

QUALITY TEST DATA

KS5

DWG. NO.		PA757 - 53 - 01			
QA APPROVAL		R / D			
NLJ	NLS	APPROVED	CHECKED	ENGR.	DRAWN
<i>Klamro</i>	<i>James Klamro</i>	<i>Hatter</i>	<i>J. J. J.</i>	<i>ER</i>	<i>ER</i>
4 MAR '92	28 FEB '92	28 FEB '92	28 FEB '92	31 . 1 . 92	31 . 1 . 92

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Terminology used

Definition

V_{in} Input voltage
 V_{out} Output voltage
 I_{in} Input current
 I_{out} Output current
 T_a Temperature

KS5 Specifications

NEMIC-LAMBDA

PA757-01-01A

*: For delivery, contact to our sales office.

ITEMS		MODEL	KS5-5	KS5-12
1	Nominal Output Voltage	V	5	12
2	Minimum Output Current	A	0	0
3	Maximum Output Current	A	1.0	0.45
4	Maximum Output Power	W	5.0	5.4
5	Efficiency (typ)	(*1) %	67	69
6	Input Voltage Range	(*2) -	85 ~ 132VAC (47~440Hz) or 110 ~ 175VDC	
7	Input Current (typ)	(*1) A	0.2A at 100VAC	
8	Inrush Current (typ)	A	15A at 100VAC, Ta = 25°C	
9	Output Voltage Range	-	FIXED ±5% (Max)	
10	Maximum Ripple & Noise	(*3) mV	120	150
11	Maximum Line Regulation	(*3,*4) mV	20	48
12	Maximum Load Regulation	(*3,*5) mV	40	96
13	Maximum Temperature Drift	(*3,*6) mV	50	120
14	Over Current Protection	(*7) -	105% ~	
15	Over Voltage Protection	(*8) -	110% ~	
16	Parallel Operation	-	_____	
17	Series Operation	-	Possible	
18	Hold-Up Time (typ)	-	17mS at 5W, 100VAC, Ta = 25°C	
19	Operating Temperature	-	-10°C ~ +70°C (-10°C : 80%, 0~+50°C : 100%, +70°C : 25%)	
20	Operating Humidity	-	30 ~ 90%RH (No dewdrop)	
21	Storage Temperature	-	-30 ~ +85°C	
22	Storage Humidity	-	20%RH ~ 95%RH (No dewdrop)	
23	Cooling	-	Convection Cooling	
24	Withstand Voltage	-	Input-Output : 2kVAC(20mA), Input-FG : 2kVAC(20mA) Output-FG : 500VAC(100mA) for 1minute each.	
25	Isolation Resistance	-	More than100MΩ at 25°C and 70%RH Output-FG 500VDC	
26	Vibration	-	10~55Hz, Constant Amplitude 1.65mm p-p (Max 10G), sweep 1 Minute X,Y,Z 1 hour each	
27	Shock	-	Less than 50G for 11±5mS on ± (X, Y, Z) axis each 3 times	
28	Safety	-	Approved by UL1950,CSA234	
29	Conducted Radio Noise	-	Built to meet VCCI-Class A, FCC class B	
30	Weight	g	70g	
31	Size (WxHxD)	mm	45 x 19.5 x 48 (Refer to Outline Drawing)	

* Read Instruction manual carefully, before using the power supply unit.

= NOTES =

- *1. At 100VAC and Maximum Output Power, Ta=25C.
- *2. For cases where conformance to various safety specs (UL, CSA) are required to be described as 100-120VAC, 50/60Hz on name plate.
- *3. Please refer to Fig. A for measurement determination of line & load regulation and output ripple & noise voltage.
- *4. From 85~132VAC, constant load.
- *5. From Min load - Full load (Maximum power), constant input Voltage.
- *6. From 0~50°C, constant input voltage and load.
- *7. Current limiting with automatic recovery. Avoid to operate over load or dead short for more than 30seconds.
- *8. Over Voltage Clamping by Zener Diode.

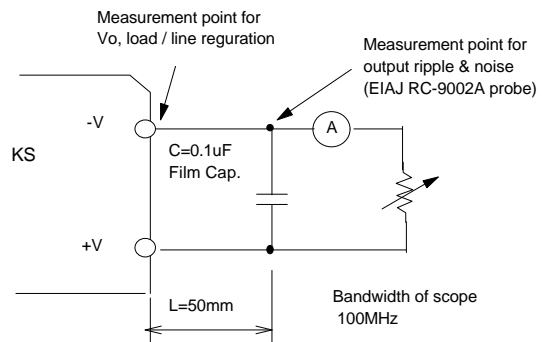
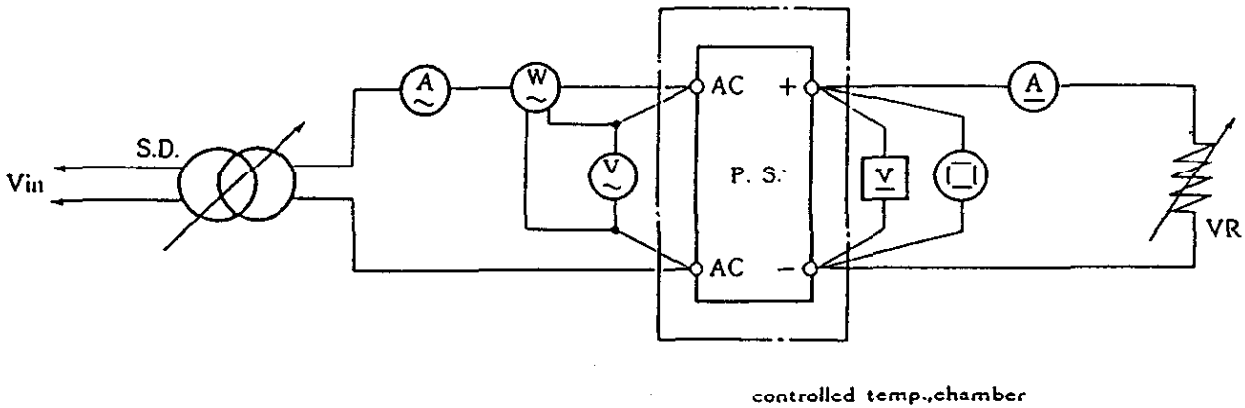


Fig.A

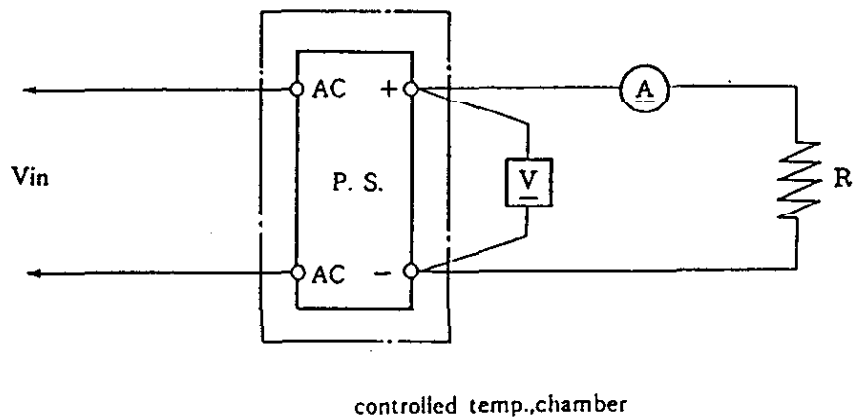
2. 評価測定方法 EVALUATION METHOD

2-1 測定回路 Circuits used for determination

(1) 静特性 Steady state data



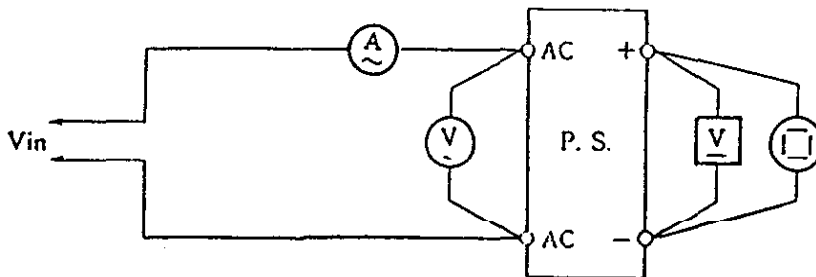
(2) 通電ドリフト特性 Warm up voltage drift characteristics



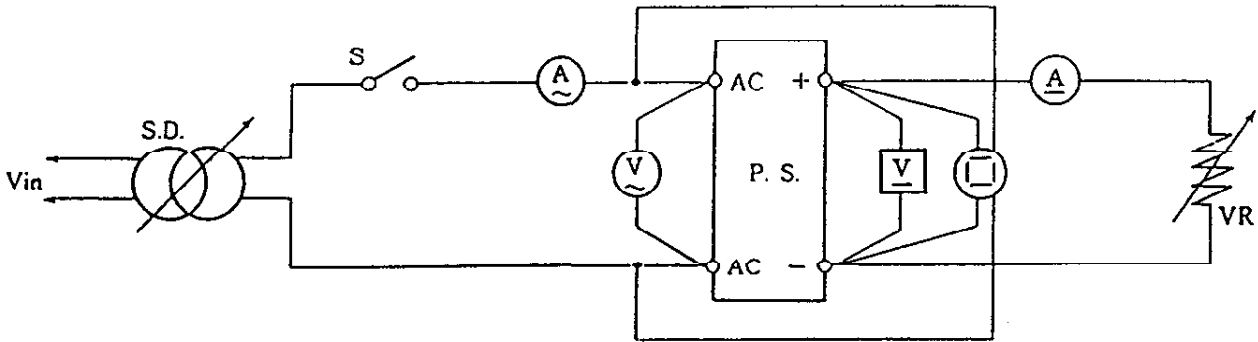
(3) 過電流保護特性 Over current protection (OCP) characteristics

Same as steady state data.

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



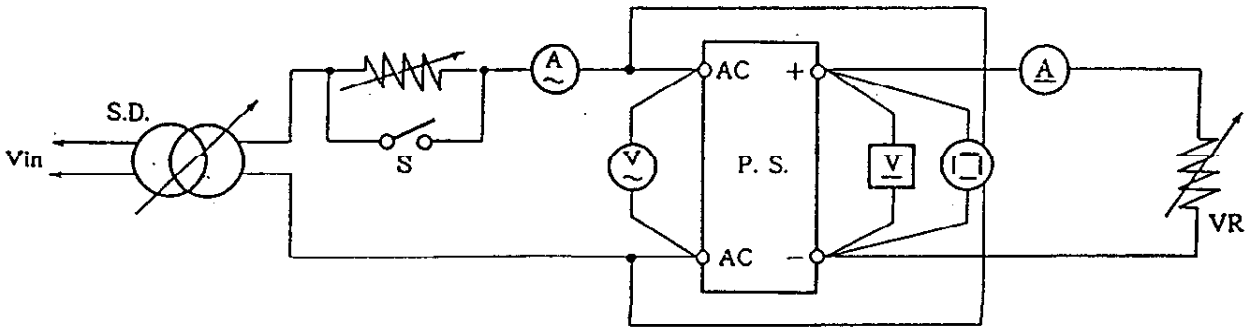
(5) 出力立上り特性 Output rise characteristics



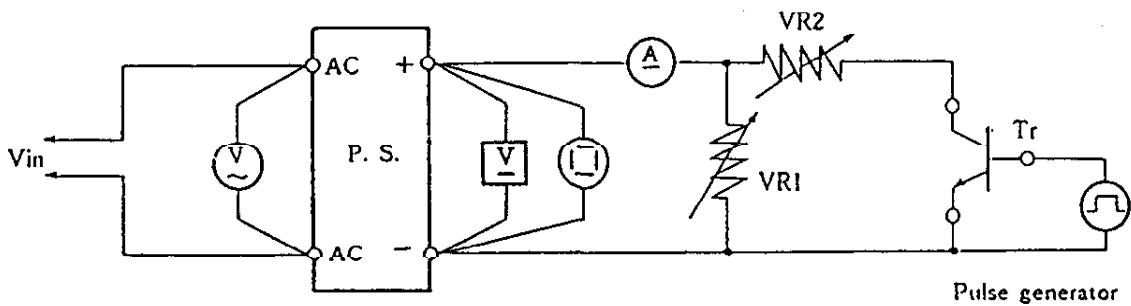
(6) 出力立下り特性 Output fall characteristics

Same as output rise characteristics.

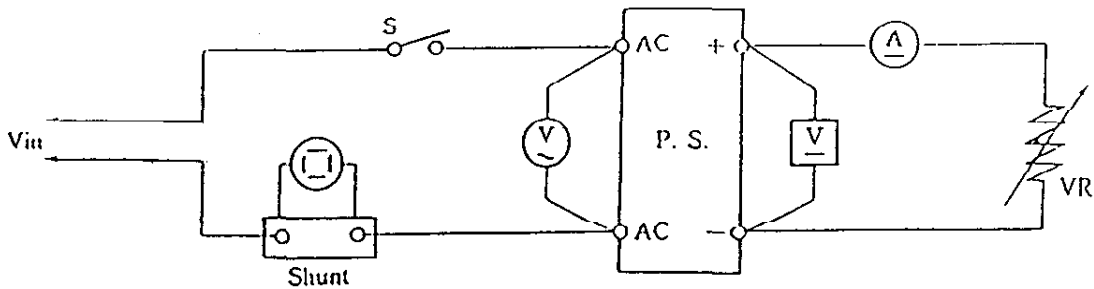
(7) 過渡応答 (入力急変) 特性 Dynamic line response characteristics



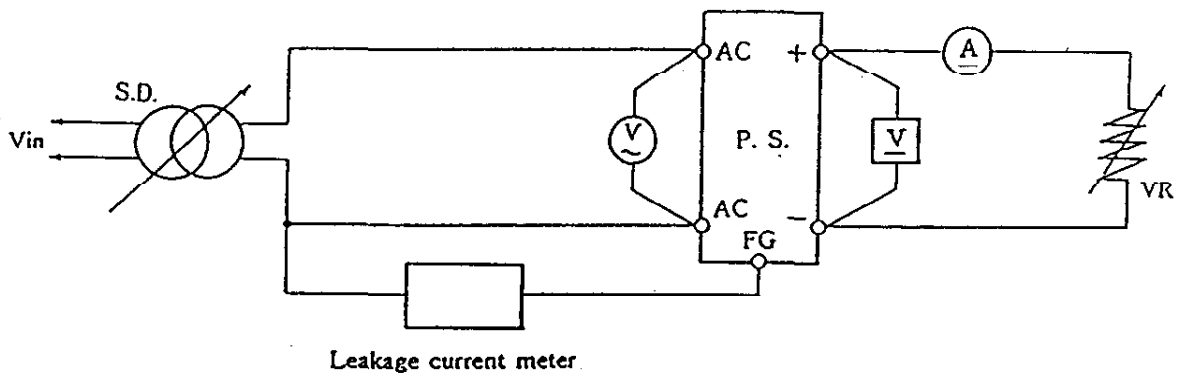
(8) 過渡応答 (負荷急変) 特性 Dynamic load response characteristics



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



(10) リーク電流 (漏洩電流) 特性 Leakage current characteristics



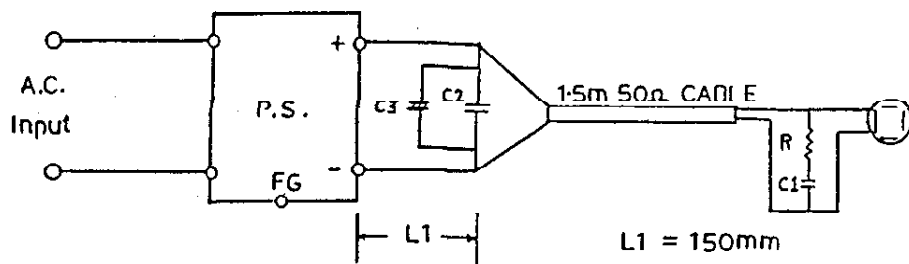
Note : Leakage current measured through a 1kΩ resistor.

Range used : AC + DC

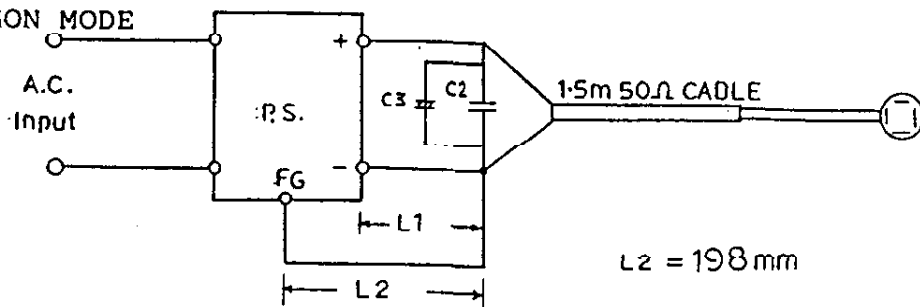
(1) Output-ripple, noise

- R = 50Ω
- C1 = 4700pF
- C2 = 0.1μF
- C3 = 100μF

a) NORMAL MODE



b) NORMAL + COMMON MODE



2-2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	Oscilloscope	HITACHI DENSHI	V-1065
2	Digital storage oscilloscope	HITACHI DENSHI	VC-6041
3	Digital voltmeter	IWATSU	VDAC 7411
4	Digital watt/current/volt meter	HIOKI	3182
5	DC Ampere meter	YOKOGAWA ELECTRIC	2051
6	Autotransformer	SUPERIOR ELECTRIC	136 BT
7	Variable resistive load	IWASHITA ELECTRIC	D-5-10/16
8	Dynamic dummy load	TAKAMIZAWA CYBERNETICS KIRUSUI	PSA-150D PLZ72W, PLZ150WA
9	Digirush currenter	TAKAMIZAWA CYBERNETICS	PSA-200
10	Current Probe/Amplifier	TEKTRONIX	A6303/AM503
11	Controlled Temp. Chamber	TABAI	PL-2GM
12	Leakage current meter	YOKOGAWA ELECTRIC	3226
13	Equipment for dynamic line response	- BUILT IN-HOUSE -	

REGULATION - Line and Load, Temp. Drift

KS5

5V

1. Regulation - Line and Load Condition Ta : 25°C

Iout \ Vin	AC 85 v	AC 100 v	AC 132 v	Line Regulation
0 %	5.020 v	5.020 v	5.020 v	0 mv 0 %
50 %	5.017 v	5.018 v	5.018 v	1 mv 0.02 %
100 %	5.015 v	5.016 v	5.016 v	1 mv 0.02 %
Load	5 mv	4 mv	4 mv	
Regulation	0.10 %	0.08 %	0.08 %	

2. Temperature Drift Conditions Vin : AC100v
Iout : 100 %

Ta	0 °C	25 °C	50 °C	Temp. Stability
Vout	5.019 v	5.016 v	5.013 v	6 mv 0.12 %

12V

1. Regulation - Line and Load Condition Ta : 25°C

Iout \ Vin	AC 85 v	AC 100 v	AC 132 v	Line Regulation
0 %	11.991 v	11.992 v	11.992 v	1 mv 0.01 %
50 %	11.988 v	11.989 v	11.990 v	2 mv 0.02 %
100 %	11.987 v	11.988 v	11.989 v	2 mv 0.02 %
Load	4 mv	4 mv	3 mv	
Regulation	0.03 %	0.03 %	0.03 %	

2. Temperature Drift Conditions Vin : AC100v
Iout : 100 %

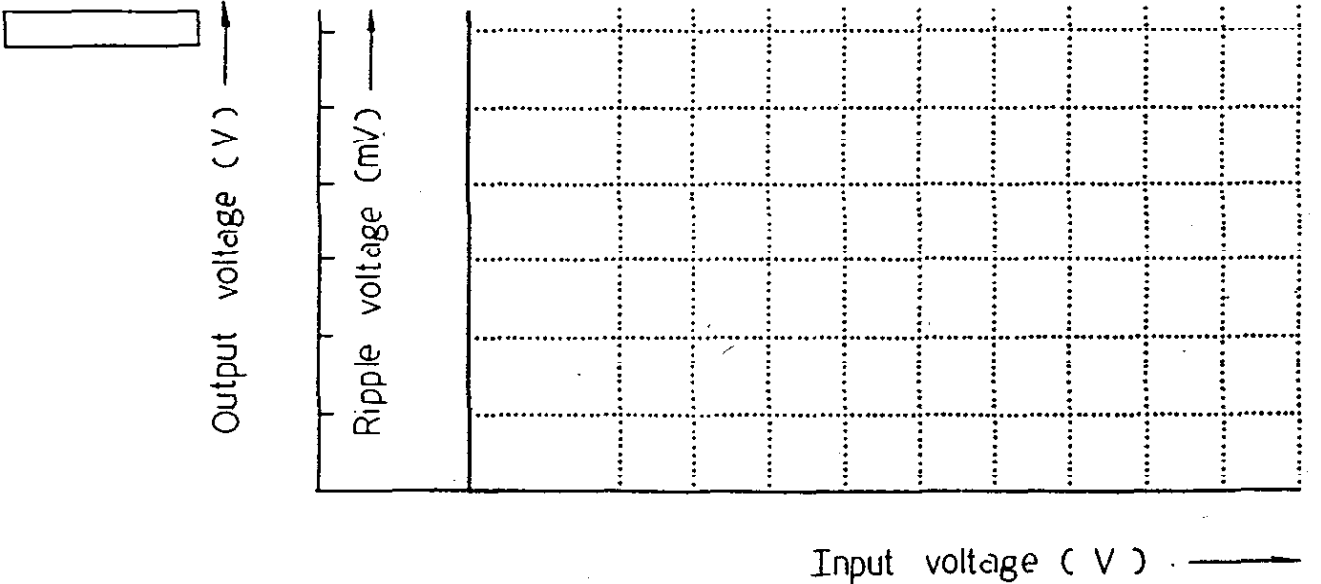
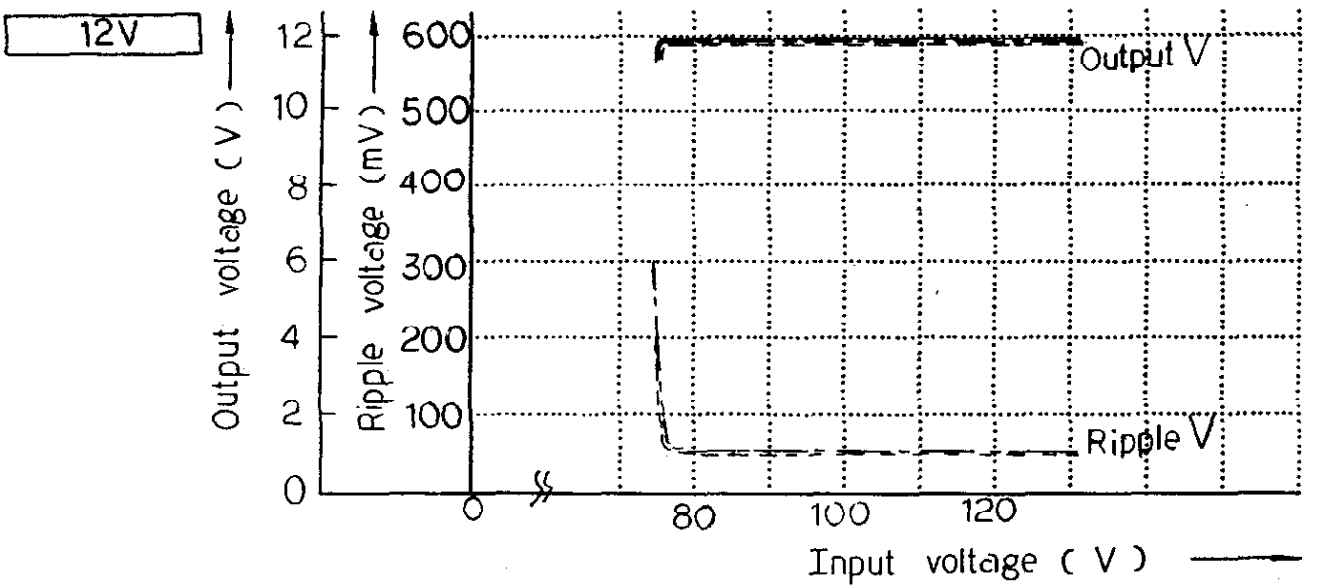
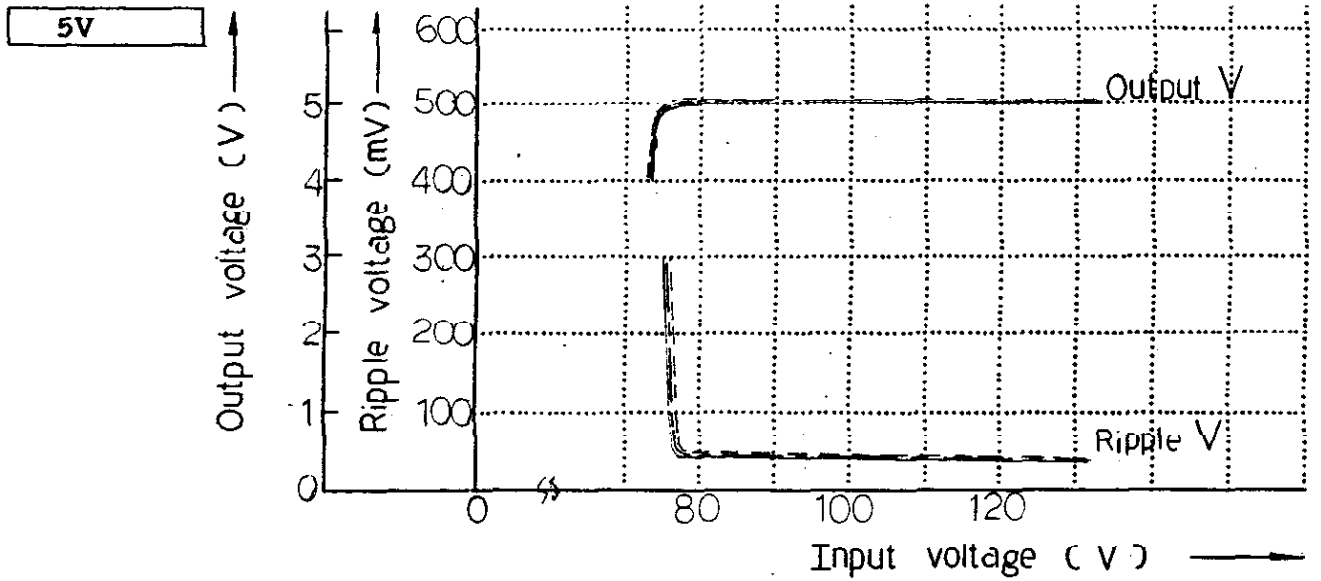
Ta	0 °C	25 °C	50 °C	Temp. Stability
Vout	11.962 v	11.988 v	12.003 v	41 mv 0.34 %

Output voltage and ripple voltage
v.s input voltage

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Iout : 100%

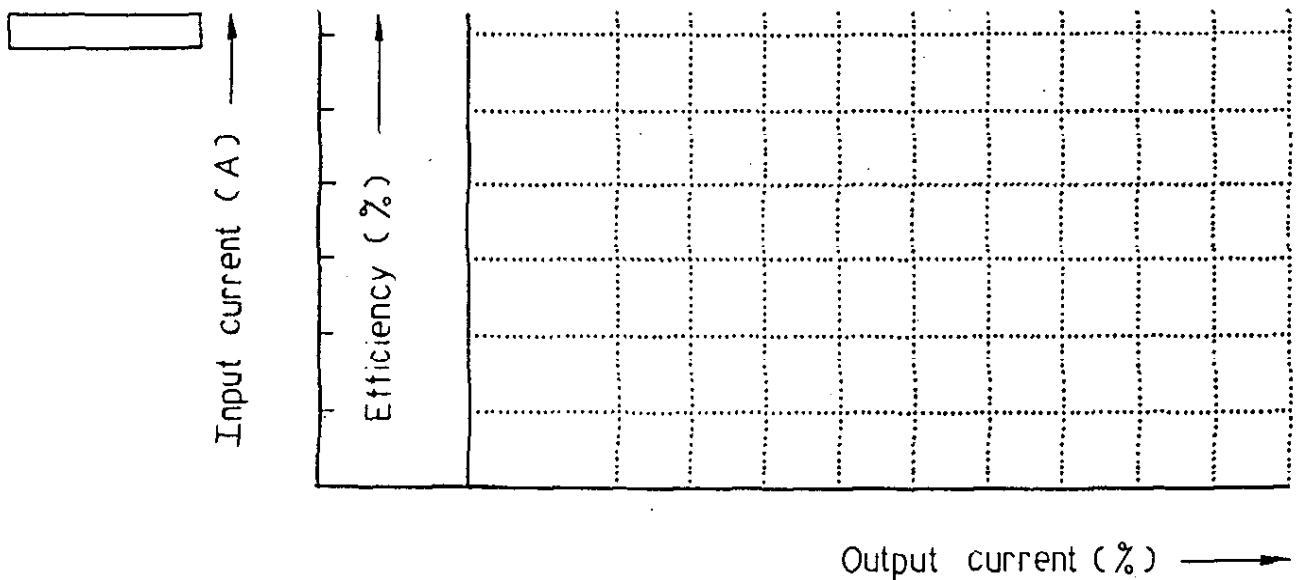
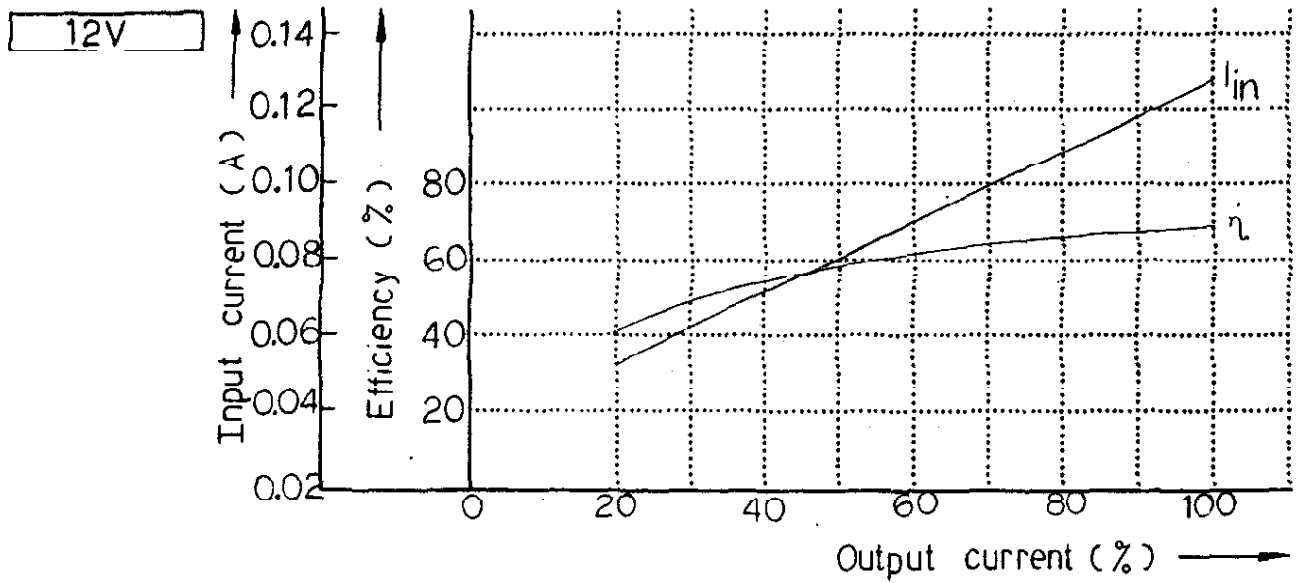
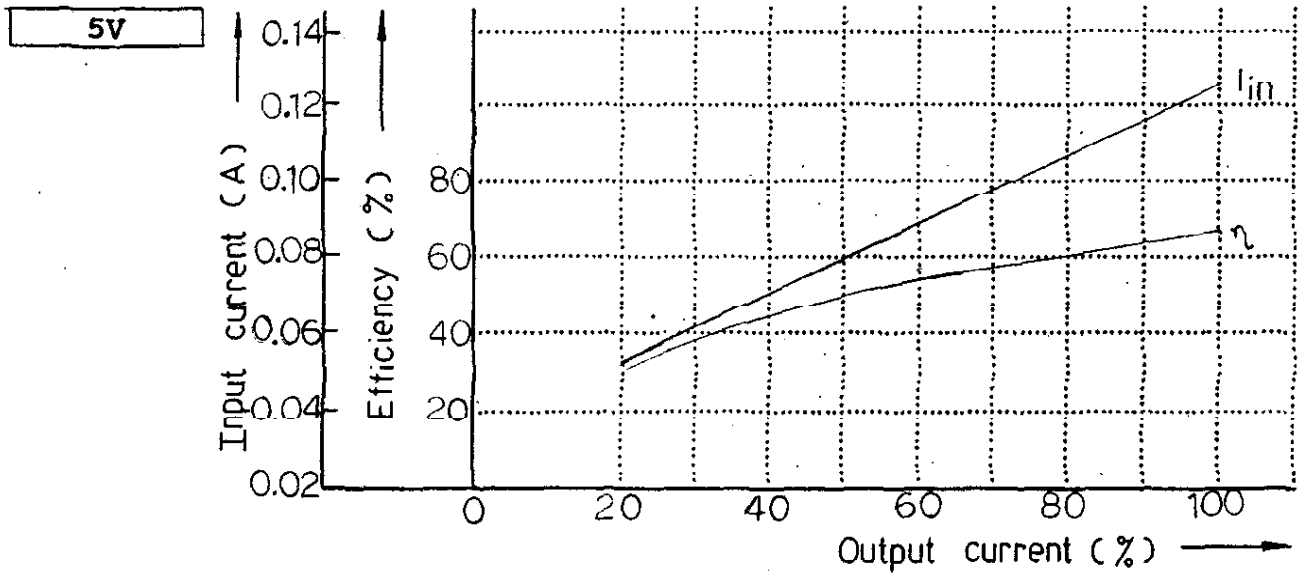
Conditions Ta : 0°C -----
25°C -----
50°C -----



Efficiency and input current v.s
output current

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Conditions V_{in} : AC 100V
 T_a : 25°C

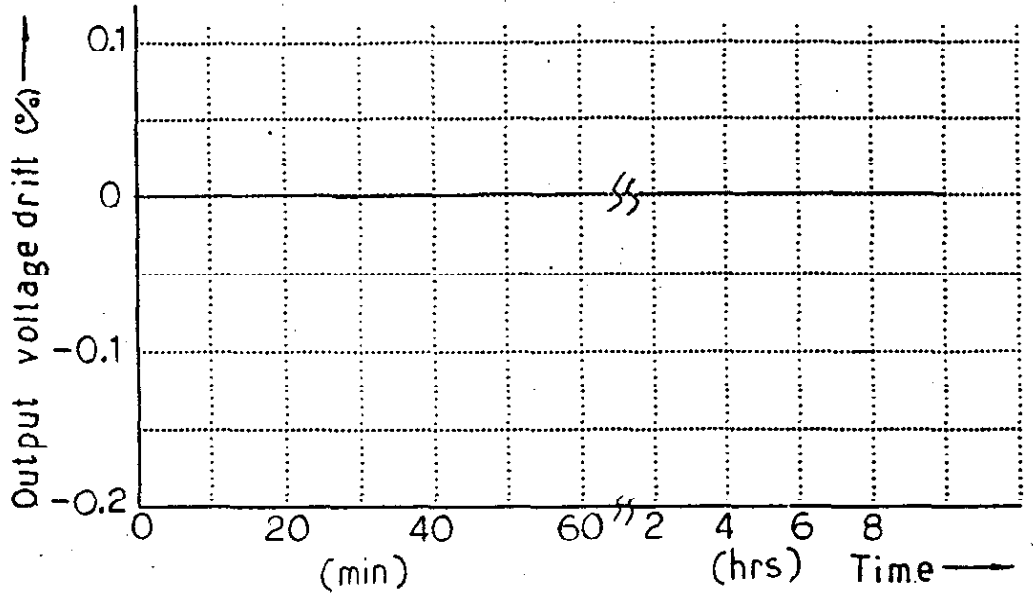


Warm up voltage drift

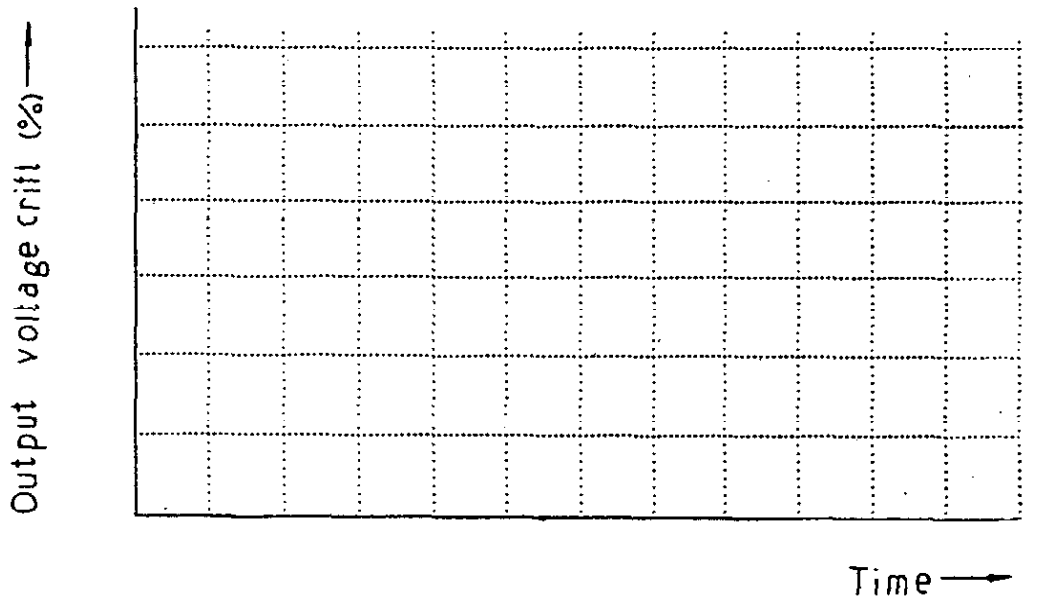
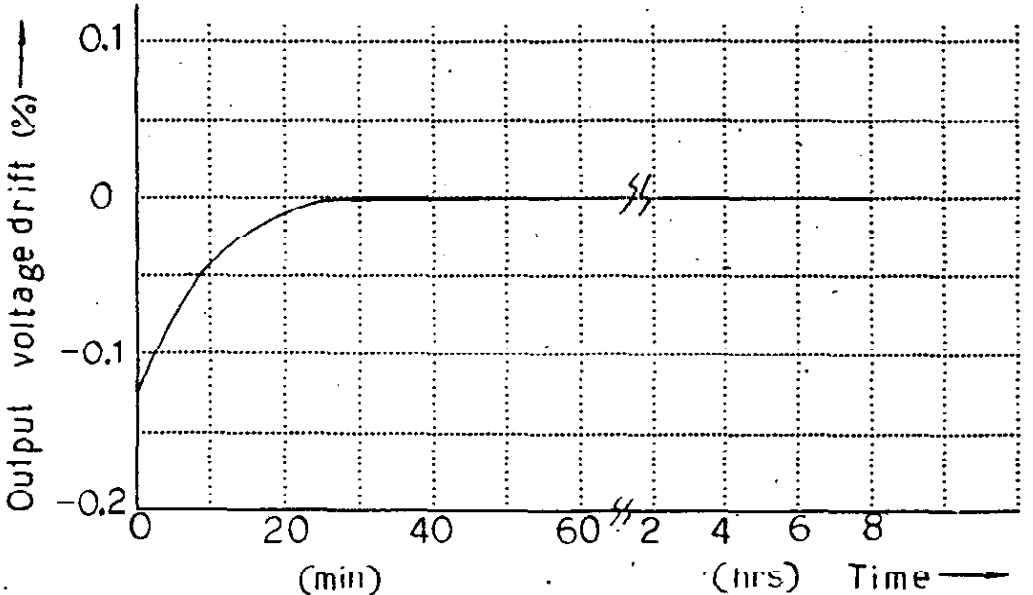
KS5

Conditions Vin : AC 100 v
Vout,Iout: 100%
Ta : 25°C

5V



12V



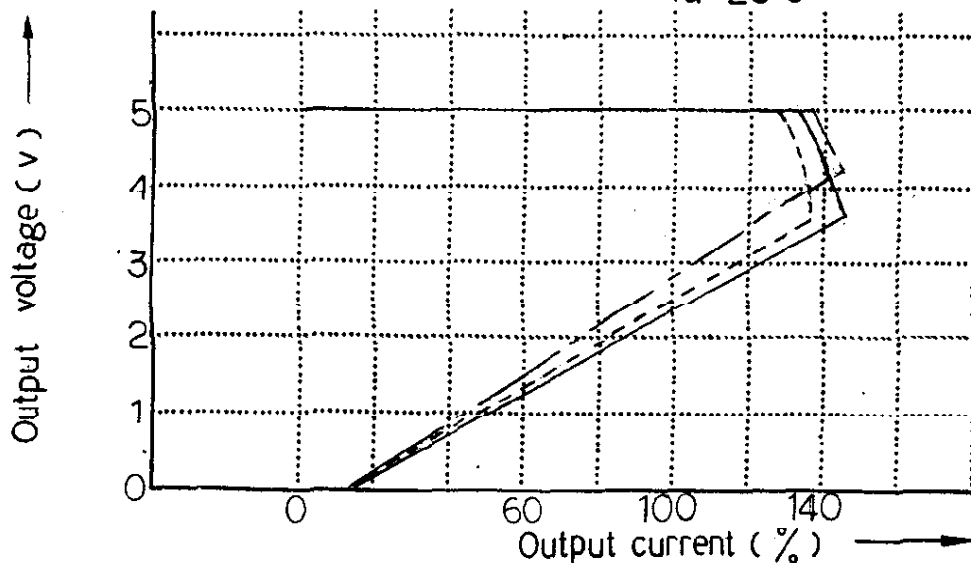
O.C.P Characteristics

KS5

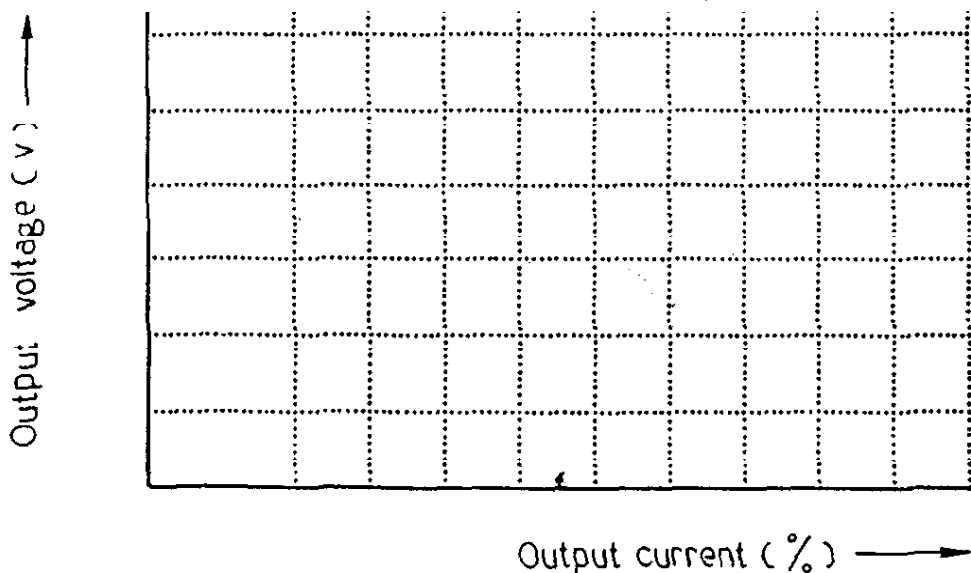
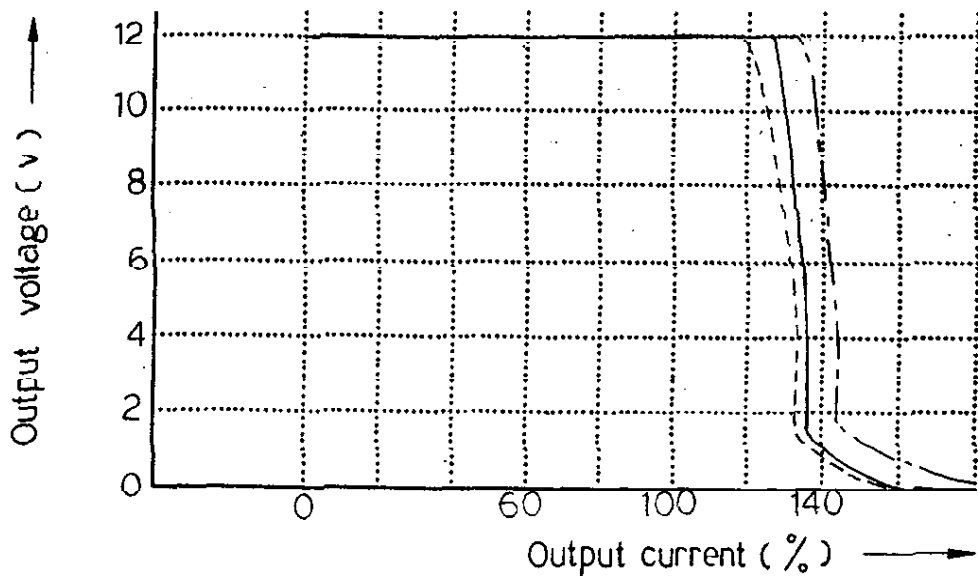
Conditions Vin: AC 85 v - - - - -
 AC 100 v - - - - -
 AC 132 v - - - - -

Ta: 25°C

5V



12V

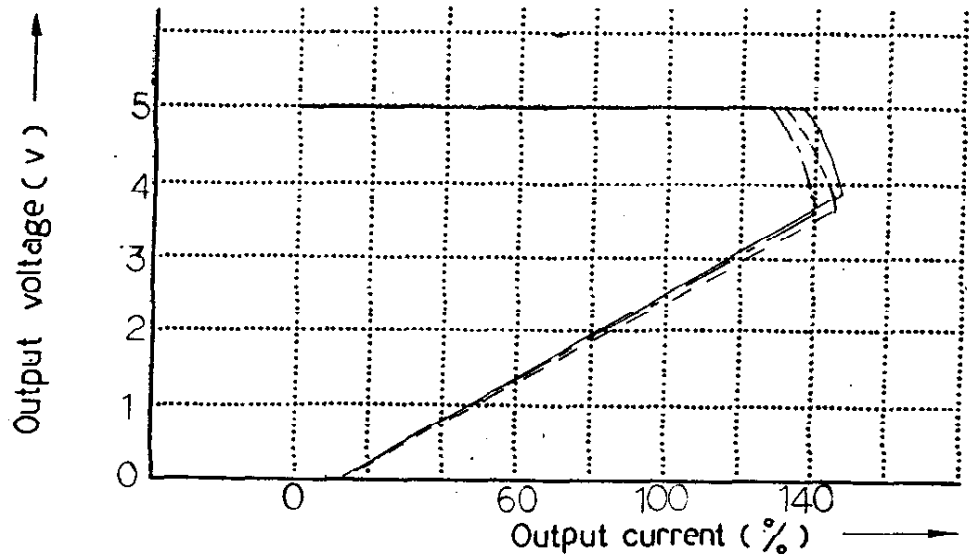


O.C.P Characteristics

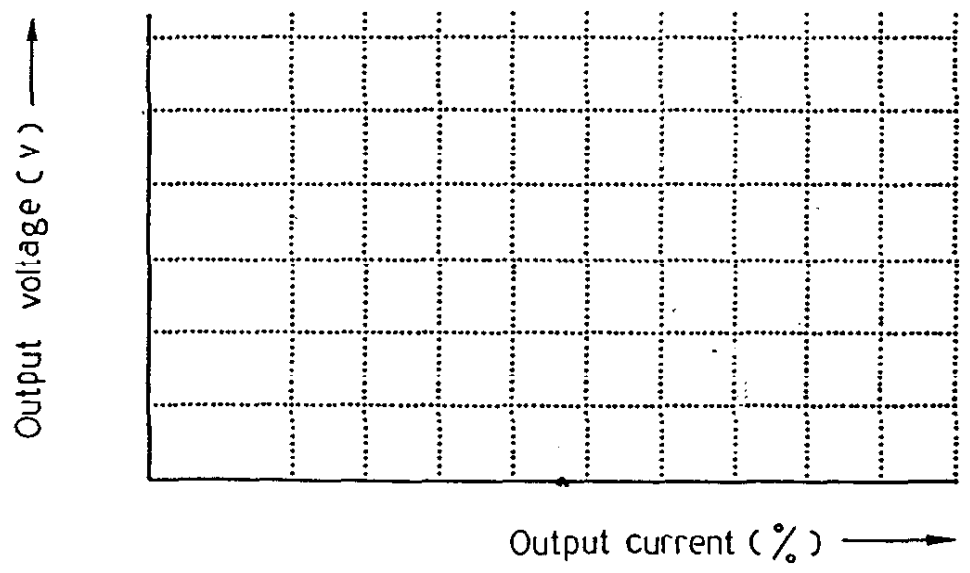
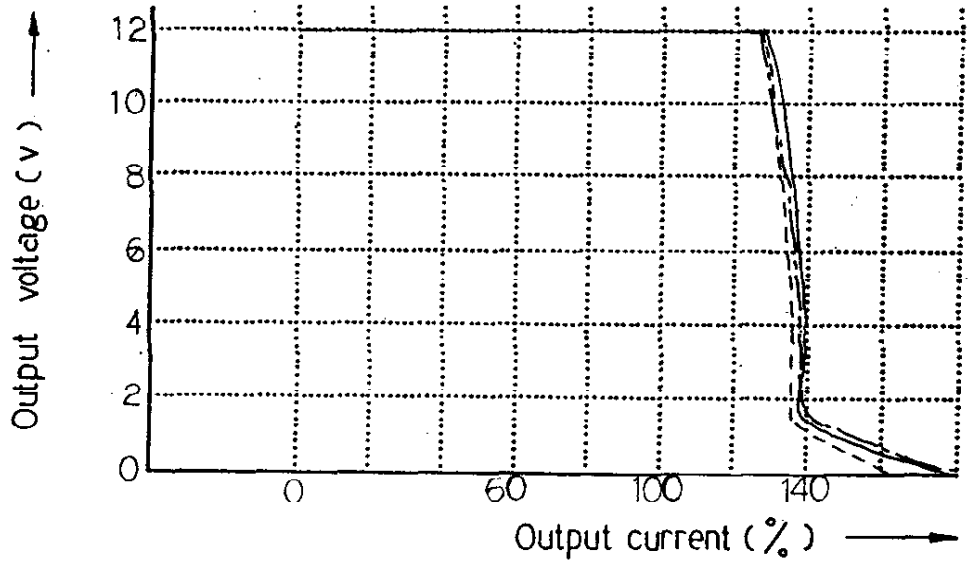
KS5

Conditions
 Vin : AC 100v
 Ta : 0°C ———
 25°C - - - -
 50°C - - - -

5V



12V

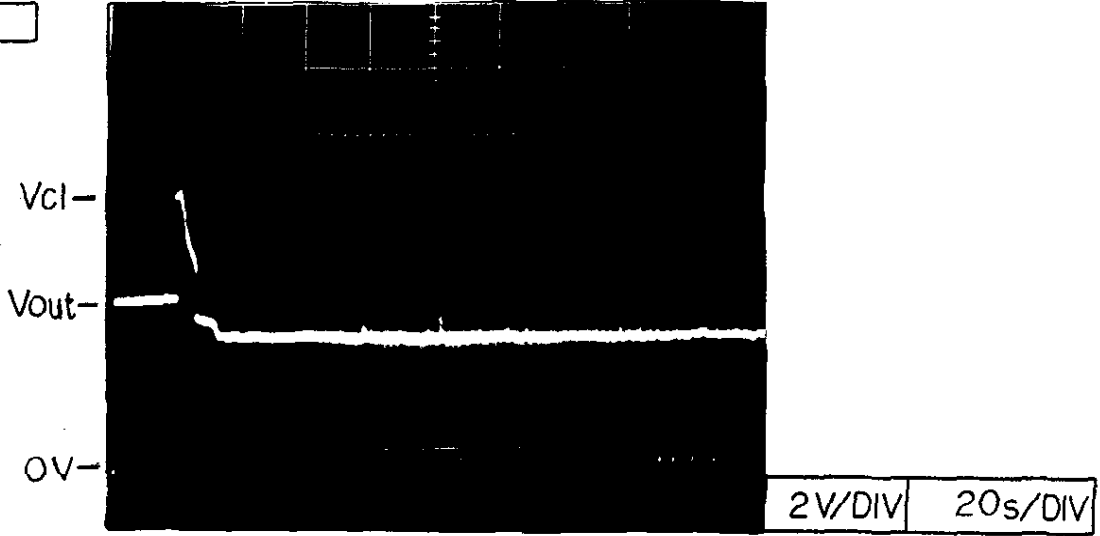


OVP Characteristics

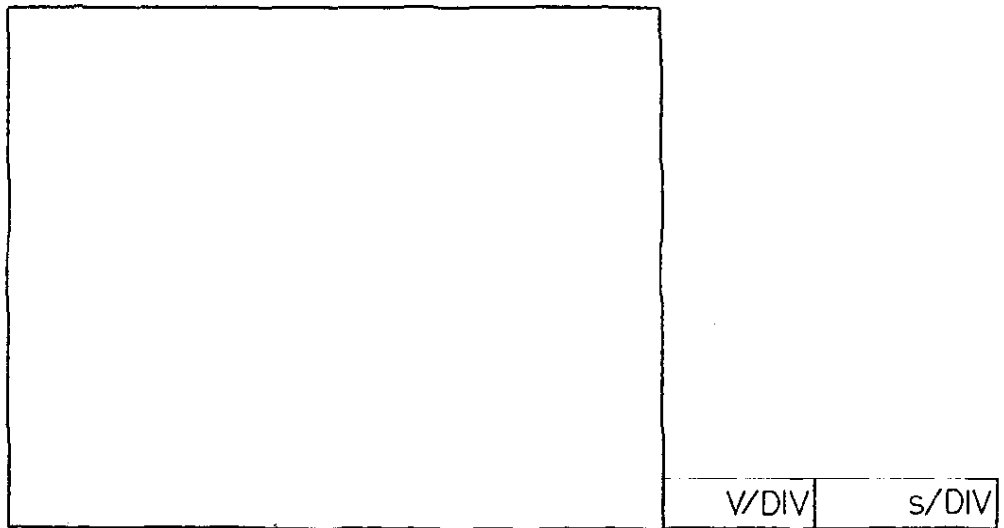
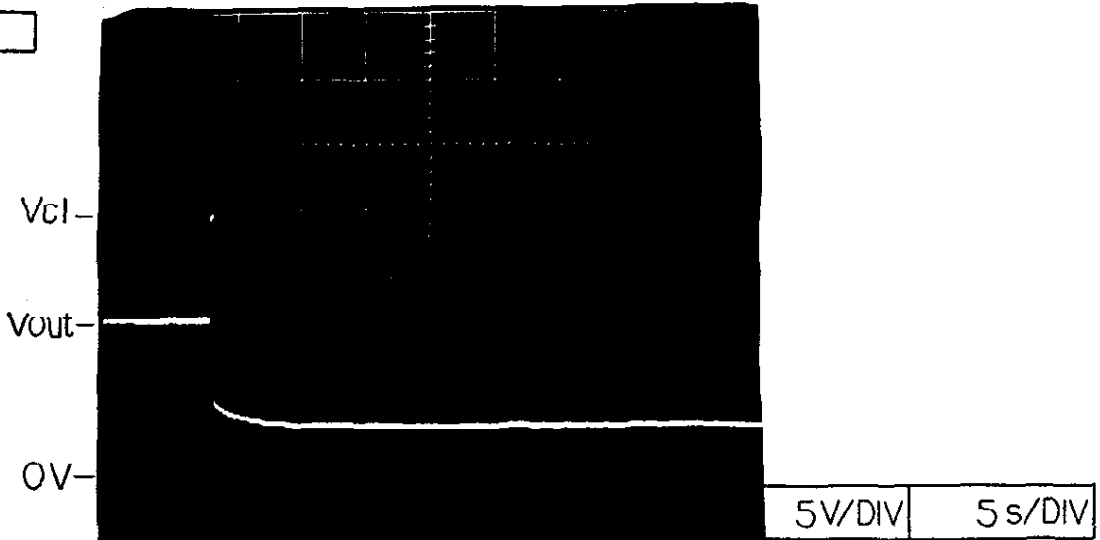
KS 5

Conditions Vin: AC 100 v
Iout: 0 %
T_a: 25°C

5V



12V

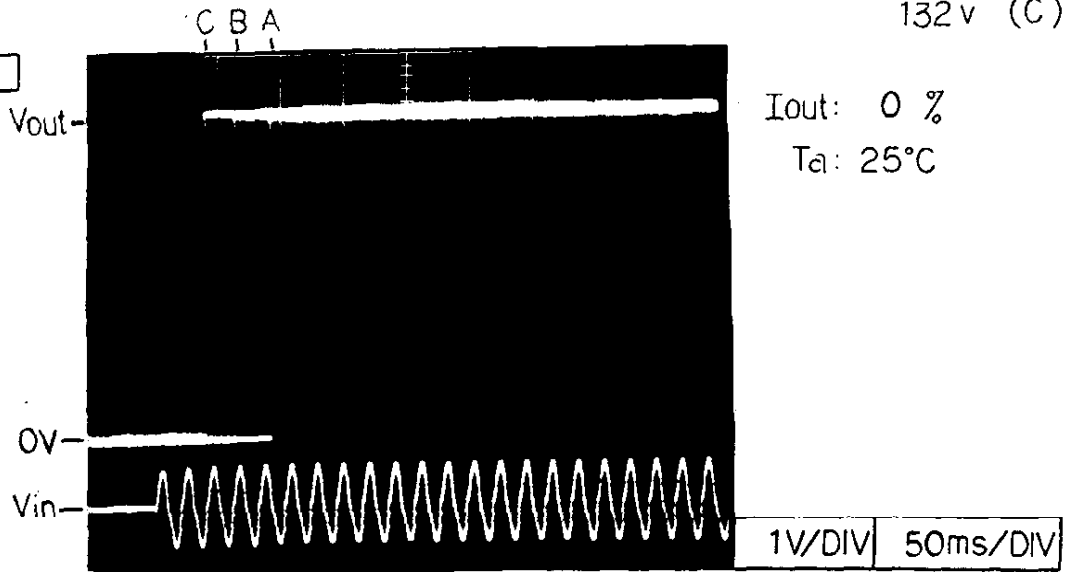


Output rise time

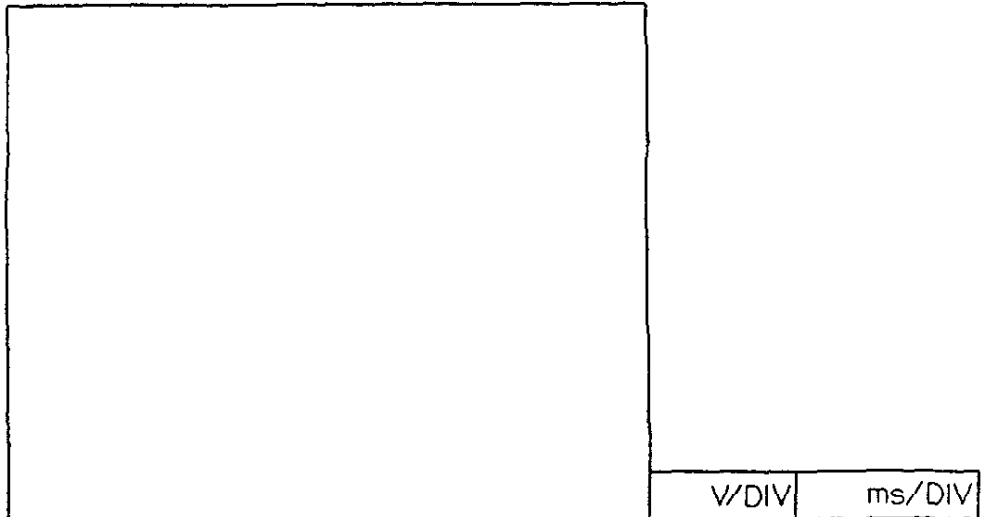
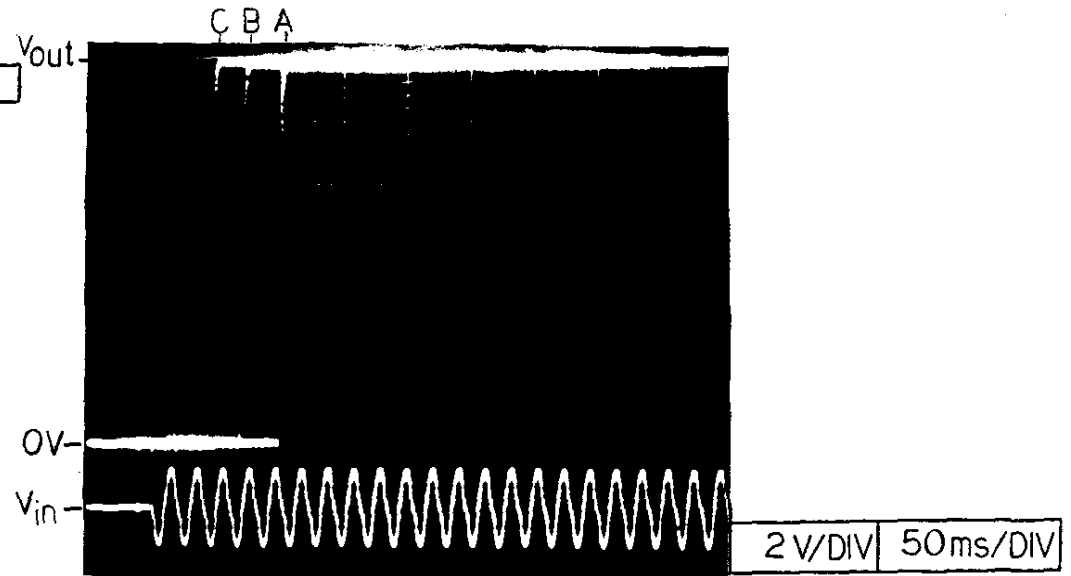
KS 5

Conditions Vin: AC 85v (A)
100V (B)
132v (C)

5V



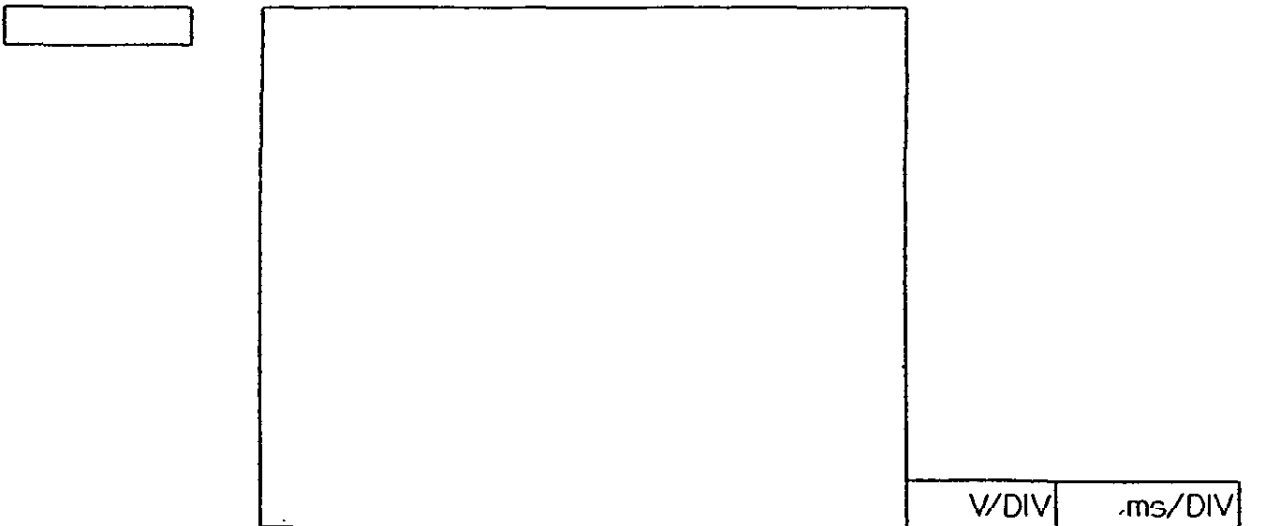
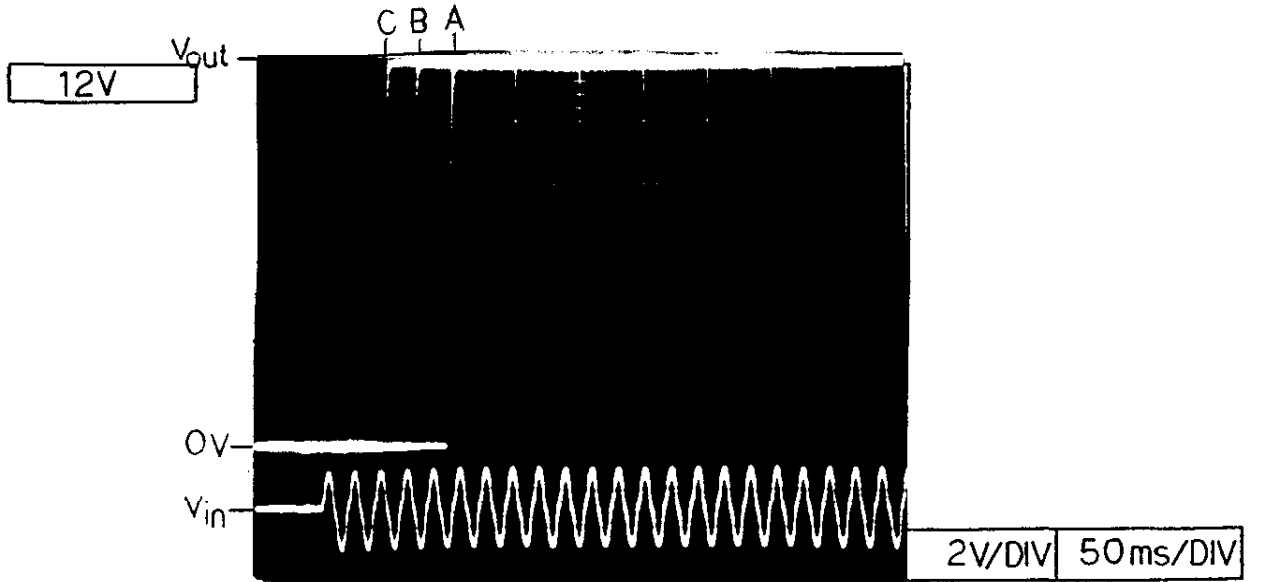
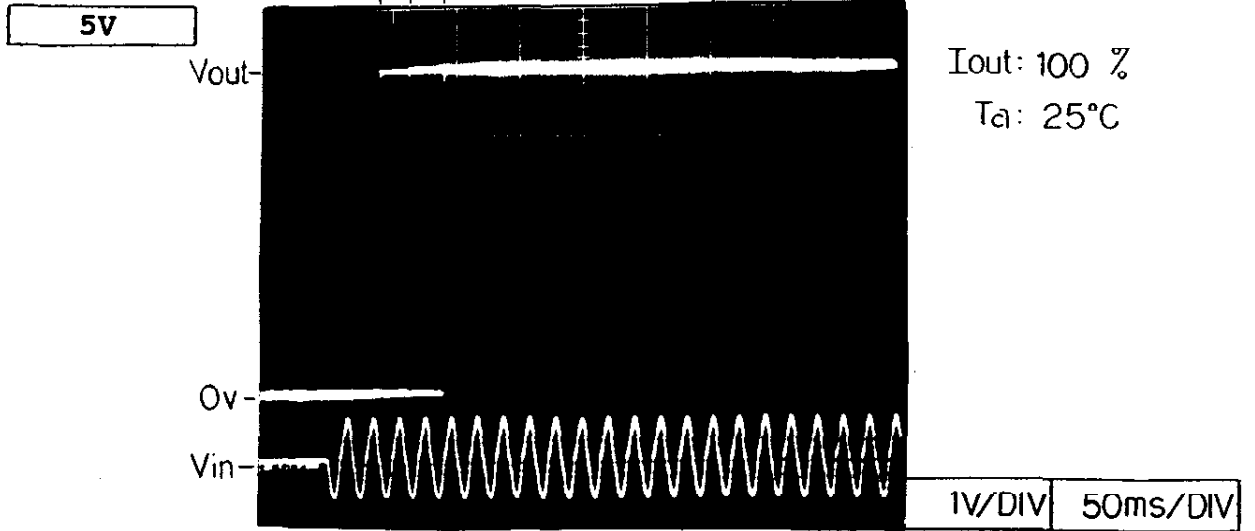
12V



Output rise time

KS 5

Conditions Vin: AC 85v (A)
100v (B)
132v (C)

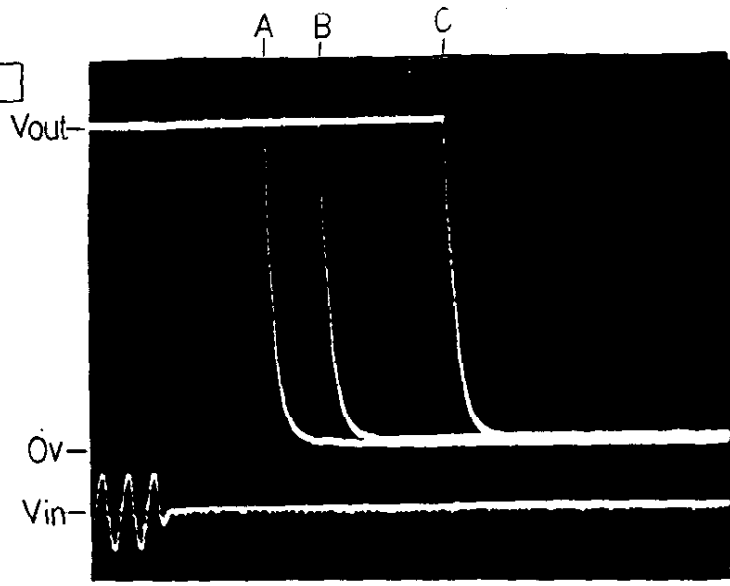


Output fall time

KS 5

Conditions Vin: AC 85v (A)
100v (B)
132v (C)

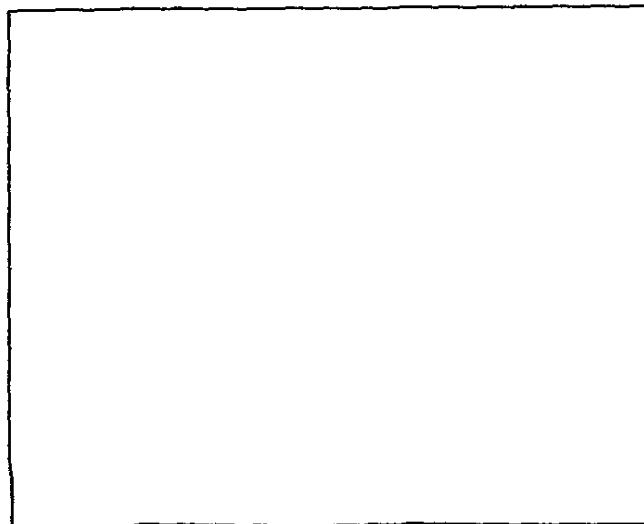
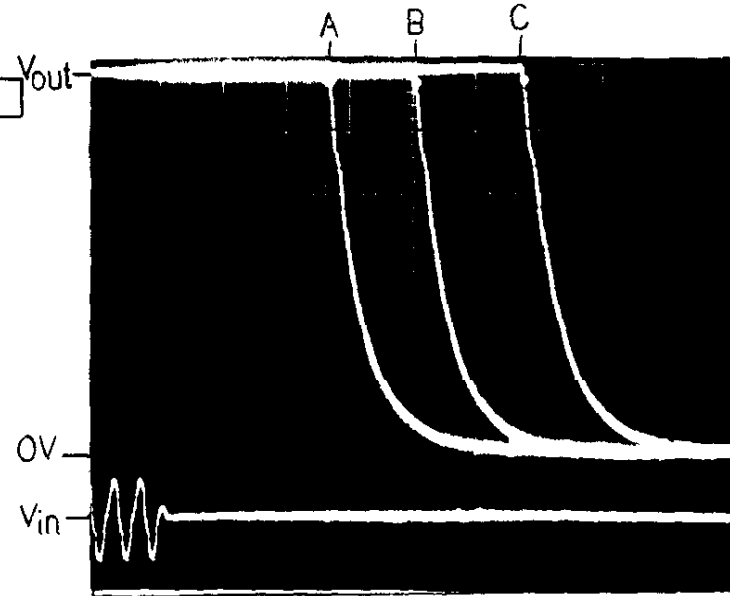
5V



Iout: 0 %

Ta: 25°C

12V

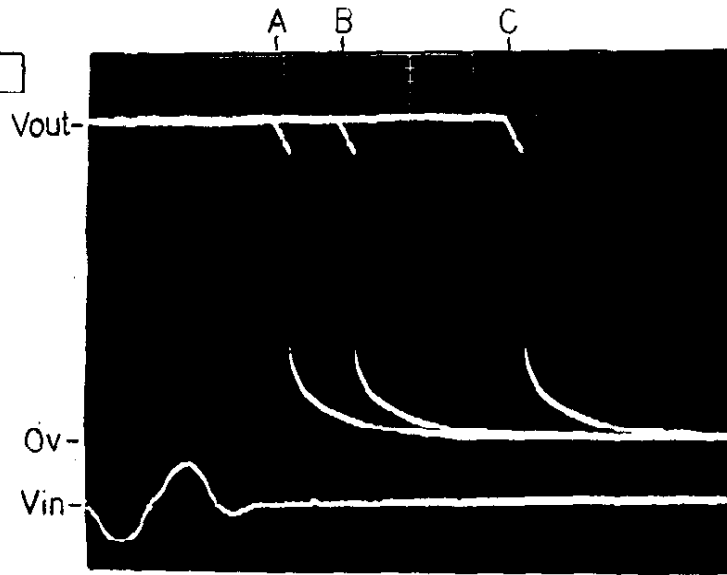


Output fall time

KS 5

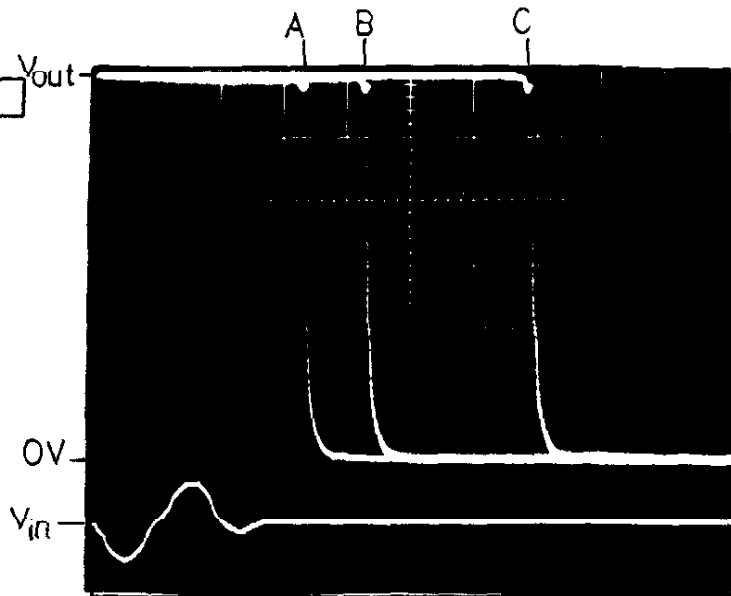
Conditions Vin: AC 85v (A)
100v (B)
132v (C)

5V

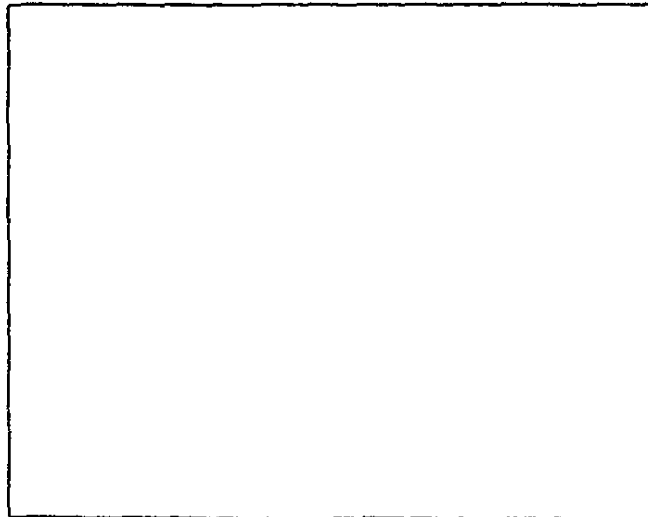


Iout: 100 %
Ta: 25°C

12V



[Empty box]



V/DIV | s/DIV

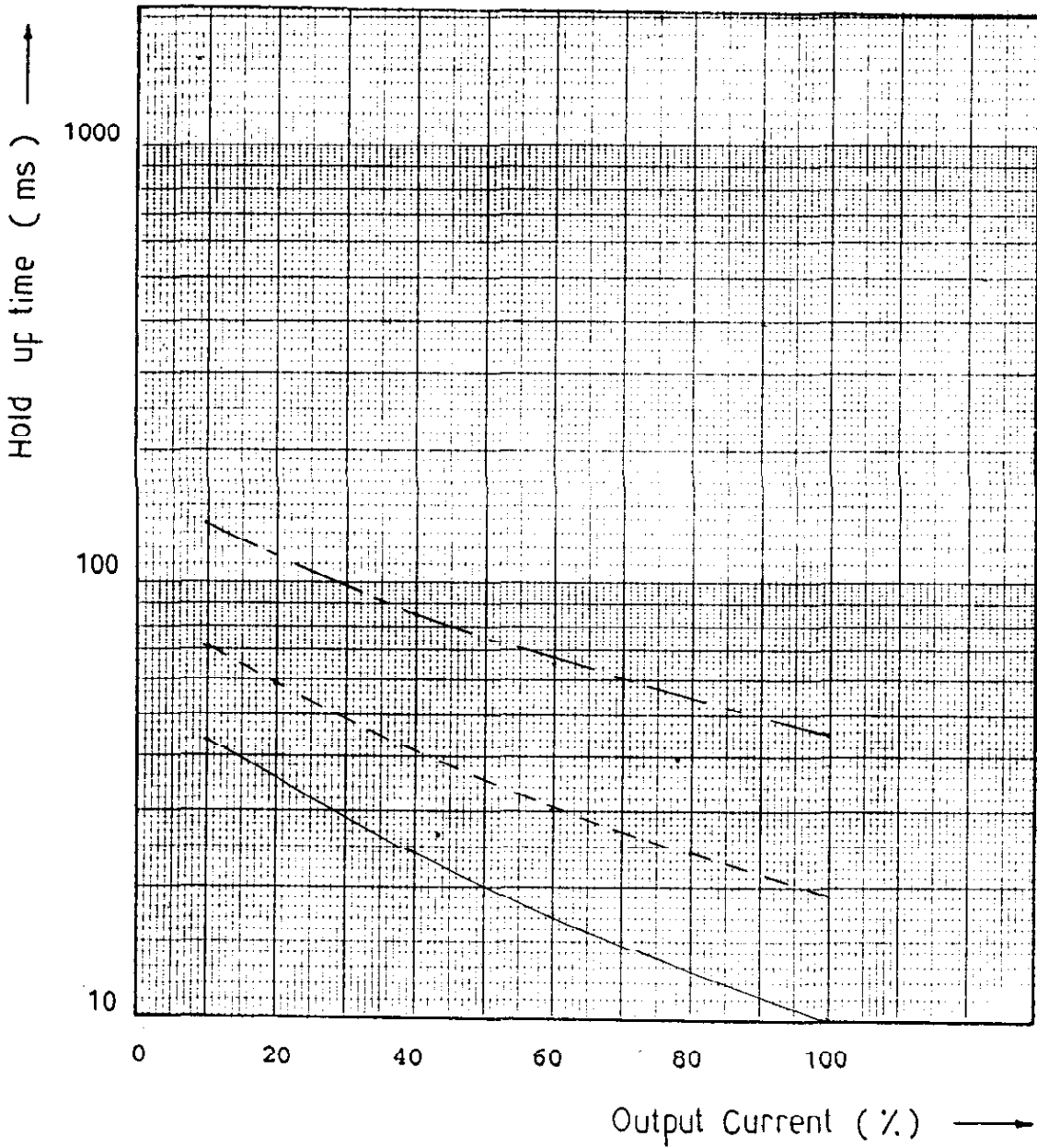
Hold Up Time

KS5

5 V

Vin : AC 85 v ———
AC 100 v - - - -
AC 132 v - - - -

Ta : 25°C



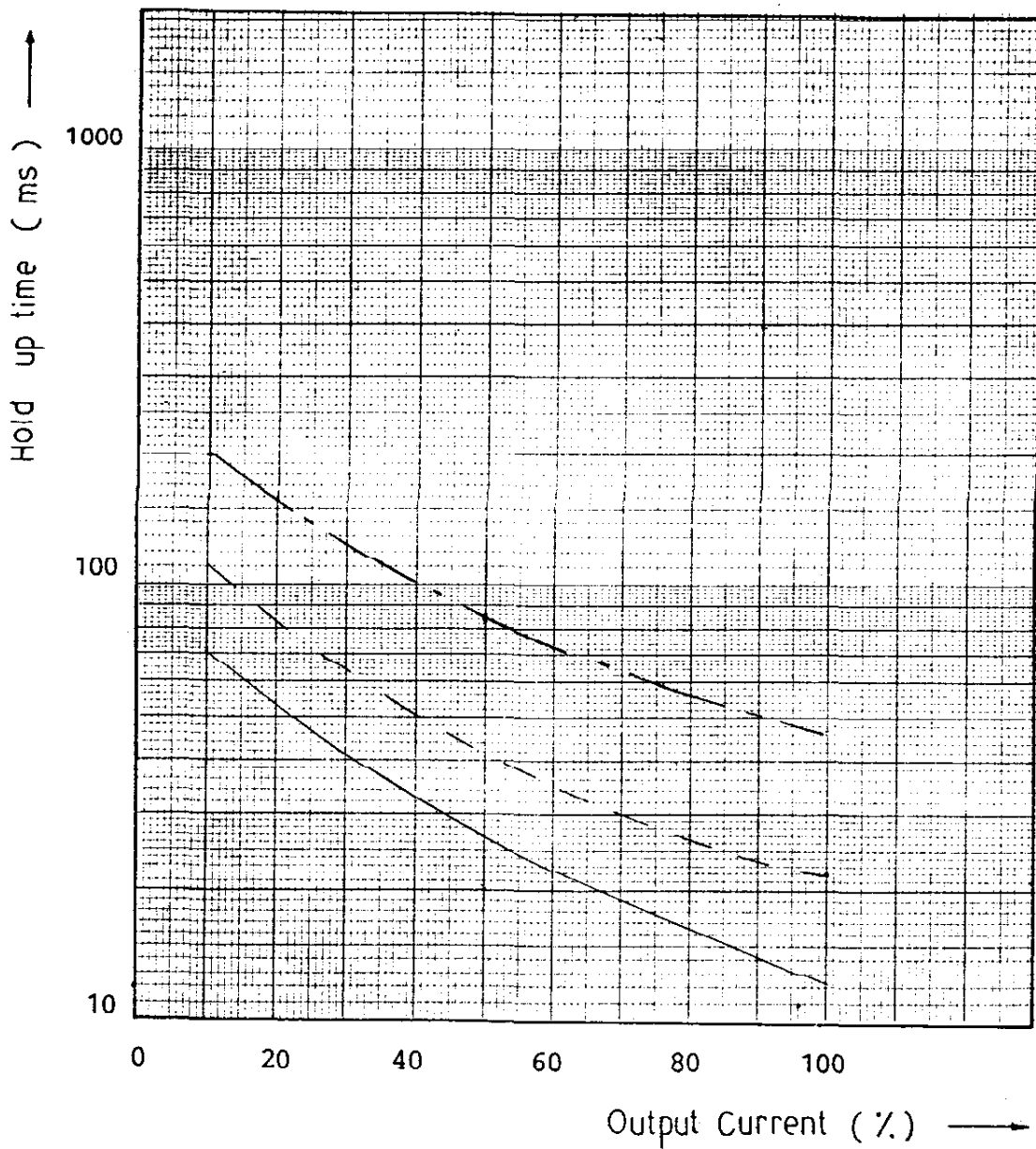
Hold Up Time

KS5

12V

Vin : AC 85 v ———
AC 100 v - - - -
AC 132 v - · - · -

Ta : 25°C



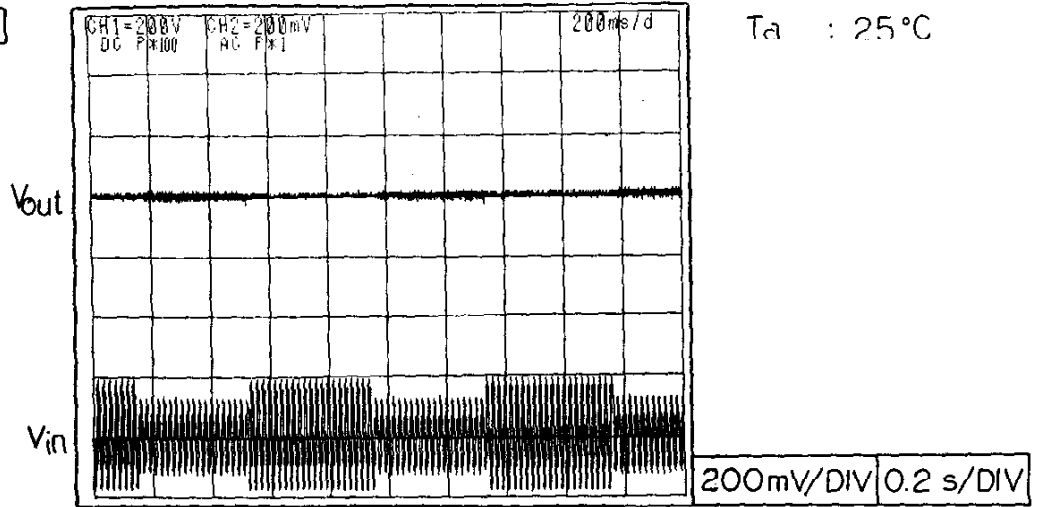
Dynamic line response

KS5

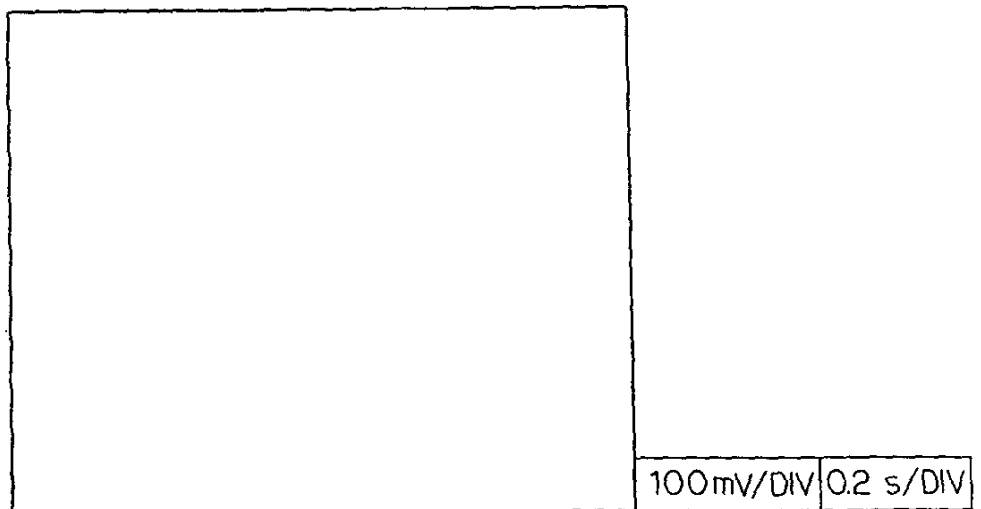
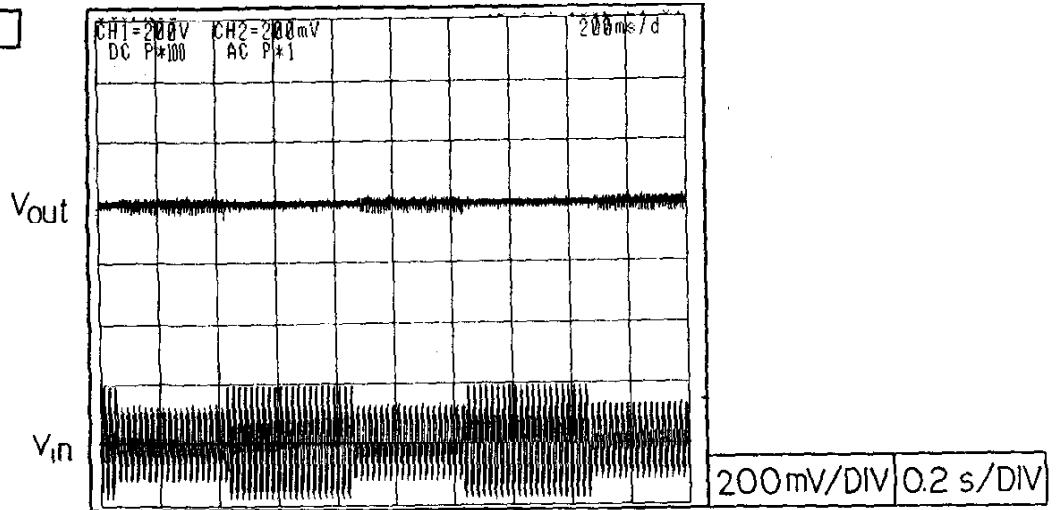
Vin : AC 85 v \rightleftharpoons AC 132 v

Conditions
Vout : Rated
Iout : 100%
Ta : 25°C

5V



12V



Dynamic load response

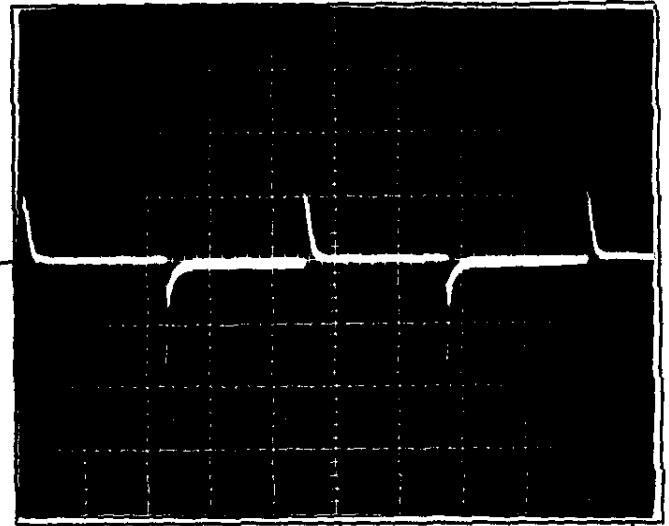
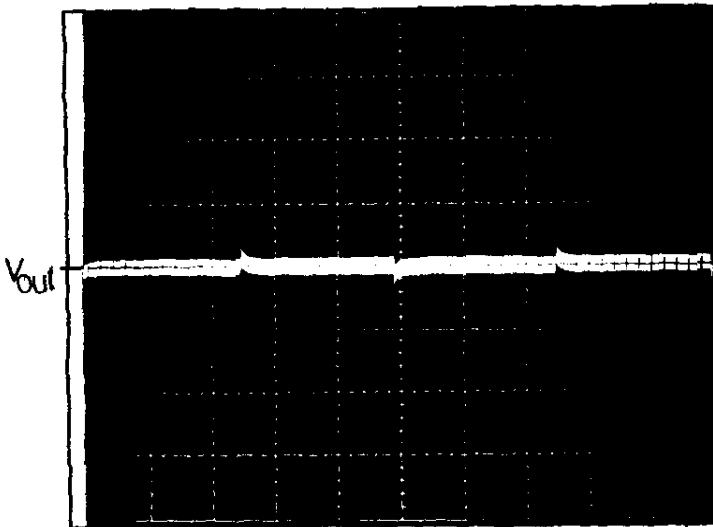
KS5

Conditions Vin: AC 100v
Ta: 25°C

5V

Iout 50 \longleftrightarrow 100% f=100Hz

Iout 0 \longleftrightarrow 100% f=100Hz

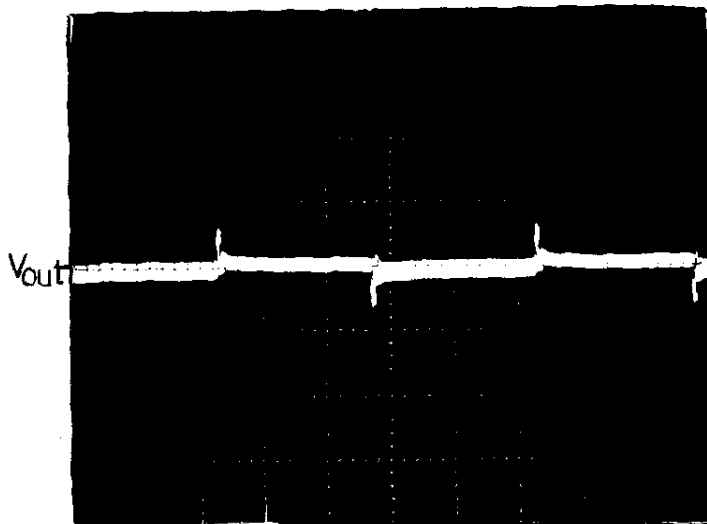


100 mV/DIV	2 ms / DIV
+ 0.8%	- 0.8%

100 mV/DIV	2 ms / DIV
+ 2.2%	- 3.4%

Iout 50 \longleftrightarrow 100% f=1 kHz

Iout 0 \longleftrightarrow 100% f=1 kHz



100 mV/DIV	0.2 ms / DIV
+ 0.8%	- 0.8%

100 mV/DIV	0.2 ms / DIV
+ 2.4%	- 4.0%

Dynamic load response

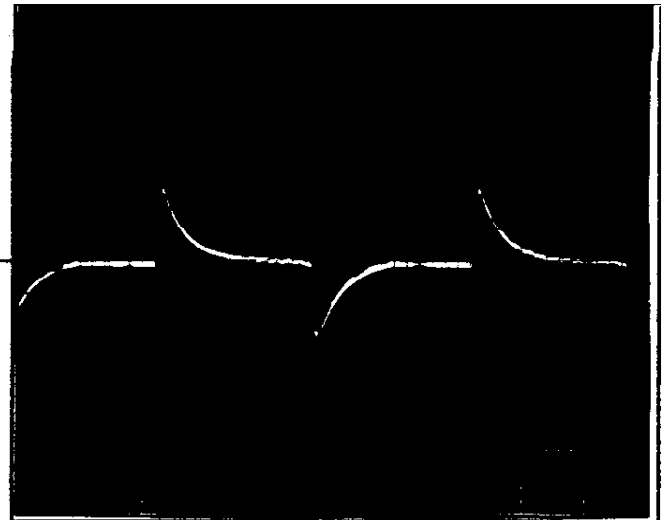
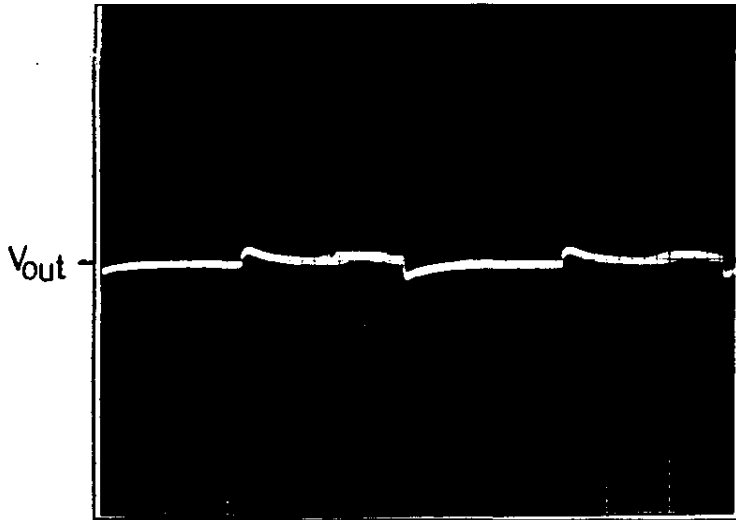
KS5

Conditions Vin : AC100 v
Ta : 25°C

12V

Iout 50 ↔ 100% f=100Hz

Iout 0 ↔ 100% f=100Hz

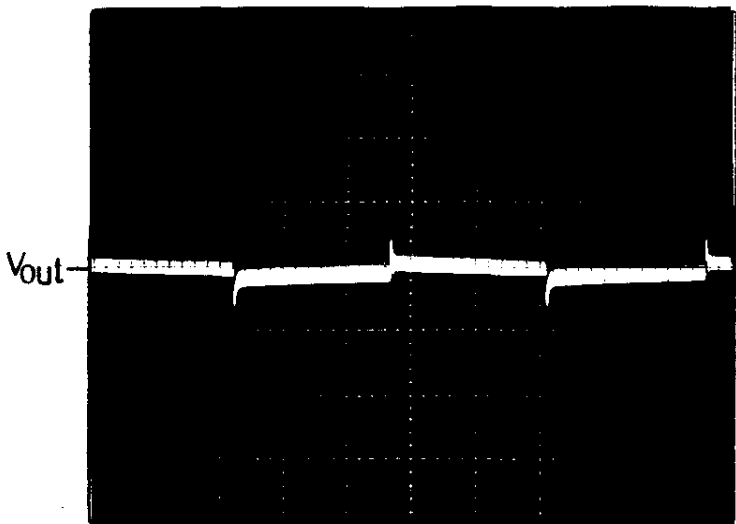


100 mV/DIV	2 ms / DIV
+ 0.3%	- 0.3%

100 mV/DIV	2 ms / DIV
+ 1.0%	- 1.2%

Iout 50 ↔ 100% f=1 kHz

Iout 0 ↔ 100% f=1 kHz



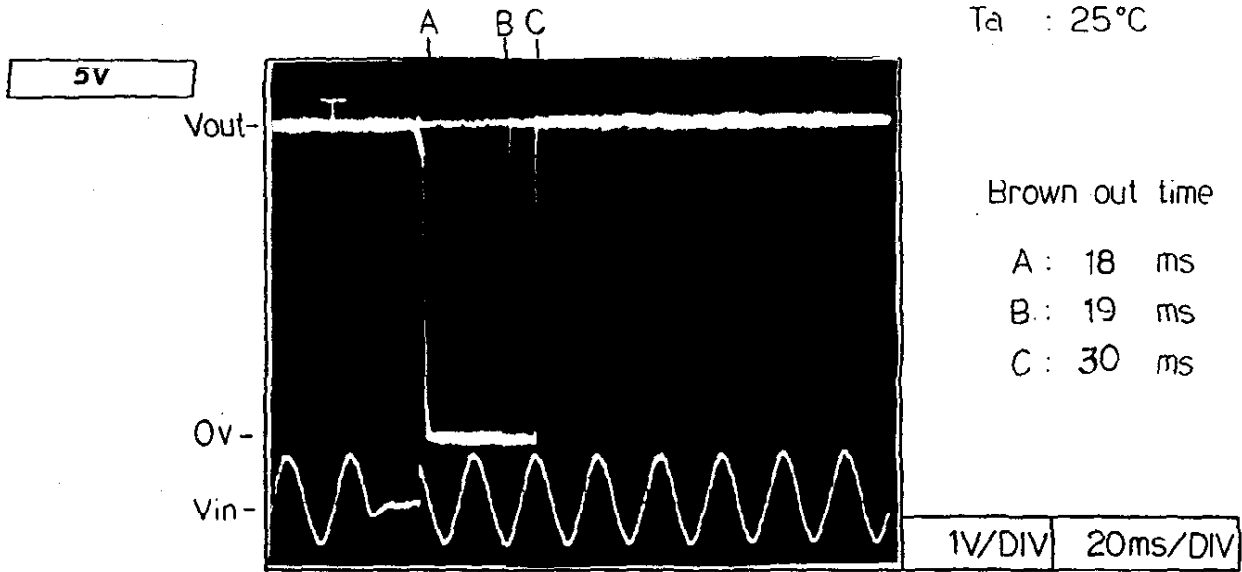
100 mV/DIV	0.2 ms / DIV
+ 0.3%	0.3%

100 mV/DIV	0.2 ms / DIV
+ 0.8%	- 0.9%

Response to brown out

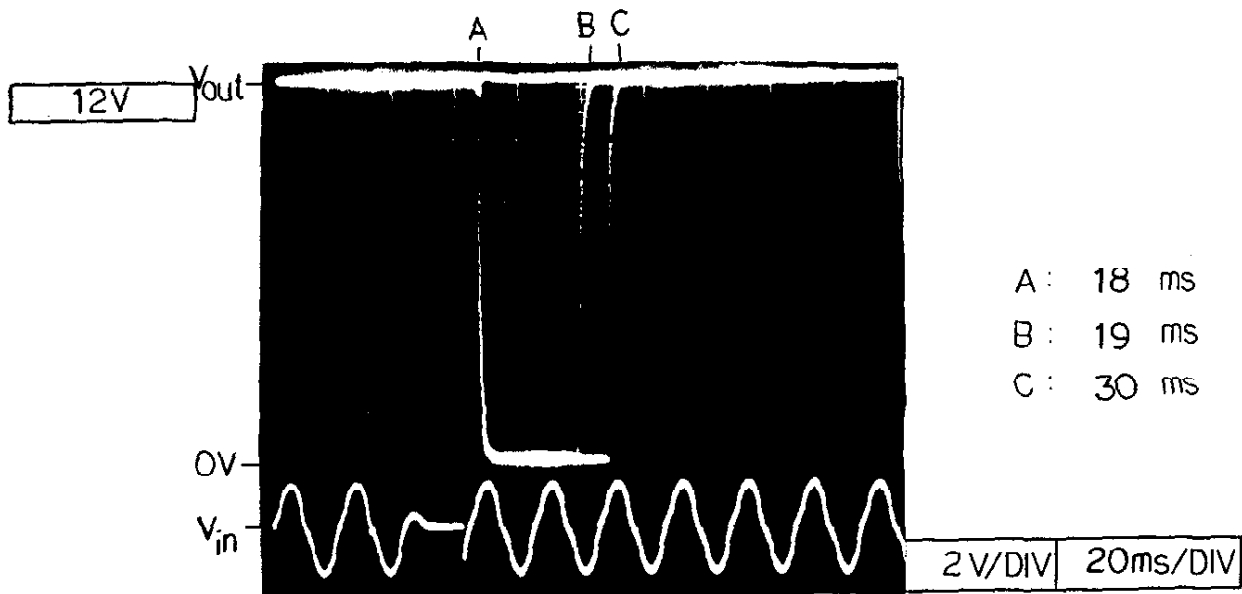
KS 5

Conditions Vin : AC 100 v
Iout : 100 %
Ta : 25°C

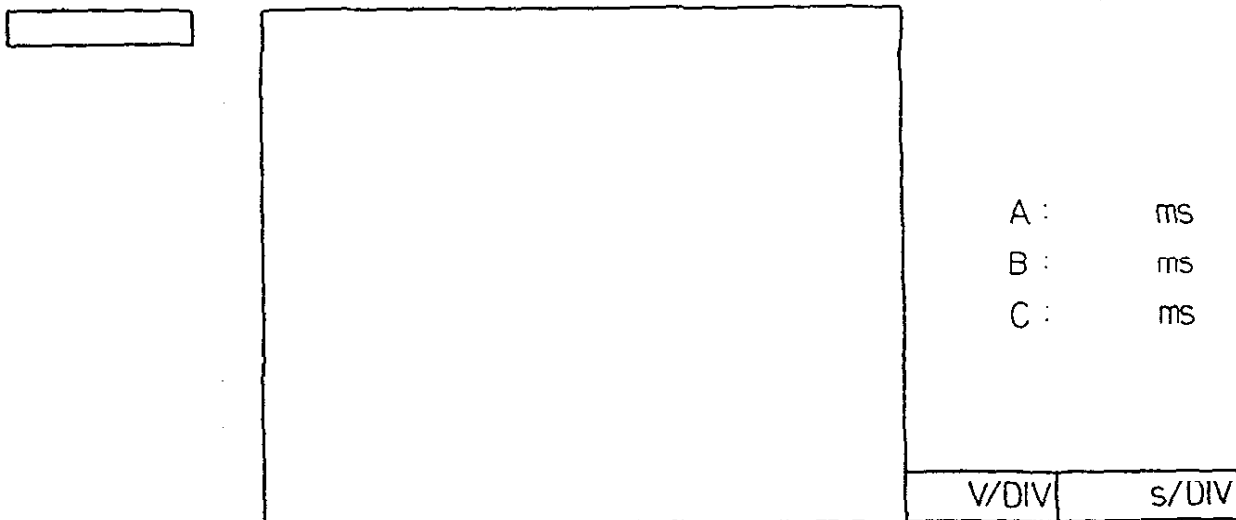


Brown out time

- A : 18 ms
- B : 19 ms
- C : 30 ms



- A : 18 ms
- B : 19 ms
- C : 30 ms



- A : ms
- B : ms
- C : ms

Inrush Current Characteristics

KS5

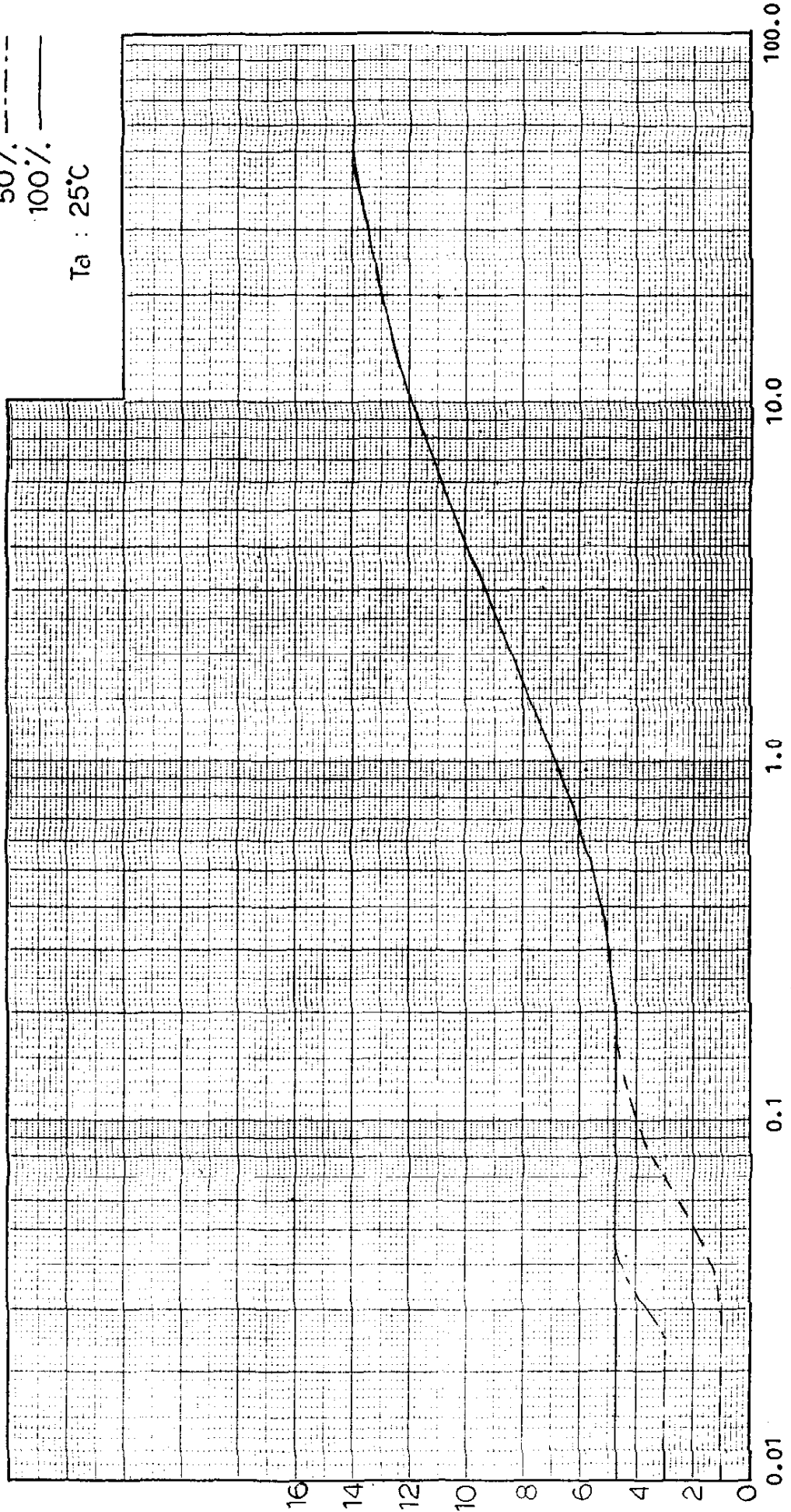
V_{in} : AC 100V

I_{out} : 0% -----

50% -----

100% -----

T_a : 25°C



(Max) Inrush Current (A) ←

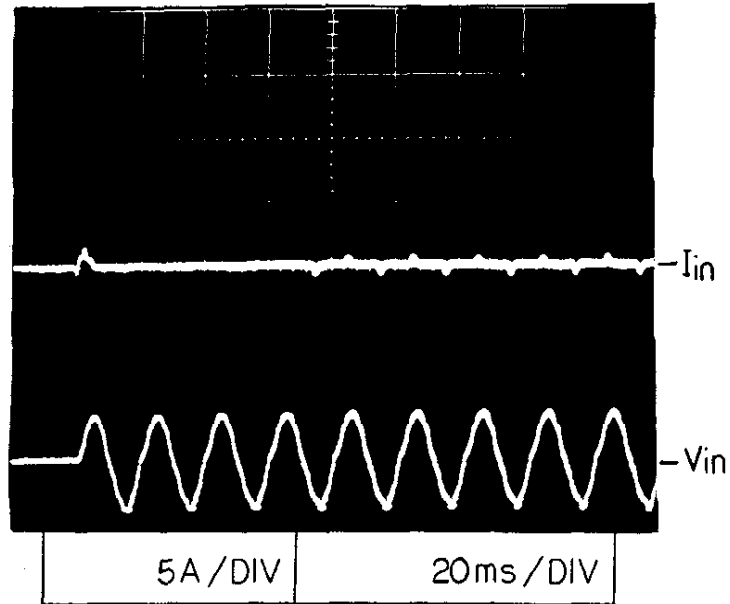
→ Brown out time (s)

Inrush current waveform

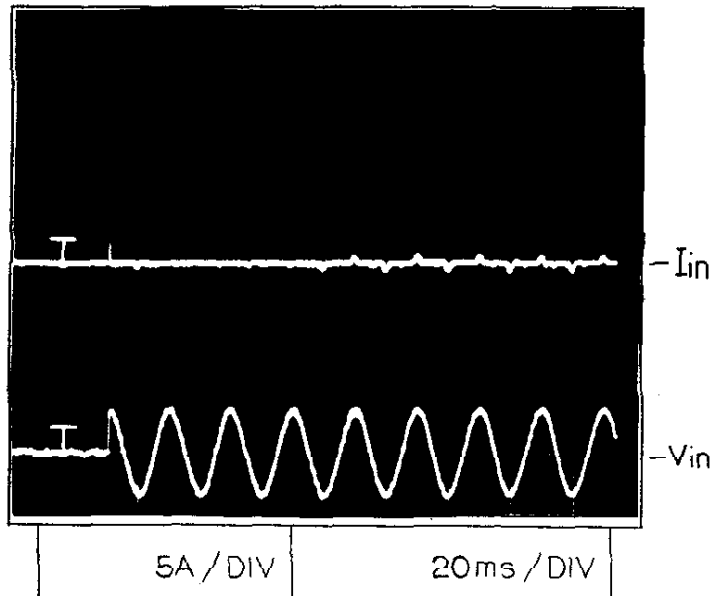
KS 5

Conditions V_{in} : AC 100 v
 I_{out} : 100%
 T_a : 25°C

Switch on phase angle
of input AC voltage
 $\phi = 0^\circ$



Switch on phase angle
of input AC voltage
 $\phi = 90^\circ$



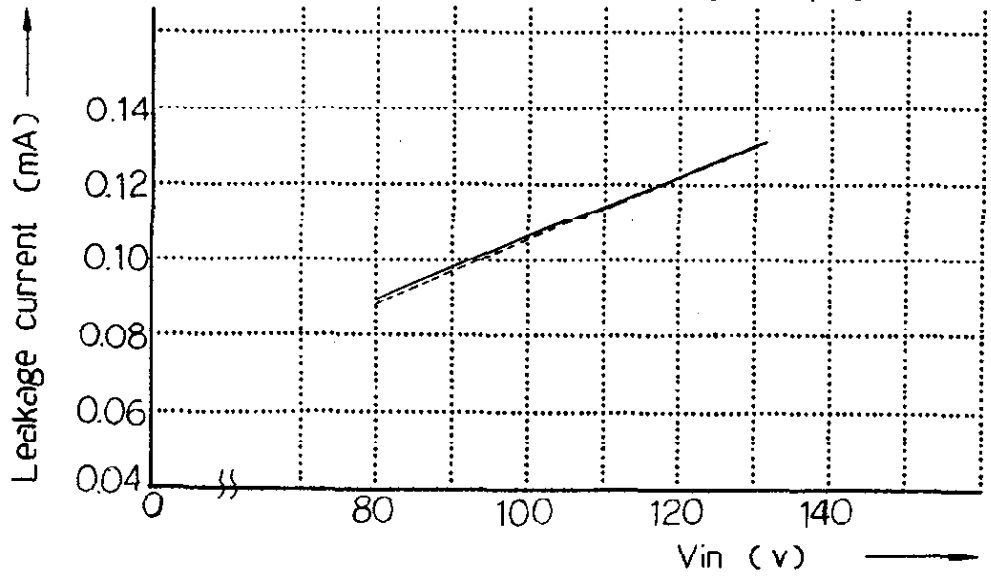
Leakage current

KS5

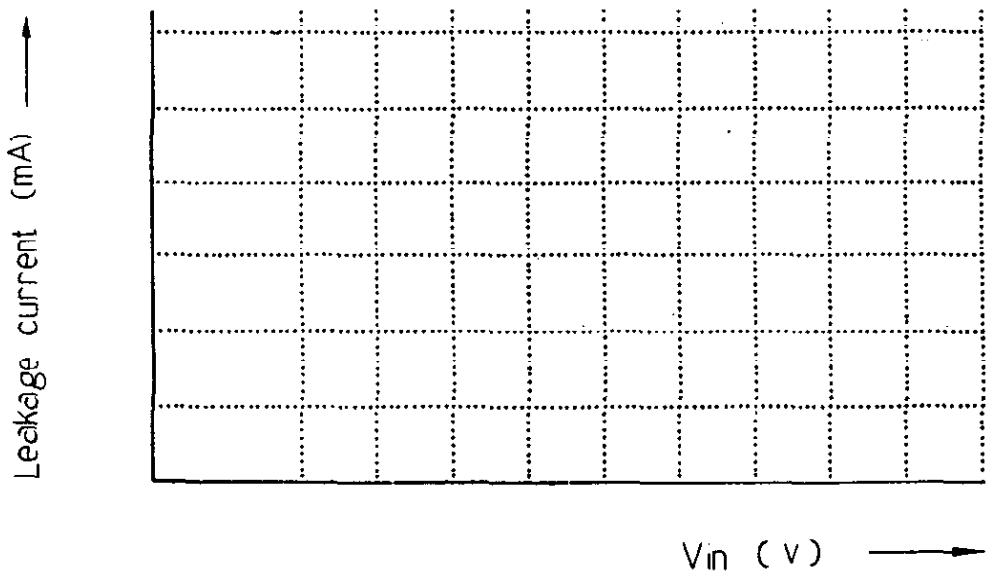
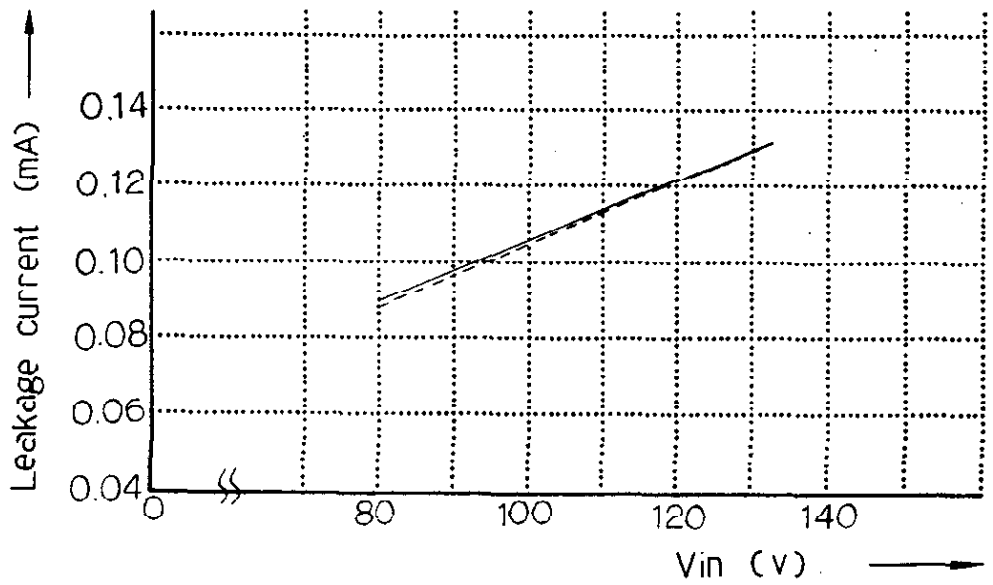
Conditions

Iout : 100 % ———
0 % - - - -
Ta : 25°C

5V



12V



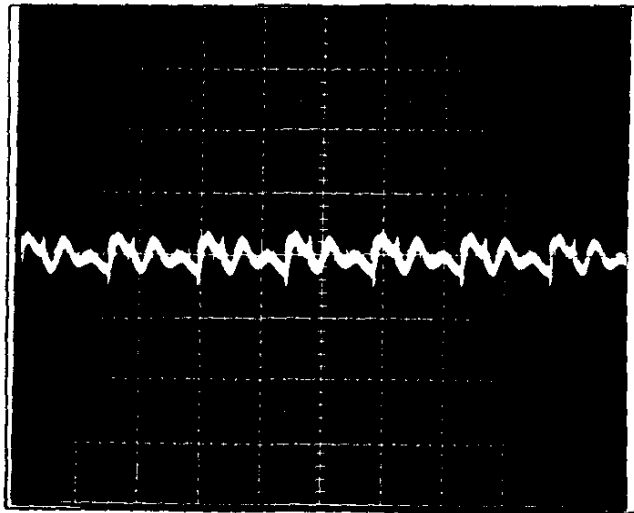
OUTPUT-RIPPLE, NOISE

KS5

Conditions Vin: AC 100 v
Iout: 100 %
Ta: 25°C

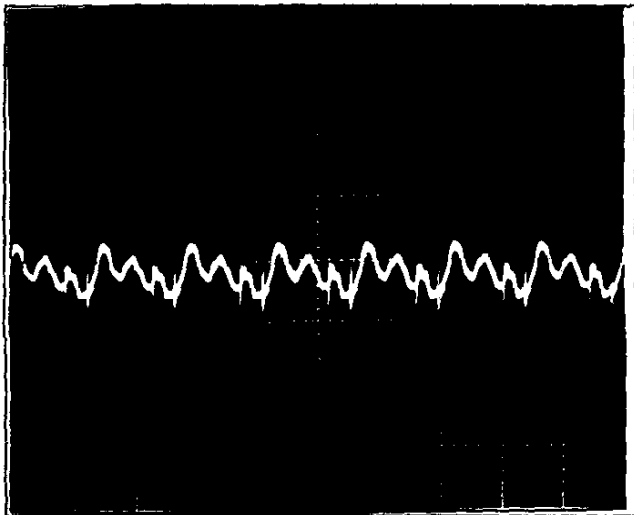
NORMAL MODE

5V

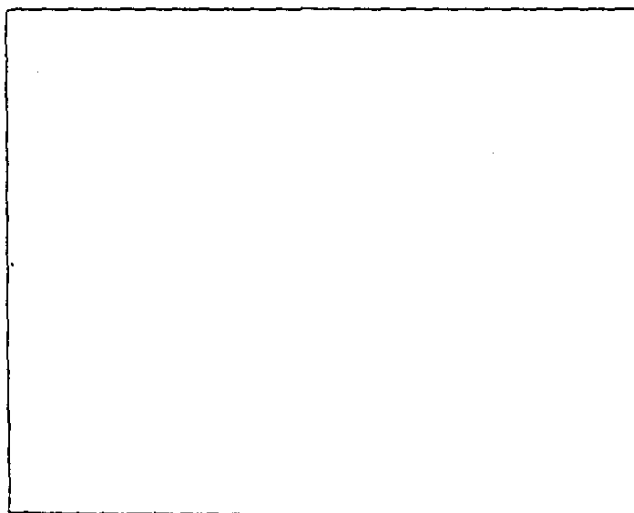


20mV/DIV | 2 μs/DIV

12V



20mV/DIV | 2 μs/DIV



mV/DIV | μs/DIV

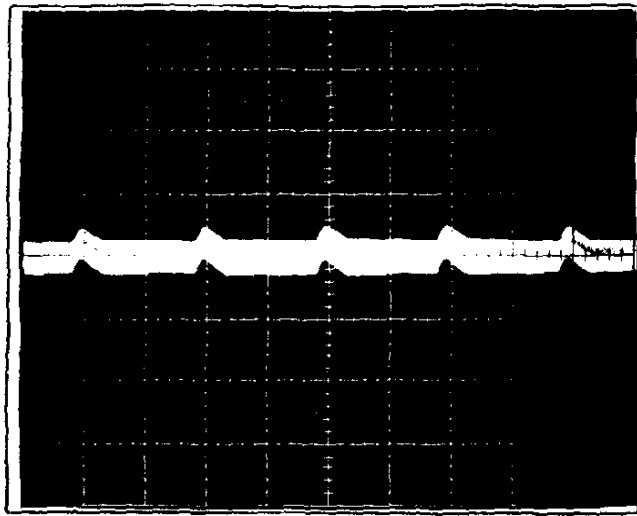
OUTPUT-RIPPLE, NOISE

KS5

Conditions Vin: AC 100 v
Iout: 100 %
Ta: 25°C

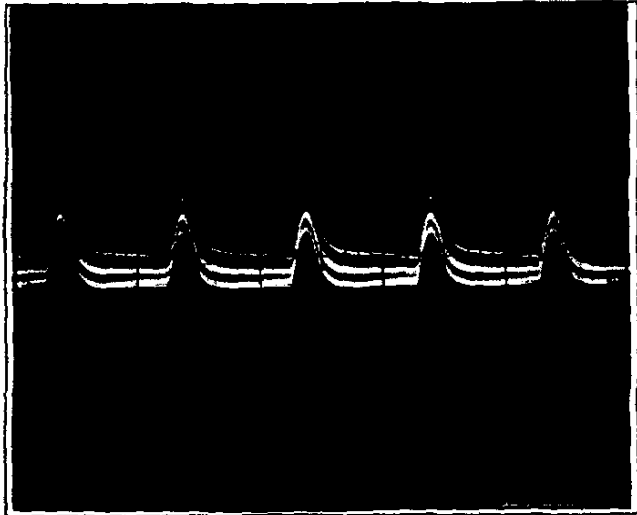
NORMAL MODE

5V

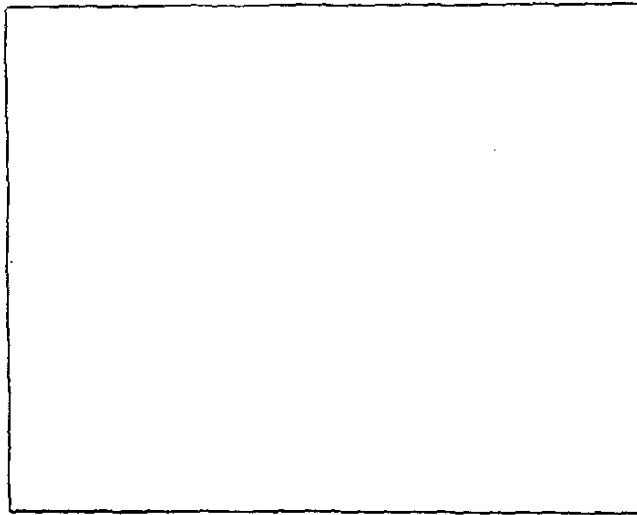


20mV/DIV | 5 ms/DIV

12V



20mV/DIV | 5 ms/DIV



mV/DIV | μs/DIV

OUTPUT-RIPPLE, NOISE

KS5

Conditions

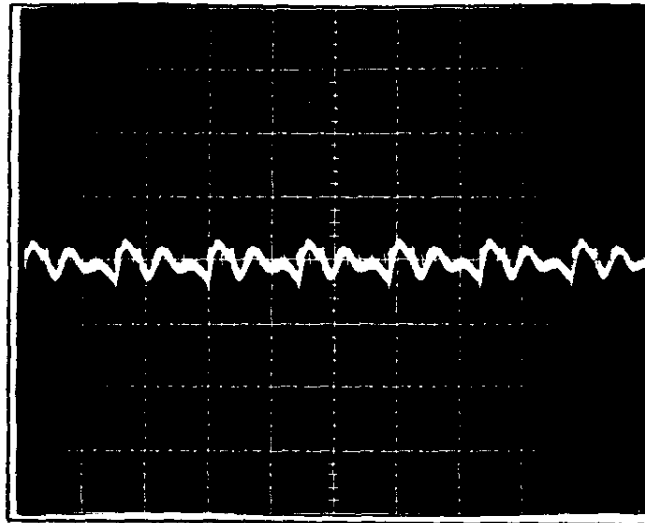
Vin: AC 100v

Iout: 100%

Ta: 25°C

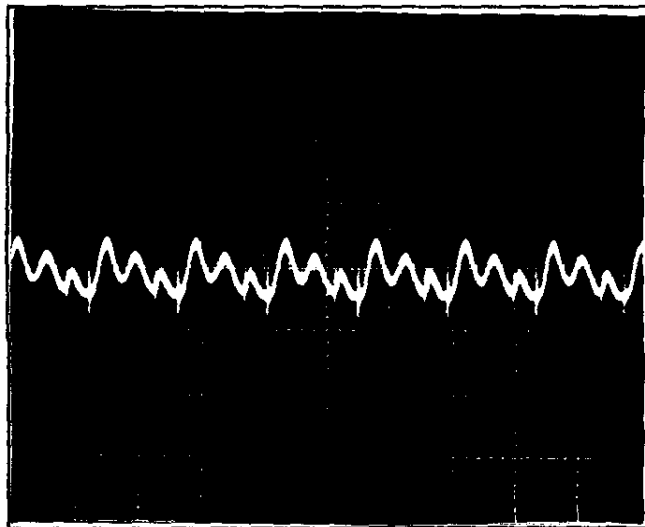
COMMON + NORMAL MODE

5V

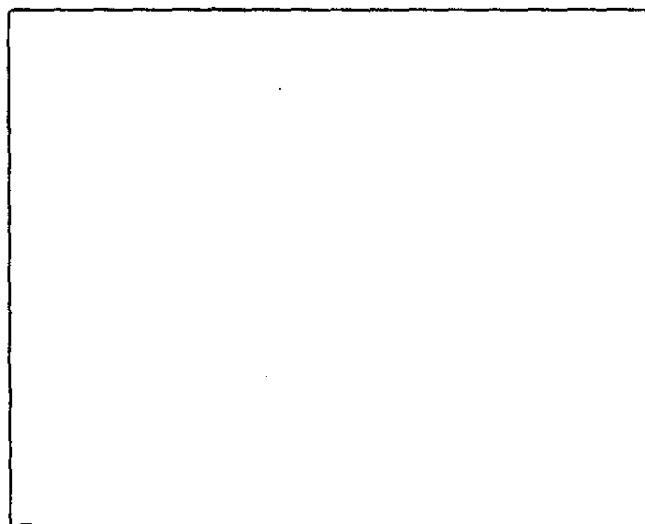


20mV/DIV | 2µs/DIV

12V



20mV/DIV | 2µs/DIV



mV/DIV | µs/DIV

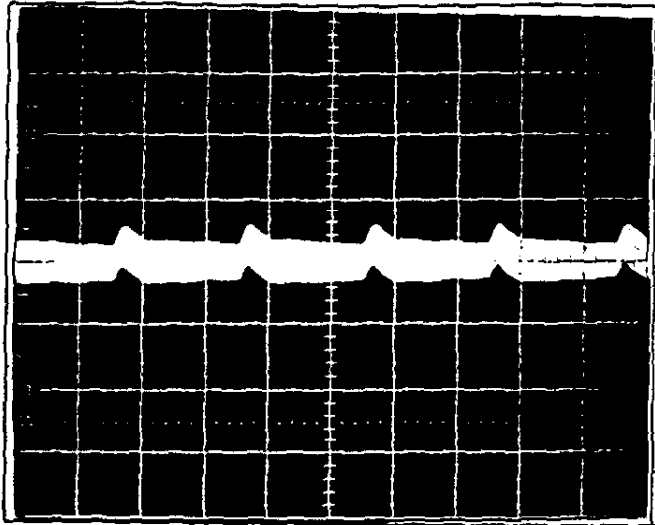
OUTPUT-RIPPLE, NOISE

KS5

Conditions Vin: AC 100 v
Iout: 100 %
Ta: 25°C

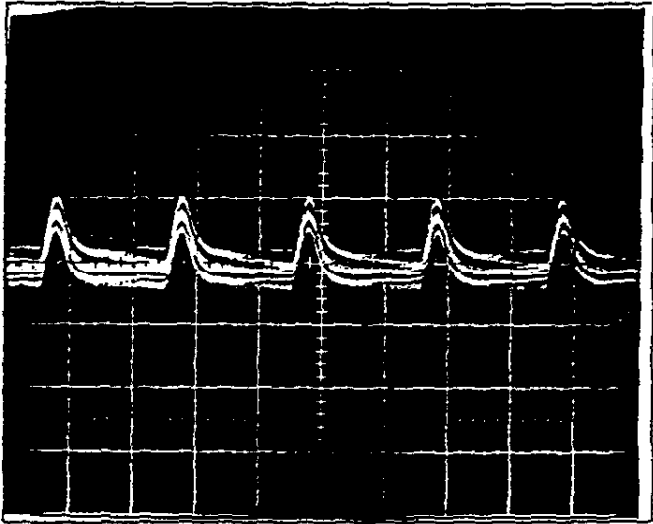
COMMON + NORMAL MODE

5V

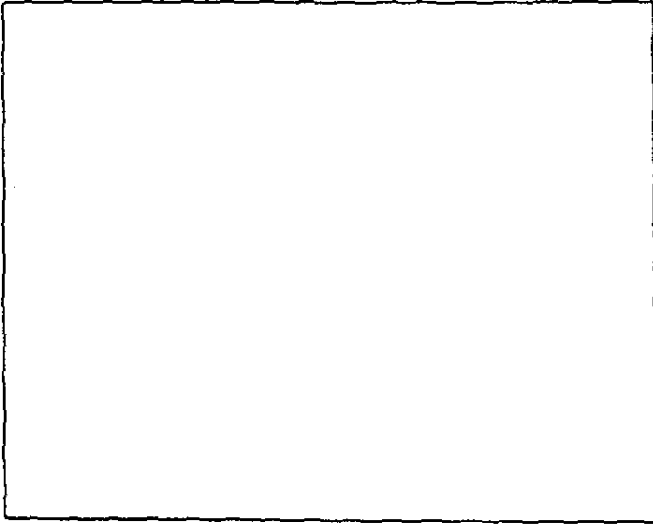


20mV/DIV | 5ms/DIV

12V



20mV/DIV | 5 ms/DIV



mV/DIV | μ s/DIV