



TEST DATA OF LFA15F-5

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.

CONTENTS

1.Input Current (by Load Current)	1
2.Input Power (by Load Current)	2
3.Efficiency (by Input Voltage)	3
4.Efficiency (by Load Current)	4
5.Power Factor (by Input Voltage)	5
6.Power Factor (by Load Current)	6
7.Inrush Current	7
8.Leakage Current	8
9.Line Regulation	9
10.Load Regulation	10
11.Dynamic Load Response	11
12.Ripple Voltage (by Load Current)	12
13.Ripple-Noise	13
14.Ripple Voltage (by Ambient Temperature)	14
15.Ambient Temperature Drift	15
16.Output Voltage Accuracy	16
17.Time Lapse Drift	17
18.Rise and Fall Time	18
19.Hold-Up Time	19
20.Instantaneous Interruption Compensation	20
21.Minimum Input Voltage for Regulated Output Voltage	21
22.Overcurrent Protection	22
23.Overvoltage Protection	23
24.Figure of Testing Circuitry	24

(Final Page 25)

Model	LFA15F-5																																																					
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<div><div>—△— Input Volt. 100V</div><div>---□--- Input Volt. 200V</div><div>-·-○-·- Input Volt. 230V</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>0.0</td><td>0.012</td><td>0.010</td><td>0.011</td></tr><tr><td>0.6</td><td>0.084</td><td>0.058</td><td>0.054</td></tr><tr><td>1.2</td><td>0.146</td><td>0.093</td><td>0.085</td></tr><tr><td>1.8</td><td>0.208</td><td>0.125</td><td>0.116</td></tr><tr><td>2.4</td><td>0.270</td><td>0.162</td><td>0.148</td></tr><tr><td>3.0</td><td>0.333</td><td>0.196</td><td>0.178</td></tr><tr><td>3.3</td><td>0.366</td><td>0.213</td><td>0.194</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	0.012	0.010	0.011	0.6	0.084	0.058	0.054	1.2	0.146	0.093	0.085	1.8	0.208	0.125	0.116	2.4	0.270	0.162	0.148	3.0	0.333	0.196	0.178	3.3	0.366	0.213	0.194	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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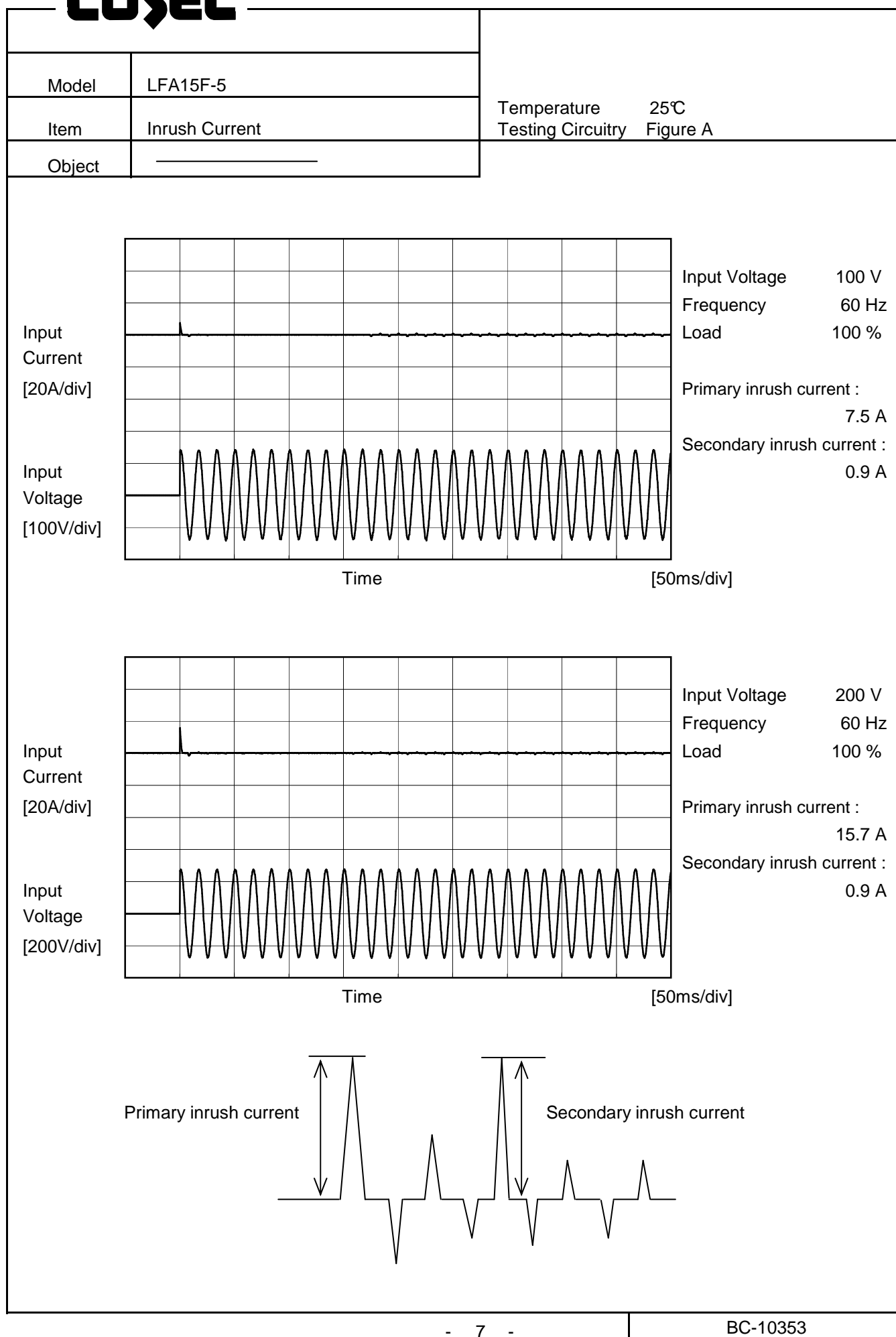
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- 6 -

BC-10353

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		Temperature 25℃ Testing Circuitry Figure B
Model	LFA15F-5	
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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0.6	5.068	5.068	5.068																																																			
1.2	5.066	5.066	5.066																																																			
1.8	5.064	5.064	5.063																																																			
2.4	5.061	5.061	5.061																																																			
3.0	5.059	5.059	5.059																																																			
3.3	5.058	5.058	5.058																																																			
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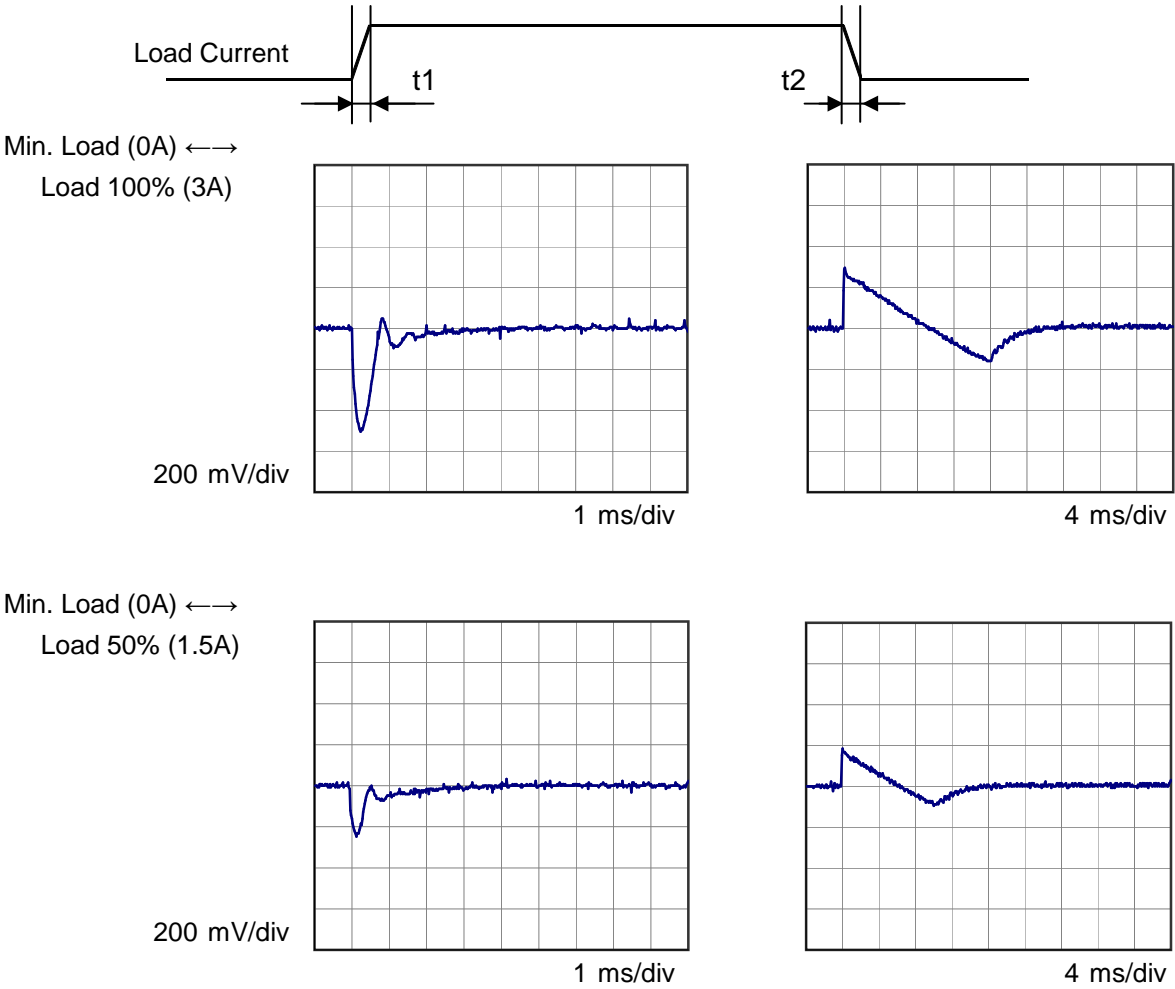
BC-10353



Model	LFA15F-5	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+5V3A		

Input Volt. 100 V
Cycle 1000 ms

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



Model	LFA15F-5	Temperature Testing Circuitry	25℃ Figure C																																						
Item	Ripple Voltage (by Load Current)																																								
Object	+5V3A																																								
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>		<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>40</td></tr><tr><td>0.6</td><td>15</td><td>15</td></tr><tr><td>1.2</td><td>15</td><td>15</td></tr><tr><td>1.8</td><td>20</td><td>15</td></tr><tr><td>2.4</td><td>20</td><td>15</td></tr><tr><td>3.0</td><td>25</td><td>25</td></tr><tr><td>3.3</td><td>25</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></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	25	40	0.6	15	15	1.2	15	15	1.8	20	15	2.4	20	15	3.0	25	25	3.3	25	25	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 100 [V]	Input Volt. 200 [V]																																							
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<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>																																									
<div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div><p>Ripple [mVp-p]</p><p>T1</p><p>T2</p></div>																																									
Fig. Complex Ripple Wave Form																																									

Model	LFA15F-5																																								
Item	Ripple-Noise	Temperature	25℃																																						
Object	+5V3A	Testing Circuitry	Figure C																																						
1.Graph		2.Values																																							
<div><div><div>—△— Input Volt. 100V</div><div>-·-○-·- Input Volt. 200V</div></div><p>Ripple-Noise [mV]</p><p>Load Current [A]</p></div> <div><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>		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 100 [V]</th><th>Input Volt. 200 [V]</th></tr><tr><td>0.0</td><td>30</td><td>40</td></tr><tr><td>0.6</td><td>20</td><td>20</td></tr><tr><td>1.2</td><td>20</td><td>25</td></tr><tr><td>1.8</td><td>30</td><td>25</td></tr><tr><td>2.4</td><td>30</td><td>30</td></tr><tr><td>3.0</td><td>40</td><td>45</td></tr><tr><td>3.3</td><td>40</td><td>45</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-Noise [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.0	30	40	0.6	20	20	1.2	20	25	1.8	30	25	2.4	30	30	3.0	40	45	3.3	40	45	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																								
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0.0	30	40																																							
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<div><div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div></div><p>Ripple-Noise [mVp-p]</p></div> <p>Fig. Complex Ripple Wave Form</p>																																									

Model	LFA15F-5																																																					
Item	Ambient Temperature Drift	Testing Circuitry Figure A																																																				
Object	+5V3A																																																					
1.Graph		2.Values																																																				
<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>		<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>5.062</td><td>5.062</td><td>5.062</td></tr><tr><td>-10</td><td>5.061</td><td>5.061</td><td>5.061</td></tr><tr><td>0</td><td>5.060</td><td>5.060</td><td>5.060</td></tr><tr><td>10</td><td>5.060</td><td>5.060</td><td>5.060</td></tr><tr><td>20</td><td>5.060</td><td>5.060</td><td>5.060</td></tr><tr><td>25</td><td>5.060</td><td>5.060</td><td>5.060</td></tr><tr><td>30</td><td>5.060</td><td>5.060</td><td>5.060</td></tr><tr><td>40</td><td>5.059</td><td>5.059</td><td>5.059</td></tr><tr><td>50</td><td>5.058</td><td>5.058</td><td>5.058</td></tr><tr><td>60</td><td>5.055</td><td>5.055</td><td>5.055</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	5.062	5.062	5.062	-10	5.061	5.061	5.061	0	5.060	5.060	5.060	10	5.060	5.060	5.060	20	5.060	5.060	5.060	25	5.060	5.060	5.060	30	5.060	5.060	5.060	40	5.059	5.059	5.059	50	5.058	5.058	5.058	60	5.055	5.055	5.055	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
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10	5.060	5.060	5.060																																																			
20	5.060	5.060	5.060																																																			
25	5.060	5.060	5.060																																																			
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50	5.058	5.058	5.058																																																			
60	5.055	5.055	5.055																																																			
--	-	-	-																																																			

- 15 -

BC-10353



		Testing Circuitry Figure A
Model	LFA15F-5	
Item	Output Voltage Accuracy	
Object	+5V3A	

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 - 3A

* 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	30	264	0	5.071	±7	±0.1
Minimum Voltage	50	264	3	5.058		

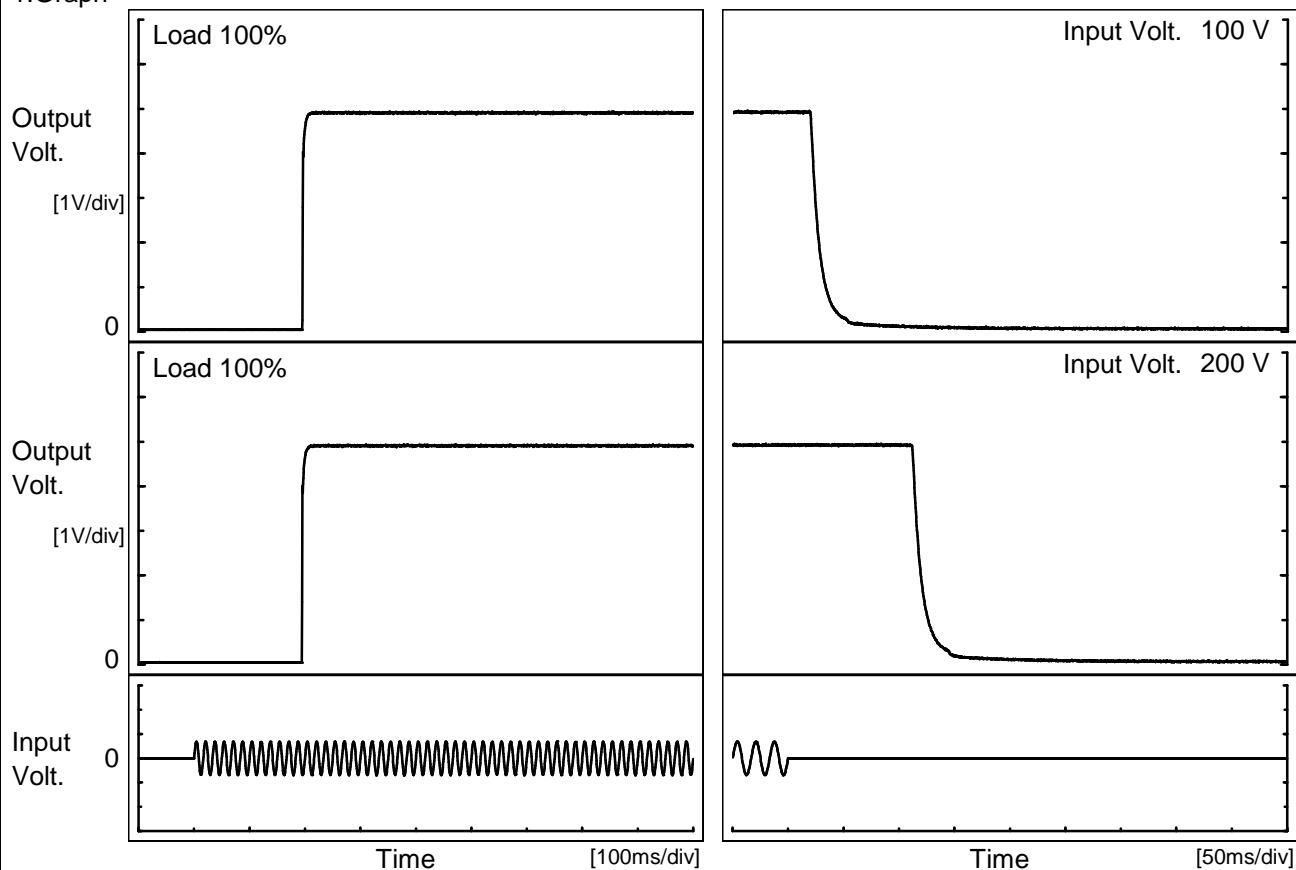
Model	LFA15F-5																								
Item	Time Lapse Drift	Temperature	25℃																						
		Testing Circuitry	Figure A																						
Object	+5V3A																								
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 100V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>5.065</td></tr><tr><td>0.5</td><td>5.061</td></tr><tr><td>1.0</td><td>5.061</td></tr><tr><td>2.0</td><td>5.061</td></tr><tr><td>3.0</td><td>5.060</td></tr><tr><td>4.0</td><td>5.060</td></tr><tr><td>5.0</td><td>5.060</td></tr><tr><td>6.0</td><td>5.060</td></tr><tr><td>7.0</td><td>5.060</td></tr><tr><td>8.0</td><td>5.060</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	5.065	0.5	5.061	1.0	5.061	2.0	5.061	3.0	5.060	4.0	5.060	5.0	5.060	6.0	5.060	7.0	5.060	8.0	5.060
Time since start [H]	Output Voltage [V]																								
0.0	5.065																								
0.5	5.061																								
1.0	5.061																								
2.0	5.061																								
3.0	5.060																								
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5.0	5.060																								
6.0	5.060																								
7.0	5.060																								
8.0	5.060																								
* The characteristic of AC200V is equal.																									

- 17 -

BC-10353

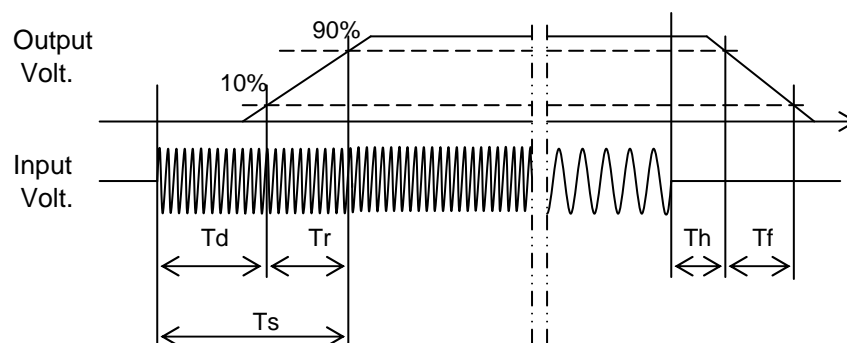
Model	LFA15F-5	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+5V3A		

1.Graph



2.Values

Input Volt. \ Time	Td	Tr	Ts	Th	Tf
100 V	196.0	4.0	200.0	20.5	19.8
200 V	195.0	4.5	199.5	112.8	21.0



Model		LFA15F-5	Temperature		25℃																																
Item		Hold-Up Time	Testing Circuitry		Figure A																																
Object		+5V3A																																			
1.Graph			2.Values																																		
<div><div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div>50</div><div>100</div><div>150</div><div>200</div><div>250</div><div>300</div></div><div><div>Hold-Up Time [ms]</div><div>Input Voltage [V]</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>			<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>22</td><td>8</td></tr><tr><td>85</td><td>32</td><td>12</td></tr><tr><td>100</td><td>48</td><td>21</td></tr><tr><td>120</td><td>75</td><td>34</td></tr><tr><td>200</td><td>234</td><td>114</td></tr><tr><td>230</td><td>314</td><td>158</td></tr><tr><td>264</td><td>420</td><td>209</td></tr><tr><td>280</td><td>475</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	22	8	85	32	12	100	48	21	120	75	34	200	234	114	230	314	158	264	420	209	280	475	238	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																				
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200	234	114																																			
230	314	158																																			
264	420	209																																			
280	475	238																																			
--	-	-																																			
<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>																																					

- 19 -

BC-10353

Model	LFA15F-5																																																					
Item	Instantaneous Interruption Compensation	Temperature	25℃																																																			
Object	+5V3A	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> <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>0.6</td><td>123</td><td>543</td><td>719</td></tr><tr><td>1.2</td><td>62</td><td>291</td><td>391</td></tr><tr><td>1.8</td><td>40</td><td>197</td><td>266</td></tr><tr><td>2.4</td><td>28</td><td>145</td><td>197</td></tr><tr><td>3.0</td><td>21</td><td>114</td><td>156</td></tr><tr><td>3.3</td><td>18</td><td>103</td><td>140</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	-	-	-	0.6	123	543	719	1.2	62	291	391	1.8	40	197	266	2.4	28	145	197	3.0	21	114	156	3.3	18	103	140	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
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- 20 -

BC-10353

Model

LFA15F-5

Item

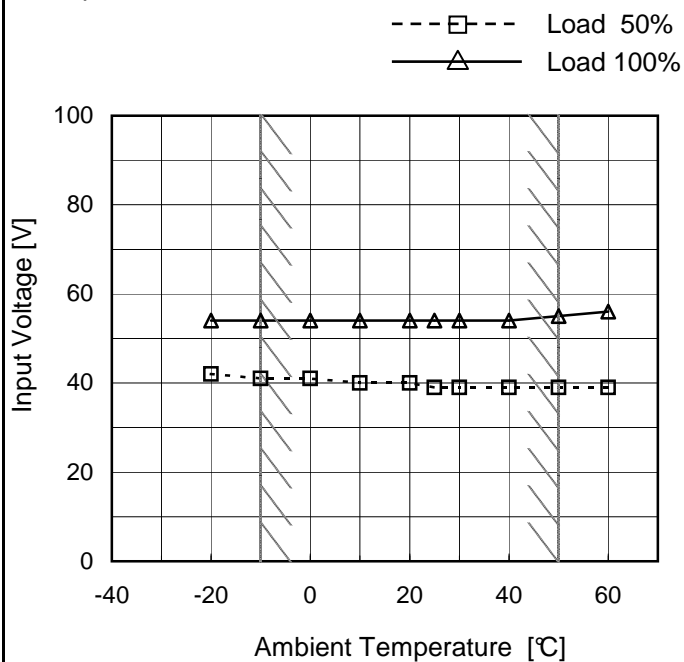
Minimum Input Voltage
for Regulated Output Voltage

Object

+5V3A

Testing Circuitry Figure A

1. Graph



Note: Slanted line shows the range of the rated ambient temperature.

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	42	54
-10	41	54
0	41	54
10	40	54
20	40	54
25	39	54
30	39	54
40	39	54
50	39	55
60	39	56
--	-	-

Model	LFA15F-5																																											
Item	Overcurrent Protection	Temperature	25℃																																									
Object	+5V3A	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>5.00</td><td>4.93</td><td>6.32</td></tr><tr><td>4.75</td><td>-</td><td>-</td></tr><tr><td>4.50</td><td>-</td><td>-</td></tr><tr><td>4.00</td><td>-</td><td>-</td></tr><tr><td>3.50</td><td>-</td><td>-</td></tr><tr><td>3.00</td><td>-</td><td>-</td></tr><tr><td>2.50</td><td>-</td><td>-</td></tr><tr><td>2.00</td><td>-</td><td>-</td></tr><tr><td>1.50</td><td>-</td><td>-</td></tr><tr><td>1.00</td><td>-</td><td>-</td></tr><tr><td>0.50</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]	5.00	4.93	6.32	4.75	-	-	4.50	-	-	4.00	-	-	3.50	-	-	3.00	-	-	2.50	-	-	2.00	-	-	1.50	-	-	1.00	-	-	0.50	-	-	0.00	-	-
Output Voltage [V]	Load Current [A]																																											
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- 22 -

BC-10353

[illegible]

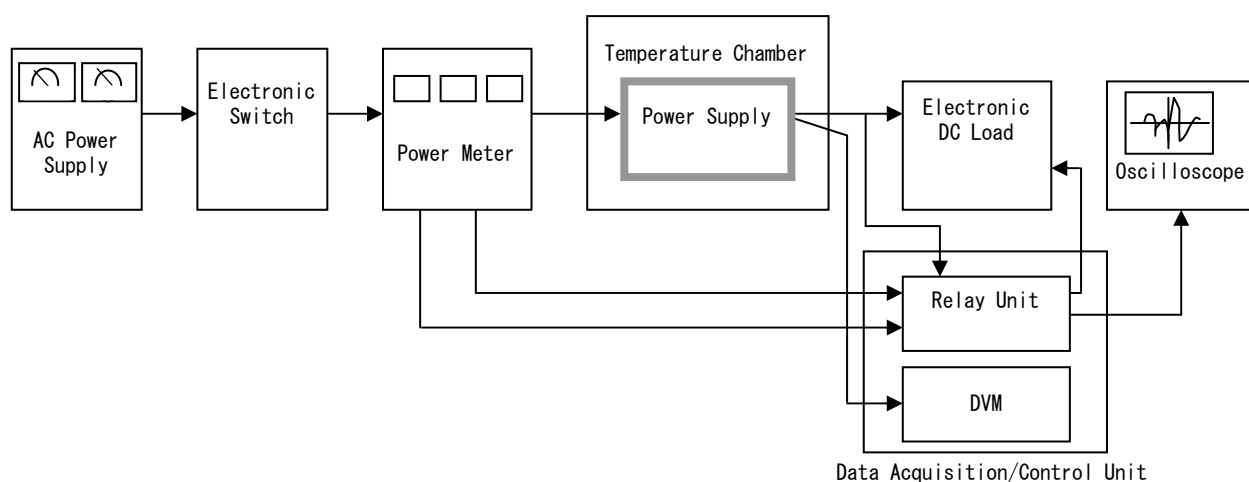


Figure A

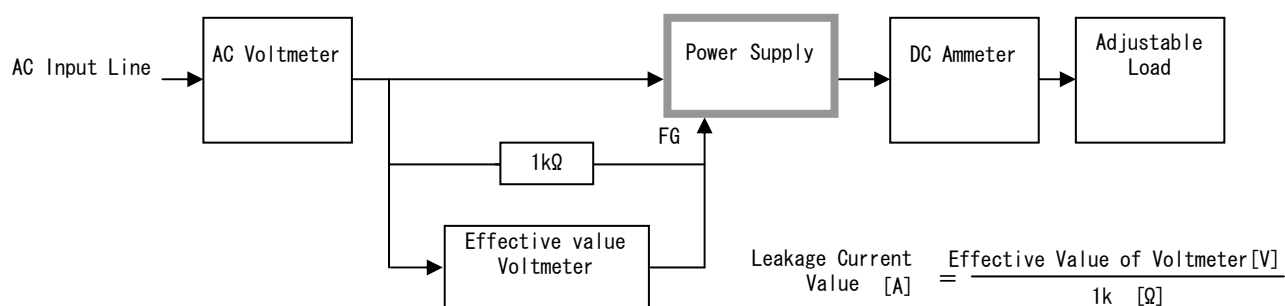


Figure B (DEN-AN)

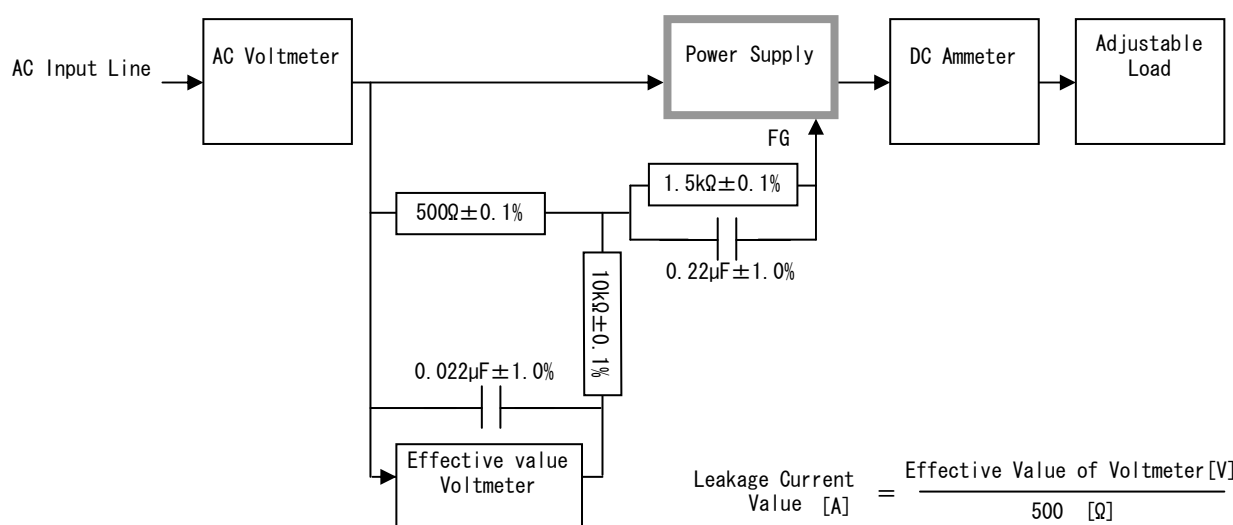


Figure B (IEC60950-1)

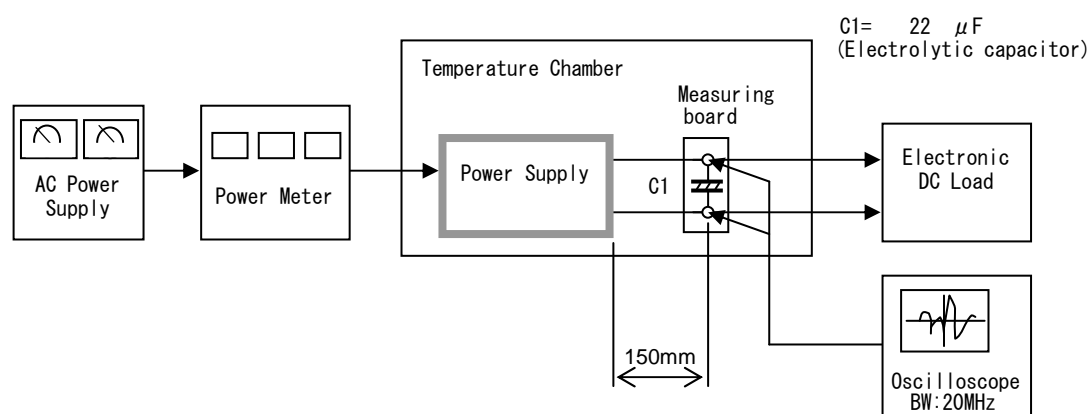


Figure C