参考資料

COSEL

TEST DATA OF ZUW150512

(5.0V INPUT)

Regulated DC Power Supply

Date : Feb.23. 1998

Approved by : Nagai
Design Manager

Prepared by : Hanaoka
Design Engineer

コーセル株式会社

COSEL CO.,LTD.

COSEL

CONTENTS

(Final Page 22)

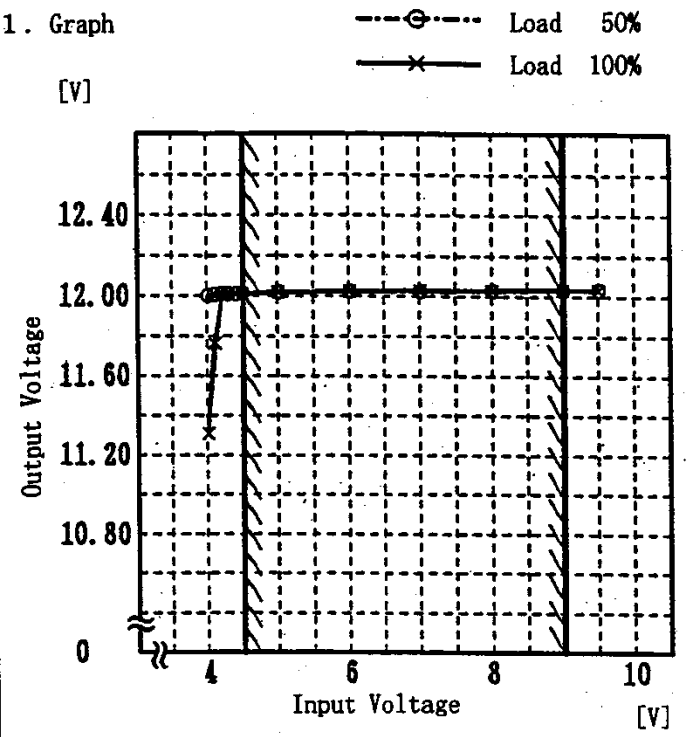
COSEL

Model	ZUW150512
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object +12.0V0.60A

1. Graph

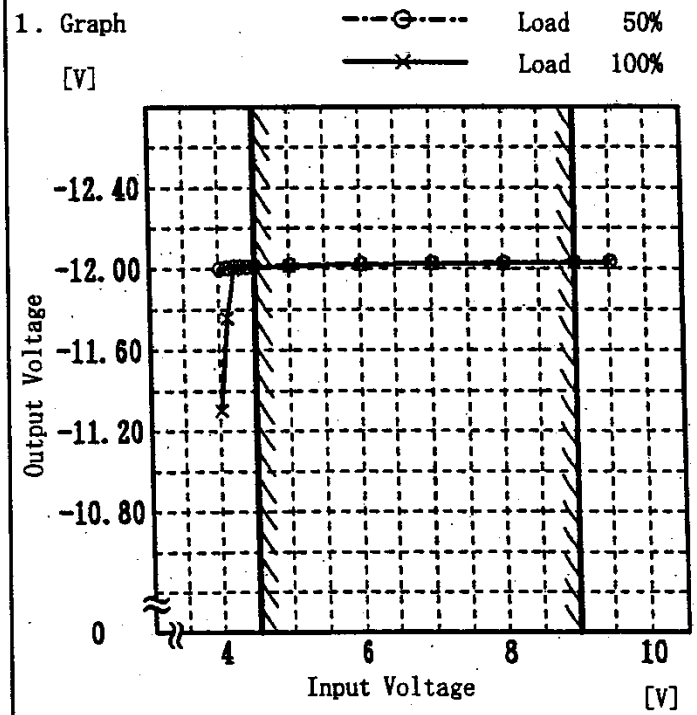


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	12.003	11.307
4.1	12.008	11.762
4.2	12.011	12.004
4.3	12.012	12.009
4.4	12.014	12.011
4.5	12.015	12.013
5.0	12.020	12.020
6.0	12.025	12.026
7.0	12.029	12.030
8.0	12.031	12.032
9.0	12.033	12.034
9.5	12.034	12.035

Object −12V0.60A

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

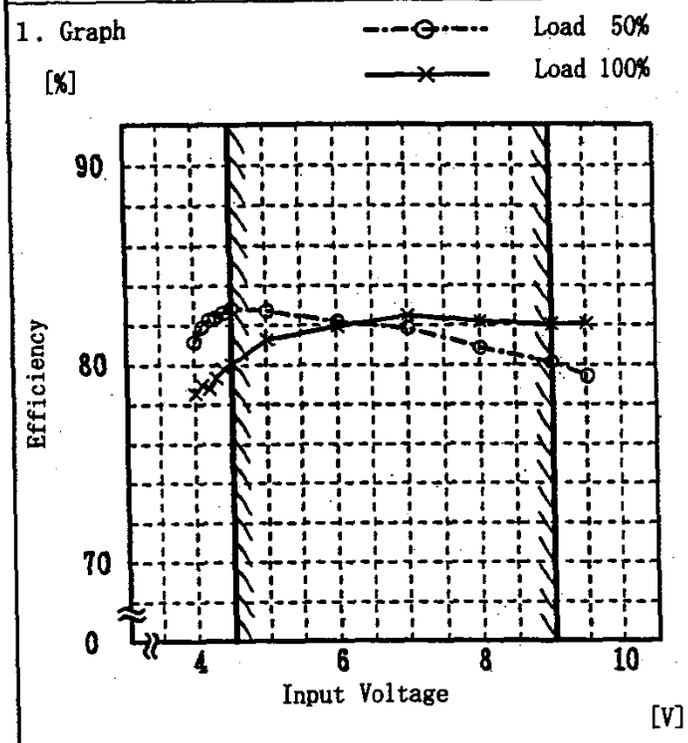
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	-12.001	-11.302
4.1	-12.006	-11.756
4.2	-12.009	-11.996
4.3	-12.011	-12.001
4.4	-12.012	-12.003
4.5	-12.013	-12.005
5.0	-12.019	-12.013
6.0	-12.025	-12.020
7.0	-12.028	-12.024
8.0	-12.031	-12.027
9.0	-12.033	-12.029
9.5	-12.034	-12.030

COSEL

Model	ZUW150512
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

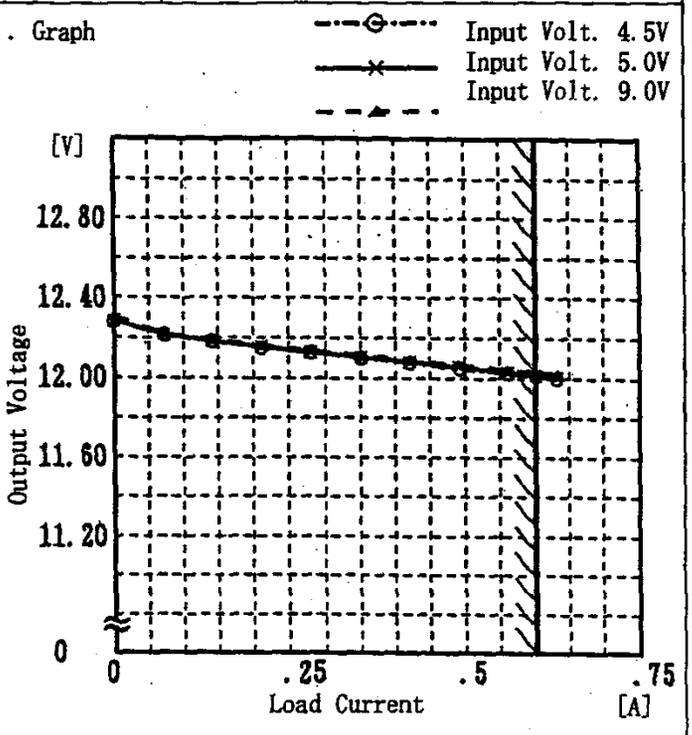
Input Voltage [V]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
4.0	81.2	78.6
4.1	81.9	79.0
4.2	82.3	78.8
4.3	82.4	79.4
4.4	82.7	79.8
4.5	82.9	80.1
5.0	82.7	81.3
6.0	82.2	82.0
7.0	81.9	82.5
8.0	80.8	82.2
9.0	80.1	82.1
9.5	79.4	82.1

COSEL

Model	ZUW150512
Item	Load Regulation 静的負荷変動
Object	+12.0V0.60A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

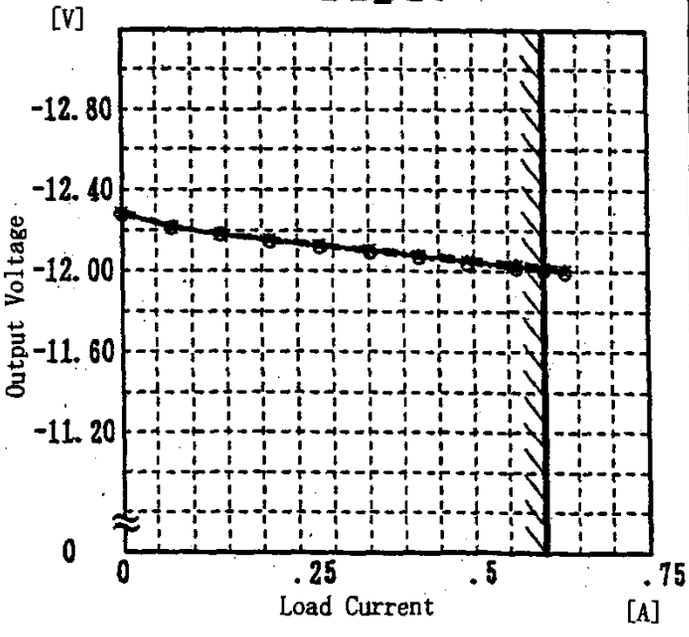


2. Values

Load Current	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
[A]	Output Volt. [V]		
0.000	12.280	12.284	12.304
0.070	12.212	12.214	12.219
0.140	12.180	12.182	12.187
0.210	12.152	12.155	12.161
0.280	12.126	12.130	12.137
0.350	12.100	12.105	12.113
0.420	12.076	12.081	12.091
0.490	12.051	12.057	12.069
0.560	12.026	12.033	12.047
0.600	12.013	12.020	12.035
0.630	12.002	12.010	12.025

Object −12V0.60A

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	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
[A]	Output Volt. [V]		
0.000	-12.278	-12.282	-12.300
0.070	-12.211	-12.214	-12.219
0.140	-12.178	-12.181	-12.187
0.210	-12.150	-12.153	-12.160
0.280	-12.122	-12.127	-12.135
0.350	-12.096	-12.101	-12.111
0.420	-12.070	-12.076	-12.088
0.490	-12.045	-12.051	-12.065
0.560	-12.019	-12.027	-12.042
0.600	-12.004	-12.012	-12.029
0.630	-11.993	-12.001	-12.019

COSEL

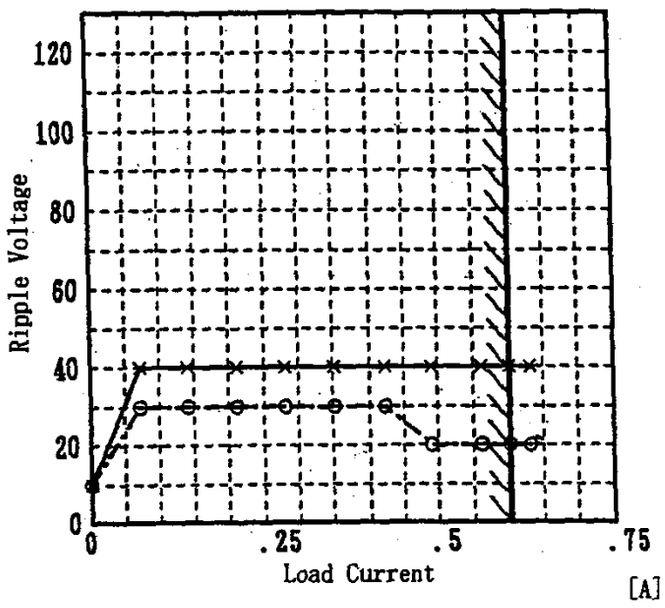
Model	ZUW150512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12.0V0.60A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

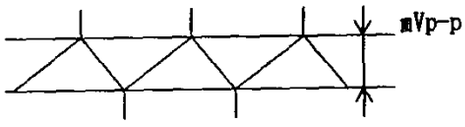
[mV]

—·—○—·— Input Volt. 4.5V
——×—— Input Volt. 9.0V



Ripple Voltage is shown as p-p in the figure below.

Note: Slanted line shows the range of the rated load current.



2. Values

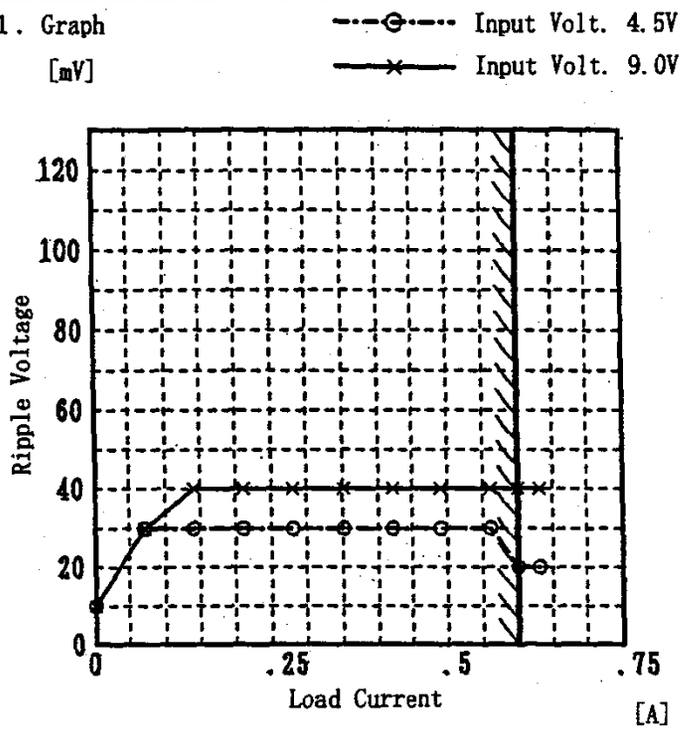
Load Current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple Output Volt. [mV]	
0.000	10	10
0.070	30	40
0.140	30	40
0.210	30	40
0.280	30	40
0.350	30	40
0.420	30	40
0.490	20	40
0.560	20	40
0.600	20	40
0.630	20	40

COSEL

Model	ZUW150512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	-12.0V0.60A

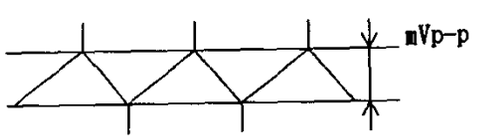
Temperature 25℃
Testing Circuitry Figure A

1. Graph



Ripple Voltage is shown as p-p in the figure below.

Note: Slanted line shows the range of the rated load current.



2. Values

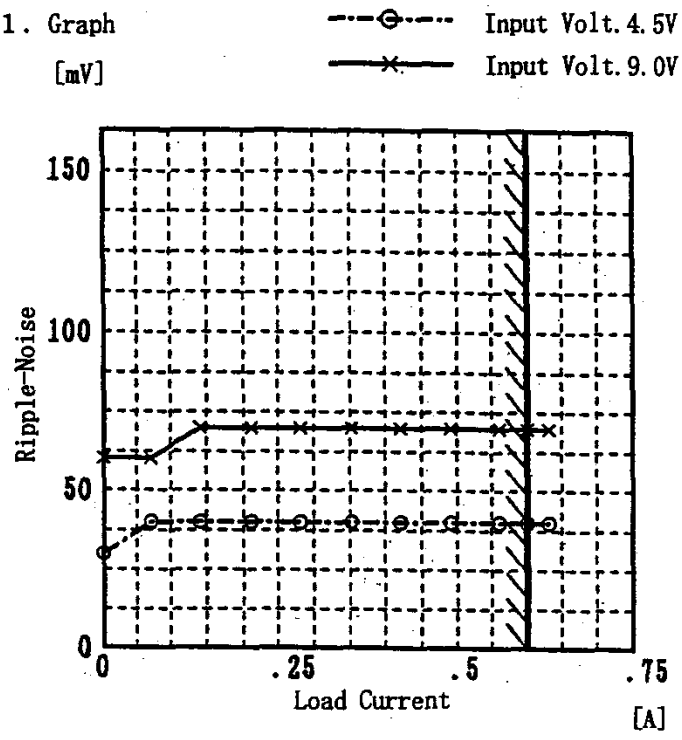
Load Current [A]	Input Volt. 4.5 [V]	Input Volt. 9.0 [V]
	Ripple Output Volt. [mV]	
0.000	10	10
0.070	30	30
0.140	30	40
0.210	30	40
0.280	30	40
0.350	30	40
0.420	30	40
0.490	30	40
0.560	30	40
0.600	20	40
0.630	20	40

COSEL

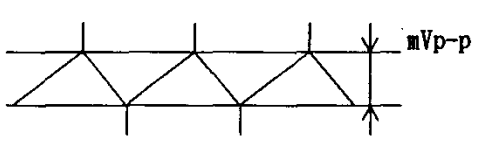
Model	ZUW150512
Item	Ripple-Noise リップルノイズ
Object	+12.0V0.60A

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.



2. Values

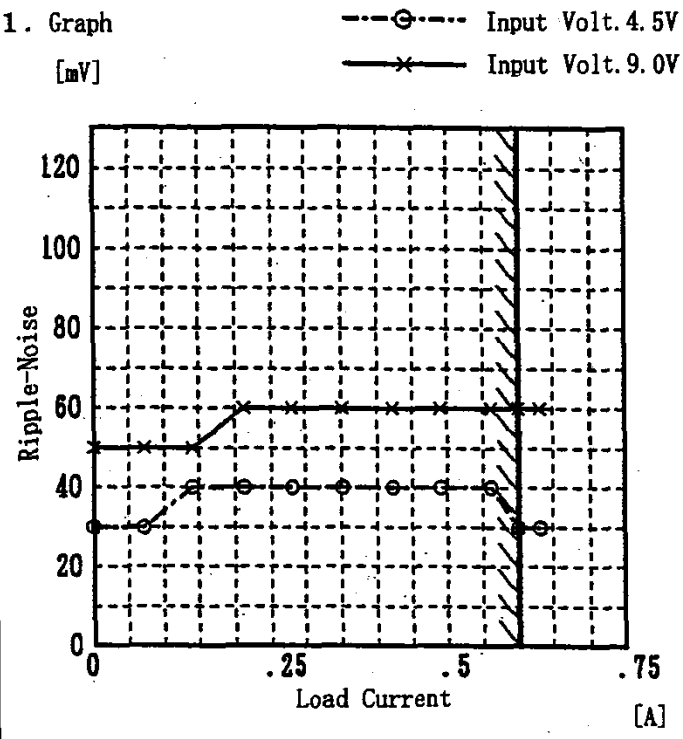
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	30	60
0.070	40	60
0.140	40	70
0.210	40	70
0.280	40	70
0.350	40	70
0.420	40	70
0.490	40	70
0.560	40	70
0.600	40	70
0.630	40	70

COSEL

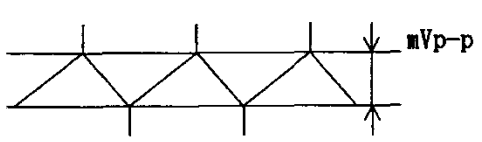
Model	ZUW150512
Item	Ripple-Noise リップルノイズ
Object	-12.0V0.60A

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.



2. Values

Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	30	50
0.070	30	50
0.140	40	50
0.210	40	60
0.280	40	60
0.350	40	60
0.420	40	60
0.490	40	60
0.560	40	60
0.600	30	60
0.630	30	60

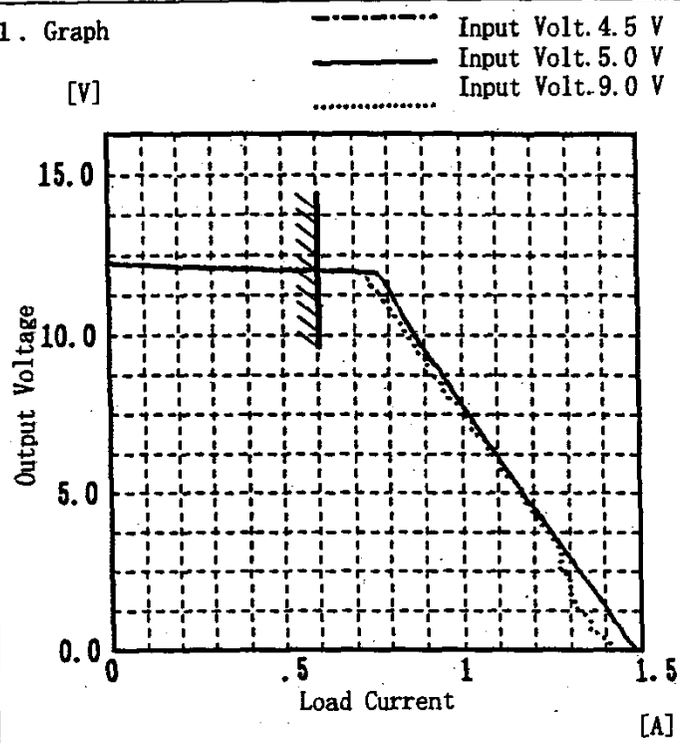
COSEL

Model	ZUW150512
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object +12.0V0.60A

1. Graph

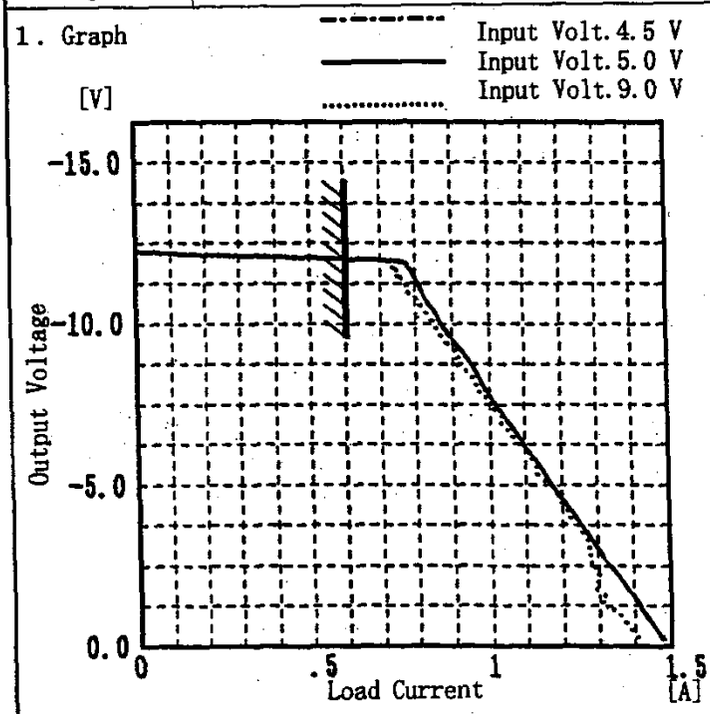


2. Values

Output Voltage [V]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Load Current [A]		
11.99	0.66	0.66	0.72
11.40	0.80	0.80	0.77
10.80	0.83	0.83	0.80
9.60	0.90	0.90	0.87
8.40	0.96	0.96	0.94
7.20	1.03	1.03	1.02
6.00	1.11	1.11	1.10
4.80	1.18	1.18	1.16
3.60	1.26	1.26	1.25
2.40	1.33	1.33	1.28
1.20	1.41	1.41	1.34
0.00	1.49	1.49	1.42

Object −12V0.60A

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]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Load Current [A]		
-11.99	0.65	0.65	0.70
-11.40	0.80	0.80	0.76
-10.80	0.83	0.83	0.80
-9.60	0.89	0.89	0.87
-8.40	0.96	0.96	0.94
-7.20	1.04	1.04	1.03
-6.00	1.11	1.11	1.10
-4.80	1.18	1.18	1.20
-3.60	1.26	1.26	1.25
-2.40	1.34	1.33	1.28
-1.20	1.42	1.42	1.35
0.00	1.50	1.50	1.43

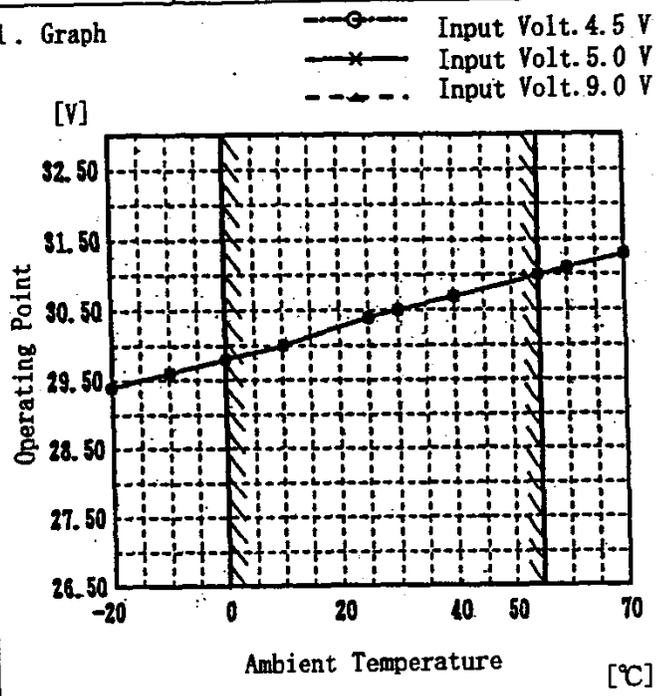
BC−2087

COSEL

Model	ZUW150512
Item	Overvoltage Protection 過電圧保護
Object	±12.0V0.60A

Testing Circuitry Figure A

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。

Overvoltage protection is measured at between +Vo-Pin and -Vo-Pin.

2. Values

Ambient Temp.	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
[℃]	Operating Point [V]		
-20	29.40	29.40	29.40
-10	29.60	29.60	29.60
0	29.80	29.80	29.80
10	30.00	30.00	30.00
25	30.40	30.40	30.40
30	30.50	30.50	30.50
40	30.70	30.70	30.70
55	31.00	31.00	31.00
60	31.10	31.10	31.10
70	31.30	31.30	31.30

COSEL

Model	ZUW150512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12.0V0.60A		

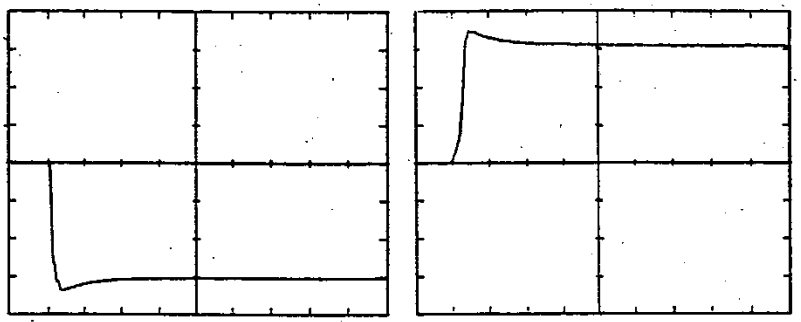
Input Volt. 5.0 V

Cycle 10 mS

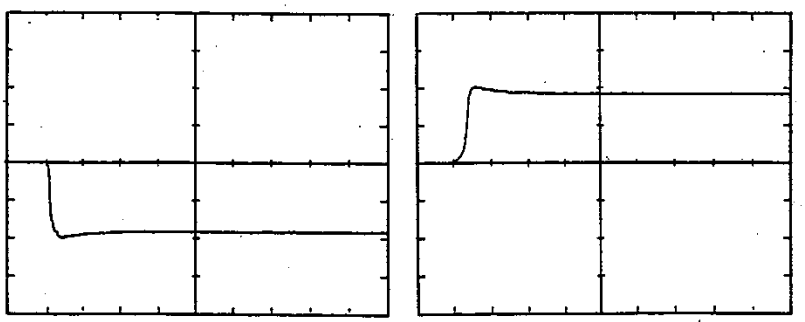
Load Current

Load 0% ⟷ Load 100 %

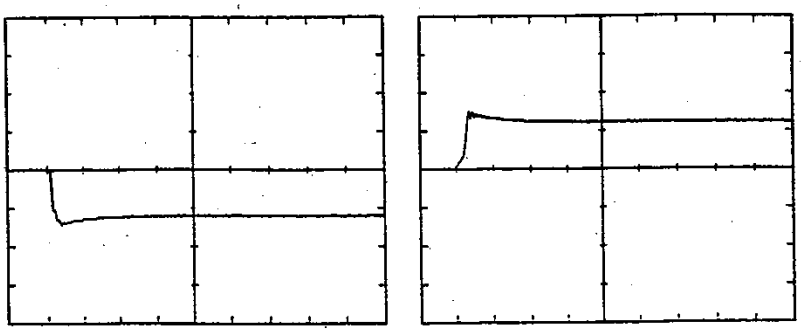
100[mV/div]



Load 0% ⟷ Load 50 %



Load 50 % ⟷ Load 100 %



0.5[mS/div]

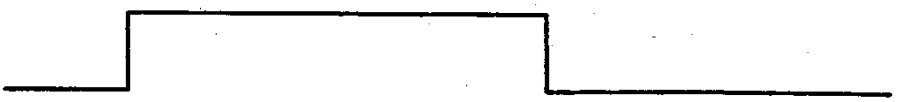
COSEL

Model	ZUW150512
Item	Dynamic Load Responce 動的負荷変動
Object	-12.0V0.60A

Temperature 25℃
Testing Circuitry Figure A

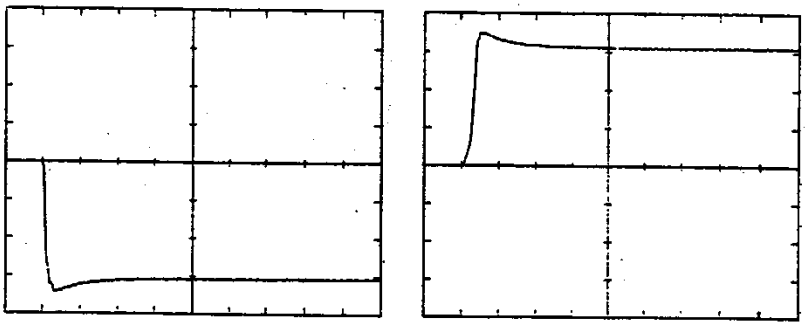
Input Volt. 5.0 V
Cycle 10 mS

Load Current

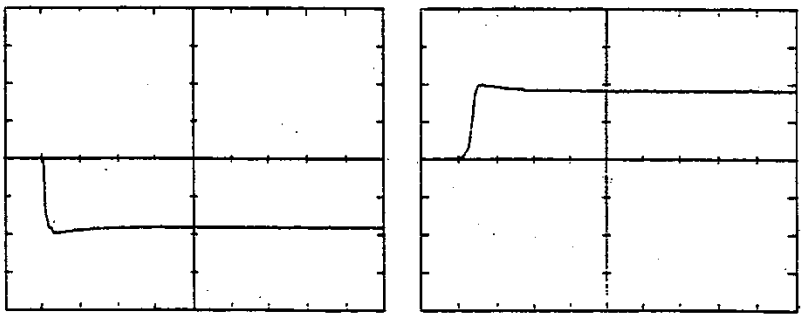


Load 0% ⟷ Load 100 %

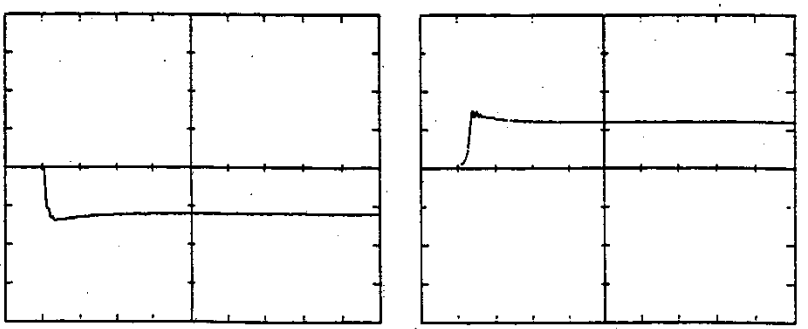
100[mV/div]



Load 0% ⟷ Load 50 %



Load 50 % ⟷ Load 100 %



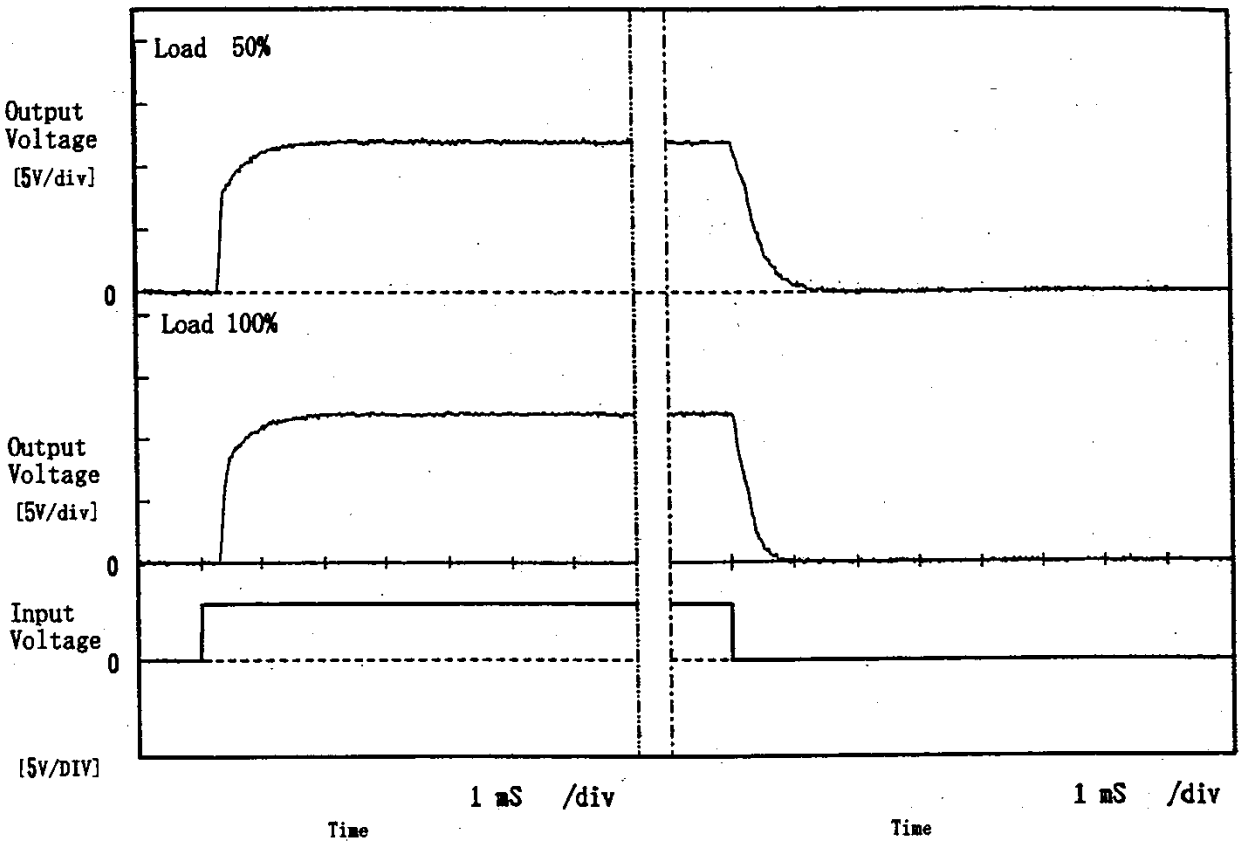
0.5[mS/div]

COSEL

Model	ZUW150512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+12.0V0.60A		

1. Graph

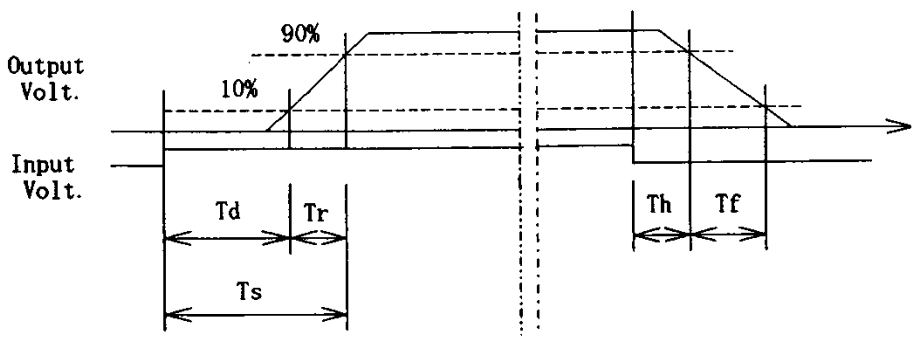
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.30	0.65	0.95	0.10	0.72
100 %	0.30	0.65	0.95	0.10	0.43

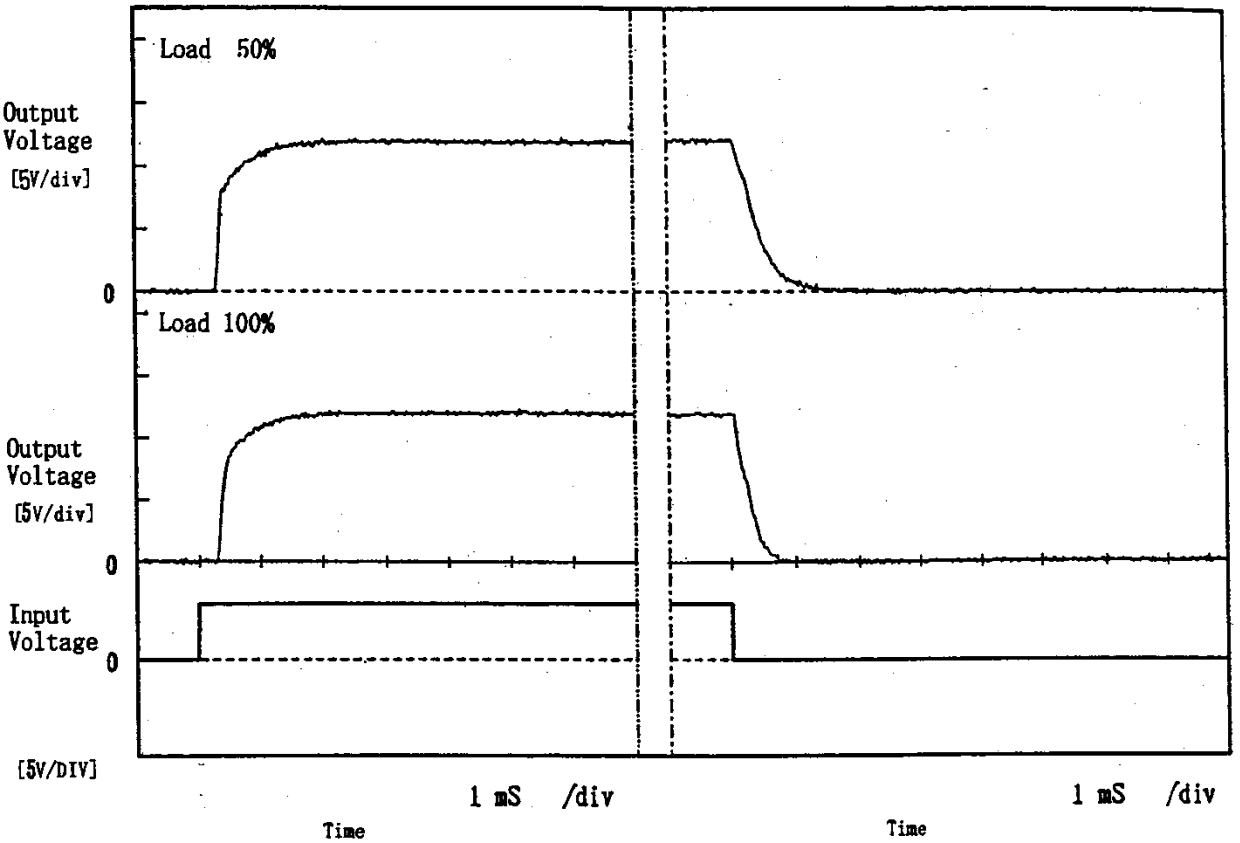


COSEL

Model	ZUW150512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	-12.0V0.60A		

1. Graph

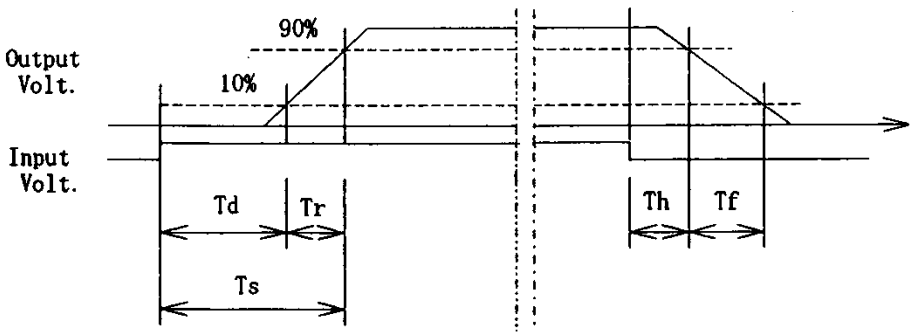
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.32	0.66	0.98	0.10	0.75
100 %	0.32	0.66	0.98	0.10	0.43



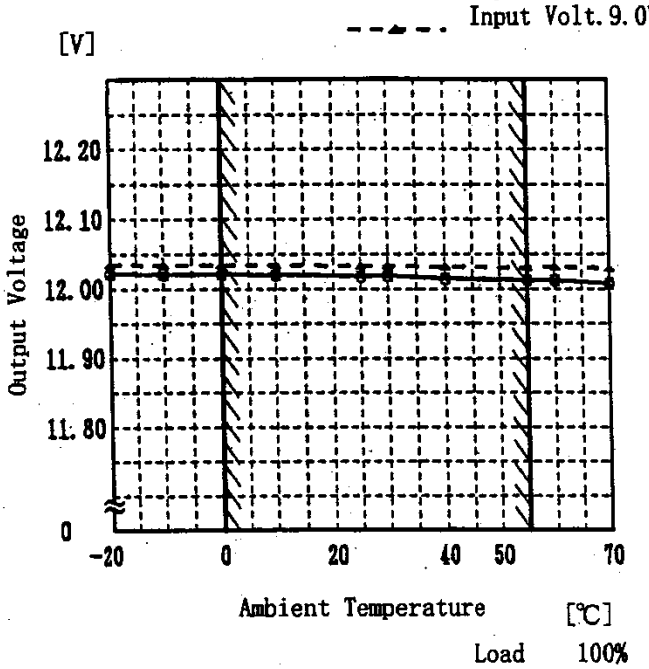
COSEL

Model	ZUW150512
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +12.0V0.60A

1. Graph

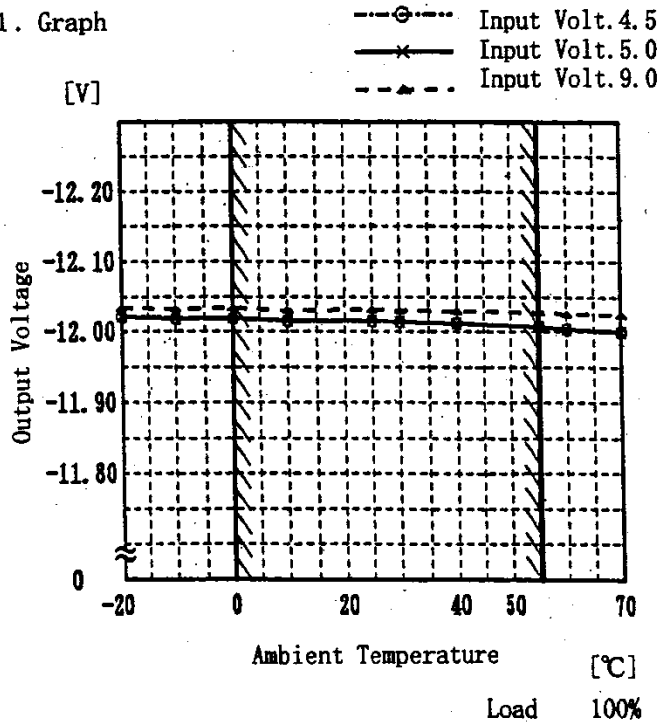


2. Values

Temperature [℃]	Input Volt. 4.5[V]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Output Volt. [V]		
-20	12.023	12.023	12.035
-10	12.021	12.021	12.034
0	12.021	12.021	12.034
10	12.021	12.021	12.034
25	12.019	12.019	12.033
30	12.019	12.019	12.034
40	12.015	12.015	12.032
55	12.013	12.013	12.031
60	12.013	12.013	12.032
70	12.008	12.008	12.030

Object −12V0.60A

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]	Input Volt. 5.0[V]	Input Volt. 9.0[V]
	Output Volt. [V]		
-20	-12.021	-12.021	-12.034
-10	-12.019	-12.019	-12.033
0	-12.019	-12.019	-12.033
10	-12.016	-12.016	-12.030
25	-12.015	-12.015	-12.031
30	-12.014	-12.014	-12.031
40	-12.012	-12.012	-12.030
55	-12.008	-12.008	-12.028
60	-12.004	-12.004	-12.026
70	-12.001	-12.001	-12.025

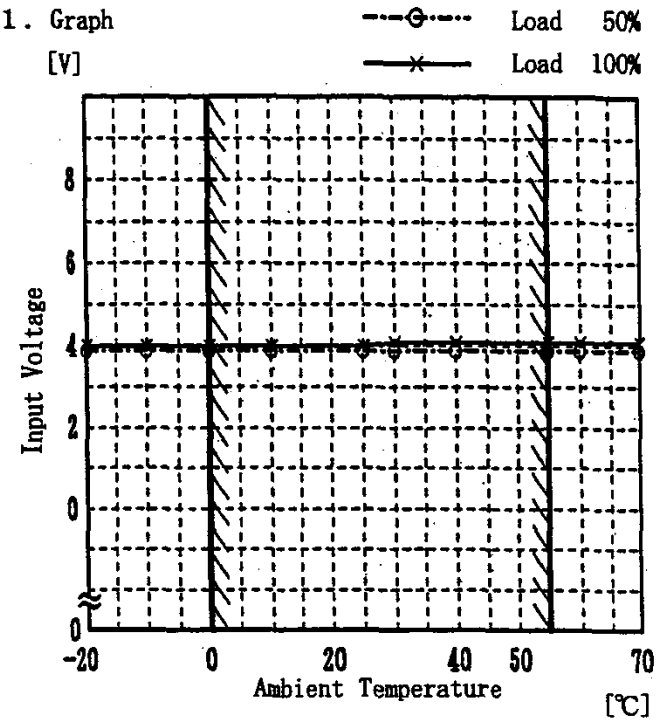
COSEL

Model	ZUW150512
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 +12.0V0.60A

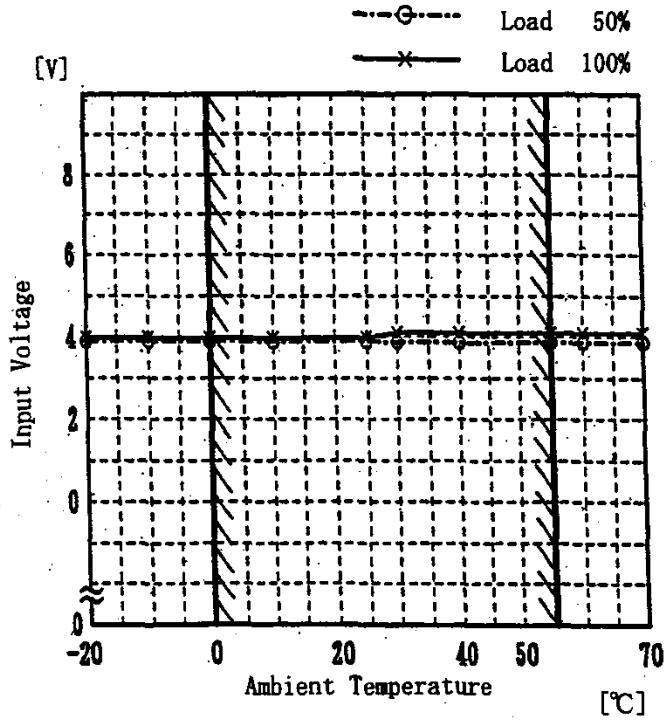
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-20	3.9	4.0
-10	3.9	4.0
0	3.9	4.0
10	3.9	4.0
25	3.9	4.0
30	3.9	4.1
40	3.9	4.1
55	3.9	4.1
60	3.9	4.1
70	3.9	4.1

Object −12V0.60A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-20	3.9	4.0
-10	3.9	4.0
0	3.9	4.0
10	3.9	4.0
25	3.9	4.0
30	3.9	4.1
40	3.9	4.1
55	3.9	4.1
60	3.9	4.1
70	3.9	4.1

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。

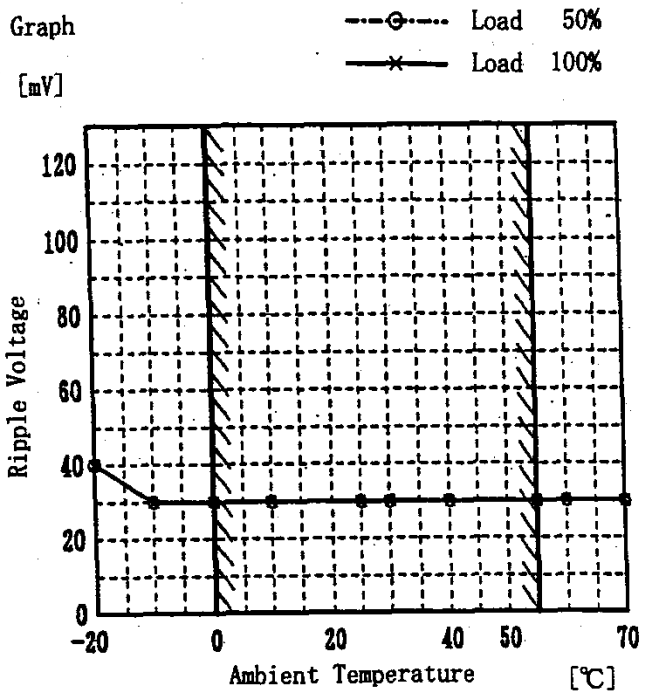
COSEL

Model	ZUW150512
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry Figure A

Object +12V0.60A

1. Graph



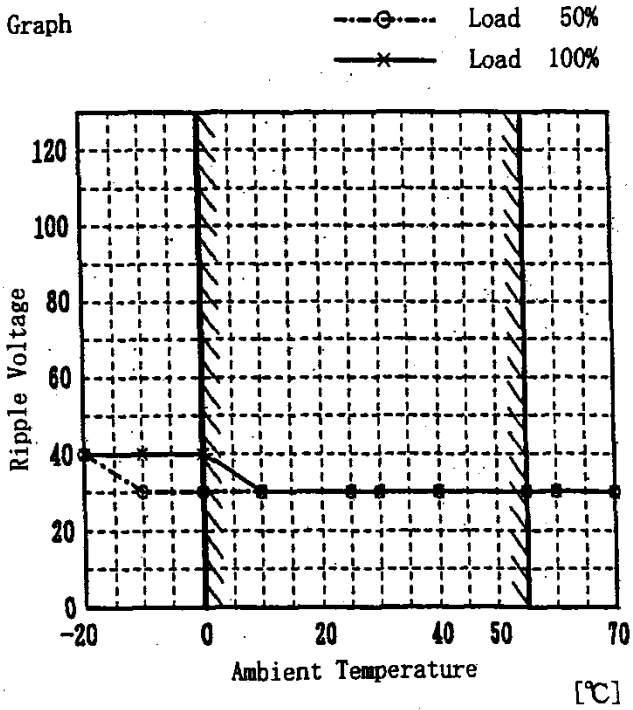
Input Volt. 4.5V

2. Values

Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-20	40	40
-10	30	30
0	30	30
10	30	30
25	30	30
30	30	30
40	30	30
55	30	30
60	30	30
70	30	30

Object −12V0.60A

1. Graph



Input Volt. 4.5V

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]
-20	40	40
-10	30	40
0	30	40
10	30	30
25	30	30
30	30	30
40	30	30
55	30	30
60	30	30
70	30	30

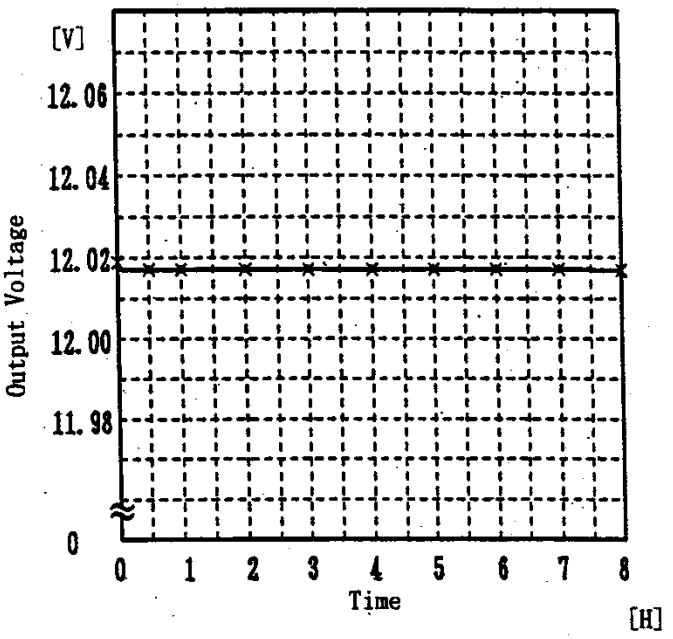
COSEL

Model	ZUW150512
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object +12.0V0.60A

1. Graph



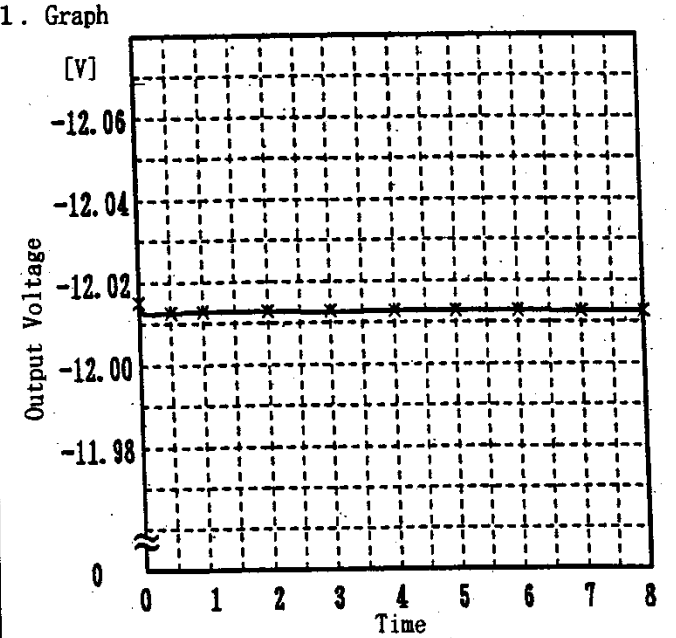
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	12.019
0.5	12.017
1.0	12.017
2.0	12.017
3.0	12.017
4.0	12.017
5.0	12.017
6.0	12.017
7.0	12.017
8.0	12.017

Object −12V0.60A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-12.015
0.5	-12.013
1.0	-12.013
2.0	-12.013
3.0	-12.013
4.0	-12.013
5.0	-12.013
6.0	-12.013
7.0	-12.013
8.0	-12.013

COSEL

Model	ZUW150512	
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 : 0～55 ℃

Input Voltage : 4.5～9.0 V

Load Current (AVR 1) : 0.00～0.60 A

(AVR 2) : 0.00～0.60 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 0～55 ℃

入力電圧 4.5～9.0 V

負荷電流 (AVR 1) 0.00～0.60 A

(AVR 2) 0.00～0.60 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 ＋12.0V0.60A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	55	9.0	0.00	12.337	±167	±1.4
Minimum Voltage	55	4.5	0.60	12.003		

Object －12V0.60A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	55	9.0	0.00	-12.332	±170	±1.5
Minimum Voltage	55	4.5	0.60	-11.992		

COSEL

Model	ZUW150512	
Item	Condensation 結露特性	Testing Circuitry Figure A
Object	+12.0V0.60A	

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	11.902	30	50
	2	11.908	30	50
	3	11.898	30	50
Load 100 %	1	11.901	30	50
	2	11.899	30	50
	3	11.897	30	50

Input Volt. 5.0 V

COSEL

Model	ZUW150512
Item	Condensation 結露特性
Object	−12.0V0.60A

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	-11.901	30	40
	2	-11.908	30	40
	3	-11.903	30	50
Load 100 %	1	-11.913	30	40
	2	-11.898	30	40
	3	-11.906	30	40

Input Volt. 5.0 V

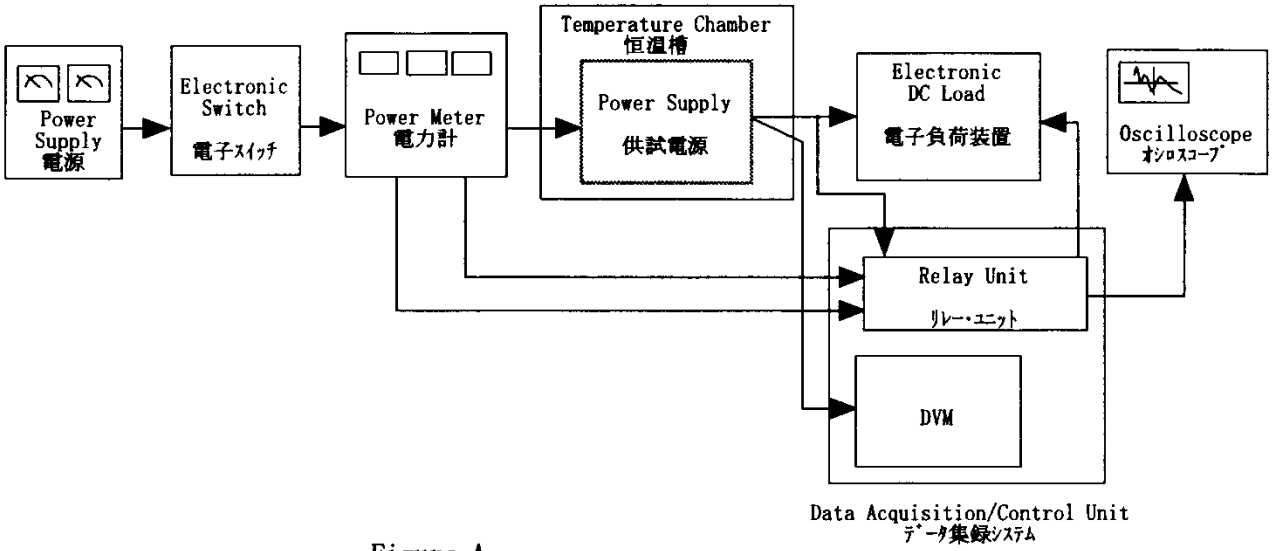

Power Supply
電源
Electronic Switch
電子スイッチ
Power Meter
電力計
Temperature Chamber
恒温槽
Power Supply
供試電源
Electronic DC Load
電子負荷装置
Oscilloscope
オシロスコープ
Relay Unit
リレー・ユニット
DVM
Data Acquisition/Control Unit
データ集録システム

Figure A