

TEST DATA OF SNTUNS100F24

Regulated DC Power Supply

Approved by : Takahiro Yoneda Takahiro Yoneda Design Manager

Prepared by : Satoshi Kinoshita Satoshi Kinoshita Design Engineer

COSEL CO.,LTD.

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Model	SNTUNS100F24	Temperature Testing Circuitry	25°C Figure A																																																				
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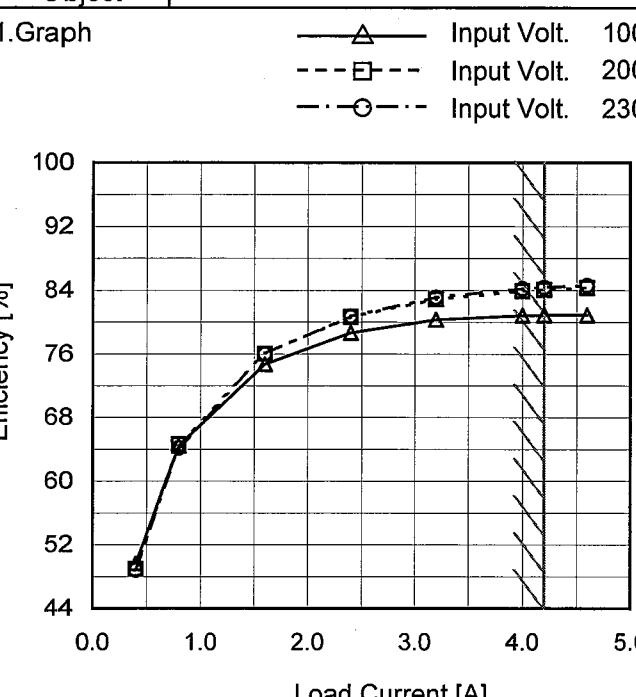
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<p>The graph plots Efficiency [%] on the y-axis (44 to 100) against Input Voltage [V] on the x-axis (50 to 300). Two data series are shown: Load 50% (dashed line with square markers) and Load 100% (solid line with triangle markers). Both series show efficiency increasing with input voltage. 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>76.2</td><td>78.6</td></tr> <tr><td>85</td><td>76.7</td><td>79.4</td></tr> <tr><td>100</td><td>77.7</td><td>80.9</td></tr> <tr><td>120</td><td>78.5</td><td>82.3</td></tr> <tr><td>200</td><td>79.3</td><td>84.1</td></tr> <tr><td>230</td><td>79.4</td><td>84.3</td></tr> <tr><td>264</td><td>79.7</td><td>84.6</td></tr> <tr><td>280</td><td>80.3</td><td>84.5</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>				Input Voltage [V]	Efficiency Load 50% [%]	Efficiency Load 100% [%]	80	76.2	78.6	85	76.7	79.4	100	77.7	80.9	120	78.5	82.3	200	79.3	84.1	230	79.4	84.3	264	79.7	84.6	280	80.3	84.5	--	-	-
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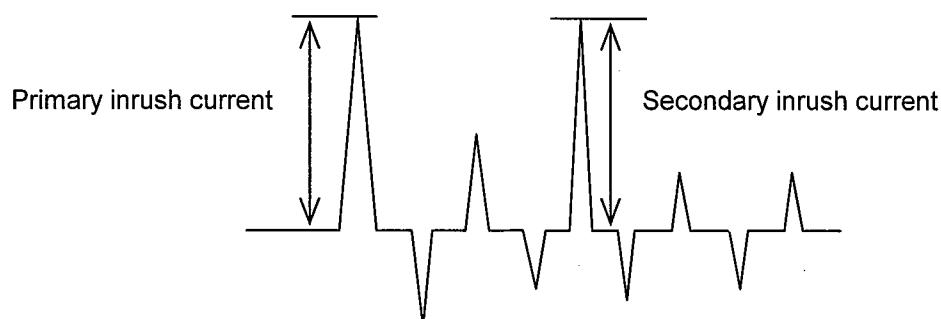
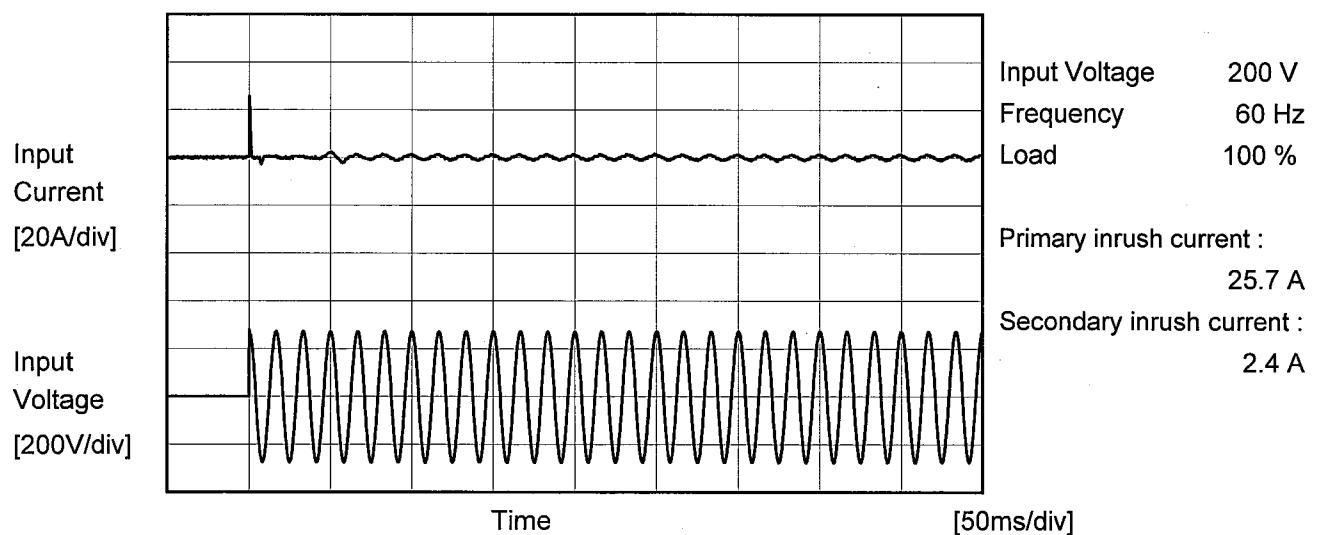
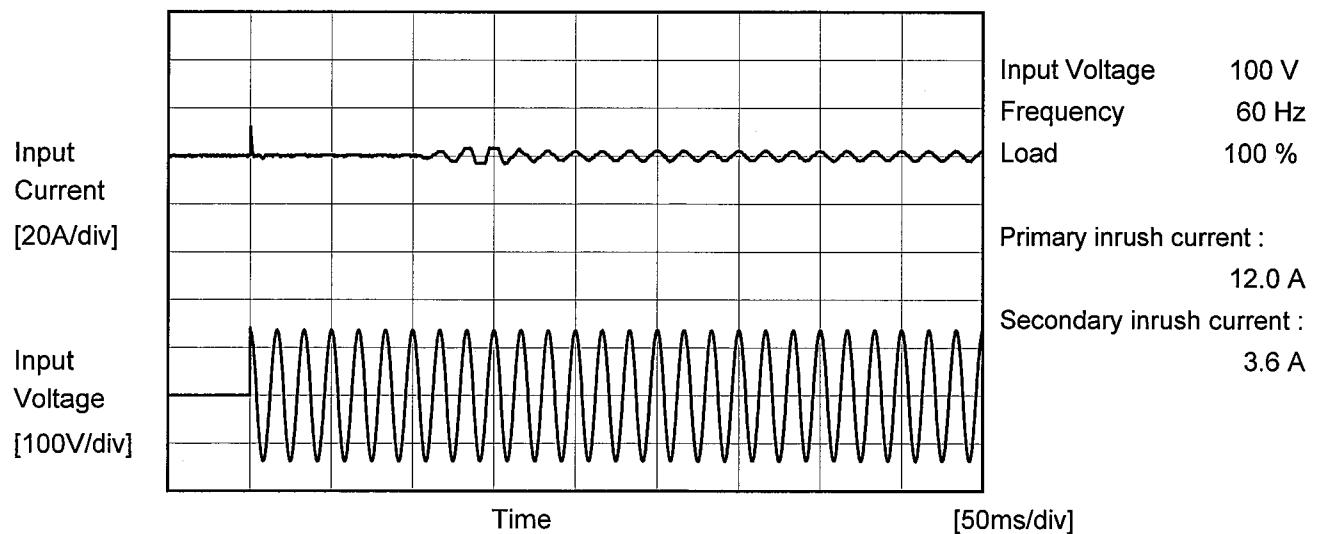
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COSEL

Model	SNTUNS100F24	Temperature Testing Circuitry Figure A
Item	Inrush Current	
Object	—	





Model	SNTUNS100F24	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

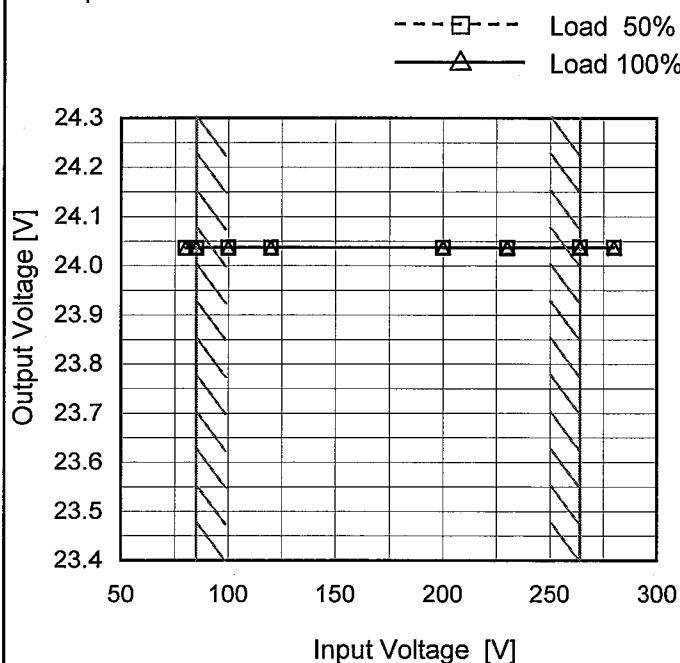
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

COSEL

Model	SNTUNS100F24
Item	Line Regulation
Object	+24V4.2A

Temperature 25°C
 Testing Circuitry Figure A

1.Graph



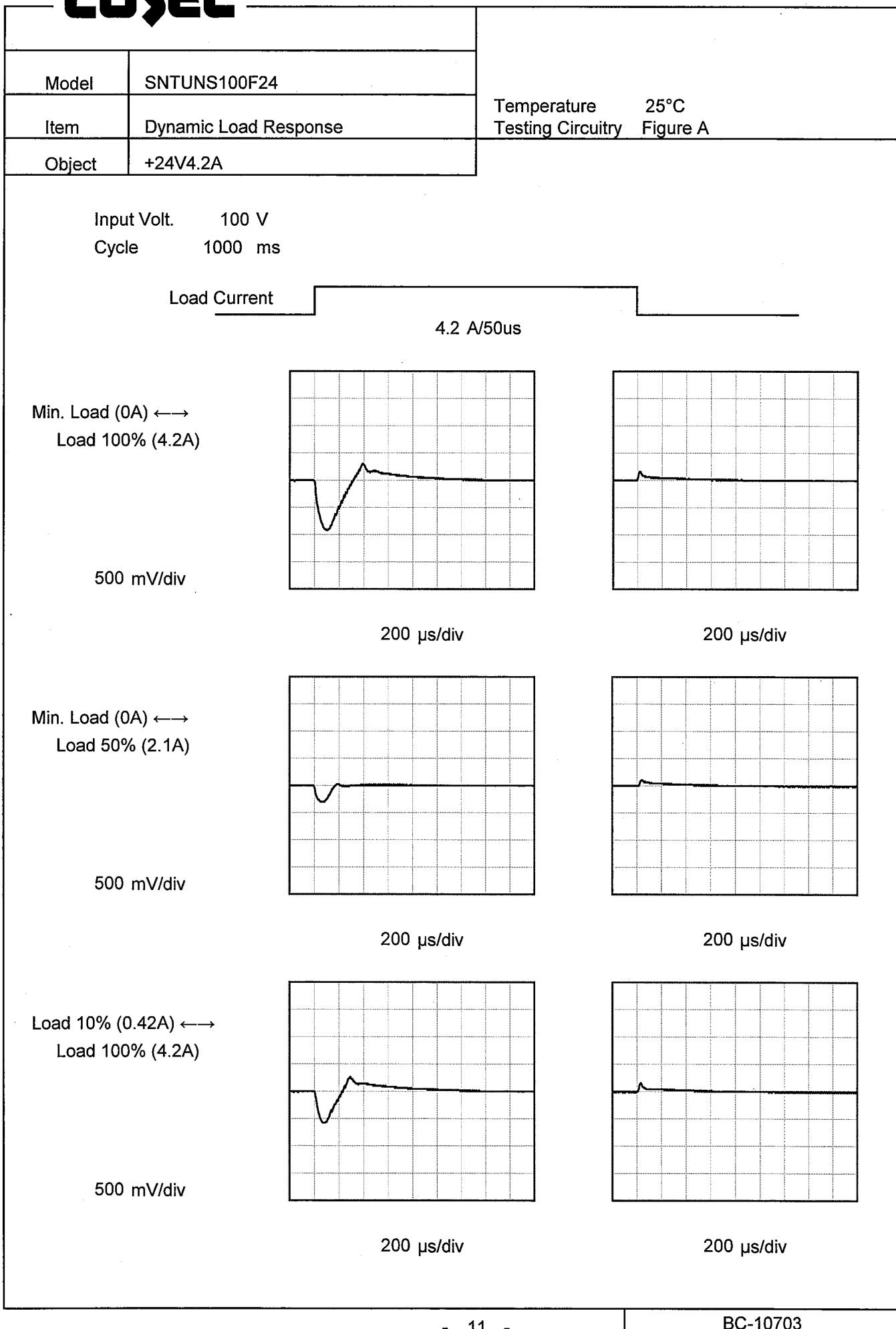
2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
80	24.036	24.037
85	24.036	24.037
100	24.036	24.037
120	24.037	24.037
200	24.037	24.037
230	24.037	24.037
264	24.037	24.038
280	24.037	24.037
--	-	-

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

COSEL

Model	SNTUNS100F24	Temperature	25°C																																																			
Item	Load Regulation	Testing Circuitry	Figure A																																																			
Object	+24V4.2A																																																					
1. Graph		2. Values																																																				
<p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V Input Volt. 200V Input Volt. 230V 		<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</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>24.039</td><td>24.039</td><td>24.040</td></tr> <tr><td>0.4</td><td>24.038</td><td>24.039</td><td>24.040</td></tr> <tr><td>0.8</td><td>24.038</td><td>24.039</td><td>24.040</td></tr> <tr><td>1.6</td><td>24.037</td><td>24.038</td><td>24.039</td></tr> <tr><td>2.4</td><td>24.037</td><td>24.038</td><td>24.038</td></tr> <tr><td>3.2</td><td>24.037</td><td>24.037</td><td>24.038</td></tr> <tr><td>4.0</td><td>24.037</td><td>24.037</td><td>24.037</td></tr> <tr><td>4.2</td><td>24.037</td><td>24.037</td><td>24.037</td></tr> <tr><td>4.6</td><td>24.036</td><td>24.037</td><td>24.037</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]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	24.039	24.039	24.040	0.4	24.038	24.039	24.040	0.8	24.038	24.039	24.040	1.6	24.037	24.038	24.039	2.4	24.037	24.038	24.038	3.2	24.037	24.037	24.038	4.0	24.037	24.037	24.037	4.2	24.037	24.037	24.037	4.6	24.036	24.037	24.037	--	-	-	-	--	-	-	-
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COSEL

COSEL

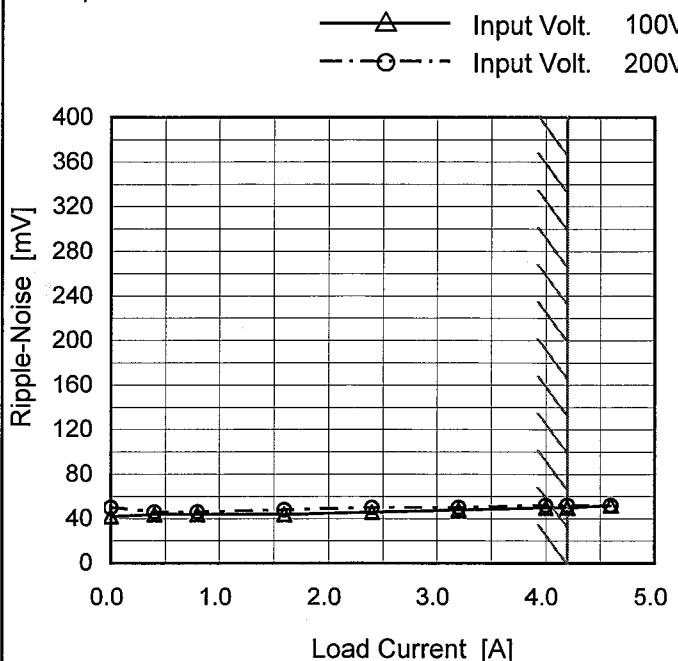
Model	SNTUNS100F24																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C																																						
Object	+24V4.2A																																							
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<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 100 [V]</th> <th>Input Volt. 200 [V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td><td>38</td><td>44</td></tr> <tr> <td>0.4</td><td>40</td><td>44</td></tr> <tr> <td>0.8</td><td>40</td><td>44</td></tr> <tr> <td>1.6</td><td>40</td><td>44</td></tr> <tr> <td>2.4</td><td>42</td><td>46</td></tr> <tr> <td>3.2</td><td>44</td><td>48</td></tr> <tr> <td>4.0</td><td>46</td><td>50</td></tr> <tr> <td>4.2</td><td>46</td><td>50</td></tr> <tr> <td>4.6</td><td>46</td><td>50</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. 100 [V]	Input Volt. 200 [V]	0.0	38	44	0.4	40	44	0.8	40	44	1.6	40	44	2.4	42	46	3.2	44	48	4.0	46	50	4.2	46	50	4.6	46	50	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
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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>																																								
Fig. Complex Ripple Wave Form																																								

COSEL

Model	SNTUNS100F24
Item	Ripple-Noise
Object	+24V4.2A

Temperature 25°C
Testing Circuitry Figure C

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. 100 [V]	Input Volt. 200 [V]
0.0	42	50
0.4	44	46
0.8	44	46
1.6	44	48
2.4	46	50
3.2	48	50
4.0	50	52
4.2	50	52
4.6	52	52
--	-	-
--	-	-

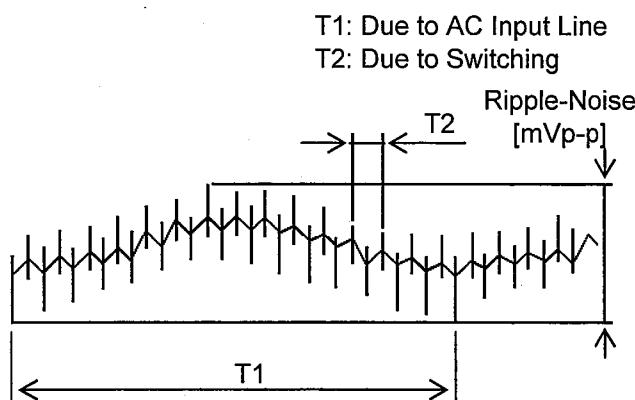


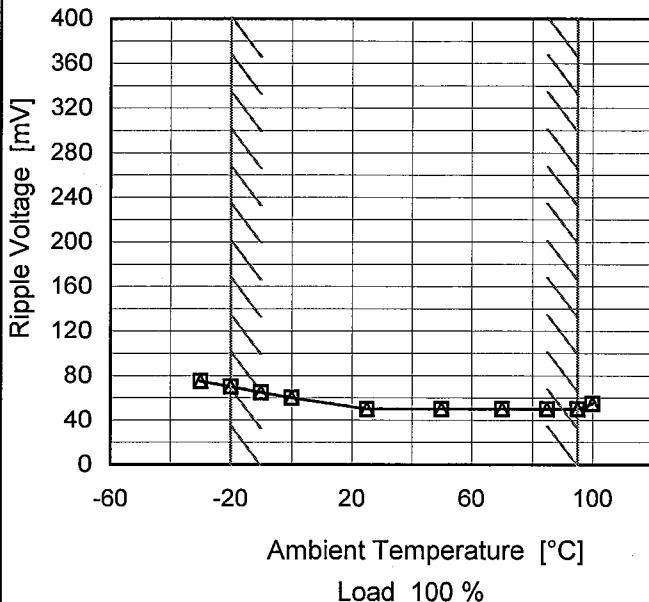
Fig. Complex Ripple Wave Form

COSEL

Model	SNTUNS100F24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V4.2A

1. Graph

--□--- Input Volt. 100V
 —△— Input Volt. 200V



Measured by 100 MHz Oscilloscope.

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

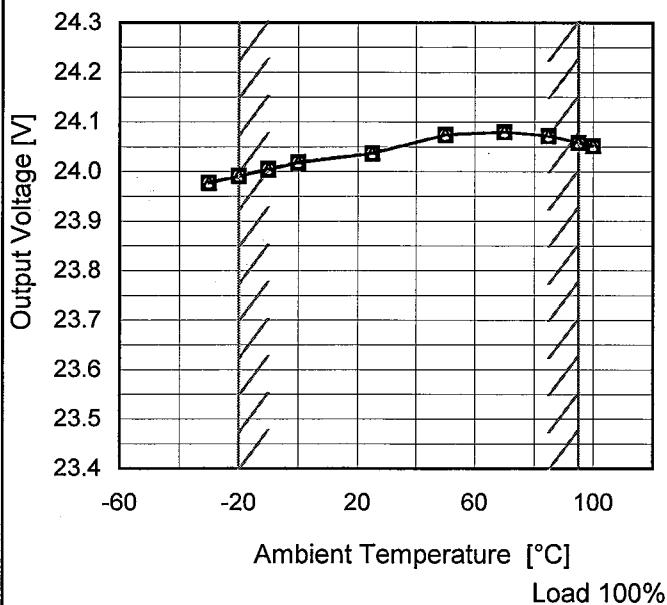
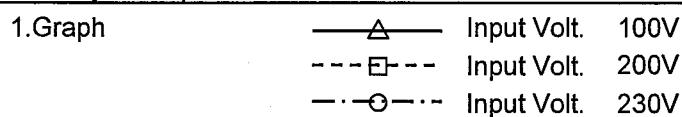
Testing Circuitry Figure C

2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-30	75	75
-20	70	70
-10	65	65
0	60	60
25	50	50
50	50	50
70	50	50
85	50	50
95	50	50
100	55	55
--	-	-

COSEL

Model	SNTUNS100F24
Item	Ambient Temperature Drift
Object	+24V4.2A



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-30	23.977	23.977	23.978
-20	23.991	23.991	23.992
-10	24.004	24.005	24.005
0	24.018	24.019	24.019
25	24.037	24.037	24.037
50	24.074	24.074	24.074
70	24.080	24.080	24.080
85	24.073	24.072	24.072
95	24.059	24.058	24.058
100	24.052	24.052	24.052
--	-	-	-

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



Model	SNTUNS100F24	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+24V4.2A	

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 : 85 - 264V

Load Current : 0 - 4.2A

* 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	70	85	0	24.085	±48	±0.2
Minimum Voltage	-20	85	4.2	23.990		

COSEL

Model	SNTUNS100F24
Item	Time Lapse Drift
Object	+24V4.2A

1.Graph

Output Voltage [V]	24.3 24.2 24.1 24.0 23.9 23.8 23.7 23.6 23.5 23.4
Time [H]	0.0 2.0 4.0 6.0 8.0 10.0

Input Volt. 100V
Load 100%

* The characteristic of AC200V is equal.

Temperature	25°C
Testing Circuitry	Figure A

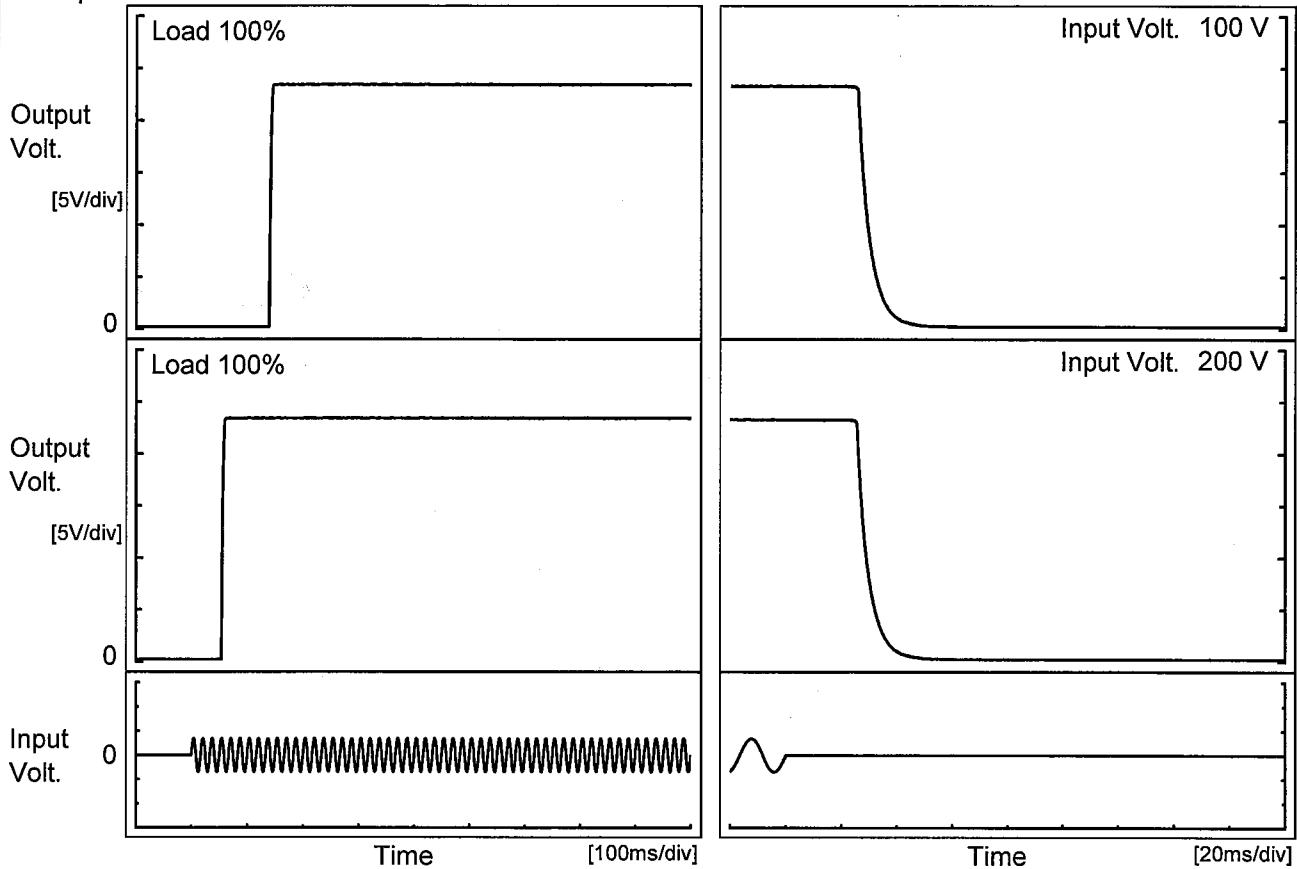
2.Values

Time since start [H]	Output Voltage [V]
0.0	24.033
0.5	24.040
1.0	24.040
2.0	24.040
3.0	24.041
4.0	24.041
5.0	24.042
6.0	24.042
7.0	24.042
8.0	24.042

COSEL

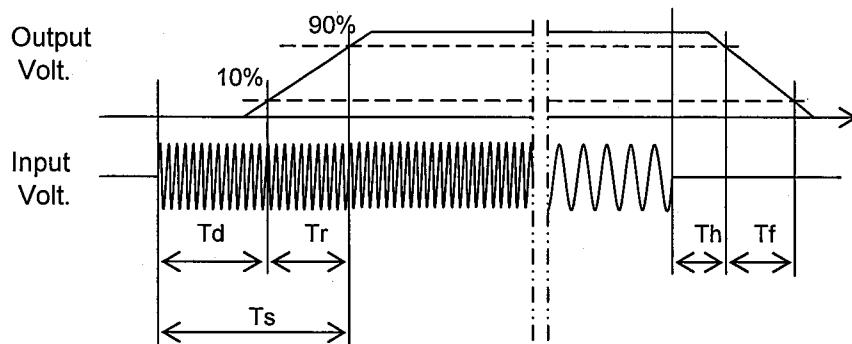
Model	SNTUNS100F24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V4.2A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
100 V		139.5	4.5	144.0	26.1	9.2	
200 V		54.0	4.5	58.5	25.9	9.3	



COSEL

Model	SNTUNS100F24	Temperature Testing Circuitry 25°C Figure A																																
Item	Hold-Up Time																																	
Object	+24V4.2A																																	
1. Graph		2. Values																																
<p>Graph showing Hold-Up Time [ms] vs Input Voltage [V]. The Y-axis is logarithmic from 1 to 1000 ms. The X-axis is linear from 50 to 300 V. Two series are shown: Load 50% (dashed line with squares) and Load 100% (solid line with triangles). Both series show a minimum hold-up time around 100V and a maximum around 250V. A slanted line indicates the rated input voltage range.</p>		<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>26</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	26	--	-	-
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<p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy. Note: Slanted line shows the range of the rated input voltage.</p>																																		

COSEL

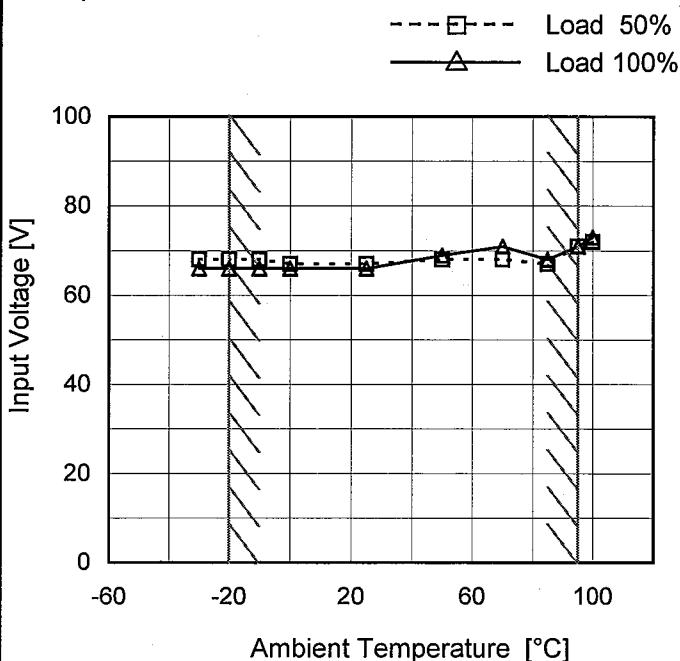
Model	SNTUNS100F24	Temperature 25°C																																																			
Item	Instantaneous Interruption Compensation	Testing Circuitry Figure A																																																			
Object	+24V4.2A																																																				
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Note:	Slanted line shows the range of the rated load current.																																																				

COSEL

Model	SNTUNS100F24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V4.2A

Testing Circuitry Figure A

1. Graph



2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	68	66
-20	68	66
-10	68	66
0	67	66
25	67	66
50	68	69
70	68	71
85	67	68
95	71	71
100	72	73
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Note: Slanted line shows the range of the rated ambient temperature.

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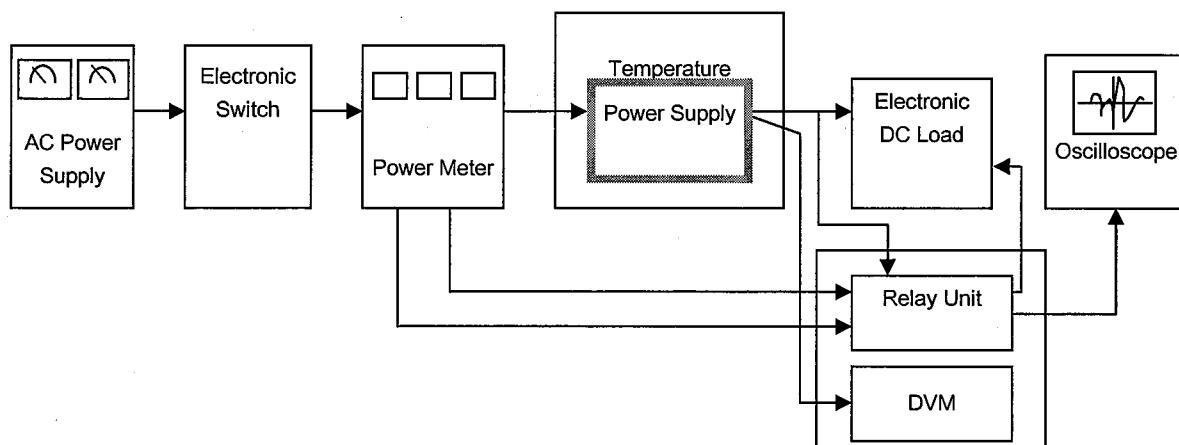
Model	SNTUNS100F24																																										
Item	Overcurrent Protection	Temperature 25°C Testing Circuitry Figure A																																									
Object	+24V4.2A																																										
1. Graph																																											
<p>The graph plots Output Voltage [V] on the Y-axis (0.0 to 30.0) against Load Current [A] on the X-axis (0.0 to 8.0). Two curves are shown: one for Input Volt. 100V and one for Input Volt. 200V. Both curves remain constant at approximately 24V until a certain load current is reached, after which they drop linearly. A slanted line connects the points where the voltage begins to drop for both curves, indicating the range of the rated load current.</p>																																											
<p>Note: Slanted line shows the range of the rated load current.</p>																																											
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<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>24.0</td><td>5.20</td><td>4.47</td></tr> <tr><td>22.8</td><td>5.25</td><td>5.26</td></tr> <tr><td>21.6</td><td>5.30</td><td>4.47</td></tr> <tr><td>19.2</td><td>5.41</td><td>5.41</td></tr> <tr><td>16.8</td><td>5.53</td><td>5.53</td></tr> <tr><td>14.4</td><td>5.68</td><td>5.68</td></tr> <tr><td>12.0</td><td>5.86</td><td>5.86</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]	24.0	5.20	4.47	22.8	5.25	5.26	21.6	5.30	4.47	19.2	5.41	5.41	16.8	5.53	5.53	14.4	5.68	5.68	12.0	5.86	5.86	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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<p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p> <p>Legend:</p> <ul style="list-style-type: none"> Input Volt. 100V (Solid line with open triangle) Input Volt. 200V (Dashed line with open square) 		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> </tr> </thead> <tbody> <tr> <td>-30</td><td>29.58</td><td>29.56</td> </tr> <tr> <td>-20</td><td>29.59</td><td>29.59</td> </tr> <tr> <td>-10</td><td>29.61</td><td>29.61</td> </tr> <tr> <td>0</td><td>29.64</td><td>29.62</td> </tr> <tr> <td>25</td><td>29.67</td><td>29.67</td> </tr> <tr> <td>50</td><td>29.66</td><td>29.68</td> </tr> <tr> <td>70</td><td>29.67</td><td>29.67</td> </tr> <tr> <td>85</td><td>29.65</td><td>29.63</td> </tr> <tr> <td>95</td><td>29.62</td><td>29.62</td> </tr> <tr> <td>100</td><td>29.61</td><td>29.61</td> </tr> <tr> <td>--</td><td>-</td><td>-</td> </tr> </tbody> </table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 200[V]	-30	29.58	29.56	-20	29.59	29.59	-10	29.61	29.61	0	29.64	29.62	25	29.67	29.67	50	29.66	29.68	70	29.67	29.67	85	29.65	29.63	95	29.62	29.62	100	29.61	29.61	--	-	-
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--	-	-																																						

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

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Data Acquisition/Control Unit

Figure A

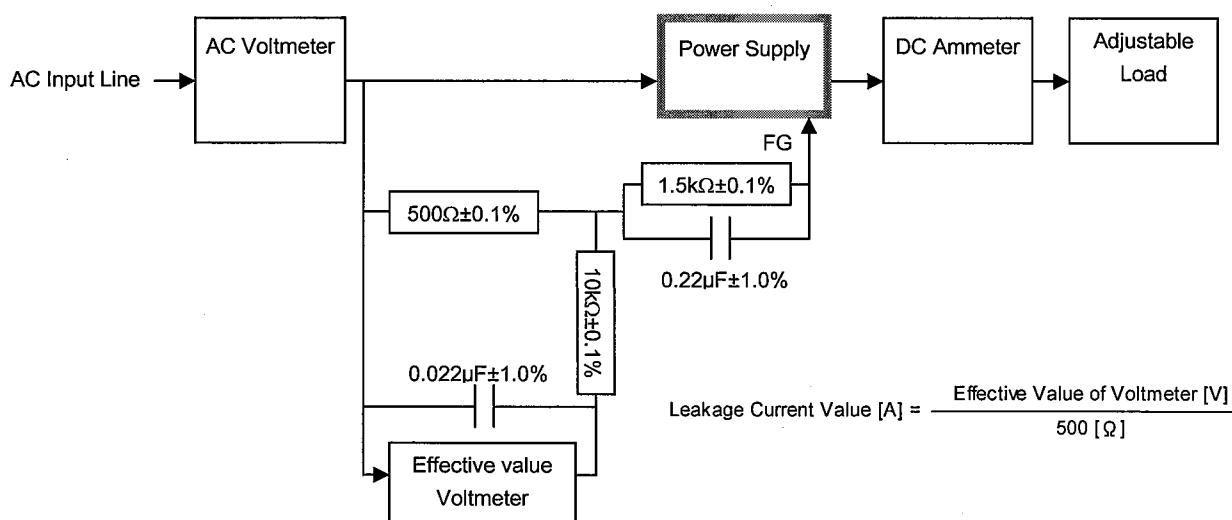


Figure B (IEC60950-1)

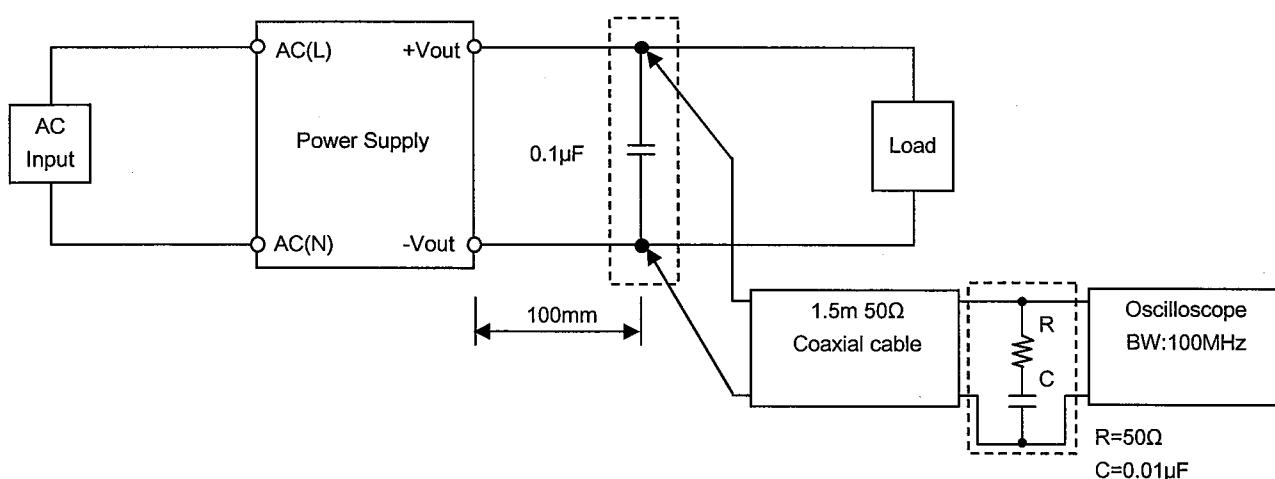


Figure C