

TEST DATA OF TUXS200F24

Regulated DC Power Supply
October 21, 2016

Approved by : Junichi Hatagishi
Junichi Hatagishi Design Manager

Prepared by : Hiroyuki Shoji
Hiroyuki Shoji 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 25

(Final Page 25)



Model		TUXS200F24		Temperature 25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph		<p> —△— Input Volt. 100V - - - □ - - - Input Volt. 200V - · - ○ - · - - Input Volt. 230V </p>		2.Values																																																				
				<table border="1"> <thead> <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> </thead> <tbody> <tr> <td>0.00</td> <td>0.131</td> <td>0.225</td> <td>0.255</td> </tr> <tr> <td>1.66</td> <td>0.524</td> <td>0.348</td> <td>0.345</td> </tr> <tr> <td>3.22</td> <td>0.911</td> <td>0.516</td> <td>0.480</td> </tr> <tr> <td>4.98</td> <td>1.345</td> <td>0.721</td> <td>0.654</td> </tr> <tr> <td>6.64</td> <td>1.770</td> <td>0.924</td> <td>0.821</td> </tr> <tr> <td>8.30</td> <td>2.207</td> <td>1.126</td> <td>0.997</td> </tr> <tr> <td>9.13</td> <td>2.435</td> <td>1.235</td> <td>1.089</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]	Input Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	0.131	0.225	0.255	1.66	0.524	0.348	0.345	3.22	0.911	0.516	0.480	4.98	1.345	0.721	0.654	6.64	1.770	0.924	0.821	8.30	2.207	1.126	0.997	9.13	2.435	1.235	1.089	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Input Current [A]																																																							
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																					
0.00	0.131	0.225	0.255																																																					
1.66	0.524	0.348	0.345																																																					
3.22	0.911	0.516	0.480																																																					
4.98	1.345	0.721	0.654																																																					
6.64	1.770	0.924	0.821																																																					
8.30	2.207	1.126	0.997																																																					
9.13	2.435	1.235	1.089																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					
<p>Note: Slanted line shows the range of the rated load current.</p>																																																								



Model		TUXS200F24		Temperature 25°C																																																				
Item		Input Power (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph			—△— Input Volt. 100V	2.Values																																																				
			- - □ - - Input Volt. 200V																																																					
			- · - ○ - · - Input Volt. 230V																																																					
<p>Note: Slanted line shows the range of the rated load current.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Input Power [W]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr> <td>0.00</td> <td>6.1</td> <td>6.5</td> <td>6.4</td> </tr> <tr> <td>1.66</td> <td>47.7</td> <td>48.3</td> <td>49.1</td> </tr> <tr> <td>3.22</td> <td>87.1</td> <td>87.0</td> <td>87.3</td> </tr> <tr> <td>4.98</td> <td>131.9</td> <td>130.9</td> <td>131.1</td> </tr> <tr> <td>6.64</td> <td>174.7</td> <td>172.6</td> <td>172.6</td> </tr> <tr> <td>8.30</td> <td>218.6</td> <td>215.2</td> <td>215.0</td> </tr> <tr> <td>9.13</td> <td>241.1</td> <td>237.0</td> <td>236.7</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]	Input Power [W]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	6.1	6.5	6.4	1.66	47.7	48.3	49.1	3.22	87.1	87.0	87.3	4.98	131.9	130.9	131.1	6.64	174.7	172.6	172.6	8.30	218.6	215.2	215.0	9.13	241.1	237.0	236.7	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Input Power [W]																																																							
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																					
0.00	6.1	6.5	6.4																																																					
1.66	47.7	48.3	49.1																																																					
3.22	87.1	87.0	87.3																																																					
4.98	131.9	130.9	131.1																																																					
6.64	174.7	172.6	172.6																																																					
8.30	218.6	215.2	215.0																																																					
9.13	241.1	237.0	236.7																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					



Model		TUXS200F24	Temperature 25°C																																	
Item		Efficiency (by Input Voltage)	Testing Circuitry Figure A																																	
Object		_____																																		
1.Graph		2.Values																																		
<p>---□--- Load 50% —△— Load 100%</p>		<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Efficiency [%]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>80</td><td>89.5</td><td>90.0</td></tr> <tr><td>85</td><td>89.8</td><td>90.4</td></tr> <tr><td>100</td><td>90.1</td><td>91.3</td></tr> <tr><td>120</td><td>90.5</td><td>91.9</td></tr> <tr><td>200</td><td>90.5</td><td>92.7</td></tr> <tr><td>230</td><td>90.4</td><td>92.8</td></tr> <tr><td>264</td><td>90.4</td><td>93.1</td></tr> <tr><td>280</td><td>90.5</td><td>93.0</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>			Input Voltage [V]	Efficiency [%]		Load 50%	Load 100%	80	89.5	90.0	85	89.8	90.4	100	90.1	91.3	120	90.5	91.9	200	90.5	92.7	230	90.4	92.8	264	90.4	93.1	280	90.5	93.0	--	-	-
Input Voltage [V]	Efficiency [%]																																			
	Load 50%	Load 100%																																		
80	89.5	90.0																																		
85	89.8	90.4																																		
100	90.1	91.3																																		
120	90.5	91.9																																		
200	90.5	92.7																																		
230	90.4	92.8																																		
264	90.4	93.1																																		
280	90.5	93.0																																		
--	-	-																																		
<p>Note: Slanted line shows the range of the rated input voltage.</p>																																				



Model		TUXS200F24		Temperature 25°C																																																				
Item		Efficiency (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph		—△— Input Volt. 100V - - - □ - - - Input Volt. 200V ···○··· Input Volt. 230V		2.Values																																																				
				<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[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>1.66</td><td>83.8</td><td>82.7</td><td>81.2</td></tr> <tr><td>3.22</td><td>88.9</td><td>89.0</td><td>88.7</td></tr> <tr><td>4.98</td><td>90.8</td><td>91.4</td><td>91.3</td></tr> <tr><td>6.64</td><td>91.4</td><td>92.5</td><td>92.5</td></tr> <tr><td>8.30</td><td>91.3</td><td>92.7</td><td>92.8</td></tr> <tr><td>9.13</td><td>91.1</td><td>92.6</td><td>92.8</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]	Efficiency [%]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	1.66	83.8	82.7	81.2	3.22	88.9	89.0	88.7	4.98	90.8	91.4	91.3	6.64	91.4	92.5	92.5	8.30	91.3	92.7	92.8	9.13	91.1	92.6	92.8	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Efficiency [%]																																																							
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																					
0.00	-	-	-																																																					
1.66	83.8	82.7	81.2																																																					
3.22	88.9	89.0	88.7																																																					
4.98	90.8	91.4	91.3																																																					
6.64	91.4	92.5	92.5																																																					
8.30	91.3	92.7	92.8																																																					
9.13	91.1	92.6	92.8																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					
--	-	-	-																																																					
Note: Slanted line shows the range of the rated load current.																																																								



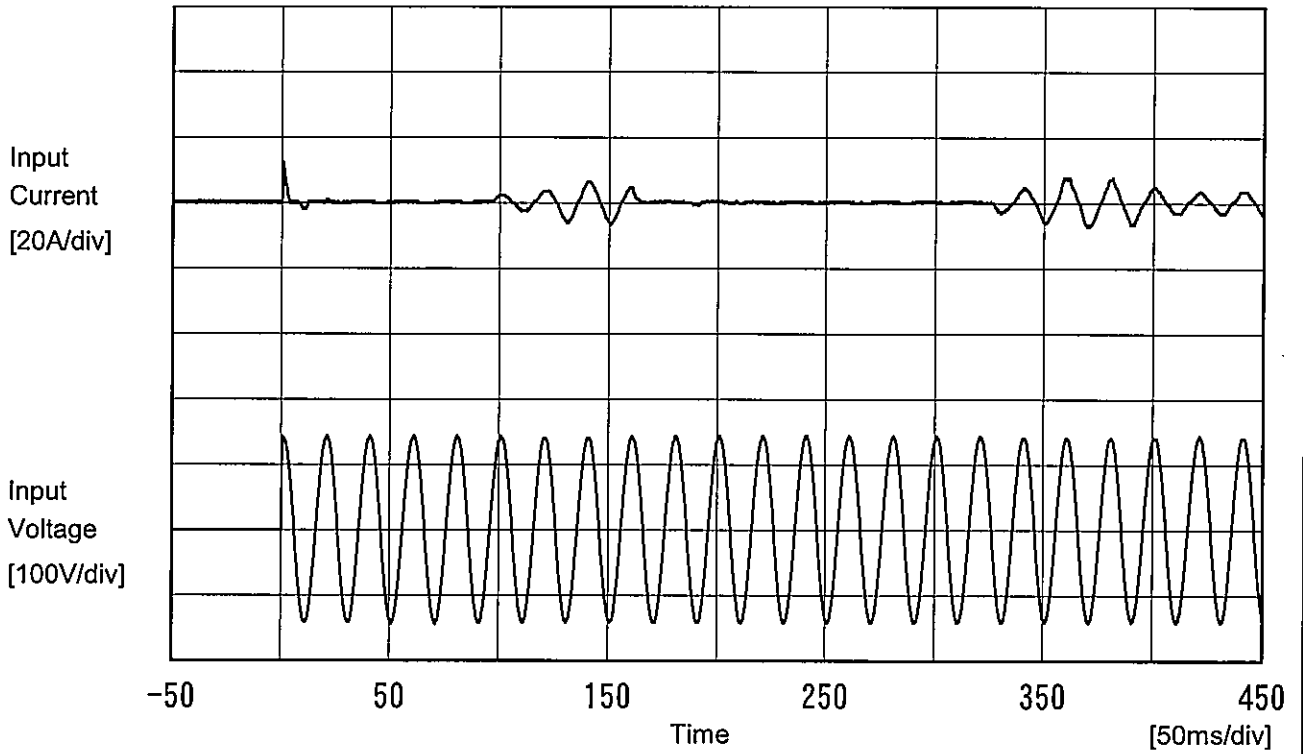
Model		TUXS200F24		Temperature 25°C Testing Circuitry Figure A																																
Item		Power Factor (by Input Voltage)																																		
Object		_____		2.Values																																
1.Graph																																				
<p>---□--- Load 50% —△— Load 100%</p>				<table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Power Factor</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>80</td><td>0.986</td><td>0.993</td></tr> <tr><td>85</td><td>0.982</td><td>0.992</td></tr> <tr><td>100</td><td>0.975</td><td>0.991</td></tr> <tr><td>120</td><td>0.950</td><td>0.986</td></tr> <tr><td>200</td><td>0.885</td><td>0.956</td></tr> <tr><td>230</td><td>0.840</td><td>0.938</td></tr> <tr><td>264</td><td>0.785</td><td>0.884</td></tr> <tr><td>280</td><td>0.455</td><td>0.612</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Input Voltage [V]	Power Factor		Load 50%	Load 100%	80	0.986	0.993	85	0.982	0.992	100	0.975	0.991	120	0.950	0.986	200	0.885	0.956	230	0.840	0.938	264	0.785	0.884	280	0.455	0.612	--	-	-
Input Voltage [V]	Power Factor																																			
	Load 50%	Load 100%																																		
80	0.986	0.993																																		
85	0.982	0.992																																		
100	0.975	0.991																																		
120	0.950	0.986																																		
200	0.885	0.956																																		
230	0.840	0.938																																		
264	0.785	0.884																																		
280	0.455	0.612																																		
--	-	-																																		
<p>Note: Slanted line shows the range of the rated input voltage.</p>																																				



<p>Model TUXS200F24</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																																			
<p>Item Power Factor (by Load Current)</p>																																																					
<p>Object _____</p>																																																					
<p>1.Graph</p> <p> —△— Input Volt. 100V - - □ - - Input Volt. 200V ···○··· Input Volt. 230V </p> <p>Power Factor</p> <p>Load Current [A]</p>		<p>2.Values</p> <table border="1"> <thead> <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> </thead> <tbody> <tr><td>0.00</td><td>0.463</td><td>0.144</td><td>0.109</td></tr> <tr><td>1.66</td><td>0.910</td><td>0.693</td><td>0.618</td></tr> <tr><td>3.22</td><td>0.957</td><td>0.844</td><td>0.791</td></tr> <tr><td>4.98</td><td>0.981</td><td>0.908</td><td>0.872</td></tr> <tr><td>6.64</td><td>0.988</td><td>0.933</td><td>0.914</td></tr> <tr><td>8.30</td><td>0.991</td><td>0.956</td><td>0.938</td></tr> <tr><td>9.13</td><td>0.991</td><td>0.959</td><td>0.945</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]	Power Factor			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	0.463	0.144	0.109	1.66	0.910	0.693	0.618	3.22	0.957	0.844	0.791	4.98	0.981	0.908	0.872	6.64	0.988	0.933	0.914	8.30	0.991	0.956	0.938	9.13	0.991	0.959	0.945	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Power Factor																																																				
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																		
0.00	0.463	0.144	0.109																																																		
1.66	0.910	0.693	0.618																																																		
3.22	0.957	0.844	0.791																																																		
4.98	0.981	0.908	0.872																																																		
6.64	0.988	0.933	0.914																																																		
8.30	0.991	0.956	0.938																																																		
9.13	0.991	0.959	0.945																																																		
--	-	-	-																																																		
--	-	-	-																																																		
--	-	-	-																																																		
--	-	-	-																																																		
<p>Note: Slanted line shows the range of the rated load current.</p>																																																					

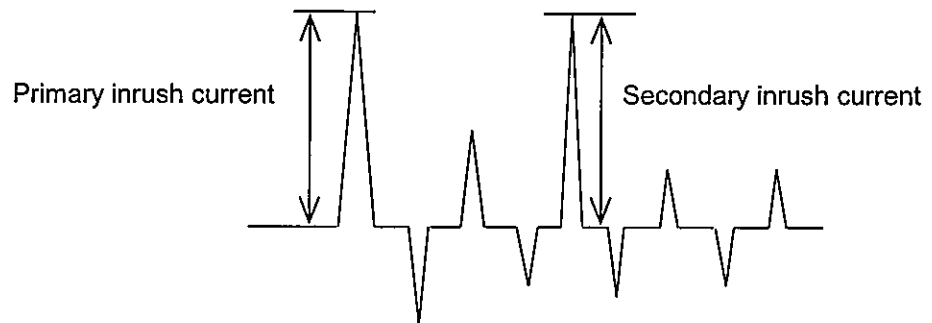


Model		TUXS200F24	Temperature 25°C Testing Circuitry Figure A
Item		Inrush Current	
Object		_____	



Input Voltage 100 V
 Frequency 50 Hz
 Load 100 %

Primary inrush current 15.5 A
 Secondary inrush current 7.7 A





Model		TUXS200F24	Temperature 25°C Testing Circuitry Figure B
Item		Leakage Current	
Object		_____	

1.Results

Standards		Input Volt.			Note
		100 [V]	200 [V]	240 [V]	
DEN-AN	Both phases	0.17	0.34	0.41	Operation
	One of phases	0.27	0.54	0.65	Stand by
IEC60950-1	Both phases	0.14	0.29	0.36	Operation
	One of phases	0.28	0.56	0.68	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 TUXS200F24</p> <p>Item Line Regulation</p> <p>Object +24V8.3A</p>		<p>Temperature 25°C</p> <p>Testing Circuitry Figure A</p>																																
<p>1.Graph</p> <div style="text-align: right;"> <p>---□--- Load 50%</p> <p>—△— Load 100%</p> </div> <p>Note: Slanted line shows the range of the rated input voltage.</p>		<p>2.Values</p> <table border="1"> <thead> <tr> <th rowspan="2">Input Voltage [V]</th> <th colspan="2">Output Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>80</td><td>24.026</td><td>24.038</td></tr> <tr><td>85</td><td>24.027</td><td>24.039</td></tr> <tr><td>100</td><td>24.029</td><td>24.038</td></tr> <tr><td>120</td><td>24.029</td><td>24.038</td></tr> <tr><td>200</td><td>24.029</td><td>24.038</td></tr> <tr><td>230</td><td>24.029</td><td>24.038</td></tr> <tr><td>264</td><td>24.028</td><td>24.038</td></tr> <tr><td>280</td><td>24.027</td><td>24.039</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Input Voltage [V]	Output Voltage [V]		Load 50%	Load 100%	80	24.026	24.038	85	24.027	24.039	100	24.029	24.038	120	24.029	24.038	200	24.029	24.038	230	24.029	24.038	264	24.028	24.038	280	24.027	24.039	--	-	-
Input Voltage [V]	Output Voltage [V]																																	
	Load 50%	Load 100%																																
80	24.026	24.038																																
85	24.027	24.039																																
100	24.029	24.038																																
120	24.029	24.038																																
200	24.029	24.038																																
230	24.029	24.038																																
264	24.028	24.038																																
280	24.027	24.039																																
--	-	-																																

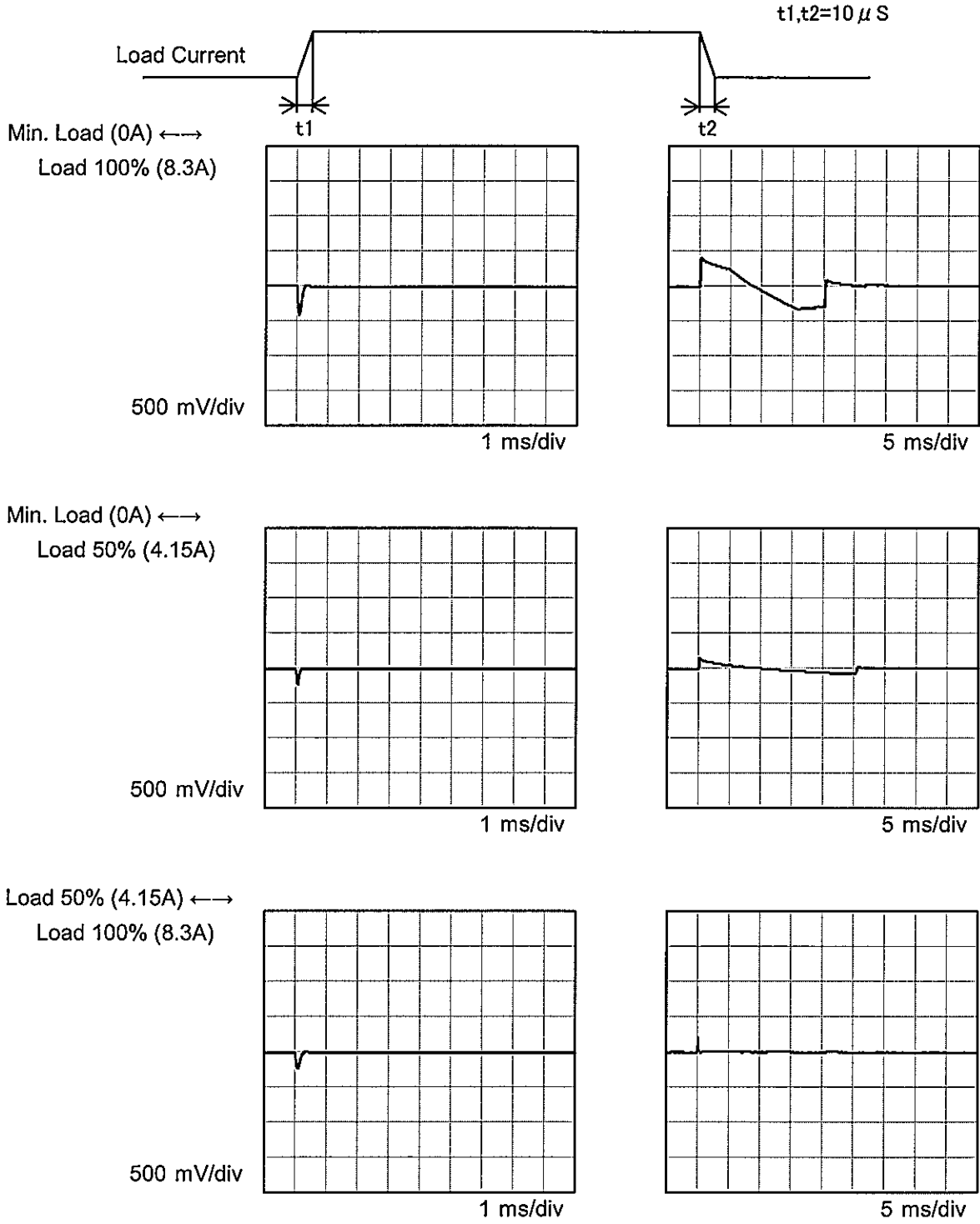


Model		TUXS200F24		Temperature 25°C Testing Circuitry Figure A																																																		
Item		Load Regulation																																																				
Object		+24V8.3A																																																				
1.Graph			—△— Input Volt. 100V ---□--- Input Volt. 200V ···○··· Input Volt. 230V	2.Values																																																		
			<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. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>0.00</td><td>24.033</td><td>24.034</td><td>24.035</td></tr> <tr><td>1.66</td><td>24.028</td><td>24.029</td><td>24.029</td></tr> <tr><td>3.22</td><td>24.029</td><td>24.030</td><td>24.029</td></tr> <tr><td>4.98</td><td>24.030</td><td>24.031</td><td>24.031</td></tr> <tr><td>6.64</td><td>24.031</td><td>24.033</td><td>24.032</td></tr> <tr><td>8.30</td><td>24.038</td><td>24.038</td><td>24.038</td></tr> <tr><td>9.13</td><td>24.042</td><td>24.041</td><td>24.041</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]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	24.033	24.034	24.035	1.66	24.028	24.029	24.029	3.22	24.029	24.030	24.029	4.98	24.030	24.031	24.031	6.64	24.031	24.033	24.032	8.30	24.038	24.038	24.038	9.13	24.042	24.041	24.041	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-
Load Current [A]	Output Voltage [V]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
0.00	24.033	24.034	24.035																																																			
1.66	24.028	24.029	24.029																																																			
3.22	24.029	24.030	24.029																																																			
4.98	24.030	24.031	24.031																																																			
6.64	24.031	24.033	24.032																																																			
8.30	24.038	24.038	24.038																																																			
9.13	24.042	24.041	24.041																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
Note: Slanted line shows the range of the rated load current.																																																						



Model	TUXS200F24	Temperature	25°C
Item	Dynamic Load Response	Testing Circuitry	Figure A
Object	+24V8.3A		

Input Volt. 100 V
Cycle 1000 ms



<p>Model TUXS200F24</p>		<p>Temperature 25°C Testing Circuitry Figure A</p>																																						
<p>Item Ripple Voltage (by Load Current)</p>																																								
<p>Object +24V8.3A</p>																																								
<p>1.Graph</p> <div style="text-align: right;"> <p>—△— Input Volt. 100V -·-○-·- Input Volt. 200V</p> </div>		<p>2.Values</p> <table border="1"> <thead> <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> </thead> <tbody> <tr><td>0.00</td><td>14</td><td>16</td></tr> <tr><td>1.66</td><td>29</td><td>29</td></tr> <tr><td>3.32</td><td>31</td><td>31</td></tr> <tr><td>4.98</td><td>34</td><td>34</td></tr> <tr><td>6.64</td><td>36</td><td>32</td></tr> <tr><td>8.30</td><td>43</td><td>40</td></tr> <tr><td>9.13</td><td>42</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> </tbody> </table>	Load Current [A]	Ripple Voltage [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.00	14	16	1.66	29	29	3.32	31	31	4.98	34	34	6.64	36	32	8.30	43	40	9.13	42	45	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																							
	Input Volt. 100 [V]	Input Volt. 200 [V]																																						
0.00	14	16																																						
1.66	29	29																																						
3.32	31	31																																						
4.98	34	34																																						
6.64	36	32																																						
8.30	43	40																																						
9.13	42	45																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						
--	-	-																																						
<p>Measured by 100 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 style="text-align: center;"> <p>T1: Due to AC Input Line T2: Due to Switching</p> </div>																																								
<p>Fig. Complex Ripple Wave Form</p>																																								

Model		TUXS200F24		Temperature 25°C																																							
Item		Ripple-Noise		Testing Circuitry Figure A																																							
Object		+24V8.3A																																									
1.Graph				2.Values																																							
				<table border="1"> <thead> <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> </thead> <tbody> <tr><td>0.00</td><td>17</td><td>19</td></tr> <tr><td>1.66</td><td>38</td><td>36</td></tr> <tr><td>3.32</td><td>39</td><td>35</td></tr> <tr><td>4.98</td><td>40</td><td>38</td></tr> <tr><td>6.64</td><td>40</td><td>41</td></tr> <tr><td>8.30</td><td>47</td><td>44</td></tr> <tr><td>9.13</td><td>50</td><td>51</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> </tbody> </table>		Load Current [A]	Ripple-Noise [mV]		Input Volt. 100 [V]	Input Volt. 200 [V]	0.00	17	19	1.66	38	36	3.32	39	35	4.98	40	38	6.64	40	41	8.30	47	44	9.13	50	51	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																										
	Input Volt. 100 [V]	Input Volt. 200 [V]																																									
0.00	17	19																																									
1.66	38	36																																									
3.32	39	35																																									
4.98	40	38																																									
6.64	40	41																																									
8.30	47	44																																									
9.13	50	51																																									
--	-	-																																									
--	-	-																																									
--	-	-																																									
--	-	-																																									
<p>Measured by 100 MHz Oscilloscope. Ripple-Noise is shown as p-p in the figure below. Note: Slanted line shows the range of the rated load current.</p>																																											
<p>Fig. Complex Ripple Wave Form</p>																																											

Model		TUXS200F24	Testing Circuitry Figure A																																						
Item		Ripple Voltage (by Ambient Temp.)																																							
Object		+24V8.3A																																							
1.Graph		<div style="text-align: right;"> ---□--- Load 50% —△— Load 100% </div> <p style="text-align: center;">Ambient Temperature [°C] Input Volt. 100V</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>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>-40</td><td>66</td><td>82</td></tr> <tr><td>-20</td><td>35</td><td>57</td></tr> <tr><td>0</td><td>32</td><td>45</td></tr> <tr><td>25</td><td>34</td><td>43</td></tr> <tr><td>50</td><td>32</td><td>43</td></tr> <tr><td>75</td><td>26</td><td>38</td></tr> <tr><td>85</td><td>26</td><td>37</td></tr> <tr><td>100</td><td>23</td><td>36</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> </tbody> </table>	Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-40	66	82	-20	35	57	0	32	45	25	34	43	50	32	43	75	26	38	85	26	37	100	23	36	--	-	-	--	-	-	--	-	-	
Ambient Temperature [°C]	Ripple Voltage [mV]																																								
	Load 50%	Load 100%																																							
-40	66	82																																							
-20	35	57																																							
0	32	45																																							
25	34	43																																							
50	32	43																																							
75	26	38																																							
85	26	37																																							
100	23	36																																							
--	-	-																																							
--	-	-																																							
--	-	-																																							
Measured by 100 MHz Oscilloscope.																																									
Note: Slanted line shows the range of the rated ambient temperature.																																									
Fig.Complex Ripple Noise Wave Form																																									



Model		TUXS200F24		Testing Circuitry Figure A																																																				
Item		Ambient Temperature Drift																																																						
Object		+24V8.3A																																																						
1.Graph		—△— Input Volt. 100V - - - □ - - - Input Volt. 200V ···○··· Input Volt. 230V		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. 100[V]</th> <th>Input Volt. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>-50</td><td>23.931</td><td>23.936</td><td>23.938</td></tr> <tr><td>-40</td><td>23.961</td><td>23.966</td><td>23.968</td></tr> <tr><td>-20</td><td>23.996</td><td>23.999</td><td>24.001</td></tr> <tr><td>0</td><td>24.022</td><td>24.024</td><td>24.025</td></tr> <tr><td>25</td><td>24.038</td><td>24.038</td><td>24.038</td></tr> <tr><td>50</td><td>24.048</td><td>24.047</td><td>24.047</td></tr> <tr><td>75</td><td>24.040</td><td>24.038</td><td>24.036</td></tr> <tr><td>85</td><td>24.031</td><td>24.028</td><td>24.026</td></tr> <tr><td>100</td><td>24.010</td><td>24.008</td><td>24.006</td></tr> <tr><td>105</td><td>24.003</td><td>24.001</td><td>23.998</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>				Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	-50	23.931	23.936	23.938	-40	23.961	23.966	23.968	-20	23.996	23.999	24.001	0	24.022	24.024	24.025	25	24.038	24.038	24.038	50	24.048	24.047	24.047	75	24.040	24.038	24.036	85	24.031	24.028	24.026	100	24.010	24.008	24.006	105	24.003	24.001	23.998	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																							
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																					
-50	23.931	23.936	23.938																																																					
-40	23.961	23.966	23.968																																																					
-20	23.996	23.999	24.001																																																					
0	24.022	24.024	24.025																																																					
25	24.038	24.038	24.038																																																					
50	24.048	24.047	24.047																																																					
75	24.040	24.038	24.036																																																					
85	24.031	24.028	24.026																																																					
100	24.010	24.008	24.006																																																					
105	24.003	24.001	23.998																																																					
--	-	-	-																																																					
Note: Slanted line shows the range of the rated ambient temperature.																																																								



Model		TUXS200F24	Testing Circuitry Figure A
Item		Output Voltage Accuracy	
Object		+24V8.3A	

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 : -40 - 85°C

Input Voltage : 100 - 230V

Load Current : 0 - 8.3A

* 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 [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	50	100	8.3	24.048	±44	±0.2
Minimum Voltage	-40	100	8.3	23.961		



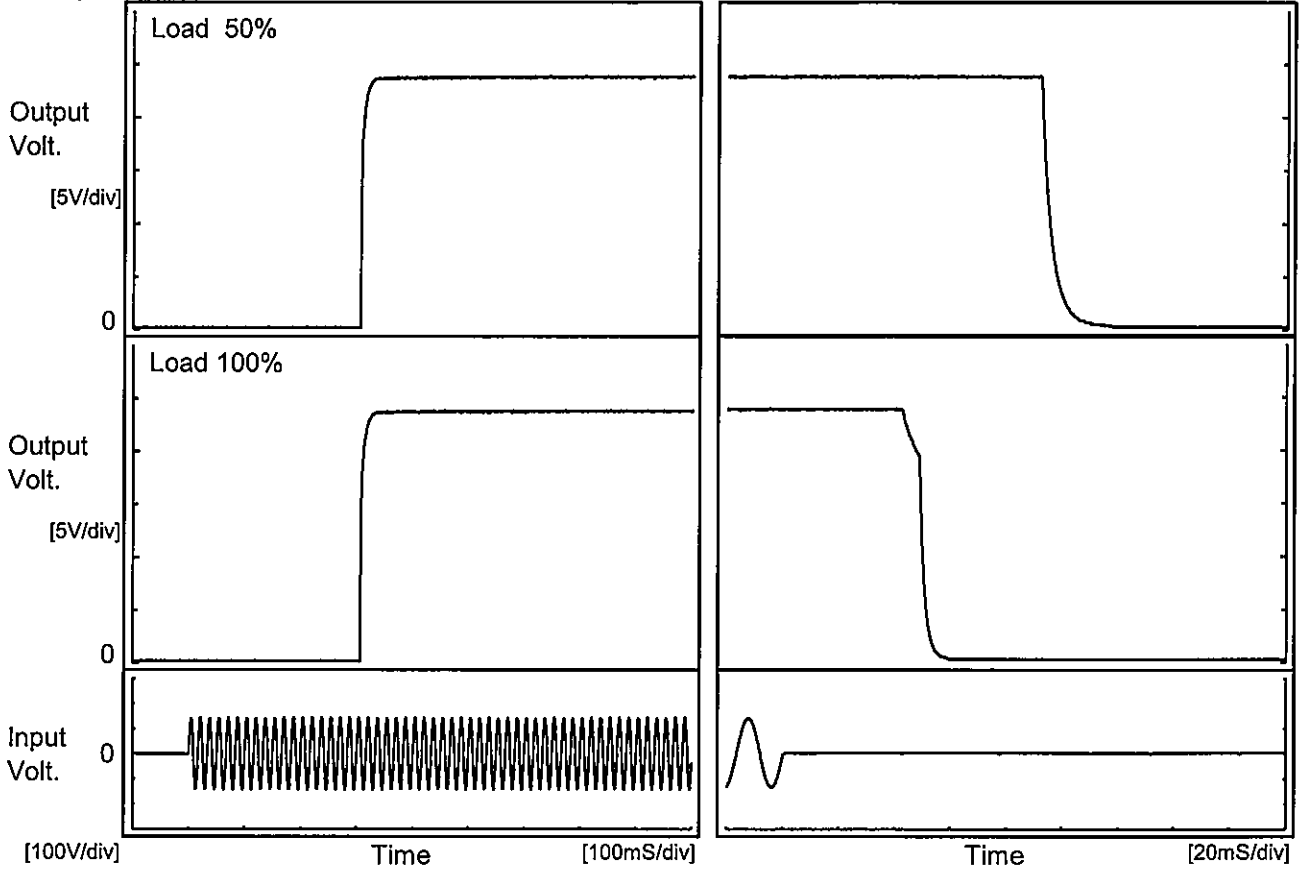
COSEL																								
Model	TUXS200F24																							
Item	Time Lapse Drift	Temperature 25°C Testing Circuitry Figure A																						
Object	+24V8.3A																							
<p>1.Graph</p> <p style="text-align: center;">Time [H]</p> <p>Input Volt. 100V Load 100%</p>		<p>2.Values</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>24.025</td></tr> <tr><td>0.5</td><td>24.038</td></tr> <tr><td>1.0</td><td>24.038</td></tr> <tr><td>2.0</td><td>24.038</td></tr> <tr><td>3.0</td><td>24.038</td></tr> <tr><td>4.0</td><td>24.038</td></tr> <tr><td>5.0</td><td>24.038</td></tr> <tr><td>6.0</td><td>24.038</td></tr> <tr><td>7.0</td><td>24.038</td></tr> <tr><td>8.0</td><td>24.038</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	24.025	0.5	24.038	1.0	24.038	2.0	24.038	3.0	24.038	4.0	24.038	5.0	24.038	6.0	24.038	7.0	24.038	8.0	24.038
Time since start [H]	Output Voltage [V]																							
0.0	24.025																							
0.5	24.038																							
1.0	24.038																							
2.0	24.038																							
3.0	24.038																							
4.0	24.038																							
5.0	24.038																							
6.0	24.038																							
7.0	24.038																							
8.0	24.038																							



Model	TUXS200F24	Temperature	25°C
Item	Rise and Fall Time	Testing Circuitry	Figure A
Object	+24V8.3A		

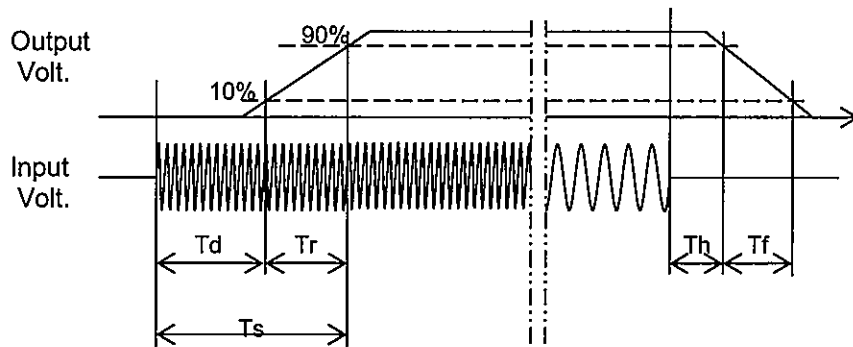
1. Graph

Input Volt. 100 V



2. Values

Load	Time	Td	Tr	Ts	Th	Tf
50 %		306.0	10.0	316.0	92.5	8.2
100 %		306.0	10.0	316.0	44.7	8.0





COSEL																																			
Model	TUXS200F24	Temperature	25°C																																
Item	Hold-Up Time	Testing Circuitry	Figure A																																
Object	+24V8.3A																																		
<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>80</td><td>91</td><td>41</td></tr> <tr><td>85</td><td>91</td><td>43</td></tr> <tr><td>100</td><td>91</td><td>42</td></tr> <tr><td>120</td><td>91</td><td>42</td></tr> <tr><td>200</td><td>91</td><td>43</td></tr> <tr><td>230</td><td>91</td><td>42</td></tr> <tr><td>264</td><td>91</td><td>43</td></tr> <tr><td>280</td><td>91</td><td>43</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>		Input Voltage [V]	Hold-Up Time [ms]		Load 50%	Load 100%	80	91	41	85	91	43	100	91	42	120	91	42	200	91	43	230	91	42	264	91	43	280	91	43	--	-	-
Input Voltage [V]	Hold-Up Time [ms]																																		
	Load 50%	Load 100%																																	
80	91	41																																	
85	91	43																																	
100	91	42																																	
120	91	42																																	
200	91	43																																	
230	91	42																																	
264	91	43																																	
280	91	43																																	
--	-	-																																	
<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>																																			



COSEL																																																						
Model	TUXS200F24	Temperature	25°C																																																			
Item	Instantaneous Interruption Compensation	Testing Circuitry	Figure A																																																			
Object	+24V8.3A																																																					
<p>1.Graph</p> <p> Input Volt. 100V Input Volt. 200V 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">Time [ms]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 200[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>1.66</td><td>204</td><td>204</td><td>204</td></tr> <tr><td>3.22</td><td>111</td><td>111</td><td>111</td></tr> <tr><td>4.98</td><td>73</td><td>73</td><td>73</td></tr> <tr><td>6.64</td><td>55</td><td>55</td><td>56</td></tr> <tr><td>8.30</td><td>42</td><td>43</td><td>42</td></tr> <tr><td>9.13</td><td>22</td><td>22</td><td>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> </tbody> </table>		Load Current [A]	Time [ms]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	0.00	-	-	-	1.66	204	204	204	3.22	111	111	111	4.98	73	73	73	6.64	55	55	56	8.30	42	43	42	9.13	22	22	22	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Time [ms]																																																					
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																			
0.00	-	-	-																																																			
1.66	204	204	204																																																			
3.22	111	111	111																																																			
4.98	73	73	73																																																			
6.64	55	55	56																																																			
8.30	42	43	42																																																			
9.13	22	22	22																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
--	-	-	-																																																			
<p>Note: Slanted line shows the range of the rated load current.</p>																																																						



Model		TUXS200F24	Testing Circuitry Figure A																																					
Item		Minimum Input Voltage for Regulated Output Voltage																																						
Object		+24V8.3A																																						
1.Graph		<div style="text-align: right;"> ---□--- Load 50% —△— Load 100% </div> <p style="text-align: center;">Ambient Temperature [°C]</p>																																						
2.Values		<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Input Voltage [V]</th> </tr> <tr> <th>Load 50%</th> <th>Load 100%</th> </tr> </thead> <tbody> <tr><td>-50</td><td>65</td><td>58</td></tr> <tr><td>-40</td><td>65</td><td>58</td></tr> <tr><td>-20</td><td>66</td><td>58</td></tr> <tr><td>0</td><td>65</td><td>58</td></tr> <tr><td>25</td><td>66</td><td>59</td></tr> <tr><td>50</td><td>66</td><td>60</td></tr> <tr><td>75</td><td>65</td><td>63</td></tr> <tr><td>85</td><td>66</td><td>65</td></tr> <tr><td>100</td><td>66</td><td>69</td></tr> <tr><td>105</td><td>66</td><td>69</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Input Voltage [V]		Load 50%	Load 100%	-50	65	58	-40	65	58	-20	66	58	0	65	58	25	66	59	50	66	60	75	65	63	85	66	65	100	66	69	105	66	69	--	-	-
Ambient Temperature [°C]	Input Voltage [V]																																							
	Load 50%	Load 100%																																						
-50	65	58																																						
-40	65	58																																						
-20	66	58																																						
0	65	58																																						
25	66	59																																						
50	66	60																																						
75	65	63																																						
85	66	65																																						
100	66	69																																						
105	66	69																																						
--	-	-																																						
Note: Slanted line shows the range of the rated ambient temperature.																																								



<p>Model TUXS200F24</p>		<p>Temperature 25°C</p>																																																								
<p>Item Overcurrent Protection</p>		<p>Testing Circuitry Figure A</p>																																																								
<p>Object +24V8.3A</p>																																																										
<p>1.Graph</p> <div style="display: flex; align-items: center;"> <div style="margin-right: 20px;"> <p>————— Input Volt. 100V</p> <p>————— Input Volt. 200V</p> <p>————— Input Volt. 230V</p> </div> </div> <p>Note: Slanted line shows the range of the rated load current.</p>		<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. 200[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>24.0</td><td>10.67</td><td>10.59</td><td>10.51</td></tr> <tr><td>22.8</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>21.6</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>19.2</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>16.8</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>14.4</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>12.0</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>9.6</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>7.2</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>4.8</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>2.4</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> <tr><td>0.0</td><td>0.00</td><td>0.00</td><td>0.00</td></tr> </tbody> </table>		Output Voltage [V]	Load Current [A]			Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]	24.0	10.67	10.59	10.51	22.8	0.00	0.00	0.00	21.6	0.00	0.00	0.00	19.2	0.00	0.00	0.00	16.8	0.00	0.00	0.00	14.4	0.00	0.00	0.00	12.0	0.00	0.00	0.00	9.6	0.00	0.00	0.00	7.2	0.00	0.00	0.00	4.8	0.00	0.00	0.00	2.4	0.00	0.00	0.00	0.0	0.00	0.00	0.00
Output Voltage [V]	Load Current [A]																																																									
	Input Volt. 100[V]	Input Volt. 200[V]	Input Volt. 230[V]																																																							
24.0	10.67	10.59	10.51																																																							
22.8	0.00	0.00	0.00																																																							
21.6	0.00	0.00	0.00																																																							
19.2	0.00	0.00	0.00																																																							
16.8	0.00	0.00	0.00																																																							
14.4	0.00	0.00	0.00																																																							
12.0	0.00	0.00	0.00																																																							
9.6	0.00	0.00	0.00																																																							
7.2	0.00	0.00	0.00																																																							
4.8	0.00	0.00	0.00																																																							
2.4	0.00	0.00	0.00																																																							
0.0	0.00	0.00	0.00																																																							



Model		TUXS200F24	Testing Circuitry Figure A																																						
Item		Oversvoltage Protection																																							
Object		+24V8.3A																																							
1.Graph		<p>—△— Input Volt. 100V ---□--- Input Volt. 230V</p> <p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p>	2.Values																																						
			<table border="1"> <thead> <tr> <th rowspan="2">Ambient Temperature [°C]</th> <th colspan="2">Operating Point [V]</th> </tr> <tr> <th>Input Volt. 100[V]</th> <th>Input Volt. 230[V]</th> </tr> </thead> <tbody> <tr><td>-50</td><td>27.72</td><td>27.72</td></tr> <tr><td>-40</td><td>27.78</td><td>27.78</td></tr> <tr><td>-20</td><td>27.92</td><td>27.92</td></tr> <tr><td>0</td><td>28.00</td><td>28.00</td></tr> <tr><td>25</td><td>28.10</td><td>28.08</td></tr> <tr><td>50</td><td>28.08</td><td>28.08</td></tr> <tr><td>75</td><td>28.12</td><td>28.12</td></tr> <tr><td>85</td><td>28.14</td><td>28.14</td></tr> <tr><td>100</td><td>28.14</td><td>28.14</td></tr> <tr><td>105</td><td>28.14</td><td>28.14</td></tr> <tr><td>--</td><td>-</td><td>-</td></tr> </tbody> </table>	Ambient Temperature [°C]	Operating Point [V]		Input Volt. 100[V]	Input Volt. 230[V]	-50	27.72	27.72	-40	27.78	27.78	-20	27.92	27.92	0	28.00	28.00	25	28.10	28.08	50	28.08	28.08	75	28.12	28.12	85	28.14	28.14	100	28.14	28.14	105	28.14	28.14	--	-	-
Ambient Temperature [°C]	Operating Point [V]																																								
	Input Volt. 100[V]	Input Volt. 230[V]																																							
-50	27.72	27.72																																							
-40	27.78	27.78																																							
-20	27.92	27.92																																							
0	28.00	28.00																																							
25	28.10	28.08																																							
50	28.08	28.08																																							
75	28.12	28.12																																							
85	28.14	28.14																																							
100	28.14	28.14																																							
105	28.14	28.14																																							
--	-	-																																							
<p>Note: Slanted line shows the range of the rated ambient temperature.</p>																																									

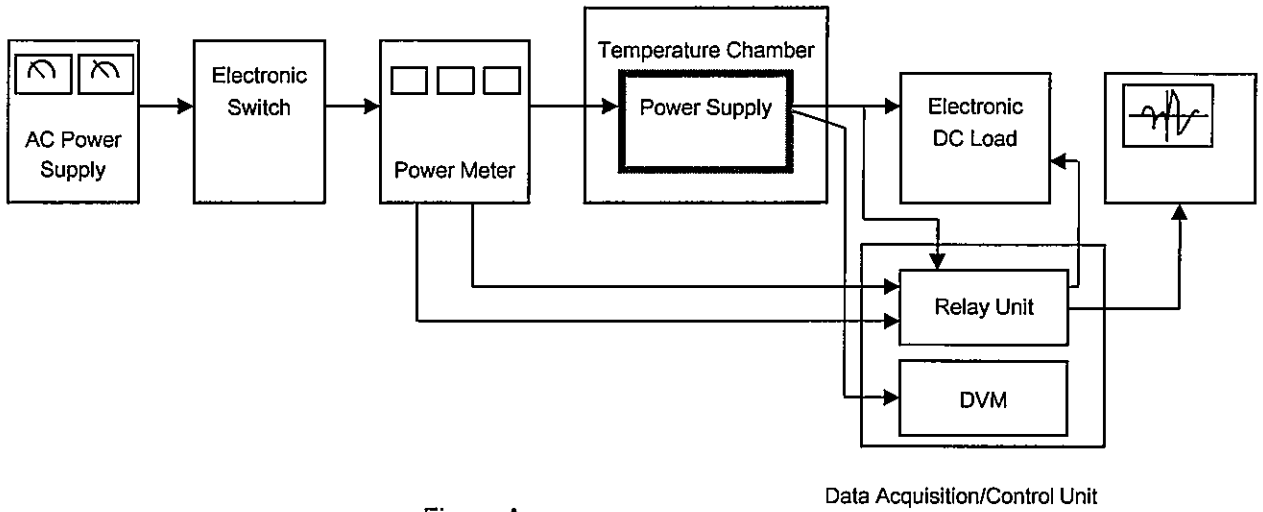


Figure A

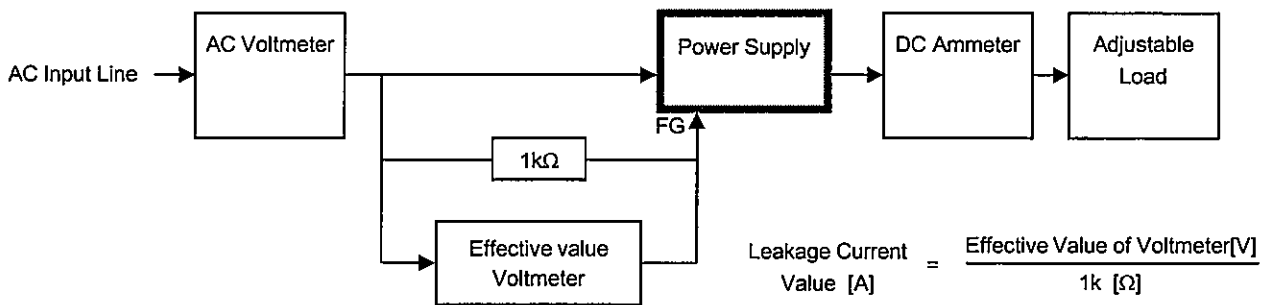


Figure B (DEN-AN)

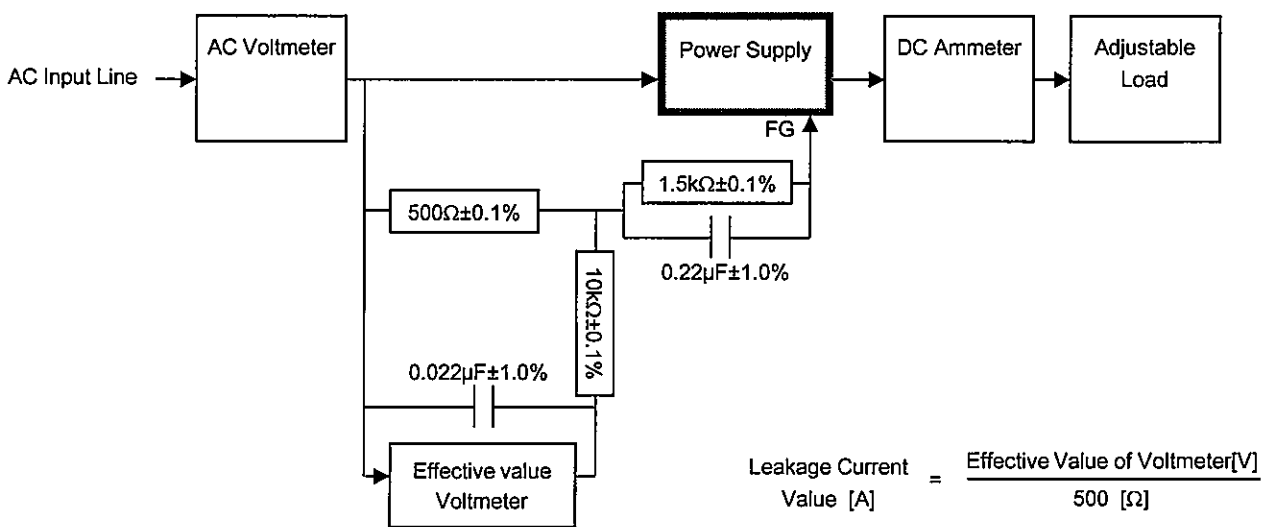
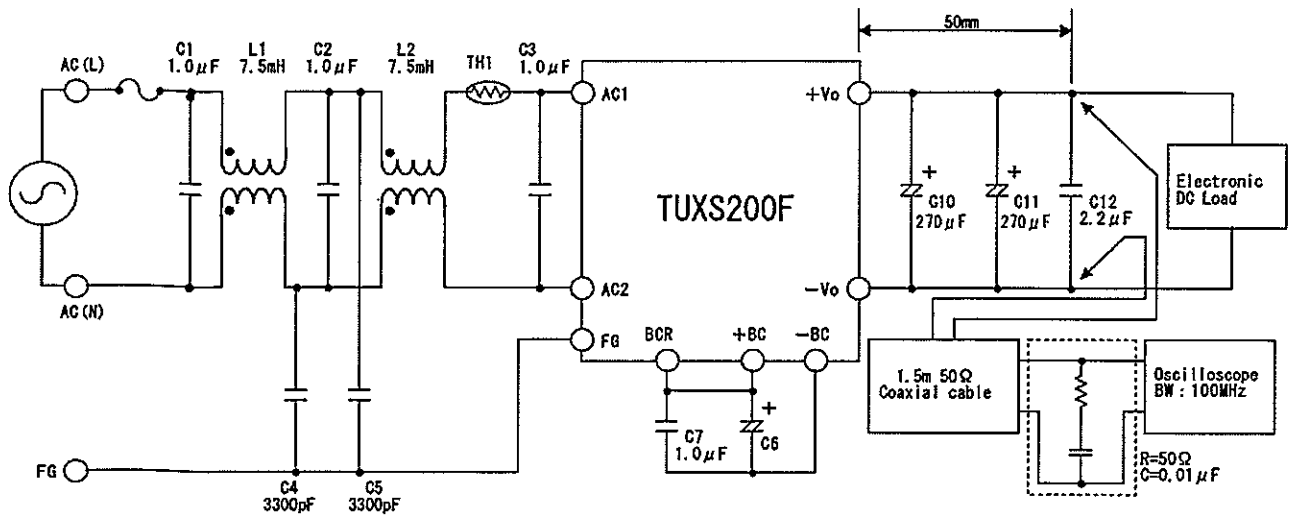


Figure B (IEC60950-1)



- L1,L2 : SCR22-060-1R0A075J(NEC TOKIN)
- TH1 : 12D2-15LCS(SEMITEC)
- C1,C2,C3 : LE105-MX(OKAYA)
- C4,C5 : DE1E3KX332M(MURATA)
- C6 : EKXJ421ELL151MM50S(Nippon Chemi-Con)
- C7 : AFS450V105K(OKAYA)
- C10,C11 : PCR1V271MCL1GS(NICHICON)
- C12 : GRM31CR72A225K(MURATA)

Figure C