

TEST DATA OF SNTUNS100F12

Regulated DC Power Supply
July 23, 2013

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Takahiro Yoneda Design Manager

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Satoshi Kinoshita Design Engineer

COSEL CO.,LTD.

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<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Input Voltage [V] on the x-axis (50 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 a slight upward trend. 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>80</td><td>77.2</td><td>79.1</td></tr> <tr><td>85</td><td>77.7</td><td>79.9</td></tr> <tr><td>100</td><td>78.7</td><td>81.5</td></tr> <tr><td>120</td><td>79.4</td><td>82.9</td></tr> <tr><td>200</td><td>80.1</td><td>84.5</td></tr> <tr><td>230</td><td>80.1</td><td>84.8</td></tr> <tr><td>264</td><td>80.4</td><td>85.1</td></tr> <tr><td>280</td><td>81.2</td><td>84.9</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	80	77.2	79.1	85	77.7	79.9	100	78.7	81.5	120	79.4	82.9	200	80.1	84.5	230	80.1	84.8	264	80.4	85.1	280	81.2	84.9	--	-	-
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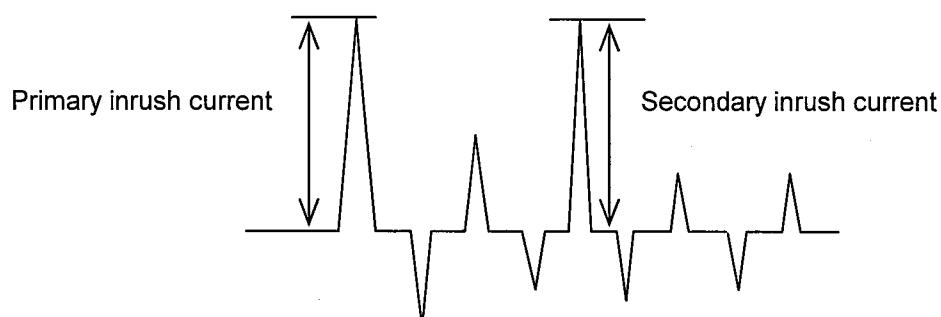
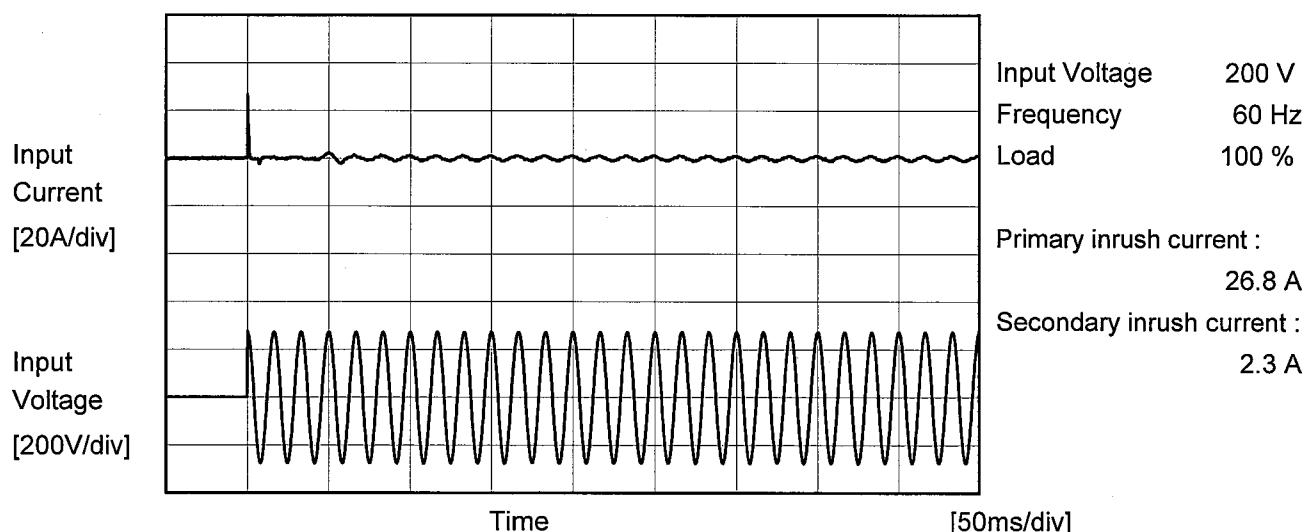
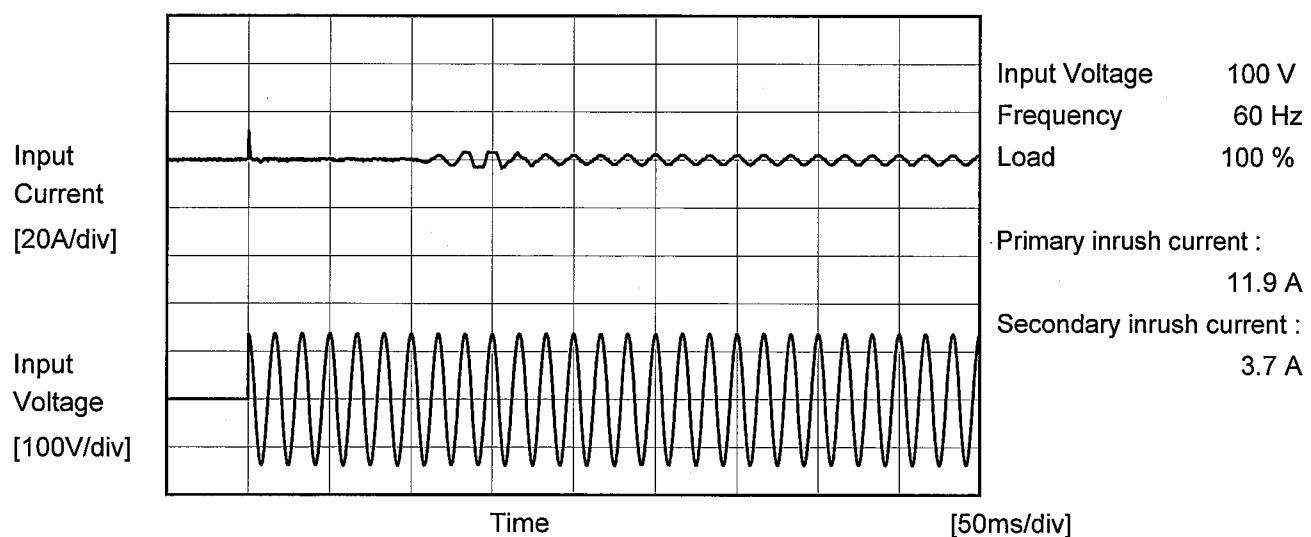
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Note: Slanted line shows the range of the rated load current.

COSEL

Model	SNTUNS100F12	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	—		





Model	SNTUNS100F12	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	<hr/>		

1. Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
IEC60950-1	Both phases	0.18	0.38	0.48	Operation
	One of phases	0.32	0.74	0.92	Stand by

The value for "One of phases" is the reference value only.

2. Condition

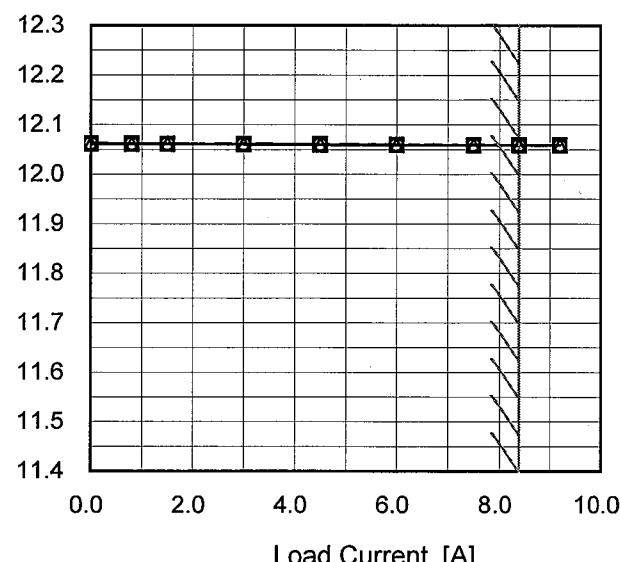
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

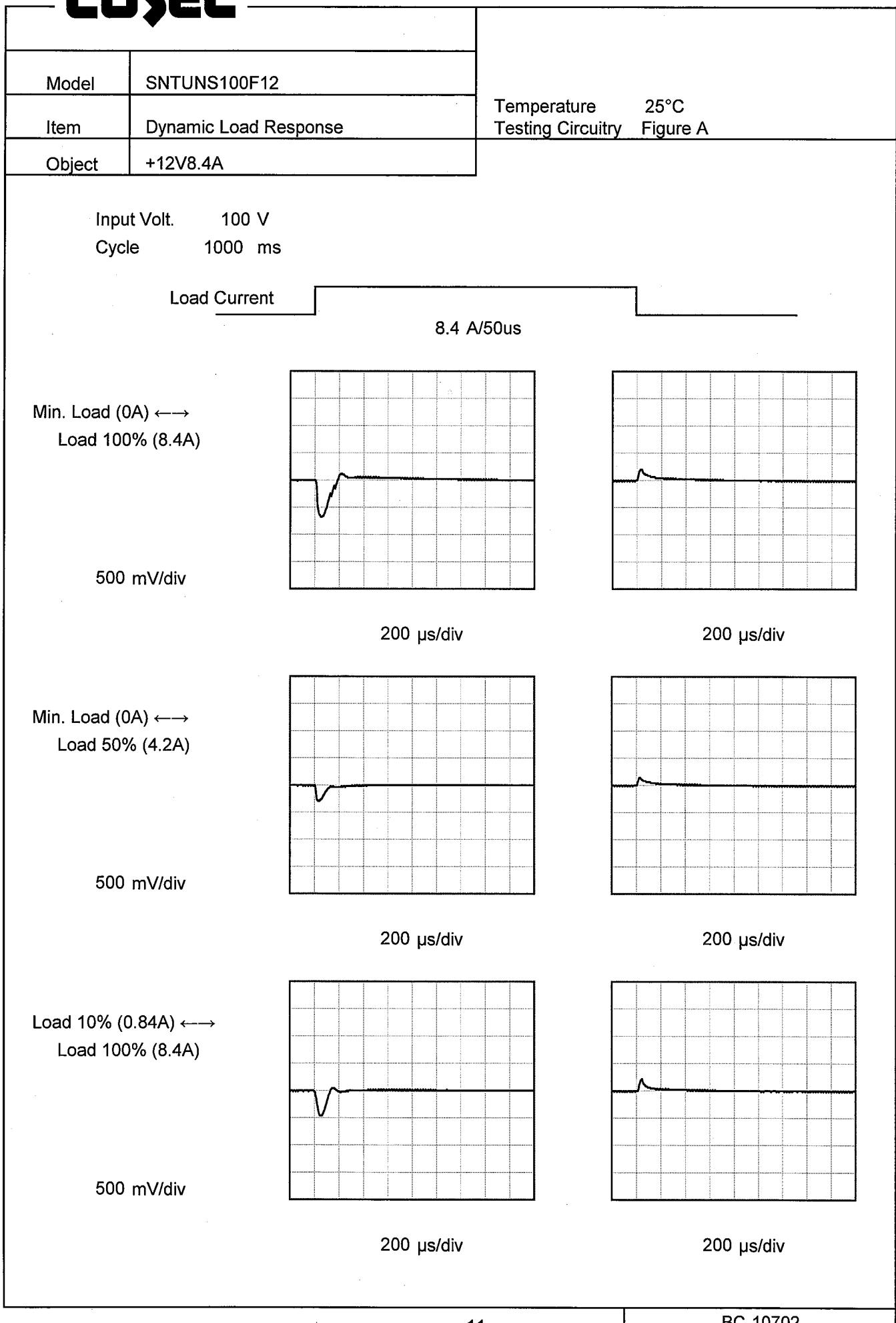
COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry 25°C Figure A																																
Item	Line Regulation																																	
Object	+12V8.4A																																	
1. Graph		2. Values																																
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Note: Slanted line shows the range of the rated input voltage.

COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry	25°C Figure A																																																			
Item	Load Regulation																																																					
Object	+12V8.4A																																																					
1.Graph	<p>—△— Input Volt. 100V - - - □ - - Input Volt. 200V - - - ○ - - Input Volt. 230V</p>  <p>Output Voltage [V]</p> <p>Load Current [A]</p>	2.Values																																																				
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COSEL

COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry 25°C Figure C																																			
Item	Ripple Voltage (by Load Current)																																				
Object	+12V8.4A																																				
1. Graph		2. Values																																			
<p>Legend: —△— Input Volt. 100V -○--- Input Volt. 200V </p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 100V)</th> <th>Ripple Voltage [mV] (Input Volt. 200V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>30</td><td>32</td></tr> <tr><td>0.8</td><td>30</td><td>32</td></tr> <tr><td>1.5</td><td>30</td><td>32</td></tr> <tr><td>3.0</td><td>32</td><td>34</td></tr> <tr><td>4.5</td><td>34</td><td>34</td></tr> <tr><td>6.0</td><td>36</td><td>36</td></tr> <tr><td>7.5</td><td>36</td><td>38</td></tr> <tr><td>8.4</td><td>36</td><td>38</td></tr> <tr><td>9.2</td><td>38</td><td>40</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. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	0.0	30	32	0.8	30	32	1.5	30	32	3.0	32	34	4.5	34	34	6.0	36	36	7.5	36	38	8.4	36	38	9.2	38	40	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)																																			
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<p>Fig. Complex Ripple Wave Form</p>																																					

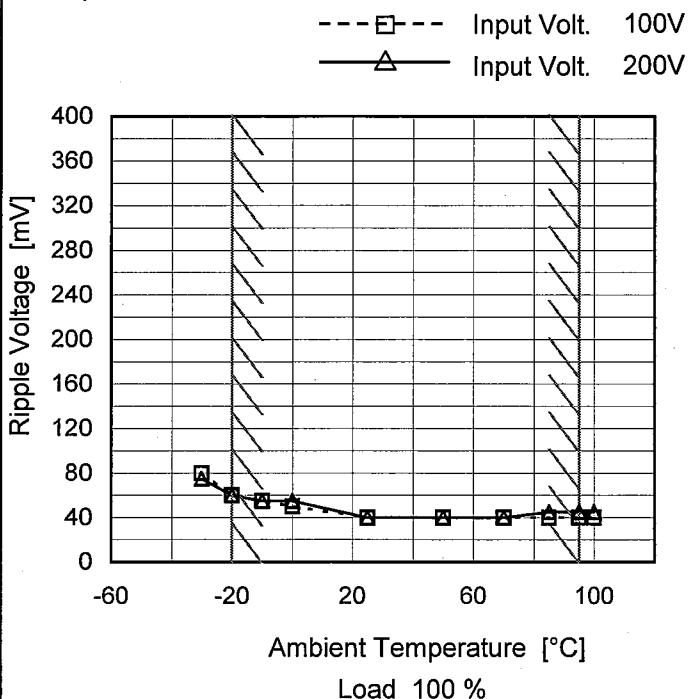
COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry 25°C Figure C																																					
Item	Ripple-Noise																																						
Object	+12V8.4A																																						
1. Graph		2. Values																																					
<p>Graph showing Ripple-Noise [mV] vs Load Current [A]. The Y-axis ranges from 0 to 400 mV, and the X-axis ranges from 0.0 to 10.0 A. Two data series are plotted: Input Volt. 100V (solid line with open circles) and Input Volt. 200V (dashed line with open circles). Both series show low noise levels (around 40 mV) across the load current range. A slanted line indicates the rated load current range.</p>																																							
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<p>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.</p>																																							
<p>Diagram illustrating the measurement of Ripple-Noise. The waveform shows noise superimposed on a DC level. Two time intervals are defined: T1, which is the full width of one cycle of the noise, and T2, which is the width of two cycles. An arrow points to the formula "Ripple-Noise [mVp-p]".</p>																																							
<p>Fig. Complex Ripple Wave Form</p>																																							

COSEL

Model	SNTUNS100F12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V8.4A

1.Graph



Measured by 100 MHz Oscilloscope.

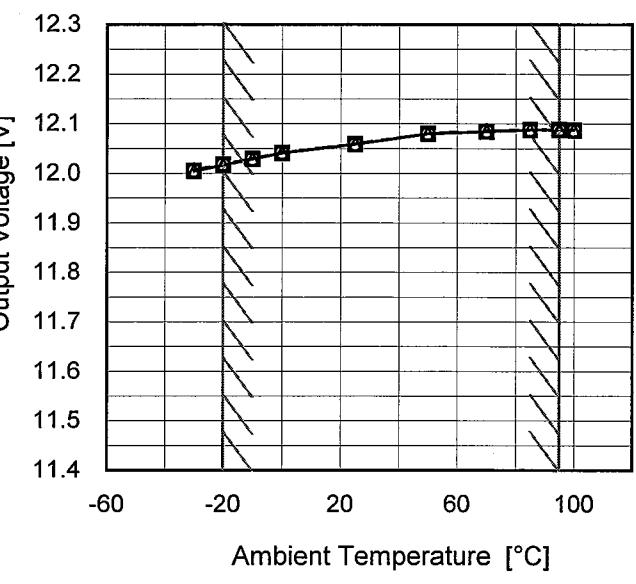
Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure C

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	80	75
-20	60	60
-10	55	55
0	50	55
25	40	40
50	40	40
70	40	40
85	40	45
95	40	45
100	40	45
--	-	-

COSEL

Model	SNTUNS100F12	Testing Circuitry Figure A																																																					
Item	Ambient Temperature Drift																																																						
Object	+12V8.4A																																																						
1.Graph	<p>—△— Input Volt. 100V - - -□- - Input Volt. 200V - - ○ - - Input Volt. 230V</p>  <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>	2.Values																																																					
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Note: Slanted line shows the range of the rated ambient temperature.



Model	SNTUNS100F12	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
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 : 85 - 264V

Load Current : 0 - 8.4A

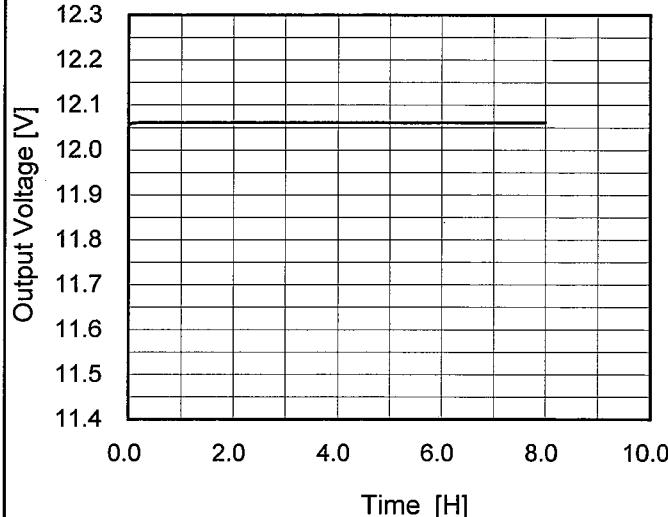
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	95	200	0	12.090	±37	±0.3
Minimum Voltage	-20	85	8.4	12.017		

COSEL

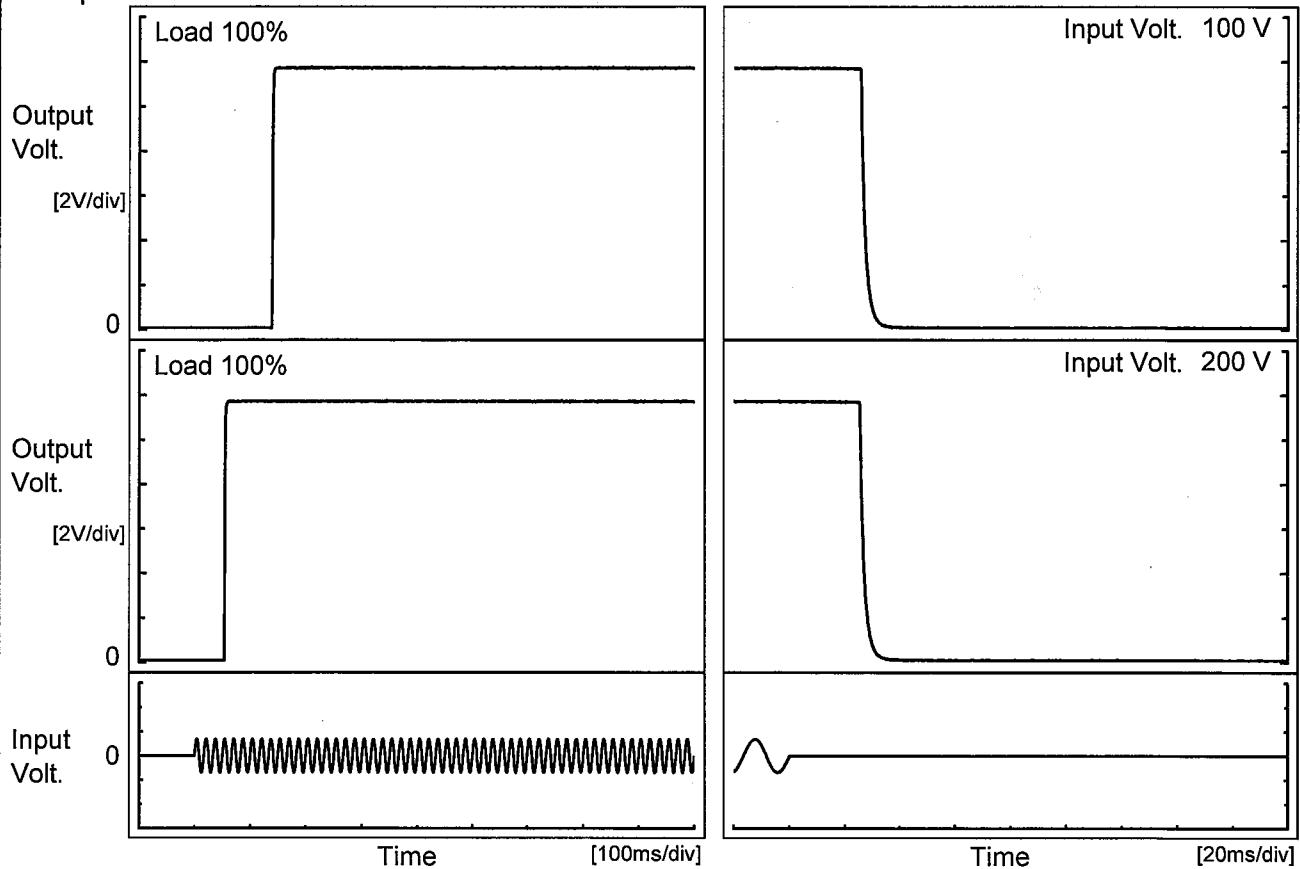
Model	SNTUNS100F12	Temperature 25°C Testing Circuitry Figure A																						
Item	Time Lapse Drift																							
Object	+12V8.4A																							
1.Graph		2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 100V Load 100%</p>		<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>12.054</td></tr> <tr><td>0.5</td><td>12.061</td></tr> <tr><td>1.0</td><td>12.061</td></tr> <tr><td>2.0</td><td>12.061</td></tr> <tr><td>3.0</td><td>12.062</td></tr> <tr><td>4.0</td><td>12.061</td></tr> <tr><td>5.0</td><td>12.061</td></tr> <tr><td>6.0</td><td>12.062</td></tr> <tr><td>7.0</td><td>12.061</td></tr> <tr><td>8.0</td><td>12.062</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	12.054	0.5	12.061	1.0	12.061	2.0	12.061	3.0	12.062	4.0	12.061	5.0	12.061	6.0	12.062	7.0	12.061	8.0	12.062
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* The characteristic of AC200V is equal.

COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry	25°C
Item	Rise and Fall Time	Figure A	
Object	+12V8.4A		

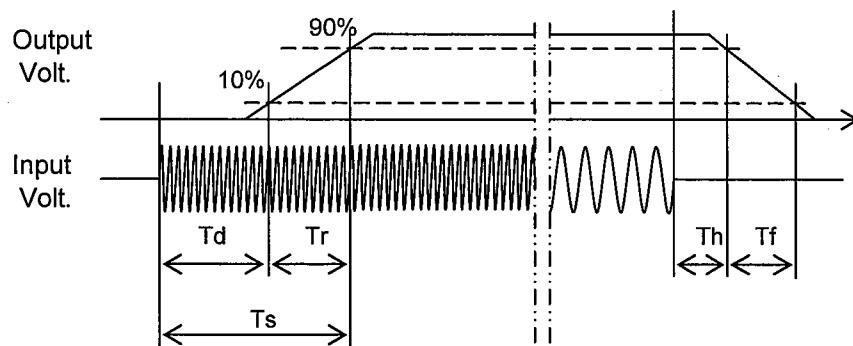
1. Graph



2. Values

[ms]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		139.5	2.0	141.5	25.9	3.4
200 V		54.0	2.0	56.0	25.7	3.4



COSEL

Model	SNTUNS100F12	Temperature	25°C																																
Item	Hold-Up Time	Testing Circuitry	Figure A																																
Object	+12V8.4A																																		
1. Graph			2. Values																																
			<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Hold-Up Time [ms]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>80</td><td>50</td><td>26</td></tr> <tr> <td>85</td><td>50</td><td>26</td></tr> <tr> <td>100</td><td>50</td><td>26</td></tr> <tr> <td>120</td><td>50</td><td>26</td></tr> <tr> <td>200</td><td>50</td><td>26</td></tr> <tr> <td>230</td><td>50</td><td>26</td></tr> <tr> <td>264</td><td>50</td><td>26</td></tr> <tr> <td>280</td><td>51</td><td>25</td></tr> <tr> <td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	80	50	26	85	50	26	100	50	26	120	50	26	200	50	26	230	50	26	264	50	26	280	51	25	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																		
	Load 50%	Load 100%																																	
80	50	26																																	
85	50	26																																	
100	50	26																																	
120	50	26																																	
200	50	26																																	
230	50	26																																	
264	50	26																																	
280	51	25																																	
--	-	-																																	
<p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>																																			

COSEL

Model	SNTUNS100F12	Temperature Testing Circuitry 25°C Figure A																																																			
Item	Instantaneous Interruption Compensation																																																				
Object	+12V8.4A																																																				
1.Graph	<p>—△— Input Volt. 100V - -□--- Input Volt. 200V - -○--- Input Volt. 230V</p> <table border="1"> <caption>Data points estimated from Graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>100V [ms]</th> <th>200V [ms]</th> <th>230V [ms]</th> </tr> </thead> <tbody> <tr><td>1.0</td><td>200</td><td>150</td><td>120</td></tr> <tr><td>2.0</td><td>150</td><td>120</td><td>100</td></tr> <tr><td>4.0</td><td>100</td><td>80</td><td>70</td></tr> <tr><td>6.0</td><td>80</td><td>60</td><td>50</td></tr> <tr><td>8.0</td><td>60</td><td>45</td><td>40</td></tr> <tr><td>9.0</td><td>50</td><td>40</td><td>35</td></tr> </tbody> </table>	Load Current [A]	100V [ms]	200V [ms]	230V [ms]	1.0	200	150	120	2.0	150	120	100	4.0	100	80	70	6.0	80	60	50	8.0	60	45	40	9.0	50	40	35	2.Values																							
Load Current [A]	100V [ms]	200V [ms]	230V [ms]																																																		
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		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Time [ms]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>0.8</td><td>192</td><td>192</td><td>191</td></tr> <tr><td>1.5</td><td>122</td><td>121</td><td>121</td></tr> <tr><td>3.0</td><td>68</td><td>67</td><td>67</td></tr> <tr><td>4.5</td><td>46</td><td>46</td><td>46</td></tr> <tr><td>6.0</td><td>35</td><td>35</td><td>35</td></tr> <tr><td>7.5</td><td>28</td><td>28</td><td>28</td></tr> <tr><td>8.4</td><td>25</td><td>25</td><td>25</td></tr> <tr><td>9.2</td><td>22</td><td>23</td><td>23</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]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	-	-	-	0.8	192	192	191	1.5	122	121	121	3.0	68	67	67	4.5	46	46	46	6.0	35	35	35	7.5	28	28	28	8.4	25	25	25	9.2	22	23	23	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																				
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9.2	22	23	23																																																		
--	-	-	-																																																		
--	-	-	-																																																		

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

COSEL

Model	SNTUNS100F12	Testing Circuitry Figure A																																						
Item	Minimum Input Voltage for Regulated Output Voltage																																							
Object	+12V8.4A																																							
1. Graph		2. Values																																						
<p>Input Voltage [V]</p> <p>Ambient Temperature [°C]</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">Ambient Temperature [°C]</th> <th colspan="2">Input Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>-30</td><td>68</td><td>66</td> </tr> <tr> <td>-20</td><td>67</td><td>66</td> </tr> <tr> <td>-10</td><td>67</td><td>66</td> </tr> <tr> <td>0</td><td>67</td><td>66</td> </tr> <tr> <td>25</td><td>66</td><td>67</td> </tr> <tr> <td>50</td><td>68</td><td>69</td> </tr> <tr> <td>70</td><td>70</td><td>71</td> </tr> <tr> <td>85</td><td>68</td><td>69</td> </tr> <tr> <td>95</td><td>71</td><td>71</td> </tr> <tr> <td>100</td><td>73</td><td>73</td> </tr> <tr> <td>--</td><td>-</td><td>-</td> </tr> </tbody> </table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-30	68	66	-20	67	66	-10	67	66	0	67	66	25	66	67	50	68	69	70	70	71	85	68	69	95	71	71	100	73	73	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
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-30	68	66																																						
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95	71	71																																						
100	73	73																																						
--	-	-																																						

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

COSEL

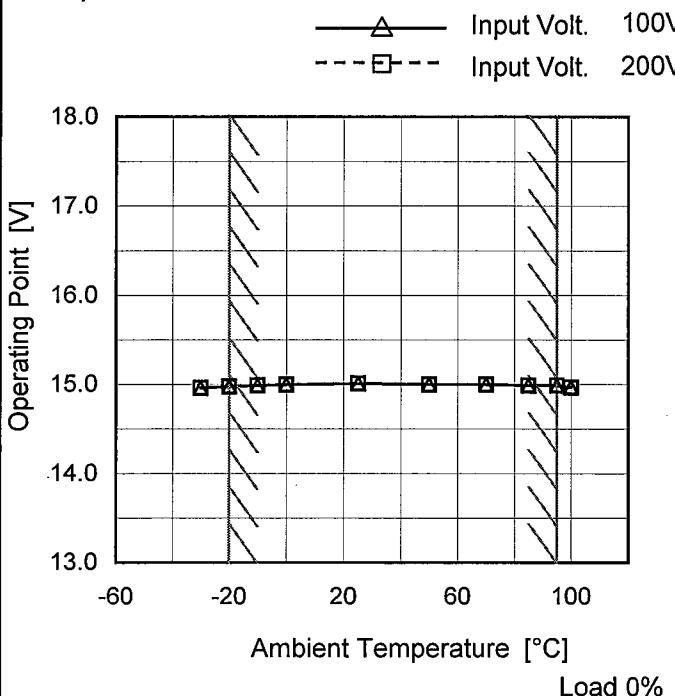
Model	SNTUNS100F12																																													
Item	Overcurrent Protection	Temperature 25°C Testing Circuitry Figure A																																												
Object	+12V8.4A																																													
1. Graph																																														
<p>The graph plots Output Voltage [V] on the Y-axis (0.0 to 16.0) against Load Current [A] on the X-axis (0.0 to 16.0). Two curves are shown: a top curve for Input Volt. 100V and a bottom curve for Input Volt. 200V. Both curves are flat at 12V until a load current of about 8.4A, after which they drop sharply. A slanted line on the graph indicates the range of the rated load current.</p>		2. Values																																												
<table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="2">Load Current [A]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> </tr> </thead> <tbody> <tr><td>12.0</td><td>10.15</td><td>10.15</td></tr> <tr><td>11.4</td><td>10.58</td><td>10.59</td></tr> <tr><td>10.8</td><td>10.15</td><td>10.15</td></tr> <tr><td>9.6</td><td>10.94</td><td>10.94</td></tr> <tr><td>8.4</td><td>11.32</td><td>11.31</td></tr> <tr><td>7.2</td><td>11.73</td><td>11.72</td></tr> <tr><td>6.0</td><td>12.21</td><td>12.20</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> <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>			Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	12.0	10.15	10.15	11.4	10.58	10.59	10.8	10.15	10.15	9.6	10.94	10.94	8.4	11.32	11.31	7.2	11.73	11.72	6.0	12.21	12.20	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																													
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Note: Slanted line shows the range of the rated load current.

COSEL

Model	SNTUNS100F12
Item	Overvoltage Protection
Object	+12V8.4A

1.Graph



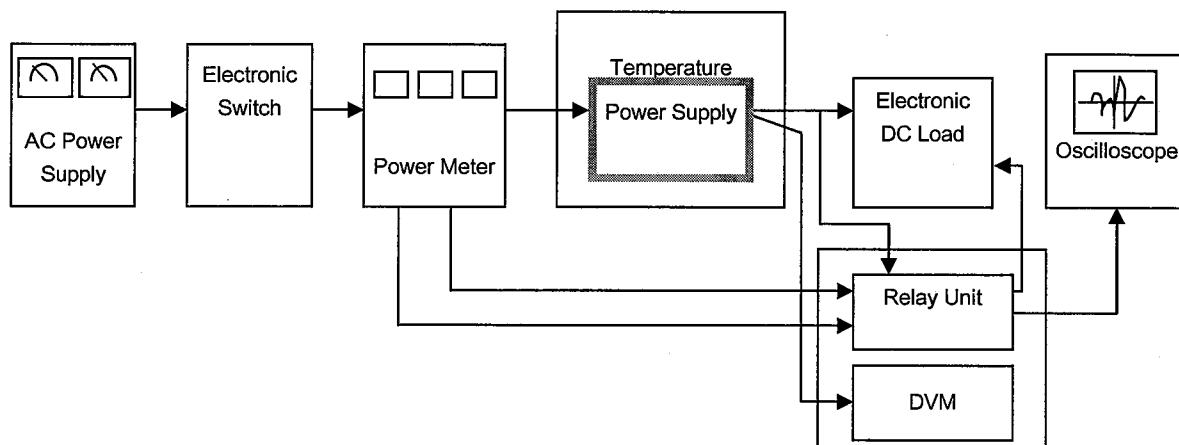
Note: Slanted line shows the range of the rated ambient temperature.

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 200[V]
-30	14.96	14.96
-20	14.98	14.98
-10	14.99	14.99
0	15.00	15.00
25	15.01	15.01
50	15.00	15.00
70	15.00	15.00
85	14.99	14.99
95	14.99	14.99
100	14.97	14.97
--	-	-

COSEL



Data Acquisition/Control Unit

Figure A

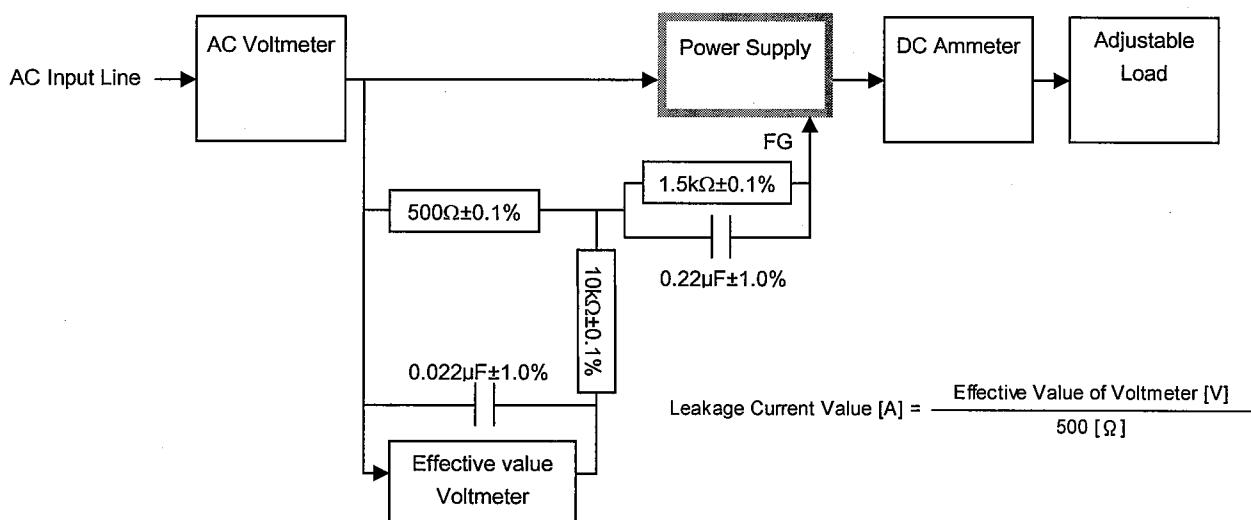


Figure B (IEC60950-1)

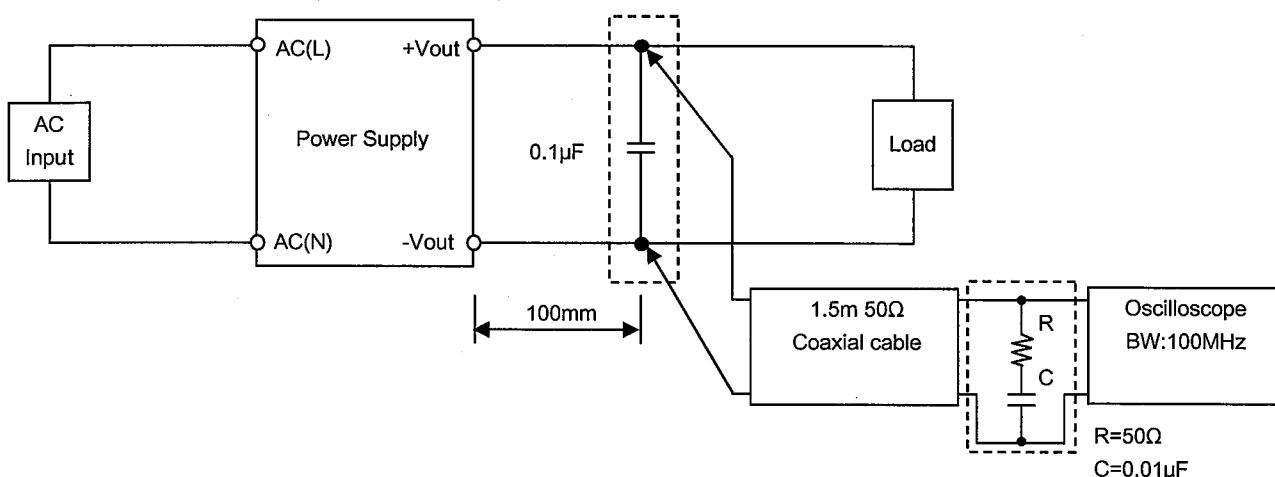


Figure C