COSEL

参考資料

TEST DATA OF TUNS50F24

Regulated DC Power Supply
April 6, 2012

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COSEL CO.,LTD.

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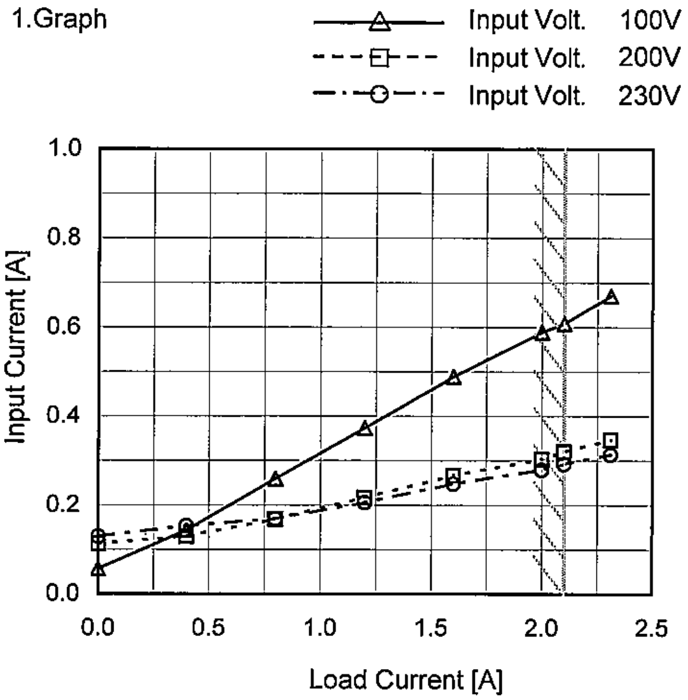
1.Graph



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	0.057	0.113	0.129
0.4	0.144	0.129	0.153
0.8	0.259	0.168	0.169
1.2	0.374	0.216	0.206
1.6	0.489	0.267	0.248
2.0	0.589	0.303	0.280
2.1	0.608	0.320	0.292
2.3	0.671	0.347	0.314
--	-	-	-
--	-	-	-
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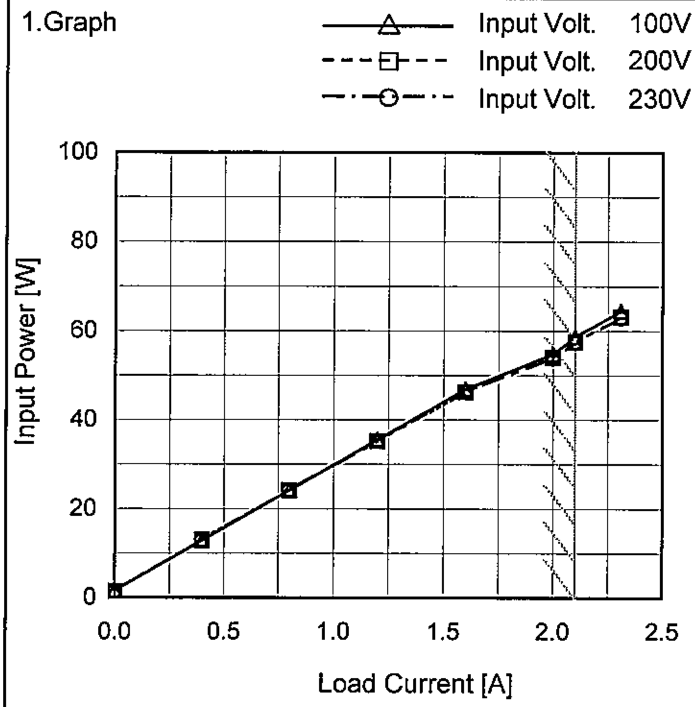
Model	TUNS50F24
Item	Input Power (by Load Current)
Object	――――――――

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]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	1.60	1.46	1.43
0.4	12.84	12.99	12.97
0.8	24.17	24.14	24.23
1.2	35.54	35.22	35.27
1.6	46.94	46.26	46.24
2.0	54.83	53.92	53.91
2.1	58.66	57.51	57.45
2.3	64.42	63.06	62.95
--	-	-	-
--	-	-	-
--	-	-	-

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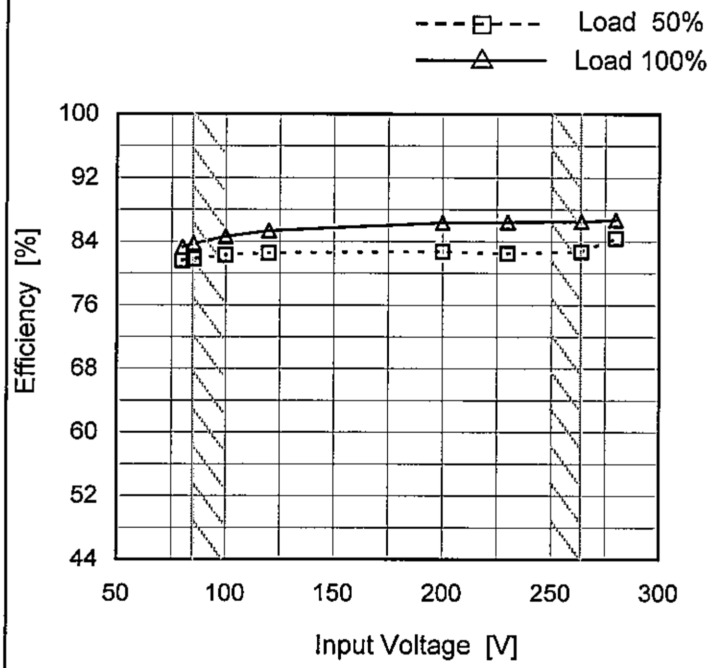
Model	TUNS50F24	Temperature	25°C
Item	Efficiency (by Input Voltage)	Testing Circuitry	Figure A
Object	————————		

1.Graph



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

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
80	81.6	83.3
85	81.8	83.7
100	82.3	84.6
120	82.5	85.4
200	82.7	86.3
230	82.4	86.4
264	82.7	86.5
280	84.4	86.7
--	-	-

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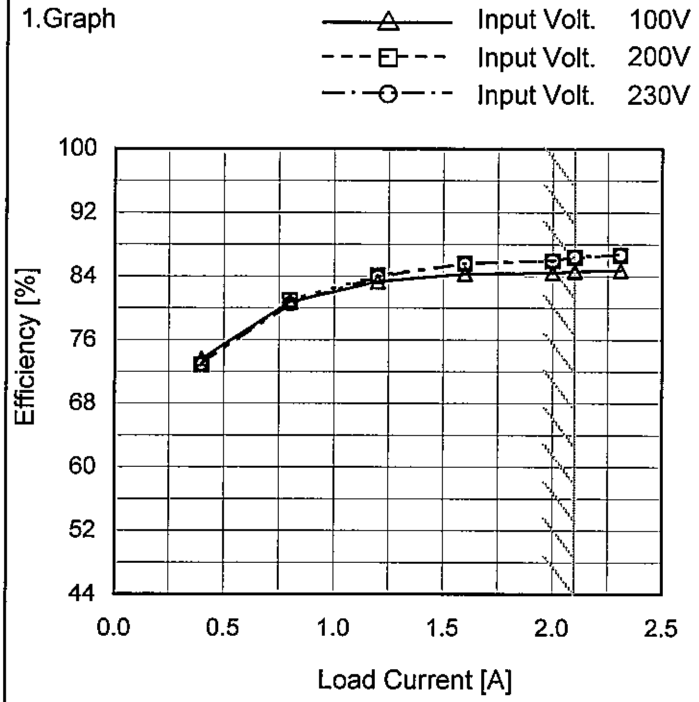
Model	TUNS50F24	
Item	Efficiency (by Load Current)	Temperature 25°C Testing Circuitry Figure A
Object	————————	

1.Graph



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

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.4	73.6	72.9	73.0
0.8	80.8	80.9	80.5
1.2	83.3	84.1	83.9
1.6	84.3	85.6	85.6
2.0	84.4	85.9	85.9
2.1	84.6	86.3	86.4
2.3	84.8	86.6	86.7
--	-	-	-
--	-	-	-
--	-	-	-

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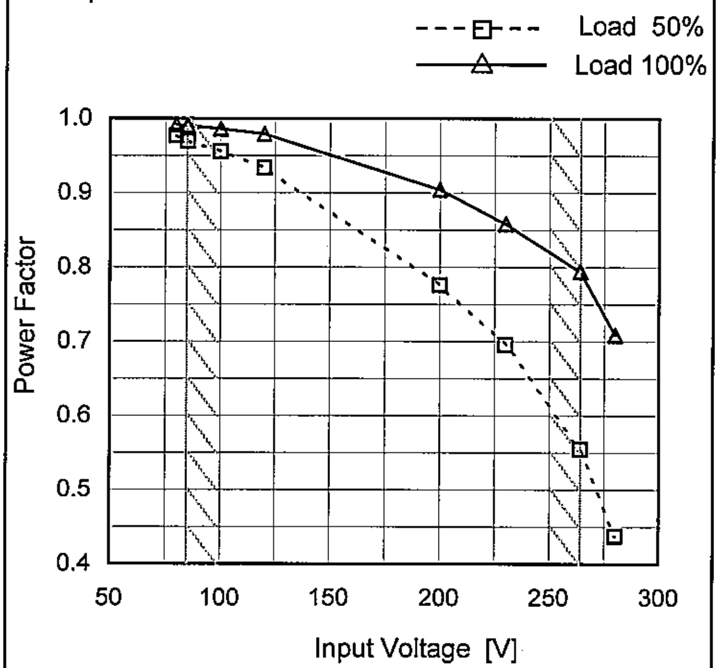
Model	TUNS50F24
Item	Power Factor (by Input Voltage)
Object	――――――――――

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	0.977	0.992
85	0.969	0.990
100	0.956	0.986
120	0.934	0.980
200	0.776	0.904
230	0.696	0.858
264	0.555	0.794
280	0.437	0.708
--	-	-

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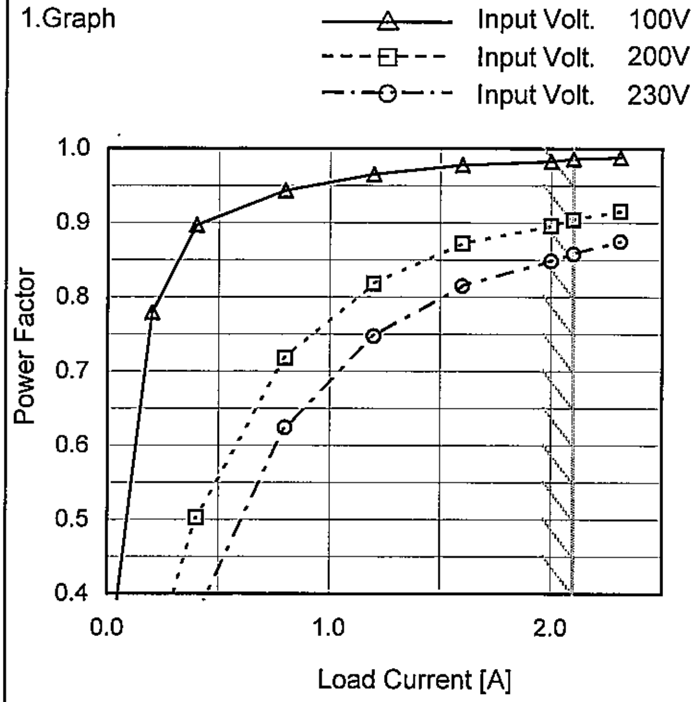
Model	TUNS50F24
Item	Power Factor (by Load Current)
Object	————————

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	0.280	0.065	0.048
0.2	0.779	0.302	0.225
0.4	0.897	0.503	0.369
0.8	0.944	0.718	0.624
1.2	0.965	0.818	0.748
1.6	0.978	0.872	0.815
2.0	0.983	0.896	0.849
2.1	0.986	0.904	0.858
2.3	0.988	0.916	0.875
--	-	-	-
--	-	-	-

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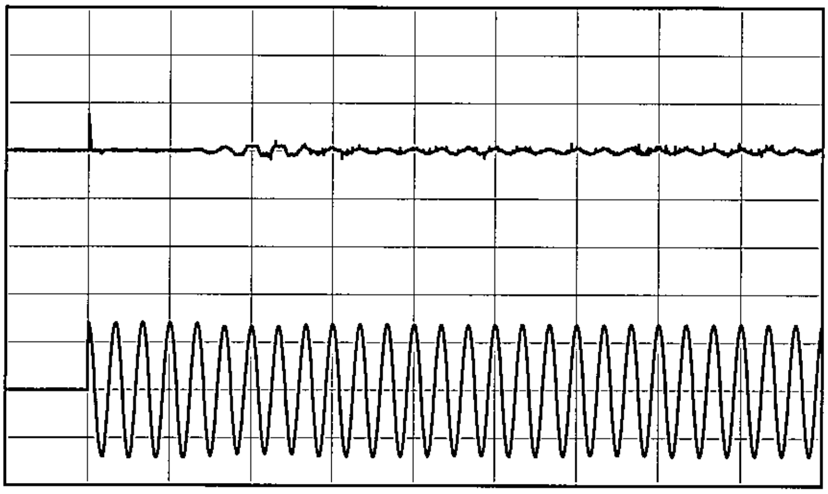
Model	TUNS50F24
Item	Inrush Current
Object	

Temperature 25°C
Testing Circuitry Figure A

Input Current [20A/div]

Input Voltage [100V/div]



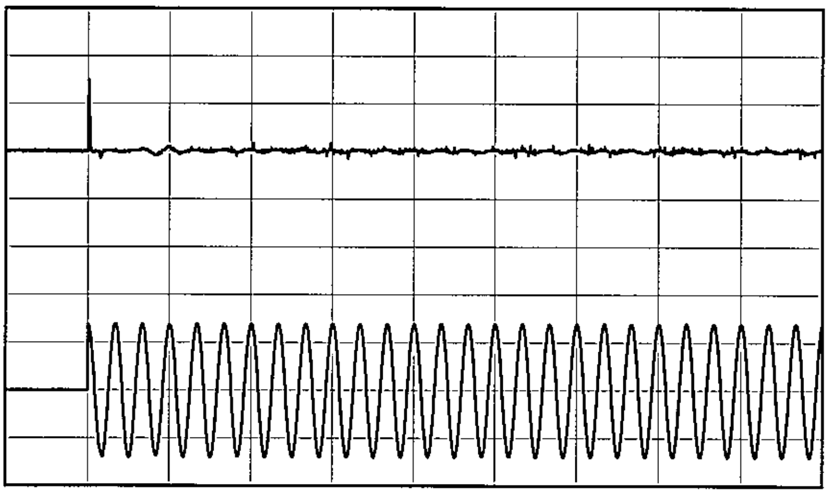
Time [50ms/div]

Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 14.9 A
Secondary inrush current : 3.8 A

Input Current [20A/div]

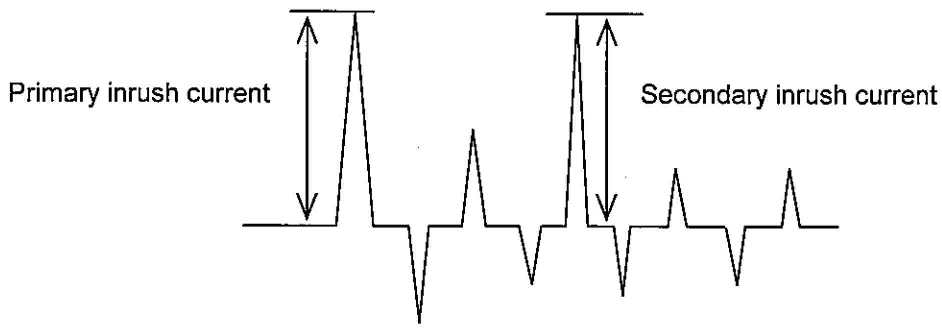
Input Voltage [200V/div]



Time [50ms/div]

Input Voltage 200 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 29.9 A
Secondary inrush current : 3.2 A



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Model	TUNS50F24	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
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.

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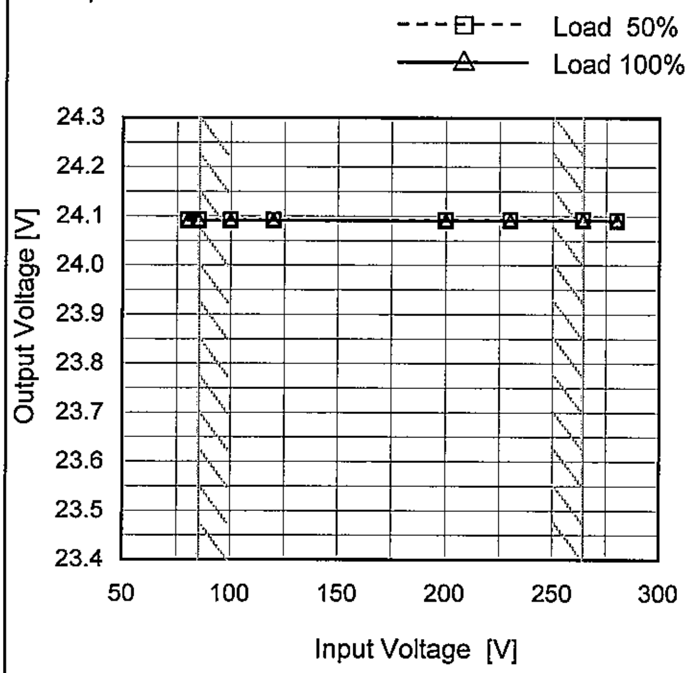
Model	TUNS50F24
Item	Line Regulation
Object	+24V2.1A

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]	Output Voltage [V]	
	Load 50%	Load 100%
80	24.092	24.091
85	24.092	24.091
100	24.092	24.091
120	24.092	24.091
200	24.092	24.091
230	24.092	24.091
264	24.093	24.092
280	24.092	24.091
--	-	-

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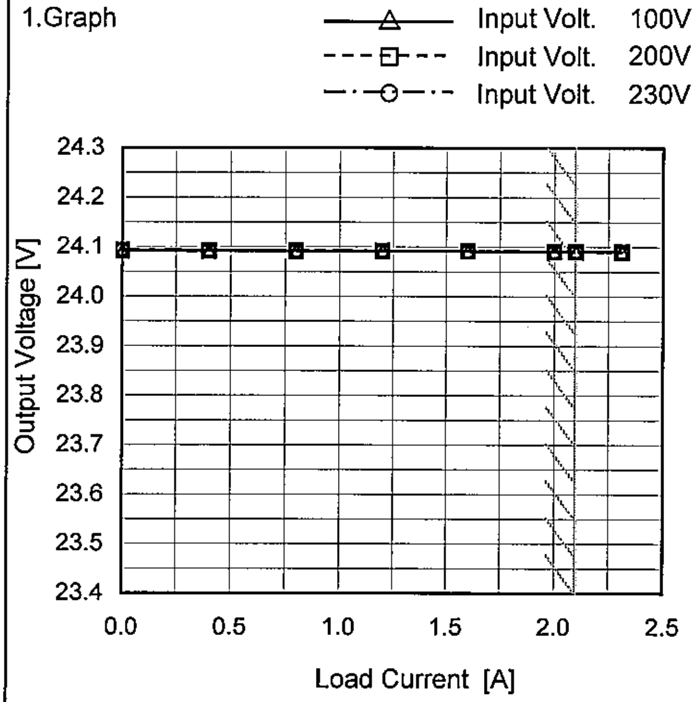
Model	TUNS50F24
Item	Load Regulation
Object	+24V2.1A

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]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	24.092	24.093	24.094
0.4	24.092	24.092	24.093
0.8	24.092	24.092	24.093
1.2	24.092	24.092	24.093
1.6	24.092	24.092	24.092
2.0	24.091	24.091	24.091
2.1	24.091	24.091	24.091
2.3	24.091	24.091	24.091
--	-	-	-
--	-	-	-
--	-	-	-

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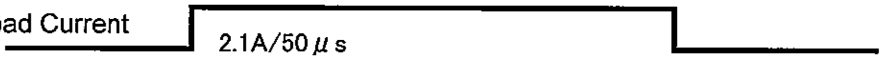
Model	TUNS50F24
Item	Dynamic Load Response
Object	+24V2.1A

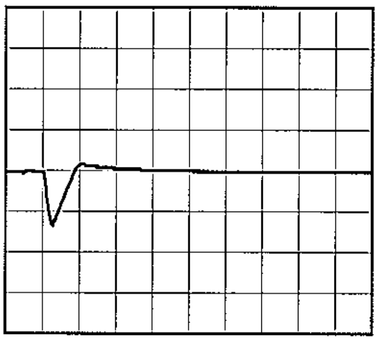
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 100 V
Cycle 1000 mS

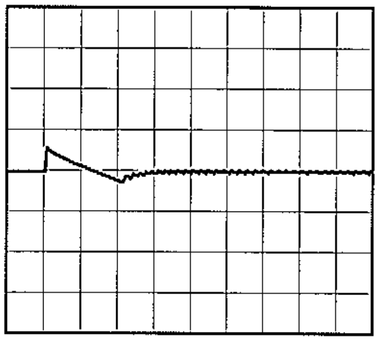
Load Current


Min. Load (0A) ⟷
Load 100% (2.1A)

500mV/div



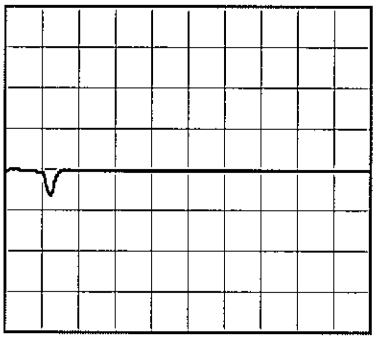
500μs/div



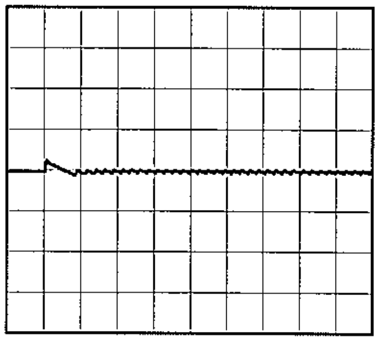
2ms/div

Min. Load (0A) ⟷
Load 50% (1.05A)

500mV/div



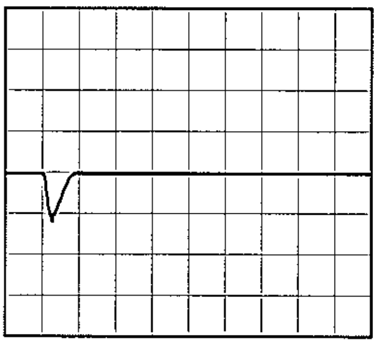
500μs/div



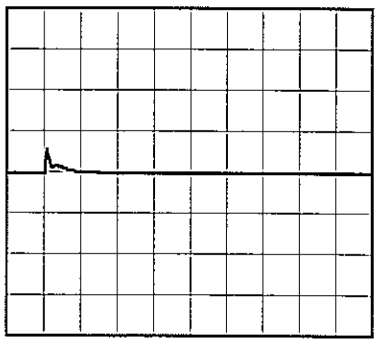
2ms/div

Load 10% (0.21A) ⟷
Load 100% (2.1A)

500mV/div



500μs/div



2ms/div

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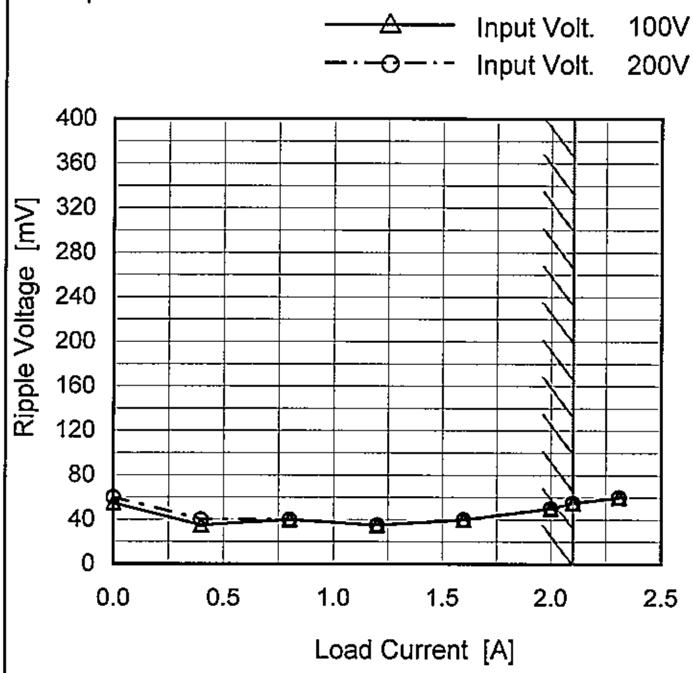
Model	TUNS50F24	Temperature	25°C
Item	Ripple Voltage (by Load Current)	Testing Circuitry	Figure C
Object	+24V2.1A		

1.Graph



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.

T1: Due to AC Input Line
T2: Due to Switching

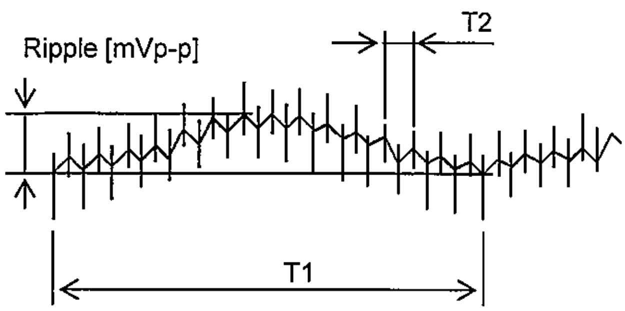


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	55	60
0.4	35	40
0.8	40	40
1.2	35	35
1.6	40	40
2.0	50	50
2.1	55	55
2.3	60	60
--	-	-
--	-	-
--	-	-

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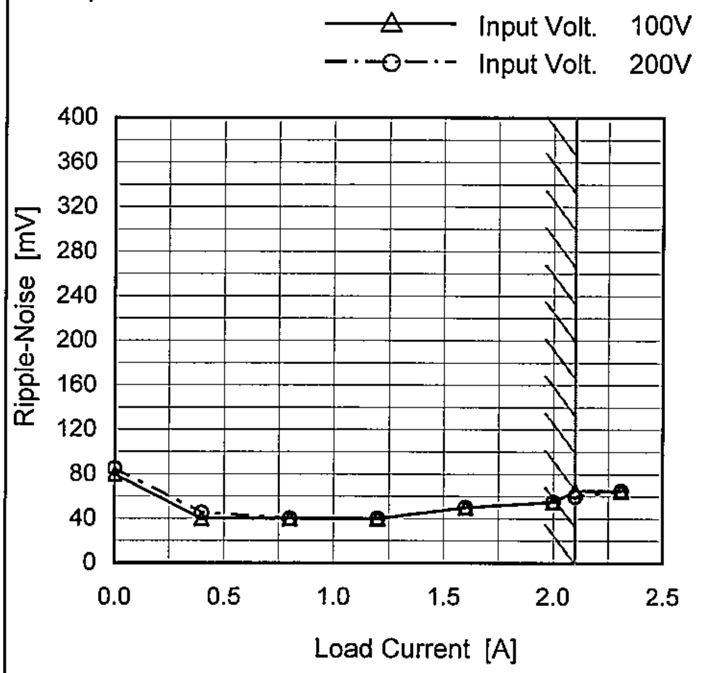
Model	TUNS50F24
Item	Ripple-Noise
Object	+24V2.1A

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.

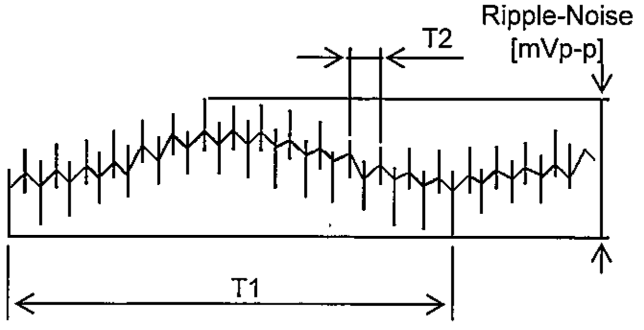


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV] Input Volt. 100 [V]	Ripple-Noise [mV] Input Volt. 200 [V]
0.0	80	85
0.4	40	45
0.8	40	40
1.2	40	40
1.6	50	50
2.0	55	55
2.1	65	60
2.3	65	65
--	-	-
--	-	-
--	-	-

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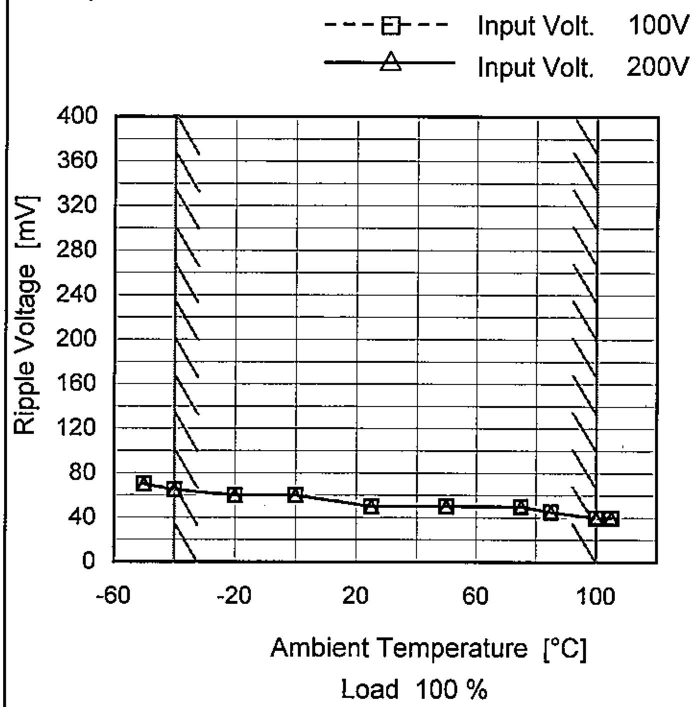
Model	TUNS50F24	
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure C
Object	+24V2.1A	

1.Graph



Measured by 100 MHz Oscilloscope.

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

2.Values

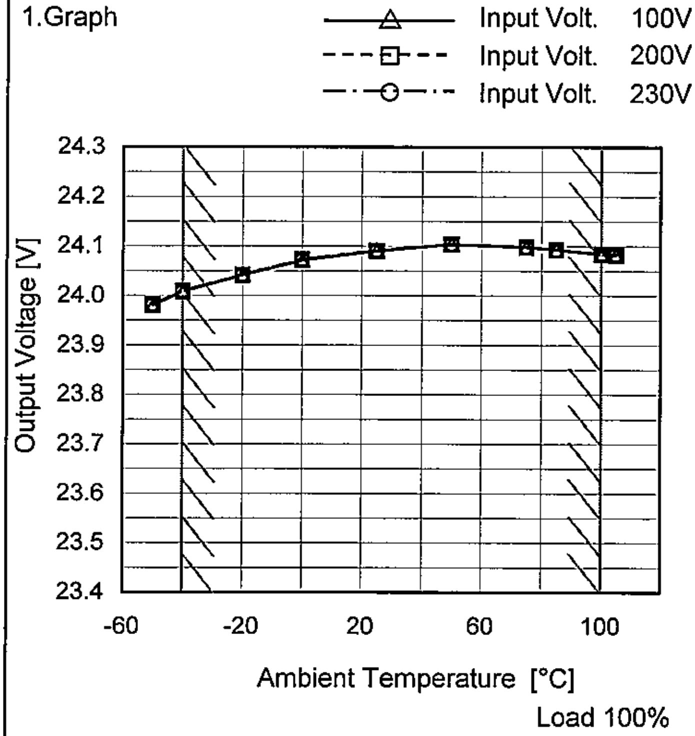
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
-50	70	70
-40	65	65
-20	60	60
0	60	60
25	50	50
50	50	50
75	50	50
85	45	45
100	40	40
105	40	40
--	-	-

COSEL

Model	TUNS50F24
Item	Ambient Temperature Drift
Object	+24V2.1A

Testing Circuitry Figure A

1.Graph



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

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-50	23.981	23.982	23.982
-40	24.009	24.009	24.009
-20	24.041	24.041	24.042
0	24.072	24.073	24.072
25	24.091	24.091	24.091
50	24.104	24.104	24.104
75	24.098	24.098	24.098
85	24.093	24.093	24.093
100	24.085	24.085	24.084
105	24.083	24.083	24.083
--	-	-	-

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Model	TUNS50F24	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
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 : -40 - 100°C
Input Voltage : 85 - 264V
Load Current : 0 - 2.1A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - 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	50	200	0	24.108	±50	±0.2
Minimum Voltage	-40	264	0	24.008		

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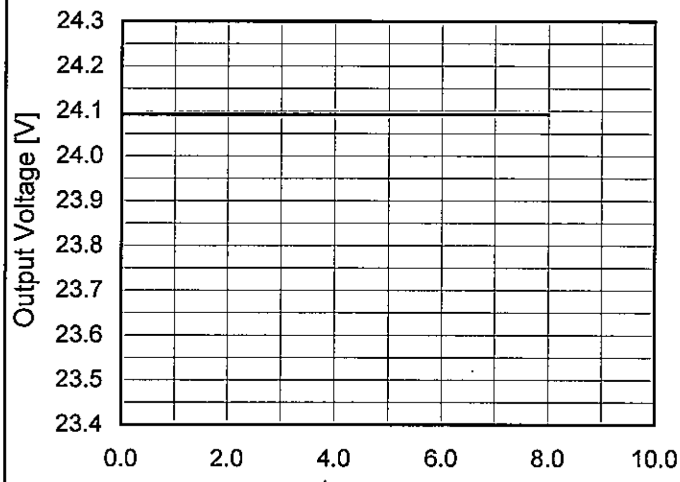
Model	TUNS50F24
Item	Time Lapse Drift
Object	+24V2.1A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC200V is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	24.089
0.5	24.094
1.0	24.093
2.0	24.093
3.0	24.093
4.0	24.093
5.0	24.093
6.0	24.093
7.0	24.093
8.0	24.093

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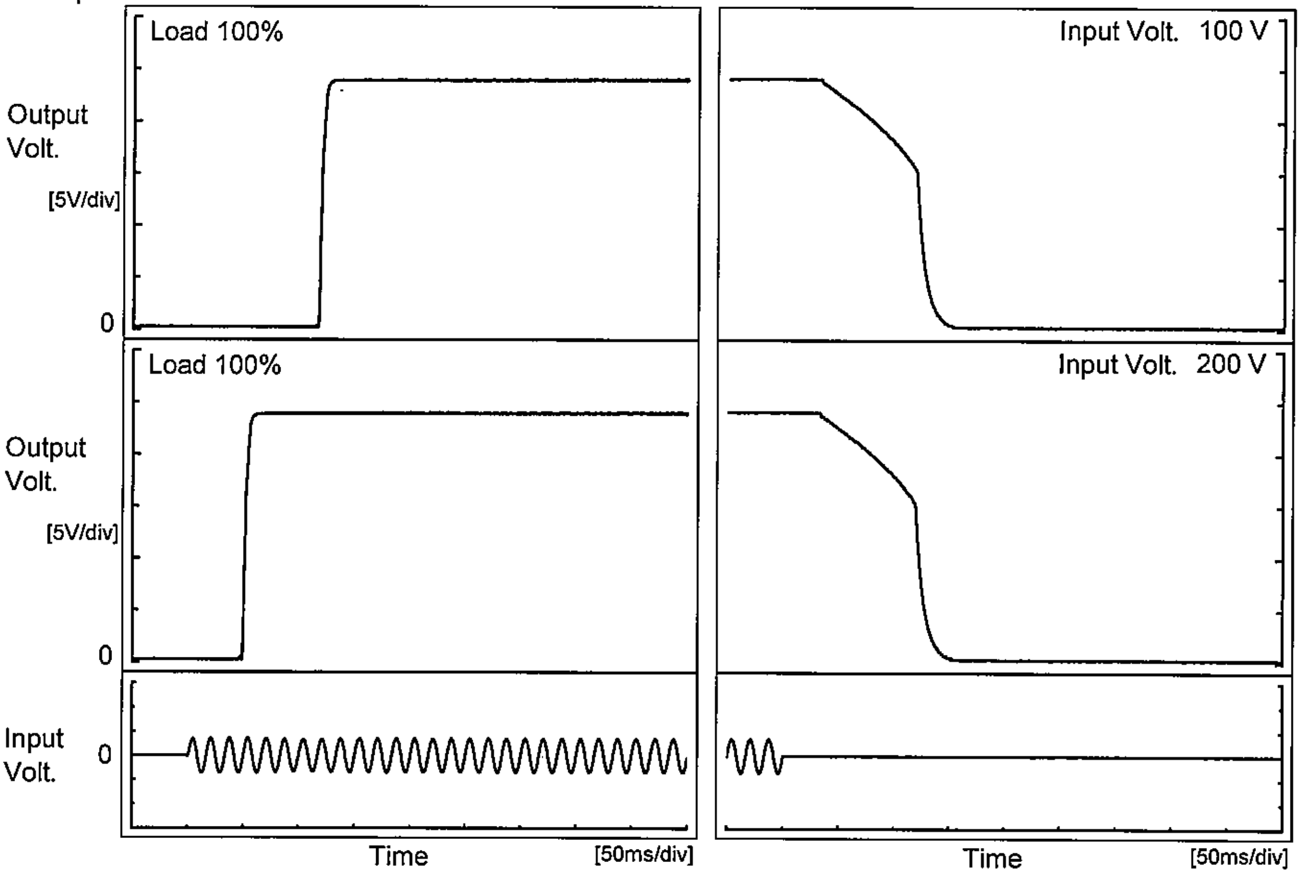
Model	TUNS50F24
Item	Rise and Fall Time
Object	+24V2.1A

Temperature 25°C
Testing Circuitry Figure A

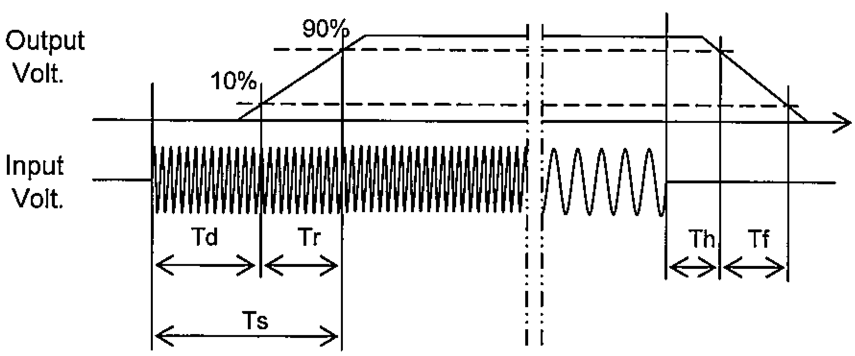
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	117.3	6.0	123.3	59.5	74.3
200 V	49.8	5.8	55.6	59.0	74.8



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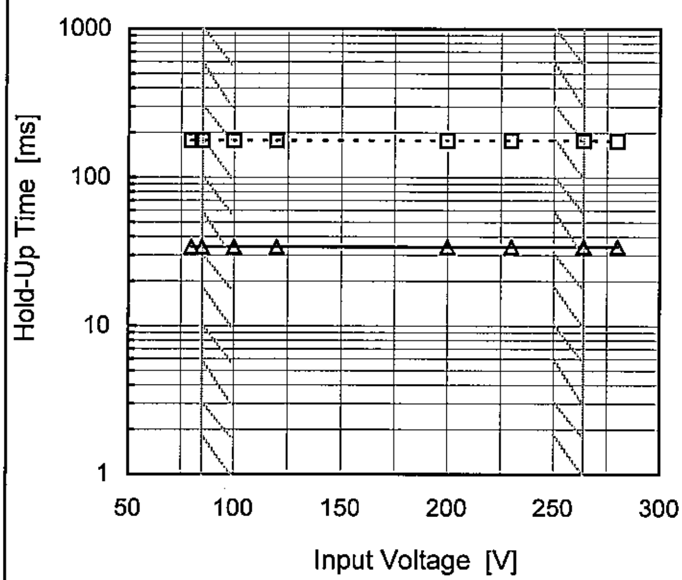
Model	TUNS50F24
Item	Hold-Up Time
Object	+24V2.1A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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	177	34
85	177	34
100	177	34
120	177	34
200	177	34
230	177	34
264	177	34
280	177	34
--	-	-

参考資料

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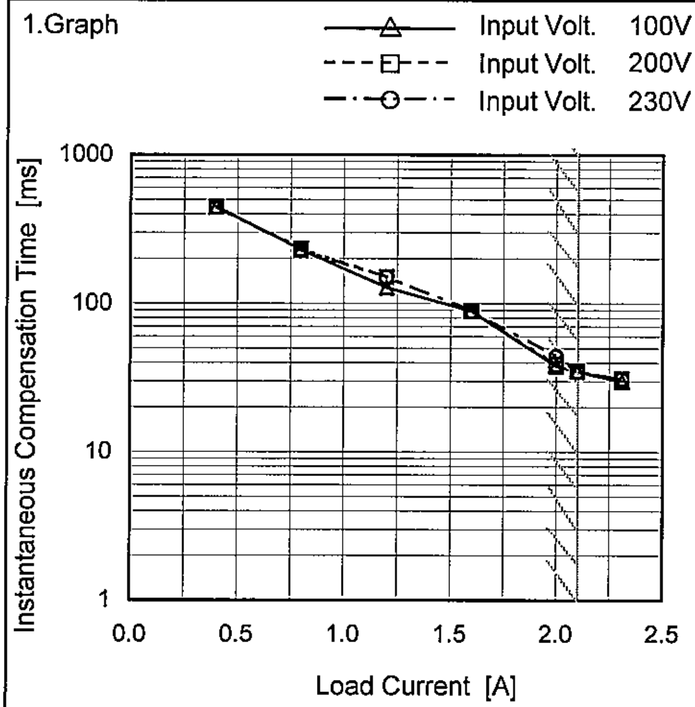
Model	TUNS50F24
Item	Instantaneous Interruption Compensation
Object	+24V2.1A

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]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.4	447	443	443
0.8	230	232	228
1.2	128	150	150
1.6	89	89	89
2.0	38	39	44
2.1	35	35	35
2.3	30	31	31
--	-	-	-
--	-	-	-
--	-	-	-

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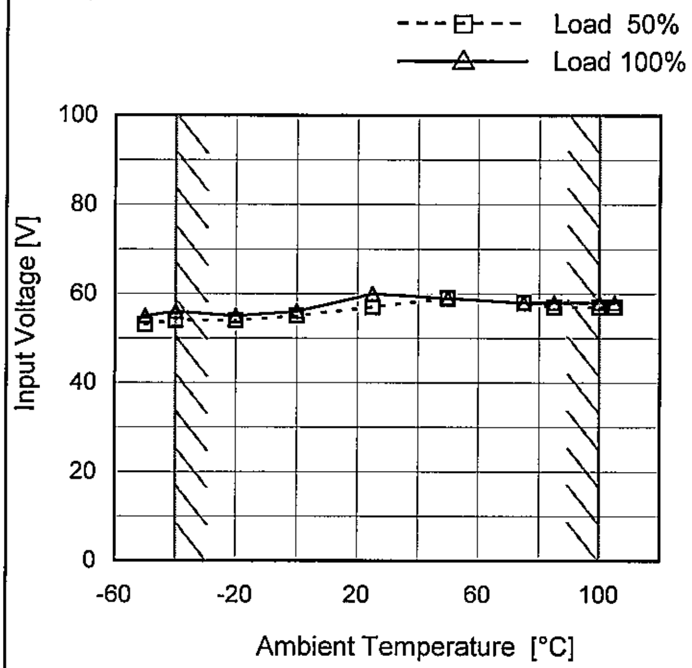
Model	TUNS50F24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V2.1A

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	53	55
-40	54	56
-20	54	55
0	55	56
25	57	60
50	59	59
75	58	58
85	57	58
100	57	58
105	57	58
--	-	-

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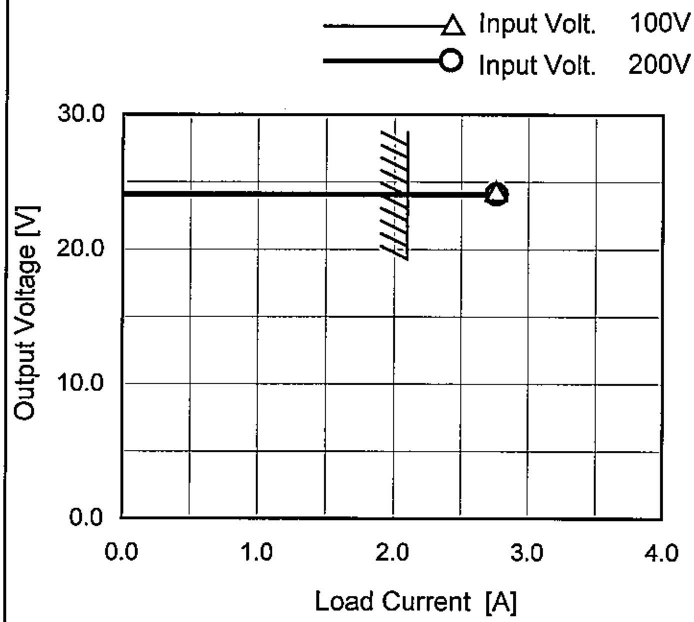
Model	TUNS50F24	
Item	Overcurrent Protection	Temperature 25°C Testing Circuitry Figure A
Object	+24V2.1A	

1.Graph



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

Intermittent operation occurs when overcurrent protection is activated.

2.Values

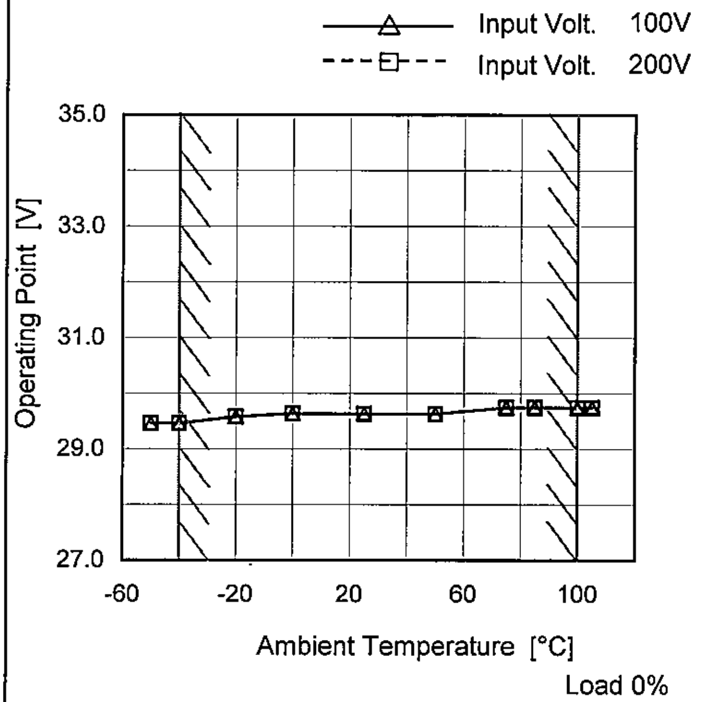
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 200[V]
24.0	2.71	2.71
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	TUNS50F24
Item	Overvoltage Protection
Object	+24V2.1A

Testing Circuitry Figure A

1.Graph



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

2.Values

Ambient Temperature [°C]	Operating Point [V] Input Volt. 100[V]	Operating Point [V] Input Volt. 200[V]
-50	29.46	29.46
-40	29.46	29.46
-20	29.58	29.58
0	29.64	29.64
25	29.63	29.63
50	29.63	29.63
75	29.75	29.75
85	29.75	29.75
100	29.75	29.75
105	29.75	29.75
--	-	-

COSEL

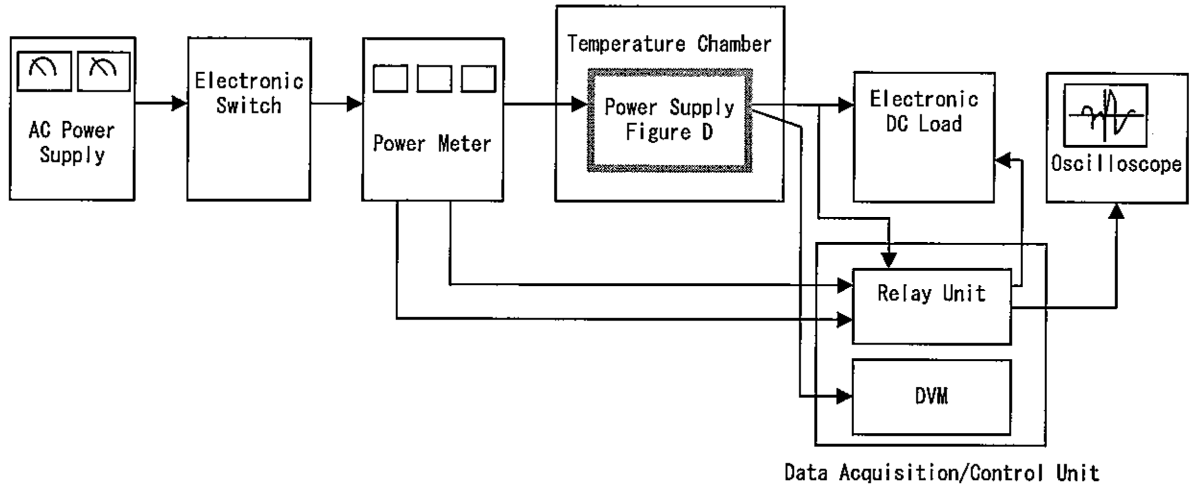
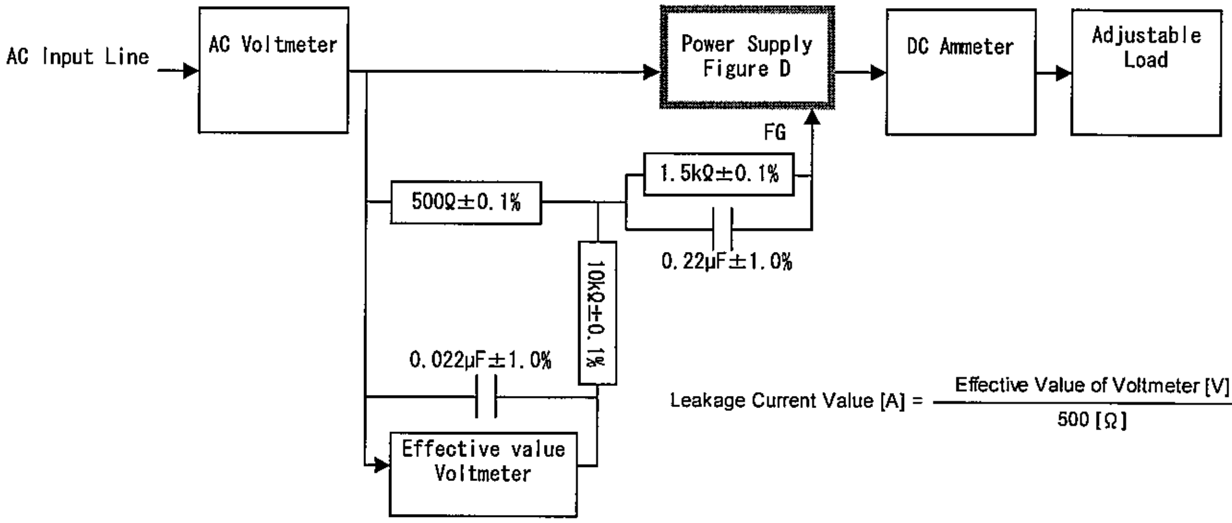
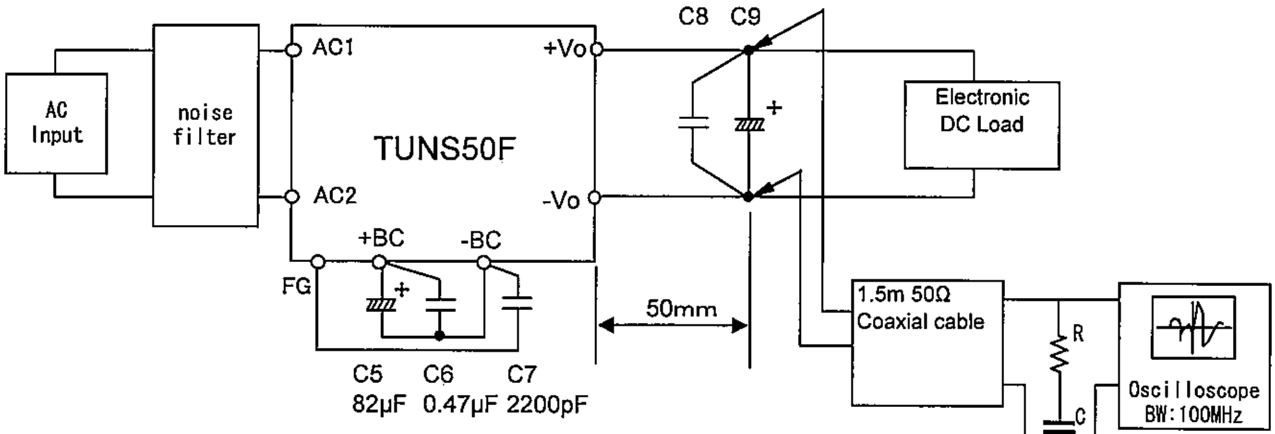


Figure A



$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter [V]}}{500\ [\Omega]}$$

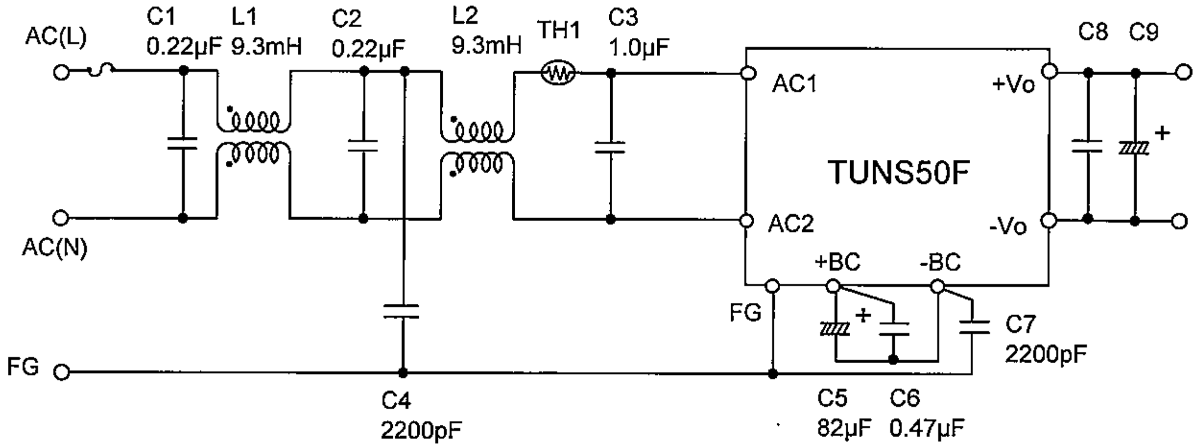
Figure B (IEC60950-1)



C8 : TUNS50F05	10µF	C9 : TUNS50F05	2200µF	(0≦Tc≦100)
TUNS50F12	10µF		2200µF×3	(-40≦Tc＜0)
TUNS50F24	4.7µF	TUNS50F12	470µF	(0≦Tc≦100)
			470µF×3	(-40≦Tc＜0)
		TUNS50F24	220µF	(0≦Tc≦100)
			220µF×3	(-40≦Tc＜0)

Tc : Base Plate Temp.

Figure C



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.

Figure D