PF500A-360

Evaluation Data

型式データ

DWG. No. C108-53-01A

DENSEI-LAMBDA

I N D E X

PAGE

使用記号 Terminology used

	定義 Definition
Vin	入力電圧 Input voltage
Vout	出力電圧 Output voltage
Iin	入力電流 Input current
Iout	出力電流 Output current
f	周波数 Frequency
Po	出力電力(最大出力電力) Output power(Maximum Output power)
Tp	ベースプレート温度 Base-plate temperature

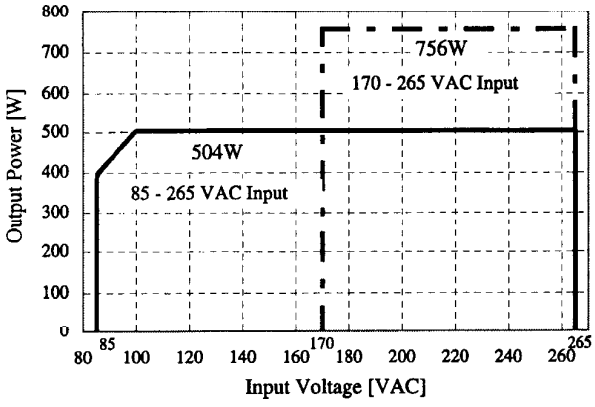
1. 仕様書 Specification

	ITEMS / MODEL			PF500A-360		REV
1	Nominal Output Voltage		V	360		
2	Nominal Input Voltage		V	100 - 240 VAC	200 - 240 VAC	
3	Available Input Voltage Range	(*7)	V	85 - 265 VAC	170 - 265 VAC	
4	Input Voltage Range with PFHC	(*10)	V	85 - 255 VAC	170 - 255 VAC	
5	Maximum Output Current		A	1.4	2.1	
6	Maximum Output Power		W	504	756	
7	Efficiency (Typ.)	(*1)	%	90	94	
8	Input Frequency	(*3)	Hz	47 - 63		
9	Input Current (Typ.)	(*1)	A	5.6	4.0	
10	In-rush Current (Typ)	(*2,9)	A	30 / 60 A peak		
11	Power Factor (Min.)	(*1)	-	0.95		
12	Output Voltage Accuracy		%	±2		
13	Maximun Ripple Voltage	(*2,9)	V	20 Vp-p		
14	Maximum Line Regulation	(*4)	V	5		
15	Maximum Load Regulation	(*5)	V	10		
16	Over-Voltage Protection	(*6)	V	390 - 420		
17	Over-Temperature Protection	(*6)	°C	100 ± 15		
18	Auxiliary Voltage		V	12 - 20		
19	Auxiliary Current (Max.)		mA	10		
20	Parallel Operation	(*9)	-	Possible		
21	Series Operation		-	Not Possible		
22	Ararm Signal	(*9)	-	IOG (Inverter Oparation Good) Signal		
23	Function Signals	(*9)	-	ENA (Enable), PC (Parallel Control)		
24	Operating Temperature		°C	-20°C - +85°C for the Baseplate , -20°C Min. for the Ambient		
25	Operating Humidity		%RH	30 - 95 %RH (No Dewdrop)		
26	Storage Temperature		°C	-40°C - + 85°C		
27	Storage Humidity		%RH	10 - 95 %RH (No Dewdrop)		
28	Cooling	(*8,9)	-	Conduction Cooled		
29	Temperature Coefficient		-	0.02 %/°C		
30	Withstand Voltage		kV	Terminal Pins - Baseplate : 3kVAC for 1min with 20mA Limit		
31	Isolation Resistance		MΩ	More than 100MΩ at 25°C, 70%RH with 500V applying		
32	Allowable Vibration		- -	Sweep for 1minute on 10-55Hz Frequency, with 0.825mm Constant Amplitude (G=49.0m/s² Max.), each 1hour for X,Y,Z direction		
33	Allowable Shock		-	196.1m/s² in the Paper Package		
34	Weight (Typ.)		g	250		
35	Size (W.xH.xD.)		mm	146 x 12.7 x 86 (Refer to the Outline Drawing)		

= NOTES =

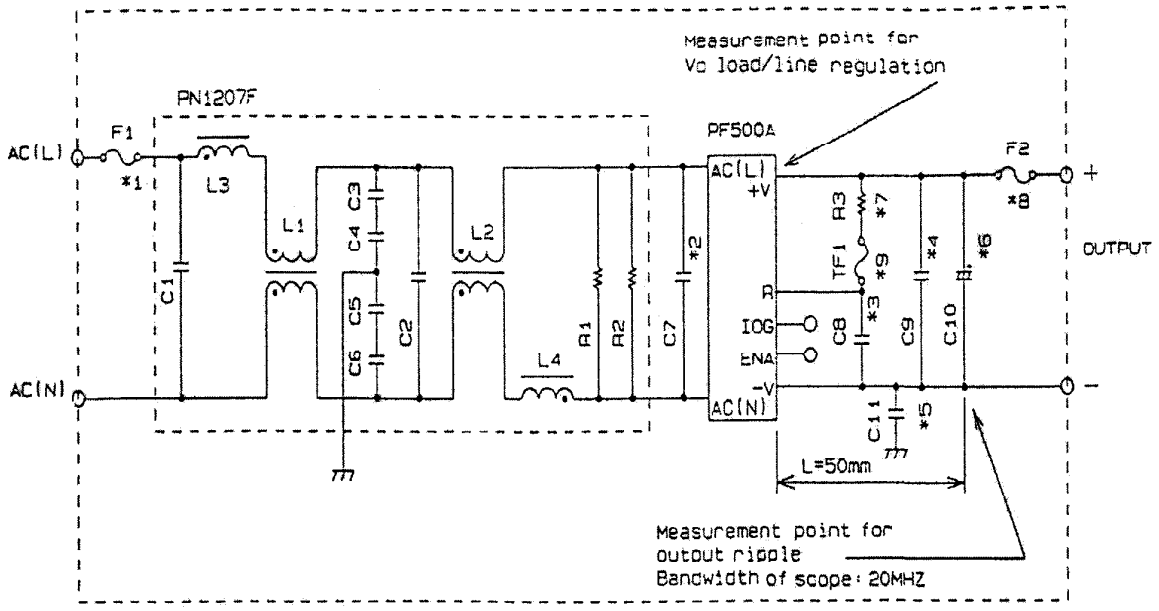
*1. At 100VAC/200VAC and Maximum Output Power.
*2. Additional Output capacitor, Fuse and In-rush Current Limit Resistor are required.
*3. For cases where conformance to various safety specs (UL, CSA, IEC) are required, to be described as 50/60 Hz on the name plate.
*4. At input range with PFHC operation, with constant load.
*5. No-Load to Full Load, with constant input voltage.
*6. Inverter Shut-down Method with Manual reset which is to cut off input voltage and cool baseplate temperature.
*7. Ratings - Refer to the Derating Curve on the right.
*8 Heatsink has to be Chosen according to Instruction Manual.
*9. Refer to Instruction Manual for details.
*10. PFHC Range. At 255 - 265 VAC, This module operates as a rectifier.
*11. Refer to T-2 for the Test Circuit.

PF500A-360 Derating Curve
at 85°C Baseplate Temperature



2．評価測定方法　Evaluation Method

2. 1 基本回路　Standard application circuit

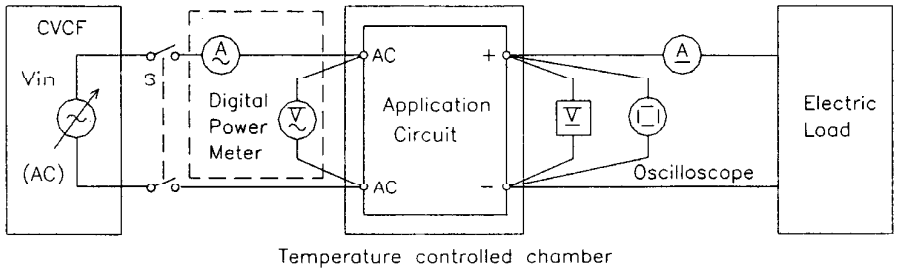


C1	AC250V	0.47uF	C9	630V	0.47uF
C2	AC250V	1.5uF	C10	450V	220uFx3
C3	AC250V	10000pF	C11	AC400V	4700pF
C4	AC250V	10000pF	F1	AC250V	10A
C5	AC250V	10000pF	F2	DC500V	3A
C6	AC250V	10000pF	TF1	THERMAL FUSE	
C7	AC250V	1uFX2		130°C	250V 2A
C8	630V	0.82uF			

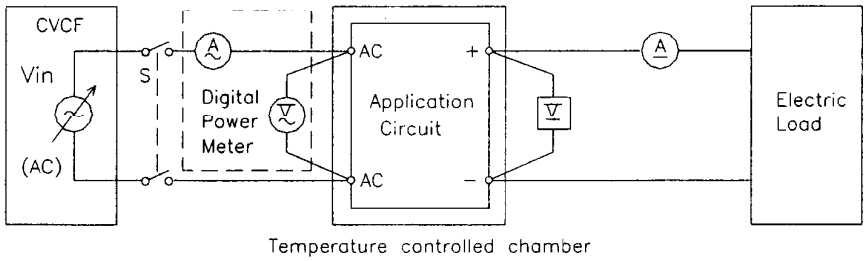
L1	2.8mHx2	
L2	2.8mHx2	
L3	150uH	
L4	150uH	
R1	1/2W	470kohm
R2	1/2W	470kohm
R3	10W	5.1ohm

2. 2 測定回路 Measurement Circuit

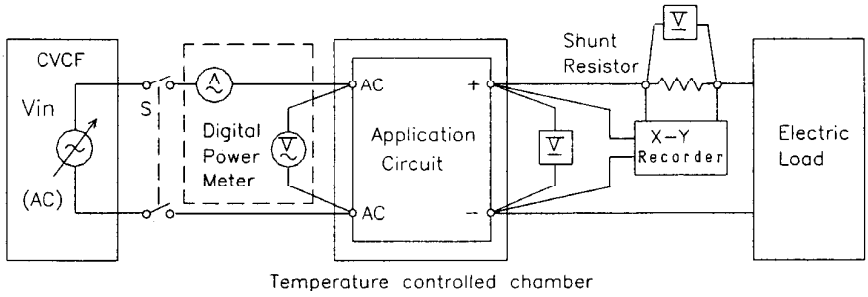
(1) 静特性 Steady state data



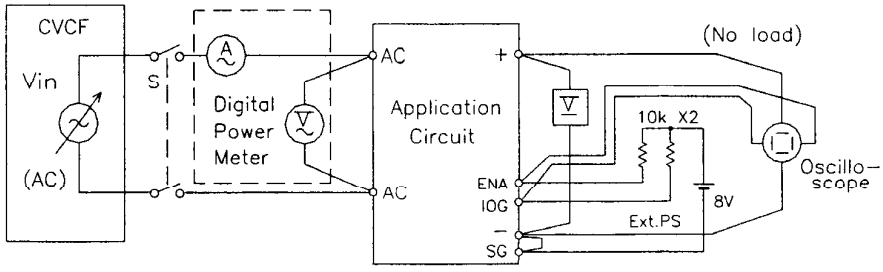
(2) 通電ドリフト特性 Warm up voltage drift characteristics



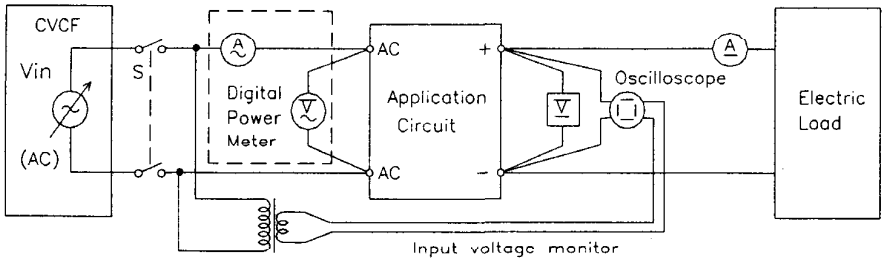
(3) 電流制限特性 Current limit characteristics



(4) 過電圧保護特性 Over voltage protection (O.V.P.) characteristics



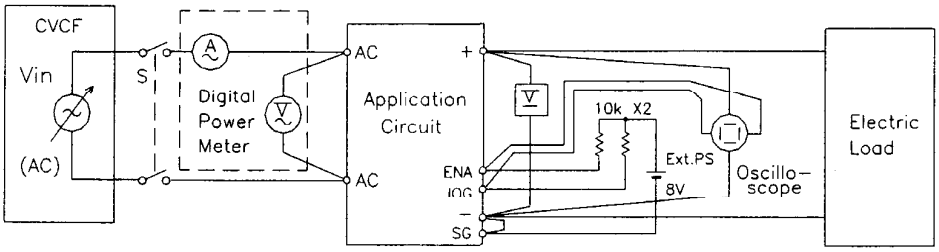
(5) 出力立ち上がり特性　Output rise characteristics



(6) 出力立ち下がり特性　Output fall characteristics

上記(5)と同じ　Same as (5) above

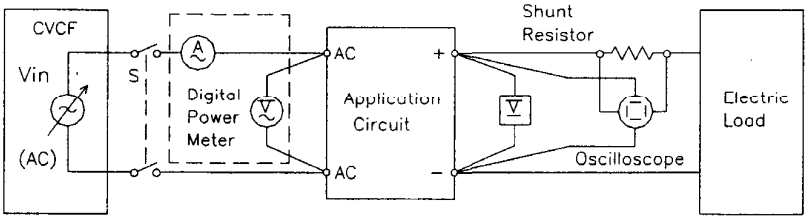
(7) ＩＯＧ・ＥＮＡ 信号対出力電圧　IOG & ENA signal vs. output voltage



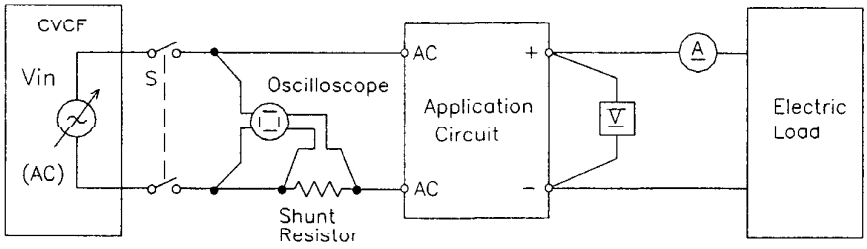
(8) 過渡応答（入力急変）特性　Dynamic line response characteristics

上記(5)と同じ　Same as (5) above

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



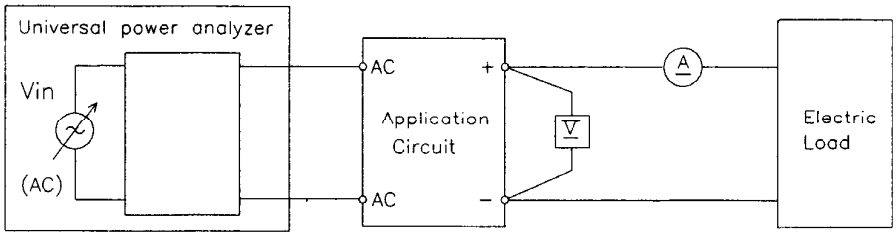
(10) 入力サージ電流（突入電流）特性　Inrush current characteristics



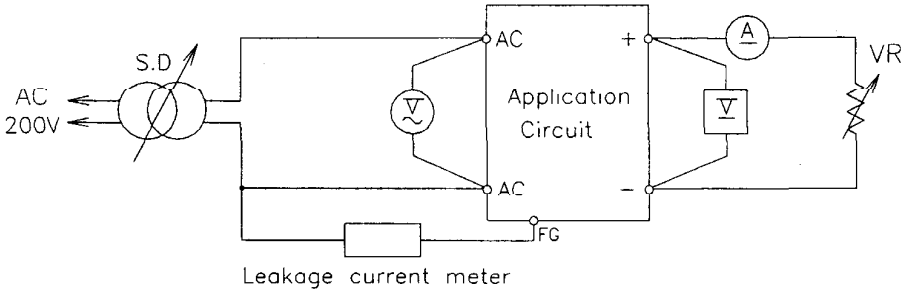
(11) 入力電流波形　Input current waveform

上記(9)と同じ　Same as (9) above

(12) 入力電流高調波成分　Input current hermonics



(13) リーク電流特性　Leakage current characteristics



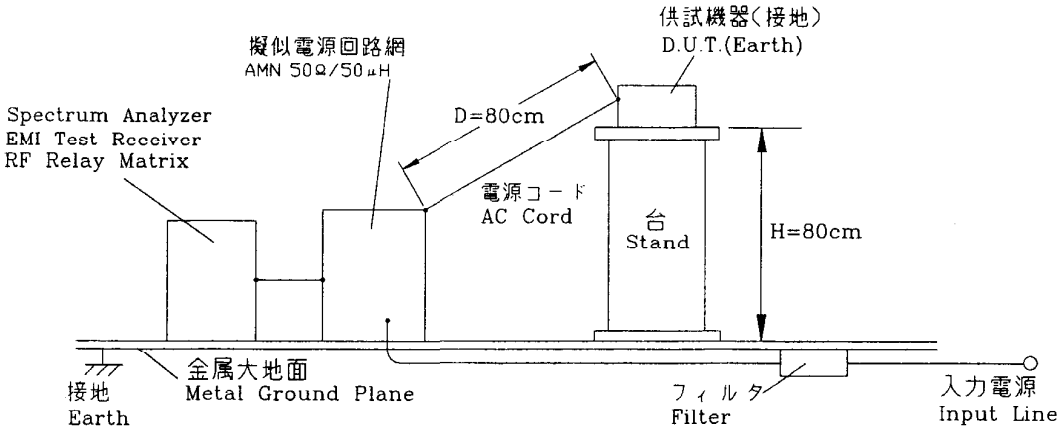
NOTE : Leakage current measured through a 1k ohm resistor.
Range used---AC+DC (For YOKOGAWA TYPE 3226)

(14) ＥＭＩ特性

Electro-Magnetic Interference characteristics

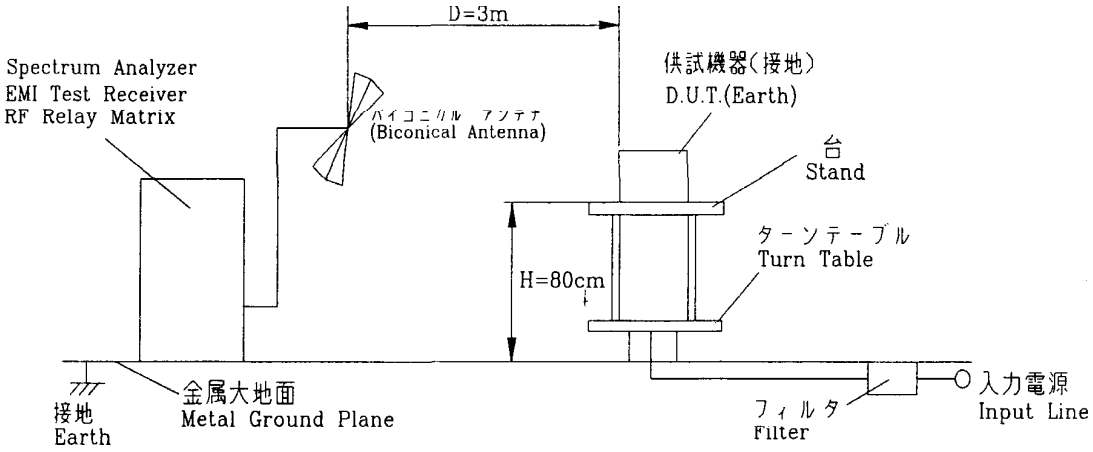
(a) 雑音端子電圧（帰還ノイズ）

Conducted Emission Noise



(b) 雑音電界強度（輻射ノイズ）

Radiated Emission Noise



2.3 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	OSCILLOSCOPE	TEKTRONIX	2465B
2	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS540B
3	DIGITAL MULTIMETER	YOKOGAWA ELECT.	7544
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110
5	SHUNT RESISTOR	YOKOGAWA ELECT.	2215
6	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503
7	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000H
8	CVCF	KIKUSUI	PCR2000L
9	LEAKAGE CURRENT METER	YOKOGAWA	TYPE3226
10	X-Y RECORDER	GRAPHTEC	WX3000
11	CONTROLLED TEMP. CHAMBER	TABAI ESPEC	SU-240

3. 特性データ　Characteristics

3. 1 静特性　Steady state data

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

360V　　Po=504W

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

Iout \ Vin	85VAC	100VAC	200VAC	255VAC	line regulation	
0%	360.6V	360.6V	360.6V	360.7V	0.1V	0.03%
50%	360.5V	360.5V	360.6V	360.7V	0.2V	0.06%
100%	360.3V	360.4V	360.6V	360.6V	0.4V	0.11%
load	0.3V	0.2V	0.1V	0.1V		
regulation	0.08%	0.06%	0.03%	0.03%		

2. Temperature drift　　Conditions Vin : 100VAC
Iout : 100%

Tp	-20 °C	+25 °C	+85 °C	temperature stability	
Vout	360.6V	360.4V	359.9V	0.7V	0.19%

360V　　Po=756W

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

Iout \ Vin	170VAC	200VAC	255VAC	line regulation	
0%	360.6V	360.6V	360.7V	0.1V	0.03%
50%	360.6V	360.6V	360.7V	0.1V	0.03%
100%	360.5V	360.5V	360.6V	0.1V	0.03%
load	0.1V	0.1V	0.1V		
regulation	0.03%	0.03%	0.03%		

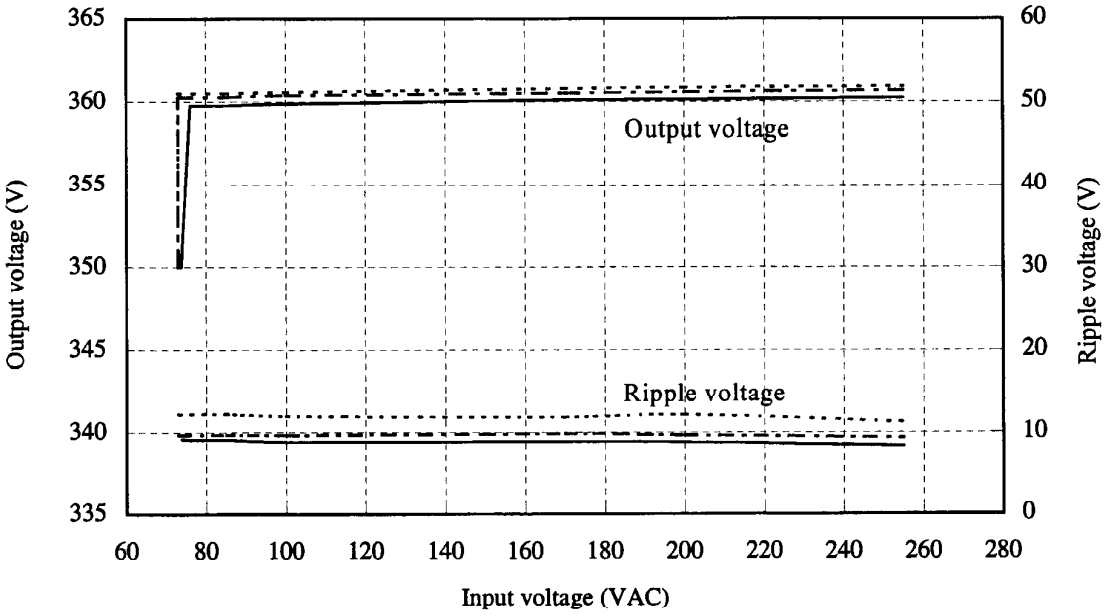
2. Temperature drift　　Conditions Vin : 200VAC
Iout : 100%

Tp	-20 °C	+25 °C	+85 °C	temperature stability	
Vout	360.7V	360.5V	360.0V	0.8V	0.22%

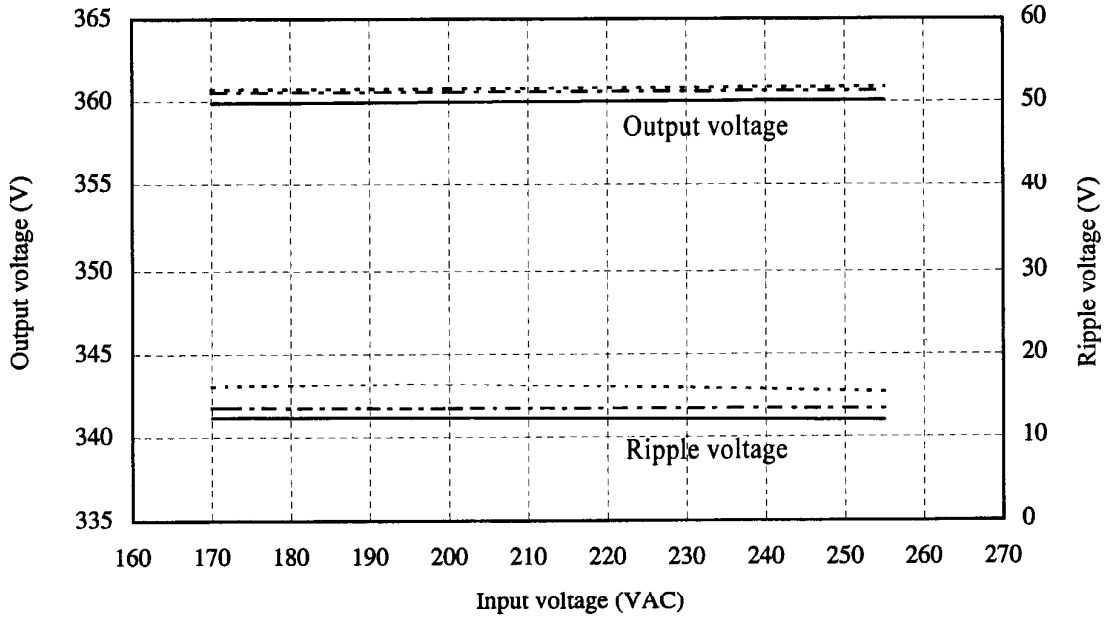
(2) 出力電圧・リップル電圧対入力電圧
Output voltage and ripple voltage vs. input voltage

Conditions Cout : 660 uF
Tp : -20 °C
: 25 °C
: 85 °C

360V Po=504W



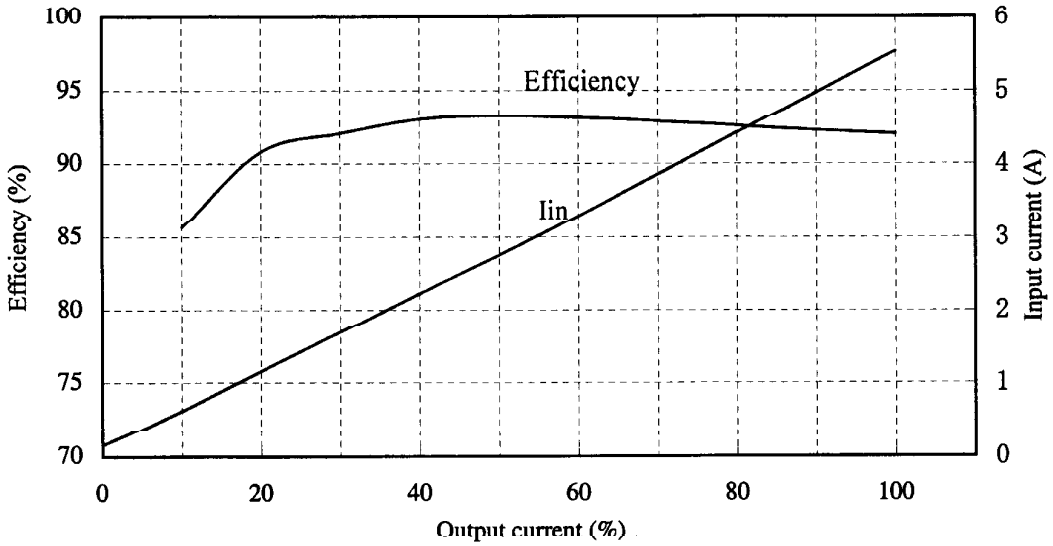
360V Po=756W



(3) 効率・入力電流対出力電流
Efficiency and input current vs. output current

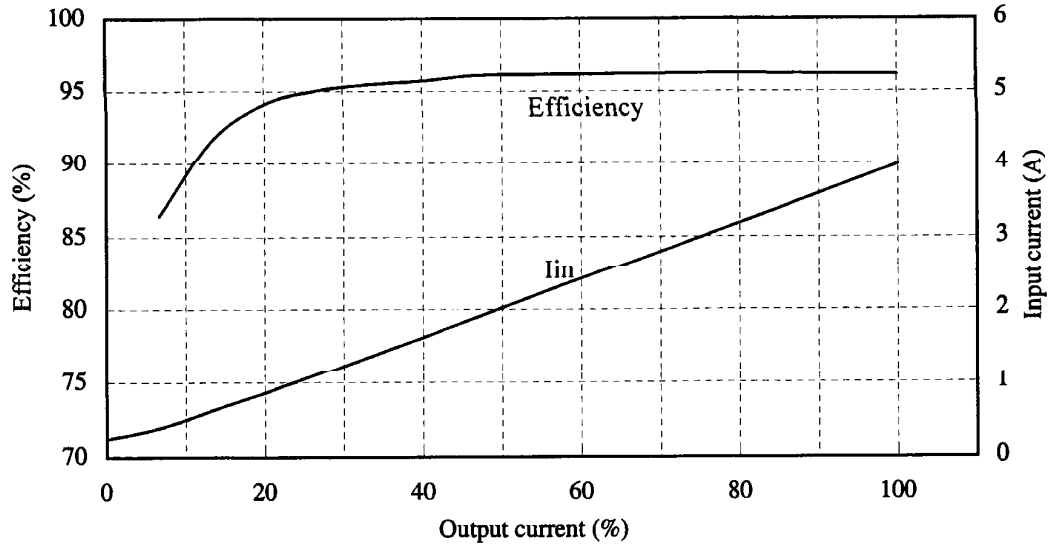
Conditions Vin : 100 VAC
Tp : 25 °C

360V Po=504W



Conditions Vin : 200 VAC
Tp : 25 °C

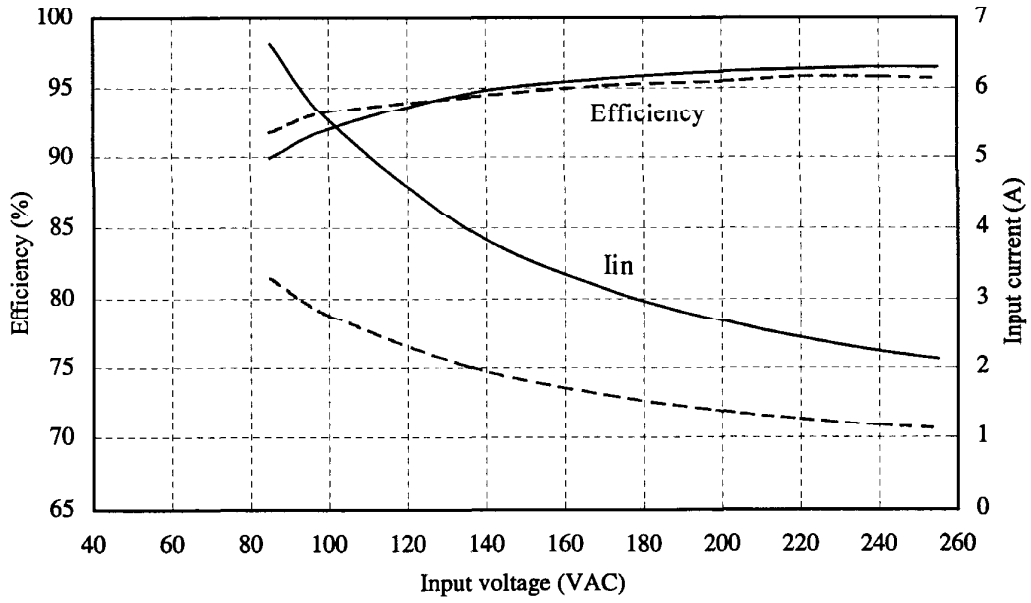
360V Po=756W



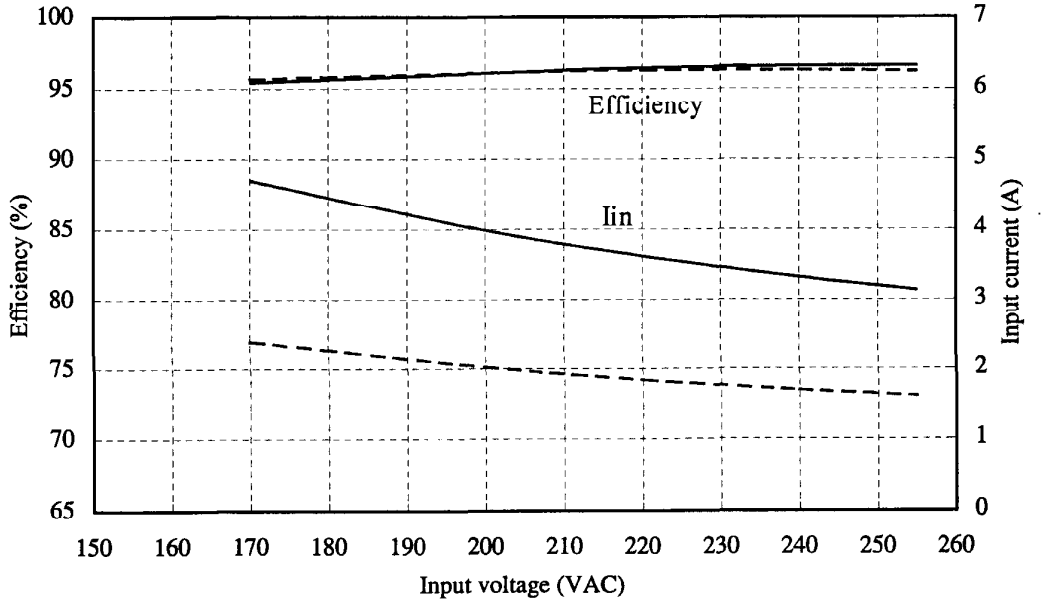
(4) 効率対入力電圧
Efficiency vs. input voltage

Conditions Iout : 100 % ——
50 % - - - -
Tp : 25 °C

360V Po=504W



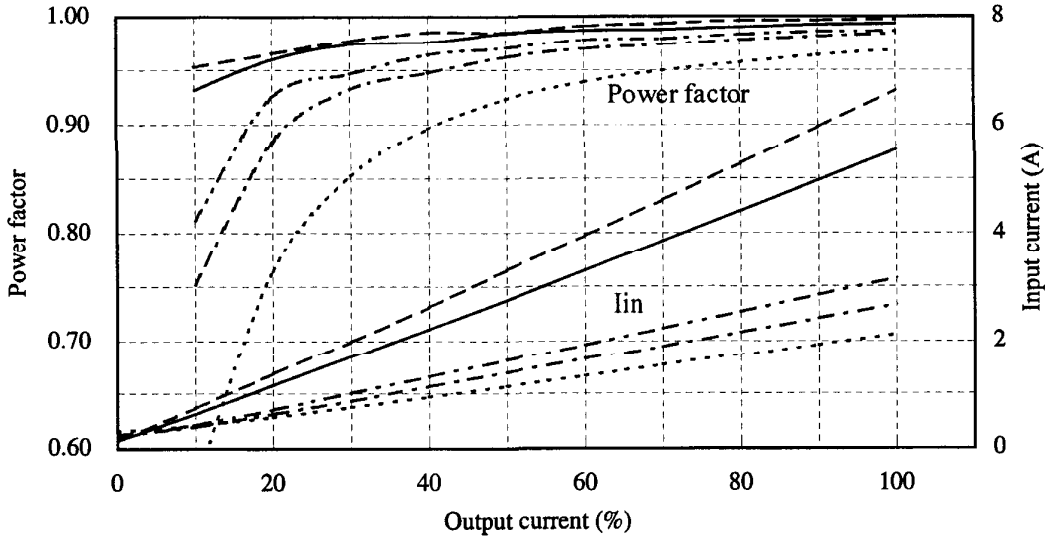
360V Po=756W



(5) 力率・入力電流対出力電流
Power factor and input current vs. output current

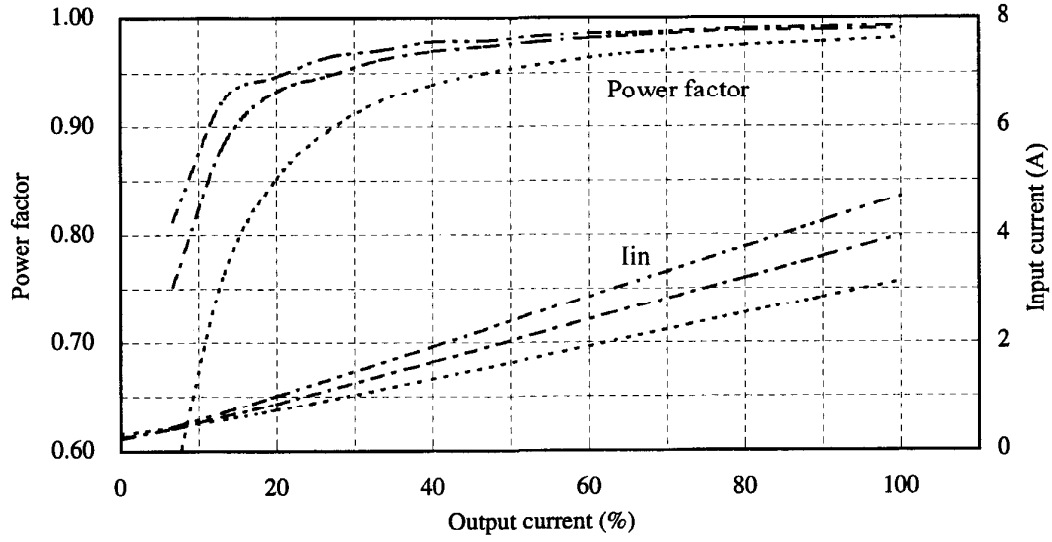
Conditions Vin : 85 VAC
100 VAC
170 VAC
200 VAC
255 VAC

360V Po=504W Tp : 25 °C



Conditions Vin : 170 VAC
200 VAC
255 VAC

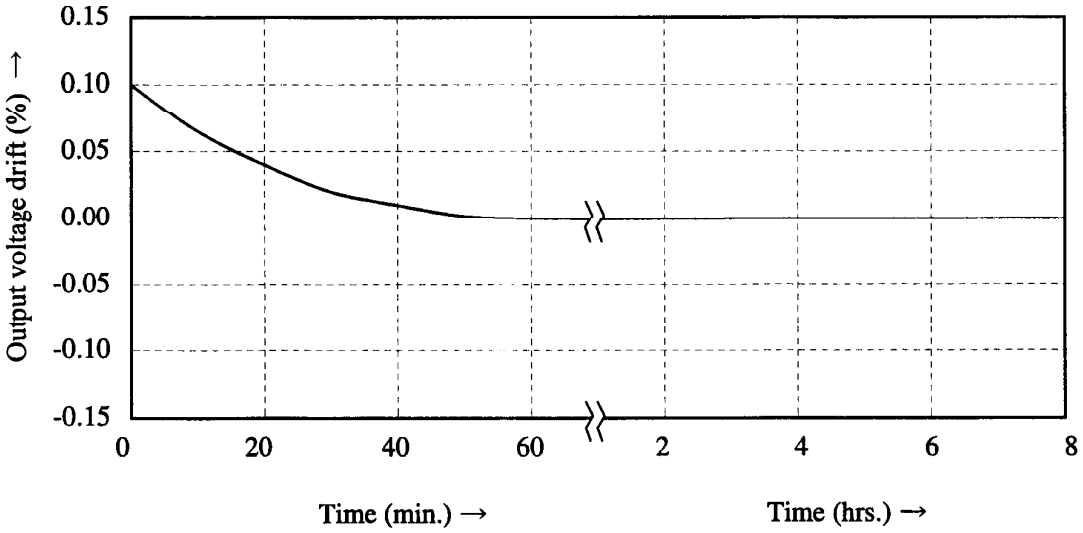
360V Po=756W Tp : 25 °C



3.2 通電ドリフト特性
Warm up voltage drift characteristics

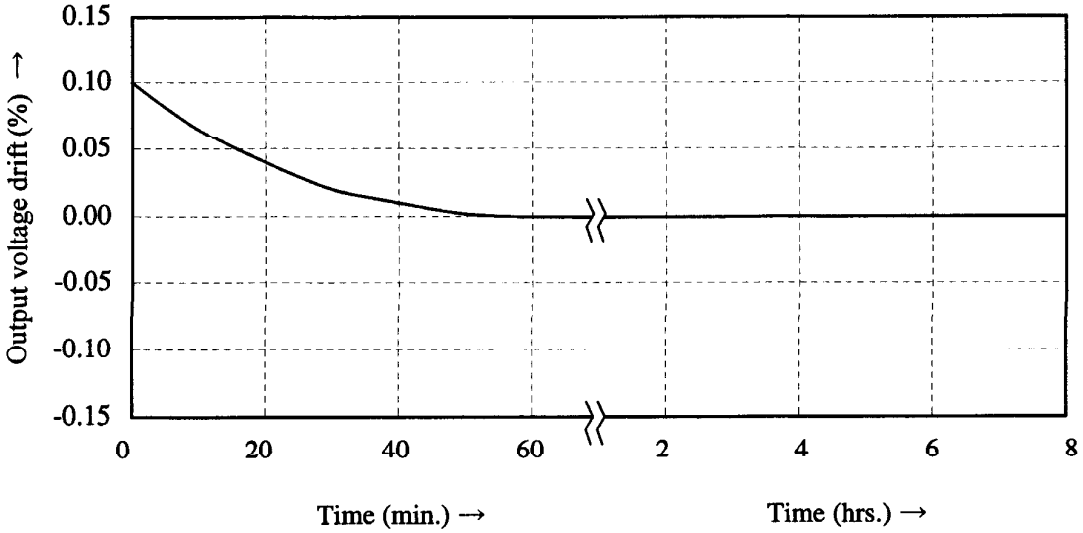
Conditions Vin : 100 VAC
Io : 100 %
Tp : 25 °C

360V　　Po=504W



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

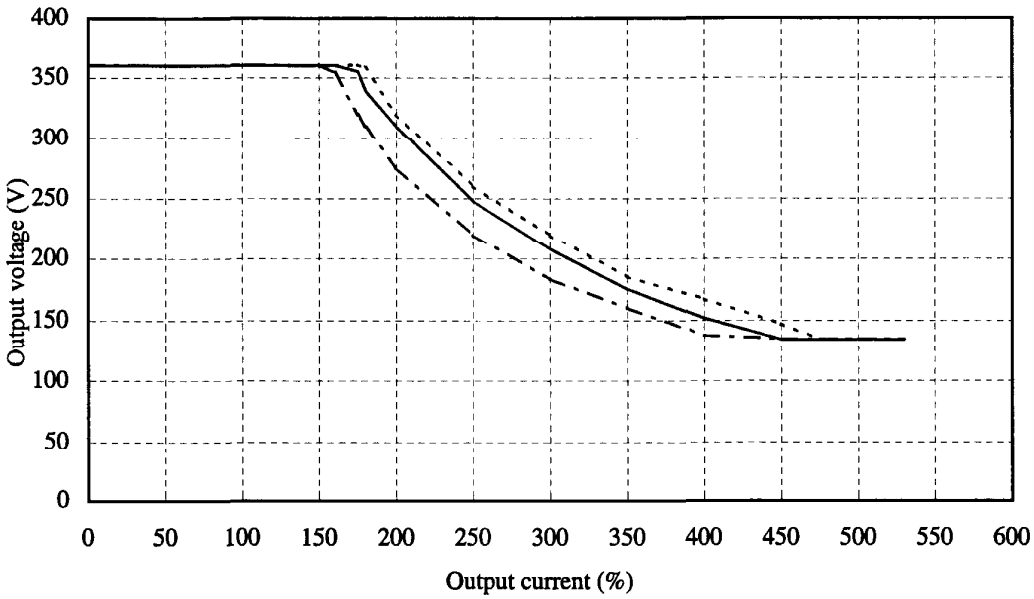
360V　　Po=756W



3.3 電流制限特性
Current limit characteristics

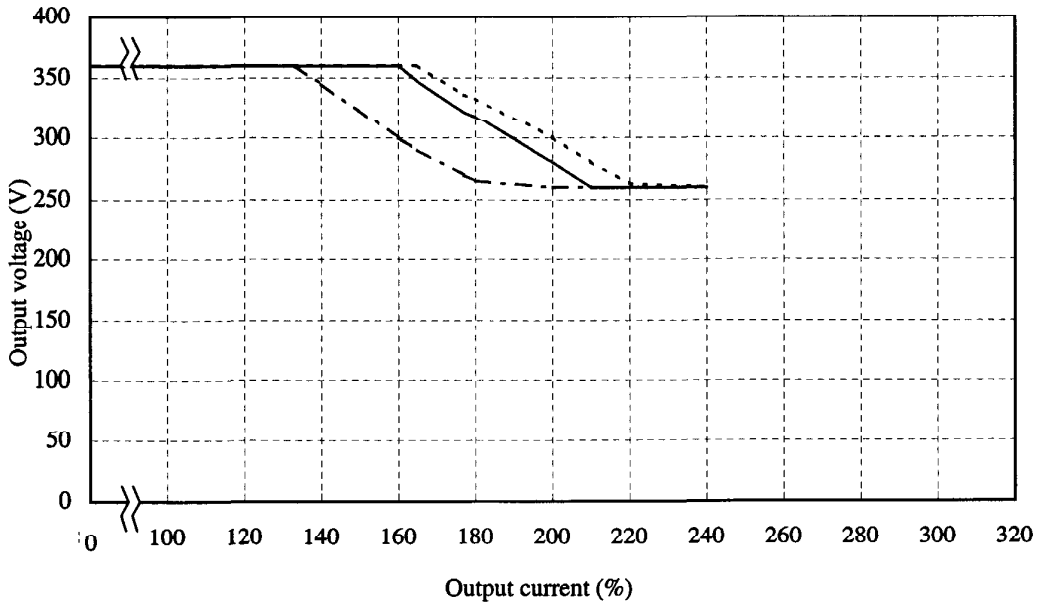
Conditions Tp : -20°C -------
25°C ———
85°C —·—·—

360V　　Po = 504W　　Vin : 100VAC



Conditions Tp : -20°C -------
: 25°C ———
: 85°C —·—·—

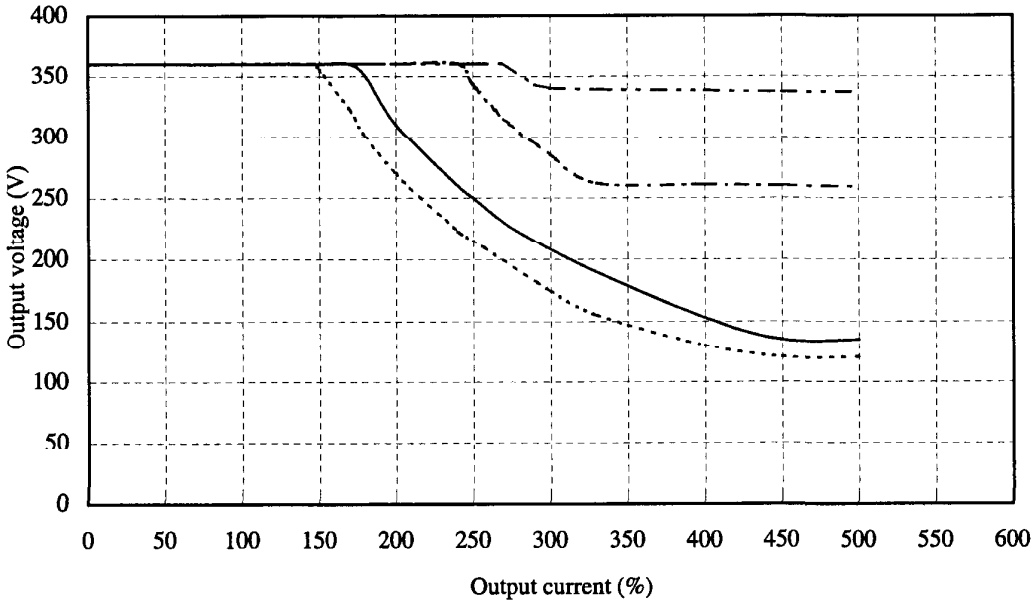
360V　　Po = 756W　　Vin : 200VAC



3. 3 電流制限特性
Current limit characteristics

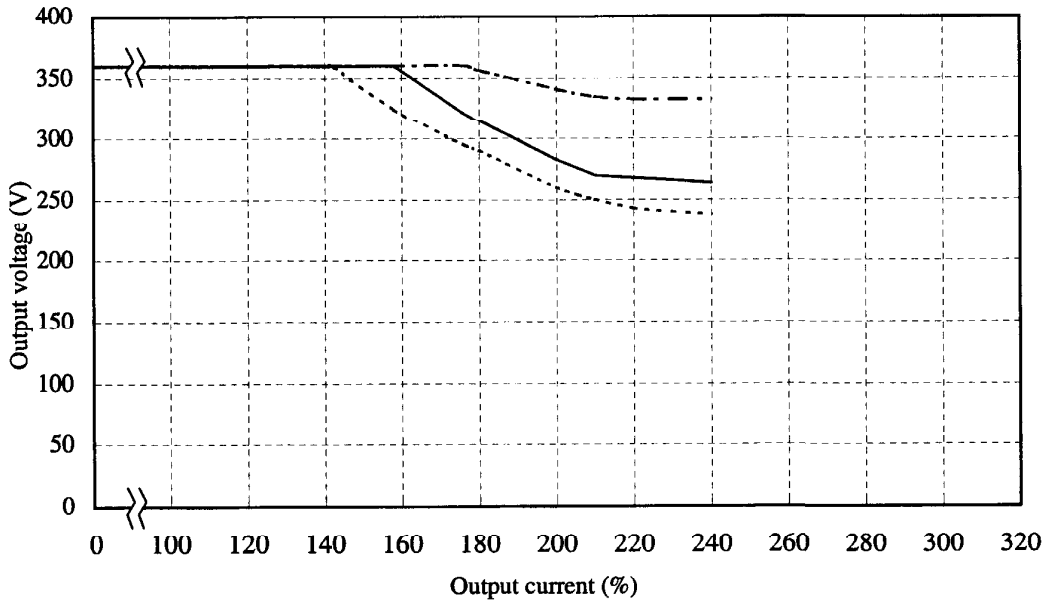
Conditions Vin : 85VAC -------
100VAC ———
200VAC —·—·—
255VAC —··—··—

360V　　Po = 504W　　Tp : 25°C



Conditions Vin : 170VAC -------
200VAC ———
255VAC —·—·—

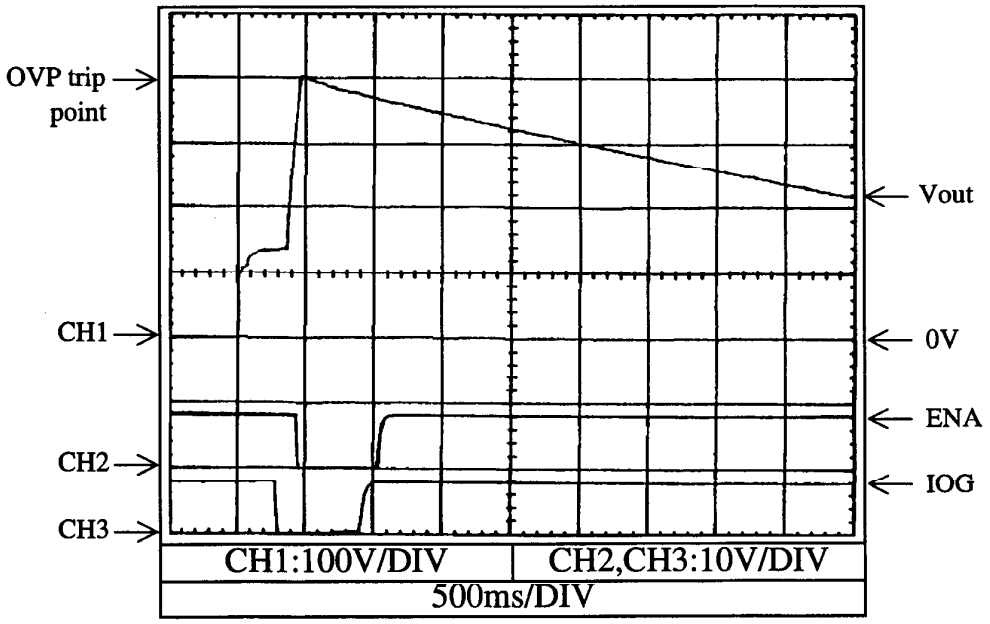
360V　　Po = 756W　　Tp : 25°C



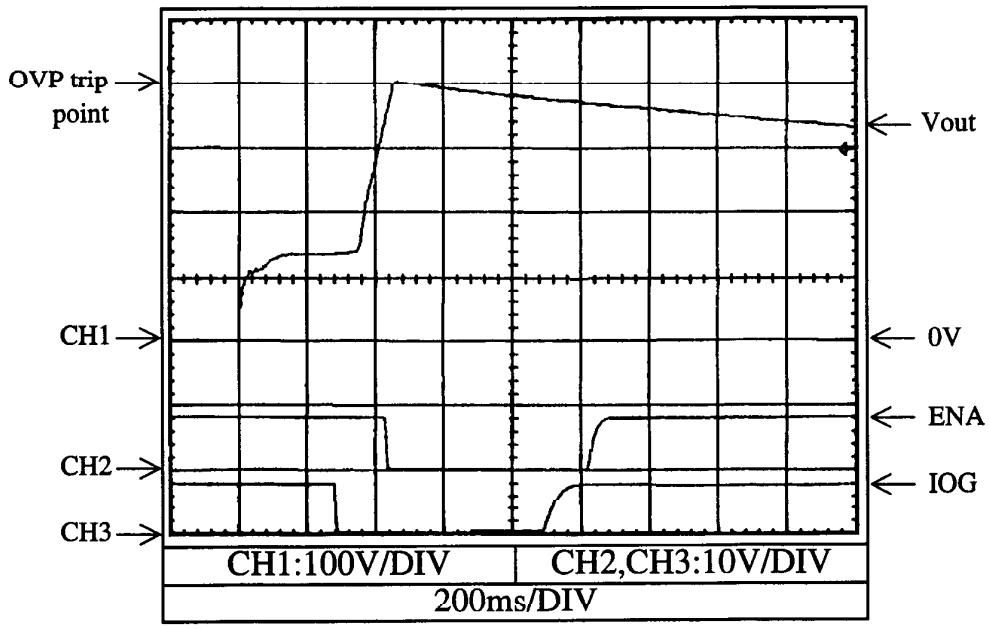
3. 4 過電圧保護特性
Over voltage protection (OVP)

Conditions Vin : 100VAC
Iout : 0%
Tp : 25°C

360V



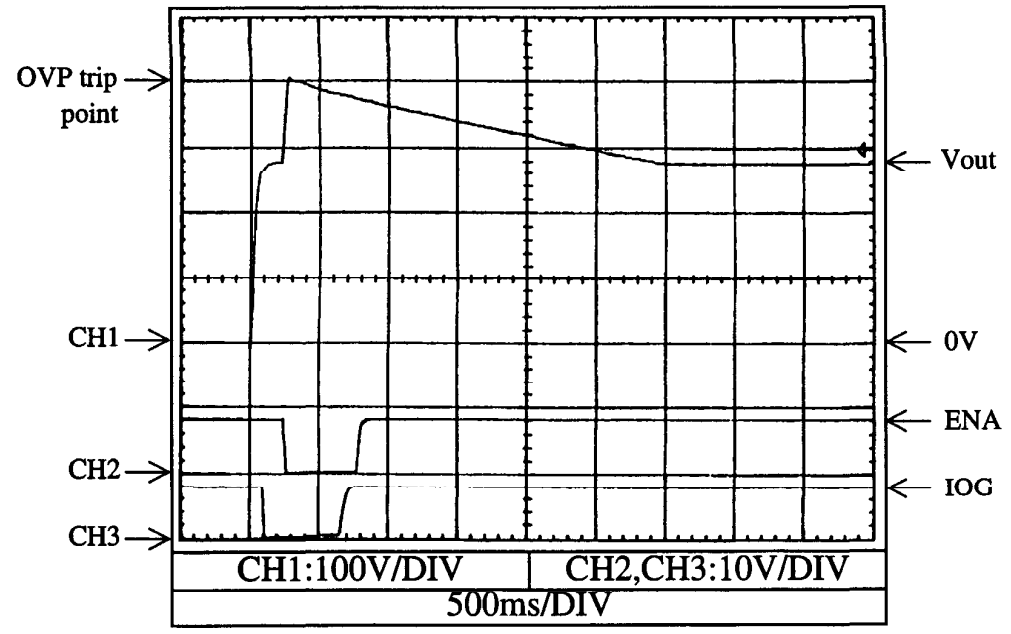
360V



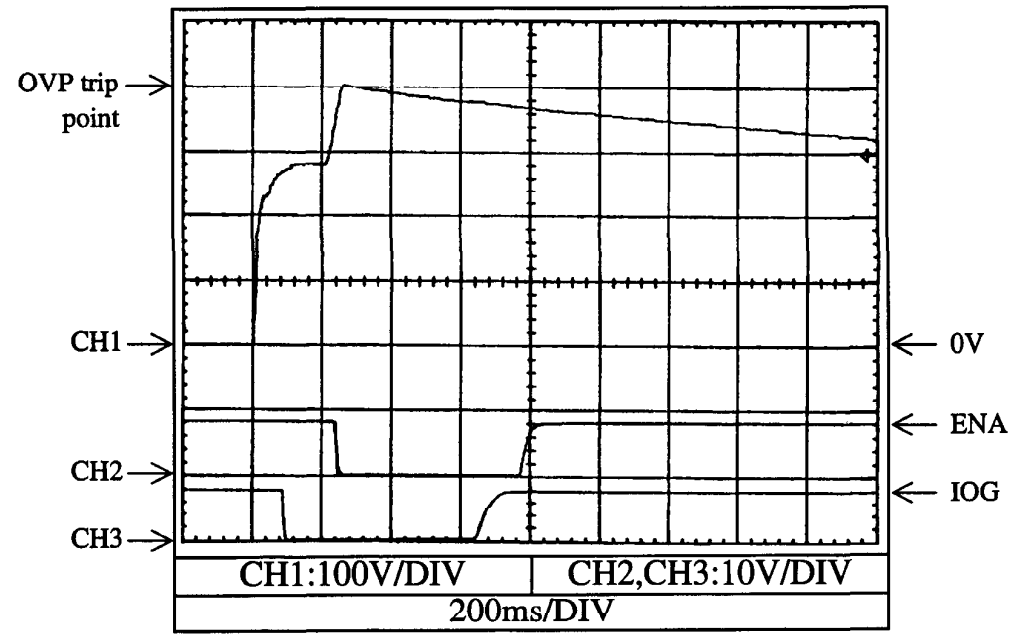
3. 4 過電圧保護特性
Over voltage protection (OVP)

Conditions Vin : 200VAC
Iout : 0%
Tp : 25°C

360V



360V

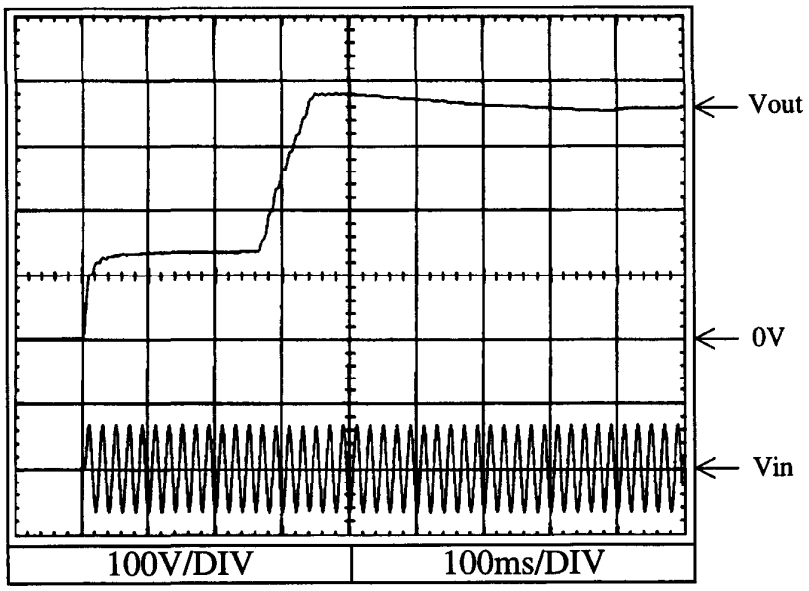


3.5 出力立上り特性

Output rise characteristics

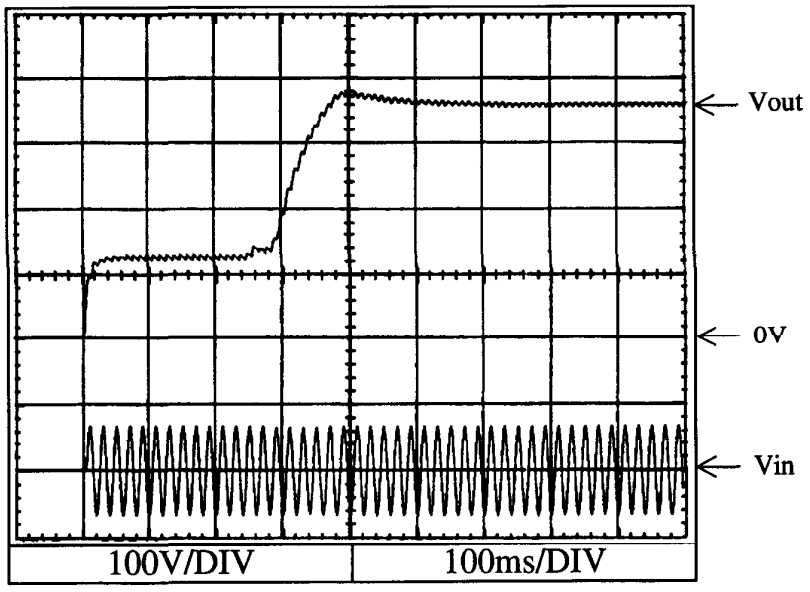
Conditions Vin : 100VAC
Iout : 0%
Tp : 25°C

360V



Conditions Vin : 100VAC
Iout : 100% (Po=504W)
Tp : 25°C

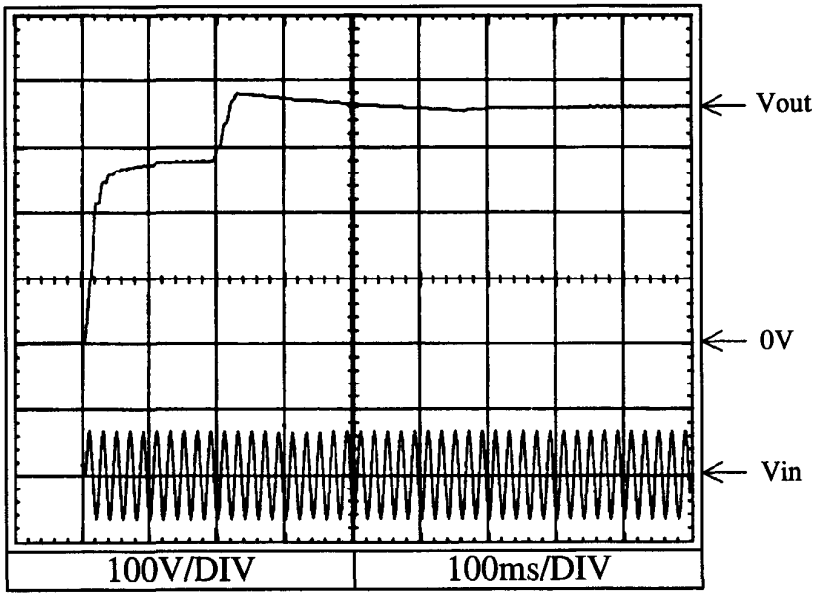
360V



3.5 出力立上り特性
Output rise characteristics

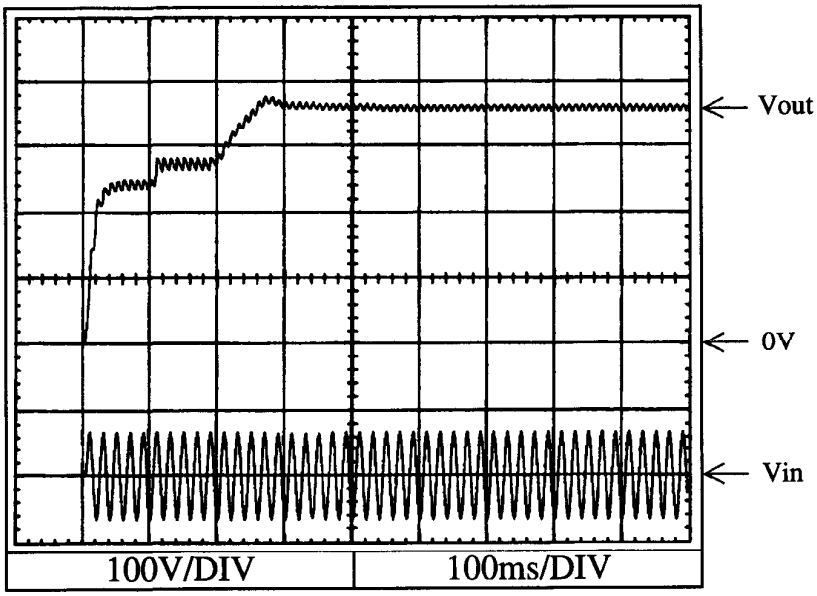
Conditions Vin : 200VAC
Iout : 0%
Tp : 25°C

360V



Conditions Vin : 200VAC
Iout : 100% (Po=756W)
Tp : 25°C

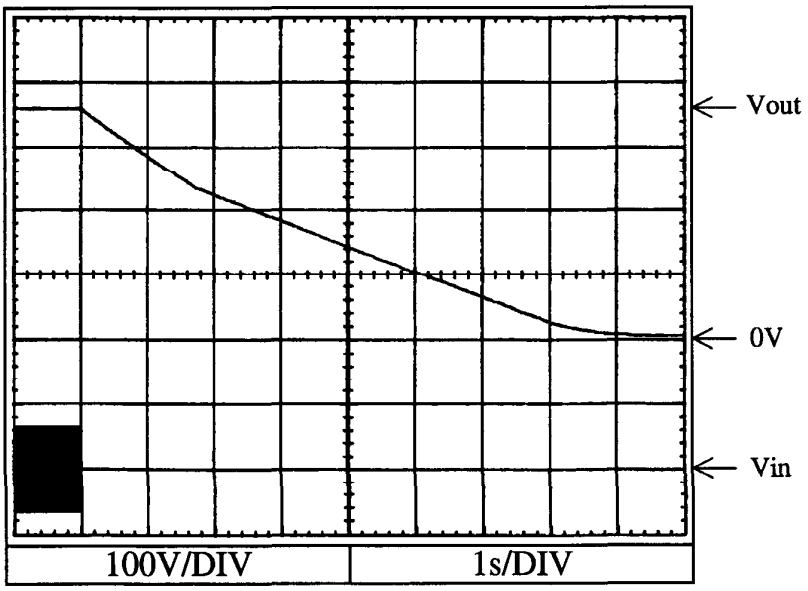
360V



3.6 出力立下り特性
Output fall characteristics

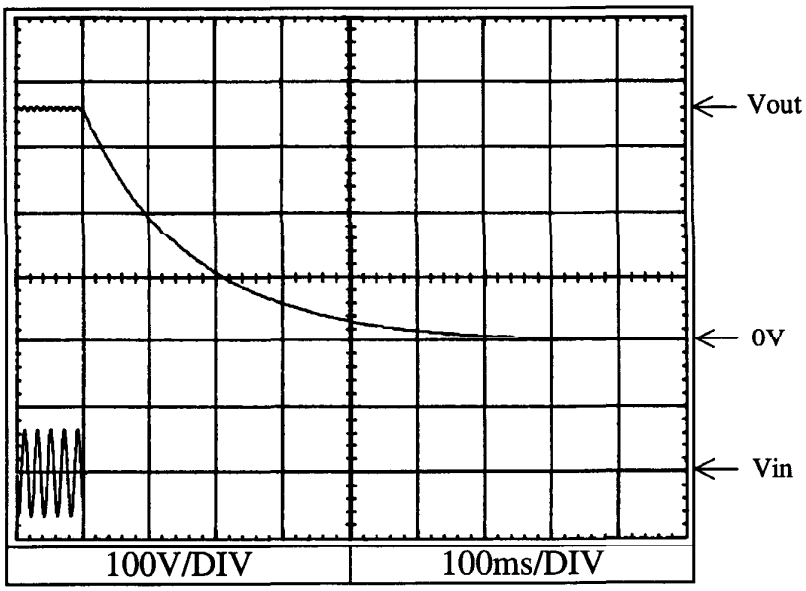
Conditions Vin : 100VAC
Iout : 0%
Tp : 25°C

360V



Conditions Vin : 100VAC
Iout : 100% (Po=504W)
Tp : 25°C

360V

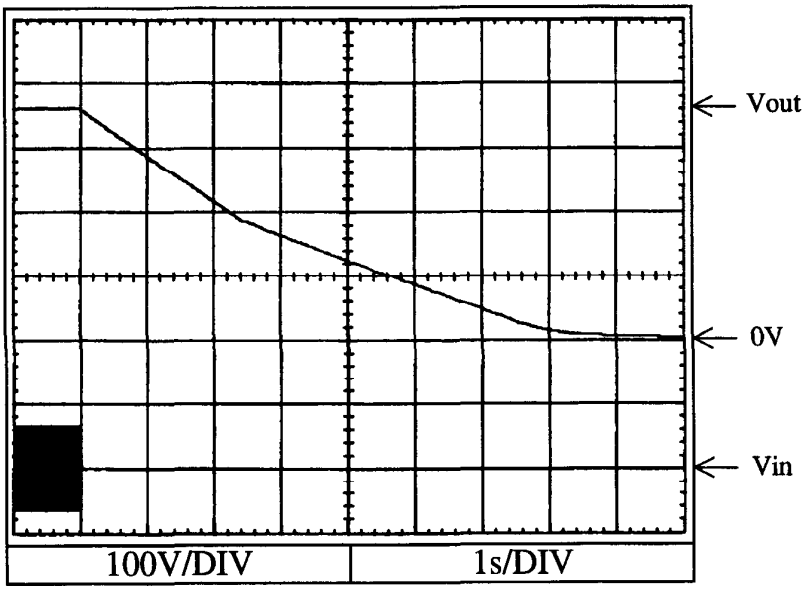


3.6 出力立下り特性

Output fall characteristics

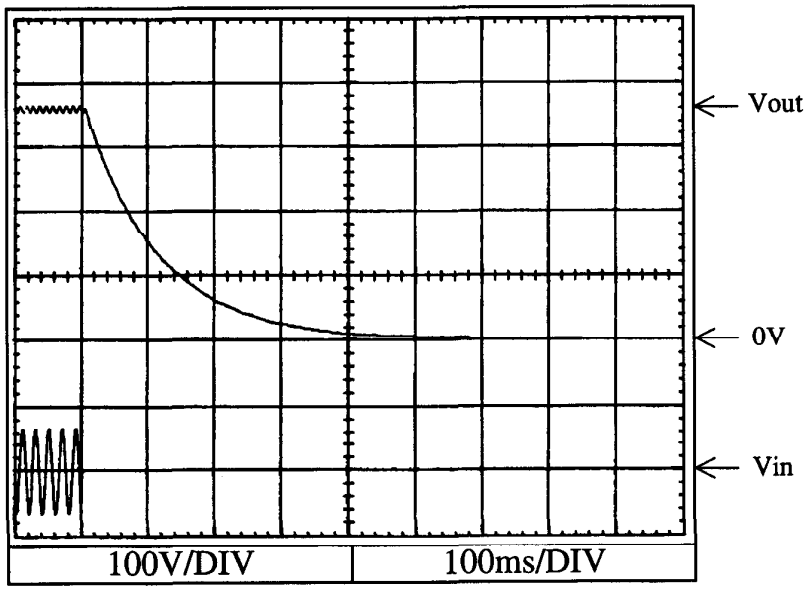
Conditions Vin : 200VAC
Iout : 0%
Tp : 25°C

360V



Conditions Vin : 200VAC
Iout : 100% (Po=756W)
Tp : 25°C

360V

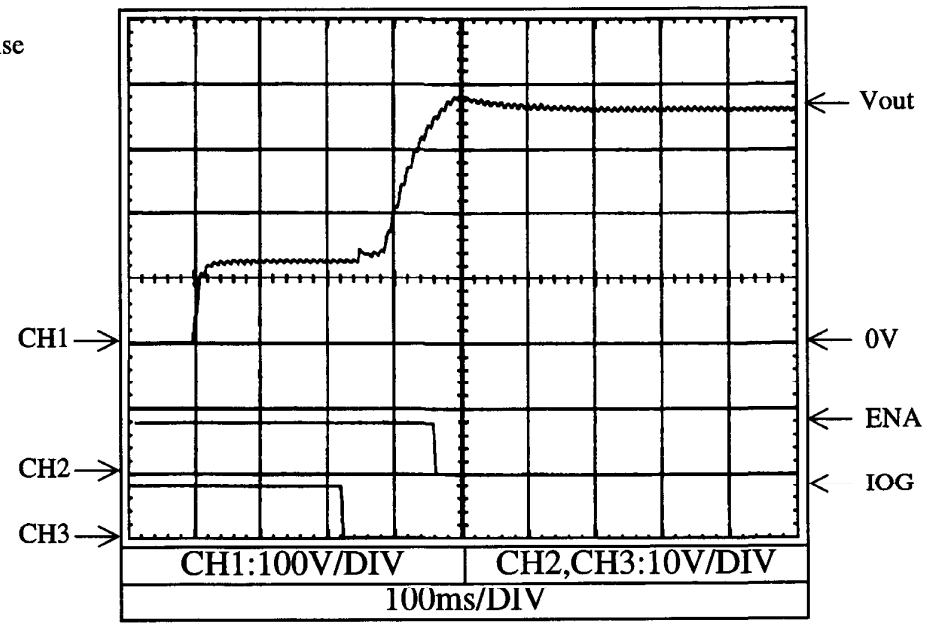


3.7 ＩＯＧ・ＥＮＡ信号対出力電圧
IOG & ENA signals vs. output voltage

Conditions Vin : 100VAC
Iout : 100%
Tp : 25°C

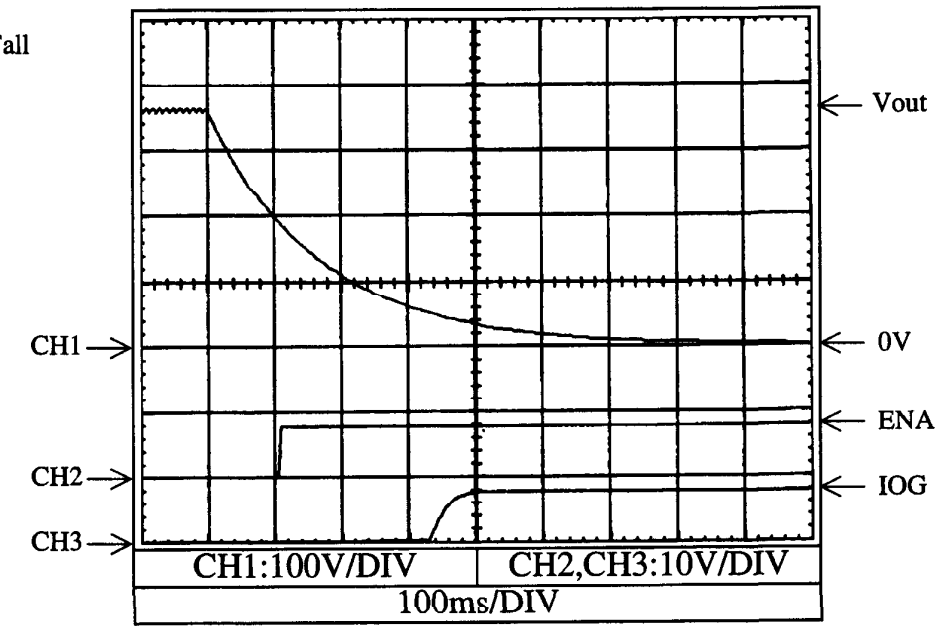
360V

(A) Rise



360V

(B) Fall

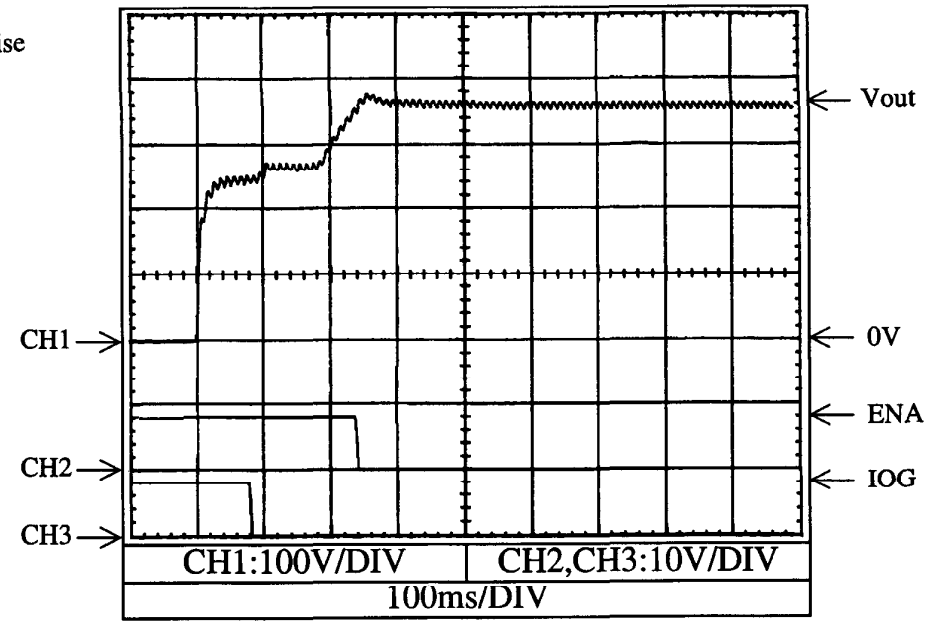


3.7 ＩＯＧ・ＥＮＡ信号対出力電圧
IOG & ENA signals vs output voltage

Conditions Vin : 200VAC
Iout : 100%
Tp : 25°C

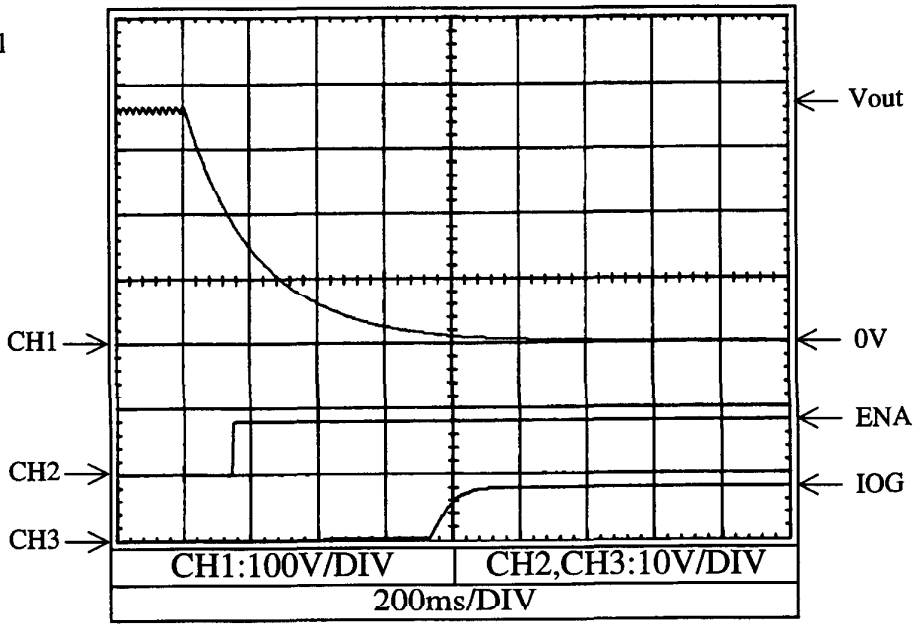
360V

(A) Rise



360V

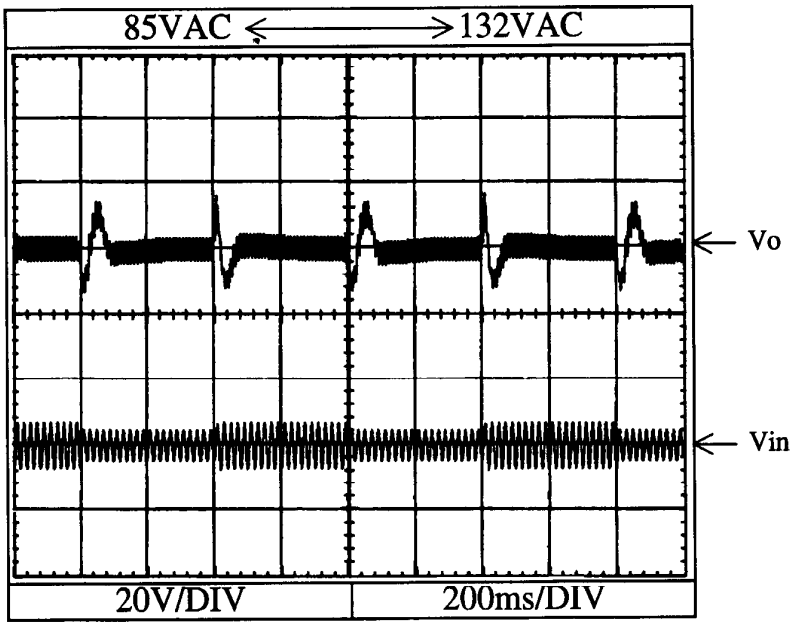
(B) Fall



3.8 過渡応答（入力急変）特性
Dynamic line responce characteristics

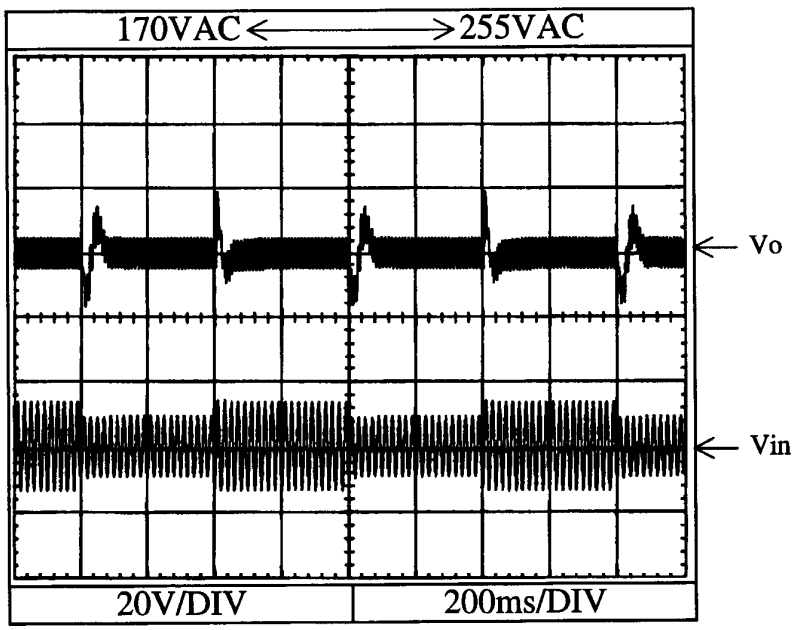
Conditions Iout : 100% (Po=504W)
Tp : 25°C

360V



Conditions Iout : 100% (Po=756W)
Tp : 25°C

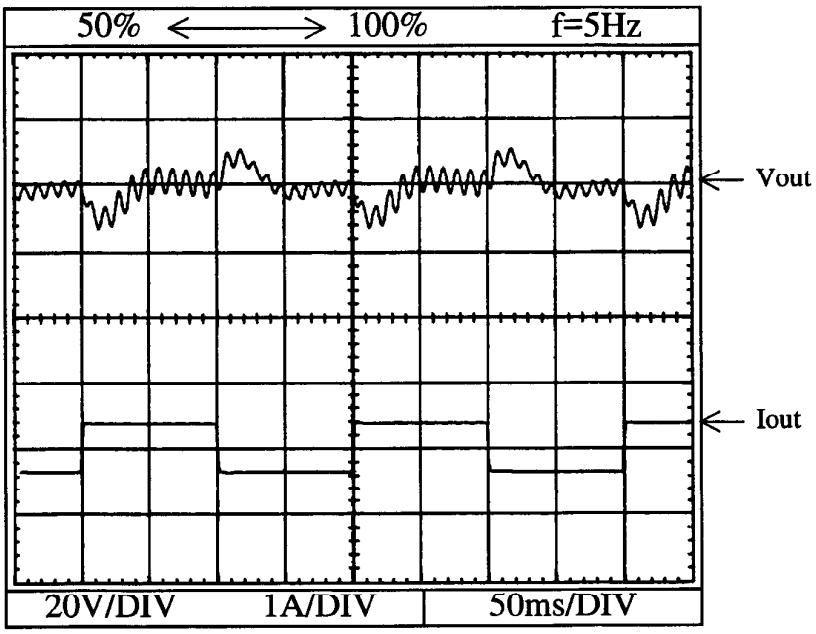
360V



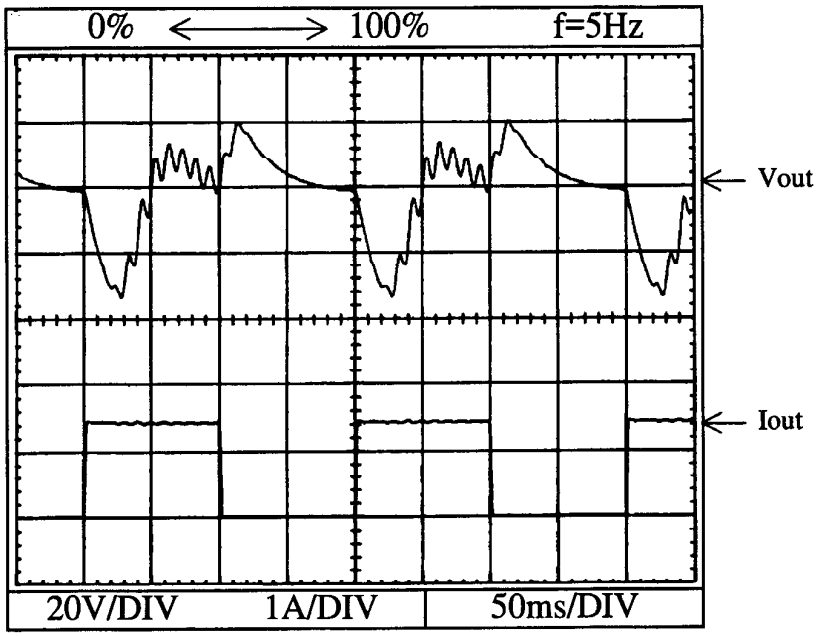
3.9 過渡応答（負荷急変）特性
Dynamic load responce characteristics

Conditions Vin : 100VAC
Tp : 25°C

360V　　Po=504W



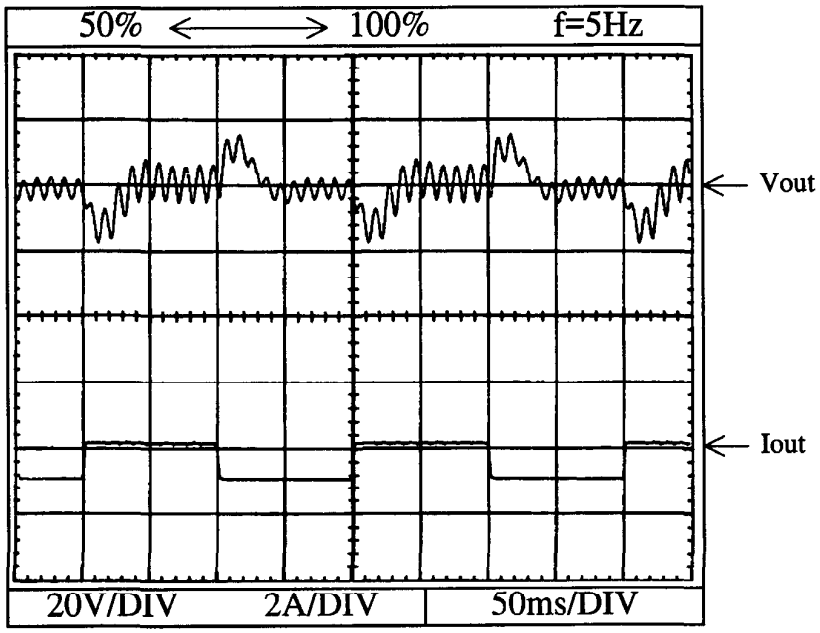
360V



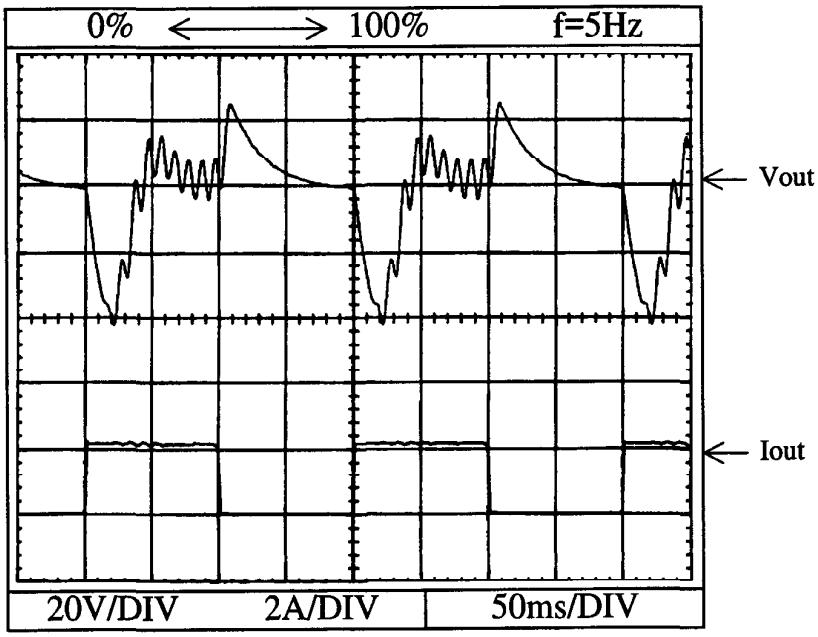
3.9 過渡応答（負荷急変）特性
Dynamic load responce characteristics

Conditions Vin : 200VAC
Tp : 25°C

360V　　Po=756W



360V

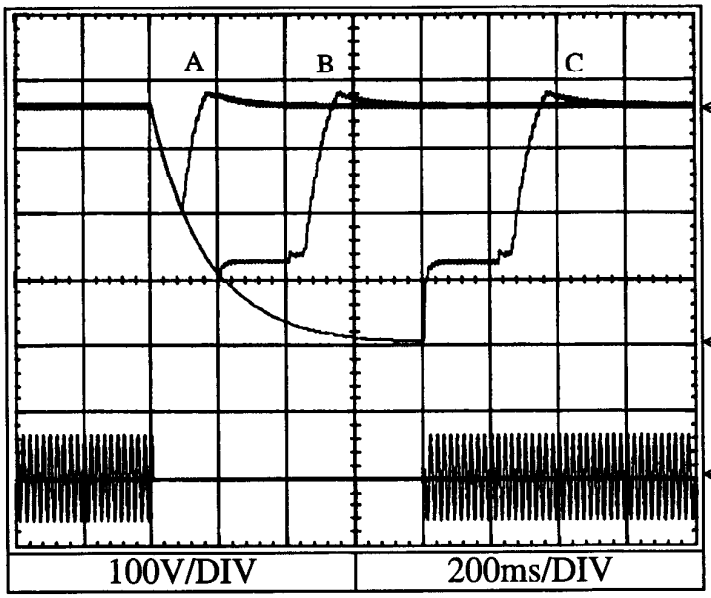


3. 10 入力瞬停特性

Responce to brown out characteristics

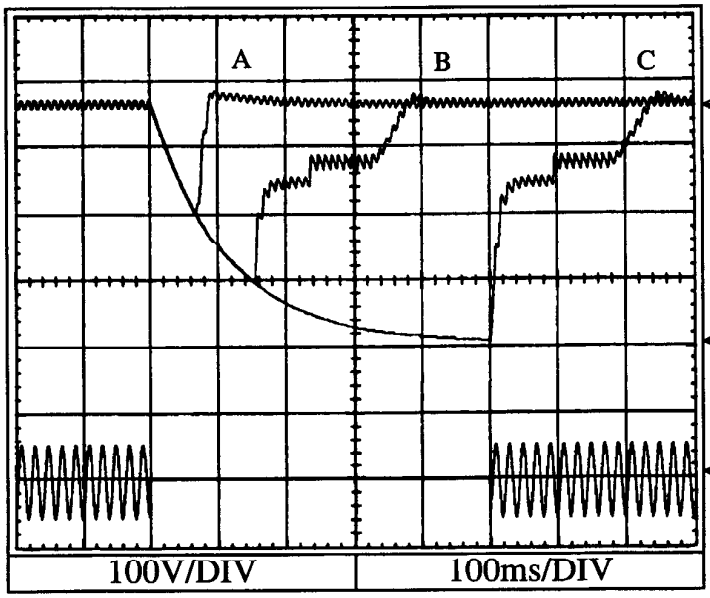
Conditions Vin : 100VAC
Iout : 100%
Tp : 25°C
brown out time
A : 92ms
B : 200ms
C : 800ms

360V



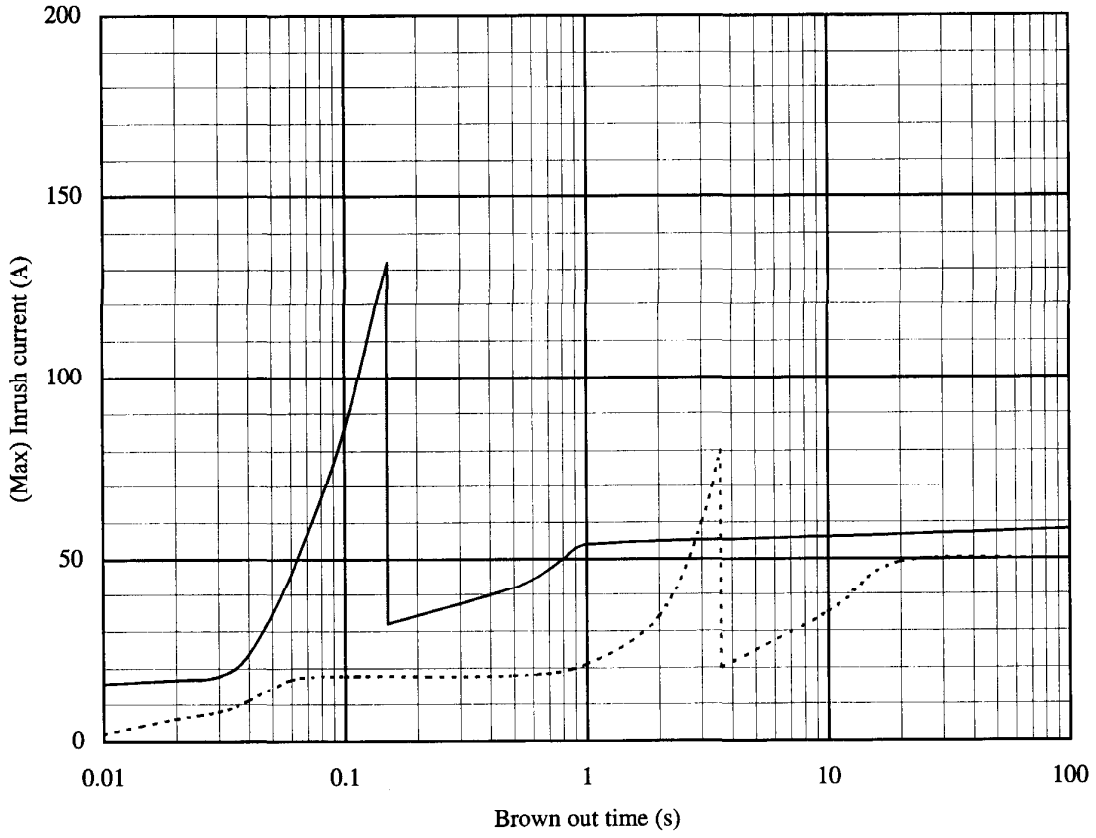
Conditions Vin : 200VAC
Iout : 100%
Tp : 25°C
brown out time
A : 65ms
B : 150ms
C : 500ms

360V



3. 11 瞬停時突入電流特性
Inrush current characteristics

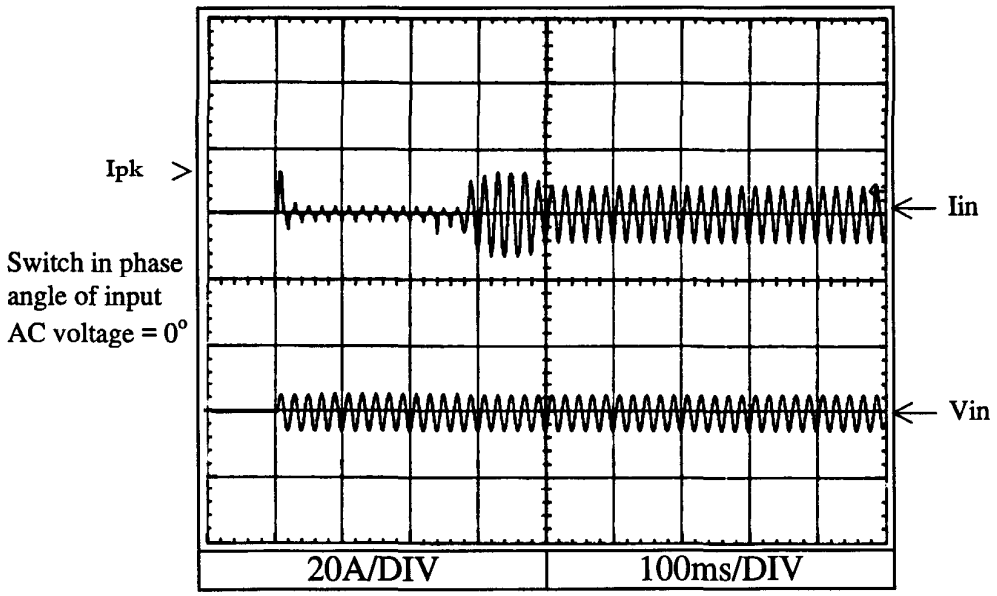
Conditions Cout : 1200 uF
Vin : 240 V
Iout : 0 % --------
: 100 % ————
Tp : 25 °C



3. 12 入力サージ電流（突入電流）波形
Inrush current waveform

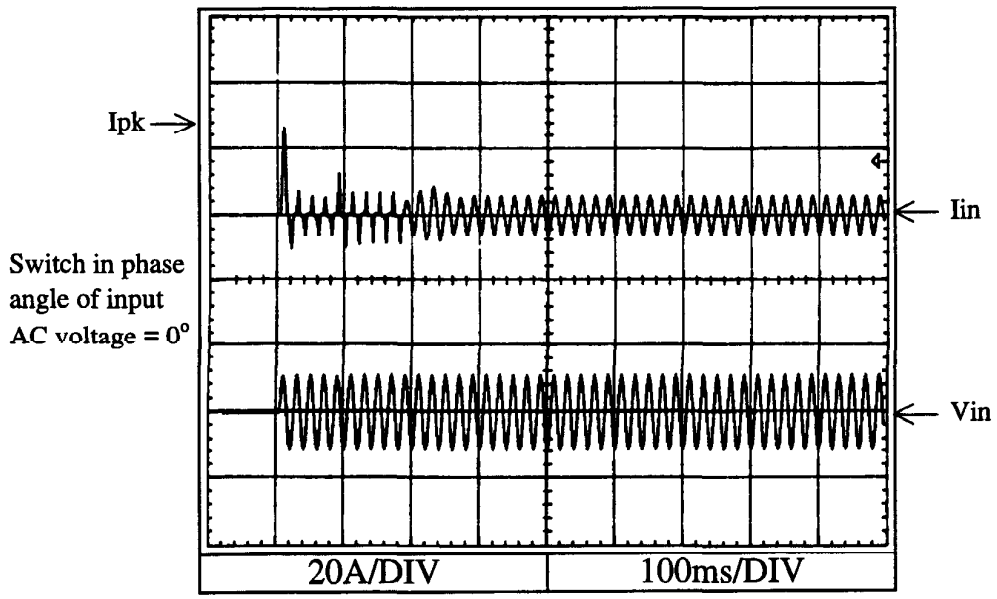
Conditions Vin : 100VAC
Tp : 25°C

360V Po=504W



Conditions Vin : 200VAC
Tp : 25°C

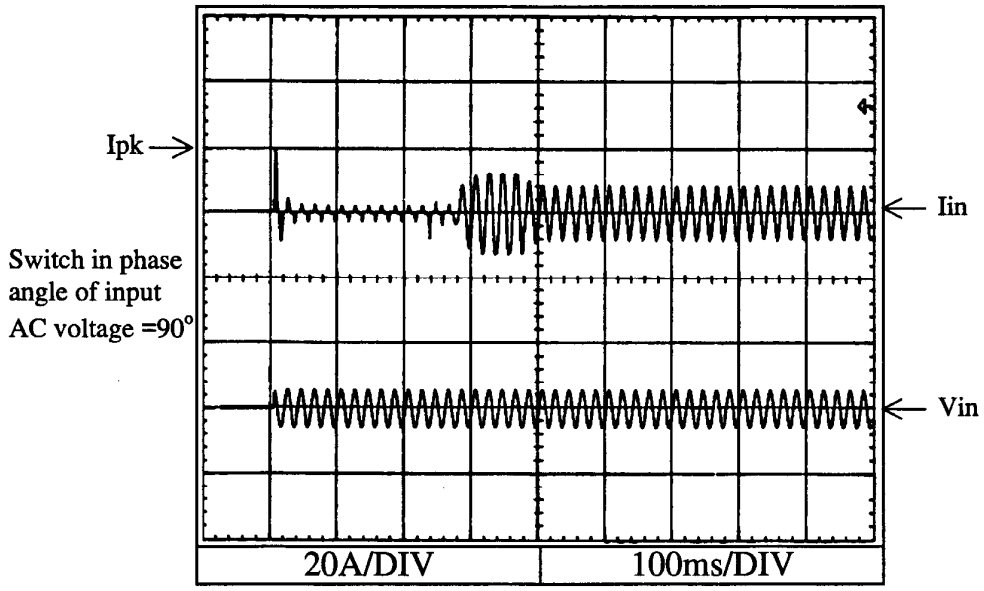
360V Po=756W



3. 12 入力サージ電流（突入電流）波形
Inrush current waveform

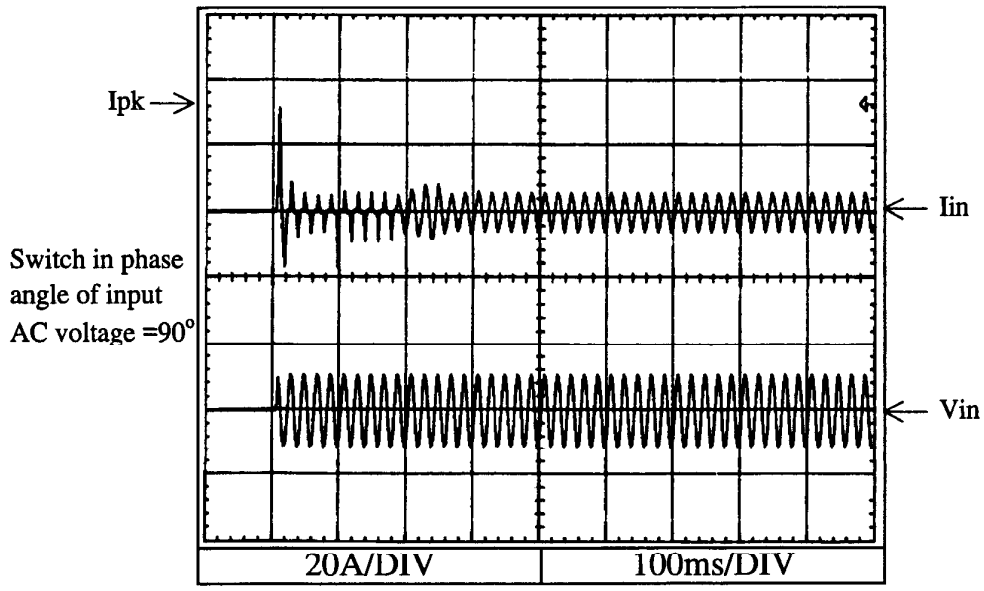
Conditions Vin : 100VAC
Tp : 25°C

360V Po=504W



Conditions Vin : 200VAC
Tp : 25°C

360V Po=756W

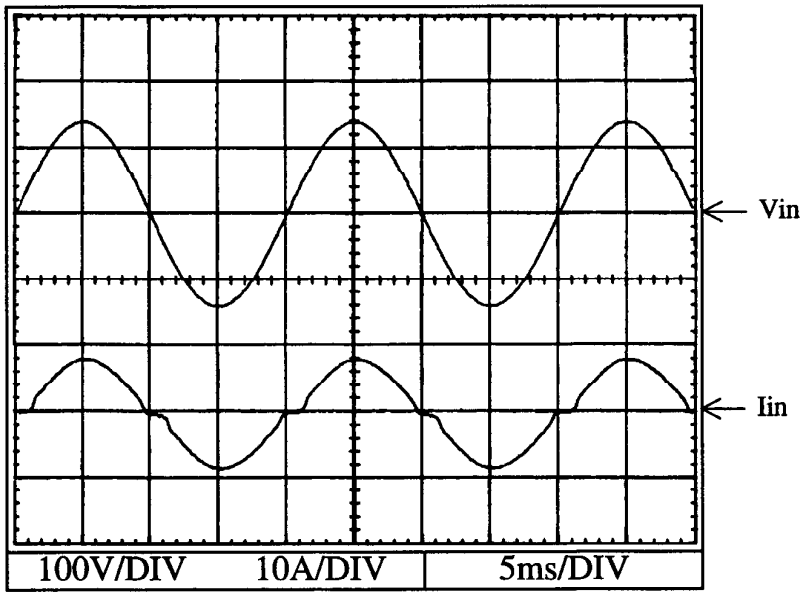


3. 13 入力電流波形

Inrush current waveform

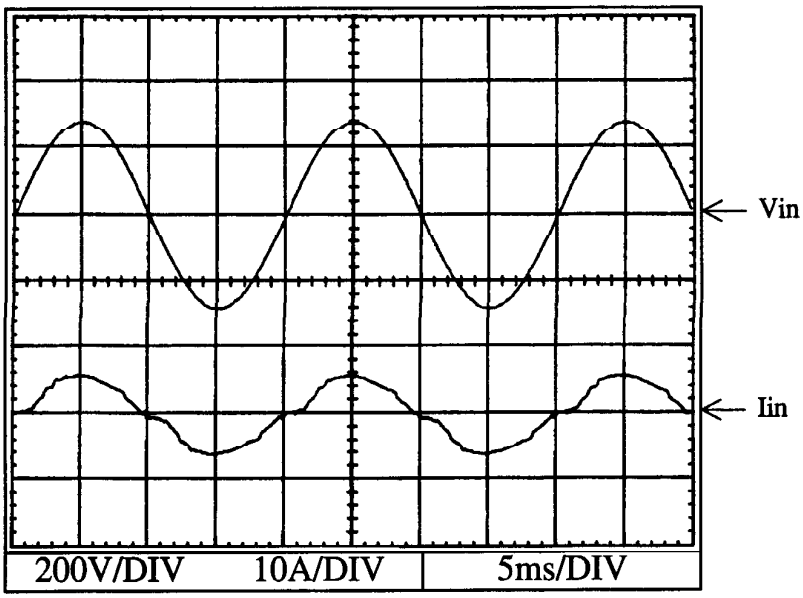
Conditions Vin : 100VAC
Io : 100% (Po=504W)
Tp : 25°C

360V



Conditions Vin : 200VAC
Iout : 100% (Po=756W)
Tp : 25°C

360V

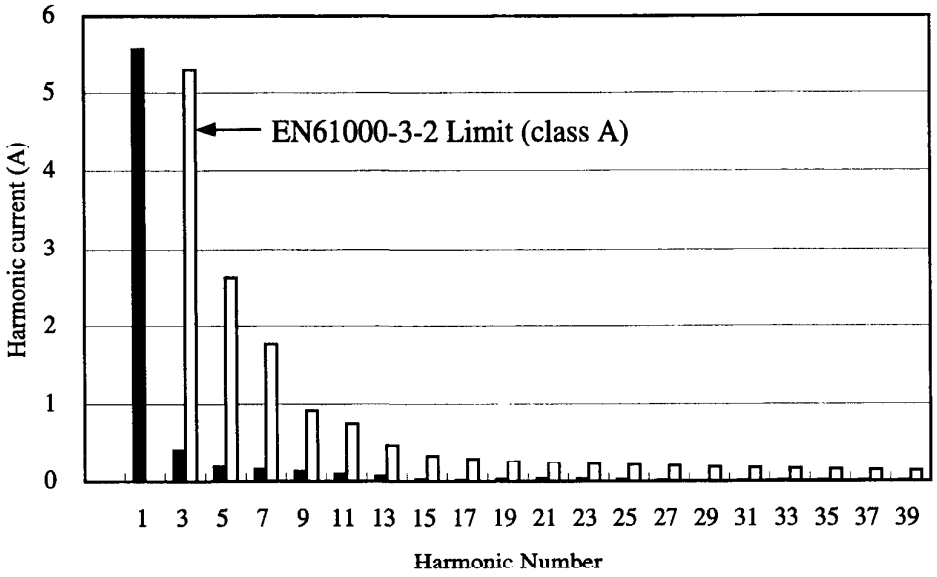


3.14 高調波成分

Input current harmonics

Conditions Vin :100VAC
Iout :100%
Tp :25°C

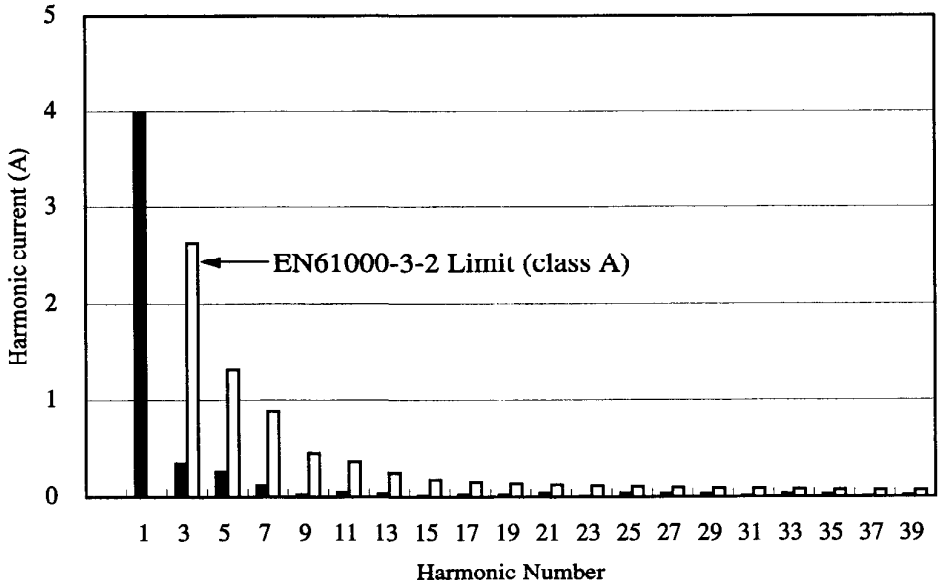
360V Po=504W



Order No.	current (A)
1	5.55
2	0.00
3	0.42
4	0.00
5	0.18
6	0.00
7	0.15
8	0.00
9	0.12

Conditions Vin :200VAC
Iout :100%
Tp :25°C

360V Po=756W

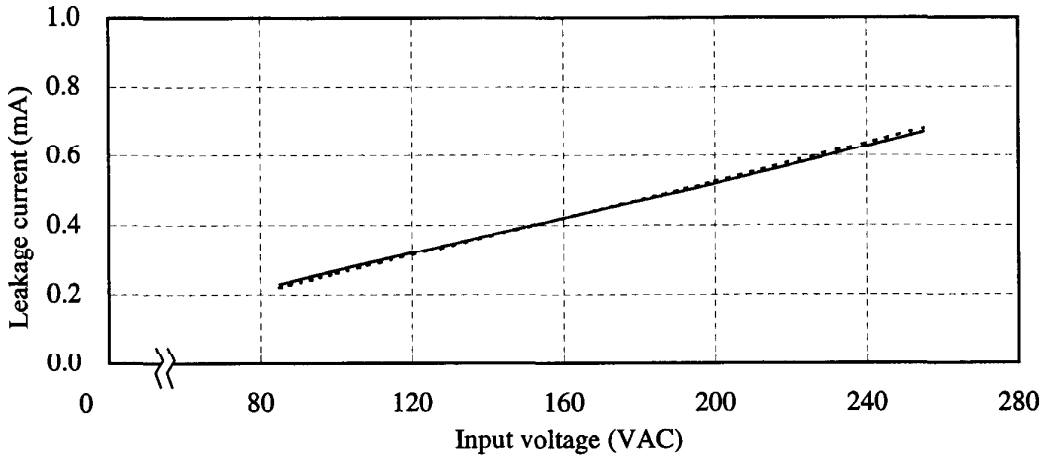


Order No.	current (A)
1	3.98
2	0.00
3	0.36
4	0.00
5	0.26
6	0.00
7	0.12
8	0.00
9	0.02

3. 15 リーク電流特性
Leakage current characteristics

Conditions Iout : 0% --------
: 100% ———
Tp : 25°C
f : 50Hz
Equipment used : TYPE3226(YOKOGAWA)

360V Po=504W



360V Po=756W