

TEST DATA OF SNDHS50A12

Regulated DC Power Supply
April 8, 2012

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Takahiro Yoneda Design Manager

Prepared by : Tadashi Arai
Tadashi Arai Design Engineer

COSEL CO.,LTD.

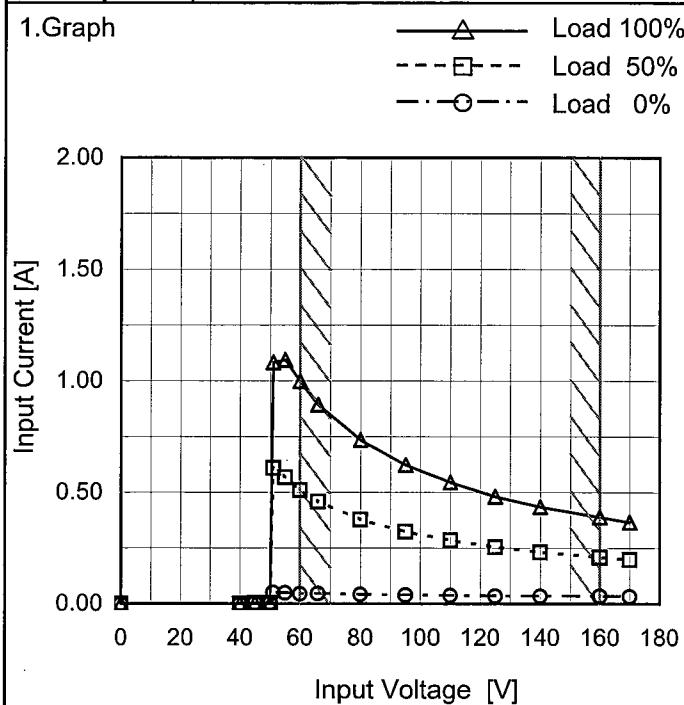
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(Final Page 19)

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Model	SNDHS50A12
Item	Input Current (by Input Voltage)
Object	+12V4.2A



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
40	0.000	0.000	0.000
45	0.002	0.002	0.002
50	0.003	0.003	0.003
51	0.050	0.609	1.083
55	0.049	0.567	1.095
60	0.044	0.510	0.998
66	0.046	0.459	0.893
80	0.041	0.378	0.735
95	0.039	0.323	0.623
110	0.037	0.284	0.546
125	0.035	0.254	0.482
140	0.034	0.231	0.435
160	0.035	0.208	0.389
170	0.033	0.198	0.367
--	-	-	-
--	-	-	-
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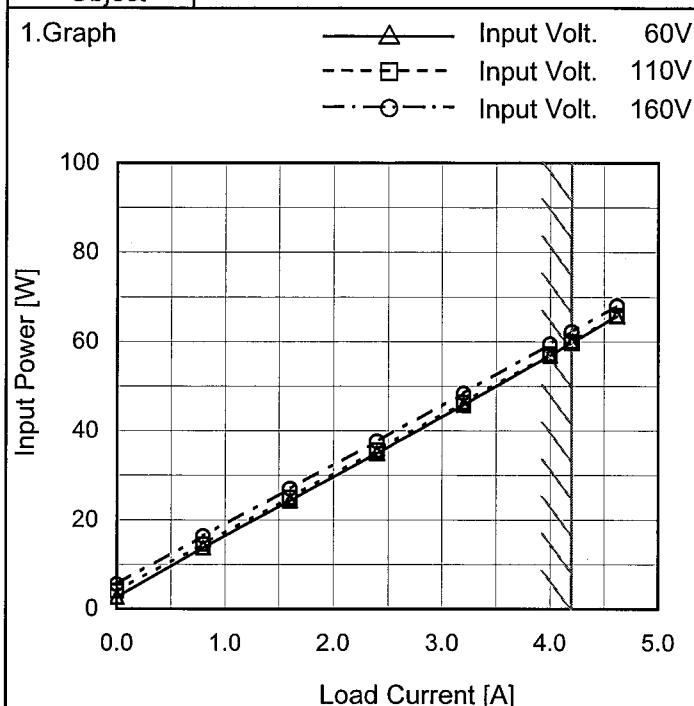
COSEL

Model	SNDHS50A12	Temperature	25°C																																																			
Item	Input Current (by Load Current)	Testing Circuitry	Figure A																																																			
Object	+12V4.2A																																																					
1.Graph		2.Values																																																				
<p>The graph shows three curves representing different input voltages: 60V (solid line with open triangles), 110V (dashed line with open squares), and 160V (dash-dot line with open circles). The x-axis is labeled "Load Current [A]" and ranges from 0.0 to 5.0. The y-axis is labeled "Input Current [A]" and ranges from 0.00 to 2.00. A slanted line is drawn through the origin, representing the rated load current range.</p>		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</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>0.00</td> <td>0.044</td> <td>0.037</td> <td>0.035</td> </tr> <tr> <td>0.80</td> <td>0.230</td> <td>0.132</td> <td>0.102</td> </tr> <tr> <td>1.60</td> <td>0.406</td> <td>0.227</td> <td>0.169</td> </tr> <tr> <td>2.40</td> <td>0.585</td> <td>0.324</td> <td>0.235</td> </tr> <tr> <td>3.20</td> <td>0.765</td> <td>0.422</td> <td>0.303</td> </tr> <tr> <td>4.00</td> <td>0.950</td> <td>0.521</td> <td>0.372</td> </tr> <tr> <td>4.20</td> <td>0.998</td> <td>0.546</td> <td>0.389</td> </tr> <tr> <td>4.62</td> <td>1.097</td> <td>0.599</td> <td>0.425</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. 60[V]	Input Volt. 110[V]	Input Volt. 160[V]	0.00	0.044	0.037	0.035	0.80	0.230	0.132	0.102	1.60	0.406	0.227	0.169	2.40	0.585	0.324	0.235	3.20	0.765	0.422	0.303	4.00	0.950	0.521	0.372	4.20	0.998	0.546	0.389	4.62	1.097	0.599	0.425	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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Model	SNDHS50A12
Item	Input Power (by Load Current)
Object	+12V4.2A



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	2.66	4.05	5.55
0.80	13.80	14.49	16.38
1.60	24.32	24.99	27.00
2.40	35.01	35.61	37.65
3.20	45.82	46.32	48.45
4.00	56.90	57.20	59.45
4.20	59.80	60.00	62.24
4.62	65.70	65.80	68.04
--	-	-	-
--	-	-	-
--	-	-	-

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

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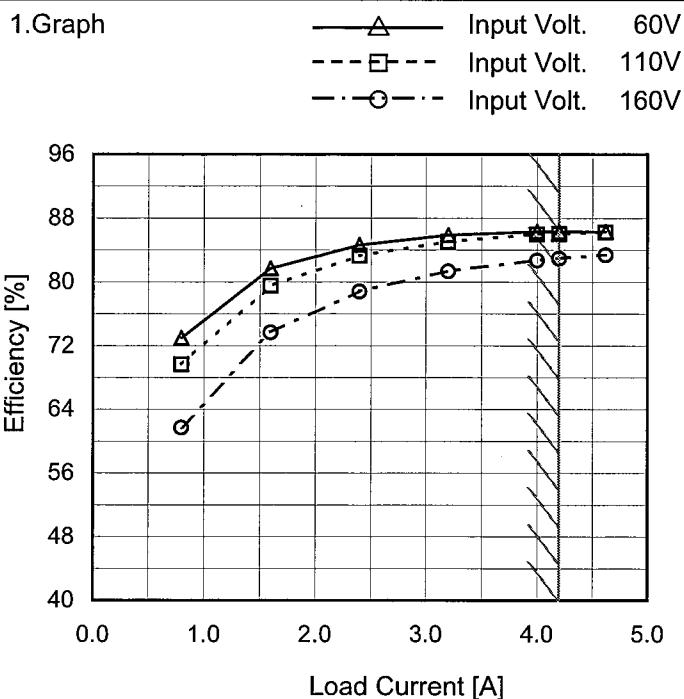
Model	SNDHS50A12	Temperature Testing Circuitry	25°C Figure A																																	
Item	Efficiency (by Input Voltage)																																			
Object	+12V4.2A																																			
1.Graph			2.Values																																	
<p>The graph plots Efficiency [%] on the y-axis (40 to 96) against Input Voltage [V] on the x-axis (50 to 170). 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 vertical slanted line is drawn through the graph, indicating 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>56</td><td>82.7</td><td>85.1</td></tr> <tr><td>60</td><td>83.7</td><td>86.2</td></tr> <tr><td>66</td><td>84.7</td><td>87.1</td></tr> <tr><td>80</td><td>85.0</td><td>87.4</td></tr> <tr><td>95</td><td>83.7</td><td>86.8</td></tr> <tr><td>110</td><td>82.4</td><td>86.1</td></tr> <tr><td>125</td><td>81.0</td><td>85.2</td></tr> <tr><td>140</td><td>79.5</td><td>84.4</td></tr> <tr><td>160</td><td>77.5</td><td>83.1</td></tr> <tr><td>170</td><td>76.3</td><td>82.5</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	56	82.7	85.1	60	83.7	86.2	66	84.7	87.1	80	85.0	87.4	95	83.7	86.8	110	82.4	86.1	125	81.0	85.2	140	79.5	84.4	160	77.5	83.1	170	76.3	82.5
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<p>Note: Slanted line shows the range of the rated input voltage.</p>																																				

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Model SNDHS50A12

Item Efficiency (by Load Current)

Object +12V4.2A

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	-	-	-
0.80	73.0	69.7	61.7
1.60	81.7	79.5	73.7
2.40	84.7	83.3	78.8
3.20	85.9	85.0	81.4
4.00	86.4	86.0	82.7
4.20	86.3	86.0	83.0
4.62	86.3	86.2	83.4
--	-	-	-
--	-	-	-
--	-	-	-

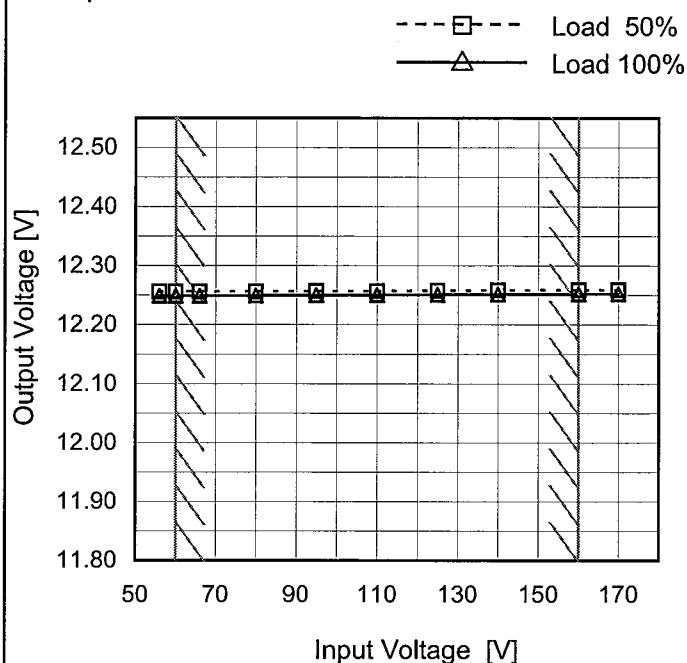
Note: Slanted line shows the range of the rated load current.

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Model	SNDHS50A12
Item	Line Regulation
Object	+12V4.2A

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
56	12.256	12.249
60	12.256	12.249
66	12.256	12.249
80	12.256	12.250
95	12.257	12.250
110	12.257	12.251
125	12.258	12.251
140	12.258	12.252
160	12.259	12.253
170	12.259	12.253

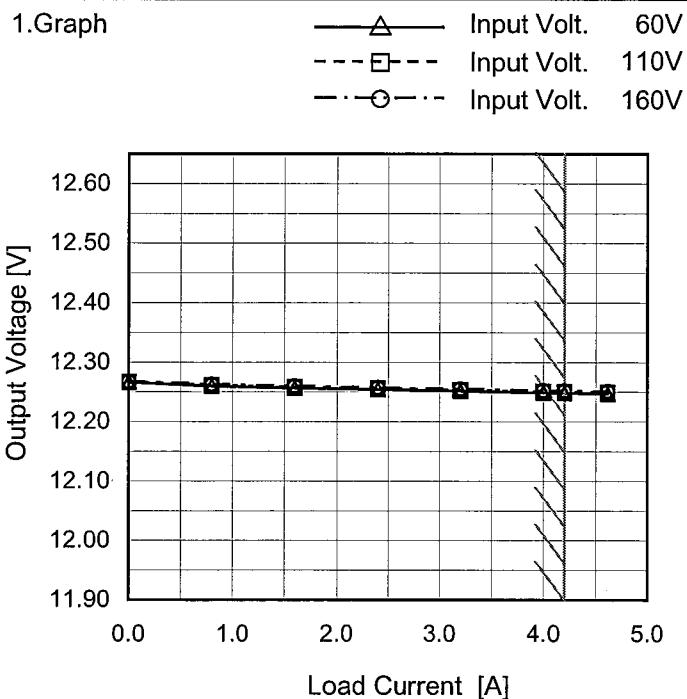
Note: Slanted line shows the range of the rated input voltage.

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Model SNDHS50A12

Item Load Regulation

Object +12V4.2A

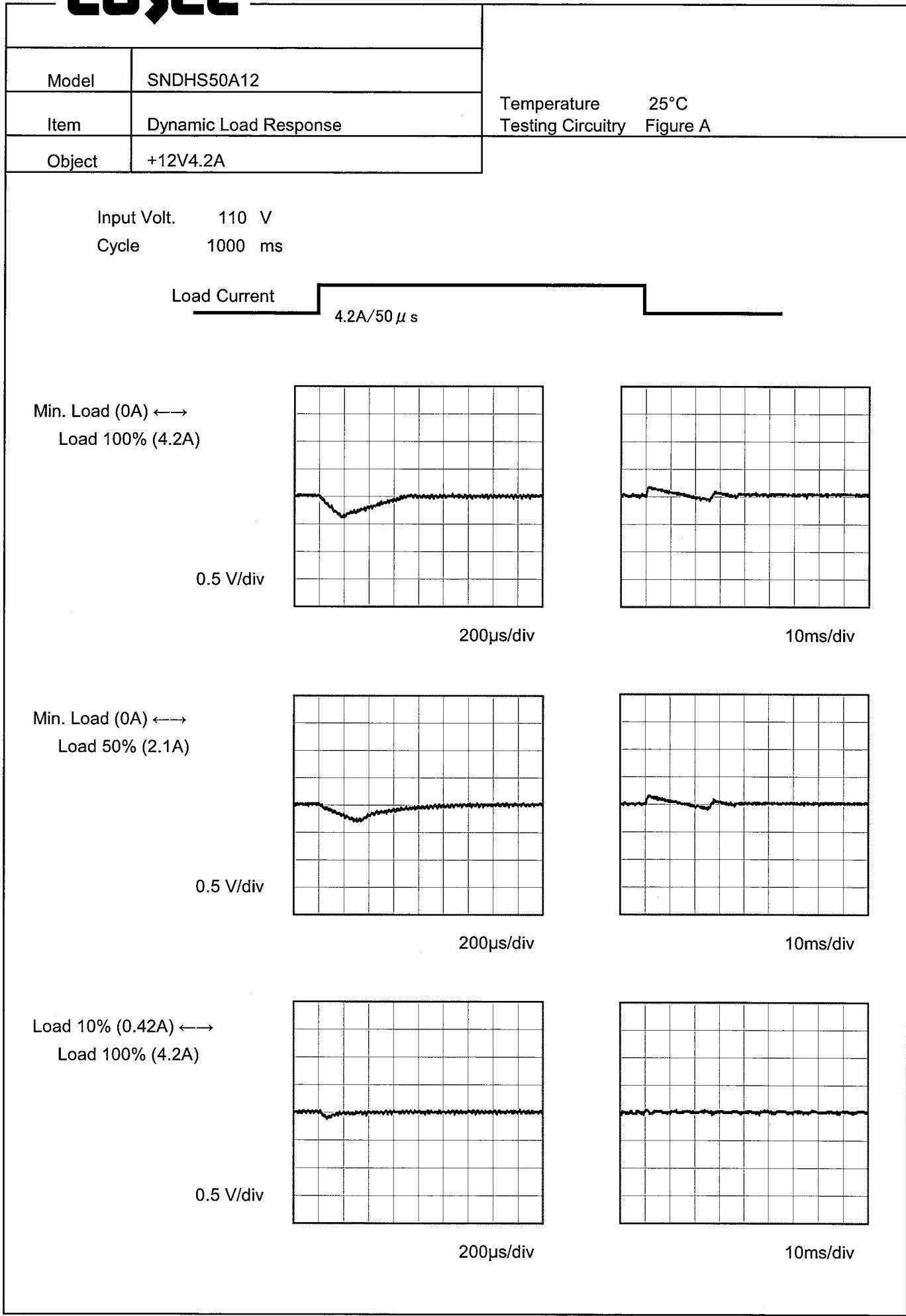


Temperature 25°C
Testing Circuitry Figure A

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 60[V]	Input Volt. 110[V]	Input Volt. 160[V]
0.00	12.267	12.267	12.267
0.80	12.260	12.261	12.263
1.60	12.257	12.258	12.260
2.40	12.254	12.256	12.257
3.20	12.252	12.253	12.255
4.00	12.249	12.251	12.253
4.20	12.248	12.251	12.252
4.62	12.247	12.249	12.251
--	-	-	-
--	-	-	-
--	-	-	-

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

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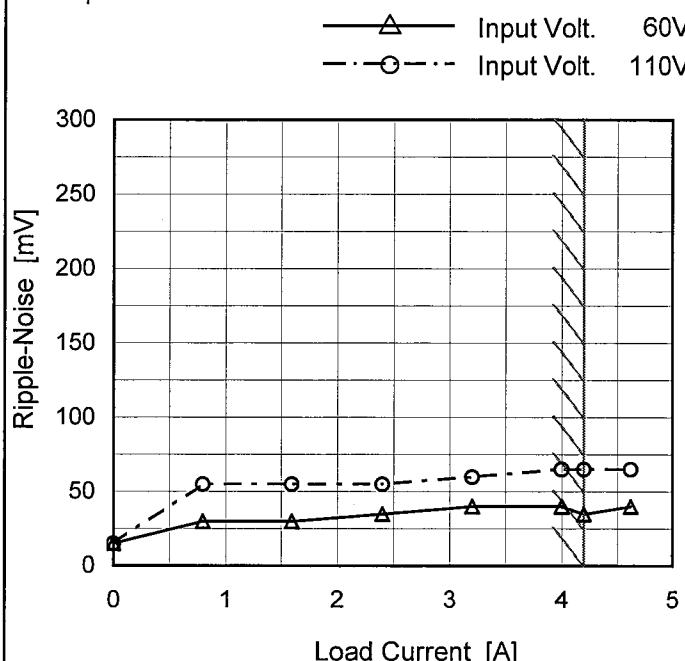
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Load Current [A]	Ripple Voltage [mV] (Input Volt. 60V)	Ripple Voltage [mV] (Input Volt. 160V)																																							
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Measured by 100 MHz Oscilloscope. Ripple Voltage is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.	<p>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</p>																																								

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Model	SNDHS50A12
Item	Ripple-Noise
Object	+12V4.2A

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. 110 [V]
0.00	15	15
0.80	30	55
1.60	30	55
2.40	35	55
3.20	40	60
4.00	40	65
4.20	35	65
4.62	40	65
--	-	-
--	-	-
--	-	-

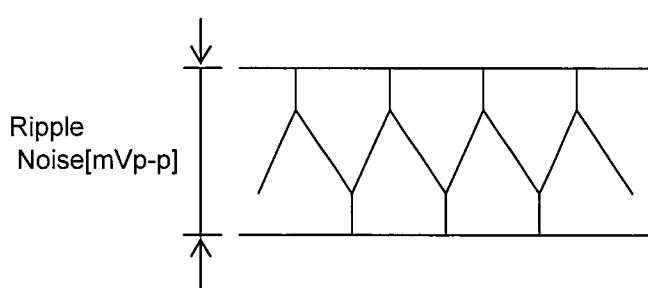
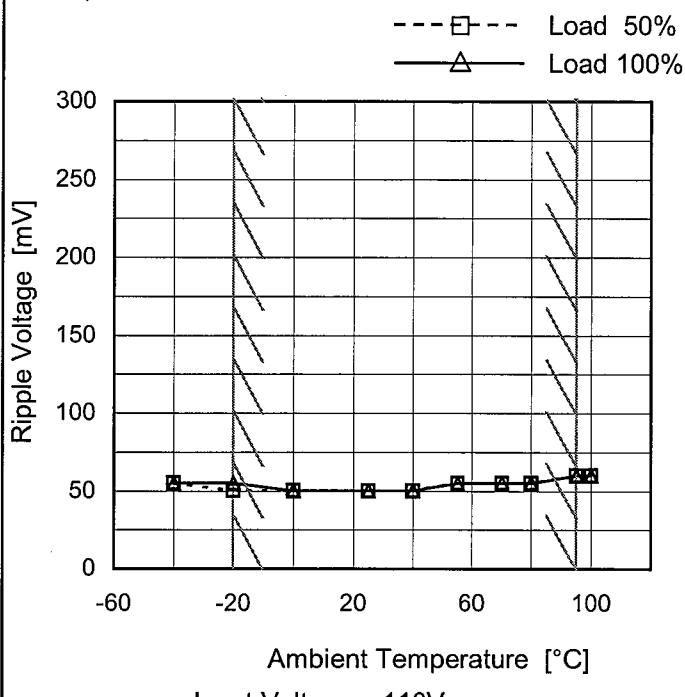


Fig.Complex Ripple Noise Wave Form

Model	SNDHS50A12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V4.2A

Testing Circuitry Figure B

1.Graph



2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	55	55
-20	50	55
0	50	50
25	50	50
40	50	50
55	55	55
70	55	55
80	55	55
95	60	60
100	60	60
--	-	-

Measured by 100 MHz Oscilloscope.

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

Ripple [mVp-p]

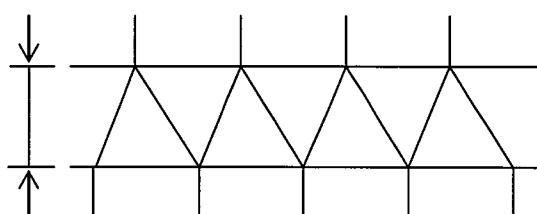
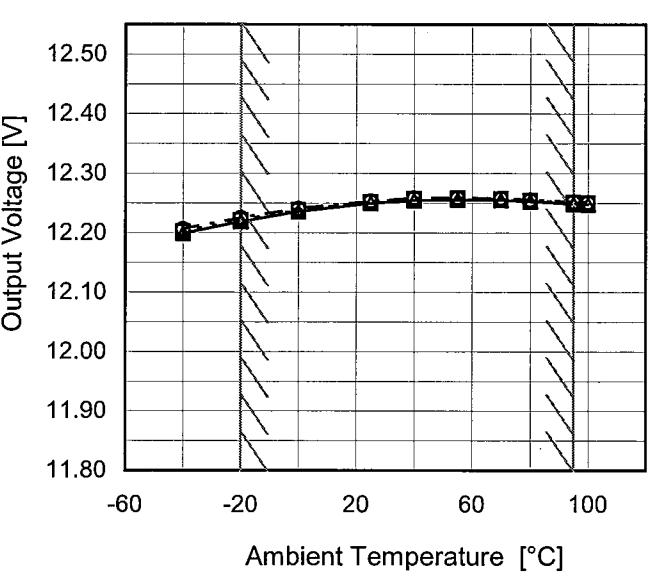


Fig.Complex Ripple Wave Form

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Model	SNDHS50A12	Testing Circuitry Figure A		
Item	Ambient Temperature Drift			
Object	+12V4.2A			
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		
		Ambient Temperature [°C]	Output Voltage [V]	
			Input Volt.	Input Volt.
			60[V]	110[V]
	-40		12.199	12.202
	-20		12.219	12.221
	0		12.236	12.238
	25		12.250	12.251
	40		12.255	12.257
	55		12.256	12.258
	70		12.255	12.257
	80		12.253	12.254
	95		12.249	12.251
	100		12.248	12.250
	--		-	-

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



Model	SNDHS50A12	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V4.2A	

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 - 4.2A

* Output Voltage Accuracy = \pm (Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2. Values

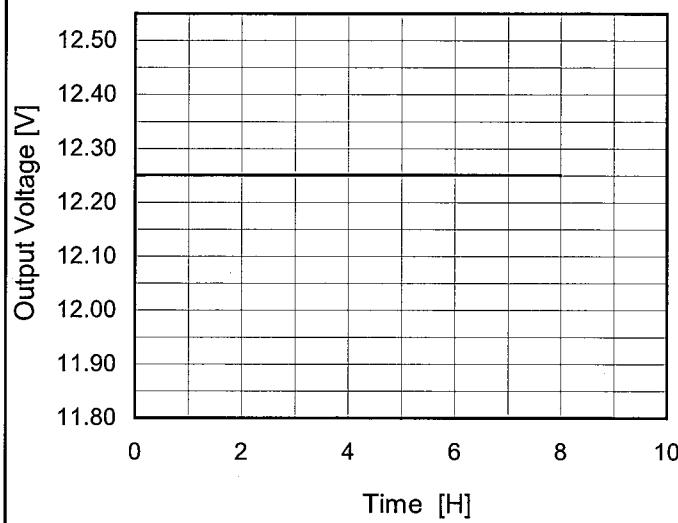
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	70	110	0	12.277	±29	±0.2
Minimum Voltage	-20	60	4.2	12.219		

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Model	SNDHS50A12
Item	Time Lapse Drift
Object	+12V4.2A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Time since start [H]	Output Voltage [V]
0.0	12.247
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	12.251
8.0	12.251

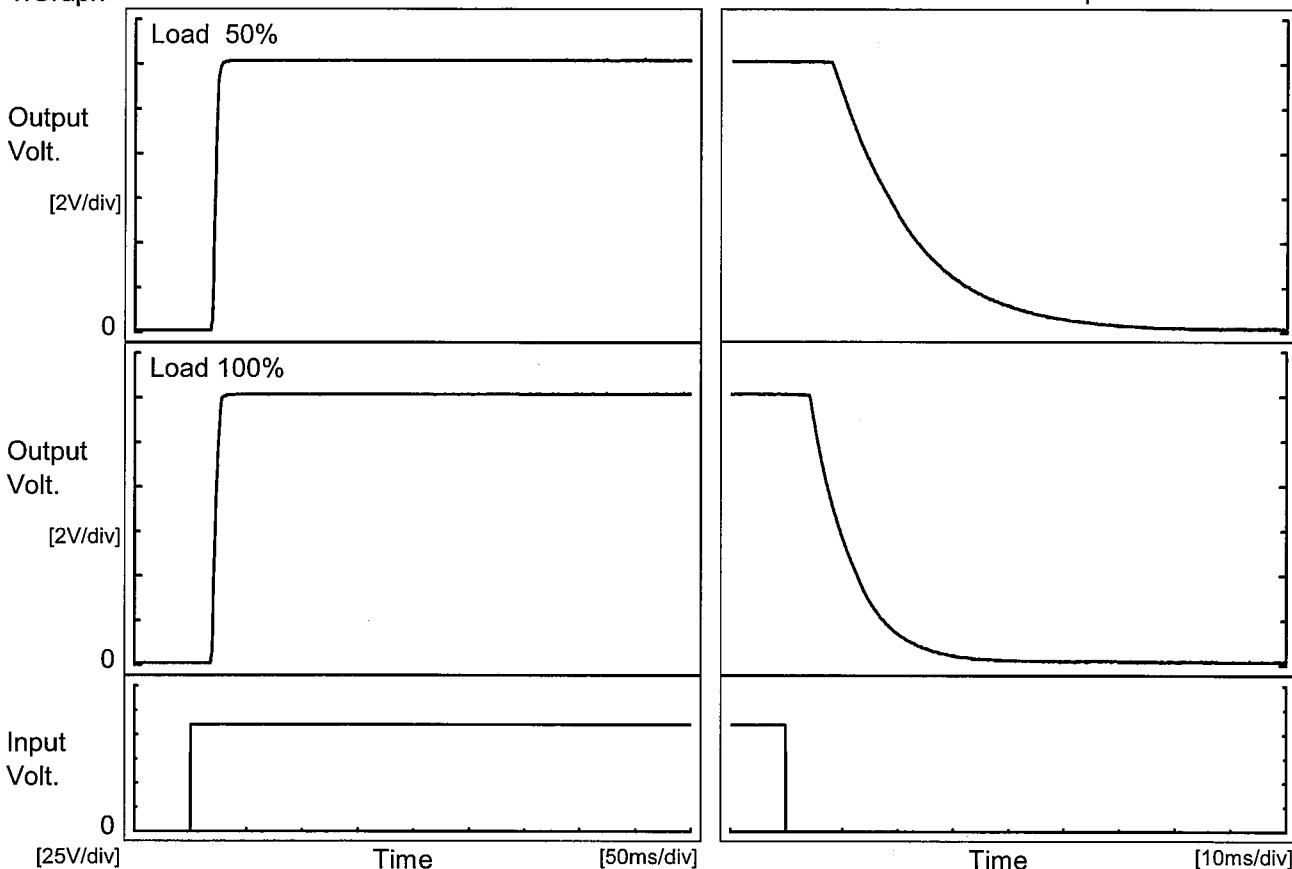
COSEL

Model	SNDHS50A12
Item	Rise and Fall Time
Object	+12V4.2A

Temperature 25°C
Testing Circuitry Figure A

1. Graph

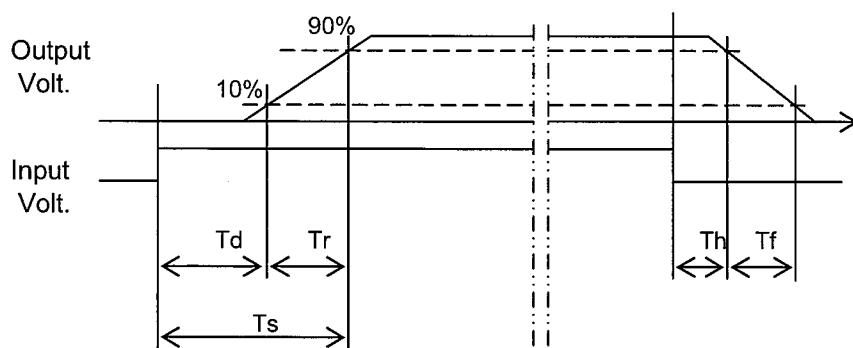
Input Volt. 110 V



2. Values

[ms]

Load	Time	Td	Tr	Ts	Th	Tf
50 %		19.5	4.5	24.0	9.9	30.3
100 %		19.8	6.0	25.8	5.1	16.5



COSEL

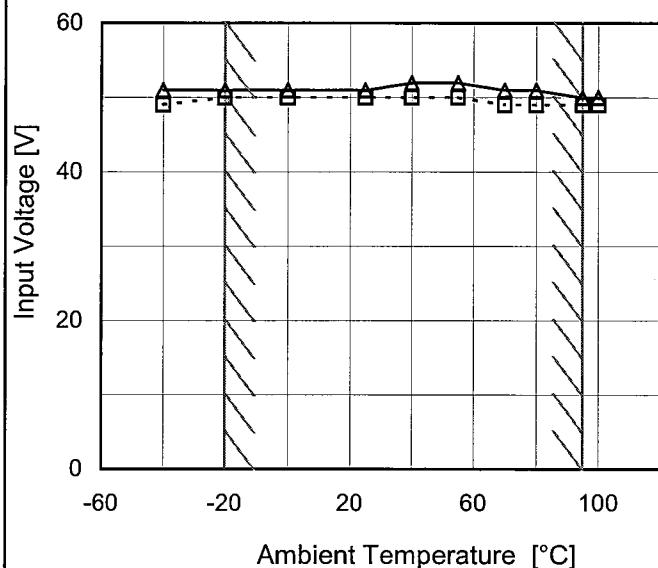
Model SNDHS50A12

Item Minimum Input Voltage
for Regulated Output Voltage

Object +12V4.2A

1.Graph

---□--- Load 50%
—△— Load 100%



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-40	49	51
-20	50	51
0	50	51
25	50	51
40	50	52
55	50	52
70	49	51
80	49	51
95	49	50
100	49	50
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Note: Slanted line shows the range of the rated ambient temperature.

COSEL

Model	SNDHS50A12	Temperature	25°C																																																											
Item	Overcurrent Protection	Testing Circuitry	Figure A																																																											
Object	+12V4.2A																																																													
1.Graph		2.Values																																																												
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Note: Slanted line shows the range of the rated load current.

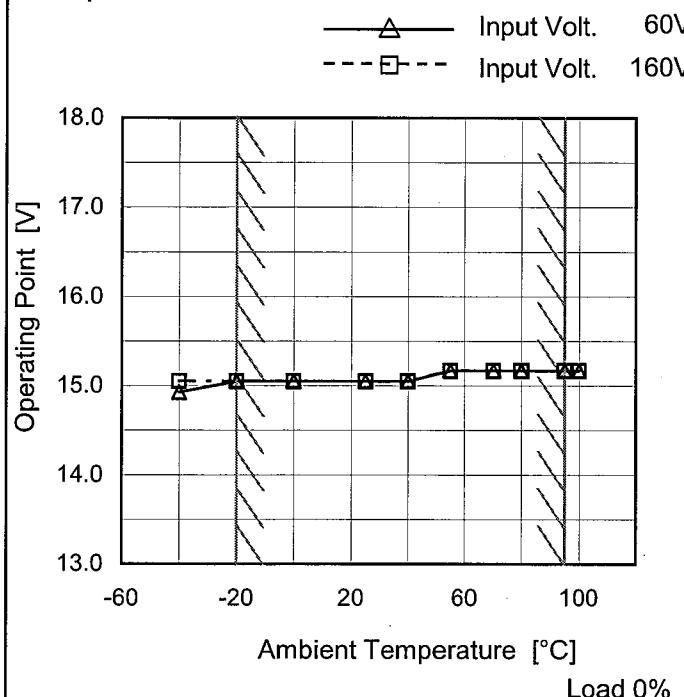
Intermittent operation occurs when overcurrent protection is activated.

Intermittent operation occurs when the output voltage is from 7V to 0V.

COSEL

Model	SNDHS50A12
Item	Overshoot Protection
Object	+12V4.2A

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. 60[V]	Input Volt. 160[V]
-40	14.93	15.05
-20	15.05	15.05
0	15.05	15.05
25	15.05	15.05
40	15.05	15.05
55	15.17	15.17
70	15.17	15.17
80	15.17	15.17
95	15.17	15.17
100	15.17	15.17
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COSEL

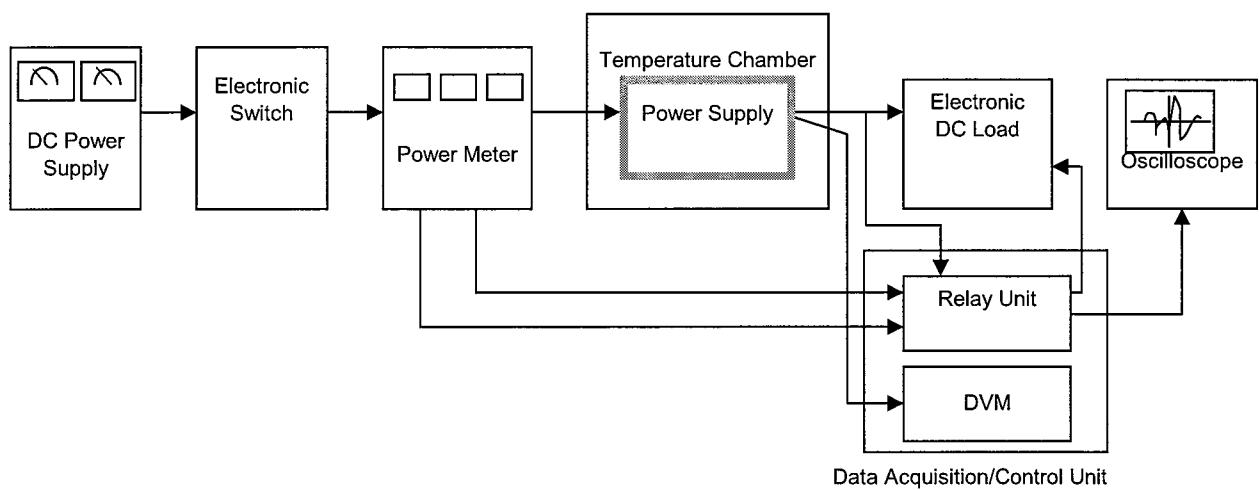


Figure A

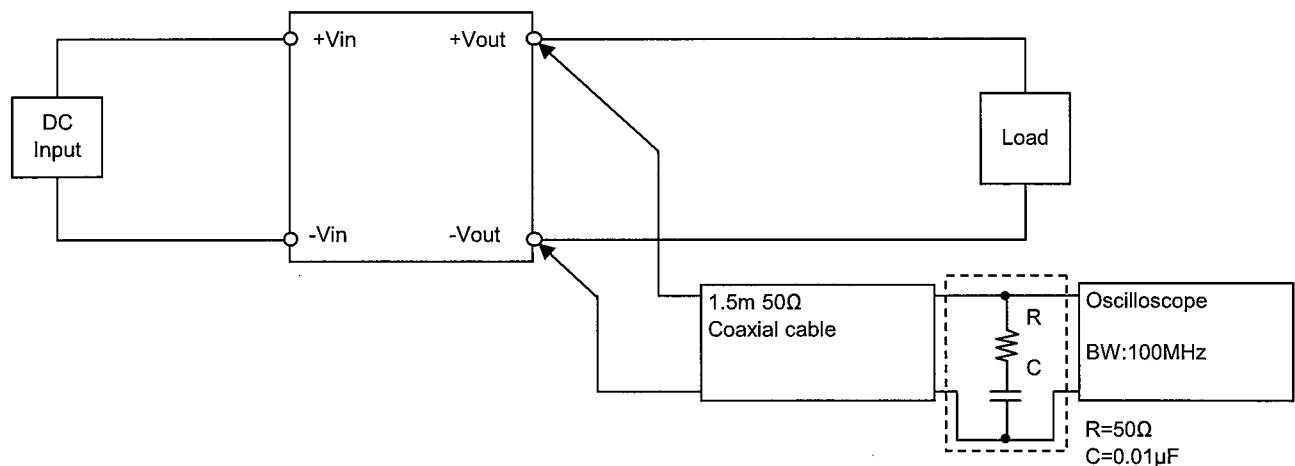


Figure B (Ripple and Ripple noise Characteristic)