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参考資料

TEST DATA OF KHEA90F-12

Regulated DC Power Supply
June 16, 2014

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COSEL CO.,LTD.

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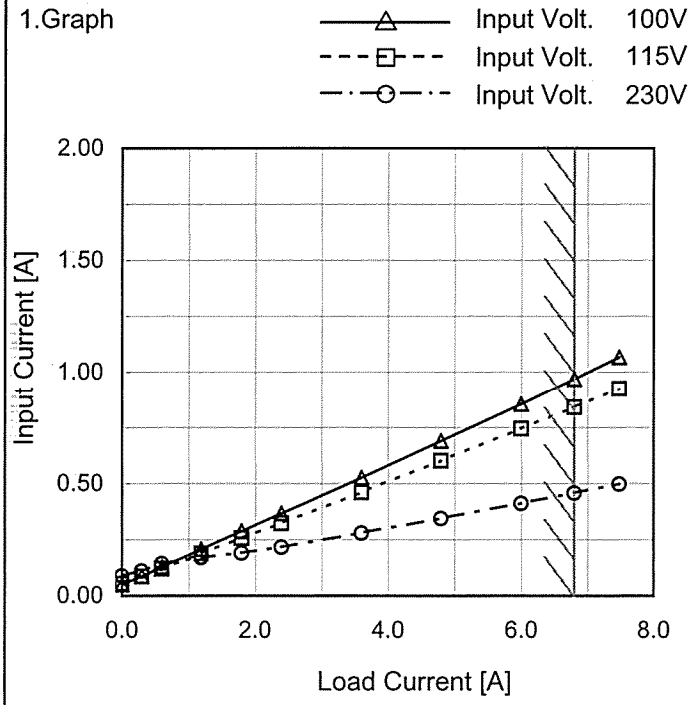
Model	KHEA90F-12
Item	Input Current (by Load Current)
Object	————————

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

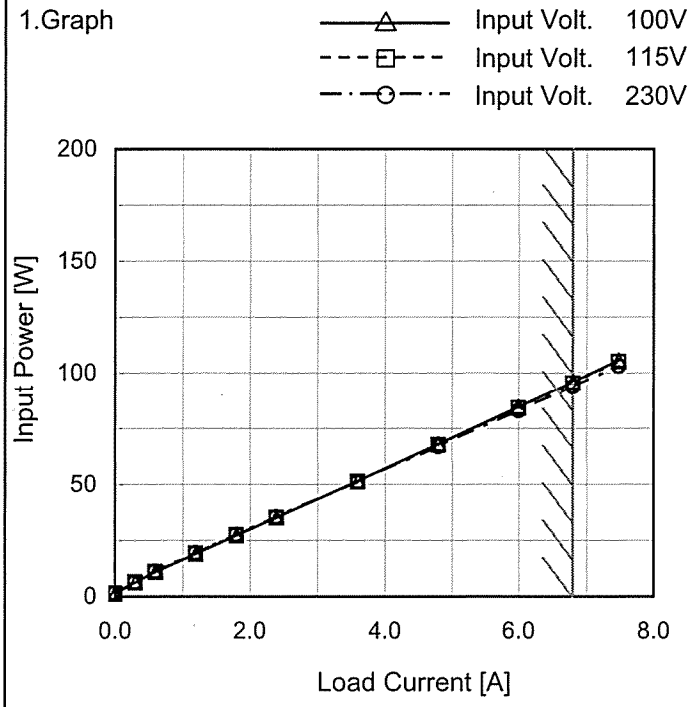
Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	0.051	0.054	0.089
0.30	0.087	0.087	0.111
0.60	0.130	0.121	0.143
1.20	0.209	0.188	0.171
1.80	0.289	0.257	0.190
2.40	0.368	0.324	0.218
3.60	0.528	0.462	0.280
4.80	0.691	0.602	0.345
6.00	0.857	0.745	0.413
6.80	0.970	0.842	0.459
7.48	1.067	0.925	0.499

COSEL

Model	KHEA90F-12
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

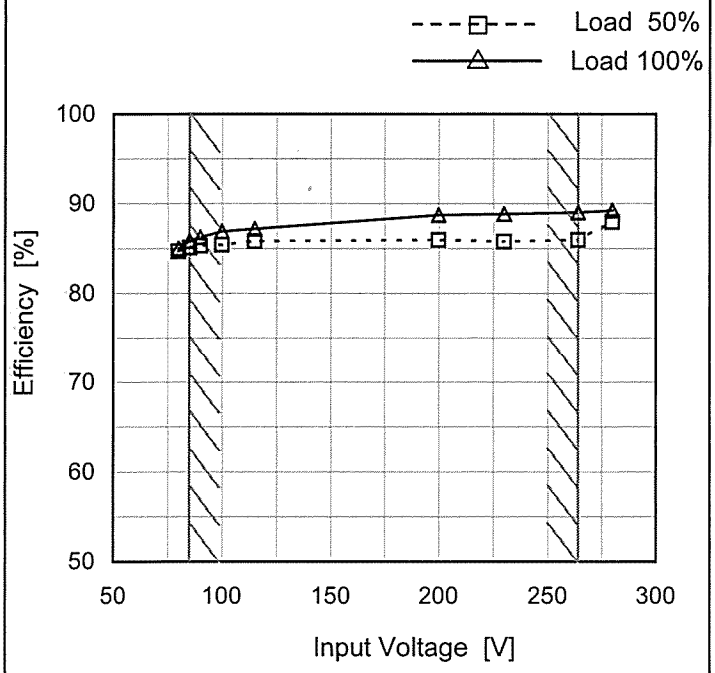
Load Current [A]	Input Power [W]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	1.3	1.4	1.6
0.30	6.4	6.4	6.5
0.60	11.0	11.1	11.3
1.20	19.2	19.2	19.6
1.80	27.4	27.4	27.8
2.40	35.3	35.3	35.6
3.60	51.6	51.3	51.3
4.80	68.1	67.7	67.0
6.00	84.7	84.2	83.0
6.80	96.0	95.4	93.8
7.48	105.8	105.0	103.1

COSEL

Model	KHEA90F-12
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%
80	84.7	85.0
85	85.1	85.8
90	85.3	86.3
100	85.4	86.9
115	85.8	87.2
200	86.0	88.8
230	85.8	88.9
264	86.0	89.1
280	87.9	89.2

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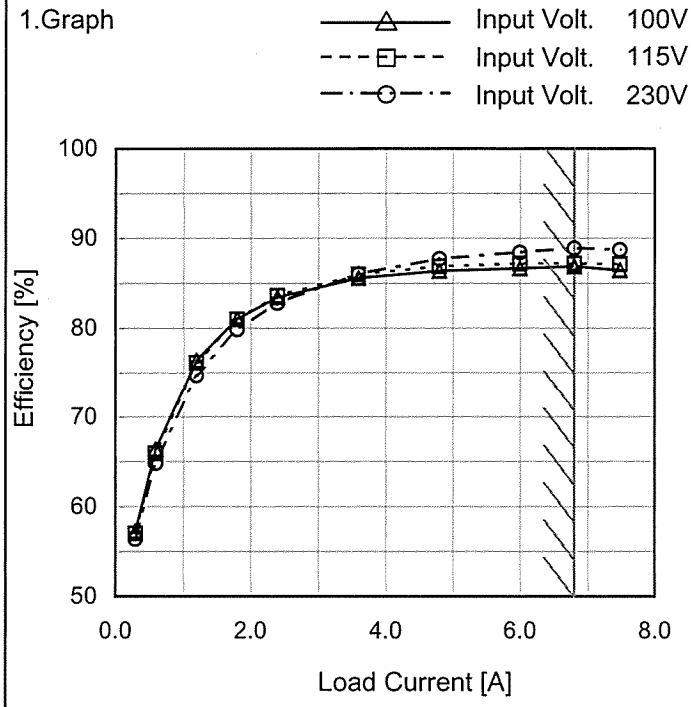
Model	KHEA90F-12
Item	Efficiency (by Load Current)
Object	————————

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]
0.00	-	-	-
0.30	57.3	57.0	56.4
0.60	66.4	65.9	64.8
1.20	76.4	76.1	74.7
1.80	81.0	81.0	79.8
2.40	83.5	83.6	82.8
3.60	85.6	86.0	86.0
4.80	86.4	86.9	87.7
6.00	86.7	87.2	88.4
6.80	86.9	87.2	88.9
7.48	86.5	87.1	88.7

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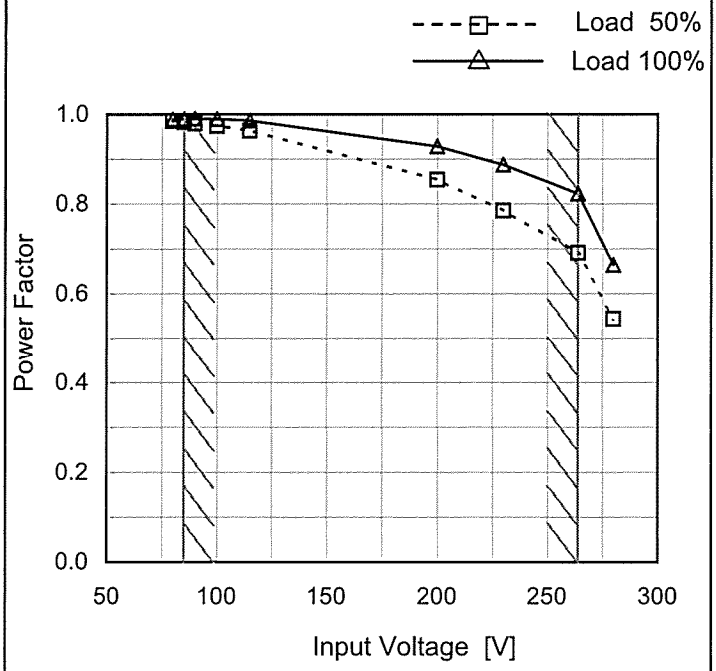
Model	KHEA90F-12
Item	Power Factor (by Input Voltage)
Object	———————

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%
80	0.985	0.989
85	0.983	0.990
90	0.980	0.991
100	0.974	0.990
115	0.963	0.986
200	0.854	0.929
230	0.785	0.888
264	0.691	0.824
280	0.544	0.665

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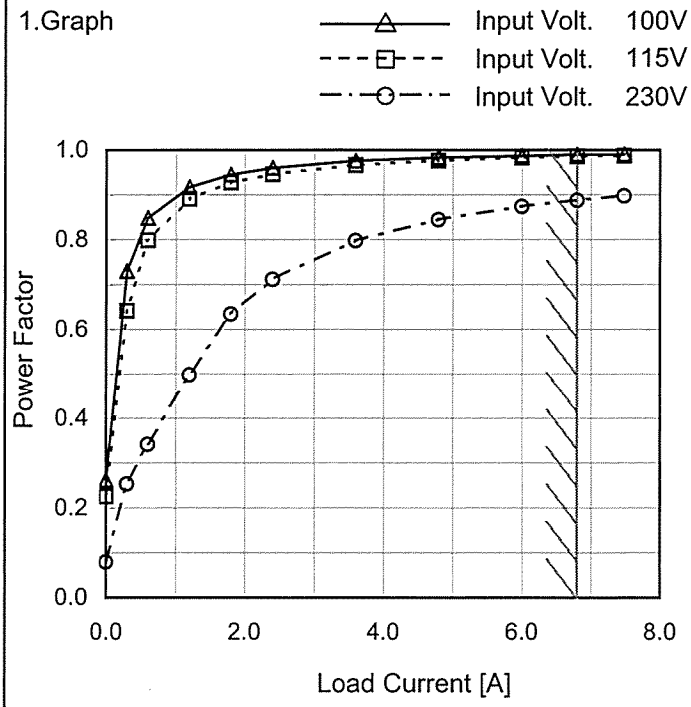
Model	KHEA90F-12
Item	Power Factor (by Load Current)
Object	————————

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]
0.00	0.262	0.225	0.080
0.30	0.731	0.642	0.253
0.60	0.849	0.799	0.342
1.20	0.918	0.891	0.499
1.80	0.946	0.928	0.634
2.40	0.961	0.946	0.712
3.60	0.976	0.966	0.798
4.80	0.984	0.976	0.845
6.00	0.987	0.982	0.875
6.80	0.990	0.986	0.888
7.48	0.991	0.987	0.898

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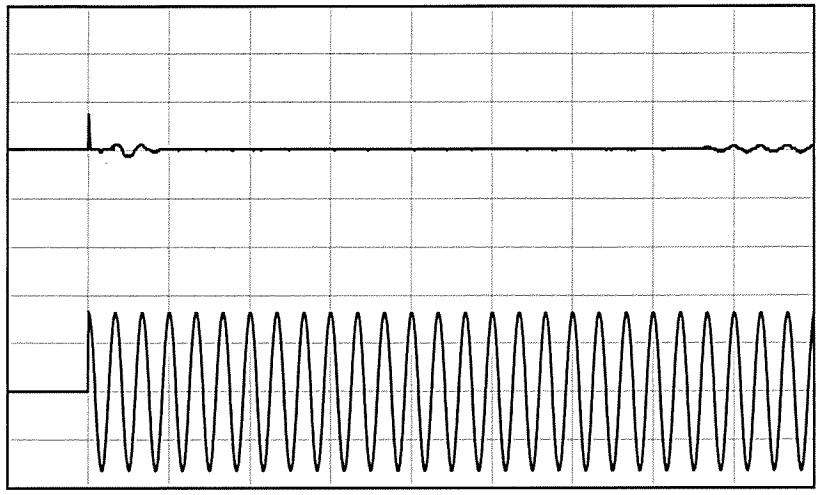
Model	KHEA90F-12
Item	Inrush Current
Object	————————

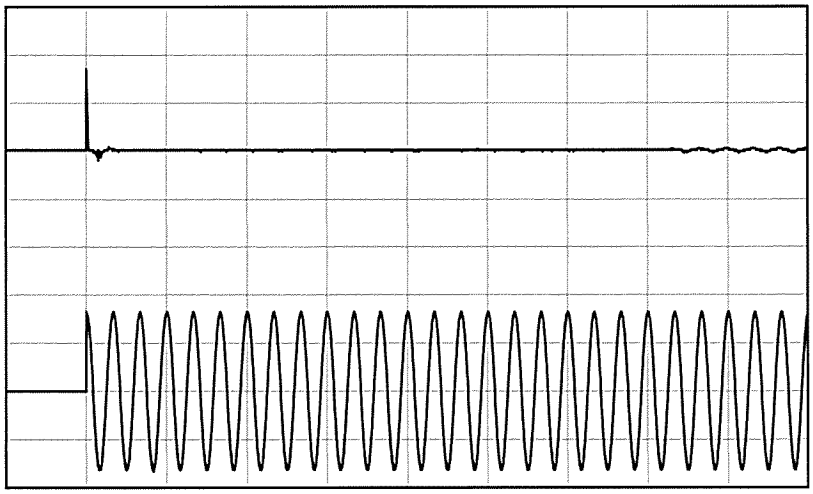
Temperature 25°C
Testing Circuitry Figure A



Input Voltage 115 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
14.7 A

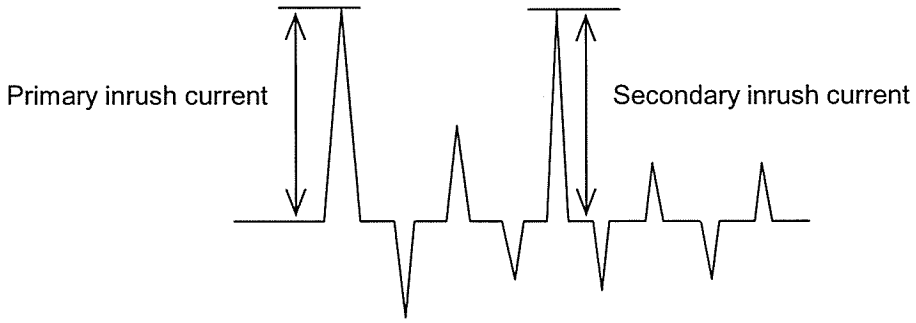
Secondary inrush current :
1.5 A



Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current :
33.8 A

Secondary inrush current :
1.4 A



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Model	KHEA90F-12	
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	0.25	0.26	0.38	Operation
	One of phases	0.26	0.30	0.68	Stand by
IEC60950-1	Both phases	0.14	0.16	0.36	Operation
	One of phases	0.26	0.30	0.68	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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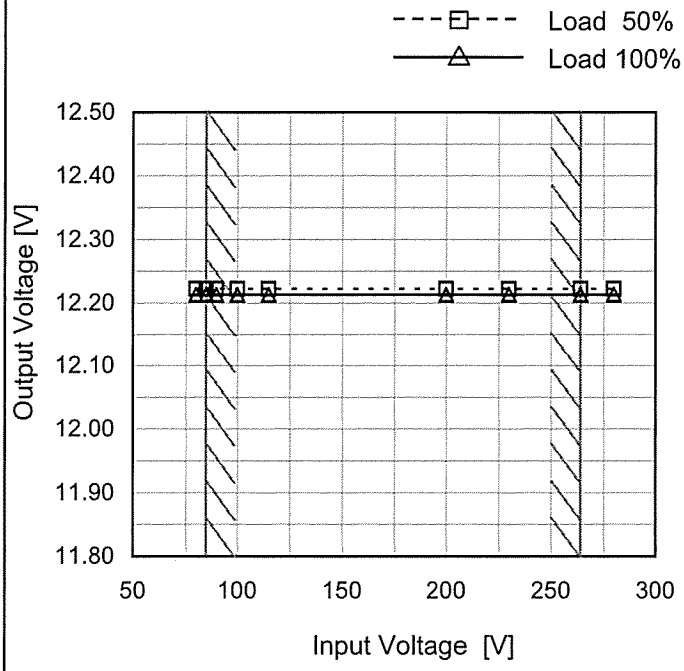
Model	KHEA90F-12
Item	Line Regulation
Object	+12V6.8A

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%
80	12.222	12.213
85	12.222	12.213
90	12.222	12.213
100	12.222	12.213
115	12.222	12.213
200	12.222	12.213
230	12.222	12.213
264	12.222	12.213
280	12.222	12.213

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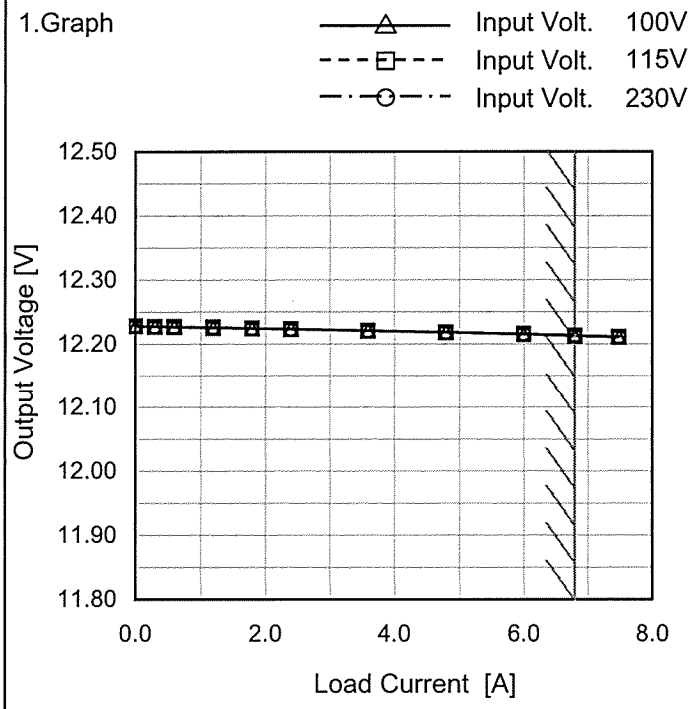
Model	KHEA90F-12
Item	Load Regulation
Object	+12V6.8A

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. 115[V]	Input Volt. 230[V]
0.00	12.228	12.228	12.228
0.30	12.227	12.227	12.227
0.60	12.227	12.227	12.226
1.20	12.226	12.226	12.226
1.80	12.224	12.224	12.224
2.40	12.223	12.223	12.223
3.60	12.221	12.221	12.220
4.80	12.218	12.218	12.218
6.00	12.215	12.216	12.216
6.80	12.213	12.213	12.213
7.48	12.211	12.211	12.211

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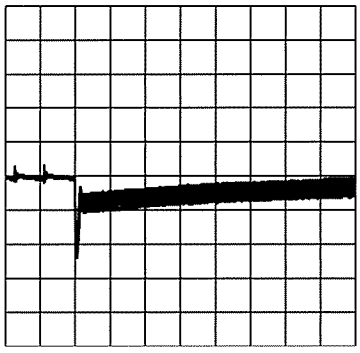
Model	KHEA90F-12		
Item	Dynamic Load Response	Temperature	25˚C
		Testing Circuitry	Figure A
Object	+12V6.8A		

Input Volt. 230 V
Cycle 1000 ms

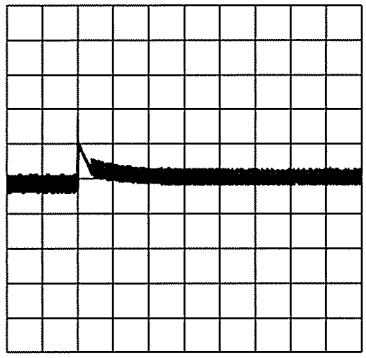
Response. t1=t2=50us. Typ

Min.Load (0A) ⟷
Load 100% (6.8A)

200mV/div



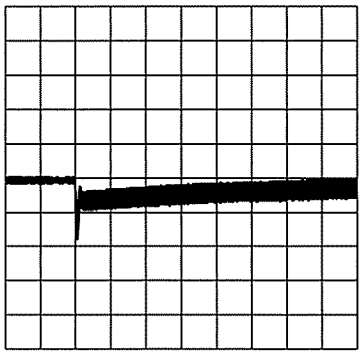
2 ms/div



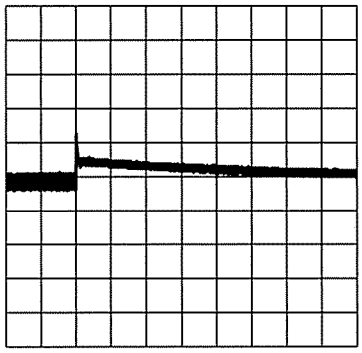
20 ms/div

Load 30%(2.04A) ⟷
Load 100% (6.8A)

200mV/div



2 ms/div



20 ms/div

＊The characteristic of AC115V is equal.

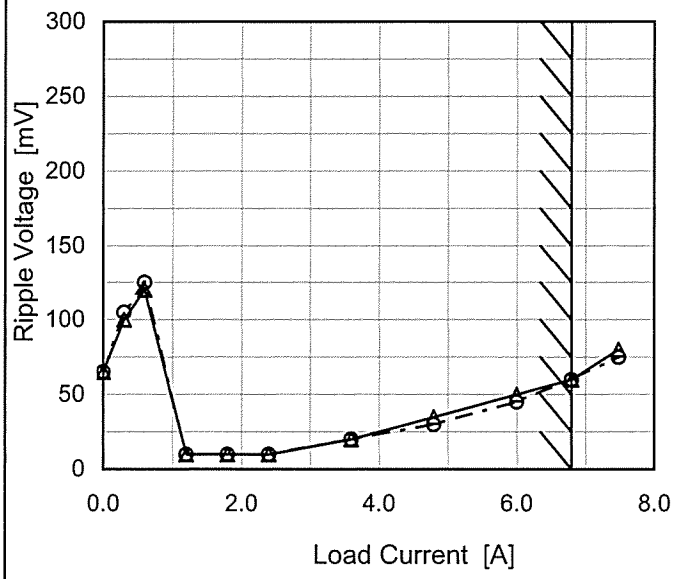
COSEL

Model	KHEA90F-12
Item	Ripple Voltage (by Load Current)
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure C

1.Graph

Input Volt. 115V
Input Volt. 230V



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

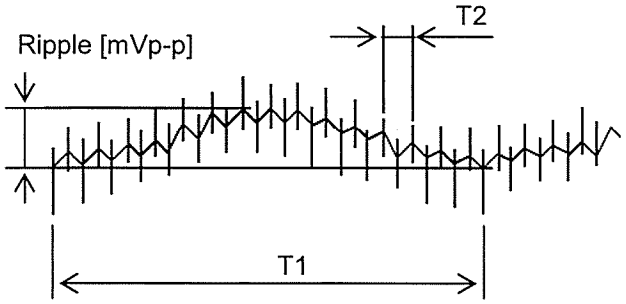


Fig. Complex Ripple Wave Form

2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	65	65
0.30	100	105
0.60	120	125
1.20	10	10
1.80	10	10
2.40	10	10
3.60	20	20
4.80	35	30
6.00	50	45
6.80	60	60
7.48	80	75

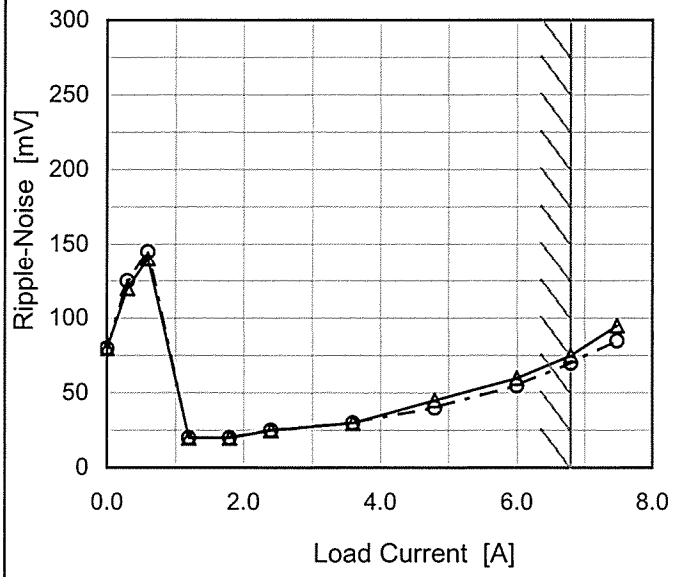
COSEL

Model	KHEA90F-12
Item	Ripple-Noise
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure C

1.Graph

Input Volt. 115V
Input Volt. 230V



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

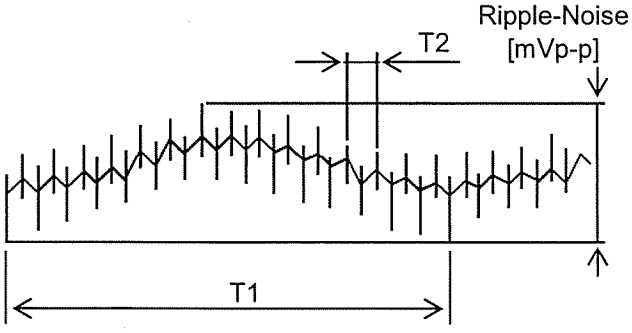


Fig. Complex Ripple Wave Form

2.Values

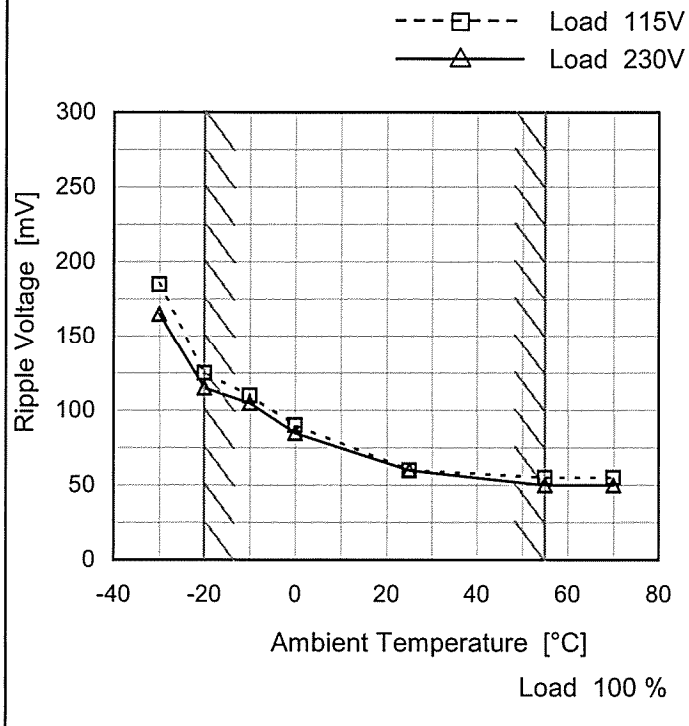
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.00	80	80
0.30	120	125
0.60	140	145
1.20	20	20
1.80	20	20
2.40	25	25
3.60	30	30
4.80	45	40
6.00	60	55
6.80	75	70
7.48	95	85

COSEL

Model	KHEA90F-12
Item	Ripple Voltage (by Ambient Temp.)
Object	+12V6.8A

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	185	165
-20	125	115
-10	110	105
0	90	85
25	60	60
55	55	50
70	55	50
--	-	-
--	-	-
--	-	-
--	-	-

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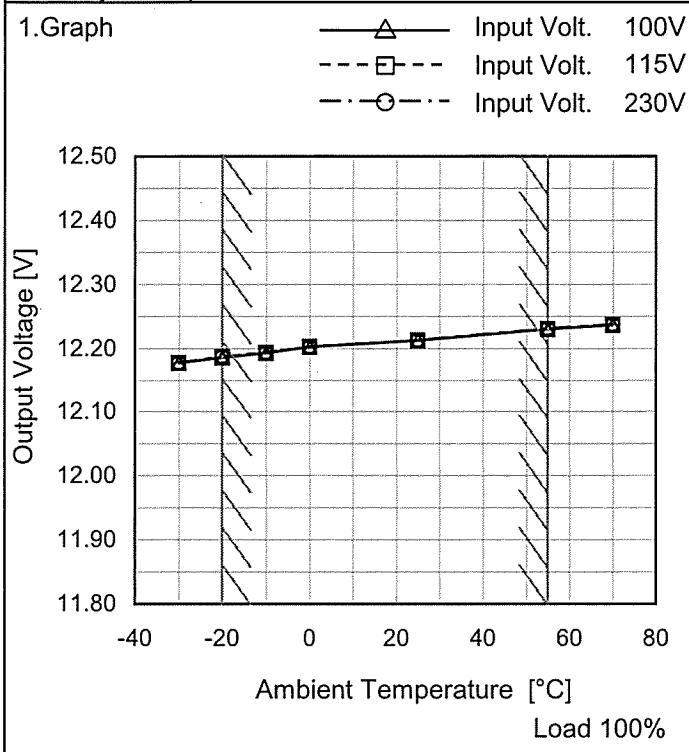
Model	KHEA90F-12
Item	Ambient Temperature Drift
Object	+12V6.8A

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	12.178	12.178	12.178
-20	12.186	12.187	12.187
-10	12.193	12.193	12.194
0	12.203	12.203	12.203
25	12.213	12.213	12.213
55	12.231	12.231	12.231
70	12.237	12.237	12.237
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	KHEA90F-12	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+12V6.8A	

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 - 55°C
Input Voltage : 85 - 264V
Load Current : 0 - 6.8A

* 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	55	100	0	12.241	±28	±0.2
Minimum Voltage	-20	100	6.8	12.186		

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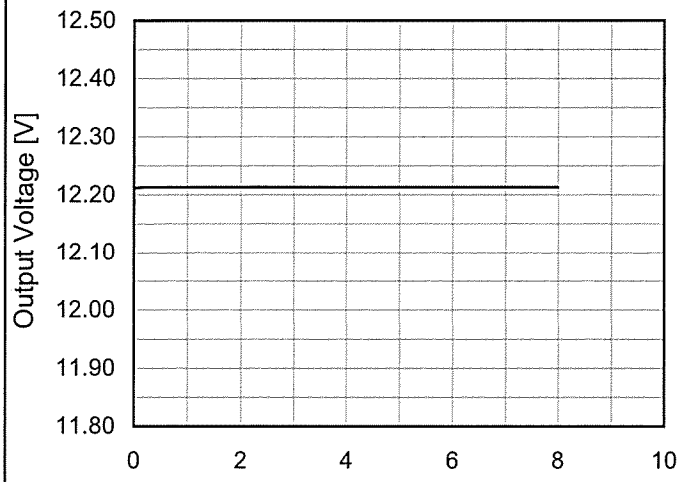
Model	KHEA90F-12
Item	Time Lapse Drift
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



Input Volt. 230V
Load 100%

* The characteristic of AC115V is equal.

2.Values

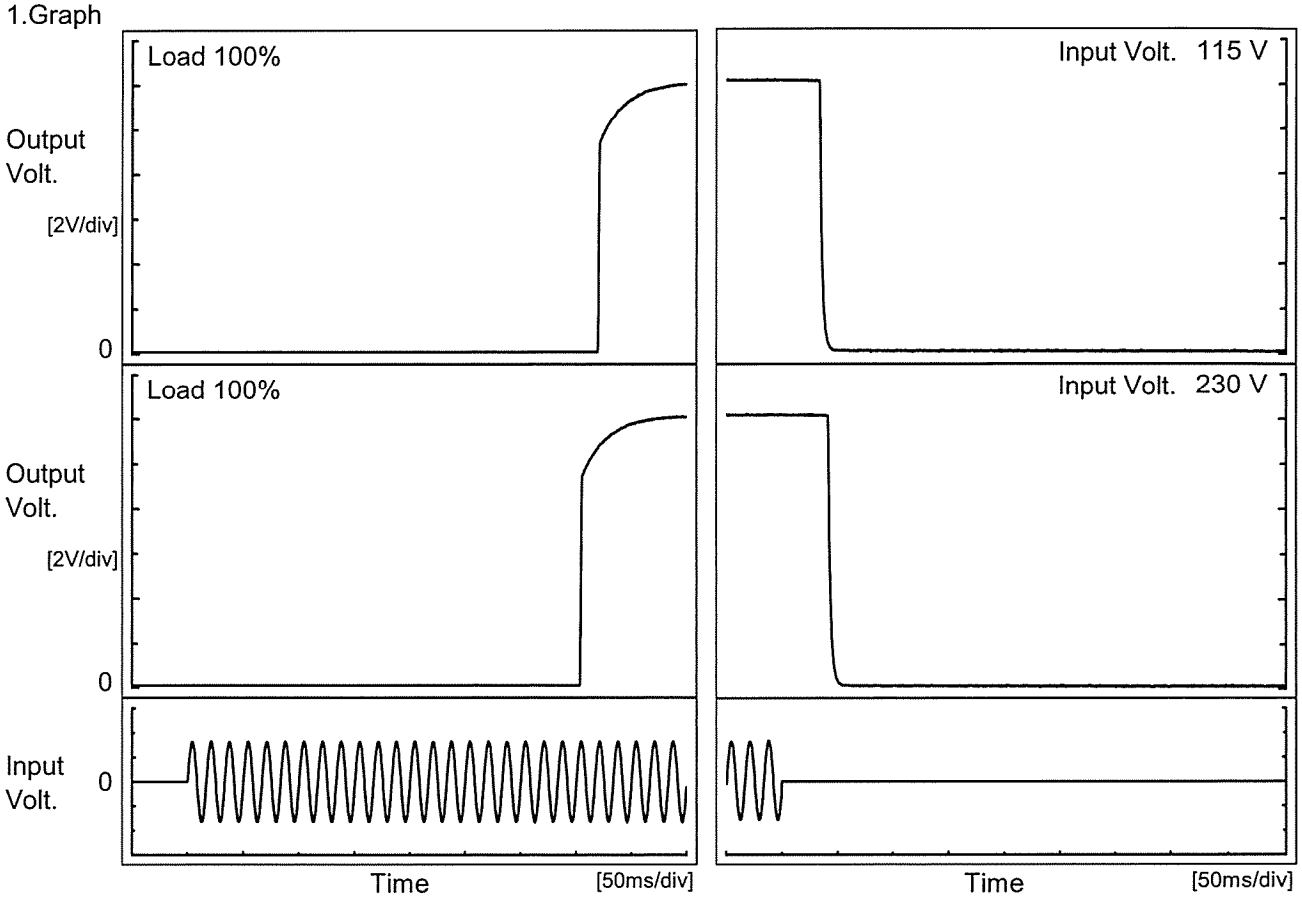
Time since start [H]	Output Voltage [V]
0.0	12.211
0.5	12.213
1.0	12.213
2.0	12.213
3.0	12.213
4.0	12.213
5.0	12.213
6.0	12.213
7.0	12.213
8.0	12.213

COSEL

Model	KHEA90F-12
Item	Rise and Fall Time
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure A

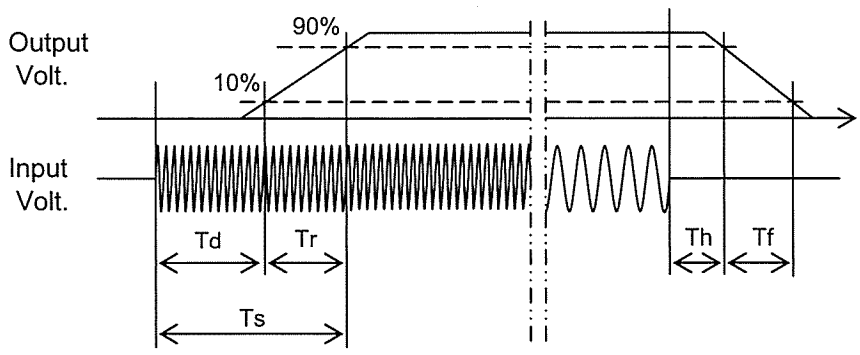
1.Graph



2.Values

[ms]

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
115 V	370.3	18.0	388.3	34.0	4.8
230 V	354.0	18.0	372.0	41.8	4.5

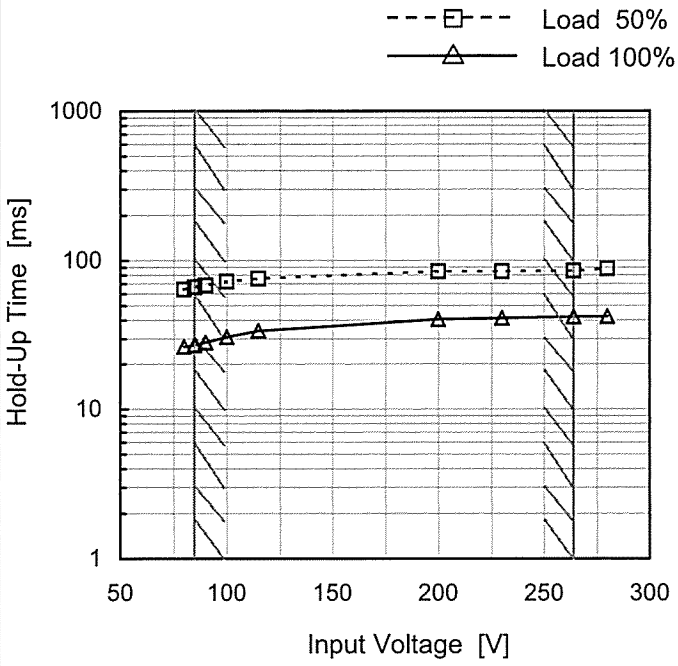


COSEL

Model	KHEA90F-12
Item	Hold-Up Time
Object	+12V6.8A

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

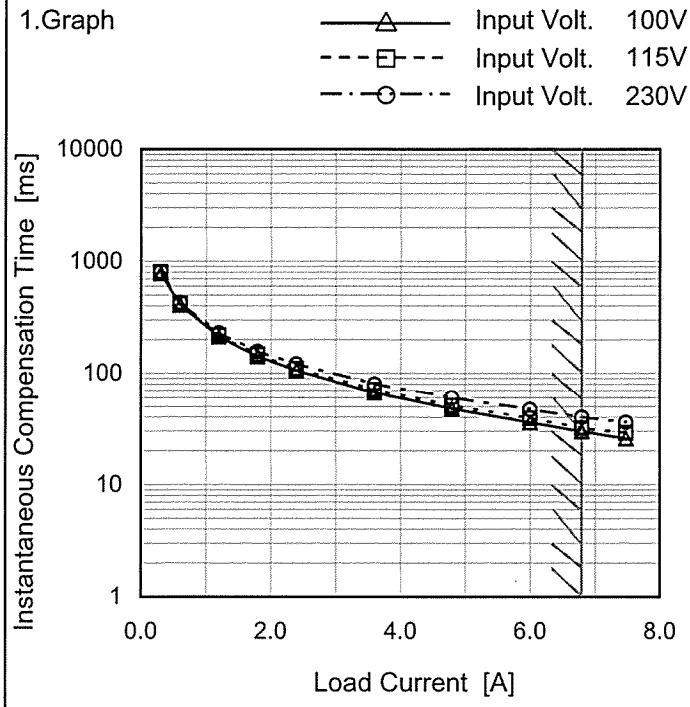
Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
80	64	27
85	66	27
90	68	28
100	72	31
115	76	34
200	84	41
230	85	41
264	86	42
280	88	42

COSEL

Model	KHEA90F-12
Item	Instantaneous Interruption Compensation
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

2.Values

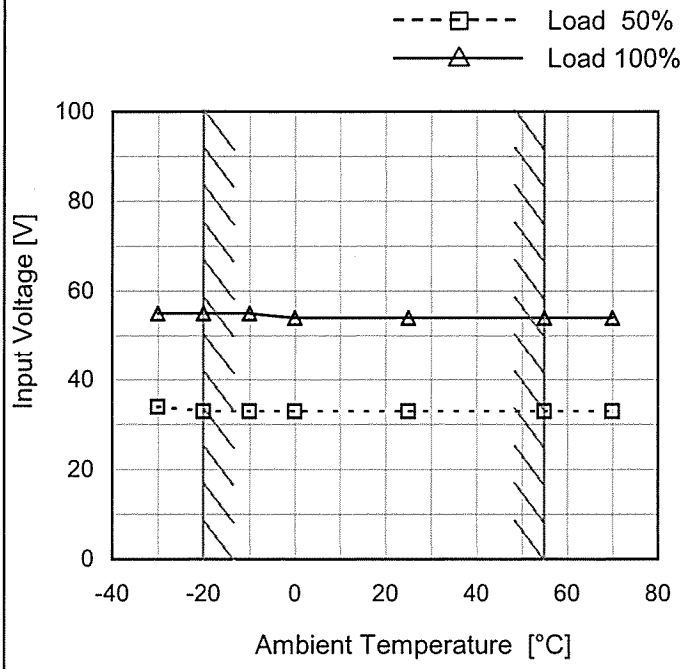
Load Current [A]	Time [ms] Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
0.00	-	-	-
0.30	785	797	810
0.60	410	418	430
1.20	214	219	230
1.80	142	147	157
2.40	106	110	121
3.60	67	71	80
4.80	48	51	60
6.00	36	39	47
6.80	30	32	40
7.48	26	29	36

COSEL

Model	KHEA90F-12
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V6.8A

Testing Circuitry Figure A

1.Graph



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

2.Values

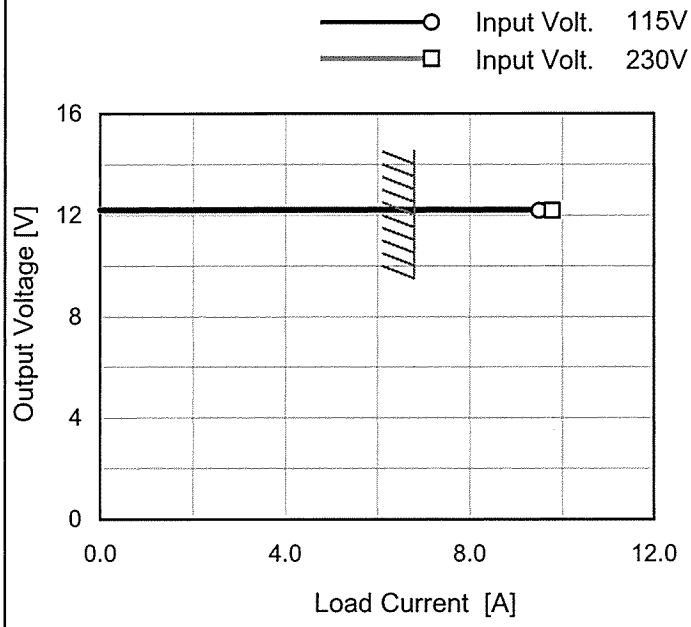
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	34	55
-20	33	55
-10	33	55
0	33	54
25	33	54
55	33	54
70	33	54
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	KHEA90F-12
Item	Overcurrent Protection
Object	+12V6.8A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



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

Intermittent operation occurs when overcurrent protection is activated.

2.Values

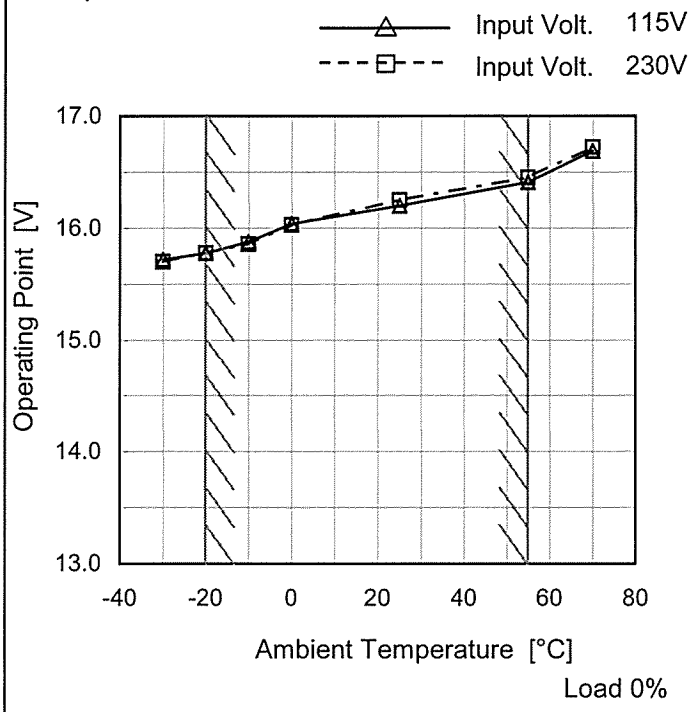
Output Voltage [V]	Load Current [A]	
	Input Volt. 115[V]	Input Volt. 230[V]
12.2	9.31	9.67
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

COSEL

Model	KHEA90F-12
Item	Overvoltage Protection
Object	+12V6.8A

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. 115[V]	Input Volt. 230[V]
-30	15.72	15.70
-20	15.78	15.78
-10	15.88	15.86
0	16.04	16.03
25	16.20	16.25
55	16.41	16.45
70	16.69	16.72
--	-	-
--	-	-
--	-	-
--	-	-

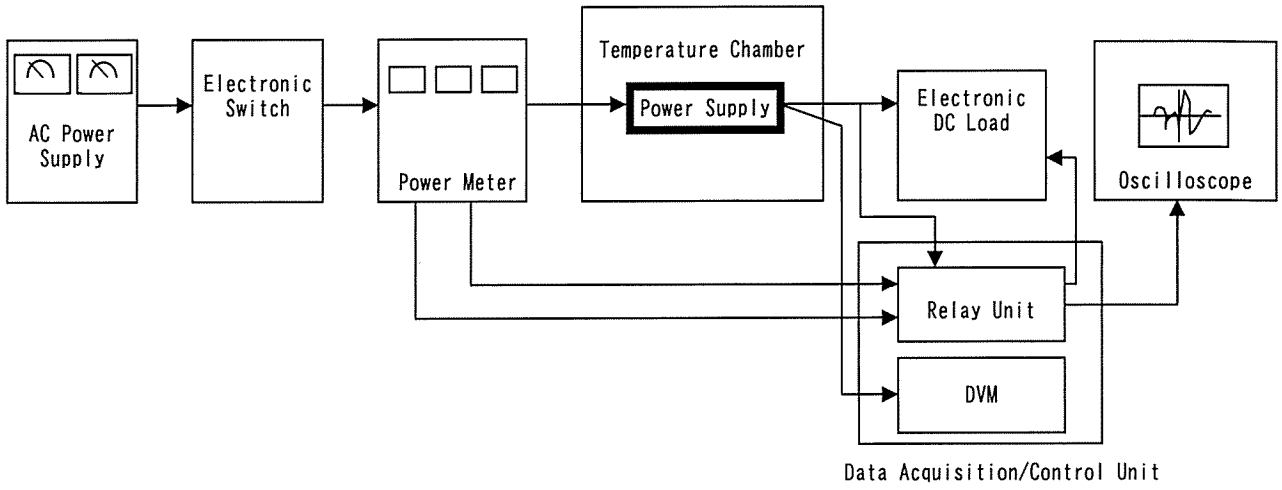


Figure A

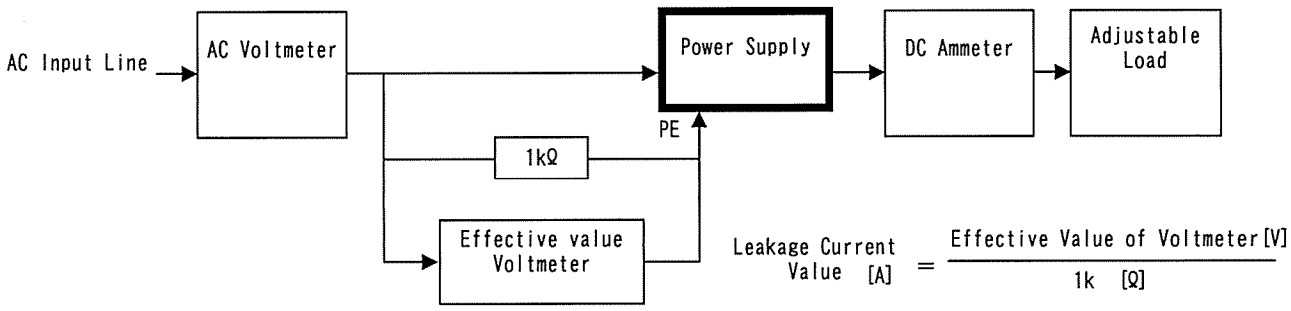


Figure B (DEN-AN)

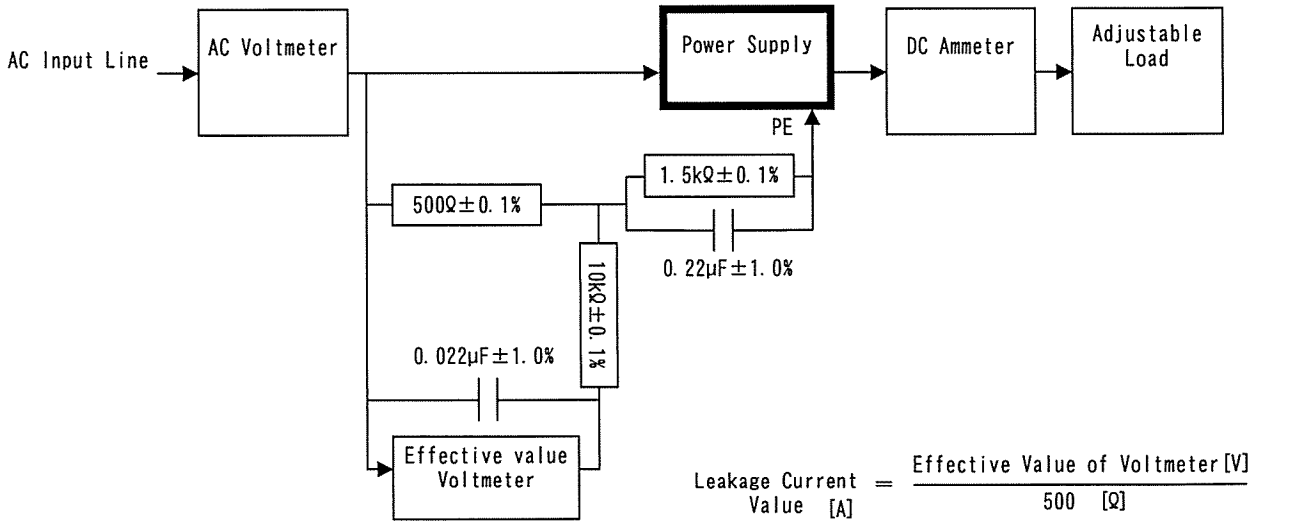
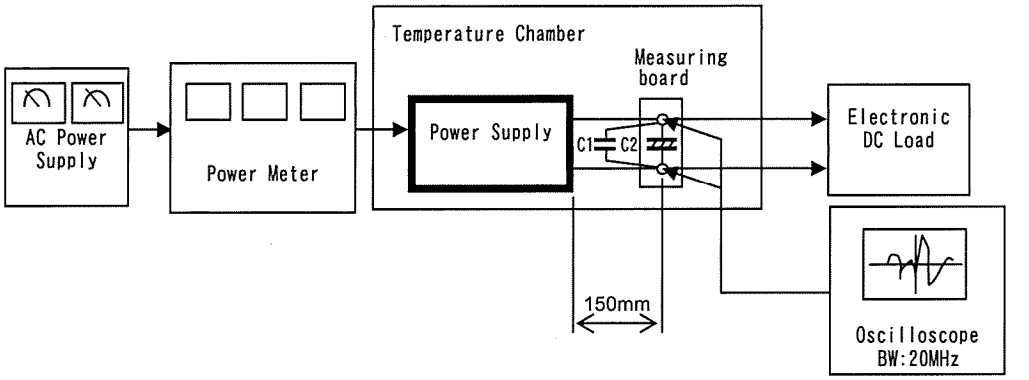


Figure B (IEC60950-1)



C1= 0.1 μF
(Ceramic capacitor)

C2= 22 μF
(Electrolytic capacitor)

Figure C