

# TEST DATA OF GHA300F-24

Regulated DC Power Supply  
April 19, 2013

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Yoshiaki Shimizu Design Manager

Prepared by : Soshi Nakamura  
Soshi Nakamura Design Engineer

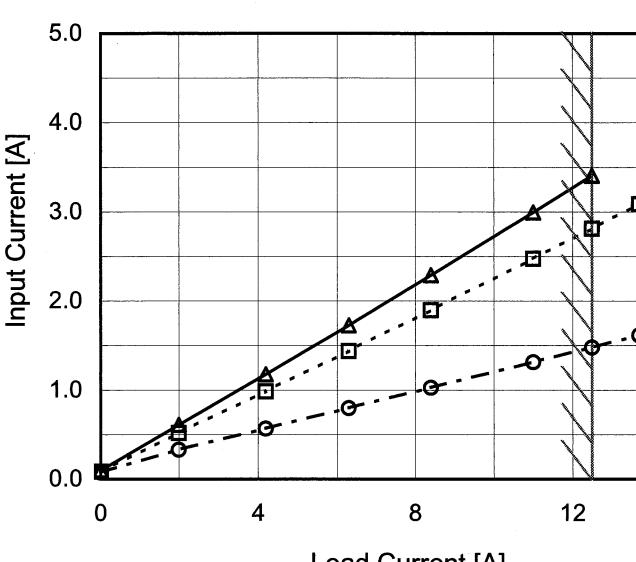
**COSEL CO.,LTD.**

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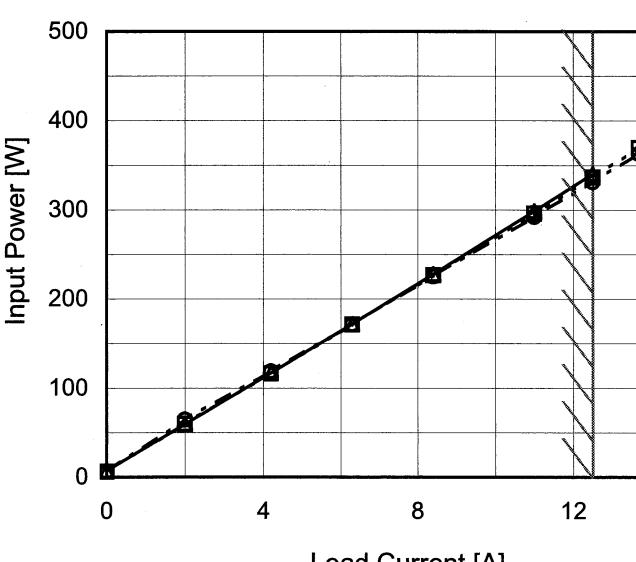
(Final Page 24)

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Model	GHA300F-24		
Item	Input Current (by Load Current)		
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). All curves show a positive linear relationship between input current and load current. A vertical slanted line is drawn across the graph, starting from approximately (0, 0.5) and ending at (12, 4.5), indicating the range of the rated load current.</p>		
Temperature	25°C		
Testing Circuitry	Figure A		
2.Values			
Load Current [A]	Input Current [A]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
0.0	0.102	0.084	0.076
2.0	0.610	0.517	0.331
4.2	1.179	0.984	0.568
6.3	1.729	1.437	0.798
8.4	2.290	1.896	1.026
11.0	2.996	2.476	1.314
12.5	3.409	2.813	1.481
13.7	-	3.087	1.617
--	-	-	-
--	-	-	-
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Note: Slanted line shows the range of the rated load current.

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1.Graph	<p style="text-align: center;"> <span style="color: black;">—△—</span> Input Volt. 100V  <span style="color: gray;">---□---</span> Input Volt. 120V  <span style="color: gray;">---○---</span> Input Volt. 230V         </p>  <p>The graph plots Input Power [W] on the Y-axis (0 to 500) against Load Current [A] on the X-axis (0 to 12). Three curves are shown for input voltages of 100V, 120V, and 230V. A vertical dashed line at approximately 12.5A indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 100V [W]</th> <th>Input Volt. 120V [W]</th> <th>Input Volt. 230V [W]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>7.2</td><td>6.2</td><td>6.1</td></tr> <tr><td>2.0</td><td>59.7</td><td>59.7</td><td>64.5</td></tr> <tr><td>4.2</td><td>117.0</td><td>116.5</td><td>119.0</td></tr> <tr><td>6.3</td><td>172.2</td><td>171.2</td><td>171.7</td></tr> <tr><td>8.4</td><td>228.2</td><td>226.5</td><td>225.4</td></tr> <tr><td>11.0</td><td>298.9</td><td>296.1</td><td>292.4</td></tr> <tr><td>12.5</td><td>340.4</td><td>336.6</td><td>331.5</td></tr> <tr><td>13.7</td><td>-</td><td>369.5</td><td>363.0</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	Input Volt. 100V [W]	Input Volt. 120V [W]	Input Volt. 230V [W]	0.0	7.2	6.2	6.1	2.0	59.7	59.7	64.5	4.2	117.0	116.5	119.0	6.3	172.2	171.2	171.7	8.4	228.2	226.5	225.4	11.0	298.9	296.1	292.4	12.5	340.4	336.6	331.5	13.7	-	369.5	363.0	--	-	-	-	--	-	-	-	--	-	-	-					
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Object	—	—																																
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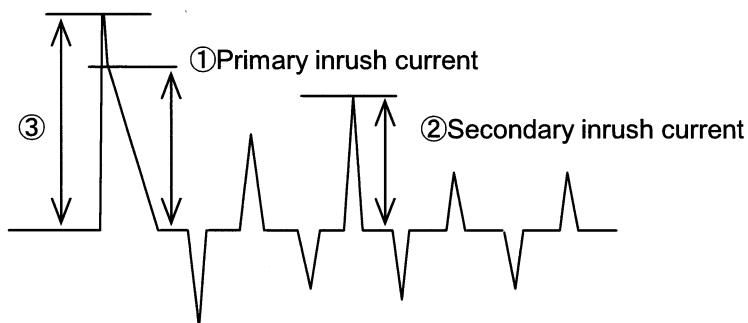
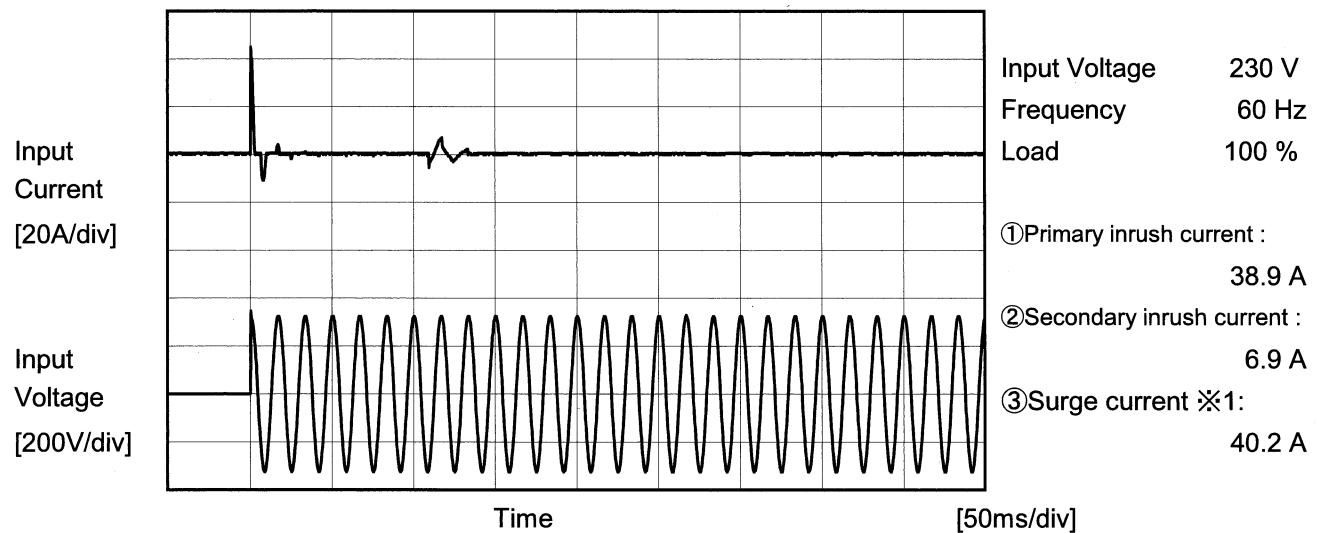
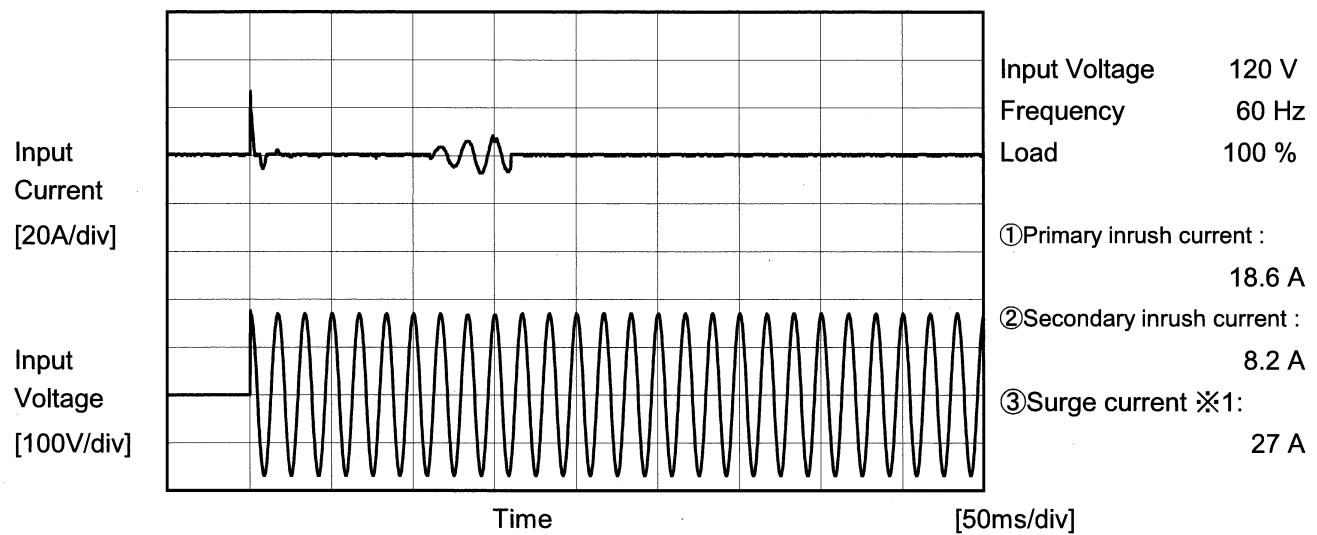
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Model	GHA300F-24	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	—		



※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.



Model	GHA300F-24	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	0.08	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

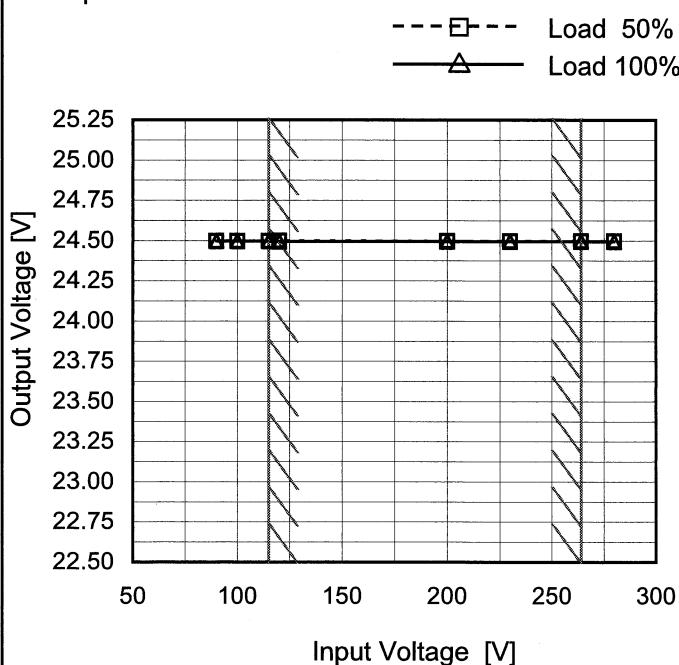
Leakage current value is concluded after measuring both phases of AC input and by choosing the larger one.

# COSEL

Model	GHA300F-24
Item	Line Regulation
Object	+24V12.5A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph



## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
90	24.498	24.497 ※1
100	24.498	24.496 ※2
115	24.498	24.496
120	24.498	24.496
200	24.498	24.496
230	24.498	24.496
264	24.497	24.496
280	24.498	24.496
--	-	-

※1: Load 80%

※2: Load 88%

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

**COSEL**

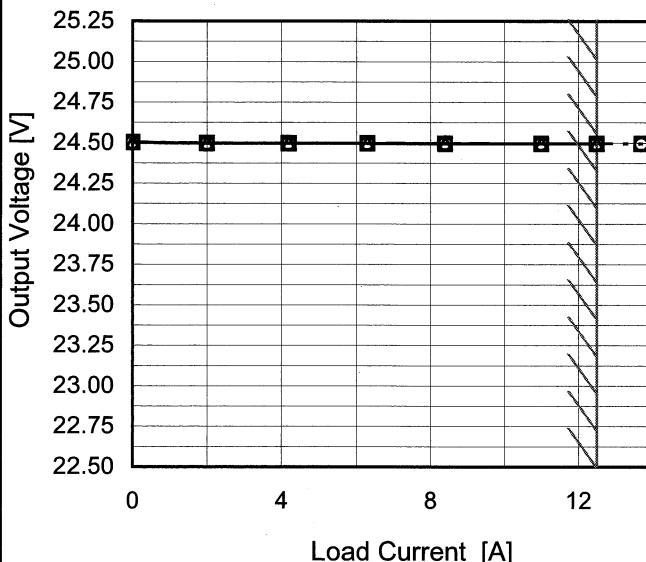
Model GHA300F-24

Item Load Regulation

Object +24V12.5A

## 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]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 120[V]	Input Volt. 230[V]
0.0	24.502	24.503	24.503
2.0	24.498	24.498	24.498
4.2	24.497	24.497	24.498
6.3	24.497	24.497	24.497
8.4	24.496	24.496	24.496
11.0	24.495	24.496	24.495
12.5	24.495	24.495	24.495
13.7	-	24.494	24.494
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

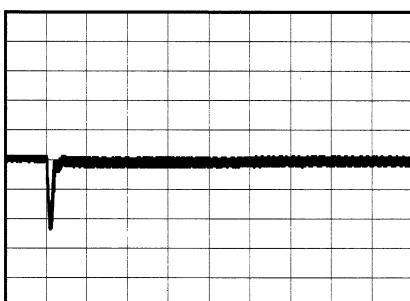
Model	GHA300F-24	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+24V 12.5A		

Input Volt. 120V  
Cycle 1000ms

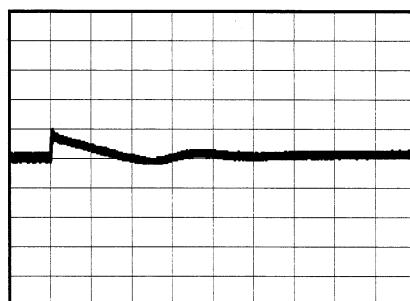
Load Current 12.5A / 50us

Min.Load (0A)↔  
Load 100%(12.5A)

500 mV/div



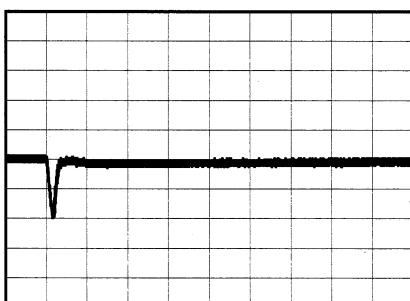
1 ms/div



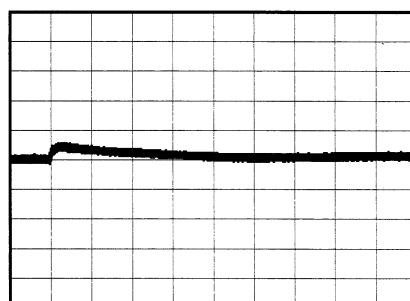
1 ms/div

Min.Load (0A)↔  
Load 50%(6.25A)

500 mV/div



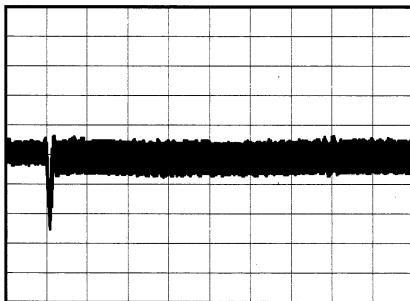
1 ms/div



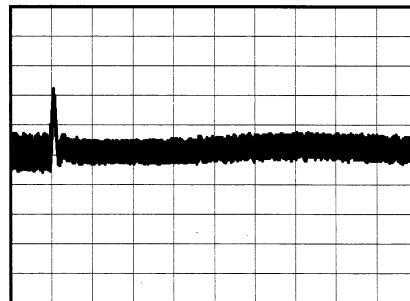
1 ms/div

Load 50% (6.25A)↔  
Load 100% (12.5A)

100 mV/div



1 ms/div



1 ms/div

**COSEL**

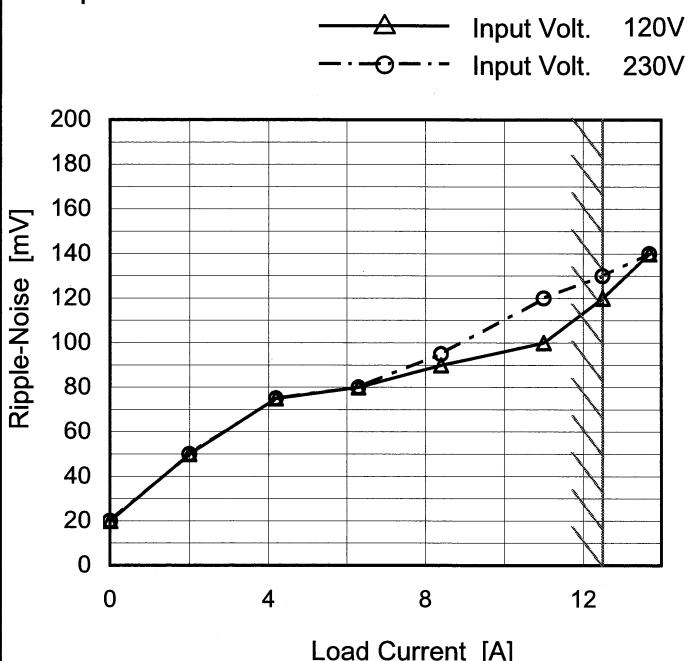
Model	GHA300F-24																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure A																																						
Object	+24V12.5A																																							
1.Graph																																								
<p>Graph showing Ripple Voltage [mV] vs Load Current [A]. The Y-axis ranges from 0 to 200 mV, and the X-axis ranges from 0 to 12 A. Two curves are plotted: a solid line for Input Volt. 120V and a dashed line for Input Volt. 230V. Both curves show an increase in ripple voltage as load current increases. A slanted line indicates the rated load current range.</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>15</td><td>20</td></tr> <tr><td>2.0</td><td>35</td><td>40</td></tr> <tr><td>4.2</td><td>50</td><td>50</td></tr> <tr><td>6.3</td><td>60</td><td>65</td></tr> <tr><td>8.4</td><td>70</td><td>70</td></tr> <tr><td>11.0</td><td>75</td><td>80</td></tr> <tr><td>12.5</td><td>90</td><td>95</td></tr> <tr><td>13.7</td><td>100</td><td>105</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>		Load Current [A]	Ripple Voltage [mV] (Input Volt. 120V)	Ripple Voltage [mV] (Input Volt. 230V)	0.0	15	20	2.0	35	40	4.2	50	50	6.3	60	65	8.4	70	70	11.0	75	80	12.5	90	95	13.7	100	105	--	-	-	--	-	-	--	-	-			
Load Current [A]	Ripple Voltage [mV] (Input Volt. 120V)	Ripple Voltage [mV] (Input Volt. 230V)																																						
0.0	15	20																																						
2.0	35	40																																						
4.2	50	50																																						
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8.4	70	70																																						
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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>15</td><td>20</td></tr> <tr><td>2.0</td><td>35</td><td>40</td></tr> <tr><td>4.2</td><td>50</td><td>50</td></tr> <tr><td>6.3</td><td>60</td><td>65</td></tr> <tr><td>8.4</td><td>70</td><td>70</td></tr> <tr><td>11.0</td><td>75</td><td>80</td></tr> <tr><td>12.5</td><td>90</td><td>95</td></tr> <tr><td>13.7</td><td>100</td><td>105</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>			Load Current [A]	Ripple Voltage [mV]		Input Volt. 120 [V]	Input Volt. 230 [V]	0.0	15	20	2.0	35	40	4.2	50	50	6.3	60	65	8.4	70	70	11.0	75	80	12.5	90	95	13.7	100	105	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 120 [V]	Input Volt. 230 [V]																																						
0.0	15	20																																						
2.0	35	40																																						
4.2	50	50																																						
6.3	60	65																																						
8.4	70	70																																						
11.0	75	80																																						
12.5	90	95																																						
13.7	100	105																																						
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<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	GHA300F-24
Item	Ripple-Noise
Object	+24V12.5A

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.

## 2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 120 [V]	Input Volt. 230 [V]
0.0	20	20
2.0	50	50
4.2	75	75
6.3	80	80
8.4	90	95
11.0	100	120
12.5	120	130
13.7	140	140
--	-	-
--	-	-
--	-	-

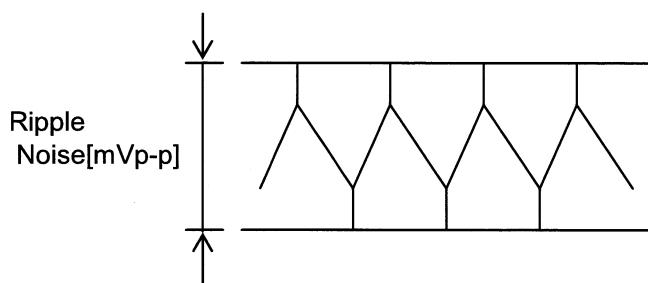
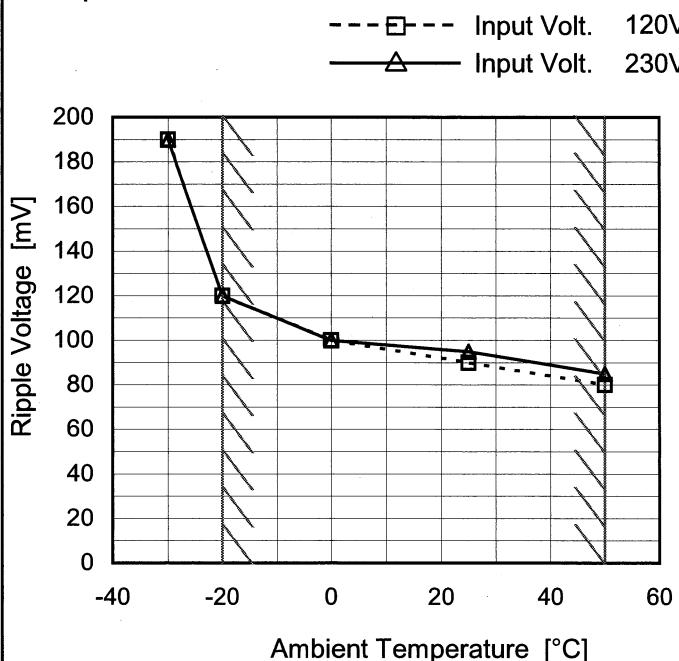


Fig.Complex Ripple Noise Wave Form

**COSEL**

Model	GHA300F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V12.5A

## 1. Graph



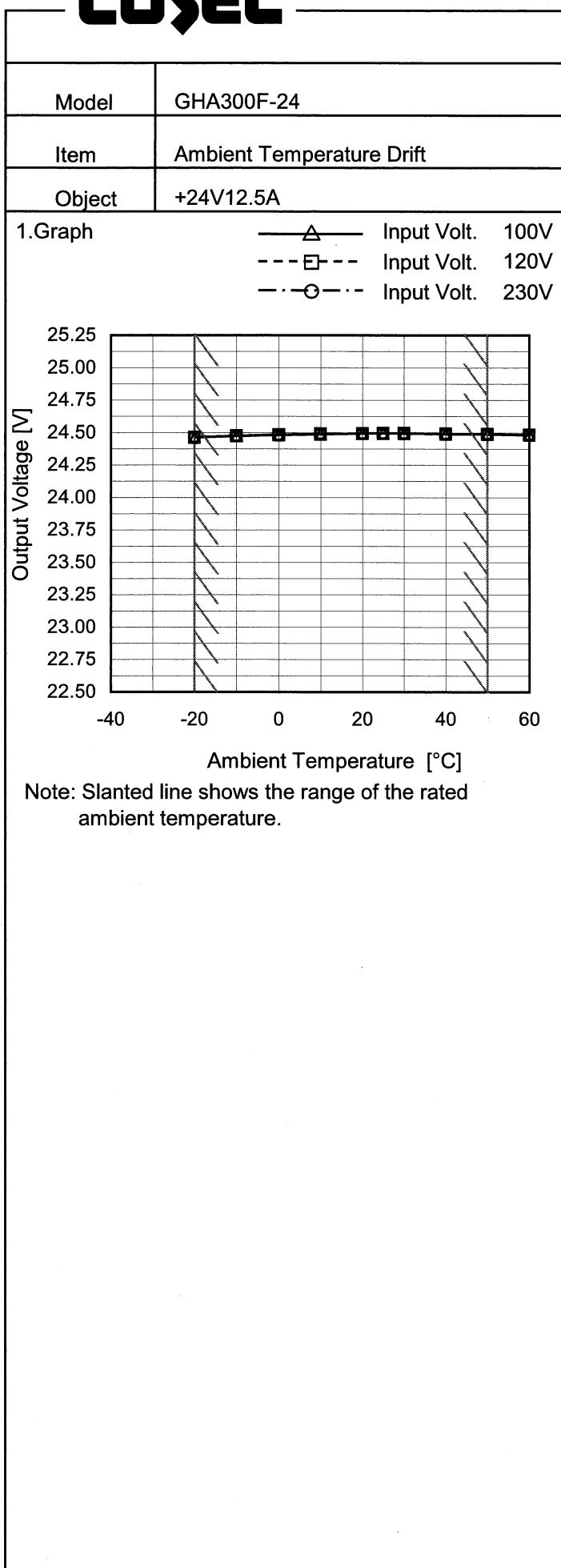
Measured by 20 MHz Oscilloscope.

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	190	190
-20	120	120
0	100	100
25	90	95
50	80	85
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

**COSEL**


## 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	24.464	24.465	24.465
-10	24.475	24.475	24.475
0	24.483	24.483	24.483
10	24.490	24.491	24.490
20	24.495	24.494	24.494
25	24.495	24.495	24.495
30	24.495	24.495	24.495
40	24.491	24.491	24.491
50	24.489	24.489	24.489
60	24.483	24.483	24.484
--	-	-	-

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



Model	GHA300F-24	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+24V12.5A	

### 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 - 12.5A

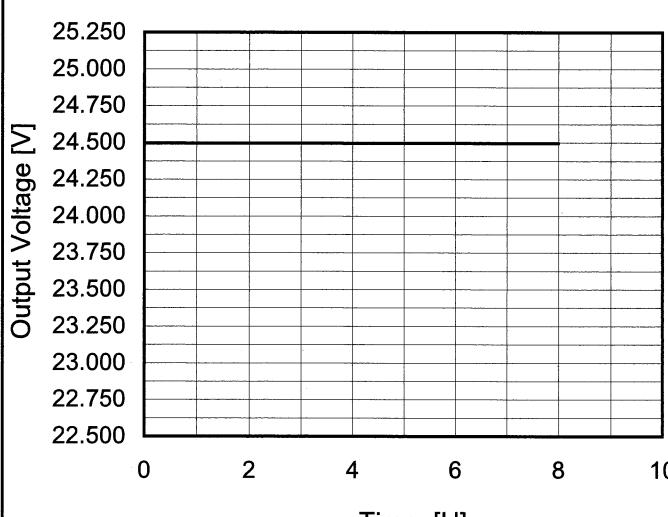
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	30	230	0	24.503		
Minimum Voltage	-20	115	12.5	24.464	±20	±0.1

**COSEL**

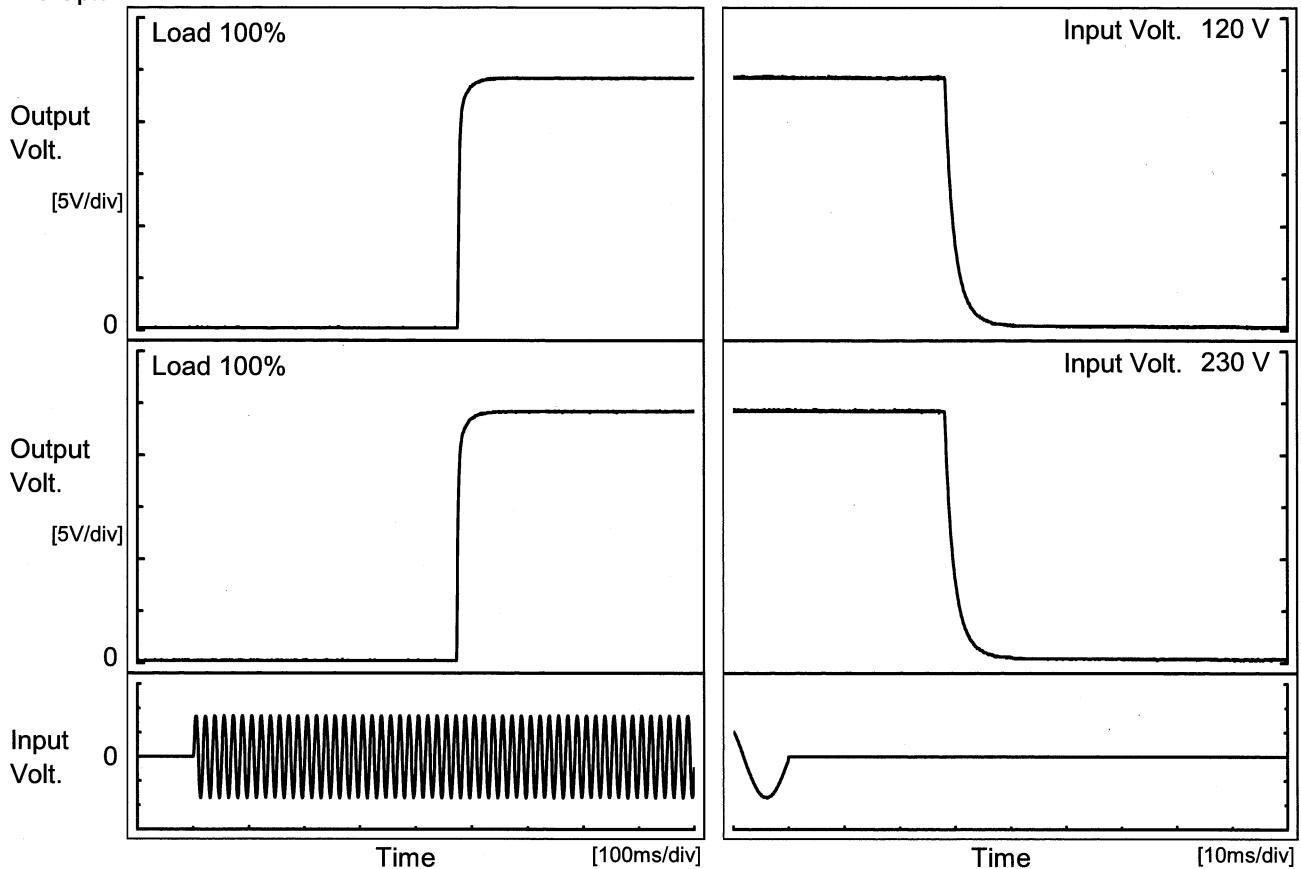
Model	GHA300F-24	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+24V12.5A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 230V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>24.495</td></tr> <tr><td>0.5</td><td>24.496</td></tr> <tr><td>1.0</td><td>24.496</td></tr> <tr><td>2.0</td><td>24.496</td></tr> <tr><td>3.0</td><td>24.496</td></tr> <tr><td>4.0</td><td>24.496</td></tr> <tr><td>5.0</td><td>24.496</td></tr> <tr><td>6.0</td><td>24.496</td></tr> <tr><td>7.0</td><td>24.496</td></tr> <tr><td>8.0</td><td>24.498</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	24.495	0.5	24.496	1.0	24.496	2.0	24.496	3.0	24.496	4.0	24.496	5.0	24.496	6.0	24.496	7.0	24.496	8.0	24.498
Time since start [H]	Output Voltage [V]																								
0.0	24.495																								
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5.0	24.496																								
6.0	24.496																								
7.0	24.496																								
8.0	24.498																								

\* The characteristic of AC120V is equal.

**COSEL**

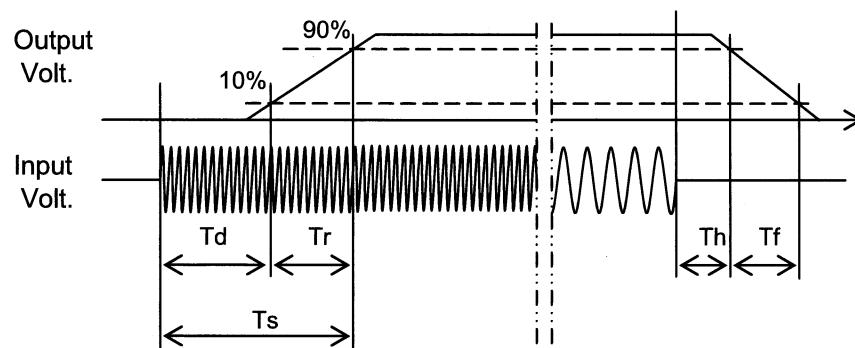
Model	GHA300F-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V12.5A		

## 1. Graph



## 2. Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
120 V		476.0	9.5	485.5	28.3	4.2	
230 V		474.0	9.0	483.0	28.3	4.2	



# COSEL

Model	GHA300F-24	Temperature 25°C																																
Item	Hold-Up Time	Testing Circuitry Figure A																																
Object	+24V12.5A																																	
1.Graph		2.Values																																
		<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Hold-Up Time [ms]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>90</td><td>55</td><td>35 ※1</td></tr> <tr><td>100</td><td>55</td><td>32 ※2</td></tr> <tr><td>115</td><td>55</td><td>28</td></tr> <tr><td>120</td><td>55</td><td>28</td></tr> <tr><td>200</td><td>54</td><td>28</td></tr> <tr><td>230</td><td>55</td><td>28</td></tr> <tr><td>264</td><td>55</td><td>28</td></tr> <tr><td>280</td><td>55</td><td>28</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table> <p>※1: Load 80% ※2: Load 88%</p>	Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	90	55	35 ※1	100	55	32 ※2	115	55	28	120	55	28	200	54	28	230	55	28	264	55	28	280	55	28	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																	
	Load 50%	Load 100%																																
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230	55	28																																
264	55	28																																
280	55	28																																
--	-	-																																
<p>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</p> <p>Note: Slanted line shows the range of the rated input voltage.</p>																																		

**COSEL**

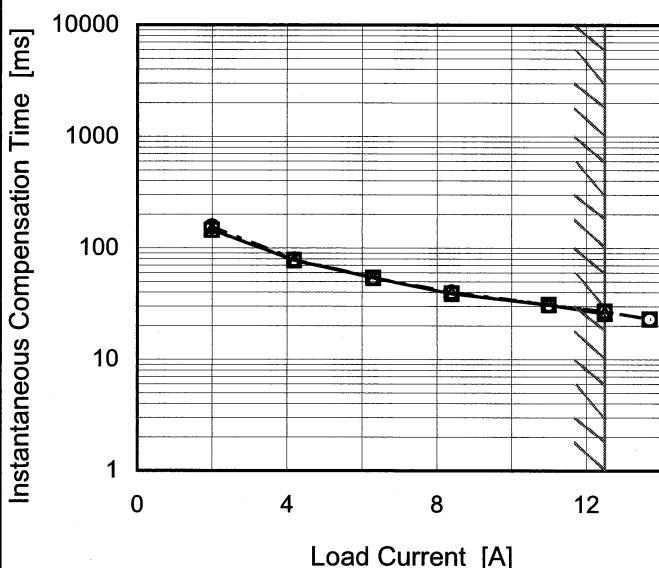
Model GHA300F-24

Item Instantaneous Interruption Compensation

Object +24V12.5A

## 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	-	-	-
2.0	146	145	156
4.2	78	78	79
6.3	54	54	54
8.4	39	39	40
11.0	31	31	31
12.5	26	27	27
13.7	-	23	23
--	-	-	-
--	-	-	-
--	-	-	-

**COSEL**

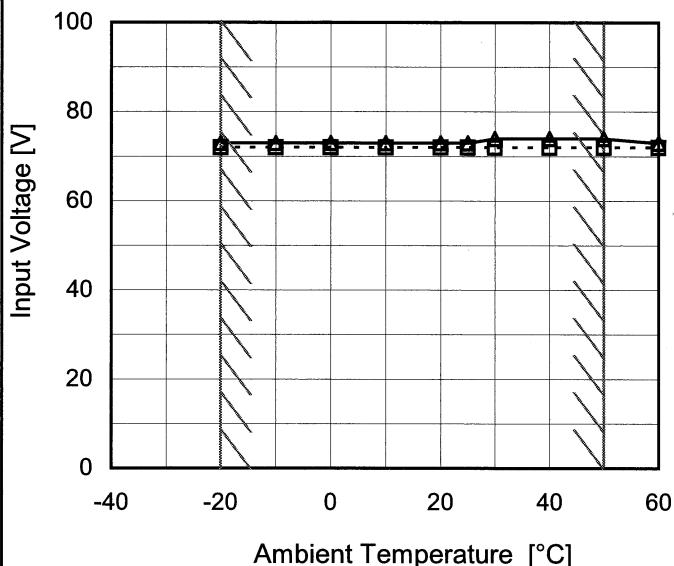
Model GHA300F-24

Item Minimum Input Voltage  
for Regulated Output Voltage

Object +24V12.5A

## 1.Graph

---□--- Load 50%  
—△— Load 100%



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	72	73
-10	72	73
0	72	73
10	72	73
20	72	73
25	72	73
30	72	74
40	72	74
50	72	74
60	72	73
--	-	-

**COSEL**

Model	GHA300F-24																																																						
Item	Overcurrent Protection	Temperature 25°C Testing Circuitry Figure A																																																					
Object	+24V12.5A																																																						
1.Graph																																																							
<p>Output Voltage [V]</p> <p>Input Volt. 120V</p> <p>Input Volt. 230V</p> <p>Load Current [A]</p>																																																							
<p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when overcurrent protection is activated.</p>																																																							
2.Values																																																							
<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>24</td><td>14.38</td><td>14.39</td></tr> <tr> <td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Output Voltage [V]	Load Current [A]		Input Volt. 120[V]	Input Volt. 230[V]	24	14.38	14.39	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																																						
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**COSEL**

Model	GHA300F-24																																							
Item	Overvoltage Protection																																							
Object	+24V12.5A																																							
1.Graph																																								
<p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p> <p>Legend:</p> <ul style="list-style-type: none"> <li>Input Volt. 120V (Solid Line with ▲)</li> <li>Input Volt. 230V (Dashed Line with □)</li> </ul>																																								
Testing Circuitry Figure A																																								
2.Values																																								
<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 120[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>-20</td> <td>30.48</td> <td>30.48</td> </tr> <tr> <td>-10</td> <td>30.78</td> <td>30.78</td> </tr> <tr> <td>0</td> <td>30.95</td> <td>30.95</td> </tr> <tr> <td>10</td> <td>31.30</td> <td>31.19</td> </tr> <tr> <td>20</td> <td>31.48</td> <td>31.48</td> </tr> <tr> <td>25</td> <td>31.66</td> <td>31.66</td> </tr> <tr> <td>30</td> <td>31.77</td> <td>31.77</td> </tr> <tr> <td>40</td> <td>32.01</td> <td>32.01</td> </tr> <tr> <td>50</td> <td>32.30</td> <td>32.30</td> </tr> <tr> <td>60</td> <td>32.47</td> <td>32.47</td> </tr> <tr> <td>--</td> <td>-</td> <td>-</td> </tr> </tbody> </table>			Ambient Temperature [°C]	Operating Point [V]		Input Volt. 120[V]	Input Volt. 230[V]	-20	30.48	30.48	-10	30.78	30.78	0	30.95	30.95	10	31.30	31.19	20	31.48	31.48	25	31.66	31.66	30	31.77	31.77	40	32.01	32.01	50	32.30	32.30	60	32.47	32.47	--	-	-
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Note: Slanted line shows the range of the rated ambient temperature.

COSEL

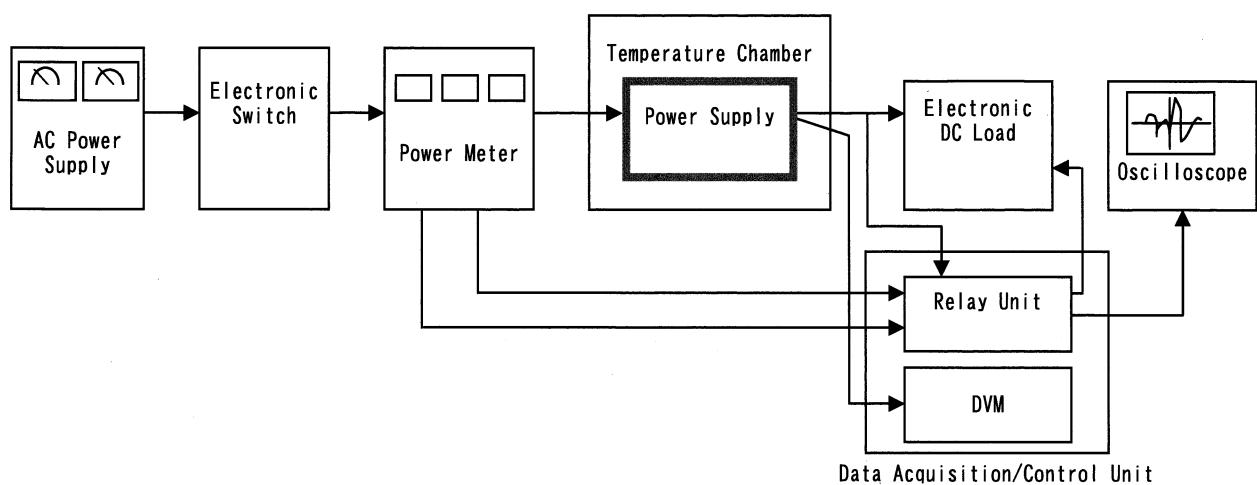


Figure A

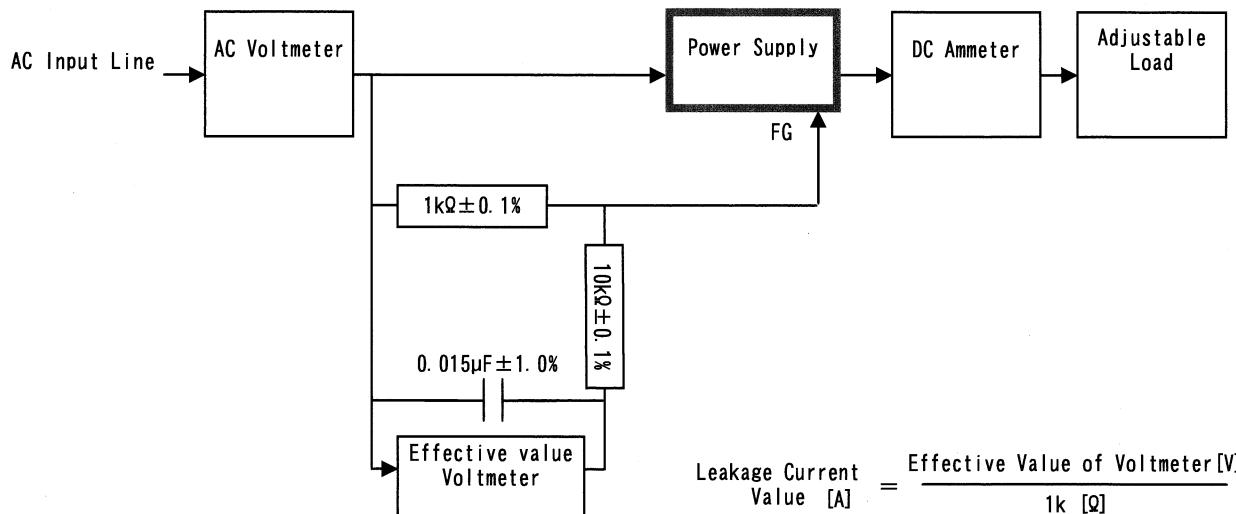


Figure B ( IEC60601-1 )