

TEST DATA OF SNDPG750

(200V INPUT)

AC-DC Front End Module
June 30, 2011

Approved by : Takahiro Yoneda
Takahiro Yoneda Design Manager

Prepared by : Tadashi Arai
Tadashi Arai Design Engineer

COSEL CO.,LTD.

CONTENTS

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

(Final Page 19)

COSEL

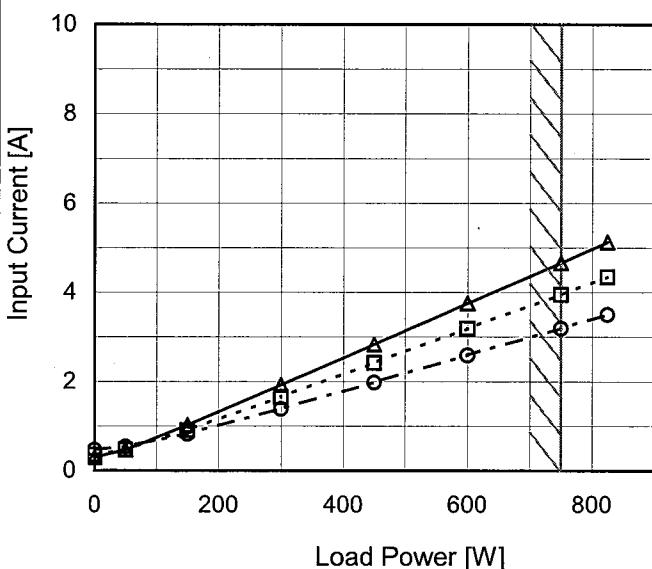
Model SNDPG750

Item Input Current (by Load Power)

Object _____

1. Graph

—△— Input Volt. 170V
 - -□--- Input Volt. 200V
 - -○--- Input Volt. 264V



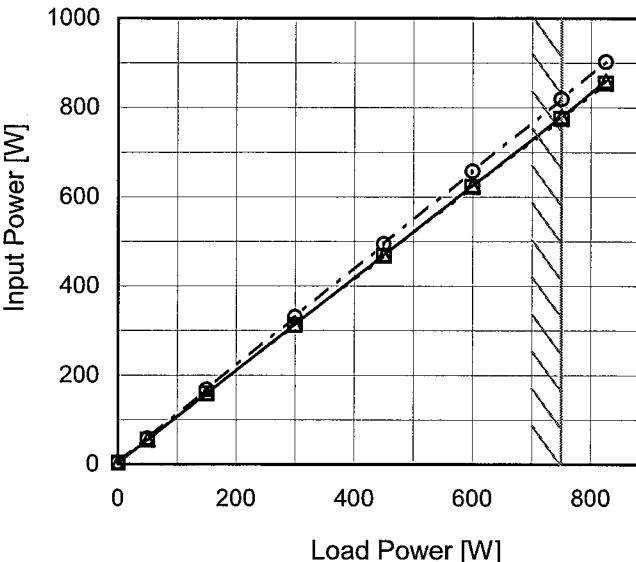
Note: Slanted line shows the range of the rated load power.

 Temperature 25°C
 Testing Circuitry Figure A

2. Values

Load Power [W]	Input Current [A]		
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
0	0.30	0.36	0.47
50	0.47	0.47	0.54
150	1.02	0.90	0.83
300	1.93	1.65	1.39
450	2.84	2.42	1.99
600	3.76	3.19	2.59
750	4.66	3.95	3.19
825	5.13	4.34	3.51
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SNDPG750	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Input Power (by Load Power)																																																					
Object																																																						
1.Graph	<p>—△— Input Volt. 170V - -□--- Input Volt. 200V - ·○--- Input Volt. 264V</p>  <p>The graph plots Input Power [W] on the Y-axis (0 to 1000) against Load Power [W] on the X-axis (0 to 800). Three curves are shown for different input voltages: 170V (solid line with triangles), 200V (dashed line with squares), and 264V (dash-dot line with circles). All curves show a linear increase in input power with load power. A slanted line is drawn across the graph, representing the rated load power range.</p>																																																					
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Power [W]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <th>Input Volt. 170[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 264[V]</th> </tr> </thead> <tbody> <tr> <td>0</td> <td>3.0</td> <td>3.2</td> <td>4.1</td> </tr> <tr> <td>50</td> <td>55.5</td> <td>55.5</td> <td>58.5</td> </tr> <tr> <td>150</td> <td>159.3</td> <td>158.6</td> <td>168.1</td> </tr> <tr> <td>300</td> <td>314.3</td> <td>313.0</td> <td>331.0</td> </tr> <tr> <td>450</td> <td>470.2</td> <td>467.9</td> <td>494.7</td> </tr> <tr> <td>600</td> <td>625.9</td> <td>622.5</td> <td>658.0</td> </tr> <tr> <td>750</td> <td>780.0</td> <td>775.5</td> <td>819.6</td> </tr> <tr> <td>825</td> <td>859.6</td> <td>854.5</td> <td>902.7</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 Power [W]	Input Power [W]			Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]	0	3.0	3.2	4.1	50	55.5	55.5	58.5	150	159.3	158.6	168.1	300	314.3	313.0	331.0	450	470.2	467.9	494.7	600	625.9	622.5	658.0	750	780.0	775.5	819.6	825	859.6	854.5	902.7	--	-	-	-	--	-	-	-	--	-	-	-
Load Power [W]	Input Power [W]																																																					
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]																																																			
0	3.0	3.2	4.1																																																			
50	55.5	55.5	58.5																																																			
150	159.3	158.6	168.1																																																			
300	314.3	313.0	331.0																																																			
450	470.2	467.9	494.7																																																			
600	625.9	622.5	658.0																																																			
750	780.0	775.5	819.6																																																			
825	859.6	854.5	902.7																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load power.																																																					

COSEL

Model	SNDPG750	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 (50 to 100) against Input Voltage [V] on the x-axis (140 to 300). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show efficiency staying above 90% across the entire input voltage range. Two vertical slanted lines are drawn on the graph, one on each side of the main data points, indicating the rated input voltage range.</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>150</td><td>95.8</td><td>95.9</td></tr> <tr><td>170</td><td>96.2</td><td>96.4</td></tr> <tr><td>180</td><td>96.4</td><td>96.6</td></tr> <tr><td>200</td><td>96.7</td><td>97.0</td></tr> <tr><td>220</td><td>96.9</td><td>97.2</td></tr> <tr><td>240</td><td>97.1</td><td>97.5</td></tr> <tr><td>255</td><td>97.2</td><td>97.5</td></tr> <tr><td>264</td><td>97.1</td><td>97.5</td></tr> <tr><td>280</td><td>97.8</td><td>97.9</td></tr> </tbody> </table>	Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	150	95.8	95.9	170	96.2	96.4	180	96.4	96.6	200	96.7	97.0	220	96.9	97.2	240	97.1	97.5	255	97.2	97.5	264	97.1	97.5	280	97.8	97.9
Input Voltage [V]	Efficiency [%]																																		
	Load 50%	Load 100%																																	
150	95.8	95.9																																	
170	96.2	96.4																																	
180	96.4	96.6																																	
200	96.7	97.0																																	
220	96.9	97.2																																	
240	97.1	97.5																																	
255	97.2	97.5																																	
264	97.1	97.5																																	
280	97.8	97.9																																	

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

COSEL

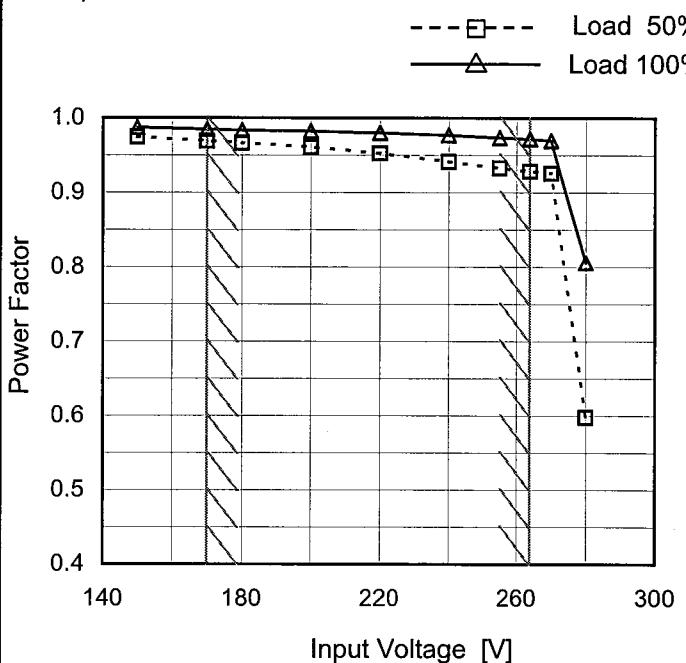
Model	SNDPG750	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Efficiency (by Load Power)																																																					
Object	_____																																																					
1.Graph	<p>—△— Input Volt. 170V - - □ - - Input Volt. 200V - - ○ - - Input Volt. 264V</p> <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Load Power [W]</th> <th>Efficiency [170V] (%)</th> <th>Efficiency [200V] (%)</th> <th>Efficiency [264V] (%)</th> </tr> </thead> <tbody> <tr><td>0</td><td>91</td><td>91</td><td>91</td></tr> <tr><td>100</td><td>93</td><td>93</td><td>93</td></tr> <tr><td>200</td><td>95</td><td>95</td><td>95</td></tr> <tr><td>300</td><td>96</td><td>96</td><td>96</td></tr> <tr><td>400</td><td>97</td><td>97</td><td>97</td></tr> <tr><td>500</td><td>98</td><td>98</td><td>98</td></tr> <tr><td>600</td><td>98.5</td><td>98.5</td><td>98.5</td></tr> <tr><td>700</td><td>98.8</td><td>98.8</td><td>98.8</td></tr> <tr><td>800</td><td>99</td><td>99</td><td>99</td></tr> </tbody> </table>			Load Power [W]	Efficiency [170V] (%)	Efficiency [200V] (%)	Efficiency [264V] (%)	0	91	91	91	100	93	93	93	200	95	95	95	300	96	96	96	400	97	97	97	500	98	98	98	600	98.5	98.5	98.5	700	98.8	98.8	98.8	800	99	99	99											
Load Power [W]	Efficiency [170V] (%)	Efficiency [200V] (%)	Efficiency [264V] (%)																																																			
0	91	91	91																																																			
100	93	93	93																																																			
200	95	95	95																																																			
300	96	96	96																																																			
400	97	97	97																																																			
500	98	98	98																																																			
600	98.5	98.5	98.5																																																			
700	98.8	98.8	98.8																																																			
800	99	99	99																																																			
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Power [W]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 170[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 264[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>50</td><td>92.3</td><td>92.0</td><td>93.9</td></tr> <tr><td>150</td><td>95.2</td><td>95.6</td><td>95.9</td></tr> <tr><td>300</td><td>96.2</td><td>96.5</td><td>97.0</td></tr> <tr><td>450</td><td>96.3</td><td>96.9</td><td>97.3</td></tr> <tr><td>600</td><td>96.4</td><td>96.9</td><td>97.5</td></tr> <tr><td>750</td><td>96.4</td><td>97.0</td><td>97.5</td></tr> <tr><td>825</td><td>96.4</td><td>97.0</td><td>97.5</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> </tbody> </table>			Load Power [W]	Efficiency [%]			Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]	0	-	-	-	50	92.3	92.0	93.9	150	95.2	95.6	95.9	300	96.2	96.5	97.0	450	96.3	96.9	97.3	600	96.4	96.9	97.5	750	96.4	97.0	97.5	825	96.4	97.0	97.5	--	-	-	-	--	-	-	-	--	-	-	-
Load Power [W]	Efficiency [%]																																																					
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]																																																			
0	-	-	-																																																			
50	92.3	92.0	93.9																																																			
150	95.2	95.6	95.9																																																			
300	96.2	96.5	97.0																																																			
450	96.3	96.9	97.3																																																			
600	96.4	96.9	97.5																																																			
750	96.4	97.0	97.5																																																			
825	96.4	97.0	97.5																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load power.																																																					

COSEL

Model	SNDPG750
Item	Power Factor (by Input Voltage)
Object	—

Temperature 25°C
 Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
150	0.975	0.988
170	0.969	0.985
180	0.966	0.984
200	0.961	0.982
220	0.952	0.980
240	0.941	0.977
255	0.933	0.974
264	0.929	0.972
270	0.926	0.970
280	0.598	0.806

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

COSEL

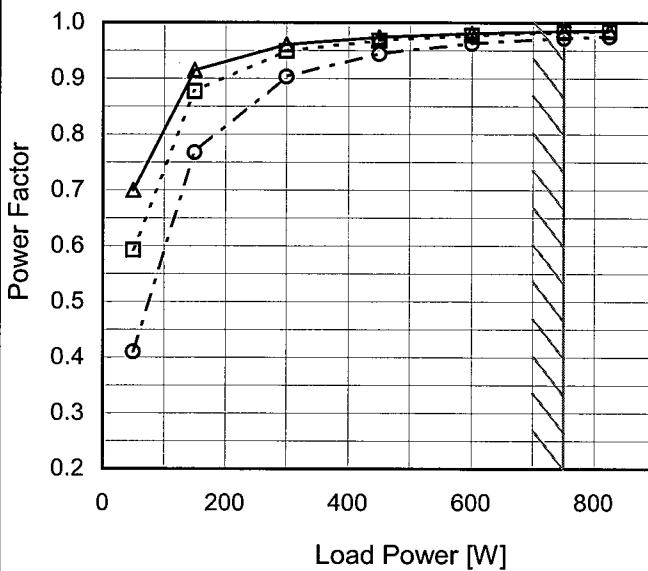
Model SNDPG750

Item Power Factor (by Load Power)

Object _____

1. Graph

—△— Input Volt. 170V
 - - -□--- Input Volt. 200V
 - -○--- Input Volt. 264V



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

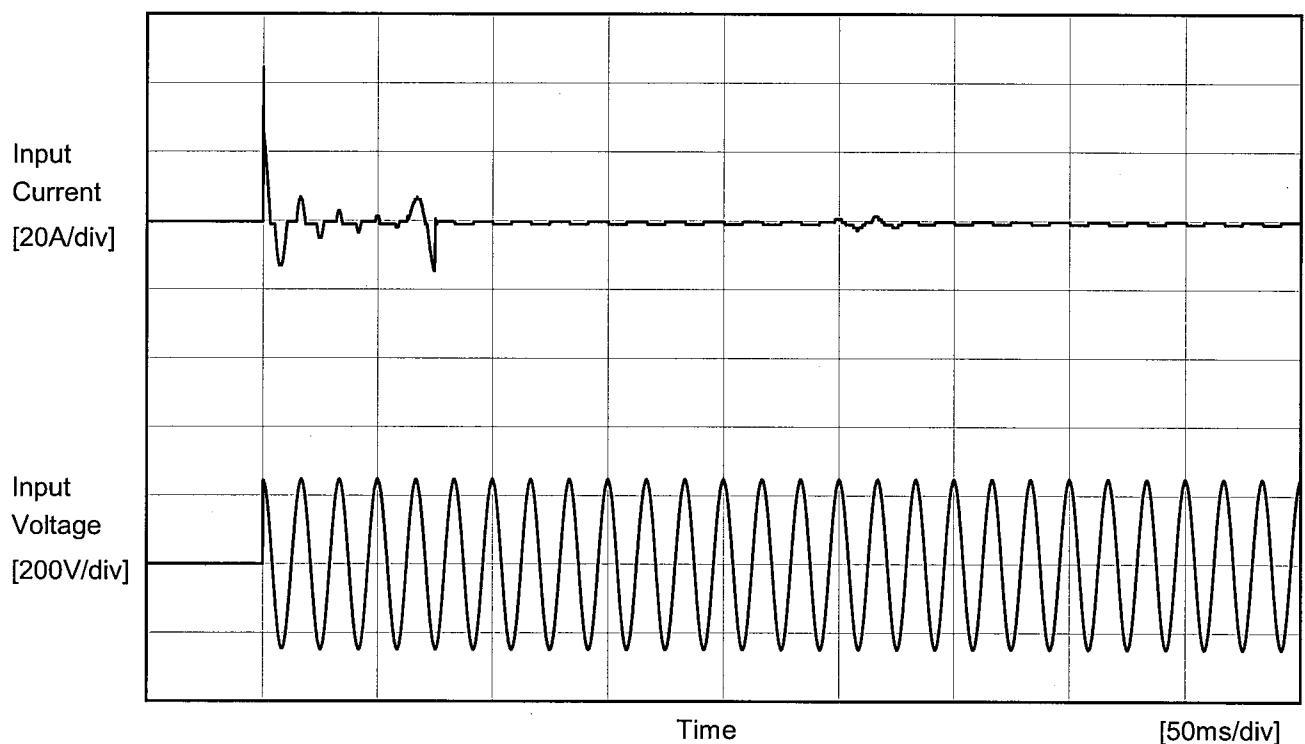
 Temperature 25°C
 Testing Circuitry Figure A

2. Values

Load Power [W]	Power Factor		
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
50	0.700	0.592	0.410
150	0.915	0.877	0.768
300	0.961	0.949	0.904
450	0.974	0.968	0.944
600	0.981	0.977	0.962
750	0.985	0.982	0.972
825	0.986	0.984	0.975
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	SNDPG750	Temperature Testing Circuitry	25°C
Item	Inrush Current		Figure A
Object	—		



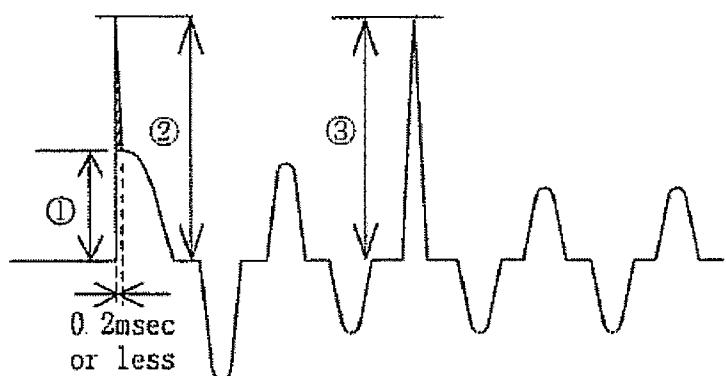
Input Voltage 200 V

Frequency 60 Hz

Load 0 %

inrush current

- ① 26A Primary inrush current
- ② 44.5A (0.2msec or less)※1
- ③ 14.7A Secondary inrush current



※1 The specification of the inrush current (primary surge) means that the surge current to a built-in noise filter (0.2msec or less : waveform ②) is excluded.



Model	SNDPG750	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	_____		

1. Results

Standards	Leakage Current [mA]		
	Input Volt. 85 [V]	Input Volt. 100 [V]	Input Volt. 132 [V]
(A)DEN-AN	-	-	-
(B)IEC60950-1	-	-	-

Standards	Leakage Current [mA]		
	Input Volt. 170 [V]	Input Volt. 240 [V]	Input Volt. 264 [V]
(B)IEC60950-1	0.25	0.29	0.38

2. Condition

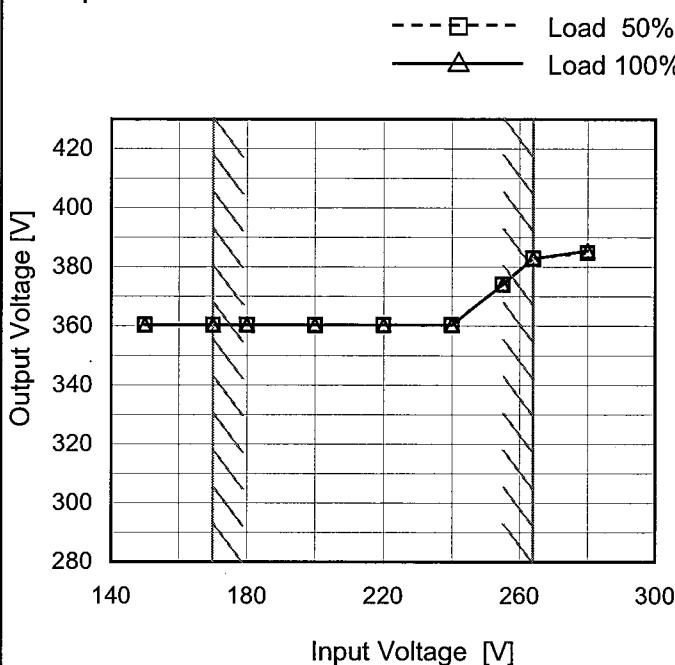
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

COSEL

Model	SNDPG750
Item	Line Regulation
Object	+360V 750W

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

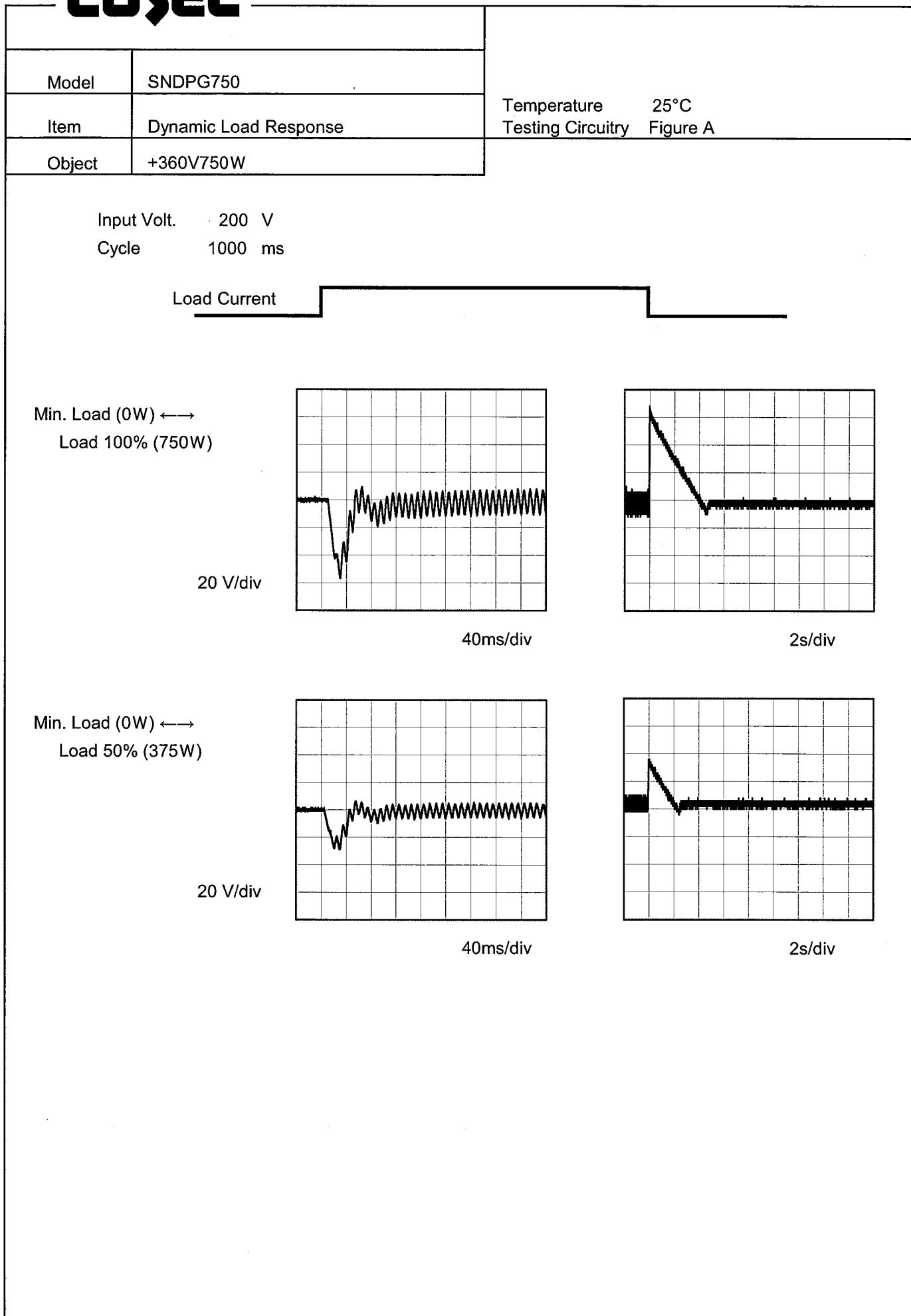
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
150	360.35	360.35
170	360.36	360.37
180	360.35	360.38
200	360.36	360.39
220	360.37	360.39
240	360.37	360.40
255	374.19	374.22
264	383.00	383.02
280	384.87	385.53

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

COSEL

Model	SNDPG750	Temperature 25°C Testing Circuitry Figure A																																																					
Item	Load Regulation																																																						
Object	+360V 750W																																																						
1.Graph	<p>Output Voltage [V]</p> <p>Load Power [W]</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 170V Input Volt. 200V Input Volt. 264V 	2.Values																																																					
		<table border="1"> <thead> <tr> <th rowspan="2">Load Power [W]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 170[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 264[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>360.30</td><td>360.32</td><td>384.24</td></tr> <tr><td>50</td><td>360.29</td><td>360.31</td><td>383.99</td></tr> <tr><td>150</td><td>360.26</td><td>360.28</td><td>382.94</td></tr> <tr><td>300</td><td>360.25</td><td>360.27</td><td>382.92</td></tr> <tr><td>450</td><td>360.25</td><td>360.27</td><td>382.92</td></tr> <tr><td>600</td><td>360.26</td><td>360.27</td><td>382.92</td></tr> <tr><td>750</td><td>360.29</td><td>360.29</td><td>382.92</td></tr> <tr><td>825</td><td>360.30</td><td>360.31</td><td>382.94</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 Power [W]	Output Voltage [V]			Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]	0	360.30	360.32	384.24	50	360.29	360.31	383.99	150	360.26	360.28	382.94	300	360.25	360.27	382.92	450	360.25	360.27	382.92	600	360.26	360.27	382.92	750	360.29	360.29	382.92	825	360.30	360.31	382.94	--	-	-	-	--	-	-	-	--	-	-	-
Load Power [W]	Output Voltage [V]																																																						
	Input Volt. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]																																																				
0	360.30	360.32	384.24																																																				
50	360.29	360.31	383.99																																																				
150	360.26	360.28	382.94																																																				
300	360.25	360.27	382.92																																																				
450	360.25	360.27	382.92																																																				
600	360.26	360.27	382.92																																																				
750	360.29	360.29	382.92																																																				
825	360.30	360.31	382.94																																																				
--	-	-	-																																																				
--	-	-	-																																																				
--	-	-	-																																																				

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

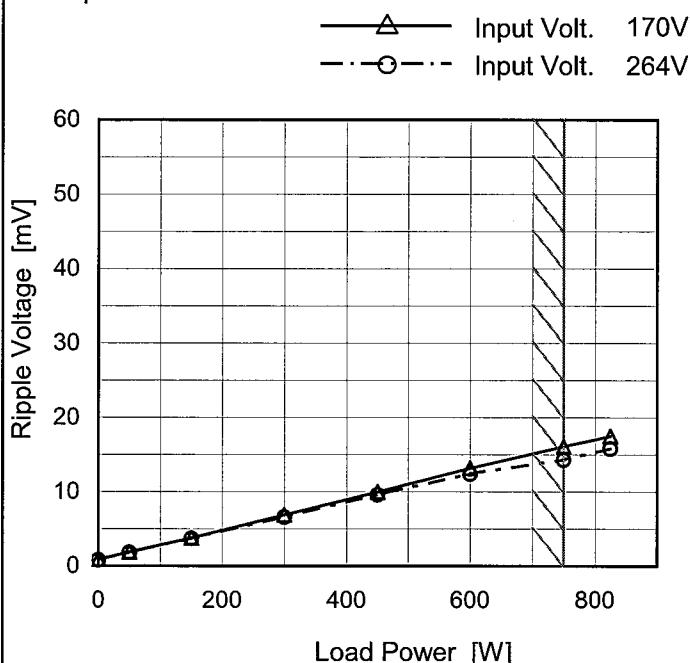
COSEL

COSEL

Model	SNDPG750
Item	Ripple Voltage (by Load Current)
Object	+360V750W

 Temperature 25°C
 Testing Circuitry Figure A

1. Graph



2. Values

Load Power [W]	Ripple Voltage [mV]	
	Input Volt. 170 [V]	Input Volt. 264 [V]
0	0.9	0.8
50	1.9	1.8
150	3.8	3.7
300	6.9	6.6
450	10	9.6
600	13.2	12.4
750	16.1	14.3
825	17.5	15.8
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

Ripple Voltage is shown as p-p in the figure below.

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

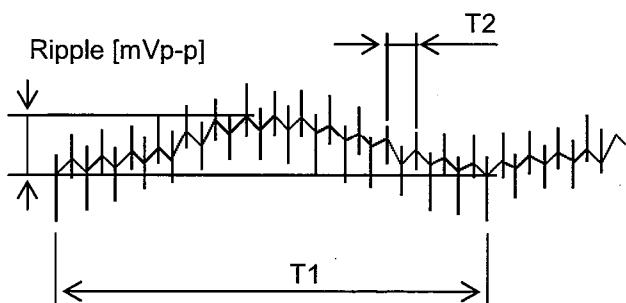
 T1: Due to AC Input Line
 T2: Due to Switching


Fig. Complex Ripple Wave Form



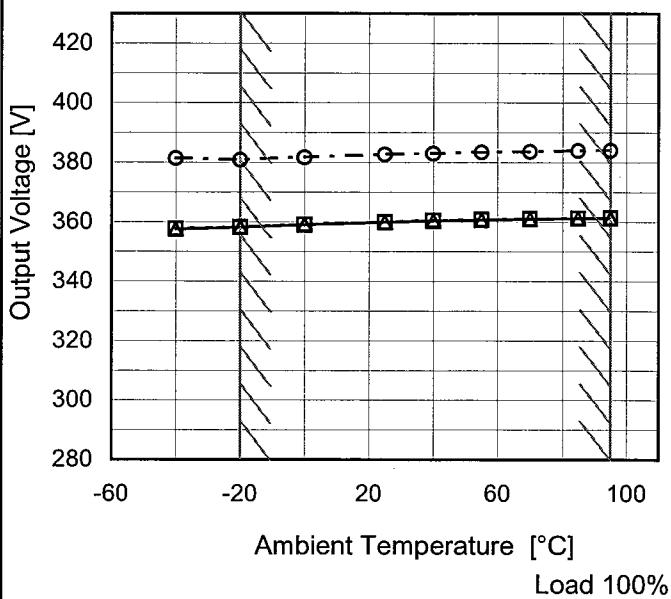
Model SNDPG750

Item Ambient Temperature Drift

Object +360V 750W

1. Graph

—△— Input Volt. 170V
 - - □ - - Input Volt. 200V
 - - ○ - - Input Volt. 264V



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. 170[V]	Input Volt. 200[V]	Input Volt. 264[V]
-40	357.60	357.66	381.43
-20	358.23	358.28	380.85
0	359.06	359.10	381.72
25	359.94	359.98	382.65
40	360.42	360.45	383.06
55	360.75	360.78	383.47
70	361.04	361.07	383.68
85	361.25	361.27	383.96
95	361.38	361.40	384.09
--	-	-	-
--	-	-	-



Model	SNDPG750	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+360V 750W	

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 : 170 - 240V

Load Power : 0 - 750W

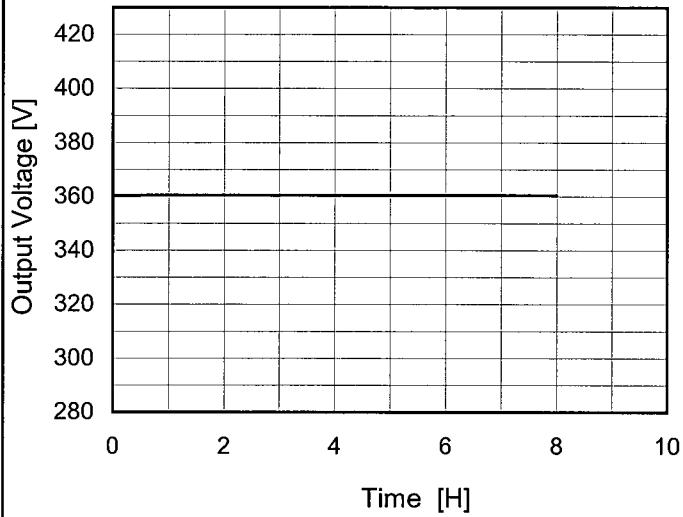
* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Power[W]	Voltage[V]	Value [V]	Ration [%]
Maximum Voltage	95	240	0	361.41	±2	±0.4
Minimum Voltage	-20	200	0	358.14		

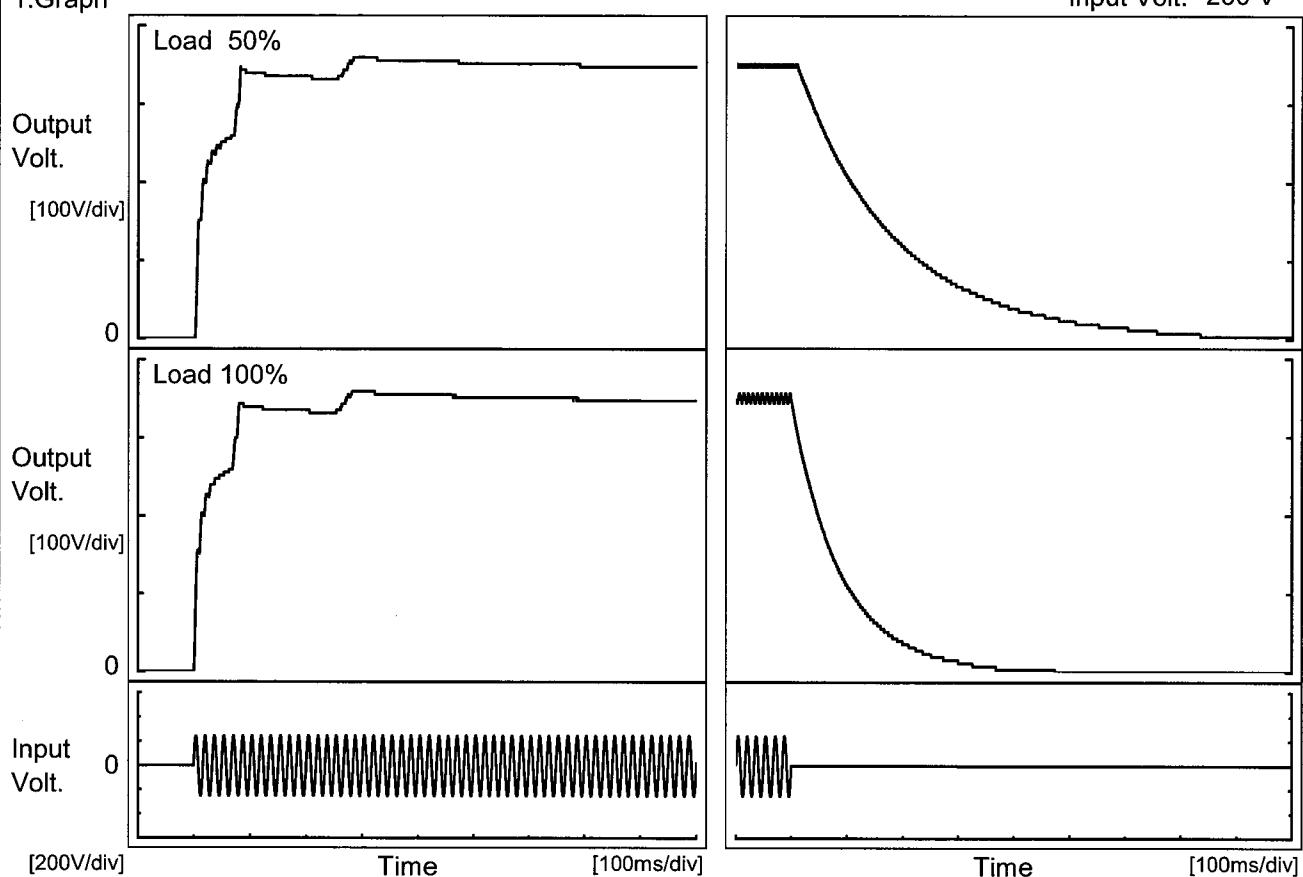
COSEL

Model	SNDPG750	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+360V 500W																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 200V 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>360.40</td></tr> <tr><td>0.5</td><td>360.50</td></tr> <tr><td>1.0</td><td>360.50</td></tr> <tr><td>2.0</td><td>360.50</td></tr> <tr><td>3.0</td><td>360.50</td></tr> <tr><td>4.0</td><td>360.50</td></tr> <tr><td>5.0</td><td>360.50</td></tr> <tr><td>6.0</td><td>360.50</td></tr> <tr><td>7.0</td><td>360.50</td></tr> <tr><td>8.0</td><td>360.50</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	360.40	0.5	360.50	1.0	360.50	2.0	360.50	3.0	360.50	4.0	360.50	5.0	360.50	6.0	360.50	7.0	360.50	8.0	360.50
Time since start [H]	Output Voltage [V]																								
0.0	360.40																								
0.5	360.50																								
1.0	360.50																								
2.0	360.50																								
3.0	360.50																								
4.0	360.50																								
5.0	360.50																								
6.0	360.50																								
7.0	360.50																								
8.0	360.50																								

COSEL

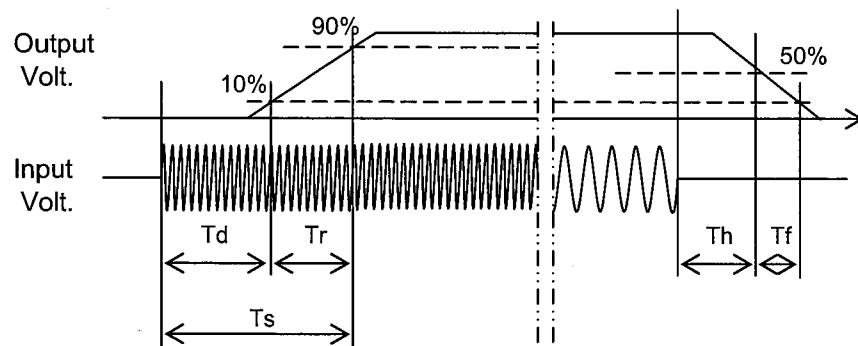
Model	SNDPG750	Temperature Testing Circuitry	25°C Figure A
Item	Rise and Fall Time		
Object	+360V 750W		

1. Graph



2. Values

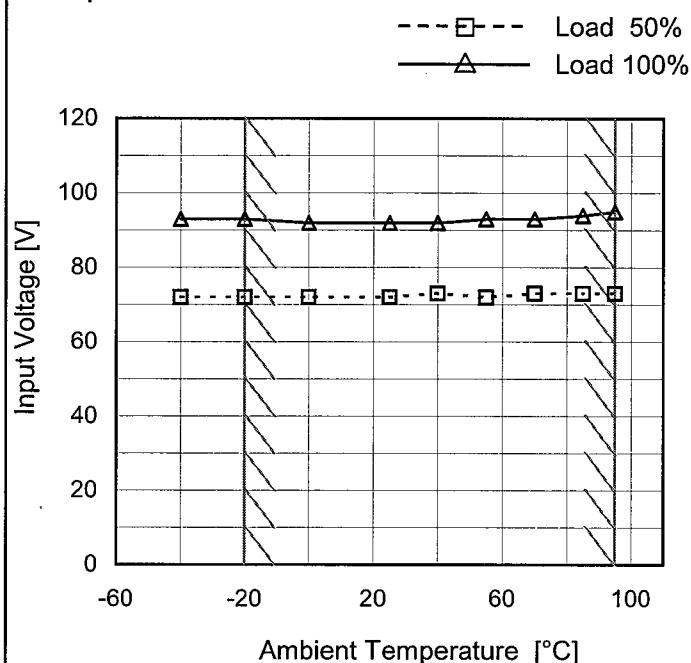
Load	Time	Td	Tr	Ts	Th	Tf	[ms]
50 %		4.0	77.0	81.0	124.0	284.0	
100 %		2.0	76.0	78.0	56.0	143.0	



COSEL

Model	SNDPG750
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+360V 750W

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	72	93
-20	72	93
0	72	92
25	72	92
40	73	92
55	72	93
70	73	93
85	73	94
95	73	95
--	-	-
--	-	-

COSEL

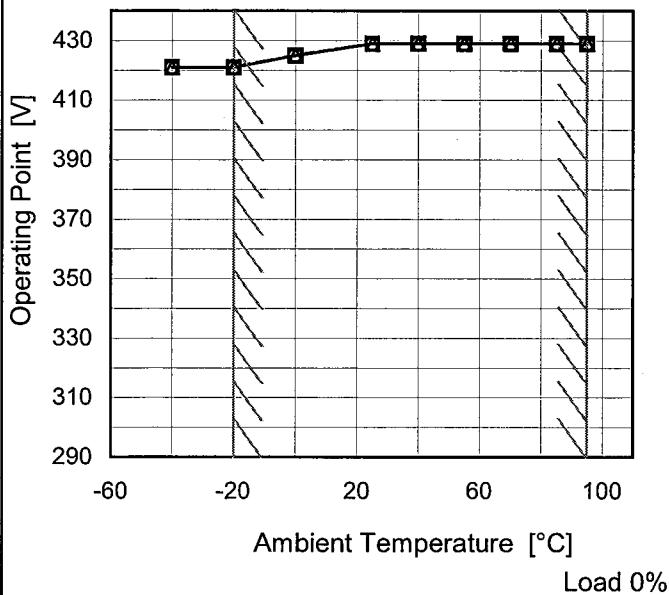
Model SNDPG750

Item Overvoltage Protection

Object +360V750W

1. Graph

—△— Input Volt. 170V
 - - □ - - Input Volt. 264V



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. 170[V]	Input Volt. 264[V]
-40	421.00	421.00
-20	421.00	421.00
0	425.00	425.00
25	429.00	429.00
40	429.00	429.00
55	429.00	429.00
70	429.00	429.00
85	429.00	429.00
95	429.00	429.00
--	-	-
--	-	-

COSEL

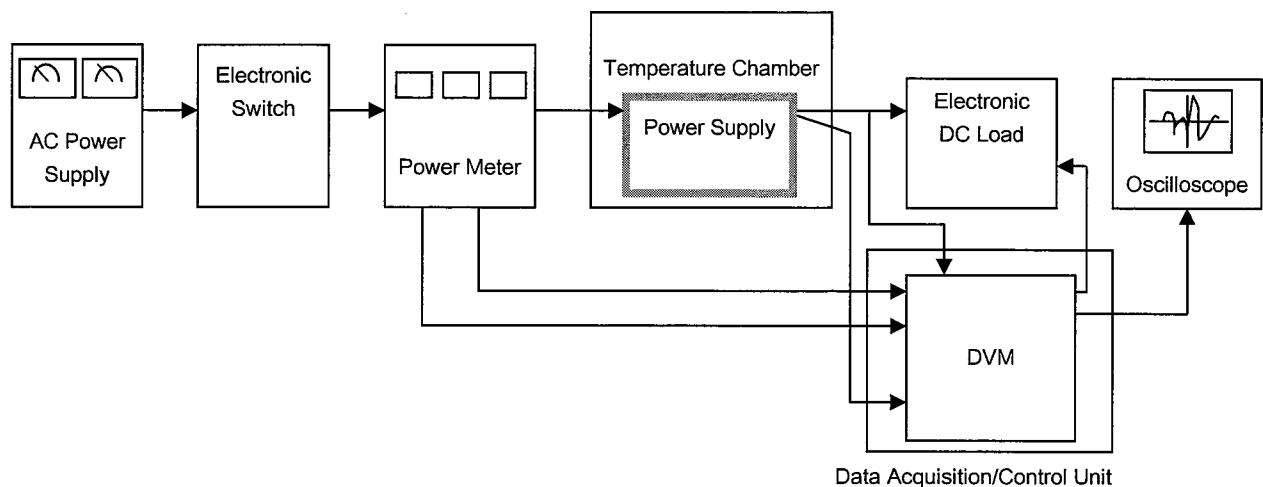


Figure A

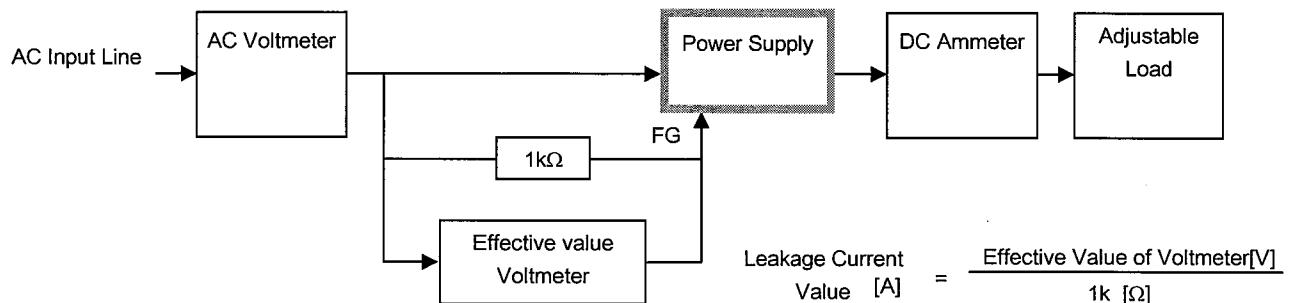


Figure B (DEN-AN)

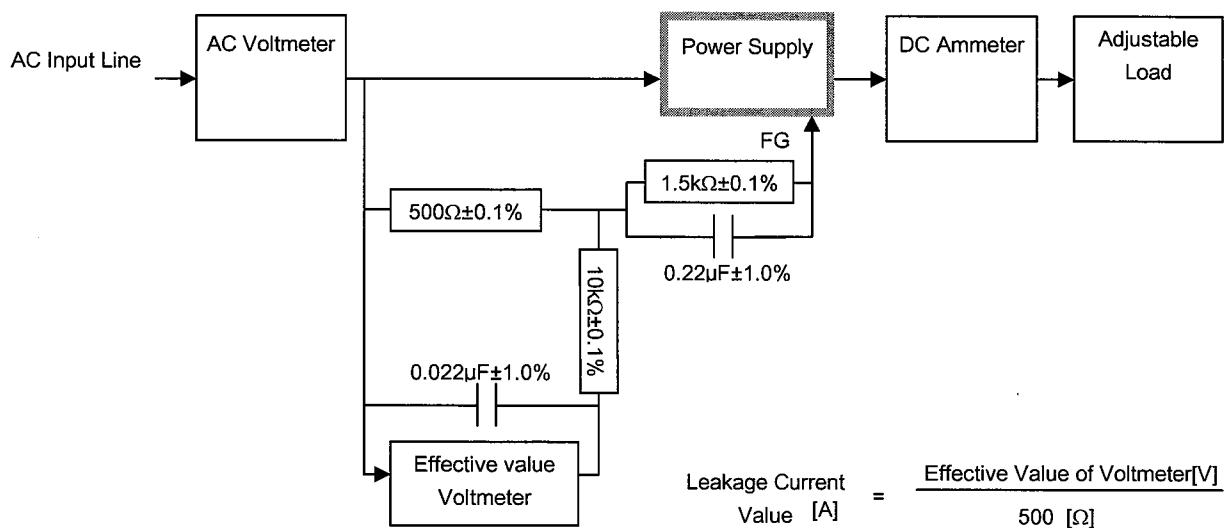


Figure B (IEC60950-1)