

TEST DATA OF KHNA480F-48

Regulated DC Power Supply
October 8, 2015

Approved by : Yukihiro Takehashi
Yukihiro Takehashi Design Manager

Prepared by : Kosuke Murai
Kosuke Murai 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		KHNA480F-48		Temperature 25°C																																																				
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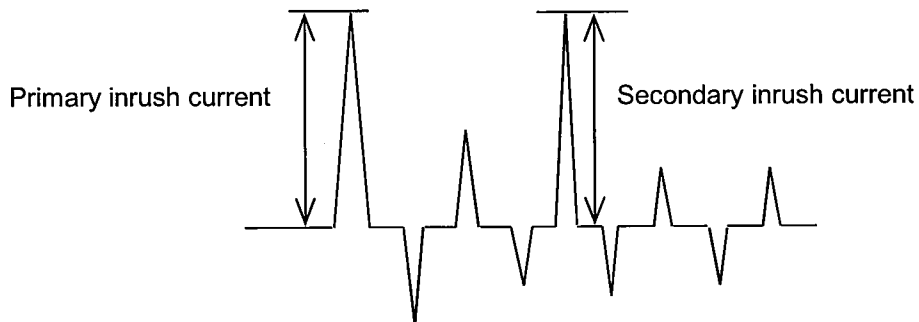
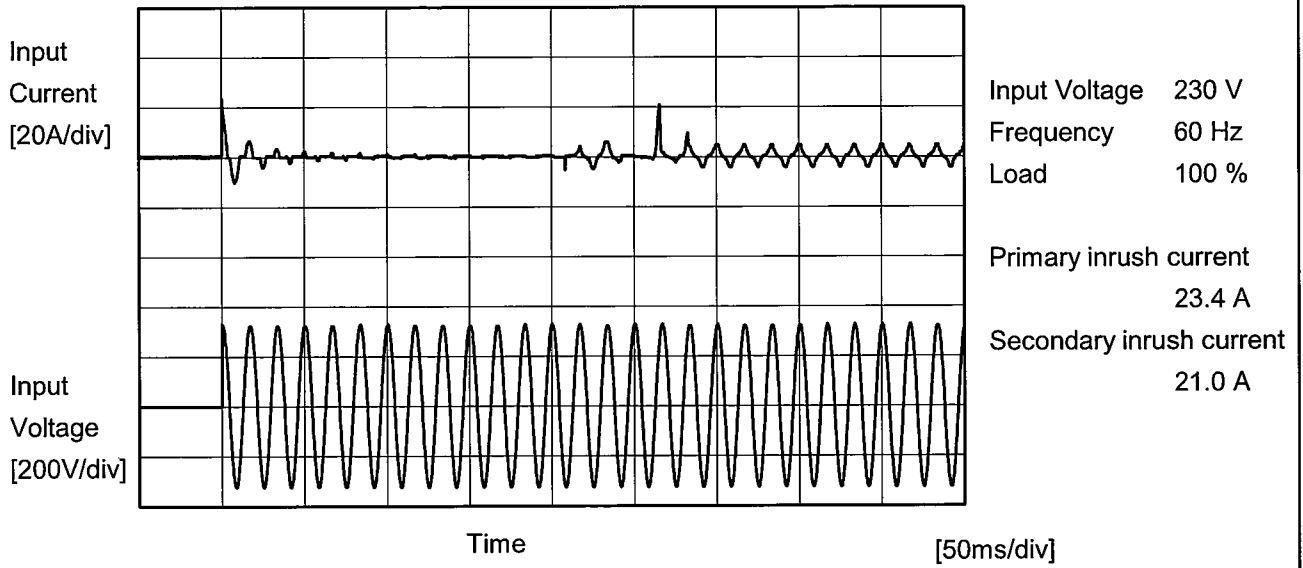
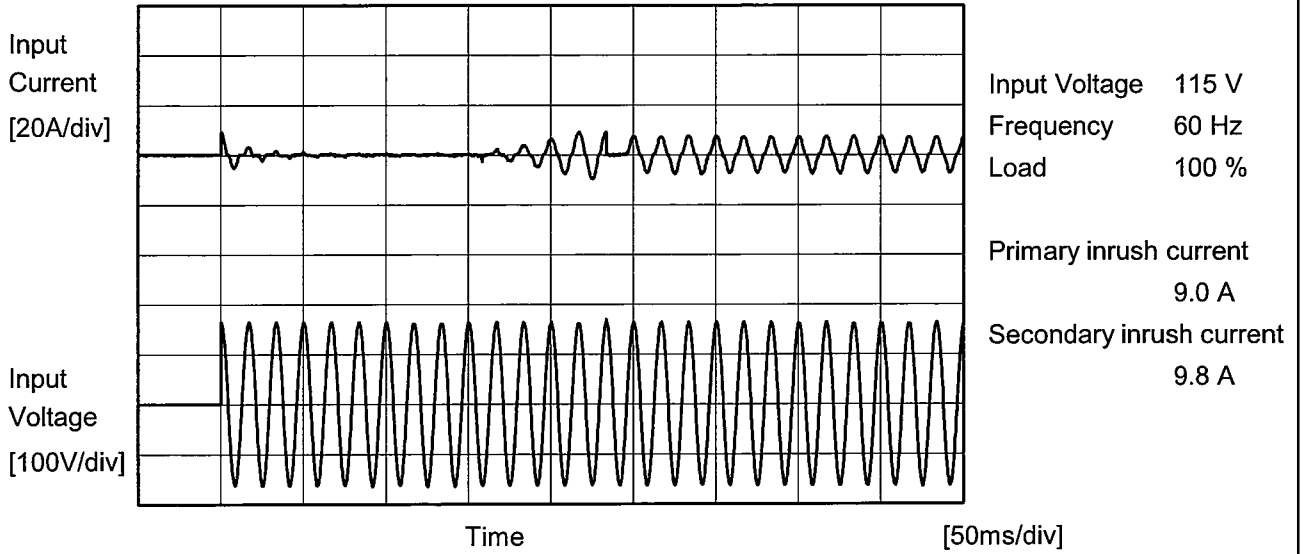
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Item		Temperature	25°C
Object		Testing Circuitry	Figure A





COSEL		Temperature 25°C Testing Circuitry Figure B
Model	KHNA480F-48	
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.



<p>Model KHNA480F-48</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																
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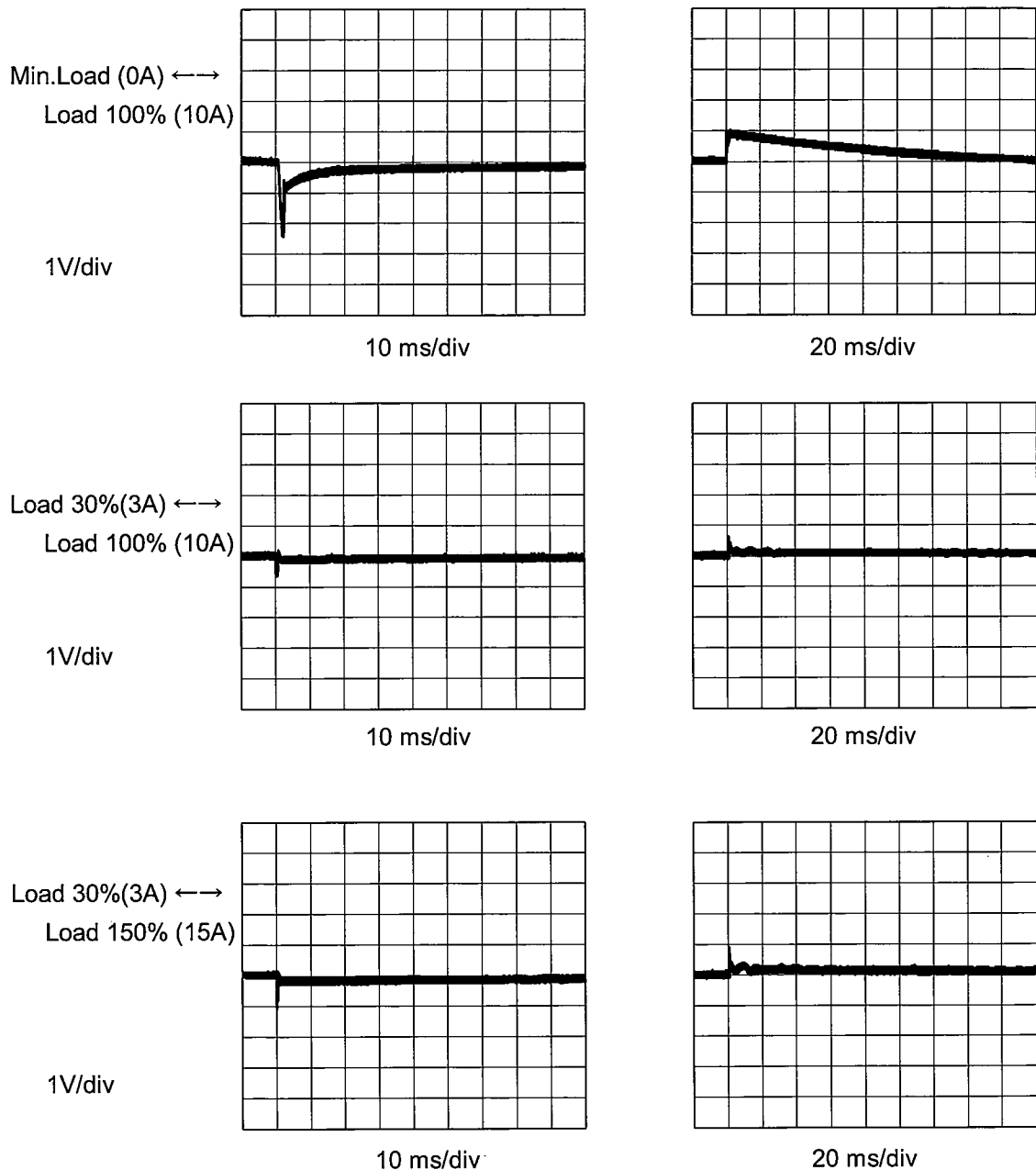
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<p>1. Graph</p> <p> —△— Input Volt. 100V - - -□- - - Input Volt. 115V - · - ○ - · - Input Volt. 230V </p> <p style="text-align: center;">Load Current [A]</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>48.316</td><td>48.306</td><td>48.294</td></tr> <tr><td>2</td><td>48.107</td><td>48.108</td><td>48.107</td></tr> <tr><td>4</td><td>48.096</td><td>48.097</td><td>48.098</td></tr> <tr><td>6</td><td>48.081</td><td>48.082</td><td>48.082</td></tr> <tr><td>8</td><td>48.102</td><td>48.103</td><td>48.103</td></tr> <tr><td>10</td><td>48.100</td><td>48.101</td><td>48.102</td></tr> <tr><td>11</td><td>48.099</td><td>48.100</td><td>48.100</td></tr> <tr><td>13</td><td>48.097</td><td>48.099</td><td>48.099</td></tr> <tr><td>15</td><td>48.095</td><td>48.096</td><td>48.097</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>		Load Current [A]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0	48.316	48.306	48.294	2	48.107	48.108	48.107	4	48.096	48.097	48.098	6	48.081	48.082	48.082	8	48.102	48.103	48.103	10	48.100	48.101	48.102	11	48.099	48.100	48.100	13	48.097	48.099	48.099	15	48.095	48.096	48.097	--	-	-	-	--	-	-	-
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<p>Note: Slanted line shows the range of the rated load current.</p>																																																						



Model		KHNA480F-48	
Item		Dynamic Load Response	
Object		+48V10A	
		Temperature	25° C
		Testing Circuitry	Figure A

Input Volt. 230 V
Cycle 1000 ms

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

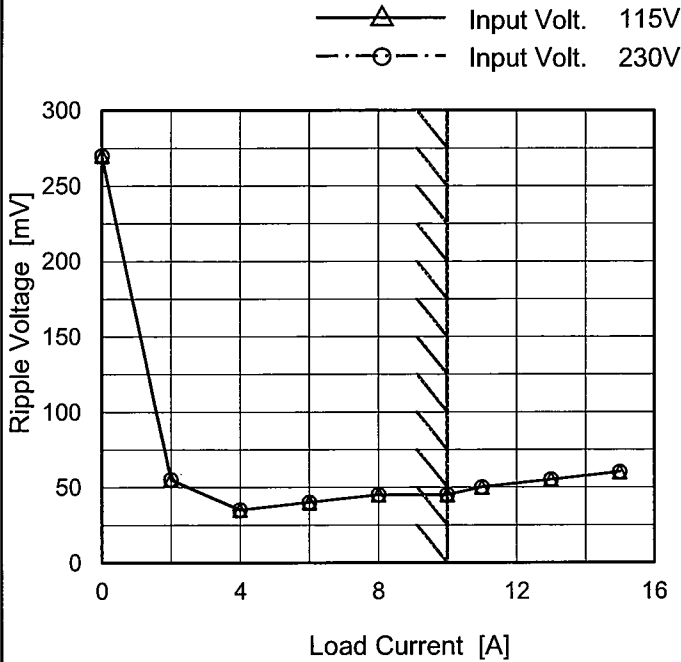


* The characteristic of AC115V is equal.



Model	KHNA480F-48	
Item	Ripple Voltage (by Load Current)	Temperature 25°C Testing Circuitry Figure C
Object	+48V10A	

1. Graph



2. Values

Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	270	270
2.0	55	55
4.0	35	35
6.0	40	40
8.0	45	45
10.0	45	45
11.0	50	50
13.0	55	55
15.0	60	60
--	-	-
--	-	-

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.

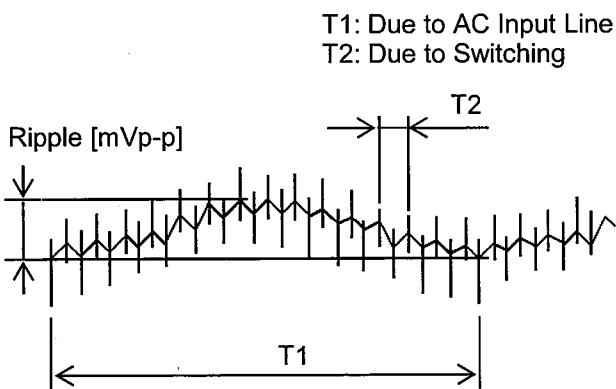
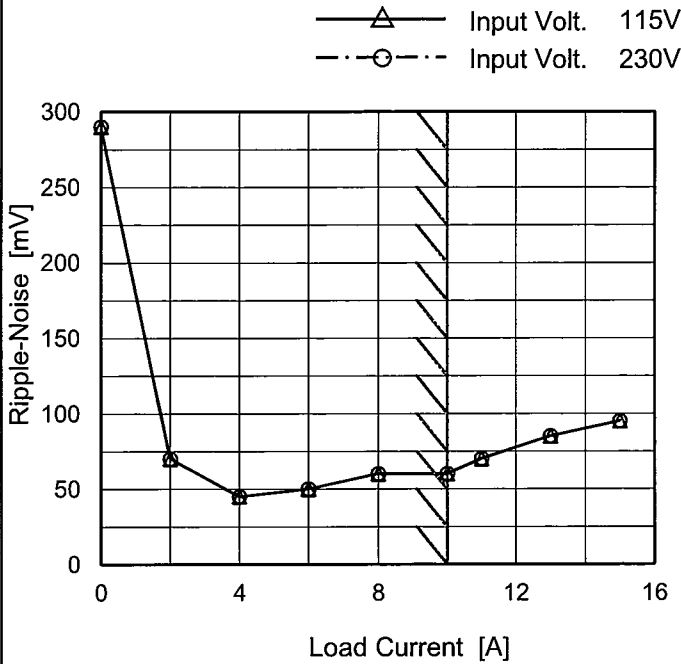


Fig. Complex Ripple Wave Form



Model	KHNA480F-48	
Item	Ripple-Noise	Temperature 25°C Testing Circuitry Figure C
Object	+48V10A	

1. Graph



Measured by 20 MHz Oscilloscope.
Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

2. Values

Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 115 [V]	Input Volt. 230 [V]
0.0	290	290
2.0	70	70
4.0	45	45
6.0	50	50
8.0	60	60
10.0	60	60
11.0	70	70
13.0	85	85
15.0	95	95
--	-	-
--	-	-

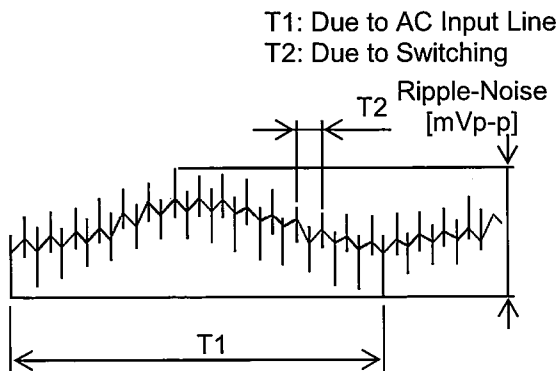


Fig. Complex Ripple Wave Form



Model		KHNA480F-48																																							
Item		Ripple Voltage (by Ambient Temp.)																																							
Object		+48V10A																																							
1.Graph		Testing Circuitry Figure C																																							
<p> ---□--- Input Volt. 115V —△— Input Volt. 230V </p> <p>Load 100 %</p>		2.Values																																							
		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Ripple Voltage [mV]</th> </tr> <tr> <th>Input Volt. 115 [V]</th> <th>Input Volt. 230 [V]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>170</td><td>170</td></tr> <tr><td>-25</td><td>105</td><td>105</td></tr> <tr><td>-10</td><td>70</td><td>70</td></tr> <tr><td>0</td><td>50</td><td>50</td></tr> <tr><td>10</td><td>45</td><td>45</td></tr> <tr><td>25</td><td>45</td><td>45</td></tr> <tr><td>40</td><td>45</td><td>45</td></tr> <tr><td>50</td><td>45</td><td>45</td></tr> <tr><td>60</td><td>50</td><td>50</td></tr> <tr><td>70</td><td>50</td><td>50</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Ambient Temperature [°C]	Ripple Voltage [mV]		Input Volt. 115 [V]	Input Volt. 230 [V]	-30	170	170	-25	105	105	-10	70	70	0	50	50	10	45	45	25	45	45	40	45	45	50	45	45	60	50	50	70	50	50	--	-	-
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Model		KHNA480F-48		Testing Circuitry Figure A																																																				
Item		Ambient Temperature Drift																																																						
Object		+48V10A																																																						
1.Graph		<p>—△— Input Volt. 85V</p> <p>---□--- Input Volt. 115V</p> <p>---○--- Input Volt. 230V</p>		2.Values																																																				
		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="3">Output Voltage [V]</th> </tr> <tr> <th>Input Volt. 85[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>47.998</td><td>47.997</td><td>47.999</td></tr> <tr><td>-25</td><td>48.003</td><td>48.002</td><td>48.003</td></tr> <tr><td>-10</td><td>48.028</td><td>48.027</td><td>48.029</td></tr> <tr><td>0</td><td>48.052</td><td>48.050</td><td>48.052</td></tr> <tr><td>10</td><td>48.065</td><td>48.065</td><td>48.066</td></tr> <tr><td>25</td><td>48.087</td><td>48.085</td><td>48.086</td></tr> <tr><td>40</td><td>48.106</td><td>48.106</td><td>48.106</td></tr> <tr><td>50</td><td>48.115</td><td>48.115</td><td>48.116</td></tr> <tr><td>60</td><td>48.112</td><td>48.112</td><td>48.113</td></tr> <tr><td>70</td><td>48.085</td><td>48.085</td><td>48.086</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>				Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 85[V]	Input Volt. 115[V]	Input Volt. 230[V]	-30	47.998	47.997	47.999	-25	48.003	48.002	48.003	-10	48.028	48.027	48.029	0	48.052	48.050	48.052	10	48.065	48.065	48.066	25	48.087	48.085	48.086	40	48.106	48.106	48.106	50	48.115	48.115	48.116	60	48.112	48.112	48.113	70	48.085	48.085	48.086	--	-	-	-
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COSEL		
Model	KHNA480F-48	
Item	Output Voltage Accuracy	Testing Circuitry Figure A
Object	+48V10A	

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 - 230V

Load Current : 0 - 10A

* 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	100	0	48.342	±170	±0.4
Minimum Voltage	-25	115	10	48.002		

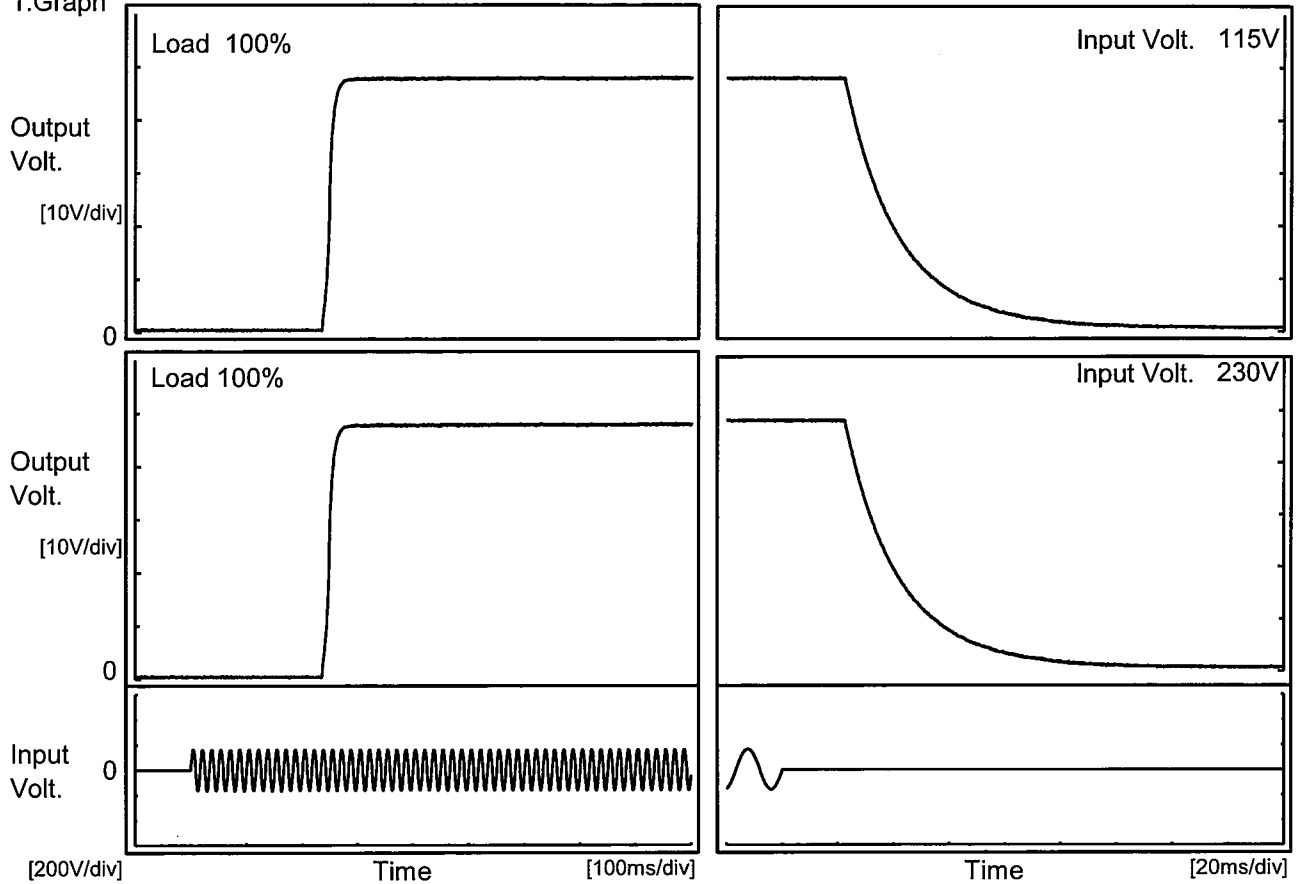


COSEL																								
Model	KHNA480F-48																							
Item	Time Lapse Drift	Temperature 25°C Testing Circuitry Figure A																						
Object	+48V10A																							
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p style="text-align: center;">Input Volt. 230V Load 100%</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th>Time since start [H]</th> <th>Output Voltage [V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>48.102</td></tr> <tr><td>0.5</td><td>48.101</td></tr> <tr><td>1.0</td><td>48.101</td></tr> <tr><td>2.0</td><td>48.101</td></tr> <tr><td>3.0</td><td>48.101</td></tr> <tr><td>4.0</td><td>48.101</td></tr> <tr><td>5.0</td><td>48.101</td></tr> <tr><td>6.0</td><td>48.101</td></tr> <tr><td>7.0</td><td>48.101</td></tr> <tr><td>8.0</td><td>48.101</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	48.102	0.5	48.101	1.0	48.101	2.0	48.101	3.0	48.101	4.0	48.101	5.0	48.101	6.0	48.101	7.0	48.101	8.0	48.101
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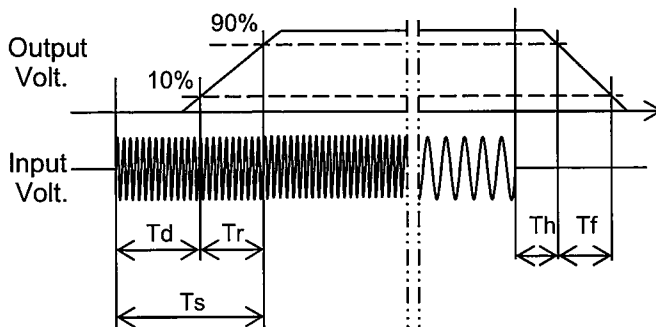
Model	KHNA480F-48	
Item	Rise and Fall Time	Temperature 25°C Testing Circuitry Figure A
Object	+48V10A	

1. Graph



2. Values

		[ms]				
Input \ Time		Td	Tr	Ts	Th	Tf
115V		240.0	19.5	261.4	25.2	45.2
230V		240.0	20.0	260.0	24.4	45.1





COSEL																																			
Model	KHNA480F-48	Temperature	25°C																																
Item	Hold-Up Time	Testing Circuitry	Figure A																																
Object	+48V10A																																		
<p>1.Graph</p> <p style="text-align: right;"> ---□--- Load 50% —△— Load 100% </p>		<p>2.Values</p> <table border="1"> <thead> <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> </thead> <tbody> <tr><td>83</td><td>46</td><td>23</td></tr> <tr><td>85</td><td>46</td><td>23</td></tr> <tr><td>100</td><td>46</td><td>23</td></tr> <tr><td>115</td><td>46</td><td>23</td></tr> <tr><td>200</td><td>46</td><td>23</td></tr> <tr><td>230</td><td>46</td><td>23</td></tr> <tr><td>264</td><td>51</td><td>26</td></tr> <tr><td>280</td><td>52</td><td>25</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	83	46	23	85	46	23	100	46	23	115	46	23	200	46	23	230	46	23	264	51	26	280	52	25	--	-	-
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. Note: Slanted line shows the range of the rated input voltage.</p>																																			



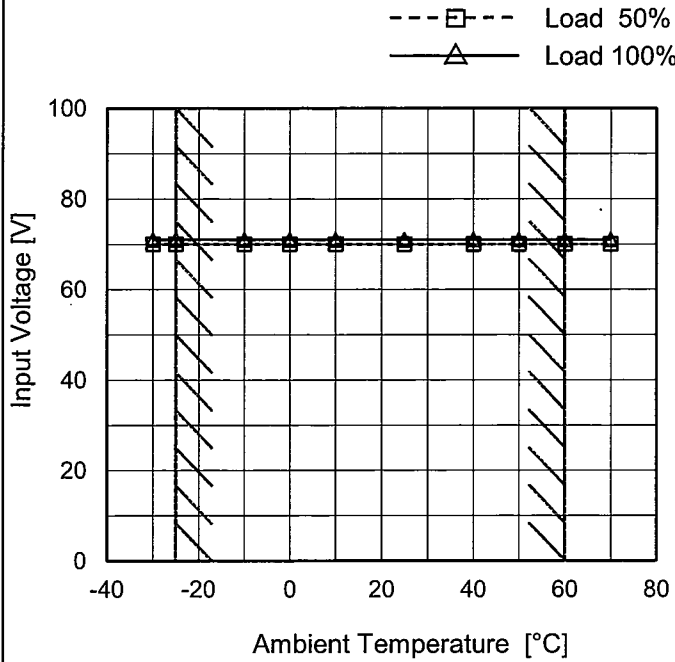
Model		KHNA480F-48		Temperature		25°C																																																				
Item		Instantaneous Interruption Compensation		Testing Circuitry		Figure A																																																				
Object		+48V10A																																																								
1. Graph				2. Values																																																						
<p> △ Input Volt. 100V □ Input Volt. 115V ○ Input Volt. 230V </p> <p style="text-align: center;">Instantaneous Compensation Time [ms]</p> <p style="text-align: center;">Load Current [A]</p>				<table border="1"> <thead> <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. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>2</td><td>110</td><td>111</td><td>110</td></tr> <tr><td>4</td><td>56</td><td>56</td><td>55</td></tr> <tr><td>6</td><td>37</td><td>37</td><td>37</td></tr> <tr><td>8</td><td>28</td><td>28</td><td>28</td></tr> <tr><td>10</td><td>22</td><td>22</td><td>22</td></tr> <tr><td>11</td><td>20</td><td>20</td><td>20</td></tr> <tr><td>13</td><td>15</td><td>15</td><td>16</td></tr> <tr><td>15</td><td>14</td><td>14</td><td>14</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>				Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0	-	-	-	2	110	111	110	4	56	56	55	6	37	37	37	8	28	28	28	10	22	22	22	11	20	20	20	13	15	15	16	15	14	14	14	--	-	-	-	--	-	-	-
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Model	KHNA480F-48	
Item	Minimum Input Voltage for Regulated Output Voltage	
Object	+48V10A	

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%
-30	70	71
-25	70	71
-10	70	71
0	70	71
10	70	71
25	70	71
40	70	71
50	70	71
60	70	71
70	70	71
--	-	-



COSEL																																																								
Model	KHNA480F-48																																																							
Item	Overcurrent Protection	Temperature	25°C																																																					
Object	+48V10A	Testing Circuitry	Figure A																																																					
<p>1.Graph</p> <div style="display: flex; justify-content: space-between;"> <div style="width: 45%;"> </div> <div style="width: 45%;"> <p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Output Voltage [V]</th> <th colspan="3">Load Current [A]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>45.6</td><td>17.06</td><td>17.10</td><td>17.11</td></tr> <tr><td>43.2</td><td>17.21</td><td>17.25</td><td>17.27</td></tr> <tr><td>38.4</td><td>17.41</td><td>17.44</td><td>17.45</td></tr> <tr><td>33.6</td><td>17.67</td><td>17.70</td><td>17.70</td></tr> <tr><td>28.8</td><td>17.96</td><td>17.99</td><td>17.99</td></tr> <tr><td>24.0</td><td>18.20</td><td>18.22</td><td>18.22</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> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table> </div> </div>		Output Voltage [V]	Load Current [A]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	45.6	17.06	17.10	17.11	43.2	17.21	17.25	17.27	38.4	17.41	17.44	17.45	33.6	17.67	17.70	17.70	28.8	17.96	17.99	17.99	24.0	18.20	18.22	18.22	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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<p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is from 24V to 0V.</p>																																																								



<p>Model KHNA480F-48</p> <p>Item Overvoltage Protection</p> <p>Object +48V10A</p>		<p>Testing Circuitry Figure A</p>																																						
<p>1. Graph</p> <div style="text-align: center;"> <p>—△— Input Volt. 115V</p> <p>---□--- Input Volt. 230V</p> </div> <p style="text-align: center;">Ambient Temperature [°C]</p> <p style="text-align: right;">Load 0%</p>		<p>2. Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 115[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>-30</td><td>58.74</td><td>58.74</td></tr> <tr><td>-25</td><td>58.74</td><td>58.74</td></tr> <tr><td>-10</td><td>58.74</td><td>58.74</td></tr> <tr><td>0</td><td>58.74</td><td>58.74</td></tr> <tr><td>10</td><td>58.74</td><td>58.74</td></tr> <tr><td>25</td><td>58.74</td><td>58.74</td></tr> <tr><td>40</td><td>58.74</td><td>58.74</td></tr> <tr><td>50</td><td>58.74</td><td>58.74</td></tr> <tr><td>60</td><td>58.74</td><td>58.74</td></tr> <tr><td>70</td><td>58.74</td><td>58.74</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 115[V]	Input Volt. 230[V]	-30	58.74	58.74	-25	58.74	58.74	-10	58.74	58.74	0	58.74	58.74	10	58.74	58.74	25	58.74	58.74	40	58.74	58.74	50	58.74	58.74	60	58.74	58.74	70	58.74	58.74	--	-	-
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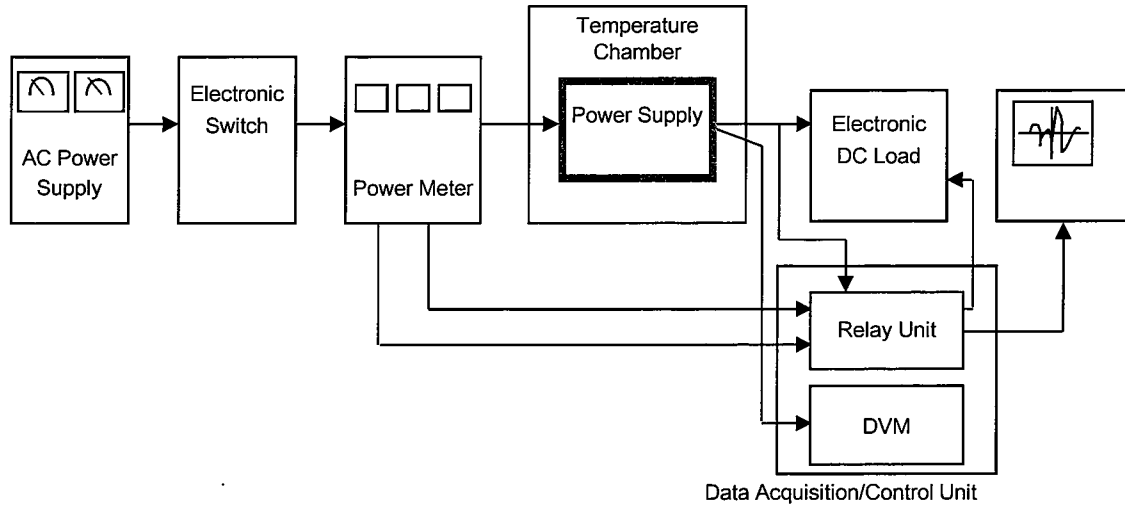


Figure A

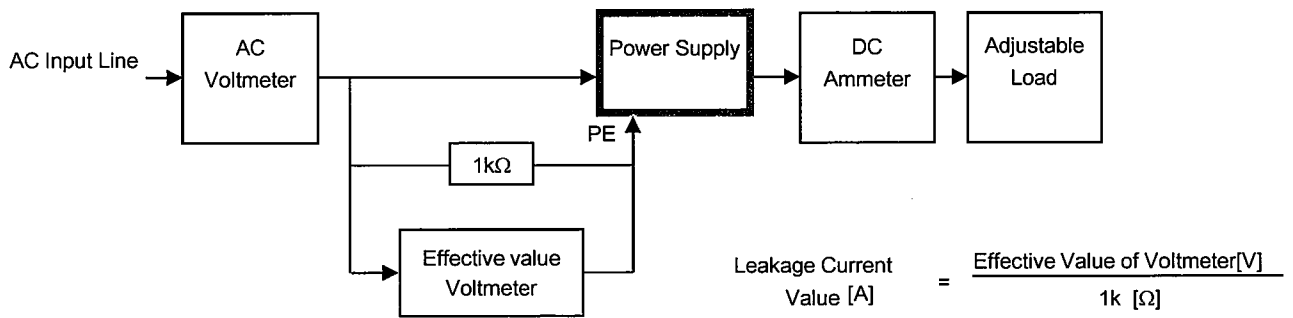


Figure B (DEN-AN)

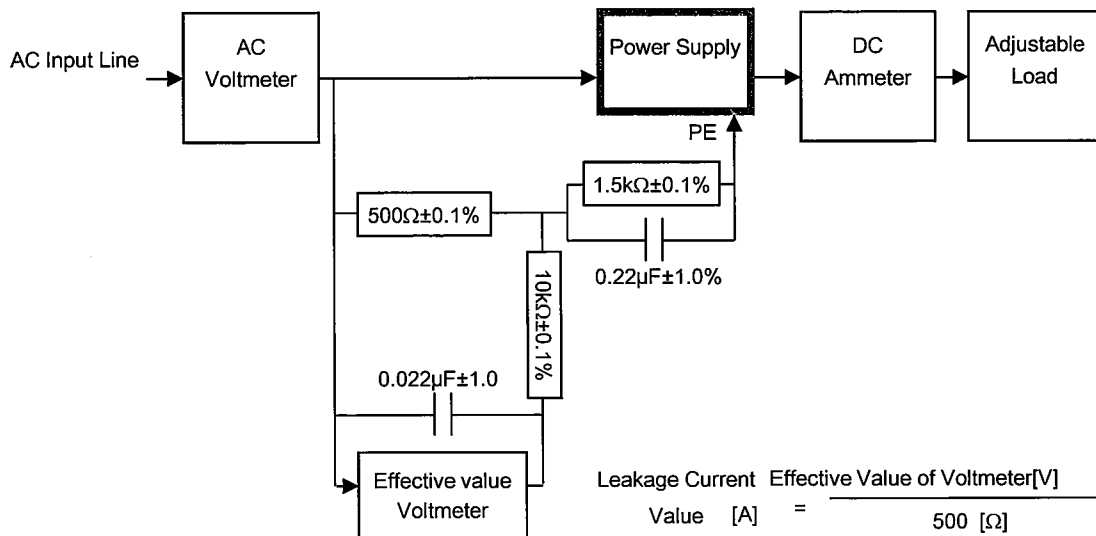


Figure B (IEC60950-1)

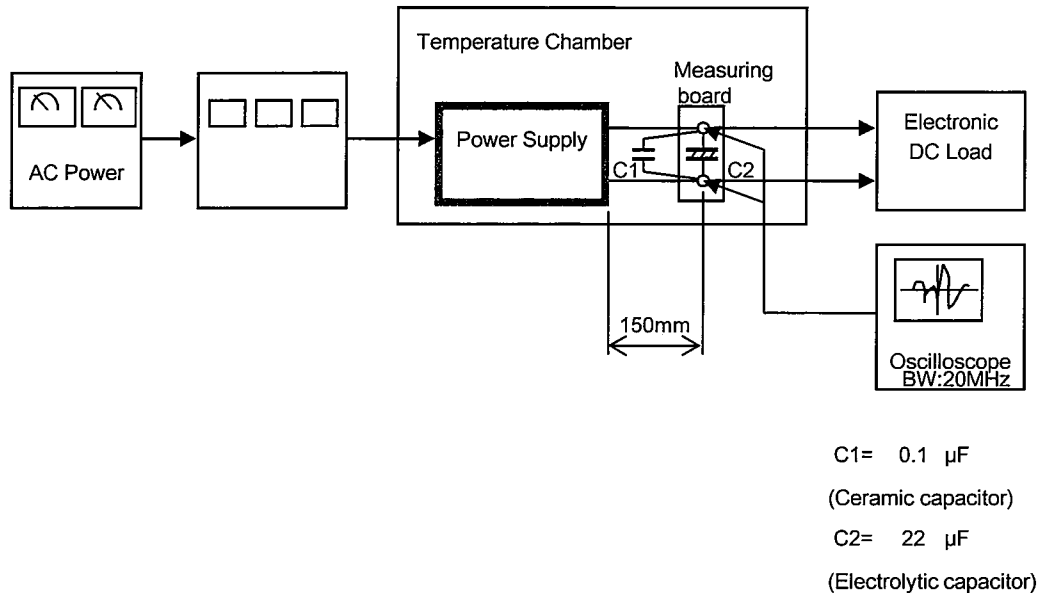


Figure C