

TEST DATA OF LHA10F-24

Regulated DC Power Supply
February 2, 2022

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Design Manager

Prepared by : Naofumi Nakada
Design Engineer

COSEL CO.,LTD.

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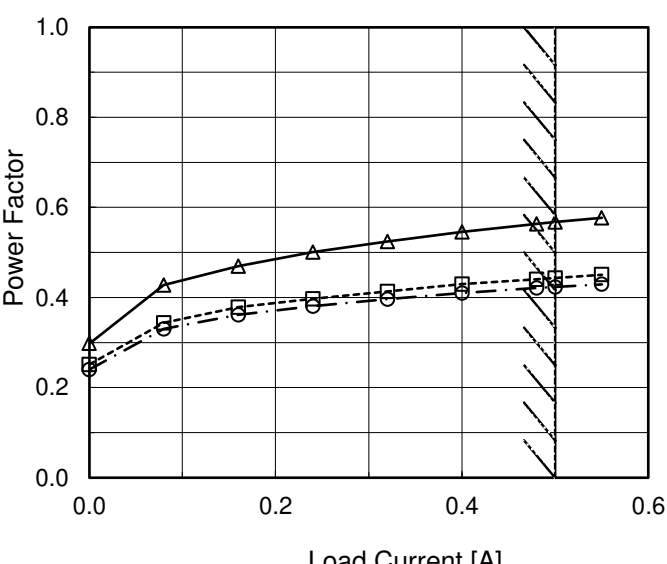


Model		LHA10F-24	Temperature25°C Testing CircuitryFigure A																																																				
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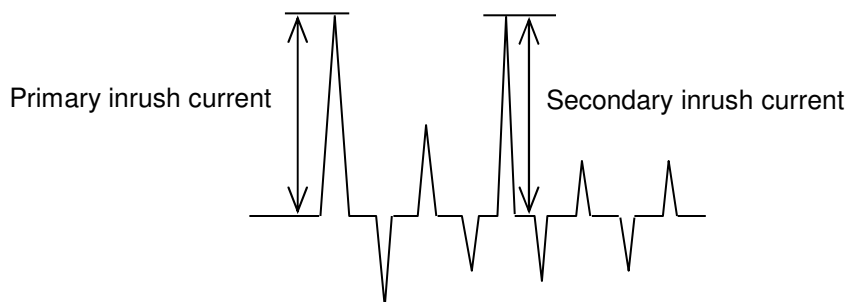
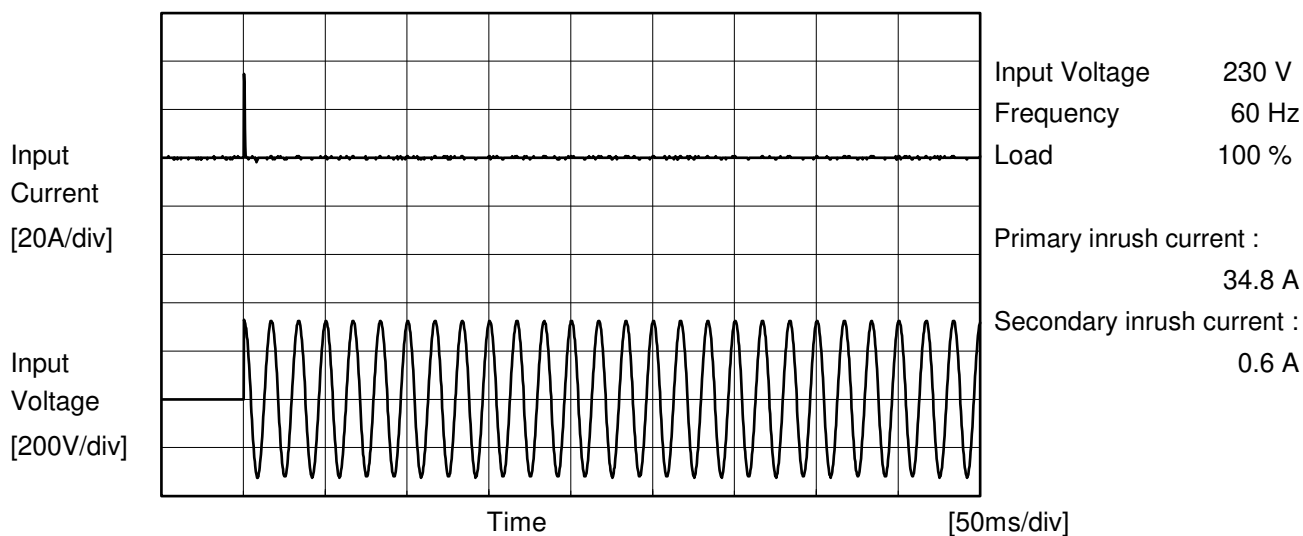
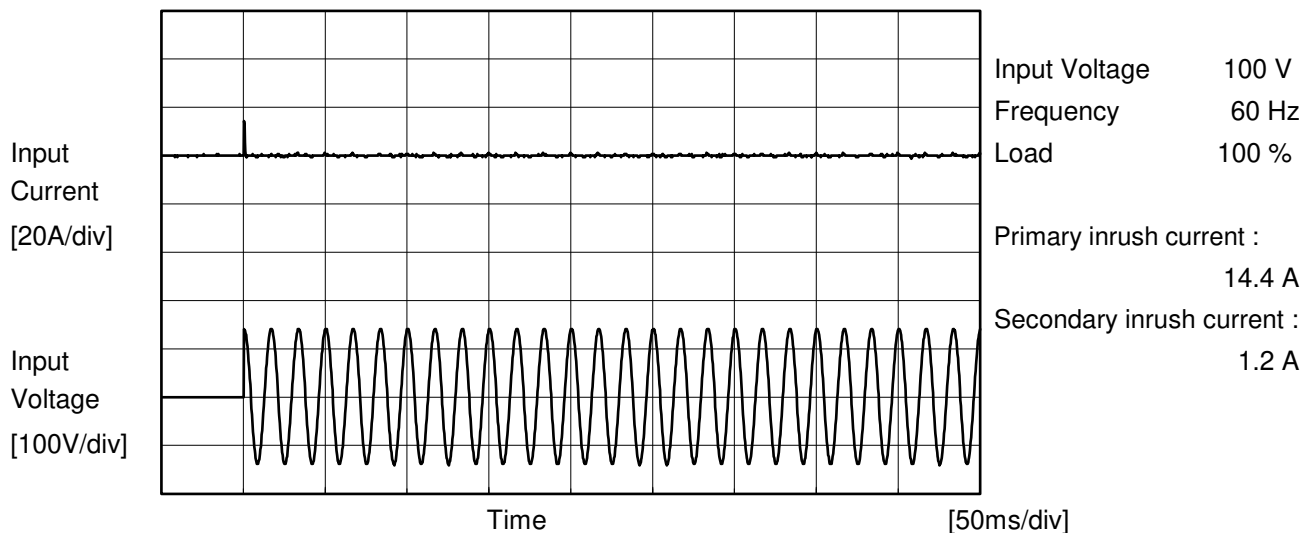
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Model		LHA10F-24	Temperature 25° C Testing Circuitry Figure A
Item		Inrush Current	
Object		_____	





Model		LHA10F-24	Temperature 25°C Testing Circuitry Figure B
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	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	Stand by
IEC62368-1	Figure B-2	Both phases	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	Stand by
	Figure B-3	Both phases	0.03	0.09	0.09	Operation
		One of phases	0.05	0.13	0.13	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	LHA10F-24																																		
Item	Line Regulation	Temperature	25°C																																
Object	+24V0.5A	Testing Circuitry	Figure A																																
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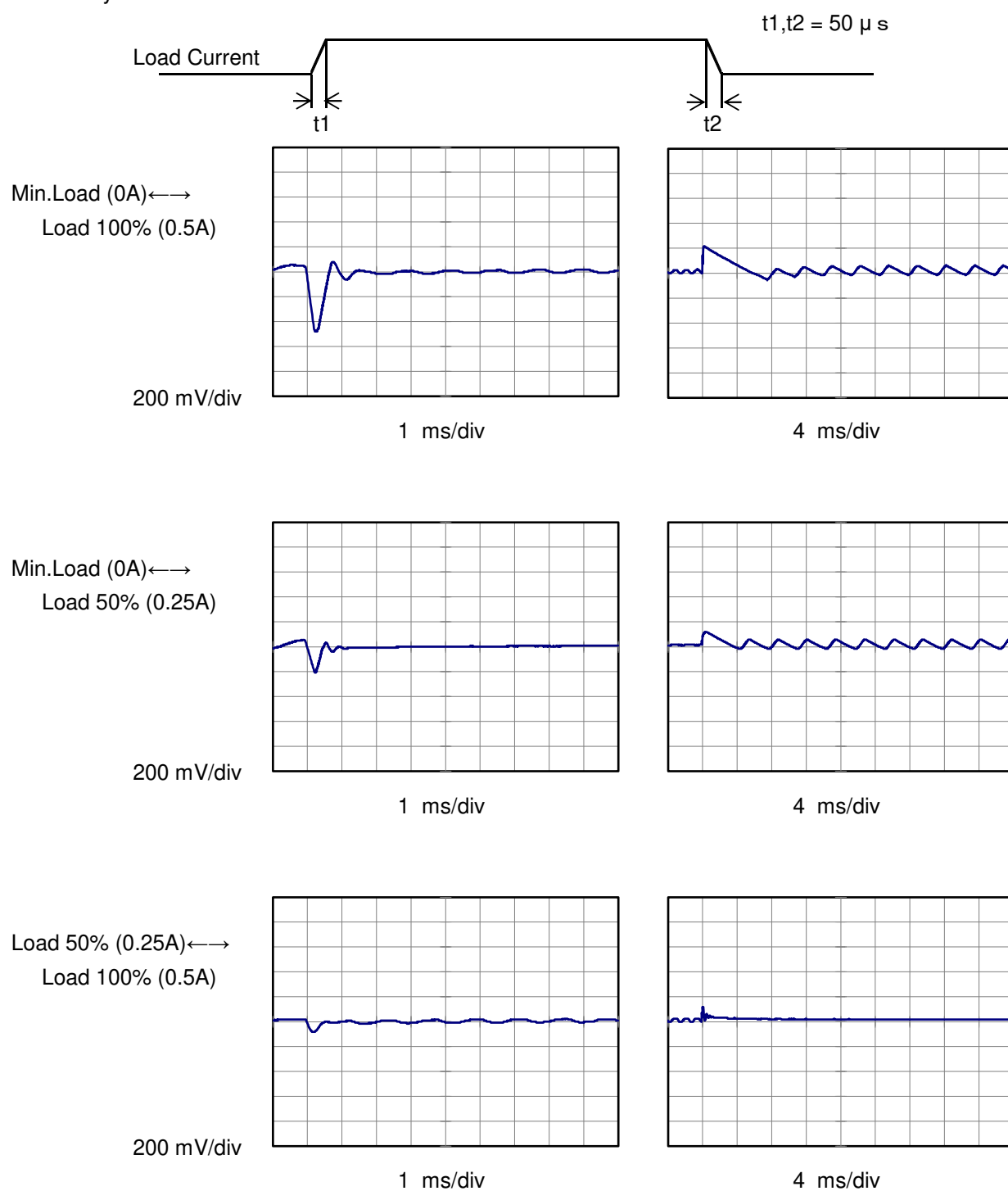


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COSEL

Model	LHA10F-24	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+24V0.5A	

Input Volt. 230 V
Cycle 1000 ms



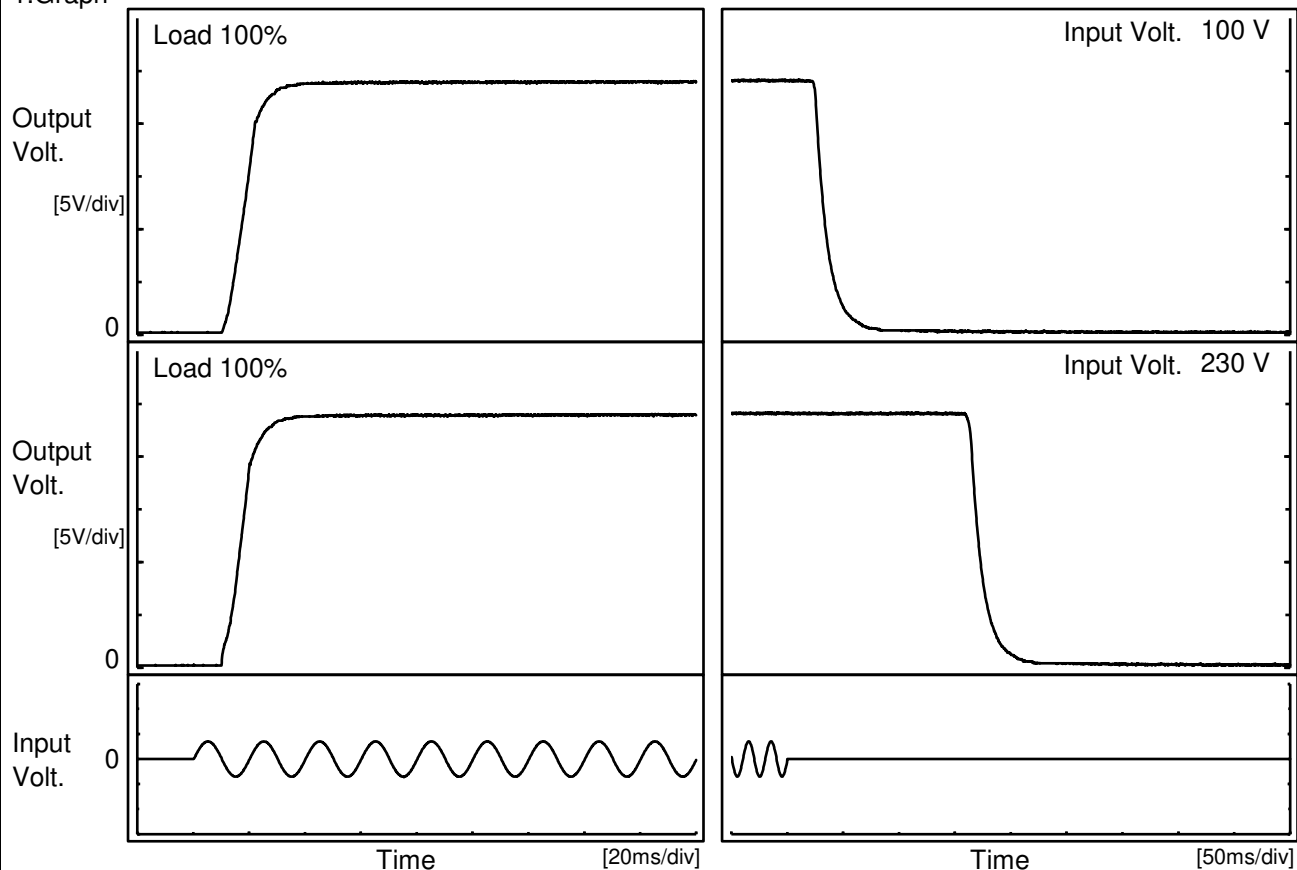
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<p>Measured by 20 MHz Oscilloscope.</p> <p>Ripple-Noise is shown as p-p in the figure below.</p> <p>Note: Slanted line shows the range of the rated load current.</p>																																											
<div><div><div><div></div><div></div></div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div></div><div><p>Ripple-Noise [mVp-p]</p></div></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>24.008</td><td>24.010</td><td>24.010</td></tr><tr><td>-15</td><td>24.018</td><td>24.020</td><td>24.020</td></tr><tr><td>-10</td><td>24.026</td><td>24.029</td><td>24.029</td></tr><tr><td>0</td><td>24.045</td><td>24.046</td><td>24.046</td></tr><tr><td>25</td><td>24.076</td><td>24.077</td><td>24.077</td></tr><tr><td>40</td><td>24.088</td><td>24.090</td><td>24.090</td></tr><tr><td>50</td><td>24.092</td><td>24.092</td><td>24.092</td></tr><tr><td>55</td><td>24.092</td><td>24.092</td><td>24.092</td></tr><tr><td>60</td><td>24.091</td><td>24.091</td><td>24.091</td></tr><tr><td>70</td><td>24.091</td><td>24.091</td><td>24.091</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	24.008	24.010	24.010	-15	24.018	24.020	24.020	-10	24.026	24.029	24.029	0	24.045	24.046	24.046	25	24.076	24.077	24.077	40	24.088	24.090	24.090	50	24.092	24.092	24.092	55	24.092	24.092	24.092	60	24.091	24.091	24.091	70	24.091	24.091	24.091	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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70	24.091	24.091	24.091																																																			
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COSEL

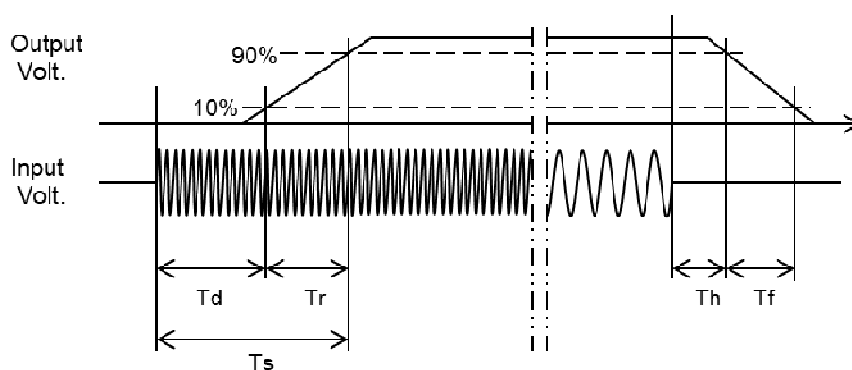
Model	LHA10F-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V0.5A		

1.Graph



2.Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		12.9	12.3	25.2	25.5	24.3
230 V		11.7	12.7	24.4	164.0	24.5



Model	LHA10F-24																																
Item	Hold-Up Time	Temperature	25°C																														
		Testing Circuitry	Figure A																														
Object	+24V0.5A																																
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>Input Voltage [V]</th><th>Load 50% [ms]</th><th>Load 100% [ms]</th></tr></thead><tbody><tr><td>85</td><td>37</td><td>15</td></tr><tr><td>90</td><td>43</td><td>18</td></tr><tr><td>100</td><td>54</td><td>24</td></tr><tr><td>120</td><td>82</td><td>38</td></tr><tr><td>200</td><td>244</td><td>118</td></tr><tr><td>230</td><td>326</td><td>163</td></tr><tr><td>264</td><td>432</td><td>217</td></tr><tr><td>280</td><td>489</td><td>248</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Input Voltage [V]	Load 50% [ms]	Load 100% [ms]	85	37	15	90	43	18	100	54	24	120	82	38	200	244	118	230	326	163	264	432	217	280	489	248	--	-	-		
Input Voltage [V]	Load 50% [ms]	Load 100% [ms]																															
85	37	15																															
90	43	18																															
100	54	24																															
120	82	38																															
200	244	118																															
230	326	163																															
264	432	217																															
280	489	248																															
--	-	-																															
<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>LOREL</div>																																																						
Model	LHA10F-24																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+24V0.5A	Testing Circuitry	Figure A																																																			
1.Graph <div><div><div><div><div></div></div><div></div></div><div><div></div></div><div><div></div></div></div><div><div>Input Volt. 100V</div><div>Input Volt. 200V</div><div>Input Volt. 230V</div></div></div> <div><div>Instantaneous Compensation Time [ms]</div><div>Load Current [A]</div></div> <div>Note: Slanted line shows the range of the rated load current.</div>		2.Values <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>0.08</td><td>165</td><td>702</td><td>930</td></tr><tr><td>0.16</td><td>86</td><td>374</td><td>501</td></tr><tr><td>0.24</td><td>56</td><td>253</td><td>337</td></tr><tr><td>0.32</td><td>42</td><td>191</td><td>257</td></tr><tr><td>0.40</td><td>32</td><td>151</td><td>204</td></tr><tr><td>0.48</td><td>25</td><td>126</td><td>169</td></tr><tr><td>0.50</td><td>24</td><td>118</td><td>163</td></tr><tr><td>0.55</td><td>18</td><td>103</td><td>142</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table></div>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	0.08	165	702	930	0.16	86	374	501	0.24	56	253	337	0.32	42	191	257	0.40	32	151	204	0.48	25	126	169	0.50	24	118	163	0.55	18	103	142	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
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--	-	-	-																																																			
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Model		LHA10F-24
Item		Minimum Input Voltage for Regulated Output Voltage
Object		+24V0.5A

1.Graph

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Model		LHA10F-24	Temperature Testing Circuitry	25°C Figure A																																												
Item		Overcurrent Protection																																														
Object		+24V0.5A																																														
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>24.0</td><td>0.77</td><td>0.79</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]	24.0	0.77	0.79	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Output Voltage [V]	Load Current [A]																																															
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Model		LHA10F-24
Item		Overvoltage Protection
Object		+24V0.5A

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	33.55	33.37
-15	33.36	33.31
-10	33.35	33.22
0	33.31	33.19
25	33.31	33.19
40	33.27	33.08
50	33.24	32.08
55	33.22	33.07
60	33.20	33.07
70	33.20	33.00
--	-	-

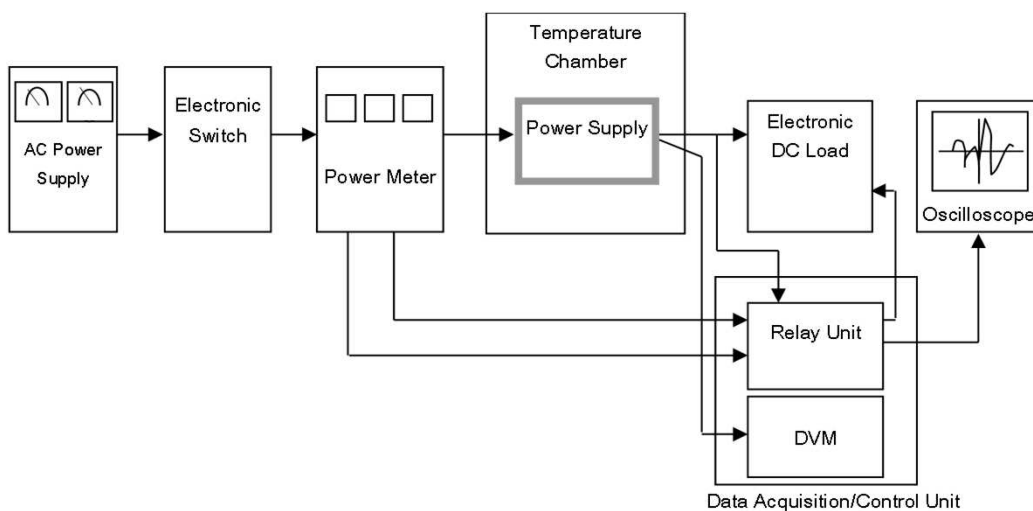


Figure A

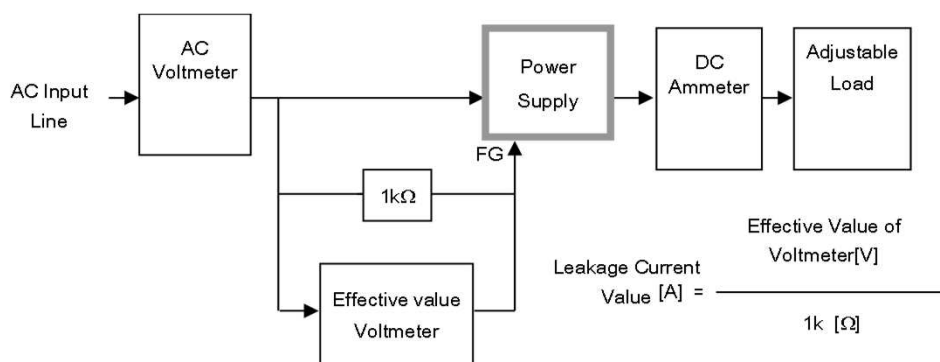


Figure B-1 (DEN-AN)

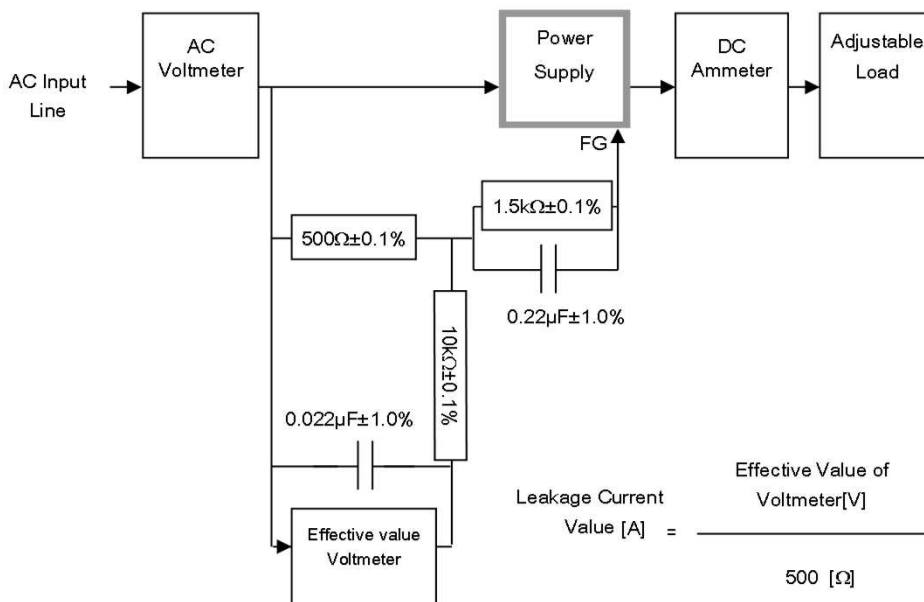


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

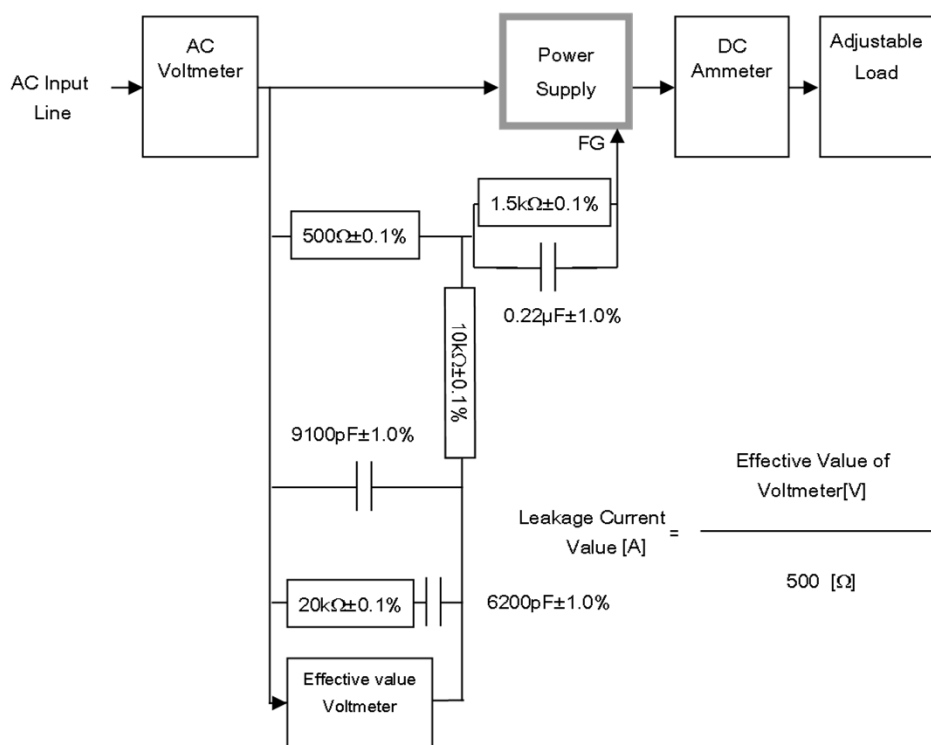


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

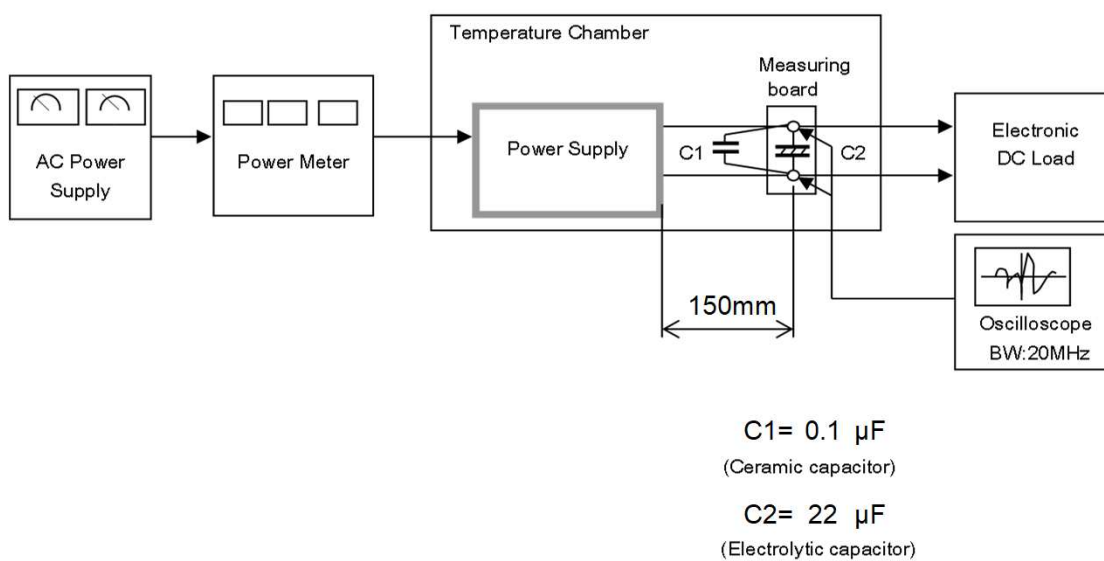


Figure C