



# TEST DATA OF CBS2004828

(48V INPUT)

Regulated DC Power Supply  
Feb. 15, 2001

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Takayuki Fukuda Design Manager

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コーワセル株式会社  
COSEL CO., LTD.

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Model	CBS2004828		Temperature Testing Circuitry 25°C Figure A																															
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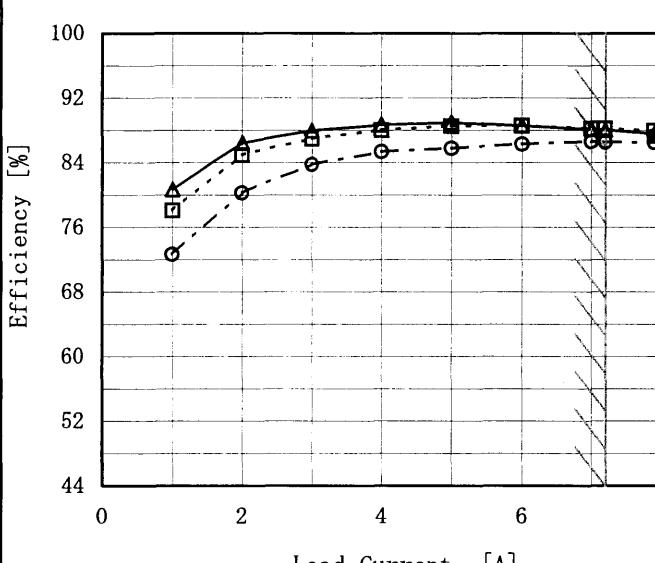
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 <p>The graph plots Efficiency [%] on the Y-axis (44 to 100) against Load Current [A] on the X-axis (0 to 8). Three data series are shown for input voltages of 36V, 48V, and 76V. The 36V curve (triangles) starts at ~78% efficiency at 1A and rises to ~88% at 7A. The 48V curve (squares) starts at ~75% efficiency at 1A and rises to ~88% at 7A. The 76V curve (circles) starts at ~68% efficiency at 1A and rises to ~85% at 7A. A diagonal line from (1, 78) to (7, 88) represents the rated load current range.</p>			<table border="1"> <thead> <tr> <th rowspan="2">Load Current [A]</th> <th colspan="3">Efficiency [%]</th> </tr> <tr> <th>Input Volt. 36[V]</th> <th>Input Volt. 48[V]</th> <th>Input Volt. 76[V]</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>-</td><td>-</td><td>-</td></tr> <tr><td>1.0</td><td>80.7</td><td>78.1</td><td>72.7</td></tr> <tr><td>2.0</td><td>86.4</td><td>85.0</td><td>80.3</td></tr> <tr><td>3.0</td><td>88.0</td><td>87.0</td><td>83.8</td></tr> <tr><td>4.0</td><td>88.7</td><td>88.0</td><td>85.3</td></tr> <tr><td>5.0</td><td>89.0</td><td>88.5</td><td>85.8</td></tr> <tr><td>6.0</td><td>88.6</td><td>88.6</td><td>86.3</td></tr> <tr><td>7.0</td><td>88.1</td><td>88.2</td><td>86.6</td></tr> <tr><td>7.2</td><td>88.0</td><td>88.2</td><td>86.5</td></tr> <tr><td>7.9</td><td>87.6</td><td>87.9</td><td>86.5</td></tr> <tr><td>--</td><td>-</td><td>-</td><td>-</td></tr> </tbody> </table>	Load Current [A]	Efficiency [%]			Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]	0.0	-	-	-	1.0	80.7	78.1	72.7	2.0	86.4	85.0	80.3	3.0	88.0	87.0	83.8	4.0	88.7	88.0	85.3	5.0	89.0	88.5	85.8	6.0	88.6	88.6	86.3	7.0	88.1	88.2	86.6	7.2	88.0	88.2	86.5	7.9	87.6	87.9	86.5	--	-	-	-
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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。

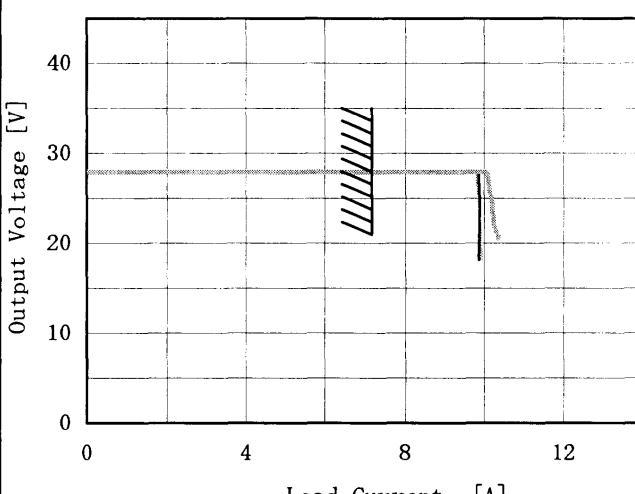
**COSEL**

Model	CBS2004828	Temperature	25°C																																						
Item	Ripple Voltage (by Load Current) リップル電圧 (負荷特性)	Testing Circuitry	Figure A																																						
Object	+28V7.2A																																								
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<p>Fig. Complex Ripple Wave Form 図 リップル波形図</p>																																									

**COSSEL**

Model	CBS2004828																																							
Item	Ripple-Noise リップルノイズ	Temperature 25°C Testing Circuitry Figure A																																						
Object	+28V7.2A																																							
1. Graph																																								
<p style="text-align: center;"> <span style="color: black;">—△—</span> Input Volt. 36V  <span style="color: gray;">---○---</span> Input Volt. 76V         </p> <table border="1"> <caption>Data points estimated from Figure 1 graph</caption> <thead> <tr> <th>Load Current [A]</th> <th>Ripple-Noise [mV] (Input Volt. 36V)</th> <th>Ripple-Noise [mV] (Input Volt. 76V)</th> </tr> </thead> <tbody> <tr><td>0.0</td><td>20</td><td>35</td></tr> <tr><td>1.4</td><td>40</td><td>60</td></tr> <tr><td>2.9</td><td>45</td><td>70</td></tr> <tr><td>4.3</td><td>55</td><td>70</td></tr> <tr><td>5.8</td><td>65</td><td>75</td></tr> <tr><td>7.2</td><td>65</td><td>75</td></tr> <tr><td>9.2</td><td>70</td><td>75</td></tr> </tbody> </table>		Load Current [A]	Ripple-Noise [mV] (Input Volt. 36V)	Ripple-Noise [mV] (Input Volt. 76V)	0.0	20	35	1.4	40	60	2.9	45	70	4.3	55	70	5.8	65	75	7.2	65	75	9.2	70	75															
Load Current [A]	Ripple-Noise [mV] (Input Volt. 36V)	Ripple-Noise [mV] (Input Volt. 76V)																																						
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<p>Ripple-Noise is shown as p-p in the figure below.    Note: Slanted line shows the range of the rated load current.</p> <p>リップルノイズは、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。</p> <p>Fig. Complex Ripple Noise Wave Form    図 リップルノイズ波形</p>																																								

**COSEL**

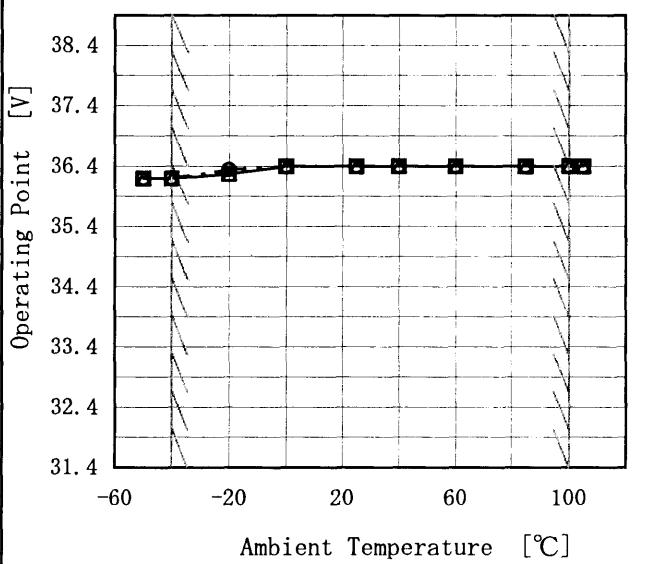
Model	CBS2004828	Temperature 25°C Testing Circuitry Figure A		
Item	Overcurrent Protection 過電流保護			
Object	+28V7.2A			
1. Graph		————— Input Volt. 36V ----- Input Volt. 48V ..... Input Volt. 76V		
		2. Values		
Output Voltage [V]		Load Current [A]		
Output Voltage [V]		Input Volt. 36[V]	Input Volt. 48[V]	Input Volt. 76[V]
28.0		7.27	7.27	7.27
26.6		9.86	9.81	10.13
25.2		9.88	9.84	10.18
22.4		9.87	9.88	10.25
19.6		9.87	9.92	10.36
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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。

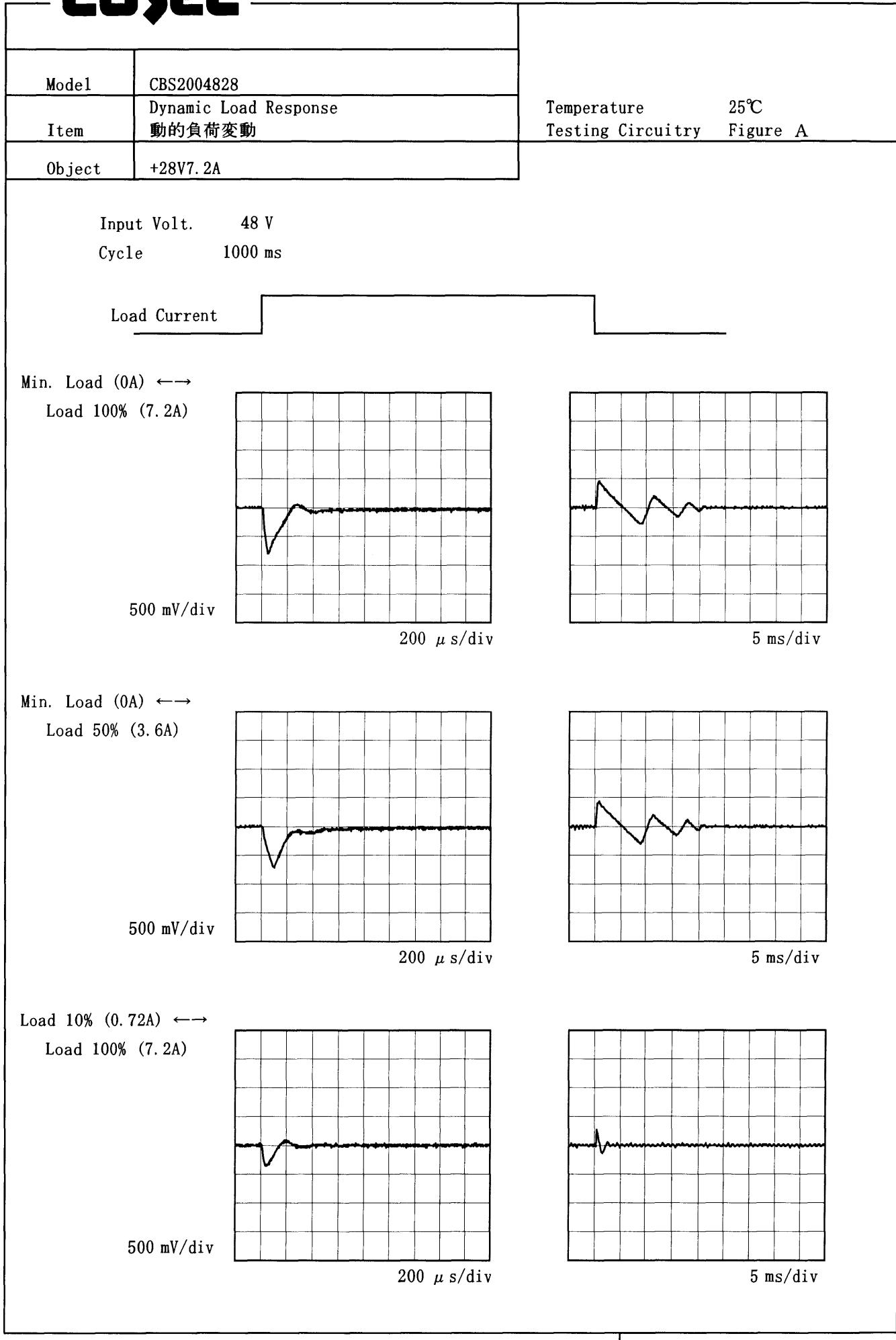
Intermittent operation occurs when the output voltage is from 18V to 0V.  
18V～0V間は、間欠モードとなる。

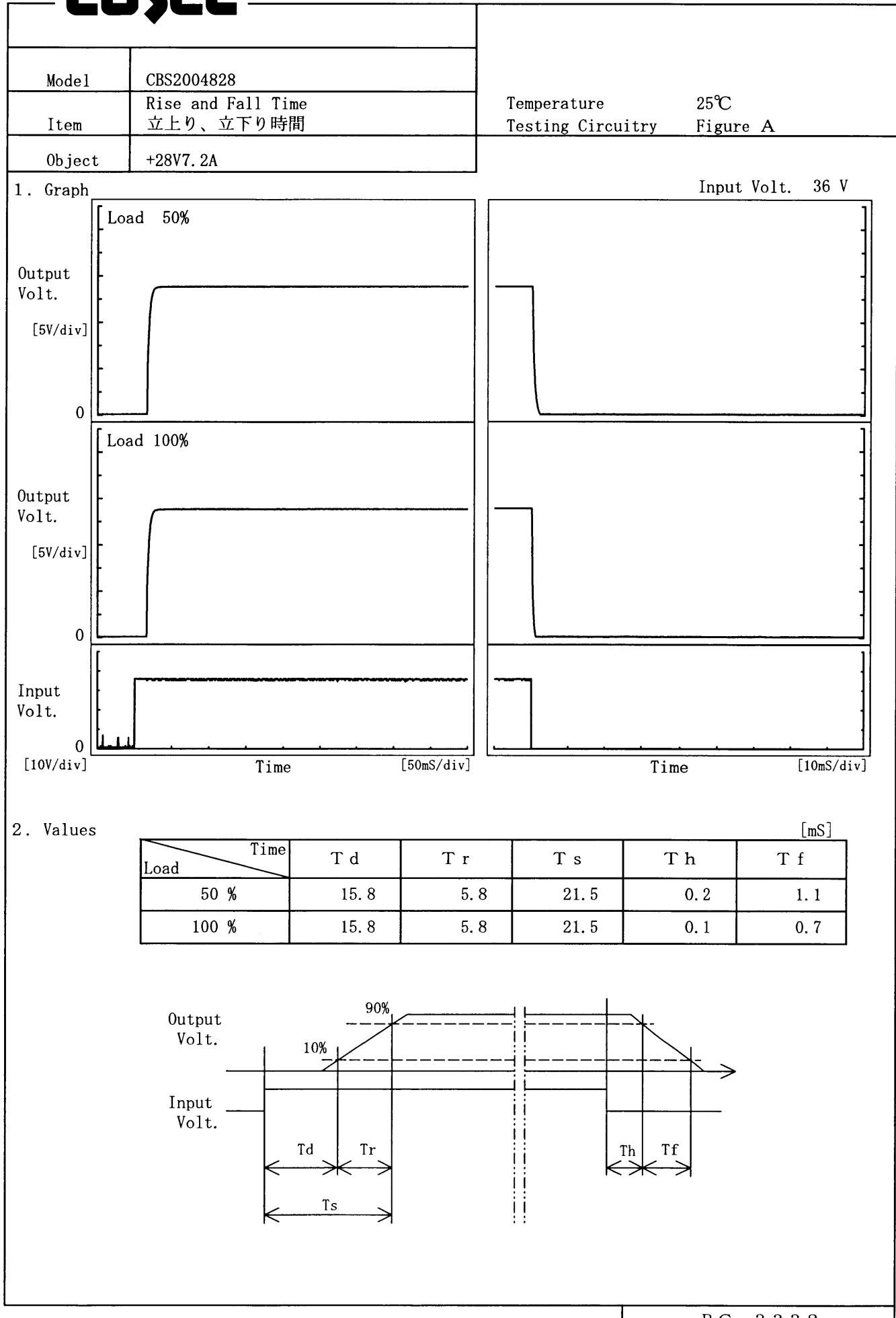
# COSEL

Model	CBS2004828	Testing Circuitry      Figure A																																																				
Item	Overvoltage Protection 過電圧保護																																																					
Object	+28V7.2A																																																					
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100	36.39	36.39	36.39																																																			
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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。

**COSSEL**

**COSSEL**



<table border="1"> <tr> <td>Model</td><td>CBS2004828</td></tr> <tr> <td>Item</td><td>Ambient Temperature Drift 周囲温度変動</td></tr> <tr> <td>Object</td><td>+28V7.2A</td></tr> </table>	Model	CBS2004828	Item	Ambient Temperature Drift 周囲温度変動	Object	+28V7.2A	Testing Circuitry Figure A																																														
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<p>1. Graph</p> <p>—△— Input Volt. 36V      - - -□- Input Volt. 48V      - - -○- Input Volt. 76V</p> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p>																																																					

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。

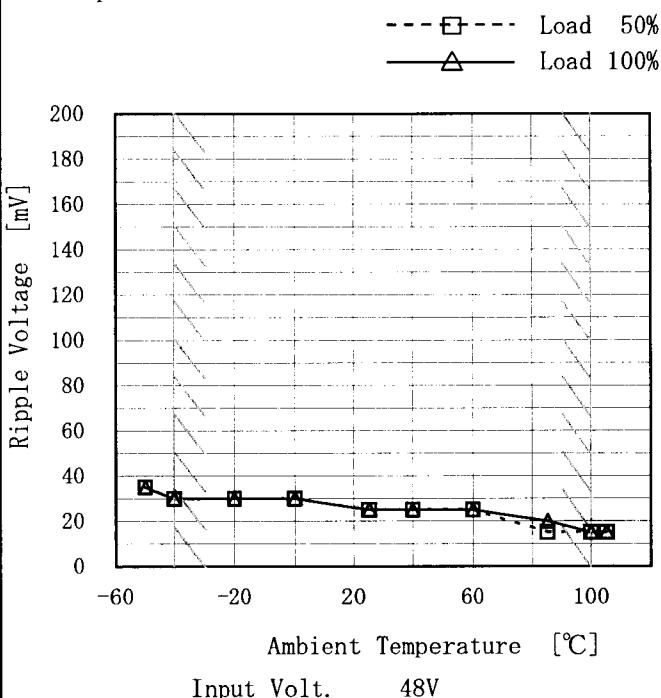
**COSEL**

<p>Model      CBS2004828</p> <p>Item      Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧</p> <p>Object     +28V7.2A</p>	Testing Circuitry      Figure A																																						
	1. Graph	2. Values																																					
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**COSEL**

Model	CBS2004828
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)
Object	+28V7.2A

## 1. Graph



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

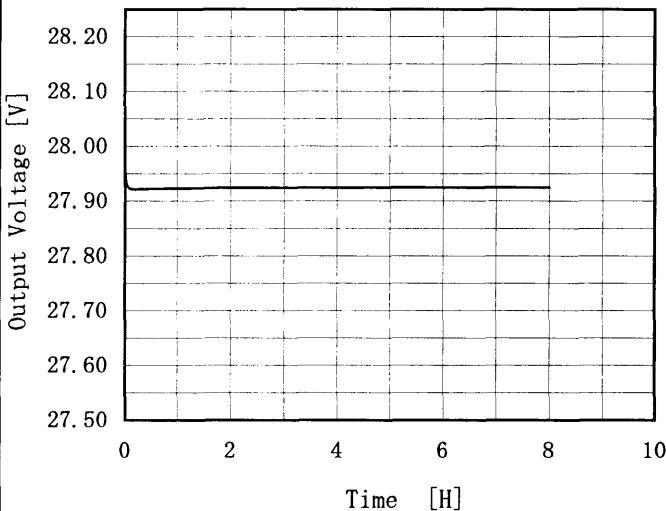
(注) 斜線は定格周囲温度範囲を示す。

Testing Circuitry Figure A

## 2. Values

Ambient Temperature [°C]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	35	35
-40	30	30
-20	30	30
0	30	30
25	25	25
40	25	25
60	25	25
85	15	20
100	15	15
105	15	15
—	—	—

**COSEL**

Model	CBS2004828	Temperature	25°C																						
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry	Figure A																						
Object	+28V7.2A																								
1. Graph			2. Values																						
 <p>Output Voltage [V]</p> <p>Time [H]</p> <p>Input Volt. 48V Load 100%</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>27.962</td></tr> <tr><td>0.5</td><td>27.923</td></tr> <tr><td>1.0</td><td>27.923</td></tr> <tr><td>2.0</td><td>27.924</td></tr> <tr><td>3.0</td><td>27.925</td></tr> <tr><td>4.0</td><td>27.925</td></tr> <tr><td>5.0</td><td>27.925</td></tr> <tr><td>6.0</td><td>27.925</td></tr> <tr><td>7.0</td><td>27.926</td></tr> <tr><td>8.0</td><td>27.926</td></tr> </tbody> </table>	Time since start [H]	Output Voltage [V]	0.0	27.962	0.5	27.923	1.0	27.923	2.0	27.924	3.0	27.925	4.0	27.925	5.0	27.925	6.0	27.925	7.0	27.926	8.0	27.926
Time since start [H]	Output Voltage [V]																								
0.0	27.962																								
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5.0	27.925																								
6.0	27.925																								
7.0	27.926																								
8.0	27.926																								



Model	CBS2004828	Testing Circuitry Figure A
Item	Output Voltage Accuracy 定電圧精度	
Object	+28V7.2A	

### 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°C

Input Voltage : 36 ~ 76V

Load Current : 0 ~ 7.2A

\* Output Voltage Accuracy = ±(Maximum of Output Voltage - Minimum of Output Voltage) / 2

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

### 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°C

入力電圧 : 36 ~ 76V

負荷電流 : 0 ~ 7.2A

\* 定電圧精度(変動値) = ±(出力電圧の最高値 - 出力電圧の最低値) / 2

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

### 2. Values

Item	Temperature [°C]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	36	0	28.012	±121	±0.4
Minimum Voltage	100	76	0	27.771		



Model	CBS2004828	
Item	Condense 結露特性	Testing Circuitry      Figure A
Object	+28V7.2A	

### 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]	28.016	Input Volt.:48V, Load Current.:7.2A
Line Regulation [mV]	1	Input Volt.:36~76V, Load Current.:7.2A
Load Regulation [mV]	1	Input Volt.:48V, Load Current.:0~7.2A



Model	CBS2004828			Temperature Testing Circuitry 25°C Figure B					
Item	Line Noise Tolerance 入力雑音耐量								
Object	+28V7.2A								
1. Conditions									
<ul style="list-style-type: none"> <li>• Input Voltage : 48 V</li> <li>• Pulse Input Duration : 1 min. or more</li> <li>• Pulse Voltage : 2000 V</li> <li>• Load : 100 %</li> <li>• Pulse Cycle : 16.7 ms</li> </ul>									
2. Results									
Pulse Width [ns]	MODE		No protection failure should occur 保護回路の誤動作がない	DC-like Regulation of Output Voltage 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					

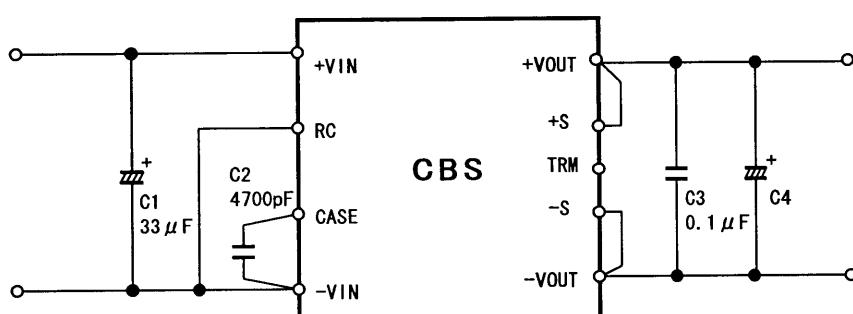
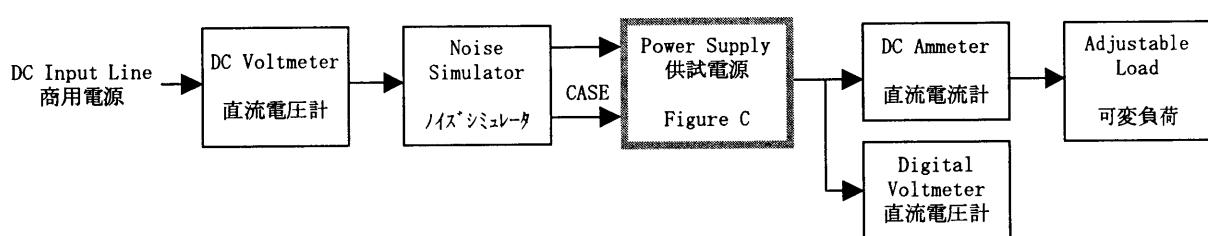
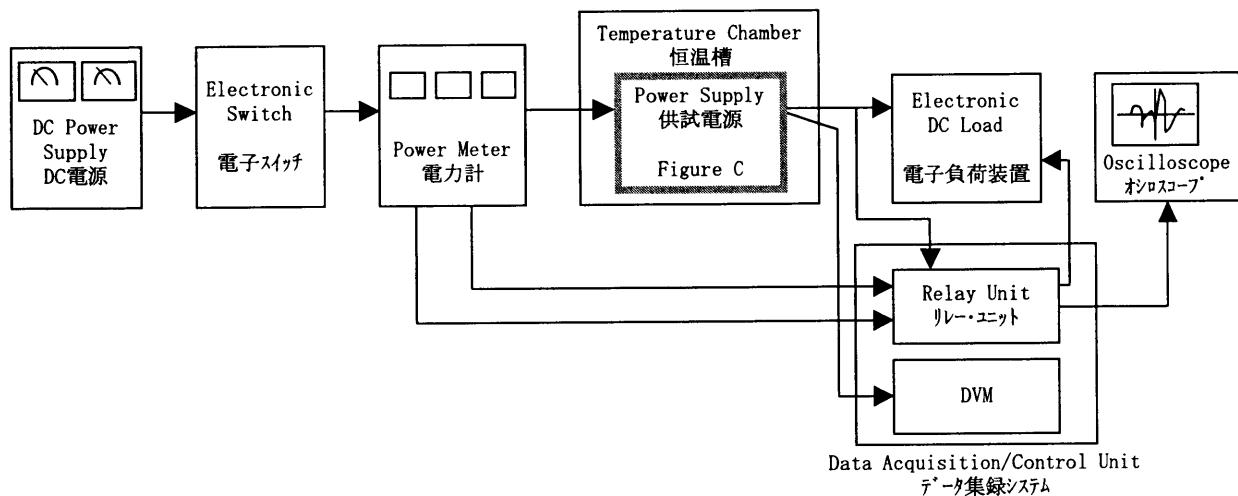


Figure C

C1 : 100V 33  $\mu$ F

C2 : 4700pF

C3 : 50V 0.1  $\mu$ F(-40°C  $\leq$  T<sub>B</sub>  $\leq$  -20°C)

C4 : CBS2004803, 05	10V 2200 $\mu$ F $\times$ 2
CBS2004812, 15	25V 1000 $\mu$ F $\times$ 2
CBS2004824, 28	35V 470 $\mu$ F $\times$ 2

(-20°C < T<sub>B</sub>  $\leq$  100°C)

C4 : CBS2004803, 05	10V 2200 $\mu$ F
CBS2004812, 15	25V 1000 $\mu$ F
CBS2004824, 28	35V 470 $\mu$ F

T<sub>B</sub>: Base Plate Temp.