参考資料

COSEL

# TEST DATA OF ZUW64815

(48.0V INPUT)

Regulated DC Power Supply

Date : Sep.21. 1996

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Design Engineer

コーセル株式会社

COSEL CO.,LTD.

参考資料

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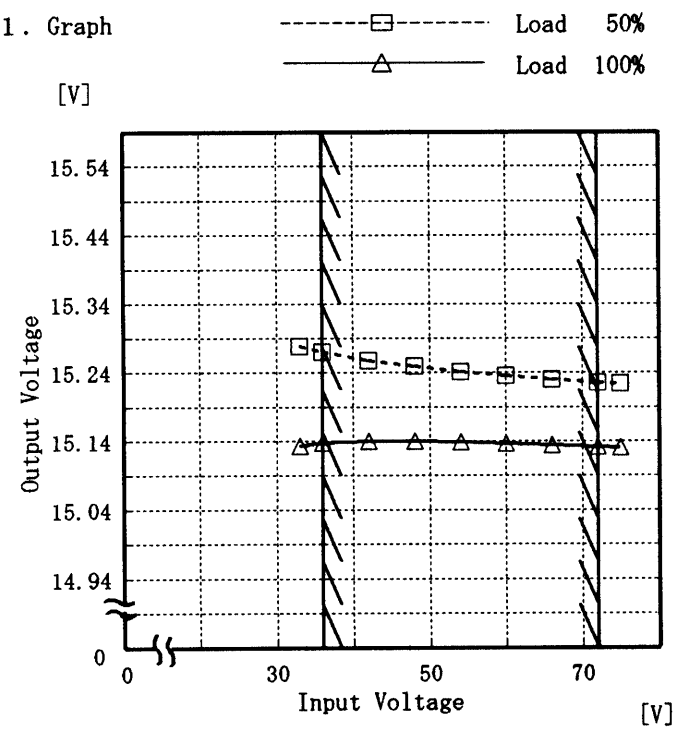
| | |
|---|---|
| Model | ZUW64815 |
| Item | Line Regulation 静的入力変動 |

Temperature 25℃
Testing Circuitry Figure A

Object +15V0.2A

1. Graph

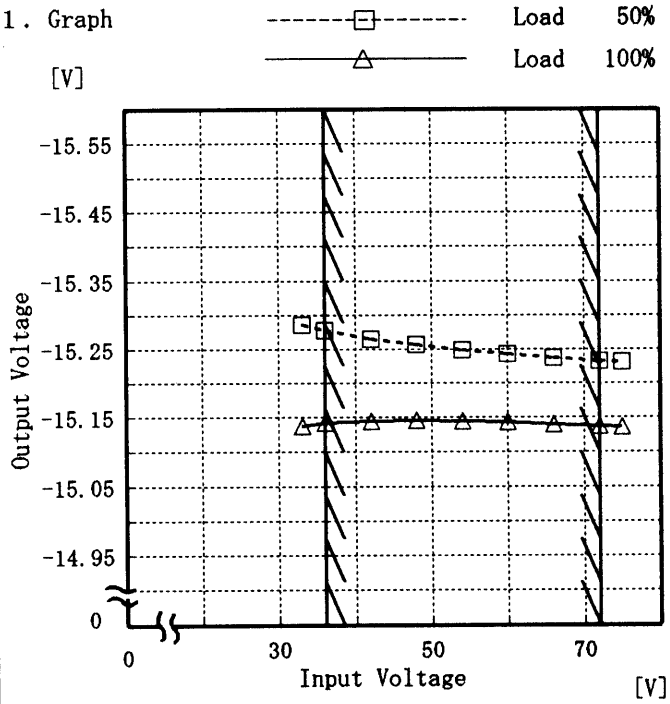



2. Values

| Input Voltage [V] | Load 50% Output Volt. [V] | Load 100% Output Volt. [V] |
|---|---|---|
| 33.0 | 15.279 | 15.133 |
| 36.0 | 15.271 | 15.137 |
| 42.0 | 15.258 | 15.140 |
| 48.0 | 15.249 | 15.140 |
| 54.0 | 15.242 | 15.139 |
| 60.0 | 15.236 | 15.136 |
| 66.0 | 15.230 | 15.134 |
| 72.0 | 15.226 | 15.132 |
| 75.0 | 15.224 | 15.130 |
| — | — | — |
| — | — | — |
| — | — | — |

Object −15V0.2A

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% Output Volt. [V] | Load 100% Output Volt. [V] |
|---|---|---|
| 33.0 | -15.286 | -15.137 |
| 36.0 | -15.277 | -15.141 |
| 42.0 | -15.265 | -15.145 |
| 48.0 | -15.256 | -15.145 |
| 54.0 | -15.249 | -15.144 |
| 60.0 | -15.242 | -15.142 |
| 66.0 | -15.237 | -15.140 |
| 72.0 | -15.232 | -15.137 |
| 75.0 | -15.231 | -15.136 |
| — | — | — |
| — | — | — |
| — | — | — |



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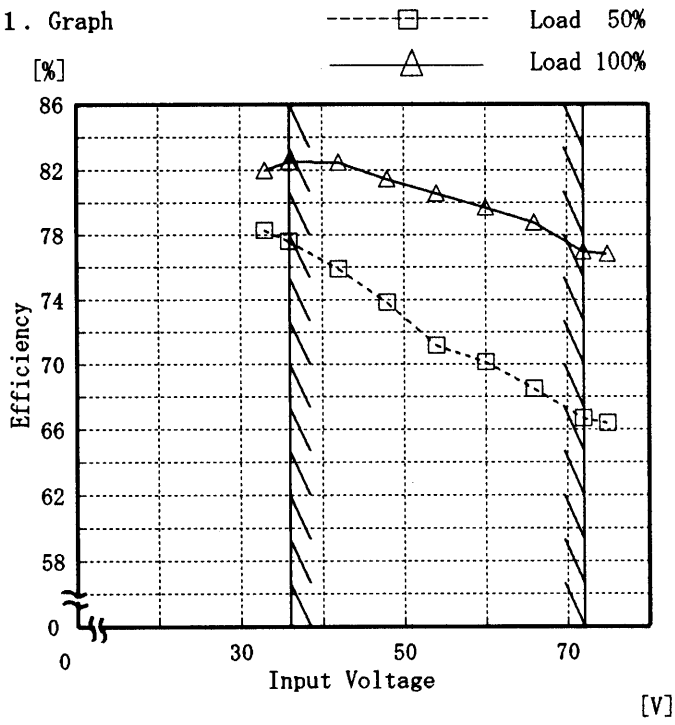
COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Efficiency 効率 |
| Object | ―――――――――――――― |

Temperature 25℃
Testing Circuitry Figure A

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% Efficiency [%] | Load 100% Efficiency [%] |
|---|---|---|
| 33.0 | 78.3 | 82.0 |
| 36.0 | 77.6 | 82.5 |
| 42.0 | 75.9 | 82.5 |
| 48.0 | 73.8 | 81.4 |
| 54.0 | 71.1 | 80.6 |
| 60.0 | 70.1 | 79.7 |
| 66.0 | 68.5 | 78.8 |
| 72.0 | 66.7 | 77.0 |
| 75.0 | 66.4 | 76.8 |
| — | — | — |
| — | — | — |
| — | — | — |

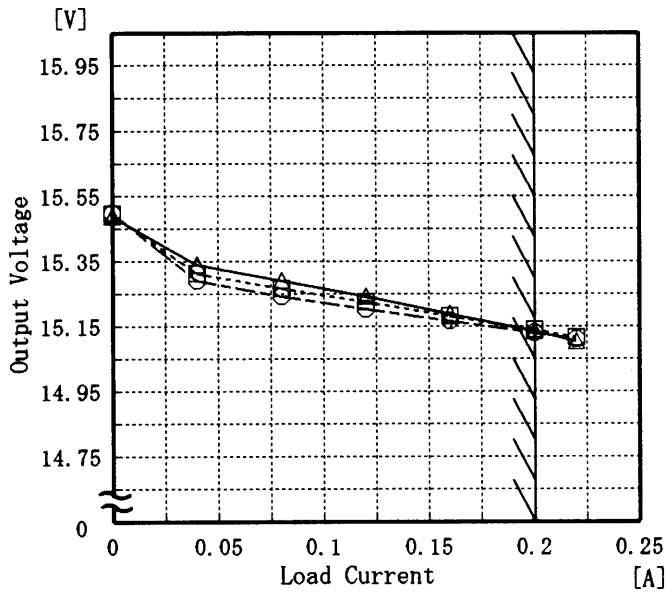
COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Load Regulation 静的負荷変動 |

Temperature 25℃
Testing Circuitry Figure A

Object +15V0.2A

1. Graph

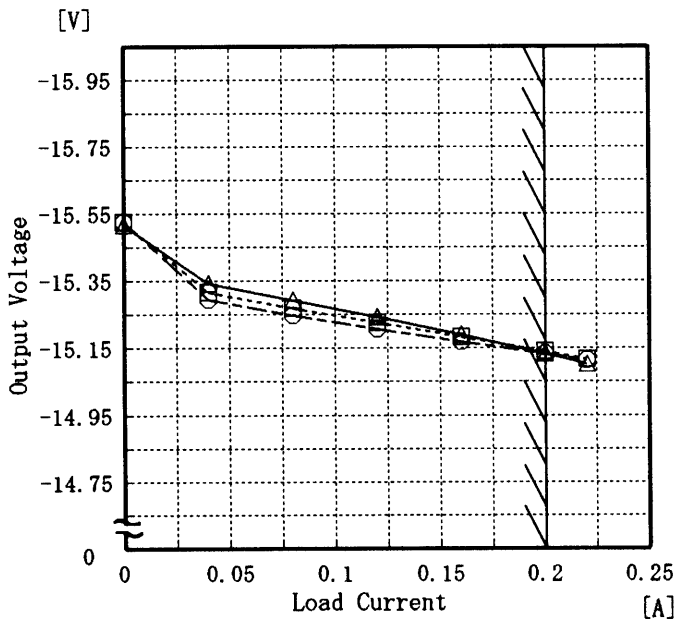



2. Values

| Load Current [A] | Input Volt. 36.0[V] Output Volt. [V] | Input Volt. 48.0[V] Output Volt. [V] | Input Volt. 72.0[V] Output Volt. [V] |
|---|---|---|---|
| 0.000 | 15.488 | 15.498 | 15.500 |
| 0.040 | 15.341 | 15.314 | 15.291 |
| 0.080 | 15.292 | 15.268 | 15.244 |
| 0.120 | 15.242 | 15.225 | 15.204 |
| 0.160 | 15.190 | 15.182 | 15.167 |
| 0.200 | 15.135 | 15.139 | 15.131 |
| 0.220 | 15.104 | 15.115 | 15.111 |
| — | — | — | — |
| — | — | — | — |
| — | — | — | — |

Object −15V0.2A

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

| Load Current [A] | Input Volt. 36.0[V] Output Volt. [V] | Input Volt. 48.0[V] Output Volt. [V] | Input Volt. 72.0[V] Output Volt. [V] |
|---|---|---|---|
| 0.000 | -15.518 | -15.527 | -15.527 |
| 0.040 | -15.344 | -15.319 | -15.296 |
| 0.080 | -15.294 | -15.271 | -15.249 |
| 0.120 | -15.244 | -15.228 | -15.209 |
| 0.160 | -15.191 | -15.184 | -15.171 |
| 0.200 | -15.135 | -15.141 | -15.134 |
| 0.220 | -15.104 | -15.117 | -15.115 |
| — | — | — | — |
| — | — | — | — |
| — | — | — | — |



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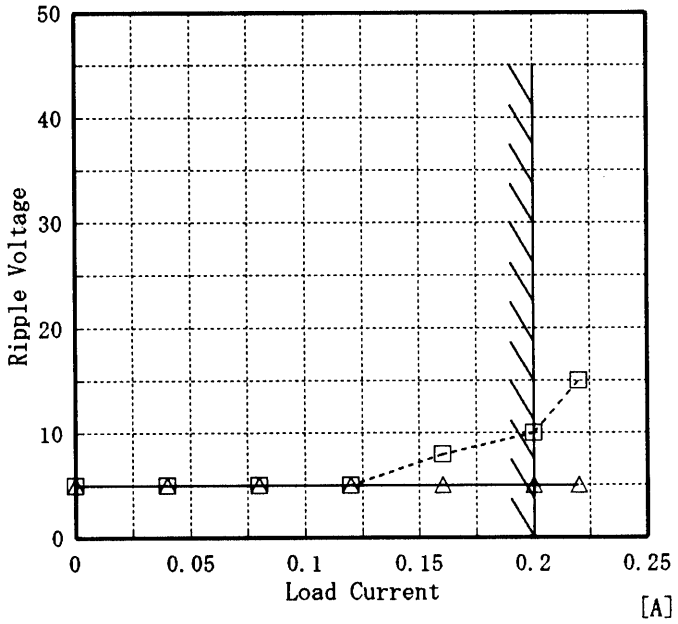
COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Ripple Voltage(by Load Current)<br>リップル電圧(負荷電流特性) |
| Object | +15V 0.2A |

Temperature 25℃
Testing Circuitry Figure A

1. Graph




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。

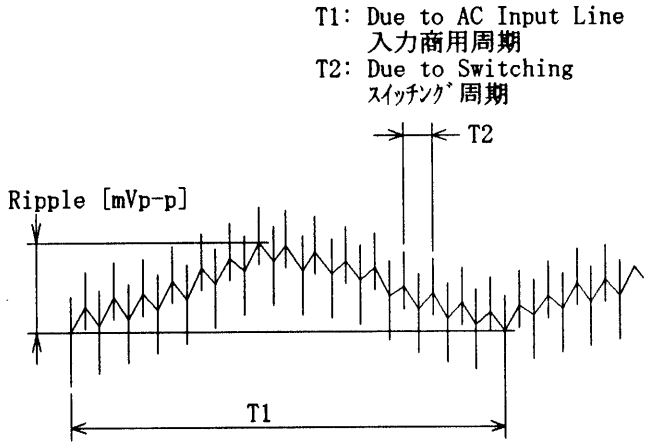



Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

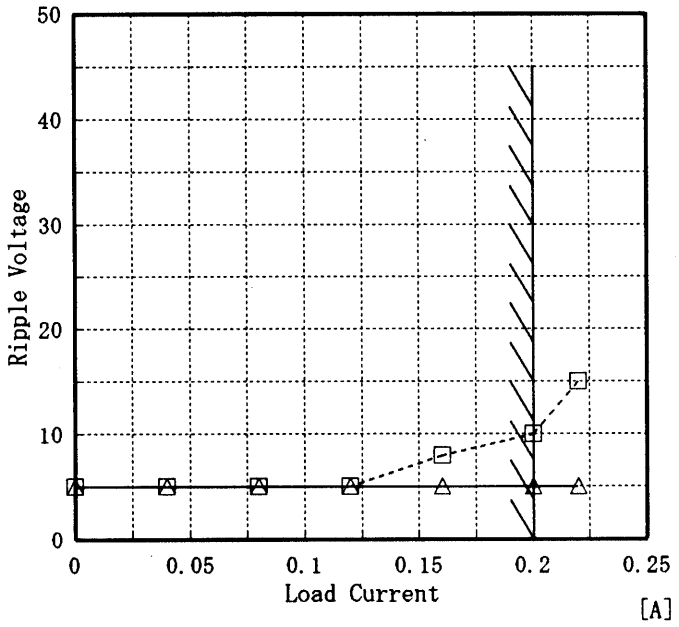
| Load Current [A] | Input Volt. 36.0 [V] Ripple Output Volt. [mV] | Input Volt. 72.0 [V] Ripple Output Volt. [mV] |
|---|---|---|
| 0.000 | 5 | 5 |
| 0.040 | 5 | 5 |
| 0.080 | 5 | 5 |
| 0.120 | 5 | 5 |
| 0.160 | 8 | 5 |
| 0.200 | 10 | 5 |
| 0.220 | 15 | 5 |
| — | — | — |
| — | — | — |
| — | — | — |
| — | — | — |

COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Ripple Voltage(by Load Current)<br>リップル電圧(負荷電流特性) |
| Object | −15V 0.2A |

Temperature 25℃
Testing Circuitry Figure A

1. Graph




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。

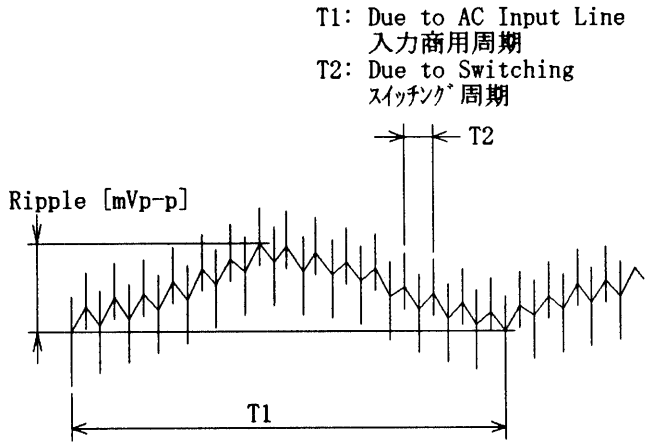



Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

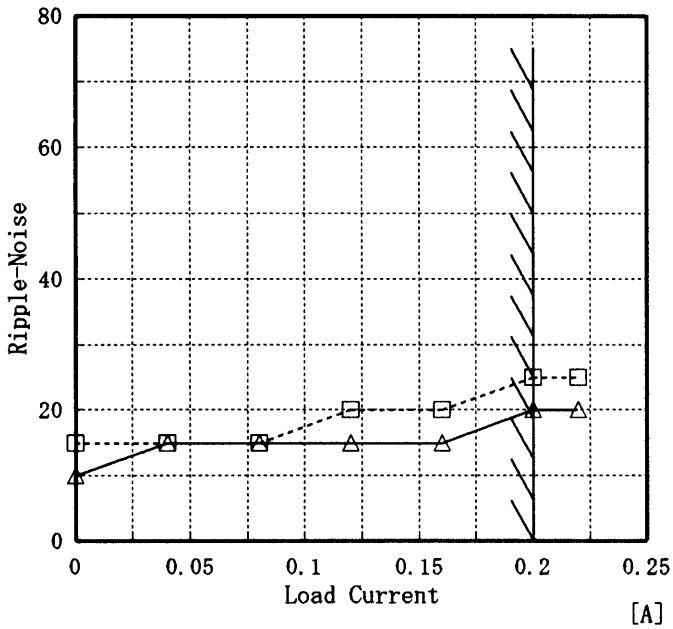
| Load Current [A] | Input Volt. 36.0 [V] Ripple Output Volt. [mV] | Input Volt. 72.0 [V] Ripple Output Volt. [mV] |
|---|---|---|
| 0.000 | 5 | 5 |
| 0.040 | 5 | 5 |
| 0.080 | 5 | 5 |
| 0.120 | 5 | 5 |
| 0.160 | 8 | 5 |
| 0.200 | 10 | 5 |
| 0.220 | 15 | 5 |
| — | — | — |
| — | — | — |
| — | — | — |
| — | — | — |

COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Ripple-Noise リップルノイズ |
| Object | +15V0.2A |

Temperature 25℃
Testing Circuitry Figure A

1. Graph




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
ｽｲｯﾁﾝｸﾞ周期

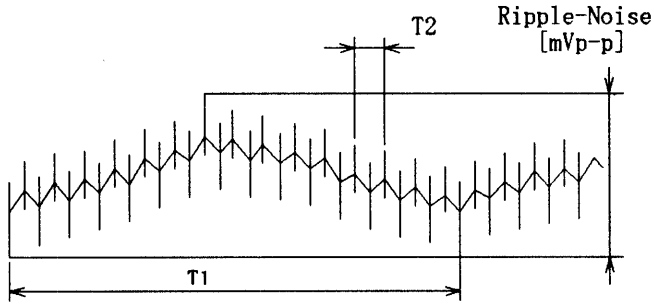



Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

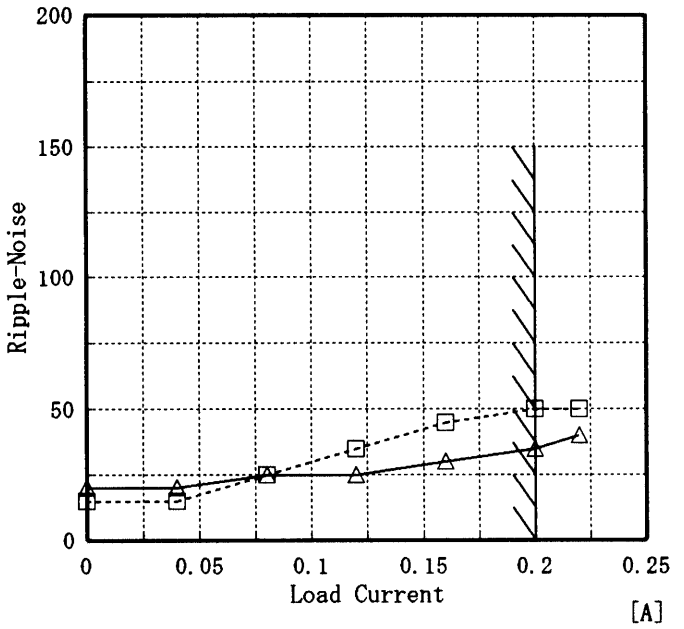
| Load current [A] | Input Volt. 36.0 [V] Ripple-Noise [mV] | Input Volt. 72.0 [V] Ripple-Noise [mV] |
|---|---|---|
| 0.000 | 15 | 10 |
| 0.040 | 15 | 15 |
| 0.080 | 15 | 15 |
| 0.120 | 20 | 15 |
| 0.160 | 20 | 15 |
| 0.200 | 25 | 20 |
| 0.220 | 25 | 20 |
| — | — | — |
| — | — | — |
| — | — | — |
| — | — | — |

COSEL

| | |
|---|---|
| Model | ZUW654815 |
| Item | Ripple-Noise リップルノイズ |
| Object | −15V0.2A |

Temperature 25℃
Testing Circuitry Figure A

1. Graph




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
ｽｲｯﾁﾝｸﾞ周期

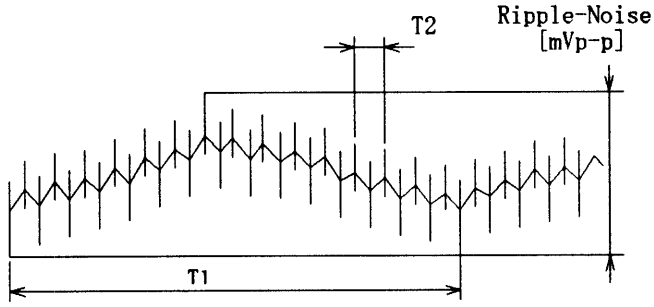



Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

| Load current [A] | Input Volt. 36.0 [V] Ripple-Noise [mV] | Input Volt. 72.0 [V] Ripple-Noise [mV] |
|---|---|---|
| 0.000 | 15 | 20 |
| 0.040 | 15 | 20 |
| 0.080 | 25 | 25 |
| 0.120 | 35 | 25 |
| 0.160 | 45 | 30 |
| 0.200 | 50 | 35 |
| 0.220 | 50 | 40 |
| — | — | — |
| — | — | — |
| — | — | — |
| — | — | — |

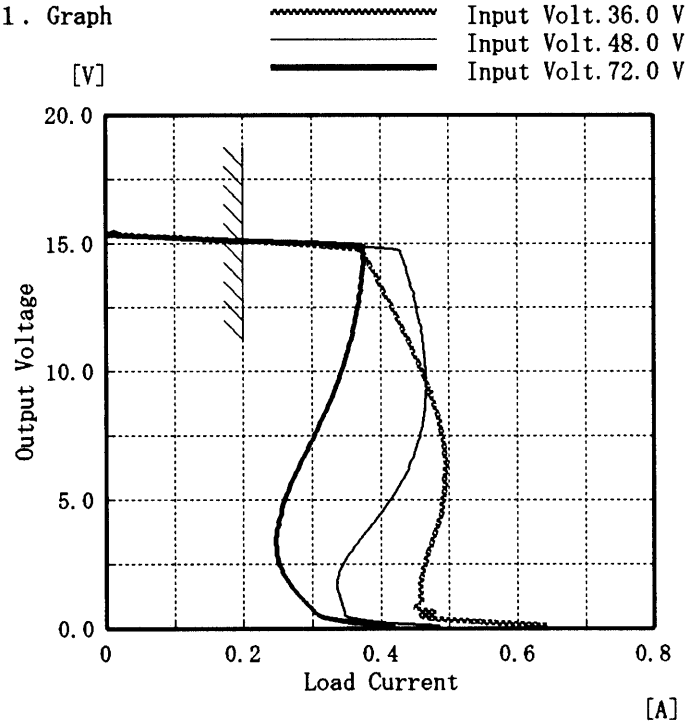
COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Overcurrent Protection<br>過電流保護 |

Temperature 25℃
Testing Circuitry Figure A

Object ＋15V0.2A

1. Graph

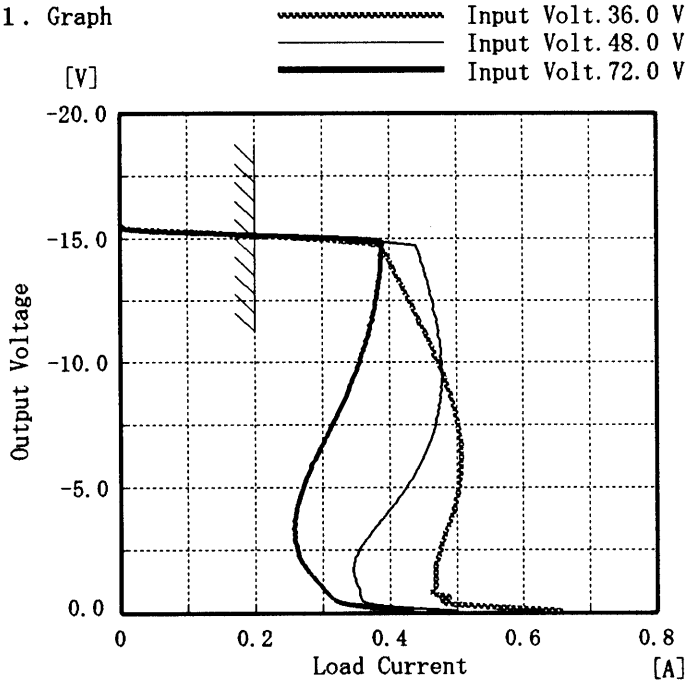



2. Values

| Output Voltage [V] | Input Volt. 36.0[V] Load Current [A] | Input Volt. 48.0[V] Load Current [A] | Input Volt. 72.0[V] Load Current [A] |
|---|---|---|---|
| 15.00 | 0.259 | 0.283 | 0.297 |
| 14.25 | 0.381 | 0.434 | 0.375 |
| 13.50 | 0.396 | 0.441 | 0.374 |
| 12.00 | 0.424 | 0.456 | 0.364 |
| 10.50 | 0.451 | 0.464 | 0.349 |
| 9.00 | 0.473 | 0.465 | 0.329 |
| 7.50 | 0.488 | 0.457 | 0.304 |
| 6.00 | 0.494 | 0.435 | 0.275 |
| 4.50 | 0.489 | 0.401 | 0.255 |
| 3.00 | 0.470 | 0.356 | 0.248 |
| 1.50 | 0.457 | 0.336 | 0.272 |
| 0.00 | 0.643 | 0.487 | 0.421 |

Object −15V0.2A

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. 36.0[V] Load Current [A] | Input Volt. 48.0[V] Load Current [A] | Input Volt. 72.0[V] Load Current [A] |
|---|---|---|---|
| -15.00 | 0.248 | 0.263 | 0.281 |
| -14.25 | 0.397 | 0.446 | 0.388 |
| -13.50 | 0.409 | 0.452 | 0.386 |
| -12.00 | 0.438 | 0.467 | 0.376 |
| -10.50 | 0.466 | 0.476 | 0.362 |
| -9.00 | 0.485 | 0.476 | 0.340 |
| -7.50 | 0.501 | 0.469 | 0.316 |
| -6.00 | 0.505 | 0.446 | 0.285 |
| -4.50 | 0.499 | 0.411 | 0.265 |
| -3.00 | 0.481 | 0.367 | 0.259 |
| -1.50 | 0.468 | 0.346 | 0.281 |
| 0.00 | 0.659 | 0.501 | 0.436 |



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| | | | |
|---|---|---|---|
| Model | ZUW64815 | | |
| Item | Dynamic Load Responce<br>動的負荷変動 | Temperature<br>Testing Circuitry | 25℃<br>Figure A |
| Object | +15V0.2A | | |

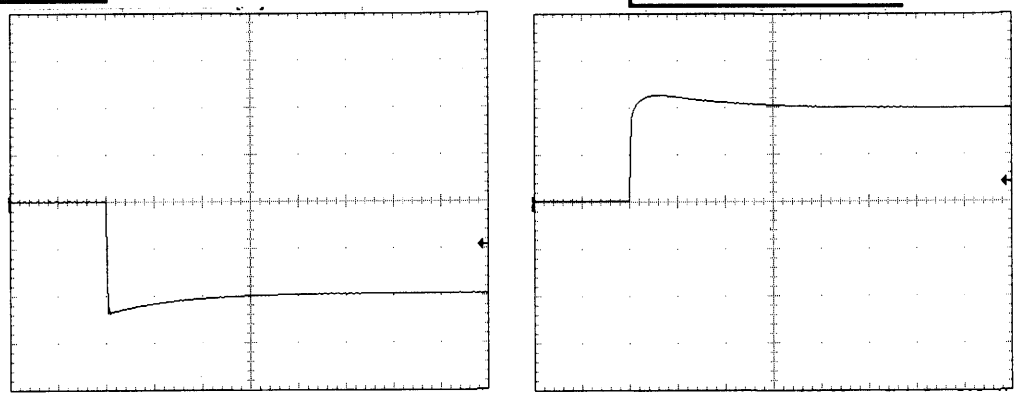
Input Volt. 48.0 V

Cycle 100 mS

Load Current

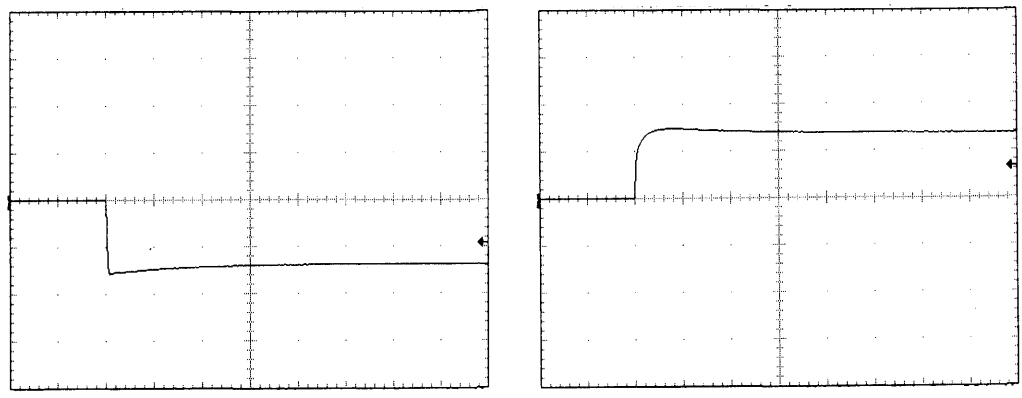
Min. Load ⟷
Load 100 %

200 mV/div



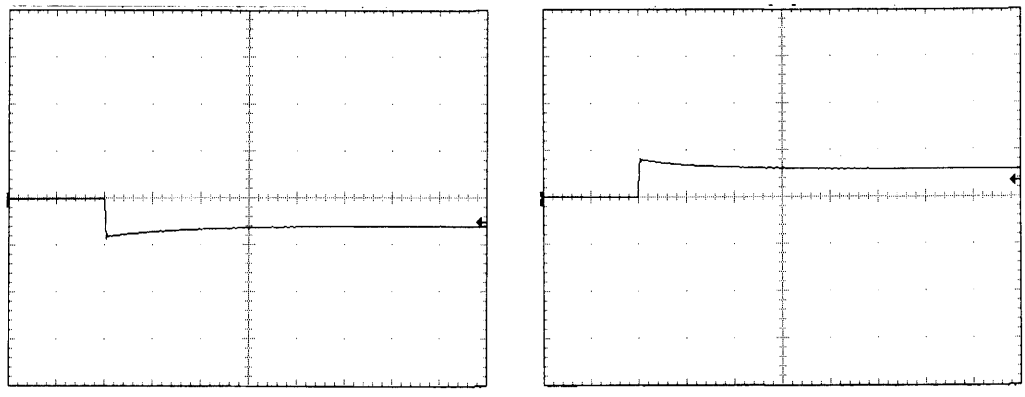
Min. Load ⟷
Load 50 %

200 mV/div



Load 50%⟷
Load 100 %

200 mV/div



1 mS/div

COSEL

| | | | |
|---|---|---|---|
| Model | ZUW64815 | | |
| Item | Dynamic Load Responce<br>動的負荷変動 | Temperature<br>Testing Circuitry | 25℃<br>Figure A |
| Object | −15V0.2A | | |

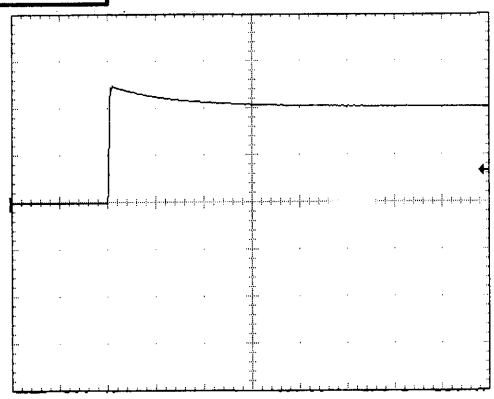
Input Volt. 48.0 V

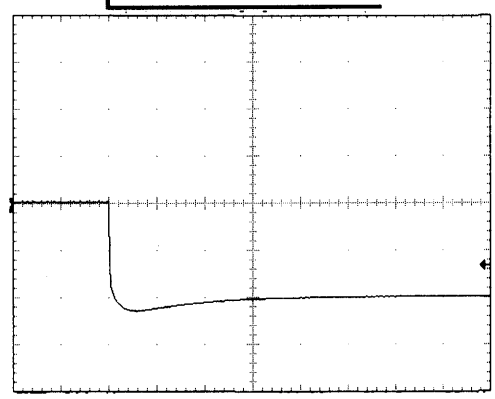
Cycle 100 mS

Load Current

Min. Load ⟷
Load 100 %

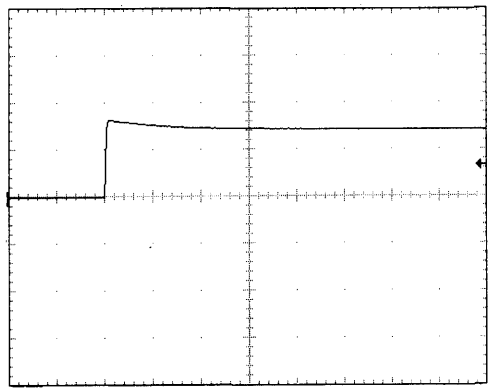
200 mV/div

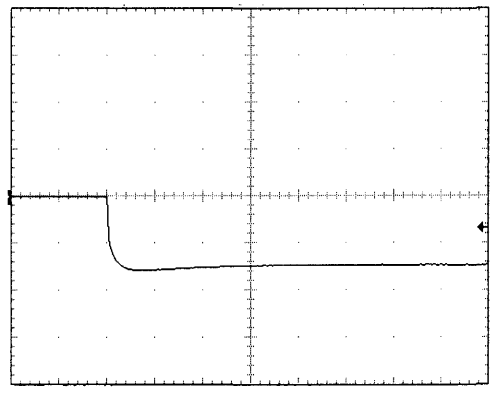




Min. Load ⟷
Load 50 %

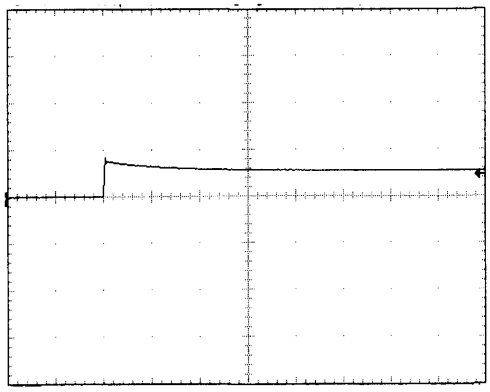
200 mV/div

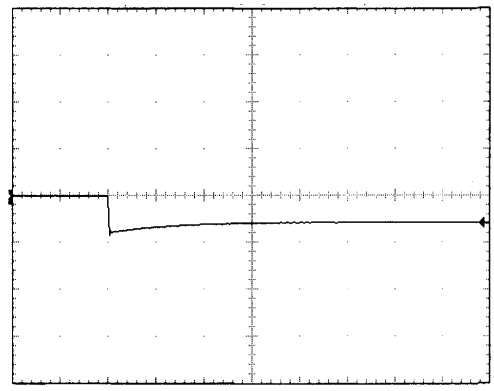




Load 50%⟷
Load 100 %

200 mV/div





1 mS/div



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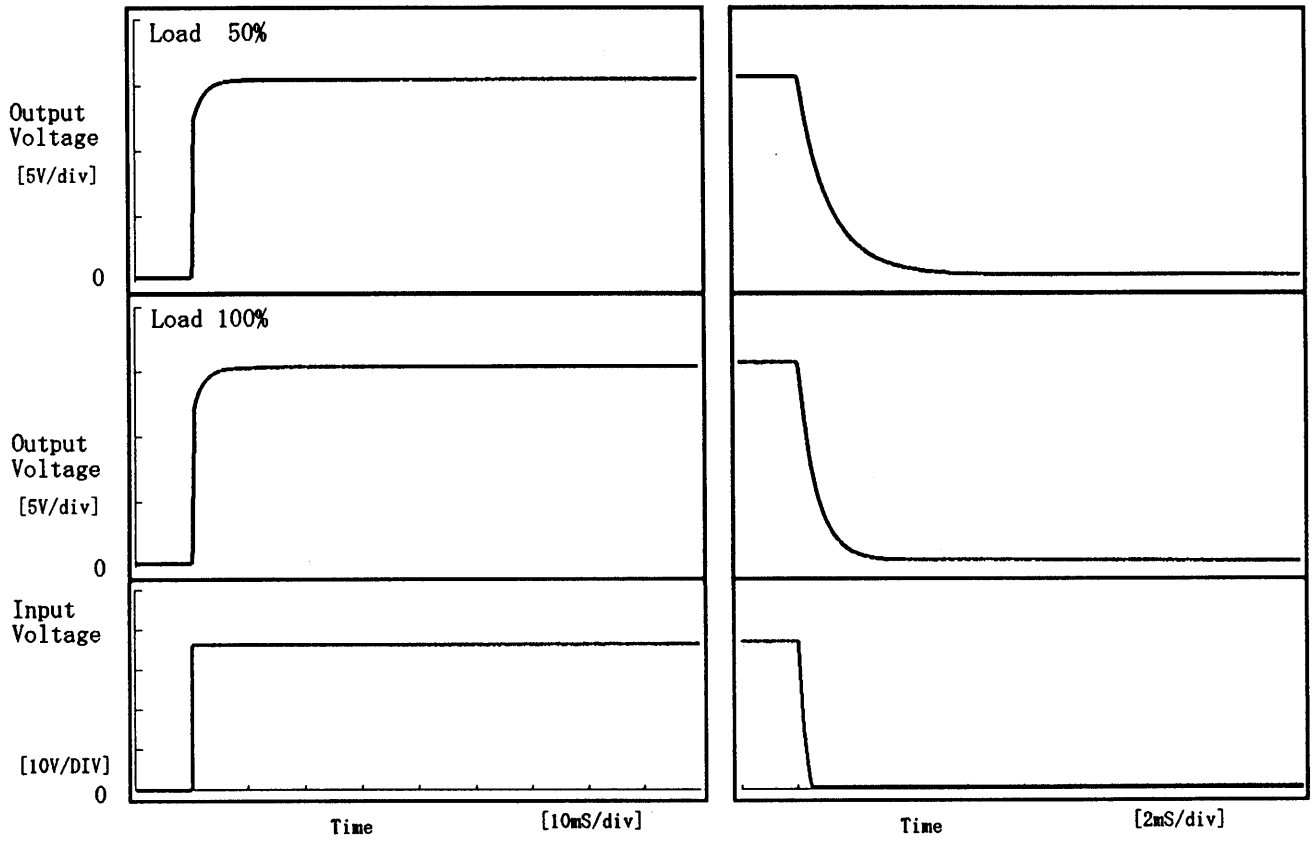
COSEL

| | | | |
|---|---|---|---|
| Model | ZUW64815 | | |
| Item | Rise and Fall Time 立上り、立下り時間 | Temperature<br>Testing Circuitry | 25℃<br>Figure A |
| Object | +15V0.2A | | |

1. Graph

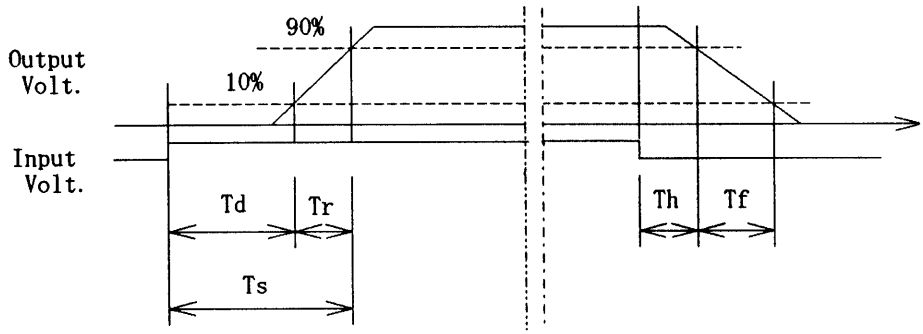
Input Volt. 36.0 V




2. Values

[mS]

| Load \ Time | T d | T r | T s | T h | T f |
|---|---|---|---|---|---|
| 50 % | 0.10 | 1.45 | 1.55 | 0.26 | 2.70 |
| 100 % | 0.10 | 1.55 | 1.65 | 0.18 | 1.47 |



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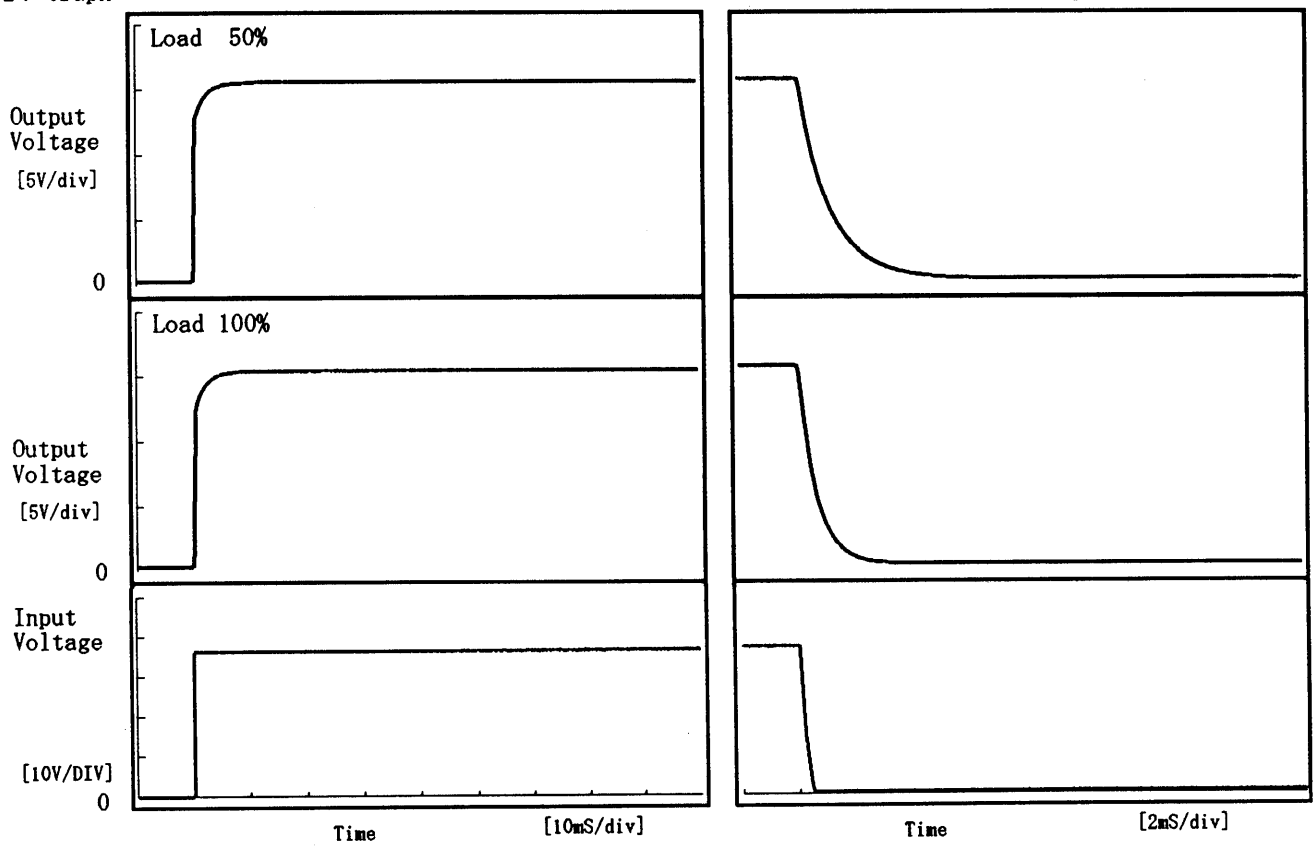
COSEL

| | | | |
|---|---|---|---|
| Model | ZUW64815 | | |
| Item | Rise and Fall Time 立上り、立下り時間 | Temperature<br>Testing Circuitry | 25℃<br>Figure A |
| Object | -15V0.2A | | |

1. Graph

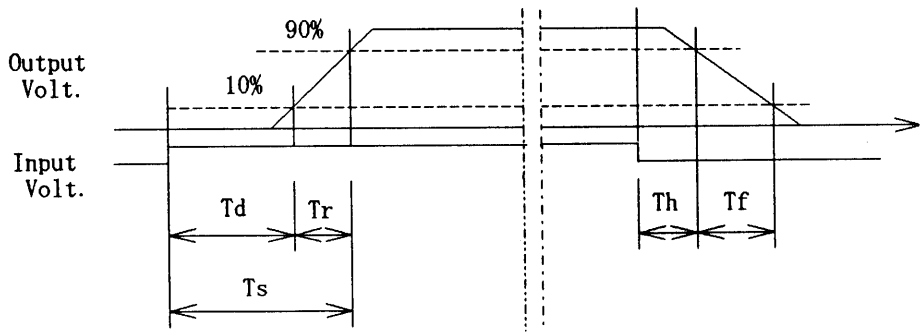
Input Volt. 36.0 V




2. Values

[mS]

| Load \ Time | Td | Tr | Ts | Th | Tf |
|---|---|---|---|---|---|
| 50 % | 0.10 | 1.25 | 1.35 | 0.27 | 2.56 |
| 100 % | 0.10 | 1.40 | 1.50 | 0.19 | 1.40 |






BC−2062

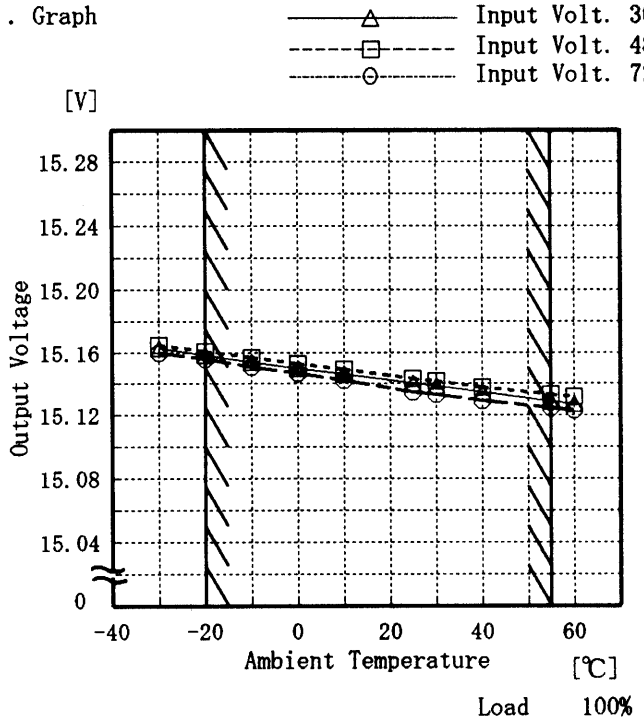
COSEL

| Model | ZUW64815 |
|---|---|
| Item | Ambient Temperature Drift<br>周囲温度変動 |

Testing Circuitry Figure A

Object +15V0.2A

1. Graph

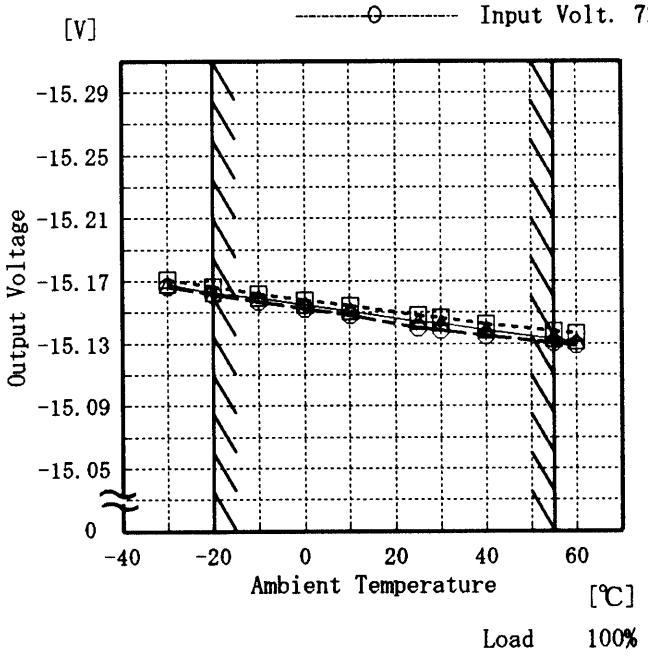



2. Values

| Temperature [℃] | Input Volt. 36.0[V] Output Volt. [V] | Input Volt. 48.0[V] Output Volt. [V] | Input Volt. 72.0[V] Output Volt. [V] |
|---|---|---|---|
| -30 | 15.162 | 15.165 | 15.160 |
| -20 | 15.158 | 15.161 | 15.155 |
| -10 | 15.154 | 15.156 | 15.151 |
| 0 | 15.150 | 15.153 | 15.146 |
| 10 | 15.146 | 15.149 | 15.142 |
| 25 | 15.140 | 15.143 | 15.134 |
| 30 | 15.139 | 15.141 | 15.133 |
| 40 | 15.134 | 15.138 | 15.129 |
| 55 | 15.129 | 15.133 | 15.125 |
| 60 | 15.127 | 15.131 | 15.123 |
| — | — | — | — |

Object −15V0.2A

1. Graph




2. Values

| Temperature [℃] | Input Volt. 36.0[V] Output Volt. [V] | Input Volt. 48.0[V] Output Volt. [V] | Input Volt. 72.0[V] Output Volt. [V] |
|---|---|---|---|
| -30 | -15.168 | -15.171 | -15.167 |
| -20 | -15.163 | -15.166 | -15.162 |
| -10 | -15.159 | -15.162 | -15.157 |
| 0 | -15.155 | -15.158 | -15.152 |
| 10 | -15.150 | -15.154 | -15.148 |
| 25 | -15.144 | -15.148 | -15.140 |
| 30 | -15.143 | -15.146 | -15.139 |
| 40 | -15.139 | -15.143 | -15.135 |
| 55 | -15.133 | -15.138 | -15.130 |
| 60 | -15.131 | -15.136 | -15.129 |
| — | — | — | — |

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

(注)斜線は定格周囲温度範囲を示す。

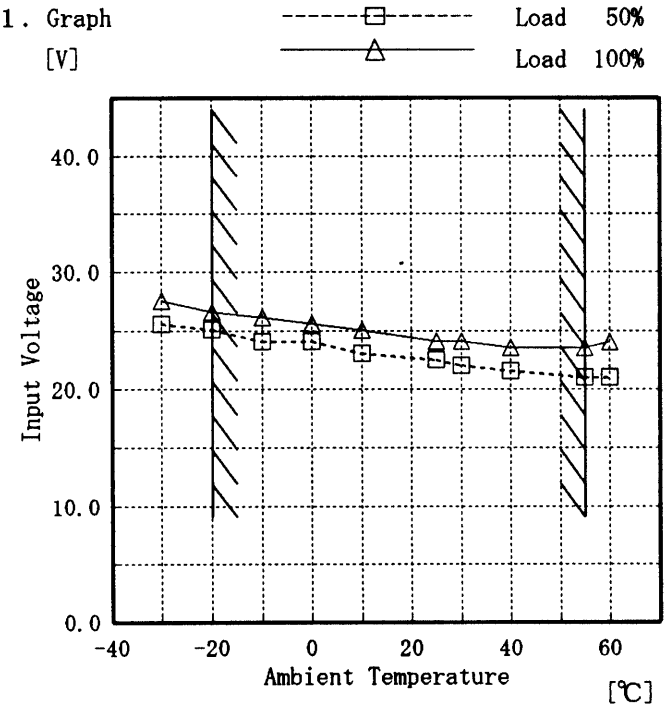
COSEL

| Model | ZUW64815 |
|---|---|
| Item | Minimum Input Voltage for Regulated Output Voltage<br>最低レギュレーション電圧 |

Testing Circuitry Figure A

Object +15V0.2A

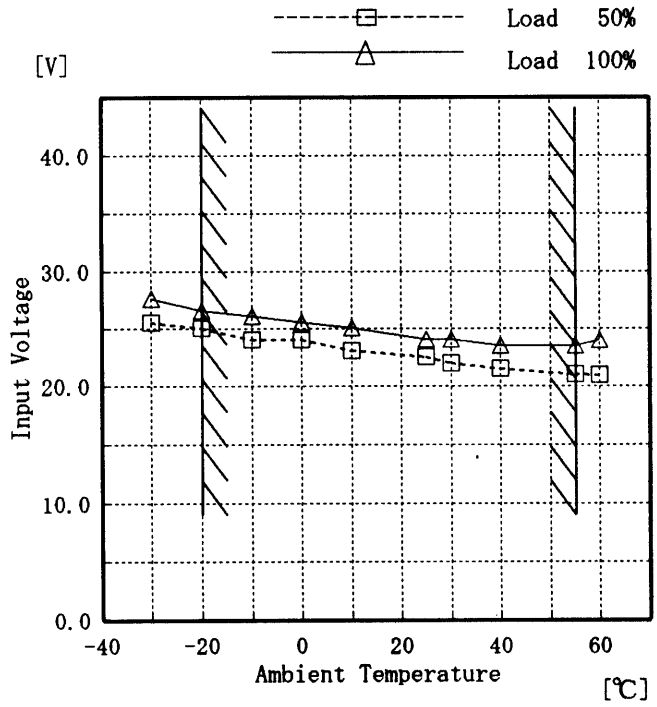
1. Graph




2. Values

| Ambient Temp. [℃] | Load 50% Input Volt. [V] | Load 100% Input Volt. [V] |
|---|---|---|
| -30 | 25.6 | 27.6 |
| -20 | 25.1 | 26.6 |
| -10 | 24.1 | 26.1 |
| 0 | 24.1 | 25.6 |
| 10 | 23.1 | 25.1 |
| 25 | 22.5 | 24.1 |
| 30 | 22.0 | 24.1 |
| 40 | 21.5 | 23.6 |
| 55 | 21.0 | 23.5 |
| 60 | 21.0 | 24.0 |
| — | — | — |

Object −15V0.2A




2. Values

| Ambient Temp. [℃] | Load 50% Input Volt. [V] | Load 100% Input Volt. [V] |
|---|---|---|
| -30 | 25.6 | 27.6 |
| -20 | 25.1 | 26.6 |
| -10 | 24.1 | 26.1 |
| 0 | 24.1 | 25.6 |
| 10 | 23.1 | 25.1 |
| 25 | 22.5 | 24.1 |
| 30 | 22.0 | 24.1 |
| 40 | 21.5 | 23.6 |
| 55 | 21.0 | 23.5 |
| 60 | 21.0 | 24.0 |
| — | — | — |

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

(注)斜線は定格周囲温度範囲を示す。

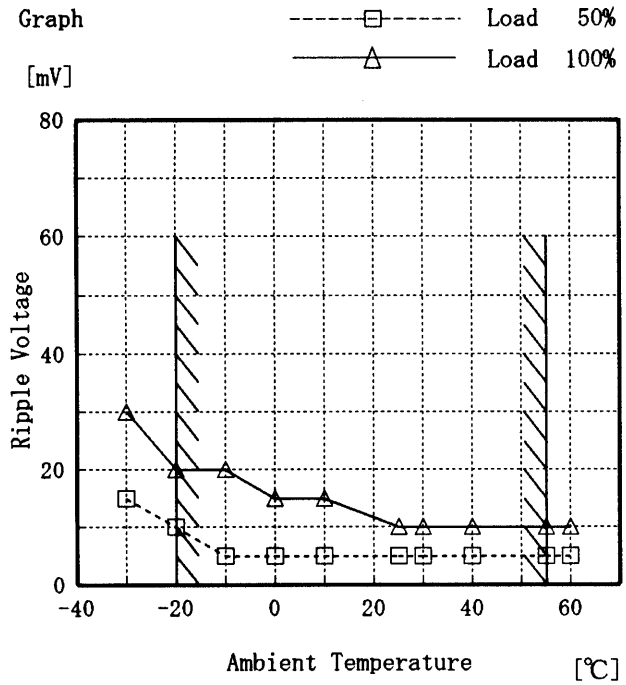
COSEL

| Model | ZUW64815 |
|---|---|
| Item | Ripple Voltage (by Ambient Temp.)<br>リップル電圧（周囲温度特性） |

Testing Circuitry　Figure A

Object　+15V0.4A

1. Graph



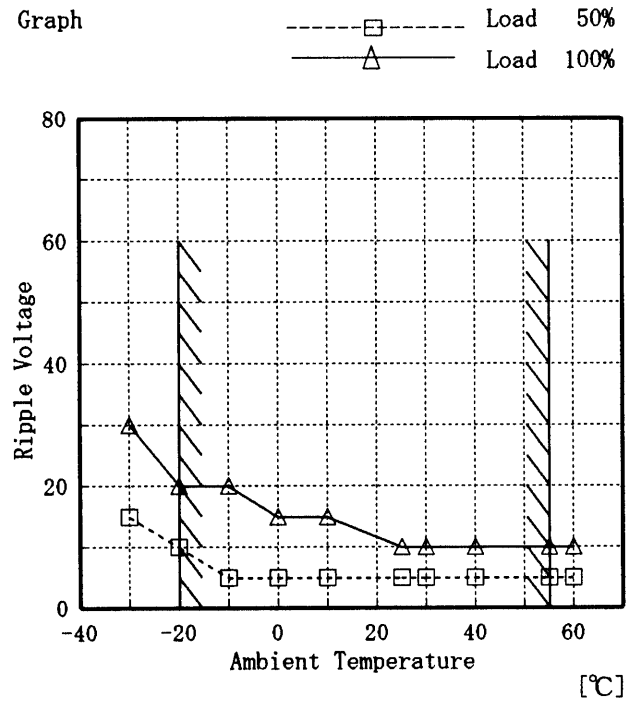

Input Volt.　36.0 V

2. Values

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

Object　−15V0.4A

1. Graph




Input Volt.　36.0 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. [℃] | Load 50% Ripple Output Volt. [mV] | Load 100% Ripple Output Volt. [mV] |
|---|---|---|
| -30 | 15 | 30 |
| -20 | 10 | 20 |
| -10 | 5 | 20 |
| 0 | 5 | 15 |
| 10 | 5 | 15 |
| 25 | 5 | 10 |
| 30 | 5 | 10 |
| 40 | 5 | 10 |
| 55 | 5 | 10 |
| 60 | 5 | 10 |
| — | — | — |

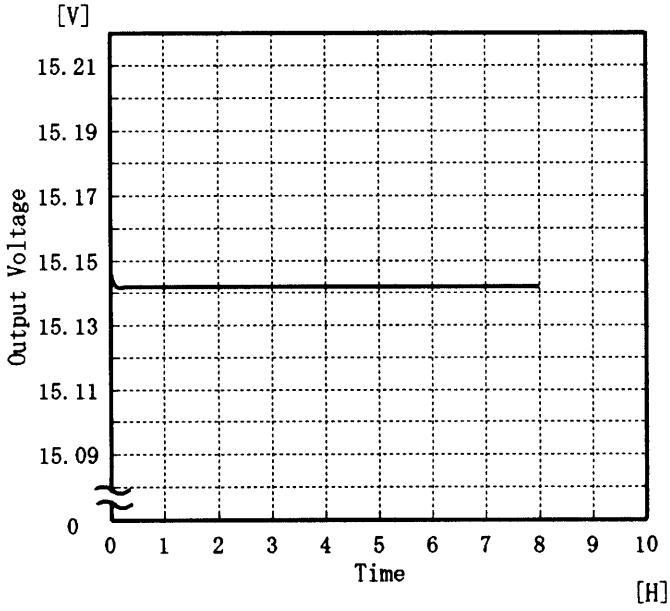
COSEL

| Model | ZUW64815 |
|---|---|
| Item | Time Lapse Drift 経時ドリフト |

Temperature 25 ℃
Testing Circuitry Figure A

Object +15V0.2A

1. Graph



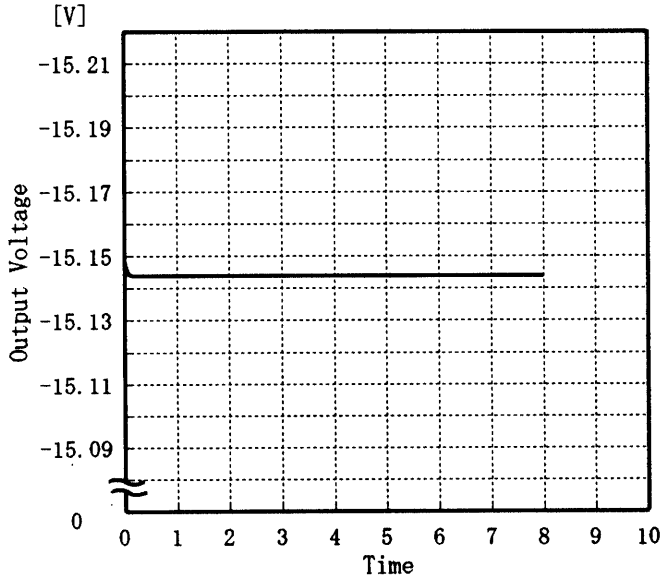

Input Volt. 48.0V
Load 100%

2. Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | 15.146 |
| 0.5 | 15.142 |
| 1.0 | 15.142 |
| 2.0 | 15.142 |
| 3.0 | 15.142 |
| 4.0 | 15.142 |
| 5.0 | 15.142 |
| 6.0 | 15.142 |
| 7.0 | 15.142 |
| 8.0 | 15.142 |

Object −15V0.2A

1. Graph




Input Volt. 48.0V
Load 100%

2. Values

| Time since start [H] | Output Voltage [V] |
|---|---|
| 0.0 | -15.148 |
| 0.5 | -15.144 |
| 1.0 | -15.144 |
| 2.0 | -15.144 |
| 3.0 | -15.144 |
| 4.0 | -15.144 |
| 5.0 | -15.144 |
| 6.0 | -15.144 |
| 7.0 | -15.144 |
| 8.0 | -15.144 |



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COSEL

| Model | ZUW64815 |
|---|---|
| Item | Output Voltage Accuracy 定電圧精度 |

Testing Circuitry Figure A

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 : 36.0～72.0 V

Load Current ( AVR 1 ) : 0.0～0.2 A

( AVR 2 ) : 0.0～0.2 A

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

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

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 36.0～72.0 V

負荷電流 (AVR 1) 0.0～0.2 A

(AVR 2) 0.0～0.2 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

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

Object ＋15V0.2A

| Item | Temperature [℃] | Input Voltage [V] | Output Current [A] | Output Voltage [V] | Output Voltage Accuracy [mV] | Output Voltage Accuracy (Ration) [%] |
|---|---|---|---|---|---|---|
| Maximum Voltage | -20 | 48.0 | 0.2 | 15.157 | ±194 | ±1.3 |
| Minimum Voltage | 25 | 72.0 | 0.0 | 14.770 | | |

Object −15V0.2A

| Item | Temperature [℃] | Input Voltage [V] | Output Current [A] | Output Voltage [V] | Output Voltage Accuracy [mV] | Output Voltage Accuracy (Ration) [%] |
|---|---|---|---|---|---|---|
| Maximum Voltage | -20 | 48.0 | 0.2 | -15.164 | ±183 | ±1.3 |
| Minimum Voltage | 55 | 72.0 | 0.0 | -14.798 | | |

COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Condensation 結露特性 |
| Object | +15V 0.2A |

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 26℃ 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２６℃、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 | 15.165 | 5 | 25 |
| | 2 | 15.171 | 5 | 25 |
| | 3 | 15.173 | 5 | 30 |
| Load 100 % | 1 | 15.053 | 10 | 35 |
| | 2 | 15.055 | 10 | 35 |
| | 3 | 15.055 | 15 | 35 |

Input Volt. 48.0 V

COSEL

| | |
|---|---|
| Model | ZUW64815 |
| Item | Condensation 結露特性 |
| Object | −15V 0.2A |

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 26℃ 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２６℃、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 | -15.152 | 5 | 30 |
| | 2 | -15.170 | 5 | 30 |
| | 3 | -15.172 | 5 | 30 |
| Load 100 % | 1 | -15.025 | 10 | 35 |
| | 2 | -15.035 | 10 | 35 |
| | 3 | -15.030 | 15 | 35 |

Input Volt. 48.0 V

COSEL

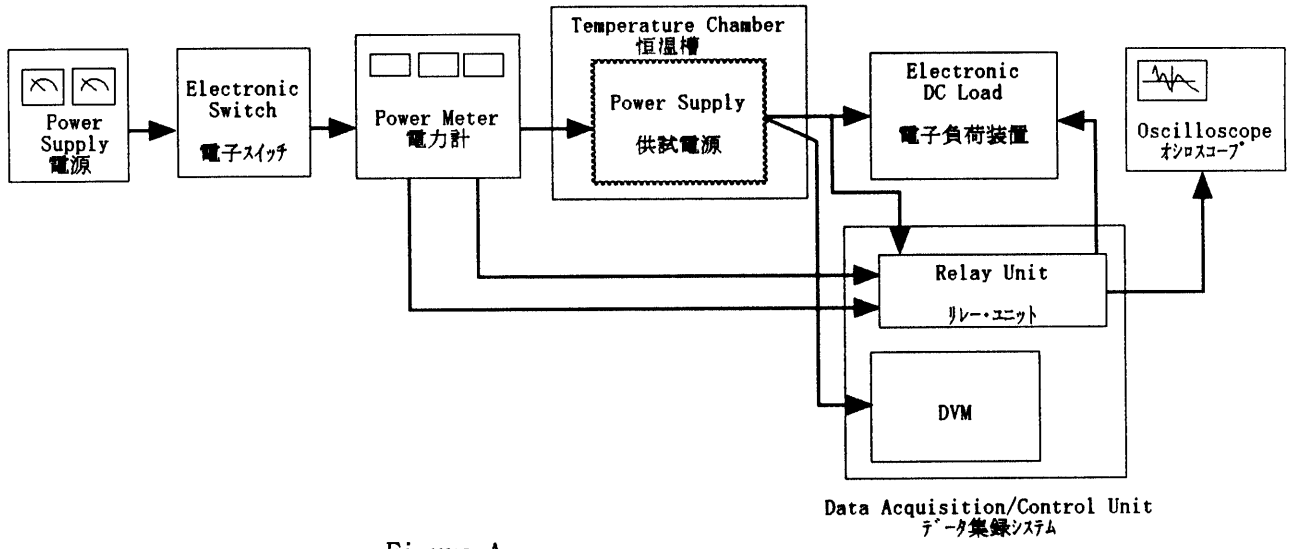


Figure A