



# TEST DATA OF LFA15F-15

Regulated DC Power Supply  
June 19, 2009

Approved by : *Yoshiaki Shimizu*  
Yoshiaki Shimizu Design Manager

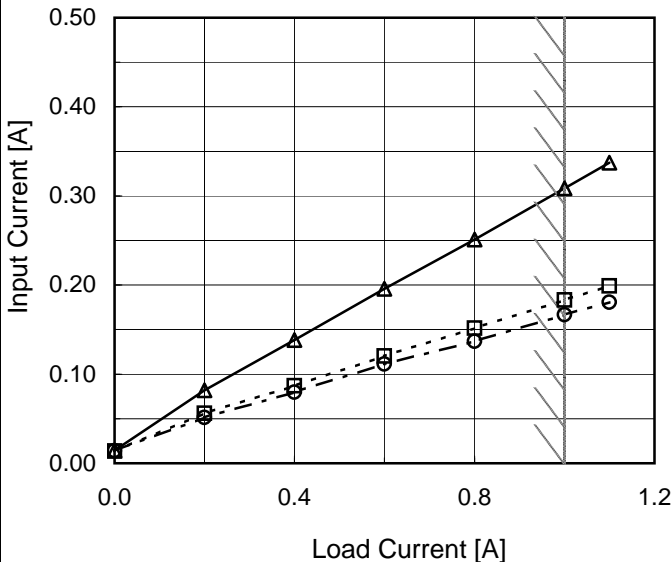
Prepared by : *Yuki Nakamura*  
Yuki Nakamura Design Engineer

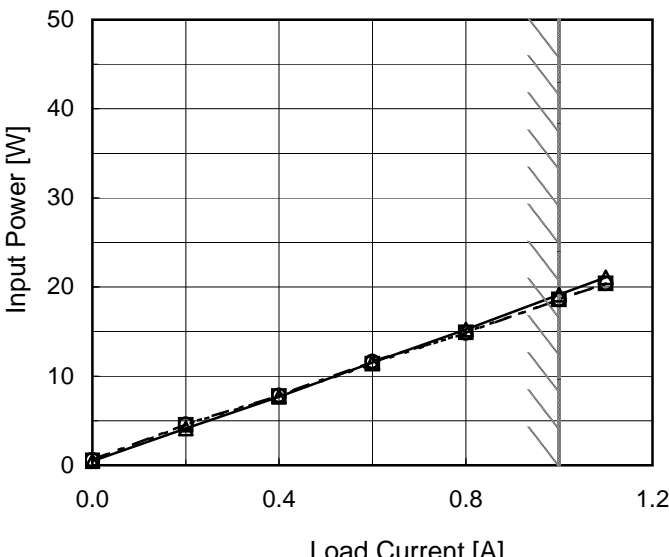
**COSEL CO.,LTD.**

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Model		LFA15F-15		Temperature 25℃																																																				
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Object		_____																																																						
1.Graph		<div><div>—△—</div>Input Volt. 100V</div> <div><div>---□---</div>Input Volt. 200V</div> <div><div>---○---</div>Input Volt. 230V</div>		2.Values																																																				
<div><div>Input Current [A]</div><div></div><div><div>Note: Slanted line shows the range of the rated load current.</div></div></div>				<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>0.0</td><td>0.014</td><td>0.014</td><td>0.014</td></tr><tr><td>0.2</td><td>0.082</td><td>0.056</td><td>0.052</td></tr><tr><td>0.4</td><td>0.138</td><td>0.087</td><td>0.080</td></tr><tr><td>0.6</td><td>0.196</td><td>0.120</td><td>0.111</td></tr><tr><td>0.8</td><td>0.251</td><td>0.152</td><td>0.137</td></tr><tr><td>1.0</td><td>0.308</td><td>0.183</td><td>0.167</td></tr><tr><td>1.1</td><td>0.337</td><td>0.199</td><td>0.181</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]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.014	0.014	0.014	0.2	0.082	0.056	0.052	0.4	0.138	0.087	0.080	0.6	0.196	0.120	0.111	0.8	0.251	0.152	0.137	1.0	0.308	0.183	0.167	1.1	0.337	0.199	0.181	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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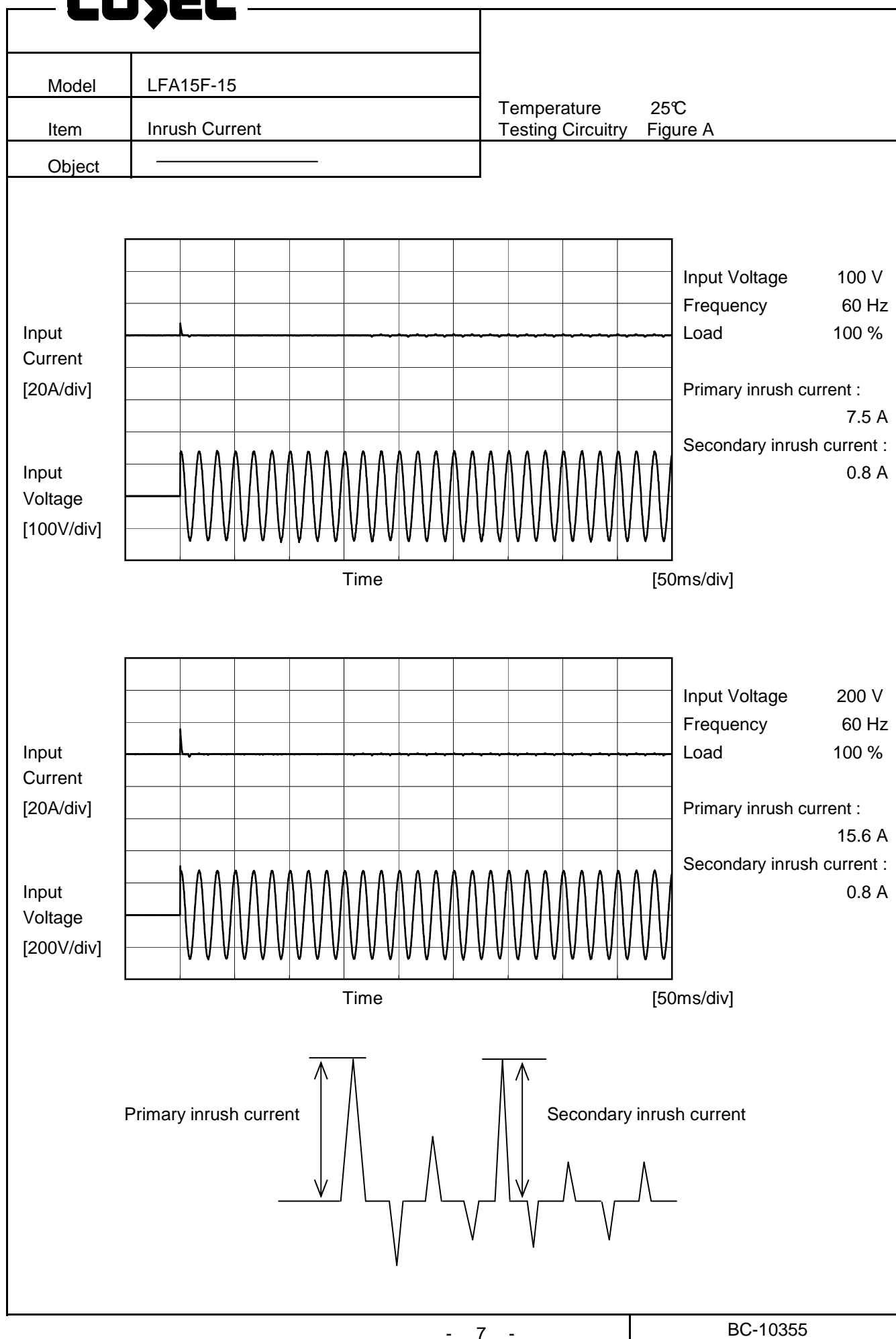
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**COSEL**

		Temperature 25℃ Testing Circuitry Figure B
Model	LFA15F-15	
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.

Model	LFA15F-15																																		
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<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> <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">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>0.0</td><td>15.049</td><td>15.049</td><td>15.049</td></tr><tr><td>0.2</td><td>15.048</td><td>15.048</td><td>15.048</td></tr><tr><td>0.4</td><td>15.048</td><td>15.048</td><td>15.048</td></tr><tr><td>0.6</td><td>15.047</td><td>15.047</td><td>15.047</td></tr><tr><td>0.8</td><td>15.047</td><td>15.047</td><td>15.047</td></tr><tr><td>1.0</td><td>15.046</td><td>15.046</td><td>15.046</td></tr><tr><td>1.1</td><td>15.046</td><td>15.046</td><td>15.046</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]	0.0	15.049	15.049	15.049	0.2	15.048	15.048	15.048	0.4	15.048	15.048	15.048	0.6	15.047	15.047	15.047	0.8	15.047	15.047	15.047	1.0	15.046	15.046	15.046	1.1	15.046	15.046	15.046	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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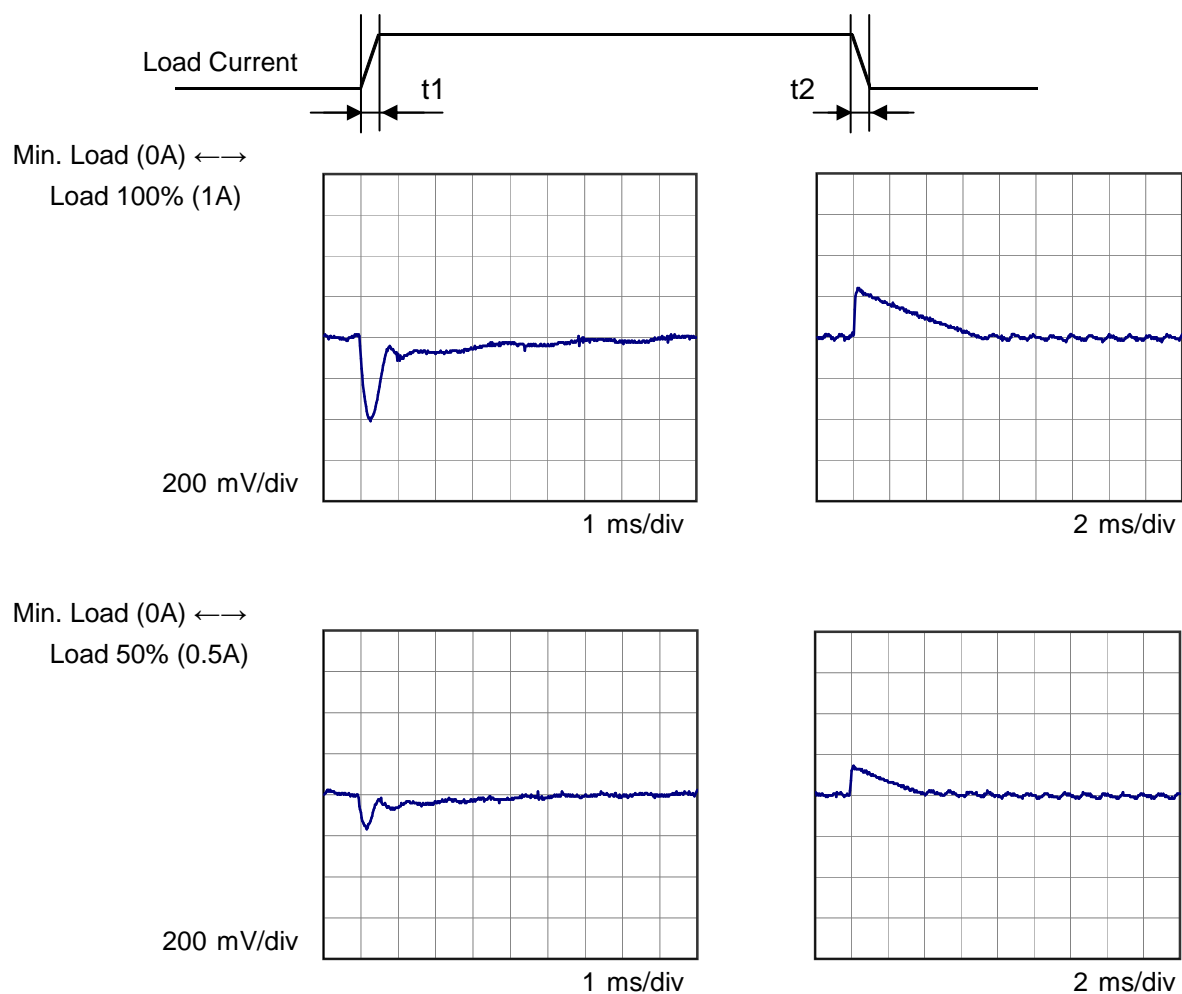
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Model	LFA15F-15	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+15V1A		

Input Volt. 100 V  
Cycle 1000 ms

Response.  $t_1=t_2=50\mu\text{s}$ . Typ



Model	LFA15F-15																																								
Item	Ripple Voltage (by Load Current)	Temperature	25℃																																						
Object	+15V1A	Testing Circuitry	Figure C																																						
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 100V</div><div>-·-○-·- Input Volt. 200V</div></div><div>Ripple Voltage [mV]</div><div>Load Current [A]</div></div>		<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>0.0</td><td>25</td><td>30</td></tr><tr><td>0.2</td><td>15</td><td>20</td></tr><tr><td>0.4</td><td>20</td><td>15</td></tr><tr><td>0.6</td><td>25</td><td>20</td></tr><tr><td>0.8</td><td>30</td><td>20</td></tr><tr><td>1.0</td><td>35</td><td>20</td></tr><tr><td>1.1</td><td>35</td><td>20</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>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	25	30	0.2	15	20	0.4	20	15	0.6	25	20	0.8	30	20	1.0	35	20	1.1	35	20	--	-	-	--	-	-	--	-	-	--	-	-
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Fig. Complex Ripple Wave Form																																									

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Model	LFA15F-15																																								
Item	Ripple-Noise	Temperature	25℃																																						
Object	+15V1A	Testing Circuitry	Figure C																																						
1.Graph		2.Values																																							
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Model		LFA15F-15	Testing Circuitry    Figure C																																																								
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<div><div><div>---□--- Input Volt. 100V</div><div>—△— Input Volt. 200V</div></div><table><caption>Graph Data Points (Estimated)</caption><thead><tr><th>Ambient Temperature [°C]</th><th>Input Volt. 100V [mV]</th><th>Input Volt. 200V [mV]</th></tr></thead><tbody><tr><td>-30</td><td>140</td><td>120</td></tr><tr><td>-10</td><td>80</td><td>70</td></tr><tr><td>0</td><td>55</td><td>45</td></tr><tr><td>25</td><td>35</td><td>20</td></tr><tr><td>50</td><td>25</td><td>20</td></tr></tbody></table><p>Ambient Temperature [°C] Load 100 %</p></div>			Ambient Temperature [°C]	Input Volt. 100V [mV]	Input Volt. 200V [mV]	-30	140	120	-10	80	70	0	55	45	25	35	20	50	25	20	<table><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><tr><td>-30</td><td>140</td><td>120</td></tr><tr><td>-10</td><td>80</td><td>70</td></tr><tr><td>0</td><td>55</td><td>45</td></tr><tr><td>25</td><td>35</td><td>20</td></tr><tr><td>50</td><td>25</td><td>20</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>	Ambient Temperature [°C]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	-30	140	120	-10	80	70	0	55	45	25	35	20	50	25	20	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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Model	LFA15F-15																																																					
Item	Ambient Temperature Drift	Testing Circuitry    Figure A																																																				
Object	+15V1A																																																					
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> <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>		<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>15.051</td><td>15.052</td><td>15.051</td></tr><tr><td>-10</td><td>15.049</td><td>15.049</td><td>15.049</td></tr><tr><td>0</td><td>15.046</td><td>15.046</td><td>15.046</td></tr><tr><td>10</td><td>15.044</td><td>15.044</td><td>15.044</td></tr><tr><td>20</td><td>15.043</td><td>15.043</td><td>15.043</td></tr><tr><td>25</td><td>15.042</td><td>15.042</td><td>15.042</td></tr><tr><td>30</td><td>15.042</td><td>15.042</td><td>15.042</td></tr><tr><td>40</td><td>15.041</td><td>15.041</td><td>15.041</td></tr><tr><td>50</td><td>15.038</td><td>15.038</td><td>15.038</td></tr><tr><td>60</td><td>15.033</td><td>15.033</td><td>15.033</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	15.051	15.052	15.051	-10	15.049	15.049	15.049	0	15.046	15.046	15.046	10	15.044	15.044	15.044	20	15.043	15.043	15.043	25	15.042	15.042	15.042	30	15.042	15.042	15.042	40	15.041	15.041	15.041	50	15.038	15.038	15.038	60	15.033	15.033	15.033	--	-	-	-
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		Testing Circuitry Figure A
Model	LFA15F-15	
Item	Output Voltage Accuracy	
Object	+15V1A	

### 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 - 1A

\* 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	15.051	±7	±0.1
Minimum Voltage	50	85	1	15.038		



Model	LFA15F-15																								
Item	Time Lapse Drift	Temperature	25℃																						
		Testing Circuitry	Figure A																						
Object	+15V1A																								
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>15.049</td></tr><tr><td>0.5</td><td>15.045</td></tr><tr><td>1.0</td><td>15.045</td></tr><tr><td>2.0</td><td>15.046</td></tr><tr><td>3.0</td><td>15.046</td></tr><tr><td>4.0</td><td>15.046</td></tr><tr><td>5.0</td><td>15.046</td></tr><tr><td>6.0</td><td>15.046</td></tr><tr><td>7.0</td><td>15.046</td></tr><tr><td>8.0</td><td>15.046</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	15.049	0.5	15.045	1.0	15.045	2.0	15.046	3.0	15.046	4.0	15.046	5.0	15.046	6.0	15.046	7.0	15.046	8.0	15.046
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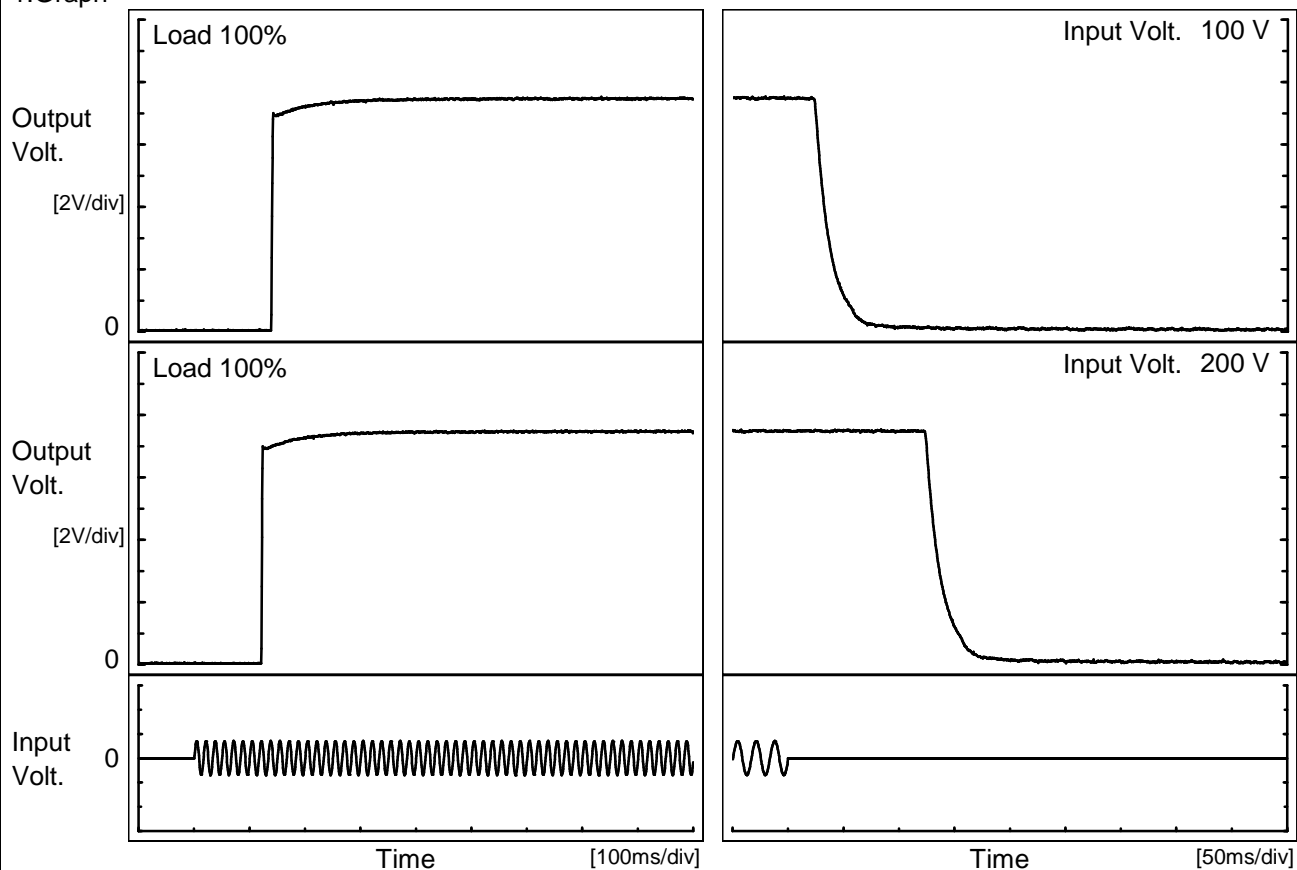
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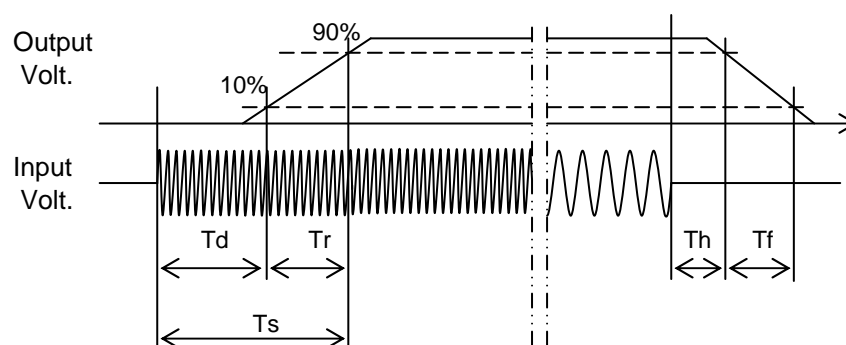
Model	LFA15F-15	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+15V1A		

## 1. Graph



## 2. Values

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	140.0	2.5	142.5	24.8	31.5
200 V	122.0	2.0	124.0	125.3	31.5



Model	LFA15F-15																																		
Item	Hold-Up Time	Temperature	25℃																																
		Testing Circuitry	Figure A																																
Object	+15V1A																																		
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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>24</td><td>4</td></tr><tr><td>85</td><td>34</td><td>9</td></tr><tr><td>100</td><td>51</td><td>20</td></tr><tr><td>120</td><td>80</td><td>37</td></tr><tr><td>200</td><td>247</td><td>123</td></tr><tr><td>230</td><td>331</td><td>166</td></tr><tr><td>264</td><td>443</td><td>226</td></tr><tr><td>280</td><td>502</td><td>256</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	75	24	4	85	34	9	100	51	20	120	80	37	200	247	123	230	331	166	264	443	226	280	502	256	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																		
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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	LFA15F-15																																																					
Item	Instantaneous Interruption Compensation	Temperature	25℃																																																			
Object	+15V1A	Testing Circuitry	Figure A																																																			
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<div><div>—△— Input Volt. 100V</div><div>- - □ - - Input Volt. 200V</div><div>- · ○ - · Input Volt. 230V</div></div> <p>Instantaneous Compensation Time [ms]</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">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>0.0</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.2</td><td>131</td><td>566</td><td>754</td></tr><tr><td>0.4</td><td>68</td><td>313</td><td>422</td></tr><tr><td>0.6</td><td>44</td><td>213</td><td>288</td></tr><tr><td>0.8</td><td>31</td><td>159</td><td>215</td></tr><tr><td>1.0</td><td>20</td><td>122</td><td>166</td></tr><tr><td>1.1</td><td>18</td><td>110</td><td>151</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]	0.0	-	-	-	0.2	131	566	754	0.4	68	313	422	0.6	44	213	288	0.8	31	159	215	1.0	20	122	166	1.1	18	110	151	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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[illegible]

Model	LFA15F-15																																											
Item	Overcurrent Protection	Temperature	25℃																																									
Object	+15V1A	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>15.00</td><td>1.80</td><td>2.35</td></tr><tr><td>14.25</td><td>-</td><td>-</td></tr><tr><td>13.50</td><td>-</td><td>-</td></tr><tr><td>12.00</td><td>-</td><td>-</td></tr><tr><td>10.50</td><td>-</td><td>-</td></tr><tr><td>9.00</td><td>-</td><td>-</td></tr><tr><td>7.50</td><td>-</td><td>-</td></tr><tr><td>6.00</td><td>-</td><td>-</td></tr><tr><td>4.50</td><td>-</td><td>-</td></tr><tr><td>3.00</td><td>-</td><td>-</td></tr><tr><td>1.50</td><td>-</td><td>-</td></tr><tr><td>0.00</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]		Input Volt. 100[V]	Input Volt. 200[V]	15.00	1.80	2.35	14.25	-	-	13.50	-	-	12.00	-	-	10.50	-	-	9.00	-	-	7.50	-	-	6.00	-	-	4.50	-	-	3.00	-	-	1.50	-	-	0.00	-	-
Output Voltage [V]	Load Current [A]																																											
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Model		LFA15F-15																																						
Item		Overvoltage Protection																																						
Object		+15V1A																																						
1.Graph		2.Values																																						
<div><div><div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 200V</div></div></div><p>Operating Point [V]</p><p>Ambient Temperature [°C]</p><p>Load 0%</p><p>Note: Slanted line shows the range of the rated ambient temperature.</p></div></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. 200[V]</th></tr><tr><td>-20</td><td>19.02</td><td>19.02</td></tr><tr><td>-10</td><td>19.16</td><td>19.16</td></tr><tr><td>0</td><td>19.30</td><td>19.30</td></tr><tr><td>10</td><td>19.44</td><td>19.44</td></tr><tr><td>20</td><td>19.58</td><td>19.58</td></tr><tr><td>25</td><td>19.66</td><td>19.66</td></tr><tr><td>30</td><td>19.73</td><td>19.65</td></tr><tr><td>40</td><td>19.80</td><td>19.80</td></tr><tr><td>50</td><td>19.94</td><td>19.94</td></tr><tr><td>60</td><td>20.08</td><td>20.08</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 200[V]	-20	19.02	19.02	-10	19.16	19.16	0	19.30	19.30	10	19.44	19.44	20	19.58	19.58	25	19.66	19.66	30	19.73	19.65	40	19.80	19.80	50	19.94	19.94	60	20.08	20.08	--	-	-
Ambient Temperature [°C]	Operating Point [V]																																							
	Input Volt. 100[V]	Input Volt. 200[V]																																						
-20	19.02	19.02																																						
-10	19.16	19.16																																						
0	19.30	19.30																																						
10	19.44	19.44																																						
20	19.58	19.58																																						
25	19.66	19.66																																						
30	19.73	19.65																																						
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50	19.94	19.94																																						
60	20.08	20.08																																						
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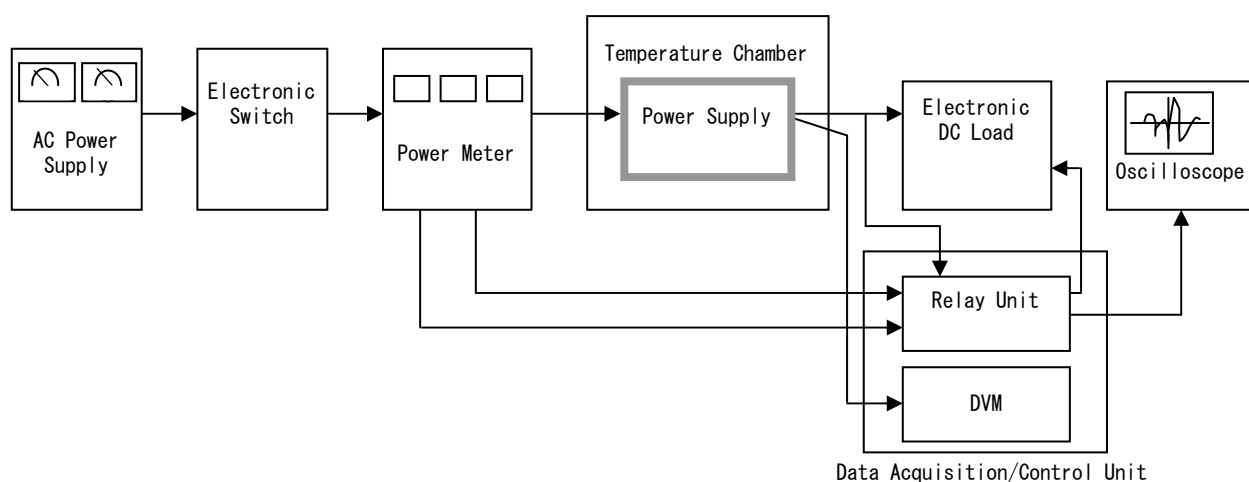


Figure A

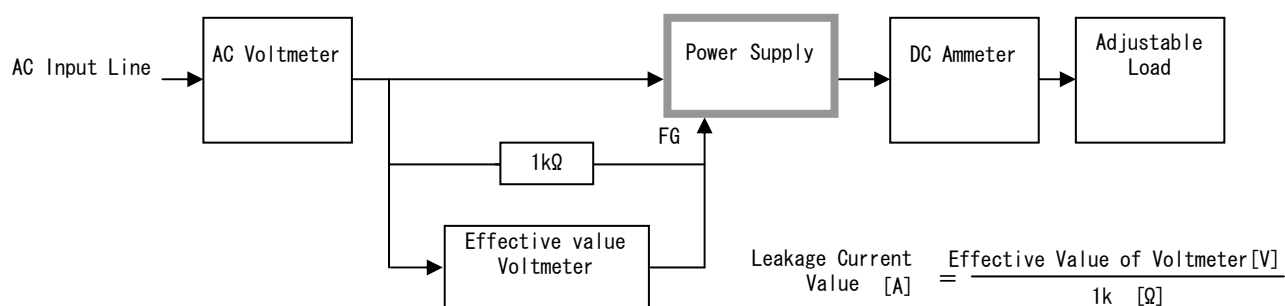


Figure B ( DEN-AN )

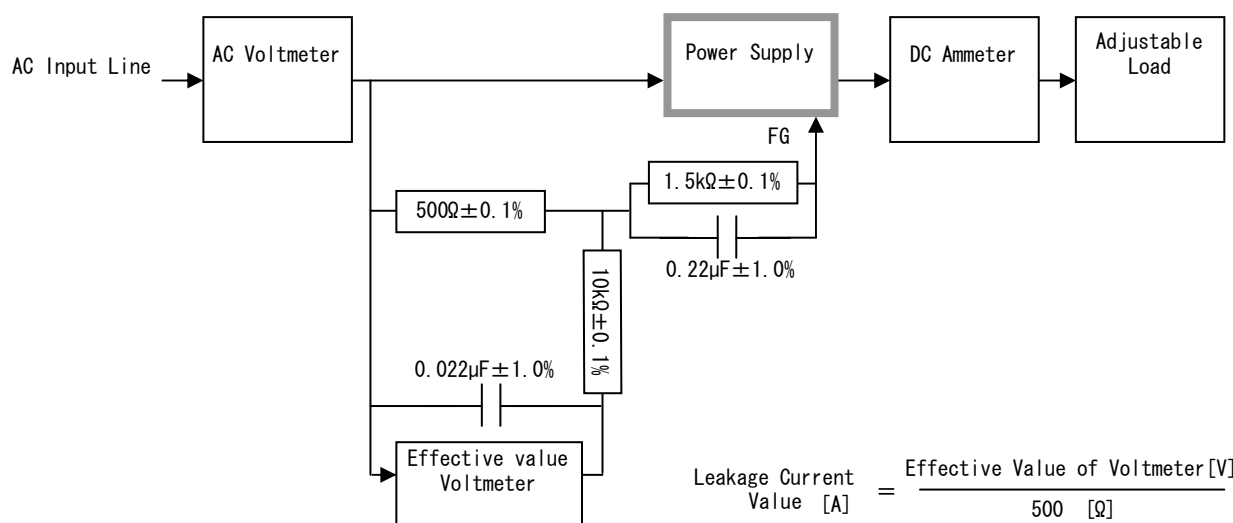


Figure B ( IEC60950-1 )

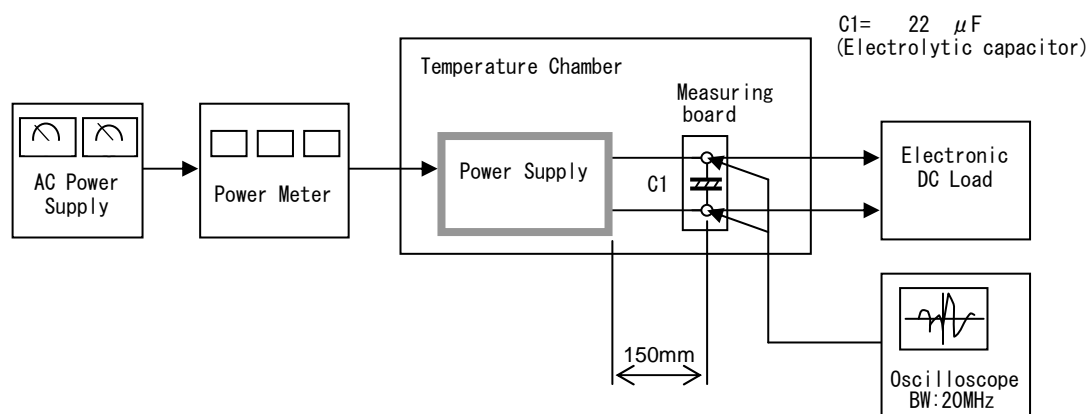


Figure C