



TEST DATA OF ZUS60512

(5.0V INPUT)

Regulated DC Power Supply

Date : Sep. 23. 1996

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コーセル株式会社
COSEL CO., LTD.

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Model		ZUS60512	Temperature		25℃																																							
Item		Line Regulation 静的入力変動	Testing Circuitry		Figure A																																							
Object		+12V0.5A																																										
1. Graph			2. Values																																									
<div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div> <div><div><div>Output Voltage [V]</div><div><div><div>12.23</div><div>12.19</div><div>12.15</div><div>12.11</div><div>12.07</div><div>12.03</div><div>11.99</div><div>0</div></div><div><div>0</div><div>5</div><div>7</div><div>9</div><div>11</div></div><div>Input Voltage [V]</div></div></div></div>			<table><tr><th>Input Voltage [V]</th><th>Load 50% Output Volt. [V]</th><th>Load 100% Output Volt. [V]</th></tr><tr><td>4.0</td><td>12.086</td><td>12.085</td></tr><tr><td>4.5</td><td>12.086</td><td>12.085</td></tr><tr><td>5.0</td><td>12.087</td><td>12.085</td></tr><tr><td>6.0</td><td>12.087</td><td>12.085</td></tr><tr><td>7.0</td><td>12.087</td><td>12.085</td></tr><tr><td>8.0</td><td>12.087</td><td>12.085</td></tr><tr><td>9.0</td><td>12.087</td><td>12.084</td></tr><tr><td>9.5</td><td>12.086</td><td>12.084</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>			Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]	4.0	12.086	12.085	4.5	12.086	12.085	5.0	12.087	12.085	6.0	12.087	12.085	7.0	12.087	12.085	8.0	12.087	12.085	9.0	12.087	12.084	9.5	12.086	12.084	—	—	—	—	—	—	—	—	—	—	—	—
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<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>																																												

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Model

ZUS60512

Item

Efficiency 効率

Temperature

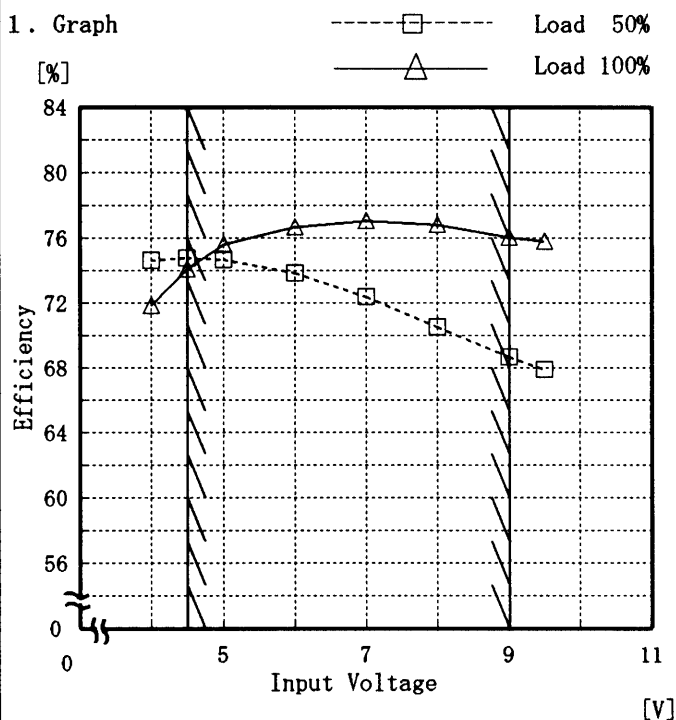
25°C

Testing Circuitry

Figure A

Object

1. Graph



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。

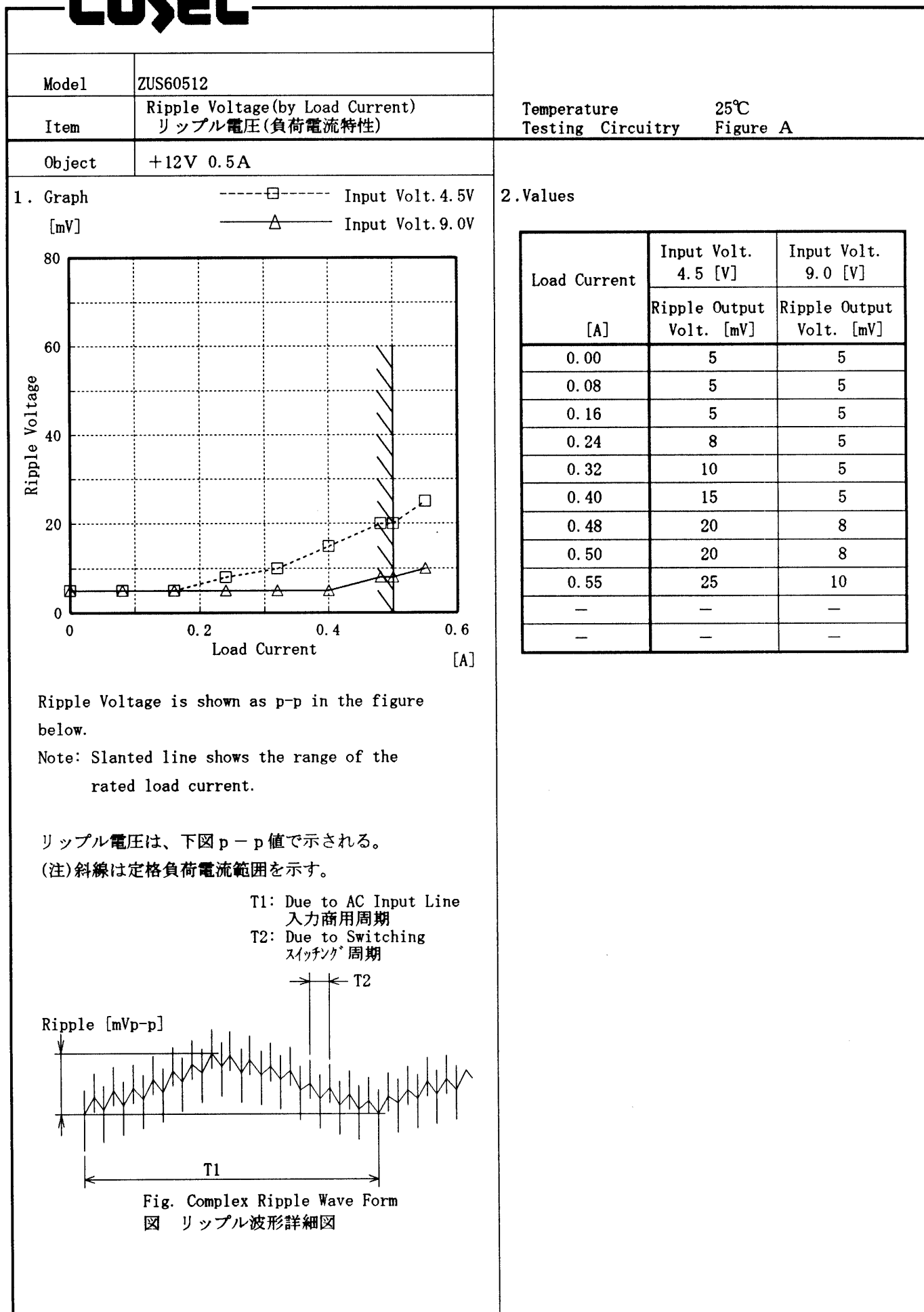
2. Values

Input Voltage [V]	Load 50%	Load 100%
	Efficiency [%]	Efficiency [%]
4.0	74.6	71.8
4.5	74.8	74.1
5.0	74.7	75.6
6.0	73.9	76.7
7.0	72.4	77.1
8.0	70.5	76.8
9.0	68.7	76.1
9.5	67.9	75.8
—	—	—
—	—	—
—	—	—
—	—	—

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Model		ZUS60512		Temperature		25℃																																																
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<div><div><div>—△—</div><div>---□---</div><div>---○---</div></div><div><div>Input Volt. 4.5V</div><div>Input Volt. 5.0V</div><div>Input Volt. 9.0V</div></div></div> <div><div>[V]</div><div>12.23</div><div>12.19</div><div>12.15</div><div>12.11</div><div>12.07</div><div>12.03</div><div>11.99</div><div>0</div></div> <div><div>Output Voltage</div></div> <div><div>0</div><div>0.2</div><div>0.4</div><div>0.6</div></div> <div><div>Load Current</div></div> <div><div>[A]</div></div> <div><div>Note: Slanted line shows the range of the rated load current.</div><div>(注)斜線は定格負荷電流範囲を示す。</div></div> <table><tr><th rowspan="2">Load Current</th><th>Input Volt.</th><th>Input Volt.</th><th>Input Volt.</th></tr><tr><th>4.5[V]</th><th>5.0[V]</th><th>9.0[V]</th></tr><tr><th>[A]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>0.00</td><td>12.089</td><td>12.090</td><td>12.091</td></tr><tr><td>0.08</td><td>12.088</td><td>12.088</td><td>12.088</td></tr><tr><td>0.16</td><td>12.087</td><td>12.087</td><td>12.087</td></tr><tr><td>0.24</td><td>12.087</td><td>12.087</td><td>12.087</td></tr><tr><td>0.32</td><td>12.086</td><td>12.086</td><td>12.086</td></tr><tr><td>0.40</td><td>12.086</td><td>12.086</td><td>12.086</td></tr><tr><td>0.48</td><td>12.085</td><td>12.085</td><td>12.085</td></tr><tr><td>0.50</td><td>12.085</td><td>12.085</td><td>12.085</td></tr><tr><td>0.55</td><td>12.085</td><td>12.085</td><td>12.085</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table>				Load Current	Input Volt.	Input Volt.	Input Volt.	4.5[V]	5.0[V]	9.0[V]	[A]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	0.00	12.089	12.090	12.091	0.08	12.088	12.088	12.088	0.16	12.087	12.087	12.087	0.24	12.087	12.087	12.087	0.32	12.086	12.086	12.086	0.40	12.086	12.086	12.086	0.48	12.085	12.085	12.085	0.50	12.085	12.085	12.085	0.55	12.085	12.085	12.085	—	—	—	—
Load Current	Input Volt.	Input Volt.	Input Volt.																																																			
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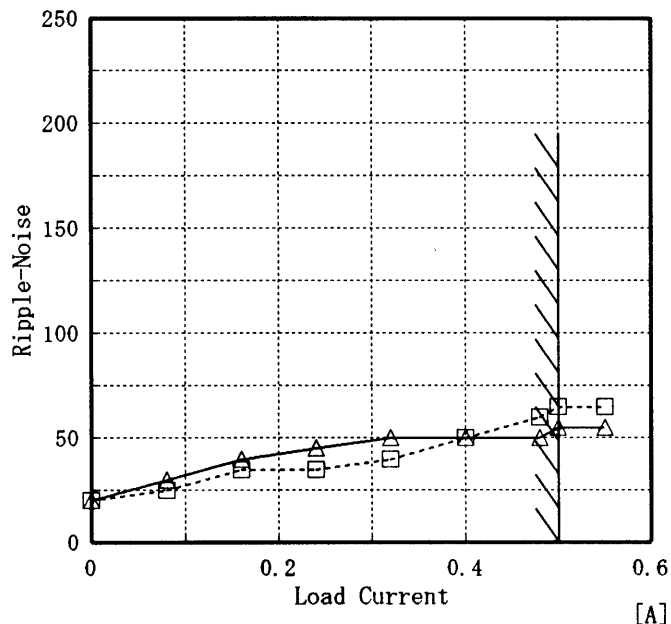


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Model ZUS60512

Item Ripple-Noise リップルノイズ

Object +12V0.5A

Temperature 25℃
Testing Circuitry Figure A1. Graph
[mV] ---□--- Input Volt. 4.5V
 ---△--- Input Volt. 9.0V

Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.

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。

T1: Due to AC Input Line
入力商用周期
T2: Due to Switching
スイッチング周期

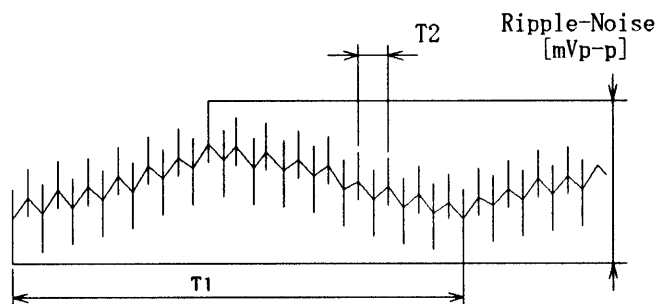


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.00	20	20
0.08	25	30
0.16	35	40
0.24	35	45
0.32	40	50
0.40	50	50
0.48	60	50
0.50	65	55
0.55	65	55
—	—	—
—	—	—

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Model

ZUS60512

Item

Overcurrent Protection
過電流保護

Object

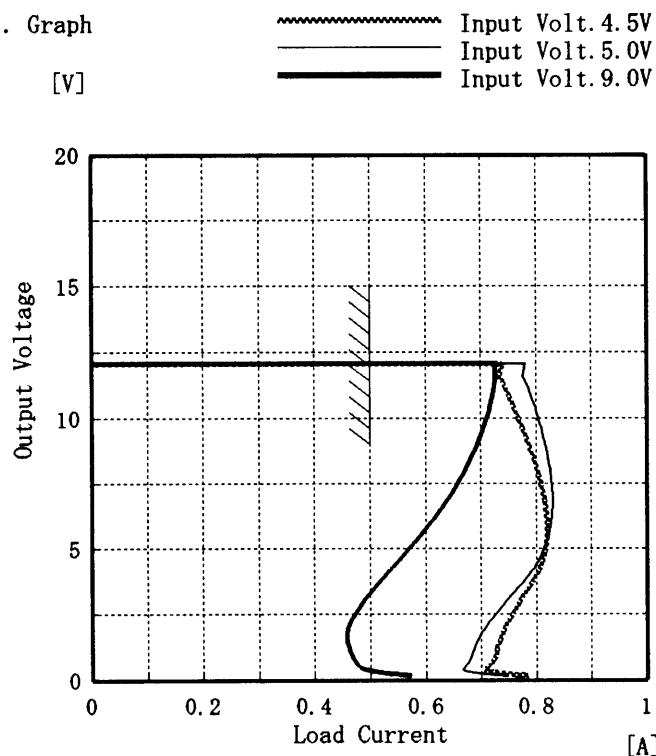
+12V0.5A

Temperature

25°C

Testing Circuitry Figure A

1. Graph



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

Output Voltage [V]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Load Current [A]	Load Current [A]	Load Current [A]
12.00	0.73	0.78	0.73
11.40	0.74	0.78	0.73
10.80	0.75	0.79	0.72
9.60	0.77	0.81	0.70
8.40	0.80	0.82	0.68
7.20	0.81	0.83	0.65
6.00	0.82	0.83	0.61
4.80	0.82	0.81	0.57
3.60	0.79	0.77	0.51
2.40	0.75	0.72	0.47
1.20	0.73	0.69	0.46
0.00	0.84	0.80	0.62

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Model	ZUS60512	Temperature 25°C Testing Circuitry Figure A
Item	Dynamic Load Responce 動的負荷変動	
Object	+12V0.5A	

Input Volt. 5.0 V

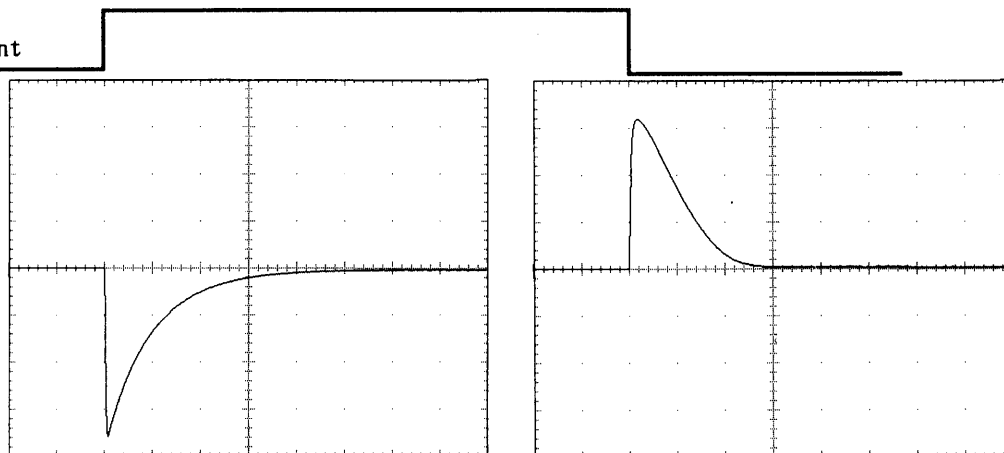
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

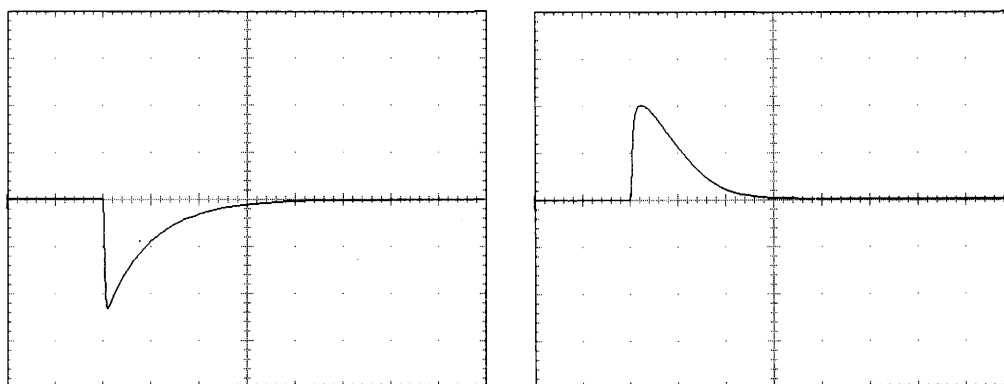
200 mV/div



Min. Load ↔

Load 50 %

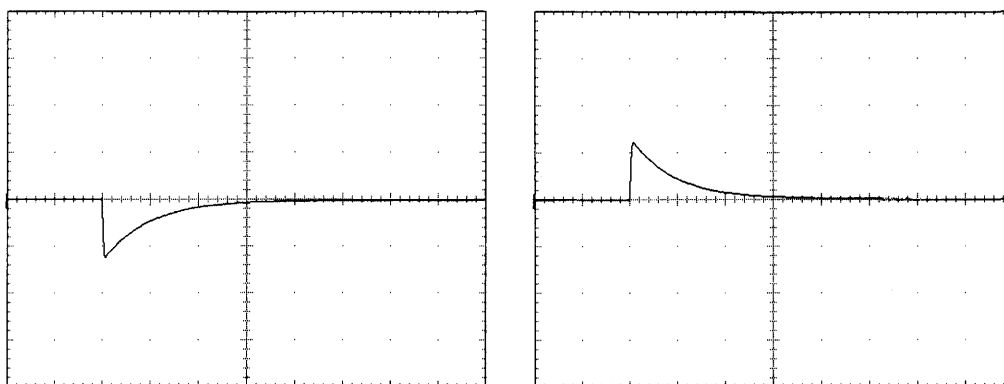
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



1 mS/div

COSEL

Model ZUS60512

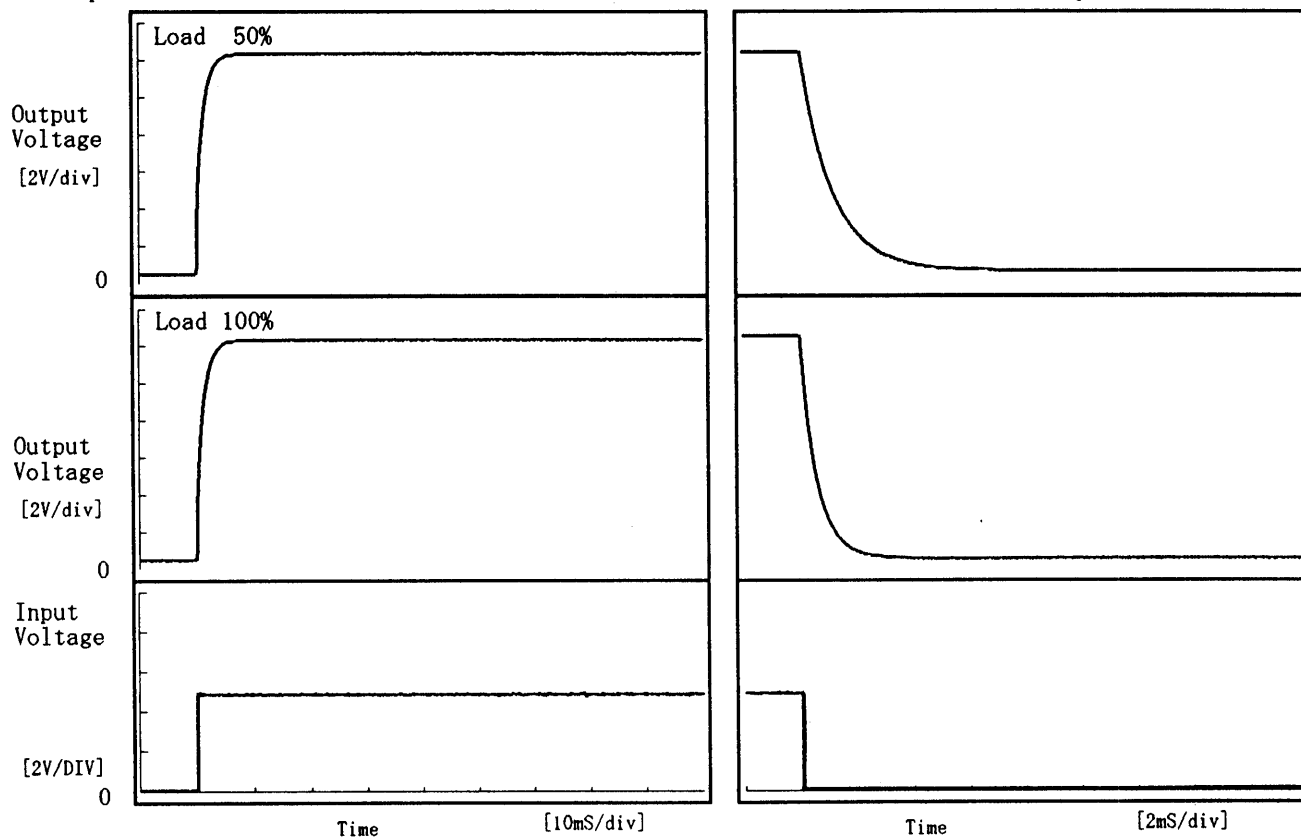
Item Rise and Fall Time 立上り、立下り時間

Temperature 25°C
Testing Circuitry Figure A

Object +12V0.5A

1. Graph

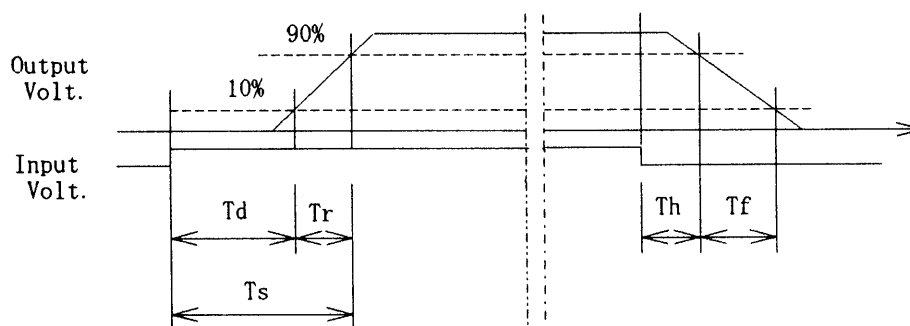
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	2.45	2.55	0.17	2.93
100 %	0.10	2.50	2.60	0.09	1.40



COSEL

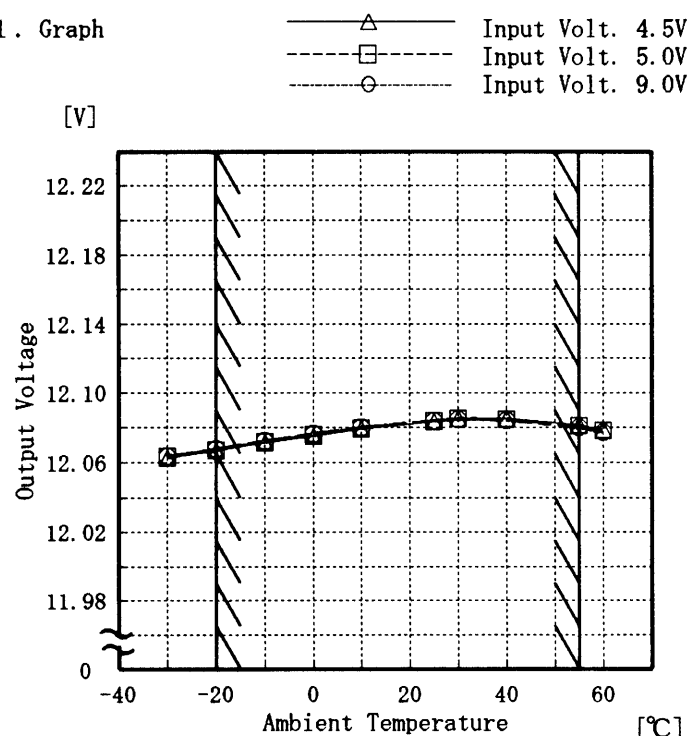
Model ZUS60512

Item Ambient Temperature Drift
周囲温度変動

Object +12V0.5A

Testing Circuitry Figure A

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。

2. Values

Temperature [°C]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]
-30	12.063	12.063	12.064
-20	12.067	12.068	12.068
-10	12.071	12.072	12.072
0	12.075	12.076	12.076
10	12.079	12.080	12.080
25	12.083	12.084	12.084
30	12.085	12.085	12.085
40	12.085	12.085	12.084
55	12.082	12.081	12.080
60	12.079	12.078	12.077
—	—	—	—

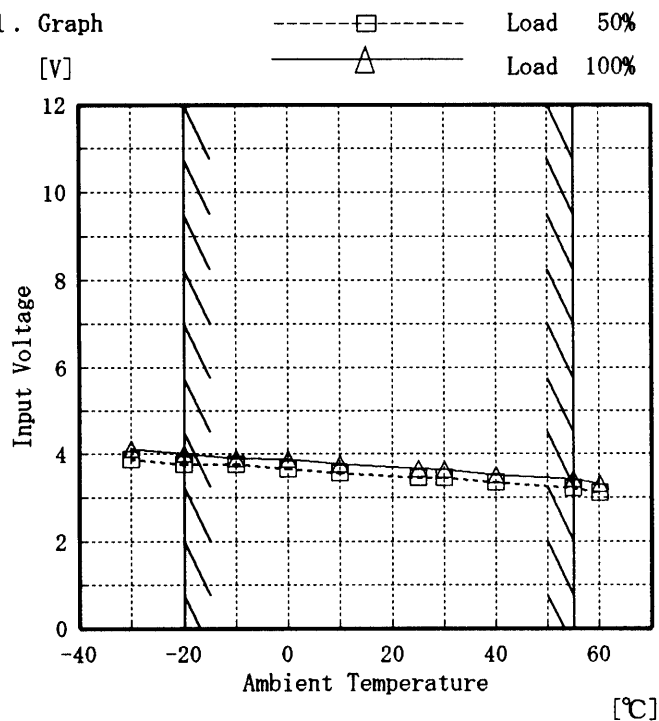
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Model ZUS60512

Item Minimum Input Voltage for Regulated Output Voltage
最低レギュレーション電圧

Object +12V0.5A

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 Temp. [°C]	Load 50%	Load 100%
	Input Volt. [V]	Input Volt. [V]
-30	3.9	4.1
-20	3.8	4.0
-10	3.8	3.9
0	3.7	3.9
10	3.6	3.8
25	3.5	3.7
30	3.5	3.6
40	3.3	3.5
55	3.2	3.4
60	3.1	3.3
—	—	—

COSEL

Model

ZUS60512

Item

Ripple Voltage (by Ambient Temp.)
リップル電圧 (周囲温度特性)

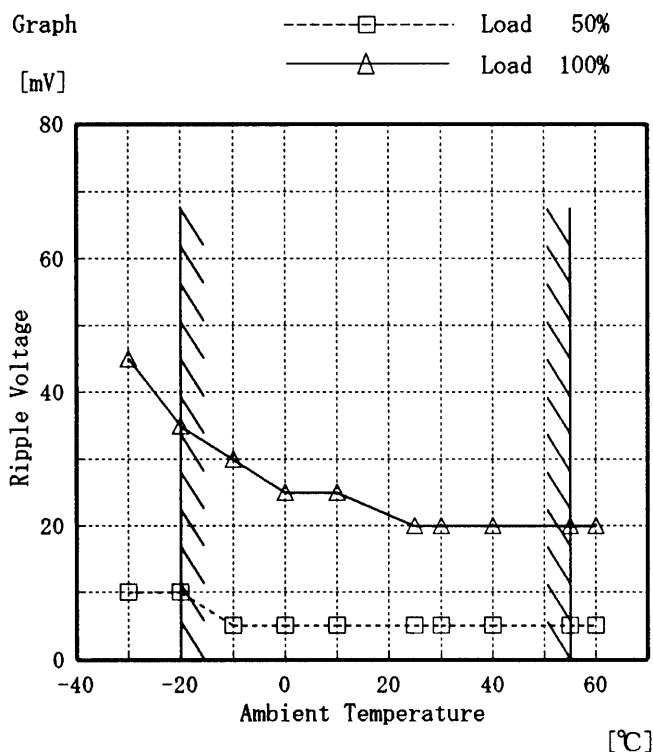
Object

+12V0.5A

Testing Circuitry

Figure A

1. Graph



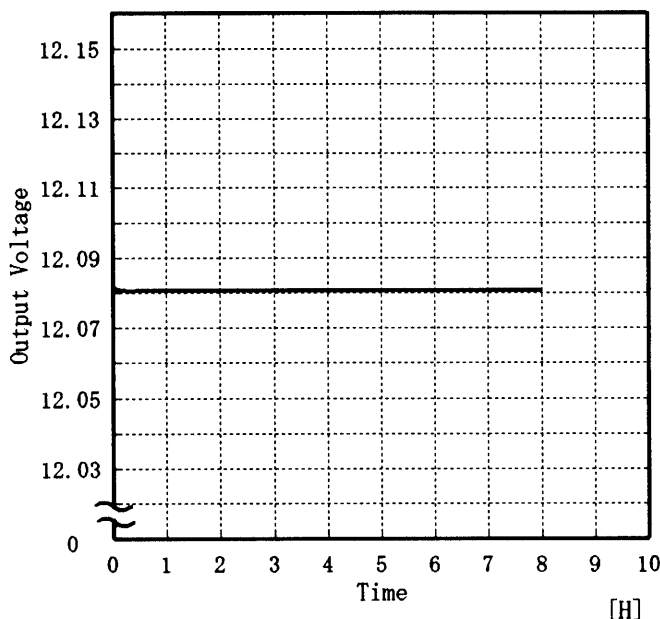
Note: Slanted line shows the range of the rated ambient temperature.

(注) 斜線は定格周囲温度範囲を示す。

2. Values

Ambient Temp. [°C]	Load 50%	Load 100%
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
-30	10	45
-20	10	35
-10	5	30
0	5	25
10	5	25
25	5	20
30	5	20
40	5	20
55	5	20
60	5	20
—	—	—

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COSEL																									
Model	ZUS60512																								
Item	Time Lapse Drift 経時ドリフト	Temperature	25 ℃																						
		Testing Circuitry	Figure A																						
Object	+12V0.5A																								
1. Graph		2.Values																							
<p>[V]</p>  <p>Output Voltage</p> <p>Time [H]</p> <p>Input Volt. 5V</p> <p>Load 100%</p>		<table><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr><tr><td>0.0</td><td>12.082</td></tr><tr><td>0.5</td><td>12.081</td></tr><tr><td>1.0</td><td>12.081</td></tr><tr><td>2.0</td><td>12.081</td></tr><tr><td>3.0</td><td>12.081</td></tr><tr><td>4.0</td><td>12.081</td></tr><tr><td>5.0</td><td>12.081</td></tr><tr><td>6.0</td><td>12.081</td></tr><tr><td>7.0</td><td>12.081</td></tr><tr><td>8.0</td><td>12.081</td></tr></table>		Time since start [H]	Output Voltage [V]	0.0	12.082	0.5	12.081	1.0	12.081	2.0	12.081	3.0	12.081	4.0	12.081	5.0	12.081	6.0	12.081	7.0	12.081	8.0	12.081
Time since start [H]	Output Voltage [V]																								
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6.0	12.081																								
7.0	12.081																								
8.0	12.081																								

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Model	ZUS60512	Testing Circuitry Figure A
Item	Output Voltage Accuracy 定電圧精度	
Object	+12V0.5A	

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 : -20~55 °C

Input Voltage : 4.5~9.0 V

Load Current : 0.0~0.5 A

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

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

定電圧精度

周囲温度、入力電圧、負荷を下記仕様内で、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 : -20~55 °C

入力電圧 : 4.5~9.0 V

負荷電流 : 0.0~0.5 A

* 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) = $\frac{\text{変動値}}{\text{定格出力電圧}} \times 100$

Item	Temperature [°C]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ratio) [%]
Maximum Voltage	25	9.0	0.0	12.090	±11	±0.1
Minimum Voltage	-20	4.5	0.5	12.068		

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Model	ZUS60512	Testing Circuitry Figure A
Item	Condensation 結露特性	
Object	+12V 0.5A	

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 26°C and the humidity is 40%RH.
- ③ Testing electrical characteristics of the unit to confirm there be no fault.
- ④ Repeating ①, ② and ③ three times.

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 26°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3度行い、異常のないことを確認する。

2. Values

	Times	Output Voltage [V]	Ripple Voltage [mV]	Ripple Noise [mV]
Load 50 %	1	11.818	5	35
	2	11.820	5	45
	3	11.821	5	45
Load 100 %	1	11.817	15	65
	2	11.821	20	65
	3	11.819	20	70

Input Volt. 5.0 V

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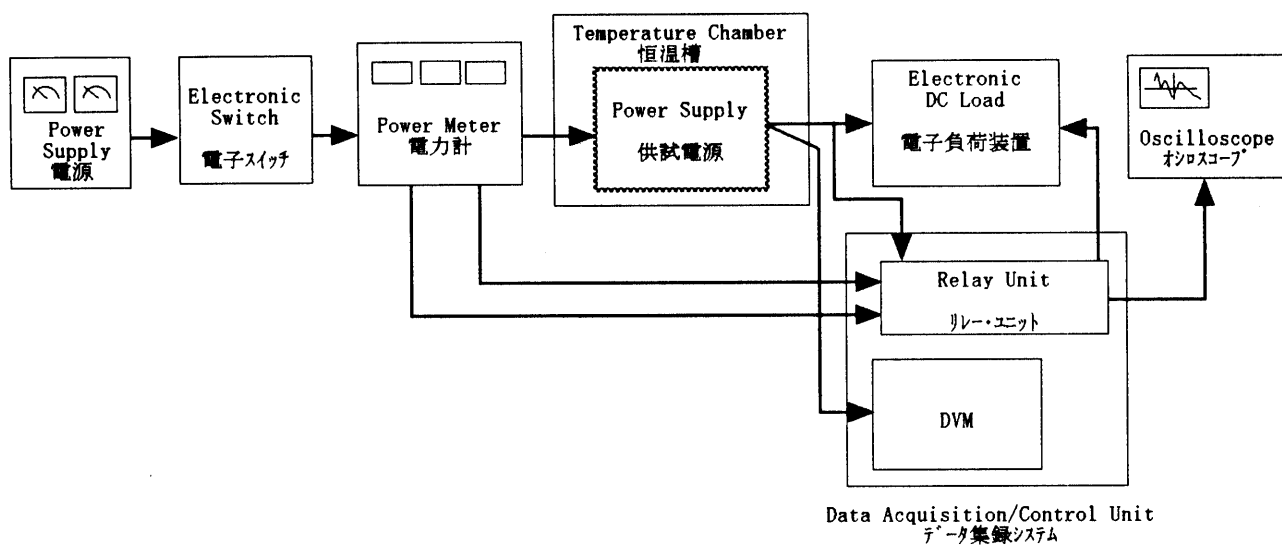


Figure A