

TEST DATA OF LHA50F-12

Regulated DC Power Supply
September 9, 2019

Approved by : Junya Kaneda
Junya Kaneda Design Manager

Prepared by : Yasushi Fukumura
Yasushi Fukumura Design Engineer

COSEL CO.,LTD.

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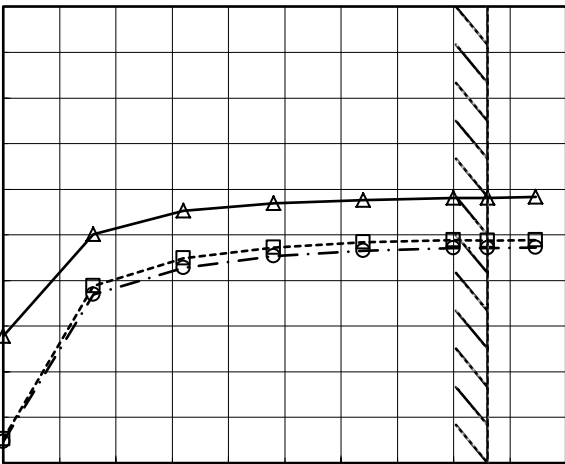
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Model		LHA50F-12		Temperature 25°C																																																				
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Object		_____																																																						
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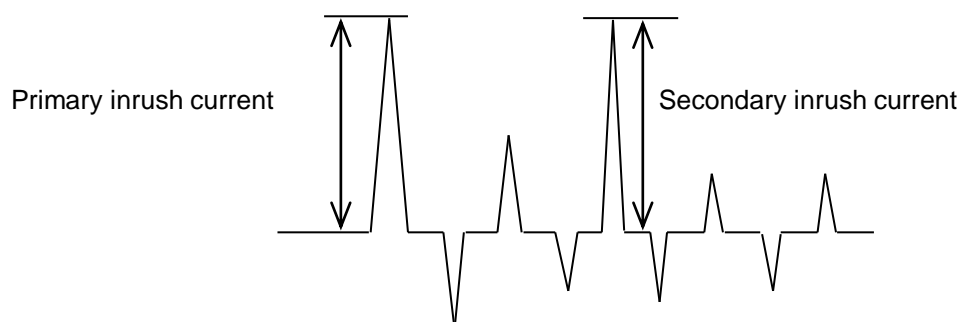
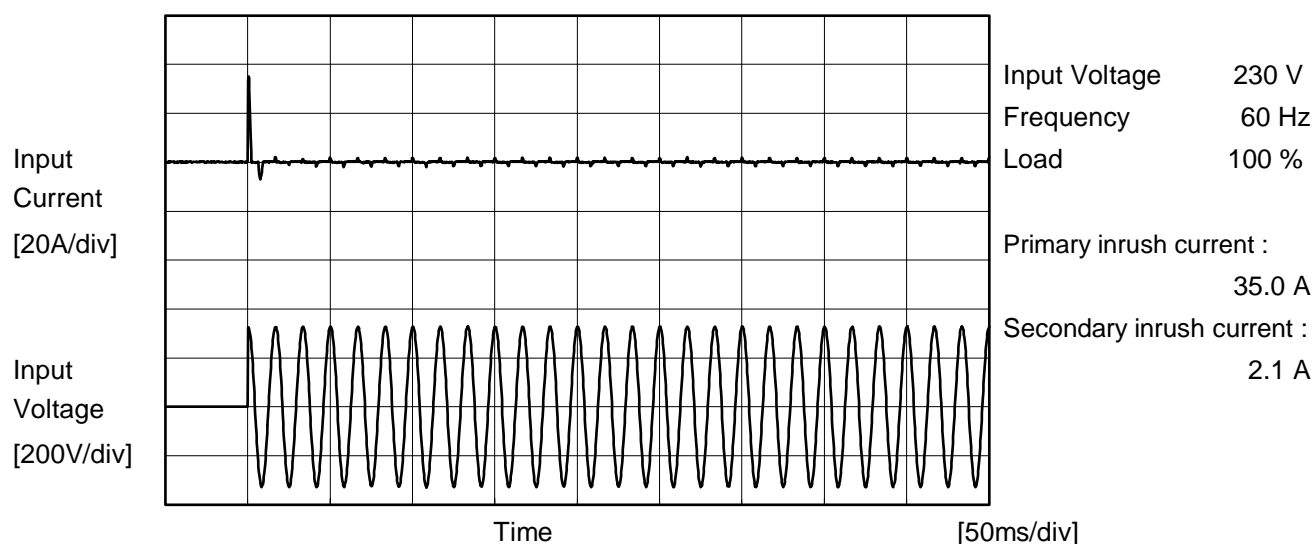
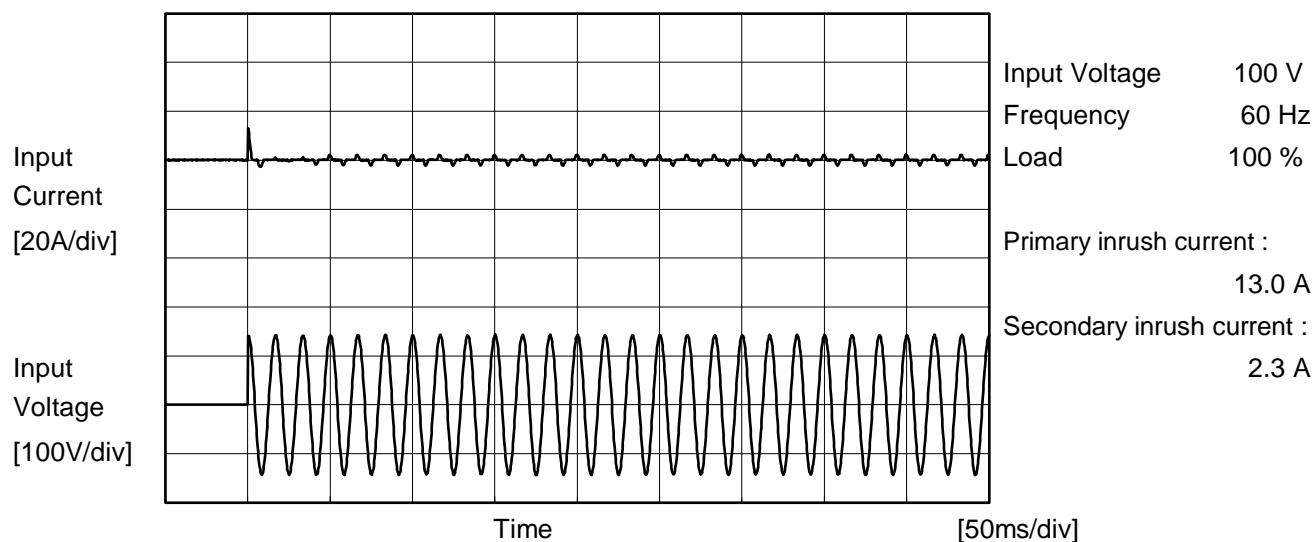
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Model	LHA50F-12	Temperature 25°C Testing Circuitry Figure A	
Item	Inrush Current		
Object	_____		





		Temperature 25°C Testing Circuitry Figure B
Model	LHA50F-12	
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	0.08	0.21	0.22	Operation
		One of phases	0.16	0.42	0.45	Stand by
IEC62368-1	Figure B-2	Both phases	0.11	0.26	0.26	Operation
		One of phases	0.16	0.38	0.40	Stand by
	Figure B-3	Both phases	0.11	0.26	0.27	Operation
		One of phases	0.16	0.38	0.40	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.



Model		LHA50F-12	Temperature25°C Testing CircuitryFigure A																																
Item		Line Regulation																																	
Object		+12V4.3A																																	
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		<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="2">Output Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>85</td><td>12.005</td><td>-</td></tr><tr><td>90</td><td>12.005</td><td>12.004</td></tr><tr><td>100</td><td>12.005</td><td>12.004</td></tr><tr><td>120</td><td>12.005</td><td>12.004</td></tr><tr><td>200</td><td>12.005</td><td>12.004</td></tr><tr><td>230</td><td>12.005</td><td>12.004</td></tr><tr><td>264</td><td>12.005</td><td>12.004</td></tr><tr><td>280</td><td>12.005</td><td>12.004</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>	Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	85	12.005	-	90	12.005	12.004	100	12.005	12.004	120	12.005	12.004	200	12.005	12.004	230	12.005	12.004	264	12.005	12.004	280	12.005	12.004	--	-	-	
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Model	LHA50F-12	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+12V4.3A	

Input Volt. 230 V
Cycle 1000 ms

$t1, t2 = 50 \mu s$

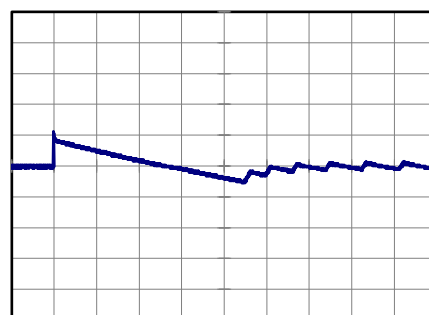
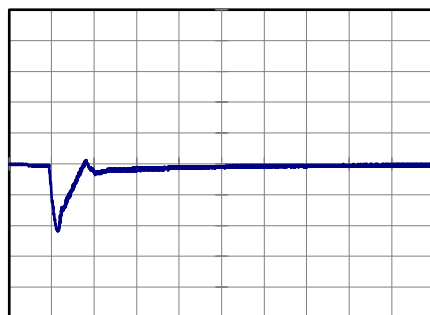
Load Current



Min.Load (0A) \longleftrightarrow
Load 100% (4.3A)

200 mV/div

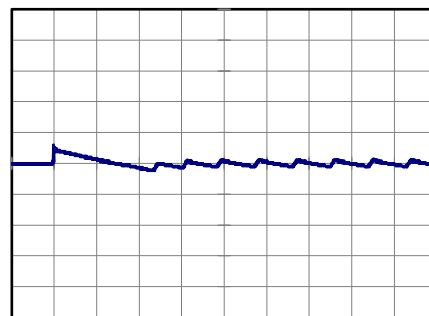
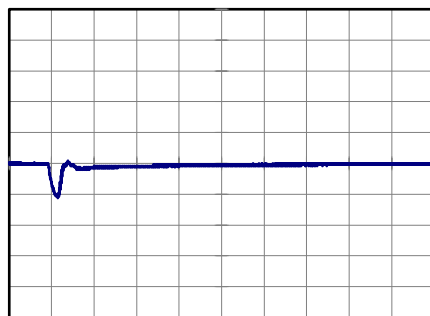
800 μs /div



Min.Load (0A) \longleftrightarrow
Load 50% (2.15A)

200 mV/div

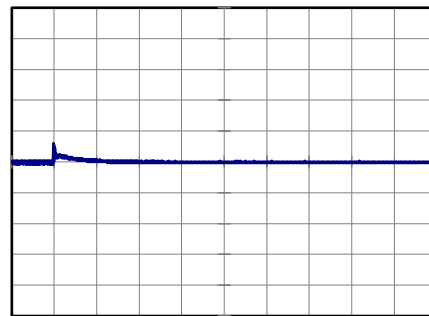
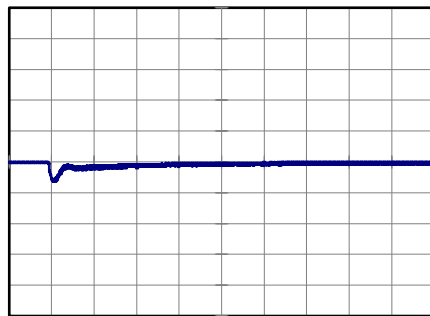
800 μs /div



Load 50% (2.15A) \longleftrightarrow
Load 100% (4.3A)

200 mV/div

800 μs /div



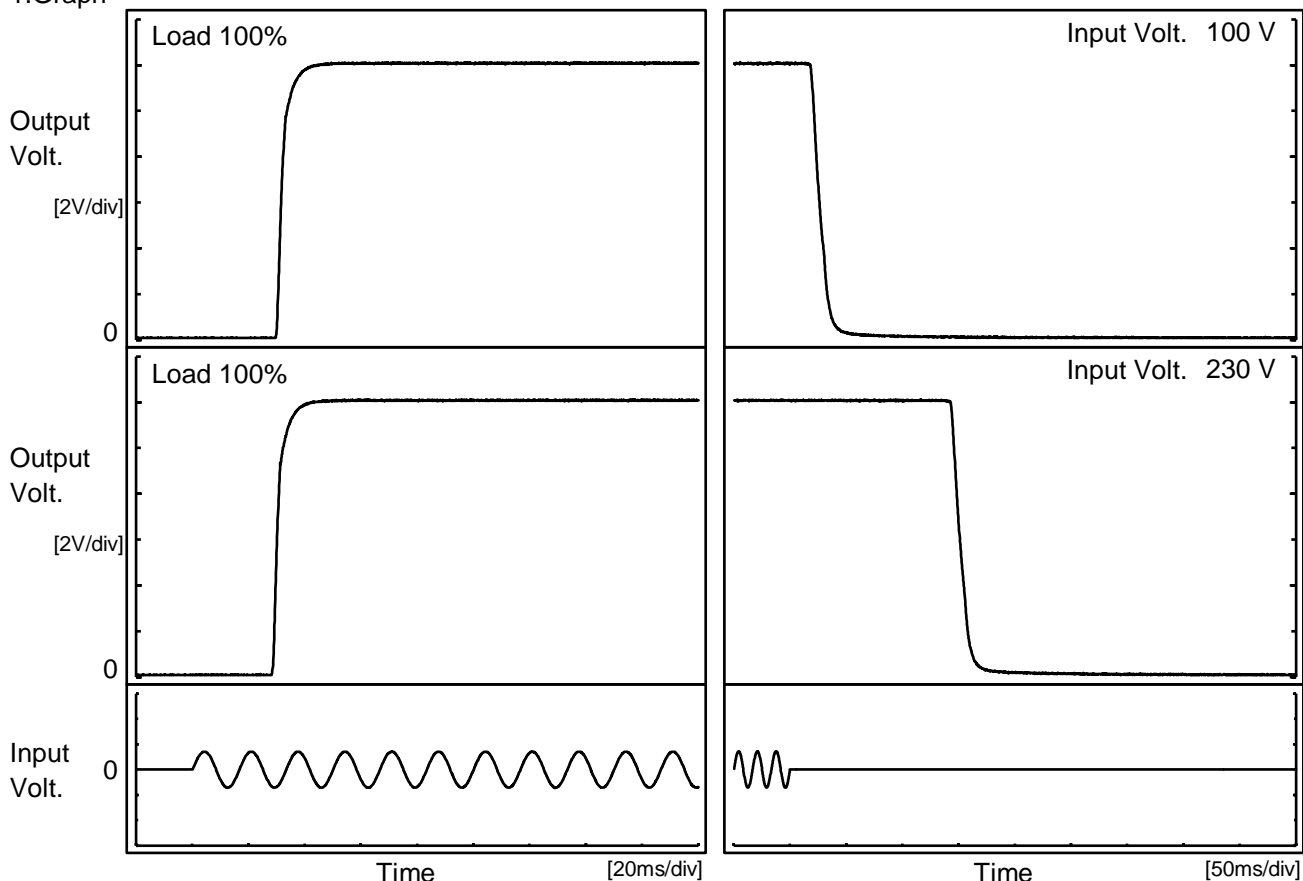
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<div><div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 200V</div></div><div><div>---○---</div><div>Input Volt. 230V</div></div></div><p>Output Voltage [V]</p><p>Ambient Temperature [°C]</p><p>Load 100%</p><p>Note: Slanted line shows the range of the rated ambient temperature.</p></div>		<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>11.988</td><td>11.988</td><td>11.988</td></tr><tr><td>-15</td><td>11.991</td><td>11.991</td><td>11.991</td></tr><tr><td>-10</td><td>11.994</td><td>11.994</td><td>11.994</td></tr><tr><td>0</td><td>11.998</td><td>11.998</td><td>11.998</td></tr><tr><td>25</td><td>12.002</td><td>12.002</td><td>12.002</td></tr><tr><td>40</td><td>12.001</td><td>12.001</td><td>12.001</td></tr><tr><td>50</td><td>12.000</td><td>12.000</td><td>12.000</td></tr><tr><td>60</td><td>11.997</td><td>11.997</td><td>11.997</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></table>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-20	11.988	11.988	11.988	-15	11.991	11.991	11.991	-10	11.994	11.994	11.994	0	11.998	11.998	11.998	25	12.002	12.002	12.002	40	12.001	12.001	12.001	50	12.000	12.000	12.000	60	11.997	11.997	11.997	--	-	-	-	--	-	-	-	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
-20	11.988	11.988	11.988																																																			
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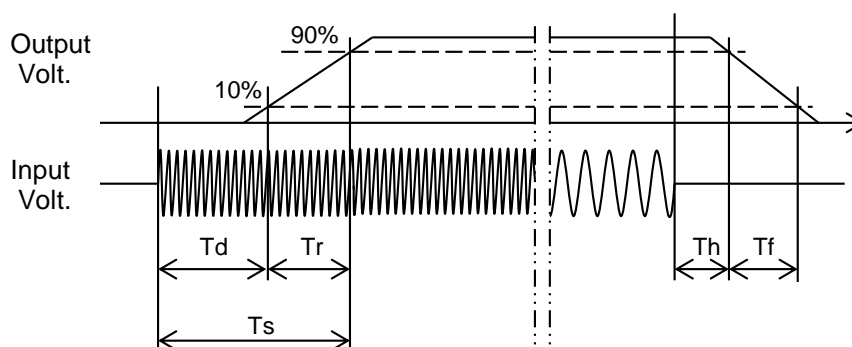
Model	LHA50F-12		
Item	Rise and Fall Time	Temperature	25°C
Object	+12V4.3A	Testing Circuitry	Figure A

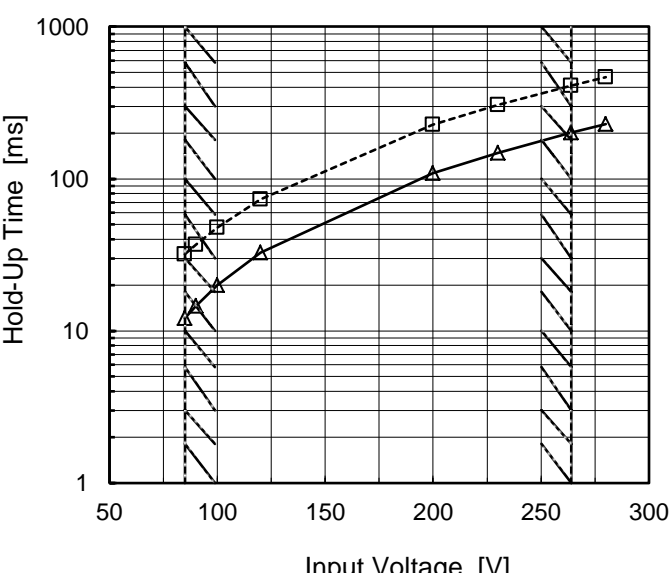
1.Graph



2.Values

		[ms]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		30.4	5.1	35.5	20.3	15.3
230 V		29.0	5.1	34.1	144.8	15.5



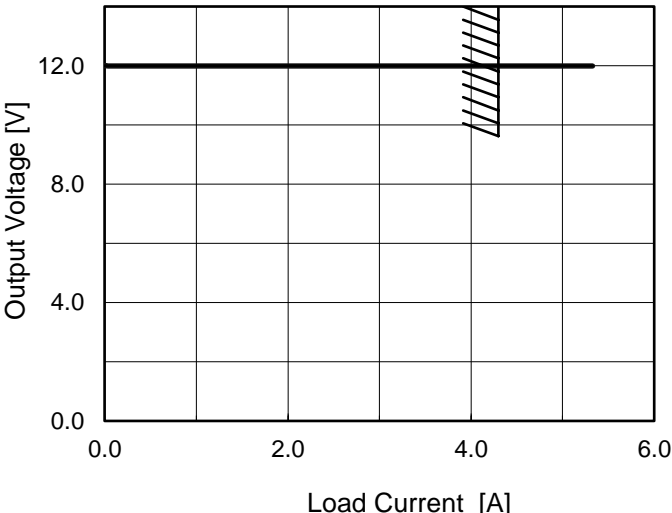
Model		LHA50F-12																																	
Item		Hold-Up Time																																	
Object		+12V4.3A																																	
1.Graph		2.Values																																	
<div><div><div>---</div><div>□</div><div>---</div></div><div>Load 50%</div></div> <div><div>---</div><div>△</div><div>---</div></div> <div>Load 100%</div> <div></div> <div><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></div>		<table><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><tr><td>85</td><td>32</td><td>-</td></tr><tr><td>90</td><td>37</td><td>15</td></tr><tr><td>100</td><td>48</td><td>20</td></tr><tr><td>120</td><td>73</td><td>33</td></tr><tr><td>200</td><td>227</td><td>109</td></tr><tr><td>230</td><td>305</td><td>148</td></tr><tr><td>264</td><td>410</td><td>202</td></tr><tr><td>280</td><td>468</td><td>229</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	32	-	90	37	15	100	48	20	120	73	33	200	227	109	230	305	148	264	410	202	280	468	229	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																		
	Load 50%	Load 100%																																	
85	32	-																																	
90	37	15																																	
100	48	20																																	
120	73	33																																	
200	227	109																																	
230	305	148																																	
264	410	202																																	
280	468	229																																	
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<div>LUCEL</div>																																																						
Model	LHA50F-12																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+12V4.3A	Testing Circuitry	Figure A																																																			
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>200V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <div><div><div>Instantaneous Compensation Time [ms]</div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div>0.0</div><div>1.0</div><div>2.0</div><div>3.0</div><div>4.0</div><div>5.0</div></div><div><div>Load Current [A]</div></div></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">Time [ms]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.00</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.80</td><td>135</td><td>597</td><td>791</td></tr><tr><td>1.60</td><td>67</td><td>306</td><td>413</td></tr><tr><td>2.40</td><td>43</td><td>204</td><td>274</td></tr><tr><td>3.20</td><td>30</td><td>150</td><td>204</td></tr><tr><td>4.00</td><td>23</td><td>118</td><td>161</td></tr><tr><td>4.30</td><td>21</td><td>109</td><td>149</td></tr><tr><td>4.73</td><td>14</td><td>98</td><td>134</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></table>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	0.80	135	597	791	1.60	67	306	413	2.40	43	204	274	3.20	30	150	204	4.00	23	118	161	4.30	21	109	149	4.73	14	98	134	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
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Model		LHA50F-12
Item		Minimum Input Voltage for Regulated Output Voltage
Object		+12V4.3A

1.Graph

<

Model		LHA50F-12																																										
Item		Overcurrent Protection																																										
Object		+12V4.3A																																										
1.Graph		2.Values																																										
<div><div><div></div><div>Input Volt. 100V</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>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>12.0</td><td>5.33</td><td>5.33</td></tr><tr><td>11.4</td><td>-</td><td>-</td></tr><tr><td>10.8</td><td>-</td><td>-</td></tr><tr><td>9.6</td><td>-</td><td>-</td></tr><tr><td>8.4</td><td>-</td><td>-</td></tr><tr><td>7.2</td><td>-</td><td>-</td></tr><tr><td>6.0</td><td>-</td><td>-</td></tr><tr><td>4.8</td><td>-</td><td>-</td></tr><tr><td>3.6</td><td>-</td><td>-</td></tr><tr><td>2.4</td><td>-</td><td>-</td></tr><tr><td>1.2</td><td>-</td><td>-</td></tr><tr><td>0.0</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 230[V]	12.0	5.33	5.33	11.4	-	-	10.8	-	-	9.6	-	-	8.4	-	-	7.2	-	-	6.0	-	-	4.8	-	-	3.6	-	-	2.4	-	-	1.2	-	-	0.0	-	-
Output Voltage [V]	Load Current [A]																																											
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12.0	5.33	5.33																																										
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Model		LHA50F-12
Item		Overvoltage Protection
Object		+12V4.3A
1.Graph		2.Values

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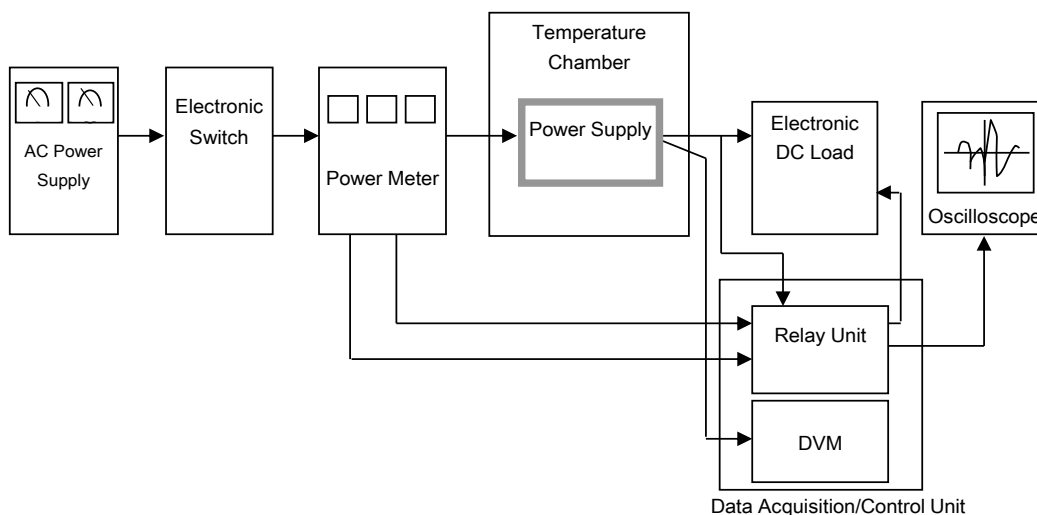


Figure A

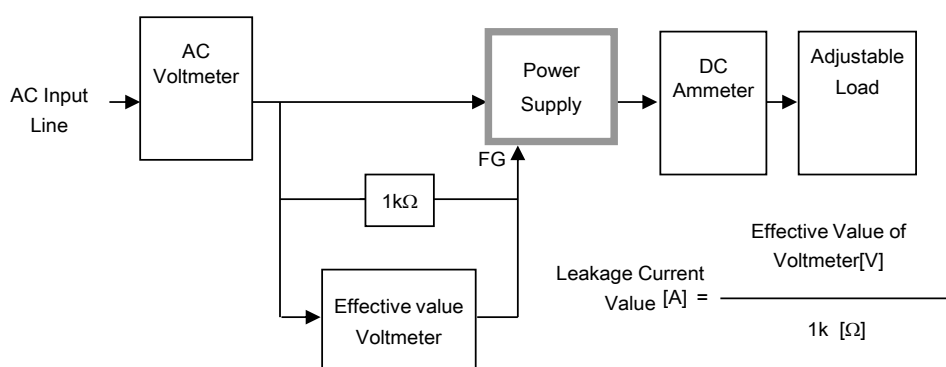


Figure B-1 (DEN-AN)

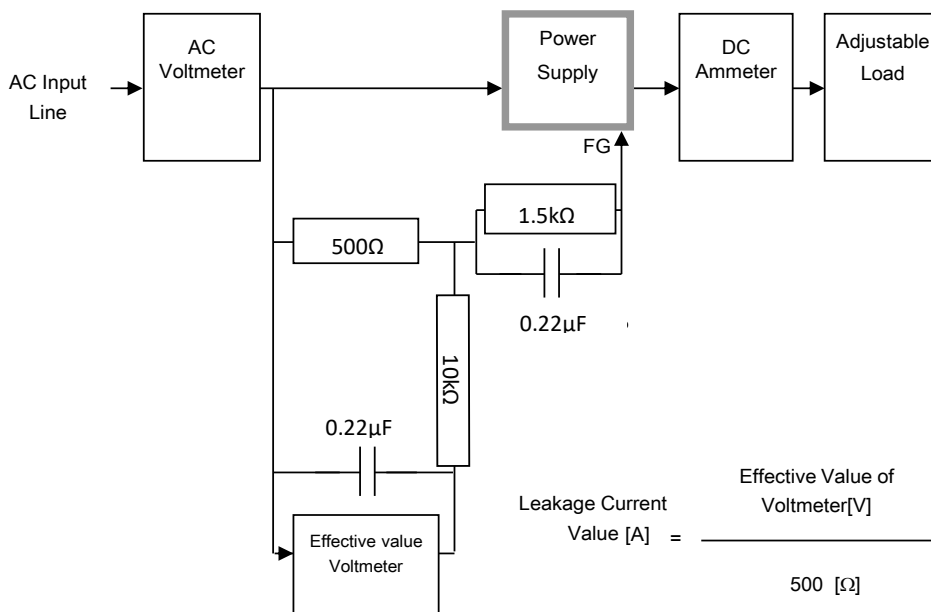


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

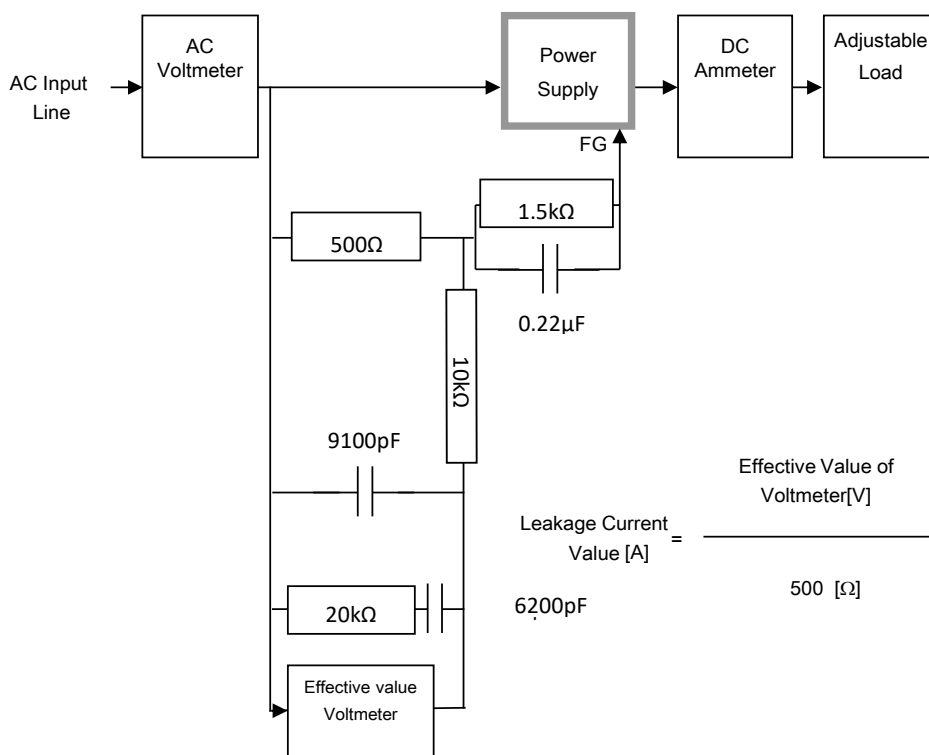


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

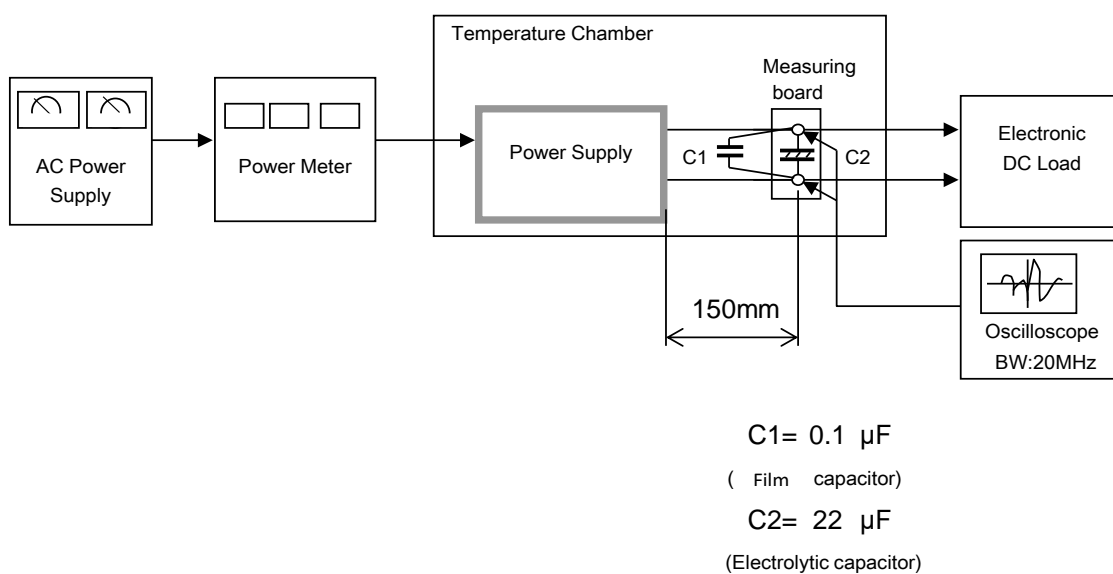


Figure C