



TEST DATA OF ZUS1R52405

(24.0V INPUT)

Regulated DC Power Supply

Date : June 14. 1996

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Design Manager

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COSEL CO., LTD.

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Model		ZUS1R52405	Temperature 25℃ Testing Circuitry Figure A																																											
Item		Line Regulation 静的入力変動																																												
Object		+5V0.3A																																												
1. Graph		<div><div>-----□-----</div>Load 50%</div> <div><div>-----△-----</div>Load 100%</div> <p>Note: Slanted line shows the range of the rated input voltage.</p> <p>(注)斜線は定格入力電圧範囲を示す。</p>	2. Values																																											
			<table><tr><th>Input Voltage [V]</th><th>Load 50% Output Volt. [V]</th><th>Load 100% Output Volt. [V]</th></tr><tr><td>16.0</td><td>5.052</td><td>5.051</td></tr><tr><td>18.0</td><td>5.052</td><td>5.052</td></tr><tr><td>20.0</td><td>5.052</td><td>5.051</td></tr><tr><td>24.0</td><td>5.053</td><td>5.052</td></tr><tr><td>30.0</td><td>5.052</td><td>5.051</td></tr><tr><td>36.0</td><td>5.052</td><td>5.051</td></tr><tr><td>40.0</td><td>5.052</td><td>5.051</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><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]	16.0	5.052	5.051	18.0	5.052	5.052	20.0	5.052	5.051	24.0	5.053	5.052	30.0	5.052	5.051	36.0	5.052	5.051	40.0	5.052	5.051	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
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Model

ZUS1R52405

Item

Efficiency 効率

Temperature

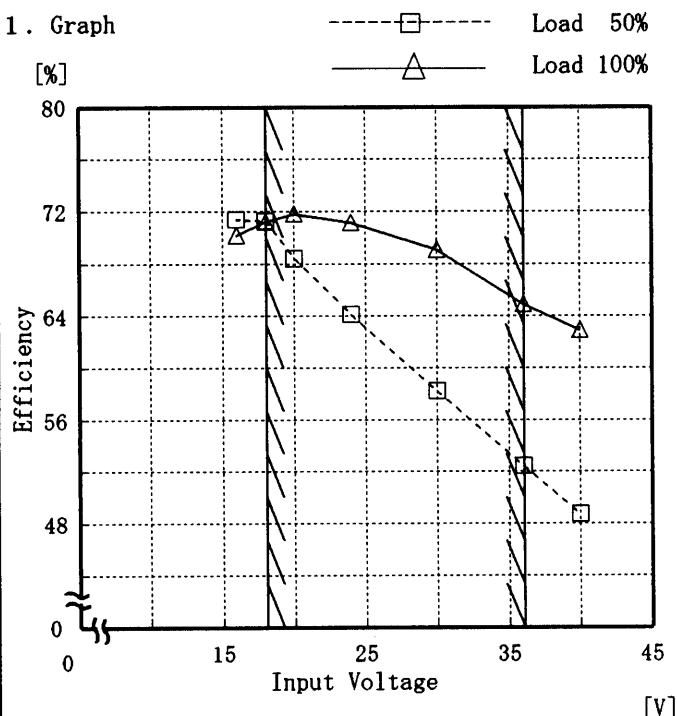
25°C

Testing Circuitry

Figure A

Object

1. Graph



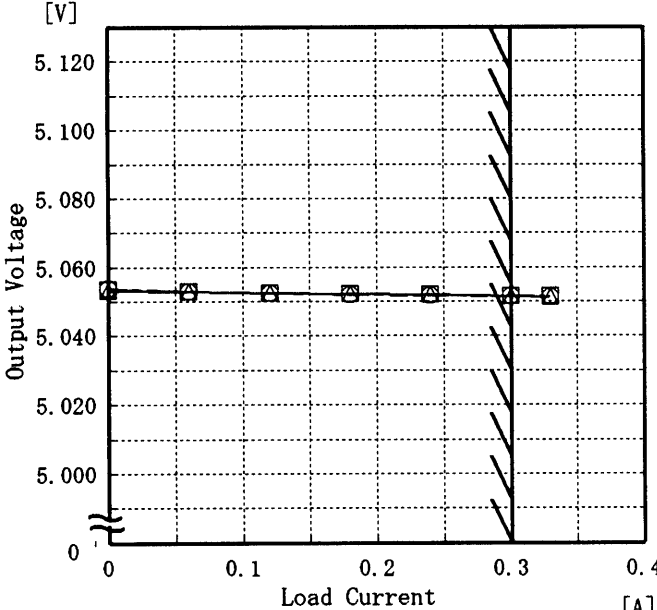
Note: Slanted line shows the range of the rated input voltage.

(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 [%]
16.0	71.4	70.2
18.0	71.3	71.2
20.0	68.4	71.8
24.0	64.1	71.1
30.0	58.2	69.0
36.0	52.4	64.9
40.0	48.7	62.9
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

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Model		ZUS1R52405		Temperature		25℃																																																
Item		Load Regulation 静的負荷変動		Testing Circuitry		Figure A																																																
Object		+5V0.3A																																																				
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<div><div><div>—△— Input Volt. 18.0V</div><div>- - -□- - Input Volt. 24.0V</div><div>- - -○- - Input Volt. 36.0V</div></div><div></div></div>				<table><tr><th rowspan="2">Load Current [A]</th><th>Input Volt. 18.0[V]</th><th>Input Volt. 24.0[V]</th><th>Input Volt. 36.0[V]</th></tr><tr><th>Output Volt. [V]</th><th>Output Volt. [V]</th><th>Output Volt. [V]</th></tr><tr><td>0.00</td><td>5.053</td><td>5.054</td><td>5.054</td></tr><tr><td>0.06</td><td>5.053</td><td>5.053</td><td>5.053</td></tr><tr><td>0.12</td><td>5.053</td><td>5.052</td><td>5.052</td></tr><tr><td>0.18</td><td>5.052</td><td>5.052</td><td>5.052</td></tr><tr><td>0.24</td><td>5.052</td><td>5.052</td><td>5.052</td></tr><tr><td>0.30</td><td>5.052</td><td>5.052</td><td>5.052</td></tr><tr><td>0.33</td><td>5.051</td><td>5.052</td><td>5.051</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 Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]	Output Volt. [V]	Output Volt. [V]	Output Volt. [V]	0.00	5.053	5.054	5.054	0.06	5.053	5.053	5.053	0.12	5.053	5.052	5.052	0.18	5.052	5.052	5.052	0.24	5.052	5.052	5.052	0.30	5.052	5.052	5.052	0.33	5.051	5.052	5.051	—	—	—	—	—	—	—	—	—	—	—	—
Load Current [A]	Input Volt. 18.0[V]	Input Volt. 24.0[V]	Input Volt. 36.0[V]																																																			
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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>																																																						

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Model		ZUS1R52405	
Item		Ripple Voltage (by Load Current) リップル電圧 (負荷電流特性)	
Object		+5V 0.3A	

1. Graph

-----□----- Input Volt. 18.0V

-----△----- Input Volt. 36.0V

[mV]

40

30

20

10

0

Ripple Voltage

0

0.1

0.2

0.3

0.4

[A]

2. Values

Load Current [A]	Input Volt. 18.0 [V]	Input Volt. 36.0 [V]
	Ripple Output Volt. [mV]	Ripple Output Volt. [mV]
0.00	5	5
0.06	5	5
0.12	5	5
0.18	5	5
0.24	5	5
0.30	10	5
0.33	10	5
—	—	—
—	—	—
—	—	—
—	—	—

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

Ripple [mVp-p]

T1

Fig. Complex Ripple Wave Form

図 リップル波形詳細図

- 5 -

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Model		ZUS1R52405		
Item		Overcurrent Protection 過電流保護	Temperature 25℃ Testing Circuitry Figure A	
Object		+5V0.3A		

1. Graph

[V]

Output Voltage [V]

Load Current [A]

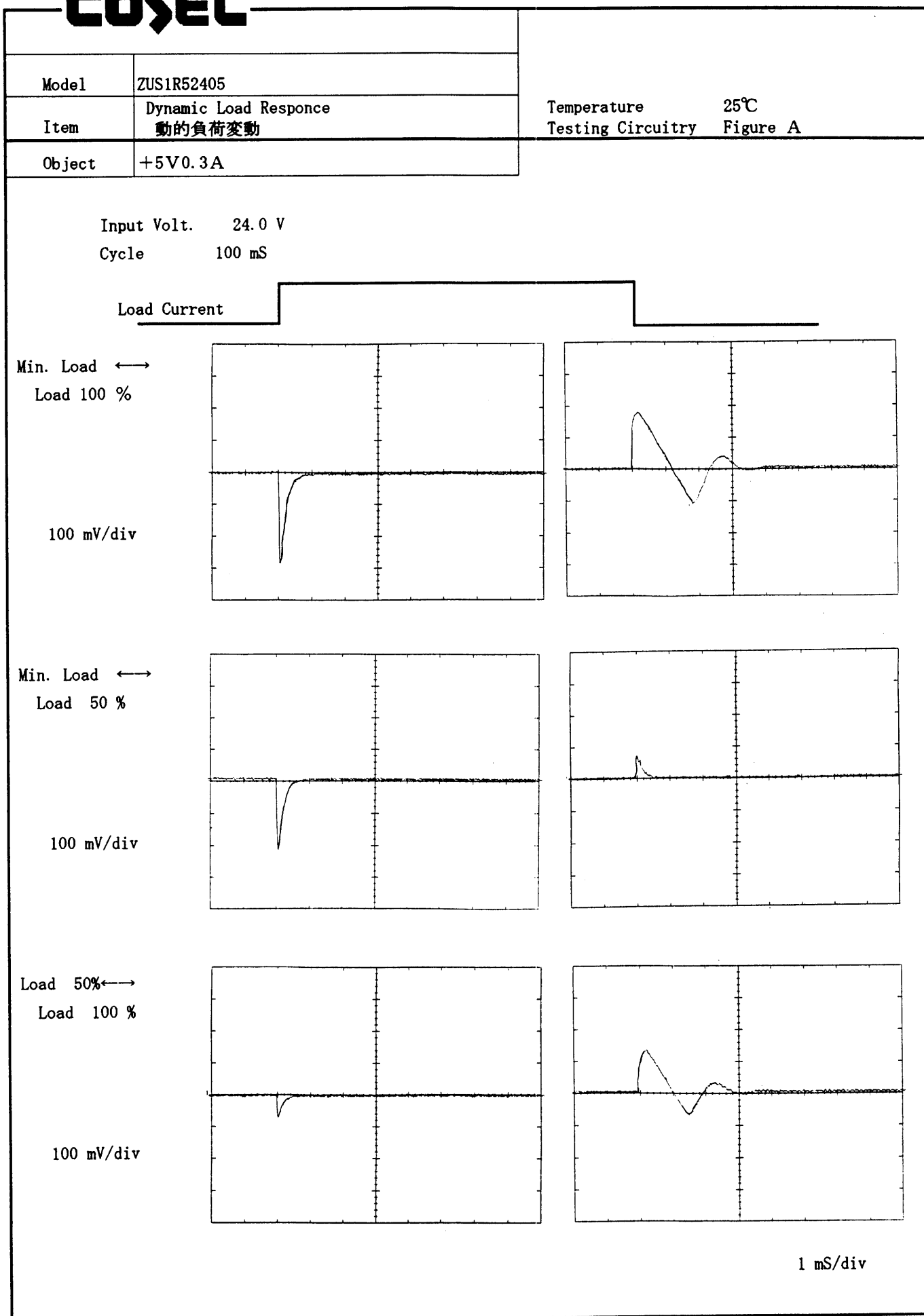
~~~~~ Input Volt. 18.0V  
\_\_\_\_\_ Input Volt. 24.0V  
———— Input Volt. 36.0V

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. 18.0[V] | Input Volt. 24.0[V] | Input Volt. 36.0[V] |
|--------------------|---------------------|---------------------|---------------------|
|                    | Load Current [A]    | Load Current [A]    | Load Current [A]    |
| 5.00               | 0.43                | 0.46                | 0.42                |
| 4.75               | 0.43                | 0.46                | 0.42                |
| 4.50               | 0.43                | 0.46                | 0.42                |
| 4.00               | 0.43                | 0.45                | 0.40                |
| 3.50               | 0.42                | 0.44                | 0.39                |
| 3.00               | 0.42                | 0.42                | 0.38                |
| 2.50               | 0.40                | 0.40                | 0.37                |
| 2.00               | 0.39                | 0.38                | 0.35                |
| 1.50               | 0.38                | 0.37                | 0.35                |
| 1.00               | 0.38                | 0.37                | 0.35                |
| 0.50               | 0.41                | 0.39                | 0.37                |
| 0.00               | 0.57                | 0.60                | 0.60                |

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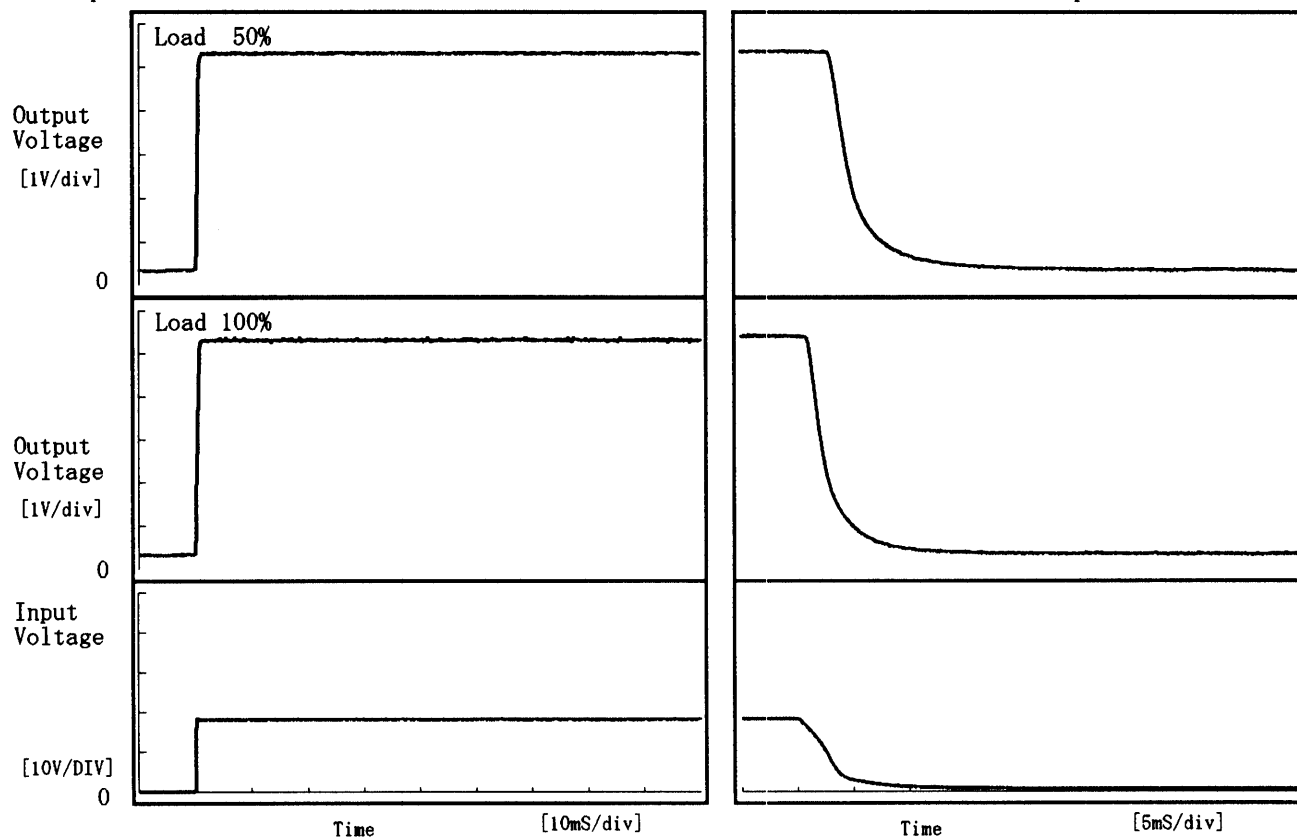


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|        |                              |                   |          |
|--------|------------------------------|-------------------|----------|
| Model  | ZUS1R52405                   | Temperature       | 25°C     |
| Item   | Rise and Fall Time 立上り、立下り時間 | Testing Circuitry | Figure A |
| Object | +5V0.3A                      |                   |          |

## 1. Graph

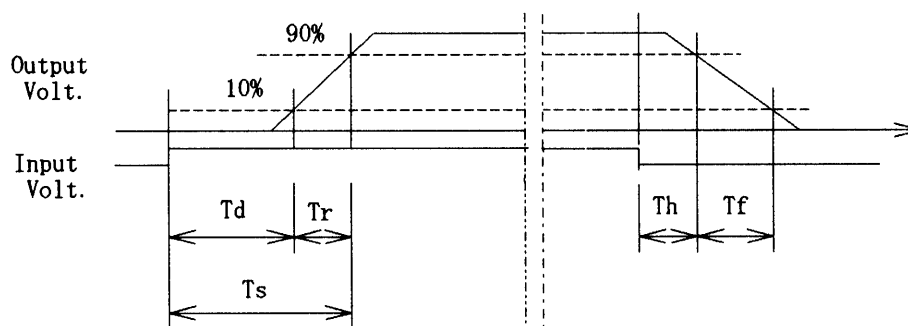
Input Volt. 18.0 V



## 2. Values

[mS]

| Load \ Time | T d  | T r  | T s  | T h  | T f  |
|-------------|------|------|------|------|------|
| 50 %        | 0.05 | 0.50 | 0.55 | 3.30 | 5.63 |
| 100 %       | 0.05 | 0.65 | 0.70 | 1.28 | 4.65 |



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Model ZUS1R52405

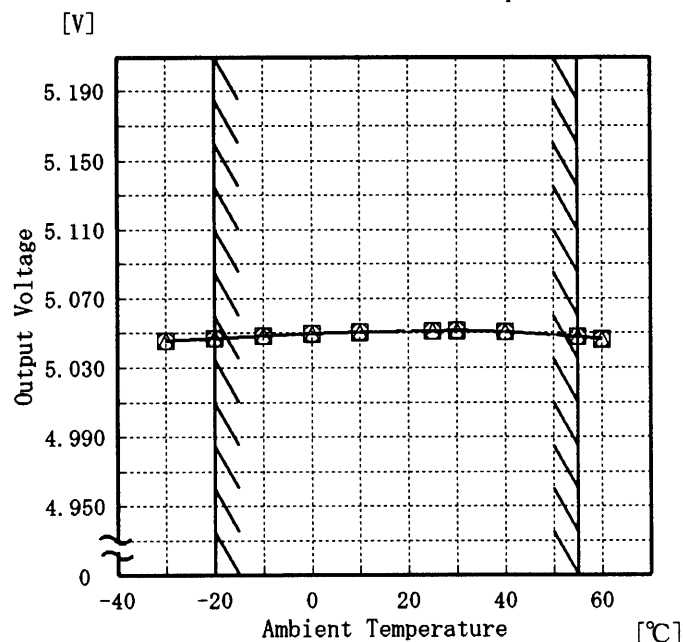
Item Ambient Temperature Drift  
周囲温度変動

Object +5V0.3A

Testing Circuitry Figure A

## 1. Graph

—△— Input Volt. 18.0V  
 - - -□- - - Input Volt. 24.0V  
 - - -○- - - Input Volt. 36.0V



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<br>[°C] | Input Volt.<br>18.0[V] | Input Volt.<br>24.0[V] | Input Volt.<br>36.0[V] |
|---------------------|------------------------|------------------------|------------------------|
|                     | Output<br>Volt. [V]    | Output<br>Volt. [V]    | Output<br>Volt. [V]    |
| -30                 | 5.046                  | 5.046                  | 5.046                  |
| -20                 | 5.047                  | 5.047                  | 5.047                  |
| -10                 | 5.048                  | 5.048                  | 5.048                  |
| 0                   | 5.049                  | 5.050                  | 5.050                  |
| 10                  | 5.050                  | 5.050                  | 5.050                  |
| 25                  | 5.051                  | 5.051                  | 5.051                  |
| 30                  | 5.051                  | 5.052                  | 5.052                  |
| 40                  | 5.050                  | 5.051                  | 5.051                  |
| 55                  | 5.048                  | 5.048                  | 5.048                  |
| 60                  | 5.046                  | 5.046                  | 5.046                  |
| —                   | —                      | —                      | —                      |

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Model

ZUS1R52405

Item

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

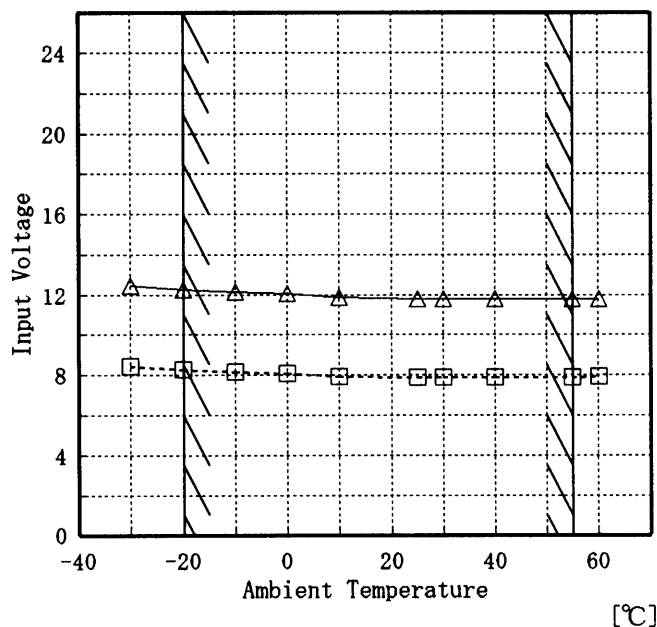
Object

+5V0.3A

Testing Circuitry Figure A

## 1. Graph

[V]



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.<br>[°C] | Load 50%           | Load 100%          |
|-----------------------|--------------------|--------------------|
|                       | Input Volt.<br>[V] | Input Volt.<br>[V] |
| -30                   | 8.4                | 12.5               |
| -20                   | 8.3                | 12.3               |
| -10                   | 8.2                | 12.1               |
| 0                     | 8.1                | 12.1               |
| 10                    | 7.9                | 11.9               |
| 25                    | 7.9                | 11.8               |
| 30                    | 7.9                | 11.8               |
| 40                    | 7.9                | 11.8               |
| 55                    | 7.9                | 11.8               |
| 60                    | 7.9                | 11.8               |
| —                     | —                  | —                  |

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Model ZUS1R52405

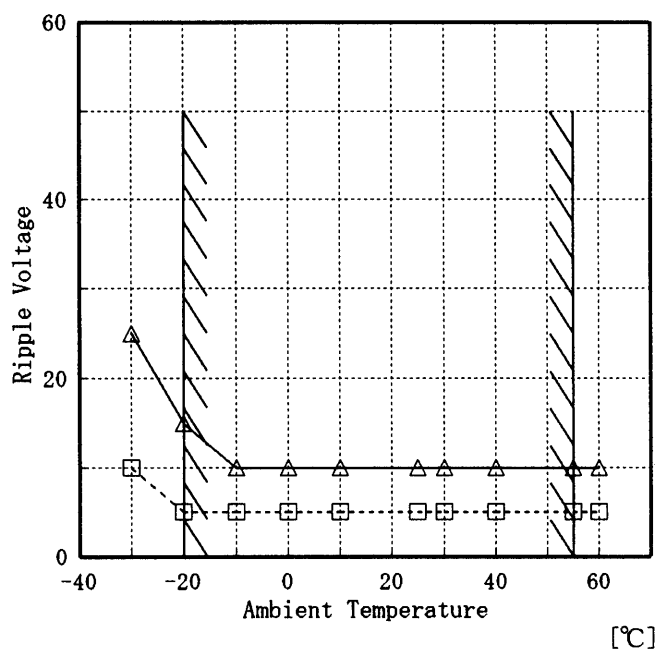
Item Ripple Voltage (by Ambient Temp.)  
リップル電圧 (周囲温度特性)

Object +5V0.3A

Testing Circuitry Figure A

## 1. Graph

[mV]



## 2. Values

| Ambient Temp.<br>[°C] | Load 50%                    | Load 100%                   |
|-----------------------|-----------------------------|-----------------------------|
|                       | Ripple Output<br>Volt. [mV] | Ripple Output<br>Volt. [mV] |
| -30                   | 10                          | 25                          |
| -20                   | 5                           | 15                          |
| -10                   | 5                           | 10                          |
| 0                     | 5                           | 10                          |
| 10                    | 5                           | 10                          |
| 25                    | 5                           | 10                          |
| 30                    | 5                           | 10                          |
| 40                    | 5                           | 10                          |
| 55                    | 5                           | 10                          |
| 60                    | 5                           | 10                          |
| —                     | —                           | —                           |

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| COSEL                                                                                    |                         |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
|------------------------------------------------------------------------------------------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|----------------------|--------------------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|-----|-------|
| Model                                                                                    | ZUS1R52405              |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| Item                                                                                     | Time Lapse Drift 経時ドリフト | Temperature                                                                                                                                                                                                                                                                                                                                                                                                                                                                  | 25 ℃     |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| Object                                                                                   | +5V0.3A                 | Testing Circuitry                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Figure A |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 1. Graph                                                                                 |                         | 2.Values                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| <p>[V]</p> <p>Output Voltage</p> <p>Time [H]</p> <p>Input Volt. 24V</p> <p>Load 100%</p> |                         | <table><thead><tr><th>Time since start [H]</th><th>Output Voltage [V]</th></tr></thead><tbody><tr><td>0.0</td><td>5.051</td></tr><tr><td>0.5</td><td>5.050</td></tr><tr><td>1.0</td><td>5.050</td></tr><tr><td>2.0</td><td>5.050</td></tr><tr><td>3.0</td><td>5.050</td></tr><tr><td>4.0</td><td>5.050</td></tr><tr><td>5.0</td><td>5.050</td></tr><tr><td>6.0</td><td>5.050</td></tr><tr><td>7.0</td><td>5.050</td></tr><tr><td>8.0</td><td>5.050</td></tr></tbody></table> |          | Time since start [H] | Output Voltage [V] | 0.0 | 5.051 | 0.5 | 5.050 | 1.0 | 5.050 | 2.0 | 5.050 | 3.0 | 5.050 | 4.0 | 5.050 | 5.0 | 5.050 | 6.0 | 5.050 | 7.0 | 5.050 | 8.0 | 5.050 |
| Time since start [H]                                                                     | Output Voltage [V]      |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 0.0                                                                                      | 5.051                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 0.5                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 1.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 2.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 3.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 4.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 5.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 6.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 7.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |
| 8.0                                                                                      | 5.050                   |                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |          |                      |                    |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |     |       |

# COSEL

|        |                               |                            |
|--------|-------------------------------|----------------------------|
| Model  | ZUS1R52405                    | Testing Circuitry Figure A |
| Item   | Output Voltage Accuracy 定電圧精度 |                            |
| Object | +5V0.3A                       |                            |

## 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 : 18.0~36.0 V

Load Current : 0.0~0.3 A

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

\* 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 °C

入力電圧 : 18.0~36.0 V

負荷電流 : 0.0~0.3 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 (Ration) [%] |
|-----------------|------------------|-------------------|--------------------|--------------------|------------------------------|--------------------------------------|
| Maximum Voltage | 25               | 36.0              | 0.0                | 5.054              | ±4                           | ±0.1                                 |
| Minimum Voltage | 55               | 36.0              | 0.3                | 5.047              |                              |                                      |

**COSEL**

LOREL

|        |                   |
|--------|-------------------|
| Model  | ZUS1R52405        |
| Item   | Condensation 結露特性 |
| Object | +5V 0.3A          |

Testing Circuitry Figure A

#### 1. Condensation test

Testing procedure is as follows.

- ① Keeping and cooling the unit in a tank at  $-10^{\circ}\text{C}$  for an hour with the input off.
- ② Taking it out of the tank and dewing itself in a room where the temperature is  $24^{\circ}\text{C}$  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 $-10^{\circ}\text{C}$ に冷却しておき、約1時間後に恒温槽から取り出し、室温 $24^{\circ}\text{C}$ 、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<br>[V] | Ripple Voltage<br>[mV] | Ripple Noise<br>[mV] |
|------------------|-------|-----------------------|------------------------|----------------------|
| Load<br>50<br>%  | 1     | 5.039                 | 5                      | 10                   |
|                  | 2     | 5.039                 | 5                      | 10                   |
|                  | 3     | 5.039                 | 5                      | 10                   |
| Load<br>100<br>% | 1     | 5.038                 | 10                     | 15                   |
|                  | 2     | 5.038                 | 10                     | 15                   |
|                  | 3     | 5.038                 | 10                     | 15                   |

Input Volt. 24.0 V

COSEL

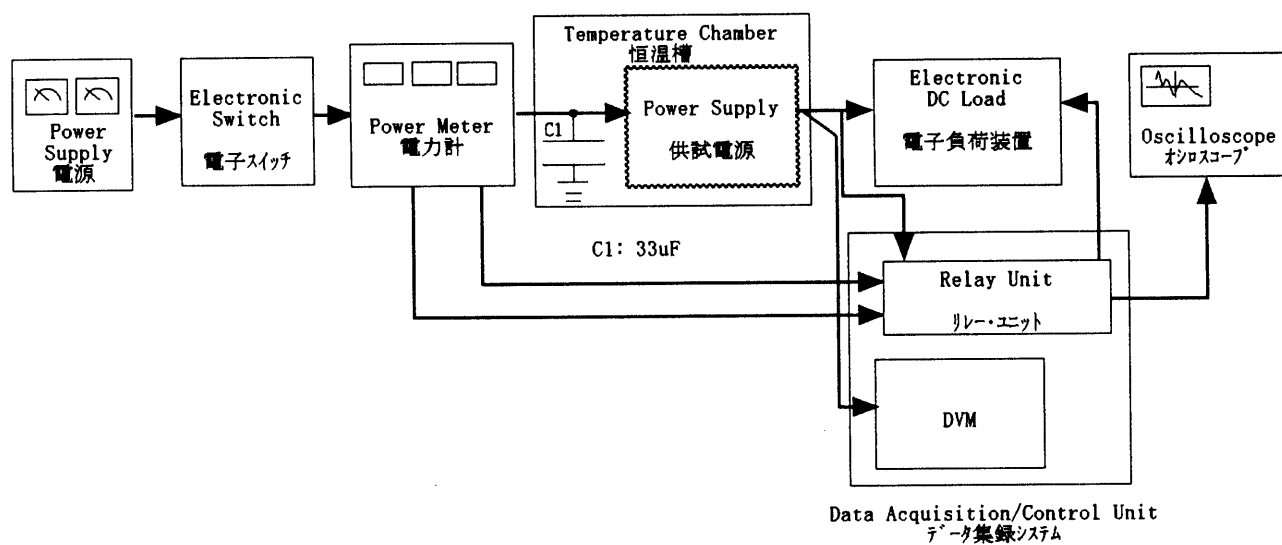


Figure A