Reference

TEST DATA OF WMA150H-24

(115V INPUT)

Regulated DC Power Supply
December 5, 2019

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COSEL CO.,LTD.

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Object	————————

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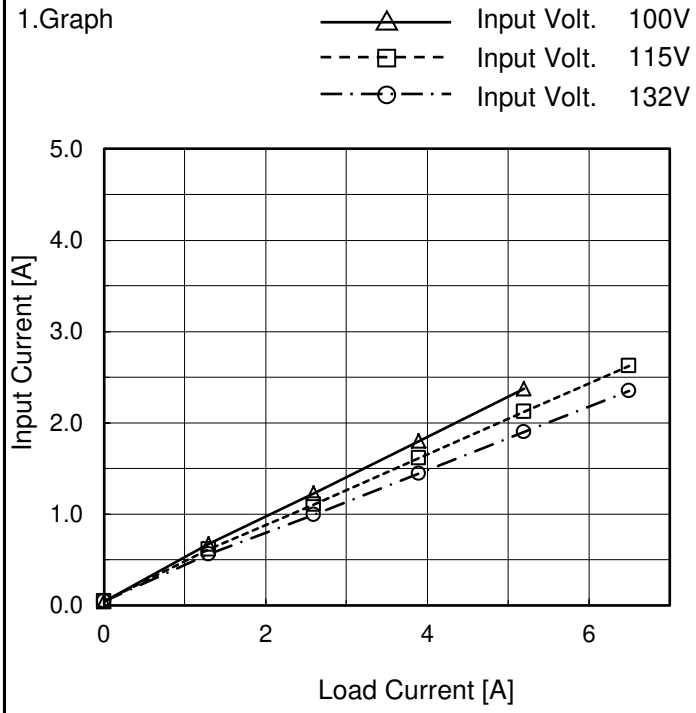

2.Values

Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	0.039	0.042	0.047
1.3	0.669	0.610	0.558
2.6	1.223	1.105	0.993
3.9	1.797	1.610	1.445
5.2	2.374	2.118	1.899
6.5	-	2.623	2.348
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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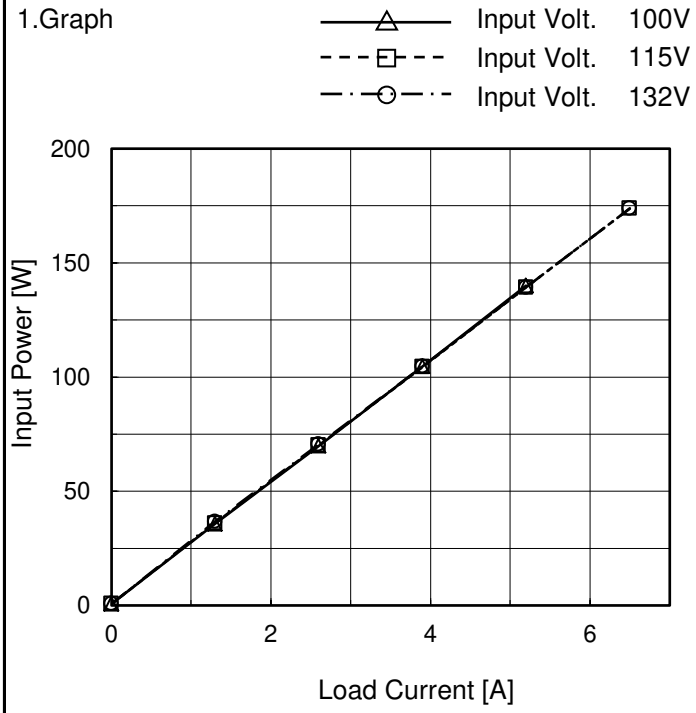
Model	WMA150H-24
Item	Input Power (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	0.5	0.6	0.6
1.3	35.6	36.0	36.7
2.6	69.8	70.1	70.6
3.9	104.8	104.6	104.7
5.2	140.0	139.4	139.3
6.5	-	173.8	173.9
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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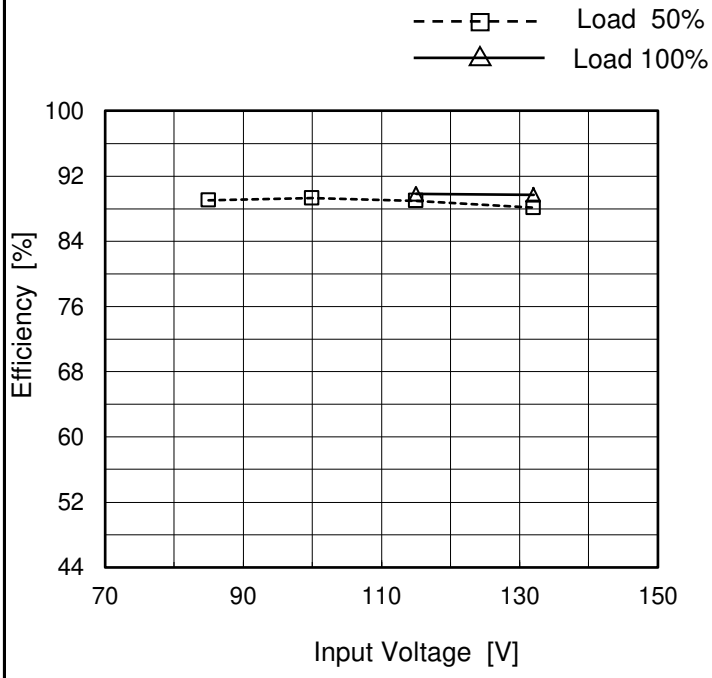
Model	WMA150H-24
Item	Efficiency (by Input Voltage)
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

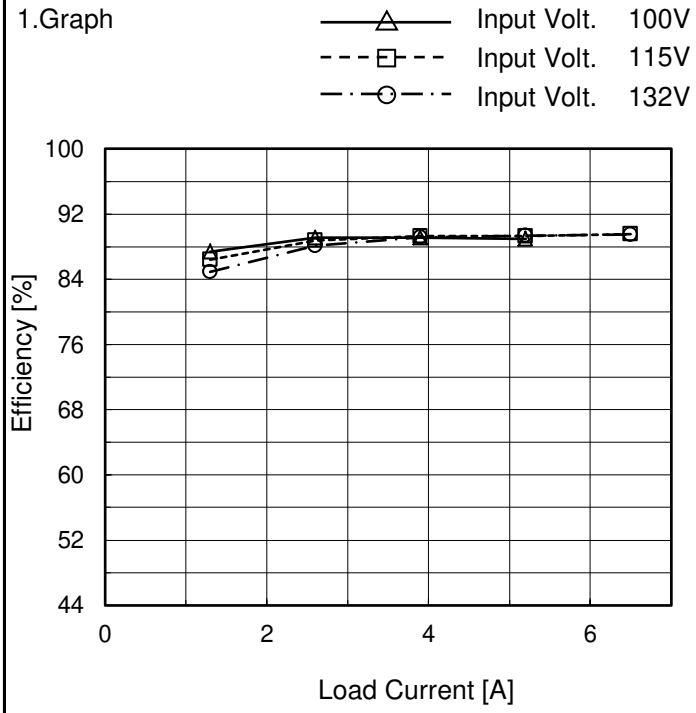
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	89.0	-
100	89.3	-
115	89.0	89.8
132	88.1	89.7
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	WMA150H-24
Item	Efficiency (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Efficiency [%]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	-	-	-
1.3	87.4	86.4	84.9
2.6	89.1	88.7	88.1
3.9	89.1	89.3	89.2
5.2	89.0	89.3	89.4
6.5	-	89.5	89.5
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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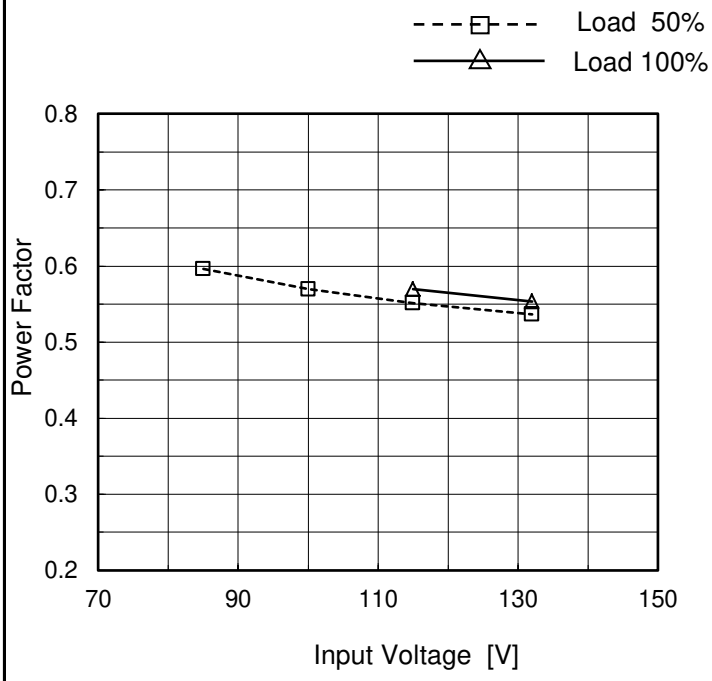
Model	WMA150H-24
Item	Power Factor (by Input Voltage)
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
85	0.596	-
100	0.569	-
115	0.552	0.569
132	0.536	0.553
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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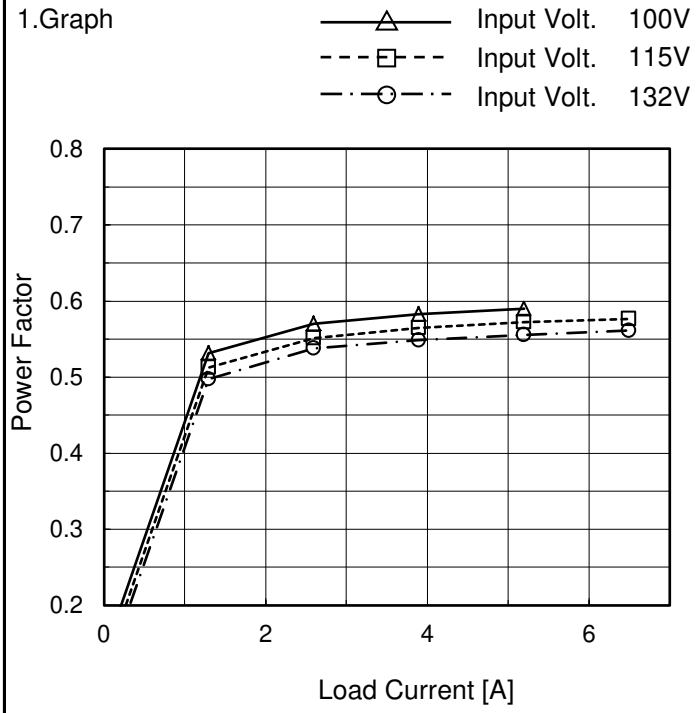
Model	WMA150H-24
Item	Power Factor (by Load Current)
Object	———————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Power Factor		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	0.136	0.119	0.104
1.3	0.531	0.513	0.497
2.6	0.571	0.551	0.538
3.9	0.583	0.565	0.549
5.2	0.590	0.572	0.556
6.5	-	0.577	0.561
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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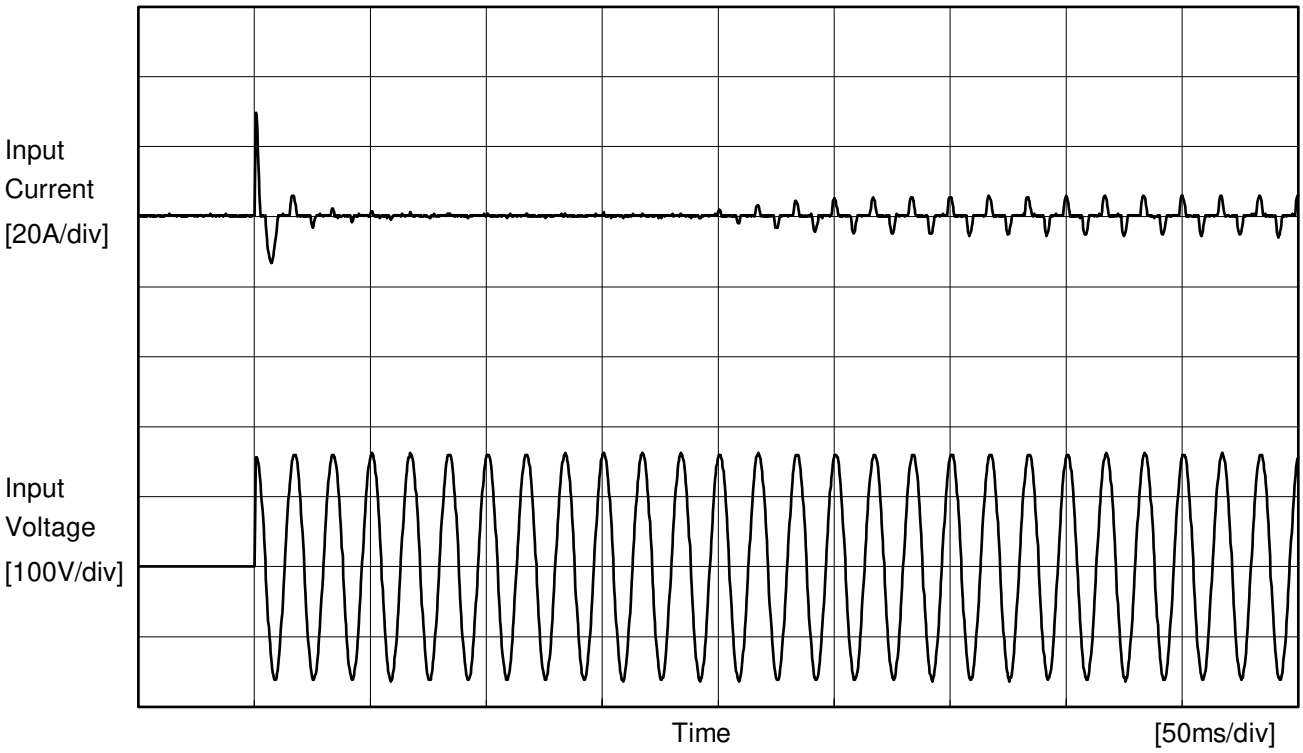
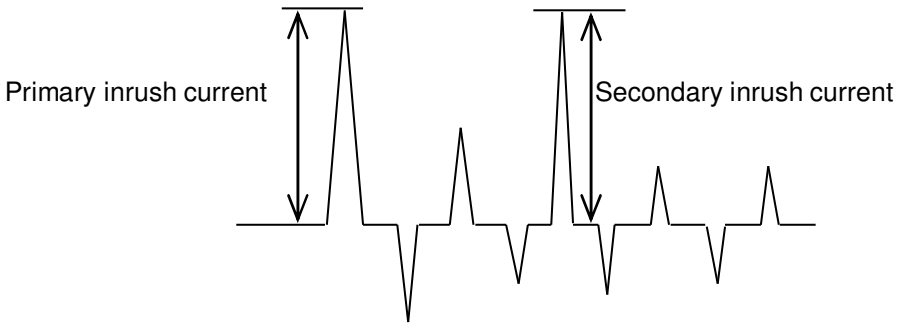
Model	WMA150H-24		
Item	Inrush Current	Temperature	25°C
		Testing Circuitry	Figure A
Object	———————		



Input Voltage	115 V
Frequency	60 Hz
Load	100 %
Primary inrush current	29.5 A
Secondary inrush current	6.1 A



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Model	WMA150H-24		
Item	Leakage Current	Temperature	25°C
		Testing Circuitry	Figure B
Object	———————————		

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	132 [V]	
IEC60601-1	Both phases	0.15	0.17	0.19	Operation
	One of phases	0.27	0.32	0.36	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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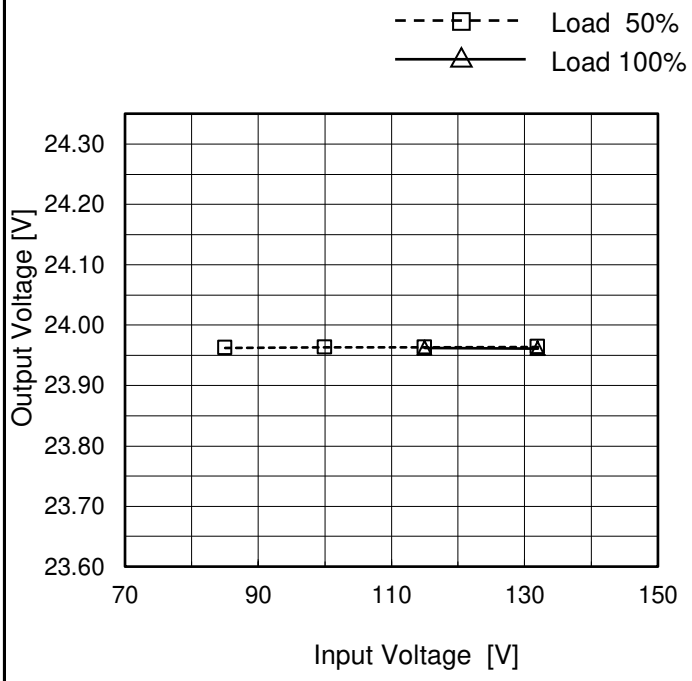
Model	WMA150H-24
Item	Line Regulation
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

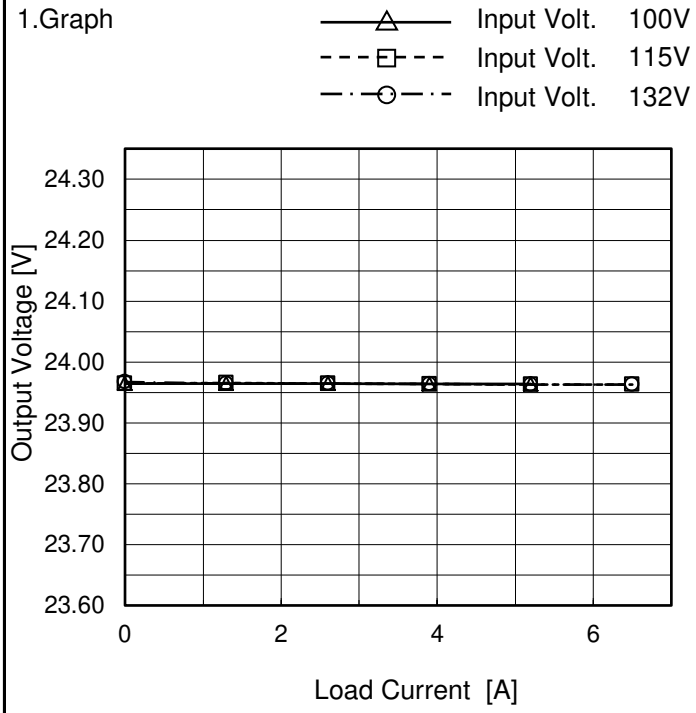
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	23.963	-
100	23.963	-
115	23.963	23.962
132	23.964	23.962
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	WMA150H-24
Item	Load Regulation
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	23.965	23.964	23.967
1.3	23.965	23.965	23.965
2.6	23.964	23.965	23.965
3.9	23.964	23.964	23.964
5.2	23.963	23.963	23.963
6.5	-	23.963	23.963
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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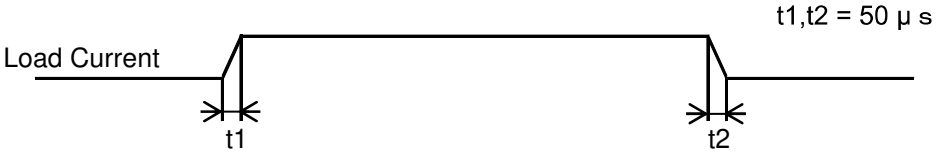
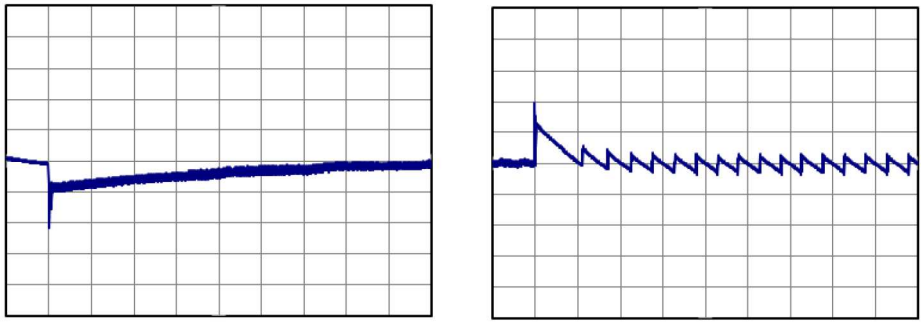
Model	WMA150H-24	
Item	Dynamic Load Response	Temperature 25°C Testing Circuitry Figure A
Object	+24V6.5A	

Input Volt. 115 V
Cycle 1000 ms



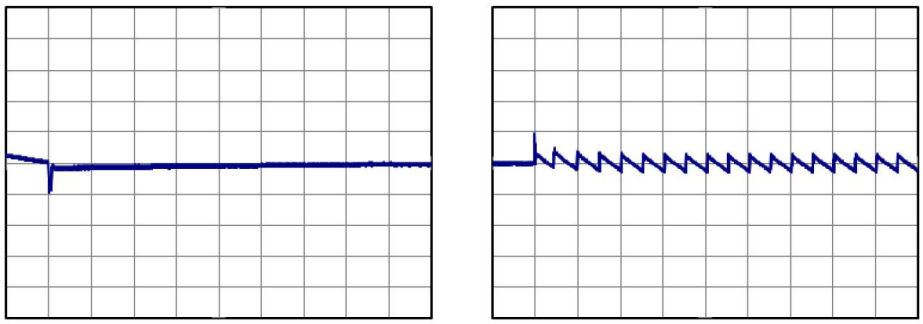
Min.Load (0A)←→
Load 100% (6.5A)



200 mV/div

4 ms/div 20 ms/div

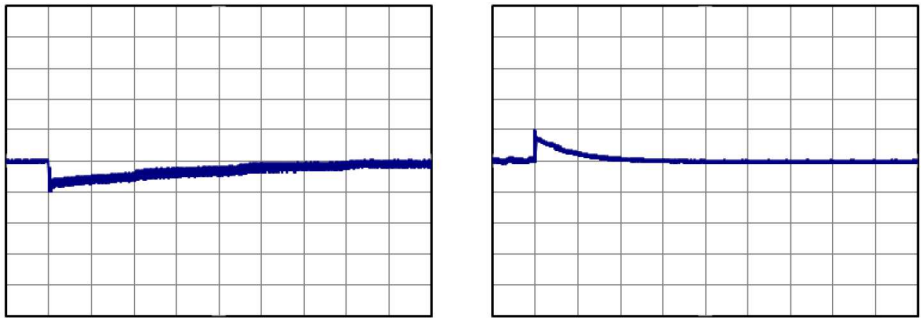
Min.Load (0A)←→
Load 50% (3.25A)



200 mV/div

4 ms/div 20 ms/div

Load 50% (3.25A)←→
Load 100% (6.5A)



200 mV/div

4 ms/div 20 ms/div

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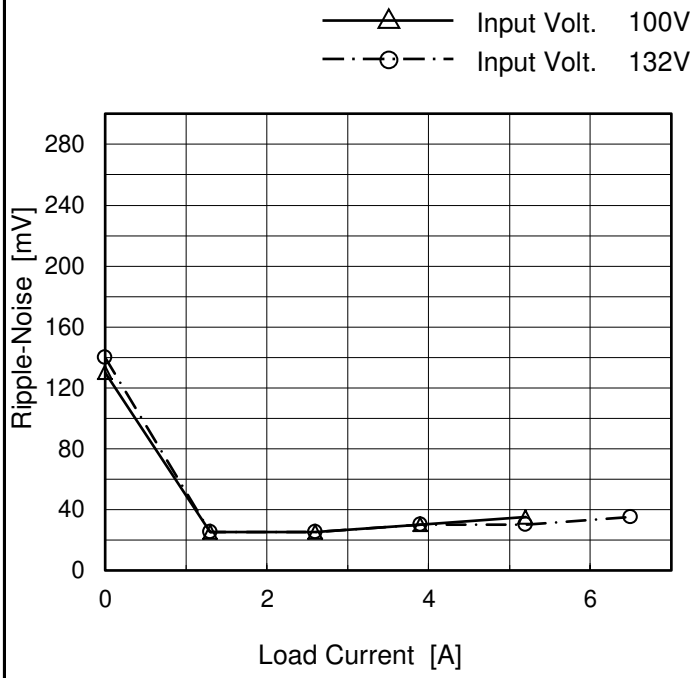
Model	WMA150H-24
Item	Ripple Noise(by Load Current)
Object	+24V6.5A

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.

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

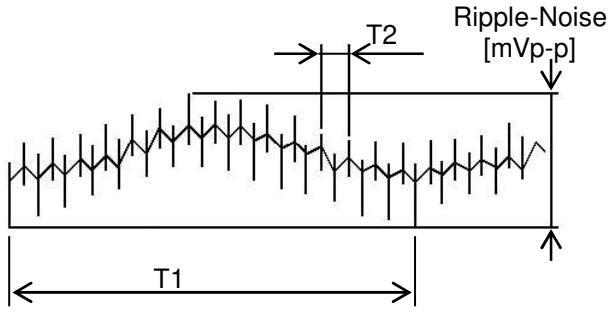


Fig. Complex Ripple Wave Form

2.Values

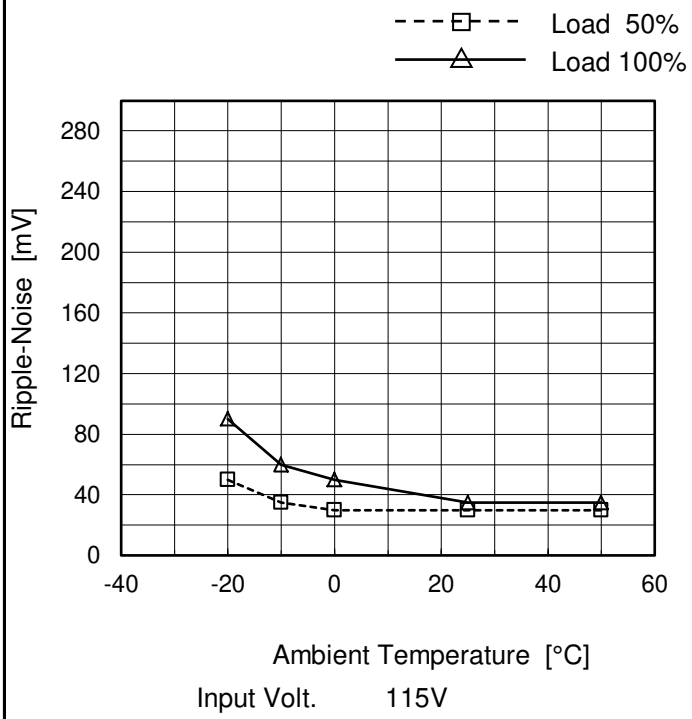
Load Current [A]	Ripple Noise [mV]	
	Input Volt. 100 [V]	Input Volt. 132 [V]
0.0	130	140
1.3	25	25
2.6	25	25
3.9	30	30
5.2	35	30
6.5	-	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	WMA150H-24
Item	Ripple Noise (by Ambient Temp.)
Object	+24V6.5A

Testing Circuitry Figure C

1.Graph



Input Volt. 115V

Measured by 20 MHz Oscilloscope.

2.Values

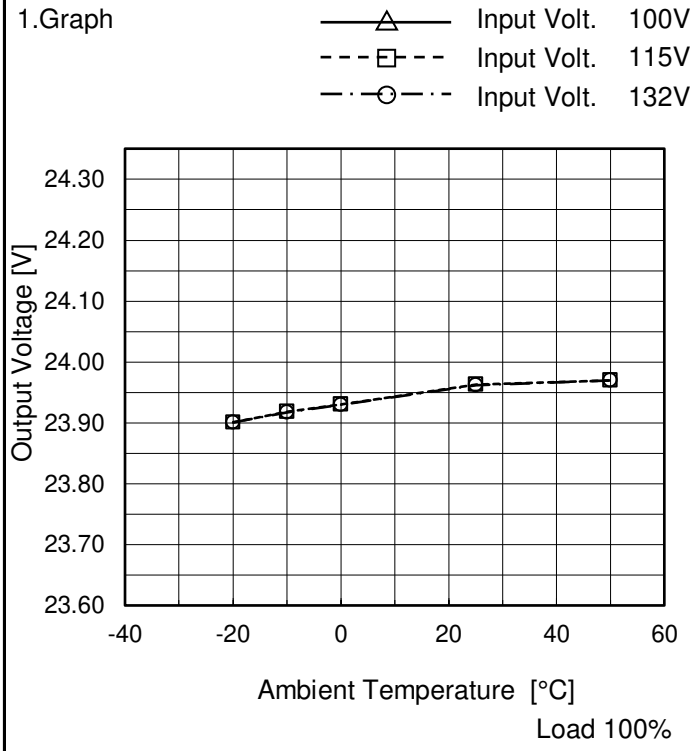
Ambient Temperature [°C]	Ripple Noise [mV]	
	Load 50%	Load 100%
-20	50	90
-10	35	60
0	30	50
25	30	35
50	30	35
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	WMA150H-24
Item	Ambient Temperature Drift
Object	+24V6.5A

Testing Circuitry Figure A

1.Graph



Load 100%

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
-20	-	23.901	23.901
-10	-	23.918	23.917
0	-	23.930	23.930
25	-	23.963	23.962
50	-	23.970	23.970
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

Model	WMA150H-24	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+24V6.5A	

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 : -10 - 50°C
Input Voltage : 100 - 132V
Load Current : 0 - 6.5A

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

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

2.Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	100	0	23.977	±31	±0.1
Minimum Voltage	-10	115	0	23.915		

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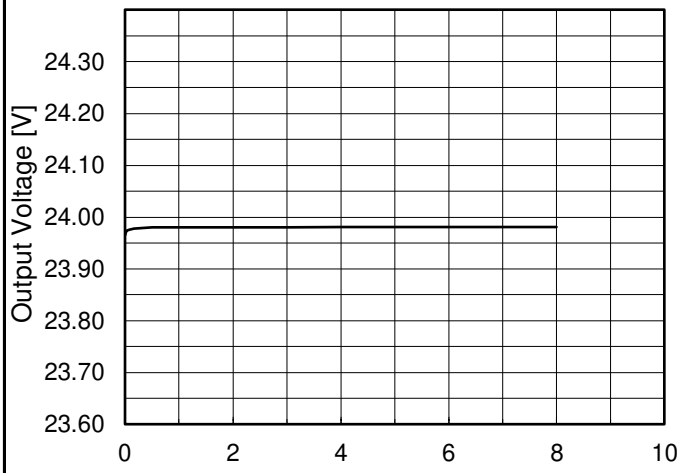
Model	WMA150H-24
Item	Time Lapse Drift
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 115V
Load 100%

2.Values

Time since start [H]	Output Voltage [V]
0.0	23.965
0.5	23.980
1.0	23.980
2.0	23.980
3.0	23.980
4.0	23.981
5.0	23.981
6.0	23.981
7.0	23.981
8.0	23.981

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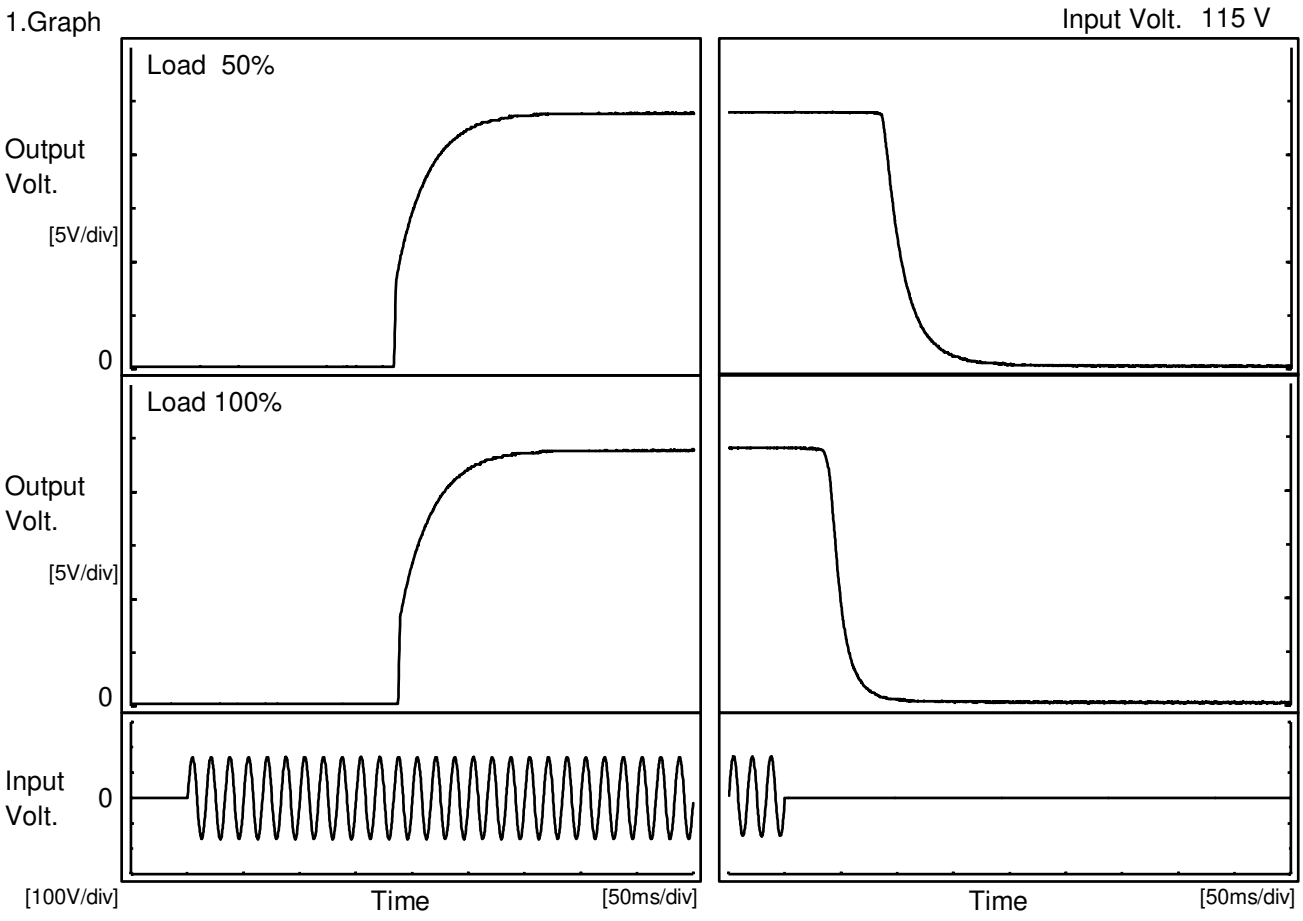
Model	WMA150H-24		
Item	Rise and Fall Time	Temperature	25°C
		Testing Circuitry	Figure A
Object	+24V6.5A		

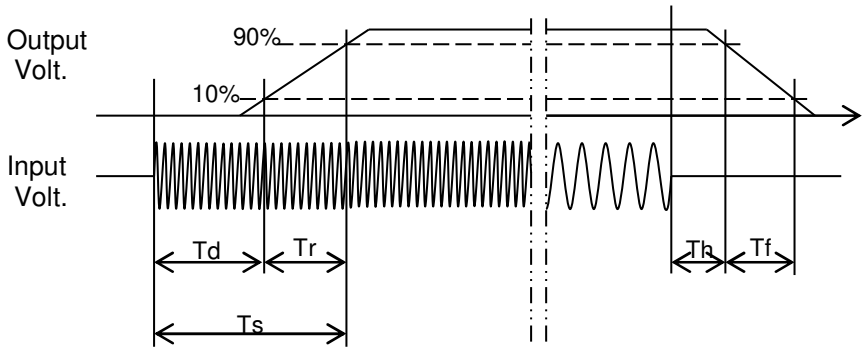
1.Graph



2.Values

[ms]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	184.3	57.8	242.1	88.8	41.3
100 %	187.8	58.0	245.8	39.0	26.3

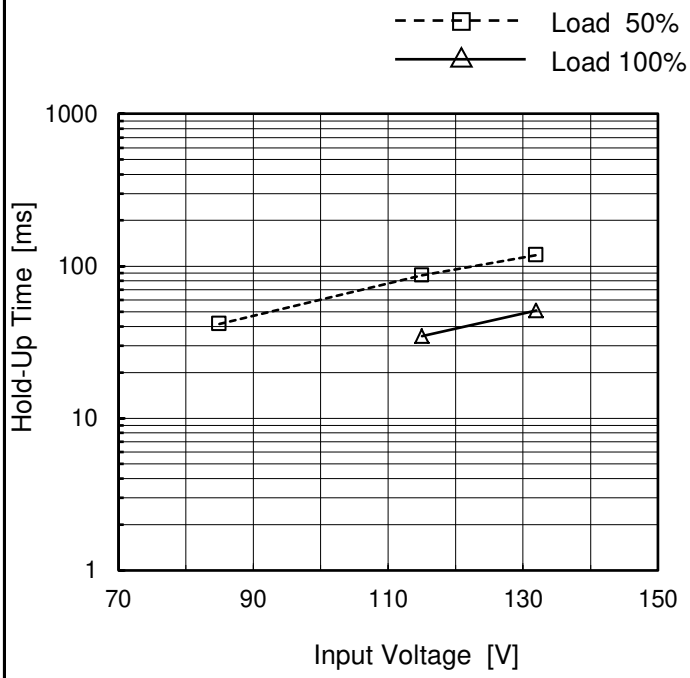


COSEL

Model	WMA150H-24
Item	Hold-Up Time
Object	+24V6.5A

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.

2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	42	-
100	62	-
115	87	35
132	119	51
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

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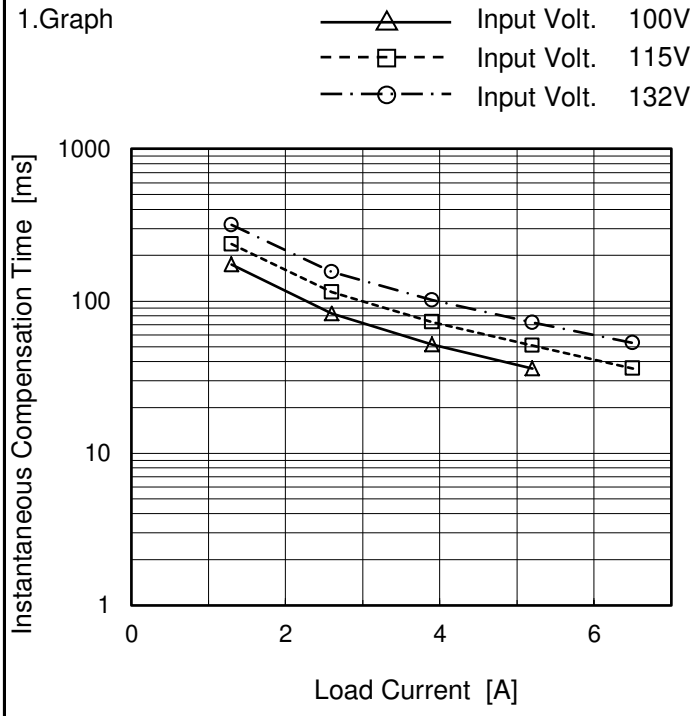
Model	WMA150H-24
Item	Instantaneous Interruption Compensation
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
0.0	-	-	-
1.3	174	236	315
2.6	83	114	155
3.9	52	73	101
5.2	36	51	72
6.5	-	36	53
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

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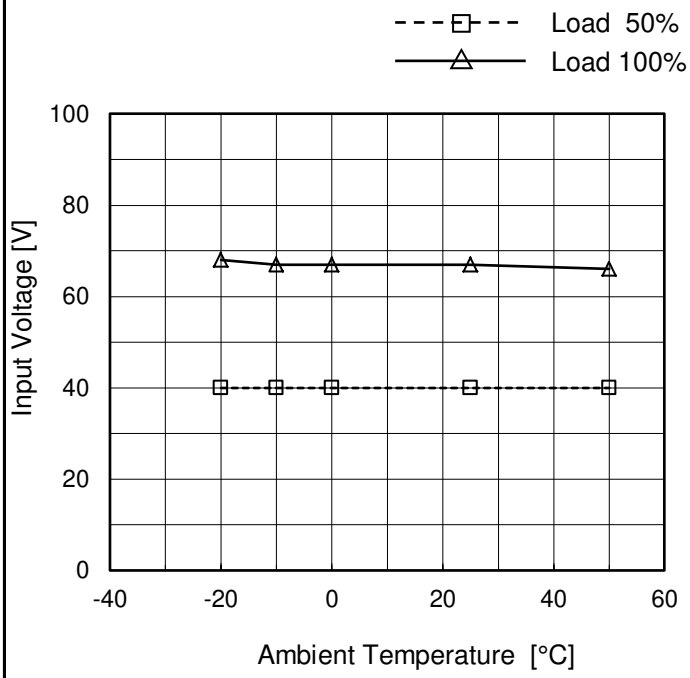
Model	WMA150H-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V6.5A

Testing Circuitry Figure A

1.Graph



2.Values

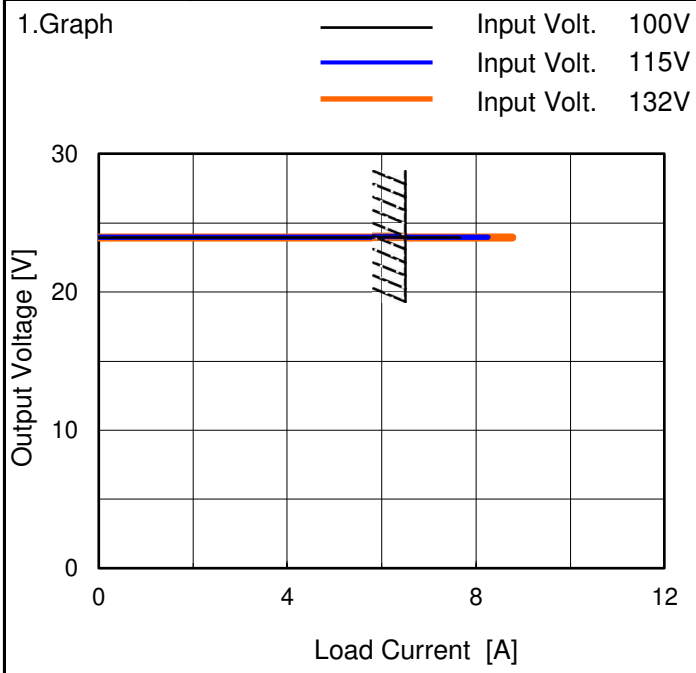
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	40	68
-10	40	67
0	40	67
25	40	67
50	40	66
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	WMA150H-24
Item	Overcurrent Protection
Object	+24V6.5A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

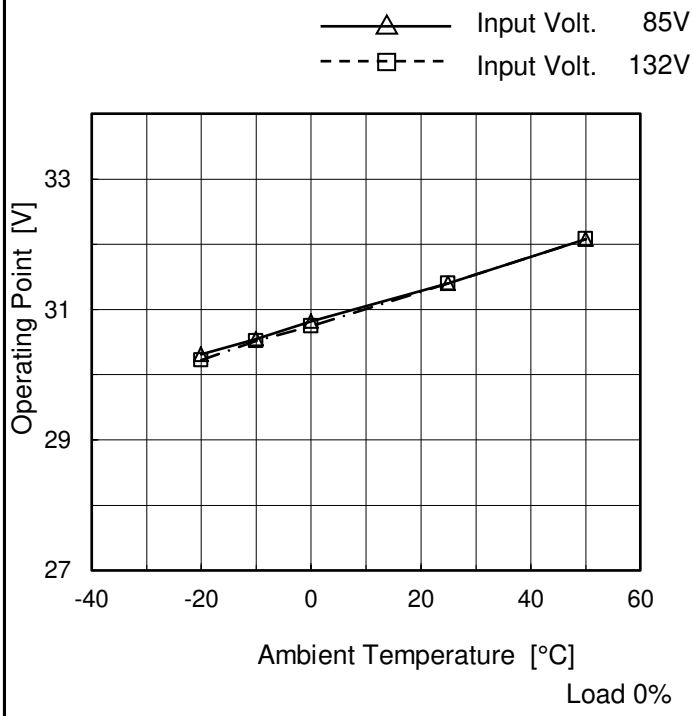
Output Voltage [V]	Load Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 132[V]
24	7.66	8.25	8.77
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	WMA150H-24
Item	Overvoltage Protection
Object	+24V6.5A

Testing Circuitry Figure A

1.Graph



Load 0%

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 85[V]	Input Volt. 132[V]
-20	30.31	30.22
-10	30.55	30.52
0	30.82	30.75
25	31.40	31.40
50	32.08	32.08
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

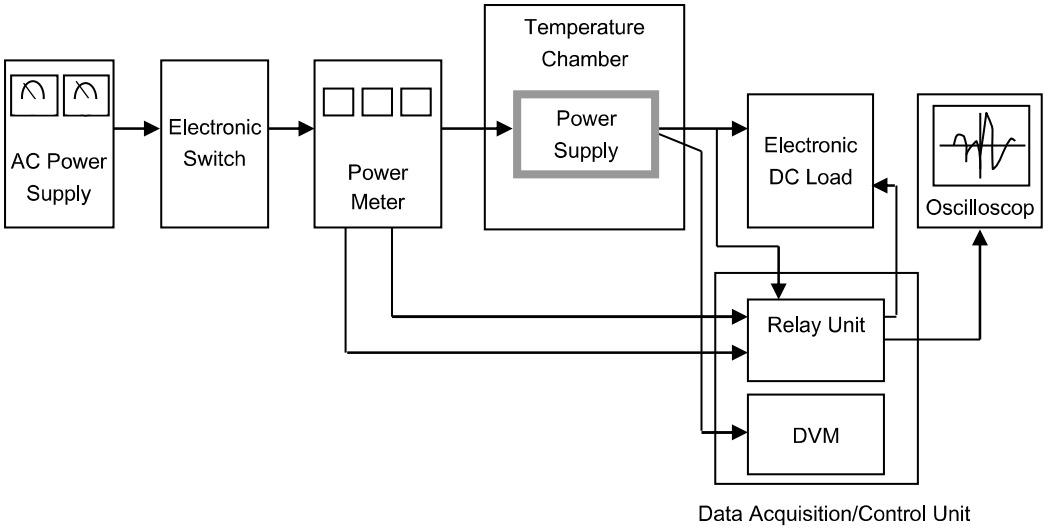


Figure A

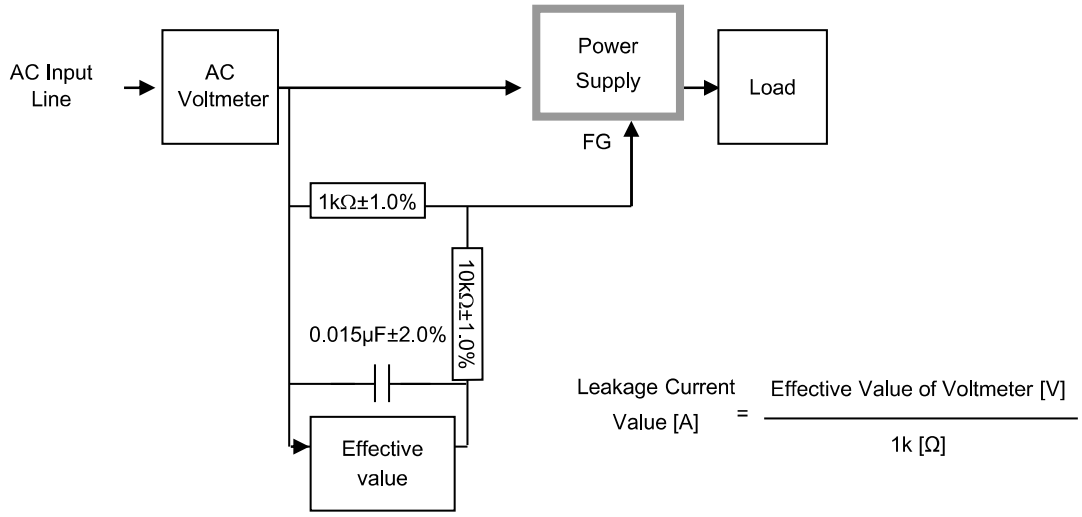
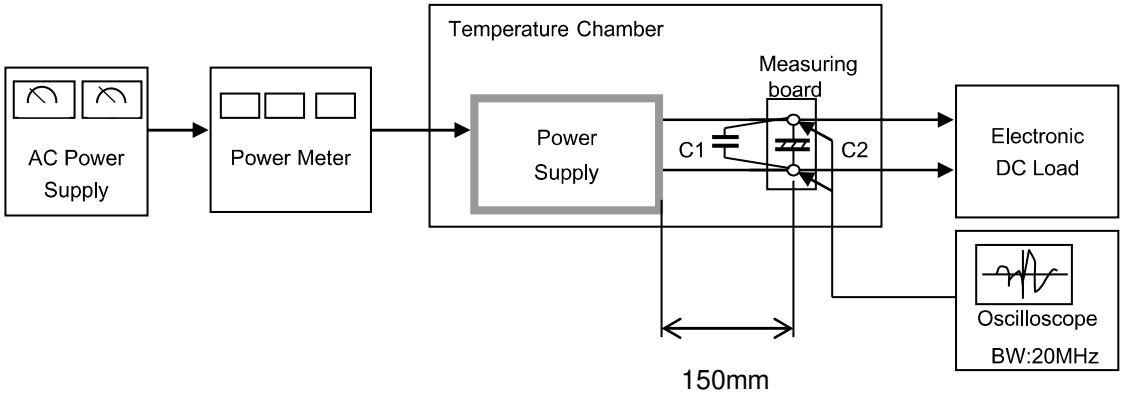


Figure B (IEC60601-1)



(Ceramic capacitor)

C1= 0.1 μF

(Electrolytic capacitor)

C2= 47 μF

Figure C