



TEST DATA OF LHA150F-24

Regulated DC Power Supply
August 29, 2019

Approved by : Junya Kaneda
Junya Kaneda Design Manager

Prepared by : Tomoyuki Sakuma
Tomoyuki Sakuma Design Engineer

COSEL CO.,LTD.

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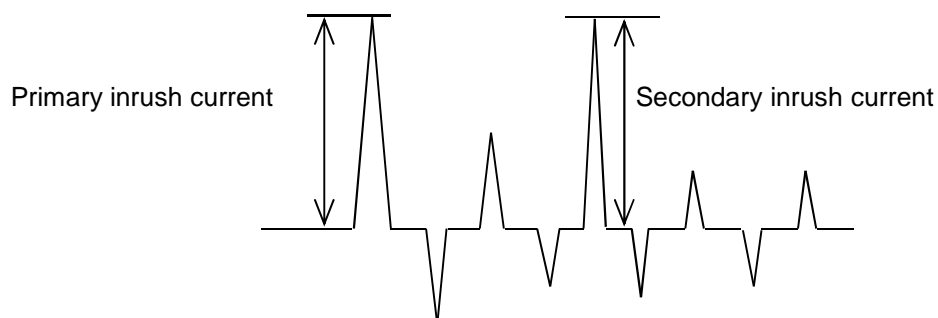
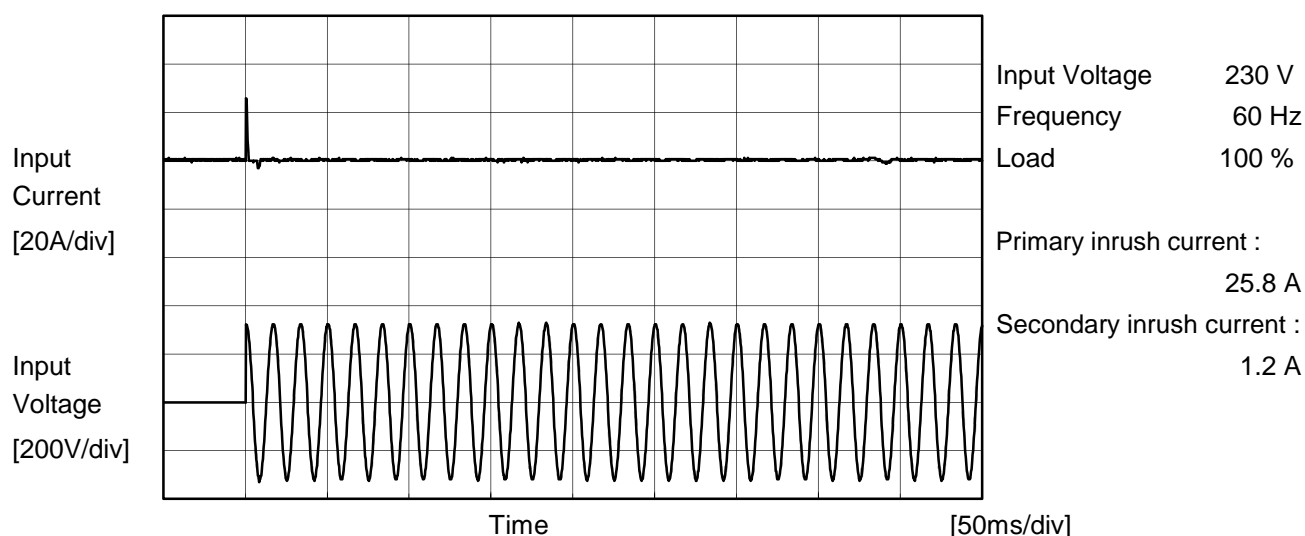
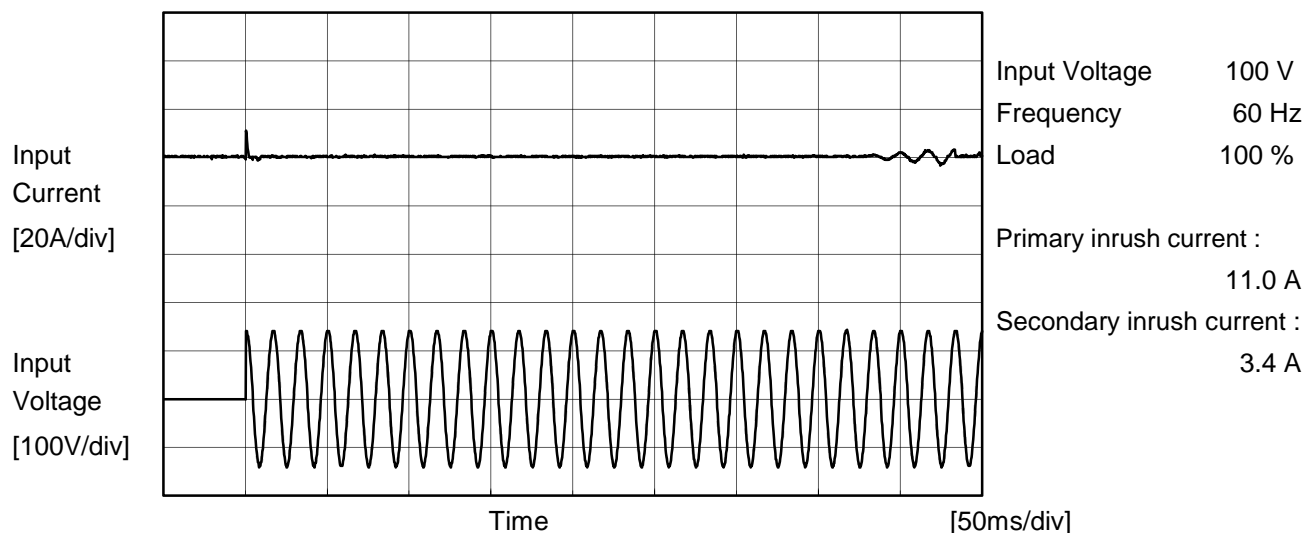


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Model	LHA150F-24	Temperature 25°C Testing Circuitry Figure A	
Item	Inrush Current		
Object	_____		





COSEL		Temperature 25°C Testing Circuitry Figure B
Model	LHA150F-24	
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	0.16	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.

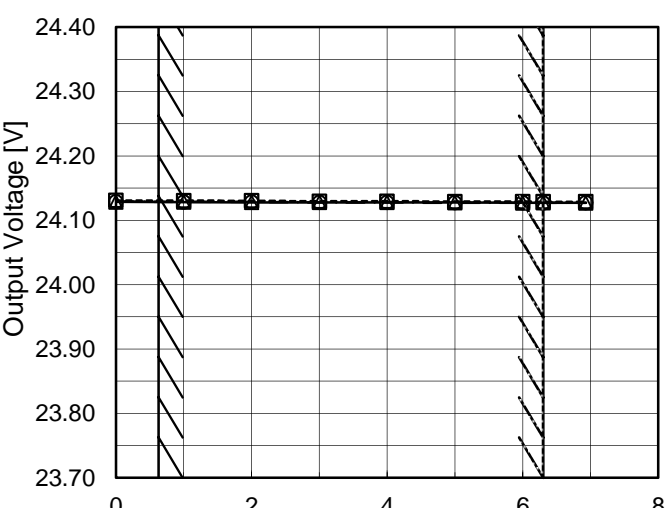
2.Condition

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



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Item	Line Regulation	Temperature	25°C																																
Object	+24V6.3A	Testing Circuitry	Figure A																																
1.Graph		2.Values																																	
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<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>24.125</td><td>-</td></tr><tr><td>90</td><td>24.125</td><td>24.125</td></tr><tr><td>100</td><td>24.125</td><td>24.125</td></tr><tr><td>120</td><td>24.126</td><td>24.125</td></tr><tr><td>200</td><td>24.127</td><td>24.127</td></tr><tr><td>230</td><td>24.127</td><td>24.127</td></tr><tr><td>264</td><td>24.127</td><td>24.127</td></tr><tr><td>280</td><td>24.129</td><td>24.128</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	85	24.125	-	90	24.125	24.125	100	24.125	24.125	120	24.126	24.125	200	24.127	24.127	230	24.127	24.127	264	24.127	24.127	280	24.129	24.128	--	-	-
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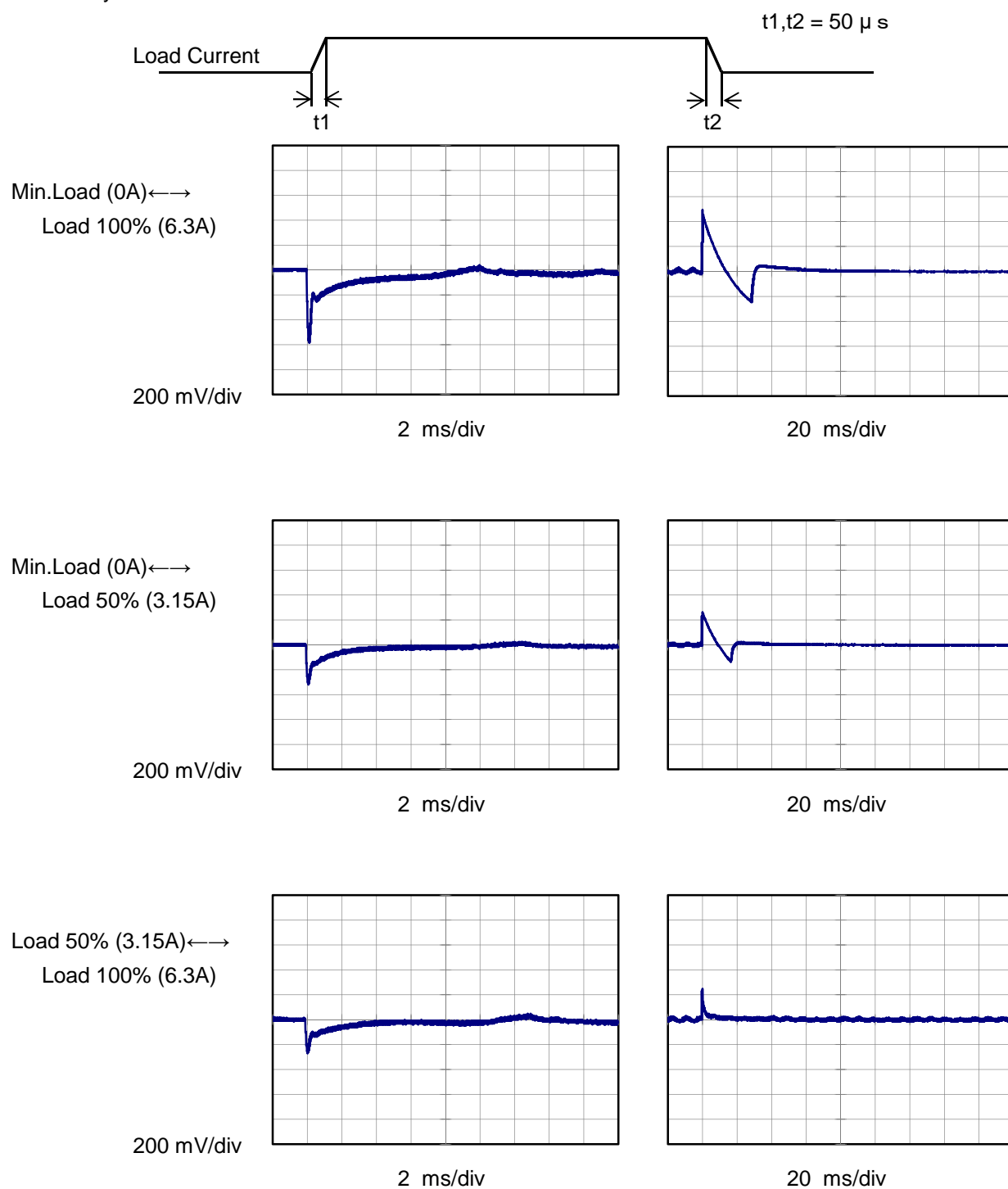


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COSEL

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Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+24V6.3A		

Input Volt. 230 V
Cycle 1000 ms



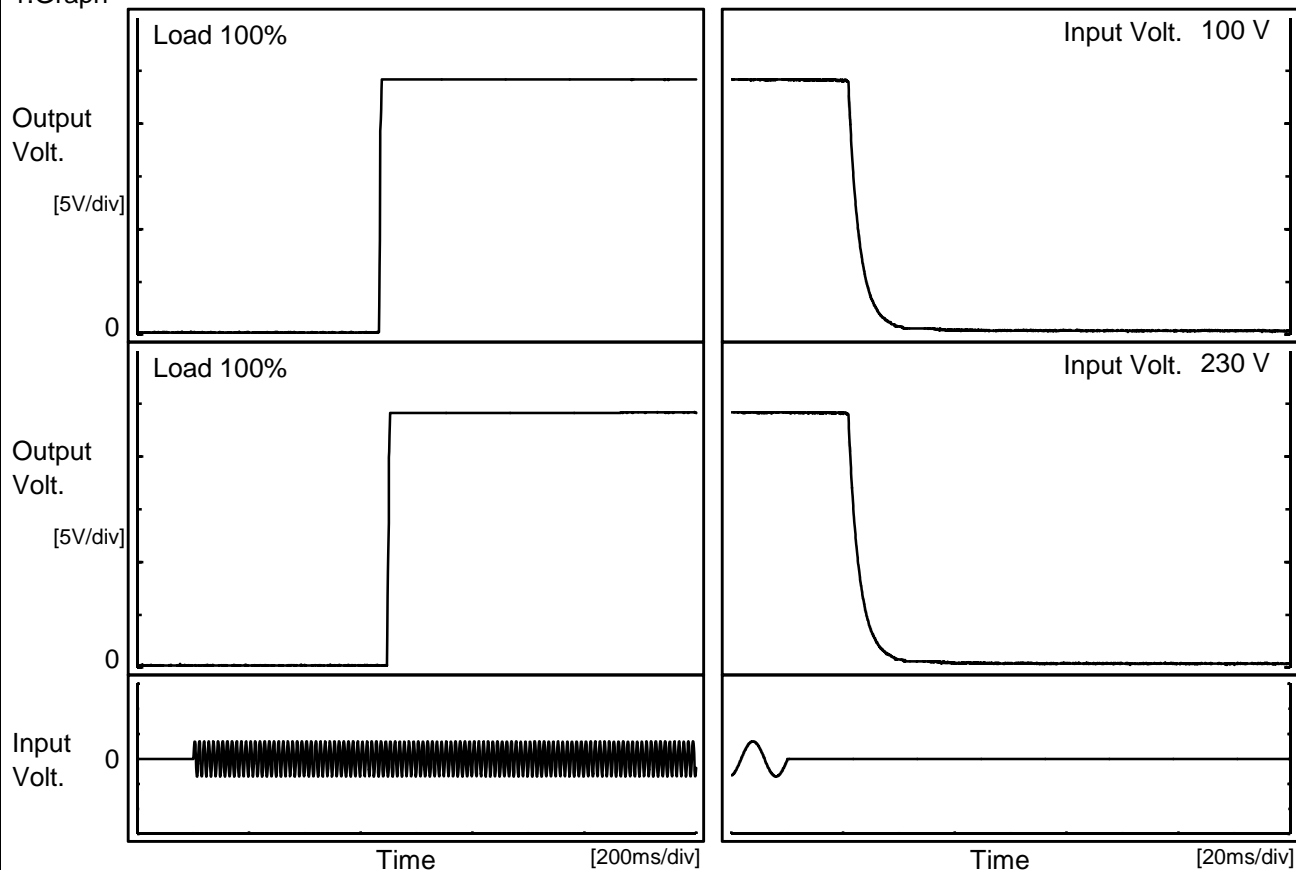
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		<div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div></div> <p>Fig. Complex Ripple Wave Form</p>																																						

Model		LHA150F-24		Testing Circuitry Figure A																																																		
Item		Ambient Temperature Drift																																																				
Object		+24V6.3A																																																				
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>Output Voltage [V]</div> <div>Ambient Temperature [°C]</div> <div>Load 100%</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>24.050</td><td>24.052</td><td>24.053</td></tr><tr><td>-10</td><td>24.071</td><td>24.073</td><td>24.073</td></tr><tr><td>0</td><td>24.089</td><td>24.091</td><td>24.091</td></tr><tr><td>10</td><td>24.105</td><td>24.106</td><td>24.106</td></tr><tr><td>20</td><td>24.117</td><td>24.118</td><td>24.118</td></tr><tr><td>25</td><td>24.122</td><td>24.123</td><td>24.123</td></tr><tr><td>30</td><td>24.127</td><td>24.128</td><td>24.128</td></tr><tr><td>40</td><td>24.133</td><td>24.134</td><td>24.134</td></tr><tr><td>50</td><td>24.138</td><td>24.138</td><td>24.138</td></tr><tr><td>60</td><td>24.139</td><td>24.139</td><td>24.139</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	24.050	24.052	24.053	-10	24.071	24.073	24.073	0	24.089	24.091	24.091	10	24.105	24.106	24.106	20	24.117	24.118	24.118	25	24.122	24.123	24.123	30	24.127	24.128	24.128	40	24.133	24.134	24.134	50	24.138	24.138	24.138	60	24.139	24.139	24.139	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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10	24.105	24.106	24.106																																																			
20	24.117	24.118	24.118																																																			
25	24.122	24.123	24.123																																																			
30	24.127	24.128	24.128																																																			
40	24.133	24.134	24.134																																																			
50	24.138	24.138	24.138																																																			
60	24.139	24.139	24.139																																																			
--	-	-	-																																																			
Note: Slanted line shows the range of the rated ambient temperature.																																																						



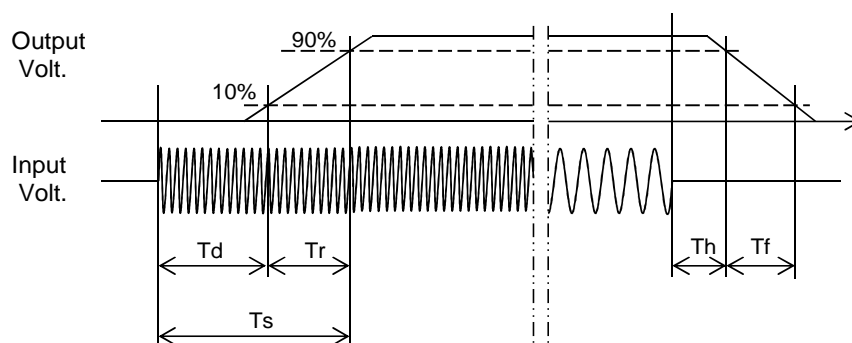
Model	LHA150F-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V6.3A		

1.Graph



2.Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		664.5	10.5	675.0	22.2	9.3
230 V		695.5	10.0	705.5	22.2	9.3



Model	LHA150F-24																																		
Item	Hold-Up Time	Temperature	25°C																																
Object	+24V6.3A	Testing Circuitry	Figure A																																
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>43</td><td>22</td></tr><tr><td>120</td><td>43</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>44</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	43	22	120	43	22	200	43	22	230	43	22	264	43	22	280	44	22	--	-	-		
Input Voltage [V]	Hold-Up Time [ms]																																		
	Load 50%	Load 100%																																	
85	43	-																																	
90	43	22																																	
100	43	22																																	
120	43	22																																	
200	43	22																																	
230	43	22																																	
264	43	22																																	
280	44	22																																	
--	-	-																																	
<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-24																																																					
Item	Instantaneous Interruption Compensation	Temperature	25°C																																																			
Object	+24V6.3A	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>Instantaneous Compensation Time [ms]</div> <div>Load Current [A]</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>1.00</td><td>115</td><td>122</td><td>127</td></tr><tr><td>2.00</td><td>65</td><td>65</td><td>65</td></tr><tr><td>3.00</td><td>44</td><td>45</td><td>44</td></tr><tr><td>4.00</td><td>33</td><td>34</td><td>33</td></tr><tr><td>5.00</td><td>26</td><td>26</td><td>27</td></tr><tr><td>6.00</td><td>20</td><td>22</td><td>22</td></tr><tr><td>6.30</td><td>20</td><td>21</td><td>21</td></tr><tr><td>6.93</td><td>18</td><td>17</td><td>17</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	-	-	-	1.00	115	122	127	2.00	65	65	65	3.00	44	45	44	4.00	33	34	33	5.00	26	26	27	6.00	20	22	22	6.30	20	21	21	6.93	18	17	17	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
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0.00	-	-	-																																																			
1.00	115	122	127																																																			
2.00	65	65	65																																																			
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5.00	26	26	27																																																			
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--	-	-	-																																																			
Note: Slanted line shows the range of the rated load current.																																																						

Model		LHA150F-24	Testing Circuitry Figure A
Item		Minimum Input Voltage for Regulated Output Voltage	
Object		+24V6.3A	
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></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></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> <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></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></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> <div><div></div><div></div></div> <div><div></div><div></div></div> <div><div></div><div></div></div> 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Model	LHA150F-24																																																	
Item	Overcurrent Protection	Temperature	25°C																																															
Object	+24V6.3A	Testing Circuitry	Figure A																																															
1.Graph		2.Values																																																
<div><div><div></div>Input Volt. 100V</div><div><div></div>Input Volt. 230V</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</td><td>10.06</td><td>10.06</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]	24	10.06	10.06	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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<div><div><div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 230V</div></div></div><div><p>Operating Point [V]</p><p>Ambient Temperature [°C]</p><p>Load 0%</p></div><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="2">Operating Point [V]</th></tr><tr><th>Input Volt. 100[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>-20</td><td>30.24</td><td>30.24</td></tr><tr><td>-10</td><td>30.47</td><td>30.47</td></tr><tr><td>0</td><td>30.65</td><td>30.65</td></tr><tr><td>10</td><td>30.88</td><td>30.88</td></tr><tr><td>20</td><td>31.06</td><td>31.06</td></tr><tr><td>25</td><td>31.18</td><td>31.18</td></tr><tr><td>30</td><td>31.29</td><td>31.29</td></tr><tr><td>40</td><td>31.47</td><td>31.47</td></tr><tr><td>50</td><td>31.64</td><td>31.64</td></tr><tr><td>60</td><td>31.88</td><td>31.88</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table></div>			Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 230[V]	-20	30.24	30.24	-10	30.47	30.47	0	30.65	30.65	10	30.88	30.88	20	31.06	31.06	25	31.18	31.18	30	31.29	31.29	40	31.47	31.47	50	31.64	31.64	60	31.88	31.88	--	-	-
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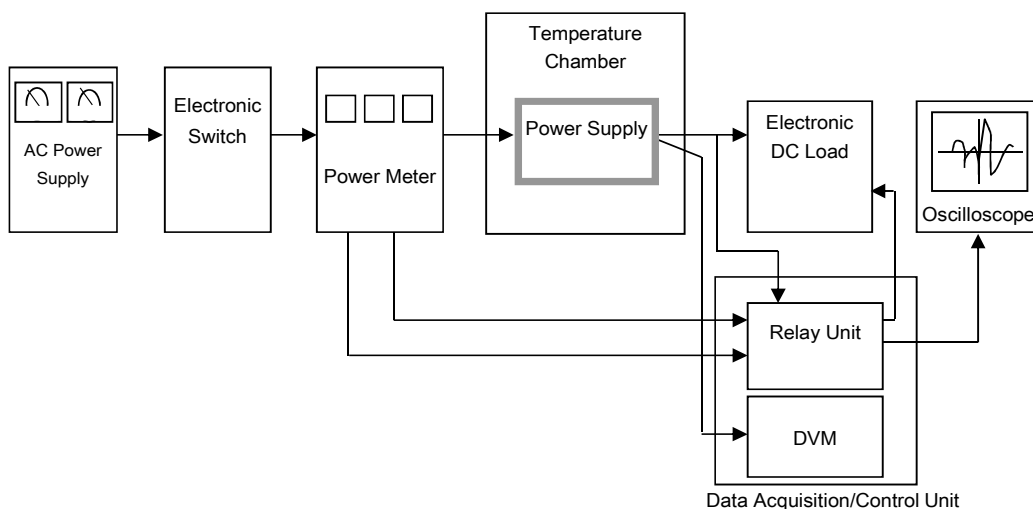


Figure A

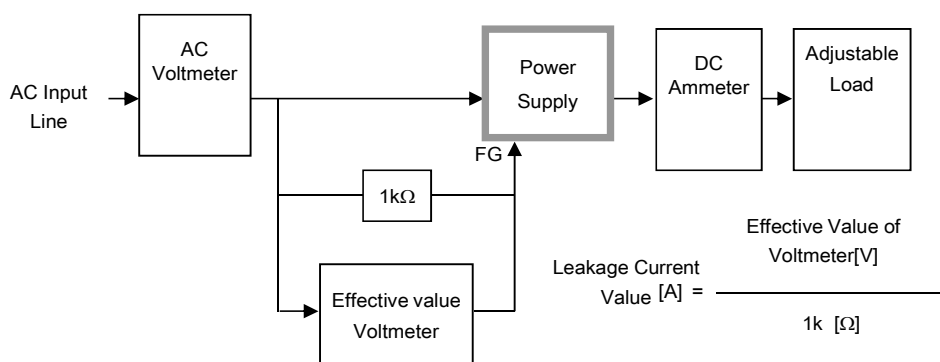


Figure B-1 (DEN-AN)

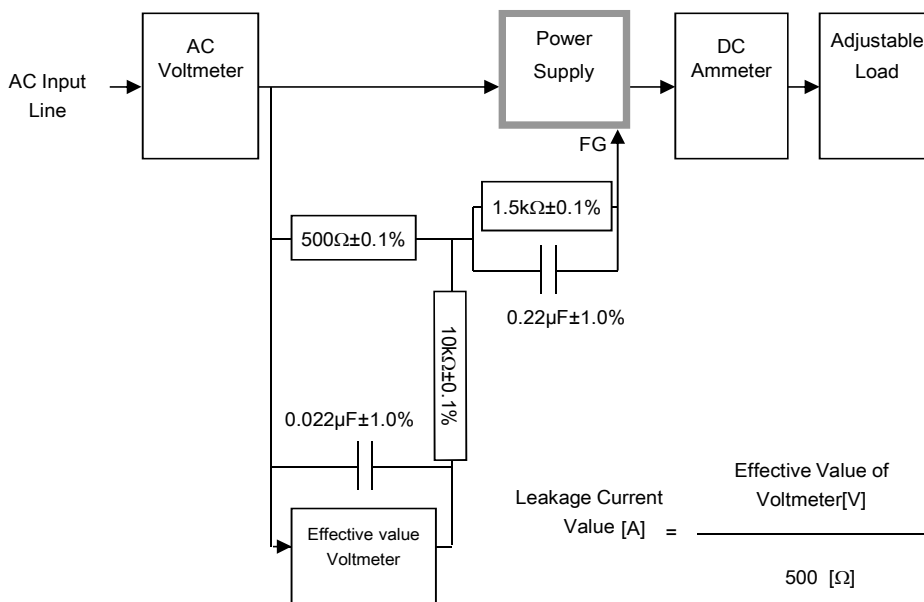


Figure B-2 (IEC62368-1 refer to IEC60990 Fig.4)

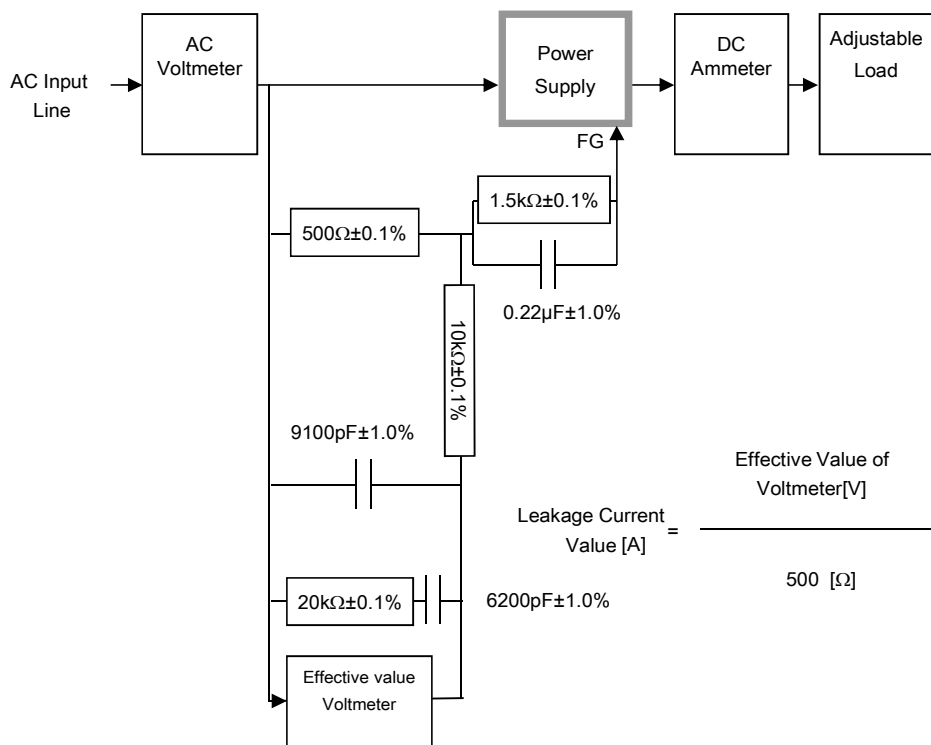


Figure B-3 (IEC62368-1 refer to IEC60990 Fig.5)

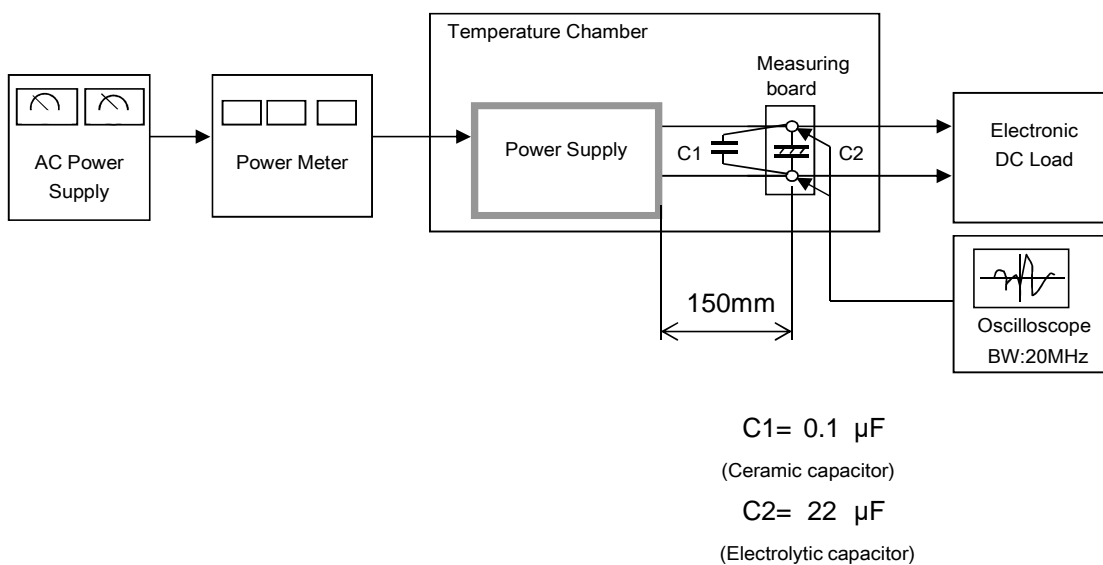


Figure C