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参考資料

TEST DATA OF KHNA480F-24

Regulated DC Power Supply
February 2, 2016

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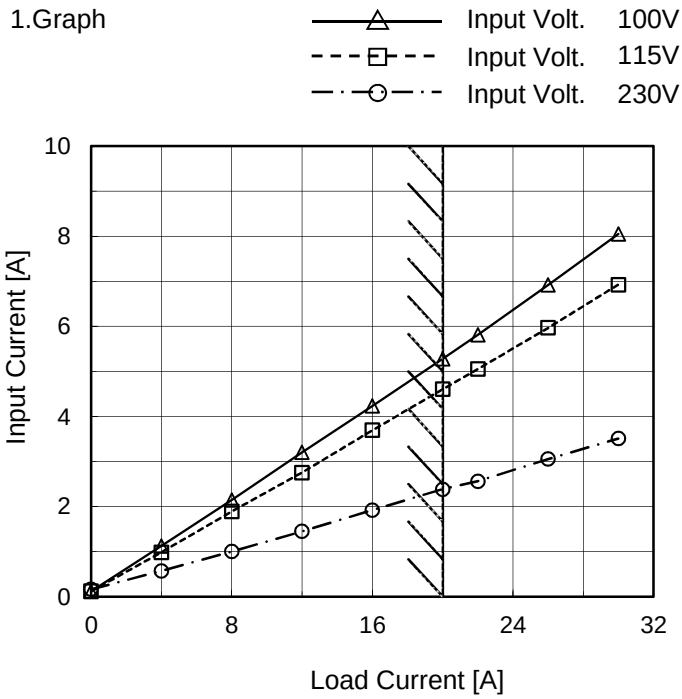
Model	KHNA480F-24
Item	Input Current (by Load Current)
Object	———

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. 115[V]	Input Volt. 230[V]
0.0	0.117	0.123	0.165
4.0	1.125	0.983	0.572
8.0	2.147	1.890	1.001
12.0	3.206	2.755	1.449
16.0	4.235	3.695	1.924
20.0	5.281	4.604	2.383
22.0	5.812	5.051	2.561
26.0	6.920	5.969	3.056
30.0	8.050	6.923	3.509
--	-	-	-
--	-	-	-

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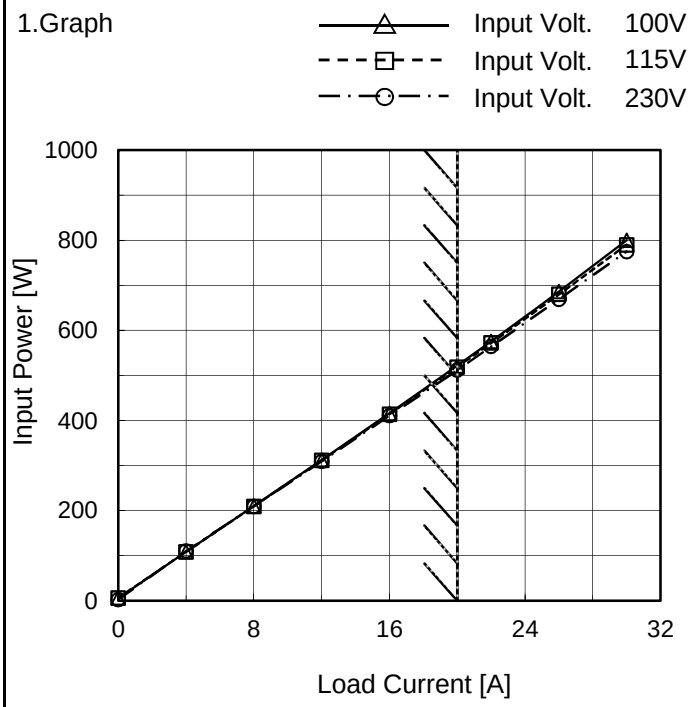
Model	KHNA480F-24
Item	Input Power (by Load Current)
Object	———

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. 115[V]	Input Volt. 230[V]
0.0	5.8	6.0	2.5
4.0	108.8	108.3	110.3
8.0	210.1	209.3	209.3
12.0	312.1	311.2	309.0
16.0	416.0	414.1	410.7
20.0	521.1	518.3	511.7
22.0	575.8	572.2	564.1
26.0	686.5	680.1	669.0
30.0	800.0	789.9	775.0
--	-	-	-
--	-	-	-

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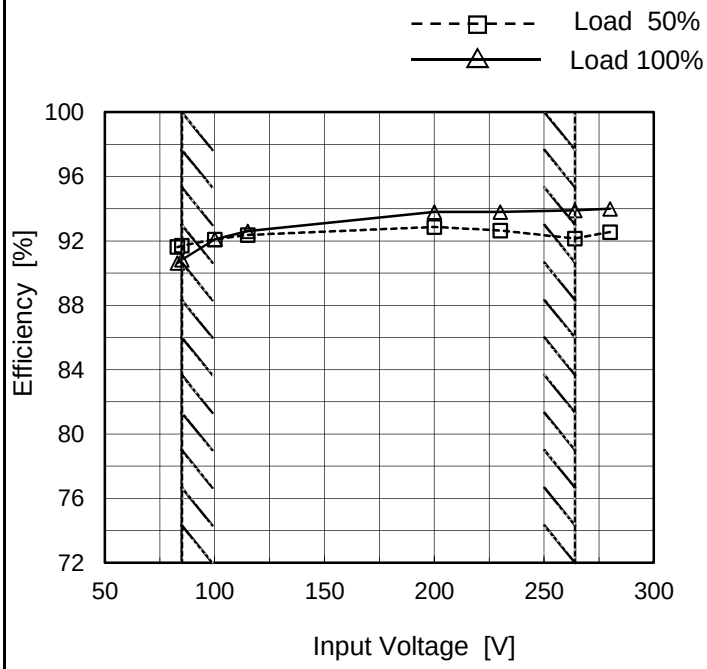
Model	KHNA480F-24
Item	Efficiency (by Input Voltage)
Object	

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%
83	91.6	90.6
85	91.7	90.8
100	92.1	92.1
115	92.4	92.6
200	92.9	93.8
230	92.6	93.8
264	92.1	93.9
280	92.5	94.0
--	-	-

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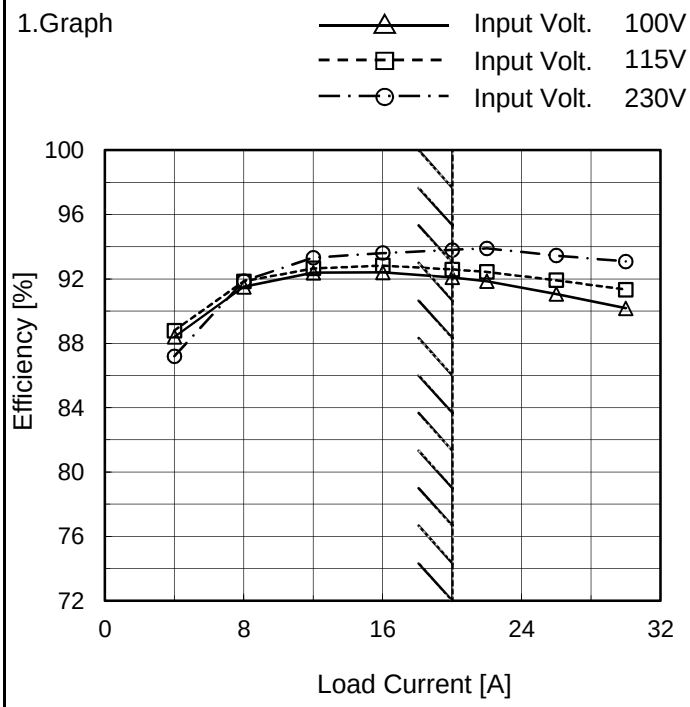
Model	KHNA480F-24
Item	Efficiency (by Load Current)
Object	———————

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. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	88.4	88.8	87.2
8.0	91.5	91.9	91.9
12.0	92.4	92.7	93.3
16.0	92.4	92.8	93.6
20.0	92.1	92.6	93.8
22.0	91.9	92.4	93.6
26.0	91.1	91.9	93.4
30.0	90.2	91.3	93.1
--	-	-	-
--	-	-	-

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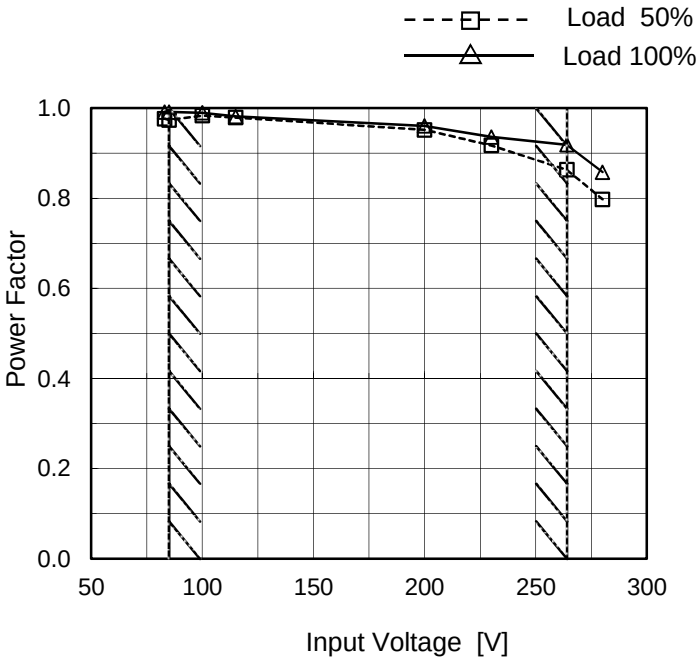
Model	KHNA480F-24
Item	Power Factor (by Input Voltage)
Object	

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%
83	0.977	0.992
85	0.974	0.992
100	0.983	0.990
115	0.979	0.982
200	0.952	0.961
230	0.917	0.936
264	0.864	0.919
280	0.798	0.858
--	-	-

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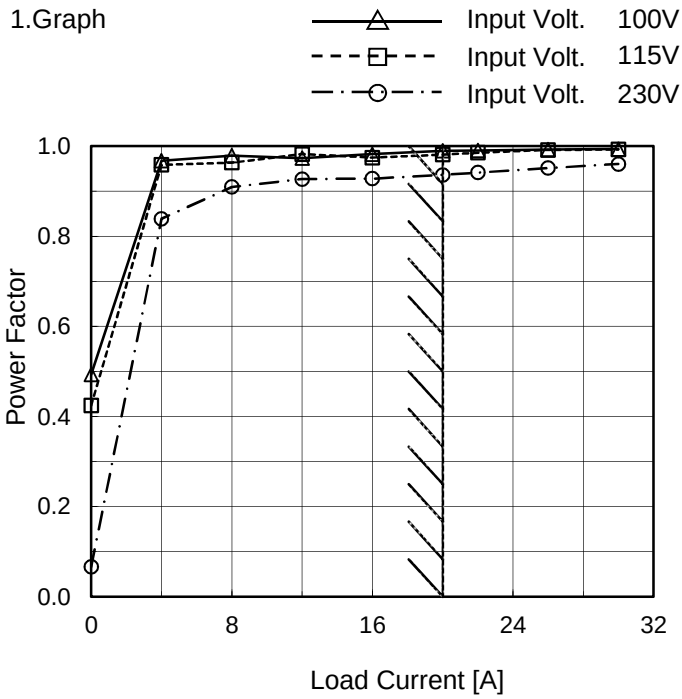
Model	KHNA480F-24
Item	Power Factor (by Load Current)
Object	———————

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. 115[V]	Input Volt. 230[V]
0.0	0.493	0.424	0.066
4.0	0.968	0.958	0.839
8.0	0.979	0.964	0.910
12.0	0.973	0.982	0.927
16.0	0.983	0.975	0.928
20.0	0.990	0.981	0.936
22.0	0.991	0.986	0.942
26.0	0.993	0.992	0.952
30.0	0.994	0.993	0.960
--	-	-	-
--	-	-	-

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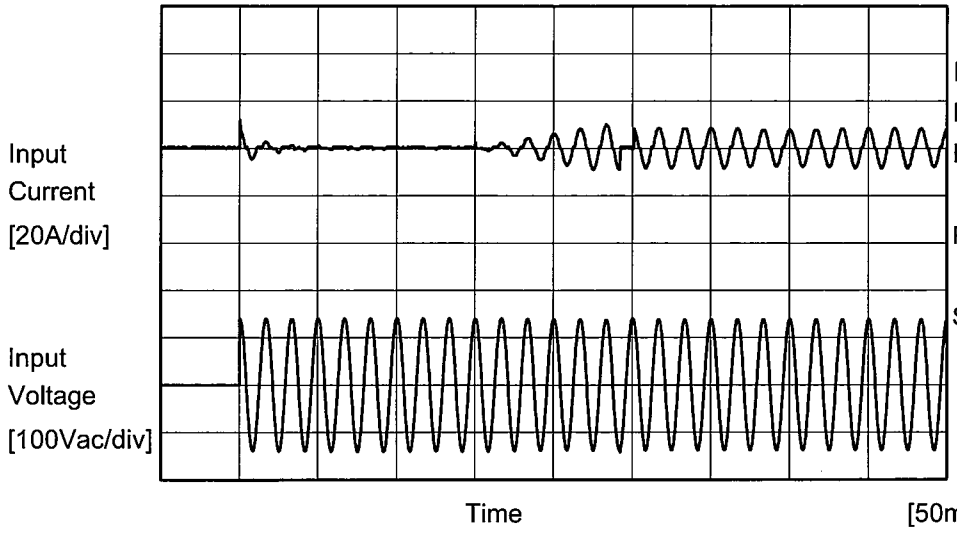
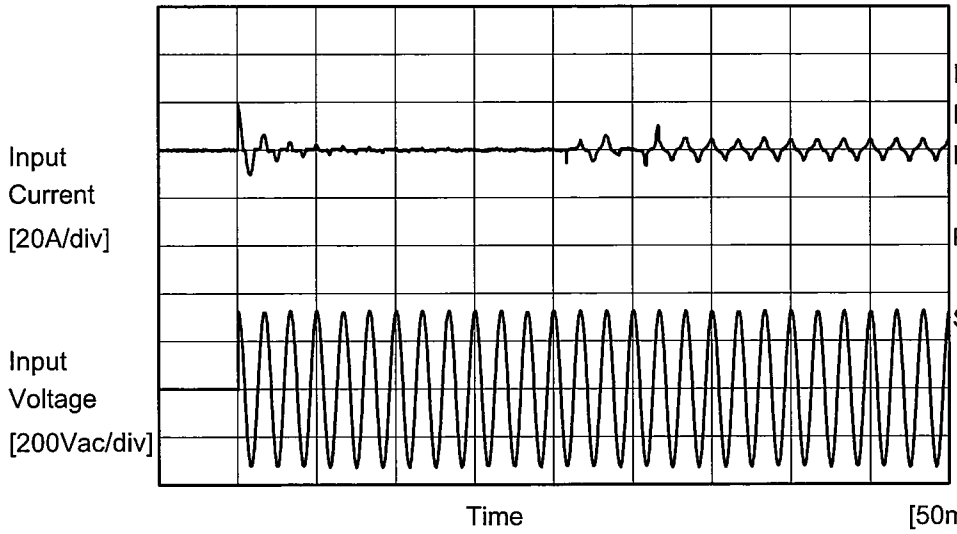
Model	KHNA480F-24	
Item	Inrush Current	Temperature 25°C Testing Circuitry Figure A
Object	———————	



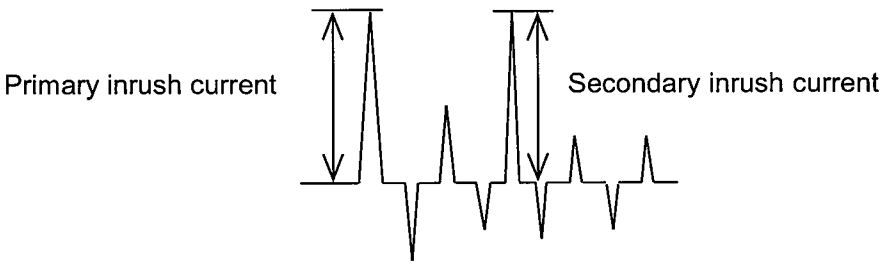
Input Voltage 115 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
11.9 A
Secondary inrush current :
10.1 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
19.2 A
Secondary inrush current :
10.3 A



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Model	KHNA480F-24	
Item	Leakage Current	Temperature 25°C Testing Circuitry Figure B
Object	———————	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
DEN-AN	Both phases	0.31	0.35	0.76	Operation
	One of phases	0.45	0.52	1.20	Stand by
IEC60950-1	Both phases	0.30	0.34	0.72	Operation
	One of phases	0.43	0.50	1.09	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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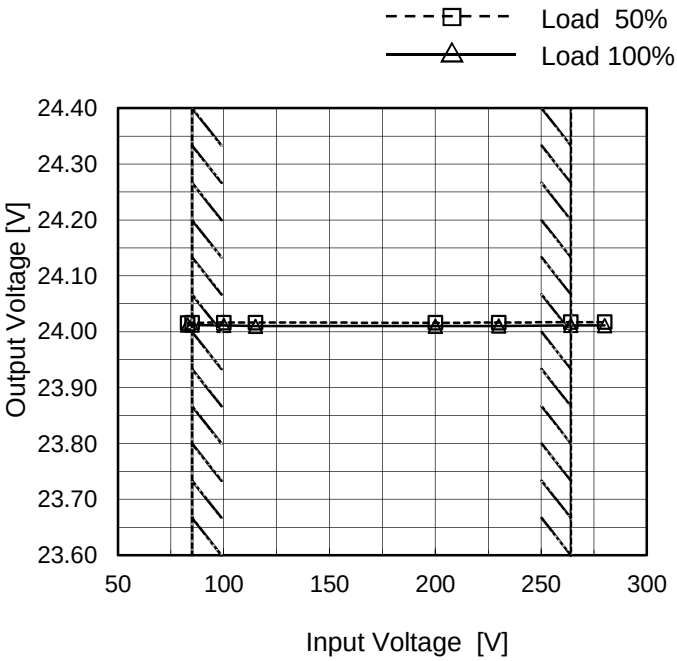
Model	KHNA480F-24
Item	Line Regulation
Object	+24V20A

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%
83	24.016	24.012
85	24.016	24.012
100	24.016	24.012
115	24.016	24.010
200	24.016	24.010
230	24.016	24.010
264	24.017	24.012
280	24.017	24.011
--	-	-

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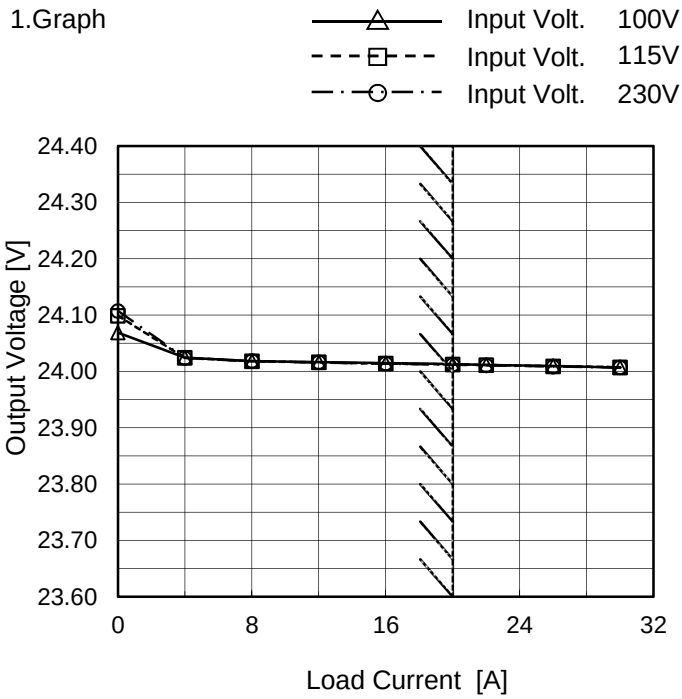
Model	KHNA480F-24
Item	Load Regulation
Object	+24V20A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

Burst operation at 30% load or less.

2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	24.069	24.099	24.107
4.0	24.025	24.024	24.024
8.0	24.019	24.018	24.018
12.0	24.016	24.016	24.016
16.0	24.015	24.014	24.014
20.0	24.013	24.012	24.012
22.0	24.012	24.011	24.011
26.0	24.010	24.009	24.008
30.0	24.007	24.007	24.007
--	-	-	-
--	-	-	-

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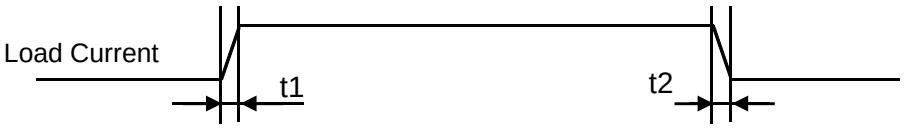
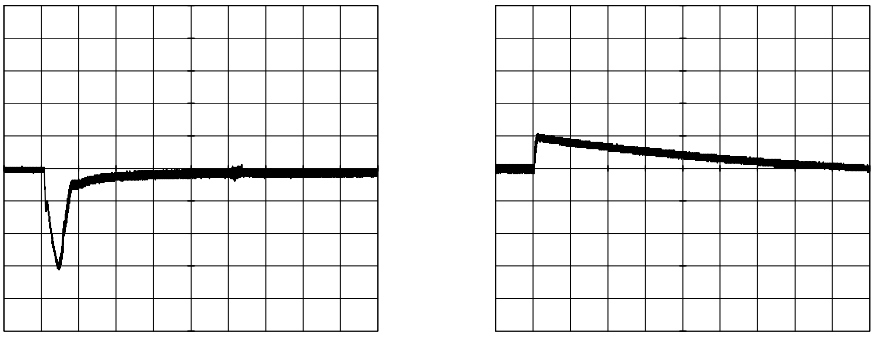
Model	KHNA480F-24		
Item	Dynamic Load Response	Temperature Testing Circuitry	25° C Figure A
Object	+24V20A		

Input Volt. 230 V
Cycle 1000 ms

Response. t1=t2=50us. Typ



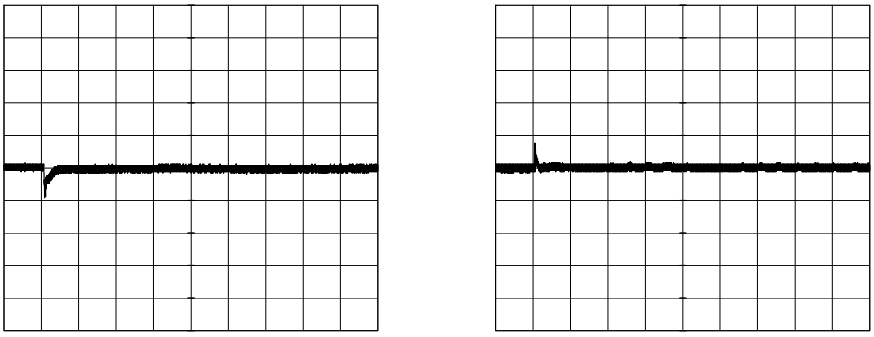
Min.Load (0A) ←→
Load 100% (20A)



500mV/div

2 ms/div 20 ms/div

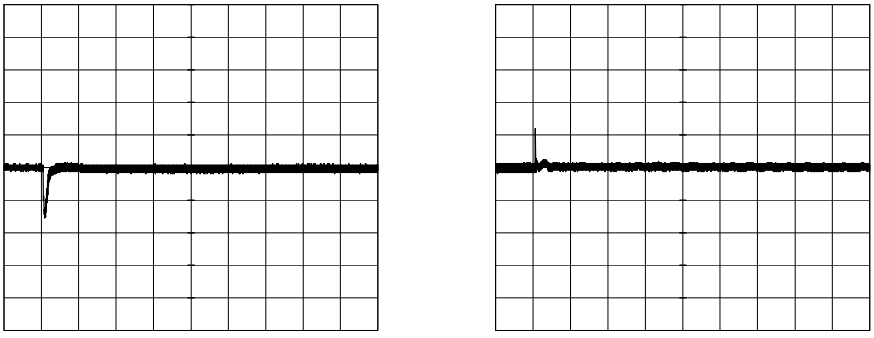
Load 30%(6A) ←→
Load 100% (20A)



500mV/div

2 ms/div 20 ms/div

Load 30%(6A) ←→
Load 150% (30A)



500mV/div

2 ms/div 20 ms/div

∗ The characteristic of AC115V is equal.

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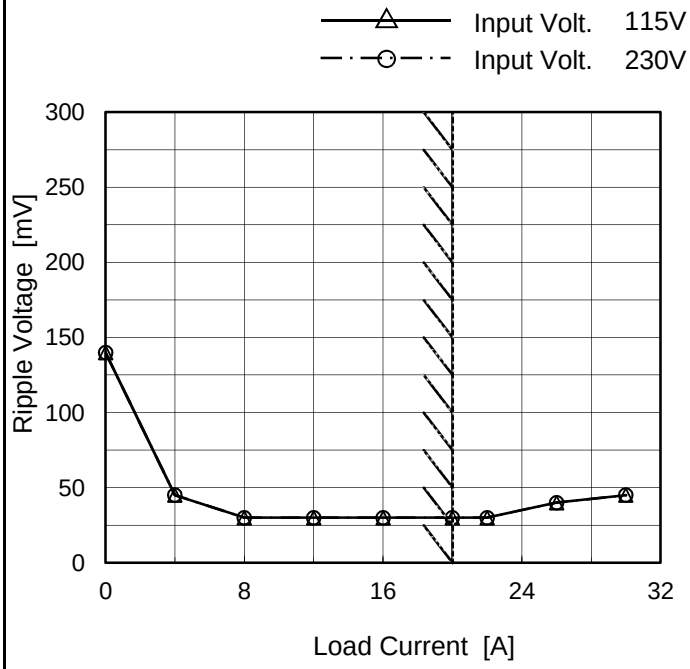
Model	KHNA480F-24
Item	Ripple Voltage (by Load Current)
Object	+24V20A

Temperature 25°C
Testing Circuitry Figure C

1.Graph



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.

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

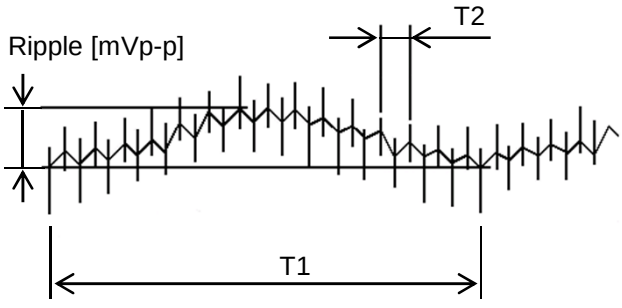


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	140	140
4.0	45	45
8.0	30	30
12.0	30	30
16.0	30	30
20.0	30	30
22.0	30	30
26.0	40	40
30.0	45	45
--	-	-
--	-	-

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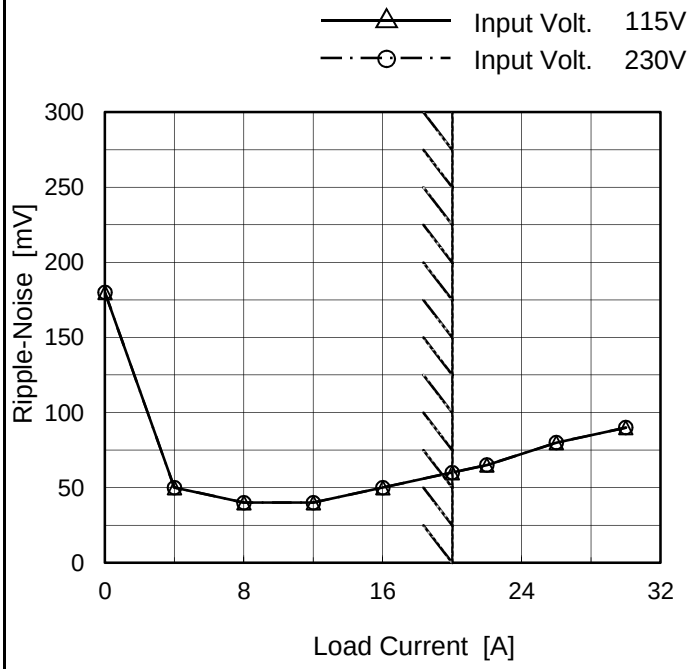
Model	KHNA480F-24
Item	Ripple-Noise
Object	+24V20A

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.

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

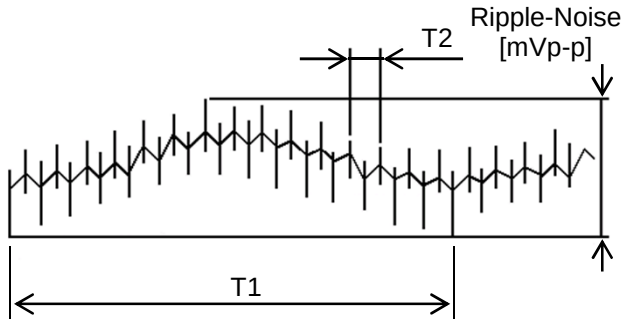


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	180	180
4.0	50	50
8.0	40	40
12.0	40	40
16.0	50	50
20.0	60	60
22.0	65	65
26.0	80	80
30.0	90	90
--	-	-
--	-	-

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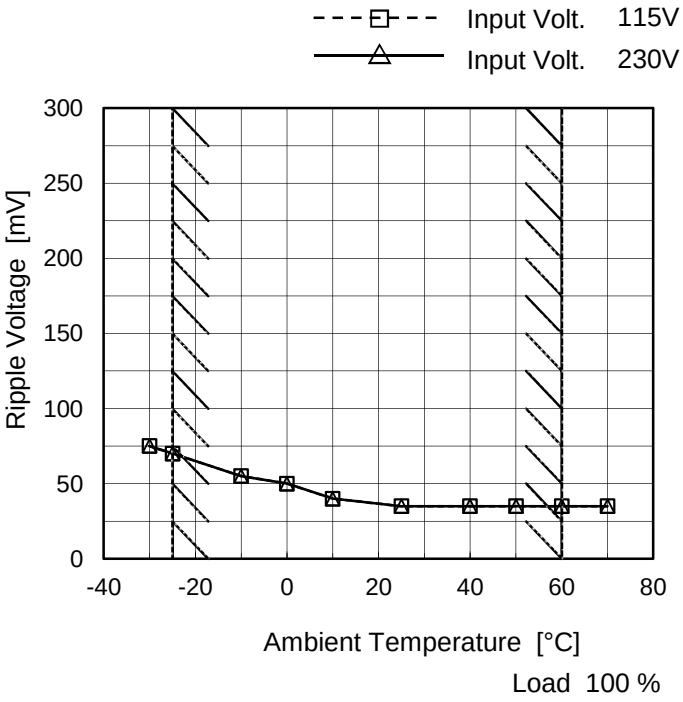
Model	KHNA480F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V20A

Testing Circuitry Figure C

1.Graph



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	75	75
-25	70	70
-10	55	55
0	50	50
10	40	40
25	30	30
40	35	35
50	35	35
60	35	35
70	35	35
--	-	-

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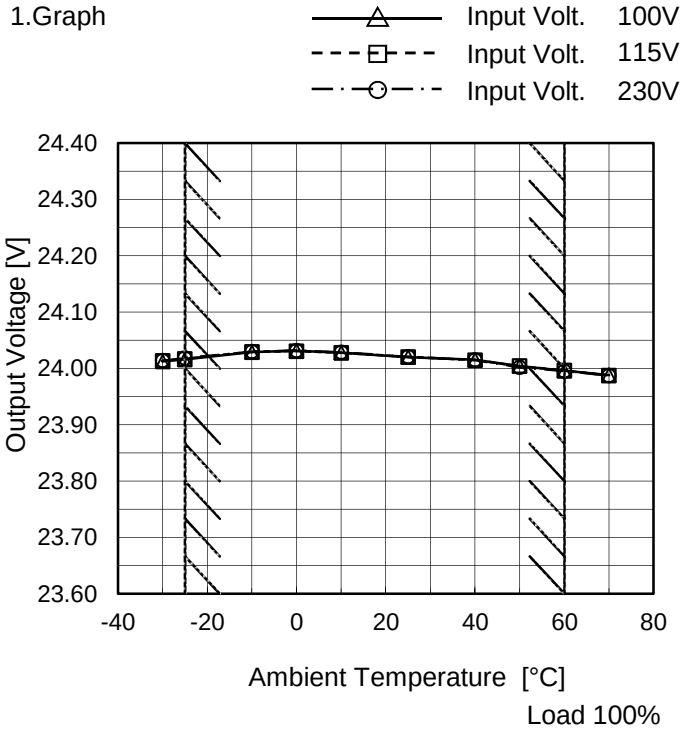
Model	KHNA480F-24
Item	Ambient Temperature Drift
Object	+24V20A

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. 115[V]	Input Volt. 230[V]
-30	24.012	24.013	24.014
-25	24.016	24.017	24.018
-10	24.029	24.030	24.030
0	24.031	24.031	24.032
10	24.028	24.028	24.029
25	24.020	24.020	24.021
40	24.016	24.015	24.015
50	24.004	24.004	24.002
60	23.996	23.996	23.995
70	23.988	23.987	23.987
--	-	-	-

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Model	KHNA480F-24	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+24V20A	

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 : -25 - 60°C
Input Voltage : 85 - 264V
Load Current : 0 - 20A

* 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	60	264	0	24.139	±78	±0.3
Minimum Voltage	-25	85	20	23.983		

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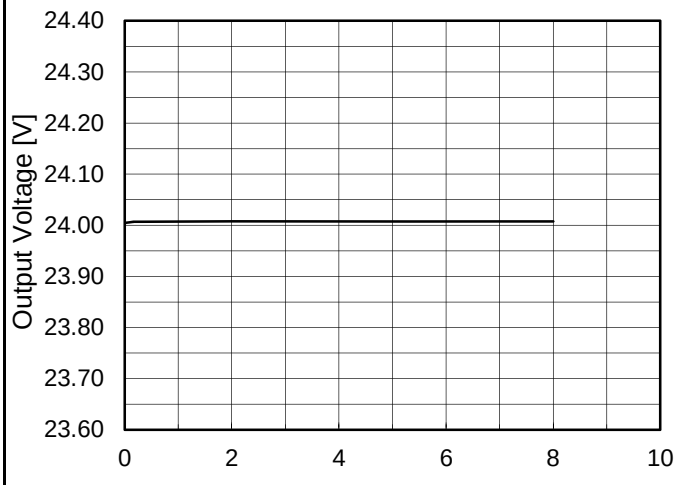
Model	KHNA480F-24
Item	Time Lapse Drift
Object	+24V20A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 230V
Load 100%

* The characteristic of AC115V is equal.

2.Values

Time since start [H]	Output Voltage [V]
0.0	24.004
0.5	24.007
1.0	24.007
2.0	24.008
3.0	24.008
4.0	24.008
5.0	24.008
6.0	24.008
7.0	24.008
8.0	24.008

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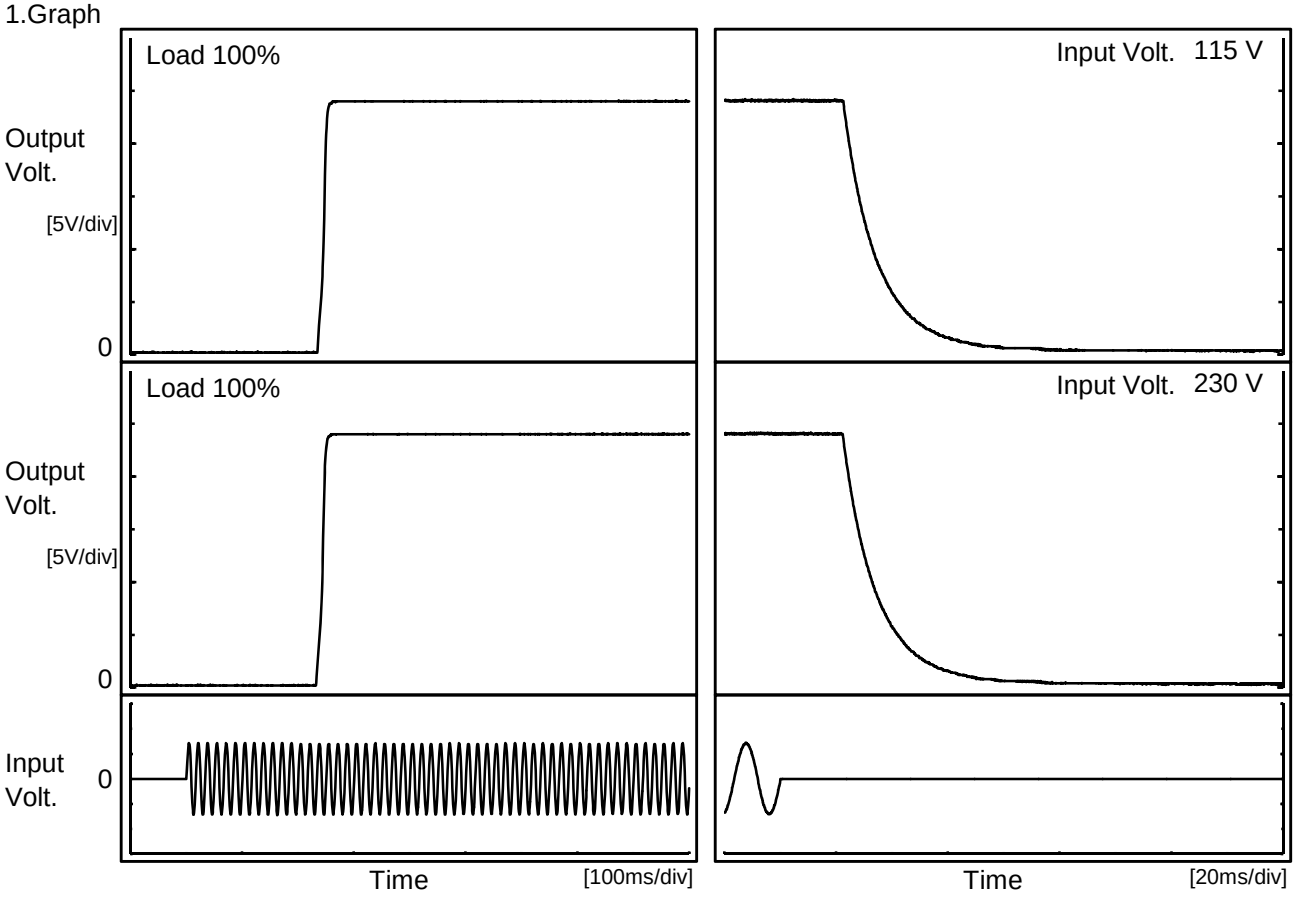
Model	KHNA480F-24	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+24V20A	

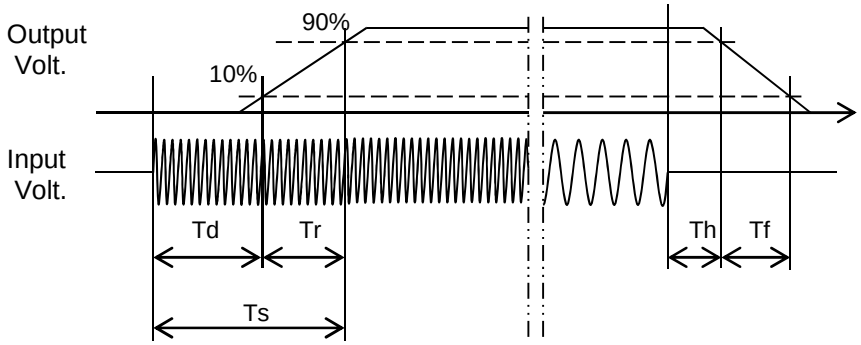
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
115 V	238.0	13.5	251.5	23.6	28.2
230 V	235.5	14.0	249.5	23.4	28.0

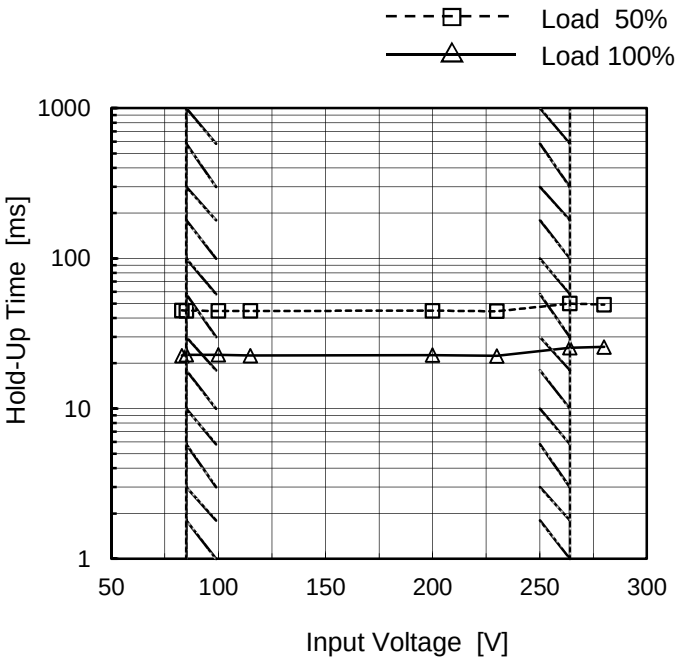


COSEL

Model	KHNA480F-24
Item	Hold-Up Time
Object	+24V20A

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

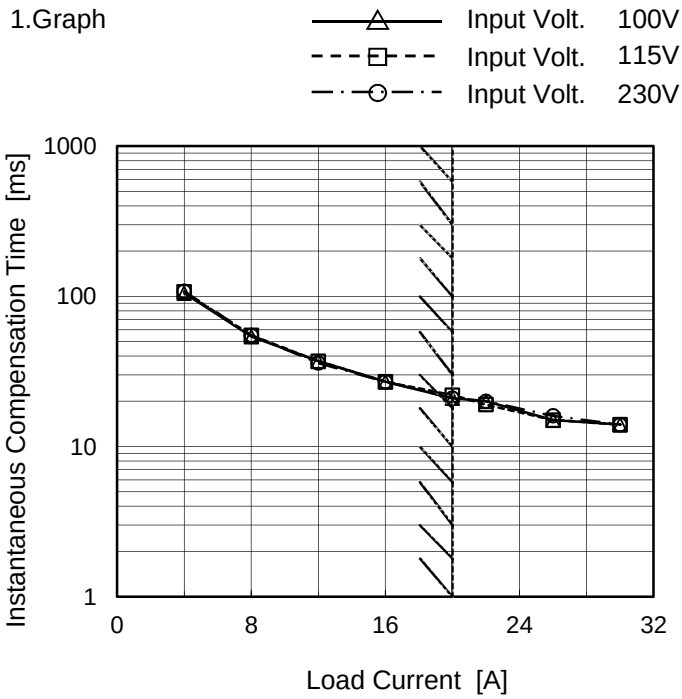
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
83	45	23
85	45	23
100	45	23
115	45	23
200	45	23
230	45	22
264	50	25
280	50	26
--	-	-

COSEL

Model	KHNA480F-24
Item	Instantaneous Interruption Compensation
Object	+24V20A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

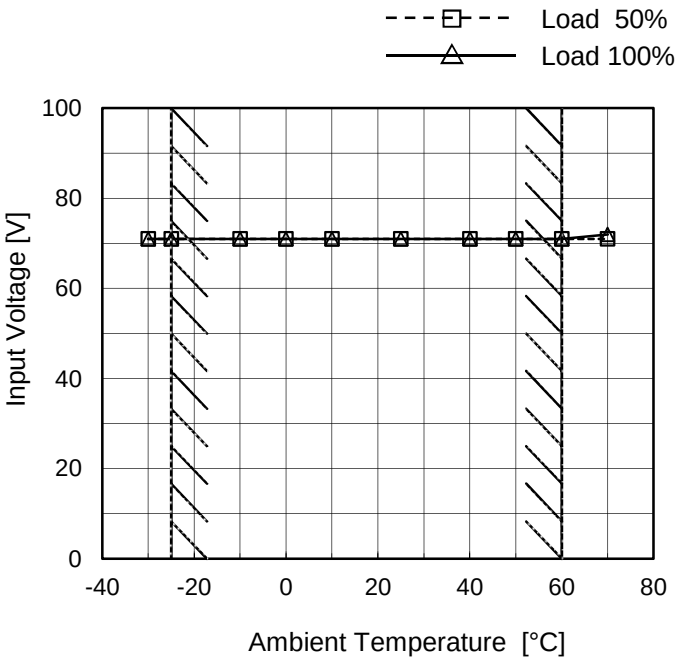
Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.0	-	-	-
4.0	105	107	108
8.0	54	55	55
12.0	37	37	36
16.0	27	27	27
20.0	21	22	21
22.0	20	19	20
26.0	15	15	16
30.0	14	14	14
--	-	-	-
--	-	-	-

COSEL

Model	KHNA480F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V20A

Testing Circuitry Figure A

1.Graph



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

2.Values

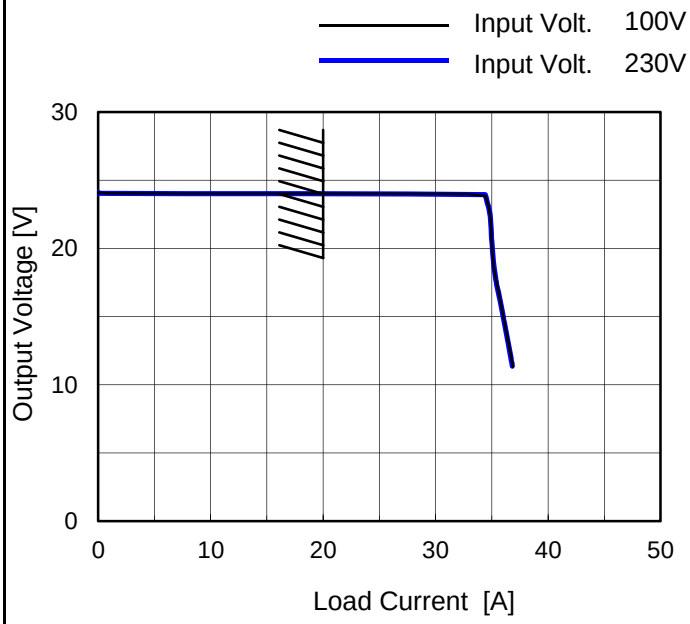
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	71	71
-25	71	71
-10	71	71
0	71	71
10	71	71
25	71	71
40	71	71
50	71	71
60	71	71
70	71	72
--	-	-

COSEL

Model	KHNA480F-24
Item	Overcurrent Protection
Object	+24V20A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

Intermittent operation occurs when the output voltage is from 11.2V to 0V.

2.Values

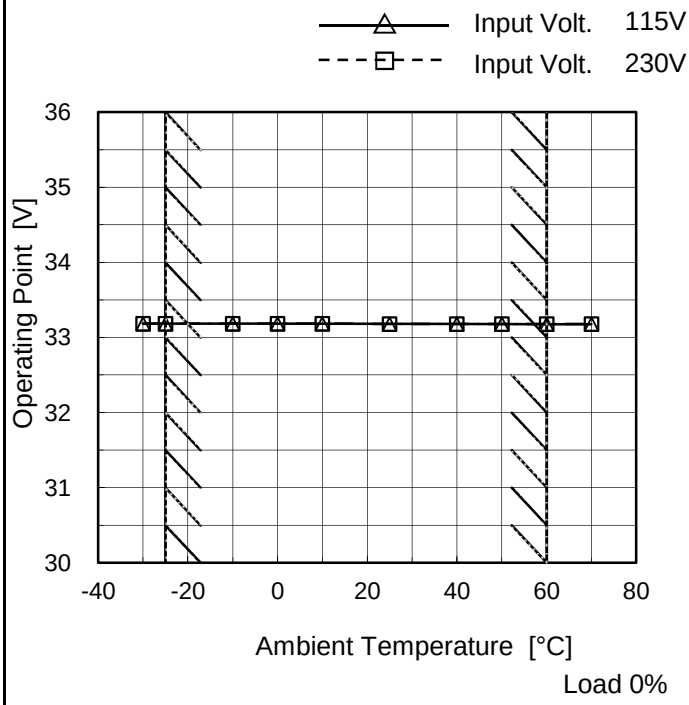
Output Voltage [V]	Load Current [A]	
	Input Volt. 100[V]	Input Volt. 230[V]
22.8	34.78	34.80
21.6	34.92	27.61
19.2	35.10	35.11
16.8	35.59	35.53
14.4	36.16	36.11
12.0	36.72	36.66
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	KHNA480F-24
Item	Overvoltage Protection
Object	+24V20A

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. 115[V]	Input Volt. 230[V]
-30	33.18	33.18
-25	33.18	33.18
-10	33.18	33.18
0	33.18	33.18
10	33.18	33.18
25	33.18	33.18
40	33.18	33.18
50	33.18	33.18
60	33.18	33.18
70	33.18	33.18
--	-	-

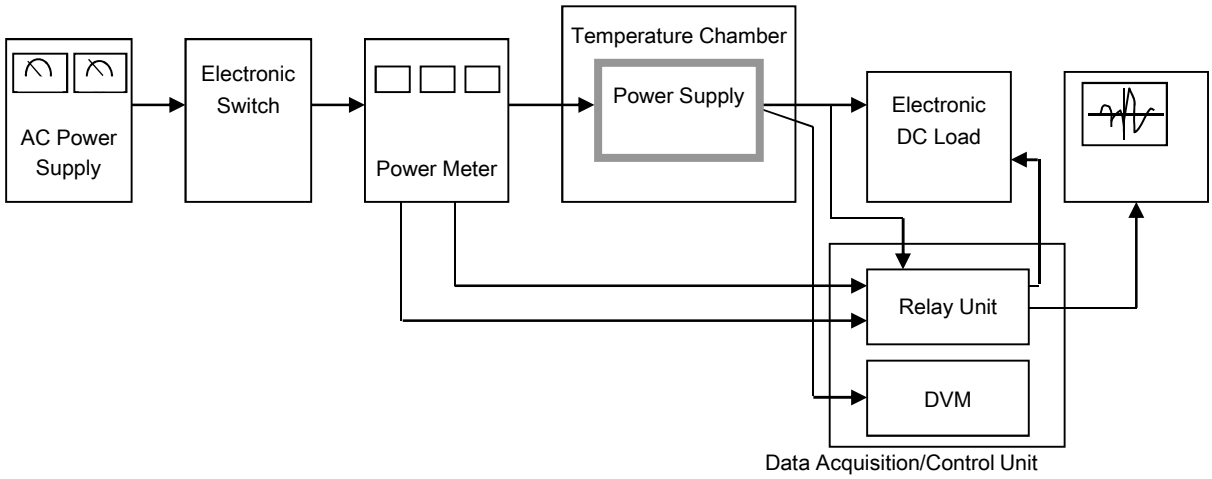


Figure A

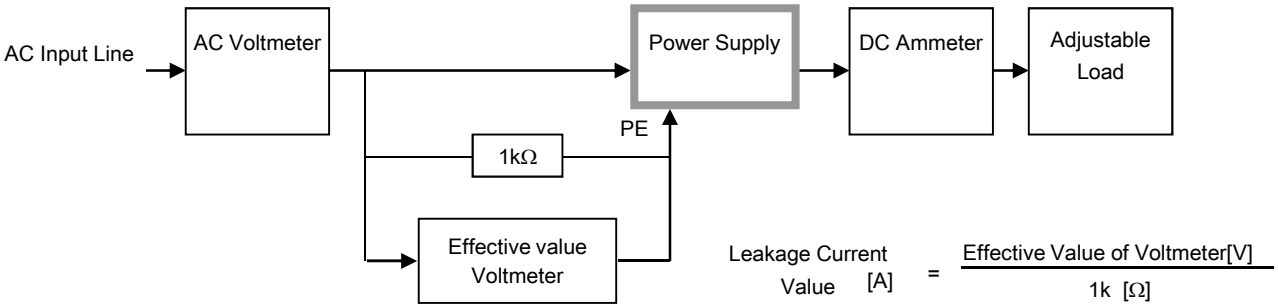


Figure B (DEN-AN)

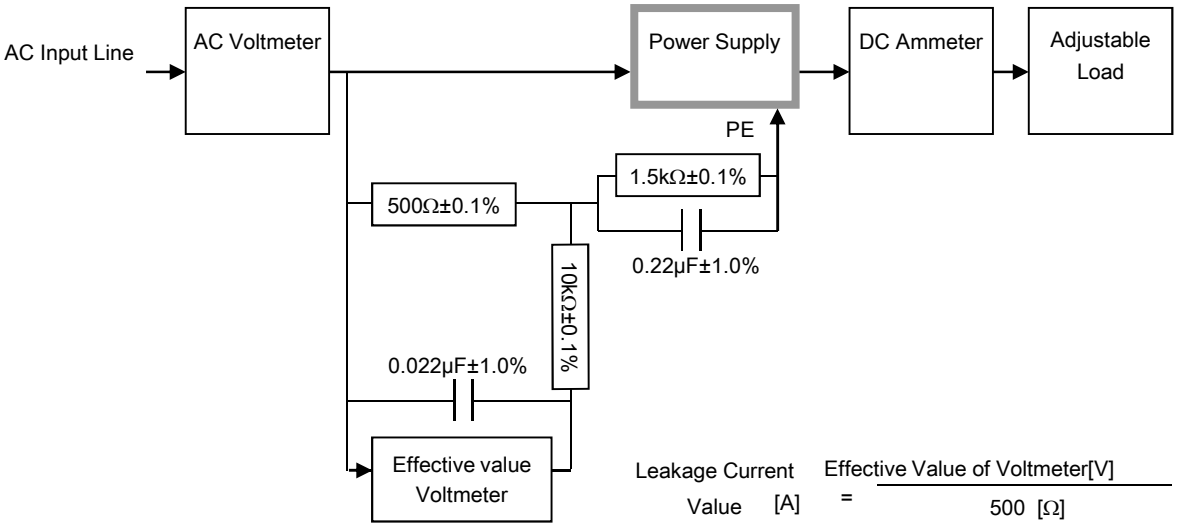
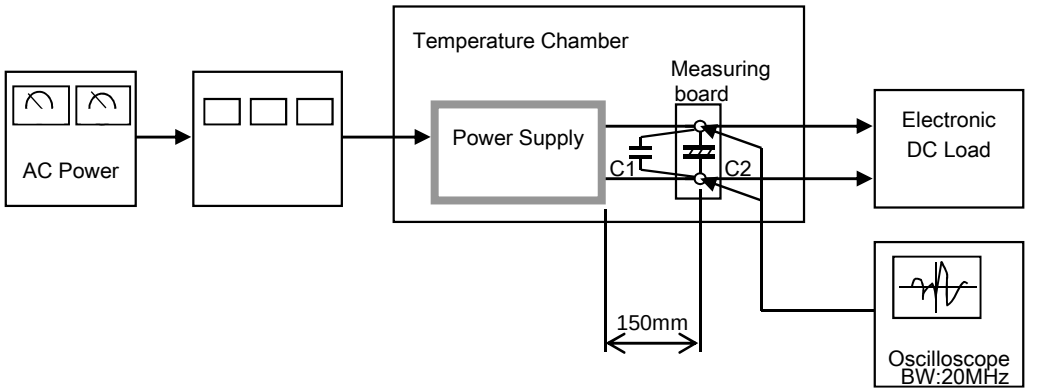


Figure B (IEC60950-1)



C1= 0.1 μF
(Ceramic capacitor)
C2= 22 μF
(Electrolytic capacitor)

Figure C