



TEST DATA OF ZUW1R50512

(5.0V INPUT)

Regulated DC Power Supply

Date : June 14. 1996

Approved by : T. Sugimori
Design Manager

Prepared by : K. Shimano
Design Engineer

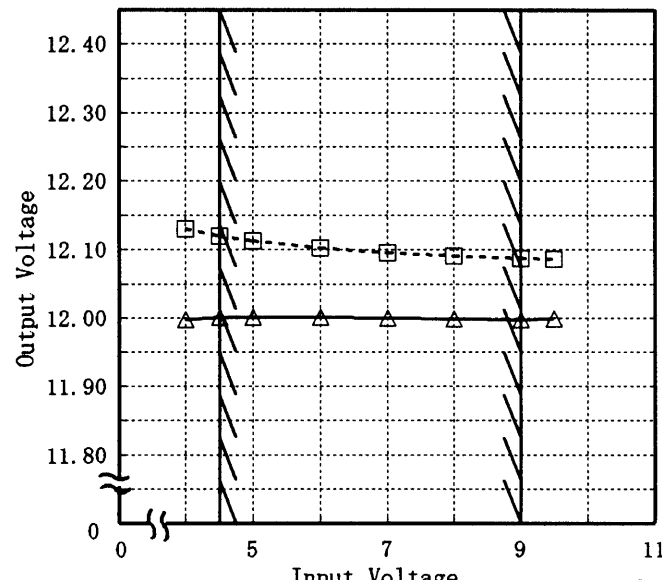
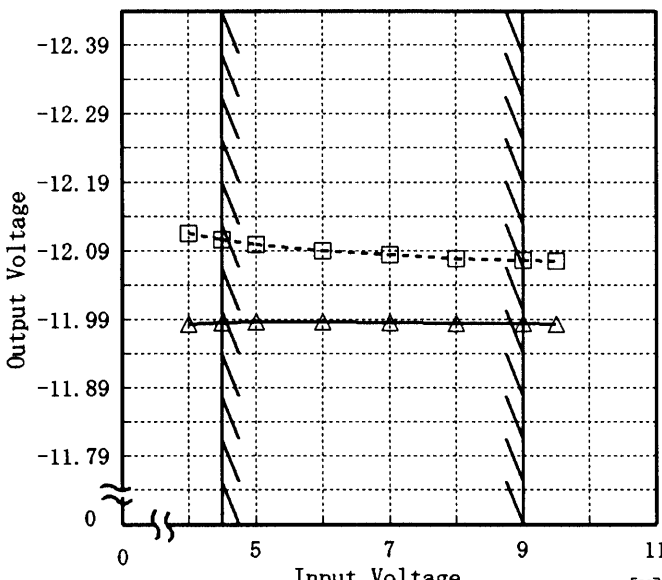
コーセル株式会社
COSEL CO., LTD.

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Model		ZUW1R50512																																								
Item		Line Regulation 静的入力変動																																								
Object		+12V0.065A																																								
1. Graph		-----□----- Load 50% -----△----- Load 100%																																								
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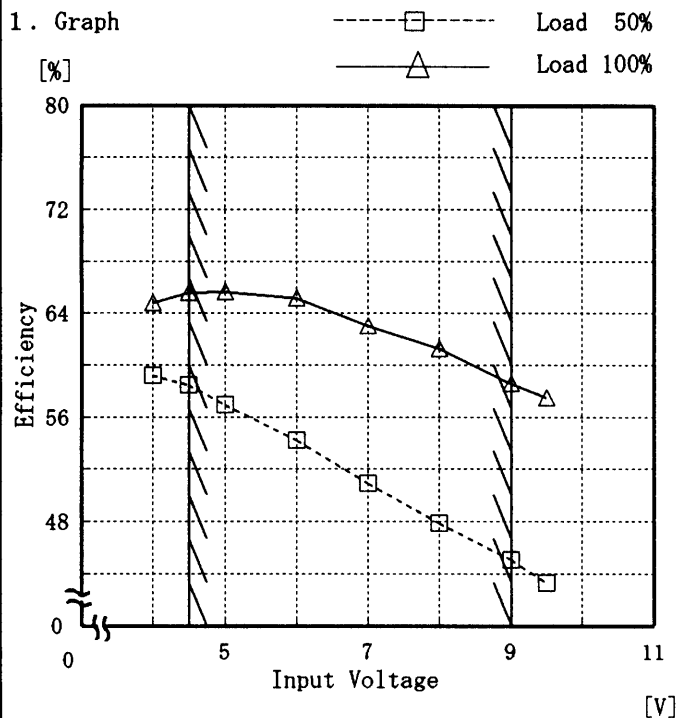
Model ZUW1R50512

Item Efficiency 効率

Object

Temperature 25°C
Testing Circuitry Figure A

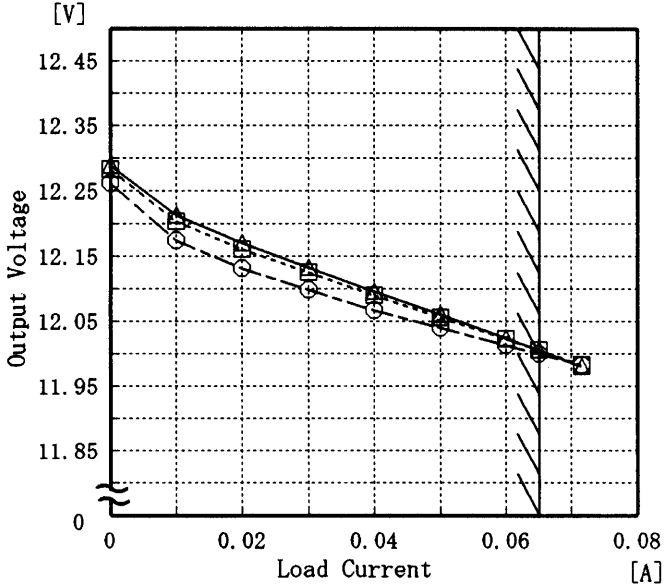
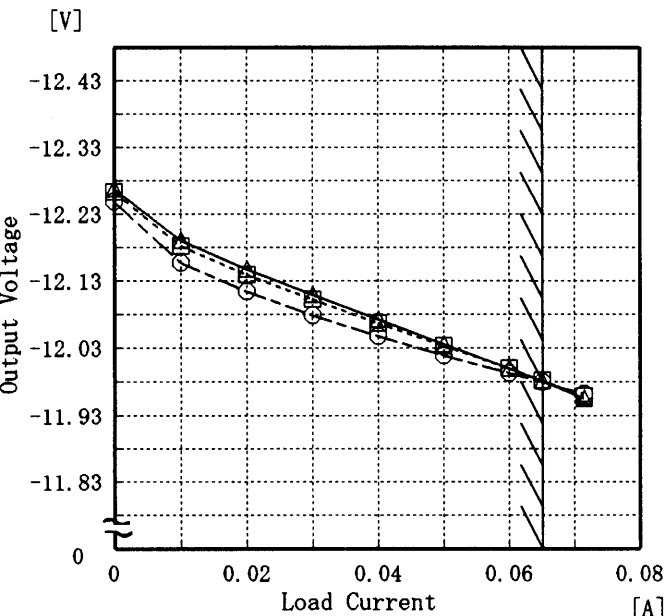
1. Graph



2. Values

Input Voltage [V]	Load 50%	Load 100%
	Efficiency [%]	Efficiency [%]
4.0	59.2	64.8
4.5	58.5	65.6
5.0	57.0	65.7
6.0	54.2	65.2
7.0	50.9	63.1
8.0	47.9	61.3
9.0	45.0	58.6
9.5	43.3	57.5
—	—	—
—	—	—
—	—	—
—	—	—

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Model	ZUW1R50512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12V 0.065A

Temperature	25℃
Testing Circuitry	Figure A

1. Graph

-----□-----

Input Volt. 4.5V

-----△-----

Input Volt. 9.0V

[mV]

100

80

60

40

20

0

0

0.02

0.04

0.06

0.08

Load Current

[A]

2.Values

Load Current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.000	8	8
0.010	10	8
0.020	12	10
0.030	14	10
0.040	16	10
0.060	20	10
0.065	28	12
0.072	30	12
—	—	—
—	—	—
—	—	—

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。

T1: Due to AC Input Line
入力商用周期

T2: Due to Switching
スイッチング周期

← T2

← T1

Ripple [mVp-p]

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

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Model		ZUW1R50512	
Item		Ripple Voltage (by Load Current) リップル電圧 (負荷電流特性)	
Object		-12V 0.065A	

1. Graph

-----□----- Input Volt. 4.5V

-----△----- Input Volt. 9.0V

[mV]

100

80

60

40

20

0

Ripple Voltage

0

0.02

0.04

0.06

0.08

Load Current

[A]

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。

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T1: Due to AC Input Line
入力商用周期

T2: Due to Switching
スイッチング周期

→

←

T2

Ripple [mVp-p]

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↓

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COSEL

Model		ZUW1R50512	
Item		Ripple-Noise リップルノイズ	
Object		+12V0.065A	

1. Graph

-----□-----

Input Volt. 4.5V

-----△-----

Input Volt. 9.0V

[mV]

120

100

80

60

40

20

0

Ripple-Noise

0

0.02

0.04

0.06

0.08

[A]

0

0.02

0.04

0.06

0.08

0

20

40

60

80

100

120

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

T2

Ripple-Noise
[mVp-p]

T1

Fig. Complex Ripple Wave Form

図 リップル波形詳細図

Load current	Input Volt.	Input Volt.
	4.5 [V]	9.0 [V]
[A]	Ripple-Noise	Ripple-Noise
	[mV]	[mV]
0.000	10	10
0.010	13	10
0.020	14	12
0.030	15	12
0.040	18	12
0.060	24	14
0.065	30	15
0.072	35	16
—	—	—
—	—	—
—	—	—

2. Values

COSEL

Model ZUW1R50512

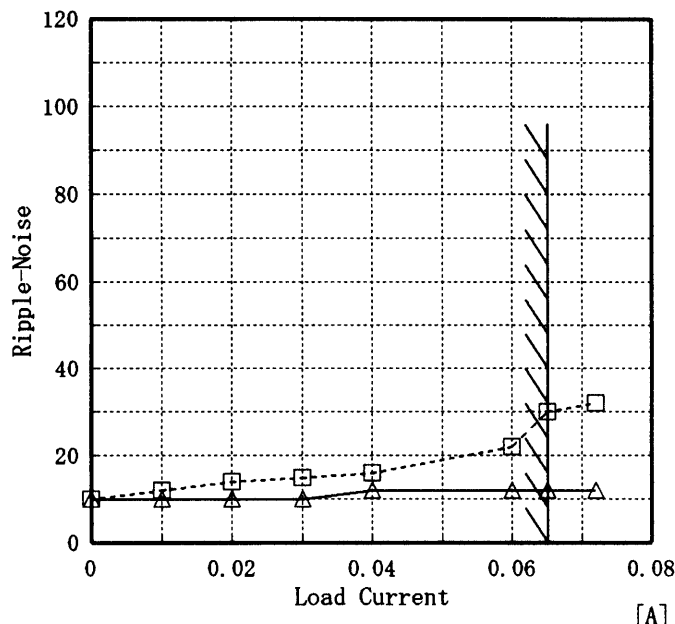
Item Ripple-Noise リップルノイズ

Object -12V0.065A

Temperature 25°C
Testing Circuitry Figure A

1. 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。

2. Values

Load current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple-Noise [mV]	Ripple-Noise [mV]
0.000	10	10
0.010	12	10
0.020	14	10
0.030	15	10
0.040	16	12
0.060	22	12
0.065	30	12
0.072	32	12
—	—	—
—	—	—
—	—	—

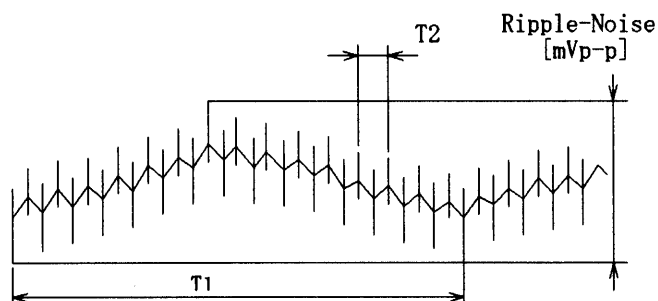
T1: Due to AC Input Line
入力商用周期T2: Due to Switching
スイッチング周期

Fig. Complex Ripple Wave Form

図 リップル波形詳細図

COSEL

Model		ZUW1R50512	
Item		Overcurrent Protection 過電流保護	
Object		+12V0.065A	

1. Graph

[V]

20.0

15.0

10.0

5.0

0.0

0

0.1

0.2

0.3

0.4

Load Current

[A]

~~~~~ Input Volt. 4.5 V

\_\_\_\_\_ Input Volt. 5.0 V

\_\_\_\_\_ Input Volt. 9.0 V

2. Values

| Output Voltage [V] | Input Volt. 4.5[V] | Input Volt. 5.0[V] | Input Volt. 9.0[V] |
|--------------------|--------------------|--------------------|--------------------|
|                    | Load Curr-ent [A]  | Load Curr-ent [A]  | Load Curr-ent [A]  |
| 12.00              | 0.073              | 0.056              | 0.052              |
| 11.40              | 0.129              | 0.132              | 0.120              |
| 10.80              | 0.135              | 0.139              | 0.124              |
| 9.60               | 0.150              | 0.151              | 0.132              |
| 8.40               | 0.165              | 0.165              | 0.140              |
| 7.20               | 0.178              | 0.177              | 0.147              |
| 6.00               | 0.194              | 0.190              | 0.153              |
| 4.80               | 0.207              | 0.200              | 0.157              |
| 3.60               | 0.219              | 0.208              | 0.161              |
| 2.40               | 0.230              | 0.215              | 0.165              |
| 1.20               | 0.244              | 0.225              | 0.175              |
| 0.00               | 0.295              | 0.274              | 0.175              |

|        |  |            |  |
|--------|--|------------|--|
| Object |  | -12V0.065A |  |
|--------|--|------------|--|

1. Graph

[V]

-20.0

-15.0

-10.0

-5.0

0.0

0

0.1

0.2

0.3

0.4

Load Current

[A]

~~~~~ Input Volt. 4.5 V

_____ Input Volt. 5.0 V

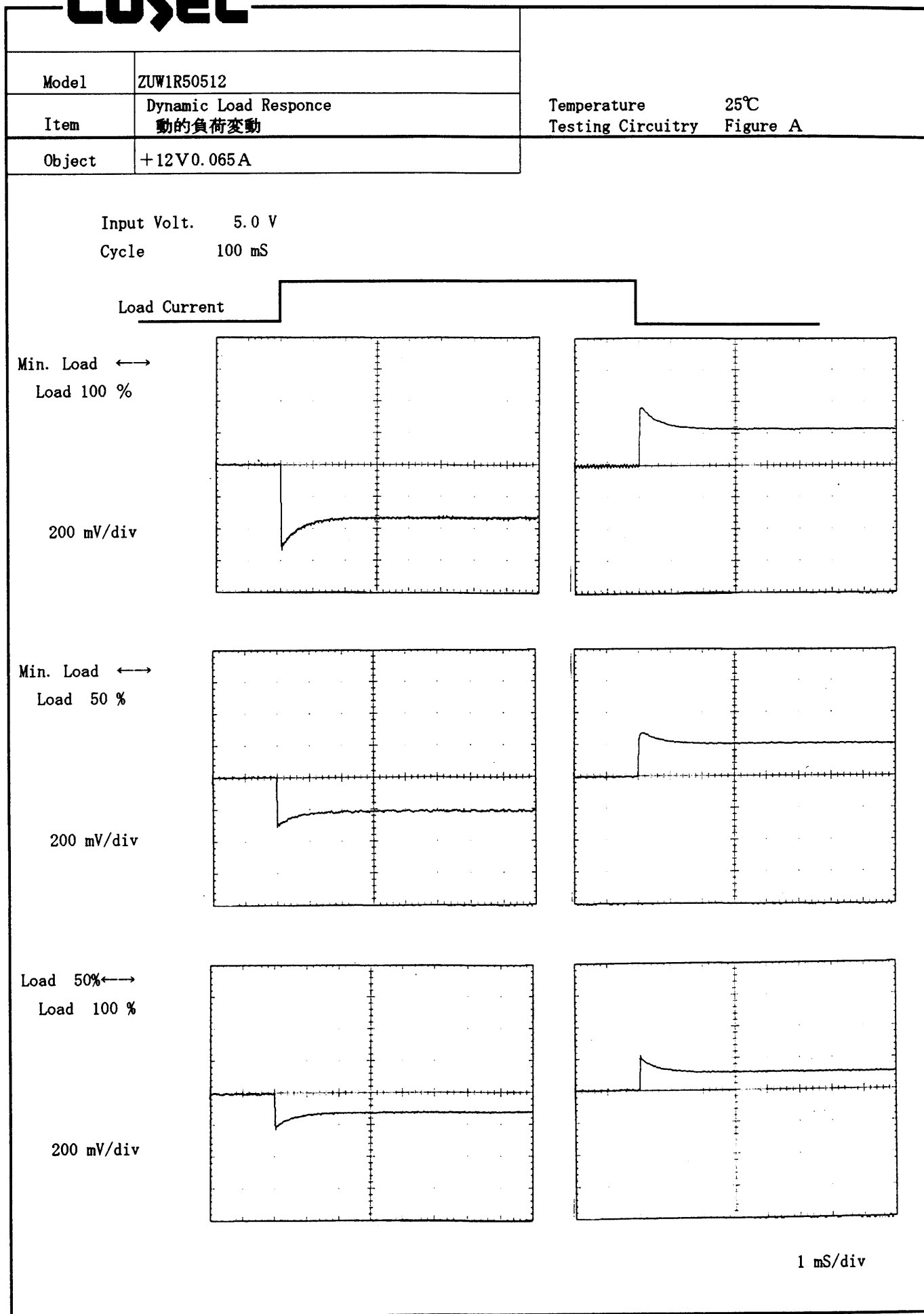
_____ Input Volt. 9.0 V

2. Values

| Output Voltage [V] | Input Volt. 4.5[V] | Input Volt. 5.0[V] | Input Volt. 9.0[V] |
|--------------------|--------------------|--------------------|--------------------|
| | Load Curr-ent [A] | Load Curr-ent [A] | Load Curr-ent [A] |
| -12.00 | 0.081 | 0.084 | 0.091 |
| -11.40 | 0.132 | 0.135 | 0.123 |
| -10.80 | 0.138 | 0.141 | 0.127 |
| -9.60 | 0.152 | 0.154 | 0.135 |
| -8.40 | 0.167 | 0.168 | 0.144 |
| -7.20 | 0.183 | 0.181 | 0.151 |
| -6.00 | 0.197 | 0.194 | 0.158 |
| -4.80 | 0.212 | 0.205 | 0.162 |
| -3.60 | 0.225 | 0.214 | 0.166 |
| -2.40 | 0.237 | 0.222 | 0.170 |
| -1.20 | 0.253 | 0.233 | 0.182 |
| 0.00 | 0.300 | 0.277 | 0.193 |

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

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| | | | |
|--------|---------------------------------|-------------------|----------|
| Model | ZUW1R50512 | Temperature | 25°C |
| Item | Dynamic Load Responce
動的負荷変動 | Testing Circuitry | Figure A |
| Object | -12V 0.065A | | |

Input Volt. 5.0 V

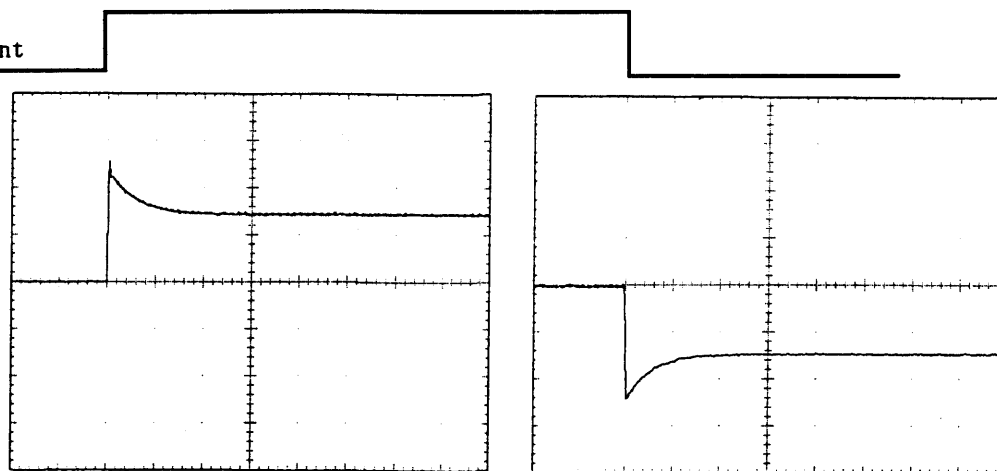
Cycle 100 mS

Load Current

Min. Load ↔

Load 100 %

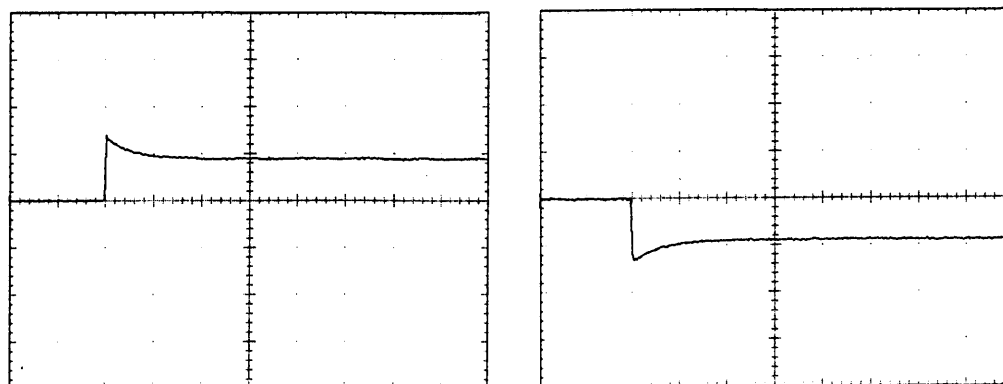
200 mV/div



Min. Load ↔

Load 50 %

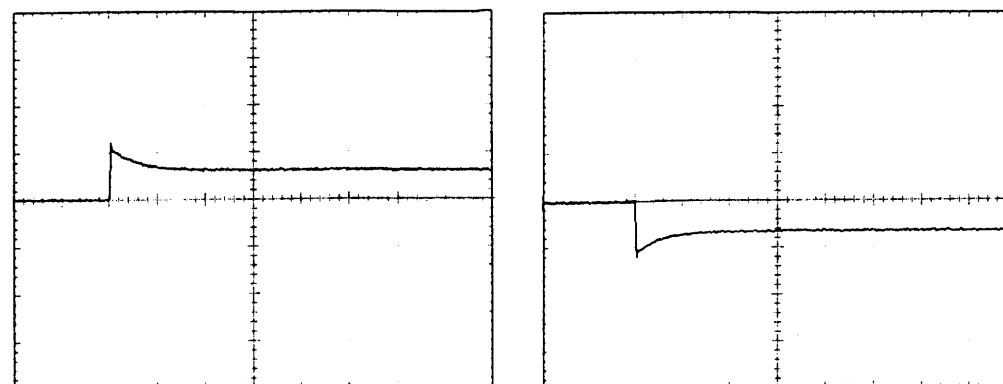
200 mV/div



Load 50% ↔

Load 100 %

200 mV/div



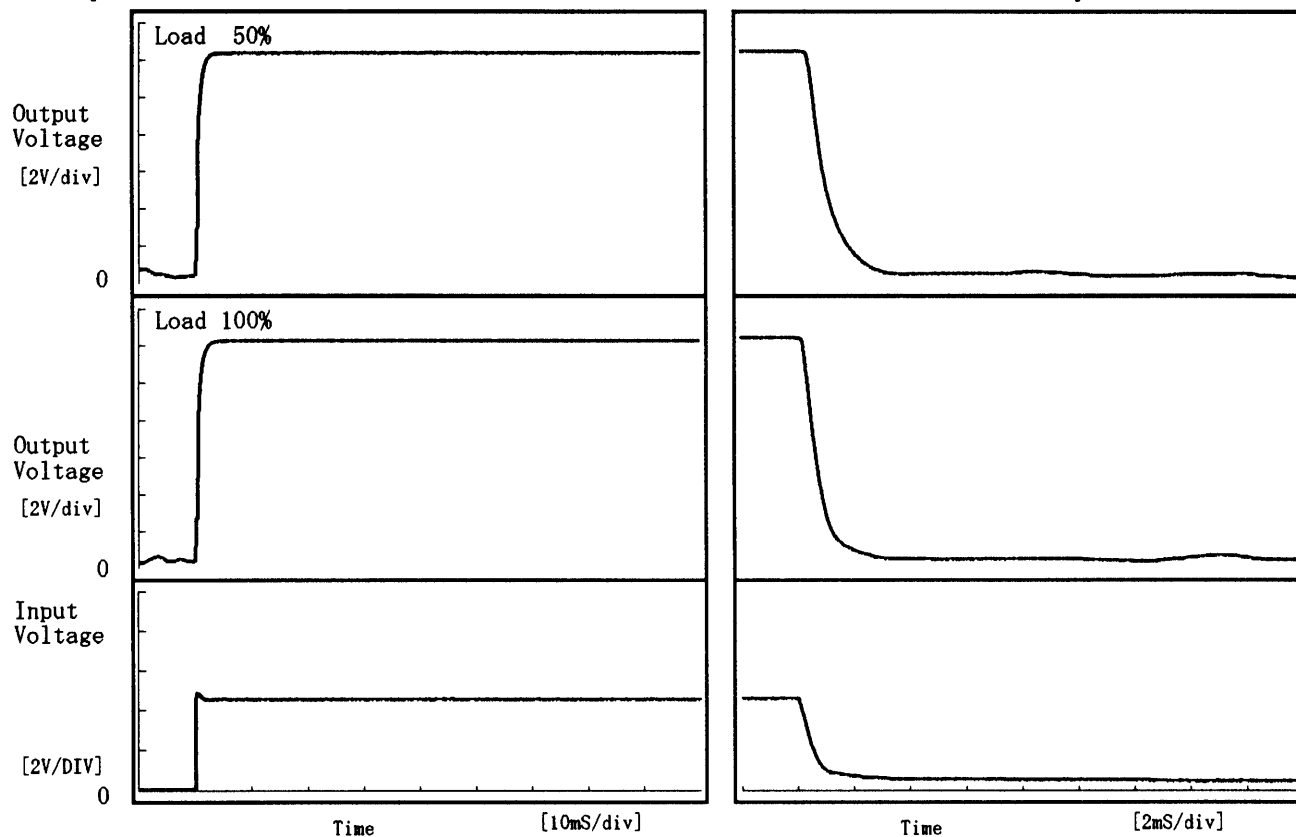
1 mS/div

COSEL

| | | | |
|--------|------------------------------|-------------------|----------|
| Model | ZUW1R50512 | Temperature | 25℃ |
| Item | Rise and Fall Time 立上り、立下り時間 | Testing Circuitry | Figure A |
| Object | +12V0.065A | | |

1. Graph

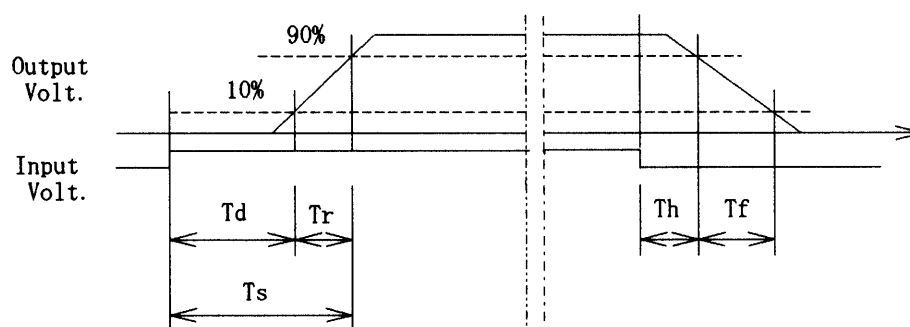
Input Volt. 4.5 V



2. Values

[mS]

| Load \ Time | T d | T r | T s | T h | T f |
|-------------|------|------|------|------|------|
| 50 % | 0.05 | 1.25 | 1.30 | 0.49 | 1.64 |
| 100 % | 0.05 | 1.30 | 1.35 | 0.30 | 1.19 |

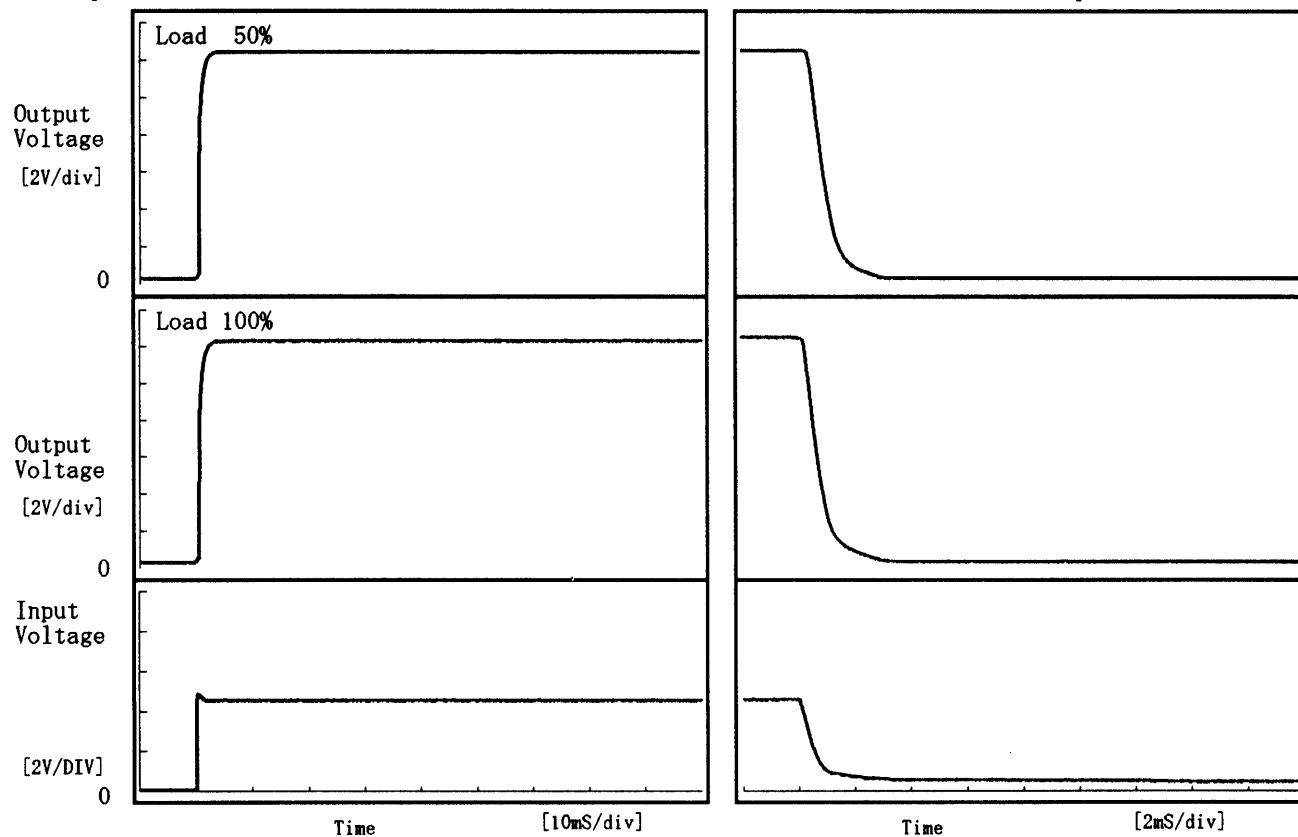


COSEL

| | | | |
|--------|------------------------------|-------------------|----------|
| Model | ZUW1R50512 | Temperature | 25℃ |
| Item | Rise and Fall Time 立上り、立下り時間 | Testing Circuitry | Figure A |
| Object | -12V0.065A | | |

1. Graph

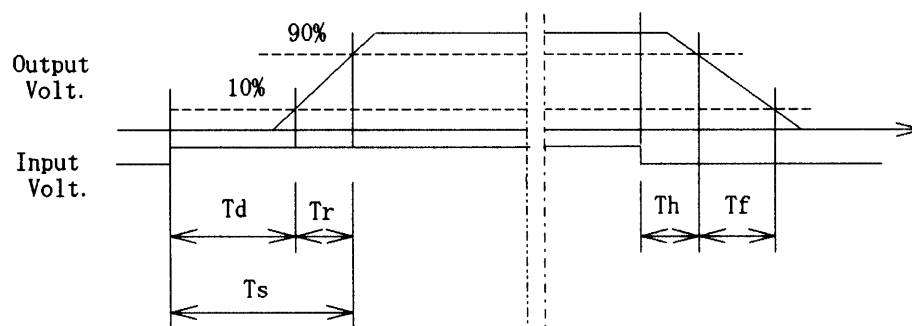
Input Volt. 4.5 V



2. Values

[mS]

| Load \ Time | T d | T r | T s | T h | T f |
|-------------|------|------|------|------|------|
| 50 % | 0.40 | 0.85 | 1.25 | 0.48 | 1.16 |
| 100 % | 0.40 | 0.90 | 1.30 | 0.30 | 1.15 |



COSEL

| Model | | ZUW1R50512 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|--|-----------------------|---|-----------------------|---------------------|-----------------------|-----------------------|-----------------------|---------------------|---------------------|---------------------|-----|---------|---------|---------|-----|---------|---------|---------|-----|---------|---------|---------|---|---------|---------|---------|----|---------|---------|---------|----|---------|---------|---------|----|---------|---------|---------|----|---------|---------|---------|----|---------|---------|---------|----|---------|---------|---------|---|---|---|---|
| Item | | Ambient Temperature Drift
周囲温度変動 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | | +12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Graph | | 2. Values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div><div>△</div><div>Input Volt. 4.5V</div></div><div><div>□</div><div>Input Volt. 5.0V</div></div><div><div>○</div><div>Input Volt. 9.0V</div></div></div> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> | | <table><tr><th rowspan="2">Temperature
[°C]</th><th>Input Volt.
4.5[V]</th><th>Input Volt.
5.0[V]</th><th>Input Volt.
9.0[V]</th></tr><tr><th>Output
Volt. [V]</th><th>Output
Volt. [V]</th><th>Output
Volt. [V]</th></tr><tr><td>-30</td><td>12.005</td><td>12.006</td><td>12.001</td></tr><tr><td>-20</td><td>12.004</td><td>12.005</td><td>12.000</td></tr><tr><td>-10</td><td>12.004</td><td>12.005</td><td>12.000</td></tr><tr><td>0</td><td>12.003</td><td>12.004</td><td>11.999</td></tr><tr><td>10</td><td>12.004</td><td>12.004</td><td>11.999</td></tr><tr><td>25</td><td>12.004</td><td>12.004</td><td>12.001</td></tr><tr><td>30</td><td>12.004</td><td>12.005</td><td>12.001</td></tr><tr><td>40</td><td>12.004</td><td>12.005</td><td>12.002</td></tr><tr><td>55</td><td>12.003</td><td>12.004</td><td>12.003</td></tr><tr><td>60</td><td>12.002</td><td>12.003</td><td>12.003</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table> | | 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 | 12.005 | 12.006 | 12.001 | -20 | 12.004 | 12.005 | 12.000 | -10 | 12.004 | 12.005 | 12.000 | 0 | 12.003 | 12.004 | 11.999 | 10 | 12.004 | 12.004 | 11.999 | 25 | 12.004 | 12.004 | 12.001 | 30 | 12.004 | 12.005 | 12.001 | 40 | 12.004 | 12.005 | 12.002 | 55 | 12.003 | 12.004 | 12.003 | 60 | 12.002 | 12.003 | 12.003 | — | — | — | — |
| 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 | 12.005 | 12.006 | 12.001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | 12.004 | 12.005 | 12.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | 12.004 | 12.005 | 12.000 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 12.003 | 12.004 | 11.999 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 12.004 | 12.004 | 11.999 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 12.004 | 12.004 | 12.001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 12.004 | 12.005 | 12.001 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 12.004 | 12.005 | 12.002 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 12.003 | 12.004 | 12.003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 12.002 | 12.003 | 12.003 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | | -12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Graph | | 2. Values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div><div>△</div><div>Input Volt. 4.5V</div></div><div><div>□</div><div>Input Volt. 5.0V</div></div><div><div>○</div><div>Input Volt. 9.0V</div></div></div> <p>Output Voltage [V]</p> <p>Ambient Temperature [°C]</p> <p>Load 100%</p> | | <table><tr><th rowspan="2">Temperature
[°C]</th><th>Input Volt.
4.5[V]</th><th>Input Volt.
5.0[V]</th><th>Input Volt.
9.0[V]</th></tr><tr><th>Output
Volt. [V]</th><th>Output
Volt. [V]</th><th>Output
Volt. [V]</th></tr><tr><td>-30</td><td>-11.989</td><td>-11.990</td><td>-11.986</td></tr><tr><td>-20</td><td>-11.989</td><td>-11.990</td><td>-11.986</td></tr><tr><td>-10</td><td>-11.989</td><td>-11.989</td><td>-11.986</td></tr><tr><td>0</td><td>-11.989</td><td>-11.989</td><td>-11.986</td></tr><tr><td>10</td><td>-11.989</td><td>-11.989</td><td>-11.986</td></tr><tr><td>25</td><td>-11.988</td><td>-11.989</td><td>-11.986</td></tr><tr><td>30</td><td>-11.987</td><td>-11.988</td><td>-11.986</td></tr><tr><td>40</td><td>-11.987</td><td>-11.988</td><td>-11.986</td></tr><tr><td>55</td><td>-11.985</td><td>-11.986</td><td>-11.987</td></tr><tr><td>60</td><td>-11.984</td><td>-11.985</td><td>-11.987</td></tr><tr><td>—</td><td>—</td><td>—</td><td>—</td></tr></table> | | 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 | -11.989 | -11.990 | -11.986 | -20 | -11.989 | -11.990 | -11.986 | -10 | -11.989 | -11.989 | -11.986 | 0 | -11.989 | -11.989 | -11.986 | 10 | -11.989 | -11.989 | -11.986 | 25 | -11.988 | -11.989 | -11.986 | 30 | -11.987 | -11.988 | -11.986 | 40 | -11.987 | -11.988 | -11.986 | 55 | -11.985 | -11.986 | -11.987 | 60 | -11.984 | -11.985 | -11.987 | — | — | — | — |
| 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 | -11.989 | -11.990 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | -11.989 | -11.990 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | -11.989 | -11.989 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | -11.989 | -11.989 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | -11.989 | -11.989 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | -11.988 | -11.989 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | -11.987 | -11.988 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | -11.987 | -11.988 | -11.986 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | -11.985 | -11.986 | -11.987 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | -11.984 | -11.985 | -11.987 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 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。 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

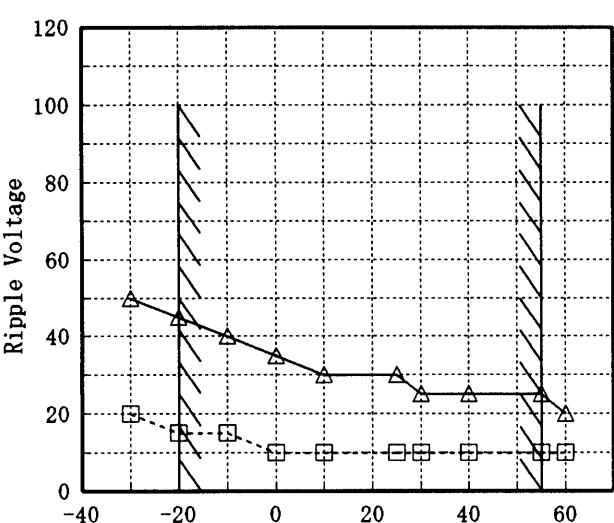
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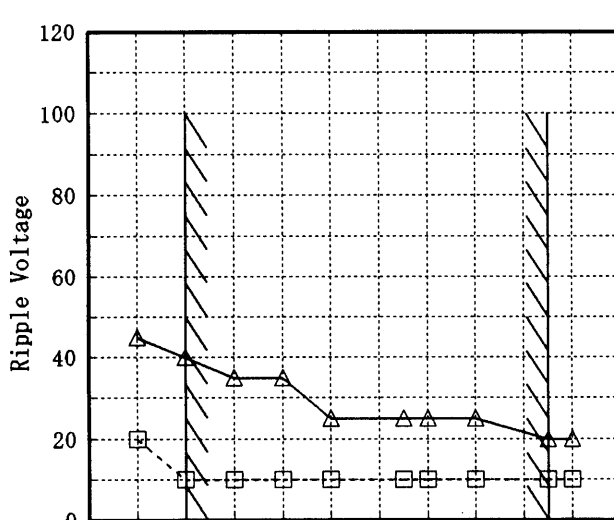
| Model | | ZUW1R50512 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------------|--|--|-----------------------|--------------------------------|---------------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|---|-----|-----|----|-----|-----|----|-----|-----|----|-----|-----|----|-----|-----|----|-----|-----|----|-----|-----|---|---|---|
| Item | | Minimum Input Voltage for Regulated Output Voltage
最低レギュレーション電圧 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | | +12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Graph | | 2. Values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div> <p>Input Voltage [V]</p> <p>Ambient Temperature [°C]</p> | | <table><tr><th>Ambient Temp.
[°C]</th><th>Load 50%
Input Volt.
[V]</th><th>Load 100%
Input Volt.
[V]</th></tr><tr><td>-30</td><td>3.2</td><td>3.6</td></tr><tr><td>-20</td><td>3.1</td><td>3.6</td></tr><tr><td>-10</td><td>3.0</td><td>3.5</td></tr><tr><td>0</td><td>3.0</td><td>3.4</td></tr><tr><td>10</td><td>2.9</td><td>3.4</td></tr><tr><td>25</td><td>2.9</td><td>3.3</td></tr><tr><td>30</td><td>2.9</td><td>3.3</td></tr><tr><td>40</td><td>2.8</td><td>3.3</td></tr><tr><td>55</td><td>2.8</td><td>3.2</td></tr><tr><td>60</td><td>2.8</td><td>3.2</td></tr><tr><td>—</td><td>—</td><td>—</td></tr></table> | | Ambient Temp.
[°C] | Load 50%
Input Volt.
[V] | Load 100%
Input Volt.
[V] | -30 | 3.2 | 3.6 | -20 | 3.1 | 3.6 | -10 | 3.0 | 3.5 | 0 | 3.0 | 3.4 | 10 | 2.9 | 3.4 | 25 | 2.9 | 3.3 | 30 | 2.9 | 3.3 | 40 | 2.8 | 3.3 | 55 | 2.8 | 3.2 | 60 | 2.8 | 3.2 | — | — | — |
| Ambient Temp.
[°C] | Load 50%
Input Volt.
[V] | Load 100%
Input Volt.
[V] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -30 | 3.2 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | 3.1 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | 3.0 | 3.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 3.0 | 3.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 2.9 | 3.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 2.9 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 2.9 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 2.8 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 2.8 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 2.8 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | | -12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div><div>-----□----- Load 50%</div><div>-----△----- Load 100%</div></div> <p>Input Voltage [V]</p> <p>Ambient Temperature [°C]</p> | | <div>2. Values</div> <table><tr><th>Ambient Temp.
[°C]</th><th>Load 50%
Input Volt.
[V]</th><th>Load 100%
Input Volt.
[V]</th></tr><tr><td>-30</td><td>3.2</td><td>3.6</td></tr><tr><td>-20</td><td>3.1</td><td>3.6</td></tr><tr><td>-10</td><td>3.0</td><td>3.5</td></tr><tr><td>0</td><td>3.0</td><td>3.4</td></tr><tr><td>10</td><td>2.9</td><td>3.4</td></tr><tr><td>25</td><td>2.9</td><td>3.3</td></tr><tr><td>30</td><td>2.9</td><td>3.3</td></tr><tr><td>40</td><td>2.8</td><td>3.3</td></tr><tr><td>55</td><td>2.8</td><td>3.2</td></tr><tr><td>60</td><td>2.8</td><td>3.2</td></tr><tr><td>—</td><td>—</td><td>—</td></tr></table> | | Ambient Temp.
[°C] | Load 50%
Input Volt.
[V] | Load 100%
Input Volt.
[V] | -30 | 3.2 | 3.6 | -20 | 3.1 | 3.6 | -10 | 3.0 | 3.5 | 0 | 3.0 | 3.4 | 10 | 2.9 | 3.4 | 25 | 2.9 | 3.3 | 30 | 2.9 | 3.3 | 40 | 2.8 | 3.3 | 55 | 2.8 | 3.2 | 60 | 2.8 | 3.2 | — | — | — |
| Ambient Temp.
[°C] | Load 50%
Input Volt.
[V] | Load 100%
Input Volt.
[V] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -30 | 3.2 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | 3.1 | 3.6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | 3.0 | 3.5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 3.0 | 3.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 2.9 | 3.4 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 2.9 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 2.9 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 2.8 | 3.3 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 2.8 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 2.8 | 3.2 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <div>Note: Slanted line shows the range of the rated ambient temperature.</div> <div>(注)斜線は定格周囲温度範囲を示す。</div> | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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| Model | | ZUW1R50512 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------------------|--|--------------------------------------|---------------------------------------|-----|----|----|-----|----|----|-----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|--|--|
| Item | | Ripple Voltage (by Ambient Temp.)
リップル電圧 (周囲温度特性) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Object | | +12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 1. Graph | | -----□----- Load 50%
-----△----- Load 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| [mV] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ripple Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ambient Temperature [°C] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Volt. 4.5 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><th>Ambient Temp. [°C]</th><th>Load 50%
Ripple Output Volt. [mV]</th><th>Load 100%
Ripple Output Volt. [mV]</th></tr><tr><td>-30</td><td>20</td><td>50</td></tr><tr><td>-20</td><td>15</td><td>45</td></tr><tr><td>-10</td><td>15</td><td>40</td></tr><tr><td>0</td><td>10</td><td>35</td></tr><tr><td>10</td><td>10</td><td>30</td></tr><tr><td>25</td><td>10</td><td>30</td></tr><tr><td>30</td><td>10</td><td>25</td></tr><tr><td>40</td><td>10</td><td>25</td></tr><tr><td>55</td><td>10</td><td>25</td></tr><tr><td>60</td><td>10</td><td>20</td></tr><tr><td>—</td><td>—</td><td>—</td></tr></table> | | Ambient Temp. [°C] | Load 50%
Ripple Output Volt. [mV] | Load 100%
Ripple Output Volt. [mV] | -30 | 20 | 50 | -20 | 15 | 45 | -10 | 15 | 40 | 0 | 10 | 35 | 10 | 10 | 30 | 25 | 10 | 30 | 30 | 10 | 25 | 40 | 10 | 25 | 55 | 10 | 25 | 60 | 10 | 20 | — | — | — | | |
| Ambient Temp. [°C] | Load 50%
Ripple Output Volt. [mV] | Load 100%
Ripple Output Volt. [mV] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -30 | 20 | 50 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | 15 | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | 15 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 10 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 10 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 10 | 30 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 10 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Object | | -12V0.065A | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|---|--------------------------------------|---|--------------------------------------|---------------------------------------|-----|----|----|-----|----|----|-----|----|----|---|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|----|---|---|---|--|--|
| 1. Graph | | -----□----- Load 50%
-----△----- Load 100% | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|  | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ripple Voltage | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ambient Temperature [°C] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Input Volt. 4.5 V | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2. Values | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| <table><tr><th>Ambient Temp. [°C]</th><th>Load 50%
Ripple Output Volt. [mV]</th><th>Load 100%
Ripple Output Volt. [mV]</th></tr><tr><td>-30</td><td>20</td><td>45</td></tr><tr><td>-20</td><td>10</td><td>40</td></tr><tr><td>-10</td><td>10</td><td>35</td></tr><tr><td>0</td><td>10</td><td>35</td></tr><tr><td>10</td><td>10</td><td>25</td></tr><tr><td>25</td><td>10</td><td>25</td></tr><tr><td>30</td><td>10</td><td>25</td></tr><tr><td>40</td><td>10</td><td>25</td></tr><tr><td>55</td><td>10</td><td>20</td></tr><tr><td>60</td><td>10</td><td>20</td></tr><tr><td>—</td><td>—</td><td>—</td></tr></table> | | Ambient Temp. [°C] | Load 50%
Ripple Output Volt. [mV] | Load 100%
Ripple Output Volt. [mV] | -30 | 20 | 45 | -20 | 10 | 40 | -10 | 10 | 35 | 0 | 10 | 35 | 10 | 10 | 25 | 25 | 10 | 25 | 30 | 10 | 25 | 40 | 10 | 25 | 55 | 10 | 20 | 60 | 10 | 20 | — | — | — | | |
| Ambient Temp. [°C] | Load 50%
Ripple Output Volt. [mV] | Load 100%
Ripple Output Volt. [mV] | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -30 | 20 | 45 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -20 | 10 | 40 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| -10 | 10 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 0 | 10 | 35 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 10 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 25 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 30 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 40 | 10 | 25 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 55 | 10 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 60 | 10 | 20 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| — | — | — | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

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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。 | |

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|---|-------------------------|
| COSEL | |
| Model | ZUW1R50512 |
| Item | Time Lapse Drift 経時ドリフト |
| Object | +12V0.065A |
| 1. Graph | |
| <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

LOTEL

| | | |
|-------|----------------------------------|-------------------------------|
| | | Testing Circuitry Figure A |
| Model | ZUW1R50512 | |
| Item | Output Voltage Accuracy 定電圧精度 | |

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 ℃

Input Voltage : 4.5～9.0 V

Load Current (AVR 1) : 0.000～0.065 A

(AVR 2) : 0.000～0.065 A

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

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

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 ℃

入力電圧 4.5～9.0 V

負荷電流 (AVR 1) 0.000～0.065 A

(AVR 2) 0.000～0.065 A

* 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

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

| | |
|--------|------------|
| Object | +12V0.065A |
|--------|------------|

| Item | Temperature
[℃] | Input
Voltage [V] | Output
Current [A] | Output
Voltage [V] | Output Voltage
Accuracy [mV] | Output Voltage
Accuracy(Ration) [%] |
|-----------------|--------------------|----------------------|-----------------------|-----------------------|---------------------------------|--|
| Maximum Voltage | -20 | 5.0 | 0.065 | 12.003 | ±135 | ±1.2 |
| Minimum Voltage | 25 | 4.5 | 0.000 | 11.733 | | |

| | |
|--------|------------|
| Object | -12V0.065A |
|--------|------------|

| Item | Temperature
[℃] | Input
Voltage [V] | Output
Current [A] | Output
Voltage [V] | Output Voltage
Accuracy [mV] | Output Voltage
Accuracy(Ration) [%] |
|-----------------|--------------------|----------------------|-----------------------|-----------------------|---------------------------------|--|
| Maximum Voltage | -20 | 5.0 | 0.065 | -11.988 | ±136 | ±1.2 |
| Minimum Voltage | 55 | 4.5 | 0.000 | -11.717 | | |

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LOREL

| | | | |
|--------|-------------------|-------------------|----------|
| | | | |
| Model | ZUW1R50512 | | |
| Item | Condensation 結露特性 | Testing Circuitry | Figure A |
| Object | +12V 0.065A | | |

1. Condensation test

Testing procedure is as follows.

① Keeping and cooling the unit in a tank at -10℃ 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℃ 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℃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 | 11.963 | 15 | 20 |
| | 2 | 11.867 | 15 | 20 |
| | 3 | 11.872 | 15 | 20 |
| Load
100
% | 1 | 11.912 | 30 | 35 |
| | 2 | 11.845 | 30 | 35 |
| | 3 | 11.839 | 30 | 35 |

Input Volt. 5.0 V

COSEL

LOGEL

| | |
|--------|-------------------|
| Model | ZUW1R50512 |
| Item | Condensation 結露特性 |
| Object | -12V 0.065A |

Testing Circuitry Figure A

1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at -10℃ 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℃ 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℃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 | -12.021 | 15 | 15 |
| | 2 | -12.063 | 15 | 15 |
| | 3 | -12.102 | 15 | 15 |
| Load
100
% | 1 | -11.963 | 25 | 30 |
| | 2 | -11.985 | 25 | 30 |
| | 3 | -12.046 | 25 | 30 |

Input Volt. 5.0 V

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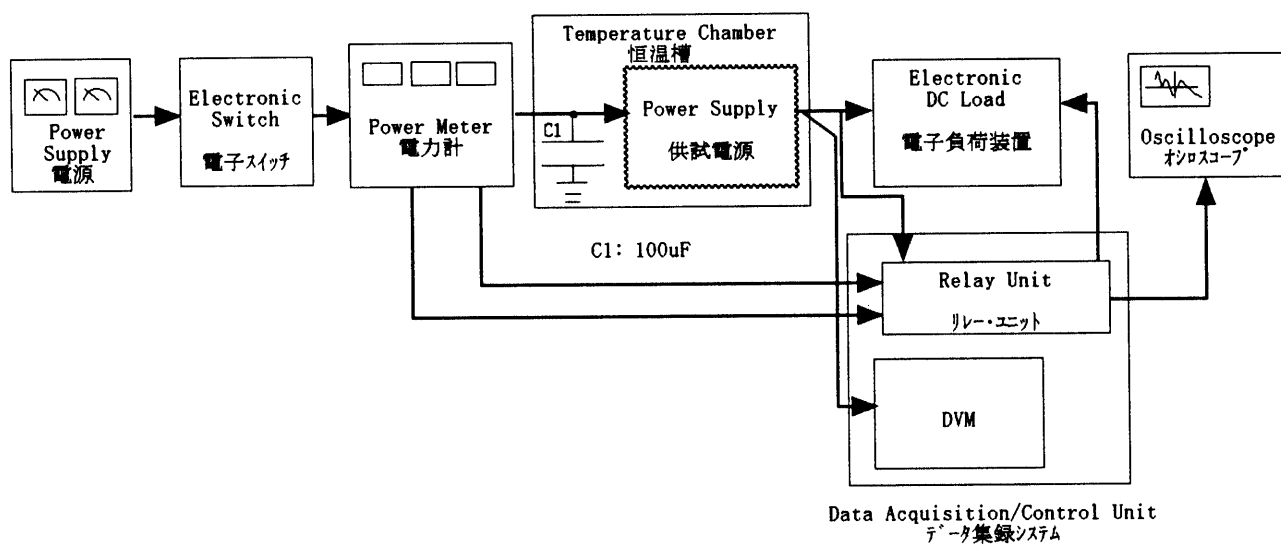


Figure A