参考資料

TEST DATA OF LHA10F-3R3-Y

Regulated DC Power Supply
February 2, 2022

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COSEL CO.,LTD.

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Object	————————

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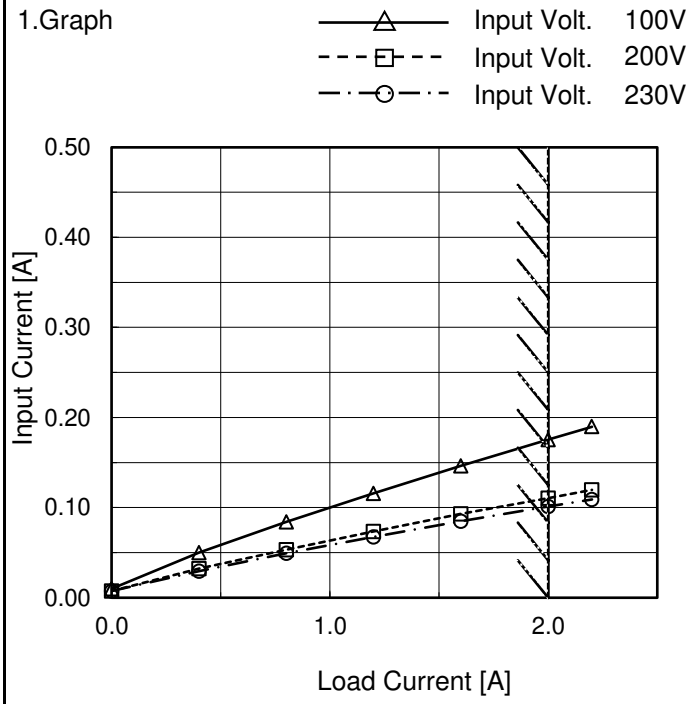

Note: Slanted line shows the range of the rated load current.

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	0.010	0.008	0.007
0.4	0.050	0.032	0.030
0.8	0.084	0.053	0.049
1.2	0.116	0.074	0.067
1.6	0.146	0.093	0.085
2.0	0.176	0.110	0.101
2.2	0.190	0.120	0.109
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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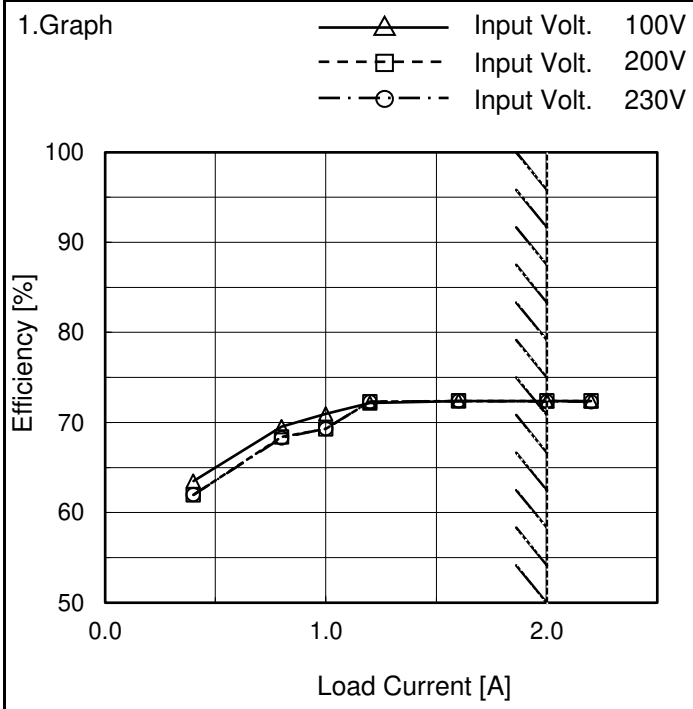
Model	LHA10F-3R3-Y
Item	Efficiency (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

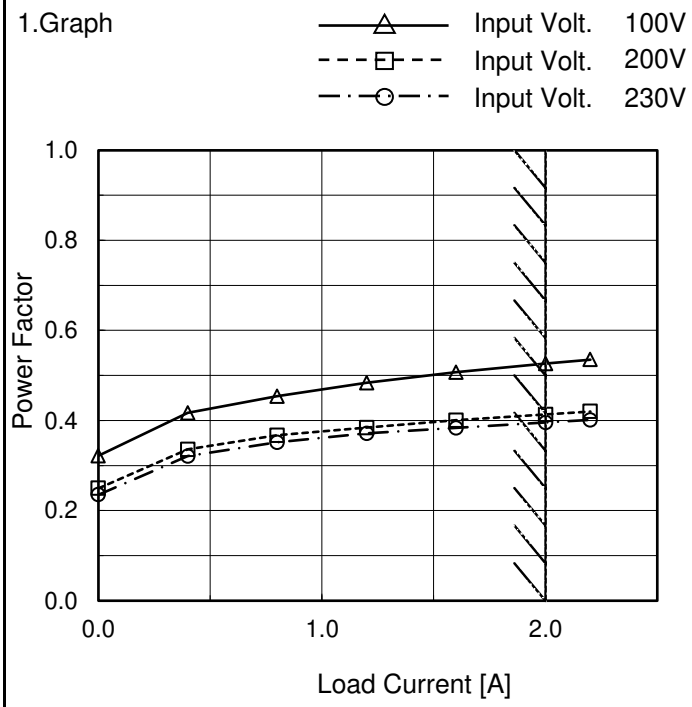
Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
0.0	-	-	-
0.4	63.5	62.0	62.0
0.8	69.5	68.4	68.3
1.0	70.9	69.3	69.3
1.2	72.2	72.3	72.3
1.6	72.4	72.4	72.4
2.0	72.4	72.4	72.4
2.2	72.4	72.4	72.3
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	LHA10F-3R3-Y
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	0.322	0.250	0.236
0.4	0.417	0.336	0.321
0.8	0.454	0.367	0.351
1.2	0.484	0.384	0.371
1.6	0.507	0.400	0.383
2.0	0.526	0.414	0.396
2.2	0.535	0.420	0.402
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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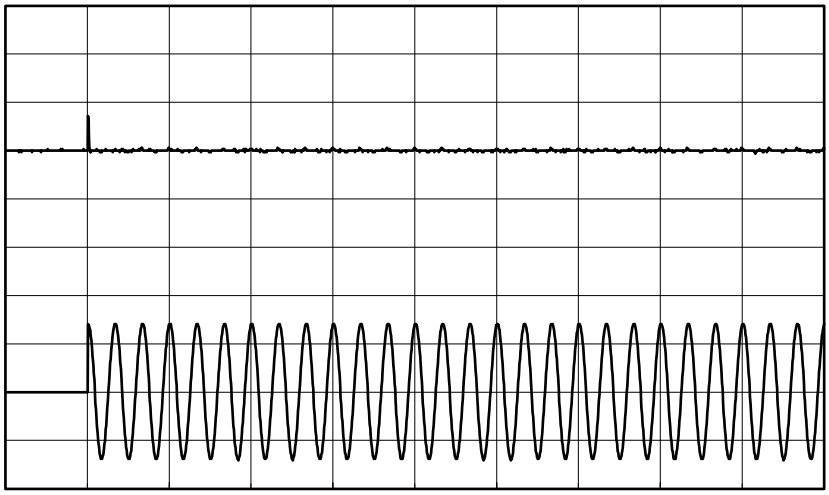
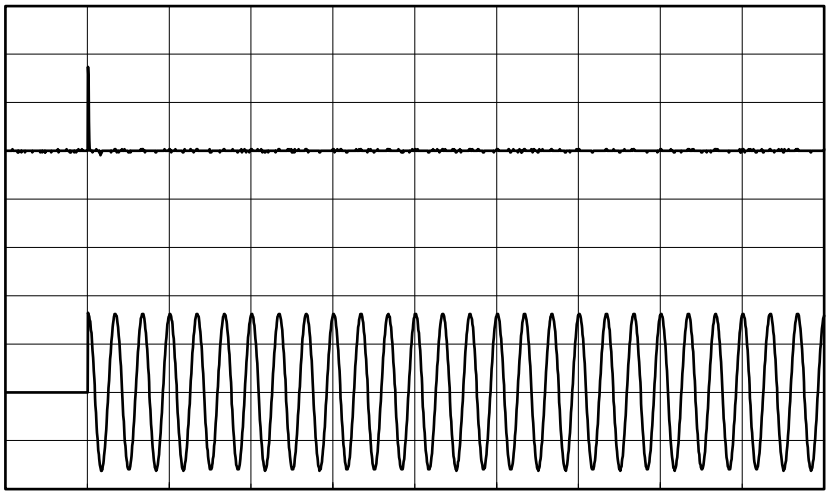
Model	LHA10F-3R3-Y		
Item	Inrush Current	Temperature	25° C
		Testing Circuitry	Figure A
Object	――――――		



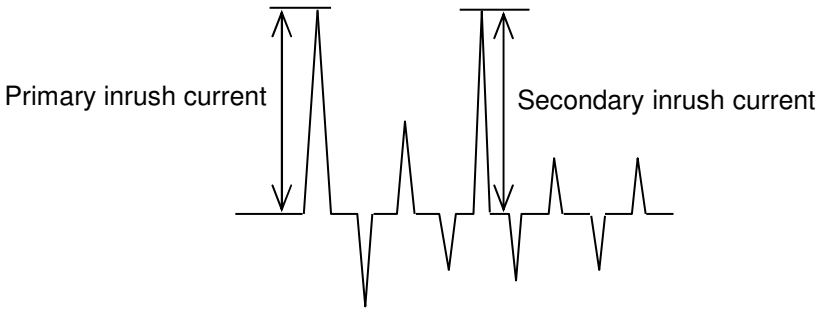
Input Voltage 100 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
14.4 A
Secondary inrush current :
1.2 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
34.8 A
Secondary inrush current :
0.6 A



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Model	LHA10F-3R3-Y	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	――――――――――――	

1.Results

[mA]

Standards	Testing Circuitry	Measuring Method	Input Volt.			Note
			100 [V]	230 [V]	240 [V]	
DEN-AN	Figure B-1	Both phases	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	Stand by
IEC62368-1	Figure B-2	Both phases	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	Stand by
	Figure B-3	Both phases	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	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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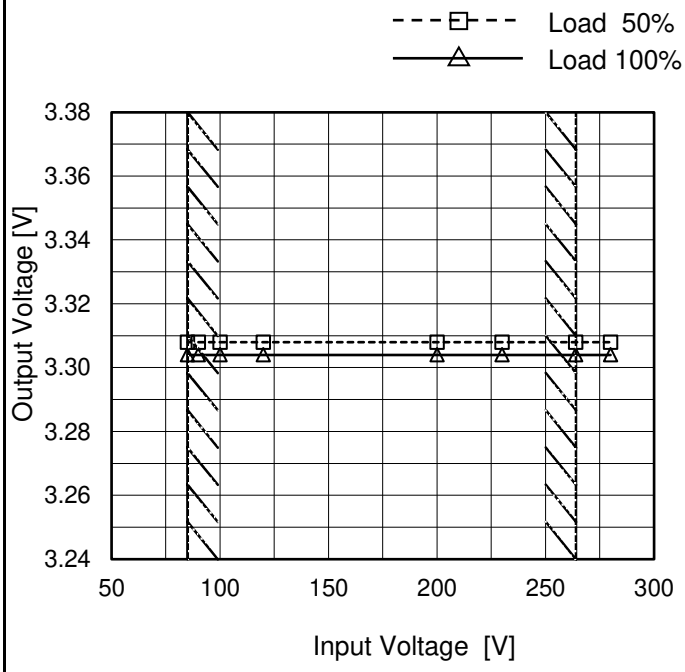
Model	LHA10F-3R3-Y
Item	Line Regulation
Object	+3.3V2A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

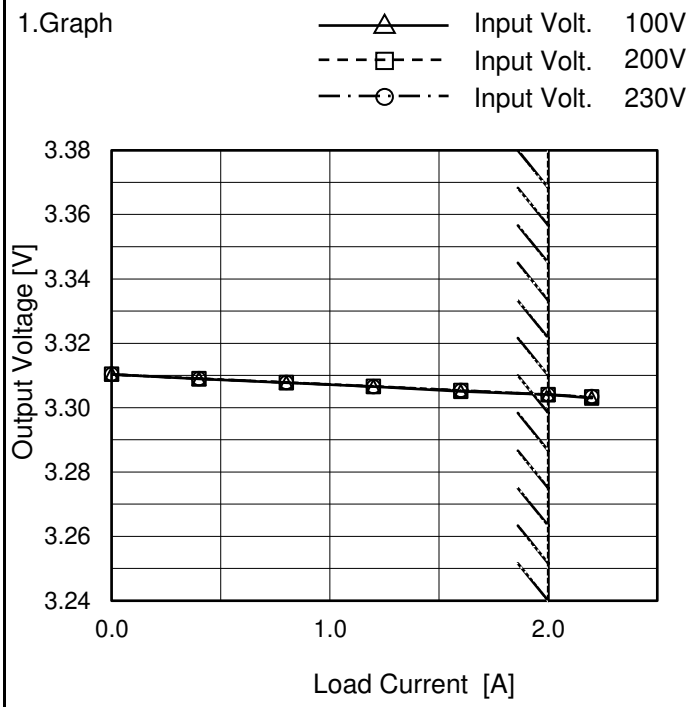
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	3.308	3.304
90	3.308	3.304
100	3.308	3.304
120	3.308	3.304
200	3.308	3.304
230	3.308	3.304
264	3.308	3.304
280	3.308	3.304
--	-	-

COSEL

Model	LHA10F-3R3-Y
Item	Load Regulation
Object	+3.3V2A

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	3.310	3.310	3.310
0.4	3.309	3.309	3.309
0.8	3.308	3.308	3.308
1.2	3.307	3.307	3.307
1.6	3.305	3.305	3.305
2.0	3.304	3.304	3.304
2.2	3.303	3.303	3.303
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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Model	LHA10F-3R3-Y
Item	Dynamic Load Response
Object	+3.3V2A

Temperature 25°C
Testing Circuitry Figure A

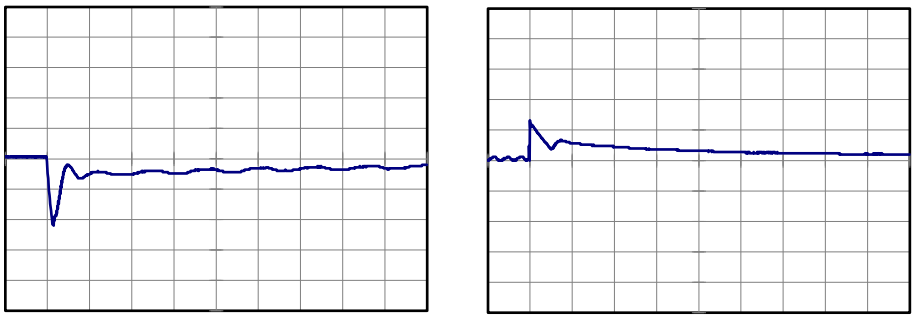
Input Volt. 230 V
Cycle 1000 ms

t1,t2 = 50 μs

Load Current

t1 t2

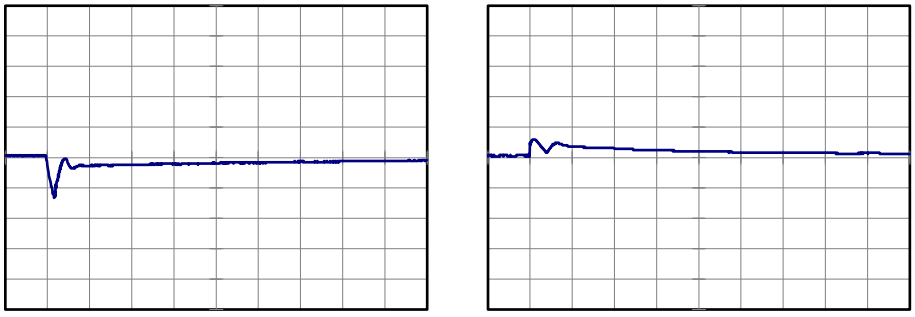
Min.Load (0A)←→
Load 100% (2A)



200 mV/div

1 ms/div 4 ms/div

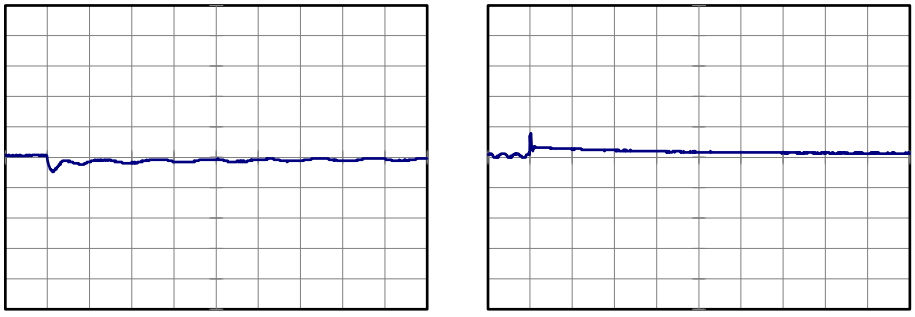
Min.Load (0A)←→
Load 50% (1A)



200 mV/div

1 ms/div 4 ms/div

Load 50% (1A)←→
Load 100% (2A)



200 mV/div

1 ms/div 4 ms/div

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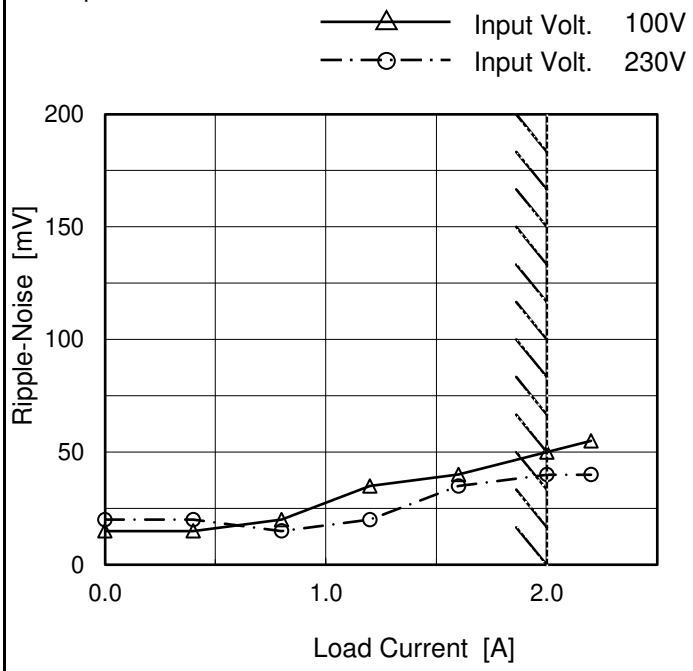
Model	LHA10F-3R3-Y
Item	Ripple-Noise(by Load Current)
Object	+3.3V2A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

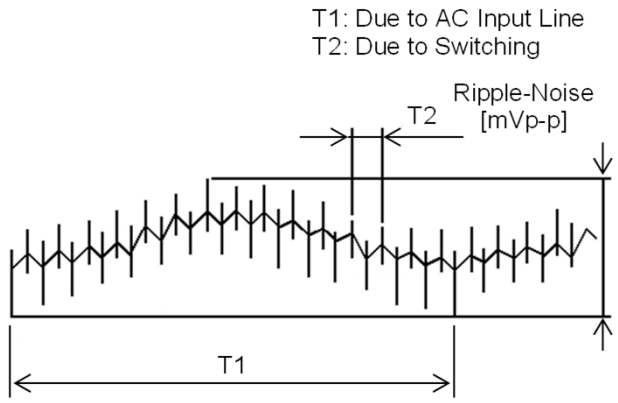


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 230 [V]
0.0	15	20
0.4	15	20
0.8	20	15
1.2	35	20
1.6	40	35
2.0	50	40
2.2	55	40
--	-	-
--	-	-
--	-	-
--	-	-

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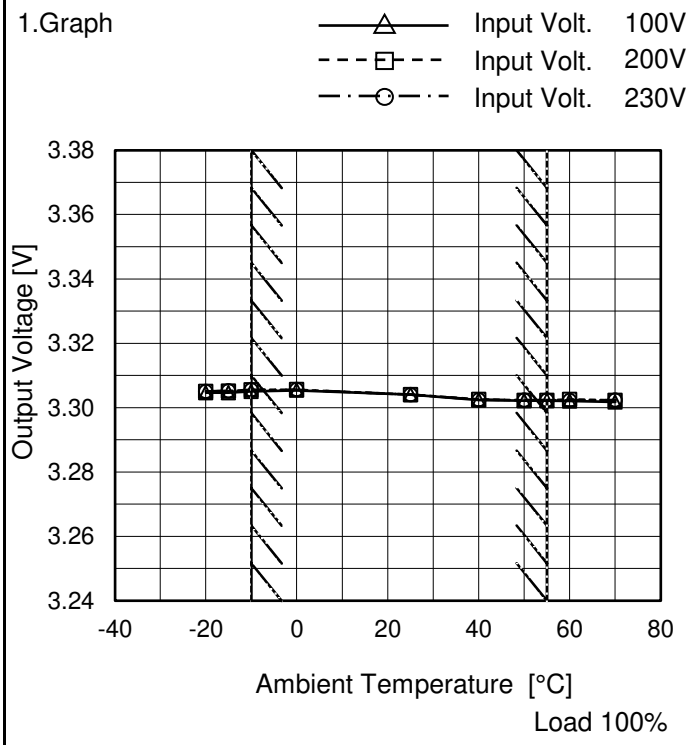
Model	LHA10F-3R3-Y
Item	Ambient Temperature Drift
Object	+3.3V2A

Testing Circuitry Figure A

1.Graph



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

2.Values

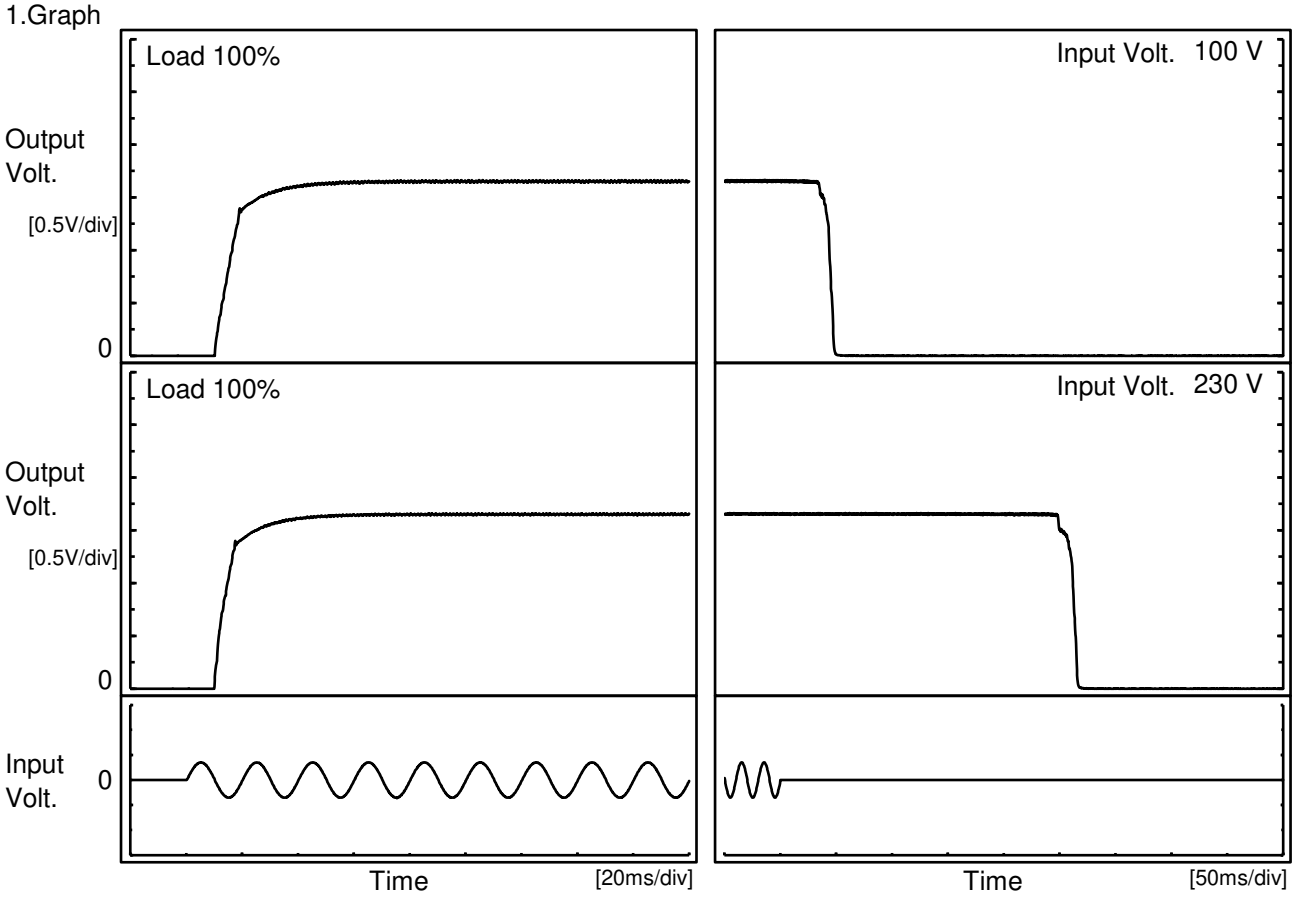
Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]
-20	3.305	3.305	3.305
-15	3.305	3.305	3.305
-10	3.305	3.306	3.306
0	3.305	3.306	3.306
25	3.304	3.304	3.304
40	3.302	3.303	3.303
50	3.302	3.302	3.302
55	3.302	3.302	3.302
60	3.302	3.303	3.302
70	3.302	3.302	3.302
--	-	-	-

COSEL

Model	LHA10F-3R3-Y
Item	Rise and Fall Time
Object	+3.3V2A

Temperature 25°C
Testing Circuitry Figure A

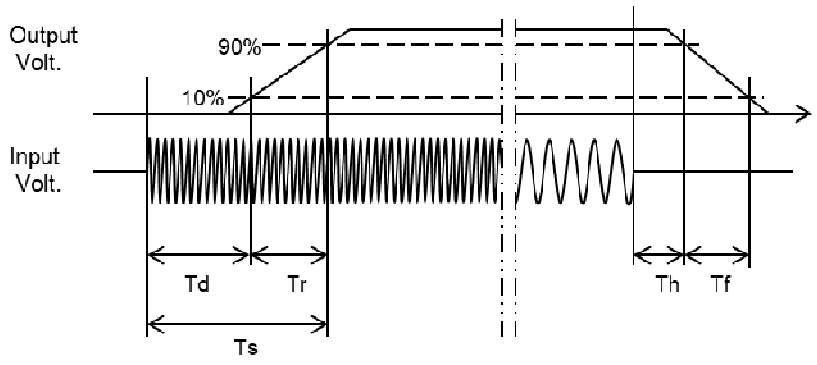
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	10.8	14.7	25.5	39.3	8.3
230 V	10.5	13.4	23.9	254.0	11.5



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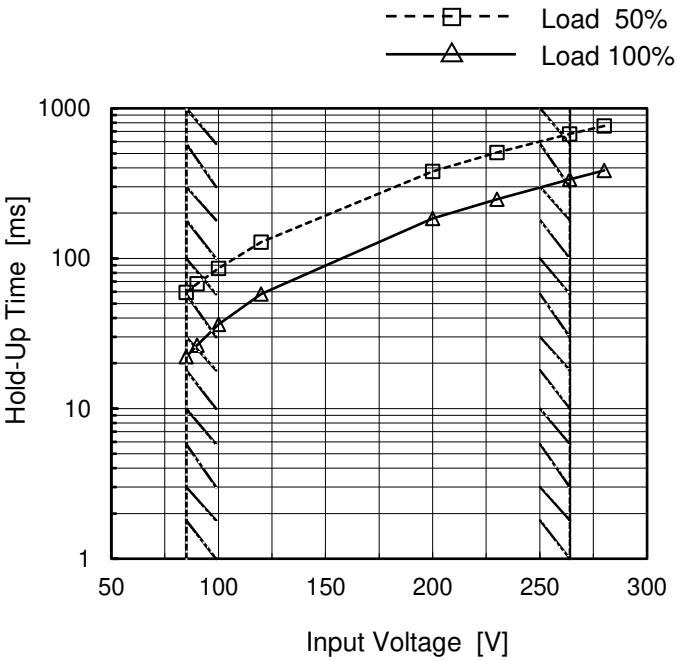
COSEL

Model	LHA10F-3R3-Y
Item	Hold-Up Time
Object	+3.3V2A

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

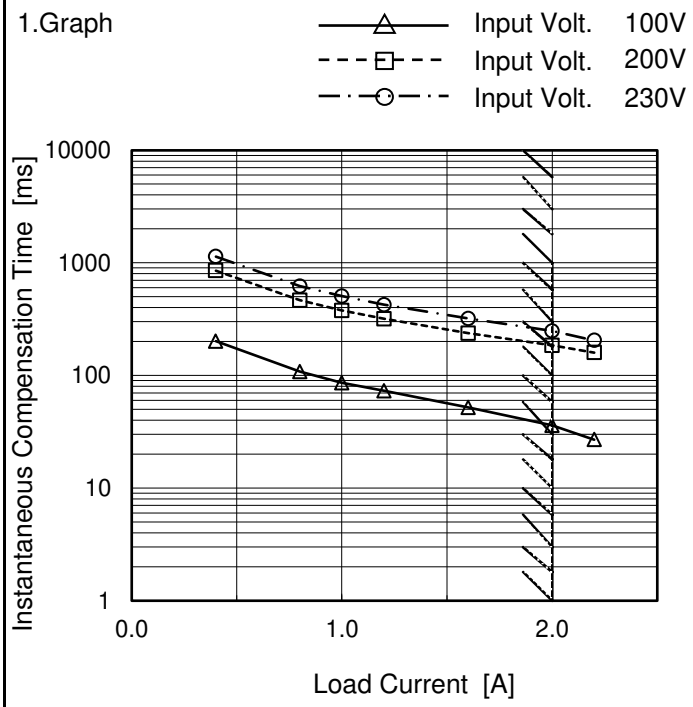
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	59	22
90	68	26
100	86	36
120	128	58
200	379	185
230	508	248
264	675	335
280	763	386
--	-	-

COSEL

Model	LHA10F-3R3-Y
Item	Instantaneous Interruption Compensation
Object	+3.3V2A

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	202	854	1141
0.8	108	465	621
1.0	86	379	508
1.2	73	318	426
1.6	52	238	320
2.0	36	185	248
2.2	27	160	205
--	-	-	-
--	-	-	-
--	-	-	-

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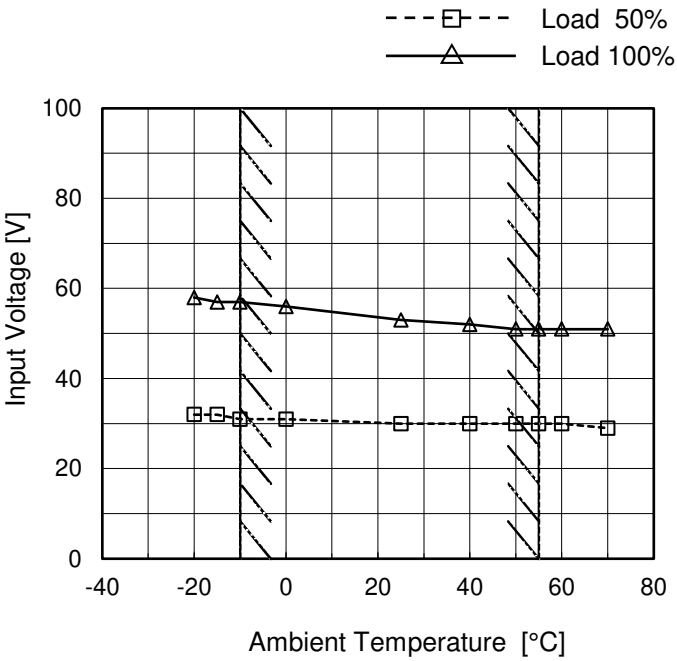
Model	LHA10F-3R3-Y
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+3.3V2A

Testing Circuitry Figure A

1.Graph



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

2.Values

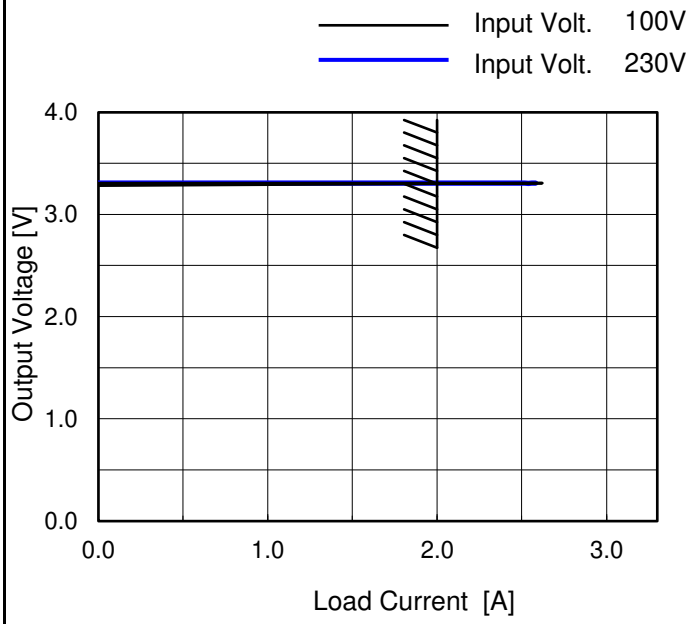
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	32	58
-15	32	57
-10	31	57
0	31	56
25	30	53
40	30	52
50	30	51
55	30	51
60	30	51
70	29	51
--	-	-

COSEL

Model	LHA10F-3R3-Y
Item	Overcurrent Protection
Object	+3.3V2A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

Overcurrent protection is Hiccup mode.

2.Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
3.300	2.62	2.58
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-
-	-	-

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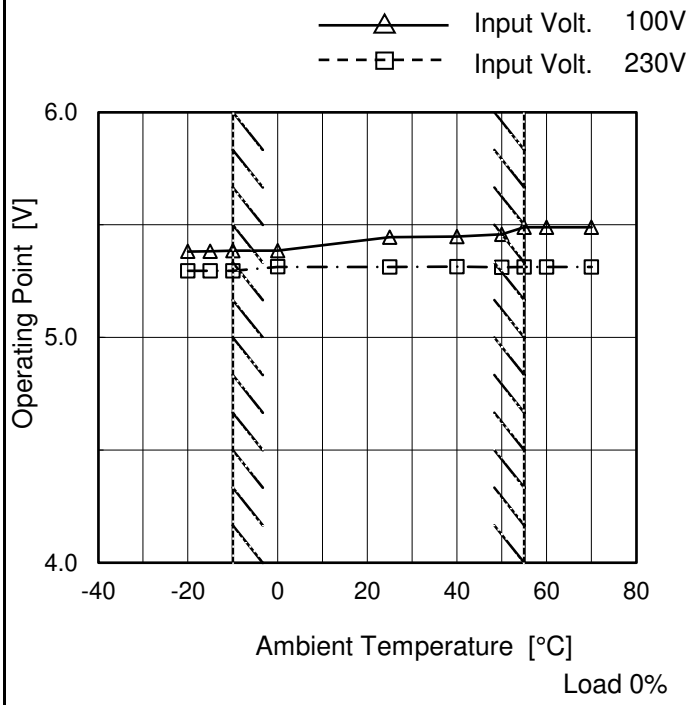
Model	LHA10F-3R3-Y
Item	Overvoltage Protection
Object	+3.3V2A

Testing Circuitry Figure A

1.Graph



Load 0%

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]
-20	5.38	5.30
-15	5.38	5.30
-10	5.38	5.30
0	5.39	5.31
25	5.44	5.31
40	5.45	5.31
50	5.46	5.31
55	5.49	5.31
60	5.49	5.31
70	5.49	5.31
--	-	-

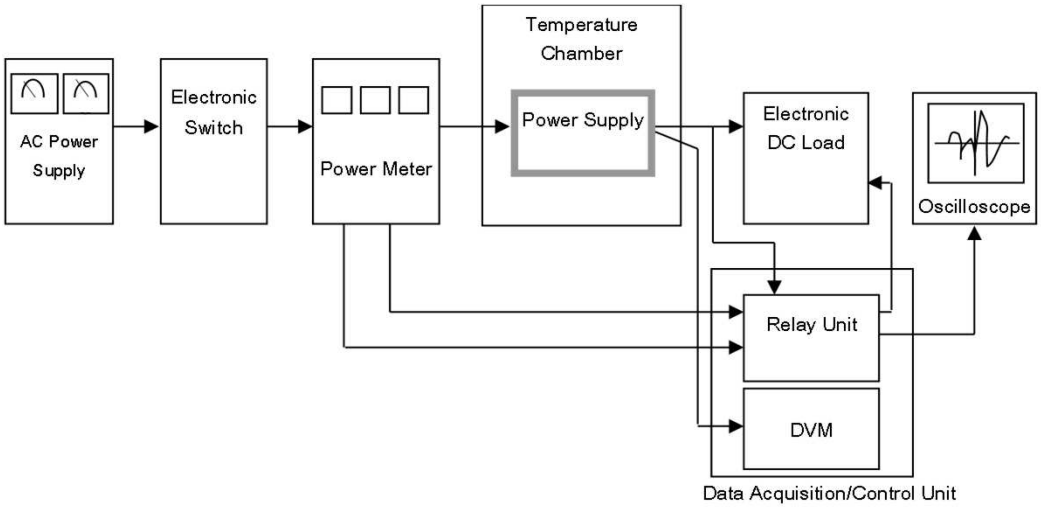


Figure A

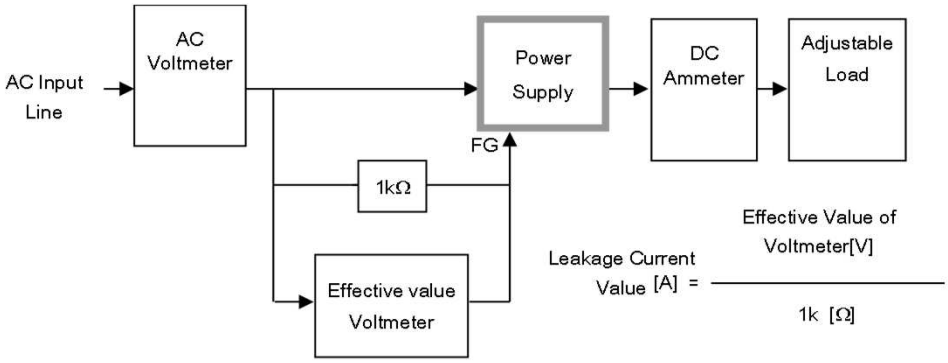


Figure B-1 (DEN-AN)

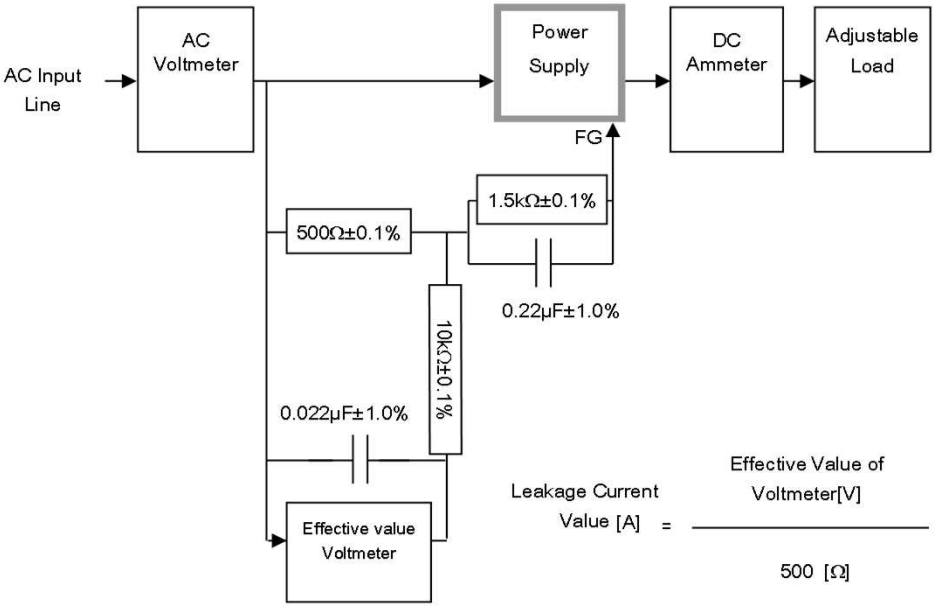


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

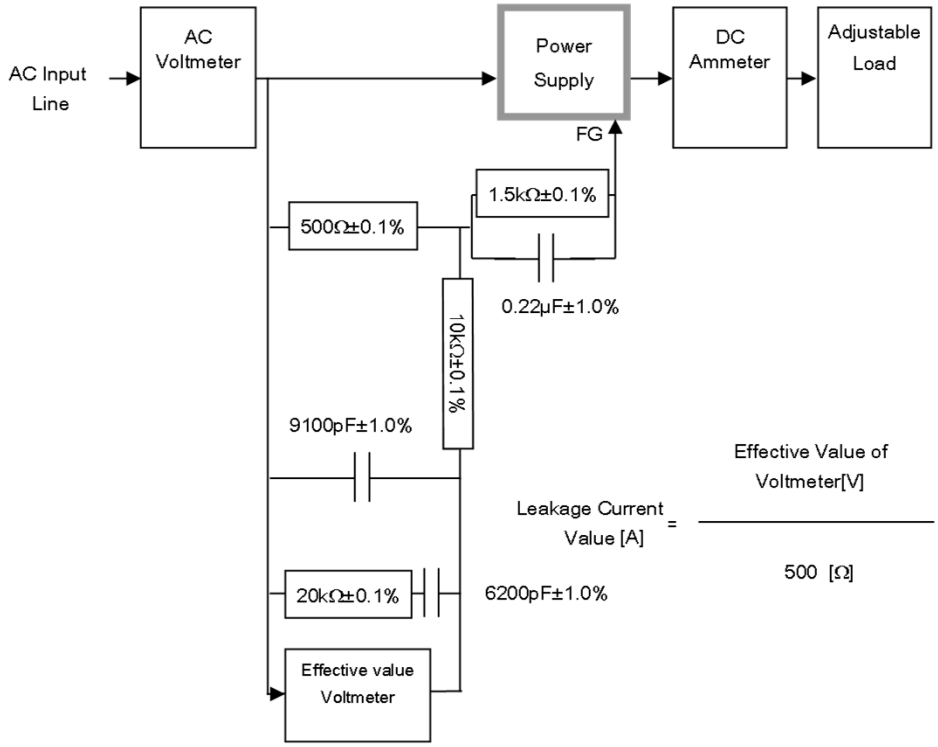
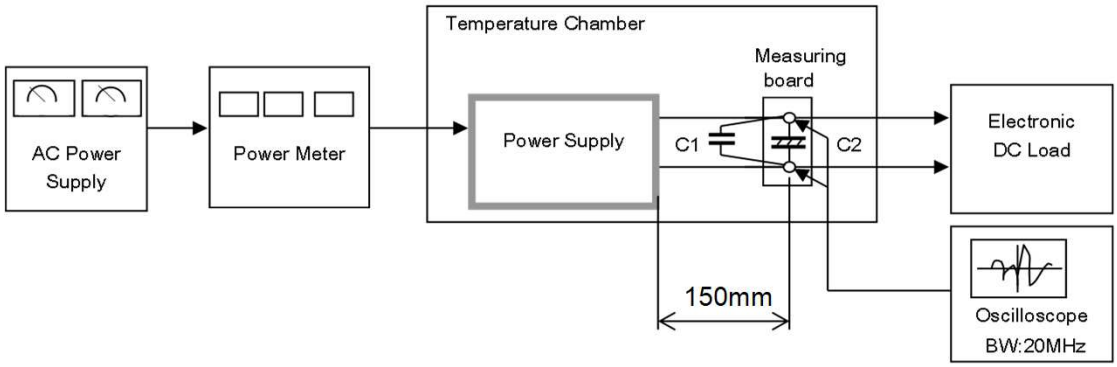


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)



C1= 0.1 μF
(Ceramic capacitor)

C2= 22 μF
(Electrolytic capacitor)

Figure C