
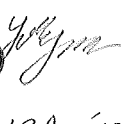
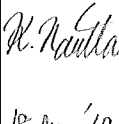


CN200A110-*

EVALUATION DATA

型式データ

DWG.NO. C257-53-01		
承認	査閲	担当
 20 Aug '10	 19 Aug '10	 18 Aug '10

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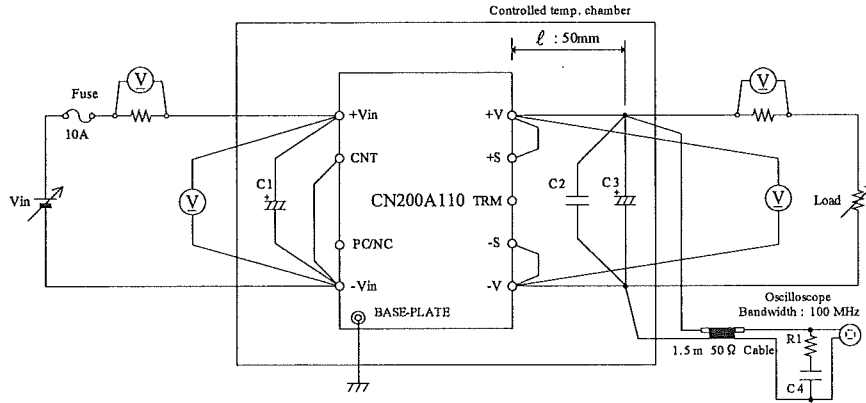
使用記号 Terminology used

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	Baseplate temperature
T _a	周囲温度	Ambient temperature
f	周波数	Frequency

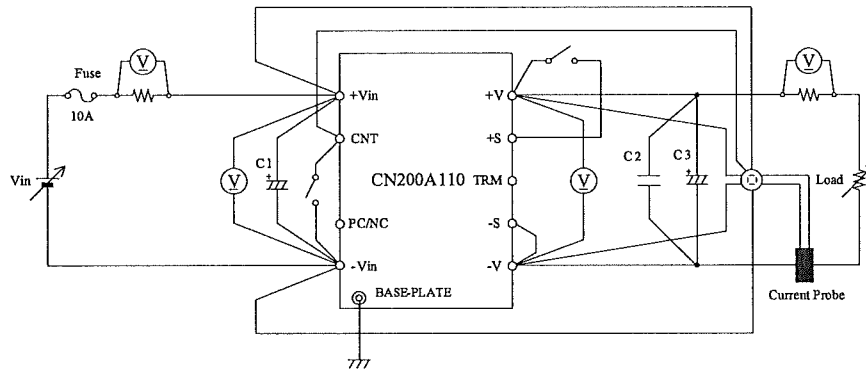
1. 測定方法 Evaluation Method

1.1 測定回路 Measurement Circuits

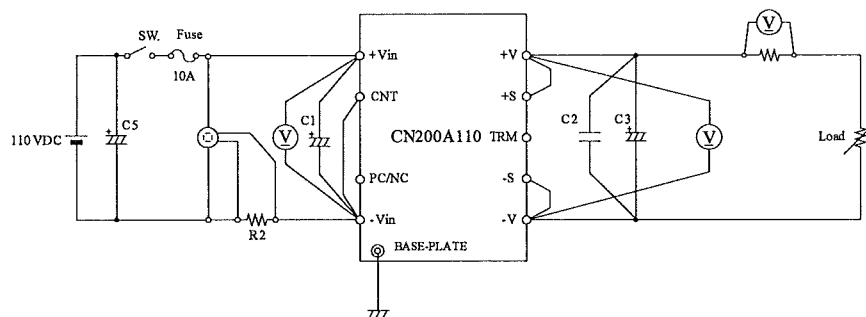
- (1) 静特性、過電流保護特性、出力リップル、ノイズ波形
Steady state characteristics, Over current protection (OCP) characteristics and Output ripple and noise waveform



- (2) 待機電力、通電ドリフト、過電圧保護、出力立ち上がり、立ち下り、過渡応答特性
Standby power, Warm up voltage drift, Over voltage protection (OVP), Output rise and fall and Dynamic response characteristics



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



C1 : 100uF Electrolytic Capacitor

C2 : 2.2μF Ceramic Capacitor

C3 : 5V-2200uF Electrolytic Capacitor

: 12V-1000uF Electrolytic Capacitor

: 15V-1000uF Electrolytic Capacitor

: 24V-470uF Electrolytic Capacitor

C4 : 4700pF Ceramic Capacitor

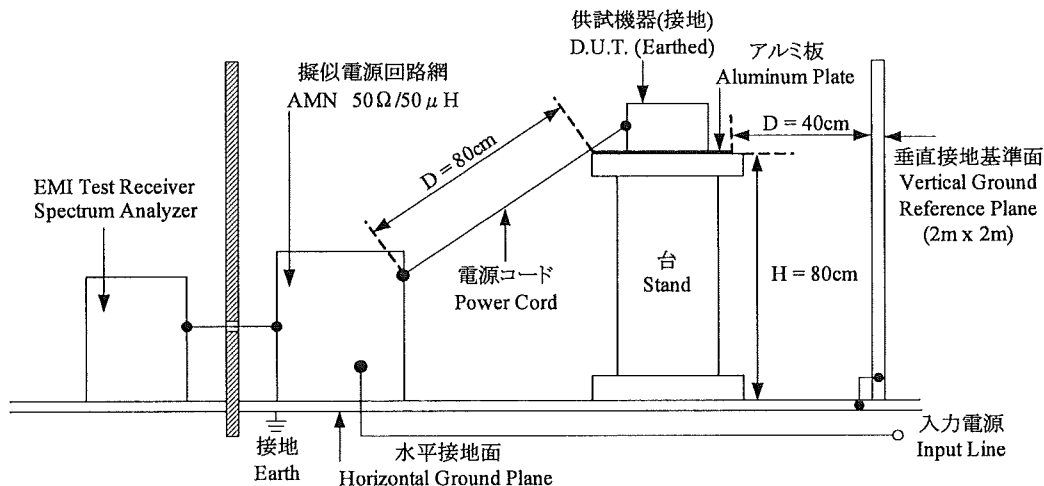
C5 : 8000uF Electrolytic Capacitor

R1 : 50 Ω

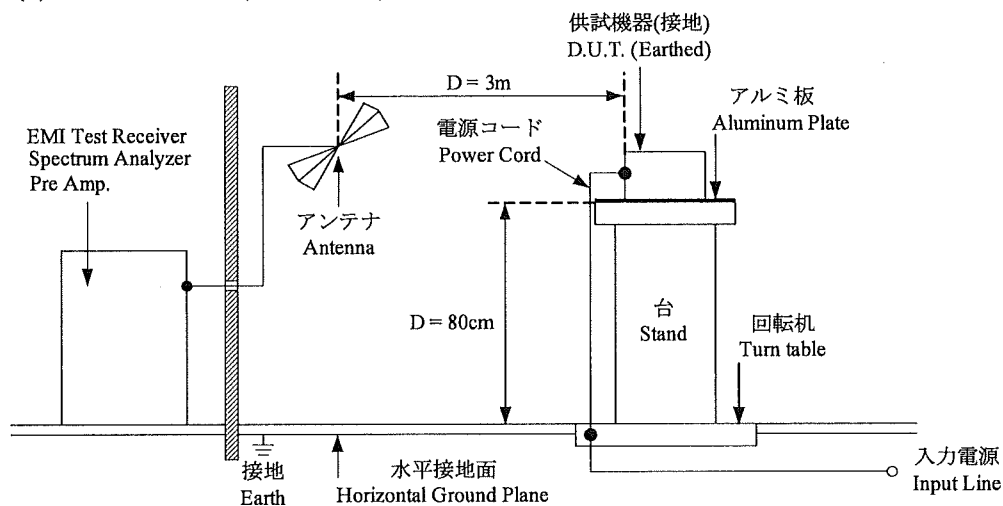
R2 : 0.01 Ω

(4) EMI特性 Electro-Magnetic Interference characteristics

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

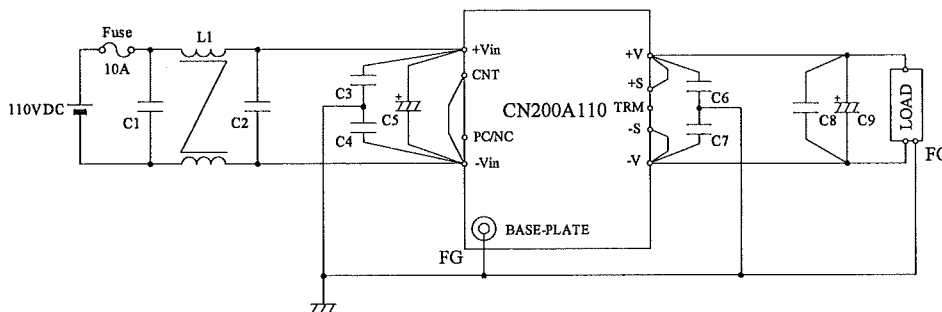


(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



* 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 | C9 : 5V-2200μF Electrolytic Capacitor |
| C3, C4 : 4700pF Ceramic Capacitor x 2 parallel | : 12V-1000μF Electrolytic Capacitor |
| C5 : 100μF Electrolytic Capacitor | : 15V-1000μF Electrolytic Capacitor |
| C6, C7 : 4700pF Ceramic Capacitor x 2 parallel | : 24V-470μF Electrolytic Capacitor |
| C8 : 2.2μF Ceramic Capacitor | L1 : 3.0mH |

1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	OSCILLOSCOPE	TEKTRONIX	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	LECROY	WR6050A
3	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
4	CURRENT PROBE	TEKTRONIX	A6303
5	SHUNT RESISTER	YOKOGAWA ELECT.	2215
6	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
7	SPECTRUM ANALYZER EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI
8	AMN	SCHWARZBECK	NNLK8121
9	ANTENNA(BICONICAL ANTENNA)	TESEQ	CBL6111D
10	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
11	AC POWER SUPPLY	TAKASAGO	AA-2000XG

2. 特性データ Characteristics

2.1 静特性 Steady state data

(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift

5V

1. Regulation - line and load Condition Tbp : 25°C

Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	5.003V	5.003V	5.003V	0mV	0.000%
50%	5.003V	5.002V	5.002V	1mV	0.020%
100%	5.002V	5.001V	5.001V	1mV	0.020%
Load regulation	1mV	2mV	2mV		
	0.020%	0.040%	0.040%		

2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	5.010V	5.001V	4.997V	13mV	0.260%

12V

1. Regulation - line and load Condition Tbp : 25°C

Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	12.006V	12.005V	12.005V	1mV	0.008%
50%	12.004V	12.003V	12.002V	2mV	0.017%
100%	12.001V	12.001V	12.000V	1mV	0.008%
Load regulation	5mV	4mV	5mV		
	0.042%	0.033%	0.042%		

2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	12.037V	12.001V	11.980V	57mV	0.475%

(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift

15V

1. Regulation - line and load Condition Tbp : 25°C

Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	14.991V	14.992V	14.991V	1mV	0.007%
50%	14.990V	14.990V	14.989V	1mV	0.007%
100%	14.988V	14.988V	14.987V	1mV	0.007%
Load regulation	3mV	4mV	4mV		
	0.020%	0.027%	0.027%		

2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	15.019V	14.988V	14.972V	47mV	0.313%

24V

1. Regulation - line and load Condition Tbp : 25°C

Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	24.005V	24.004V	24.003V	2mV	0.008%
50%	24.003V	24.002V	24.001V	2mV	0.008%
100%	24.000V	23.999V	23.998V	2mV	0.008%
Load regulation	5mV	5mV	5mV		
	0.021%	0.021%	0.021%		

2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

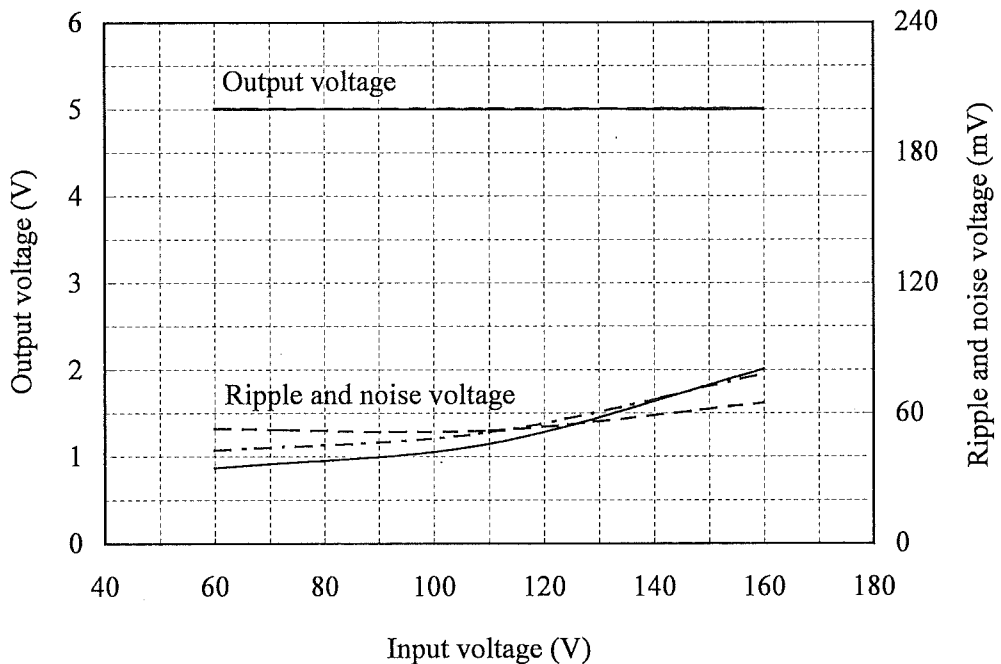
Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	24.053V	23.999V	23.965V	88mV	0.367%

(2) 出力電圧・出力リップル、ノイズ電圧 対 入力電圧

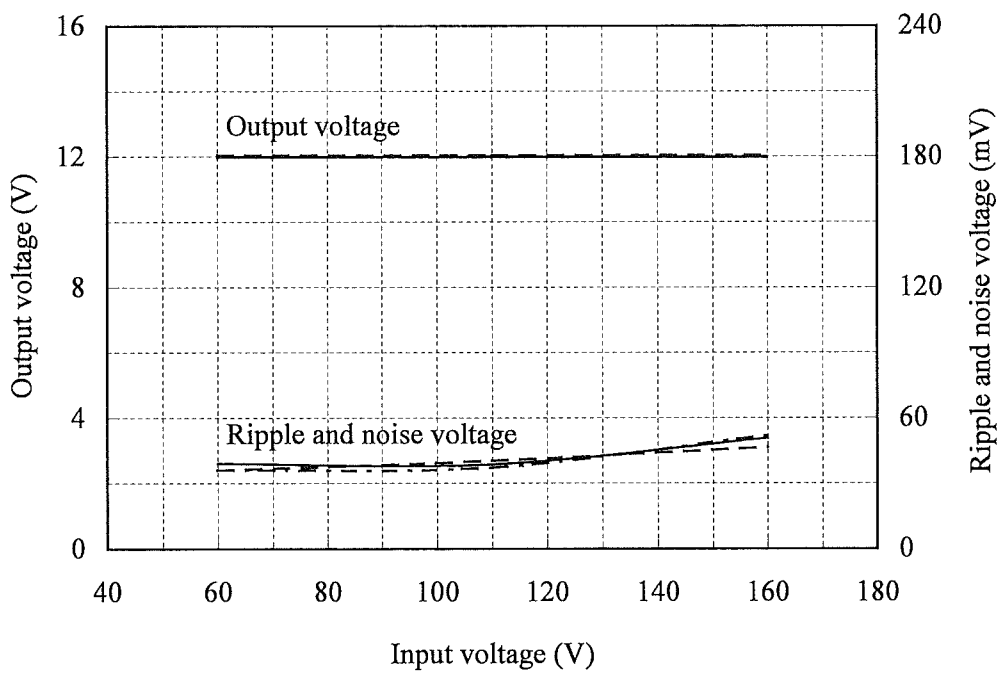
Output voltage and ripple and noise voltage vs. Input voltage

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 ripple and noise voltage vs. Input voltage

Conditions I_o : 100 %

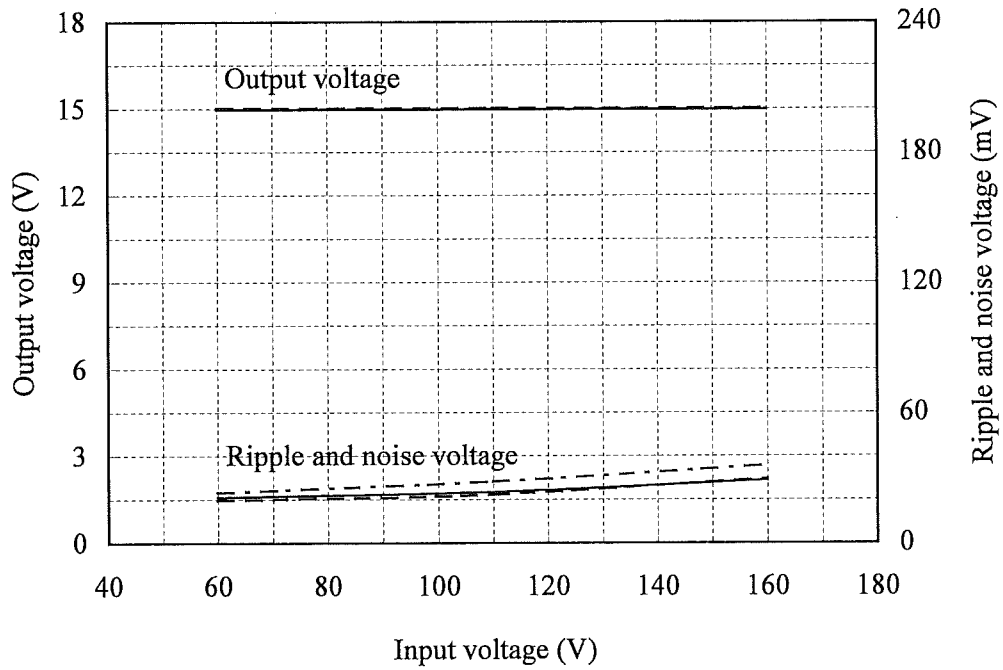
T_{bp} : -40 °C

: 25 °C

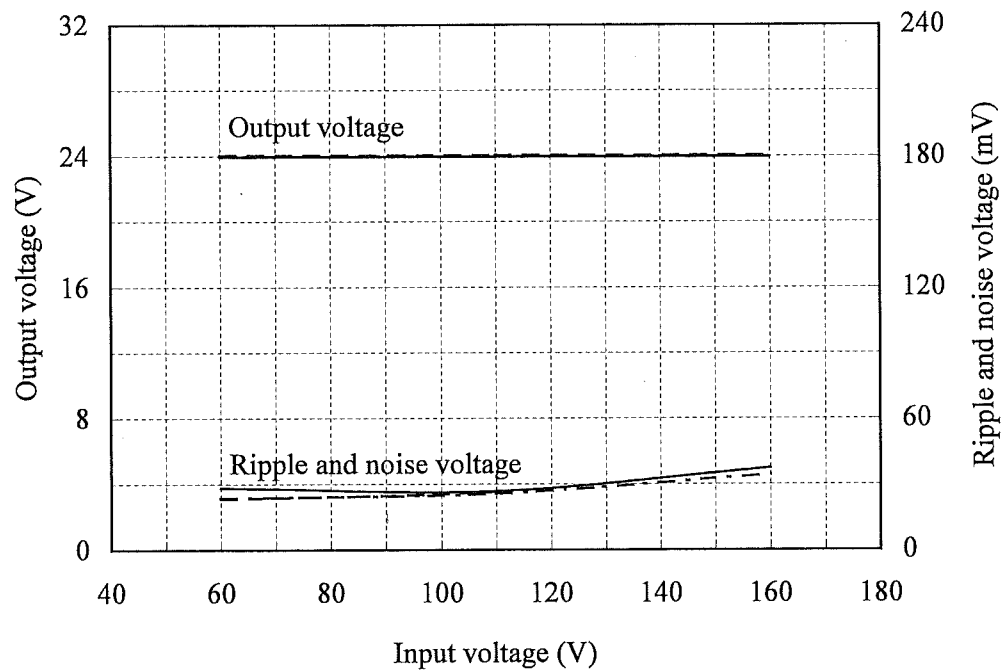
: 100 °C



15V



24V

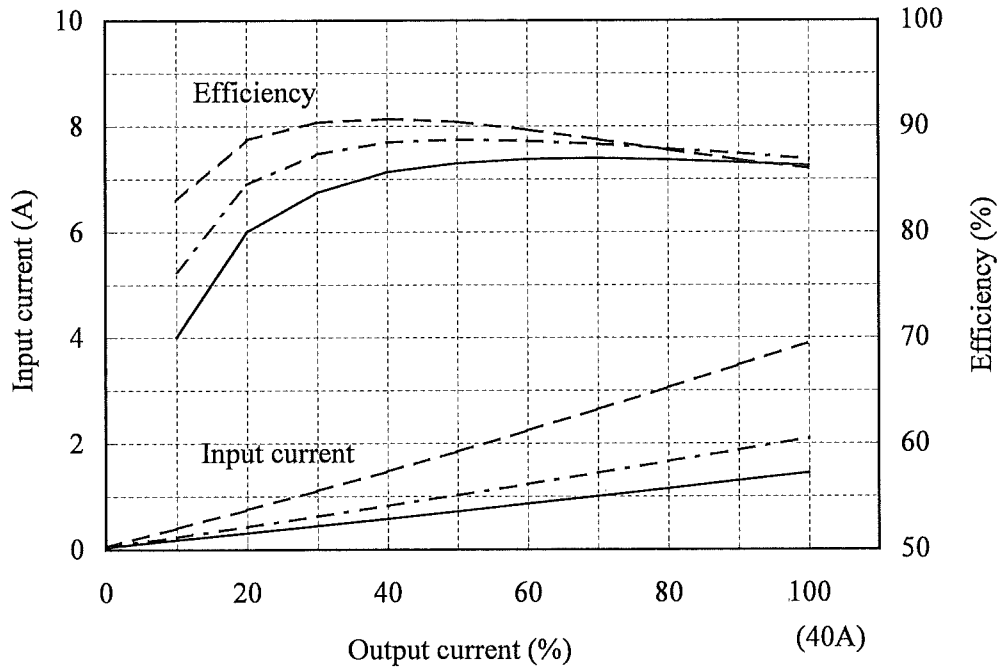


(3) 入力電流・効率 対 出力電流

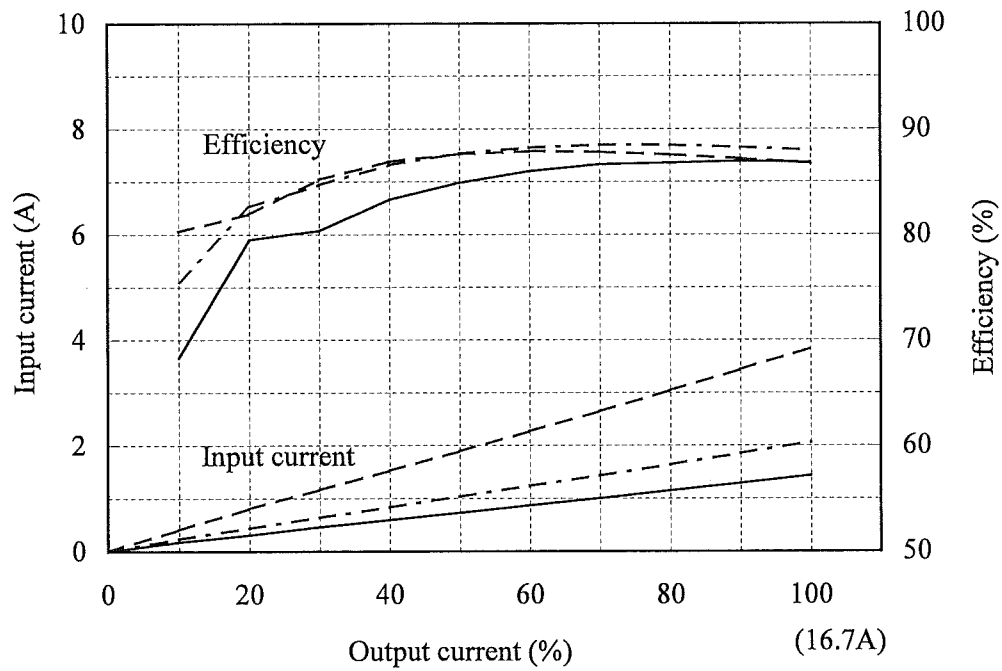
Input current and Efficiency vs. Output current

Conditions Vin : 60 VDC -----
 : 110 VDC - - - - -
 : 160 VDC _____
 Tbp : 25 °C

5V



12V

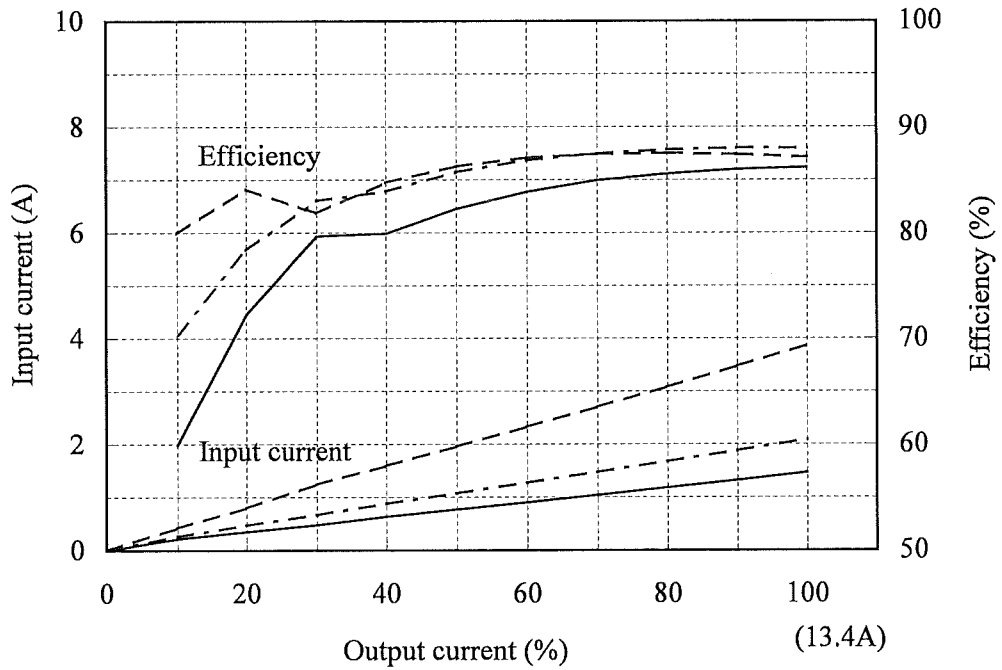


(3) 入力電流・効率 対 出力電流

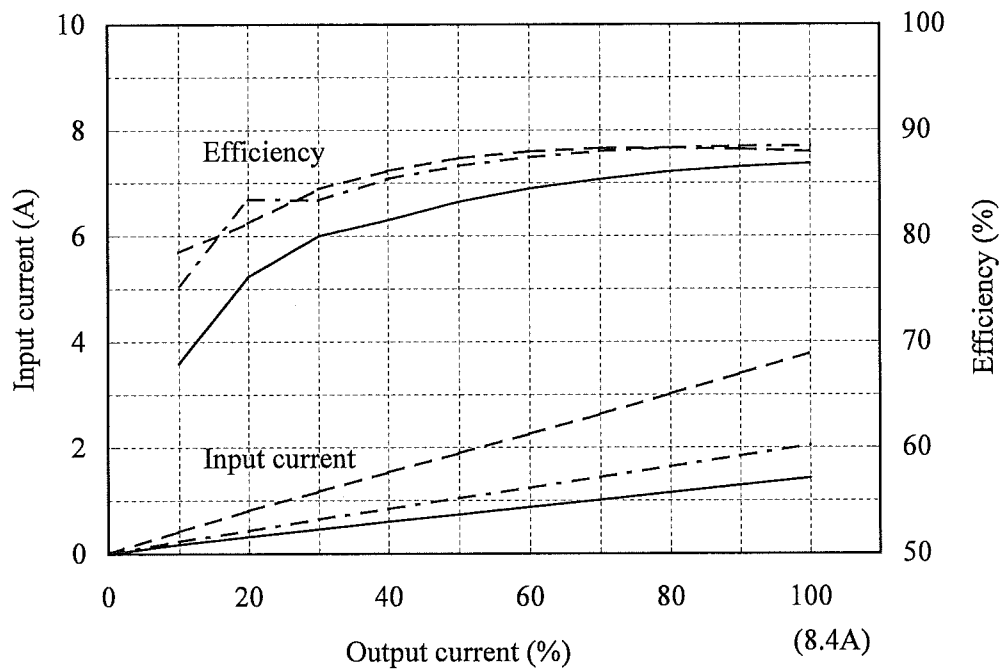
Input current and Efficiency vs. Output current

Conditions Vin : 60 VDC -----
 : 110 VDC - - - - -
 : 160 VDC _____
 Tbp : 25 °C

15V



24V

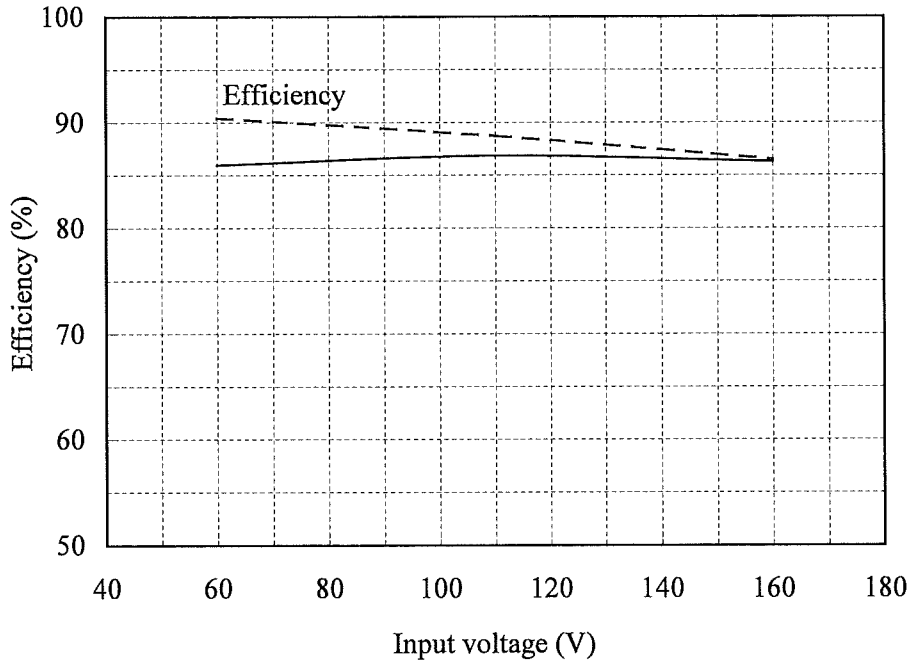


(4) 効率 対 入力電圧

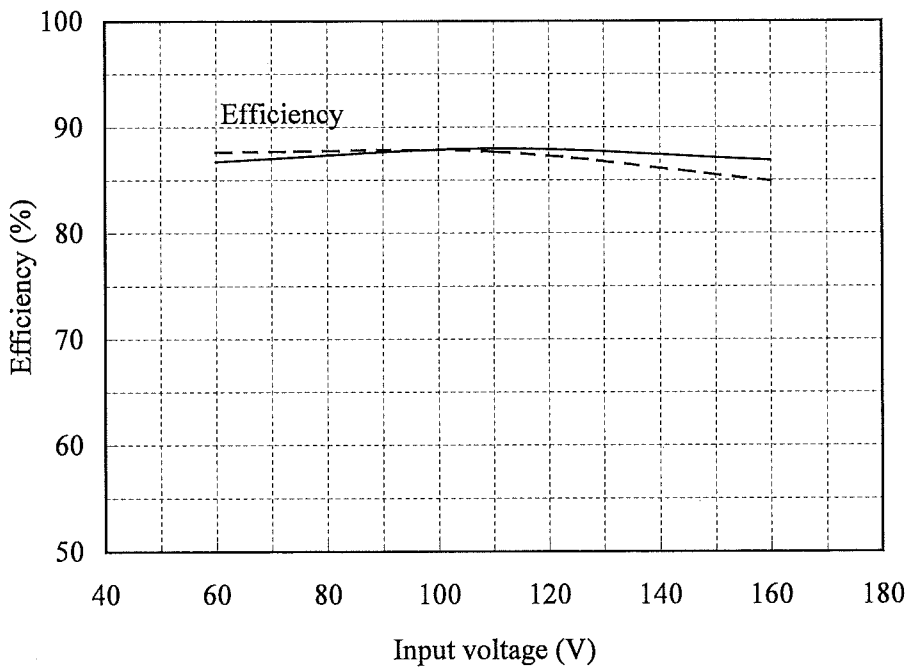
Efficiency vs. Input voltage

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

5V



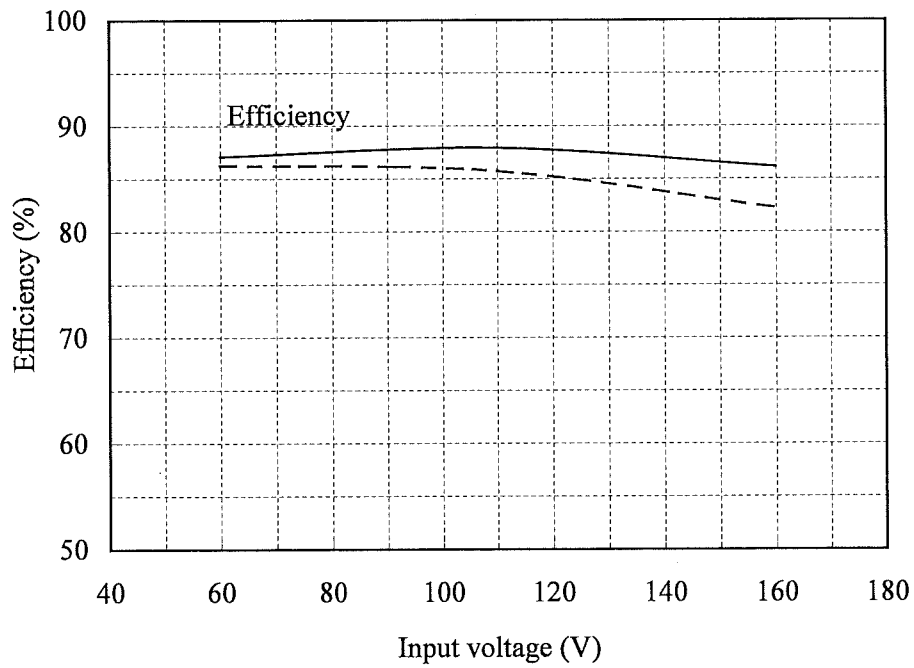
12V



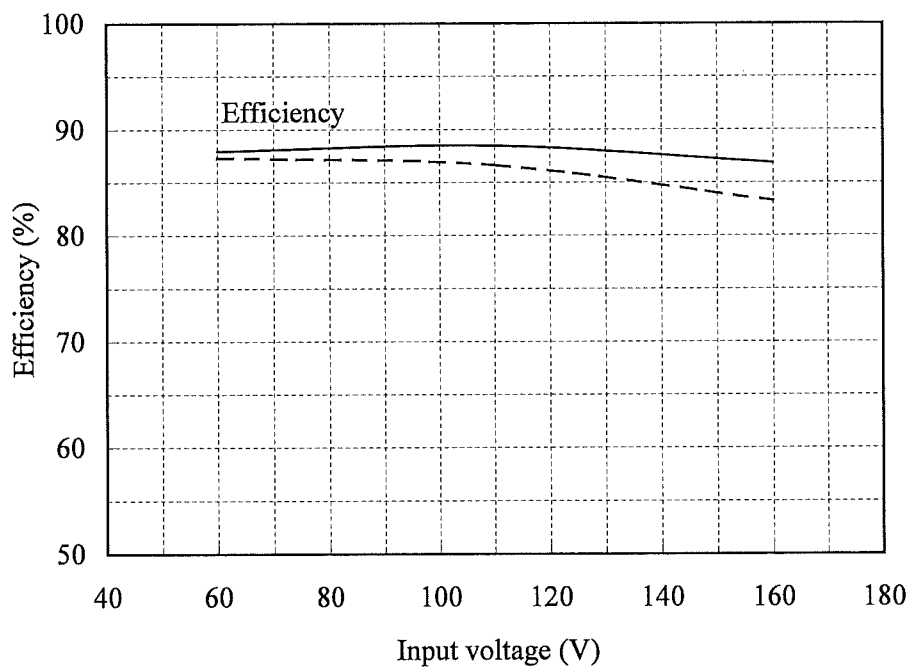
(4) 効率 対 入力電圧
Efficiency vs. Input voltage

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

15V



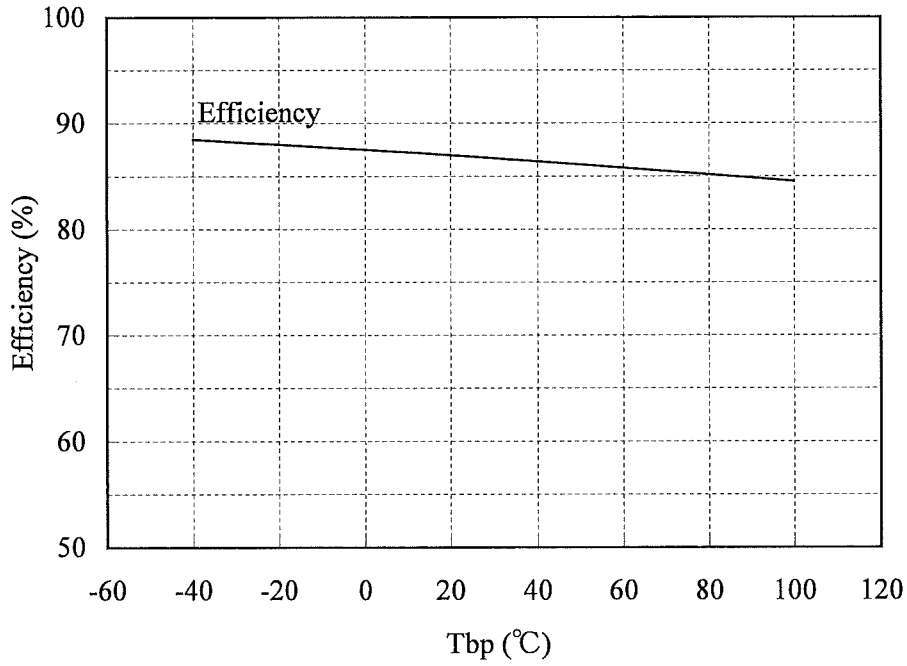
24V



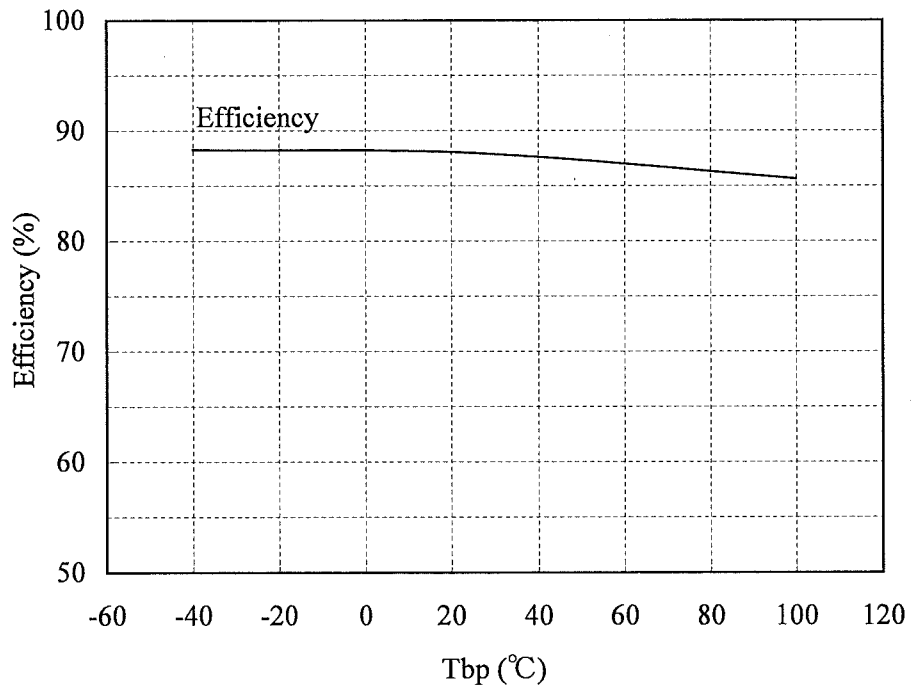
(5) 効率対ベースプレート温度
Efficiency vs. Baseplate temperature

Conditions Vin : 110 VDC
Io : 100 %

5V



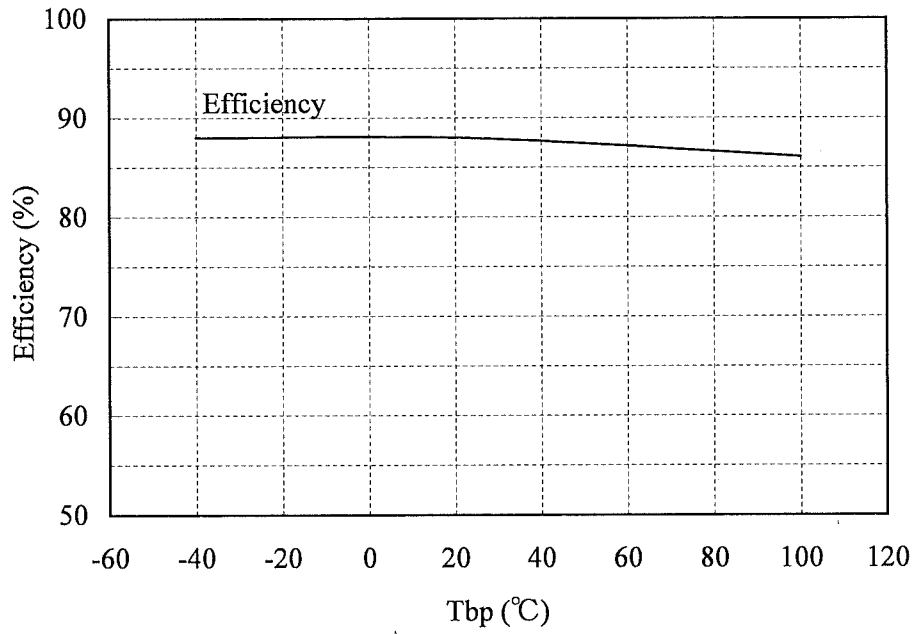
12V



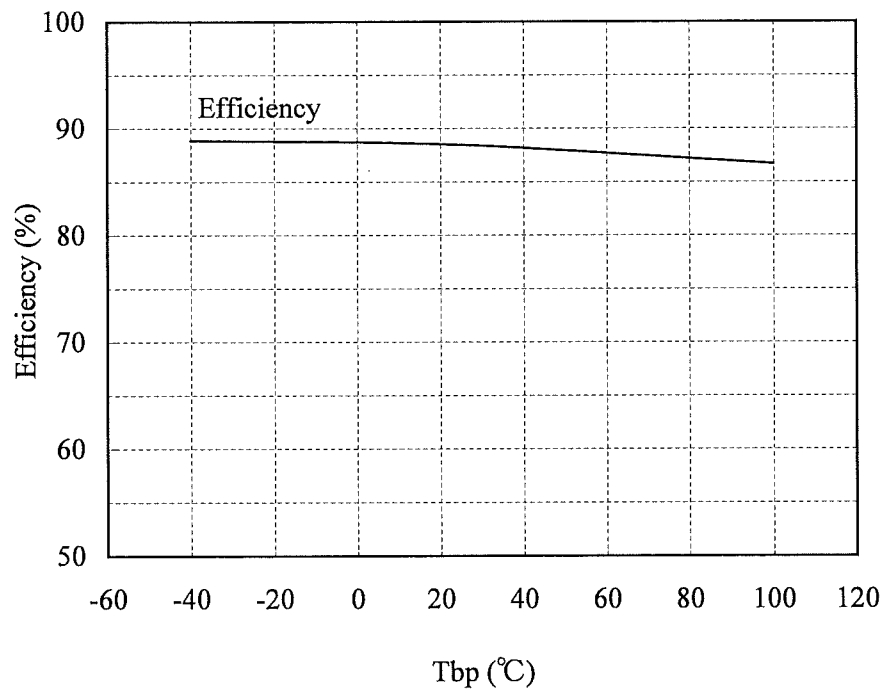
(5) 効率対 ベースプレート温度
Efficiency vs. Baseplate temperature

Conditions Vin : 110 VDC
Io : 100 %

15V



24V



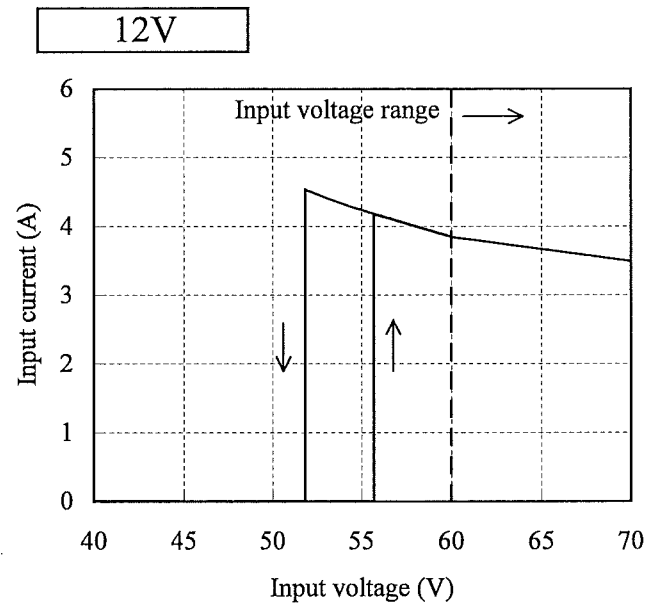
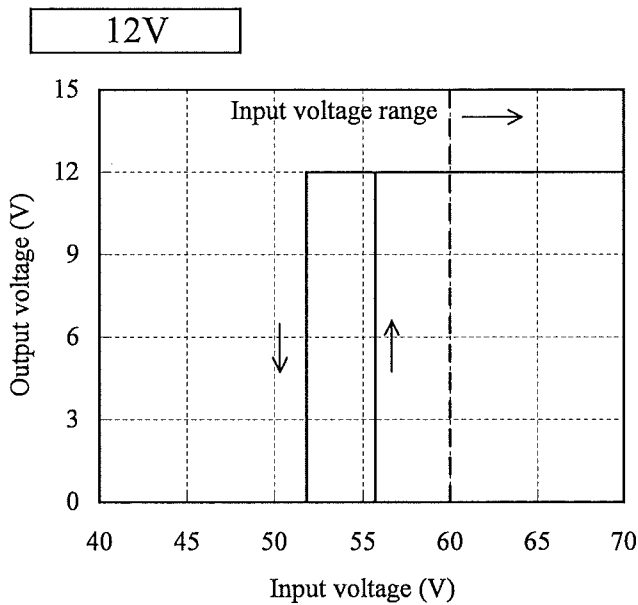
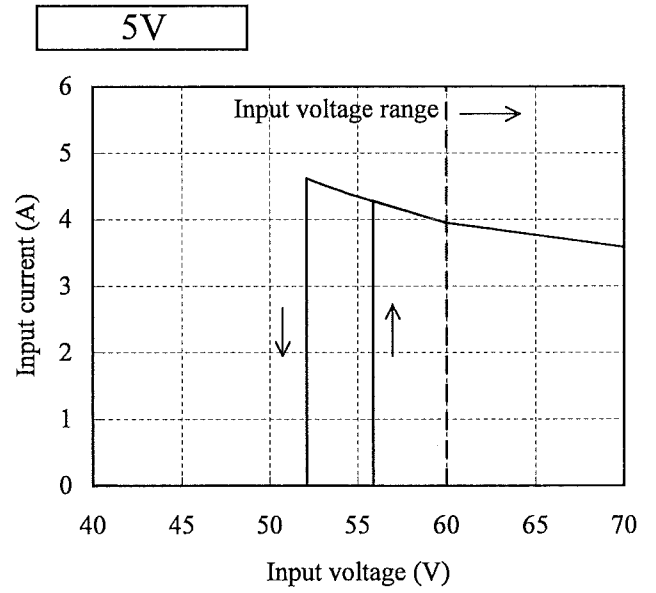
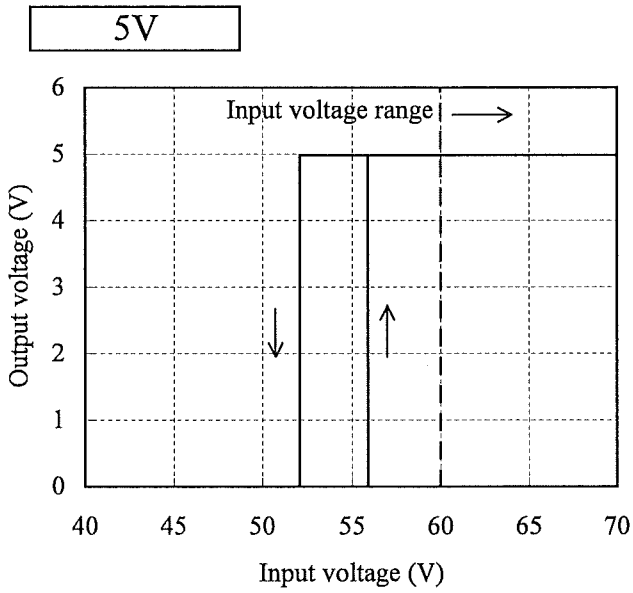
(6) 起動・停止電圧特性
Start and Stop voltage characteristics

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

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

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

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



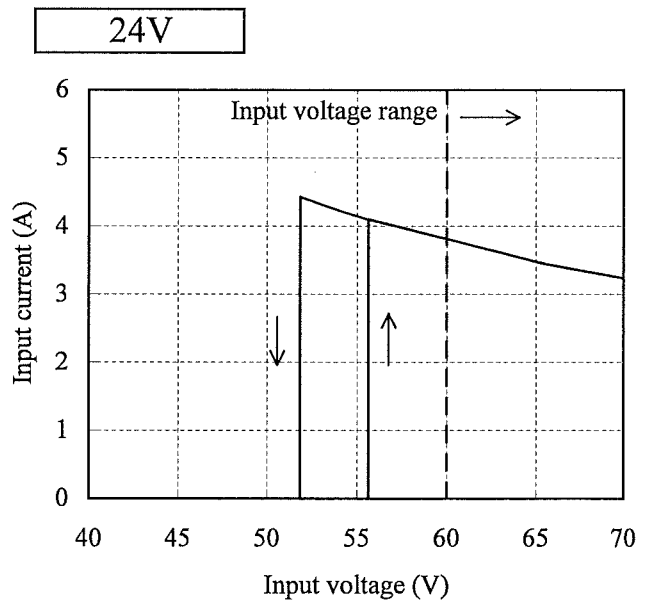
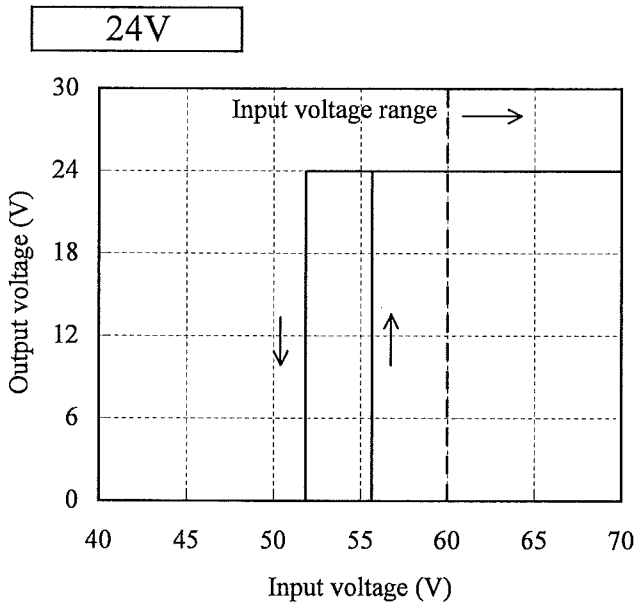
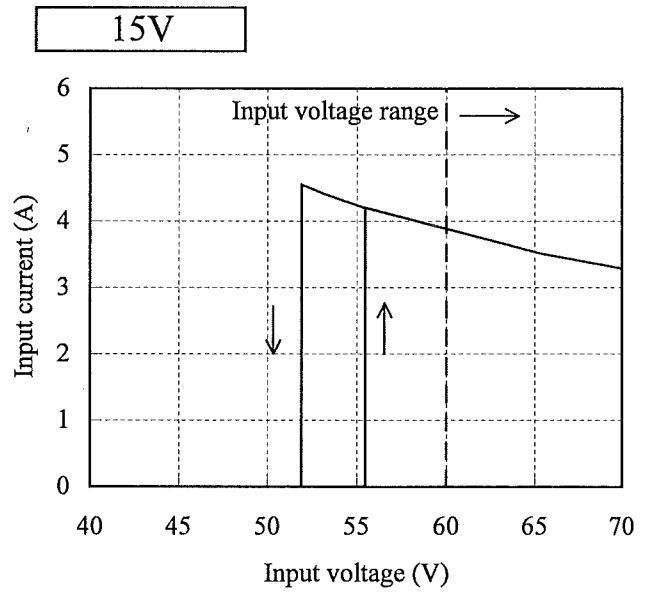
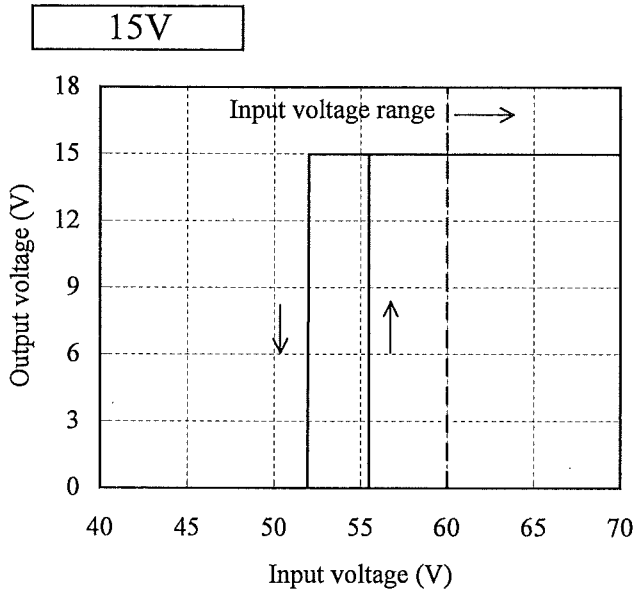
(6) 起動・停止電圧特性
Start and Stop voltage characteristics

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

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

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

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

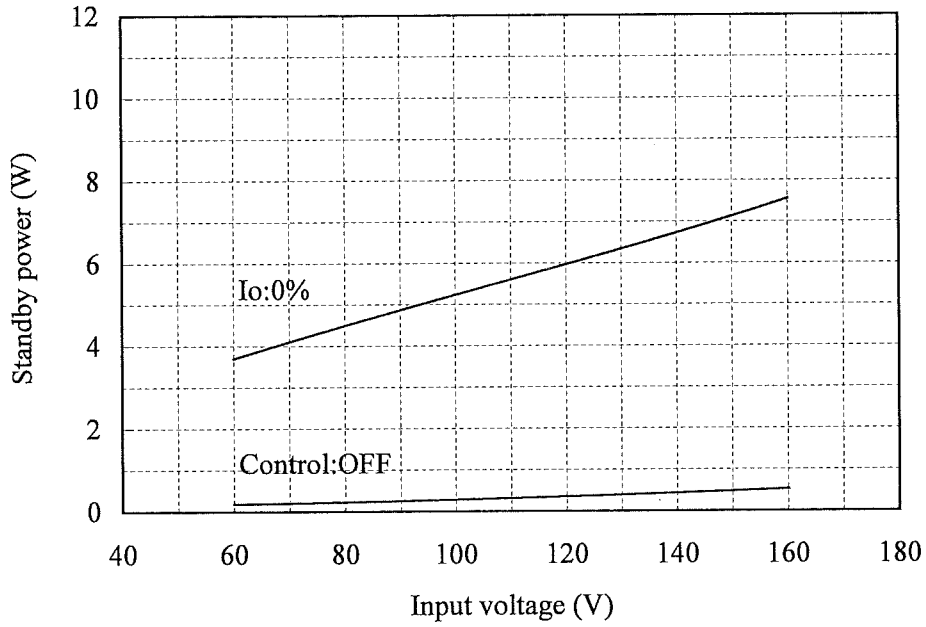


2.2 待機電力特性

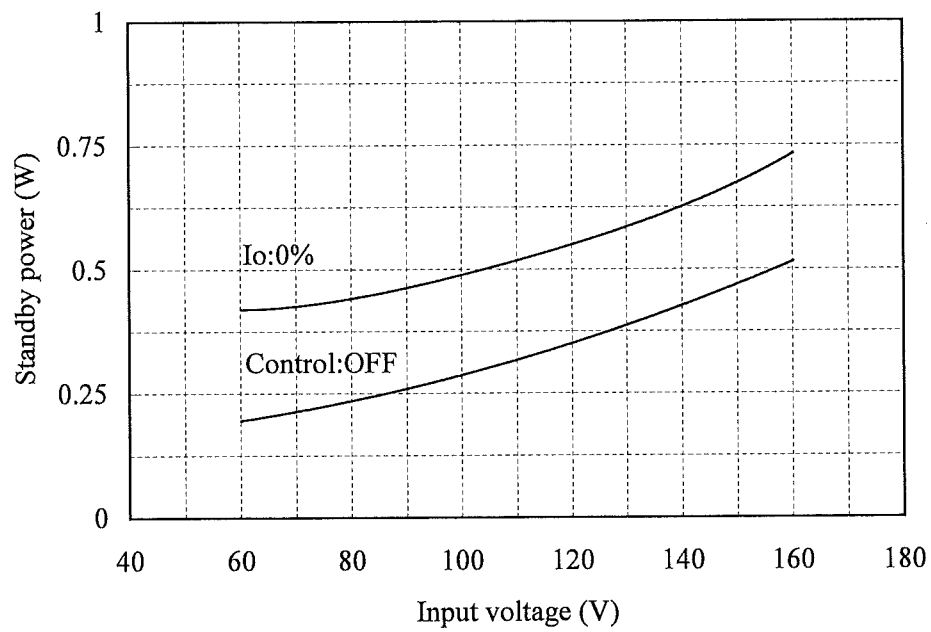
Standby power characteristics

Condition T_{bp} : 25 °C

5V



12V

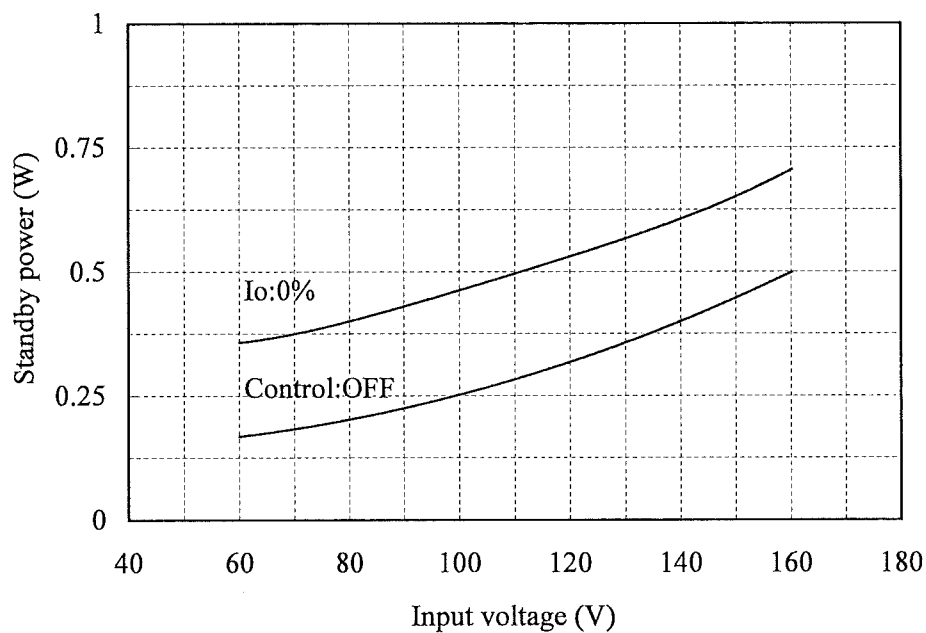


2.2 待機電力特性

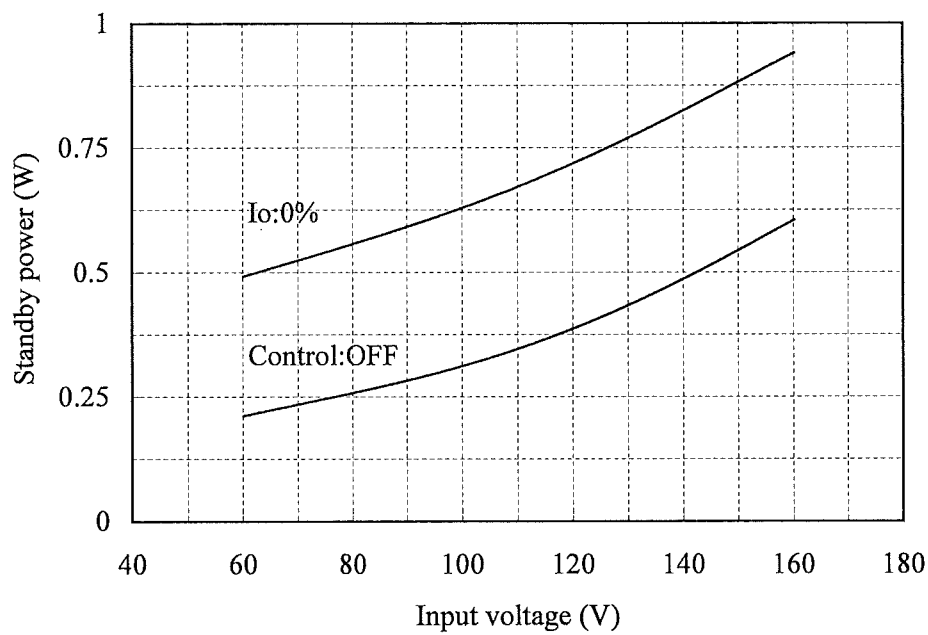
Standby power characteristics

Condition Tbp : 25 °C

15V



24V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

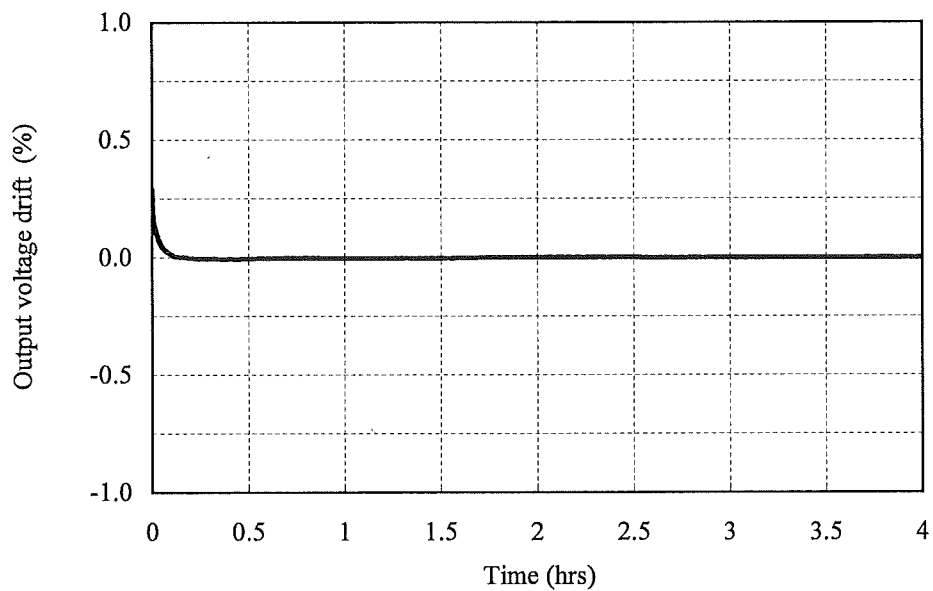
Conditions

V_{in} : 110 VDC

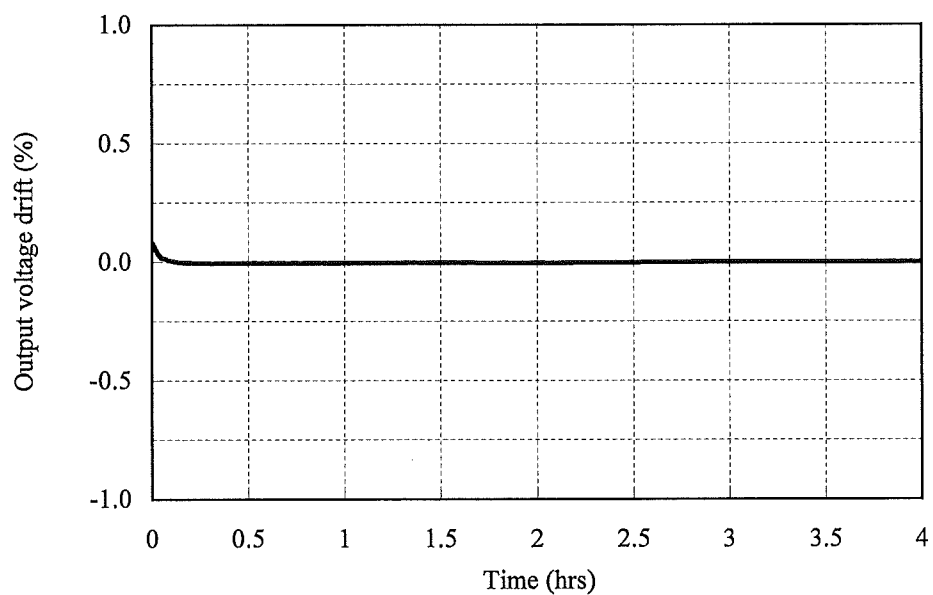
I_o : 100 %

T_a : 25 °C

5V



12V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

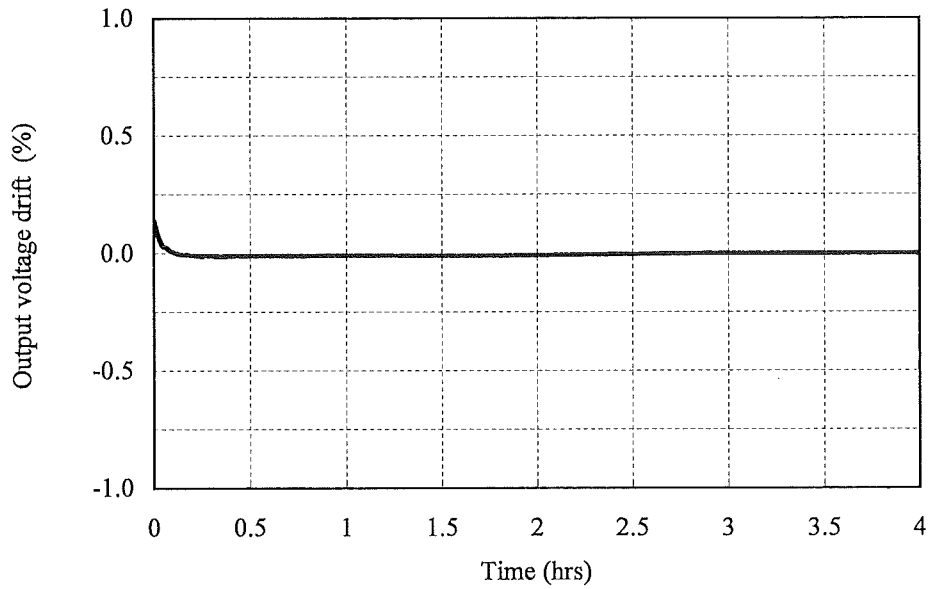
Conditions

Vin : 110 VDC

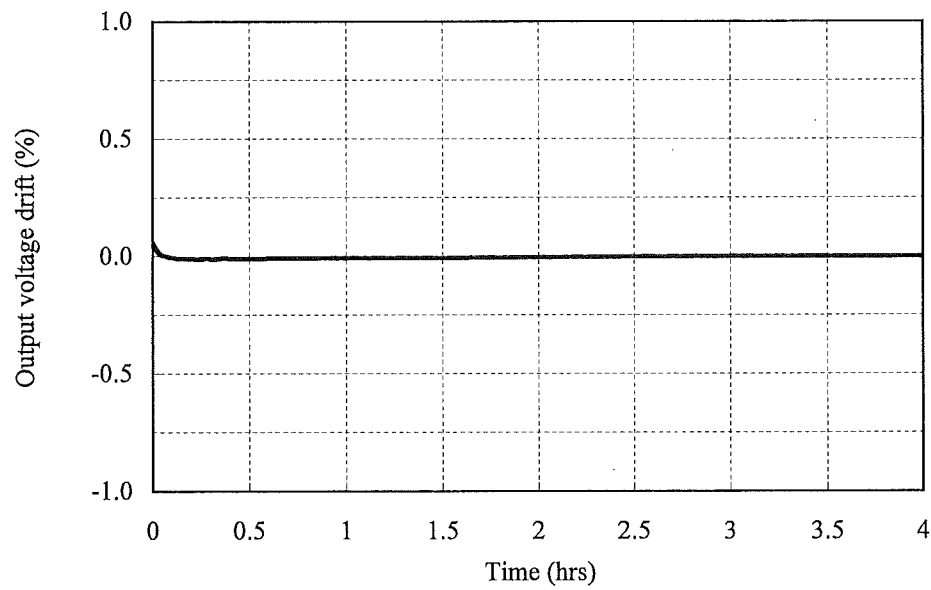
Io : 100 %

Ta : 25 °C

15V



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

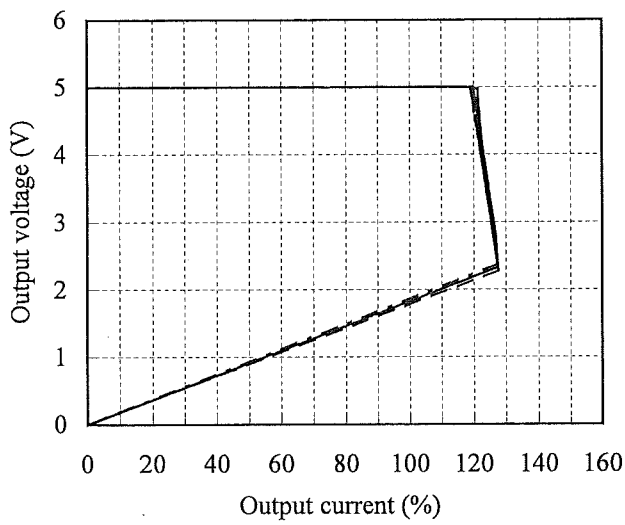
Conditions Vin : 60 VDC -----
 : 110 VDC - - - - -
 : 160 VDC _____
 Tbp : 25 °C

ベースプレート温度依存性

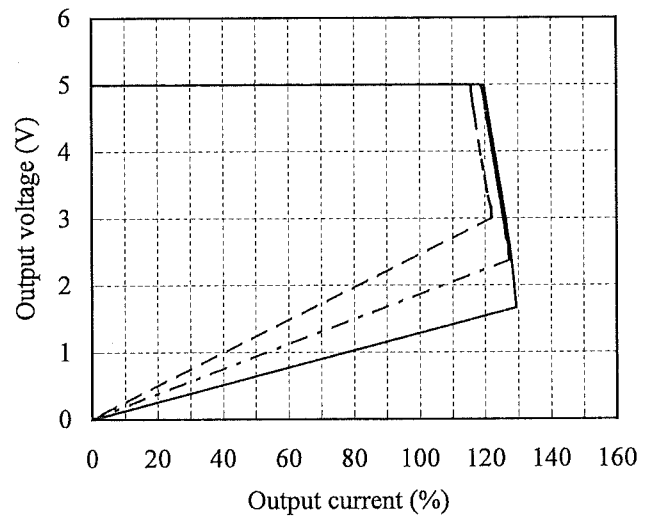
Baseplate temperature dependence

Conditions Vin : 110 VDC
 Tbp : -40 °C -----
 : 25 °C - - - - -
 : 100 °C _____

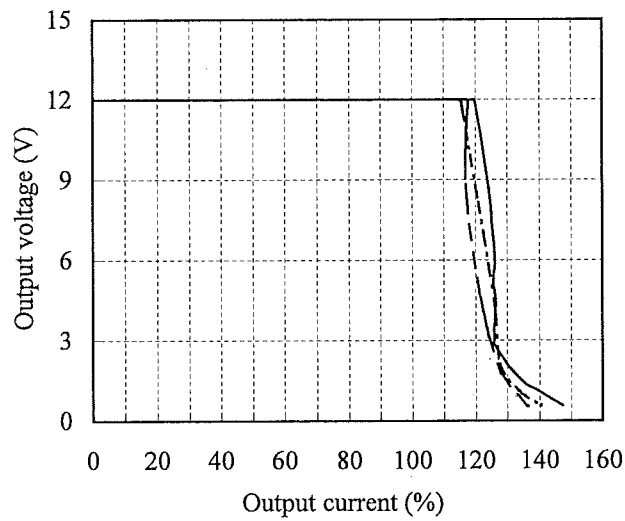
5V



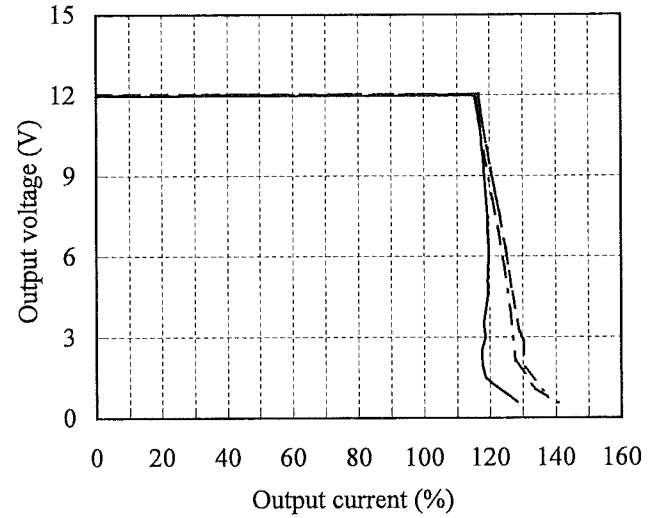
5V



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

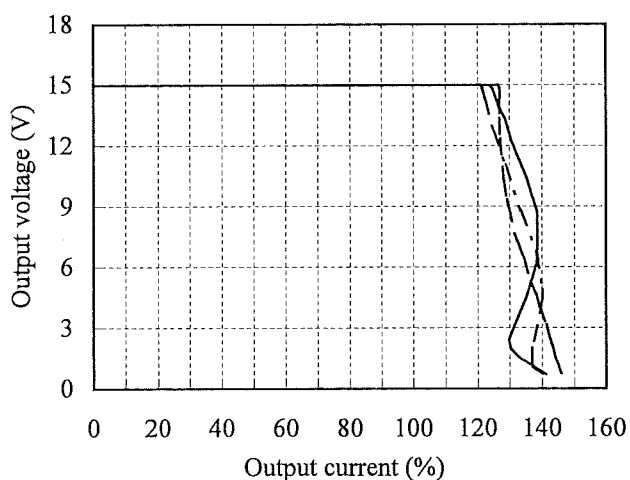
Conditions Vin : 60 VDC -----
 : 110 VDC - - - - -
 : 160 VDC ————
 Tbp : 25 °C

ベースプレート温度依存性

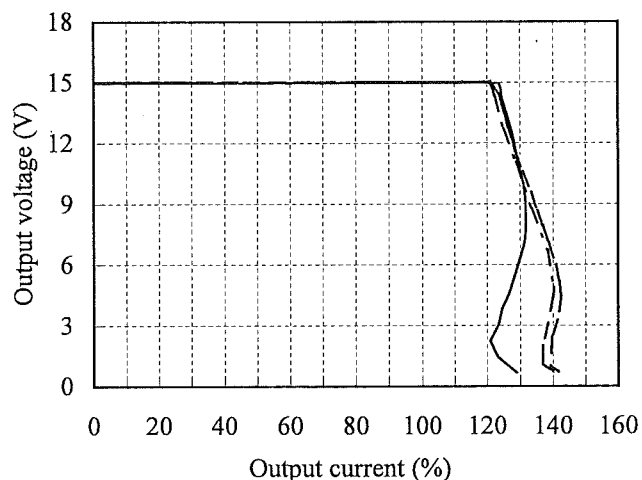
Baseplate temperature dependence

Conditions Vin : 110 VDC
 Tbp : -40 °C -----
 : 25 °C - - - - -
 : 100 °C ————

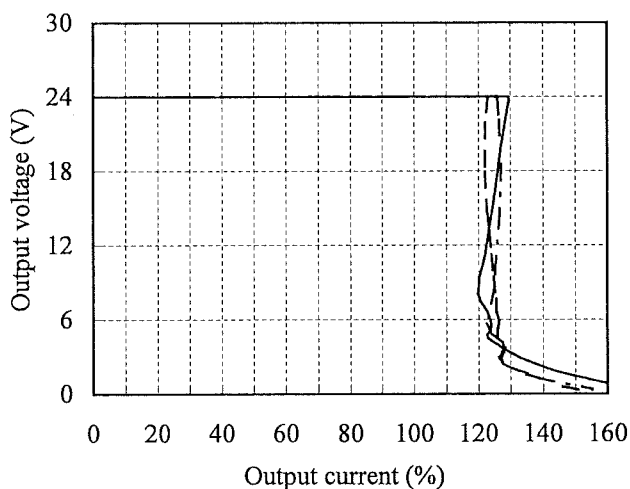
15V



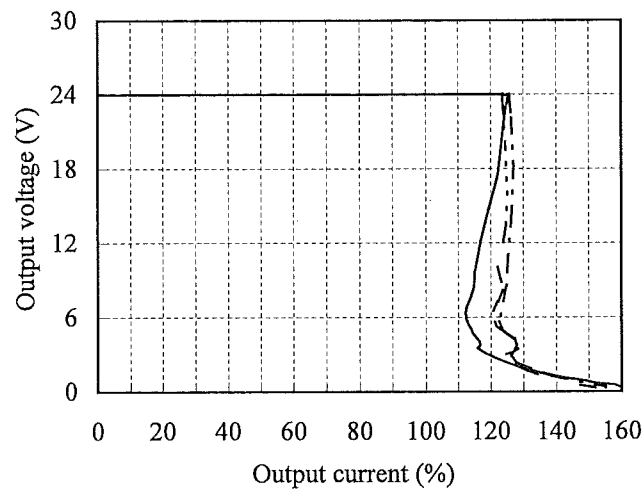
15V



24V



24V



2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

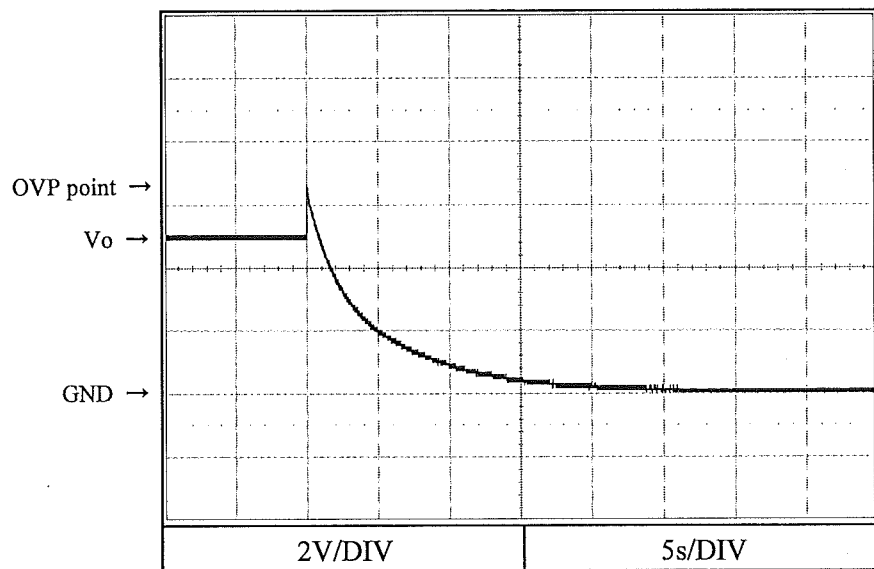
Conditions

Vin : 110 VDC

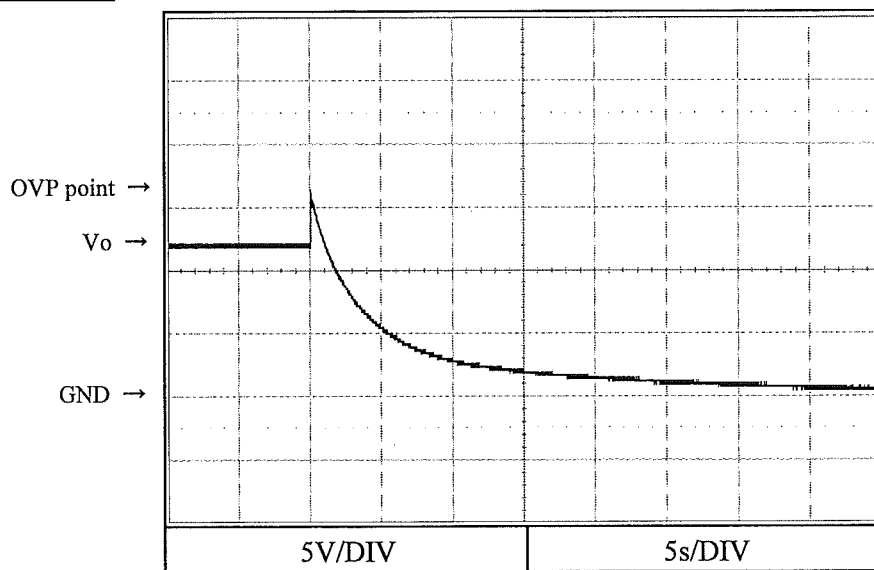
Io : 0 %

Tbp : 25 °C

5V



12V



2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

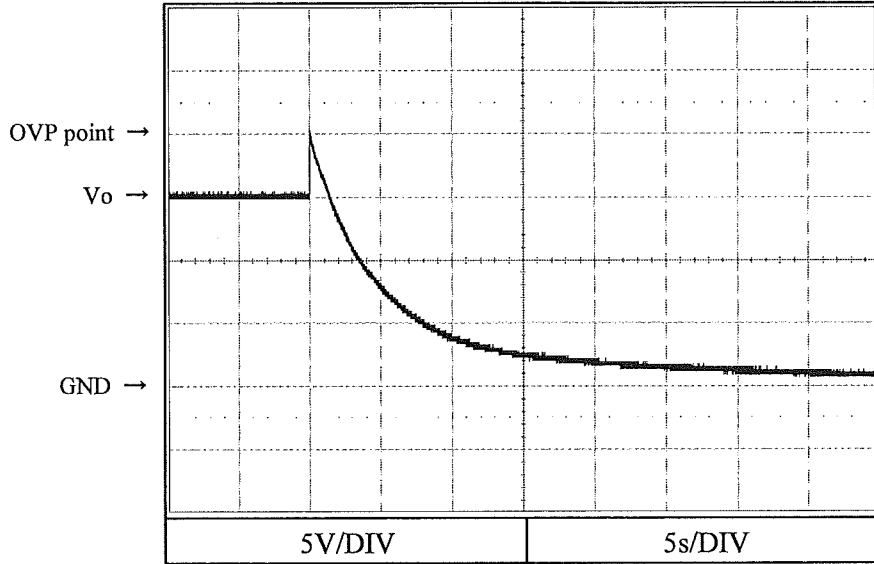
Conditions

Vin : 110 VDC

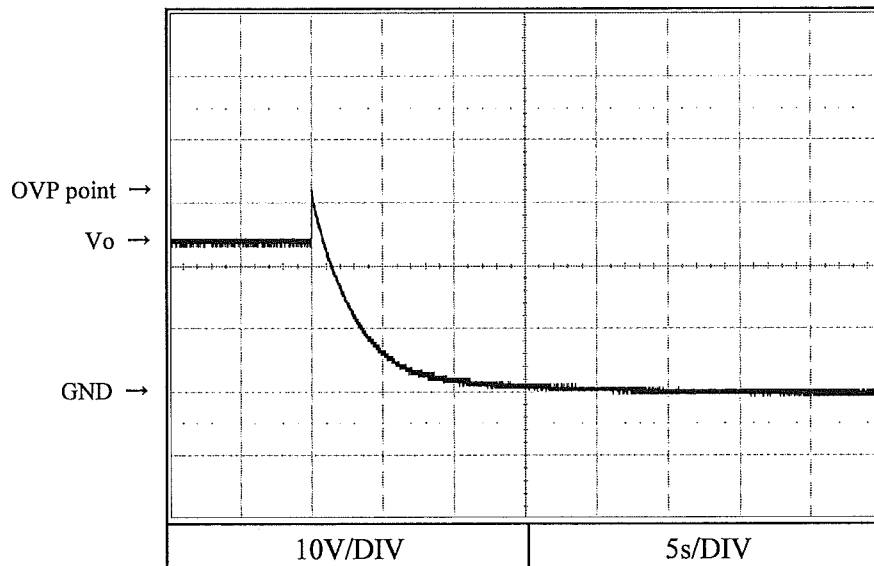
Io : 0 %

Tbp : 25 °C

15V



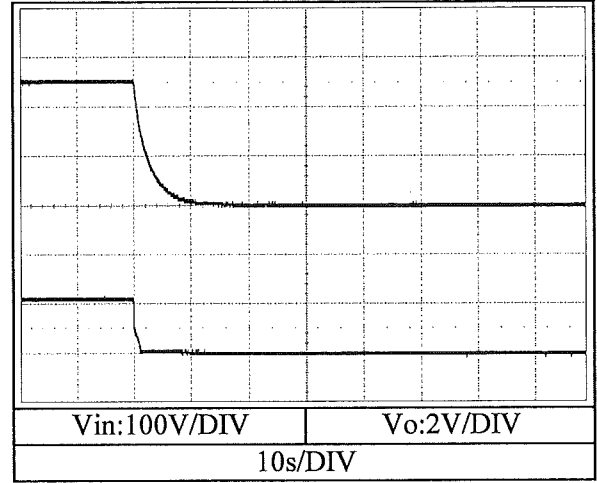
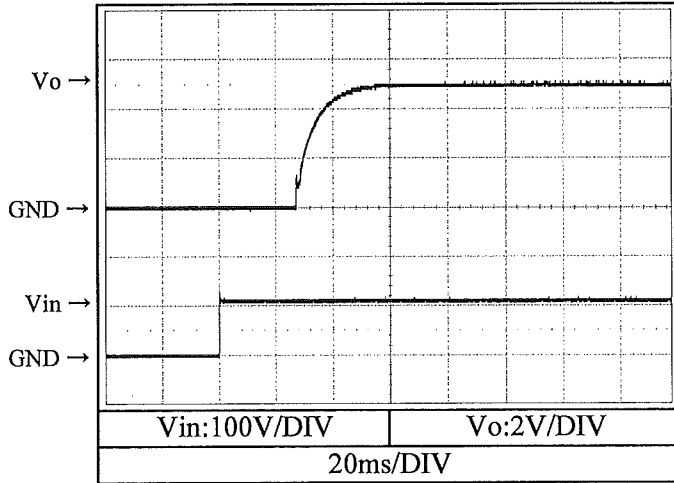
24V



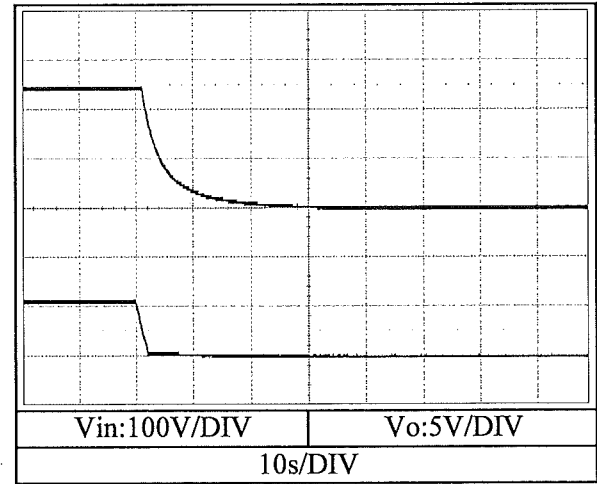
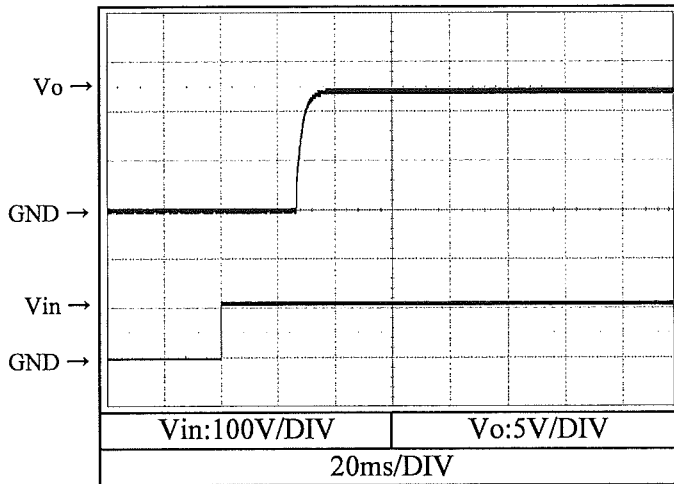
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 110 VDC
Io : 0 %
Tbp : 25 °C

5V



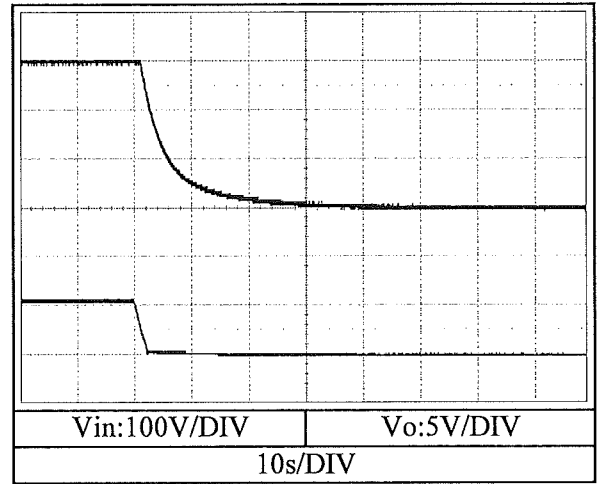
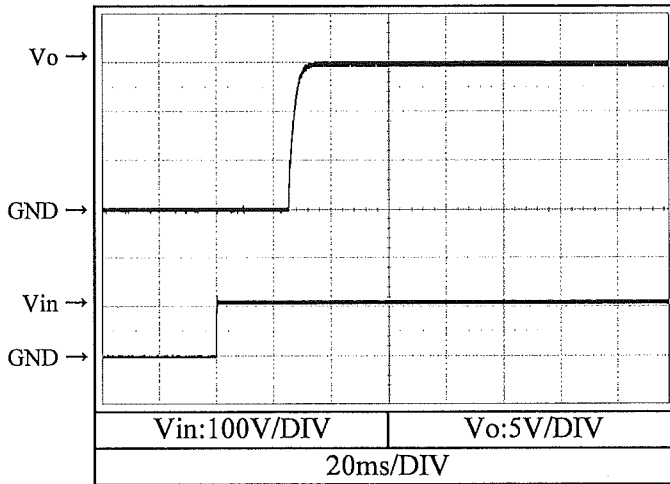
12V



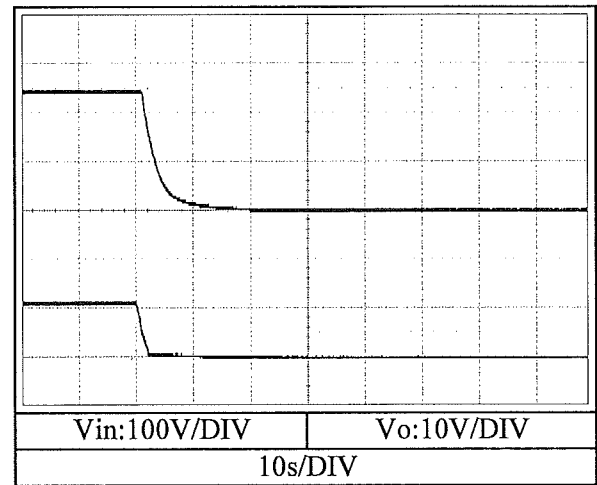
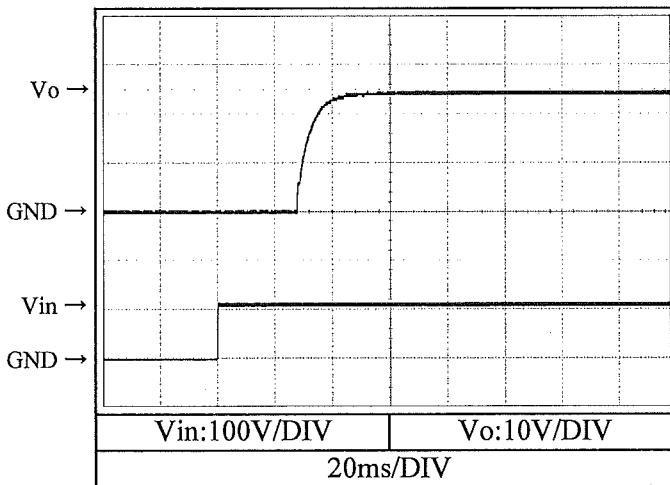
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 110 VDC
Io : 0 %
Tbp : 25 °C

15V



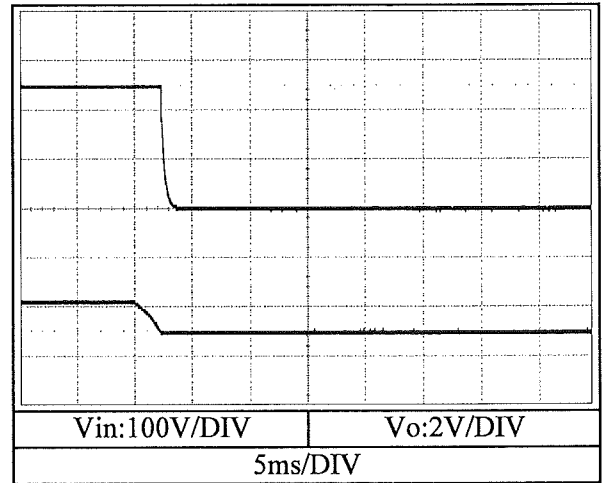
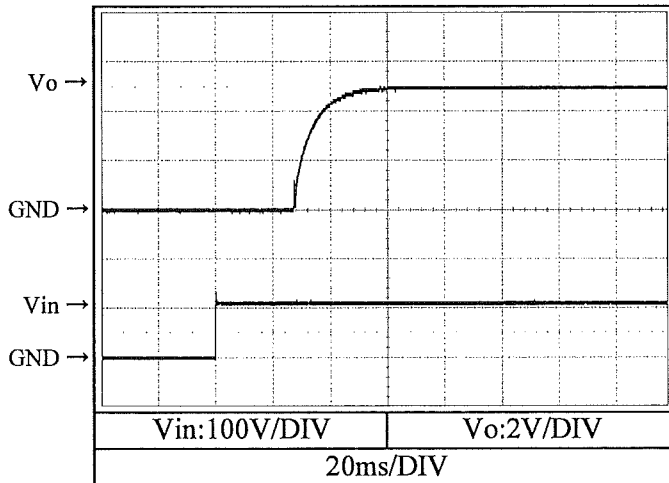
24V



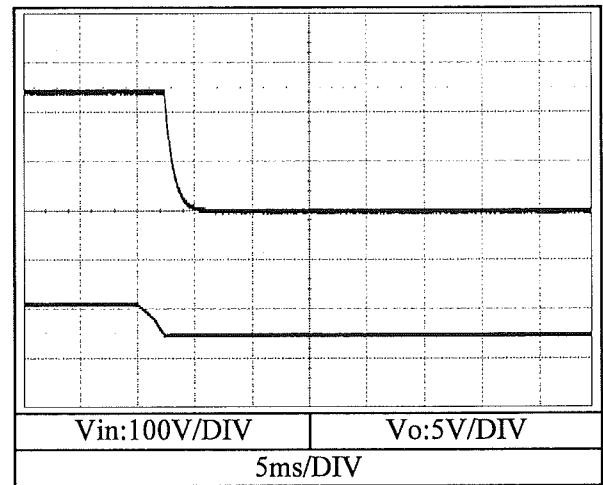
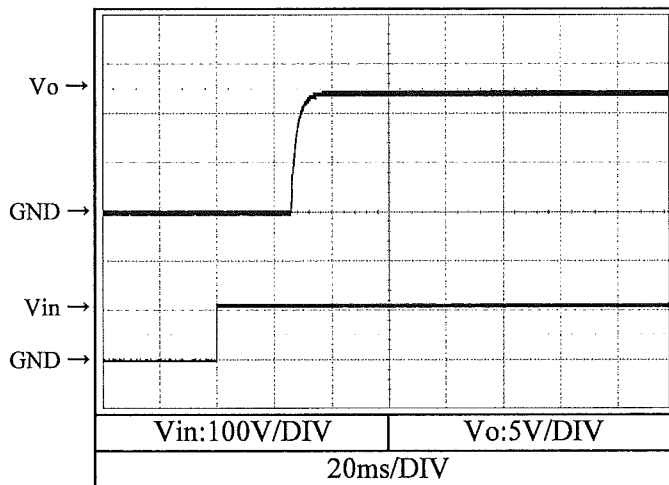
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 110 VDC
Io : 100 %
Tbp : 25 °C

5V



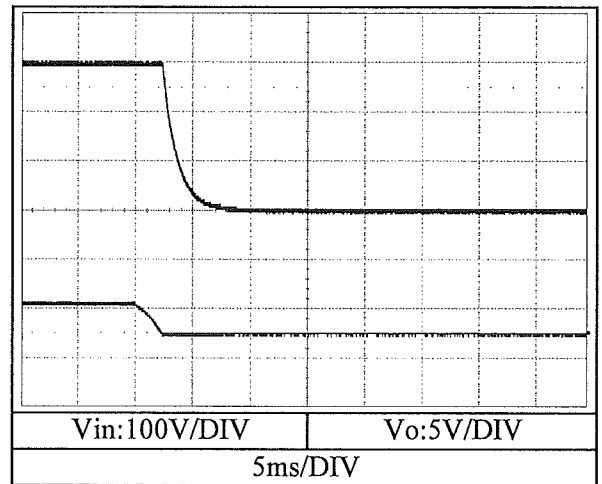
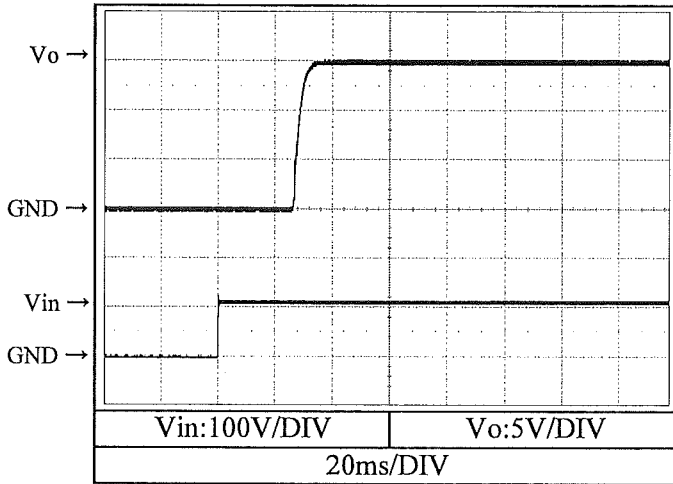
12V



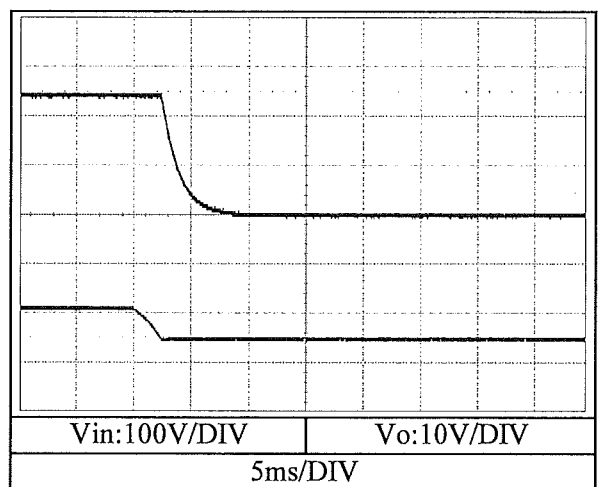
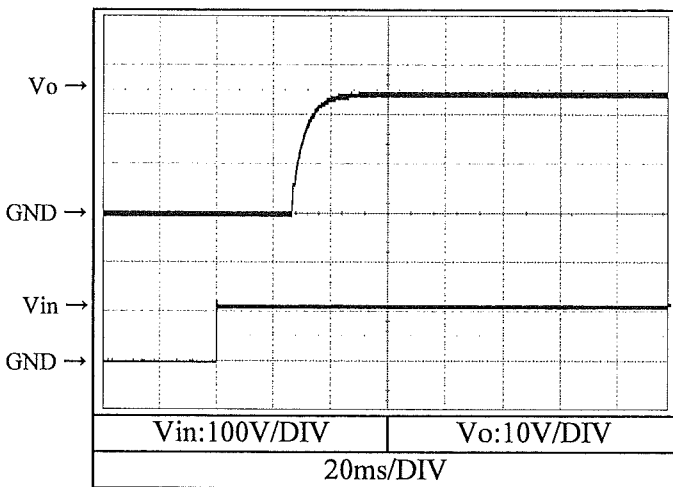
2.6 出力立ち上がり、立ち下がり特性
Output rise and fall characteristics

Conditions Vin : 110 VDC
Io : 100 %
Tbp : 25 °C

15V



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

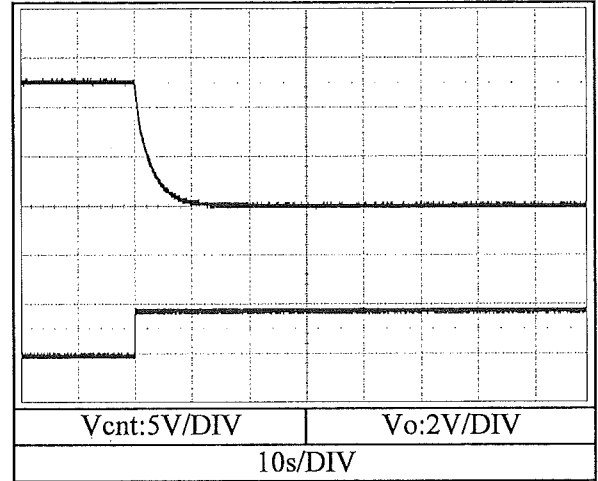
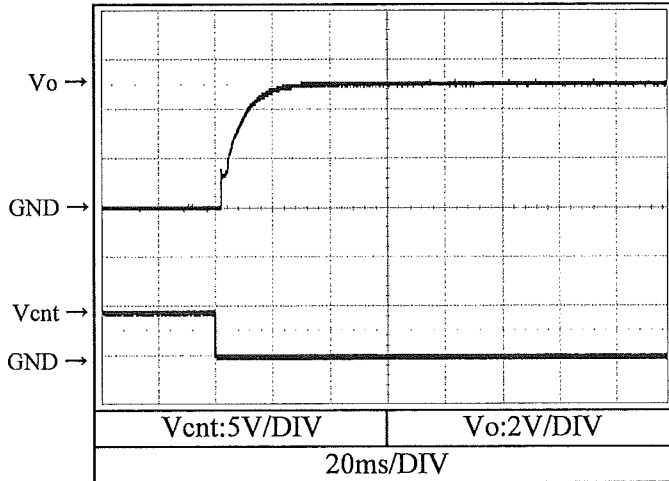
Conditions

Vin : 110 VDC

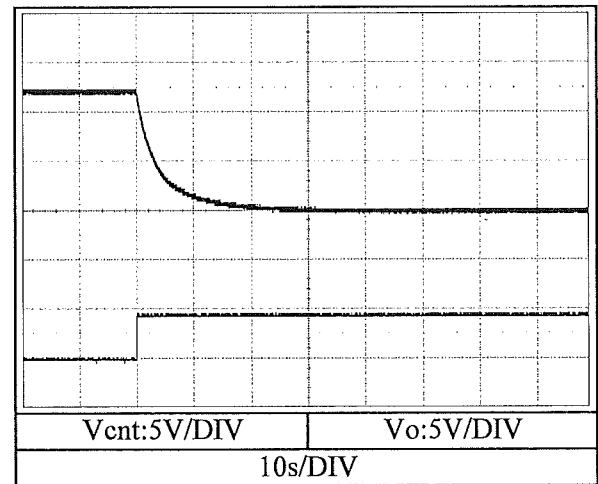
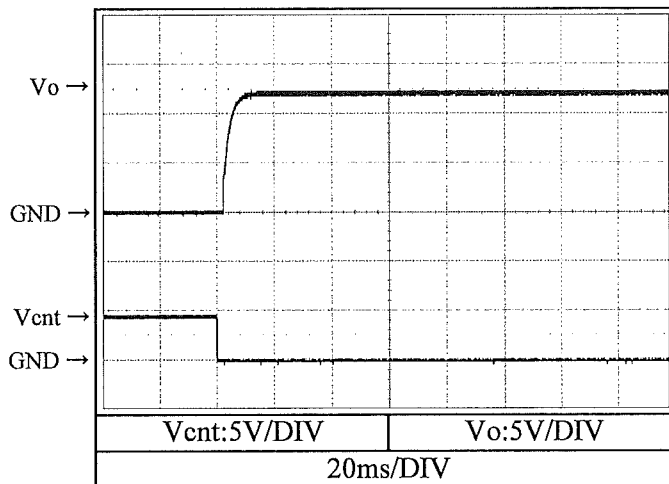
Io : 0%

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

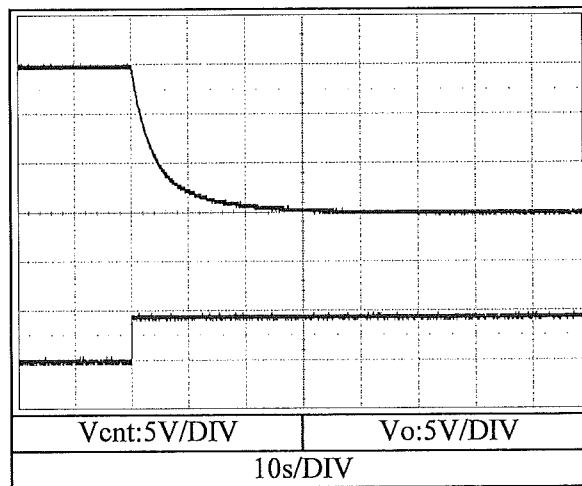
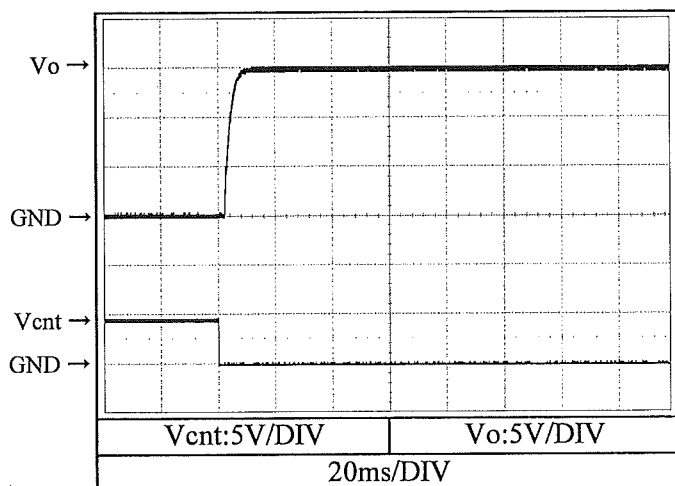
Conditions

Vin : 110 VDC

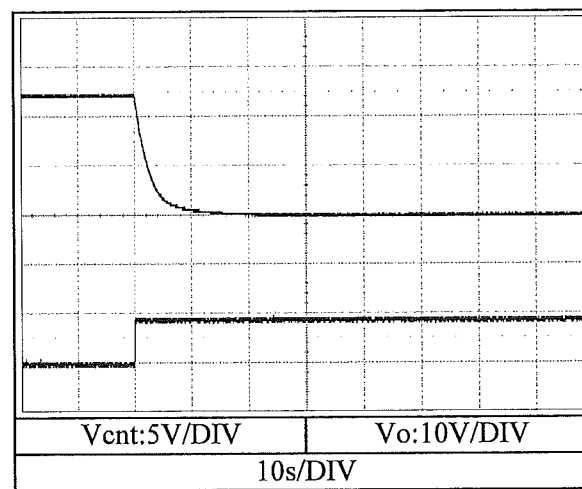
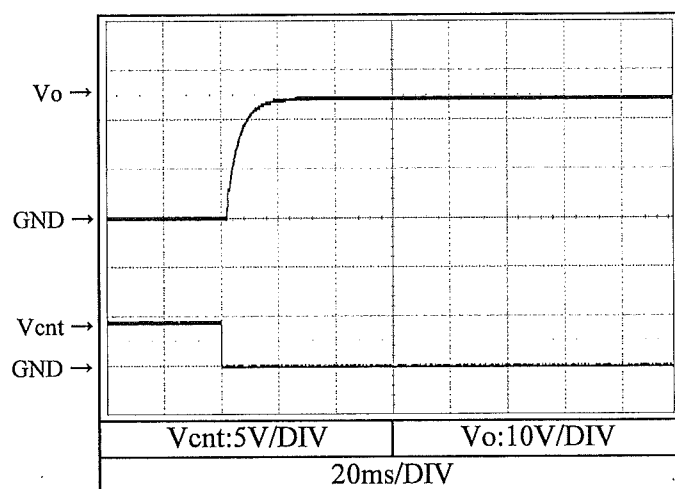
Io : 0%

Tbp : 25 °C

15V



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

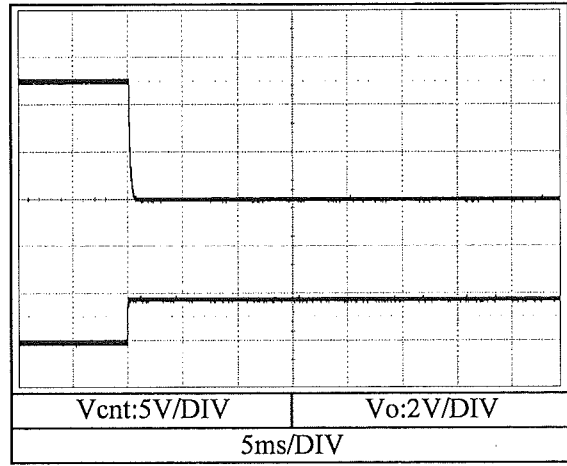
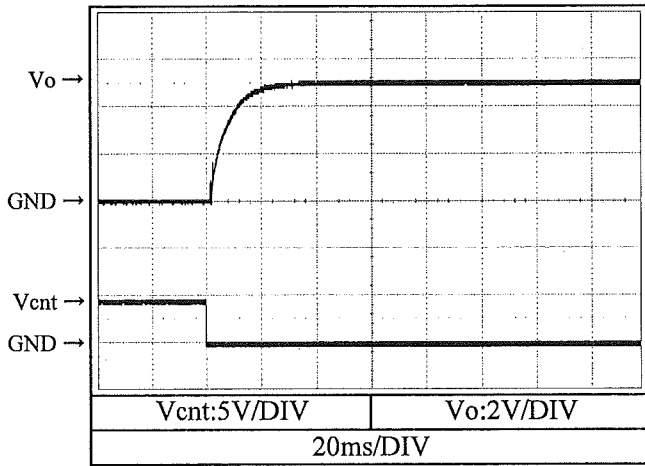
Conditions

Vin : 110 VDC

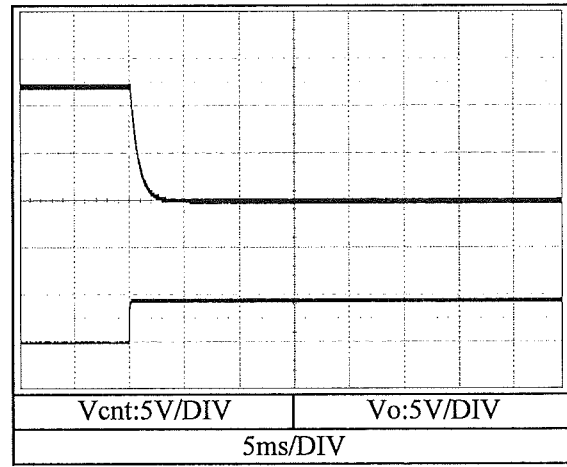
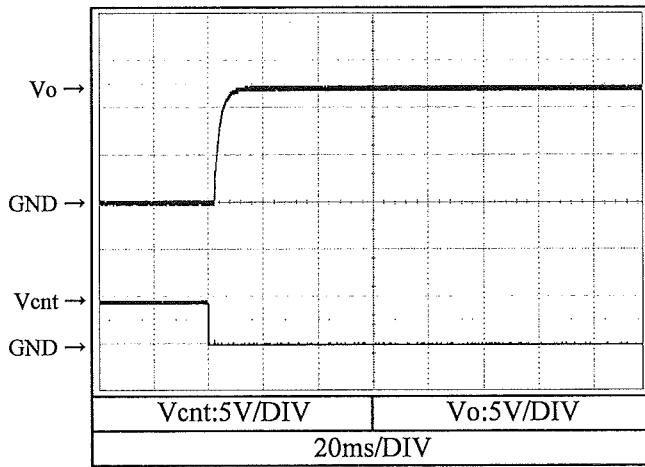
Io : 100 %

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

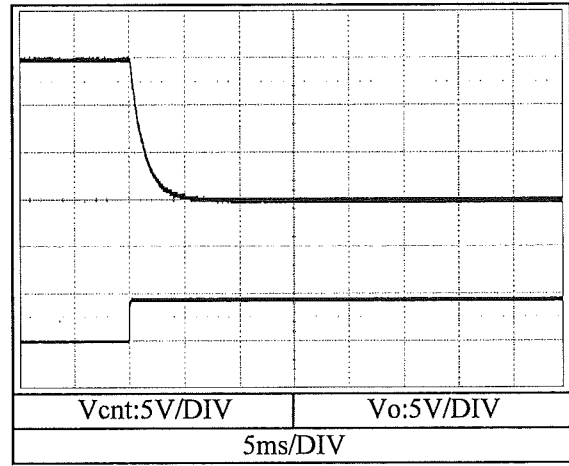
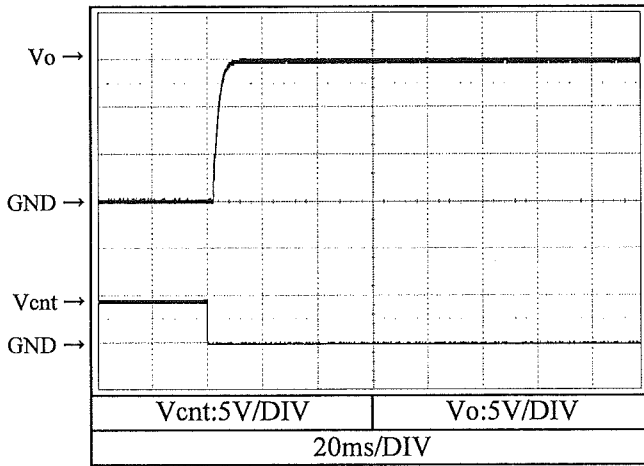
Conditions

Vin : 110 VDC

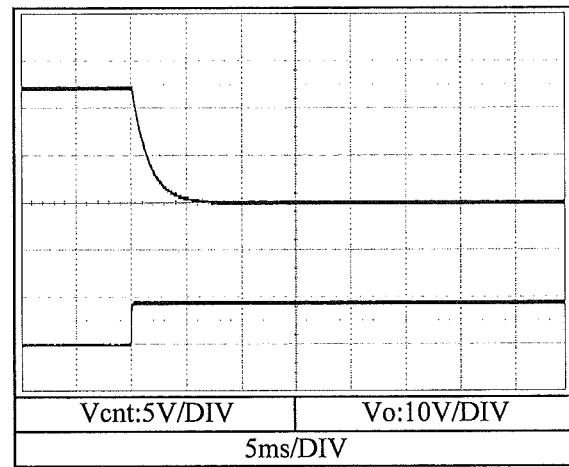
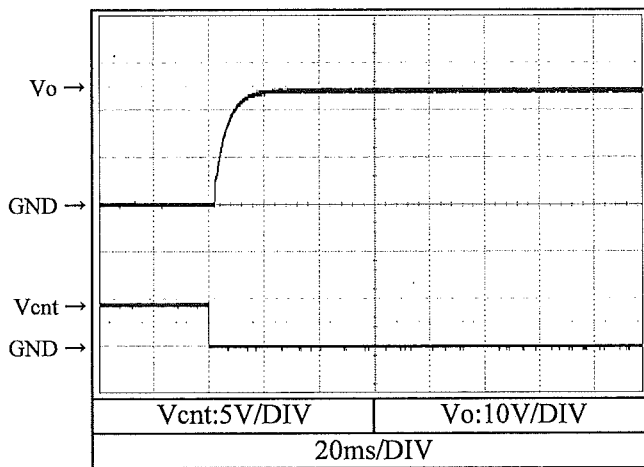
Io : 100 %

Tbp : 25 °C

15V



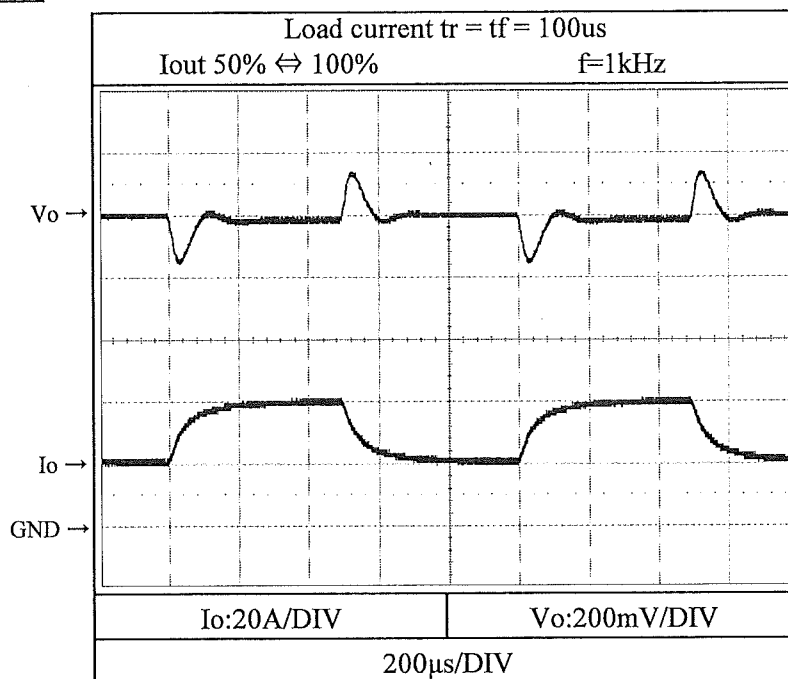
24V



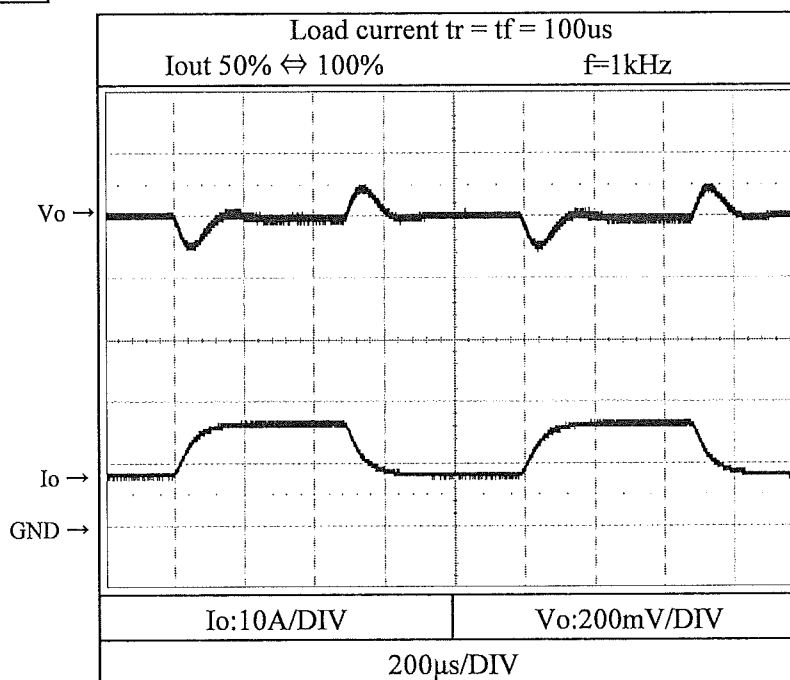
2.7 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 110 VDC
Tbp : 25 °C

5V



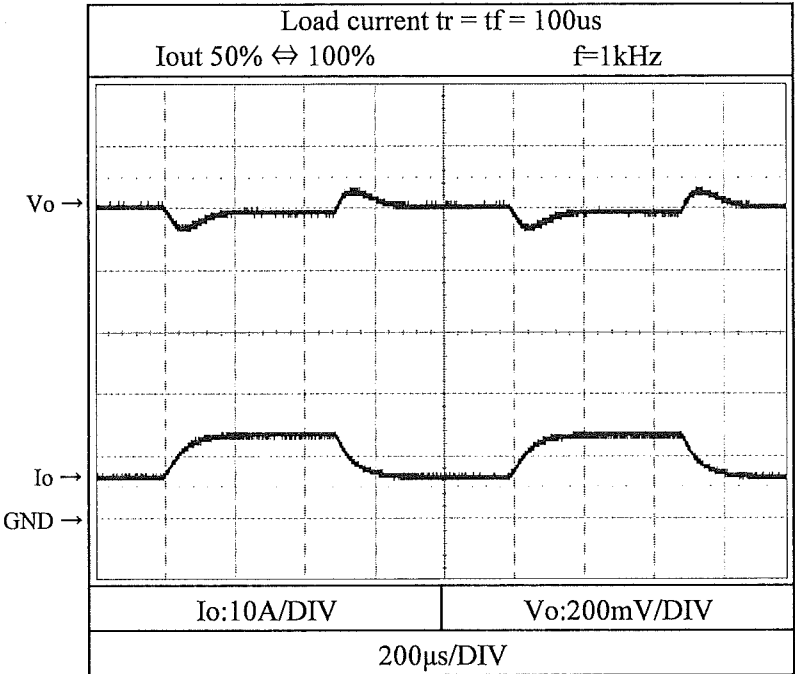
12V



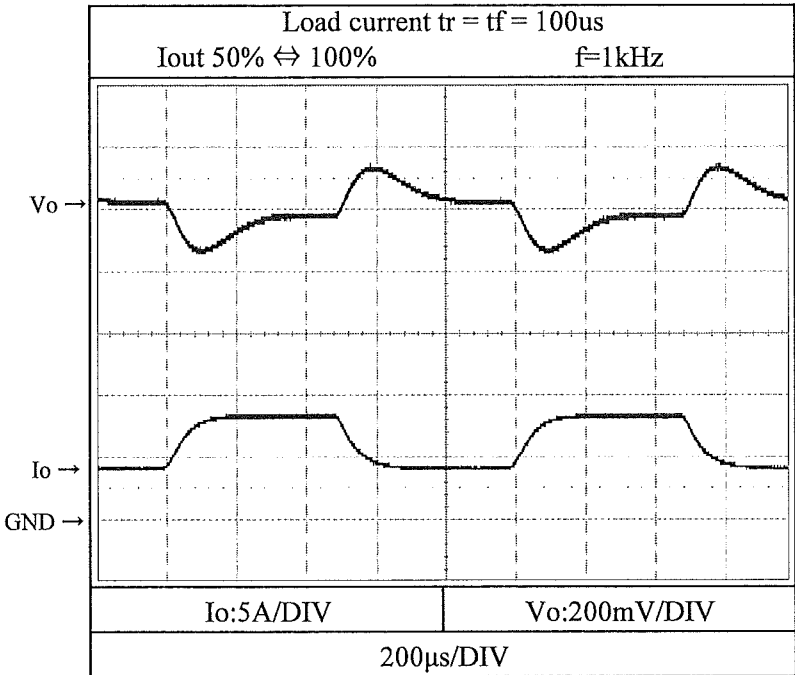
2.7 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 110 VDC
Tbp : 25 °C

15V



24V

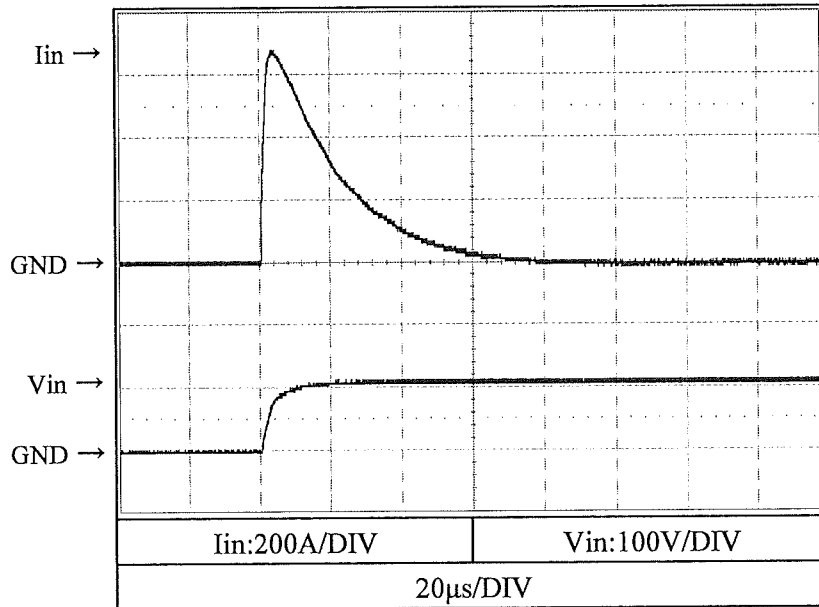


2.8 入力サージ電流（突入電流）特性
Inrush current characteristics

Conditions

V_{in} : 110 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

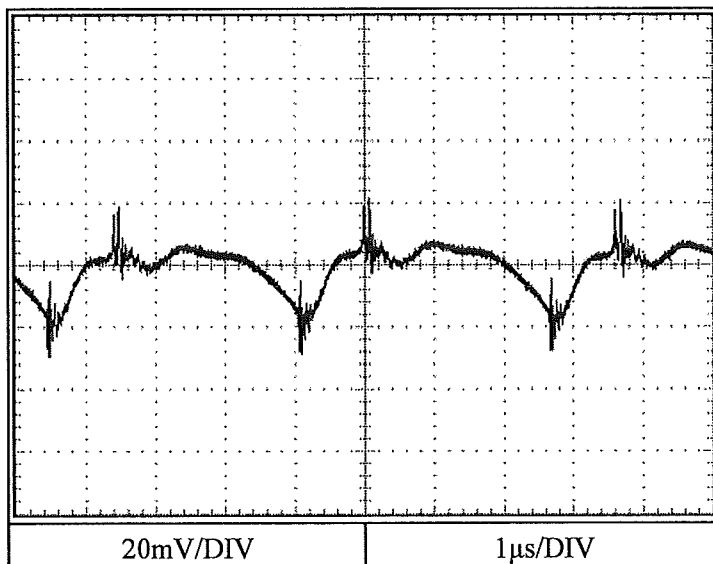
Conditions

Vin : 110 VDC

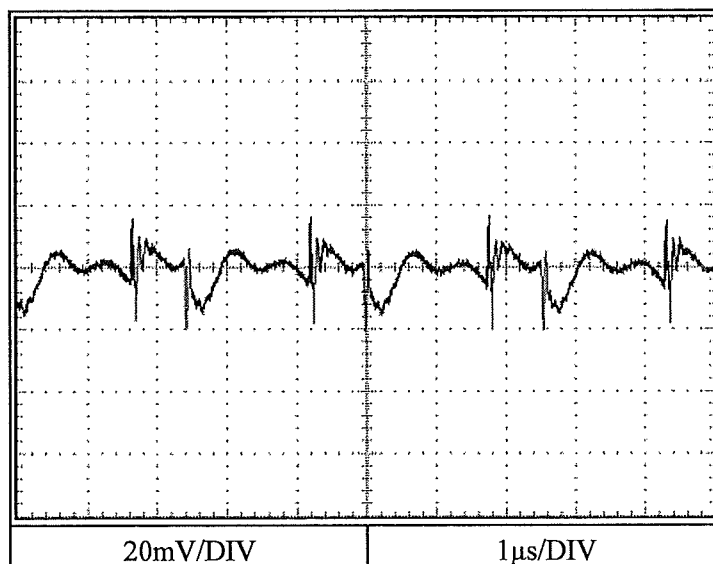
Io : 100 %

Tbp : 25 °C

5V



12V



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

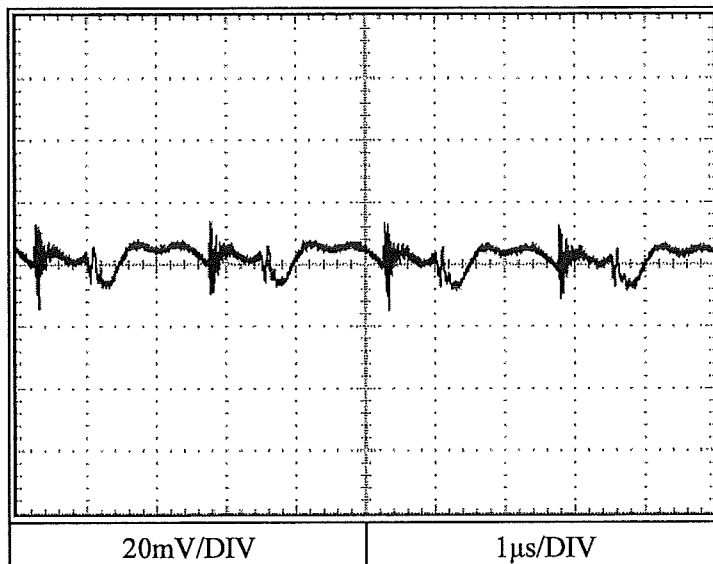
Conditions

Vin : 110 VDC

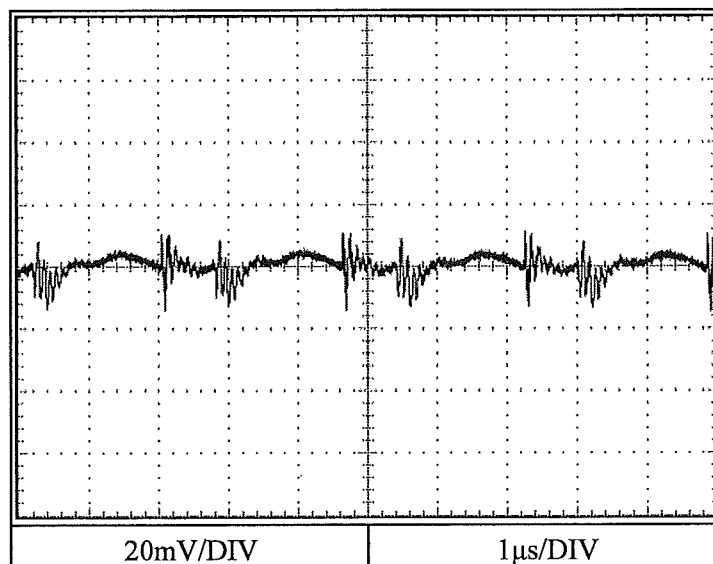
Io : 100 %

Tbp : 25 °C

15V



24V



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

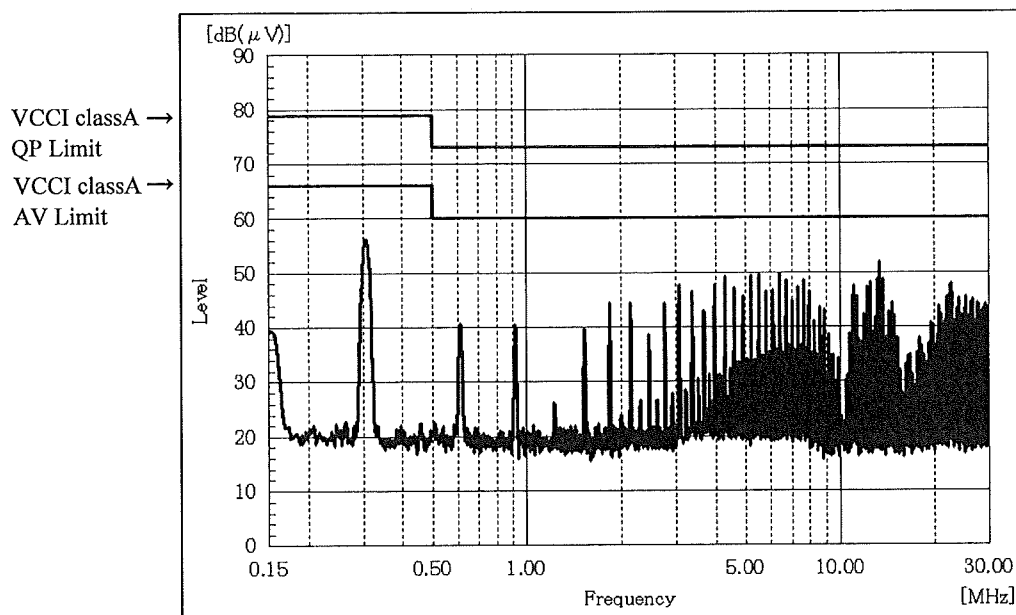
Vin : 110 VDC

Io : 100 %

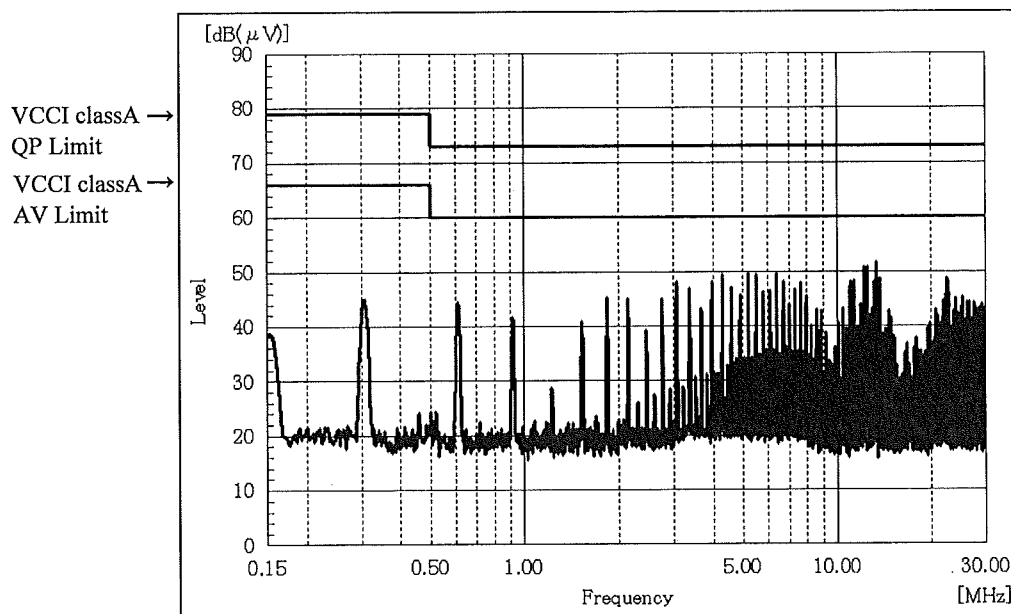
Tbp : 25 °C

5V

+Vin



-Vin



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

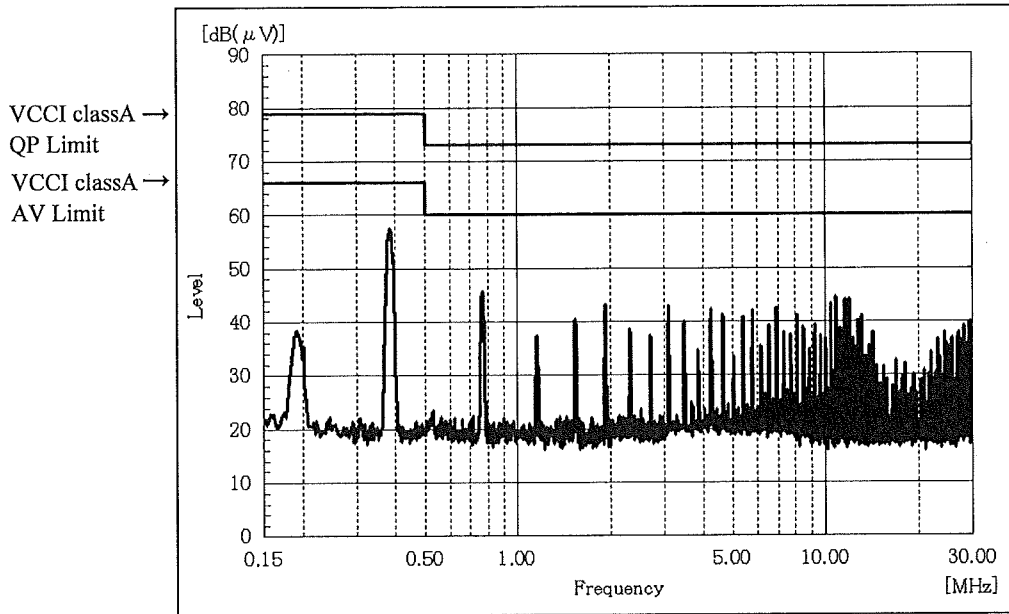
Vin : 110 VDC

Io : 100 %

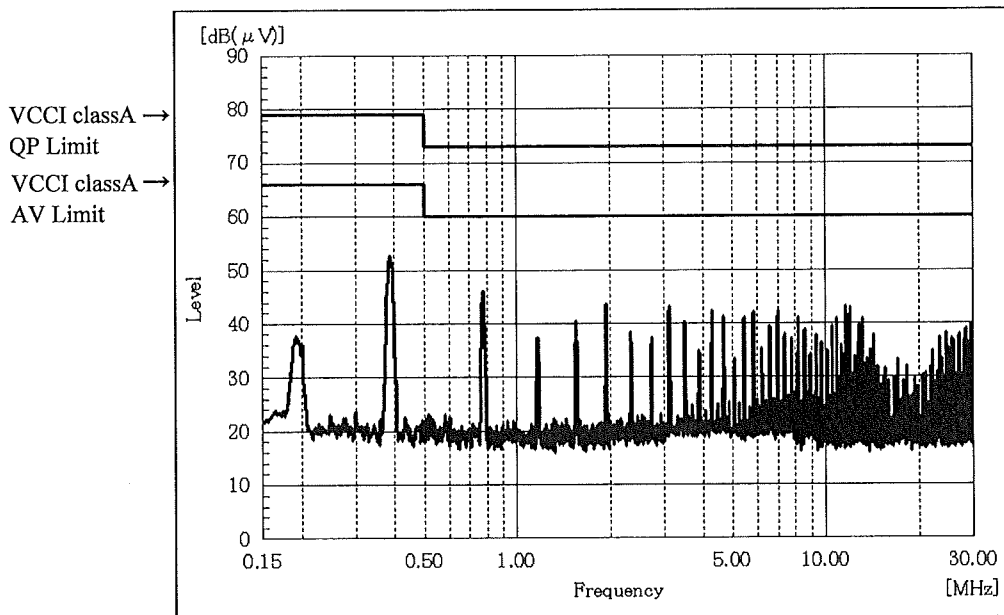
Tbp : 25 °C

12V

+Vin



-Vin



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

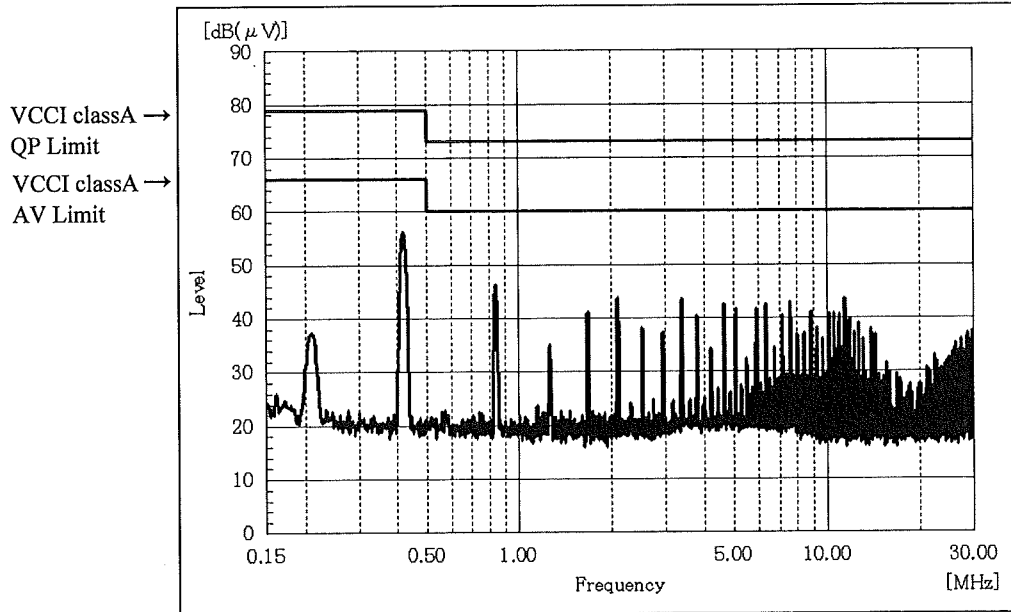
Vin : 110 VDC

Io : 100 %

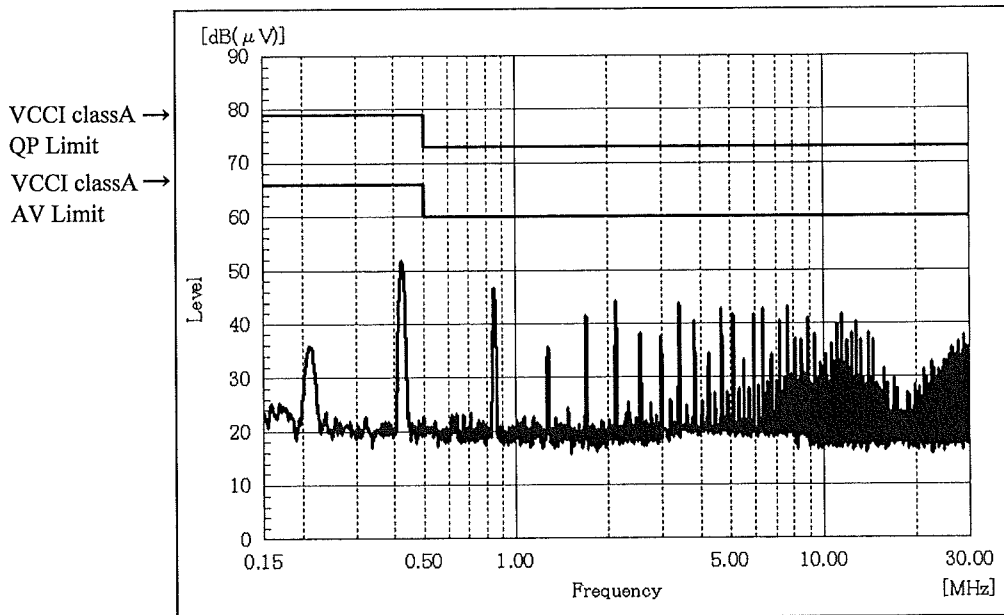
Tbp : 25 °C

15V

+Vin



-Vin



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

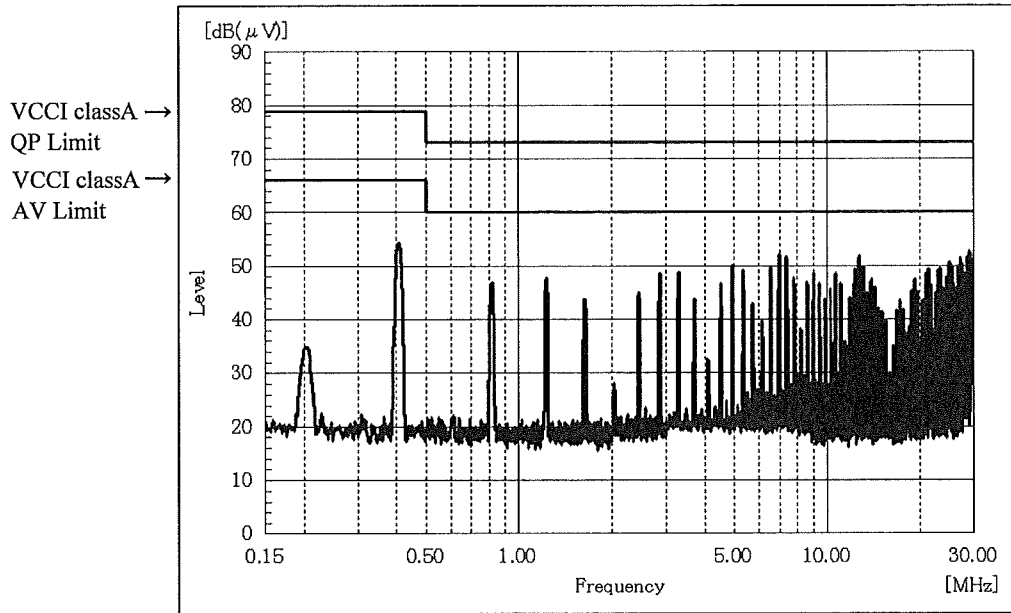
Vin : 110 VDC

Io : 100 %

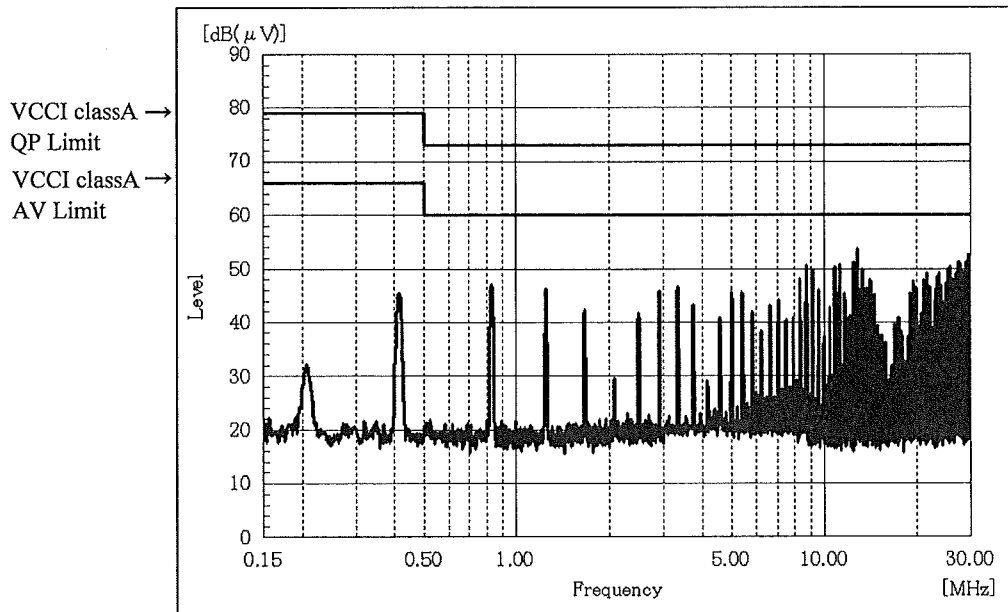
Tbp : 25 °C

24V

+Vin



-Vin



2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

Vin : 110 VDC

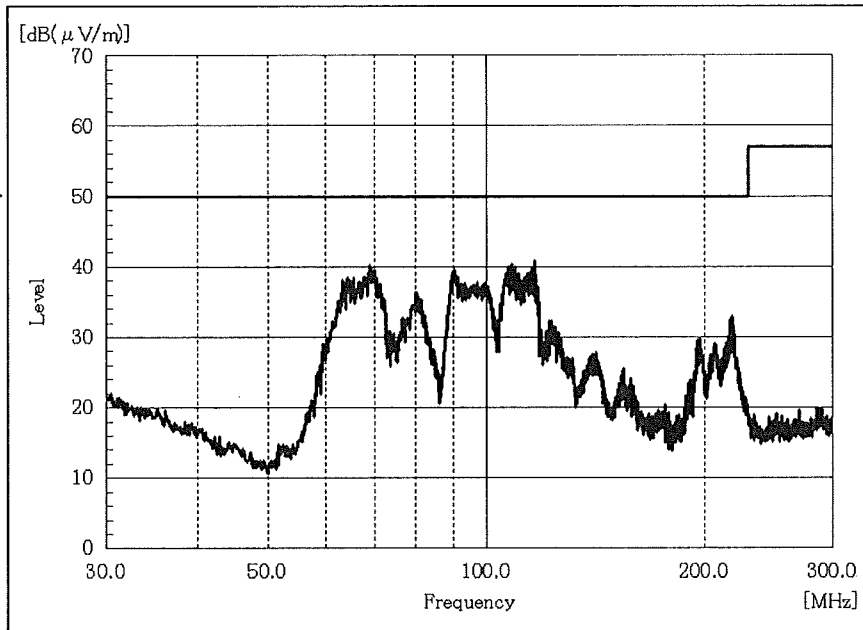
Io : 100 %

Tbp : 25 °C

5V

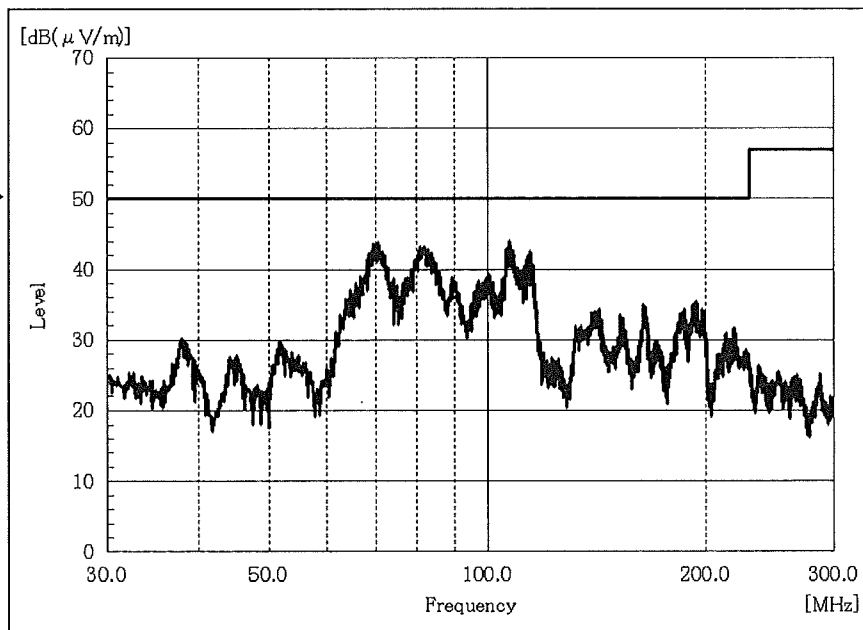
HORIZONTAL

VCCI classA →
QP Limit



VERTICAL

VCCI classA →
QP Limit



2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

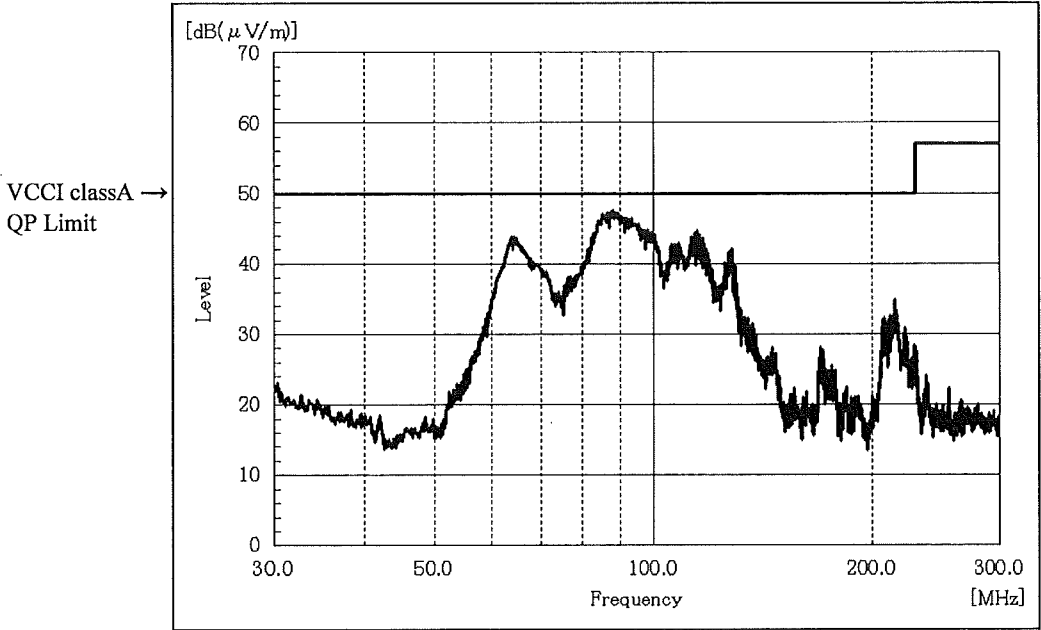
Vin : 110 VDC

Io : 100 %

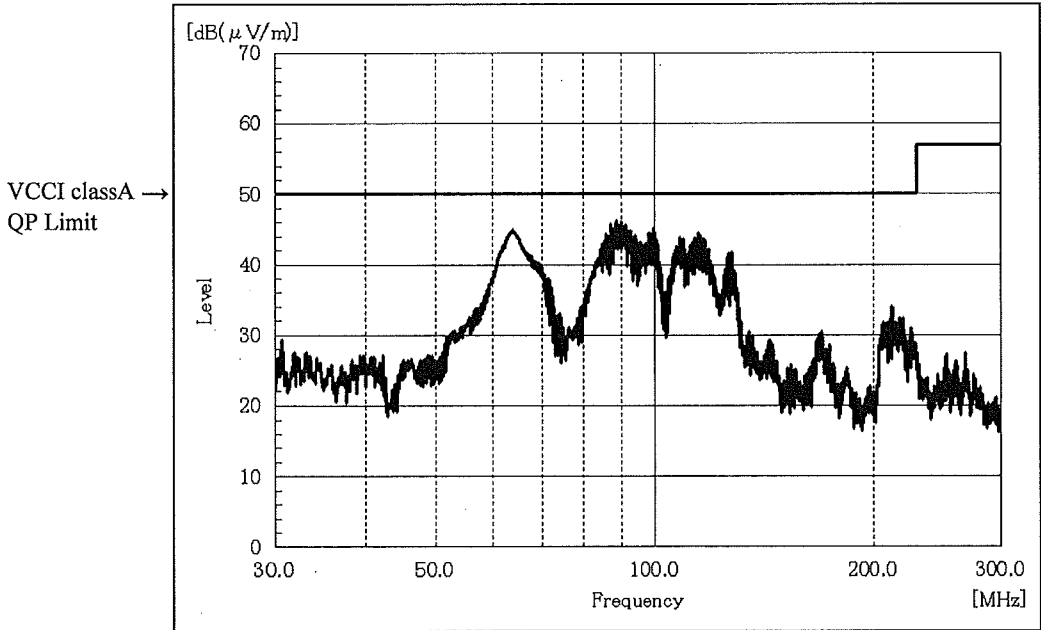
Tbp : 25 °C

12V

HORIZONTAL



VERTICAL



2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

Vin : 110 VDC

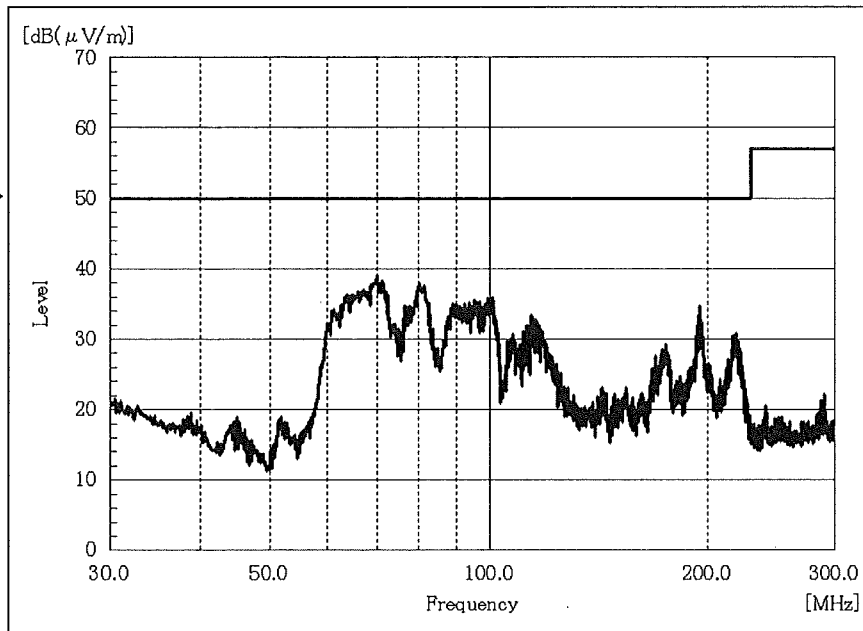
Io : 100 %

Tbp : 25 °C

15V

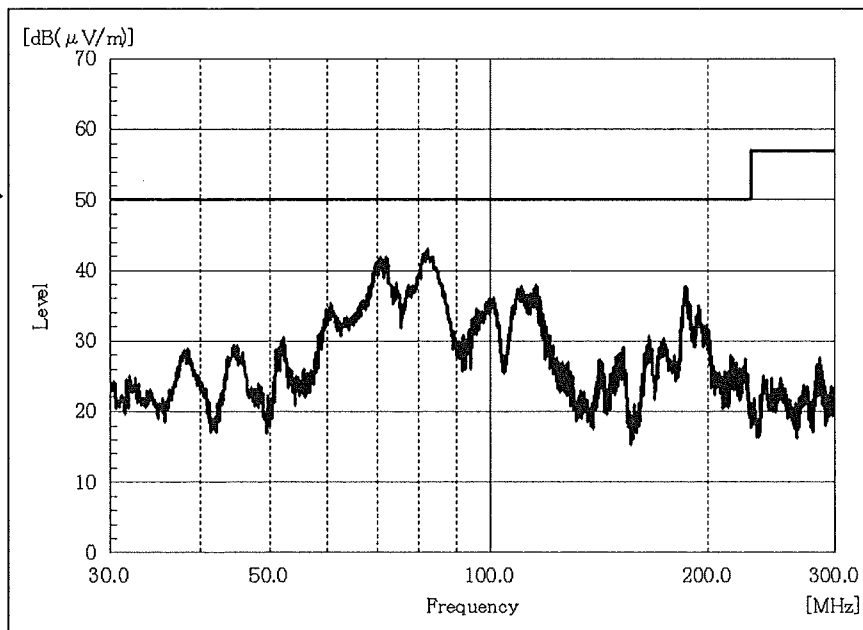
HORIZONTAL

VCCI classA →
QP Limit



VERTICAL

VCCI classA →
QP Limit



2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

Vin : 110 VDC

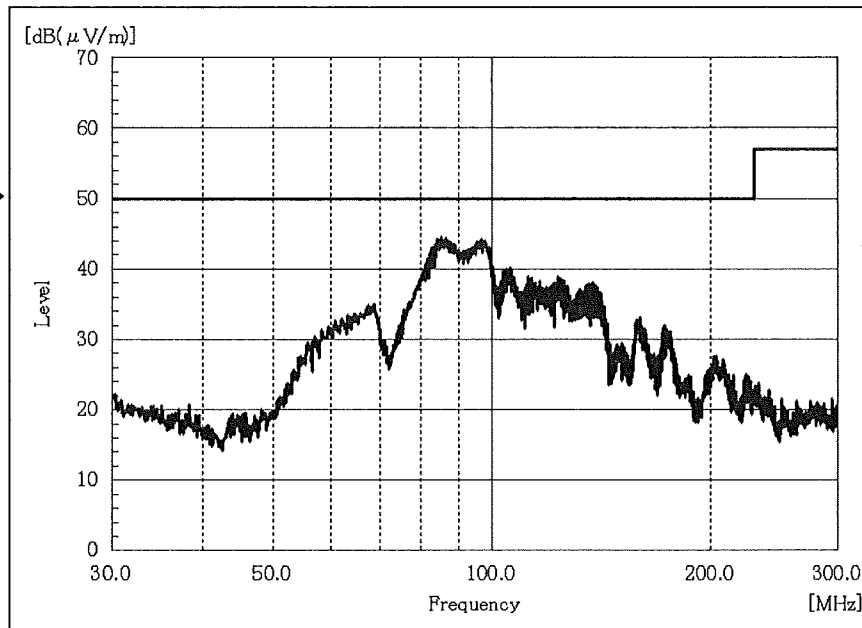
Io : 100 %

Tbp : 25 °C

24V

HORIZONTAL

VCCI classA →
QP Limit



VERTICAL

VCCI classA →
QP Limit

