参考資料

COSEL

TEST DATA OF ZUW60515

(5.0V INPUT)

Regulated DC Power Supply

Date : Sep.21. 1996

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Design Manager

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Design Engineer

コーセル株式会社

COSEL CO.,LTD.

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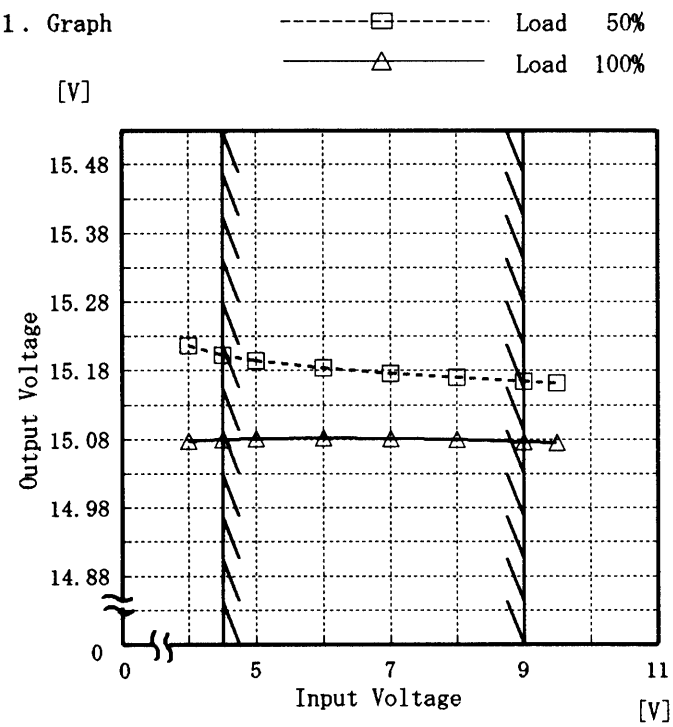
1. Graph



2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	15.217	15.078
4.5	15.203	15.080
5.0	15.194	15.081
6.0	15.184	15.082
7.0	15.176	15.081
8.0	15.170	15.079
9.0	15.165	15.077
9.5	15.162	15.075
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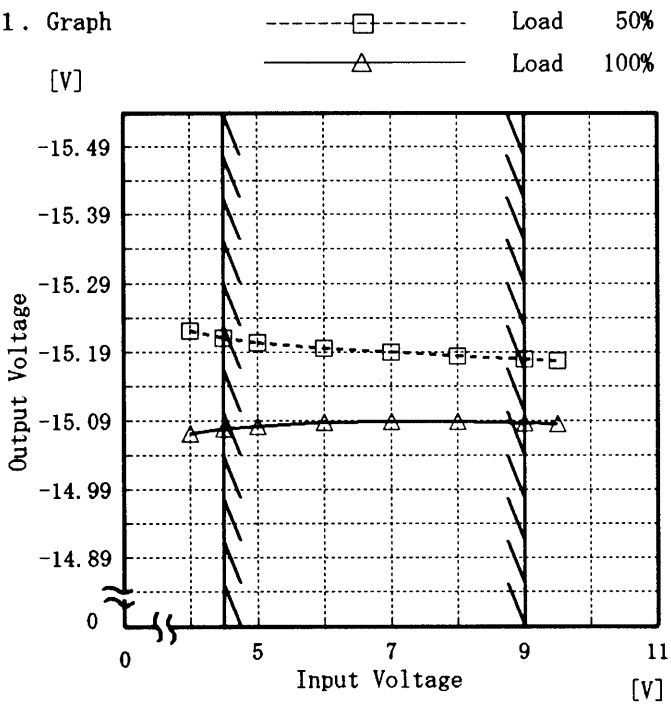
Object −15V0.2A

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

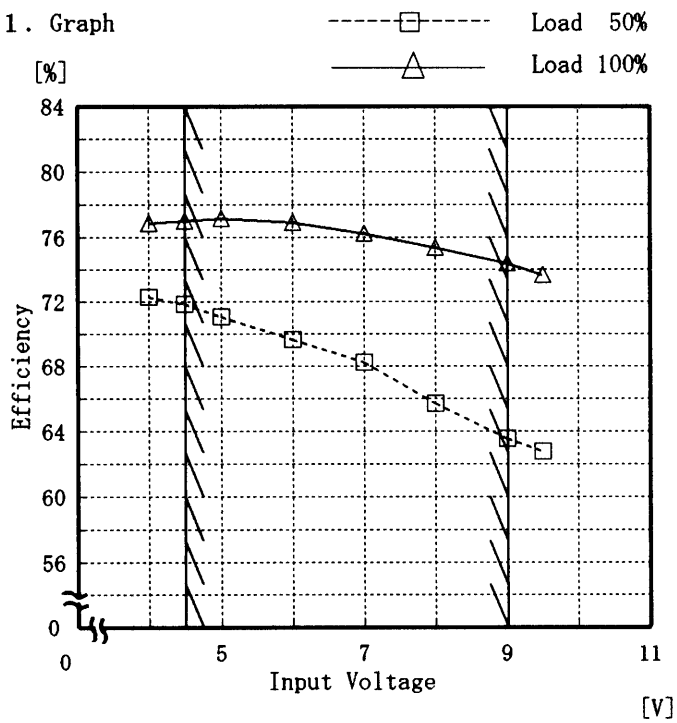
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	-15.221	-15.071
4.5	-15.210	-15.078
5.0	-15.204	-15.082
6.0	-15.195	-15.087
7.0	-15.190	-15.089
8.0	-15.184	-15.089
9.0	-15.179	-15.087
9.5	-15.177	-15.086
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW60515
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 [%]
4.0	72.3	76.9
4.5	71.8	77.0
5.0	71.1	77.1
6.0	69.6	76.9
7.0	68.2	76.2
8.0	65.7	75.4
9.0	63.6	74.4
9.5	62.8	73.7
—	—	—
—	—	—
—	—	—
—	—	—

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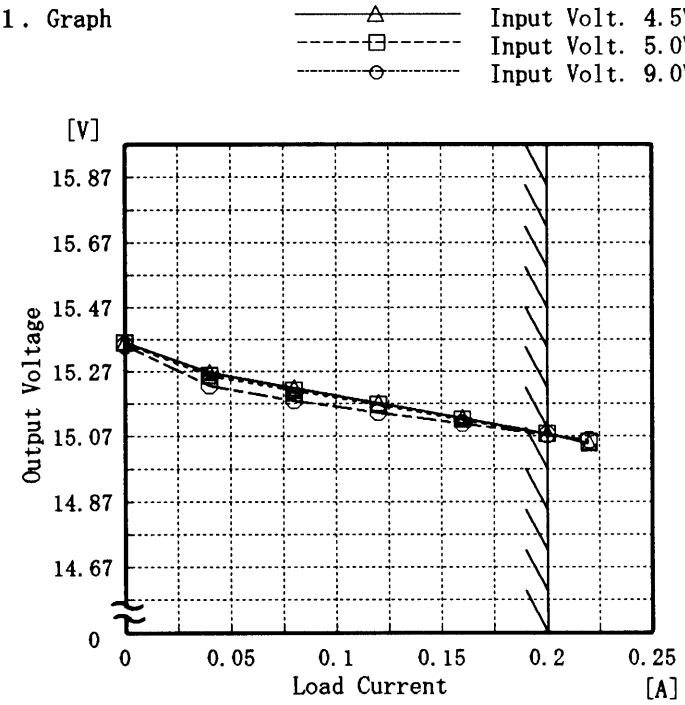
Model	ZUW60515	Temperature	25℃
Item	Load Regulation 静的負荷変動	Testing Circuitry	Figure A

Object ＋15V0.2A

1. Graph

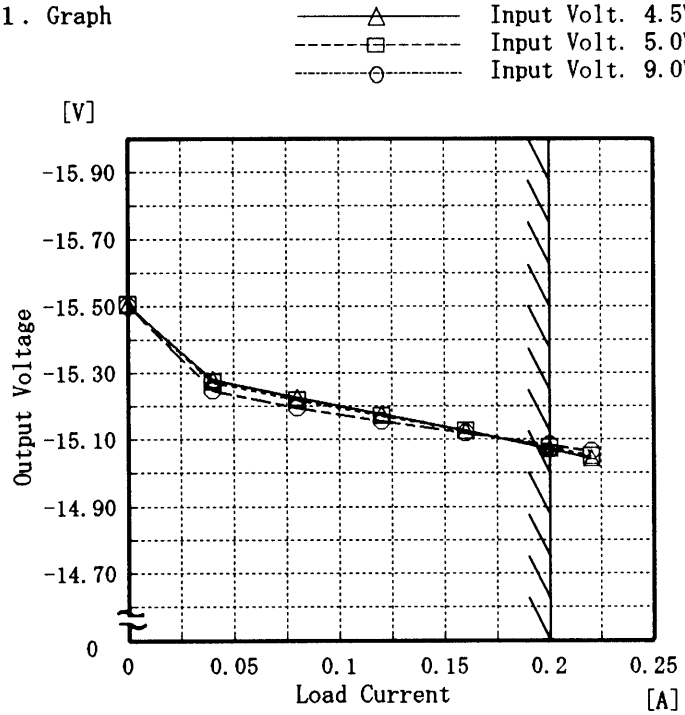


2. Values

Load Current [A]	Input Volt. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
0.000	15.362	15.361	15.353
0.040	15.267	15.259	15.227
0.080	15.219	15.211	15.181
0.120	15.173	15.167	15.143
0.160	15.125	15.122	15.108
0.200	15.076	15.077	15.075
0.220	15.048	15.052	15.057
—	—	—	—
—	—	—	—
—	—	—	—

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. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
0.000	-15.506	-15.508	-15.503
0.040	-15.281	-15.275	-15.248
0.080	-15.228	-15.221	-15.196
0.120	-15.178	-15.174	-15.155
0.160	-15.127	-15.126	-15.119
0.200	-15.073	-15.078	-15.084
0.220	-15.043	-15.051	-15.066
—	—	—	—
—	—	—	—
—	—	—	—

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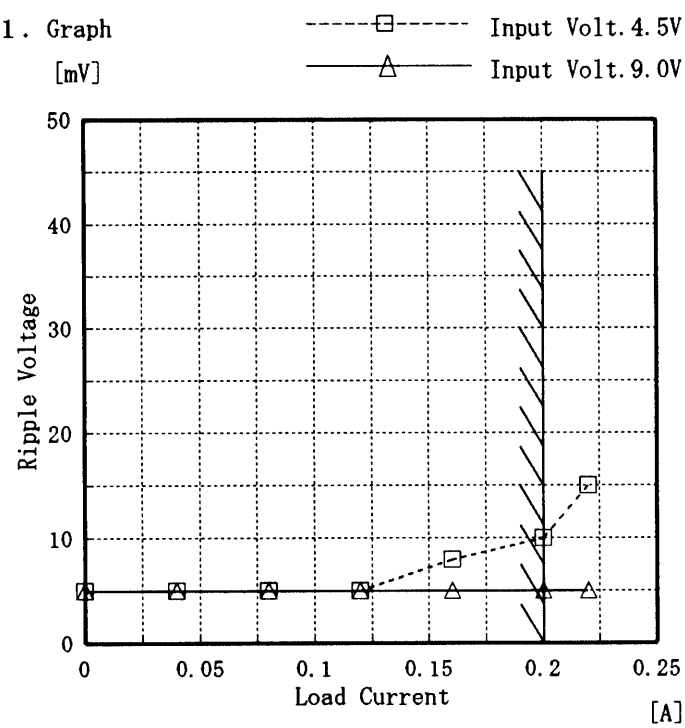
Model	ZUW6515
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+15V 0.2A

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。

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

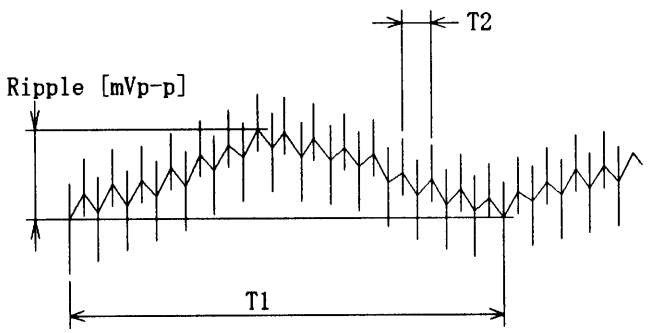


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

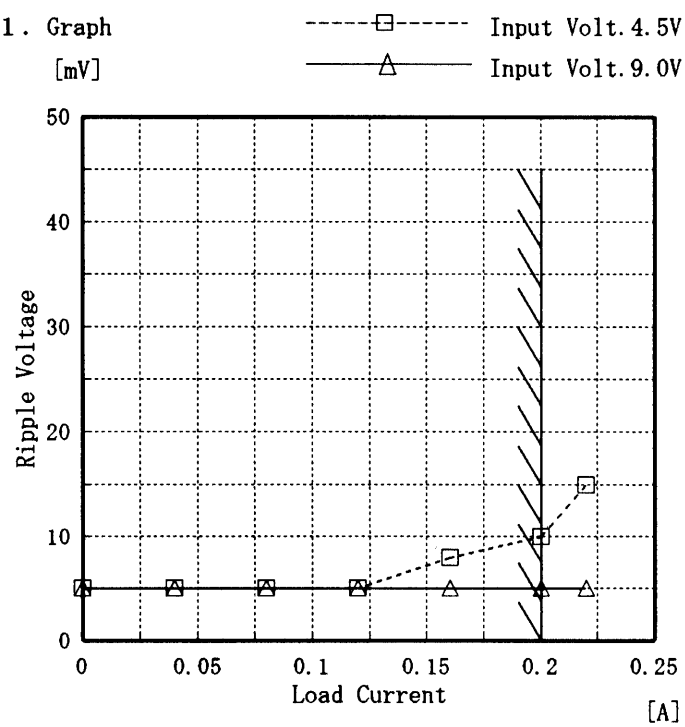
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	8	5
0.200	10	5
0.220	15	5
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW60515
Item	Ripple Voltage(by Load Current) 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。

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

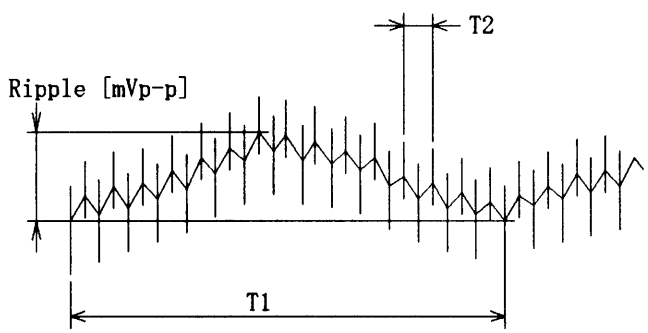


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [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
—	—	—
—	—	—
—	—	—
—	—	—

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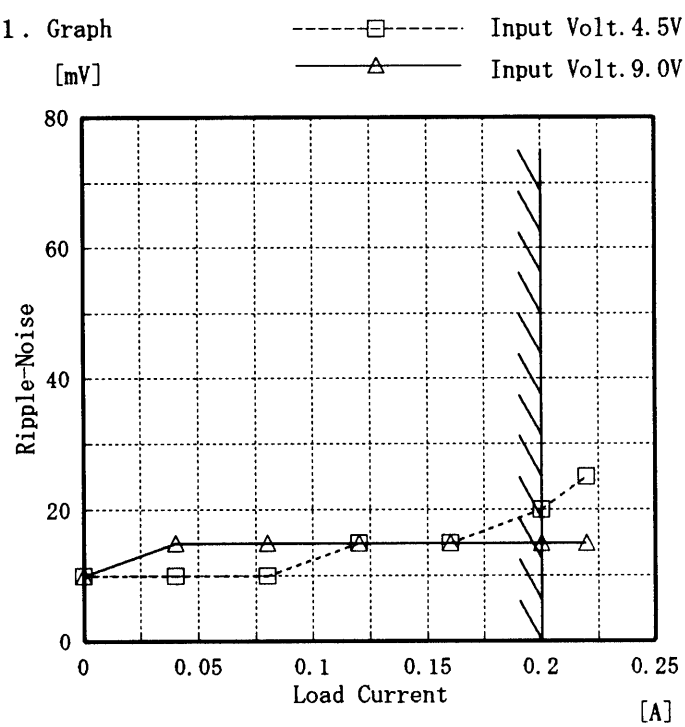
Model	ZUW60515
Item	Ripple-Noise リップルノイズ
Object	+15V0.2A

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

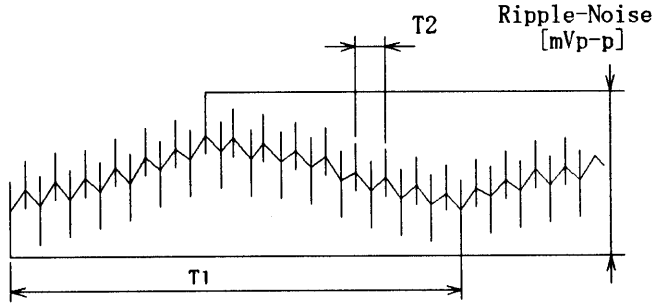


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

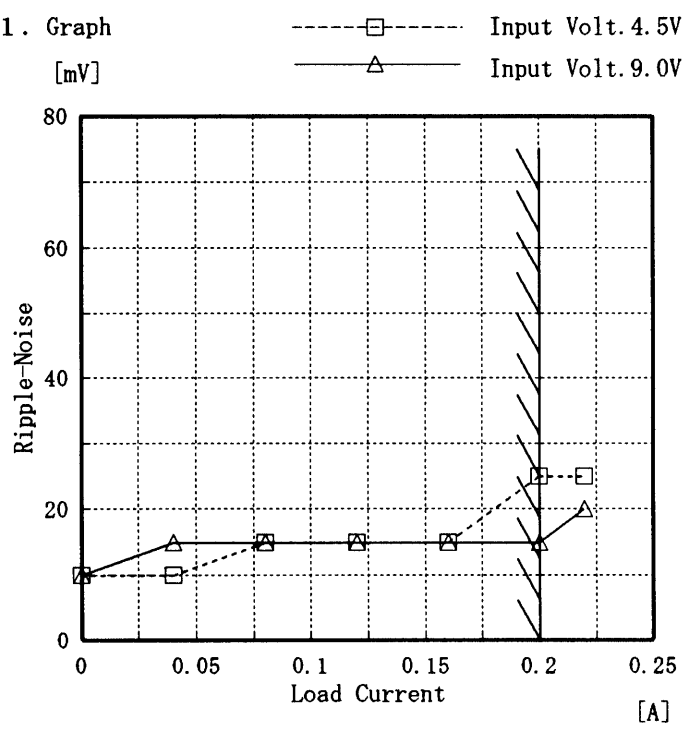
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	10	10
0.040	10	15
0.080	10	15
0.120	15	15
0.160	15	15
0.200	20	15
0.220	25	15
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW60515
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

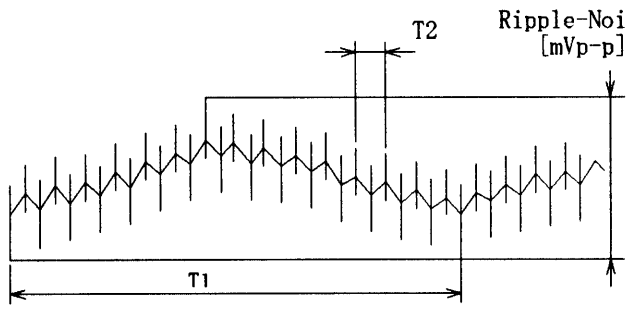


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	10	10
0.040	10	15
0.080	15	15
0.120	15	15
0.160	15	15
0.200	25	15
0.220	25	20
—	—	—
—	—	—
—	—	—
—	—	—

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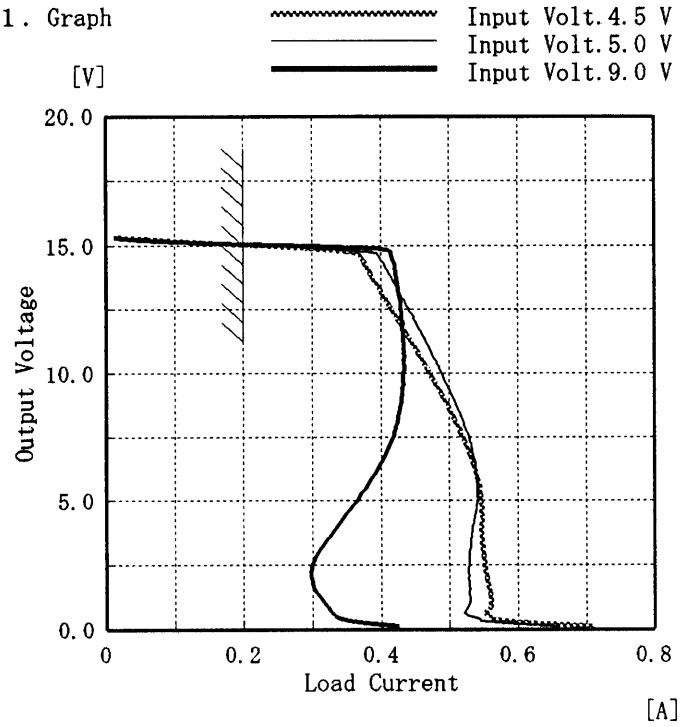
Model	ZUW60515
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object +15V0.2A

1. Graph

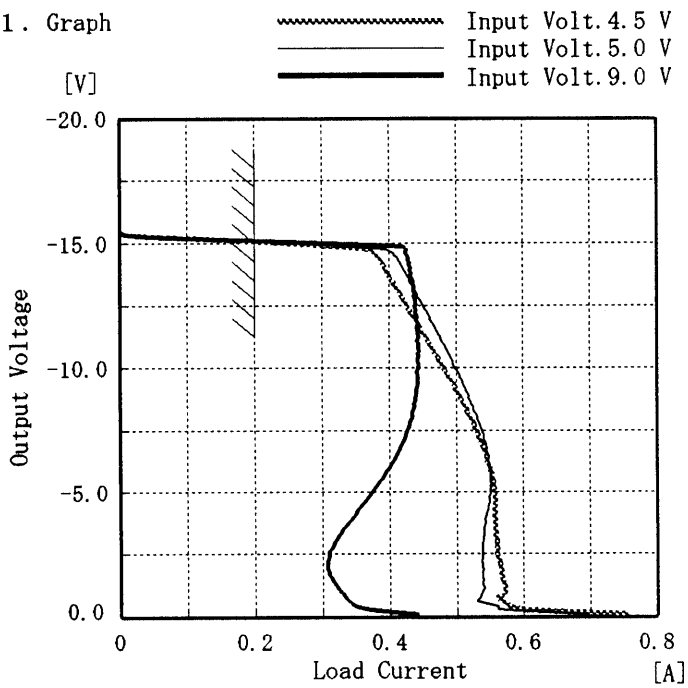


2. Values

Output Voltage [V]	Input Volt. 4.5[V] Load Current [A]	Input Volt. 5.0[V] Load Current [A]	Input Volt. 9.0[V] Load Current [A]
15.00	0.223	0.227	0.297
14.25	0.377	0.405	0.420
13.50	0.391	0.418	0.424
12.00	0.425	0.450	0.433
10.50	0.459	0.477	0.434
9.00	0.490	0.504	0.430
7.50	0.517	0.526	0.419
6.00	0.539	0.539	0.391
4.50	0.546	0.537	0.350
3.00	0.548	0.529	0.311
1.50	0.558	0.529	0.303
0.00	0.712	0.660	0.426

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. 4.5[V] Load Current [A]	Input Volt. 5.0[V] Load Current [A]	Input Volt. 9.0[V] Load Current [A]
15.00	0.235	0.240	0.216
14.25	0.388	0.416	0.430
13.50	0.405	0.429	0.435
12.00	0.437	0.460	0.441
10.50	0.473	0.490	0.444
9.00	0.502	0.516	0.440
7.50	0.529	0.537	0.428
6.00	0.550	0.550	0.399
4.50	0.557	0.548	0.359
3.00	0.559	0.540	0.320
1.50	0.569	0.539	0.315
0.00	0.757	0.695	0.444

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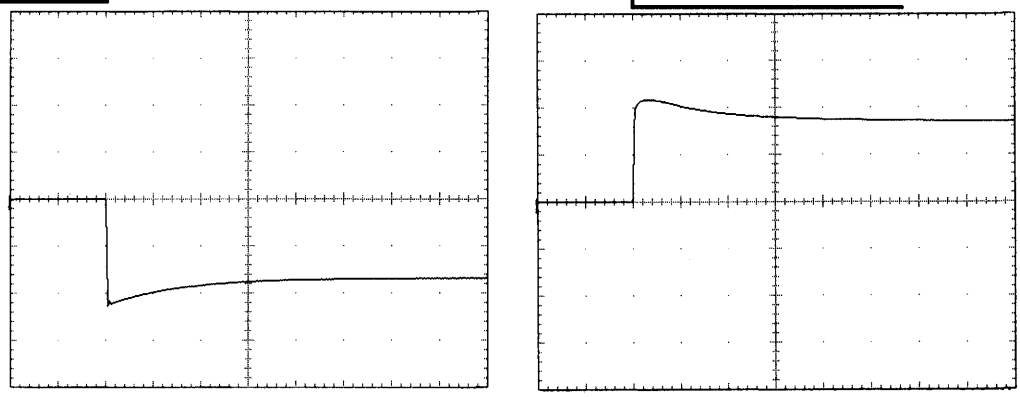
Model	ZUW60515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+15V0.2A		

Input Volt. 5.0 V

Cycle 100 mS

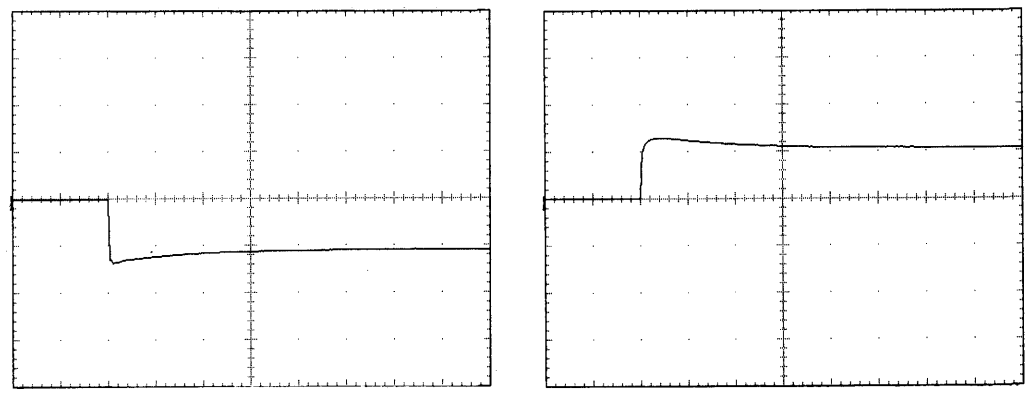
Load Current

Min. Load ⟷
Load 100 %



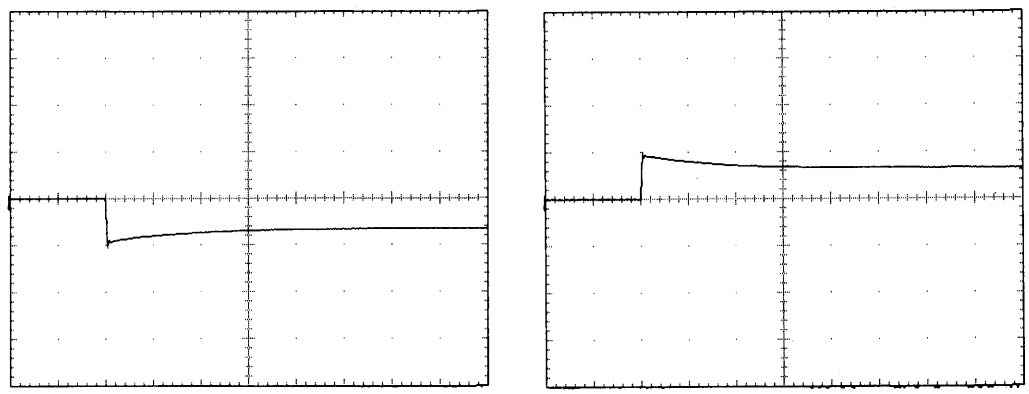
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

COSEL

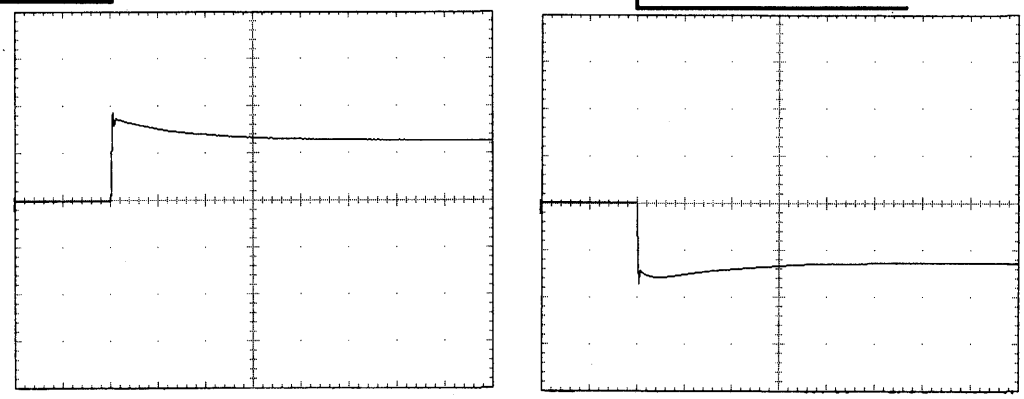
Model	ZUW60515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−15V0.2A		

Input Volt. 5.0 V

Cycle 100 mS

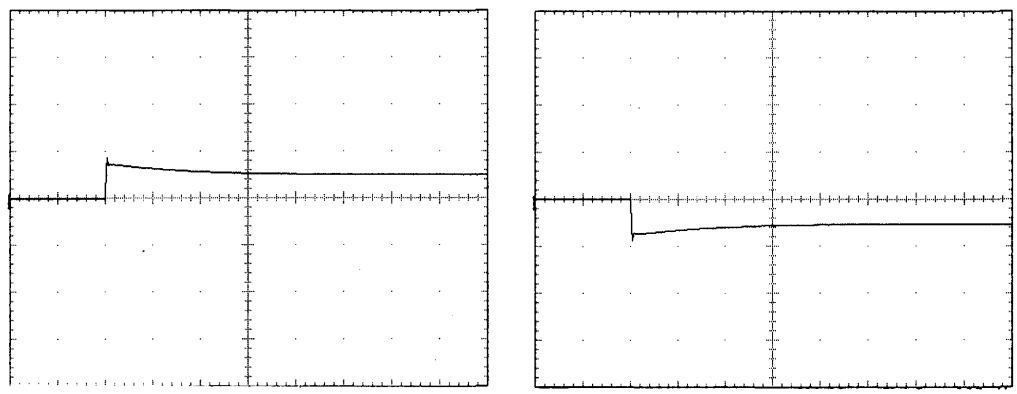
Load Current

Min. Load ⟷
Load 100 %



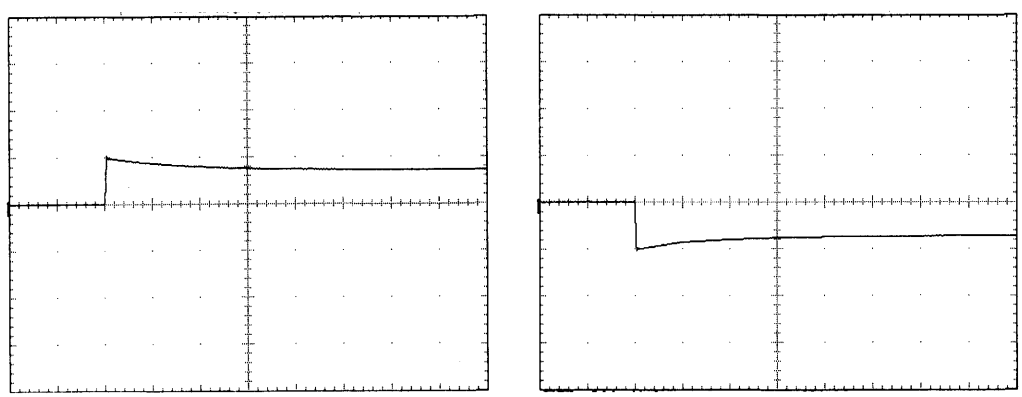
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

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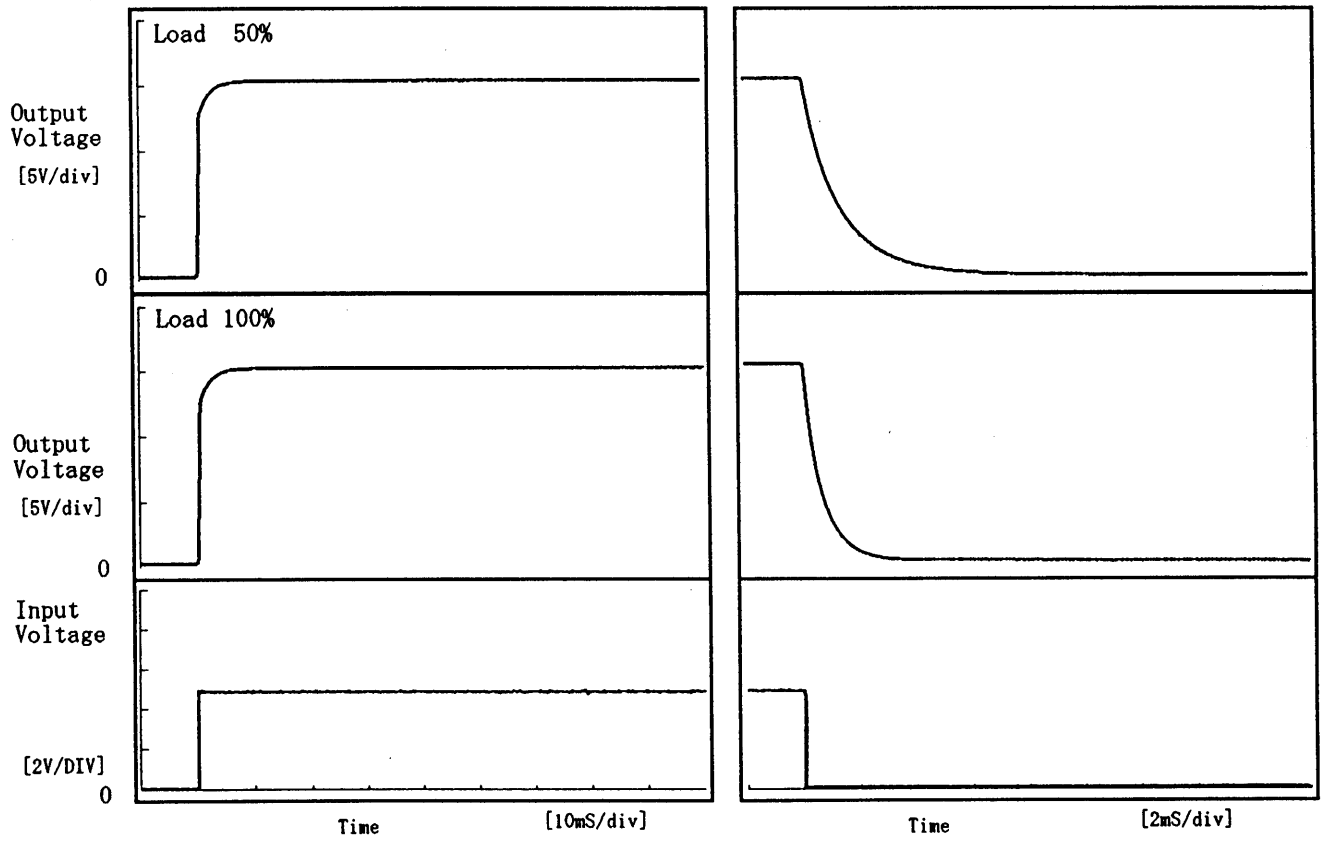
Model	ZUW60515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+15V0.2A		

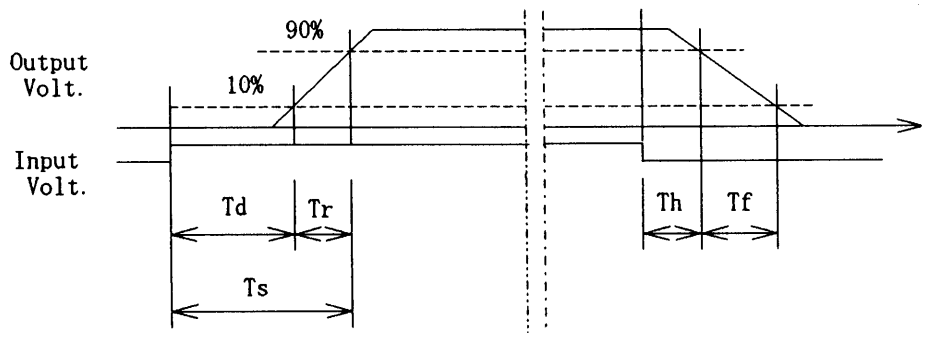
1. Graph



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.15	1.30	1.45	0.19	3.17
100 %	0.10	1.50	1.60	0.11	1.54



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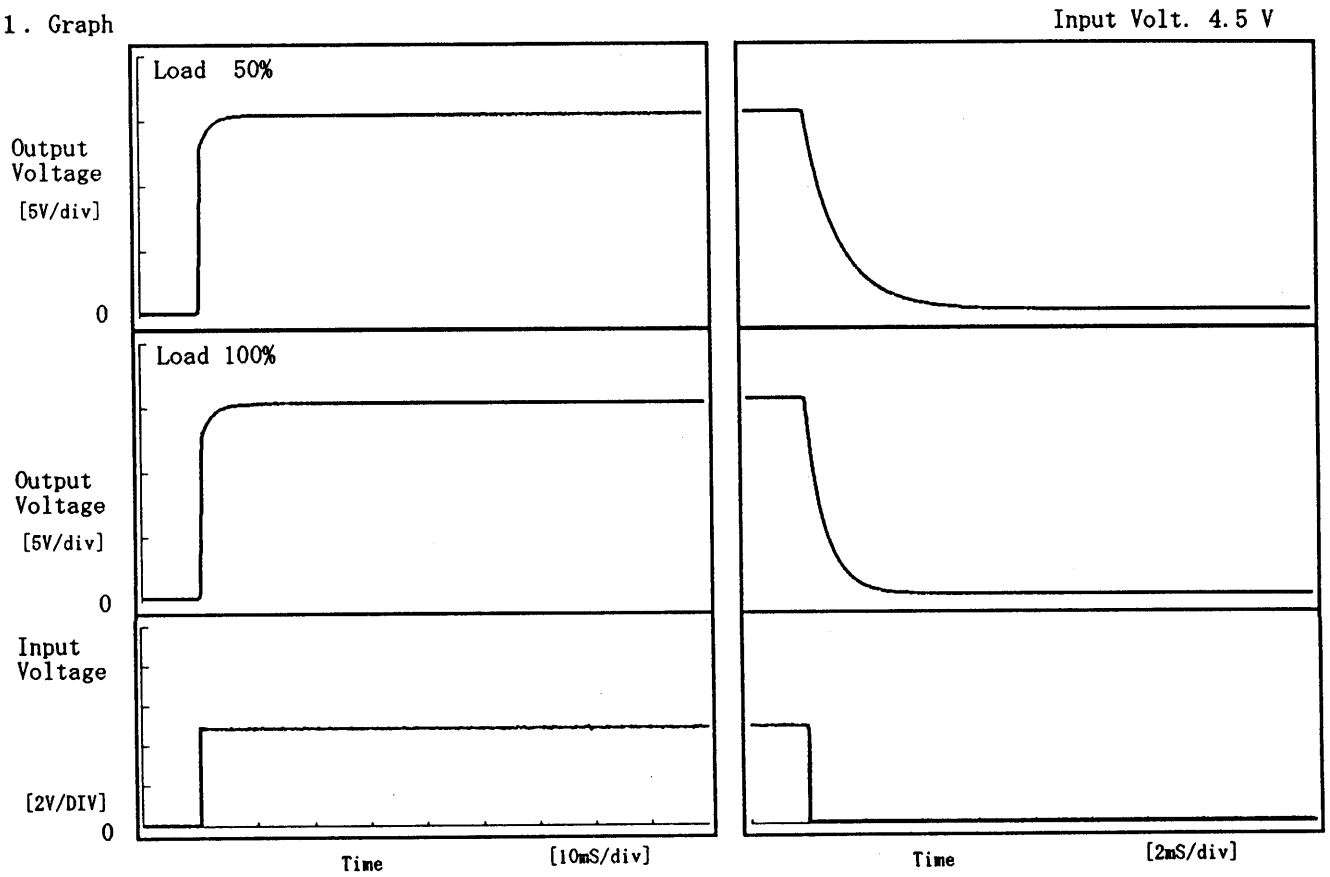
Model	ZUW60515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	-15V0.2A		

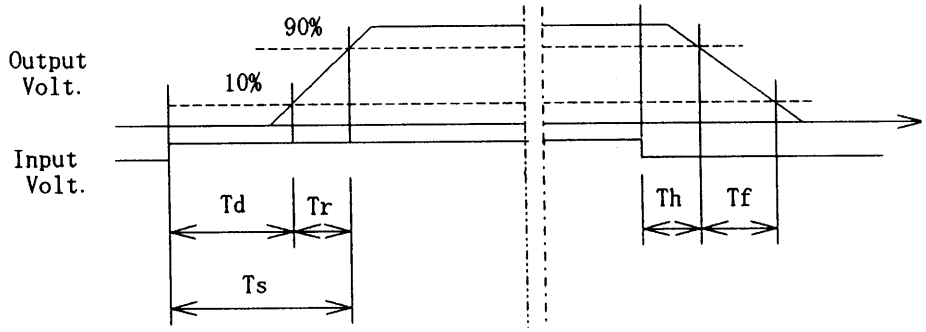
1. Graph



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	1.20	1.30	0.19	2.88
100 %	0.10	1.35	1.45	0.11	1.56



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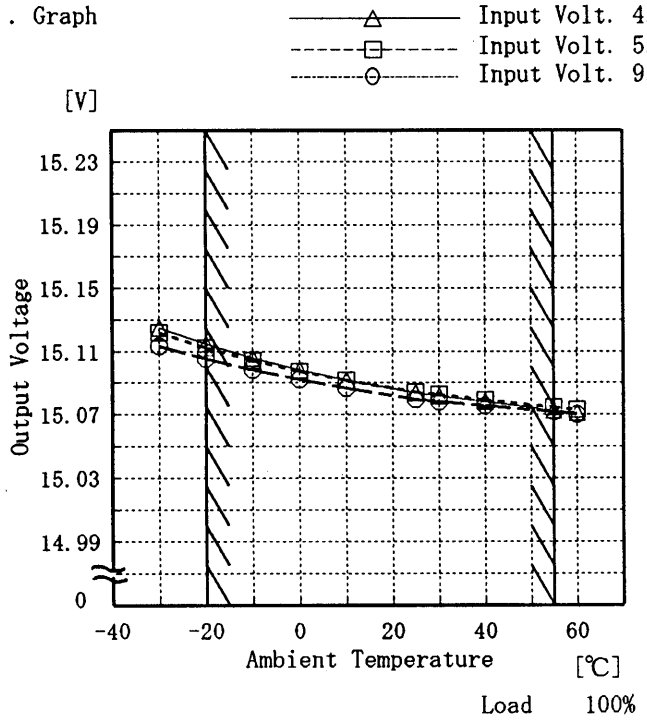
Model	ZUW60515
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +15V0.2A

1. Graph

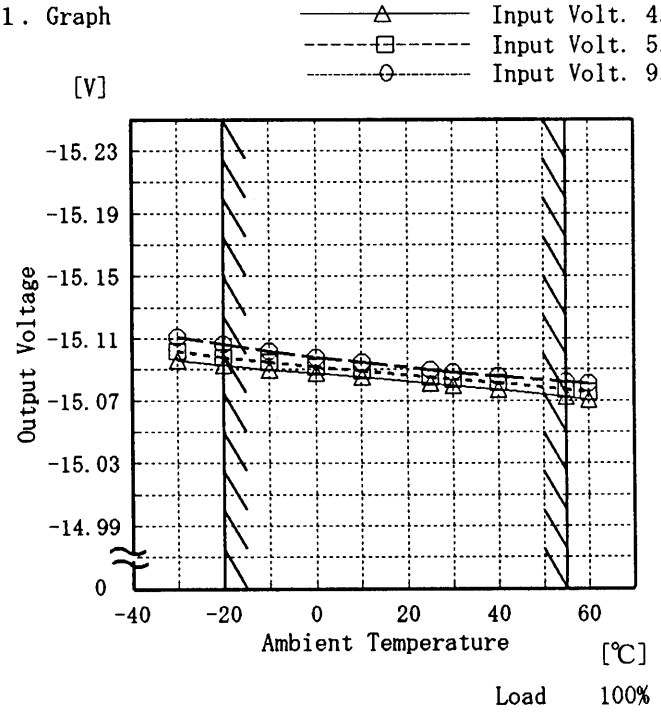


2. Values

Temperature [℃]	Input Volt. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
-30	15.125	15.122	15.113
-20	15.115	15.112	15.105
-10	15.106	15.104	15.098
0	15.098	15.097	15.092
10	15.092	15.092	15.087
25	15.084	15.084	15.080
30	15.081	15.082	15.078
40	15.078	15.079	15.075
55	15.073	15.075	15.072
60	15.071	15.073	15.070
—	—	—	—

Object −15V0.2A

1. Graph



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

(注)斜線は定格周囲温度範囲を示す。

2. Values

Temperature [℃]	Input Volt. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
-30	-15.096	-15.102	-15.111
-20	-15.093	-15.098	-15.106
-10	-15.090	-15.095	-15.102
0	-15.087	-15.092	-15.098
10	-15.085	-15.089	-15.094
25	-15.081	-15.085	-15.090
30	-15.080	-15.084	-15.088
40	-15.077	-15.081	-15.086
55	-15.072	-15.077	-15.082
60	-15.070	-15.075	-15.081
—	—	—	—

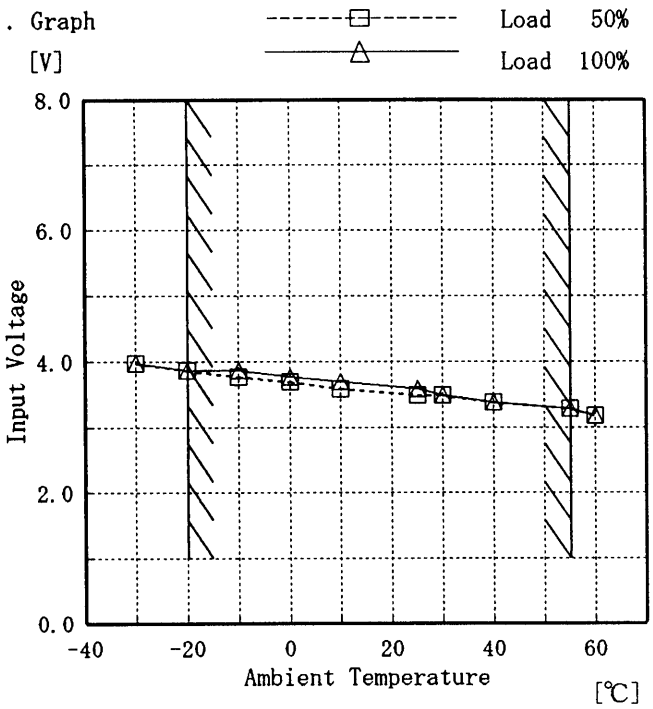
COSEL

Model	ZUW60515
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧

Testing Circuitry Figure A

Object +15V0.2A

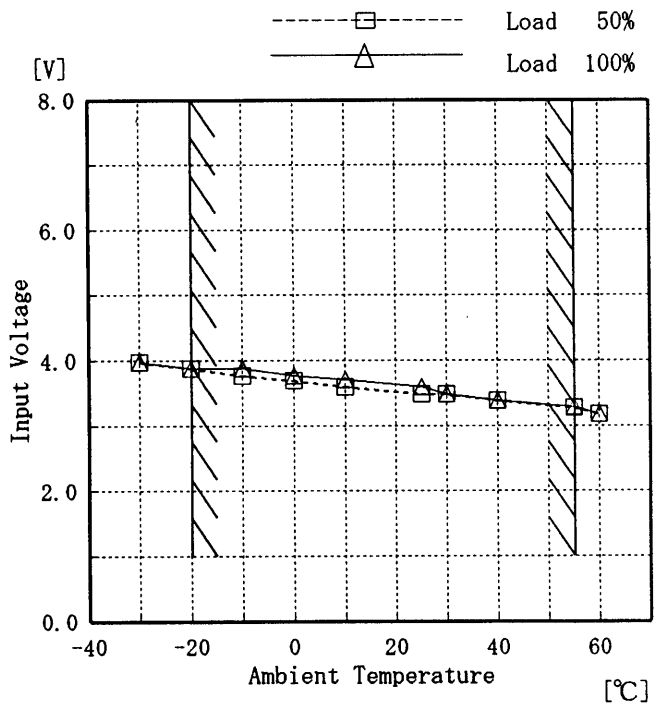
1. Graph



2. Values

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

Object −15V0.2A



2. Values

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

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。

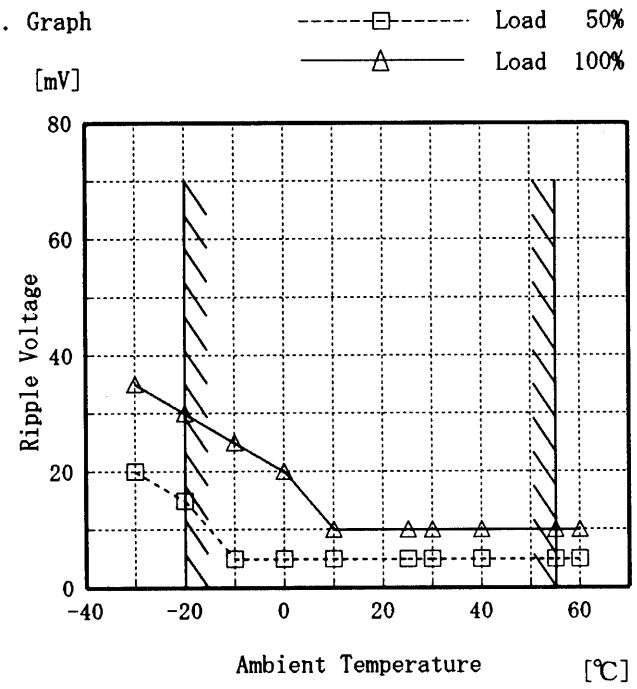
COSEL

Model	ZUW60515
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry Figure A

Object ＋15V0.2A

1. Graph



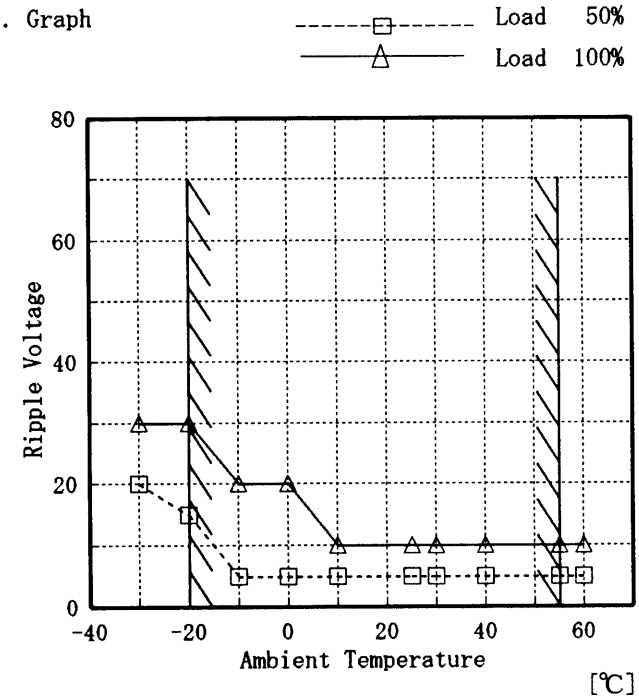
Input Volt. 4.5 V

2. Values

Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-30	20	35
-20	15	30
-10	5	25
0	5	20
10	5	10
25	5	10
30	5	10
40	5	10
55	5	10
60	5	10
—	—	—

Object －15V0.2A

1. Graph



Input Volt. 4.5 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

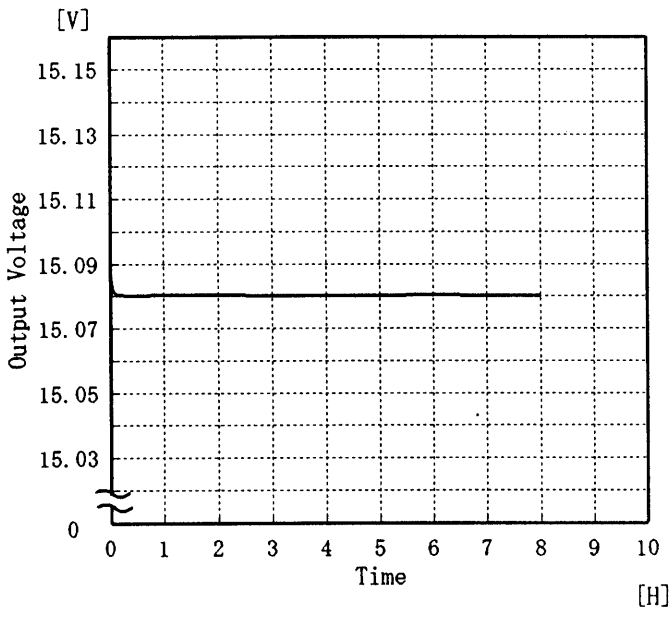
Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-30	20	30
-20	15	30
-10	5	20
0	5	20
10	5	10
25	5	10
30	5	10
40	5	10
55	5	10
60	5	10
—	—	—

COSEL

Model	ZUW60515	Temperature	25 ℃
Item	Time Lapse Drift 経時ドリフト	Testing Circuitry	Figure A

Object +15V0.2A

1. Graph



Input Volt. 5.0V

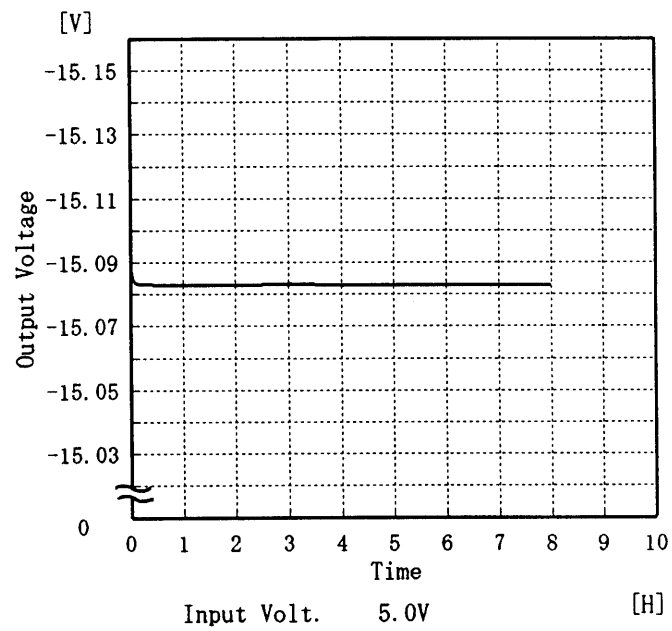
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	15.086
0.5	15.080
1.0	15.080
2.0	15.080
3.0	15.080
4.0	15.080
5.0	15.080
6.0	15.081
7.0	15.080
8.0	15.080

Object −15V0.2A

1. Graph



Input Volt. 5.0V

Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-15.088
0.5	-15.083
1.0	-15.083
2.0	-15.083
3.0	-15.083
4.0	-15.083
5.0	-15.083
6.0	-15.083
7.0	-15.083
8.0	-15.083

COSEL

Model	ZUW60515	
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 : 4.5～9.0 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 4.5～9.0 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	4.5	0.2	15.106	±219	±1.5
Minimum Voltage	55	9.0	0.0	14.669		

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	5.0	0.2	-15.103	±140	±1.0
Minimum Voltage	55	9.0	0.0	-14.824		

COSEL

Model	ZUW60515
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	15.207	5	15
	2	15.208	5	15
	3	15.209	5	15
Load 100 %	1	15.099	15	30
	2	15.101	15	25
	3	15.108	15	25

Input Volt. 5.0 V

COSEL

Model	ZUW60515
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	-15.214	5	25
	2	-15.218	5	15
	3	-15.217	5	15
Load 100 %	1	-15.090	15	30
	2	-15.089	15	25
	3	-15.078	15	25

Input Volt. 5.0 V

COSEL

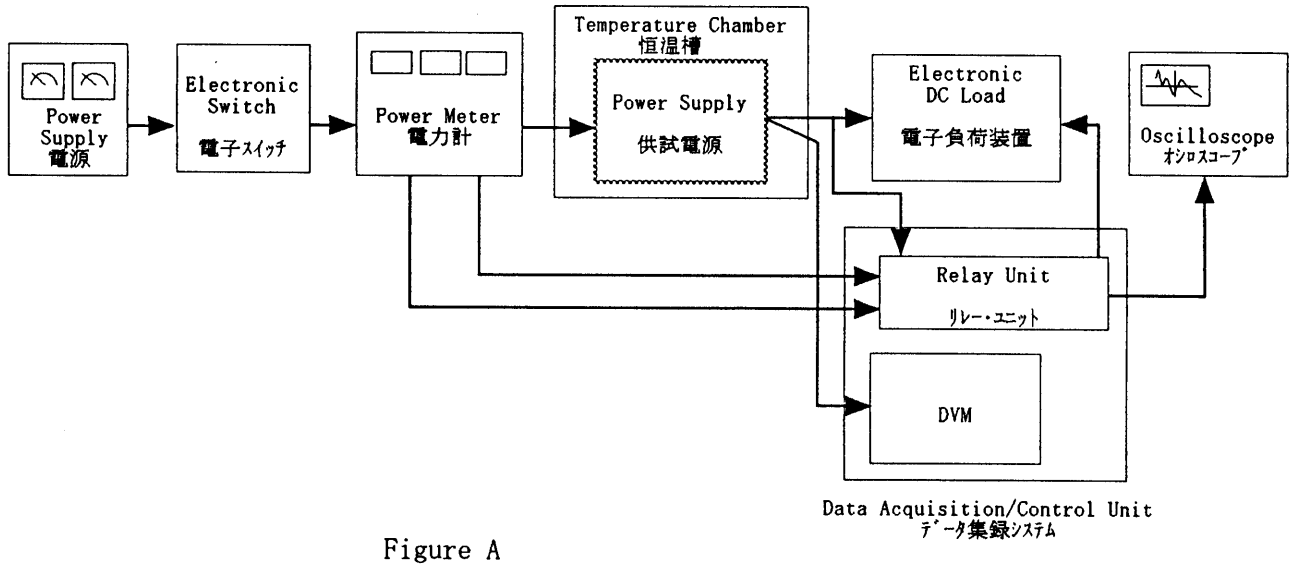


Figure A