load Regulation
Object	+5V10A

Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]
0.0	5.091	5.091	5.092
1.5	5.084	5.085	5.086
3.0	5.080	5.080	5.080
4.5	5.075	5.075	5.076
6.0	5.070	5.070	5.071
7.5	5.065	5.066	5.066
9.0	5.060	5.061	5.061
10.0	5.057	5.058	5.058
11.0	5.054	5.054	5.055
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Note: Slanted line shows the range of the rated load current.

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Model	SNDHS50B05	Temperature Testing Circuitry	25°C Figure B																																								
Item	Ripple Voltage (by Load Current)																																										
Object	+5V10A																																										
1. Graph			2. Values																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The graph shows two curves: one for Input Volt. 200V (solid line) and one for Input Volt. 400V (dashed line). The Y-axis is Ripple Voltage [mV] from 0 to 300. The X-axis is Load Current [A] from 0 to 12. Both curves remain low until approximately 8A, then rise sharply towards 300mV at 10A. A slanted line indicates the rated load current range from 0.0 to 11.0 A.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 200 [V]</th> <th>Input Volt. 400 [V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td> <td>5</td> <td>5</td> </tr> <tr> <td>1.5</td> <td>15</td> <td>20</td> </tr> <tr> <td>3.0</td> <td>15</td> <td>15</td> </tr> <tr> <td>4.5</td> <td>15</td> <td>15</td> </tr> <tr> <td>6.0</td> <td>15</td> <td>15</td> </tr> <tr> <td>7.5</td> <td>15</td> <td>20</td> </tr> <tr> <td>9.0</td> <td>20</td> <td>20</td> </tr> <tr> <td>10.0</td> <td>20</td> <td>20</td> </tr> <tr> <td>11.0</td> <td>20</td> <td>20</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. 200 [V]	Input Volt. 400 [V]	0.0	5	5	1.5	15	20	3.0	15	15	4.5	15	15	6.0	15	15	7.5	15	20	9.0	20	20	10.0	20	20	11.0	20	20	--	-	-	--	-	-
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3.0	15	15																																									
4.5	15	15																																									
6.0	15	15																																									
7.5	15	20																																									
9.0	20	20																																									
10.0	20	20																																									
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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>Diagram illustrating a Complex Ripple Wave Form. The waveform consists of a series of sharp, triangular peaks and troughs superimposed on a constant baseline. Arrows indicate the peak-to-peak amplitude of the ripples.</p>																																											
<p>Fig. Complex Ripple Wave Form</p>																																											

COSEL

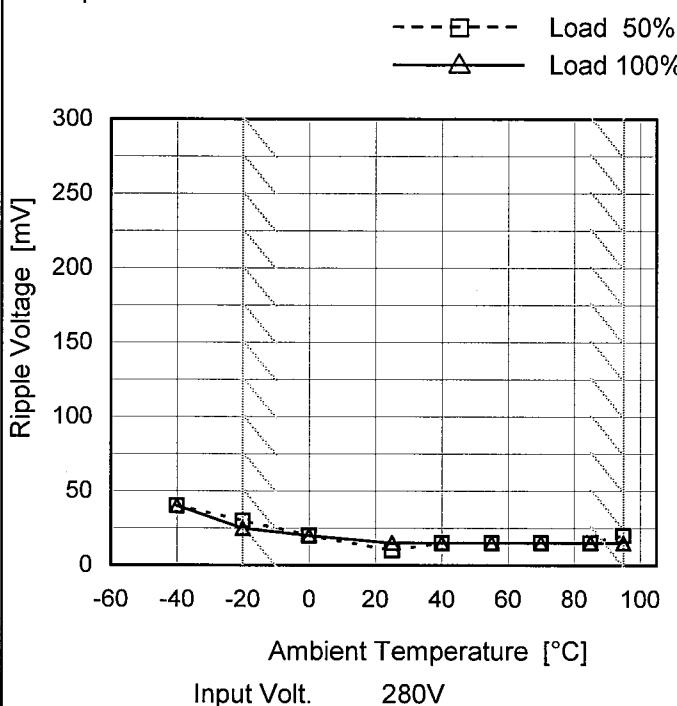
Model	SNDHS50B05	Temperature 25°C																																						
Item	Ripple-Noise	Testing Circuitry Figure B																																						
Object	+5V10A																																							
1. Graph																																								
<p>Y-axis: Ripple-Noise [mV] X-axis: Load Current [A]</p> <p>Legend: —▲— Input Volt. 200V -○--- Input Volt. 400V </p>																																								
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Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 200 [V]	Input Volt. 400 [V]																																						
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COSEL

Model	SNDHS50B05
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V10A

Testing Circuitry Figure B

1. Graph



Measured by 100 MHz Oscilloscope.

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

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	40	40
-20	30	25
0	20	20
25	10	15
40	15	15
55	15	15
70	15	15
85	15	15
95	20	15
--	-	-
--	-	-

COSEL

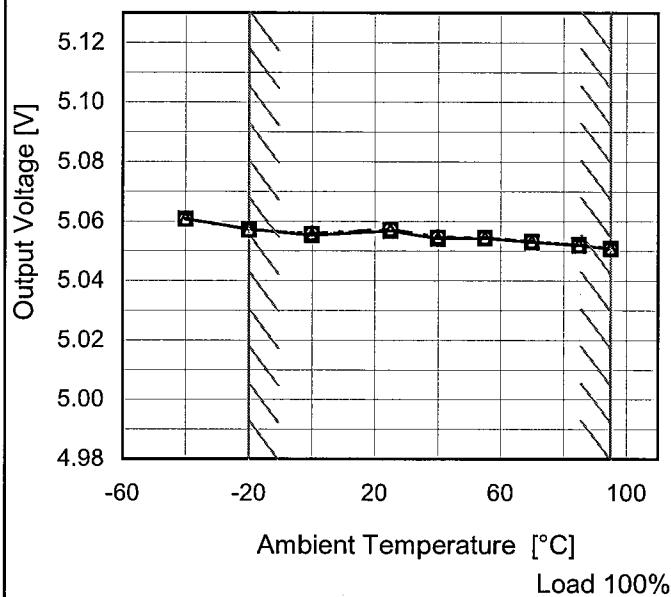
Model SNDHS50B05

Item Ambient Temperature Drift

Object +5V10A

1. Graph

—△— Input Volt. 200V
 - - -□- - Input Volt. 280V
 - - ○ - - Input Volt. 400V



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

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	5.061	5.061	5.061
-20	5.057	5.057	5.057
0	5.055	5.056	5.056
25	5.057	5.057	5.057
40	5.054	5.055	5.055
55	5.054	5.055	5.055
70	5.053	5.053	5.053
85	5.052	5.052	5.052
95	5.051	5.051	5.051
--	-	-	-
--	-	-	-



Model	SNDHS50B05	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+5V10A	

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 - 10A

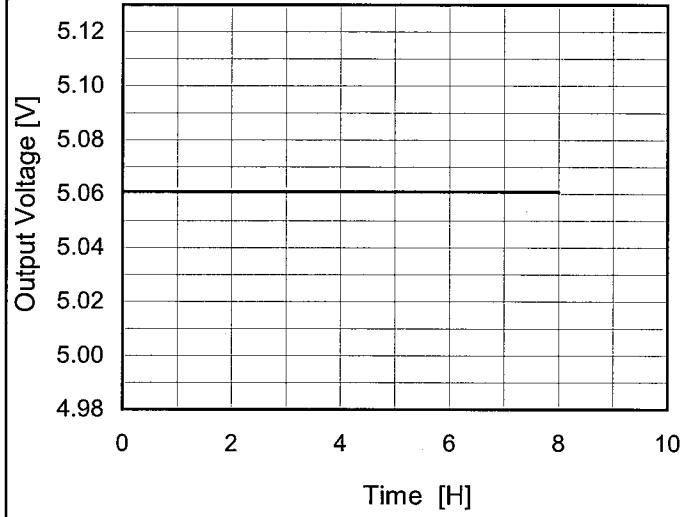
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	95	280	0	5.093	± 21	± 0.4
Minimum Voltage	95	200	10	5.051		

COSEL

Model	SNDHS50B05	Temperature Testing Circuitry	25°C Figure A																						
Item	Time Lapse Drift																								
Object	+5V10A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 280V 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>5.061</td></tr> <tr><td>0.5</td><td>5.061</td></tr> <tr><td>1.0</td><td>5.061</td></tr> <tr><td>2.0</td><td>5.061</td></tr> <tr><td>3.0</td><td>5.061</td></tr> <tr><td>4.0</td><td>5.061</td></tr> <tr><td>5.0</td><td>5.061</td></tr> <tr><td>6.0</td><td>5.061</td></tr> <tr><td>7.0</td><td>5.061</td></tr> <tr><td>8.0</td><td>5.061</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	5.061	0.5	5.061	1.0	5.061	2.0	5.061	3.0	5.061	4.0	5.061	5.0	5.061	6.0	5.061	7.0	5.061	8.0	5.061
Time since start [H]	Output Voltage [V]																								
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COSEL

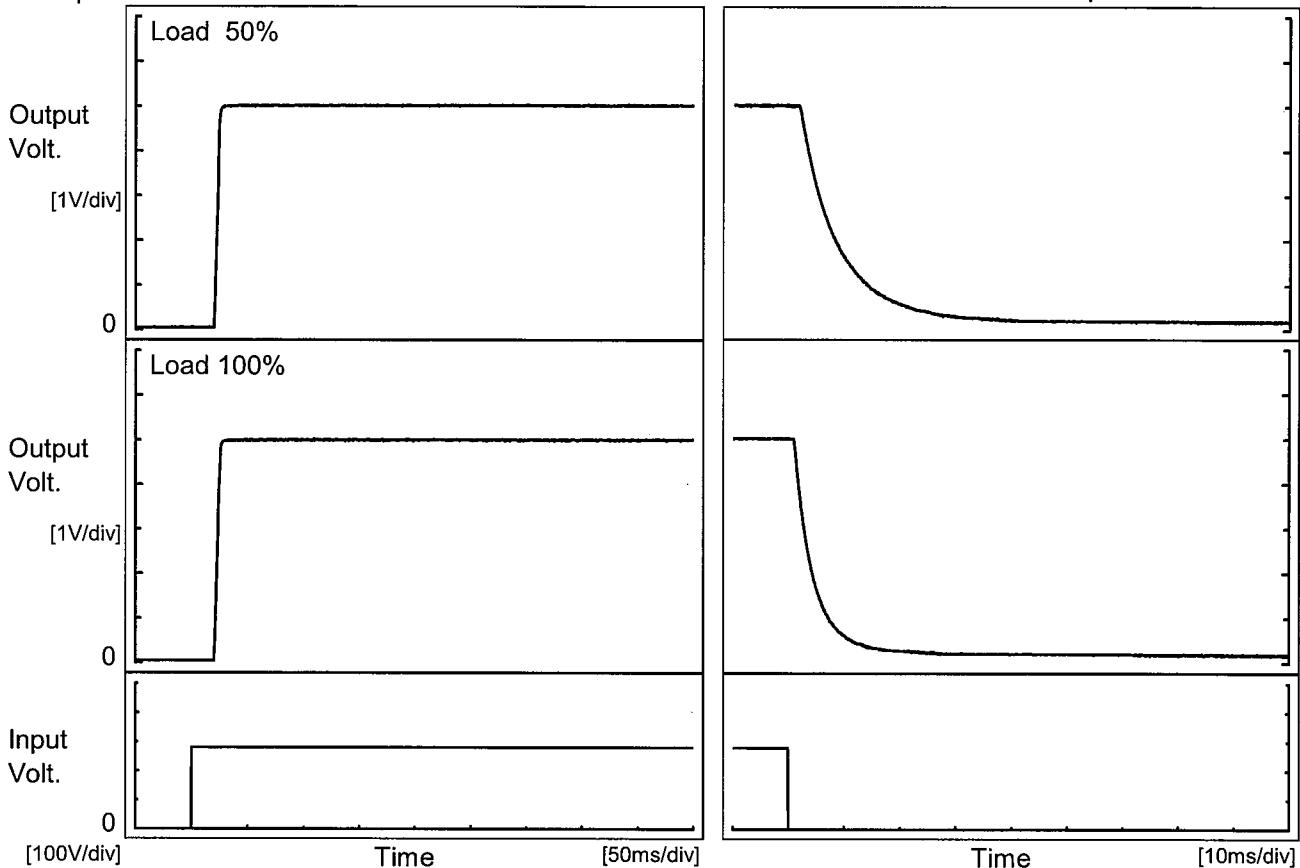
Model SNDHS50B05

Item Rise and Fall Time

Object +5V10A

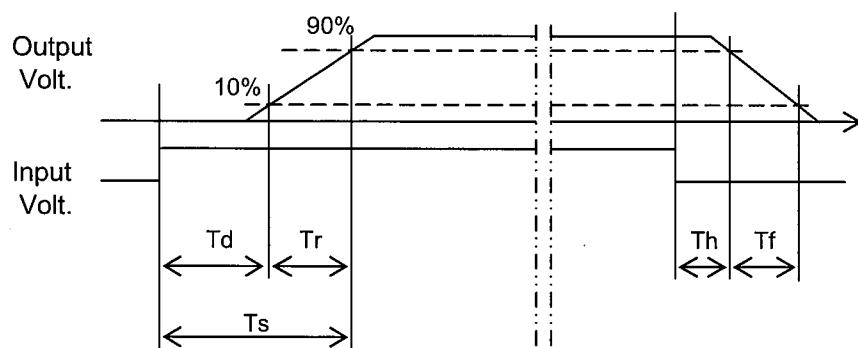
Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		21.0	3.8	24.8	2.6	18.7	
100 %		21.3	4.5	25.8	1.3	9.8	

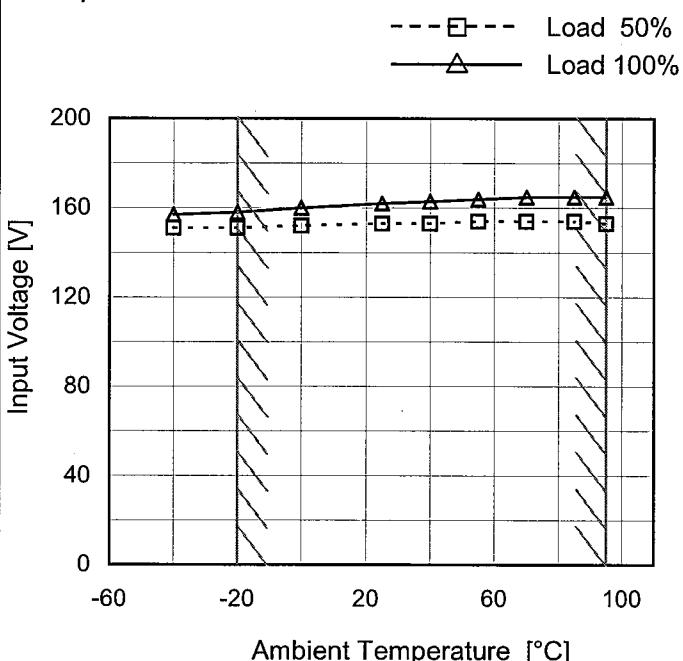


COSEL

Model	SNDHS50B05
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V10A

Testing Circuitry Figure A

1. Graph



2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	151	157
-20	151	158
0	152	160
25	153	162
40	153	163
55	154	164
70	154	165
85	154	165
95	153	165
--	-	-
--	-	-

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

COSEL

Model	SNDHS50B05
Item	Overcurrent Protection
Object	+5V10A
1.Graph	<p>— Input Volt. 200V — Input Volt. 280V - - - Input Volt. 400V</p> <p>Output Voltage [V]</p> <p>Load Current [A]</p>
Note:	Slanted line shows the range of the rated load current.
Intermittent operation occurs when the output voltage is from 2.5V 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]
4.75	12.15	12.75	13.75
4.50	12.23	12.89	13.85
4.00	12.49	13.20	14.10
3.50	12.76	13.51	14.24
3.00	13.07	13.86	14.32
2.50	13.36	14.25	14.43
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
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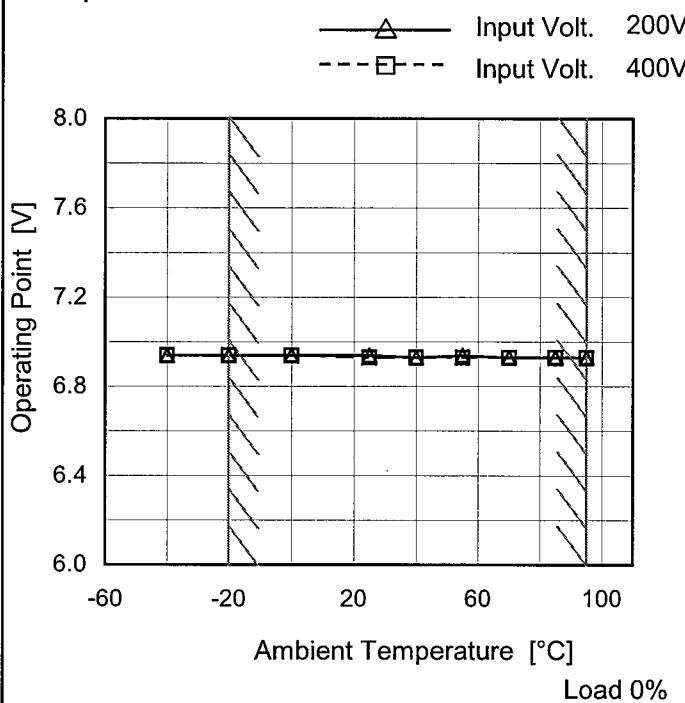
COSEL

Model SNDHS50B05

Item Overvoltage Protection

Object +5V10A

1. Graph



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

Testing Circuitry Figure A

2. Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 200[V]	Input Volt. 400[V]
-40	6.94	6.94
-20	6.94	6.94
0	6.94	6.94
25	6.94	6.93
40	6.93	6.93
55	6.94	6.93
70	6.93	6.93
85	6.93	6.93
95	6.93	6.93
--	-	-
--	-	-

COSEL

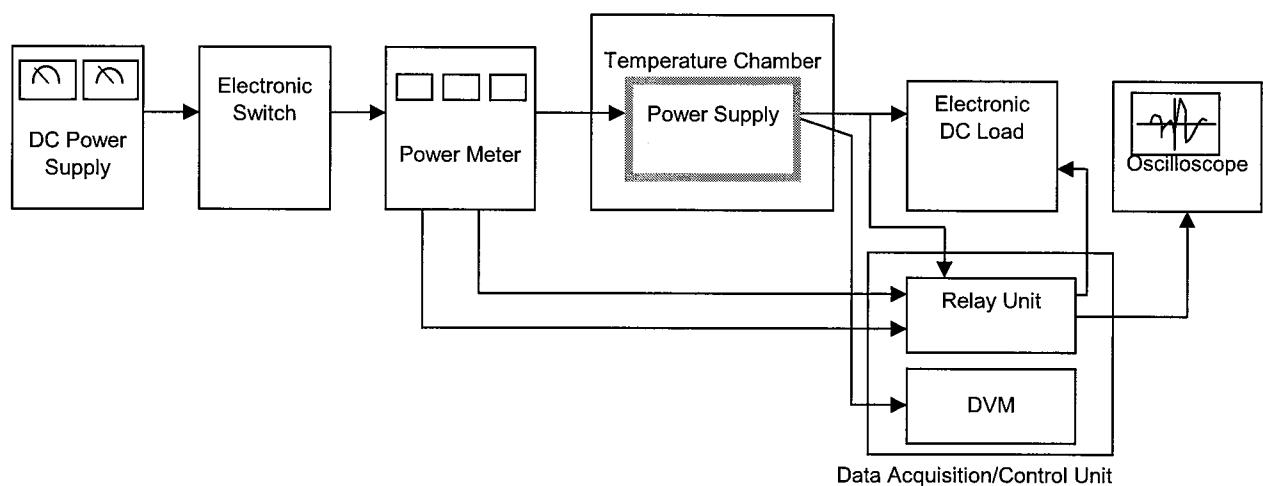


Figure A

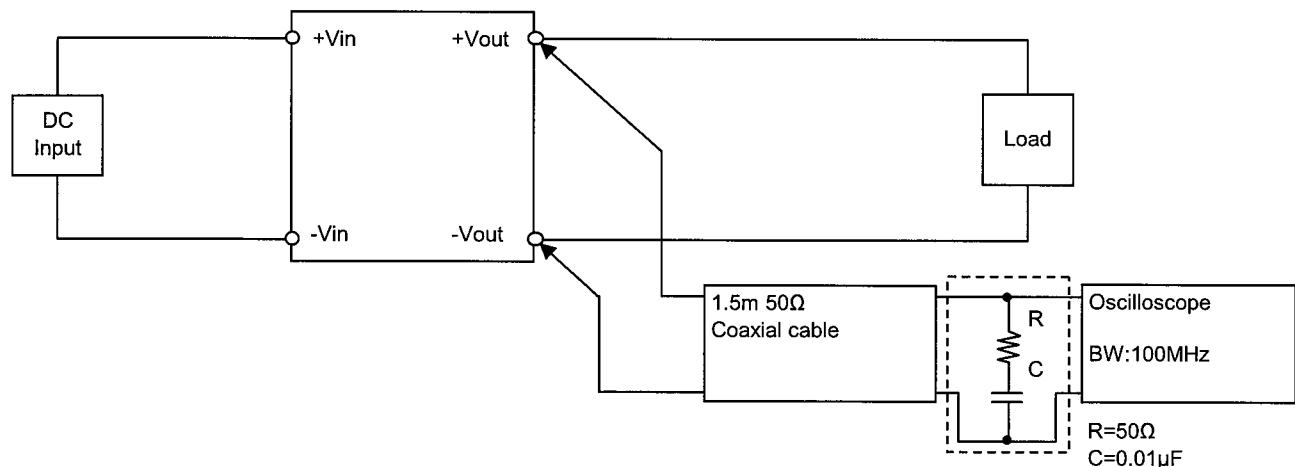


Figure B (Ripple and Ripple noise Characteristic)