

TEST DATA OF TUNS100F24

Regulated DC Power Supply
April 11, 2012

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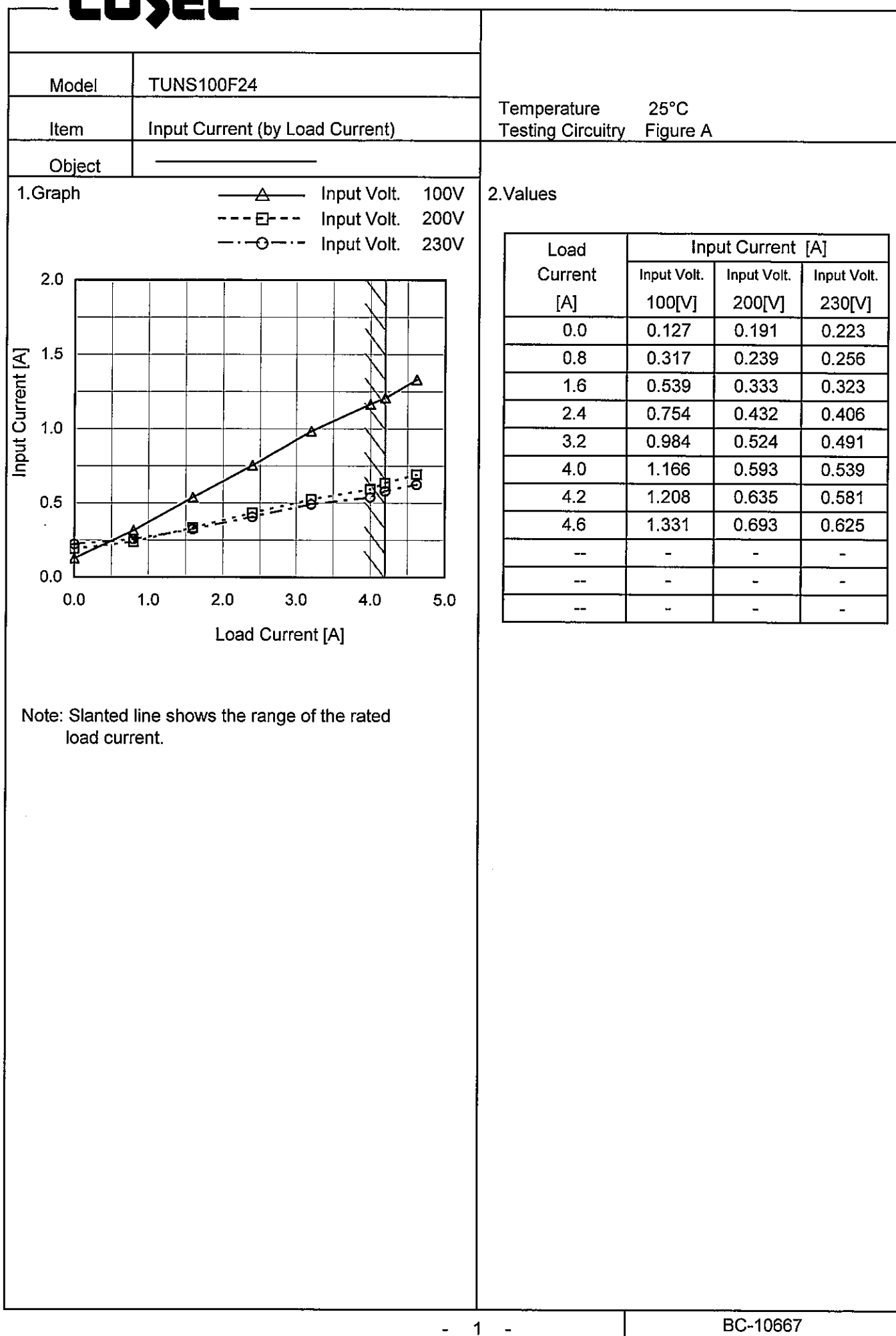
COSEL CO.,LTD.

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Model

TUNS100F24

Item

Input Power (by Load Current)

Object

1.Graph

—△—

Input Volt.

100V

---□---

Input Volt.

200V

-·-○-·-

Input Volt.

230V

Input Power [W]

200

150

100

50

0

0.0

1.0

2.0

3.0

4.0

5.0

Load Current [A]

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

2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	8.5	9.0	8.9
0.8	29.7	29.7	30.1
1.6	51.6	51.5	51.4
2.4	73.6	72.9	73.0
3.2	96.4	94.8	94.8
4.0	113.8	111.2	111.1
4.2	119.8	117.2	117.1
4.6	131.8	128.6	128.4
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Model		TUNS100F24																																	
Item		Efficiency (by Input Voltage)																																	
Object																																			
1.Graph		2.Values																																	
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>---△---</div><div>Load 100%</div></div></div> <table><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>80.4</td><td>82.8</td></tr><tr><td>85</td><td>80.9</td><td>83.4</td></tr><tr><td>100</td><td>81.3</td><td>84.4</td></tr><tr><td>120</td><td>81.7</td><td>85.2</td></tr><tr><td>200</td><td>81.5</td><td>86.3</td></tr><tr><td>230</td><td>81.8</td><td>86.4</td></tr><tr><td>264</td><td>81.9</td><td>86.6</td></tr><tr><td>280</td><td>82.6</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	80.4	82.8	85	80.9	83.4	100	81.3	84.4	120	81.7	85.2	200	81.5	86.3	230	81.8	86.4	264	81.9	86.6	280	82.6	87.1	--	-	-		
Input Voltage [V]	Efficiency [%]																																		
	Load 50%	Load 100%																																	
80	80.4	82.8																																	
85	80.9	83.4																																	
100	81.3	84.4																																	
120	81.7	85.2																																	
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--	-	-																																	
Note: Slanted line shows the range of the rated input voltage.																																			

-3-

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Model

TUNS100F24

Item

Efficiency (by Load Current)

Object

1.Graph

—△—

Input Volt.

100V

---□---

Input Volt.

200V

-·-○-·-

Input Volt.

230V

Efficiency [%]

Load Current [A]

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

Temperature

25°C

Testing Circuitry

Figure A

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.8	69.3	69.3	68.4
1.6	79.0	79.1	79.2
2.4	82.7	83.5	83.4
3.2	84.0	85.4	85.4
4.0	84.3	86.2	86.3
4.2	84.4	86.3	86.4
4.6	84.4	86.5	86.6
--	-	-	-
--	-	-	-
--	-	-	-

Model		TUNS100F24	
Item		Power Factor (by Input Voltage)	
Object			
1.Graph		2.Values	

Model		TUNS100F24	
Item		Power Factor (by Load Current)	
Object			

1.Graph

—△—

Input Volt.

100V

- - -□- - -

Input Volt.

200V

- · -○- · -

Input Volt.

230V

Power Factor

1.0

0.9

0.8

0.7

0.6

0.5

0.4

0.0

1.0

2.0

3.0

4.0

5.0

Load Current [A]

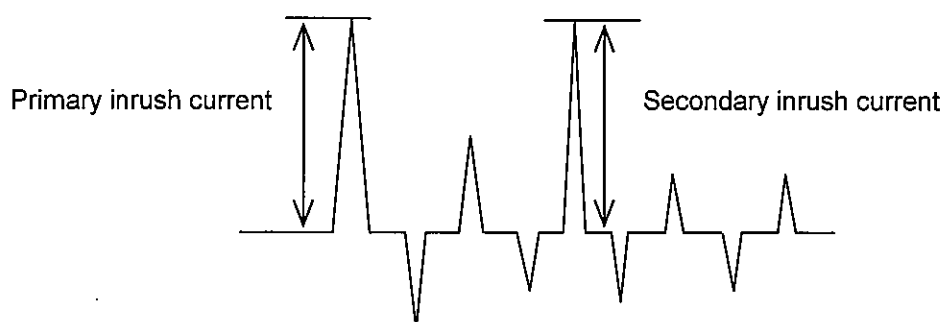
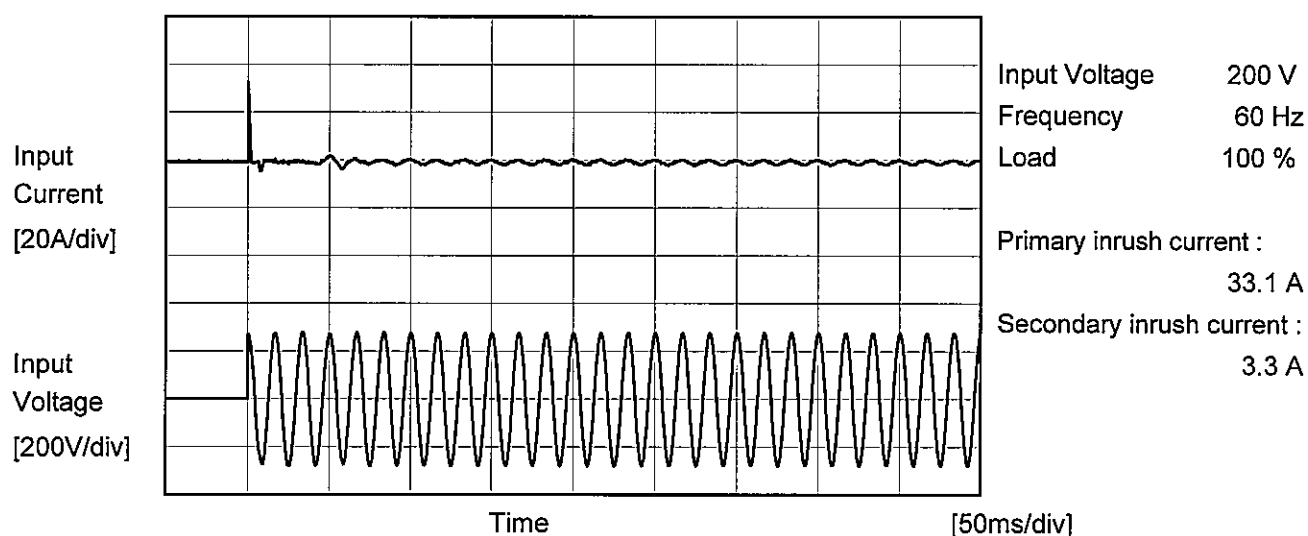
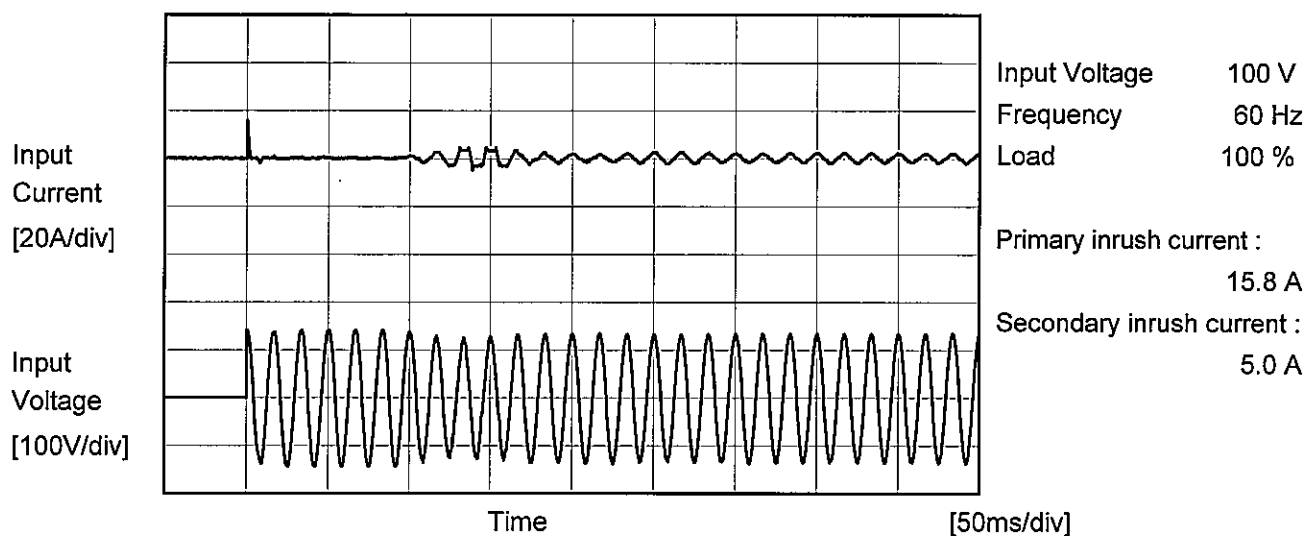
2.Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.669	0.236	0.174
0.4	0.835	0.473	0.352
0.8	0.940	0.623	0.512
1.6	0.961	0.773	0.693
2.4	0.979	0.846	0.783
3.2	0.982	0.905	0.840
4.0	0.993	0.924	0.877
4.2	0.993	0.924	0.877
4.6	0.992	0.929	0.894
--	-	-	-
--	-	-	-

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

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Model	TUNS100F24	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





		Temperature 25°C Testing Circuitry Figure B
Model	TUNS100F24	
Item	Leakage Current	
Object		

1.Results

[mA]

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.

Model		TUNS100F24	
Item		Line Regulation	
Object		+24V4.2A	
1.Graph		2.Values	

□

Load 50%

—

△

—

Load 100%

Output Voltage [V]

24.3

24.2

24.1

24.0

23.9

23.8

23.7

23.6

23.5

23.4

50

100

150

200

250

300

Input Voltage [V]

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

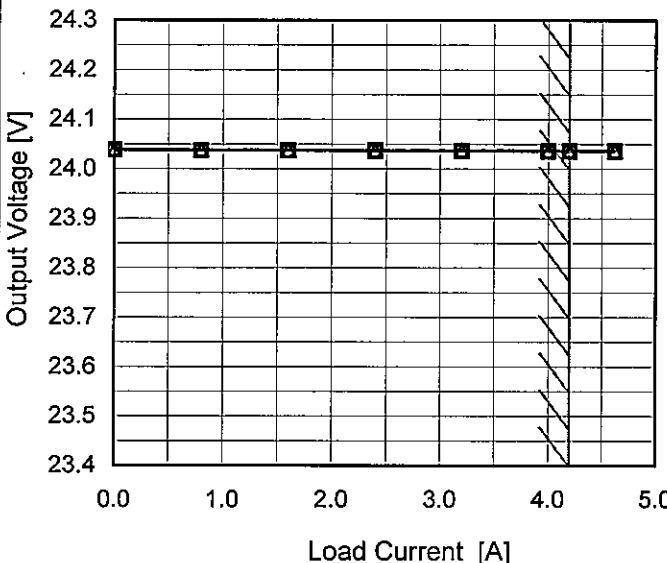
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
80	24.036	24.035
85	24.037	24.036
100	24.037	24.036
120	24.037	24.036
200	24.036	24.036
230	24.037	24.036
264	24.037	24.036
280	24.037	24.036
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Model	TUNS100F24																																																					
Item	Load Regulation	Temperature	25°C																																																			
		Testing Circuitry	Figure A																																																			
Object	+24V4.2A																																																					
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>Note: Slanted line shows the range of the rated load current.</p>		<table><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><tr><td>0.0</td><td>24.039</td><td>24.039</td><td>24.039</td></tr><tr><td>0.8</td><td>24.038</td><td>24.038</td><td>24.038</td></tr><tr><td>1.6</td><td>24.037</td><td>24.037</td><td>24.038</td></tr><tr><td>2.4</td><td>24.037</td><td>24.037</td><td>24.037</td></tr><tr><td>3.2</td><td>24.037</td><td>24.037</td><td>24.037</td></tr><tr><td>4.0</td><td>24.036</td><td>24.036</td><td>24.037</td></tr><tr><td>4.2</td><td>24.036</td><td>24.036</td><td>24.037</td></tr><tr><td>4.6</td><td>24.036</td><td>24.036</td><td>24.036</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></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	24.039	0.8	24.038	24.038	24.038	1.6	24.037	24.037	24.038	2.4	24.037	24.037	24.037	3.2	24.037	24.037	24.037	4.0	24.036	24.036	24.037	4.2	24.036	24.036	24.037	4.6	24.036	24.036	24.036	--	-	-	-	---	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
0.0	24.039	24.039	24.039																																																			
0.8	24.038	24.038	24.038																																																			
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Model	TUNS100F24		
Item	Dynamic Load Response	Temperature	25°C
Object	+24V4.2A	Testing Circuitry	Figure A

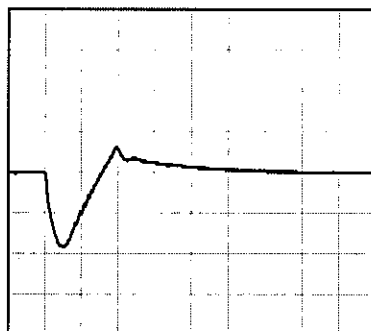
Input Volt. 100 V
Cycle 1000 ms

Load Current

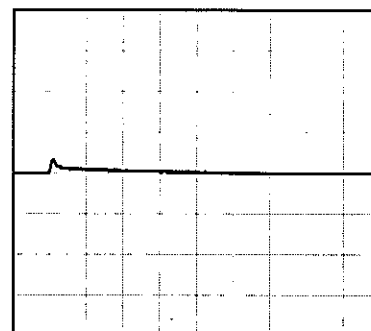
4.2 A/50us

Min. Load (0A) \longleftrightarrow
Load 100% (4.2A)

500 mV/div



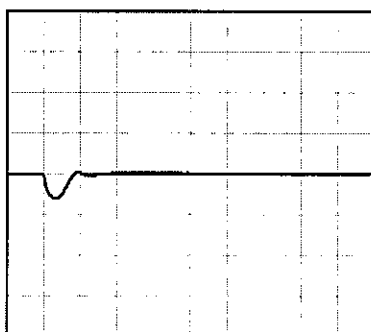
200 μ s/div



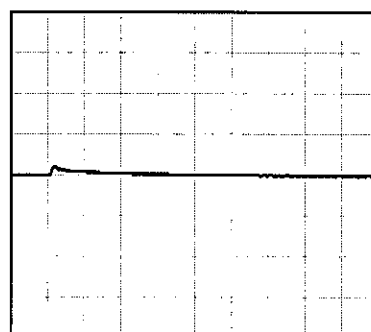
200 μ s/div

Min. Load (0A) \longleftrightarrow
Load 50% (2.1A)

500 mV/div



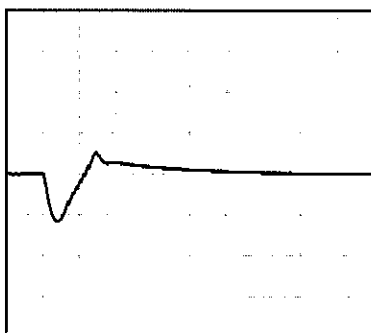
200 μ s/div



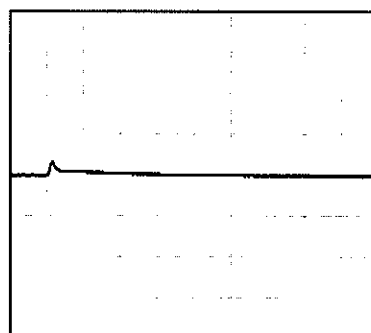
200 μ s/div

Load 10% (0.42A) \longleftrightarrow
Load 100% (4.2A)

500 mV/div

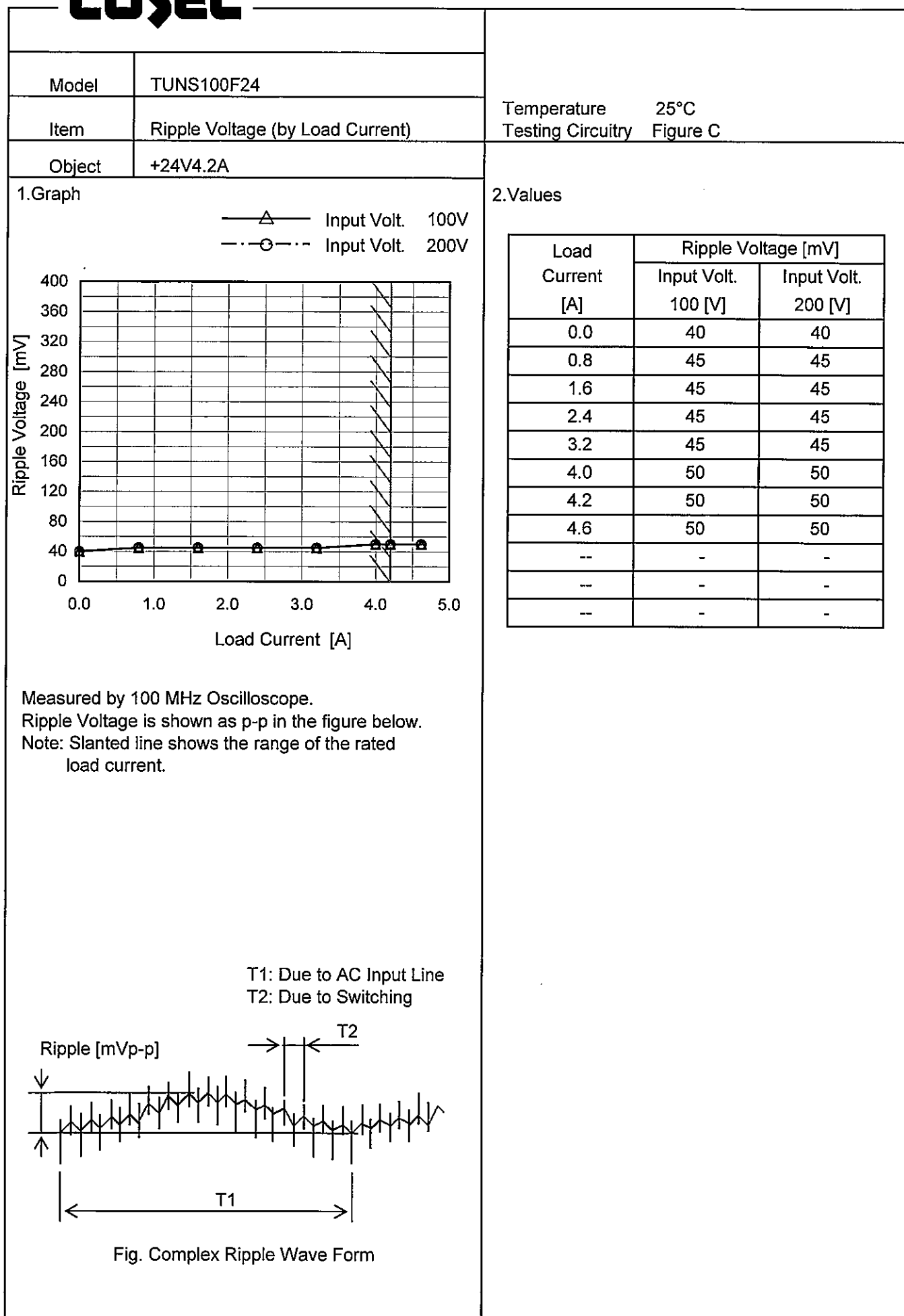


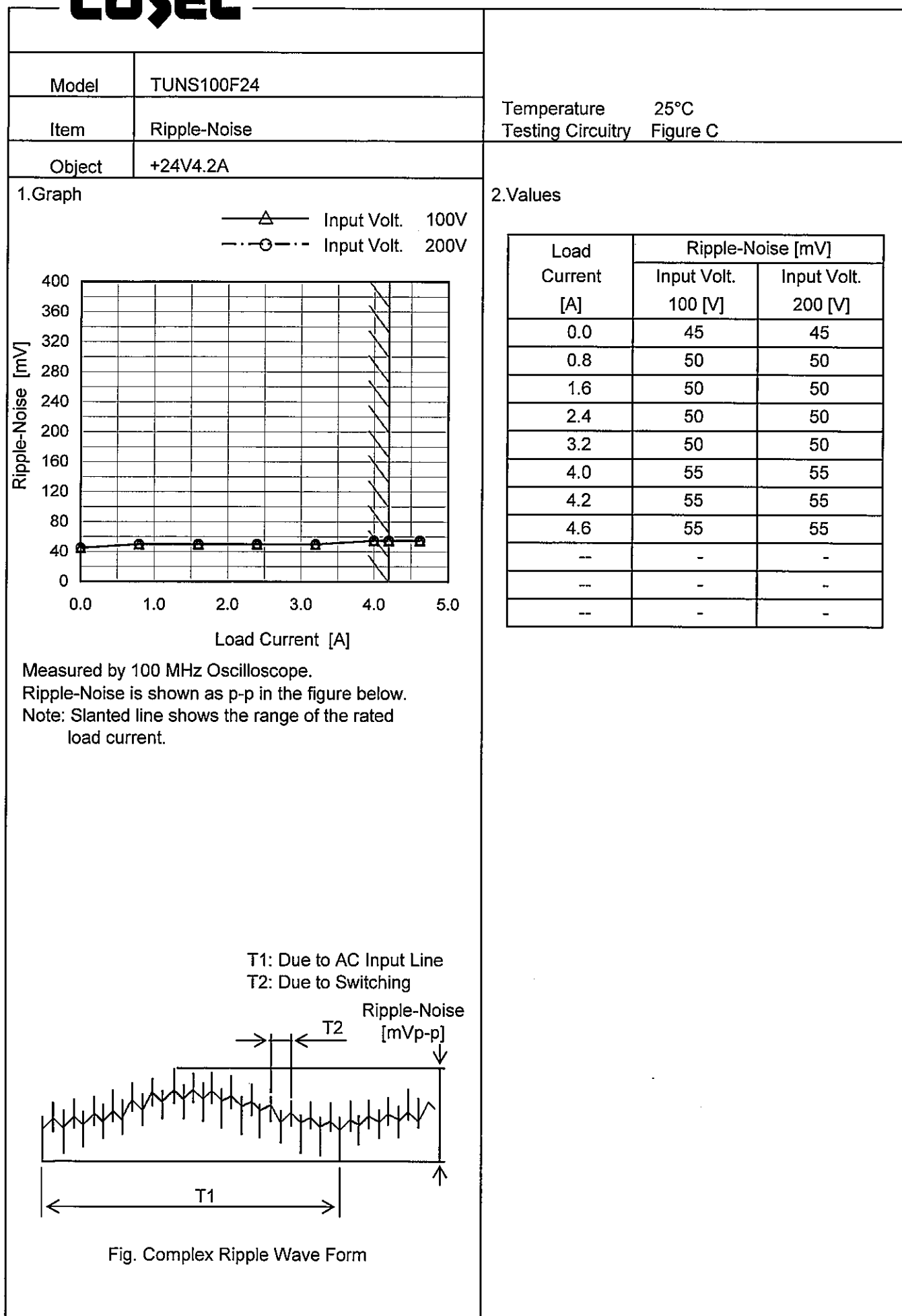
200 μ s/div



200 μ s/div

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Model		TUNS100F24	
Item		Ripple Voltage (by Ambient Temp.)	
Object		+24V4.2A	
1.Graph		2.Values	

□

Input Volt. 100V

△

Input Volt. 200V

400

360

320

280

240

200

160

120

80

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0

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Model		TUNS100F24																																																				
Item		Ambient Temperature Drift																																																				
Object		+24V4.2A																																																				
1.Graph		2.Values																																																				
<div><div><div><div><div></div><div></div></div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div><div></div><div></div></div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div><div></div><div></div></div><div>-·-○-·-</div><div>Input Volt.</div><div>230V</div></div></div><div><p>Output Voltage [V]</p><p>Ambient Temperature [°C]</p><p>Load 100%</p><p>Note: Slanted line shows the range of the rated ambient temperature.</p></div></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>-50</td><td>23.941</td><td>23.940</td><td>23.941</td></tr><tr><td>-40</td><td>23.968</td><td>23.968</td><td>23.967</td></tr><tr><td>-20</td><td>24.001</td><td>24.001</td><td>24.001</td></tr><tr><td>0</td><td>24.025</td><td>24.024</td><td>24.024</td></tr><tr><td>25</td><td>24.041</td><td>24.041</td><td>24.041</td></tr><tr><td>50</td><td>24.043</td><td>24.043</td><td>24.043</td></tr><tr><td>75</td><td>24.032</td><td>24.032</td><td>24.032</td></tr><tr><td>85</td><td>24.025</td><td>24.025</td><td>24.024</td></tr><tr><td>100</td><td>24.013</td><td>24.013</td><td>24.012</td></tr><tr><td>105</td><td>24.008</td><td>24.008</td><td>24.007</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]	-50	23.941	23.940	23.941	-40	23.968	23.968	23.967	-20	24.001	24.001	24.001	0	24.025	24.024	24.024	25	24.041	24.041	24.041	50	24.043	24.043	24.043	75	24.032	24.032	24.032	85	24.025	24.025	24.024	100	24.013	24.013	24.012	105	24.008	24.008	24.007	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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25	24.041	24.041	24.041																																																			
50	24.043	24.043	24.043																																																			
75	24.032	24.032	24.032																																																			
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		Testing Circuitry Figure A
Model	TUNS100F24	
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 : -40 - 100°C

Input Voltage : 85 - 264V

Load Current : 0 - 4.2A

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

* 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	24.047	±42	±0.2
Minimum Voltage	-40	264	0	23.964		

COSEL

Model

TUNS100F24

Item

Time Lapse Drift

Object

+24V4.2A

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

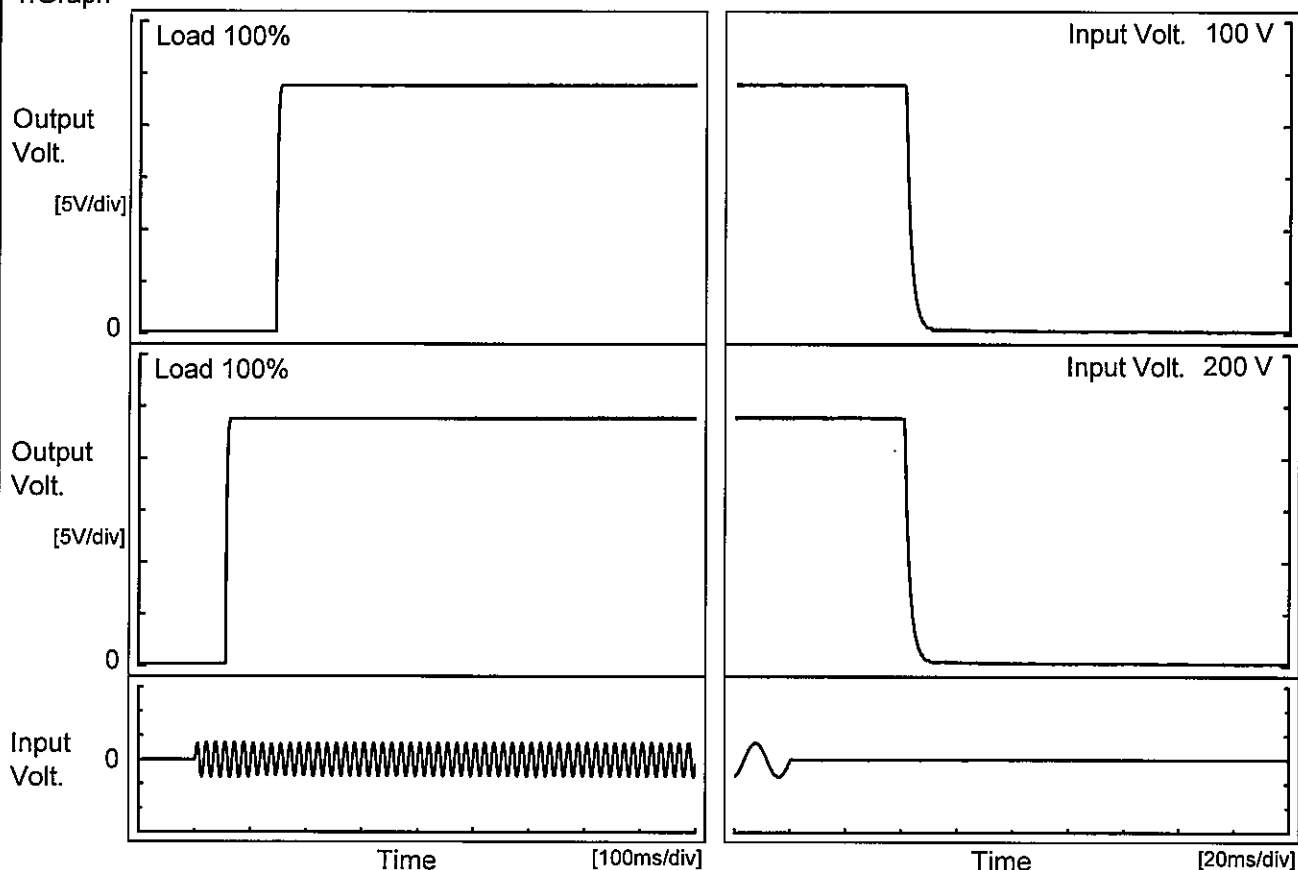
Time since start [H]	Output Voltage [V]
0.0	24.034
0.5	24.038
1.0	24.038
2.0	24.038
3.0	24.038
4.0	24.038
5.0	24.038
6.0	24.038
7.0	24.038
8.0	24.038

* The characteristic of AC200V is equal.

COSEL

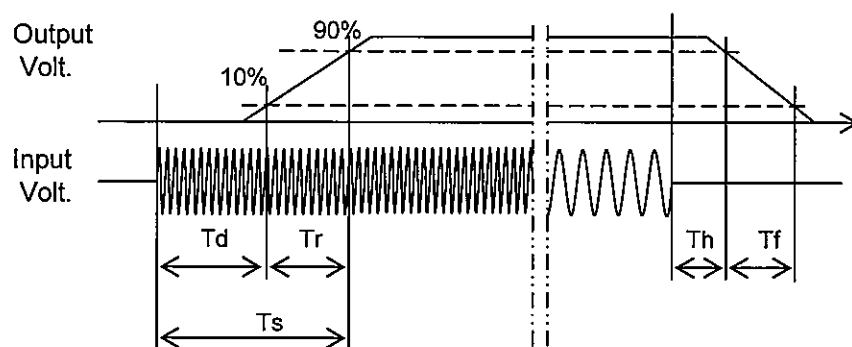
Model	TUNS100F24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V4.2A		

1. Graph



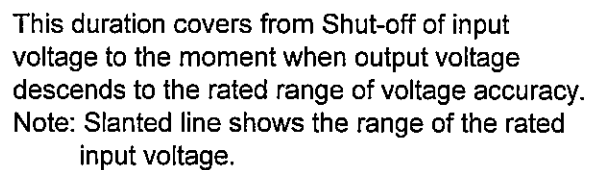
2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		145.5	2.0	147.5	41.3	4.2
200 V		56.0	2.0	58.0	41.3	4.1



Temperature 25°C
Testing Circuitry Figure A

2.Values



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COSEL

Model		TUNS100F24																																																				
Item		Instantaneous Interruption Compensation																																																				
Object		+24V4.2A																																																				
1.Graph		2.Values																																																				
<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><div><div>Instantaneous Compensation Time [ms]</div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div>0.0</div><div>1.0</div><div>2.0</div><div>3.0</div><div>4.0</div><div>5.0</div></div><div><div>Load Current [A]</div><div></div></div></div>		<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>0.8</td><td>175</td><td>175</td><td>175</td></tr><tr><td>1.6</td><td>96</td><td>96</td><td>95</td></tr><tr><td>2.4</td><td>66</td><td>66</td><td>67</td></tr><tr><td>3.2</td><td>50</td><td>50</td><td>50</td></tr><tr><td>4.0</td><td>42</td><td>42</td><td>42</td></tr><tr><td>4.2</td><td>40</td><td>40</td><td>40</td></tr><tr><td>4.6</td><td>37</td><td>36</td><td>36</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></table>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	-	-	-	0.8	175	175	175	1.6	96	96	95	2.4	66	66	67	3.2	50	50	50	4.0	42	42	42	4.2	40	40	40	4.6	37	36	36	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
0.0	-	-	-																																																			
0.8	175	175	175																																																			
1.6	96	96	95																																																			
2.4	66	66	67																																																			
3.2	50	50	50																																																			
4.0	42	42	42																																																			
4.2	40	40	40																																																			
4.6	37	36	36																																																			
--	-	-	-																																																			
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Note: Slanted line shows the range of the rated load current.																																																						

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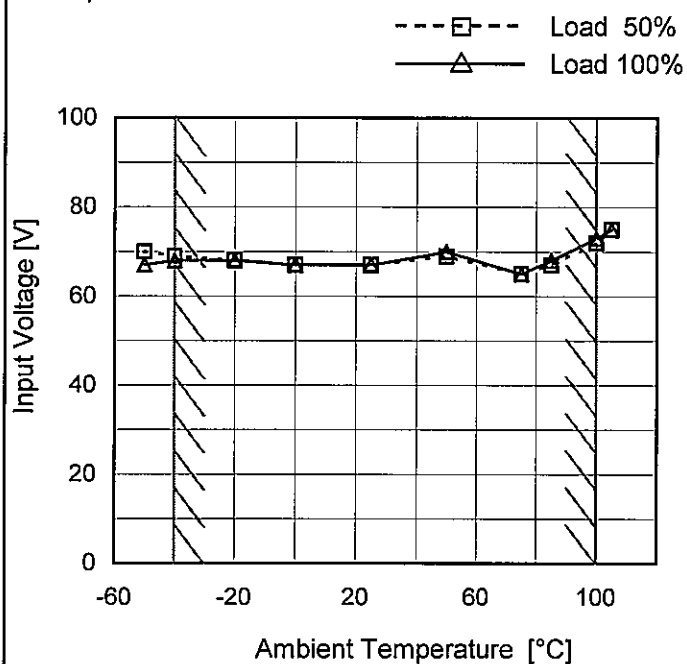
Model TUNS100F24

Item Minimum Input Voltage
for Regulated Output Voltage

Object +24V4.2A

Testing Circuitry Figure A

1. Graph



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

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	70	67
-40	69	68
-20	68	68
0	67	67
25	67	67
50	69	70
75	65	65
85	67	68
100	72	73
105	75	75
--	-	-

Model	TUNS100F24																																											
Item	Overcurrent Protection	Temperature	25°C																																									
Object	+24V4.2A	Testing Circuitry	Figure A																																									
1.Graph		2.Values																																										
<div><div><div></div>Input Volt. 100V</div><div><div></div>Input Volt. 200V</div></div> <p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>		<table><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><tr><td>24.00</td><td>5.53</td><td>5.53</td></tr><tr><td>22.80</td><td>5.12</td><td>5.13</td></tr><tr><td>21.60</td><td>5.14</td><td>5.15</td></tr><tr><td>19.20</td><td>5.32</td><td>5.33</td></tr><tr><td>16.80</td><td>5.51</td><td>5.51</td></tr><tr><td>14.40</td><td>5.70</td><td>5.70</td></tr><tr><td>12.00</td><td>5.93</td><td>5.92</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></table>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	24.00	5.53	5.53	22.80	5.12	5.13	21.60	5.14	5.15	19.20	5.32	5.33	16.80	5.51	5.51	14.40	5.70	5.70	12.00	5.93	5.92	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																											
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Model		TUNS100F24	
Item		Overvoltage Protection	
Object		+24V4.2A	
1.Graph		2.Values	
<div><div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> 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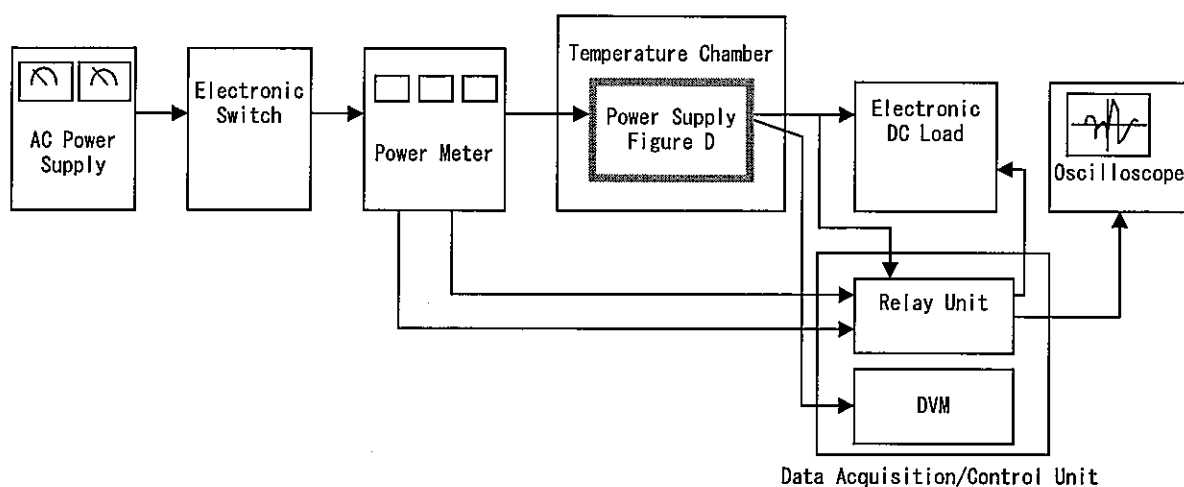


Figure A

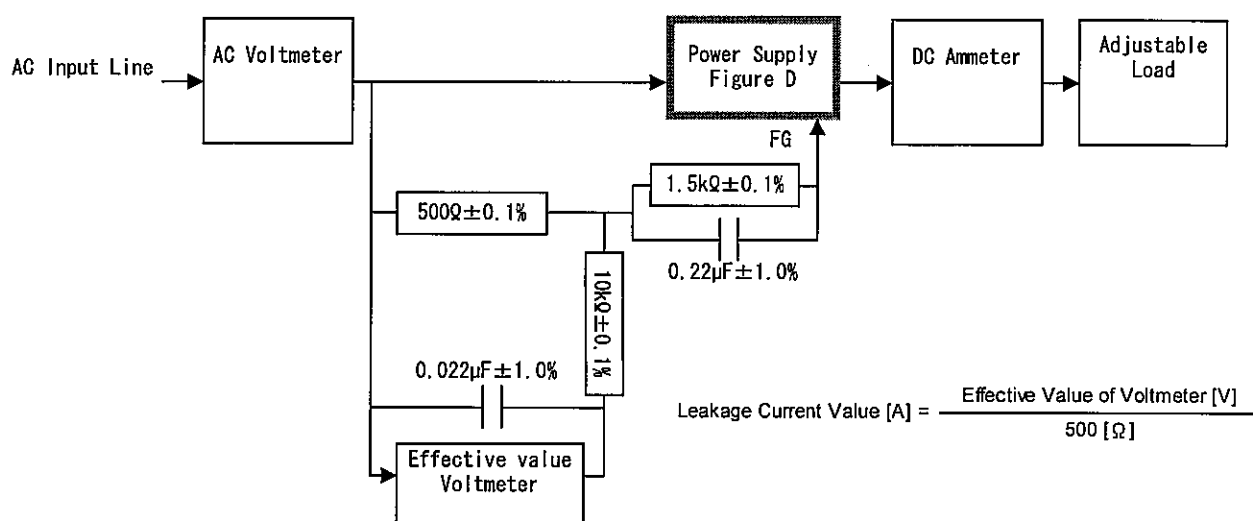


Figure B (IEC60950-1)

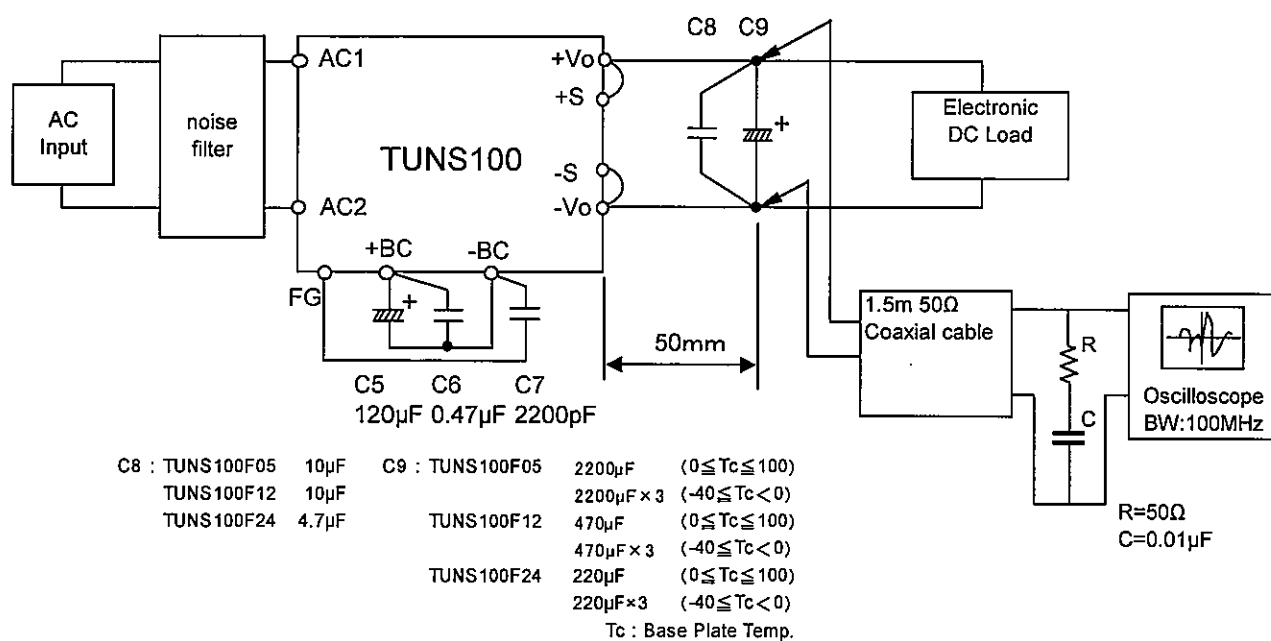
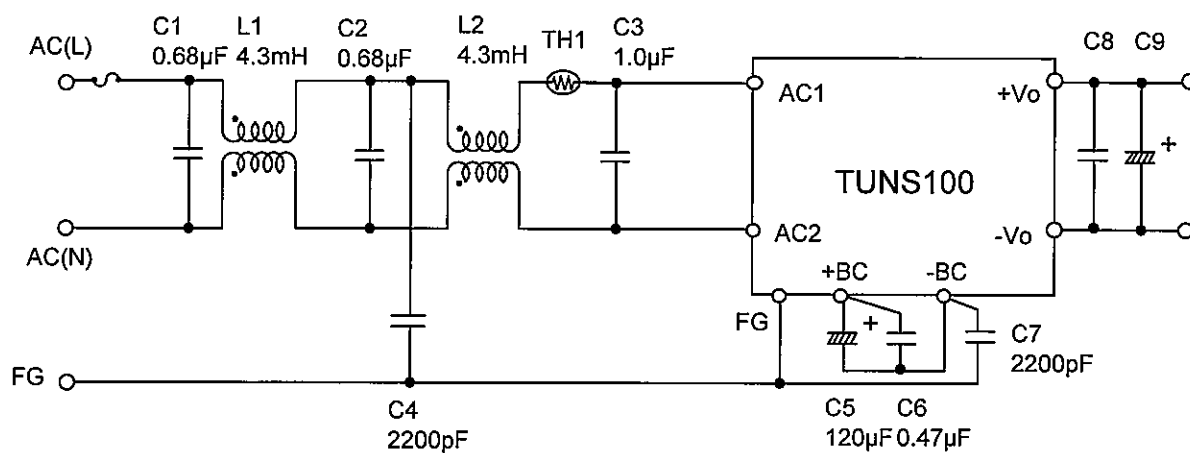


Figure C

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