

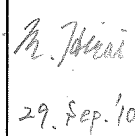


# CN30A110-\*

## EVALUATION DATA

### 型式データ

DWG.NO. C256-53-01/30-A		
承認	査閲	担当
 1. Oct. '10	 30. Sep. '10	 29. Sep. '10

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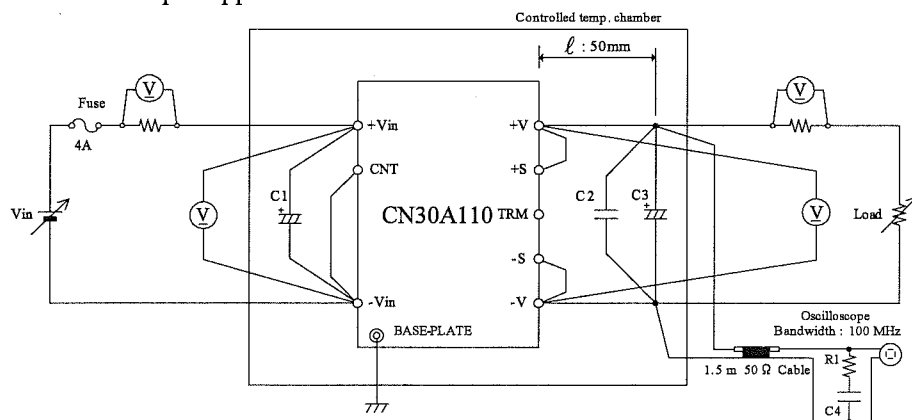
## 使用記号 Terminology used

Definition		
V <sub>in</sub> .....	入力電圧	Input voltage
V <sub>o</sub> .....	出力電圧	Output voltage
V <sub>cnt</sub> .....	CNT電圧	CNT voltage
I <sub>in</sub> .....	入力電流	Input current
I <sub>o</sub> .....	出力電流	Output current
T <sub>bp</sub> .....	ベースプレート温度	Baseplate temperature
T <sub>a</sub> .....	周囲温度	Ambient temperature
f .....	周波数	Frequency

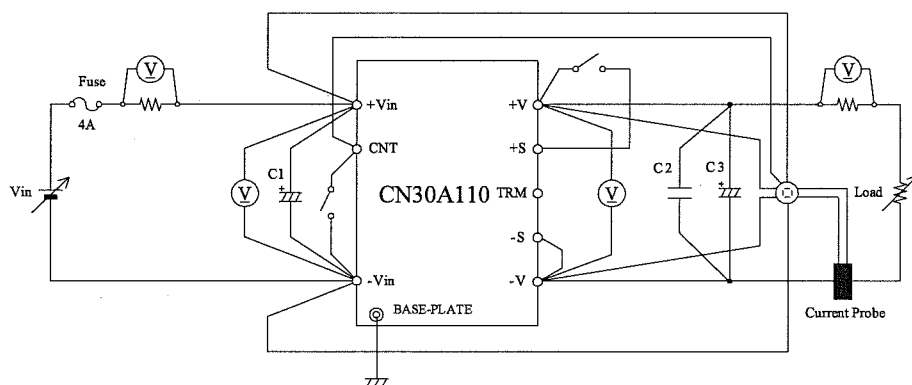
1. 測定方法 Evaluation Method

1.1 測定回路 Measurement Circuits

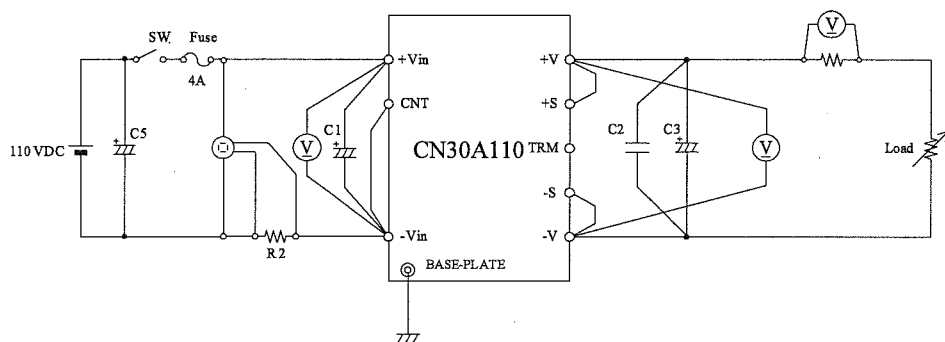
- (1) 静特性、過電流保護特性、出力リップル、ノイズ波形  
Steady state characteristics, Over current protection (OCP) characteristics and Output ripple and noise waveform



- (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 : 47 $\mu$ F Electrolytic Capacitor

C2 : 2.2 $\mu$ F Ceramic Capacitor

C3 : 5V-1000 $\mu$ F Electrolytic Capacitor

: 12V-470 $\mu$ F Electrolytic Capacitor

: 15V-470 $\mu$ F Electrolytic Capacitor

: 24V-220 $\mu$ F Electrolytic Capacitor

C4 : 4700pF Ceramic Capacitor

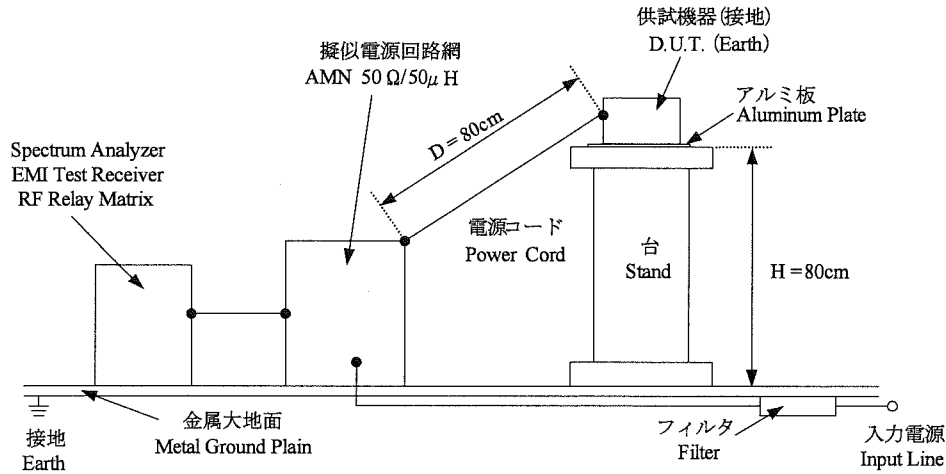
C5 : 8000 $\mu$ F Electrolytic Capacitor

R1 : 50  $\Omega$

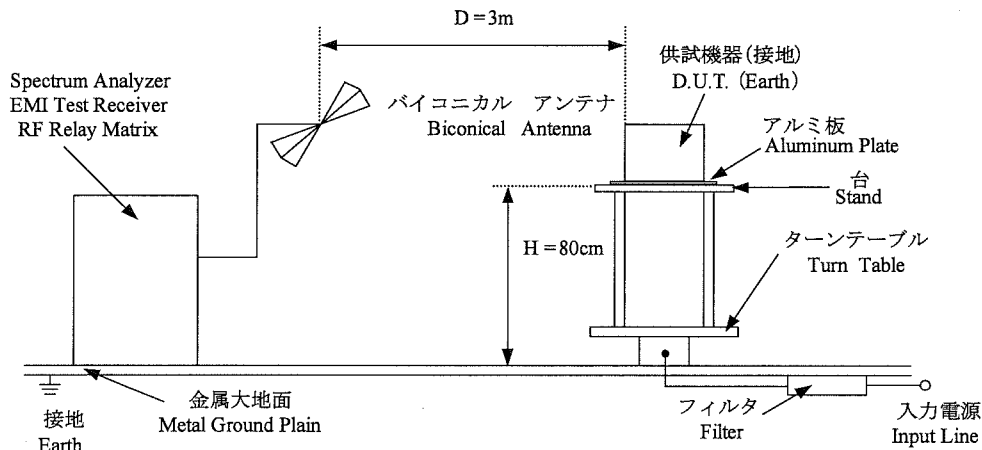
R2 : 0.01  $\Omega$

(4) EMI特性 Electro-Magnetic Interference characteristics

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

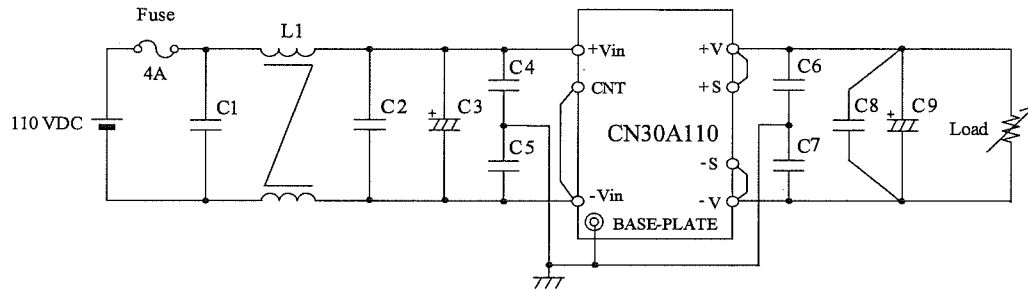


(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



\* 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 : 1.5μF Film Capacitor

C3 : 47μF Electrolytic Capacitor

C4, C5 : 3300pF Ceramic Capacitor

C6, C7 : 4700pF Ceramic Capacitor

C8 : 2.2μF Ceramic Capacitor

C9 : 5V-1000μF Electrolytic Capacitor

: 12V-470μF Electrolytic Capacitor

: 15V-470μF Electrolytic Capacitor

: 24V-220μF Electrolytic Capacitor

L1 : 1.4mH

## 1.2 使用測定機器 List of equipments 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	LECROY	AP015
5	SHUNT RESISTER	YOKOGAWA ELECT.	2215
6	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
7	SPECTRUM ANALYZER EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI
8	RF SELECTOR	TOYO, CORP	NS4900
9	AMN	SCHWARZBECK	NNLK8121
10	ANTENNA(BICONICAL ANTENNA)	TESEQ	CBL6111D
11	DYNAMIC DUMMY LOAD	TAKASAGO	FK-400L
12	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%	5.009V	5.009V	5.009V	0mV	0.000%
50%	5.009V	5.009V	5.009V	0mV	0.000%
100%	5.008V	5.008V	5.008V	0mV	0.000%
Load regulation	1mV	1mV	1mV		
	0.020%	0.020%	0.020%		

2. Temperature drift				Conditions Vin : 110VDC Io : 100%	
Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	5.012V	5.008V	5.002V	10mV	0.200%

12V

1. Regulation - line and load				Condition Tbp : 25°C	
Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	11.991V	11.991V	11.990V	1mV	0.009%
50%	11.991V	11.991V	11.990V	1mV	0.009%
100%	11.991V	11.991V	11.990V	1mV	0.009%
Load regulation	0mV	0mV	0mV		
	0.000%	0.000%	0.000%		

2. Temperature drift				Conditions Vin : 110VDC Io : 100%	
Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	12.000V	11.991V	11.991V	9mV	0.075%

## (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%	14.983V	14.982V	14.982V	1mV	0.007%
50%	14.982V	14.982V	14.982V	0mV	0.000%
100%	14.982V	14.982V	14.982V	0mV	0.000%
Load regulation	1mV	0mV	0mV		
	0.007%	0.000%	0.000%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	14.984V	14.982V	14.989V	7mV	0.047%

24V

## 1. Regulation - line and load

Condition Tbp : 25°C

Io \ Vin	60VDC	110VDC	160VDC	Line regulation	
0%	23.936V	23.936V	23.936V	0mV	0.000%
50%	23.936V	23.936V	23.936V	0mV	0.000%
100%	23.936V	23.936V	23.935V	1mV	0.005%
Load regulation	0mV	0mV	1mV		
	0.000%	0.000%	0.005%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	23.955V	23.936V	23.947V	19mV	0.080%

(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 %

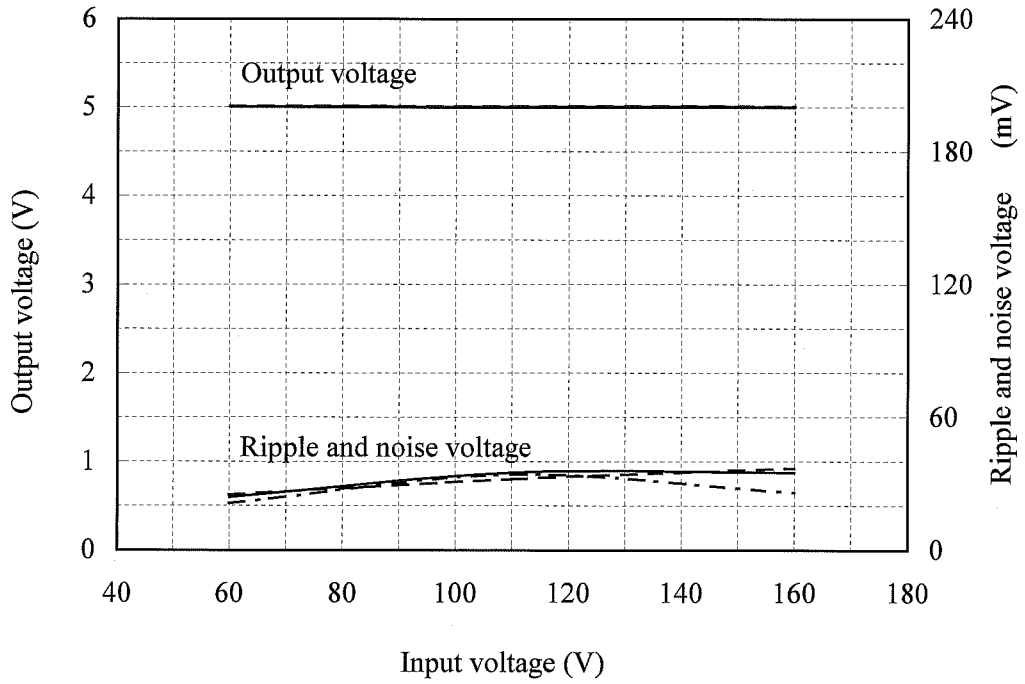
$T_{bp}$  : -40 °C

: 25 °C

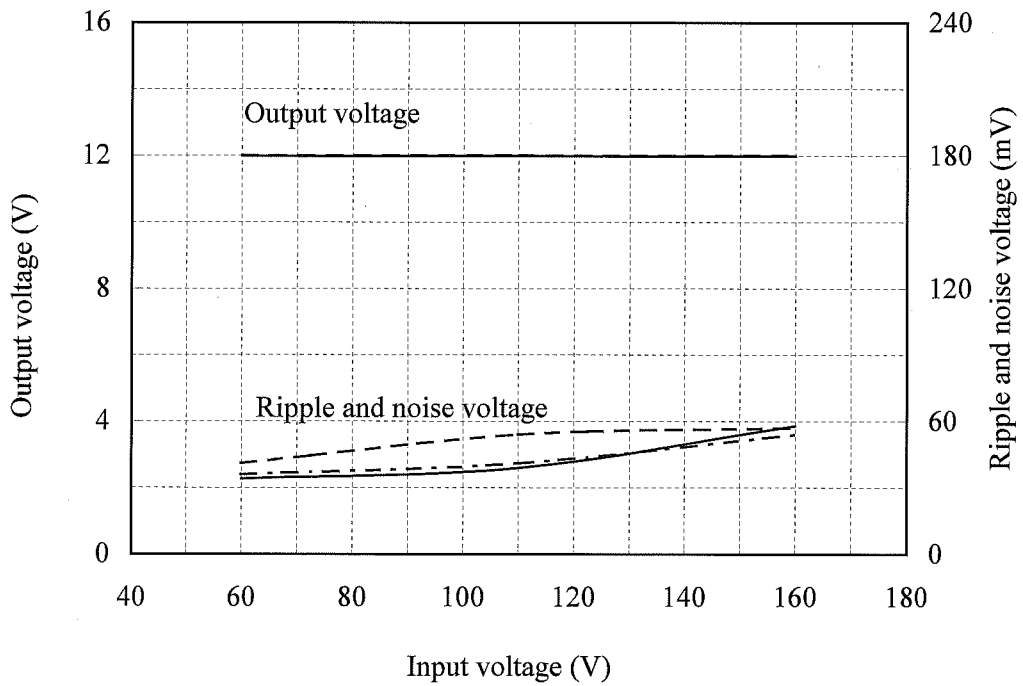
: 100 °C



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 %

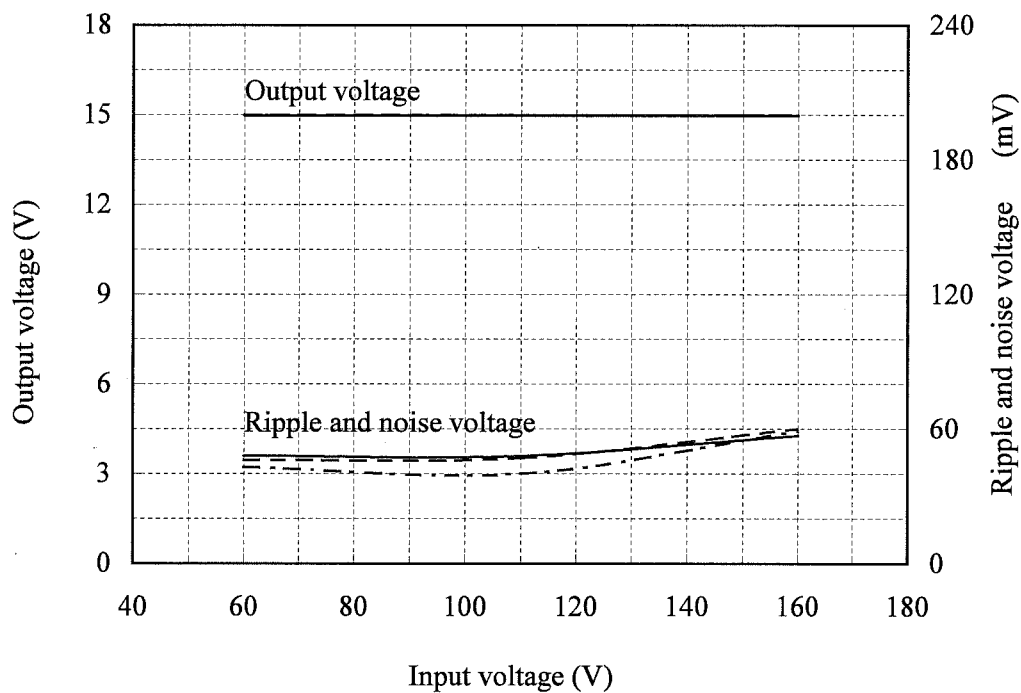
$T_{bp}$  : -40 °C

: 25 °C

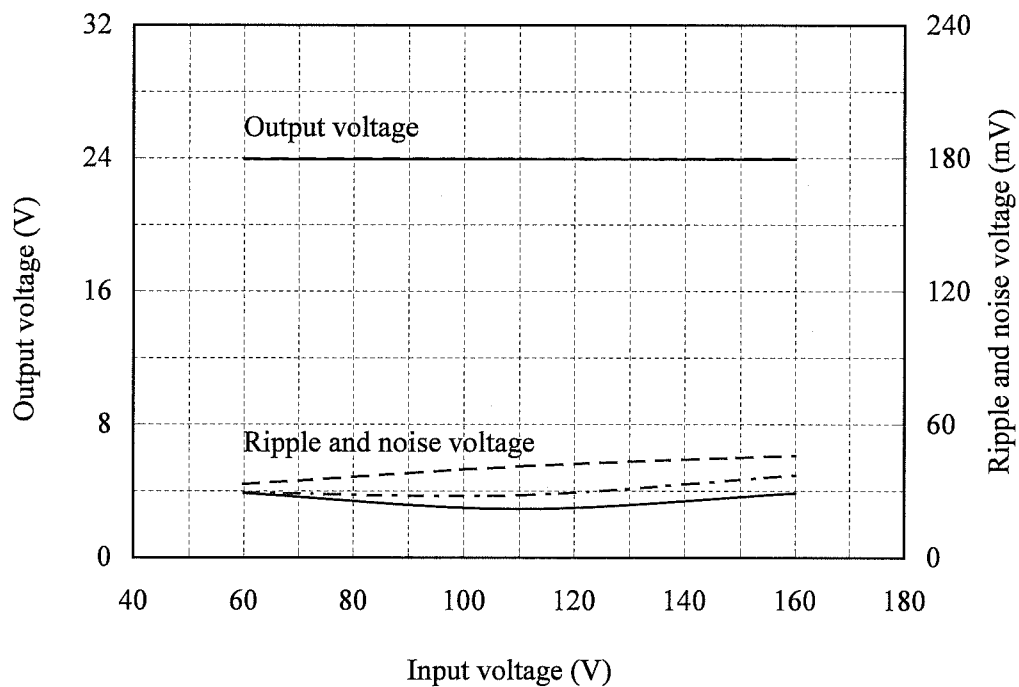
: 100 °C



15V



24V

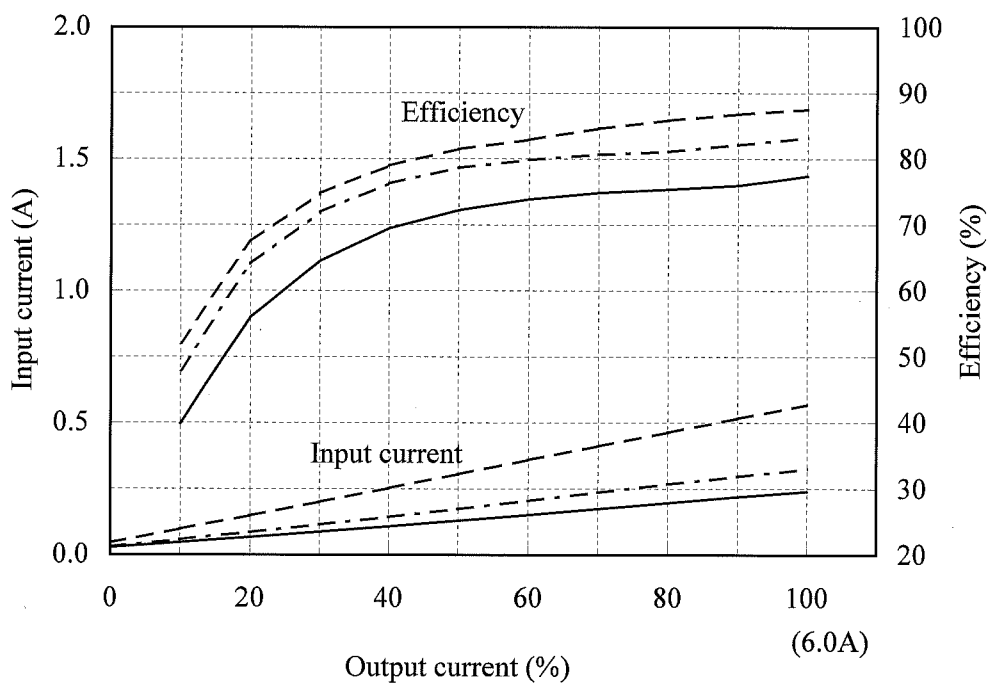


(3) 入力電流・効率 対 出力電流

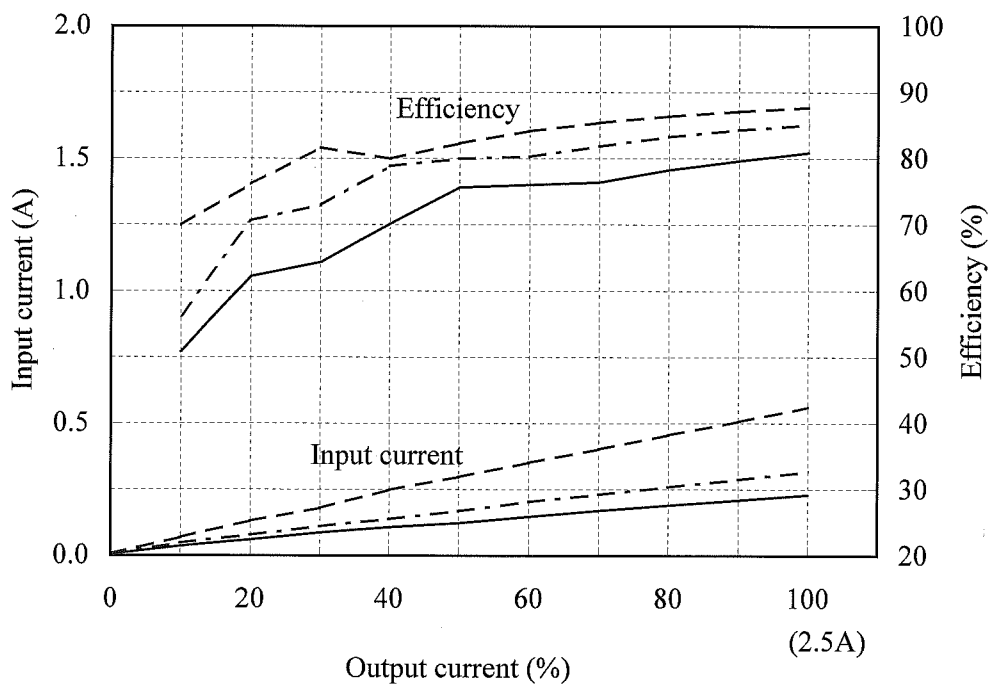
Input current and Efficiency vs. Output current

Conditions  $V_{in}$  : 60 VDC ---  
 : 110 VDC - - -  
 : 160 VDC ———  
 $T_{bp}$  : 25 °C

5V



12V

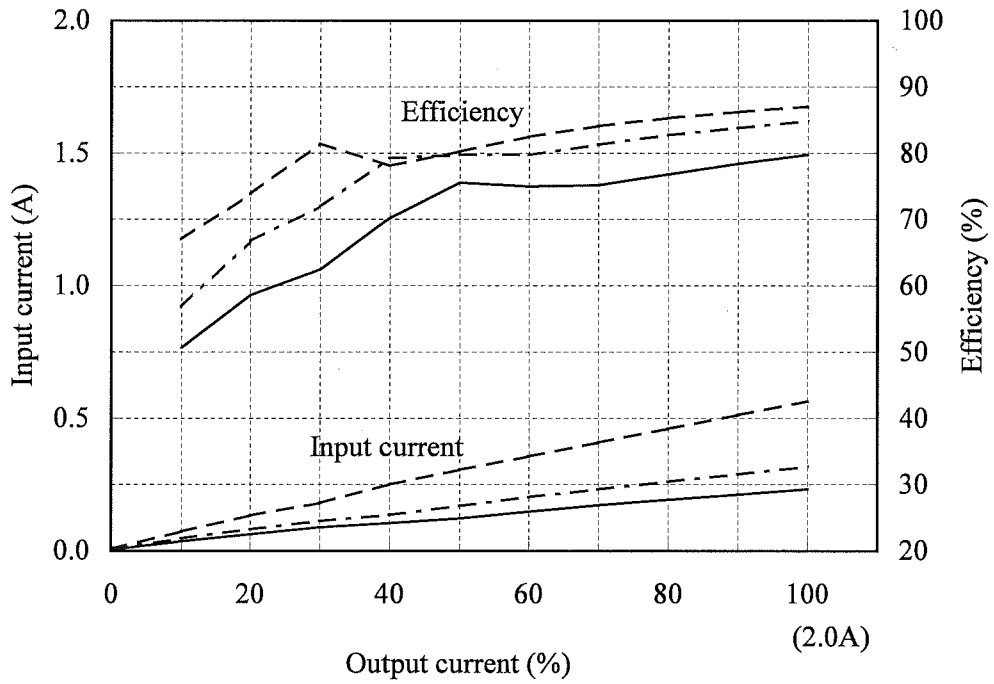


(3) 入力電流・効率 対 出力電流

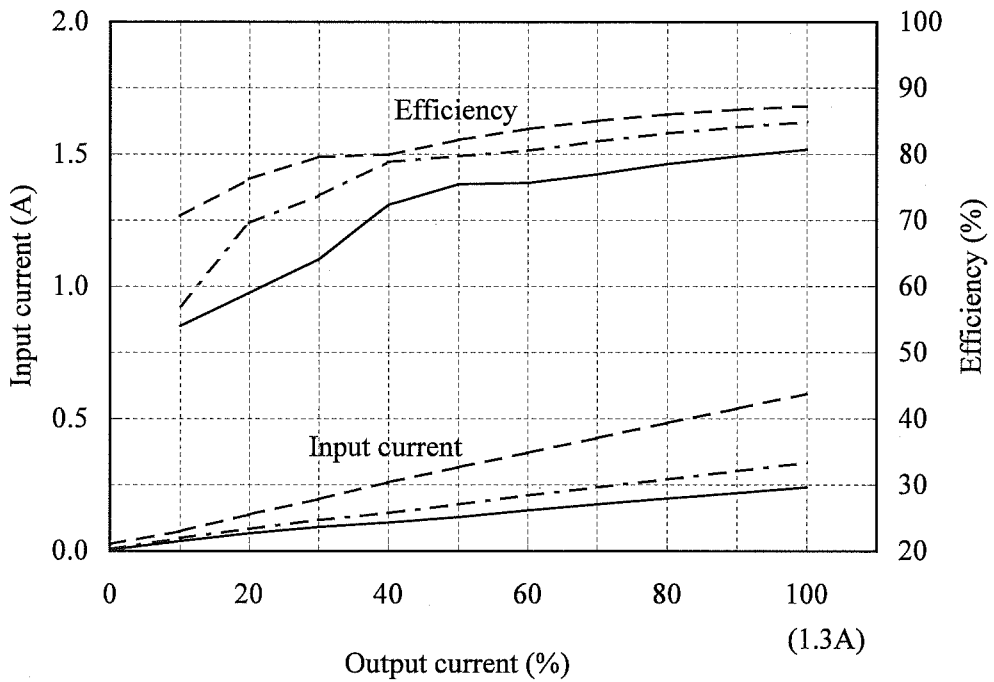
Input current and Efficiency vs. Output current

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

15V



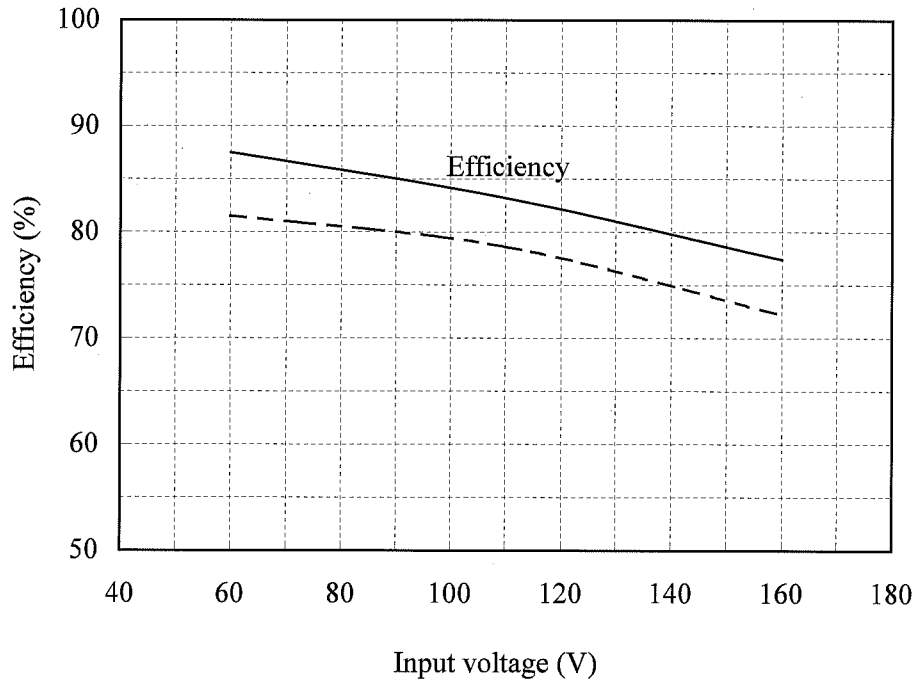
24V



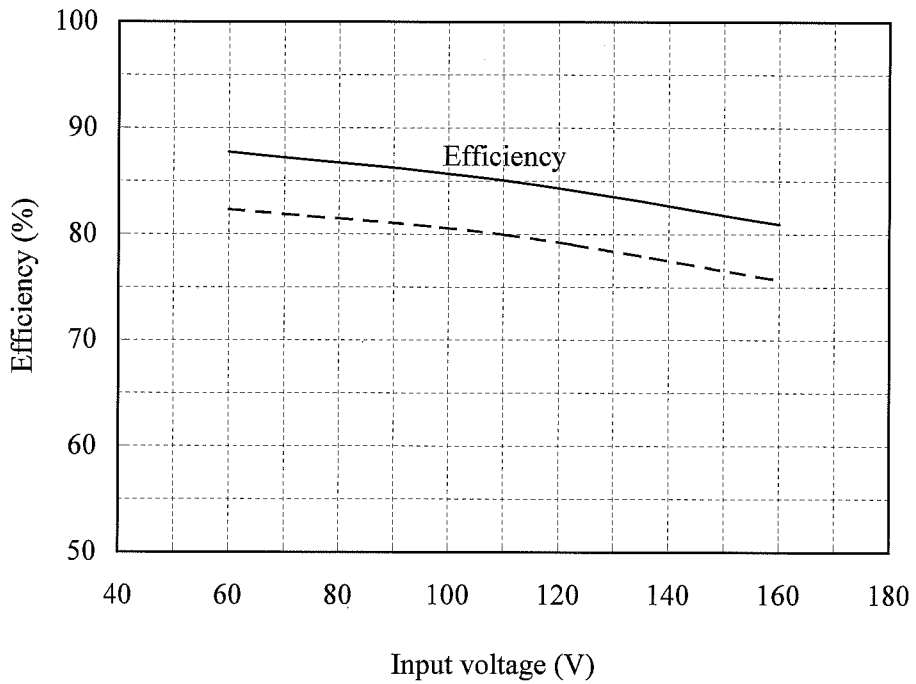
(4) 効率 対 入力電圧  
Efficiency vs. Input voltage

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

5V



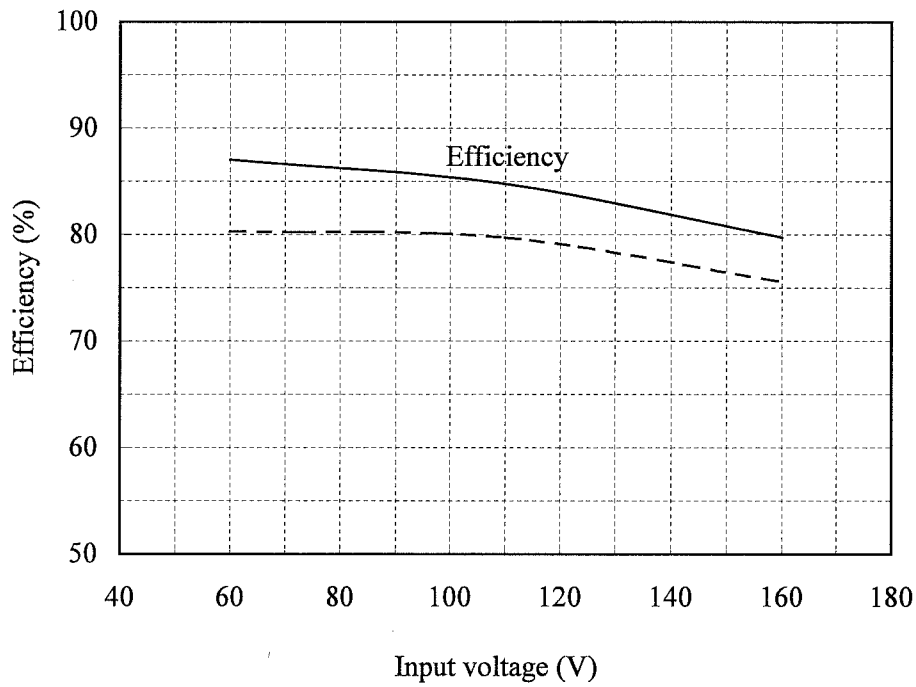
12V



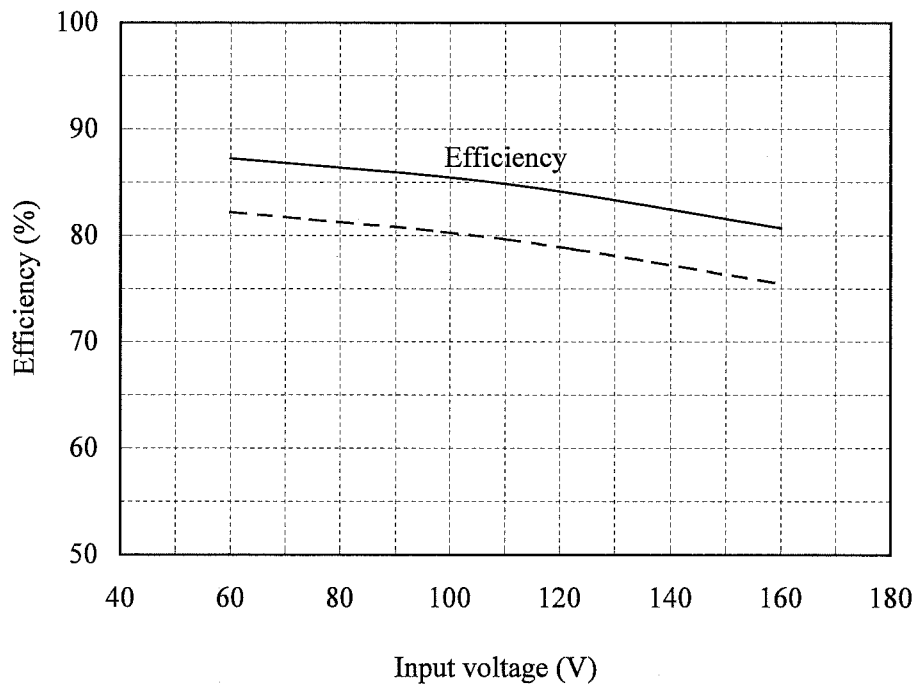
(4) 効率 対 入力電圧  
Efficiency vs. Input voltage

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

15V



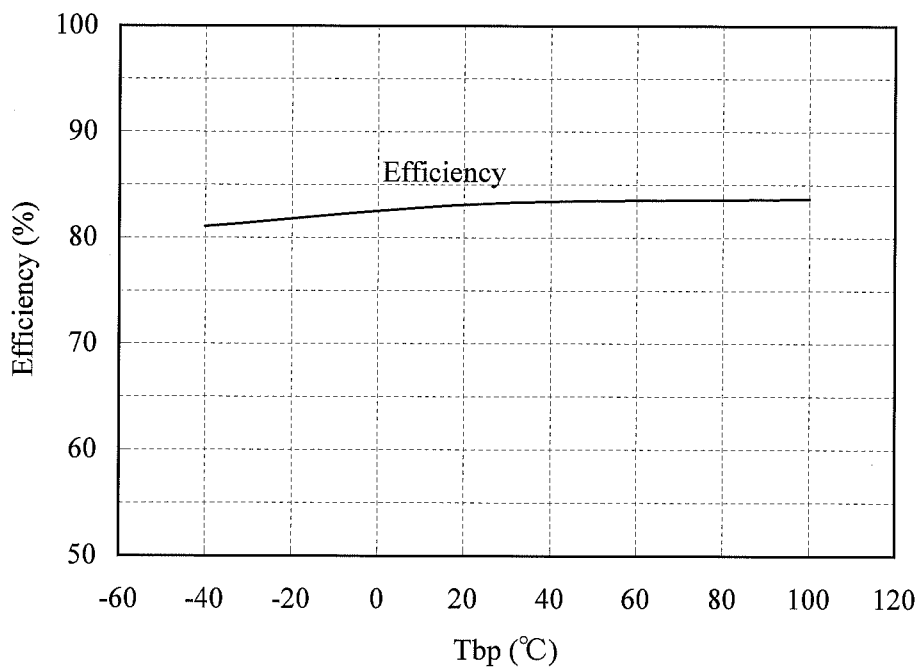
24V



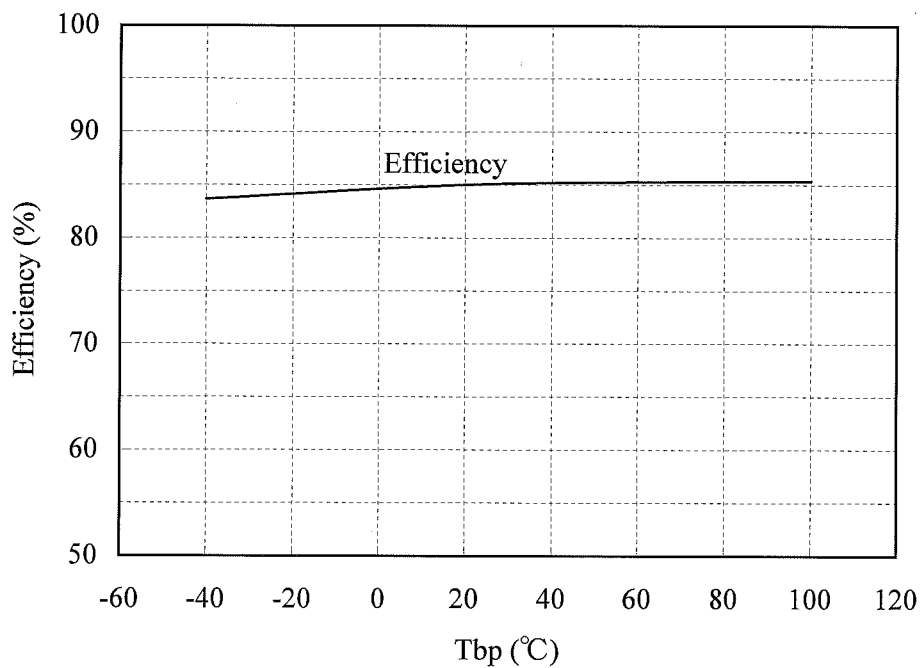
(5) 効率対 ベースプレート温度  
Efficiency vs. Baseplate temperature

Conditions  $V_{in}$  : 110 VDC  
 $I_o$  : 100 %

5V



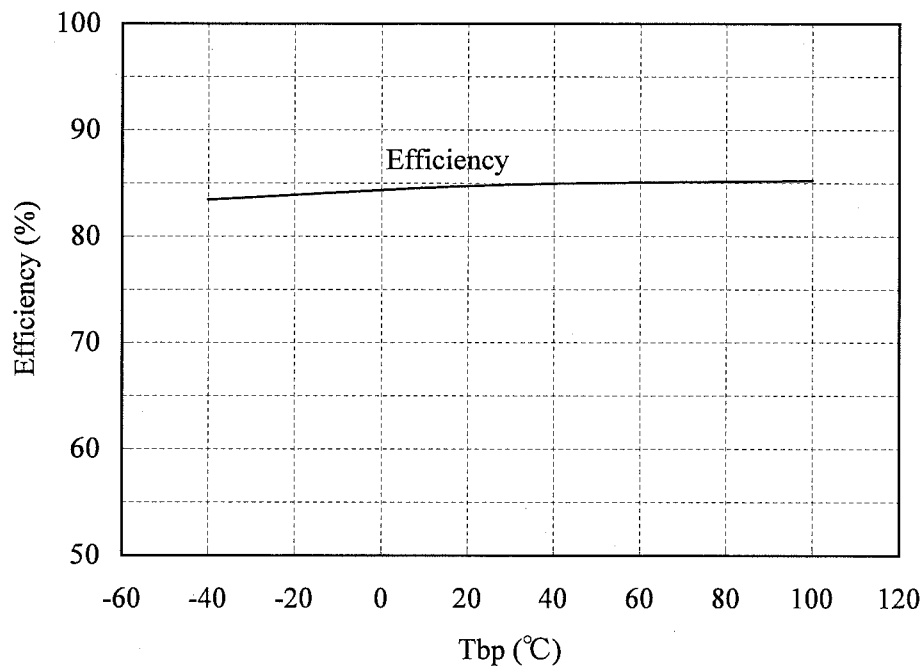
12V



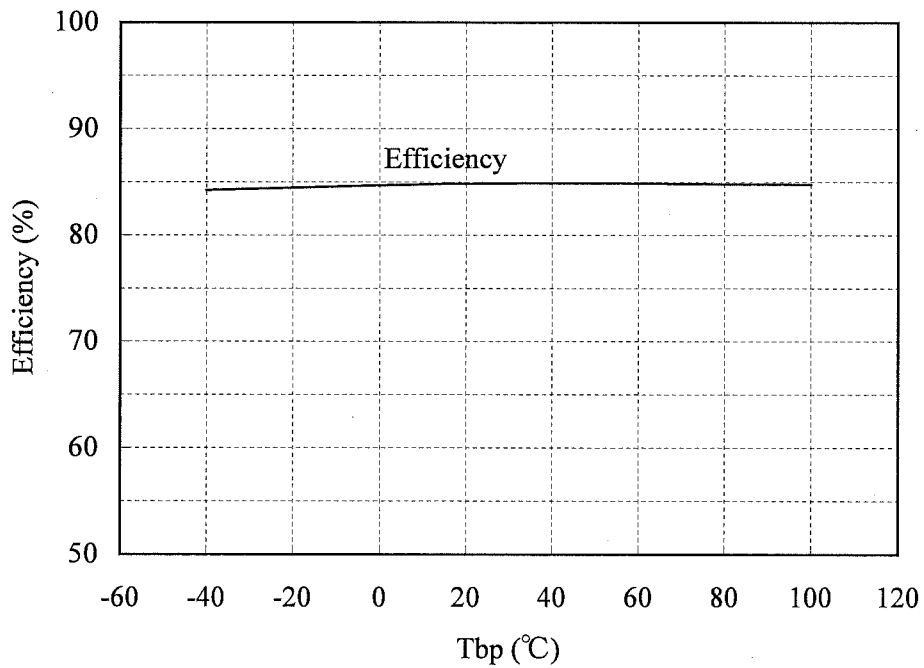
(5) 効率対ベースプレート温度  
Efficiency vs. Baseplate temperature

Conditions Vin : 110 VDC  
Io : 100 %

15V



24V



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

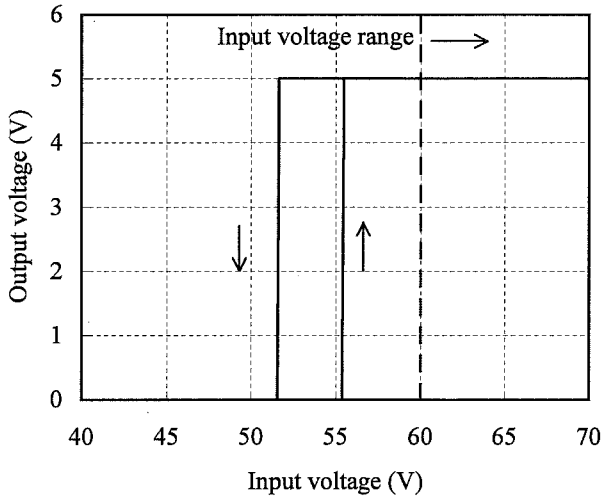
出力電圧 対 入力電圧  
Output voltage vs. Input voltage

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

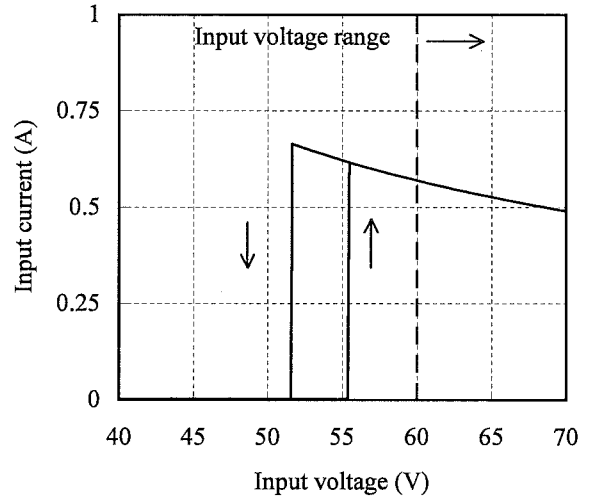
入力電流 対 入力電圧  
Input current vs. Input voltage

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

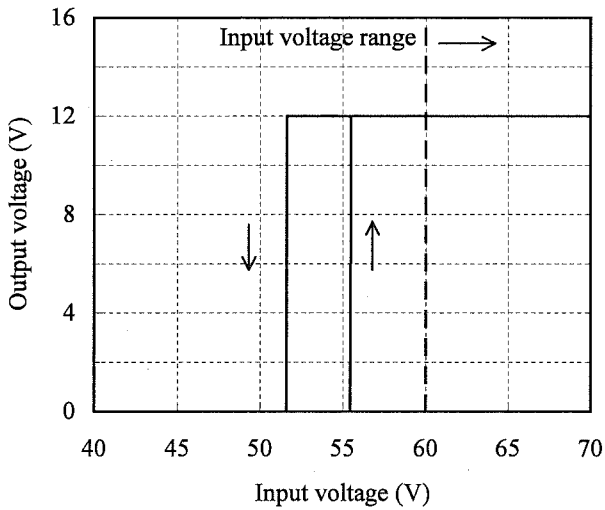
5V



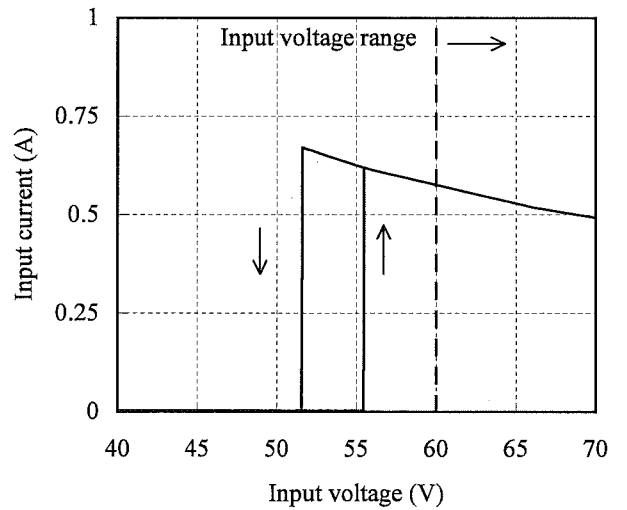
5V



12V



12V





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

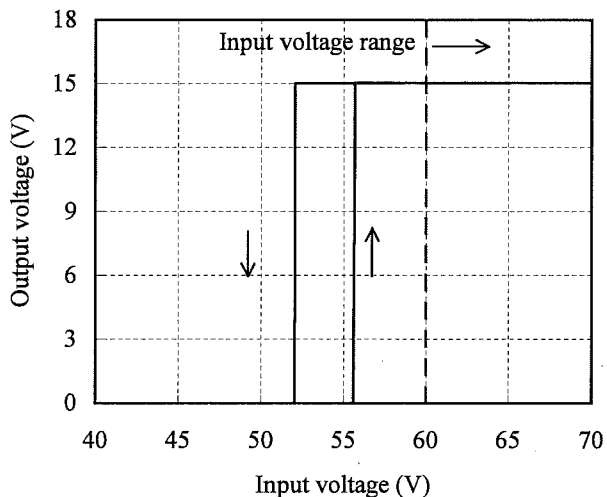
出力電圧 対 入力電圧  
Output voltage vs. Input voltage

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

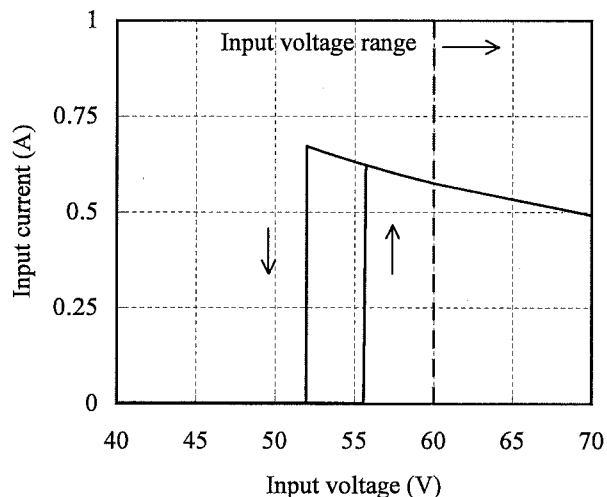
入力電流 対 入力電圧  
Input current vs. Input voltage

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

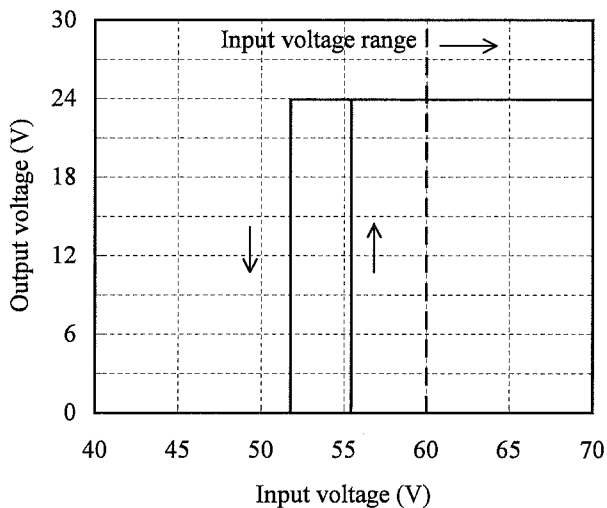
15V



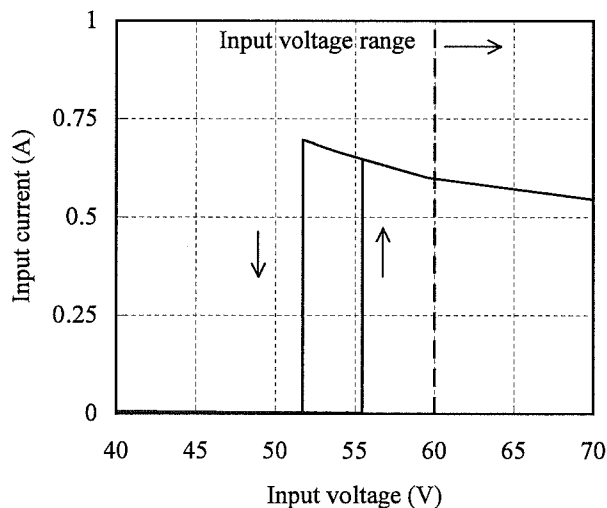
15V



24V



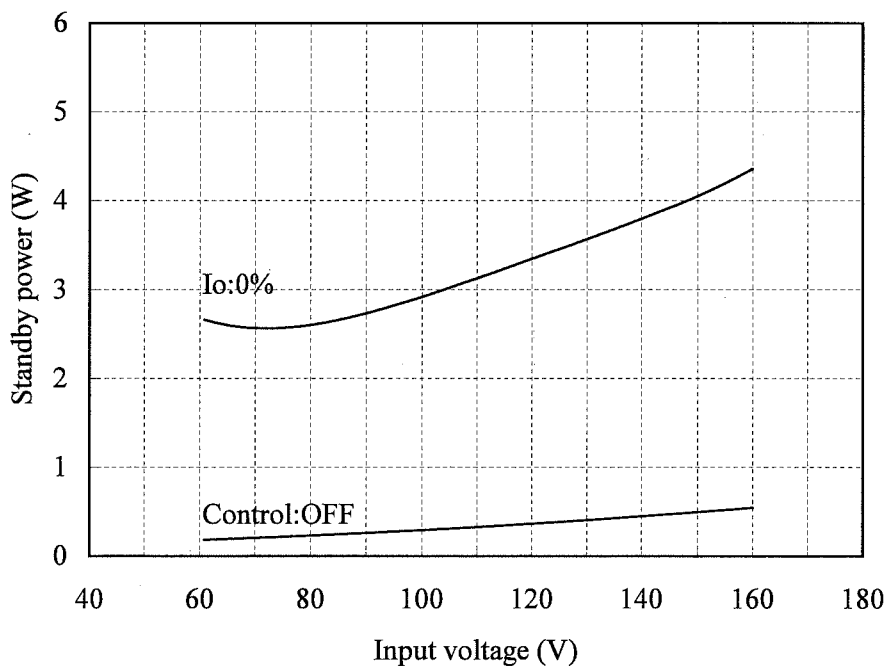
24V



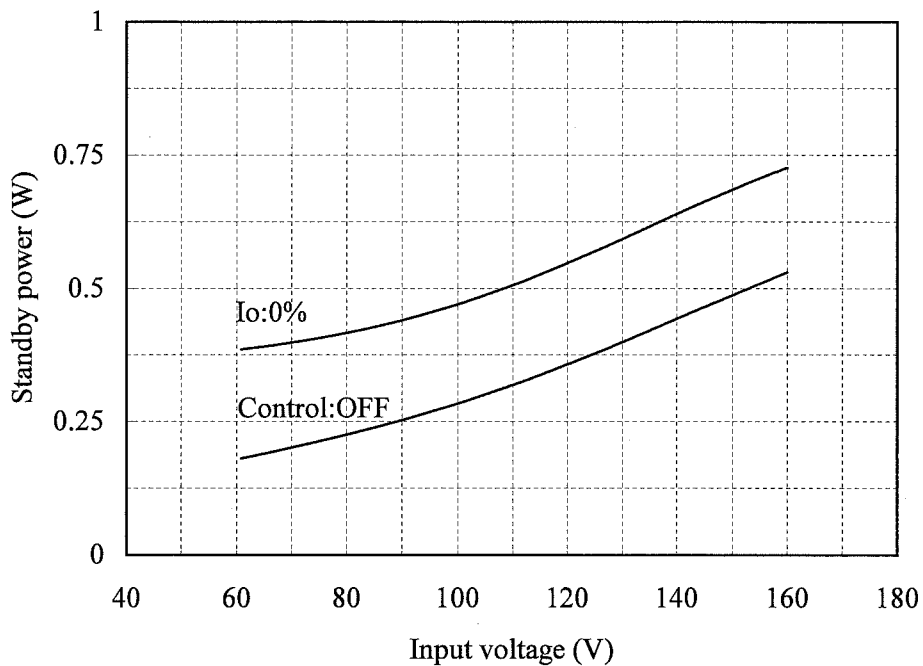
2.2 待機電力特性  
Standby power characteristics

Conditions Tbp : 25 °C

5V



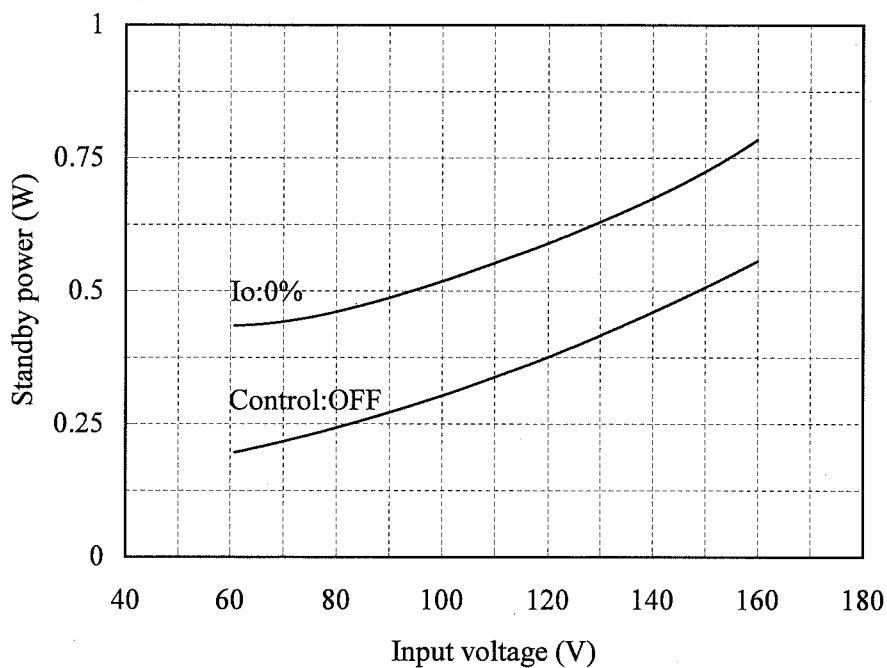
12V



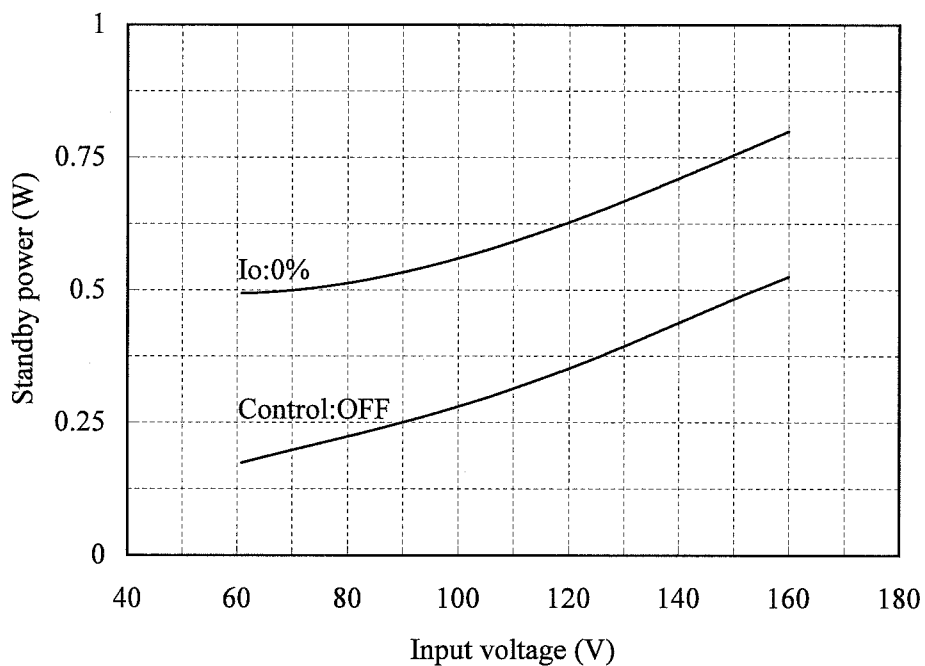
2.2 待機電力特性  
Standby power characteristics

Conditions Tbp : 25 °C

15V



24V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

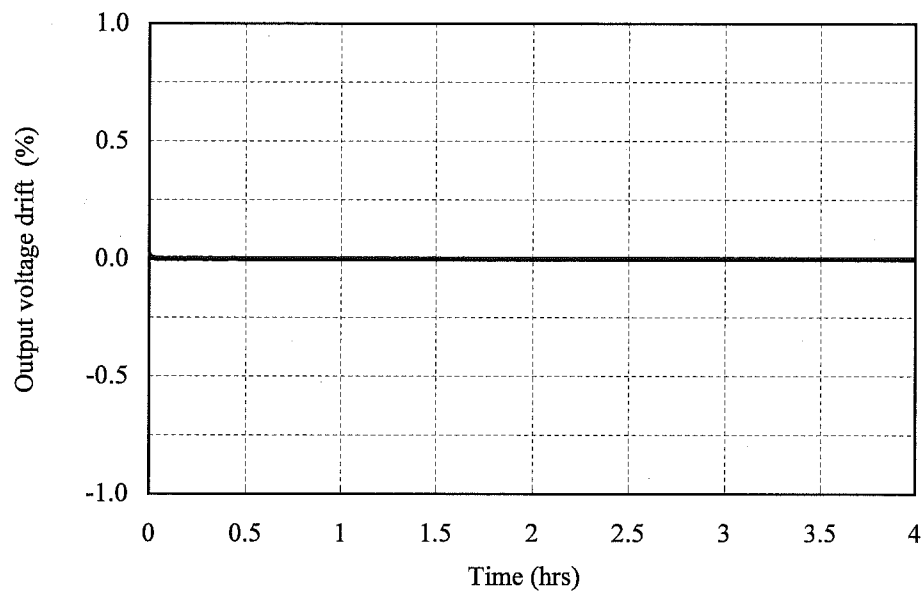
Conditions

Vin : 110 VDC

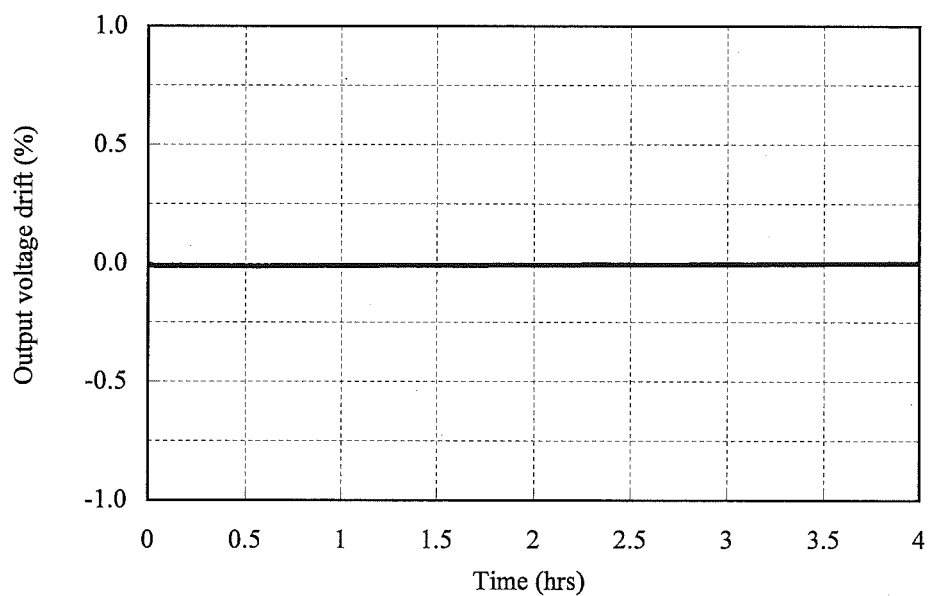
Io : 100 %

Ta : 25 °C

5V



12V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

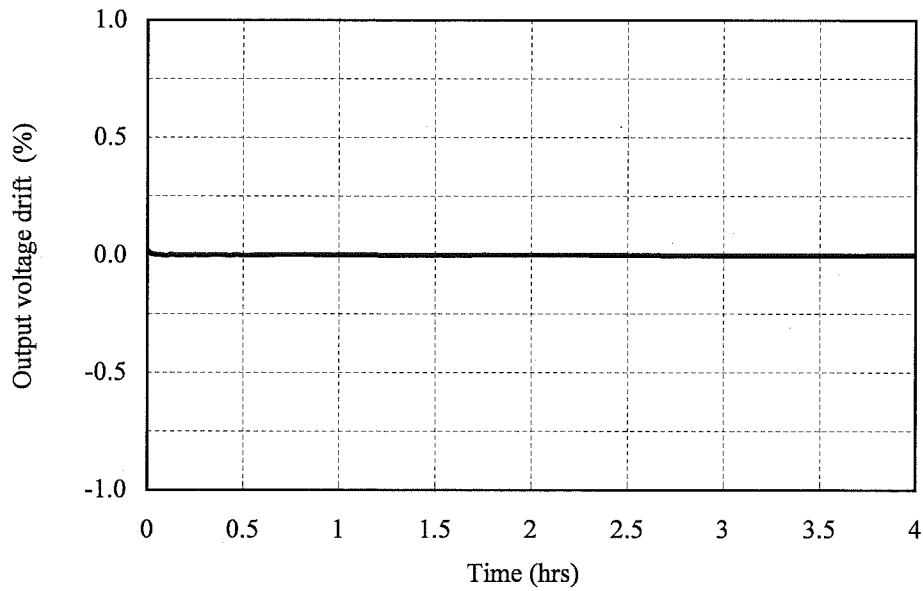
Conditions

V<sub>in</sub> : 110 VDC

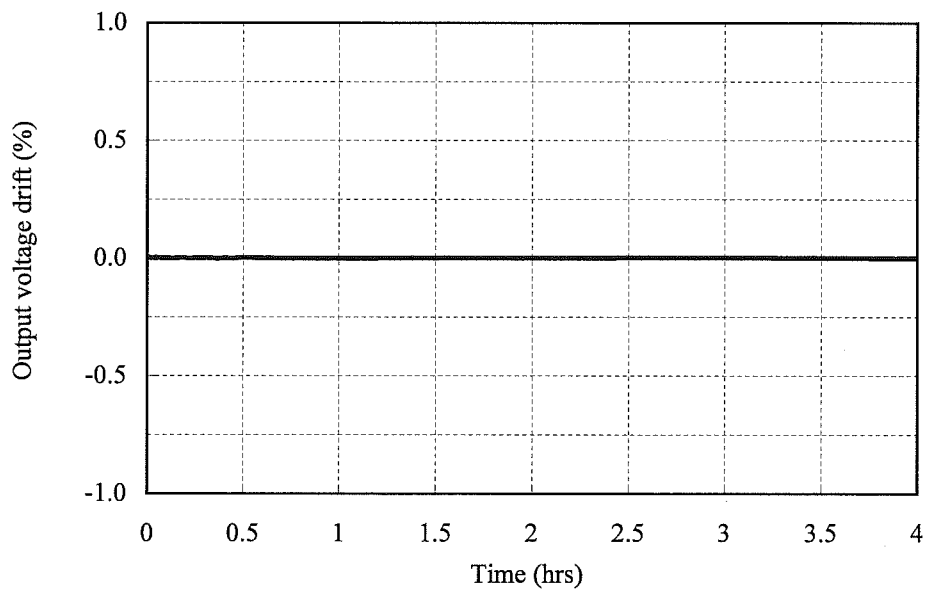
I<sub>o</sub> : 100 %

T<sub>a</sub> : 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

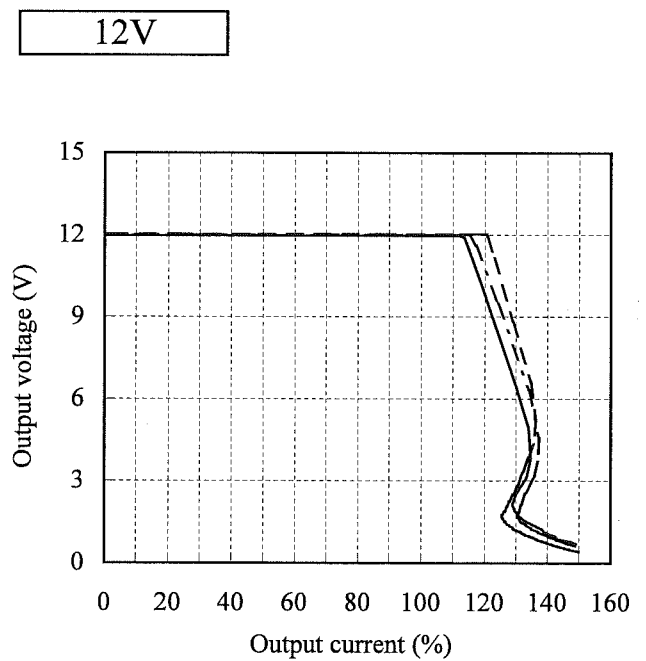
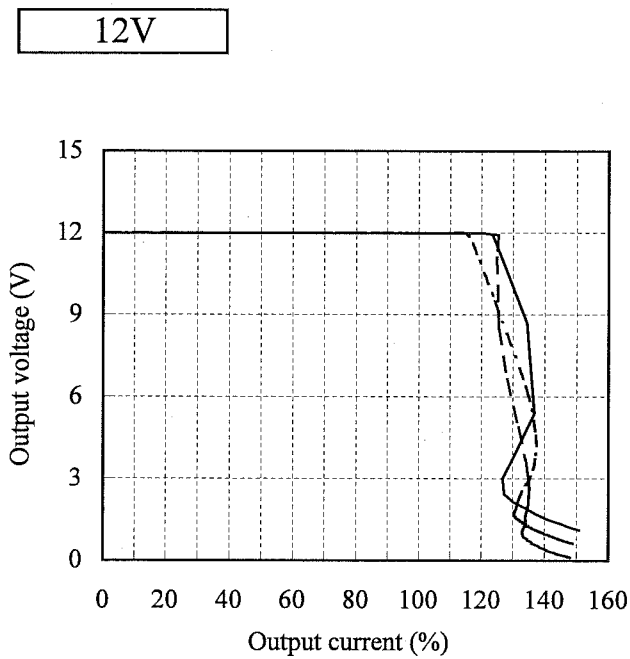
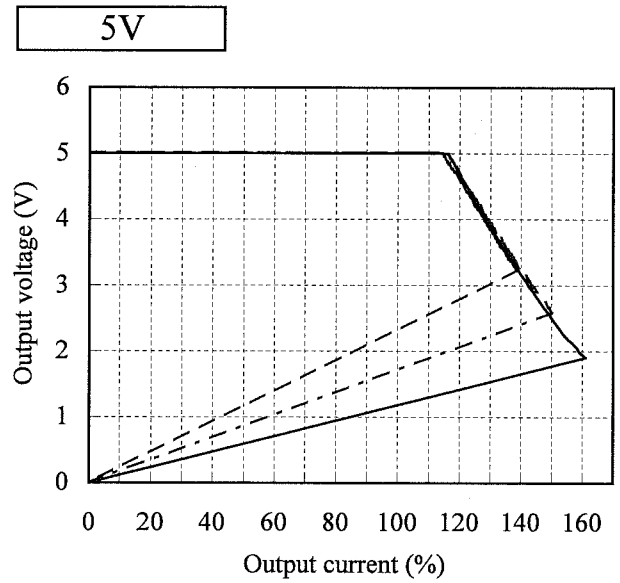
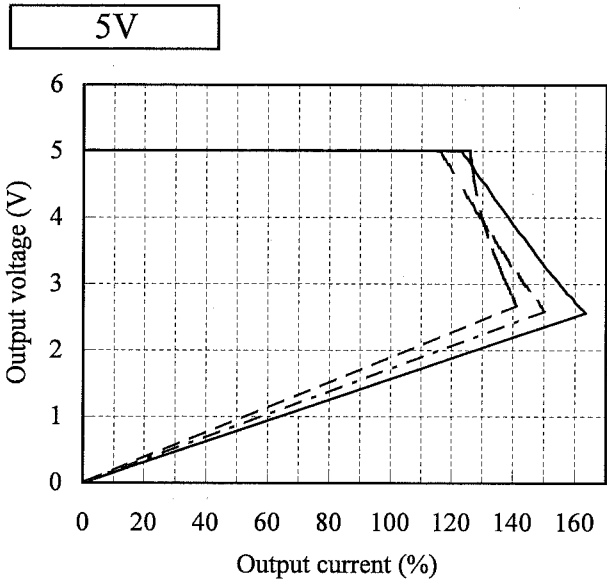
Input voltage dependence

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 \_\_\_\_\_



2.4 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

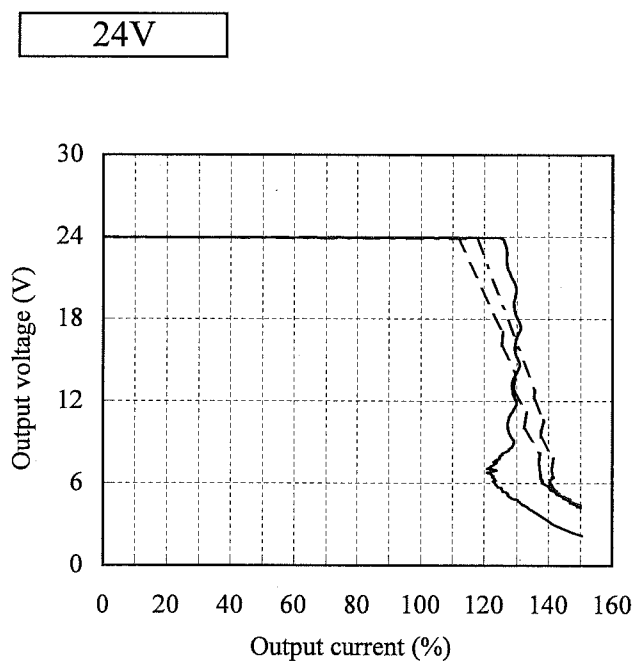
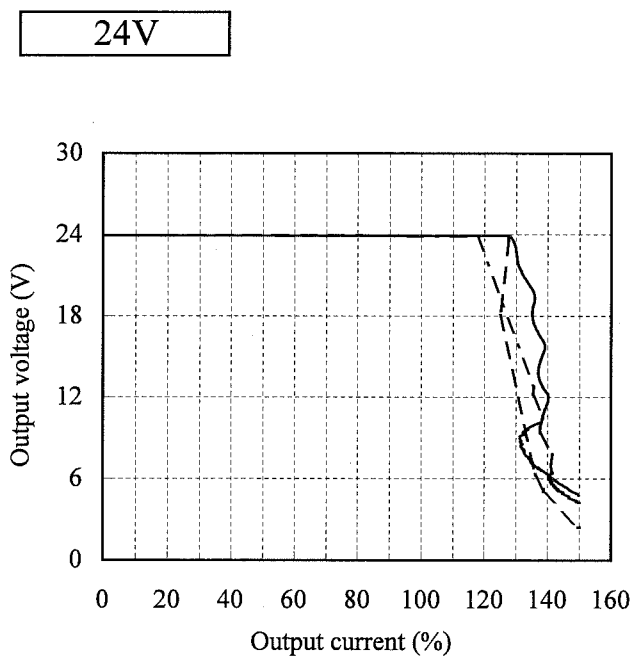
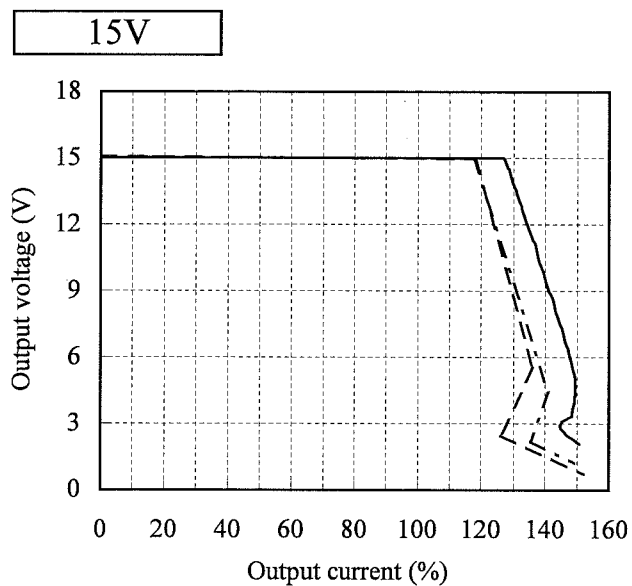
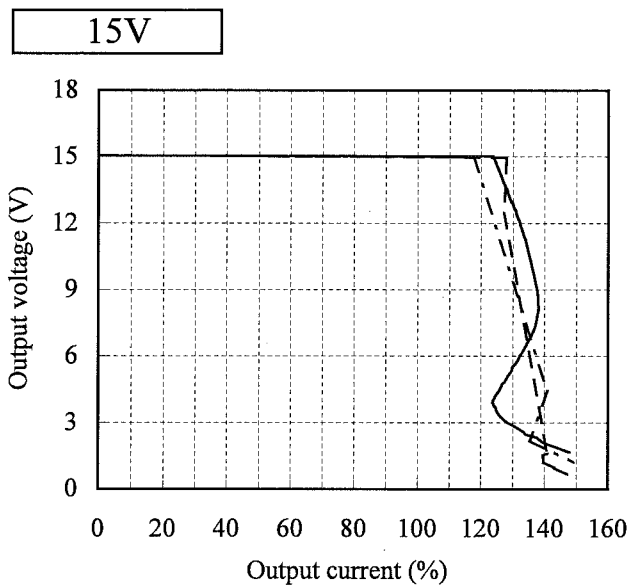
Input voltage dependence

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 \_\_\_\_\_



2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

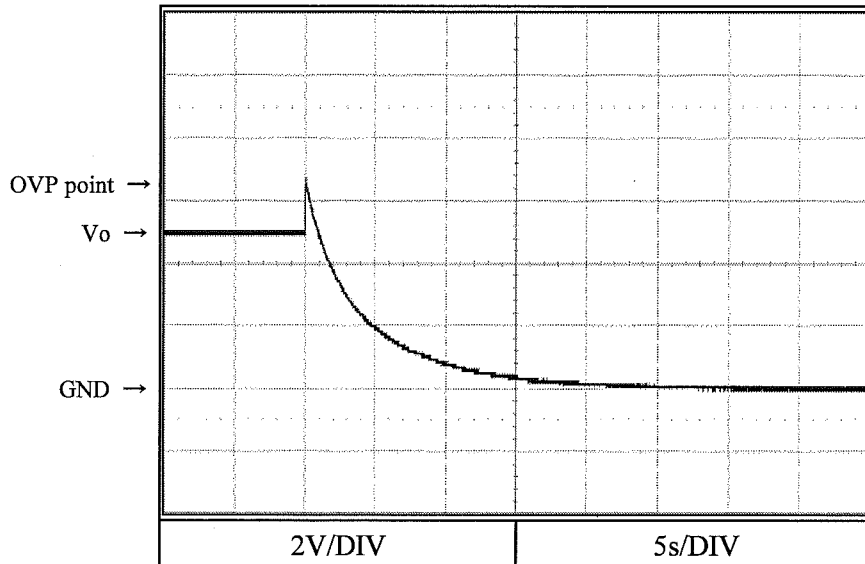
Conditions

$V_{in}$  : 110 VDC

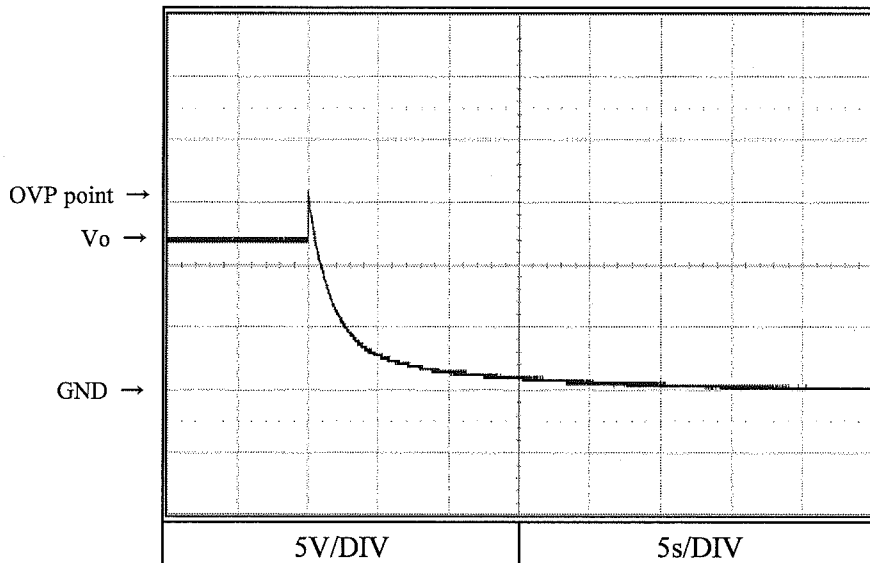
$I_o$  : 0 %

$T_{bp}$  : 25 °C

5V



12V





2.5 過電圧保護特性

Over voltage protection (OVP) characteristics

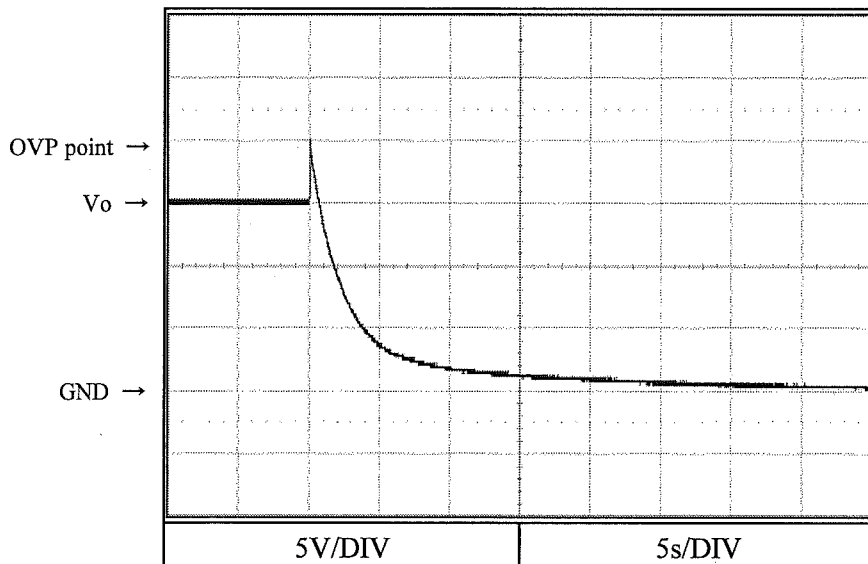
Conditions

Vin : 110 VDC

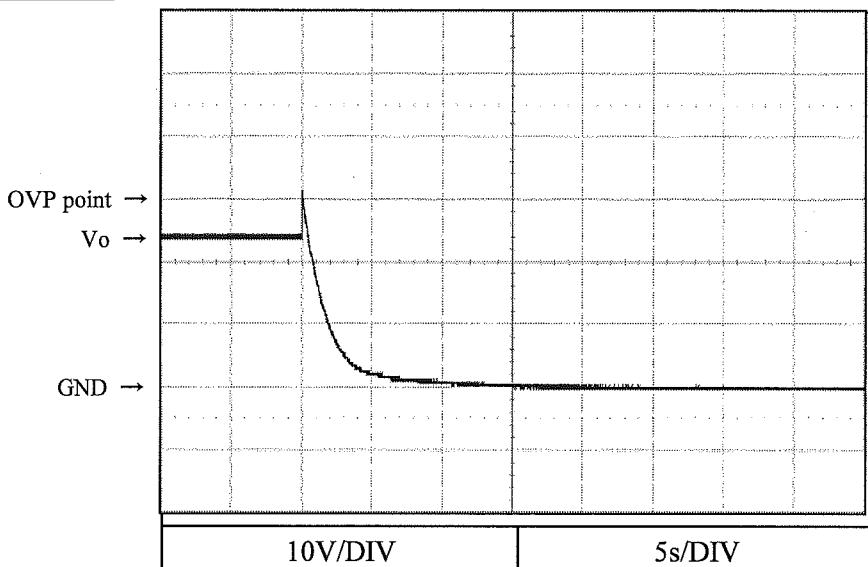
Io : 0%

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

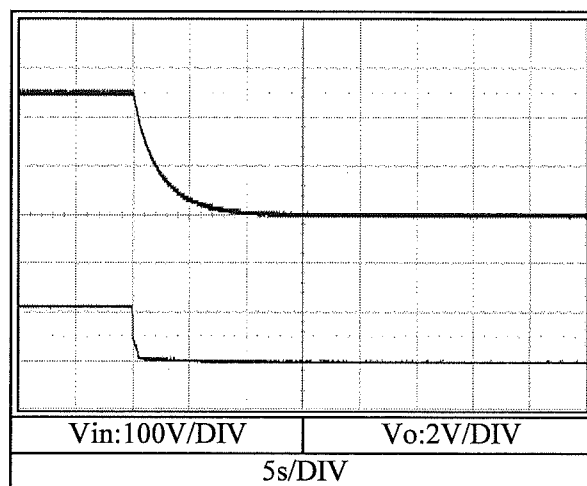
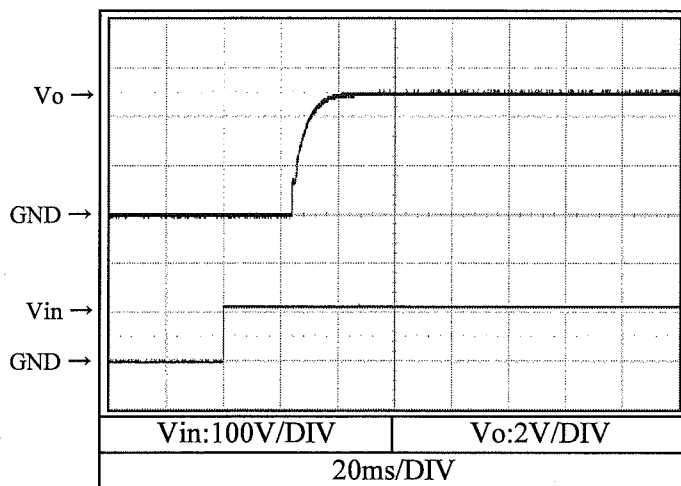
Conditions

Vin : 110 VDC

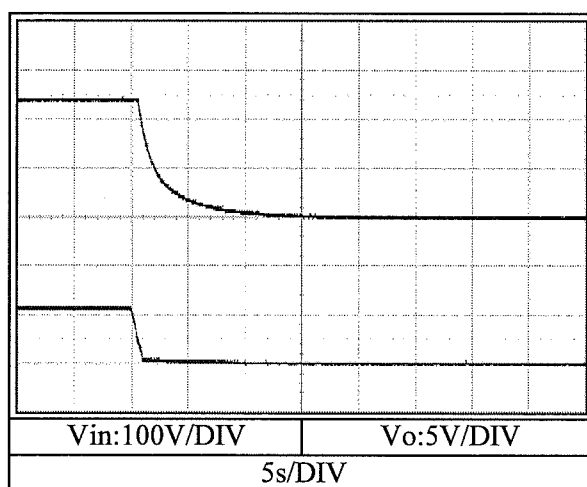
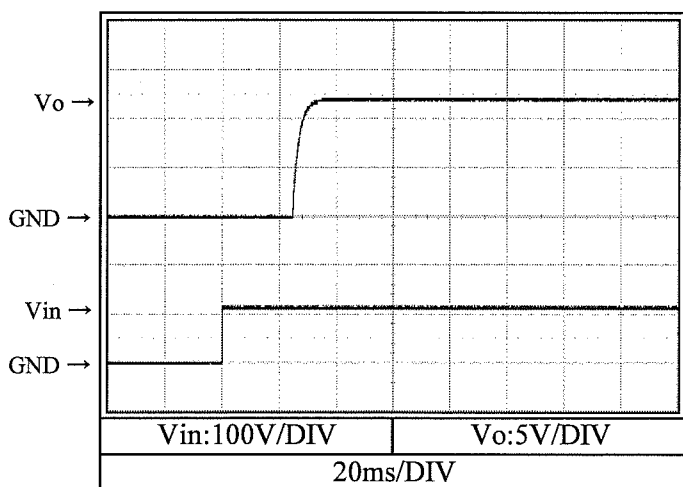
Io : 0%

Tbp : 25 °C

5V



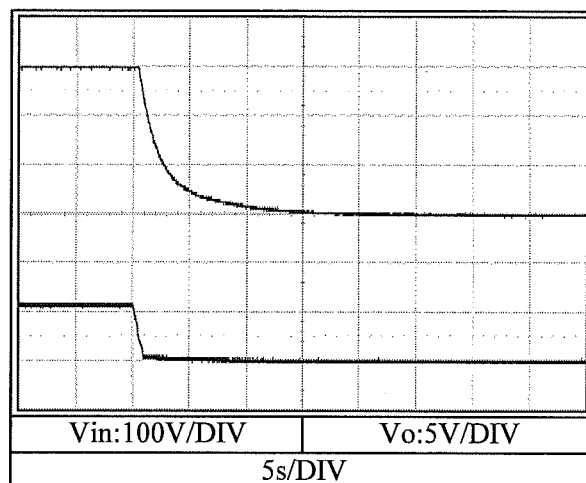
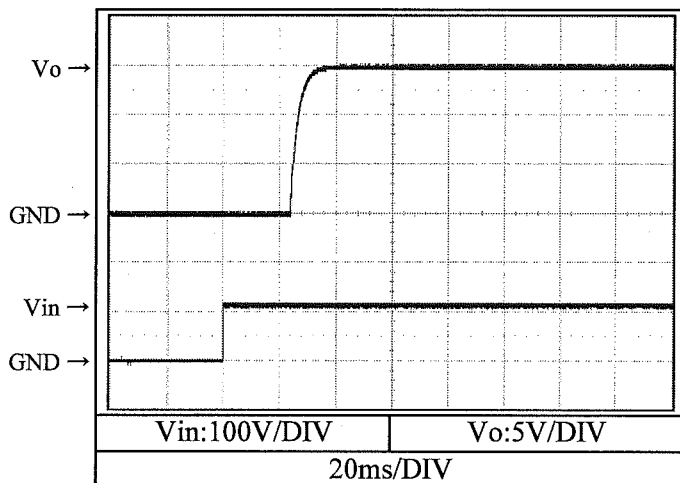
12V



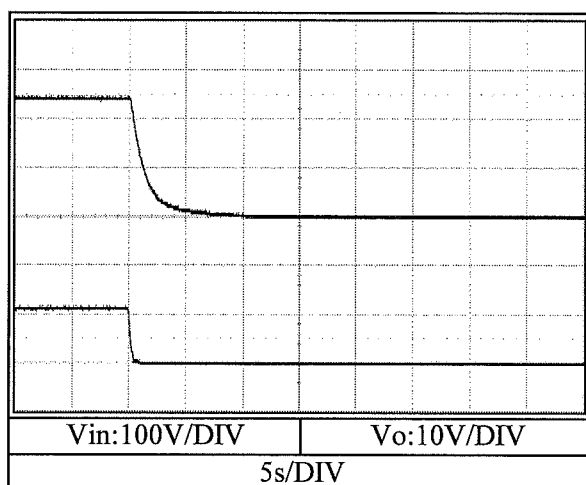
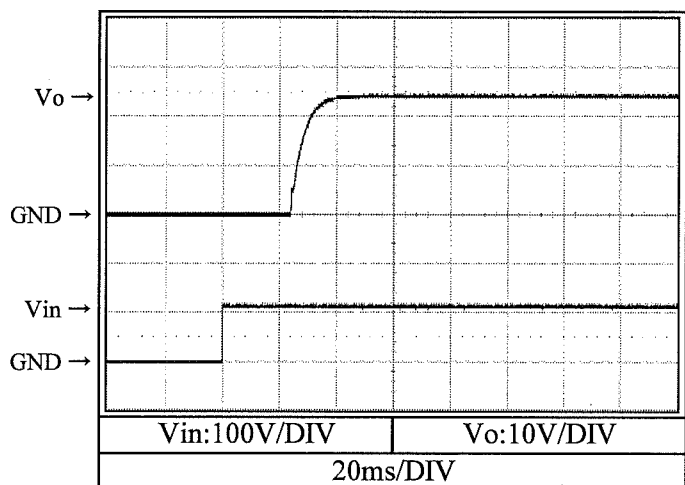
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

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

15V



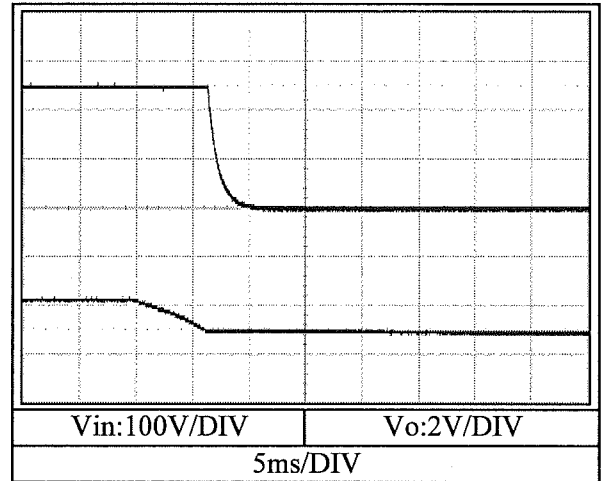
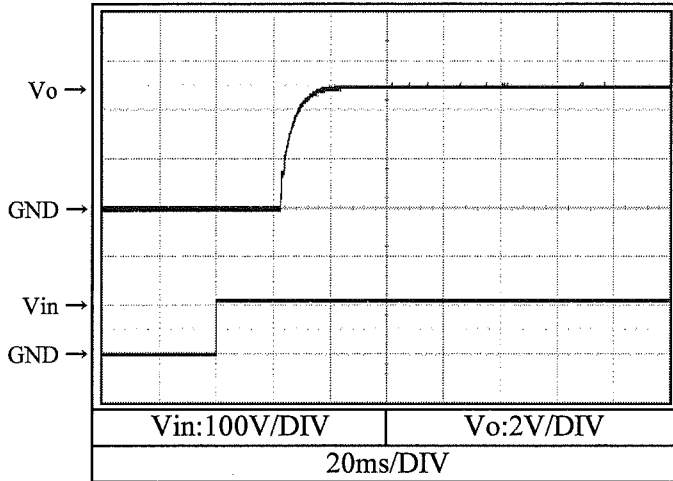
24V



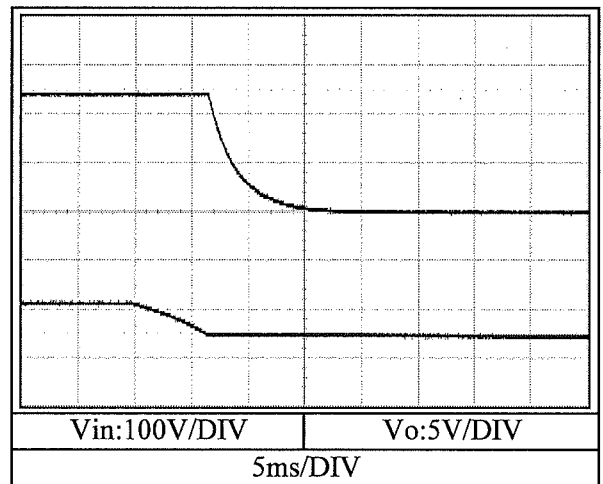
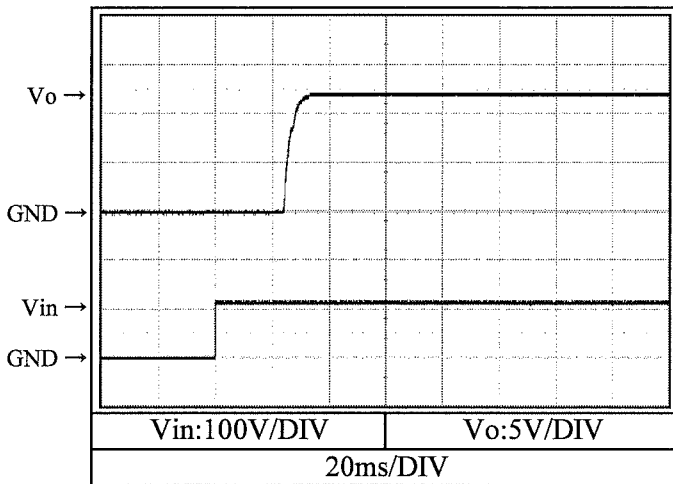
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

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

5V



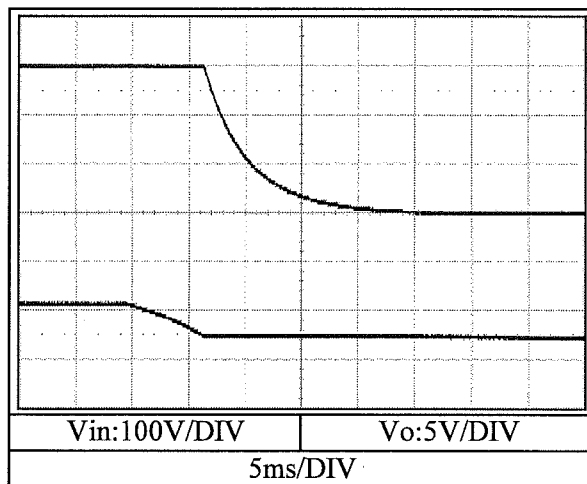
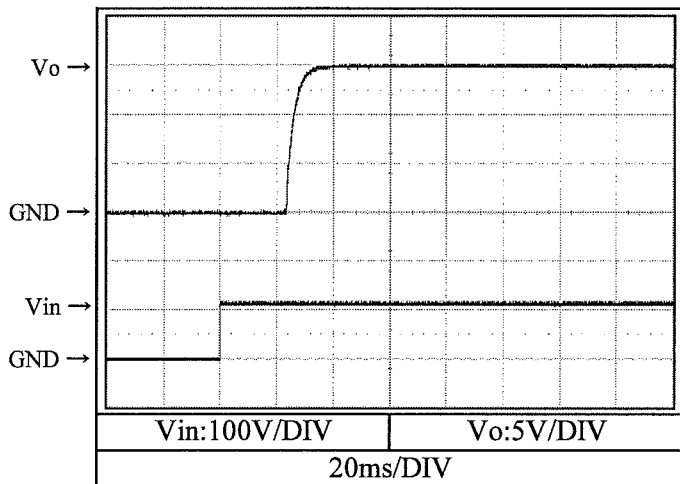
12V



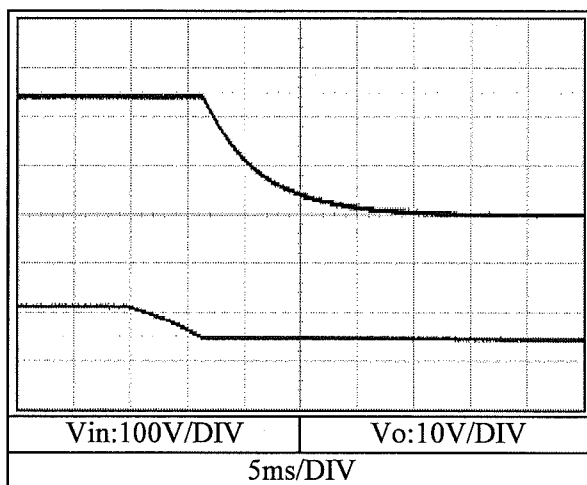
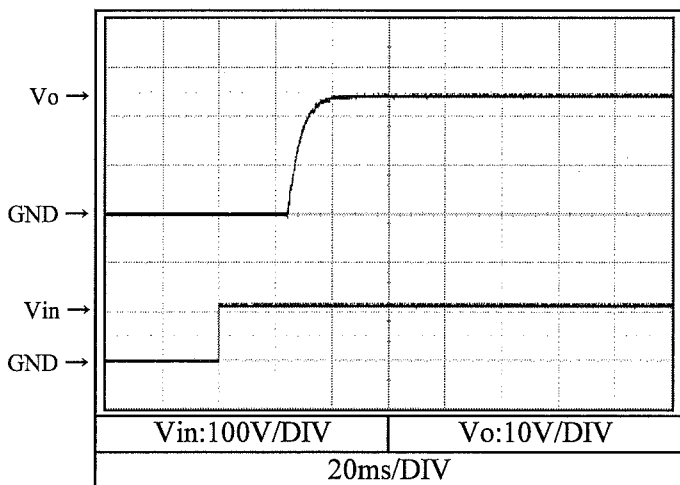
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

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

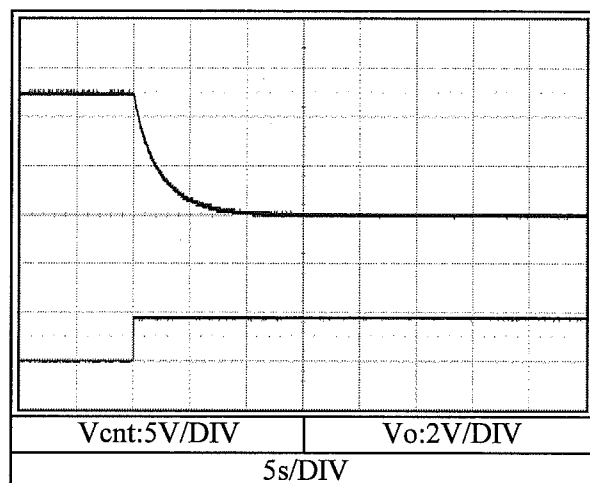
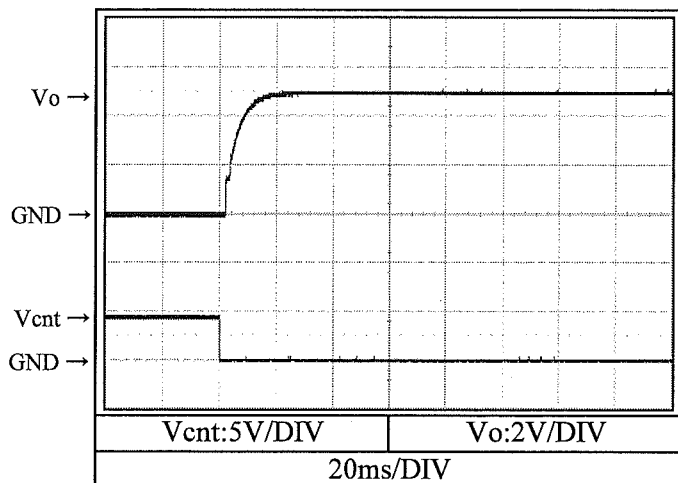
Conditions

Vin : 110 VDC

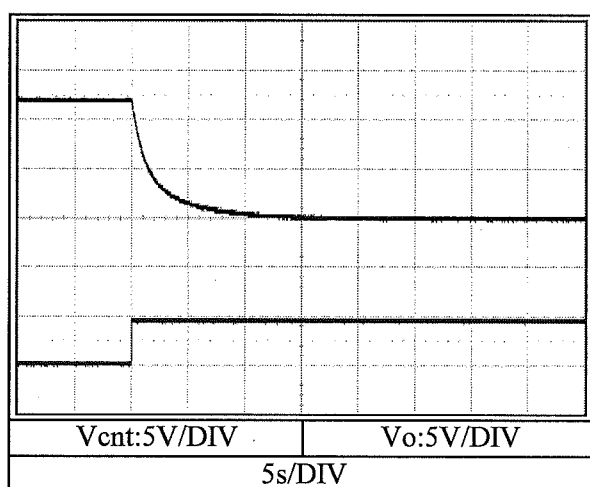
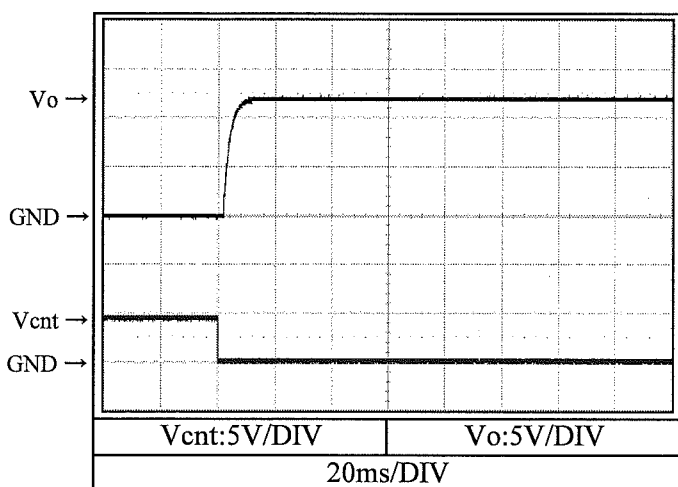
Io : 0%

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

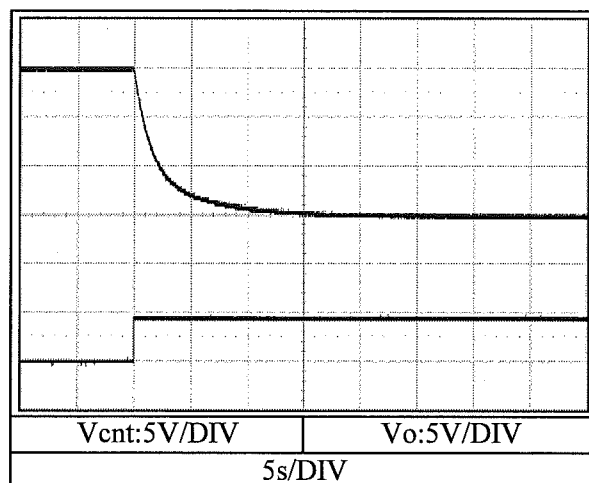
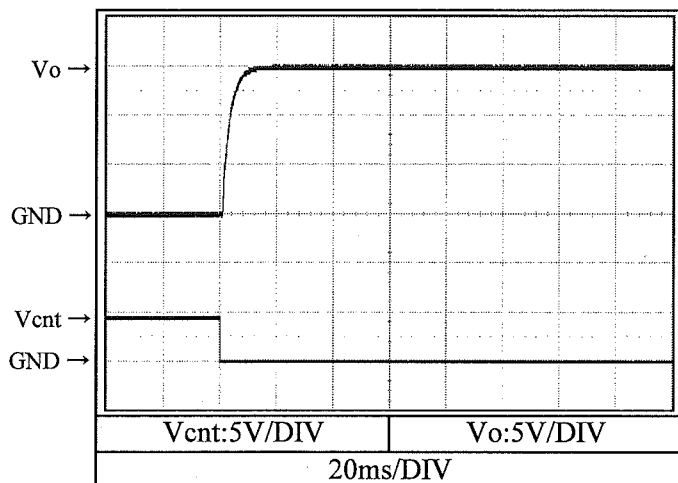
Conditions

Vin : 110 VDC

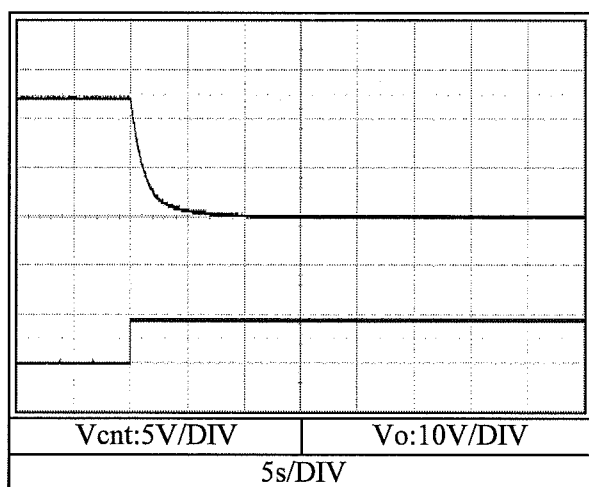
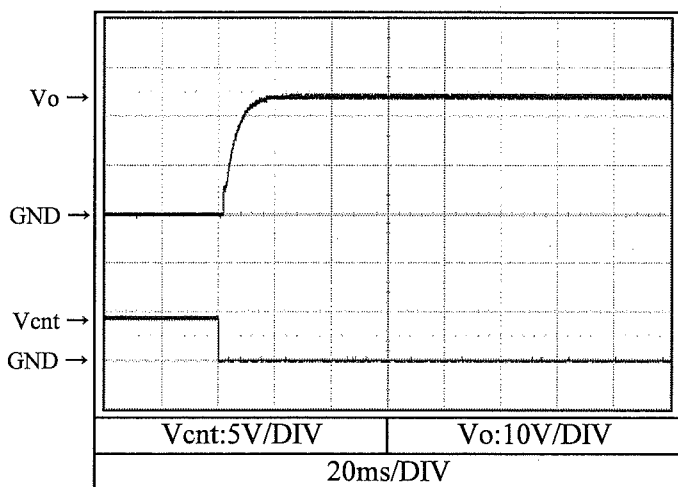
Io : 0%

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

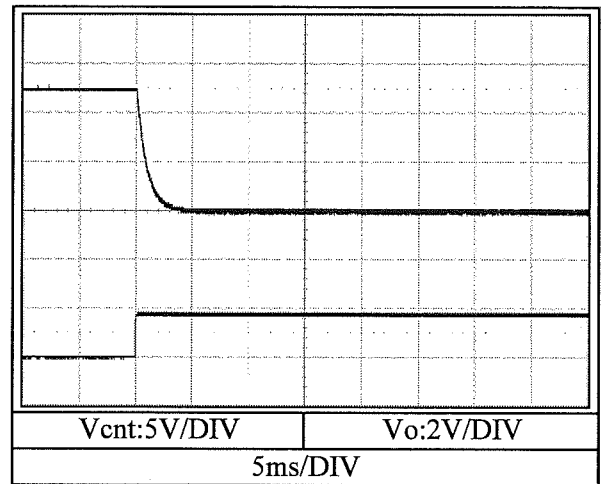
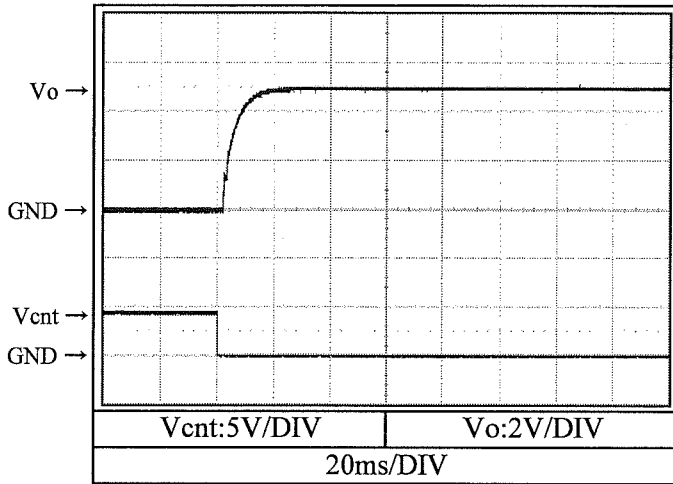
Conditions

Vin : 110 VDC

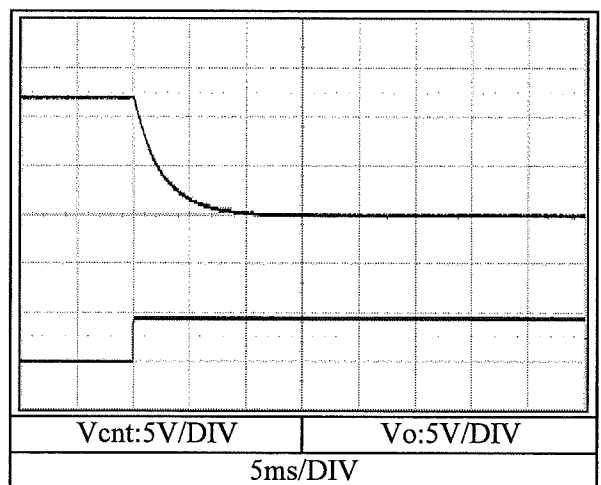
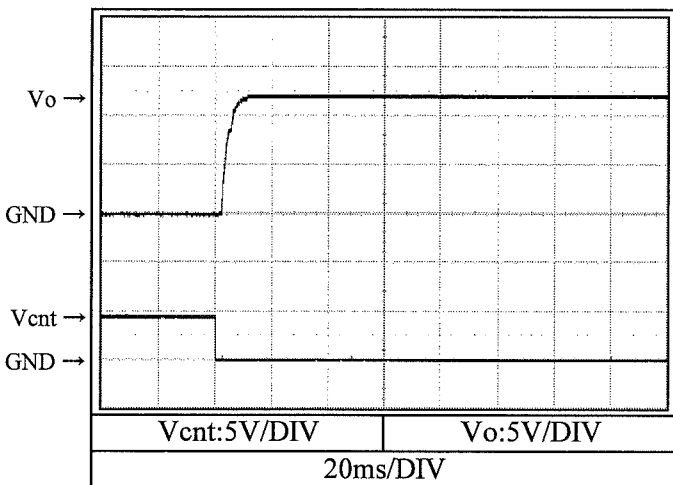
Io : 100 %

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

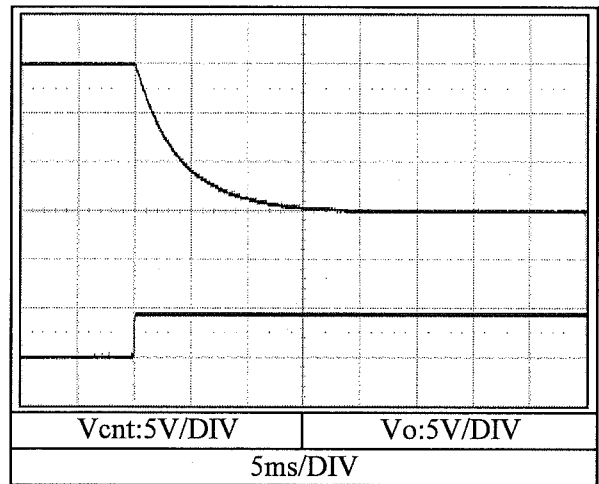
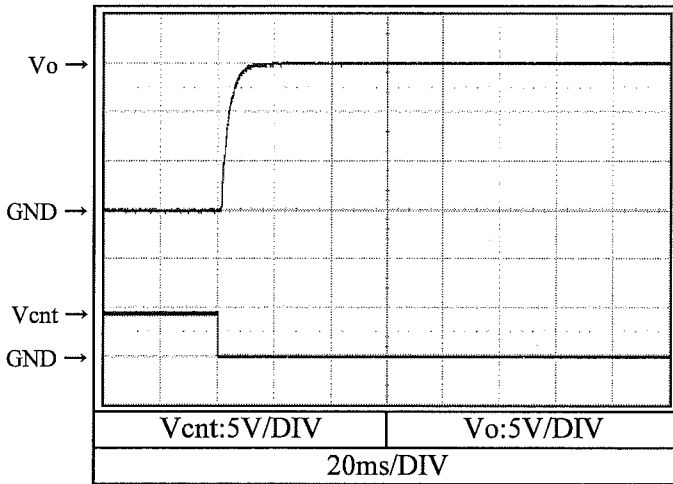
Conditions

Vin : 110 VDC

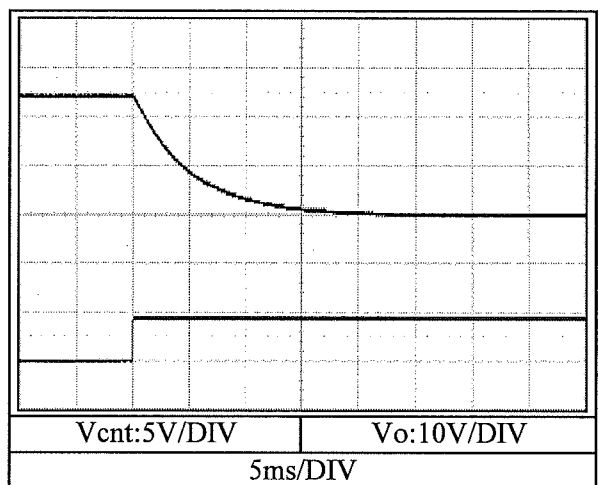
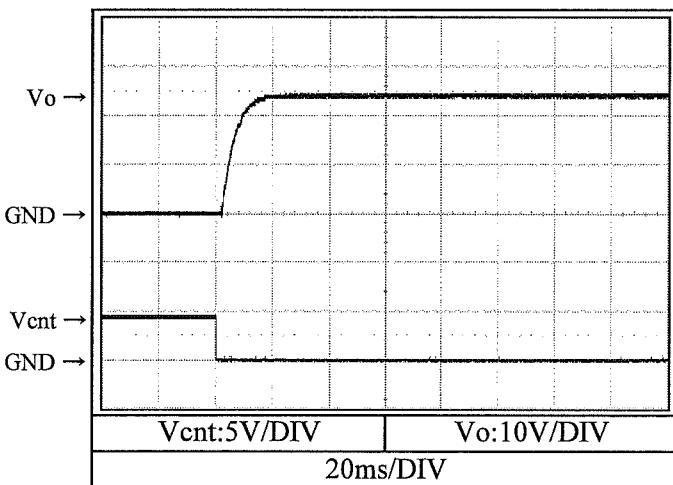
Io : 100 %

Tbp : 25 °C

15V



24V



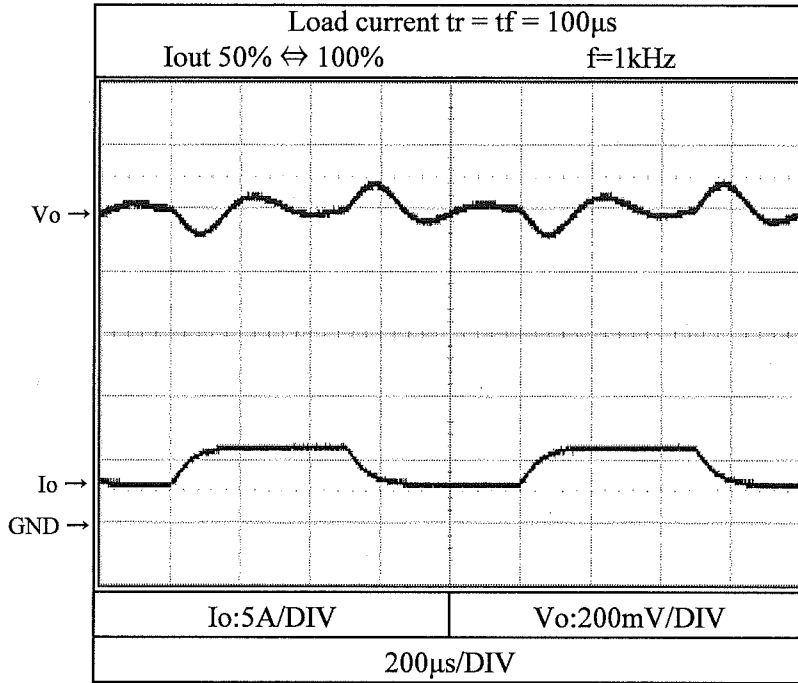
2.7 過渡応答（負荷急変）特性  
Dynamic load response characteristics

Conditions

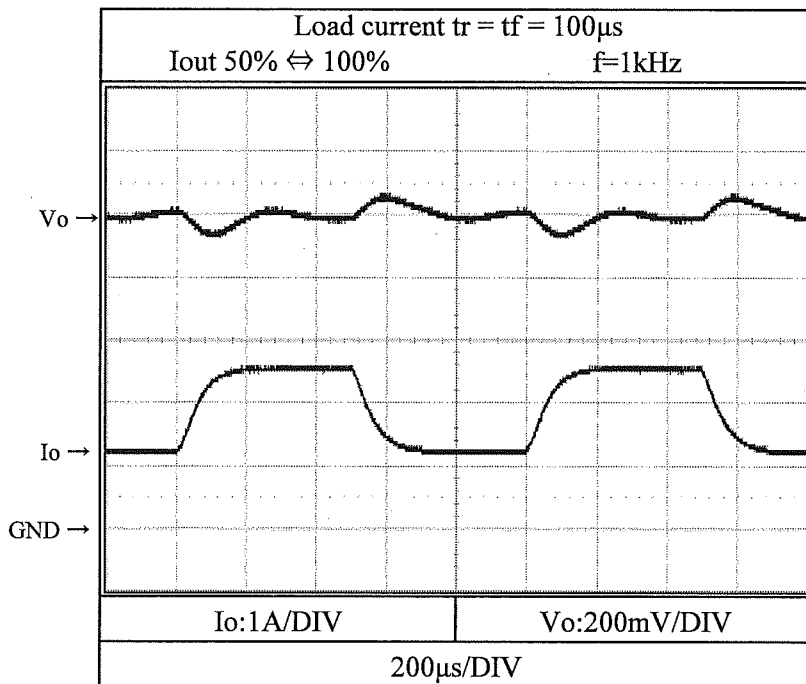
Vin : 110 VDC

Tbp : 25 °C

5V



12V



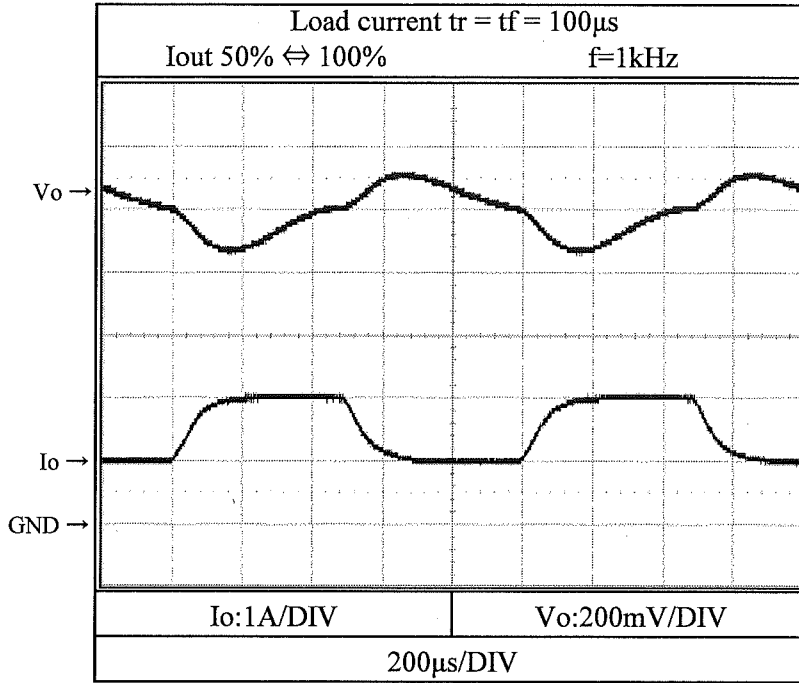
2.7 過渡応答 (負荷急変) 特性  
 Dynamic load response characteristics

Conditions

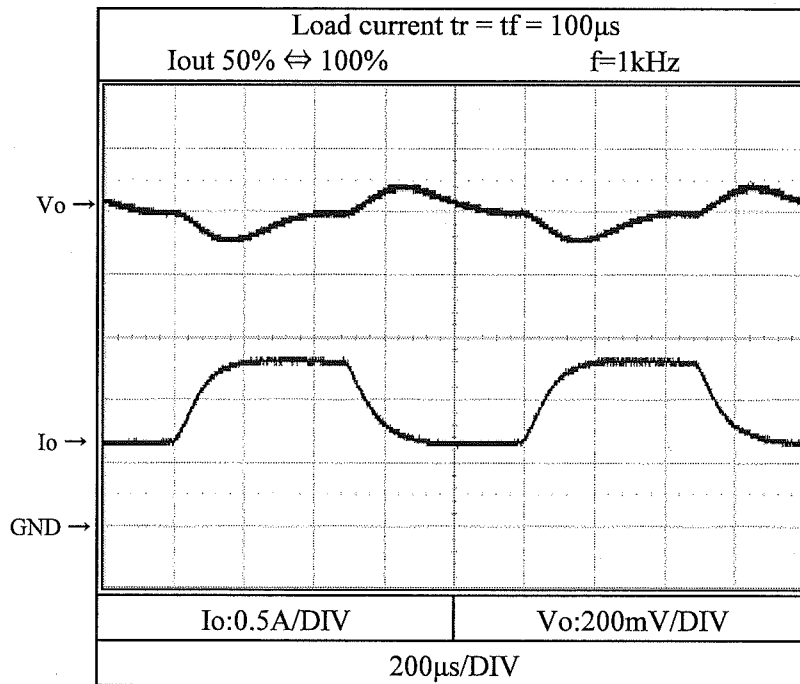
Vin : 110 VDC

Tbp : 25 °C

15V



24V



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

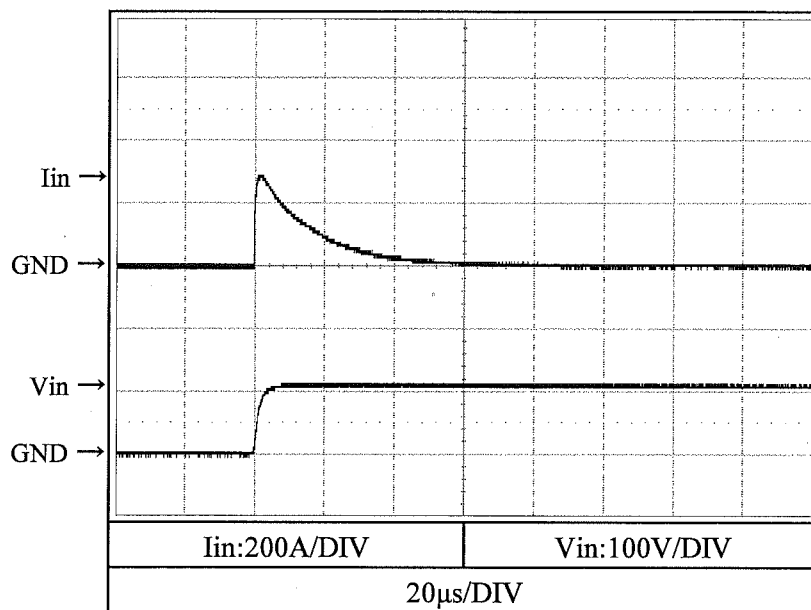
Conditions

V<sub>in</sub> : 110 VDC

I<sub>o</sub> : 100 %

T<sub>bp</sub> : 25 °C

5V

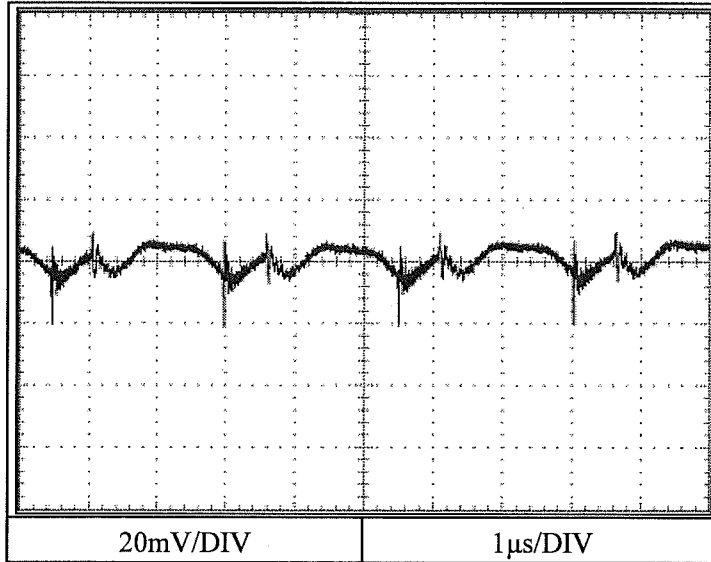


2.9 出カリップル、ノイズ波形  
Output ripple and noise waveform

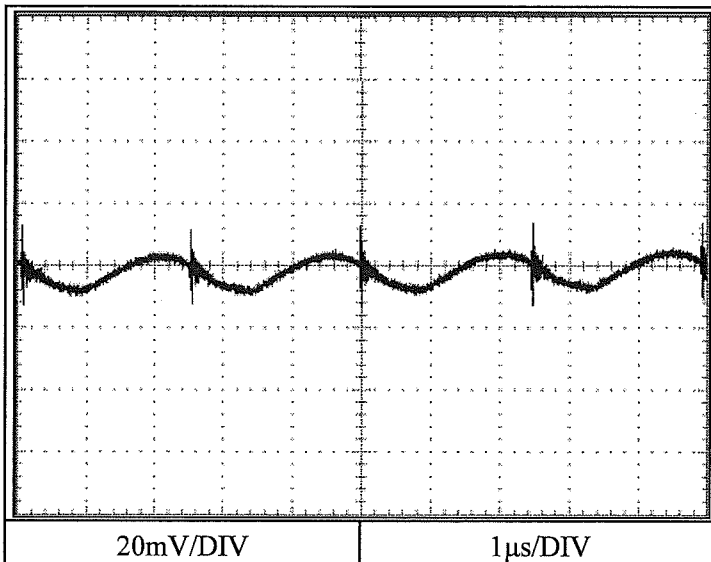
Conditions

V<sub>in</sub> : 110 VDC  
I<sub>o</sub> : 100 %  
T<sub>bp</sub> : 25 °C

5V



12V

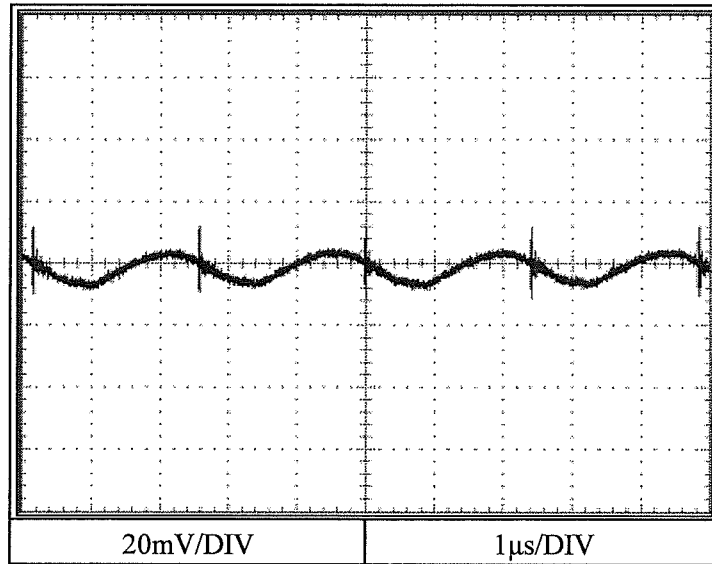


2.9 出力リップル、ノイズ波形  
Output ripple and noise waveform

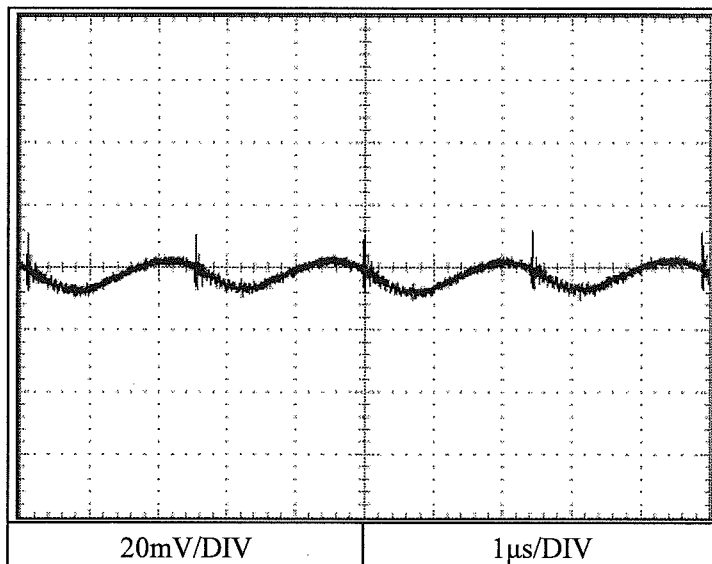
Conditions

V<sub>in</sub> : 110 VDC  
I<sub>o</sub> : 100 %  
T<sub>bp</sub> : 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

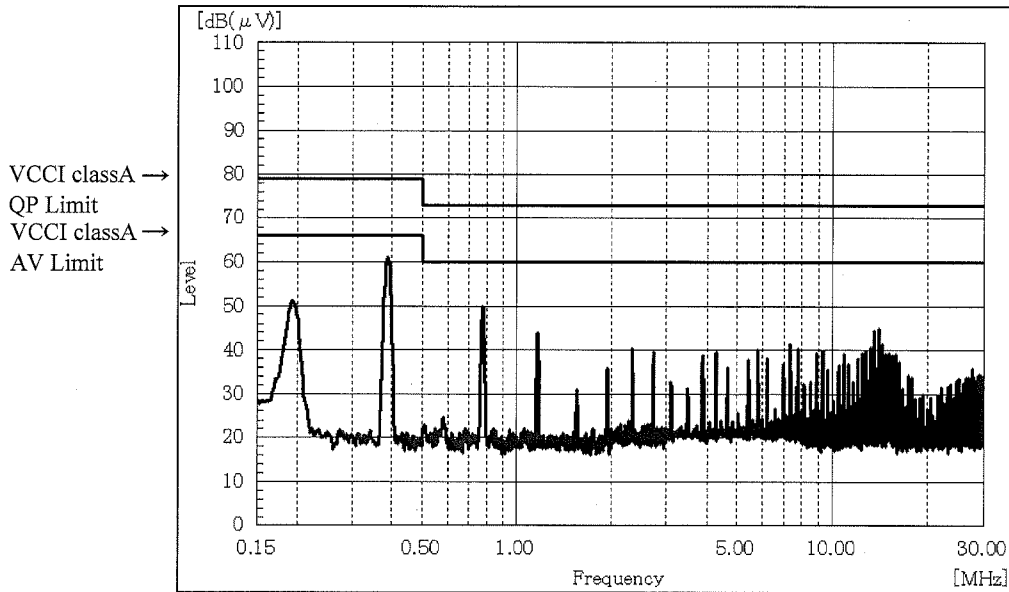
Vin : 110 VDC

Io : 100 %

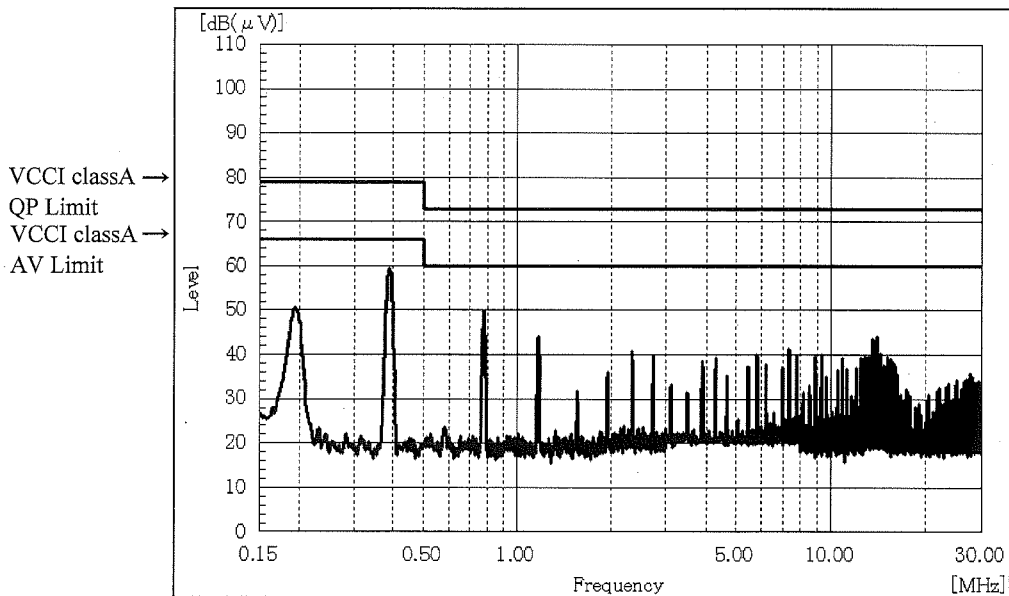
Tbp : 25 °C

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

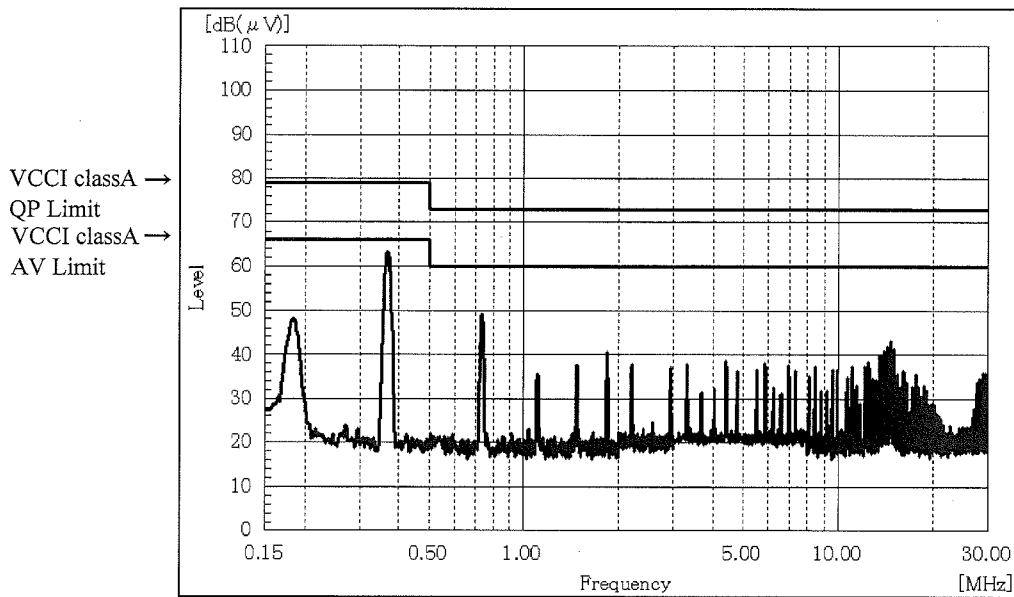
Vin : 110 VDC

Io : 100 %

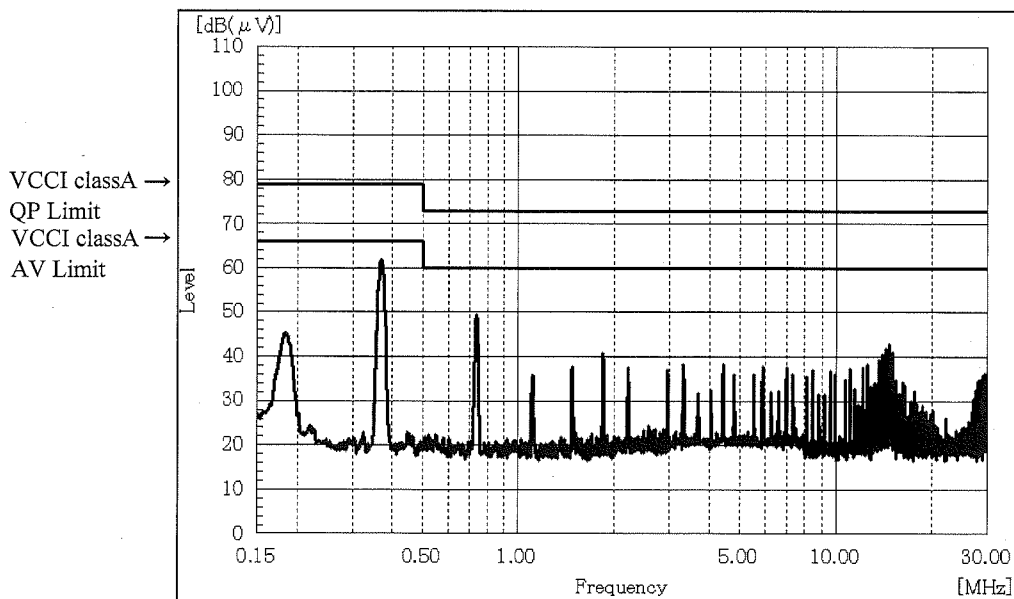
Tbp : 25 °C

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

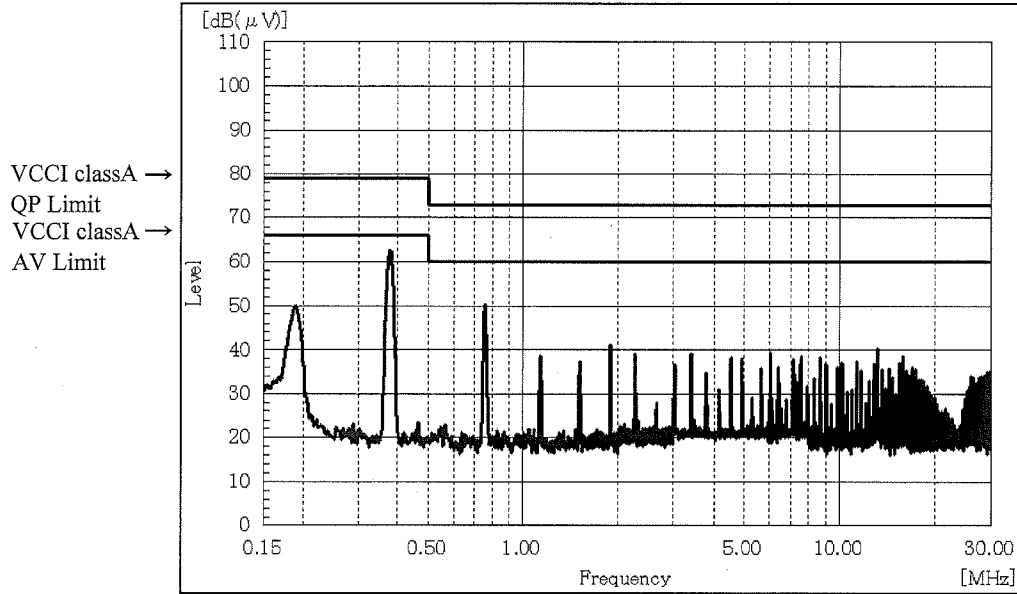
Vin : 110 VDC

Io : 100 %

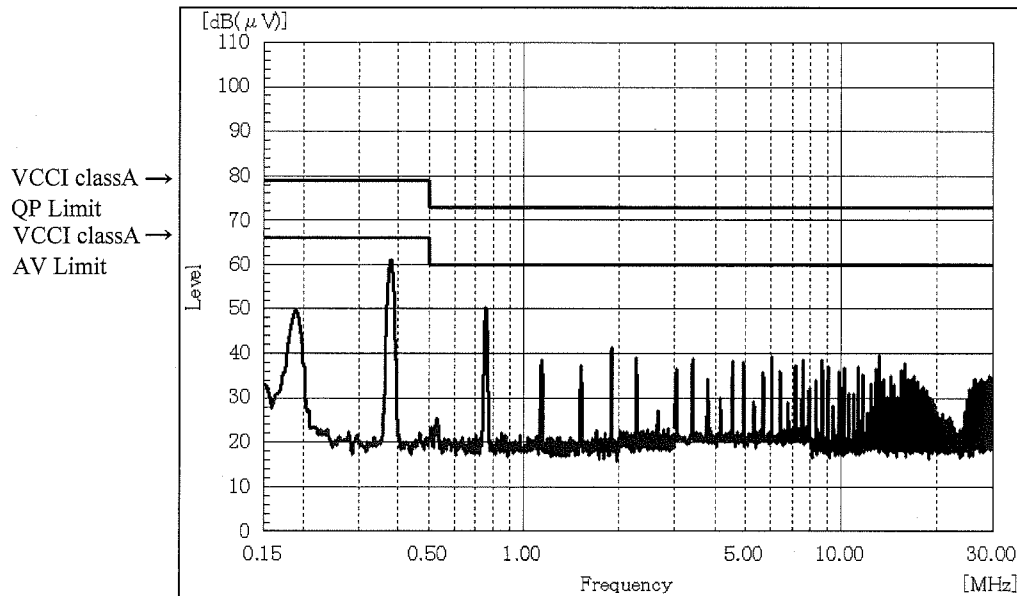
Tbp : 25 °C

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

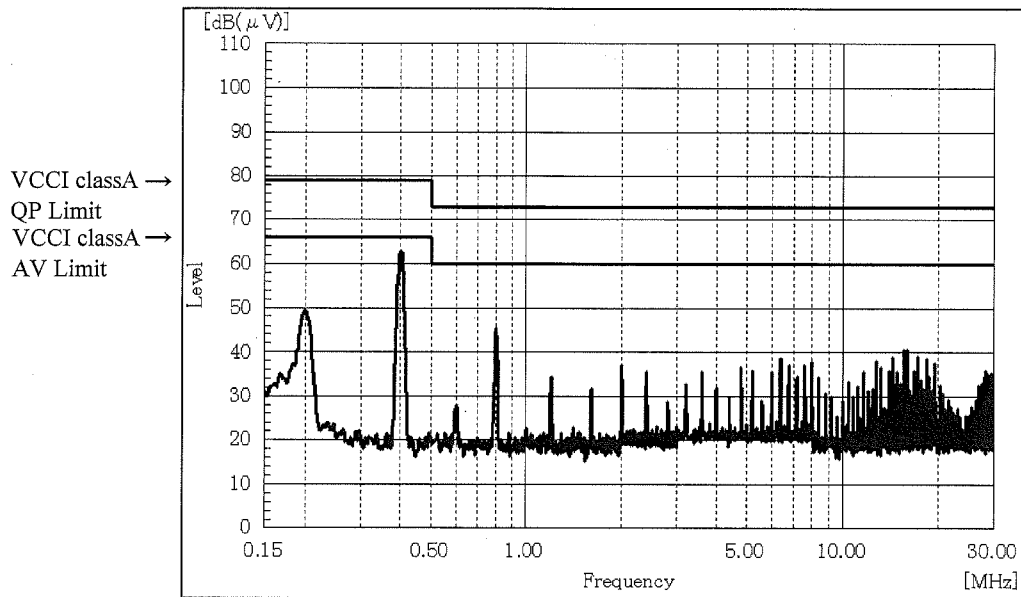
Vin : 110 VDC

Io : 100 %

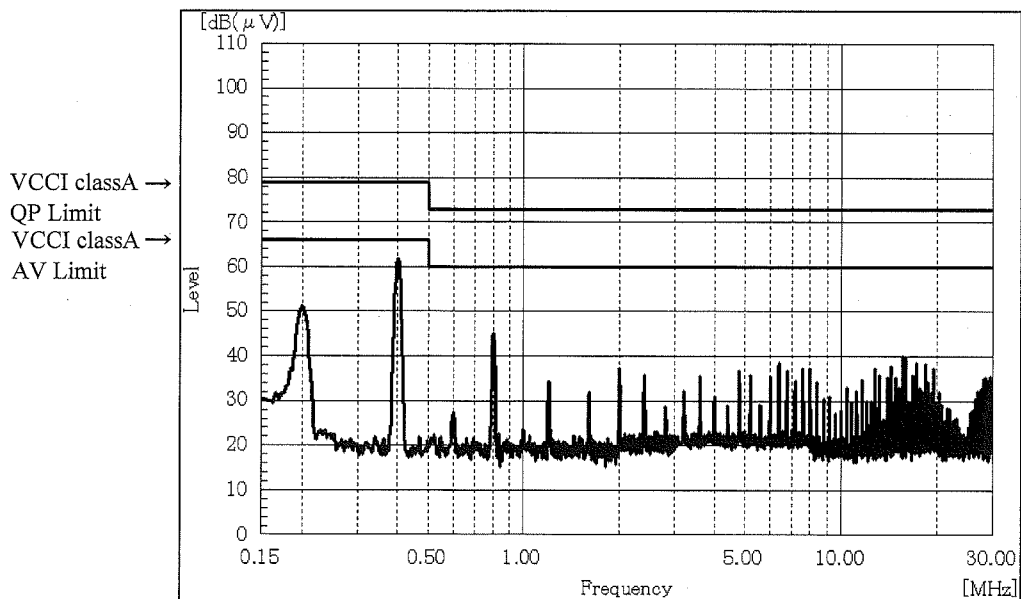
Tbp : 25 °C

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

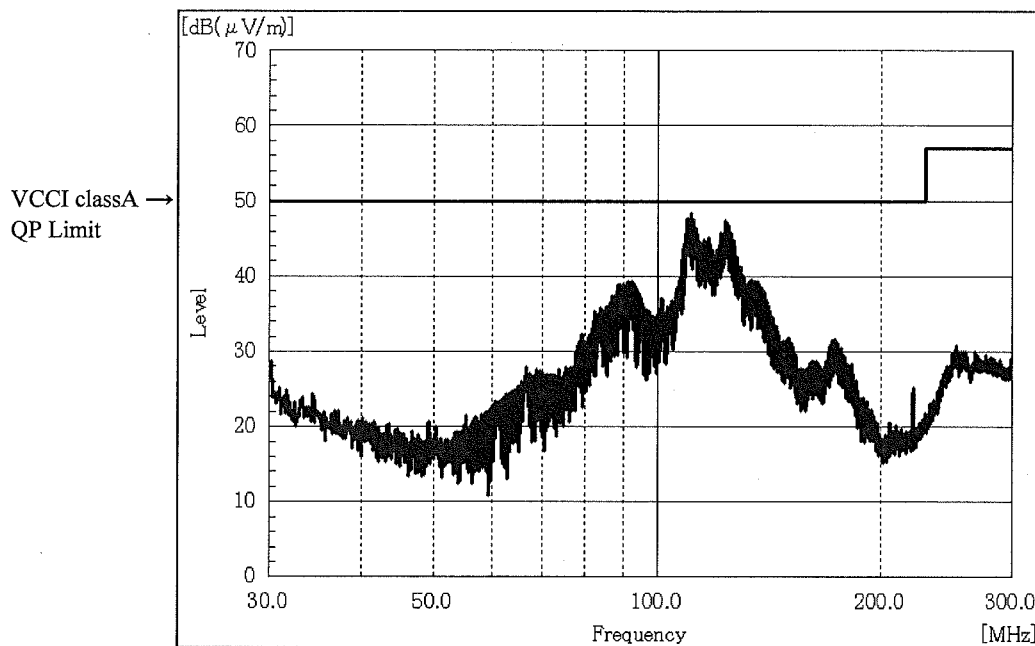
Vin : 110 VDC

Io : 100 %

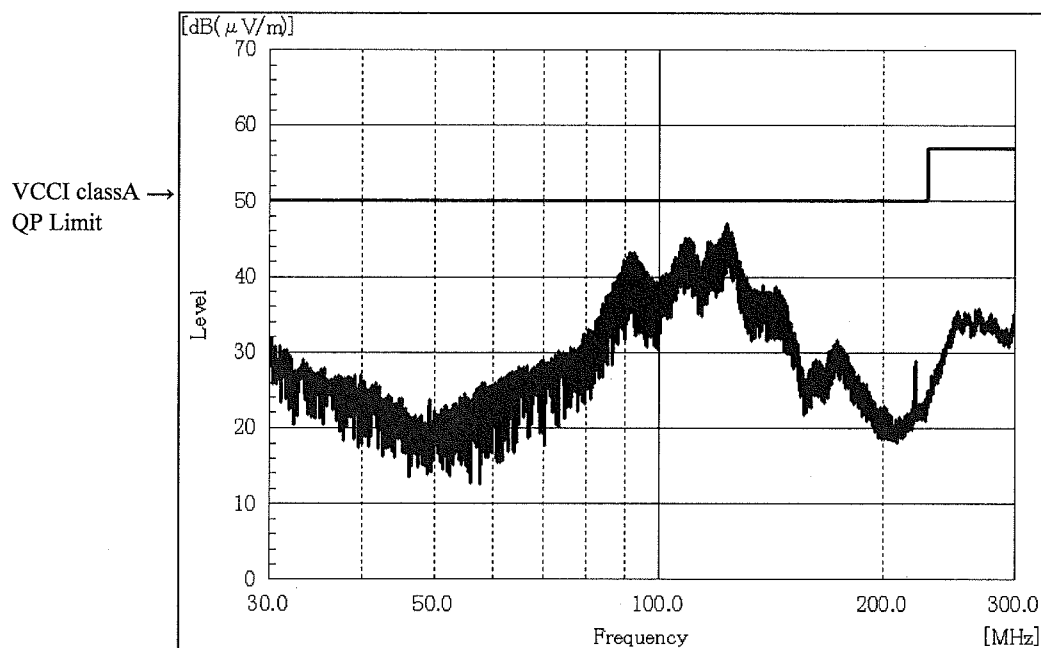
Tbp : 25 °C

5V

HORIZONTAL



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

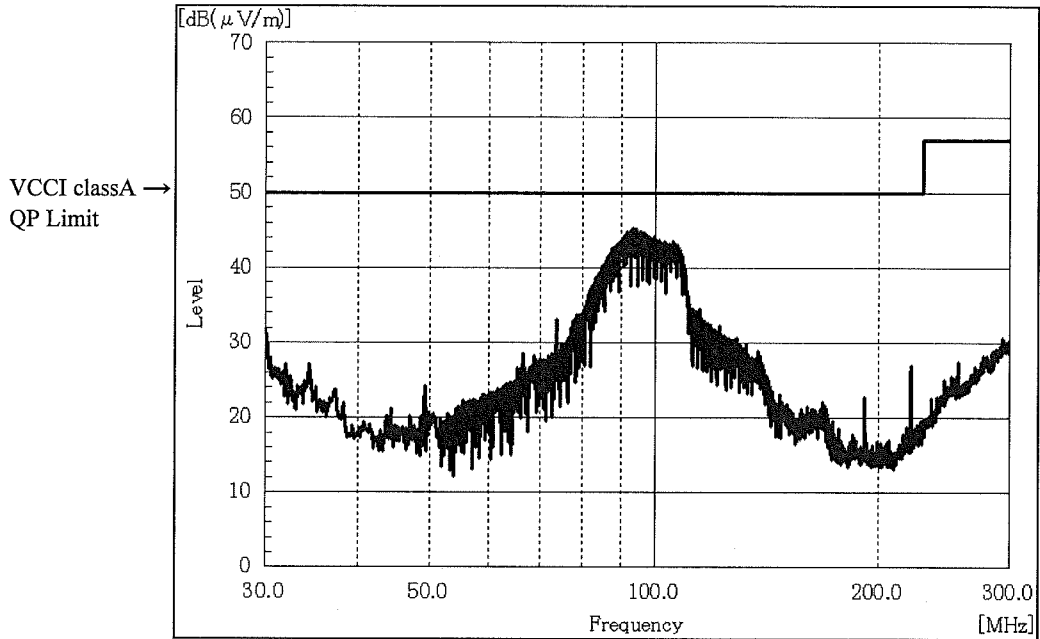
Vin : 110 VDC

Io : 100 %

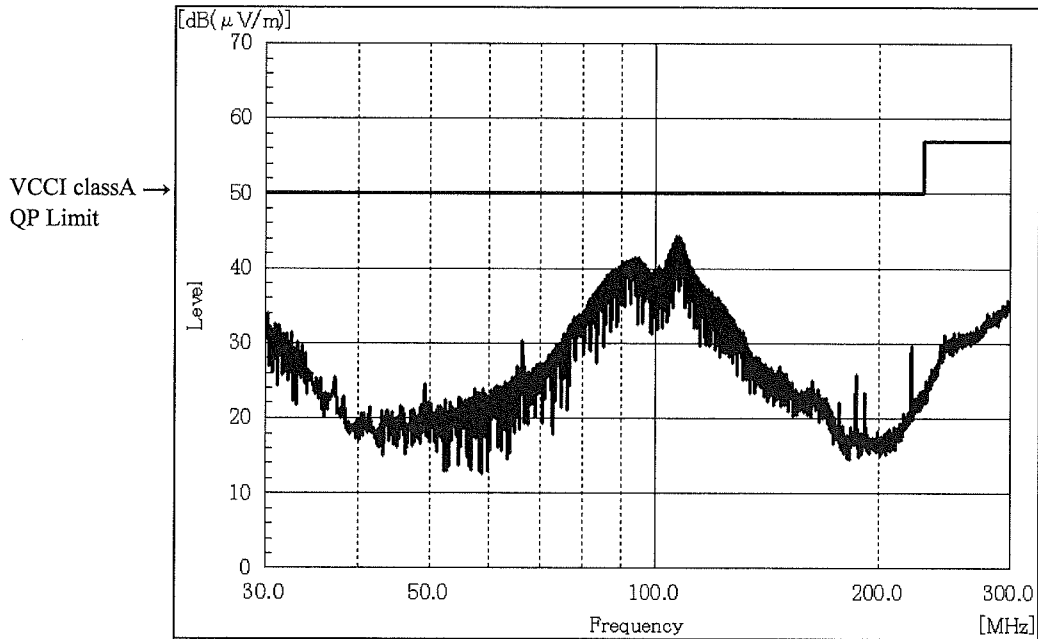
Tbp : 25 °C

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

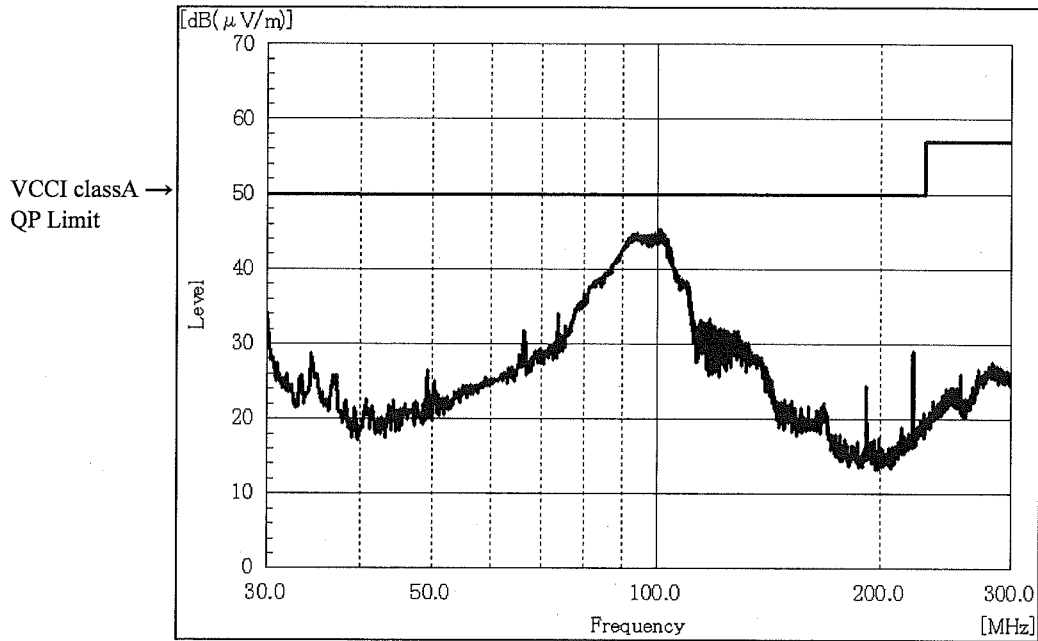
Vin : 110 VDC

Io : 100 %

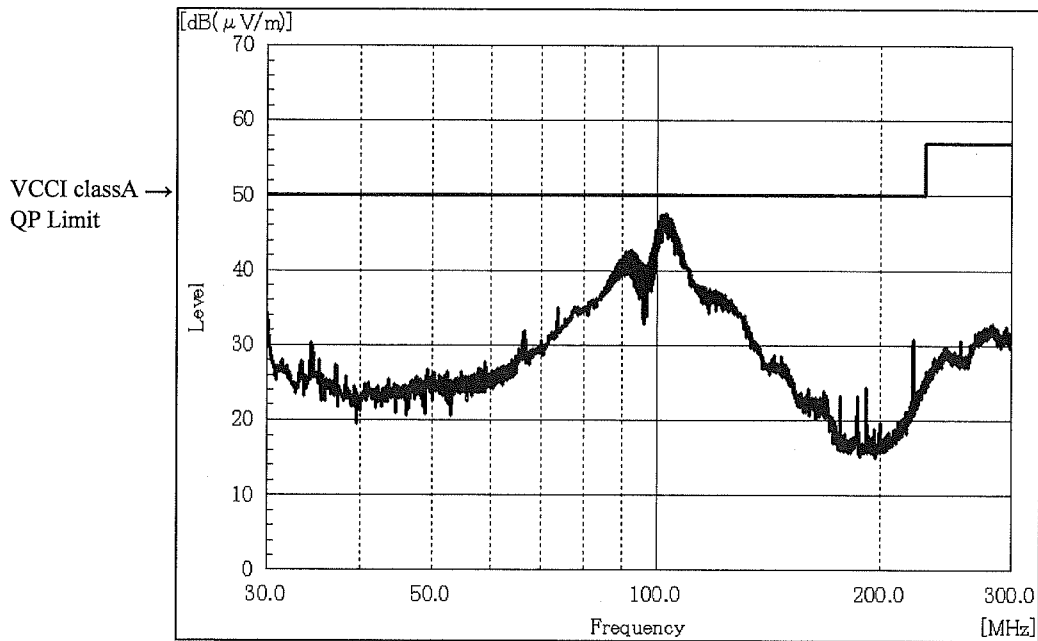
Tbp : 25 °C

15V

HORIZONTAL



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

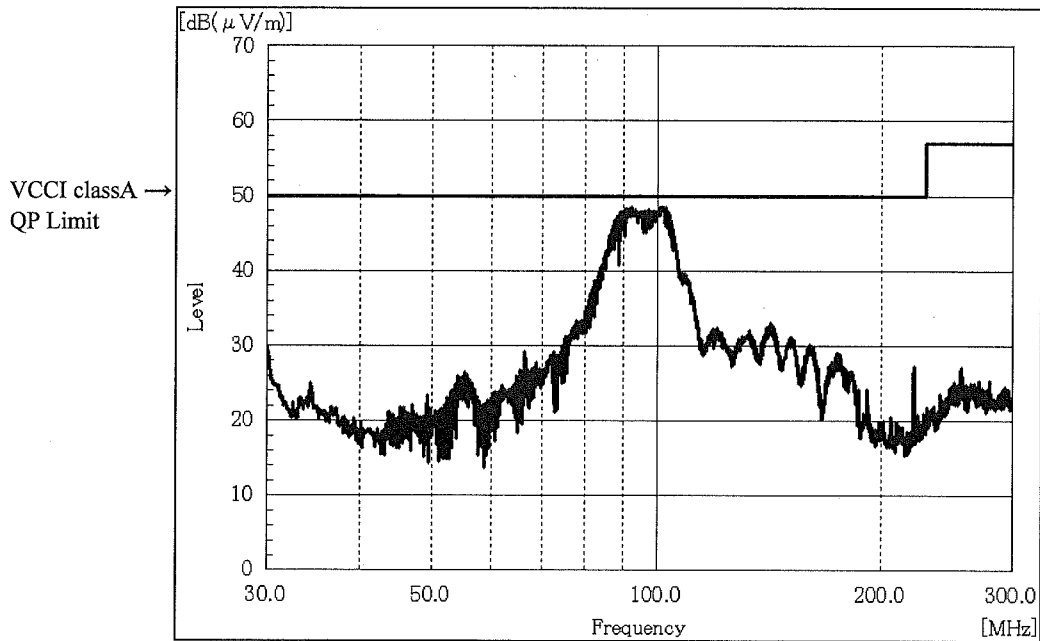
Vin : 110 VDC

Io : 100 %

Tbp : 25 °C

24V

HORIZONTAL



VERTICAL

