

TEST DATA OF KHNA480F-24

Regulated DC Power Supply
February 2, 2016

Approved by : Yukihiro Takehashi
Yukihiro Takehashi Design Manager

Prepared by : Kosuke Murai
Kosuke Murai Design Engineer

COSEL CO.,LTD.

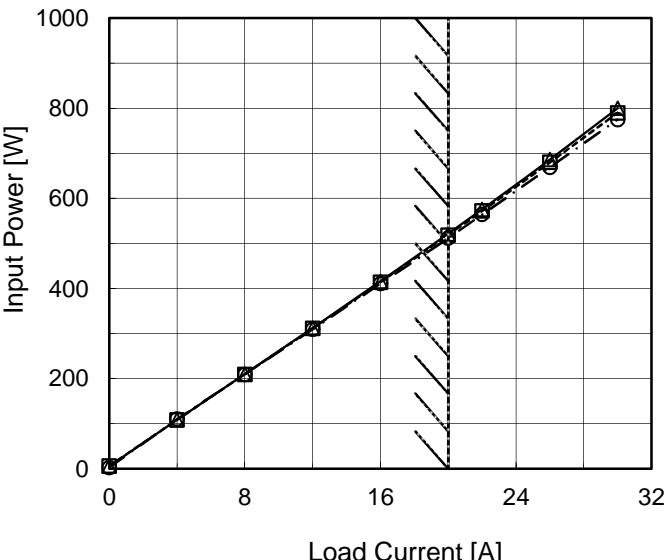
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Model		KHNA480F-24		Temperature 25°C																																																				
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12.0	92.4	92.7	93.3																																																					
16.0	92.4	92.8	93.6																																																					
20.0	92.1	92.6	93.8																																																					
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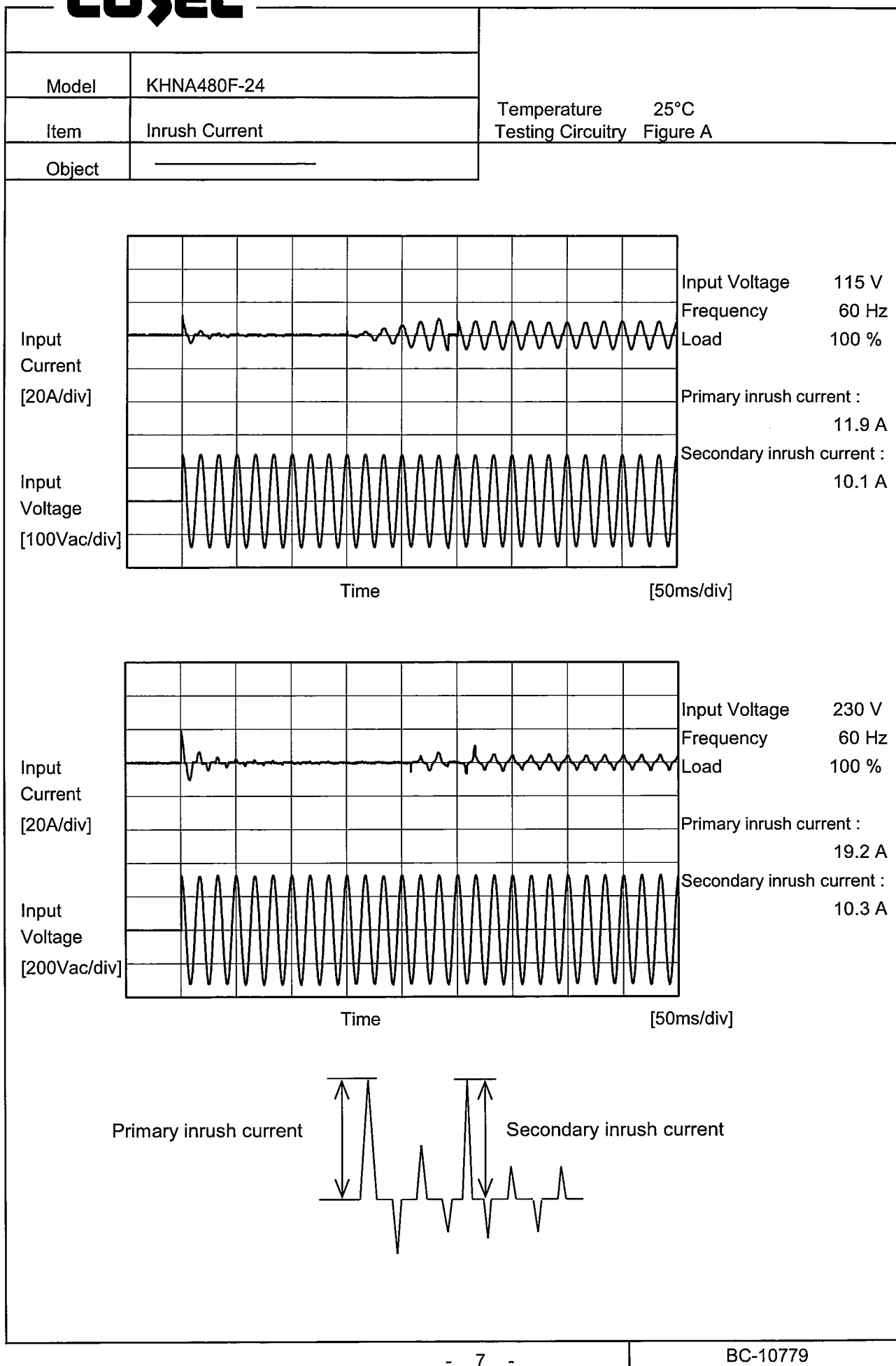
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BC-10779

Model		KHNA480F-24		Temperature		25°C																																	
Item		Power Factor (by Input Voltage)		Testing Circuitry		Figure A																																	
Object		_____																																					
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Note: Slanted line shows the range of the rated load current.																																																						



Input Current
[20A/div]

Input Voltage
[200Vac/div]

Time [50ms/div]

Input Voltage 230 V
Frequency 60 Hz
Load 100 %

Primary inrush current : 19.2 A
Secondary inrush current : 10.3 A

Primary inrush current

Secondary inrush current



LOREL		Temperature 25°C Testing Circuitry Figure B
Model	KHNA480F-24	
Item	Leakage Current	
Object	_____	

1.Results

[mA]

Standards		Input Volt.			Note
		100 [V]	115 [V]	240 [V]	
DEN-AN	Both phases	0.31	0.35	0.76	Operation
	One of phases	0.45	0.52	1.20	Stand by
IEC60950-1	Both phases	0.30	0.34	0.72	Operation
	One of phases	0.43	0.50	1.09	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	KHNA480F-24																																
Item	Line Regulation	Temperature	25°C																														
Object	+24V20A	Testing Circuitry	Figure A																														
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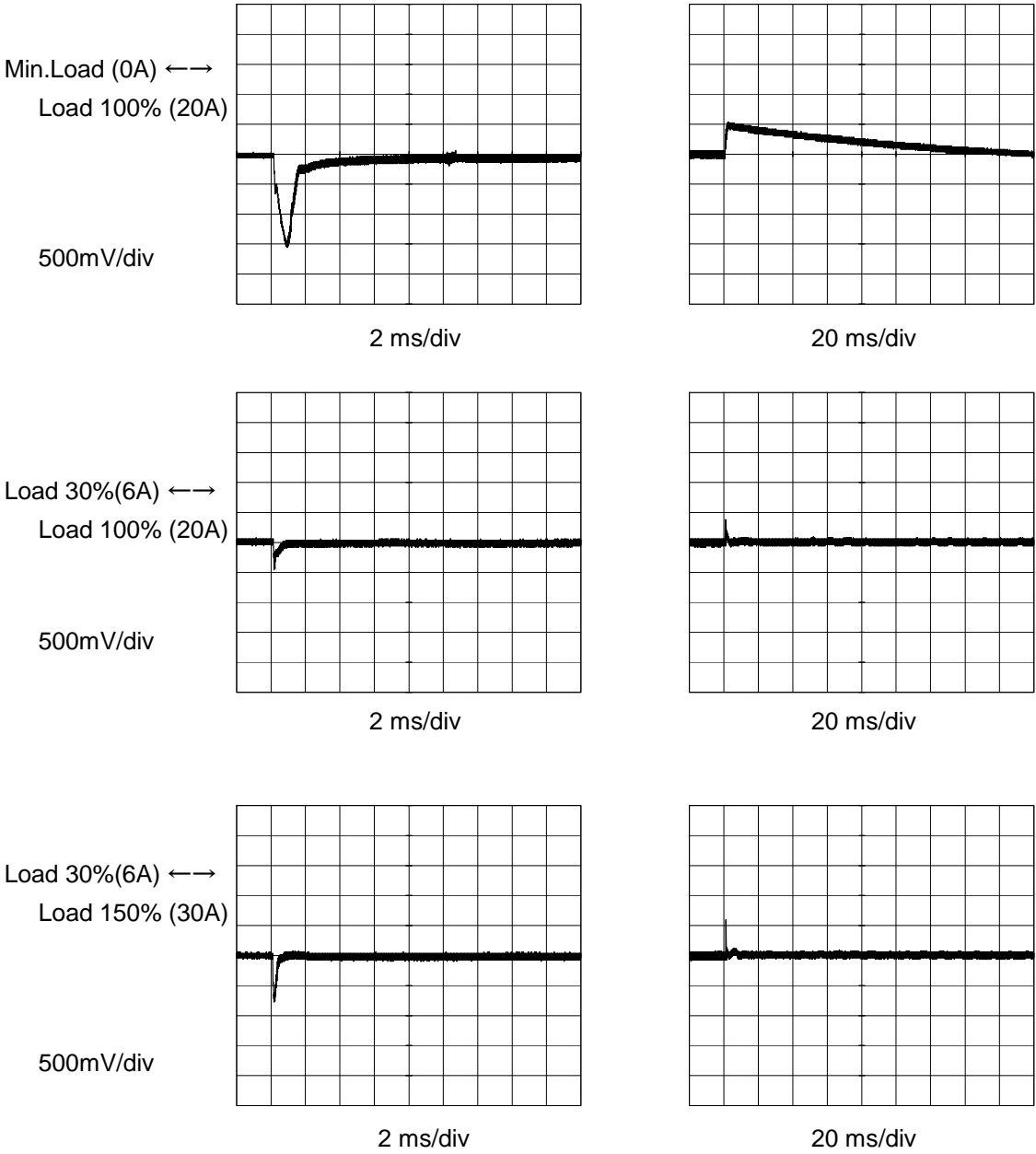


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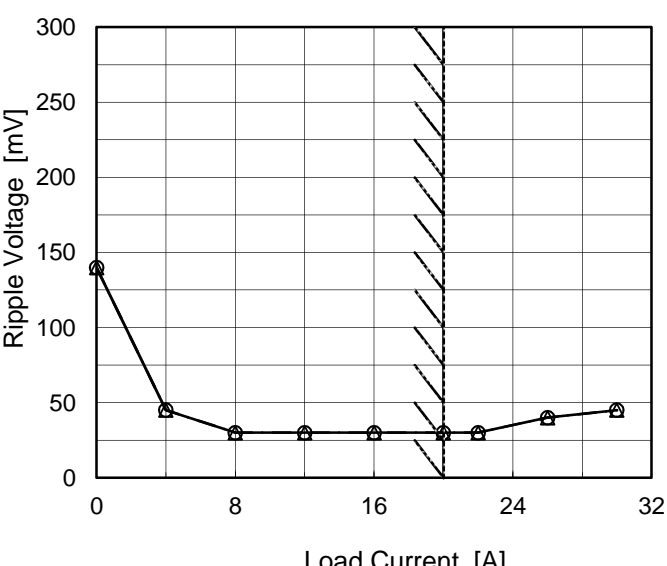
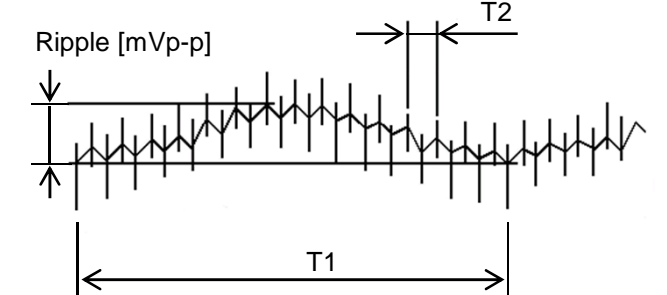


Model	KHNA480F-24		
Item	Dynamic Load Response	Temperature	25° C
Object	+24V20A	Testing Circuitry	Figure A

Input Volt. 230 V Response. $t_1=t_2=50\mu s$. Typ
Cycle 1000 ms



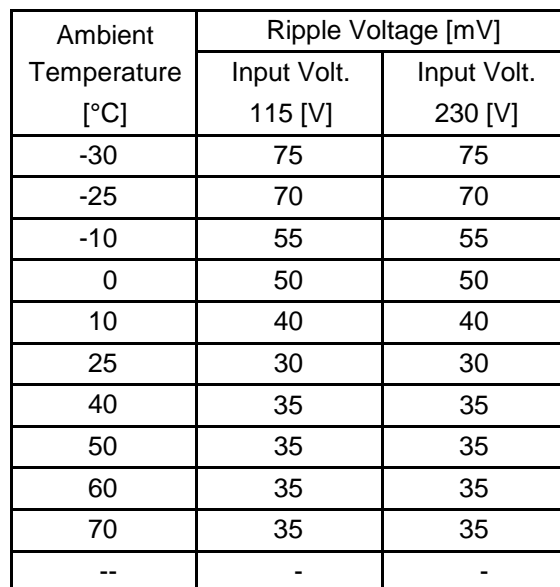
* The characteristic of AC115V is equal.

Model		KHNA480F-24		Temperature 25°C																																							
Item		Ripple Voltage (by Load Current)		Testing Circuitry Figure C																																							
Object		+24V20A																																									
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Model		KHNA480F-24																																							
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Object		+24V20A																																							
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Load Current [A]	Ripple-Noise [mV]																																								
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Testing Circuitry Figure C

2.Values



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

Model	KHNA480F-24																																																					
Item	Ambient Temperature Drift		Testing Circuitry Figure A																																																			
Object	+24V20A																																																					
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt. 100V</div></div><div><div>---□---</div><div>Input Volt. 115V</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. 115[V]</th><th>Input Volt. 230[V]</th></tr><tr><td>-30</td><td>24.012</td><td>24.013</td><td>24.014</td></tr><tr><td>-25</td><td>24.016</td><td>24.017</td><td>24.018</td></tr><tr><td>-10</td><td>24.029</td><td>24.030</td><td>24.030</td></tr><tr><td>0</td><td>24.031</td><td>24.031</td><td>24.032</td></tr><tr><td>10</td><td>24.028</td><td>24.028</td><td>24.029</td></tr><tr><td>25</td><td>24.020</td><td>24.020</td><td>24.021</td></tr><tr><td>40</td><td>24.016</td><td>24.015</td><td>24.015</td></tr><tr><td>50</td><td>24.004</td><td>24.004</td><td>24.002</td></tr><tr><td>60</td><td>23.996</td><td>23.996</td><td>23.995</td></tr><tr><td>70</td><td>23.988</td><td>23.987</td><td>23.987</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. 115[V]	Input Volt. 230[V]	-30	24.012	24.013	24.014	-25	24.016	24.017	24.018	-10	24.029	24.030	24.030	0	24.031	24.031	24.032	10	24.028	24.028	24.029	25	24.020	24.020	24.021	40	24.016	24.015	24.015	50	24.004	24.004	24.002	60	23.996	23.996	23.995	70	23.988	23.987	23.987	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]																																																			
-30	24.012	24.013	24.014																																																			
-25	24.016	24.017	24.018																																																			
-10	24.029	24.030	24.030																																																			
0	24.031	24.031	24.032																																																			
10	24.028	24.028	24.029																																																			
25	24.020	24.020	24.021																																																			
40	24.016	24.015	24.015																																																			
50	24.004	24.004	24.002																																																			
60	23.996	23.996	23.995																																																			
70	23.988	23.987	23.987																																																			
--	-	-	-																																																			



		Testing Circuitry Figure A
Model	KHNA480F-24	
Item	Output Voltage Accuracy	
Object	+24V20A	

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 : -25 - 60°C

Input Voltage : 85 - 264V

Load Current : 0 - 20A

* 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

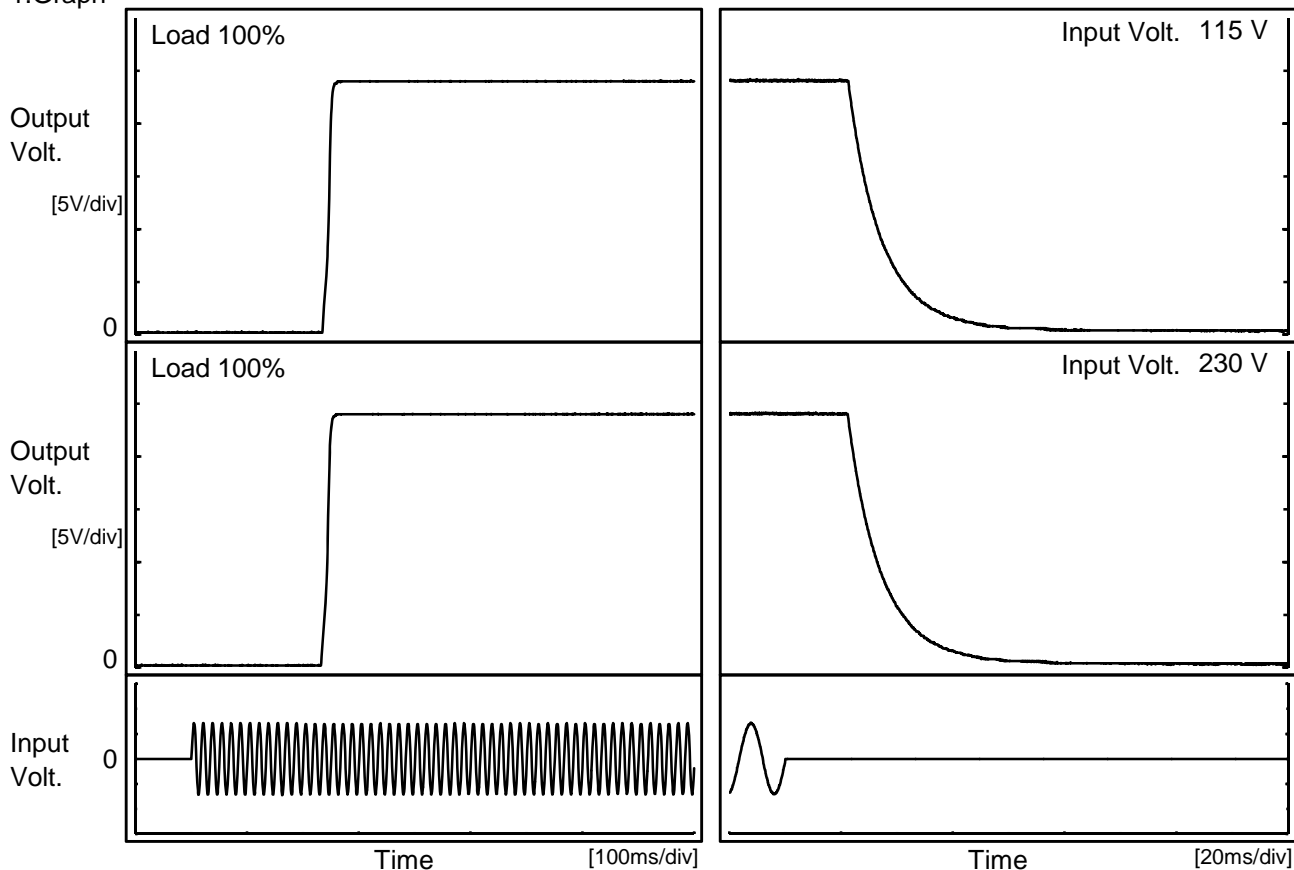
Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	60	264	0	24.139	±78	±0.3
Minimum Voltage	-25	85	20	23.983		



Model		KHNA480F-24		Temperature25°C Testing CircuitryFigure A
Item		Time Lapse Drift		
Object		+24V20A		
1.Graph				2.Values
<div><div><div>Output Voltage [V]</div><div><div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></div><div></di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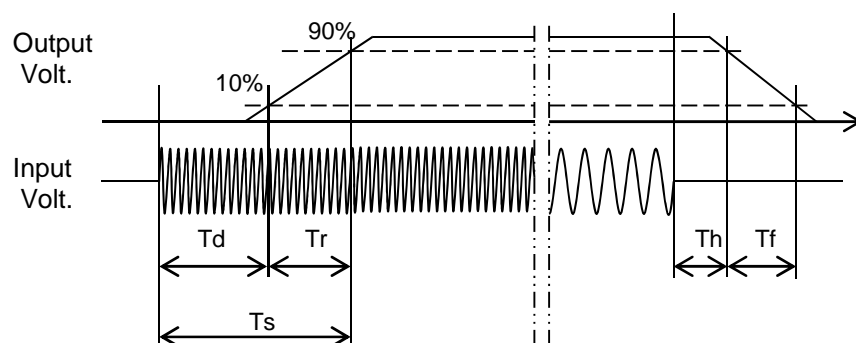
Model	KHNA480F-24	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+24V20A	

1.Graph



2.Values

Input Volt.	Time	Td	Tr	Ts	Th	Tf
115 V		238.0	13.5	251.5	23.6	28.2
230 V		235.5	14.0	249.5	23.4	28.0



Model	KHNA480F-24																																
Item	Hold-Up Time	Temperature	25°C																														
		Testing Circuitry	Figure A																														
Object	+24V20A																																
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>Input Voltage [V]</th><th>Load 50% [ms]</th><th>Load 100% [ms]</th></tr></thead><tbody><tr><td>83</td><td>45</td><td>23</td></tr><tr><td>85</td><td>45</td><td>23</td></tr><tr><td>100</td><td>45</td><td>23</td></tr><tr><td>115</td><td>45</td><td>23</td></tr><tr><td>200</td><td>45</td><td>23</td></tr><tr><td>230</td><td>45</td><td>22</td></tr><tr><td>264</td><td>50</td><td>25</td></tr><tr><td>280</td><td>50</td><td>26</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></tbody></table>		Input Voltage [V]	Load 50% [ms]	Load 100% [ms]	83	45	23	85	45	23	100	45	23	115	45	23	200	45	23	230	45	22	264	50	25	280	50	26	--	-	-		
Input Voltage [V]	Load 50% [ms]	Load 100% [ms]																															
83	45	23																															
85	45	23																															
100	45	23																															
115	45	23																															
200	45	23																															
230	45	22																															
264	50	25																															
280	50	26																															
--	-	-																															
<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	KHNA480F-24		
Item	Instantaneous Interruption Compensation	Temperature	25°C
Object	+24V20A	Testing Circuitry	Figure A
<p>1.Graph</p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> △□○ </p> <p> </p>			

Model	KHNA480F-24																																						
Item	Minimum Input Voltage for Regulated Output Voltage																																						
Object	+24V20A																																						
1.Graph		2.Values																																					
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Model	KHNA480F-24																																											
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<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>Intermittent operation occurs when the output voltage is from 11.2V 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>22.8</td><td>34.78</td><td>34.80</td></tr><tr><td>21.6</td><td>34.92</td><td>27.61</td></tr><tr><td>19.2</td><td>35.10</td><td>35.11</td></tr><tr><td>16.8</td><td>35.59</td><td>35.53</td></tr><tr><td>14.4</td><td>36.16</td><td>36.11</td></tr><tr><td>12.0</td><td>36.72</td><td>36.66</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]	22.8	34.78	34.80	21.6	34.92	27.61	19.2	35.10	35.11	16.8	35.59	35.53	14.4	36.16	36.11	12.0	36.72	36.66	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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Model		KHNA480F-24	
Item		Overvoltage Protection	
Object		+24V20A	
1.Graph		2.Values	

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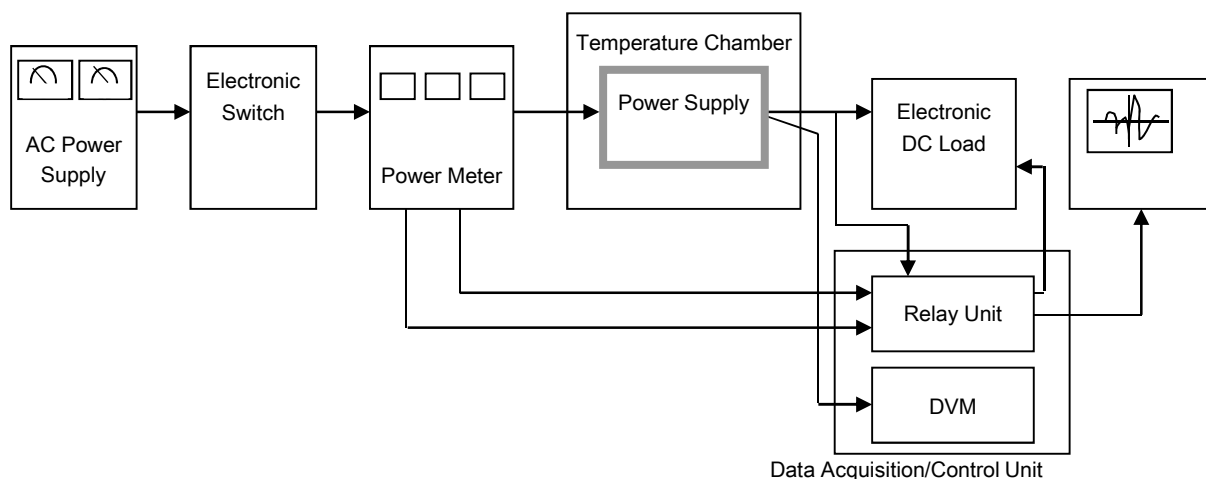


Figure A

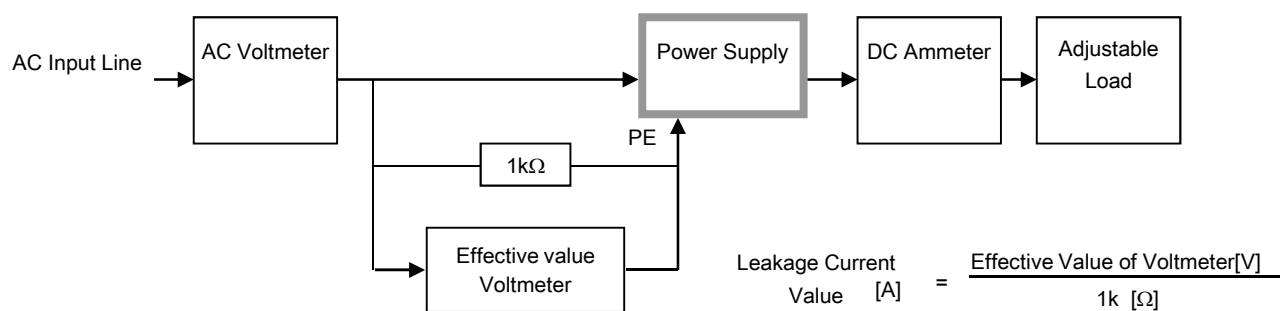


Figure B (DEN-AN)

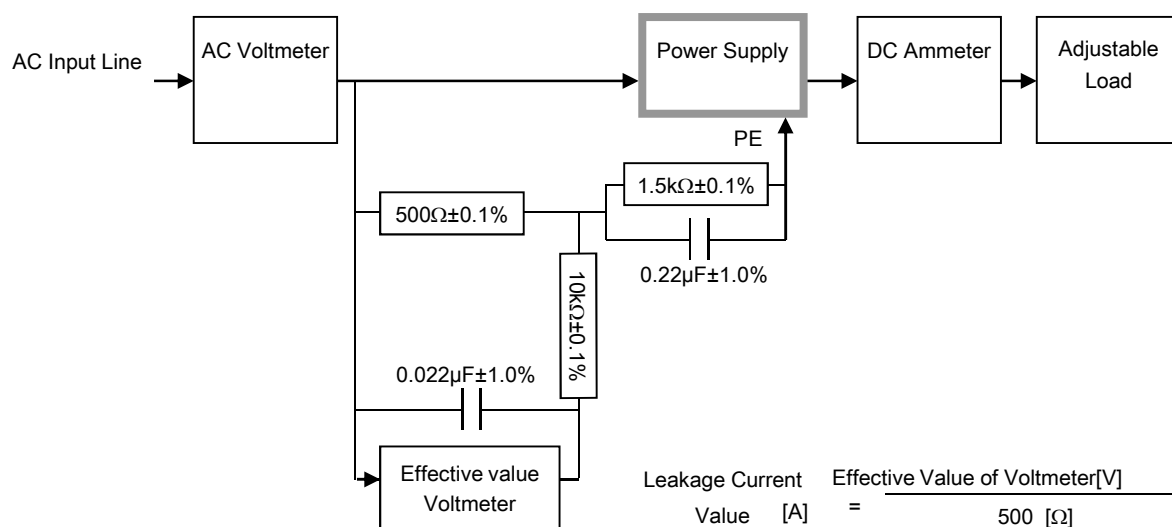


Figure B (IEC60950-1)

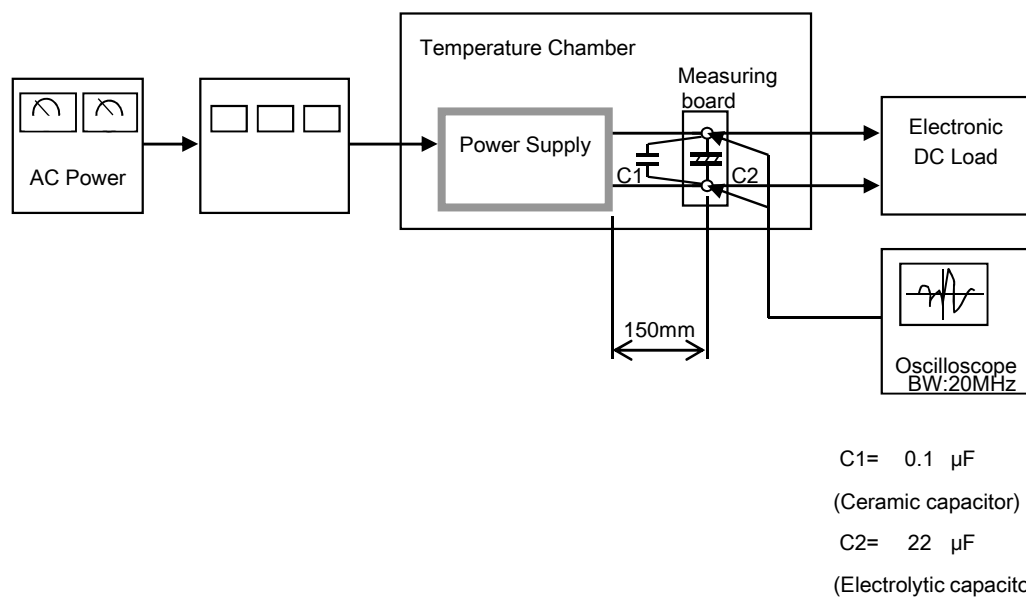


Figure C