参考資料

COSEL

TEST DATA OF ZUW1R50515

(5.0V INPUT)

Regulated DC Power Supply

Date : June 14. 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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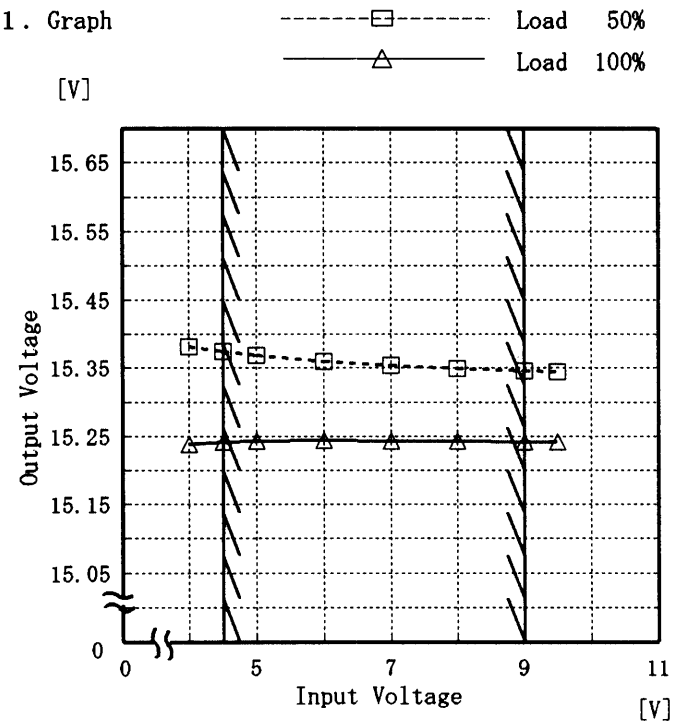
Model	ZUW1R50515	
Item	Line Regulation 静的入力変動	Temperature 25℃ Testing Circuitry Figure A

Object ＋15V0.05A

1. Graph



2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	15.381	15.239
4.5	15.374	15.242
5.0	15.369	15.243
6.0	15.360	15.244
7.0	15.354	15.243
8.0	15.350	15.242
9.0	15.346	15.242
9.5	15.345	15.242
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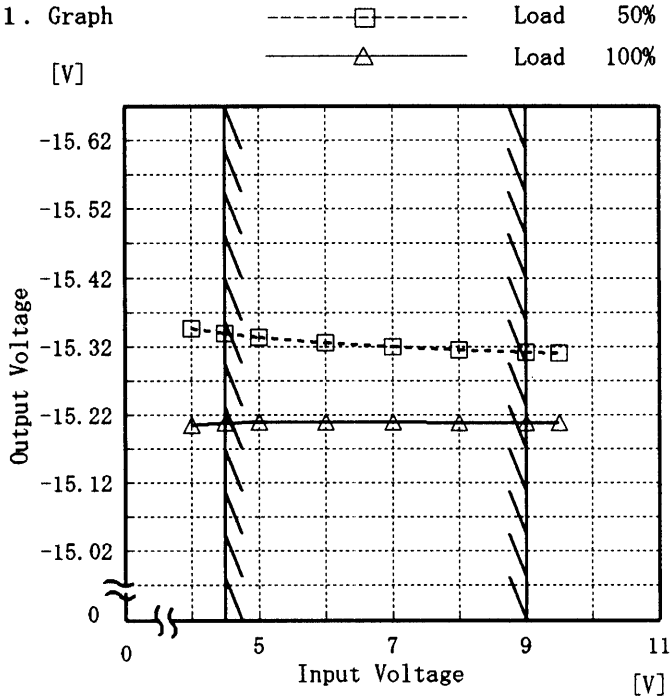
—	—	—

Object －15V0.05A

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

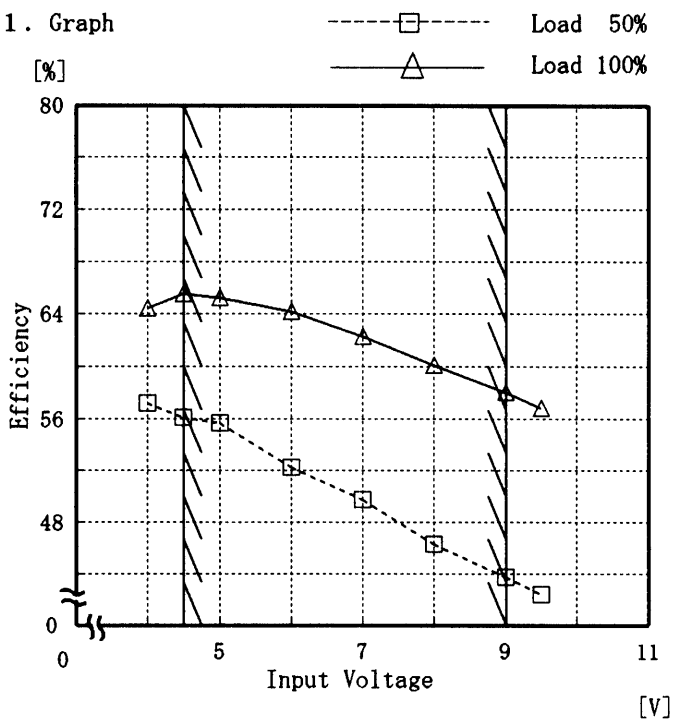
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	-15.346	-15.205
4.5	-15.339	-15.208
5.0	-15.333	-15.210
6.0	-15.325	-15.210
7.0	-15.319	-15.209
8.0	-15.315	-15.208
9.0	-15.311	-15.208
9.5	-15.310	-15.208
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW1R50515
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	57.2	64.4
4.5	56.1	65.6
5.0	55.7	65.3
6.0	52.2	64.2
7.0	49.8	62.3
8.0	46.3	60.1
9.0	43.7	58.1
9.5	42.4	56.9
—	—	—
—	—	—
—	—	—
—	—	—

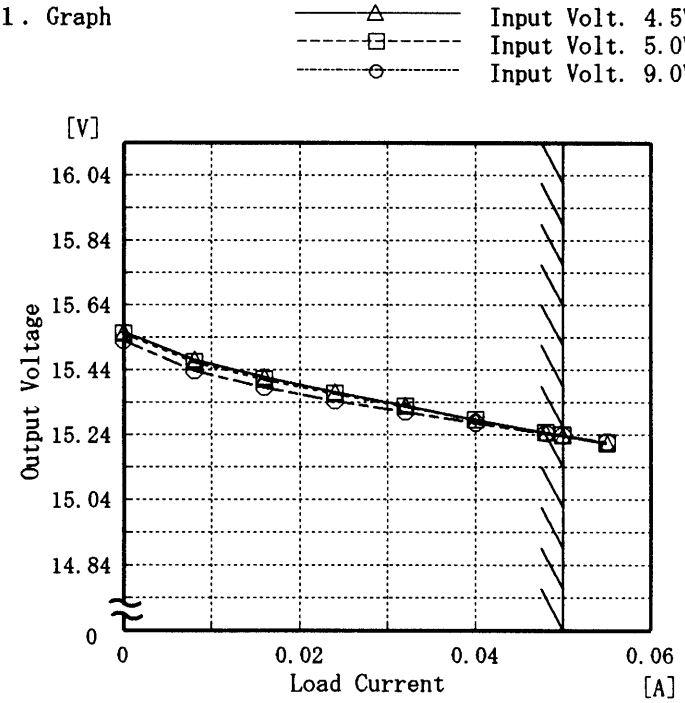
COSEL

Model	ZUW1R50515
Item	Load Regulation 静的負荷変動

Temperature 25℃
Testing Circuitry Figure A

Object +15V0.05A

1. Graph

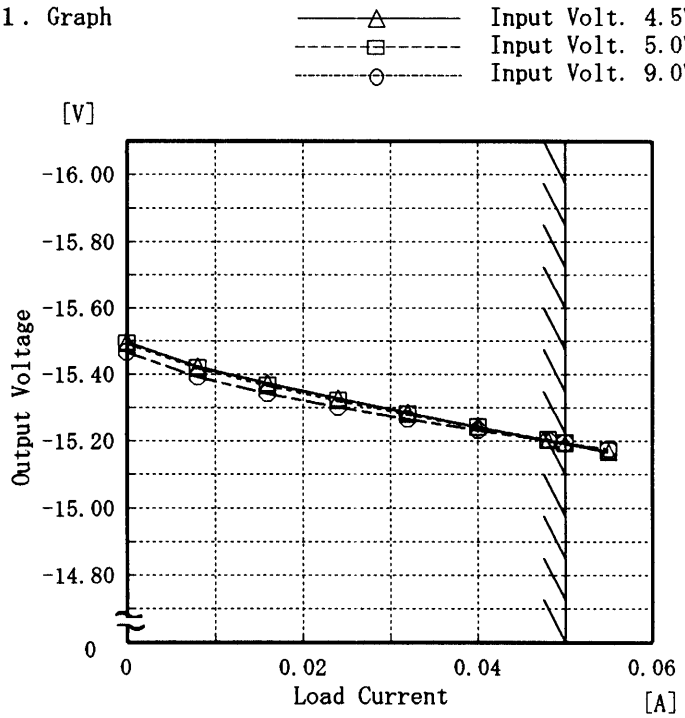


2. Values

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	15.558	15.552	15.530
0.008	15.471	15.464	15.437
0.016	15.417	15.411	15.386
0.024	15.372	15.367	15.345
0.032	15.330	15.326	15.310
0.040	15.287	15.286	15.275
0.048	15.247	15.248	15.244
0.050	15.237	15.239	15.237
0.055	15.212	15.215	15.218
—	—	—	—

Object −15V0.05A

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	-15.499	-15.493	-15.468
0.008	-15.426	-15.419	-15.393
0.016	-15.374	-15.368	-15.344
0.024	-15.329	-15.323	-15.304
0.032	-15.286	-15.282	-15.268
0.040	-15.245	-15.244	-15.235
0.048	-15.204	-15.206	-15.204
0.050	-15.194	-15.196	-15.196
0.055	-15.169	-15.173	-15.177
—	—	—	—

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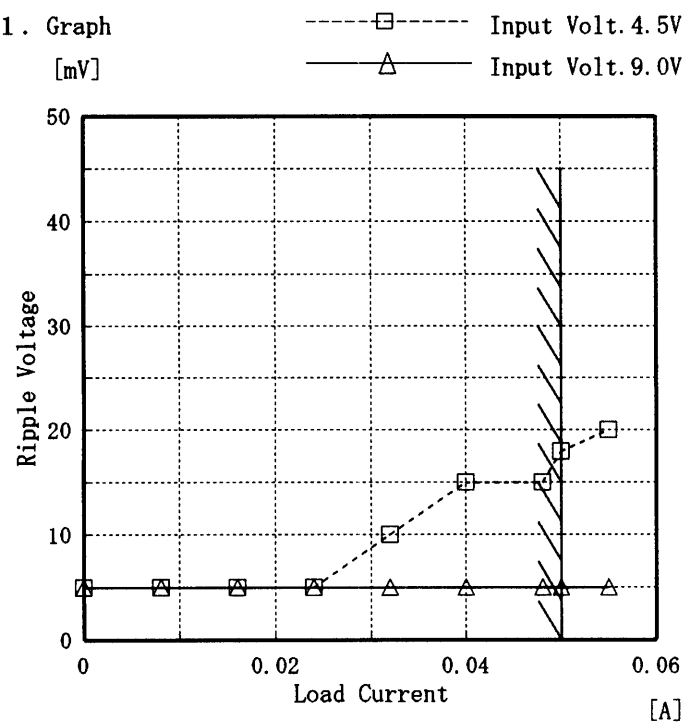
Model	ZUW1R50515
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+15V 0.05A

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

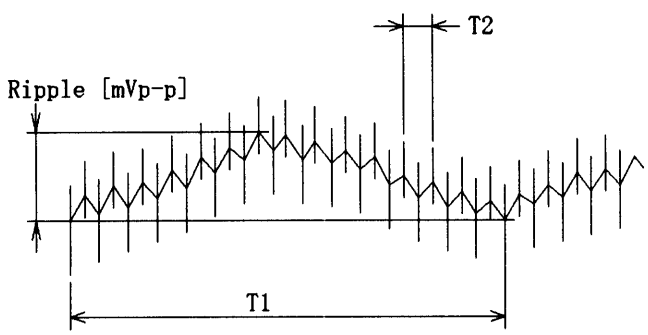


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

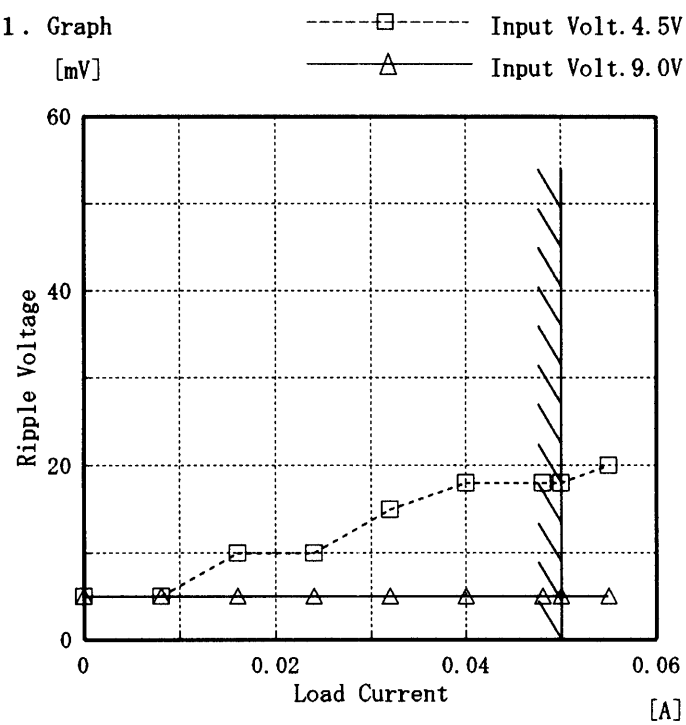
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.008	5	5
0.016	5	5
0.024	5	5
0.032	10	5
0.040	15	5
0.048	15	5
0.050	18	5
0.055	20	5
—	—	—
—	—	—

COSEL

Model	ZUW1R50515
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	−15V 0.05A

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

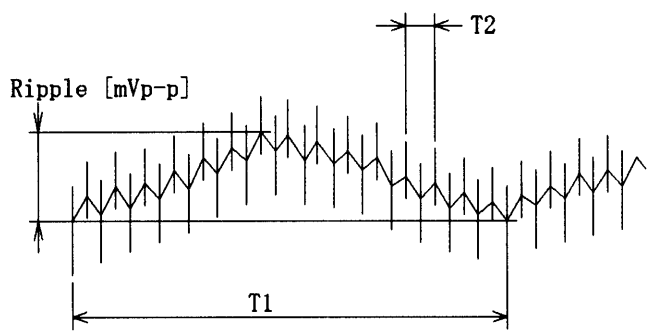


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

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
0.008	5	5
0.016	10	5
0.024	10	5
0.032	15	5
0.040	18	5
0.048	18	5
0.050	18	5
0.055	20	5
—	—	—
—	—	—

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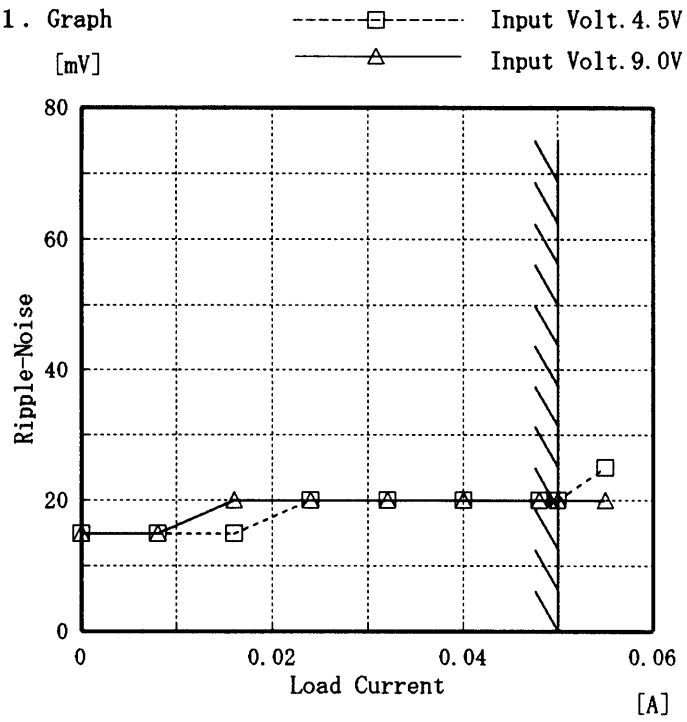
Model	ZUW1R50515
Item	Ripple-Noise リップルノイズ
Object	+15V0.05A

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

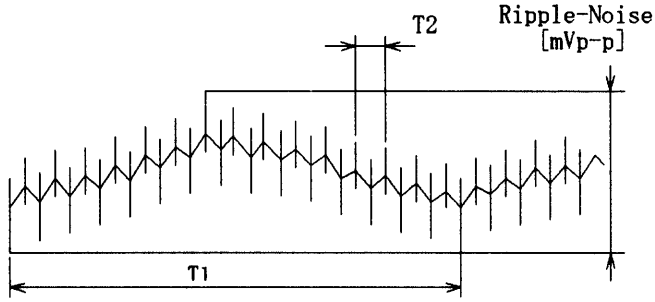


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

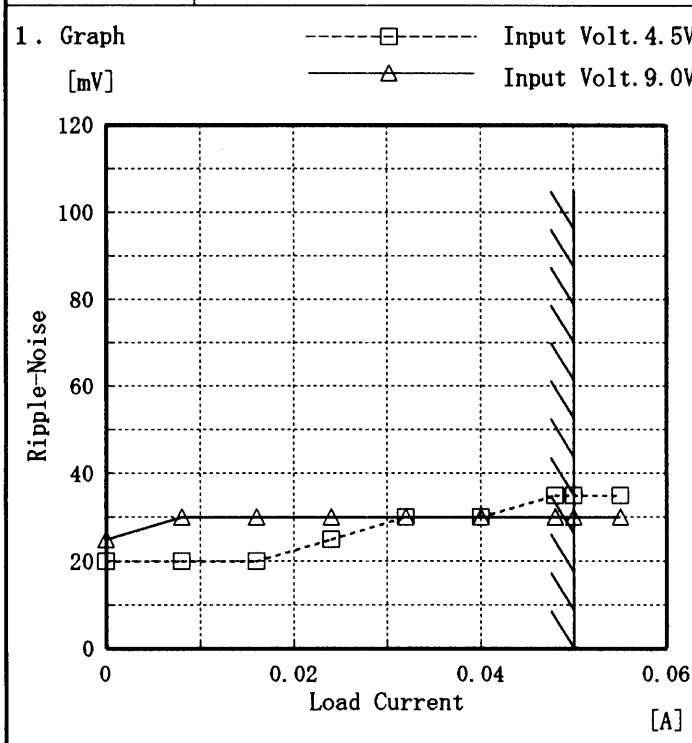
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	15	15
0.008	15	15
0.016	15	20
0.024	20	20
0.032	20	20
0.040	20	20
0.048	20	20
0.050	20	20
0.055	25	20
—	—	—
—	—	—

COSEL

Model	ZUW1R50515
Item	Ripple-Noise リップルノイズ
Object	−15V0.05A

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

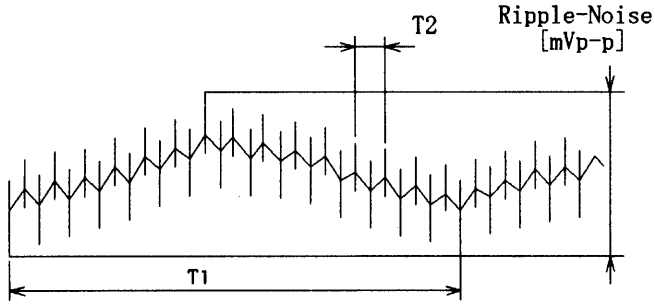


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	20	25
0.008	20	30
0.016	20	30
0.024	25	30
0.032	30	30
0.040	30	30
0.048	35	30
0.050	35	30
0.055	35	30
—	—	—
—	—	—

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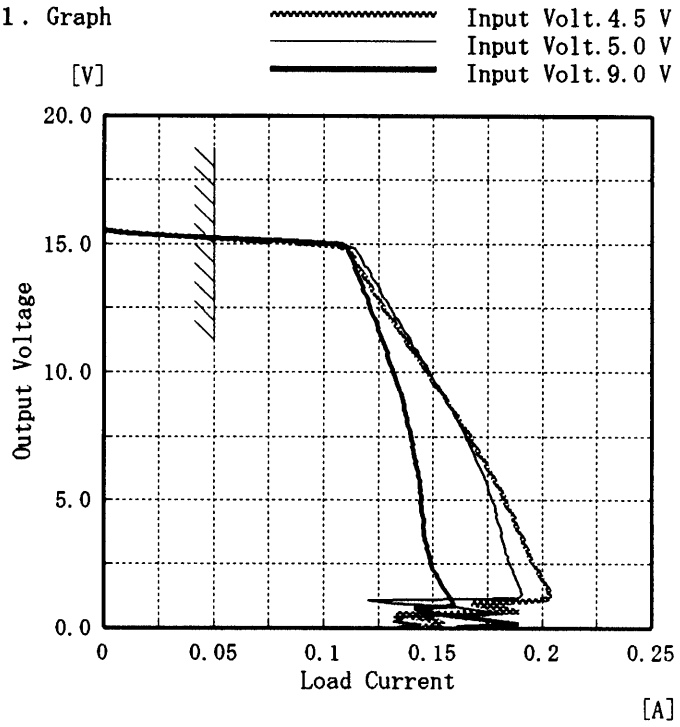
Model	ZUW1R50515
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object +15V0.05A

1. Graph

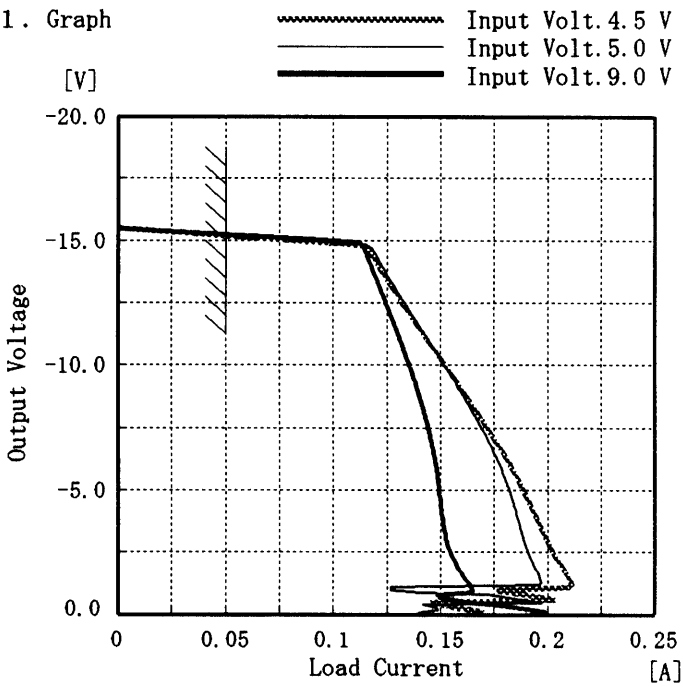


2. Values

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	0.086	0.089	0.109
14.25	0.114	0.118	0.113
13.50	0.120	0.123	0.117
12.00	0.131	0.134	0.124
10.50	0.142	0.144	0.129
9.00	0.154	0.155	0.135
7.50	0.166	0.165	0.140
6.00	0.176	0.173	0.143
4.50	0.186	0.178	0.145
3.00	0.193	0.183	0.147
1.50	0.203	0.190	0.155
0.00	0.145	0.134	0.161

Object −15V0.05A

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	0.094	0.101	0.089
-14.25	0.119	0.121	0.116
-13.50	0.124	0.126	0.120
-12.00	0.136	0.136	0.126
-10.50	0.147	0.147	0.133
-9.00	0.159	0.158	0.139
-7.50	0.171	0.168	0.144
-6.00	0.182	0.177	0.148
-4.50	0.191	0.183	0.150
-3.00	0.199	0.189	0.152
-1.50	0.209	0.196	0.160
0.00	0.171	0.139	0.200

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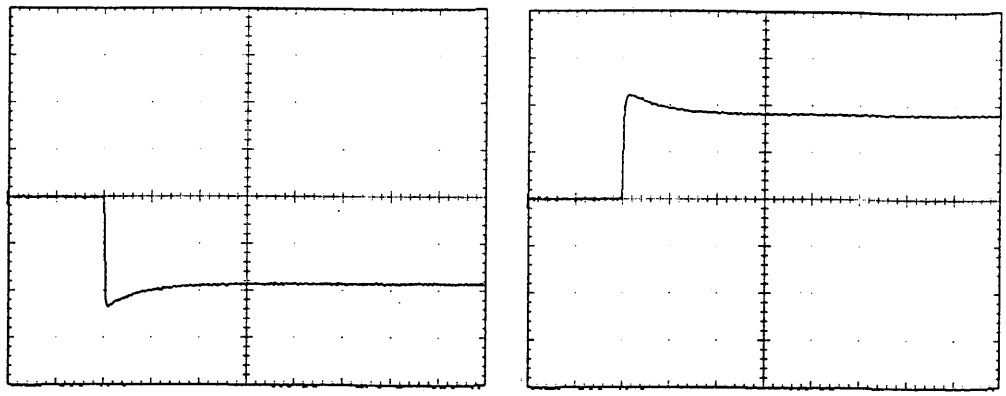
Model	ZUW1R50515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+15V0.05A		

Input Volt. 5.0 V

Cycle 100 mS

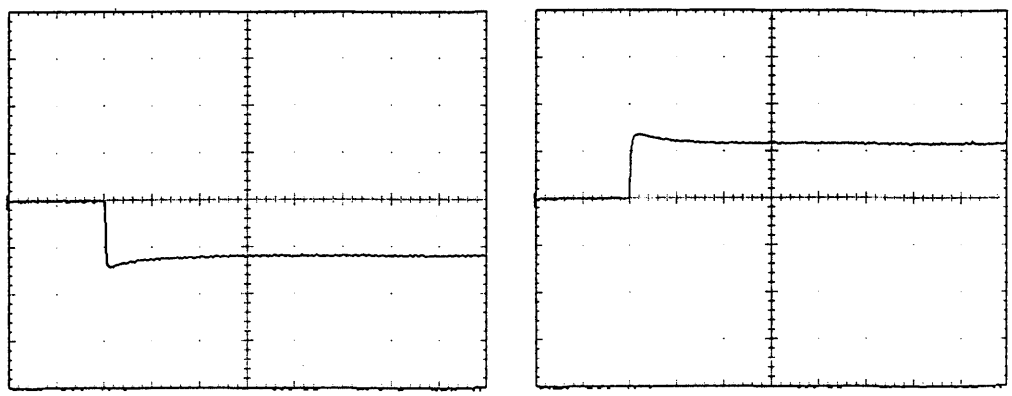
Load Current

Min. Load ⟷
Load 100 %



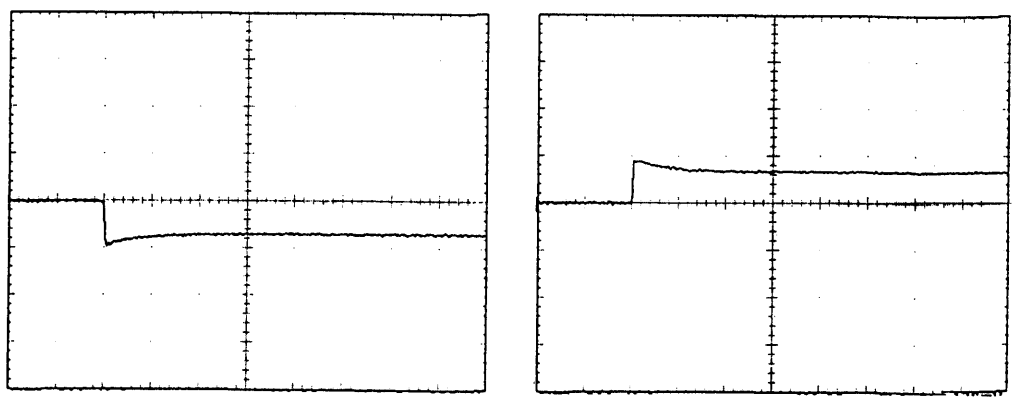
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

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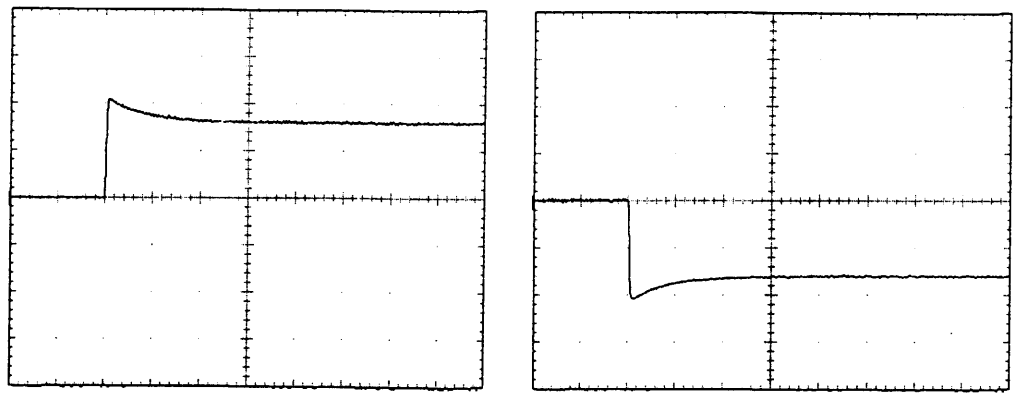
Model	ZUW1R50515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−15V0.05A		

Input Volt. 5.0 V

Cycle 100 mS

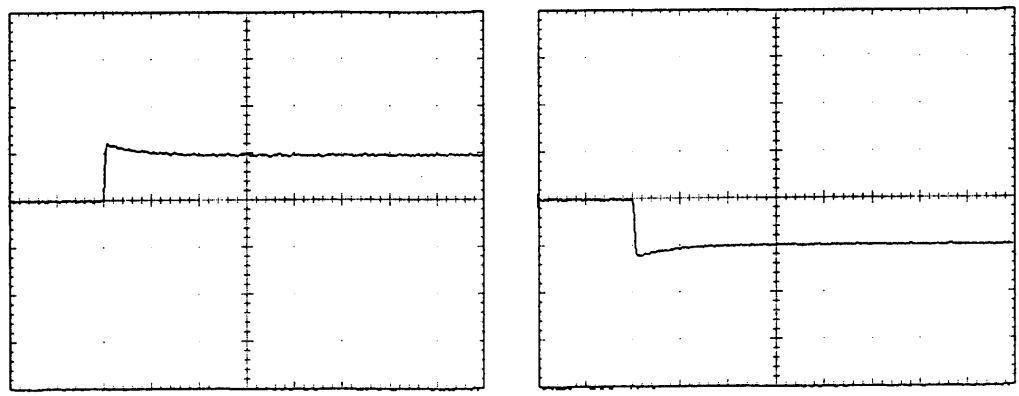
Load Current

Min. Load ⟷
Load 100 %



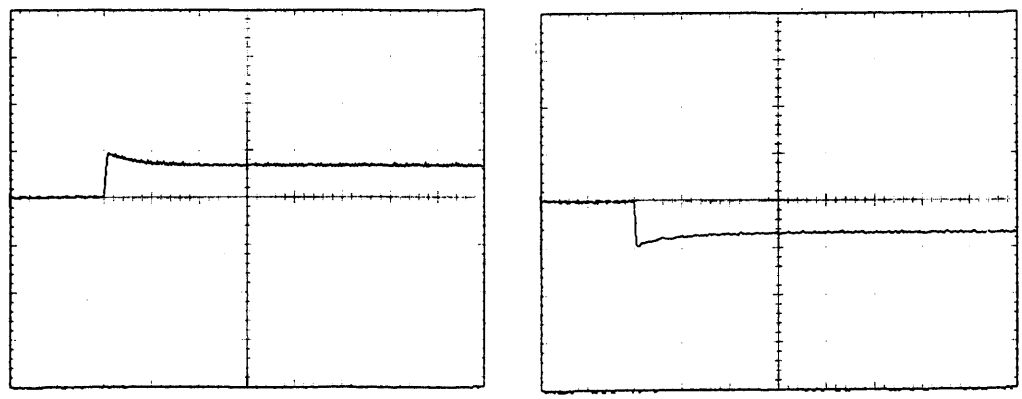
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

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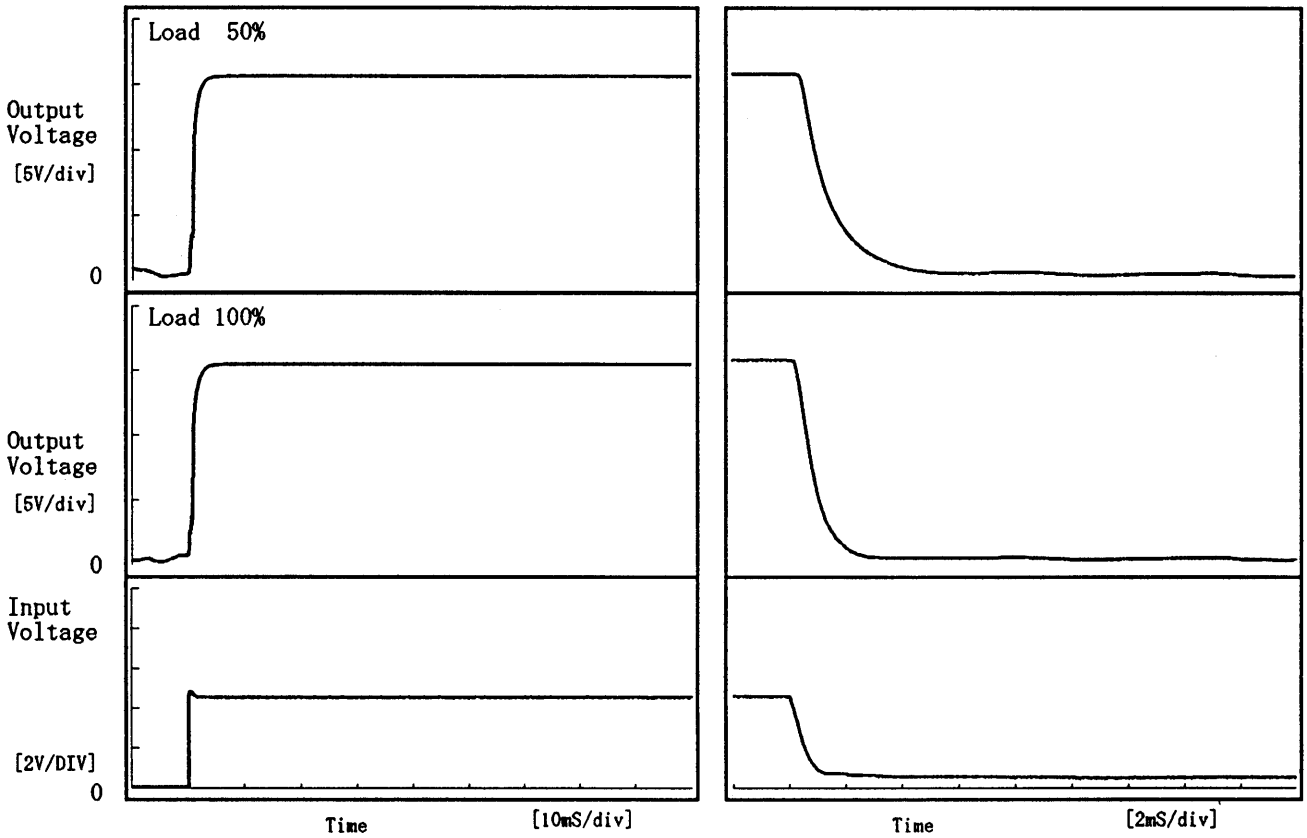
Model	ZUW1R50515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+15V0.05A		

1. Graph

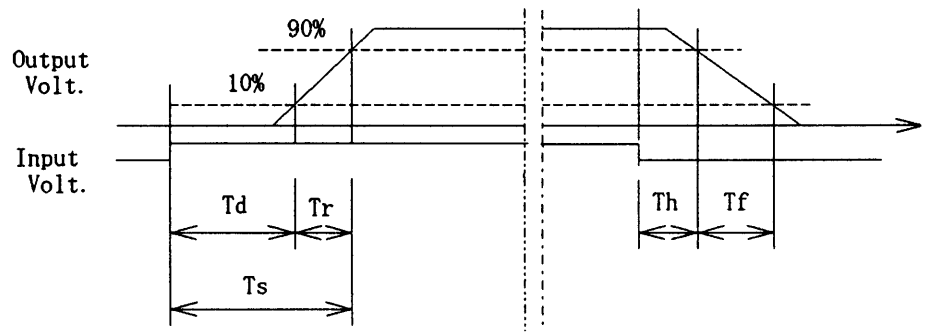
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	1.55	1.65	0.59	2.56
100 %	0.10	1.60	1.70	0.39	1.43



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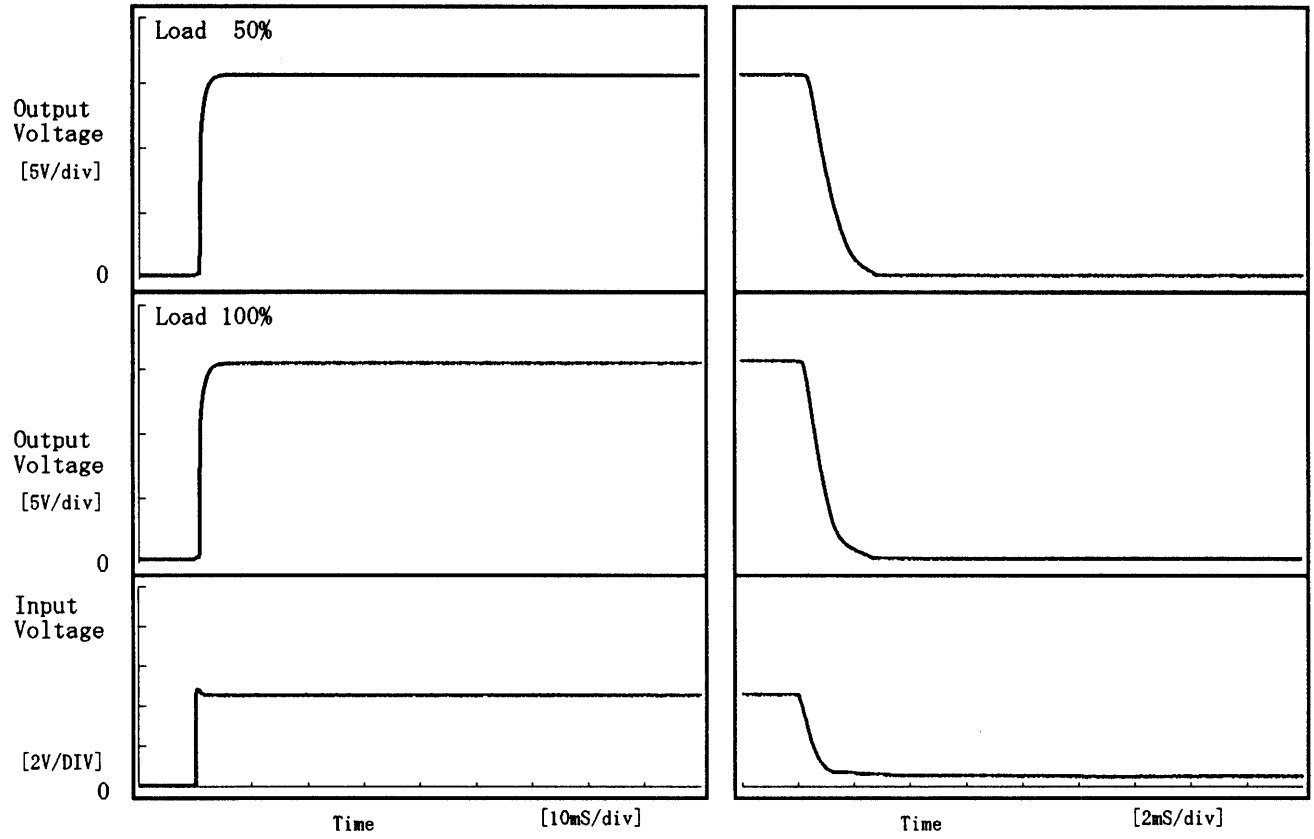
Model	ZUW1R50515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	-15V0.05A		

1. Graph

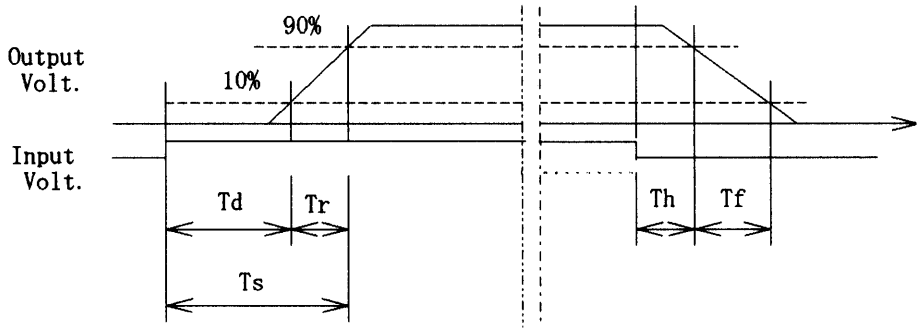
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.65	1.00	1.65	0.57	1.44
100 %	0.65	1.05	1.70	0.37	1.25



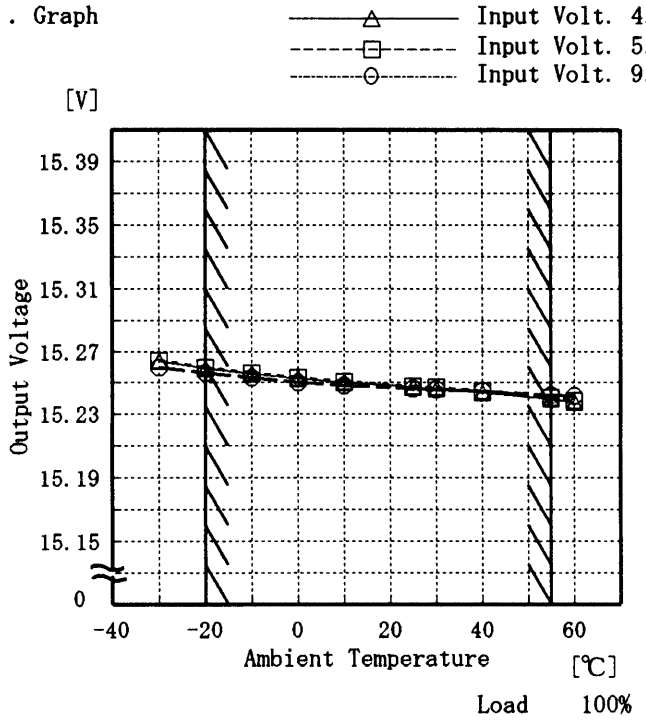
COSEL

Model	ZUW1R50515
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +15V0.05A

1. Graph

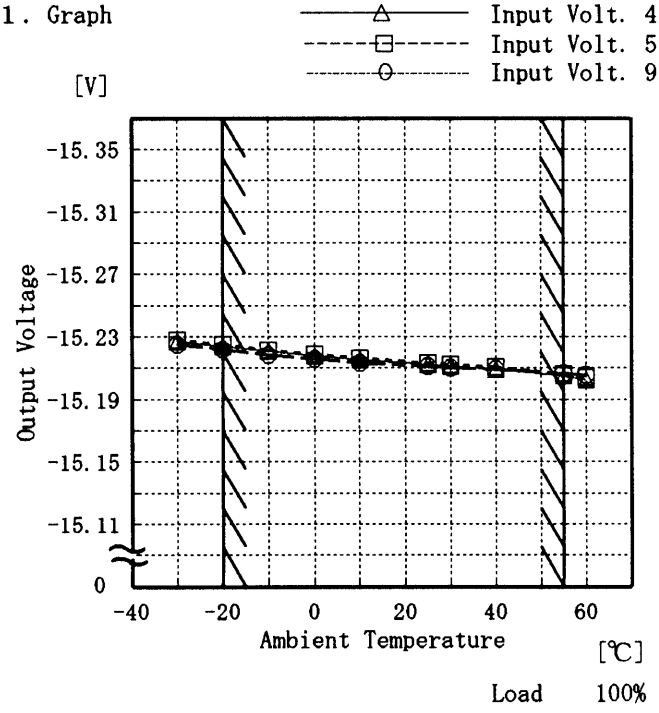


2. Values

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	15.264	15.264	15.260
-20	15.259	15.260	15.256
-10	15.256	15.256	15.253
0	15.252	15.253	15.250
10	15.250	15.251	15.248
25	15.247	15.248	15.246
30	15.246	15.247	15.246
40	15.244	15.245	15.244
55	15.239	15.241	15.242
60	15.237	15.239	15.241
—	—	—	—

Object −15V0.05A

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	-15.227	-15.228	-15.225
-20	-15.224	-15.225	-15.222
-10	-15.221	-15.221	-15.218
0	-15.218	-15.219	-15.216
10	-15.215	-15.216	-15.213
25	-15.212	-15.213	-15.211
30	-15.211	-15.212	-15.210
40	-15.209	-15.210	-15.209
55	-15.205	-15.206	-15.207
60	-15.203	-15.204	-15.206
—	—	—	—

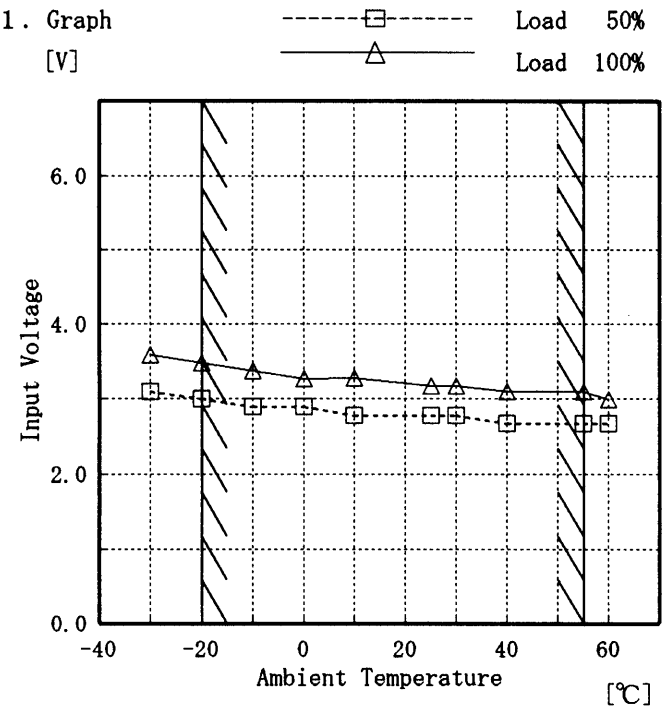
COSEL

Model	ZUW1R50515
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 +15V0.05A

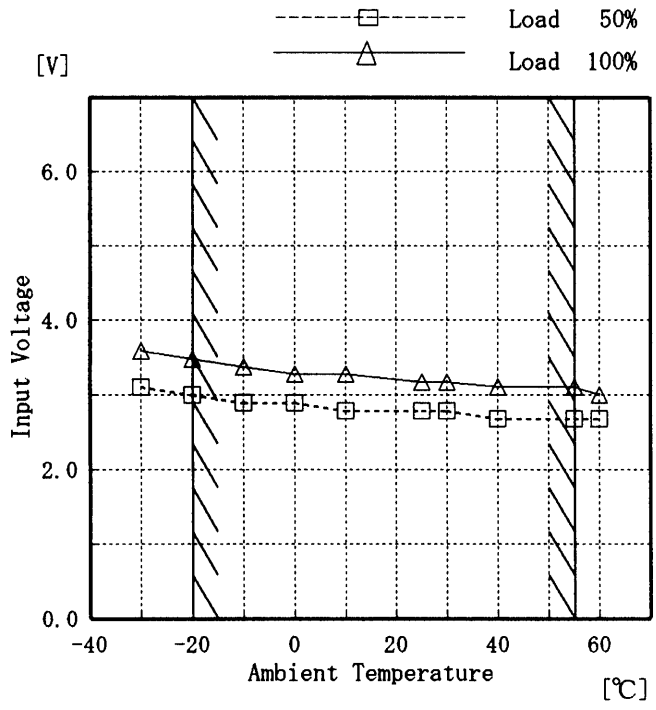
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.1	3.6
-20	3.0	3.5
-10	2.9	3.4
0	2.9	3.3
10	2.8	3.3
25	2.8	3.2
30	2.8	3.2
40	2.7	3.1
55	2.7	3.1
60	2.7	3.0
—	—	—

Object −15V0.05A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.1	3.6
-20	3.0	3.5
-10	2.9	3.4
0	2.9	3.3
10	2.8	3.3
25	2.8	3.2
30	2.8	3.2
40	2.7	3.1
55	2.7	3.1
60	2.7	3.0
—	—	—

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。

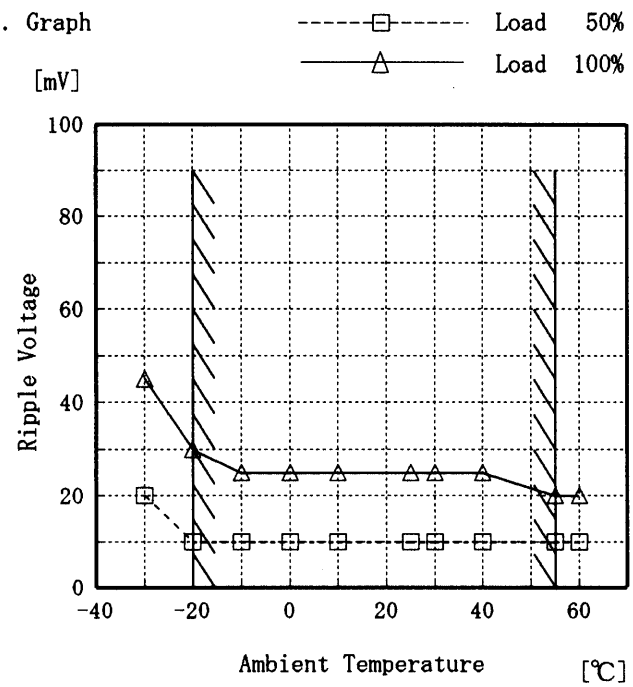
COSEL

Model	ZUW1R50515
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)

Testing Circuitry Figure A

Object ＋15V0.05A

1. Graph



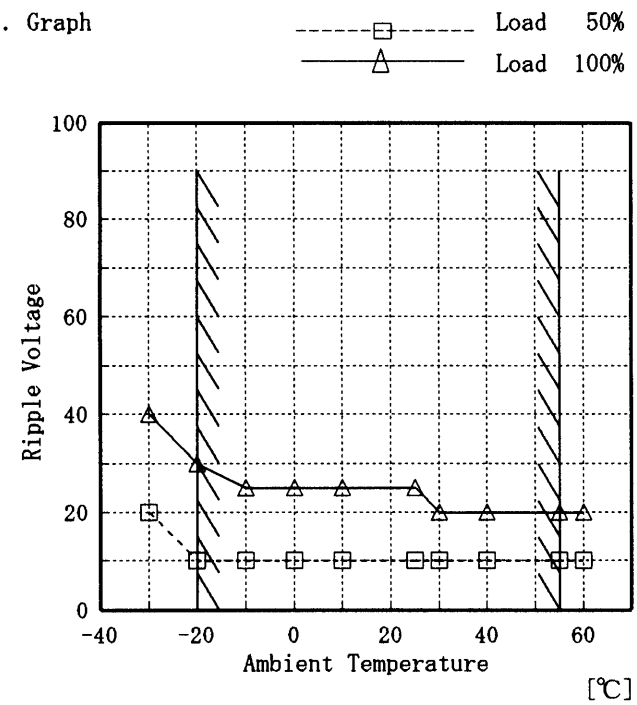
Input Volt. 4.5 V

2. Values

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

Object －15V0.05A

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	40
-20	10	30
-10	10	25
0	10	25
10	10	25
25	10	25
30	10	20
40	10	20
55	10	20
60	10	20
—	—	—

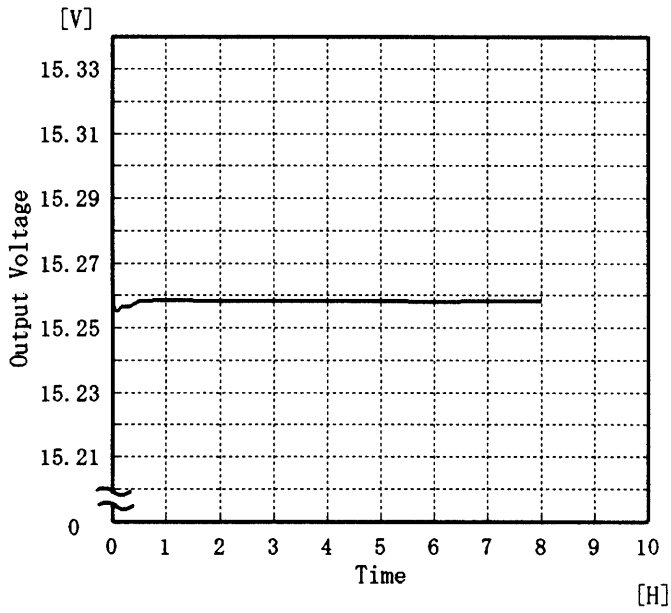
COSEL

Model	ZUW1R50515
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object +15V0.05A

1. Graph



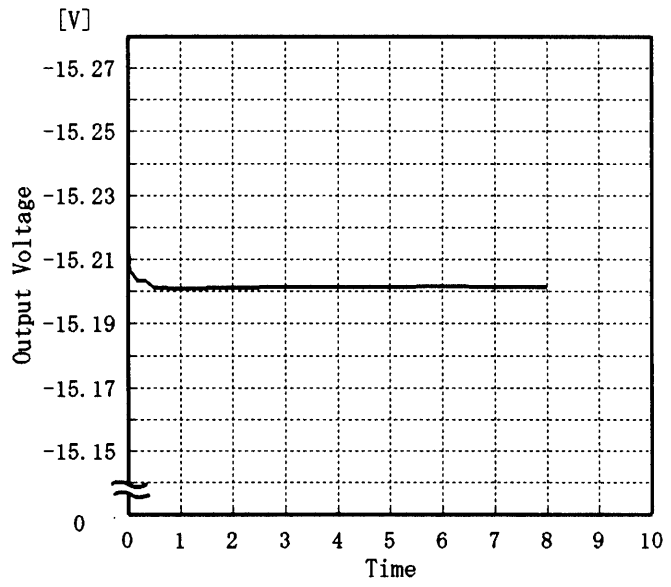
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	15.262
0.5	15.259
1.0	15.259
2.0	15.258
3.0	15.258
4.0	15.258
5.0	15.258
6.0	15.258
7.0	15.258
8.0	15.258

Object −15V0.05A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-15.215
0.5	-15.201
1.0	-15.201
2.0	-15.201
3.0	-15.201
4.0	-15.202
5.0	-15.202
6.0	-15.202
7.0	-15.201
8.0	-15.202

COSEL

Model	ZUW1R50515	
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) : 0.00～0.05 A

(AVR 2) : 0.00～0.05 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) 0.00～0.05 A

(AVR 2) 0.00～0.05 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 ＋15V0.05A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	-20	5.0	0.05	15.257	±155	±1.1
Minimum Voltage	25	4.5	0.00	14.948		

Object －15V0.05A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	-20	5.0	0.05	-15.223	±161	±1.1
Minimum Voltage	55	4.5	0.00	-14.902		

COSEL

Model	ZUW1R50515
Item	Condensation 結露特性
Object	+15V 0.05A

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	15.102	5	15
	2	15.111	5	15
	3	15.097	5	15
Load 100 %	1	15.021	20	20
	2	15.063	20	20
	3	15.005	20	20

Input Volt. 5.0 V

COSEL

Model	ZUW1R50515
Item	Condensation 結露特性
Object	−15V 0.05A

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	-14.887	10	25
	2	-14.935	10	25
	3	-14.876	10	25
Load 100 %	1	-14.847	20	35
	2	-14.893	20	35
	3	-14.841	20	35

Input Volt. 5.0 V

COSEL

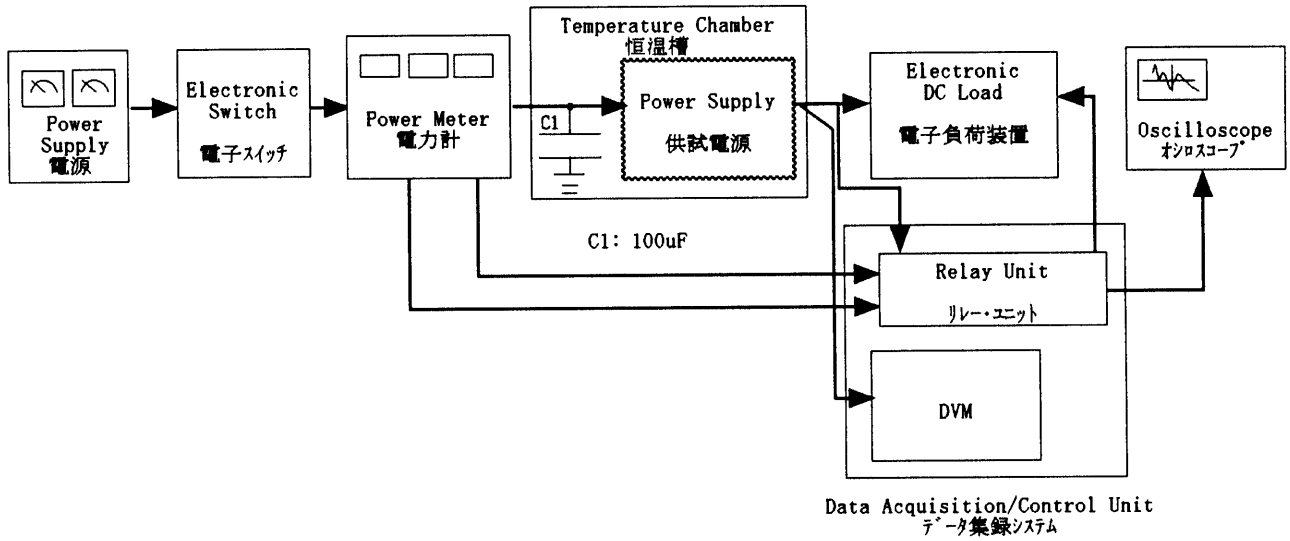


Figure A