



TEST DATA OF LFA10F-24

Regulated DC Power Supply
June 19, 2009

Approved by : Yoshiaki Shimizu
Yoshiaki Shimizu Design Manager

Prepared by : Yuki Nakamura
Yuki Nakamura Design Engineer

COSEL CO.,LTD.

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Model	LFA10F-24																																																					
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<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> <p>Input Current [A]</p> <p>Load Current [A]</p> <p>Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</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>0.016</td><td>0.011</td><td>0.011</td></tr><tr><td>0.08</td><td>0.065</td><td>0.046</td><td>0.043</td></tr><tr><td>0.16</td><td>0.106</td><td>0.068</td><td>0.063</td></tr><tr><td>0.24</td><td>0.146</td><td>0.092</td><td>0.085</td></tr><tr><td>0.32</td><td>0.181</td><td>0.114</td><td>0.103</td></tr><tr><td>0.40</td><td>0.219</td><td>0.137</td><td>0.126</td></tr><tr><td>0.48</td><td>0.255</td><td>0.155</td><td>0.142</td></tr><tr><td>0.50</td><td>0.263</td><td>0.160</td><td>0.146</td></tr><tr><td>0.55</td><td>0.286</td><td>0.176</td><td>0.159</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]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	0.016	0.011	0.011	0.08	0.065	0.046	0.043	0.16	0.106	0.068	0.063	0.24	0.146	0.092	0.085	0.32	0.181	0.114	0.103	0.40	0.219	0.137	0.126	0.48	0.255	0.155	0.142	0.50	0.263	0.160	0.146	0.55	0.286	0.176	0.159	--	-	-	-	--	-	-	-
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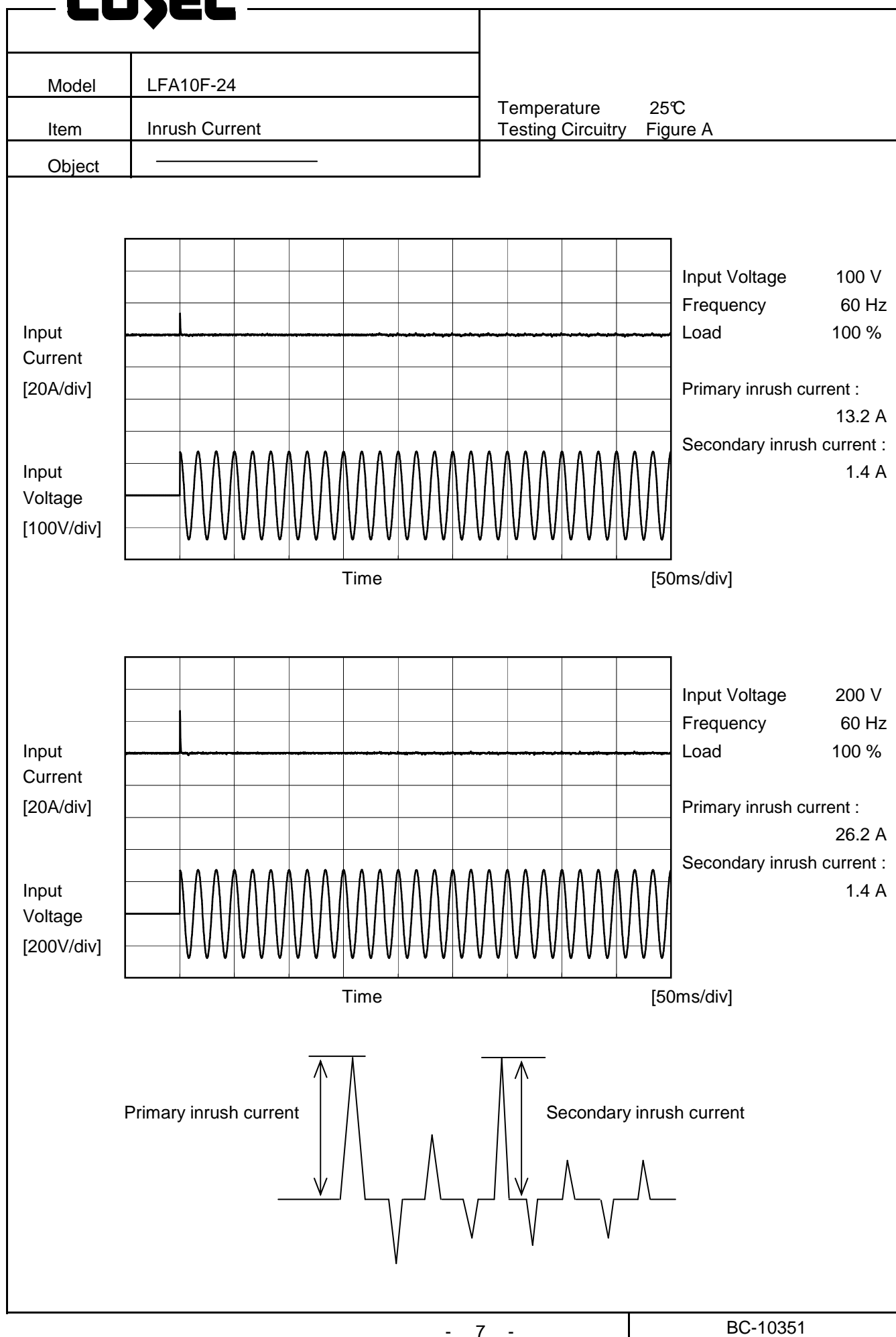
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		Temperature 25℃ Testing Circuitry Figure B
Model	LFA10F-24	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

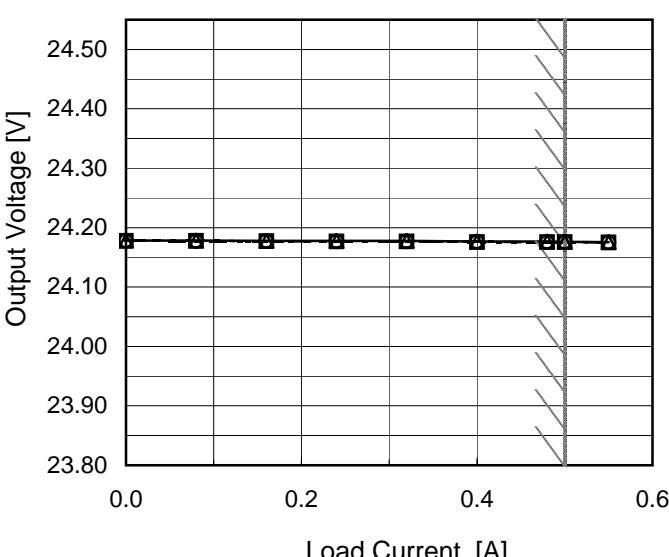
Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.07	0.14	0.16	Operation
	One of phase	0.13	0.27	0.33	stand by
IEC60950-1	Both phases	0.09	0.19	0.20	Operation
	One of phase	0.13	0.28	0.31	stand by

The value for "One phase" 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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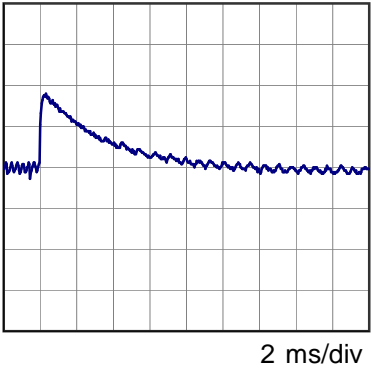
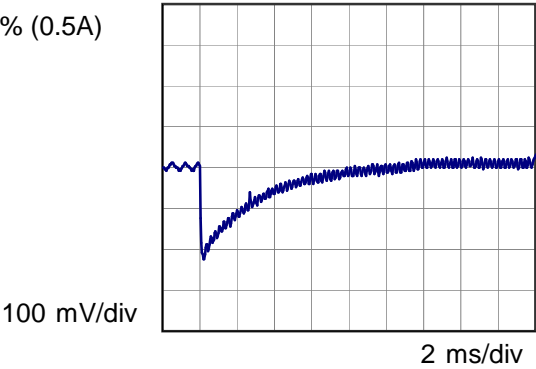
Model	LFA10F-24	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+24V0.5A		

Input Volt. 100 V
Cycle 1000 ms

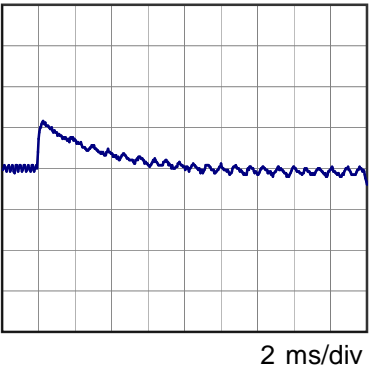
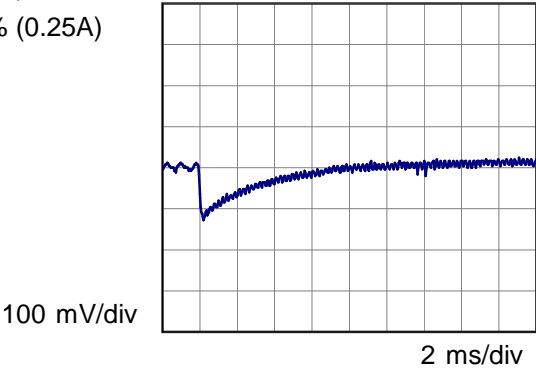
Response. t1=t2=50us. Typ



Min. Load (0A) ←→
Load 100% (0.5A)



Min. Load (0A) ←→
Load 50% (0.25A)



Model	LFA10F-24																																								
Item	Ripple Voltage (by Load Current)	Temperature	25℃																																						
Object	+24V0.5A	Testing Circuitry	Figure C																																						
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 100V</div><div>-·-○-·- Input Volt. 200V</div></div><p>Ripple Voltage [mV]</p><p>Load Current [A]</p></div> <p>Measured by 20 MHz Oscilloscope. Ripple Voltage is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.</p>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 100 [V]</th><th>Input Volt. 200 [V]</th></tr><tr><td>0.00</td><td>30</td><td>30</td></tr><tr><td>0.08</td><td>10</td><td>15</td></tr><tr><td>0.16</td><td>15</td><td>20</td></tr><tr><td>0.24</td><td>20</td><td>20</td></tr><tr><td>0.32</td><td>25</td><td>20</td></tr><tr><td>0.40</td><td>25</td><td>20</td></tr><tr><td>0.48</td><td>30</td><td>25</td></tr><tr><td>0.50</td><td>30</td><td>25</td></tr><tr><td>0.55</td><td>30</td><td>25</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.00	30	30	0.08	10	15	0.16	15	20	0.24	20	20	0.32	25	20	0.40	25	20	0.48	30	25	0.50	30	25	0.55	30	25	--	-	-	--	-	-
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Model	LFA10F-24																																																																												
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Model	LFA10F-24																																							
Item	Ripple Voltage (by Ambient Temp.)	Testing Circuitry Figure C																																						
Object	+24V0.5A																																							
<p>1.Graph</p> <div style="text-align: right;"> --- □ --- Input Volt. 100V — △ — Input Volt. 200V </div> <p style="text-align: center;">Ambient Temperature [°C] Load 100 %</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 100 [V]</th> <th>Input Volt. 200 [V]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>170</td><td>160</td></tr> <tr><td>-10</td><td>70</td><td>60</td></tr> <tr><td>0</td><td>55</td><td>50</td></tr> <tr><td>25</td><td>30</td><td>25</td></tr> <tr><td>50</td><td>35</td><td>25</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> </tbody> </table>	Ambient Temperature [°C]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	-30	170	160	-10	70	60	0	55	50	25	30	25	50	35	25	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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Ambient Temperature [°C]	Output Voltage [V]																																																					
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		Testing Circuitry Figure A
Model	LFA10F-24	
Item	Output Voltage Accuracy	
Object	+24V0.5A	

1. Output Voltage Accuracy

This is defined as the value of the output voltage, regulation load, ambient temperature and input voltage varied at random in the range as specified below.

Temperature : -10 - 50℃

Input Voltage : 85 - 264V

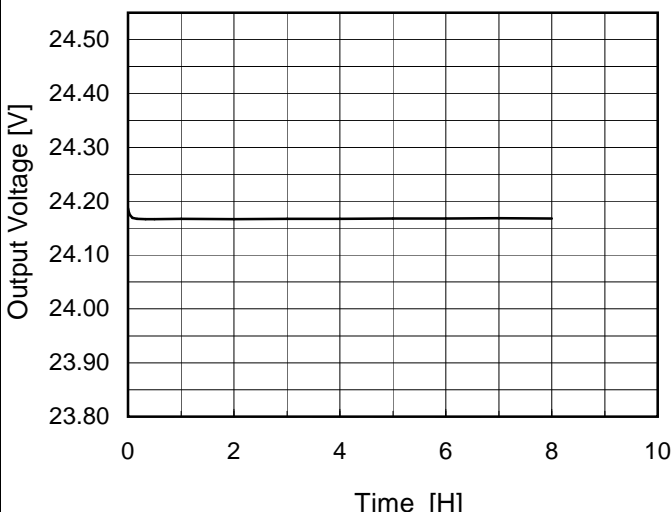
Load Current : 0 - 0.5A

* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

* Output Voltage Accuracy (Ration) = $\frac{\text{Output Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

2. Values

Item	Temperature [℃]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-10	85	0	24.201	±24	±0.1
Minimum Voltage	50	264	0.5	24.153		

Model	LFA10F-24																								
Item	Time Lapse Drift	Temperature	25℃																						
		Testing Circuitry	Figure A																						
Object	+24V0.5A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>24.187</td></tr><tr><td>0.5</td><td>24.166</td></tr><tr><td>1.0</td><td>24.167</td></tr><tr><td>2.0</td><td>24.167</td></tr><tr><td>3.0</td><td>24.167</td></tr><tr><td>4.0</td><td>24.167</td></tr><tr><td>5.0</td><td>24.168</td></tr><tr><td>6.0</td><td>24.168</td></tr><tr><td>7.0</td><td>24.168</td></tr><tr><td>8.0</td><td>24.168</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	24.187	0.5	24.166	1.0	24.167	2.0	24.167	3.0	24.167	4.0	24.167	5.0	24.168	6.0	24.168	7.0	24.168	8.0	24.168
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* The characteristic of AC200V is equal.																									

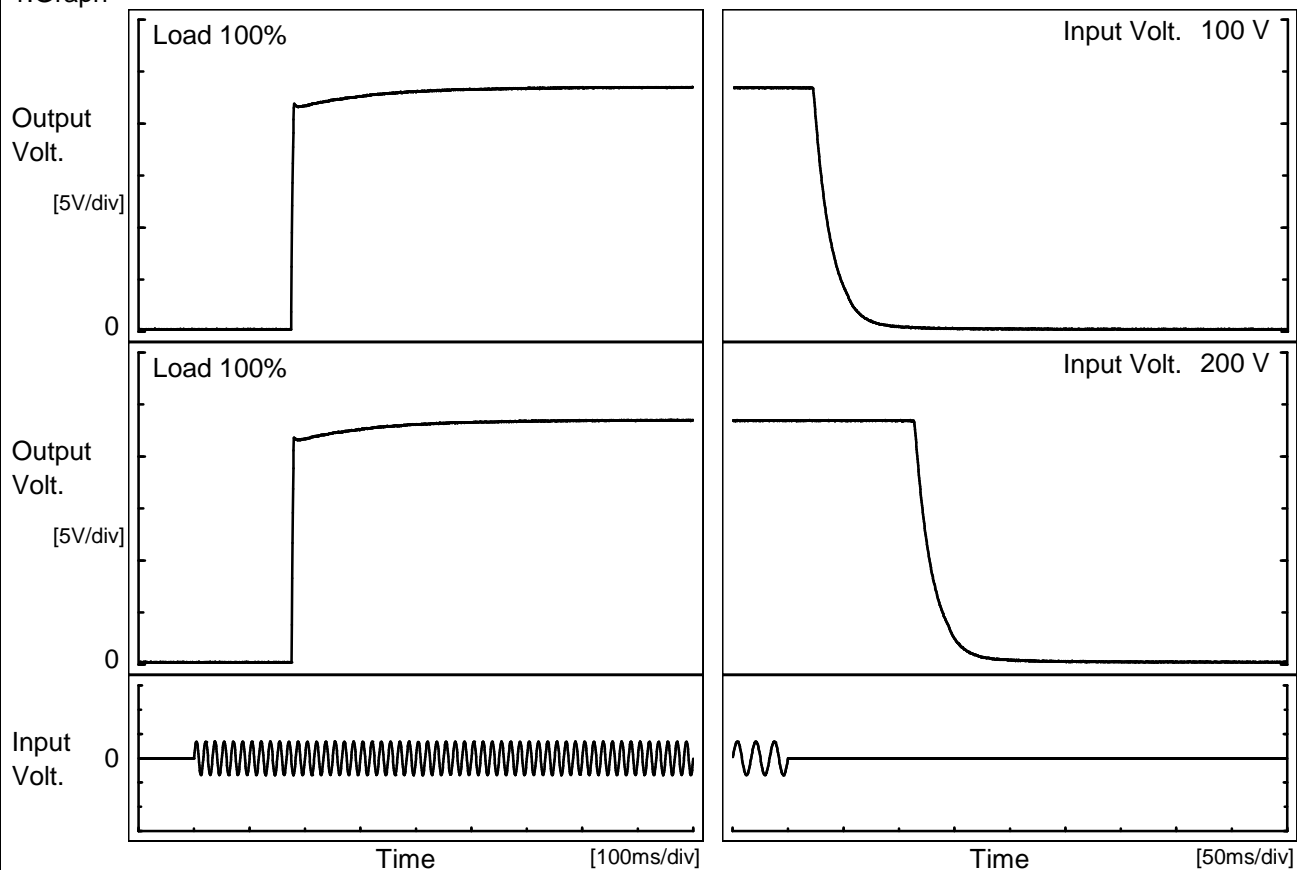
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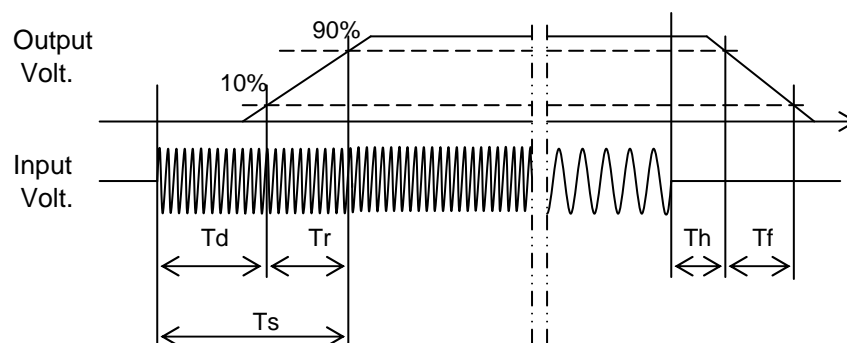
Model	LFA10F-24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V0.5A		

1.Graph



2.Values

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	176.0	4.5	180.5	23.3	33.8
200 V	176.5	4.0	180.5	115.0	34.5



Model	LFA10F-24																																		
Item	Hold-Up Time	Temperature	25℃																																
		Testing Circuitry	Figure A																																
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<div><div>---□--- Load 50%</div><div>—△— Load 100%</div><p>Hold-Up Time [ms]</p><p>Input Voltage [V]</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>75</td><td>23</td><td>9</td></tr><tr><td>85</td><td>32</td><td>14</td></tr><tr><td>100</td><td>48</td><td>22</td></tr><tr><td>120</td><td>74</td><td>35</td></tr><tr><td>200</td><td>226</td><td>115</td></tr><tr><td>230</td><td>302</td><td>156</td></tr><tr><td>264</td><td>400</td><td>210</td></tr><tr><td>280</td><td>452</td><td>238</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	75	23	9	85	32	14	100	48	22	120	74	35	200	226	115	230	302	156	264	400	210	280	452	238	--	-	-
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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>																																			

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Model	LFA10F-24																																																					
Item	Instantaneous Interruption Compensation	Temperature	25℃																																																			
Object	+24V0.5A	Testing Circuitry	Figure A																																																			
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		Testing Circuitry Figure A																																						
Model	LFA10F-24																																							
Item	Minimum Input Voltage for Regulated Output Voltage																																							
Object	+24V0.5A																																							
1.Graph		2.Values																																						
<div><div><div>---□--- Load 50%</div><div>—△— Load 100%</div></div><p>Input Voltage [V]</p><p>Ambient Temperature [°C]</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="2">Input Voltage [V]</th></tr><tr><th>Load 50%</th><th>Load 100%</th></tr><tr><td>-20</td><td>37</td><td>52</td></tr><tr><td>-10</td><td>37</td><td>52</td></tr><tr><td>0</td><td>37</td><td>52</td></tr><tr><td>10</td><td>37</td><td>53</td></tr><tr><td>20</td><td>38</td><td>53</td></tr><tr><td>25</td><td>38</td><td>53</td></tr><tr><td>30</td><td>38</td><td>54</td></tr><tr><td>40</td><td>38</td><td>55</td></tr><tr><td>50</td><td>39</td><td>55</td></tr><tr><td>60</td><td>39</td><td>56</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-20	37	52	-10	37	52	0	37	52	10	37	53	20	38	53	25	38	53	30	38	54	40	38	55	50	39	55	60	39	56	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
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Model	LFA10F-24																																											
Item	Overcurrent Protection	Temperature	25℃																																									
Object	+24V0.5A	Testing Circuitry	Figure A																																									
1.Graph		2.Values																																										
<div><div><div>△</div><div>Input Volt. 100V</div></div><div><div>○</div><div>Input Volt. 200V</div></div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is less than rated output voltage.</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. 200[V]</th></tr><tr><td>24.0</td><td>0.90</td><td>1.14</td></tr><tr><td>22.8</td><td>-</td><td>-</td></tr><tr><td>21.6</td><td>-</td><td>-</td></tr><tr><td>19.2</td><td>-</td><td>-</td></tr><tr><td>16.8</td><td>-</td><td>-</td></tr><tr><td>14.4</td><td>-</td><td>-</td></tr><tr><td>12.0</td><td>-</td><td>-</td></tr><tr><td>9.6</td><td>-</td><td>-</td></tr><tr><td>7.2</td><td>-</td><td>-</td></tr><tr><td>4.8</td><td>-</td><td>-</td></tr><tr><td>2.4</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. 200[V]	24.0	0.90	1.14	22.8	-	-	21.6	-	-	19.2	-	-	16.8	-	-	14.4	-	-	12.0	-	-	9.6	-	-	7.2	-	-	4.8	-	-	2.4	-	-	0.0	-	-
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2.4	-	-																																										
0.0	-	-																																										

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Model		LFA10F-24
Item		Overvoltage Protection
Object		+24V0.5A

1.Graph

△

Input Volt. 100V

□

Input Volt. 200V

Operating Point [V]

33.0

31.0

29.0

27.0

-40

-20

0

20

40

60

80

Ambient Temperature [℃]

Load 0%

<

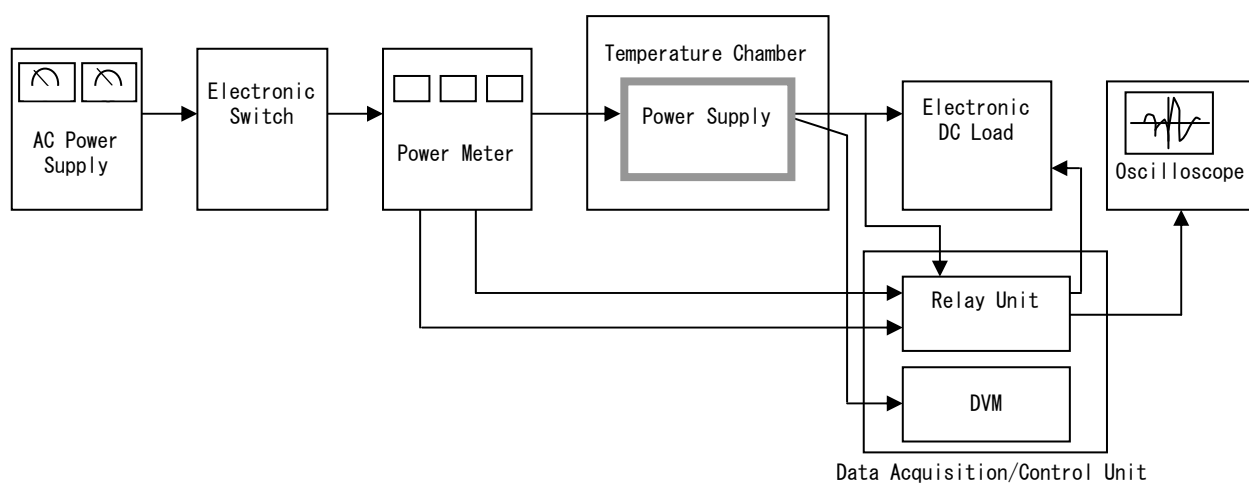


Figure A

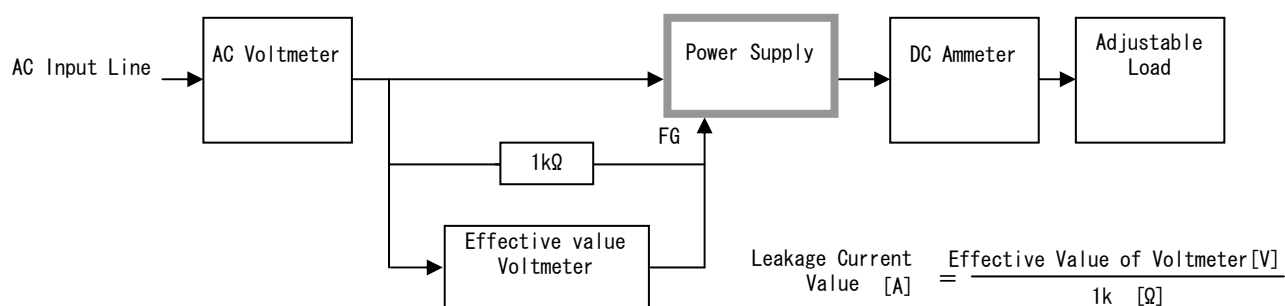


Figure B (DEN-AN)

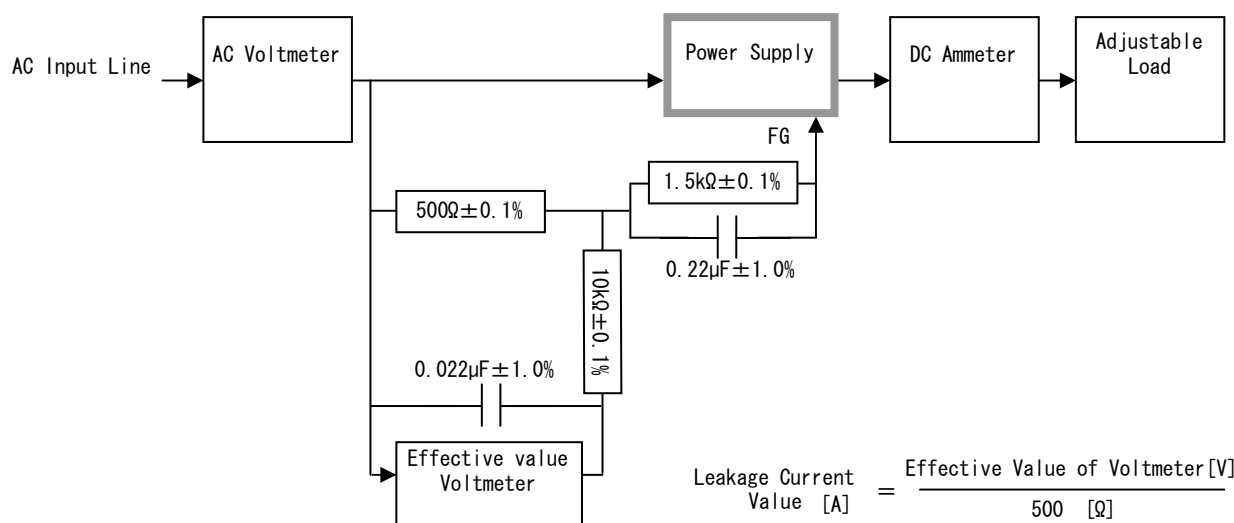


Figure B (IEC60950-1)

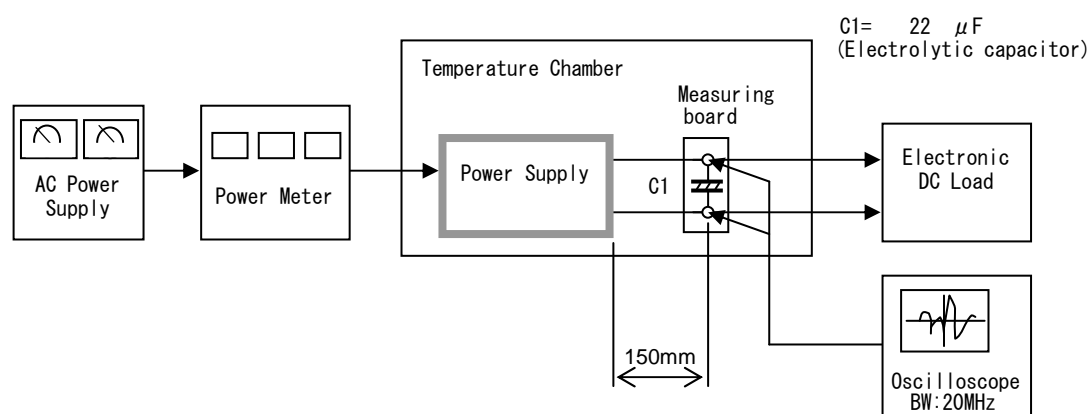


Figure C