

# TEST DATA OF GHA500F-30-SNF

Regulated DC Power Supply  
December 7, 2015

Approved by : Kenji Shihata  
Kenji Shihata Design Manager

Prepared by : Masashi Shibata  
Masashi Shibata Design Engineer

**COSEL CO.,LTD.**

## CONTENTS

1. Input Current (by Load Current) . . . . .	1
2. Input Power (by Load Current) . . . . .	2
3. Efficiency (by Input Voltage) . . . . .	3
4. Efficiency (by Load Current) . . . . .	4
5. Power Factor (by Input Voltage) . . . . .	5
6. Power Factor (by Load Current) . . . . .	6
7. Inrush Current . . . . .	7
8. Leakage Current . . . . .	8
9. Line Regulation . . . . .	9
10. Load Regulation . . . . .	10
11. Dynamic Load Response . . . . .	11
12. Ripple Voltage (by Load Current) . . . . .	12
13. Ripple-Noise . . . . .	13
14. Ripple Voltage (by Ambient Temperature) . . . . .	14
15. Ambient Temperature Drift . . . . .	15
16. Output Voltage Accuracy . . . . .	16
17. Time Lapse Drift . . . . .	17
18. Rise and Fall Time . . . . .	18
19. Hold-Up Time . . . . .	19
20. Instantaneous Interruption Compensation . . . . .	20
21. Minimum Input Voltage for Regulated Output Voltage . . . . .	21
22. Overcurrent Protection . . . . .	22
23. Overvoltage Protection . . . . .	23
24. Figure of Testing Circuitry . . . . .	24

(Final Page 24)

**COSEL**

Model	GHA500F-30-SNF																																																					
Item	Input Current (by Load Current)	Temperature Testing Circuitry	25°C Figure A																																																			
Object	_____																																																					
1.Graph	—△— Input Volt. 100V - -□--- Input Volt. 120V - -○--- Input Volt. 230V																																																					
	<p>The graph shows three curves representing different input voltages: 100V (solid line with triangles), 120V (dashed line with squares), and 230V (dash-dot line with circles). The curves show that as input voltage increases, the required load current decreases for a given input current. A slanted line on the graph indicates the range of the rated load current.</p> <table border="1"> <caption>Data points estimated from the graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>Input Current [A] (100V)</th> <th>Input Current [A] (120V)</th> <th>Input Current [A] (230V)</th> </tr> </thead> <tbody> <tr><td>0</td><td>0.188</td><td>0.132</td><td>0.114</td></tr> <tr><td>4</td><td>0.774</td><td>0.664</td><td>0.408</td></tr> <tr><td>8</td><td>1.466</td><td>1.230</td><td>0.692</td></tr> <tr><td>12</td><td>2.234</td><td>1.862</td><td>1.006</td></tr> <tr><td>16</td><td>2.894</td><td>2.396</td><td>1.272</td></tr> <tr><td>20</td><td>3.650</td><td>3.022</td><td>1.588</td></tr> </tbody> </table>			Load Current [A]	Input Current [A] (100V)	Input Current [A] (120V)	Input Current [A] (230V)	0	0.188	0.132	0.114	4	0.774	0.664	0.408	8	1.466	1.230	0.692	12	2.234	1.862	1.006	16	2.894	2.396	1.272	20	3.650	3.022	1.588																							
Load Current [A]	Input Current [A] (100V)	Input Current [A] (120V)	Input Current [A] (230V)																																																			
0	0.188	0.132	0.114																																																			
4	0.774	0.664	0.408																																																			
8	1.466	1.230	0.692																																																			
12	2.234	1.862	1.006																																																			
16	2.894	2.396	1.272																																																			
20	3.650	3.022	1.588																																																			
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Current [A]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 120[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.188</td><td>0.132</td><td>0.114</td></tr> <tr><td>2.1</td><td>0.774</td><td>0.664</td><td>0.408</td></tr> <tr><td>4.3</td><td>1.466</td><td>1.230</td><td>0.692</td></tr> <tr><td>6.7</td><td>2.234</td><td>1.862</td><td>1.006</td></tr> <tr><td>8.7</td><td>2.894</td><td>2.396</td><td>1.272</td></tr> <tr><td>11.0</td><td>3.650</td><td>3.022</td><td>1.588</td></tr> <tr><td>11.9</td><td>3.960</td><td>3.266</td><td>1.710</td></tr> <tr><td>13.3</td><td>4.430</td><td>3.664</td><td>1.906</td></tr> <tr><td>14.7</td><td>4.920</td><td>4.050</td><td>2.104</td></tr> <tr><td>16.7</td><td>5.610</td><td>4.620</td><td>2.394</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Current [A]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	0.188	0.132	0.114	2.1	0.774	0.664	0.408	4.3	1.466	1.230	0.692	6.7	2.234	1.862	1.006	8.7	2.894	2.396	1.272	11.0	3.650	3.022	1.588	11.9	3.960	3.266	1.710	13.3	4.430	3.664	1.906	14.7	4.920	4.050	2.104	16.7	5.610	4.620	2.394	--	-	-	-
Load Current [A]	Input Current [A]																																																					
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																			
0.0	0.188	0.132	0.114																																																			
2.1	0.774	0.664	0.408																																																			
4.3	1.466	1.230	0.692																																																			
6.7	2.234	1.862	1.006																																																			
8.7	2.894	2.396	1.272																																																			
11.0	3.650	3.022	1.588																																																			
11.9	3.960	3.266	1.710																																																			
13.3	4.430	3.664	1.906																																																			
14.7	4.920	4.050	2.104																																																			
16.7	5.610	4.620	2.394																																																			
--	-	-	-																																																			
	<p>Note: Slanted line shows the range of the rated load current.</p>																																																					

**COSEL**

Model	GHA500F-30-SNF																																																					
Item	Input Power (by Load Current)																																																					
Object	_____																																																					
1.Graph	<p>Graph showing Input Power [W] vs Load Current [A]. The Y-axis ranges from 0 to 1000 W, and the X-axis ranges from 0 to 20 A. Three curves are plotted for Input Volt. 100V (solid line with triangles), Input Volt. 120V (dashed line with squares), and Input Volt. 230V (dash-dot line with circles). A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Power [W] (100V)</th> <th>Input Power [W] (120V)</th> <th>Input Power [W] (230V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>7.2</td><td>7.5</td><td>6.0</td></tr> <tr><td>2.1</td><td>75.1</td><td>75.6</td><td>75.0</td></tr> <tr><td>4.3</td><td>144.9</td><td>144.9</td><td>143.0</td></tr> <tr><td>6.7</td><td>222.3</td><td>221.4</td><td>218.0</td></tr> <tr><td>8.7</td><td>287.6</td><td>285.7</td><td>280.0</td></tr> <tr><td>11.0</td><td>363.9</td><td>360.9</td><td>354.0</td></tr> <tr><td>11.9</td><td>394.0</td><td>390.6</td><td>382.0</td></tr> <tr><td>13.3</td><td>442.0</td><td>437.1</td><td>428.0</td></tr> <tr><td>14.7</td><td>490.0</td><td>485.0</td><td>473.0</td></tr> <tr><td>16.7</td><td>560.0</td><td>553.0</td><td>539.0</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Power [W] (100V)	Input Power [W] (120V)	Input Power [W] (230V)	0.0	7.2	7.5	6.0	2.1	75.1	75.6	75.0	4.3	144.9	144.9	143.0	6.7	222.3	221.4	218.0	8.7	287.6	285.7	280.0	11.0	363.9	360.9	354.0	11.9	394.0	390.6	382.0	13.3	442.0	437.1	428.0	14.7	490.0	485.0	473.0	16.7	560.0	553.0	539.0	--	-	-	-			
Load Current [A]	Input Power [W] (100V)	Input Power [W] (120V)	Input Power [W] (230V)																																																			
0.0	7.2	7.5	6.0																																																			
2.1	75.1	75.6	75.0																																																			
4.3	144.9	144.9	143.0																																																			
6.7	222.3	221.4	218.0																																																			
8.7	287.6	285.7	280.0																																																			
11.0	363.9	360.9	354.0																																																			
11.9	394.0	390.6	382.0																																																			
13.3	442.0	437.1	428.0																																																			
14.7	490.0	485.0	473.0																																																			
16.7	560.0	553.0	539.0																																																			
--	-	-	-																																																			
Temperature Testing Circuitry	25°C Figure A																																																					
2.Values	<table border="1"> <thead> <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> </thead> <tbody> <tr><td>0.0</td><td>7.2</td><td>7.5</td><td>6.0</td></tr> <tr><td>2.1</td><td>75.1</td><td>75.6</td><td>75.0</td></tr> <tr><td>4.3</td><td>144.9</td><td>144.9</td><td>143.0</td></tr> <tr><td>6.7</td><td>222.3</td><td>221.4</td><td>218.0</td></tr> <tr><td>8.7</td><td>287.6</td><td>285.7</td><td>280.0</td></tr> <tr><td>11.0</td><td>363.9</td><td>360.9</td><td>354.0</td></tr> <tr><td>11.9</td><td>394.0</td><td>390.6</td><td>382.0</td></tr> <tr><td>13.3</td><td>442.0</td><td>437.1</td><td>428.0</td></tr> <tr><td>14.7</td><td>490.0</td><td>485.0</td><td>473.0</td></tr> <tr><td>16.7</td><td>560.0</td><td>553.0</td><td>539.0</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Input Power [W]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	7.2	7.5	6.0	2.1	75.1	75.6	75.0	4.3	144.9	144.9	143.0	6.7	222.3	221.4	218.0	8.7	287.6	285.7	280.0	11.0	363.9	360.9	354.0	11.9	394.0	390.6	382.0	13.3	442.0	437.1	428.0	14.7	490.0	485.0	473.0	16.7	560.0	553.0	539.0	--	-	-	-
Load Current [A]	Input Power [W]																																																					
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																			
0.0	7.2	7.5	6.0																																																			
2.1	75.1	75.6	75.0																																																			
4.3	144.9	144.9	143.0																																																			
6.7	222.3	221.4	218.0																																																			
8.7	287.6	285.7	280.0																																																			
11.0	363.9	360.9	354.0																																																			
11.9	394.0	390.6	382.0																																																			
13.3	442.0	437.1	428.0																																																			
14.7	490.0	485.0	473.0																																																			
16.7	560.0	553.0	539.0																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

**COSEL**

Model	GHA500F-30-SNF																																	
Item	Efficiency (by Input Voltage)	Temperature 25°C Testing Circuitry Figure A																																
Object	—	—																																
1.Graph																																		
<p>Efficiency [%]</p> <p>Input Voltage [V]</p> <p>--- □ --- Load 50%</p> <p>— △ — Load 100%</p>																																		
2.Values																																		
<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>90</td> <td>90.7</td> <td>89.6 ※1</td> </tr> <tr> <td>100</td> <td>91.2</td> <td>90.5 ※2</td> </tr> <tr> <td>115</td> <td>91.9</td> <td>91.1</td> </tr> <tr> <td>120</td> <td>92.0</td> <td>91.3</td> </tr> <tr> <td>200</td> <td>92.7</td> <td>93.4</td> </tr> <tr> <td>230</td> <td>93.8</td> <td>93.4</td> </tr> <tr> <td>264</td> <td>94.1</td> <td>93.6</td> </tr> <tr> <td>280</td> <td>94.1</td> <td>93.7</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	90	90.7	89.6 ※1	100	91.2	90.5 ※2	115	91.9	91.1	120	92.0	91.3	200	92.7	93.4	230	93.8	93.4	264	94.1	93.6	280	94.1	93.7	--	-	-
Input Voltage [V]	Efficiency [%]																																	
	Load 50%	Load 100%																																
90	90.7	89.6 ※1																																
100	91.2	90.5 ※2																																
115	91.9	91.1																																
120	92.0	91.3																																
200	92.7	93.4																																
230	93.8	93.4																																
264	94.1	93.6																																
280	94.1	93.7																																
--	-	-																																
※1 : Load 80% ※2 : Load 88%																																		
Note: Slanted line shows the range of the rated input voltage.																																		

**COSEL**

Model	GHA500F-30-SNF																																																					
Item	Efficiency (by Load Current)																																																					
Object	_____																																																					
1.Graph	<p>Graph showing Efficiency (%) vs Load Current (A) for GHA500F-30-SNF at 25°C. The graph plots efficiency against load current for three input voltages: 100V (solid line with triangles), 120V (dashed line with squares), and 230V (dash-dot line with circles). A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 100V [%]</th> <th>Input Volt. 120V [%]</th> <th>Input Volt. 230V [%]</th> </tr> </thead> <tbody> <tr><td>2.1</td><td>84.6</td><td>84.2</td><td>84.9</td></tr> <tr><td>4.3</td><td>89.7</td><td>89.7</td><td>91.0</td></tr> <tr><td>6.7</td><td>91.0</td><td>91.4</td><td>92.9</td></tr> <tr><td>8.7</td><td>91.3</td><td>92.0</td><td>93.9</td></tr> <tr><td>11.0</td><td>91.2</td><td>92.1</td><td>93.8</td></tr> <tr><td>11.9</td><td>91.2</td><td>92.0</td><td>94.1</td></tr> <tr><td>13.3</td><td>90.8</td><td>91.9</td><td>93.9</td></tr> <tr><td>14.7</td><td>90.5</td><td>91.5</td><td>93.9</td></tr> <tr><td>16.7</td><td>90.0</td><td>91.2</td><td>93.6</td></tr> </tbody> </table>			Load Current [A]	Input Volt. 100V [%]	Input Volt. 120V [%]	Input Volt. 230V [%]	2.1	84.6	84.2	84.9	4.3	89.7	89.7	91.0	6.7	91.0	91.4	92.9	8.7	91.3	92.0	93.9	11.0	91.2	92.1	93.8	11.9	91.2	92.0	94.1	13.3	90.8	91.9	93.9	14.7	90.5	91.5	93.9	16.7	90.0	91.2	93.6											
Load Current [A]	Input Volt. 100V [%]	Input Volt. 120V [%]	Input Volt. 230V [%]																																																			
2.1	84.6	84.2	84.9																																																			
4.3	89.7	89.7	91.0																																																			
6.7	91.0	91.4	92.9																																																			
8.7	91.3	92.0	93.9																																																			
11.0	91.2	92.1	93.8																																																			
11.9	91.2	92.0	94.1																																																			
13.3	90.8	91.9	93.9																																																			
14.7	90.5	91.5	93.9																																																			
16.7	90.0	91.2	93.6																																																			
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 120[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>2.1</td><td>84.6</td><td>84.2</td><td>84.9</td></tr> <tr><td>4.3</td><td>89.7</td><td>89.7</td><td>91.0</td></tr> <tr><td>6.7</td><td>91.0</td><td>91.4</td><td>92.9</td></tr> <tr><td>8.7</td><td>91.3</td><td>92.0</td><td>93.9</td></tr> <tr><td>11.0</td><td>91.2</td><td>92.1</td><td>93.8</td></tr> <tr><td>11.9</td><td>91.2</td><td>92.0</td><td>94.1</td></tr> <tr><td>13.3</td><td>90.8</td><td>91.9</td><td>93.9</td></tr> <tr><td>14.7</td><td>90.5</td><td>91.5</td><td>93.9</td></tr> <tr><td>16.7</td><td>90.0</td><td>91.2</td><td>93.6</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Efficiency [%]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	-	-	-	2.1	84.6	84.2	84.9	4.3	89.7	89.7	91.0	6.7	91.0	91.4	92.9	8.7	91.3	92.0	93.9	11.0	91.2	92.1	93.8	11.9	91.2	92.0	94.1	13.3	90.8	91.9	93.9	14.7	90.5	91.5	93.9	16.7	90.0	91.2	93.6	--	-	-	-
Load Current [A]	Efficiency [%]																																																					
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																			
0.0	-	-	-																																																			
2.1	84.6	84.2	84.9																																																			
4.3	89.7	89.7	91.0																																																			
6.7	91.0	91.4	92.9																																																			
8.7	91.3	92.0	93.9																																																			
11.0	91.2	92.1	93.8																																																			
11.9	91.2	92.0	94.1																																																			
13.3	90.8	91.9	93.9																																																			
14.7	90.5	91.5	93.9																																																			
16.7	90.0	91.2	93.6																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

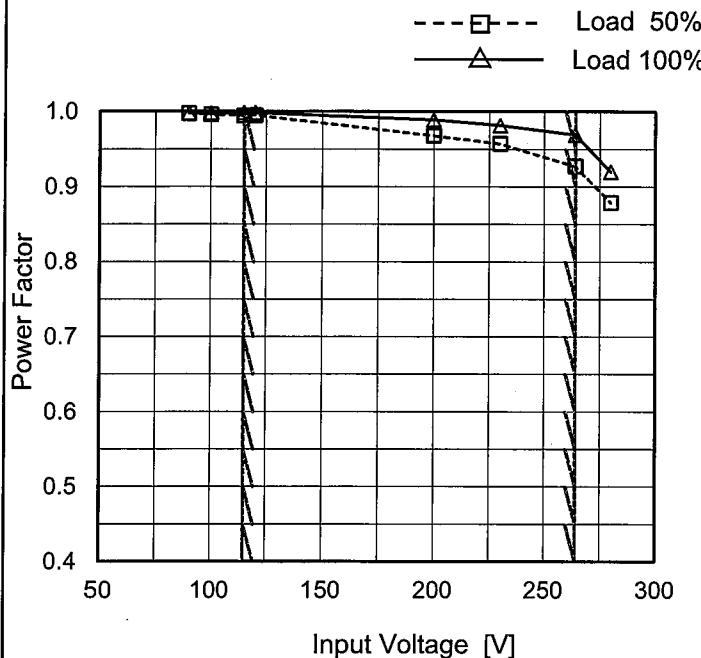
**COSEL**

Model GHA500F-30-SNF

Item Power Factor (by Input Voltage)

Object \_\_\_\_\_

## 1. Graph

Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
90	0.998	0.998 ※1
100	0.996	0.998 ※2
115	0.995	0.999
120	0.995	0.999
200	0.968	0.989
230	0.957	0.982
264	0.927	0.969
280	0.879	0.920
--	-	-

※1 : Load 80%

※2 : Load 88%

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

**COSEL**

Model	GHA500F-30-SNF																																																					
Item	Power Factor (by Load Current)	Temperature 25°C	Testing Circuitry Figure A																																																			
Object																																																						
1.Graph	<p>—△— Input Volt. 100V        - - -□- Input Volt. 120V        - - ○- Input Volt. 230V</p>																																																					
2.Values	<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Power Factor</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 120[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td><td>0.383</td><td>0.475</td><td>0.231</td></tr> <tr> <td>2.1</td><td>0.972</td><td>0.950</td><td>0.798</td></tr> <tr> <td>4.3</td><td>0.990</td><td>0.983</td><td>0.899</td></tr> <tr> <td>6.7</td><td>0.996</td><td>0.993</td><td>0.944</td></tr> <tr> <td>8.7</td><td>0.998</td><td>0.994</td><td>0.956</td></tr> <tr> <td>11.0</td><td>0.998</td><td>0.997</td><td>0.970</td></tr> <tr> <td>11.9</td><td>0.998</td><td>0.998</td><td>0.972</td></tr> <tr> <td>13.3</td><td>0.998</td><td>0.998</td><td>0.977</td></tr> <tr> <td>14.7</td><td>0.998</td><td>0.998</td><td>0.979</td></tr> <tr> <td>16.7</td><td>0.999</td><td>0.999</td><td>0.978</td></tr> <tr> <td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Power Factor			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	0.383	0.475	0.231	2.1	0.972	0.950	0.798	4.3	0.990	0.983	0.899	6.7	0.996	0.993	0.944	8.7	0.998	0.994	0.956	11.0	0.998	0.997	0.970	11.9	0.998	0.998	0.972	13.3	0.998	0.998	0.977	14.7	0.998	0.998	0.979	16.7	0.999	0.999	0.978	--	-	-	-
Load Current [A]	Power Factor																																																					
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																			
0.0	0.383	0.475	0.231																																																			
2.1	0.972	0.950	0.798																																																			
4.3	0.990	0.983	0.899																																																			
6.7	0.996	0.993	0.944																																																			
8.7	0.998	0.994	0.956																																																			
11.0	0.998	0.997	0.970																																																			
11.9	0.998	0.998	0.972																																																			
13.3	0.998	0.998	0.977																																																			
14.7	0.998	0.998	0.979																																																			
16.7	0.999	0.999	0.978																																																			
--	-	-	-																																																			
Note:	Slanted line shows the range of the rated load current.																																																					

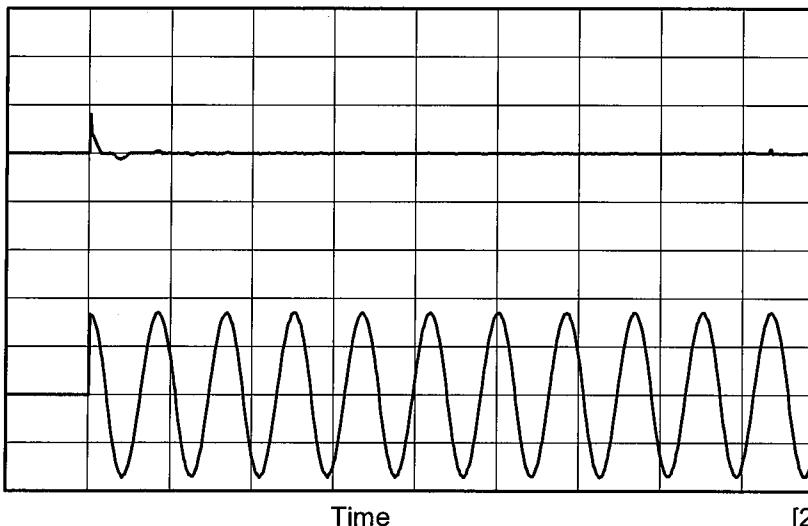
**COSEL**

Model GHA500F-30-SNF

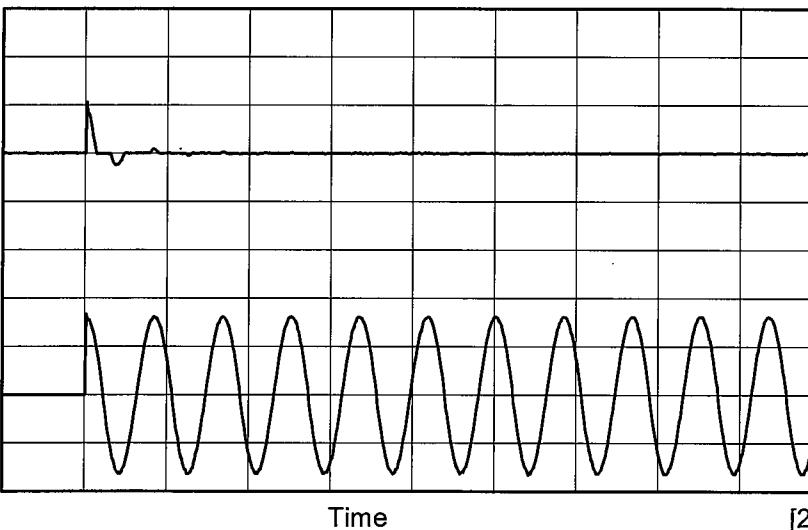
Temperature 25°C  
Testing Circuitry Figure A

Item Inrush Current

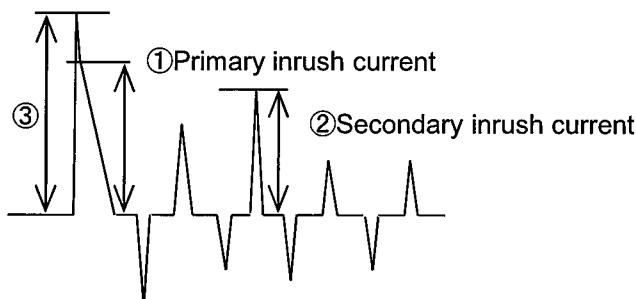
Object \_\_\_\_\_

Input  
Current  
[50A/div]Input  
Voltage  
[100V/div]Input Voltage 120 V  
Frequency 60 Hz  
Load 100 %

- ① Primary inrush current : 20.4A
- ② Secondary inrush current : 2.4A
- ③ Surge current ※1: 40.8A

Input  
Current  
[50A/div]Input  
Voltage  
[200V/div]Input Voltage 230 V  
Frequency 60 Hz  
Load 100 %

- ① Primary inrush current : 40.2A
- ② Secondary inrush current : 4.2A
- ③ Surge current ※1: 53.0A



※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.



Model	GHA500F-30-SNF	Temperature Testing Circuitry	25°C Figure B
Item	Leakage Current		
Object	<hr/>		

### 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

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.

**COSEL**

Model	GHA500F-30-SNF																																	
Item	Line Regulation	Temperature      25°C Testing Circuitry      Figure A																																
Object	+30V16.7A																																	
1.Graph																																		
<p>The graph plots Output Voltage [V] on the Y-axis (30.00 to 30.80) against Input Voltage [V] on the X-axis (50 to 300). Two horizontal lines represent load conditions: a dashed line for Load 50% at approximately 30.28 V and a solid line for Load 100% at approximately 30.29 V. Slanted lines on either side of these horizontal lines indicate the range of the rated input voltage.</p>																																		
2.Values																																		
<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>90</td><td>30.285</td><td>30.283 ※1</td> </tr> <tr> <td>100</td><td>30.285</td><td>30.283 ※2</td> </tr> <tr> <td>115</td><td>30.286</td><td>30.285</td> </tr> <tr> <td>120</td><td>30.287</td><td>30.285</td> </tr> <tr> <td>200</td><td>30.287</td><td>30.286</td> </tr> <tr> <td>230</td><td>30.287</td><td>30.286</td> </tr> <tr> <td>264</td><td>30.287</td><td>30.286</td> </tr> <tr> <td>280</td><td>30.287</td><td>30.286</td> </tr> <tr> <td>--</td><td>-</td><td>-</td> </tr> </tbody> </table>			Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	90	30.285	30.283 ※1	100	30.285	30.283 ※2	115	30.286	30.285	120	30.287	30.285	200	30.287	30.286	230	30.287	30.286	264	30.287	30.286	280	30.287	30.286	--	-	-
Input Voltage [V]	Output Voltage [V]																																	
	Load 50%	Load 100%																																
90	30.285	30.283 ※1																																
100	30.285	30.283 ※2																																
115	30.286	30.285																																
120	30.287	30.285																																
200	30.287	30.286																																
230	30.287	30.286																																
264	30.287	30.286																																
280	30.287	30.286																																
--	-	-																																
※1 : Load 80% ※2 : Load 88%																																		
Note: Slanted line shows the range of the rated input voltage.																																		

**COSEL**

Model	GHA500F-30-SNF
Item	Load Regulation
Object	+30V16.7A
1.Graph	
<p style="text-align: center;"> <span style="margin-right: 10px;">—△— Input Volt. 100V</span>  <span style="margin-right: 10px;">---□--- Input Volt. 120V</span>  <span style="margin-right: 10px;">---○--- Input Volt. 230V</span> </p> <p>The graph displays the output voltage regulation across a load current range from 0 to 16A. The output voltage remains constant at approximately 30.30V for low load currents (up to about 10A) and then begins to drop slightly as the load increases, reaching a minimum of about 30.28V at 16A. A slanted line indicates the rated load current range.</p>	
<p>Note: Slanted line shows the range of the rated load current.</p>	

Temperature 25°C  
Testing Circuitry Figure A

## 2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
0.0	30.290	30.292	30.292
2.1	30.286	30.289	30.289
4.3	30.286	30.288	30.288
6.7	30.285	30.288	30.287
8.7	30.285	30.287	30.287
11.0	30.284	30.287	30.287
11.9	30.284	30.286	30.286
13.3	30.284	30.286	30.286
14.7	30.283	30.286	30.286
16.7	30.283	30.285	30.286
--	-	-	-

**COSEL**

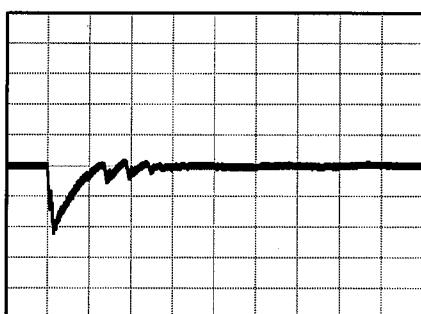
Model	GHA500F-30-SNF	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+30V 16.7A		

Input Volt. 120V  
 Cycle 1000ms

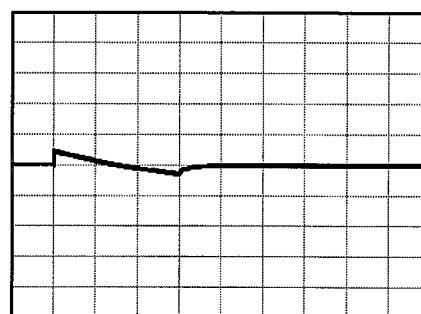
Load Current   
 16.7A / 50μs

Min.Load (0A)↔  
 Load 100%(16.7A)

1 V/div



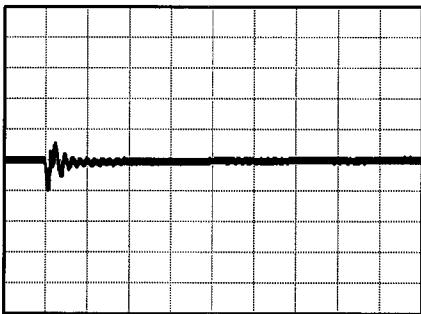
4 ms/div



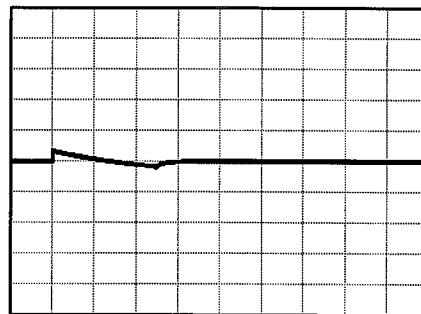
40 ms/div

Min.Load (0A)↔  
 Load 50%(8.35A)

1 V/div



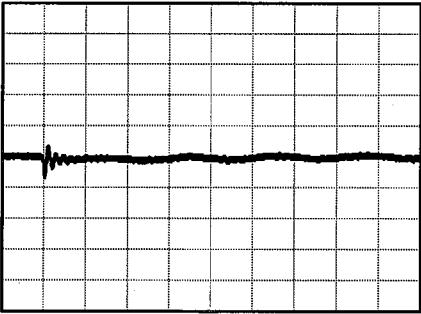
4 ms/div



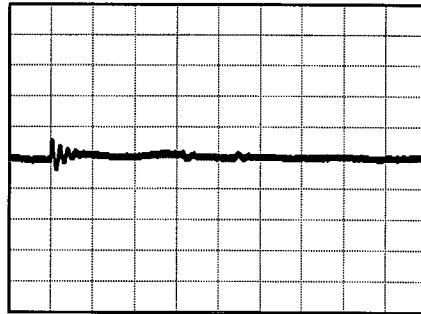
40 ms/div

Load 50% (8.35A)↔  
 Load 100% (16.7A)

500 mV/div



4 ms/div



4 ms/div

Note : With recommended external capacitor 3300  $\mu$ F

**COSEL**

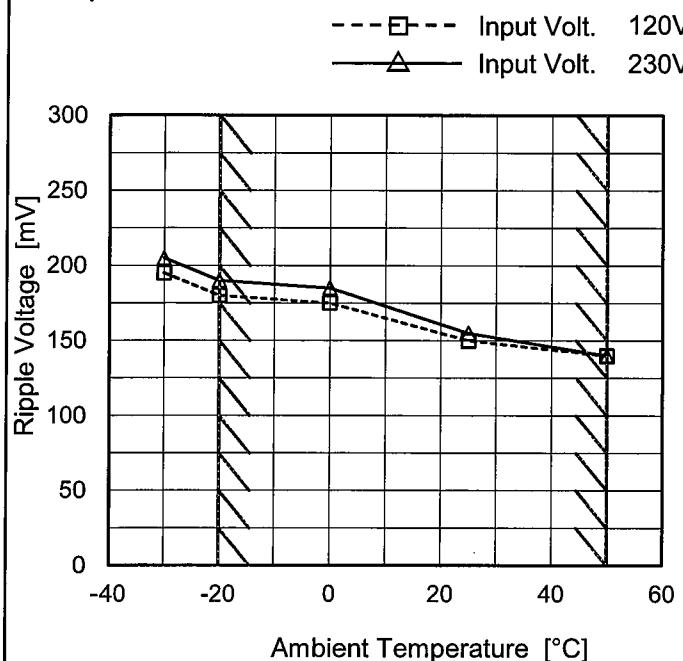
Model	GHA500F-30-SNF																																						
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure A																																					
Object	+30V16.7A																																						
1.Graph																																							
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 300 mV, and the X-axis ranges from 0 to 20 A. Two curves are plotted: one for Input Volt. 120V (solid line with open circles) and one for Input Volt. 230V (dashed line with open circles). Both curves show an increase in ripple voltage as load current increases. A slanted line indicates the range of rated load current.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple Voltage [mV] (Input Volt. 120V)</th> <th>Ripple Voltage [mV] (Input Volt. 230V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5</td><td>5</td></tr> <tr><td>2.1</td><td>70</td><td>70</td></tr> <tr><td>4.3</td><td>90</td><td>90</td></tr> <tr><td>6.7</td><td>100</td><td>100</td></tr> <tr><td>8.7</td><td>115</td><td>120</td></tr> <tr><td>11.0</td><td>130</td><td>120</td></tr> <tr><td>11.9</td><td>130</td><td>125</td></tr> <tr><td>13.4</td><td>140</td><td>140</td></tr> <tr><td>14.7</td><td>140</td><td>145</td></tr> <tr><td>16.7</td><td>150</td><td>155</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple Voltage [mV] (Input Volt. 120V)	Ripple Voltage [mV] (Input Volt. 230V)	0.0	5	5	2.1	70	70	4.3	90	90	6.7	100	100	8.7	115	120	11.0	130	120	11.9	130	125	13.4	140	140	14.7	140	145	16.7	150	155	--	-	-		
Load Current [A]	Ripple Voltage [mV] (Input Volt. 120V)	Ripple Voltage [mV] (Input Volt. 230V)																																					
0.0	5	5																																					
2.1	70	70																																					
4.3	90	90																																					
6.7	100	100																																					
8.7	115	120																																					
11.0	130	120																																					
11.9	130	125																																					
13.4	140	140																																					
14.7	140	145																																					
16.7	150	155																																					
--	-	-																																					
2.Values																																							
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 120 [V]</th> <th>Input Volt. 230 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>5</td><td>5</td></tr> <tr><td>2.1</td><td>70</td><td>70</td></tr> <tr><td>4.3</td><td>90</td><td>90</td></tr> <tr><td>6.7</td><td>100</td><td>100</td></tr> <tr><td>8.7</td><td>115</td><td>120</td></tr> <tr><td>11.0</td><td>130</td><td>120</td></tr> <tr><td>11.9</td><td>130</td><td>125</td></tr> <tr><td>13.4</td><td>140</td><td>140</td></tr> <tr><td>14.7</td><td>140</td><td>145</td></tr> <tr><td>16.7</td><td>150</td><td>155</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 120 [V]	Input Volt. 230 [V]	0.0	5	5	2.1	70	70	4.3	90	90	6.7	100	100	8.7	115	120	11.0	130	120	11.9	130	125	13.4	140	140	14.7	140	145	16.7	150	155	--	-	-
Load Current [A]	Ripple Voltage [mV]																																						
	Input Volt. 120 [V]	Input Volt. 230 [V]																																					
0.0	5	5																																					
2.1	70	70																																					
4.3	90	90																																					
6.7	100	100																																					
8.7	115	120																																					
11.0	130	120																																					
11.9	130	125																																					
13.4	140	140																																					
14.7	140	145																																					
16.7	150	155																																					
--	-	-																																					
<p>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.</p> <p>Ripple [mVp-p]</p> <p>Fig.Complex Ripple Wave Form</p>																																							

**COSEL**

Model	GHA500F-30-SNF																																							
Item	Ripple-Noise	Temperature      25°C Testing Circuitry      Figure A																																						
Object	+30V16.7A																																							
1.Graph																																								
		2.Values																																						
<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="2">Ripple-Noise [mV]</th> </tr> <tr> <th>Input Volt. 120 [V]</th> <th>Input Volt. 230 [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>25</td><td>20</td></tr> <tr><td>2.1</td><td>85</td><td>85</td></tr> <tr><td>4.3</td><td>90</td><td>90</td></tr> <tr><td>6.7</td><td>110</td><td>110</td></tr> <tr><td>8.7</td><td>120</td><td>125</td></tr> <tr><td>11.0</td><td>135</td><td>135</td></tr> <tr><td>11.9</td><td>140</td><td>140</td></tr> <tr><td>13.4</td><td>150</td><td>145</td></tr> <tr><td>14.7</td><td>155</td><td>155</td></tr> <tr><td>16.7</td><td>165</td><td>165</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Load Current [A]	Ripple-Noise [mV]		Input Volt. 120 [V]	Input Volt. 230 [V]	0.0	25	20	2.1	85	85	4.3	90	90	6.7	110	110	8.7	120	125	11.0	135	135	11.9	140	140	13.4	150	145	14.7	155	155	16.7	165	165	--	-	-
Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 120 [V]	Input Volt. 230 [V]																																						
0.0	25	20																																						
2.1	85	85																																						
4.3	90	90																																						
6.7	110	110																																						
8.7	120	125																																						
11.0	135	135																																						
11.9	140	140																																						
13.4	150	145																																						
14.7	155	155																																						
16.7	165	165																																						
--	-	-																																						
<p>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.</p>																																								
<p>Fig.Complex Ripple Noise Wave Form</p>																																								

Model	GHA500F-30-SNF
Item	Ripple Voltage (by Ambient Temp.)
Object	+30V16.7A

## 1.Graph



Measured by 20 MHz Oscilloscope.

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

## Testing Circuitry Figure A

## 2.Values

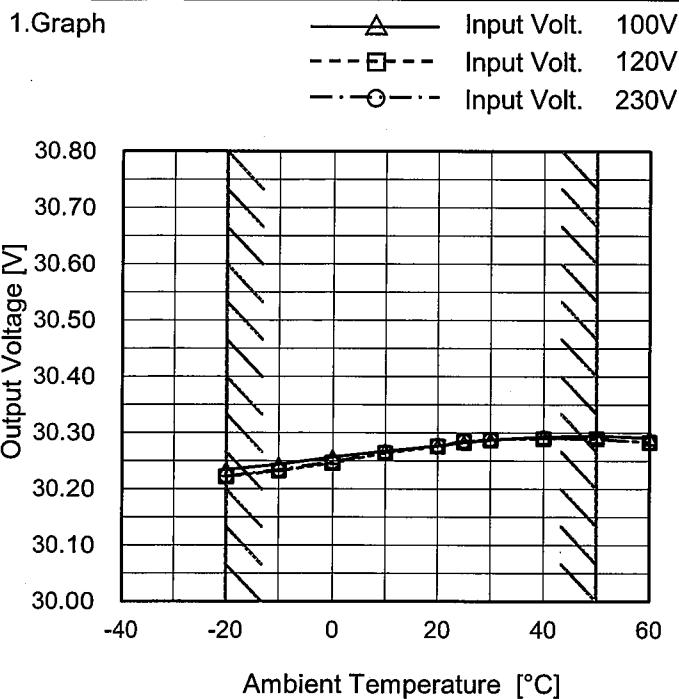
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
-30	195	205
-20	180	190
0	175	185
25	150	155
50	140	140
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

**COSEL**

Model GHA500F-30-SNF

Item Ambient Temperature Drift

Object +30V16.7A



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

Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
-20	30.235	30.222	30.223
-10	30.244	30.233	30.234
0	30.257	30.246	30.248
10	30.268	30.264	30.266
20	30.277	30.276	30.277
25	30.283	30.285	30.286
30	30.287	30.288	30.288
40	30.293	30.290	30.291
50	30.295	30.289	30.289
60	30.292	30.283	30.283
--	-	-	-

Note: In case of Input Volt. 100V, Load 88%.  
Other case Load 100%.



Model	GHA500F-30-SNF	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+30V16.7A	

### 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 - 16.7A

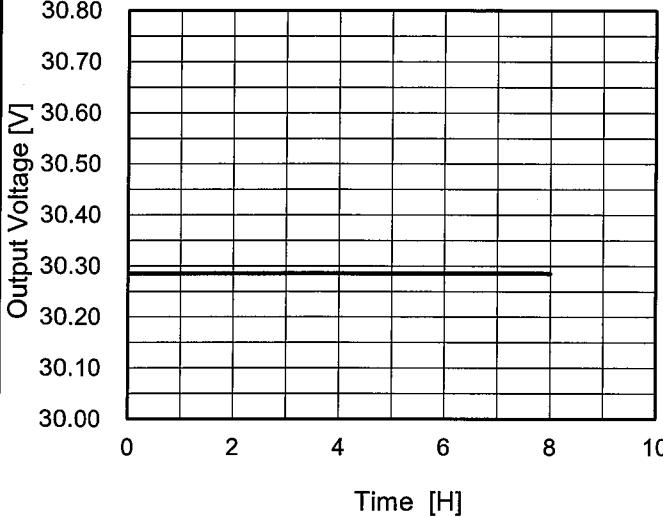
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	230	0	30.286	±35	±0.1
Minimum Voltage	-20	115	16.7	30.217		

**COSEL**

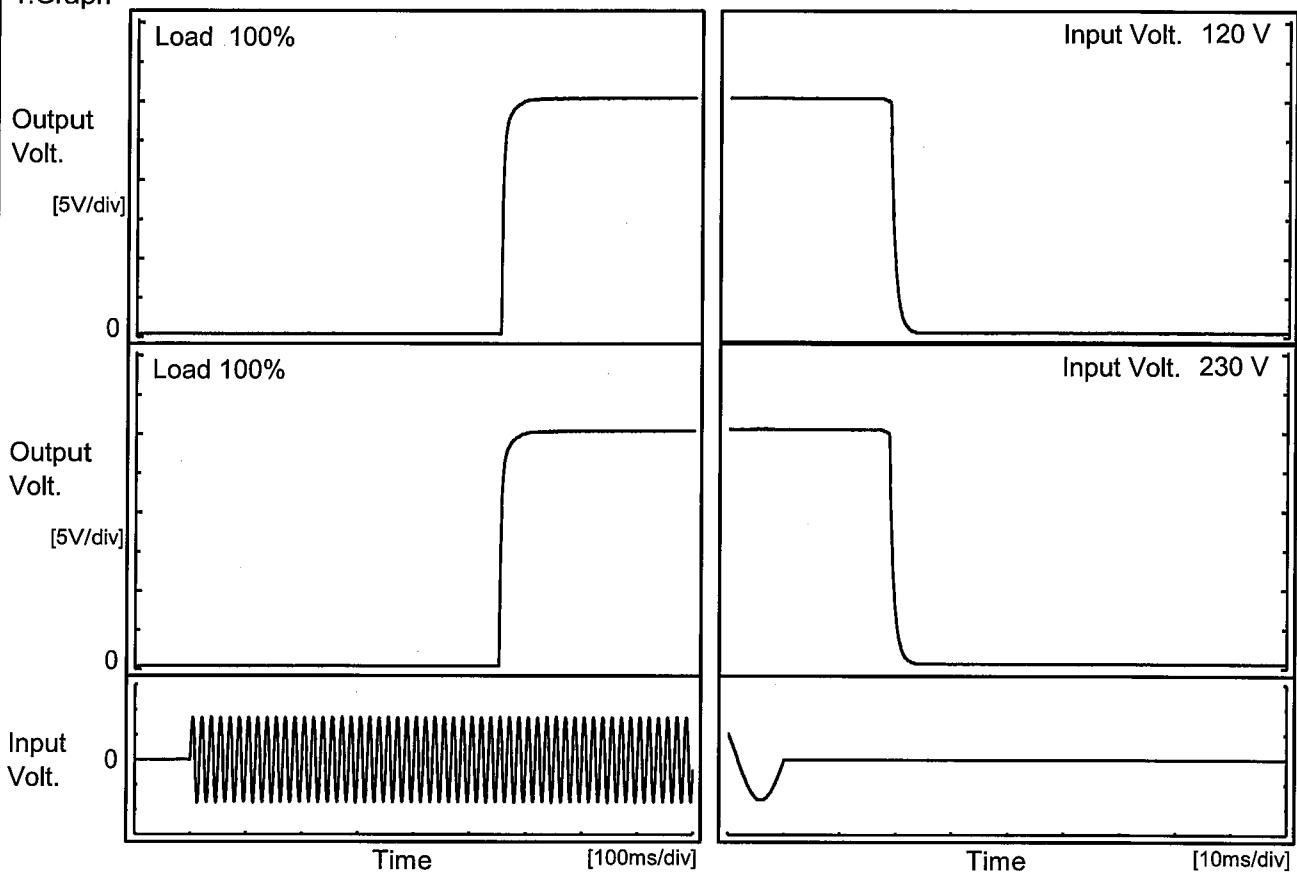
Model	GHA500F-30-SNF	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+30V16.7A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 230V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>30.286</td></tr> <tr><td>0.5</td><td>30.285</td></tr> <tr><td>1.0</td><td>30.285</td></tr> <tr><td>2.0</td><td>30.286</td></tr> <tr><td>3.0</td><td>30.285</td></tr> <tr><td>4.0</td><td>30.285</td></tr> <tr><td>5.0</td><td>30.285</td></tr> <tr><td>6.0</td><td>30.286</td></tr> <tr><td>7.0</td><td>30.286</td></tr> <tr><td>8.0</td><td>30.286</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	30.286	0.5	30.285	1.0	30.285	2.0	30.286	3.0	30.285	4.0	30.285	5.0	30.285	6.0	30.286	7.0	30.286	8.0	30.286
Time since start [H]	Output Voltage [V]																								
0.0	30.286																								
0.5	30.285																								
1.0	30.285																								
2.0	30.286																								
3.0	30.285																								
4.0	30.285																								
5.0	30.285																								
6.0	30.286																								
7.0	30.286																								
8.0	30.286																								

**COSEL**

Model	GHA500F-30-SNF
Item	Rise and Fall Time
Object	+30V16.7A

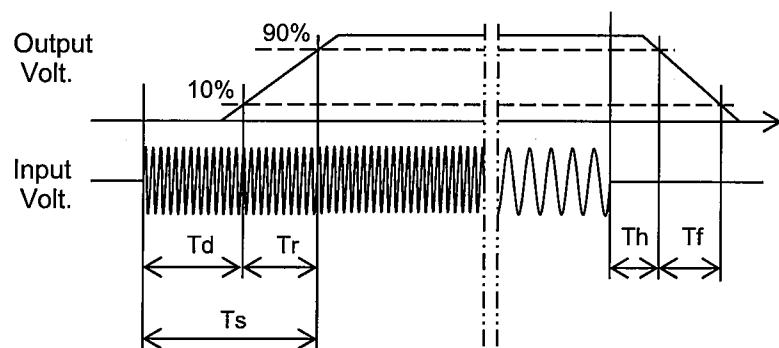
Temperature 25°C  
Testing Circuitry Figure A

## 1. Graph



## 2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
120V		553.5	10.5	564.0	18.8	1.8	
230V		552.0	10.5	562.5	18.8	1.8	



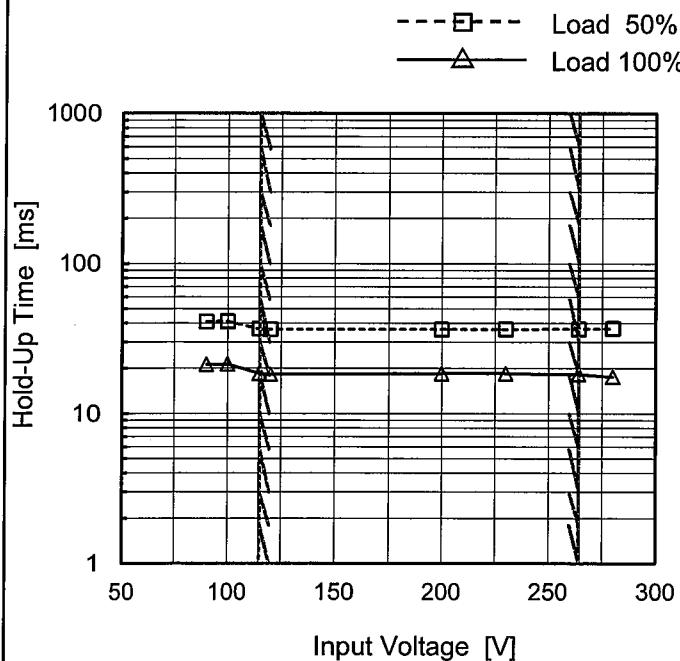
**COSEL**

Model GHA500F-30-SNF

Item Hold-Up Time

Object +30V16.7A

## 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.

Temperature 25°C  
Testing Circuitry Figure A

## 2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
90	41	21 ※1
100	41	21 ※2
115	37	19
120	36	18
200	36	19
230	37	19
264	37	18
280	37	18
--	-	-

※1 : Load 80%

※2 : Load 88%

**COSEL**

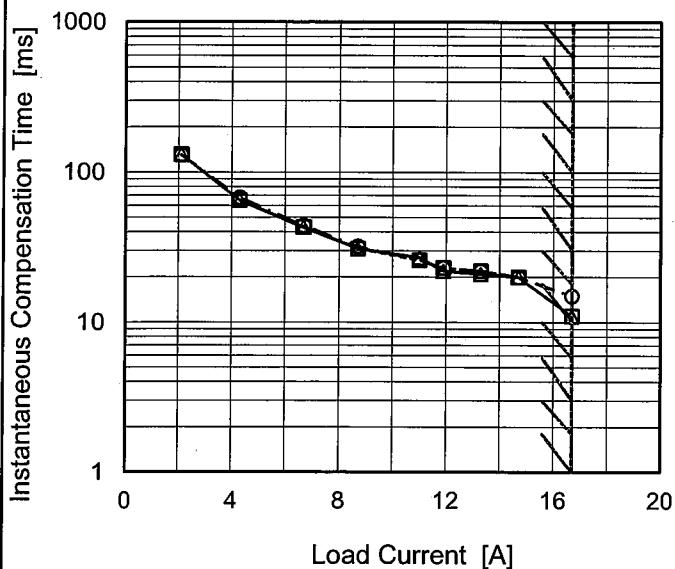
Model GHA500F-30-SNF

Item Instantaneous Interruption Compensation

Object +30V16.7A

## 1.Graph

—△— Input Volt. 100V  
 - - □ - - Input Volt. 120V  
 - - ○ - - Input Volt. 230V



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

 Temperature 25°C  
 Testing Circuitry Figure A

## 2.Values

Load Current [A]	Time [ms]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
0.0	-	-	-
2.1	131	131	130
4.3	65	65	68
6.7	43	43	44
8.7	31	31	32
11.0	27	26	26
11.9	22	23	23
13.3	21	22	22
14.7	20	20	20
16.7	11	11	15
--	-	-	-

**COSEL**

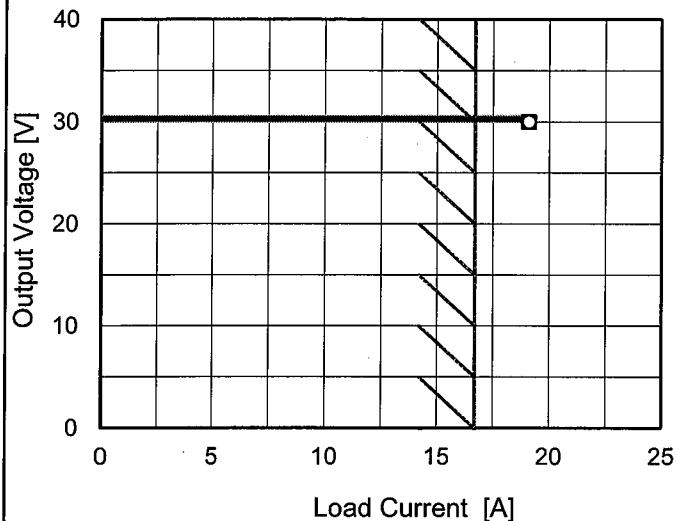
Model	GHA500F-30-SNF																																							
Item	Minimum Input Voltage for Regulated Output Voltage																																							
Object	+30V16.7A																																							
1.Graph																																								
<p>Input Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Legend: ---□--- Load 50%    —△— Load 100%</p>																																								
<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																								
Testing Circuitry Figure A																																								
2.Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Input Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr> <td>-20</td> <td>72</td> <td>79</td> </tr> <tr> <td>-10</td> <td>71</td> <td>73</td> </tr> <tr> <td>0</td> <td>72</td> <td>76</td> </tr> <tr> <td>10</td> <td>72</td> <td>76</td> </tr> <tr> <td>20</td> <td>72</td> <td>77</td> </tr> <tr> <td>25</td> <td>71</td> <td>77</td> </tr> <tr> <td>30</td> <td>72</td> <td>76</td> </tr> <tr> <td>40</td> <td>73</td> <td>74</td> </tr> <tr> <td>50</td> <td>73</td> <td>76</td> </tr> <tr> <td>60</td> <td>73</td> <td>75</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	72	79	-10	71	73	0	72	76	10	72	76	20	72	77	25	71	77	30	72	76	40	73	74	50	73	76	60	73	75	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
	Load 50%	Load 100%																																						
-20	72	79																																						
-10	71	73																																						
0	72	76																																						
10	72	76																																						
20	72	77																																						
25	71	77																																						
30	72	76																																						
40	73	74																																						
50	73	76																																						
60	73	75																																						
--	-	-																																						

**COSEL**

Model	GHA500F-30-SNF
Item	Overcurrent Protection
Object	+30V16.7A

## 1. Graph

—○— Input Volt. 120V  
 —□— Input Volt. 230V



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

Intermittent operation occurs when overcurrent protection is activated.

Temperature 25°C  
Testing Circuitry Figure A

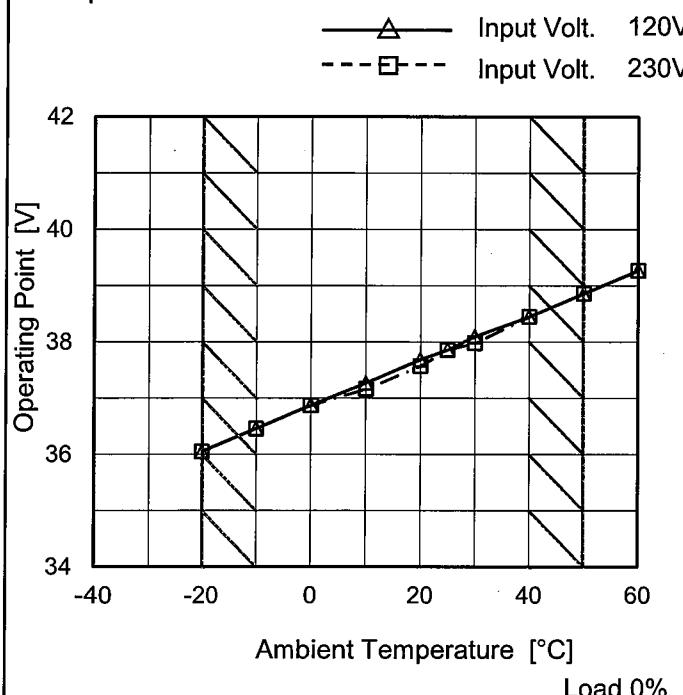
## 2. Values

Output Voltage [V]	Load Current [A]	
	Input Volt. 120[V]	Input Volt. 230[V]
30	19.09	19.10
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

**COSEL**

Model	GHA500F-30-SNF
Item	Ovvoltage Protection
Object	+30V16.7A

## 1.Graph



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

## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 120[V]	Input Volt. 230[V]
-20	36.05	36.05
-10	36.46	36.46
0	36.87	36.87
10	37.27	37.16
20	37.69	37.57
25	37.86	37.86
30	38.10	37.98
40	38.45	38.45
50	38.86	38.86
60	39.27	39.27
--	-	-

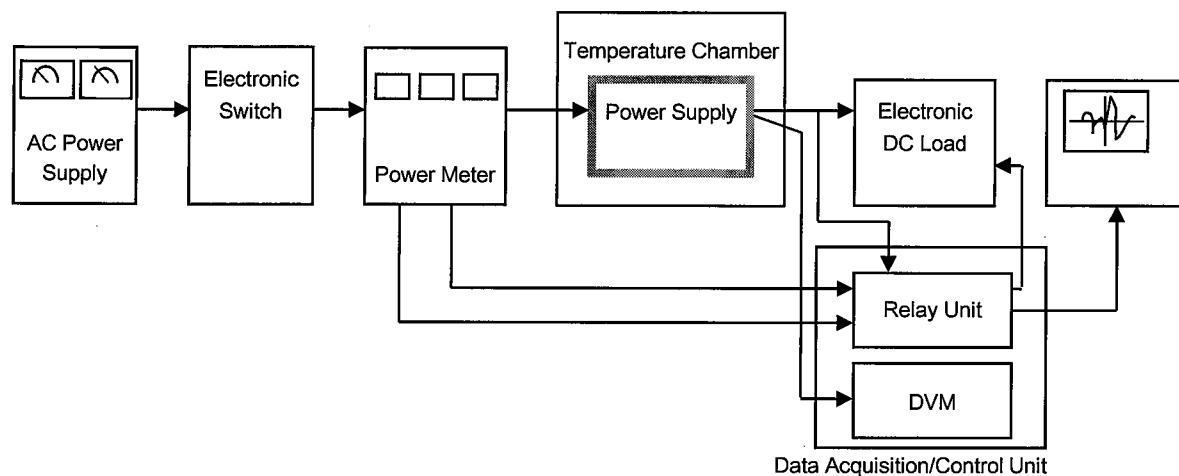


Figure A

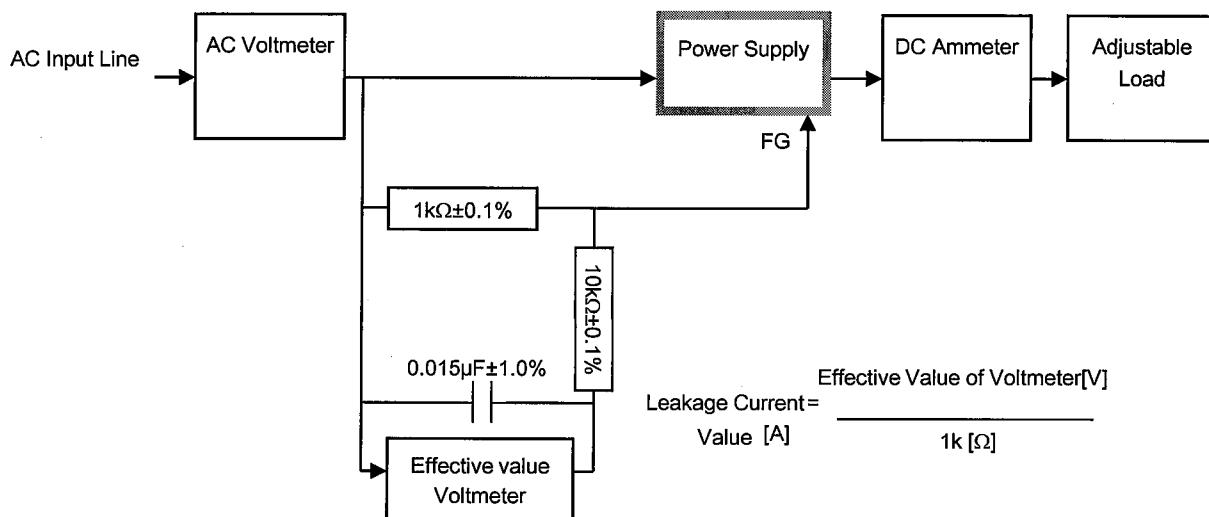


Figure B ( IEC60601-1 )