

TEST DATA OF LHA50F-36

Regulated DC Power Supply
September 13, 2019

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COSEL CO.,LTD.

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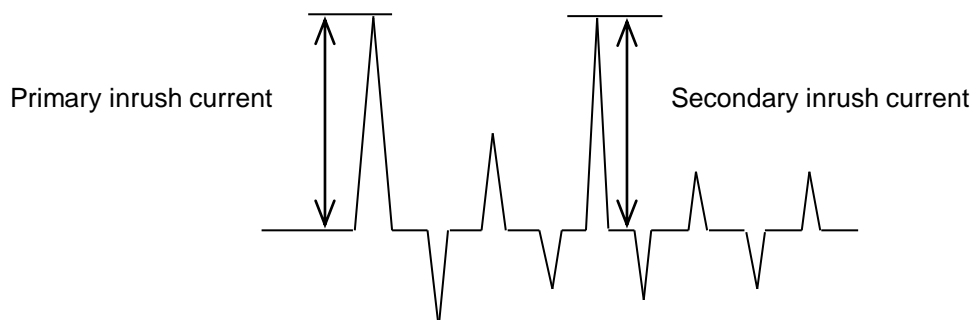
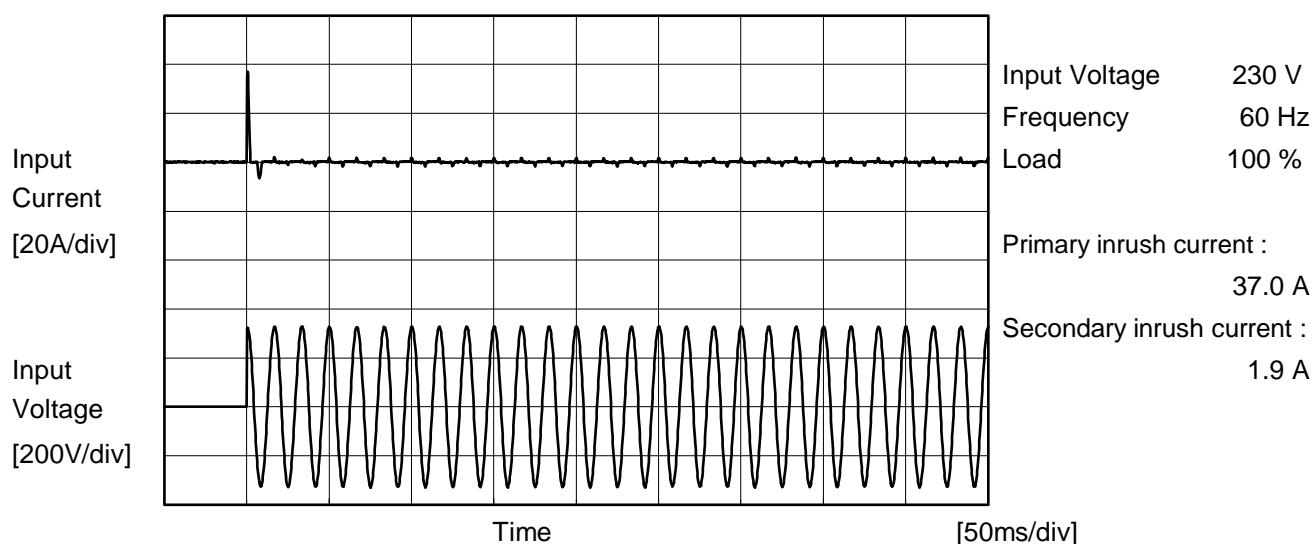
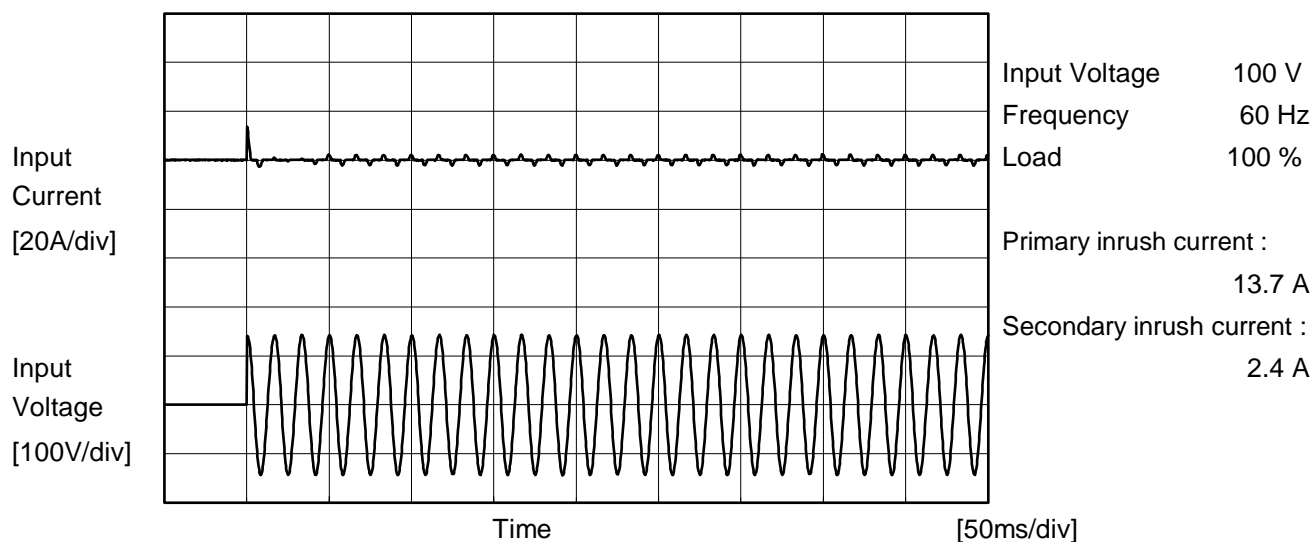
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COSEL

Model	LHA50F-36	Temperature 25°C Testing Circuitry Figure A	
Item	Inrush Current		
Object			



		Temperature 25°C Testing Circuitry Figure B
Model	LHA50F-36	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

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.

<div>LUCEL</div>			
Model	LHA50F-36		
Item	Line Regulation	Temperature	25°C
Object	+36V1.4A	Testing Circuitry	Figure A
1.Graph		2.Values	
<div><div><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><div><div>Output Voltage 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Model		LHA50F-36	Temperature25°C																																																				
Item		Load Regulation	Testing CircuitryFigure A																																																				
Object		+36V1.4A																																																					
1.Graph		<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>Output Voltage [V]</div><div>Load Current [A]</div></div></div>	2.Values																																																				
		<table><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. 200[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>0.00</td><td>36.349</td><td>36.350</td><td>36.350</td></tr><tr><td>0.30</td><td>36.347</td><td>36.348</td><td>36.349</td></tr><tr><td>0.60</td><td>36.347</td><td>36.348</td><td>36.348</td></tr><tr><td>0.90</td><td>36.346</td><td>36.347</td><td>36.348</td></tr><tr><td>1.00</td><td>36.346</td><td>36.347</td><td>36.347</td></tr><tr><td>1.40</td><td>36.345</td><td>36.346</td><td>36.347</td></tr><tr><td>1.54</td><td>36.345</td><td>36.346</td><td>36.347</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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>			Load Current [A]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	36.349	36.350	36.350	0.30	36.347	36.348	36.349	0.60	36.347	36.348	36.348	0.90	36.346	36.347	36.348	1.00	36.346	36.347	36.347	1.40	36.345	36.346	36.347	1.54	36.345	36.346	36.347	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Note: Slanted line shows the range of the rated load current.																																																							

Model	LHA50F-36	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+36V1.4A	

Input Volt. 230 V
Cycle 1000 ms

$t_1, t_2 = 50 \mu s$

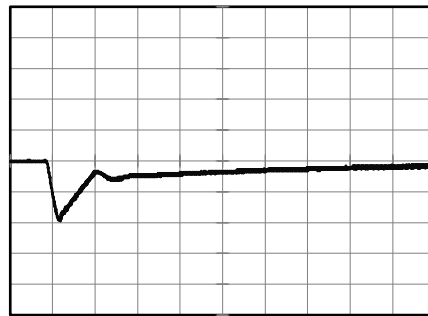
Load Current



Min. Load (0A) \longleftrightarrow
Load 100% (1.4A)

200 mV/div

800 μs /div

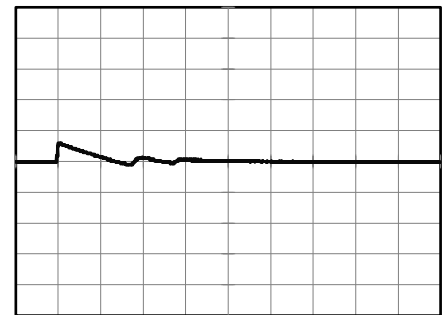
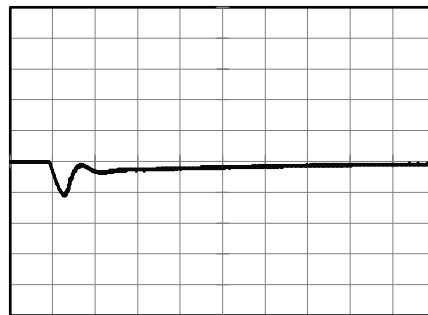


4 ms/div

Min. Load (0A) \longleftrightarrow
Load 50% (0.7A)

200 mV/div

800 μs /div

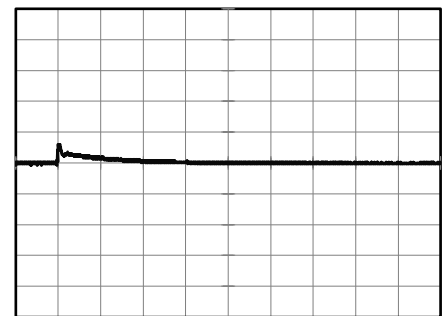
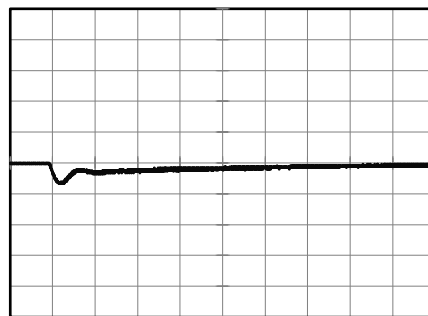


4 ms/div

Load 50% (0.7A) \longleftrightarrow
Load 100% (1.4A)

200 mV/div

800 μs /div

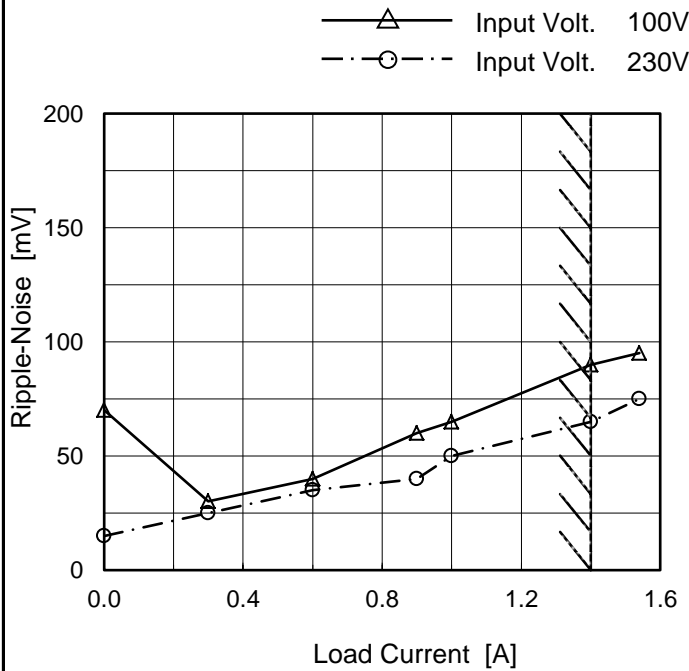


4 ms/div

Model	LHA50F-36
Item	Ripple-Noise(by Load Current)
Object	+36V1.4A

Temperature 25°C
Testing Circuitry Figure C

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. 100 [V]	Input Volt. 230 [V]
0.00	70	15
0.30	30	25
0.60	40	35
0.90	60	40
1.00	65	50
1.40	90	65
1.54	95	75
--	-	-
--	-	-
--	-	-
--	-	-

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

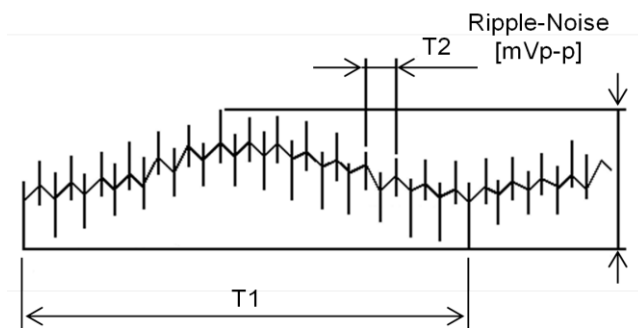


Fig. Complex Ripple Wave Form

Model		LHA50F-36
Item		Ambient Temperature Drift
Object		+36V1.4A

1.Graph

△

—

Input Volt. 100V

□

Input Volt. 200V

○

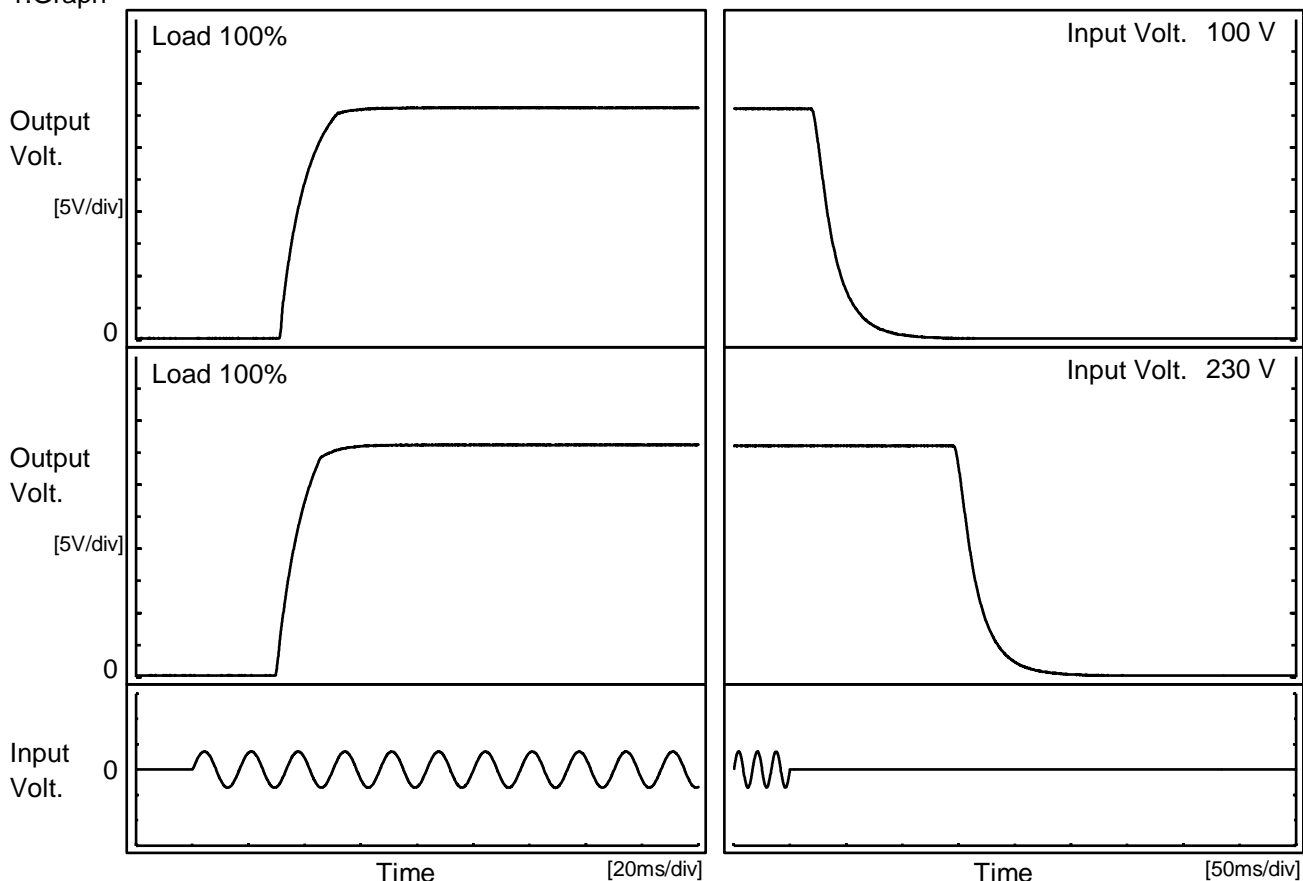
- · -

Input Volt. 230V

Output Voltage [V]

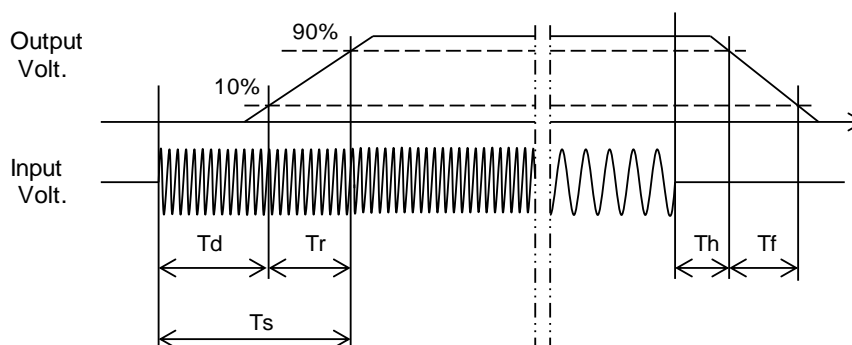
Model	LHA50F-36		
Item	Rise and Fall Time	Temperature	25°C
Object	+36V1.4A	Testing Circuitry	Figure A

1.Graph



2.Values

		[ms]				
Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		31.9	15.5	47.4	23.5	39.8
230 V		30.7	13.4	44.1	150.0	40.0



Model		LHA50F-36	Temperature 25°C Testing Circuitry Figure A																															
Item		Hold-Up Time																																
Object		+36V1.4A																																
1.Graph			2.Values																															
<div><div><div><div><div></div><div></div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>Load 50%</div><div><div><div><div></div><div></div></div><div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>Load 100%</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>34</td><td>-</td></tr><tr><td>90</td><td>39</td><td>16</td></tr><tr><td>100</td><td>50</td><td>22</td></tr><tr><td>120</td><td>75</td><td>35</td></tr><tr><td>200</td><td>229</td><td>112</td></tr><tr><td>230</td><td>308</td><td>152</td></tr><tr><td>264</td><td>413</td><td>207</td></tr><tr><td>280</td><td>470</td><td>235</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>				Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	34	-	90	39	16	100	50	22	120	75	35	200	229	112	230	308	152	264	413	207	280	470	235	--	-
Input Voltage [V]	Hold-Up Time [ms]																																	
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230	308	152																																
264	413	207																																
280	470	235																																
--	-	-																																
<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>																																		

Hold-Up Time [ms]

1000

100

10

1

50

100

150

200

250

300

Input Voltage [V]

Model		LHA50F-36	Temperature25°C																																																				
Item		Instantaneous Interruption Compensation	Testing CircuitryFigure A																																																				
Object		+36V1.4A																																																					
1.Graph		<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>Instantaneous Compensation Time [ms]</p> <p>Load Current [A]</p>	2.Values																																																				
		<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>0.30</td><td>122</td><td>524</td><td>705</td></tr><tr><td>0.60</td><td>60</td><td>268</td><td>360</td></tr><tr><td>0.90</td><td>39</td><td>178</td><td>240</td></tr><tr><td>1.00</td><td>34</td><td>159</td><td>216</td></tr><tr><td>1.40</td><td>22</td><td>113</td><td>154</td></tr><tr><td>1.54</td><td>20</td><td>101</td><td>137</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><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	-	-	-	0.30	122	524	705	0.60	60	268	360	0.90	39	178	240	1.00	34	159	216	1.40	22	113	154	1.54	20	101	137	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-		
Load Current [A]	Time [ms]																																																						
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Model	LHA50F-36																																														
Item	Overcurrent Protection	Temperature	25°C																																												
Object	+36V1.4A	Testing Circuitry	Figure A																																												
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<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>36.0</td><td>1.69</td><td>1.66</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]	36.0	1.69	1.66	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
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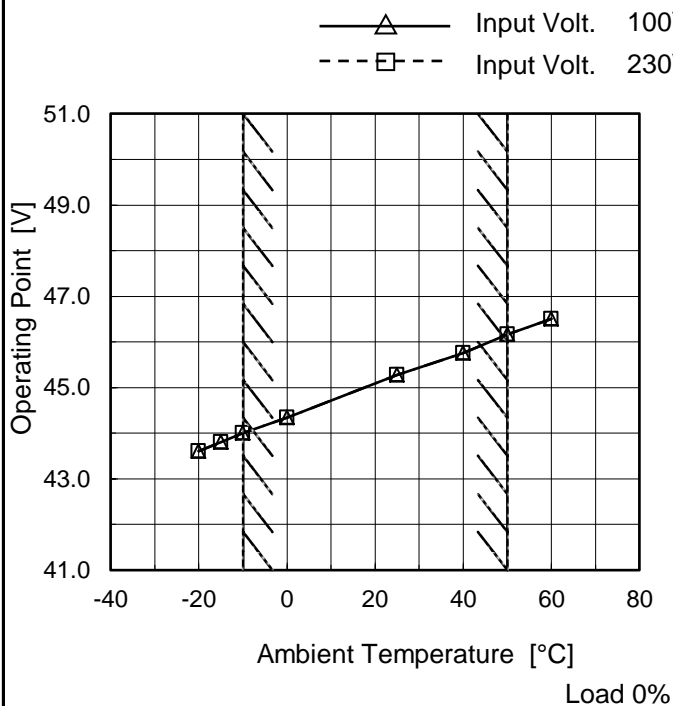
Model LHA50F-36

Item Overvoltage Protection

Object +36V1.4A

Testing Circuitry Figure A

1. Graph



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	43.60	43.60
-15	43.80	43.80
-10	44.00	44.00
0	44.34	44.34
25	45.28	45.28
40	45.76	45.76
50	46.16	46.16
60	46.50	46.50
--	-	-
--	-	-
--	-	-

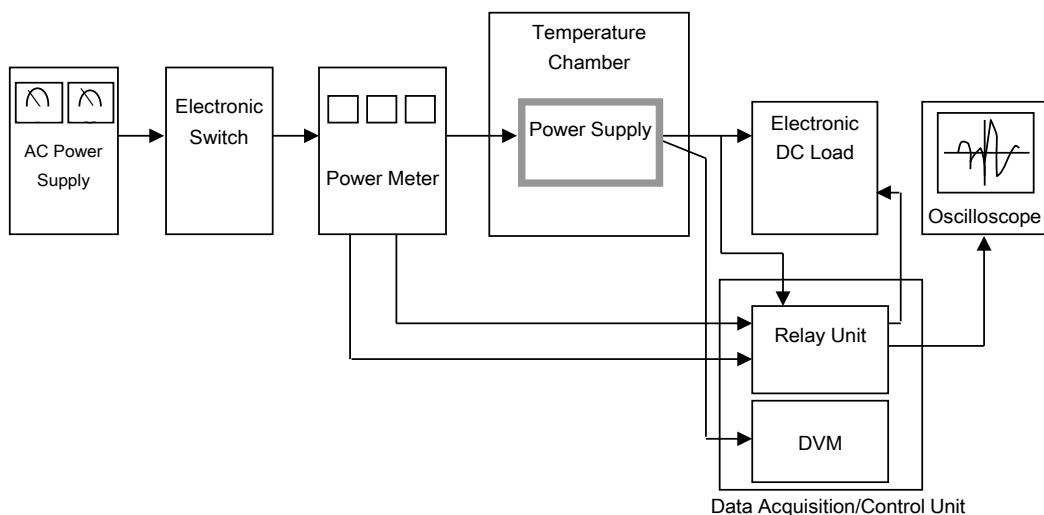


Figure A

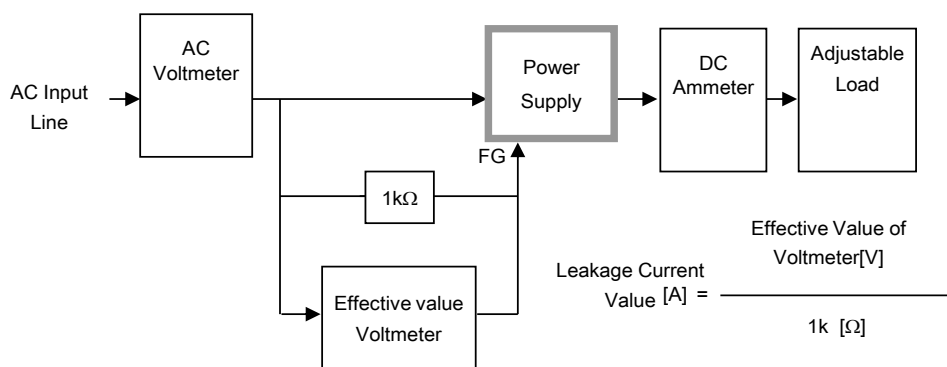


Figure B-1 (DEN-AN)

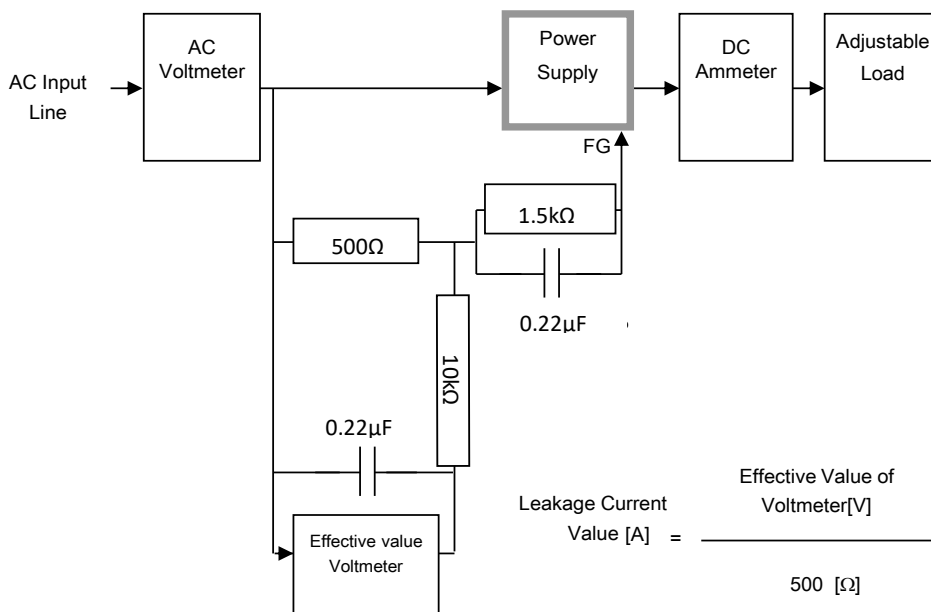


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

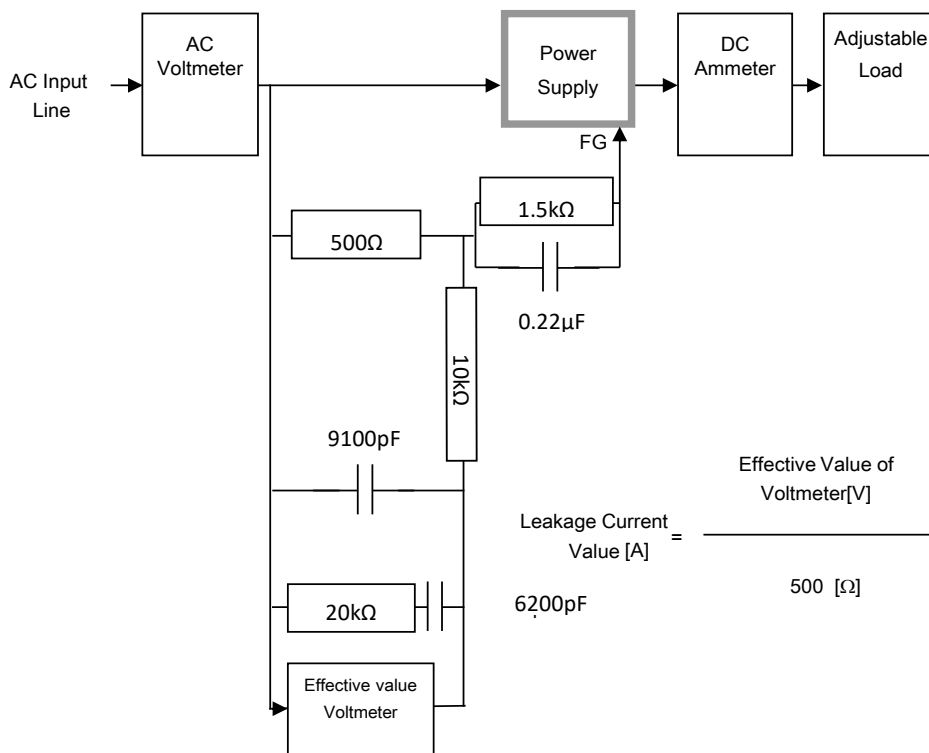


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

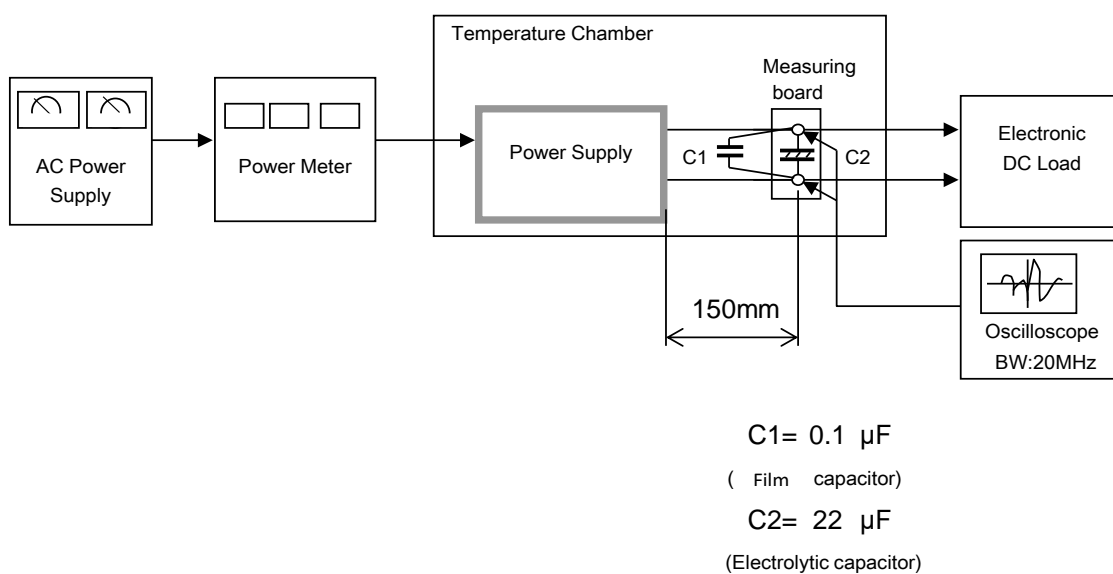


Figure C