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参考資料

TEST DATA OF TUHS25F05

Regulated DC Power Supply
February 28, 2014

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COSEL CO.,LTD.

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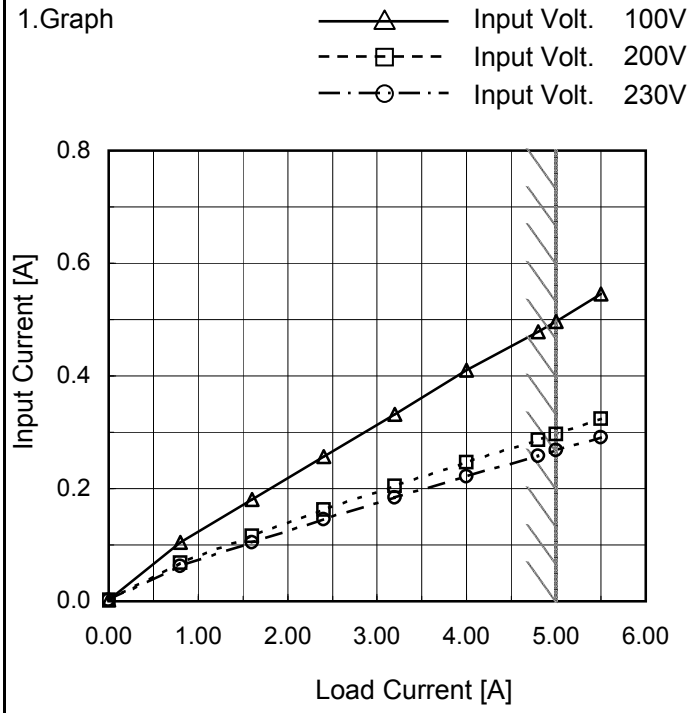
Model	TUHS25F05
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

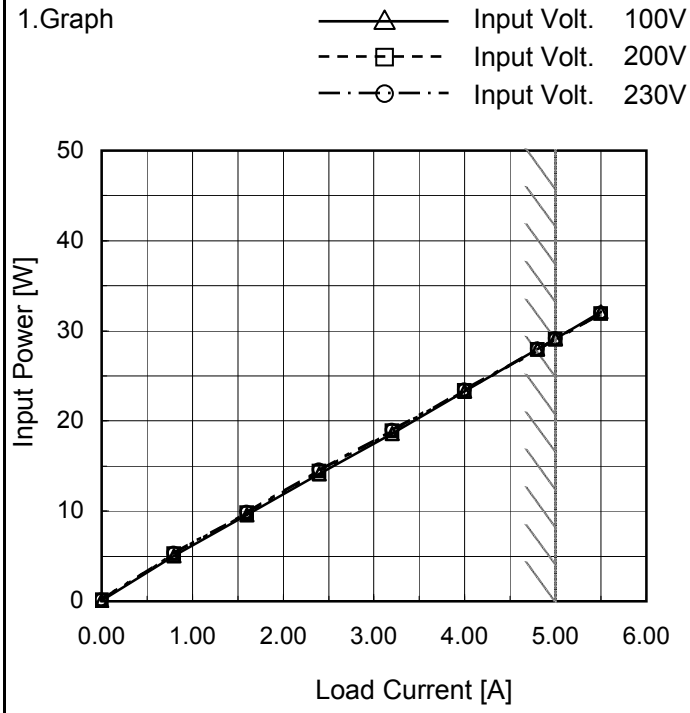
Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.002	0.002	0.002
0.8	0.104	0.068	0.062
1.6	0.181	0.116	0.104
2.4	0.257	0.162	0.145
3.2	0.332	0.204	0.184
4.0	0.410	0.247	0.222
4.8	0.478	0.286	0.258
5.0	0.497	0.297	0.268
5.5	0.546	0.324	0.291
--	-	-	-
--	-	-	-

COSEL

Model	TUHS25F05
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	0.07	0.11	0.13
0.8	5.07	5.25	5.32
1.6	9.62	9.79	9.88
2.4	14.12	14.40	14.53
3.2	18.63	18.86	18.98
4.0	23.28	23.34	23.45
4.8	27.95	27.89	27.98
5.0	29.13	29.03	29.11
5.5	32.13	31.88	31.97
--	-	-	-
--	-	-	-

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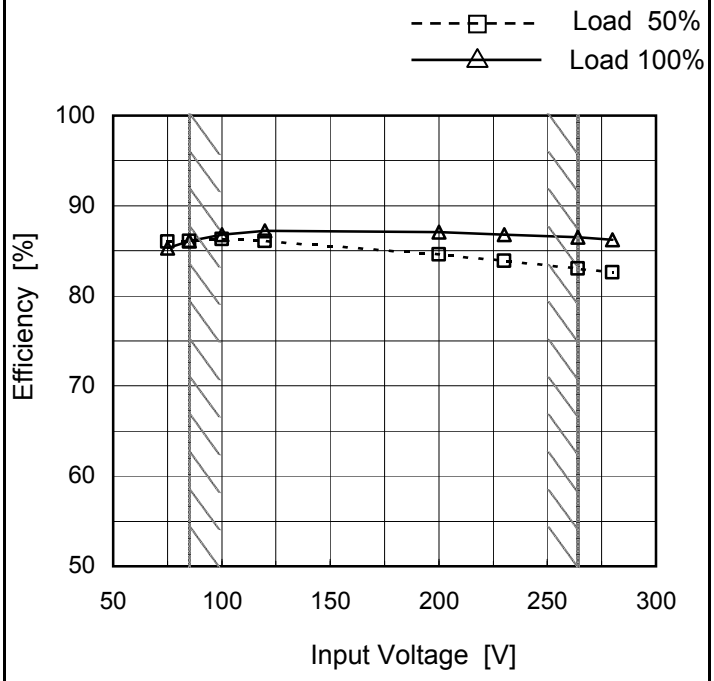
Model	TUHS25F05
Item	Efficiency (by Input Voltage)
Object	――――――――――

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	86.0	85.3
85	86.1	86.1
100	86.3	86.8
120	86.1	87.2
200	84.6	87.1
230	83.9	86.8
264	83.0	86.5
280	82.6	86.2
--	-	-

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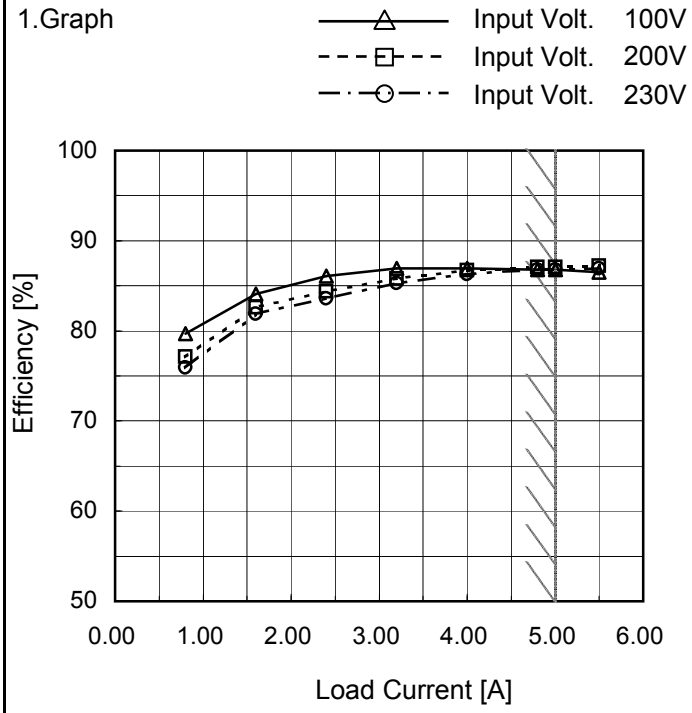
Model	TUHS25F05
Item	Efficiency (by Load Current)
Object	————————

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]
0.0	-	-	-
0.8	79.7	77.1	75.9
1.6	84.1	82.6	81.9
2.4	86.1	84.4	83.6
3.2	86.9	85.8	85.3
4.0	86.9	86.7	86.3
4.8	86.8	87.1	86.8
5.0	86.8	87.1	86.8
5.5	86.5	87.2	86.9
--	-	-	-
--	-	-	-

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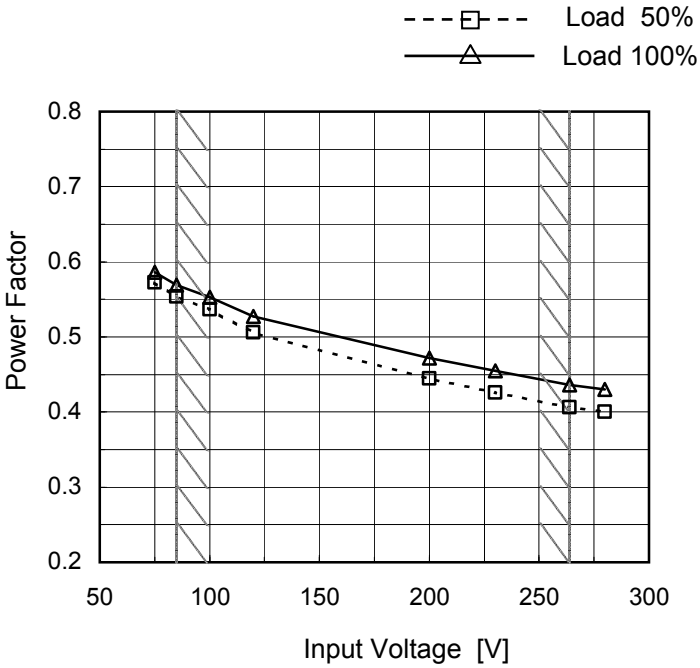
Model	TUHS25F05
Item	Power Factor (by Input Voltage)
Object	――――――――――

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	0.573	0.586
85	0.553	0.569
100	0.537	0.553
120	0.506	0.527
200	0.445	0.472
230	0.426	0.455
264	0.406	0.436
280	0.401	0.430
--	-	-

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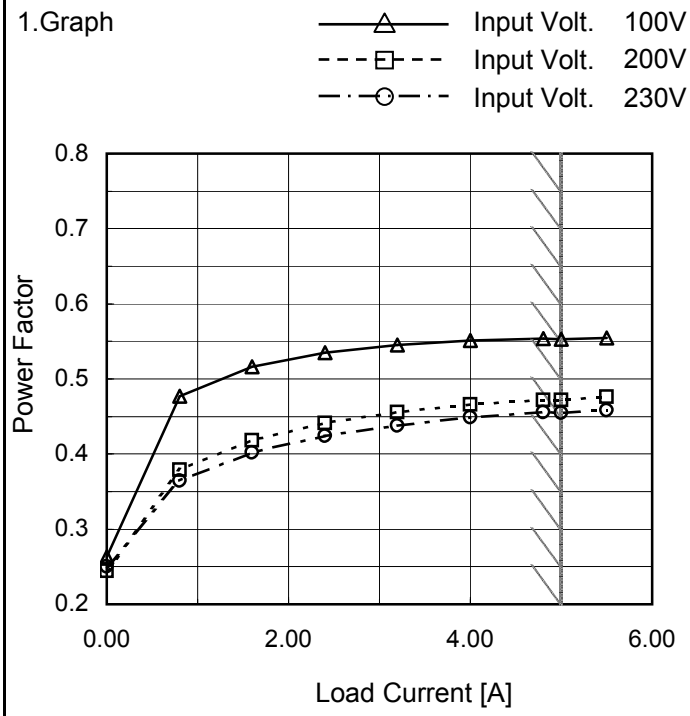
Model	TUHS25F05
Item	Power Factor (by Load Current)
Object	————————

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	0.263	0.244	0.250
0.8	0.477	0.379	0.365
1.6	0.516	0.418	0.402
2.4	0.535	0.441	0.424
3.2	0.545	0.456	0.438
4.0	0.551	0.466	0.449
4.8	0.554	0.472	0.456
5.0	0.553	0.472	0.455
5.5	0.554	0.476	0.459
--	-	-	-
--	-	-	-

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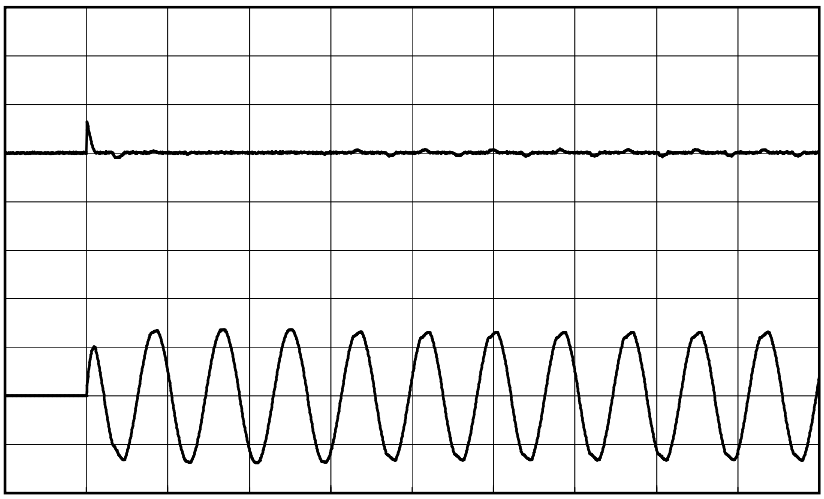
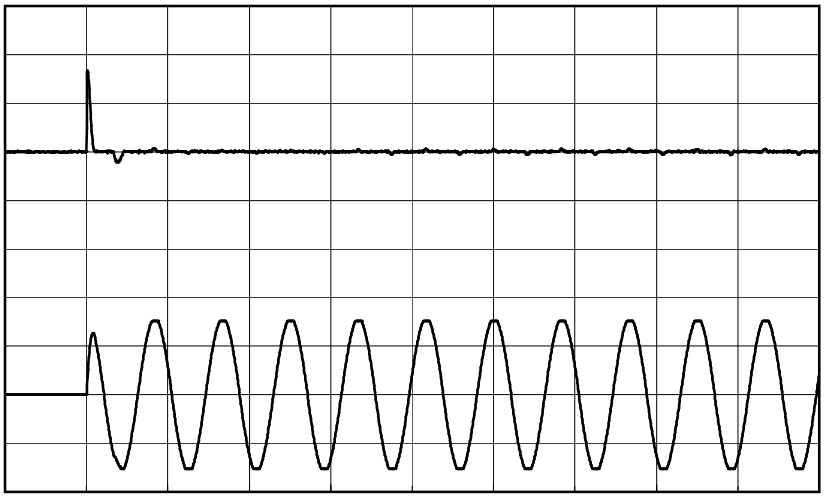
Model	TUHS25F05
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A



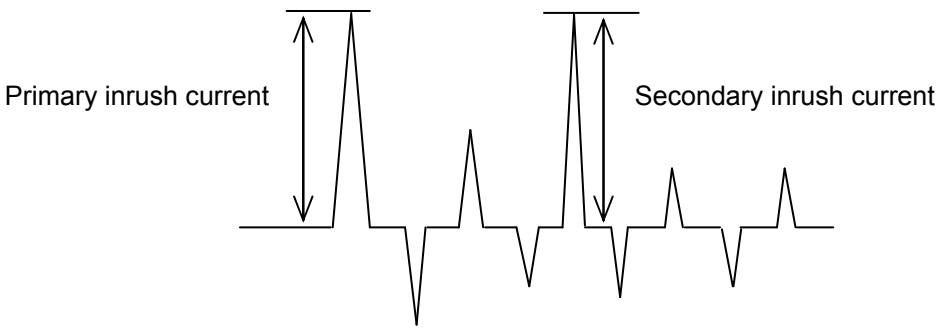
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
12.7 A
Secondary inrush current :
1.7 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
33.2 A
Secondary inrush current :
1.6 A



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Model	TUHS25F05	
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	0.008	0.009	0.010	Operation
	One of phases	0.008	0.017	0.020	Stand by
IEC60950-1	Both phases	0.006	0.011	0.014	Operation
	One of phases	0.008	0.016	0.020	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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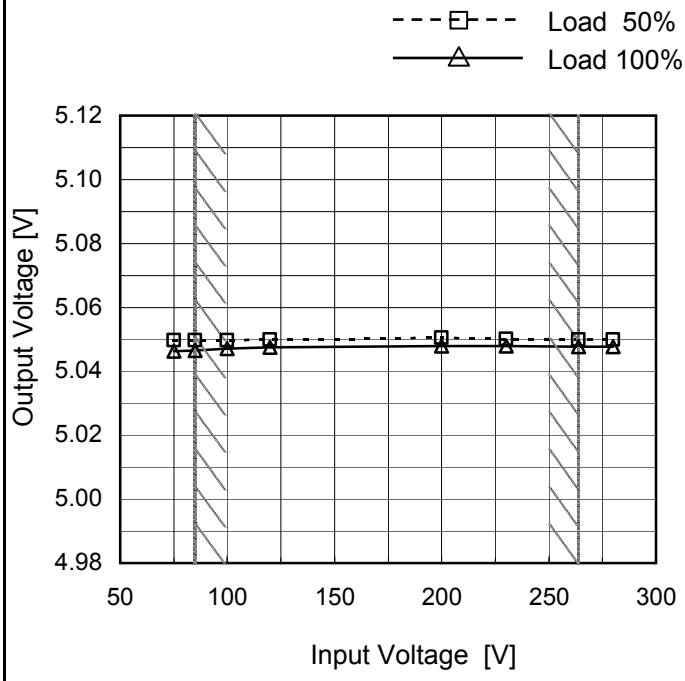
Model	TUHS25F05
Item	Line Regulation
Object	+5V5A

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	5.050	5.046
85	5.050	5.046
100	5.050	5.047
120	5.050	5.047
200	5.051	5.048
230	5.050	5.048
264	5.050	5.048
280	5.050	5.048
--	-	-

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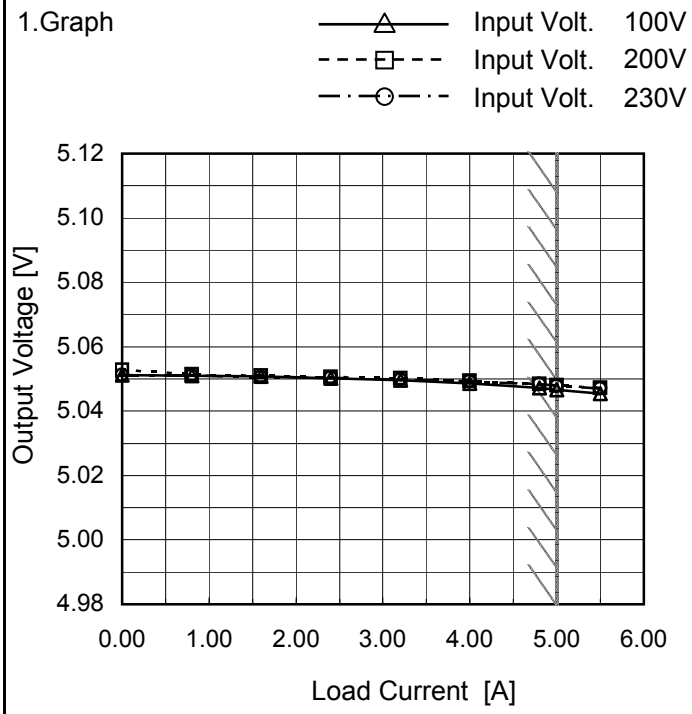
Model	TUHS25F05
Item	Load Regulation
Object	+5V5A

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	5.051	5.053	5.051
0.8	5.051	5.051	5.051
1.6	5.051	5.051	5.051
2.4	5.050	5.051	5.050
3.2	5.050	5.050	5.050
4.0	5.049	5.049	5.049
4.8	5.047	5.049	5.048
5.0	5.047	5.048	5.048
5.5	5.045	5.047	5.047
--	-	-	-
--	-	-	-

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Model	TUHS25F05		
Item	Dynamic Load Response	Temperature Testing Circuitry	25℃ Figure A
Object	+5V 5A		

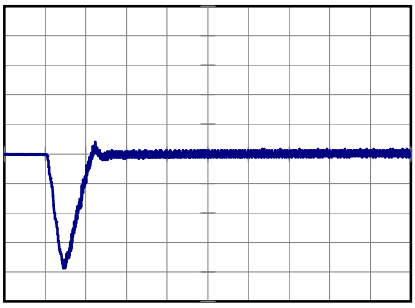
Input Volt. 230V
Cycle 500ms

Load Current

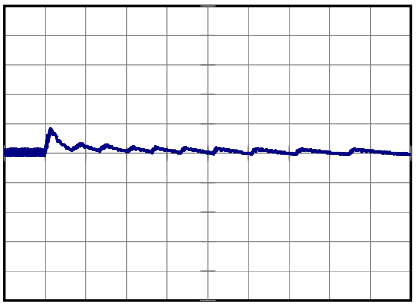
5A / 100us

Min.Load (0A)←→
Load 100%(5A)

500 mV/div



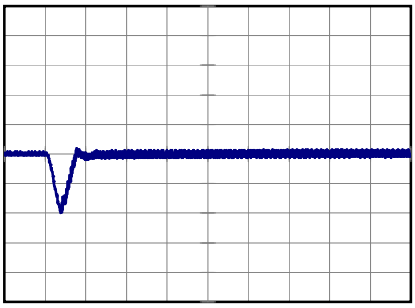
200 us/div



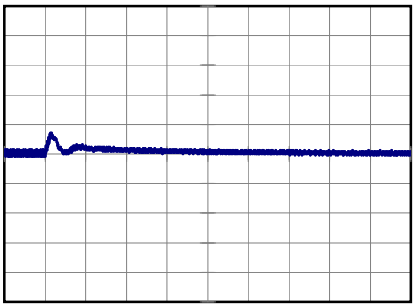
200 us/div

Load 20% (1A)←→
Load 100%(5A)

500 mV/div



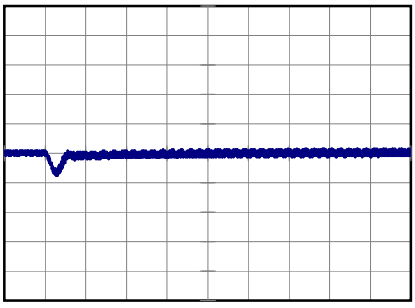
200 us/div



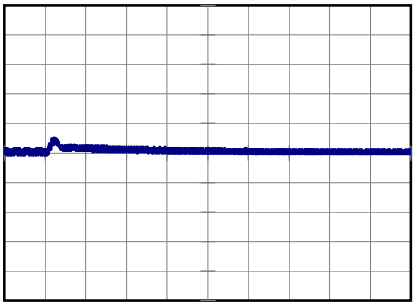
200 us/div

Load 50% (2.5A)←→
Load 100% (5A)

500 mV/div



200 us/div



200 us/div

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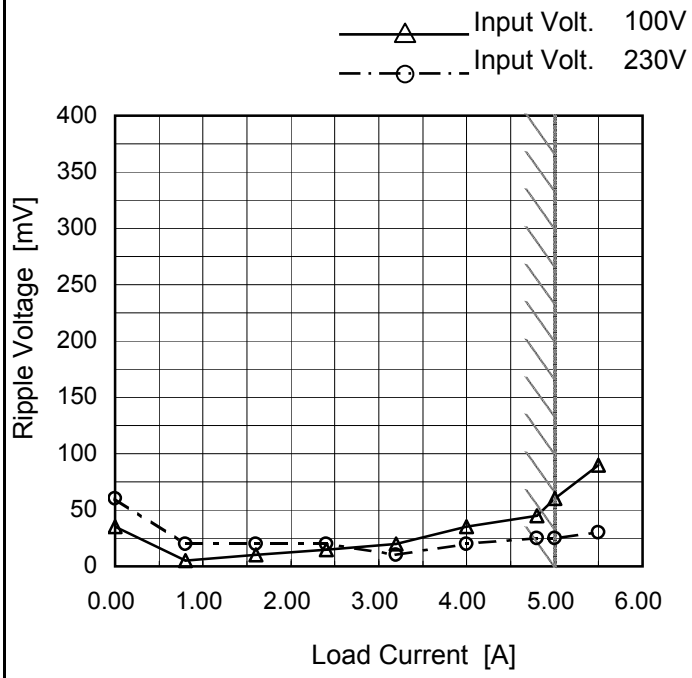
Model	TUHS25F05
Item	Ripple Voltage (by Load Current)
Object	+5V5A

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

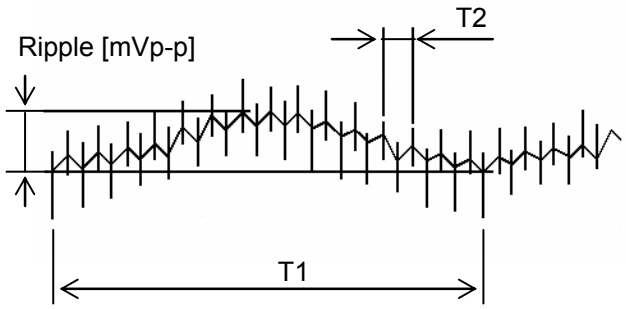


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0	35	60
0.8	5	20
1.6	10	20
2.4	15	20
3.2	20	10
4.0	35	20
4.8	45	25
5.0	60	25
5.5	90	30
--	-	-
--	-	-

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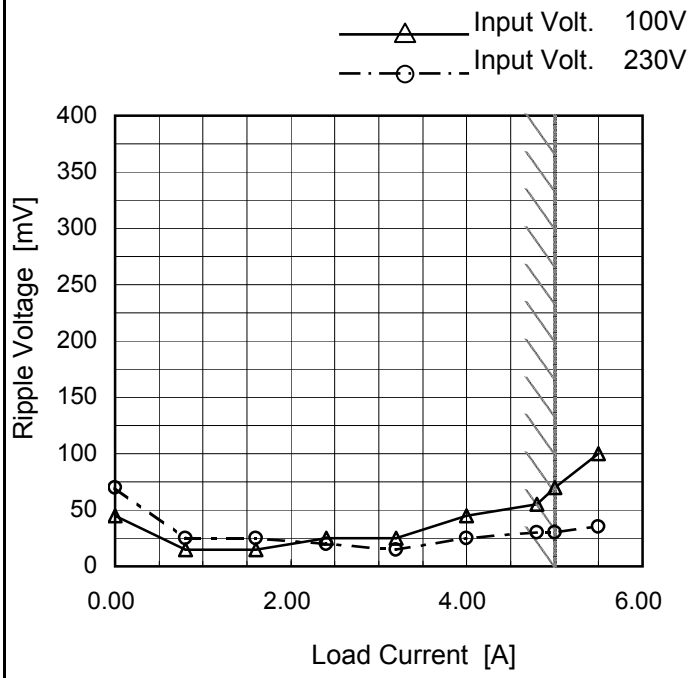
Model	TUHS25F05
Item	Ripple-Noise
Object	+5V5A

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. 230 [V]
0	45	70
0.8	15	25
1.6	15	25
2.4	25	20
3.2	25	15
4.0	45	25
4.8	55	30
5.0	70	30
5.5	100	35
--	-	-
--	-	-

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

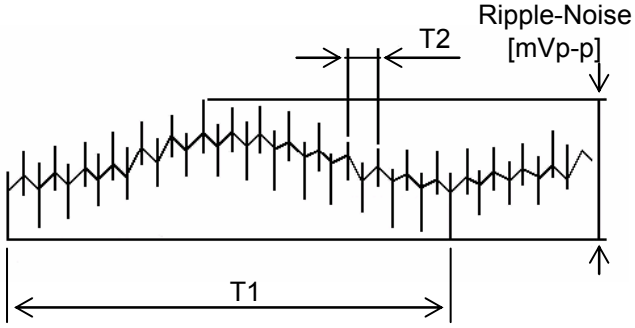


Fig. Complex Ripple Wave Form

BC-10796

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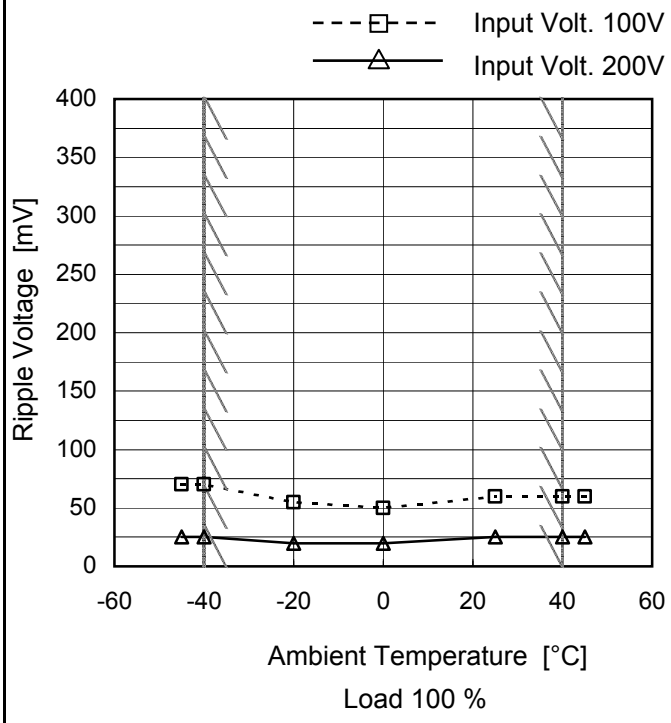
Model	TUHS25F05
Item	Ripple Voltage (by Ambient Temp.)
Object	+5V5A

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	70	25
-40	70	25
-20	55	20
0	50	20
25	60	25
40	60	25
45	60	25
--	-	-
--	-	-
--	-	-
--	-	-

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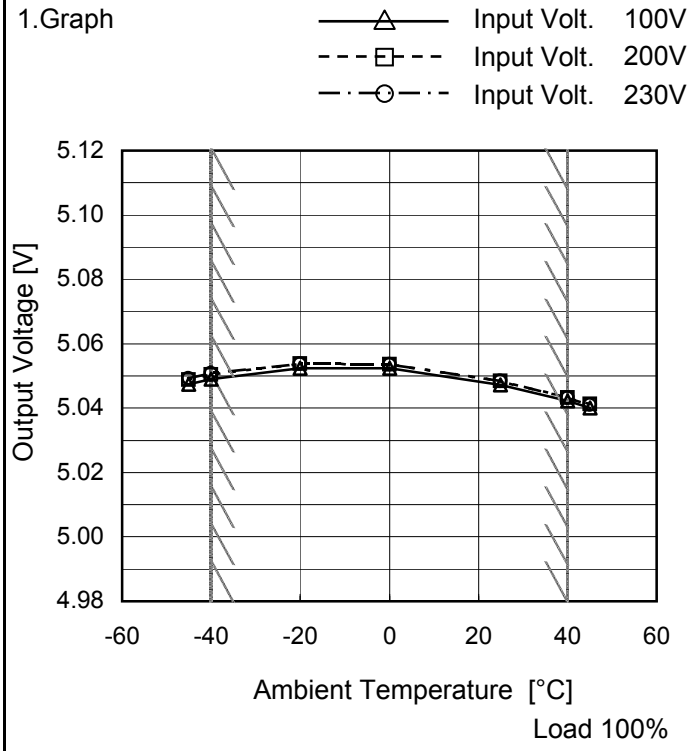
Model	TUHS25F05
Item	Ambient Temperature Drift
Object	+5V5A

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	5.048	5.049	5.049
-40	5.049	5.050	5.051
-20	5.052	5.054	5.054
0	5.052	5.054	5.054
25	5.047	5.048	5.048
40	5.042	5.043	5.043
45	5.040	5.041	5.041
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	TUHS25F05	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+5V5A	

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 - 40°C
Input Voltage : 85 - 264V
Load Current : 0 - 5A

* 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

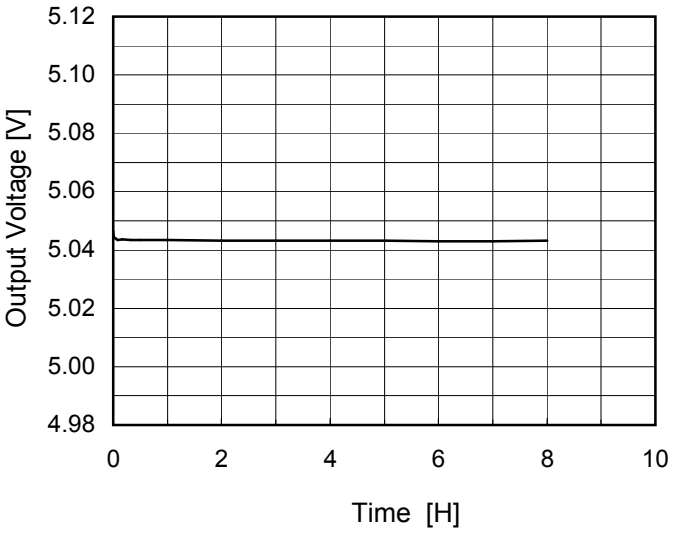
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	0	264	0	5.057	±8	±0.2
Minimum Voltage	40	85	5	5.041		

COSEL

Model	TUHS25F05
Item	Time Lapse Drift
Object	+5V5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 100V
Load 100%

* The characteristic of AC230V is equal.

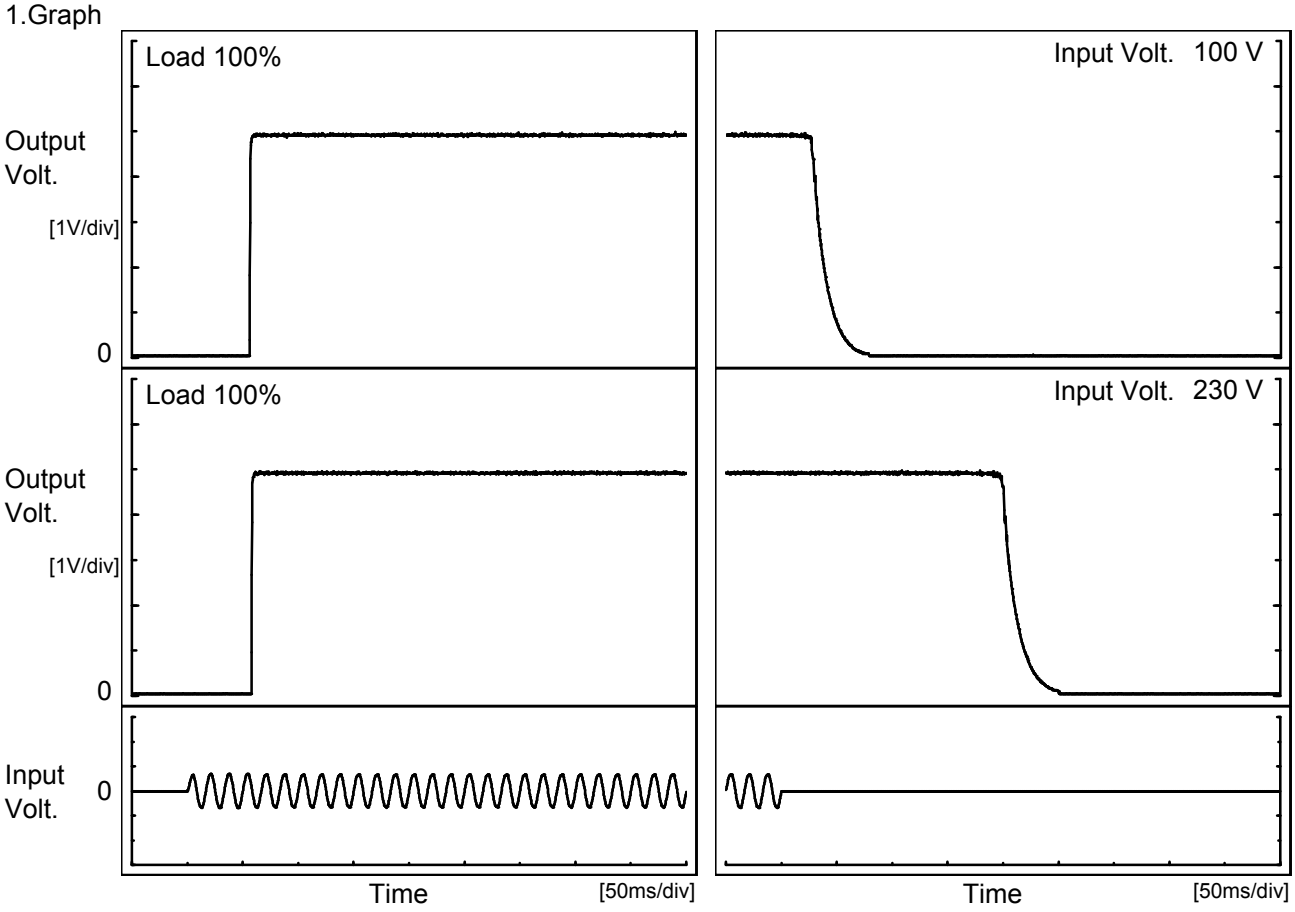
2.Values

Time since start [H]	Output Voltage [V]
0.0	5.047
0.5	5.044
1.0	5.043
2.0	5.043
3.0	5.043
4.0	5.043
5.0	5.043
6.0	5.043
7.0	5.043
8.0	5.043

COSEL

Model	TUHS25F05	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+5V5A	

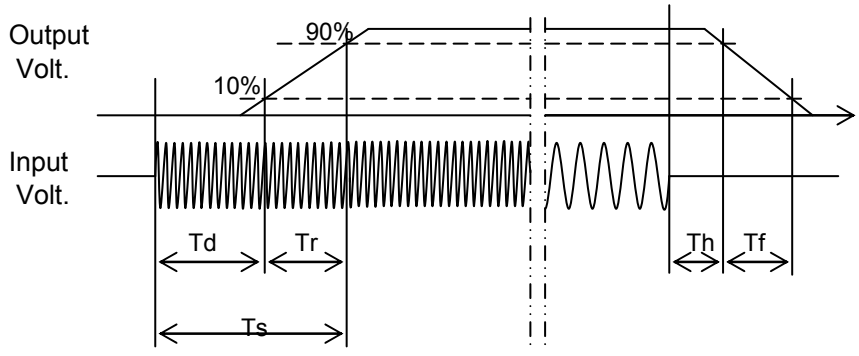
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	56.5	0.8	57.3	27.0	26.5
230 V	58.0	0.8	58.8	200.5	26.8

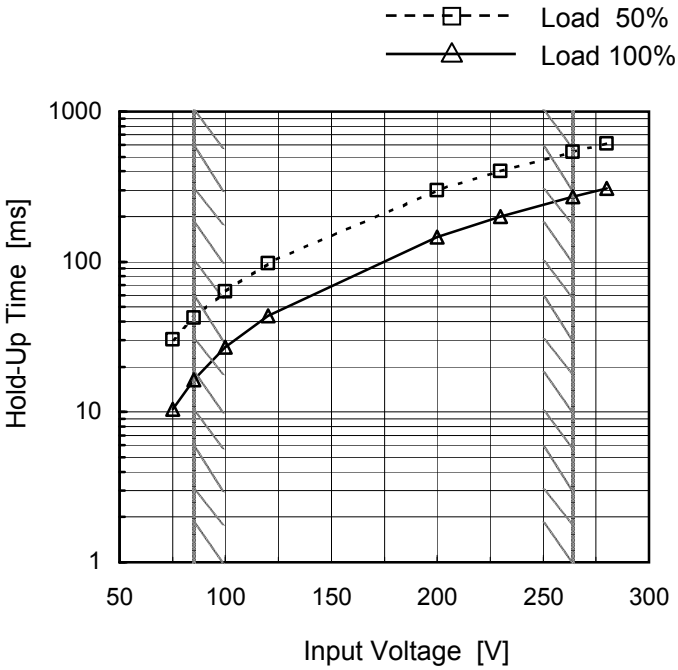


COSEL

Model	TUHS25F05
Item	Hold-Up Time
Object	+5V5A

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

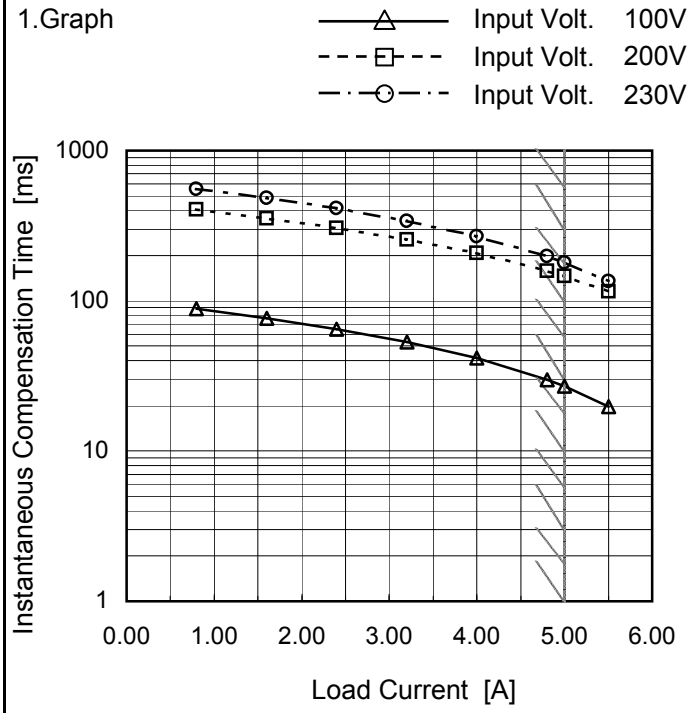
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
75	30	10
85	42	16
100	64	27
120	97	44
200	300	146
230	403	201
264	541	271
280	612	307
--	-	-

COSEL

Model	TUHS25F05
Item	Instantaneous Interruption Compensation
Object	+5V5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

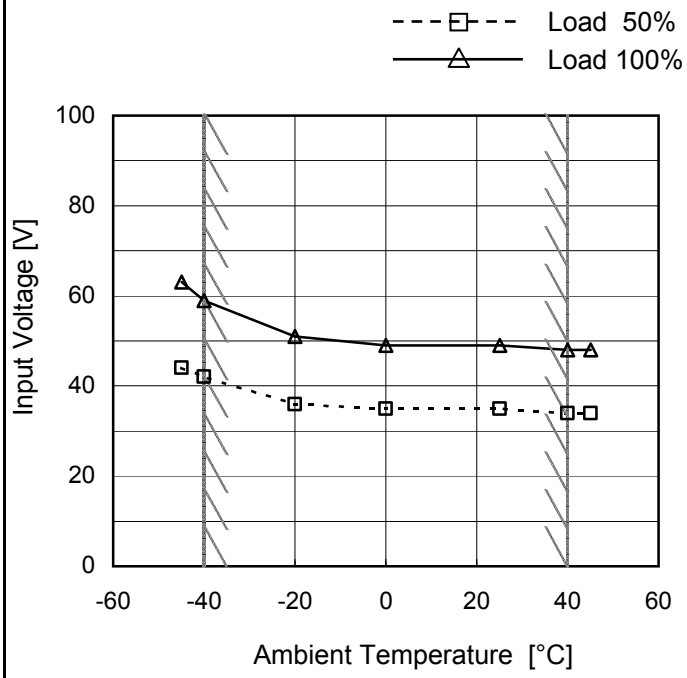
Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.8	88	404	554
1.6	77	355	483
2.4	65	306	412
3.2	53	257	340
4.0	42	208	269
4.8	30	158	198
5.0	27	146	180
5.5	20	115	136
--	-	-	-
--	-	-	-

COSEL

Model	TUHS25F05
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+5V5A

Testing Circuitry Figure A

1.Graph



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

2.Values

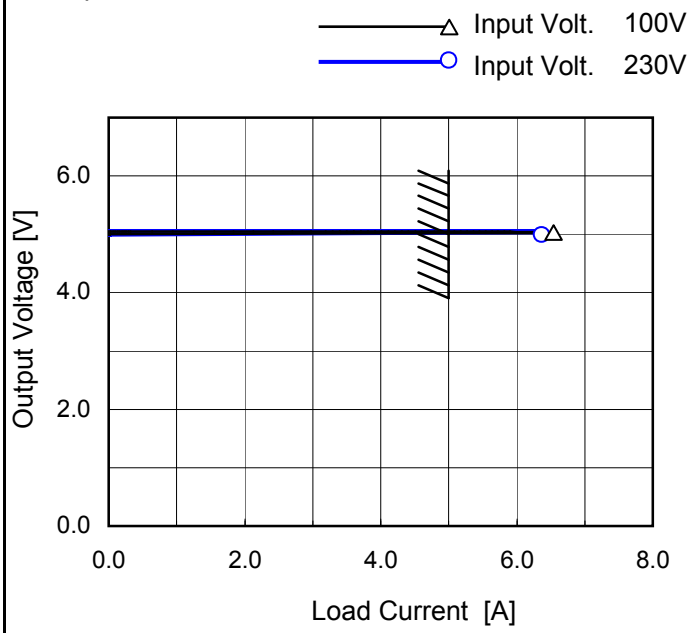
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-45	44	63
-40	42	59
-20	36	51
0	35	49
25	35	49
40	34	48
45	34	48
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS25F05
Item	Overcurrent Protection
Object	+5V5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

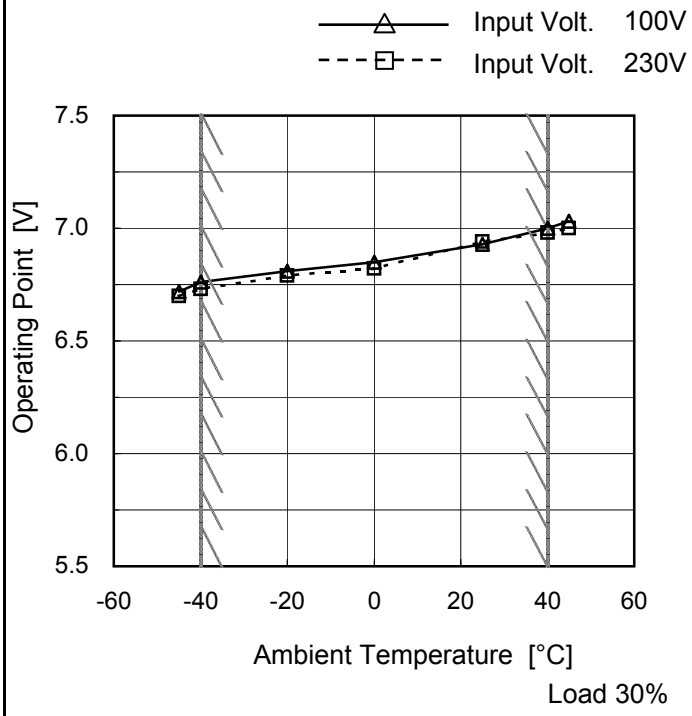
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
5.0	6.41	6.35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	TUHS25F05
Item	Overvoltage Protection
Object	+5V5A

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	6.72	6.70
-40	6.76	6.73
-20	6.81	6.79
0	6.85	6.82
25	6.93	6.94
40	7.00	6.98
45	7.03	7.00
--	-	-
--	-	-
--	-	-
--	-	-

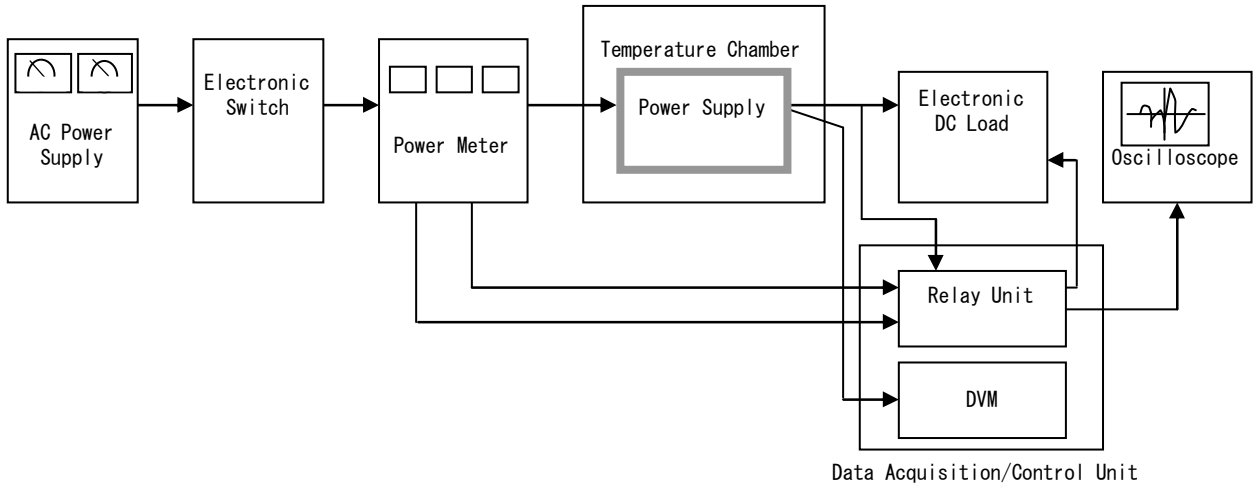


Figure A

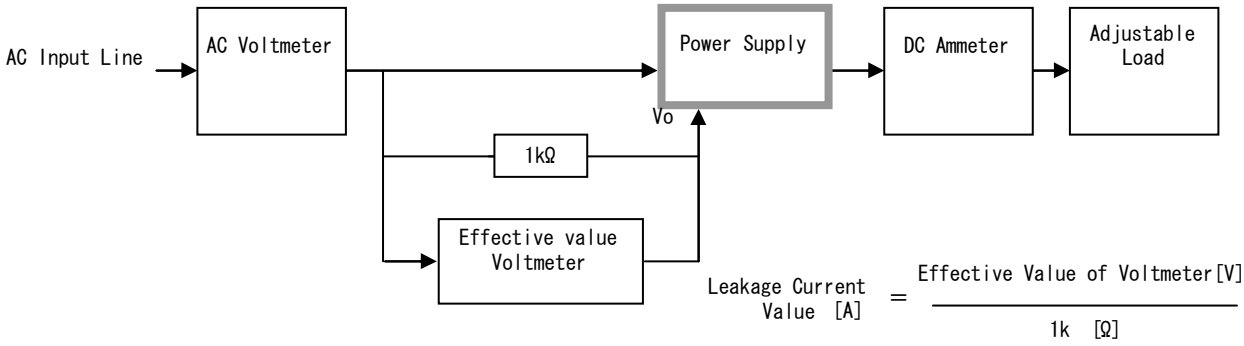


Figure B (DEN-AN)

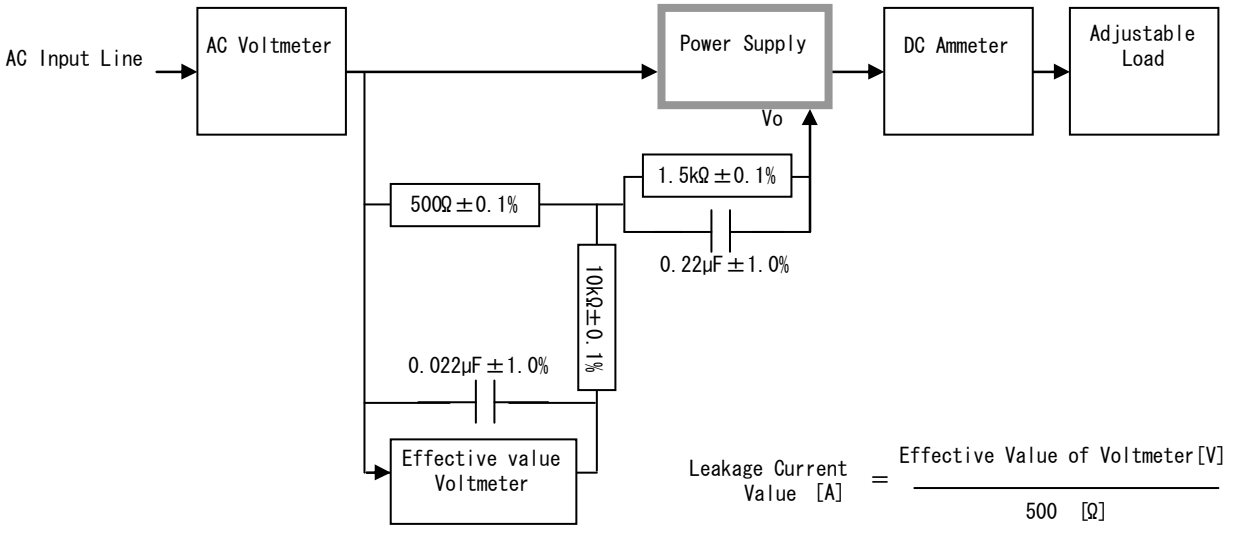
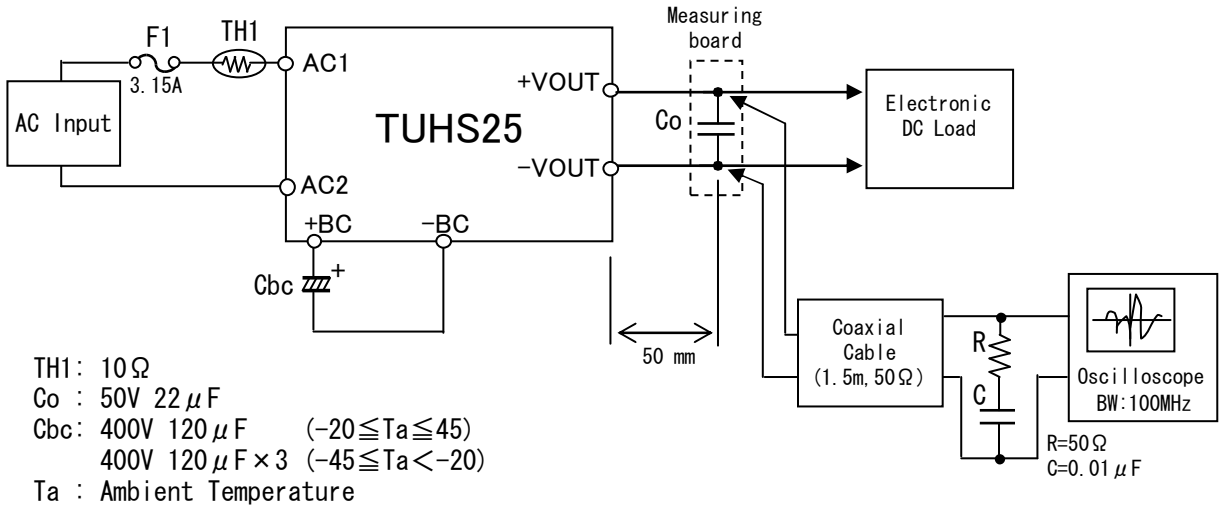


Figure B (IEC60950-1)



TH1: 10Ω
Co : 50V 22μF
Cbc: 400V 120μF (-20≦Ta≦45)
400V 120μF×3 (-45≦Ta<-20)
Ta : Ambient Temperature

Figure C