参考資料

COSEL

TEST DATA OF ZUW100515

(5.0V INPUT)

Regulated DC Power Supply

Date : Sep 21. 1996

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Design Manager

Prepared by : M. Takashima
Design Engineer

コーセル株式会社

COSEL CO.,LTD.

参考資料

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(Final Page 20)

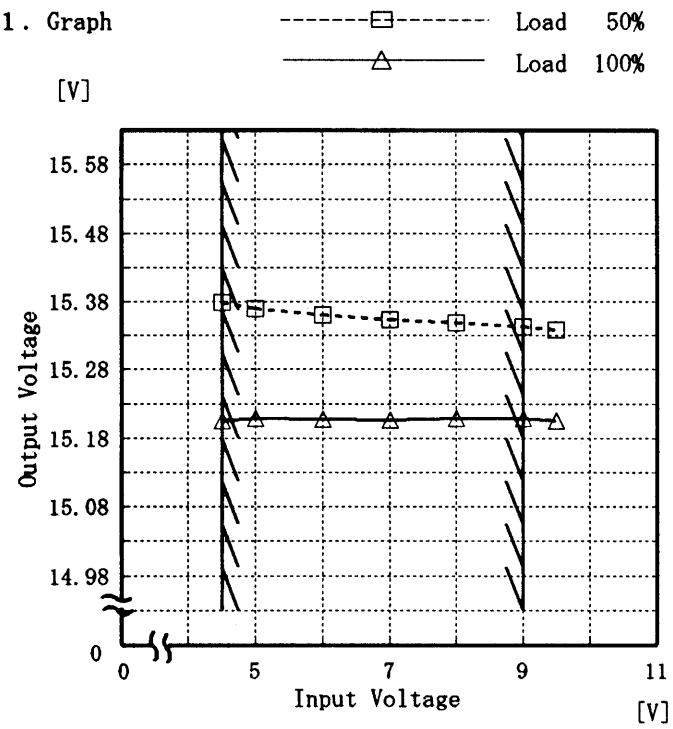
COSEL

Model	ZUW100515
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋15V0.300A

1. Graph

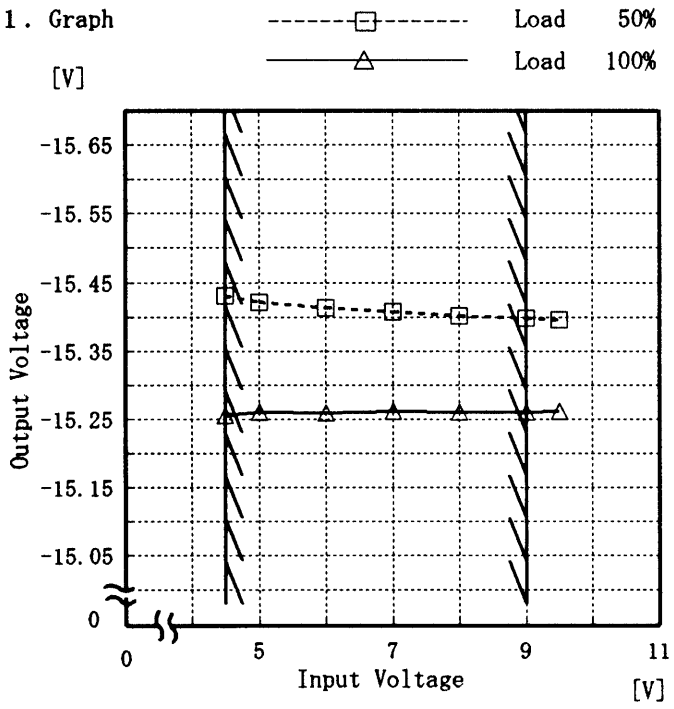


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.5	15.378	15.206
5.0	15.370	15.209
6.0	15.360	15.208
7.0	15.353	15.207
8.0	15.348	15.209
9.0	15.344	15.208
9.5	15.338	15.205
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

Object －15V0.300A

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]
4.5	-15.431	-15.256
5.0	-15.422	-15.260
6.0	-15.413	-15.260
7.0	-15.407	-15.261
8.0	-15.402	-15.260
9.0	-15.398	-15.261
9.5	-15.396	-15.262
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

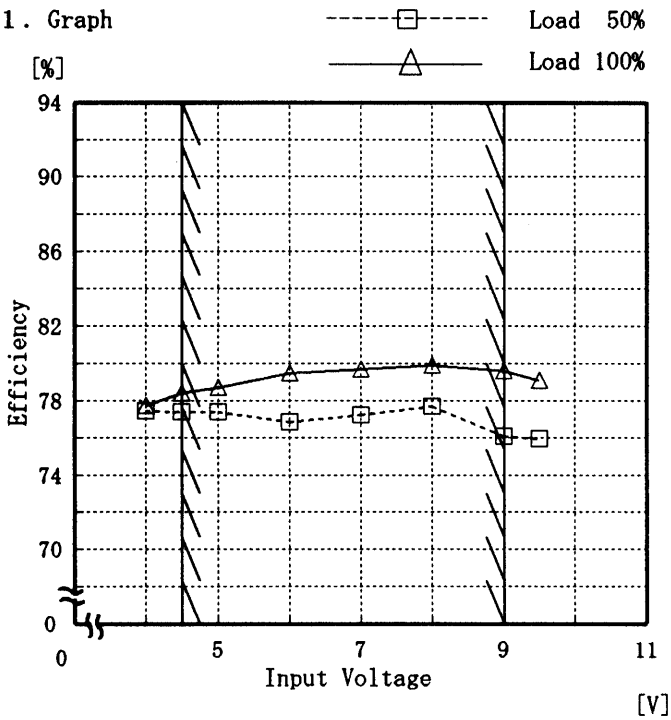
BC－2076

COSEL

Model	ZUW100515
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	77.5	77.7
4.5	77.4	78.4
5.0	77.4	78.7
6.0	76.8	79.5
7.0	77.2	79.7
8.0	77.7	79.9
9.0	76.1	79.6
9.5	75.9	79.1
—	—	—
—	—	—
—	—	—
—	—	—

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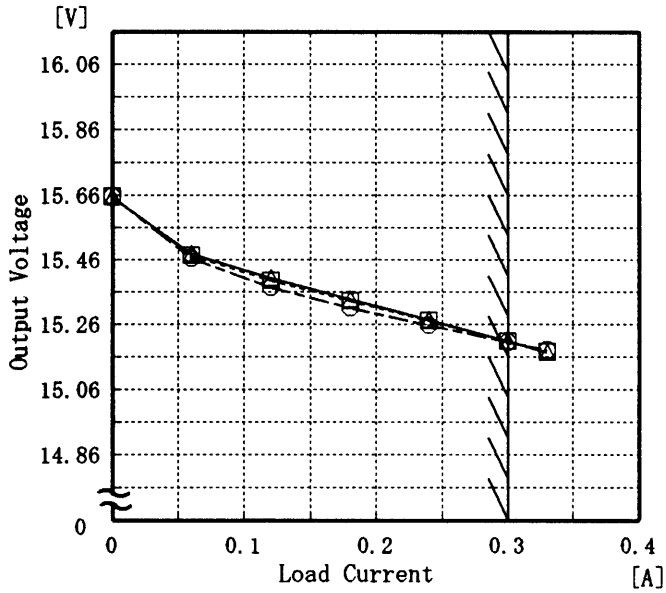
COSEL

Model	ZUW100515
Item	Load Regulation 静的負荷変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋15V0.300A

1. Graph

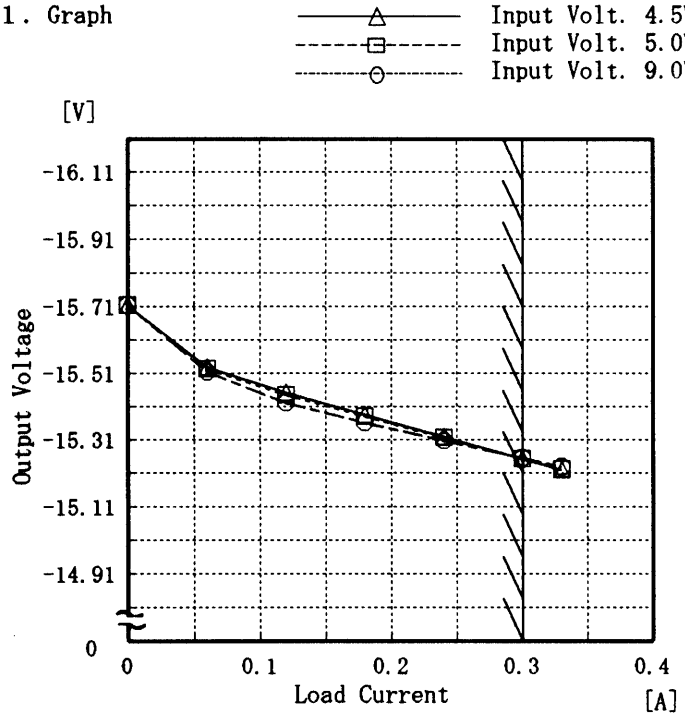


2. Values

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	15.655	15.657	15.659
0.060	15.479	15.475	15.465
0.120	15.403	15.397	15.374
0.180	15.337	15.333	15.311
0.240	15.273	15.271	15.258
0.300	15.208	15.208	15.206
0.330	15.176	15.177	15.181
—	—	—	—
—	—	—	—
—	—	—	—

Object −15V0.300A

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	-15.716	-15.716	-15.716
0.060	-15.531	-15.526	-15.516
0.120	-15.454	-15.447	-15.424
0.180	-15.387	-15.382	-15.363
0.240	-15.321	-15.319	-15.310
0.300	-15.255	-15.255	-15.257
0.330	-15.222	-15.223	-15.231
—	—	—	—
—	—	—	—
—	—	—	—

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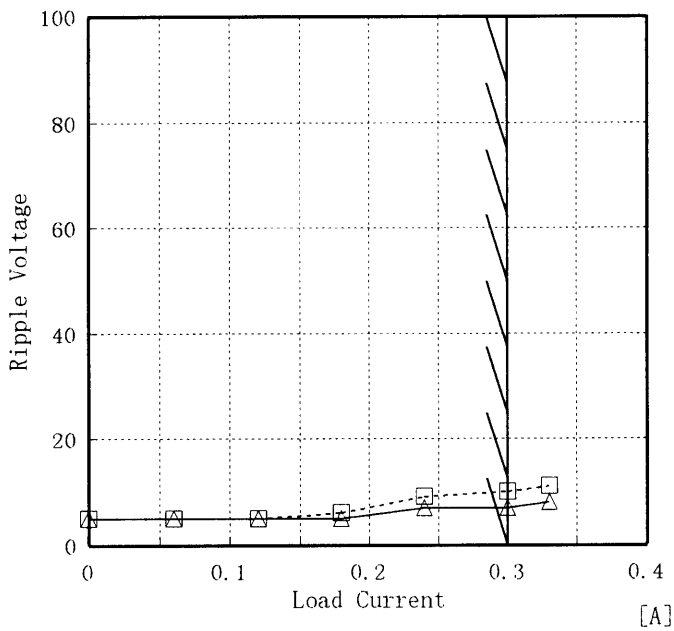
Model	ZUW100515
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+15V0.30A

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

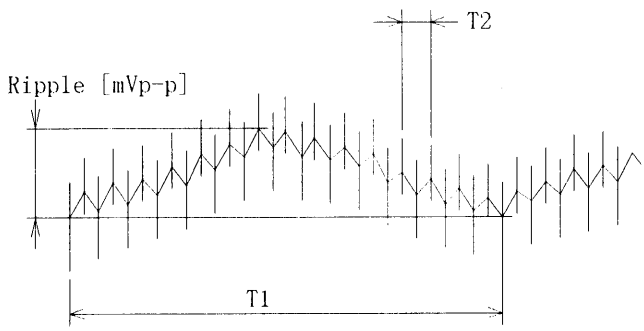


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

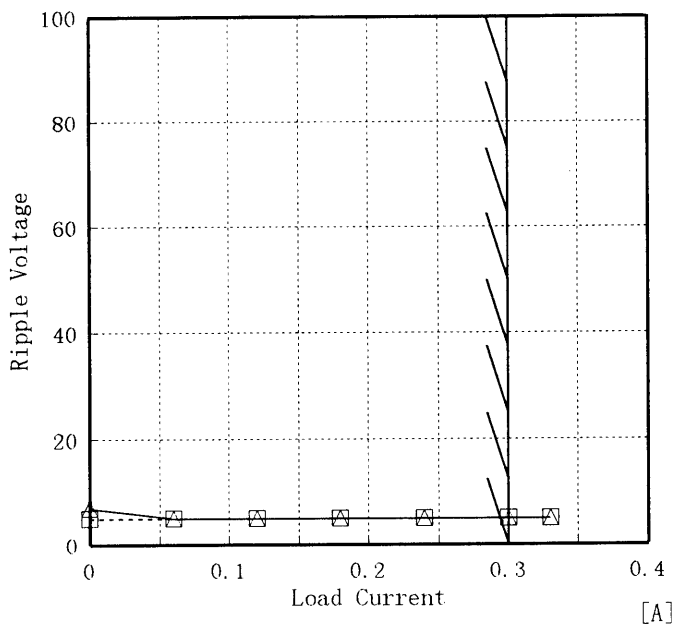
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.00	5	5
0.06	5	5
0.12	5	5
0.18	6	5
0.24	9	7
0.30	10	7
0.33	11	8
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW100515
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	-15V0.30A

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

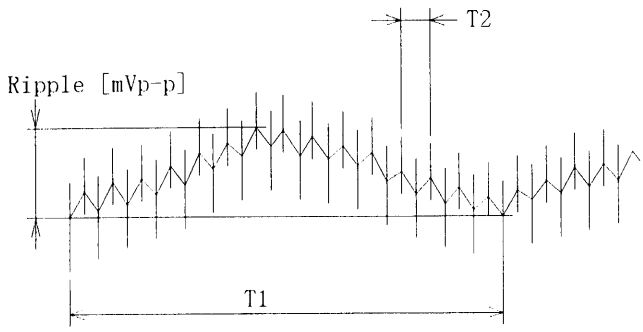


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

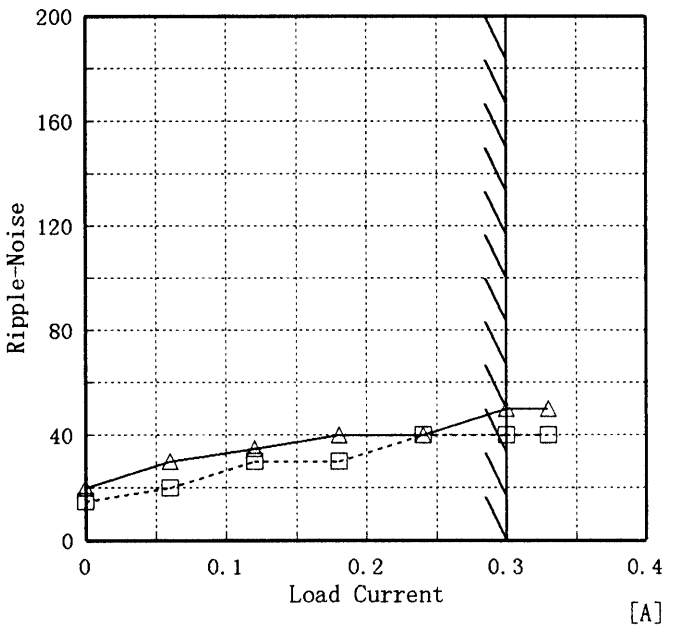
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.00	5	7
0.06	5	5
0.12	5	5
0.18	5	5
0.24	5	5
0.30	5	5
0.33	5	5
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW100515
Item	Ripple-Noise　リップルノイズ
Object	+15V0.300A

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

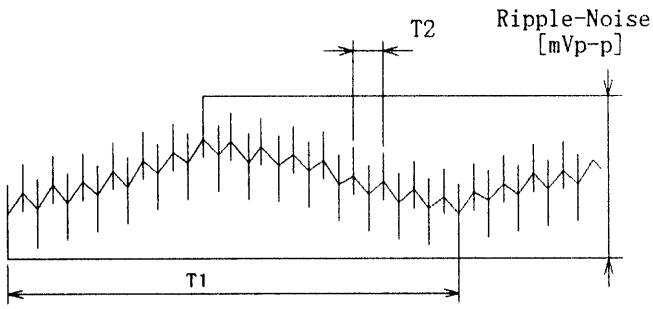


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

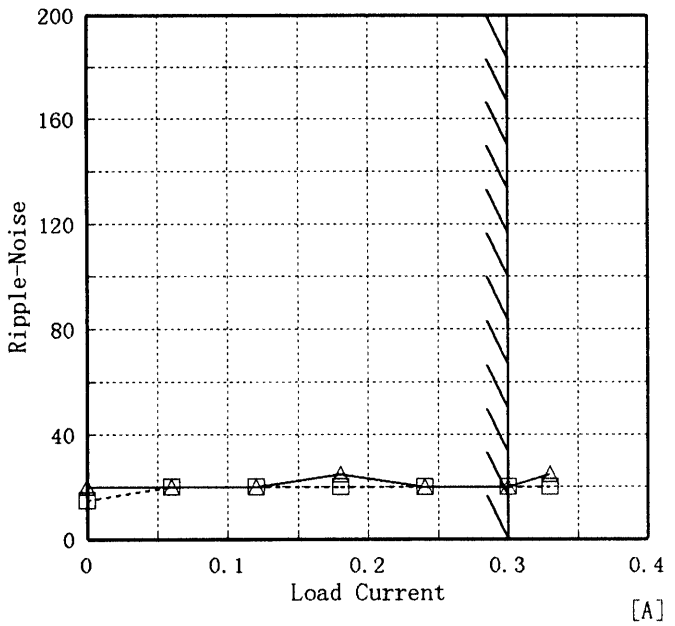
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.00	15	20
0.06	20	30
0.12	30	35
0.18	30	40
0.24	40	40
0.30	40	50
0.33	40	50
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW100515
Item	Ripple-Noise　リップルノイズ
Object	-15V0.300A

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

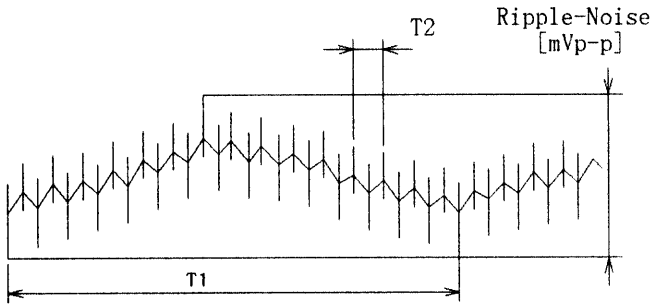


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.00	15	20
0.06	20	20
0.12	20	20
0.18	20	25
0.24	20	20
0.30	20	20
0.33	20	25
—	—	—
—	—	—
—	—	—
—	—	—

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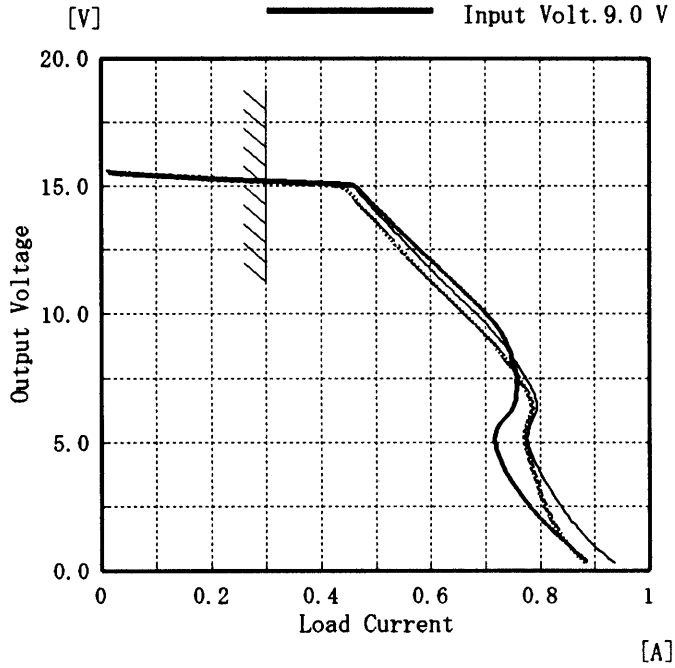
Model	ZUW100515
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object ＋15V0.300A

1. Graph

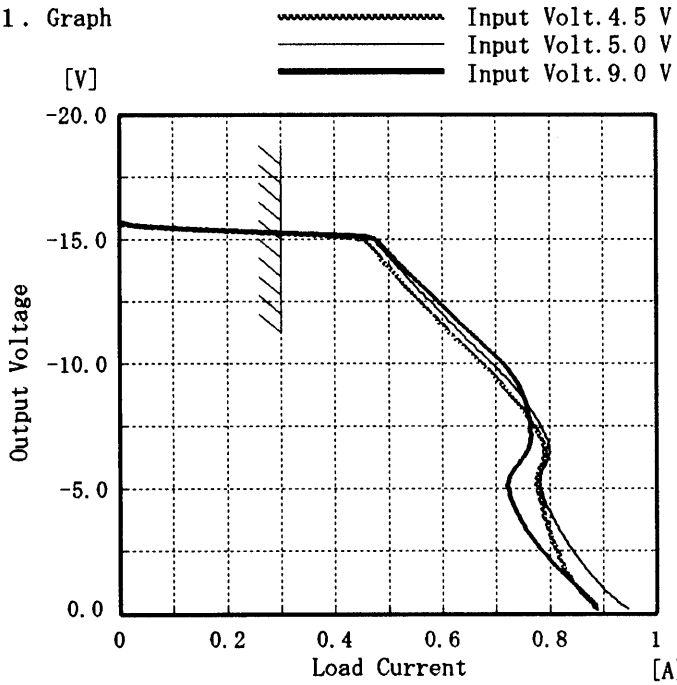


2. Values

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	0.441	0.459	0.464
14.25	0.473	0.490	0.499
13.50	0.501	0.521	0.531
12.00	0.564	0.584	0.601
10.50	0.638	0.658	0.678
9.00	0.705	0.723	0.735
7.50	0.757	0.771	0.757
6.00	0.780	0.787	0.738
4.50	0.779	0.783	0.723
3.00	0.799	0.820	0.760
1.50	0.833	0.872	0.824
0.00	0.884	0.938	0.881

Object －15V0.300A

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]
12.00	0.581	0.617	0.625
11.40	0.671	0.712	0.709
10.80	0.723	0.758	0.759
9.60	0.823	0.874	0.885
8.40	0.901	0.945	0.949
7.20	0.963	0.999	0.989
6.00	0.906	0.912	0.876
4.80	0.820	0.797	0.732
3.60	0.786	0.754	0.675
2.40	0.861	0.834	0.788
1.20	1.063	1.040	0.978
0.00	1.225	1.165	0.950

BC－2076

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Model	ZUW100515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+15V 0.300A		

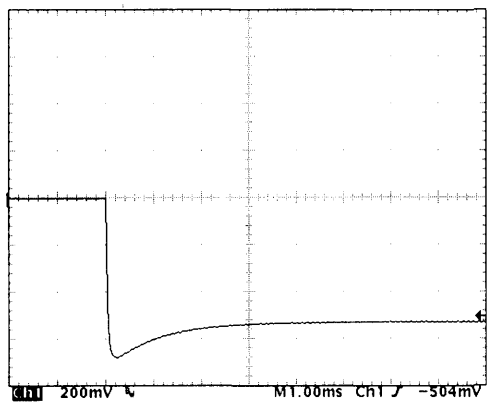
Input Volt. 5 V

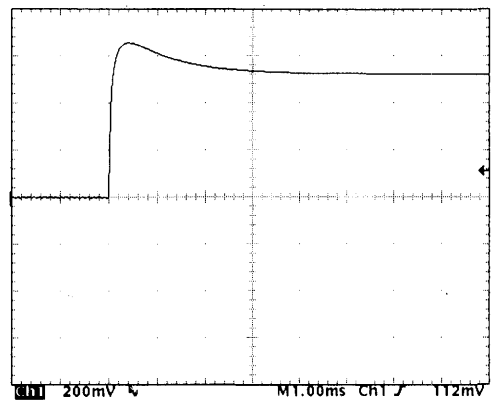
Cycle 100 mS

Load Current

Min. Load ←→
Load 100 %

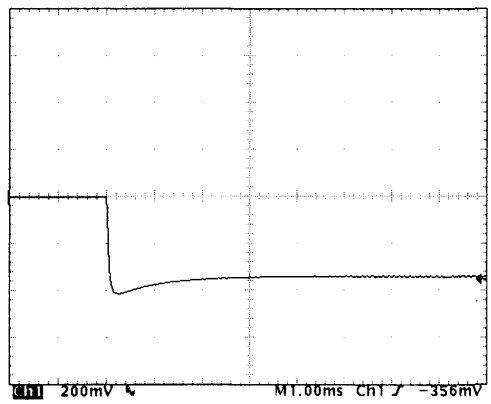
200 mV/div

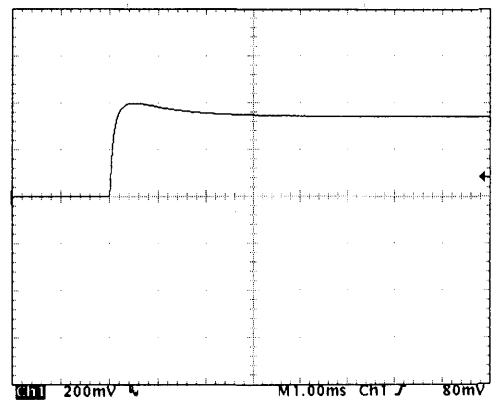




Min. Load ←→
Load 50 %

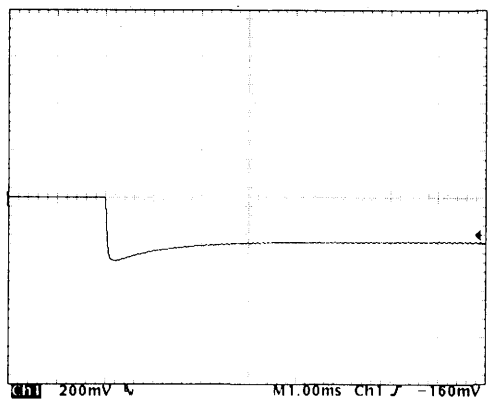
200 mV/div

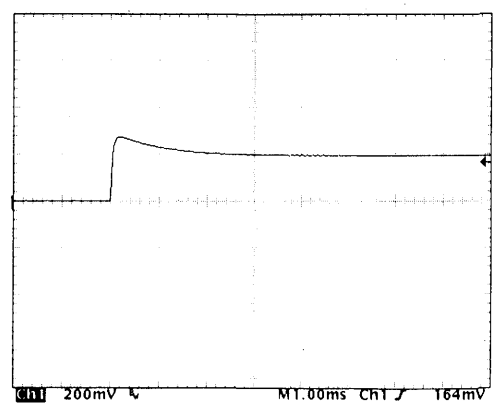




Load 50%←→
Load 100 %

200 mV/div





1 mS/div

COSEL

Model	ZUW100515		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	-15V0.300A		

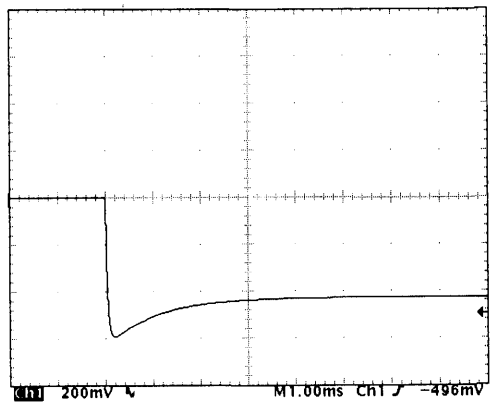
Input Volt. 5 V

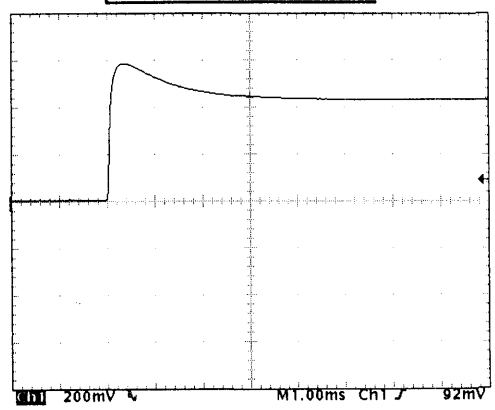
Cycle 100 mS

Load Current

Min. Load ←→
Load 100 %

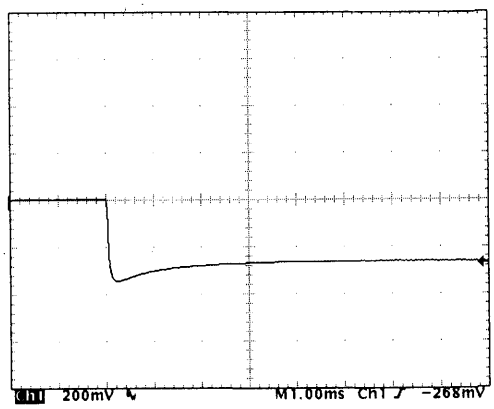
200 mV/div

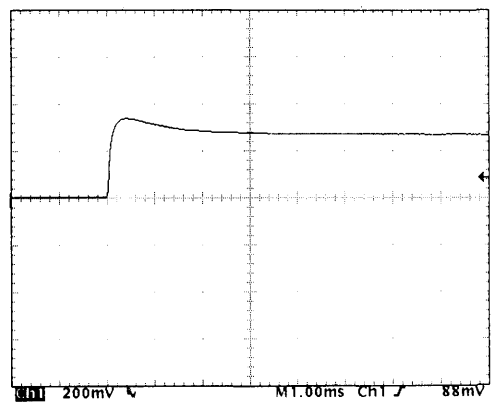




Min. Load ←→
Load 50 %

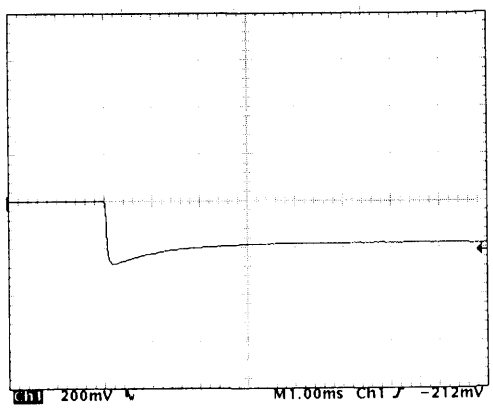
200 mV/div

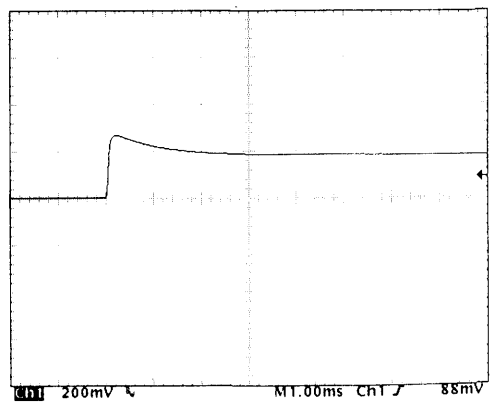




Load 50%←→
Load 100 %

200 mV/div





1 mS/div

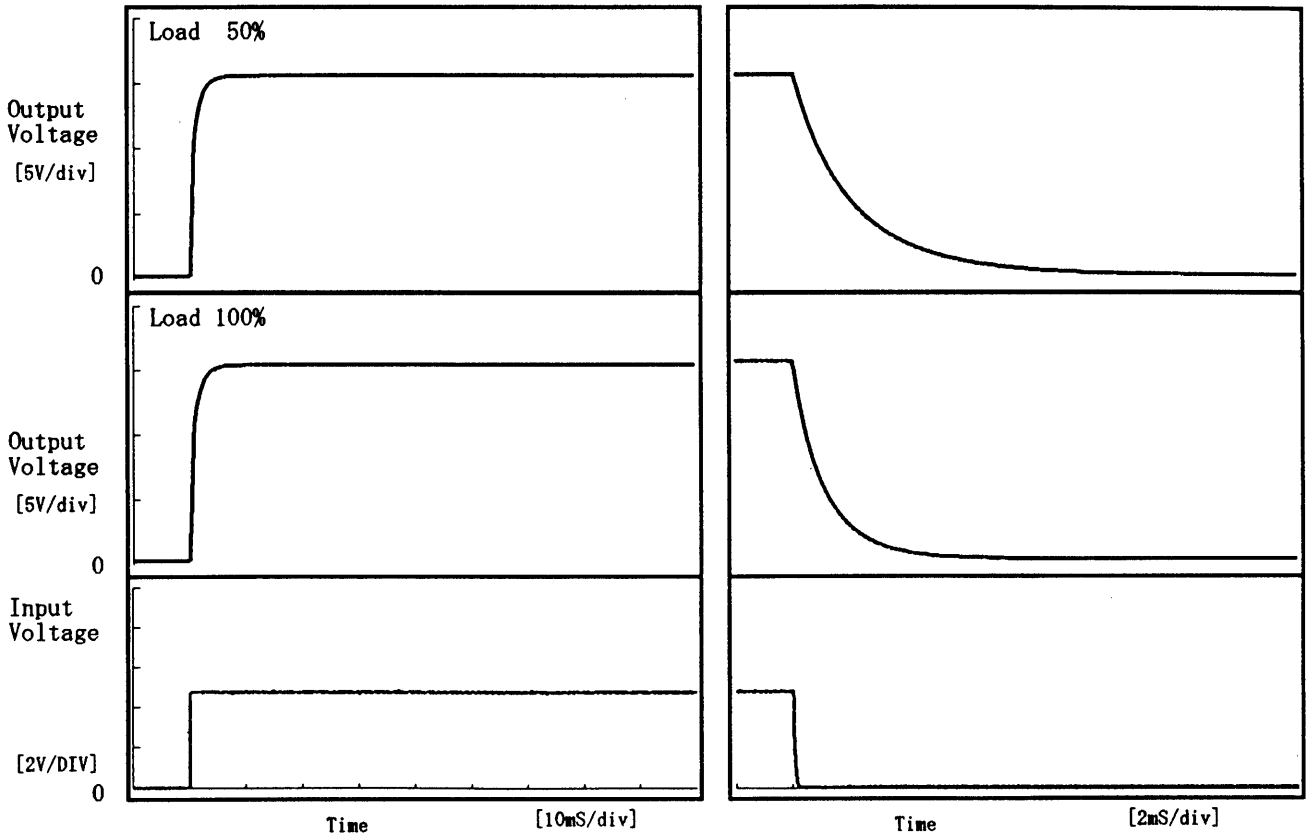
BC－2076

COSEL

Model	ZUW100515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+15V0.300A		

1. Graph

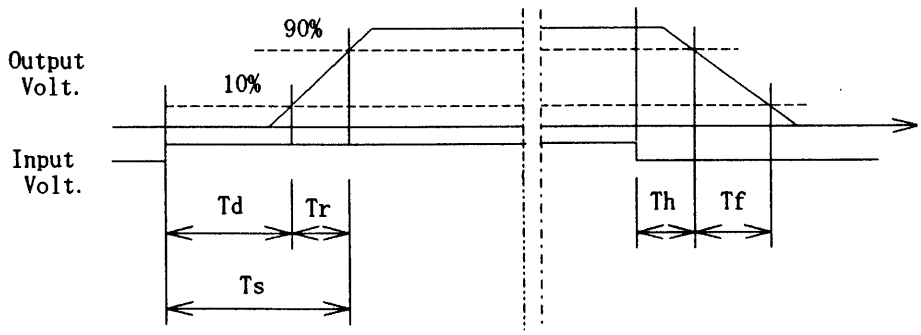
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.15	1.95	2.10	0.33	5.30
100 %	0.15	2.10	2.25	0.19	2.76



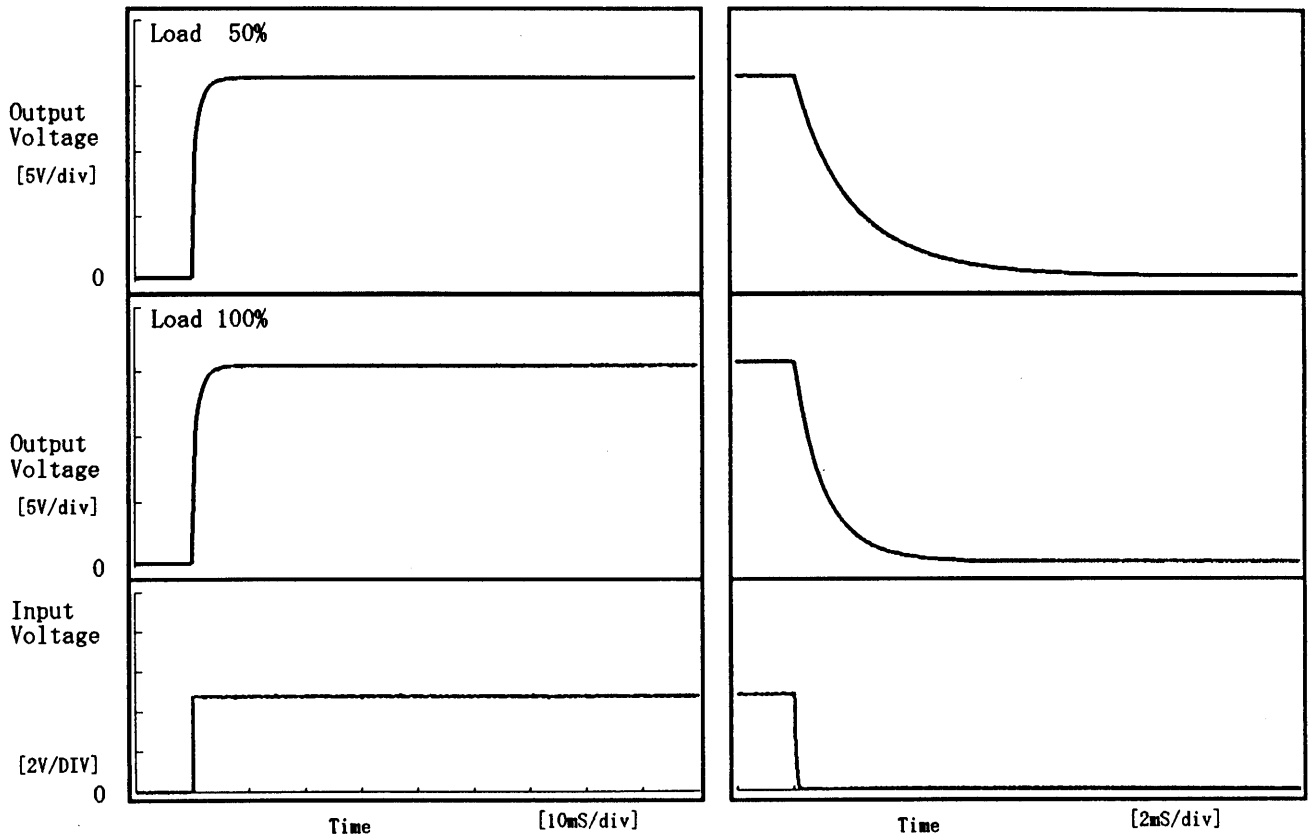
BC−2076

COSEL

Model	ZUW100515		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	-15V0.300A		

1. Graph

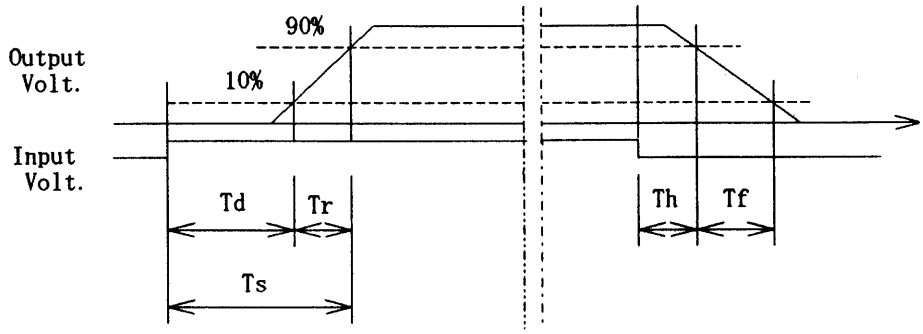
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.15	1.85	2.00	0.33	5.07
100 %	0.15	1.95	2.10	0.19	2.53



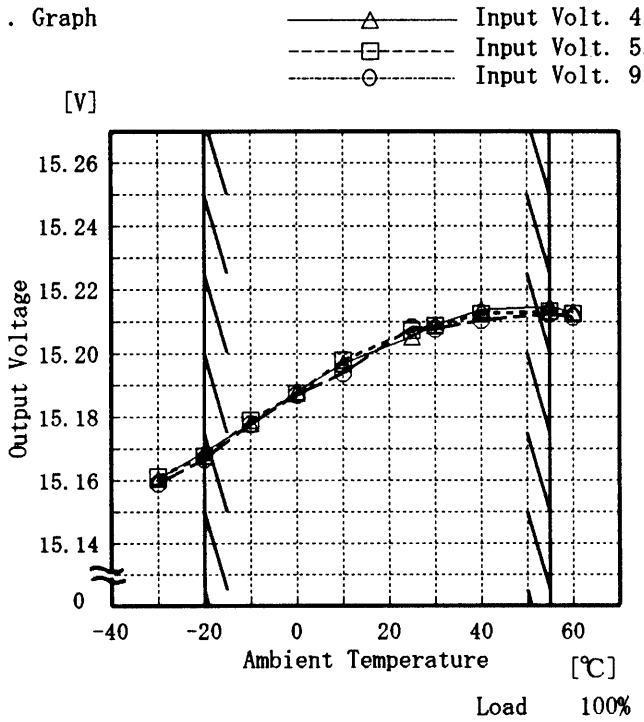
COSEL

Model	ZUW100515
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object ＋15V0.300A

1. Graph

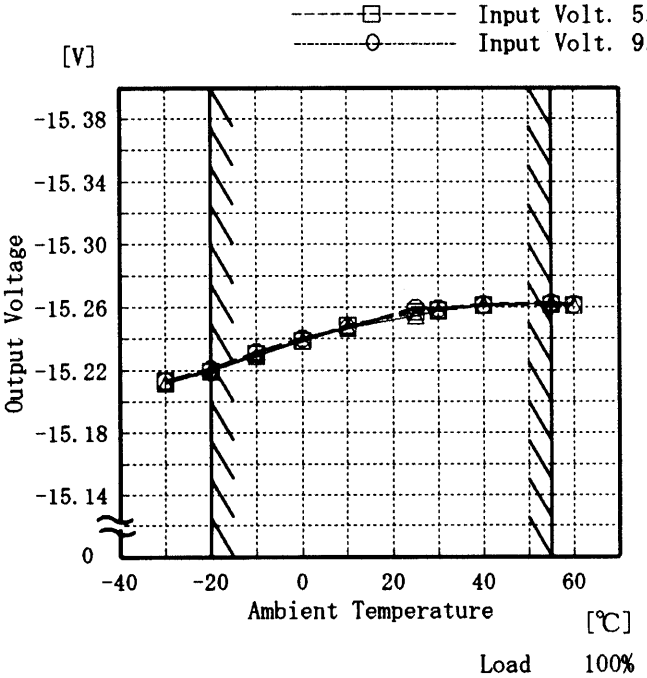


2. Values

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	15.160	15.161	15.159
-20	15.169	15.168	15.167
-10	15.178	15.179	15.178
0	15.188	15.188	15.187
10	15.197	15.198	15.194
25	15.205	15.207	15.208
30	15.209	15.209	15.208
40	15.214	15.212	15.210
55	15.215	15.213	15.212
60	15.213	15.212	15.211
—	—	—	—

Object −15V0.300A

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	-15.212	-15.213	-15.213
-20	-15.220	-15.219	-15.221
-10	-15.229	-15.230	-15.231
0	-15.239	-15.238	-15.240
10	-15.247	-15.248	-15.247
25	-15.255	-15.257	-15.260
30	-15.258	-15.258	-15.259
40	-15.262	-15.261	-15.261
55	-15.263	-15.262	-15.262
60	-15.261	-15.261	-15.261
—	—	—	—

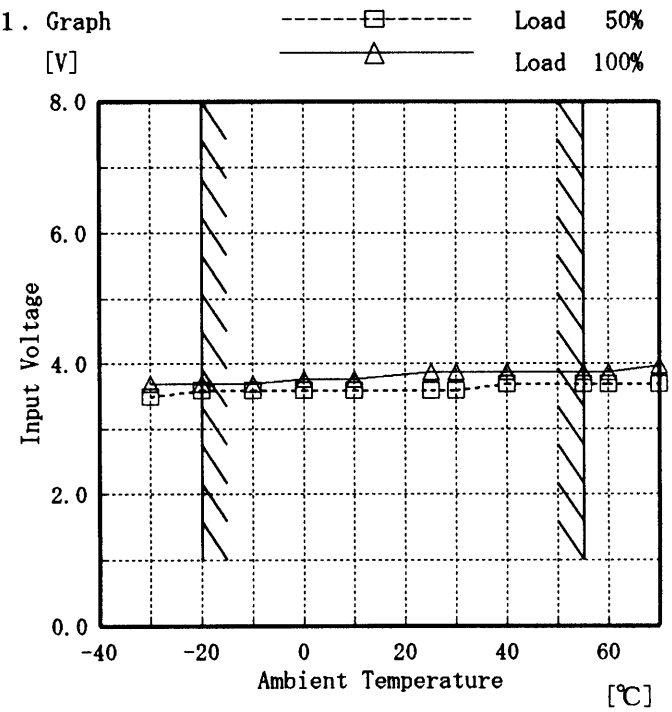
COSEL

Model	ZUW100515
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 ＋15V0.300A

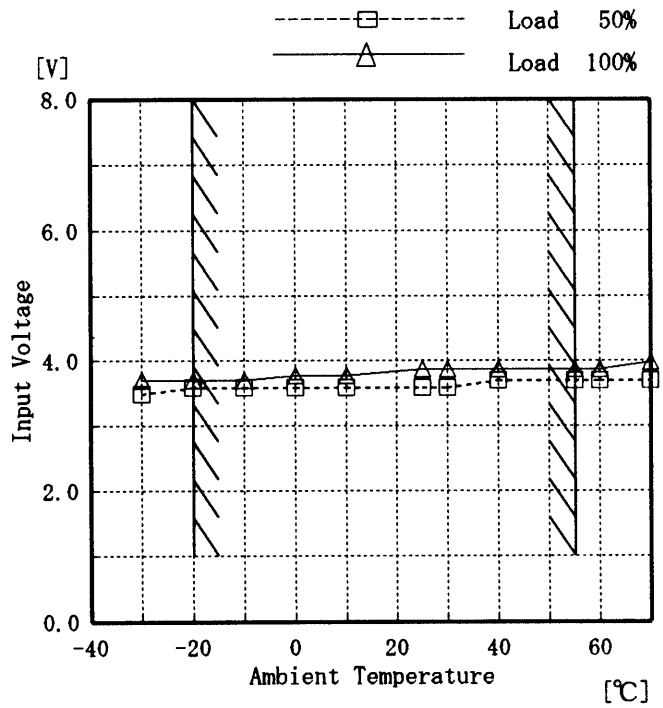
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.5	3.7
-20	3.6	3.7
-10	3.6	3.7
0	3.6	3.8
10	3.6	3.8
25	3.6	3.9
30	3.6	3.9
40	3.7	3.9
55	3.7	3.9
60	3.7	3.9
70	3.7	4.0

Object －15V0.300A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.5	3.7
-20	3.6	3.7
-10	3.6	3.7
0	3.6	3.8
10	3.6	3.8
25	3.6	3.9
30	3.6	3.9
40	3.7	3.9
55	3.7	3.9
60	3.7	3.9
70	3.7	4.0

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。

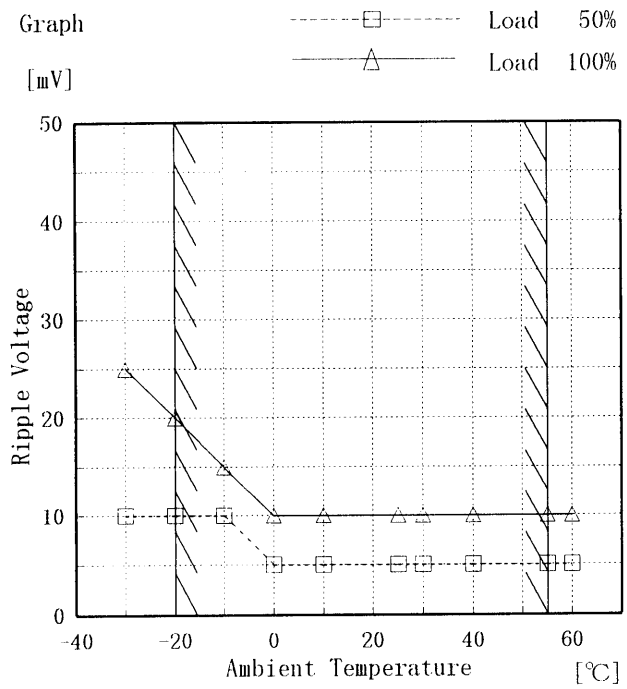
COSEL

Model	ZUW100515
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry　Figure A

Object　+15V0.300A

1. Graph



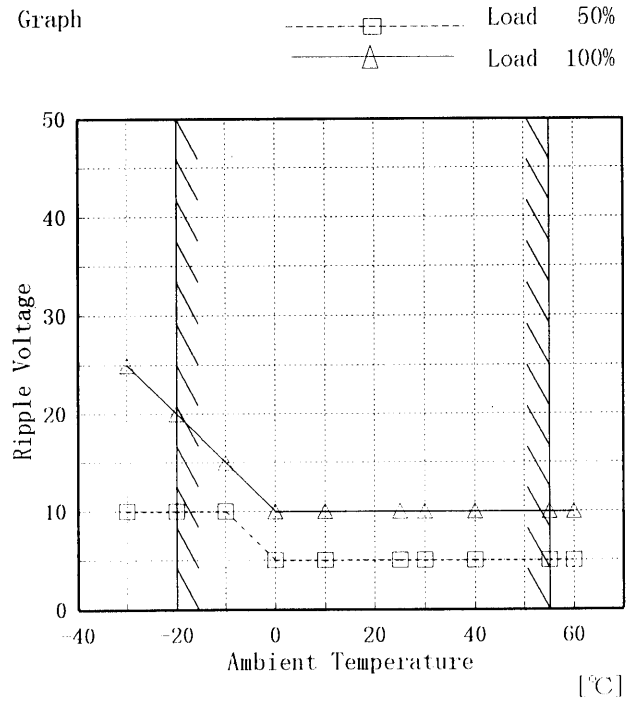
Input Volt.　4.5 V

2. Values

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

Object　−15V0.300A

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	5	10
-20	5	10
-10	5	10
0	5	5
10	5	5
25	5	5
30	5	5
40	5	5
55	5	5
60	5	5
—	—	—

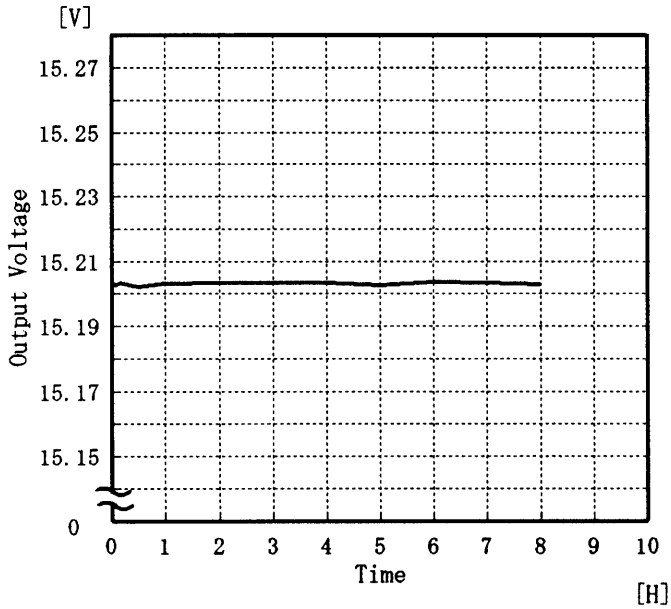
COSEL

Model	ZUW100515
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object ＋15V0.300A

1. Graph



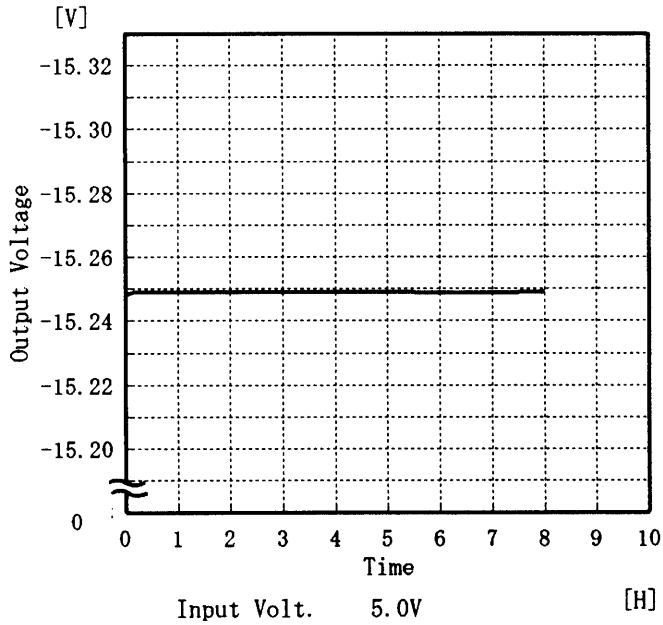
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	15.205
0.5	15.202
1.0	15.203
2.0	15.203
3.0	15.203
4.0	15.203
5.0	15.203
6.0	15.204
7.0	15.203
8.0	15.203

Object －15V0.300A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-15.250
0.5	-15.249
1.0	-15.249
2.0	-15.249
3.0	-15.249
4.0	-15.249
5.0	-15.249
6.0	-15.249
7.0	-15.249
8.0	-15.249

COSEL

Model	ZUW100515
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) : 0.000～0.300 A

(AVR 2) : 0.000～0.300 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) 0.000～0.300 A

(AVR 2) 0.000～0.300 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 ＋15V0.300A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	55	4.5	0.300	15.214	±258	±1.8
Minimum Voltage	55	9.0	0.000	14.699		

Object －15V0.300A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	55	4.5	0.300	-15.263	±254	±1.7
Minimum Voltage	55	9.0	0.000	-14.755		

COSEL

Model	ZUW100515
Item	Condensation 結露特性
Object	+15V0.300A

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	15.306	5	30
	2	15.338	5	30
	3	15.296	5	30
Load 100 %	1	15.133	10	35
	2	15.194	10	35
	3	15.156	10	35

Input Volt. 5.0 V

COSEL

Model	ZUW100515
Item	Condensation 結露特性
Object	−15V0.300A

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	15.400	5	25
	2	15.367	5	25
	3	15.390	5	25
Load 100 %	1	15.245	10	35
	2	15.213	10	35
	3	15.237	10	35

Input Volt. 5.0 V

COSEL

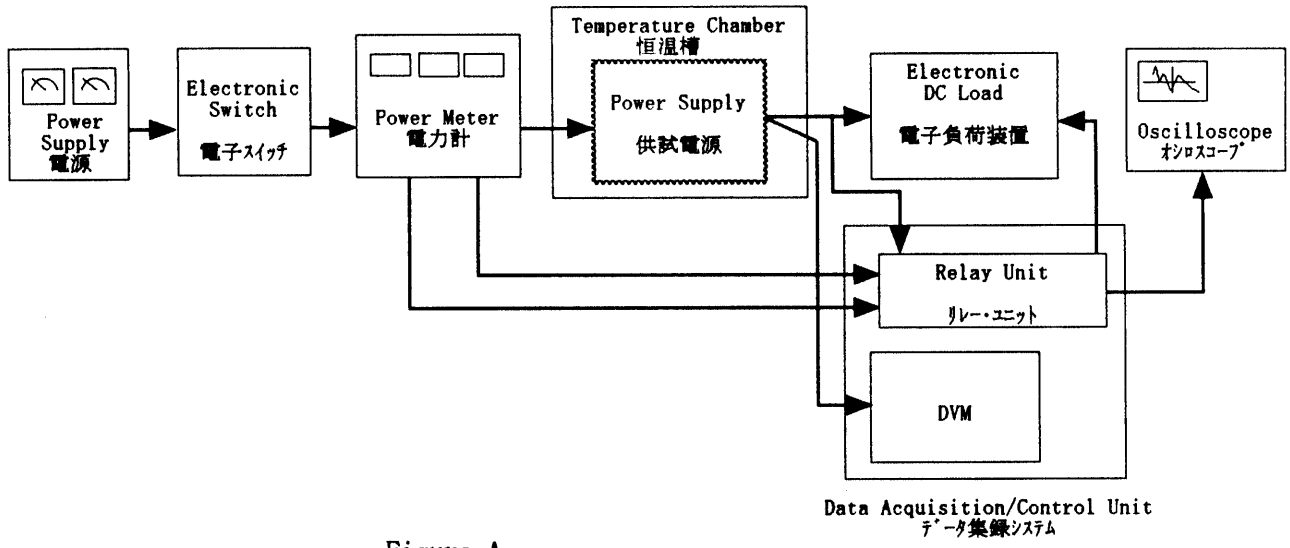


Figure A