



# TEST DATA OF CBS1004828

(48V INPUT)

Regulated DC Power Supply  
Feb. 15, 2001

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**コーセル株式会社**  
**COSEL CO.,LTD.**

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Model		CBS1004828		Temperature		25℃																																																																								
Item		Input Current (by Input Voltage) 入力電流 (入力電圧特性)		Testing Circuitry		Figure A																																																																								
Object																																																																														
1. Graph				2. Values																																																																										
<div><div><div>—△— Load 100%</div><div>---□--- Load 50%</div><div>---○--- Load 0%</div></div><p>Input Current [A]</p><p>Input Voltage [V]</p></div> <div>Note: Slanted line shows the range of the rated input voltage.</div> <div>(注) 斜線は定格入力電圧範囲を示す。</div>				<table><tr><th rowspan="2">Input Voltage [V]</th><th colspan="3">Input Current [A]</th></tr><tr><th>Load 0%</th><th>Load 50%</th><th>Load 100%</th></tr><tr><td>8.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>16.0</td><td>0.000</td><td>0.000</td><td>0.000</td></tr><tr><td>24.0</td><td>0.008</td><td>0.008</td><td>0.008</td></tr><tr><td>30.6</td><td>0.089</td><td>1.900</td><td>3.738</td></tr><tr><td>33.0</td><td>0.071</td><td>1.739</td><td>3.434</td></tr><tr><td>36.0</td><td>0.068</td><td>1.589</td><td>3.128</td></tr><tr><td>40.0</td><td>0.065</td><td>1.438</td><td>2.820</td></tr><tr><td>48.0</td><td>0.059</td><td>1.211</td><td>2.360</td></tr><tr><td>60.0</td><td>0.049</td><td>0.992</td><td>1.906</td></tr><tr><td>70.0</td><td>0.042</td><td>0.868</td><td>1.644</td></tr><tr><td>76.0</td><td>0.041</td><td>0.810</td><td>1.524</td></tr><tr><td>80.0</td><td>0.040</td><td>0.800</td><td>1.455</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>				Input Voltage [V]	Input Current [A]			Load 0%	Load 50%	Load 100%	8.0	0.000	0.000	0.000	16.0	0.000	0.000	0.000	24.0	0.008	0.008	0.008	30.6	0.089	1.900	3.738	33.0	0.071	1.739	3.434	36.0	0.068	1.589	3.128	40.0	0.065	1.438	2.820	48.0	0.059	1.211	2.360	60.0	0.049	0.992	1.906	70.0	0.042	0.868	1.644	76.0	0.041	0.810	1.524	80.0	0.040	0.800	1.455	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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# COSEL

Model		CBS1004828	
Item		Input Current (by Load Current) 入力電流 (負荷特性)	
Object			

1. Graph

—△—

Input Volt.

36V

---□---

Input Volt.

48V

-·-○-·-

Input Volt.

76V

Input Current [A]

5.0

4.0

3.0

2.0

1.0

0.0

0.0

1.0

2.0

3.0

4.0

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。

2. Values

Load Current [A]	Input Current [A]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	0.068	0.058	0.041
0.6	0.596	0.469	0.327
1.2	1.088	0.840	0.573
1.8	1.587	1.209	0.809
2.4	2.106	1.590	1.047
3.0	2.621	1.980	1.286
3.6	3.142	2.370	1.529
4.0	3.498	2.633	1.696
--	-	-	-
--	-	-	-
--	-	-	-

# COSEL

Model		CBS1004828		Temperature		25℃																																																				
Item		Input Power (by Load Current) 入力電力（負荷特性）		Testing Circuitry		Figure A																																																				
Object		_____																																																								
1. Graph				2. Values																																																						
<div><div><div>—△—</div><div>Input Volt.</div><div>36V</div></div><div><div>---□---</div><div>Input Volt.</div><div>48V</div></div><div><div>---○---</div><div>Input Volt.</div><div>76V</div></div></div> <div><p>Input Power [W]</p><p>Load Current [A]</p></div>				<table><tr><th rowspan="2">Load Current [A]</th><th colspan="3">Input Power [W]</th></tr><tr><th>Input Volt. 36[V]</th><th>Input Volt. 48[V]</th><th>Input Volt. 76[V]</th></tr><tr><td>0.0</td><td>2.5</td><td>2.8</td><td>3.2</td></tr><tr><td>0.6</td><td>21.5</td><td>22.6</td><td>24.9</td></tr><tr><td>1.2</td><td>39.1</td><td>40.3</td><td>43.6</td></tr><tr><td>1.8</td><td>56.9</td><td>57.9</td><td>61.7</td></tr><tr><td>2.4</td><td>75.5</td><td>76.0</td><td>79.8</td></tr><tr><td>3.0</td><td>93.7</td><td>94.8</td><td>98.0</td></tr><tr><td>3.6</td><td>112.1</td><td>113.2</td><td>116.3</td></tr><tr><td>4.0</td><td>124.6</td><td>125.7</td><td>128.9</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 Power [W]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	2.5	2.8	3.2	0.6	21.5	22.6	24.9	1.2	39.1	40.3	43.6	1.8	56.9	57.9	61.7	2.4	75.5	76.0	79.8	3.0	93.7	94.8	98.0	3.6	112.1	113.2	116.3	4.0	124.6	125.7	128.9	--	—	—	—	--	—	—	—	--	—	—	—
Load Current [A]	Input Power [W]																																																									
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0.6	21.5	22.6	24.9																																																							
1.2	39.1	40.3	43.6																																																							
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<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

Model		CBS1004828	
Item		Efficiency (by Input Voltage) 効率 (入力電圧特性)	
Object			
1. Graph		2. Values	

---

□

---

Load 50%

—

△

—

Load 100%

Efficiency [%]

100

96

92

88

84

80

76

72

20

40

60

80

Input Voltage [V]

20

40

60

80

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

(注) 斜線は定格入力電圧範囲を示す。

Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
33	86.7	88.4
36	86.7	88.6
40	86.3	88.5
48	85.0	88.0
55	83.9	87.1
60	82.9	86.7
70	81.1	85.9
76	80.1	85.2
80	79.4	84.7

# COSEL

Model		CBS1004828	
Item		Efficiency (by Load Current) 効率 (負荷特性)	
Object			

1. Graph

—△— Input Volt. 36V

---□--- Input Volt. 48V

---○--- Input Volt. 76V

Efficiency [%]

100

92

84

76

68

60

52

44

0.0

1.0

2.0

3.0

4.0

Load Current [A]

2. Values

Load Current [A]	Efficiency [%]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	—	—	—
0.6	74.9	71.8	64.5
1.2	83.6	81.4	75.3
1.8	86.7	85.2	80.0
2.4	87.5	87.0	82.6
3.0	88.3	87.3	84.2
3.6	88.6	88.0	85.2
4.0	88.7	88.0	85.6
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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。



**COSEL**

Model		CBS1004828	
Item		Load Regulation 静的負荷変動	
Object		+28V3.6A	

1. Graph

—△—

Input Volt.

36V

---□---

Input Volt.

48V

-·-○-·-

Input Volt.

76V

Output Voltage [V]

28.20

28.10

28.00

27.90

27.80

27.70

27.60

27.50

0.0

1.0

2.0

3.0

4.0

Load Current [A]

28.20

28.10

28.00

27.90

27.80

27.70

27.60

27.50

0.0

1.0

2.0

3.0

4.0

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。

2. Values

Load Current [A]	Output Voltage [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
0.0	27.928	27.928	27.928
0.6	27.928	27.928	27.928
1.2	27.928	27.928	27.929
1.8	27.928	27.928	27.929
2.4	27.928	27.929	27.929
3.0	27.929	27.929	27.929
3.6	27.929	27.929	27.929
4.0	27.929	27.929	27.929
--	-	-	-
--	-	-	-

# COSEL

Model		CBS1004828	
Item		Ripple Voltage (by Load Current) リップル電圧 (負荷特性)	
Object		+28V3.6A	

1. Graph

Input Volt. 36V

Input Volt. 76V

Load Current [A]	Input Volt. 36V [mV]	Input Volt. 76V [mV]
0.0	5	10
0.7	10	20
1.4	10	20
2.2	10	20
2.9	10	20
3.6	10	20
4.3	10	20
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Ripple Voltage is shown as p-p in the figure below.

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

リップル電圧は、下図 p - p 値で示される。

(注) 斜線は定格負荷電流範囲を示す。

Ripple [mVp-p]

Fig. Complex Ripple Wave Form

図 リップル波形図

Temperature	25℃
Testing Circuitry	Figure A

2. Values

Load Current [A]	Ripple Output Voltage [mV]	
	Input Volt. 36 [V]	Input Volt. 76 [V]
0.0	5	10
0.7	10	20
1.4	10	20
2.2	10	20
2.9	10	20
3.6	10	20
4.3	10	20
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# COSEL

ModelCBS1004828		Temperature25℃	
ItemRipple-Noise リップルノイズ		Testing CircuitryFigure A	
Object+28V3.6A			
1. Graph		2. Values	

△

Input Volt. 36V

○

Input Volt. 76V

200

180

160

140

120

100

80

60

40

20

0

0.0

1.0

2.0

3.0

4.0

Ripple-Noise [mV]

Load Current [A]

# COSEL

Model	CBS1004828																																																													
Item	Overcurrent Protection 過電流保護	Temperature	25℃																																																											
Object	+28V3.6A	Testing Circuitry	Figure A																																																											
1. Graph		2. Values																																																												
<div><div><div></div><div></div><div></div></div><div>Input Volt. 36V Input Volt. 48V Input Volt. 76V</div></div> <p>Output Voltage [V]</p> <p>Load Current [A]</p> <p>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。</p> <p>Intermittent operation occurs when the output voltage is from 22.4V to 0V. 22.4V～0V間は、間欠モードとなる。</p>		<table><tr><th rowspan="2">Output Voltage [V]</th><th colspan="3">Load Current [A]</th></tr><tr><th>Input Volt. 36[V]</th><th>Input Volt. 48[V]</th><th>Input Volt. 76[V]</th></tr><tr><td>28.0</td><td>3.61</td><td>3.62</td><td>3.61</td></tr><tr><td>26.6</td><td>4.67</td><td>4.64</td><td>4.80</td></tr><tr><td>25.2</td><td>4.67</td><td>4.66</td><td>4.83</td></tr><tr><td>22.4</td><td>4.68</td><td>4.68</td><td>4.88</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. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	28.0	3.61	3.62	3.61	26.6	4.67	4.64	4.80	25.2	4.67	4.66	4.83	22.4	4.68	4.68	4.88	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--
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# COSEL

Model		CBS1004828	
Item		Overvoltage Protection 過電圧保護	
Object		+28V3.6A	
1. Graph		2. Values	

—△—

Input Volt. 36V

36V

---□---

Input Volt. 48V

48V

---○---

Input Volt. 76V

76V

Operating Point [V]

Ambient Temperature [°C]

Load 0%

Ambient Temperature [°C]	Operating Point [V]		
	Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
-50	36.68	36.68	36.68
-40	36.68	36.68	36.68
-20	36.75	36.75	36.75
0	36.82	36.82	36.82
25	36.82	36.82	36.82
40	36.82	36.82	36.82
60	36.82	36.82	36.82
85	36.82	36.82	36.82
100	36.82	36.82	36.82
105	36.82	36.75	36.82
--	-	-	-

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

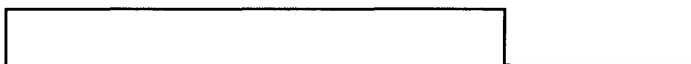
(注) 斜線は定格周囲温度範囲を示す。



Model	CBS1004828	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Response 動的負荷変動	
Object	+28V3.6A	

Input Volt. 48 V  
Cycle 1000 ms

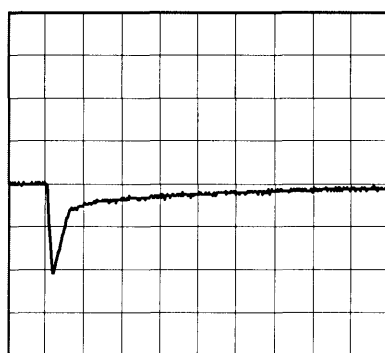
Load Current



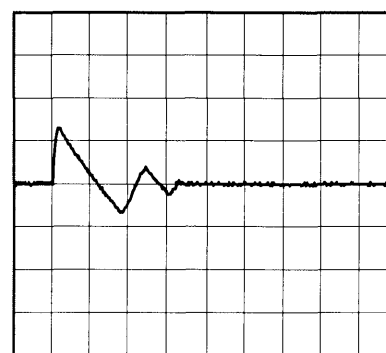
Min. Load (0A)  $\longleftrightarrow$

Load 100% (3.6A)

500 mV/div



500  $\mu$ s/div

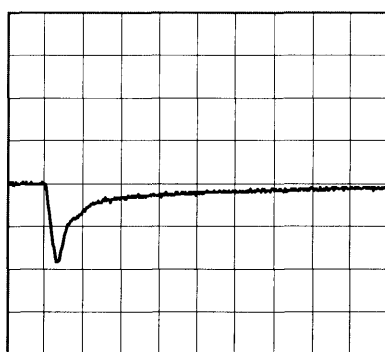


5 ms/div

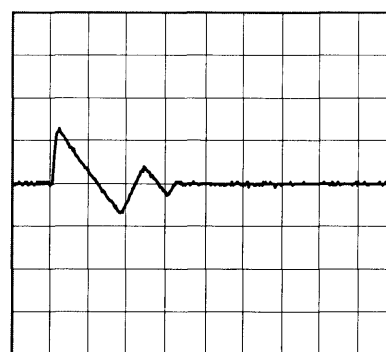
Min. Load (0A)  $\longleftrightarrow$

Load 50% (1.8A)

500 mV/div



500  $\mu$ s/div

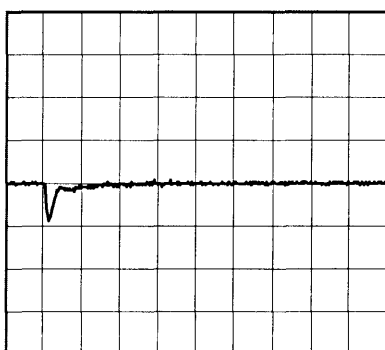


5 ms/div

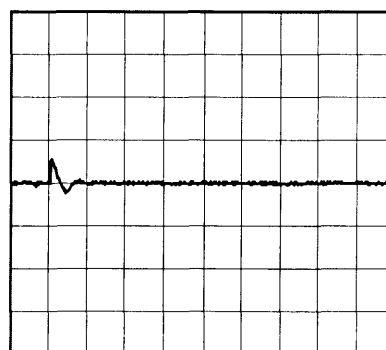
Load 10% (0.36A)  $\longleftrightarrow$

Load 100% (3.6A)

500 mV/div

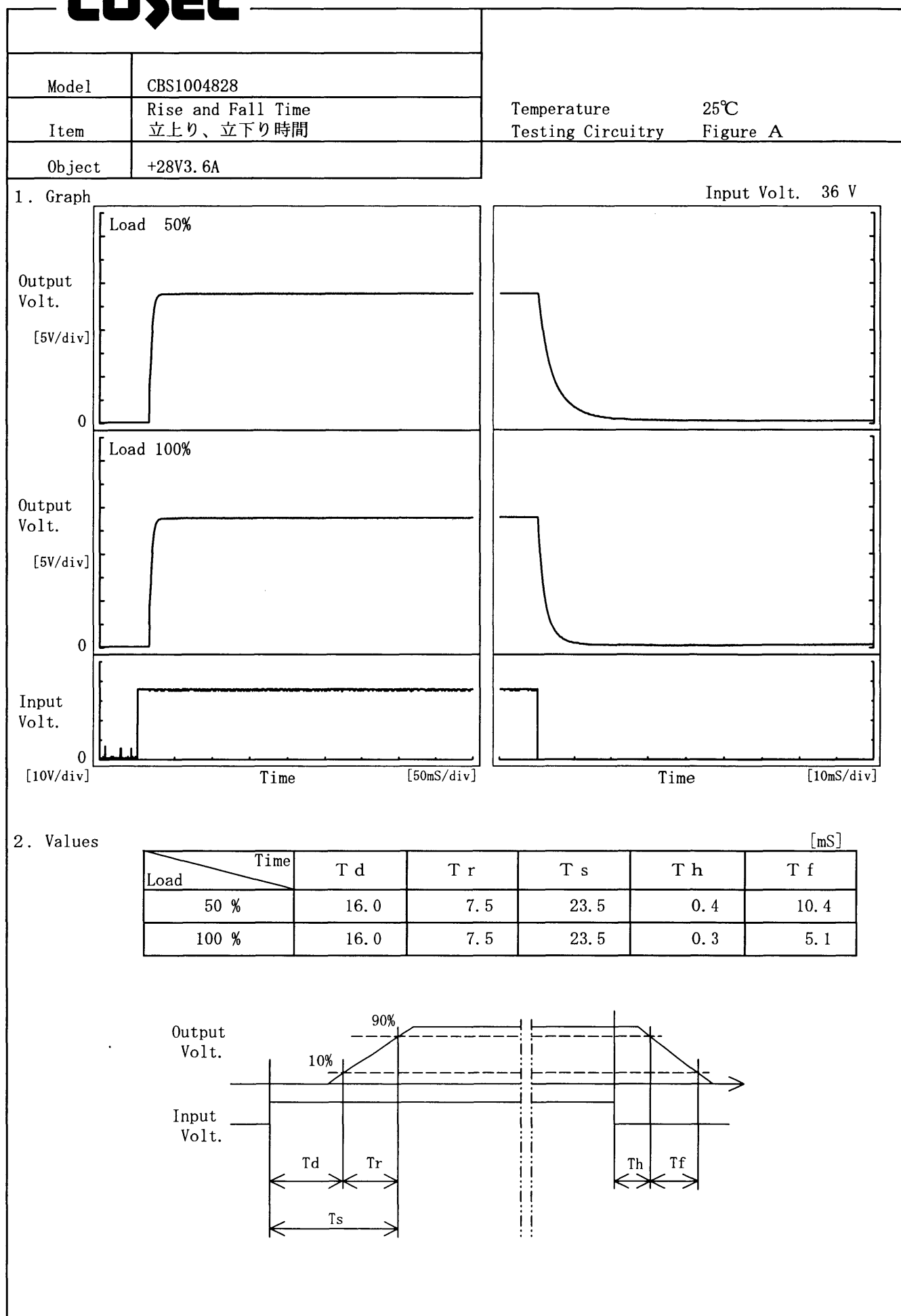


500  $\mu$ s/div



5 ms/div

# COSEL



# COSEL

Model		CBS1004828	
Item		Ambient Temperature Drift 周囲温度変動	
Object		+28V3.6A	

1. Graph

—△—

Input Volt.

36V

---□---

Input Volt.

48V

---○---

Input Volt.

76V

Output Voltage [V]

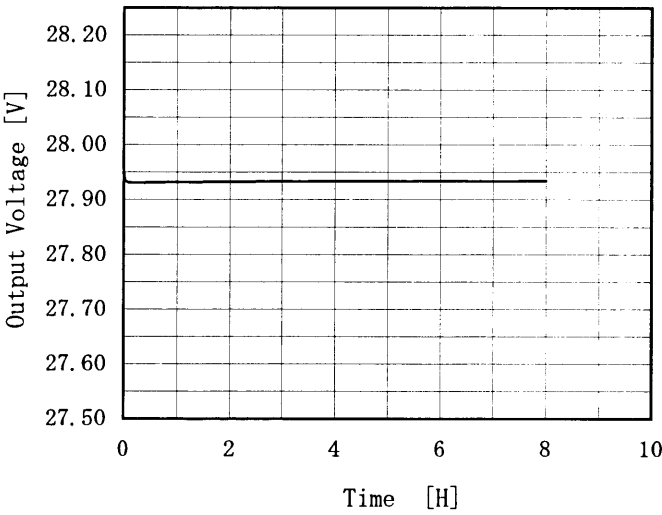


# COSEL

# COSEL

Model	CBS1004828																																						
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)	Testing Circuitry      Figure A																																					
Object	+28V3.6A																																						
1. Graph		2. Values																																					
<div><div>---□---</div><div>Load 50%</div></div> <div><div>—△—</div><div>Load 100%</div></div> <table><thead><tr><th>Ambient Temperature [°C]</th><th>Load 50% [mV]</th><th>Load 100% [mV]</th></tr></thead><tbody><tr><td>-50</td><td>25</td><td>25</td></tr><tr><td>-40</td><td>20</td><td>20</td></tr><tr><td>-20</td><td>15</td><td>15</td></tr><tr><td>0</td><td>15</td><td>15</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>15</td><td>10</td></tr><tr><td>100</td><td>10</td><td>10</td></tr><tr><td>105</td><td>10</td><td>10</td></tr><tr><td>--</td><td>—</td><td>—</td></tr></tbody></table> <p>Input Volt.      48V</p>		Ambient Temperature [°C]	Load 50% [mV]	Load 100% [mV]	-50	25	25	-40	20	20	-20	15	15	0	15	15	25	15	15	40	15	15	60	15	15	85	15	10	100	10	10	105	10	10	--	—	—		
Ambient Temperature [°C]	Load 50% [mV]	Load 100% [mV]																																					
-50	25	25																																					
-40	20	20																																					
-20	15	15																																					
0	15	15																																					
25	15	15																																					
40	15	15																																					
60	15	15																																					
85	15	10																																					
100	10	10																																					
105	10	10																																					
--	—	—																																					
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	CBS1004828																								
Item	Time Lapse Drift 経時ドリフト	Temperature	25℃																						
Object	+28V3.6A	Testing Circuitry	Figure A																						
1. Graph		2. Values																							
<div><p>Output Voltage [V]</p><p>Time [H]</p><p>Input Volt. 48V</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>27.952</td></tr><tr><td>0.5</td><td>27.931</td></tr><tr><td>1.0</td><td>27.932</td></tr><tr><td>2.0</td><td>27.933</td></tr><tr><td>3.0</td><td>27.933</td></tr><tr><td>4.0</td><td>27.934</td></tr><tr><td>5.0</td><td>27.934</td></tr><tr><td>6.0</td><td>27.935</td></tr><tr><td>7.0</td><td>27.934</td></tr><tr><td>8.0</td><td>27.935</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	27.952	0.5	27.931	1.0	27.932	2.0	27.933	3.0	27.933	4.0	27.934	5.0	27.934	6.0	27.935	7.0	27.934	8.0	27.935
Time since start [H]	Output Voltage [V]																								
0.0	27.952																								
0.5	27.931																								
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6.0	27.935																								
7.0	27.934																								
8.0	27.935																								

# COSEL

		Testing Circuitry    Figure A
Model	CBS1004828	
Item	Output Voltage Accuracy 定電圧精度	
Object	+28V3.6A	

## 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 : 36 ~ 76V

Load Current : 0 ~ 3.6A

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

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

## 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 : 36 ~ 76V

負荷電流 : 0 ~ 3.6A

\* 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	-40	48	3.6	27.970	±76	±0.3
Minimum Voltage	100	76	0	27.819		

Model	CBS1004828	
Item	Condense 結露特性	
Object	+28V3. 6A	

### 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℃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℃、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]	27.980	Input Volt.:48V, Load Current.:3.6A
Line Regulation [mV]	1	Input Volt.:36~76V, Load Current.:3.6A
Load Regulation [mV]	1	Input Volt.:48V, Load Current.:0~3.6A

# COSEL

Model	CBS1004828		
Item	Line Noise Tolerance 入力雑音耐量	Temperature	25℃
		Testing Circuitry	Figure B
Object	+28V3.6A		

## 1. Conditions

- Input Voltage : 48 V
- Pulse Input Duration : 1 min. or more
- Pulse Voltage : 2000 V
- Load : 100 %
- Pulse Cycle : 16.7 ms

## 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

# COSEL

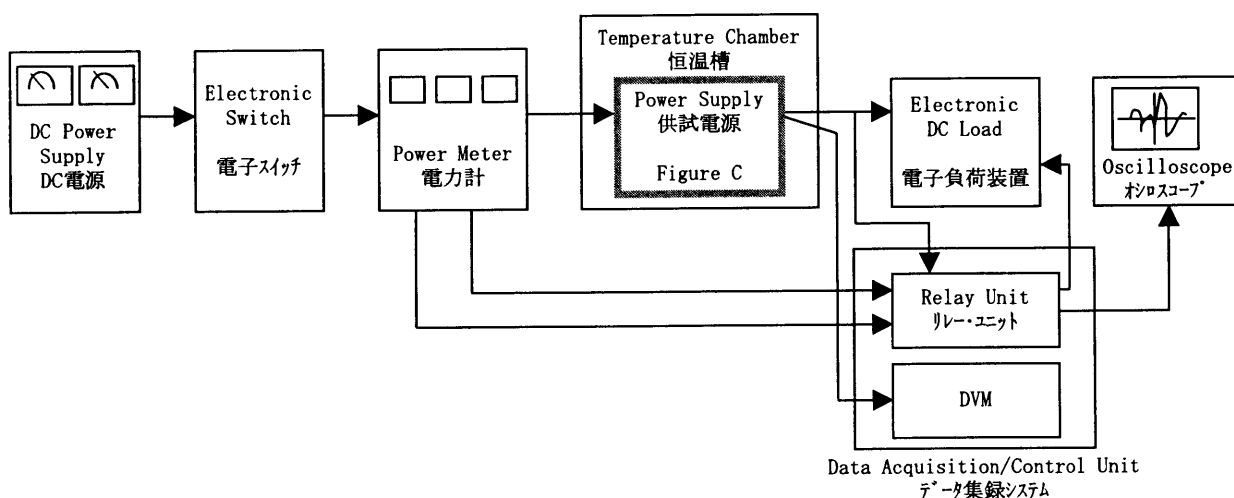


Figure A

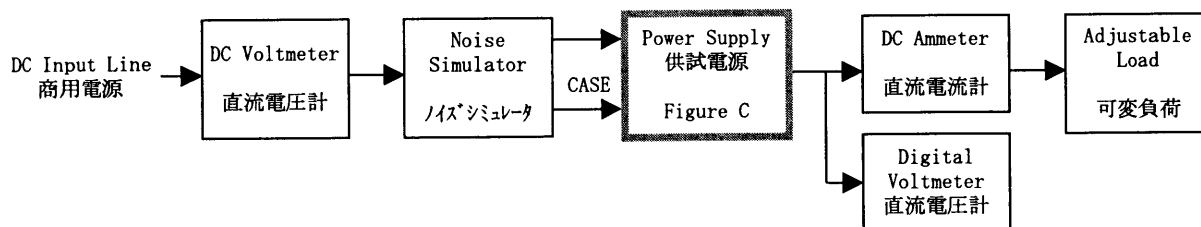


Figure B

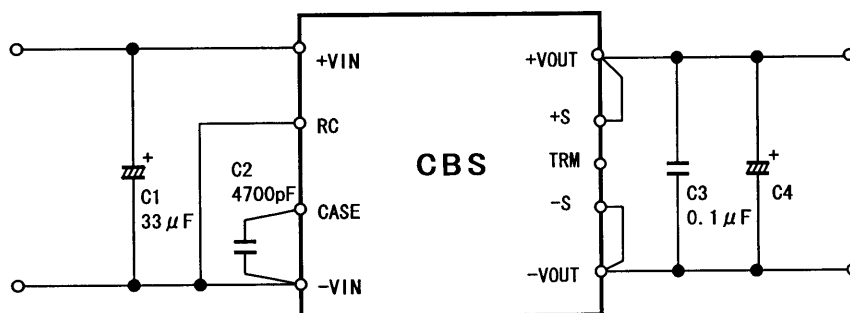


Figure C

C1 : 100V 33  $\mu$ F

C2 : 4700pF

C3 : 50V 0.1  $\mu$ F

( $-40^{\circ}\text{C} \leq T_B \leq -20^{\circ}\text{C}$ )

C4 : CBS2004803, 05	10V	2200 $\mu$ F	$\times 2$
CBS2004812, 15	35V	470 $\mu$ F	$\times 2$
CBS2004824, 28	35V	220 $\mu$ F	$\times 2$

( $-20^{\circ}\text{C} < T_B \leq 100^{\circ}\text{C}$ )

C4 : CBS2004803, 05	10V	2200 $\mu$ F
CBS2004812, 15	35V	470 $\mu$ F
CBS2004824, 28	35V	220 $\mu$ F

$T_B$ : Base Plate Temp.