QUALITY

TEST DATA

SWT100-- *

--------- INDEX ---------

Terminology

	Definition
Vin	Input voltage
Vout	Output voltage
Iin	Input current
Iout	Output current
Ta	Ambient temperature

SWT100 SPECIFICATIONS

CA704-01-01F

	MODEL / ITEMS			SWT100-522			SWT100-525			SWT100-5FF		
				CH1	CH2	CH3	CH1	CH2	CH3	CH1	CH2	CH3
1	NOMINAL OUTPUT VOLTAGE		V	+5	+12	-12	+5	+12	-5	+5	+15	-15
2	MIN. OUTPUT CURRENT		A	0.5	0	0	0.5	0	0	0.5	0	0
3	MAX. OUTPUT CURRENT		A	8	4	0.8	8	4	0.8	8	3.2	0.8
4	PEAK OUTPUT CURRENT		A	-	-	-	-	-	-	-	-	-
5	MAX. OUTPUT POWER		W	97.6			92			100		
6	EFFICIENCY (TYP)	(* 1)	-	74%								
7	INPUT VOLTAGE RANGE	(* 2)	-	AC85~265V (Continuously), 47~63 Hz /110~340VDC								
8	INPUT CURRENT (TYP)	(* 1)	-	2.9A(Vin=100VAC) / 1.9A (Vin=200VAC)								
9	INRUSH CURRENT (TYP)	(*10)	-	15A / 100VAC 30A / 200VAC (Ta=25°C)								
10	OUTPUT VOLTAGE		-	CH1 +5V fixed, CH2.3 fixed Shipment condition: CH1: ±1%, CH2: ±3%, CH3: ±5%								
11	MAX. RIPPLE & NOISE	(* 3)	-	±5V: 120mV; ±12V: 150mV; ±15V: 150 mV								
12	MAX. LINE REGULATION	(*3,4)	-	CH1:1%, CH2: 2%, CH3: 1%								
13	MAX. LOAD REGULATION	(*3,5)	-	CH1:2%, CH2: 4%, CH3: 2%								
14	MAX. TEMPERATURE DRIFT	(*3,6)	-	0.04%/°C								
15	OVER CURRENT PROTECTION	(* 7)	-	Automatic recovery, O.C.P point: 105% ~								
16	OVER VOLTAGE PROTECTION	(* 8)	-	6V ~ (CH1 only)								
17	HOLD - UP TIME (TYP)	(* 1)	-	17ms (Input 100VAC)								
18	OPERATING TEMPERATURE	(* 9)	-	Convection cooling 0 ~ 50°C:100% load; 60°C:70% load								
19	OPERATING HUMIDITY		-	30% ~ 90%RH								
20	STORAGE TEMPERATURE		-	-20°C ~ +85°C								
21	STORAGE HUMIDITY		-	10% ~ 95%RH								
22	COOLING		-	Convection cooling								
23	EMI		-	Conform to FCC-B, VCCI-2, EN55022B								
24	WITHSTAND VOLTAGE		-	I/P-O/P:3kVAC(20mA),I/P-FG:2.5kVAC(20mA),O/P-FG:500VAC(100mA) for 1min								
25	ISOLATION RESISTANCE		-	More than 100MΩ at Ta=25°C and 70%RH, Output - FG 500VDC								
26	VIBRATION		-	10 ~ 55Hz Amplitude (sweep 1min) Less than 19.6m/s^2 X ,Y ,Z 1Hr each								
27	SHOCK		-	Less than 196.1m/s^2								
28	OUTPUT GROUNDING		-	All channels common ground (3 terminals)								
29	SAFETY		-	Conform to UL1950, CSA950, EN60950, DENTORI								
30	WEIGHT		-	600g								
31	SIZE (W*D*H)		m/m	108.0 x 196.9 x 45.0								
			inch	4.25 x 7.75 x 1.77 (3.75 x 7.25 mounting hole Φ 3.5mm)								

NOTES:

*1. At 100VAC, 200VAC and MAX. OUTPUT POWER (Convection cooling), Ta=25°C.
*2. For cases where conformance to various safety specs (UL,CSA, EN) are required to be described as 100~120VAC, 200~240VAC, 50/60 Hz on name plate.
*3. Please refer to Fig A for measurement determination of line & load regulation and output ripple voltage. (Measure with JEITA RC-9131 probe)
*4. From 85~132VAC / 170~265VAC, constant load.
*5. From Min. load - Full load (Maximum power), constant input voltage.
*6. From 0°C ~ +50°C, constant input voltage and load.
*7. Current limiting with automatic recovery. Avoid to operate over load or dead short for more than 30 seconds.
*8. Over voltage clamping by zener diode.
*9. At standard mounting method, Fig B.
*10. When resuming operation in less than 5sec. after power failure, soft start circuit will not limit the in-rush current at turn-on.

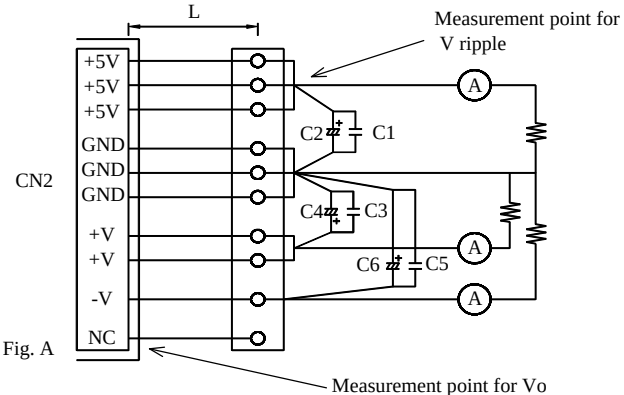


Fig. A

L: 150mm AWG#18
C1,C3,C5: Film Cap 0.1µF
C2,C4,C6: Elec. Cap 100µF
Bandwidth of scope: 100MHz

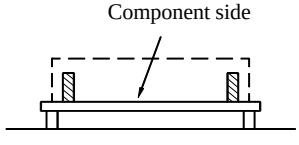


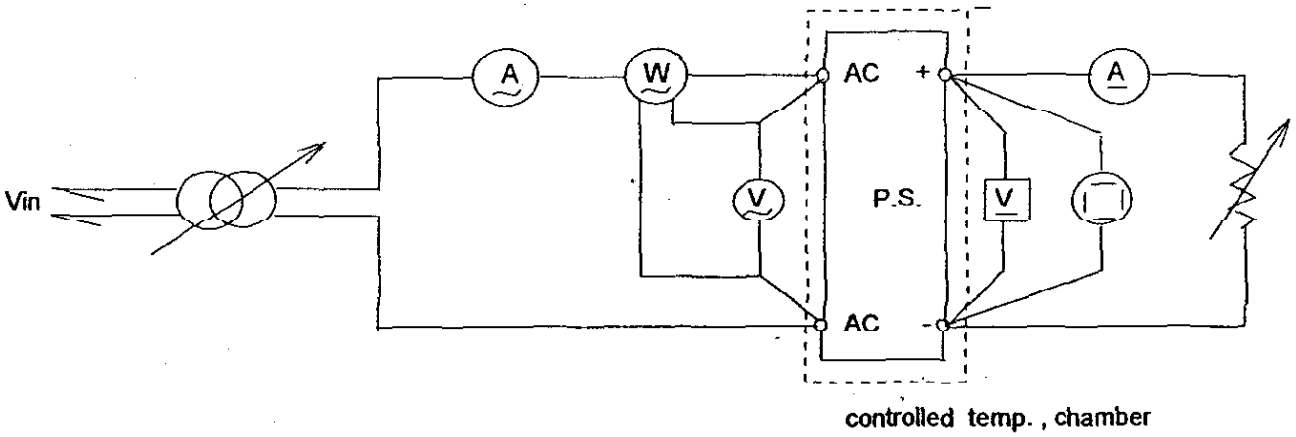
Fig. B

2. EVALUATION METHOD

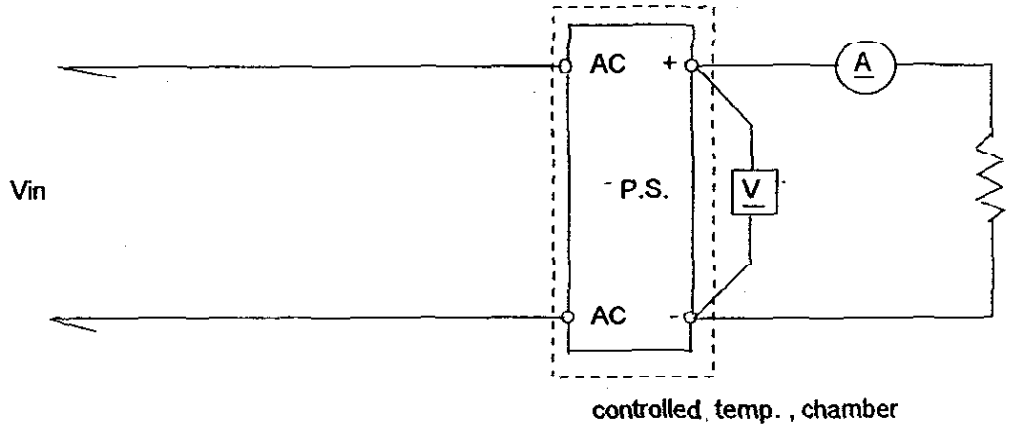
SWT100 - *

2 - 1 Circuits used for determination

(1) Steady state data

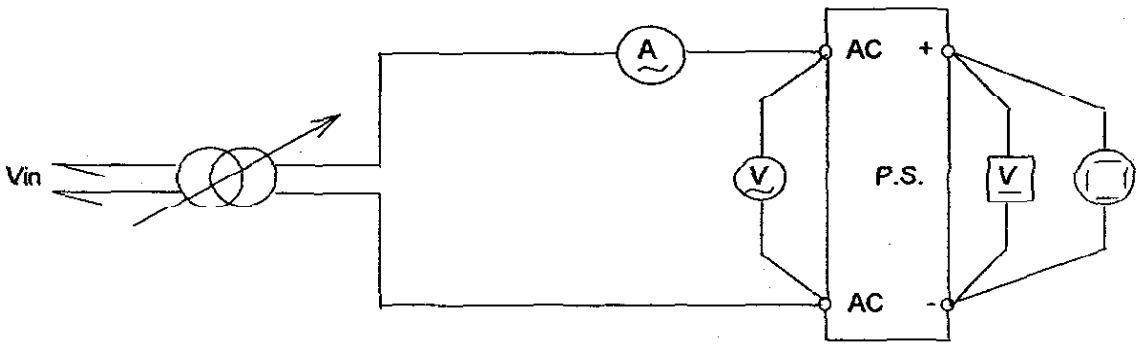


(2) Warm up voltage drift characteristics

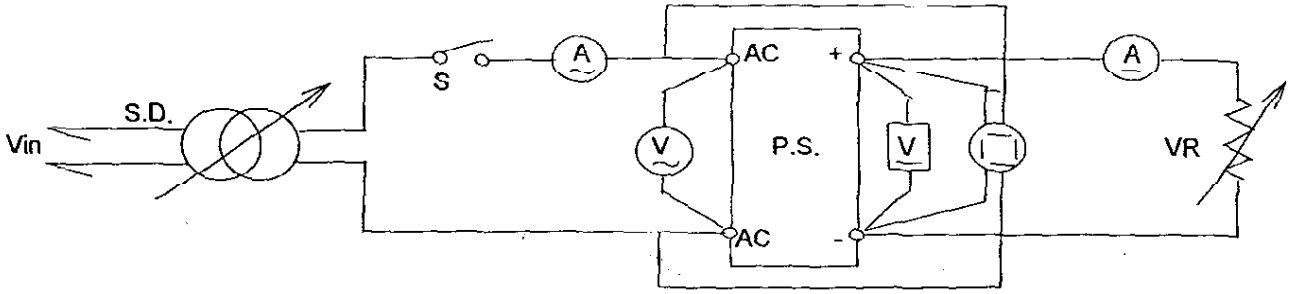


(3) Over current protection (OCP) characteristics
Same as steady state data

(4) Over voltage protection (OVP) characteristics

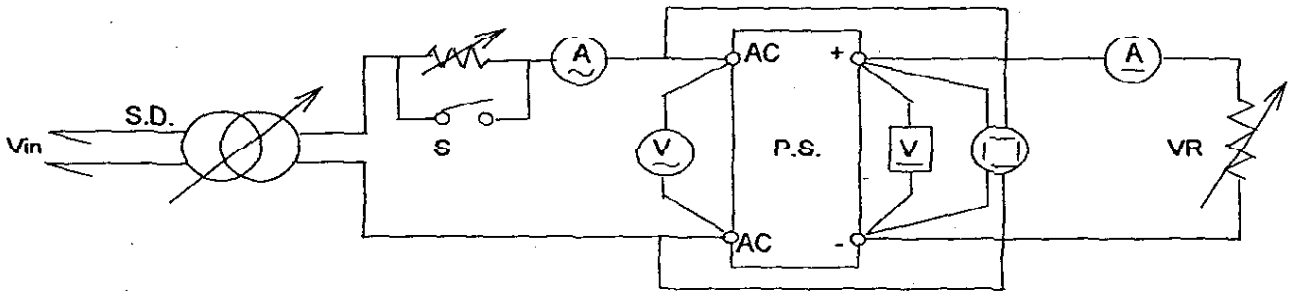


(5) Output rise characteristics

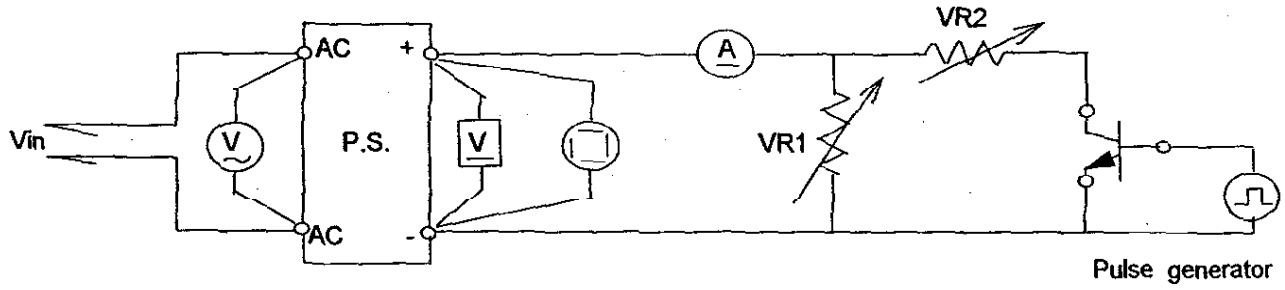


(6) Output fall characteristics same as output rise characteristics

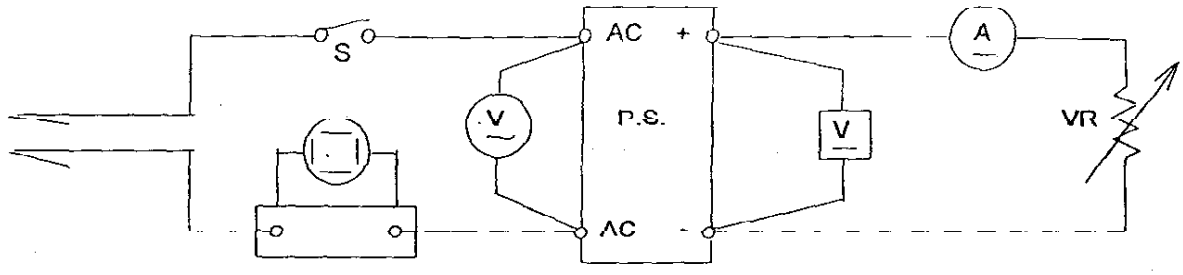
(7) Dynamic line response characteristics



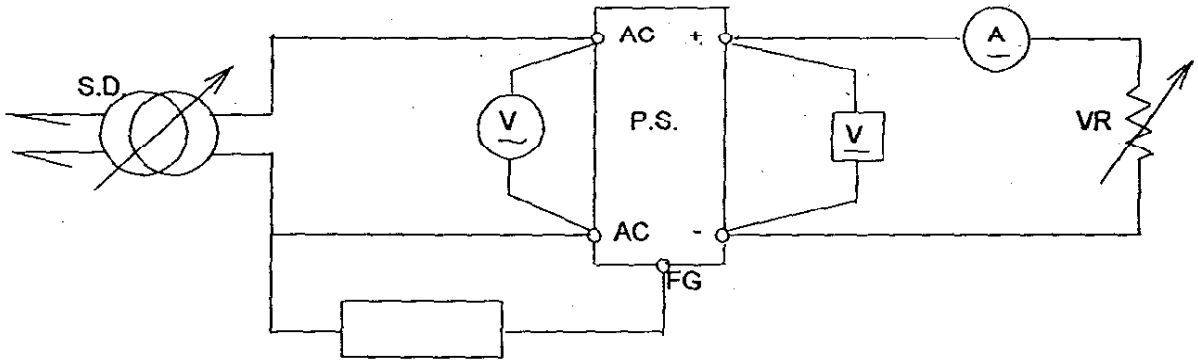
(8) Dynamic load response characteristics



(9) Inrush current characteristics



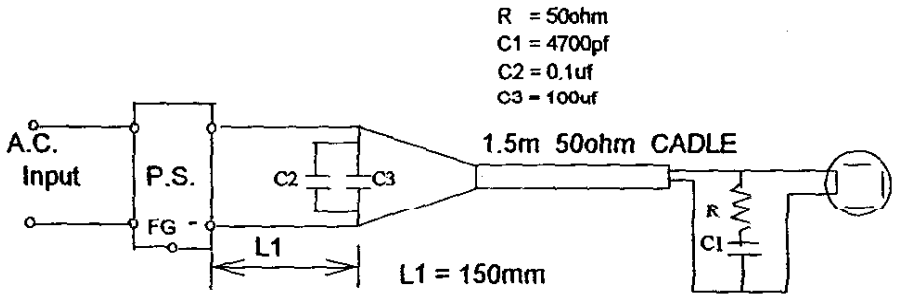
(10) Leakage current characteristics



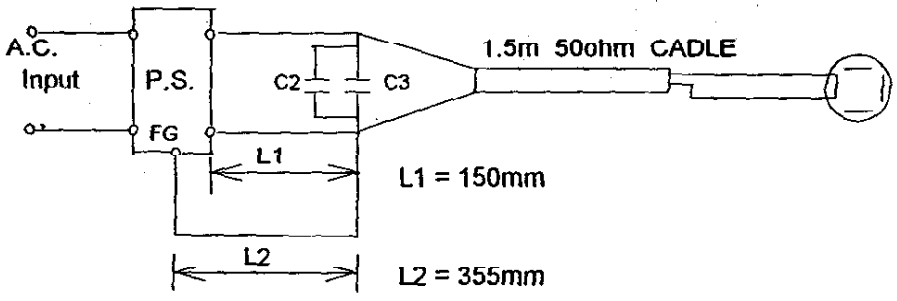
Note : Leakage current measured through a 1Kohm resistor
Range wed : AC + DC

(11) Output - ripple , noise

a) NORMAL MODE



b) NORMAL + COMMON MODE



2 - 2 List of equipments

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	Oscilloscope	HITACHI	V - 1050
2	Digital storage oscilloscope	TEKTRONIX	TDS - 540A
3	Digital multimeter	MASTECH	DM8145A
4	Digital watt/current/volt meter	HIOKI	3186
5	DC Ampere meter	YOKOGAWA	2051
6	Autotransformer	YUYAO	TDGC2 - 2
7	Variable resistive load	IWASHITA	D - 5
8	Electric load	KIKUSUI	PLZ72W,PLZ300W
9	Digirush currenter	TAKAMISAWA	PSA - 200
10	Current Probe/Amplifier	TEKTRONIX	A6303/AM503B
11	Controlled Temp. Chamber.	HIFLEX	FX4100
12	Leakage current meter	YOKOGAWA	3226
13	AC Power Supply	KIKUSUI	PCR - 2000L

REGULATION - Line & Load,Temp. Drift

SWT100-522

CH1

1. Regulation - Line & Load

Conditions Ta = 25°C
CH2,CH3: Iout = 100%

Iout / Vin	AC 85V	AC 100V	AC 132V	Line Regulation	
Min Load	5.020V	5.021V	5.021V	0.001V	0.02%
50%	5.018V	5.018V	5.018V	0V	0.00%
100%	5.013V	5.016V	5.015V	0.003V	0.06%
Load	0.007V	0.005V	0.006V		
Regulation	0.14%	0.10%	0.12%		

2.. Temperature Drift

Conditions Vin = 100VAC
Iout = 100%

Ta(°C)	0	25	50	Temp. Stability	
Vout	5.030V	5.016V	5.012V	0.018V	0.36%

CH2

1. Regulation - Line & Load

Conditions Ta = 25°C
CH1,CH3: Iout = 100%

Iout / Vin	AC 85V	AC 100V	AC 132V	Line Regulation	
Min Load	12.068V	12.068V	12.069V	0.001V	0.01%
50%	12.076V	12.076V	12.076V	0V	0.00%
100%	12.084V	12.085V	12.085V	0.001V	0.01%
Load	0.016V	0.017V	0.016V		
Regulation	0.13%	0.14%	0.13%		

2.. Temperature Drift

Conditions Vin = 100VAC
Iout = 100%

Ta(°C)	0	25	50	Temp. Stability	
Vout	12.085V	12.085V	12.082V	0.005V	0.04%

CH3

1. Regulation - Line & Load

Conditions Ta = 25°C
CH1,CH2: Iout = 100%

Iout / Vin	AC 85V	AC 100V	AC 132V	Line Regulation	
Min Load	-12.021V	-12.020V	-12.020V	0.001V	0.01%
50%	-12.013V	-12.013V	-12.013V	0V	0.00%
100%	-12.007V	-12.007V	-12.007V	0V	0.00%
Load	0.014V	0.013V	0.013V		
Regulation	0.12%	0.11%	0.11%		

2.. Temperature Drift

Conditions Vin = 100VAC
Iout = 100%

Ta(°C)	0	25	50	Temp. Stability	
Vout	-11.992V	-12.007V	-12.036V	0.044V	0.37%

REGULATION - Line & Load,Temp. Drift

SWT100-522

CH1

1. Regulation - Line & Load

Conditions Ta = 25°C
CH2,CH3: Iout = 100%

Iout / Vin	AC 170V	AC 200V	AC 265V	Line Regulation	
Min Load	5.019V	5.022V	5.022V	0.003V	0.06%
50%	5.016V	5.016V	5.016V	0V	0.00%
100%	5.012V	5.012V	5.013V	0.001V	0.02%
Load Regulation	0.007V	0.010V	0.009V		
	0.14%	0.20%	0.18%		

2.. Temperature Drift

Conditions Vin = 200VAC
Iout = 100%

Ta(°C)	0	25	50	Temp. Stability	
Vout	5.031V	5.012V	5.014V	0.019V	0.38%

CH2

1. Regulation - Line & Load

Conditions Ta = 25°C
CH1,CH3: Iout = 100%

Iout / Vin	AC 170V	AC 200V	AC 265V	Line Regulation	
Min Load	12.068V	12.068V	12.069V	0.001V	0.01%
50%	12.076V	12.076V	12.076V	0V	0.00%
100%	12.085V	12.085V	12.087V	0.002V	0.02%
Load Regulation	0.017V	0.017V	0.018V		
	0.14%	0.14%	0.15%		

2.. Temperature Drift

Conditions Vin = 200VAC
Iout = 100%

Ta(°C)	0	25	50	Temp. Stability	
Vout	12.086V	12.085V	12.082V	0.005V	0.04%

CH3

1. Regulation - Line & Load

Conditions Ta = 25°C
CH1,CH2: Iout = 100%

Iout / Vin	AC 170V	AC 200V	AC 265V	Line Regulation	
Min Load	-12.025V	-12.024V	-12.023V	0.002V	0.02%
50%	-12.018V	-12.019V	-12.019V	0.001V	0.01%
100%	-12.014V	-12.014V	-12.014V	0V	0.00%
Load Regulation	0.011V	0.010V	0.009V		
	0.09%	0.08%	0.09%		

2.. Temperature Drift

Conditions Vin = 200VAC
Iout = 100%

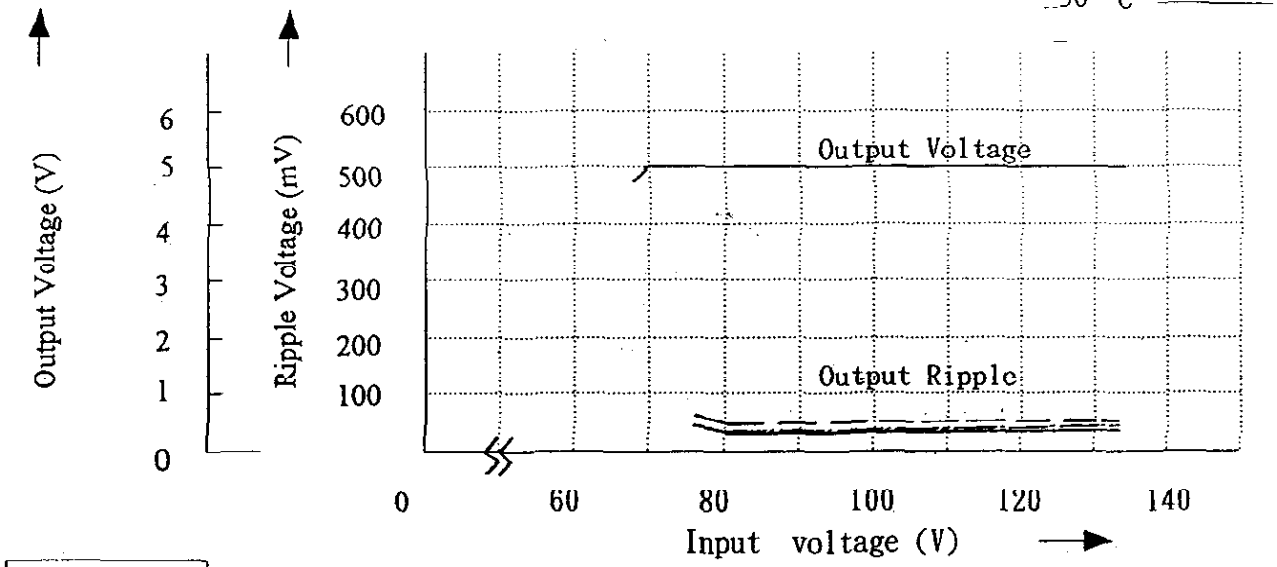
Ta(°C)	0	25	50	Temp. Stability	
Vout	-11.989V	-12.014V	12.038V	0.049V	0.41%

OUTPUT VOLTAGE AND RIPPLE v.s INPUT VOLTAGE

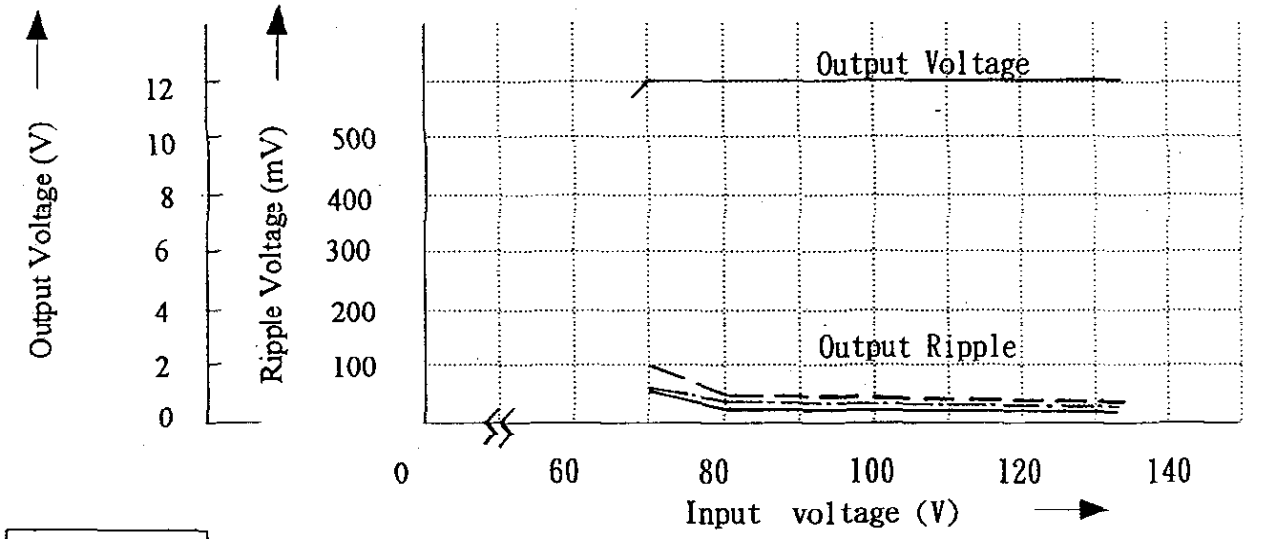
SWT100 - 522

Conditions Iout = 100%
Ta: 0 °C
25 °C
50 °C

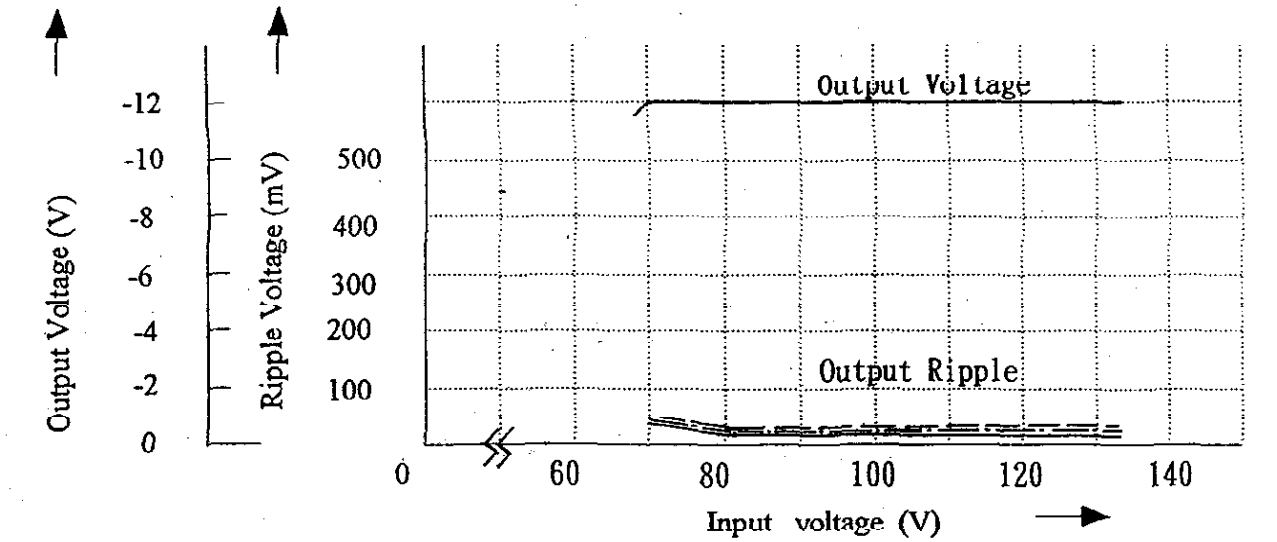
CH1



CH2



CH3

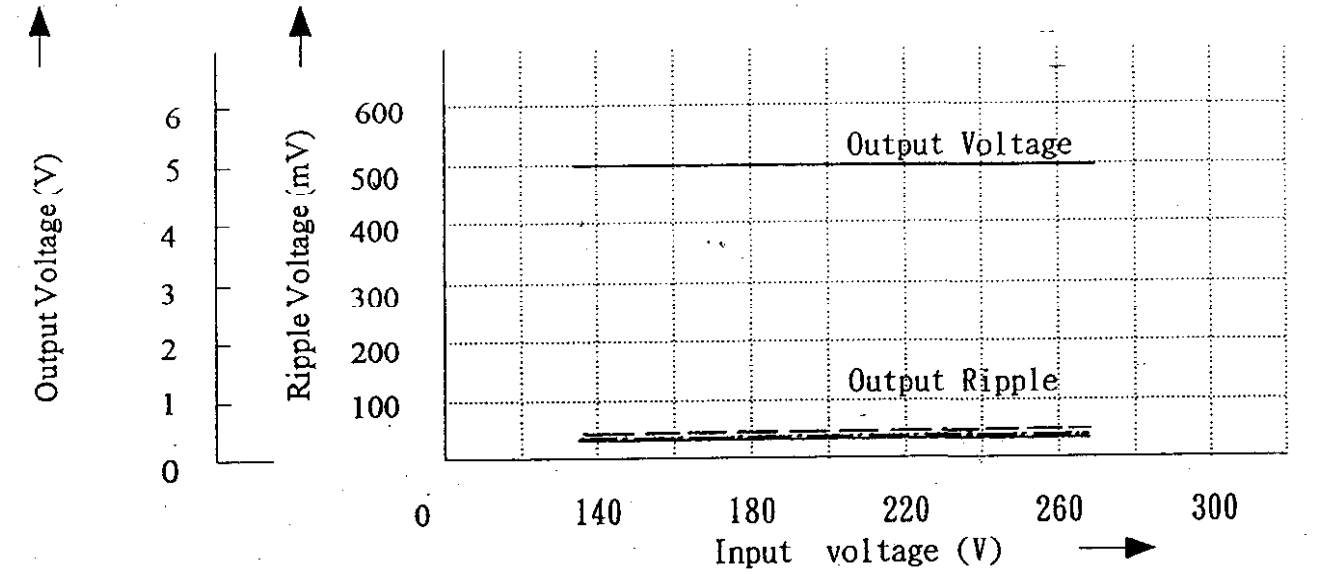


OUTPUT VOLTAGE AND RIPPLE v.s INPUT VOLTAGE

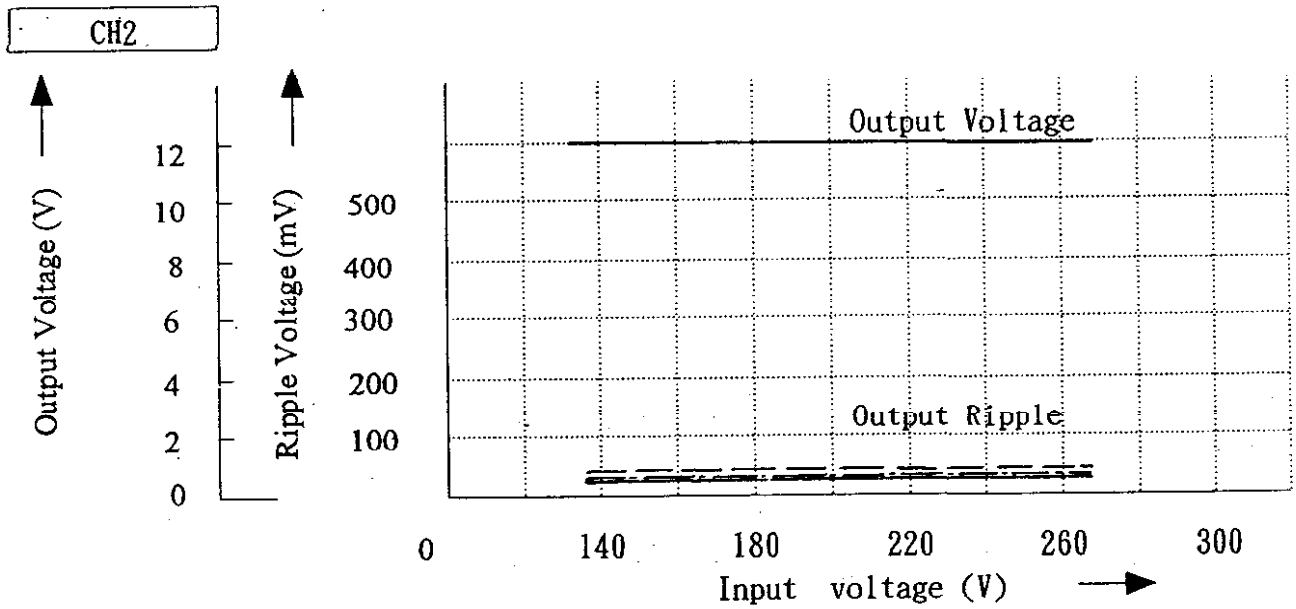
SWT100 - 522

Conditions Iout = 100%
Ta : 0 °C — —
25 °C — - —
50 °C ———

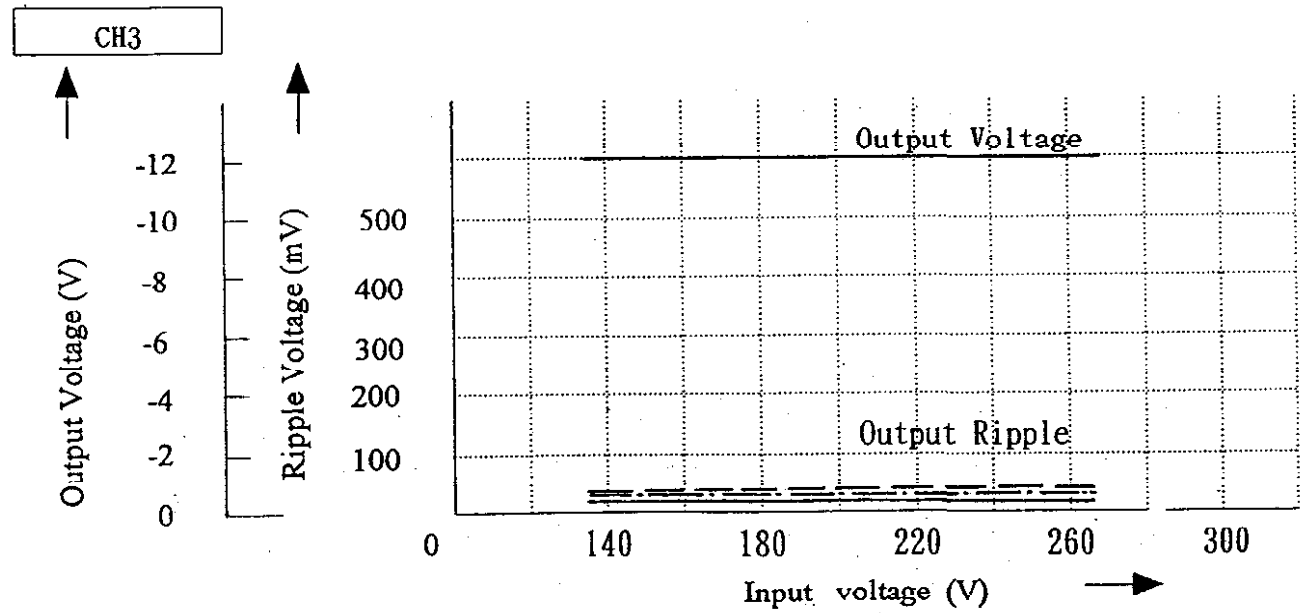
CH1



CH2



CH3



EFFIENCY AND INPUT CURRENT v.s OUTPUT CURRENT

SWT100 - *

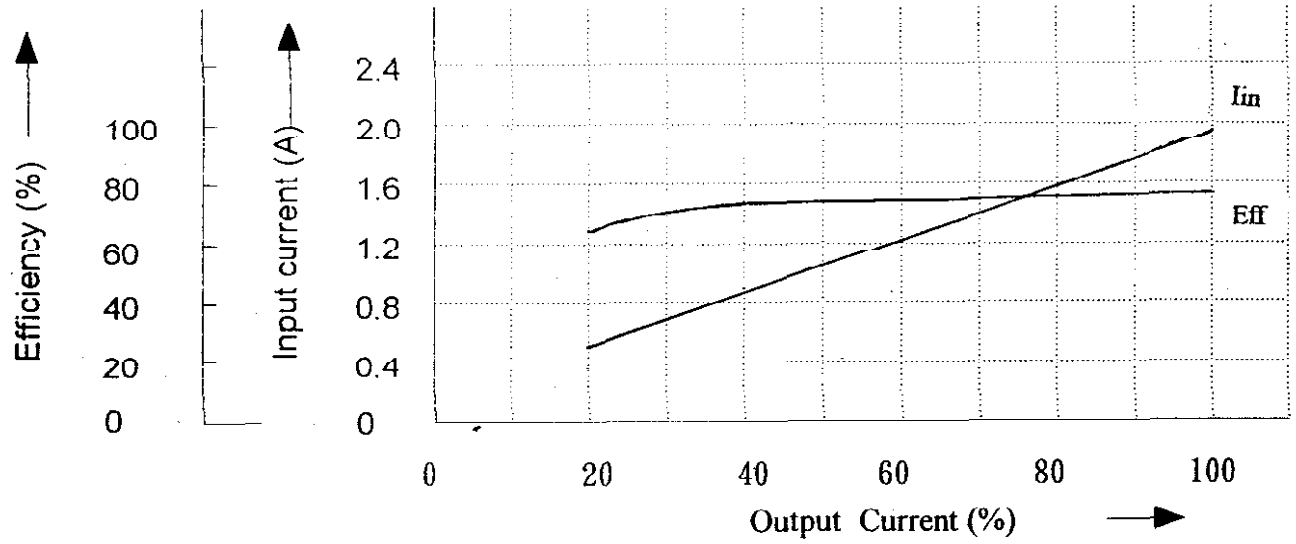
Conditions

Vina = 100VAC

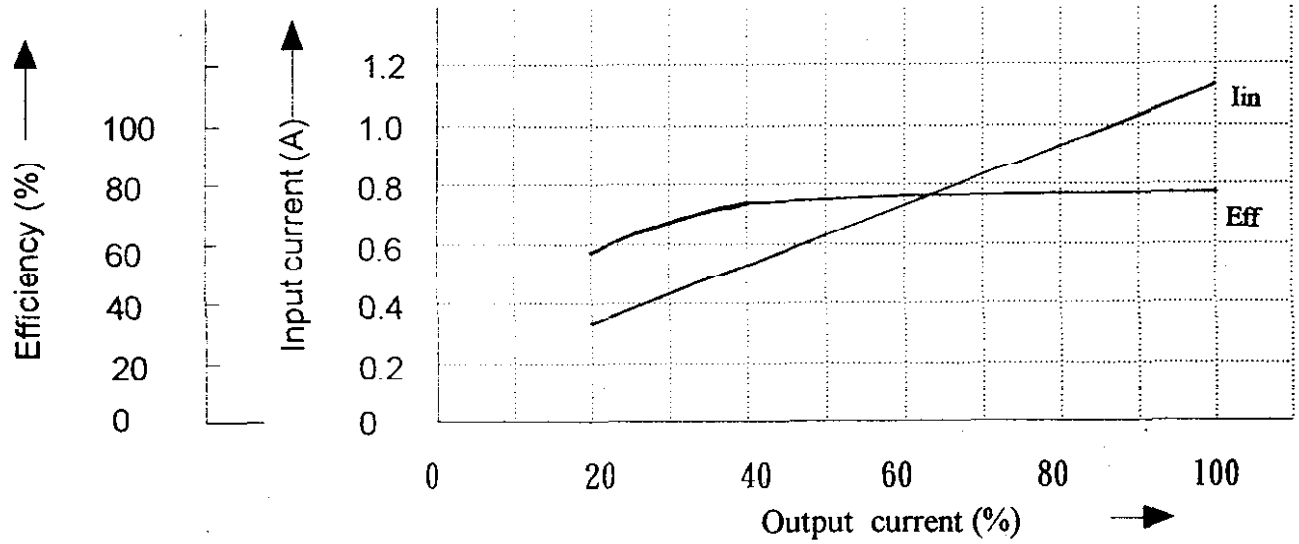
Vinb = 200VAC

Ta = 25 °C

A: 100VAC



B: 200VAC

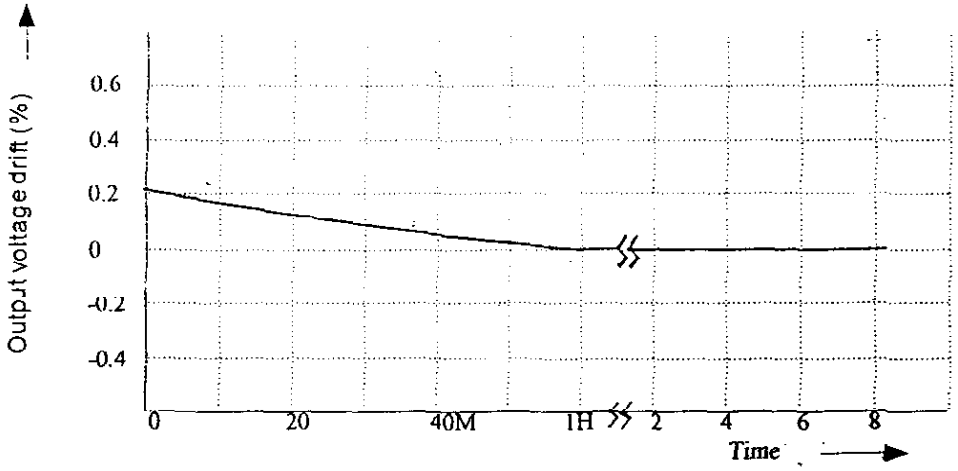


WARM UP DRIFT

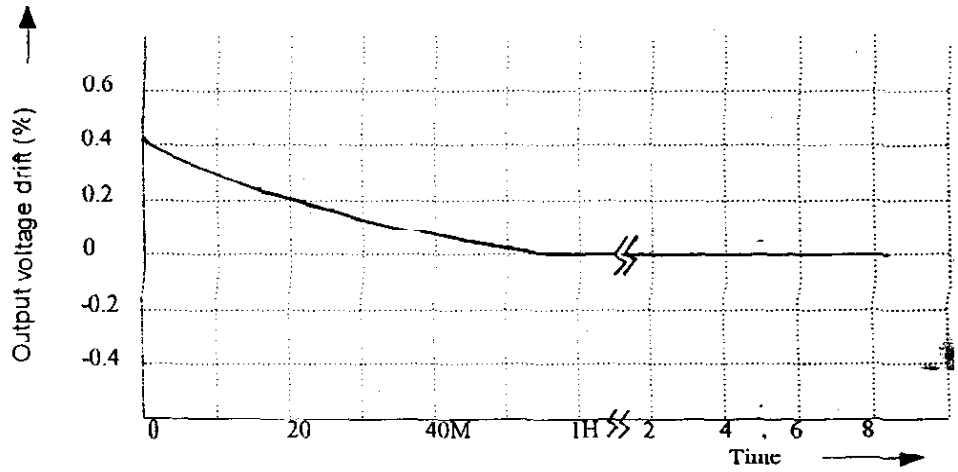
SWT100 - 522

Conditions Vin = 100VAC
Iout = 100%
Ta = 25 °C

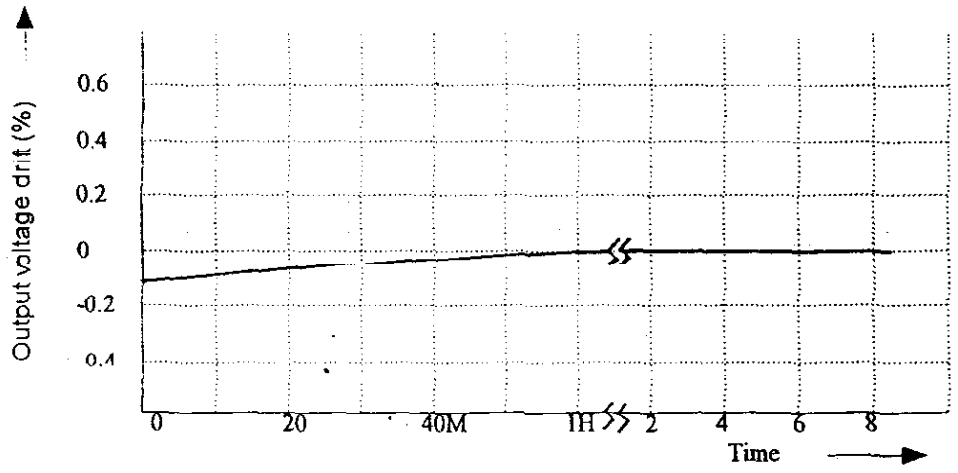
CH1



CH2



CH3



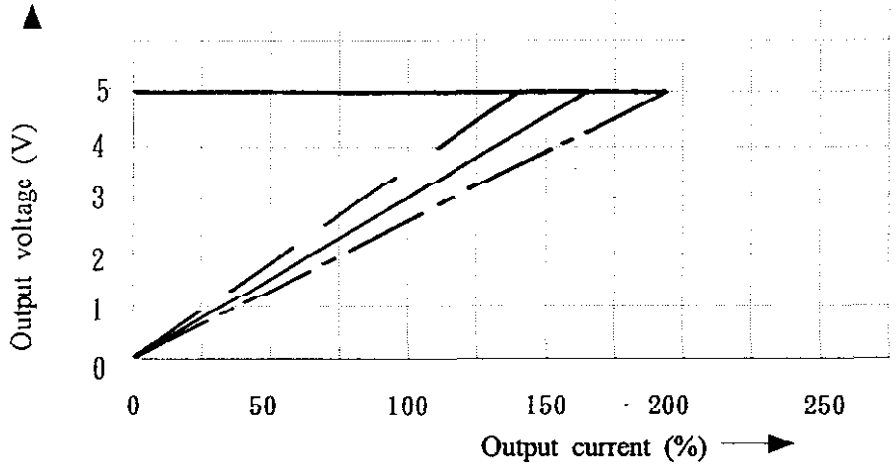
OCP CHARACTERISTICS v.s INPUT VOLTAGE

SWT100 - 522

Conditions Ta = 25 °C
Vin : 85VAC
100VAC
132VAC

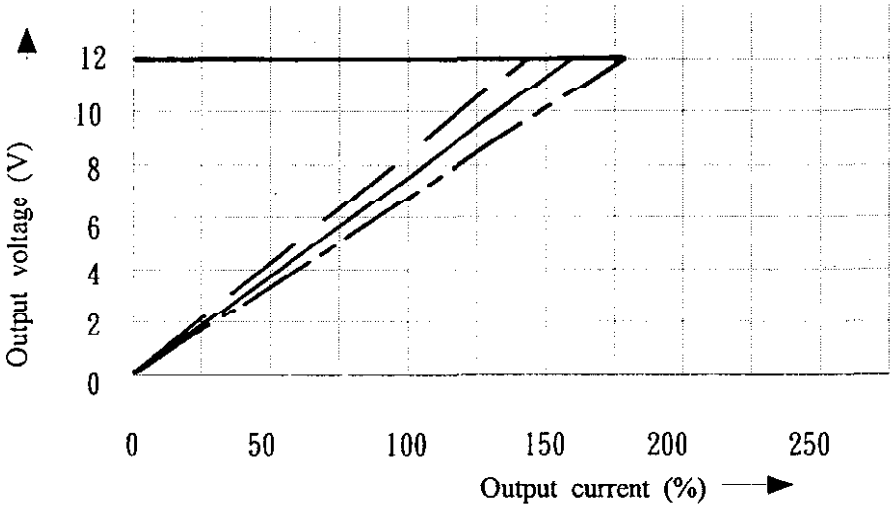
CH1

Iout:
CH2,3:100%



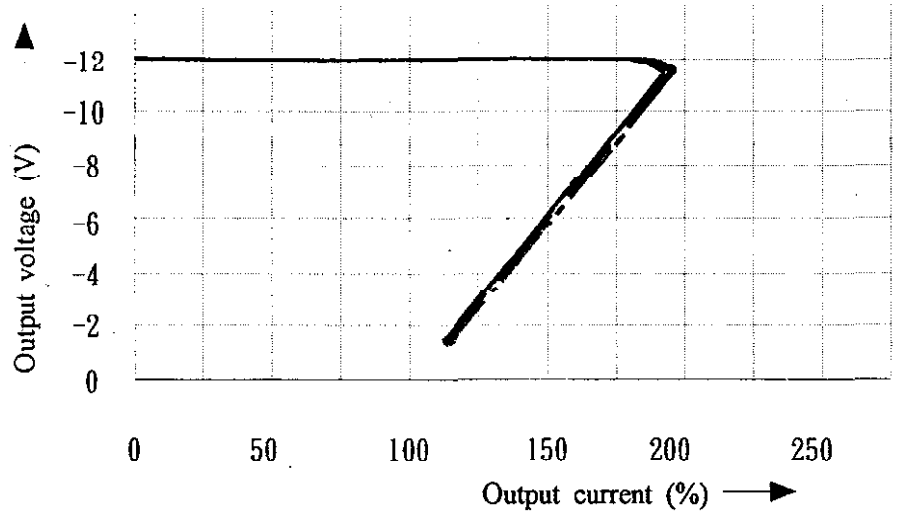
CH2

Iout:
CH1,3:100%



CH3

Iout:
CH1,2:100%



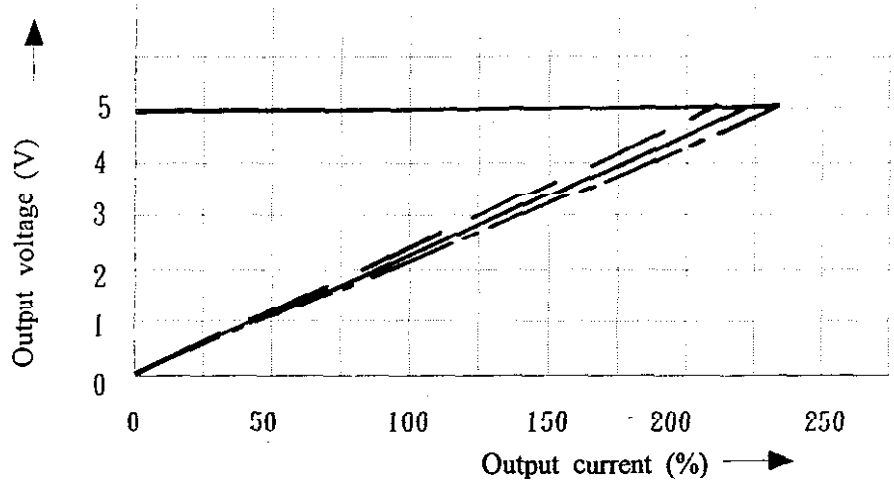
OCP CHARACTERISTICS v.s INPUT VOLTAGE

SWT100 - 522

Conditions Ta = 25 °C
Vin :170VAC
200VAC
265VAC

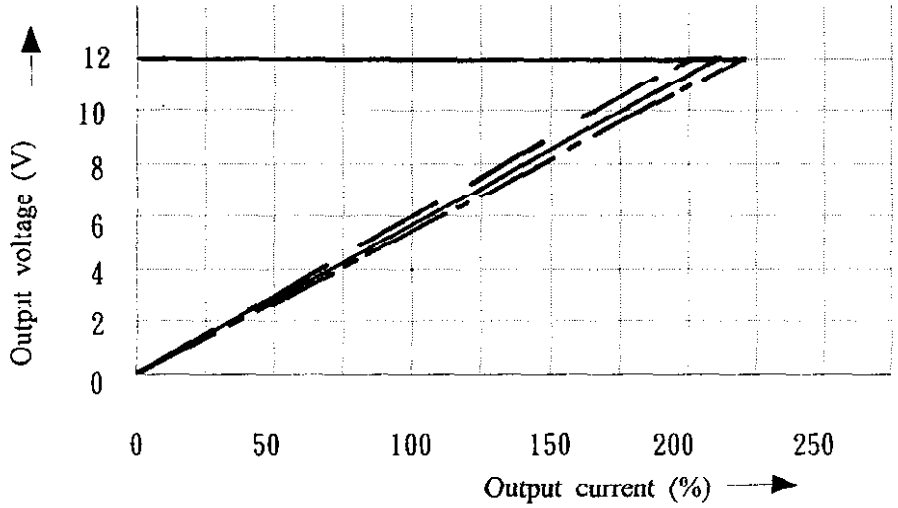
CH1

Iout:
CH2,3:100%



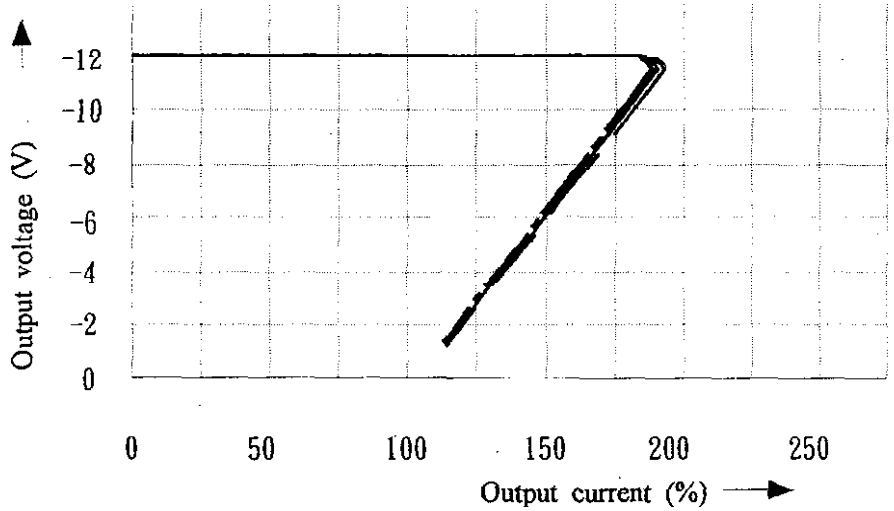
CH2

Iout:
CH1,3:100%



CH3

Iout:
CH1,2:100%



OCP CHARACTERISTICS v.s TEMP.

SWT100 - 522

Conditions

Vin = 100VAC

Ta : 0 °C

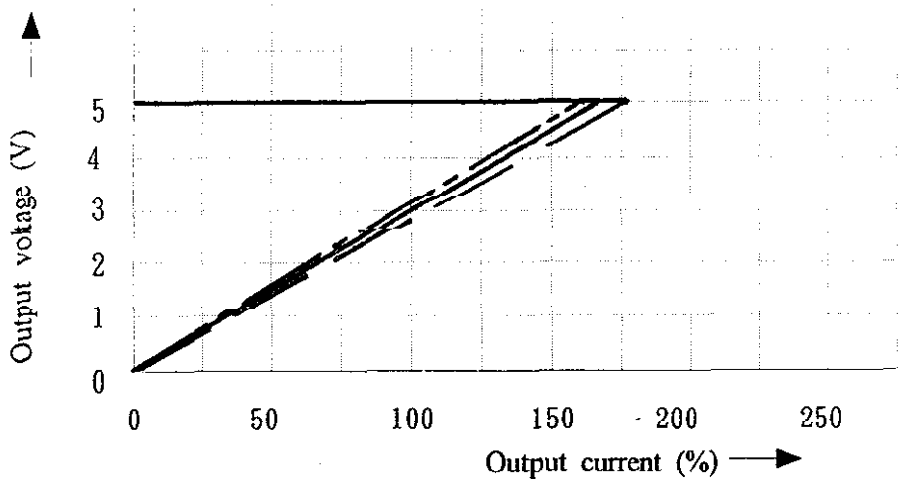
25 °C

50 °C

CH1

Iout:

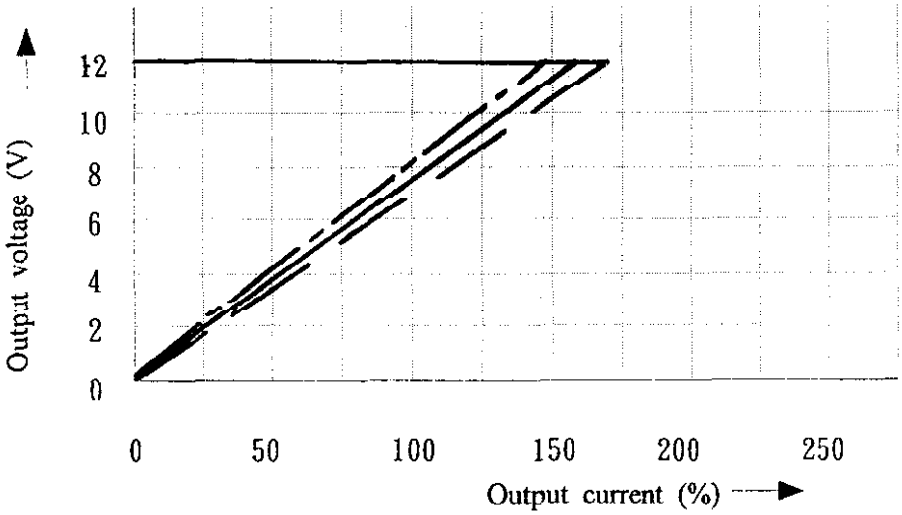
CH2,3:100%



CH2

Iout:

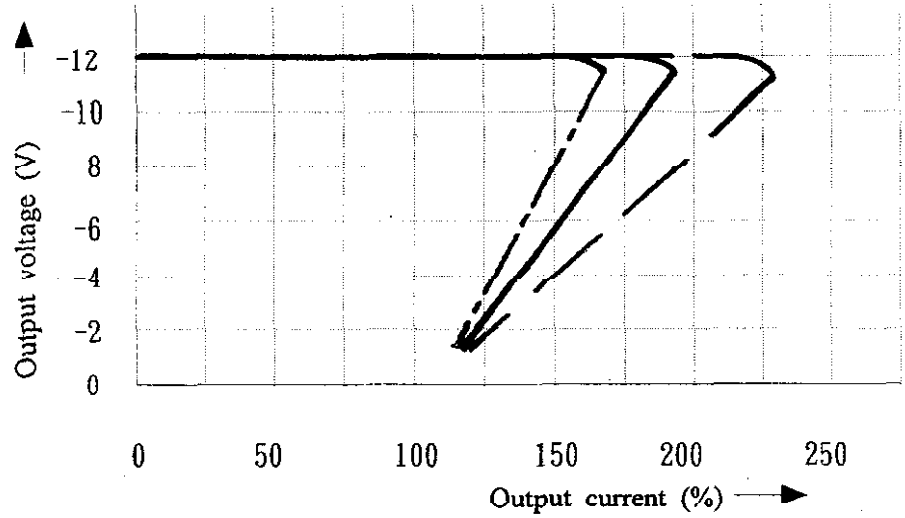
CH1,3:100%



CH3

Iout:

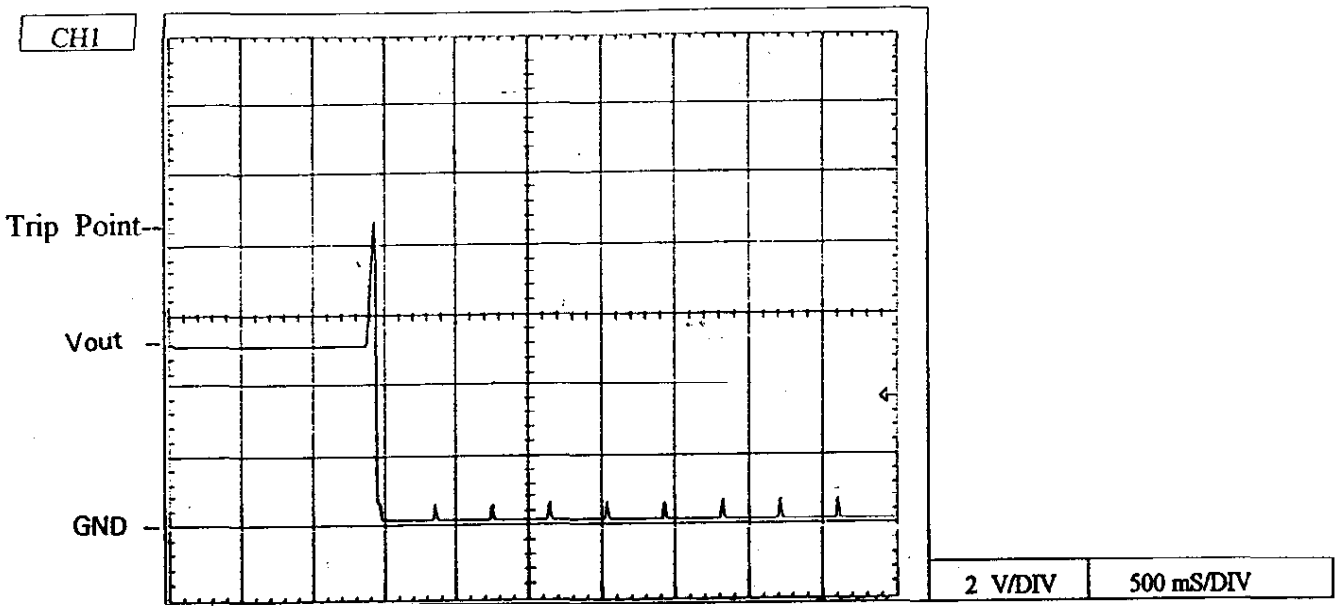
CH1,2:100%



O.V.P CHARACTERISTICS

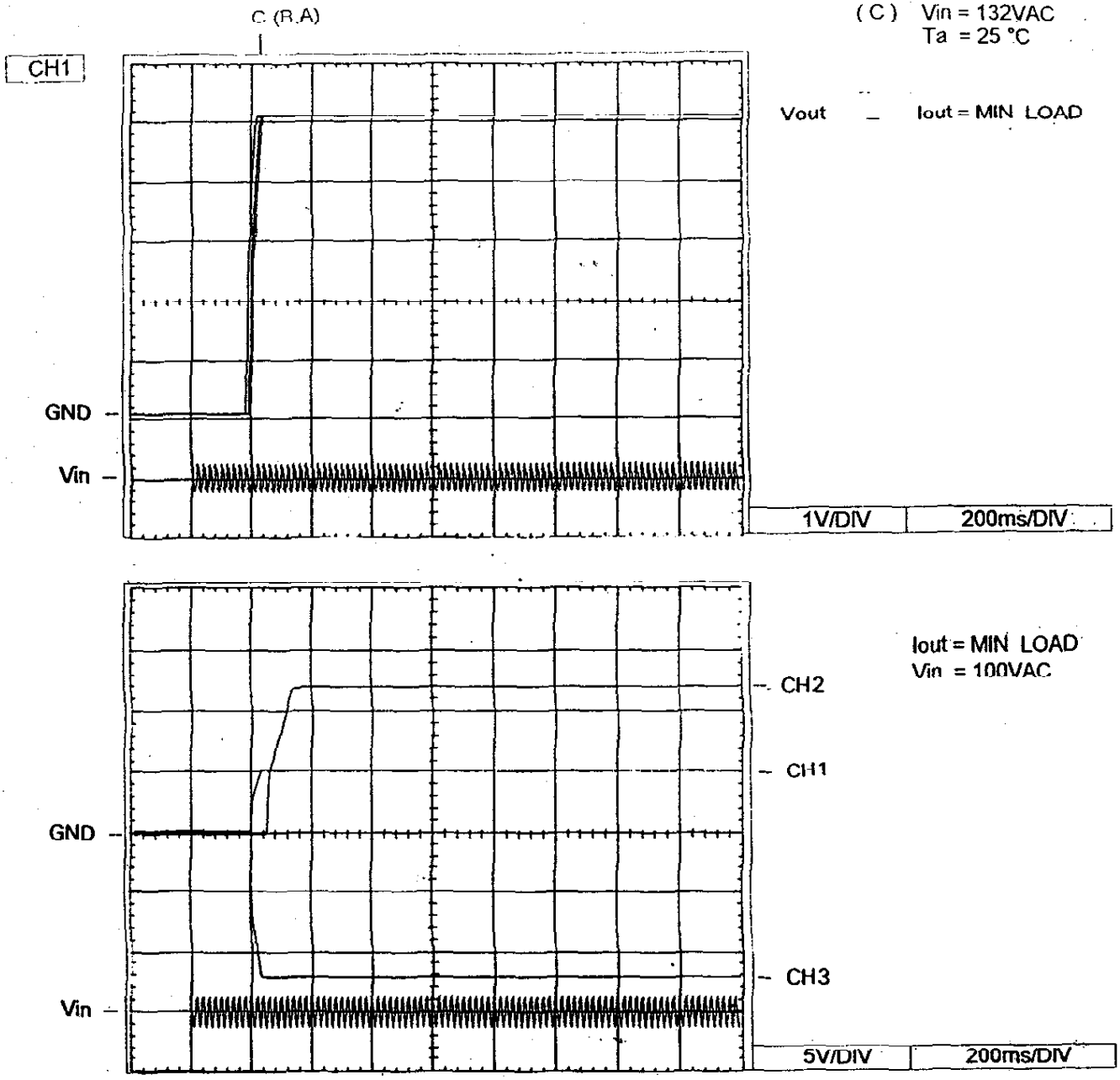
SWT100- *

Conditions Vin = 100VAC
Iout = Min Load
Ta = 25 °C



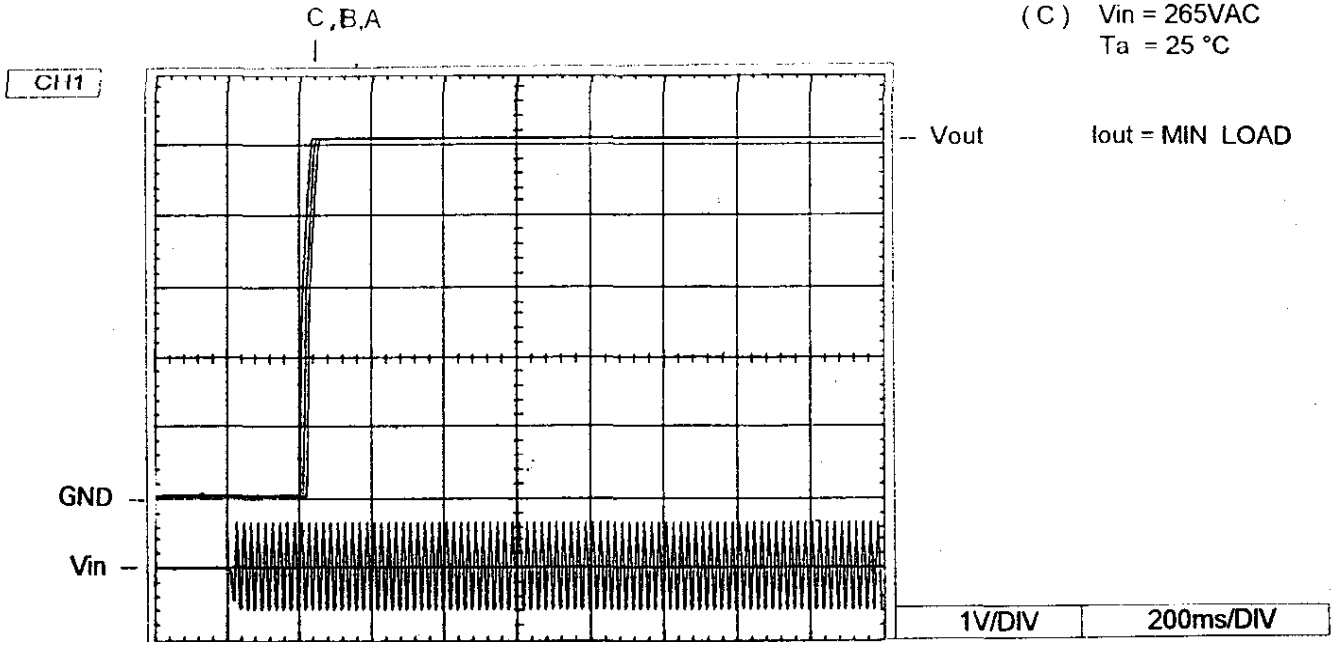
OUTPUT RISE TIME

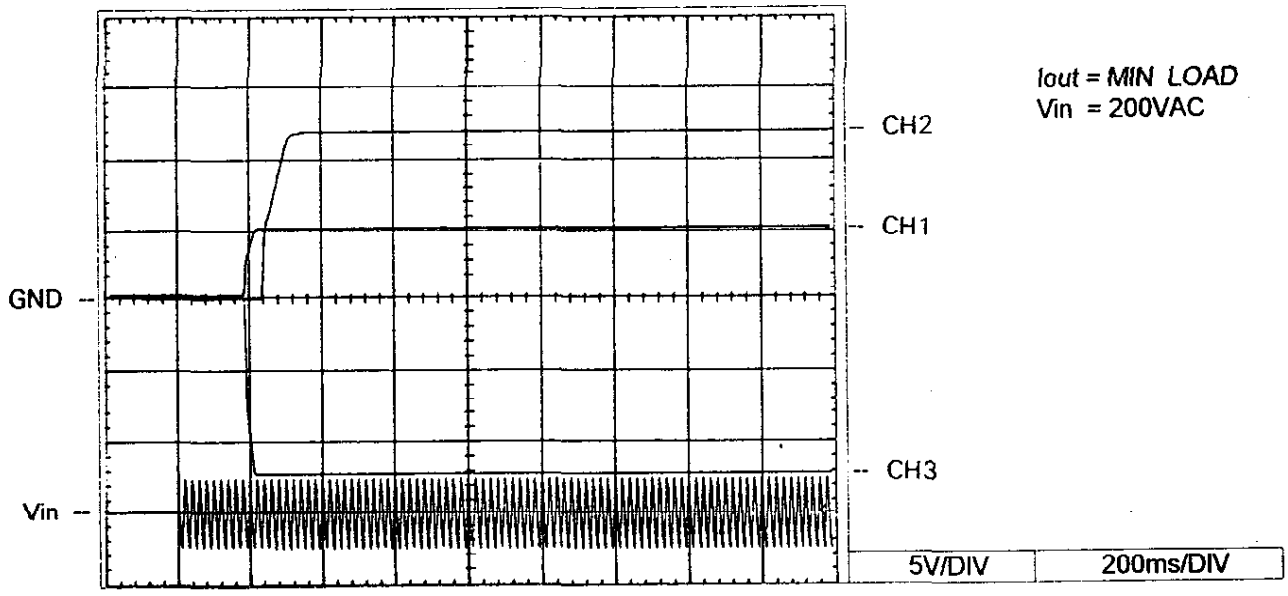
Conditions
(A) Vin = 85VAC
(B) Vin = 100VAC
(C) Vin = 132VAC
Ta = 25 °C



OUTPUT RISE TIME

Conditions
(A) Vin = 170VAC
(B) Vin = 200VAC
(C) Vin = 265VAC
Ta = 25 °C

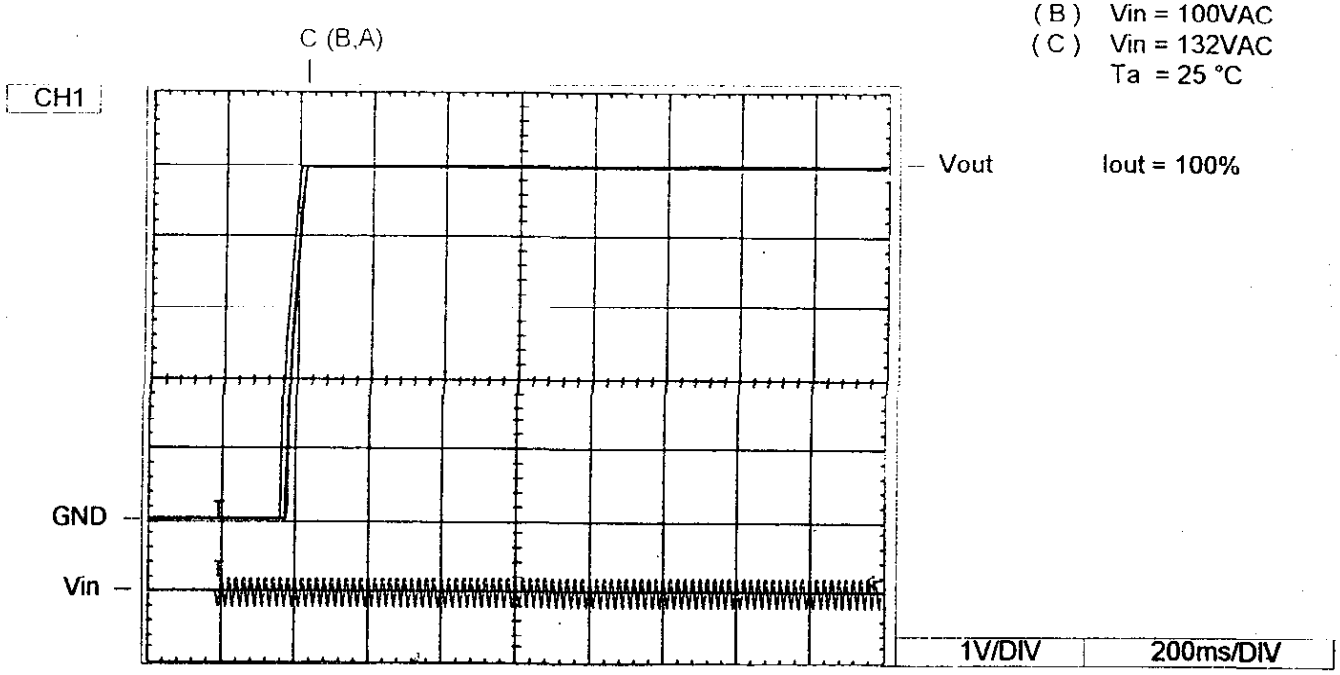


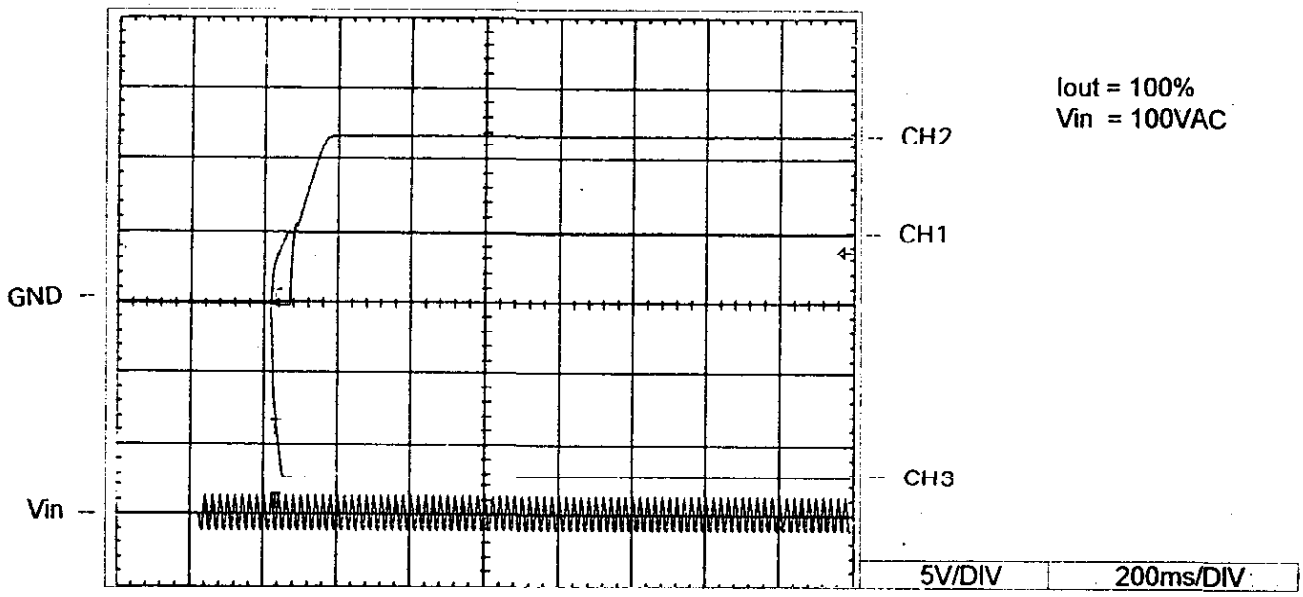


OUTPUT RISE TIME

Conditions

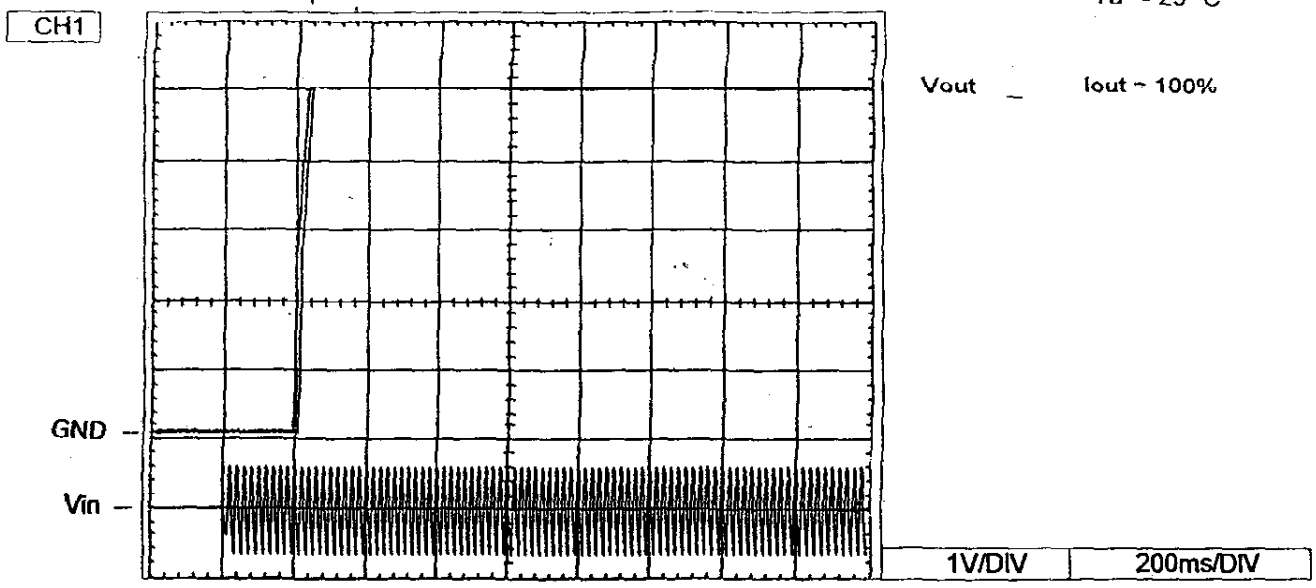
(A) Vin = 85VAC
(B) Vin = 100VAC
(C) Vin = 132VAC
Ta = 25 °C

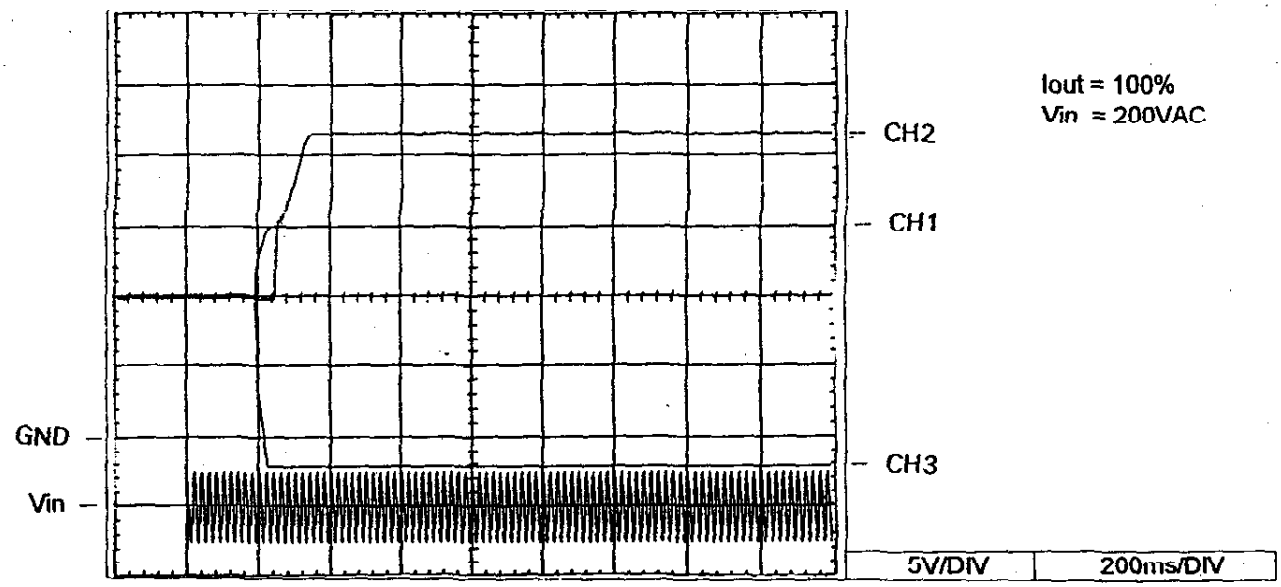




OUTPUT RISE TIME

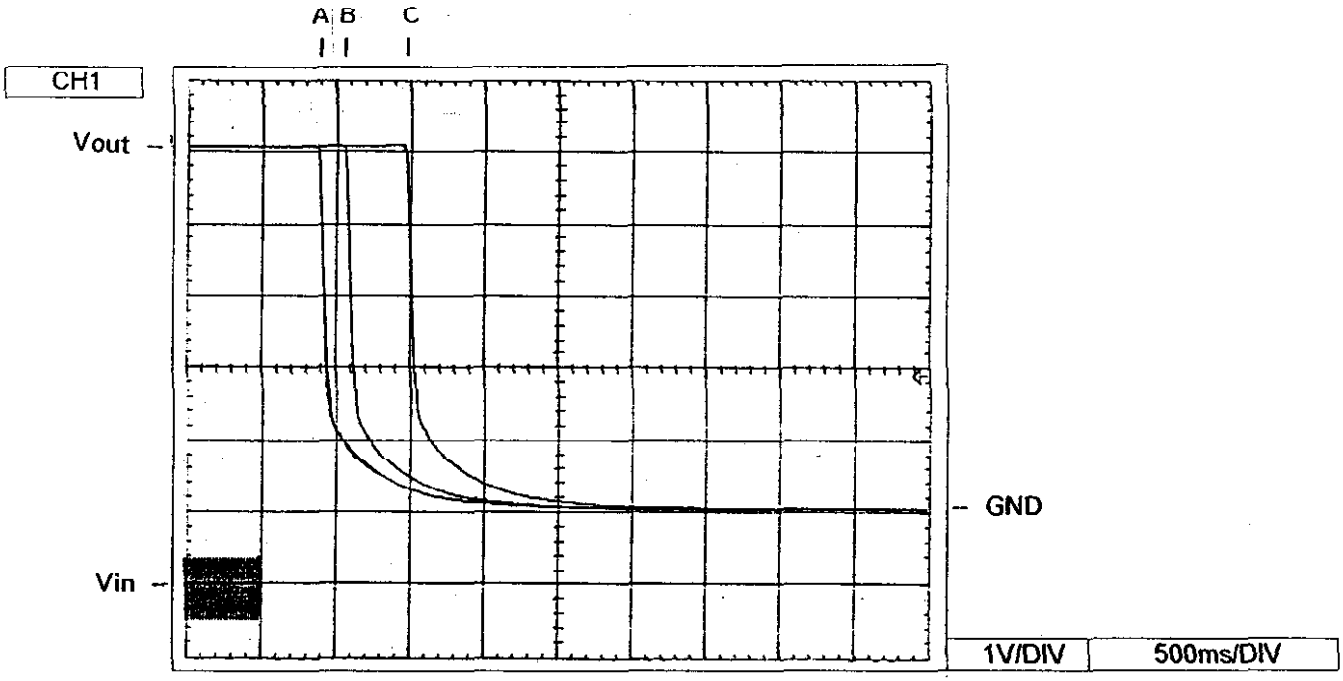
Conditions
(A) Vin = 170VAC
(B) Vin = 200VAC
(C) Vin = 265VAC
Ta = 25 °C

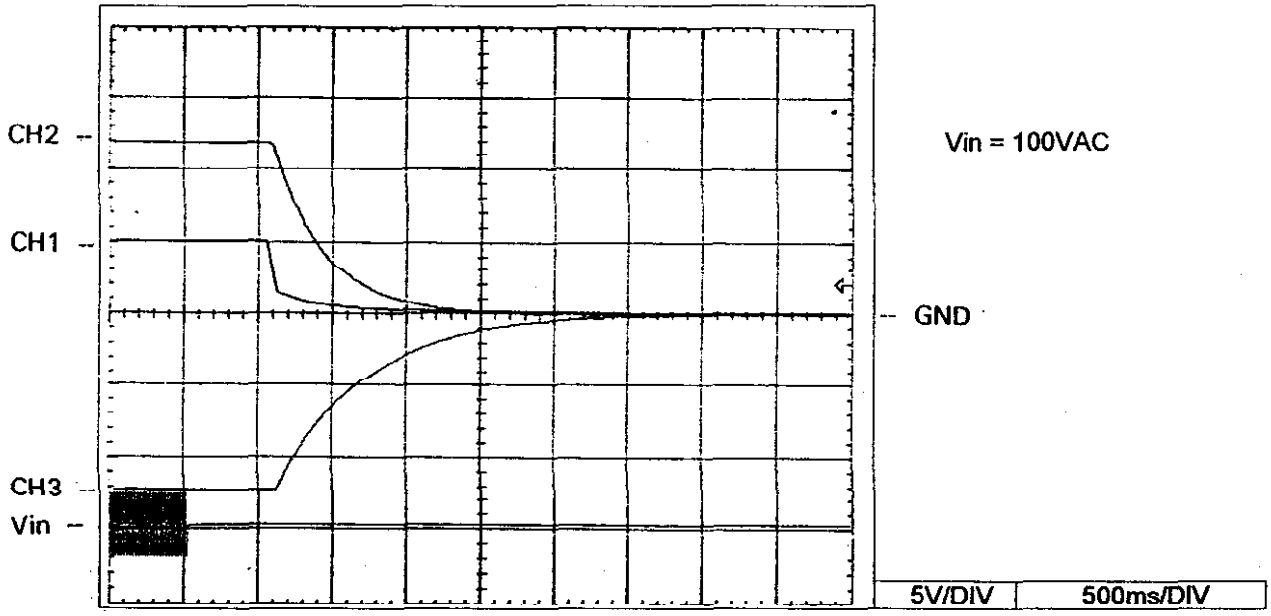




OUTPUT FALL TIME

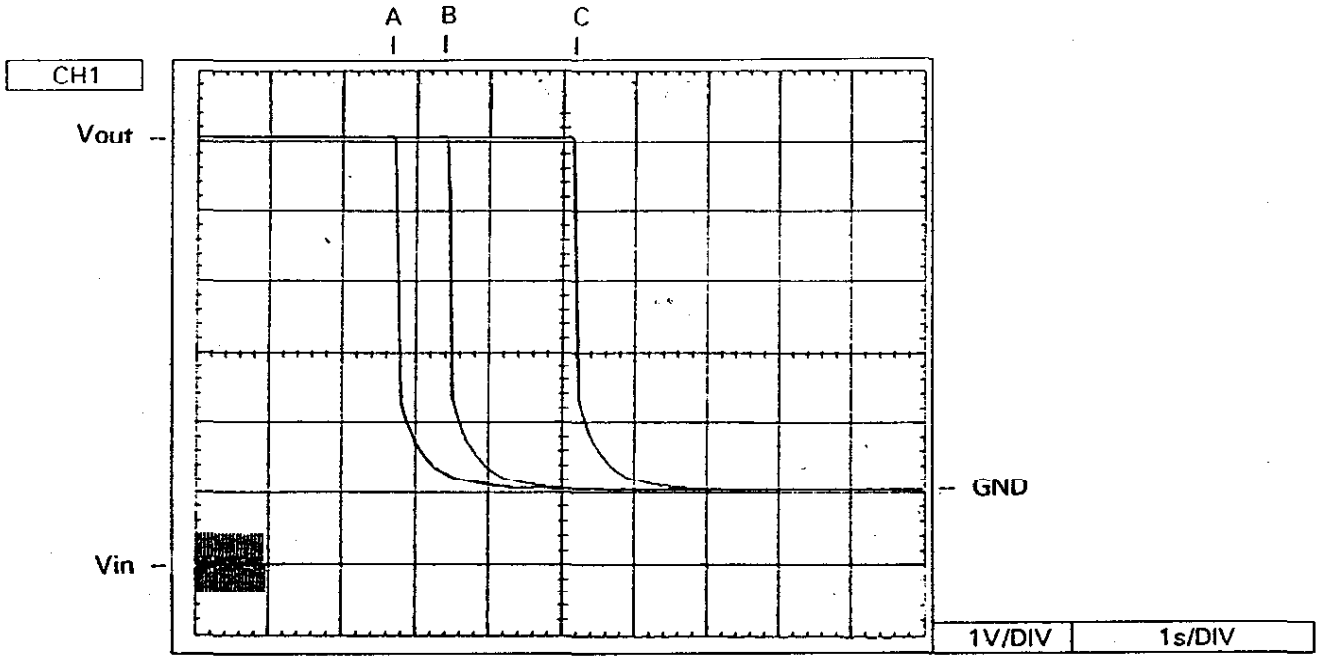
Conditions
(A) Vin = 85VAC
(B) Vin = 100VAC
(C) Vin = 132VAC
Ta = 25°C
Iout = MIN LOAD

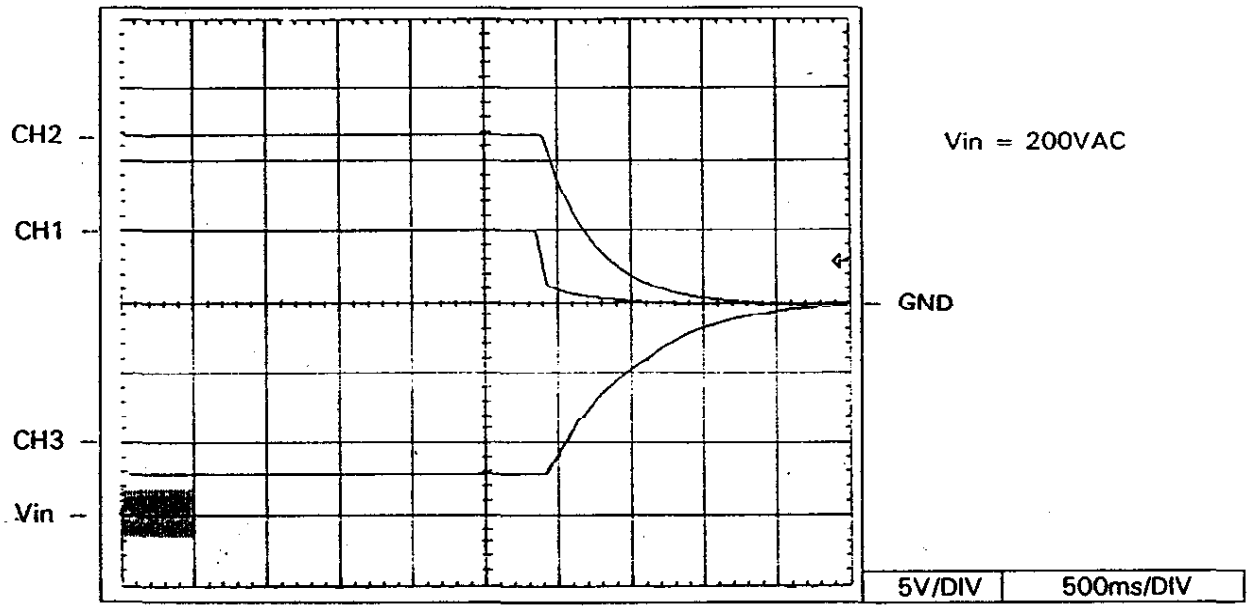




OUTPUT FALL TIME

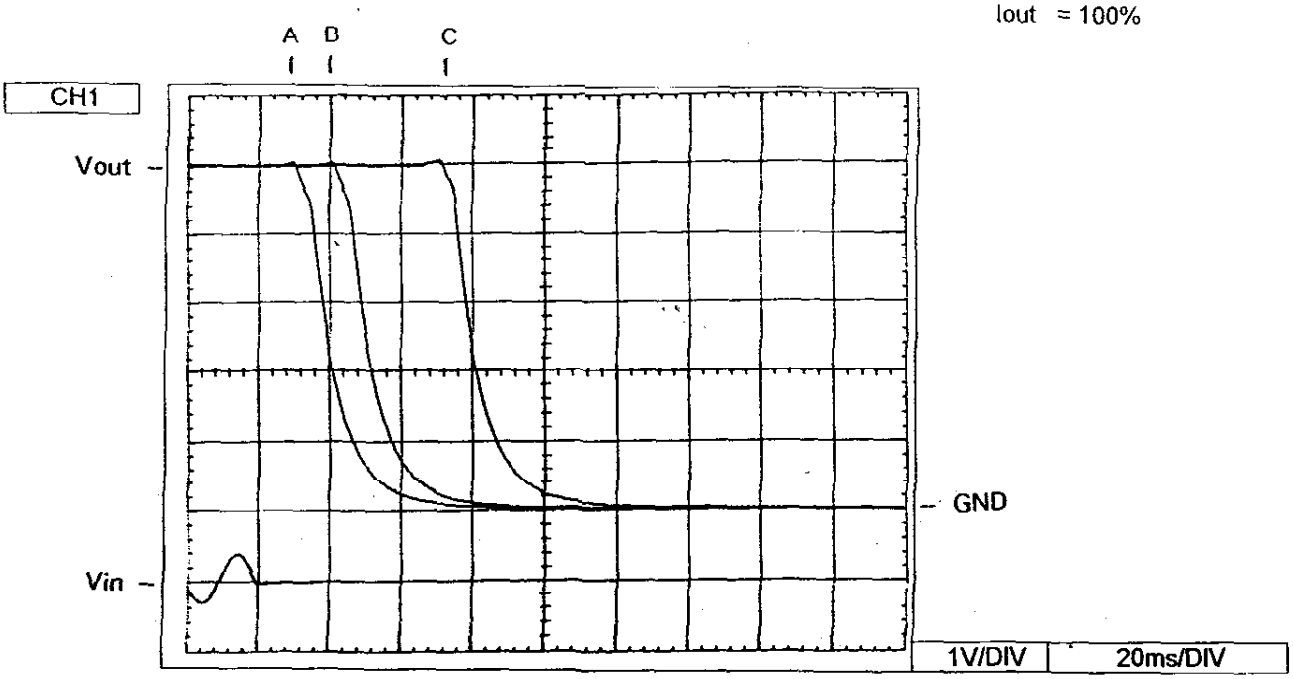
Conditions
(A) Vin = 170VAC
(B) Vin = 200VAC
(C) Vin = 265VAC
Ta = 25°C
Iout = MIN LOAD

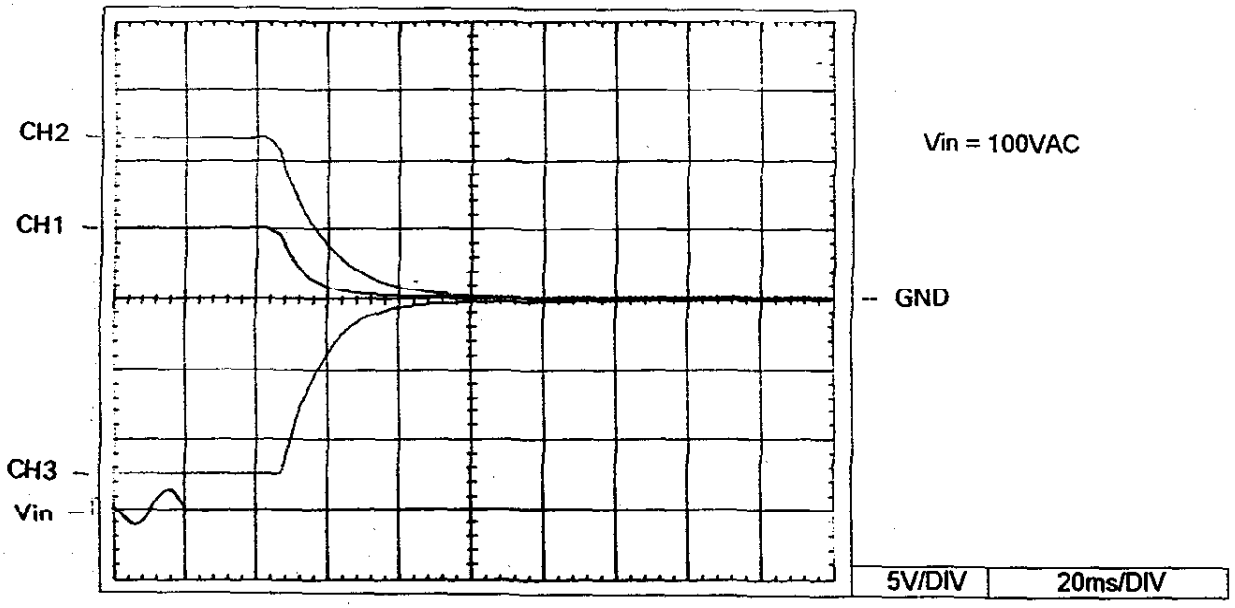




OUTPUT FALL TIME

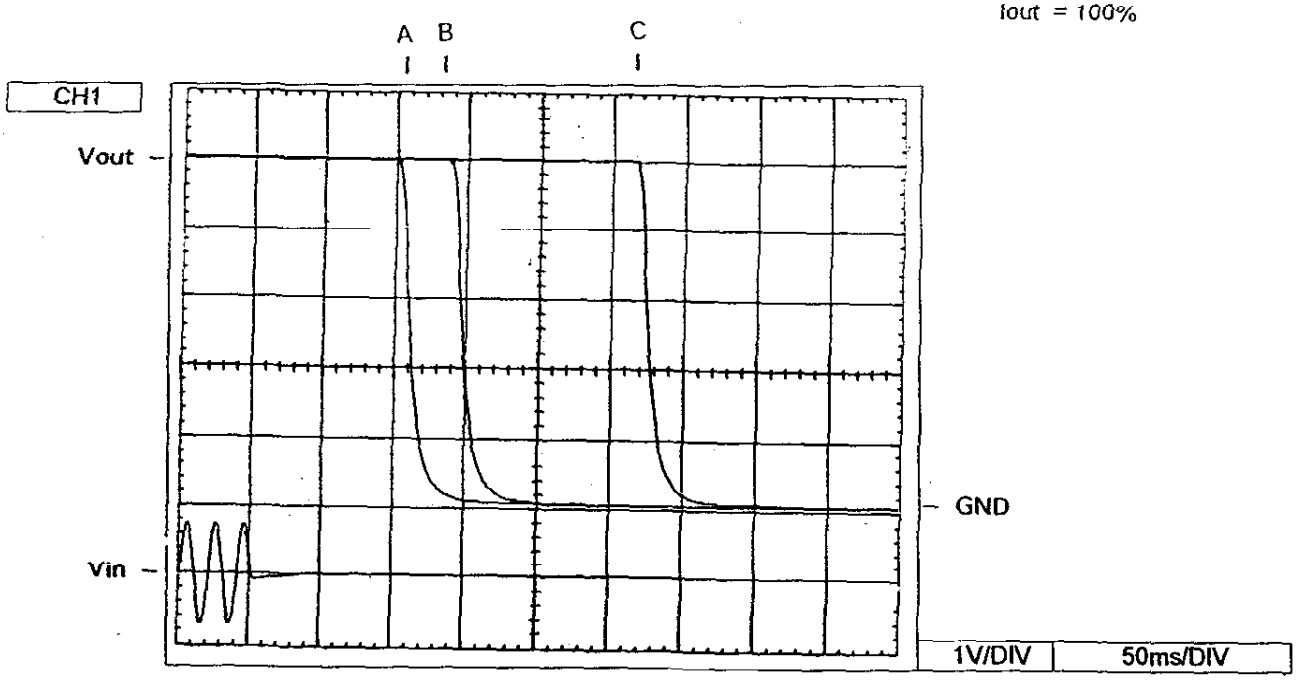
Conditions
(A) Vin = 85VAC
(B) Vin = 100VAC
(C) Vin = 132VAC
Ta = 25°C
Iout = 100%

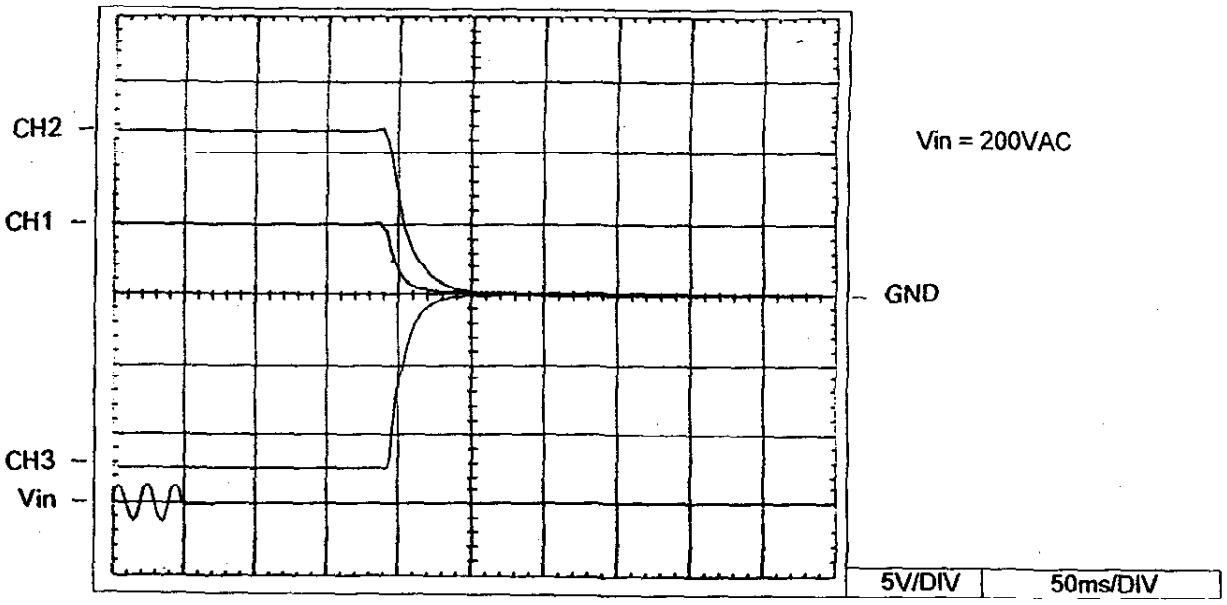




OUTPUT FALL TIME

Conditions (A) Vin = 170VAC
(B) Vin = 200VAC
(C) Vin = 265VAC
Ta = 25°C
Iout = 100%

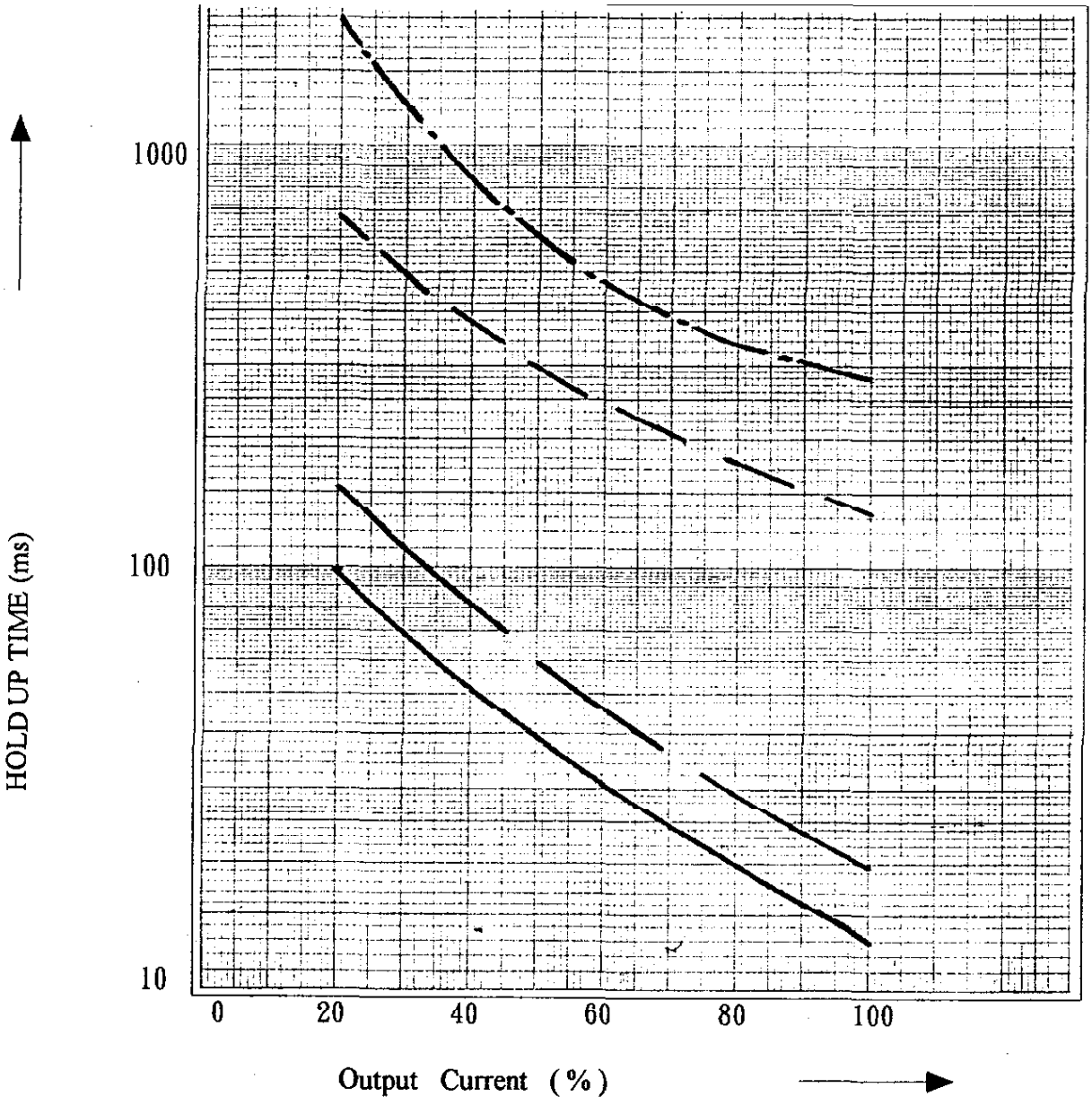




HOLD UP TIME

Conditions

Vin = 85VAC
100VAC
200VAC
265VAC
Ta = 25 °C



DYNAMIC LINE RESPONSE

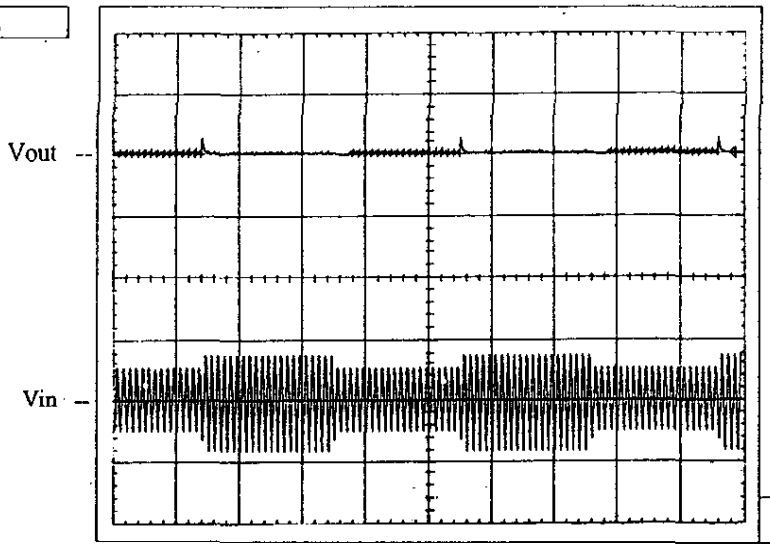
SWT100-522

Conditions

Vin :85VAC ◄——► 132VAC

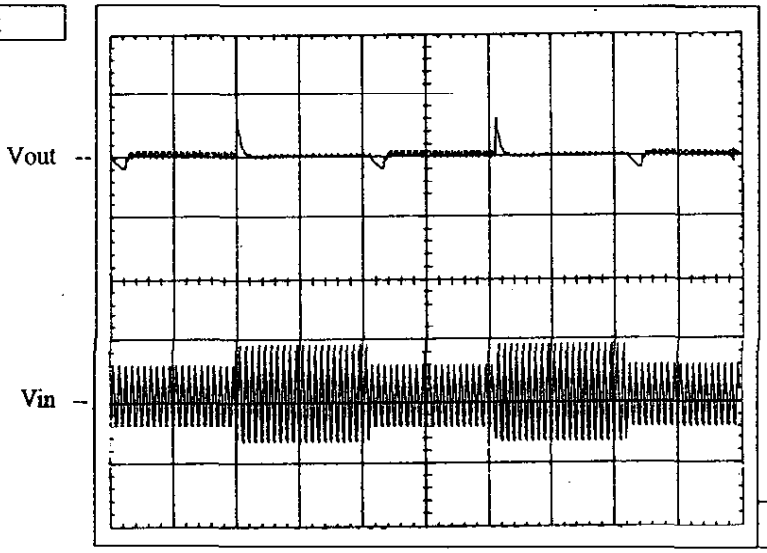
Iout = 100%
Ta = 25 °C

CH1



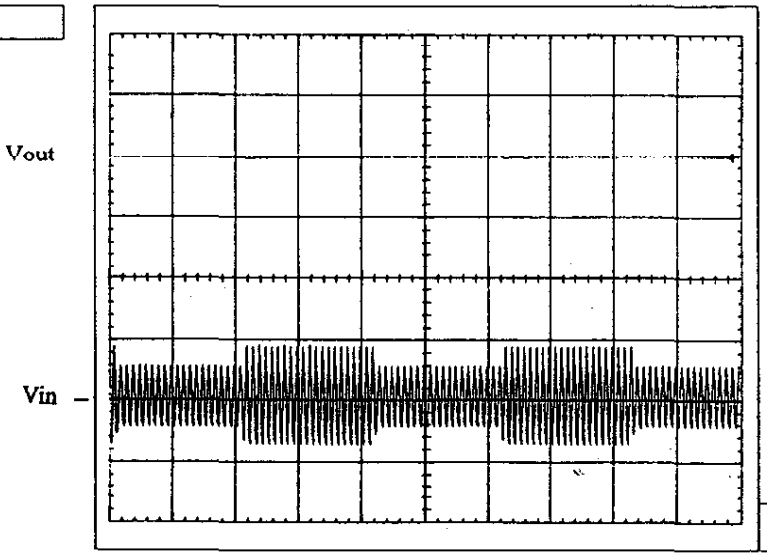
100mV/DIV | 200mS/DIV

CH2



100mV/DIV | 200mS/DIV

CH3



100mV/DIV | 200mS/DIV

DYNAMIC LINE RESPONSE

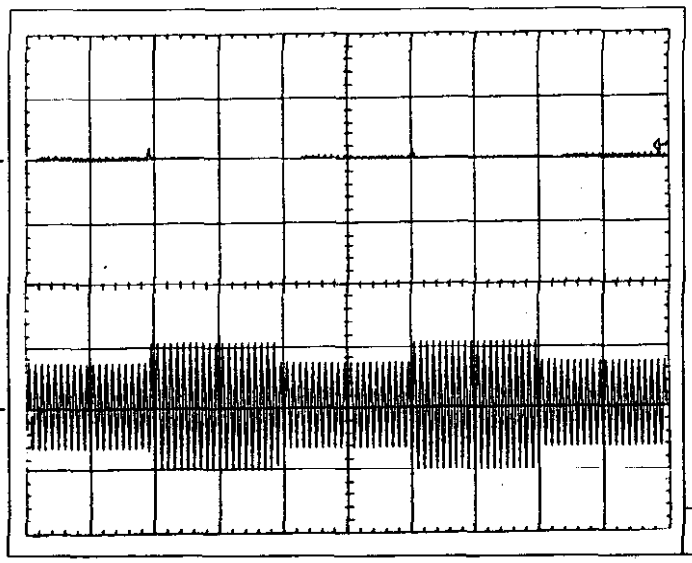
SWT100-522

Conditions

Vin :170VAC ◄——► 265VAC

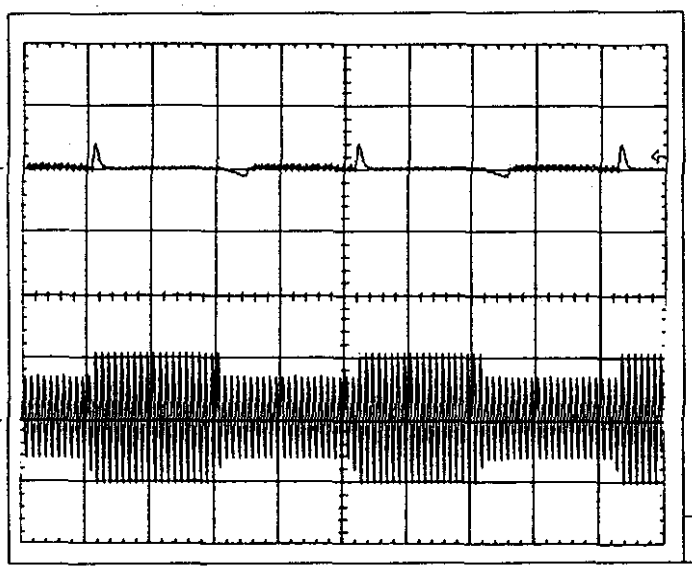
Iout = 100%
Ta = 25 °C

CH1



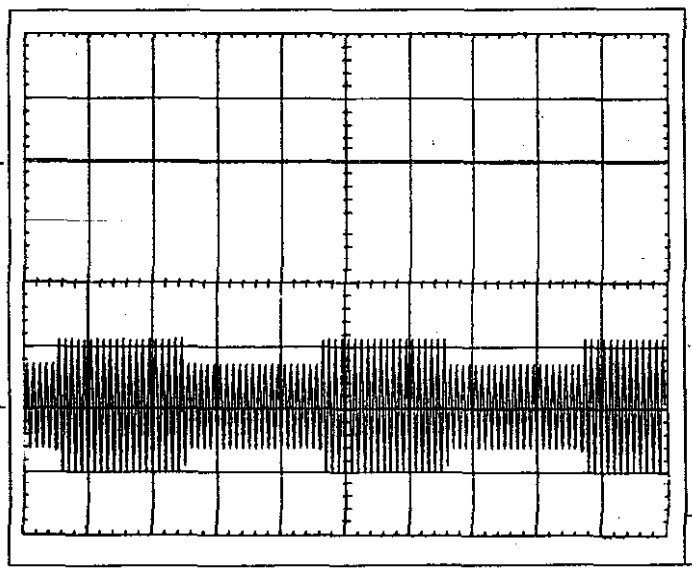
100mV/DIV 200mS/DIV

CH2



100mV/DIV 200mS/DIV

CH3



100mV/DIV 200mS/DIV

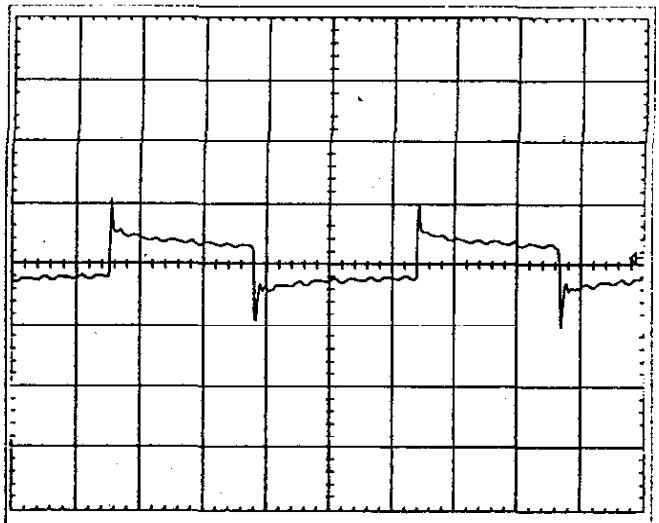
DYNAMIC LOAD RESPONSE

SWT100-522

CH1

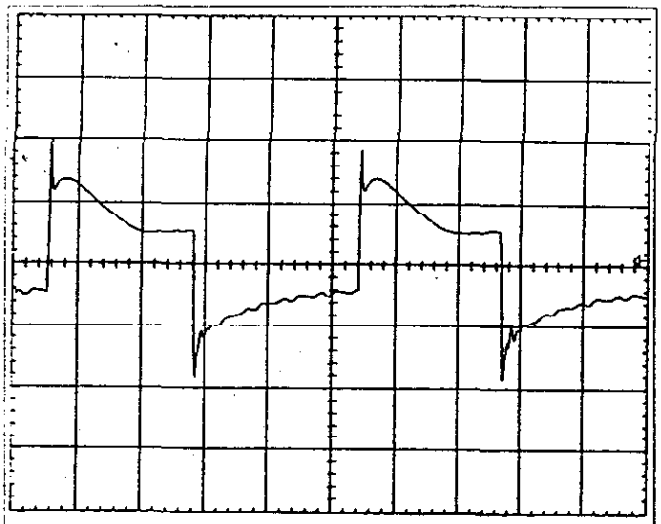
Conditions Ta = 25 °C
Vin = 100VAC
CH2,CH3: Iout = 100%

Iout 50% ◄----► 100% f = 100Hz



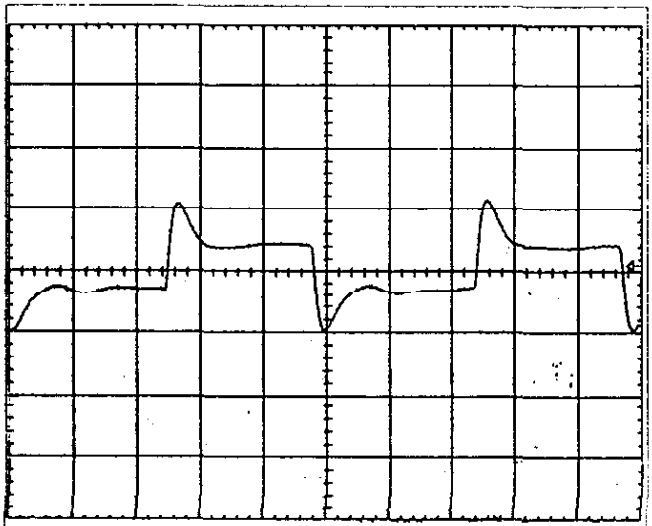
100mV/DIV	2mS/DIV
+2.20%	-2.12%

Iout Min ◄---► 100% f=100Hz



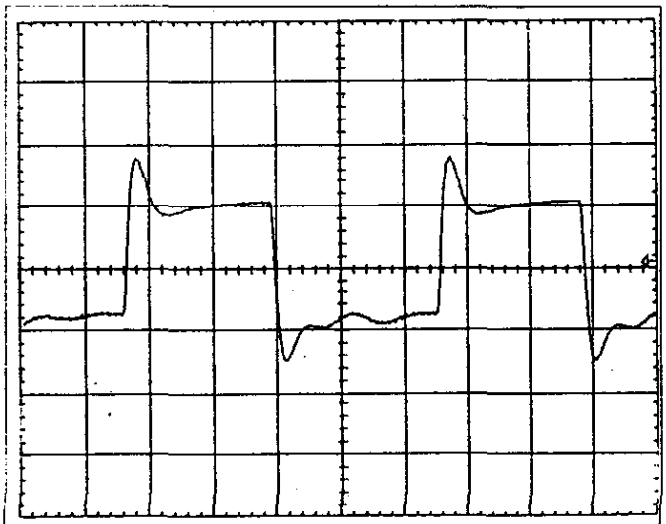
100mV/DIV	2mS/DIV
+3.92%	-3.96%

Iout 50% ◄---► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+2.28%	-2.12%

Iout Min ◄---► 100% f=1kHz



100mV/DIV	0.2mS/DIV
+3.56%	-3.04%

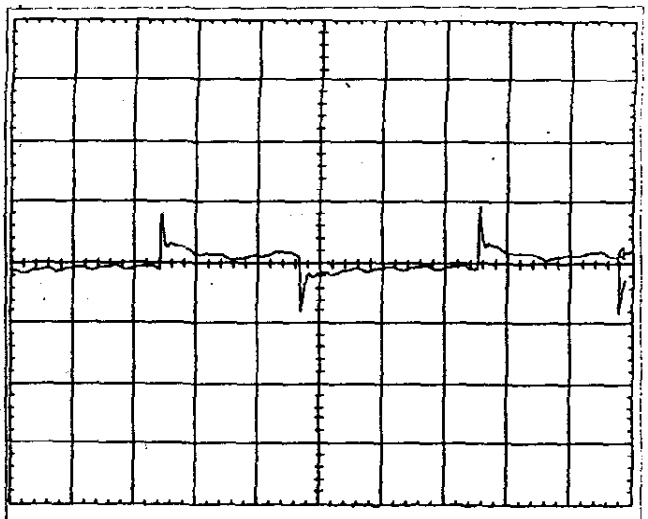
DYNAMIC LOAD RESPONSE

SWT100-522

CH1

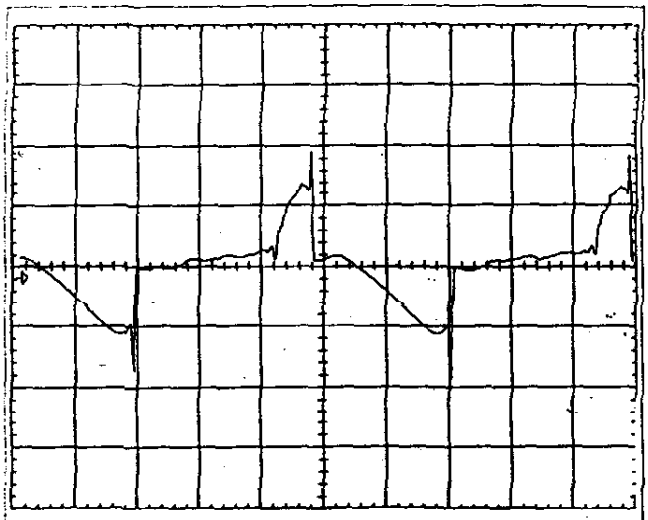
Conditions Ta = 25 °C
Vin = 200VAC
CH2,CH3: Iout = 100%

Iout 50% ◄——► 100% f = 100Hz



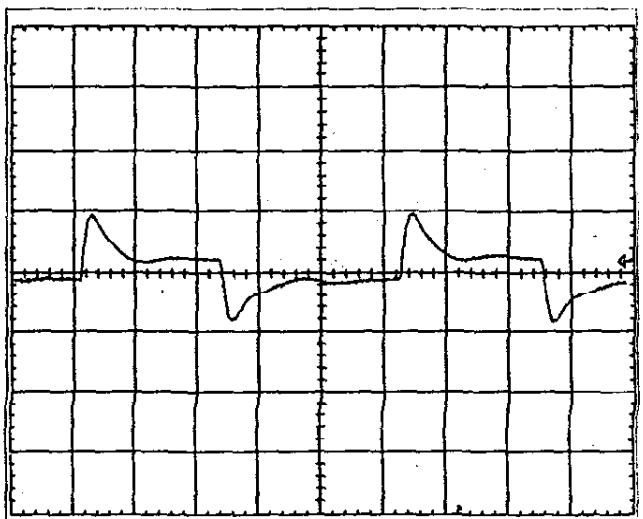
100mV/DIV	2mS/DIV
+1.84%	-1.72%

Iout Min ◄——► 100% f=100Hz



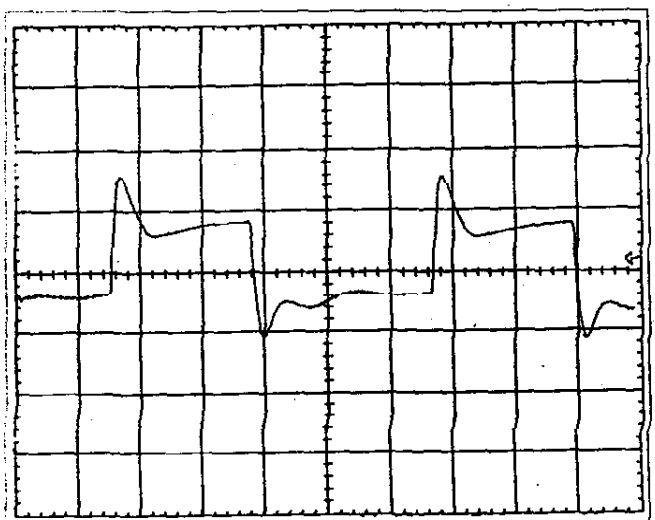
100mV/DIV	2mS/DIV
+3.68%	-3.88%

Iout 50% ◄——► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+1.88%	-1.72%

Iout Min ◄——► 100% f=1kHz



100mV/DIV	0.2mS/DIV
+3.20%	-2.28%

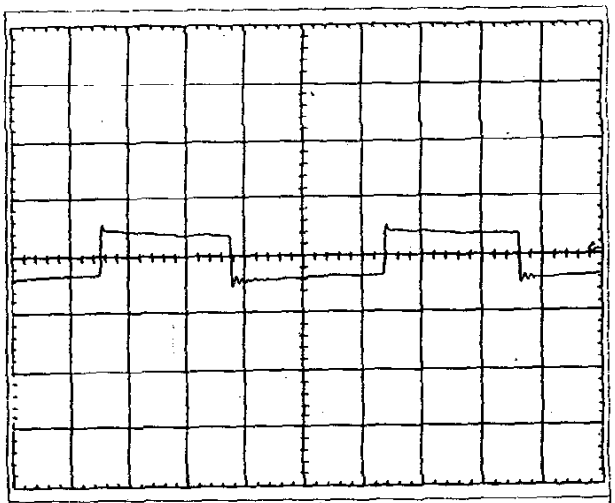
DYNAMIC LOAD RESPONSE

SWT100-522

CH2

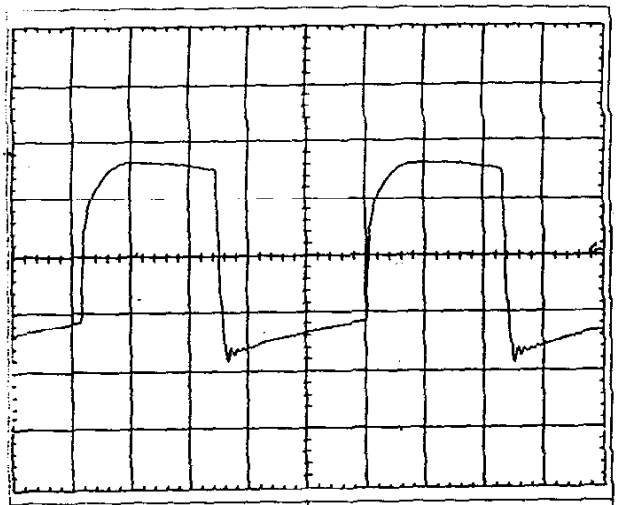
Conditions Ta = 25 °C
Vin = 100VAC
CH1,CH3: Iout = 100%

Iout 50% ◄——► 100% f = 100Hz



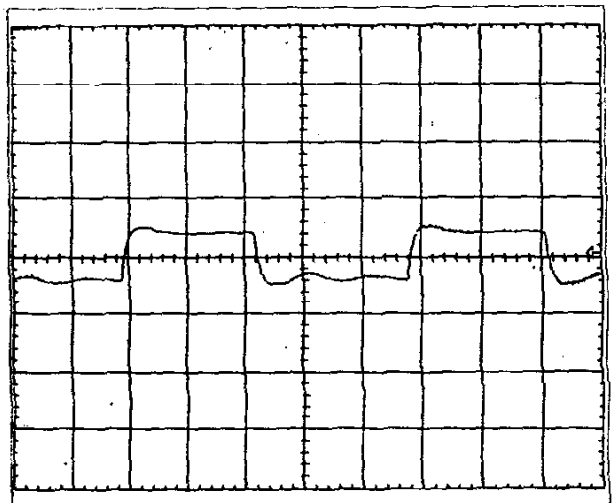
100mV/DIV	2ms/DIV
+0.48%	-0.40%

Iout Min ◄——► 100% f=100Hz



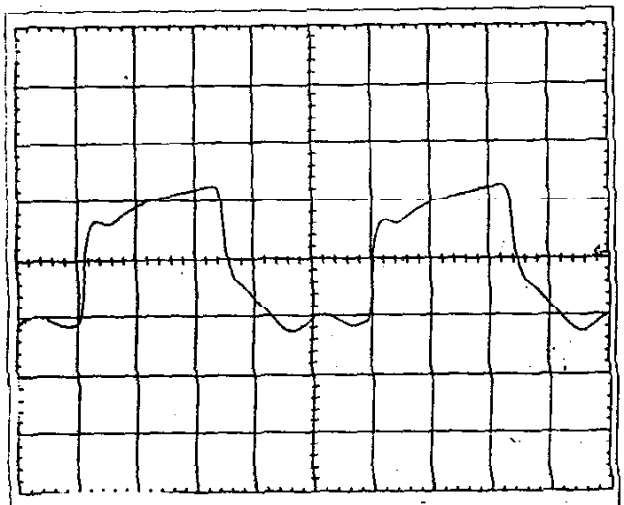
100mV/DIV	2mS/DIV
+1.40%	-1.55%

Iout 50% ◄——► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+0.47%	-0.42%

Iout Min ◄——► 100% f=1kHz



100mV/DIV	0.2mS/DIV
+1.10%	-1.05%

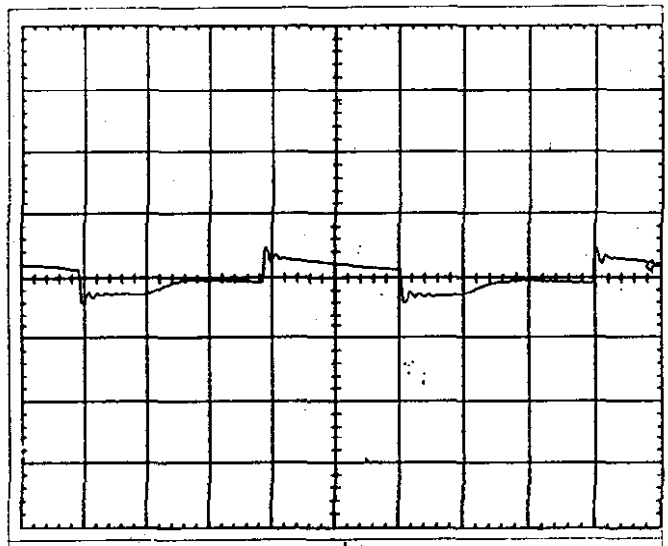
DYNAMIC LOAD RESPONSE

SWT100-522

CH2

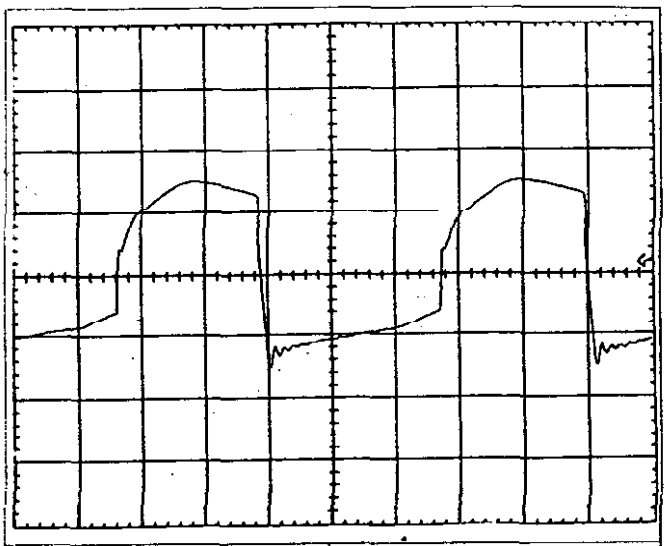
Conditions Ta = 25 °C
Vin = 200VAC
CH1,CH3: Iout = 100%

Iout 50% ◄——► 100% f = 100Hz



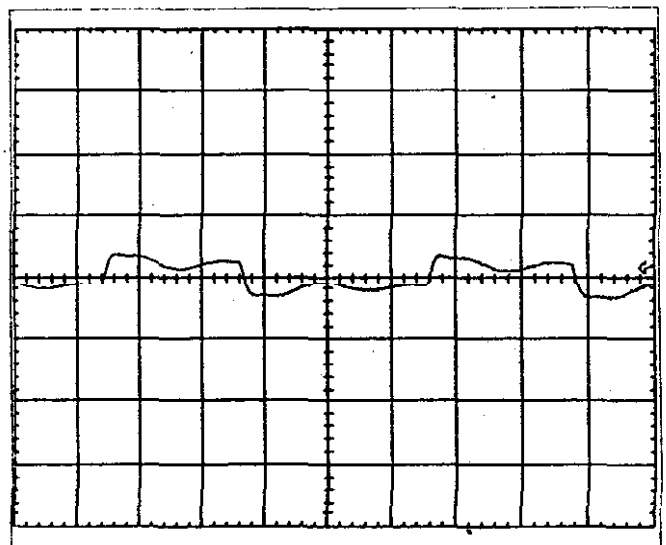
100mV/DIV	2ms/DIV
+0.40%	-0.35%

Iout Min ◄——► 100% f=100Hz



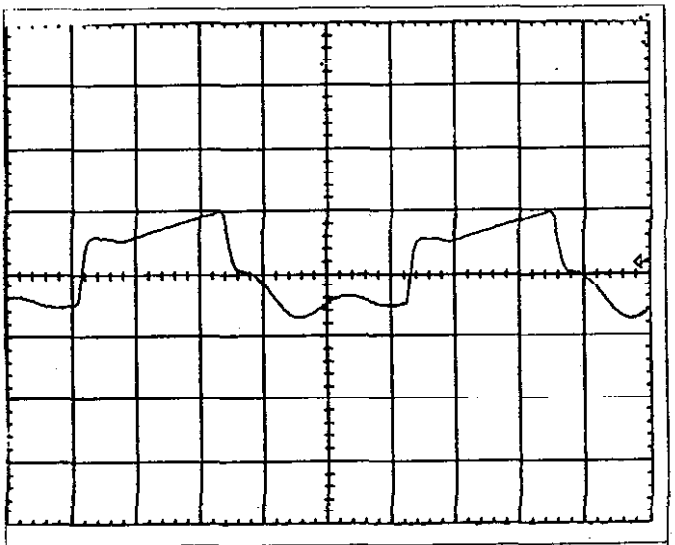
100mV/DIV	2mS/DIV
+1.28%	-1.28%

Iout 50% ◄——► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+0.33%	-0.32%

Iout Min ◄——► 100% f=1kHz



100mV/DIV	0.2mS/DIV
+0.83%	-0.63%

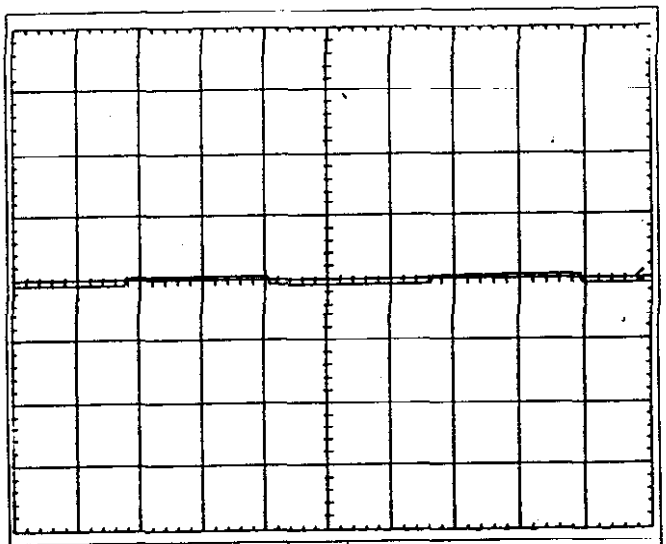
DYNAMIC LOAD RESPONSE

SWT100-522

CH3

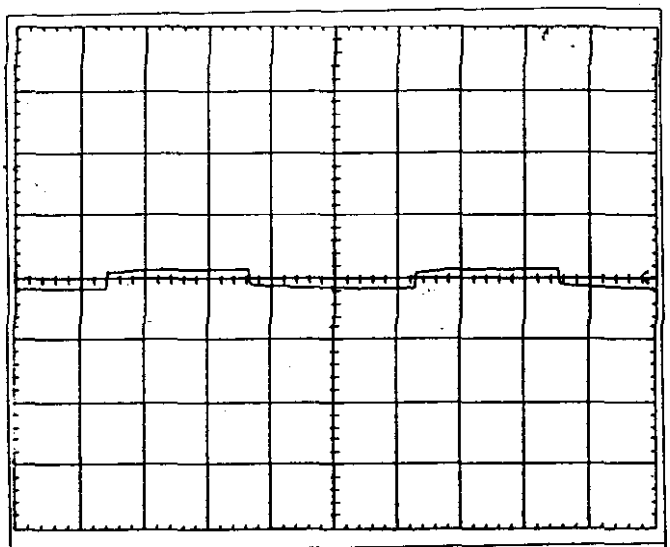
Conditions Ta = 25 °C
Vin = 100VAC
CH1,CH2: Iout = 100%

Iout 50% ◄——► 100% f = 100Hz



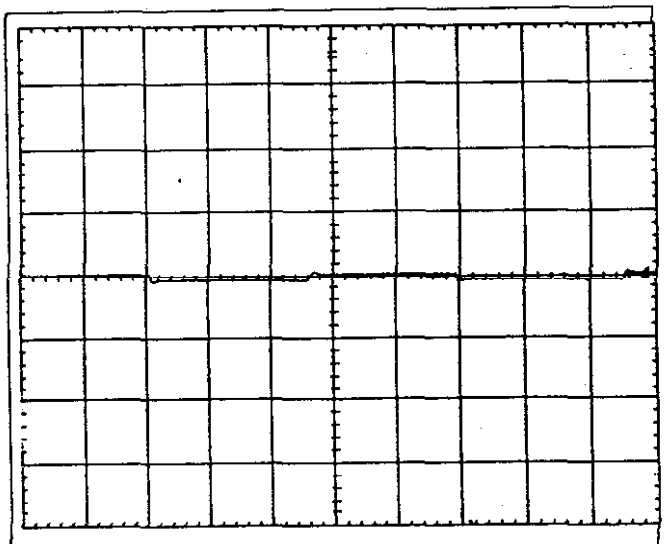
100mV/DIV	2ms/DIV
+0.10%	-0.02%

Iout Min ◄——► 100% f=100Hz



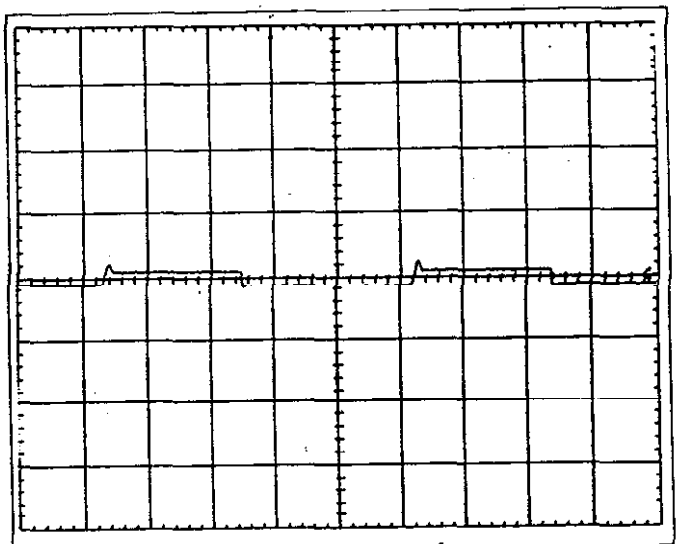
100mV/DIV	2mS/DIV
+0.18%	-0.08%

Iout 50% ◄——► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+0.13%	-0.03%

Iout Min ◄——► 100% f=1kHz



100mV/DIV	0.2mS/DIV
+0.28%	-0.08%

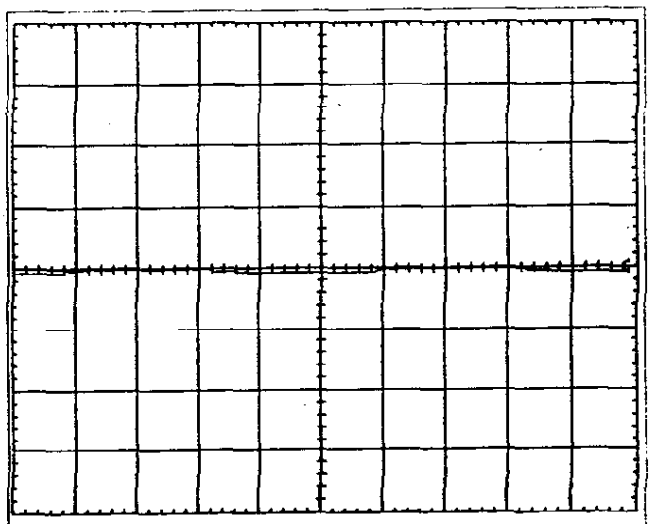
DYNAMIC LOAD RESPONSE

SWT100-522

CH3

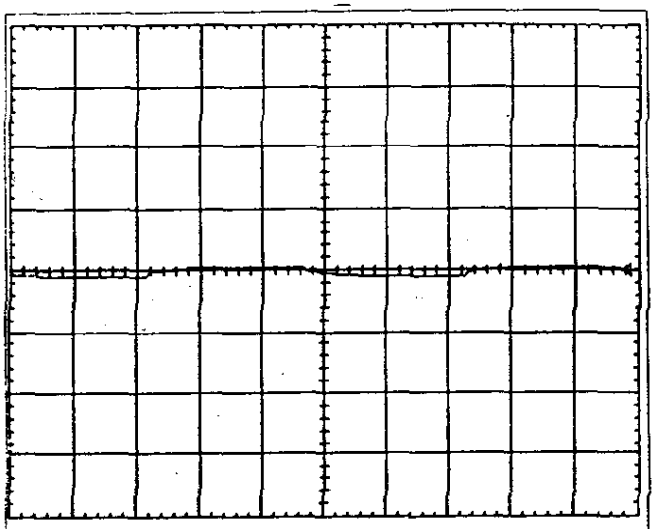
Conditions Ta = 25 °C
Vin = 200VAC
CH1,CH2: Iout = 100%

Iout 50% ◄——► 100% f = 100Hz



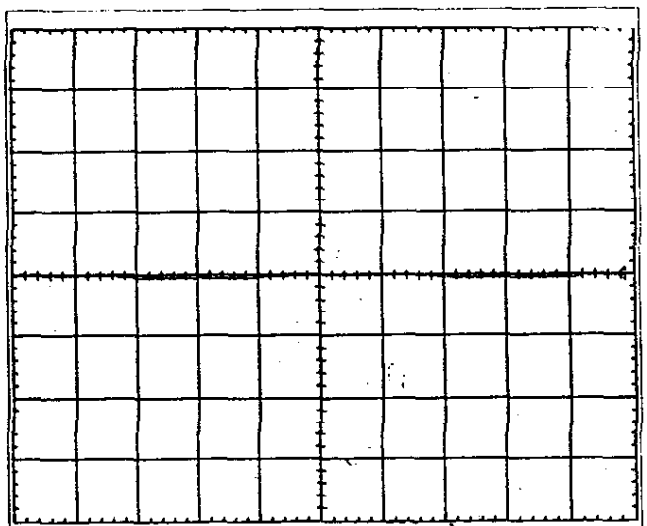
100mV/DIV	2ms/DIV
+0.00%	-0.05%

Iout Min ◄——► 100% f=100Hz



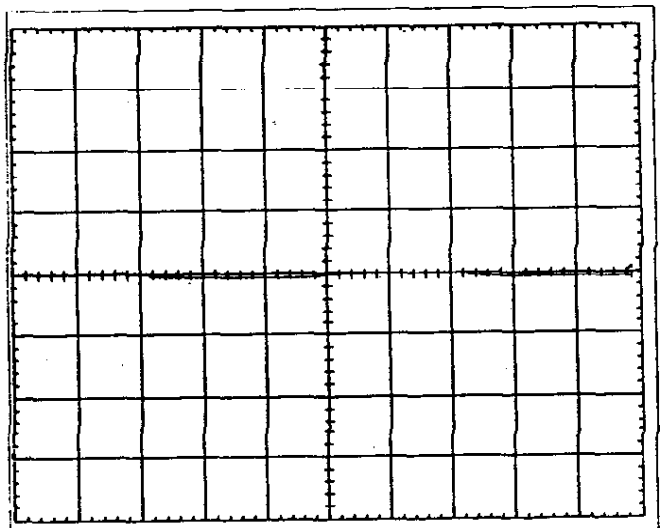
100mV/DIV	2mS/DIV
+0.02%	-0.12%

Iout 50% ◄——► 100% f = 1kHz



100mV/DIV	0.2mS/DIV
+0.00%	-0.08%

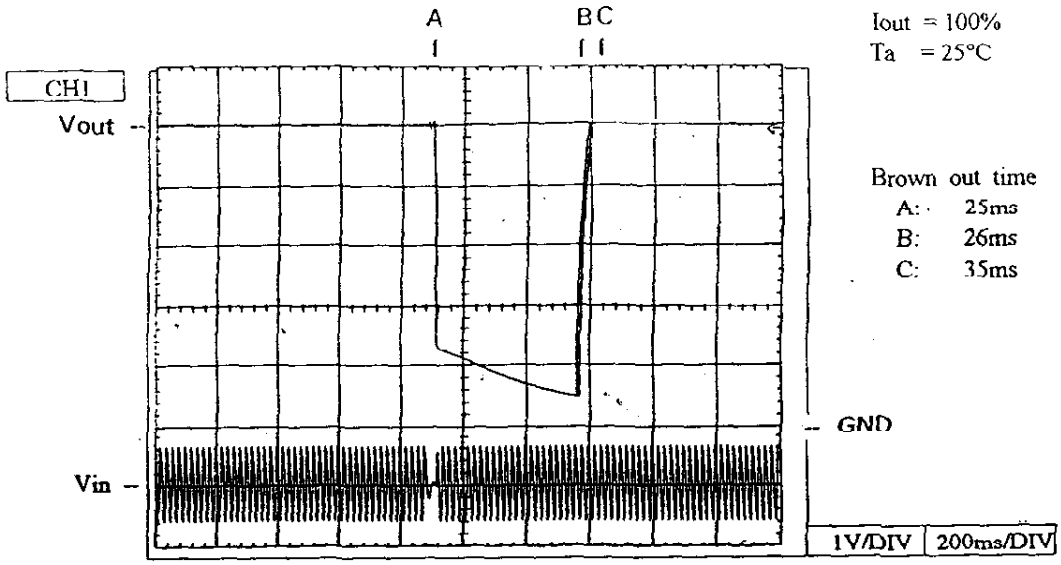
Iout Min ◄——► 100% f=1kHz



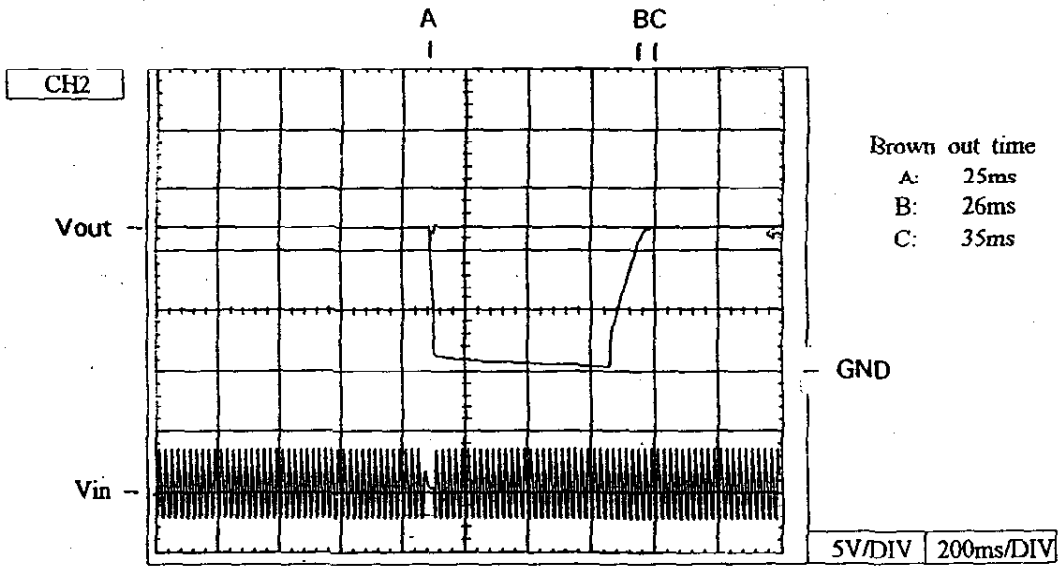
100mV/DIV	0.2mS/DIV
+0.02%	-0.08%

RESPONSE TO BROWN OUT

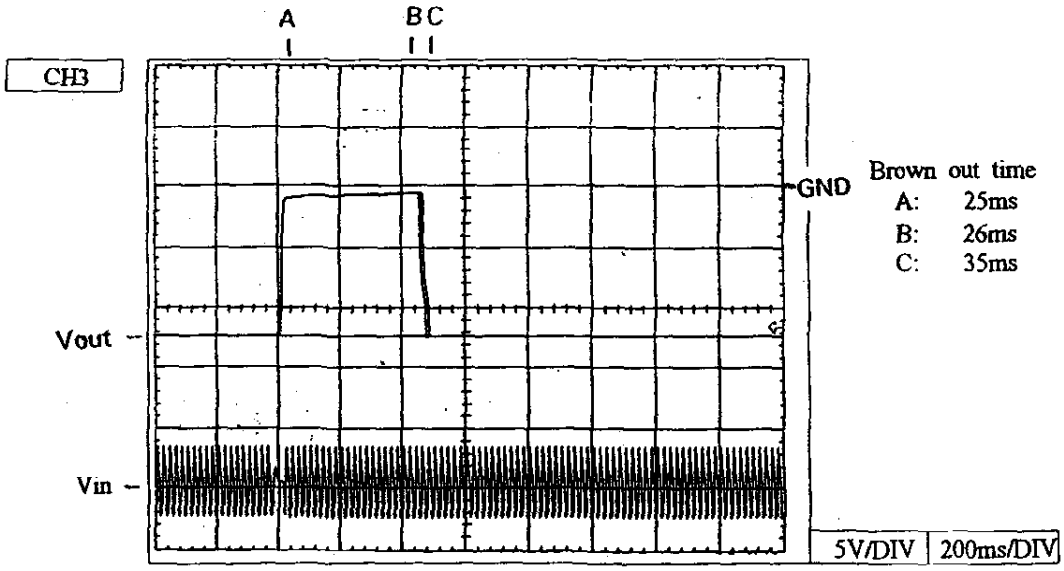
Conditions Vin = 100VAC
Iout = 100%
Ta = 25°C



Brown out time
A: 25ms
B: 26ms
C: 35ms

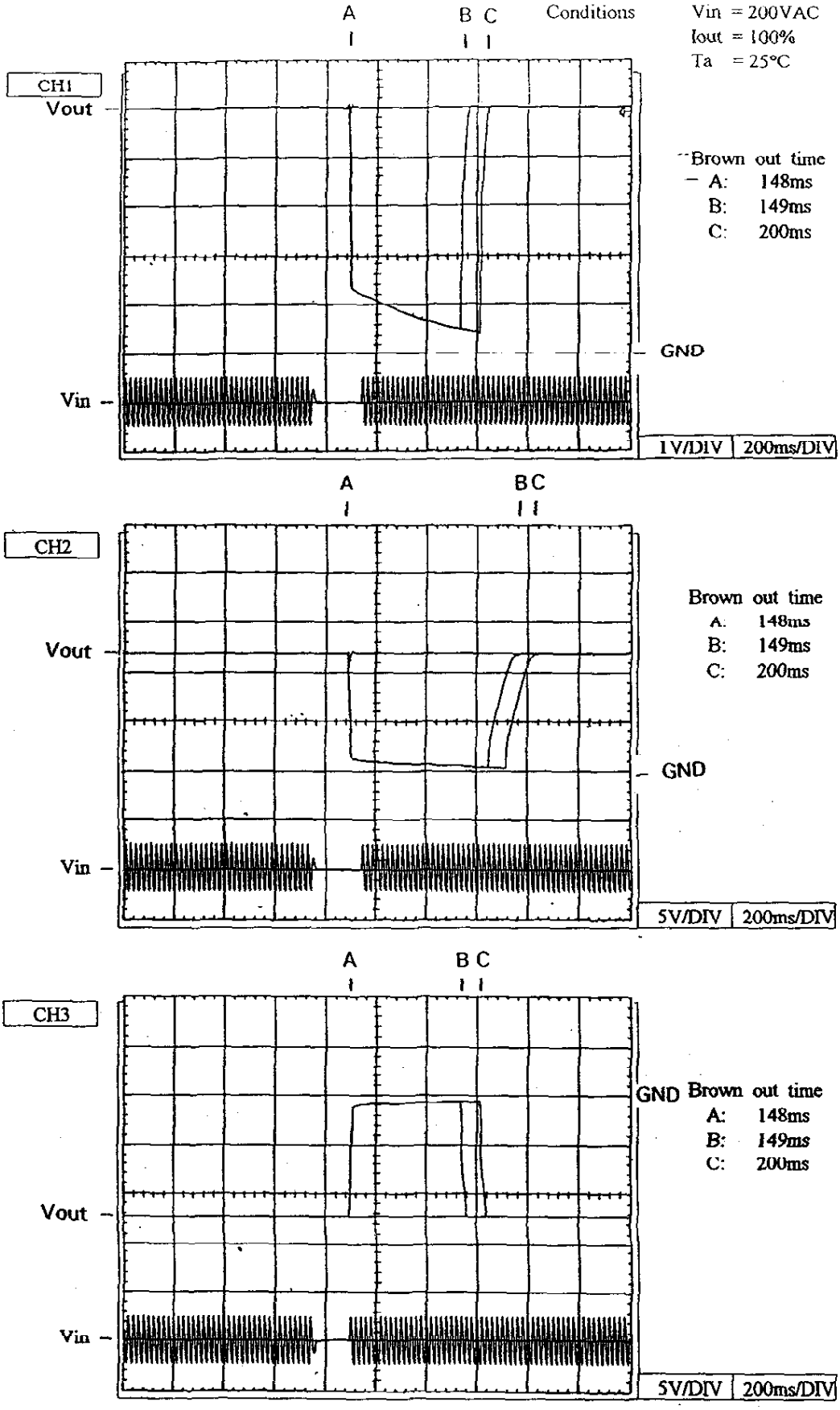


Brown out time
A: 25ms
B: 26ms
C: 35ms



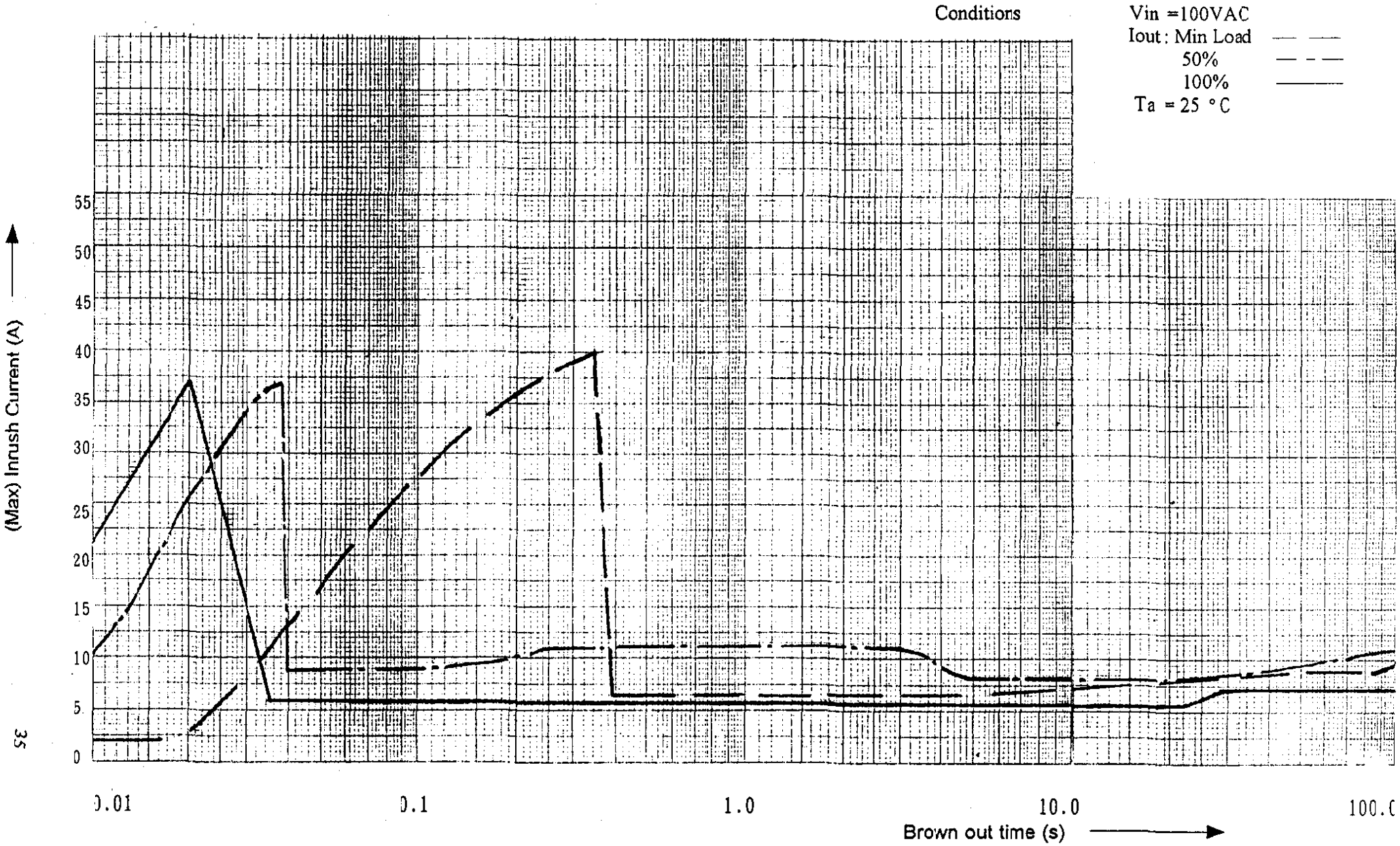
Brown out time
A: 25ms
B: 26ms
C: 35ms

RESPONSE TO BROWN OUT



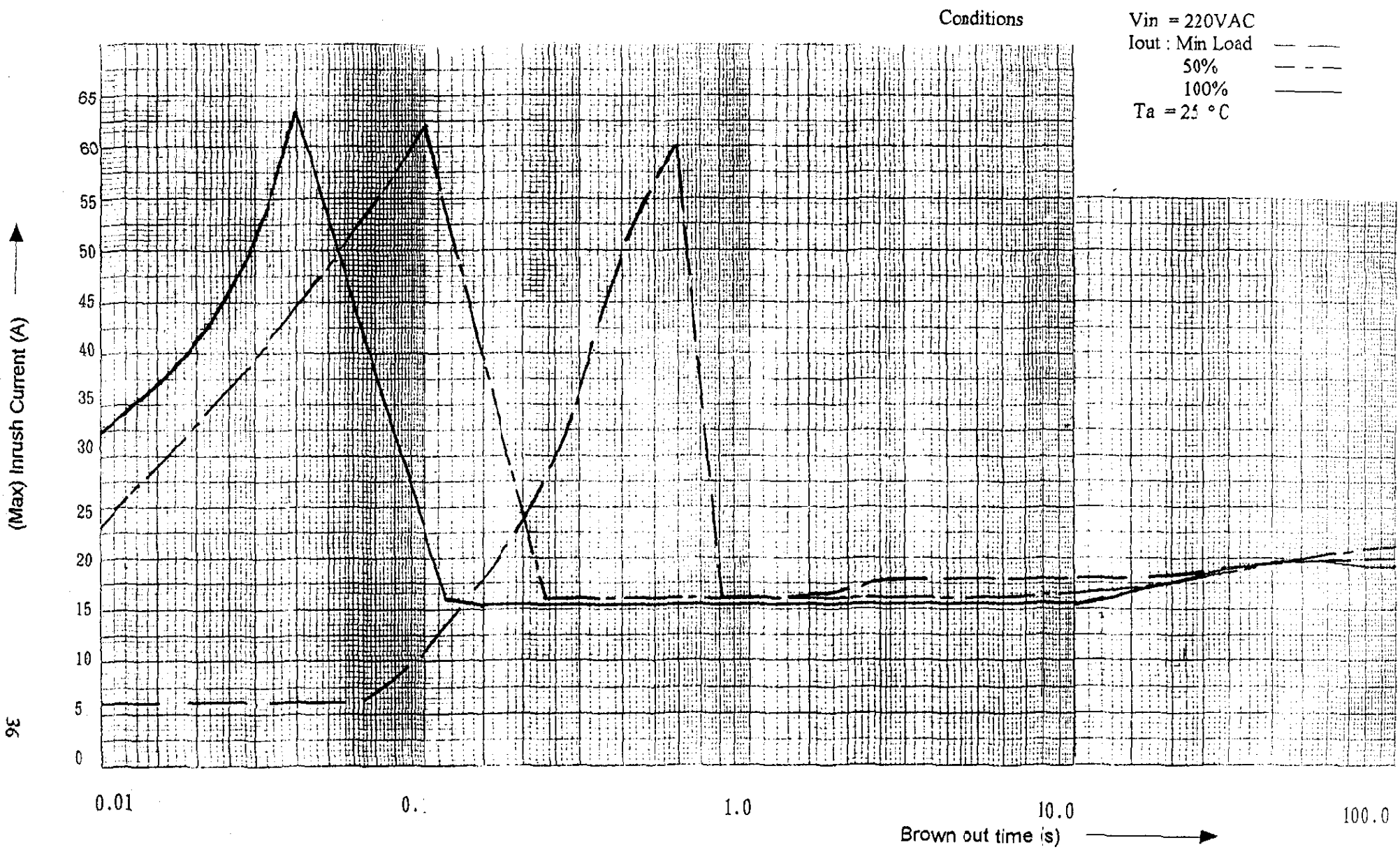
INRUSH v.s BROWN OUT TIME

SWT100 - *



INRUSH v.s BROWN OUT TIME

SWT100 - *



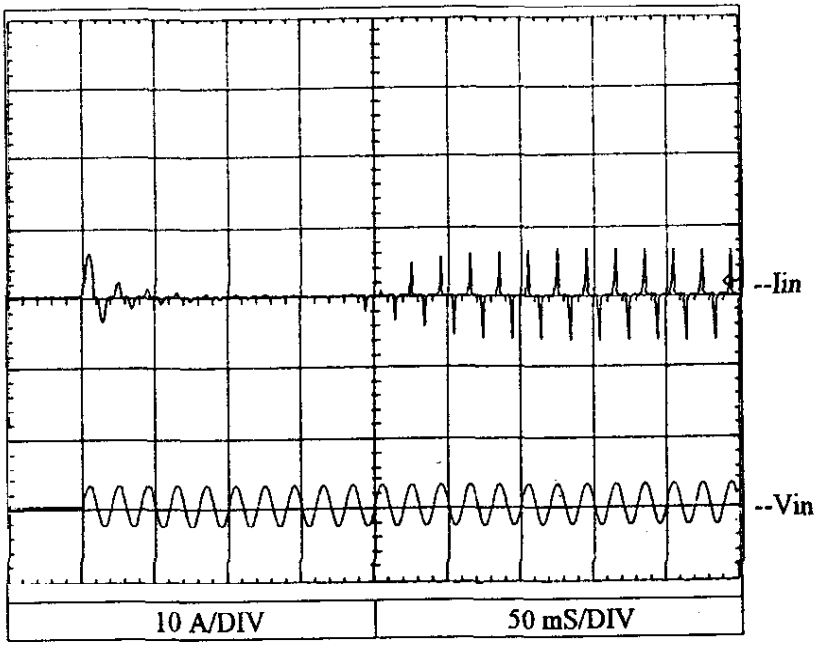
INRUSH CURRENT WAVEFORM

SWT100- *

Conditions Ta = 25 °C
Vin = 100VAC
Iout = 100%

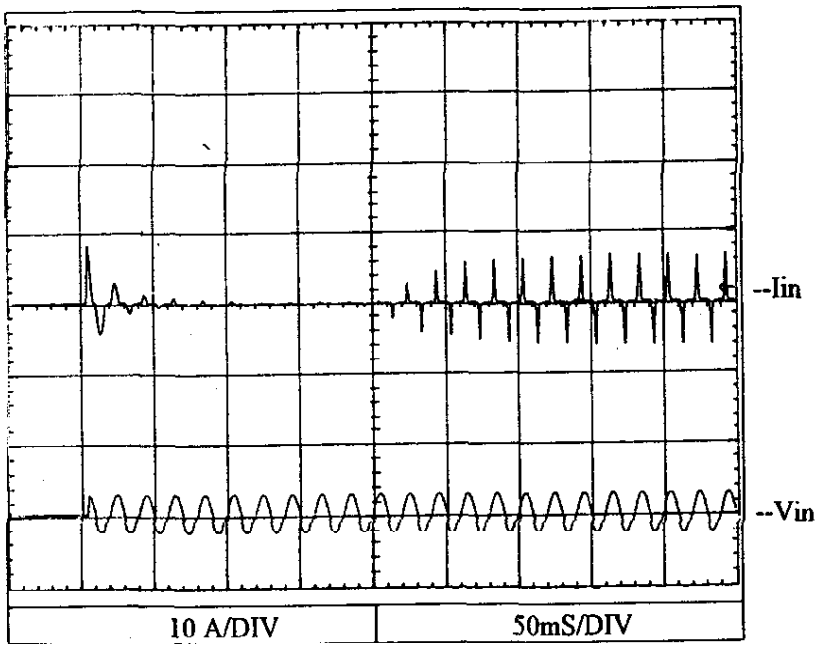
Switch on phase angle of input AC voltage

ϕ = 0 °



Switch on phase angle of input AC voltage

ϕ = 90 °



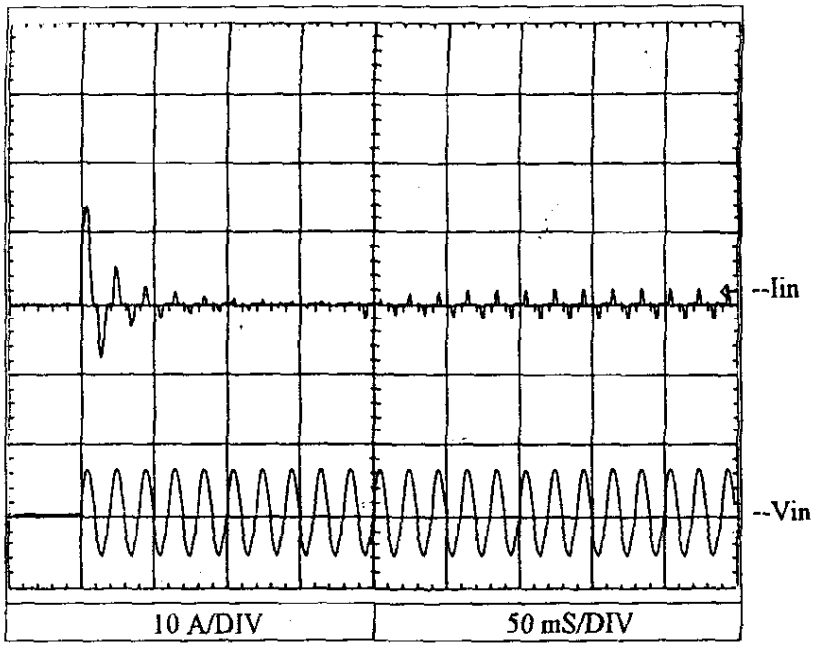
INRUSH CURRENT WAVEFORM

SWT100- *

Conditions Ta = 25 °C
Vin = 220VAC
Iout = 100%

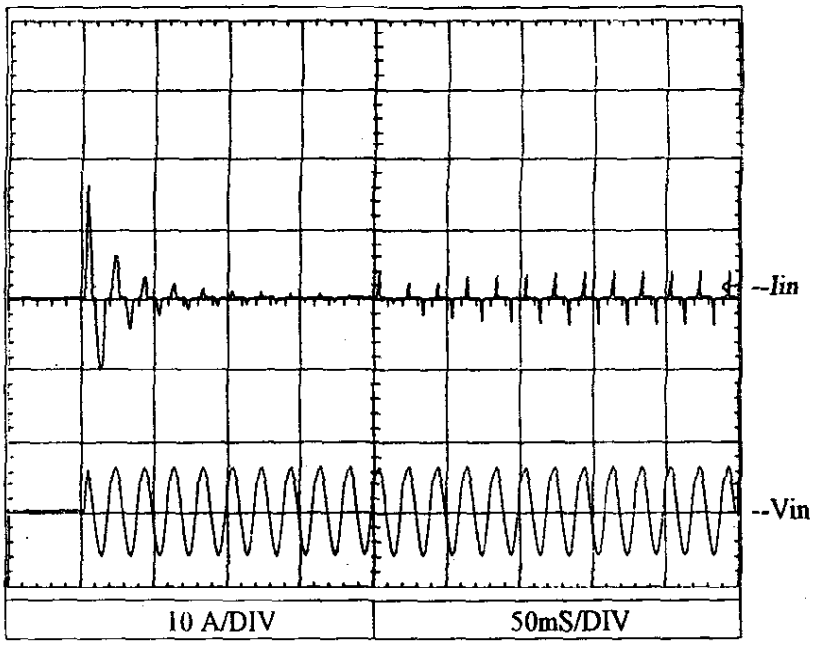
Switch on phase angle of input AC voltage

ϕ = 0 °



Switch on phase angle of input AC voltage

ϕ =90 °

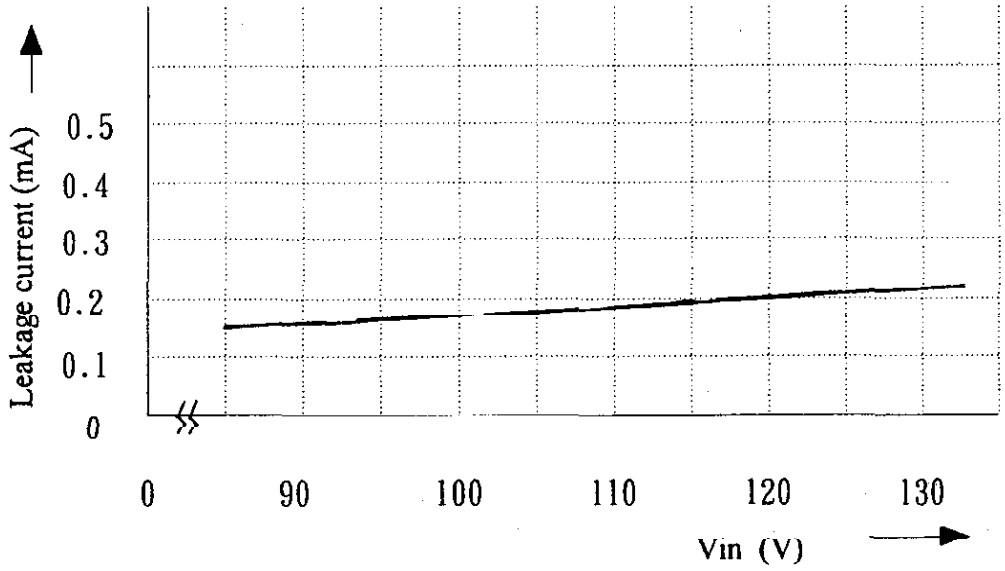


LEAKAGE CURRENT

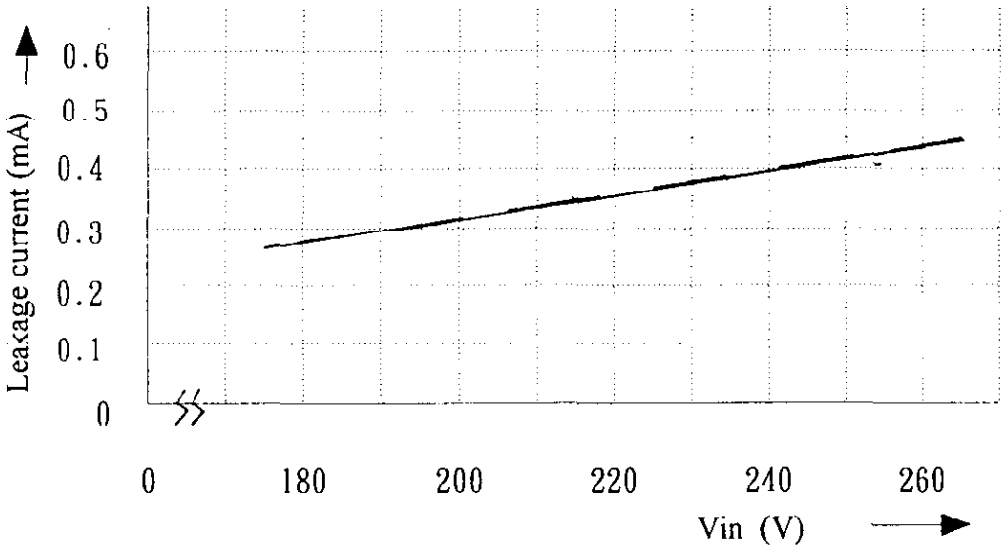
SWT100 - *

Conditions Ta = 25 °C
Iout : MIN LOAD — — —
100% ————
: 50Hz

AC100V



AC200V



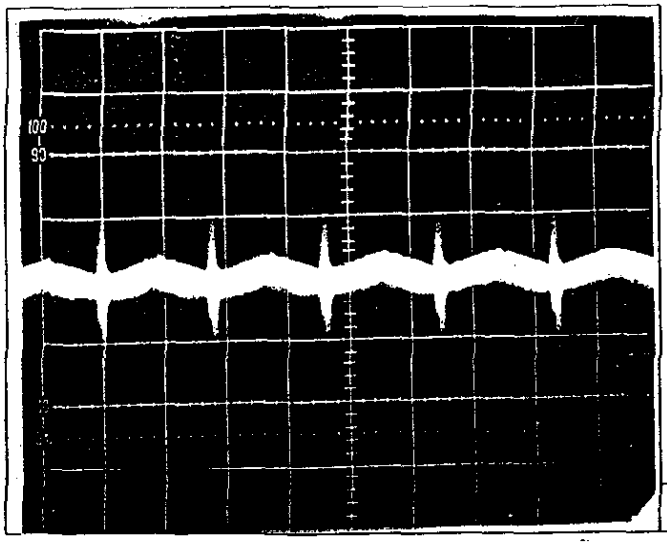
OUTPUT-RIPPLE, NOISE

SWT100 - 522

Conditions Vin = 100VAC
Iout = 100%
Ta = 25 °C

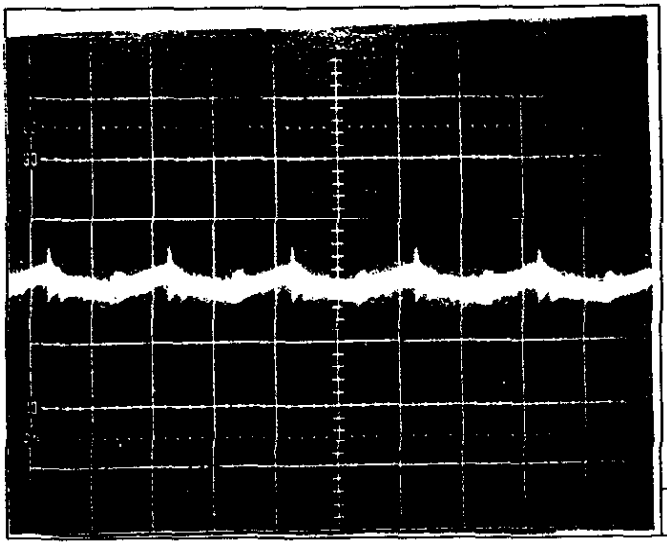
NORMAL MODE

CH1



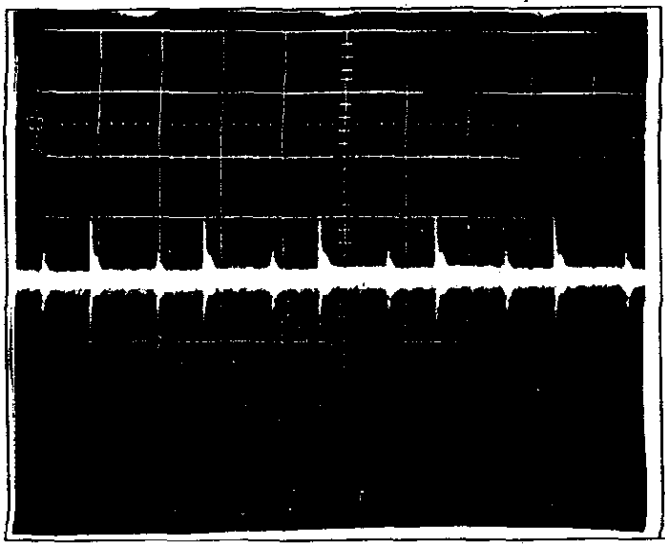
20mV/DIV 5uS/DIV

CH2



20mV/DIV 5uS/DIV

CH3



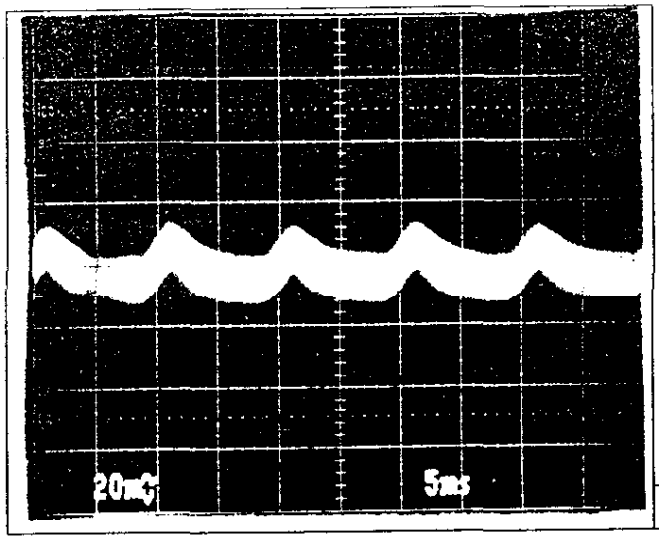
20mV/DIV 5uS/DIV

OUTPUT-RIPPLE, NOISE

SWT100 - 522	
Conditions	Vin = 100VAC
	Iout = 100%
	Ta = 25 °C

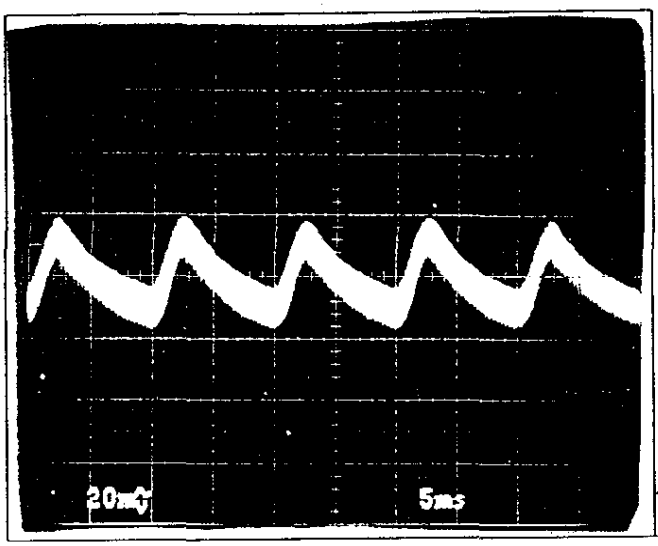
NORMAL MODE

CH1



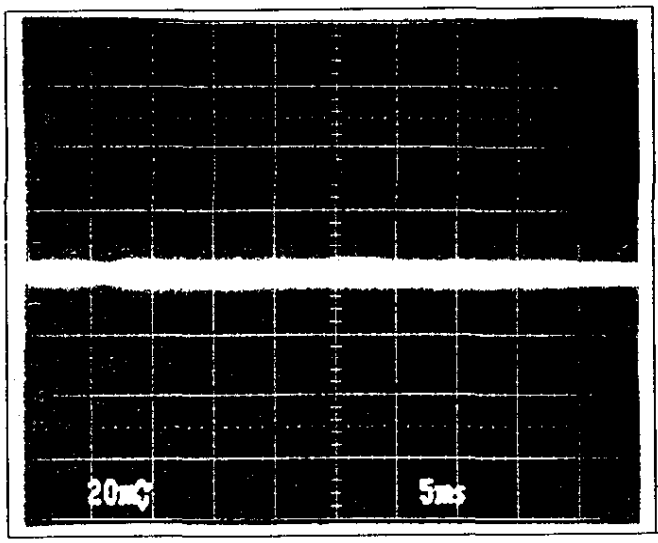
20mV/DIV | 5mS/DIV

CH2



20mV/DIV | 5mS/DIV

CH3



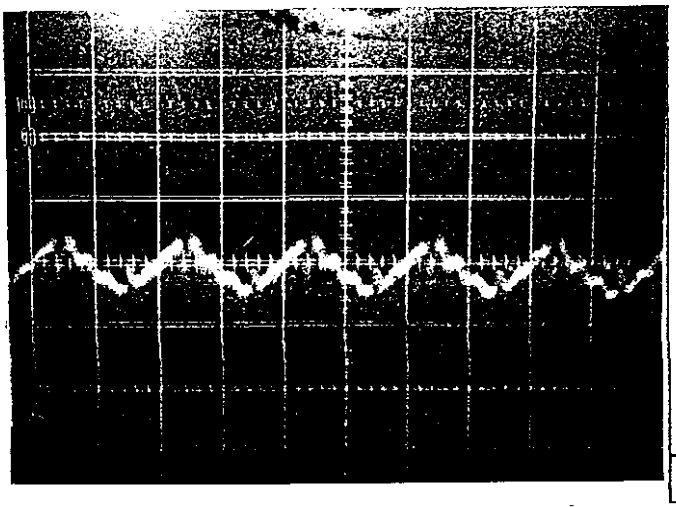
20mV/DIV | 5mS/DIV

OUTPUT-RIPPLE, NOISE

SWT100 522	
Conditions	Vin = 100VAC
	Iout = 100%
	Ta = 25 °C

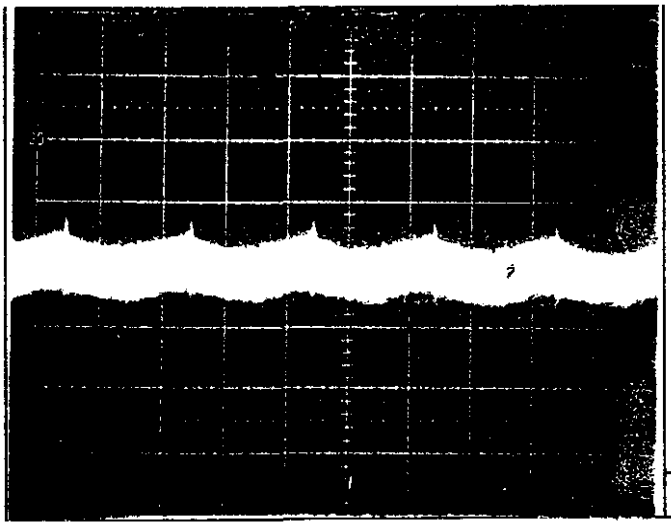
COMMON : NORMAL

CH1



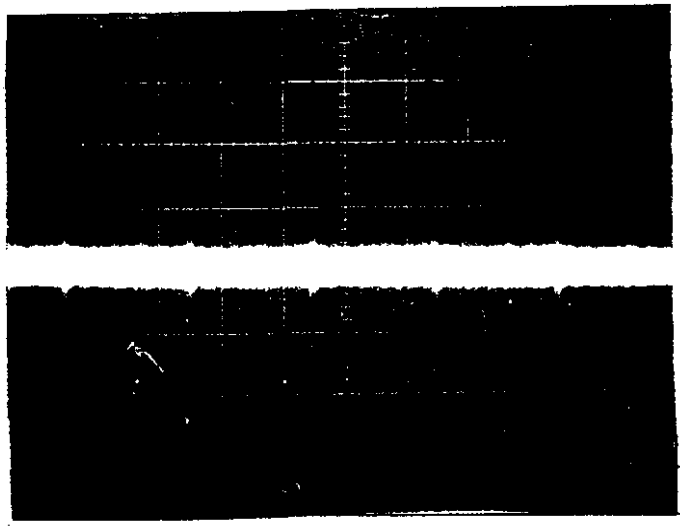
20mV/DIV | 5uS/DIV

CH2



20mV/DIV | 5uS/DIV

CH3



20mV/DIV | 5uS/DIV