



TEST DATA OF LHA150F-48

Regulated DC Power Supply
September 2, 2019

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Junya Kaneda Design Manager

Prepared by : Tomoyuki Sakuma
Tomoyuki Sakuma Design Engineer

COSEL CO.,LTD.

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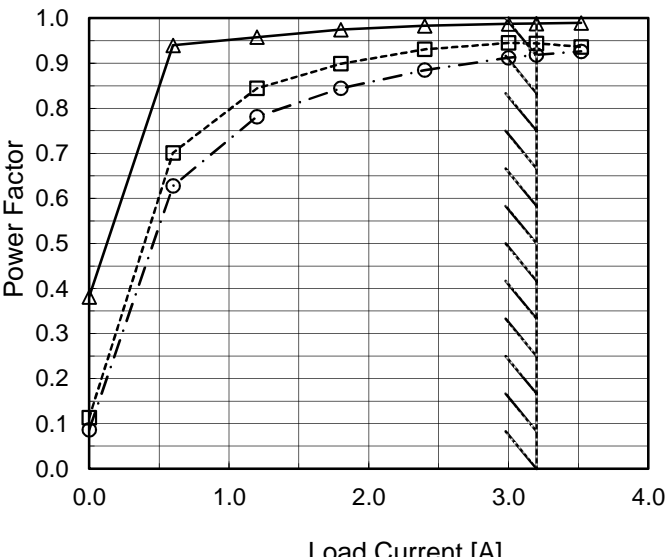


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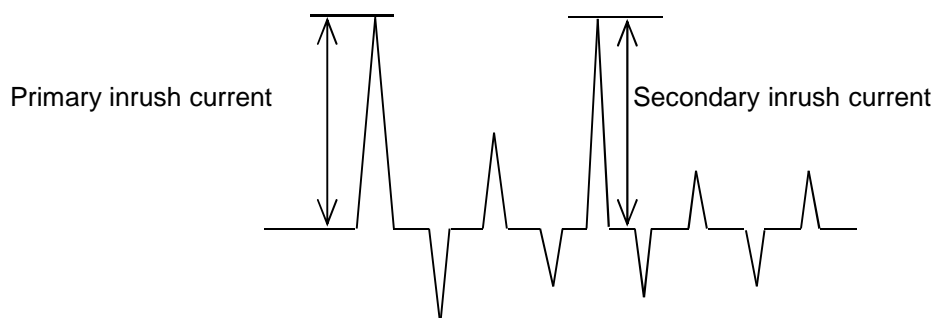
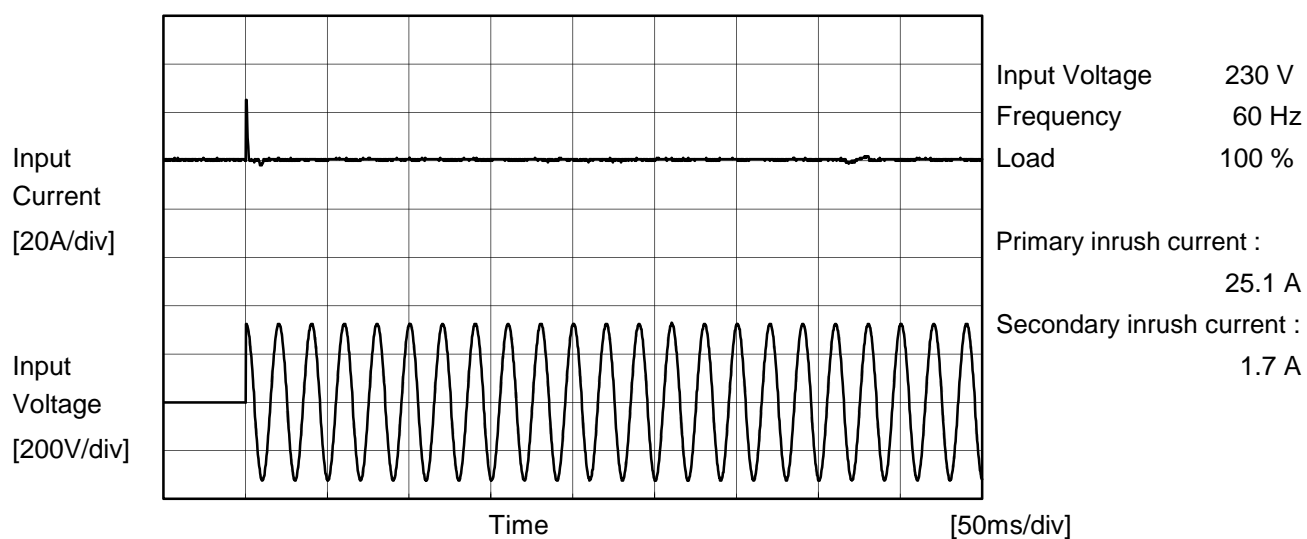
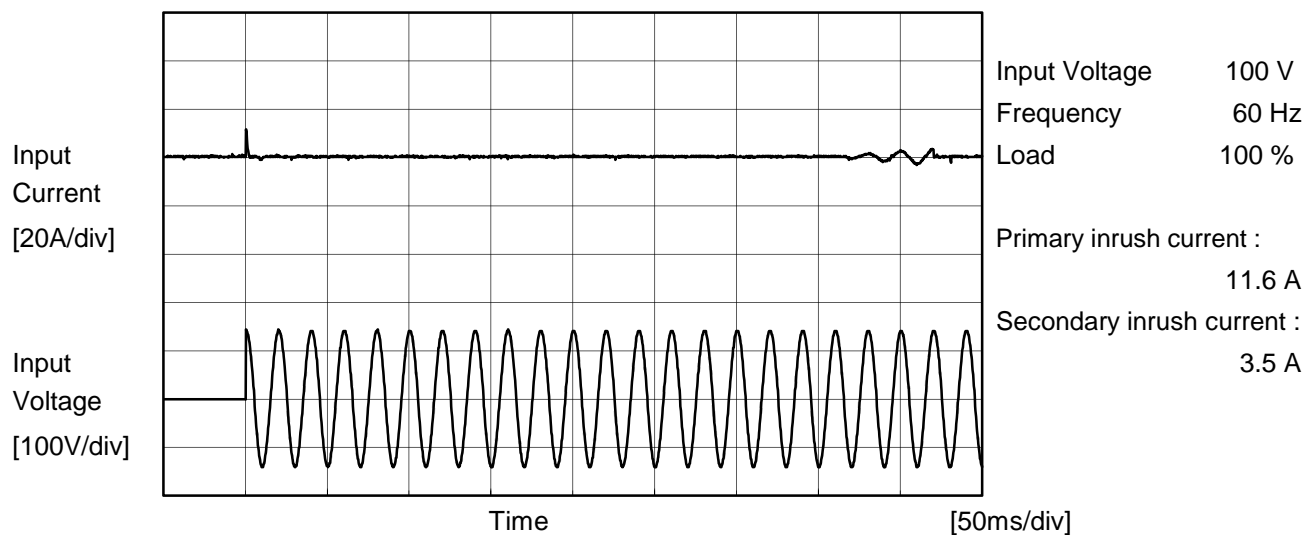
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- 3 -

BC-11405



Model	LHA150F-48	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





COSEL		Temperature 25°C Testing Circuitry Figure B
Model	LHA150F-48	
Item	Leakage Current	
Object	_____	

1.Results

Standards	Testing Circuitry	Measuring Method	Input Volt.			Note
			100 [V]	230 [V]	240 [V]	
DEN-AN	Figure B-1	Both phases	0.16	0.39	0.41	Operation
		One of phases	0.27	0.69	0.72	Stand by
IEC62368-1	Figure B-2	Both phases	0.16	0.38	0.39	Operation
		One of phases	0.27	0.67	0.70	Stand by
	Figure B-3	Both phases	0.16	0.38	0.39	Operation
		One of phases	0.27	0.66	0.70	Stand by

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

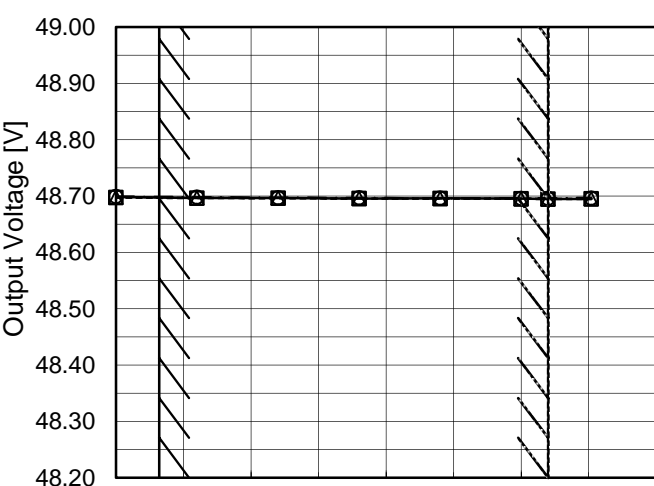
2.Condition

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



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Object	+48V3.2A	Testing Circuitry	Figure A																																
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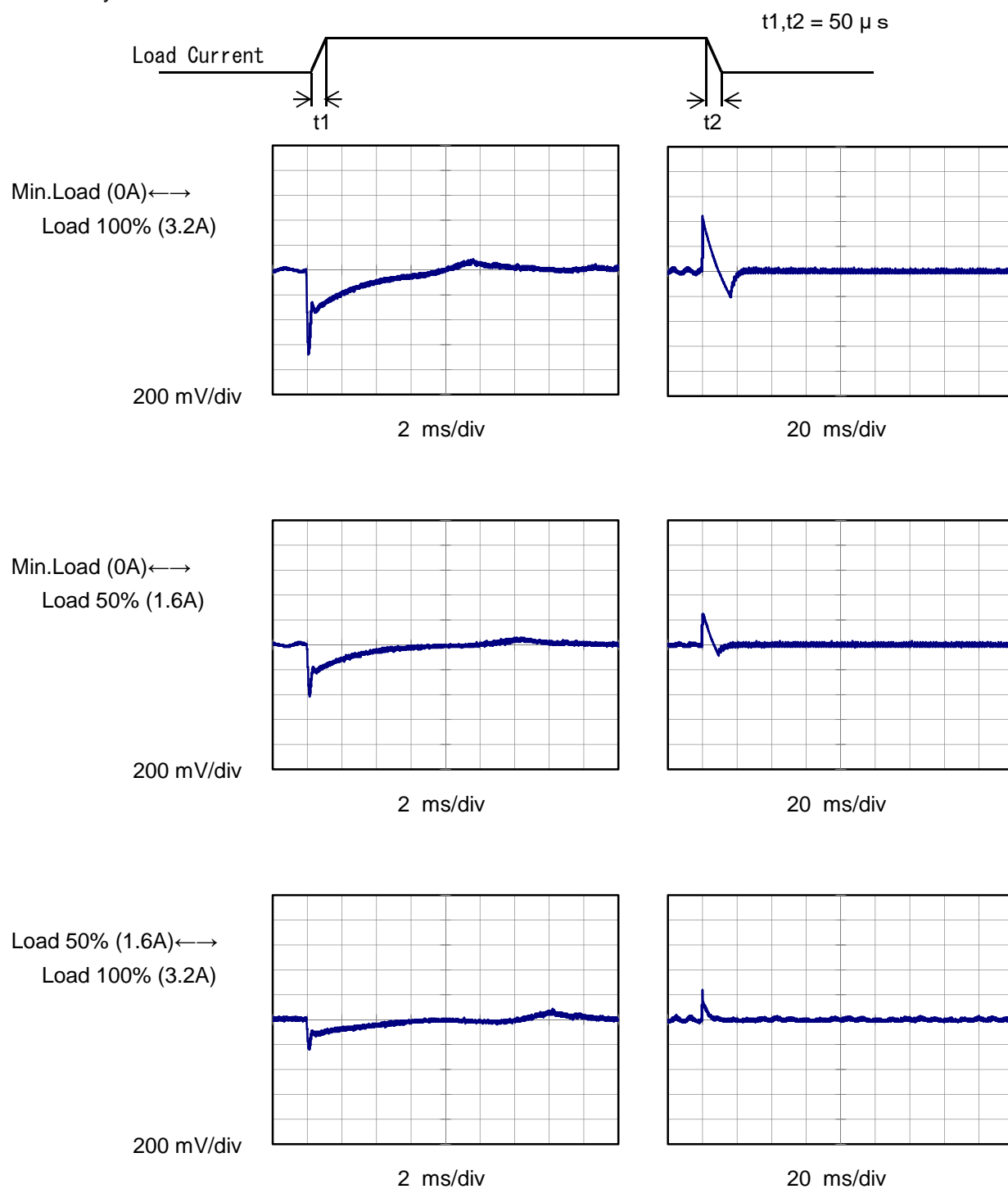


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COSEL

Model	LHA150F-48	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+48V3.2A		

Input Volt. 230 V
Cycle 1000 ms



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1.Graph			2.Values																																																																												
<div><div><div><div><div></div><div>△</div><div>Input Volt. 100V</div></div><div><div></div><div>○</div><div>Input Volt. 230V</div></div></div><div><table><thead><tr><th>Load Current [A]</th><th>Input Volt. 100 [V]</th><th>Input Volt. 230 [V]</th></tr></thead><tbody><tr><td>0.00</td><td>130</td><td>130</td></tr><tr><td>0.60</td><td>100</td><td>100</td></tr><tr><td>1.20</td><td>115</td><td>115</td></tr><tr><td>1.80</td><td>110</td><td>110</td></tr><tr><td>2.40</td><td>120</td><td>120</td></tr><tr><td>3.00</td><td>130</td><td>130</td></tr><tr><td>3.20</td><td>135</td><td>135</td></tr><tr><td>3.52</td><td>150</td><td>150</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></div><div><p>Measured by 20 MHz Oscilloscope.</p><p>Ripple-Noise is shown as p-p in the figure below.</p><p>Note: Slanted line shows the range of the rated load current.</p><div><div><div><div></div><div>T1: Due to AC Input Line</div></div><div><div></div><div>T2: Due to Switching</div></div></div><div><p>Ripple-Noise [mVp-p]</p></div></div><p>Fig. Complex Ripple Wave Form</p></div></div></div>			Load Current [A]	Input Volt. 100 [V]	Input Volt. 230 [V]	0.00	130	130	0.60	100	100	1.20	115	115	1.80	110	110	2.40	120	120	3.00	130	130	3.20	135	135	3.52	150	150	--	-	-	--	-	-	--	-	-	<table><thead><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 100 [V]</th><th>Input Volt. 230 [V]</th></tr></thead><tbody><tr><td>0.00</td><td>130</td><td>130</td></tr><tr><td>0.60</td><td>100</td><td>100</td></tr><tr><td>1.20</td><td>115</td><td>115</td></tr><tr><td>1.80</td><td>110</td><td>110</td></tr><tr><td>2.40</td><td>120</td><td>120</td></tr><tr><td>3.00</td><td>130</td><td>130</td></tr><tr><td>3.20</td><td>135</td><td>135</td></tr><tr><td>3.52</td><td>150</td><td>150</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-Noise [mV]		Input Volt. 100 [V]	Input Volt. 230 [V]	0.00	130	130	0.60	100	100	1.20	115	115	1.80	110	110	2.40	120	120	3.00	130	130	3.20	135	135	3.52	150	150	--	-	-	--	-	-	--	-	-
Load Current [A]	Input Volt. 100 [V]	Input Volt. 230 [V]																																																																													
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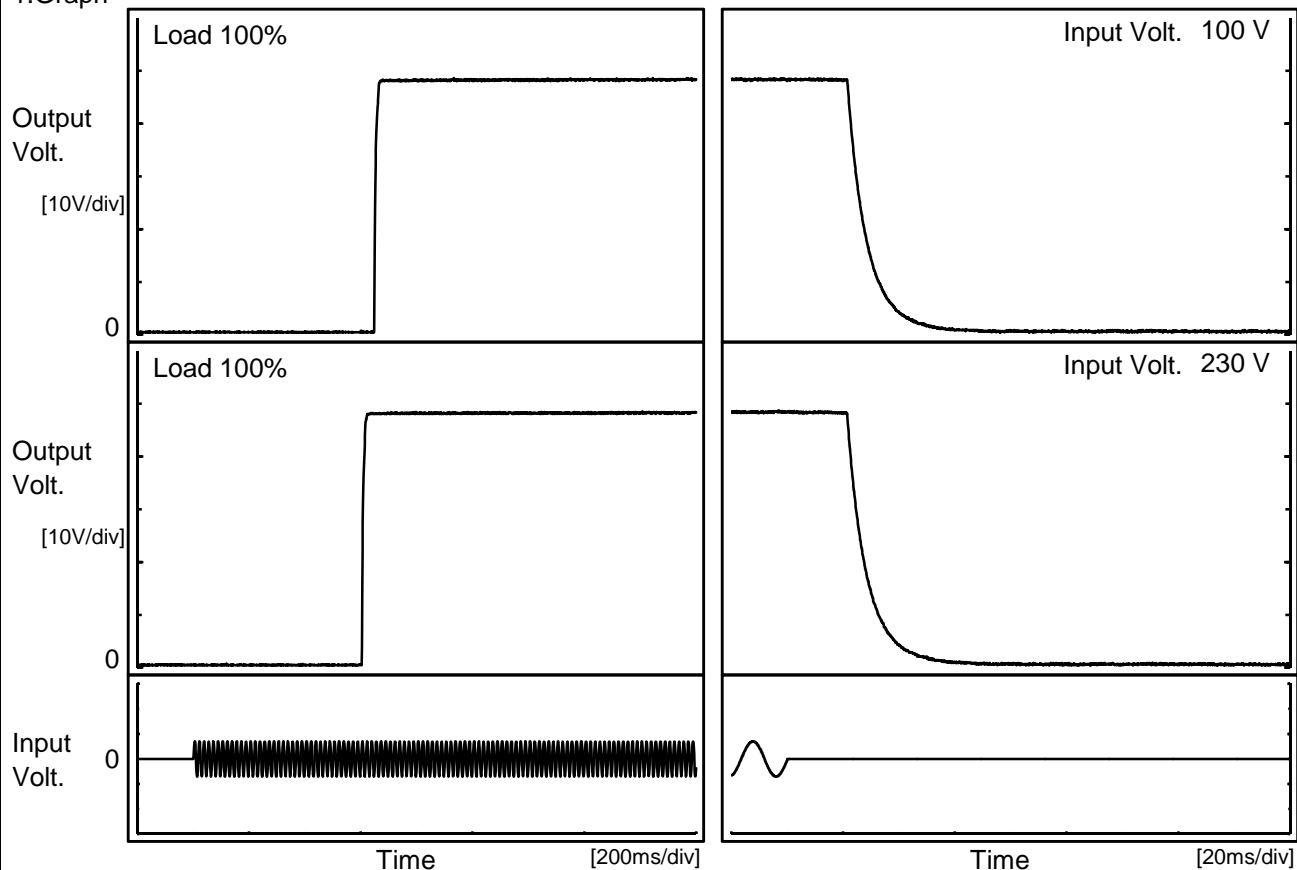


Model		LHA150F-48																																																			
Item		Ambient Temperature Drift																																																			
Object		+48V3.2A																																																			
1.Graph		<div><div><div><div><div></div></div><div></div></div><div>Input Volt. 100V</div></div><div><div><div><div></div></div><div></div></div><div>Input Volt. 200V</div></div><div><div><div><div></div></div><div></div></div><div>Input Volt. 230V</div></div></div> <div><div><div><div><div></div></div><div></div></div><div>Output Voltage [V]</div></div><div><div><div>Ambient Temperature [°C]</div><div>Load 100%</div></div></div><div><div>Note: Slanted line shows the range of the rated ambient temperature.</div></div></div>																																																			
2.Values		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>-20</td><td>48.504</td><td>48.505</td><td>48.505</td></tr><tr><td>-10</td><td>48.553</td><td>48.553</td><td>48.554</td></tr><tr><td>0</td><td>48.598</td><td>48.598</td><td>48.599</td></tr><tr><td>10</td><td>48.636</td><td>48.636</td><td>48.636</td></tr><tr><td>20</td><td>48.668</td><td>48.668</td><td>48.668</td></tr><tr><td>25</td><td>48.681</td><td>48.681</td><td>48.681</td></tr><tr><td>30</td><td>48.692</td><td>48.693</td><td>48.693</td></tr><tr><td>40</td><td>48.714</td><td>48.714</td><td>48.714</td></tr><tr><td>50</td><td>48.731</td><td>48.731</td><td>48.731</td></tr><tr><td>60</td><td>48.742</td><td>48.742</td><td>48.742</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>	Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-20	48.504	48.505	48.505	-10	48.553	48.553	48.554	0	48.598	48.598	48.599	10	48.636	48.636	48.636	20	48.668	48.668	48.668	25	48.681	48.681	48.681	30	48.692	48.693	48.693	40	48.714	48.714	48.714	50	48.731	48.731	48.731	60	48.742	48.742	48.742	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																				
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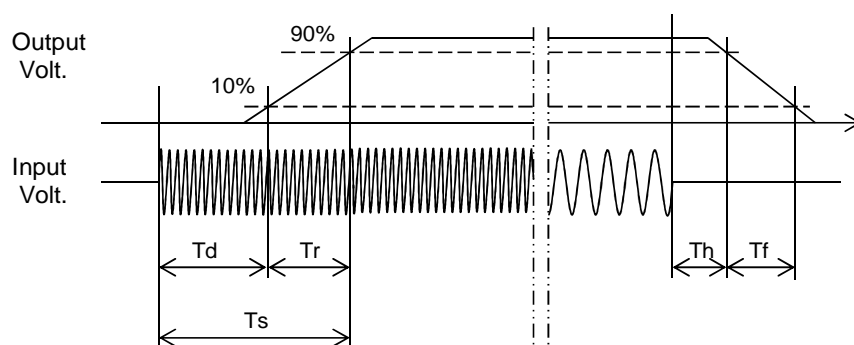
Model	LHA150F-48	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+48V3.2A		

1.Graph



2.Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		649.0	12.0	661.0	22.1	16.2
230 V		605.0	10.0	615.0	22.0	16.1





Model	LHA150F-48																																		
Item	Hold-Up Time	Temperature	25°C																																
		Testing Circuitry	Figure A																																
Object	+48V3.2A																																		
1.Graph		2.Values																																	
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <table><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>85</td><td>43</td><td>-</td></tr><tr><td>90</td><td>43</td><td>22</td></tr><tr><td>100</td><td>42</td><td>22</td></tr><tr><td>120</td><td>42</td><td>22</td></tr><tr><td>200</td><td>43</td><td>22</td></tr><tr><td>230</td><td>43</td><td>22</td></tr><tr><td>264</td><td>43</td><td>22</td></tr><tr><td>280</td><td>45</td><td>22</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	43	-	90	43	22	100	42	22	120	42	22	200	43	22	230	43	22	264	43	22	280	45	22	--	-	-		
Input Voltage [V]	Hold-Up Time [ms]																																		
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264	43	22																																	
280	45	22																																	
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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>																																			



Model	LHA150F-48		
Item	Instantaneous Interruption Compensation	Temperature	25°C
Object	+48V3.2A	Testing Circuitry	Figure A
1.Graph		2.Values	
<div><div><div><div><div></div><div>△</div></div><div>Input Volt. 100V</div></div><div><div><div></div><div>□</div></div><div>Input Volt. 200V</div></div><div><div><div></div><div>○</div></div><div>Input Volt. 230V</div></div></div><div><div><div>Instantaneous Compensation Time 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Model		LHA150F-48
Item		Minimum Input Voltage for Regulated Output Voltage
Object		+48V3.2A

1.Graph



Model	LHA150F-48																																																	
Item	Overcurrent Protection	Temperature	25°C																																															
Object	+48V3.2A	Testing Circuitry	Figure A																																															
1.Graph		2.Values																																																
<div><div></div>Input Volt. 100V</div> <div><div></div>Input Volt. 230V</div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Overcurrent protection is Hiccup mode.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="2">Load Current [A]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>48</td><td>5.15</td><td>5.15</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. 100[V]	Input Volt. 230[V]	48	5.15	5.15	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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Model		LHA150F-48
Item		Overvoltage Protection
Object		+48V3.2A

1.Graph

—△—

Input Volt. 100V

---□---

Input Volt. 230V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

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

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 100[V]	Input Volt. 230[V]
-20	63.41	63.41
-10	62.94	62.94
0	63.35	63.35
10	62.70	62.70
20	62.65	62.65
25	62.99	62.99
30	62.94	62.94
40	62.70	62.70
50	63.23	63.23
60	63.94	63.94
--	-	-

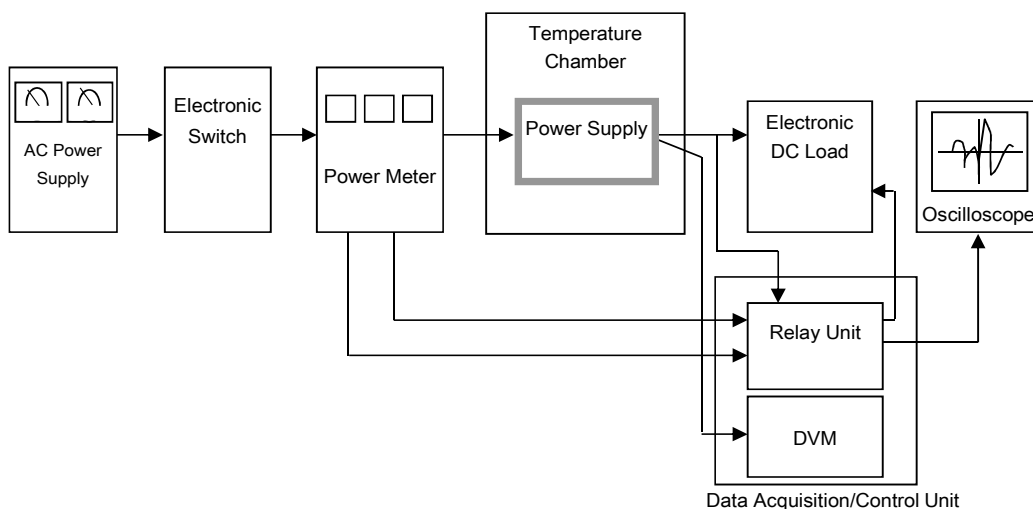


Figure A

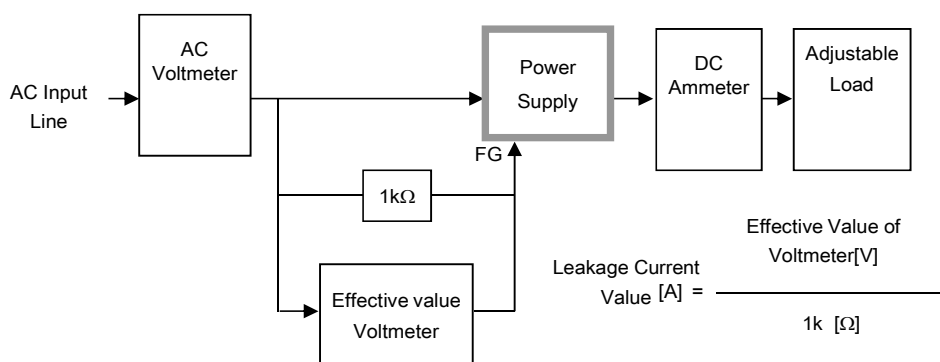


Figure B-1 (DEN-AN)

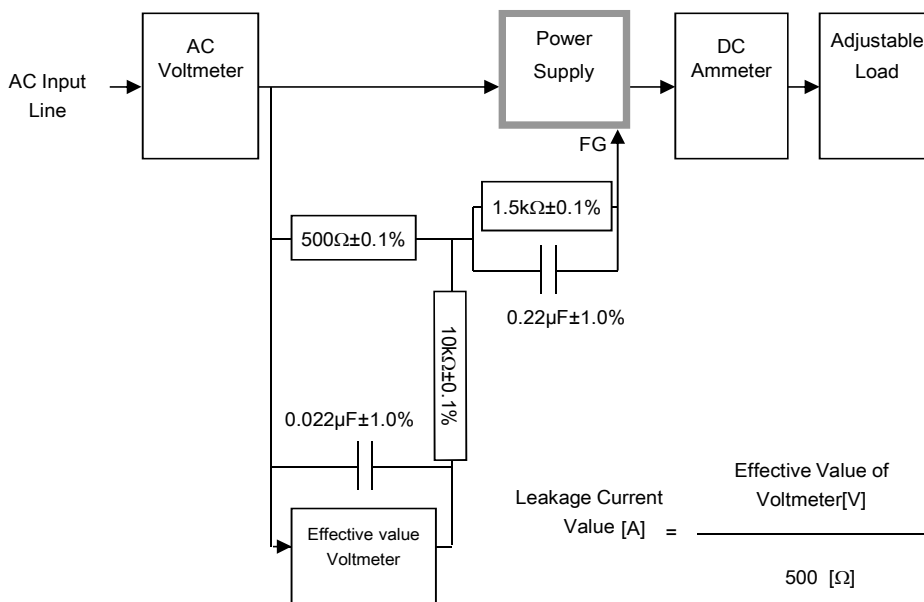


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

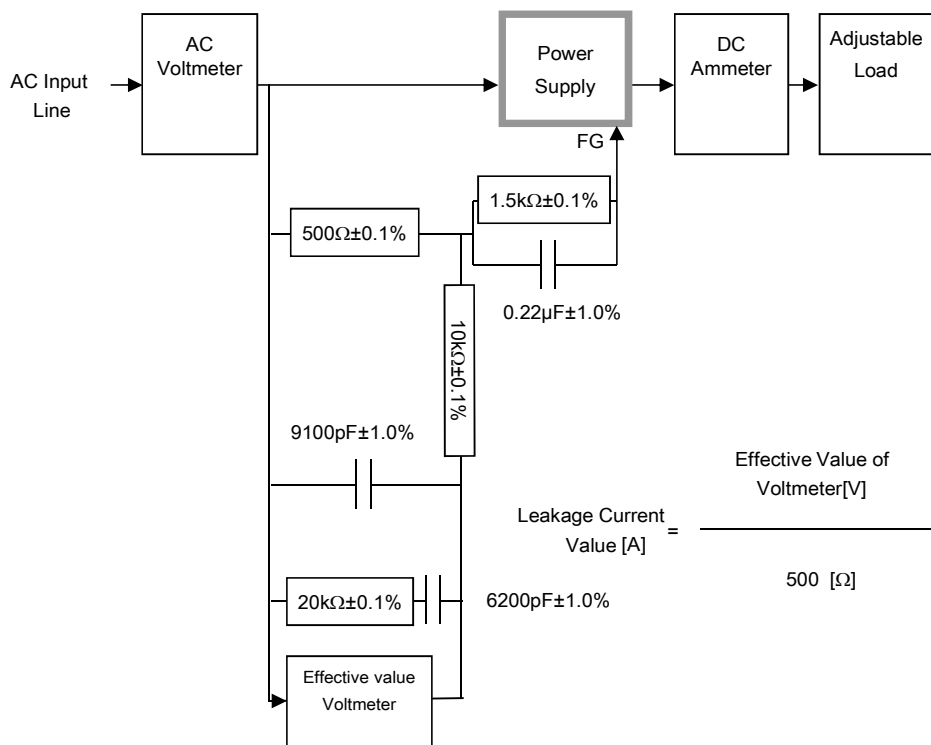


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

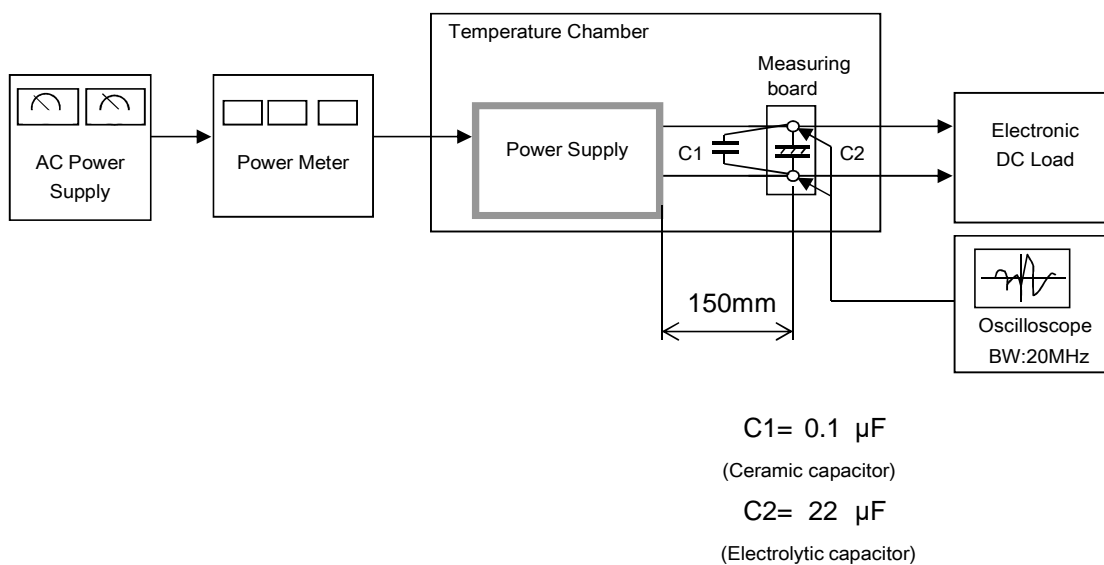


Figure C