



# TEST DATA OF GHA500F-12-SNF

Regulated DC Power Supply  
May 7, 2015

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Prepared by : Masashi Shibata Design Engineer

**COSEL CO.,LTD.**

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(Final Page 24)

Model

GHA500F-12-SNF

Item

Input Current (by Load Current)

Object

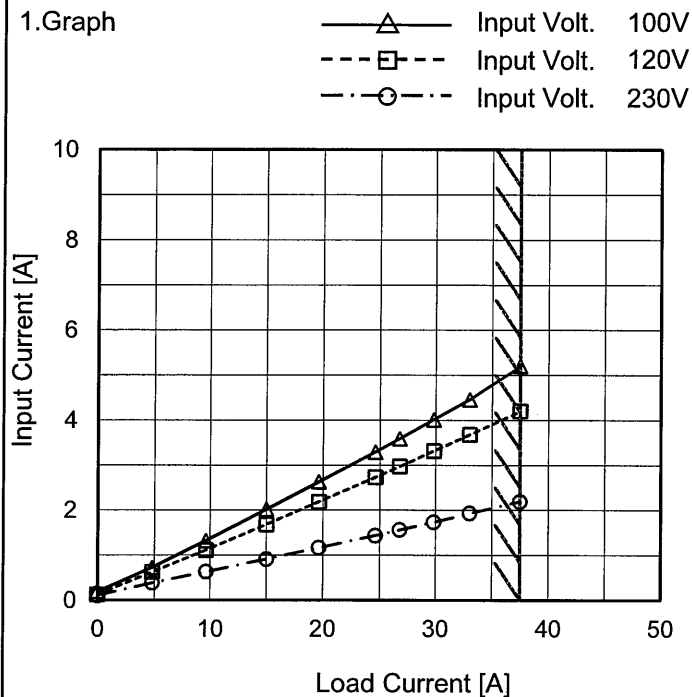
Temperature

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. 120[V]	Input Volt. 230[V]
0.0	0.192	0.126	0.105
4.8	0.720	0.622	0.384
9.6	1.324	1.112	0.632
15.0	2.020	1.682	0.915
19.6	2.631	2.186	1.166
24.6	3.294	2.732	1.439
26.8	3.588	2.972	1.562
29.8	4.010	3.314	1.734
33.0	4.460	3.677	1.932
37.5	5.200	4.200	2.192
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Model		GHA500F-12-SNF		Temperature 25°C																																																				
Item		Input Power (by Load Current)		Testing Circuitry Figure A																																																				
Object																																																								
1.Graph		<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>120V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <div><p>Note: Slanted line shows the range of the rated load current.</p></div>		2.Values																																																				
		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Power [W]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 120[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.0</td><td>7.5</td><td>8.0</td><td>7.1</td></tr><tr><td>4.8</td><td>70.2</td><td>70.6</td><td>71.3</td></tr><tr><td>9.6</td><td>131.6</td><td>131.4</td><td>130.6</td></tr><tr><td>15.0</td><td>202.0</td><td>201.0</td><td>198.0</td></tr><tr><td>19.6</td><td>263.4</td><td>261.6</td><td>257.0</td></tr><tr><td>24.6</td><td>330.0</td><td>327.3</td><td>320.9</td></tr><tr><td>26.8</td><td>359.4</td><td>356.1</td><td>348.7</td></tr><tr><td>29.8</td><td>402.0</td><td>397.2</td><td>390.0</td></tr><tr><td>33.0</td><td>447.0</td><td>441.2</td><td>432.0</td></tr><tr><td>37.5</td><td>517.0</td><td>505.0</td><td>493.0</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>				Load Current [A]	Input Power [W]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	7.5	8.0	7.1	4.8	70.2	70.6	71.3	9.6	131.6	131.4	130.6	15.0	202.0	201.0	198.0	19.6	263.4	261.6	257.0	24.6	330.0	327.3	320.9	26.8	359.4	356.1	348.7	29.8	402.0	397.2	390.0	33.0	447.0	441.2	432.0	37.5	517.0	505.0	493.0	--	-	-	-
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Model

GHA500F-12-SNF

Item

Efficiency (by Input Voltage)

Object

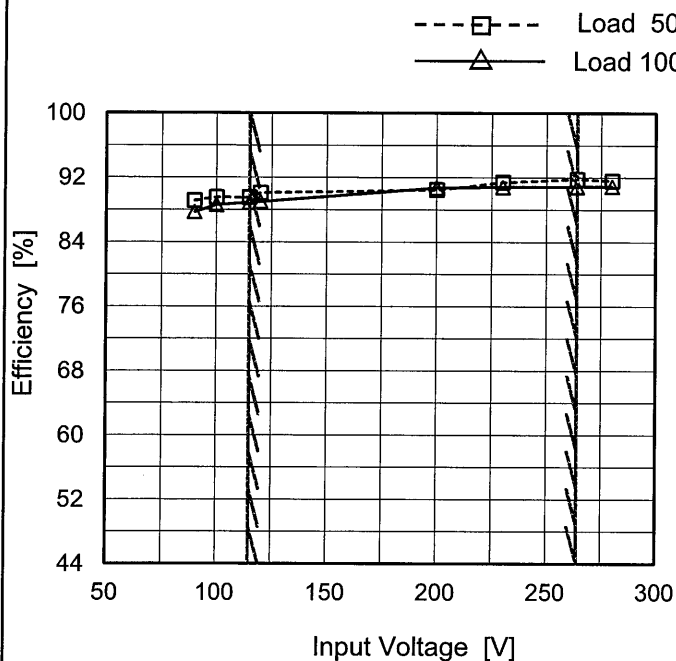
Temperature

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%
90	89.2	87.7 ※1
100	89.5	88.6 ※2
115	89.5	88.9
120	90.1	89.0
200	90.5	90.7
230	91.4	90.9
264	91.8	90.9
280	91.6	90.9
--	-	-

※1 : Load 80%

※2 : Load 88%

Model

GHA500F-12-SNF

Item

Efficiency (by Load Current)

Object

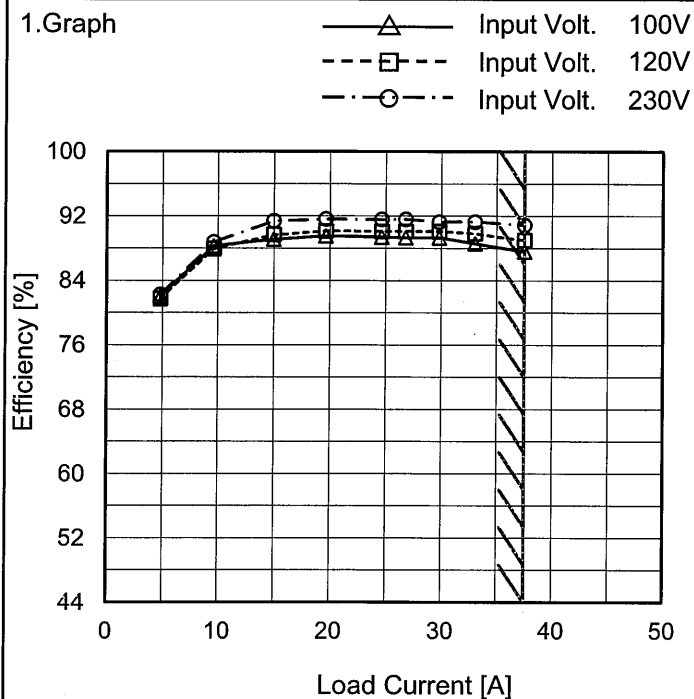
Temperature

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. 120[V]	Input Volt. 230[V]
0.0	-	-	-
4.8	82.0	81.7	82.2
9.6	88.3	88.0	88.8
15.0	89.1	89.7	91.4
19.6	89.5	90.1	91.6
24.6	89.4	90.1	91.6
26.8	89.3	90.1	91.6
29.8	89.3	90.1	91.3
33.0	88.6	89.8	91.3
37.5	87.6	89.0	90.9
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Model

GHA500F-12-SNF

Item

Power Factor (by Input Voltage)

Object

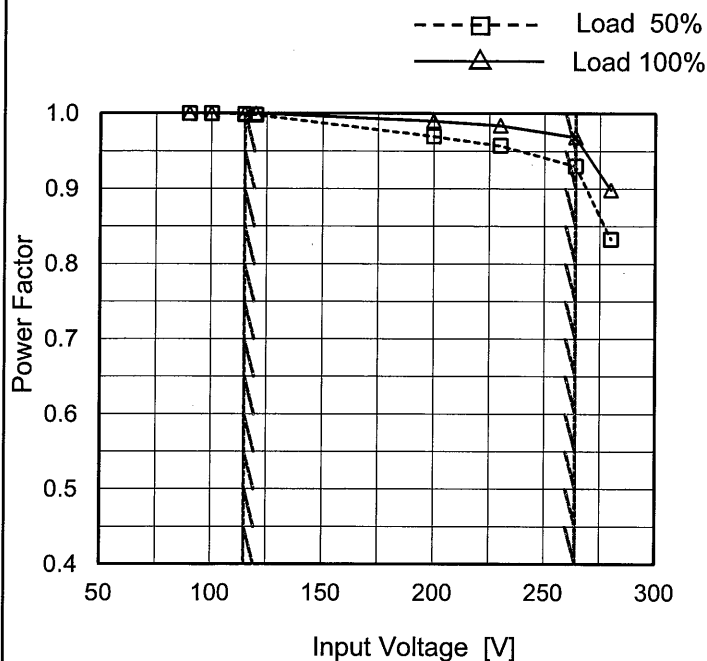
Temperature

25°C

Testing Circuitry

Figure A

1.Graph



2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
90	0.999	0.999 ※1
100	0.999	0.999 ※2
115	0.999	0.999
120	0.998	0.999
200	0.970	0.990
230	0.957	0.984
264	0.930	0.969
280	0.833	0.898
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※1 : Load80%

※2 : Load88%

Model		GHA500F-12-SNF		Temperature 25°C																																																				
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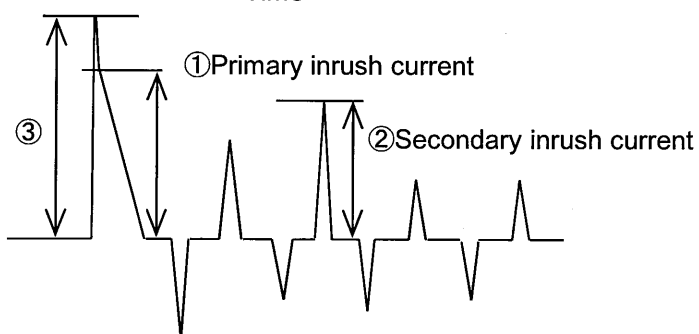
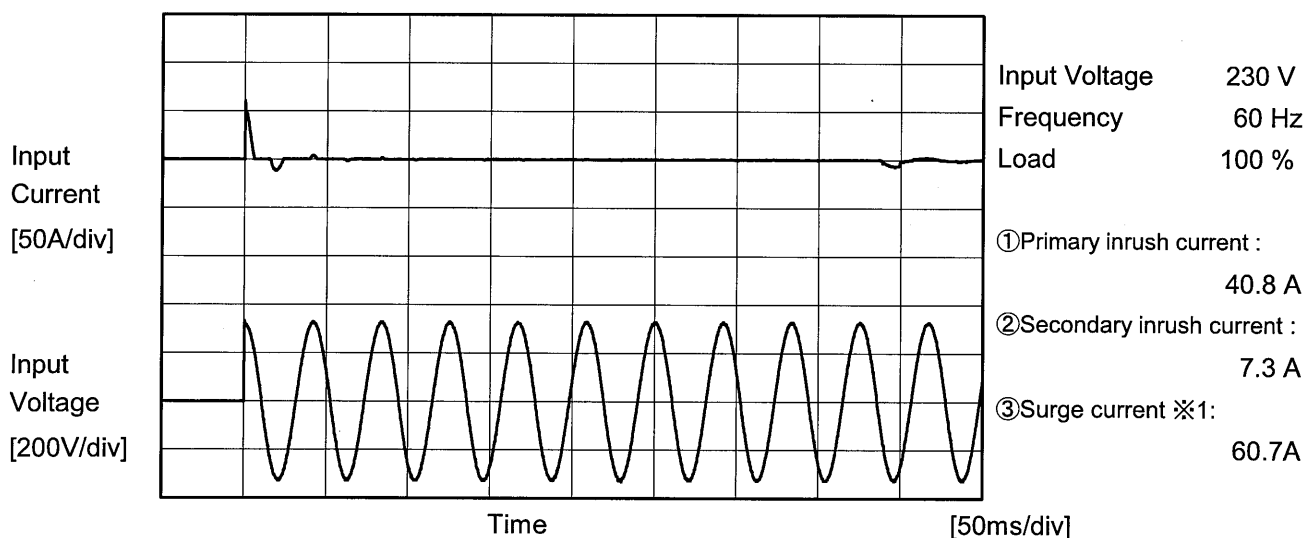
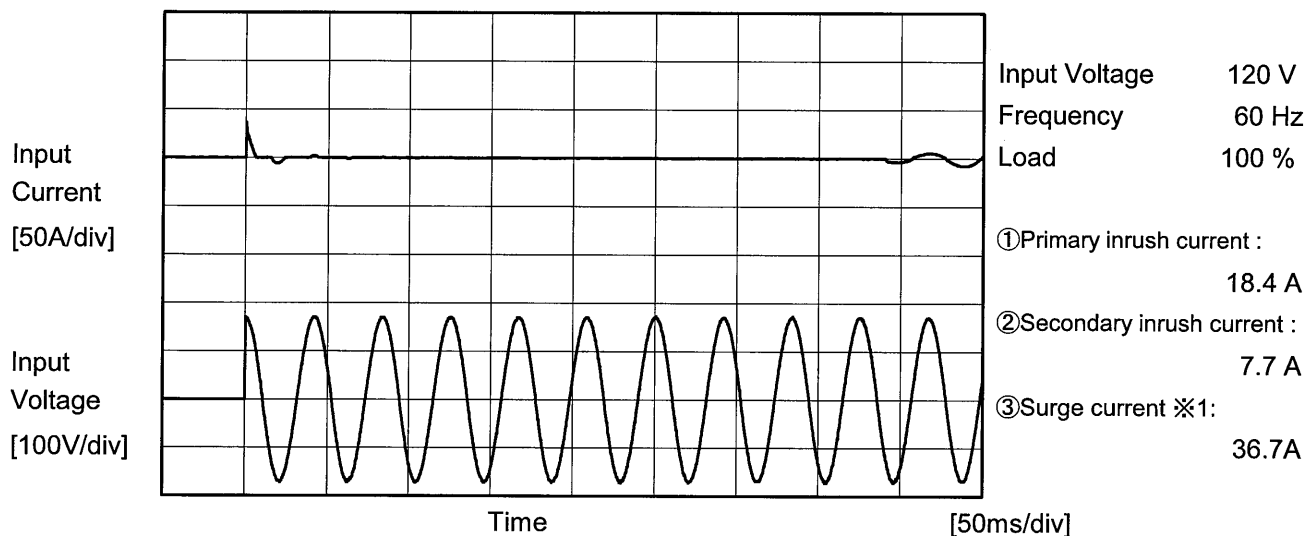
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Model		GHA500F-12-SNF	Temperature 25°C Testing Circuitry Figure A
Item		Inrush Current	
Object		_____	



※1 The specification of the primary inrush current means that the surge current to a built-in noise filter (0.4msec or less : waveform ③) is excluded.



COSEL			
Model	GHA500F-12-SNF	Temperature 25°C Testing Circuitry Figure B	
Item	Leakage Current		
Object			

## 1.Results

Standards		Input Volt.			Note
		100 [V]	120 [V]	240 [V]	
IEC60601	Both phases	0.07	0.09	0.17	Operation
	One of phases	0.13	0.15	0.32	Stand by

[mA]

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.

Model		GHA500F-12-SNF																																	
Item		Line Regulation																																	
Object		+12V37.5A																																	
1.Graph		2.Values																																	
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Output Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>90</td><td>12.068</td><td>12.061 ※1</td></tr><tr><td>100</td><td>12.067</td><td>12.061 ※2</td></tr><tr><td>115</td><td>12.067</td><td>12.059</td></tr><tr><td>120</td><td>12.067</td><td>12.059</td></tr><tr><td>200</td><td>12.067</td><td>12.059</td></tr><tr><td>230</td><td>12.067</td><td>12.059</td></tr><tr><td>264</td><td>12.067</td><td>12.059</td></tr><tr><td>280</td><td>12.067</td><td>12.059</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table> <div>※1 : Load80%</div> <div>※2 : Load88%</div>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	90	12.068	12.061 ※1	100	12.067	12.061 ※2	115	12.067	12.059	120	12.067	12.059	200	12.067	12.059	230	12.067	12.059	264	12.067	12.059	280	12.067	12.059	--	-	-
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Model		GHA500F-12-SNF																																																				
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# COSEL

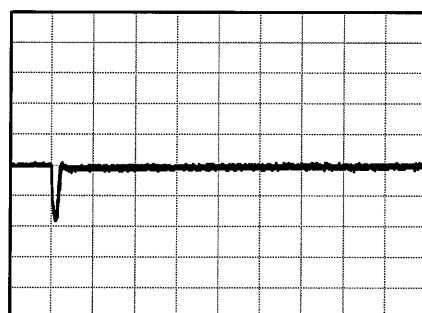
Model	GHA500F-12-SNF	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+12V 37.5A		

Input Volt. 120V  
Cycle 1000ms

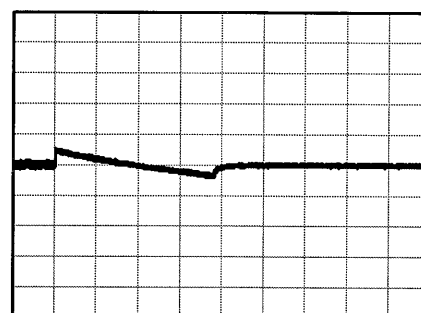
Load Current  37.5A / 50us

Min.Load (0A) ←→  
Load 100%(37.5A)

500 mV/div



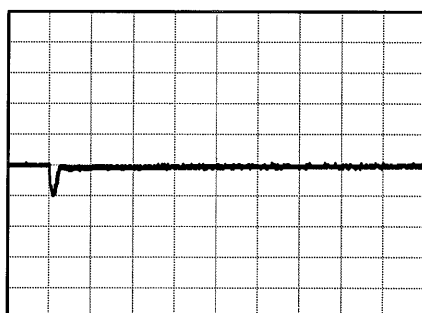
1 ms/div



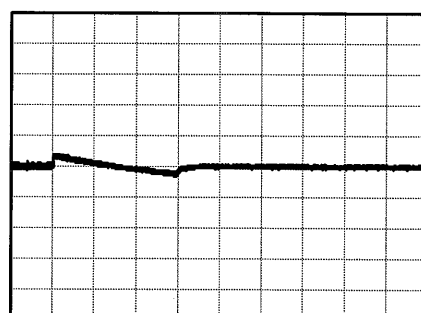
20 ms/div

Min.Load (0A) ←→  
Load 50%(18.75A)

500 mV/div



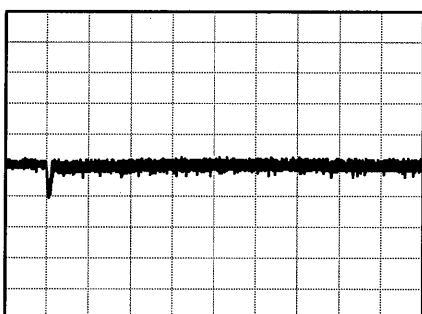
1 ms/div



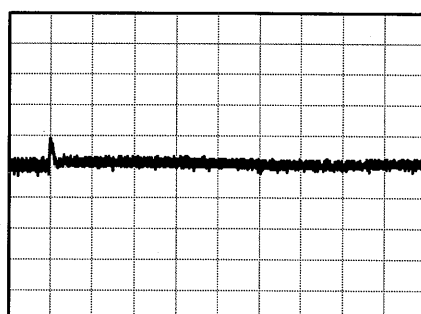
20 ms/div

Load 50% (18.75A) ←→  
Load 100% (37.5A)

200 mV/div



1 ms/div



1 ms/div

Note : With recommended external capacitor 2200  $\mu$  F

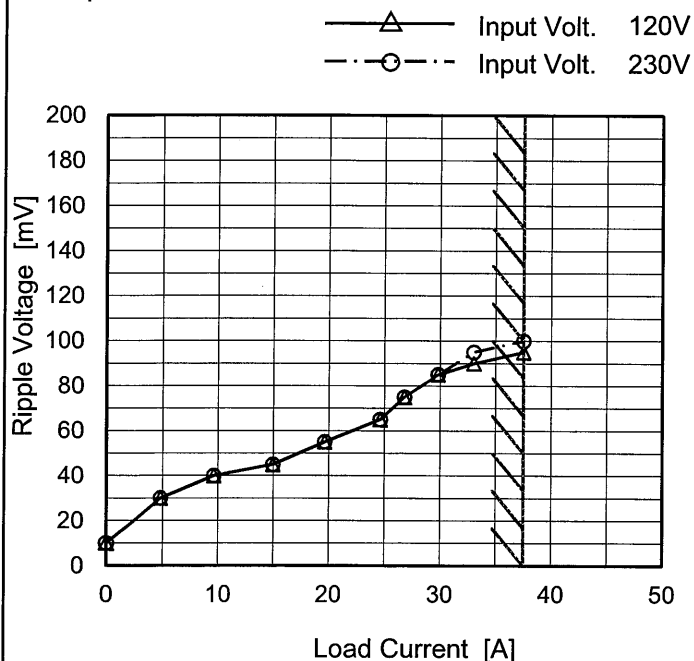
Model GHA500F-12-SNF

Item Ripple Voltage (by Load Current)

Object +12V37.5A

Temperature 25°C  
Testing Circuitry Figure A

# 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.

Ripple [mVp-p]

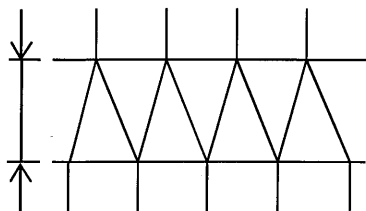


Fig.Complex Ripple Wave Form

# 2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
0.0	10	10
4.8	30	30
9.6	40	40
15.0	45	45
19.6	55	55
24.6	65	65
26.8	75	75
29.8	85	85
33.0	90	95
37.5	95	100
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# COSEL

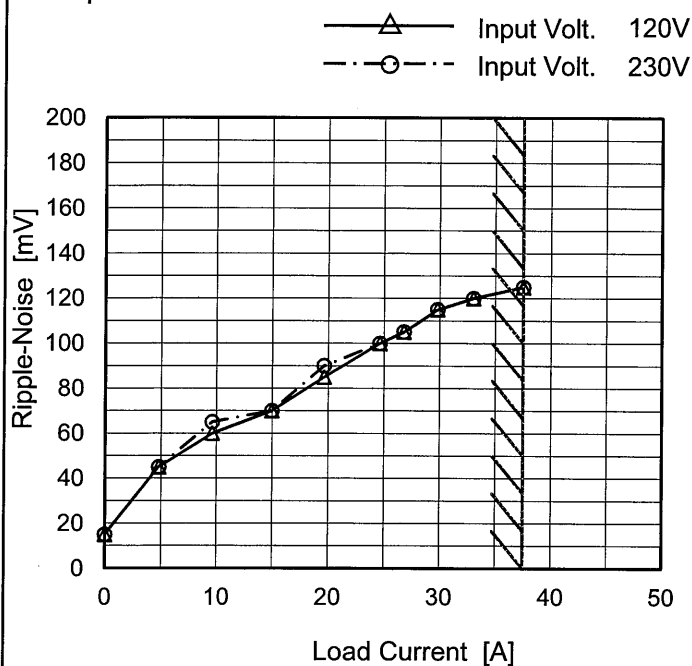
Model GHA500F-12-SNF

Item Ripple-Noise

Object +12V37.5A

Temperature 25°C  
Testing Circuitry Figure A

## 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.

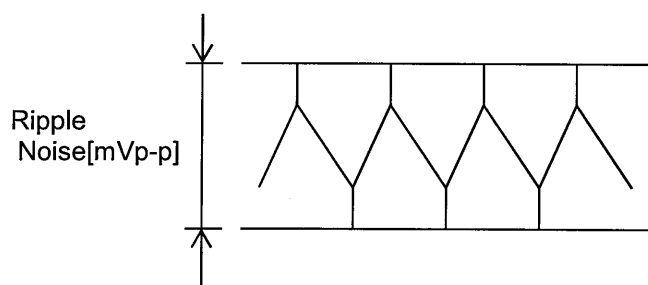


Fig.Complex Ripple Noise Wave Form

## 2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
0.0	15	15
4.8	45	45
9.6	60	65
15.0	70	70
19.6	85	90
24.6	100	100
26.8	105	105
29.8	115	115
33.0	120	120
37.5	125	125
--	-	-

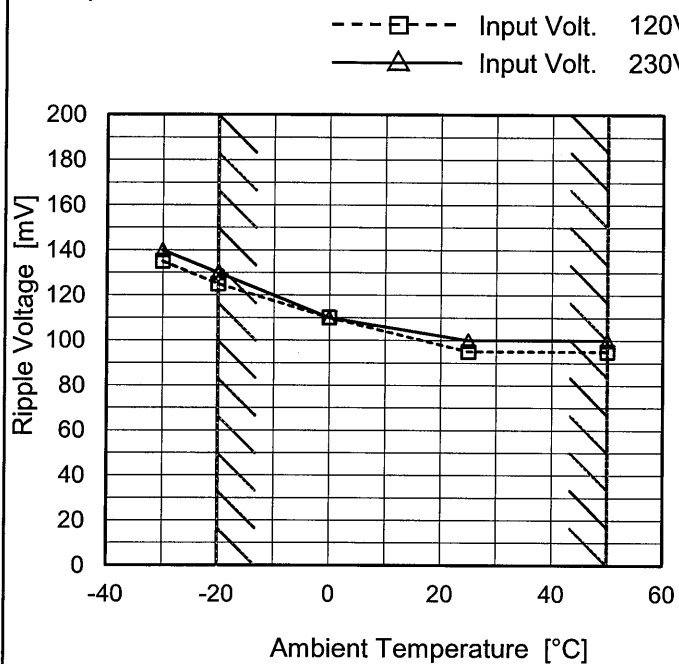
Model GHA500F-12-SNF

Item Ripple Voltage (by Ambient Temp.)

Object +12V37.5A

Testing Circuitry Figure A

# 1.Graph



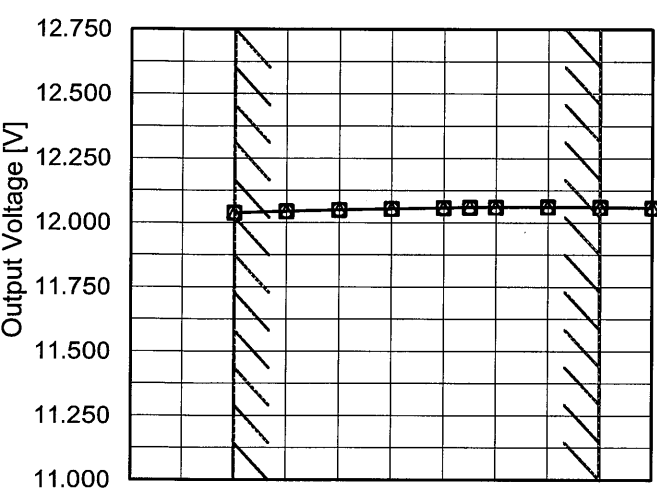
Measured by 20 MHz Oscilloscope.

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

# 2.Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
-30	135	140
-20	125	130
0	110	110
25	95	100
50	95	100
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



Model		GHA500F-12-SNF																																																				
Item		Ambient Temperature Drift																																																				
Object		+12V37.5A																																																				
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>120V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div>  <div>Note: Slanted line shows the range of the rated ambient temperature.</div>		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 120[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>-20</td><td>12.038</td><td>12.037</td><td>12.038</td></tr><tr><td>-10</td><td>12.044</td><td>12.044</td><td>12.045</td></tr><tr><td>0</td><td>12.051</td><td>12.049</td><td>12.051</td></tr><tr><td>10</td><td>12.054</td><td>12.054</td><td>12.055</td></tr><tr><td>20</td><td>12.058</td><td>12.058</td><td>12.058</td></tr><tr><td>25</td><td>12.061</td><td>12.059</td><td>12.059</td></tr><tr><td>30</td><td>12.060</td><td>12.060</td><td>12.060</td></tr><tr><td>40</td><td>12.061</td><td>12.061</td><td>12.061</td></tr><tr><td>50</td><td>12.060</td><td>12.060</td><td>12.060</td></tr><tr><td>60</td><td>12.058</td><td>12.058</td><td>12.058</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table> <div>Note: In case of Input Volt. 100V, Load 88%. Other case Load 100%.</div>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	-20	12.038	12.037	12.038	-10	12.044	12.044	12.045	0	12.051	12.049	12.051	10	12.054	12.054	12.055	20	12.058	12.058	12.058	25	12.061	12.059	12.059	30	12.060	12.060	12.060	40	12.061	12.061	12.061	50	12.060	12.060	12.060	60	12.058	12.058	12.058	--	-	-	-
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10	12.054	12.054	12.055																																																			
20	12.058	12.058	12.058																																																			
25	12.061	12.059	12.059																																																			
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Model		GHA500F-12-SNF	Testing Circuitry Figure A
Item		Output Voltage Accuracy	
Object		+12V37.5A	

## 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 : -20 - 50°C

Input Voltage : 115 - 264V

Load Current : 0 - 37.5A

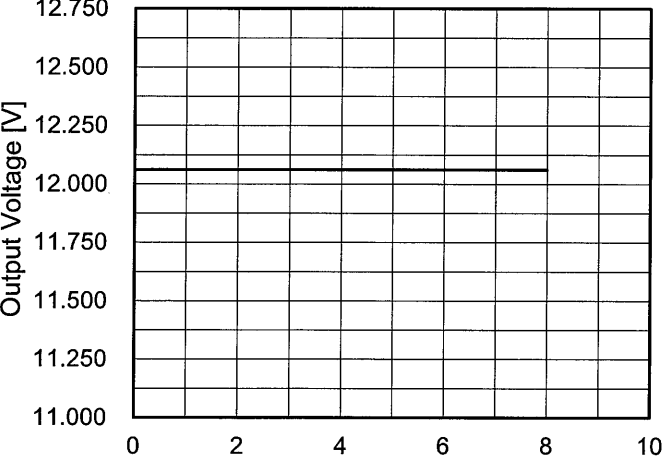
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

\* 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	40	264	0	12.079	±21	±0.2
Minimum Voltage	-20	115	37.5	12.037		

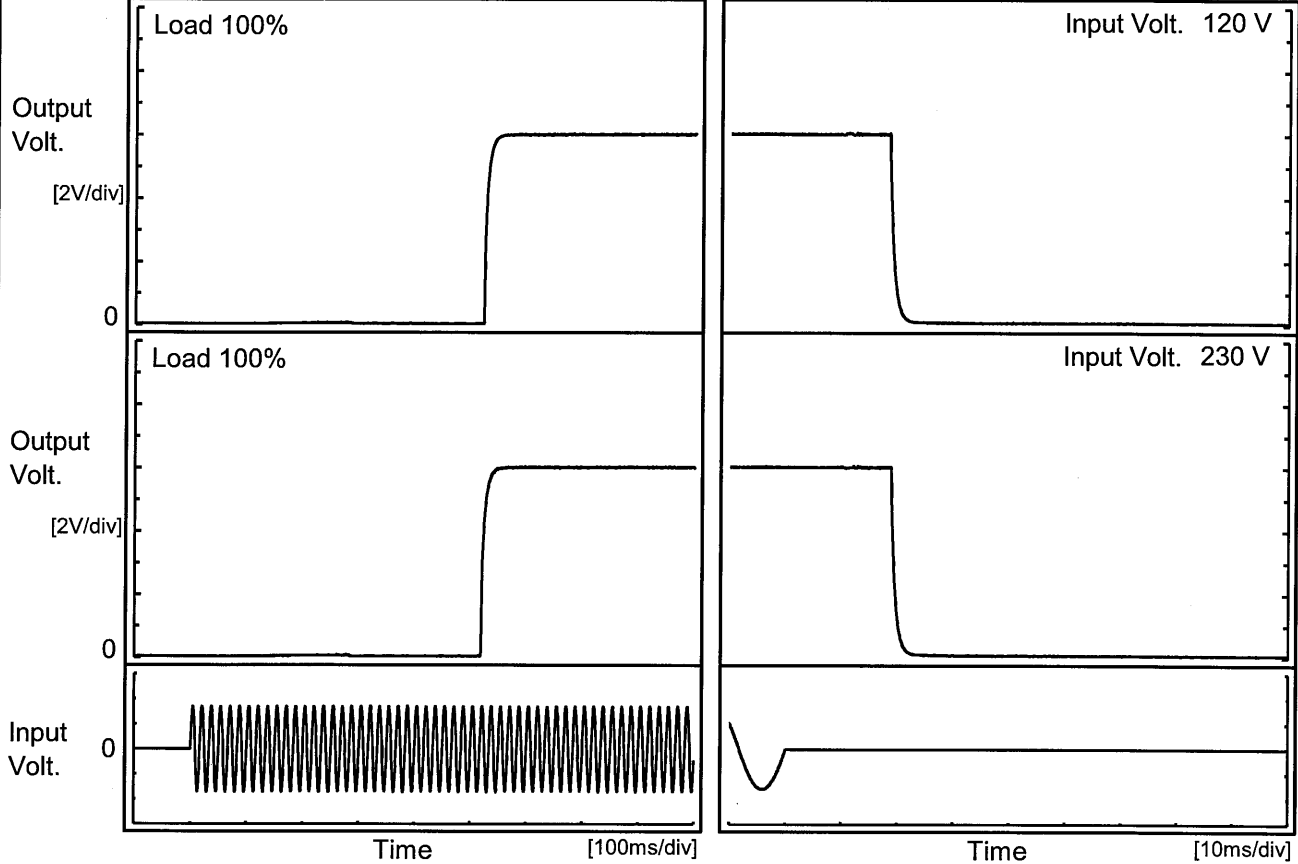


LUCEL																									
Model	GHA500F-12-SNF																								
Item	Time Lapse Drift	Temperature	25°C																						
Object	+12V37.5A	Testing Circuitry	Figure A																						
1.Graph		2.Values																							
<div><p>Input Volt. 230V Load 100%</p></div>		<table><thead><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr></thead><tbody><tr><td>0.0</td><td>12.060</td></tr><tr><td>0.5</td><td>12.061</td></tr><tr><td>1.0</td><td>12.062</td></tr><tr><td>2.0</td><td>12.061</td></tr><tr><td>3.0</td><td>12.062</td></tr><tr><td>4.0</td><td>12.061</td></tr><tr><td>5.0</td><td>12.061</td></tr><tr><td>6.0</td><td>12.061</td></tr><tr><td>7.0</td><td>12.061</td></tr><tr><td>8.0</td><td>12.061</td></tr></tbody></table>		Time since start [H]	Output Voltage [V]	0.0	12.060	0.5	12.061	1.0	12.062	2.0	12.061	3.0	12.062	4.0	12.061	5.0	12.061	6.0	12.061	7.0	12.061	8.0	12.061
Time since start [H]	Output Voltage [V]																								
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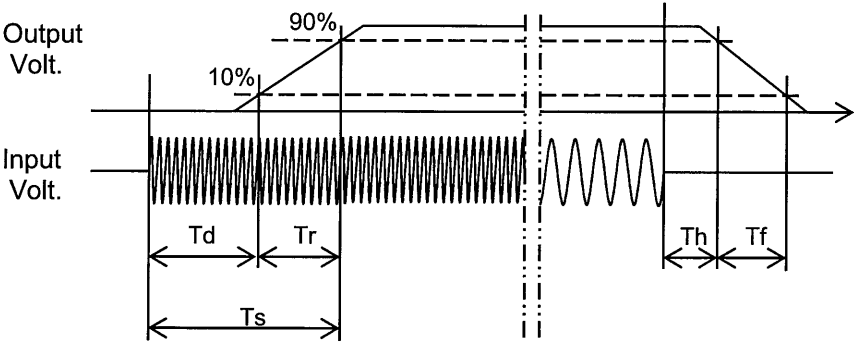
Model	GHA500F-12-SNF		
Item	Rise and Fall Time	Temperature	25°C
Object	+12V37.5A	Testing Circuitry	Figure A

1.Graph



2.Values

		[ms]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
120 V		523.0	13.0	536.0	18.6	1.7
230 V		519.0	13.0	532.0	18.9	1.6



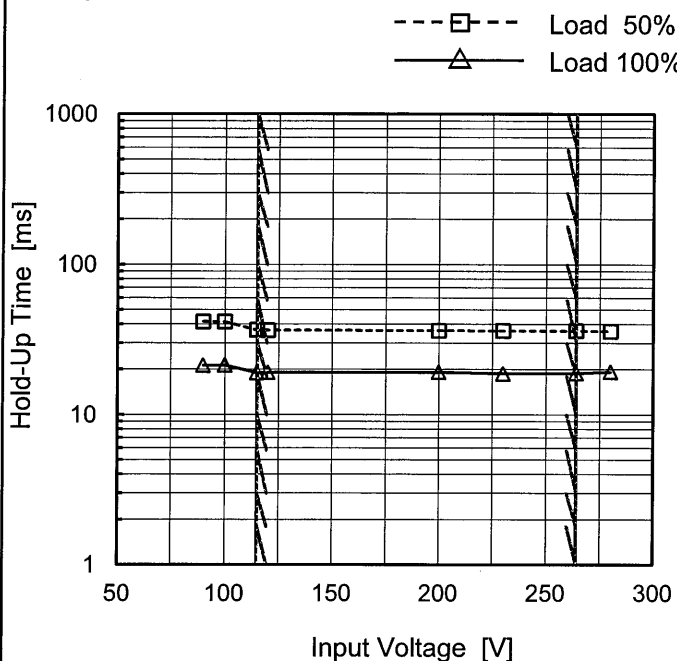
Model GHA500F-12-SNF

Item Hold-Up Time

Object +12V37.5A

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

# 2.Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
90	42	21 ※1
100	42	21 ※2
115	37	19
120	36	19
200	36	19
230	36	19
264	36	19
280	36	19
--	-	-

※1 : Load80%

※2 : Load88%

Model	GHA500F-12-SNF		
Item	Instantaneous Interruption Compensation	Temperature	25°C
Object	+12V37.5A	Testing Circuitry	Figure A
<p>1.Graph</p> <p> <span style="display: inline-block; width: 20px; border-bottom: 1px solid black; margin-right: 5px;"></span>△<span style="display: inline-block; width: 20px; border-bottom: 1px dashed black; margin-right: 5px;"></span>□<span style="display: inline-block; width: 20px; border-bottom: 1px dash-dot black; margin-right: 5px;"></span>○<span style="display: inline-block; width: 20px; border-bottom: 1px solid black; margin-right: 5px;"></span> </p> <p> <span style="display: inline-block; width: 20px; border-bottom: 1px solid black; margin-right: 5px;"></span>△<span style="display: inline-block; width: 20px; border-bottom: 1px dashed black; margin-right: 5px;"></span>□<span style="display: inline-block; width: 20px; border-bottom: 1px dash-dot black; margin-right: 5px;"></span>○<span style="display: inline-block; width: 20px; border-bottom: 1px solid black; margin-right: 5px;"></span> </p> <p> <span style="display: inline-block; width: 20px; border-bottom: 1px solid black; margin-right: 5px;"></span>△<span style="display: inline-block; 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Model

GHA500F-12-SNF

Item

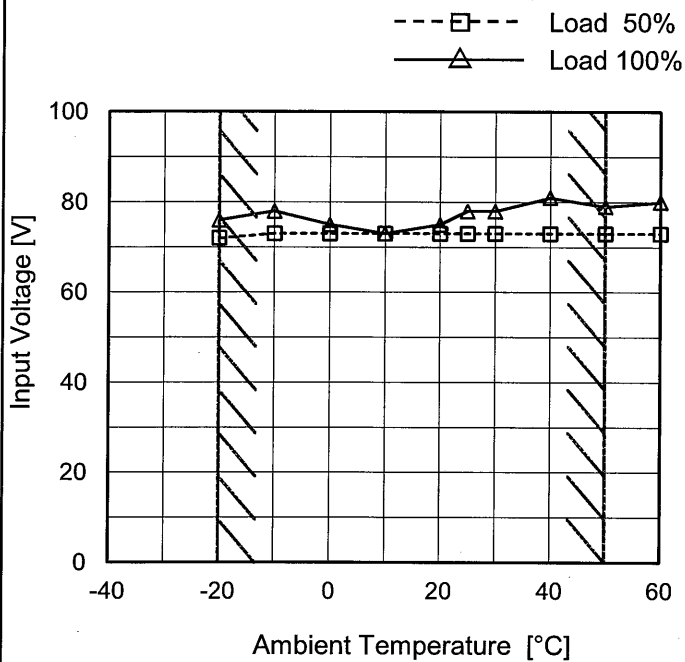
Minimum Input Voltage  
for Regulated Output Voltage

Object

+12V37.5A

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	72	76
-10	73	78
0	73	75
10	73	73
20	73	75
25	73	78
30	73	78
40	73	81
50	73	79
60	73	80
--	-	-

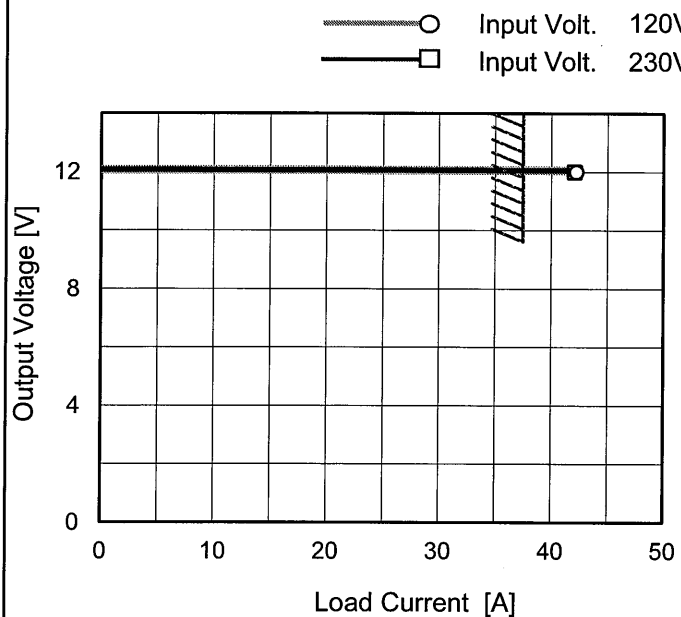
Model GHA500F-12-SNF

Item Overcurrent Protection

Object +12V37.5A

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. 120[V]	Input Volt. 230[V]
12	42.06	42.23
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



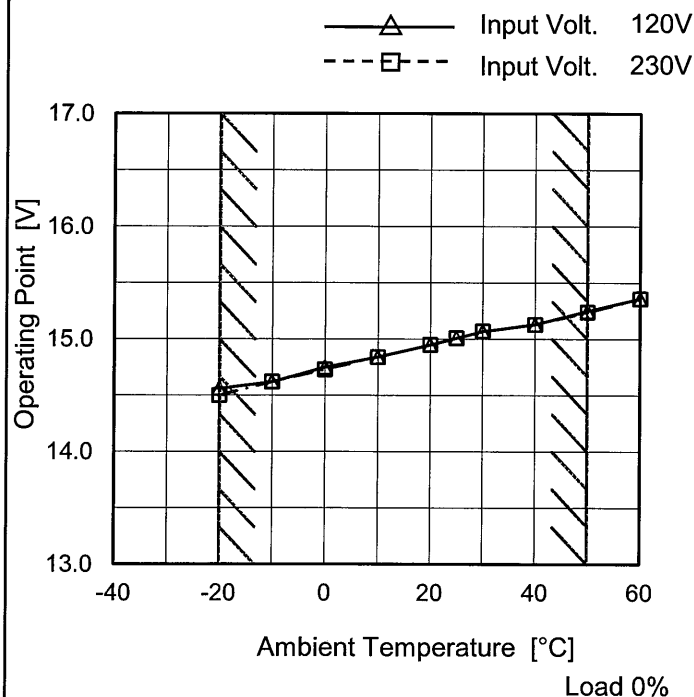
Model GHA500F-12-SNF

Item Overvoltage Protection

Object +12V37.5A

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. 120[V]	Input Volt. 230[V]
-20	14.56	14.50
-10	14.62	14.62
0	14.75	14.73
10	14.84	14.84
20	14.95	14.95
25	15.01	15.01
30	15.07	15.07
40	15.13	15.13
50	15.25	15.24
60	15.36	15.36
--	-	-

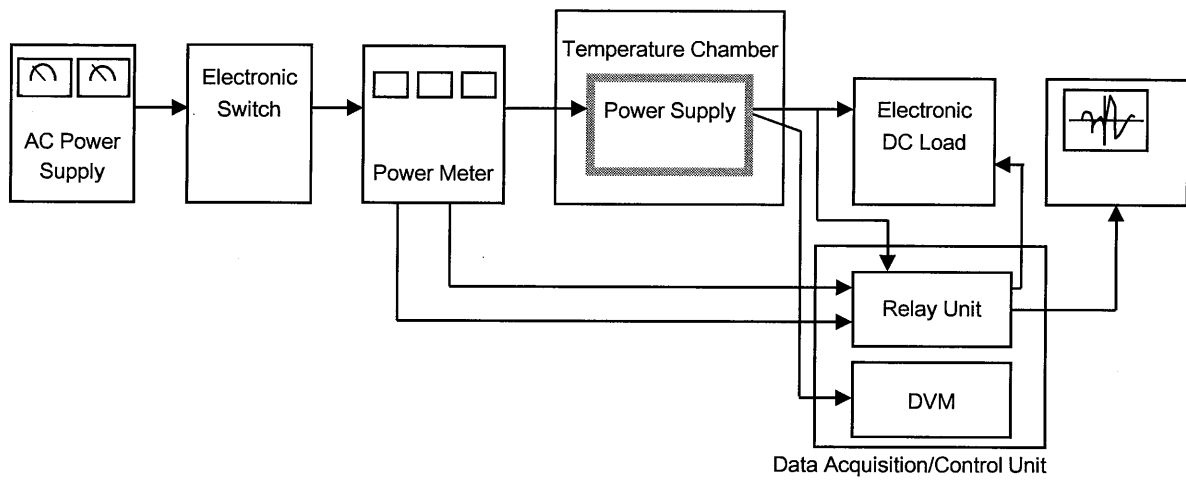


Figure A

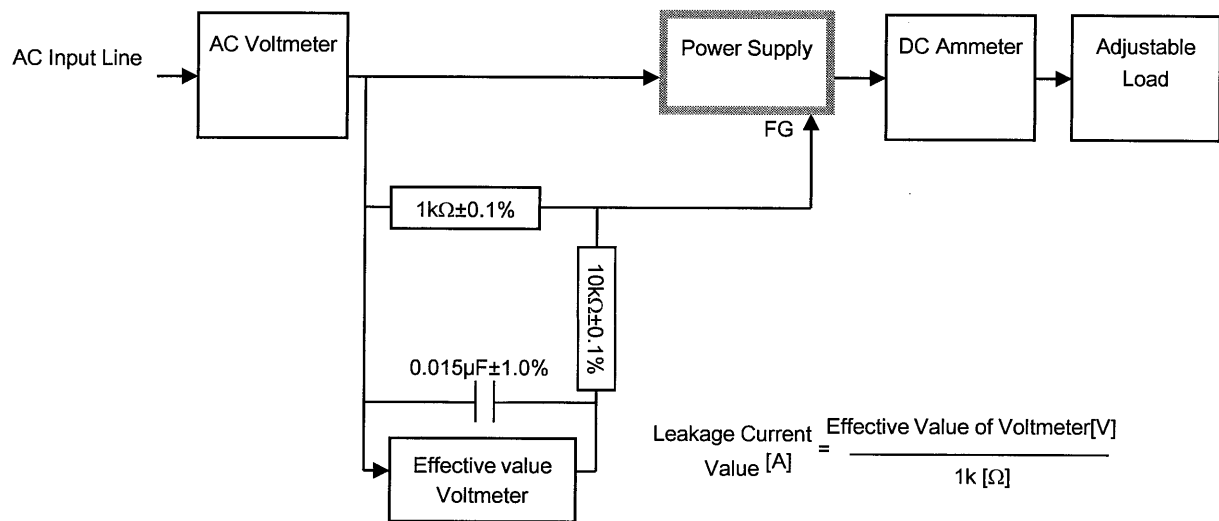


Figure B ( IEC60601-1 )