

PFE500-*

EVALUATION DATA

型式データ

DWG.NO. C212-53-01		
承認	査閲	担当
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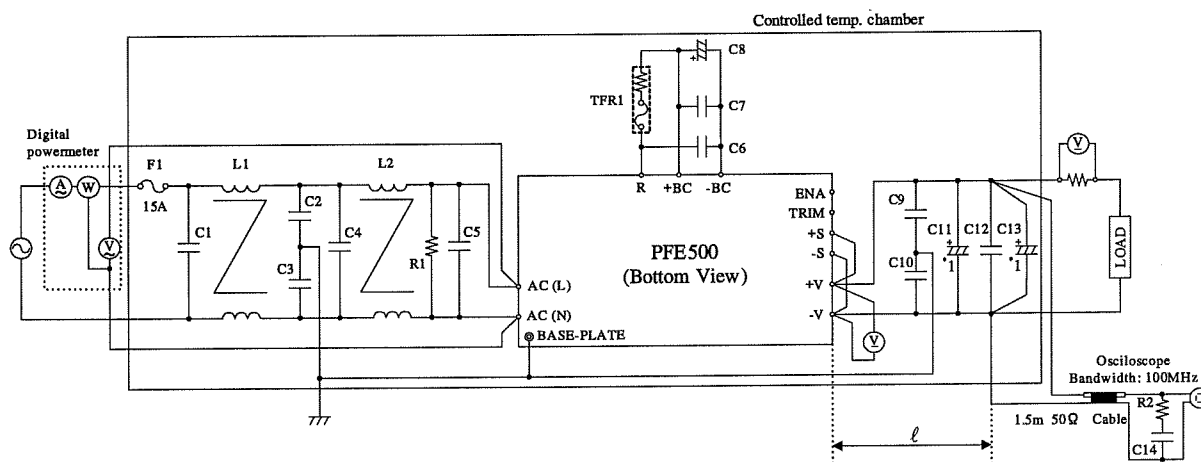
使用記号 Terminology used

	Definition	
V _{in}	 入力電圧	Input Voltage
V _o	 出力電圧	Output Voltage
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

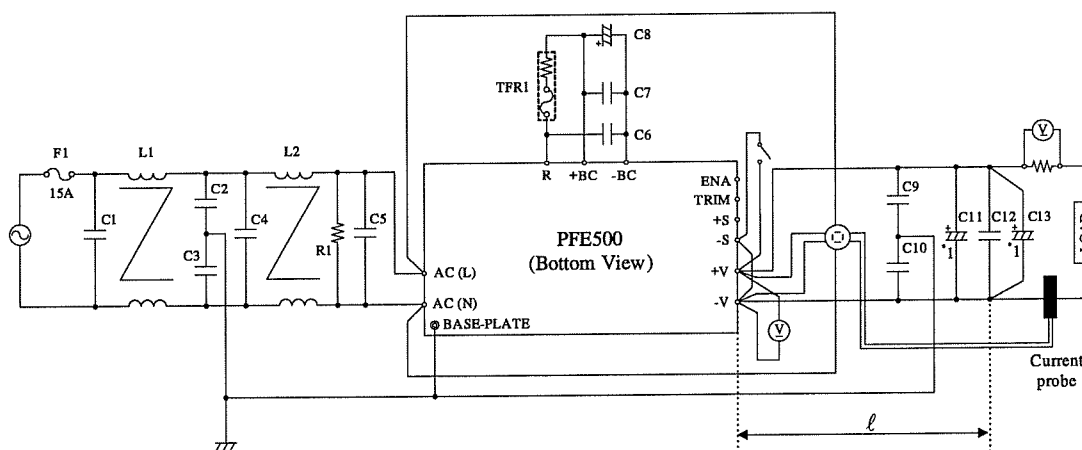
1. 測定方法 Evaluation Method

1.1 測定回路 Measurement Circuits

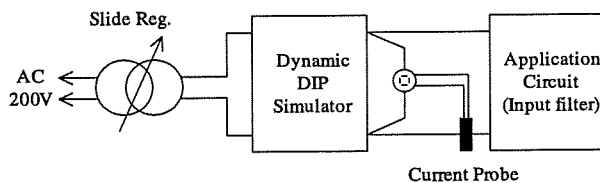
(1) 静特性、出力リップル、ノイズ波形 Steady state characteristics and Output ripple noise waveform



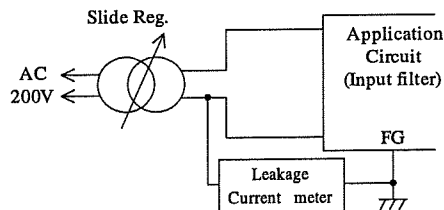
(2) 過渡応答、保護機能、その他 Dynamic, protection and other characteristics



Inrush current characteristics



Leakage current characteristics



C1, C4, C5: 1uF Film Capacitor
C2, C3: 4700pF Ceramic Capacitor
C6, C7: 1uF Film Capacitor
C8: 390uF x2parallel Electrolytic Capacitor
C9, C10: 0.033uF
C12: 2.2uF Ceramic Capacitor
C14: 4700pF Ceramic Capacitor

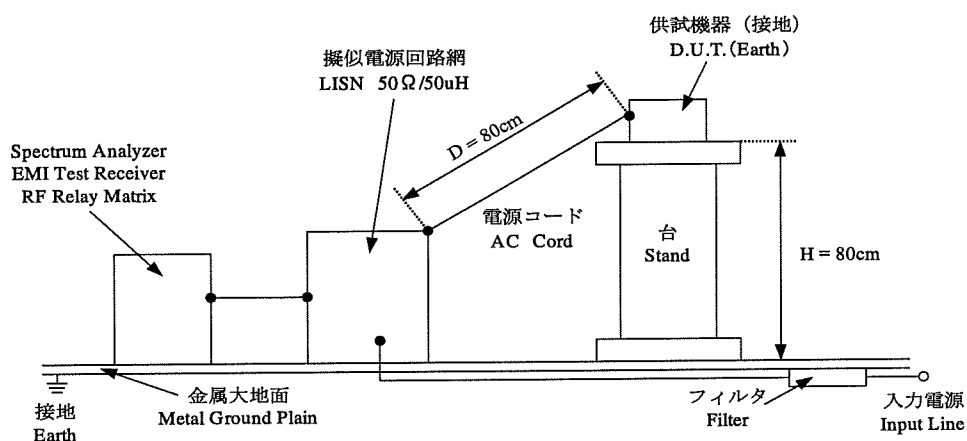
C11, C13: 12V-1000uF Electrolytic Capacitor
28V- 470uF Electrolytic Capacitor
48V- 220uF Electrolytic Capacitor
R1: 2W 470kΩ
R2: 50Ω
L1, L2: 6mH
ℓ: 50mm
TFR1: 10Ω more 139°C

==== Note ====

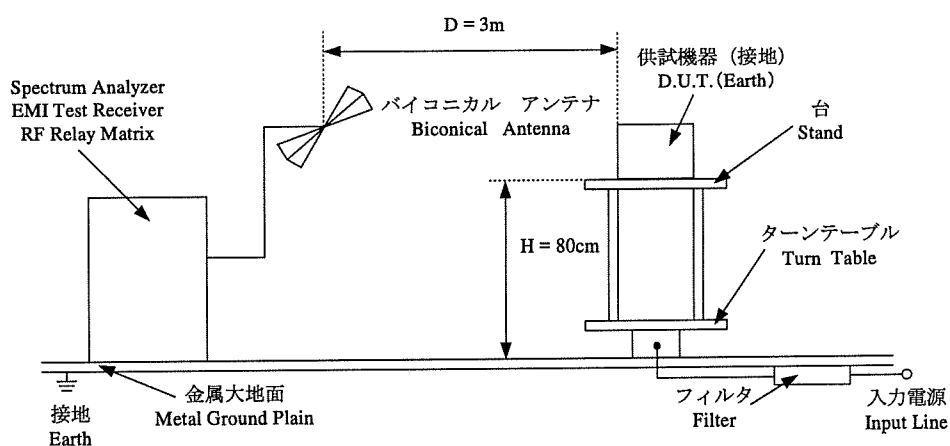
*1: If the ambient temperature is less than -20°C,
use twice of the recommended capacitor above.

(3) EMI特性 Electro-Magnetic Interference characteristics

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



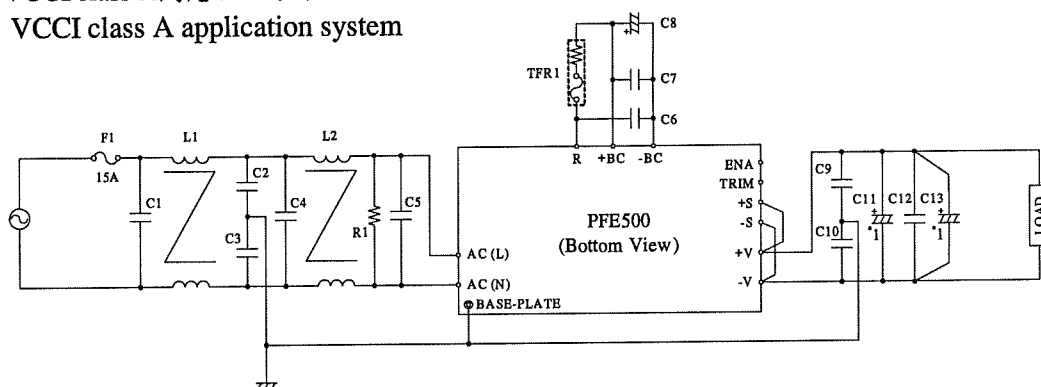
(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



* 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, C4, C5: 1μF Film Capacitor
 C2, C3: 4700pF Ceramic Capacitor
 C6, C7: 1μF Film Capacitor
 C8: 390μF x2parallel Electrolytic Capacitor
 C9, C10: 0.033μF
 C12: 2.2μF Ceramic Capacitor

C11, C13: 12V-1000μF Electrolytic Capacitor
 28V- 470μF Electrolytic Capacitor
 48V- 220μF Electrolytic Capacitor
 R1: 2W 470k Ω
 L1, L2: 6mH
 TFR1: 10 Ω more 139°C

1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL PHOSPHOR OSCILLOSCOPE	TEKTRONIX	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	IWATSU-LECROY	LT364L
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	CURRENT PROBE AMPFILIER	TEKTRONIX	TM502A
6	CURRENT PROBE	TEKTRONIX	A6303
7	SHUNT RESISTER	YOKOGAWA ELECT.	2215
8	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
9	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSA
10	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
11	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
12	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
13	AMN	KYORITU DENSHI	KNW-242
14	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	BBA9106
15	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
16	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

12V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	12.015V	12.015V	12.016V	12.015V	1mV	0.008%
50%	12.008V	12.008V	12.008V	12.008V	0mV	0.000%
100%	12.001V	12.002V	12.002V	12.002V	1mV	0.008%
load	14mV	13mV	14mV	13mV		
regulation	0.117%	0.108%	0.117%	0.108%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Tbp	-40°C	+25°C	+85°C	temperature stability	
Vout	11.937V	12.002V	11.990V	65mV	0.542%

28V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	28.163V	28.164V	28.163V	28.164V	1mV	0.004%
50%	28.148V	28.149V	28.148V	28.149V	1mV	0.004%
100%	28.145V	28.145V	28.145V	28.145V	0mV	0.000%
load	18mV	19mV	18mV	19mV		
regulation	0.064%	0.068%	0.064%	0.068%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Tbp	-40°C	+25°C	+100°C	temperature stability	
Vout	28.062V	28.145V	28.022V	123mV	0.439%

48V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	48.018V	48.018V	48.019V	48.020V	2mV	0.004%
50%	48.004V	48.002V	48.003V	48.005V	3mV	0.006%
100%	48.001V	48.002V	48.002V	48.003V	2mV	0.004%
load	17mV	16mV	17mV	17mV		
regulation	0.035%	0.033%	0.035%	0.035%		

2. Temperature drift

Conditions Vin=100VAC

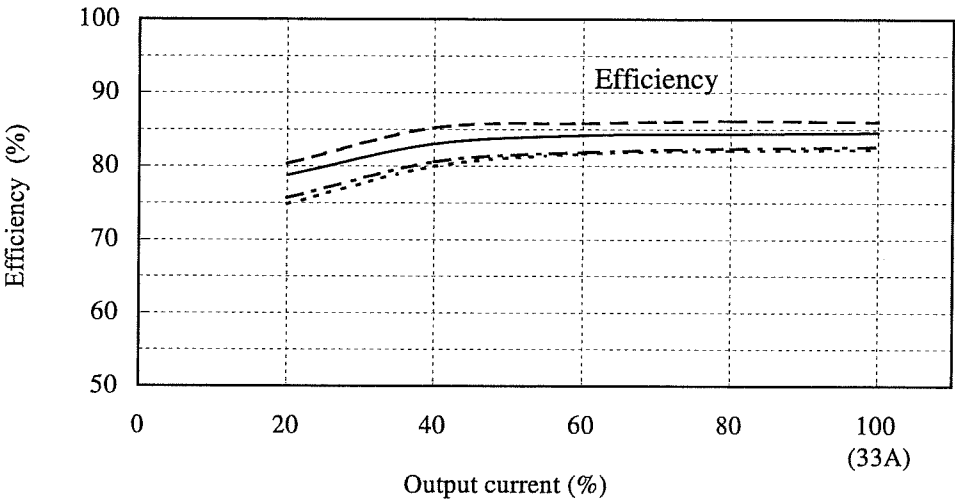
Iout=100%

Tbp	-40°C	+25°C	+100°C	temperature stability	
Vout	47.778V	48.002V	48.032V	254mV	0.529%

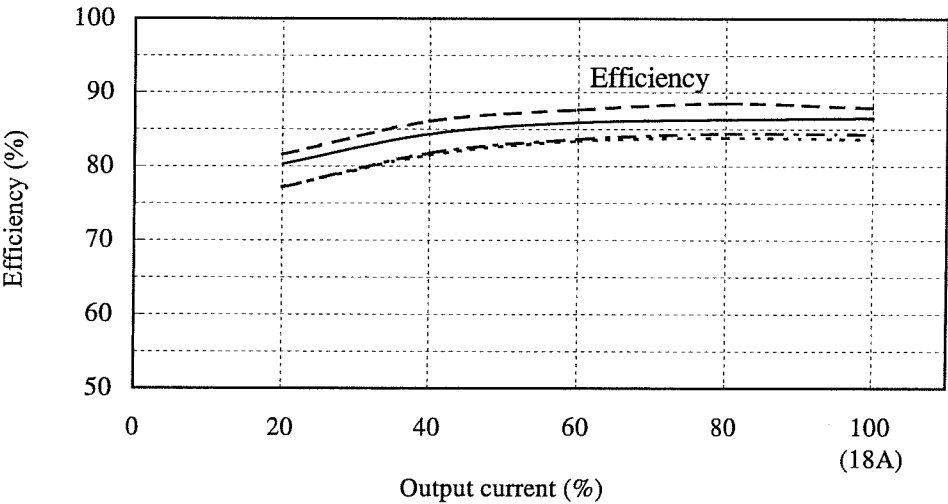
(2) 効率 対 出力電流
Efficiency vs. Output current

Conditions Vin : 85 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
Tbp : 25 °C

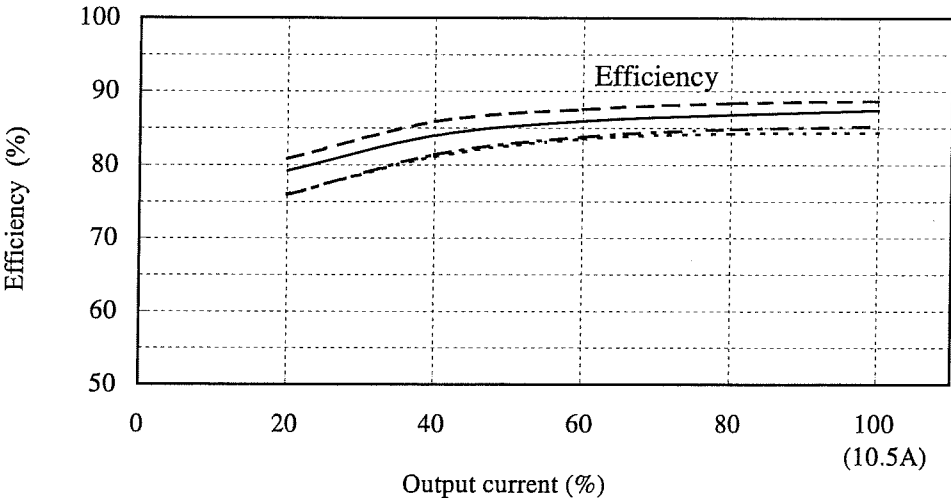
12V



28V



48V

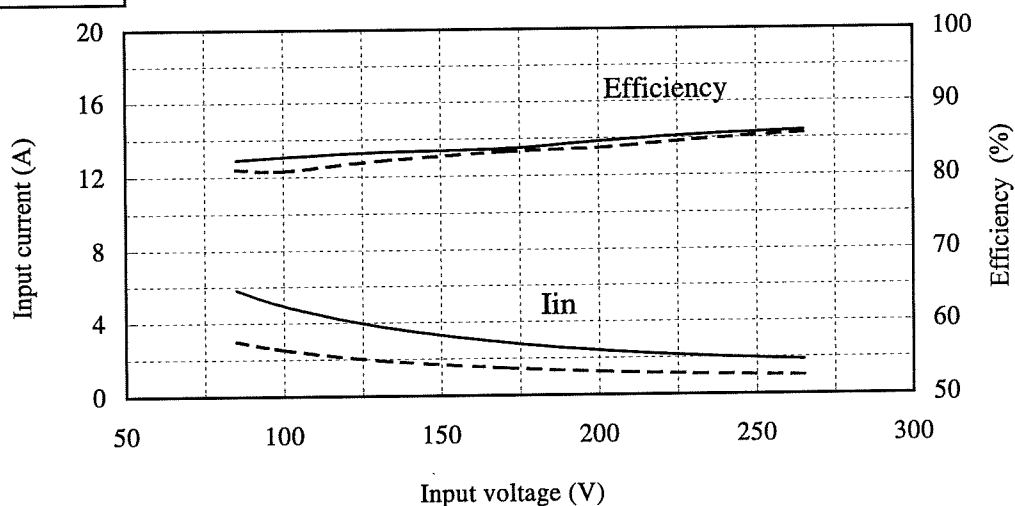


(3) 入力電流・効率 対 入力電圧

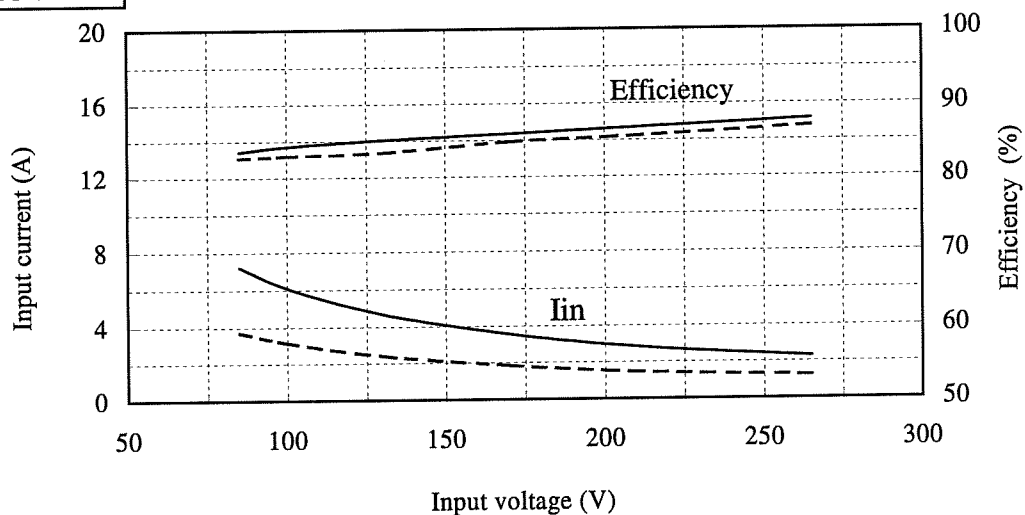
Input current and Efficiency vs. Output current

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

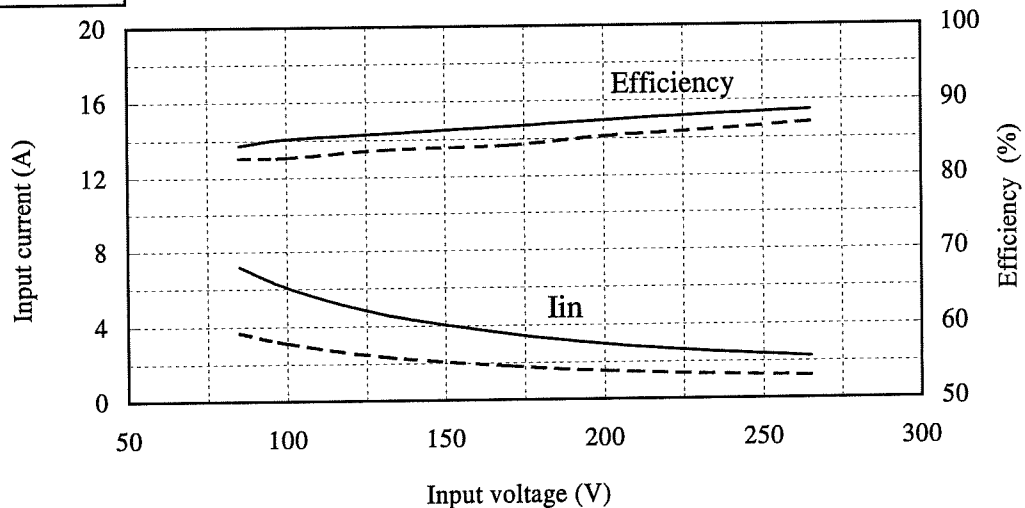
12V



28V



48V

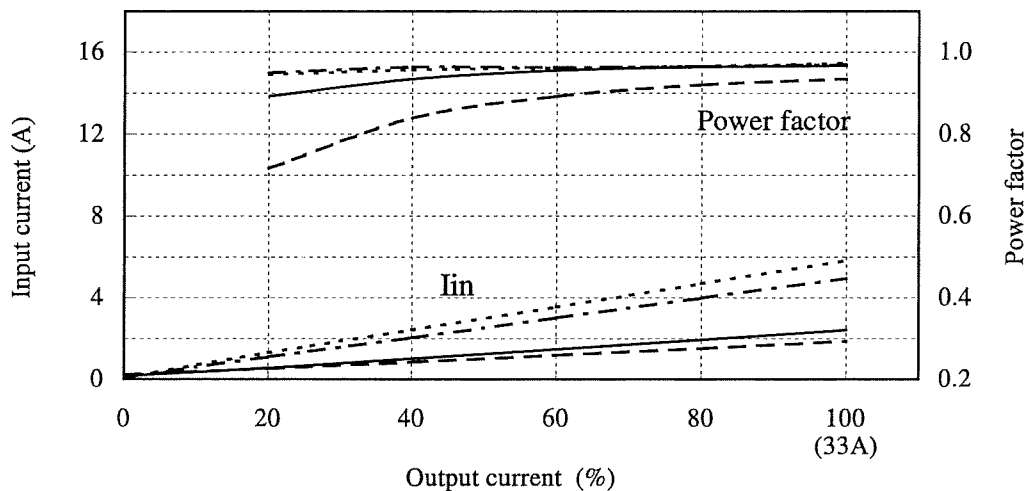


(4) 入力電流・力率 対 出力電流

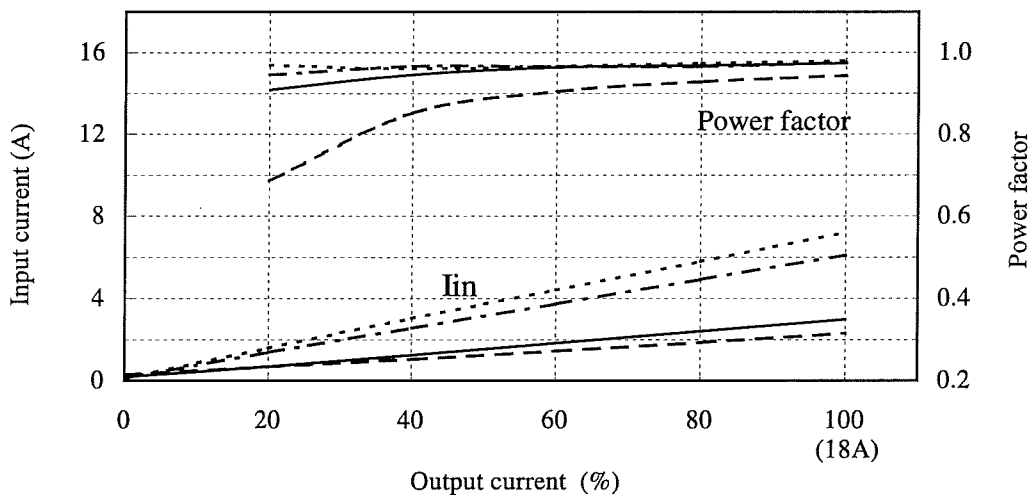
Input current and Power factor vs. Output current

Conditions Vin : 85 VAC -----
 : 100 VAC -----
 : 200 VAC -----
 : 265 VAC -----
 Tbp : 25 °C

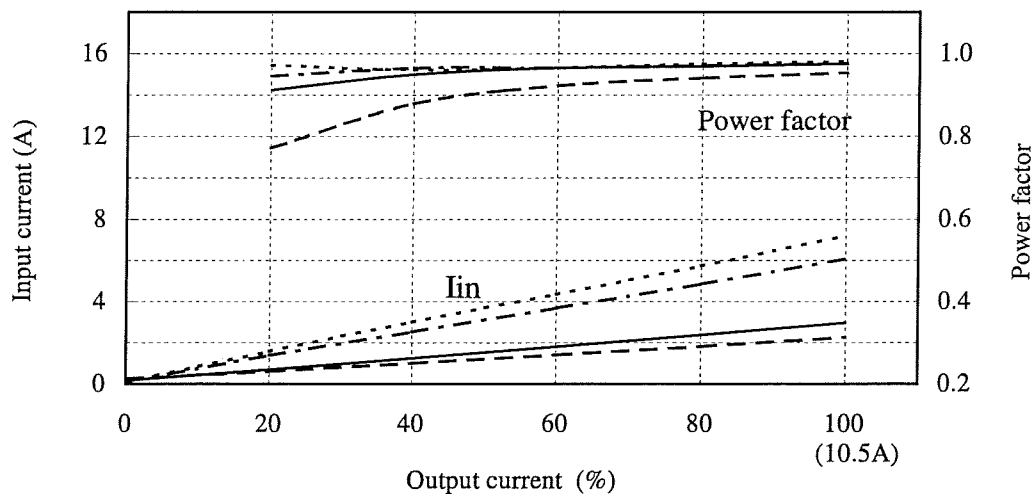
12V



28V



48V



2.2 通電ドリフト特性

Warm up voltage drift characteristics

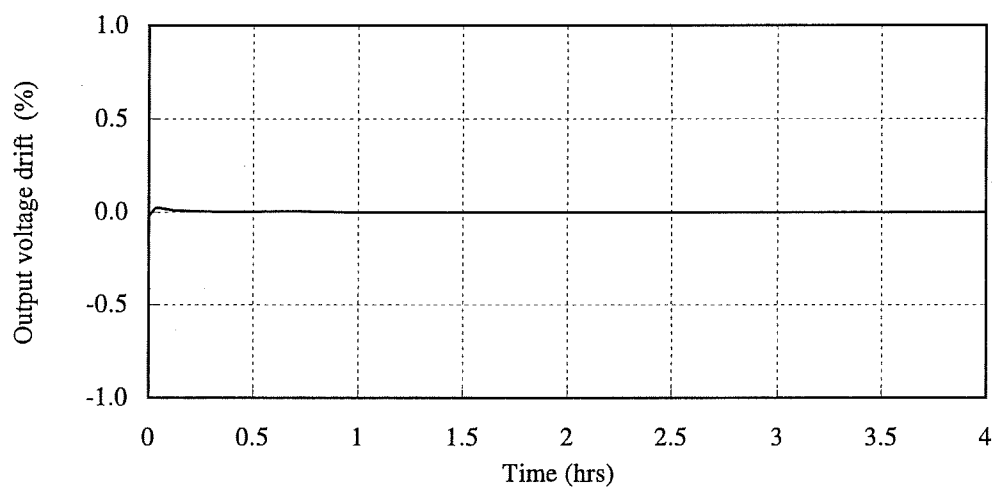
Conditions

Vin : 100VAC

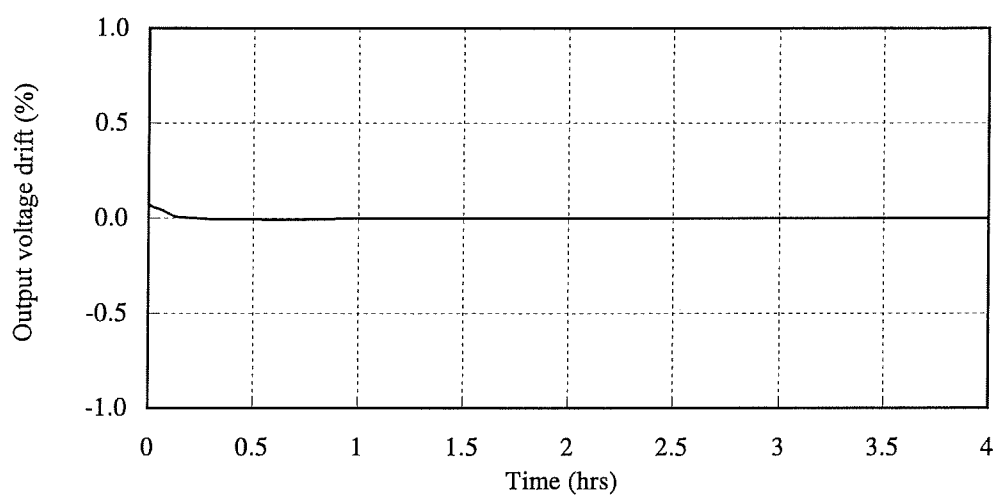
Io : 100%

Ta : 25°C

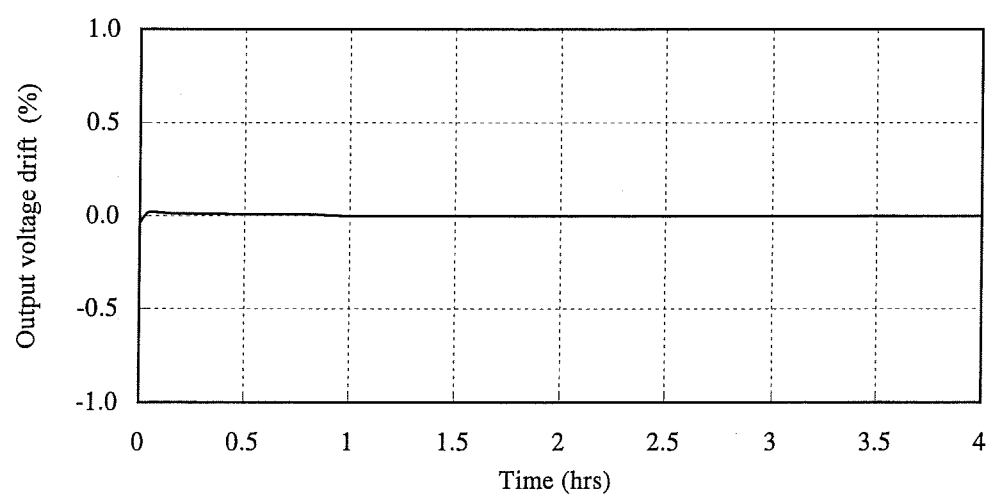
12V



28V



48V



2.3 過電流保護特性

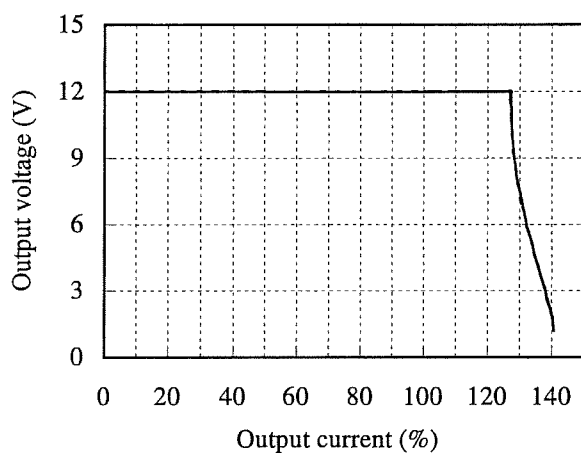
Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

Conditions V_{in} : 100 VAC -----
 200 VAC ————
 T_{bp} : 25 °C

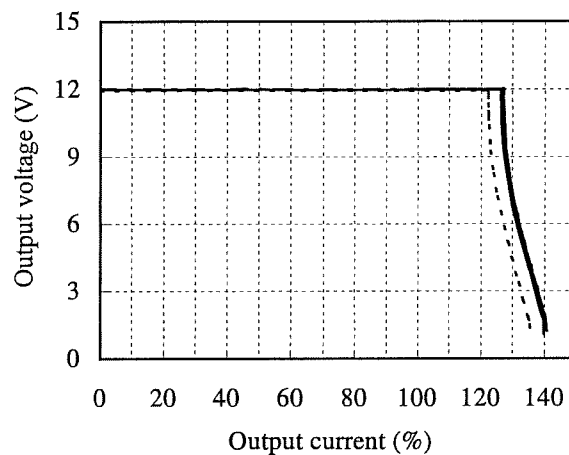
12V



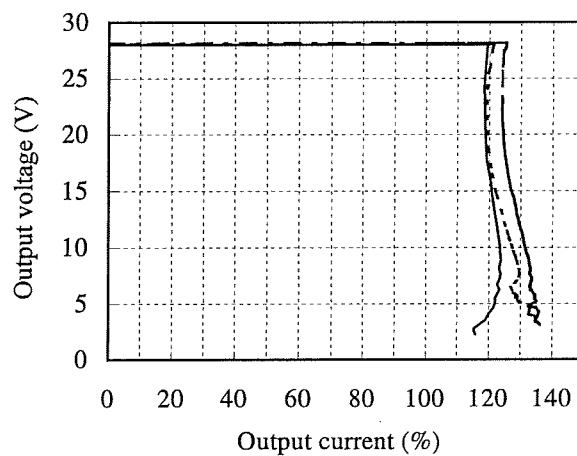
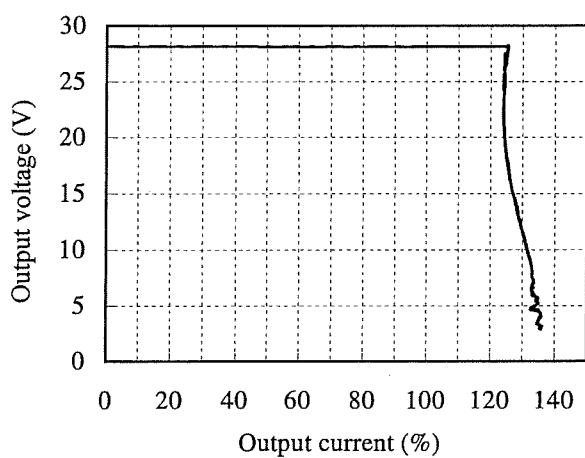
ベースプレート温度依存性

Baseplate temperature dependence

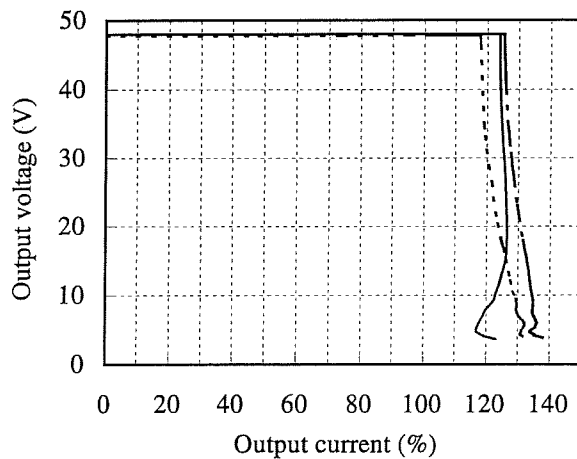
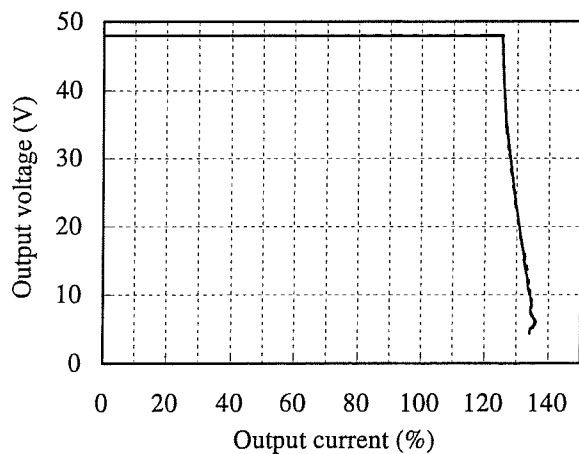
Conditions V_{in} : 100 VAC
 T_{bp} : -40 °C -----
 25 °C - - - - -
 85 °C(12V) ————
 100 °C(28,48V) ————



28V



48V



2.4 過電圧保護特性

Over voltage protection (OVP) characteristics

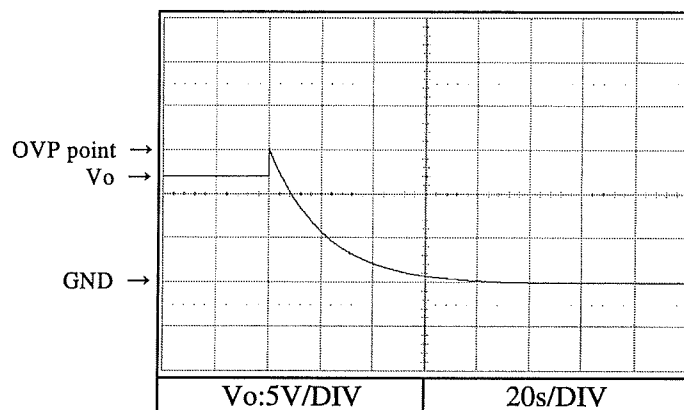
Conditions

Vin : 100VAC

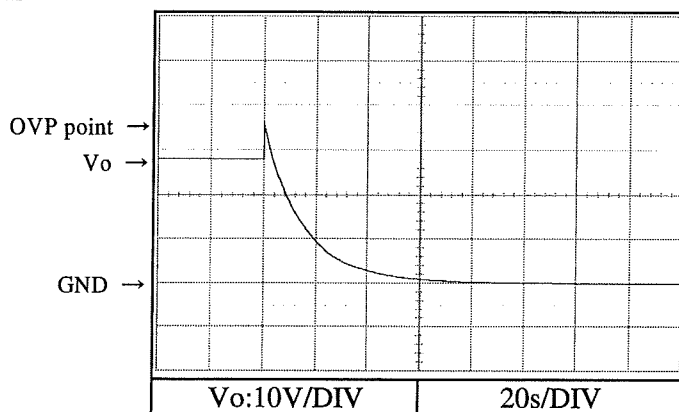
Io : 0%

Tbp : 25°C

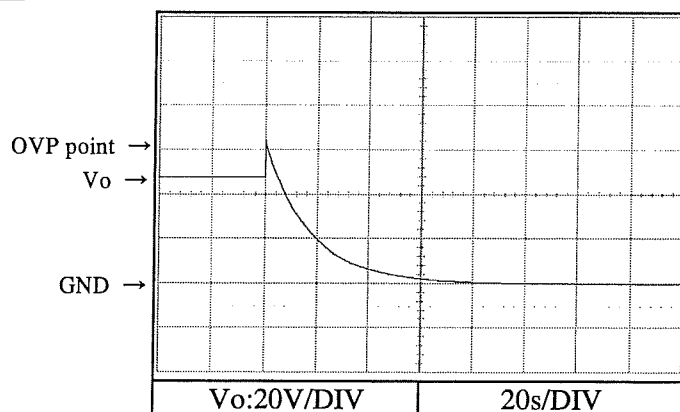
12V



28V



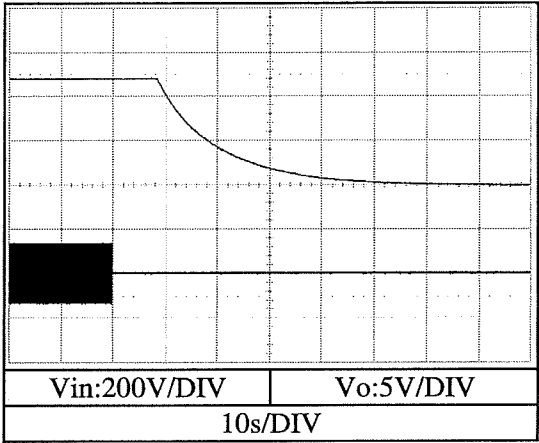
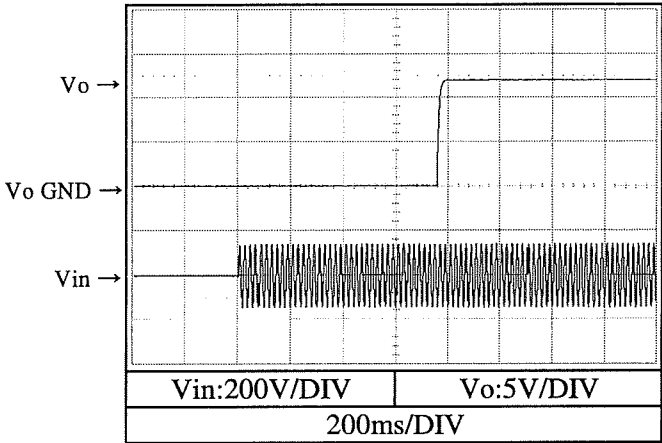
48V



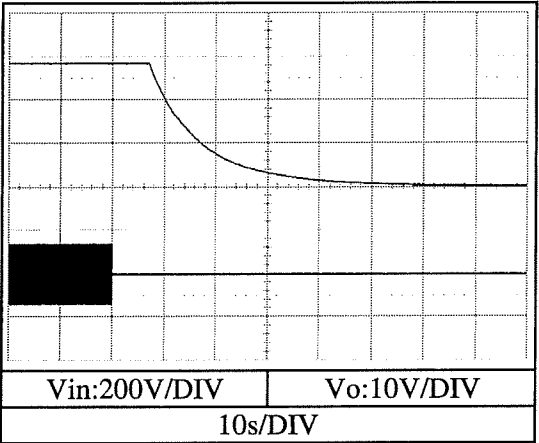
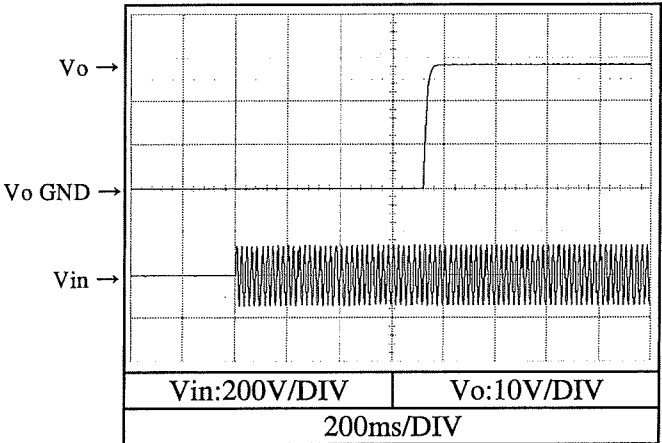
2.5 出力立ち上がり、立ち下り特性
Output rise and fall characteristics

Conditions Vin : 100VAC
Io : 0%
Tbp : 25°C

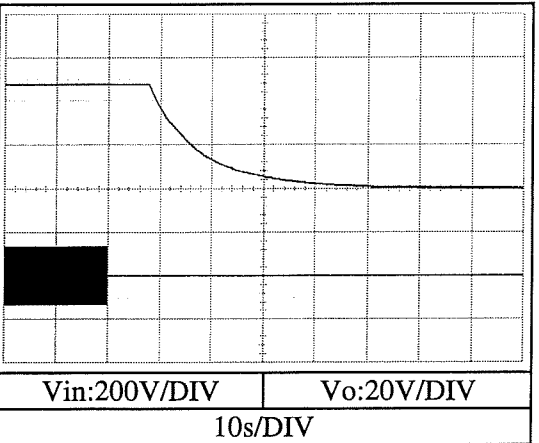
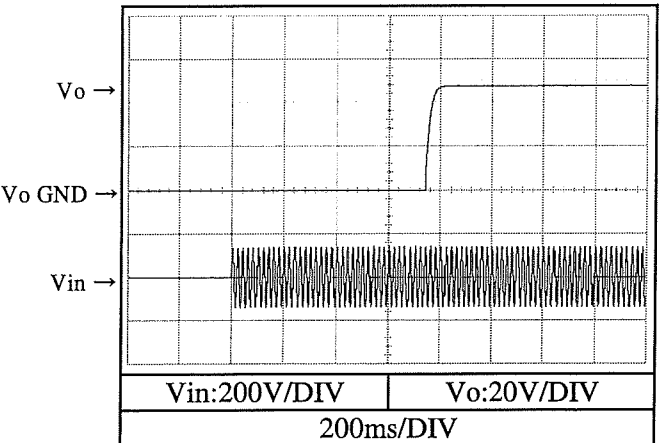
12V



28V



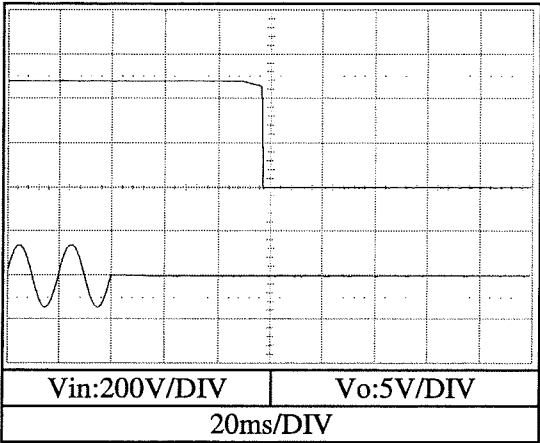
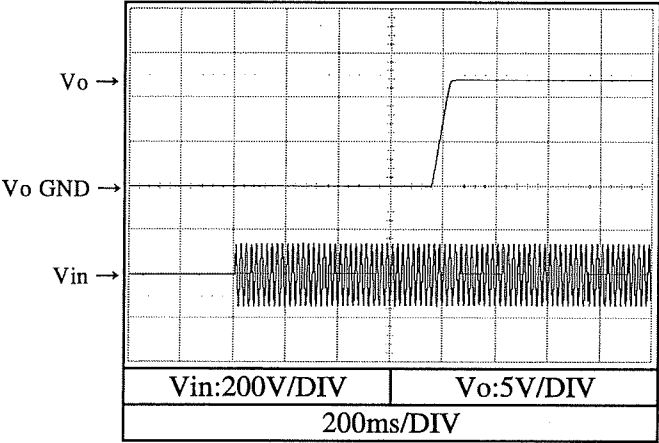
48V



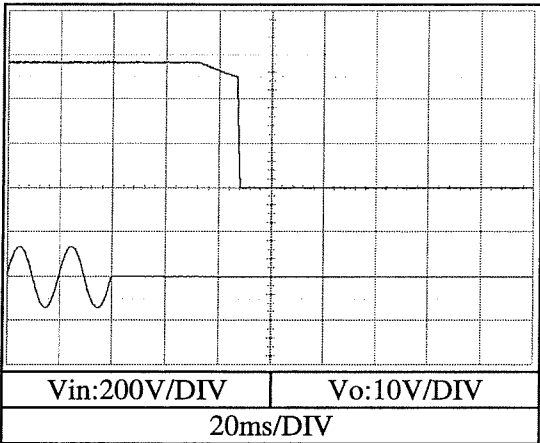
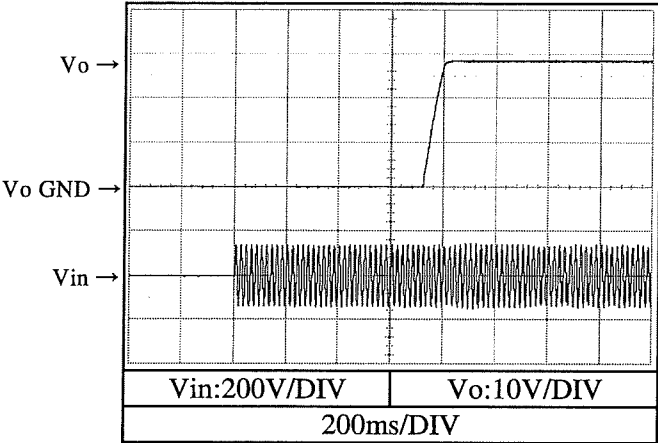
2.5 出力立ち上がり、立ち下り特性
Output rise and fall characteristics

Conditions Vin : 100VAC
Io : 100%
Tbp : 25°C

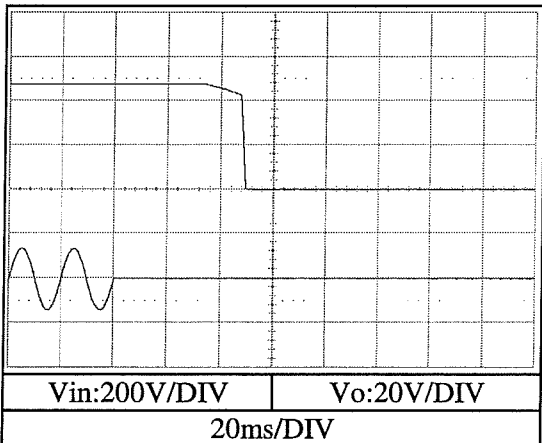
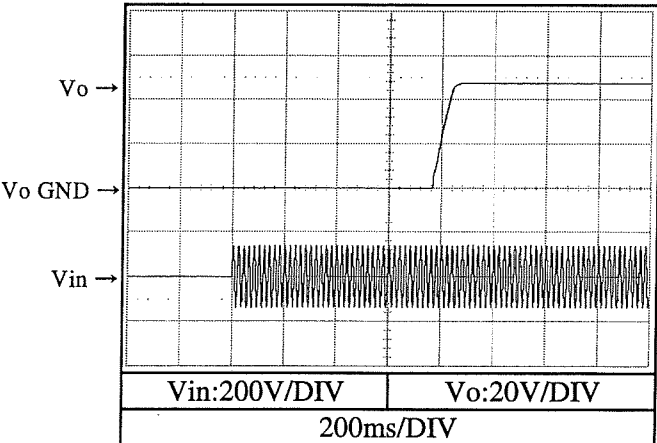
12V



28V



48V



2.5 出力立ち上がり、立ち下り特性 Output rise and fall characteristics

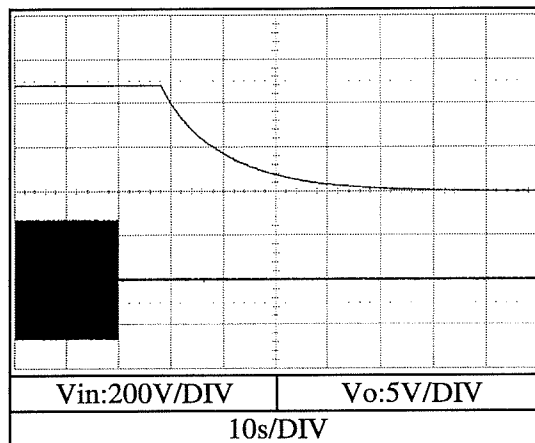
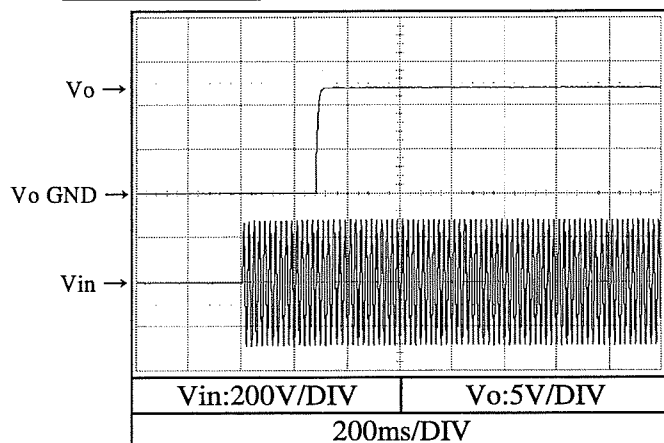
Conditions

Vin : 200VAC

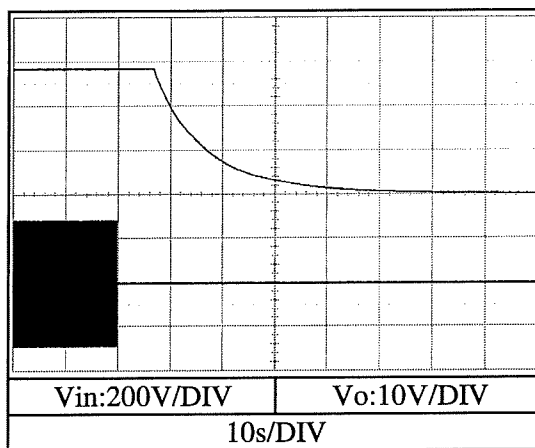
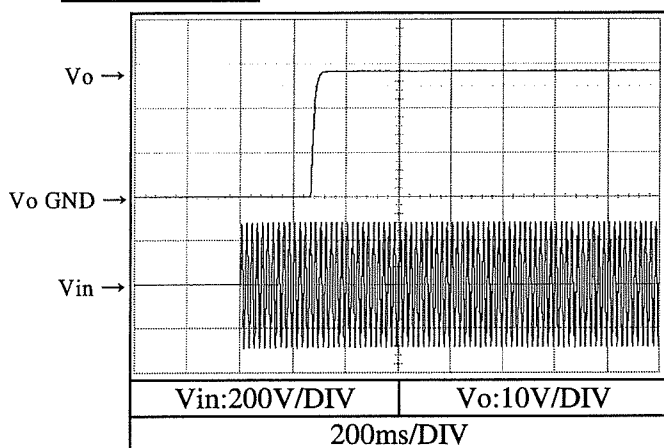
Io : 0%

Tbp : 25°C

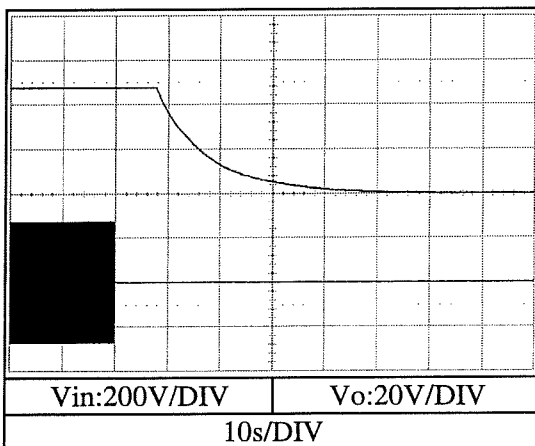
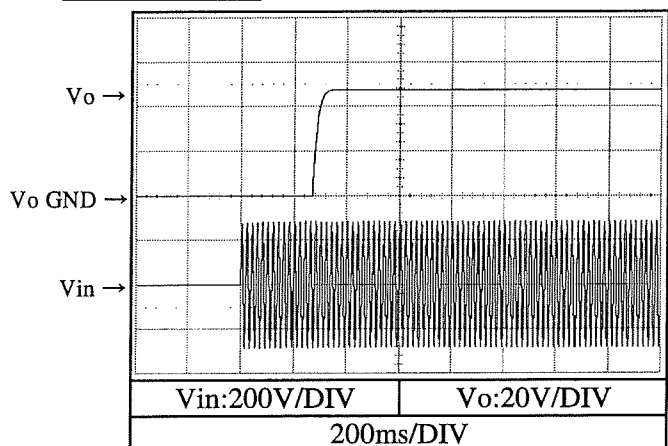
12V



28V



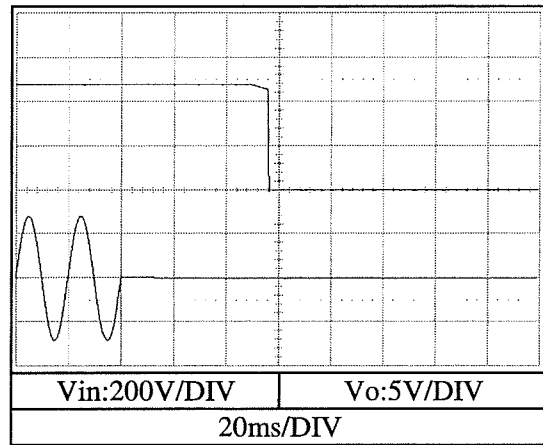
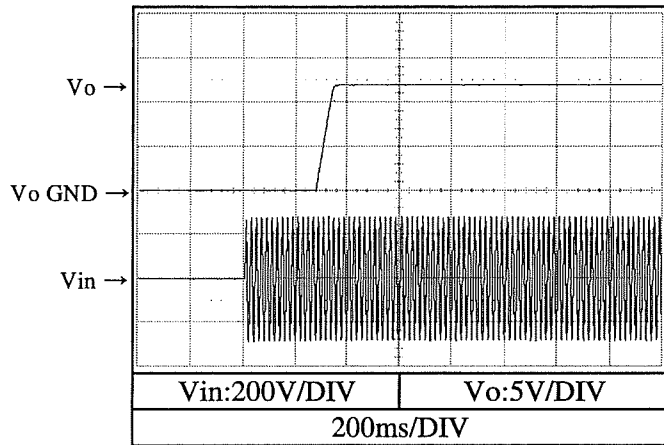
48V



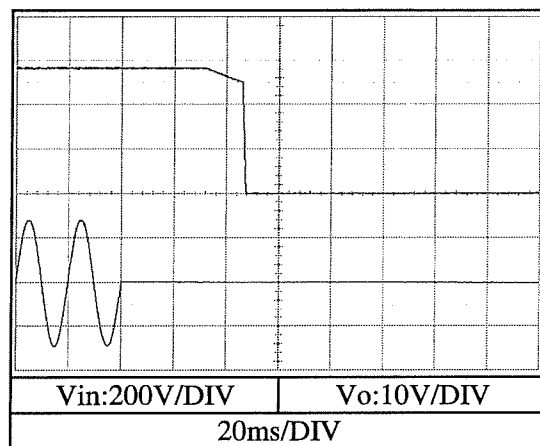
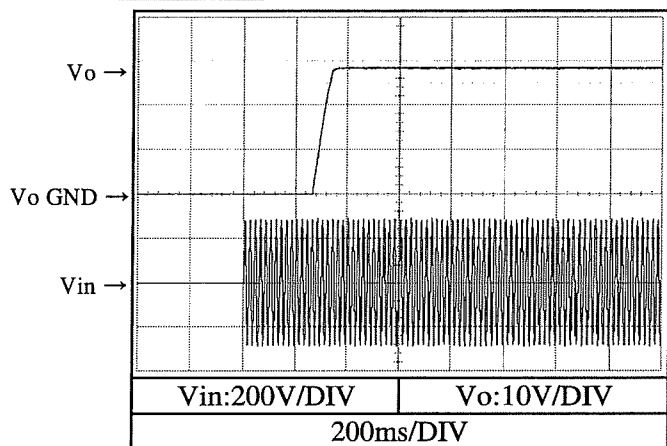
2.5 出力立ち上がり、立ち下り特性
Output rise and fall characteristics

Conditions Vin : 200VAC
Io : 100%
Tbp : 25°C

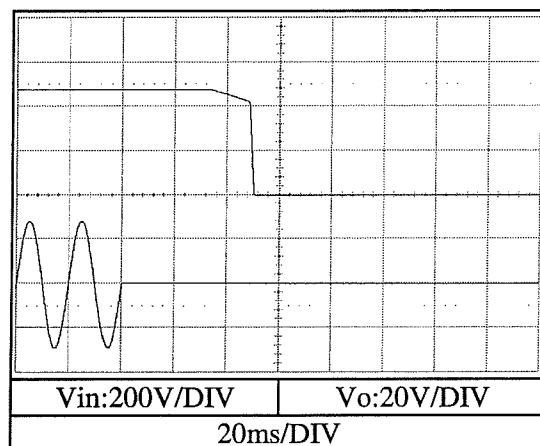
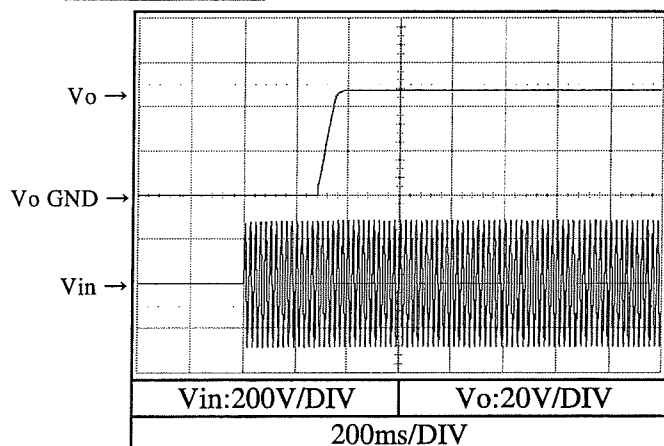
12V



28V



48V

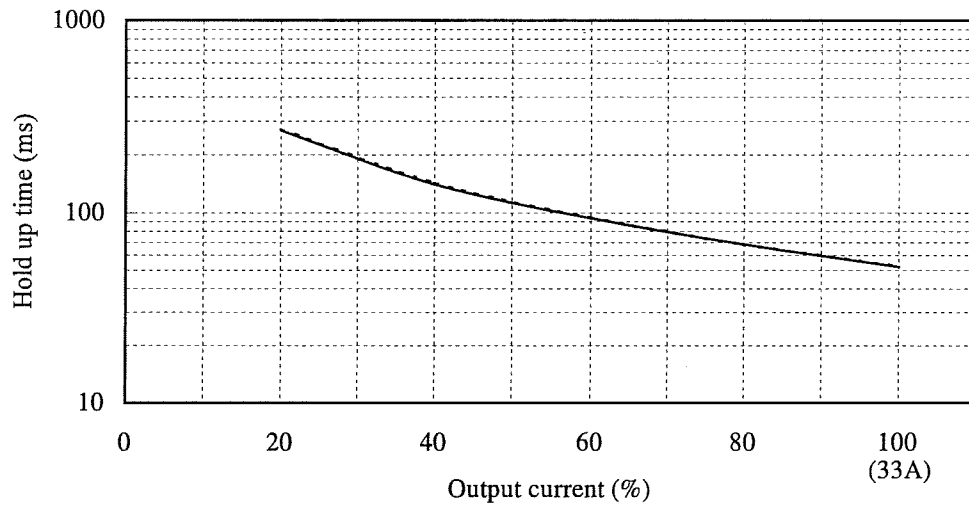


2.6 出力保持時間特性

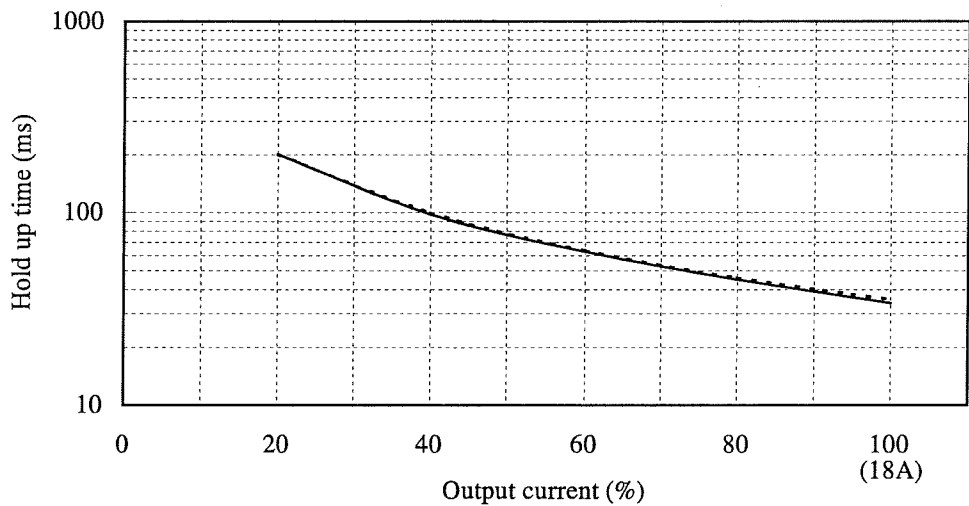
Hold up time characteristics

Conditions Vin : 100 VAC -----
200 VAC ———
Tbp : 25 °C

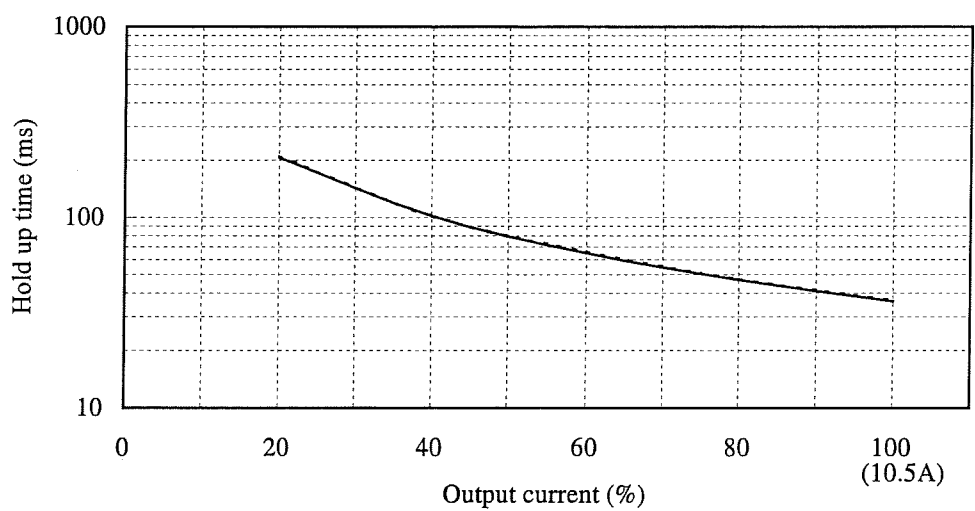
12V



28V



48V



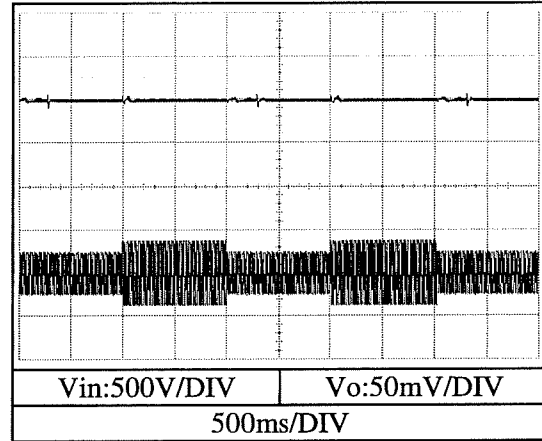
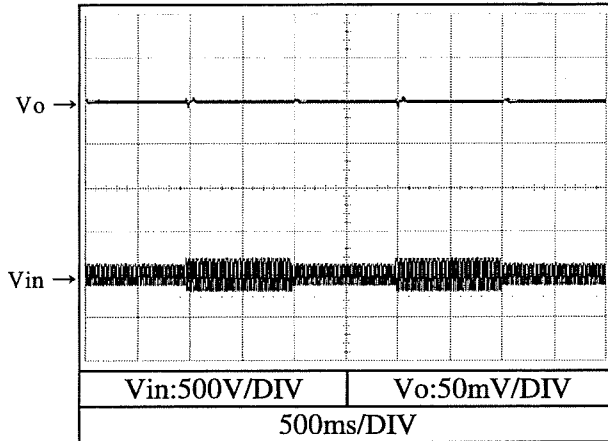
2.7 過渡応答（入力急変）特性

Dynamic line response characteristics

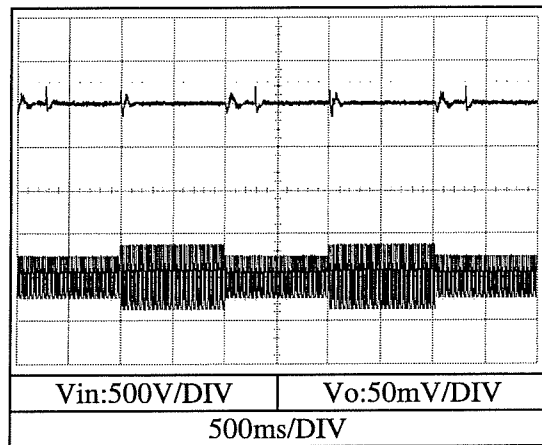
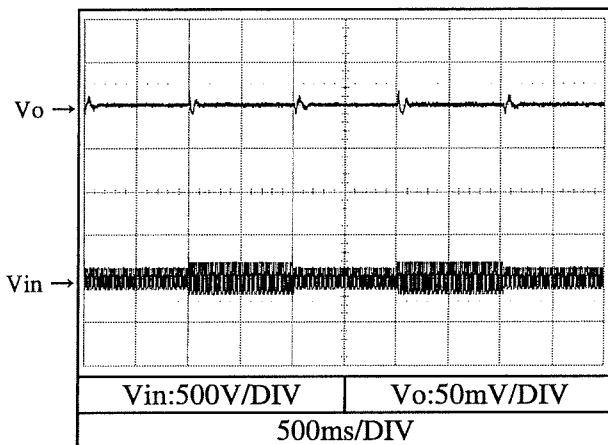
Conditions

 I_o : 100% T_{bp} : 25°CVin:85VAC $\rightleftharpoons$ 130VACVin:170VAC $\rightleftharpoons$ 265VAC

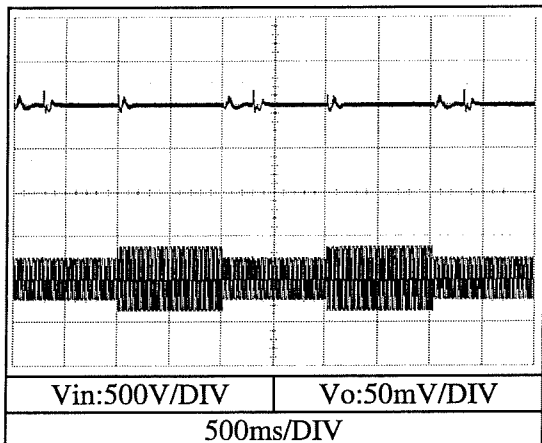
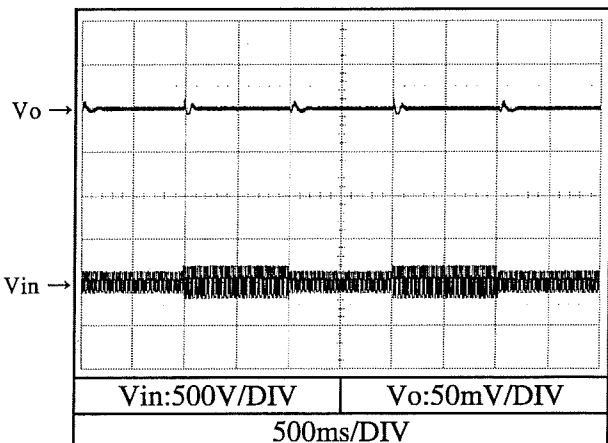
12V



28V



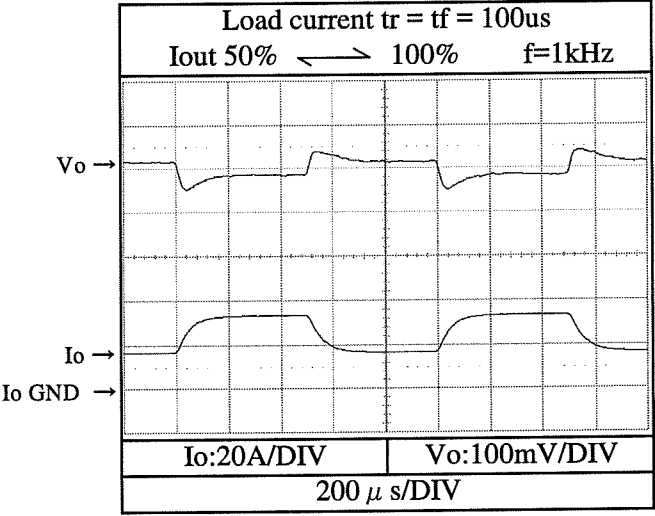
48V



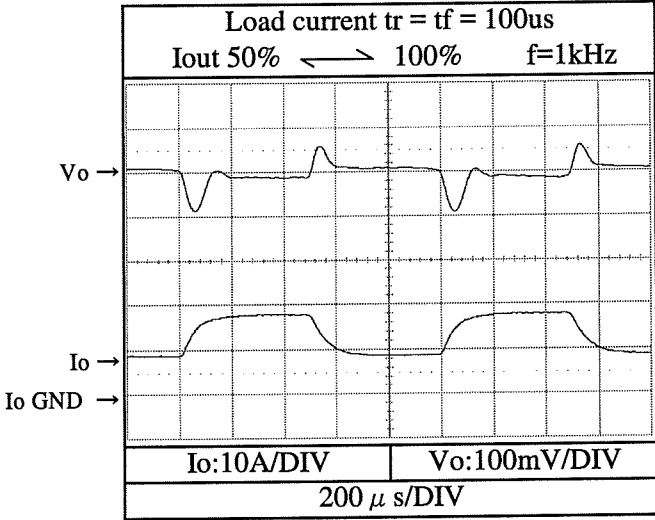
2.8 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions
Vin : 100VAC
Tbp : 25°C

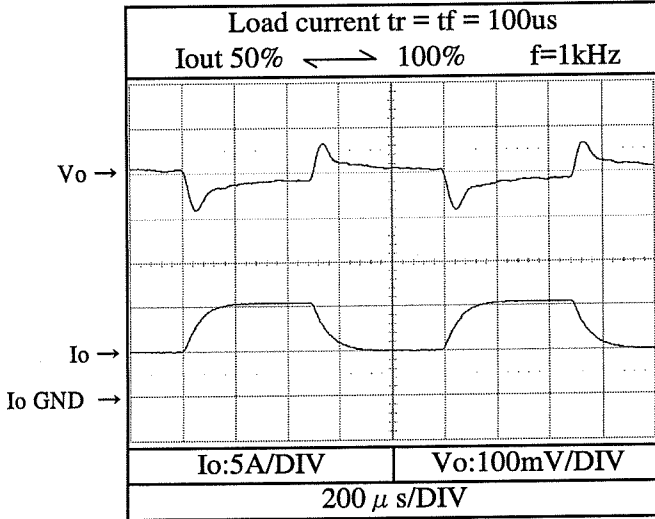
12V



28V



48V



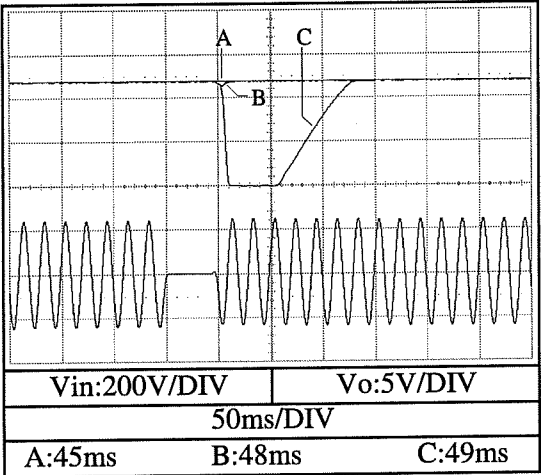
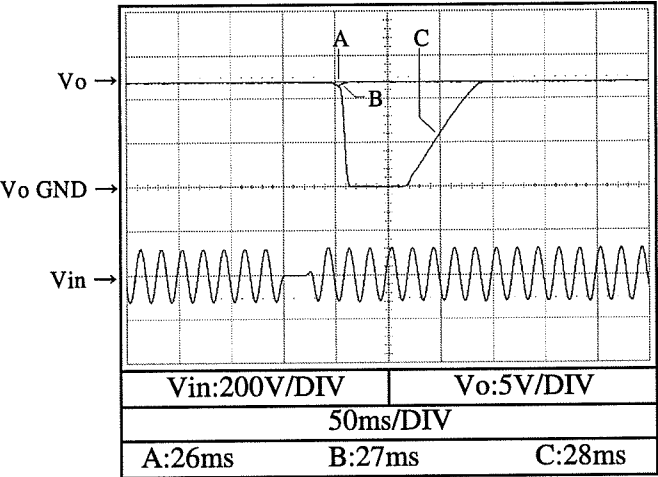
2.9 入力電圧瞬停特性
Response to brownout characteristics

Conditions I_o : 100%
 T_{bp} : 25°C

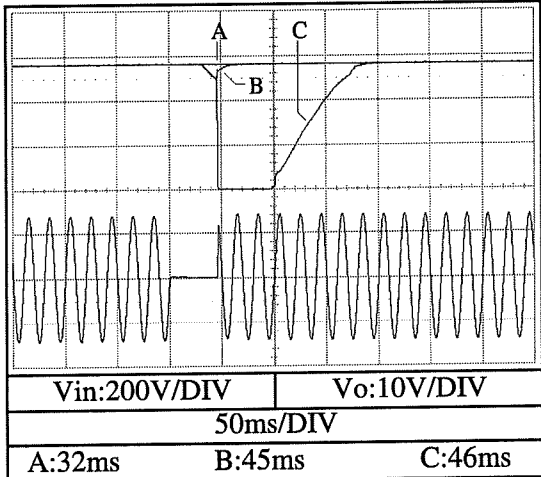
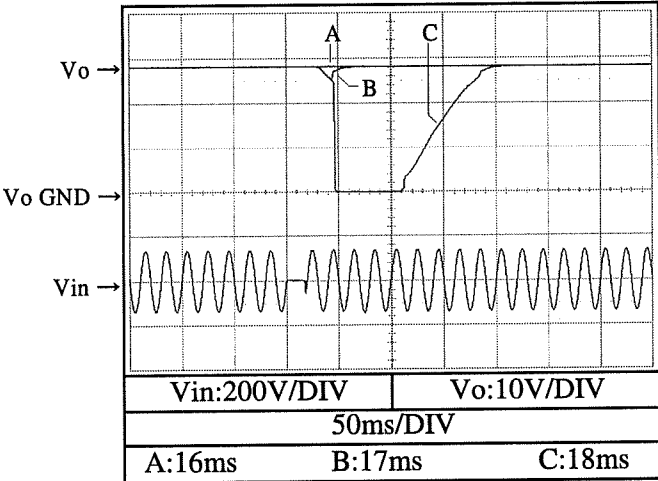
V_{in} : 100VAC

V_{in} : 200VAC

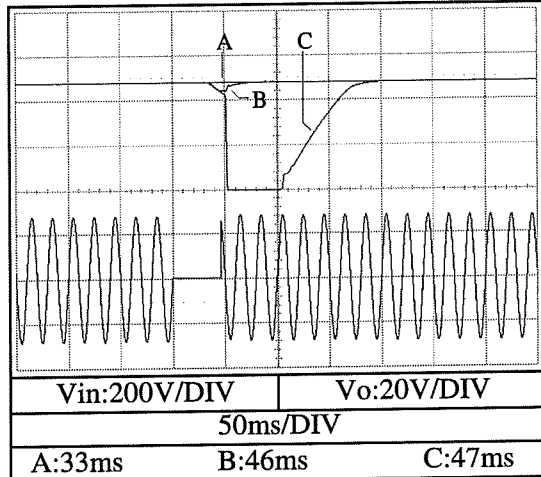
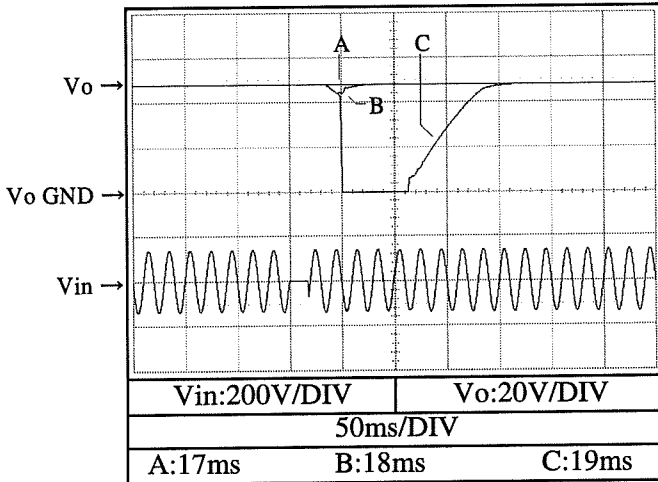
12V



28V

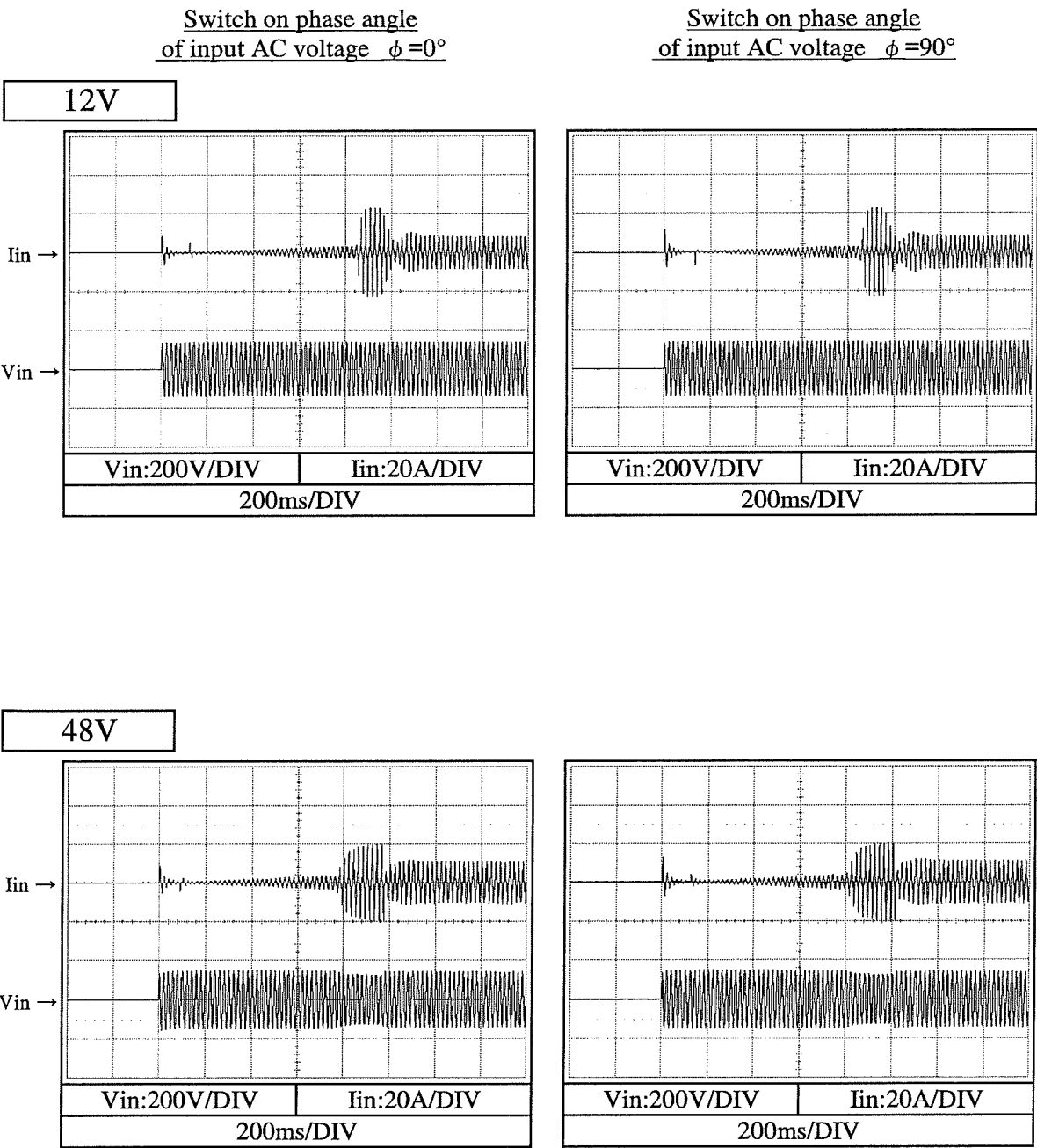


48V



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

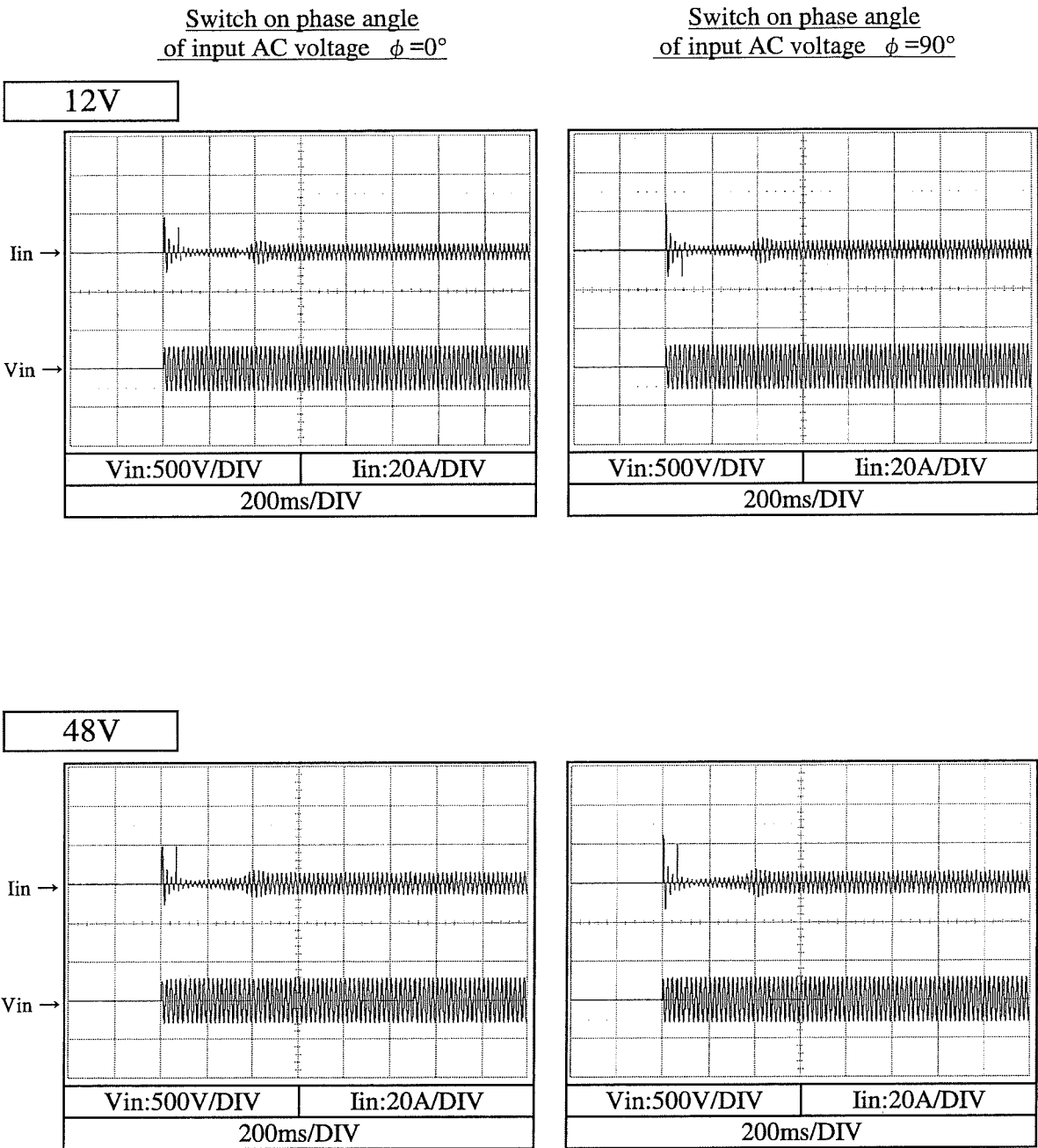
Conditions Vin : 100VAC
Io : 100%
Tbp : 25°C



Note : 28V is same as characteristics of 48V

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

Conditions Vin : 200VAC
Io : 100%
Tbp : 25°C



Note : 28V is same as characteristics of 48V

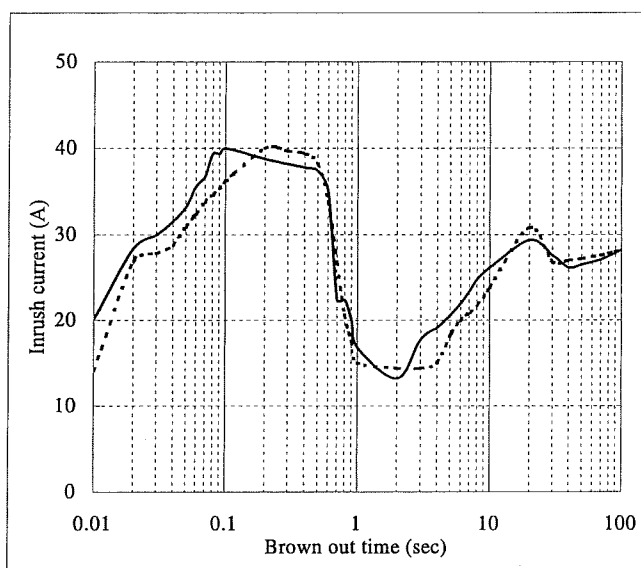
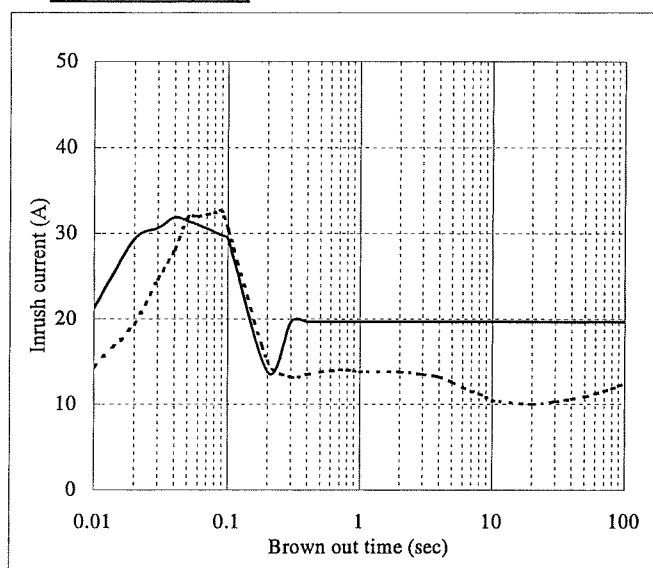
2.11 瞬停時突入電流特性

Inrush current characteristics

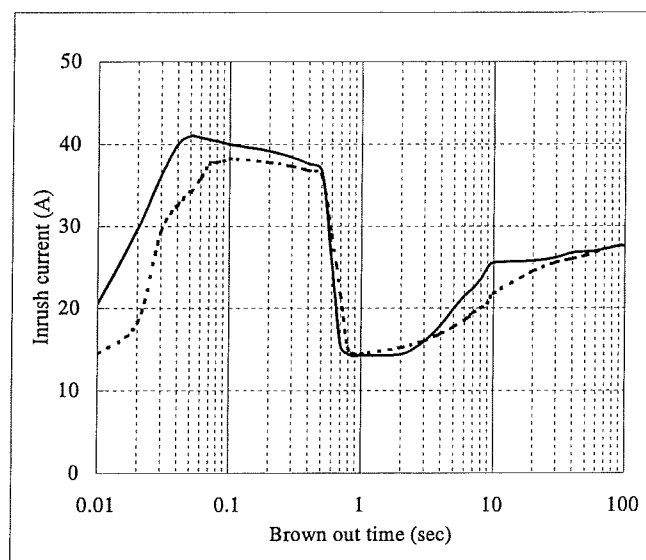
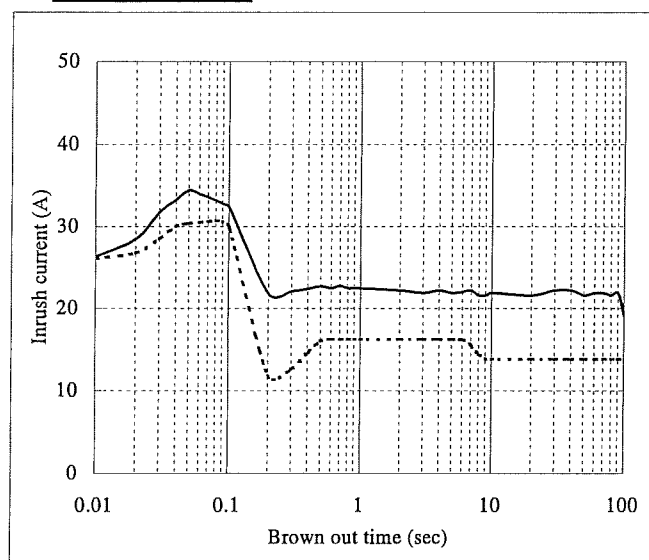
Conditions I_o : 50 % -----
 100 % ————
 T_{bp} : 25 °C

Vin:100VACVin:200VAC

12V



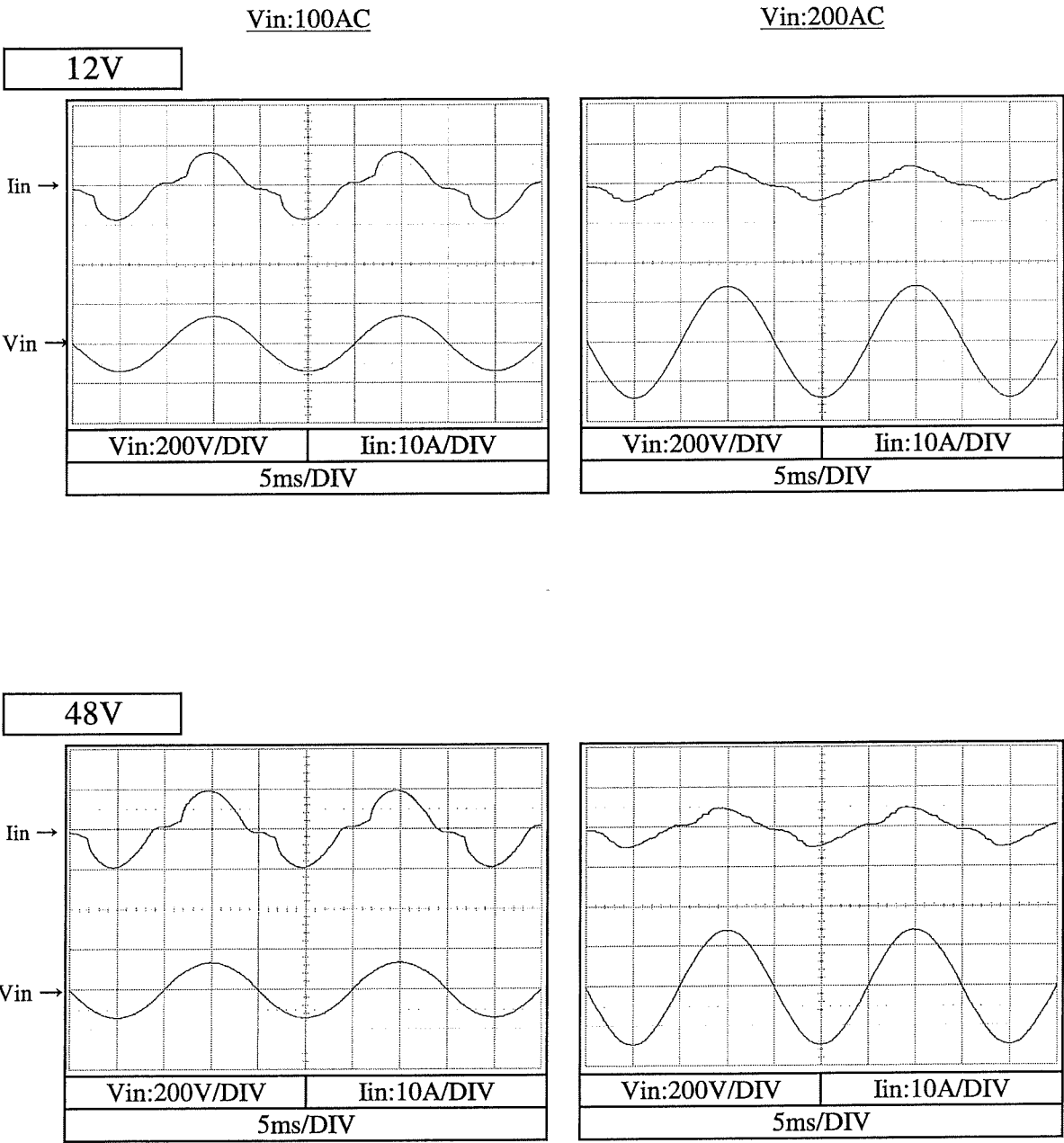
48V



Note : Above data includes secondary inrush current.
 : 28V is same as characteristics of 48V

2.12 入力電流波形
Input current waveform

Conditions I_o : 100%
 T_{bp} : 25°C



Note : 28V is same as characteristics of 48V

2.13 高調波成分

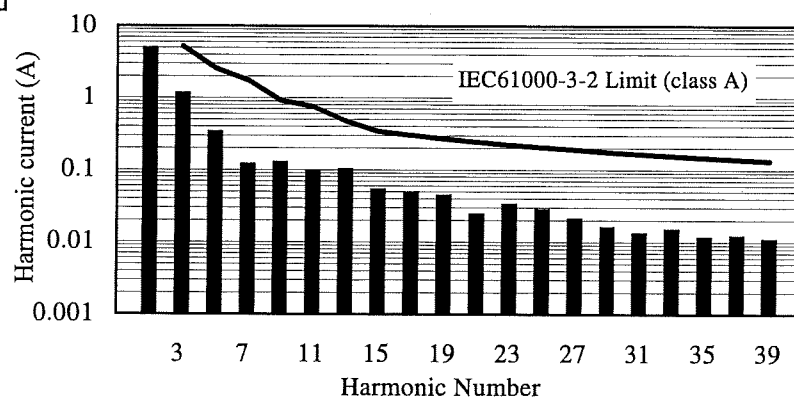
Input current harmonics

Conditions

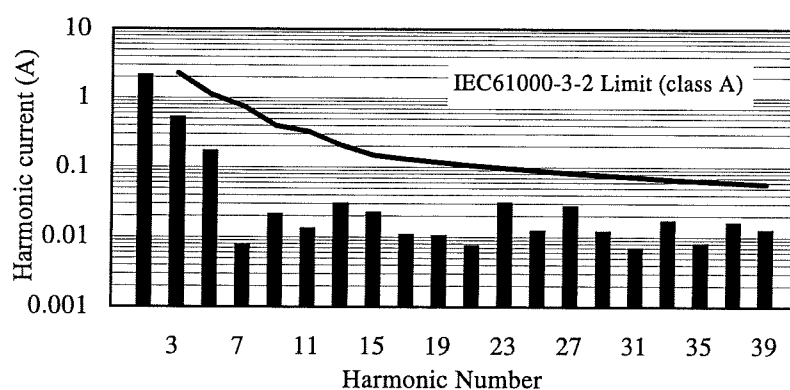
 I_o : 100% T_{bp} : 25°C

12V

Vin:100VAC

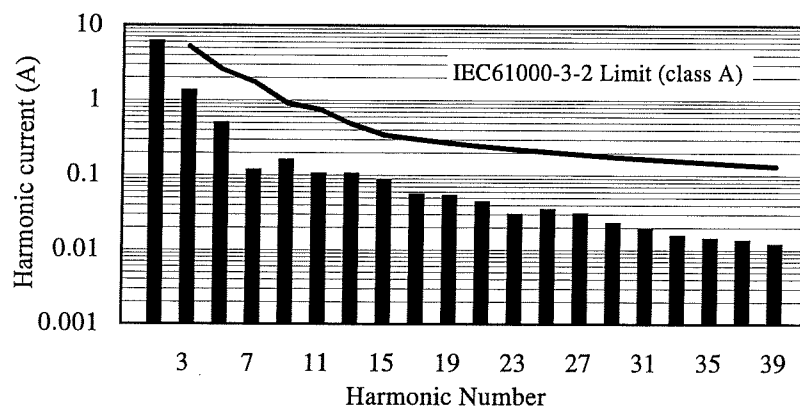


Vin:230VAC

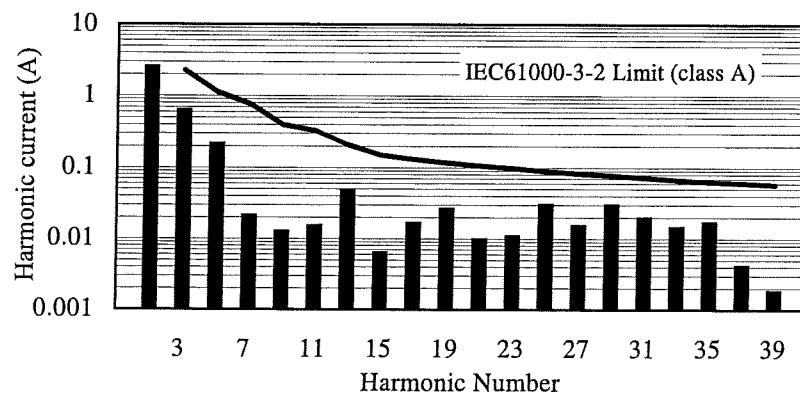


48V

Vin:100VAC



Vin:230VAC



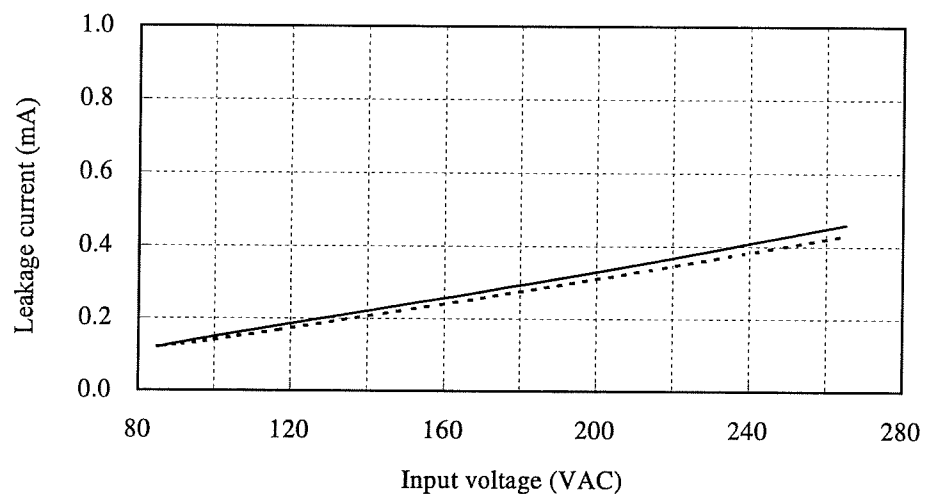
Note : 28V is same as characteristics of 48V

2.14 リーク電流特性

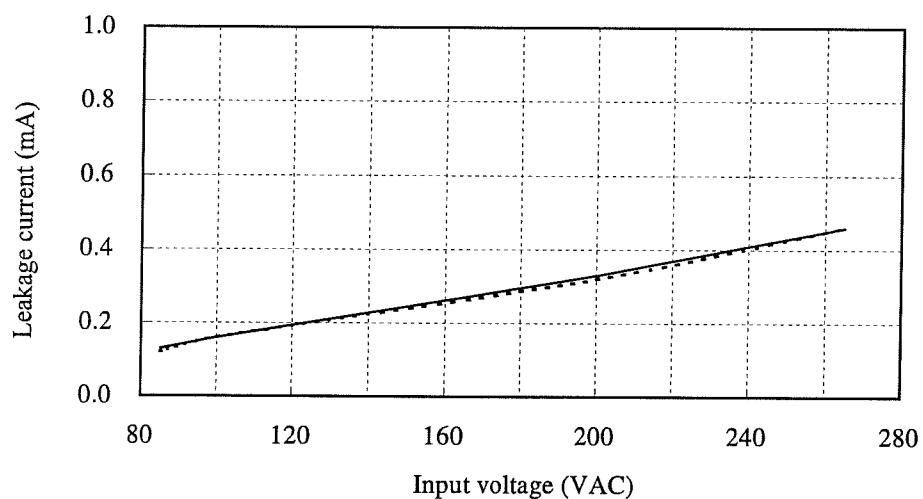
Leakage current characteristics

Conditions I_o : 0 % -----
 100 % ————
 T_{bp} : 25 °C
 f : 50 Hz
 Equipment used : MODEL 229-2
 (Simpson)

12V



48V



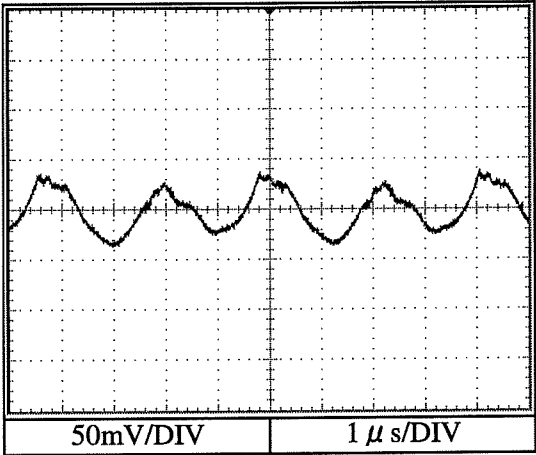
Note : 28V is same as characteristics of 48V

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

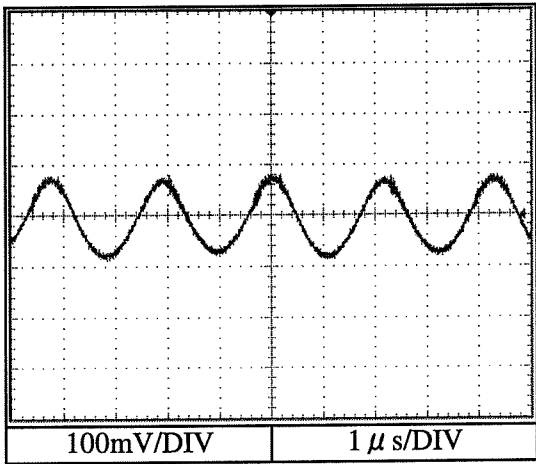
Conditions

Vin : 100VAC
Io : 100%
Tbp : 25°C

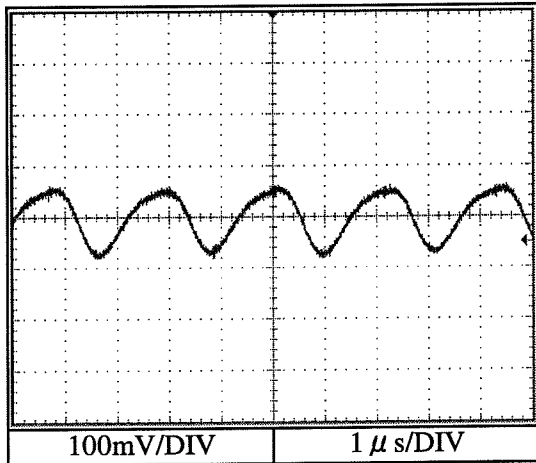
12V



28V



48V



2.16 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

Vin : 100VAC

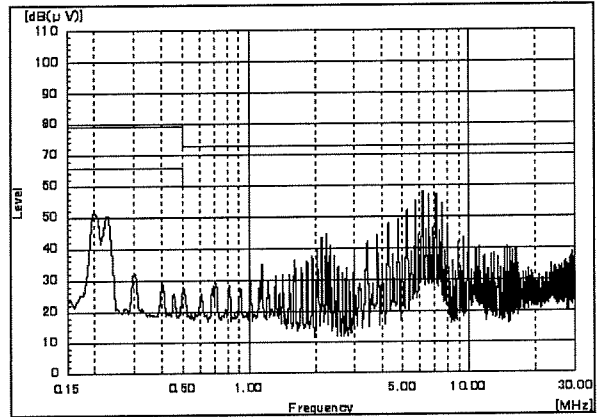
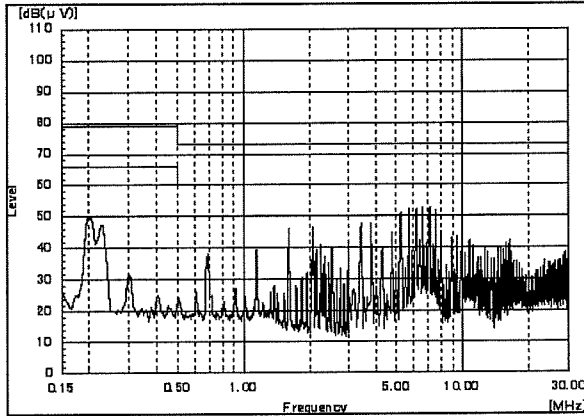
Io : 100%

Tbp : 25°C

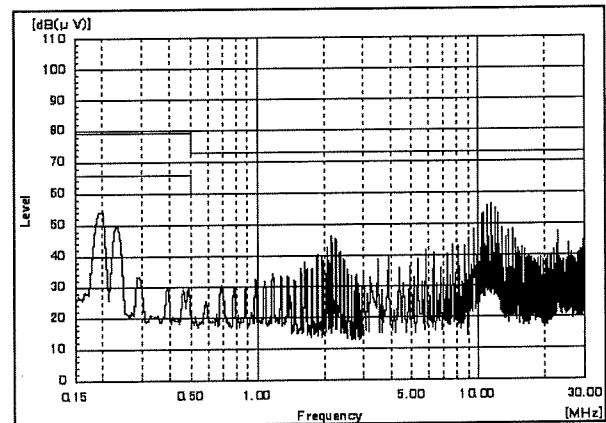
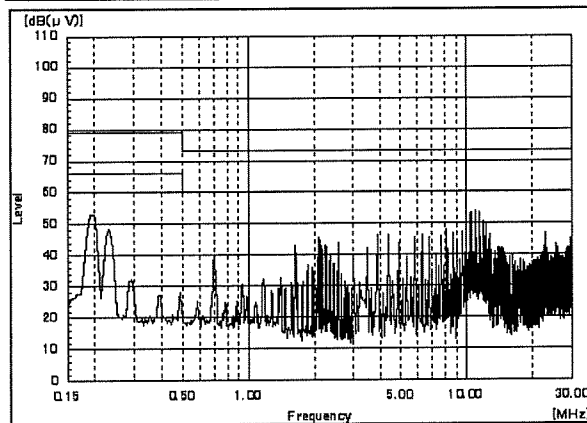
Phase:N

Phase:L

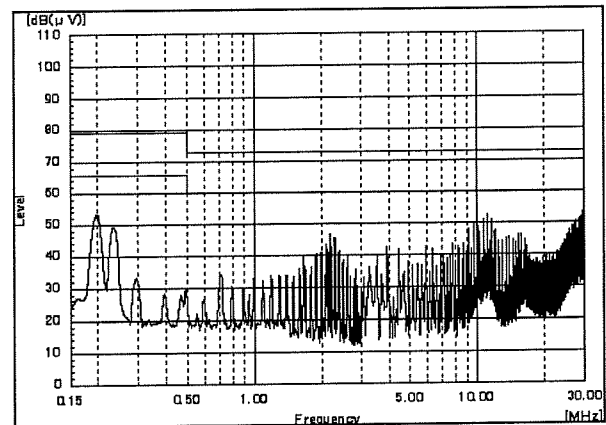
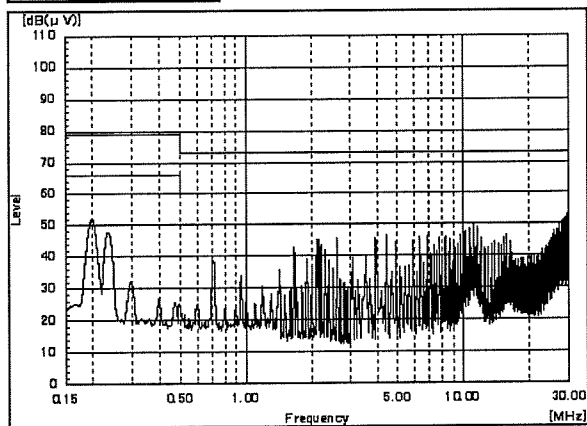
12V



28V



48V



2.16 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

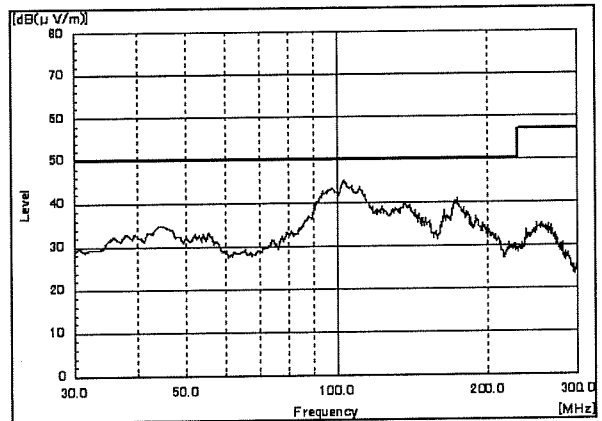
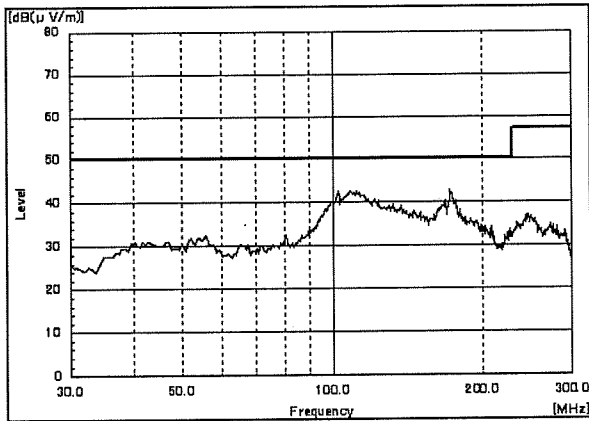
Vin : 100VAC

Io : 100%

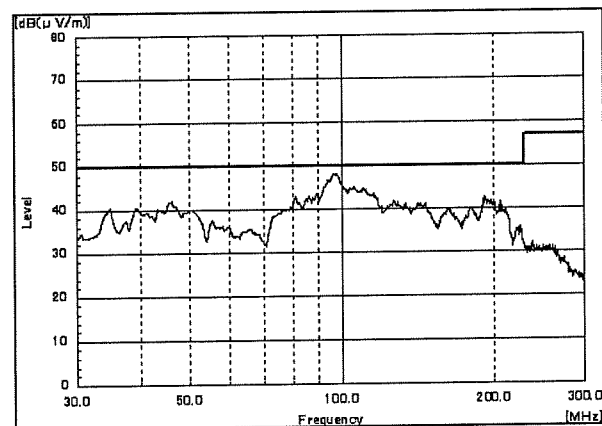
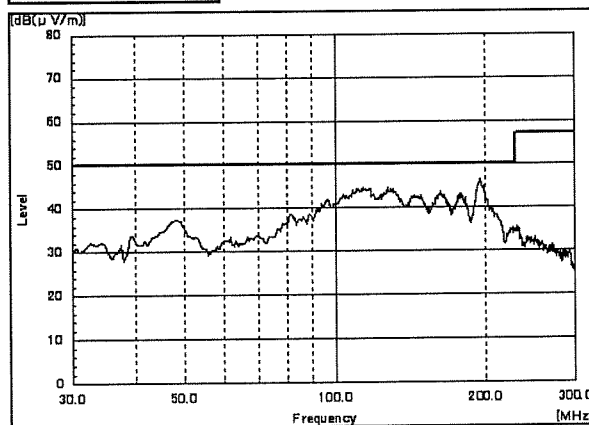
Tbp : 25°C

HORIZONTALVERTICAL

12V



28V



48V

