参考資料

COSEL

TEST DATA OF ZUW250512
(5.0V INPUT)

Regulated DC Power Supply

Date : Feb.23. 1998

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Design Manager

Prepared by : Hanoka
Design Engineer

コーセル株式会社

COSEL CO.,LTD.

参考資料

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(Final Page 22)

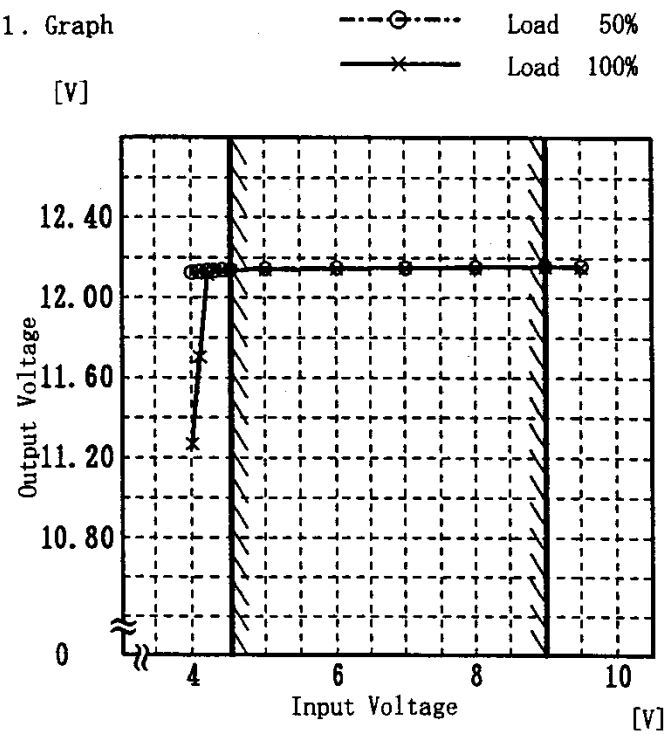
COSEL

Model	ZUW250512
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋12.0V0.84A

1. Graph

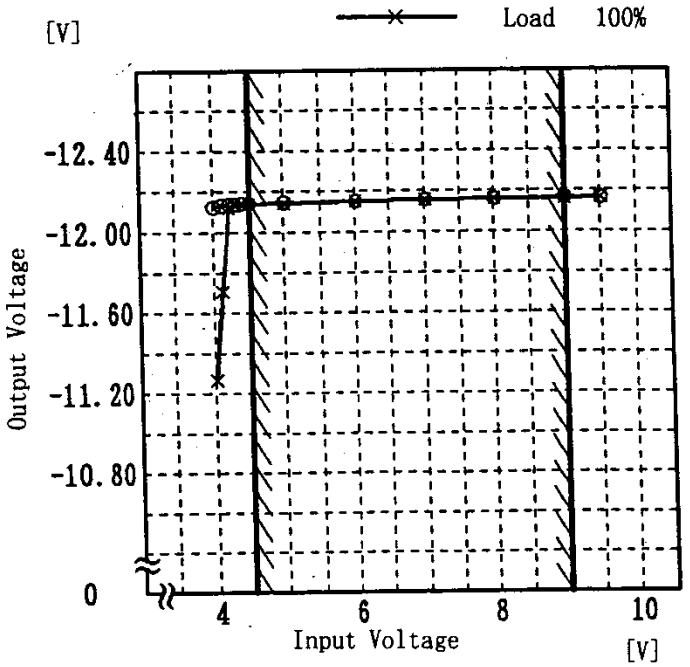


2. Values

Input Voltage [V]	Load 50 %	Load 100 %
	Output Volt.[V]	Output Volt.[V]
4.0	12.125	11.268
4.1	12.132	11.704
4.2	12.135	12.119
4.3	12.137	12.131
4.4	12.139	12.134
4.5	12.140	12.135
5.0	12.144	12.142
6.0	12.149	12.147
7.0	12.152	12.150
8.0	12.155	12.153
9.0	12.156	12.154
9.5	12.157	12.155

Object －12V0.84A

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 %	Load 100 %
	Output Volt.[V]	Output Volt.[V]
4.0	-12.127	-11.267
4.1	-12.134	-11.705
4.2	-12.137	-12.120
4.3	-12.140	-12.131
4.4	-12.142	-12.135
4.5	-12.143	-12.137
5.0	-12.148	-12.145
6.0	-12.155	-12.152
7.0	-12.159	-12.157
8.0	-12.162	-12.160
9.0	-12.164	-12.163
9.5	-12.165	-12.164

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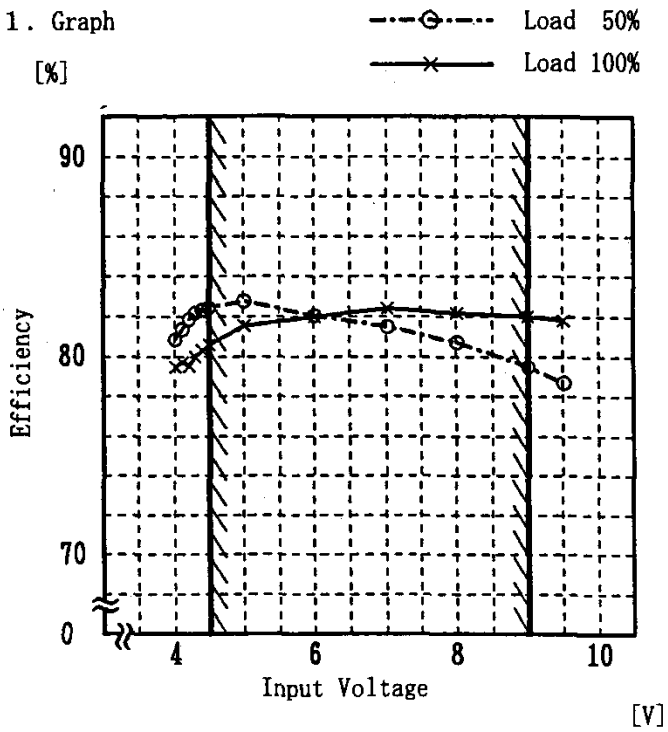
COSEL

Model	ZUW250512
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

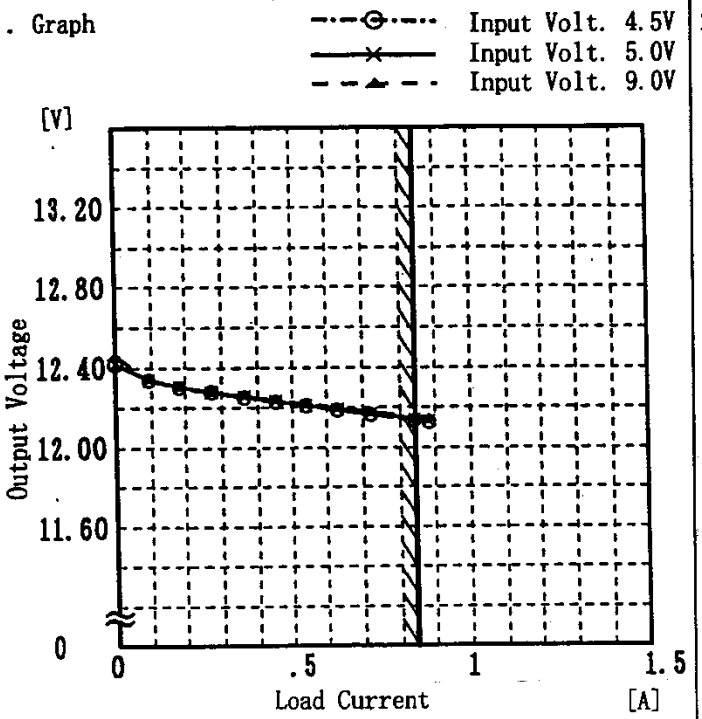
Input Voltage [V]	Load 50 %	Load 100 %
	Efficiency [%]	Efficiency [%]
4.0	80.9	79.5
4.1	81.4	79.7
4.2	81.9	79.5
4.3	82.2	80.0
4.4	82.3	80.3
4.5	82.5	80.6
5.0	82.8	81.6
6.0	82.1	82.0
7.0	81.5	82.4
8.0	80.7	82.2
9.0	79.5	82.0
9.5	78.7	81.8

COSEL

Model	ZUW250512
Item	Load Regulation 静的負荷変動
Object	+12.0V0.84A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

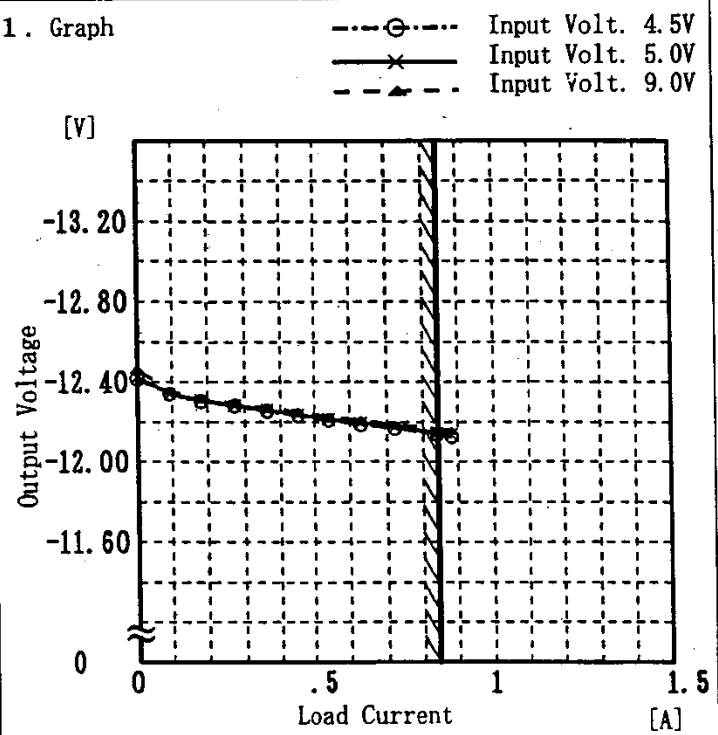


2. Values

Load Current [A]	Input Volt. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Output Volt. [V]		
0.000	12.416	12.423	12.456
0.090	12.338	12.338	12.345
0.180	12.304	12.305	12.306
0.270	12.278	12.280	12.281
0.360	12.254	12.256	12.259
0.450	12.231	12.234	12.239
0.540	12.209	12.213	12.219
0.630	12.187	12.191	12.199
0.720	12.165	12.170	12.180
0.840	12.135	12.141	12.154
0.880	12.125	12.132	12.146

Object	−12V0.84A

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. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Output Volt. [V]		
0.000	−12.415	−12.422	−12.463
0.090	−12.340	−12.342	−12.355
0.180	−12.307	−12.309	−12.316
0.270	−12.281	−12.284	−12.291
0.360	−12.257	−12.261	−12.269
0.450	−12.234	−12.238	−12.248
0.540	−12.211	−12.216	−12.228
0.630	−12.189	−12.195	−12.208
0.720	−12.166	−12.173	−12.189
0.840	−12.136	−12.144	−12.163
0.880	−12.127	−12.135	−12.154

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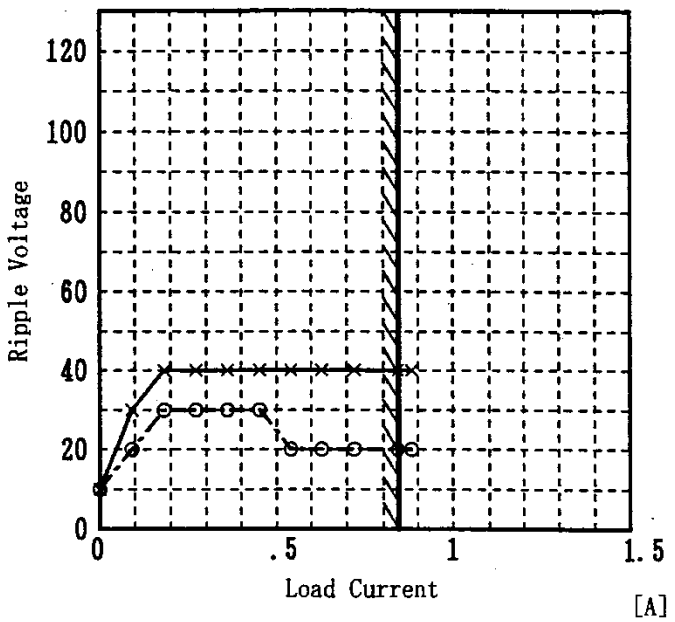
COSEL

Model	ZUW250512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12.0V0.84A

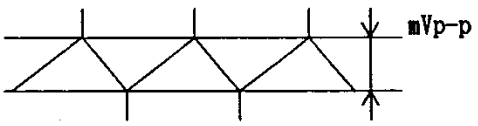
Temperature 25℃
Testing Circuitry Figure A

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

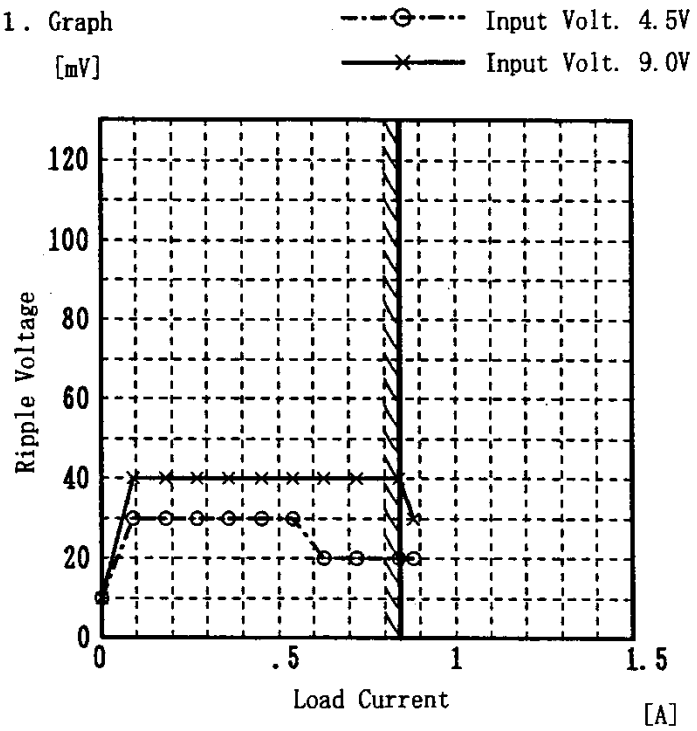
Load Current [A]	Input Volt. 4.5V Ripple Output Volt. [mV]	Input Volt. 9.0V Ripple Output Volt. [mV]
0.000	10	10
0.090	20	30
0.180	30	40
0.270	30	40
0.360	30	40
0.450	30	40
0.540	20	40
0.630	20	40
0.720	20	40
0.840	20	40
0.880	20	40

COSEL

Model	ZUW250512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	-12.0V0.84A

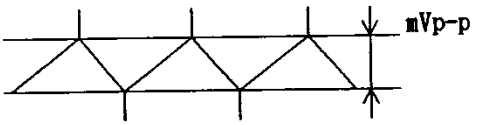
Temperature 25℃
Testing Circuitry Figure A

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

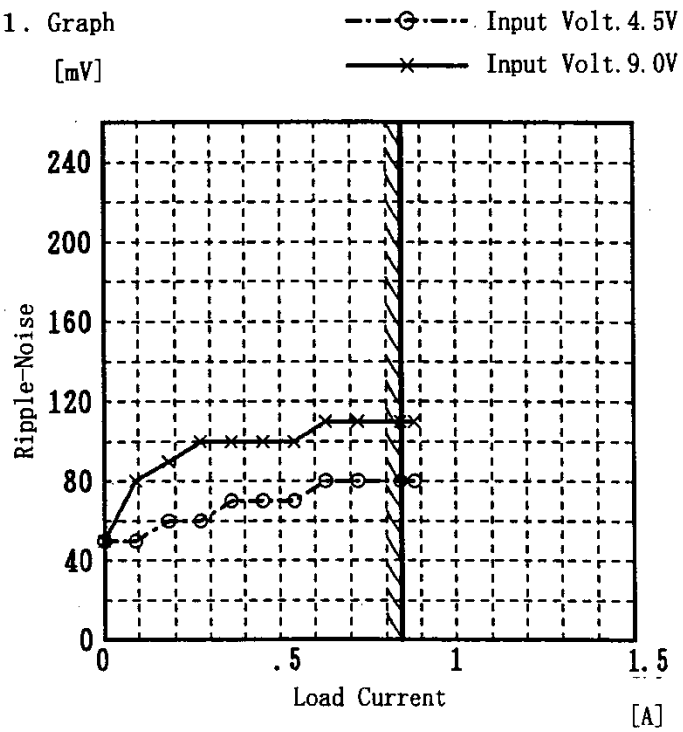
Load Current [A]	Input Volt. 4.5V Ripple Output Volt. [mV]	Input Volt. 9.0V Ripple Output Volt. [mV]
0.000	10	10
0.090	30	40
0.180	30	40
0.270	30	40
0.360	30	40
0.450	30	40
0.540	30	40
0.630	20	40
0.720	20	40
0.840	20	40
0.880	20	30

COSEL

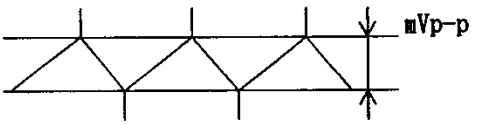
Model	ZUW250512
Item	Ripple-Noise リップルノイズ
Object	+12.0V0.84A

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. 4.5V Ripple-Noise [mV]	Input Volt. 9.0V Ripple-Noise [mV]
0.000	50	50
0.090	50	80
0.180	60	90
0.270	60	100
0.360	70	100
0.450	70	100
0.540	70	100
0.630	80	110
0.720	80	110
0.840	80	110
0.880	80	110

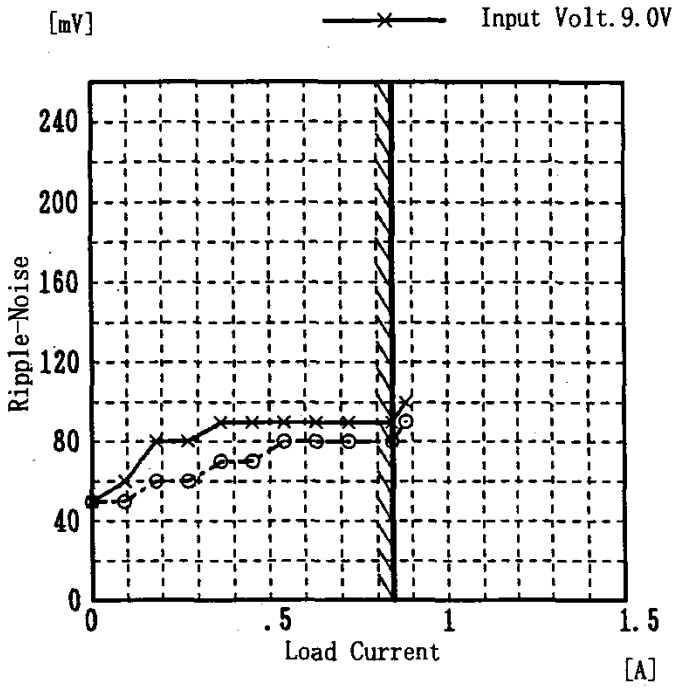
COSEL

Model	ZUW250512
Item	Ripple-Noise リップルノイズ
Object	-12.0V0.84A

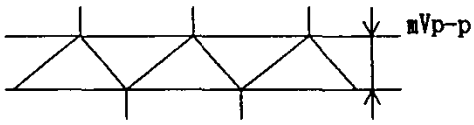
Temperature 25℃
Testing Circuitry Figure A

1. Graph

[mV]



Ripple-Noise is shown as p-p in the figure below.
Note: Slanted line shows the range of the rated load current.



2. Values

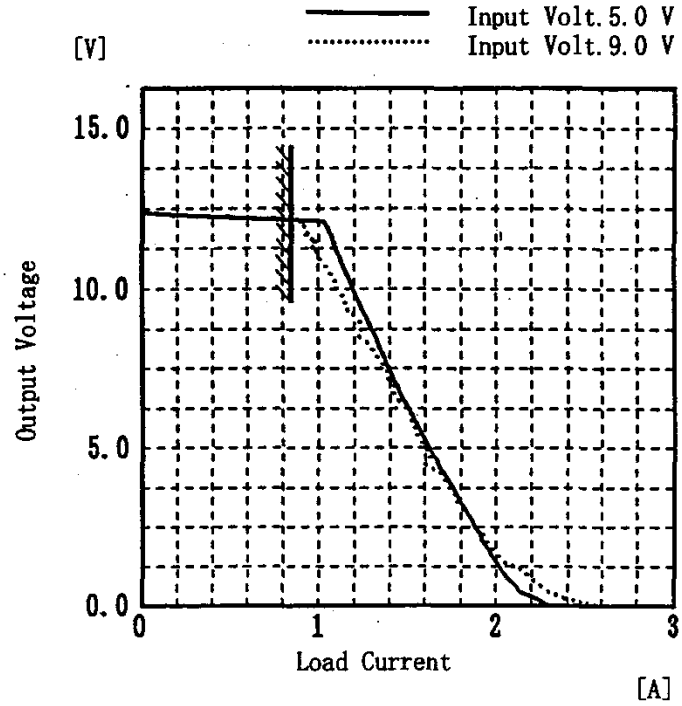
Load current [A]	Input Volt. 4.5V Ripple-Noise [mV]	Input Volt. 9.0V Ripple-Noise [mV]
0.000	50	50
0.090	50	60
0.180	60	80
0.270	60	80
0.360	70	90
0.450	70	90
0.540	80	90
0.630	80	90
0.720	80	90
0.840	80	90
0.880	90	100

COSEL

Model	ZUW250512
Item	Overcurrent Protection 過電流保護
Object	+12.0V0.84A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

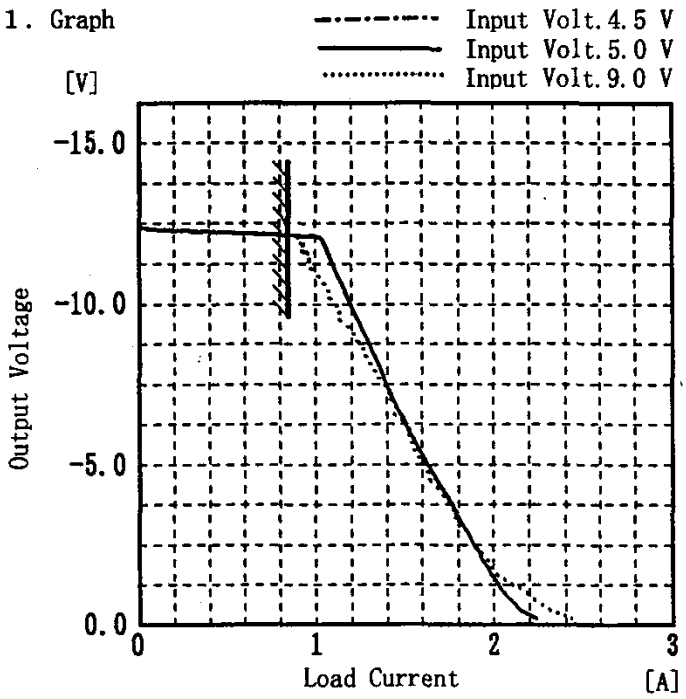


2. Values

Output Voltage [V]	Input Volt. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Load Current [A]		
11.99	1.04	1.04	0.90
11.40	1.09	1.09	0.98
10.80	1.13	1.13	1.04
9.60	1.22	1.22	1.15
8.40	1.31	1.31	1.27
7.20	1.42	1.42	1.39
6.00	1.51	1.52	1.51
4.80	1.65	1.65	1.63
3.60	1.77	1.77	1.76
2.40	1.88	1.88	1.88
1.20	2.02	2.02	2.15
0.00	2.29	2.29	2.58

Object	−12V0.84A

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. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Load Current [A]		
−11.99	1.03	1.03	0.90
−11.40	1.08	1.08	0.96
−10.80	1.12	1.12	1.01
−9.60	1.21	1.21	1.13
−8.40	1.32	1.32	1.27
−7.20	1.42	1.41	1.41
−6.00	1.52	1.51	1.52
−4.80	1.66	1.66	1.63
−3.60	1.77	1.77	1.77
−2.40	1.89	1.89	1.89
−1.20	2.04	2.04	2.16
0.00	2.32	2.32	2.61

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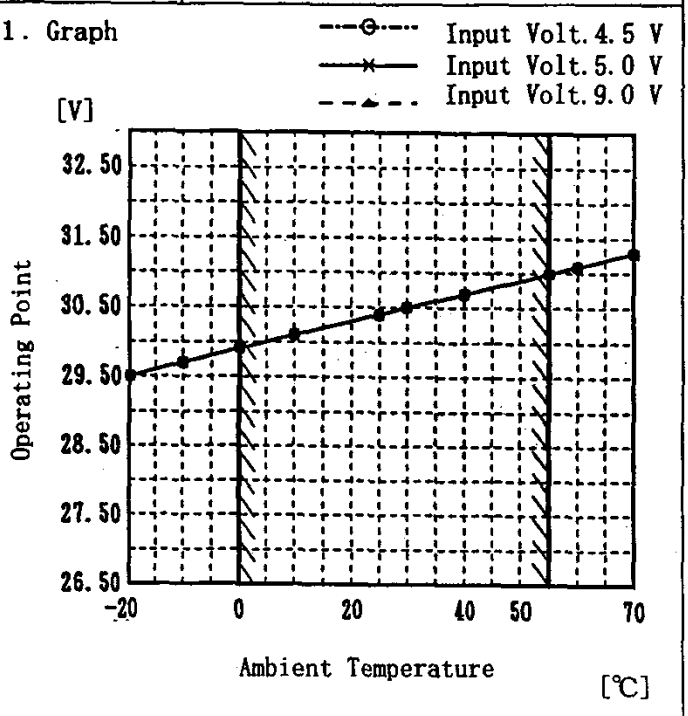
Model	ZUW250512
Item	Overvoltage Protection 過電圧保護
Object	±12.0V0.84A

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	29.50	29.50	29.50
-10	29.70	29.70	29.70
0	29.90	29.90	29.90
10	30.10	30.10	30.10
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

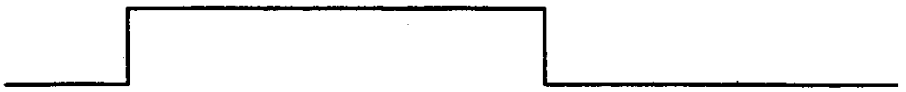
COSEL

Model	ZUW250512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12.0V0.84A		

Input Volt. 5.0 V

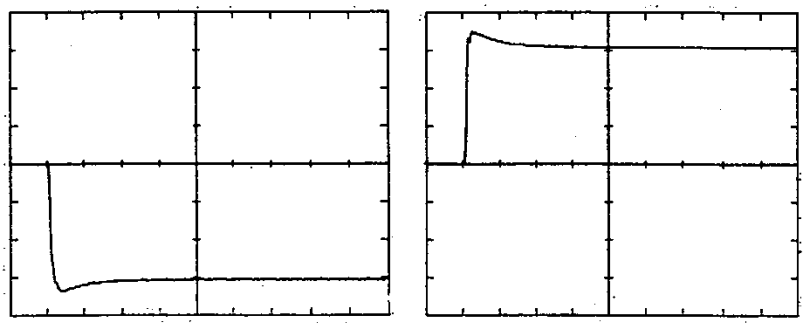
Cycle 10 mS

Load Current

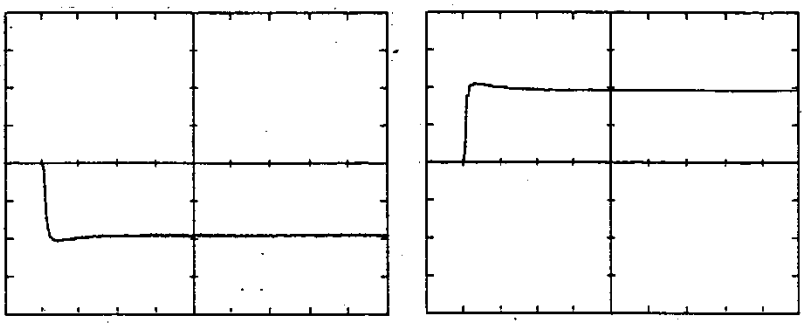


Load 0% ⟷ Load 100 %

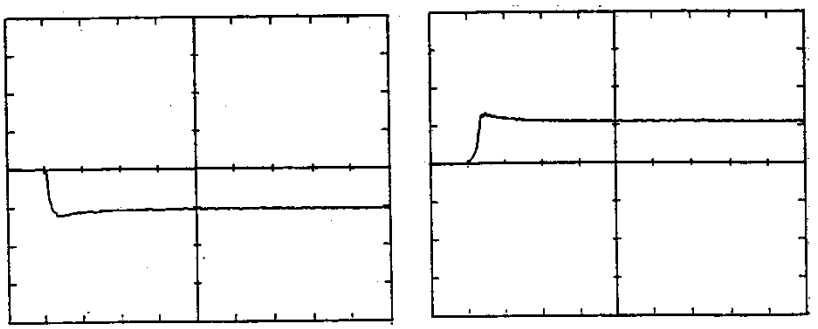
100[mV/div]



Load 0% ⟷ Load 50 %



Load 50 % ⟷ Load 100 %



0.5[mS/div]

COSEL

Model	ZUW250512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	-12.0V0.84A		

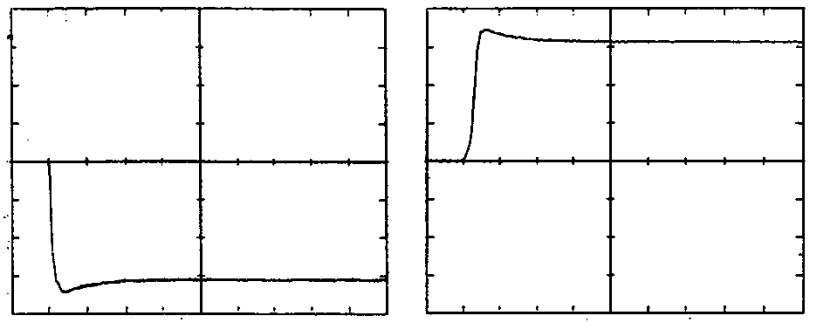
Input Volt. 5.0 V

Cycle 10 mS

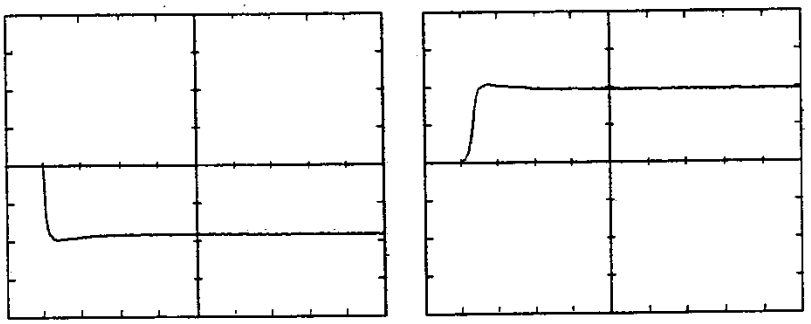
Load Current

Load 0% ⟷ Load 100 %

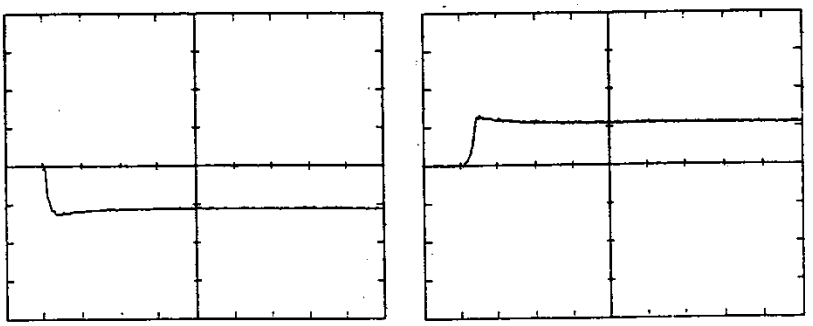
100[mV/div]



Load 0% ⟷ Load 50 %



Load 50 % ⟷ Load 100 %



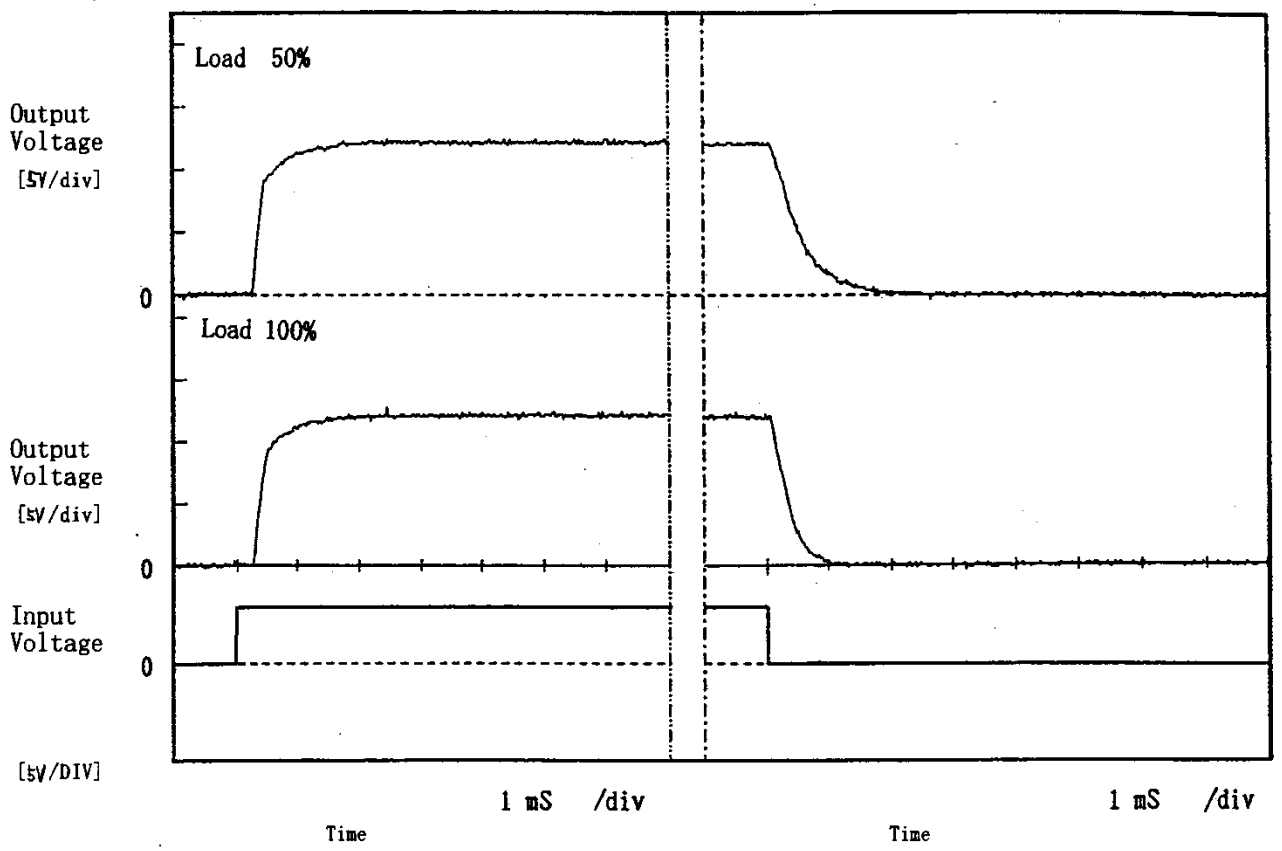
0.5[mS/div]

COSEL

Model	ZUW250512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+12.0V0.84A		

1. Graph

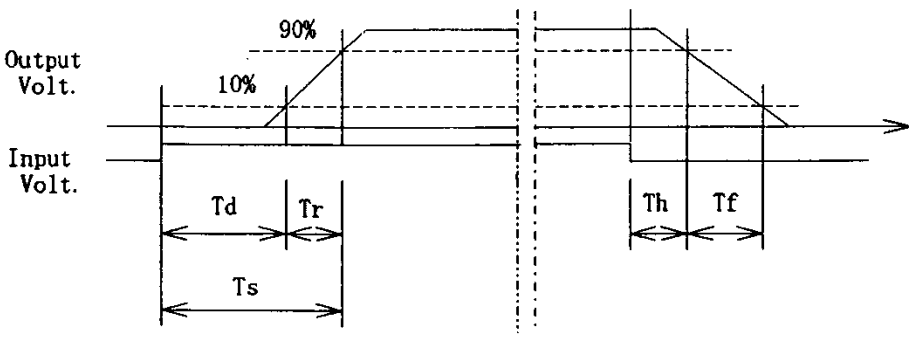
Input Volt. 4.5V



2. Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.30	0.55	0.85	0.13	1.00
100 %	0.30	0.59	0.89	0.10	0.55



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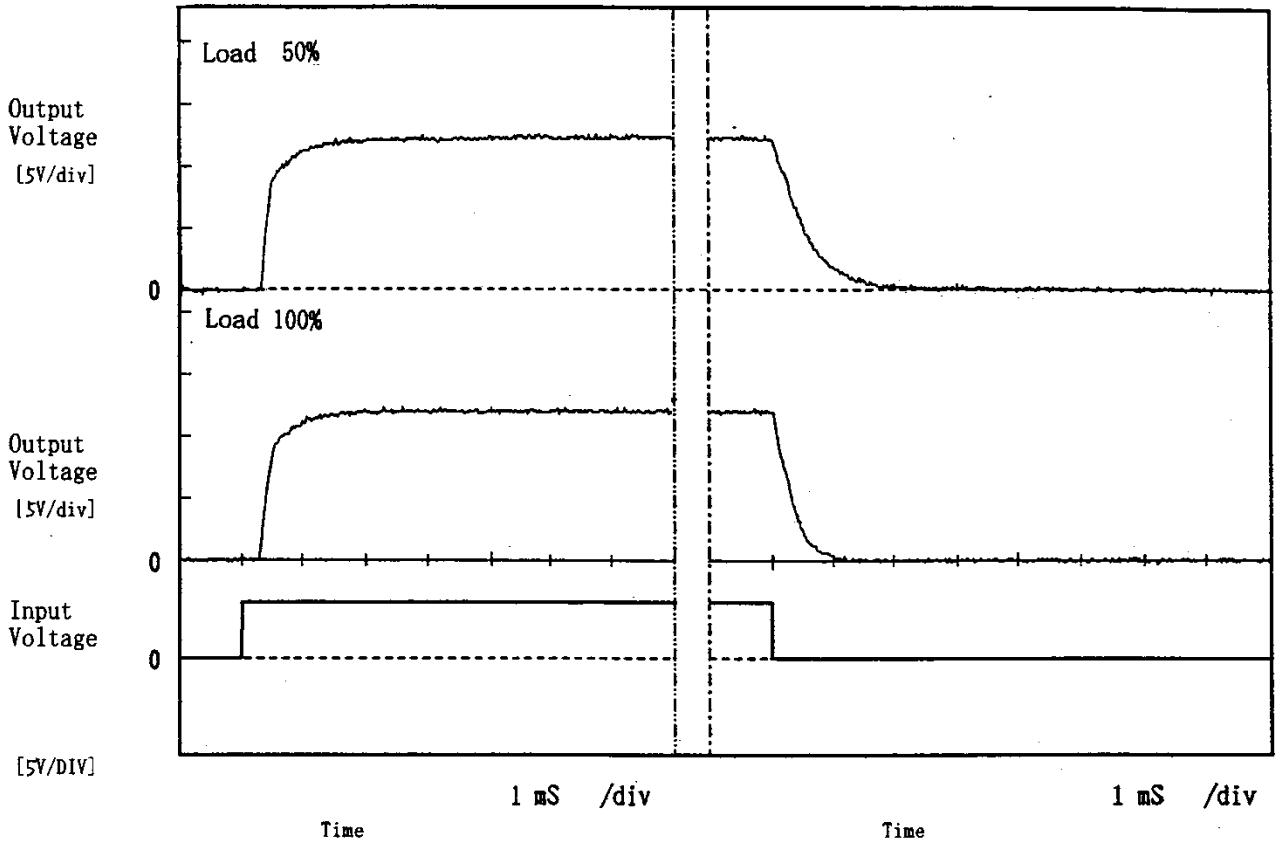
COSEL

Model	ZUW250512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	-12.0V0.84A		

1. Graph

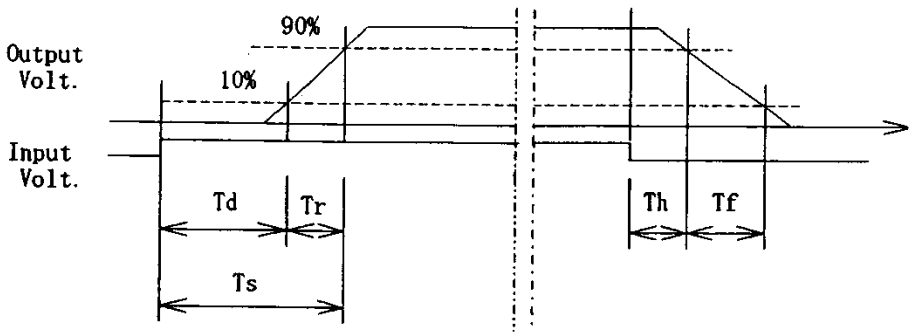
Input Volt. 4.5V



2. Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.30	0.60	0.90	0.12	1.08
100 %	0.30	0.52	0.82	0.07	0.55



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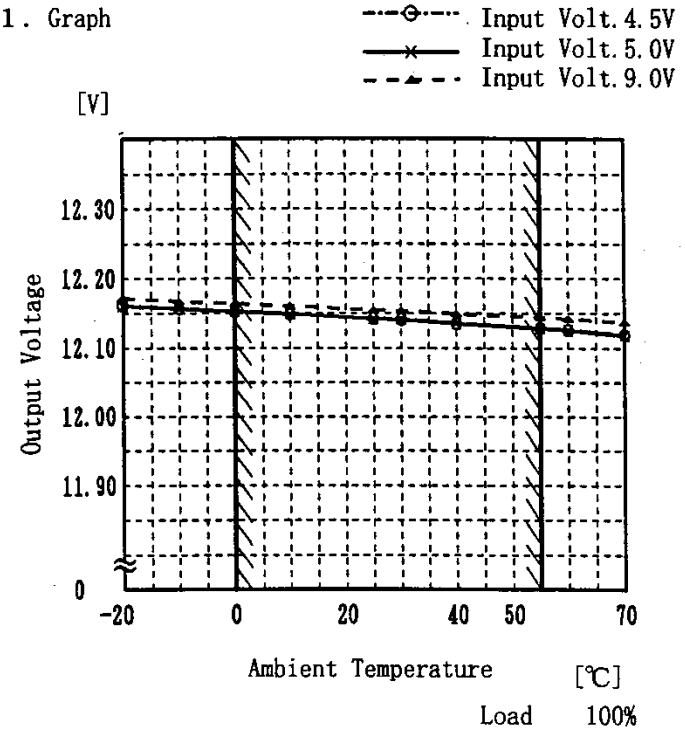
COSEL

Model	ZUW250512
Item	Ambient Temperature Drift 周囲温度変動
Object	+12.0V0.84A

Testing Circuitry Figure A

1. Graph

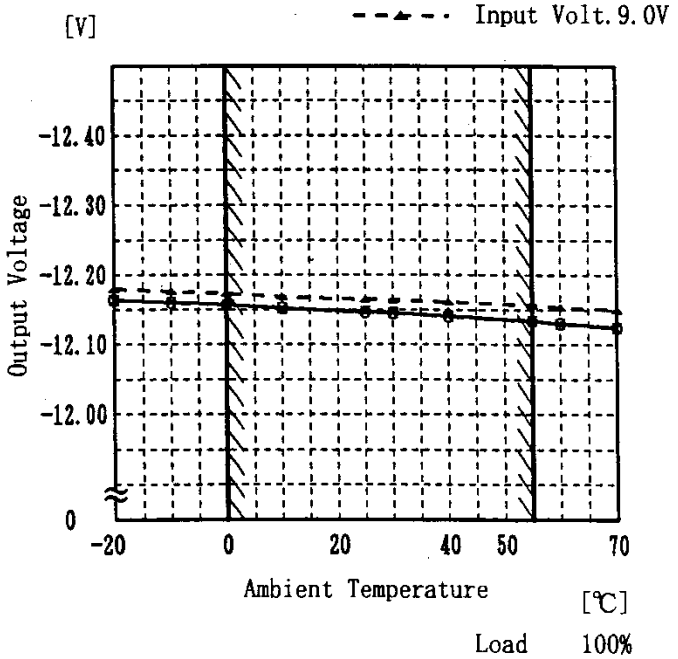


2. Values

Temperature [℃]	Input Volt. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Output Volt. [V]		
-20	12.161	12.161	12.172
-10	12.157	12.157	12.168
0	12.153	12.152	12.163
10	12.149	12.149	12.161
25	12.143	12.143	12.155
30	12.141	12.141	12.154
40	12.136	12.136	12.150
55	12.128	12.128	12.144
60	12.126	12.126	12.143
70	12.119	12.119	12.137

Object	−12V0.84A

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. 4.5V	Input Volt. 5.0V	Input Volt. 9.0V
	Output Volt. [V]		
-20	-12.164	-12.164	-12.180
-10	-12.160	-12.160	-12.176
0	-12.156	-12.156	-12.172
10	-12.152	-12.152	-12.169
25	-12.147	-12.147	-12.165
30	-12.145	-12.145	-12.164
40	-12.141	-12.141	-12.161
55	-12.135	-12.135	-12.156
60	-12.131	-12.131	-12.154
70	-12.125	-12.125	-12.150

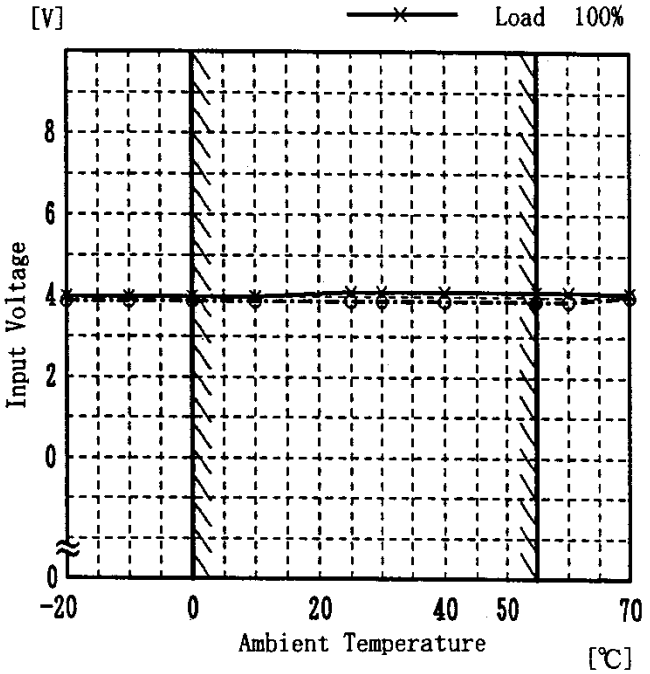
COSEL

Model	ZUW250512
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 +12.0V0.84A

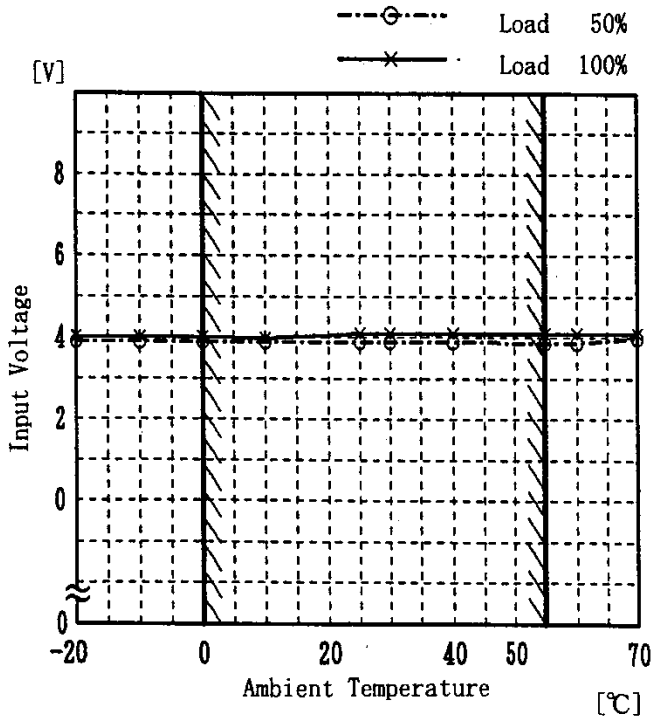
1. Graph



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	4.1
30	3.9	4.1
40	3.9	4.1
55	3.9	4.1
60	3.9	4.1
70	4.0	4.1

Object −12V0.84A



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 % 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	4.1
30	3.9	4.1
40	3.9	4.1
55	3.9	4.1
60	3.9	4.1
70	4.0	4.1

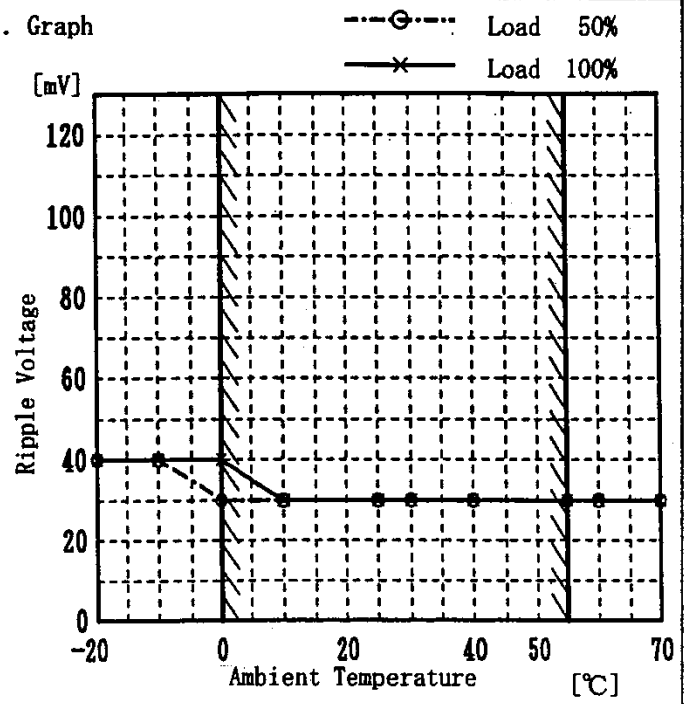
COSEL

Model	ZUW250512
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry Figure A

Object +12V0.84A

1. Graph



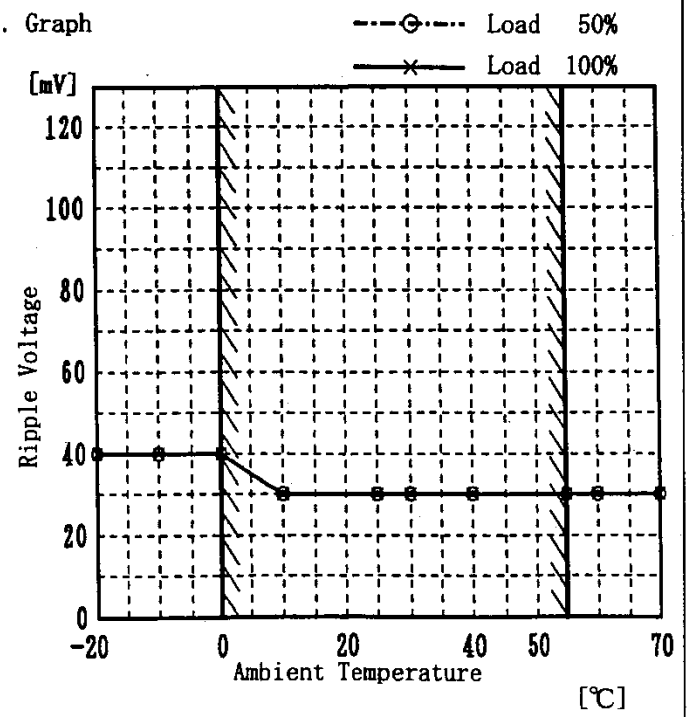
Input Volt. 4.5V

2. Values

Ambient Temp. [℃]	Load 50 % Ripple Output Volt. [mV]	Load 100 % Ripple Output Volt. [mV]
-20	40	40
-10	40	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

Object −12V0.84A

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	40	40
0	40	40
10	30	30
25	30	30
30	30	30
40	30	30
55	30	30
60	30	30
70	30	30

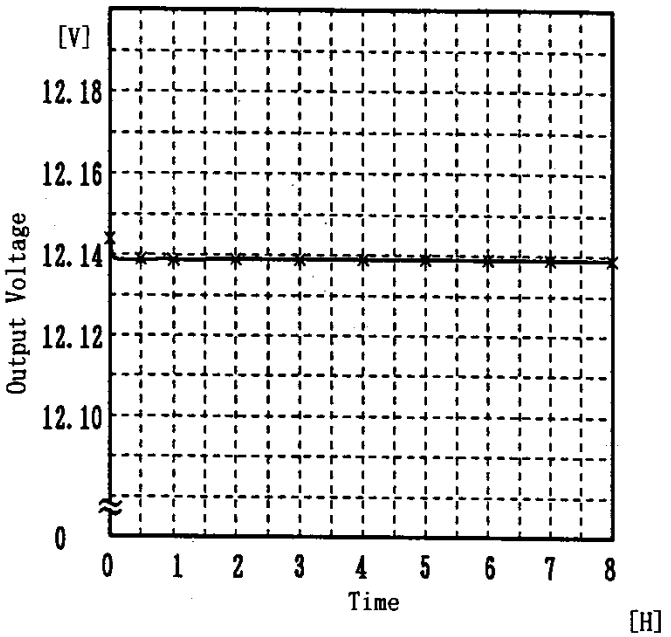
COSEL

Model	ZUW250512
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object ＋12.0V0.84A

1. Graph



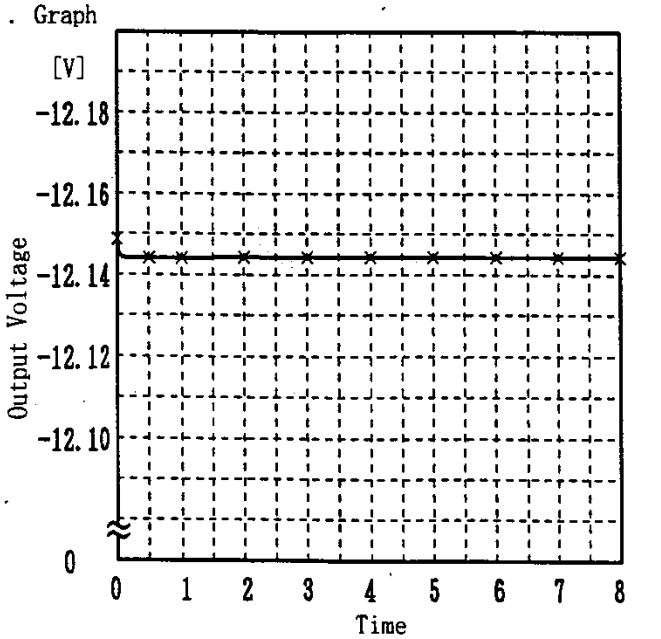
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	12.144
0.5	12.139
1.0	12.139
2.0	12.139
3.0	12.139
4.0	12.139
5.0	12.139
6.0	12.139
7.0	12.139
8.0	12.139

Object －12V0.84A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-12.149
0.5	-12.144
1.0	-12.144
2.0	-12.144
3.0	-12.144
4.0	-12.144
5.0	-12.144
6.0	-12.144
7.0	-12.144
8.0	-12.144

COSEL

Model	ZUW250512
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) : 0.00～0.84 A

(AVR 2) : 0.00～0.84 A

* Output Voltage Accuracy = ±(Maximum of Output Voltage − Minimum of Output Voltage)／2

* Output Voltage Accuracy (Ration) $= \dfrac{\text{Voltage Accuracy}}{\text{Rated Output Voltage}} \times 100$

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) 0.00～0.84 A

(AVR 2) 0.00～0.84 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

* 定電圧精度(変動率) $= \dfrac{\text{変動値}}{\text{定格出力電圧}} \times 100$

Object +12.0V0.84A

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	12.478	±183	± 1.6
Minimum Voltage	55	4.5	0.84	12.112		

Object −12V0.84A

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	-12.485	±186	±1.6
Minimum Voltage	55	4.5	0.84	-12.113		

COSEL

Model	ZUW250512
Item	Condensation 結露特性
Object	+12.0V0.84A

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	12.095	40	60
	2	12.086	40	60
	3	12.091	40	60
Load 100 %	1	12.094	40	110
	2	12.088	40	100
	3	12.095	40	100

Input Volt. 5.0 V

COSEL

Model	ZUW250512
Item	Condensation 結露特性
Object	−12.0V0.84A

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	-12.088	40	60
	2	-12.079	40	60
	3	-12.080	40	60
Load 100 %	1	-12.078	40	100
	2	-12.071	40	100
	3	-12.081	40	100

Input Volt. 5.0 V

COSEL

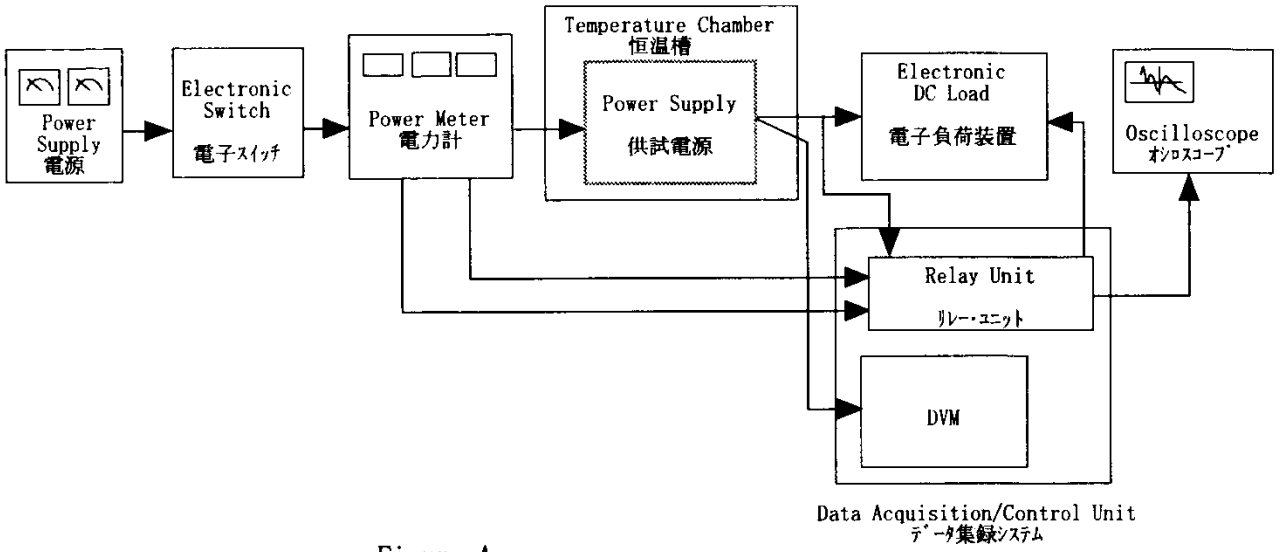


Figure A