

TEST DATA OF TUNS500F12

Regulated DC Power Supply
October 1, 2014

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COSEL CO.,LTD.

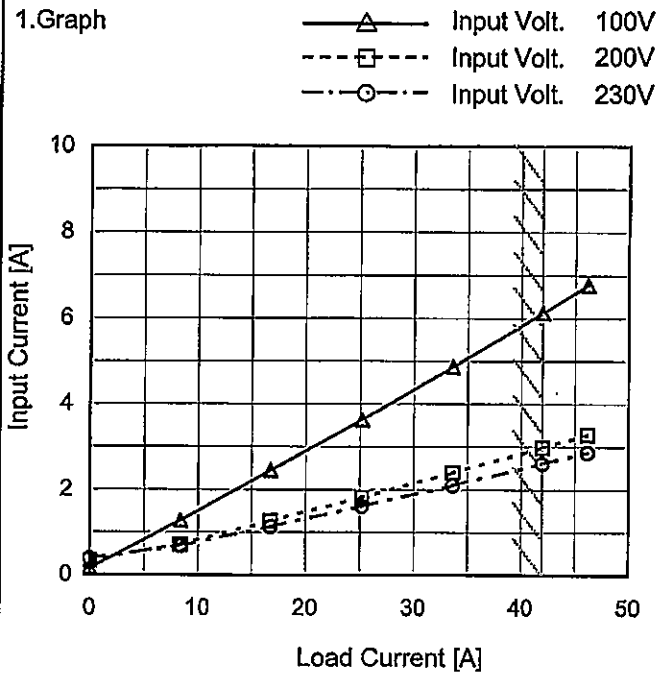
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Model	TUNS500F12
Item	Input Current (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A



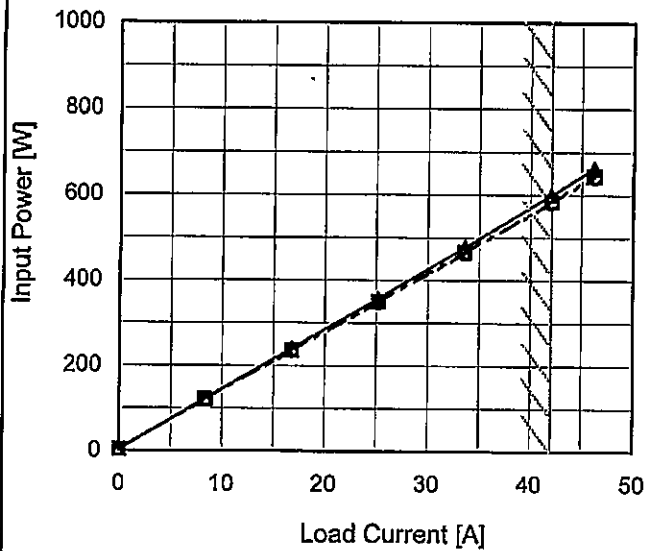
2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.161	0.334	0.384
8.4	1.282	0.713	0.674
16.8	2.451	1.258	1.129
25.2	3.634	1.817	1.606
33.6	4.868	2.394	2.099
42.0	6.130	2.982	2.606
46.2	6.776	3.283	2.864
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model	TUNS500F12
Item	Input Power (by Load Current)
Object	

1. Graph

—△— 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

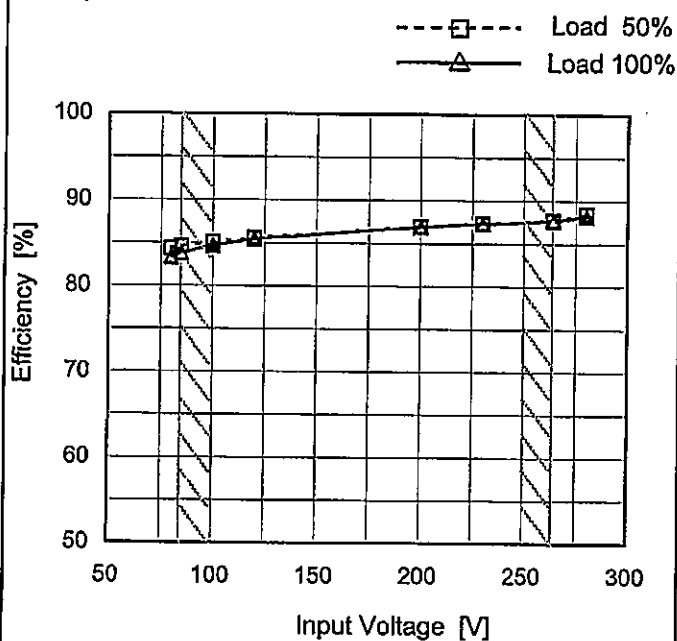
2. Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	3.1	2.9	2.9
8.4	123.2	120.4	120.0
16.8	240.4	235.2	234.2
25.2	357.6	349.8	348.2
33.6	477.5	466.4	464.3
42.0	599.9	584.7	582.0
46.2	662.4	644.6	641.5
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model	TUNS500F12
Item	Efficiency (by Input Voltage)
Object	

Temperature 25°C
Testing Circuitry Figure A

1. Graph



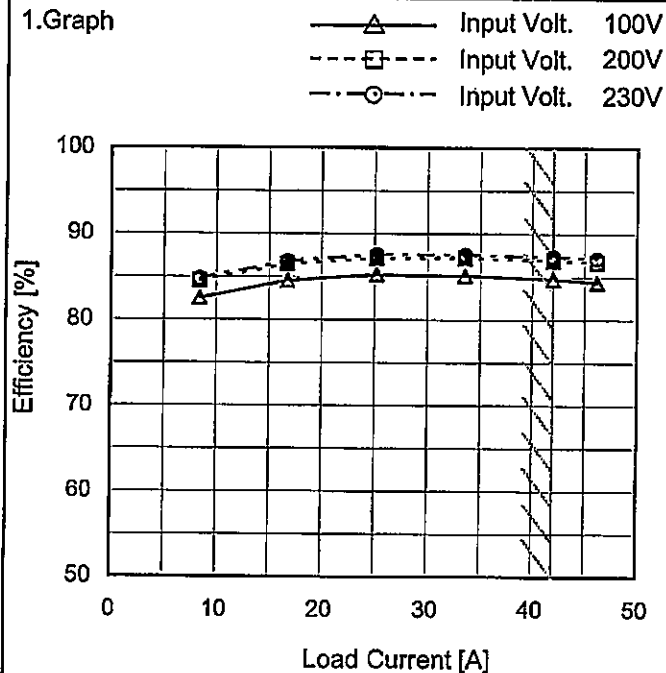
Note: Slanted line shows the range of the rated input voltage.

2. Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
80	84.3	83.3
85	84.6	83.8
100	85.1	84.7
120	85.6	85.5
200	87.0	86.9
230	87.3	87.3
264	87.7	87.7
280	88.5	88.2
--	-	-

Model	TUNS500F12
Item	Efficiency (by Load Current)
Object	

1. Graph



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

Temperature 25°C
Testing Circuitry Figure A

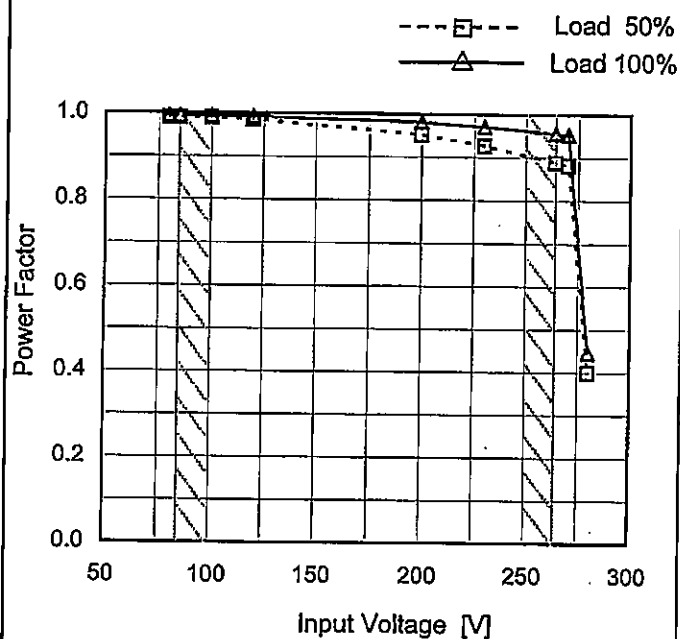
2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
8.4	82.5	84.5	84.7
16.8	84.5	86.5	86.8
25.2	85.3	87.2	87.6
33.6	85.2	87.2	87.6
42.0	84.7	86.9	87.3
46.2	84.4	86.7	87.1
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model	TUNS500F12
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

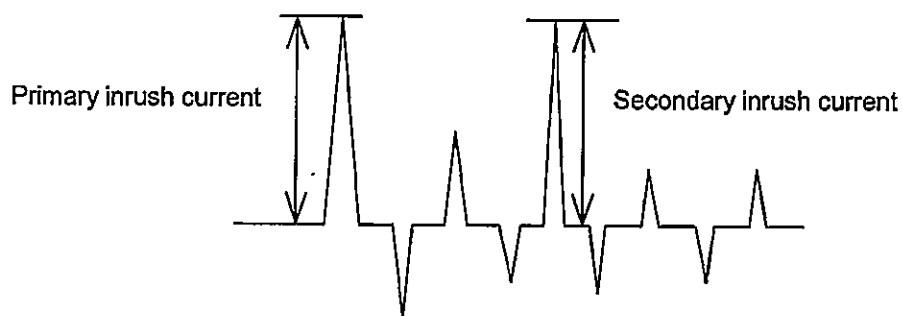
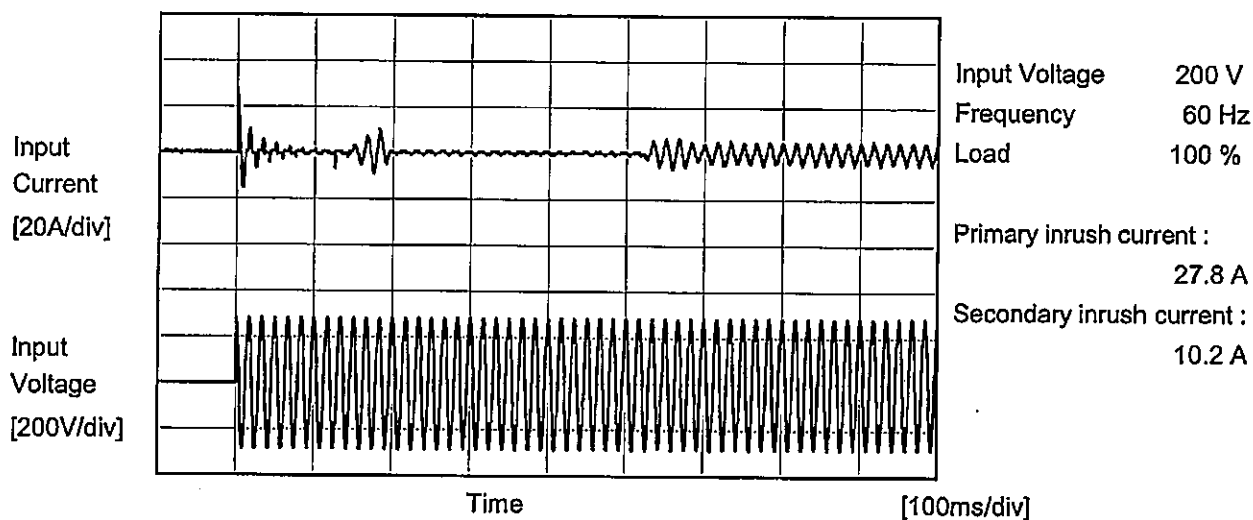
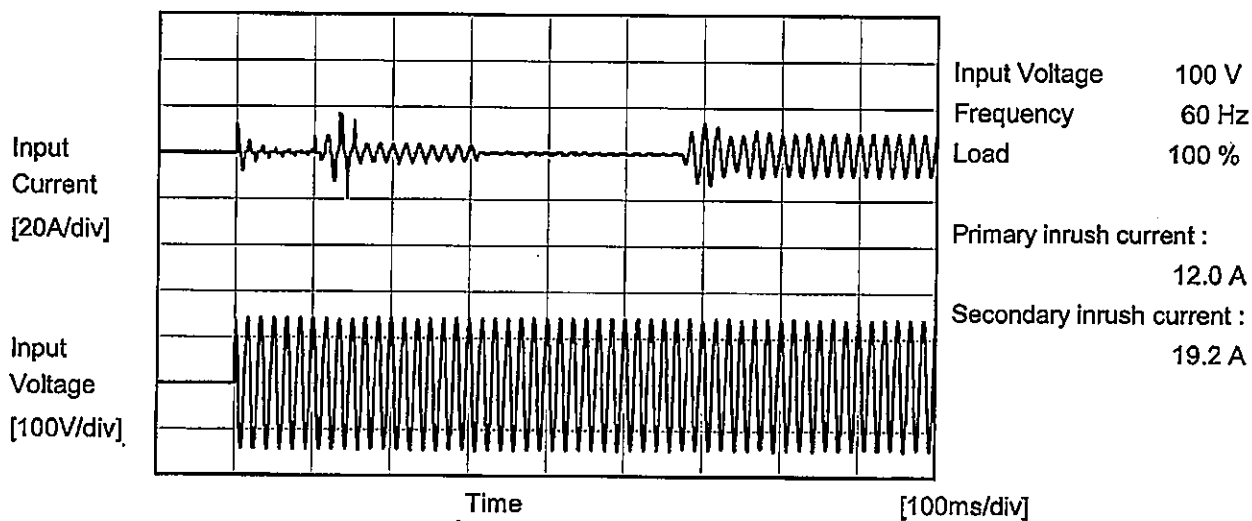
Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
80	0.990	0.995
85	0.990	0.995
100	0.989	0.994
120	0.985	0.993
200	0.952	0.982
230	0.927	0.971
264	0.889	0.956
270	0.882	0.953
280	0.400	0.447

Model		TUNS500F12																																																				
Item		Power Factor (by Load Current)																																																				
Object																																																						
1.Graph																																																						
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Note: Slanted line shows the range of the rated load current.																																																						
2.Values																																																						
<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Power Factor</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>0.190</td><td>0.044</td><td>0.033</td></tr><tr><td>4.2</td><td>0.915</td><td>0.675</td><td>0.574</td></tr><tr><td>8.4</td><td>0.962</td><td>0.843</td><td>0.773</td></tr><tr><td>16.8</td><td>0.985</td><td>0.934</td><td>0.901</td></tr><tr><td>25.2</td><td>0.991</td><td>0.962</td><td>0.942</td></tr><tr><td>33.6</td><td>0.992</td><td>0.975</td><td>0.962</td></tr><tr><td>42.0</td><td>0.994</td><td>0.982</td><td>0.971</td></tr><tr><td>46.2</td><td>0.994</td><td>0.984</td><td>0.975</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]	Power Factor			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.190	0.044	0.033	4.2	0.915	0.675	0.574	8.4	0.962	0.843	0.773	16.8	0.985	0.934	0.901	25.2	0.991	0.962	0.942	33.6	0.992	0.975	0.962	42.0	0.994	0.982	0.971	46.2	0.994	0.984	0.975	--	-	-	-	--	-	-	-	--	-	-	-
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Model	TUNS500F12	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object			



		Temperature 25°C Testing Circuitry Figure B
Model	TUNS500F12	
Item	Leakage Current	
Object		

1.Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	240[V]	
IEC60950-1	Both phases	0.16	0.33	0.40	Operation
	One of phase	0.30	0.63	0.77	stand by

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

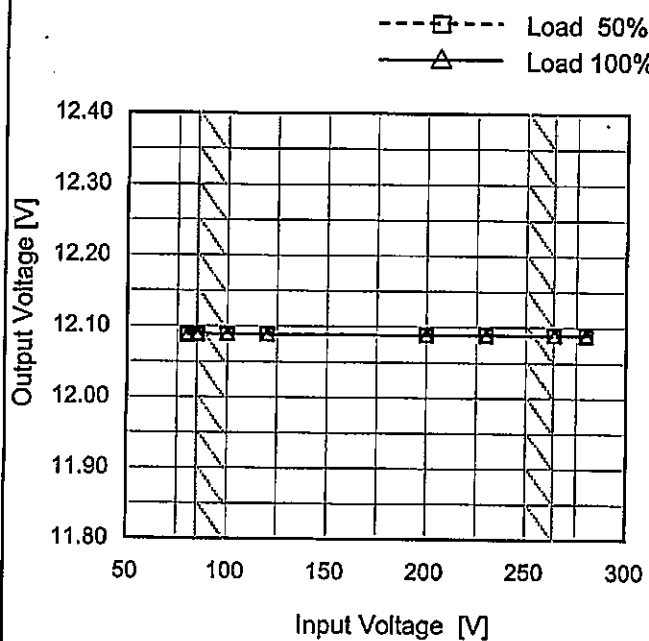
2.Condition

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

Model	TUNS500F12
Item	Line Regulation
Object	+12V42A

Temperature 25°C
Testing Circuitry Figure A

1. Graph



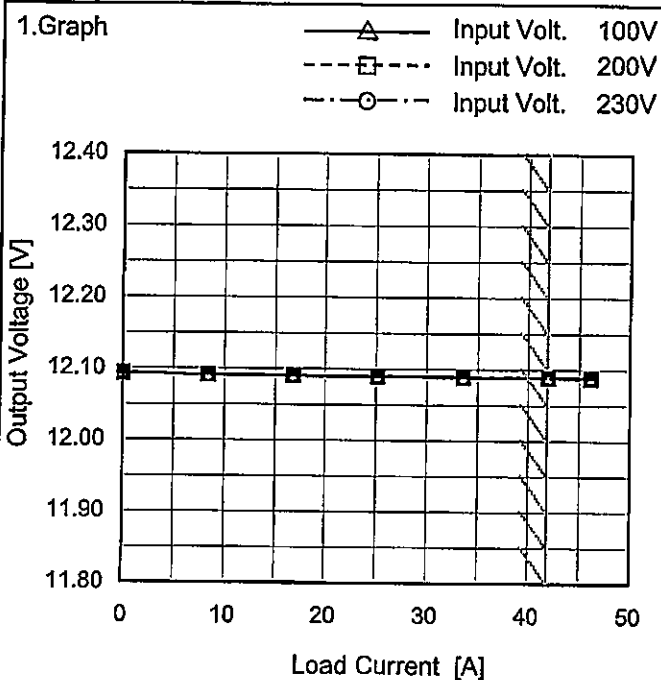
Note: Slanted line shows the range of the rated input voltage.

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
80	12.089	12.088
85	12.089	12.088
100	12.089	12.089
120	12.089	12.089
200	12.089	12.089
230	12.089	12.089
264	12.089	12.089
280	12.089	12.089
--	-	-

Model	TUNS500F12
Item	Load Regulation
Object	+12V42A

Temperature 25°C
Testing Circuitry Figure A



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	12.093	12.093	12.093
8.4	12.091	12.091	12.091
16.8	12.090	12.090	12.090
25.2	12.090	12.090	12.090
33.6	12.089	12.089	12.089
42.0	12.089	12.089	12.089
46.2	12.088	12.088	12.088
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	TUNS500F12
Item	Dynamic Load Response
Object	+12V 42A

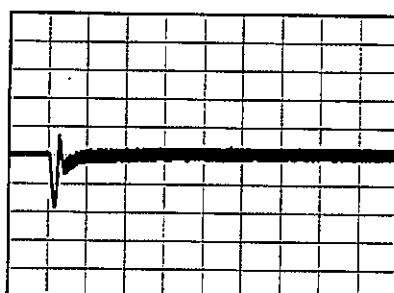
Temperature 25°C
Testing Circuitry Figure A

Input Volt. 100V
Cycle 1000ms

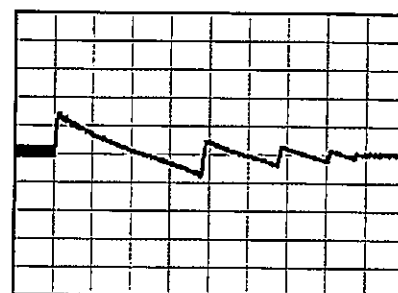
Load Current  42A / 50us

Min.Load (0A) ←→
Load 100%(42A)

200 mV/div



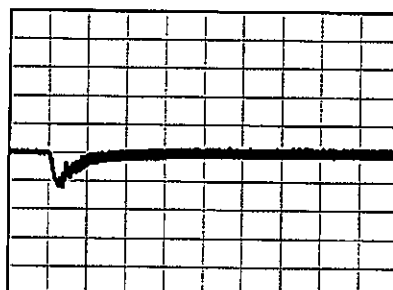
200 us/div



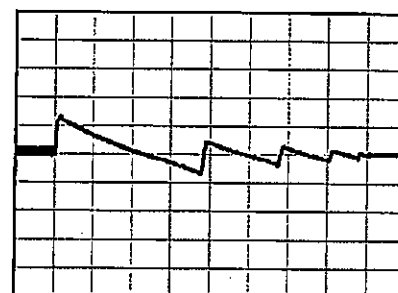
10 ms/div

Min.Load (0A) ←→
Load 50%(21A)

200 mV/div



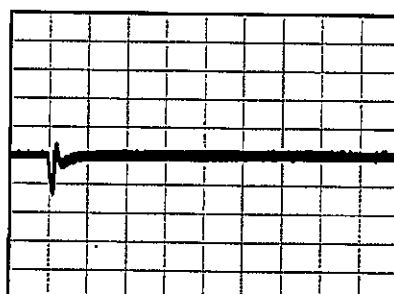
200 us/div



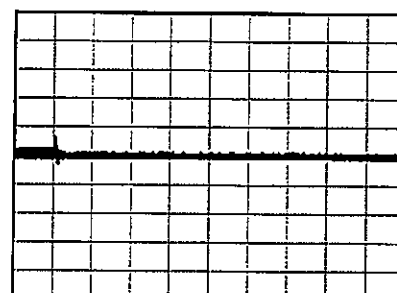
10 ms/div

Load 10% (4.2A) ←→
Load 100% (42A)

200 mV/div



200 us/div

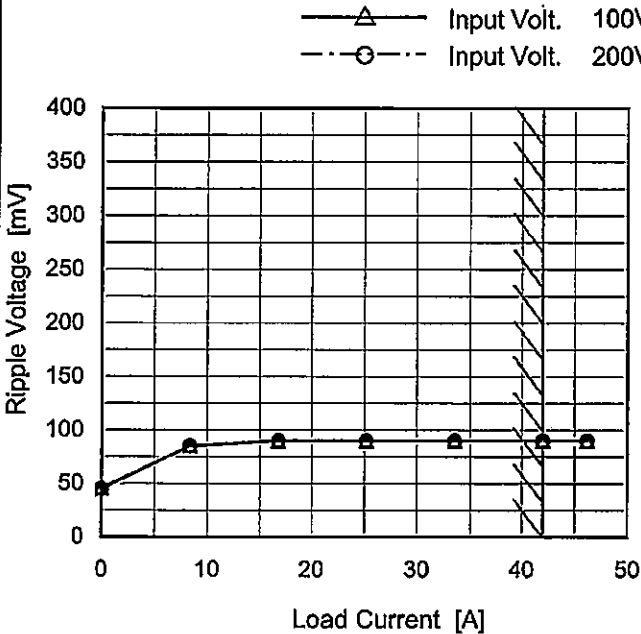


10 ms/div

Model	TUNS500F12
Item	Ripple Voltage (by Load Current)
Object	+12V42A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 200 [V]
0.0	45	45
8.4	85	85
16.8	90	90
25.2	90	90
33.6	90	90
42.0	90	90
46.2	90	90
--	-	-
--	-	-
--	-	-
--	-	-

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.

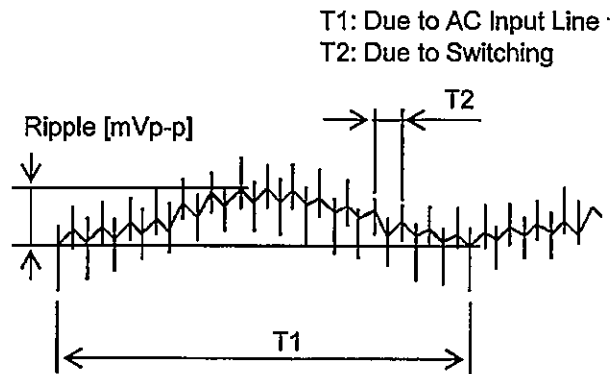
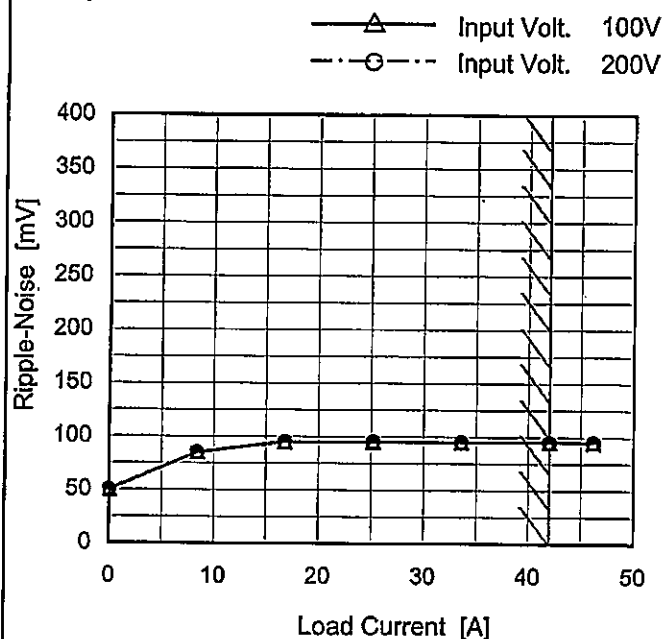


Fig. Complex Ripple Wave Form

Model	TUNS500F12
Item	Ripple-Noise
Object	+12V42A

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	50	50
8.4	85	85
16.8	95	95
25.2	95	95
33.6	95	95
42.0	95	95
46.2	95	95
--	-	-
--	-	-
--	-	-
--	-	-

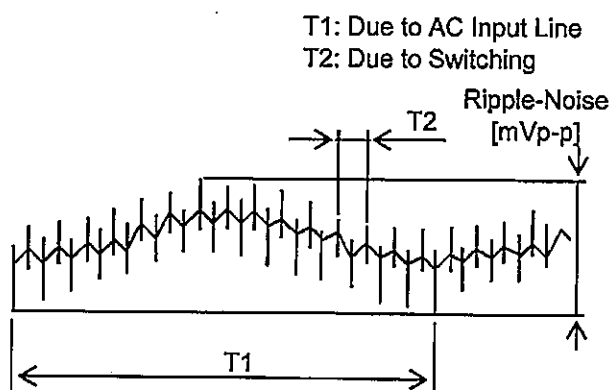


Fig. Complex Ripple Wave Form

Model

TUNS500F12

Item

Ripple Voltage (by Ambient Temp.)

Object

+12V42A

1.Graph

□

Load 50%

△

Load 100%

Ripple Voltage [mV]

Ambient Temperature [°C]

Input Volt. 200V

Measured by 100 MHz Oscilloscope.

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

2.Values

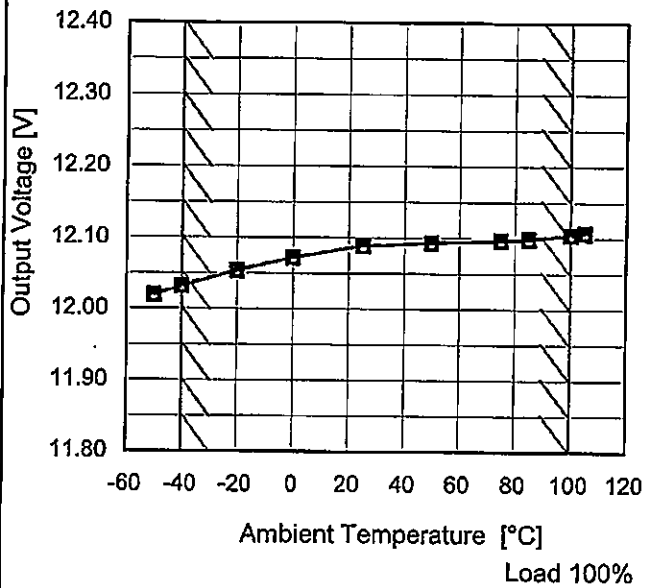
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	115	115
-40	105	110
-20	100	100
0	105	105
25	90	90
50	90	90
75	85	85
85	85	85
100	85	85
105	85	85
--	-	-

Model	TUNS500F12
Item	Ambient Temperature Drift
Object	+12V42A

Testing Circuitry Figure A

1. Graph

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



2. Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-50	12.019	12.020	12.020
-40	12.032	12.032	12.032
-20	12.053	12.054	12.054
0	12.072	12.072	12.072
25	12.089	12.089	12.089
50	12.093	12.093	12.093
75	12.097	12.097	12.097
85	12.098	12.099	12.099
100	12.104	12.104	12.104
105	12.107	12.108	12.108
---	-	-	-

Model	TUNS500F12	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+12V42A	

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 - 42A

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

* Output Voltage Accuracy (Ratio) = $\frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

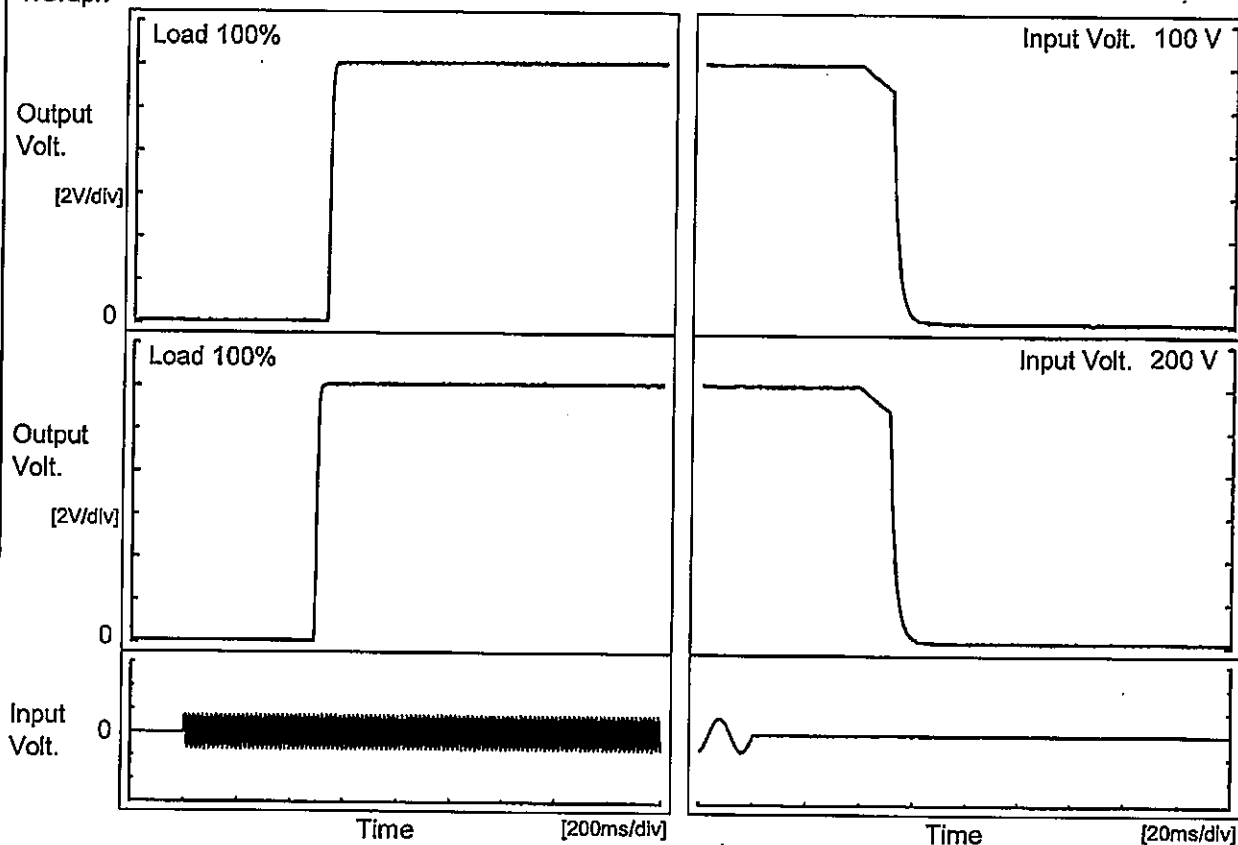
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	100	85	0	12.109	±40	±0.3
Minimum Voltage	-40	85	42	12.030		

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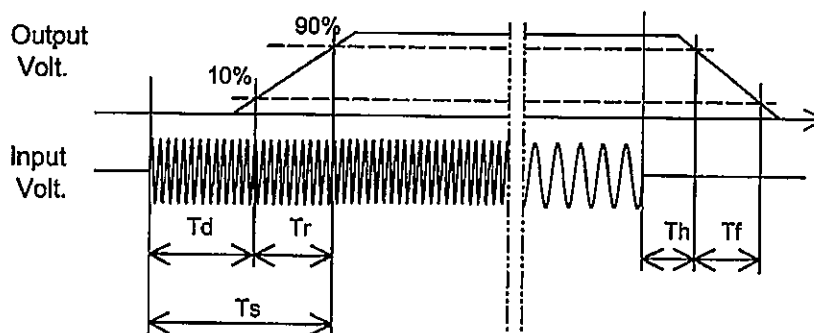
Model	TUNS500F12	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V42A		

1. Graph



2. Values

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	529.0	11.0	540.0	50.7	4.9
200 V	490.0	11.0	501.0	50.9	4.9

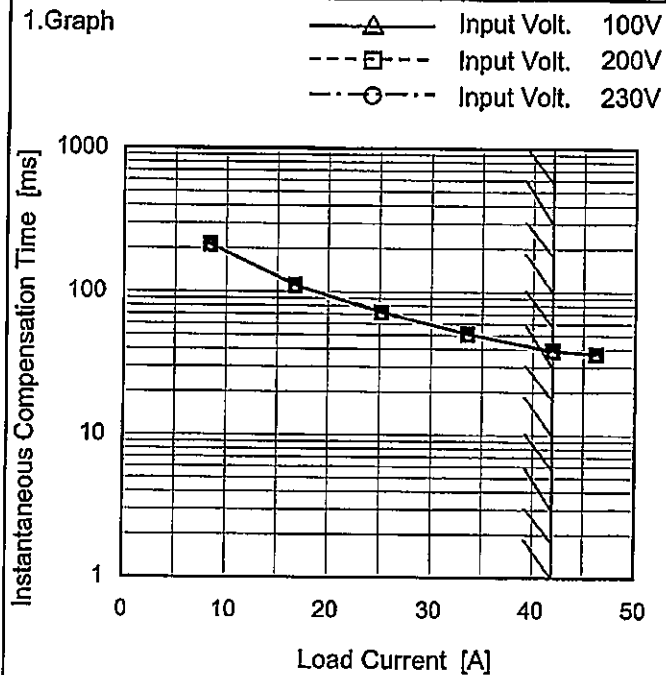


Model		TUNS500F12	Temperature 25°C Testing Circuitry Figure A
Item		Hold-Up Time	
Object		+12V42A	
1.Graph			2.Values
<div><div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div><div>Hold-Up Time [ms]</div><div>Input Voltage [V]</div></div>			
<p>This duration covers from Shut-off 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.</p>			
Input Voltage [V]		Hold-Up Time [ms]	
		Load 50%	Load 100%
80		89	41
85		89	41
100		89	41
120		89	41
200		89	41
230		89	41
264		89	41
280		96	43
--		-	-

Model	TUNS500F12
Item	Instantaneous Interruption Compensation
Object	+12V42A

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	-	-	-
8.4	214	214	214
16.8	111	111	111
25.2	72	72	72
33.6	51	51	51
42.0	39	39	39
46.2	37	37	37
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	TUNS500F12
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V42A

1.Graph

---□---

Load 50%

—△—

Load 100%

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

Testing Circuitry Figure A

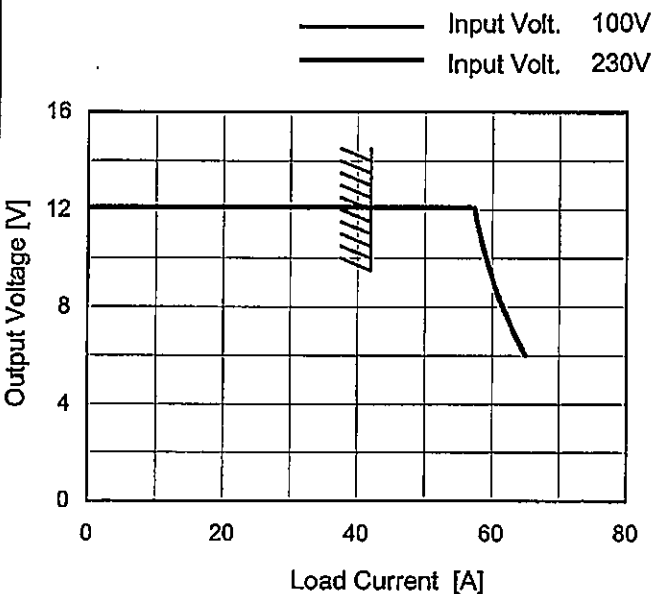
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	72	71
-40	72	72
-20	72	72
0	72	72
25	72	72
50	71	72
75	71	72
85	71	71
100	71	72
105	72	73
--	-	-



Model	TUNS500F12
Item	Overcurrent Protection
Object	+12V42A

1.Graph



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

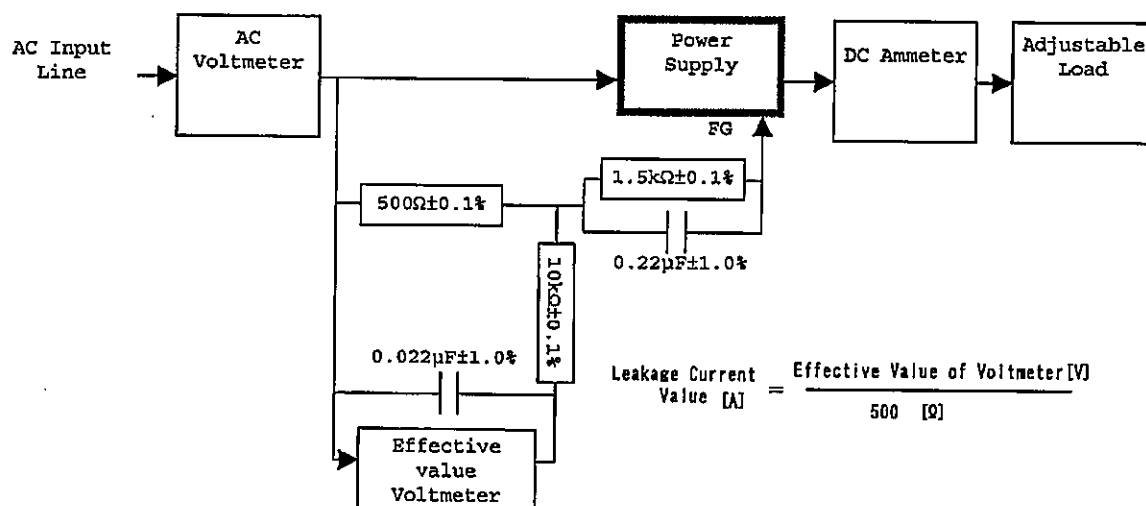
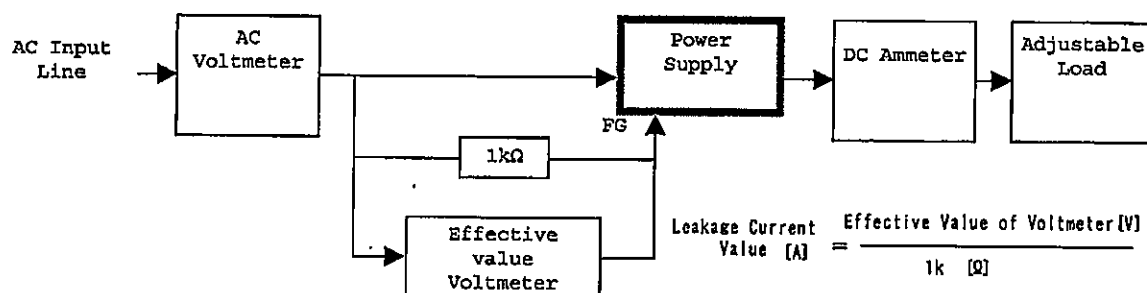
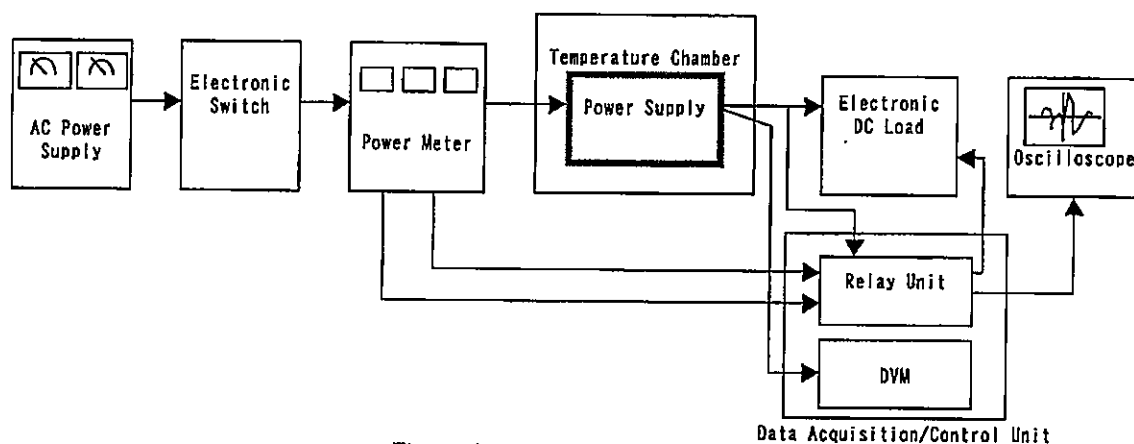
Intermittent operation occurs when the output voltage is from 6V to 0V.

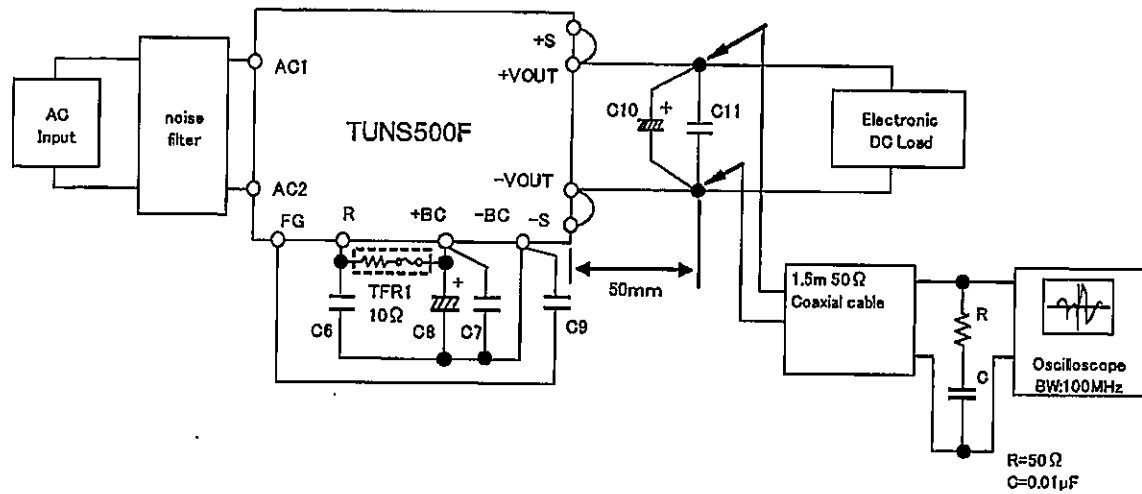
Temperature 25°C
Testing Circuitry Figure A

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
12.0	42.56	42.39
11.4	57.72	57.82
10.8	58.22	58.32
9.6	59.40	59.47
8.4	60.97	60.89
7.2	62.74	62.72
6.0	64.90	64.97
--	-	-
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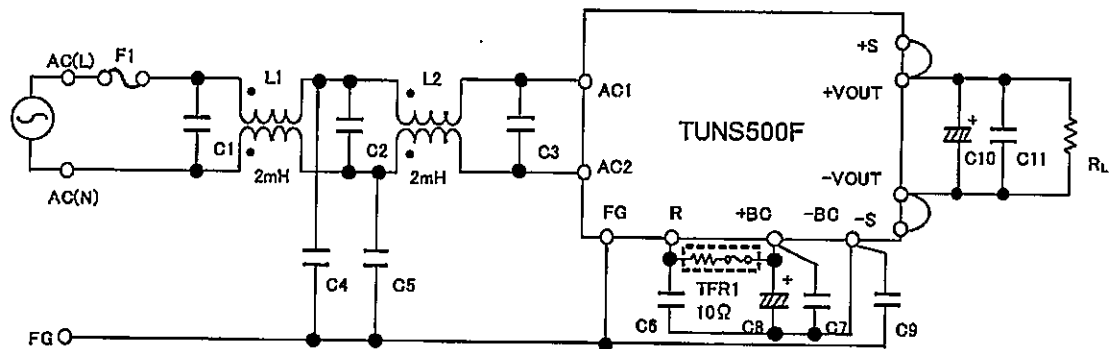
Model		TUNS500F12																																						
Item		Overvoltage Protection																																						
Object		+12V42A																																						
1.Graph		<div> <div> <div>—△—</div> <div>Input Volt. 100V</div> </div> <div> <div>---□---</div> <div>Input Volt. 200V</div> </div> </div> <p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																						
2.Values		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Operating Point [V]</th></tr> <tr> <th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th></tr> </thead> <tbody> <tr><td>-50</td><td>15.77</td><td>15.77</td></tr> <tr><td>-40</td><td>15.77</td><td>15.77</td></tr> <tr><td>-20</td><td>15.83</td><td>15.83</td></tr> <tr><td>0</td><td>15.82</td><td>15.82</td></tr> <tr><td>25</td><td>15.82</td><td>15.82</td></tr> <tr><td>50</td><td>15.82</td><td>15.82</td></tr> <tr><td>75</td><td>15.82</td><td>15.82</td></tr> <tr><td>85</td><td>15.82</td><td>15.82</td></tr> <tr><td>100</td><td>15.82</td><td>15.82</td></tr> <tr><td>105</td><td>15.82</td><td>15.82</td></tr> <tr><td>---</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 200[V]	-50	15.77	15.77	-40	15.77	15.77	-20	15.83	15.83	0	15.82	15.82	25	15.82	15.82	50	15.82	15.82	75	15.82	15.82	85	15.82	15.82	100	15.82	15.82	105	15.82	15.82	---	-	-
Ambient Temperature [°C]	Operating Point [V]																																							
	Input Volt. 100[V]	Input Volt. 200[V]																																						
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85	15.82	15.82																																						
100	15.82	15.82																																						
105	15.82	15.82																																						
---	-	-																																						





C10	: TUNS500F12	2200 μ F	($0 \leq T_c \leq 100$)	C11	: TUNS500F12	10 μ F
		2200 μ F \times 3	($-40 \leq T_c < 0$)		TUNS500F28	4.7 μ F
	TUNS500F28	1000 μ F	($0 \leq T_c \leq 100$)		TUNS500F48	2.2 μ F
		1000 μ F \times 3	($-40 \leq T_c < 0$)			
	TUNS500F48	470 μ F	($0 \leq T_c \leq 100$)			
		470 μ F \times 3	($-40 \leq T_c < 0$)			
			Tc: Base Plate Temp.			

Figure C



L1, L2	: SC-15-200(NEC TOKIN)	C11	: TUNS500F12	10 μ F Ceramic Capacitor
C1, C2	: 0.68 μ F 310V Film Capacitor \times 2		TUNS500F28	4.7 μ F Ceramic Capacitor
C3	: 1.0 μ F 310V Film Capacitor \times 2		TUNS500F48	2.2 μ F Ceramic Capacitor
C4, C5, C9	: 2200pF Ceramic Capacitor			
C6, C7	: 0.68 μ F 450V Film Capacitor \times 2			
C8	: 390 μ F 450V Electrolytic Capacitor \times 2			
C10	: TUNS500F12	2200 μ F	25V Electrolytic Capacitor	
	TUNS500F28	1000 μ F	50V Electrolytic Capacitor	
	TUNS500F48	470 μ F	63V Electrolytic Capacitor	

Figure D