



TEST DATA OF GMA300F-24

Regulated DC Power Supply
October 11, 2017

Approved by :

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Design Engineer

COSEL CO.,LTD.



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(Final Page 25)

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Model	GMA300F-24																																																					
Item	Input Current (by Load Current)																																																					
Object	_____																																																					
1.Graph	—△— Input Volt. 100V - -□--- Input Volt. 115V - -○--- Input Volt. 230V																																																					
<p>The graph shows three curves representing different input voltages. The 100V curve (triangles) has the steepest slope, followed by 115V (squares), and 230V (circles) has the shallowest slope. All curves start at (0,0) and end at approximately (13.8A, 3.7A). A slanted line is drawn through the curves, representing the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 100[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>0.088</td><td>0.085</td><td>0.096</td></tr> <tr><td>2.5</td><td>0.729</td><td>0.622</td><td>0.373</td></tr> <tr><td>3.1</td><td>0.902</td><td>0.766</td><td>0.445</td></tr> <tr><td>5.0</td><td>1.388</td><td>1.175</td><td>0.658</td></tr> <tr><td>6.3</td><td>1.736</td><td>1.483</td><td>0.799</td></tr> <tr><td>7.5</td><td>2.027</td><td>1.798</td><td>0.955</td></tr> <tr><td>8.8</td><td>2.342</td><td>2.075</td><td>1.102</td></tr> <tr><td>10.0</td><td>2.682</td><td>2.338</td><td>1.244</td></tr> <tr><td>10.6</td><td>2.852</td><td>2.466</td><td>1.316</td></tr> <tr><td>12.5</td><td>3.374</td><td>2.901</td><td>1.528</td></tr> <tr><td>13.8</td><td>3.726</td><td>3.204</td><td>1.669</td></tr> </tbody> </table>	Load Current [A]	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.0	0.088	0.085	0.096	2.5	0.729	0.622	0.373	3.1	0.902	0.766	0.445	5.0	1.388	1.175	0.658	6.3	1.736	1.483	0.799	7.5	2.027	1.798	0.955	8.8	2.342	2.075	1.102	10.0	2.682	2.338	1.244	10.6	2.852	2.466	1.316	12.5	3.374	2.901	1.528	13.8	3.726	3.204	1.669	Temperature 25°C Testing Circuitry Figure A					
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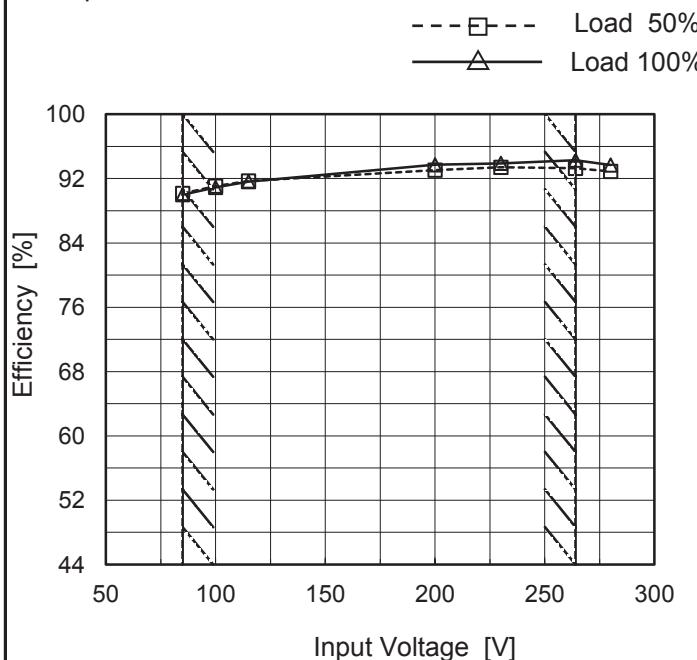
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Item	Input Power (by Load Current)																																																					
Object	_____																																																					
1.Graph	<p>The graph plots Input Power [W] on the Y-axis (0 to 500) against Load Current [A] on the X-axis (0 to 12). Three data series are shown for different input voltages: 100V (solid line with open triangle markers), 115V (dashed line with open square markers), and 230V (dash-dot line with open circle markers). All three curves show a positive linear relationship between power and load current. A slanted line is drawn across the graph, starting from approximately (0, 40) and ending at (12, 360), indicating the range of the rated load current.</p>																																																					
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Model	GMA300F-24
Item	Efficiency (by Input Voltage)
Object	_____

1.Graph


 Temperature 25°C
 Testing Circuitry Figure A

2.Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
85	90.2	90.0 ※1
100	91.1	90.9 ※2
115	91.7	91.6
200	93.1	93.7
230	93.4	93.9
264	93.3	94.3
280	92.9	93.7
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--	-	-

※1 : Load 70%

※2 : Load 85%

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

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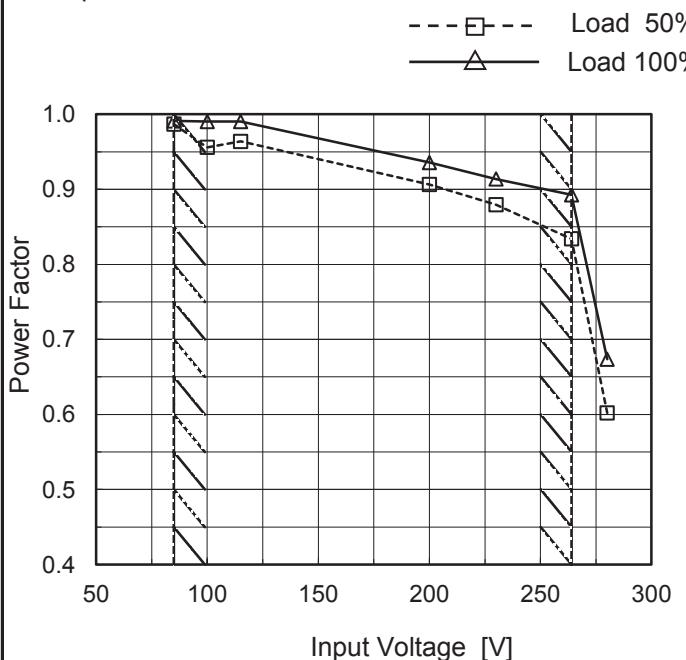
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

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Model	GMA300F-24
Item	Power Factor (by Input Voltage)
Object	_____

 Temperature 25°C
 Testing Circuitry Figure A

1.Graph



2.Values

Input Voltage [V]	Power Factor	
	Load 50%	Load 100%
85	0.987	0.991 ※1
100	0.956	0.990 ※2
115	0.964	0.990
200	0.906	0.936
230	0.880	0.914
264	0.834	0.893
280	0.602	0.674
--	-	-
--	-	-

※1 : Load 70%

※2 : Load 85%

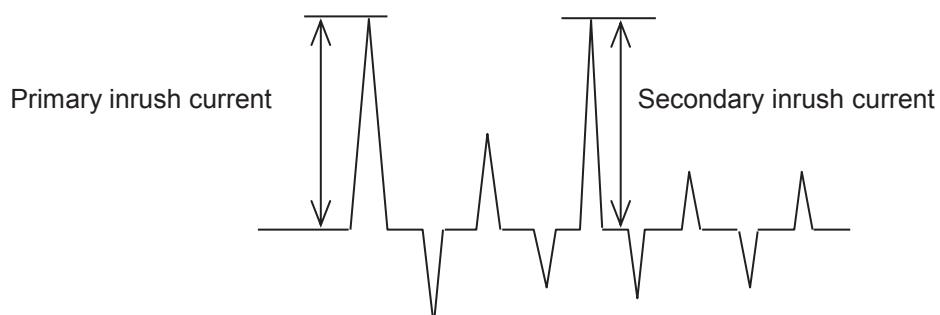
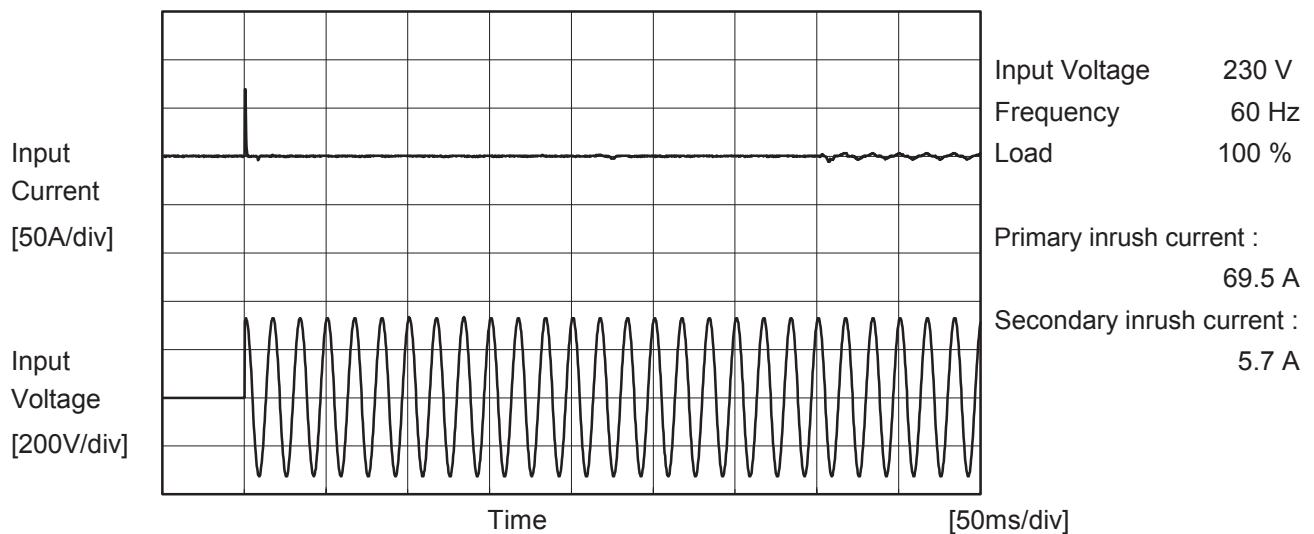
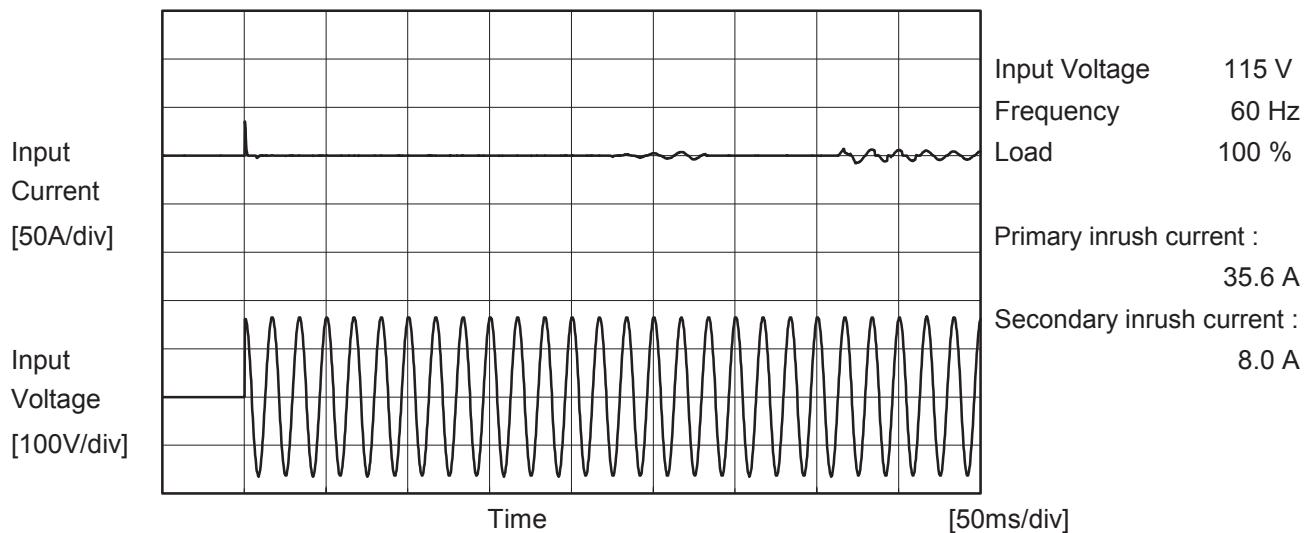
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Model	GMA300F-24																																																					
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Model	GMA300F-24	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





Model	GMA300F-24	Temperature	25°C
Item	Leakage Current	Testing Circuitry	Figure B
Object	<hr/>		

1. Results

[mA]

Standards	Input Volt.			Note	
	100 [V]	115 [V]	240 [V]		
IEC60601-1	Both phases	0.07	0.08	0.18	Operation
	One of phases	0.09	0.10	0.23	Stand by

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

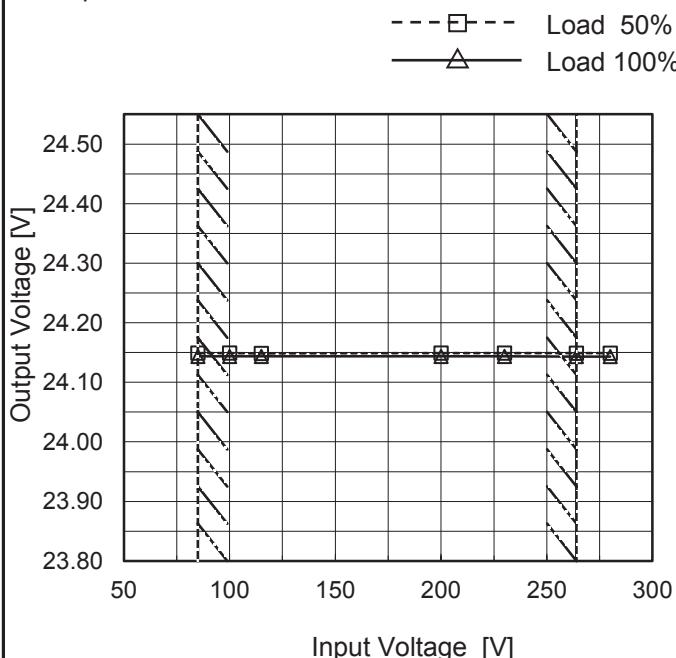
2. Condition

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

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Model	GMA300F-24
Item	Line Regulation
Object	+24V12.5A

1. Graph



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

Temperature 25°C
Testing Circuitry Figure A

2. Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
85	24.149	24.143 ※1
100	24.149	24.143 ※2
115	24.148	24.143
200	24.149	24.143
230	24.149	24.143
264	24.149	24.143
280	24.149	24.143
--	-	-
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※1 : Load 70%

※2 : Load 85%

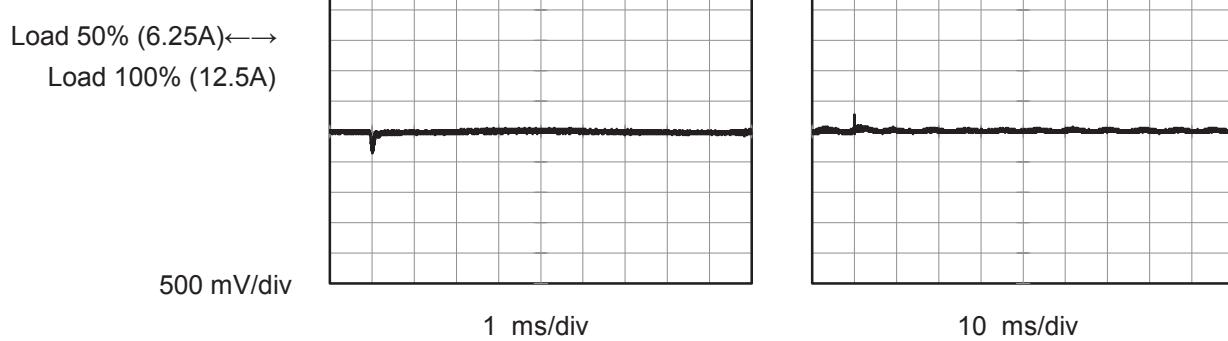
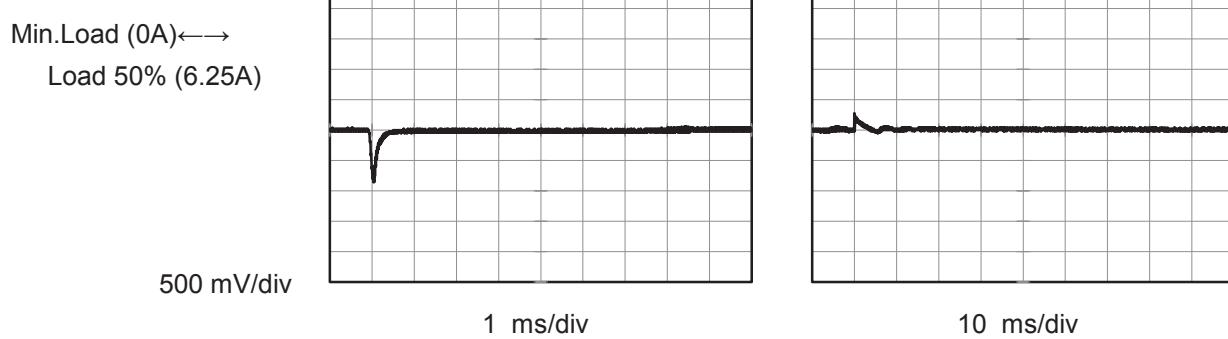
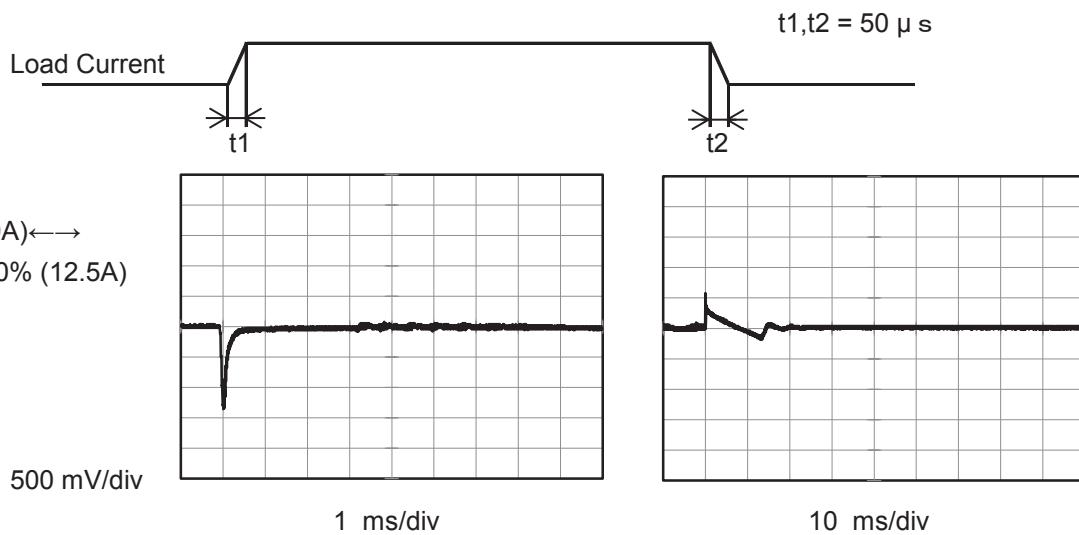
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1.Graph																																																						
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<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.0</td><td>24.155</td><td>24.156</td><td>24.155</td></tr> <tr> <td>2.5</td><td>24.152</td><td>24.152</td><td>24.152</td></tr> <tr> <td>3.1</td><td>24.152</td><td>24.152</td><td>24.151</td></tr> <tr> <td>5.0</td><td>24.150</td><td>24.150</td><td>24.150</td></tr> <tr> <td>6.3</td><td>24.149</td><td>24.149</td><td>24.149</td></tr> <tr> <td>7.5</td><td>24.148</td><td>24.148</td><td>24.148</td></tr> <tr> <td>8.8</td><td>24.147</td><td>24.147</td><td>24.147</td></tr> <tr> <td>10.0</td><td>24.146</td><td>24.146</td><td>24.146</td></tr> <tr> <td>10.6</td><td>24.146</td><td>24.145</td><td>24.146</td></tr> <tr> <td>12.5</td><td>24.144</td><td>24.144</td><td>24.144</td></tr> <tr> <td>13.8</td><td>24.143</td><td>24.142</td><td>24.142</td></tr> </tbody> </table>				Load Current [A]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.0	24.155	24.156	24.155	2.5	24.152	24.152	24.152	3.1	24.152	24.152	24.151	5.0	24.150	24.150	24.150	6.3	24.149	24.149	24.149	7.5	24.148	24.148	24.148	8.8	24.147	24.147	24.147	10.0	24.146	24.146	24.146	10.6	24.146	24.145	24.146	12.5	24.144	24.144	24.144	13.8	24.143	24.142	24.142
Load Current [A]	Output Voltage [V]																																																					
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

COSEL

Model	GMA300F-24	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+24V12.5A		

Input Volt. 115 V
 Cycle 1000 ms

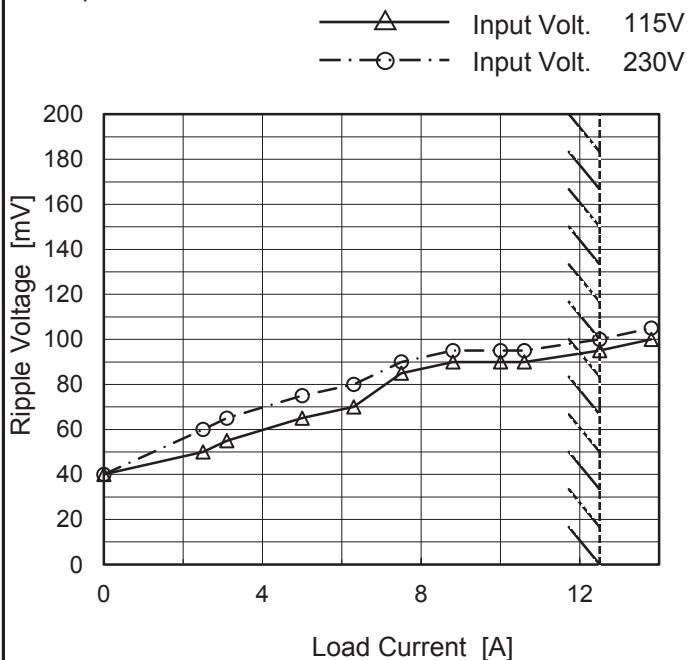


COSEL

Model	GMA300F-24
Item	Ripple Voltage (by Load Current)
Object	+24V12.5A

 Temperature 25°C
 Testing Circuitry Figure C

1.Graph



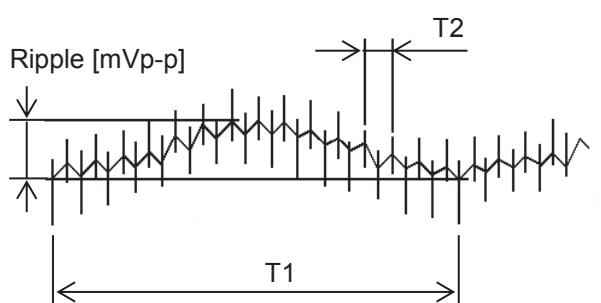
2.Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	40	40
2.5	50	60
3.1	55	65
5.0	65	75
6.3	70	80
7.5	85	90
8.8	90	95
10.0	90	95
10.6	90	95
12.5	95	100
13.8	100	105

Measured by 20 MHz Oscilloscope.

Ripple Voltage is shown as p-p in the figure below.

Note: Slanted line shows the range of the rated load current.
 T1: Due to AC Input Line
 T2: Due to Switching

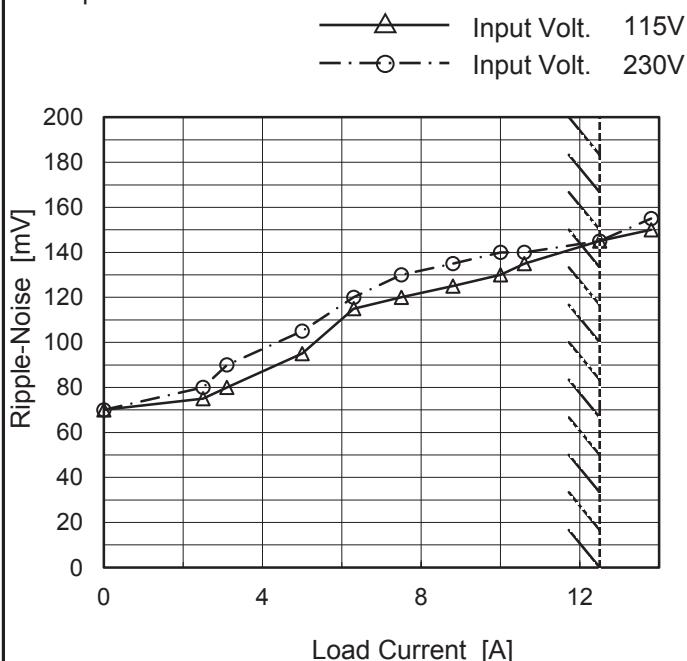


COSEL

Model	GMA300F-24
Item	Ripple-Noise
Object	+24V12.5A

 Temperature 25°C
 Testing Circuitry Figure C

1.Graph



2.Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	70	70
2.5	75	80
3.1	80	90
5.0	95	105
6.3	115	120
7.5	120	130
8.8	125	135
10.0	130	140
10.6	135	140
12.5	145	145
13.8	150	155

Measured by 20 MHz Oscilloscope.

Ripple-Noise is shown as p-p in the figure below.

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

T1: Due to AC Input Line
 T2: Due to Switching

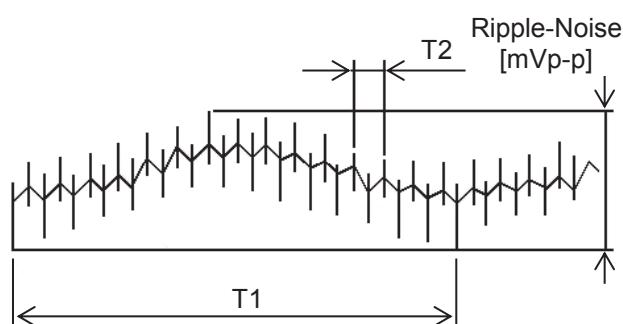
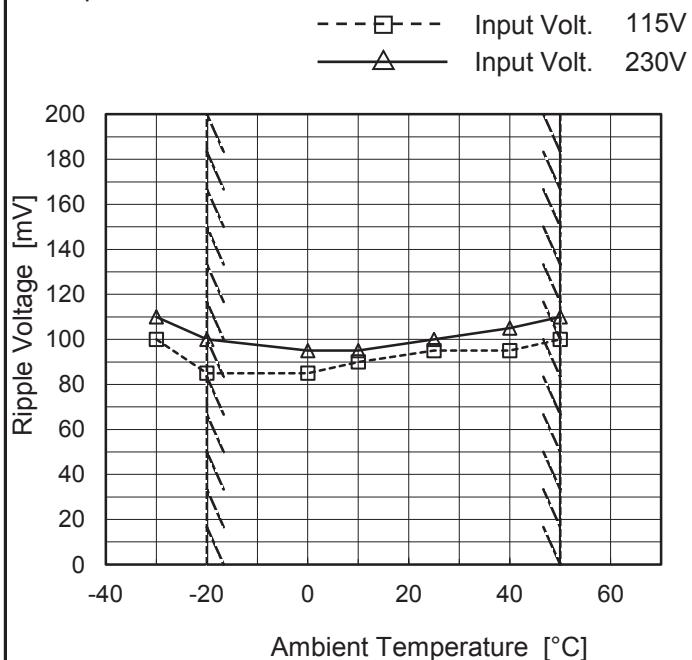


Fig. Complex Ripple Wave Form

COSEL

Model	GMA300F-24
Item	Ripple Voltage (by Ambient Temp.)
Object	+24V12.5A

1.Graph



Testing Circuitry Figure C

2.Values

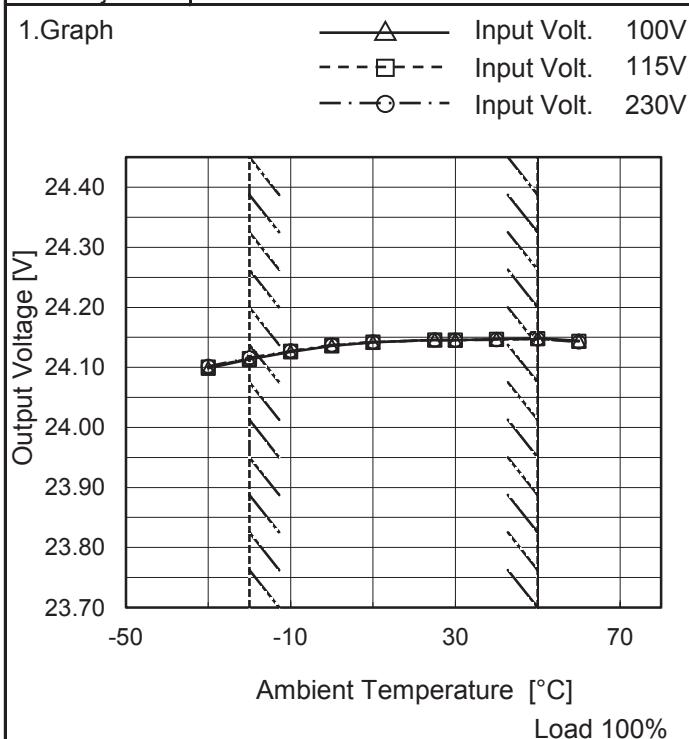
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
-30	100	110
-20	85	100
0	85	95
10	90	95
25	95	100
40	95	105
50	100	110
--	-	-
--	-	-
--	-	-
--	-	-

Measured by 20 MHz Oscilloscope.

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

COSEL

Model	GMA300F-24
Item	Ambient Temperature Drift
Object	+24V12.5A



Testing Circuitry Figure A

2.Values

Ambient Temperature [°C]	Output Voltage [V]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
-30	24.099	24.101	24.102
-20	24.113	24.115	24.116
-10	24.126	24.127	24.128
0	24.136	24.137	24.137
10	24.142	24.142	24.142
25	24.146	24.146	24.146
30	24.145	24.145	24.145
40	24.147	24.147	24.146
50	24.149	24.148	24.147
60	24.144	24.143	24.142
--	-	-	-

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



Model	GMA300F-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 : 85 - 264V

Load Current : 0 - 12.5A

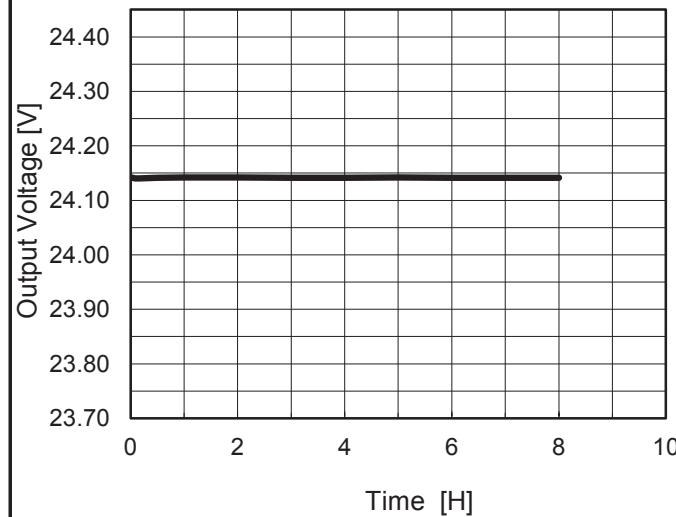
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	50	264	0	24.162	±25	±0.1
Minimum Voltage	-20	85	12.5	24.112		

COSEL

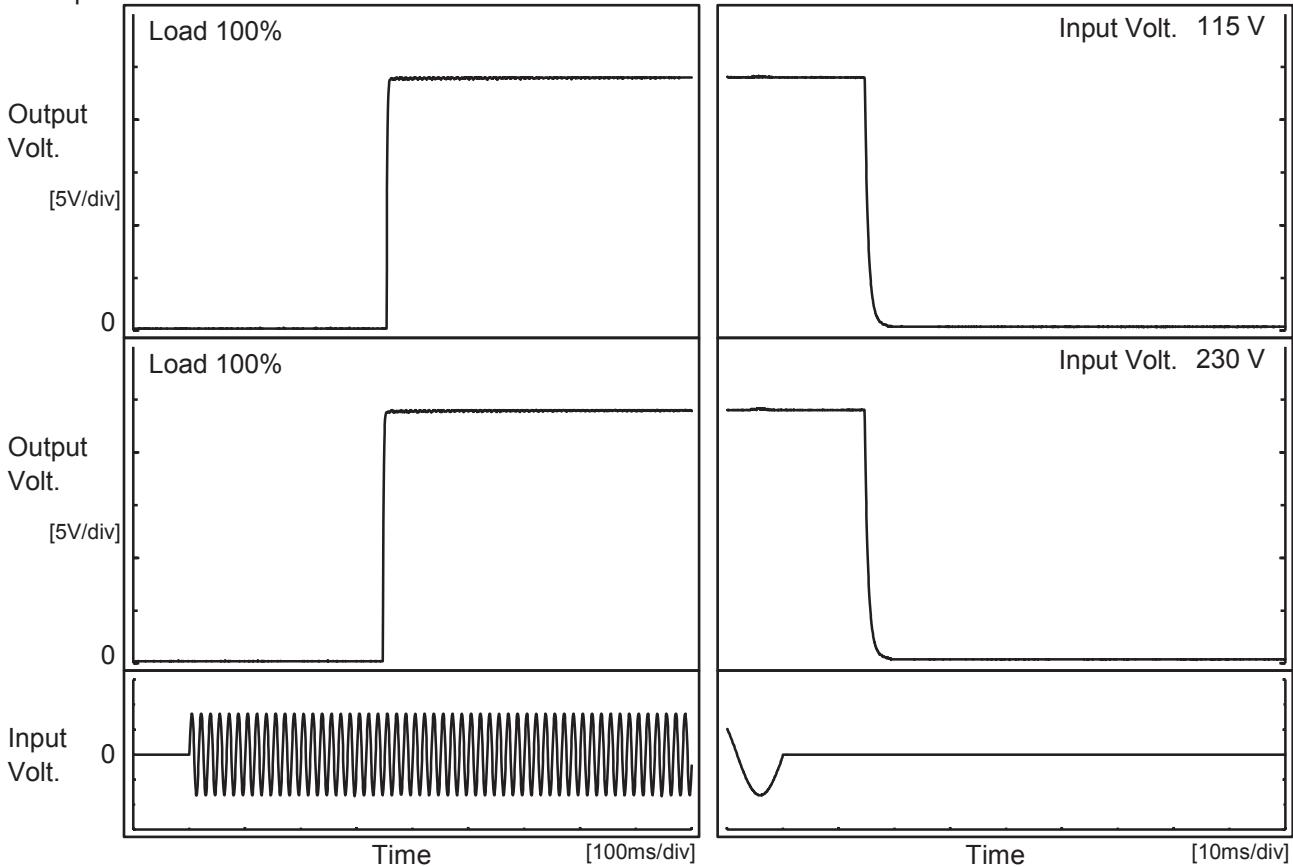
Model	GMA300F-24	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+24V12.5A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 115V Load 100%</p>			<table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>24.143</td></tr> <tr><td>0.5</td><td>24.141</td></tr> <tr><td>1.0</td><td>24.142</td></tr> <tr><td>2.0</td><td>24.142</td></tr> <tr><td>3.0</td><td>24.141</td></tr> <tr><td>4.0</td><td>24.142</td></tr> <tr><td>5.0</td><td>24.142</td></tr> <tr><td>6.0</td><td>24.142</td></tr> <tr><td>7.0</td><td>24.142</td></tr> <tr><td>8.0</td><td>24.141</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	24.143	0.5	24.141	1.0	24.142	2.0	24.142	3.0	24.141	4.0	24.142	5.0	24.142	6.0	24.142	7.0	24.142	8.0	24.141
Time since start [H]	Output Voltage [V]																								
0.0	24.143																								
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5.0	24.142																								
6.0	24.142																								
7.0	24.142																								
8.0	24.141																								

*The characteristic of AC230V is equal.

COSEL

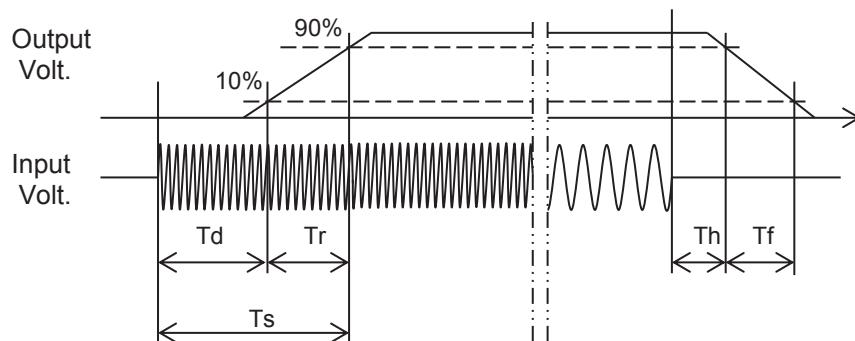
Model	GMA300F-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V12.5A		

1.Graph



2.Values

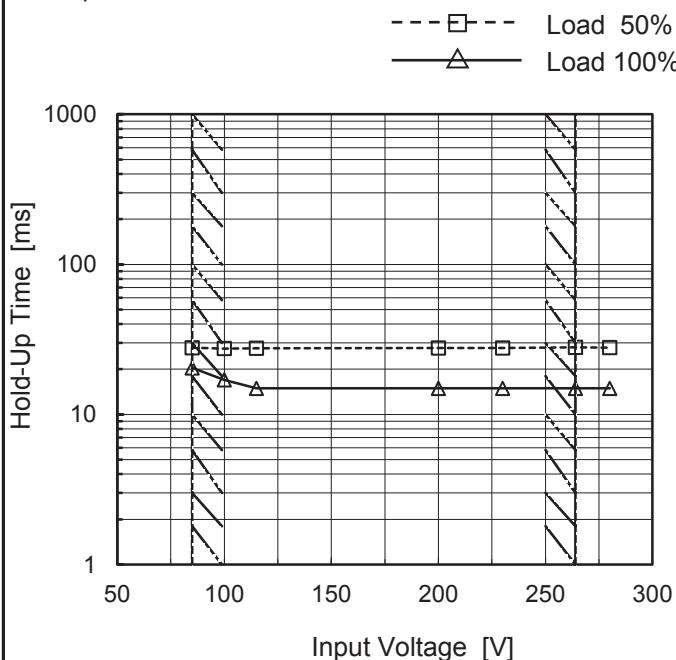
Input Volt.	Time	Td	Tr	Ts	Th	Tf	[ms]
115 V		354.0	2.5	356.5	14.8	1.5	
230 V		347.5	2.5	350.0	14.7	1.5	



COSEL

Model	GMA300F-24
Item	Hold-Up Time
Object	+24V12.5A

1. Graph



Temperature 25°C
Testing Circuitry Figure A

2. Values

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
85	28	20 ※1
100	28	17 ※2
115	28	15
200	28	15
230	28	15
264	28	15
280	28	15
--	-	-
--	-	-

※1 : Load 70%

※2 : Load 85%

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.

COSEL

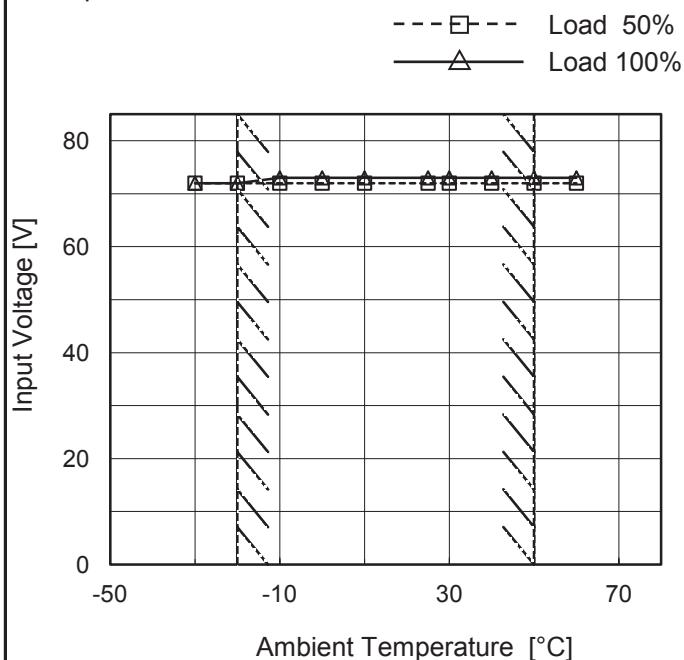
Model	GMA300F-24																																																					
Item	Instantaneous Interruption Compensation	Temperature Testing Circuitry	25°C Figure A																																																			
Object	+24V12.5A																																																					
1.Graph																																																						
<p>Graph showing Instantaneous Compensation Time [ms] vs Load Current [A]. The Y-axis is logarithmic from 1 to 1000 ms. The X-axis is linear from 0 to 12 A. Three curves are plotted for Input Voltages: 100V (solid line with open triangle markers), 115V (dashed line with open square markers), and 230V (dash-dot line with open circle markers). A slanted line indicates the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>100[V] [ms]</th> <th>115[V] [ms]</th> <th>230[V] [ms]</th> </tr> </thead> <tbody> <tr><td>3.1</td><td>51</td><td>51</td><td>53</td></tr> <tr><td>5.0</td><td>32</td><td>32</td><td>32</td></tr> <tr><td>6.3</td><td>26</td><td>26</td><td>27</td></tr> <tr><td>7.5</td><td>22</td><td>22</td><td>22</td></tr> <tr><td>8.8</td><td>19</td><td>19</td><td>19</td></tr> <tr><td>10.0</td><td>15</td><td>15</td><td>15</td></tr> <tr><td>10.6</td><td>14</td><td>14</td><td>15</td></tr> <tr><td>12.5</td><td>13</td><td>13</td><td>14</td></tr> <tr><td>13.8</td><td>4</td><td>4</td><td>13</td></tr> </tbody> </table>	Load Current [A]	100[V] [ms]	115[V] [ms]	230[V] [ms]	3.1	51	51	53	5.0	32	32	32	6.3	26	26	27	7.5	22	22	22	8.8	19	19	19	10.0	15	15	15	10.6	14	14	15	12.5	13	13	14	13.8	4	4	13														
Load Current [A]	100[V] [ms]	115[V] [ms]	230[V] [ms]																																																			
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Load Current [A]		Time [ms]																																																				
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0.0	-	-	-																																																			
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						

COSEL

Model	GMA300F-24
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+24V12.5A

Testing Circuitry Figure A

1.Graph



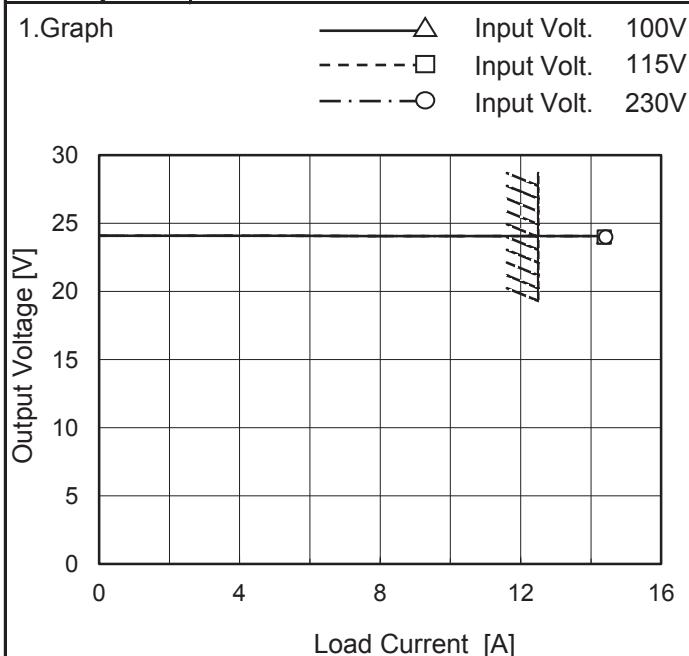
2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	72	72
-20	72	72
-10	72	73
0	72	73
10	72	73
25	72	73
30	72	73
40	72	73
50	72	73
60	72	73
--	-	-

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

COSEL

Model	GMA300F-24
Item	Overcurrent Protection
Object	+24V12.5A



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

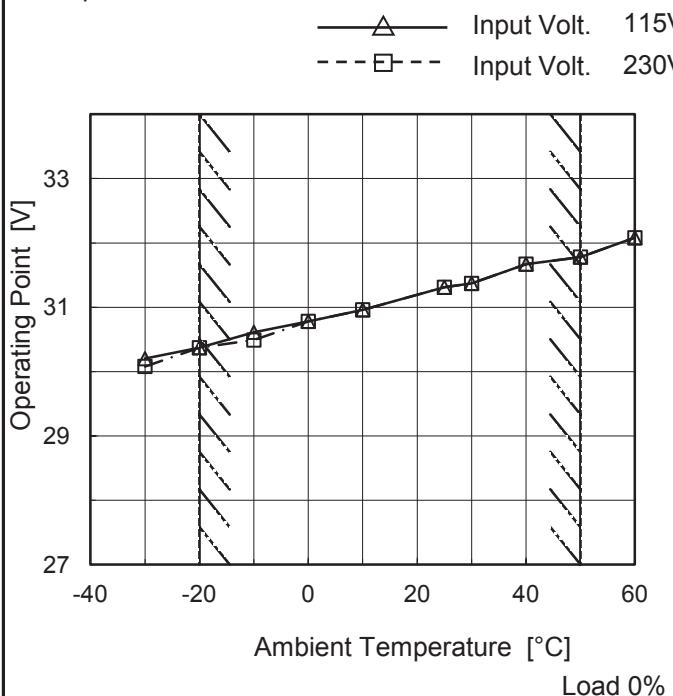
2.Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]
24	14.36	14.38	14.42
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-
--	-	-	-

COSEL

Model	GMA300F-24
Item	Overvoltage Protection
Object	+24V12.5A

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. 115[V]	Input Volt. 230[V]
-30	30.20	30.08
-20	30.37	30.37
-10	30.61	30.49
0	30.78	30.78
10	30.96	30.96
25	31.31	31.31
30	31.37	31.37
40	31.67	31.67
50	31.78	31.78
60	32.08	32.08
--	-	-

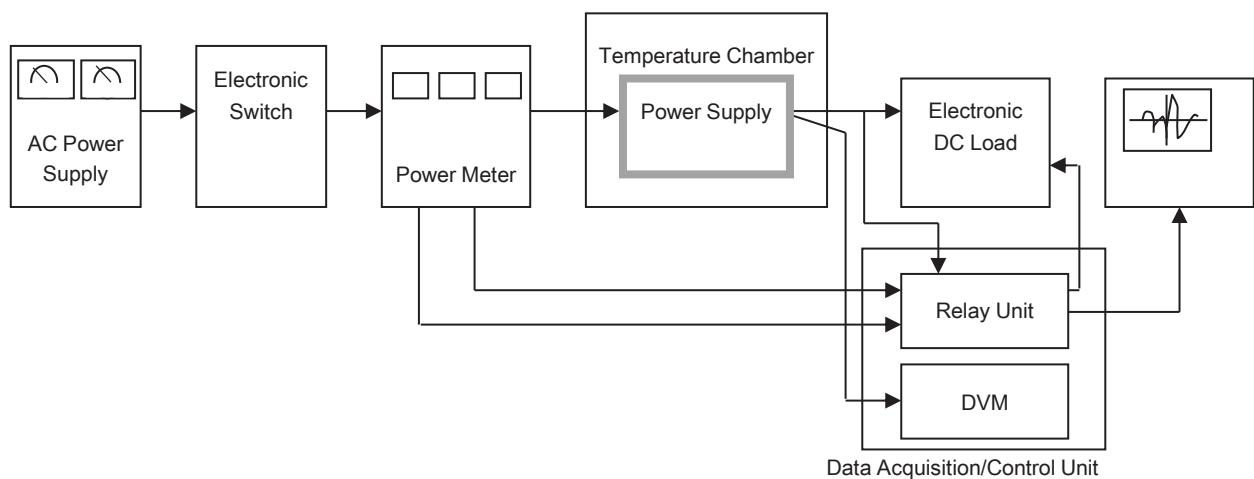


Figure A

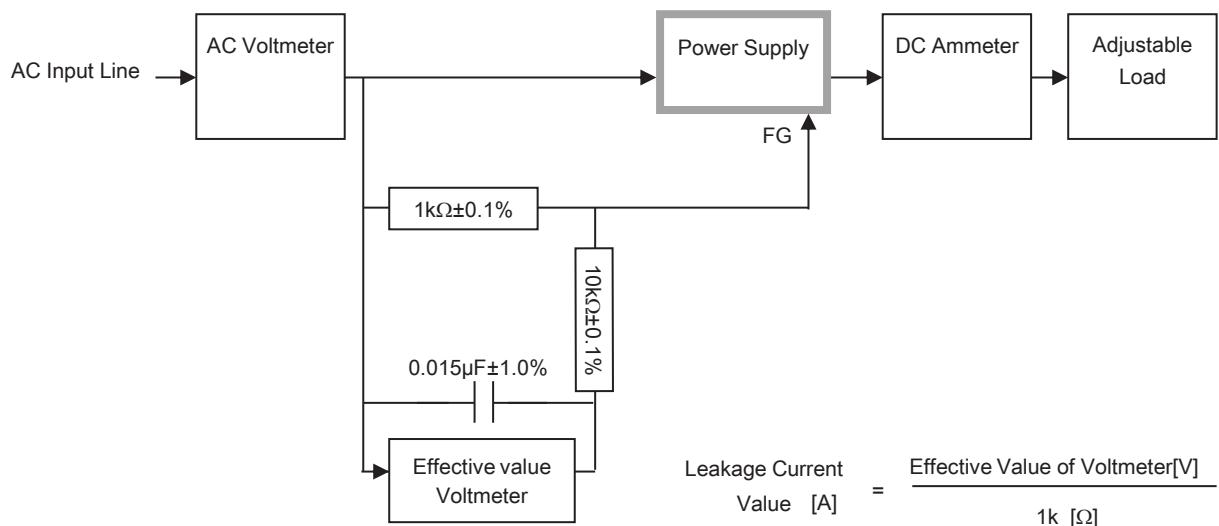
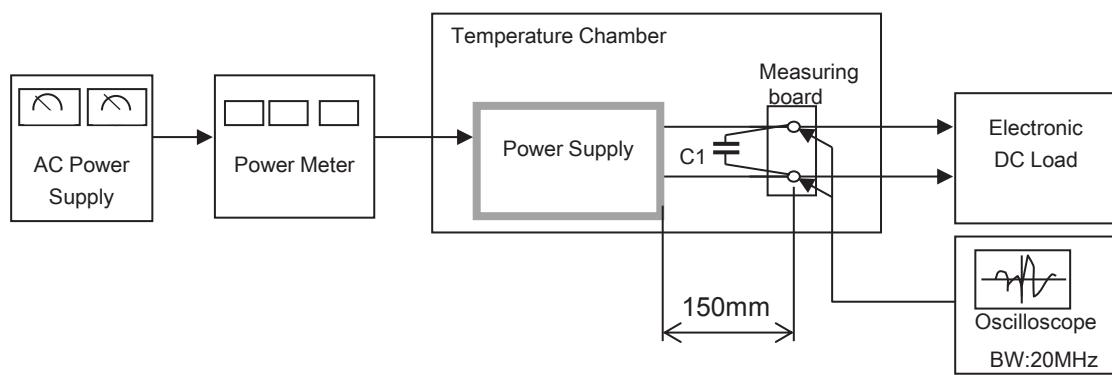


Figure B (IEC60601-1)



$C1 = 22 \mu\text{F}$
(Electrolytic capacitor)

Figure C