参考資料

COSEL

TEST DATA OF ZTW1R50512
(5.0V INPUT)

Regulated DC Power Supply

Date : Mar.5. 1998

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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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(Final Page 20)

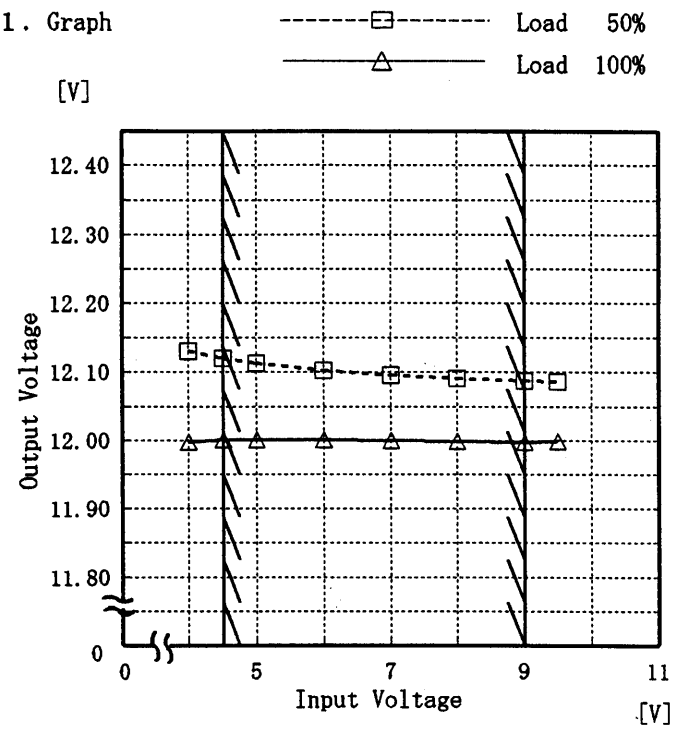
COSEL

Model	ZTW1R50512
Item	Line Regulation 静的入力変動

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.065A

1. Graph

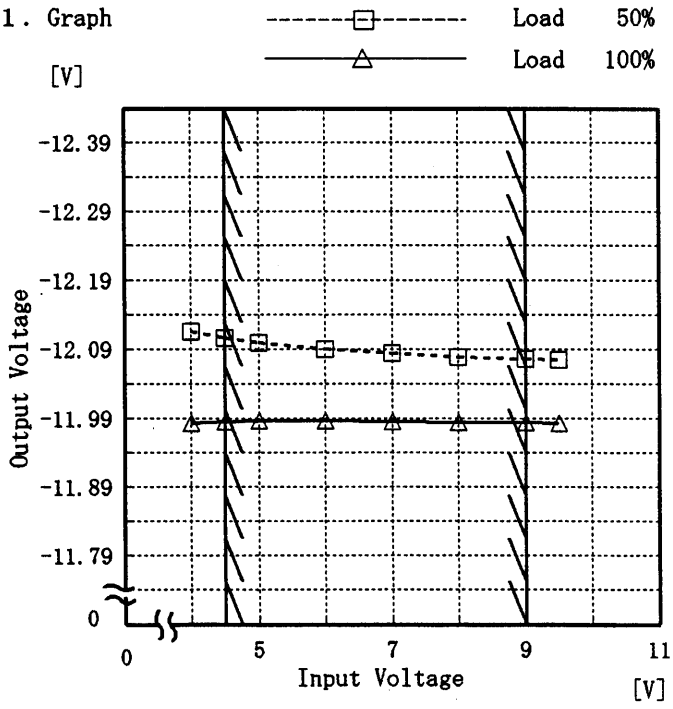


2. Values

Input Voltage [V]	Load 50% Output Volt. [V]	Load 100% Output Volt. [V]
4.0	12.130	11.998
4.5	12.120	12.000
5.0	12.113	12.001
6.0	12.103	12.001
7.0	12.096	12.000
8.0	12.092	11.998
9.0	12.088	11.998
9.5	12.086	11.998
—	—	—
—	—	—
—	—	—
—	—	—

Object －12V0.065A

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	-12.115	-11.983
4.5	-12.106	-11.985
5.0	-12.099	-11.986
6.0	-12.090	-11.986
7.0	-12.083	-11.985
8.0	-12.079	-11.985
9.0	-12.076	-11.984
9.5	-12.074	-11.984
—	—	—
—	—	—
—	—	—
—	—	—

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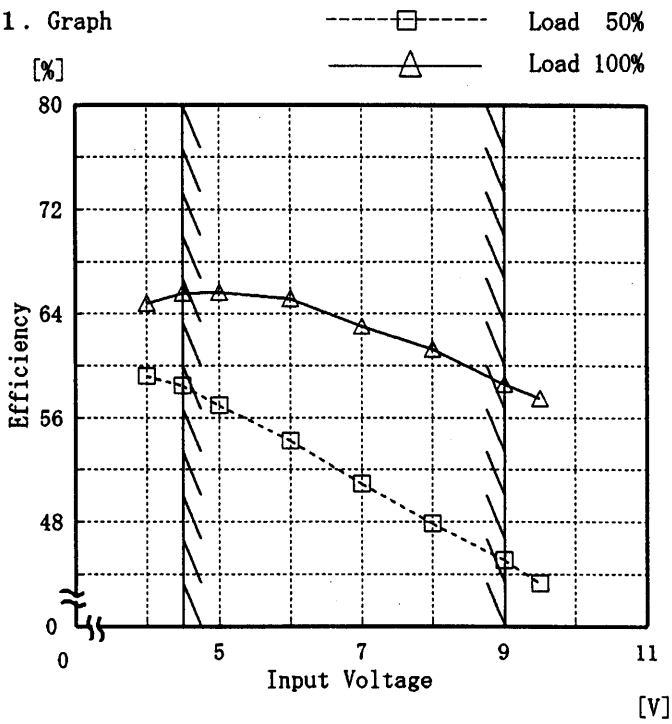
COSEL

Model	ZTW1R50512
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

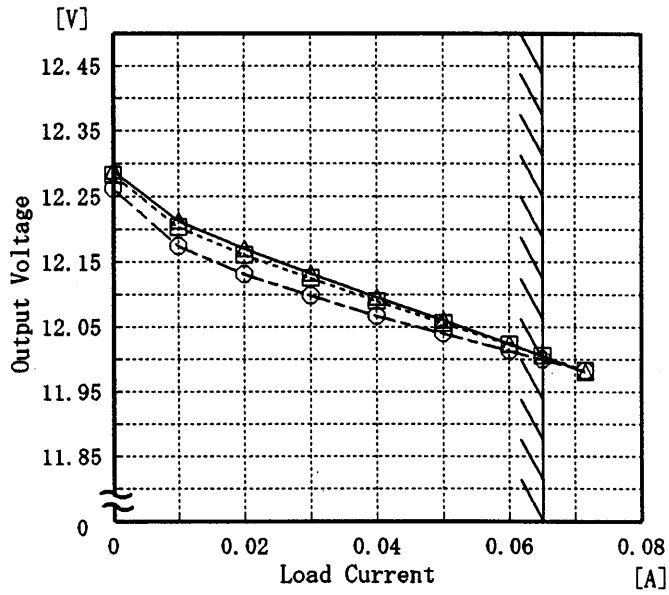
Input Voltage [V]	Load 50% Efficiency [%]	Load 100% Efficiency [%]
4.0	59.2	64.8
4.5	58.5	65.6
5.0	57.0	65.7
6.0	54.2	65.2
7.0	50.9	63.1
8.0	47.9	61.3
9.0	45.0	58.6
9.5	43.3	57.5
—	—	—
—	—	—
—	—	—
—	—	—

COSEL

Model	ZTW1R50512
Item	Load Regulation 静的負荷変動
Object	+12V0.065A

Temperature 25℃
Testing Circuitry Figure A

1. Graph

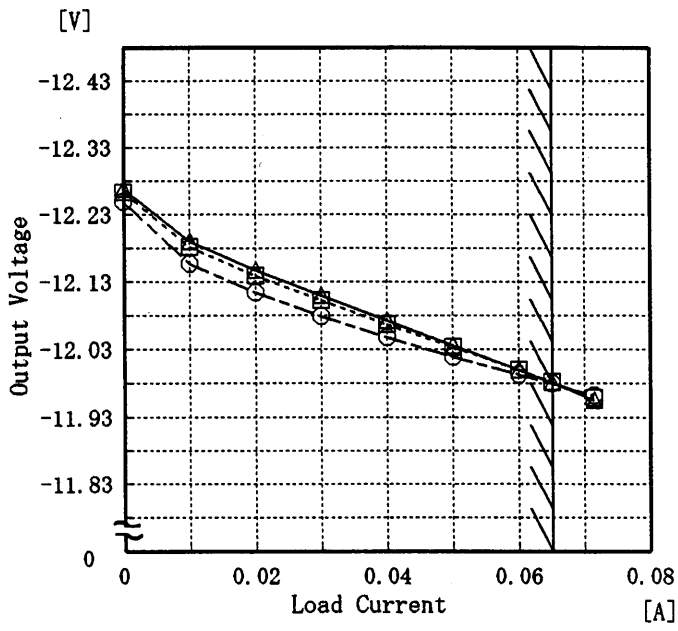


2. Values

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	12.290	12.283	12.262
0.010	12.213	12.204	12.175
0.020	12.170	12.161	12.132
0.030	12.133	12.125	12.098
0.040	12.096	12.090	12.067
0.050	12.061	12.056	12.040
0.060	12.025	12.023	12.013
0.065	12.006	12.006	12.000
0.072	11.981	11.983	11.983
—	—	—	—

Object	−12V0.065A

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	-12.268	-12.264	-12.249
0.010	-12.191	-12.183	-12.158
0.020	-12.148	-12.140	-12.115
0.030	-12.110	-12.103	-12.080
0.040	-12.074	-12.068	-12.049
0.050	-12.037	-12.034	-12.020
0.060	-12.001	-12.001	-11.994
0.065	-11.982	-11.983	-11.980
0.072	-11.956	-11.959	-11.963
—	—	—	—

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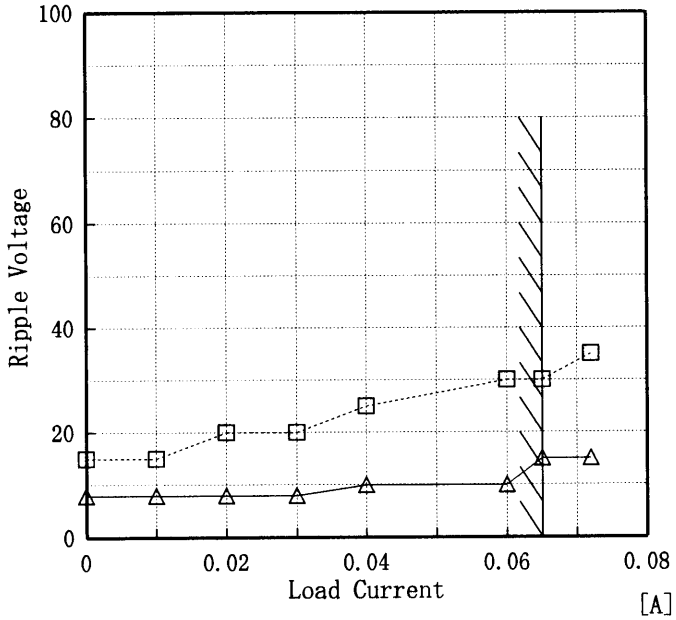
COSEL

Model	ZTW1R50512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	+12V0.065A

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

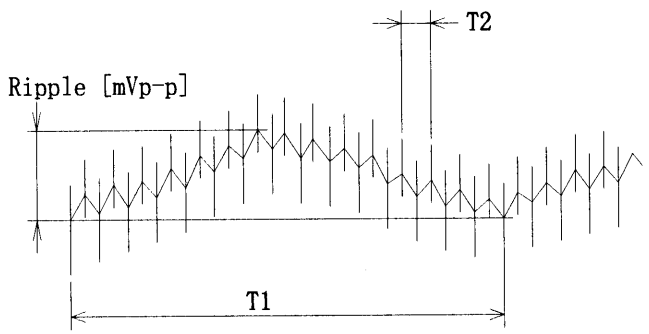


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

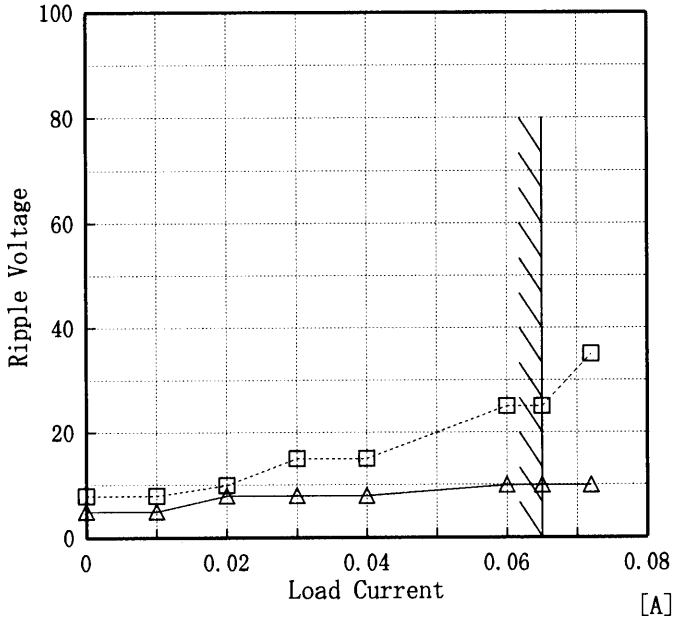
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.000	15	8
0.010	15	8
0.020	20	8
0.030	20	8
0.040	25	10
0.060	30	10
0.065	30	15
0.072	35	15
—	—	—
—	—	—
—	—	—

COSEL

Model	ZTW1R50512
Item	Ripple Voltage(by Load Current) リップル電圧(負荷電流特性)
Object	-12V0.065A

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

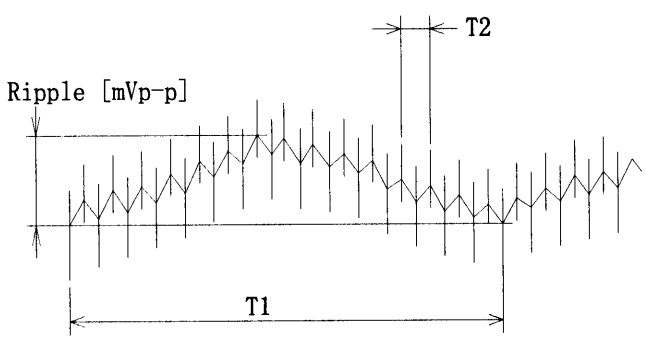


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

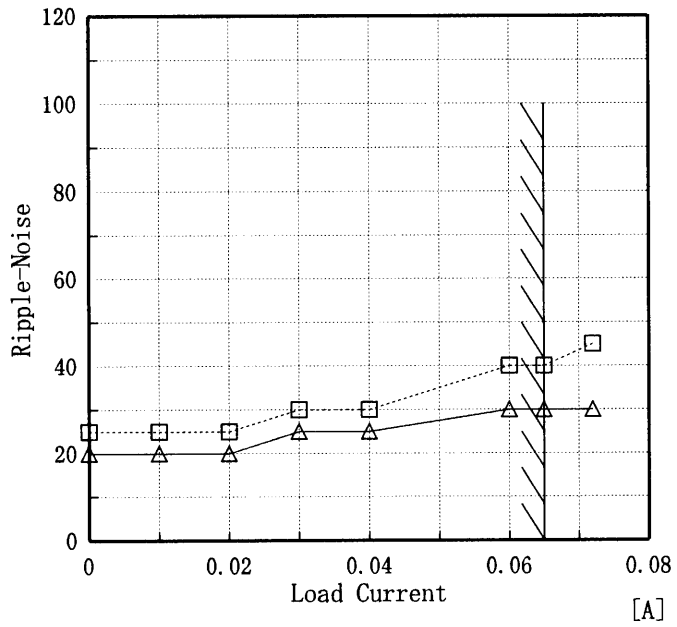
Load Current [A]	Input Volt. 4.5 [V] Ripple Output Volt. [mV]	Input Volt. 9.0 [V] Ripple Output Volt. [mV]
0.000	8	5
0.010	8	5
0.020	10	8
0.030	15	8
0.040	15	8
0.060	25	10
0.065	25	10
0.072	35	10
—	—	—
—	—	—
—	—	—

COSEL

Model	ZTW1R50512
Item	Ripple-Noise リップルノイズ
Object	+12V0.065A

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

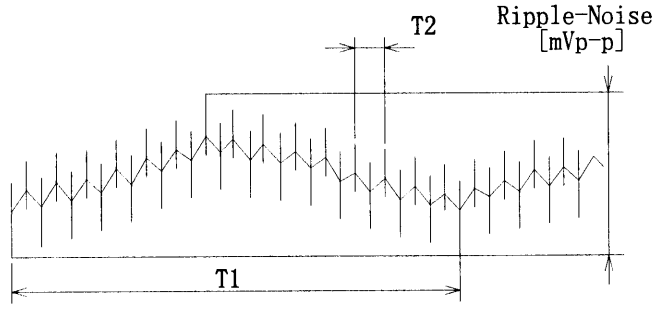


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

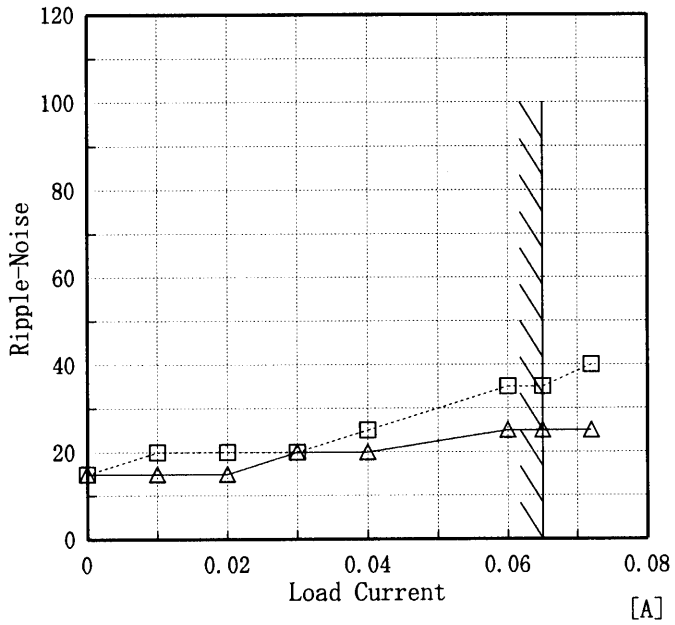
Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	25	20
0.010	25	20
0.020	25	20
0.030	30	25
0.040	30	25
0.060	40	30
0.065	40	30
0.072	45	30
—	—	—
—	—	—
—	—	—

COSEL

Model	ZTW1R50512
Item	Ripple-Noise リップルノイズ
Object	-12V0.065A

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

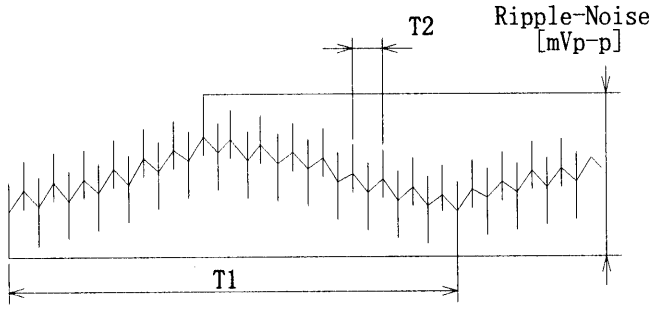


Fig. Complex Ripple Wave Form
図 リップル波形詳細図

2. Values

Load current [A]	Input Volt. 4.5 [V] Ripple-Noise [mV]	Input Volt. 9.0 [V] Ripple-Noise [mV]
0.000	15	15
0.010	20	15
0.020	20	15
0.030	20	20
0.040	25	20
0.060	35	25
0.065	35	25
0.072	40	25
—	—	—
—	—	—
—	—	—

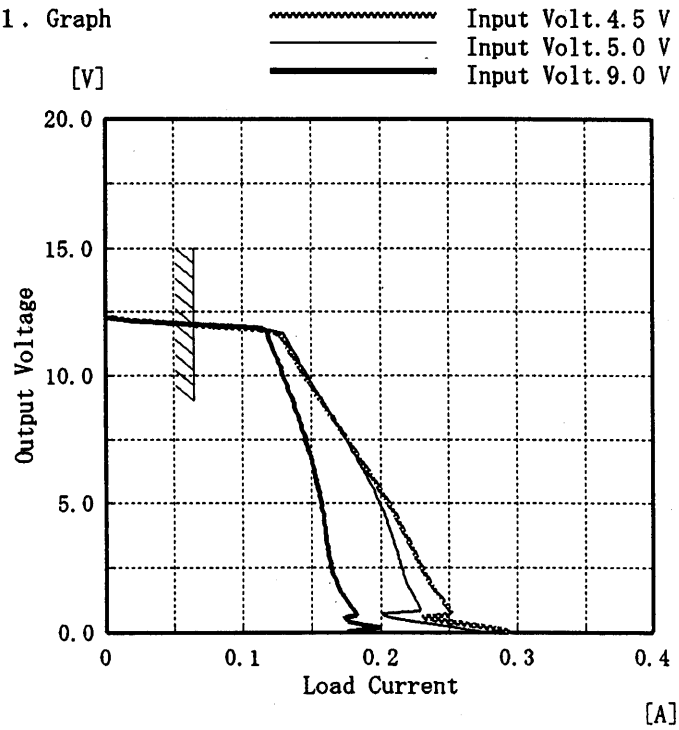
COSEL

Model	ZTW1R50512
Item	Overcurrent Protection 過電流保護

Temperature 25℃
Testing Circuitry Figure A

Object ＋12V0.065A

1. Graph

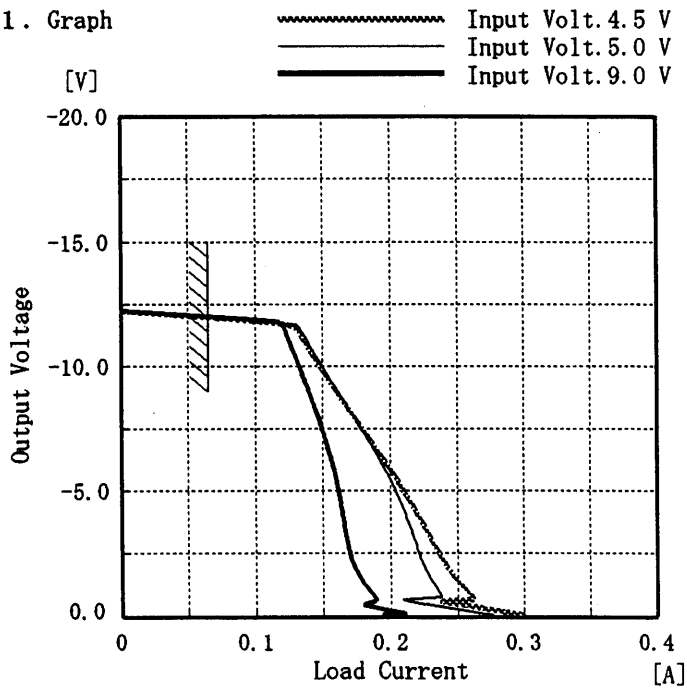


2. Values

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	0.073	0.056	0.052
11.40	0.129	0.132	0.120
10.80	0.135	0.139	0.124
9.60	0.150	0.151	0.132
8.40	0.165	0.165	0.140
7.20	0.178	0.177	0.147
6.00	0.194	0.190	0.153
4.80	0.207	0.200	0.157
3.60	0.219	0.208	0.161
2.40	0.230	0.215	0.165
1.20	0.244	0.225	0.175
0.00	0.295	0.274	0.175

Object －12V0.065A

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	0.081	0.084	0.091
-11.40	0.132	0.135	0.123
-10.80	0.138	0.141	0.127
-9.60	0.152	0.154	0.135
-8.40	0.167	0.168	0.144
-7.20	0.183	0.181	0.151
-6.00	0.197	0.194	0.158
-4.80	0.212	0.205	0.162
-3.60	0.225	0.214	0.166
-2.40	0.237	0.222	0.170
-1.20	0.253	0.233	0.182
0.00	0.300	0.277	0.193

COSEL

Model	ZTW1R50512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.065A		

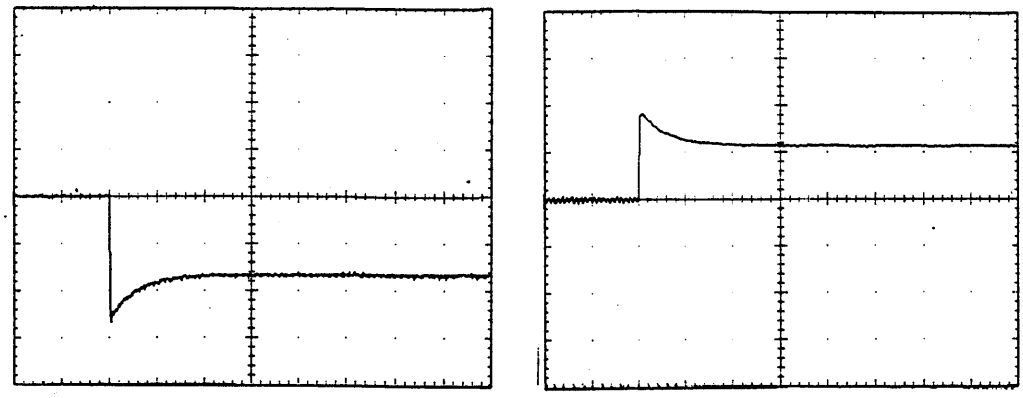
Input Volt. 5.0 V

Cycle 100 mS

Load Current

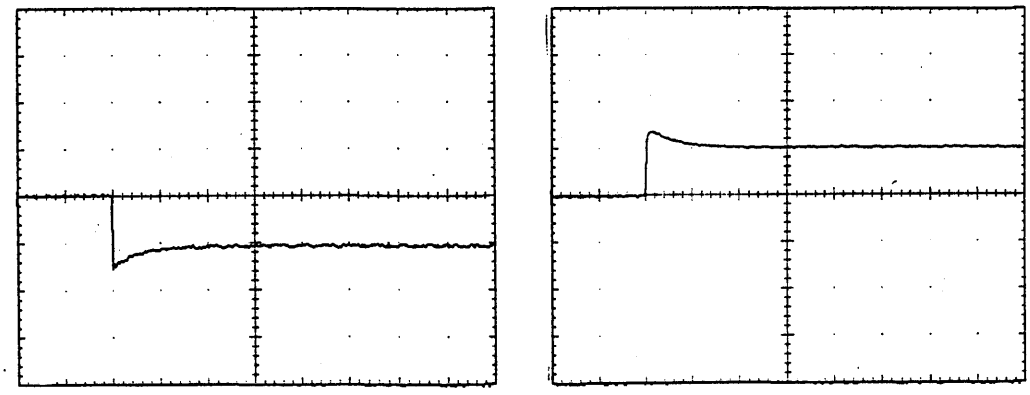
Min. Load ⟷
Load 100 %

200 mV/div



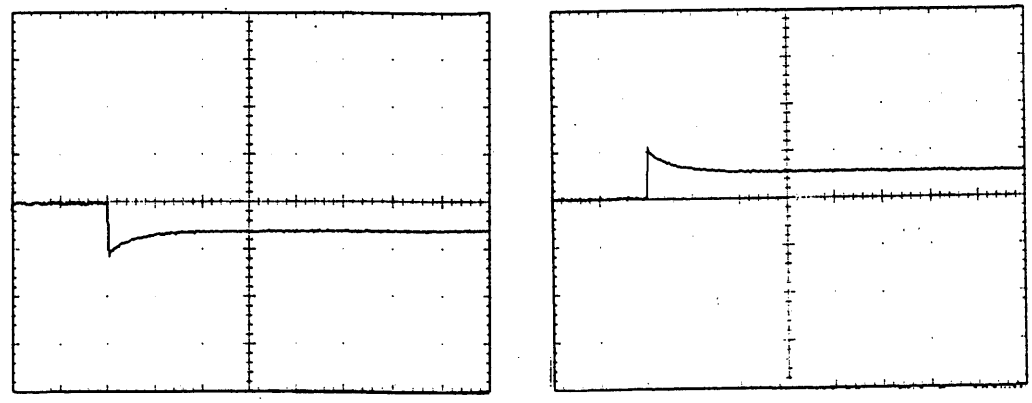
Min. Load ⟷
Load 50 %

200 mV/div



Load 50%⟷
Load 100 %

200 mV/div



1 mS/div

COSEL

Model	ZTW1R50512		
Item	Dynamic Load Responce 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	−12V0.065A		

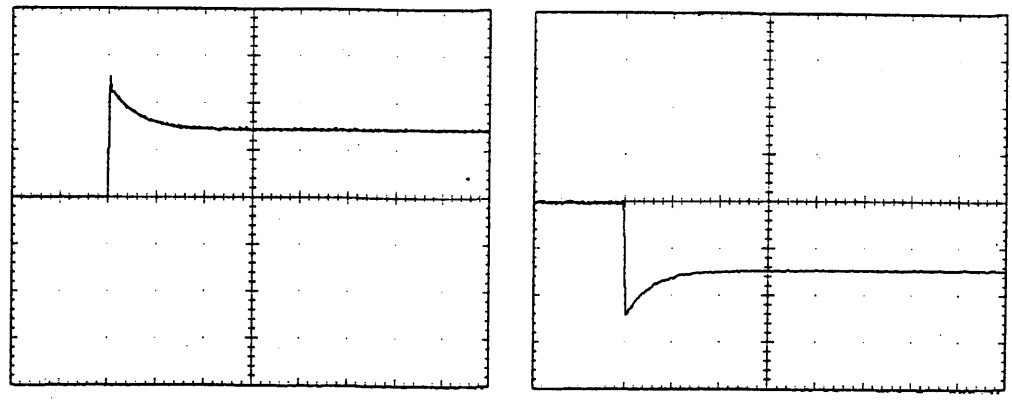
Input Volt. 5.0 V

Cycle 100 mS

Load Current

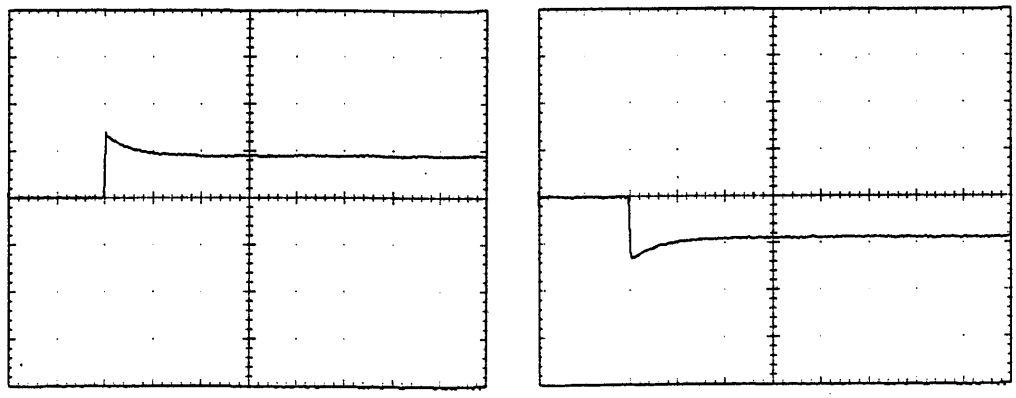
Min. Load ⟷
Load 100 %

200 mV/div



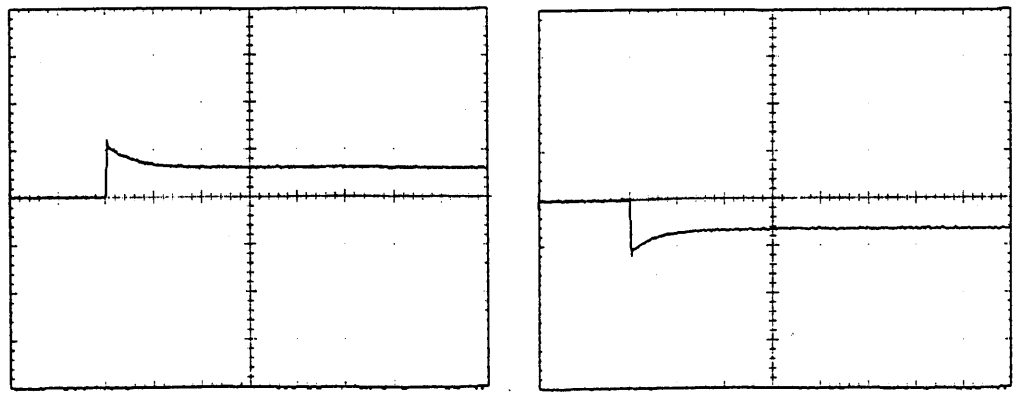
Min. Load ⟷
Load 50 %

200 mV/div



Load 50%⟷
Load 100 %

200 mV/div



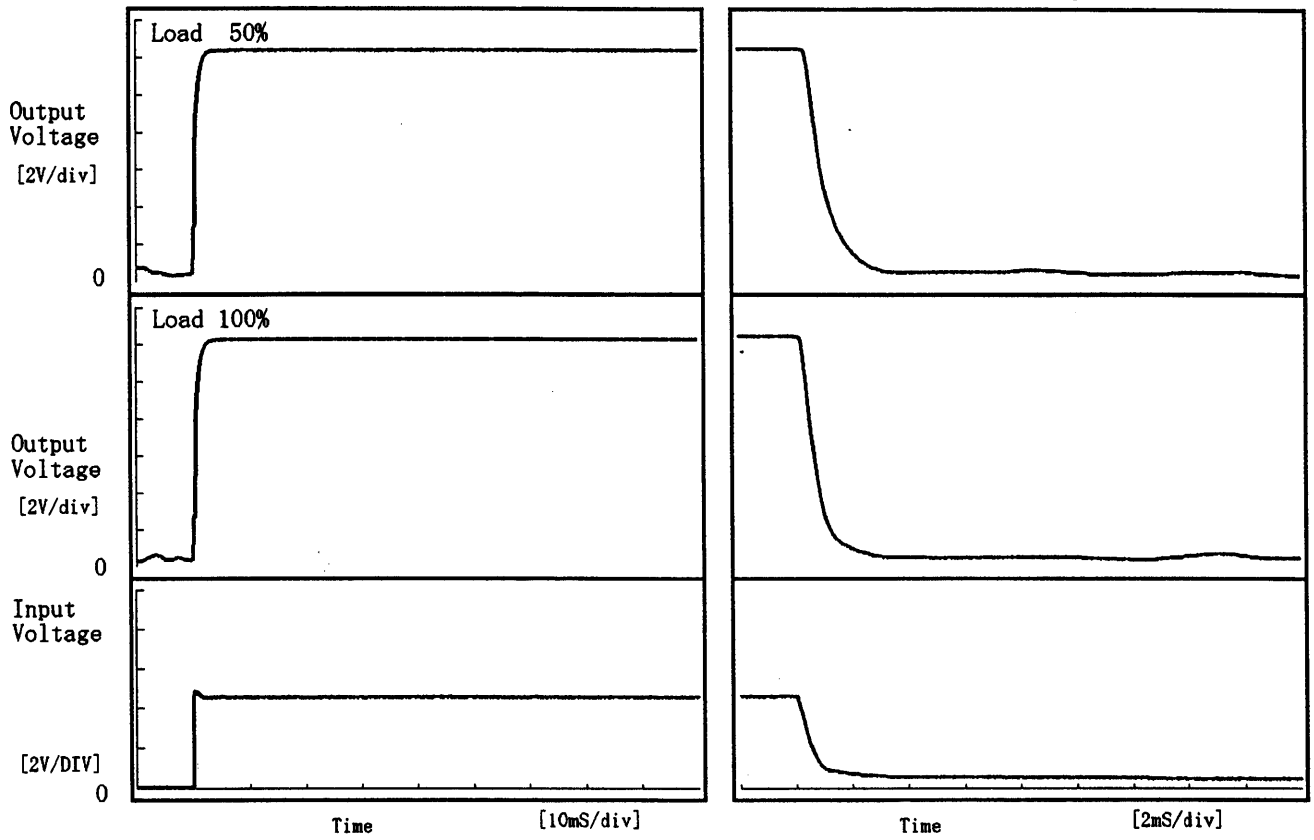
1 mS/div

COSEL

Model	ZTW1R50512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+12V0.065A		

1. Graph

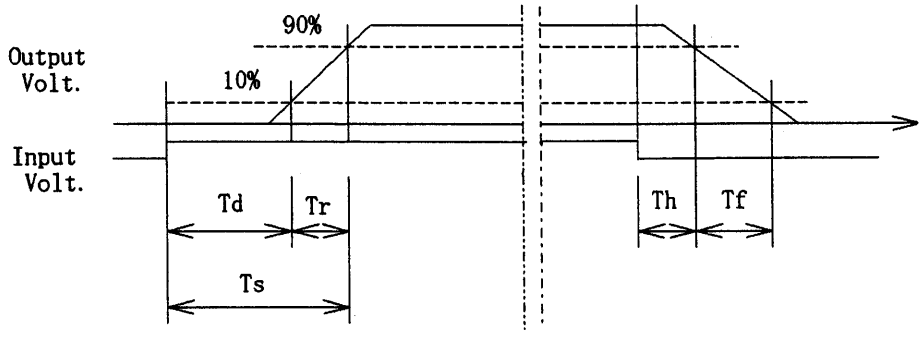
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	Td	Tr	Ts	Th	Tf
50 %	0.05	1.25	1.30	0.49	1.64
100 %	0.05	1.30	1.35	0.30	1.19

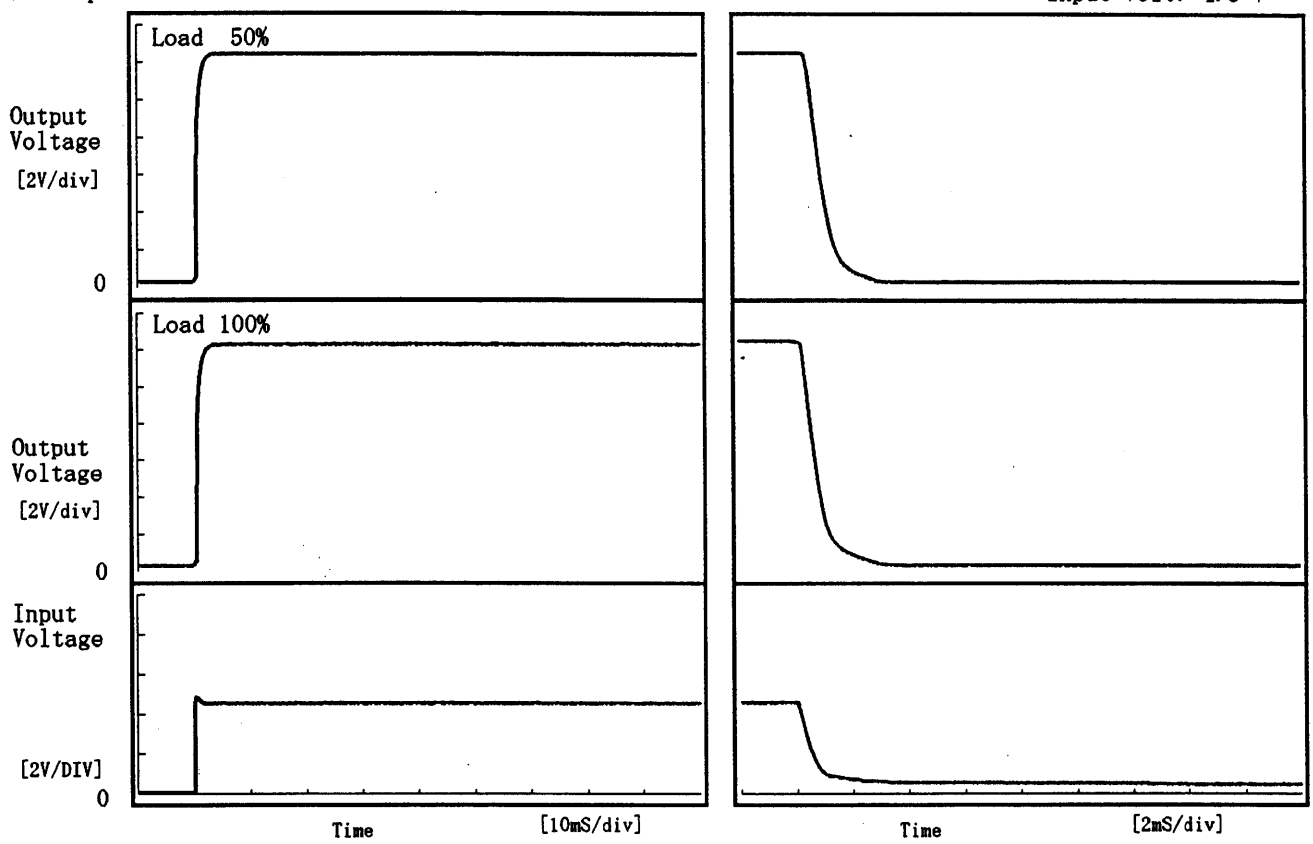


COSEL

Model	ZTW1R50512		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	-12V0.065A		

1. Graph

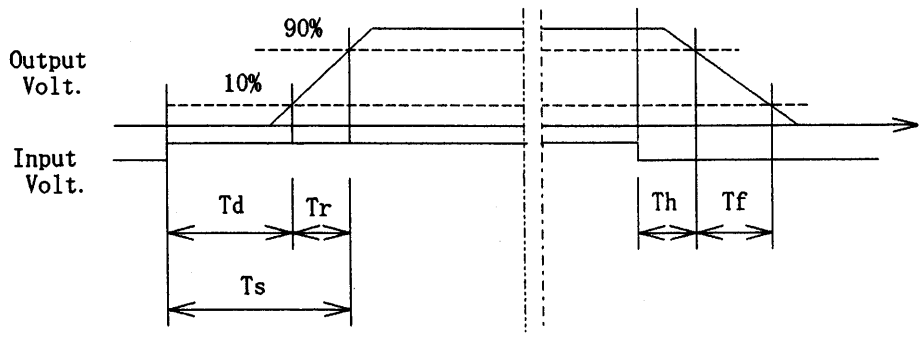
Input Volt. 4.5 V



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	0.40	0.85	1.25	0.48	1.16
100 %	0.40	0.90	1.30	0.30	1.15



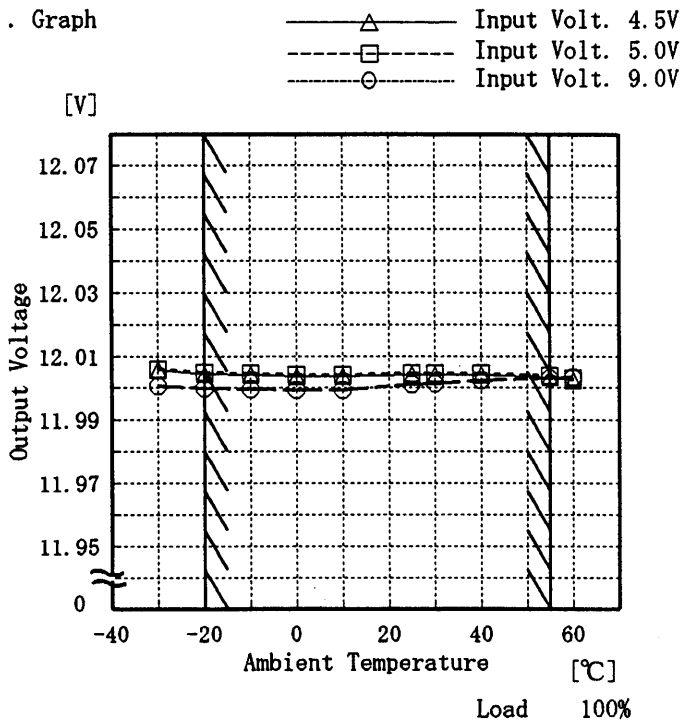
COSEL

Model	ZTW1R50512
Item	Ambient Temperature Drift 周囲温度変動

Testing Circuitry Figure A

Object ＋12V0.065A

1. Graph

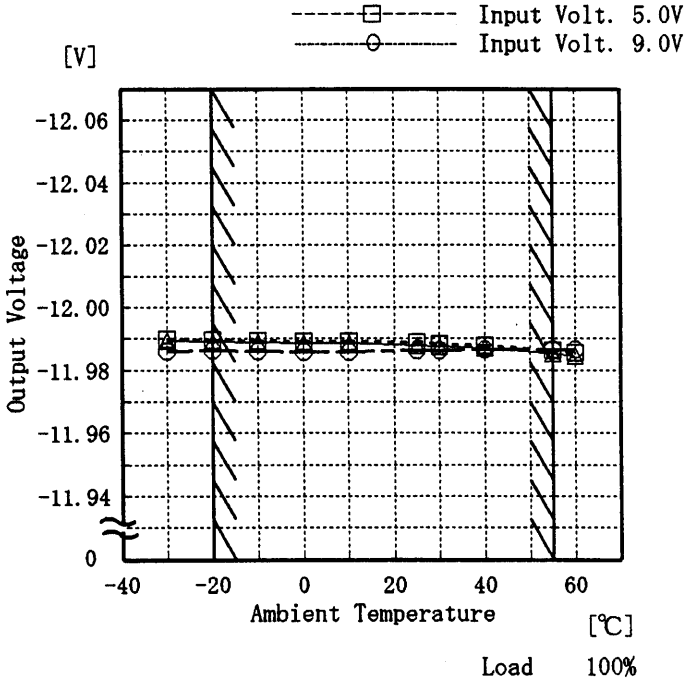


2. Values

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	12.005	12.006	12.001
-20	12.004	12.005	12.000
-10	12.004	12.005	12.000
0	12.003	12.004	11.999
10	12.004	12.004	11.999
25	12.004	12.004	12.001
30	12.004	12.005	12.001
40	12.004	12.005	12.002
55	12.003	12.004	12.003
60	12.002	12.003	12.003
—	—	—	—

Object －12V0.065A

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] Output Volt. [V]	Input Volt. 5.0[V] Output Volt. [V]	Input Volt. 9.0[V] Output Volt. [V]
-30	-11.989	-11.990	-11.986
-20	-11.989	-11.990	-11.986
-10	-11.989	-11.989	-11.986
0	-11.989	-11.989	-11.986
10	-11.989	-11.989	-11.986
25	-11.988	-11.989	-11.986
30	-11.987	-11.988	-11.986
40	-11.987	-11.988	-11.986
55	-11.985	-11.986	-11.987
60	-11.984	-11.985	-11.987
—	—	—	—

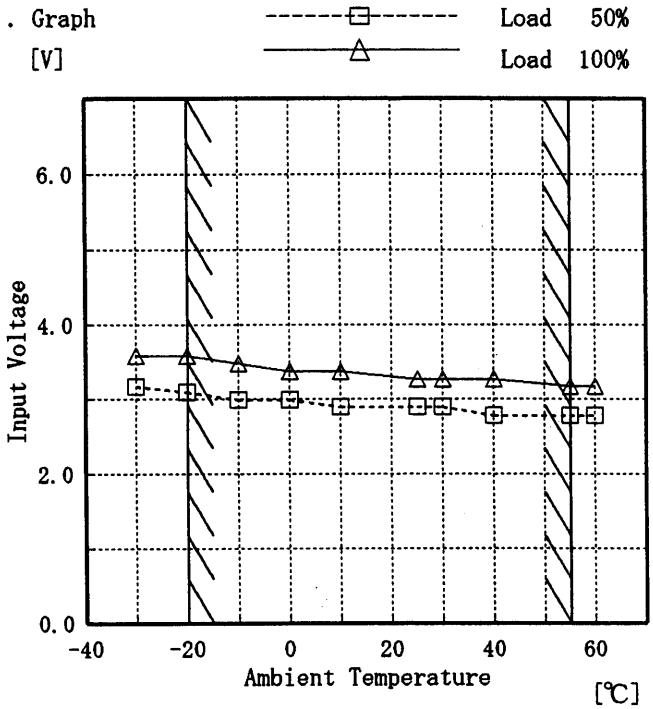
COSEL

Model	ZTW1R50512
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 +12V0.065A

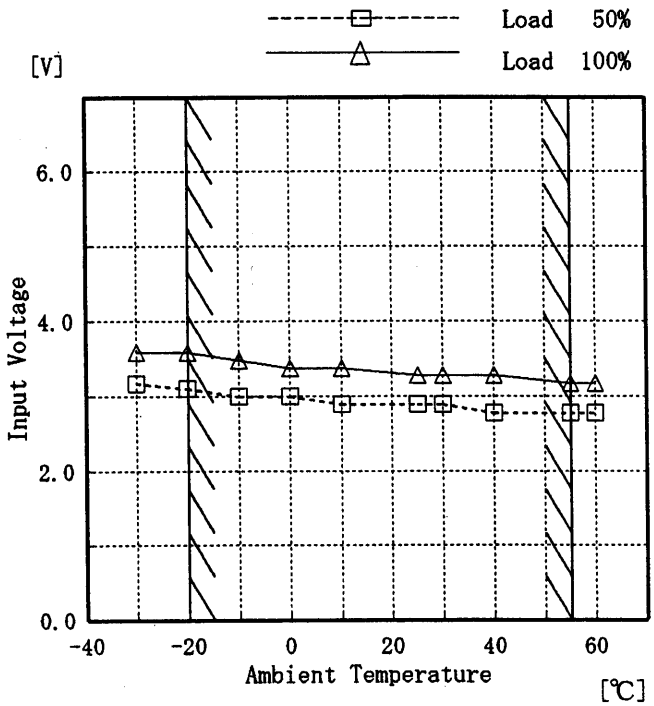
1. Graph



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.2	3.6
-20	3.1	3.6
-10	3.0	3.5
0	3.0	3.4
10	2.9	3.4
25	2.9	3.3
30	2.9	3.3
40	2.8	3.3
55	2.8	3.2
60	2.8	3.2
—	—	—

Object −12V0.065A



2. Values

Ambient Temp. [℃]	Load 50% Input Volt. [V]	Load 100% Input Volt. [V]
-30	3.2	3.6
-20	3.1	3.6
-10	3.0	3.5
0	3.0	3.4
10	2.9	3.4
25	2.9	3.3
30	2.9	3.3
40	2.8	3.3
55	2.8	3.2
60	2.8	3.2
—	—	—

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−3118

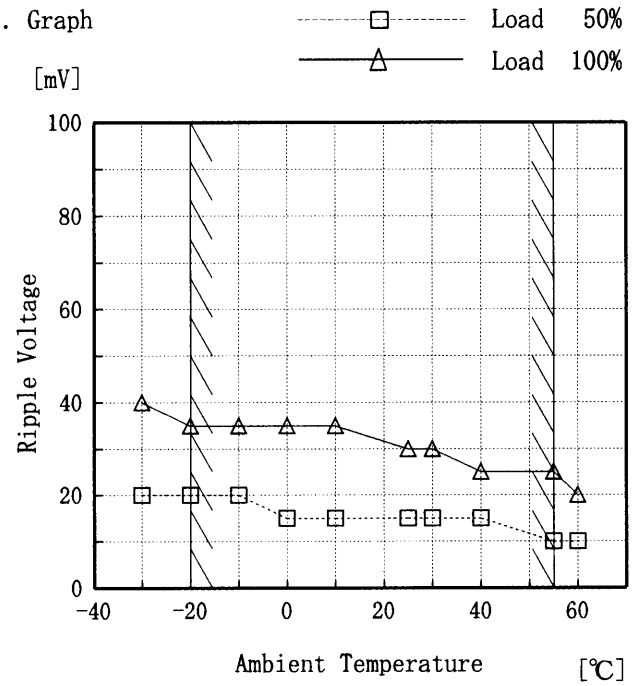
COSEL

Model	ZTW1R50512
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）

Testing Circuitry　Figure A

Object	+12V0.065A

1. Graph



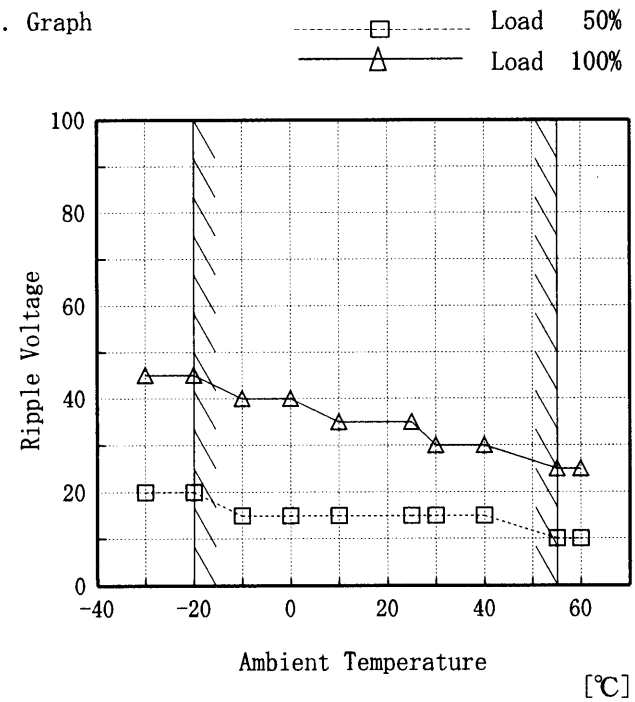
Input Volt.　4.5 V

2. Values

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

Object	−12V0.065A

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	20	45
-20	20	45
-10	15	40
0	15	40
10	15	35
25	15	35
30	15	30
40	15	30
55	10	25
60	10	25
—	—	—

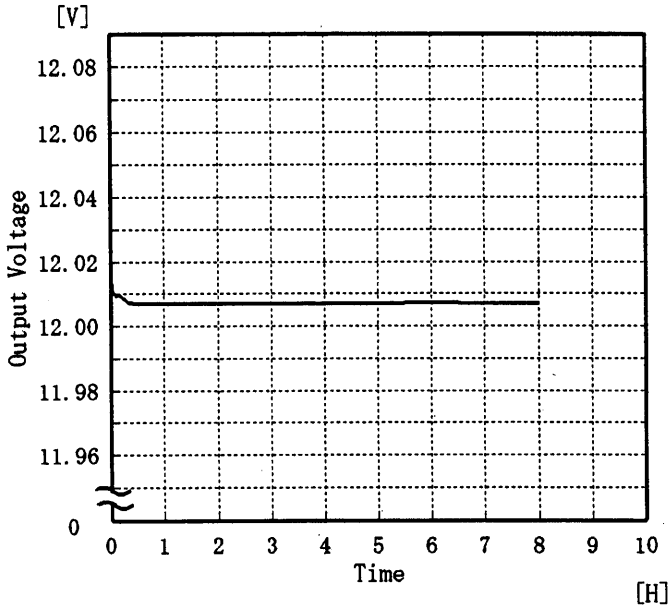
COSEL

Model	ZTW1R50512
Item	Time Lapse Drift 経時ドリフト

Temperature 25 ℃
Testing Circuitry Figure A

Object ＋12V0.065A

1. Graph



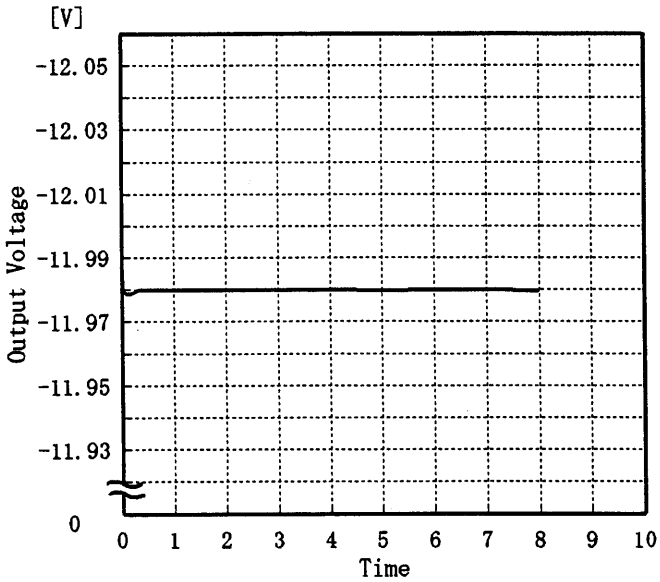
Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	12.015
0.5	12.007
1.0	12.007
2.0	12.007
3.0	12.007
4.0	12.007
5.0	12.007
6.0	12.007
7.0	12.007
8.0	12.007

Object −12V0.065A

1. Graph



Input Volt. 5.0V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	-11.985
0.5	-11.980
1.0	-11.980
2.0	-11.980
3.0	-11.980
4.0	-11.980
5.0	-11.980
6.0	-11.980
7.0	-11.980
8.0	-11.980

BC−3118

COSEL

Model	ZTW1R50512
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) : 0.000～0.065 A

(AVR 2) : 0.000～0.065 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) 0.000～0.065 A

(AVR 2) 0.000～0.065 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 ＋12V0.065A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	-20	5.0	0.065	12.003	±135	±1.2
Minimum Voltage	25	4.5	0.000	11.733		

Object －12V0.065A

Item	Temperature [℃]	Input Voltage [V]	Output Current [A]	Output Voltage [V]	Output Voltage Accuracy [mV]	Output Voltage Accuracy (Ration) [%]
Maximum Voltage	-20	5.0	0.065	-11.988	±136	±1.2
Minimum Voltage	55	4.5	0.000	-11.717		

COSEL

Model	ZTW1R50512
Item	Condensation 結露特性
Object	+12V0.065A

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.

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行い、異常のないことを確認する。

2．Values

Item	Data	Testing Conditions
Output Voltage [V]	12.307	Input Volt.: 5V, Load Current:0.065A
Line Regulation [mV]	9	Input Volt.: 4.5～9V, Load Current:0.065A
Load Regulation [mV]	295	Input Volt.: 5V, Load Current:0～0.065A

COSEL

Model	ZTW1R50512
Item	Condensation 結露特性
Object	−12V0.065A

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.

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行い、異常のないことを確認する。

2. Values

Item	Data	Testing Conditions
Output Voltage [V]	-12.258	Input Volt.: 5V, Load Current:0.065A
Line Regulation [mV]	4	Input Volt.: 4.5～9V, Load Current:0.065A
Load Regulation [mV]	271	Input Volt.: 5V, Load Current:0～0.065A

COSEL

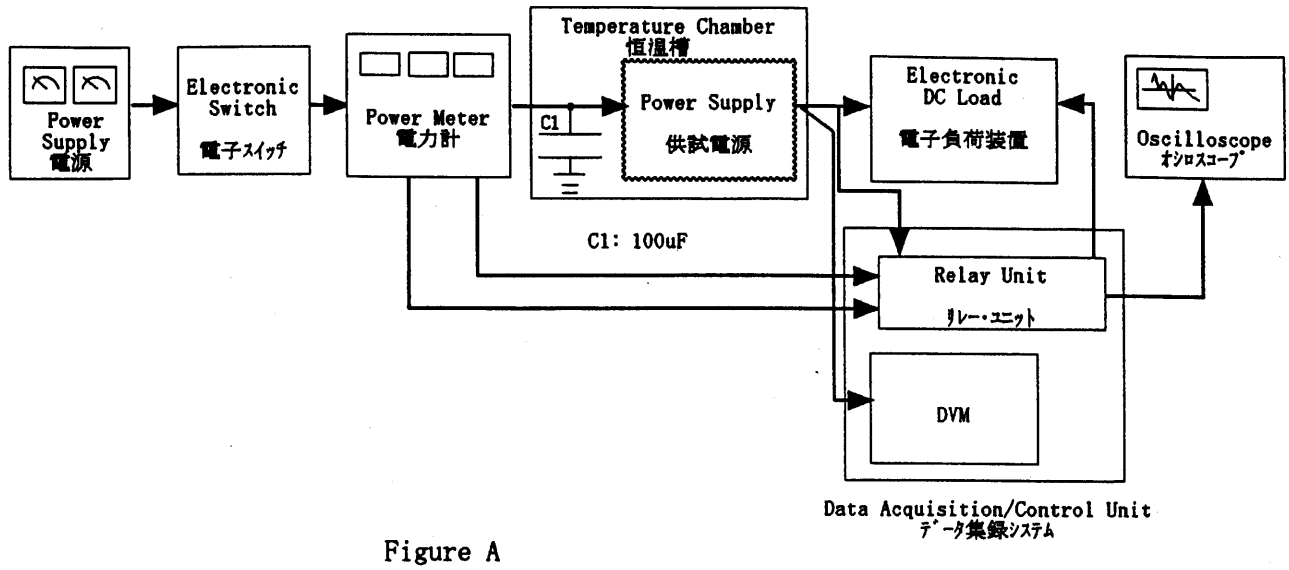


Figure A