参考資料

COSEL

TEST DATA OF ZUW61212

(12.0V INPUT)

Regulated DC Power Supply

Date : Sep.21. 1996

Approved by : T. Sugimori
Design Manager

Prepared by : H. Ise
Design Engineer

コーセル株式会社

COSEL CO.,LTD.

参考資料

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(Final Page 20)

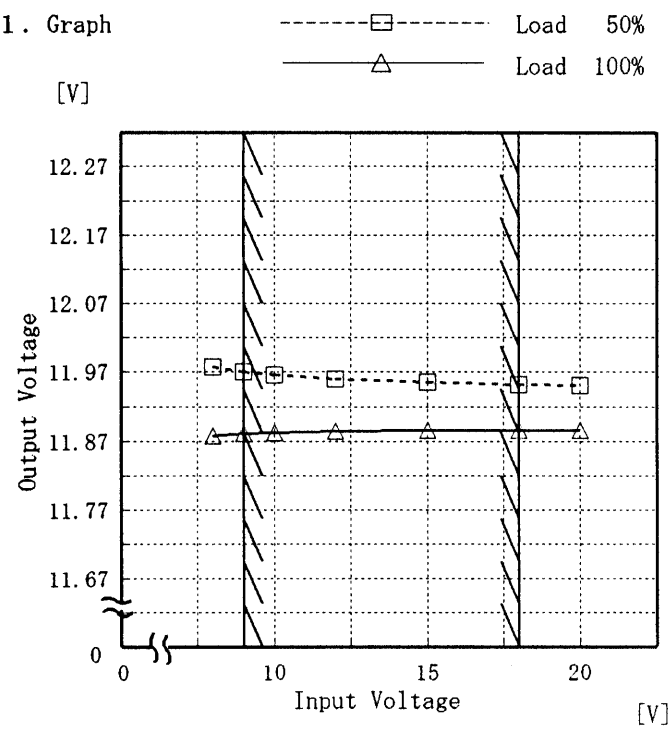
COSEL

Model	ZUW61212
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object +12V0.25A

1. Graph

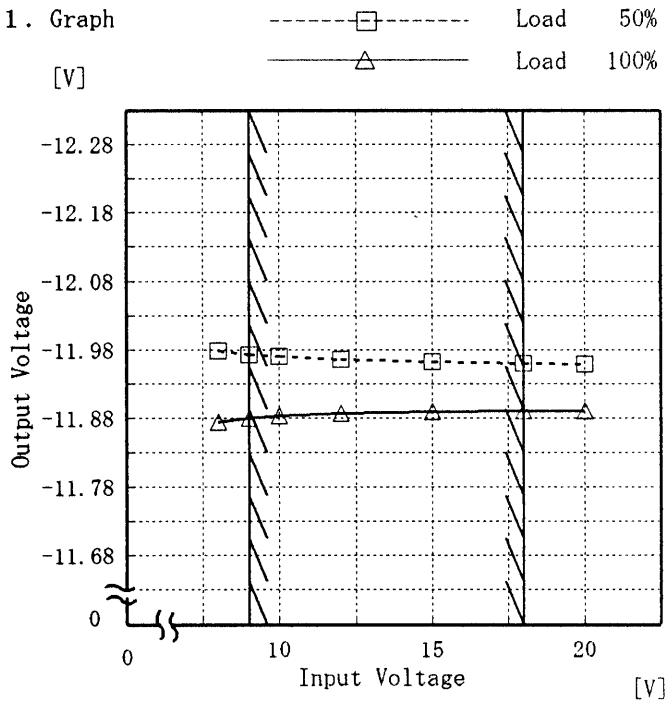


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
8.0	11.977	11.878
9.0	11.970	11.881
10.0	11.966	11.883
12.0	11.960	11.885
15.0	11.955	11.886
18.0	11.952	11.886
20.0	11.950	11.885
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

Object −12V0.25A

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]
8.0	-11.979	-11.874
9.0	-11.973	-11.879
10.0	-11.970	-11.883
12.0	-11.966	-11.887
15.0	-11.962	-11.889
18.0	-11.960	-11.890
20.0	-11.959	-11.890
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

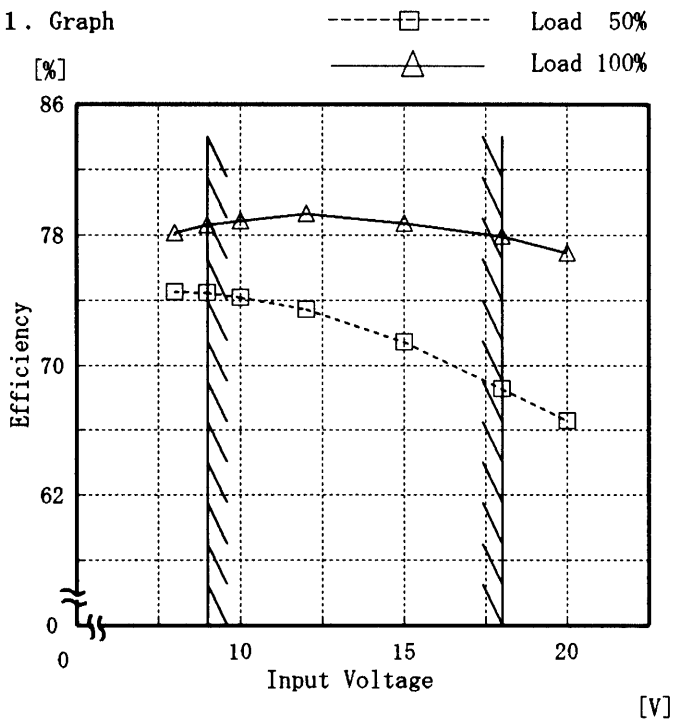
BC−2057

COSEL

Model	ZUW61212
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 [%]
8.0	74.5	78.1
9.0	74.5	78.6
10.0	74.2	78.9
12.0	73.4	79.3
15.0	71.5	78.7
18.0	68.6	77.9
20.0	66.6	76.9
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

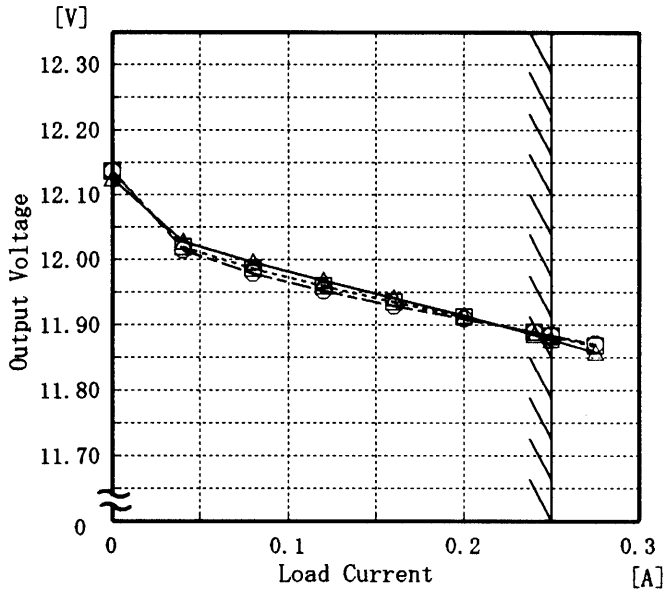
COSEL

Model	ZUW61212
Item	Load Regulation 静的負荷変動

Temperature 25℃
Testing Circuitry Figure A

Object +12V0.25A

1. Graph

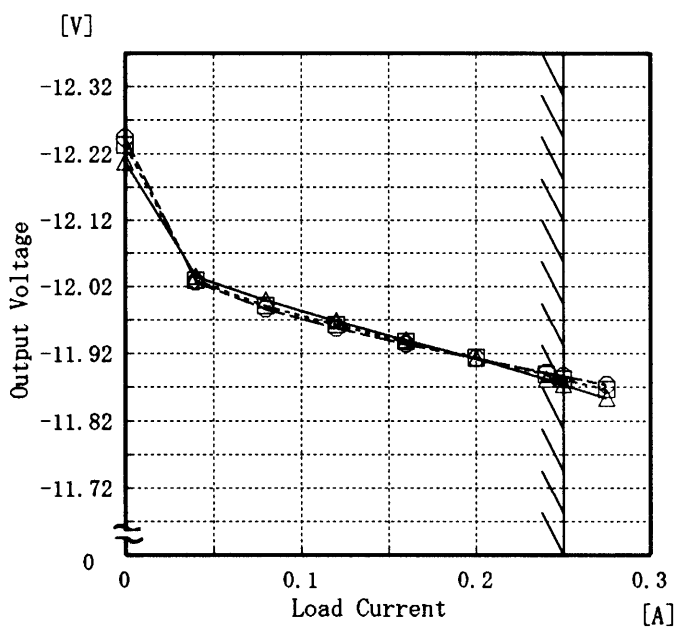


2. Values

Load Current [A]	Input Volt. 9.0[V] Output Volt. [V]	Input Volt. 12.0[V] Output Volt. [V]	Input Volt. 18.0[V] Output Volt. [V]
0.000	12.125	12.137	12.137
0.040	12.028	12.020	12.015
0.080	11.996	11.986	11.979
0.120	11.968	11.959	11.952
0.160	11.941	11.936	11.929
0.200	11.914	11.912	11.909
0.240	11.886	11.889	11.889
0.250	11.878	11.882	11.884
0.275	11.859	11.868	11.871
—	—	—	—

Object −12V0.25A

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. 9.0[V] Output Volt. [V]	Input Volt. 12.0[V] Output Volt. [V]	Input Volt. 18.0[V] Output Volt. [V]
0.000	-12.208	-12.234	-12.244
0.040	-12.036	-12.030	-12.028
0.080	-12.000	-11.992	-11.988
0.120	-11.970	-11.964	-11.959
0.160	-11.941	-11.939	-11.935
0.200	-11.913	-11.915	-11.914
0.240	-11.882	-11.889	-11.892
0.250	-11.874	-11.883	-11.887
0.275	-11.854	-11.867	-11.874
—	—	—	—

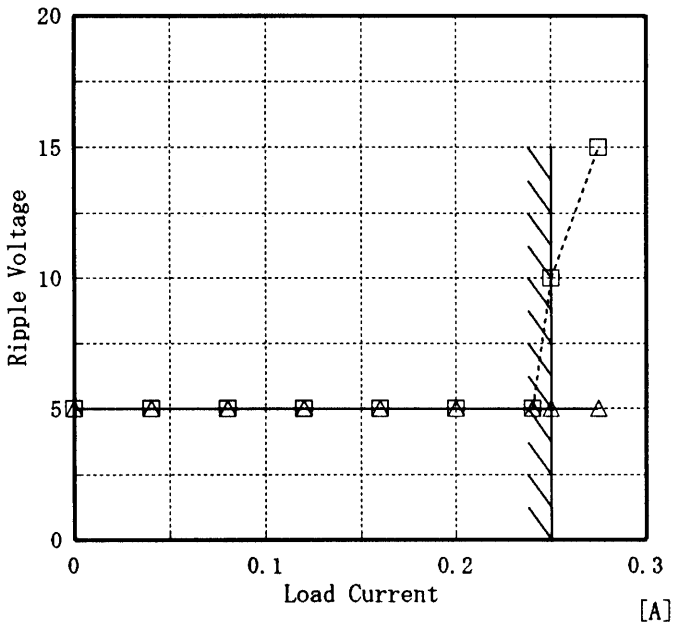
BC−2057

COSEL

Model	ZUW61212
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12V 0.25A

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

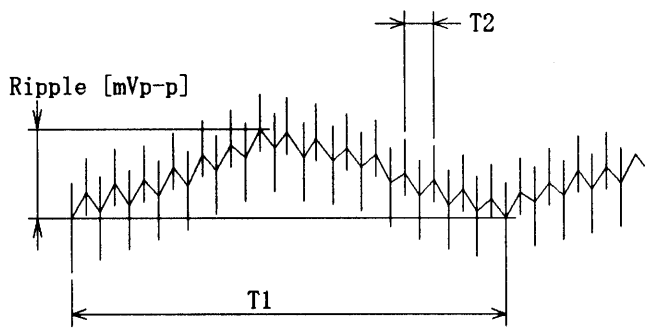


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

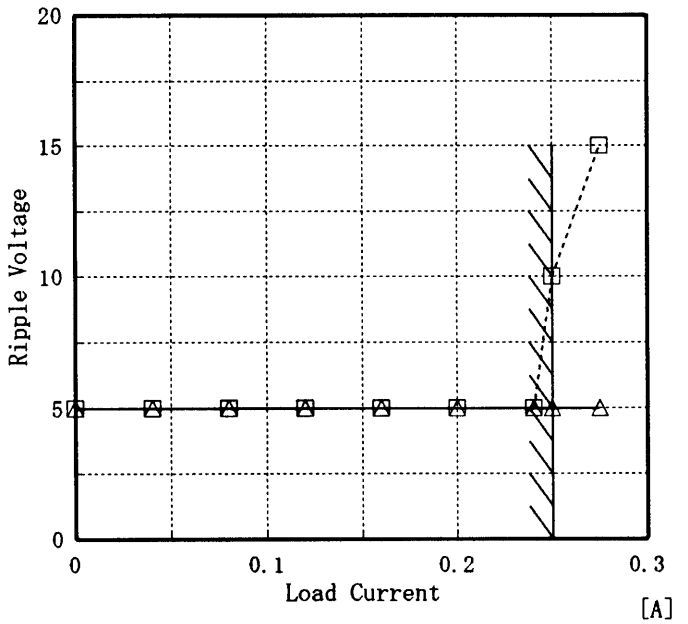
Load Current [A]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]	Input Volt. 18.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	5	5
0.200	5	5
0.240	5	5
0.250	10	5
0.275	15	5
—	—	—
—	—	—

COSEL

Model	ZUW61212
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	−12V 0.25A

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

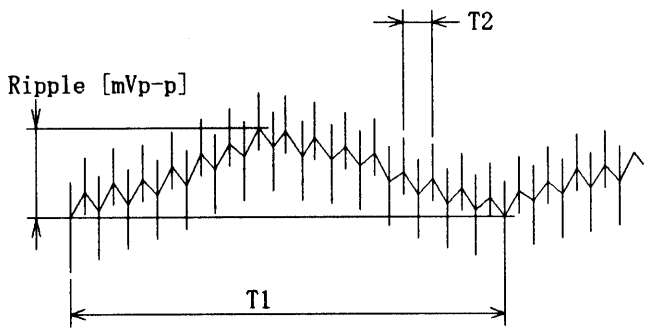


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

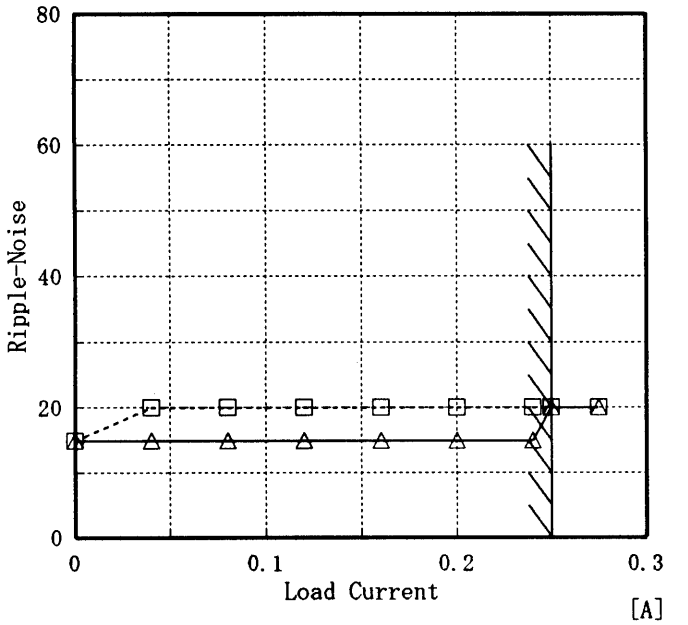
Load Current [A]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]	Input Volt. 18.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	5	5
0.200	5	5
0.240	5	5
0.250	10	5
0.275	15	5
—	—	—
—	—	—

COSEL

Model	ZUW61212
Item	Ripple-Noise リップルノイズ
Object	+12V0.25A

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

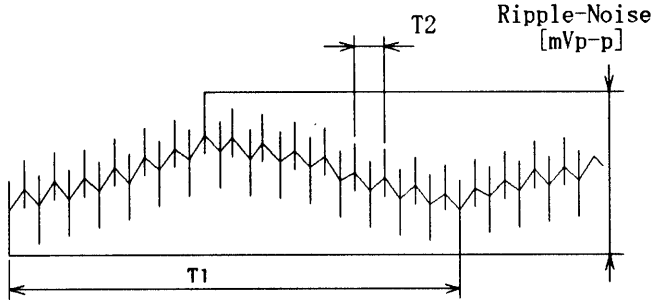


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

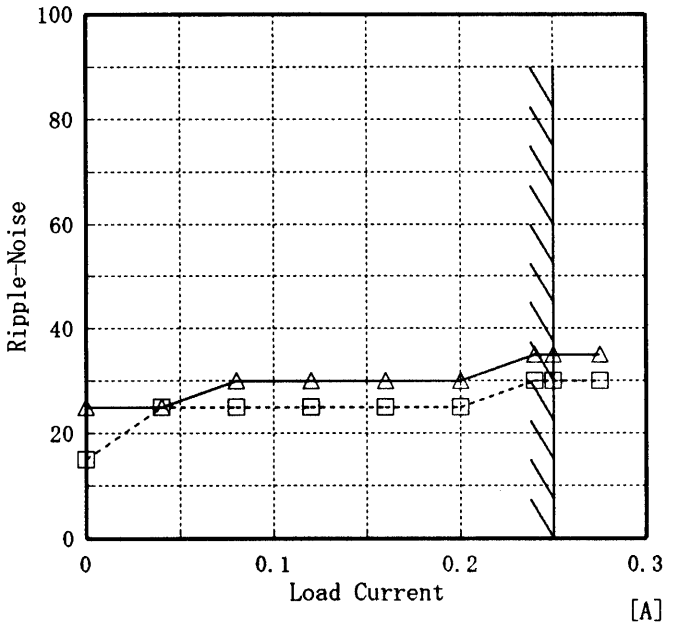
Load current [A]	Input Volt. 9.0 [V] Ripple-Noise [mV]	Input Volt. 18.0 [V] Ripple-Noise [mV]
0.000	15	15
0.040	20	15
0.080	20	15
0.120	20	15
0.160	20	15
0.200	20	15
0.240	20	15
0.250	20	20
0.275	20	20
—	—	—
—	—	—

COSEL

Model	ZUW61212
Item	Ripple-Noise リップルノイズ
Object	−12V0.25A

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

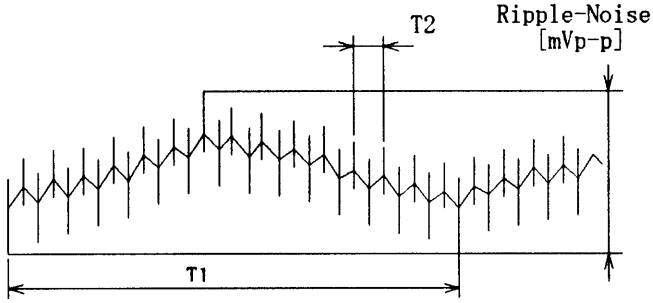


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 9.0 [V] Ripple-Noise [mV]	Input Volt. 18.0 [V] Ripple-Noise [mV]
0.000	15	25
0.040	25	25
0.080	25	30
0.120	25	30
0.160	25	30
0.200	25	30
0.240	30	35
0.250	30	35
0.275	30	35
—	—	—
—	—	—

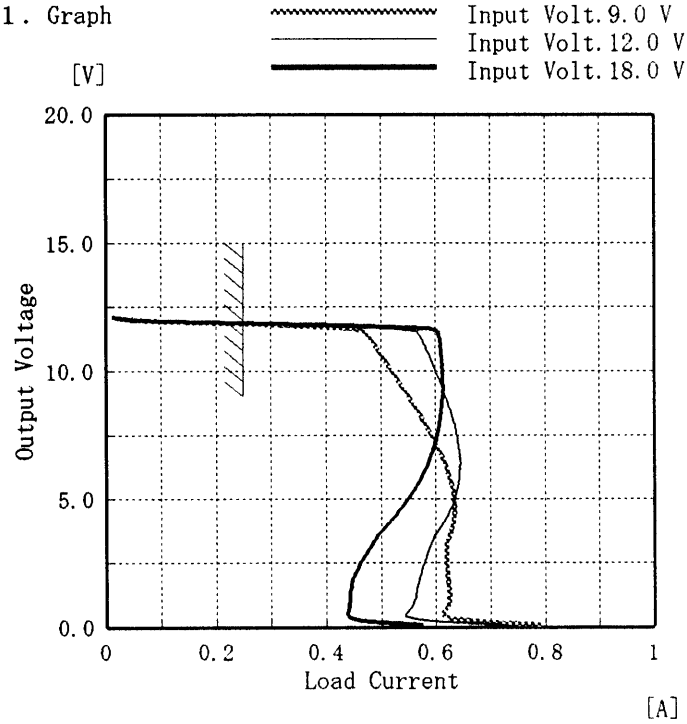
COSEL

Model	ZUW61212
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph

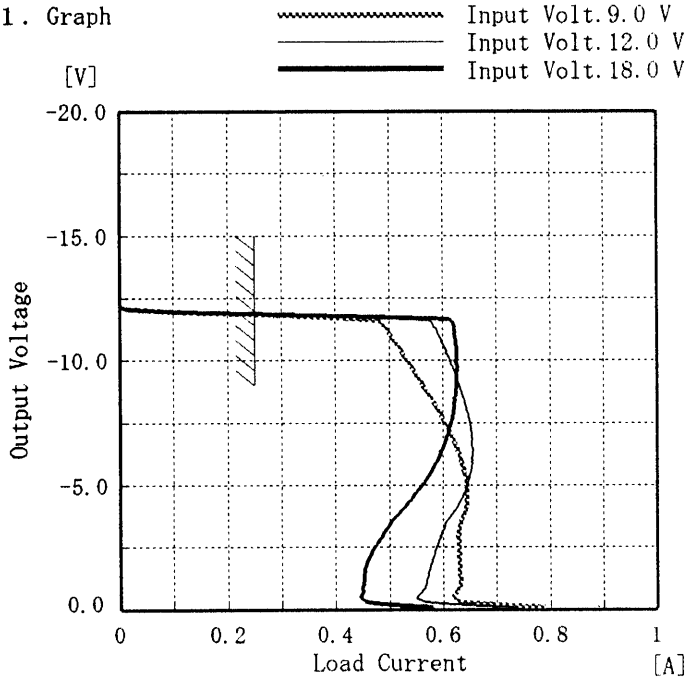


2. Values

Output Voltage [V]	Input Volt. 9.0[V] Load Current [A]	Input Volt. 12.0[V] Load Current [A]	Input Volt. 18.0[V] Load Current [A]
12.00	0.072	0.057	0.048
11.40	0.476	0.571	0.606
10.80	0.492	0.582	0.610
9.60	0.530	0.606	0.613
8.40	0.566	0.627	0.610
7.20	0.598	0.639	0.599
6.00	0.622	0.643	0.577
4.80	0.634	0.632	0.545
3.60	0.626	0.601	0.497
2.40	0.619	0.577	0.461
1.20	0.624	0.562	0.443
0.00	0.792	0.732	0.577

Object －12V0.25A

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. 9.0[V] Load Current [A]	Input Volt. 12.0[V] Load Current [A]	Input Volt. 18.0[V] Load Current [A]
-12.00	0.064	0.017	0.019
-11.40	0.490	0.582	0.621
-10.80	0.507	0.597	0.624
-9.60	0.546	0.620	0.626
-8.40	0.578	0.639	0.623
-7.20	0.613	0.652	0.611
-6.00	0.634	0.655	0.590
-4.80	0.645	0.640	0.554
-3.60	0.634	0.610	0.507
-2.40	0.629	0.586	0.469
-1.20	0.632	0.569	0.452
0.00	0.792	0.734	0.582

COSEL

Model	ZUW61212		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.25A		

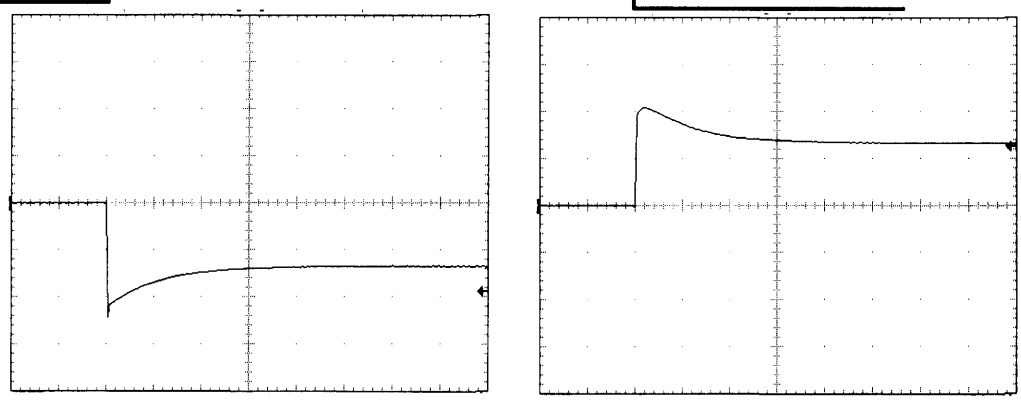
Input Volt. 12.0 V

Cycle 100 mS

Load Current

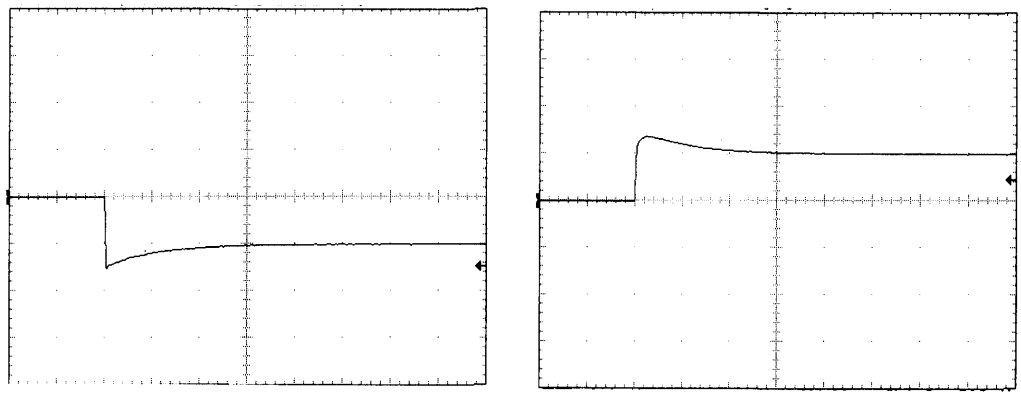
Min. Load ←→
Load 100 %

200 mV/div



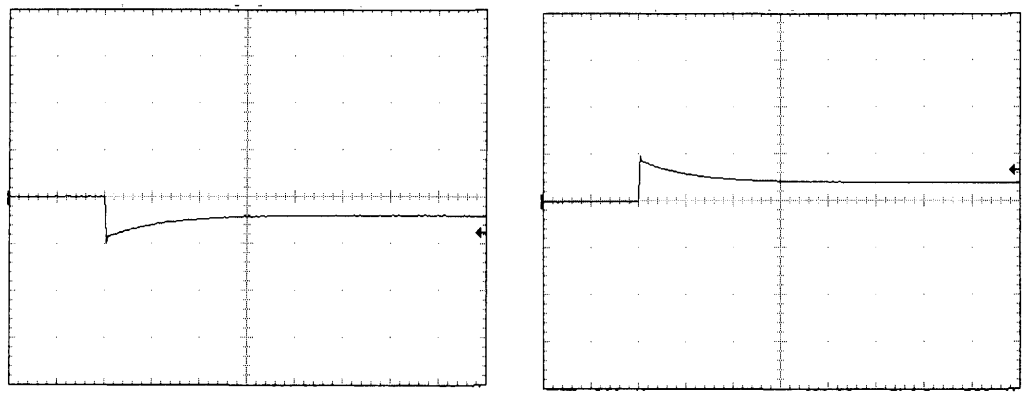
Min. Load ←→
Load 50 %

200 mV/div



Load 50%←→
Load 100 %

200 mV/div



1 mS/div

COSEL

Model	ZUW61212		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−12V0.25A		

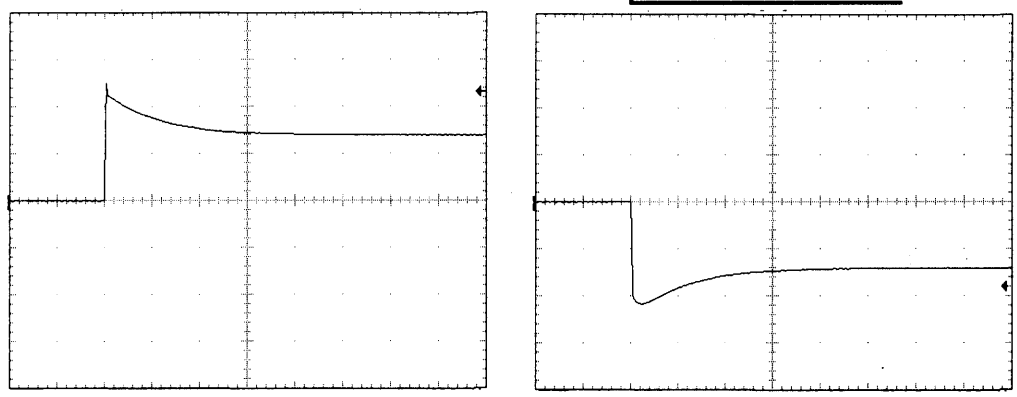
Input Volt. 12.0 V

Cycle 100 mS

Load Current

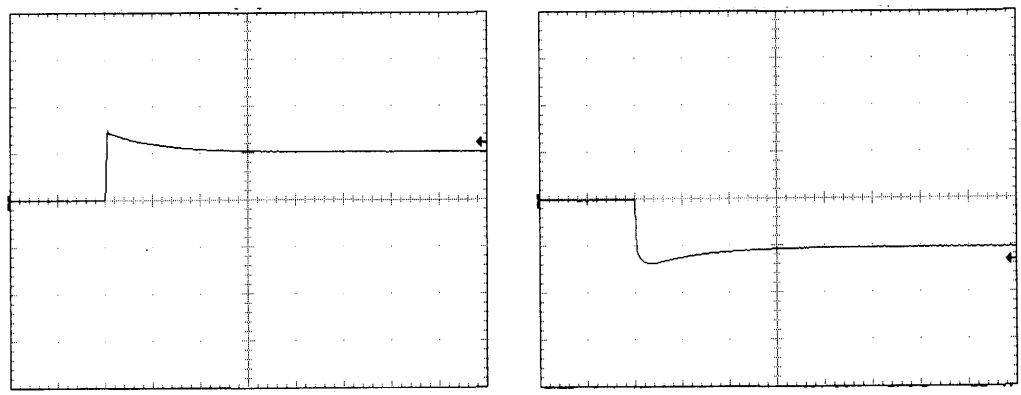
Min. Load ←→
Load 100 %

200 mV/div



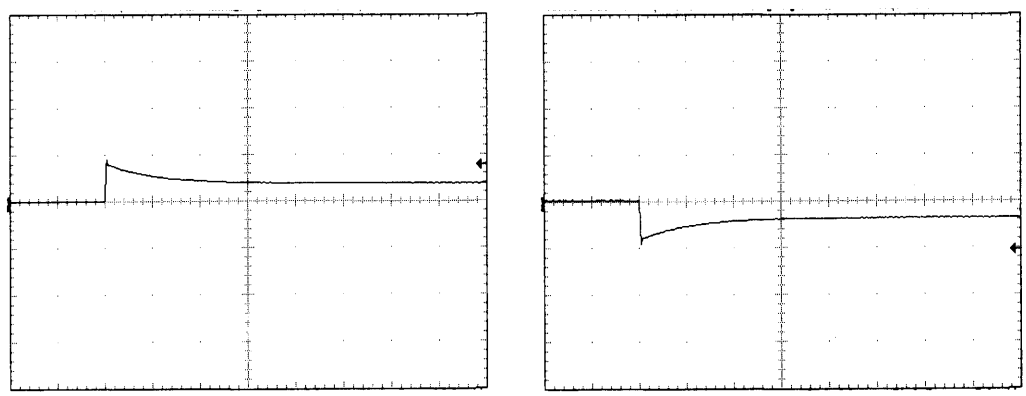
Min. Load ←→
Load 50 %

200 mV/div



Load 50%←→
Load 100 %

200 mV/div



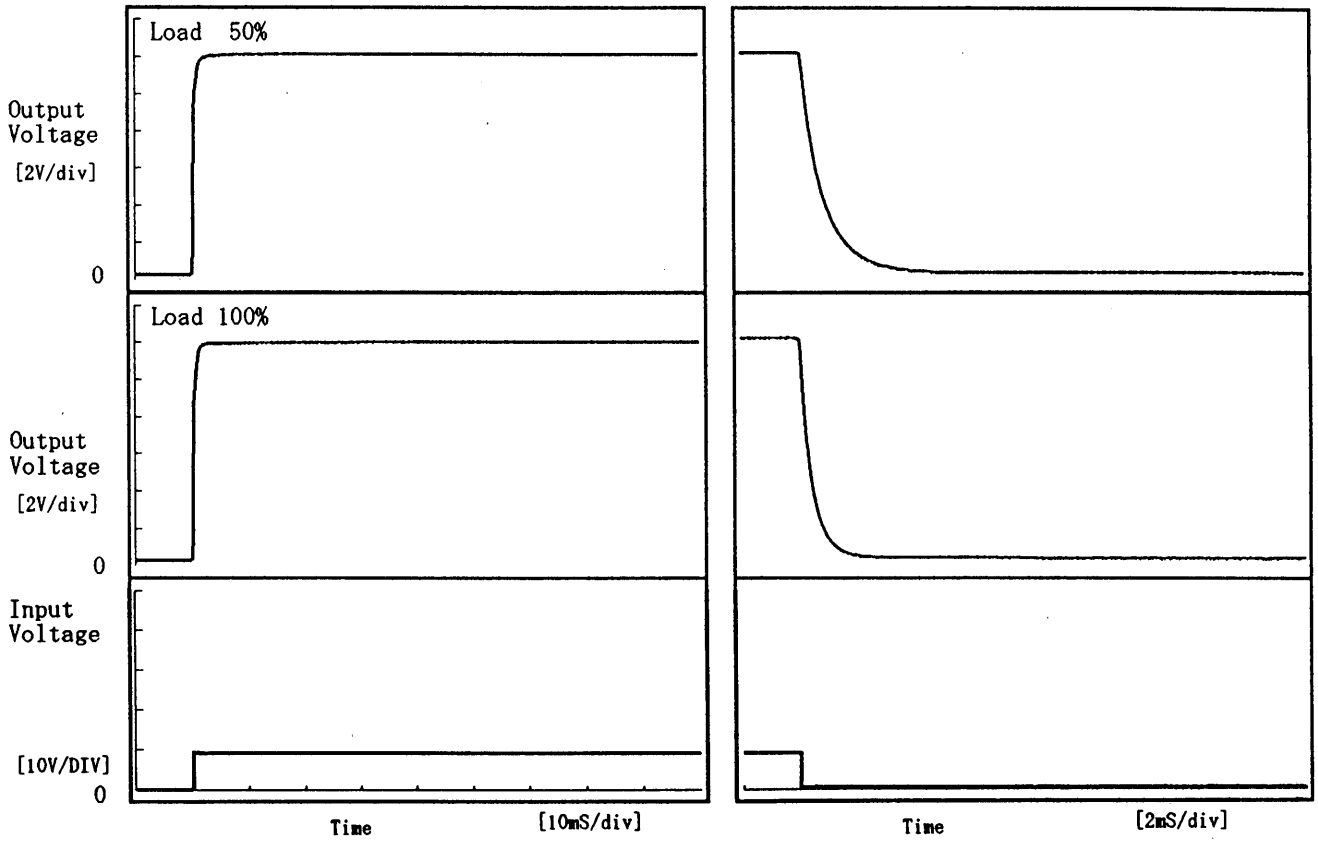
1 mS/div

COSEL

Model	ZUW61212		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.25A		

1. Graph

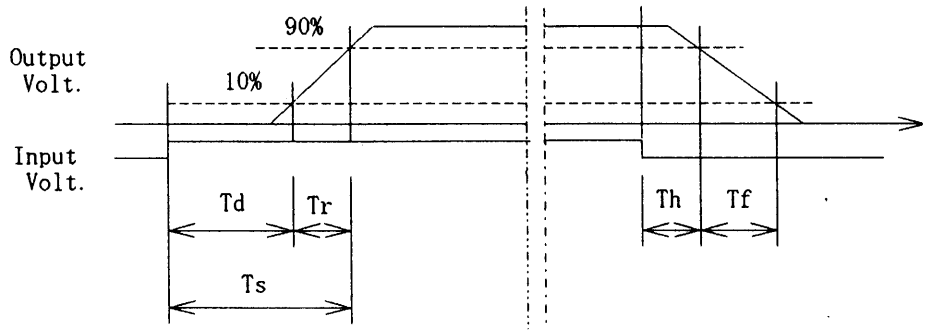
Input Volt. 9.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.05	0.85	0.90	0.18	1.95
100 %	0.05	0.95	1.00	0.12	1.00

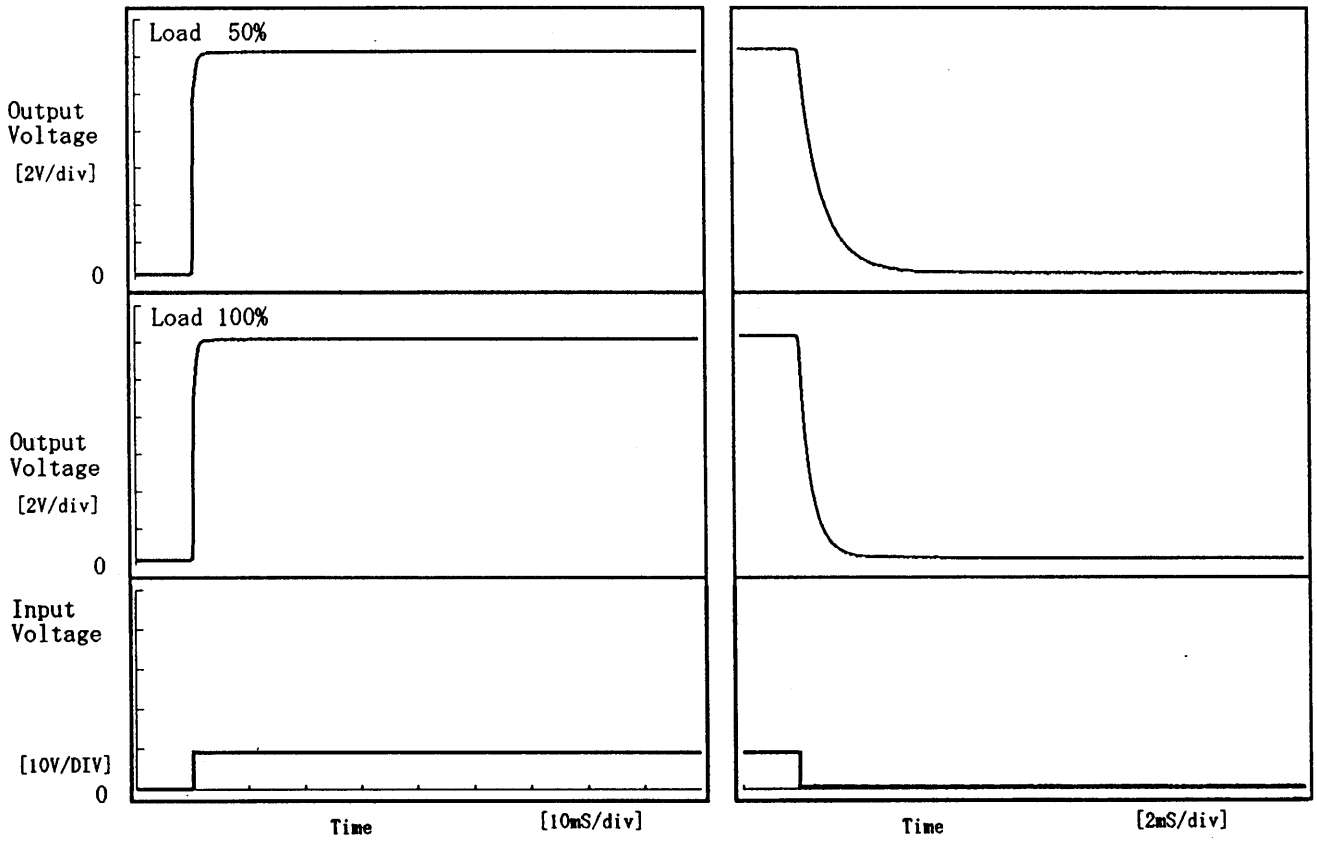


COSEL

Model	ZUW61212	Temperature	25℃
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-12V0.25A		

1. Graph

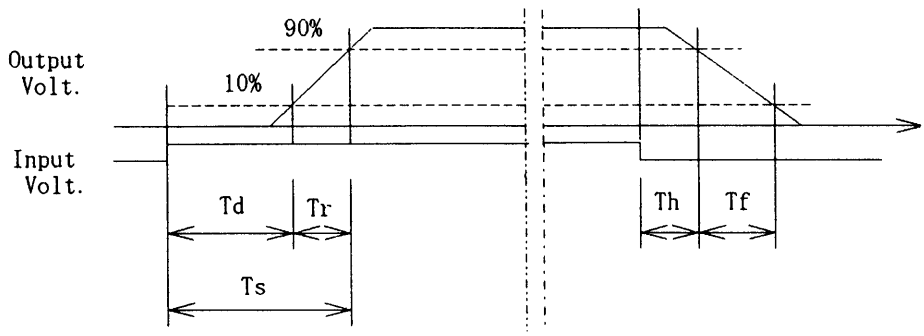
Input Volt. 9.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.05	0.80	0.85	0.19	1.90
100 %	0.05	0.90	0.95	0.12	1.01



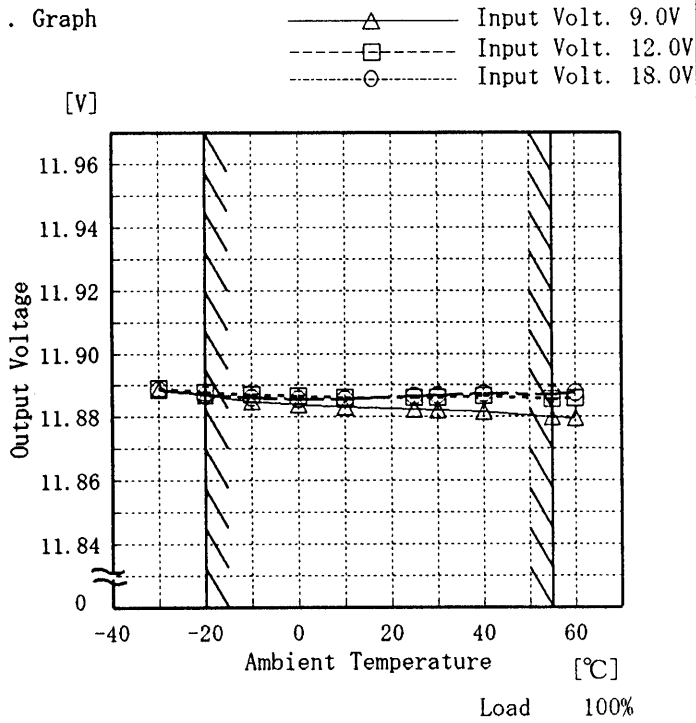
COSEL

Model	ZUW61212
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +12V0.25A

1. Graph

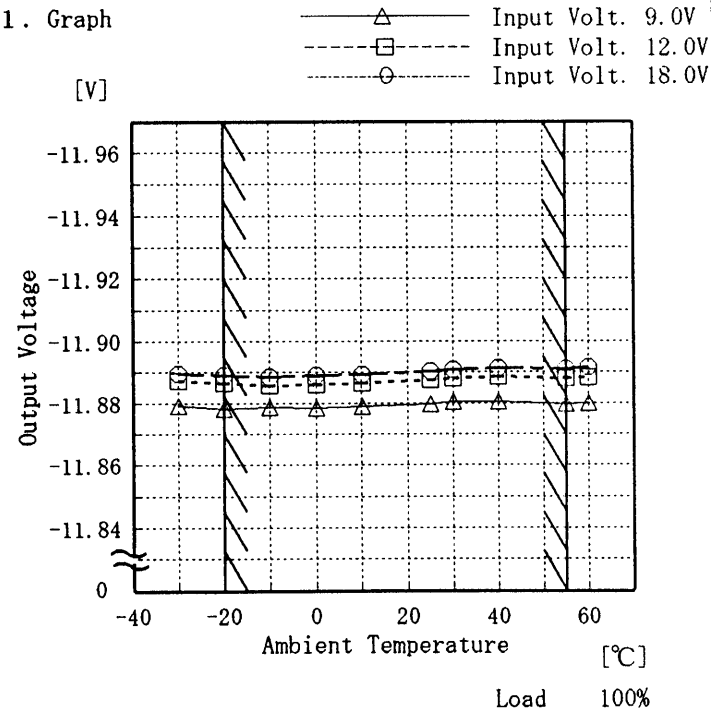


2. Values

Temperature [℃]	Input Volt. 9.0[V] Output Volt. [V]	Input Volt. 12.0[V] Output Volt. [V]	Input Volt. 18.0[V] Output Volt. [V]
-30	11.888	11.889	11.888
-20	11.887	11.888	11.887
-10	11.885	11.887	11.886
0	11.884	11.886	11.886
10	11.883	11.886	11.886
25	11.882	11.886	11.886
30	11.882	11.886	11.887
40	11.882	11.886	11.887
55	11.880	11.886	11.887
60	11.880	11.886	11.887
—	—	—	—

Object −12V0.25A

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. 9.0[V] Output Volt. [V]	Input Volt. 12.0[V] Output Volt. [V]	Input Volt. 18.0[V] Output Volt. [V]
-30	-11.879	-11.887	-11.890
-20	-11.878	-11.886	-11.889
-10	-11.879	-11.886	-11.889
0	-11.878	-11.886	-11.889
10	-11.879	-11.886	-11.889
25	-11.880	-11.888	-11.890
30	-11.880	-11.888	-11.891
40	-11.881	-11.889	-11.891
55	-11.880	-11.888	-11.891
60	-11.880	-11.888	-11.892
—	—	—	—

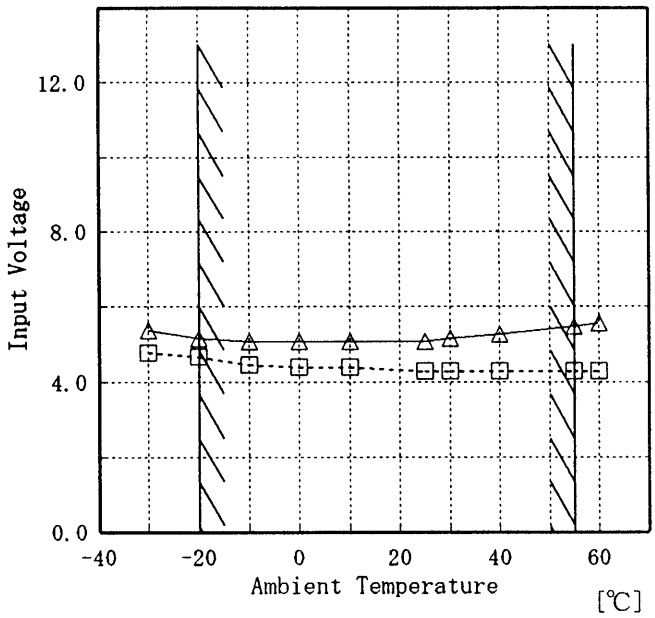
COSEL

Model	ZUW61212
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 +12V0.25A

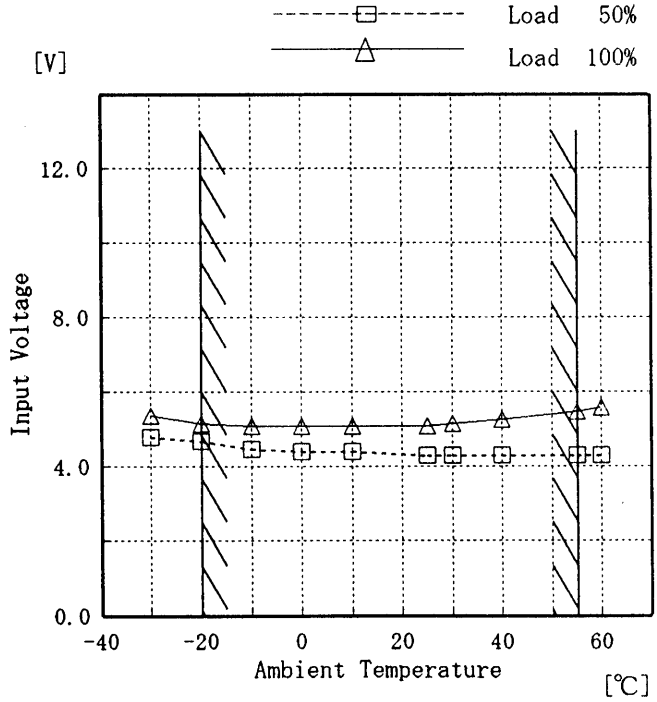
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	4.8	5.4
-20	4.7	5.2
-10	4.5	5.1
0	4.4	5.1
10	4.4	5.1
25	4.3	5.1
30	4.3	5.2
40	4.3	5.3
55	4.3	5.5
60	4.3	5.6
—	—	—

Object −12V0.25A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	4.8	5.4
-20	4.7	5.2
-10	4.5	5.1
0	4.4	5.1
10	4.4	5.1
25	4.3	5.1
30	4.3	5.2
40	4.3	5.3
55	4.3	5.5
60	4.3	5.6
—	—	—

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。

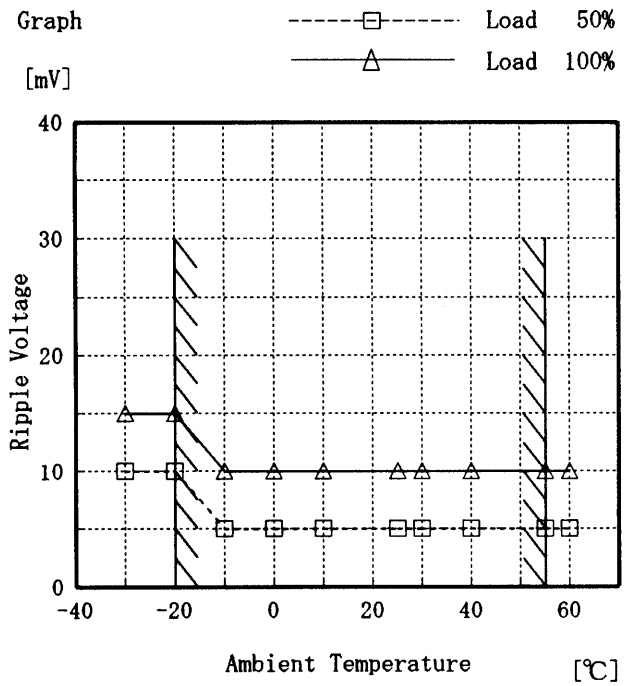
COSEL

Model	ZUW61212
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry Figure A

Object	+12V0.25A

1. Graph



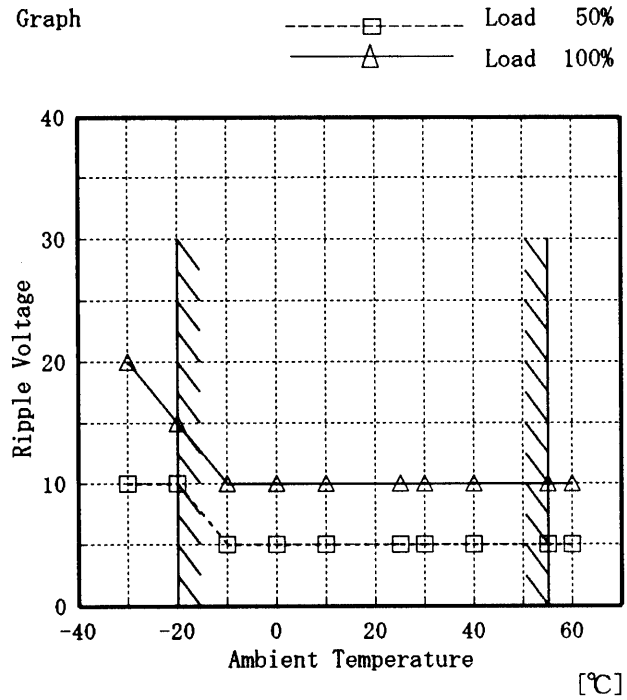
Input Volt. 9.0 V

2. Values

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

Object	−12V0.25A

1. Graph



Input Volt. 9.0 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	10	20
-20	10	15
-10	5	10
0	5	10
10	5	10
25	5	10
30	5	10
40	5	10
55	5	10
60	5	10
—	—	—

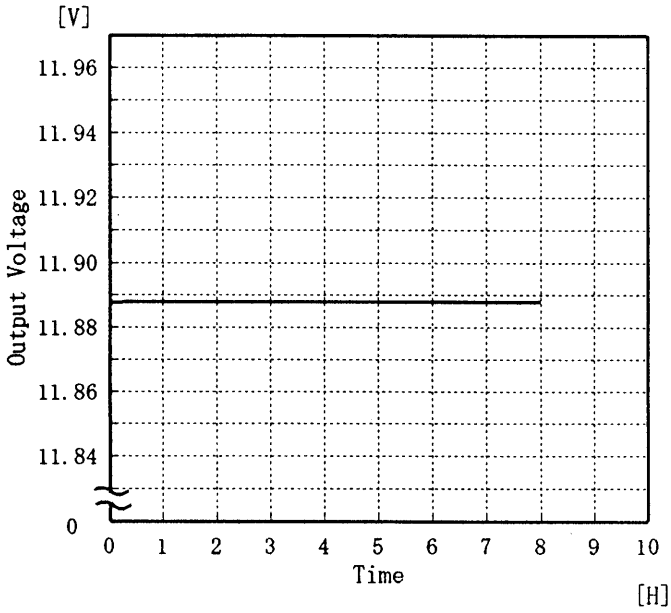
COSEL

Model	ZUW61212
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph



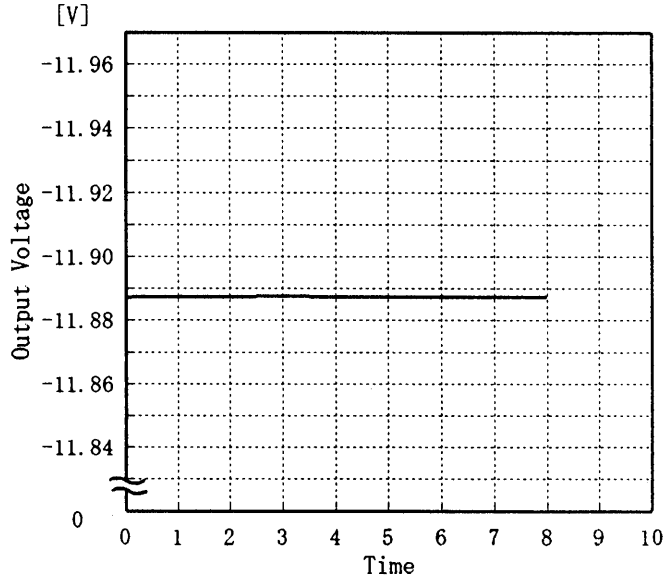
Input Volt. 12.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	11.887
0.5	11.888
1.0	11.888
2.0	11.888
3.0	11.888
4.0	11.888
5.0	11.888
6.0	11.888
7.0	11.888
8.0	11.888

Object －12V0.25A

1. Graph



Input Volt. 12.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.887
0.5	-11.888
1.0	-11.888
2.0	-11.888
3.0	-11.888
4.0	-11.888
5.0	-11.888
6.0	-11.888
7.0	-11.888
8.0	-11.888

BC－2057

COSEL

Model	ZUW61212
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 : 9.0～18.0 V

Load Current (AVR 1) : 0.00～0.25 A

(AVR 2) : 0.00～0.25 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 9.0～18.0 V

負荷電流 (AVR 1) 0.00～0.25 A

(AVR 2) 0.00～0.25 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 ＋12V0.25A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	55	18.0	0.25	11.888	±172	±1.5
Minimum Voltage	55	12.0	0.00	11.545		

Object －12V0.25A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	55	18.0	0.25	-11.893	±116	±1.0
Minimum Voltage	25	12.0	0.00	-11.661		

COSEL

Model	ZUW61212
Item	Condensation 結露特性
Object	+12V 0.25A

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	12.229	5	40
	2	12.236	5	40
	3	12.224	5	40
Load 100 %	1	12.144	5	50
	2	12.142	5	50
	3	12.142	5	50

Input Volt. 12.0 V

COSEL

Model	ZUW61212
Item	Condensation 結露特性
Object	−12V 0.25A

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	-12.227	5	40
	2	-12.233	5	50
	3	-12.228	5	45
Load 100 %	1	-12.133	5	60
	2	-12.136	5	65
	3	-12.137	5	60

Input Volt. 12.0 V

COSEL

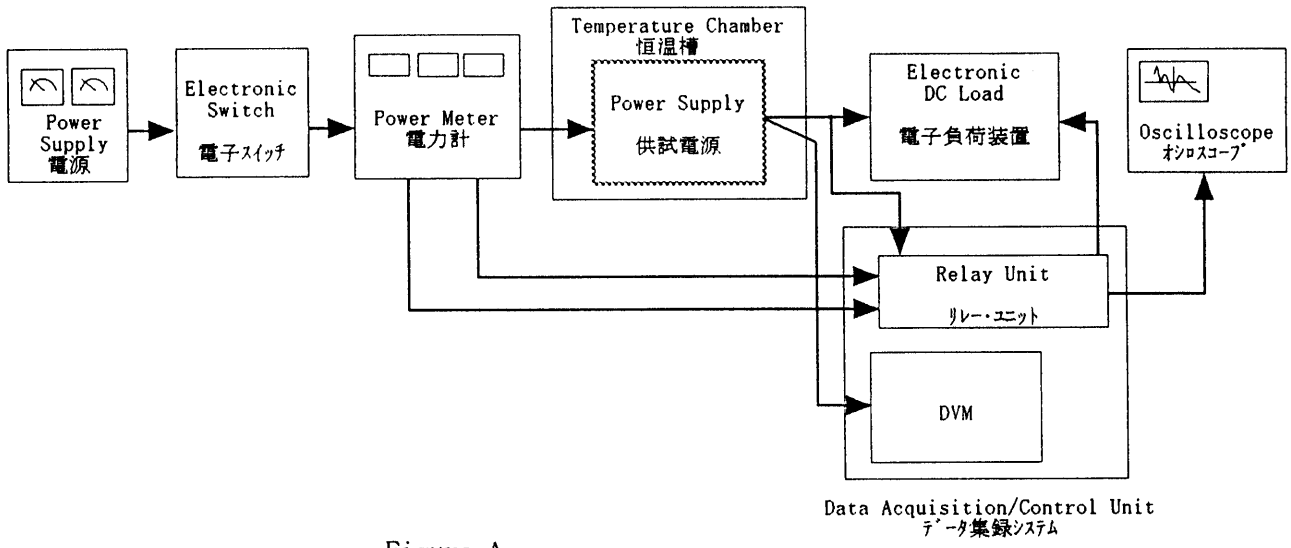


Figure A