

TEST DATA OF SNDHS100A12

Regulated DC Power Supply
April 9, 2012

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Takahiro Yoneda Design Manager

Prepared by : Tadashi Arai
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	SNDHS100A12																																																																							
Item	Input Current (by Input Voltage)																																																																							
Object	+12V8.4A																																																																							
1.Graph																																																																								
<p>The graph plots Input Current [A] on the y-axis (0.0 to 4.0) against Input Voltage [V] on the x-axis (0 to 180). Three curves are shown: Load 100% (triangles), Load 50% (squares), and Load 0% (circles). A slanted line indicates the rated voltage range.</p> <table border="1"> <thead> <tr> <th>Input Voltage [V]</th> <th>Load 0% [A]</th> <th>Load 50% [A]</th> <th>Load 100% [A]</th> </tr> </thead> <tbody> <tr><td>40</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>45</td><td>0.000</td><td>0.000</td><td>0.000</td></tr> <tr><td>50</td><td>0.038</td><td>1.116</td><td>2.006</td></tr> <tr><td>55</td><td>0.038</td><td>1.079</td><td>2.160</td></tr> <tr><td>60</td><td>0.036</td><td>0.982</td><td>1.966</td></tr> <tr><td>66</td><td>0.037</td><td>0.887</td><td>1.772</td></tr> <tr><td>80</td><td>0.036</td><td>0.731</td><td>1.456</td></tr> <tr><td>95</td><td>0.035</td><td>0.614</td><td>1.222</td></tr> <tr><td>110</td><td>0.034</td><td>0.533</td><td>1.058</td></tr> <tr><td>125</td><td>0.034</td><td>0.474</td><td>0.935</td></tr> <tr><td>140</td><td>0.034</td><td>0.426</td><td>0.839</td></tr> <tr><td>160</td><td>0.034</td><td>0.378</td><td>0.739</td></tr> <tr><td>170</td><td>0.033</td><td>0.359</td><td>0.698</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>	Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]	40	0.000	0.000	0.000	45	0.000	0.000	0.000	50	0.038	1.116	2.006	55	0.038	1.079	2.160	60	0.036	0.982	1.966	66	0.037	0.887	1.772	80	0.036	0.731	1.456	95	0.035	0.614	1.222	110	0.034	0.533	1.058	125	0.034	0.474	0.935	140	0.034	0.426	0.839	160	0.034	0.378	0.739	170	0.033	0.359	0.698	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Input Voltage [V]	Load 0% [A]	Load 50% [A]	Load 100% [A]																																																																					
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 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
40	0.000	0.000	0.000
45	0.000	0.000	0.000
50	0.038	1.116	2.006
55	0.038	1.079	2.160
60	0.036	0.982	1.966
66	0.037	0.887	1.772
80	0.036	0.731	1.456
95	0.035	0.614	1.222
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160	0.034	0.378	0.739
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Note: Slanted line shows the range of the rated input voltage.

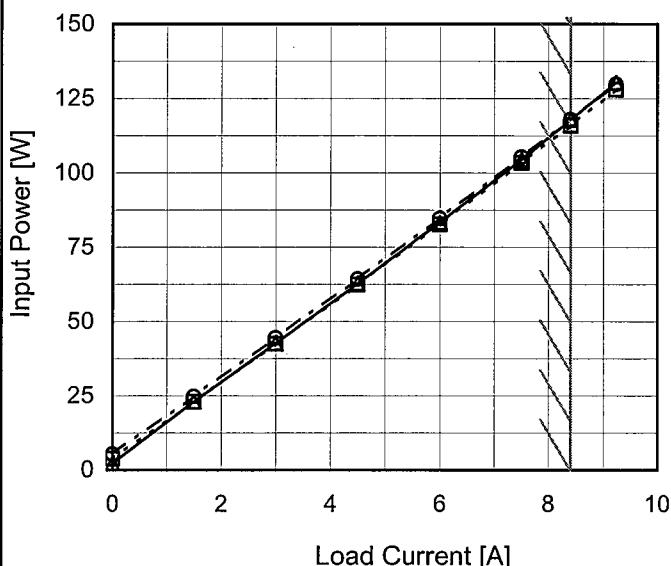
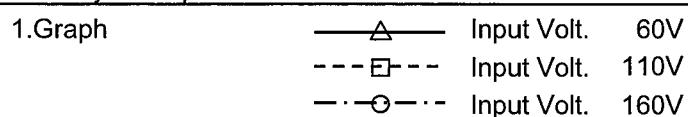
COSEL

Model	SNDHS100A12	Temperature	25°C																																														
Item	Input Current (by Load Current)	Testing Circuitry	Figure A																																														
Object	+12V8.4A																																																
1.Graph		2.Values																																															
<p>—△— Input Volt. 60V - - -□- - Input Volt. 110V - - ○- - Input Volt. 160V</p> <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 60V [A]</th> <th>Input Volt. 110V [A]</th> <th>Input Volt. 160V [A]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>0.036</td><td>0.034</td><td>0.033</td></tr> <tr><td>1.50</td><td>0.385</td><td>0.209</td><td>0.155</td></tr> <tr><td>3.00</td><td>0.713</td><td>0.387</td><td>0.278</td></tr> <tr><td>4.50</td><td>1.048</td><td>0.569</td><td>0.403</td></tr> <tr><td>6.00</td><td>1.393</td><td>0.754</td><td>0.531</td></tr> <tr><td>7.50</td><td>1.746</td><td>0.942</td><td>0.661</td></tr> <tr><td>8.40</td><td>1.966</td><td>1.058</td><td>0.739</td></tr> <tr><td>9.24</td><td>2.176</td><td>1.166</td><td>0.813</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 Volt. 60V [A]	Input Volt. 110V [A]	Input Volt. 160V [A]	0.00	0.036	0.034	0.033	1.50	0.385	0.209	0.155	3.00	0.713	0.387	0.278	4.50	1.048	0.569	0.403	6.00	1.393	0.754	0.531	7.50	1.746	0.942	0.661	8.40	1.966	1.058	0.739	9.24	2.176	1.166	0.813	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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Model	SNDHS100A12
Item	Input Power (by Load Current)
Object	+12V8.4A



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

Temperature 25°C
 Testing Circuitry Figure A

2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 60[V]	Input Volt. 110[V]	Input Volt. 160[V]
0.00	2.2	3.8	5.3
1.50	23.1	23.0	24.8
3.00	42.7	42.5	44.5
4.50	62.8	62.4	64.4
6.00	83.3	82.7	84.7
7.50	104.5	103.4	105.4
8.40	117.9	116.0	118.0
9.24	130.4	128.0	129.8
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--	-	-	-
--	-	-	-

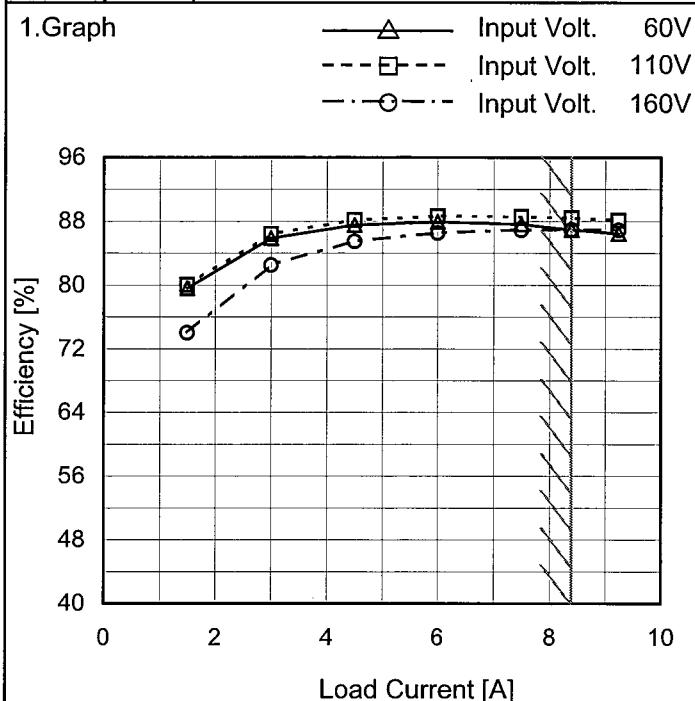
COSEL

Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure A																																			
Item	Efficiency (by Input Voltage)																																					
Object	+12V8.4A																																					
1.Graph			2.Values																																			
<p>Efficiency [%]</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">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>56</td><td>87.0</td><td>86.4</td></tr> <tr><td>60</td><td>87.4</td><td>87.0</td></tr> <tr><td>66</td><td>87.8</td><td>87.6</td></tr> <tr><td>80</td><td>88.1</td><td>88.2</td></tr> <tr><td>95</td><td>88.4</td><td>88.5</td></tr> <tr><td>110</td><td>88.0</td><td>88.3</td></tr> <tr><td>125</td><td>87.1</td><td>87.9</td></tr> <tr><td>140</td><td>86.3</td><td>87.5</td></tr> <tr><td>160</td><td>85.1</td><td>86.9</td></tr> <tr><td>170</td><td>84.5</td><td>86.6</td></tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	56	87.0	86.4	60	87.4	87.0	66	87.8	87.6	80	88.1	88.2	95	88.4	88.5	110	88.0	88.3	125	87.1	87.9	140	86.3	87.5	160	85.1	86.9	170	84.5	86.6
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Note: Slanted line shows the range of the rated input voltage.

COSEL

Model	SNDHS100A12
Item	Efficiency (by Load Current)
Object	+12V8.4A



Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 60[V]	Input Volt. 110[V]	Input Volt. 160[V]
0.00	-	-	-
1.50	79.6	80.0	74.0
3.00	85.9	86.4	82.5
4.50	87.6	88.1	85.5
6.00	88.0	88.6	86.5
7.50	87.6	88.6	86.9
8.40	87.0	88.4	86.9
9.24	86.5	88.1	86.9
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--	-	-	-
--	-	-	-

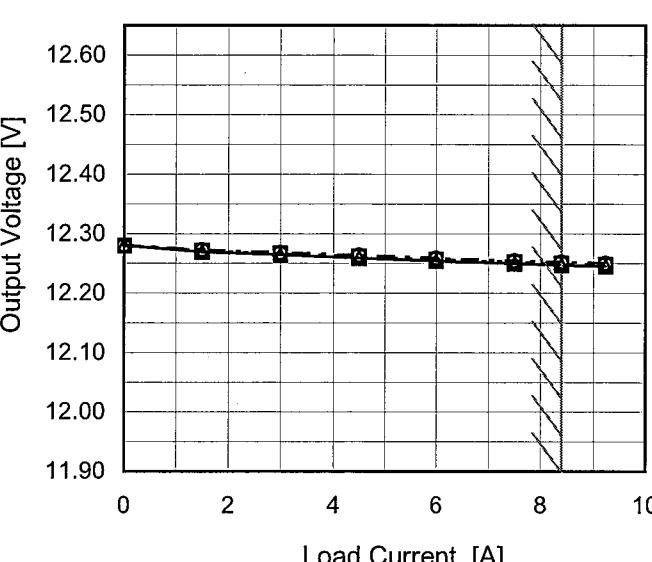
Note: Slanted line shows the range of the rated load current.

COSEL

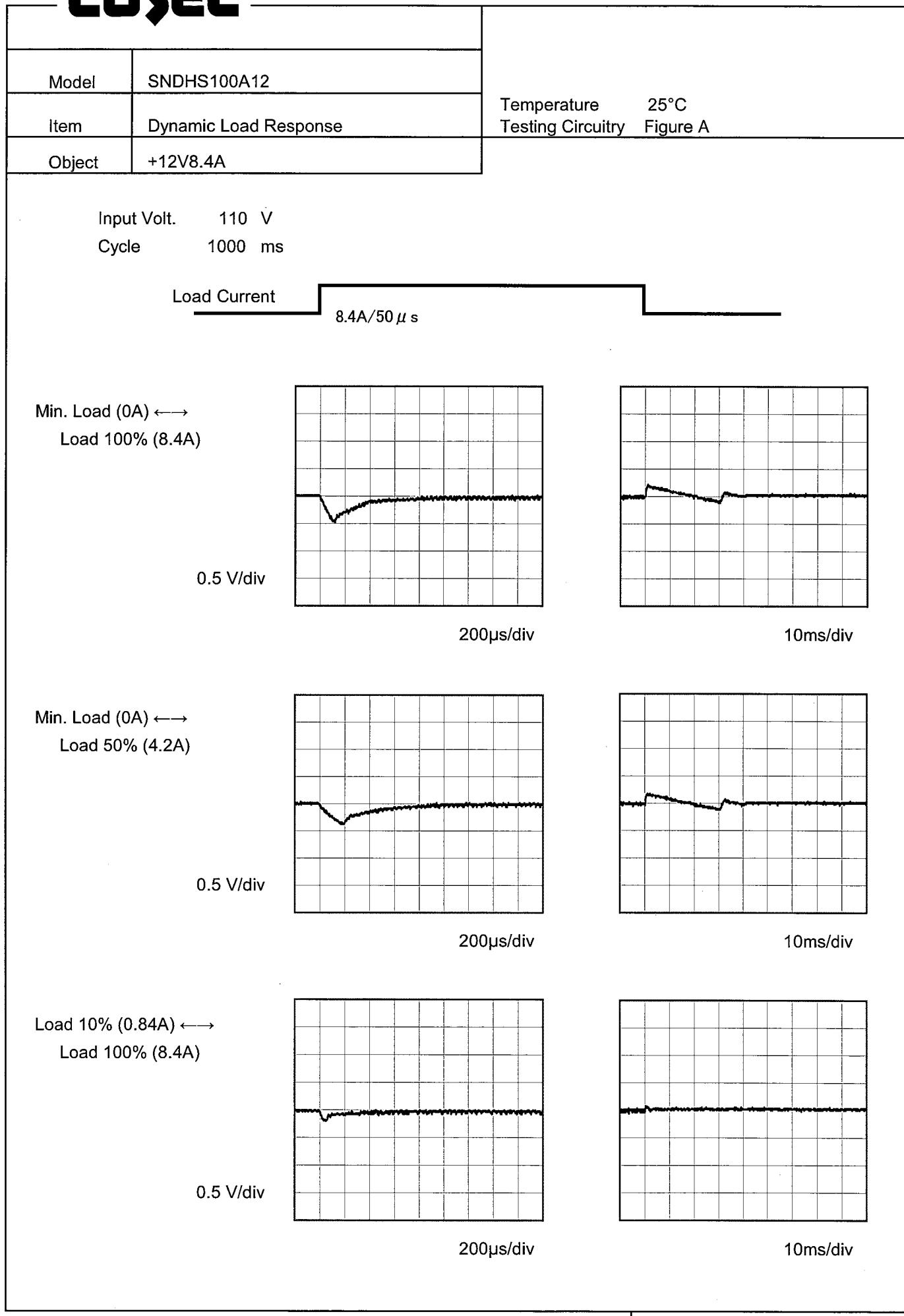
Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure A																																			
Item	Line Regulation																																					
Object	+12V8.4A																																					
1.Graph			2.Values																																			
<p>Output Voltage [V]</p> <p>Input Voltage [V]</p> <p>Legend: ---□--- Load 50% —△— Load 100%</p>			<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>56</td><td>12.262</td><td>12.248</td></tr> <tr><td>60</td><td>12.262</td><td>12.248</td></tr> <tr><td>66</td><td>12.261</td><td>12.248</td></tr> <tr><td>80</td><td>12.262</td><td>12.249</td></tr> <tr><td>95</td><td>12.262</td><td>12.249</td></tr> <tr><td>110</td><td>12.262</td><td>12.250</td></tr> <tr><td>125</td><td>12.263</td><td>12.251</td></tr> <tr><td>140</td><td>12.263</td><td>12.252</td></tr> <tr><td>160</td><td>12.264</td><td>12.253</td></tr> <tr><td>170</td><td>12.264</td><td>12.253</td></tr> </tbody> </table>	Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	56	12.262	12.248	60	12.262	12.248	66	12.261	12.248	80	12.262	12.249	95	12.262	12.249	110	12.262	12.250	125	12.263	12.251	140	12.263	12.252	160	12.264	12.253	170	12.264	12.253
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Note: Slanted line shows the range of the rated input voltage.

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Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Load Regulation																																																					
Object	+12V8.4A																																																					
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

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COSEL

Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure B																																				
Item	Ripple Voltage (by Load Current)																																						
Object	+12V8.4A																																						
1.Graph			2.Values																																				
<p>Graph showing Ripple Voltage [mV] vs Load Current [A].</p> <p>Legend:</p> <ul style="list-style-type: none"> —△— Input Volt. 60V -○- Input Volt. 160V <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 60V)</th> <th>Ripple Voltage [mV] (Input Volt. 160V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>5</td><td>5</td></tr> <tr><td>1.50</td><td>20</td><td>30</td></tr> <tr><td>3.00</td><td>20</td><td>30</td></tr> <tr><td>4.50</td><td>20</td><td>30</td></tr> <tr><td>6.00</td><td>20</td><td>35</td></tr> <tr><td>7.50</td><td>20</td><td>35</td></tr> <tr><td>8.40</td><td>20</td><td>35</td></tr> <tr><td>9.24</td><td>25</td><td>35</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. 60V)	Ripple Voltage [mV] (Input Volt. 160V)	0.00	5	5	1.50	20	30	3.00	20	30	4.50	20	30	6.00	20	35	7.50	20	35	8.40	20	35	9.24	25	35	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV] (Input Volt. 60V)	Ripple Voltage [mV] (Input Volt. 160V)																																					
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<p>Measured by 100 MHz Oscilloscope.</p> <p>Ripple Voltage is shown as p-p in the figure below.</p> <p>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

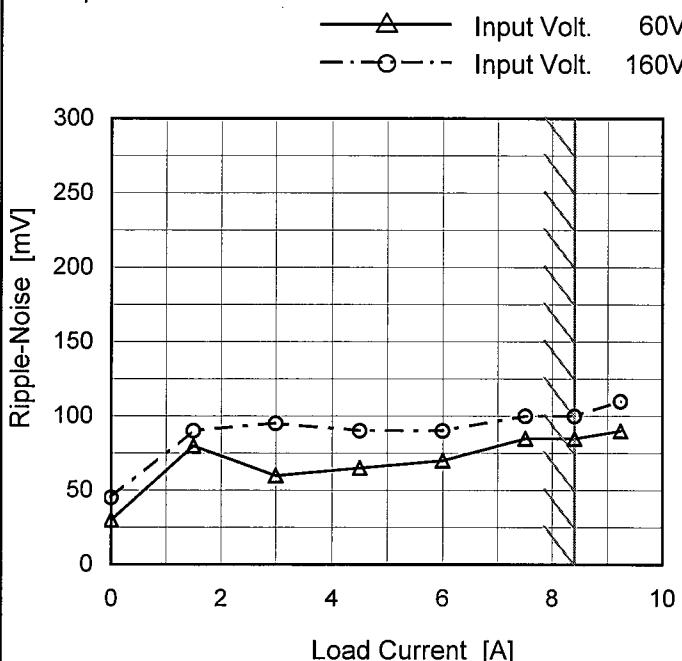
Model SNDHS100A12

Item Ripple-Noise

Object +12V8.4A

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. 60 [V]	Input Volt. 160 [V]
0.00	30	45
1.50	80	90
3.00	60	95
4.50	65	90
6.00	70	90
7.50	85	100
8.40	85	100
9.24	90	110
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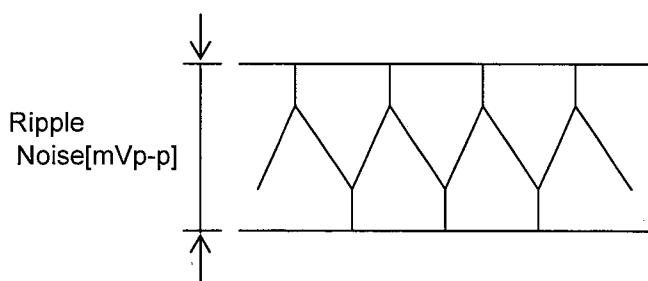
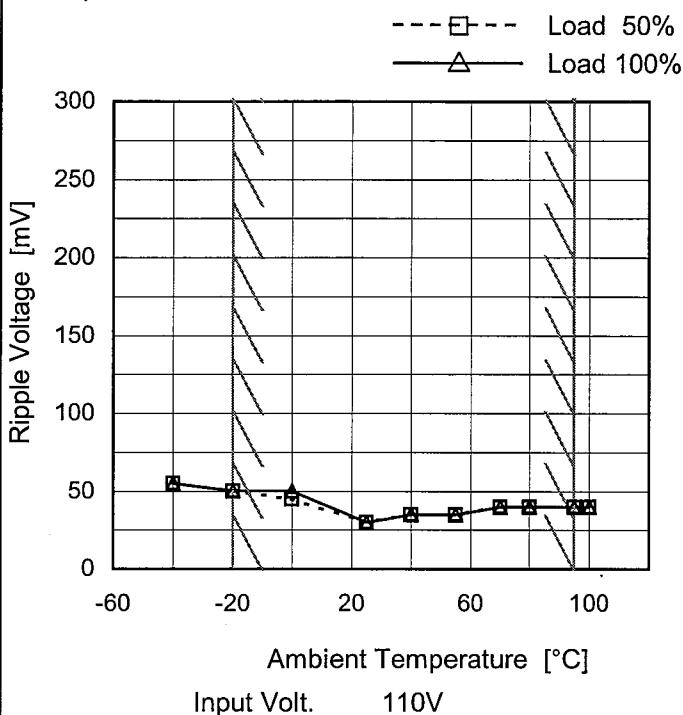


Fig.Complex Ripple Noise Wave Form

Model	SNDHS100A12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V8.2A

Testing Circuitry Figure B

1.Graph



2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	55	55
-20	50	50
0	45	50
25	30	30
40	35	35
55	35	35
70	40	40
80	40	40
95	40	40
100	40	40
--	-	-

Measured by 100 MHz Oscilloscope.

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

Ripple [mVp-p]

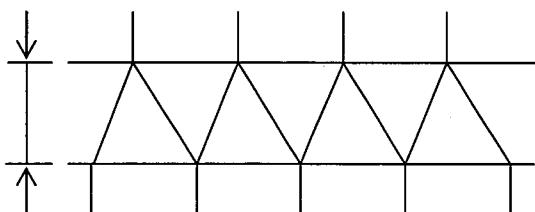
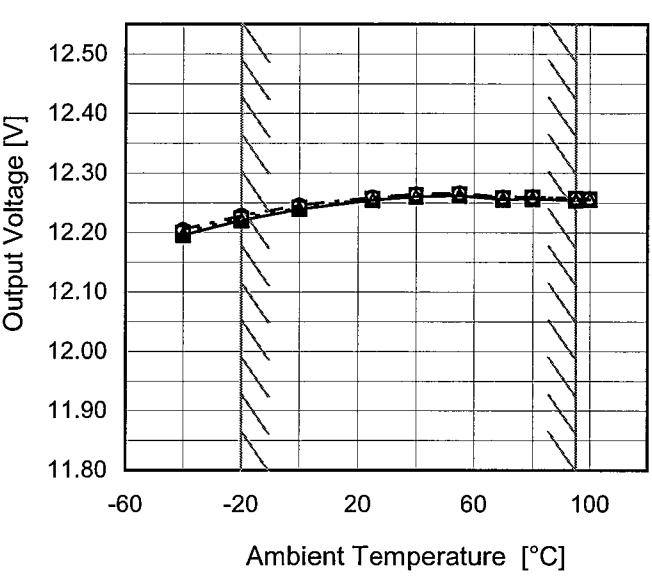


Fig.Complex Ripple Wave Form

COSEL

Model	SNDHS100A12	Testing Circuitry Figure A																																																					
Item	Ambient Temperature Drift																																																						
Object	+12V8.4A																																																						
1.Graph	<p style="text-align: center;"> —△— Input Volt. 60V ---□--- Input Volt. 110V ---○--- Input Volt. 160V </p>  <p style="text-align: center;">Output Voltage [V]</p> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: center;">Load 100%</p>	2.Values																																																					
		<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 60[V]</th> <th>Input Volt. 110[V]</th> <th>Input Volt. 160[V]</th> </tr> </thead> <tbody> <tr> <td>-40</td> <td>12.196</td> <td>12.200</td> <td>12.204</td> </tr> <tr> <td>-20</td> <td>12.221</td> <td>12.224</td> <td>12.228</td> </tr> <tr> <td>0</td> <td>12.239</td> <td>12.242</td> <td>12.246</td> </tr> <tr> <td>25</td> <td>12.255</td> <td>12.257</td> <td>12.259</td> </tr> <tr> <td>40</td> <td>12.261</td> <td>12.263</td> <td>12.265</td> </tr> <tr> <td>55</td> <td>12.263</td> <td>12.265</td> <td>12.266</td> </tr> <tr> <td>70</td> <td>12.256</td> <td>12.258</td> <td>12.259</td> </tr> <tr> <td>80</td> <td>12.257</td> <td>12.259</td> <td>12.260</td> </tr> <tr> <td>95</td> <td>12.254</td> <td>12.257</td> <td>12.258</td> </tr> <tr> <td>100</td> <td>12.256</td> <td>12.256</td> <td>12.257</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 60[V]	Input Volt. 110[V]	Input Volt. 160[V]	-40	12.196	12.200	12.204	-20	12.221	12.224	12.228	0	12.239	12.242	12.246	25	12.255	12.257	12.259	40	12.261	12.263	12.265	55	12.263	12.265	12.266	70	12.256	12.258	12.259	80	12.257	12.259	12.260	95	12.254	12.257	12.258	100	12.256	12.256	12.257	--	-	-	-
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Note: Slanted line shows the range of the rated ambient temperature.



Model	SNDHS100A12	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V8.4A	

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 : 60 - 160V

Load Current : 0 - 8.4A

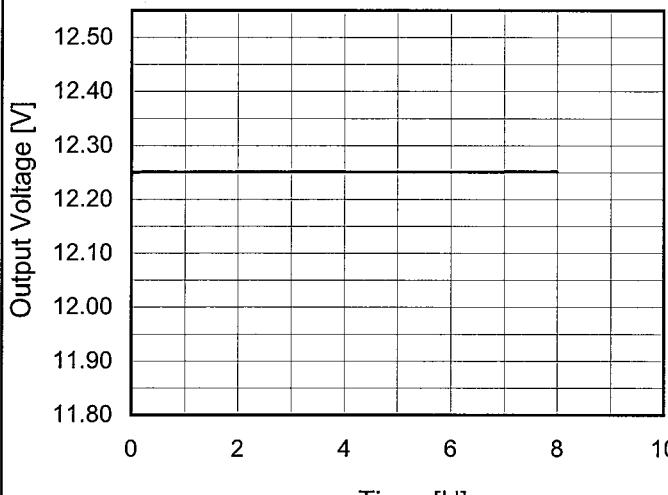
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	60	0	12.298	± 39	± 0.3
Minimum Voltage	-20	60	8.4	12.221		

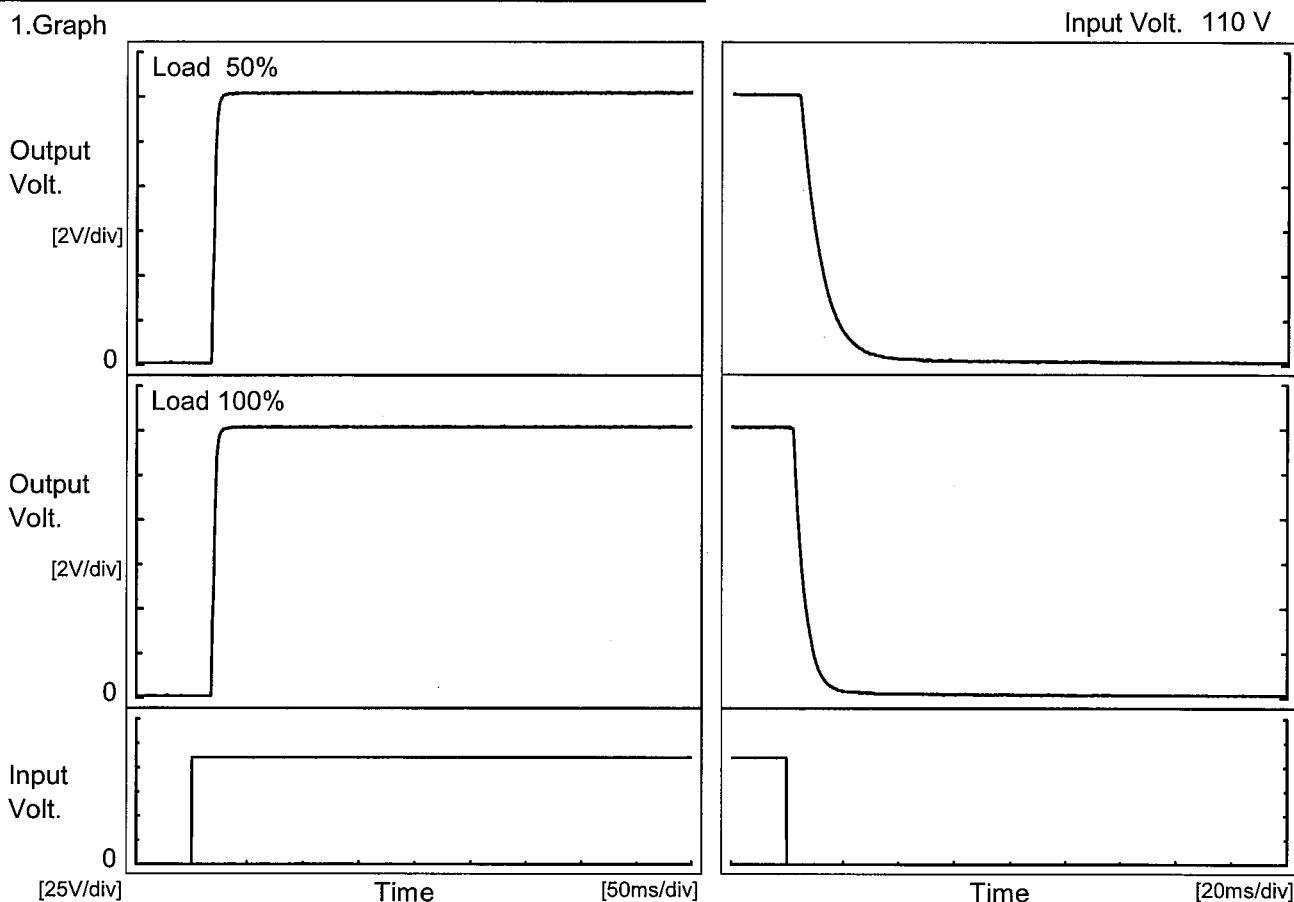
COSEL

Model	SNDHS100A12	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+12V8.4A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 110V 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>12.246</td></tr> <tr><td>0.5</td><td>12.251</td></tr> <tr><td>1.0</td><td>12.251</td></tr> <tr><td>2.0</td><td>12.251</td></tr> <tr><td>3.0</td><td>12.251</td></tr> <tr><td>4.0</td><td>12.251</td></tr> <tr><td>5.0</td><td>12.251</td></tr> <tr><td>6.0</td><td>12.251</td></tr> <tr><td>7.0</td><td>12.252</td></tr> <tr><td>8.0</td><td>12.251</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	12.246	0.5	12.251	1.0	12.251	2.0	12.251	3.0	12.251	4.0	12.251	5.0	12.251	6.0	12.251	7.0	12.252	8.0	12.251
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COSEL

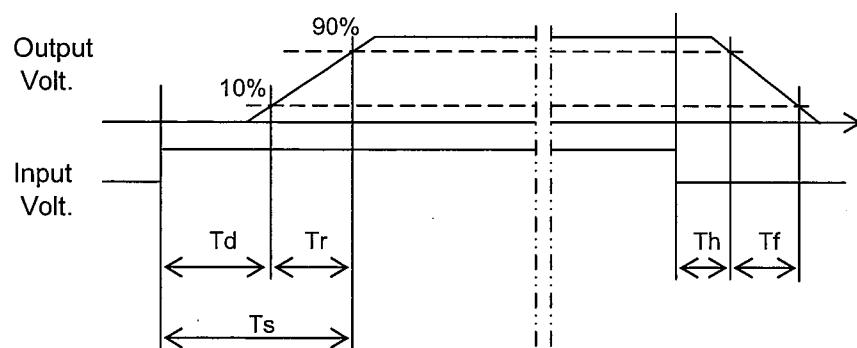
Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure A
Item	Rise and Fall Time		
Object	+12V8.4A		

1. Graph



2. Values

Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		18.0	4.5	22.5	5.3	16.7	
100 %		18.0	4.8	22.8	2.6	9.1	



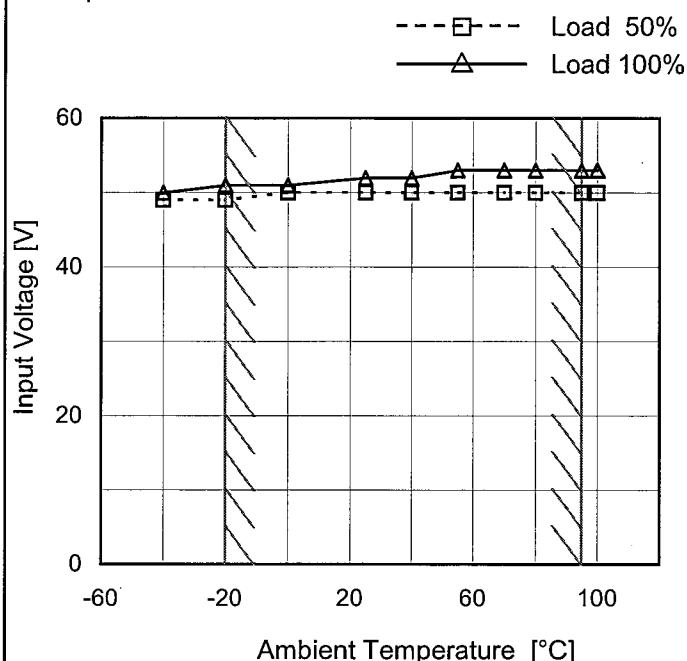
COSEL

Model SNDHS100A12

Item Minimum Input Voltage
for Regulated Output Voltage

Object +12V8.4A

1.Graph



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	49	50
-20	49	51
0	50	51
25	50	52
40	50	52
55	50	53
70	50	53
80	50	53
95	50	53
100	50	53
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COSEL

Model	SNDHS100A12	Temperature Testing Circuitry	25°C Figure A																																																															
Item	Overcurrent Protection																																																																	
Object	+12V8.4A																																																																	
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Note: Slanted line shows the range of the rated load current.

Intermittent operation occurs when overcurrent protection is activated.

Intermittent operation occurs when the output voltage is from 8V to 0V.

COSEL

Model	SNDHS100A12																																							
Item	Overvoltage Protection																																							
Object	+12V8.4A																																							
1.Graph																																								
<p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p> <p>Input Volt. 60V</p> <p>Input Volt. 160V</p>																																								
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Note: Slanted line shows the range of the rated ambient temperature.

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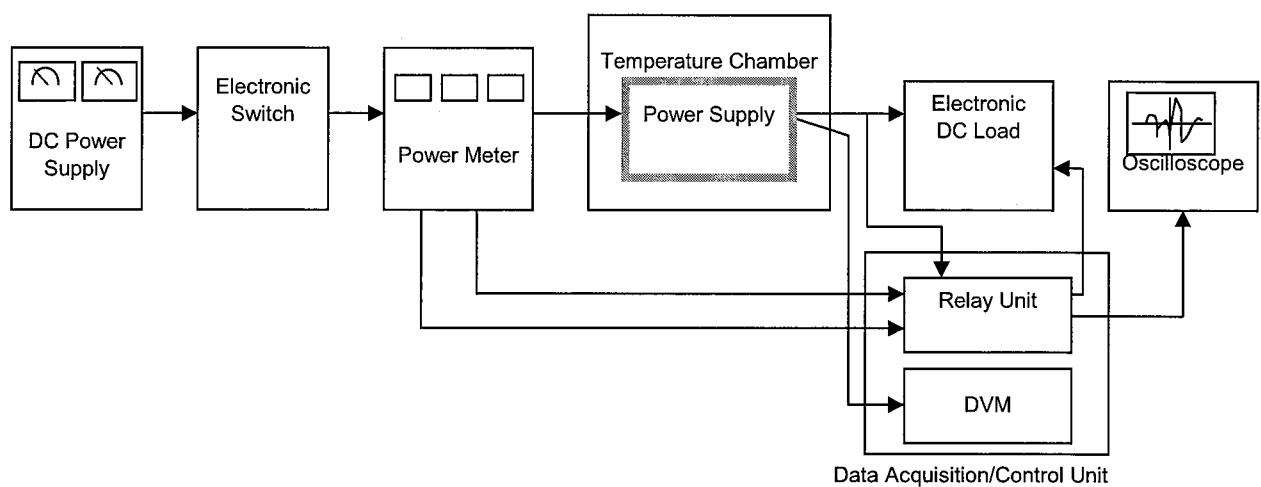


Figure A

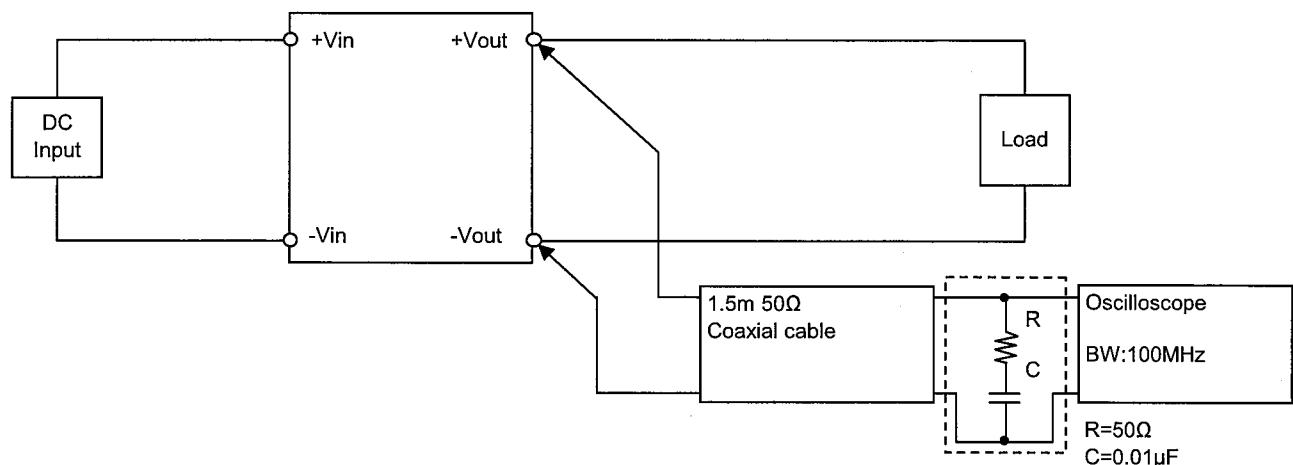


Figure B (Ripple and Ripple noise Characteristic)