



TEST DATA OF CBS502403

(24V INPUT)

Regulated DC Power Supply
Jul.1, 2002

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コーセル株式会社
COSEL CO.,LTD.

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Model	CBS502403																																
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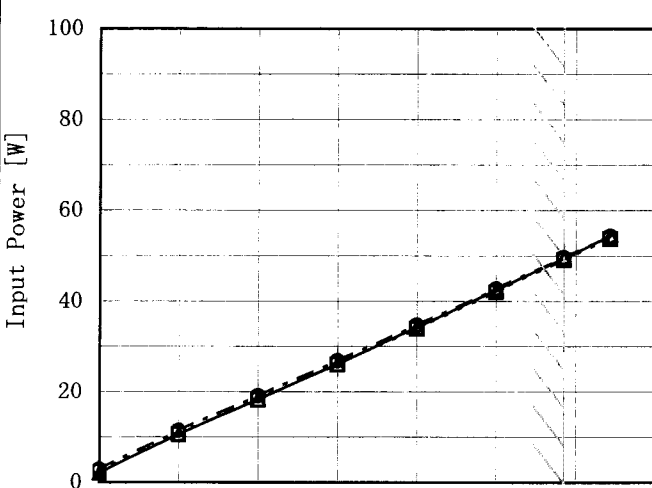
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Item		Efficiency (by Input Voltage) 効率 (入力電圧特性)	
Object			

1. Graph

□

Load 50%

△

Load 100%

Efficiency [%]

86

82

78

74

70

66

62

58

10

20

30

40

50

Input Voltage [V]

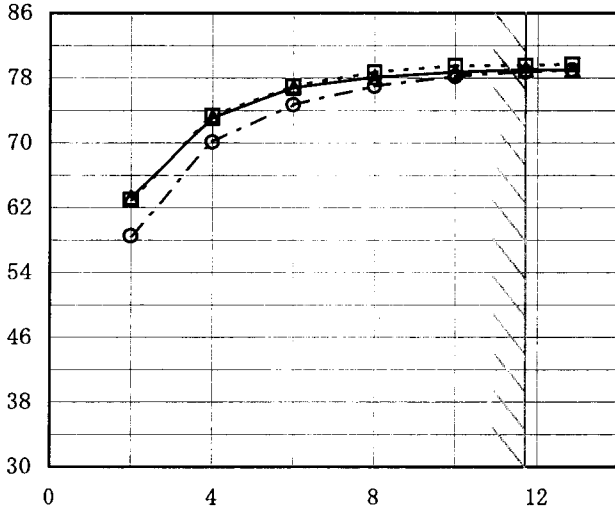
Note: Slanted line shows the range of the rated input voltage.

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2. Values

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
16	74.1	77.5
18	76.8	79.2
20	77.4	79.7
24	76.8	79.7
30	75.9	79.5
36	74.5	78.9
40	73.8	78.4
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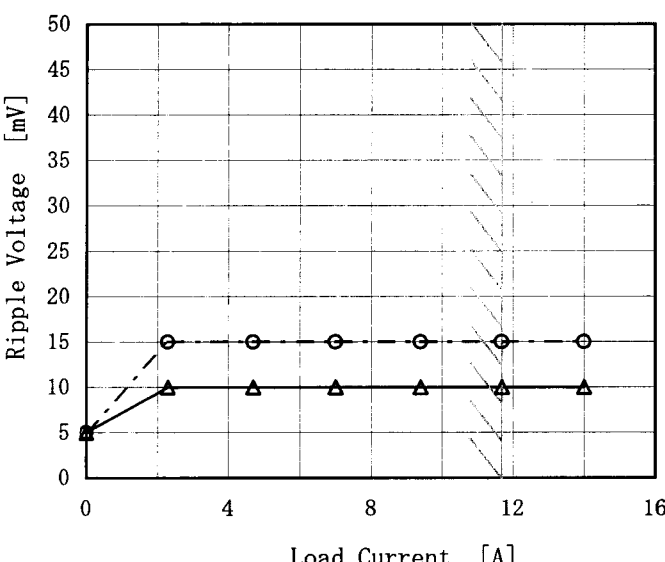
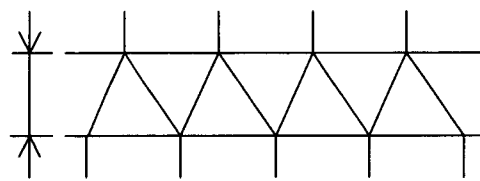
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10.00	3.343	3.343	3.342																																															
11.70	3.343	3.343	3.342																																															
12.87	3.342	3.342	3.342																																															
--	—	—	—																																															
--	—	—	—																																															
<p>Note: Slanted line shows the range of the rated load current.</p> <p>(注) 斜線は定格負荷電流範囲を示す。</p>																																																		

COSEL

ModelCBS502403		Temperature25℃																																							
Item	Ripple Voltage (by Load Current) リップル電圧（負荷特性）	Testing Circuitry	Figure A																																						
Object	+3.3V11.7A																																								
1. Graph		2. Values																																							
<div><div>—△— Input Volt. 18V</div><div>- -○- - Input Volt. 36V</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>5</td><td>5</td></tr><tr><td>2.3</td><td>10</td><td>15</td></tr><tr><td>4.7</td><td>10</td><td>15</td></tr><tr><td>7.0</td><td>10</td><td>15</td></tr><tr><td>9.4</td><td>10</td><td>15</td></tr><tr><td>11.7</td><td>10</td><td>15</td></tr><tr><td>14.0</td><td>10</td><td>15</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	5	5	2.3	10	15	4.7	10	15	7.0	10	15	9.4	10	15	11.7	10	15	14.0	10	15	--	—	—	--	—	—	--	—	—	--	—	—
Load Current [A]	Ripple Voltage [mV]																																								
	Input Volt. 18 [V]	Input Volt. 36 [V]																																							
0.0	5	5																																							
2.3	10	15																																							
4.7	10	15																																							
7.0	10	15																																							
9.4	10	15																																							
11.7	10	15																																							
14.0	10	15																																							
--	—	—																																							
--	—	—																																							
--	—	—																																							
--	—	—																																							
<p>Ripple Voltage is shown as p-p in the figure below.</p> <p>Note: Slanted line shows the range of the rated load current.</p> <p>リップル電圧は、下図 p - p 値で示される。</p> <p>（注）斜線は定格負荷電流範囲を示す。</p> <div><div>Ripple [mVp-p]</div><div></div></div> <p>Fig. Complex Ripple Wave Form</p> <p>図 リップル波形詳細図</p>																																									

COSEL

Model		CBS502403		Temperature		25℃	
Item		Ripple-Noise リップルノイズ		Testing Circuitry		Figure A	
Object		+3.3V11.7A					
1. Graph				2. Values			

△

Input Volt. 18V

○

Input Volt. 36V

Ripple-Noise [mV]

200

180

160

140

120

100

80

60

40

20

0

0

4

8

12

16

COSEL

Model		CBS502403	Temperature Testing Circuitry	25℃ Figure A
Item		Overcurrent Protection 過電流保護		
Object		+3.3V11.7A		

1. Graph

Input Volt. 18V

Input Volt. 24V

Input Volt. 36V

Output Voltage [V]

6.0

5.0

4.0

3.0

2.0

1.0

0.0

0

4

8

12

16

20

Load Current [A]

Note: Slanted line shows the range of the rated load current.

(注) 斜線は定格負荷電流範囲を示す。

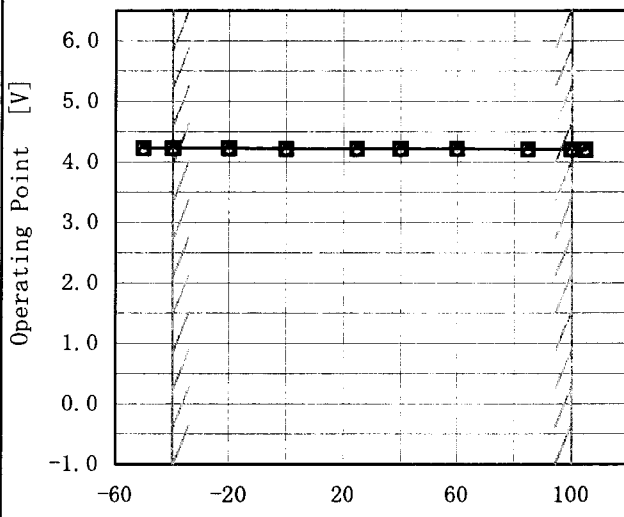
Intermittent operation occurs when the output voltage is from 1.65V to 0V.

1.65V～0V間は、間欠モードとなる。

2. Values

Output Voltage [V]	Load Current [A]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
3.300	13.31	13.36	13.36
3.135	15.17	14.85	14.82
2.970	15.14	14.91	14.94
2.640	15.22	15.04	15.16
2.310	15.37	15.22	15.32
1.980	15.51	15.37	15.53
1.650	15.44	15.51	15.77
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COSEL

Model	CBS502403																																																						
Item	Overvoltage Protection 過電圧保護	Testing Circuitry Figure A																																																					
Object	+3.3V11.7A																																																						
1. Graph		2. Values																																																					
<div><div>—△—</div>Input Volt. 18V</div> <div><div>---□---</div>Input Volt. 24V</div> <div><div>---○---</div>Input Volt. 36V</div>  <p>Operating Point [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 0%</p>		<table><tr><th rowspan="2">Ambient Temperature [°C]</th><th colspan="3">Operating Point [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>-50</td><td>4.23</td><td>4.23</td><td>4.23</td></tr><tr><td>-40</td><td>4.23</td><td>4.23</td><td>4.23</td></tr><tr><td>-20</td><td>4.23</td><td>4.23</td><td>4.23</td></tr><tr><td>0</td><td>4.22</td><td>4.22</td><td>4.22</td></tr><tr><td>25</td><td>4.22</td><td>4.22</td><td>4.22</td></tr><tr><td>40</td><td>4.22</td><td>4.22</td><td>4.22</td></tr><tr><td>60</td><td>4.22</td><td>4.22</td><td>4.22</td></tr><tr><td>85</td><td>4.21</td><td>4.21</td><td>4.21</td></tr><tr><td>100</td><td>4.21</td><td>4.21</td><td>4.21</td></tr><tr><td>105</td><td>4.20</td><td>4.21</td><td>4.21</td></tr><tr><td>--</td><td>—</td><td>—</td><td>—</td></tr></table>			Ambient Temperature [°C]	Operating Point [V]			Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]	-50	4.23	4.23	4.23	-40	4.23	4.23	4.23	-20	4.23	4.23	4.23	0	4.22	4.22	4.22	25	4.22	4.22	4.22	40	4.22	4.22	4.22	60	4.22	4.22	4.22	85	4.21	4.21	4.21	100	4.21	4.21	4.21	105	4.20	4.21	4.21	--	—	—	—
Ambient Temperature [°C]	Operating Point [V]																																																						
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]																																																				
-50	4.23	4.23	4.23																																																				
-40	4.23	4.23	4.23																																																				
-20	4.23	4.23	4.23																																																				
0	4.22	4.22	4.22																																																				
25	4.22	4.22	4.22																																																				
40	4.22	4.22	4.22																																																				
60	4.22	4.22	4.22																																																				
85	4.21	4.21	4.21																																																				
100	4.21	4.21	4.21																																																				
105	4.20	4.21	4.21																																																				
--	—	—	—																																																				
Note: Slanted line shows the range of the rated ambient temperature.																																																							
(注) 斜線は定格周囲温度範囲を示す。																																																							

COSEL

Model	CBS502403	Temperature	25°C
Item	Dynamic Load Response 動的負荷変動	Testing Circuitry	Figure A
Object	+3.3V11.7A		

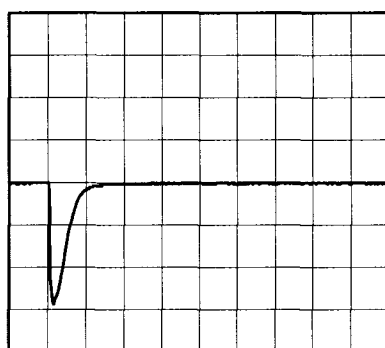
Input Volt. 24 V
Cycle 1000 ms

Load Current

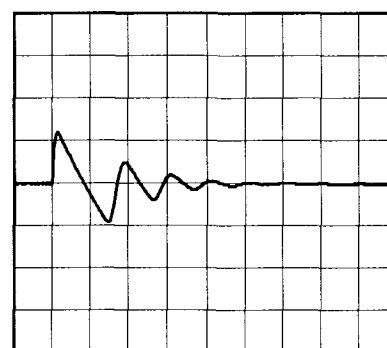
Min. Load (0A) ←→

Load 100% (11.7A)

200 mV/div



500 μs/div

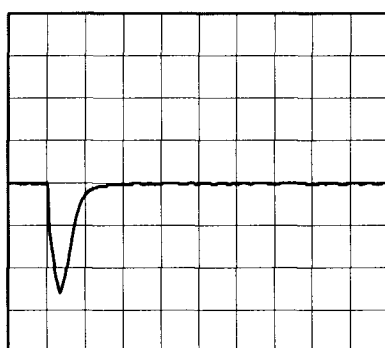


5 ms/div

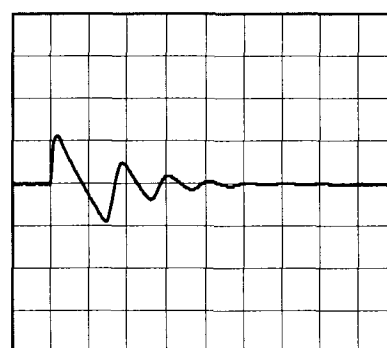
Min. Load (0A) ←→

Load 50% (5.85A)

200 mV/div



500 μs/div

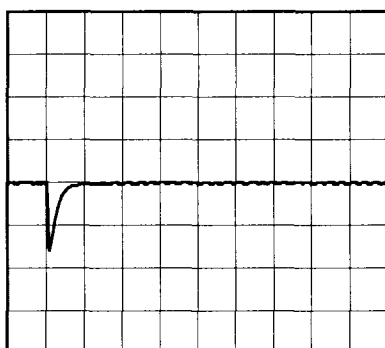


5 ms/div

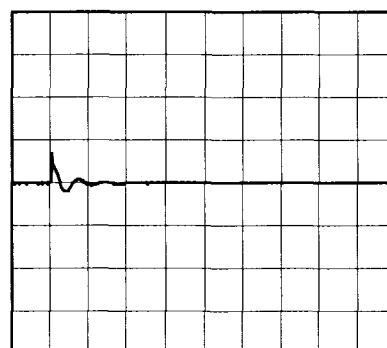
Load 10% (1.17A) ←→

Load 100% (11.7A)

200 mV/div



500 μs/div



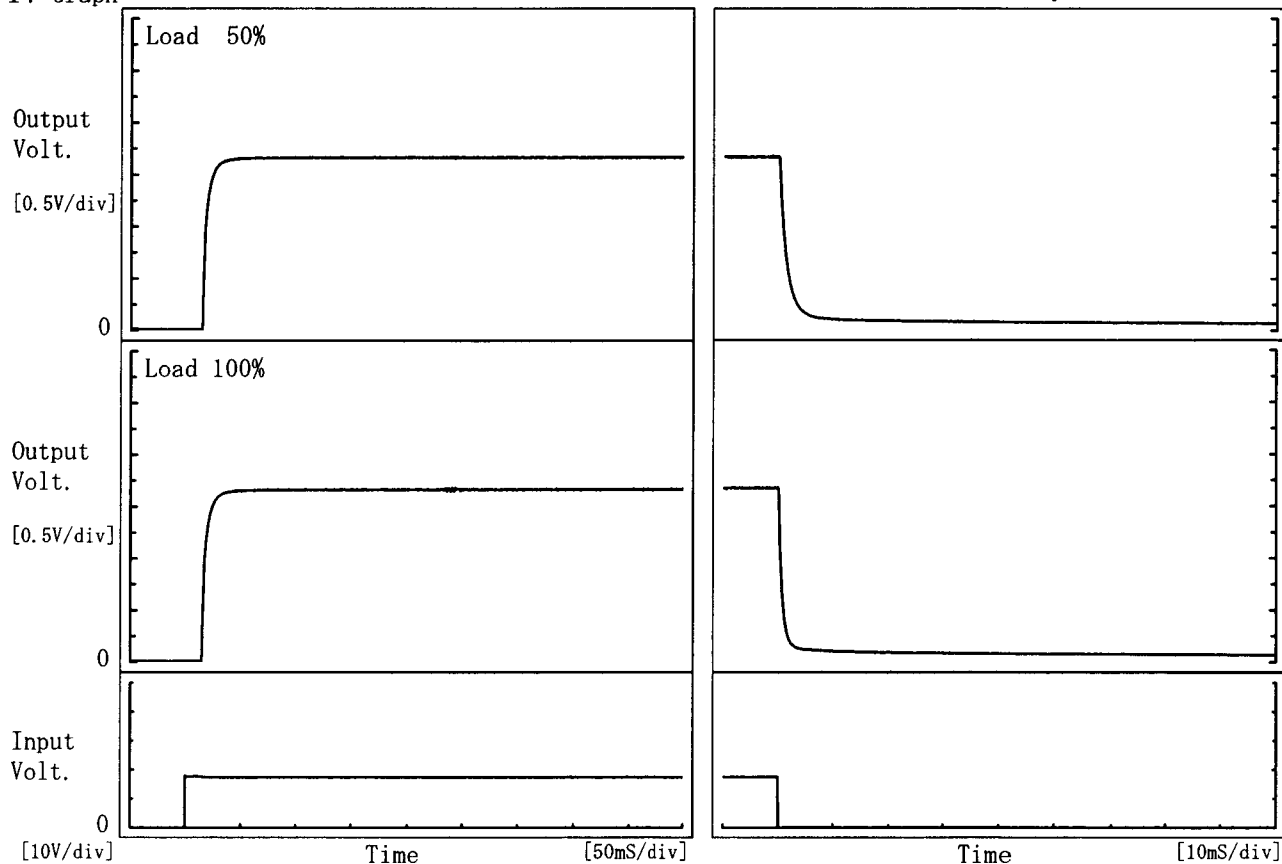
5 ms/div

COSEL

Model	CBS502403	Temperature	25°C
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	+3.3V11.7A		

1. Graph

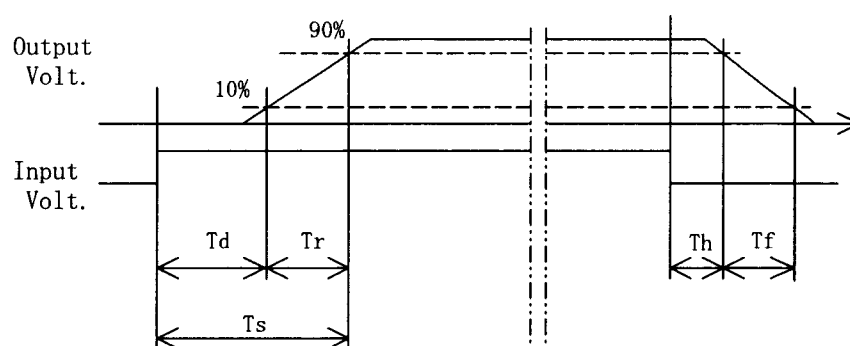
Input Volt. 18 V



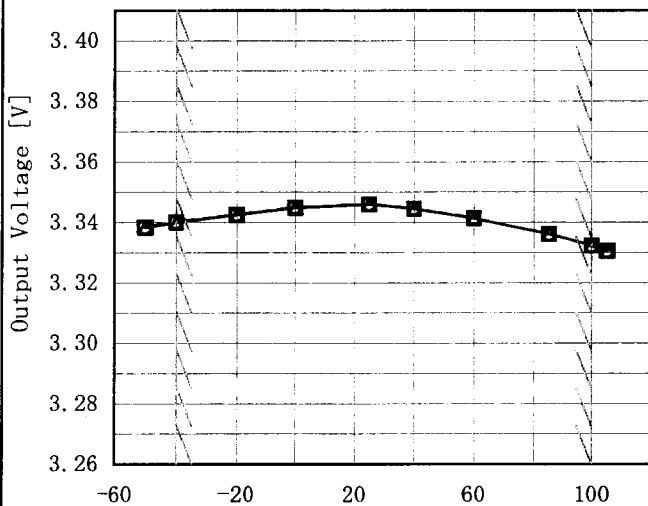
2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	15.3	9.3	24.5	0.2	4.3
100 %	15.3	9.5	24.8	0.2	2.3



COSEL

Model	CBS502403																																																						
Item	Ambient Temperature Drift 周囲温度変動	Testing Circuitry Figure A																																																					
Object	+3.3V11.7A																																																						
1. Graph		2. Values																																																					
<div><div>—△—</div><div>Input Volt. 18V</div></div> <div><div>---□---</div><div>Input Volt. 24V</div></div> <div><div>---○---</div><div>Input Volt. 36V</div></div>  <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</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>-50</td><td>3.338</td><td>3.338</td><td>3.338</td></tr><tr><td>-40</td><td>3.340</td><td>3.340</td><td>3.340</td></tr><tr><td>-20</td><td>3.343</td><td>3.343</td><td>3.343</td></tr><tr><td>0</td><td>3.345</td><td>3.345</td><td>3.345</td></tr><tr><td>25</td><td>3.346</td><td>3.346</td><td>3.346</td></tr><tr><td>40</td><td>3.345</td><td>3.345</td><td>3.345</td></tr><tr><td>60</td><td>3.341</td><td>3.341</td><td>3.341</td></tr><tr><td>85</td><td>3.336</td><td>3.336</td><td>3.336</td></tr><tr><td>100</td><td>3.332</td><td>3.332</td><td>3.332</td></tr><tr><td>105</td><td>3.331</td><td>3.331</td><td>3.331</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]	-50	3.338	3.338	3.338	-40	3.340	3.340	3.340	-20	3.343	3.343	3.343	0	3.345	3.345	3.345	25	3.346	3.346	3.346	40	3.345	3.345	3.345	60	3.341	3.341	3.341	85	3.336	3.336	3.336	100	3.332	3.332	3.332	105	3.331	3.331	3.331	--	—	—	—
Ambient Temperature [°C]	Output Voltage [V]																																																						
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]																																																				
-50	3.338	3.338	3.338																																																				
-40	3.340	3.340	3.340																																																				
-20	3.343	3.343	3.343																																																				
0	3.345	3.345	3.345																																																				
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100	3.332	3.332	3.332																																																				
105	3.331	3.331	3.331																																																				
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Note: Slanted line shows the range of the rated ambient temperature.																																																							
(注) 斜線は定格周囲温度範囲を示す。																																																							

COSEL

Model		CBS502403	
Item		Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧	
Object		+3.3V11.7A	

1. Graph

---□---

Load 50%

—△—

Load 100%

Input Voltage [V]

32

24

16

8

0

-60

-20

20

60

100

Ambient Temperature [°C]

2. Values

Ambient Temperature [°C]	Input Voltage [V]	
	Load 50%	Load 100%
-50	14.8	15.3
-40	14.8	15.2
-20	14.8	15.3
0	14.8	15.4
25	14.7	15.4
40	14.7	15.4
60	14.6	15.4
85	14.6	15.3
100	14.5	15.3
105	14.5	15.3
--	—	—

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

(注) 斜線は定格周囲温度範囲を示す。

COSEL

Model	CBS502403	Testing Circuitry Figure A																																							
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)																																								
Object	+3.3V11.7A																																								
1. Graph		2. Values																																							
<div><div><div>---□---</div><div>Load 50%</div></div><div><div>—△—</div><div>Load 100%</div></div></div> <p>Input Volt. 24V</p>		<table><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><tr><td>-50</td><td>35</td><td>35</td></tr><tr><td>-40</td><td>30</td><td>30</td></tr><tr><td>-20</td><td>25</td><td>25</td></tr><tr><td>0</td><td>20</td><td>20</td></tr><tr><td>25</td><td>15</td><td>15</td></tr><tr><td>40</td><td>15</td><td>15</td></tr><tr><td>60</td><td>15</td><td>15</td></tr><tr><td>85</td><td>20</td><td>20</td></tr><tr><td>100</td><td>20</td><td>20</td></tr><tr><td>105</td><td>20</td><td>20</td></tr><tr><td>--</td><td>—</td><td>—</td></tr></table>		Ambient Temperature [°C]	Ripple Voltage [mV]		Load 50%	Load 100%	-50	35	35	-40	30	30	-20	25	25	0	20	20	25	15	15	40	15	15	60	15	15	85	20	20	100	20	20	105	20	20	--	—	—
Ambient Temperature [°C]	Ripple Voltage [mV]																																								
	Load 50%	Load 100%																																							
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-40	30	30																																							
-20	25	25																																							
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85	20	20																																							
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Note: Slanted line shows the range of the rated ambient temperature.																																									
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COSEL

Model	CBS502403		
Item	Time Lapse Drift 経時ドリフト	Temperature	25℃
Object	+3.3V11.7A	Testing Circuitry	Figure A
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

		Testing Circuitry Figure A
Model	CBS502403	
Item	Output Voltage Accuracy 定電圧精度	
Object	+3.3V11.7A	

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 ~ 100℃

Input Voltage : 18 ~ 36V

Load Current : 0 ~ 11.7A

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

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

1. 定電圧精度

周囲温度、入力電圧、負荷電流を下記仕様内で、任意に変動させたときの出力電圧の変動をいう。

周囲温度 : -40 ~ 100℃

入力電圧 : 18 ~ 36V

負荷電流 : 0 ~ 11.7A

* 定電圧精度(変動値) = $\pm (\text{出力電圧の最高値} - \text{出力電圧の最低値}) / 2$

* 定電圧精度(変動率) = $\frac{\text{変動値}}{\text{定格出力電圧}} \times 100$

2. Values

Item	Temperature [℃]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	25	18	11.7	3.346	±7	±0.2
Minimum Voltage	100	36	11.7	3.332		

COSEL

		Testing Circuitry Figure A
Model	CBS502403	
Item	Condense 結露特性	
Object	+3.3V11.7A	

1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at -10°C for an hour with the input off.
- ② Taking it out of the tank and dewing itself in a room where the temperature is 25°C and the humidity is 40%RH.
- ③ Testing electrical characteristics of the unit to confirm there be no fault.

1. 結露特性試験

入力を切った状態で、恒温槽で -10°C に冷却しておき、約1時間後に恒温槽から取り出し、室温 25°C 、湿度40%RHの状態におき結露させ、その電気的特性の測定を行い異常のないことを確認する。

2. Values

Item	Data	Testing Conditions
Output Voltage [V]	3.341	Input Volt. : 24V, Load Current. : 11.7A
Line Regulation [mV]	1	Input Volt. : 18~36V, Load Current. : 11.7A
Load Regulation [mV]	1	Input Volt. : 24V, Load Current. : 0~11.7A

COSEL

Model	CBS502403	Temperature	25°C
Item	Line Noise Tolerance 入力雑音耐量	Testing Circuitry	Figure B
Object	+3.3V11.7A		

1. Conditions

- Input Voltage : 24 V
- Pulse Voltage : 2000 V
- Pulse Cycle : 16.7 mS
- Pulse Input Duration : 1 min. or more
- Load : 100 %

2. Results

Pulse Width [nS]	MODE		No protection failure should occur	DC-like Regulation of Output Voltage
		POLARITY	保護回路の誤動作がない	出力電圧の直流的変動
50	COMMON	+	OK	no fluctuation
		—	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		—	OK	no fluctuation
1000	COMMON	+	OK	no fluctuation
		—	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		—	OK	no fluctuation

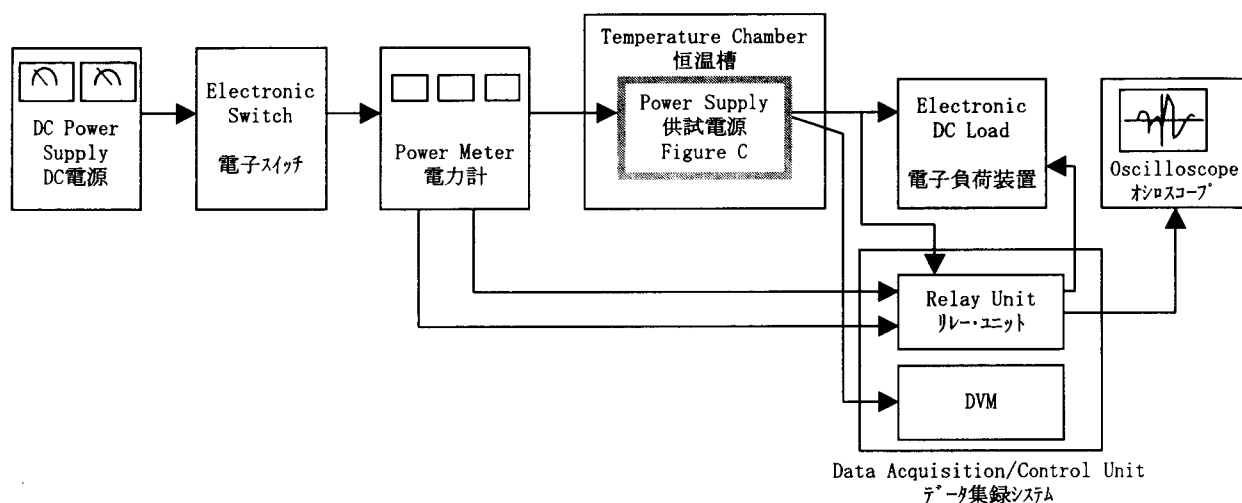


Figure A

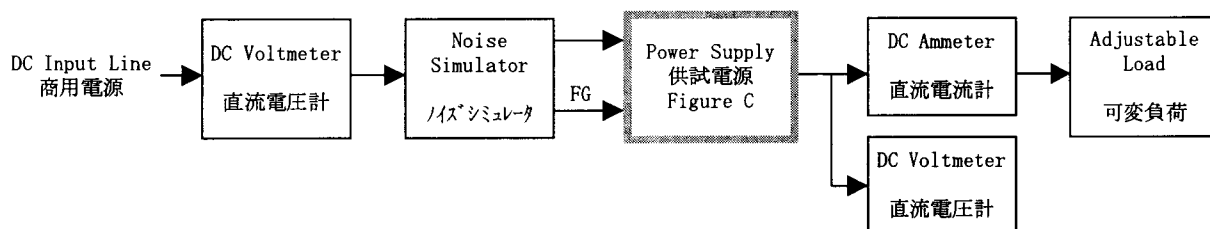


Figure B

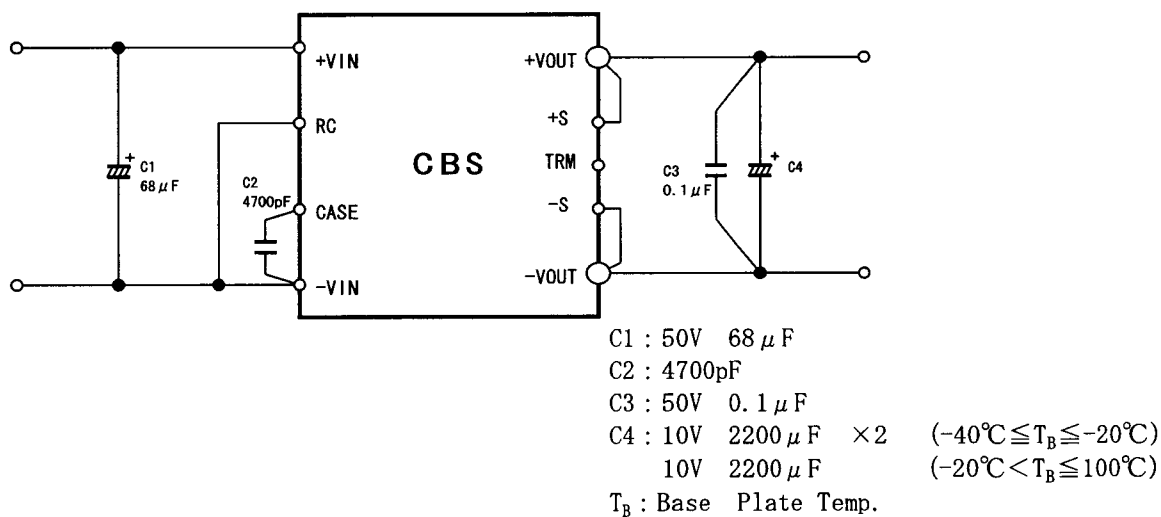


Figure C