



# TEST DATA OF LGA150A-24

Regulated DC Power Supply  
April 15 , 2008

Approved by : Yoshiaki Shimizu  
Yoshiaki Shimizu Design Manager

Prepared by : Kazuo Ishimura  
Kazuo Ishimura Design Engineer

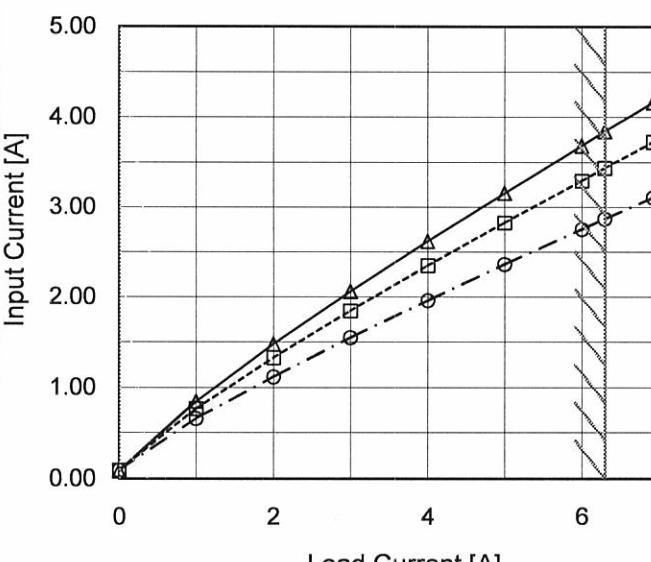
**COSEL CO.,LTD.**

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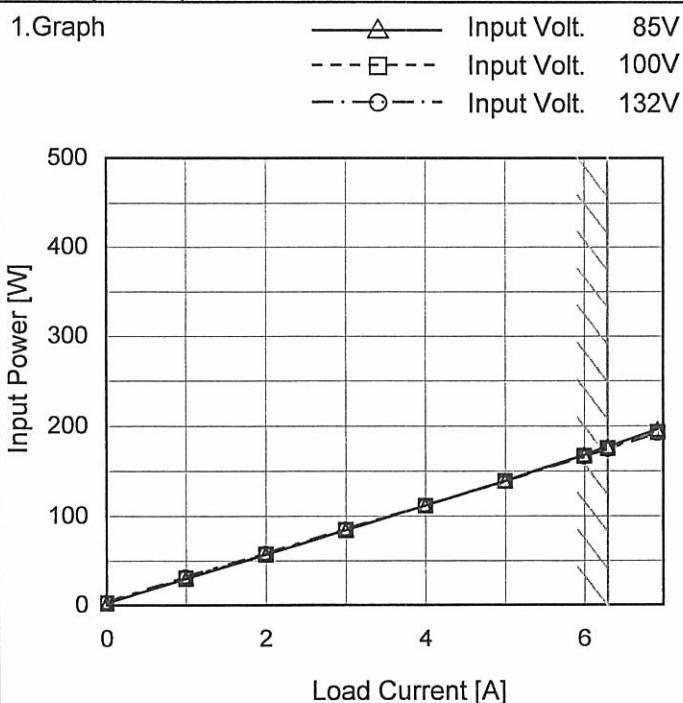
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Model	LGA150A-24																																																					
Item	Input Current (by Load Current)	Temperature 25°C	Testing Circuitry Figure A																																																			
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Model	LGA150A-24
Item	Input Power (by Load Current)
Object	_____



Temperature 25°C  
Testing Circuitry Figure A

## 2.Values

Load Current [A]	Input Power [W]		
	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.00	2.1	2.5	3.4
1.00	29.9	30.5	31.9
2.00	56.6	57.0	58.3
3.00	84.0	84.3	85.1
4.00	111.6	111.3	111.6
5.00	139.5	138.9	138.6
6.00	168.0	166.8	165.9
6.30	177.0	175.2	174.3
6.93	196.0	192.9	191.7
--	-	-	-
--	-	-	-

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



Model	LGA150A-24	Temperature 25°C																																
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Object	_____	_____																																
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<p>Efficiency [%]</p> <p>Input Voltage [V]</p> <p>Legend: Load 50% (dashed line with squares), Load 100% (solid line with triangles)</p>																																		
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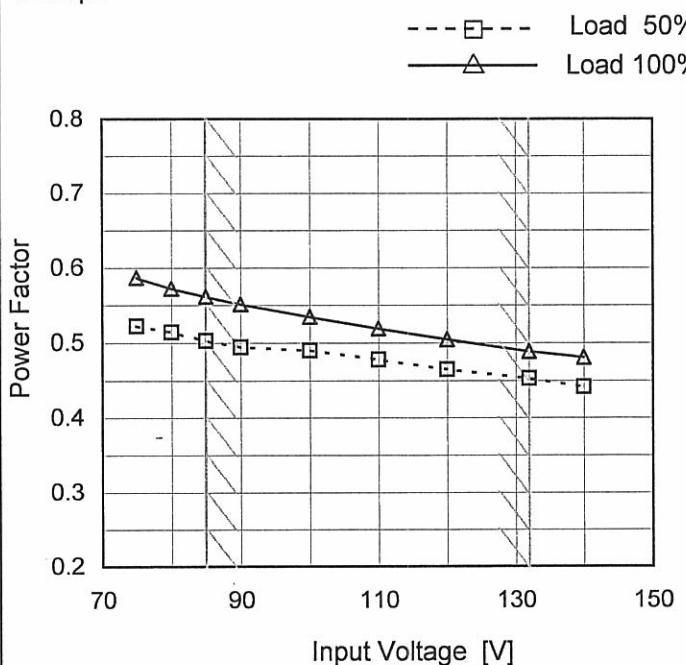
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1.Graph	<p>Graph showing Efficiency [%] vs Load Current [A]. The Y-axis ranges from 34 to 90 in increments of 6. The X-axis ranges from 0 to 6 in increments of 2. Three curves are plotted for Input Volt. 85V (solid line with squares), Input Volt. 100V (dashed line with circles), and Input Volt. 132V (dash-dot line with triangles). All curves show efficiency increasing with load current. A vertical slanted line is drawn from the X-axis at approximately 5.5A up to the 132V curve.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 85[V]</th> <th>Input Volt. 100[V]</th> <th>Input Volt. 132[V]</th> </tr> </thead> <tbody> <tr><td>1.00</td><td>81.1</td><td>79.8</td><td>76.4</td></tr> <tr><td>2.00</td><td>85.7</td><td>85.4</td><td>83.4</td></tr> <tr><td>3.00</td><td>87.1</td><td>86.8</td><td>85.9</td></tr> <tr><td>4.00</td><td>87.4</td><td>87.6</td><td>87.1</td></tr> <tr><td>5.00</td><td>87.5</td><td>87.9</td><td>87.8</td></tr> <tr><td>6.00</td><td>87.1</td><td>87.8</td><td>88.1</td></tr> <tr><td>6.30</td><td>86.6</td><td>87.7</td><td>88.1</td></tr> <tr><td>6.93</td><td>86.4</td><td>87.5</td><td>88.0</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. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]	1.00	81.1	79.8	76.4	2.00	85.7	85.4	83.4	3.00	87.1	86.8	85.9	4.00	87.4	87.6	87.1	5.00	87.5	87.9	87.8	6.00	87.1	87.8	88.1	6.30	86.6	87.7	88.1	6.93	86.4	87.5	88.0	--	-	-	-	--	-	-	-							
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Model	LGA150A-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%
75	0.523	0.587
80	0.514	0.572
85	0.503	0.562
90	0.494	0.551
100	0.490	0.534
110	0.478	0.519
120	0.465	0.505
132	0.453	0.489
140	0.442	0.481

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

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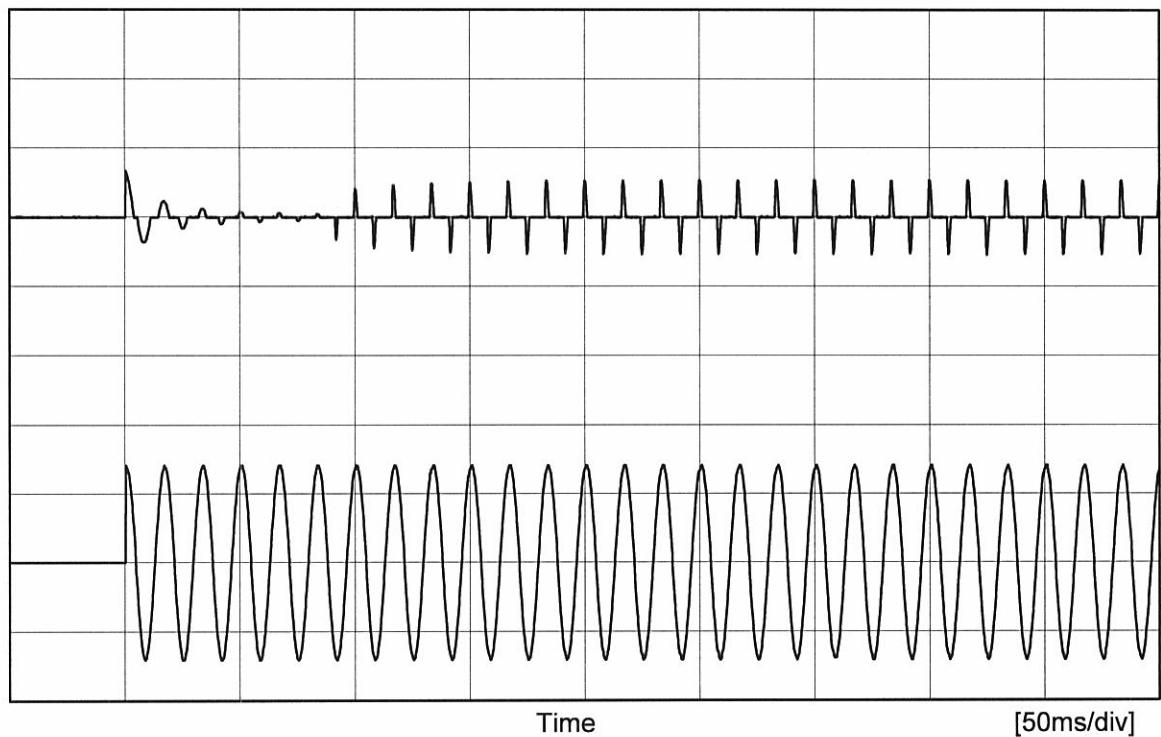
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Model LGA150A-24

Item Inrush Current

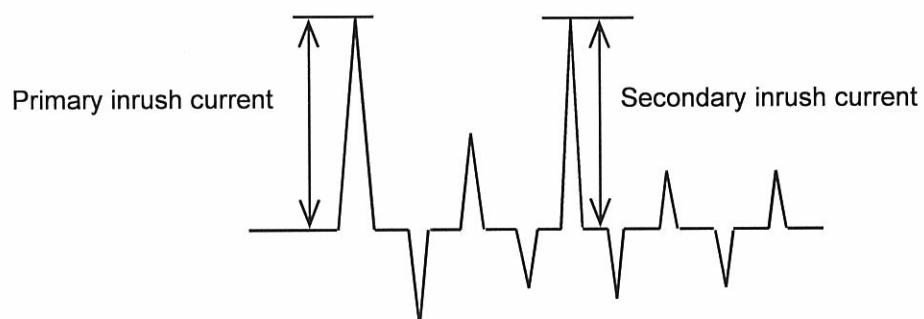
Temperature 25°C  
Testing Circuitry Figure A

Object \_\_\_\_\_

Input  
Current  
[20A/div]

Input Voltage	100 V
Frequency	60 Hz
Load	100 %

Primary inrush current	13.2 A
Secondary inrush current	10.9 A





Model	LGA150A-24	Temperature Testing Circuitry Figure B
Item	Leakage Current	
Object	_____	

### 1. Results

Standards	Leakage Current [mA]		
	Input Volt. 100 [V]	Input Volt. 120 [V]	Input Volt. 132 [V]
(A)DEN-AN	0.30	0.39	0.43
(B)IEC60950	0.30	0.37	0.42

frequency 60Hz

### 2. Condition

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

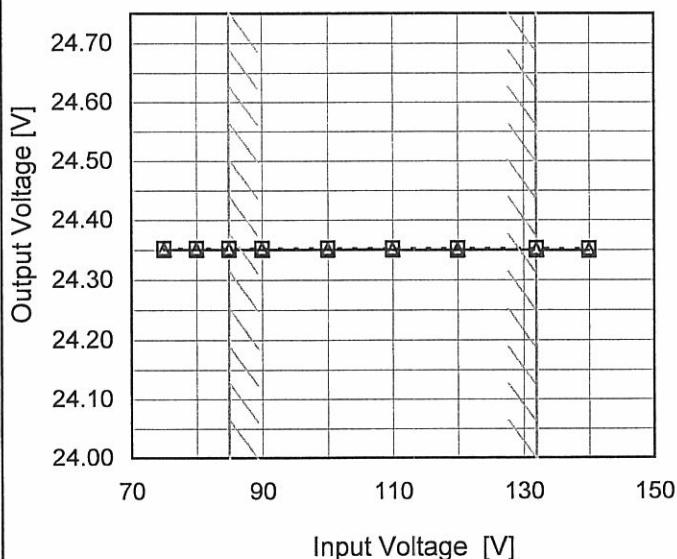
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Model	LGA150A-24
Item	Line Regulation
Object	+24V6.3A

Temperature 25°C  
Testing Circuitry Figure A

## 1.Graph

--□-- Load 50%  
—△— Load 100%



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

## 2.Values

Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
75	24.353	24.350
80	24.353	24.350
85	24.353	24.350
90	24.353	24.350
100	24.353	24.350
110	24.353	24.350
120	24.353	24.350
132	24.352	24.350
140	24.352	24.349

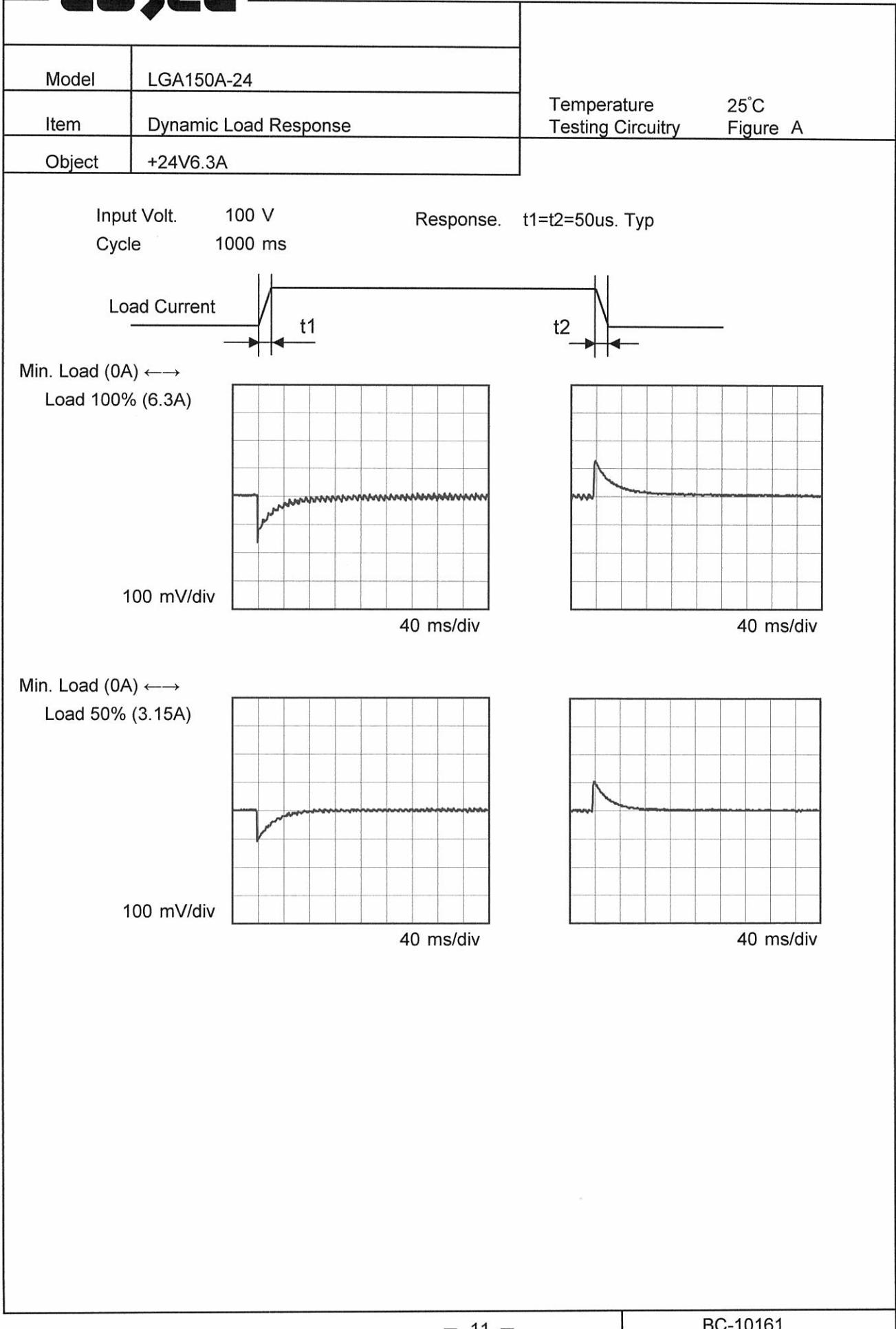
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	<p>The graph plots Output Voltage [V] on the Y-axis (23.90 to 24.60) against Load Current [A] on the X-axis (0 to 6). Three data series are shown for input voltages of 85V, 100V, and 132V. All series show a flat output voltage curve. A slanted line is drawn through the data points at approximately 6.3A, indicating the rated load current range.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Output Voltage [V] (85V)</th> <th>Output Voltage [V] (100V)</th> <th>Output Voltage [V] (132V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>24.348</td><td>24.347</td><td>24.347</td></tr> <tr><td>1.00</td><td>24.346</td><td>24.346</td><td>24.345</td></tr> <tr><td>2.00</td><td>24.346</td><td>24.346</td><td>24.345</td></tr> <tr><td>3.00</td><td>24.346</td><td>24.345</td><td>24.345</td></tr> <tr><td>4.00</td><td>24.345</td><td>24.345</td><td>24.344</td></tr> <tr><td>5.00</td><td>24.345</td><td>24.345</td><td>24.344</td></tr> <tr><td>6.00</td><td>24.345</td><td>24.345</td><td>24.344</td></tr> <tr><td>6.30</td><td>24.345</td><td>24.345</td><td>24.344</td></tr> <tr><td>6.93</td><td>24.345</td><td>24.343</td><td>24.344</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]	Output Voltage [V] (85V)	Output Voltage [V] (100V)	Output Voltage [V] (132V)	0.00	24.348	24.347	24.347	1.00	24.346	24.346	24.345	2.00	24.346	24.346	24.345	3.00	24.346	24.345	24.345	4.00	24.345	24.345	24.344	5.00	24.345	24.345	24.344	6.00	24.345	24.345	24.344	6.30	24.345	24.345	24.344	6.93	24.345	24.343	24.344	--	-	-	-	--	-	-	-		
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--	-	-	-																																																
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Note: Slanted line shows the range of the rated load current.

## 2.Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
0.00	24.348	24.347	24.347
1.00	24.346	24.346	24.345
2.00	24.346	24.346	24.345
3.00	24.346	24.345	24.345
4.00	24.345	24.345	24.344
5.00	24.345	24.345	24.344
6.00	24.345	24.345	24.344
6.30	24.345	24.345	24.344
6.93	24.345	24.343	24.344
--	-	-	-
--	-	-	-

**COSEL**

Model	LGA150A-24																																							
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C																																						
Object	+24V6.3A																																							
1.Graph																																								
<p>—▲— Input Volt. 85V -○- Input Volt. 132V</p>																																								
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. 85 [V]</th> <th>Input Volt. 132 [V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td><td>10</td><td>10</td></tr> <tr> <td>1.00</td><td>10</td><td>10</td></tr> <tr> <td>2.00</td><td>15</td><td>15</td></tr> <tr> <td>3.00</td><td>15</td><td>15</td></tr> <tr> <td>4.00</td><td>15</td><td>15</td></tr> <tr> <td>5.00</td><td>20</td><td>20</td></tr> <tr> <td>6.00</td><td>20</td><td>20</td></tr> <tr> <td>6.30</td><td>20</td><td>20</td></tr> <tr> <td>6.93</td><td>20</td><td>20</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. 85 [V]	Input Volt. 132 [V]	0.00	10	10	1.00	10	10	2.00	15	15	3.00	15	15	4.00	15	15	5.00	20	20	6.00	20	20	6.30	20	20	6.93	20	20	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 85 [V]	Input Volt. 132 [V]																																						
0.00	10	10																																						
1.00	10	10																																						
2.00	15	15																																						
3.00	15	15																																						
4.00	15	15																																						
5.00	20	20																																						
6.00	20	20																																						
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--	-	-																																						
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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>T1: Due to AC Input Line T2: Due to Switching</p> <p>Fig. Complex Ripple Wave Form</p>																																								

**COSEL**

Model	LGA150A-24		Temperature Testing Circuitry 25°C Figure C																																					
Item	Ripple-Noise																																							
Object	+24V6.3A																																							
1. Graph	<p>Graph showing Ripple-Noise [mV] vs Load Current [A]. The Y-axis ranges from 0 to 200 mV, and the X-axis ranges from 0 to 7 A. Two curves are shown: one for Input Volt. 85V (solid line with triangle markers) and one for Input Volt. 132V (dashed line with circle markers). Both curves show an increase in noise with load current. A slanted line indicates the range of the rated load current.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Ripple-Noise [mV] (Input Volt. 85V)</th> <th>Ripple-Noise [mV] (Input Volt. 132V)</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>15</td><td>15</td></tr> <tr><td>1.00</td><td>25</td><td>25</td></tr> <tr><td>2.00</td><td>35</td><td>35</td></tr> <tr><td>3.00</td><td>40</td><td>40</td></tr> <tr><td>4.00</td><td>45</td><td>45</td></tr> <tr><td>5.00</td><td>50</td><td>50</td></tr> <tr><td>6.00</td><td>60</td><td>60</td></tr> <tr><td>6.30</td><td>65</td><td>65</td></tr> <tr><td>6.93</td><td>70</td><td>70</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple-Noise [mV] (Input Volt. 85V)	Ripple-Noise [mV] (Input Volt. 132V)	0.00	15	15	1.00	25	25	2.00	35	35	3.00	40	40	4.00	45	45	5.00	50	50	6.00	60	60	6.30	65	65	6.93	70	70	--	-	-	--	-	-		
Load Current [A]	Ripple-Noise [mV] (Input Volt. 85V)	Ripple-Noise [mV] (Input Volt. 132V)																																						
0.00	15	15																																						
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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. 85 [V]</th> <th>Input Volt. 132 [V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>15</td><td>15</td></tr> <tr><td>1.00</td><td>25</td><td>25</td></tr> <tr><td>2.00</td><td>35</td><td>35</td></tr> <tr><td>3.00</td><td>40</td><td>40</td></tr> <tr><td>4.00</td><td>45</td><td>45</td></tr> <tr><td>5.00</td><td>50</td><td>50</td></tr> <tr><td>6.00</td><td>60</td><td>60</td></tr> <tr><td>6.30</td><td>65</td><td>65</td></tr> <tr><td>6.93</td><td>70</td><td>70</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 85 [V]	Input Volt. 132 [V]	0.00	15	15	1.00	25	25	2.00	35	35	3.00	40	40	4.00	45	45	5.00	50	50	6.00	60	60	6.30	65	65	6.93	70	70	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																							
	Input Volt. 85 [V]	Input Volt. 132 [V]																																						
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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>Diagram illustrating a Complex Ripple Wave Form. The diagram shows a waveform with two distinct noise components: T1, which is a low-frequency noise component due to the AC input line, and T2, which is a higher-frequency noise component due to switching. The total noise amplitude is indicated by a vertical arrow and labeled as Ripple-Noise [mVp-p].</p>																																							
Fig. Complex Ripple Wave Form																																								

**COSEL**

Model	LGA150A-24	Testing Circuitry FigureC																												
Item	Ripple Voltage (by Ambient Temp.)																													
Object	+24V6.3A																													
1.Graph		2.Values																												
<p>Graph showing Ripple Voltage [mV] vs Ambient Temperature [°C]. The graph shows a decreasing trend of Ripple Voltage as ambient temperature increases from -30°C to 40°C. A slanted line indicates the range of rated ambient temperature between approximately -10°C and 25°C.</p> <p>Input Volt. 100V Input Load. 100%</p>																														
<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 ambient temperature.</p> <p>T1: Due to AC Input Line T2: Due to Switching</p> <p>Ripple [mVp-p]</p> <p>Fig. Complex Ripple Wave Form</p>																														
		<table border="1"> <thead> <tr> <th>Ambient Temperature [°C]</th> <th>Ripple Voltage [mV]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>140</td></tr> <tr><td>-10</td><td>70</td></tr> <tr><td>0</td><td>45</td></tr> <tr><td>25</td><td>20</td></tr> <tr><td>40</td><td>20</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> <tr><td>--</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Ripple Voltage [mV]	-30	140	-10	70	0	45	25	20	40	20	--	-	--	-	--	-	--	-	--	-	--	-	--	-	--	-
Ambient Temperature [°C]	Ripple Voltage [mV]																													
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**COSEL**

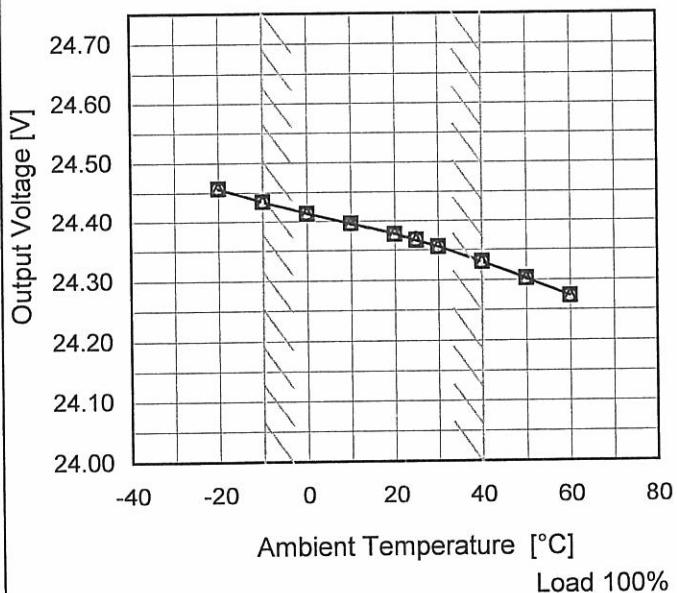
Model LGA150A-24

Item Ambient Temperature Drift

Object +24V6.3A

1.Graph

—△— Input Volt. 85V  
 - - -□--- Input Volt. 100V  
 - - -○--- Input Volt. 132V



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. 85[V]	Input Volt. 100[V]	Input Volt. 132[V]
-20	24.457	24.457	24.457
-10	24.434	24.434	24.434
0	24.414	24.414	24.414
10	24.396	24.396	24.395
20	24.378	24.377	24.377
25	24.367	24.367	24.368
30	24.356	24.356	24.356
40	24.331	24.331	24.331
50	24.303	24.303	24.303
60	24.273	24.273	24.273
--	-	-	-



Model	LGA150A-24	Testing Circuitry Figure A
Item	Output Voltage Accuracy	
Object	+24V6.3A	

### 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 : -10 - 40°C

Input Voltage : 85 - 132V

Load Current : 0 - 6.3A

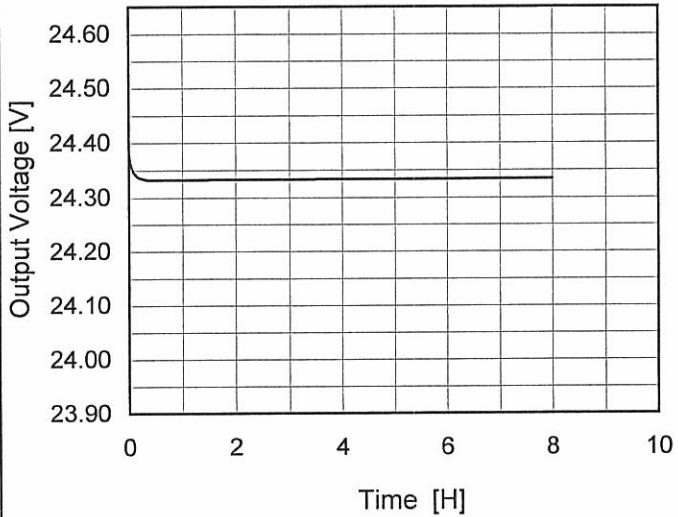
\* Output Voltage Accuracy =  $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-10	85	0	24.439	±54	±0.2
Minimum Voltage	40	132	6.3	24.331		

**COSEL**

Model	LGA150A-24	Temperature	25°C																						
Item	Time Lapse Drift	Testing Circuitry	Figure A																						
Object	+24V6.3A																								
1.Graph			2.Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 100V 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>24.382</td></tr> <tr><td>0.5</td><td>24.333</td></tr> <tr><td>1.0</td><td>24.333</td></tr> <tr><td>2.0</td><td>24.333</td></tr> <tr><td>3.0</td><td>24.333</td></tr> <tr><td>4.0</td><td>24.334</td></tr> <tr><td>5.0</td><td>24.334</td></tr> <tr><td>6.0</td><td>24.334</td></tr> <tr><td>7.0</td><td>24.335</td></tr> <tr><td>8.0</td><td>24.334</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	24.382	0.5	24.333	1.0	24.333	2.0	24.333	3.0	24.333	4.0	24.334	5.0	24.334	6.0	24.334	7.0	24.335	8.0	24.334
Time since start [H]	Output Voltage [V]																								
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**COSEL**

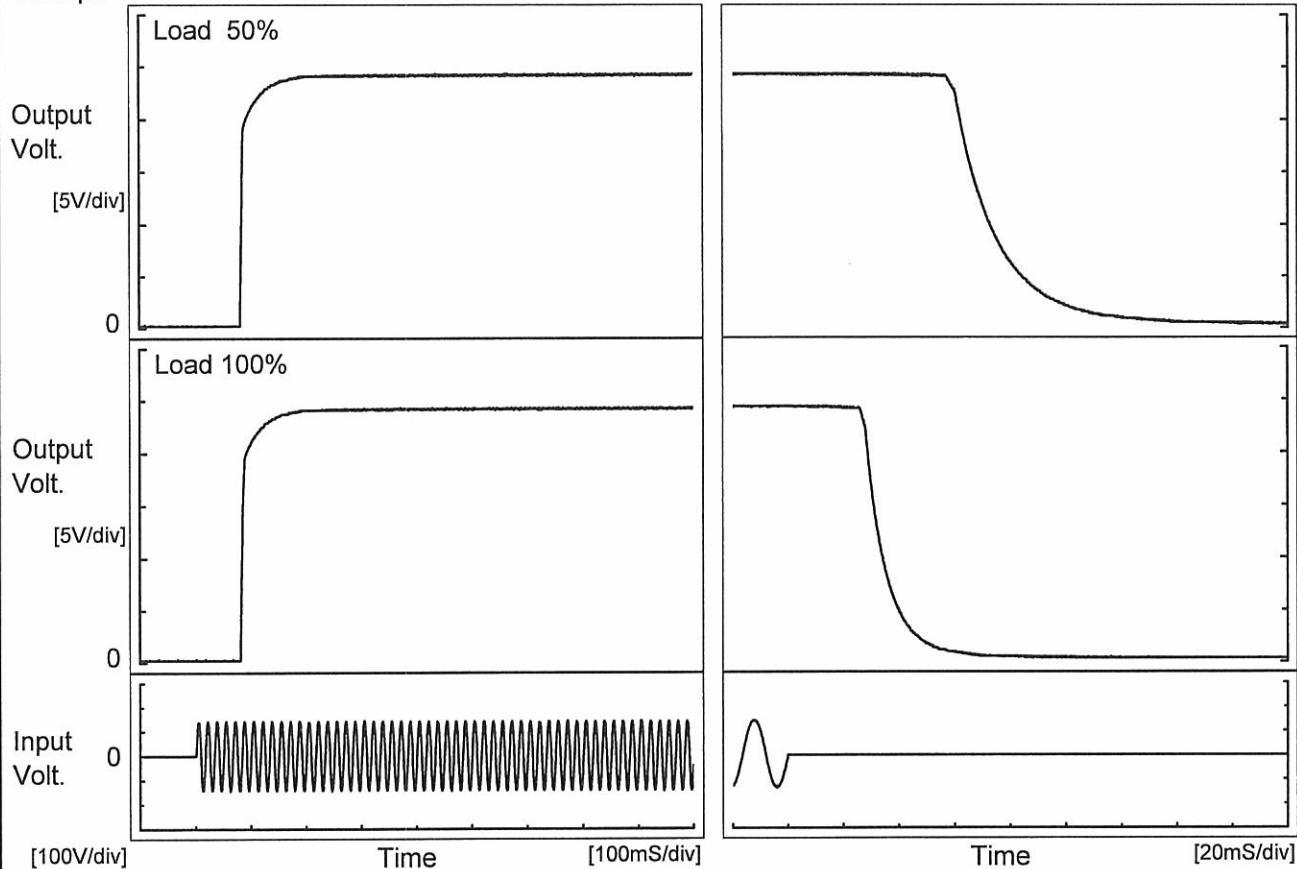
Model LGA150A-24

Item Rise and Fall Time

Temperature 25°C  
Testing Circuitry Figure A

Object +24V6.3A

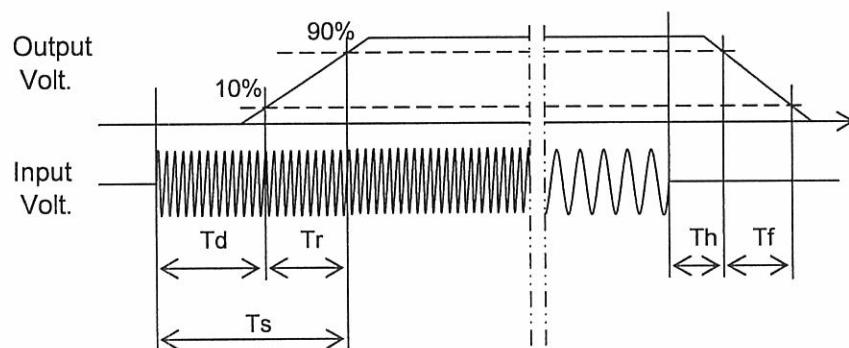
## 1. Graph



## 2. Values

[mS]

Load	Time	Td	Tr	Ts	Th	Tf
50 %		82.5	28.5	111.0	60.6	35.4
100 %		82.5	28.0	110.5	28.2	17.7





Model	LGA150A-24																																	
Item	Hold-Up Time	Temperature Testing Circuitry    25°C Figure A																																
Object	+24V6.3A																																	
1.Graph																																		
<p>Legend:      - - - □ - - - Load 50%      —△— Load 100%   </p> <p>Y-axis: Hold-Up Time [ms]      X-axis: Input Voltage [V]</p>																																		
2.Values																																		
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Input Voltage [V]	Hold-Up Time [ms]																																	
	Load 50%	Load 100%																																
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<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	LGA150A-24																																																					
Item	Instantaneous Interruption Compensation																																																					
Object	+24V6.3A																																																					
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 ranges from 0 to 6 A. Three curves are shown for Input Volt. 85V (solid line with triangles), Input Volt. 100V (dashed line with squares), and Input Volt. 132V (dash-dot line with circles). A slanted line shows the range of the rated load current.</p> <table border="1"> <thead> <tr> <th>Load Current [A]</th> <th>Input Volt. 85V [ms]</th> <th>Input Volt. 100V [ms]</th> <th>Input Volt. 132V [ms]</th> </tr> </thead> <tbody> <tr><td>1.00</td><td>118</td><td>185</td><td>362</td></tr> <tr><td>2.00</td><td>60</td><td>95</td><td>190</td></tr> <tr><td>3.00</td><td>36</td><td>63</td><td>127</td></tr> <tr><td>4.00</td><td>26</td><td>46</td><td>96</td></tr> <tr><td>5.00</td><td>21</td><td>36</td><td>76</td></tr> <tr><td>6.00</td><td>14</td><td>29</td><td>63</td></tr> <tr><td>6.30</td><td>14</td><td>27</td><td>57</td></tr> <tr><td>6.93</td><td>13</td><td>23</td><td>51</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. 85V [ms]	Input Volt. 100V [ms]	Input Volt. 132V [ms]	1.00	118	185	362	2.00	60	95	190	3.00	36	63	127	4.00	26	46	96	5.00	21	36	76	6.00	14	29	63	6.30	14	27	57	6.93	13	23	51	--	-	-	-	--	-	-	-							
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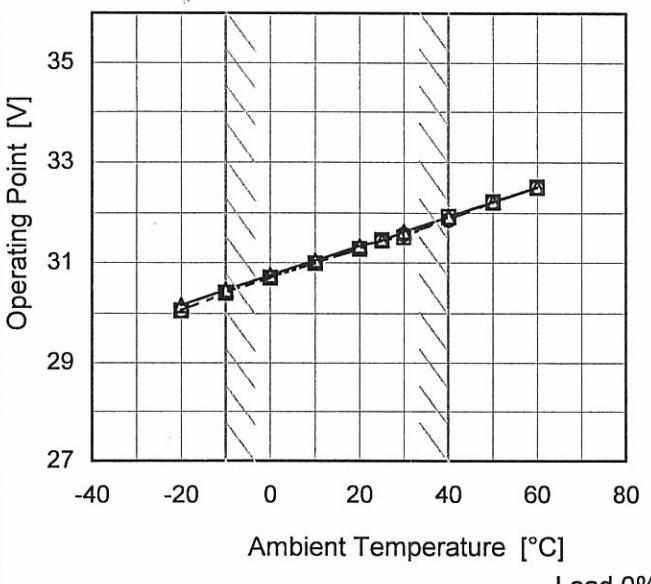


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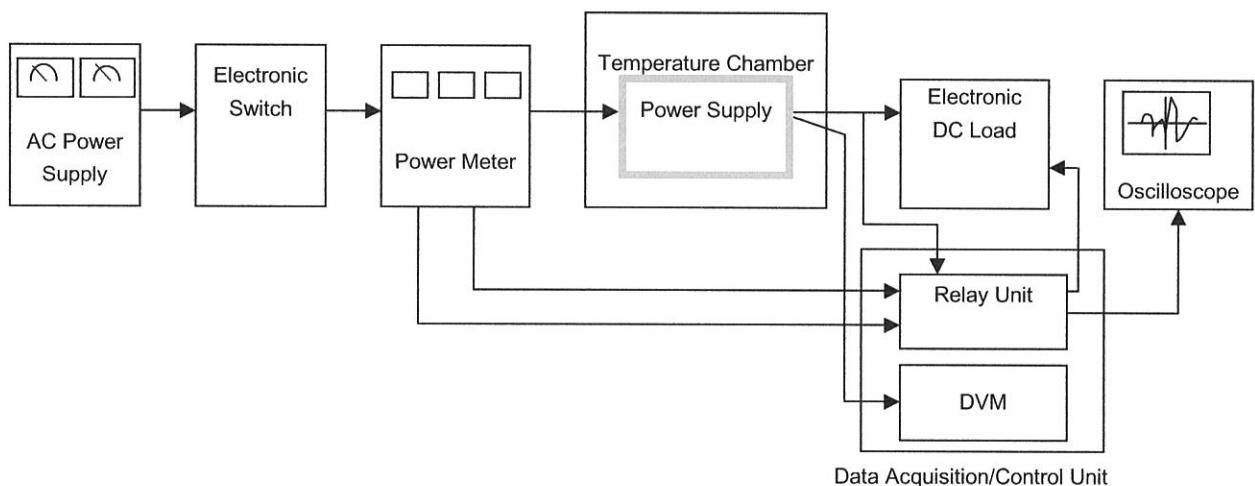


Figure A

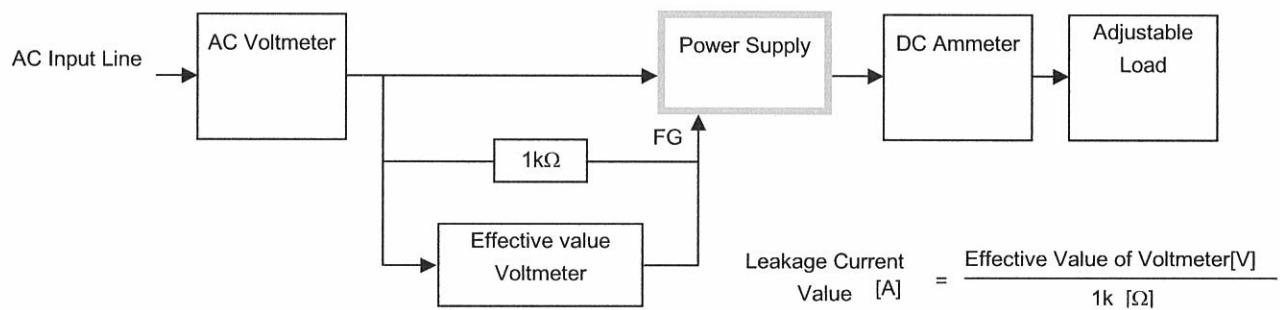


Figure B ( DEN-AN )

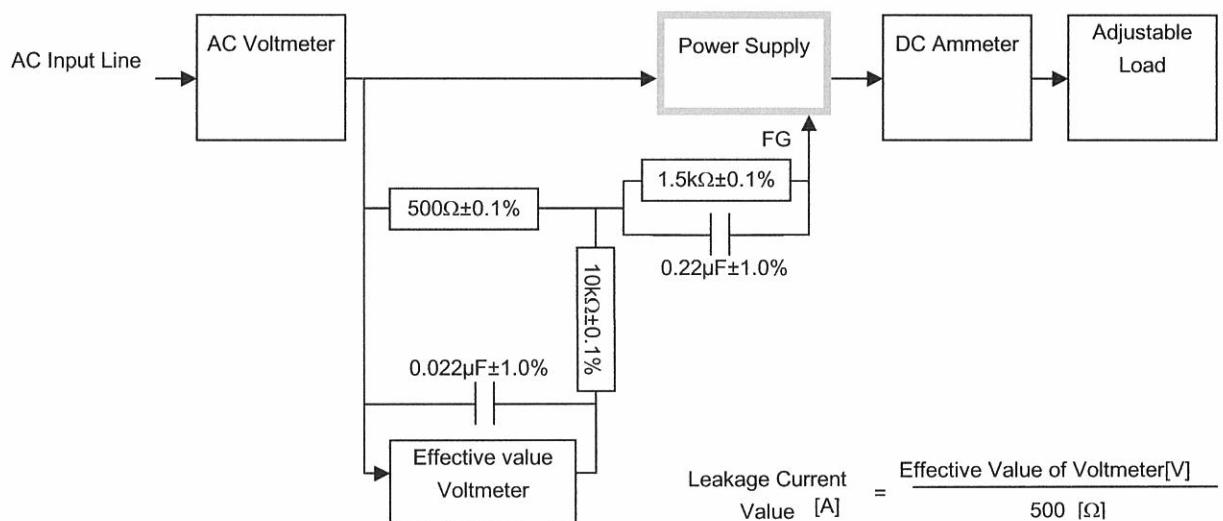


Figure B ( IEC60950-1 )

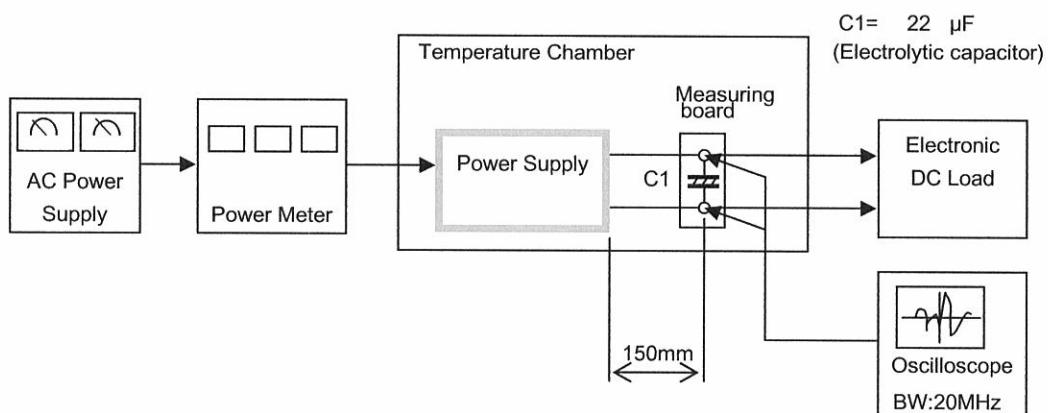


Figure C