参考資料

COSEL

TEST DATA OF ZUW30512

(5.0V INPUT)

Regulated DC Power Supply

Date : Nov.5. 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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CONTENTS

(Final Page 20)

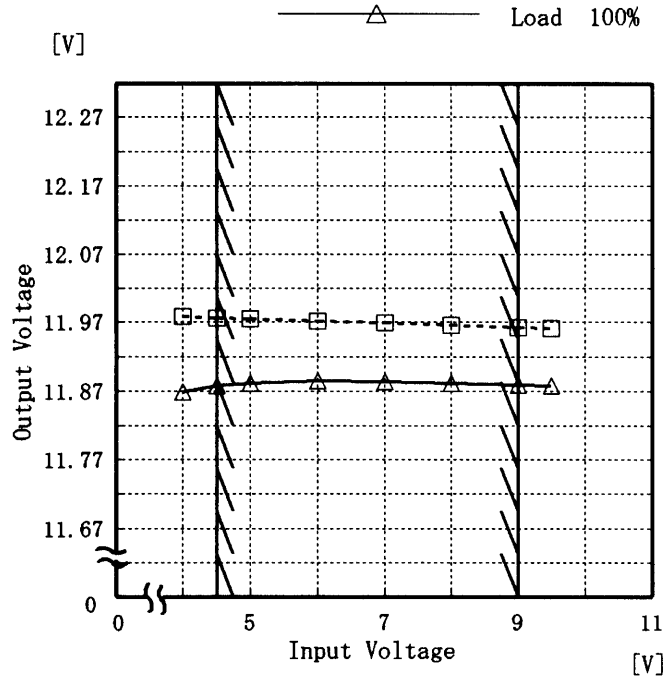
COSEL

Model	ZUW30512
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object +12V0.13A

1. Graph

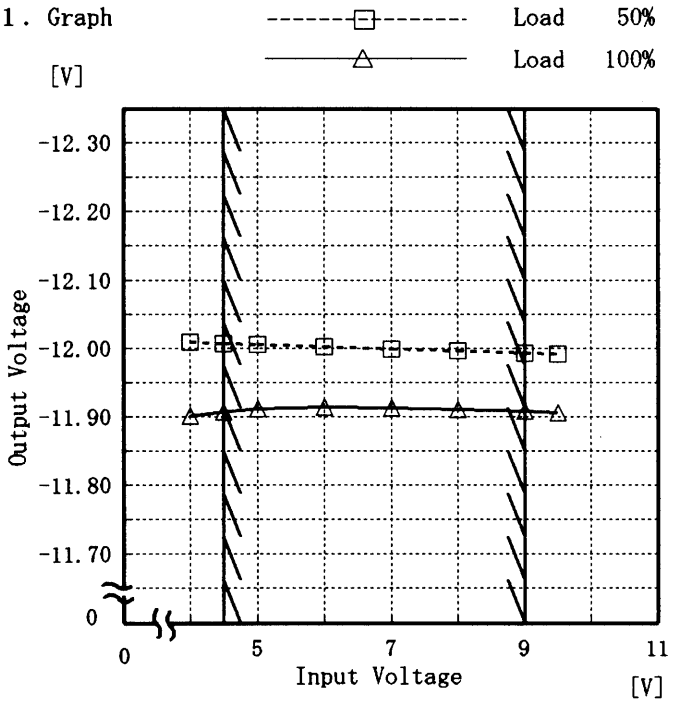


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	11.978	11.869
4.5	11.976	11.877
5.0	11.975	11.881
6.0	11.972	11.885
7.0	11.969	11.884
8.0	11.966	11.882
9.0	11.963	11.879
9.5	11.961	11.878
—	—	—
—	—	—
—	—	—
—	—	—

Object −12V0.13A

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	-12.009	-11.901
4.5	-12.007	-11.907
5.0	-12.005	-11.911
6.0	-12.002	-11.913
7.0	-11.999	-11.912
8.0	-11.996	-11.910
9.0	-11.993	-11.908
9.5	-11.992	-11.906
—	—	—
—	—	—
—	—	—
—	—	—

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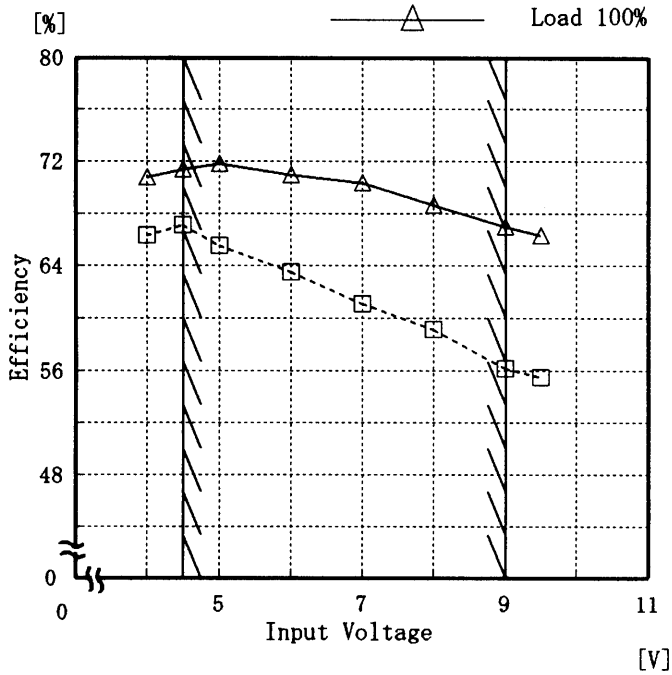
Model	ZUW30512
Item	Efficiency 効率
Object	———————————

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	66.3	70.7
4.5	67.1	71.4
5.0	65.5	71.8
6.0	63.5	71.0
7.0	61.1	70.3
8.0	59.2	68.7
9.0	56.2	67.0
9.5	55.5	66.3
—	—	—
—	—	—
—	—	—
—	—	—

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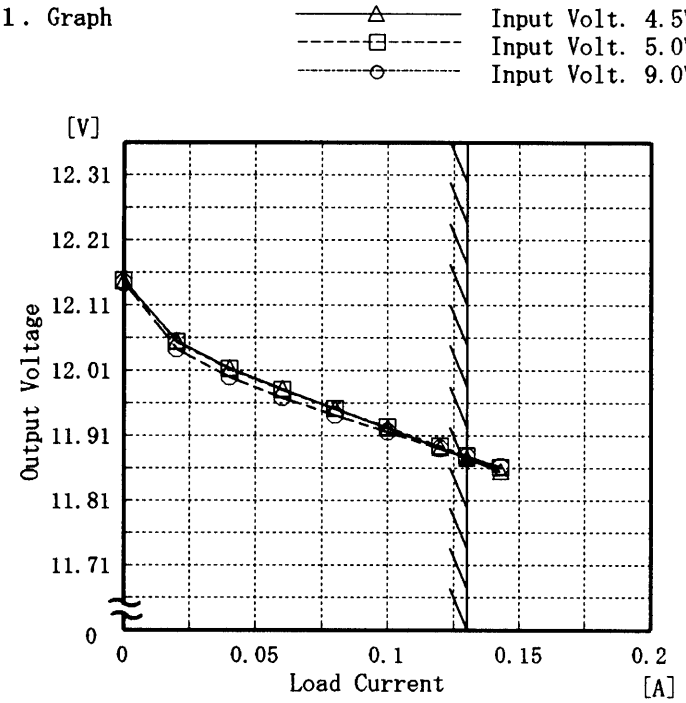
Model	ZUW30512	Temperature	25℃
Item	Load Regulation 静的負荷変動	Testing Circuitry	Figure A

Object +12V0.13A

1. Graph

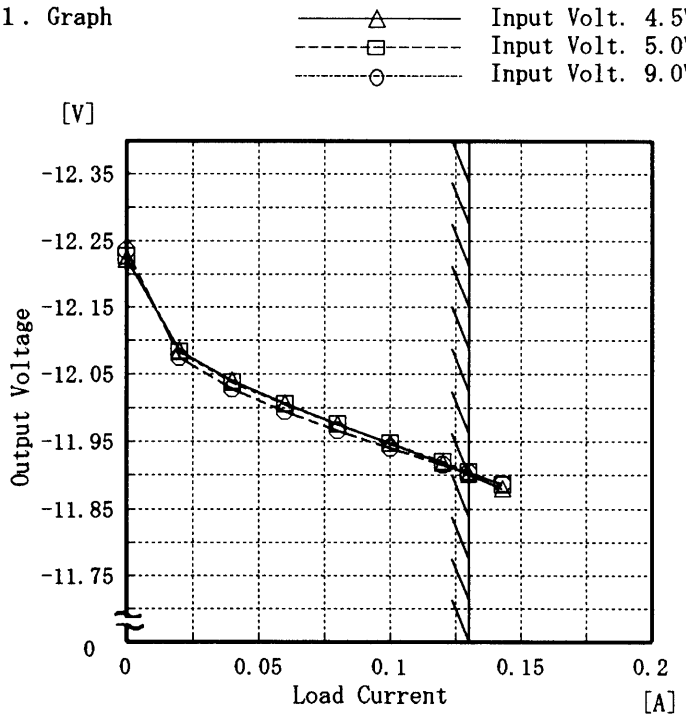


2. Values

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	12.146	12.147	12.145
0.020	12.055	12.054	12.043
0.040	12.014	12.012	12.000
0.060	11.981	11.980	11.969
0.080	11.952	11.951	11.941
0.100	11.923	11.923	11.916
0.120	11.892	11.894	11.890
0.130	11.876	11.880	11.878
0.143	11.855	11.861	11.862
—	—	—	—

Object −12V0.13A

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	-12.224	-12.228	-12.237
0.020	-12.085	-12.084	-12.076
0.040	-12.041	-12.039	-12.029
0.060	-12.008	-12.006	-11.996
0.080	-11.977	-11.976	-11.967
0.100	-11.948	-11.949	-11.941
0.120	-11.918	-11.920	-11.916
0.130	-11.902	-11.906	-11.904
0.143	-11.881	-11.886	-11.888
—	—	—	—

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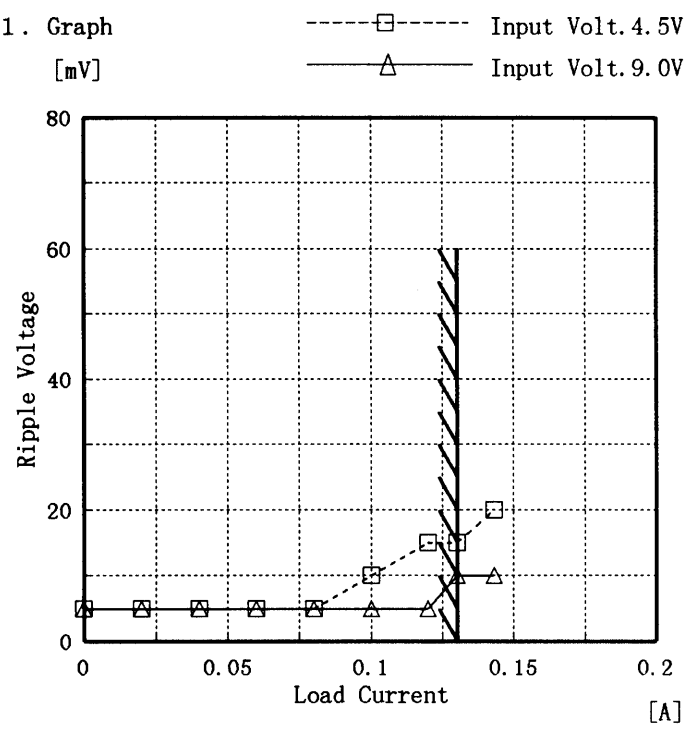
Model	ZUW30512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12V0.13A

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

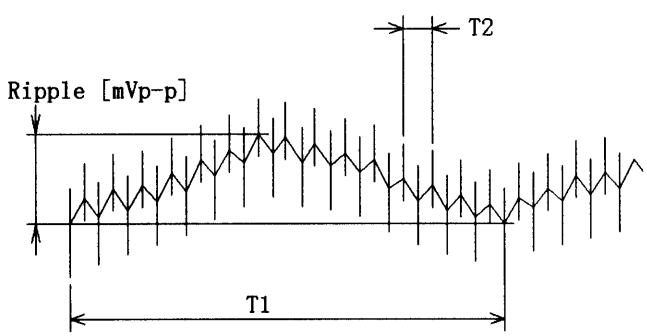


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

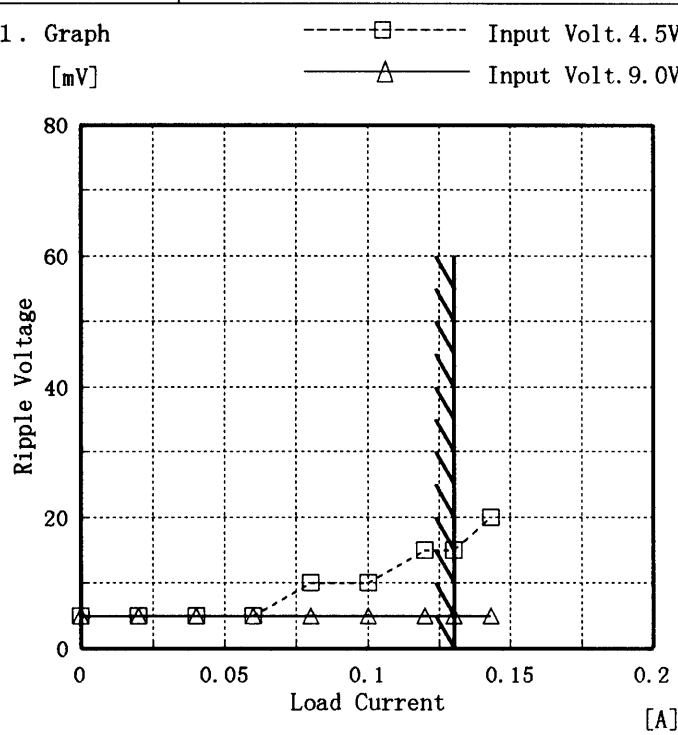
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.00	5	5
0.02	5	5
0.04	5	5
0.06	5	5
0.08	5	5
0.10	10	5
0.12	15	5
0.13	15	10
0.14	20	10
—	—	—
—	—	—

COSEL

Model	ZUW30512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	−12V0.13A

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

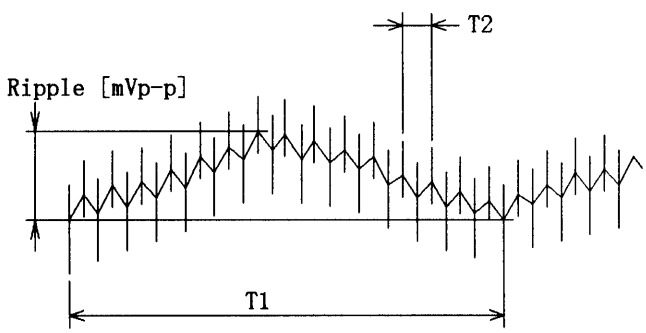


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

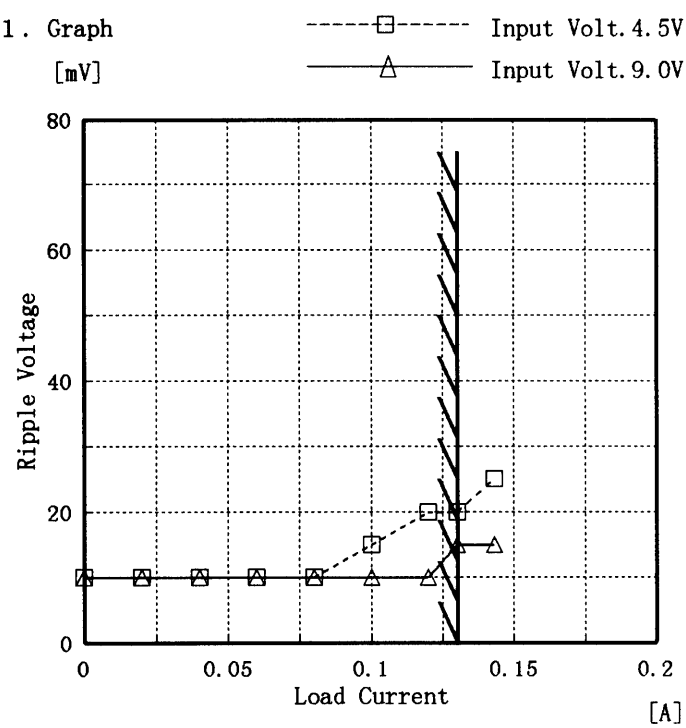
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.00	5	5
0.02	5	5
0.04	5	5
0.06	5	5
0.08	10	5
0.10	10	5
0.12	15	5
0.13	15	5
0.14	20	5
—	—	—
—	—	—

COSEL

Model	ZUW30512
Item	Ripple-Noise リップルノイズ
Object	+12V0.13A

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。

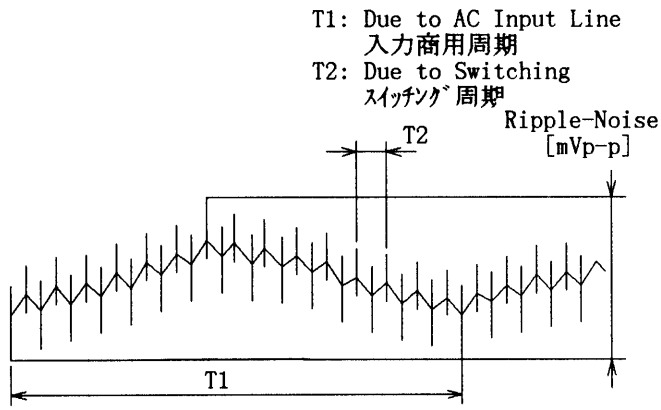


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

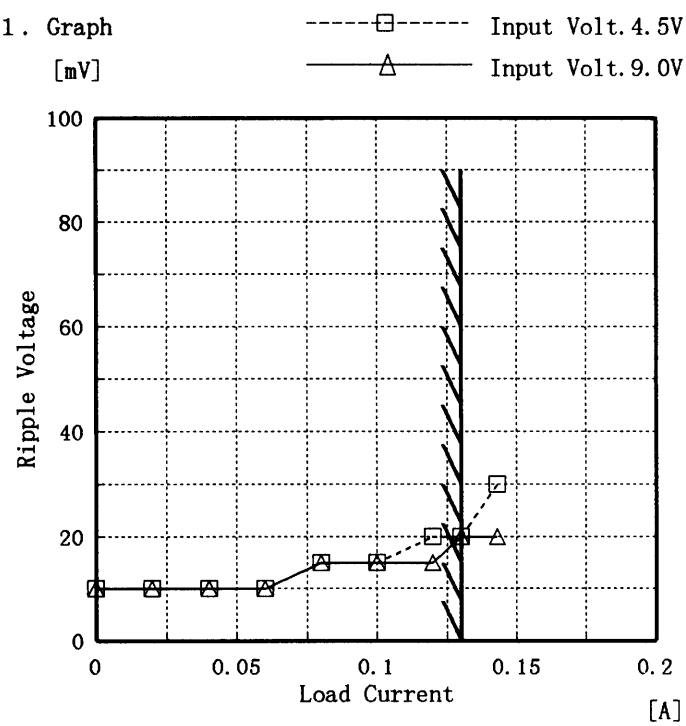
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.00	10	10
0.02	10	10
0.04	10	10
0.06	10	10
0.08	10	10
0.10	15	10
0.12	20	10
0.13	20	15
0.14	25	15
—	—	—
—	—	—

COSEL

Model	ZUW30512
Item	Ripple-Noise リップルノイズ
Object	−12V0.13A

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。

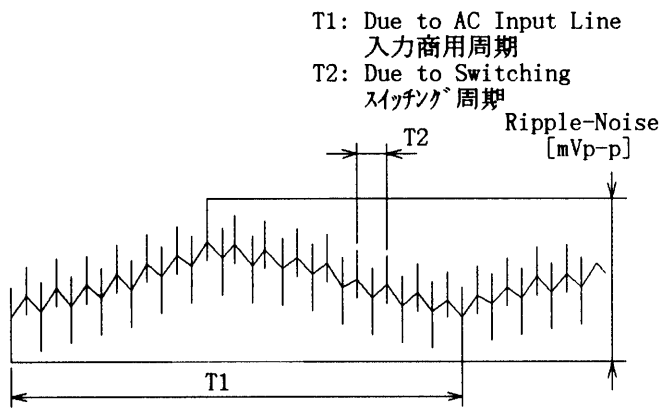


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

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	10	10
0.02	10	10
0.04	10	10
0.06	10	10
0.08	15	15
0.10	15	15
0.12	20	15
0.13	20	20
0.14	30	20
—	—	—
—	—	—

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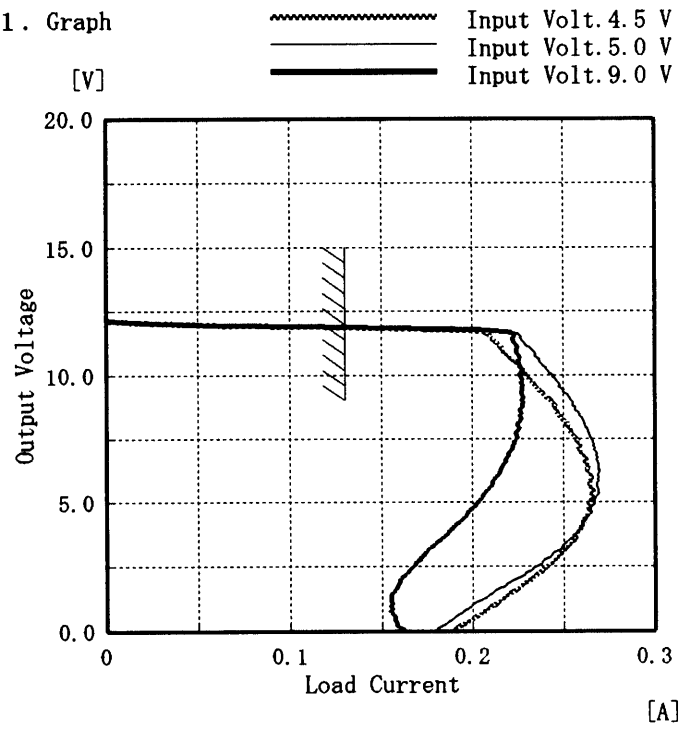
Model	ZUW30512
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object +12V0.13A

1. Graph

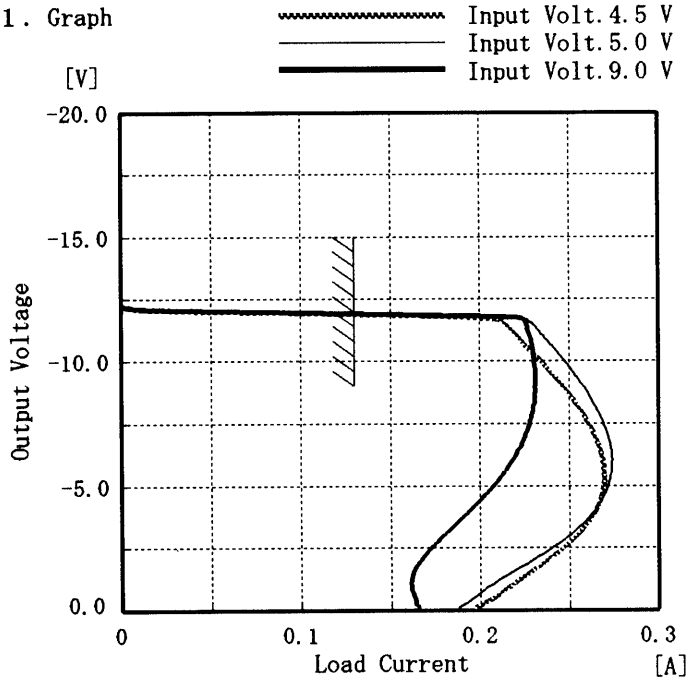


2. Values

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]
12.00	0.068	0.065	0.058
11.40	0.210	0.226	0.222
10.80	0.220	0.235	0.225
9.60	0.234	0.248	0.228
8.40	0.248	0.258	0.226
7.20	0.259	0.266	0.222
6.00	0.265	0.268	0.215
4.80	0.263	0.265	0.201
3.60	0.256	0.255	0.184
2.40	0.239	0.233	0.167
1.20	0.216	0.205	0.155
0.00	0.189	0.180	0.163

Object −12V0.13A

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	0.084	0.084	0.077
-11.40	0.216	0.232	0.227
-10.80	0.223	0.238	0.229
-9.60	0.237	0.251	0.231
-8.40	0.252	0.263	0.231
-7.20	0.263	0.271	0.227
-6.00	0.269	0.274	0.218
-4.80	0.269	0.271	0.206
-3.60	0.261	0.259	0.189
-2.40	0.245	0.238	0.171
-1.20	0.223	0.211	0.162
0.00	0.196	0.187	0.167

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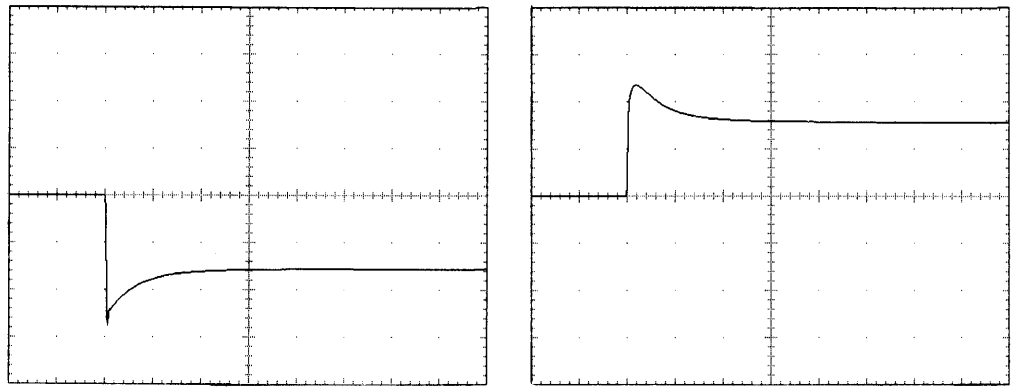
Model	ZUW30512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.13A		

Input Volt. 5.0 V

Cycle 100 mS

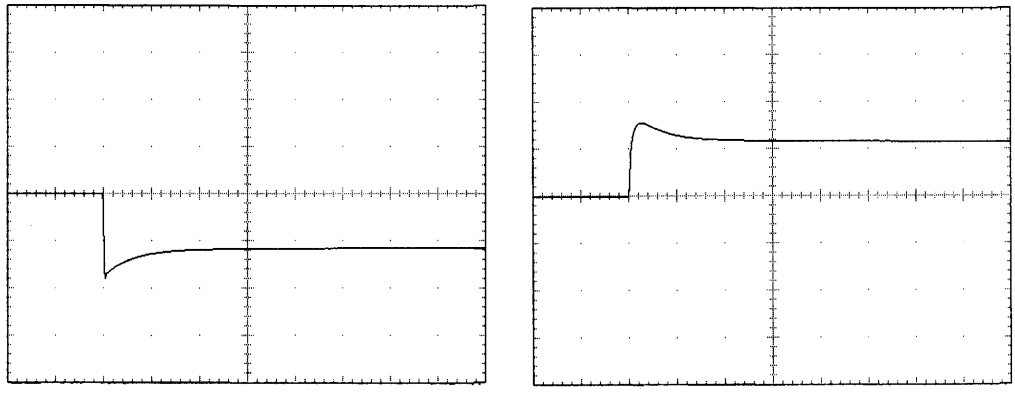
Load Current

Min. Load ⟷
Load 100 %



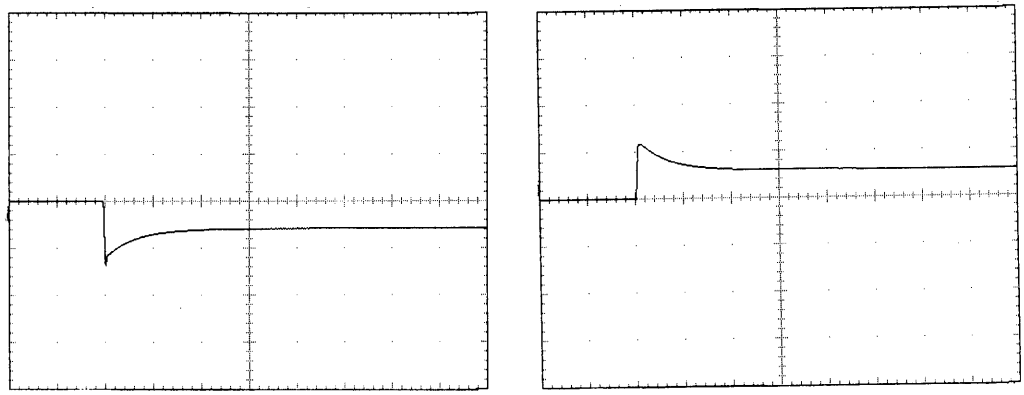
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

COSEL

Model	ZUW30512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−12V0.13A		

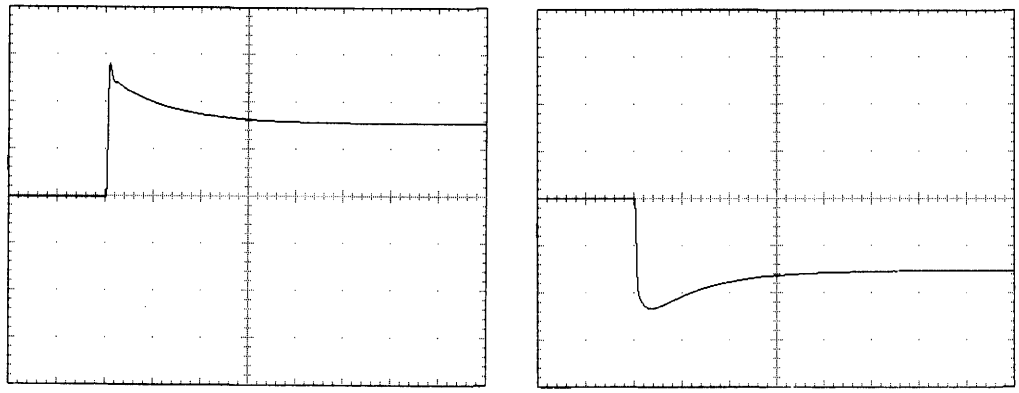
Input Volt. 5.0 V

Cycle 100 mS

Load Current

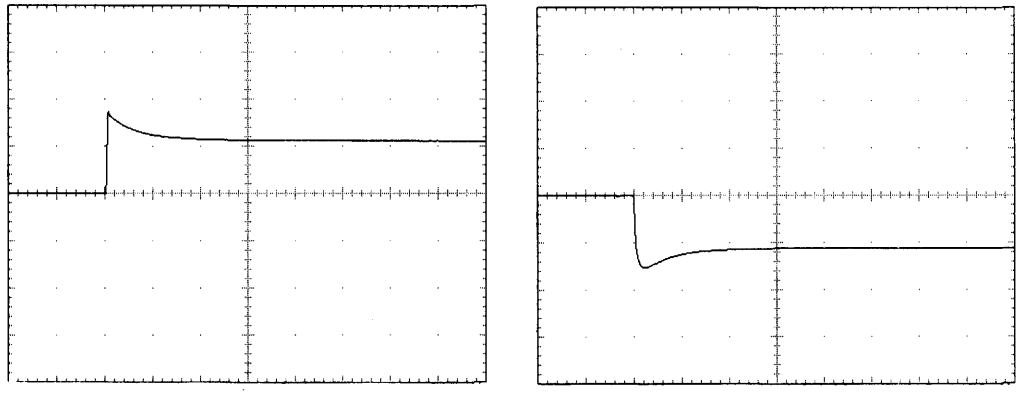
Min. Load ⟷
Load 100 %

200 mV/div



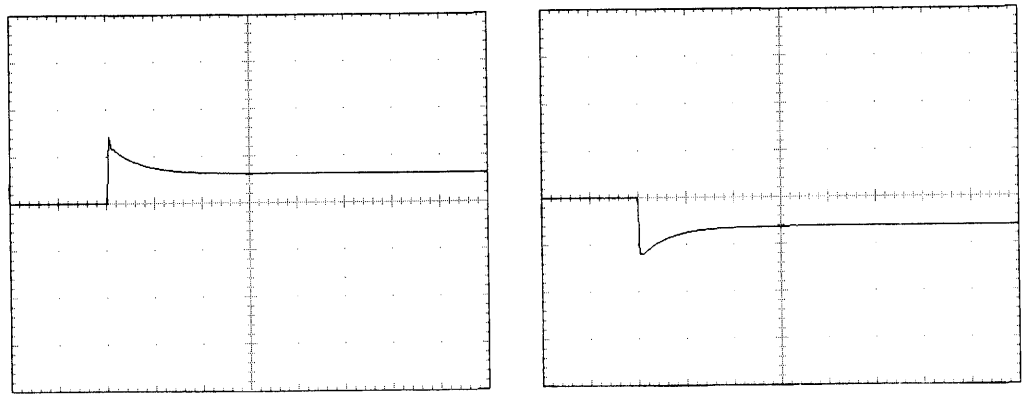
Min. Load ⟷
Load 50 %

200 mV/div



Load 50%⟷
Load 100 %

200 mV/div

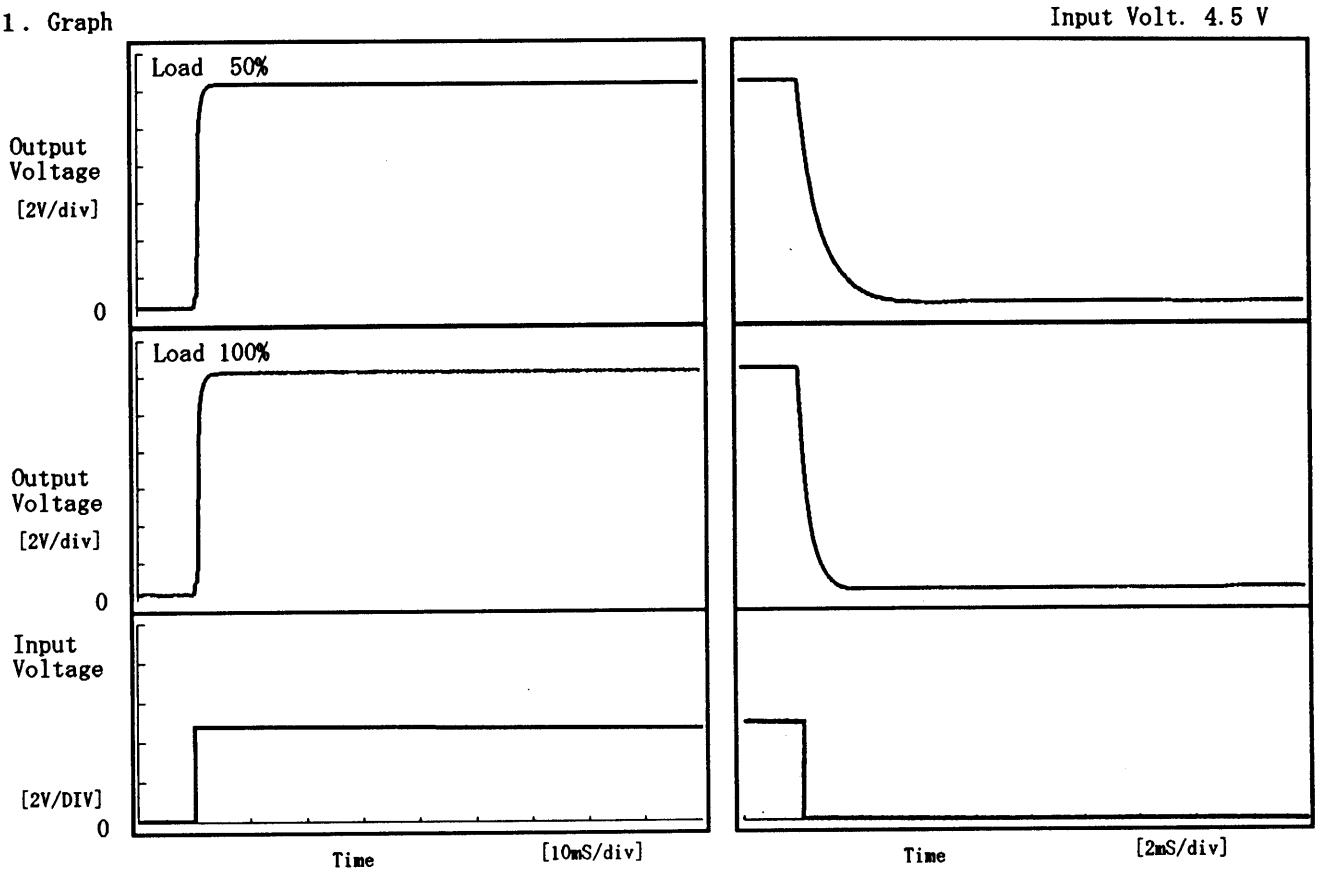


1 mS/div

COSEL

Model	ZUW30512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+12V0.13A		

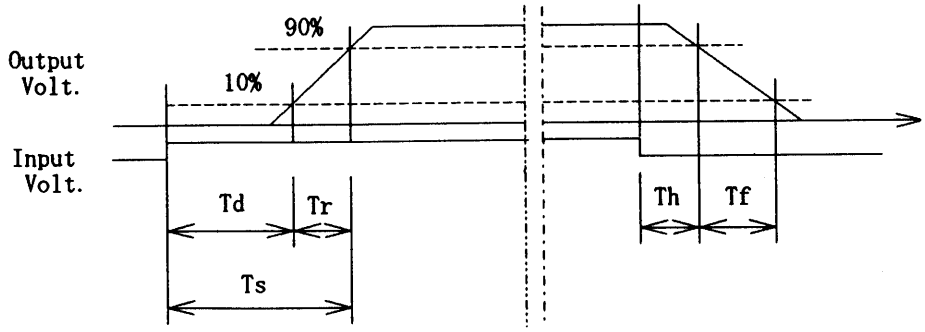
1. Graph



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.60	0.70	1.30	0.10	1.86
100 %	0.60	0.80	1.40	0.06	0.86



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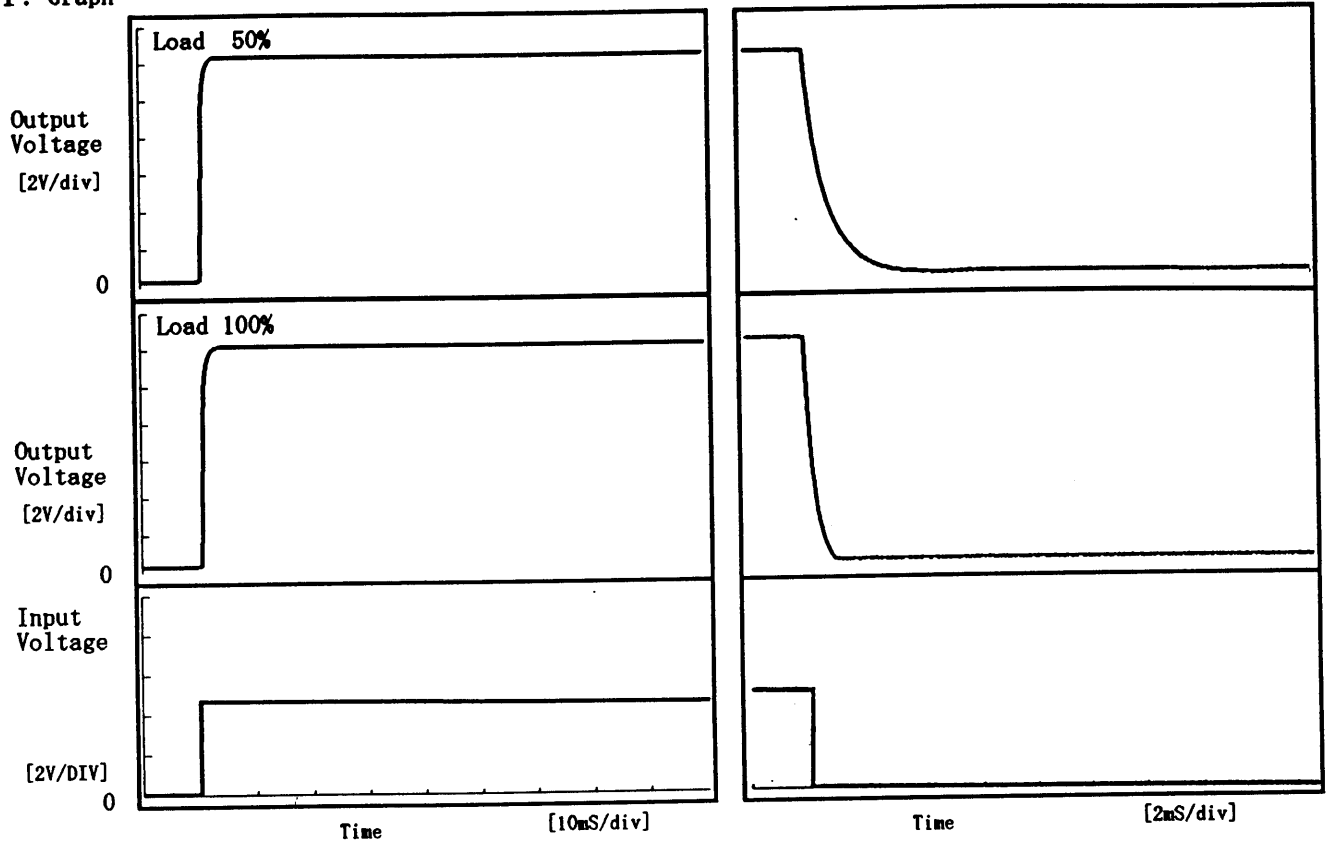
Model	ZUW30512	Temperature	25℃
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-12V0.13A		

1. Graph

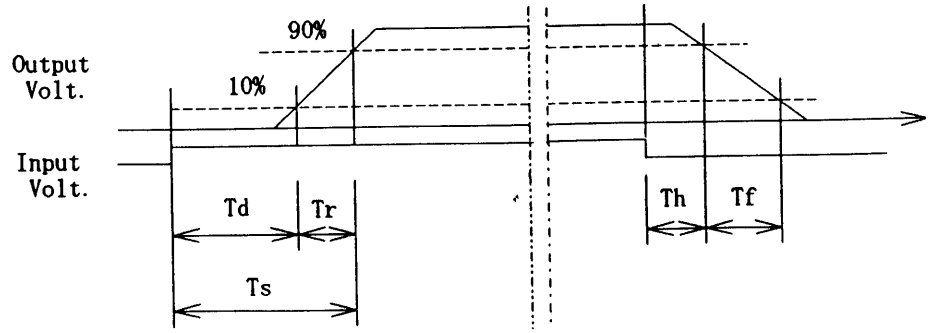
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.60	0.75	1.35	0.10	1.67
100 %	0.60	0.85	1.45	0.06	0.67



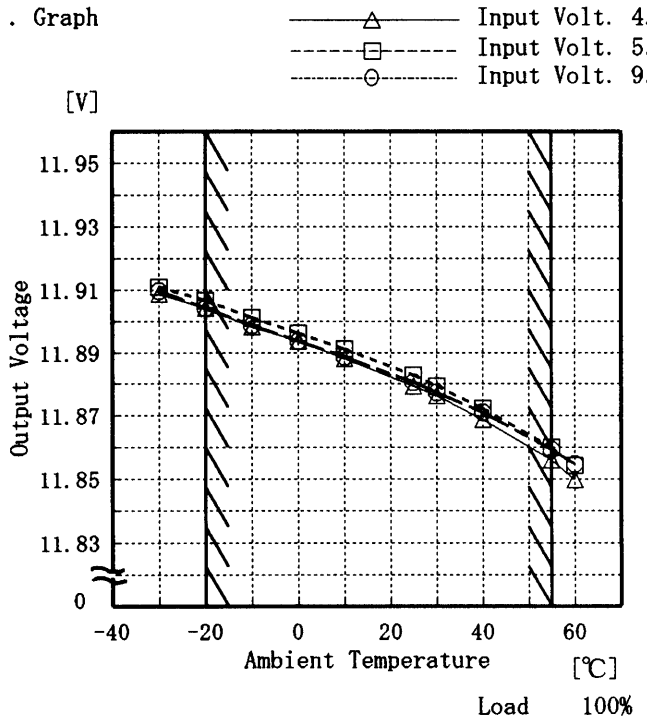
COSEL

Model	ZUW30512
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object ＋12V0.13A

1. Graph

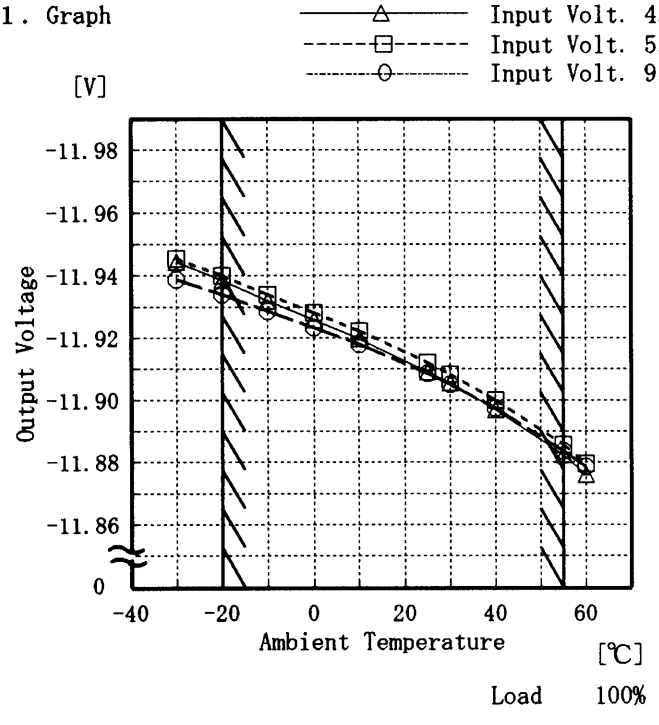


2. Values

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	11.909	11.911	11.910
-20	11.904	11.907	11.904
-10	11.898	11.901	11.899
0	11.893	11.896	11.894
10	11.888	11.891	11.889
25	11.879	11.883	11.880
30	11.876	11.879	11.877
40	11.869	11.872	11.871
55	11.856	11.860	11.859
60	11.850	11.854	11.855
—	—	—	—

Object －12V0.13A

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	-11.944	-11.945	-11.939
-20	-11.939	-11.940	-11.934
-10	-11.932	-11.934	-11.929
0	-11.926	-11.928	-11.923
10	-11.920	-11.922	-11.918
25	-11.909	-11.912	-11.909
30	-11.905	-11.908	-11.905
40	-11.897	-11.900	-11.897
55	-11.882	-11.886	-11.884
60	-11.876	-11.880	-11.879
—	—	—	—

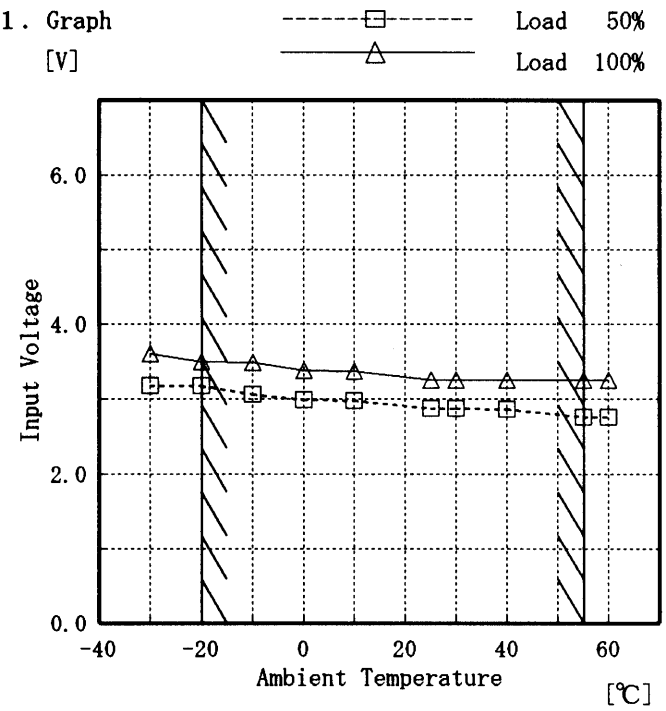
COSEL

Model	ZUW30512
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 +12V0.13A

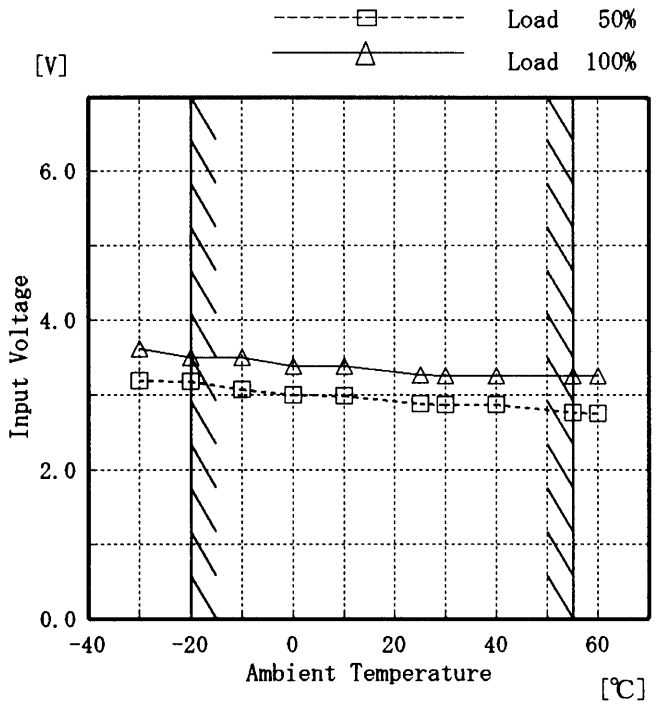
1. Graph



2. Values

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

Object −12V0.13A



2. Values

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

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。

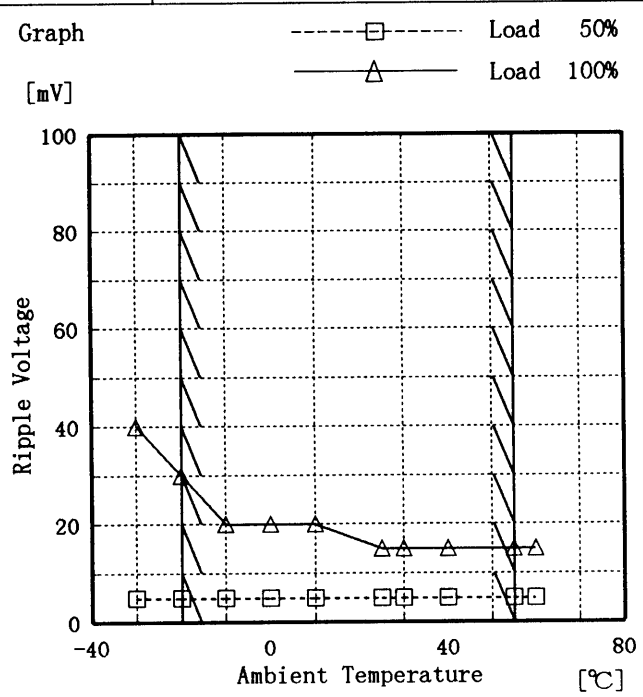
COSEL

Model	ZUW30512
Item	Ripple Voltage (by Ambient Temp.) リップル電圧 (周囲温度特性)

Testing Circuitry Figure A

Object +12V0.13A

1. Graph



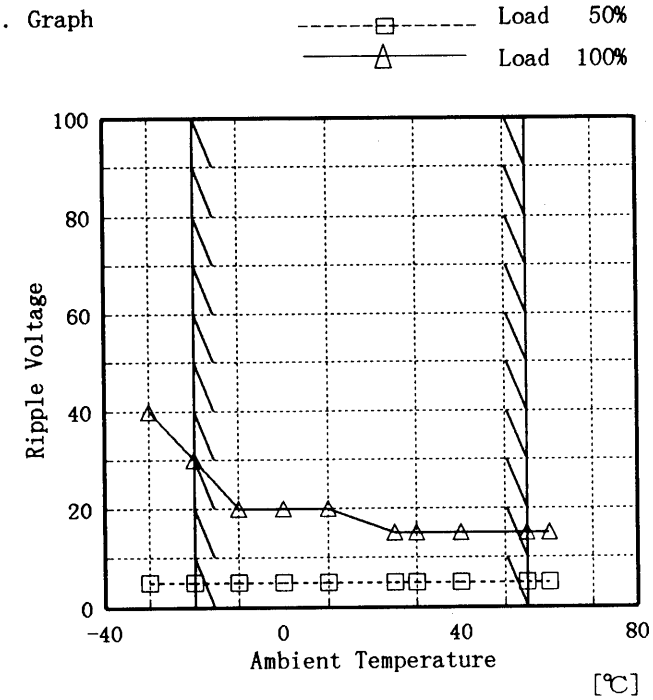
Input Volt. 4.5 V

2. Values

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

Object −12V0.13A

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	40
-20	5	30
-10	5	25
0	5	25
10	5	20
25	5	15
30	5	15
40	5	15
55	5	15
60	5	15
—	—	—

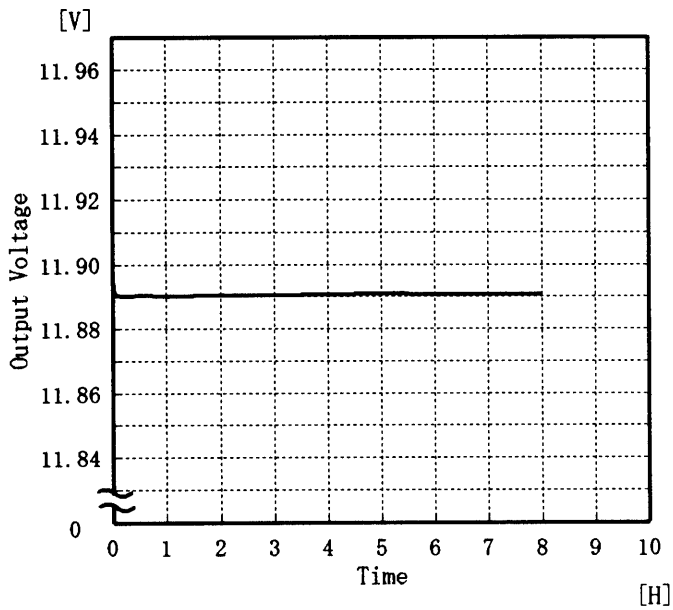
COSEL

Model	ZUW30512
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object +12V0.13A

1. Graph



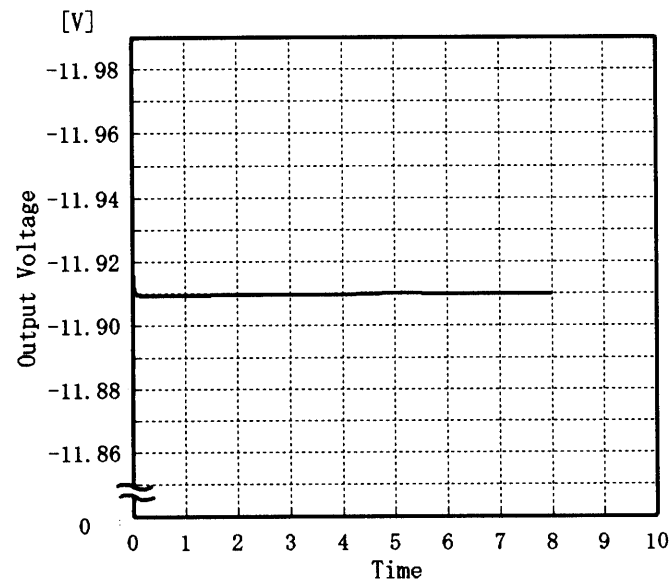
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	11.896
0.5	11.890
1.0	11.890
2.0	11.891
3.0	11.891
4.0	11.891
5.0	11.891
6.0	11.891
7.0	11.891
8.0	11.891

Object −12V0.13A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.919
0.5	-11.910
1.0	-11.910
2.0	-11.910
3.0	-11.910
4.0	-11.910
5.0	-11.910
6.0	-11.910
7.0	-11.910
8.0	-11.910

COSEL

Model	ZUW30512	
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) : 0.00～0.13 A

(AVR 2) : 0.00～0.13 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) 0.00～0.13 A

(AVR 2) 0.00～0.13 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 +12V0.13A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	-20	5.0	0.13	11.905	±174	±1.5
Minimum Voltage	25	9.0	0.00	11.558		

Object −12V0.13A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	-20	5.0	0.13	-11.939	±132	±1.1
Minimum Voltage	55	4.5	0.00	-11.675		

COSEL

Model	ZUW30512
Item	Condensation 結露特性
Object	+12V0.13A

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	11.986	5	15
	2	11.978	5	15
	3	11.982	5	15
Load 100 %	1	11.897	10	20
	2	11.885	10	20
	3	11.888	10	20

Input Volt. 5.0 V

COSEL

Model	ZUW30512
Item	Condensation 結露特性
Object	−12V0.13A

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	-12.009	5	15
	2	-12.012	5	15
	3	-12.013	5	15
Load 100 %	1	-11.921	10	30
	2	-11.924	10	30
	3	-11.928	10	35

Input Volt. 5.0 V

COSEL

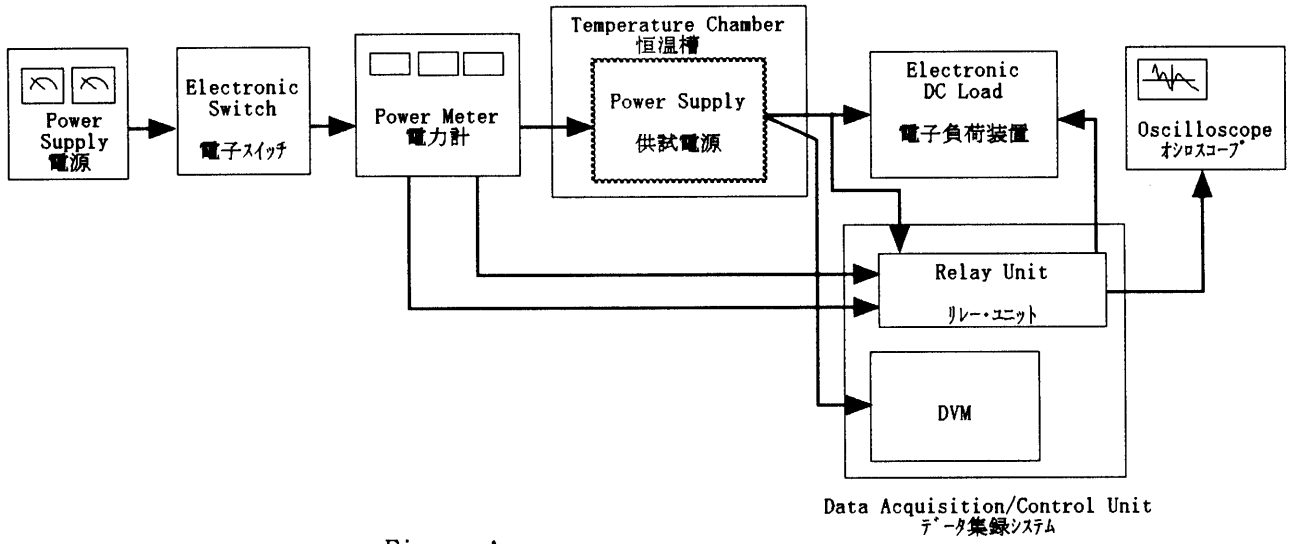


Figure A