

# TEST DATA OF PCA600F-12-P2

Regulated DC Power Supply  
March 13, 2017

Approved by : Kaji Todo  
Koji Todo Design Manager

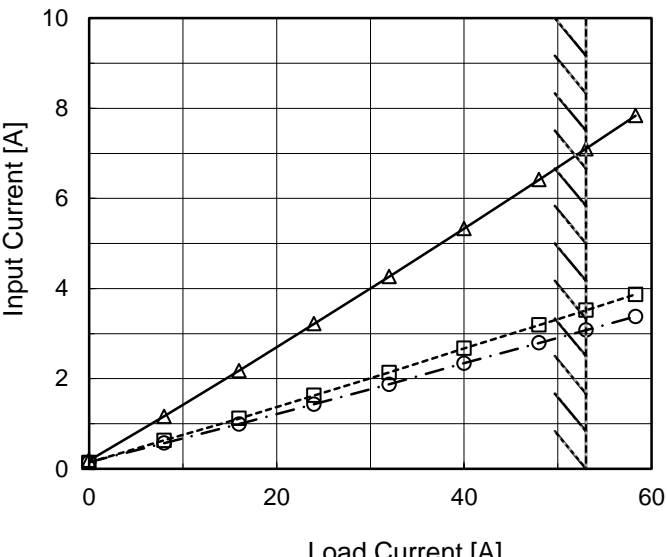
Prepared by : Yutaka Tamura  
Yutaka Tamura Design Engineer

**COSEL CO.,LTD.**

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Model		PCA600F-12-P2		Temperature 25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph		<div><div>—△—</div>Input Volt. 100V</div> <div><div>---□---</div>Input Volt. 200V</div> <div><div>-·-○-·-</div>Input Volt. 230V</div>  <p>Note: Slanted line shows the range of the rated load current.</p>		2.Values																																																				
		<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>0.185</td><td>0.139</td><td>0.146</td></tr><tr><td>8.0</td><td>1.163</td><td>0.630</td><td>0.569</td></tr><tr><td>16.0</td><td>2.180</td><td>1.117</td><td>0.990</td></tr><tr><td>24.0</td><td>3.219</td><td>1.627</td><td>1.432</td></tr><tr><td>32.0</td><td>4.263</td><td>2.135</td><td>1.874</td></tr><tr><td>40.0</td><td>5.329</td><td>2.671</td><td>2.344</td></tr><tr><td>48.0</td><td>6.416</td><td>3.191</td><td>2.794</td></tr><tr><td>53.0</td><td>7.102</td><td>3.518</td><td>3.076</td></tr><tr><td>58.3</td><td>7.837</td><td>3.869</td><td>3.378</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	0.185	0.139	0.146	8.0	1.163	0.630	0.569	16.0	2.180	1.117	0.990	24.0	3.219	1.627	1.432	32.0	4.263	2.135	1.874	40.0	5.329	2.671	2.344	48.0	6.416	3.191	2.794	53.0	7.102	3.518	3.076	58.3	7.837	3.869	3.378	--	-	-	-	--	-	-	-
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Item		Efficiency (by Input Voltage)		Testing Circuitry Figure A																															
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Item		Power Factor (by Input Voltage)		Testing Circuitry Figure A	
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1.Graph				2.Values	
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Model		PCA600F-12-P2		Temperature25°C																																																				
Item		Power Factor (by Load Current)		Testing CircuitryFigure A																																																				
Object																																																								
1.Graph		<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><p>Power Factor</p><p>Load Current [A]</p></div> <div>Note: Slanted line shows the range of the rated load current.</div>		2.Values																																																				
		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Power Factor</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>0.706</td><td>0.374</td><td>0.294</td></tr><tr><td>8.0</td><td>0.980</td><td>0.904</td><td>0.874</td></tr><tr><td>16.0</td><td>0.993</td><td>0.954</td><td>0.936</td></tr><tr><td>24.0</td><td>0.996</td><td>0.972</td><td>0.959</td></tr><tr><td>32.0</td><td>0.997</td><td>0.981</td><td>0.970</td></tr><tr><td>40.0</td><td>0.998</td><td>0.980</td><td>0.971</td></tr><tr><td>48.0</td><td>0.998</td><td>0.984</td><td>0.976</td></tr><tr><td>53.0</td><td>0.998</td><td>0.985</td><td>0.978</td></tr><tr><td>58.3</td><td>0.999</td><td>0.987</td><td>0.981</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]	Power Factor			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.0	0.706	0.374	0.294	8.0	0.980	0.904	0.874	16.0	0.993	0.954	0.936	24.0	0.996	0.972	0.959	32.0	0.997	0.981	0.970	40.0	0.998	0.980	0.971	48.0	0.998	0.984	0.976	53.0	0.998	0.985	0.978	58.3	0.999	0.987	0.981	--	-	-	-	--	-	-	-
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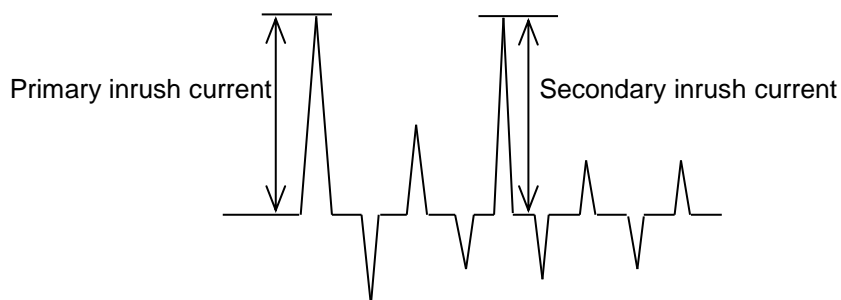
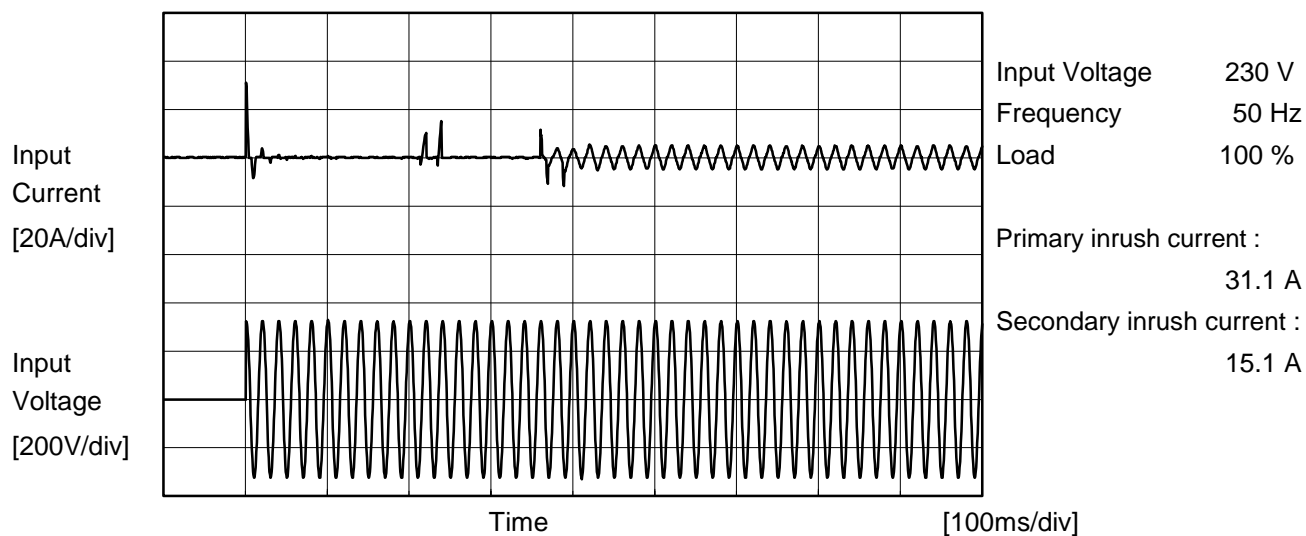
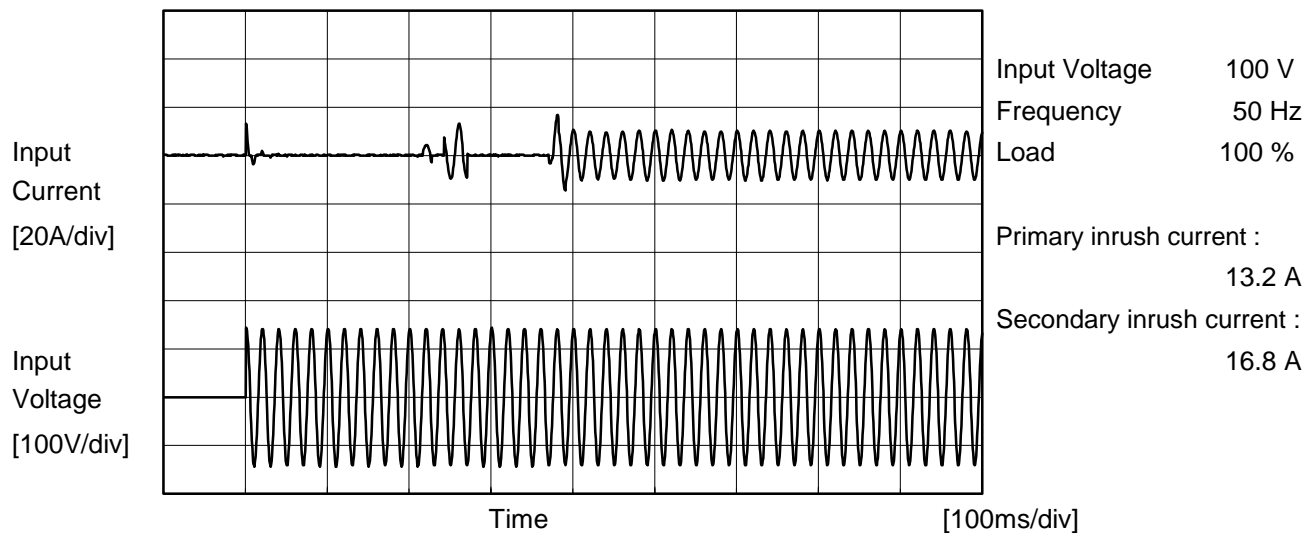
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**COSEL**

Model	PCA600F-12-P2	Temperature	25°C
Item	Inrush Current	Testing Circuitry	Figure A
Object	_____		





		Temperature 25°C Testing Circuitry Figure B
Model	PCA600F-12-P2	
Item	Leakage Current	
Object	_____	

## 1.Results

Standards	Testing Circuitry	Measuring Method	Input Volt.			Note
			100 [V]	230 [V]	240 [V]	
DEN-AN	Figure B-1	Both phases	0.13	0.30	0.31	Operation
		One of phases	0.25	0.56	0.58	Stand by
IEC62368-1	Figure B-2	Both phases	0.12	0.29	0.30	Operation
		One of phases	0.25	0.54	0.56	Stand by
	Figure B-3	Both phases	0.12	0.29	0.30	Operation
		One of phases	0.25	0.54	0.57	Stand by
IEC60601-1	Figure B-4	Both phases	0.12	0.29	0.30	Operation
		One of phases	0.24	0.53	0.55	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		PCA600F-12-P2	
Item		Line Regulation	
Object		+12V53A	
1.Graph		2.Values	

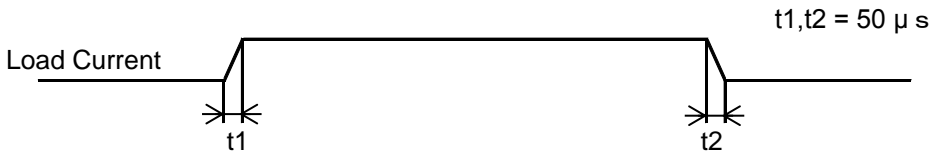


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58.3	12.142	12.142	12.142																																																					
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Note: Slanted line shows the range of the rated load current.																																																								



Model	PCA600F-12-P2		
Item	Dynamic Load Response	Temperature	25°C
		Testing Circuitry	Figure A
Object	+12V53A		

Input Volt. 100 V  
Cycle 1000 ms



Min.Load (0A) ←→  
Load 100% (53A)

1 V/div

2 ms/div

10 ms/div

Min.Load (0A) ←→  
Load 50% (26.5A)

1 V/div

2 ms/div

10 ms/div

Model		PCA600F-12-P2		Temperature 25°C																																							
Item		Ripple Voltage (by Load Current)		Testing Circuitry Figure A																																							
Object		+12V53A																																									
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<div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div>Input Volt.</div><div>100V</div></div><div><div>Input Volt.</div><div>230V</div></div></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></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. 230 [V]</th></tr><tr><td>0.0</td><td>27</td><td>33</td></tr><tr><td>8.0</td><td>20</td><td>31</td></tr><tr><td>14.1</td><td>86</td><td>33</td></tr><tr><td>15.4</td><td>34</td><td>78</td></tr><tr><td>16.0</td><td>39</td><td>36</td></tr><tr><td>24.0</td><td>48</td><td>49</td></tr><tr><td>32.0</td><td>52</td><td>54</td></tr><tr><td>40.0</td><td>57</td><td>58</td></tr><tr><td>48.0</td><td>57</td><td>62</td></tr><tr><td>53.0</td><td>59</td><td>65</td></tr><tr><td>58.3</td><td>69</td><td>70</td></tr></table>		Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 230 [V]	0.0	27	33	8.0	20	31	14.1	86	33	15.4	34	78	16.0	39	36	24.0	48	49	32.0	52	54	40.0	57	58	48.0	57	62	53.0	59	65	58.3	69	70
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Model		PCA600F-12-P2																																						
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<div><div><div><div><div></div><div></div></div><div></div><div></div></div><div><div>Input Volt. 100V</div><div>Input Volt. 230V</div></div></div><div><table><thead><tr><th>Ambient Temperature [°C]</th><th>100 [V]</th><th>230 [V]</th></tr></thead><tbody><tr><td>-30</td><td>124</td><td>120</td></tr><tr><td>-20</td><td>104</td><td>100</td></tr><tr><td>-10</td><td>95</td><td>95</td></tr><tr><td>0</td><td>84</td><td>84</td></tr><tr><td>10</td><td>80</td><td>80</td></tr><tr><td>25</td><td>77</td><td>76</td></tr><tr><td>30</td><td>74</td><td>74</td></tr><tr><td>40</td><td>68</td><td>72</td></tr><tr><td>50</td><td>70</td><td>72</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table></div></div> <div><div>Measured by 20 MHz Oscilloscope.</div><div>Note: Slanted line shows the range of the rated ambient temperature.</div></div>			Ambient Temperature [°C]	100 [V]	230 [V]	-30	124	120	-20	104	100	-10	95	95	0	84	84	10	80	80	25	77	76	30	74	74	40	68	72	50	70	72	--	-	-	--	-	-		
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Model		PCA600F-12-P2																																																				
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- 15 -

BC-11159



Model		PCA600F-12-P2
Item		Output Voltage Accuracy
Object		+12V53A

Testing Circuitry Figure A

### 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 : -20 - 50°C

Input Voltage : 85 - 264V

Load Current : 0 - 53A

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

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

### 2. Values

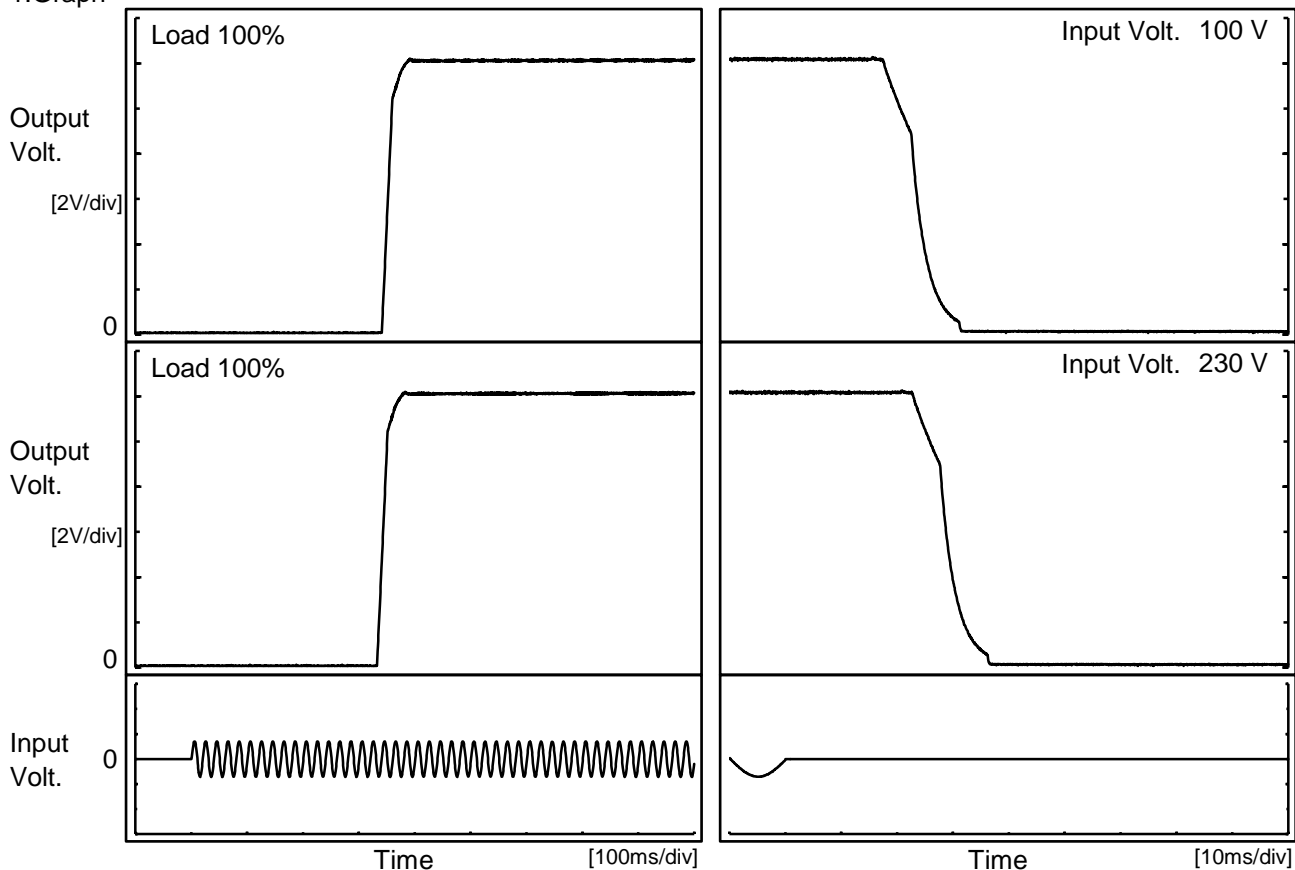
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	25	200	0	12.160	±16	±0.1
Minimum Voltage	-20	264	53	12.129		



Model		PCA600F-12-P2		Temperature25°C Testing CircuitryFigure A
Item		Time Lapse Drift		
Object		+12V53A		
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></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></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></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></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></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><d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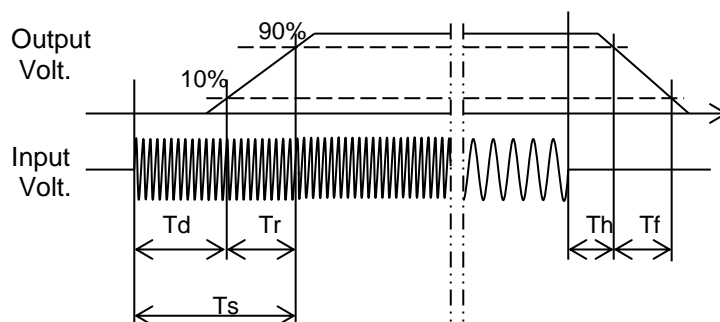
Model	PCA600F-12-P2	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+12V53A		

1.Graph



2.Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
100 V		343.5	22.0	365.5	19.2	9.0
230 V		335.0	22.0	357.0	24.4	8.9



Model		PCA600F-12-P2	
Item		Hold-Up Time	
Object		+12V53A	
1.Graph		2.Values	

1000

100

10

1

50

100

150

200

250

300

Hold-Up Time [ms]

Input Voltage [V]

---

□

---

Load 50%

---

△

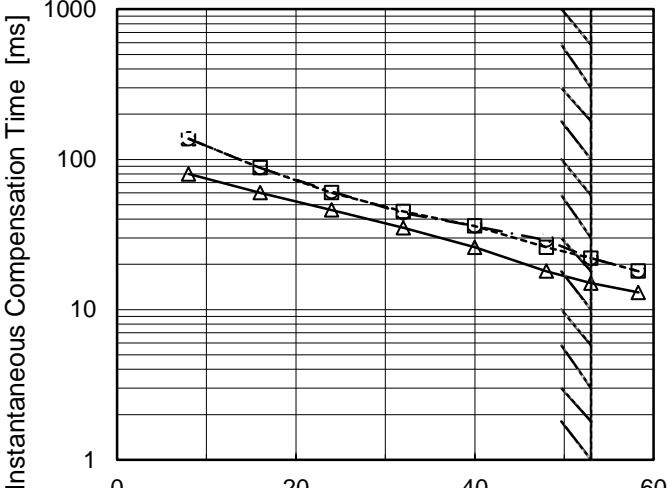
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Load 100%

Input Voltage [V]	Hold-Up Time [ms]	
	Load 50%	Load 100%
80	36	18
85	36	18
100	36	18
120	36	18
200	47	23
230	47	23
264	47	23
280	47	23
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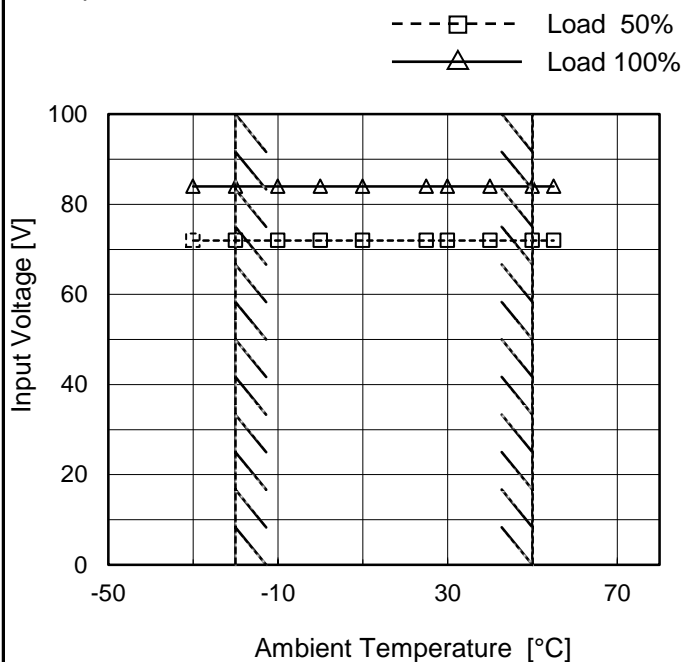
This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.

Note: Slanted line shows the range of the rated input voltage.

Model		PCA600F-12-P2		Temperature 25°C																																																				
Item		Instantaneous Interruption Compensation		Testing Circuitry Figure A																																																				
Object		+12V53A																																																						
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>  <p>Note: Slanted line shows the range of the rated load current.</p>		2.Values																																																				
		<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>8.0</td><td>80</td><td>137</td><td>137</td></tr><tr><td>16.0</td><td>60</td><td>88</td><td>88</td></tr><tr><td>24.0</td><td>46</td><td>60</td><td>61</td></tr><tr><td>32.0</td><td>35</td><td>45</td><td>44</td></tr><tr><td>40.0</td><td>26</td><td>36</td><td>36</td></tr><tr><td>48.0</td><td>18</td><td>26</td><td>29</td></tr><tr><td>53.0</td><td>15</td><td>22</td><td>22</td></tr><tr><td>58.3</td><td>13</td><td>18</td><td>18</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	-	-	-	8.0	80	137	137	16.0	60	88	88	24.0	46	60	61	32.0	35	45	44	40.0	26	36	36	48.0	18	26	29	53.0	15	22	22	58.3	13	18	18	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																							
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																					
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16.0	60	88	88																																																					
24.0	46	60	61																																																					
32.0	35	45	44																																																					
40.0	26	36	36																																																					
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58.3	13	18	18																																																					
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Model	PCA600F-12-P2
Item	Minimum Input Voltage for Regulated Output Voltage
Object	+12V53A

## 1.Graph



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

## Testing Circuitry Figure A

## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-30	72	84
-20	72	84
-10	72	84
0	72	84
10	72	84
25	72	84
30	72	84
40	72	84
50	72	84
55	72	84
--	-	-

Model		PCA600F-12-P2		Temperature Testing Circuitry	25°C Figure A																																												
Item		Overcurrent Protection																																															
Object		+12V53A																																															
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>Intermittent operation occurs when the output voltage is from 6V to 0V.</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>11.4</td><td>61.05</td><td>60.71</td></tr><tr><td>10.8</td><td>61.09</td><td>60.72</td></tr><tr><td>9.6</td><td>60.94</td><td>60.97</td></tr><tr><td>8.4</td><td>61.10</td><td>60.56</td></tr><tr><td>7.2</td><td>60.70</td><td>60.73</td></tr><tr><td>6.2</td><td>60.97</td><td>61.00</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]	11.4	61.05	60.71	10.8	61.09	60.72	9.6	60.94	60.97	8.4	61.10	60.56	7.2	60.70	60.73	6.2	60.97	61.00	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Output Voltage [V]	Load Current [A]																																																
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7.2	60.70	60.73																																															
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Model		PCA600F-12-P2
Item		Overvoltage Protection
Object		+12V53A

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]
-30	15.47	15.47
-20	15.47	15.47
-10	15.47	15.47
0	15.47	15.47
10	15.47	15.47
25	15.47	15.47
30	15.47	15.47
40	15.47	15.47
50	15.47	15.47
55	15.47	15.47
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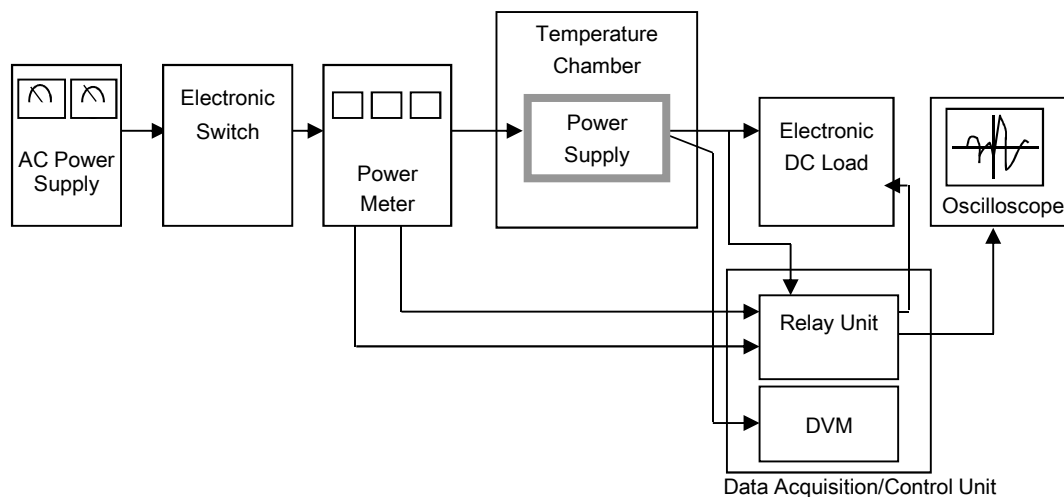


Figure A

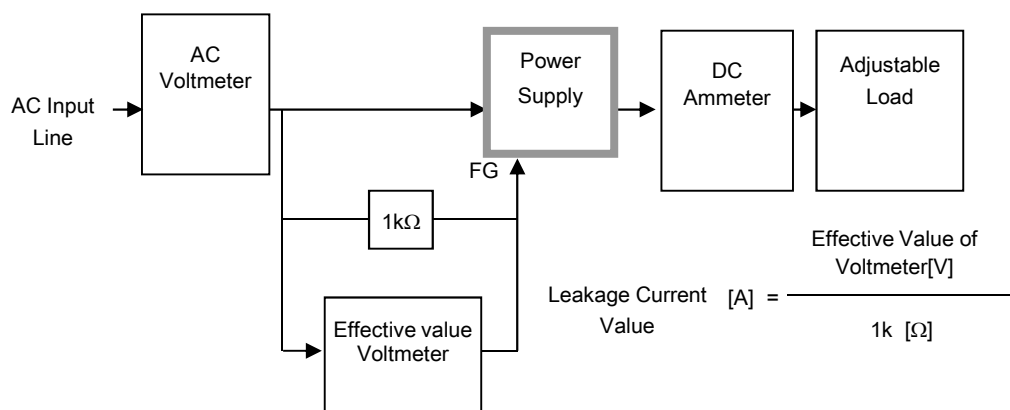


Figure B-1 ( DEN-AN )

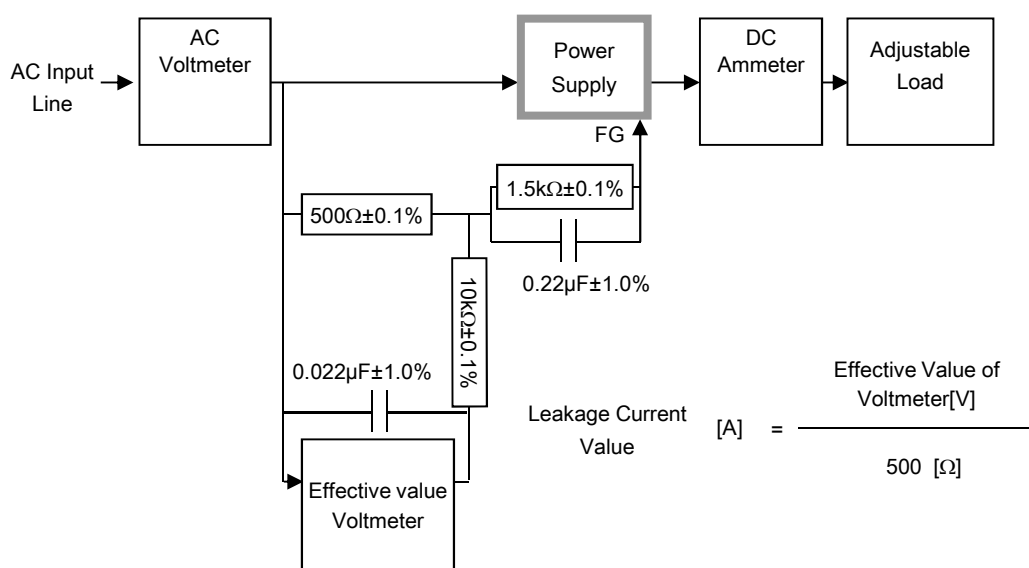


Figure B-2 ( IEC62368-1 refer to IEC60990 Fig.4 )

