参考資料

COSEL

TEST DATA OF CBS502424
(24V INPUT)

Regulated DC Power Supply
Jun. 20, 2002

Approved by : Isao Yasuda
Isao Yasuda Design Manager

Prepared by : Kouichi Kinoshita
Kouichi Kinoshita Design Engineer

コーセル株式会社
COSEL CO.,LTD.

COSEL

CONTENTS

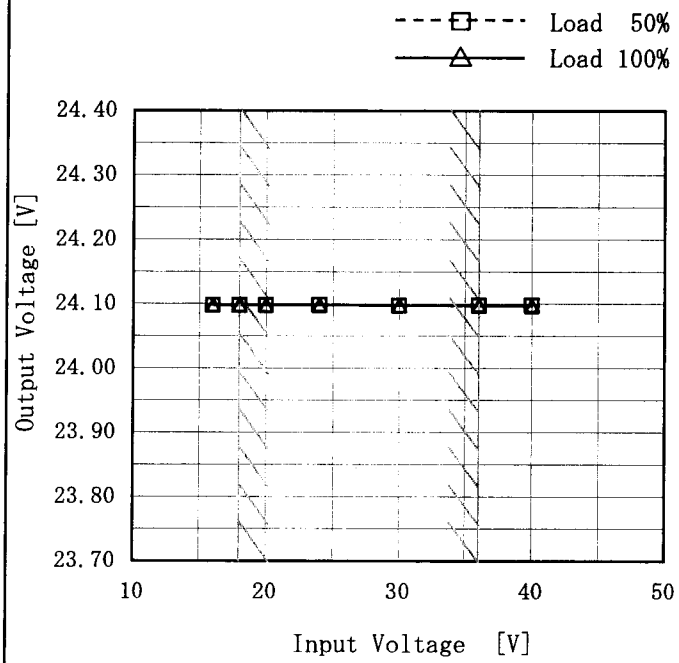
(Final Page 21)

COSEL

Model	CBS502424
Item	Line Regulation 静的入力変動
Object	+24V2.1A

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

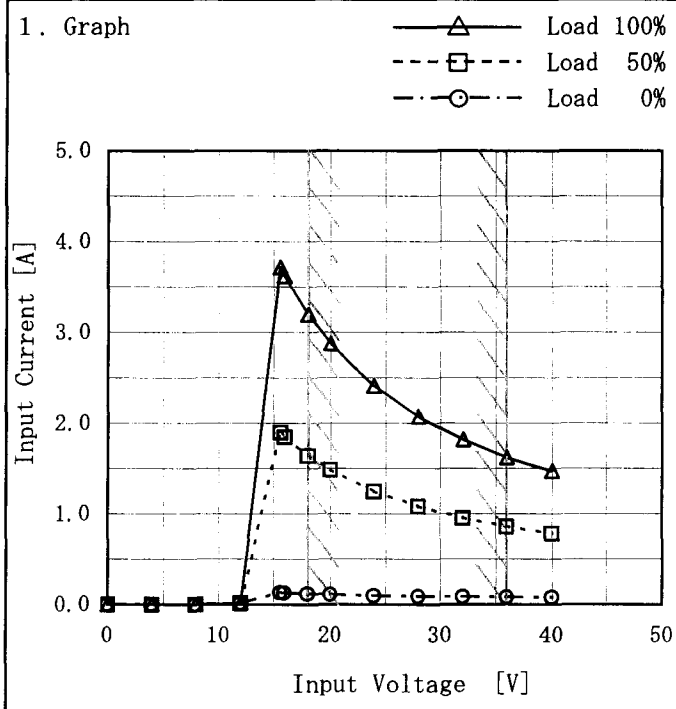
Input Voltage [V]	Output Voltage [V]	
	Load 50%	Load 100%
16	24.098	24.098
18	24.098	24.098
20	24.098	24.098
24	24.099	24.098
30	24.098	24.098
36	24.098	24.098
40	24.098	24.097
--	—	—
--	—	—

COSEL

Model	CBS502424
Item	Input Current (by Input Voltage) 入力電流（入力電圧特性）
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

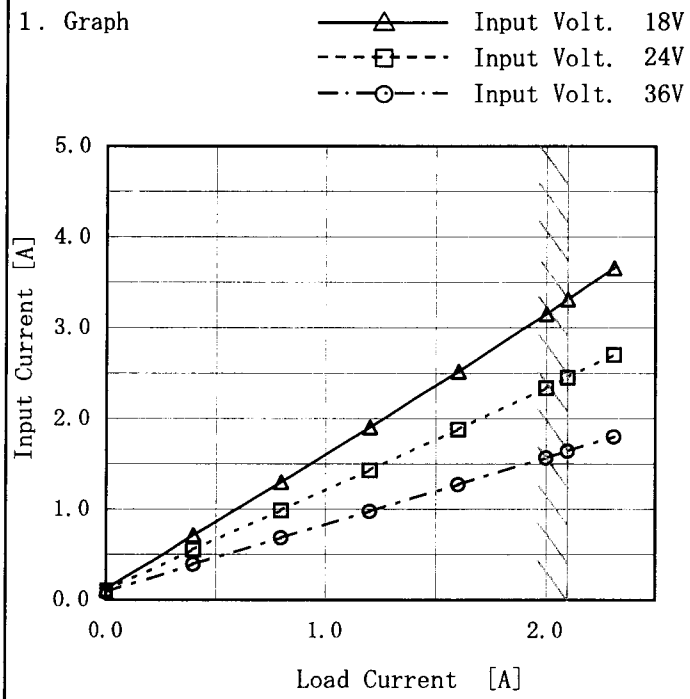
Input Voltage [V]	Input Current [A]		
	Load 0%	Load 50%	Load 100%
0	0.000	0.000	0.000
4.0	0.000	0.000	0.000
8.0	0.000	0.000	0.000
12.0	0.015	0.015	0.015
15.6	0.129	1.898	3.718
16.0	0.126	1.846	3.620
18.0	0.116	1.638	3.198
20.0	0.108	1.486	2.879
24.0	0.097	1.246	2.410
28.0	0.089	1.080	2.072
32.0	0.085	0.954	1.820
36.0	0.082	0.858	1.621
40.0	0.077	0.782	1.471
--	—	—	—
--	—	—	—
--	—	—	—

COSEL

Model	CBS502424
Item	Input Current (by Load Current) 入力電流（負荷特性）
Object	————————

Temperature 25℃
Testing Circuitry Figure A

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

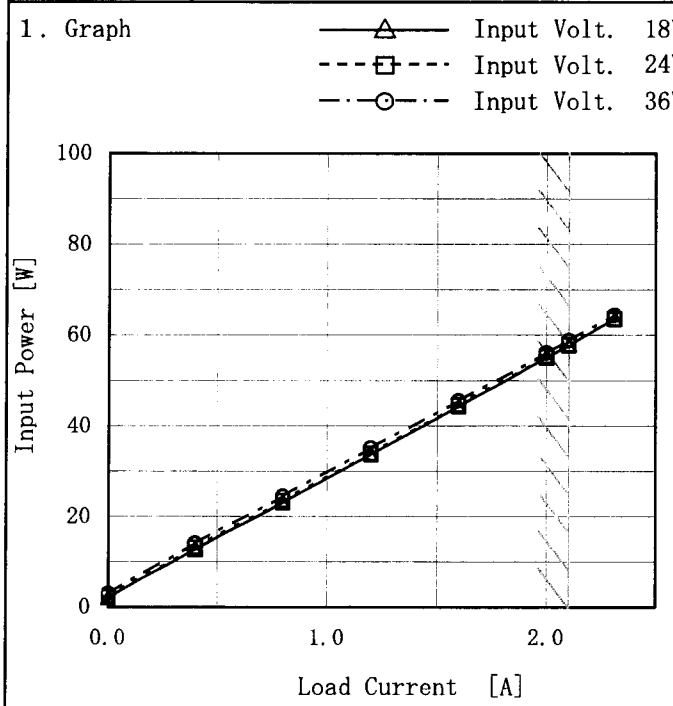
Load Current [A]	Input Current [A]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.00	0.117	0.097	0.082
0.40	0.715	0.551	0.391
0.80	1.298	0.986	0.682
1.20	1.904	1.429	0.975
1.60	2.520	1.880	1.269
2.00	3.154	2.338	1.566
2.10	3.314	2.454	1.641
2.31	3.658	2.702	1.799
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	CBS502424
Item	Input Power (by Load Current) 入力電力 (負荷特性)
Object	————————

Temperature 25℃
Testing Circuitry Figure A

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

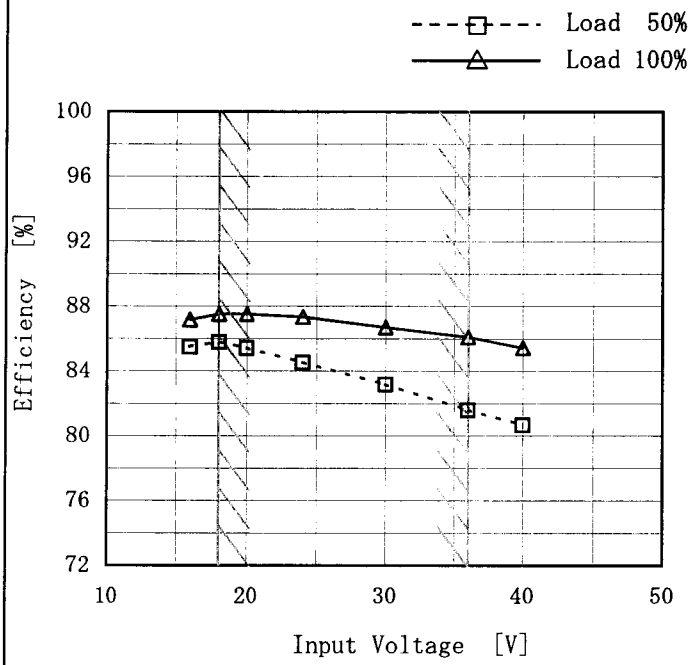
Load Current [A]	Input Power [W]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.00	2.11	2.34	2.97
0.40	12.74	13.18	14.08
0.80	23.05	23.48	24.50
1.20	33.70	33.94	35.10
1.60	44.30	44.60	45.50
2.00	55.10	55.30	56.10
2.10	57.80	57.90	58.80
2.31	63.60	63.60	64.40
--	—	—	—
--	—	—	—
--	—	—	—

COSEL

Model	CBS502424
Item	Efficiency (by Input Voltage) 効率（入力電圧特性）
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

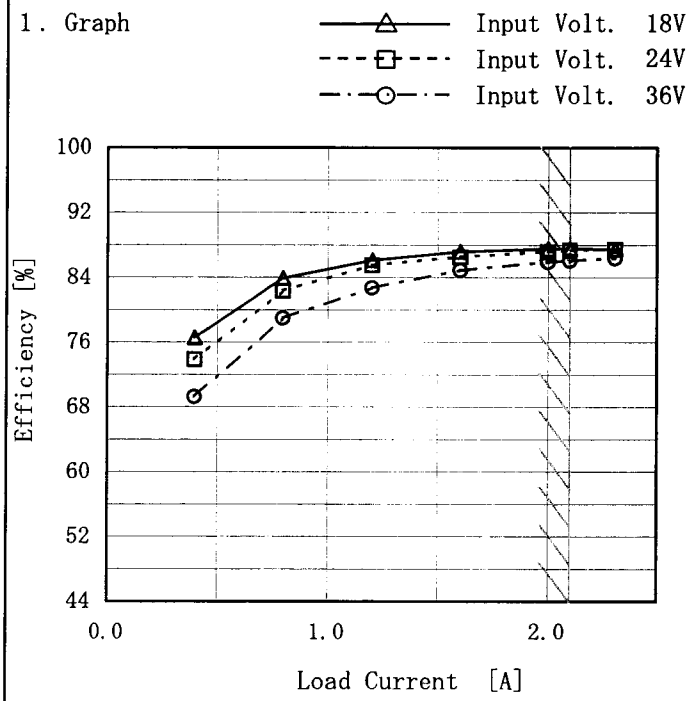
Input Voltage [V]	Efficiency [%]	
	Load 50%	Load 100%
16	85.5	87.2
18	85.8	87.5
20	85.4	87.5
24	84.5	87.4
30	83.2	86.7
36	81.6	86.1
40	80.7	85.4
—	—	—
—	—	—

COSEL

Model	CBS502424
Item	Efficiency (by Load Current) 効率（負荷特性）
Object	————————

Temperature 25℃
Testing Circuitry Figure A

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

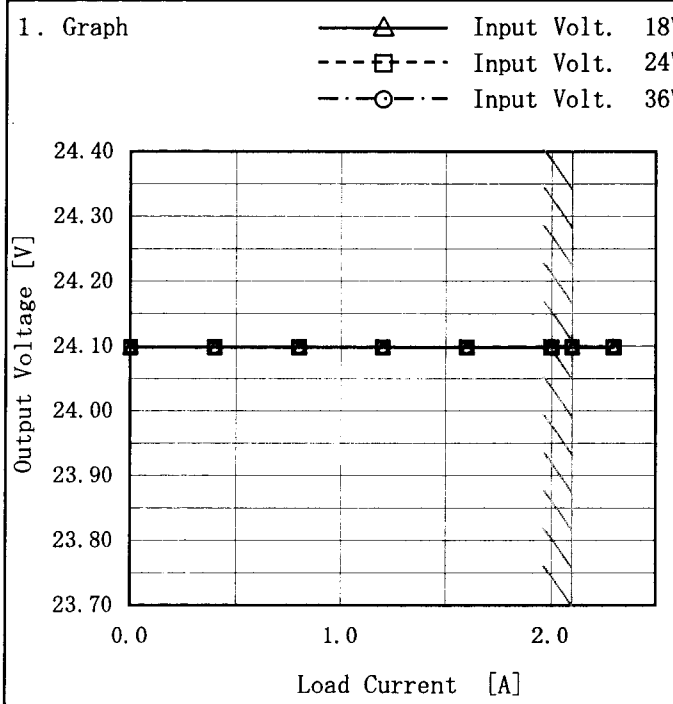
Load Current [A]	Efficiency [%]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.00	—	—	—
0.40	76.6	73.9	69.2
0.80	83.9	82.4	79.0
1.20	86.1	85.5	82.7
1.60	87.2	86.5	84.9
2.00	87.5	87.2	85.9
2.10	87.5	87.4	86.0
2.31	87.5	87.5	86.4
—	—	—	—
—	—	—	—
—	—	—	—

COSEL

Model	CBS502424
Item	Load Regulation 静的負荷変動
Object	+24V2.1A

Temperature 25℃
Testing Circuitry Figure A

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

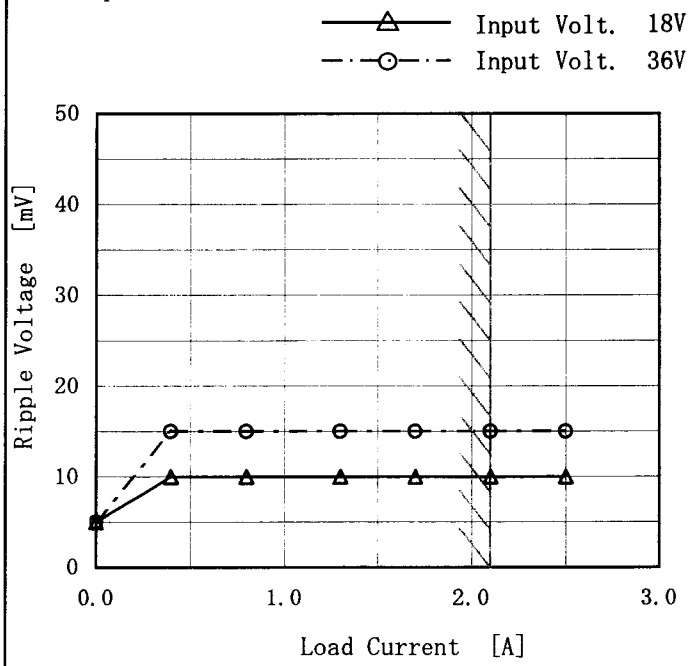
Load Current [A]	Output Voltage [V]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
0.0	24.098	24.098	24.098
0.4	24.098	24.098	24.098
0.8	24.098	24.098	24.098
1.2	24.098	24.098	24.098
1.6	24.098	24.098	24.098
2.0	24.098	24.098	24.099
2.1	24.098	24.098	24.099
2.3	24.098	24.098	24.099
—	—	—	—
—	—	—	—

COSEL

Model	CBS502424
Item	Ripple Voltage (by Load Current) リップル電圧（負荷特性）
Object	+24V2.1A

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。

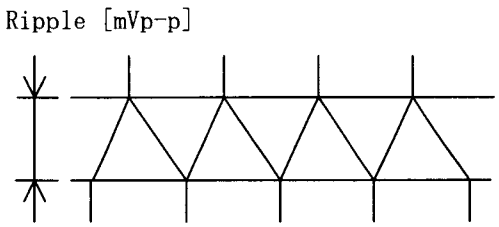


Fig. Complex Ripple Wave Form
図　リップル波形詳細図

2. Values

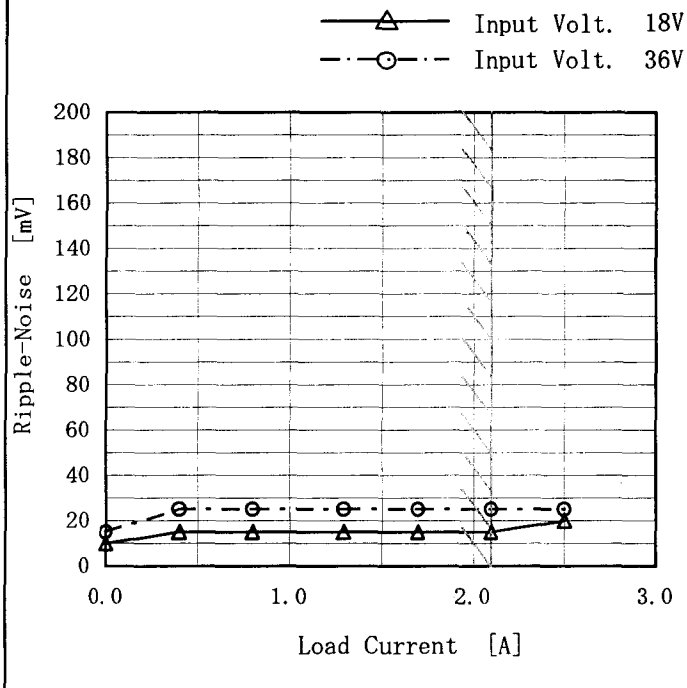
Load Current [A]	Ripple Voltage [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.0	5	5
0.4	10	15
0.8	10	15
1.3	10	15
1.7	10	15
2.1	10	15
2.5	10	15
--	—	—
--	—	—
--	—	—
--	—	—

COSEL

Model	CBS502424
Item	Ripple-Noise リップルノイズ
Object	+24V2.1A

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。

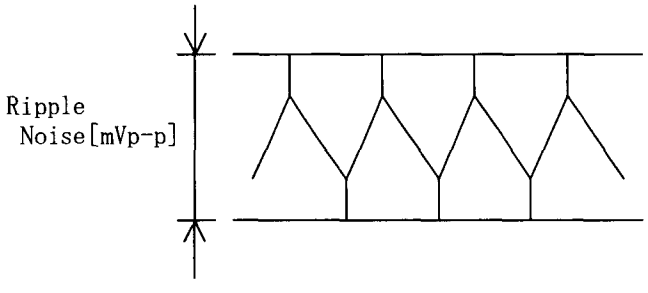


Fig. Complex Ripple Noise Wave Form
図　リップルノイズ波形

2. Values

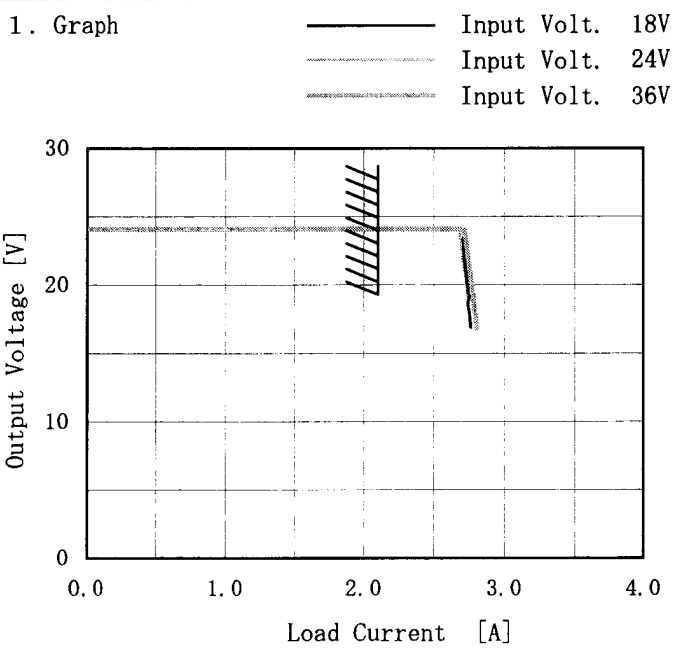
Load Current [A]	Ripple-Noise [mV]	
	Input Volt. 18 [V]	Input Volt. 36 [V]
0.0	10	15
0.4	15	25
0.8	15	25
1.3	15	25
1.7	15	25
2.1	15	25
2.5	20	25
--	—	—
--	—	—
--	—	—
--	—	—

COSEL

Model	CBS502424
Item	Overcurrent Protection 過電流保護
Object	+24V2.1A

Temperature 25℃
Testing Circuitry Figure A

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。

Intermittent operation occurs when the output voltage is from 16.8V to 0V.
16.8V～0V間は、間欠モードとなる。

2. Values

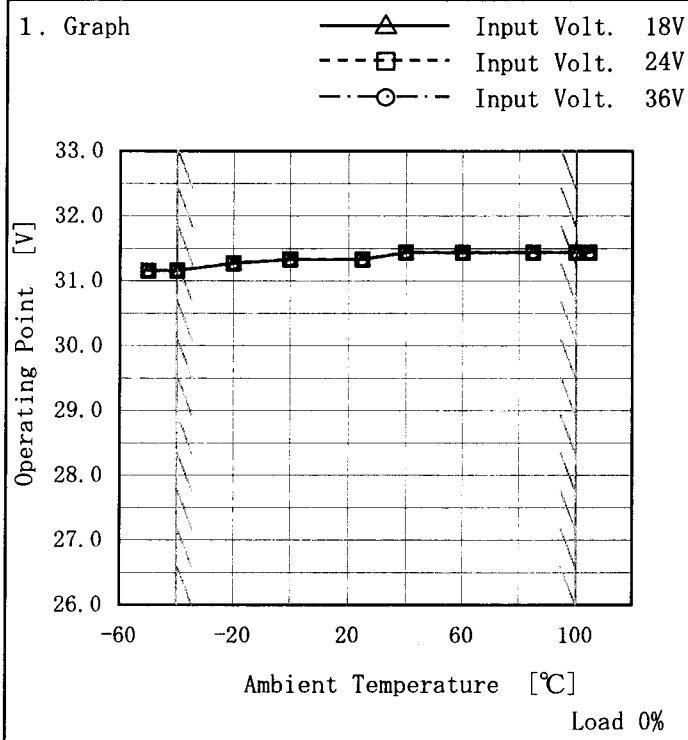
Output Voltage [V]	Load Current [A]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
24.0	2.17	2.17	2.13
22.8	2.71	2.70	2.73
21.6	2.72	2.71	2.75
19.2	2.75	2.74	2.78
16.8	2.76	2.76	2.80
--	—	—	—
--	—	—	—
--	—	—	—
--	—	—	—
--	—	—	—
--	—	—	—
--	—	—	—

COSEL

Model	CBS502424
Item	Overvoltage Protection 過電圧保護
Object	+24V2.1A

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。

2. Values

Ambient Temperature [℃]	Operating Point [V]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-50	31.16	31.16	31.16
-40	31.16	31.16	31.16
-20	31.27	31.27	31.27
0	31.33	31.33	31.33
25	31.33	31.33	31.33
40	31.44	31.44	31.44
60	31.44	31.44	31.44
85	31.44	31.44	31.44
100	31.44	31.44	31.44
105	31.44	31.44	31.44
--	—	—	—

COSEL

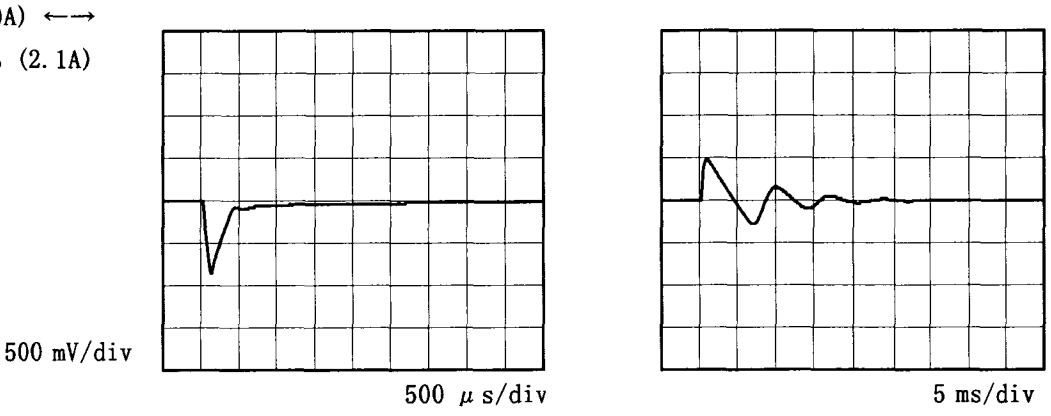
Model	CBS502424		
Item	Dynamic Load Response 動的負荷変動	Temperature Testing Circuitry	25℃ Figure A
Object	+24V2.1A		

Input Volt. 24 V

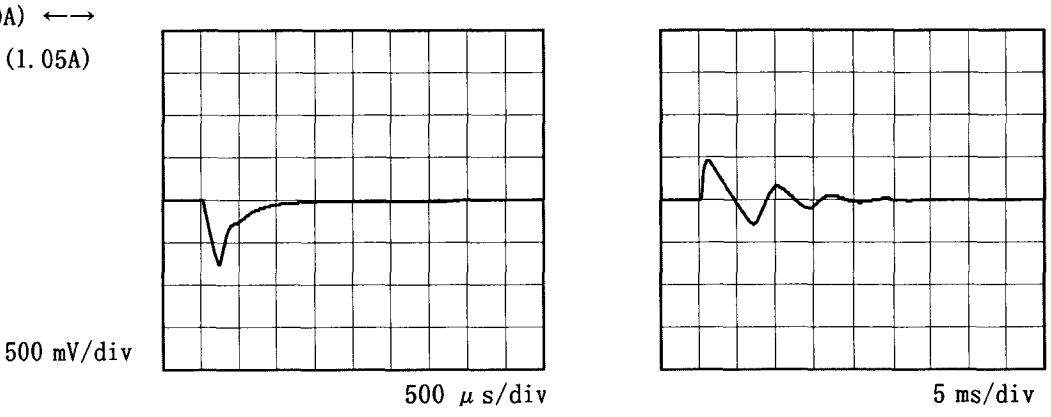
Cycle 1000 ms

Load Current

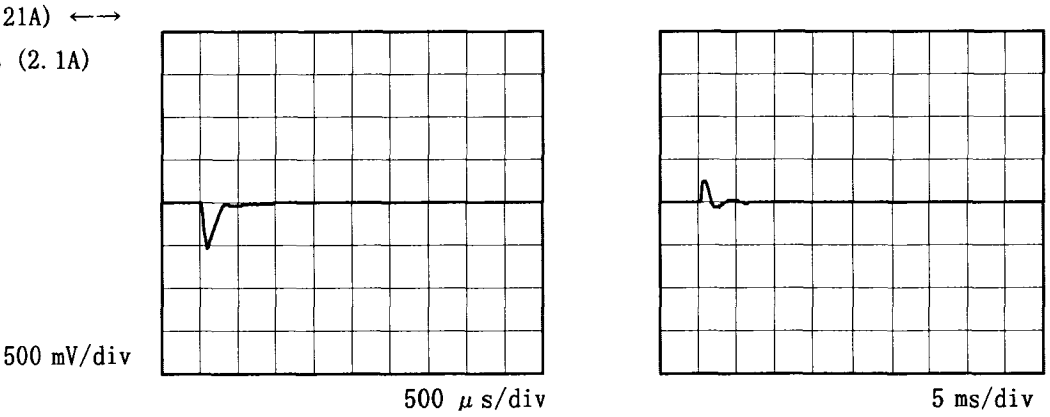
Min. Load (0A) ←→
Load 100% (2.1A)



Min. Load (0A) ←→
Load 50% (1.05A)



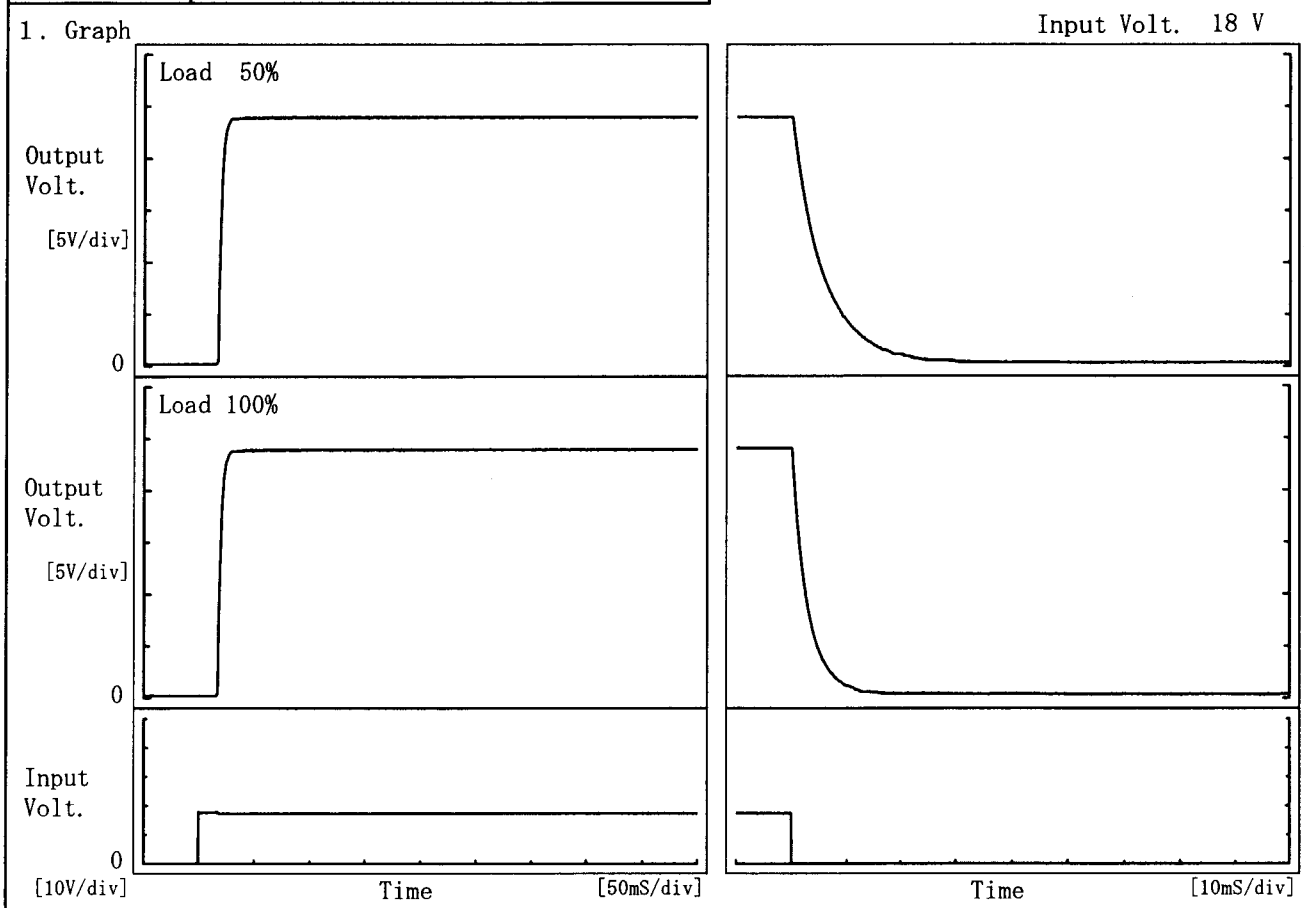
Load 10% (0.21A) ←→
Load 100% (2.1A)



COSEL

Model	CBS502424		
Item	Rise and Fall Time 立上り、立下り時間	Temperature Testing Circuitry	25℃ Figure A
Object	+24V2.1A		

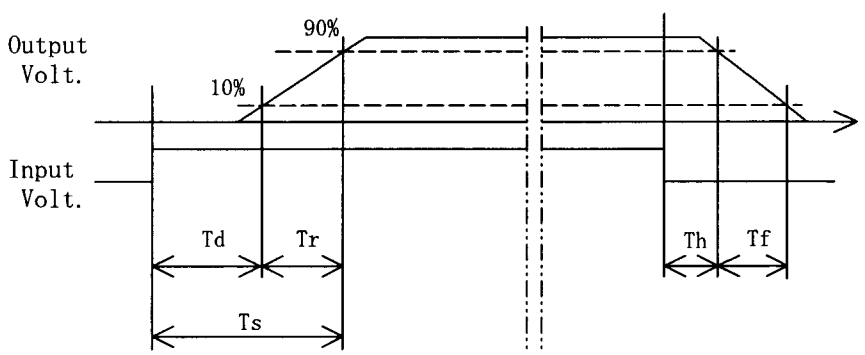
1. Graph



2. Values

[mS]

Load \ Time	T d	T r	T s	T h	T f
50 %	17.0	6.3	23.3	0.7	12.9
100 %	17.0	6.3	23.3	0.4	6.7

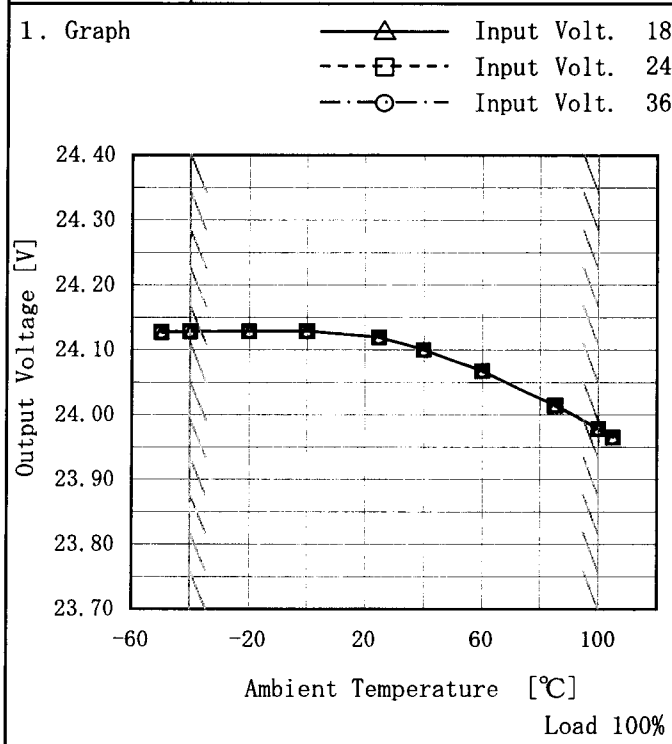


COSEL

Model	CBS502424
Item	Ambient Temperature Drift 周囲温度変動
Object	+24V2.1A

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。

2. Values

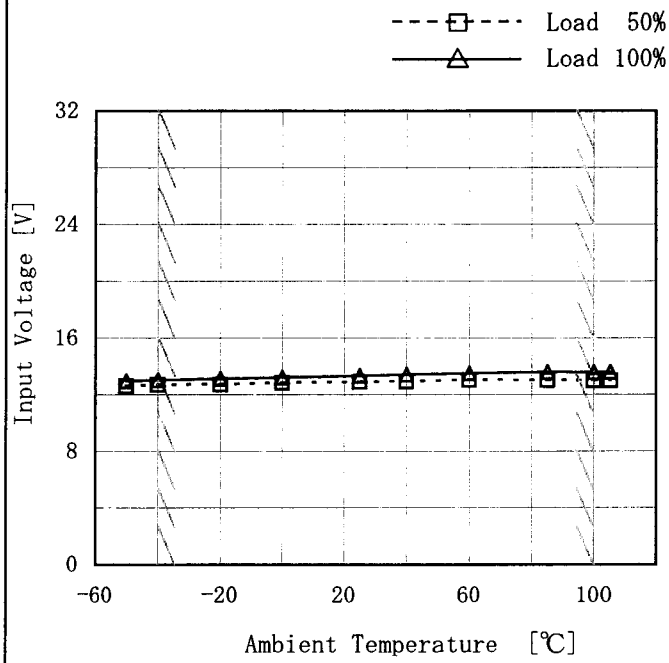
Ambient Temperature [℃]	Output Voltage [V]		
	Input Volt. 18[V]	Input Volt. 24[V]	Input Volt. 36[V]
-50	24.127	24.128	24.127
-40	24.129	24.129	24.129
-20	24.129	24.129	24.129
0	24.129	24.129	24.129
25	24.120	24.119	24.119
40	24.101	24.100	24.100
60	24.068	24.068	24.067
85	24.015	24.014	24.014
100	23.979	23.978	23.978
105	23.966	23.965	23.965
--	—	—	—

COSEL

Model	CBS502424
Item	Minimum Input Voltage for Regulated Output Voltage 最低レギュレーション電圧
Object	+24V2.1A

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。

2. Values

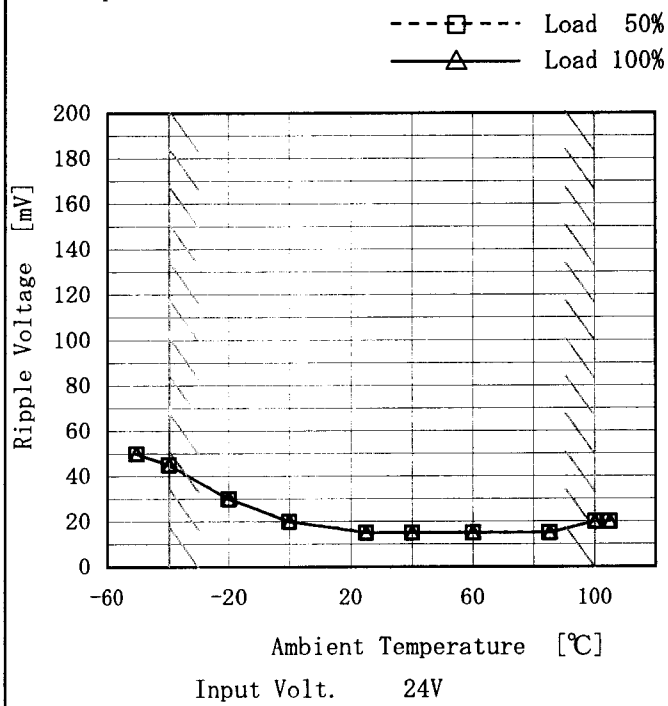
Ambient Temperature [℃]	Input Voltage [V]	
	Load 50%	Load 100%
-50	12.7	13.0
-40	12.7	13.1
-20	12.8	13.2
0	12.9	13.3
25	13.0	13.4
40	13.0	13.5
60	13.1	13.6
85	13.1	13.7
100	13.0	13.6
105	13.0	13.6
—	—	—

COSEL

Model	CBS502424
Item	Ripple Voltage (by Ambient Temp.) リップル電圧（周囲温度特性）
Object	+24V2.1A

Testing Circuitry Figure A

1. Graph



Input Volt. 24V

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

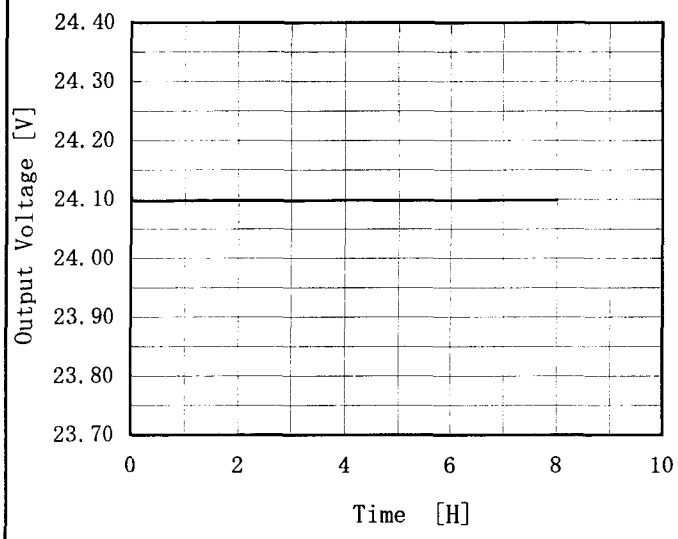
Ambient Temperature [℃]	Ripple Voltage [mV]	
	Load 50%	Load 100%
-50	50	50
-40	45	45
-20	30	30
0	20	20
25	15	15
40	15	15
60	15	15
85	15	15
100	20	20
105	20	20
---	—	—

COSEL

Model	CBS502424
Item	Time Lapse Drift 経時ドリフト
Object	+24V2.1A

Temperature 25℃
Testing Circuitry Figure A

1. Graph



Input Volt. 24V
Load 100%

2. Values

Time since start [H]	Output Voltage [V]
0.0	24.106
0.5	24.097
1.0	24.098
2.0	24.098
3.0	24.098
4.0	24.099
5.0	24.099
6.0	24.099
7.0	24.099
8.0	24.099

COSEL

Model	CBS502424
Item	Output Voltage Accuracy 定電圧精度
Object	+24V2.1A

Testing Circuitry Figure A

1. 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 : -40 ～ 100℃

Input Voltage : 18 ～ 36V

Load Current : 0 ～ 2.1A

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

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

1. 定電圧精度

周囲温度、入力電圧、負荷電流を下記仕様内で、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 : -40 ～ 100℃

入力電圧 : 18 ～ 36V

負荷電流 : 0 ～ 2.1A

* 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

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

2. Values

Item	Temperature [℃]	Input Voltage[V]	Output		Output Voltage Accuracy	
			Current[A]	Voltage[V]	Value [mV]	Ration [%]
Maximum Voltage	-40	36	2.1	24.129	±77	±0.3
Minimum Voltage	100	36	0	23.975		

COSEL

Model	CBS502424
Item	Condense 結露特性
Object	+24V2.1A

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]	24.112	Input Volt.:24V, Load Current.:2.1A
Line Regulation [mV]	2	Input Volt.:18～36V, Load Current.:2.1A
Load Regulation [mV]	1	Input Volt.:24V, Load Current.:0～2.1A

COSEL

Model	CBS502424		
Item	Line Noise Tolerance 入力雑音耐量	Temperature Testing Circuitry	25℃ Figure B
Object	+24V2.1A		

1. Conditions

・Input Voltage : 24 V
・Pulse Voltage : 2000 V
・Pulse Cycle : 16.7 mS
・Pulse Input Duration : 1 min. or more
・Load : 100 %

2. Results

Pulse Width [nS]	MODE	POLARITY	No protection failure should occur 保護回路の誤動作がない	DC-like Regulation of Output Voltage 出力電圧の直流的変動
50	COMMON	+	OK	no fluctuation
		−	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		−	OK	no fluctuation
1000	COMMON	+	OK	no fluctuation
		−	OK	no fluctuation
	NORMAL	+	OK	no fluctuation
		−	OK	no fluctuation

COSEL

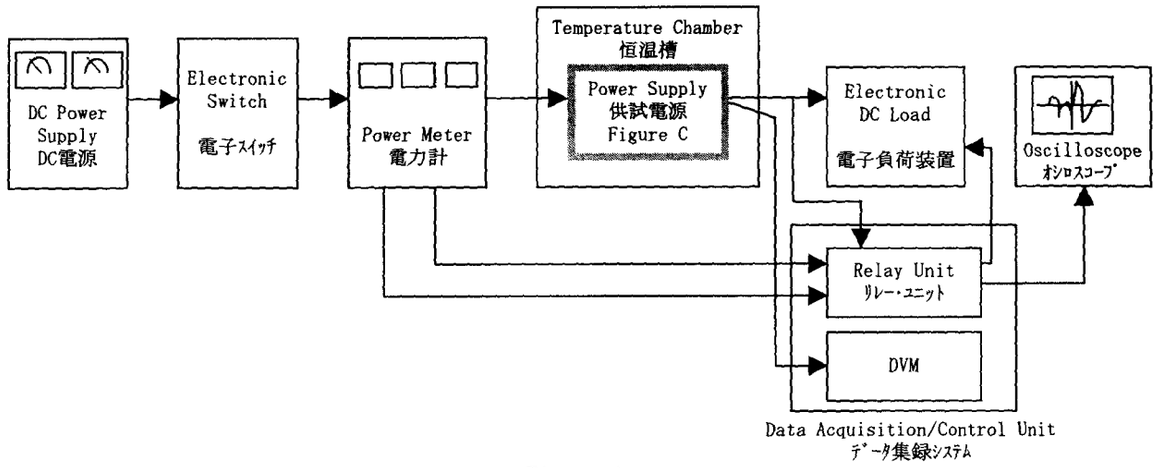


Figure A

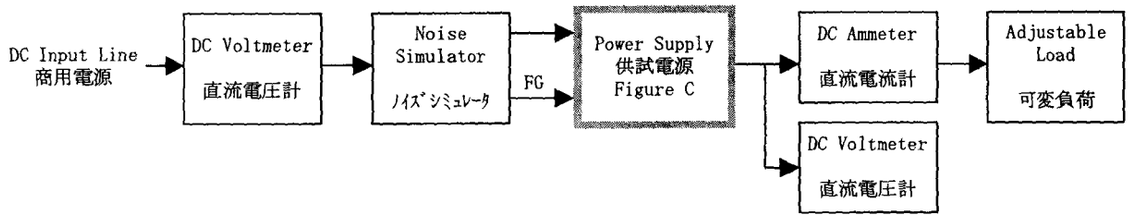
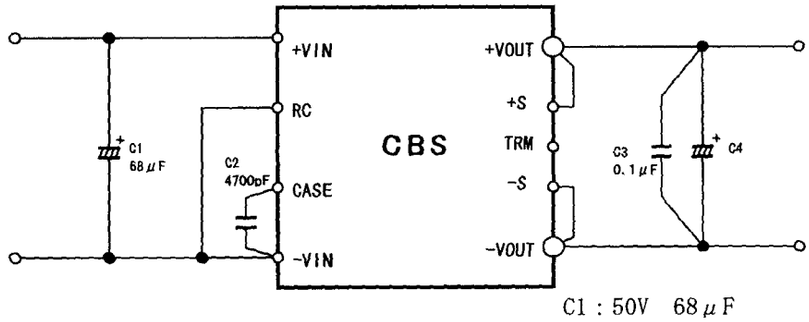


Figure B



C1 : 50V 68μF
C2 : 4700pF
C3 : 50V 0.1μF
C4 : 35V 220μF ×2 (-40℃≦T_B≦-20℃)
35V 220μF (-20℃<T_B≦100℃)
T_B : Base Plate Temp.

Figure C