

TEST DATA OF TUNS50F05

Regulated DC Power Supply
April 6, 2012

Approved by : Takayuki Fukuda
Takayuki Fukuda Design Manager

Prepared by : Ryosuke Nakao
Ryosuke Nakao Design Engineer

COSEL CO.,LTD.

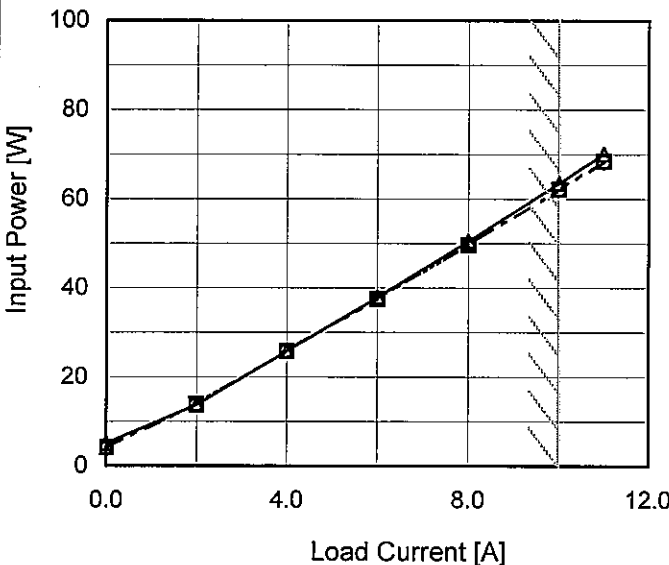
CONTENTS

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 , 25

(Final Page 25)

Model		TUNS50F05																																																				
Item		Input Current (by Load Current)																																																				
Object																																																						
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> <p>Input Current [A]</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">Input Current [A]</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>0.075</td><td>0.116</td><td>0.132</td></tr><tr><td>2.0</td><td>0.152</td><td>0.131</td><td>0.153</td></tr><tr><td>4.0</td><td>0.276</td><td>0.173</td><td>0.172</td></tr><tr><td>6.0</td><td>0.399</td><td>0.225</td><td>0.213</td></tr><tr><td>8.0</td><td>0.526</td><td>0.282</td><td>0.259</td></tr><tr><td>10.0</td><td>0.660</td><td>0.341</td><td>0.310</td></tr><tr><td>11.0</td><td>0.731</td><td>0.372</td><td>0.336</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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.075	0.116	0.132	2.0	0.152	0.131	0.153	4.0	0.276	0.173	0.172	6.0	0.399	0.225	0.213	8.0	0.526	0.282	0.259	10.0	0.660	0.341	0.310	11.0	0.731	0.372	0.336	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model		TUNS50F05		Temperature Testing Circuitry	25°C Figure A																																																			
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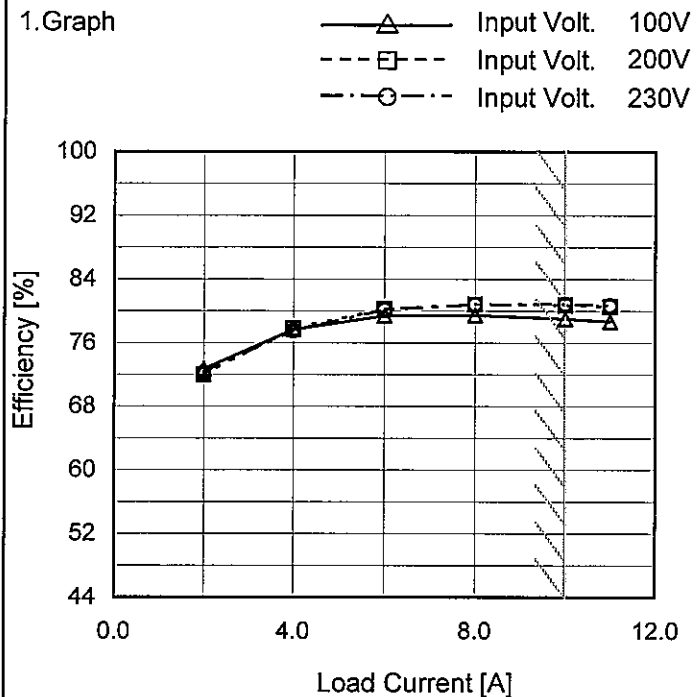
Model TUNS50F05

Item Efficiency (by Load Current)

Object

Temperature 25°C
Testing Circuitry Figure A

1. Graph



2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
2.0	72.7	72.0	72.3
4.0	77.7	77.8	77.5
6.0	79.4	80.2	80.1
8.0	79.5	80.8	80.8
10.0	79.0	80.7	80.8
11.0	78.7	80.5	80.7
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model

TUNS50F05

Item

Power Factor (by Input Voltage)

Object

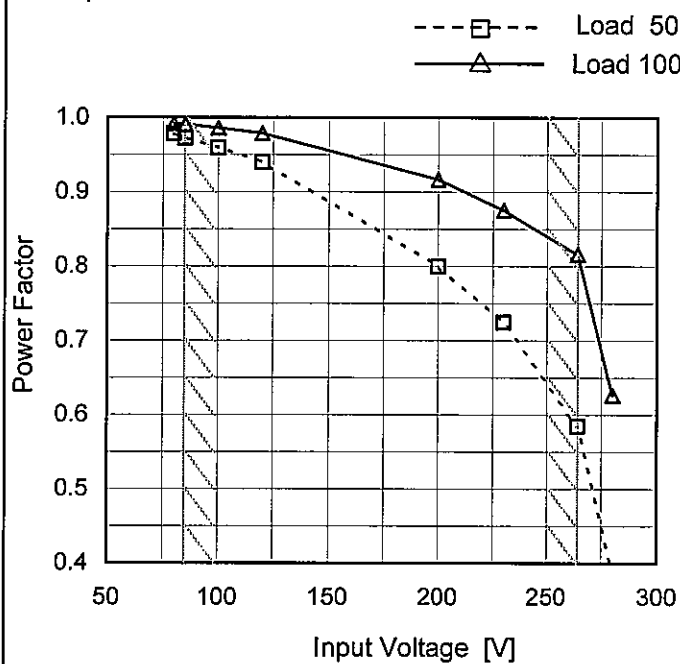
Temperature

25°C

Testing Circuitry

Figure A

1. Graph



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

2. Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
80	0.978	0.992
85	0.972	0.991
100	0.959	0.986
120	0.940	0.979
200	0.799	0.917
230	0.724	0.876
264	0.585	0.816
280	0.390	0.627
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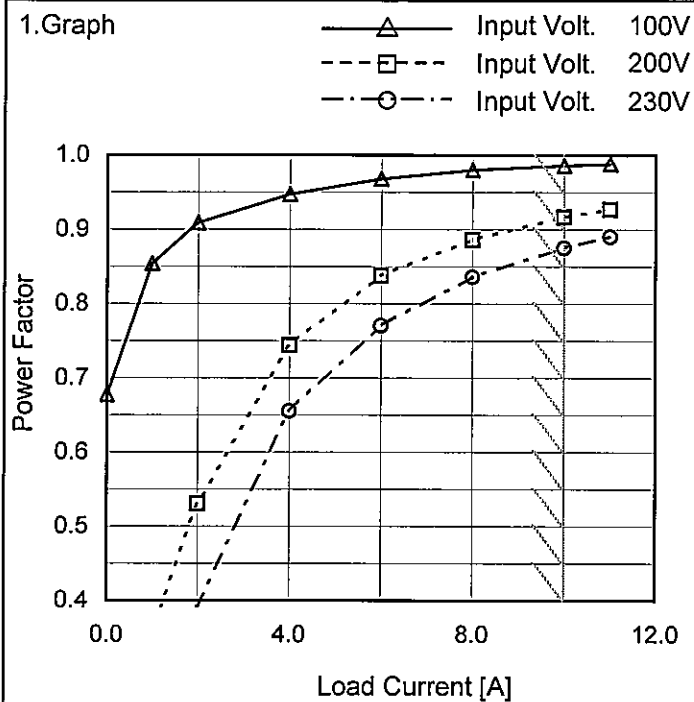
Model TUNS50F05

Item Power Factor (by Load Current)

Object

Temperature 25°C
Testing Circuitry Figure A

1. Graph



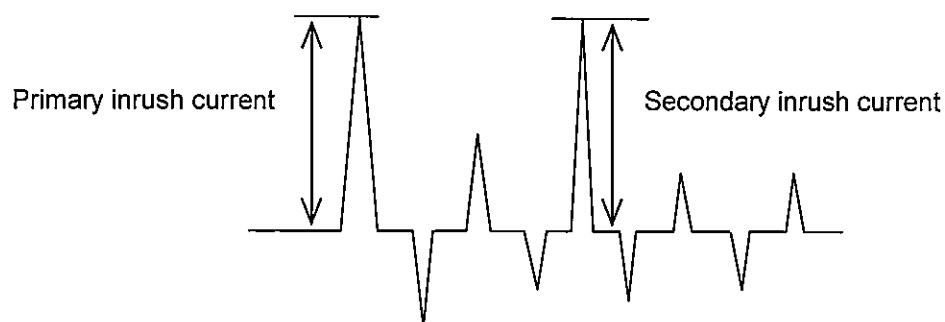
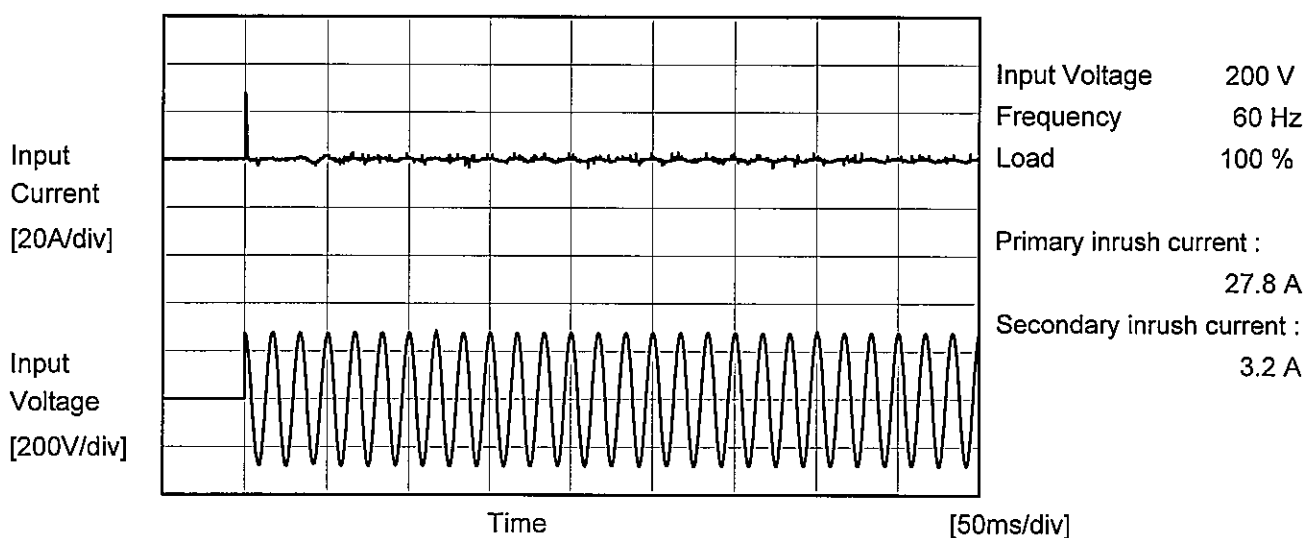
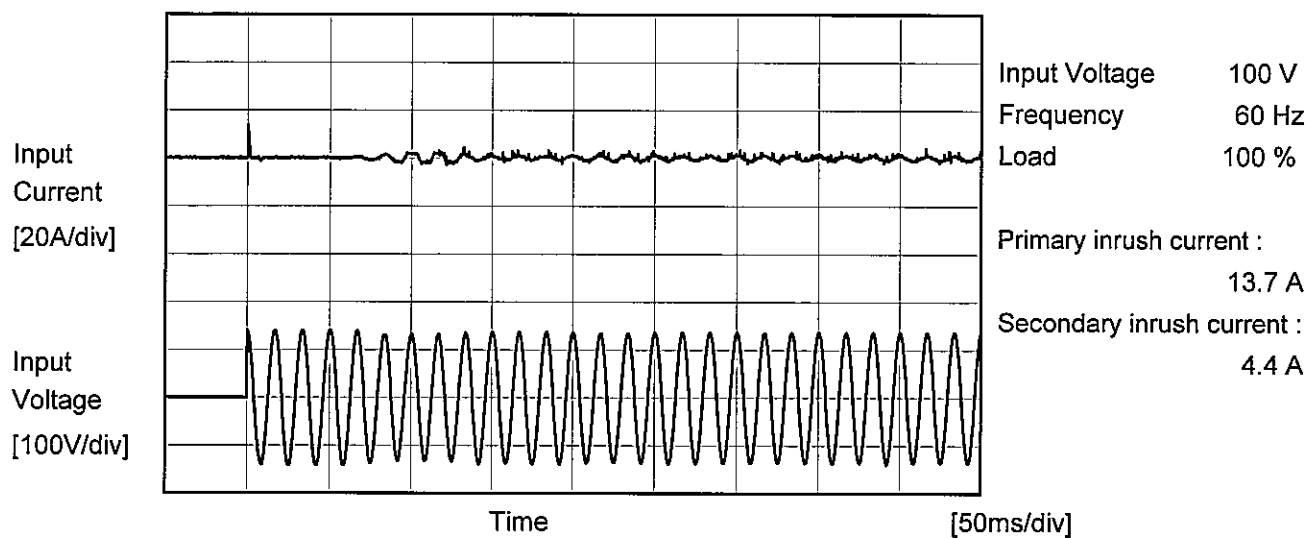
Note: Slanted line shows the range of the rated load current.

2. Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.677	0.177	0.130
1.0	0.854	0.354	0.250
2.0	0.909	0.531	0.391
4.0	0.947	0.744	0.656
6.0	0.968	0.838	0.771
8.0	0.980	0.886	0.836
10.0	0.986	0.917	0.876
11.0	0.989	0.927	0.890
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Model	TUNS50F05	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object			



		Temperature 25°C Testing Circuitry Figure B
Model	TUNS50F05	
Item	Leakage Current	
Object		

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	264 [V]	
IEC60950-1	Both phases	0.16	0.38	0.48	Operation
	One of phases	0.21	0.46	0.63	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.

Model		TUNS50F05	
Item		Line Regulation	
Object		+5V10A	
1.Graph		2.Values	

□

Load 50%

—

△

—

Load 100%

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
80	5.053	5.052
85	5.053	5.052
100	5.053	5.052
120	5.053	5.053
200	5.053	5.052
230	5.053	5.053
264	5.053	5.053
280	5.053	5.053
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Note: Slanted line shows the range of the rated input voltage.

Input Voltage [V]	Output Voltage [V]	
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80	5.053	5.052
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100	5.053	5.052
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200	5.053	5.052
230	5.053	5.053
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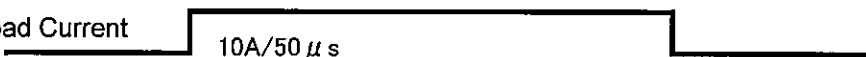
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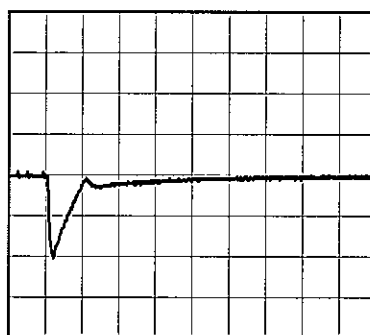
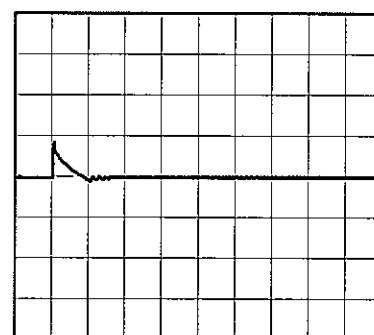
Model	TUNS50F05	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+5V10A	

Input Volt. 100 V
Cycle 1000 mS

Load Current  10A/50 μ s

Min. Load (0A) \longleftrightarrow
Load 100% (10A)

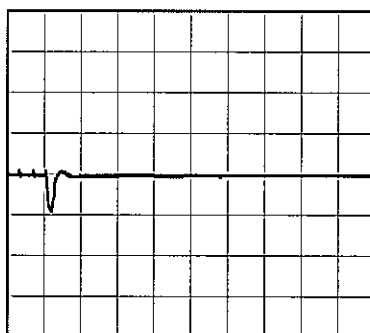
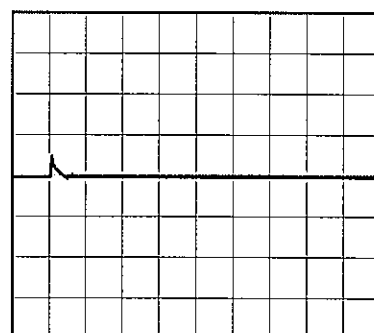
200mV/div

500 μ s/div

2ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (5A)

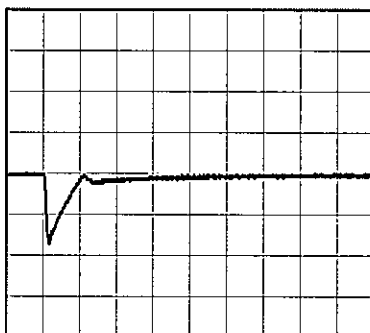
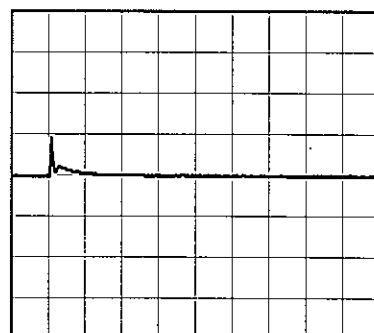
200mV/div

500 μ s/div

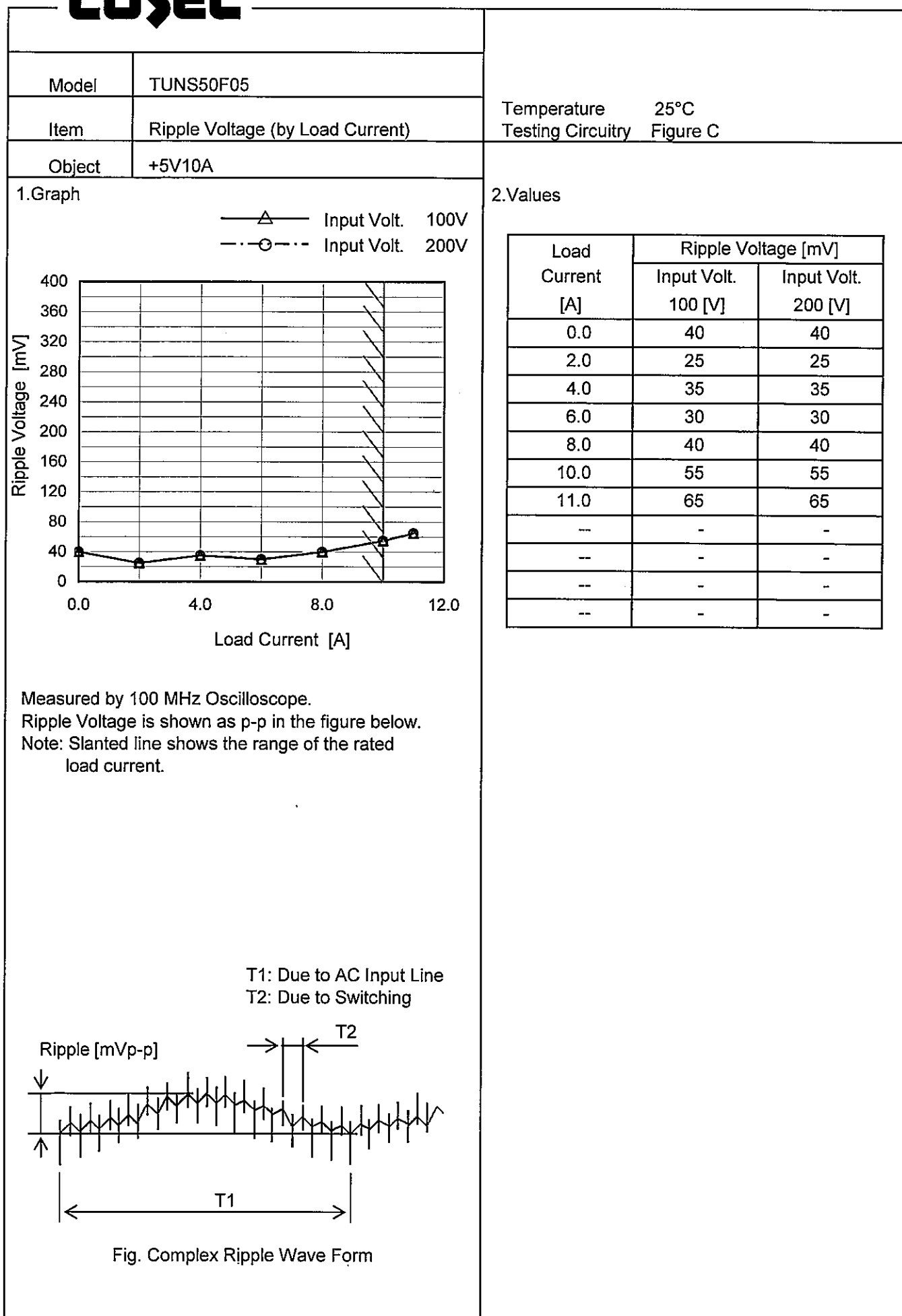
2ms/div

Load 10% (1A) \longleftrightarrow
Load 100% (10A)

200mV/div

500 μ s/div

2ms/div

COSEL

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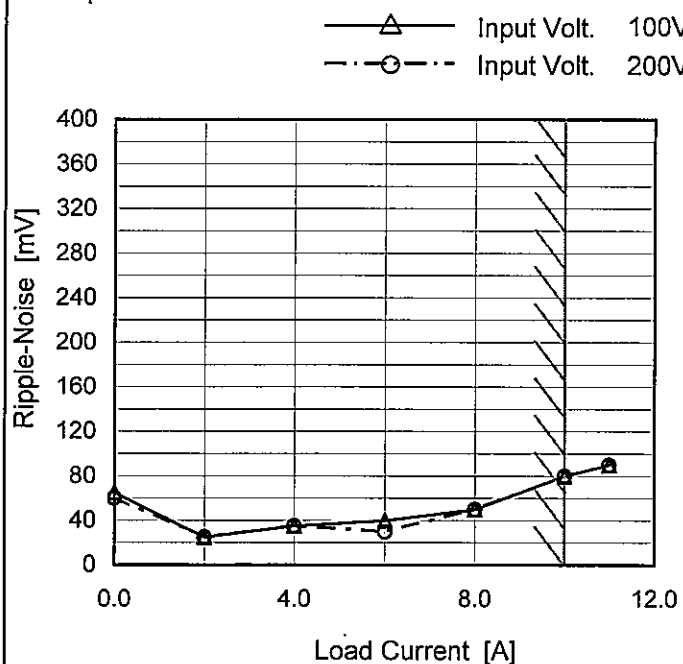
Model TUNS50F05

Item Ripple-Noise

Object +5V10A

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	65	60
2.0	25	25
4.0	35	35
6.0	40	30
8.0	50	50
10.0	80	80
11.0	90	90
--	-	-
--	-	-
--	-	-
--	-	-

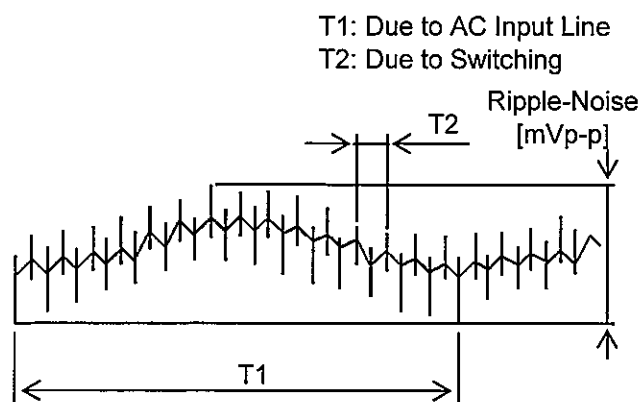


Fig. Complex Ripple Wave Form

Model		TUNS50F05	
Item		Ripple Voltage (by Ambient Temp.)	
Object		+5V10A	

1.Graph

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

Ripple Voltage [mV]

Ambient Temperature [°C]

Load 100 %

2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-50	80	85
-40	75	80
-20	70	70
0	60	60
25	55	55
50	55	55
75	55	55
85	55	45
100	50	45
105	50	45
--	-	-

Measured by 100 MHz Oscilloscope.

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

- 14 -

BC-10662

Model		TUNS50F05																																																				
Item		Ambient Temperature Drift																																																				
Object		+5V10A																																																				
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>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>		<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>5.037</td><td>5.038</td><td>5.038</td></tr><tr><td>-40</td><td>5.042</td><td>5.042</td><td>5.042</td></tr><tr><td>-20</td><td>5.045</td><td>5.045</td><td>5.045</td></tr><tr><td>0</td><td>5.047</td><td>5.047</td><td>5.047</td></tr><tr><td>25</td><td>5.053</td><td>5.053</td><td>5.053</td></tr><tr><td>50</td><td>5.058</td><td>5.058</td><td>5.058</td></tr><tr><td>75</td><td>5.062</td><td>5.062</td><td>5.062</td></tr><tr><td>85</td><td>5.062</td><td>5.062</td><td>5.062</td></tr><tr><td>100</td><td>5.062</td><td>5.062</td><td>5.062</td></tr><tr><td>105</td><td>5.062</td><td>5.062</td><td>5.062</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	5.037	5.038	5.038	-40	5.042	5.042	5.042	-20	5.045	5.045	5.045	0	5.047	5.047	5.047	25	5.053	5.053	5.053	50	5.058	5.058	5.058	75	5.062	5.062	5.062	85	5.062	5.062	5.062	100	5.062	5.062	5.062	105	5.062	5.062	5.062	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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105	5.062	5.062	5.062																																																			
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- 15 -

BC-10662



		Testing Circuitry Figure A
Model	TUNS50F05	
Item	Output Voltage Accuracy	
Object	+5V10A	

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 - 10A

* 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	100	85	0	5.064	±11	±0.2
Minimum Voltage	-40	85	10	5.042		

Model	TUNS50F05																								
Item	Time Lapse Drift	Temperature	25°C																						
Object	+5V10A	Testing Circuitry	Figure A																						
1.Graph		2.Values																							
<div><div><div>5.3</div><div>5.2</div><div>5.1</div><div>5.0</div><div>4.9</div><div>4.8</div><div>4.7</div><div>4.6</div><div>4.5</div><div>4.4</div></div><div><div>0.0</div><div>2.0</div><div>4.0</div><div>6.0</div><div>8.0</div><div>10.0</div></div><div><div>Output Voltage [V]</div><div>Time [H]</div><div>Input Volt. 100V</div><div>Load 100%</div></div></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>5.050</td></tr><tr><td>0.5</td><td>5.053</td></tr><tr><td>1.0</td><td>5.053</td></tr><tr><td>2.0</td><td>5.053</td></tr><tr><td>3.0</td><td>5.053</td></tr><tr><td>4.0</td><td>5.053</td></tr><tr><td>5.0</td><td>5.053</td></tr><tr><td>6.0</td><td>5.053</td></tr><tr><td>7.0</td><td>5.053</td></tr><tr><td>8.0</td><td>5.053</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	5.050	0.5	5.053	1.0	5.053	2.0	5.053	3.0	5.053	4.0	5.053	5.0	5.053	6.0	5.053	7.0	5.053	8.0	5.053
Time since start [H]	Output Voltage [V]																								
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5.0	5.053																								
6.0	5.053																								
7.0	5.053																								
8.0	5.053																								
* The characteristic of AC200V is equal.																									

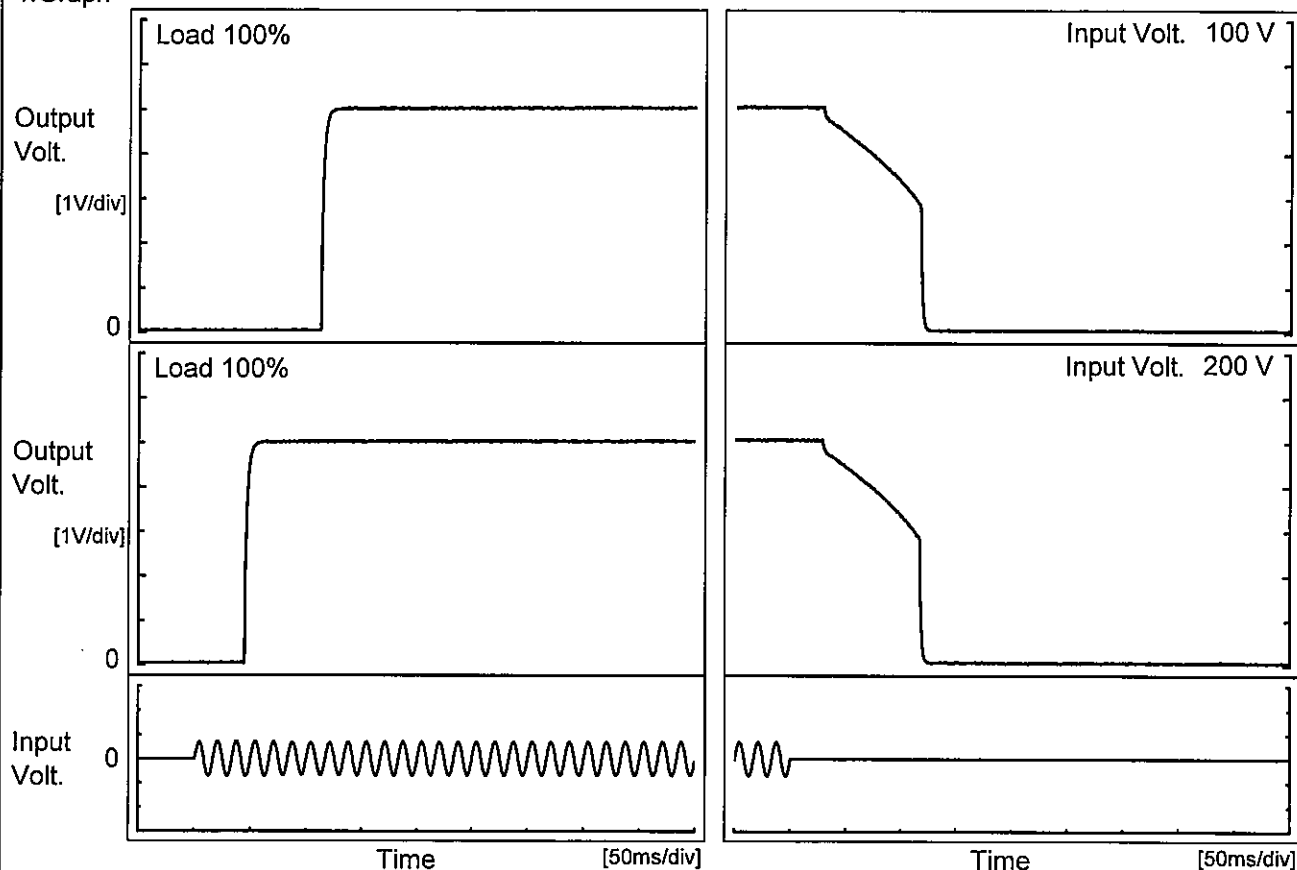
- 17 -

BC-10662

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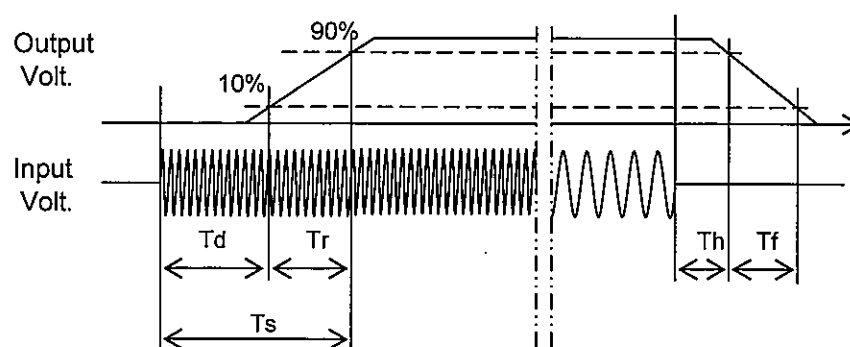
Model	TUNS50F05	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+5V10A		

1. Graph



2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		112.5	4.3	116.8	46.0	73.0
200 V		45.3	4.3	49.6	46.5	72.5



BC-10662

Temperature	25°C
Testing Circuitry	Figure A



Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
2.0	403	401	401
4.0	206	209	203
6.0	121	125	125
8.0	69	68	65
10.0	30	30	30
11.0	27	27	27
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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

Model

TUNS50F05

Item

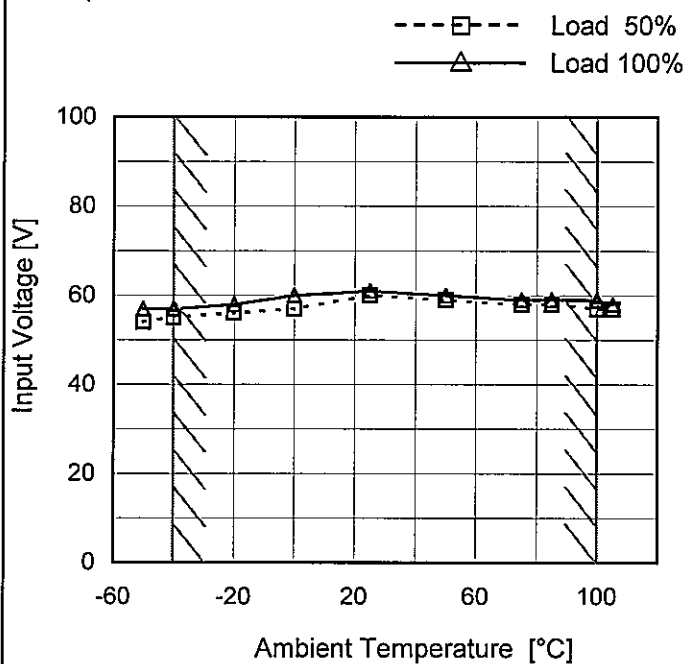
Minimum Input Voltage
for Regulated Output Voltage

Object

+5V10A

Testing Circuitry Figure A

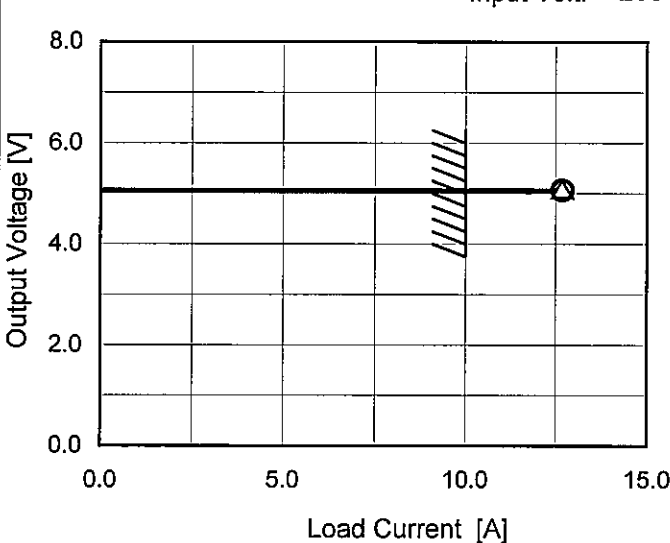
1. Graph



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

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	54	57
-40	55	57
-20	56	58
0	57	60
25	60	61
50	59	60
75	58	59
85	58	59
100	57	59
105	57	58
--	-	-

Model		TUNS50F05																																																
Item		Overcurrent Protection																																																
Object		+5V10A																																																
1.Graph		Temperature 25°C Testing Circuitry Figure A																																																
<div><div><div></div><div>△ Input Volt. 100V</div></div><div><div></div><div>○ Input Volt. 200V</div></div></div>  <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when overcurrent protection is activated.</p>		2.Values																																																
		<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>5.0</td><td>12.50</td><td>12.51</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><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><tr><td>--</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	5.0	12.50	12.51	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																																	
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- 22 -

BC-10662

Model		TUNS50F05	
Item		Overvoltage Protection	
Object		+5V10A	
1.Graph		2.Values	

COSEL

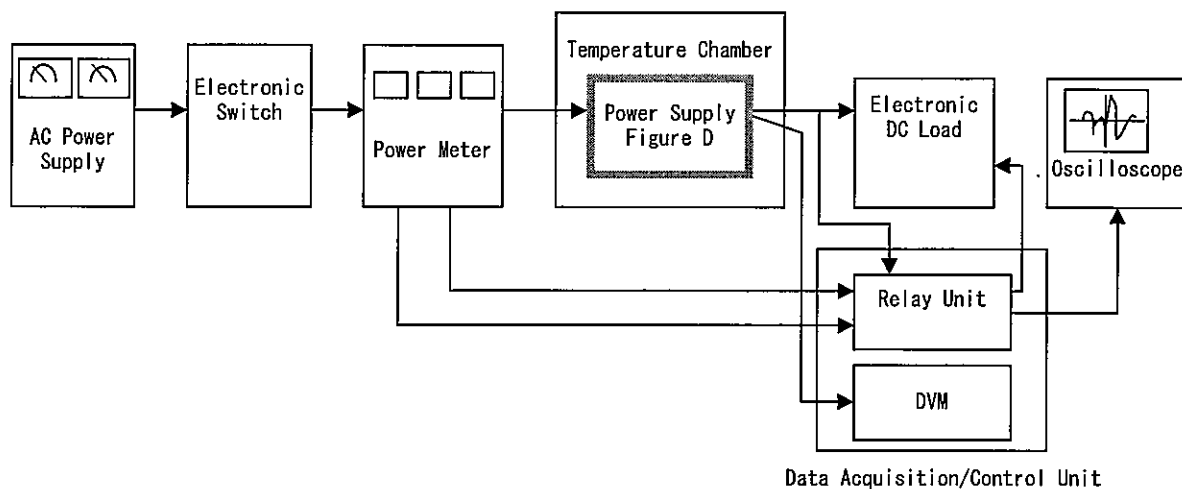


Figure A

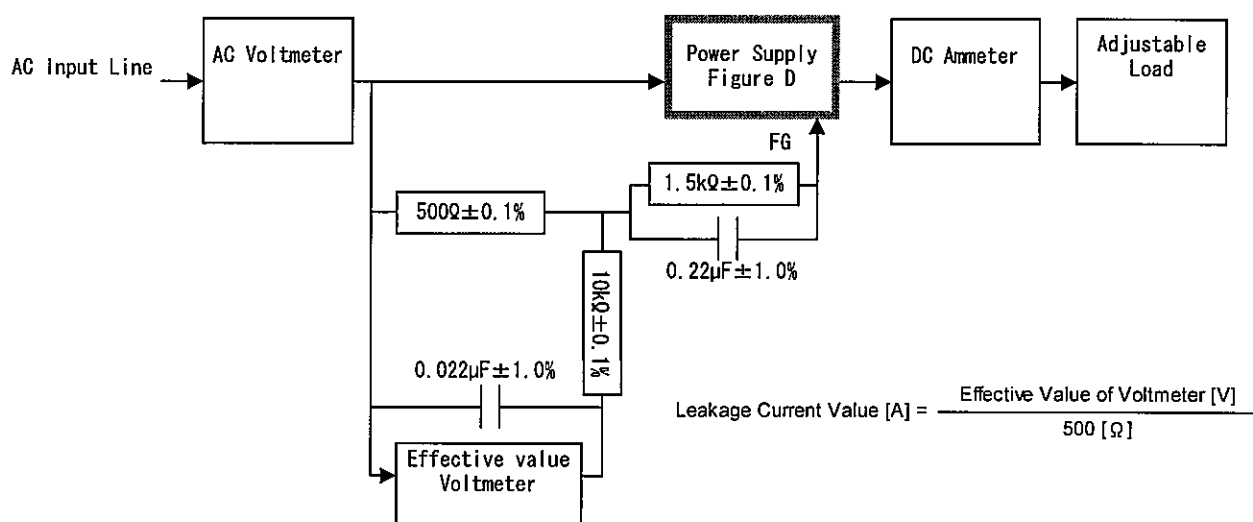


Figure B (IEC60950-1)

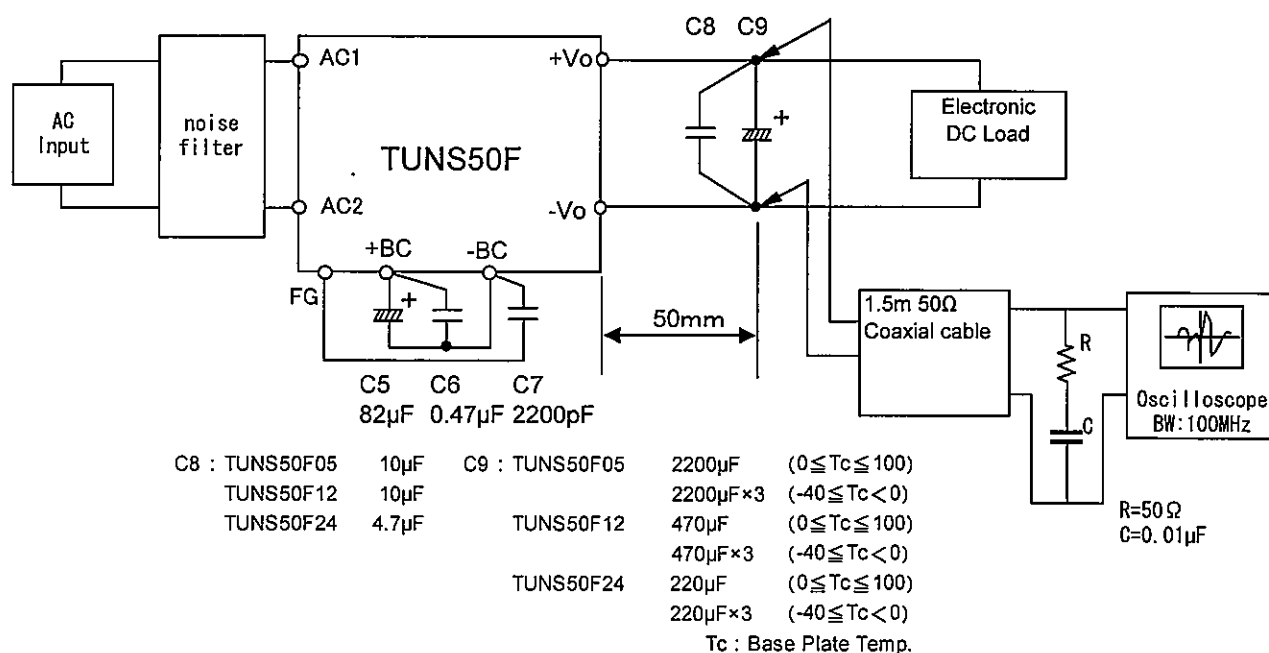
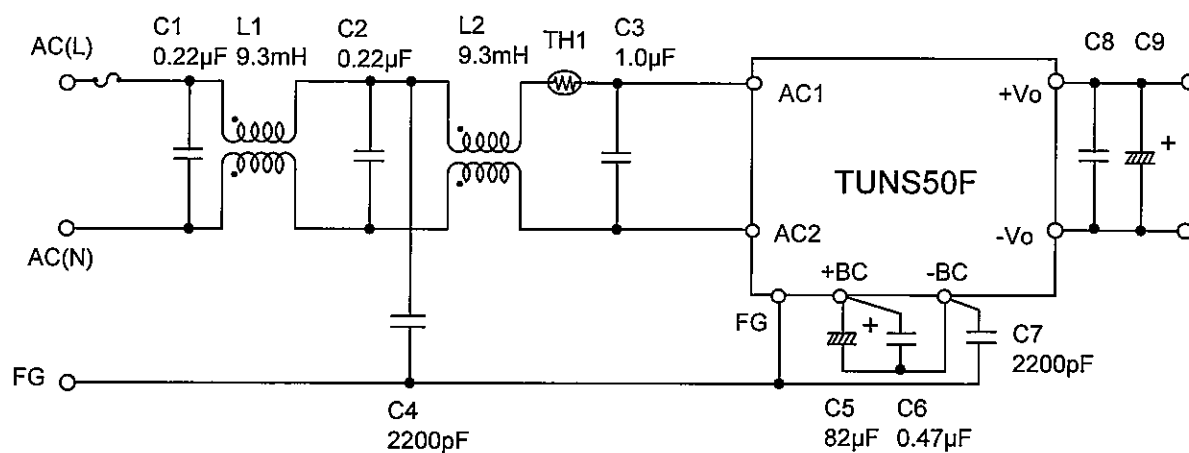


Figure C

COSEL



L1,L2 : SS11VL-R10093(NEC TOKIN)	C9 : TUNS50F05	2200μF	(0≤Tc≤100)
TH1 : 5D2-08(SEMITEC)		2200μF×3	(-40≤Tc<0)
C8 : TUNS50F05	10μF	TUNS50F12	470μF (0≤Tc≤100)
TUNS50F12	10μF		470μF×3 (-40≤Tc<0)
TUNS50F24	4.7μF	TUNS50F24	220μF (0≤Tc≤100)
			220μF×3 (-40≤Tc<0)
Tc : Base Plate Temp.			

T_c : Base Plate Temp.

Figure D