

# TEST DATA OF WMA35F-48

Regulated DC Power Supply  
November 9, 2020

Approved by : Takashi Kajii  
Design Manager

Prepared by : Takeshi Natsuno  
Design Engineer

**COSEL CO.,LTD.**

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(Final Page 23)

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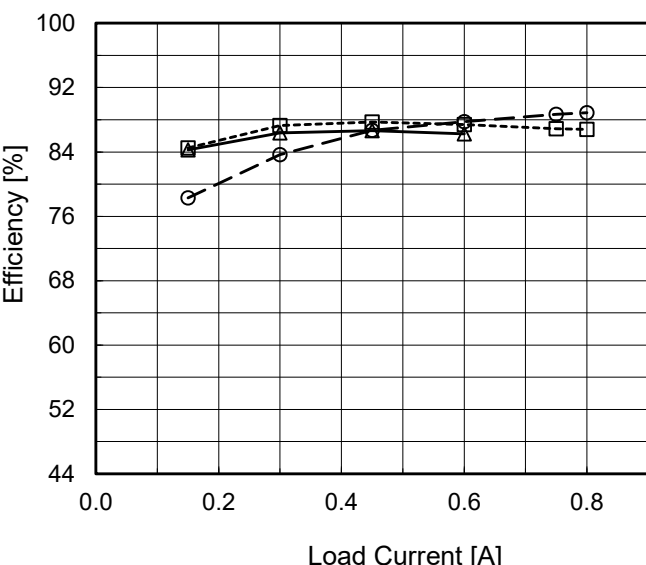
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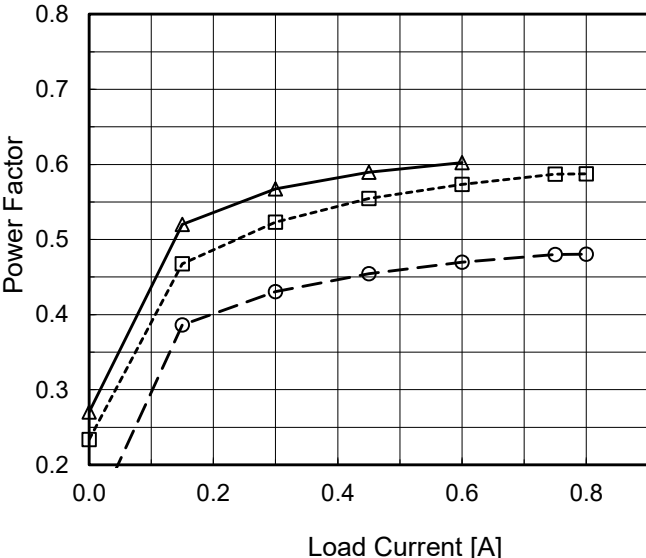
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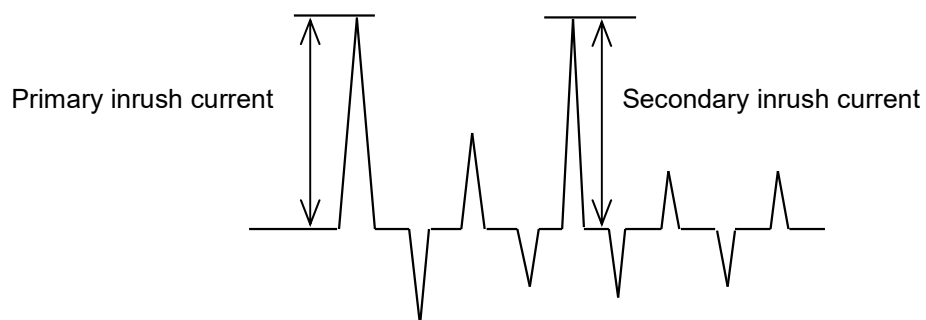
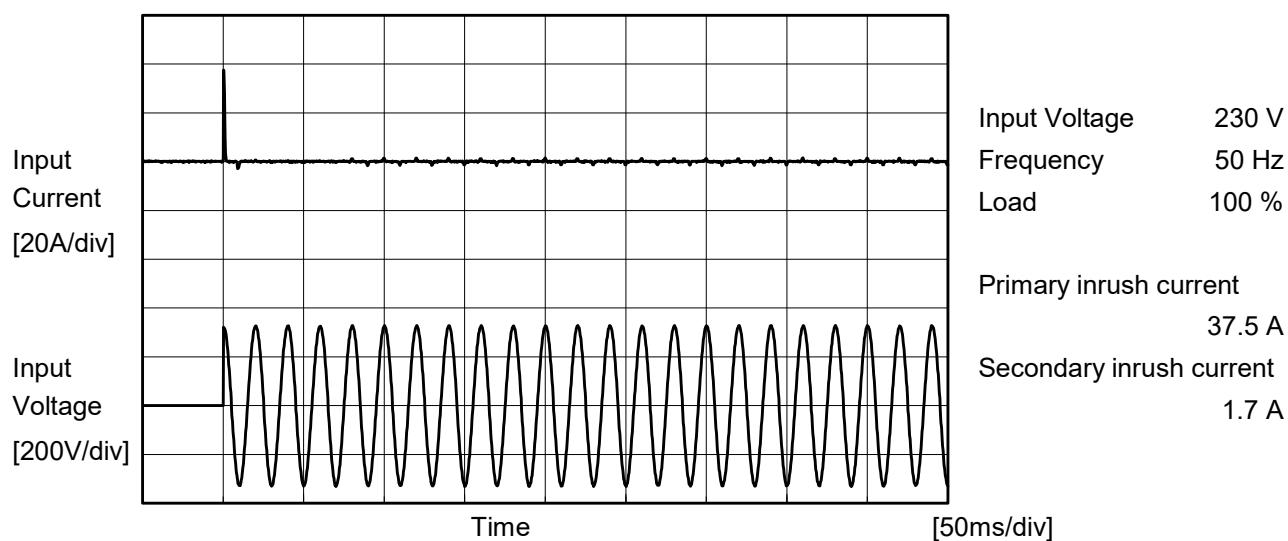
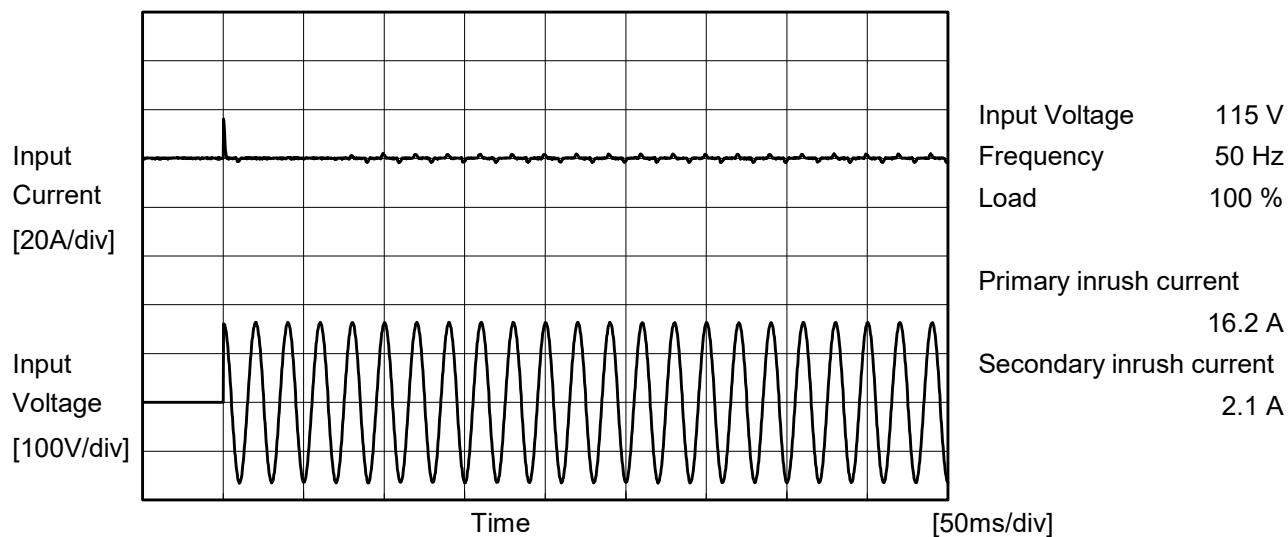
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Model	WMA35F-48	Temperature 25°C Testing Circuitry Figure A
Item	Inrush Current	
Object	_____	





Model		Temperature 25°C Testing Circuitry Figure B
WMA35F-48		
Item	Leakage Current	
Object	_____	

## 1.Results

[mA]

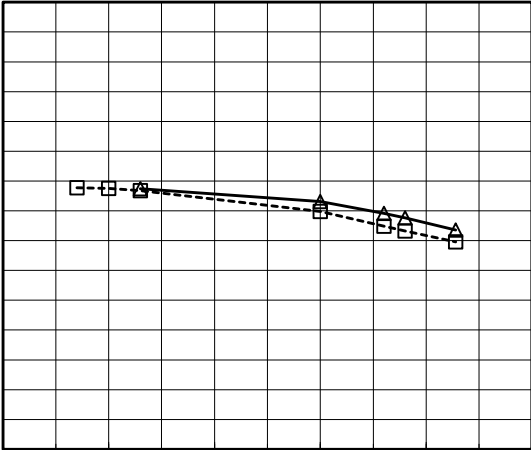
Standards	Measuring Method	Input Volt.			Note
		100 [V]	115 [V]	230 [V]	
IEC60601-1	Both phases	0.12	0.14	0.31	Operation
	One of phases	0.23	0.26	0.59	Stand by

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.

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Model		WMA35F-48	Temperature25°C																															
Item		Line Regulation	Testing CircuitryFigure A																															
Object		+48V0.8A																																
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Model	WMA35F-48	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response	
Object	+48V0.8A	

Input Volt. 230 V  
Cycle 1000 ms

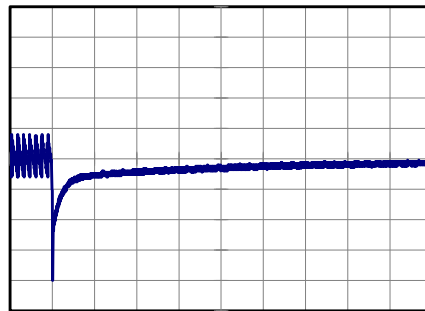
$t_1, t_2 = 50 \mu s$

Load Current

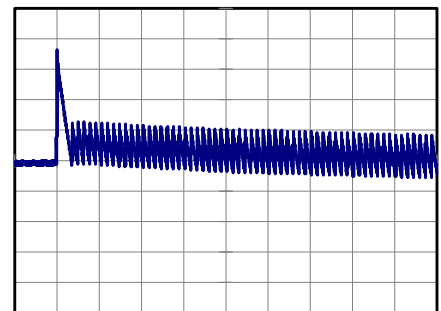


Min.Load (0A) ←→  
Load 100% (0.8A)

100 mV/div



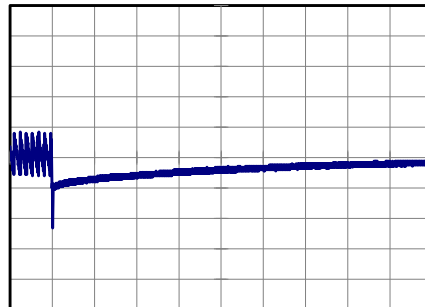
40 ms/div



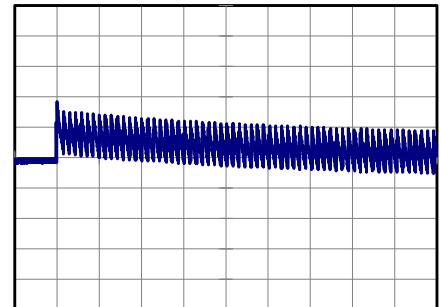
40 ms/div

Min.Load (0A) ←→  
Load 50% (0.4A)

100 mV/div



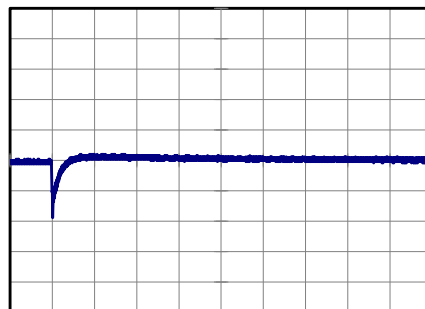
40 ms/div



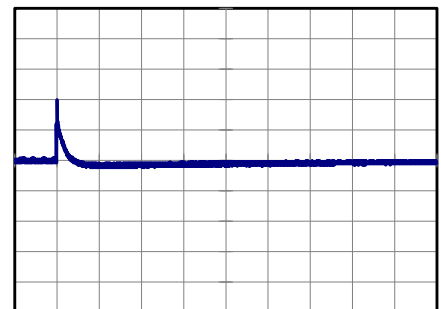
40 ms/div

Load 50% (0.4A) ←→  
Load 100% (0.8A)

100 mV/div



40 ms/div



40 ms/div

# COSEL

Model		WMA35F-48	Temperature 25°C																																							
Item		Ripple-Noise (by Load Current)	Testing Circuitry Figure C																																							
Object		+48V0.8A																																								
1.Graph			2.Values																																							
<div><div><div>—△— Input Volt. 115V</div><div>- - ⊖ - - Input Volt. 230V</div></div><div>Ripple-Noise [mV]</div><div>Load Current [A]</div></div>			<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 115 [V]</th><th>Input Volt. 230 [V]</th></tr><tr><td>0.00</td><td>81</td><td>134</td></tr><tr><td>0.16</td><td>19</td><td>19</td></tr><tr><td>0.32</td><td>23</td><td>21</td></tr><tr><td>0.48</td><td>26</td><td>22</td></tr><tr><td>0.64</td><td>34</td><td>21</td></tr><tr><td>0.80</td><td>45</td><td>24</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>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 115 [V]	Input Volt. 230 [V]	0.00	81	134	0.16	19	19	0.32	23	21	0.48	26	22	0.64	34	21	0.80	45	24	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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<div>Measured by 20 MHz Oscilloscope.</div> <div>Ripple-Noise is shown as p-p in the figure below.</div> <div><div><div>T1: Due to AC Input Line</div><div>T2: Due to Switching</div></div><div>Ripple-Noise [mVp-p]</div><div>T1</div><div>T2</div></div> <div>Fig. Complex Ripple Wave Form</div>																																										

BC-11648

BC-11648





Model		WMA35F-48	Testing Circuitry Figure A
Item		Output Voltage Accuracy	
Object		+48V0.8A	

### 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 : 100 - 230V

Load Current : 0 - 0.8A

\* 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	50	230	0	48.118	±144	±0.3
Minimum Voltage	-20	132	0.8	47.831		

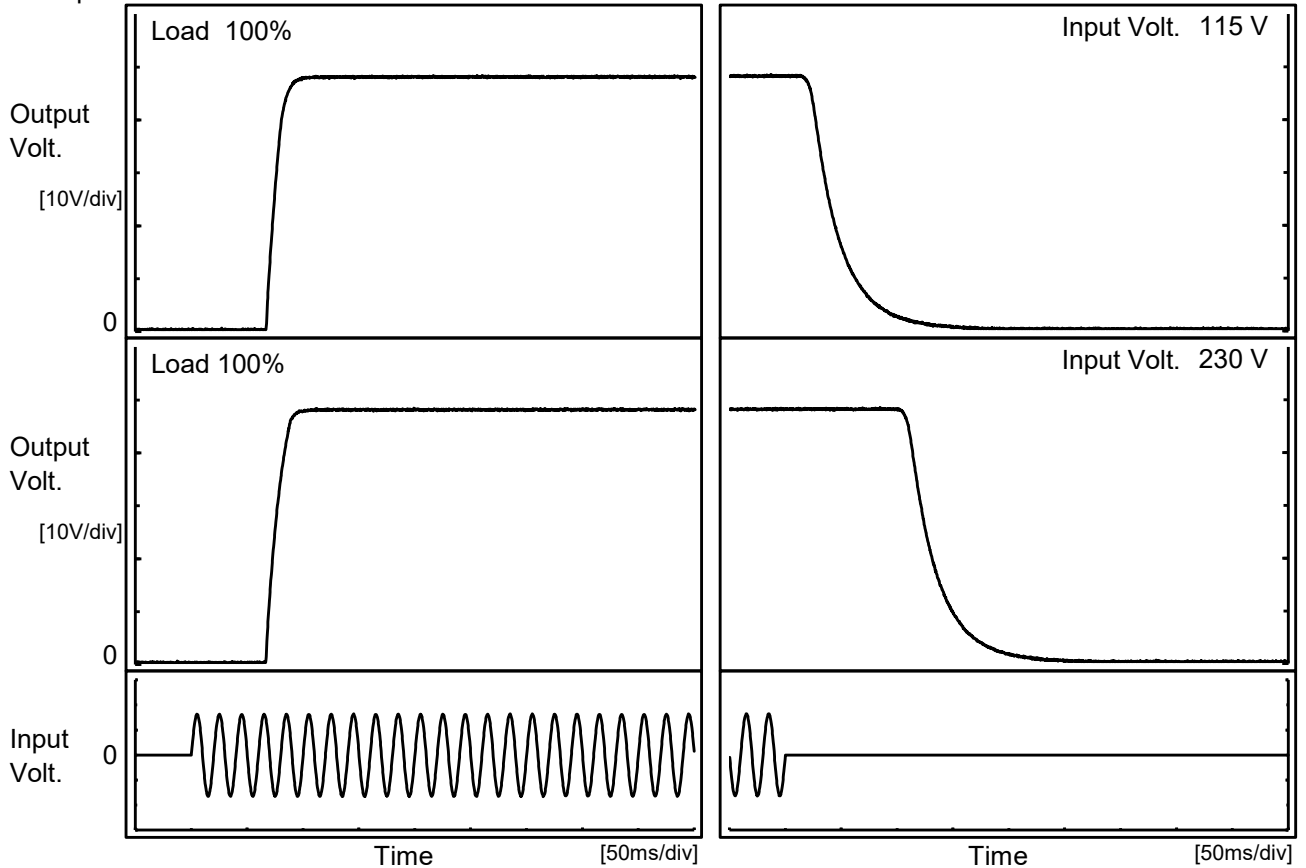
**COSEL**

Model		WMA35F-48	Temperature 25°C Testing Circuitry Figure A
Item		Time Lapse Drift	
Object		+48V0.8A	
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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**COSEL**

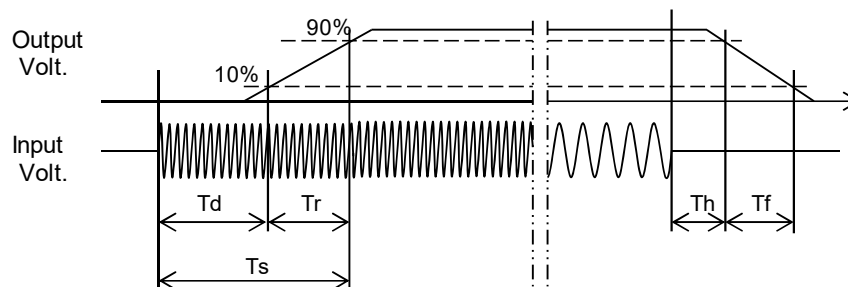
Model	WMA35F-48	Temperature 25°C Testing Circuitry Figure A
Item	Rise and Fall Time	
Object	+48V0.8A	

## 1.Graph



## 2.Values

		[ms]				
Input Volte	Time	Td	Tr	Ts	Th	Tf
115 V		69.3	25.8	95.1	24.3	56.3
230 V		67.8	18.5	86.3	111.0	56.3



**COSEL**

<div>LUCEL</div>																																			
Model	WMA35F-48																																		
Item	Hold-Up Time	Temperature	25°C																																
Object	+48V0.8A	Testing Circuitry	Figure A																																
1.Graph		2.Values																																	
<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> <div><div>Hold-Up Time [ms]</div><div><div><div>1000</div><div>100</div><div>10</div><div>1</div></div><div><div><div>50</div><div>100</div><div>150</div><div>200</div><div>250</div><div>300</div></div></div></div><div><div>Input Voltage [V]</div></div></div> <div><div>This duration covers from Shut-off of input voltage to the moment when output voltage descends to the rated range of voltage accuracy.</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>85</td><td>24</td><td>-</td></tr><tr><td>100</td><td>36</td><td>-</td></tr><tr><td>115</td><td>49</td><td>19</td></tr><tr><td>200</td><td>164</td><td>78</td></tr><tr><td>230</td><td>221</td><td>107</td></tr><tr><td>240</td><td>243</td><td>118</td></tr><tr><td>264</td><td>296</td><td>145</td></tr><tr><td>--</td><td>-</td><td>-</td></tr><tr><td>--</td><td>-</td><td>-</td></tr></table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	85	24	-	100	36	-	115	49	19	200	164	78	230	221	107	240	243	118	264	296	145	--	-	-	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																		
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**COSEL**

Model		WMA35F-48	Temperature25°C																																																				
Item		Instantaneous Interruption Compensation	Testing CircuitryFigure A																																																				
Object		+48V0.8A																																																					
1.Graph			2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>100V</div></div><div><div>---□---</div><div>Input Volt.</div><div>115V</div></div><div><div>---○---</div><div>Input Volt.</div><div>230V</div></div></div> <table><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>0.00</td><td>-</td><td>-</td><td>-</td></tr><tr><td>0.15</td><td>104</td><td>139</td><td>571</td></tr><tr><td>0.30</td><td>51</td><td>69</td><td>300</td></tr><tr><td>0.45</td><td>33</td><td>45</td><td>199</td></tr><tr><td>0.60</td><td>23</td><td>32</td><td>149</td></tr><tr><td>0.75</td><td>-</td><td>24</td><td>117</td></tr><tr><td>0.80</td><td>-</td><td>21</td><td>107</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>			Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	0.00	-	-	-	0.15	104	139	571	0.30	51	69	300	0.45	33	45	199	0.60	23	32	149	0.75	-	24	117	0.80	-	21	107	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-		
Load Current [A]	Time [ms]																																																						
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]																																																				
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0.15	104	139	571																																																				
0.30	51	69	300																																																				
0.45	33	45	199																																																				
0.60	23	32	149																																																				
0.75	-	24	117																																																				
0.80	-	21	107																																																				
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**COSEL**

Model

WMA35F-48

Item

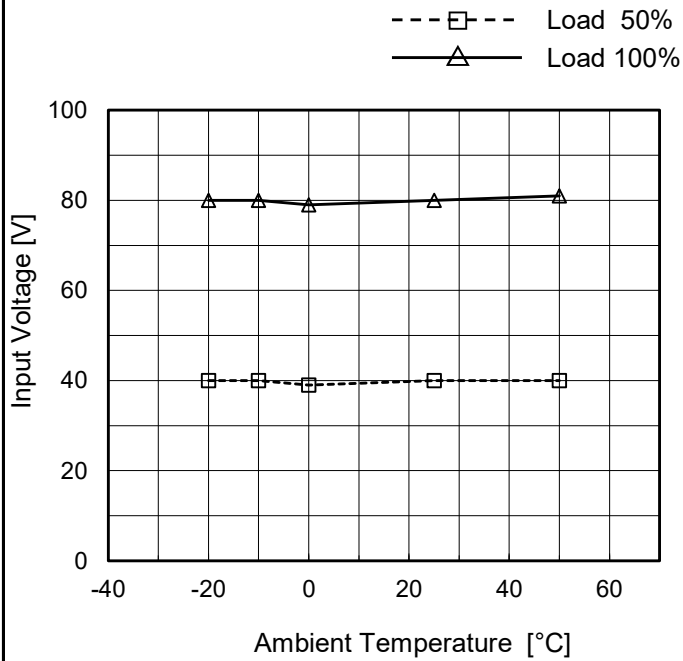
Minimum Input Voltage  
for Regulated Output Voltage

Object

+48V0.8A

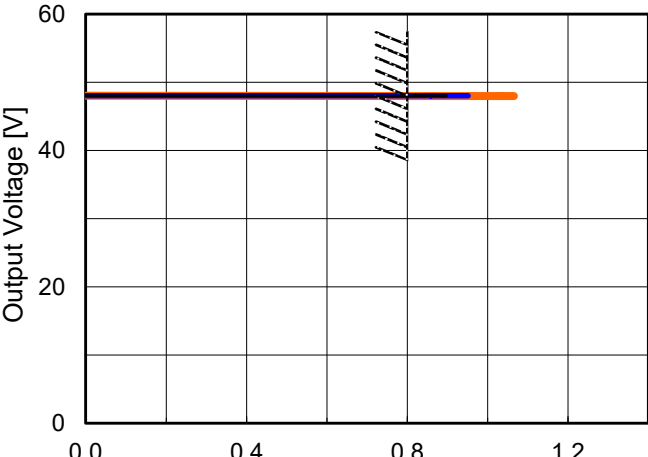
Testing Circuitry Figure A

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-20	40	80
-10	40	80
0	39	79
25	40	80
50	40	81
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-

Model		WMA35F-48																																																																
Item		Overcurrent Protection																																																																
Object		+48V0.8A																																																																
1.Graph		2.Values																																																																
<div><div><div></div><div></div><div></div></div><div><div>Input Volt. 100V</div><div>Input Volt. 115V</div><div>Input Volt. 230V</div></div></div>  <p>Note: Slanted line shows the range of the rated load current.</p>		<table><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><tr><td>48</td><td>0.90</td><td>0.95</td><td>1.07</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><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><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Output Voltage [V]	Load Current [A]			Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]	48	0.90	0.95	1.07	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Output Voltage [V]	Load Current [A]																																																																	
	Input Volt. 100[V]	Input Volt. 115[V]	Input Volt. 230[V]																																																															
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- 21 -

BC-11648

**COSEL**

Model

WMA35F-48

Item

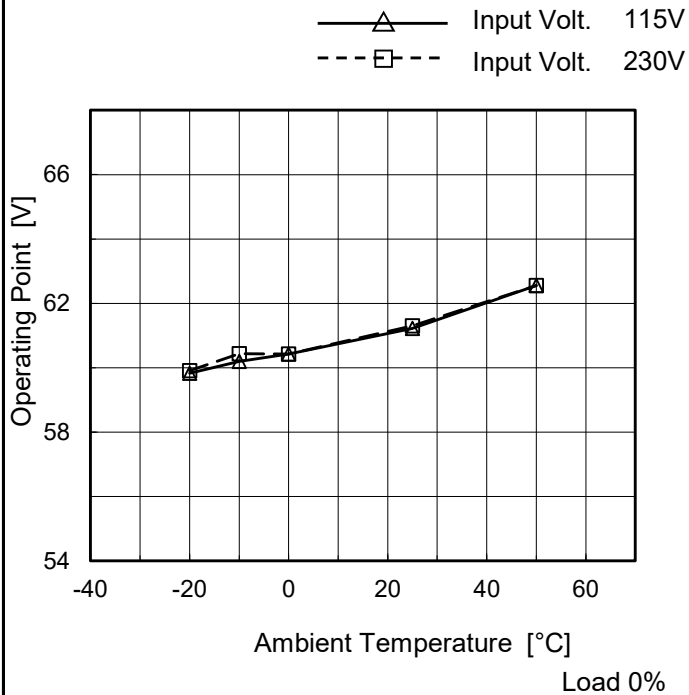
Overvoltage Protection

Object

+48V0.8A

Testing Circuitry Figure A

## 1.Graph



## 2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 115[V]	Input Volt. 230[V]
-20	59.90	59.91
-10	60.13	60.43
0	60.27	60.42
25	61.30	61.30
50	62.55	62.55
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-
--	-	-



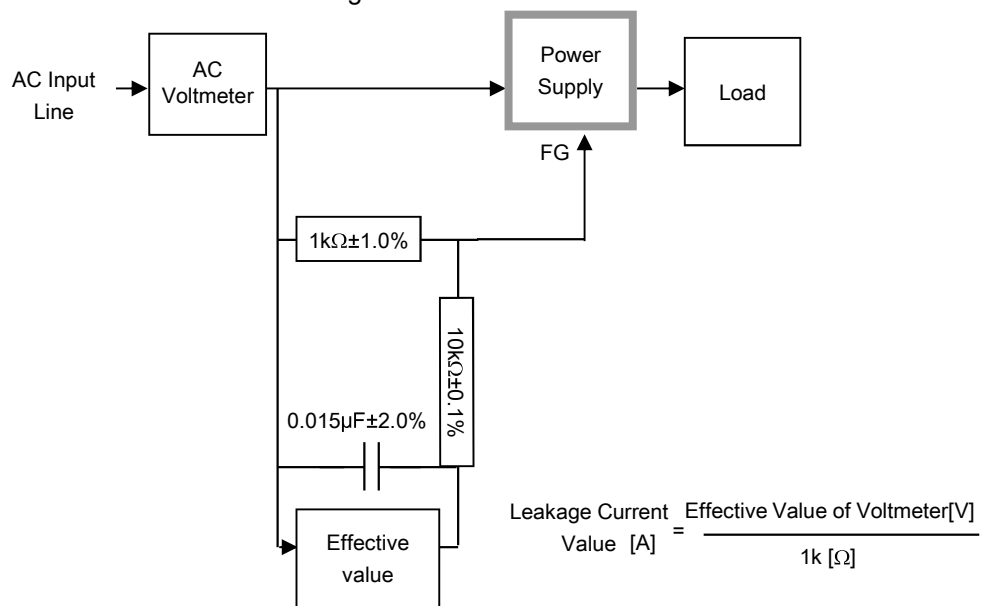
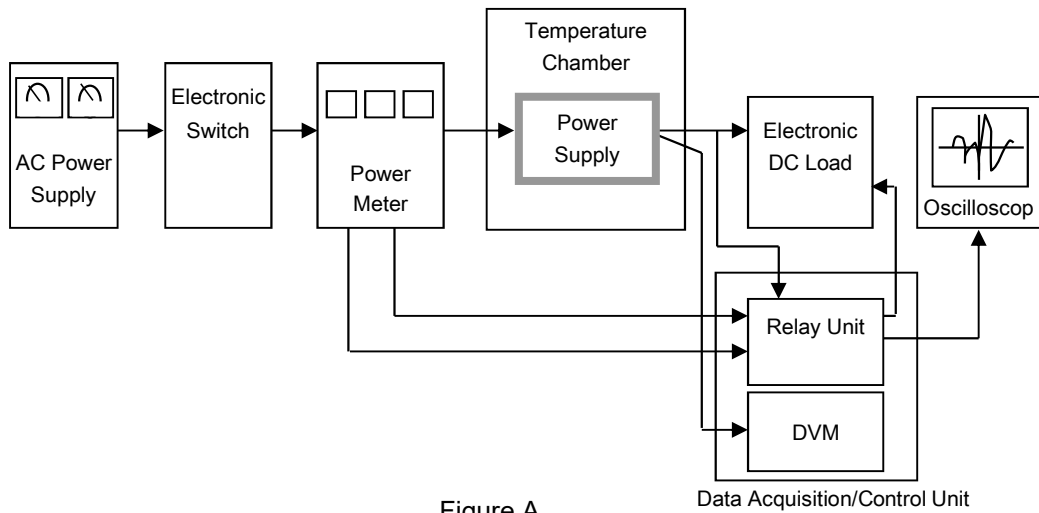


Figure B (IEC60601-1)

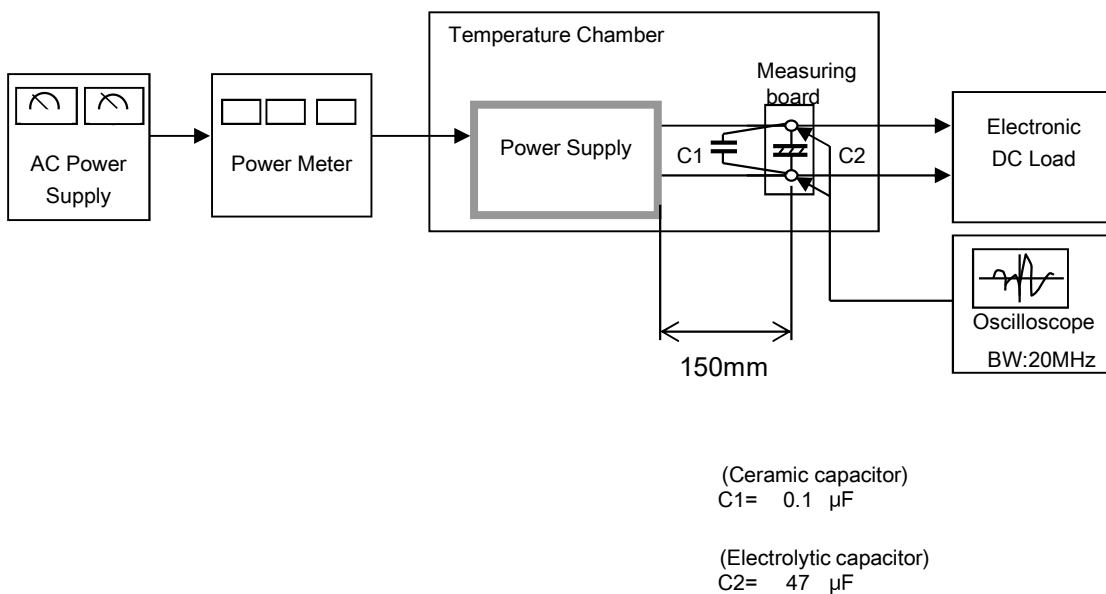


Figure C