



TEST DATA OF CHS3002424

Regulated DC Power Supply
July 23, 2019

Approved by : Yukihiro Takehashi
Yukihiro Takehashi Design Manager

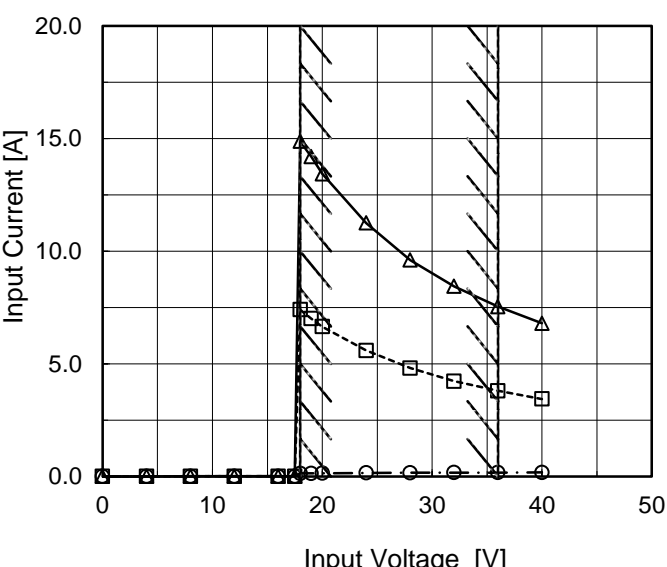
Prepared by : Kohei Yoshimoto
Kohei Yoshimoto Design Engineer

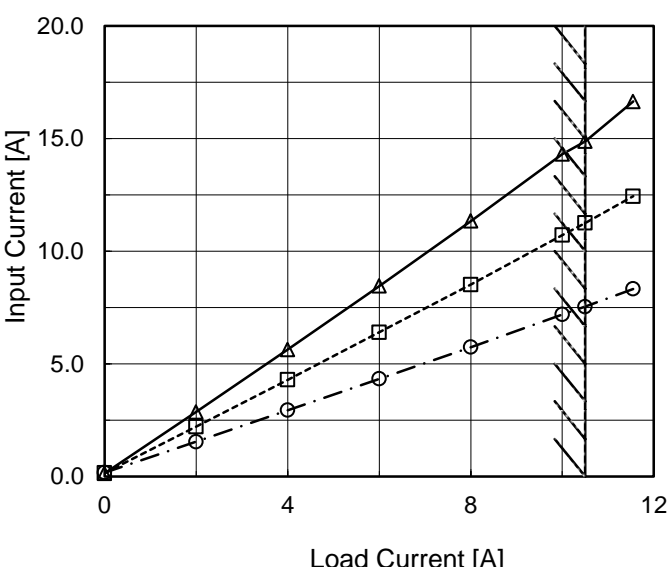
COSEL CO.,LTD.

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Model		CHS3002424		Temperature 25°C	
Item		Input Current (by Input Voltage)		Testing Circuitry Figure A	
Object					
1.Graph					
		<div><div><div>—△—</div><div>Load 100%</div></div><div><div>---□---</div><div>Load 50%</div></div><div><div>---○---</div><div>Load 0%</div></div></div>			
					
Note: Slanted line shows the range of the rated input voltage.					
2.Values					
Input Voltage [V]		Input Current [A]			
		Load 0%	Load 50%	Load 100%	
0.0		0.000	0.000	0.000	
4.0		0.002	0.002	0.002	
8.0		0.009	0.009	0.009	
12.0		0.010	0.010	0.010	
16.0		0.010	0.010	0.010	
17.5		0.010	0.010	0.010	
18.0		0.133	7.403	14.880	
19.0		0.139	7.004	14.201	
20.0		0.144	6.649	13.437	
24.0		0.156	5.594	11.253	
28.0		0.168	4.810	9.605	
32.0		0.174	4.231	8.444	
36.0		0.175	3.802	7.541	
40.0		0.181	3.443	6.800	
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		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Input Volt. 18[V]</th><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><tr><td>0.00</td><td>0.133</td><td>0.156</td><td>0.175</td></tr><tr><td>2.00</td><td>2.868</td><td>2.209</td><td>1.545</td></tr><tr><td>4.00</td><td>5.635</td><td>4.293</td><td>2.940</td></tr><tr><td>6.00</td><td>8.453</td><td>6.404</td><td>4.336</td></tr><tr><td>8.00</td><td>11.341</td><td>8.522</td><td>5.745</td></tr><tr><td>10.00</td><td>14.313</td><td>10.718</td><td>7.189</td></tr><tr><td>10.50</td><td>14.880</td><td>11.253</td><td>7.541</td></tr><tr><td>11.55</td><td>16.649</td><td>12.443</td><td>8.328</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. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.00	0.133	0.156	0.175	2.00	2.868	2.209	1.545	4.00	5.635	4.293	2.940	6.00	8.453	6.404	4.336	8.00	11.341	8.522	5.745	10.00	14.313	10.718	7.189	10.50	14.880	11.253	7.541	11.55	16.649	12.443	8.328	--	-	-	-	--	-	-	-	--	-	-	-
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Model		CHS3002424		Temperature		25°C	
Item		Efficiency (by Load Current)		Testing Circuitry		Figure A	
Object							
1.Graph		<div><div>—△—</div>Input Volt. 18V</div> <div><div>---□---</div>Input Volt. 24V</div> <div><div>-·-○-·-</div>Input Volt. 36V</div>		2.Values			
<div><div>Efficiency [%]</div><div><div>Load Current [A]</div></div></div>							
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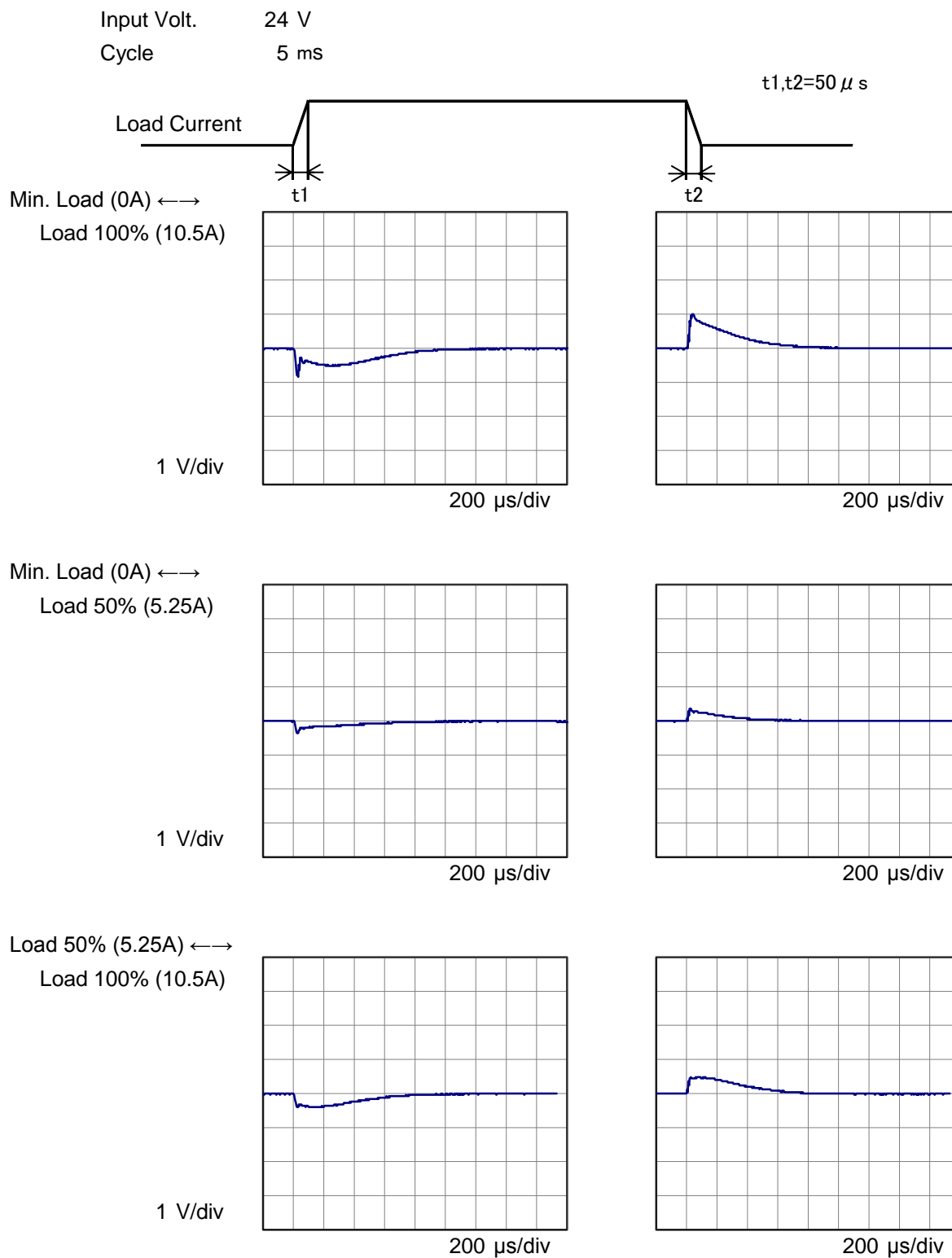
Model		CHS3002424		Temperature25°C	
Item		Line Regulation		Testing CircuitryFigure A	
Object		+24V10.5A			
1.Graph				2.Values	
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Item		Load Regulation		Testing CircuitryFigure A																																																				
Object		+24V10.5A																																																						
1.Graph		<div><div><div>—△—</div><div>Input Volt.</div><div>18V</div></div><div><div>---□---</div><div>Input Volt.</div><div>24V</div></div><div><div>---○---</div><div>Input Volt.</div><div>36V</div></div></div> <div><div><div>Output Voltage [V]</div><div><div>24.40</div><div>24.30</div><div>24.20</div><div>24.10</div><div>24.00</div><div>23.90</div><div>23.80</div><div>23.70</div></div><div><div>0</div><div>4</div><div>8</div><div>12</div></div><div>Load Current [A]</div></div><div></div></div> <div><div>Note: Slanted line shows the range of the rated load current.</div></div>		2.Values																																																				
		<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 18[V]</th><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><tr><td>0.00</td><td>24.060</td><td>24.061</td><td>24.060</td></tr><tr><td>2.00</td><td>24.059</td><td>24.060</td><td>24.059</td></tr><tr><td>4.00</td><td>24.057</td><td>24.059</td><td>24.059</td></tr><tr><td>6.00</td><td>24.056</td><td>24.058</td><td>24.058</td></tr><tr><td>8.00</td><td>24.056</td><td>24.058</td><td>24.059</td></tr><tr><td>10.00</td><td>24.057</td><td>24.058</td><td>24.059</td></tr><tr><td>10.50</td><td>24.060</td><td>24.061</td><td>24.062</td></tr><tr><td>11.55</td><td>24.060</td><td>24.061</td><td>24.062</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]	Output Voltage [V]			Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	0.00	24.060	24.061	24.060	2.00	24.059	24.060	24.059	4.00	24.057	24.059	24.059	6.00	24.056	24.058	24.058	8.00	24.056	24.058	24.059	10.00	24.057	24.058	24.059	10.50	24.060	24.061	24.062	11.55	24.060	24.061	24.062	--	-	-	-	--	-	-	-	--	-	-	-
Load Current [A]	Output Voltage [V]																																																							
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]																																																					
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COSEL

Model	CHS3002424	Temperature Testing Circuitry	25°C Figure A
Item	Dynamic Load Response		
Object	+24V10.5A		



Model		CHS3002424	Temperature25°C Testing CircuitryFigure B																																						
Item		Ripple Voltage (by Load Current)																																							
Object		+24V10.5A																																							
1.Graph			2.Values																																						
<div><div><div><div><div></div><div>Input Volt.</div><div>18V</div></div><div><div></div><div>Input Volt.</div><div>36V</div></div></div><div><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></div><div><div><div><div></div><div>Ripple [mVp-p]</div></div><div><p>Fig.Complex Ripple Wave Form</p></div></div></div></div>			<table><tr><th rowspan="2">Load Current [A]</th><th colspan="2">Ripple Voltage [mV]</th></tr><tr><th>Input Volt. 18 [V]</th><th>Input Volt. 36 [V]</th></tr><tr><td>0.0</td><td>80</td><td>160</td></tr><tr><td>2.6</td><td>80</td><td>160</td></tr><tr><td>5.3</td><td>80</td><td>160</td></tr><tr><td>7.9</td><td>80</td><td>160</td></tr><tr><td>10.5</td><td>80</td><td>165</td></tr><tr><td>11.6</td><td>85</td><td>165</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 Voltage [mV]		Input Volt. 18 [V]	Input Volt. 36 [V]	0.0	80	160	2.6	80	160	5.3	80	160	7.9	80	160	10.5	80	165	11.6	85	165	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
Load Current [A]	Ripple Voltage [mV]																																								
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7.9	80	160																																							
10.5	80	165																																							
11.6	85	165																																							
--	-	-																																							
--	-	-																																							
--	-	-																																							
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Temperature	25°C
Testing Circuitry	Figure B

2.Values

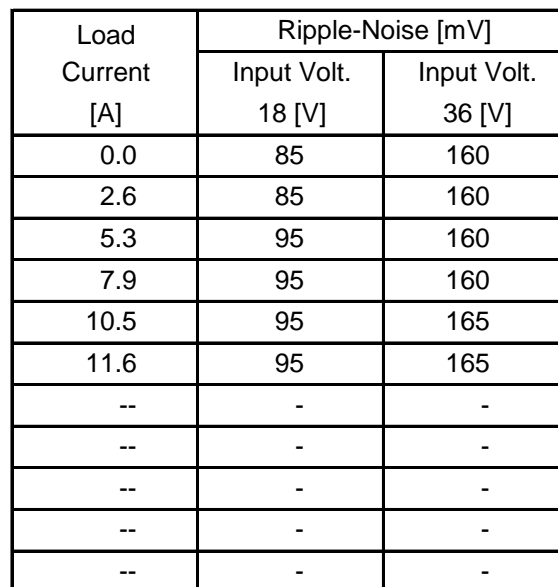


Fig.Complex Ripple Noise Wave Form

BC-11379

Model		CHS3002424																																																				
Item		Ambient Temperature Drift																																																				
Object		+24V10.5A																																																				
1.Graph		2.Values																																																				
<div><div><div>—△—</div><div>Input Volt.</div><div>18V</div></div><div><div>---□---</div><div>Input Volt.</div><div>24V</div></div><div><div>---○---</div><div>Input Volt.</div><div>36V</div></div></div> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> <p>Note: Slanted line shows the range of the rated ambient temperature.</p>		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="3">Output Voltage [V]</th></tr><tr><th>Input Volt. 18[V]</th><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><tr><td>-40</td><td>23.955</td><td>23.959</td><td>23.965</td></tr><tr><td>-20</td><td>24.000</td><td>24.004</td><td>24.008</td></tr><tr><td>0</td><td>24.034</td><td>24.037</td><td>24.040</td></tr><tr><td>25</td><td>24.060</td><td>24.061</td><td>24.062</td></tr><tr><td>40</td><td>24.069</td><td>24.070</td><td>24.070</td></tr><tr><td>55</td><td>24.073</td><td>24.073</td><td>24.072</td></tr><tr><td>60</td><td>24.073</td><td>24.073</td><td>24.072</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>		Ambient Temperature [°C]	Output Voltage [V]			Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	-40	23.955	23.959	23.965	-20	24.000	24.004	24.008	0	24.034	24.037	24.040	25	24.060	24.061	24.062	40	24.069	24.070	24.070	55	24.073	24.073	24.072	60	24.073	24.073	24.072	--	-	-	-	--	-	-	-	--	-	-	-	--	-	-	-
Ambient Temperature [°C]	Output Voltage [V]																																																					
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COSEL		Testing Circuitry Figure A
Model	CHS3002424	
Item	Output Voltage Accuracy	
Object	+24V10.5A	

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 - 55°C

Input Voltage : 18 - 36V

Load Current : 0 - 10.5A

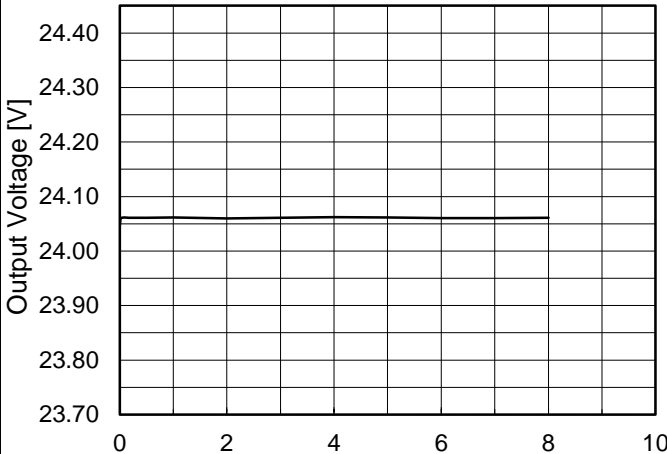
* Output Voltage Accuracy = $\pm(\text{Maximum of Output Voltage} - \text{Minimum of Output Voltage}) / 2$

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

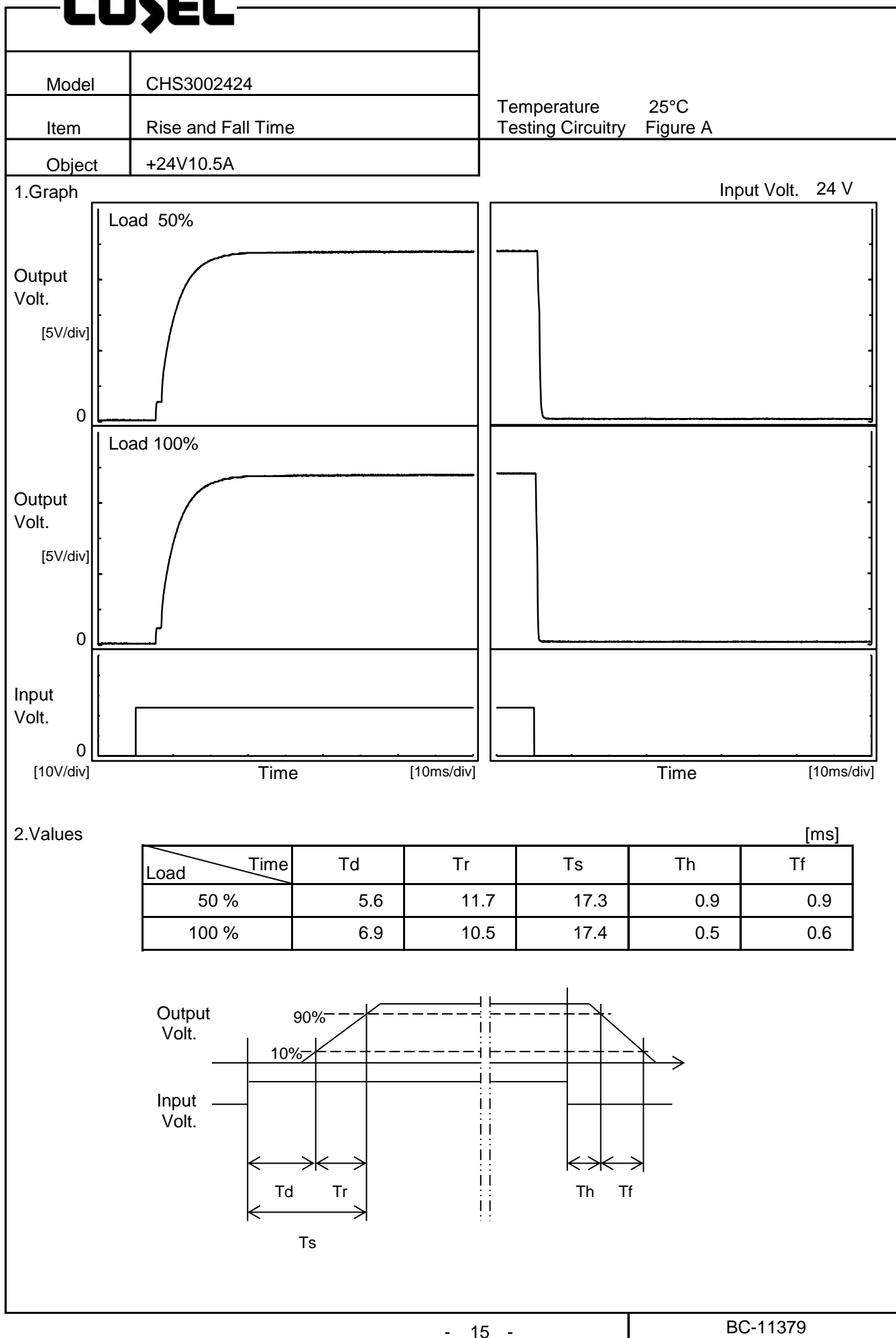
2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ratio [%]
Maximum Voltage	55	24	10.5	24.073	±64	±0.3
Minimum Voltage	-40	36	0	23.945		



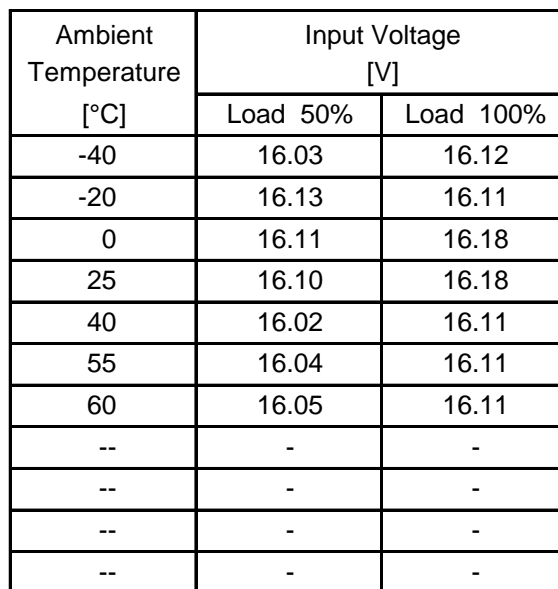
COSEL																									
Model	CHS3002424																								
Item	Time Lapse Drift	Temperature	25°C																						
Object	+24V10.5A	Testing Circuitry	Figure A																						
1.Graph		2.Values																							
<div></div> <div>Output Voltage [V]</div> <div>Time [H]</div> <div>Input Volt. 24V</div> <div>Load 100%</div>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>24.047</td></tr><tr><td>0.5</td><td>24.061</td></tr><tr><td>1.0</td><td>24.061</td></tr><tr><td>2.0</td><td>24.060</td></tr><tr><td>3.0</td><td>24.061</td></tr><tr><td>4.0</td><td>24.062</td></tr><tr><td>5.0</td><td>24.061</td></tr><tr><td>6.0</td><td>24.061</td></tr><tr><td>7.0</td><td>24.061</td></tr><tr><td>8.0</td><td>24.061</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	24.047	0.5	24.061	1.0	24.061	2.0	24.060	3.0	24.061	4.0	24.062	5.0	24.061	6.0	24.061	7.0	24.061	8.0	24.061
Time since start [H]	Output Voltage [V]																								
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7.0	24.061																								
8.0	24.061																								

COSEL



Testing Circuitry Figure A

2.Values



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

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Model		CHS3002424	Testing Circuitry Figure A																																						
Item		Overvoltage Protection																																							
Object		+24V10.5A																																							
1.Graph																																									
<div><div><div><div><div></div><div>—△—</div><div>Input Volt.</div><div>24V</div></div><div><div>---□---</div><div>Input Volt.</div><div>36V</div></div></div><div><p>Operating Point [V]</p><p>Ambient Temperature [°C]</p><p>Load 0%</p></div></div><div>Note: Slanted line shows the range of the rated ambient temperature.</div></div>																																									
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<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="2">Operating Point [V]</th></tr><tr><th>Input Volt. 24[V]</th><th>Input Volt. 36[V]</th></tr><tr><td>-40</td><td>30.0</td><td>29.9</td></tr><tr><td>-20</td><td>30.0</td><td>30.0</td></tr><tr><td>0</td><td>30.0</td><td>29.9</td></tr><tr><td>25</td><td>30.0</td><td>29.9</td></tr><tr><td>40</td><td>29.9</td><td>29.8</td></tr><tr><td>55</td><td>29.9</td><td>29.7</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>				Ambient Temperature [°C]	Operating Point [V]		Input Volt. 24[V]	Input Volt. 36[V]	-40	30.0	29.9	-20	30.0	30.0	0	30.0	29.9	25	30.0	29.9	40	29.9	29.8	55	29.9	29.7	--	-	-	--	-	-	--	-	-	--	-	-	--	-	-
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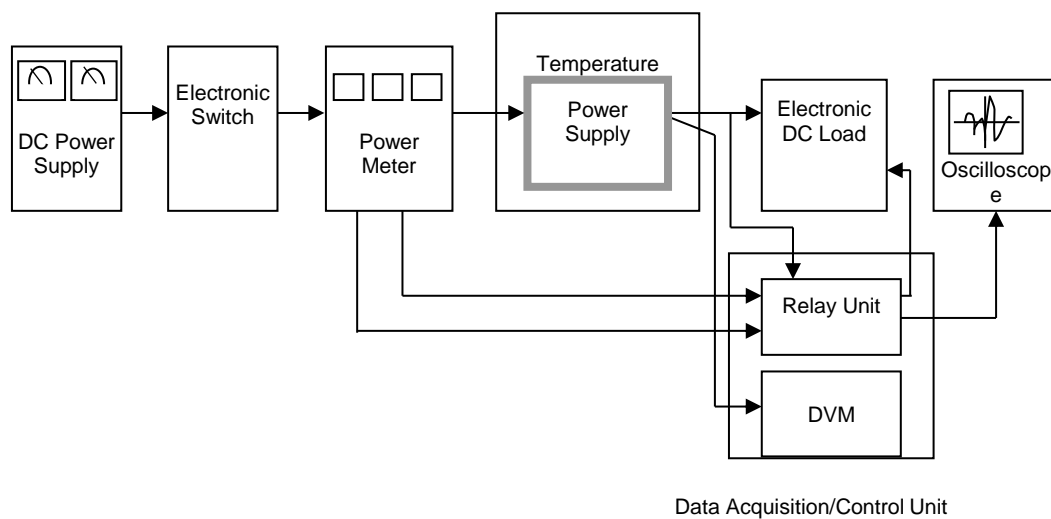


Figure A

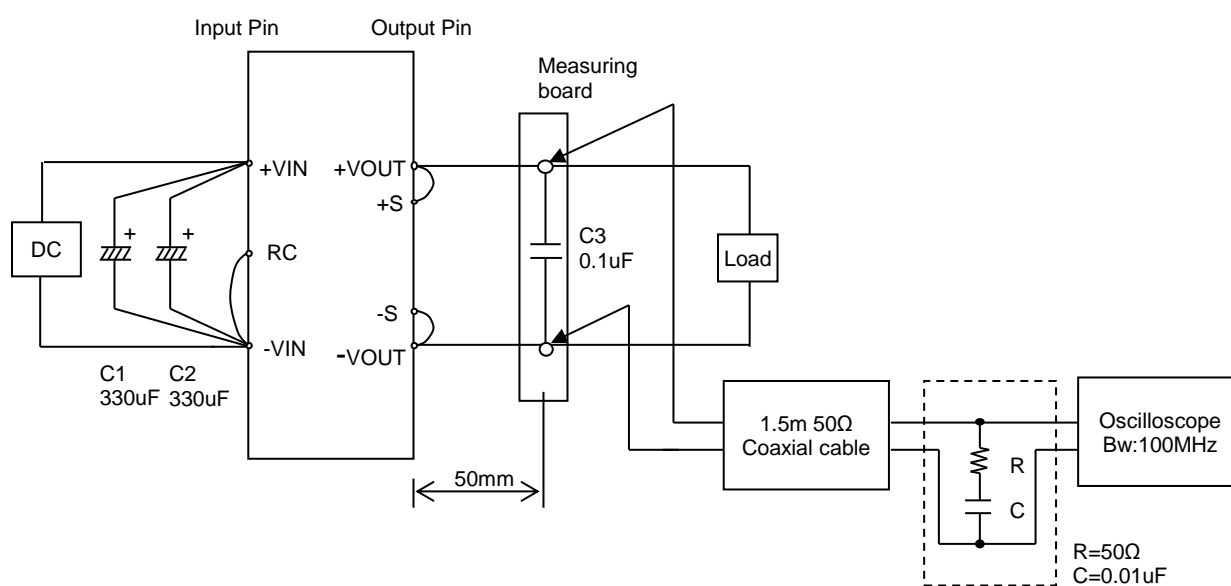


Figure B