

TEST DATA OF TUNS100F12

Regulated DC Power Supply
April 10, 2012

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Takayuki Fukuda Design Manager

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Shintaro Mizukami Design Engineer

COSEL CO.,LTD.

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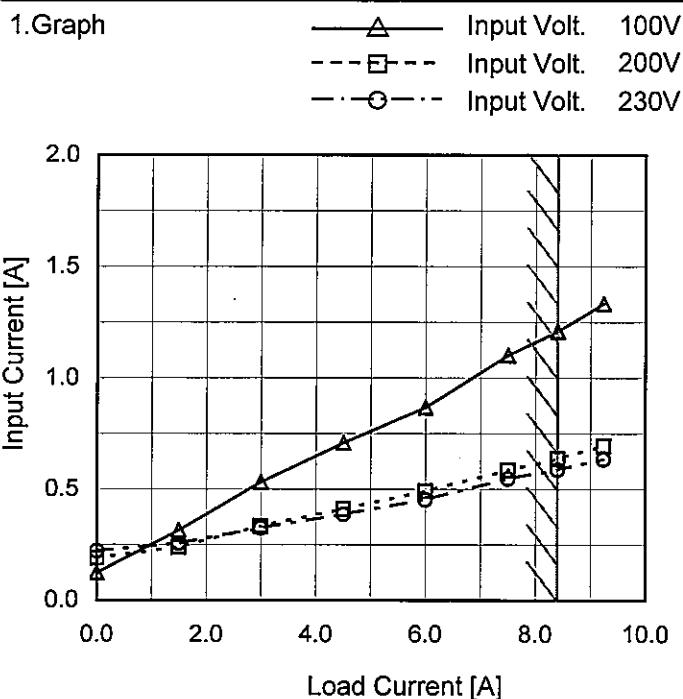
(Final Page 25)

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Model TUNS100F12

Item Input Current (by Load Current)

Object _____

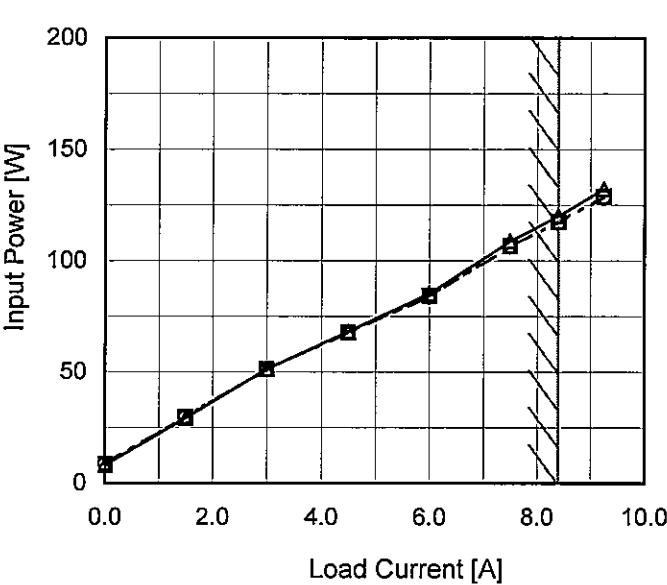
Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.124	0.189	0.221
1.5	0.314	0.239	0.255
3.0	0.531	0.334	0.325
4.5	0.708	0.410	0.387
6.0	0.868	0.491	0.453
7.5	1.102	0.584	0.547
8.4	1.210	0.637	0.588
9.2	1.334	0.695	0.635
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--	-	-	-
--	-	-	-

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

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Model	TUNS100F12																																																					
Item	Input Power (by Load Current)	Temperature Testing Circuitry	25°C Figure A																																																			
Object	<hr/>																																																					
1.Graph	<p>—△— Input Volt. 100V - - -□--- Input Volt. 200V - - -○--- Input Volt. 230V</p>  <p>The graph plots Input Power [W] on the Y-axis (0 to 200) against Load Current [A] on the X-axis (0.0 to 10.0). Three curves are shown for different input voltages: 100V (triangles), 200V (squares), and 230V (circles). All curves show a linear increase in power with load current. A slanted line is drawn across the graph, starting from approximately (0.0, 10) and ending at (8.5, 180), representing the rated load current range.</p>																																																					
2.Values	<table border="1"> <thead> <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> </thead> <tbody> <tr><td>0.0</td><td>8.1</td><td>8.6</td><td>8.5</td></tr> <tr><td>1.5</td><td>29.4</td><td>29.7</td><td>29.9</td></tr> <tr><td>3.0</td><td>51.3</td><td>51.1</td><td>51.0</td></tr> <tr><td>4.5</td><td>68.3</td><td>67.7</td><td>67.6</td></tr> <tr><td>6.0</td><td>85.3</td><td>84.3</td><td>84.0</td></tr> <tr><td>7.5</td><td>108.8</td><td>106.6</td><td>106.4</td></tr> <tr><td>8.4</td><td>120.1</td><td>117.5</td><td>117.2</td></tr> <tr><td>9.2</td><td>132.2</td><td>128.9</td><td>128.6</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 Power [W]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	8.1	8.6	8.5	1.5	29.4	29.7	29.9	3.0	51.3	51.1	51.0	4.5	68.3	67.7	67.6	6.0	85.3	84.3	84.0	7.5	108.8	106.6	106.4	8.4	120.1	117.5	117.2	9.2	132.2	128.9	128.6	--	-	-	-	--	-	-	-	--	-	-	-
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Model	TUNS100F12																																	
Item	Efficiency (by Input Voltage)	Temperature 25°C Testing Circuitry Figure A																																
Object	—																																	
1. Graph																																		
<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 increase in efficiency as input voltage increases. A slanted line on the graph indicates the rated input voltage range.</p>		2. Values																																
<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>80</td> <td>80.5</td> <td>82.6</td> </tr> <tr> <td>85</td> <td>81.0</td> <td>83.3</td> </tr> <tr> <td>100</td> <td>81.4</td> <td>84.4</td> </tr> <tr> <td>120</td> <td>81.9</td> <td>85.2</td> </tr> <tr> <td>200</td> <td>82.0</td> <td>86.3</td> </tr> <tr> <td>230</td> <td>82.0</td> <td>86.5</td> </tr> <tr> <td>264</td> <td>82.3</td> <td>86.7</td> </tr> <tr> <td>280</td> <td>82.4</td> <td>87.1</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	80	80.5	82.6	85	81.0	83.3	100	81.4	84.4	120	81.9	85.2	200	82.0	86.3	230	82.0	86.5	264	82.3	86.7	280	82.4	87.1	--	-	-
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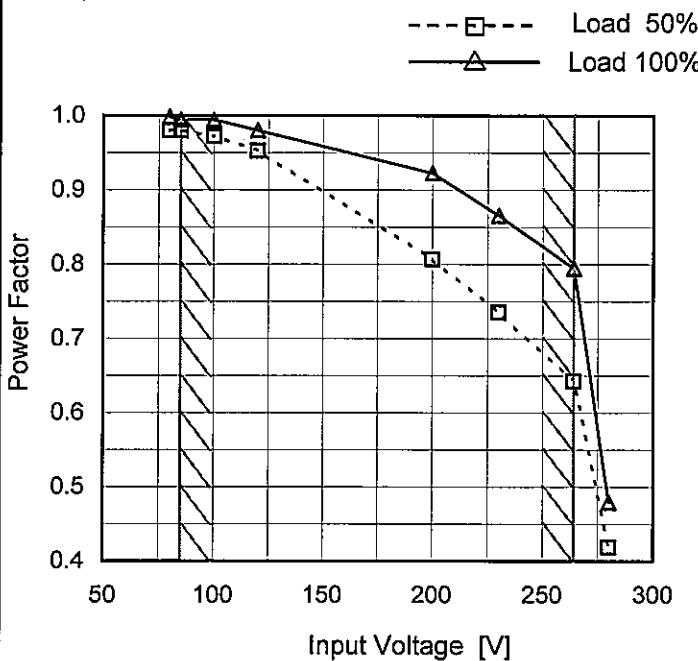
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Note:	Slanted line shows the range of the rated load current.																																																					

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Model	TUNS100F12
Item	Power Factor (by Input Voltage)
Object	—

1. Graph



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

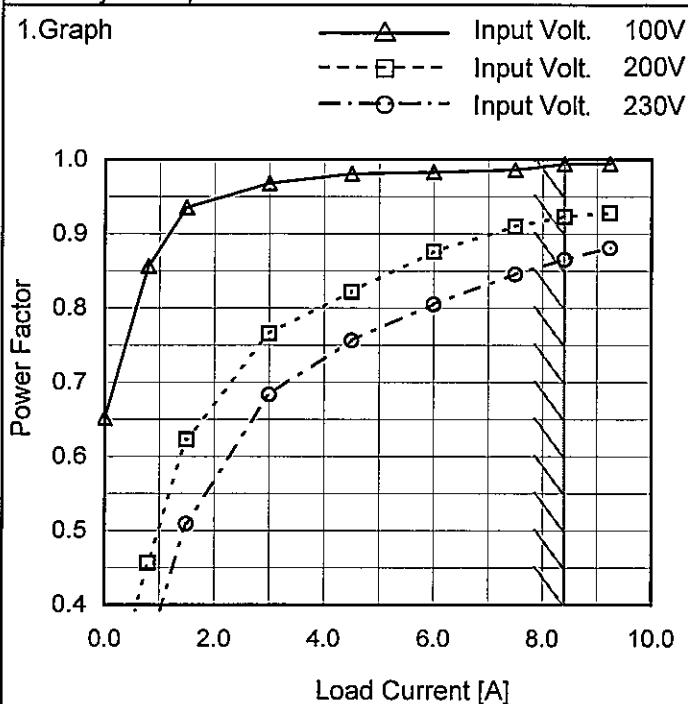
Temperature 25°C
Testing Circuitry Figure A

2. Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
80	0.980	0.998
85	0.980	0.994
100	0.972	0.994
120	0.952	0.980
200	0.807	0.923
230	0.735	0.866
264	0.643	0.795
280	0.419	0.479
—	-	-

COSEL

Model	TUNS100F12
Item	Power Factor (by Load Current)
Object	_____


 Temperature 25°C
 Testing Circuitry Figure A

2. Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.652	0.228	0.167
0.8	0.857	0.457	0.339
1.5	0.936	0.623	0.509
3.0	0.968	0.766	0.684
4.5	0.981	0.822	0.756
6.0	0.983	0.876	0.805
7.5	0.986	0.910	0.846
8.4	0.994	0.923	0.866
9.2	0.994	0.928	0.881
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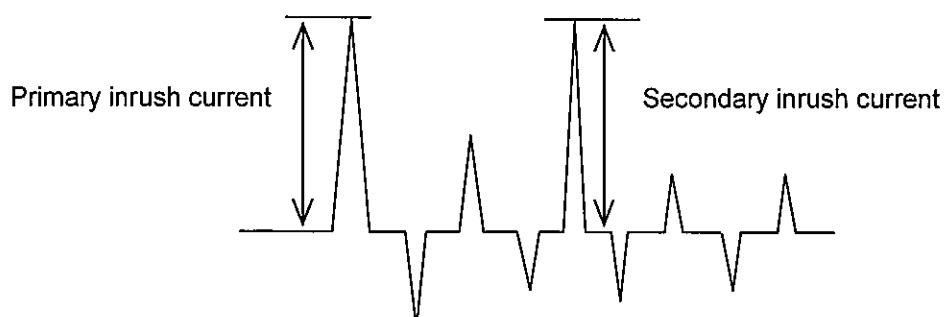
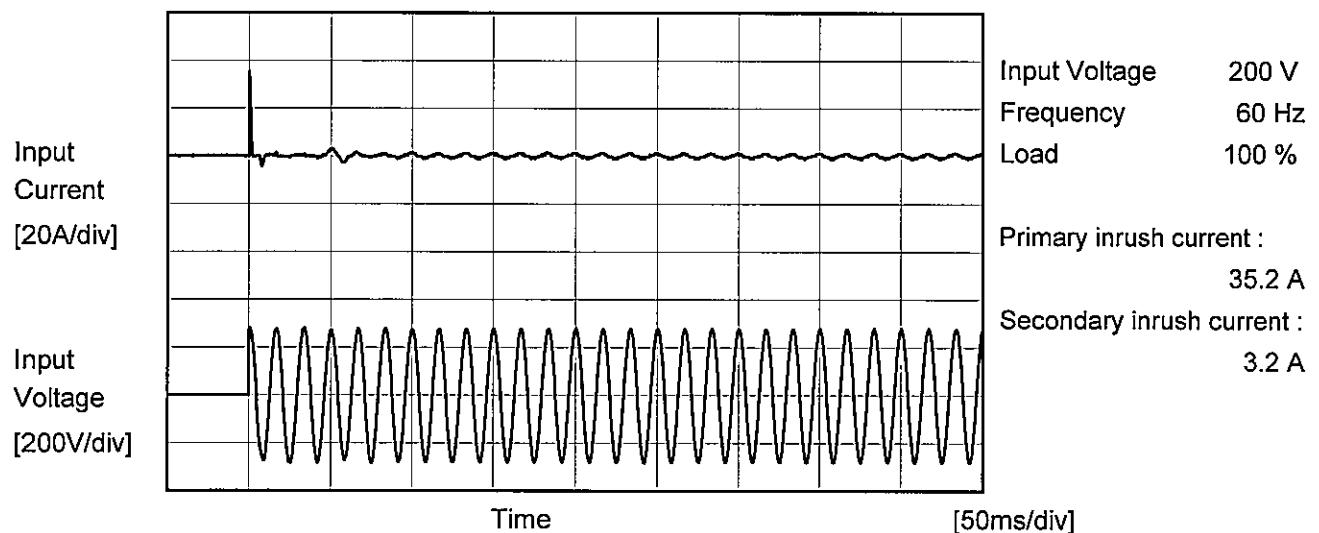
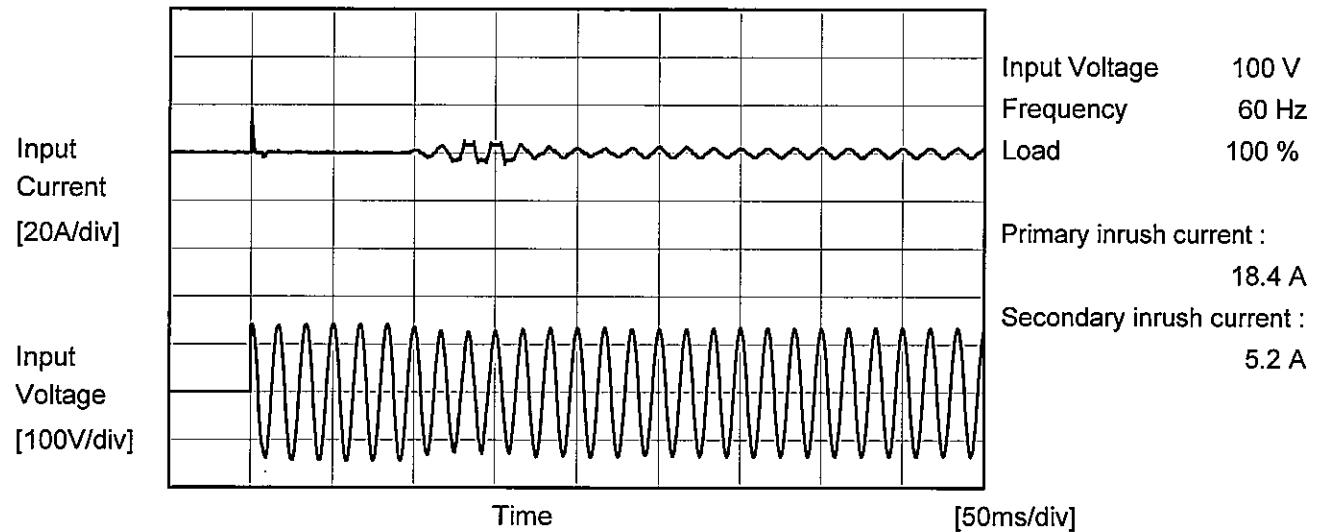
Note: Slanted line shows the range of the rated load current.

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Model TUNS100F12

Item Inrush Current

Object _____

Temperature 25°C
Testing Circuitry Figure A



Model	TUNS100F12	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	—		

1. Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	264[V]	
IEC60950-1	Both phases	0.17	0.37	0.49	Operation
	One of phase	0.22	0.48	0.65	stand by

The value for "One phase" is the reference value only.

2. Condition

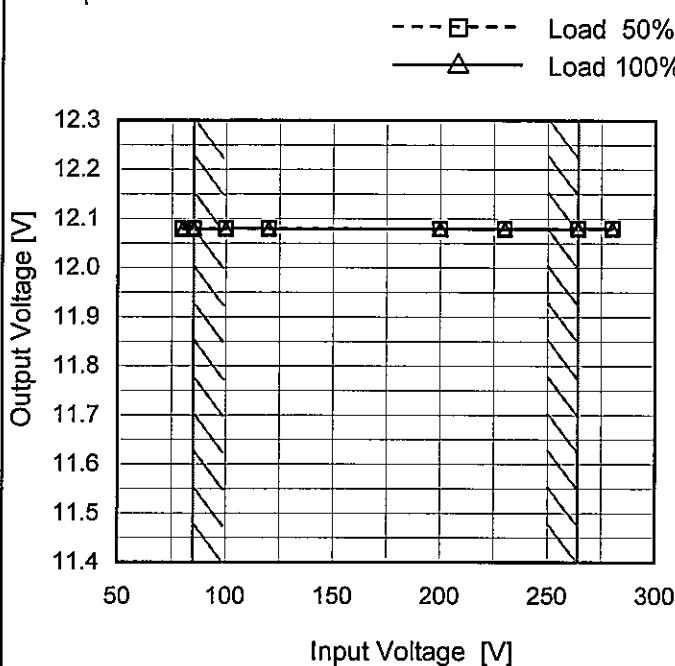
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

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Model	TUNS100F12
Item	Line Regulation
Object	+12V8.4A

Temperature 25°C
 Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
80	12.080	12.079
85	12.080	12.079
100	12.080	12.079
120	12.080	12.080
200	12.080	12.079
230	12.080	12.079
264	12.080	12.080
280	12.080	12.080
--	-	-

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

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Model	TUNS100F12
Item	Load Regulation
Object	+12V8.4A

1. Graph

Output Voltage [V]

Load Current [A]

Legend:

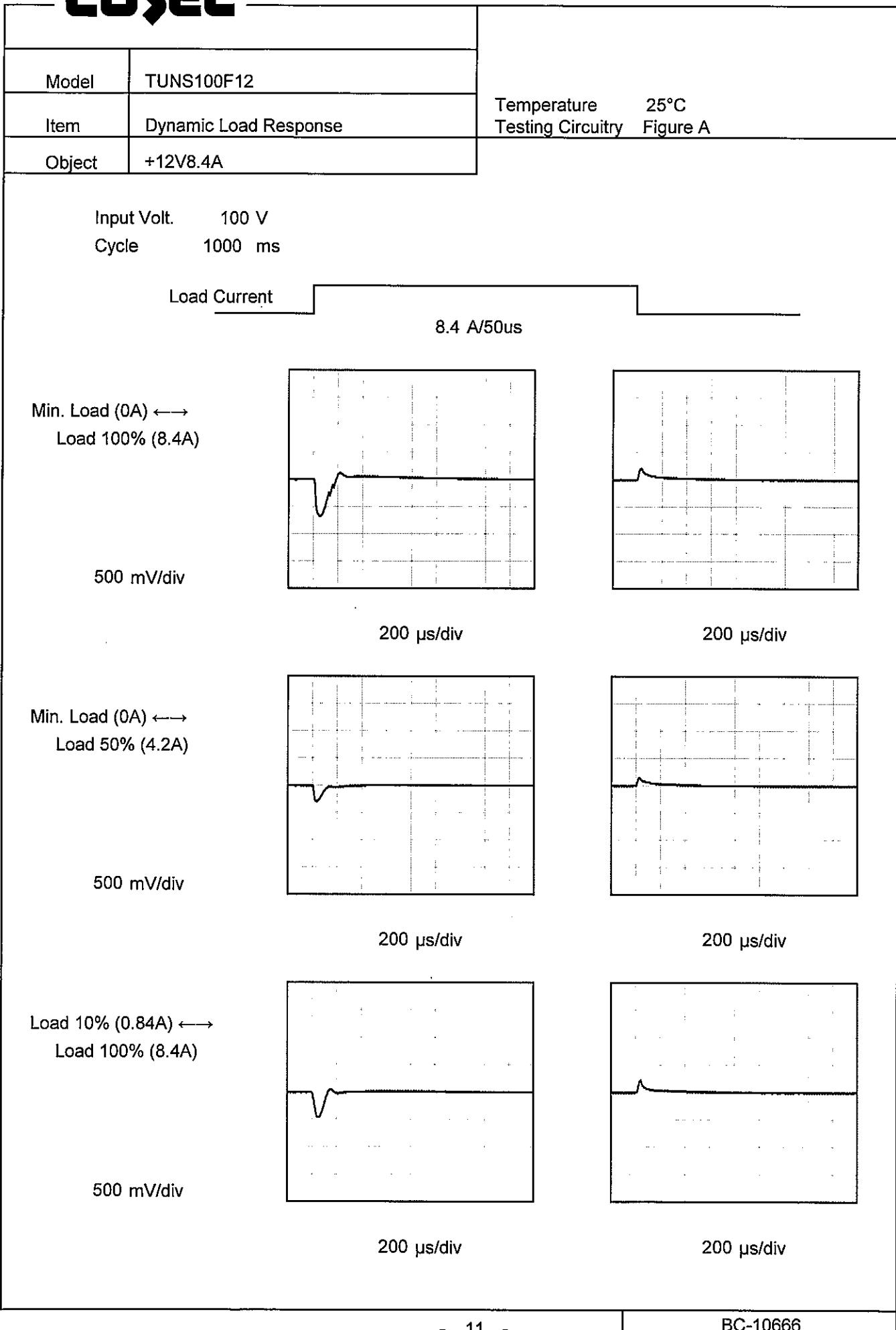
- Input Volt. 100V
- Input Volt. 200V
- Input Volt. 230V

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

Temperature 25°C
Testing Circuitry Figure A

2. Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	12.082	12.081	12.082
1.5	12.081	12.081	12.081
3.0	12.081	12.081	12.081
4.5	12.081	12.081	12.081
6.0	12.081	12.081	12.081
7.5	12.080	12.080	12.080
8.4	12.080	12.080	12.080
9.2	12.080	12.080	12.080
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--	-	-	-
--	-	-	-

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COSEL

Model	TUNS100F12	Temperature Testing Circuitry	25°C Figure C																																						
Item	Ripple Voltage (by Load Current)																																								
Object	+12V8.4A																																								
1.Graph	<p>—△— Input Volt. 100V -·○- Input Volt. 200V</p> <table border="1"> <caption>Data points estimated from Graph</caption> <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>40</td><td>40</td></tr> <tr><td>2.0</td><td>40</td><td>40</td></tr> <tr><td>4.0</td><td>40</td><td>40</td></tr> <tr><td>6.0</td><td>40</td><td>40</td></tr> <tr><td>7.5</td><td>50</td><td>50</td></tr> <tr><td>8.4</td><td>50</td><td>50</td></tr> <tr><td>9.2</td><td>50</td><td>50</td></tr> </tbody> </table>			Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)	0.0	40	40	2.0	40	40	4.0	40	40	6.0	40	40	7.5	50	50	8.4	50	50	9.2	50	50														
Load Current [A]	Ripple Voltage [mV] (Input Volt. 100V)	Ripple Voltage [mV] (Input Volt. 200V)																																							
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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>T1: Due to AC Input Line T2: Due to Switching</p> <p>Fig. Complex Ripple Wave Form</p>																																								

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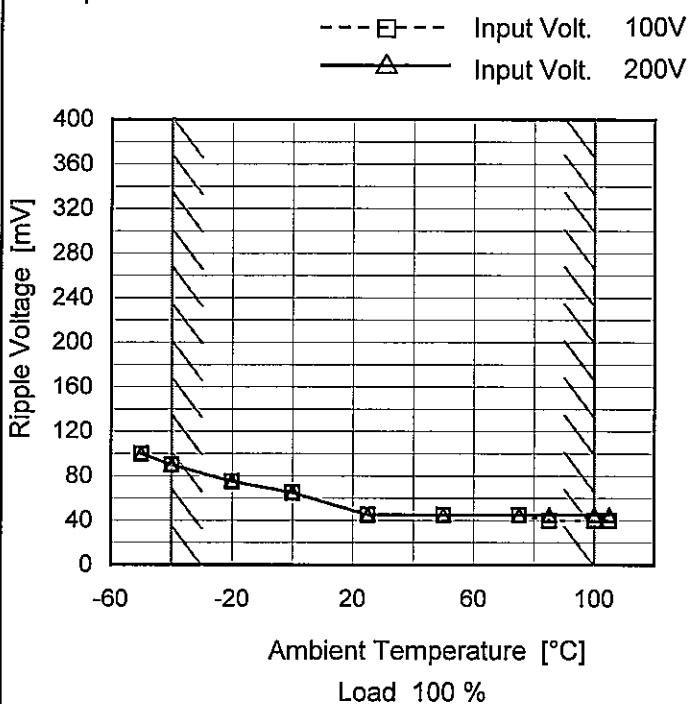
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Load Current [A]	Ripple-Noise [mV]																																							
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<p>Measured by 100 MHz Oscilloscope. Ripple-Noise is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.</p>																																								
<p>Fig. Complex Ripple Wave Form</p>																																								

COSEL

Model	TUNS100F12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V8.4A

Testing Circuitry Figure C

1. Graph



2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-50	100	100
-40	90	90
-20	75	75
0	65	65
25	45	45
50	45	45
75	45	45
85	40	45
100	40	45
105	40	45
--	-	-

Measured by 100 MHz Oscilloscope.

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

COSEL

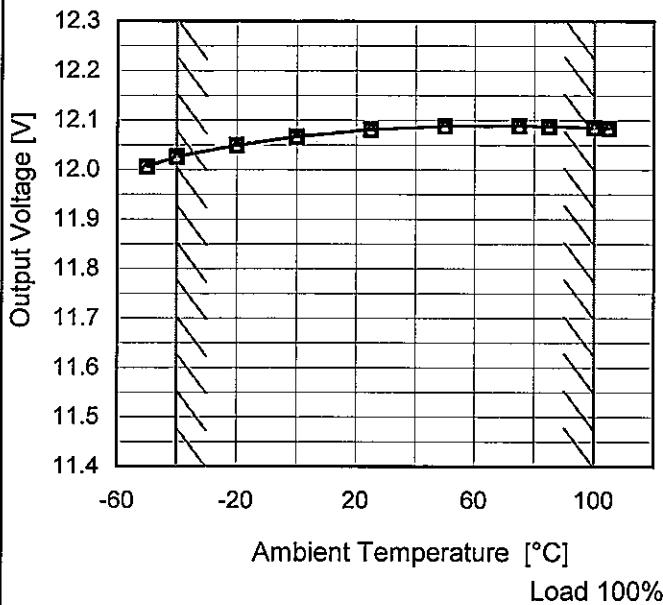
Model TUNS100F12

Item Ambient Temperature Drift

Object +12V8.4A

1. Graph

—△— Input Volt. 100V
 - - -□--- Input Volt. 200V
 - - -○--- Input Volt. 230V



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. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-50	12.006	12.006	12.006
-40	12.026	12.027	12.026
-20	12.049	12.050	12.050
0	12.067	12.067	12.067
25	12.081	12.082	12.082
50	12.088	12.088	12.088
75	12.089	12.089	12.089
85	12.088	12.088	12.088
100	12.086	12.086	12.085
105	12.084	12.084	12.084
--	-	-	-



Model	TUNS100F12	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
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 : -40 ~ 100°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	75	85	0	12.092	± 34	± 0.3
Minimum Voltage	-40	264	0	12.025		

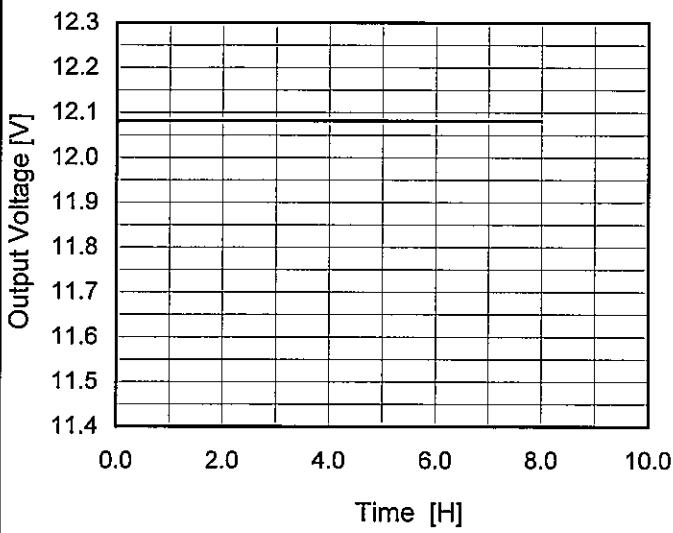
COSEL

Model TUNS100F12

Item Time Lapse Drift

Object +12V8.4A

1. Graph



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	12.077
0.5	12.082
1.0	12.082
2.0	12.082
3.0	12.082
4.0	12.082
5.0	12.082
6.0	12.082
7.0	12.082
8.0	12.082

COSEL

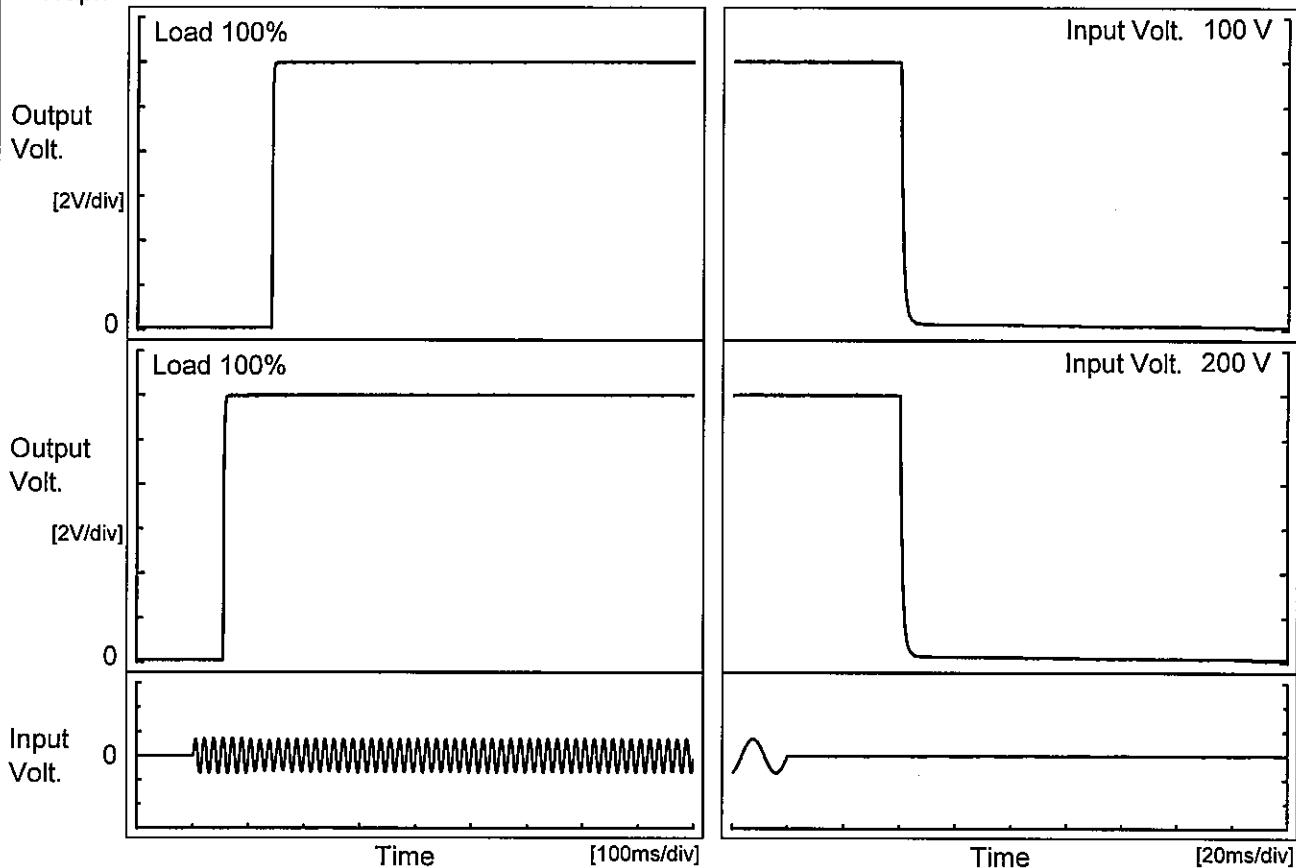
Model TUNS100F12

Item Rise and Fall Time

Object +12V8.4A

Temperature 25°C
Testing Circuitry Figure A

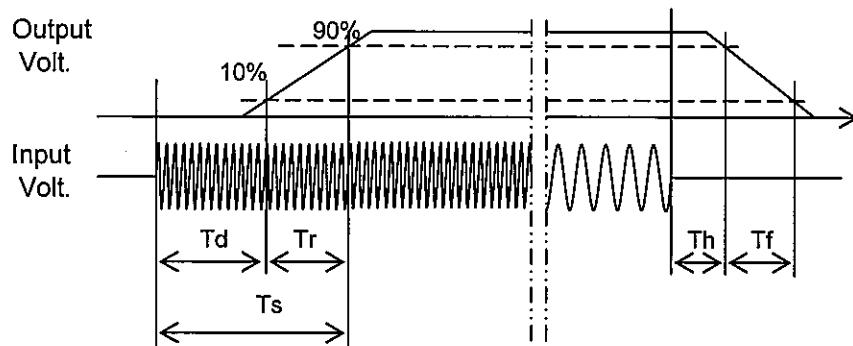
1. Graph



2. Values

[ms]

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		140.5	2.0	142.5	40.1	2.1
200 V		55.0	2.0	57.0	40.2	2.1

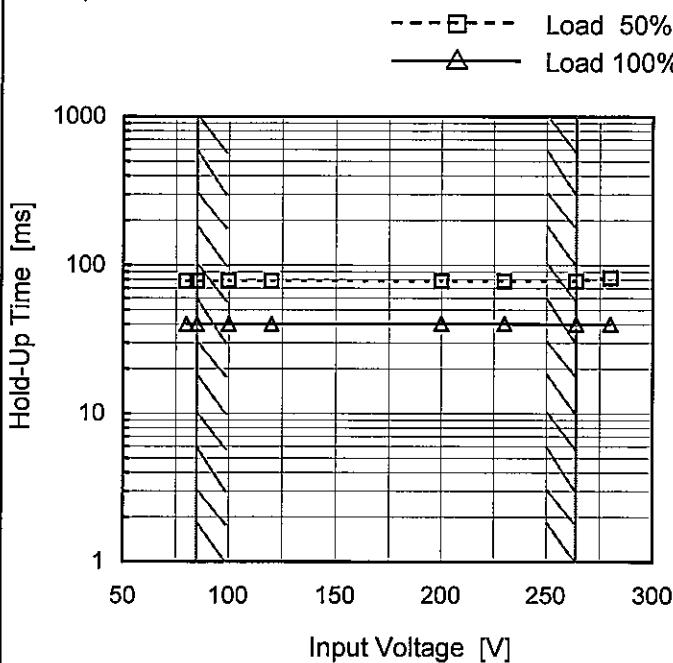


COSEL

Model	TUNS100F12
Item	Hold-Up Time
Object	+12V8.4A

Temperature 25°C
 Testing Circuitry Figure A

1. Graph



2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
80	78	40
85	78	40
100	78	40
120	78	40
200	78	40
230	78	40
264	78	40
280	82	40
--	-	-

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.

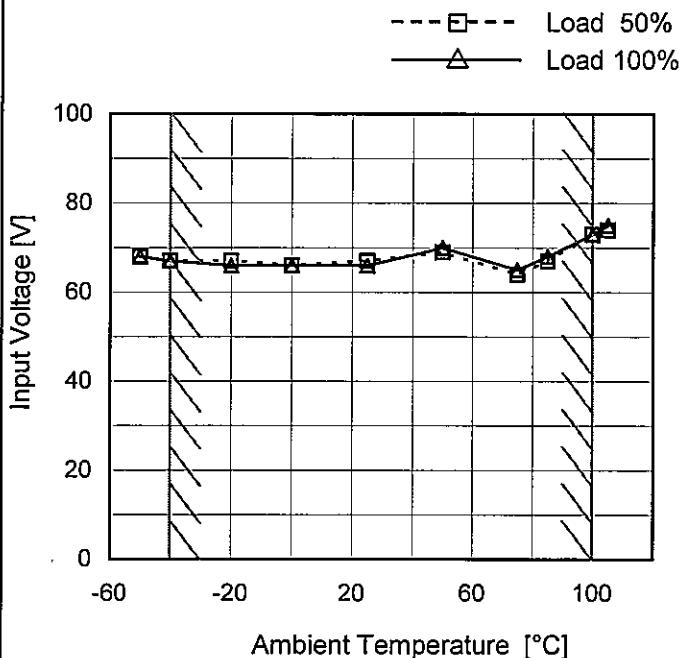
COSEL

Model	TUNS100F12	Temperature 25°C Testing Circuitry 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 1</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>1.5</td><td>174</td><td>173</td><td>170</td></tr> <tr><td>3.0</td><td>105</td><td>105</td><td>105</td></tr> <tr><td>4.5</td><td>75</td><td>75</td><td>75</td></tr> <tr><td>6.0</td><td>55</td><td>56</td><td>56</td></tr> <tr><td>7.5</td><td>43</td><td>45</td><td>45</td></tr> <tr><td>8.4</td><td>39</td><td>40</td><td>40</td></tr> <tr><td>9.2</td><td>37</td><td>36</td><td>36</td></tr> </tbody> </table>	Load Current [A]	100V [ms]	200V [ms]	230V [ms]	1.5	174	173	170	3.0	105	105	105	4.5	75	75	75	6.0	55	56	56	7.5	43	45	45	8.4	39	40	40	9.2	37	36	36																					
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Note:	Slanted line shows the range of the rated load current.																																																					

COSEL

Model	TUNS100F12
Item	Minimum Input Voltage for Regulated Output Voltage
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]	Input Voltage [V]	
	Load 50%	Load 100%
-50	68	68
-40	67	67
-20	67	66
0	66	66
25	67	66
50	69	70
75	64	65
85	67	68
100	73	73
105	74	75
--	-	-

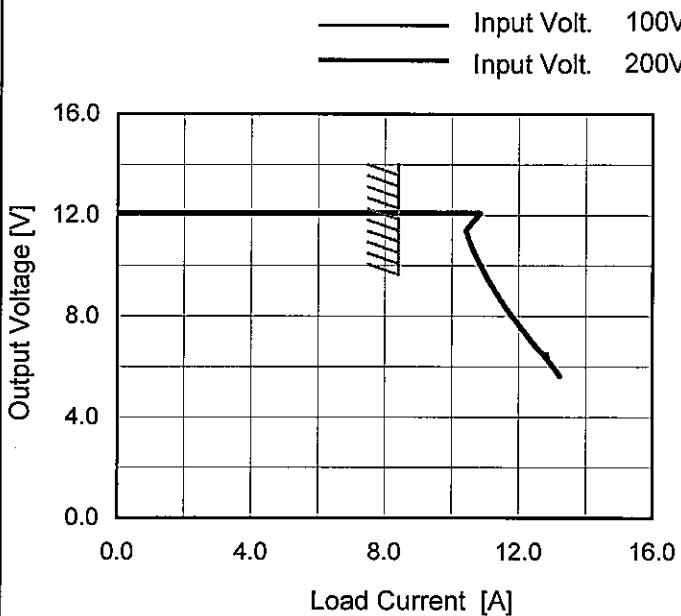
COSEL

Model TUNS100F12

Item Overcurrent Protection

Object +12V8.4A

1. Graph

Temperature 25°C
Testing Circuitry Figure A

2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
12.00	10.80	10.86
11.40	10.43	10.42
10.80	10.59	10.59
9.60	11.02	11.01
8.40	11.59	11.57
7.20	12.25	12.28
6.00	13.02	13.02
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

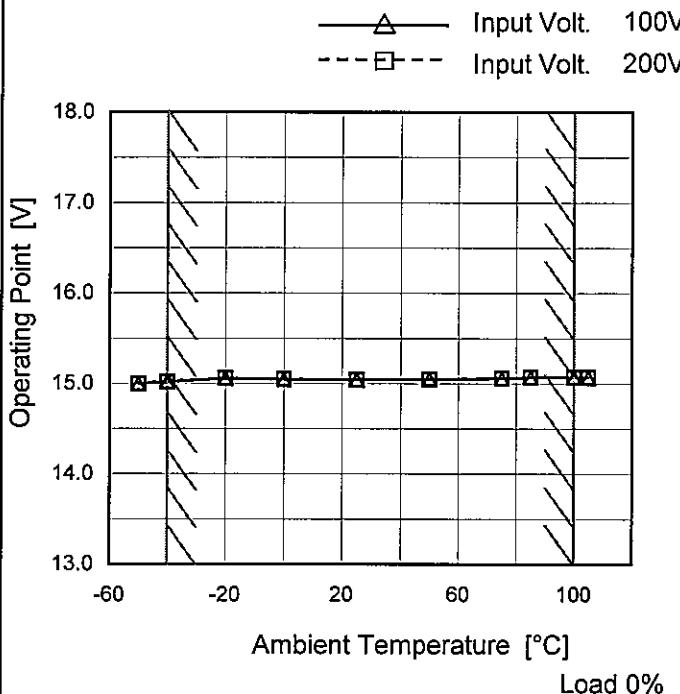
COSEL

Model TUNS100F12

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]
-50	15.00	15.00
-40	15.02	15.02
-20	15.06	15.06
0	15.05	15.05
25	15.04	15.04
50	15.05	15.05
75	15.06	15.06
85	15.07	15.07
100	15.07	15.07
105	15.07	15.07
--	-	-

COSEL

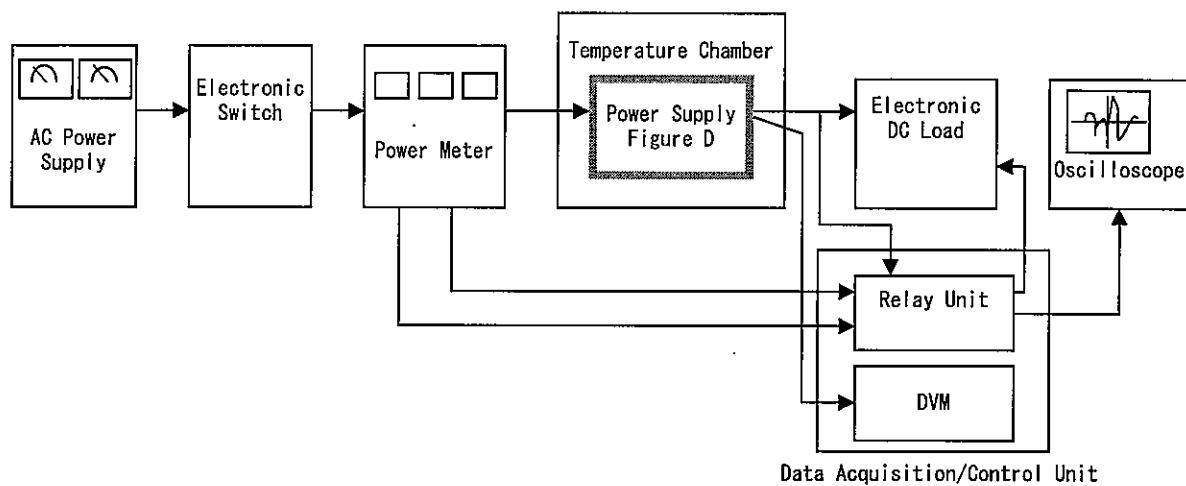


Figure A

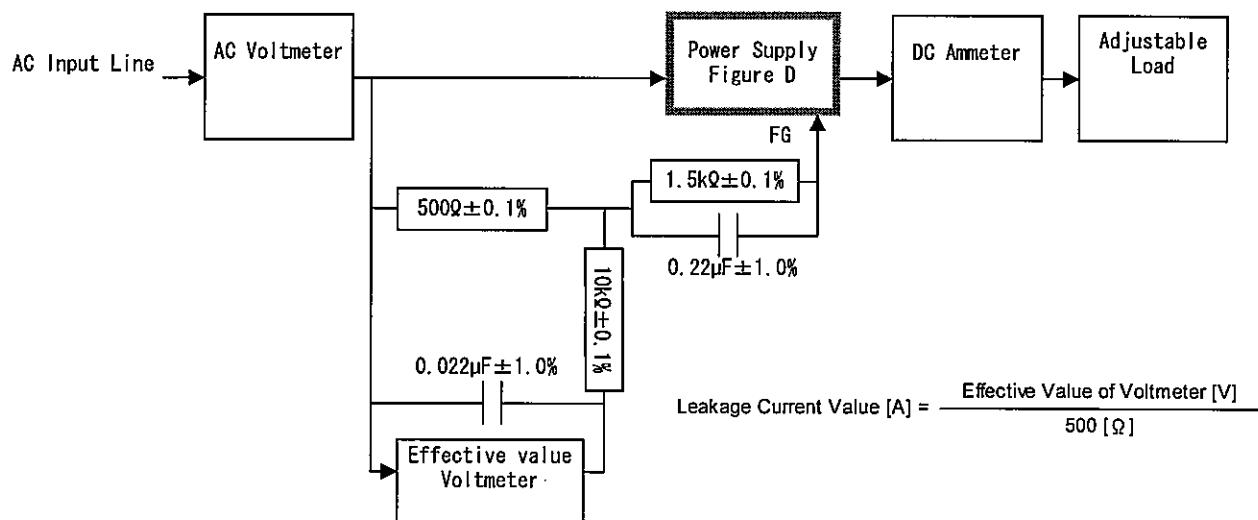


Figure B (IEC60950-1)

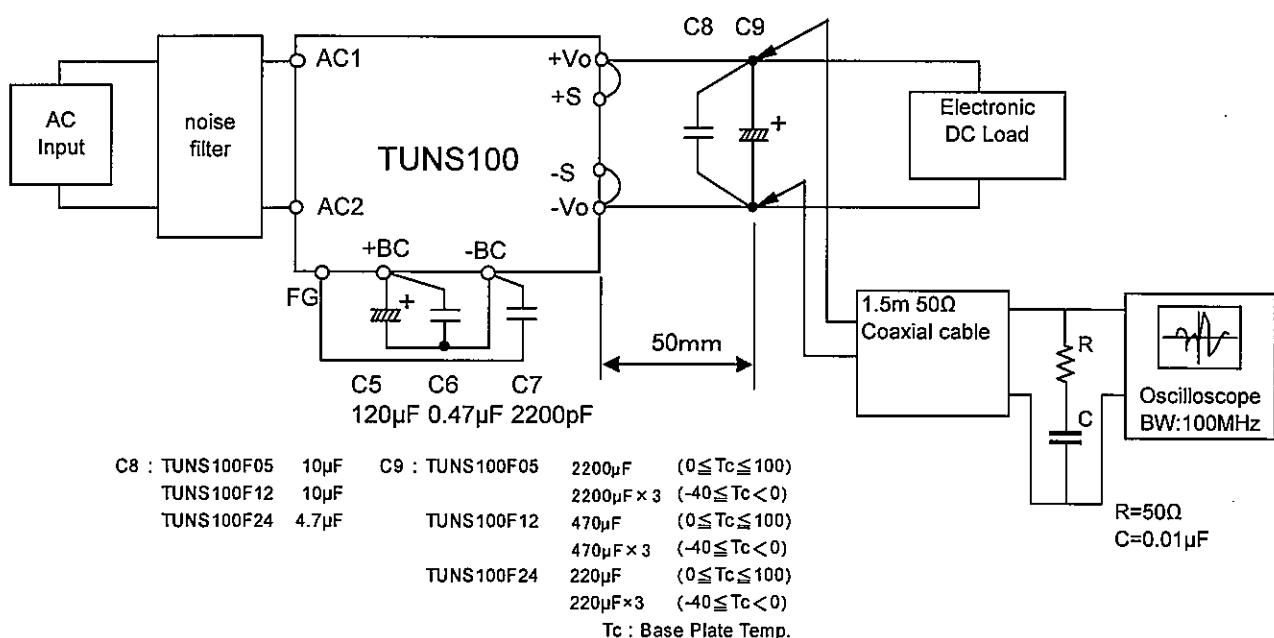
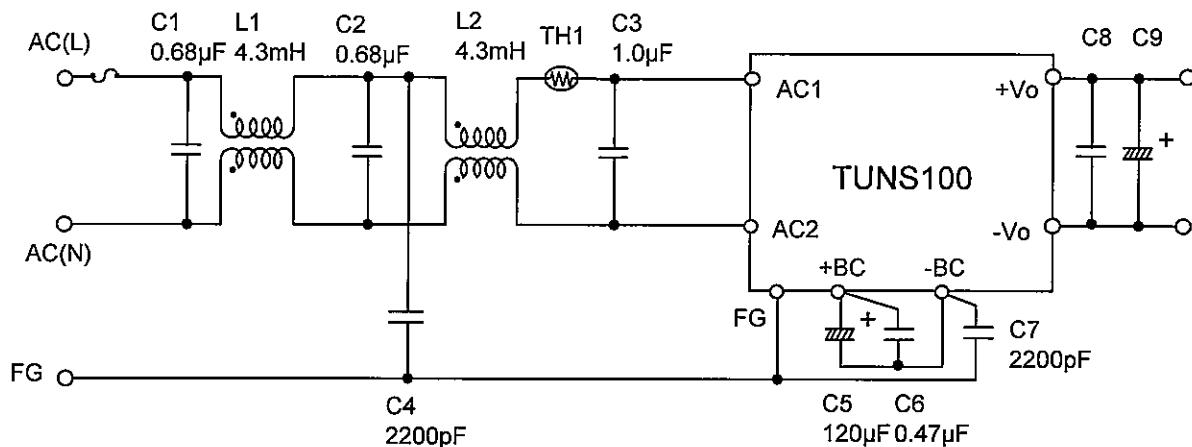


Figure C

COSEL

L1,L2 : SSB11V-R17043(NEC TOKIN)

TH1 : 8D2-11(SEMITEC)

C8 : TUNS100F05 10μF

TUNS100F12 10μF

TUNS100F24 4.7μF

C9 : TUNS100F05 2200μF (0 ≤ Tc ≤ 100)

2200μF × 3 (-40 ≤ Tc < 0)

TUNS100F12 470μF (0 ≤ Tc ≤ 100)

470μF × 3 (-40 ≤ Tc < 0)

TUNS100F24 220μF (0 ≤ Tc ≤ 100)

220μF × 3 (-40 ≤ Tc < 0)

Tc : Base Plate Temp.

Figure D