

TEST DATA OF GHA500F-15

Regulated DC Power Supply
April 19, 2013

Approved by : *Yoshiaki Shimizu*
Yoshiaki Shimizu Design Manager

Prepared by : *Soshi Nakamura*
Soshi Nakamura Design Engineer

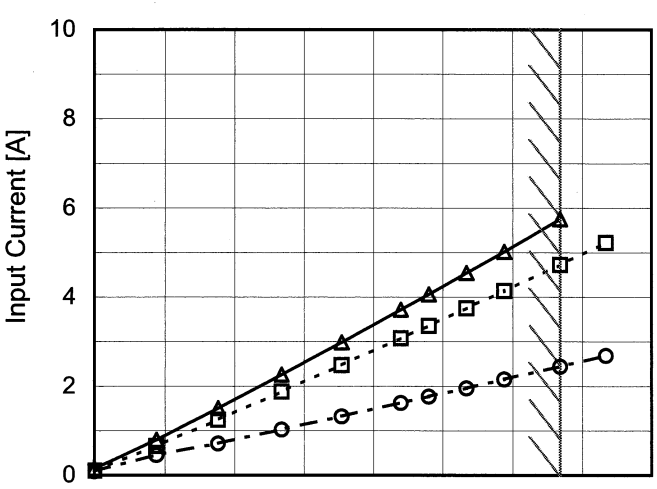
COSEL CO.,LTD.

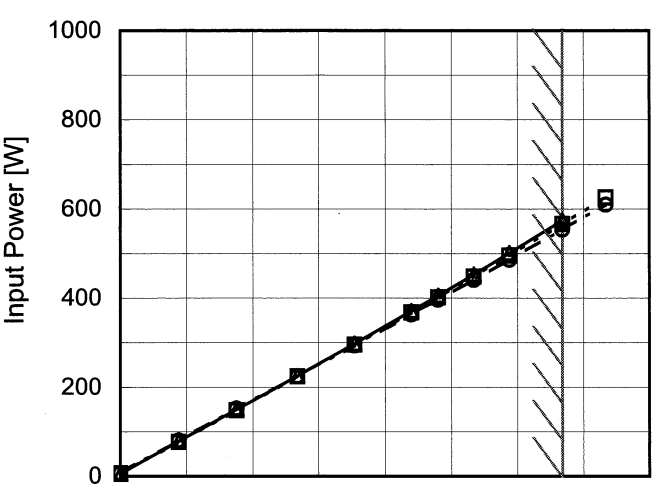
CONTENTS

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-15		Temperature 25°C																																																				
Item		Input Current (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> 		2.Values																																																				
		<table><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><tr><td>0.0</td><td>0.152</td><td>0.099</td><td>0.086</td></tr><tr><td>4.4</td><td>0.801</td><td>0.657</td><td>0.449</td></tr><tr><td>8.8</td><td>1.508</td><td>1.244</td><td>0.711</td></tr><tr><td>13.4</td><td>2.265</td><td>1.875</td><td>1.028</td></tr><tr><td>17.7</td><td>2.985</td><td>2.472</td><td>1.322</td></tr><tr><td>22.0</td><td>3.722</td><td>3.074</td><td>1.622</td></tr><tr><td>24.0</td><td>4.066</td><td>3.357</td><td>1.764</td></tr><tr><td>26.7</td><td>4.544</td><td>3.747</td><td>1.957</td></tr><tr><td>29.4</td><td>5.023</td><td>4.136</td><td>2.152</td></tr><tr><td>33.4</td><td>5.752</td><td>4.724</td><td>2.444</td></tr><tr><td>36.7</td><td>-</td><td>5.221</td><td>2.689</td></tr></table>				Load Current [A]	Input Current [A]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	0.152	0.099	0.086	4.4	0.801	0.657	0.449	8.8	1.508	1.244	0.711	13.4	2.265	1.875	1.028	17.7	2.985	2.472	1.322	22.0	3.722	3.074	1.622	24.0	4.066	3.357	1.764	26.7	4.544	3.747	1.957	29.4	5.023	4.136	2.152	33.4	5.752	4.724	2.444	36.7	-	5.221	2.689
Load Current [A]	Input Current [A]																																																							
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																					
0.0	0.152	0.099	0.086																																																					
4.4	0.801	0.657	0.449																																																					
8.8	1.508	1.244	0.711																																																					
13.4	2.265	1.875	1.028																																																					
17.7	2.985	2.472	1.322																																																					
22.0	3.722	3.074	1.622																																																					
24.0	4.066	3.357	1.764																																																					
26.7	4.544	3.747	1.957																																																					
29.4	5.023	4.136	2.152																																																					
33.4	5.752	4.724	2.444																																																					
36.7	-	5.221	2.689																																																					
Note: Slanted line shows the range of the rated load current.																																																								

Model		GHA500F-15		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>  <p>Note: Slanted line shows the range of the rated load current.</p>		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>6.0</td><td>6.7</td><td>7.3</td></tr><tr><td>4.4</td><td>78.7</td><td>76.8</td><td>80.7</td></tr><tr><td>8.8</td><td>149.8</td><td>148.1</td><td>152.2</td></tr><tr><td>13.4</td><td>225.8</td><td>224.0</td><td>224.7</td></tr><tr><td>17.7</td><td>297.8</td><td>295.2</td><td>293.6</td></tr><tr><td>22.0</td><td>371.4</td><td>367.8</td><td>363.6</td></tr><tr><td>24.0</td><td>406.1</td><td>401.9</td><td>396.4</td></tr><tr><td>26.7</td><td>453.6</td><td>448.4</td><td>441.0</td></tr><tr><td>29.4</td><td>501.7</td><td>495.4</td><td>486.0</td></tr><tr><td>33.4</td><td>574.4</td><td>565.9</td><td>554.0</td></tr><tr><td>36.7</td><td>-</td><td>625.5</td><td>610.0</td></tr></table>				Load Current [A]	Input Power [W]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	6.0	6.7	7.3	4.4	78.7	76.8	80.7	8.8	149.8	148.1	152.2	13.4	225.8	224.0	224.7	17.7	297.8	295.2	293.6	22.0	371.4	367.8	363.6	24.0	406.1	401.9	396.4	26.7	453.6	448.4	441.0	29.4	501.7	495.4	486.0	33.4	574.4	565.9	554.0	36.7	-	625.5	610.0
Load Current [A]	Input Power [W]																																																							
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																					
0.0	6.0	6.7	7.3																																																					
4.4	78.7	76.8	80.7																																																					
8.8	149.8	148.1	152.2																																																					
13.4	225.8	224.0	224.7																																																					
17.7	297.8	295.2	293.6																																																					
22.0	371.4	367.8	363.6																																																					
24.0	406.1	401.9	396.4																																																					
26.7	453.6	448.4	441.0																																																					
29.4	501.7	495.4	486.0																																																					
33.4	574.4	565.9	554.0																																																					
36.7	-	625.5	610.0																																																					

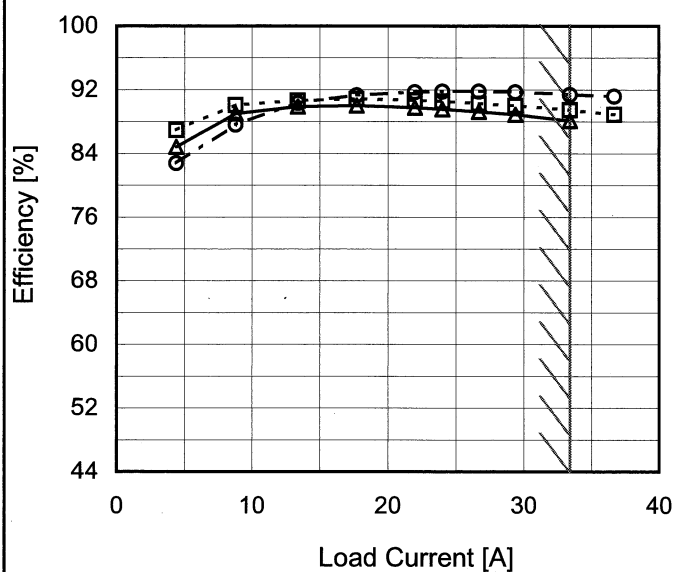
COSEL

Model	GHA500F-15
Item	Efficiency (by Load Current)
Object	

Temperature 25°C
Testing Circuitry Figure A

1.Graph

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



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	-	-	-
4.4	84.8	86.9	82.8
8.8	89.0	90.1	87.6
13.4	89.9	90.6	90.4
17.7	90.0	90.8	91.3
22.0	89.8	90.7	91.7
24.0	89.6	90.5	91.8
26.7	89.2	90.3	91.8
29.4	88.9	90.0	91.7
33.4	88.1	89.9	91.9
36.7	-	88.9	91.2



Model		GHA500F-15	
Item		Efficiency (by Input Voltage)	
Object			

1.Graph

□

Load 50%

—

△

—

Load 100%

Efficiency [%]

100

92

84

76

68

60

52

44

50

100

150

200

250

300

Input Voltage [V]

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

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
90	89.8	88.3 ※1
100	90.2	88.9 ※2
115	90.7	89.2
120	90.9	89.9
200	91.3	91.2
230	91.2	91.9
264	91.1	92.0
280	91.2	91.7
--	-	-

※1:Load 80%

※2:Load 88%



Model	GHA500F-15																																		
Item	Power Factor (by Input Voltage)	Temperature	25°C																																
		Testing Circuitry	Figure A																																
Object																																			
1.Graph		2.Values																																	
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>---</div><div>△</div><div>---</div></div> <div>Load 100%</div> <table><thead><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Power Factor</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr></thead><tbody><tr><td>90</td><td>0.999</td><td>0.999 ※1</td></tr><tr><td>100</td><td>0.998</td><td>0.999 ※2</td></tr><tr><td>115</td><td>0.996</td><td>0.999</td></tr><tr><td>120</td><td>0.996</td><td>0.999</td></tr><tr><td>200</td><td>0.976</td><td>0.991</td></tr><tr><td>230</td><td>0.962</td><td>0.986</td></tr><tr><td>264</td><td>0.946</td><td>0.978</td></tr><tr><td>280</td><td>0.934</td><td>0.898</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Input Voltage [V]	Power Factor		Load 50%	Load 100%	90	0.999	0.999 ※1	100	0.998	0.999 ※2	115	0.996	0.999	120	0.996	0.999	200	0.976	0.991	230	0.962	0.986	264	0.946	0.978	280	0.934	0.898	--	-	-		
Input Voltage [V]	Power Factor																																		
	Load 50%	Load 100%																																	
90	0.999	0.999 ※1																																	
100	0.998	0.999 ※2																																	
115	0.996	0.999																																	
120	0.996	0.999																																	
200	0.976	0.991																																	
230	0.962	0.986																																	
264	0.946	0.978																																	
280	0.934	0.898																																	
--	-	-																																	
Note: Slanted line shows the range of the rated input voltage.		※1:Load 80% ※2:Load 88%																																	

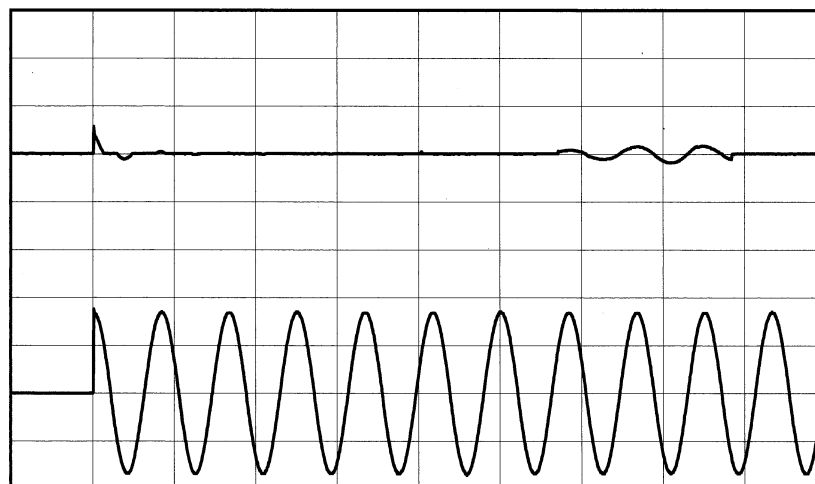
Model		GHA500F-15		Temperature		25°C																																																				
Item		Power Factor (by Load Current)		Testing Circuitry		Figure A																																																				
Object																																																										
1.Graph				2.Values																																																						
<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>Power Factor</div> <div>Load Current [A]</div> <div>Note: Slanted line shows the range of the rated load current.</div>				<table><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><tr><td>0.0</td><td>0.390</td><td>0.564</td><td>0.368</td></tr><tr><td>4.4</td><td>0.981</td><td>0.974</td><td>0.780</td></tr><tr><td>8.8</td><td>0.993</td><td>0.991</td><td>0.930</td></tr><tr><td>13.4</td><td>0.997</td><td>0.996</td><td>0.950</td></tr><tr><td>17.7</td><td>0.998</td><td>0.996</td><td>0.965</td></tr><tr><td>22.0</td><td>0.999</td><td>0.997</td><td>0.974</td></tr><tr><td>24.0</td><td>0.999</td><td>0.998</td><td>0.977</td></tr><tr><td>26.7</td><td>0.999</td><td>0.998</td><td>0.979</td></tr><tr><td>29.4</td><td>0.999</td><td>0.999</td><td>0.982</td></tr><tr><td>33.4</td><td>0.999</td><td>0.999</td><td>0.986</td></tr><tr><td>36.7</td><td>-</td><td>0.999</td><td>0.985</td></tr></table>				Load Current [A]	Power Factor			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	0.390	0.564	0.368	4.4	0.981	0.974	0.780	8.8	0.993	0.991	0.930	13.4	0.997	0.996	0.950	17.7	0.998	0.996	0.965	22.0	0.999	0.997	0.974	24.0	0.999	0.998	0.977	26.7	0.999	0.998	0.979	29.4	0.999	0.999	0.982	33.4	0.999	0.999	0.986	36.7	-	0.999	0.985
Load Current [A]	Power Factor																																																									
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																							
0.0	0.390	0.564	0.368																																																							
4.4	0.981	0.974	0.780																																																							
8.8	0.993	0.991	0.930																																																							
13.4	0.997	0.996	0.950																																																							
17.7	0.998	0.996	0.965																																																							
22.0	0.999	0.997	0.974																																																							
24.0	0.999	0.998	0.977																																																							
26.7	0.999	0.998	0.979																																																							
29.4	0.999	0.999	0.982																																																							
33.4	0.999	0.999	0.986																																																							
36.7	-	0.999	0.985																																																							

COSEL

Model	GHA500F-15	Temperature 25°C Testing Circuitry Figure A	
Item	Inrush Current		
Object	_____		

Input
Current
[50A/div]

Input
Voltage
[100V/div]



Time

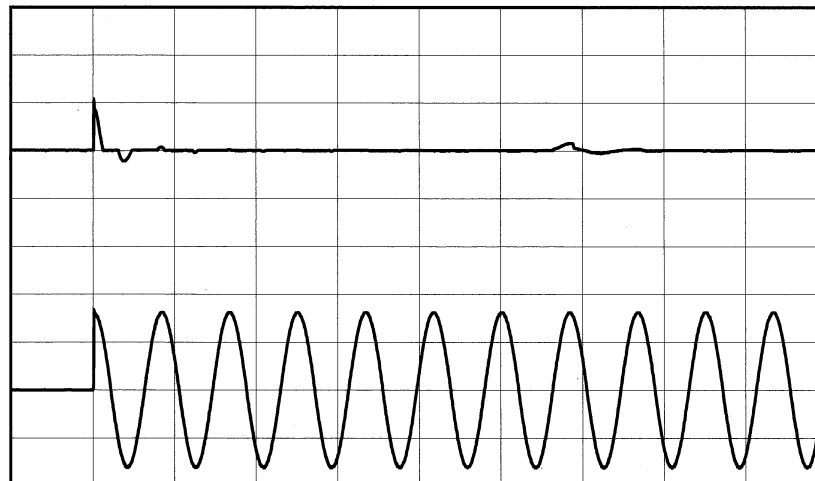
[20ms/div]

Input Voltage 120 V
Frequency 60 Hz
Load 100 %

①Primary inrush current : 19.8 A
②Secondary inrush current : 9.2 A
③Surge current ※1: 28.2 A

Input
Current
[50A/div]

Input
Voltage
[200V/div]

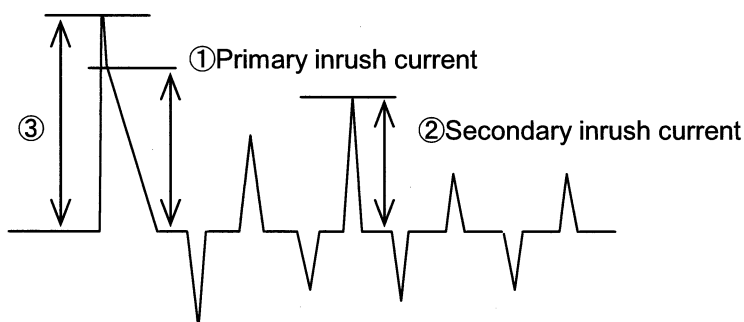


Time

[20ms/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %

①Primary inrush current : 42 A
②Secondary inrush current : 7.5 A
③Surge current ※1: 54 A



※1 The specification of the primary inrush current means that the surge current to a built-in noise filter (0.2msec or less: waveform ③) is excluded.



		Temperature 25°C Testing Circuitry Figure B
Model	GHA500F-15	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	120 [V]	240 [V]	
IEC60601	Both phases	0.08	0.09	0.17	Operation
	One of phases	0.14	0.15	0.31	Stand by

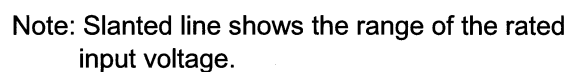
The value for "One of phases" is the reference value only.

2.Condition

Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

Temperature	25°C
Testing Circuitry	Figure A

2.Values



※1 : Load 80%
※2 : Load 88%




Model	GHA500F-15		
Item	Load Regulation	Temperature	25°C
Object	+15V33.4A	Testing Circuitry	Figure A
1.Graph		2.Values	
<div><div><div><div><div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></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><div><div>Output Voltage [V]</div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div></div></div></div></div>			



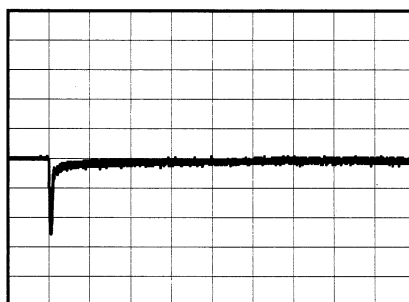
Model	GHA500F-15		
Item	Dynamic Load Response	Temperature	25°C
Object	+15V 33.4A	Testing Circuitry	Figure A

Input Volt. 120V
Cycle 1000ms

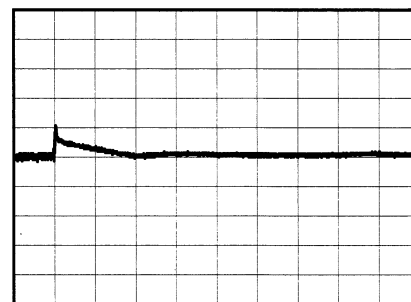
Load Current  33.4A / 50us

Min.Load (0A) ←→
Load 100%(33.4A)

500 mV/div



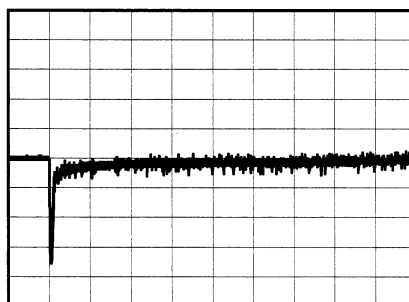
1 ms/div



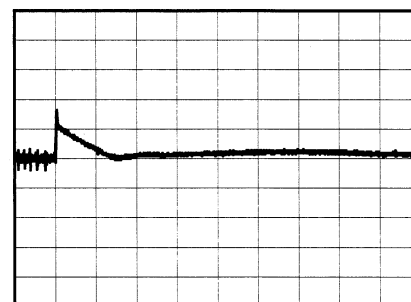
1 ms/div

Min.Load (0A) ←→
Load 50%(16.7A)

200 mV/div



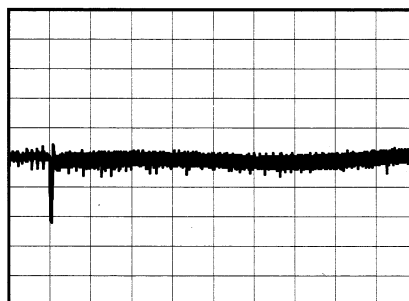
1 ms/div



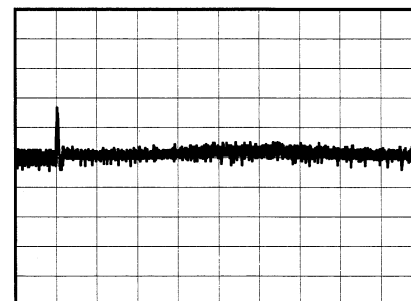
1 ms/div

Load 50% (16.7A) ←→
Load 100% (33.4A)

200 mV/div



1 ms/div



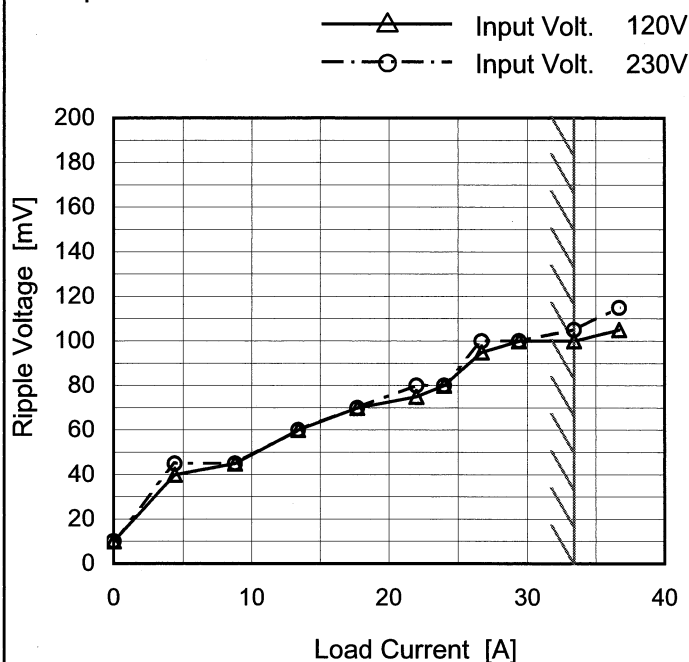
1 ms/div

COSEL

Model	GHA500F-15
Item	Ripple Voltage (by Load Current)
Object	+15V33.4A

Temperature 25°C
Testing Circuitry Figure A

1.Graph



2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
0.0	10	10
4.4	40	45
8.8	45	45
13.4	60	60
17.7	70	70
22.0	75	80
24.0	80	80
26.7	95	100
29.4	100	100
33.4	100	105
36.7	105	115

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]

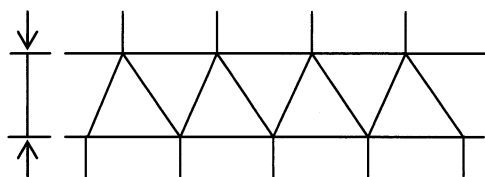


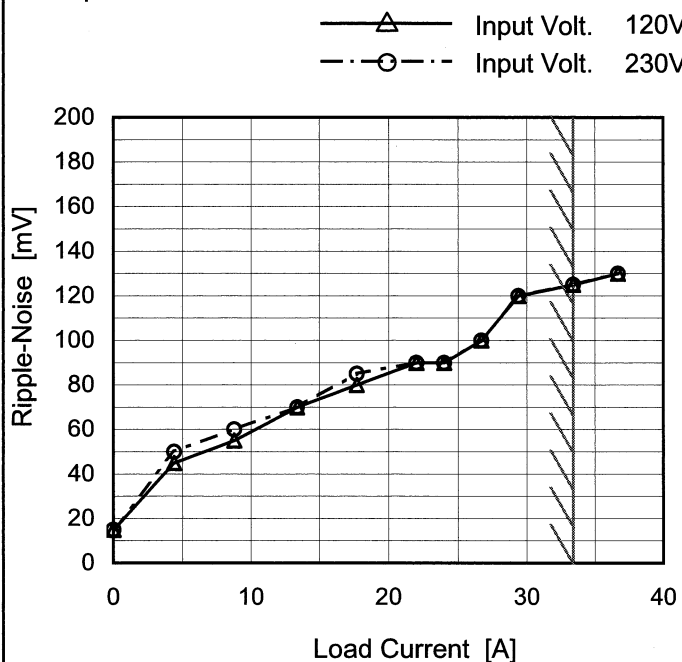
Fig.Complex Ripple Wave Form

COSEL

Model	GHA500F-15
Item	Ripple-Noise
Object	+15V33.4A

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.

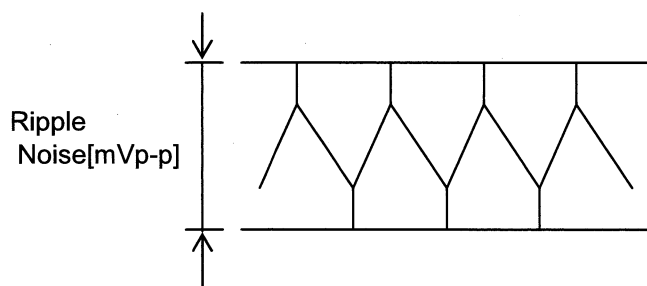


Fig.Complex Ripple Noise Wave Form

2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
0.0	15	15
4.4	45	50
8.8	55	60
13.4	70	70
17.7	80	85
22.0	90	90
24.0	90	90
26.7	100	100
29.4	120	120
33.4	125	125
36.7	130	130

Model	GHA500F-15																																						
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure A																																					
Object	+15V33.4A																																						
1.Graph		2.Values																																					
<div><div><div>---□---</div><div>Input Volt. 120V</div></div><div><div>—△—</div><div>Input Volt. 230V</div></div></div> <table><thead><tr><th>Ambient Temperature [°C]</th><th>120V [mV]</th><th>230V [mV]</th></tr></thead><tbody><tr><td>-30</td><td>130</td><td>140</td></tr><tr><td>-20</td><td>130</td><td>130</td></tr><tr><td>0</td><td>120</td><td>130</td></tr><tr><td>25</td><td>100</td><td>105</td></tr><tr><td>50</td><td>95</td><td>95</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Ambient Temperature [°C]	120V [mV]	230V [mV]	-30	130	140	-20	130	130	0	120	130	25	100	105	50	95	95	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-		
Ambient Temperature [°C]	120V [mV]	230V [mV]																																					
-30	130	140																																					
-20	130	130																																					
0	120	130																																					
25	100	105																																					
50	95	95																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
--	-	-																																					
Measured by 20 MHz Oscilloscope. Note: Slanted line shows the range of the rated ambient temperature.																																							

COSEL

Model		GHA500F-15	
Item		Ambient Temperature Drift	
Object		+15V33.4A	
1.Graph		2.Values	

—△—

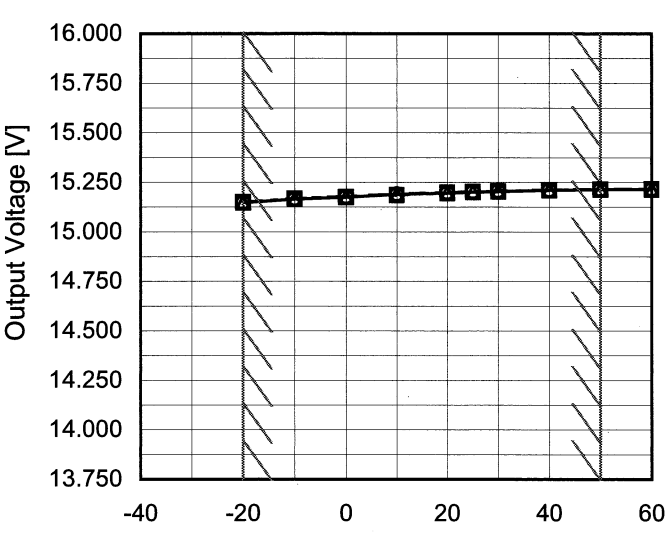
Input Volt. 100V

---□---

Input Volt. 120V

---○---

Input Volt. 230V



Output Voltage [V]

Ambient Temperature [°C]

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

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
-20	15.148	15.150	15.149
-10	15.166	15.167	15.167
0	15.176	15.176	15.177
10	15.189	15.186	15.190
20	15.197	15.198	15.198
25	15.201	15.202	15.203
30	15.205	15.206	15.206
40	15.211	15.211	15.212
50	15.214	15.214	15.214
60	15.215	15.215	15.215
--	-	-	-

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



		Testing Circuitry Figure A
Model	GHA500F-15	
Item	Output Voltage Accuracy	
Object	+15V33.4A	

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 - 33.4A

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

* 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	50	230	0	15.223	±38	±0.3
Minimum Voltage	-20	115	33.4	15.148		



Model		GHA500F-15	
Item		Time Lapse Drift	
Object		+15V33.4A	

1.Graph

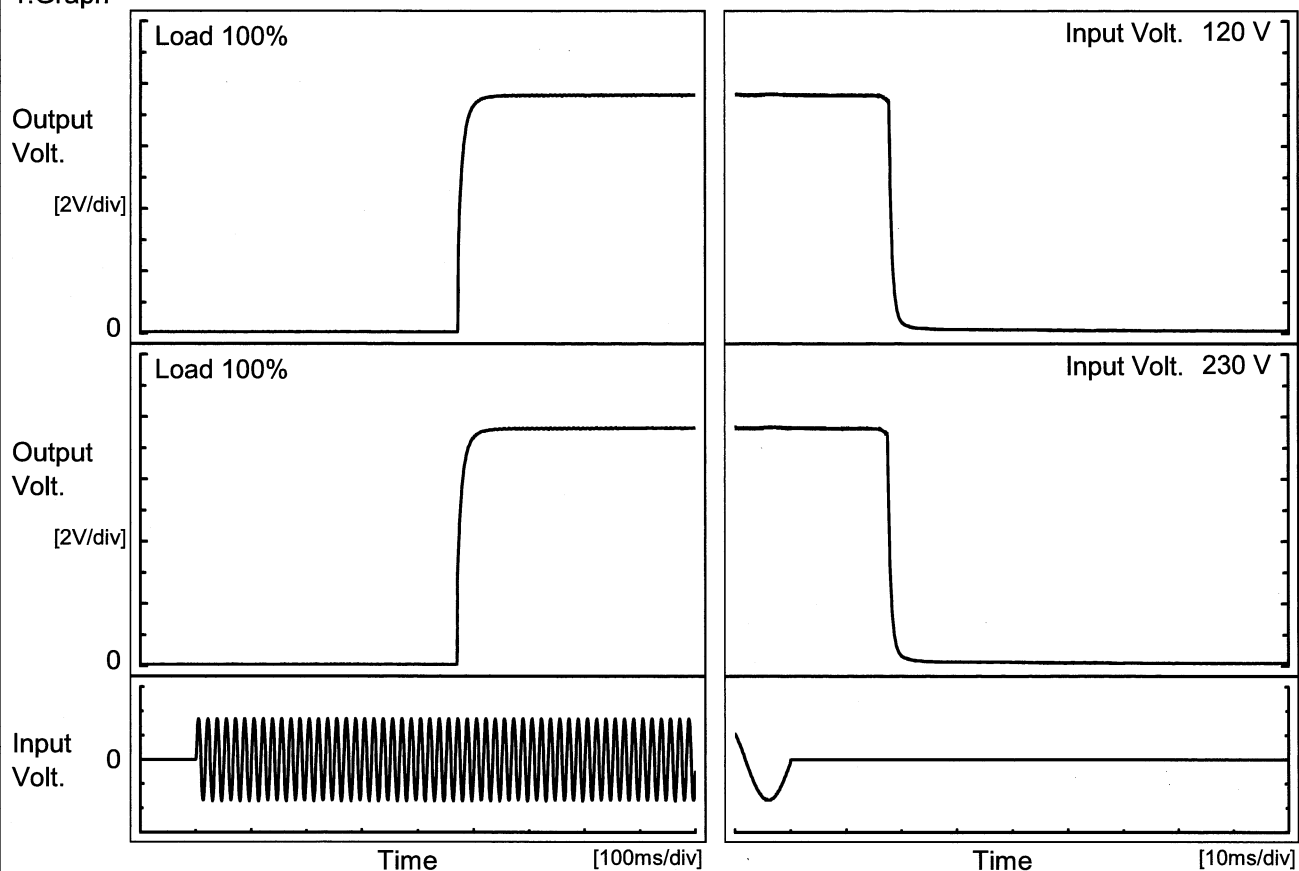
Output Voltage [V]

<

COSEL

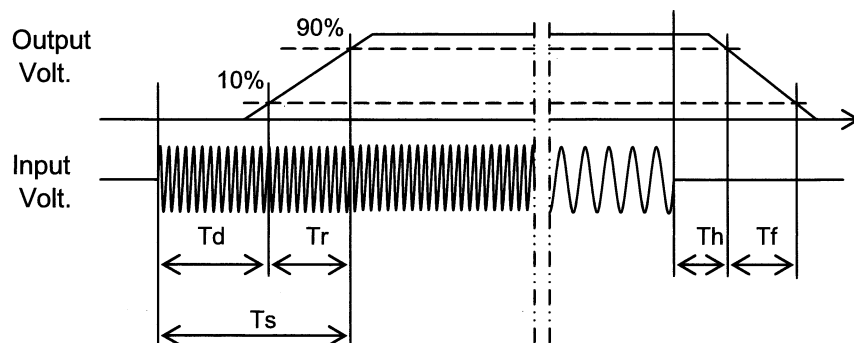
Model	GHA500F-15	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time	
Object	+15V33.4A	

1.Graph



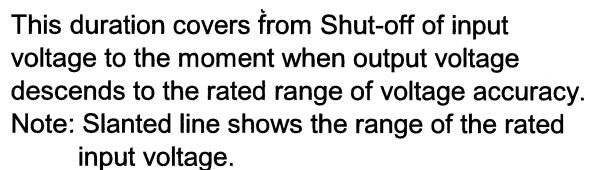
2.Values

		[ms]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
120 V		473.0	16.5	489.5	17.8	1.4
230 V		471.0	16.5	487.5	17.6	1.4



Temperature	25°C
Testing Circuitry	Figure A

2.Values

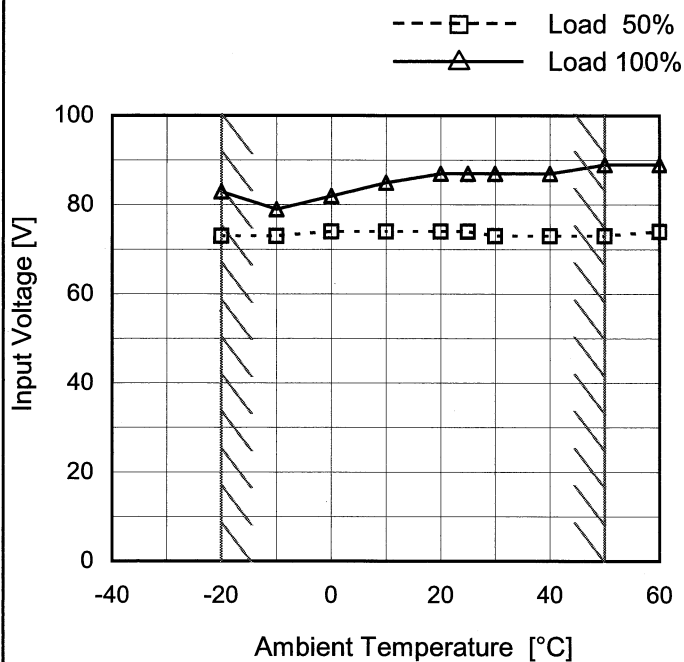


※1 : Load 80%
※2 : Load 88%

Model	GHA500F-15																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+15V33.4A	Testing Circuitry	Figure A																																																			
1.Graph		2.Values																																																				
<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>Instantaneous Compensation Time [ms]</div><div>10000</div><div>1000</div><div>100</div><div>10</div><div>1</div><div>0</div><div>10</div><div>20</div><div>30</div><div>40</div><div>Load Current [A]</div></div>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Time [ms]</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>-</td><td>-</td><td>-</td></tr><tr><td>4.4</td><td>115</td><td>115</td><td>119</td></tr><tr><td>8.8</td><td>60</td><td>60</td><td>61</td></tr><tr><td>13.4</td><td>39</td><td>39</td><td>39</td></tr><tr><td>17.7</td><td>30</td><td>30</td><td>30</td></tr><tr><td>22.0</td><td>22</td><td>22</td><td>23</td></tr><tr><td>24.0</td><td>21</td><td>22</td><td>22</td></tr><tr><td>26.7</td><td>17</td><td>20</td><td>20</td></tr><tr><td>29.4</td><td>16</td><td>18</td><td>17</td></tr><tr><td>33.4</td><td>13</td><td>16</td><td>16</td></tr><tr><td>36.7</td><td>-</td><td>14</td><td>14</td></tr></table>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]	0.0	-	-	-	4.4	115	115	119	8.8	60	60	61	13.4	39	39	39	17.7	30	30	30	22.0	22	22	23	24.0	21	22	22	26.7	17	20	20	29.4	16	18	17	33.4	13	16	16	36.7	-	14	14
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]																																																			
0.0	-	-	-																																																			
4.4	115	115	119																																																			
8.8	60	60	61																																																			
13.4	39	39	39																																																			
17.7	30	30	30																																																			
22.0	22	22	23																																																			
24.0	21	22	22																																																			
26.7	17	20	20																																																			
29.4	16	18	17																																																			
33.4	13	16	16																																																			
36.7	-	14	14																																																			
Note: Slanted line shows the range of the rated load current.																																																						

Model	GHA500F-15
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+15V33.4A

1. Graph



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

Testing Circuitry Figure A

2. Values

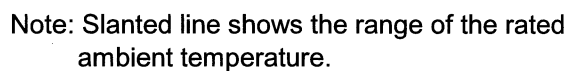
Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	73	83
-10	73	79
0	74	82
10	74	85
20	74	87
25	74	87
30	73	87
40	73	87
50	73	89
60	74	89
--	-	-

COSEL

Model	GHA500F-15																																																	
Item	Overcurrent Protection	Temperature	25°C																																															
Object	+15V33.4A	Testing Circuitry	Figure A																																															
1.Graph		2.Values																																																
<div><div><div></div><div>○ Input Volt. 120V</div></div><div><div></div><div>□ Input Volt. 230V</div></div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when overcurrent protection is activated.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="2">Load Current [A]</th></tr><tr><th>Input Volt. 120[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>15</td><td>38.41</td><td>38.40</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]		Input Volt. 120[V]	Input Volt. 230[V]	15	38.41	38.40	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																																	
	Input Volt. 120[V]	Input Volt. 230[V]																																																
15	38.41	38.40																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																
--	-	-																																																

Testing Circuitry Figure A

2.Values



Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 120[V]	Input Volt. 230[V]
-20	19.04	19.04
-10	19.27	19.27
0	19.39	19.39
10	19.57	19.57
20	19.74	19.74
25	19.74	19.74
30	19.86	19.86
40	20.03	20.03
50	20.15	20.15
60	20.38	20.27
--	-	-

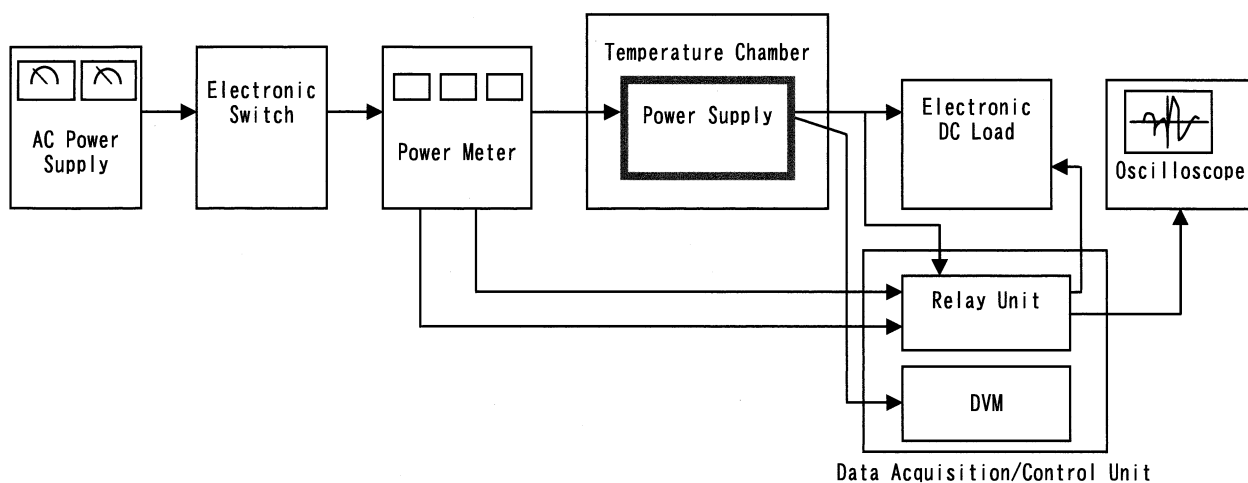


Figure A

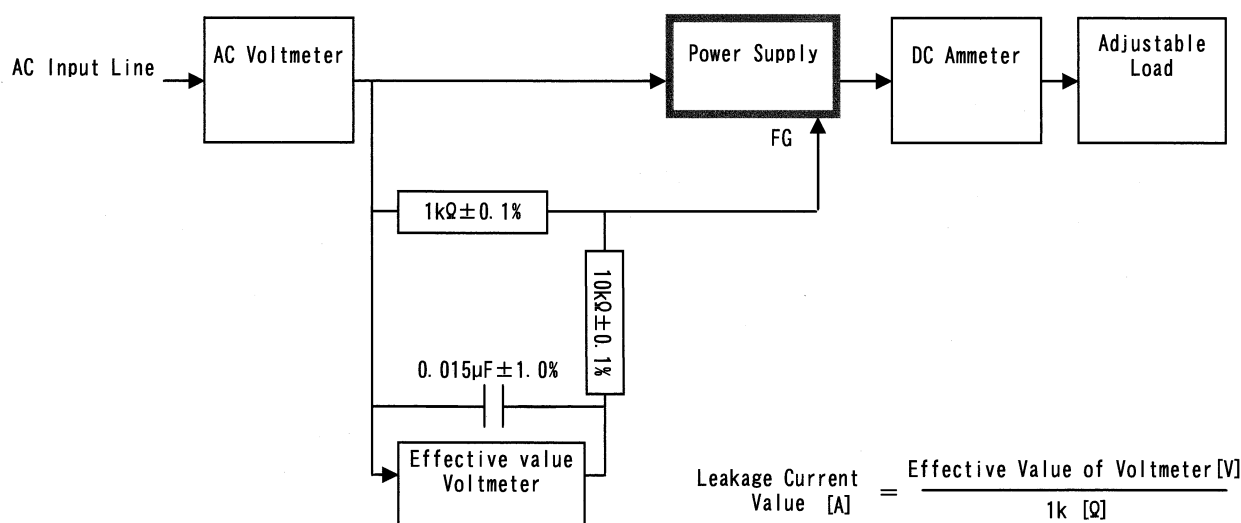


Figure B (IEC60601-1)