参考資料

COSEL

TEST DATA OF ZUW62412

(24.0V INPUT)

Regulated DC Power Supply

Date : Sep. 21. 1996

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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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CONTENTS

1. Line Regulation ・・・・・・・・・・・・・・・・・・・・・・・ 1
静的入力変動
2. Efficiency ・・・・・・・・・・・・・・・・・・・・・・・・・ 2
効率
3. Load Regulation ・・・・・・・・・・・・・・・・・・・・・・ 3
静的負荷変動
4. Ripple Voltage (by Load Current) ・・・・・・・・・・・・・ 4
リップル電圧(負荷電流特性)
5. Ripple-Noise ・・・・・・・・・・・・・・・・・・・・・・・・ 6
リップルノイズ
6. Overcurrent Protection ・・・・・・・・・・・・・・・・・・ 8
過電流保護
7. Dynamic Load Responce ・・・・・・・・・・・・・・・・・・ 9
動的負荷変動
8. Rise and Fall Time ・・・・・・・・・・・・・・・・・・・・ 11
立上り、立下がり時間
9. Ambient Temperature Drift ・・・・・・・・・・・・・・・・ 13
周囲温度変動
10. Minimum Input Voltage for Regulated Output Voltage ・・・ 14
最低レギュレーション電圧
11. Ripple Voltage (by Ambient Temperature) ・・・・・・・・・ 15
リップル電圧 (周囲温度特性)
12. Time Lapse Drift ・・・・・・・・・・・・・・・・・・・・・ 16
経時ドリフト
13. Output Voltage Accuracy ・・・・・・・・・・・・・・・・・ 17
定電圧精度
14. Condensation ・・・・・・・・・・・・・・・・・・・・・・・ 18
結露特性
15. Figure of Testing Circuitry ・・・・・・・・・・・・・・・ 20
測定回路図

(Final Page 20)

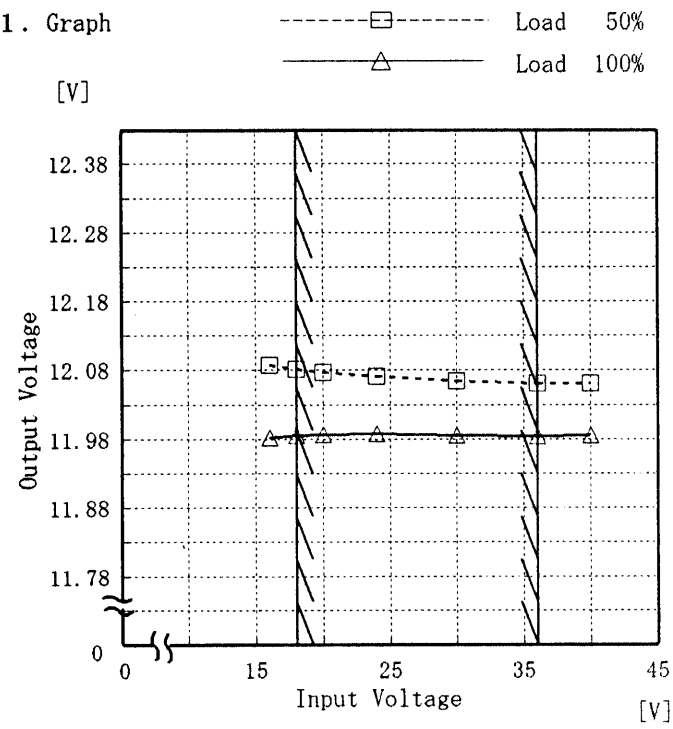
COSEL

Model	ZUW62412
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph

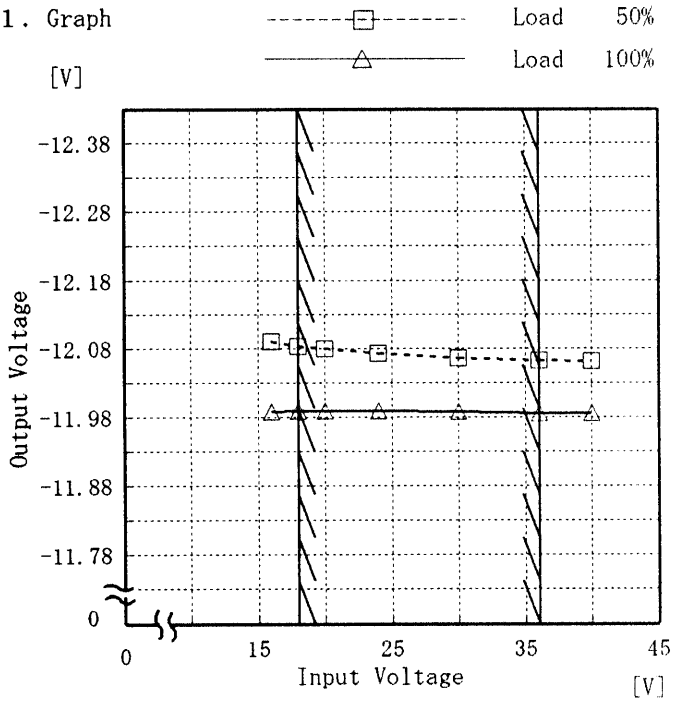


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
16.0	12.087	11.983
18.0	12.081	11.985
20.0	12.077	11.986
24.0	12.071	11.987
30.0	12.065	11.986
36.0	12.061	11.985
40.0	12.061	11.985
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

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]
16.0	-12.090	-11.988
18.0	-12.083	-11.989
20.0	-12.079	-11.990
24.0	-12.072	-11.989
30.0	-12.065	-11.987
36.0	-12.062	-11.986
40.0	-12.061	-11.986
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

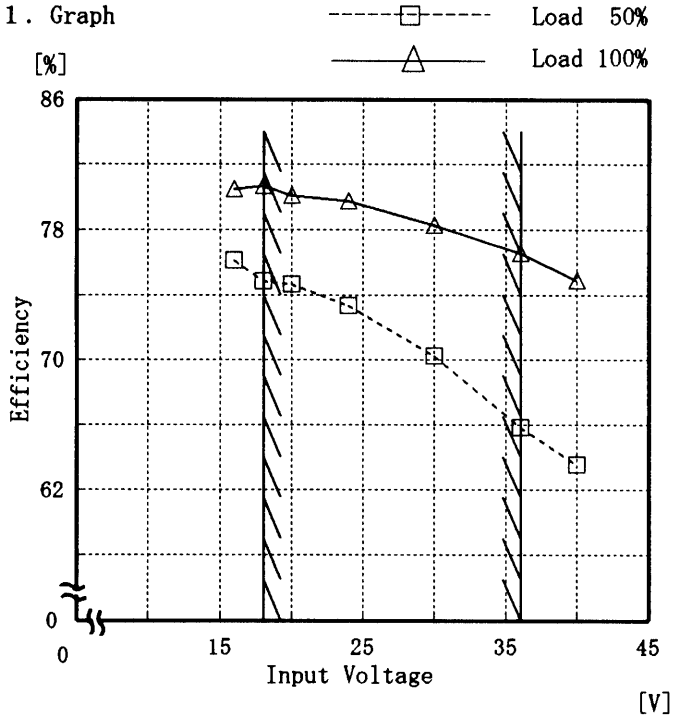
BC－2059

COSEL

Model	ZUW62412
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 [%]
16.0	76.2	80.5
18.0	74.8	80.7
20.0	74.7	80.1
24.0	73.4	79.7
30.0	70.2	78.3
36.0	65.9	76.6
40.0	63.6	74.9
—	—	—
—	—	—
—	—	—
—	—	—
—	—	—

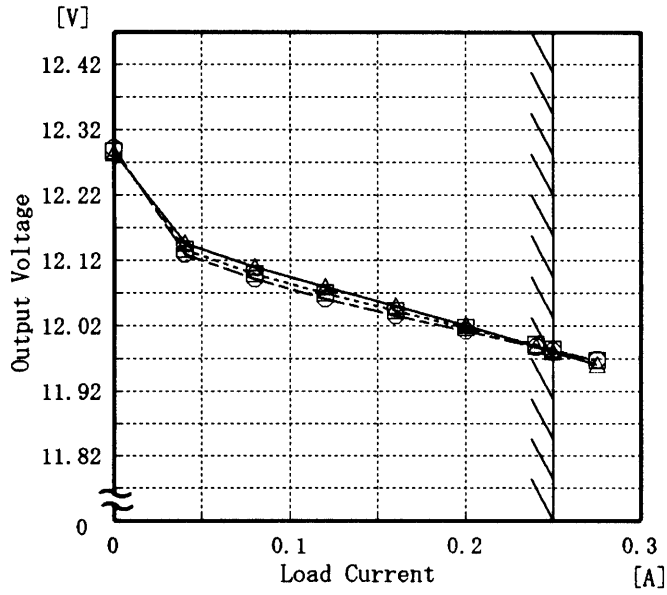
COSEL

Model	ZUW62412
Item	Load Regulation 静的負荷変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph

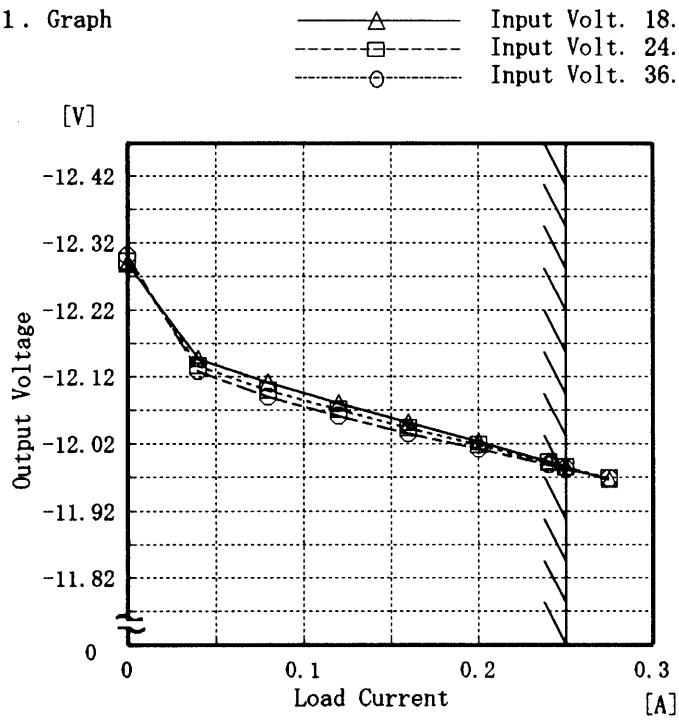


2. Values

Load Current [A]	Input Volt. 18.0[V] Output Volt. [V]	Input Volt. 24.0[V] Output Volt. [V]	Input Volt. 36.0[V] Output Volt. [V]
0.000	12.285	12.287	12.293
0.040	12.147	12.137	12.130
0.080	12.110	12.100	12.091
0.120	12.080	12.070	12.062
0.160	12.050	12.043	12.036
0.200	12.021	12.017	12.012
0.240	11.990	11.991	11.989
0.250	11.981	11.984	11.982
0.275	11.962	11.968	11.968
—	—	—	—

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. 18.0[V] Output Volt. [V]	Input Volt. 24.0[V] Output Volt. [V]	Input Volt. 36.0[V] Output Volt. [V]
0.000	-12.290	-12.293	-12.301
0.040	-12.149	-12.137	-12.129
0.080	-12.112	-12.101	-12.091
0.120	-12.082	-12.072	-12.062
0.160	-12.053	-12.045	-12.036
0.200	-12.024	-12.019	-12.013
0.240	-11.994	-11.993	-11.989
0.250	-11.986	-11.986	-11.983
0.275	-11.967	-11.970	-11.969
—	—	—	—

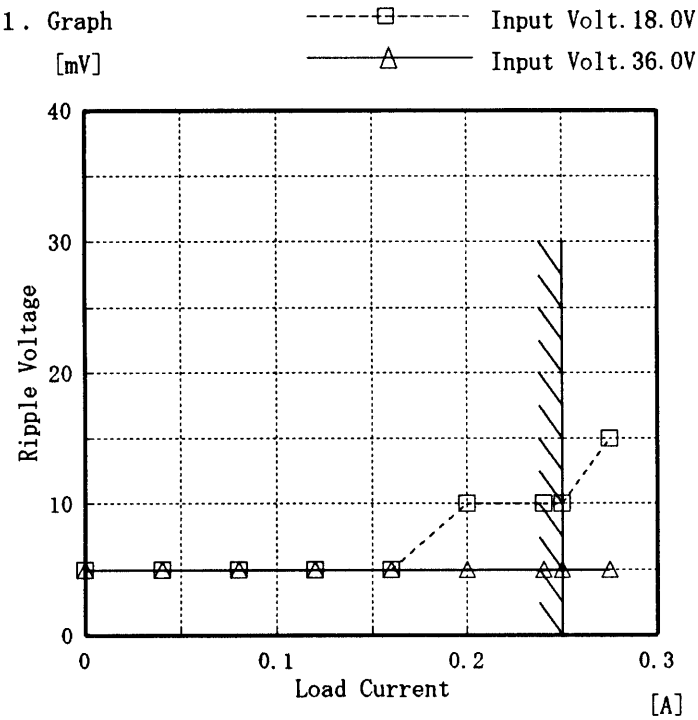
BC−2059

COSEL

Model	ZUW62412
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。

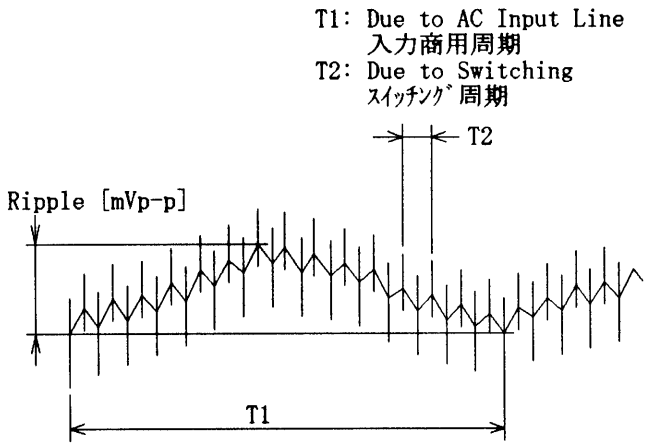


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

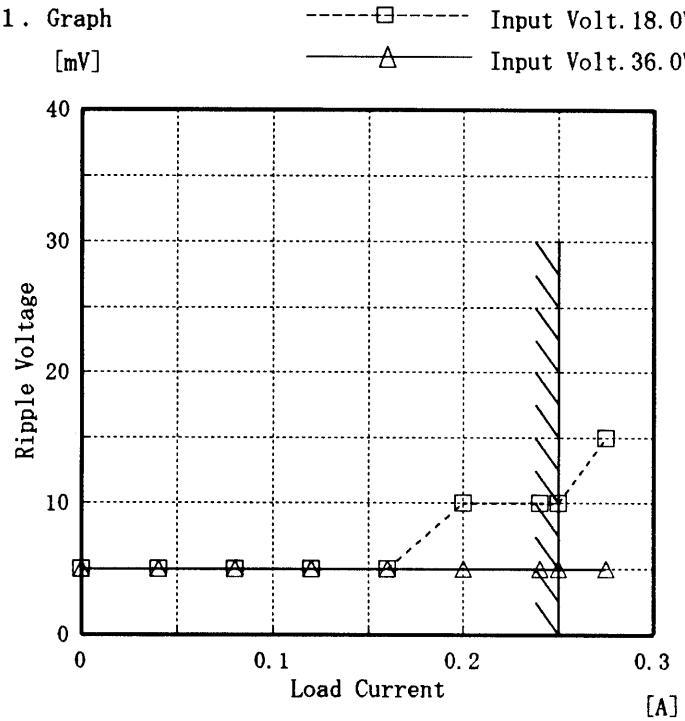
Load Current [A]	Input Volt. 18.0 [V] Ripple Output Volt. [mV]	Input Volt. 36.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	5	5
0.200	10	5
0.240	10	5
0.250	10	5
0.275	15	5
—	—	—
—	—	—

COSEL

Model	ZUW62412
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。

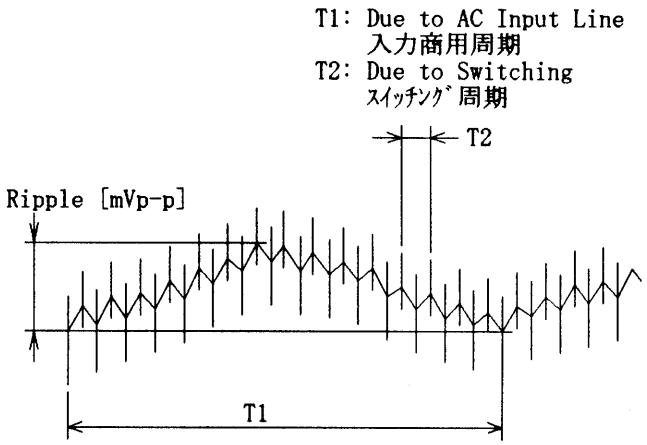


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

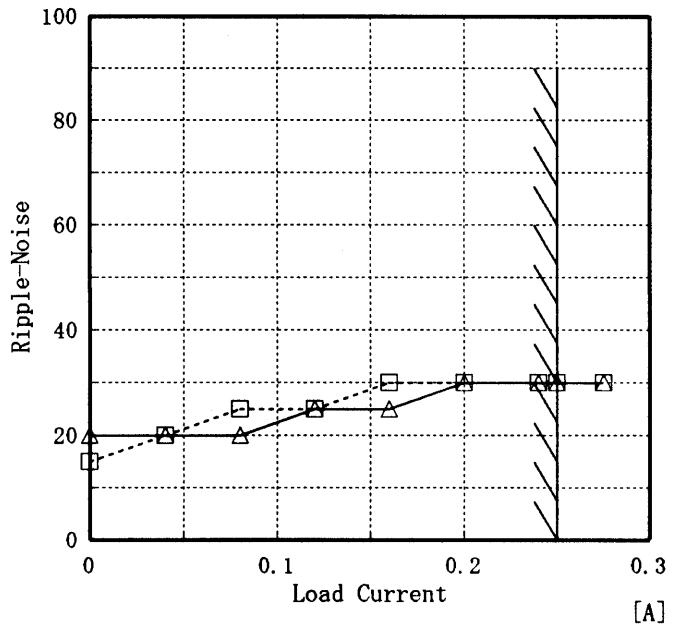
Load Current [A]	Input Volt. 18.0 [V] Ripple Output Volt. [mV]	Input Volt. 36.0 [V] Ripple Output Volt. [mV]
0.000	5	5
0.040	5	5
0.080	5	5
0.120	5	5
0.160	5	5
0.200	10	5
0.240	10	5
0.250	10	5
0.275	15	5
—	—	—
—	—	—

COSEL

Model	ZUW62412
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

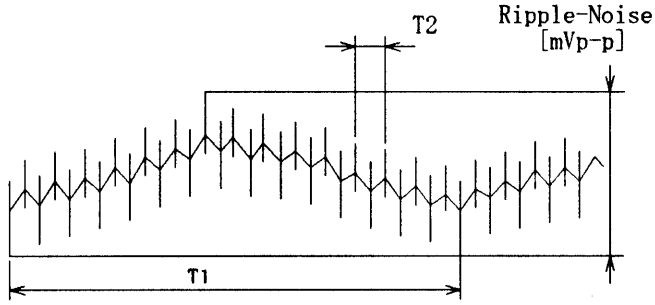


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

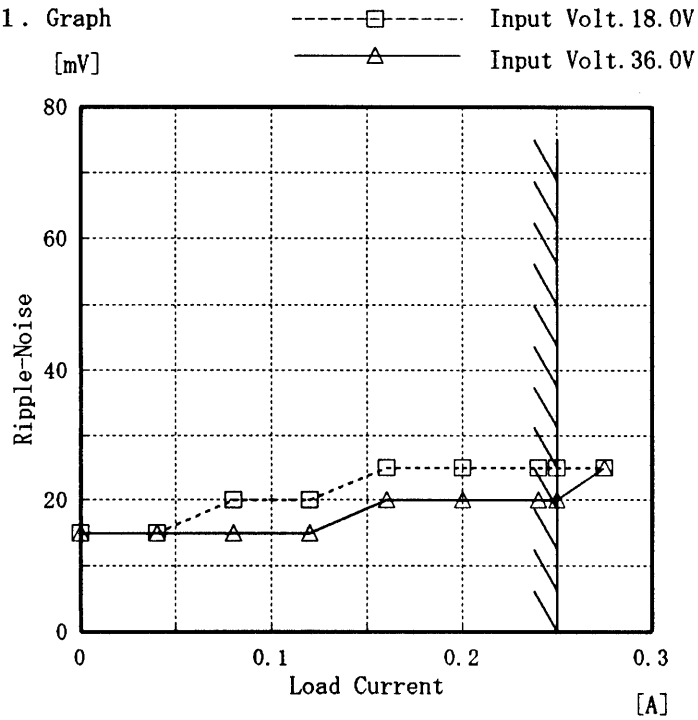
Load current [A]	Input Volt. 18.0 [V] Ripple-Noise [mV]	Input Volt. 36.0 [V] Ripple-Noise [mV]
0.000	15	20
0.040	20	20
0.080	25	20
0.120	25	25
0.160	30	25
0.200	30	30
0.240	30	30
0.250	30	30
0.275	30	30
—	—	—
—	—	—

COSEL

Model	ZUW62412
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

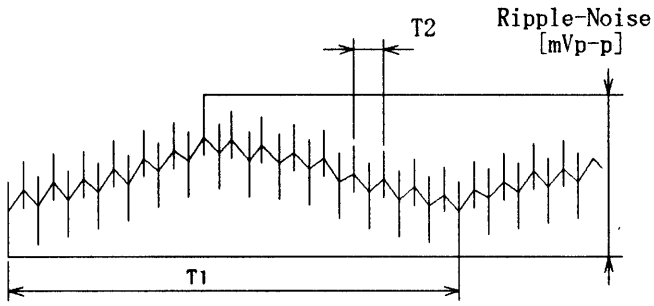


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 18.0 [V] Ripple-Noise [mV]	Input Volt. 36.0 [V] Ripple-Noise [mV]
0.000	15	15
0.040	15	15
0.080	20	15
0.120	20	15
0.160	25	20
0.200	25	20
0.240	25	20
0.250	25	20
0.275	25	25
—	—	—
—	—	—

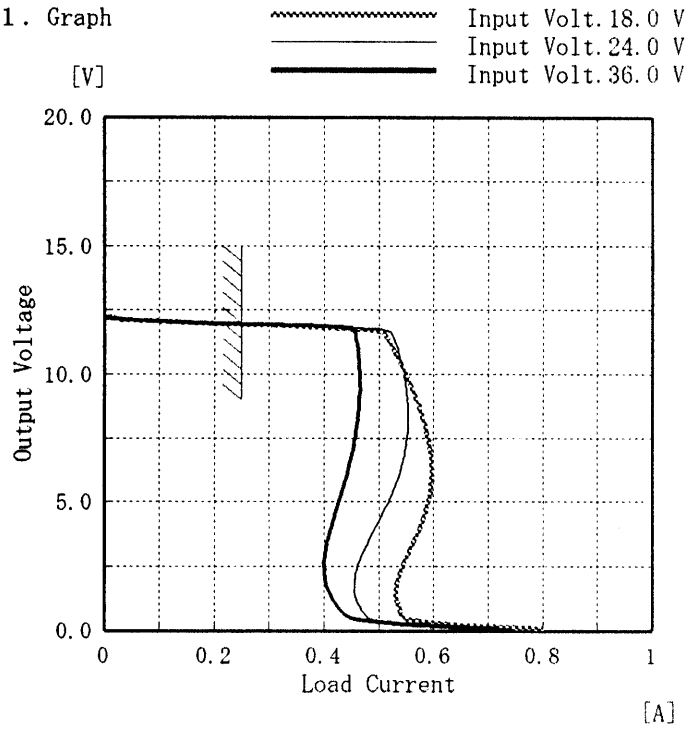
COSEL

Model	ZUW62412
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph

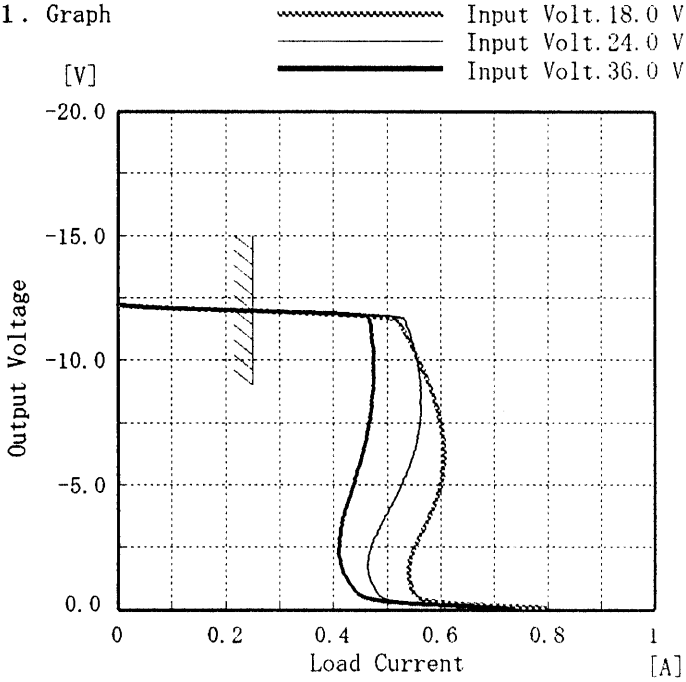


2. Values

Output Voltage [V]	Input Volt. 18.0[V] Load Current [A]	Input Volt. 24.0[V] Load Current [A]	Input Volt. 36.0[V] Load Current [A]
12.00	0.213	0.212	0.206
11.40	0.514	0.526	0.458
10.80	0.529	0.535	0.462
9.60	0.556	0.547	0.465
8.40	0.577	0.553	0.462
7.20	0.592	0.549	0.454
6.00	0.597	0.535	0.441
4.80	0.587	0.512	0.426
3.60	0.566	0.483	0.408
2.40	0.542	0.460	0.401
1.20	0.531	0.458	0.415
0.00	0.801	0.740	0.716

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. 18.0[V] Load Current [A]	Input Volt. 24.0[V] Load Current [A]	Input Volt. 36.0[V] Load Current [A]
-12.00	0.210	0.206	0.196
-11.40	0.525	0.536	0.470
-10.80	0.540	0.544	0.471
-9.60	0.563	0.557	0.557
-8.40	0.588	0.561	0.471
-7.20	0.600	0.559	0.465
-6.00	0.605	0.546	0.452
-4.80	0.597	0.522	0.434
-3.60	0.574	0.492	0.417
-2.40	0.549	0.468	0.410
-1.20	0.541	0.468	0.429
0.00	0.799	0.737	0.715

COSEL

Model	ZUW62412		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.25A		

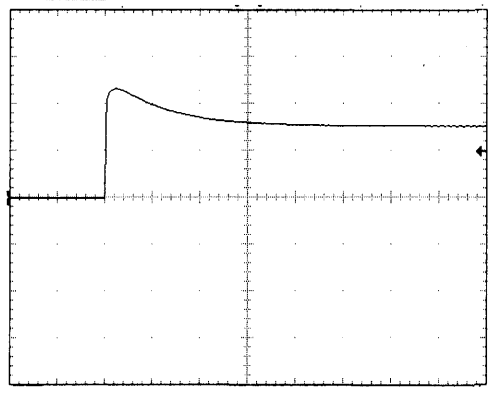
Input Volt. 24.0 V

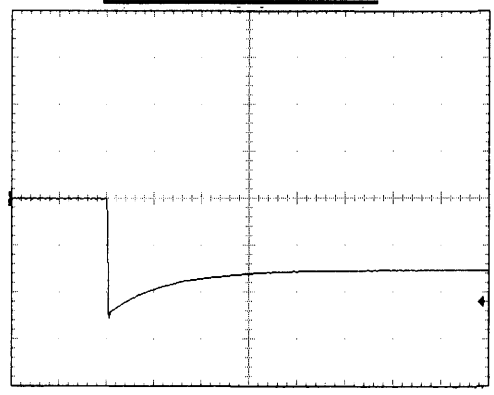
Cycle 100 mS

Load Current

Min. Load ⟷
Load 100 %

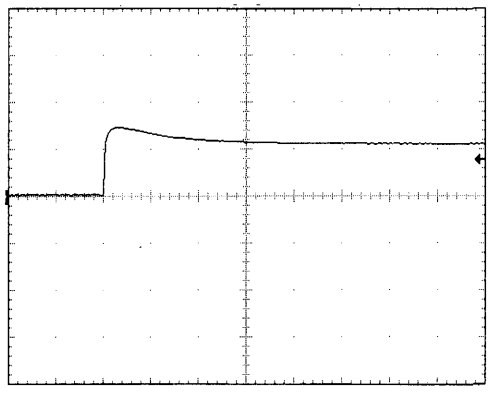
200 mV/div

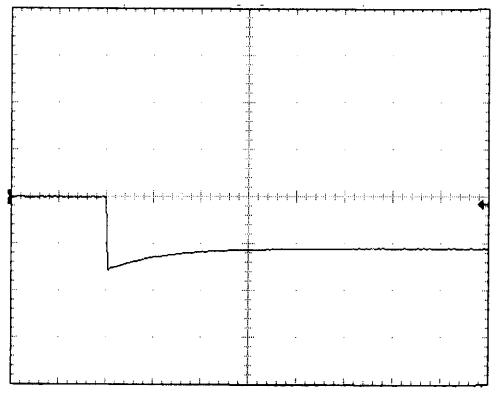




Min. Load ⟷
Load 50 %

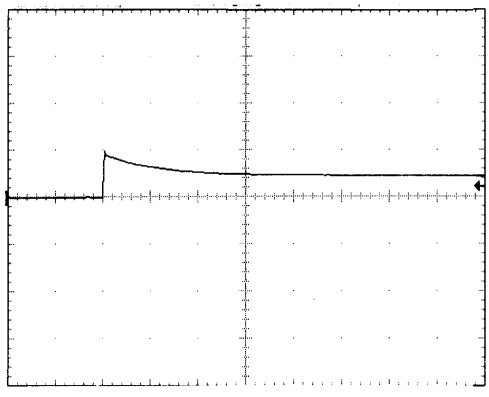
200 mV/div

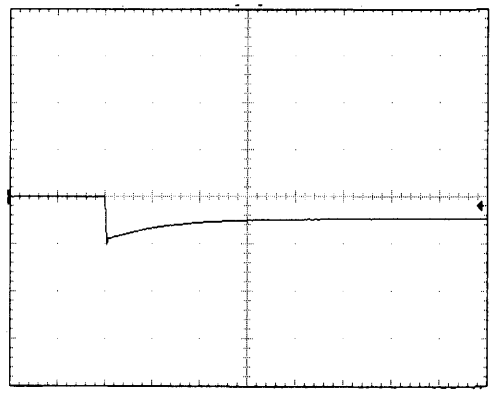




Load 50%⟷
Load 100 %

200 mV/div





1 mS/div

COSEL

Model	ZUW62412		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−12V0.25A		

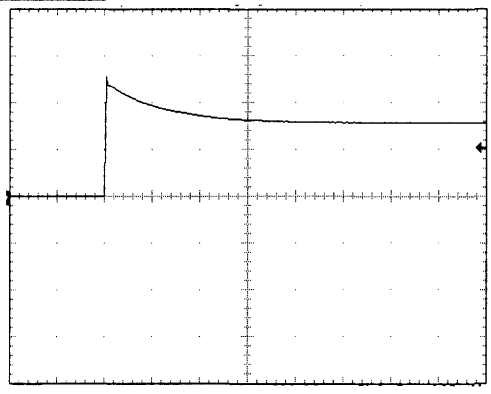
Input Volt. 24.0 V

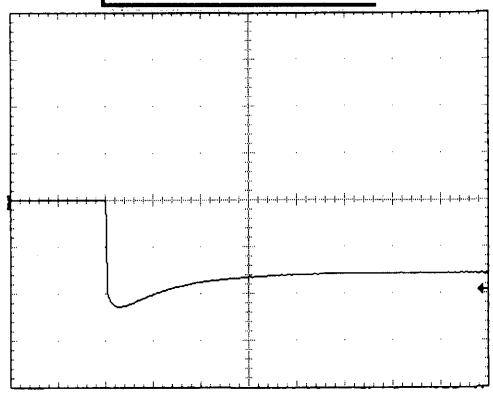
Cycle 100 mS

Load Current

Min. Load ←→
Load 100 %

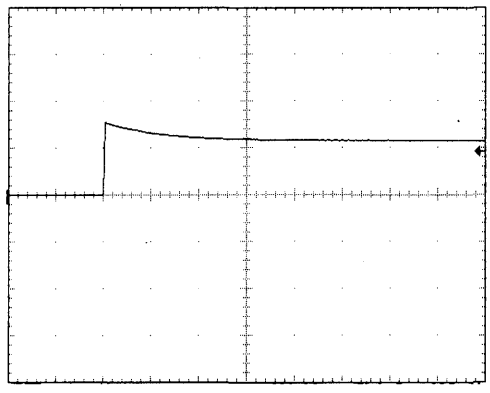
200 mV/div

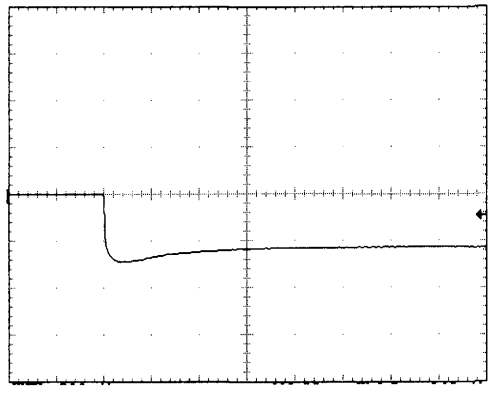




Min. Load ←→
Load 50 %

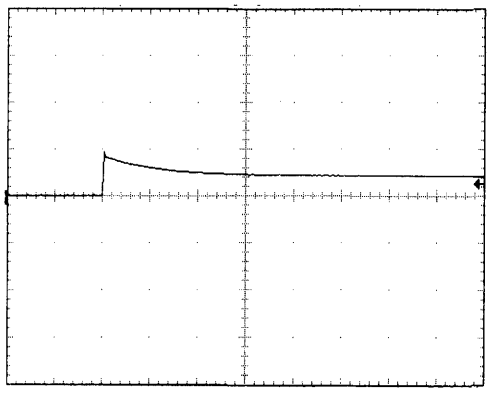
200 mV/div

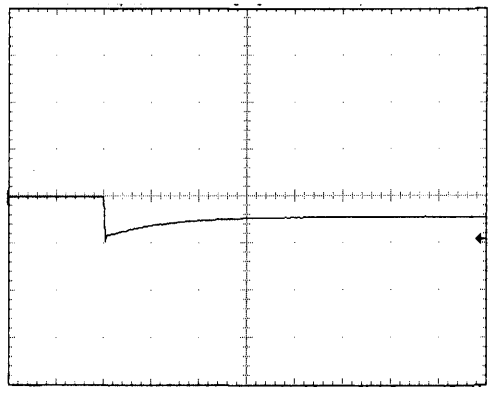




Load 50%←→
Load 100 %

200 mV/div





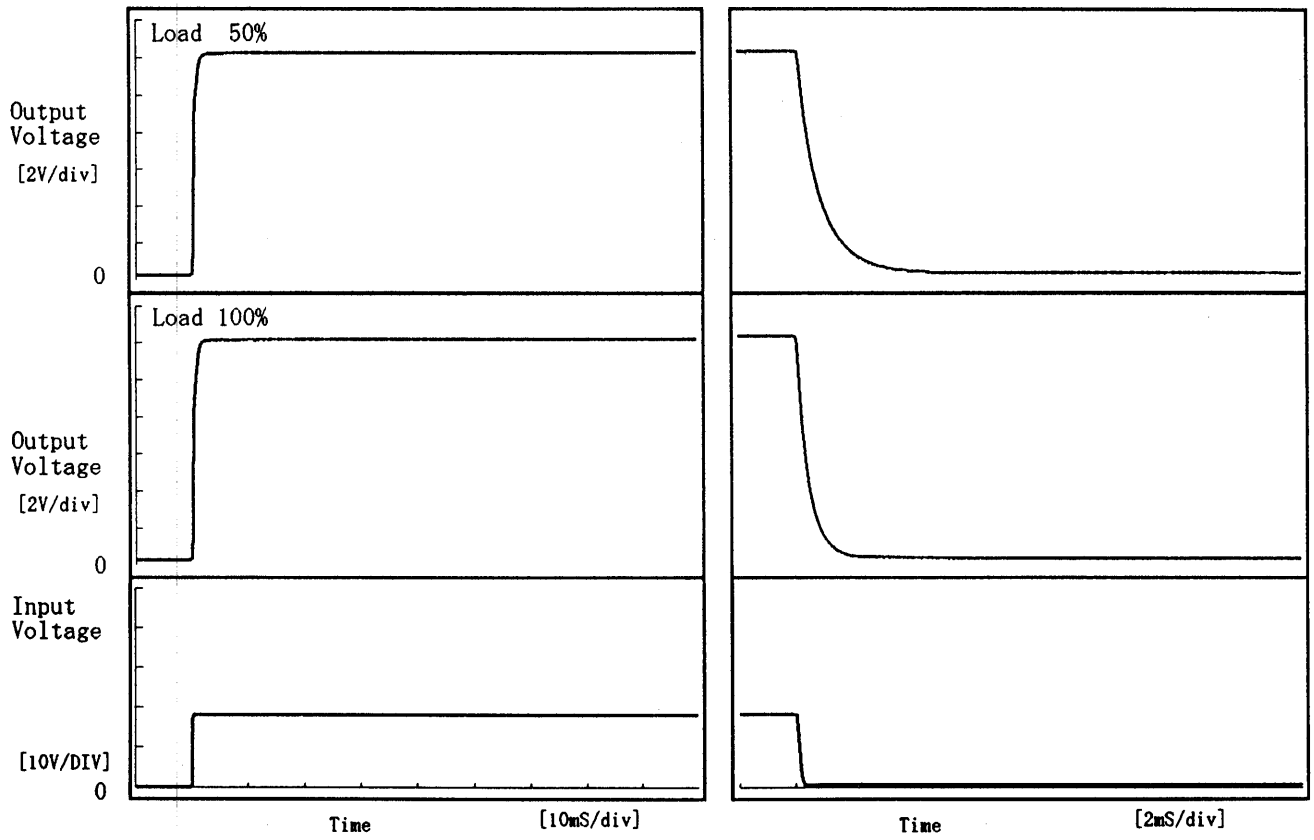
1 mS/div

COSEL

Model	ZUW62412		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.25A		

1. Graph

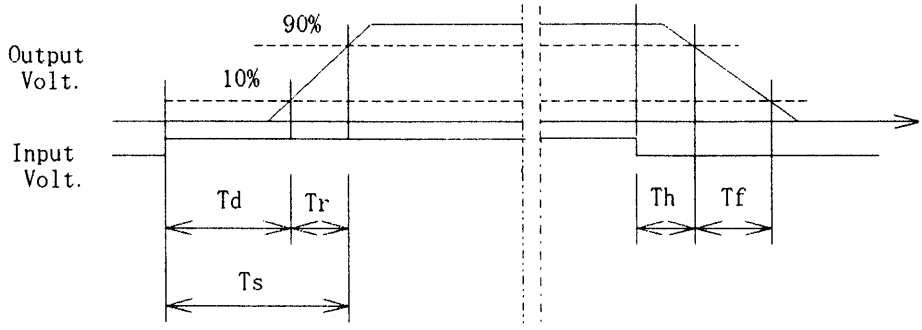
Input Volt. 18.0 V



2. Values

[mS]

Time / Load	T d	T r	T s	T h	T f
50 %	0.05	0.90	0.95	0.21	1.94
100 %	0.05	1.00	1.05	0.14	0.99



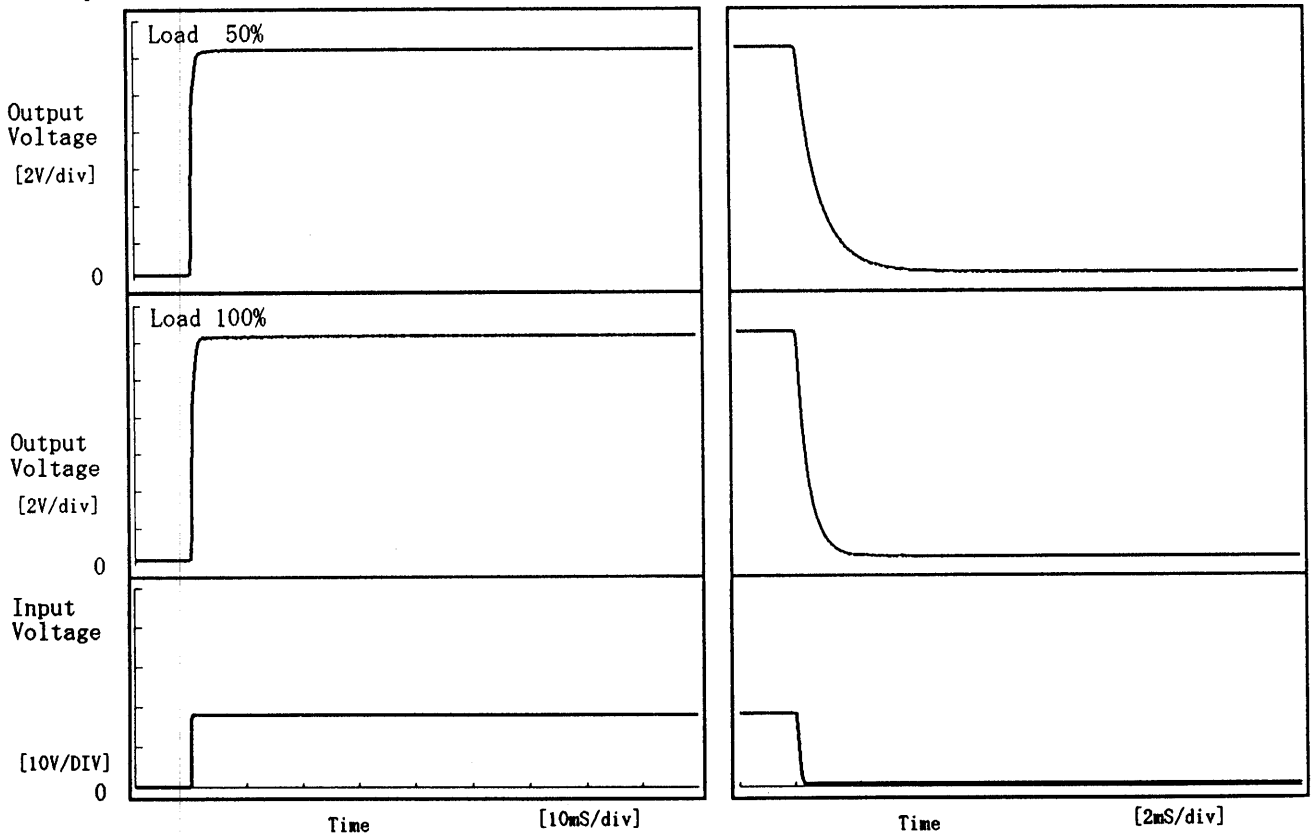
BC−2059

COSEL

Model	ZUW62412	Temperature	25℃
Item	Rise and Fall Time 立上り、立下り時間	Testing Circuitry	Figure A
Object	-12V0.25A		

1. Graph

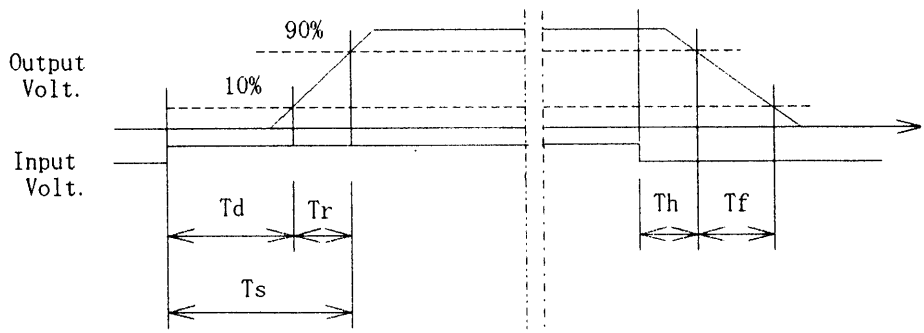
Input Volt. 18.0 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.05	0.85	0.90	0.22	1.55
100 %	0.05	0.95	1.00	0.15	0.98



BC-2059

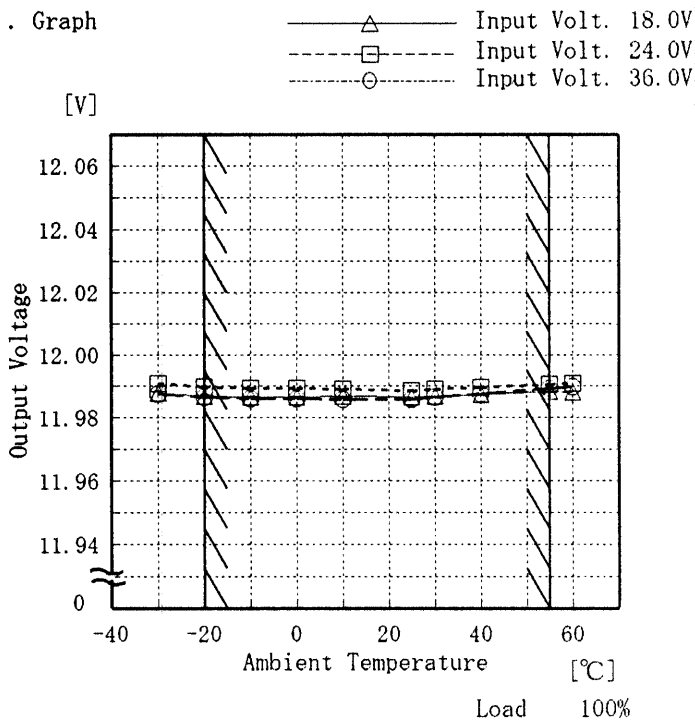
COSEL

Model	ZUW62412
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object +12V0.25A

1. Graph

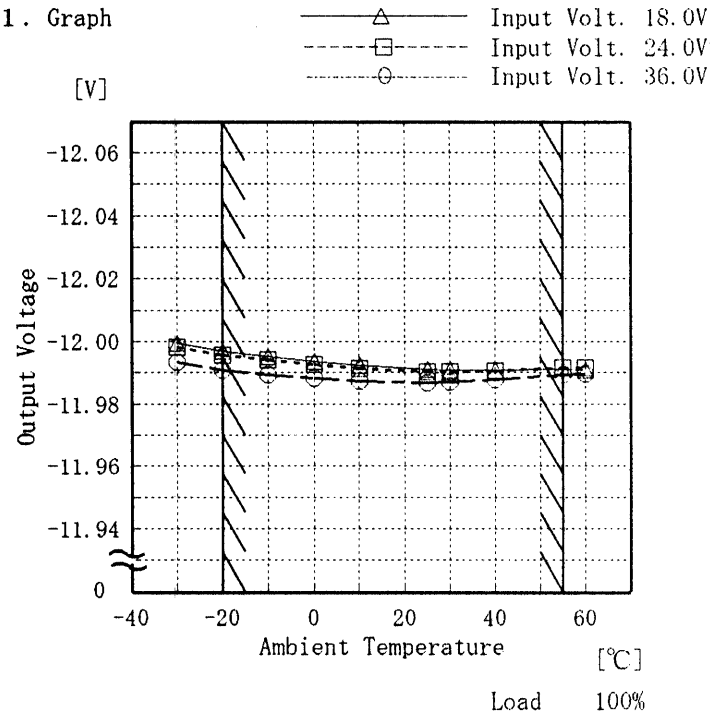


2. Values

Temperature [℃]	Input Volt. 18.0[V] Output Volt. [V]	Input Volt. 24.0[V] Output Volt. [V]	Input Volt. 36.0[V] Output Volt. [V]
-30	11.988	11.991	11.988
-20	11.987	11.990	11.986
-10	11.986	11.989	11.986
0	11.987	11.989	11.986
10	11.987	11.989	11.986
25	11.987	11.989	11.986
30	11.987	11.989	11.986
40	11.987	11.990	11.988
55	11.988	11.991	11.989
60	11.988	11.991	11.990
—	—	—	—

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. 18.0[V] Output Volt. [V]	Input Volt. 24.0[V] Output Volt. [V]	Input Volt. 36.0[V] Output Volt. [V]
-30	-12.000	-11.998	-11.993
-20	-11.997	-11.996	-11.991
-10	-11.995	-11.994	-11.989
0	-11.994	-11.993	-11.988
10	-11.992	-11.991	-11.987
25	-11.991	-11.990	-11.987
30	-11.991	-11.990	-11.987
40	-11.991	-11.991	-11.988
55	-11.991	-11.992	-11.989
60	-11.991	-11.992	-11.990
—	—	—	—

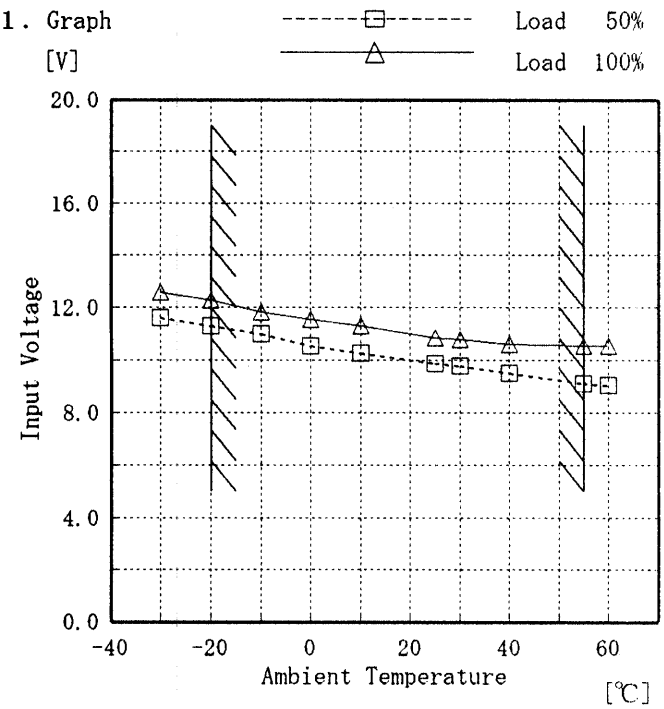
COSEL

Model	ZUW62412
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

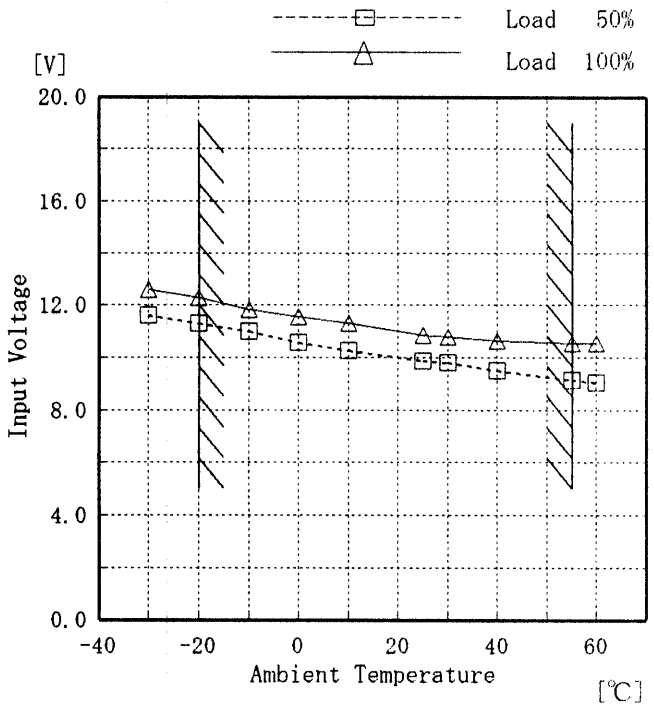
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	11.6	12.6
-20	11.3	12.3
-10	11.0	11.8
0	10.6	11.6
10	10.3	11.3
25	9.9	10.9
30	9.8	10.8
40	9.5	10.6
55	9.1	10.6
60	9.1	10.6
—	—	—

Object －12V0.25A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	11.6	12.6
-20	11.3	12.3
-10	11.0	11.8
0	10.6	11.6
10	10.3	11.3
25	9.9	10.9
30	9.8	10.8
40	9.5	10.6
55	9.1	10.6
60	9.1	10.6
—	—	—

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。

BC－2059

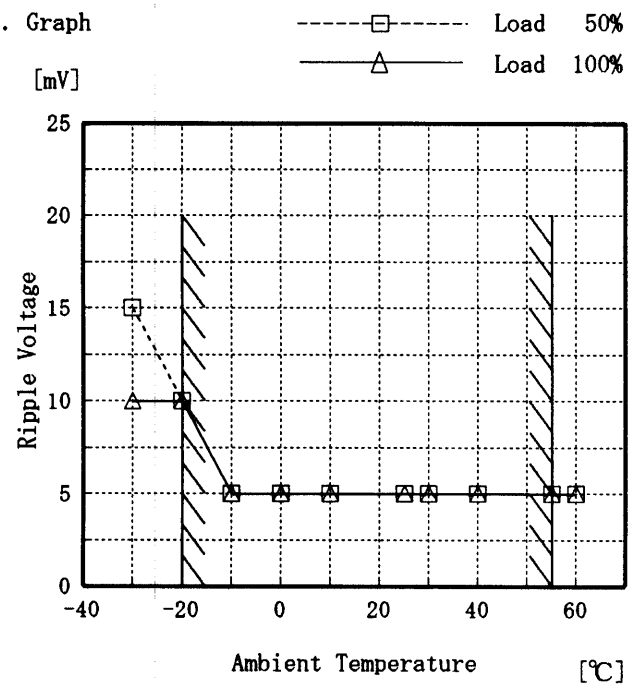
COSEL

Model	ZUW62412
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



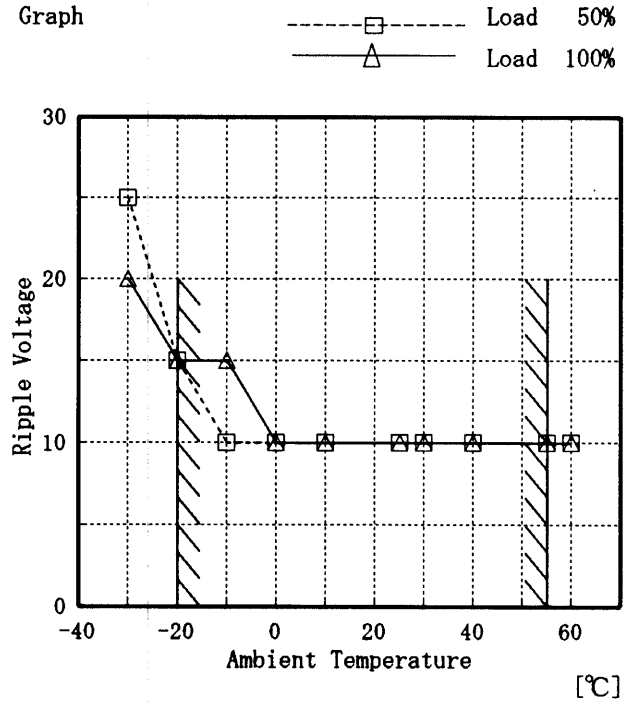
Input Volt.　18.0 V

2. Values

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

Object　−12V0.25A

1. Graph



Input Volt.　18.0 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	25	20
-20	15	15
-10	10	15
0	10	10
10	10	10
25	10	10
30	10	10
40	10	10
55	10	10
60	10	10
—	—	—

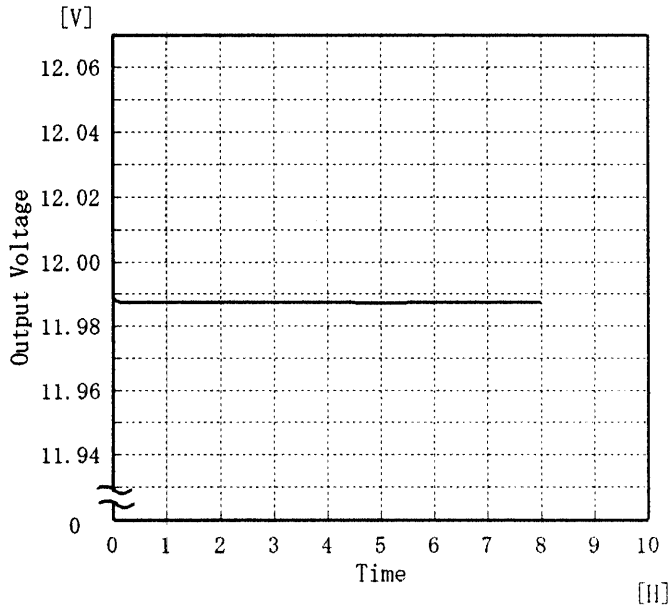
COSEL

Model	ZUW62412
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object ＋12V0.25A

1. Graph



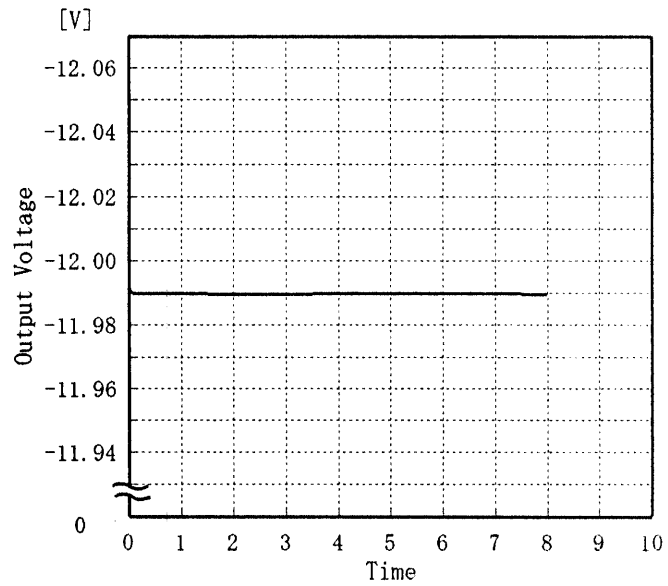
Input Volt. 24.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	11.988
0.5	11.988
1.0	11.988
2.0	11.988
3.0	11.988
4.0	11.988
5.0	11.988
6.0	11.988
7.0	11.988
8.0	11.988

Object －12V0.25A

1. Graph



Input Volt. 24.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.990
0.5	-11.990
1.0	-11.990
2.0	-11.990
3.0	-11.990
4.0	-11.990
5.0	-11.990
6.0	-11.990
7.0	-11.990
8.0	-11.990

BC－2059

COSEL

Model	ZUW62412
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 : 18.0～36.0 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 18.0～36.0 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	24.0	0.25	11.990	±143	±1.2
Minimum Voltage	25	36.0	0.00	11.704		

Object －12V0.25A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy(Ration)[%]
Maximum Voltage	-20	18.0	0.25	-11.996	±143	±1.2
Minimum Voltage	55	24.0	0.00	-11.710		

COSEL

Model	ZUW62412
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	11.952	5	15
	2	11.958	5	10
	3	11.959	5	10
Load 100 %	1	11.865	5	20
	2	11.867	5	20
	3	11.869	5	20

Input Volt. 24.0 V

COSEL

Model	ZUW62412
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	-11.948	5	15
	2	-11.951	5	15
	3	-11.951	5	15
Load 100 %	1	-11.850	5	20
	2	-11.849	5	20
	3	-11.852	5	30

Input Volt. 24.0 V

COSEL

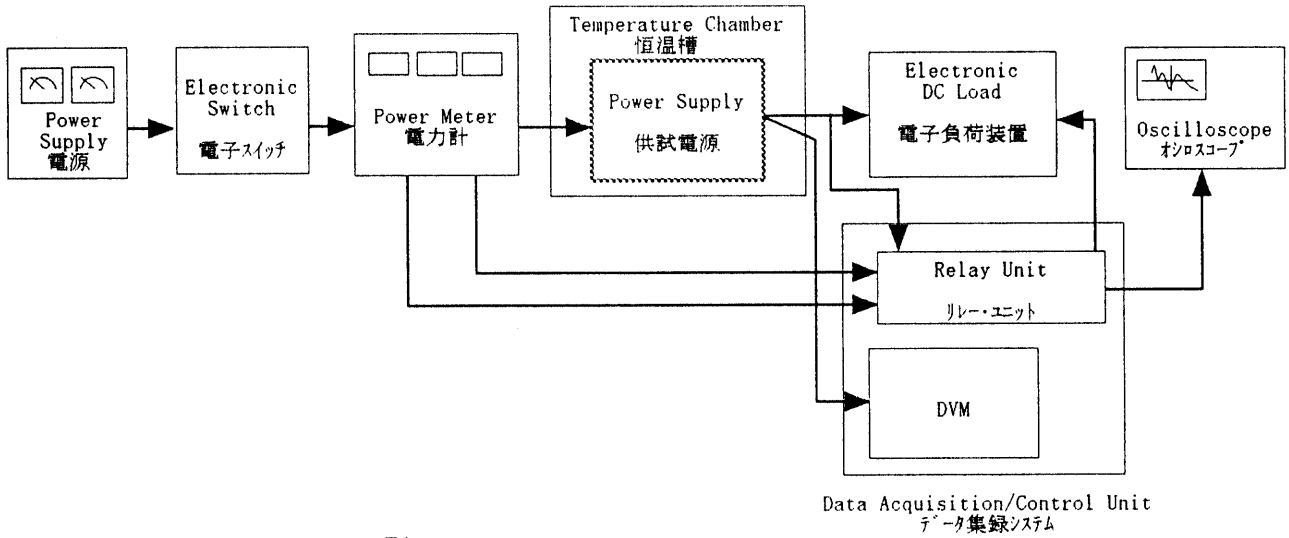


Figure A