

CN50A24-*

EVALUATION DATA

型式データ

DWG.NO. C259-53-01/50		
承認	査閲	担当
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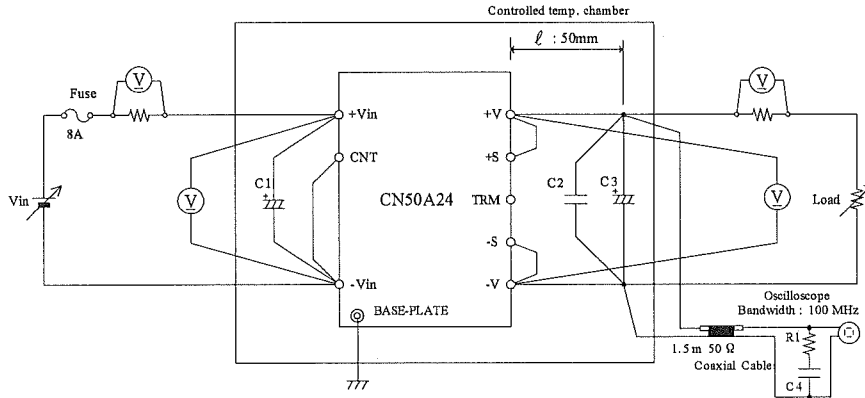
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使用記号 Terminology used

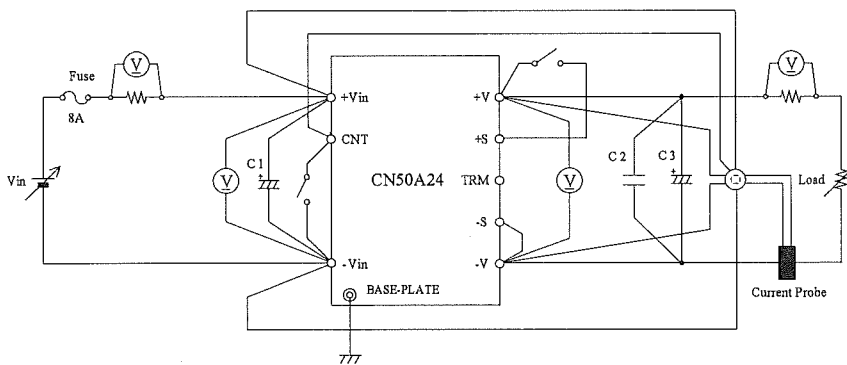
Definition		
V_{in}	入力電圧	Input voltage
V_o	出力電圧	Output voltage
V_{cnt}	CNT電圧	CNT voltage
I_{in}	入力電流	Input current
I_o	出力電流	Output current
T_{bp}	ベースプレート温度	Base-plate temperature
T_a	周囲温度	Ambient temperature
f	周波数	Frequency

1. 評価方法 Evaluation Method
 1.1 測定回路 Measurement Circuits

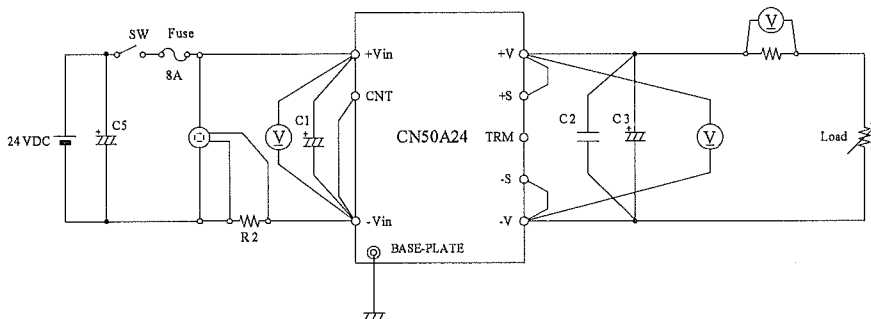
- (1) 静特性、過電流保護特性、出力リップル・ノイズ波形
 Steady state characteristics, Over current protection (OCP) characteristics and Output ripple and noise waveform



- (2) 過渡応答、過電圧保護特性、その他
 Dynamic response, Over voltage protection (OVP) characteristics and Other characteristics



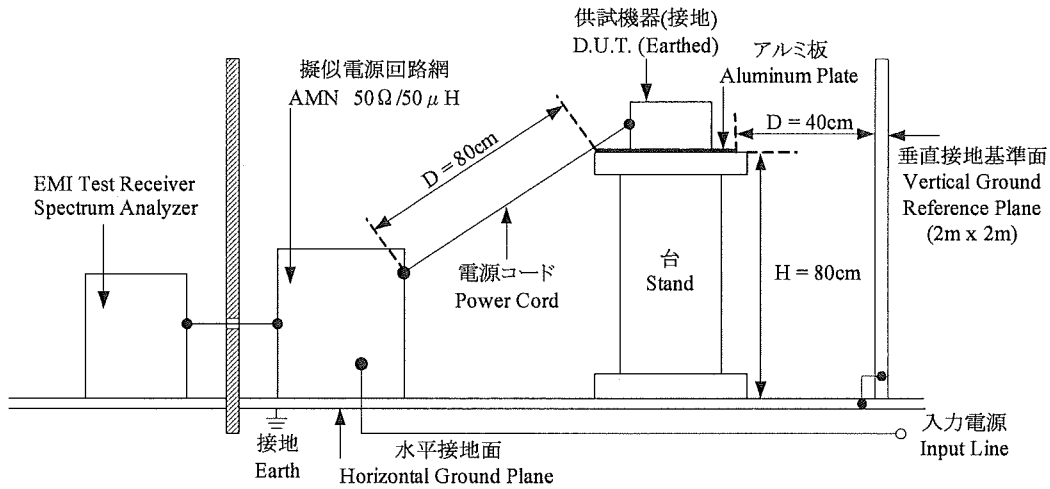
- (3) 入力サージ電流 (突入電流) 特性
 Inrush current characteristics



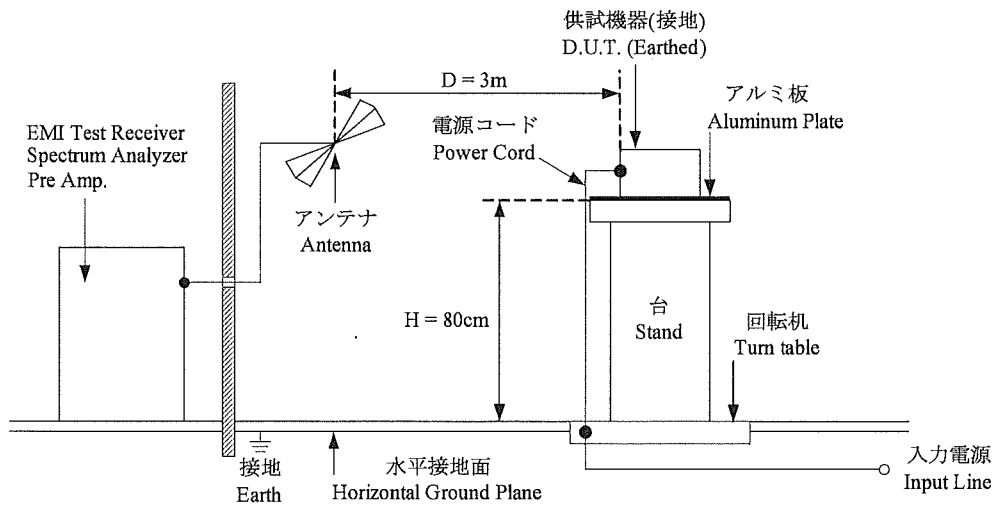
- | | |
|---------------------------------------|------------------------------------|
| C1 : 470uF Electrolytic Capacitor | C4 : 4700pF Ceramic Capacitor |
| C2 : 2.2μF Ceramic Capacitor | C5 : 8000uF Electrolytic Capacitor |
| C3 : 5V-1000uF Electrolytic Capacitor | R1 : 50 Ω |
| : 12V-470uF Electrolytic Capacitor | R2 : 0.01 Ω |
| : 24V-220uF Electrolytic Capacitor | |

(4) EMI特性 Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ) Conducted Emission Noise



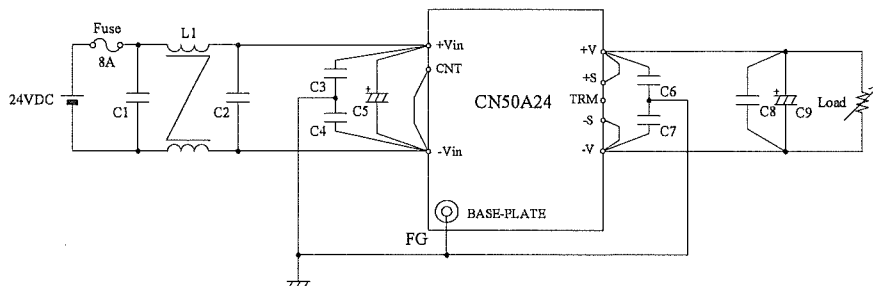
(b) 雑音電界強度(輻射ノイズ) Radiated Emission Noise



*入出力ケーブルとしてシールドケーブルを使用
Shielded cable used to input and output cable.

VCCI class A対応アプリケーションシステム

VCCI class A application system



C1,C2 : 2.2μF Film Capacitor

C3,C4 : 4700pF Ceramic Capacitor

C5 : 470μF Electrolytic Capacitor

C6,C7 : 3300pF Ceramic Capacitor x 2parallel

C8 : 2.2μF Ceramic Capacitor

C9 : 5V-1000μF Electrolytic Capacitor

: 12V-470μF Electrolytic Capacitor

: 24V-220μF Electrolytic Capacitor

L1 : 1.0mH

1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	AC POWER SUPPLY	TAKASAGO	AA-2000XG
2	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
3	DUMMY LOAD	PCN	RHF250 SERIES
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	SHUNT RESISTER	YOKOGAWA ELECT.	2215
6	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
7	DIGITAL PHOSPHOR OSCILSCOPE	TEKTRONIX	TDS3012
8	DIGITAL STORAGE OSCILSCOPE	LECROY	LT364L
9	CURRENT PROBE	LECROY	AP015
10	EMI TEST RECEIVER SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
11	PRE AMP.	SONOMA	310N
12	AMN	SCHWARZBECK	NNLK8121
13	ANTENNA(BI-LOG ANTENNA)	TESEQ	CBL6111D

2. 特性データ Characteristics

2.1 静特性 Steady state data

(1) 入力変動、負荷変動、温度変動 Line regulation, Load regulation and Temperature drift

5V

1. Line regulation and Load regulation Condition Tbp : 25°C

Io \ Vin	14.4VDC	24VDC	36VDC	Line regulation	
0%	4.998V	4.998V	4.998V	0mV	0.000%
50%	4.998V	4.998V	4.998V	0mV	0.000%
100%	4.997V	4.997V	4.997V	0mV	0.000%
Load regulation	1mV	1mV	1mV		
	0.020%	0.020%	0.020%		

2. Temperature drift Conditions Vin : 24VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	5.001V	4.997V	4.996V	5mV	0.100%

12V

1. Line regulation and Load regulation Condition Tbp : 25°C

Io \ Vin	14.4VDC	24VDC	36VDC	Line regulation	
0%	12.017V	12.017V	12.017V	0mV	0.000%
50%	12.017V	12.017V	12.017V	0mV	0.000%
100%	12.016V	12.016V	12.016V	0mV	0.000%
Load regulation	1mV	1mV	1mV		
	0.009%	0.009%	0.009%		

2. Temperature drift Conditions Vin : 24VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	12.028V	12.016V	12.007V	21mV	0.175%

(1) 入力変動、負荷変動、温度変動 Line regulation, Load regulation and Temperature drift

24V

1. Line regulation and Load regulation Condition Tbp : 25°C

Io \ Vin	14.4VDC	24VDC	36VDC	Line regulation	
0%	23.932V	23.932V	23.932V	0mV	0.000%
50%	23.932V	23.932V	23.932V	0mV	0.000%
100%	23.931V	23.932V	23.932V	1mV	0.005%
Load regulation	1mV	0mV	0mV		
	0.005%	0.000%	0.000%		

2. Temperature drift

Conditions Vin : 24VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	23.916V	23.932V	23.972V	56mV	0.233%

(2) 出力電圧、出力リップル・ノイズ電圧 対 入力電圧

Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions I_o : 100 %

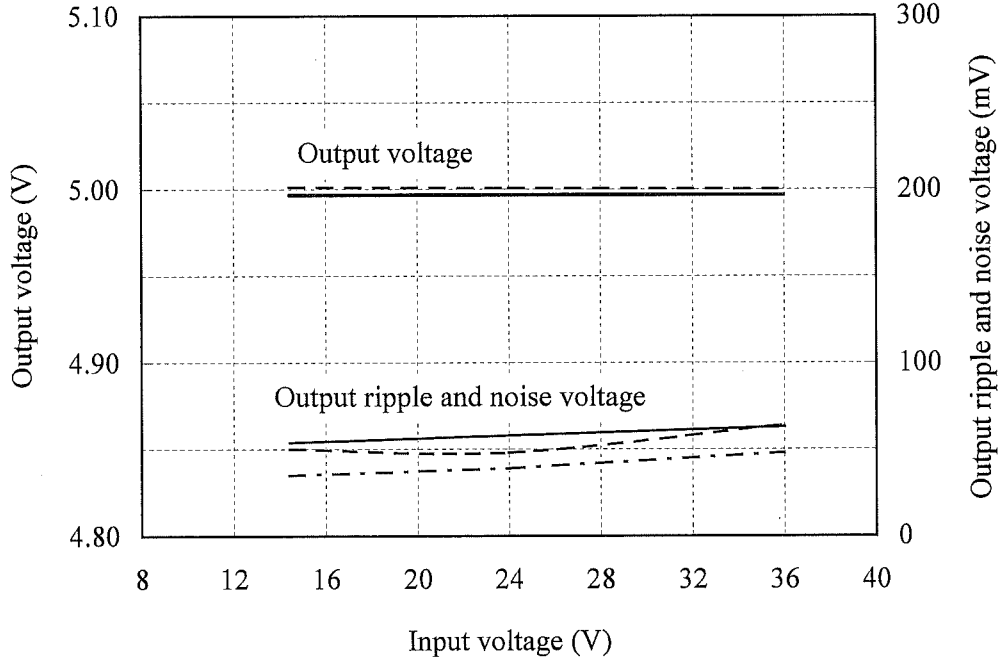
T_{bp} : -40 °C

: 25 °C

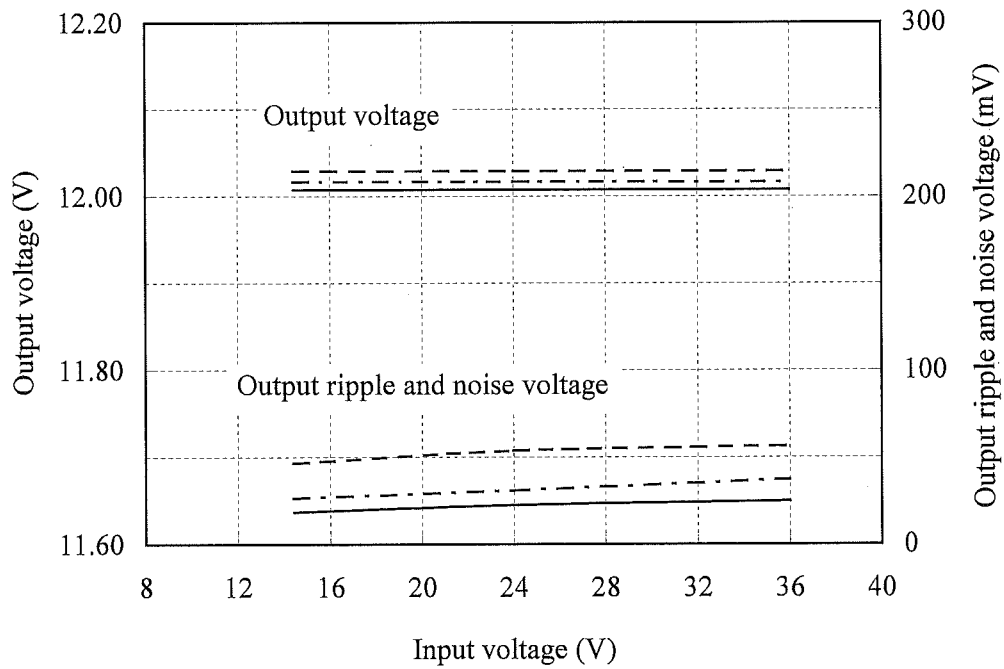
: 100 °C



5V



12V

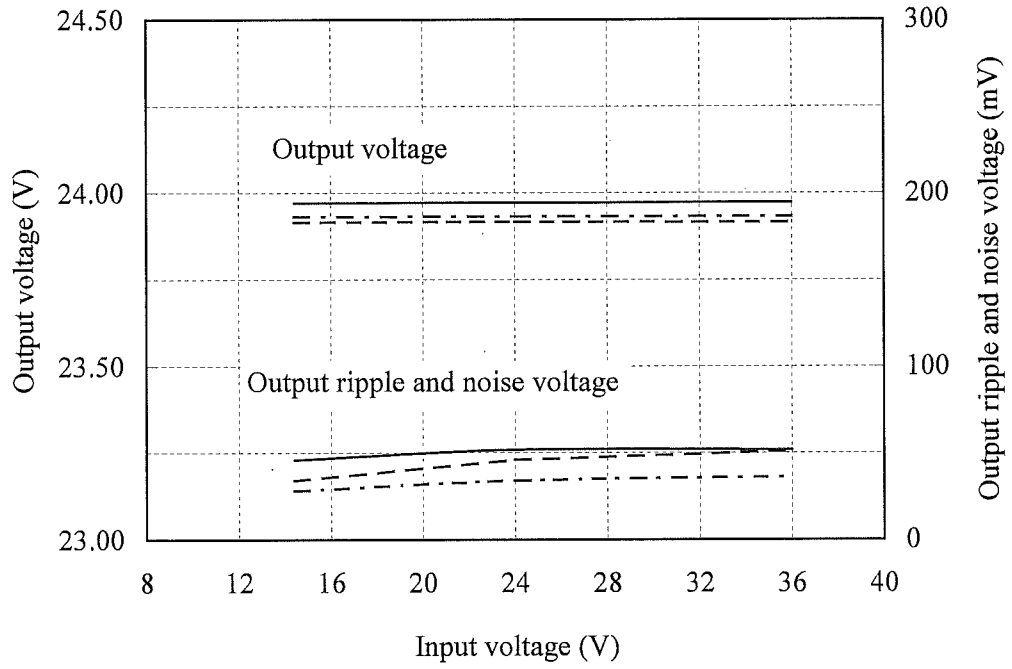


(2) 出力電圧、出力リップル・ノイズ電圧 対 入力電圧

Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions I_o : 100 %
 T_{bp} : -40 °C -----
 : 25 °C - · - · -
 : 100 °C _____

24V

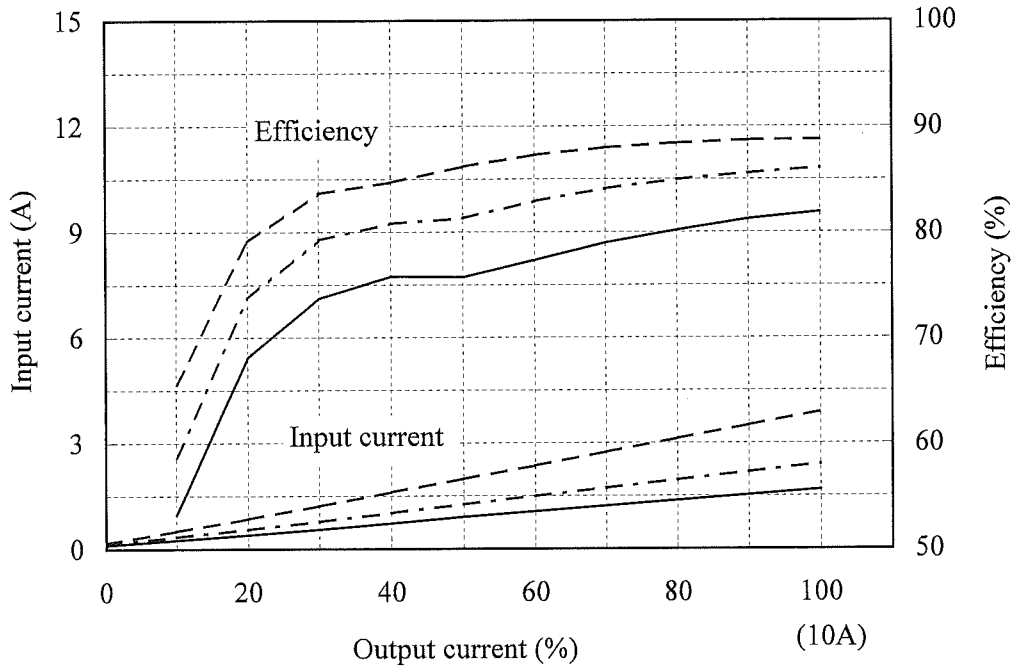


(3) 入力電流、効率 対 出力電流

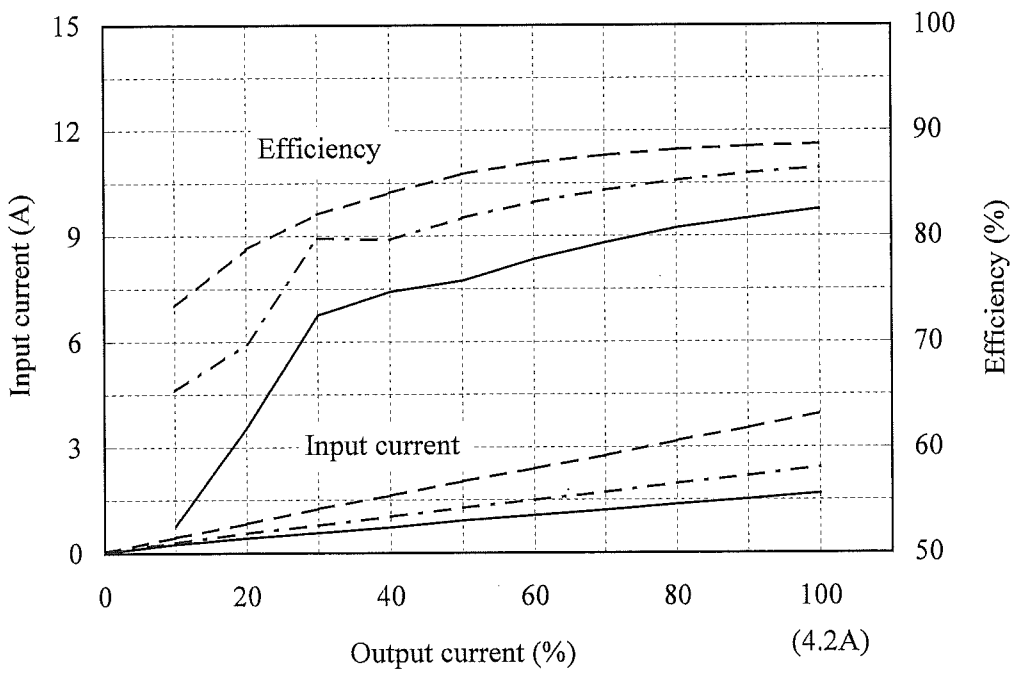
Input current and Efficiency vs. Output current

Conditions Vin : 14.4 VDC ---
 : 24 VDC - - -
 : 36 VDC ———
 Tbp : 25 °C

5V



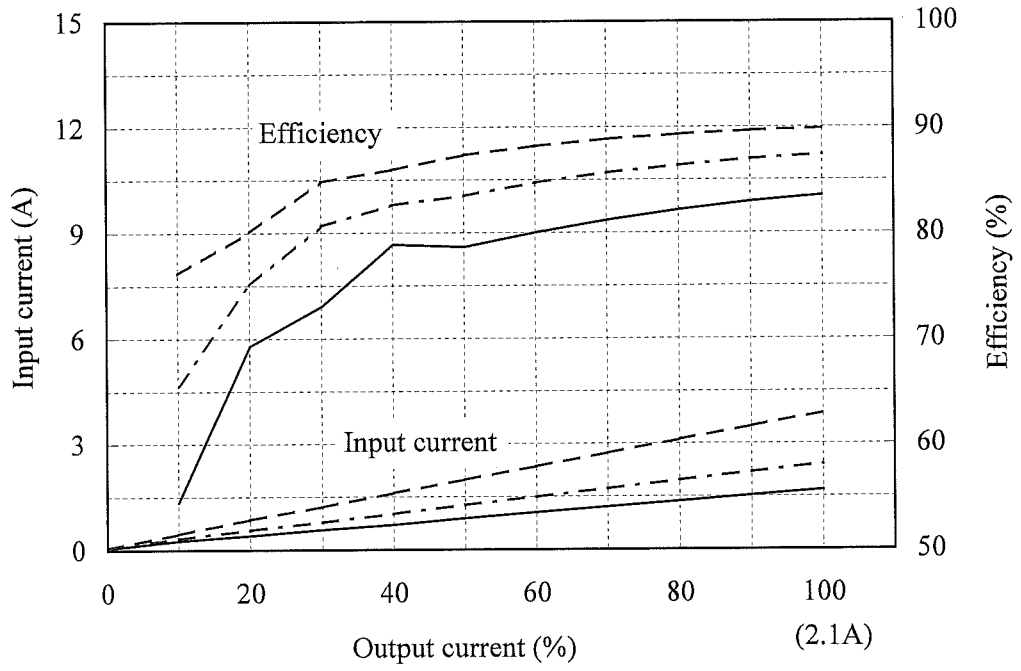
12V



(3) 入力電流、効率 対 出力電流
 Input current and Efficiency vs. Output current

Conditions Vin : 14.4 VDC -----
 : 24 VDC -.-.-.-.
 : 36 VDC _____
 Tbp : 25 °C

24V

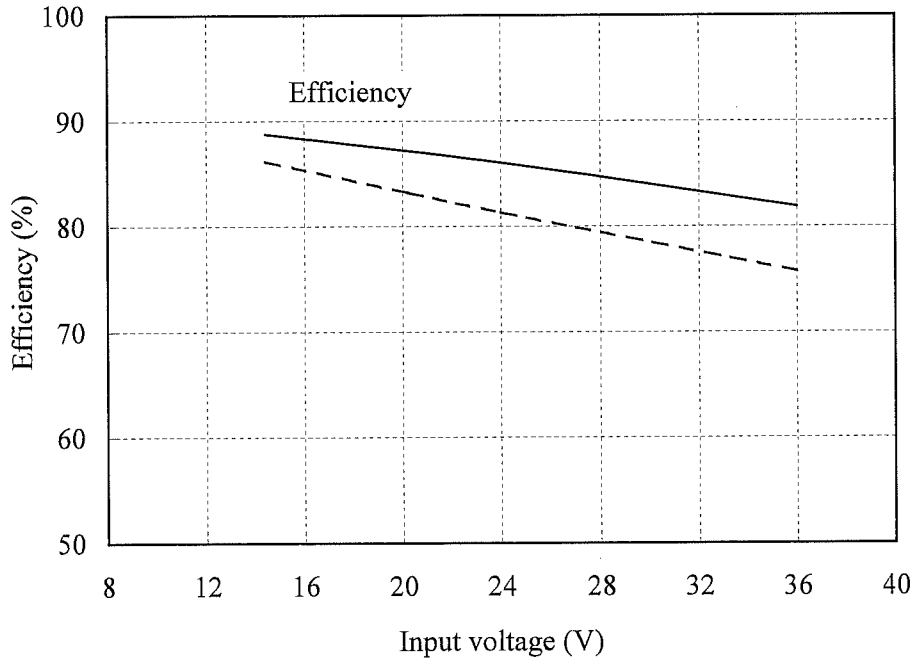


(4) 効率 対 入力電圧

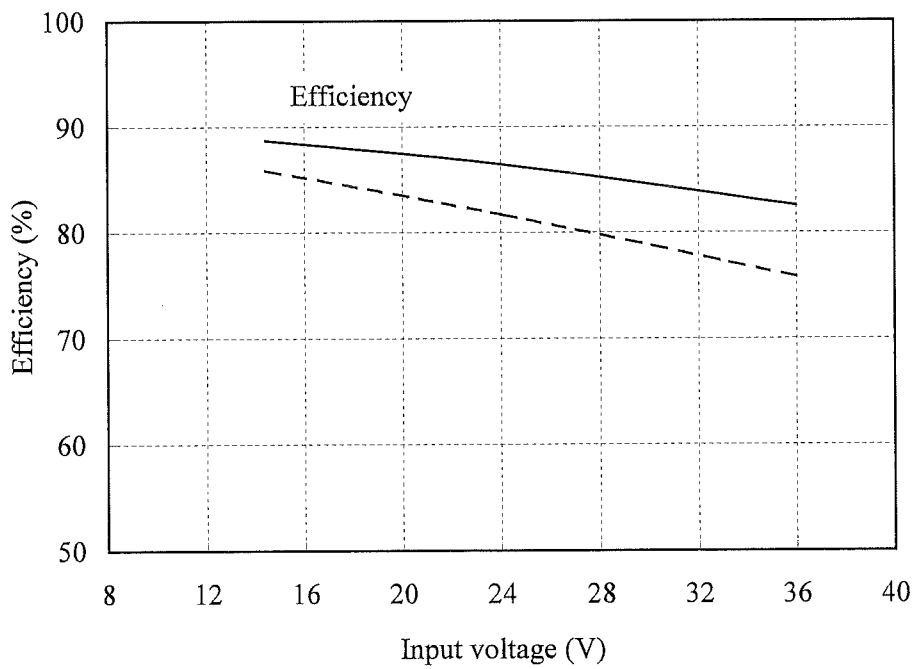
Efficiency vs. Input voltage

Conditions I_o : 50 %
 : 100 %
 T_{bp} : 25 °C

5V



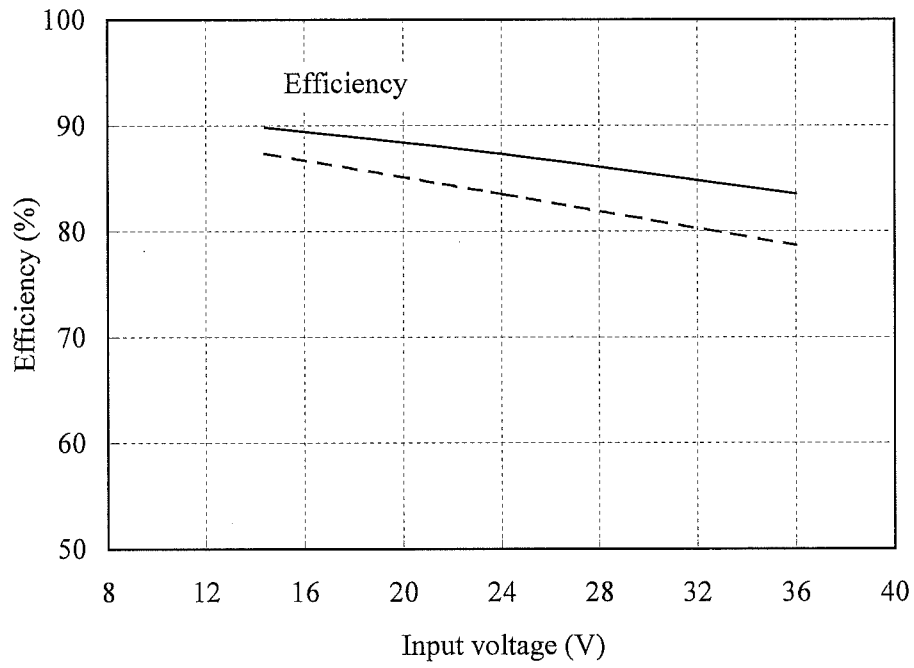
12V



(4) 効率 対 入力電圧
Efficiency vs. Input voltage

Conditions Io : 50 % -----
 : 100 % —————
 Tbp : 25 °C

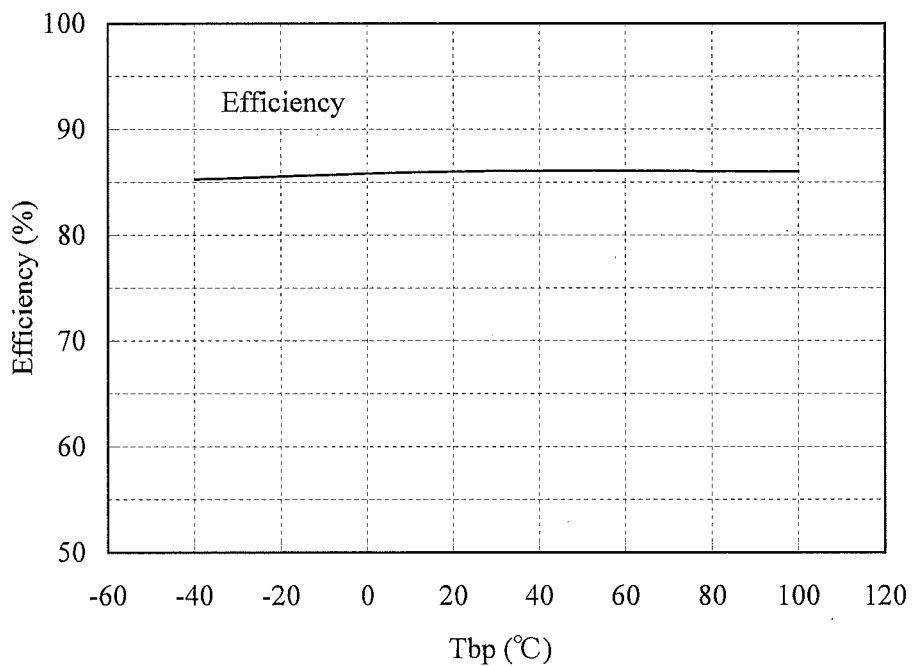
24V



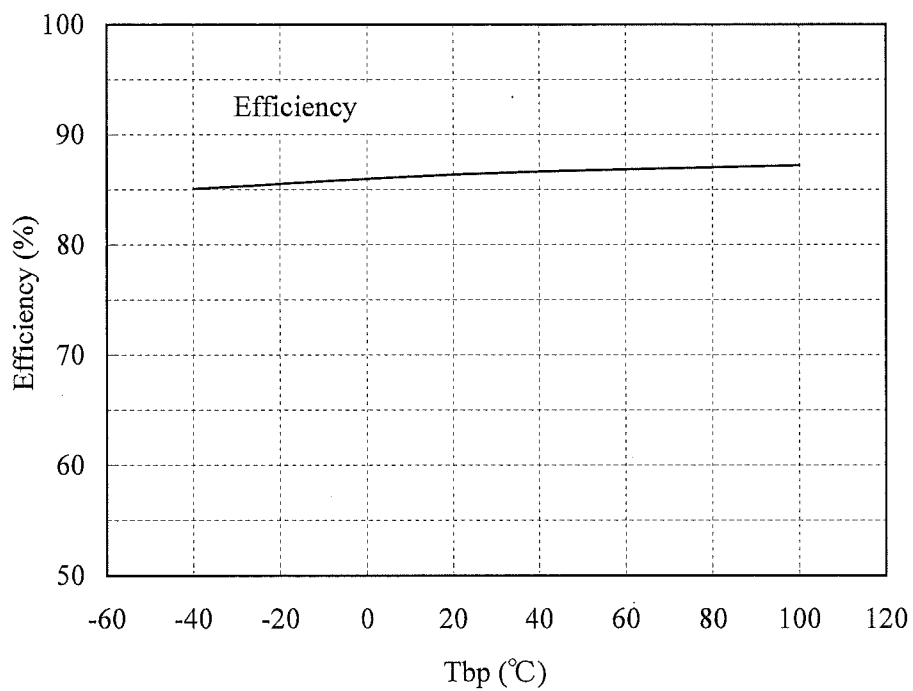
(5) 効率対 ベースプレート温度
Efficiency vs. Base-plate temperature

Conditions Vin : 24 VDC
Io : 100 %

5V



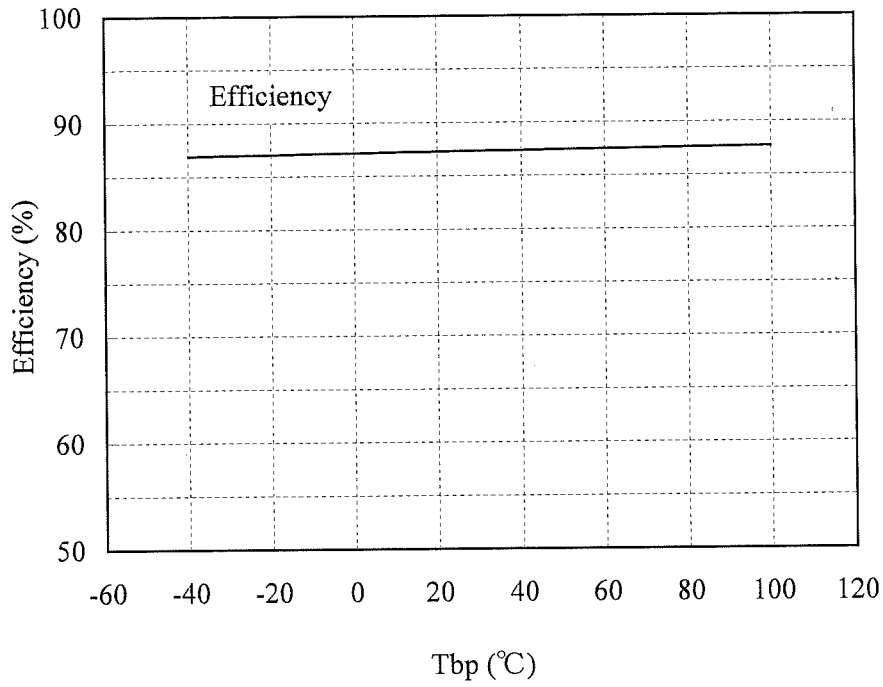
12V



(5) 効率 対 ベースプレート温度
Efficiency vs. Base-plate temperature

Conditions Vin : 24 VDC
Io : 100 %

24V

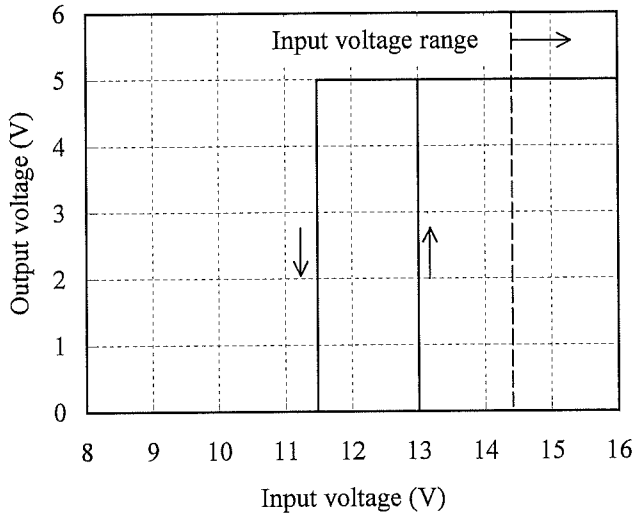


(6) 起動、停止電圧特性
Start and Stop voltage characteristics

出力電圧 対 入力電圧
Output voltage vs. Input voltage

Conditions I_o : 100 %
 T_{bp} : 25 °C

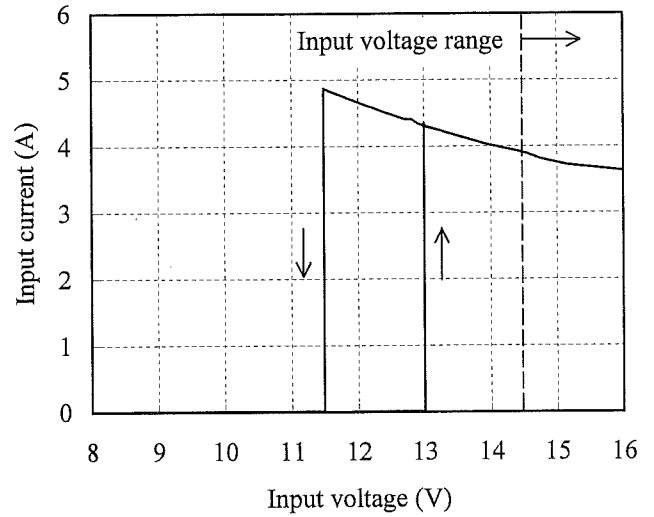
5V



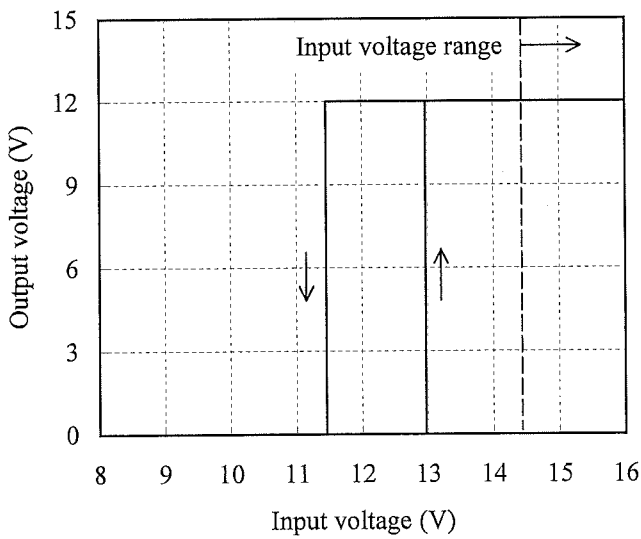
入力電流 対 入力電圧
Input current vs. Input voltage

Conditions I_o : 100 %
 T_{bp} : 25 °C

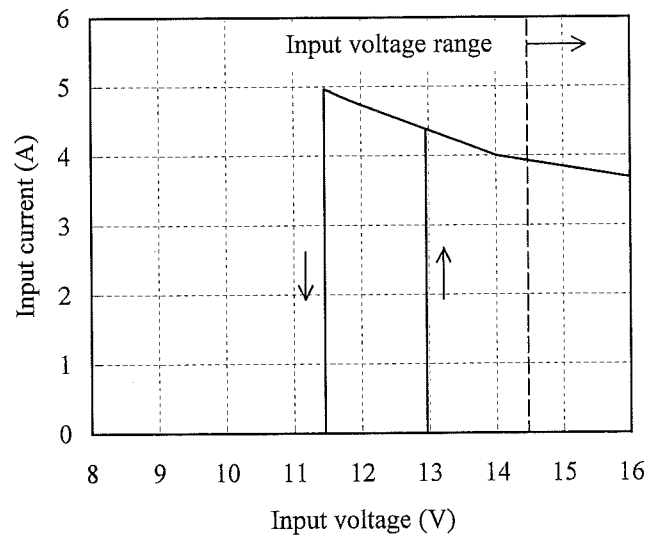
5V



12V



12V

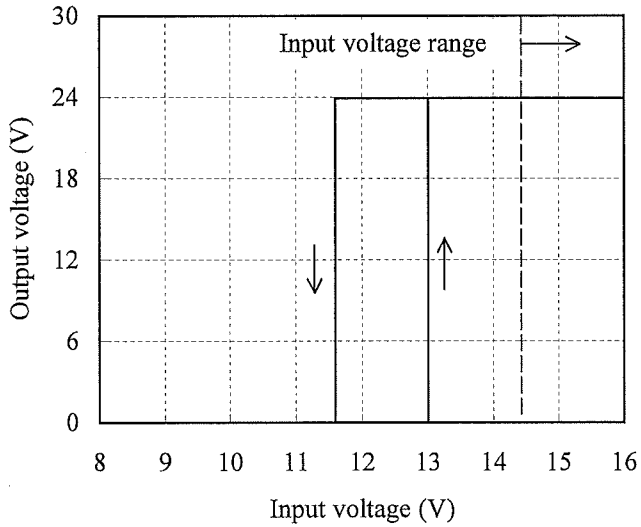


(6) 起動、停止電圧特性
Start and Stop voltage characteristics

出力電圧 対 入力電圧
Output voltage vs. Input voltage

Conditions I_o : 100 %
 T_{bp} : 25 °C

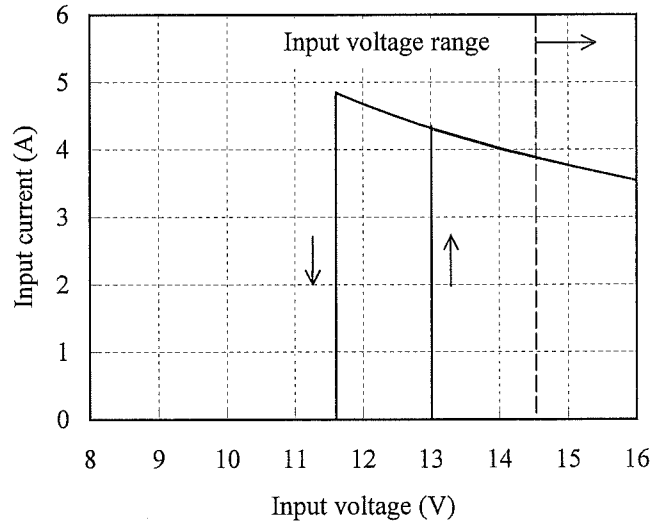
24V



入力電流 対 入力電圧
Input current vs. Input voltage

Conditions I_o : 100 %
 T_{bp} : 25 °C

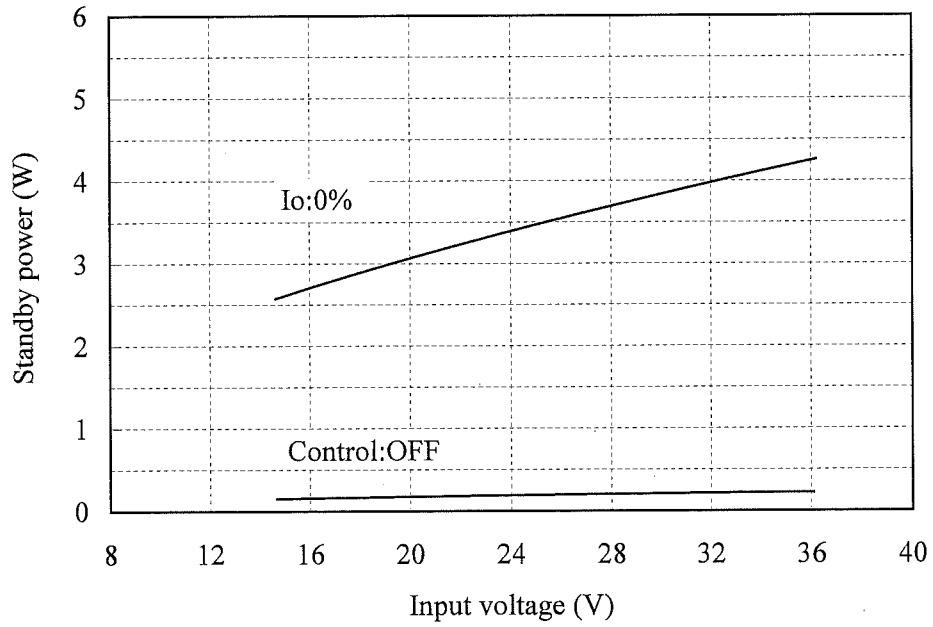
24V



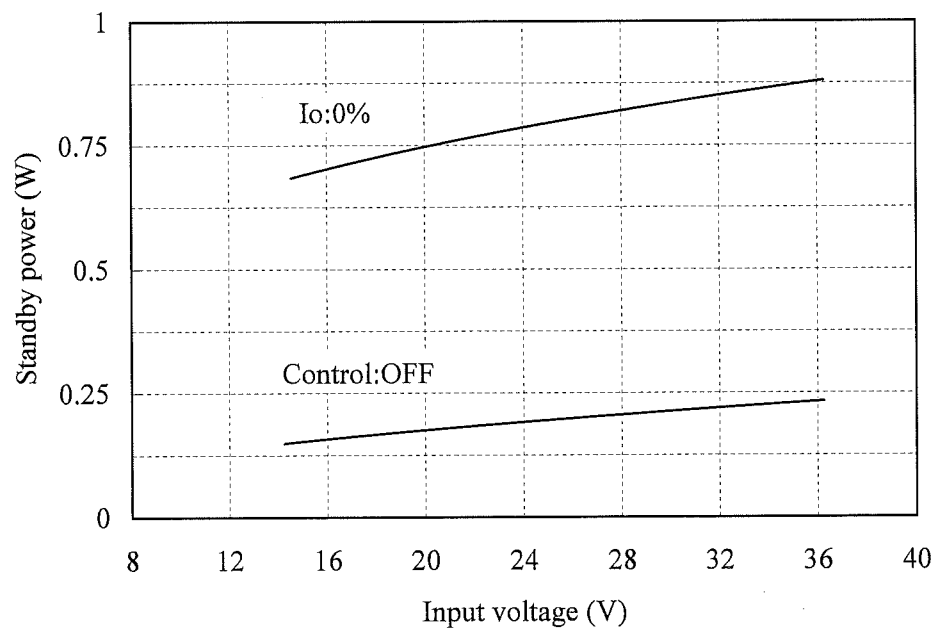
2.2 待機電力特性
Standby power characteristics

Condition Tbp : 25 °C

5V



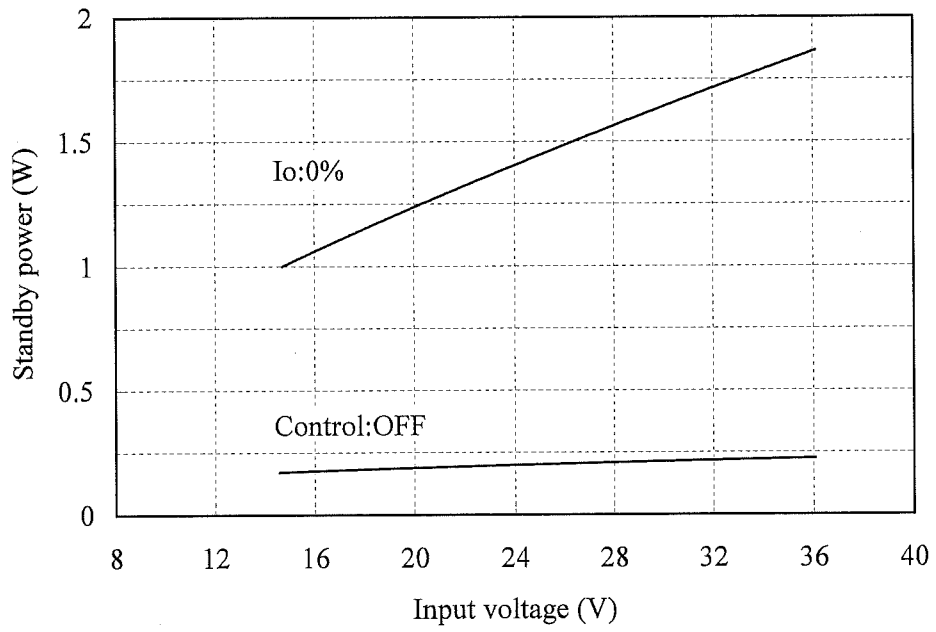
12V



2.2 待機電力特性
Standby power characteristics

Condition Tbp : 25 °C

24V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

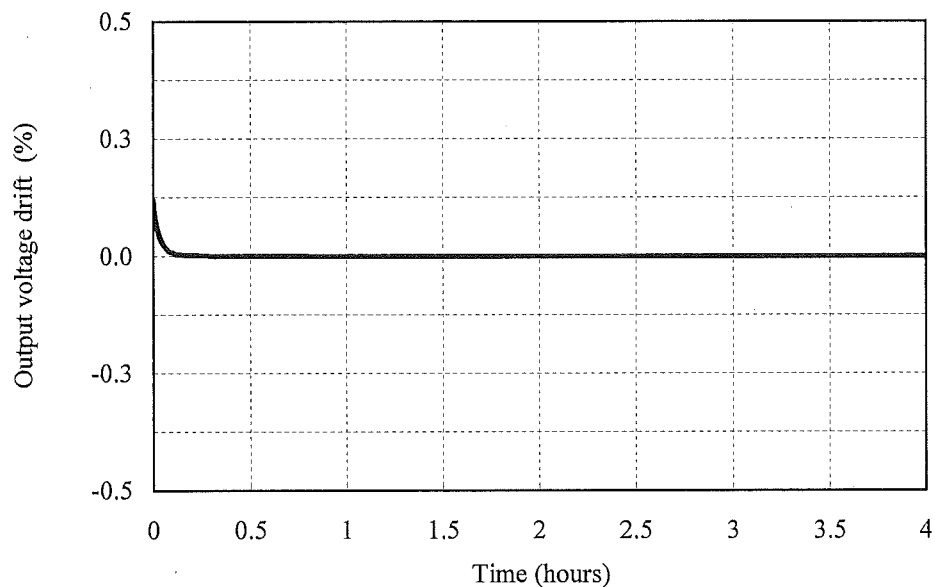
Conditions

Vin : 24 VDC

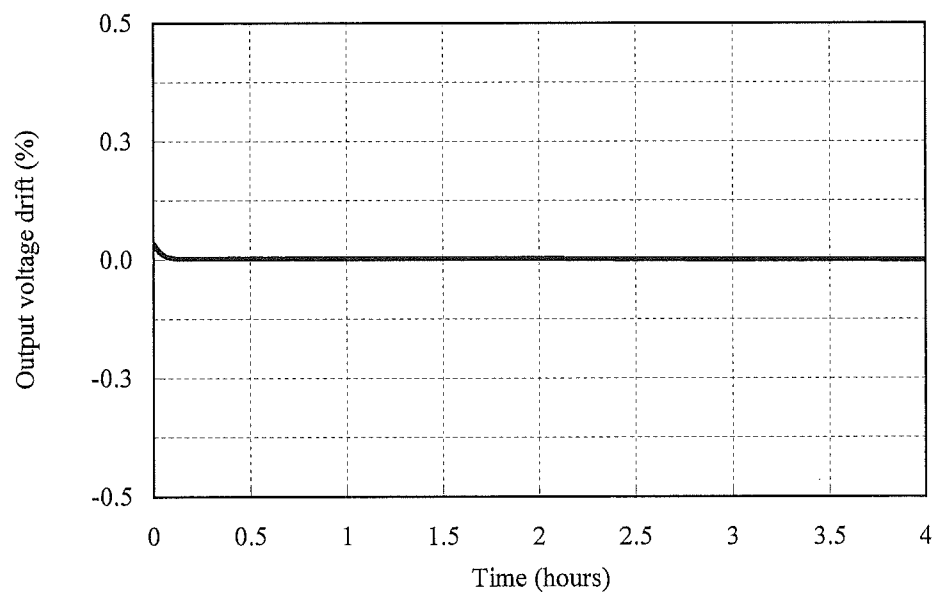
Io : 100 %

Ta : 25 °C

5V



12V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

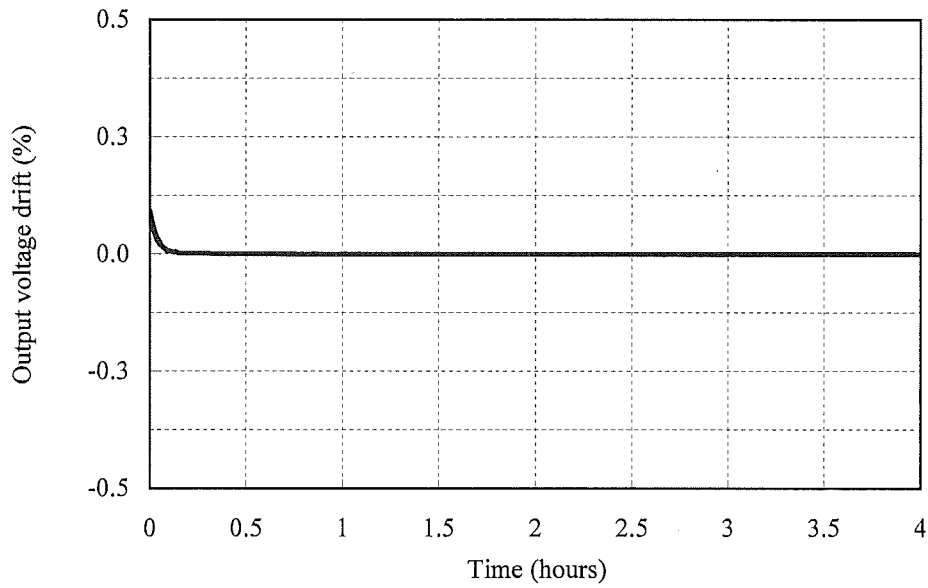
Conditions

Vin : 24 VDC

Io : 100 %

Ta : 25 °C

24V



2.4 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

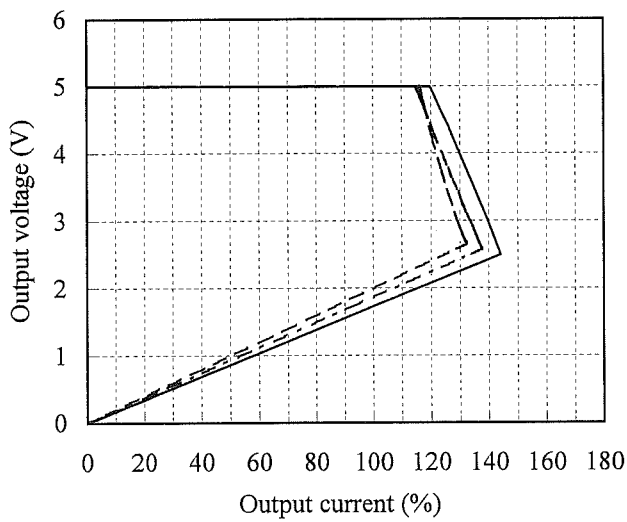
Conditions Vin : 14.4 VDC -----
 : 24 VDC - - - - -
 : 36 VDC ————
 Tbp : 25 °C

ベースプレート温度依存性

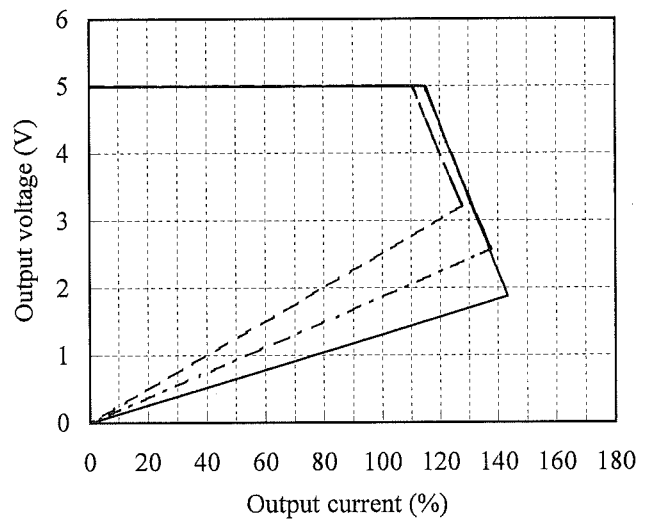
Base-plate temperature dependence

Conditions Vin : 24 VDC
 Tbp : -40 °C -----
 : 25 °C - - - - -
 : 100 °C ————

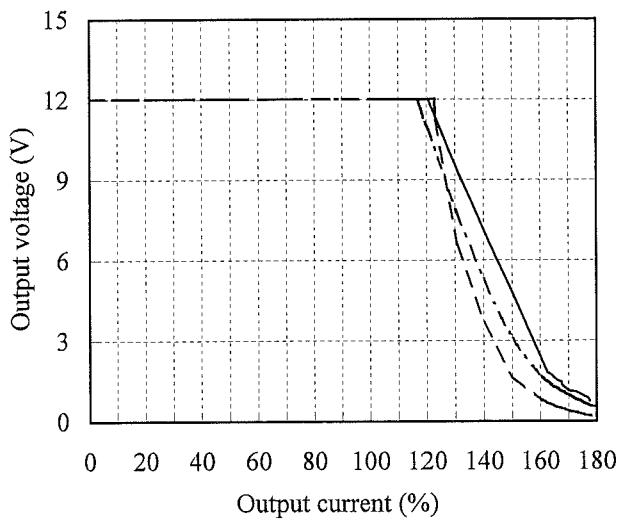
5V



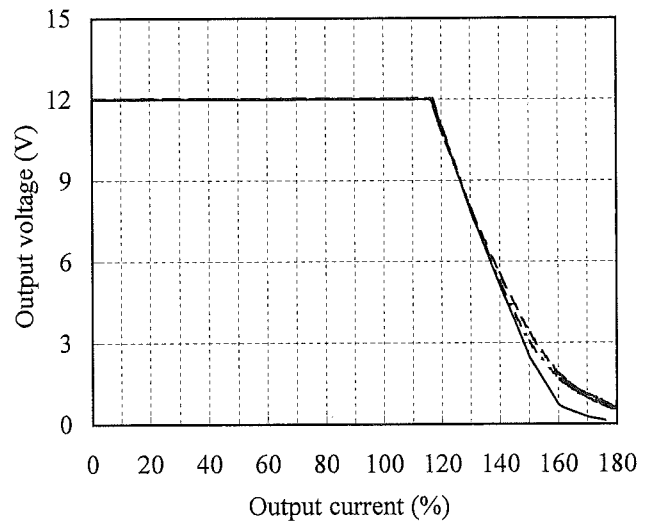
5V



12V



12V



2.4 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

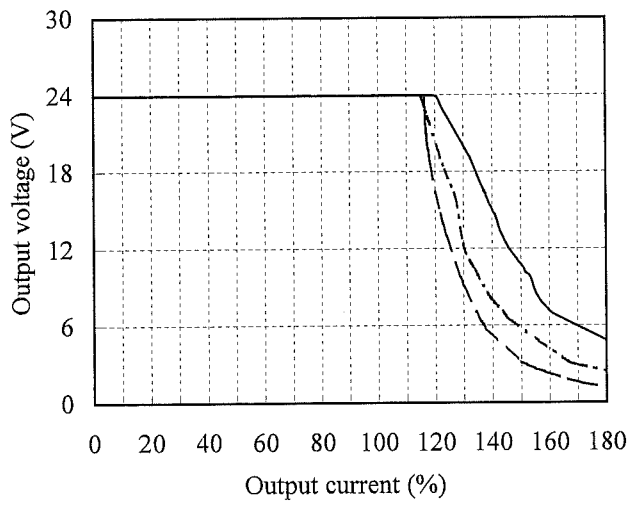
Conditions Vin : 14.4 VDC -----
 : 24 VDC - - - - -
 : 36 VDC ————
 Tbp : 25 °C

ベースプレート温度依存性

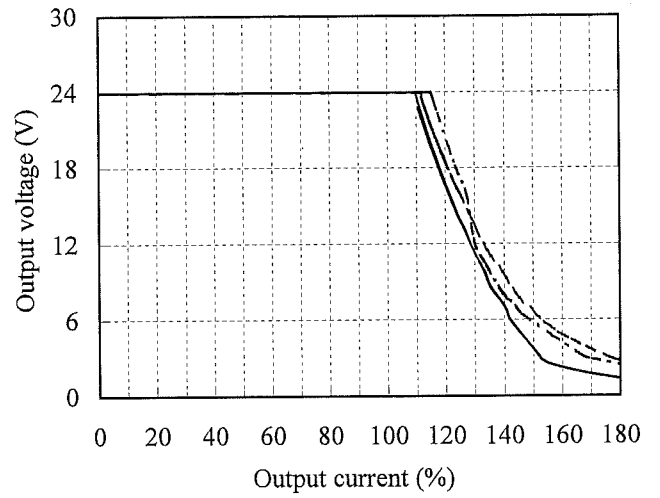
Base-plate temperature dependence

Conditions Vin : 24 VDC
 Tbp : -40 °C -----
 : 25 °C - - - - -
 : 100 °C ————

24V



24V



2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

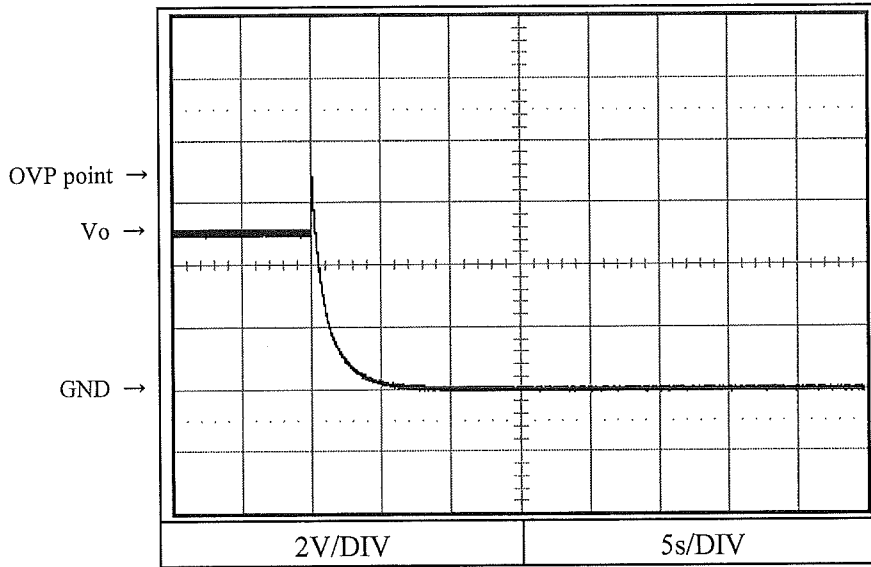
Conditions

Vin : 24 VDC

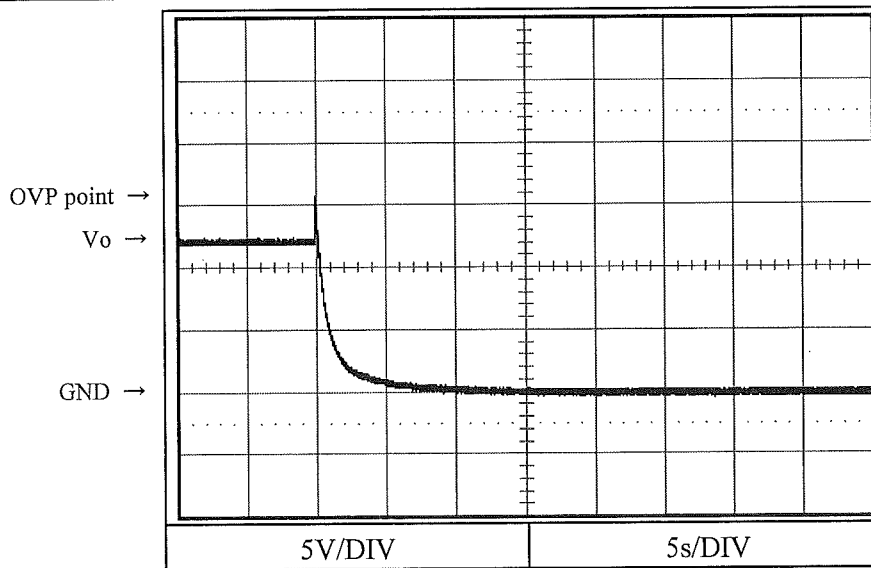
Io : 0 %

Tbp : 25 °C

5V



12V



2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

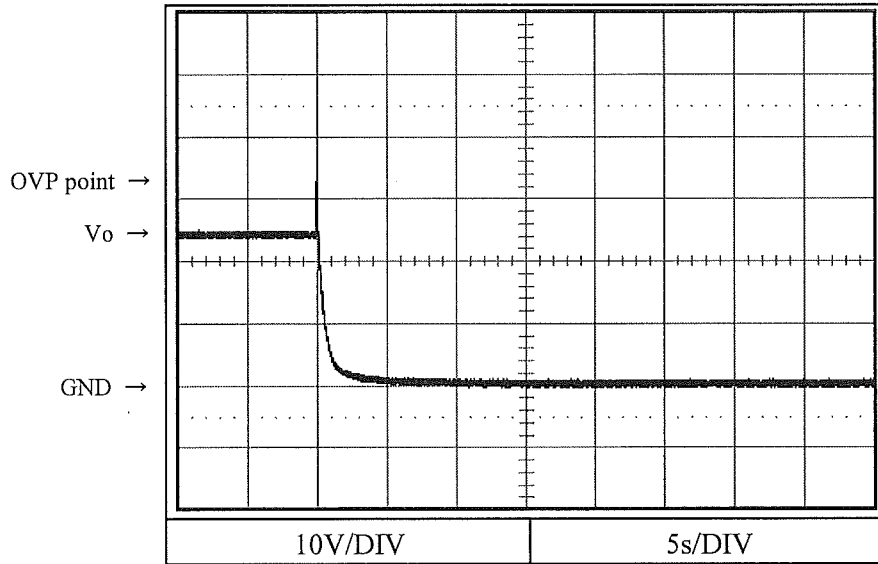
Conditions

Vin : 24 VDC

Io : 0 %

Tbp : 25 °C

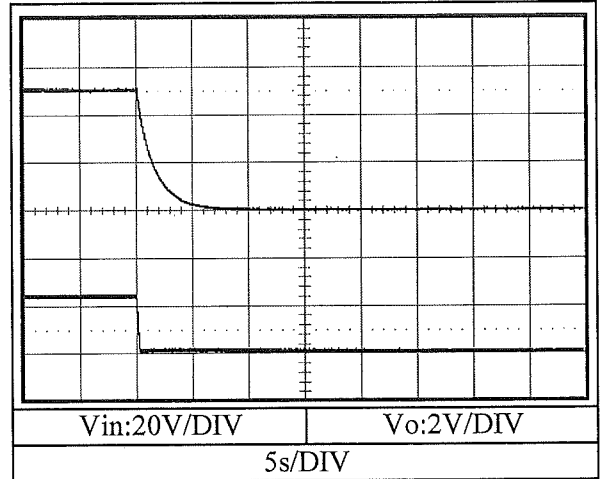
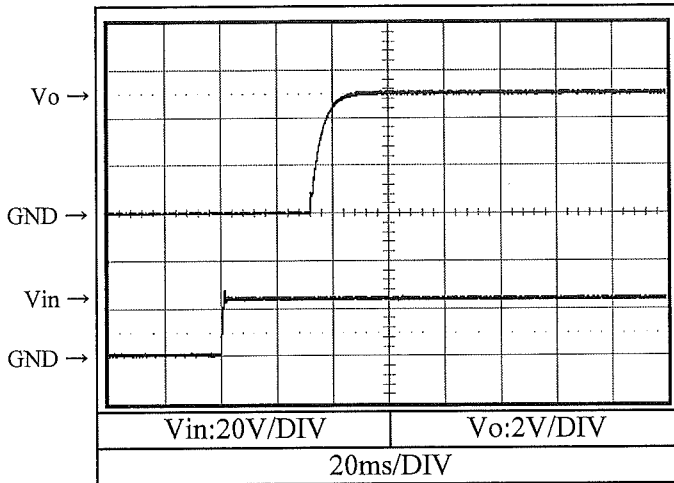
24V



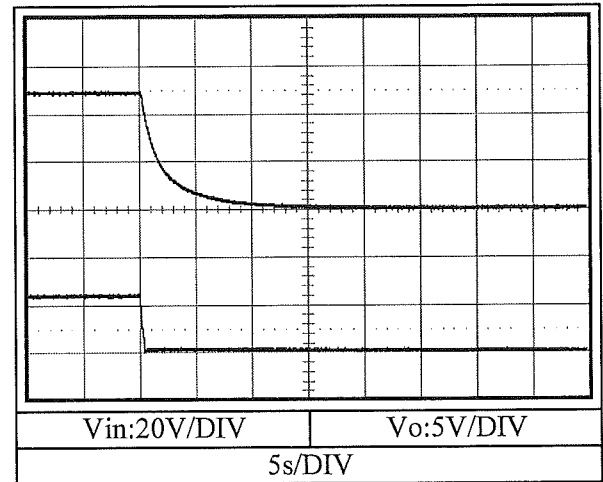
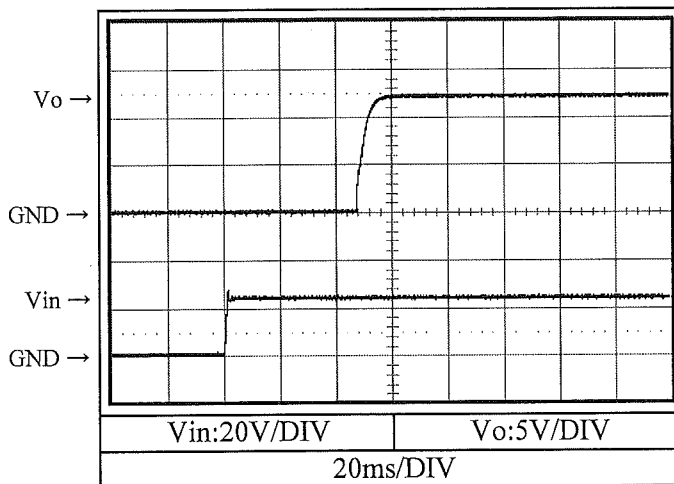
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 0 %
Tbp : 25 °C

5V



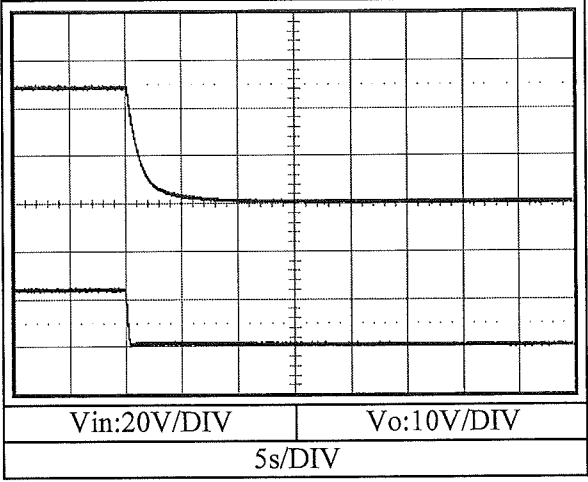
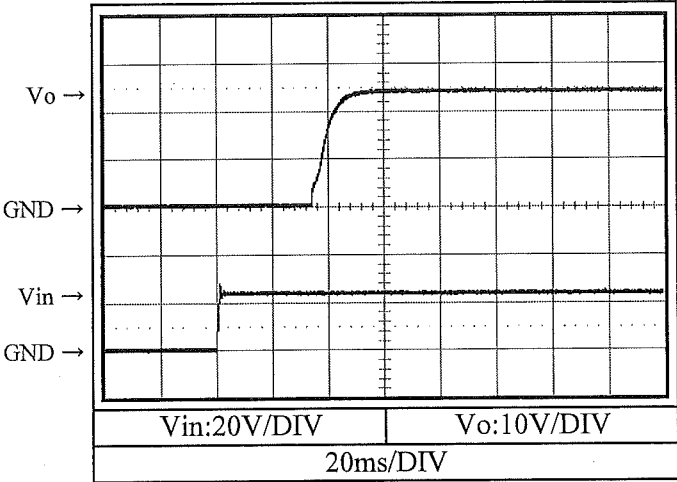
12V



2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 0 %
Tbp : 25 °C

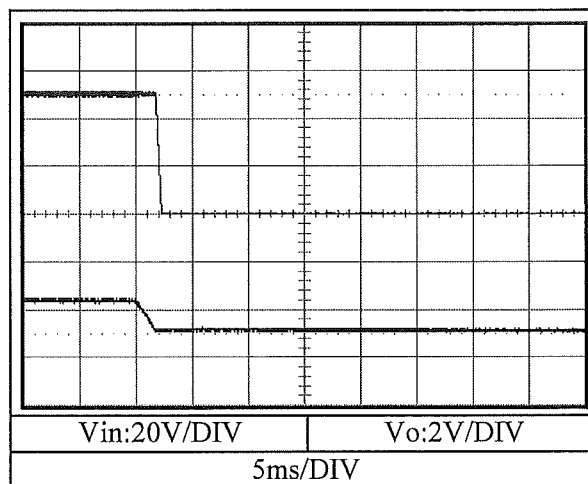
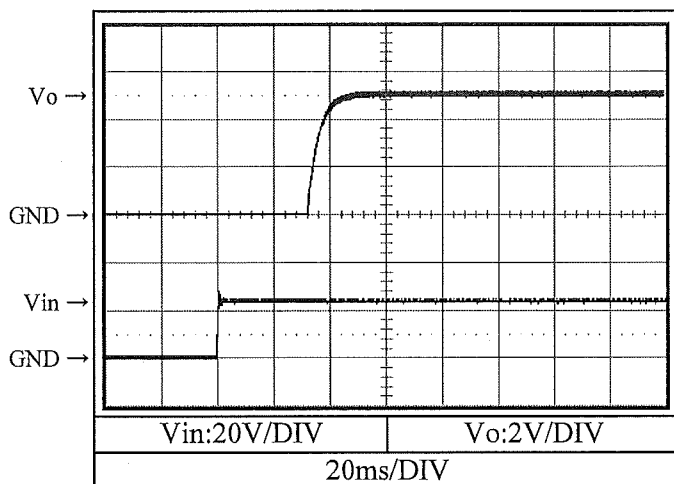
24V



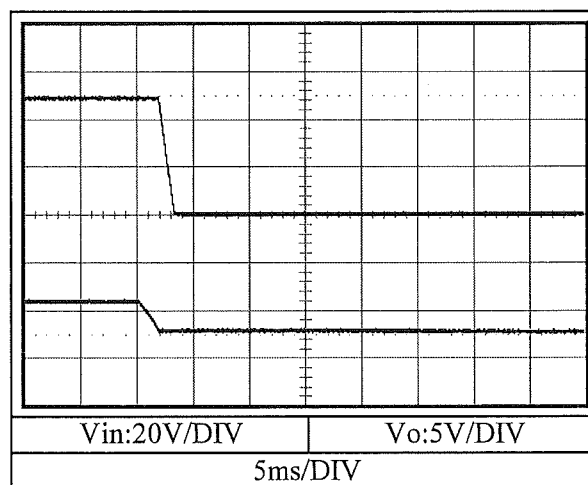
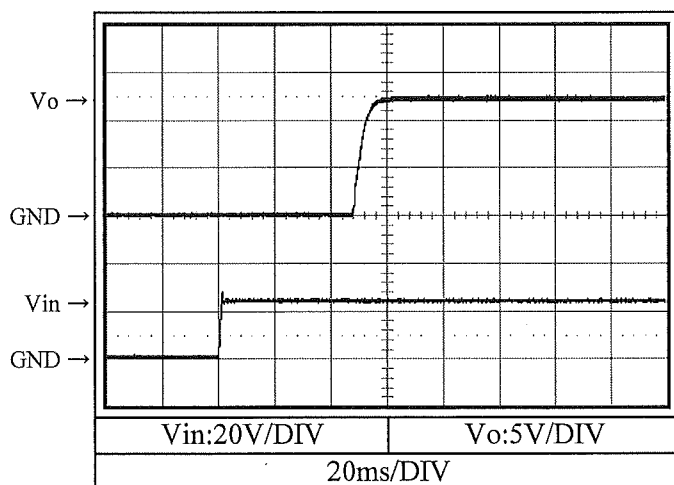
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 100 %
Tbp : 25 °C

5V



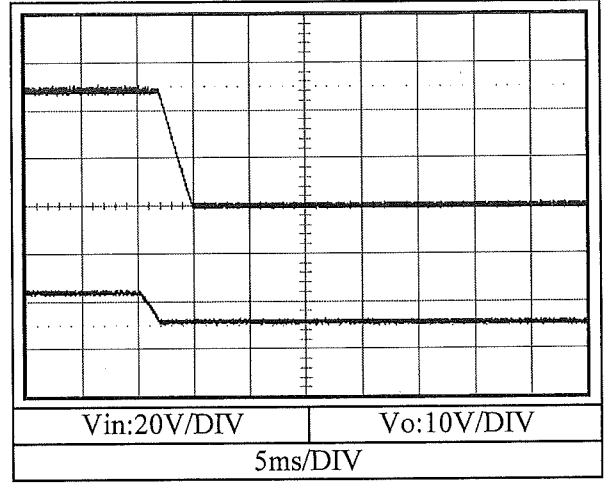
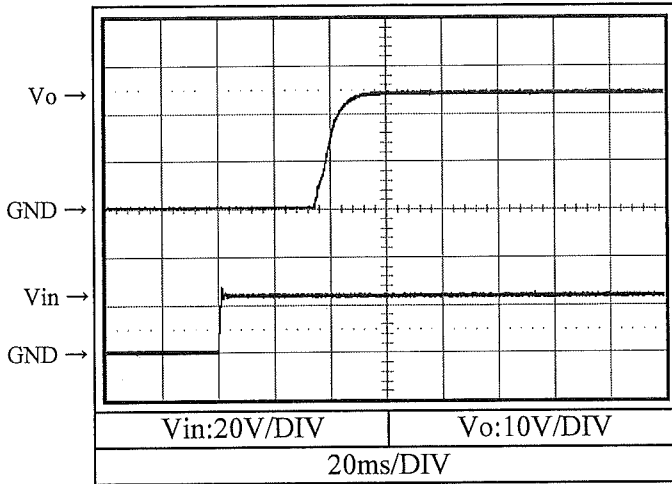
12V



2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 100 %
Tbp : 25 °C

24V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

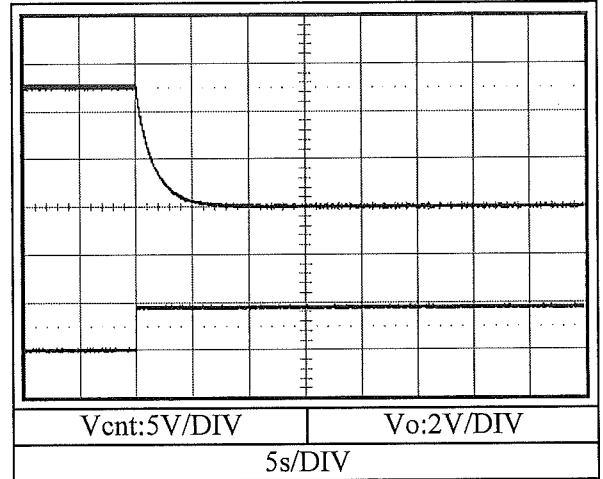
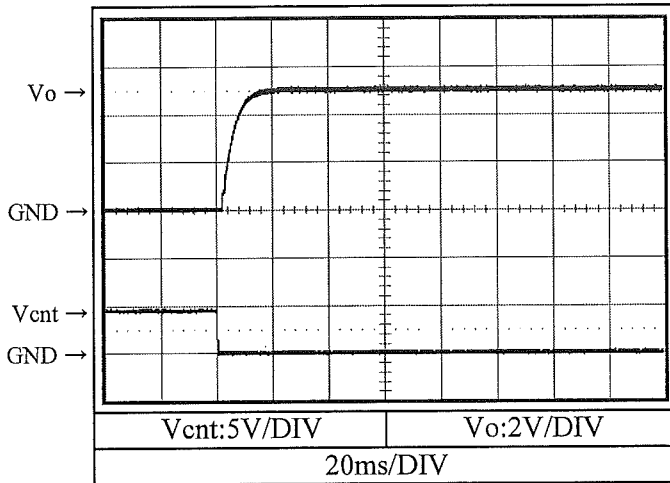
Conditions

Vin : 24 VDC

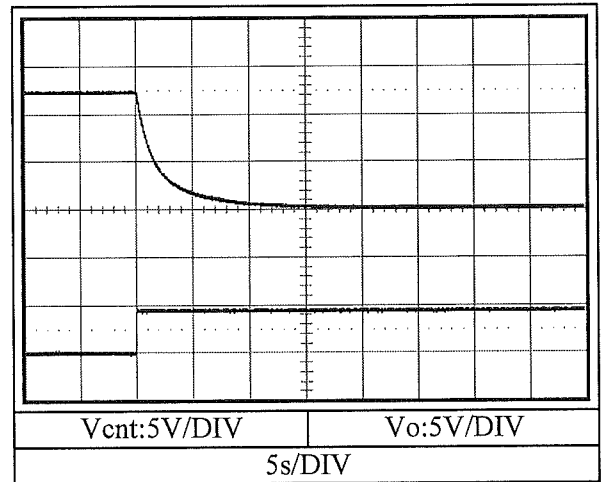
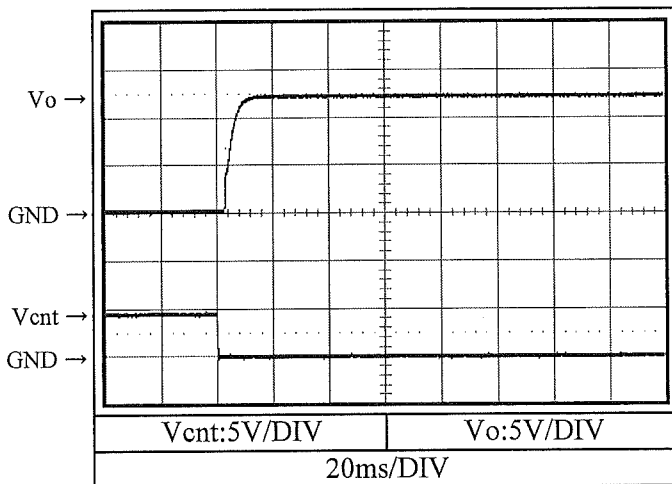
Io : 0%

Tbp : 25 °C

5V



12V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

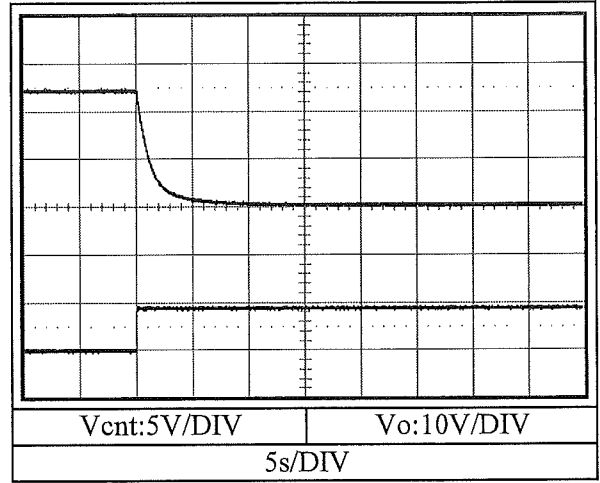
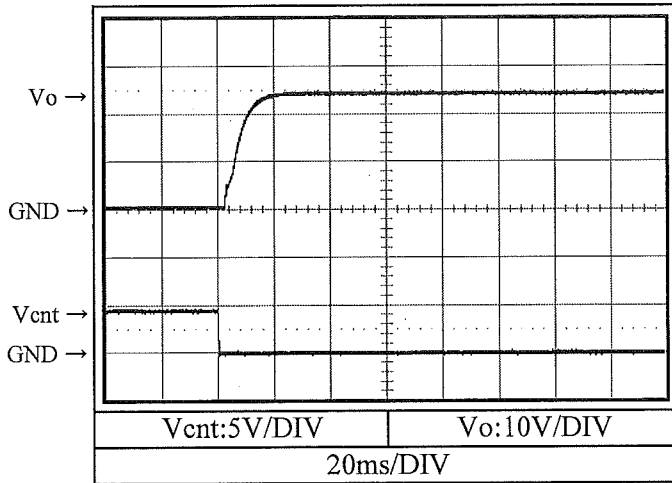
Conditions

Vin : 24 VDC

Io : 0 %

Tbp : 25 °C

24V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

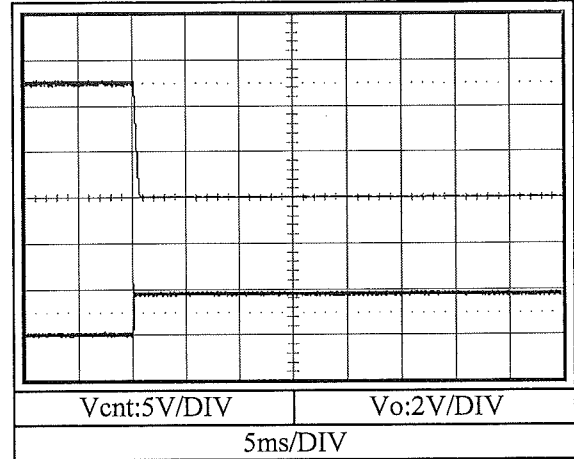
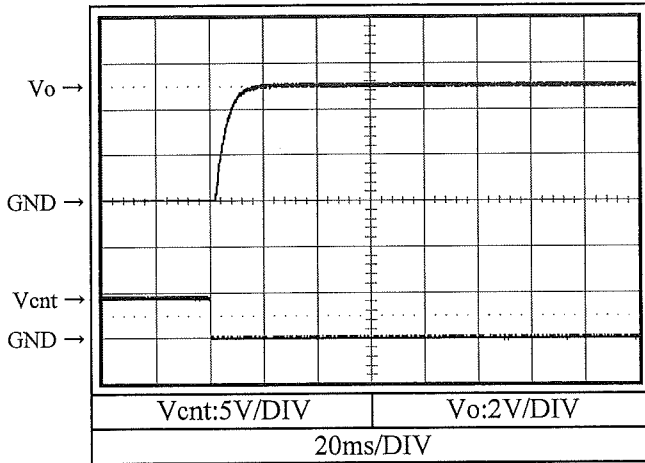
Conditions

Vin : 24 VDC

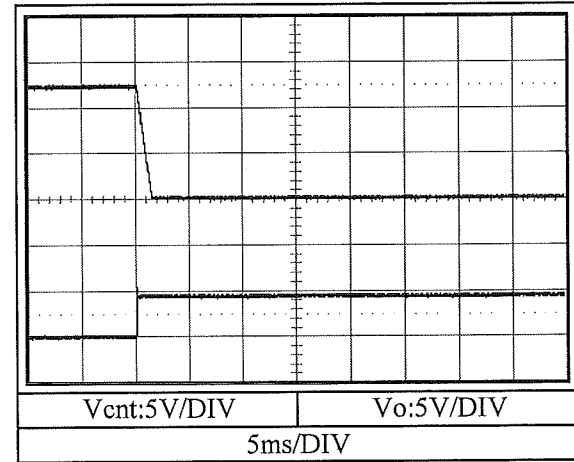
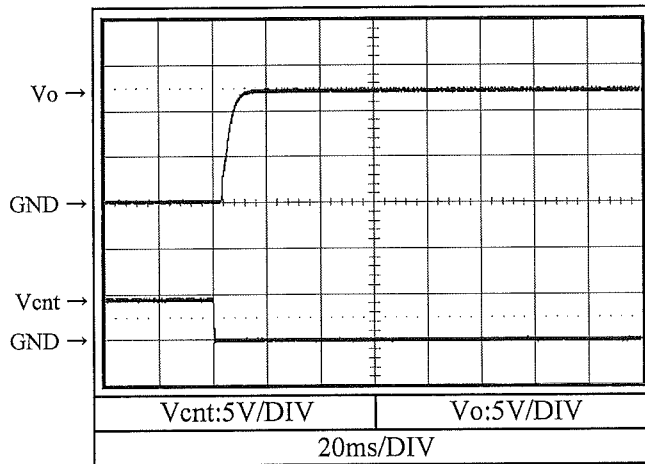
Io : 100 %

Tbp : 25 °C

5V



12V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

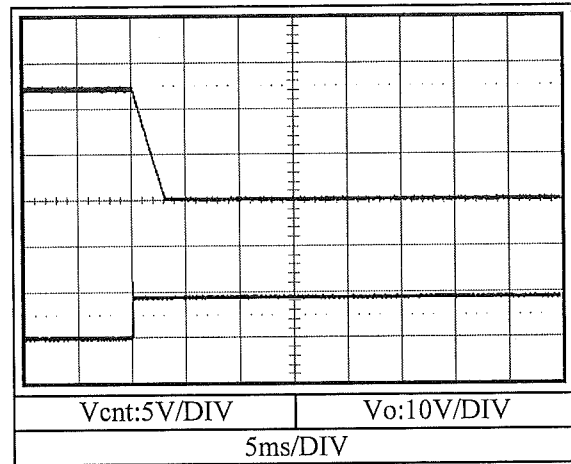
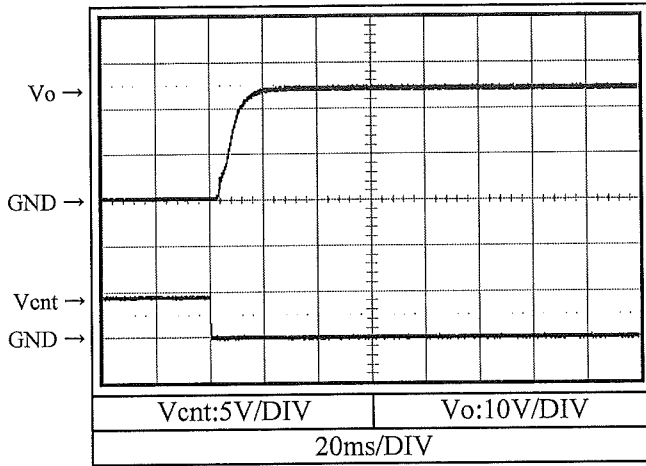
Conditions

Vin : 24 VDC

Io : 100 %

Tbp : 25 °C

24V

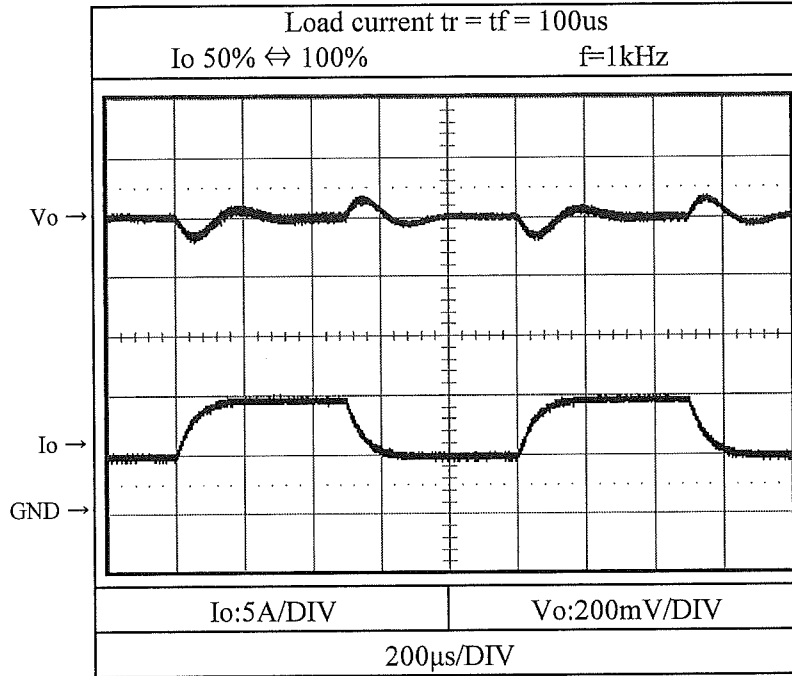


2.7 過渡応答（負荷急変）特性
Dynamic load response characteristics

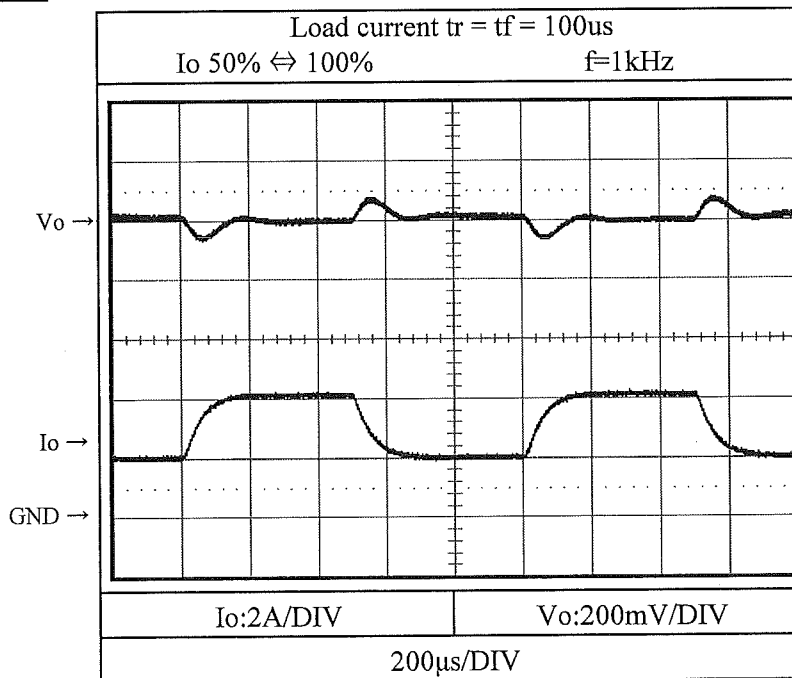
Conditions

V_{in} : 24 VDC
T_{bp} : 25 °C

5V



12V

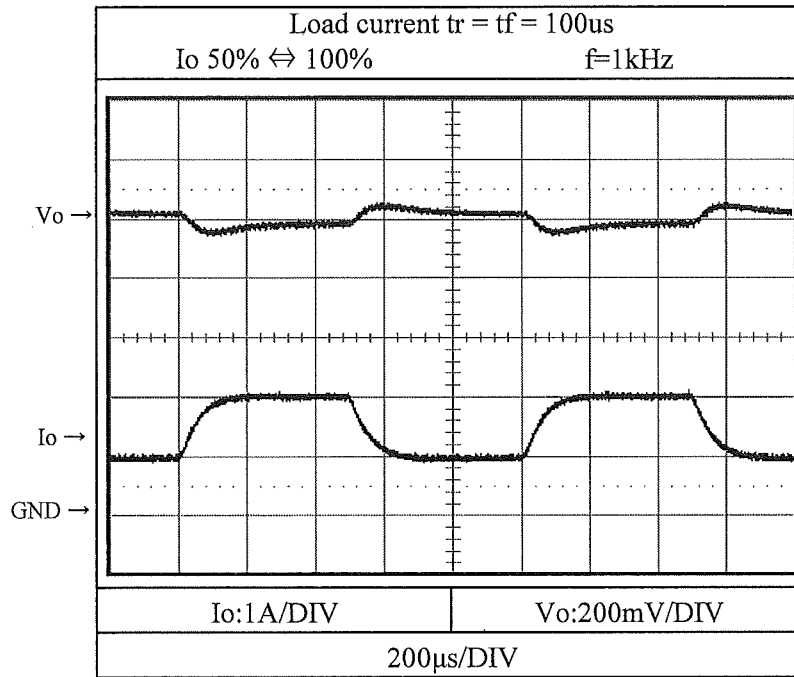


2.7 過渡応答（負荷急変）特性
 Dynamic load response characteristics

Conditions

Vin : 24 VDC
 Tbp : 25 °C

24V

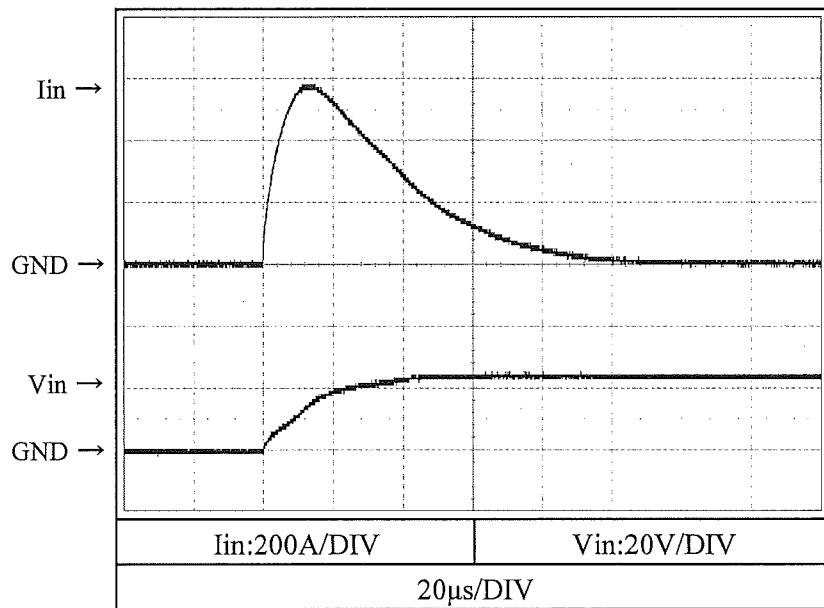


2.8 入力サージ電流 (突入電流) 特性
Inrush current characteristics

Conditions

V_{in} : 24 VDC
I_o : 100 %
T_{bp} : 25 °C

5V

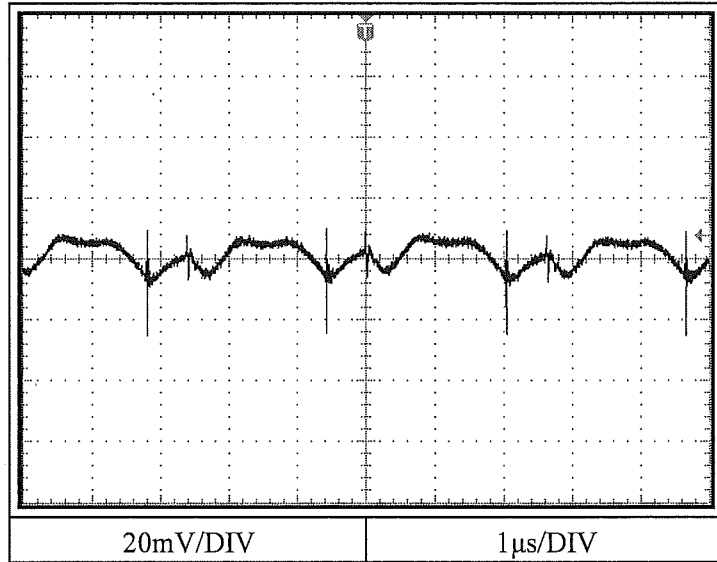


2.9 出力リップル・ノイズ波形
Output ripple and noise waveform

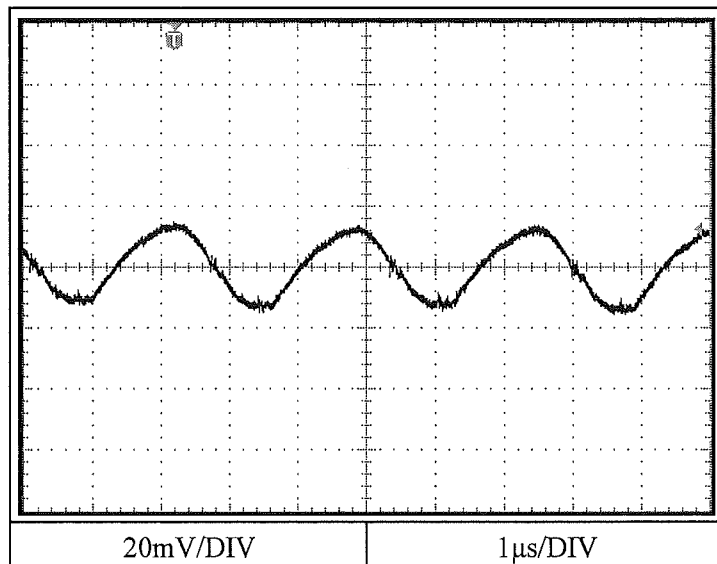
Conditions

Vin : 24 VDC
Io : 100 %
Tbp : 25 °C

5V



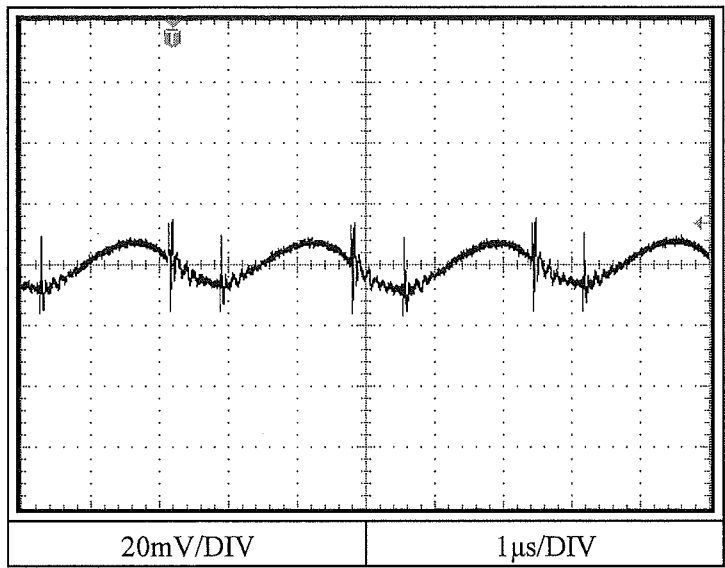
12V



2.9 出力リップル・ノイズ波形
Output ripple and noise waveform

Conditions Vin : 24 VDC
Io : 100 %
Tbp : 25 °C

24V



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise

Conditions

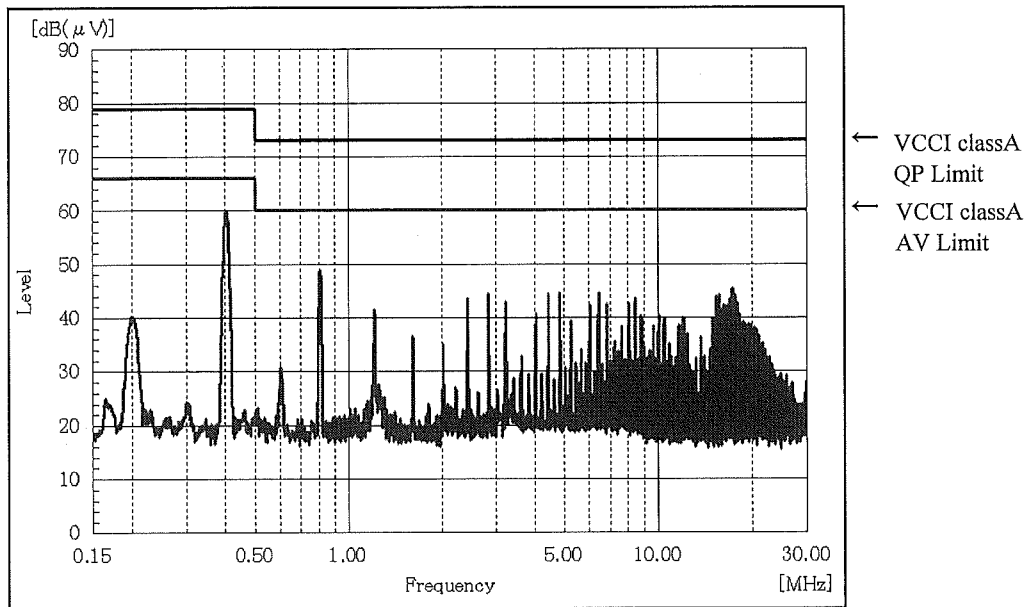
Vin : 24 VDC

Io : 100 %

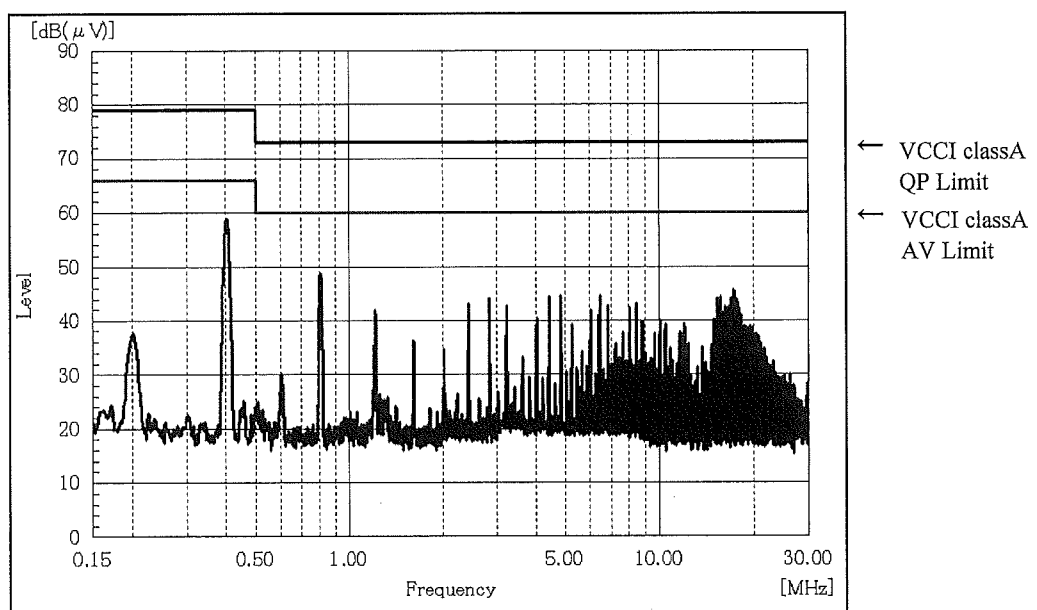
Tbp : 25 °C

5V

+Vin



-Vin



EN55011-A, EN55022-A, FCC Part.15 Subpart.B ClassAの限界値は、VCCI ClassAの限界値と同じ
 Limit of EN55011-A, EN55022-A and FCC Part.15 Subpart.B ClassA are same as its VCCI ClassA.

2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise

Conditions

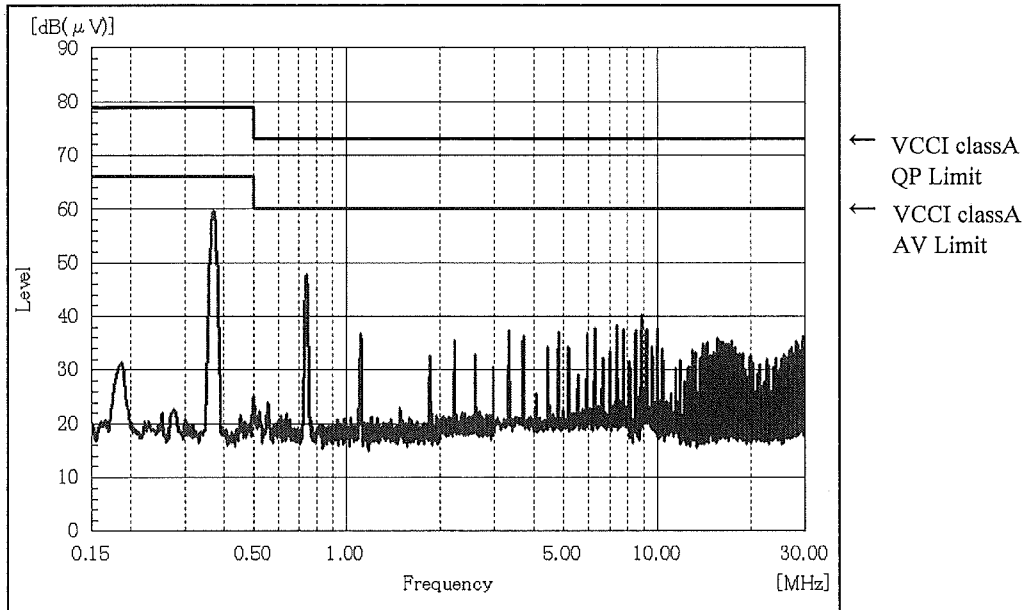
Vin : 24 VDC

Io : 100 %

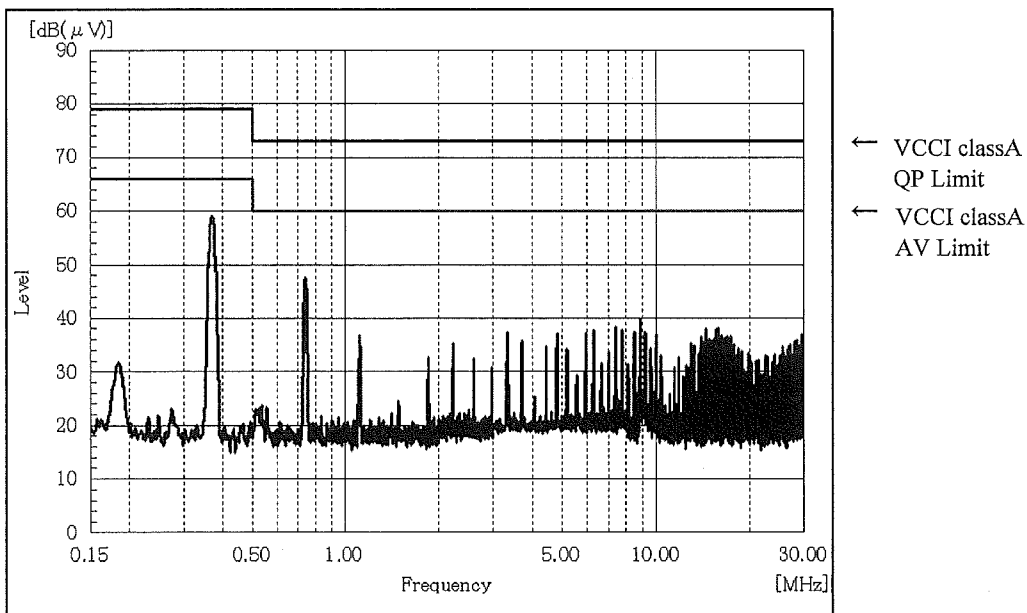
Tbp : 25 °C

12V

+Vin



-Vin



EN55011-A, EN55022-A, FCC Part.15 Subpart.B ClassAの限界値は、VCCI ClassAの限界値と同じ
 Limit of EN55011-A, EN55022-A and FCC Part.15 Subpart.B ClassA are same as its VCCI ClassA.

2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise

Conditions

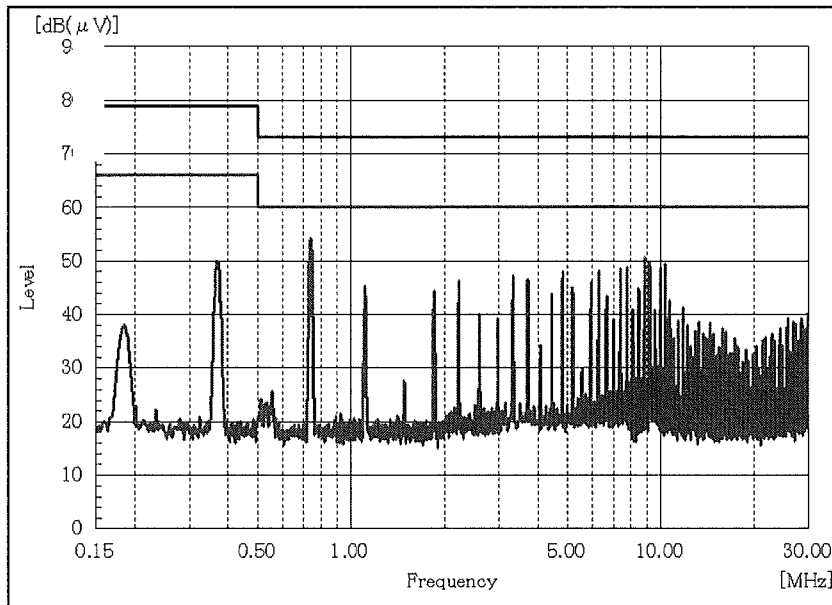
Vin : 24 VDC

Io : 100 %

Tbp : 25 °C

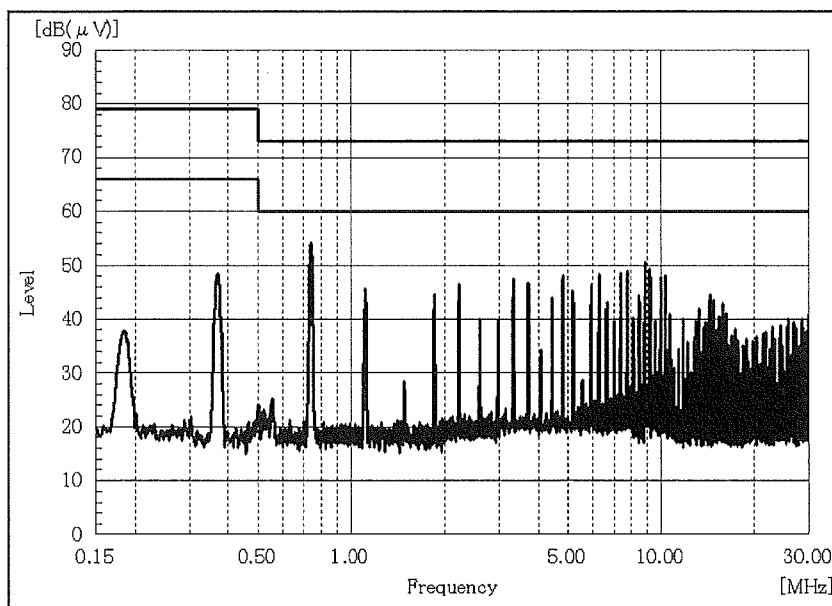
24V

+Vin



← VCCI classA
QP Limit
← VCCI classA
AV Limit

-Vin



← VCCI classA
QP Limit
← VCCI classA
AV Limit

EN55011-A, EN55022-A, FCC Part.15 Subpart.B ClassAの限界値は、VCCI ClassAの限界値と同じ
Limit of EN55011-A, EN55022-A and FCC Part.15 Subpart.B ClassA are same as its VCCI ClassA.

2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission Noise

Conditions

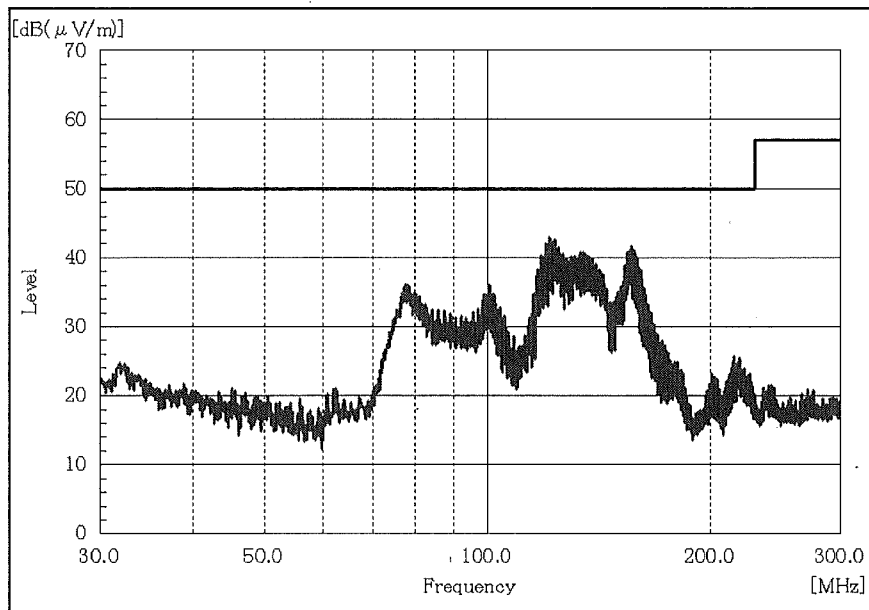
Vin : 24 VDC

Io : 100 %

Tbp : 25 °C

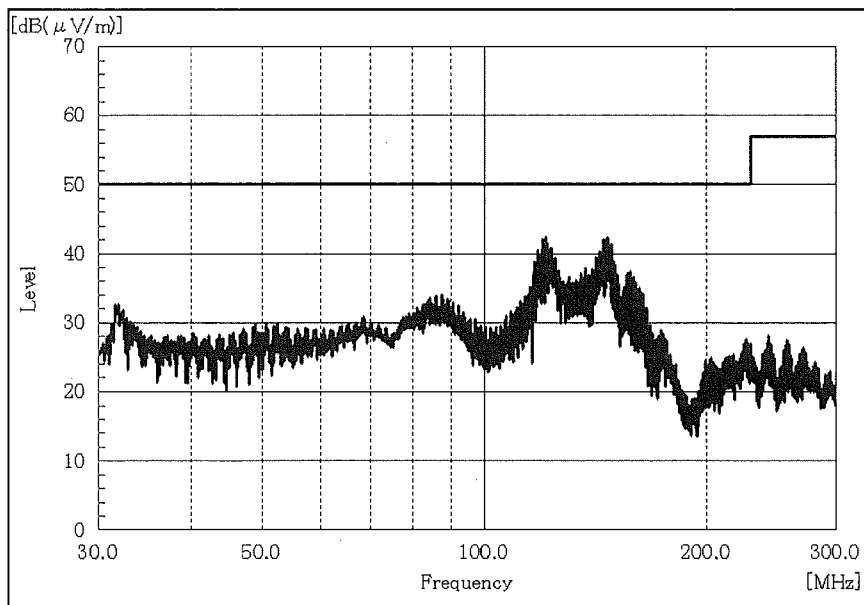
5V

HORIZONTAL



← VCCI classA
QP Limit
(Distance: 3m)

VERTICAL



← VCCI classA
QP Limit
(Distance: 3m)

EN55011-A, EN55022-Aの限界値は、VCCI ClassAの限界値と同じ
Limit of EN55011-A, EN55022-A are same as its VCCI ClassA.

2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission Noise

Conditions

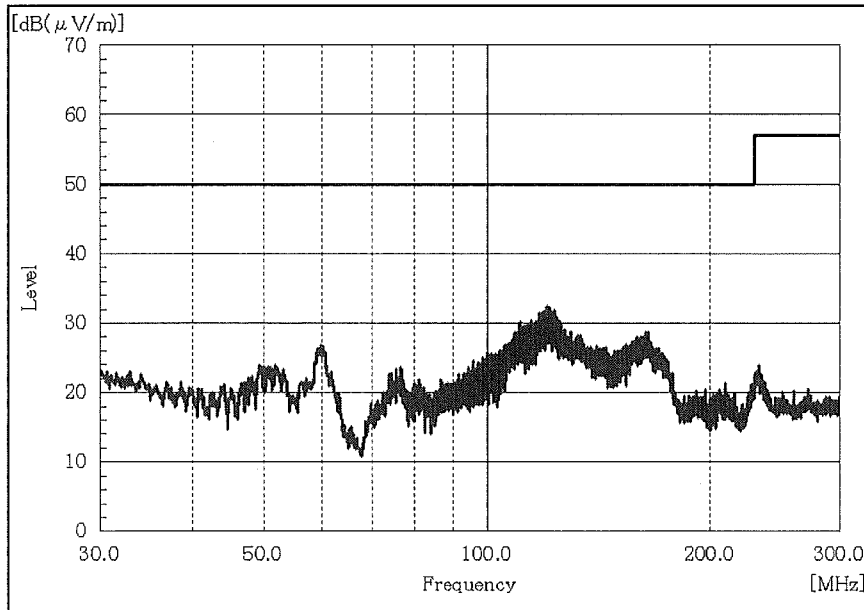
Vin : 24 VDC

Io : 100 %

Tbp : 25 °C

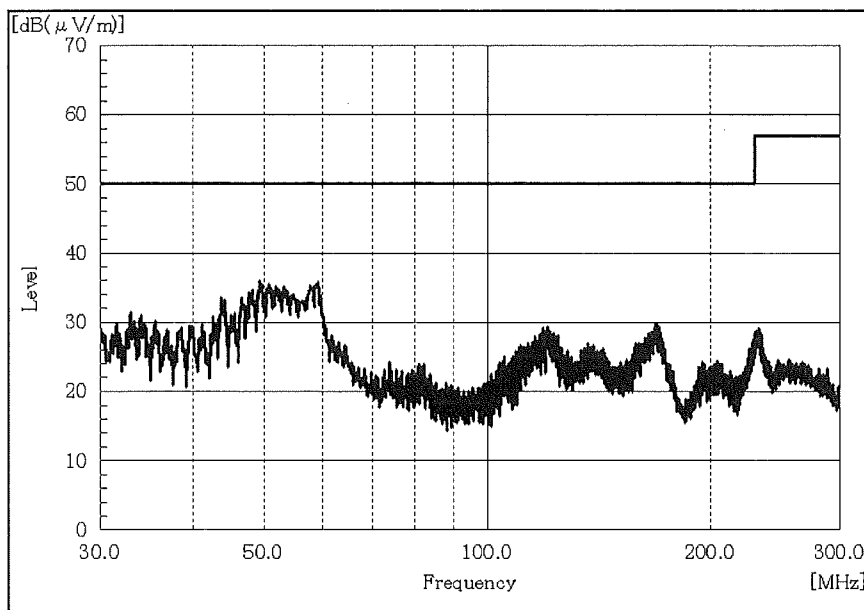
12V

HORIZONTAL



← VCCI classA
QP Limit
(Distance: 3m)

VERTICAL



← VCCI classA
QP Limit
(Distance: 3m)

EN55011-A, EN55022-Aの限界値は、VCCI ClassAの限界値と同じ
Limit of EN55011-A, EN55022-A are same as its VCCI ClassA.

2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission Noise

Conditions

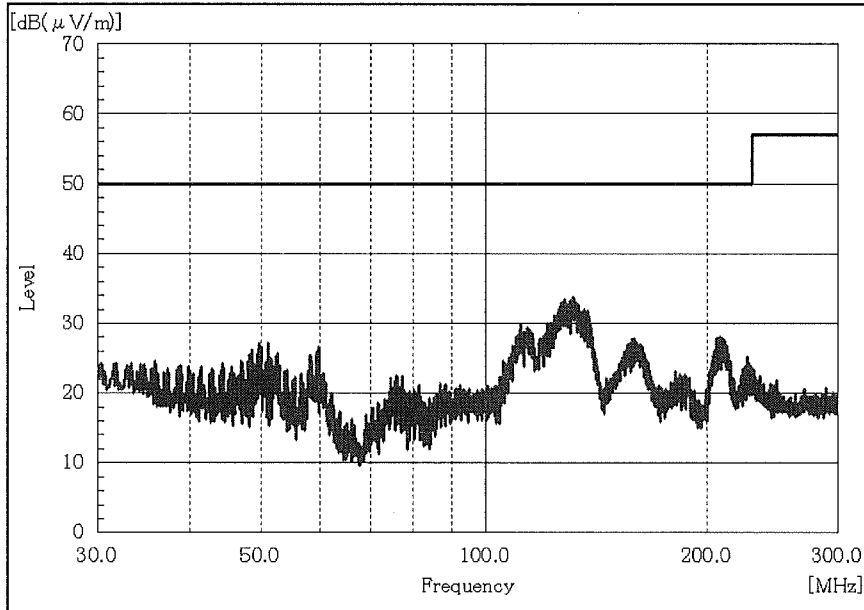
Vin : 24 VDC

Io : 100 %

Tbp : 25 °C

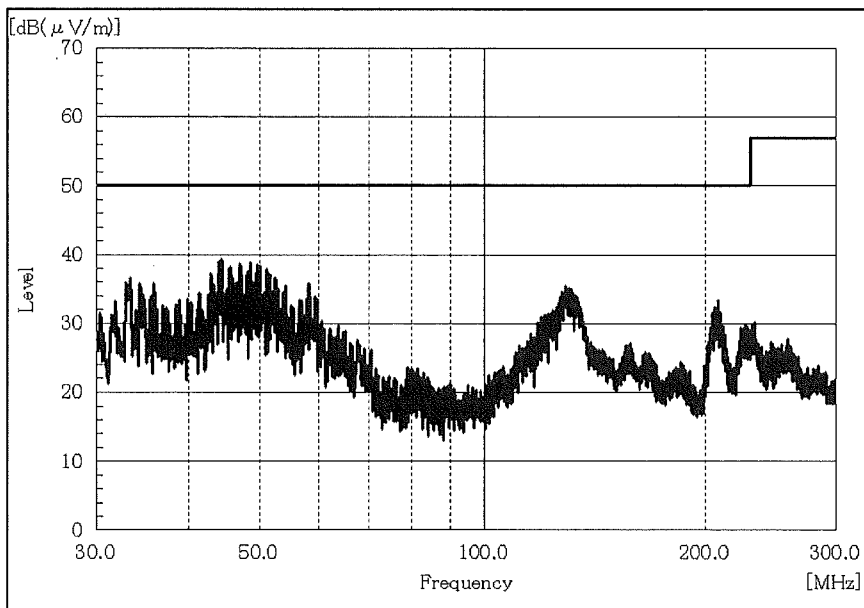
24V

HORIZONTAL



← VCCI classA
QP Limit
(Distance: 3m)

VERTICAL



← VCCI classA
QP Limit
(Distance: 3m)

EN55011-A, EN55022-Aの限界値は、VCCI ClassAの限界値と同じ
Limit of EN55011-A, EN55022-A are same as its VCCI ClassA.