

TEST DATA OF SNTUNS50F24

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.

CONTENTS

1.Input Current (by Load Current)	1
2.Input Power (by Load Current)	2
3.Efficiency (by Input Voltage)	3
4.Efficiency (by Load Current)	4
5.Power Factor (by Input Voltage)	5
6.Power Factor (by Load Current)	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 Current)	12
13.Ripple-Noise	13
14.Ripple Voltage (by Ambient Temperature)	14
15.Ambient Temperature Drift	15
16.Output Voltage Accuracy	16
17.Time Lapse Drift	17
18.Rise and Fall Time	18
19.Hold-Up Time	19
20.Instantaneous Interruption Compensation	20
21.Minimum Input Voltage for Regulated Output Voltage	21
22.Overcurrent Protection	22
23.Overvoltage Protection	23
24.Figure of Testing Circuitry	24

(Final Page 24)

Model

SNTUNS50F24

Item

Input Current (by Load Current)

Object

1.Graph

—△—

Input Volt. 100V

---□---

Input Volt. 200V

-○-

Input Volt. 230V

Input Current [A]

1.0

0.8

0.6

0.4

0.2

0.0

0.0

0.5

1.0

1.5

2.0

2.5

Load Current [A]

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

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.036	0.065	0.073
0.2	0.088	0.082	0.095
0.4	0.141	0.096	0.109
0.8	0.256	0.144	0.138
1.2	0.370	0.197	0.179
1.6	0.479	0.250	0.225
2.0	0.595	0.304	0.272
2.1	0.624	0.318	0.284
2.3	0.684	0.345	0.308
--	-	-	-
--	-	-	-

- 1 -

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Model		SNTUNS50F24																																																				
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<div><div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div><div>Note: Slanted line shows the range of the rated load current.</div></div>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Power [W]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>1.86</td><td>1.79</td><td>1.81</td></tr><tr><td>0.2</td><td>7.90</td><td>8.03</td><td>8.01</td></tr><tr><td>0.4</td><td>13.37</td><td>13.53</td><td>13.51</td></tr><tr><td>0.8</td><td>24.47</td><td>24.31</td><td>24.38</td></tr><tr><td>1.2</td><td>35.89</td><td>35.23</td><td>35.27</td></tr><tr><td>1.6</td><td>47.12</td><td>45.90</td><td>45.90</td></tr><tr><td>2.0</td><td>58.78</td><td>56.90</td><td>56.80</td></tr><tr><td>2.1</td><td>61.66</td><td>59.60</td><td>59.50</td></tr><tr><td>2.3</td><td>67.58</td><td>65.10</td><td>64.90</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Input Power [W]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	1.86	1.79	1.81	0.2	7.90	8.03	8.01	0.4	13.37	13.53	13.51	0.8	24.47	24.31	24.38	1.2	35.89	35.23	35.27	1.6	47.12	45.90	45.90	2.0	58.78	56.90	56.80	2.1	61.66	59.60	59.50	2.3	67.58	65.10	64.90	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.																																																						



Model		SNTUNS50F24	
Item		Power Factor (by Input Voltage)	
Object			

1.Graph

Load 50%

Load 100%

Power Factor

1.0

0.9

0.8

0.7

0.6

0.5

0.4

50

100

150

200

250

300

Input Voltage [V]

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

2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
80	0.983	0.994
85	0.978	0.992
100	0.967	0.988
120	0.954	0.986
200	0.879	0.937
230	0.838	0.911
264	0.692	0.871
280	0.433	0.733
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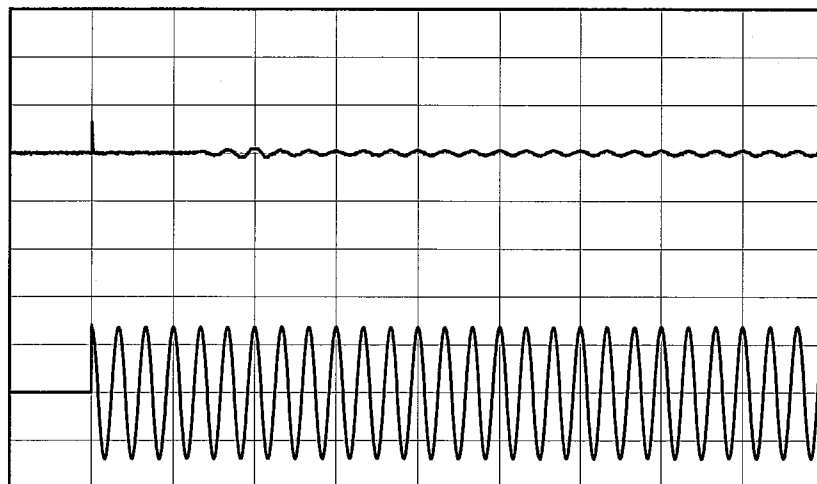
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		Temperature 25°C Testing Circuitry Figure A
Model	SNTUNS50F24	
Item	Inrush Current	
Object		

Input
Current
[20A/div]

Input
Voltage
[100V/div]



Time

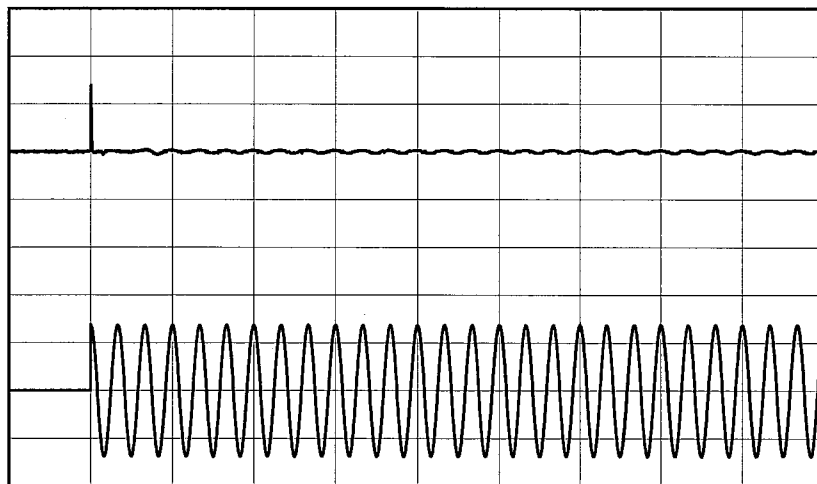
[50ms/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 12.8 A
Secondary inrush current : 1.9 A

Input
Current
[20A/div]

Input
Voltage
[200V/div]



Time

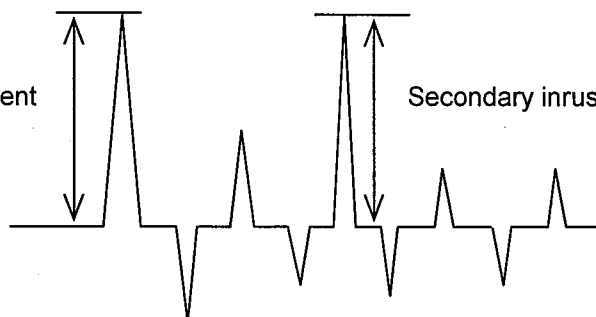
[50ms/div]

Input Voltage 200 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 27.7 A
Secondary inrush current : 1.1 A

Primary inrush current

Secondary inrush current





		Temperature 25°C Testing Circuitry Figure B
Model	SNTUNS50F24	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

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	0.72	0.90	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.

[illegible]

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Model	SNTUNS50F24																																																					
Item	Load Regulation	Temperature	25°C																																																			
Object	+24V2.1A	Testing Circuitry	Figure A																																																			
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- 10 -

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Model	SNTUNS50F24	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+24V2.1A		

Input Volt. 100 V
Cycle 1000 mS

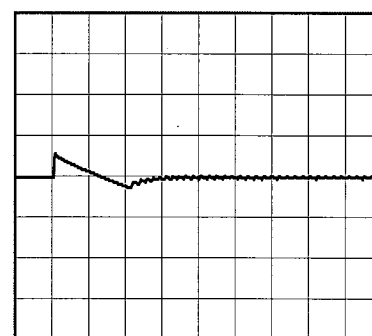
Load Current 2.1A/50 μ s

Min. Load (0A) \longleftrightarrow
Load 100% (2.1A)

500mV/div



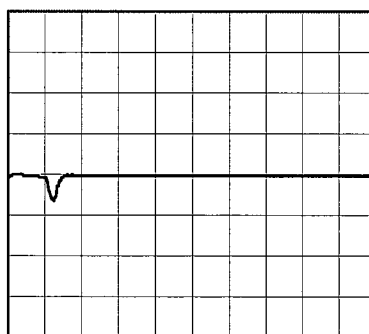
500 μ s/div



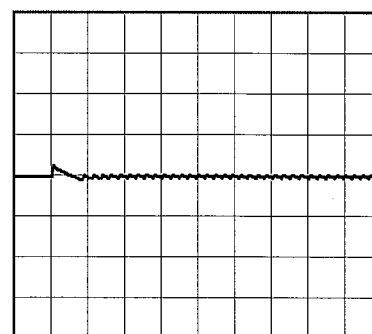
2ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (1.05A)

500mV/div



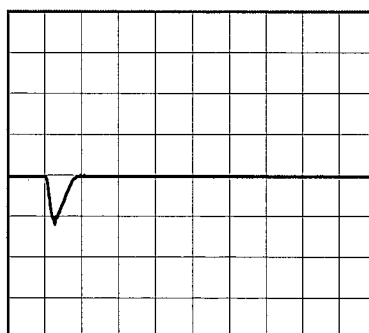
500 μ s/div



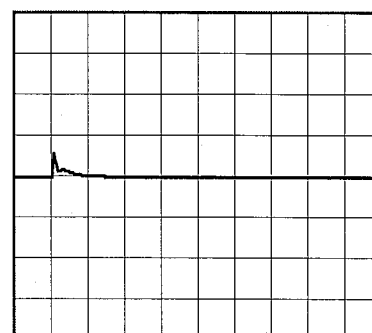
2ms/div

Load 10% (0.21A) \longleftrightarrow
Load 100% (2.1A)

500mV/div



500 μ s/div



2ms/div

COSEL

Model		SNTUNS50F24																																							
Item		Ripple Voltage (by Load Current)																																							
Object		+24V2.1A																																							
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 100V</div><div>-·-○-·- Input Volt. 200V</div></div><div>Ripple Voltage [mV]</div><div>Load Current [A]</div></div>		<table><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><tr><td>0.0</td><td>68</td><td>68</td></tr><tr><td>0.2</td><td>14</td><td>20</td></tr><tr><td>0.4</td><td>14</td><td>20</td></tr><tr><td>0.8</td><td>16</td><td>20</td></tr><tr><td>1.2</td><td>24</td><td>30</td></tr><tr><td>1.6</td><td>22</td><td>20</td></tr><tr><td>2.0</td><td>22</td><td>22</td></tr><tr><td>2.1</td><td>22</td><td>24</td></tr><tr><td>2.3</td><td>24</td><td>30</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	68	68	0.2	14	20	0.4	14	20	0.8	16	20	1.2	24	30	1.6	22	20	2.0	22	22	2.1	22	24	2.3	24	30	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
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<div>Measured by 100 MHz Oscilloscope.</div> <div>Ripple Voltage is shown as p-p in the figure below.</div> <div>Note: Slanted line shows the range of the rated load current.</div> <div><div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div></div><div>Ripple [mVp-p]</div><div>T1</div><div>T2</div></div> <div>Fig. Complex Ripple Wave Form</div>																																									

- 12 -

BC-10700

COSEL

Model		SNTUNS50F24																																							
Item		Ripple-Noise																																							
Object		+24V2.1A																																							
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 100V</div><div>-·-○-- Input Volt. 200V</div></div><div>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.</div></div>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 100 [V]</th><th>Input Volt. 200 [V]</th></tr><tr><td>0.0</td><td>68</td><td>68</td></tr><tr><td>0.2</td><td>16</td><td>22</td></tr><tr><td>0.4</td><td>18</td><td>24</td></tr><tr><td>0.8</td><td>22</td><td>26</td></tr><tr><td>1.2</td><td>30</td><td>36</td></tr><tr><td>1.6</td><td>26</td><td>26</td></tr><tr><td>2.0</td><td>32</td><td>32</td></tr><tr><td>2.1</td><td>32</td><td>32</td></tr><tr><td>2.3</td><td>32</td><td>36</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	68	68	0.2	16	22	0.4	18	24	0.8	22	26	1.2	30	36	1.6	26	26	2.0	32	32	2.1	32	32	2.3	32	36	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																								
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[illegible]

COSEL

Model		SNTUNS50F24																																																				
Item		Ambient Temperature Drift																																																				
Object		+24V2.1A																																																				
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<div><div><div>—△—</div><div>---□---</div><div>---○---</div></div><div><div>Input Volt.</div><div>Input Volt.</div><div>Input Volt.</div></div><div><div>100V</div><div>200V</div><div>230V</div></div></div> <div><p>Output Voltage [V]</p><p>Ambient Temperature [°C]</p><p>Load 100%</p></div>		<table><tr><th rowspan="2">Ambient Temperature [°C]</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><tr><td>-30</td><td>23.992</td><td>23.992</td><td>23.993</td></tr><tr><td>-20</td><td>24.010</td><td>24.010</td><td>24.010</td></tr><tr><td>-10</td><td>24.024</td><td>24.025</td><td>24.025</td></tr><tr><td>0</td><td>24.039</td><td>24.039</td><td>24.040</td></tr><tr><td>25</td><td>24.062</td><td>24.062</td><td>24.062</td></tr><tr><td>50</td><td>24.069</td><td>24.069</td><td>24.069</td></tr><tr><td>70</td><td>24.067</td><td>24.067</td><td>24.067</td></tr><tr><td>85</td><td>24.064</td><td>24.063</td><td>24.063</td></tr><tr><td>95</td><td>24.063</td><td>24.063</td><td>24.063</td></tr><tr><td>100</td><td>24.060</td><td>24.060</td><td>24.059</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-30	23.992	23.992	23.993	-20	24.010	24.010	24.010	-10	24.024	24.025	24.025	0	24.039	24.039	24.040	25	24.062	24.062	24.062	50	24.069	24.069	24.069	70	24.067	24.067	24.067	85	24.064	24.063	24.063	95	24.063	24.063	24.063	100	24.060	24.060	24.059	--	-	-	-
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--	-	-	-																																																			
Note: Slanted line shows the range of the rated ambient temperature.																																																						

- 15 -

BC-10700

COSEL

		Testing Circuitry Figure A
Model	SNTUNS50F24	
Item	Output Voltage Accuracy	
Object	+24V2.1A	

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 - 2.1A

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

* 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	50	85	0	24.078	±35	±0.1
Minimum Voltage	-20	85	2.1	24.009		

COSEL

Model

SNTUNS50F24

Item

Time Lapse Drift

Object

+24V2.1A

Temperature

25°C

Testing Circuitry

Figure A

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

0.0

2.0

4.0

6.0

8.0

10.0

Time [H]

Input Volt. 100V

Load 100%

2.Values

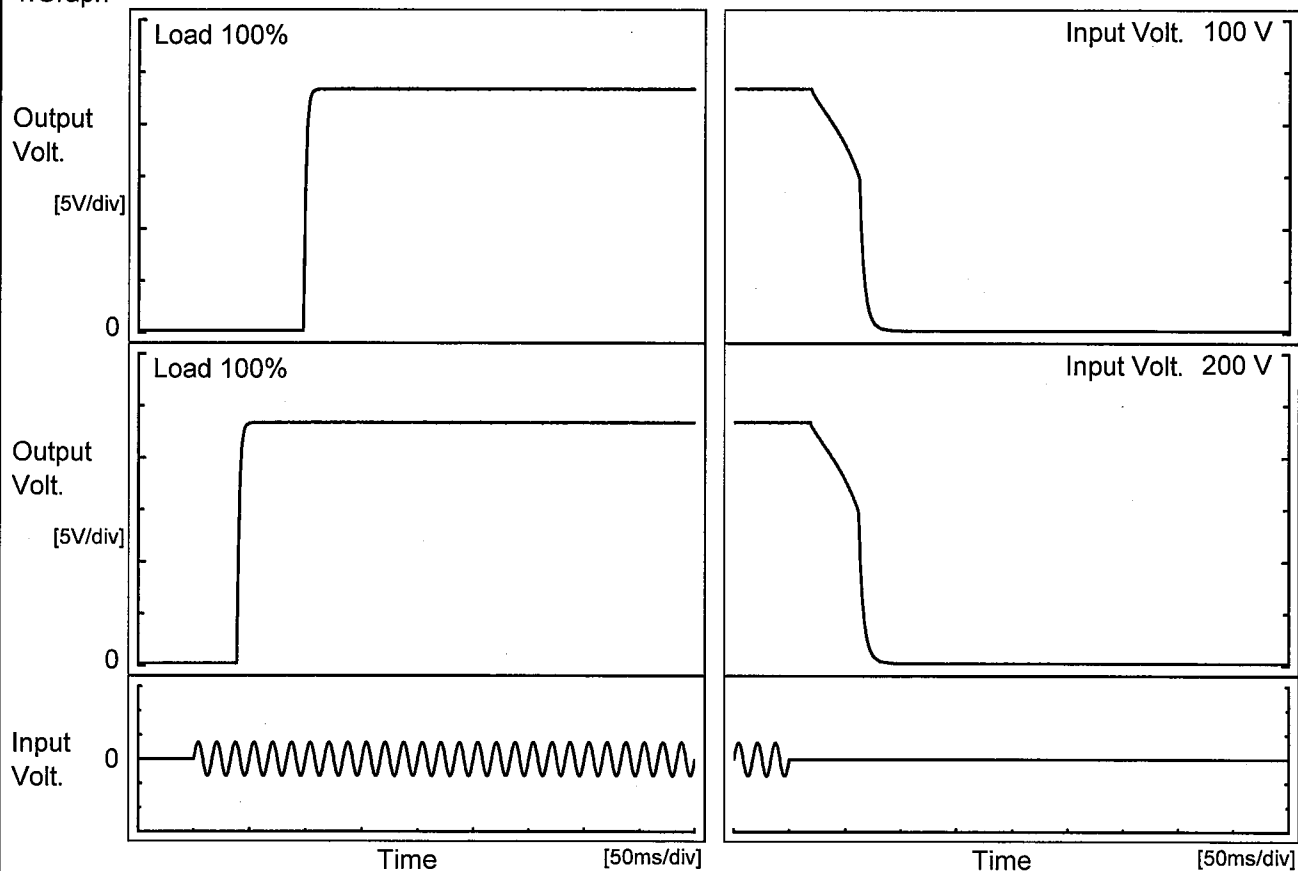
Time since start [H]	Output Voltage [V]
0.0	24.053
0.5	24.063
1.0	24.063
2.0	24.063
3.0	24.063
4.0	24.063
5.0	24.063
6.0	24.063
7.0	24.063
8.0	24.063

* The characteristic of AC200V is equal.

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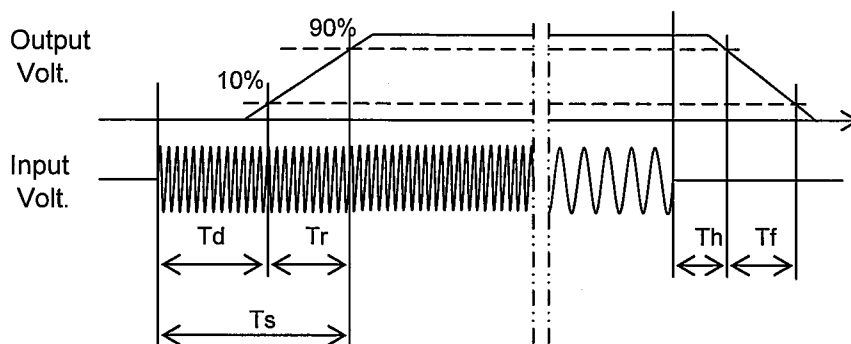
Model	SNTUNS50F24	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time	
Object	+24V2.1A	

1. Graph



2. Values

		[ms]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		98.0	4.8	102.8	27.8	42.3
200 V		39.3	4.8	44.1	27.5	42.3



Model

SNTUNS50F24

Item

Hold-Up Time

Object

+24V2.1A

Temperature

25°C

Testing Circuitry

Figure A

1.Graph

---□---

Load 50%

—△—

Load 100%

Hold-Up Time [ms]

1000

100

10

1

50

100

150

200

250

300

Input Voltage [V]

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.

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
80	92	20
85	92	20
100	92	20
120	92	20
200	92	20
230	92	19
264	92	19
280	93	19
--	-	-

- 19 -

BC-10700

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Model	SNTUNS50F24																																																						
Item	Instantaneous Interruption Compensation		Temperature	25°C																																																			
Object	+24V2.1A		Testing Circuitry	Figure A																																																			
1.Graph			2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <p>Instantaneous Compensation Time [ms]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>			<table><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><tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.2</td><td>405</td><td>402</td><td>402</td></tr><tr><td>0.4</td><td>227</td><td>227</td><td>226</td></tr><tr><td>0.8</td><td>121</td><td>120</td><td>120</td></tr><tr><td>1.2</td><td>79</td><td>79</td><td>79</td></tr><tr><td>1.6</td><td>47</td><td>47</td><td>49</td></tr><tr><td>2.0</td><td>25</td><td>25</td><td>25</td></tr><tr><td>2.1</td><td>21</td><td>21</td><td>21</td></tr><tr><td>2.3</td><td>19</td><td>19</td><td>19</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	-	-	-	0.2	405	402	402	0.4	227	227	226	0.8	121	120	120	1.2	79	79	79	1.6	47	47	49	2.0	25	25	25	2.1	21	21	21	2.3	19	19	19	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																						
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Model	SNTUNS50F24																																							
Item	Minimum Input Voltage for Regulated Output Voltage	Testing Circuitry Figure A																																						
Object	+24V2.1A																																							
1.Graph		2.Values																																						
<div> <div> <div>---</div> <div>□</div> <div>---</div> <div>Load 50%</div> </div> <div> <div>—</div> <div>△</div> <div>—</div> <div>Load 100%</div> </div> </div> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>		<table> <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> <tr><td>-30</td><td>57</td><td>59</td></tr> <tr><td>-20</td><td>58</td><td>60</td></tr> <tr><td>-10</td><td>58</td><td>60</td></tr> <tr><td>0</td><td>59</td><td>61</td></tr> <tr><td>25</td><td>61</td><td>63</td></tr> <tr><td>50</td><td>59</td><td>60</td></tr> <tr><td>70</td><td>59</td><td>60</td></tr> <tr><td>85</td><td>58</td><td>60</td></tr> <tr><td>95</td><td>58</td><td>59</td></tr> <tr><td>100</td><td>58</td><td>59</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-30	57	59	-20	58	60	-10	58	60	0	59	61	25	61	63	50	59	60	70	59	60	85	58	60	95	58	59	100	58	59	--	-	-
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COSEL

Model	SNTUNS50F24																																																	
Item	Overcurrent Protection	Temperature	25°C																																															
Object	+24V2.1A	Testing Circuitry	Figure A																																															
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- 22 -

BC-10700

<div> <div> <div>Model</div> <div>SNTUNS50F24</div> </div> <div> <div>Item</div> <div>Overvoltage Protection</div> </div> <div> <div>Object</div> <div>+24V2.1A</div> </div> </div>		<div>Testing Circuitry</div> <div>Figure A</div>																																						
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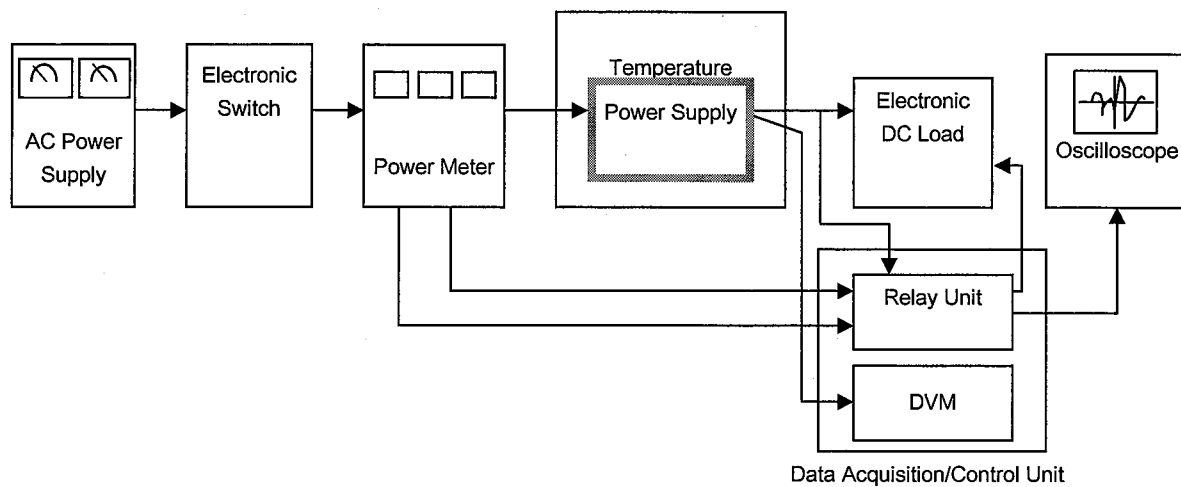


Figure A

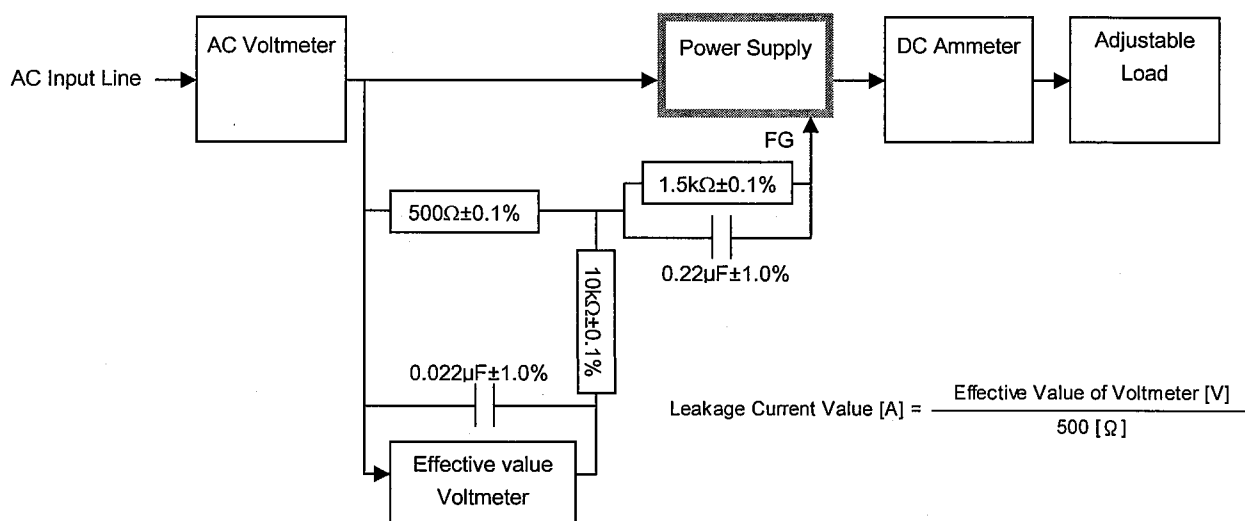


Figure B (IEC60950-1)

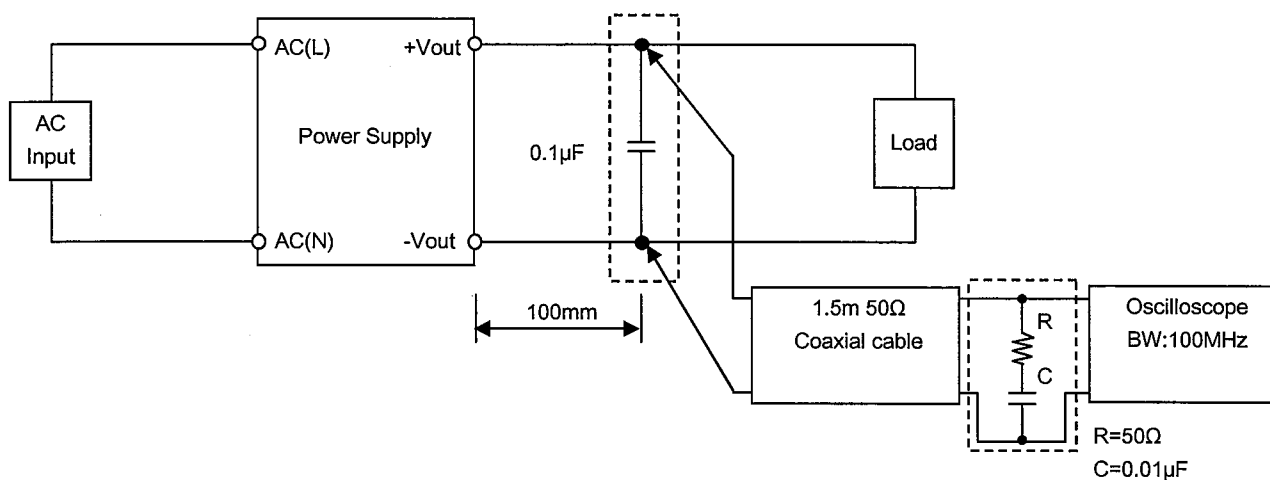


Figure C