COSEL

TEST DATA OF GMA300F-48

Regulated DC Power Supply
Jun 25, 2018

Approved by : _Jun Uchida_   Design Manager
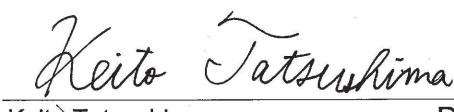
Prepared by : _Keito Tatsushima_   Design Engineer

COSEL CO.,LTD.

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Model	GMA300F-48
Item	Input Current (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph

△ —— Input Volt. 100V
--□-- Input Volt. 115V
-·○-· Input Volt. 230V

Input Current [A] vs Load Current [A]

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	0.107	0.097	0.099
1.26	0.749	0.641	0.381
1.58	0.922	0.789	0.456
2.52	1.413	1.195	0.669
3.15	1.759	1.509	0.812
3.78	2.051	1.823	0.971
4.41	2.367	2.101	1.117
5.04	2.711	2.366	1.261
5.36	2.883	2.493	1.334
6.30	3.395	2.923	1.545
6.93	3.746	3.225	1.687

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

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Model	GMA300F-48
Item	Input Power (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph

△——— Input Volt. 100V
---⊟--- Input Volt. 115V
—·—○—·— Input Volt. 230V

Load Current [A]

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. 115[V]	Input Volt. 230[V]
0.00	4.8	4.7	4.7
1.26	70.2	69.7	68.7
1.58	86.8	86.1	84.7
2.52	135.7	134.4	132.4
3.15	168.5	167.0	164.1
3.78	201.4	199.9	195.9
4.41	234.8	232.8	227.9
5.04	268.6	266.0	260.0
5.36	285.8	282.9	276.3
6.30	337.4	333.3	324.6
6.93	372.5	367.6	357.3

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Model	GMA300F-48
Item	Efficiency (by Input Voltage)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph
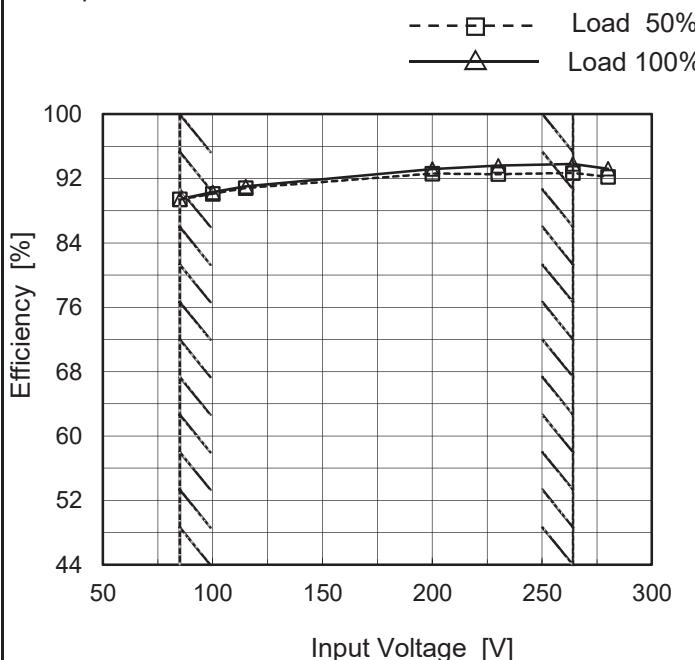
Load 50%
Load 100%

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	89.4	89.4 ※1
100	90.1	90.3 ※2
115	90.8	91.0
200	92.6	93.2
230	92.6	93.6
264	92.7	93.8
280	92.2	93.2
-	-	-
--	-	-

※1:Load 70%

※2:Load 85%

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

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Model	GMA300F-48
Item	Efficiency (by Load Current)
Object	

Temperature   25°C
Testing Circuitry   Figure A

1.Graph

Input Volt.   100V
Input Volt.   115V
Input Volt.   230V

Load Current [A]

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

2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
1.26	86.4	87.1	88.4
1.58	87.6	88.5	90.0
2.52	89.6	90.4	92.0
3.15	90.1	90.8	92.6
3.78	90.4	91.1	93.1
4.41	90.5	91.3	93.3
5.04	90.4	91.2	93.4
5.36	90.3	91.2	93.4
6.30	89.9	91.0	93.6
6.93	89.6	90.8	93.4

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Model GMA300F-48

Item Power Factor (by Input Voltage)

Object

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Load 50%
Load 100%

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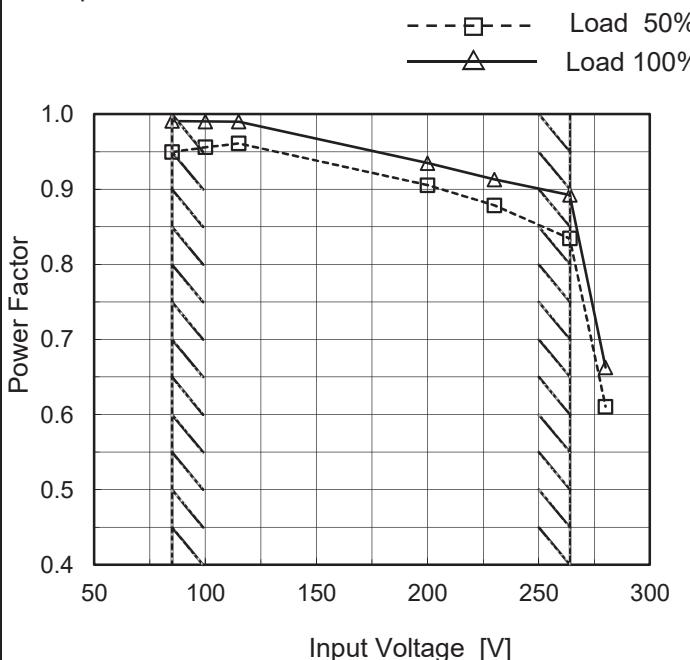
2.Values

Input Voltage [V]	Power Factor Load 50%	Load 100%
85	0.950	0.991 ※1
100	0.956	0.990 ※2
115	0.961	0.990
200	0.905	0.935
230	0.879	0.913
264	0.834	0.892
280	0.611	0.663
--	-	-
--	-	-

※1:Load 70%
※2:Load 85%

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Model	GMA300F-48
Item	Power Factor (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph

△ Input Volt. 100V
⊟ Input Volt. 115V
○ Input Volt. 230V

Load Current [A]

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

2.Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	0.542	0.515	0.207
1.26	0.937	0.944	0.783
1.58	0.939	0.947	0.808
2.52	0.958	0.977	0.860
3.15	0.956	0.961	0.879
3.78	0.980	0.952	0.877
4.41	0.990	0.962	0.886
5.04	0.989	0.977	0.895
5.36	0.990	0.985	0.900
6.30	0.992	0.990	0.913
6.93	0.993	0.990	0.921

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Model	GMA300F-48
Item	Inrush Current
Object	————————

Temperature 25°C
Testing Circuitry Figure A

Input
Current
[50A/div]

Input
Voltage
[100V/div]

Time [50ms/div]

Input Voltage 115 V
Frequency 60 Hz
Load 100 %

Primary inrush current
27.2 A
Secondary inrush current
7.2 A

Input
Current
[50A/div]

Input
Voltage
[200V/div]

Time [50ms/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current
65.5 A
Secondary inrush current
5.5 A

Primary inrush current

Secondary inrush current

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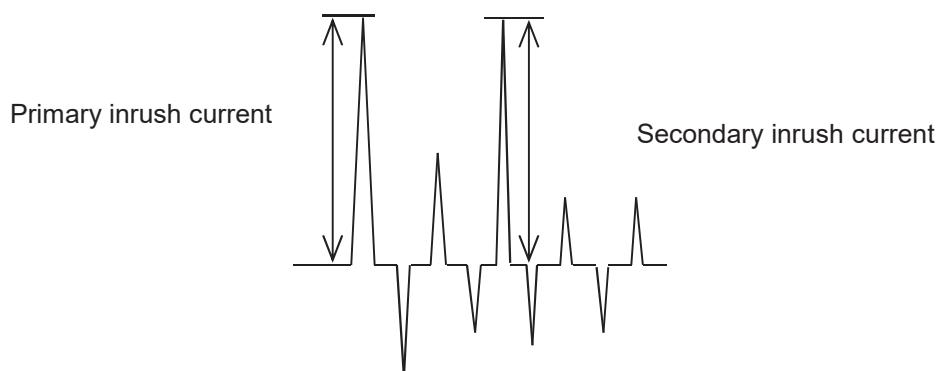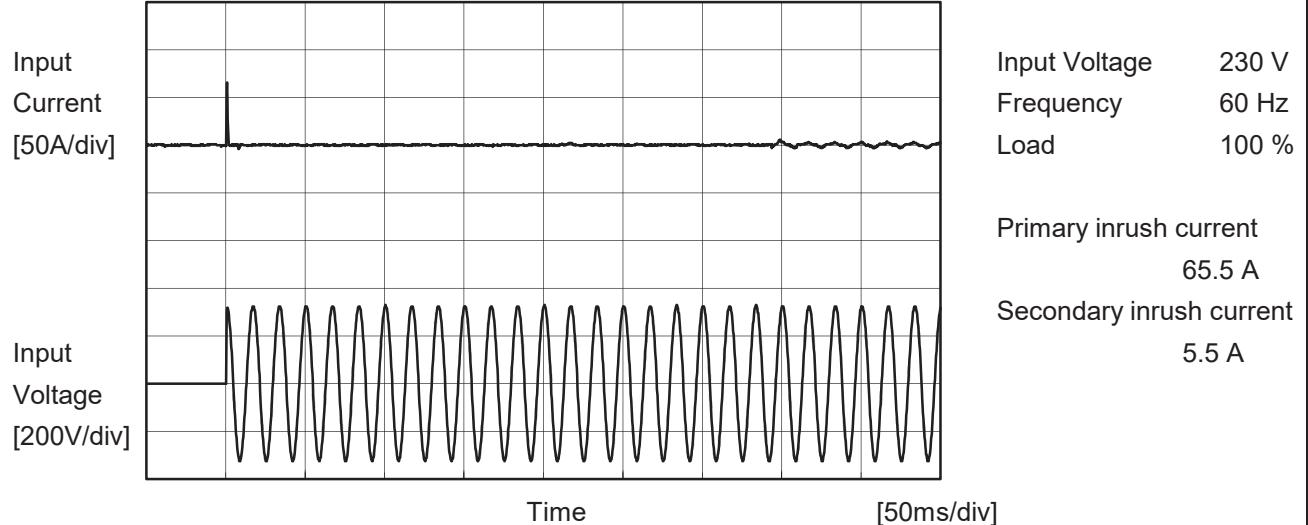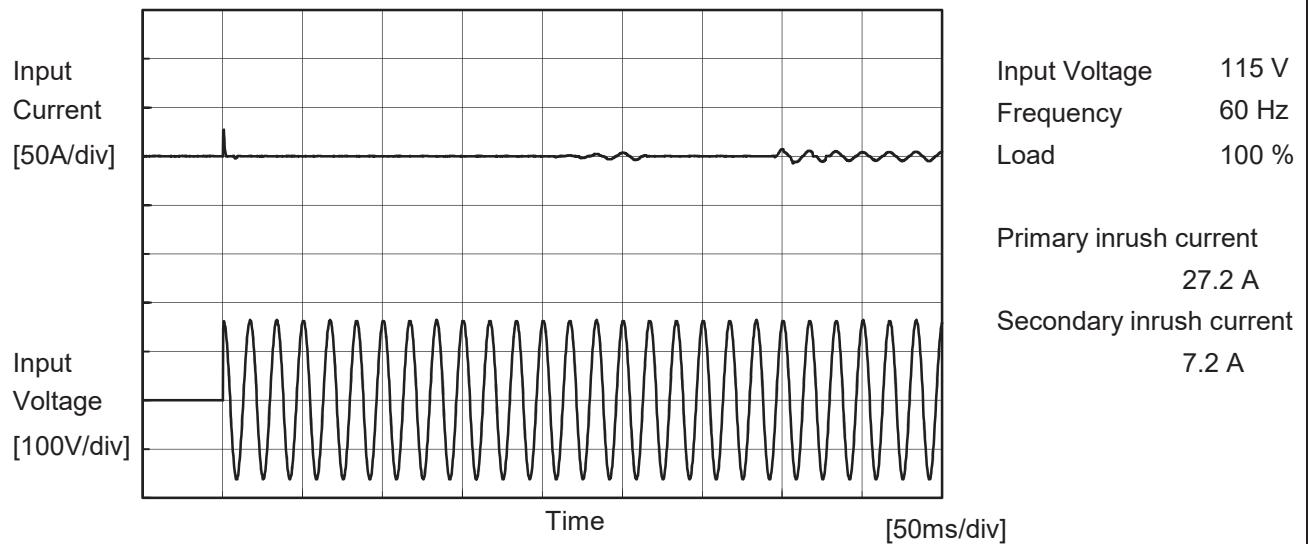
Model	GMA300F-48		Temperature	25°C
Item	Leakage Current		Testing Circuitry	Figure B
Object				

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
IEC60601-1	Both phases	0.07	0.08	0.17	Operation
	One of phases	0.10	0.11	0.24	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	GMA300F-48
Item	Line Regulation
Object	+48V6.3A

Temperature	25°C
Testing Circuitry	Figure A

1.Graph

Load 50%
Load 100%

Output Voltage [V] vs Input Voltage [V]

2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	48.180	48.178 ※1
100	48.181	48.177 ※2
115	48.181	48.177
200	48.179	48.179
230	48.179	48.176
264	48.181	48.177
280	48.180	48.176
--	-	-
--	-	-

※1:Load 70%
※2:Load 85%

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

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Model	GMA300F-48
Item	Load Regulation
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

		Input Volt.	100V
		Input Volt.	115V
		Input Volt.	230V

Load Current [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. 115[V]	Input Volt. 230[V]
0.00	48.208	48.220	48.220
1.26	48.187	48.183	48.182
1.58	48.184	48.181	48.181
2.52	48.183	48.180	48.181
3.15	48.181	48.181	48.179
3.78	48.180	48.178	48.177
4.41	48.181	48.177	48.179
5.04	48.179	48.177	48.177
5.36	48.177	48.178	48.178
6.30	48.177	48.176	48.176
--	-	-	-

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Model	GMA300F-48
Item	Dynamic Load Response
Object	+48V6.3A

Temperature 25℃
Testing Circuitry Figure A

Input Volt. 115 V
Cycle 1000 ms

t1,t2 = 50 μs

Load Current

t1　　　　　　　　t2

Min.Load (0A)←→
Load 100% (6.3A)

2 V/div

1 ms/div　　　　　　10 ms/div

Min.Load (0A)←→
Load 50% (3.15A)
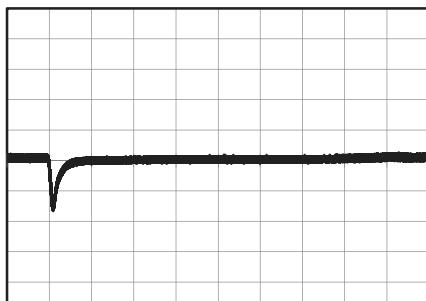
2 V/div
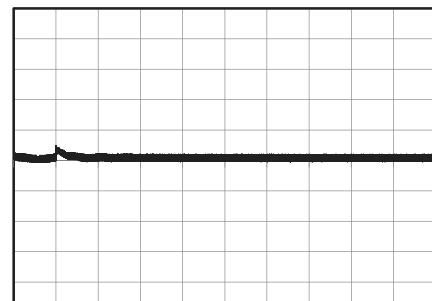
1 ms/div　　　　　　10 ms/div

Load 50% (3.15A)←→
Load 100% (6.3A)

2 V/div

1 ms/div　　　　　　10 ms/div
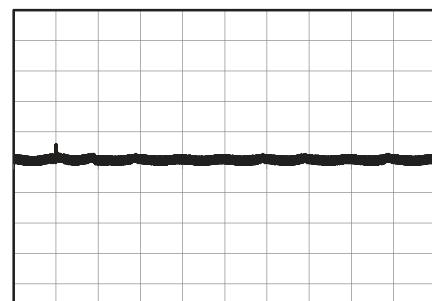
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Model	GMA300F-48
Item	Ripple Voltage (by Load Current)
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure C

1.Graph

Input Volt. 115V
Input Volt. 230V

Load Current [A]

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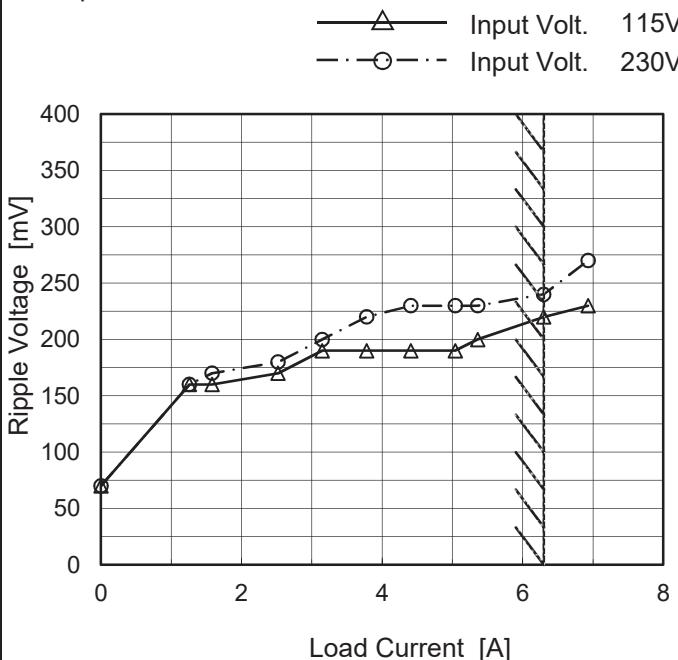
2.Values

Load Current [A]	Ripple Voltage [mV] Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	70	70
1.26	160	160
1.58	160	170
2.52	170	180
3.15	190	200
3.78	190	220
4.41	190	230
5.04	190	230
5.36	200	230
6.30	220	240
6.93	230	270

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

Ripple [mVp-p]

T2

T1
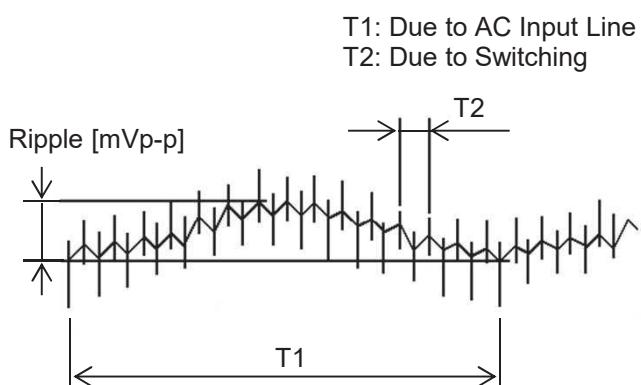
Fig. Complex Ripple Wave Form

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Model	GMA300F-48
Item	Ripple-Noise
Object	+48V6.3A

Temperature   25°C
Testing Circuitry   Figure C

1.Graph

— △ — Input Volt.   115V
— ·○· — Input Volt.   230V

Load Current [A]

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	120	120
1.26	230	240
1.58	230	240
2.52	230	240
3.15	240	250
3.78	240	280
4.41	240	280
5.04	240	280
5.36	250	290
6.30	280	300
6.93	300	320
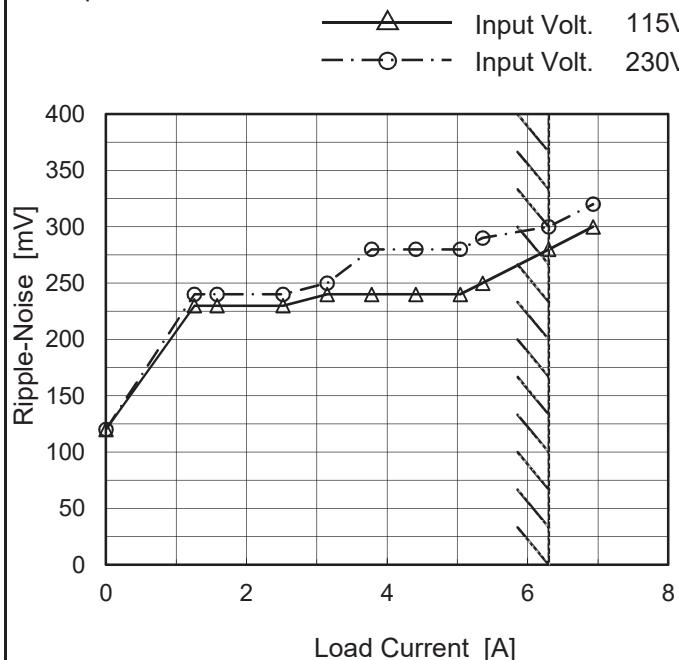
Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated
     load current.

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

Ripple-Noise
[mVp-p]

T2

T1

Fig. Complex Ripple Wave Form

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Model	GMA300F-48
Item	Ripple Voltage (by Ambient Temp.)
Object	+48V6.3A

Testing Circuitry   Figure C

1.Graph

--- ⊟ --- Input Volt.   115V
— △ — Input Volt.   230V

Ambient Temperature [°C]

Load   100 %

Measured by 20 MHz Oscilloscope.
Note: Slanted line shows the range of the rated
     ambient temperature.
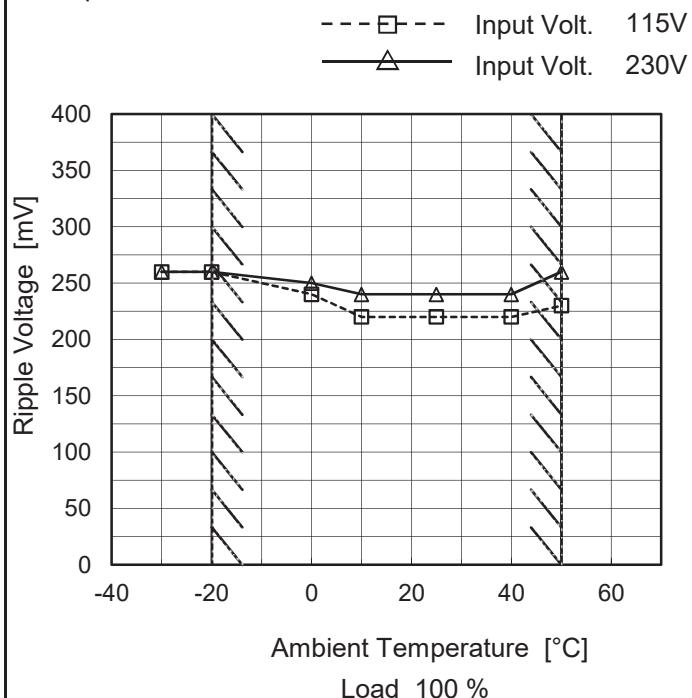
2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
-30	260	260
-20	260	260
0	240	250
10	220	240
25	220	240
40	220	240
50	230	260
--	-	-
--	-	-
--	-	-
--	-	-

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Model	GMA300F-48
Item	Ambient Temperature Drift
Object	+48V6.3A

Testing Circuitry   Figure A

1.Graph

— △ —   Input Volt.   100V
--- ⊟ ---   Input Volt.   115V
—·— ○ —·—   Input Volt.   230V

Ambient Temperature [°C]

Load 100%

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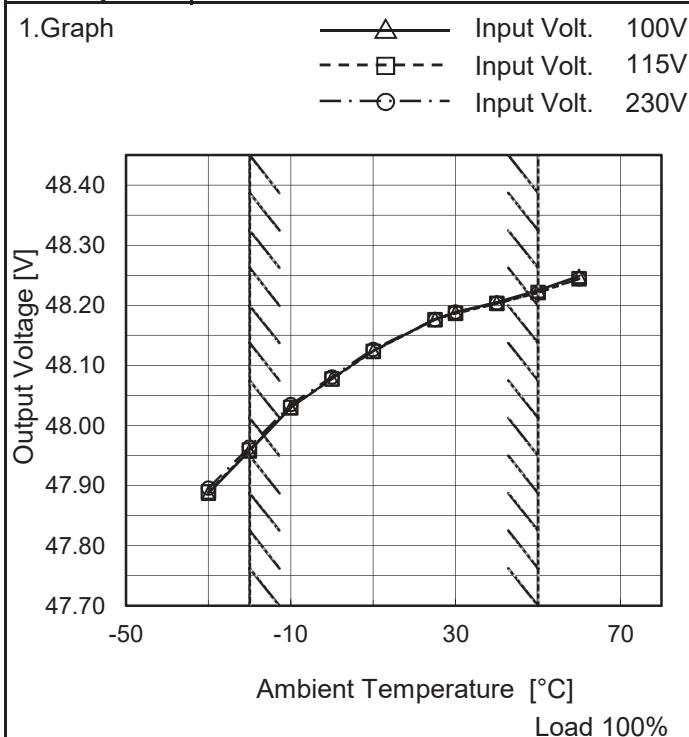
2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-30	47.887	47.889	47.896
-20	47.958	47.959	47.964
-10	48.030	48.030	48.035
0	48.078	48.077	48.081
10	48.124	48.123	48.127
25	48.177	48.176	48.176
30	48.188	48.187	48.189
40	48.205	48.203	48.204
50	48.225	48.221	48.221
60	48.249	48.245	48.244
--	-	-	-

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Model	GMA300F-48
Item	Output Voltage Accuracy
Object	+48V6.3A

Testing Circuitry   Figure A

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   :   -20 - 50°C
Input Voltage : 85 - 264V
Load Current   :   0 - 6.3A

* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

* Output Voltage Accuracy (Ratio) = $\dfrac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}}$ × 100

2.Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	264	0	48.277	±171	±0.4
Minimum Voltage	-20	85	4.4	47.935		

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Model	GMA300F-48
Item	Time Lapse Drift
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Input Volt. 115V
Load 100%
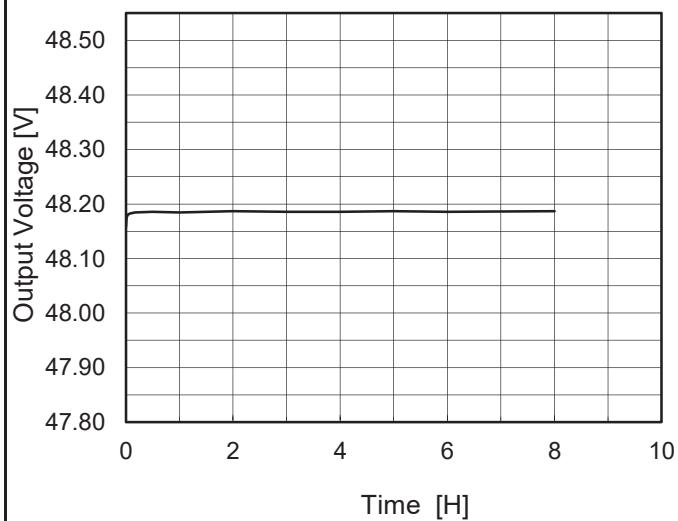
* The charactaristic of AC230 is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	48.158
0.5	48.185
1.0	48.185
2.0	48.187
3.0	48.186
4.0	48.186
5.0	48.187
6.0	48.186
7.0	48.186
8.0	48.187

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Model	GMA300F-48
Item	Rise and Fall Time
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

Load 100% — Output Volt. [10V/div] — Input Volt. 115V

Load 100% — Output Volt. [10V/div] — Input Volt. 230V

Input Volt. 0 — [200V/div] — Time [100ms/div] — Time [10ms/div]
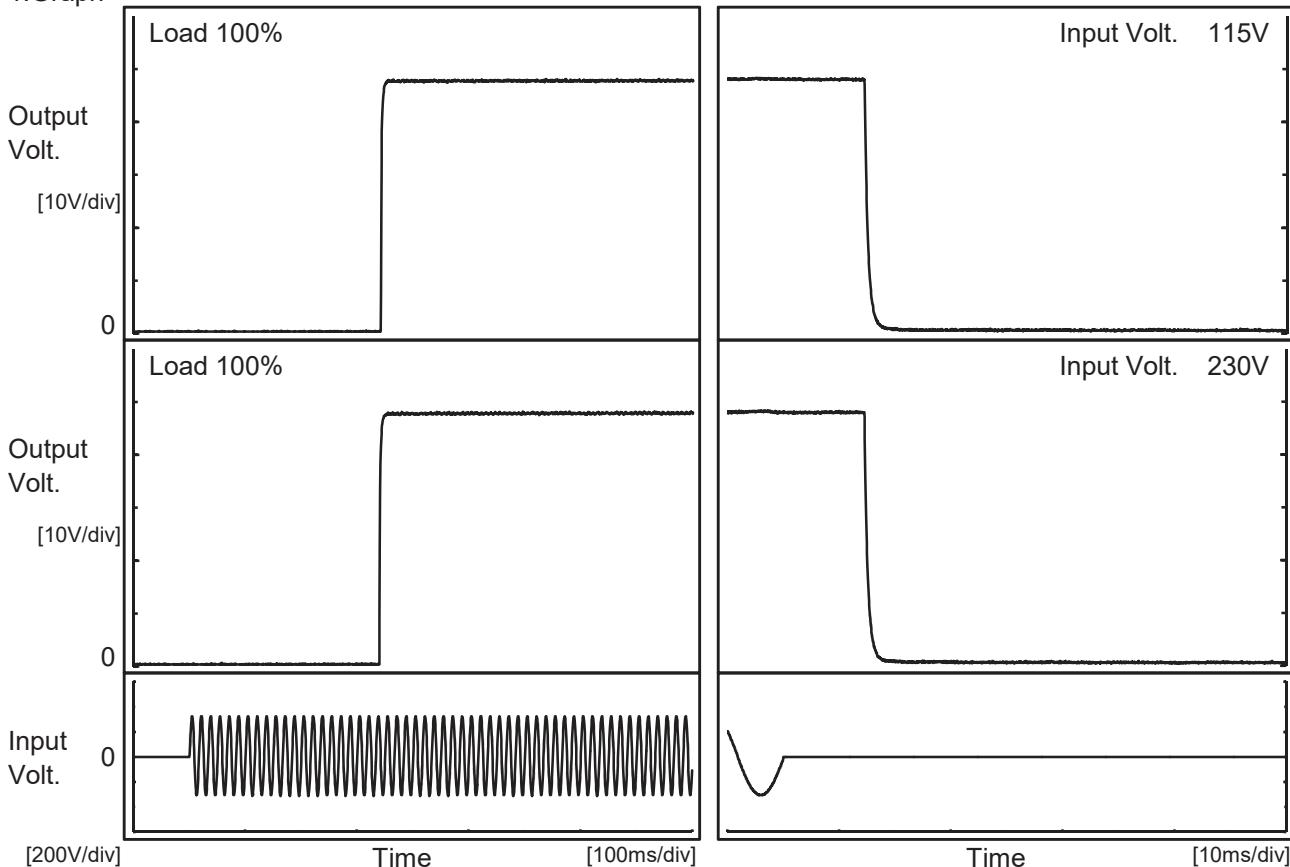
2.Values [ms]

Input Volt.　Time	Td	Tr	Ts	Th	Tf
115V	342.5	3.5	346.0	14.6	1.5
230V	340.0	3.5	343.5	14.6	1.4
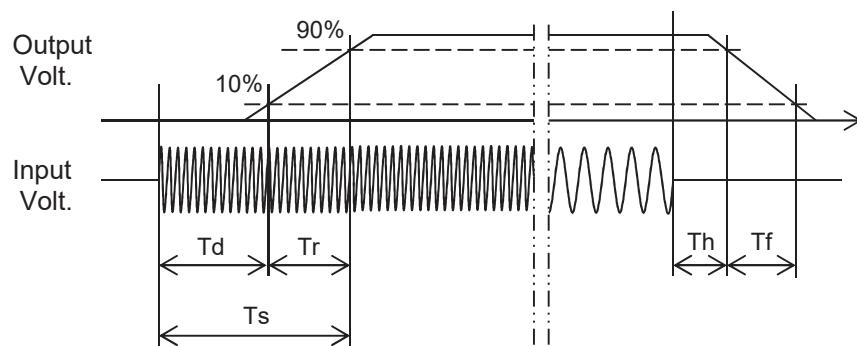
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Model	GMA300F-48
Item	Hold-Up Time
Object	+48V6.3A

Temperature   25°C
Testing Circuitry   Figure A

1.Graph
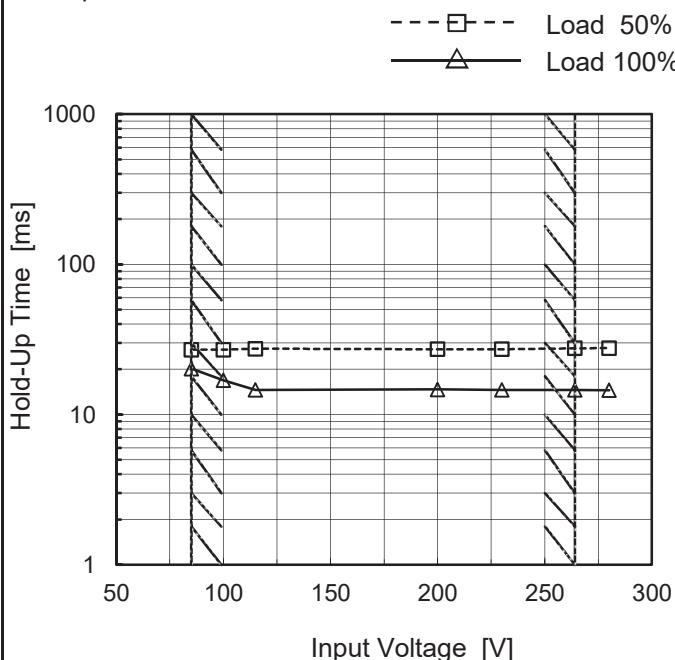
- - -◻- - - Load 50%
—△— Load 100%

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	27	20 ※1
100	27	17 ※2
115	27	15
200	27	15
230	27	15
264	28	15
280	28	15
--	-	-
--	-	-

※1:Load 70%
※2:Load 85%

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.

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参考資料

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Model	GMA300F-48
Item	Instantaneous Interruption Compensation
Object	+48V6.3A

Temperature 25°C
Testing Circuitry Figure A

1.Graph

—△— Input Volt. 100V
---□--- Input Volt. 115V
—·—○—·— Input Volt. 230V

Instantaneous Compensation Time [ms] vs Load Current [A]

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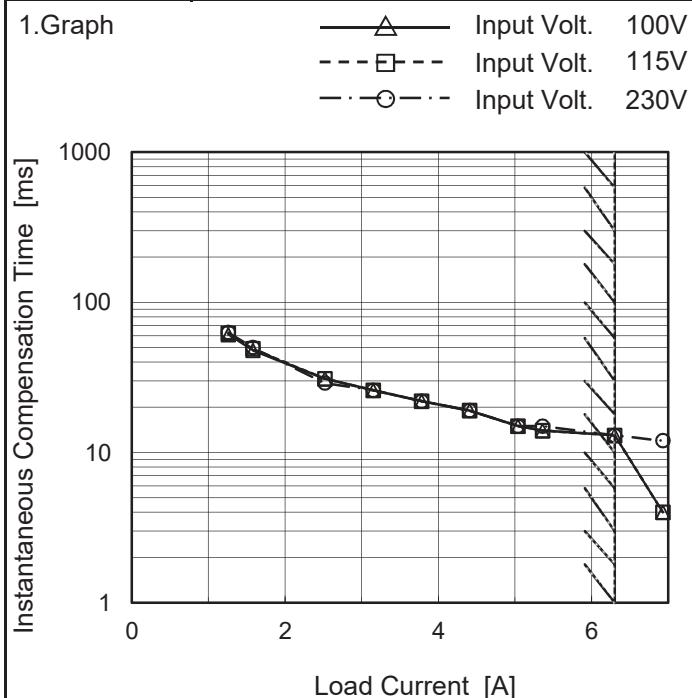
2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
1.26	61	62	63
1.58	48	49	50
2.52	31	31	29
3.15	26	26	26
3.78	22	22	22
4.41	19	19	19
5.04	15	15	15
5.36	14	14	15
6.30	13	13	13
6.93	4	4	12

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Model	GMA300F-48
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+48V6.3A
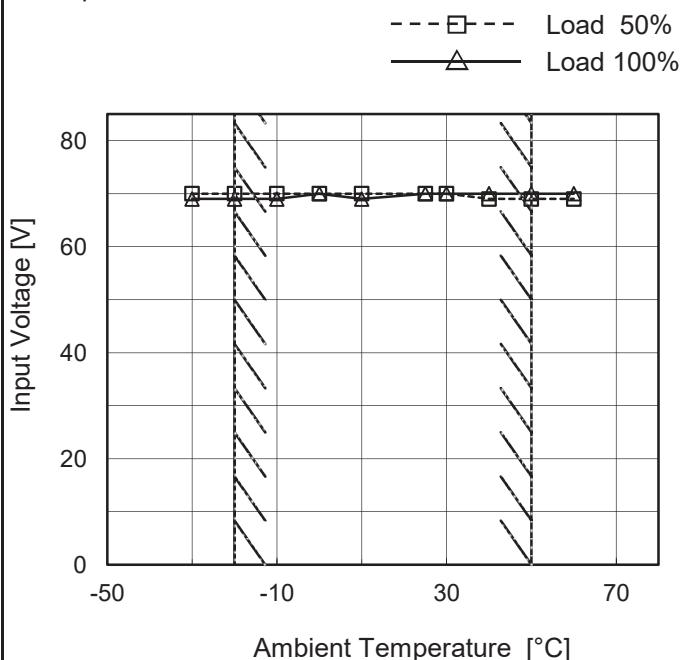
Testing Circuitry   Figure A

1.Graph

--□-- Load 50%
—△— Load 100%

Ambient Temperature [°C]

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

2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	70	69
-20	70	69
-10	70	69
0	70	70
10	70	69
25	70	70
30	70	70
40	69	70
50	69	70
60	69	70
--	-	-

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Model	GMA300F-48
Item	Overcurrent Protection
Object	+48V6.3A

Temperature　　　25°C
Testing Circuitry　Figure A

1.Graph

—————△　Input Volt.　100V
— — — —◻　Input Volt.　115V
— · —○　Input Volt.　230V

Load Current [A]

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. 115[V]	Input Volt. 230[V]
48	7.71	7.71	7.71
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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参考資料

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Model	GMA300F-48

Item	Overvoltage Protection

Object	+48V6.3A

Testing Circuitry   Figure A

1.Graph

Input Volt.   115V
Input Volt.   230V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

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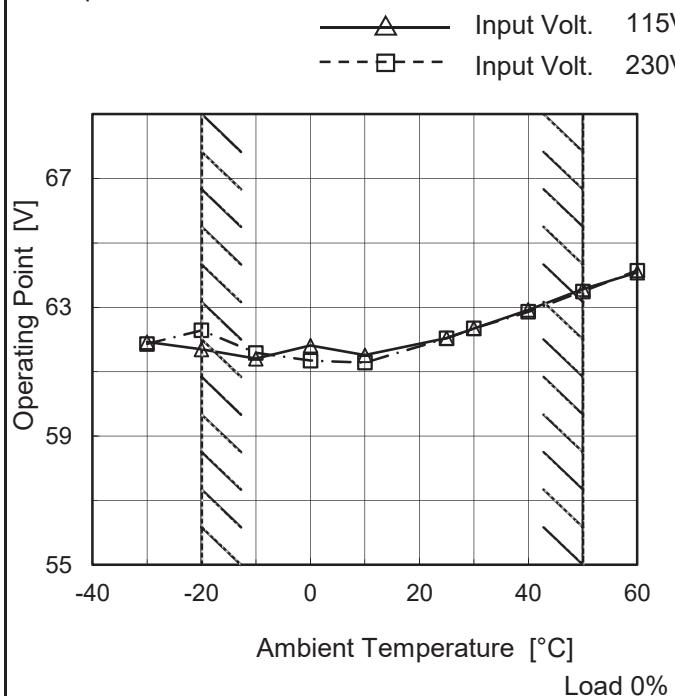
2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 115[V]	Input Volt. 230[V]
-30	61.92	61.86
-20	61.69	62.28
-10	61.40	61.58
0	61.81	61.34
10	61.51	61.28
25	62.04	62.04
30	62.34	62.34
40	62.92	62.86
50	63.56	63.49
60	64.08	64.14
--	-	-

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Figure A

$$\text{Leakage Current Value [A]} = \frac{\text{Effective Value of Voltmeter[V]}}{1\text{k} \ [\Omega]}$$

Figure B（IEC60601-1）

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COSEL

Temperature Chamber

Measuring board

AC Power Supply

Power Meter

Power Supply

C1

Electronic DC Load

Oscilloscope
BW:20MHz

150mm
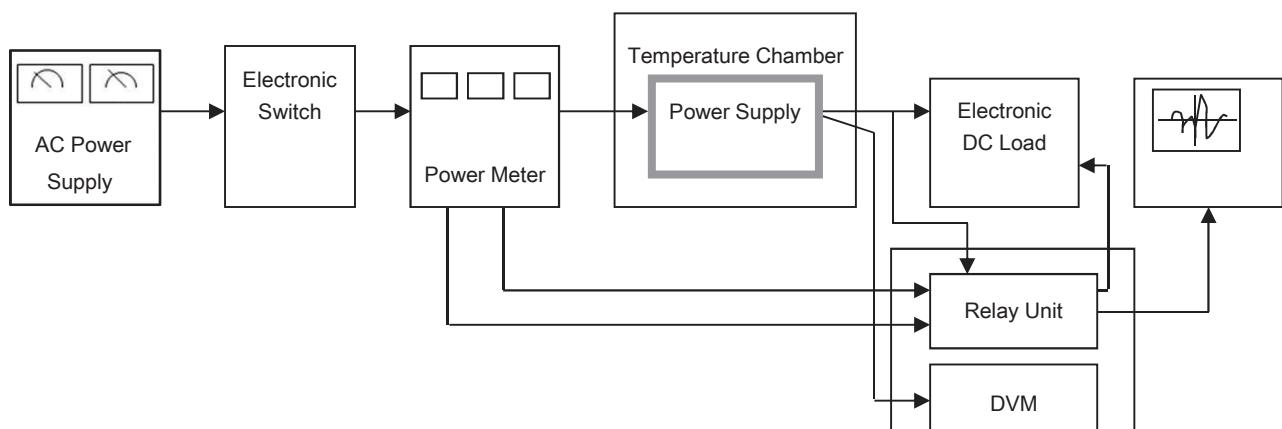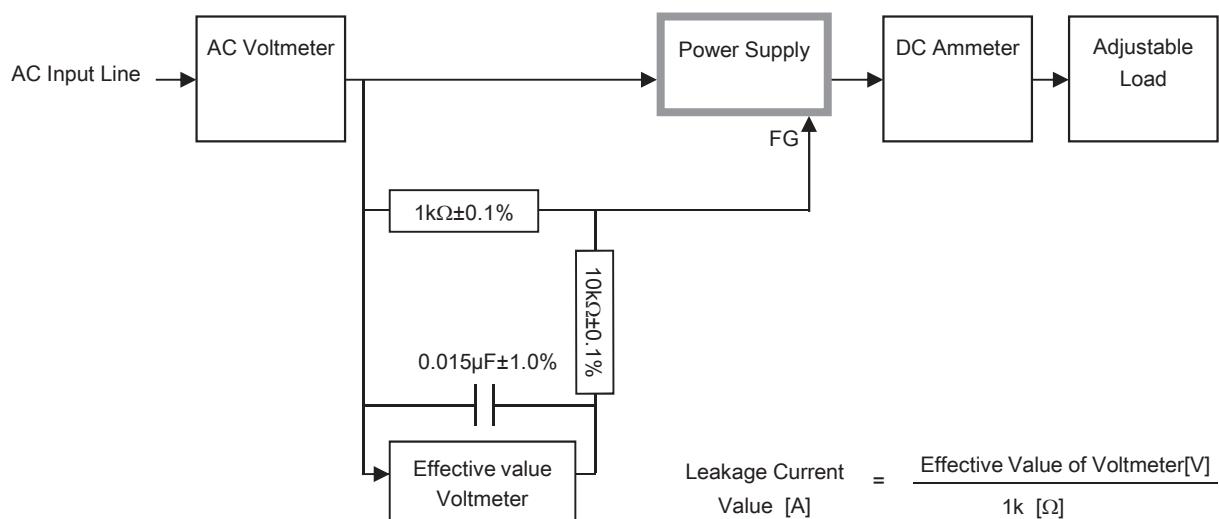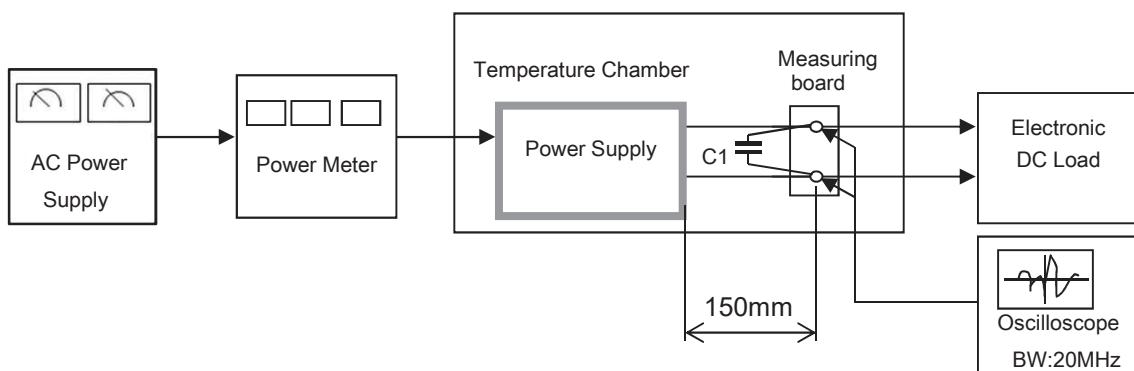
C1=   22   μF
(Electrolytic capacitor)

Figure C

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