COSEL

参考資料

TEST DATA OF TUHS10F12

Regulated DC Power Supply
February 28, 2014

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Sakae Minamide Design Engineer

COSEL CO.,LTD.

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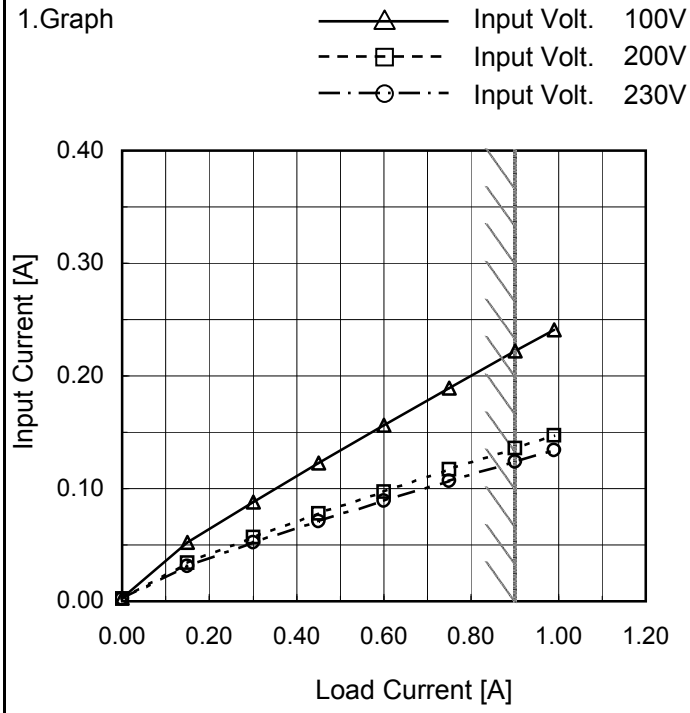
Model	TUHS10F12
Item	Input Current (by Load Current)
Object	————————

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 Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.003	0.002	0.002
0.15	0.052	0.034	0.031
0.30	0.088	0.057	0.052
0.45	0.123	0.078	0.071
0.60	0.156	0.097	0.089
0.75	0.189	0.117	0.107
0.90	0.222	0.136	0.124
0.99	0.241	0.147	0.134
--	-	-	-
--	-	-	-
--	-	-	-

BC-10794

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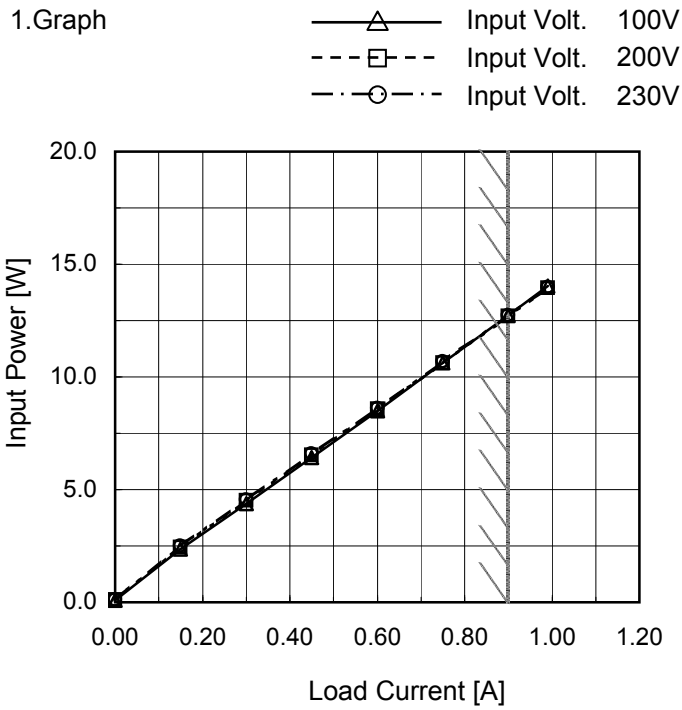
Model	TUHS10F12
Item	Input Power (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

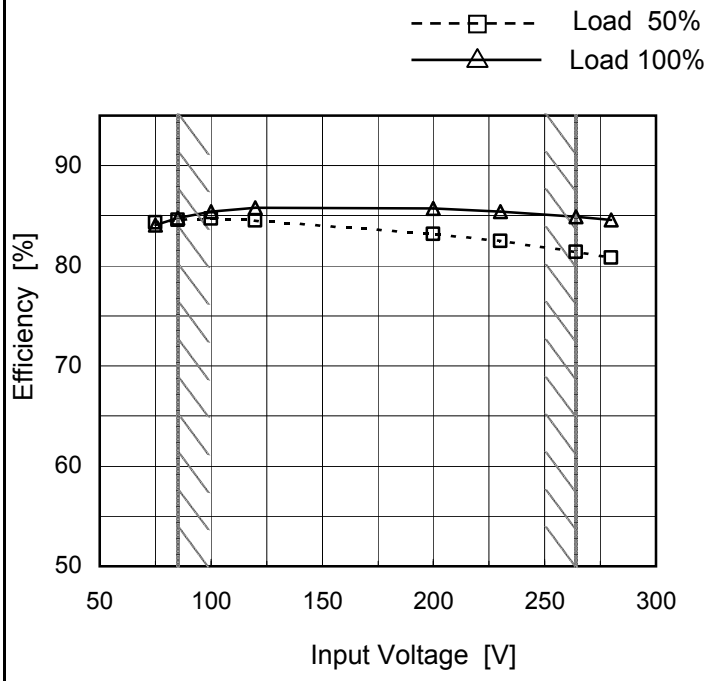
Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	0.09	0.11	0.12
0.15	2.34	2.46	2.51
0.30	4.37	4.51	4.53
0.45	6.43	6.54	6.60
0.60	8.51	8.58	8.62
0.75	10.62	10.63	10.67
0.90	12.74	12.70	12.74
0.99	14.03	13.94	13.98
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS10F12
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%
75	84.3	84.1
85	84.6	84.8
100	84.7	85.4
120	84.5	85.8
200	83.2	85.7
230	82.5	85.4
264	81.4	84.9
280	80.8	84.6
--	-	-

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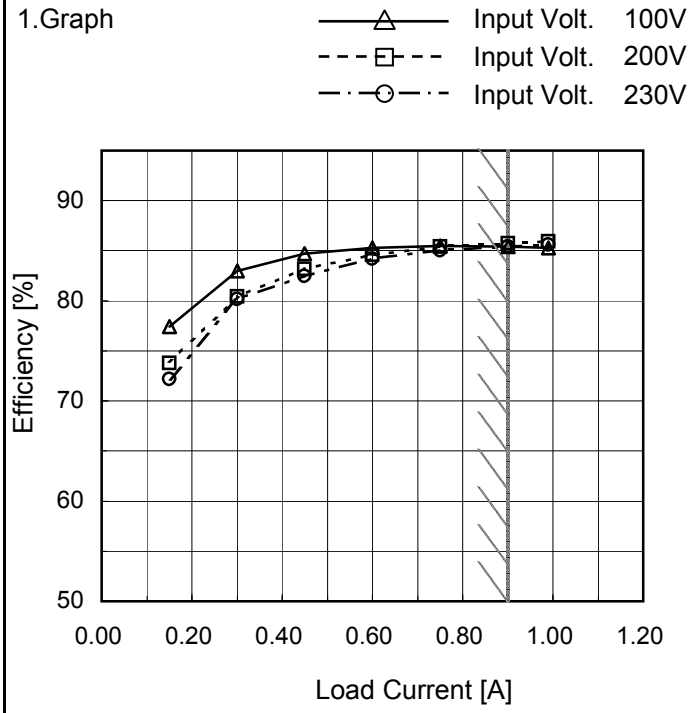
Model	TUHS10F12
Item	Efficiency (by Load Current)
Object	————————

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]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.15	77.4	73.8	72.2
0.30	83.0	80.4	80.2
0.45	84.7	83.2	82.5
0.60	85.3	84.6	84.2
0.75	85.5	85.4	85.0
0.90	85.4	85.7	85.4
0.99	85.3	85.9	85.6
--	-	-	-
--	-	-	-
--	-	-	-

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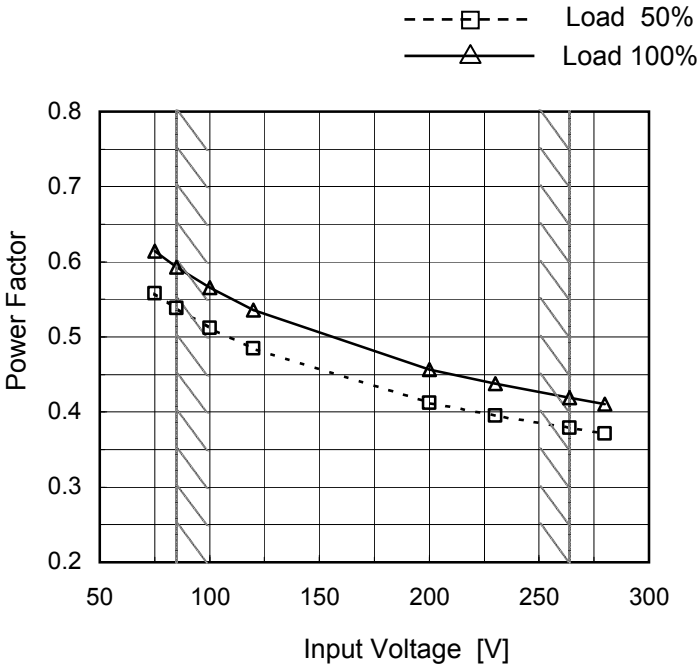
Model	TUHS10F12
Item	Power Factor (by Input Voltage)
Object	――――――――――

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%
75	0.558	0.615
85	0.538	0.593
100	0.512	0.566
120	0.484	0.535
200	0.412	0.457
230	0.395	0.437
264	0.379	0.419
280	0.372	0.411
--	-	-

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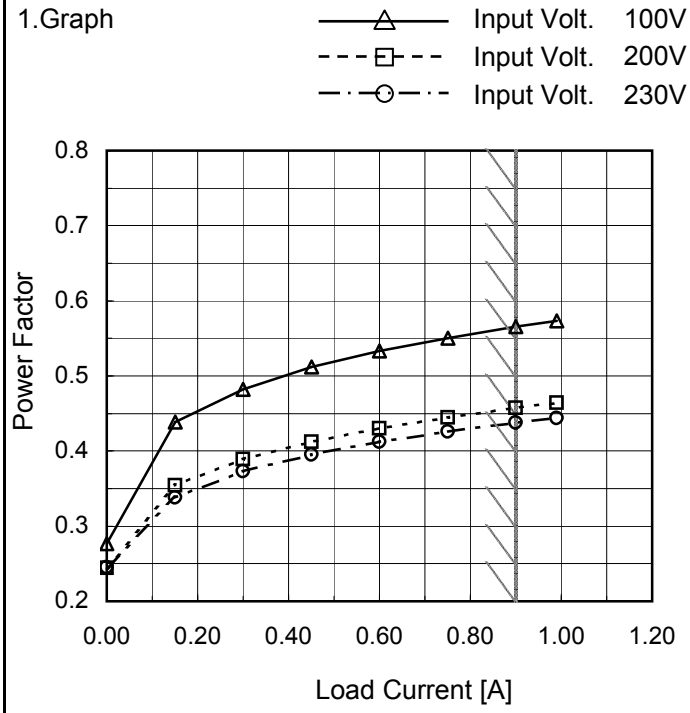
Model	TUHS10F12
Item	Power Factor (by Load Current)
Object	————————

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]
0.00	0.277	0.244	0.245
0.15	0.439	0.354	0.338
0.30	0.482	0.389	0.373
0.45	0.512	0.412	0.395
0.60	0.533	0.430	0.412
0.75	0.551	0.445	0.426
0.90	0.566	0.457	0.437
0.99	0.573	0.464	0.444
--	-	-	-
--	-	-	-
--	-	-	-

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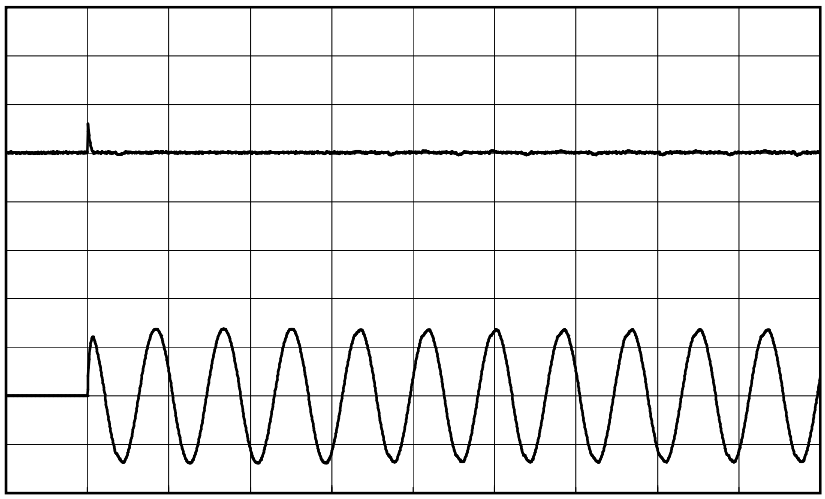
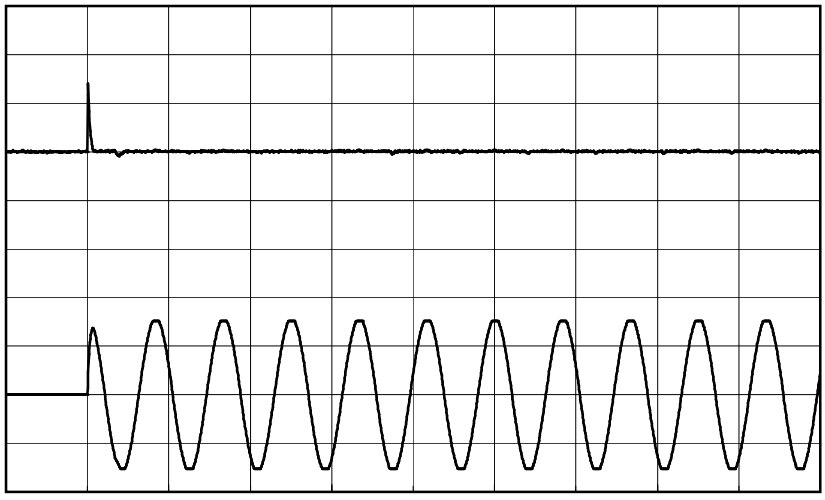
Model	TUHS10F12
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A



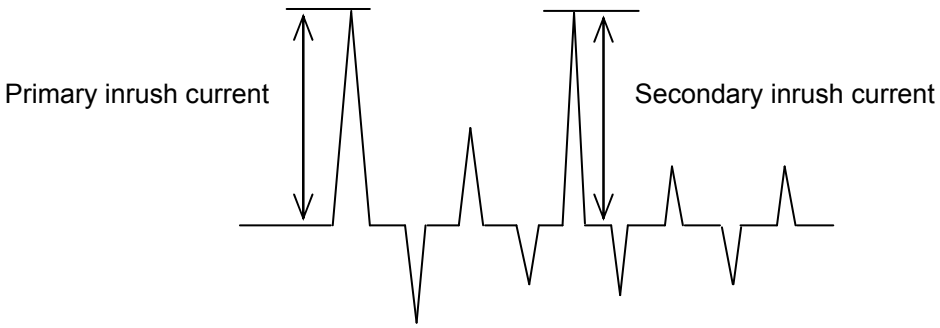
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
11.9 A
Secondary inrush current :
1.1 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
28.1 A
Secondary inrush current :
1.1 A



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Model	TUHS10F12	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	――――――――――	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	200 [V]	230 [V]	
DEN-AN	Both phases	0.005	0.008	0.008	Operation
	One of phases	0.004	0.010	0.011	Stand by
IEC60950-1	Both phases	0.003	0.006	0.007	Operation
	One of phases	0.004	0.009	0.010	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.
There is no FG in TUHS series and it is a reinforced insulation power supply of the class 2.

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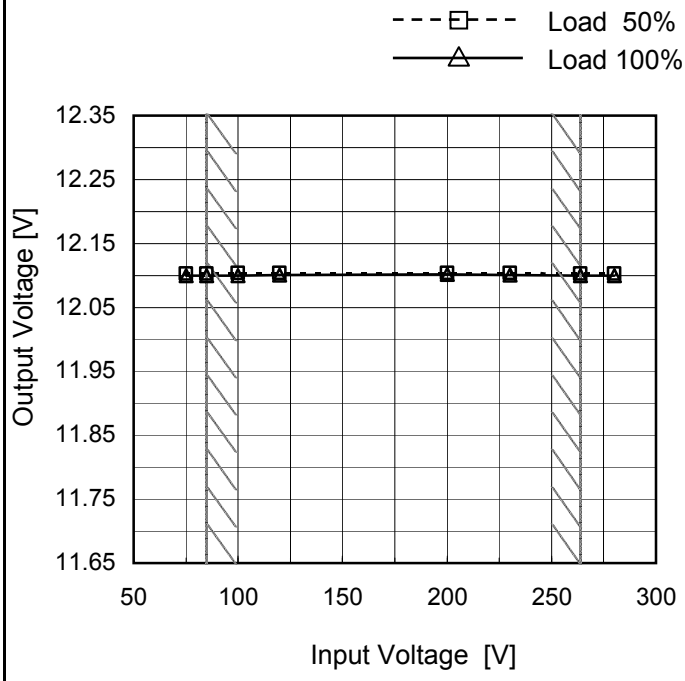
Model	TUHS10F12
Item	Line Regulation
Object	+12V0.9A

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%
75	12.102	12.099
85	12.103	12.100
100	12.104	12.100
120	12.104	12.100
200	12.104	12.101
230	12.103	12.100
264	12.103	12.100
280	12.103	12.100
--	-	-

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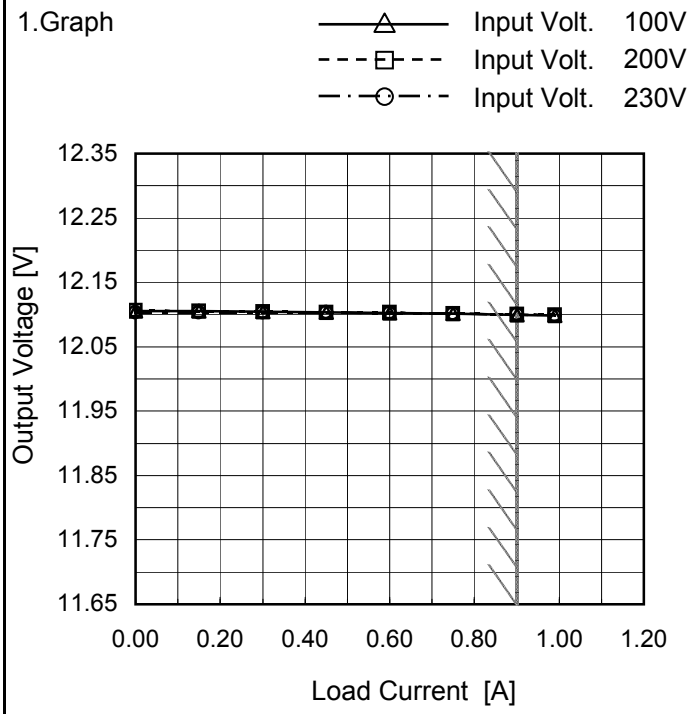
Model	TUHS10F12
Item	Load Regulation
Object	+12V0.9A

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]
0.00	12.106	12.106	12.103
0.15	12.105	12.105	12.104
0.30	12.105	12.105	12.104
0.45	12.104	12.104	12.103
0.60	12.103	12.103	12.102
0.75	12.102	12.102	12.101
0.90	12.100	12.101	12.100
0.99	12.099	12.099	12.099
--	-	-	-
--	-	-	-
--	-	-	-

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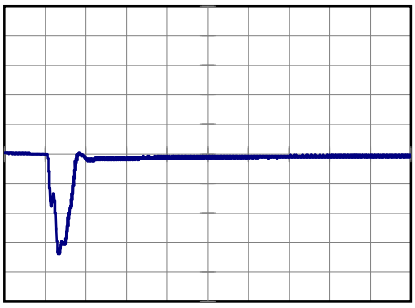
Model	TUHS10F12		
Item	Dynamic Load Response	Temperature Testing Circuitry	25℃ Figure A
Object	+12V 0.9A		

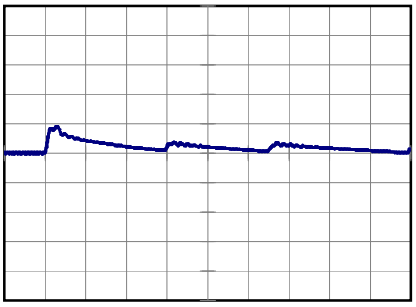
Input Volt. 230V
Cycle 500ms

Load Current

0.9A / 100us

Min.Load (0A)←→
Load 100%(0.9A)



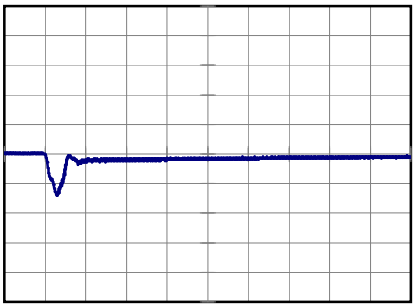


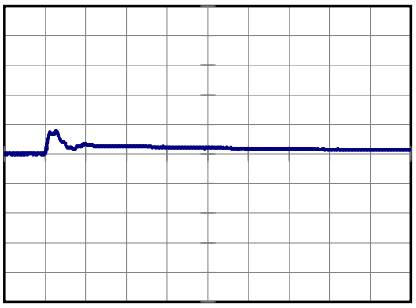
500 mV/div

200 us/div

200 us/div

Load 20% (0.18A)←→
Load 100%(0.9A)



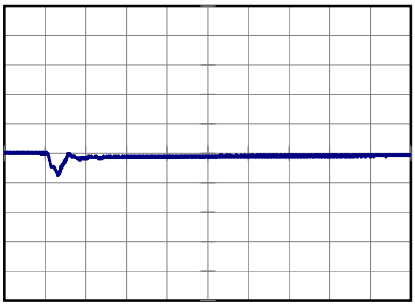


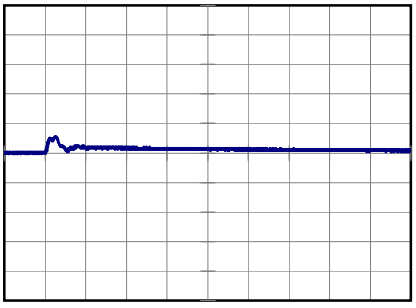
500 mV/div

200 us/div

200 us/div

Load 50% (0.45A)←→
Load 100% (0.9A)





500 mV/div

200 us/div

200 us/div

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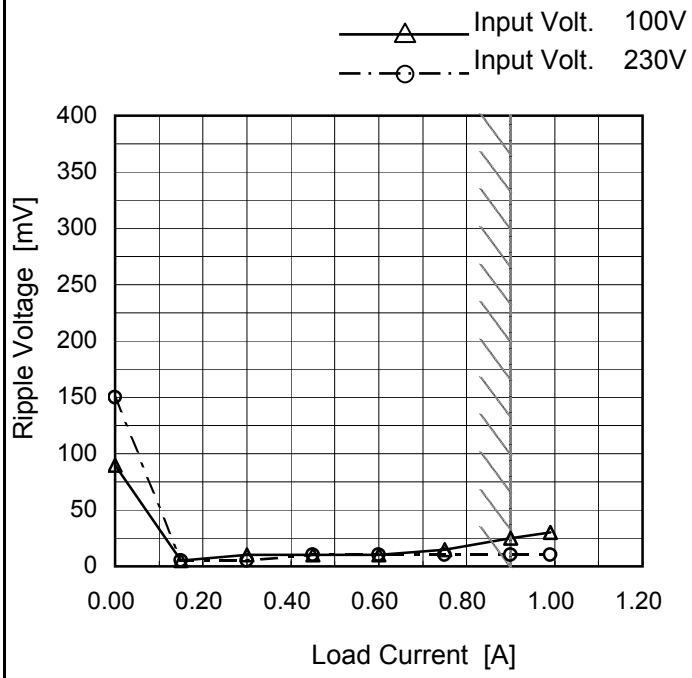
Model	TUHS10F12
Item	Ripple Voltage (by Load Current)
Object	+12V0.9A

Temperature 25°C
Testing Circuitry Figure C

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

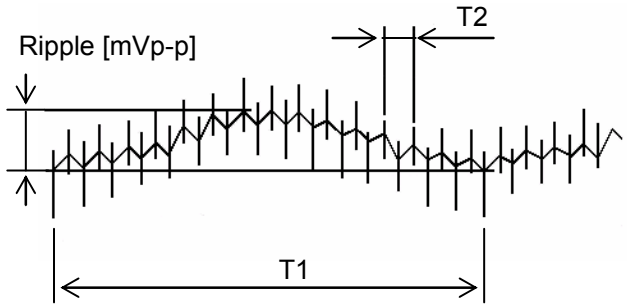


Fig. Complex Ripple Wave Form

2.Values

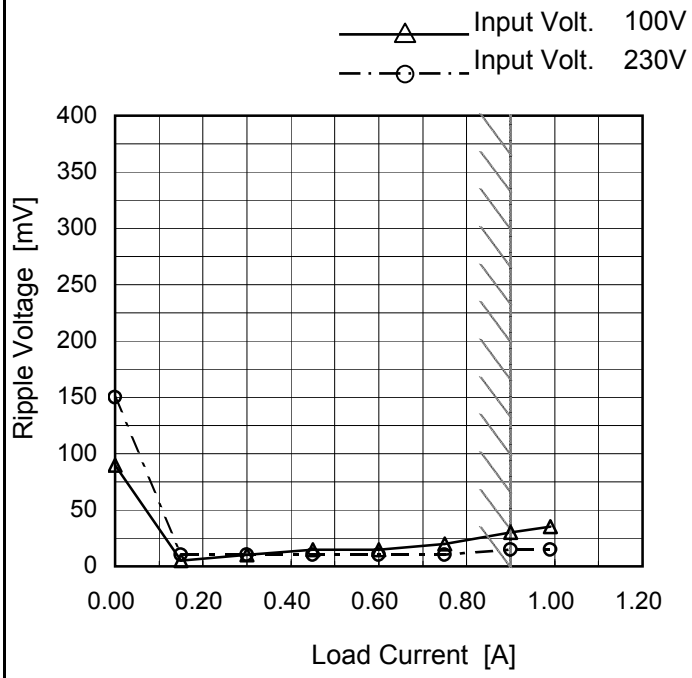
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0	90	150
0.15	5	5
0.30	10	5
0.45	10	10
0.60	10	10
0.75	15	10
0.90	25	10
0.99	30	10
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS10F12
Item	Ripple-Noise
Object	+12V0.9A

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.

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

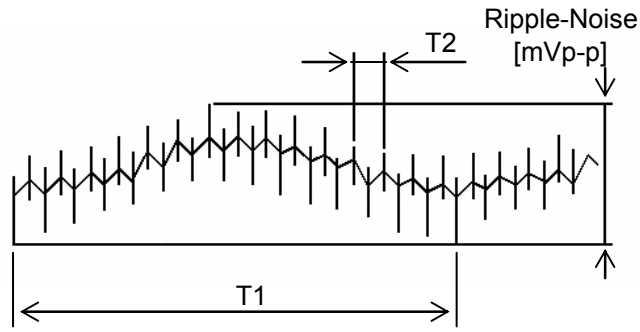


Fig. Complex Ripple Wave Form

2.Values

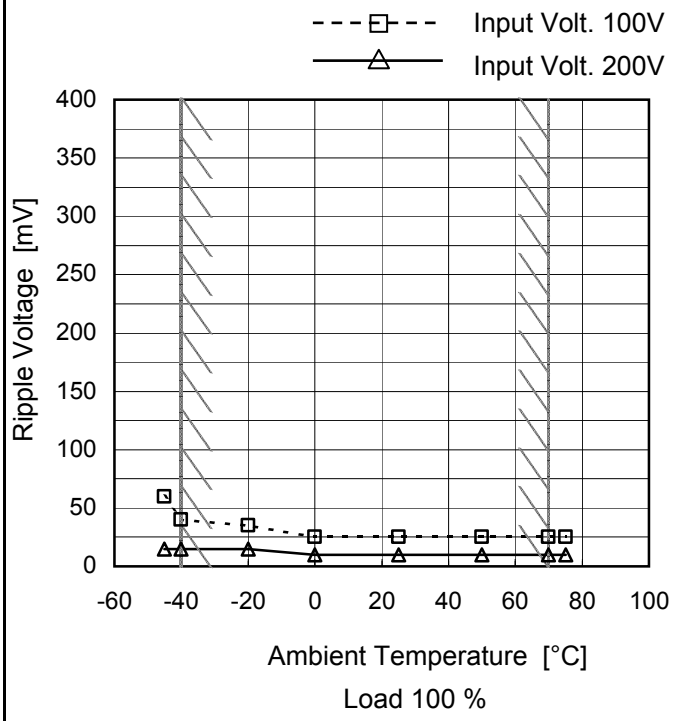
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0	90	150
0.15	5	10
0.30	10	10
0.45	15	10
0.60	15	10
0.75	20	10
0.90	30	15
0.99	35	15
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS10F12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V0.9A

Testing Circuitry Figure C

1.Graph



Load 100 %

Measured by 100 MHz Oscilloscope.
Note: Slanted line shows the range of the rated ambient temperature.

2.Values

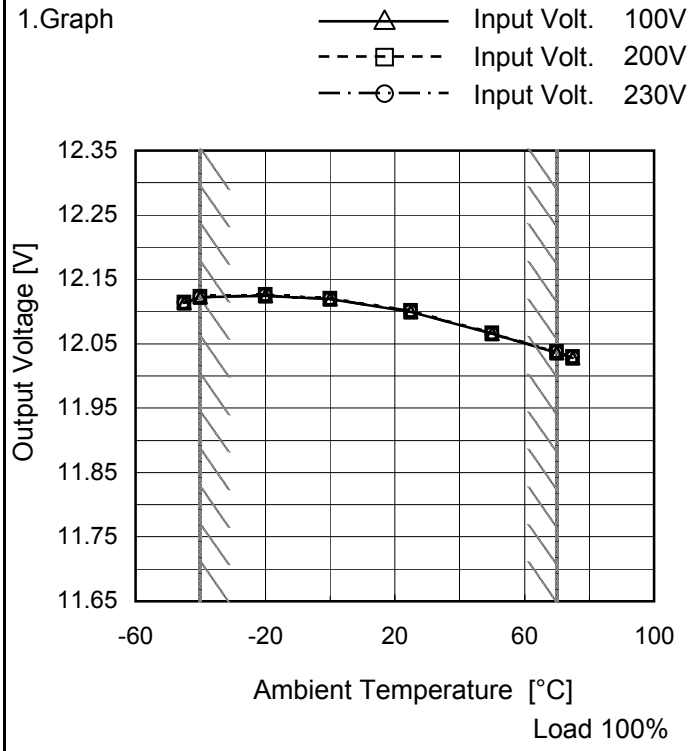
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 100V	Input Volt. 230V
-45	60	15
-40	40	15
-20	35	15
0	25	10
25	25	10
50	25	10
70	25	10
75	25	10
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS10F12
Item	Ambient Temperature Drift
Object	+12V0.9A

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]
-45	12.113	12.114	12.113
-40	12.123	12.124	12.123
-20	12.125	12.126	12.125
0	12.119	12.120	12.119
25	12.100	12.101	12.100
50	12.065	12.067	12.066
70	12.036	12.037	12.037
75	12.028	12.030	12.029
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS10F12	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+12V0.9A	

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 - 70°C
Input Voltage : 85 - 264V
Load Current : 0 - 0.9A

* 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	-20	200	0	12.130	±48	±0.4
Minimum Voltage	70	85	0.9	12.035		

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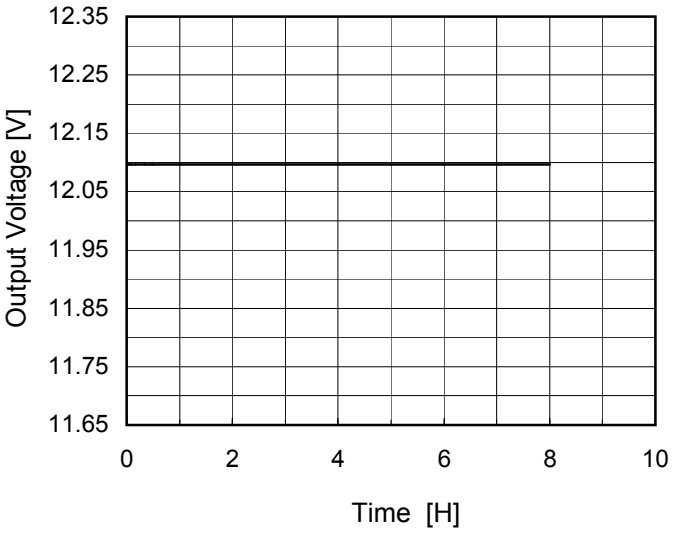
Model	TUHS10F12
Item	Time Lapse Drift
Object	+12V0.9A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC230V is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	12.100
0.5	12.097
1.0	12.097
2.0	12.096
3.0	12.096
4.0	12.096
5.0	12.096
6.0	12.096
7.0	12.096
8.0	12.096

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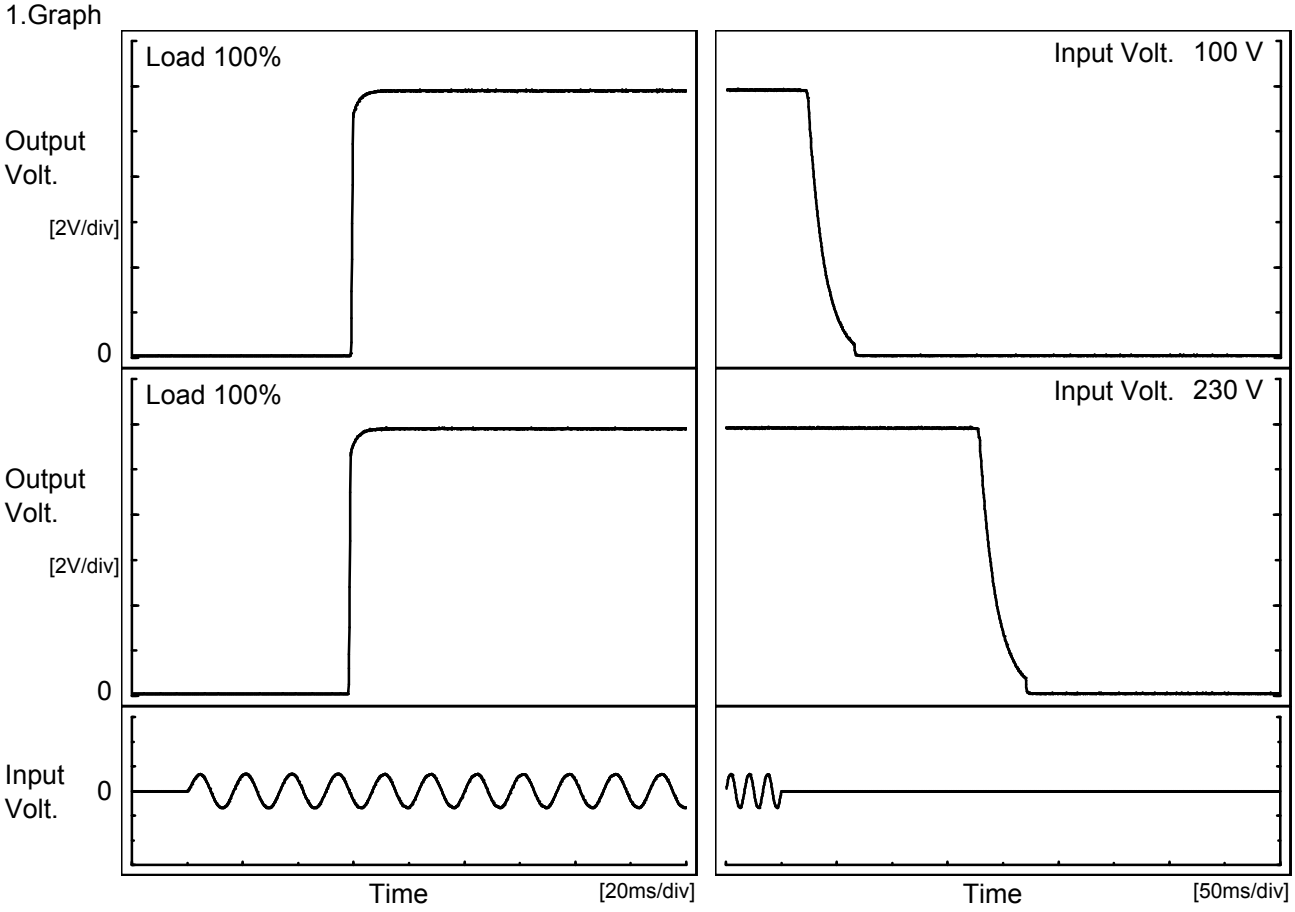
Model	TUHS10F12	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+12V0.9A	

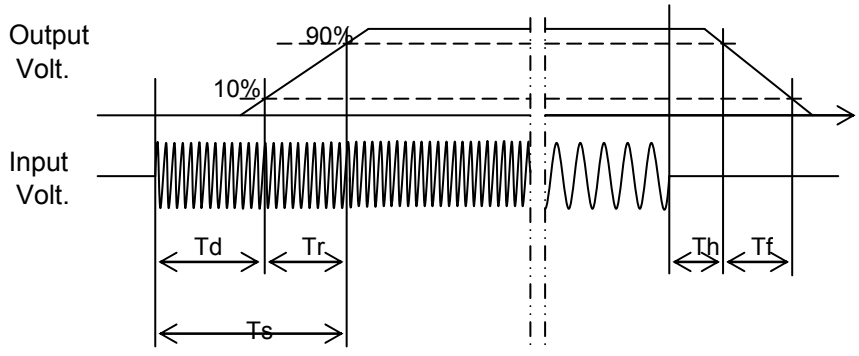
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	59.2	1.1	60.3	23.0	30.5
230 V	58.4	0.9	59.3	178.3	33.0



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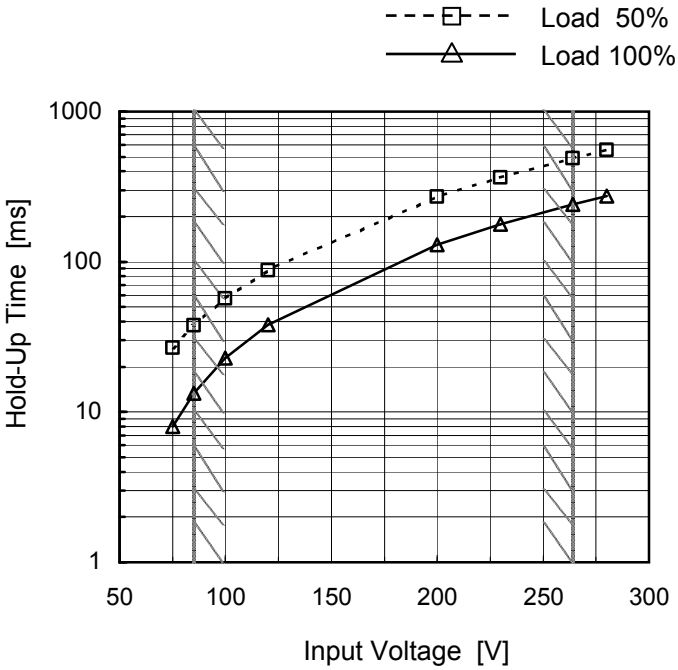
Model	TUHS10F12
Item	Hold-Up Time
Object	+12V0.9A

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

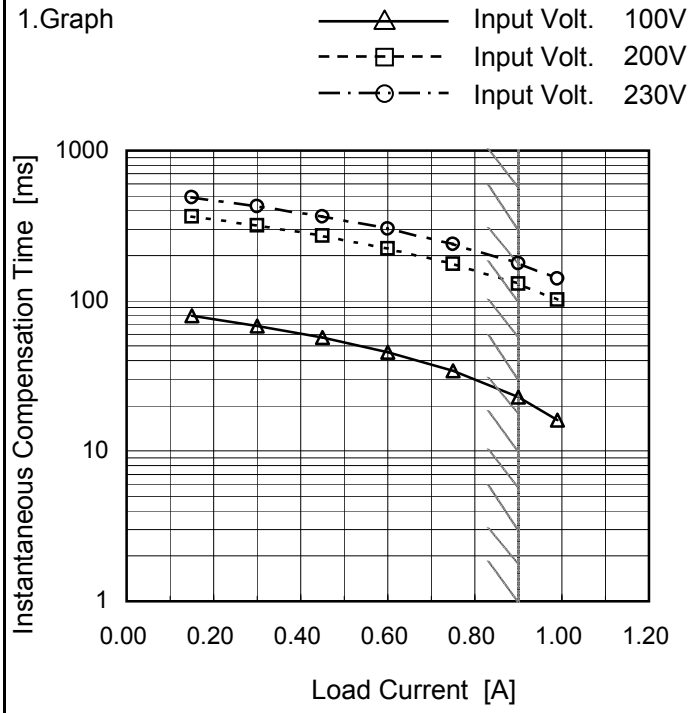
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	27	8
85	38	13
100	57	23
120	87	38
200	270	130
230	364	178
264	489	241
280	554	275
--	-	-

COSEL

Model	TUHS10F12
Item	Instantaneous Interruption Compensation
Object	+12V0.9A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

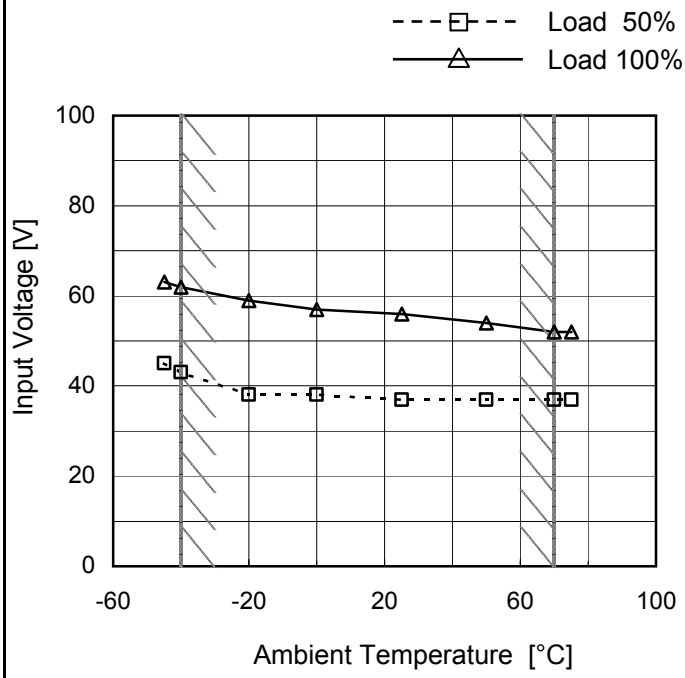
Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.00	-	-	-
0.15	79	364	488
0.30	68	317	426
0.45	57	270	364
0.60	45	224	302
0.75	34	177	240
0.90	23	130	178
0.99	16	102	141
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS10F12
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V0.9A

Testing Circuitry Figure A

1.Graph



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

2.Values

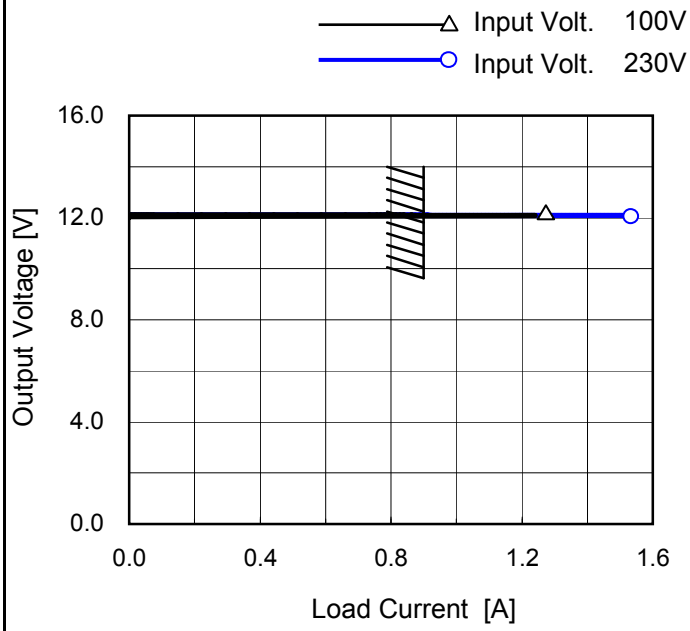
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-45	45	63
-40	43	62
-20	38	59
0	38	57
25	37	56
50	37	54
70	37	52
75	37	52
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS10F12
Item	Overcurrent Protection
Object	+12V0.9A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

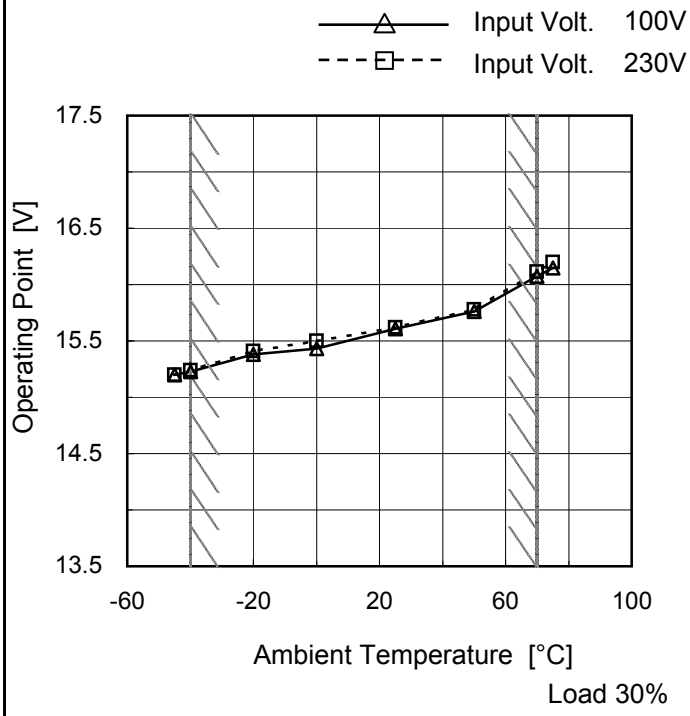
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
12.0	1.24	1.51
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS10F12
Item	Overvoltage Protection
Object	+12V0.9A

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]	Input Volt. 230[V]
-45	15.20	15.20
-40	15.23	15.24
-20	15.38	15.41
0	15.43	15.50
25	15.61	15.62
50	15.76	15.78
70	16.07	16.12
75	16.15	16.20
--	-	-
--	-	-
--	-	-

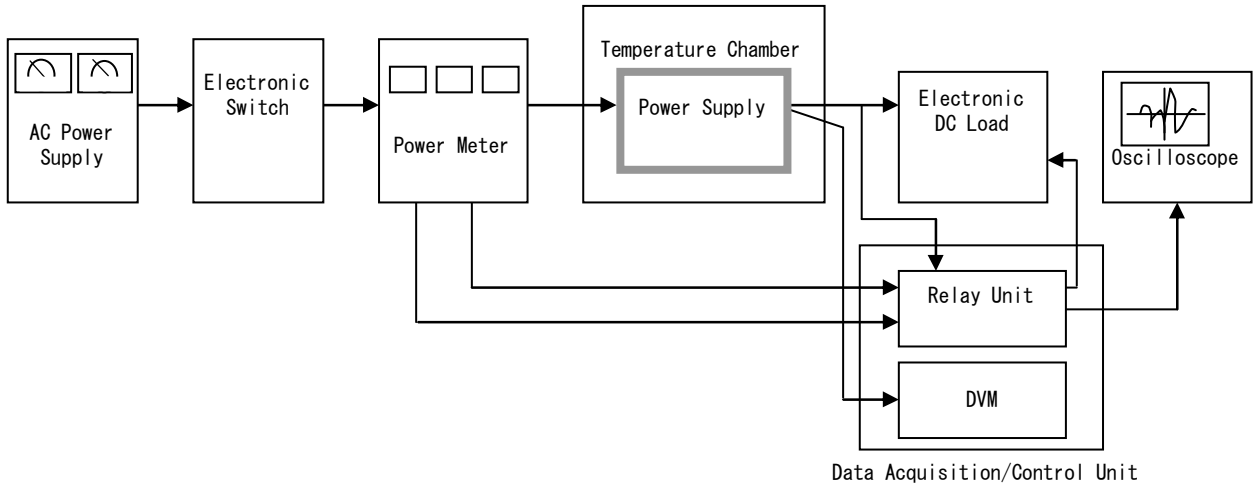


Figure A

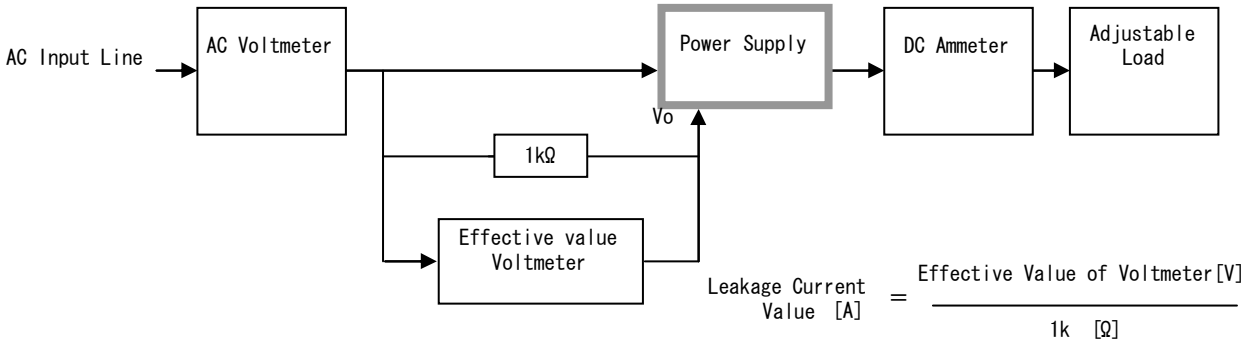


Figure B (DEN-AN)

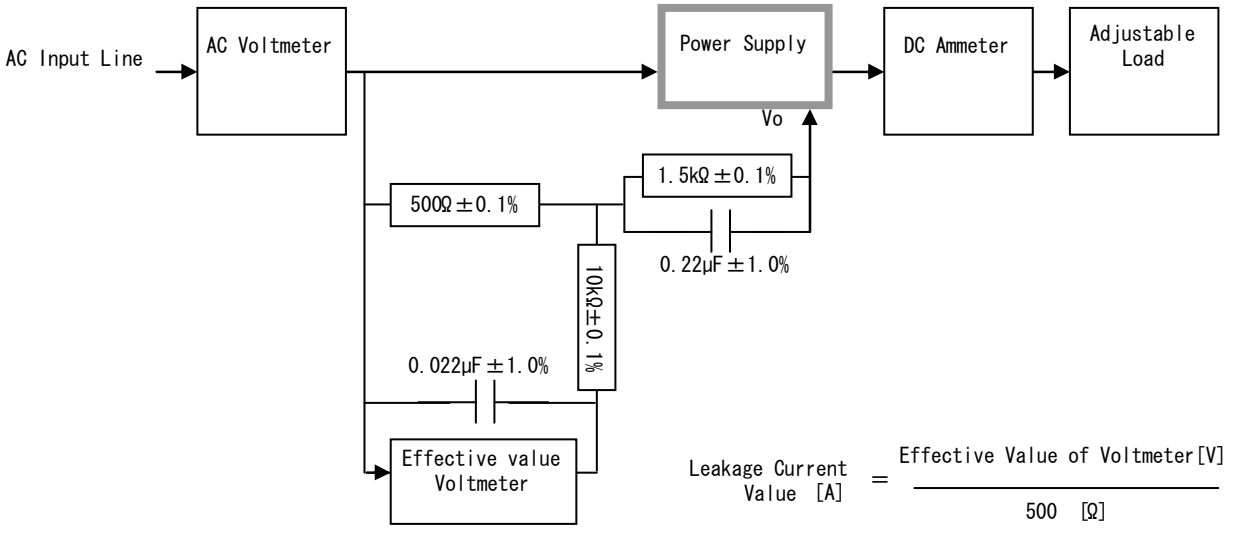
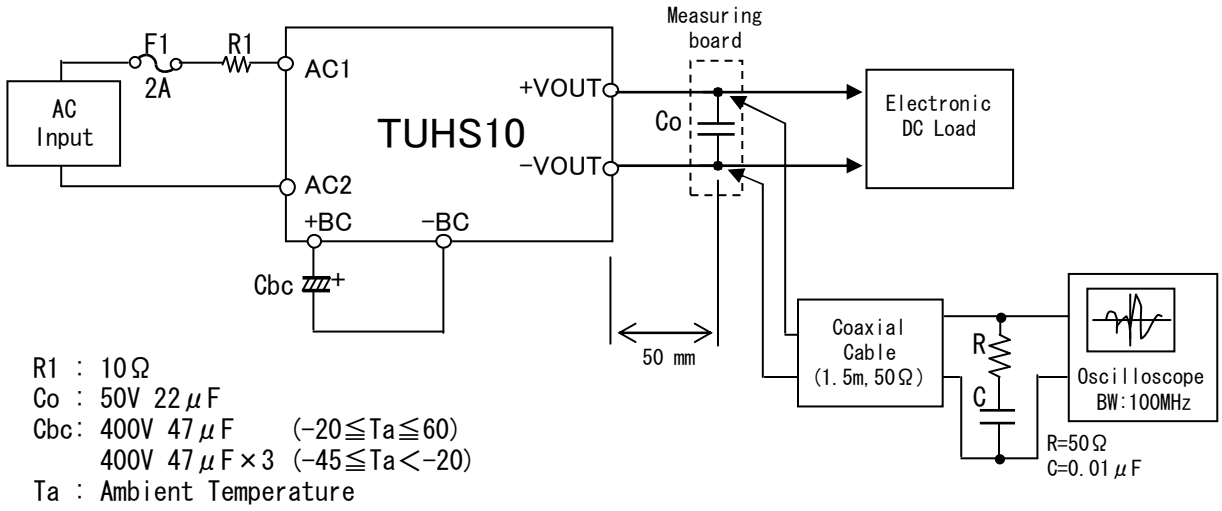


Figure B (IEC60950-1)



R1 : 10Ω
Co : 50V 22μF
Cbc: 400V 47μF (-20≦Ta≦60)
400V 47μF×3 (-45≦Ta<-20)
Ta : Ambient Temperature

Figure C