参考資料

COSEL

TEST DATA OF ZUW60512

(5.0V INPUT)

Regulated DC Power Supply

Date : Sep.21. 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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Model	ZUW60512	
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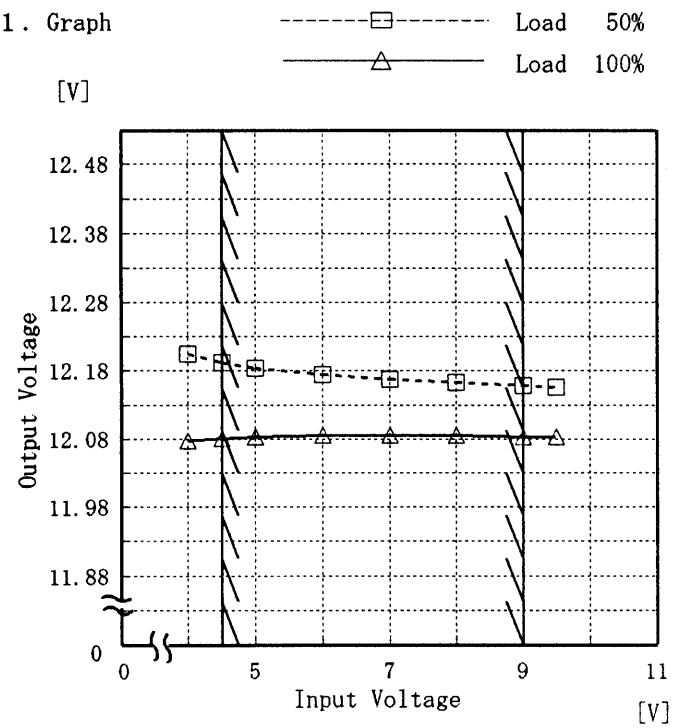
Object +12V0.25A

1. Graph

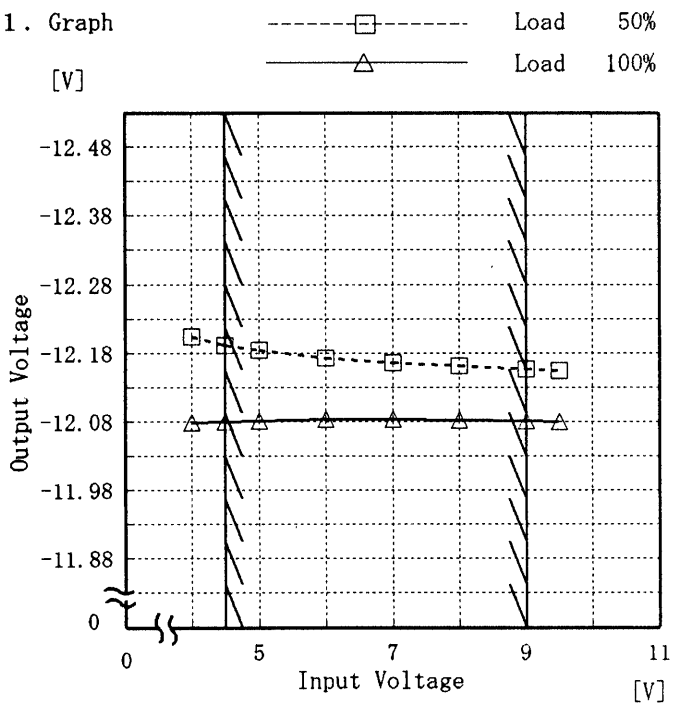


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	12.205	12.077
4.5	12.192	12.081
5.0	12.184	12.083
6.0	12.174	12.085
7.0	12.168	12.086
8.0	12.163	12.085
9.0	12.158	12.084
9.5	12.156	12.083
—	—	—
—	—	—
—	—	—
—	—	—

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

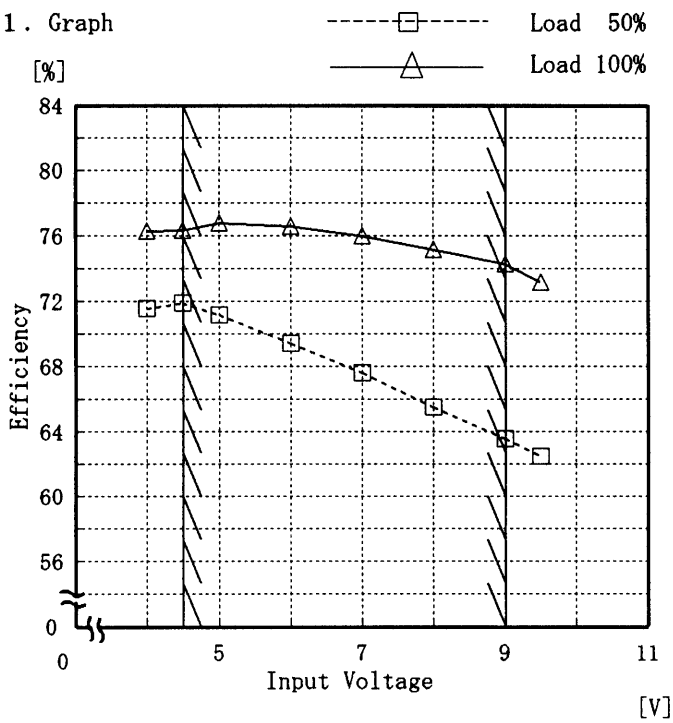
Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	-12.204	-12.079
4.5	-12.192	-12.080
5.0	-12.184	-12.082
6.0	-12.173	-12.083
7.0	-12.166	-12.083
8.0	-12.161	-12.082
9.0	-12.156	-12.081
9.5	-12.154	-12.080
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZUW60512
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	71.6	76.3
4.5	71.9	76.3
5.0	71.2	76.7
6.0	69.4	76.6
7.0	67.6	76.0
8.0	65.5	75.1
9.0	63.6	74.3
9.5	62.5	73.2
—	—	—
—	—	—
—	—	—
—	—	—

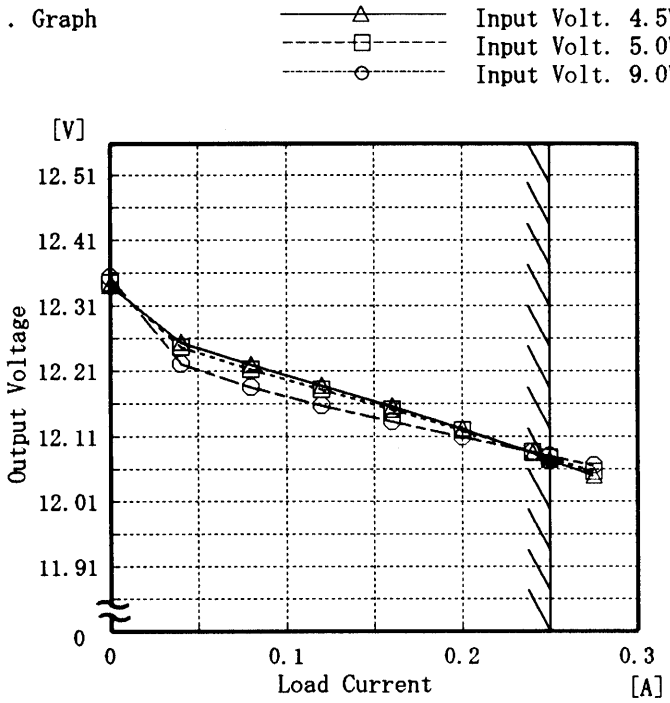
COSEL

Model	ZUW60512
Item	Load Regulation 静的負荷変動

Temperature 25℃
Testing Circuitry Figure A

Object +12V0.25A

1. Graph

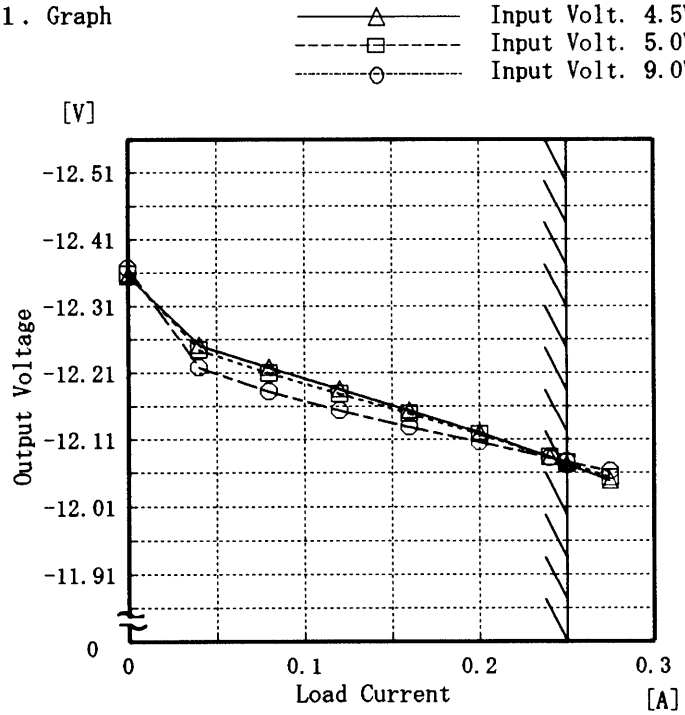


2. Values

Load Current [A]	Input Volt. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
0.000	12.342	12.345	12.354
0.040	12.254	12.247	12.221
0.080	12.220	12.212	12.185
0.120	12.188	12.181	12.158
0.160	12.156	12.151	12.133
0.200	12.122	12.120	12.110
0.240	12.085	12.087	12.086
0.250	12.075	12.078	12.080
0.275	12.050	12.056	12.066
—	—	—	—

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

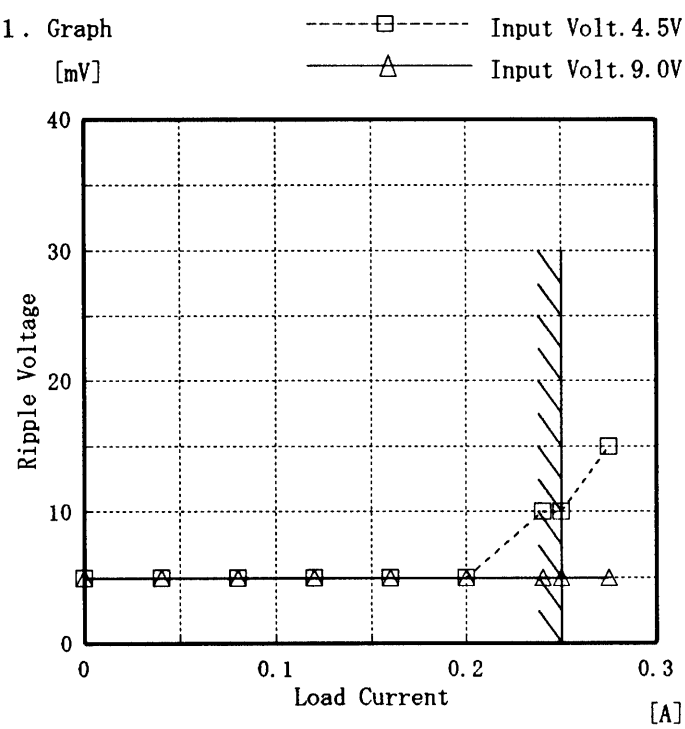
Load Current [A]	Input Volt. 4.5[V] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
0.000	-12.356	-12.359	-12.368
0.040	-12.252	-12.245	-12.219
0.080	-12.219	-12.210	-12.183
0.120	-12.187	-12.180	-12.155
0.160	-12.154	-12.150	-12.130
0.200	-12.121	-12.118	-12.107
0.240	-12.084	-12.085	-12.084
0.250	-12.074	-12.076	-12.077
0.275	-12.049	-12.054	-12.063
—	—	—	—

COSEL

Model	ZUW60512
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

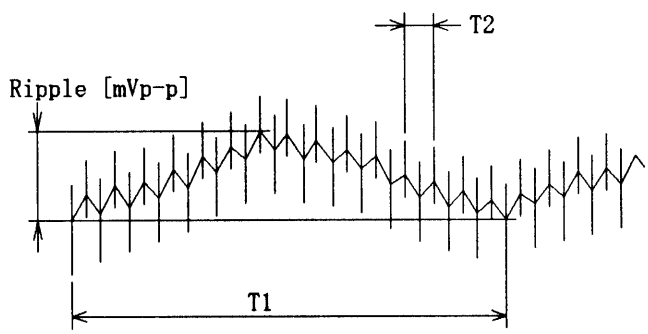


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

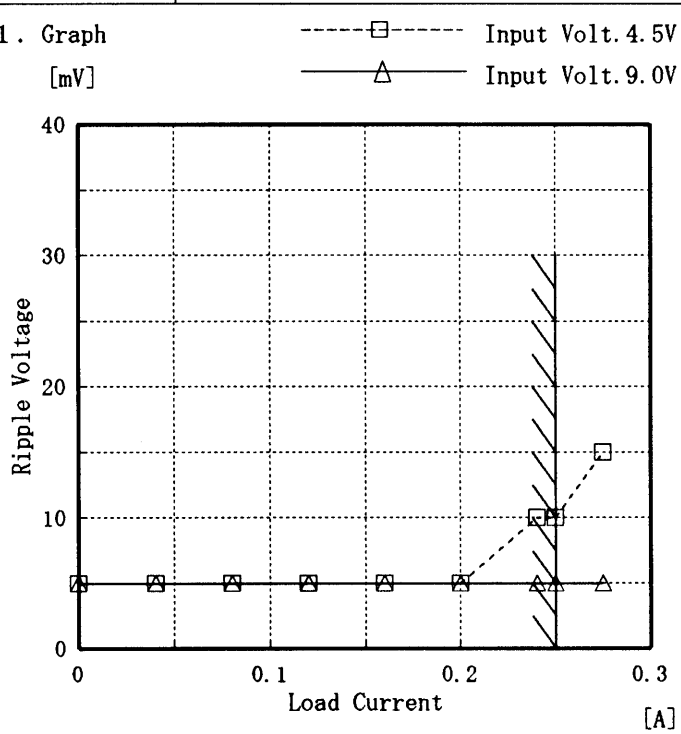
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	5	5
0.200	5	5
0.240	10	5
0.250	10	5
0.275	15	5
—	—	—
—	—	—

COSEL

Model	ZUW60512
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

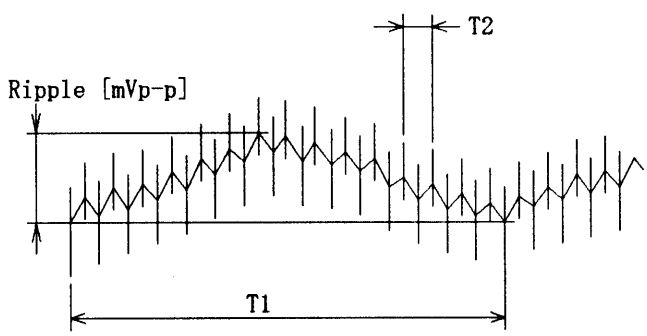


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [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	10	5
0.250	10	5
0.275	15	5
−	−	−
−	−	−

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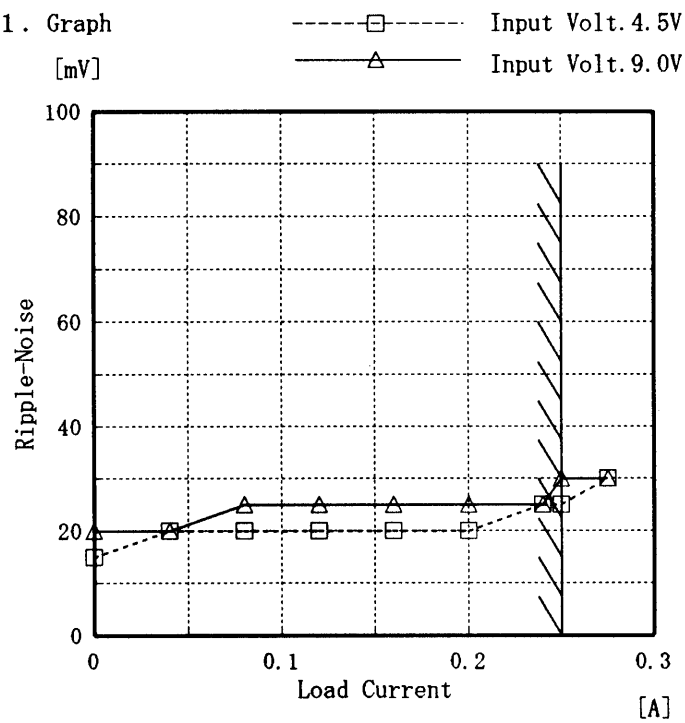
Model	ZUW60512
Item	Ripple-Noise リップルノイズ
Object	+12V0.25A

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

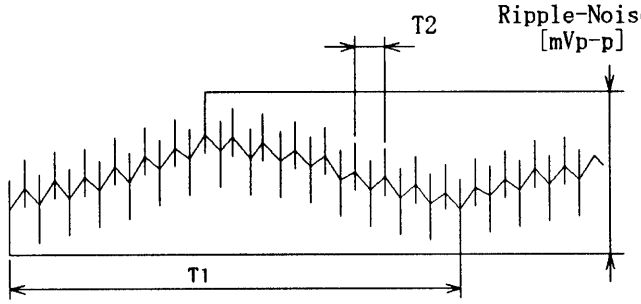


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

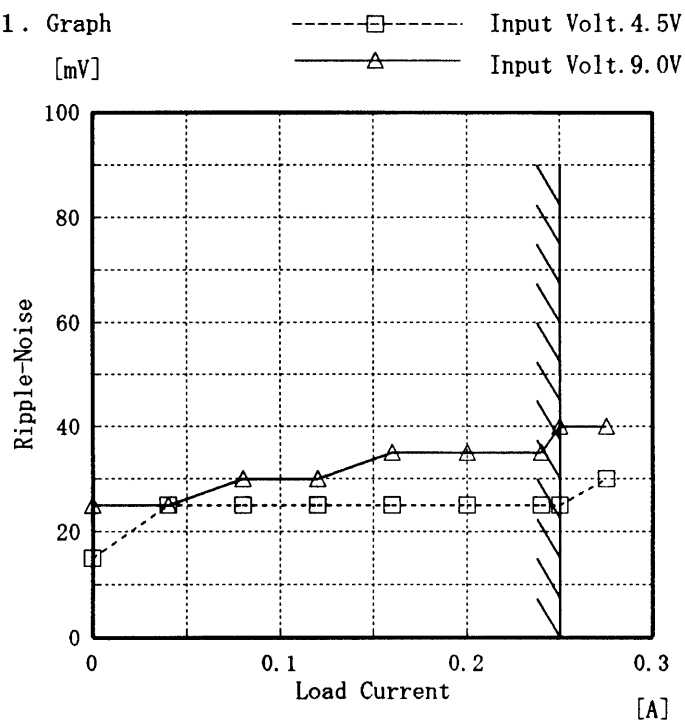
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	15	20
0.040	20	20
0.080	20	25
0.120	20	25
0.160	20	25
0.200	20	25
0.240	25	25
0.250	25	30
0.275	30	30
—	—	—
—	—	—

COSEL

Model	ZUW60512
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

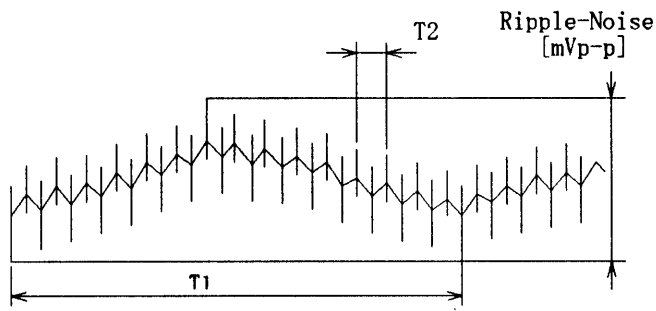


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

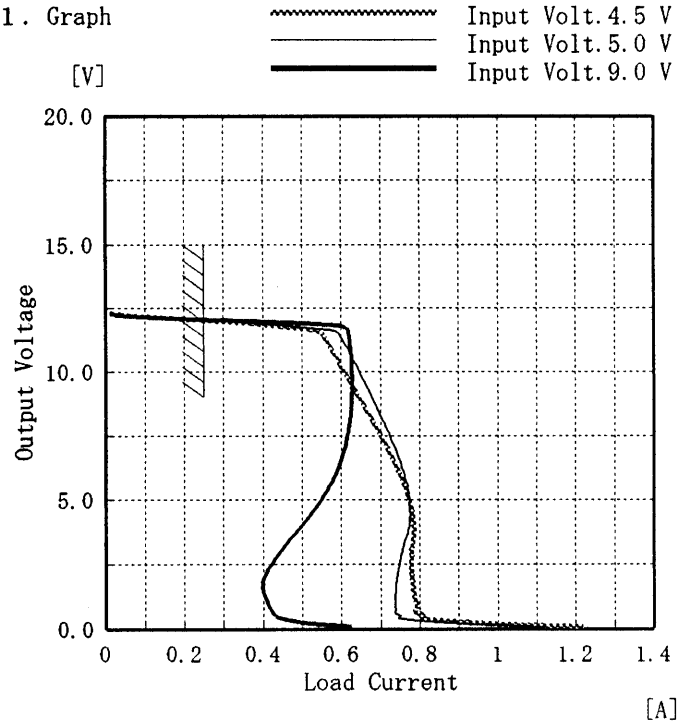
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	15	25
0.040	25	25
0.080	25	30
0.120	25	30
0.160	25	35
0.200	25	35
0.240	25	35
0.250	25	40
0.275	30	40
−	−	−
−	−	−

COSEL

Model	ZUW60512	
Item	Overcurrent Protection 過電流保護	Temperature 25℃ Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph

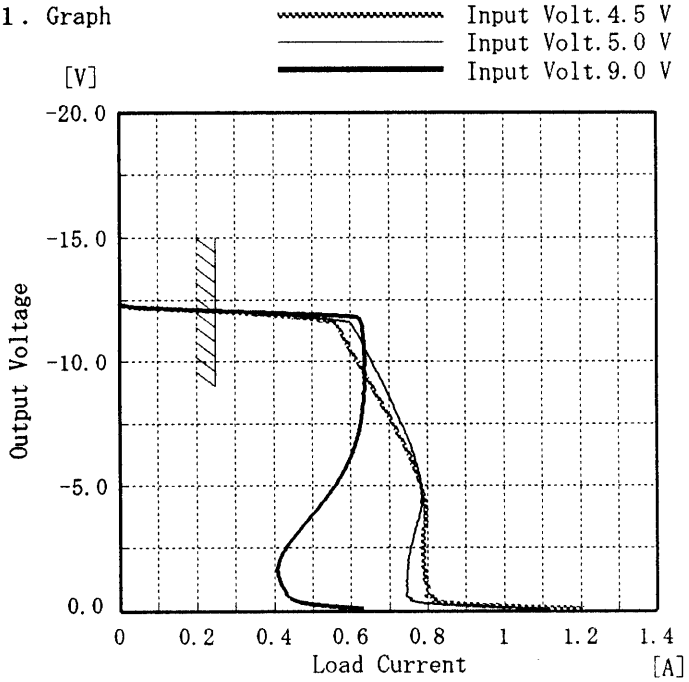


2. Values

Output Voltage [V]	Input Volt. 4.5[V] Load Current [A]	Input Volt. 5.0[V] Load Current [A]	Input Volt. 9.0[V] Load Current [A]
12.00	0.344	0.361	0.363
11.40	0.553	0.596	0.620
10.80	0.576	0.617	0.624
9.60	0.619	0.656	0.627
8.40	0.665	0.695	0.624
7.20	0.707	0.729	0.613
6.00	0.747	0.758	0.586
4.80	0.774	0.774	0.543
3.60	0.783	0.767	0.480
2.40	0.778	0.746	0.417
1.20	0.784	0.737	0.405
0.00	1.220	1.119	0.627

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. 4.5[V] Load Current [A]	Input Volt. 5.0[V] Load Current [A]	Input Volt. 9.0[V] Load Current [A]
-12.00	0.304	0.314	0.349
-11.40	0.565	0.607	0.630
-10.80	0.591	0.629	0.635
-9.60	0.631	0.665	0.638
-8.40	0.676	0.705	0.634
-7.20	0.721	0.740	0.622
-6.00	0.756	0.766	0.596
-4.80	0.784	0.783	0.551
-3.60	0.793	0.775	0.487
-2.40	0.787	0.753	0.429
-1.20	0.794	0.744	0.415
0.00	1.209	1.114	0.634

COSEL

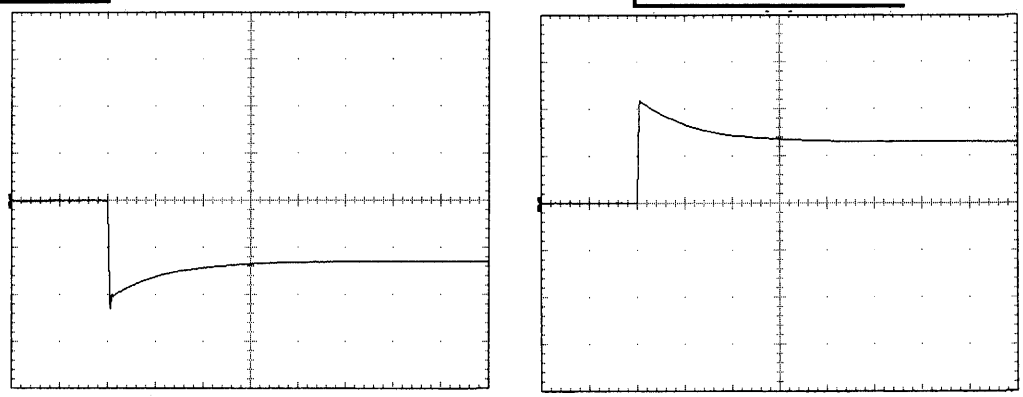
Model	ZUW60512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.25A		

Input Volt. 5.0 V

Cycle 100 mS

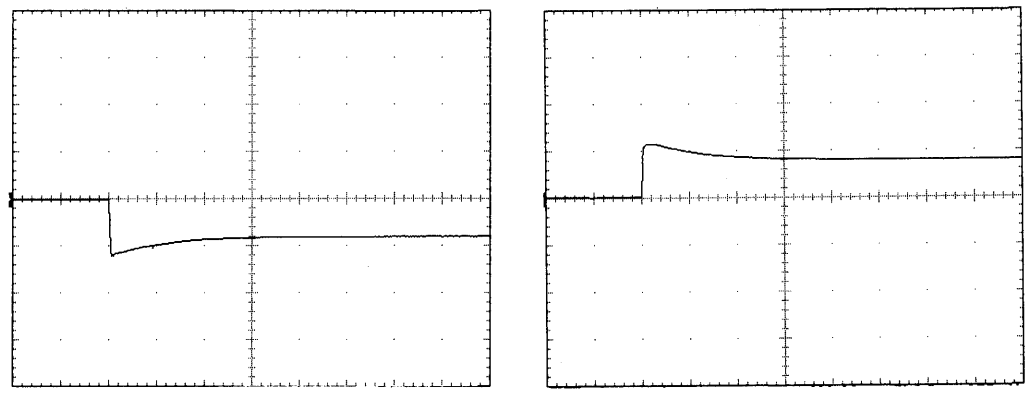
Load Current

Min. Load ⟷
Load 100 %



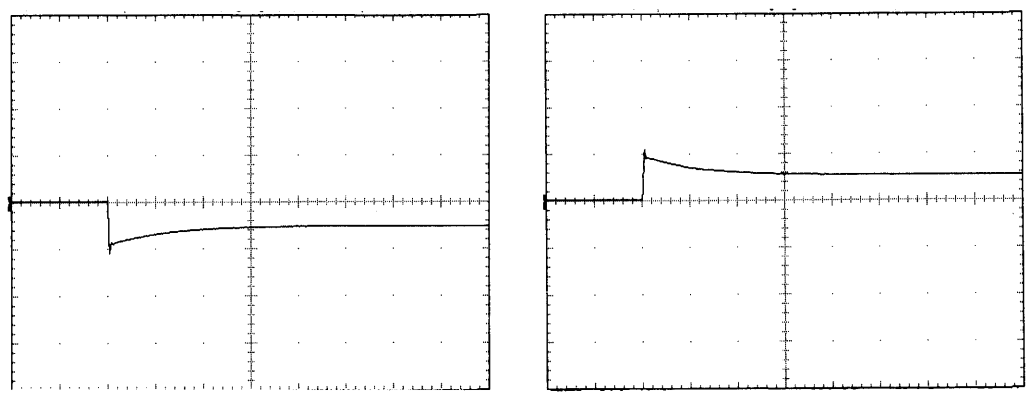
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



200 mV/div

1 mS/div

COSEL

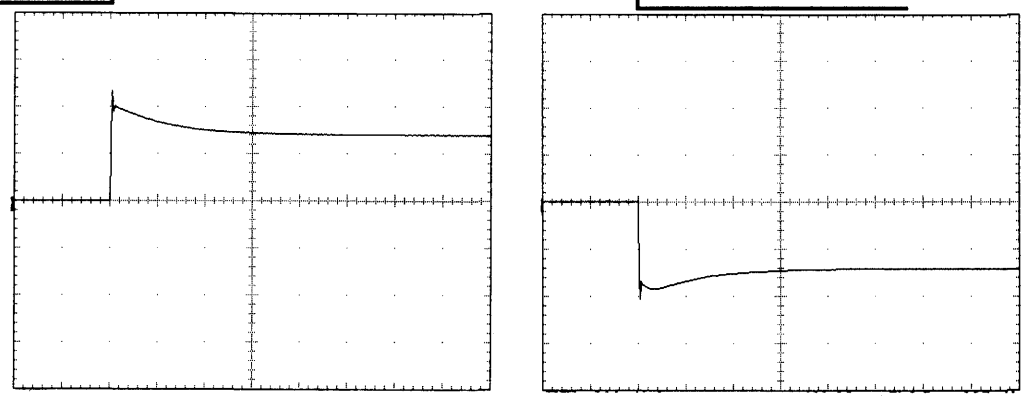
Model	ZUW60512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−12V0.25A		

Input Volt. 5.0 V

Cycle 100 mS

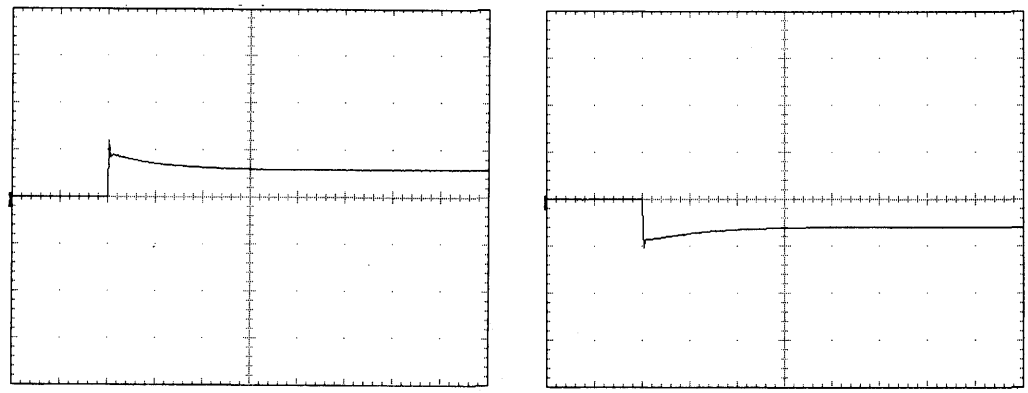
Load Current

Min. Load ⟷
Load 100 %



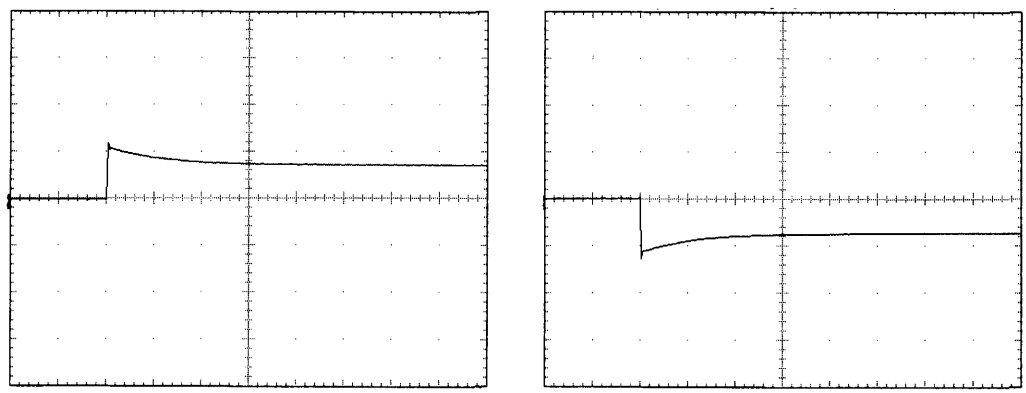
200 mV/div

Min. Load ⟷
Load 50 %



200 mV/div

Load 50%⟷
Load 100 %



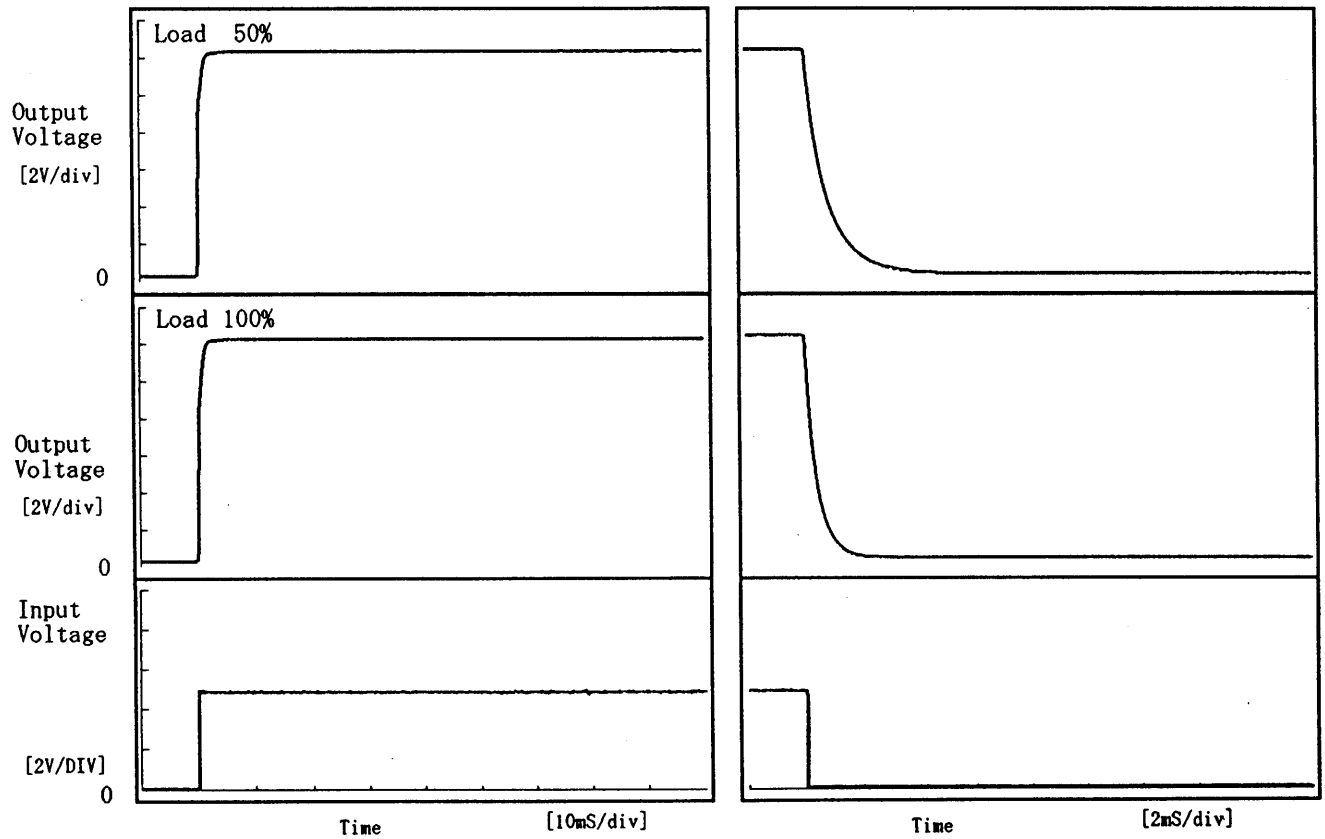
200 mV/div

1 mS/div

COSEL

Model	ZUW60512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature	25℃
		Testing Circuitry	Figure A
Object	+12V0.25A		

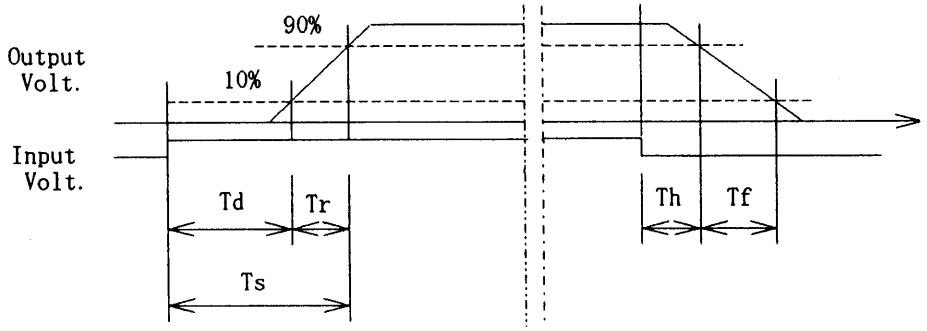
1. Graph



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	0.90	1.00	0.13	1.88
100 %	0.10	0.95	1.05	0.08	0.99

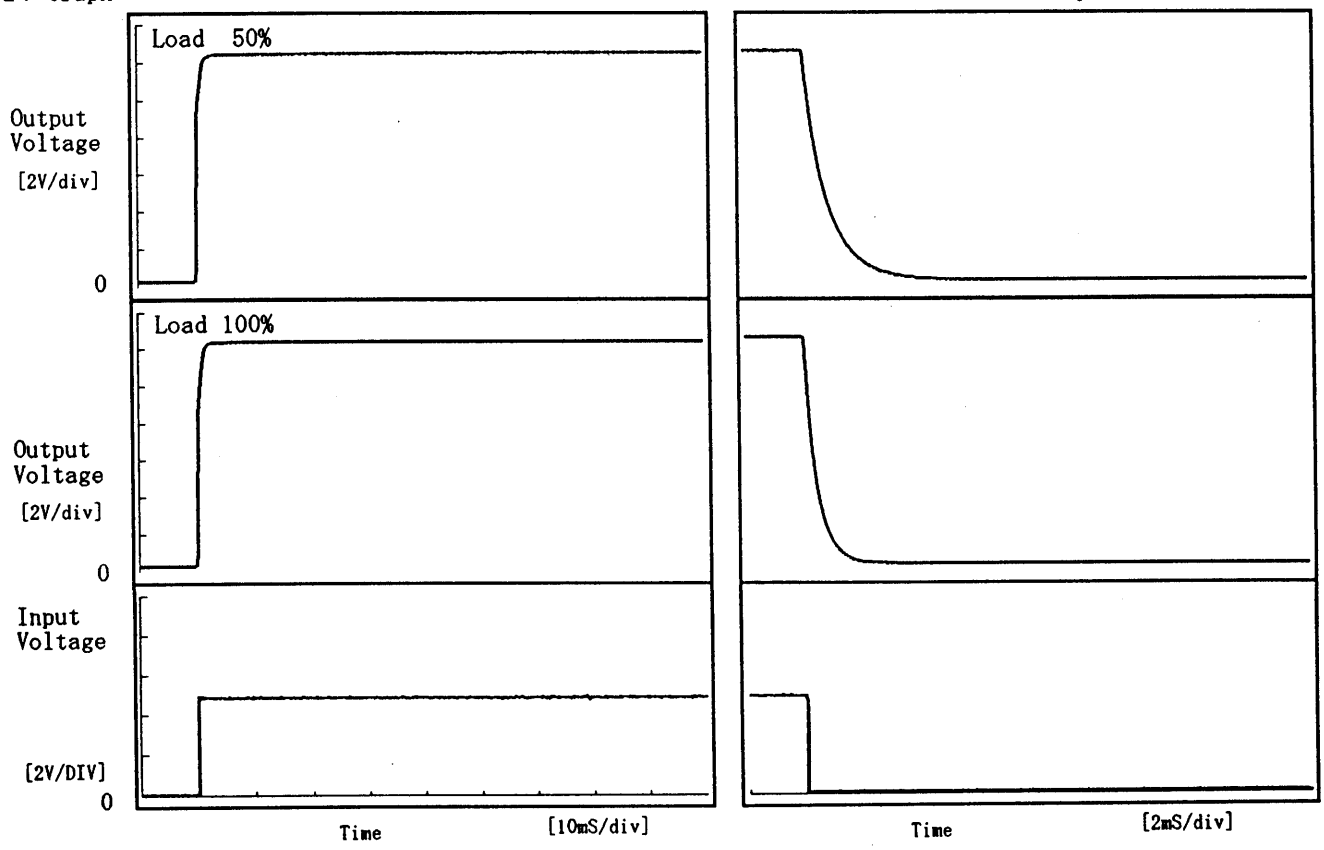


COSEL

Model	ZUW60512	
Item	Rise and Fall Time 立上り、立下り時間	Temperature 25℃ Testing Circuitry Figure A
Object	-12V0.25A	

1. Graph

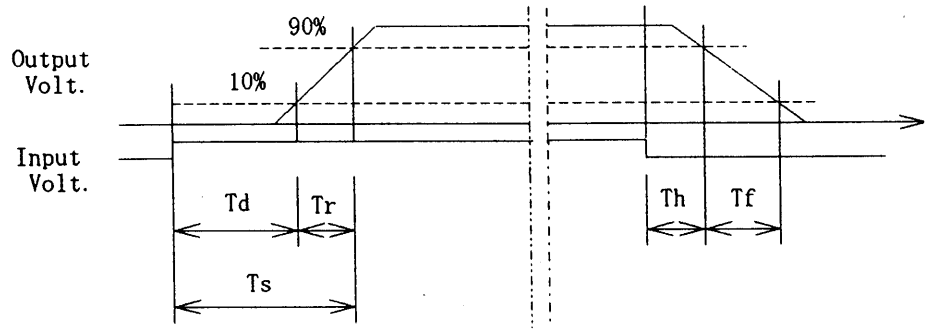
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.10	0.85	0.95	0.14	1.95
100 %	0.10	0.90	1.00	0.09	1.01



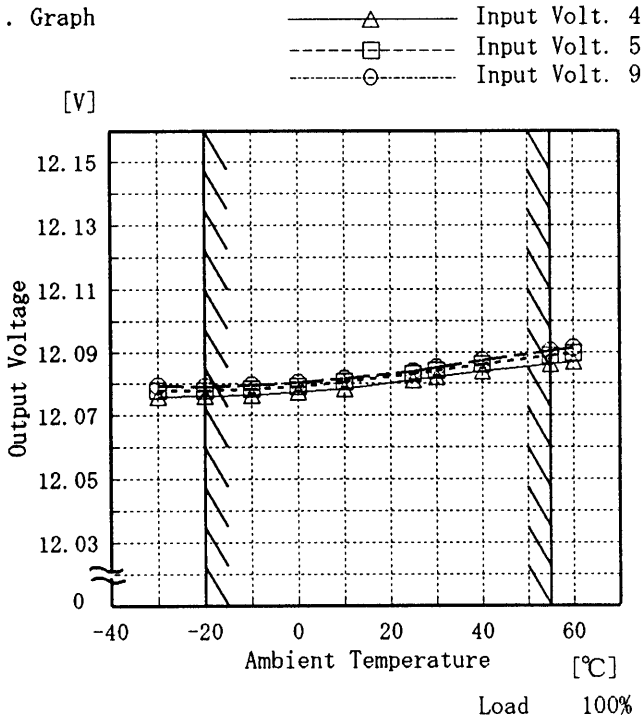
COSEL

Model	ZUW60512
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +12V0.25A

1. Graph

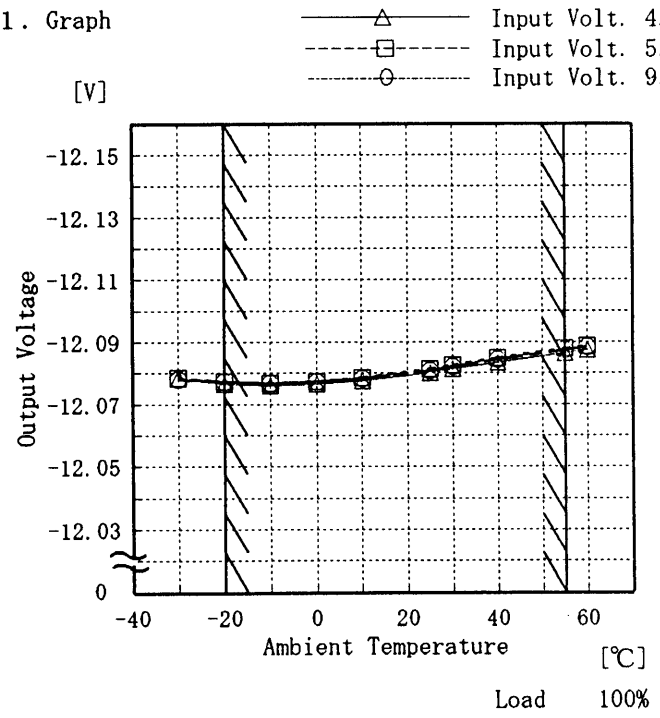


2. Values

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	12.076	12.078	12.079
-20	12.076	12.078	12.079
-10	12.076	12.078	12.079
0	12.077	12.079	12.080
10	12.078	12.081	12.082
25	12.081	12.083	12.084
30	12.082	12.084	12.085
40	12.084	12.086	12.087
55	12.086	12.089	12.090
60	12.087	12.090	12.091
—	—	—	—

Object −12V0.25A

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	-12.078	-12.079	-12.078
-20	-12.077	-12.077	-12.077
-10	-12.076	-12.077	-12.077
0	-12.076	-12.077	-12.077
10	-12.077	-12.079	-12.078
25	-12.080	-12.081	-12.081
30	-12.081	-12.083	-12.082
40	-12.083	-12.085	-12.084
55	-12.087	-12.088	-12.088
60	-12.087	-12.089	-12.088
—	—	—	—

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。

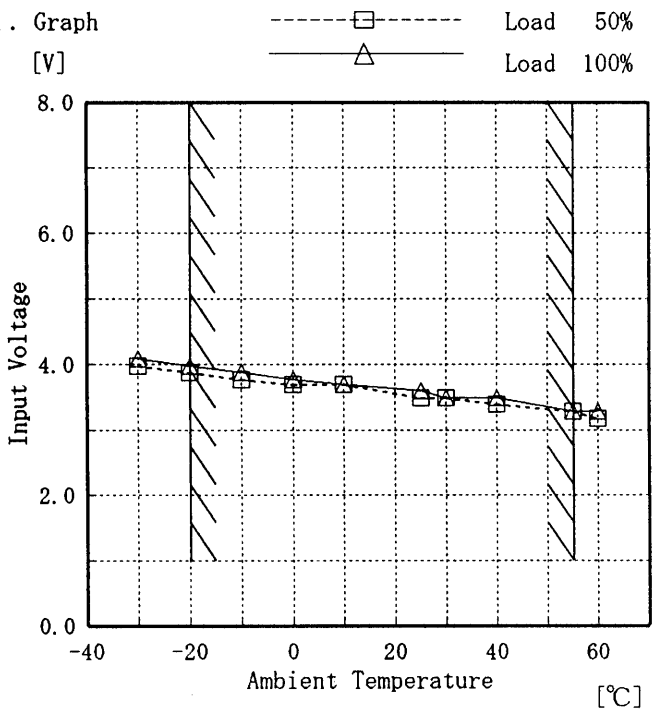
COSEL

Model	ZUW60512
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

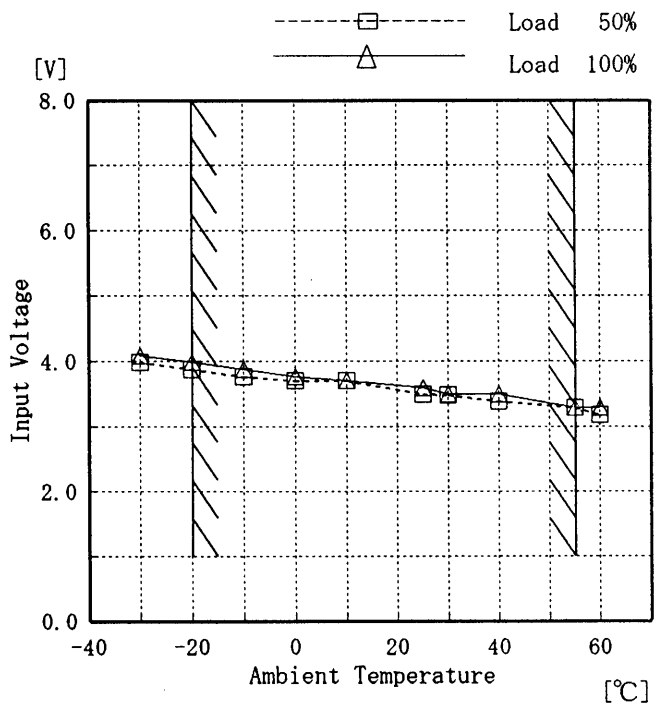
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	4.0	4.1
-20	3.9	4.0
-10	3.8	3.9
0	3.7	3.8
10	3.7	3.7
25	3.5	3.6
30	3.5	3.5
40	3.4	3.5
55	3.3	3.3
60	3.2	3.3
—	—	—

Object −12V0.25A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	4.0	4.1
-20	3.9	4.0
-10	3.8	3.9
0	3.7	3.8
10	3.7	3.7
25	3.5	3.6
30	3.5	3.5
40	3.4	3.5
55	3.3	3.3
60	3.2	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。

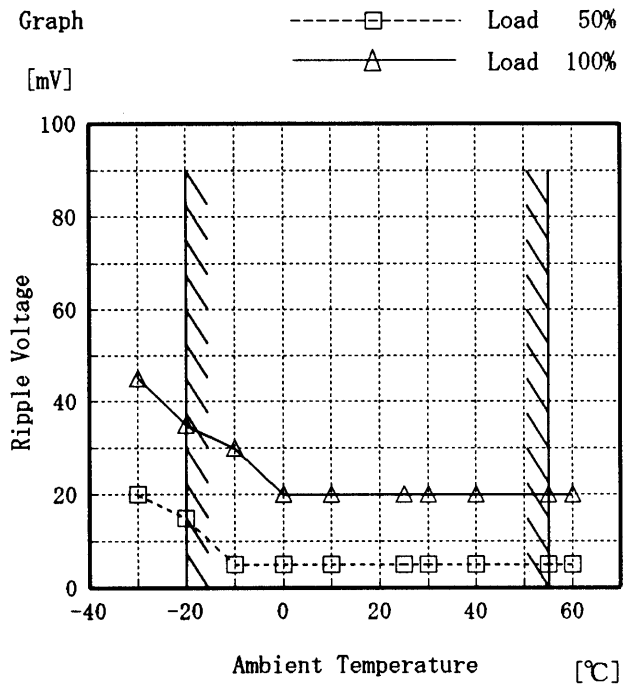
COSEL

Model	ZUW60512
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



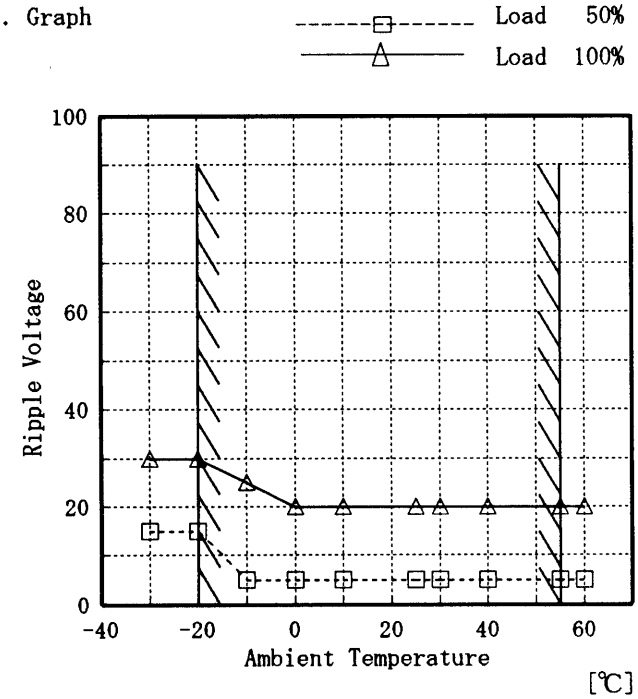
Input Volt. 4.5 V

2. Values

Ambient Temp. [℃]	Load 50% Ripple Output Volt. [mV]	Load 100% Ripple Output Volt. [mV]
-30	20	45
-20	15	35
-10	5	30
0	5	20
10	5	20
25	5	20
30	5	20
40	5	20
55	5	20
60	5	20
—	—	—

Object －12V0.25A

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

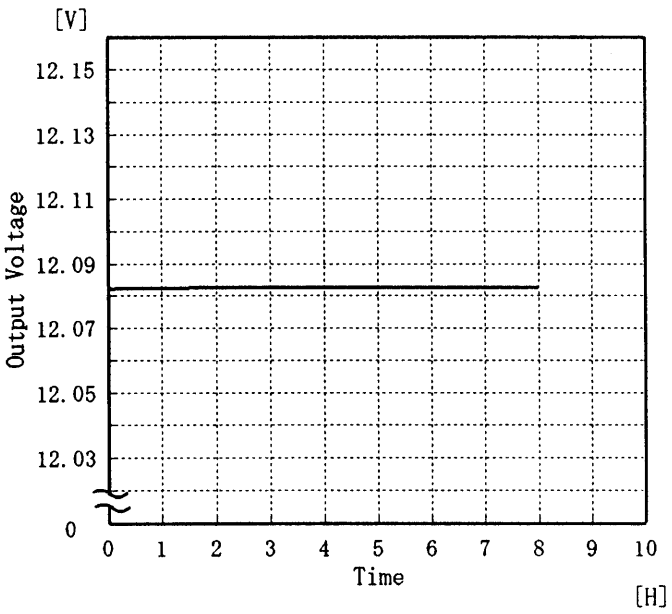
COSEL

Model	ZUW60512
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object +12V0.25A

1. Graph



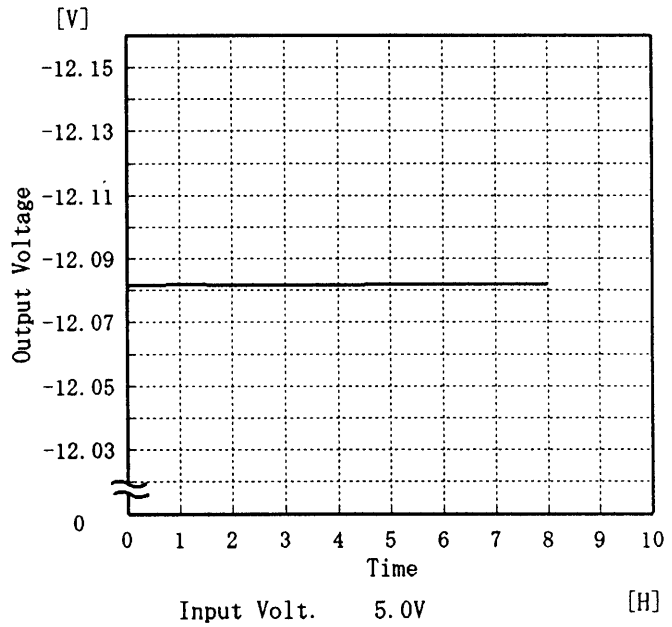
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	12.082
0.5	12.083
1.0	12.083
2.0	12.083
3.0	12.083
4.0	12.083
5.0	12.083
6.0	12.083
7.0	12.083
8.0	12.083

Object −12V0.25A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-12.081
0.5	-12.082
1.0	-12.082
2.0	-12.082
3.0	-12.082
4.0	-12.082
5.0	-12.082
6.0	-12.082
7.0	-12.082
8.0	-12.082

COSEL

Model	ZUW60512	
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) : 0.000～0.250 A

(AVR 2) : 0.000～0.250 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) 0.000～0.250 A

(AVR 2) 0.000～0.250 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 ＋12V0.250A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	55	5.0	0.250	12.092	±143	±1.2
Minimum Voltage	55	9.0	0.000	11.807		

Object −12V0.250A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	55	5.0	0.250	-12.090	±135	±1.2
Minimum Voltage	55	9.0	0.000	-11.820		

COSEL

Model	ZUW60512
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	11.940	5	25
	2	11.948	5	25
	3	11.939	5	25
Load 100 %	1	11.820	15	30
	2	11.827	15	30
	3	11.834	15	30

Input Volt. 5.0 V

COSEL

Model	ZUW60512
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	-11.918	5	25
	2	-11.963	5	25
	3	-11.969	5	25
Load 100 %	1	-11.867	15	30
	2	-11.860	15	30
	3	-11.853	15	30

Input Volt. 5.0 V

COSEL

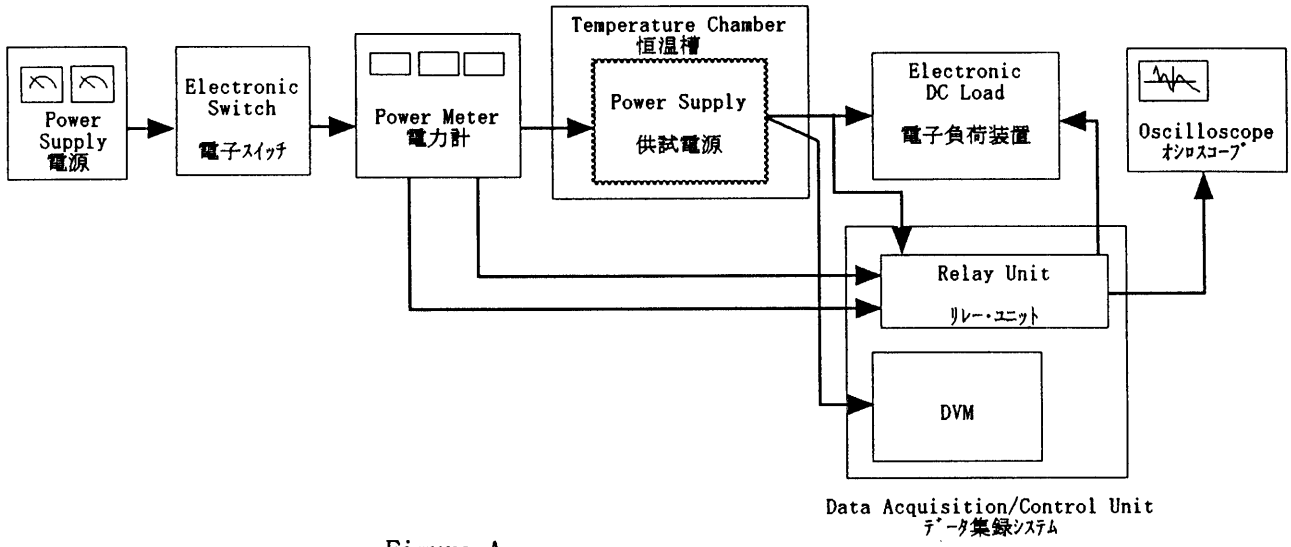


Figure A