

TEST DATA OF SNDBS400B24

Regulated DC Power Supply
July 3, 2012

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Takahiro Yoneda Design Manager

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Satoshi Kinoshita Design Engineer

COSEL CO.,LTD.

CONTENTS

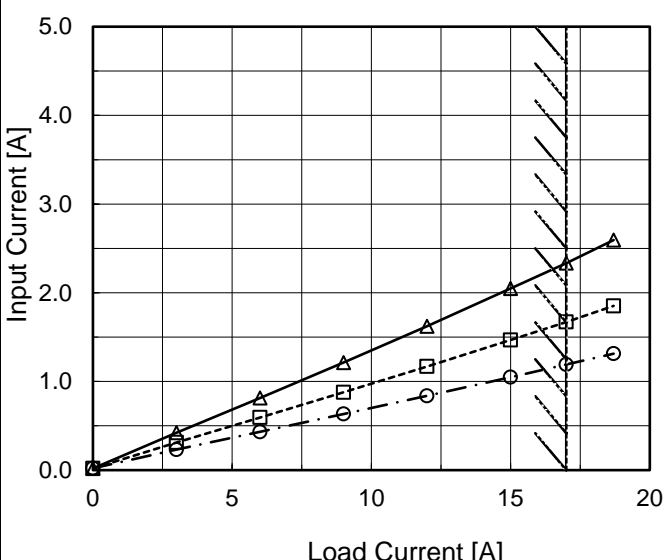
1.Input Current (by Input Voltage)	1
2.Input Current (by Load Current)	2
3.Input Power (by Load Current)	3
4.Efficiency (by Input Voltage)	4
5.Efficiency (by Load Current)	5
6.Line Regulation	6
7.Load Regulation	7
8.Dynamic Load Response	8
9.Ripple Voltage (by Load Current)	9
10.Ripple-Noise	10
11.Ripple Voltage (by Ambient Temperature)	11
12.Ambient Temperature Drift	12
13.Output Voltage Accuracy	13
14.Time Lapse Drift	14
15.Rise and Fall Time	15
16.Minimum Input Voltage for Regulated Output Voltage	16
17.Overcurrent Protection	17
18.Overvoltage Protection	18
19.Figure of Testing Circuitry	19

(Final Page 19)

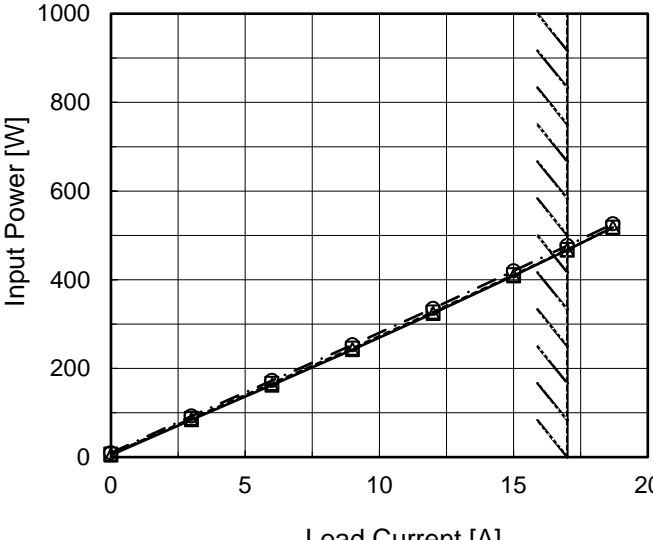
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Model		SNDBS400B24	Temperature Testing Circuitry	25°C Figure A
Item		Input Current (by Input Voltage)		
Object				
1.Graph				
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Model		SNDBS400B24		Temperature 25°C																																																				
Item		Input Current (by Load Current)		Testing Circuitry Figure A																																																				
Object		_____																																																						
1.Graph		<div><div><div>—△—</div><div>Input Volt.</div><div>200V</div></div><div><div>---□---</div><div>Input Volt.</div><div>280V</div></div><div><div>-·-○-·-</div><div>Input Volt.</div><div>400V</div></div></div>  <div>Input Current [A]</div> <div>Load Current [A]</div>		2.Values																																																				
		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Input Volt. 200[V]</th><th>Input Volt. 280[V]</th><th>Input Volt. 400[V]</th></tr><tr><td>0.0</td><td>0.019</td><td>0.020</td><td>0.021</td></tr><tr><td>3.0</td><td>0.422</td><td>0.312</td><td>0.231</td></tr><tr><td>6.0</td><td>0.813</td><td>0.593</td><td>0.432</td></tr><tr><td>9.0</td><td>1.213</td><td>0.877</td><td>0.633</td></tr><tr><td>12.0</td><td>1.622</td><td>1.169</td><td>0.838</td></tr><tr><td>15.0</td><td>2.048</td><td>1.467</td><td>1.048</td></tr><tr><td>17.0</td><td>2.334</td><td>1.670</td><td>1.191</td></tr><tr><td>18.7</td><td>2.594</td><td>1.852</td><td>1.313</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>				Load Current [A]	Input Current [A]			Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]	0.0	0.019	0.020	0.021	3.0	0.422	0.312	0.231	6.0	0.813	0.593	0.432	9.0	1.213	0.877	0.633	12.0	1.622	1.169	0.838	15.0	2.048	1.467	1.048	17.0	2.334	1.670	1.191	18.7	2.594	1.852	1.313	--	-	-	-	--	-	-	-	--	-	-	-
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COSEL

Model	SNDBS400B24																																																					
Item	Efficiency (by Load Current)	Temperature	25°C																																																			
Object		Testing Circuitry	Figure A																																																			
1.Graph		2.Values																																																				
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Load Current [A]	Efficiency [%]																																																					
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COSEL

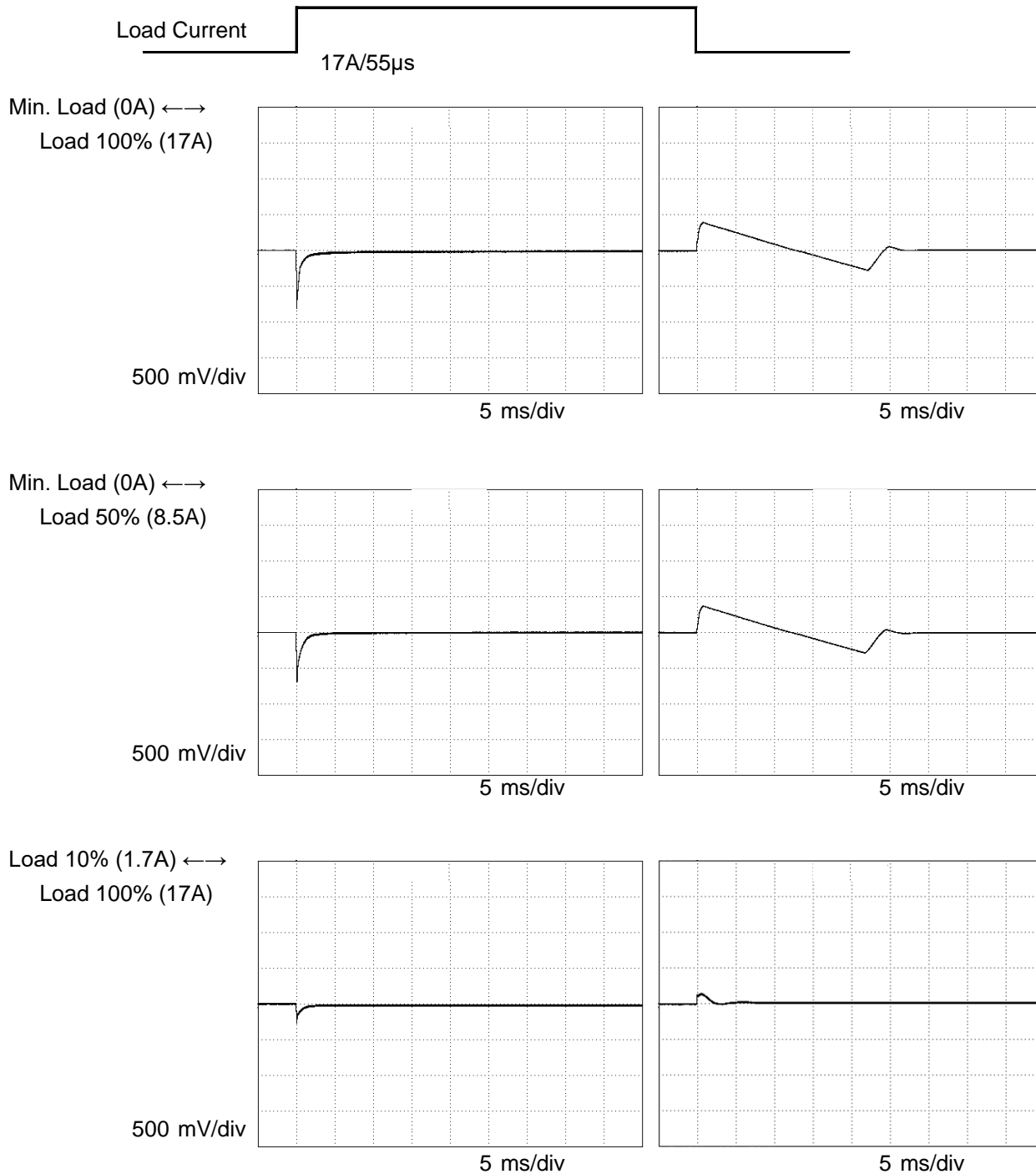
Model	SNDBS400B24																																
Item	Line Regulation	Temperature	25°C																														
Object	+24V17A	Testing Circuitry	Figure A																														
1.Graph		2.Values																															
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Input Voltage [V]	Output Voltage [V] (Load 50%)	Output Voltage [V] (Load 100%)																															
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400	24.144	24.113																															
420	24.144	24.114																															

[illegible]



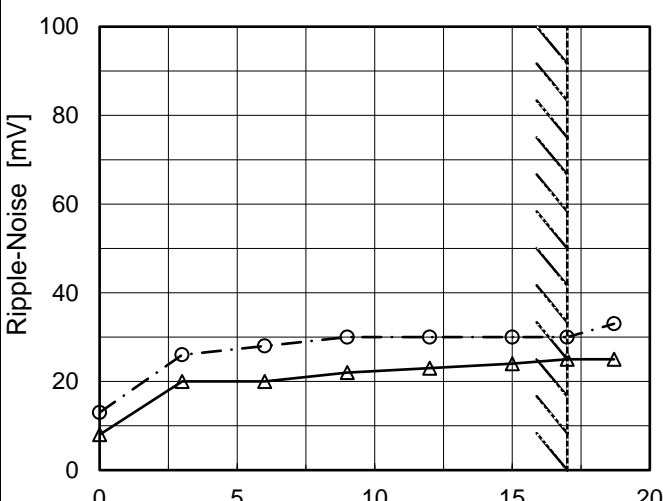
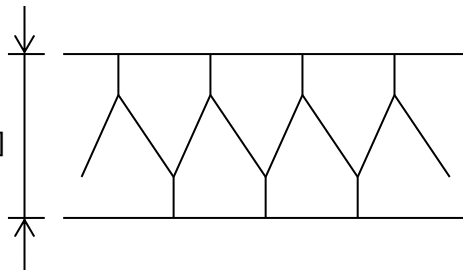
Model	SNDBS400B24	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+24V17A		

Input Volt. 280 V
Cycle 1000 ms



COSEL

Model		SNDBS400B24		Temperature 25°C																																							
Item		Ripple Voltage (by Load Current)		Testing Circuitry Figure B																																							
Object		+24V17A																																									
1.Graph				2.Values																																							
<div><div>—△— Input Volt. 200V</div><div>-·-○-·- Input Volt. 400V</div><div>Ripple Voltage [mV]</div><div>Load Current [A]</div></div> <div>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.</div> <div><div>Ripple [mVp-p]</div><div>Fig.Complex Ripple Wave Form</div></div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 200 [V]</th><th>Input Volt. 400 [V]</th></tr><tr><td>0.0</td><td>4</td><td>4</td></tr><tr><td>3.0</td><td>14</td><td>18</td></tr><tr><td>6.0</td><td>14</td><td>18</td></tr><tr><td>9.0</td><td>14</td><td>20</td></tr><tr><td>12.0</td><td>15</td><td>20</td></tr><tr><td>15.0</td><td>15</td><td>20</td></tr><tr><td>17.0</td><td>15</td><td>20</td></tr><tr><td>18.7</td><td>15</td><td>23</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 Voltage [mV]		Input Volt. 200 [V]	Input Volt. 400 [V]	0.0	4	4	3.0	14	18	6.0	14	18	9.0	14	20	12.0	15	20	15.0	15	20	17.0	15	20	18.7	15	23	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																										
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Model		SNDBS400B24		Temperature 25°C																																							
Item		Ripple-Noise		Testing Circuitry Figure B																																							
Object		+24V17A																																									
1.Graph				2.Values																																							
<div><div><div>—△— Input Volt. 200V</div><div>-·-○-·- Input Volt. 400V</div></div><p>Ripple-Noise [mV]</p><p>Load Current [A]</p></div> <div>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.</div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple-Noise [mV]</th></tr><tr><th>Input Volt. 200 [V]</th><th>Input Volt. 400 [V]</th></tr><tr><td>0.0</td><td>8</td><td>13</td></tr><tr><td>3.0</td><td>20</td><td>26</td></tr><tr><td>6.0</td><td>20</td><td>28</td></tr><tr><td>9.0</td><td>22</td><td>30</td></tr><tr><td>12.0</td><td>23</td><td>30</td></tr><tr><td>15.0</td><td>24</td><td>30</td></tr><tr><td>17.0</td><td>25</td><td>30</td></tr><tr><td>18.7</td><td>25</td><td>33</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. 200 [V]	Input Volt. 400 [V]	0.0	8	13	3.0	20	26	6.0	20	28	9.0	22	30	12.0	23	30	15.0	24	30	17.0	25	30	18.7	25	33	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple-Noise [mV]																																										
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<div><div><div>Ripple Noise[mVp-p]</div></div><div>Fig.Complex Ripple Noise Wave Form</div></div>																																											

COSEL

Model		SNDBS400B24
Item		Ripple Voltage (by Ambient Temp.)
Object		+24V17A
1.Graph		
<div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>Load 50%</div><div>Load 100%</div></div> <div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>Ripple Voltage [mV]</div><div>Ambient Temperature [°C]</div><div>Input Volt. 280V</div></div> <div><div>Measured by 100 MHz Oscilloscope.</div><div>Note: Slanted line shows the range of the rated ambient temperature.</div></div> <div><div><div><div><div></div><div></div></div><div><div></div><div></div></div></div><div><div></div><div></div></div><div><div></div><div></div></div></div><div>Ripple Noise[mVp-p]</div></div> <div>Fig.Complex Ripple Noise Wave Form</div>		

Testing Circuitry Figure A		
2.Values		
Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-40	34	34
-20	26	28
0	22	26
15	19	23
25	17	21
40	18	21
55	18	21
70	20	22
80	22	23
--	-	-
--	-	-

COSEL

Model		SNDBS400B24	Testing Circuitry Figure A																																																			
Item		Ambient Temperature Drift																																																				
Object		+24V17A																																																				
1.Graph		<div><div><div>—△—</div><div>Input Volt. 200V</div></div><div><div>---□---</div><div>Input Volt. 280V</div></div><div><div>-○-</div><div>Input Volt. 400V</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>	2.Values																																																			
		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 200[V]</th><th>Input Volt. 280[V]</th><th>Input Volt. 400[V]</th></tr><tr><td>-40</td><td>24.019</td><td>24.019</td><td>24.023</td></tr><tr><td>-20</td><td>24.051</td><td>24.051</td><td>24.055</td></tr><tr><td>0</td><td>24.083</td><td>24.082</td><td>24.085</td></tr><tr><td>15</td><td>24.099</td><td>24.100</td><td>24.105</td></tr><tr><td>25</td><td>24.108</td><td>24.110</td><td>24.113</td></tr><tr><td>40</td><td>24.120</td><td>24.122</td><td>24.124</td></tr><tr><td>55</td><td>24.129</td><td>24.132</td><td>24.133</td></tr><tr><td>70</td><td>24.117</td><td>24.118</td><td>24.116</td></tr><tr><td>80</td><td>24.110</td><td>24.107</td><td>24.101</td></tr><tr><td>90</td><td>24.085</td><td>24.080</td><td>24.075</td></tr><tr><td>--</td><td>-</td><td>-</td><td>-</td></tr></table>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]	-40	24.019	24.019	24.023	-20	24.051	24.051	24.055	0	24.083	24.082	24.085	15	24.099	24.100	24.105	25	24.108	24.110	24.113	40	24.120	24.122	24.124	55	24.129	24.132	24.133	70	24.117	24.118	24.116	80	24.110	24.107	24.101	90	24.085	24.080	24.075	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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Model		SNDBS400B24	Testing Circuitry Figure A
Item		Output Voltage Accuracy	
Object		+24V17A	

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 - 80°C

Input Voltage : 200 - 400V

Load Current : 0 - 17A

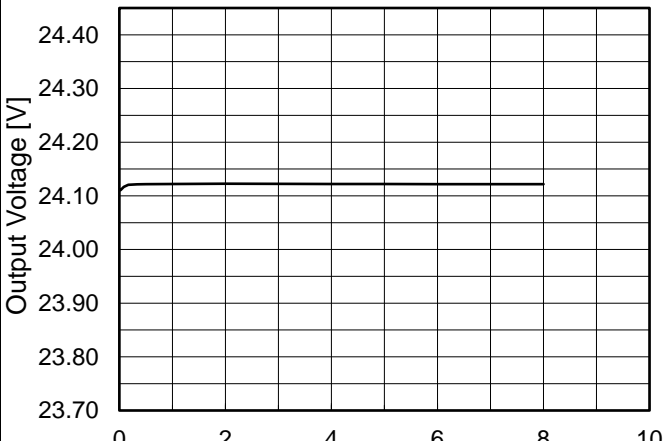
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

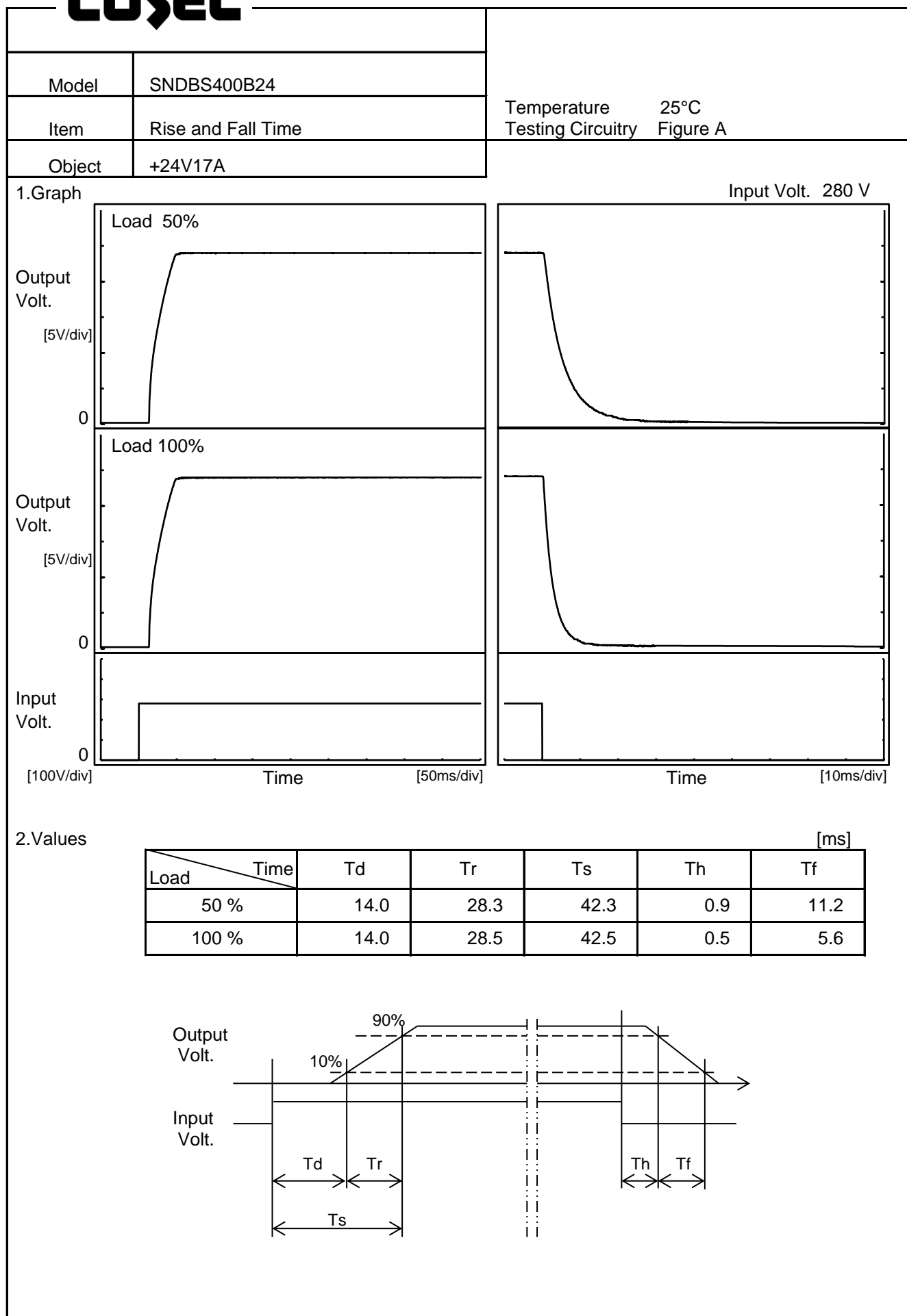
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	55	400	0	24.217	±59	±0.2
Minimum Voltage	-20	280	17	24.099		

COSEL

Model	SNDBS400B24																								
Item	Time Lapse Drift	Temperature	25°C																						
Object	+24V17A	Testing Circuitry	Figure A																						
1.Graph		2.Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 280V</p><p>Load 100%</p></div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>24.112</td></tr><tr><td>0.5</td><td>24.122</td></tr><tr><td>1.0</td><td>24.122</td></tr><tr><td>2.0</td><td>24.123</td></tr><tr><td>3.0</td><td>24.123</td></tr><tr><td>4.0</td><td>24.122</td></tr><tr><td>5.0</td><td>24.122</td></tr><tr><td>6.0</td><td>24.122</td></tr><tr><td>7.0</td><td>24.122</td></tr><tr><td>8.0</td><td>24.122</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	24.112	0.5	24.122	1.0	24.122	2.0	24.123	3.0	24.123	4.0	24.122	5.0	24.122	6.0	24.122	7.0	24.122	8.0	24.122
Time since start [H]	Output Voltage [V]																								
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5.0	24.122																								
6.0	24.122																								
7.0	24.122																								
8.0	24.122																								

COSEL





Model		SNDBS400B24
Item		Minimum Input Voltage for Regulated Output Voltage
Object		+24V17A

1.Graph

□

Load 50%

—

△

—

Load 100%

Input Voltage [V]

</

COSEL

Model	SNDBS400B24																																																													
Item	Overcurrent Protection	Temperature	25°C																																																											
Object	+24V17A	Testing Circuitry	Figure A																																																											
1.Graph		2.Values																																																												
<div><div><div></div><div>Input Volt. 200V</div></div><div><div></div><div>Input Volt. 280V</div></div><div><div></div><div>Input Volt. 400V</div></div></div> <p>Note: Slanted line shows the range of the rated load current.</p> <p>Intermittent operation occurs when the output voltage is from 17V to 0V.</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 200[V]</th><th>Input Volt. 280[V]</th><th>Input Volt. 400[V]</th></tr><tr><td>22.8</td><td>19.29</td><td>19.83</td><td>21.09</td></tr><tr><td>21.6</td><td>19.34</td><td>19.87</td><td>21.15</td></tr><tr><td>19.2</td><td>19.46</td><td>19.93</td><td>21.30</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. 200[V]	Input Volt. 280[V]	Input Volt. 400[V]	22.8	19.29	19.83	21.09	21.6	19.34	19.87	21.15	19.2	19.46	19.93	21.30	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
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Model

SNDBS400B24

Item

Overvoltage Protection

Object

+24V17A

1.Graph

—△—

Input Volt. 200V

---□---

Input Volt. 400V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

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

2.Values

Ambient Temperature [°C]	Operating Point [V]	
	Input Volt. 200[V]	Input Volt. 400[V]
-40	29.46	29.46
-20	29.87	29.87
0	30.24	30.24
15	30.47	30.47
25	30.65	30.65
40	30.94	30.94
55	31.21	31.21
70	31.47	31.47
80	31.64	31.64
90	31.87	31.88
--	-	-

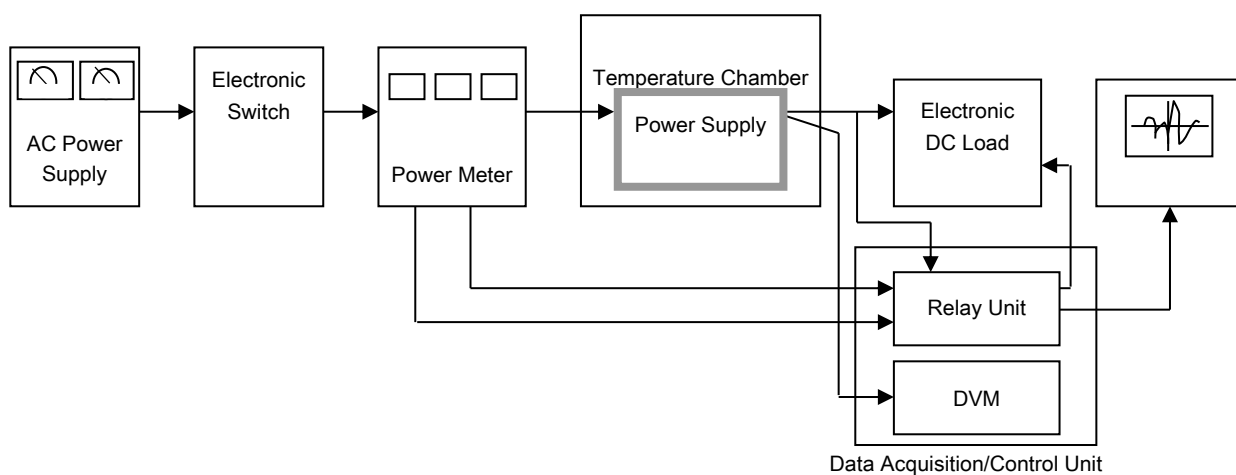


Figure A

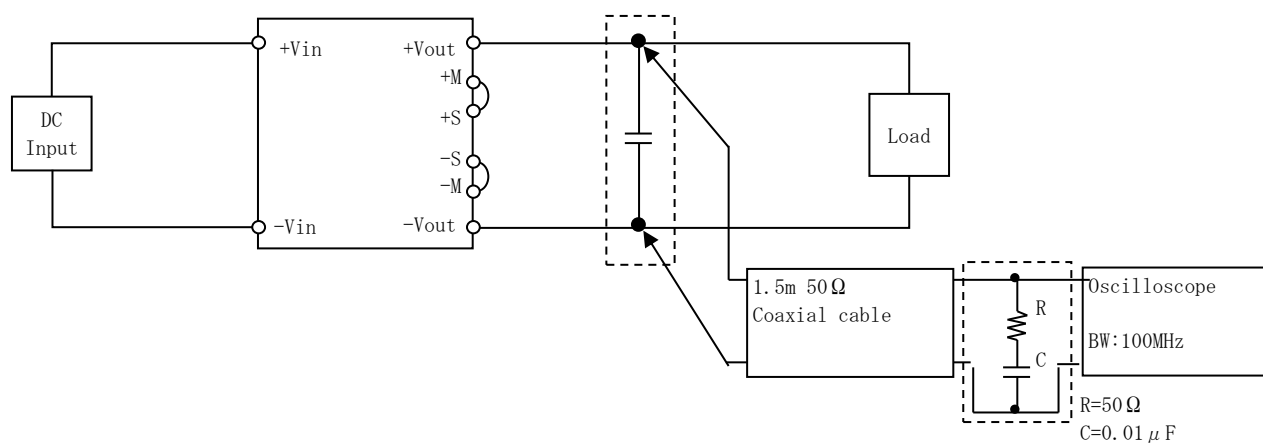


Figure B (Ripple and Ripple noise Characteristic)