

QUALITY TEST DATA

KS10

DWG. NO.		PA758-53-01			
QA APPROVAL		R / D			
NLJ	NLS	APPROVED	CHECKED	ENGR.	DRAWN
<i>Quano</i>	<i>Paulant</i>	<i>Hatter</i>	<i>Stoja</i>	S Y Lim	S Y Lim
19 MAR '92	10 MAR '92	10 MAR '92	10 MAR '92	12-2-92	12-2-92

 NEMIC-LAMBDA

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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

KS10 Specifications

NEMIC-LAMBDA

PA758-01-01A

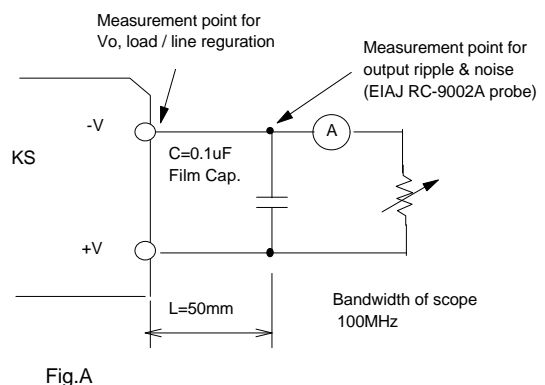
*: For delivery, contact to our sales office.

ITEMS		MODEL	KS10-5	KS10-12
1	Nominal Output Voltage	V	5	12
2	Minimum Output Current	A	0	0
3	Maximum Output Current	A	2.0	0.9
4	Maximum Output Power	W	10.0	10.8
5	Efficiency (typ)	(*1) %	73	74
6	Input Voltage Range	(*2) -	85 ~ 132VAC (47~440Hz) or 110 ~ 175VDC	
7	Input Current (typ)	(*1) A	0.3A at 100VAC	
8	Inrush Current (typ)	A	10A 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 10W, 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	85g	
31	Size (WxHxD)	mm	45 x 20.5 x 55 (Refer to Outline Drawing)	

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

= NOTES =

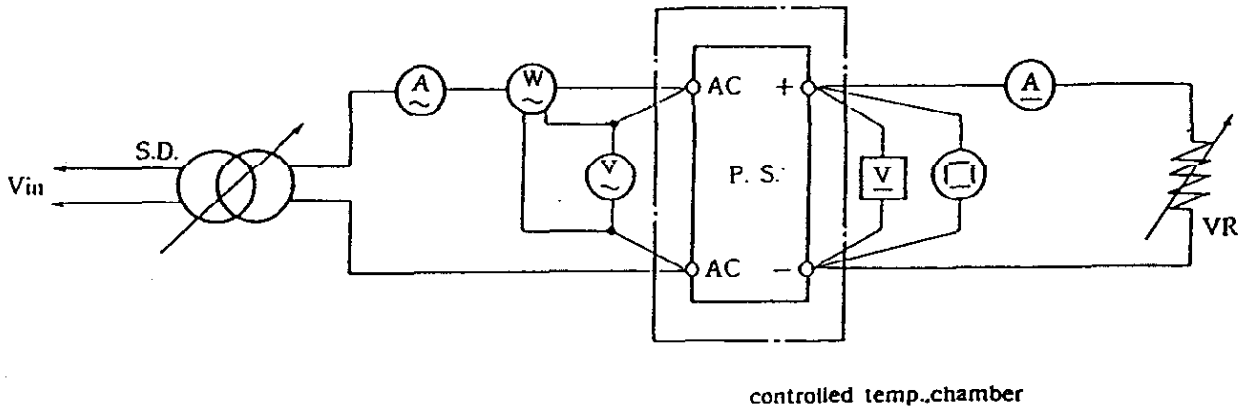
- *1. At 100VAC and Maximum Output Power, Ta=25C.
- *2. For cases where conformance to various safety specs (UL, CSA) are required to be described as 100-120VAC, 50/60Hz on name plate.
- *3. Please refer to Fig. A for measurement determination of line & load regulation and output ripple & noise voltage.
- *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.



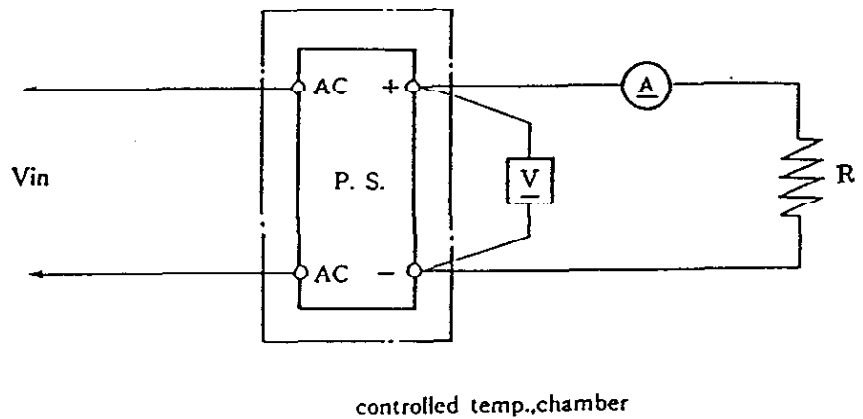
2. 評価測定方法 EVALUATION METHOD

2-1 測定回路 Circuits used for determination

(1) 静特性 Steady state data



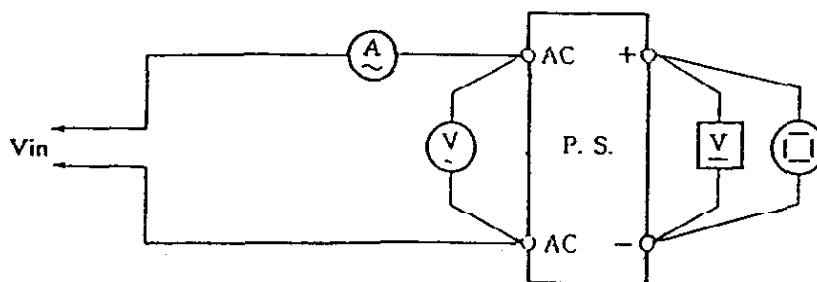
(2) 通電ドリフト特性 Warm up voltage drift characteristics



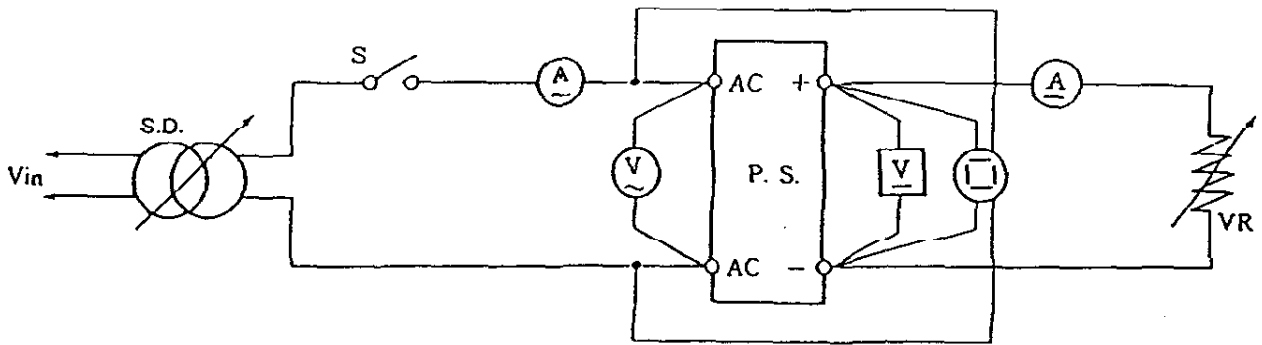
(3) 過電流保護特性 Over current protection (OCP) characteristics

Same as steady state data.

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



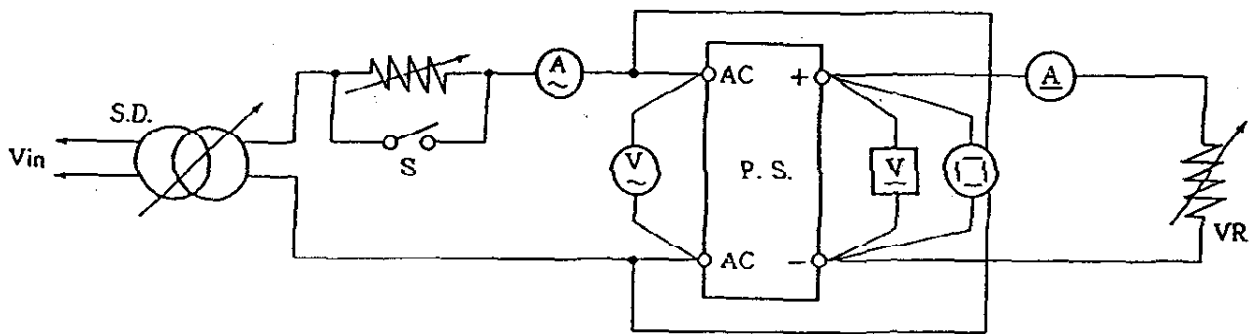
(5) 出力立上り特性 Output rise characteristics



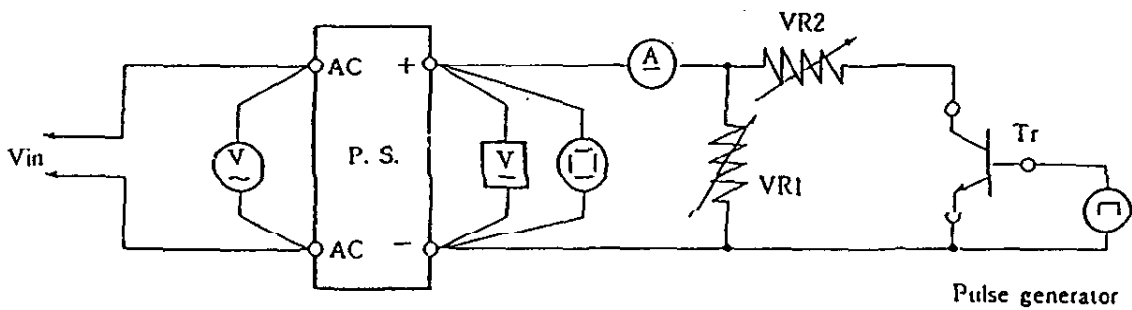
(6) 出力立下り特性 Output fall characteristics

Same as output rise characteristics.

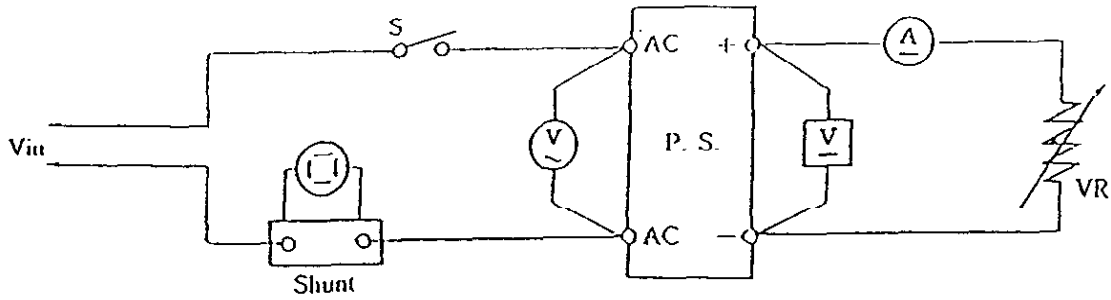
(7) 過渡応答 (入力急変) 特性 Dynamic line response characteristics



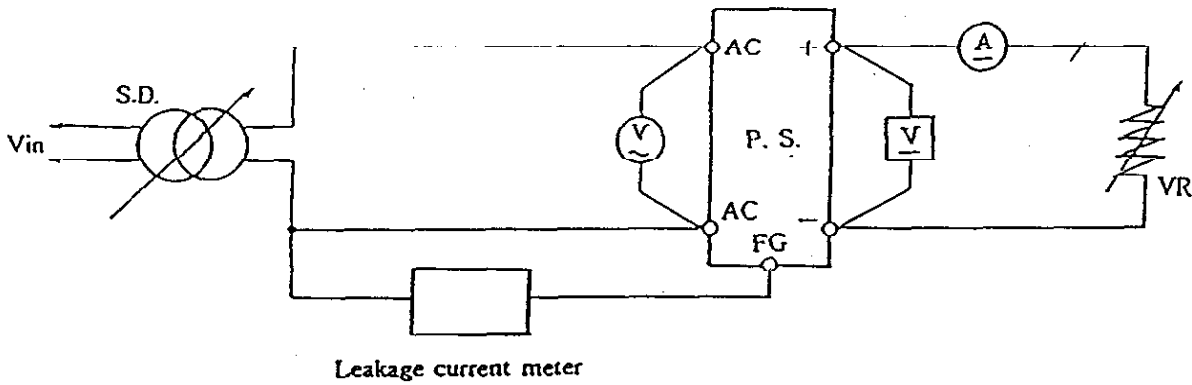
(8) 過渡応答 (負荷急変) 特性 Dynamic load response characteristics



(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

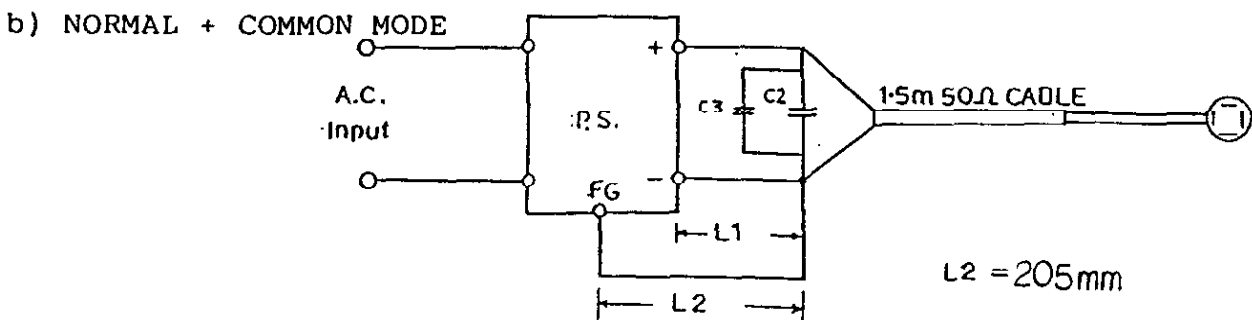
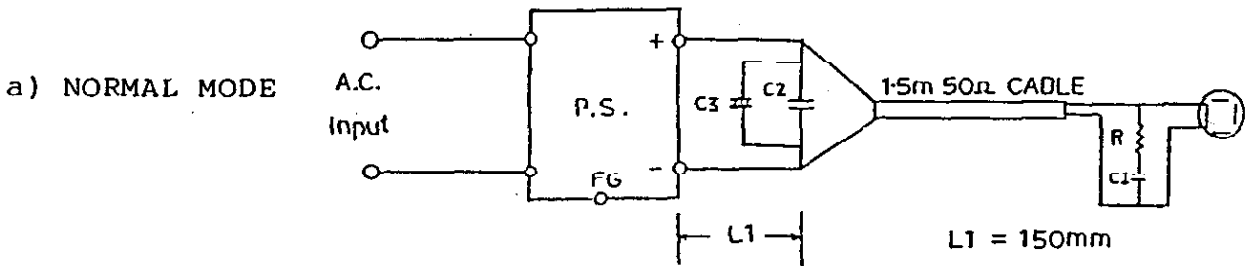


Note : Leakage current measured through a 1kΩ resistor.

Range wed : AC + DC

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

11) Output-ripple, noise



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 KIKUSUI	PSA-150D PLZ72W, PLZ150WA
9	Digital 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 -	

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

Iout	Vin	Vin			Line Regulation	
		AC 85 v	AC 100 v	AC 132 v		
0 %		5.041 v	5.041v	5.041v	0 mv	0 %
50 %		5.037 v	5.037v	5.037v	0 mv	0 %
100 %		5.033 v	5.034v	5.034v	1 mv	0.02 %
Load		8 mv	7 mv	7 mv		
Regulation		0.16 %	0.14 %	0.14 %		

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

Ta	0 °C	25 °C	50 °C	Temp. Stability
Vout	5.034 v	5.034v	5.035v	1 mv 0.02 %

12

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

Iout	Vin	Vin			Line Regulation	
		AC 85 v	AC 100 v	AC 132 v		
0 %		11.933 v	11.933v	11.934v	1 mv	0.01 %
50 %		11.930 v	11.931v	11.932v	2 mv	0.02 %
100 %		11.929 v	11.930v	11.930v	1 mv	0.01 %
Load		4 mv	3 mv	4 mv		
Regulation		0.033 %	0.025%	0.033%		

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

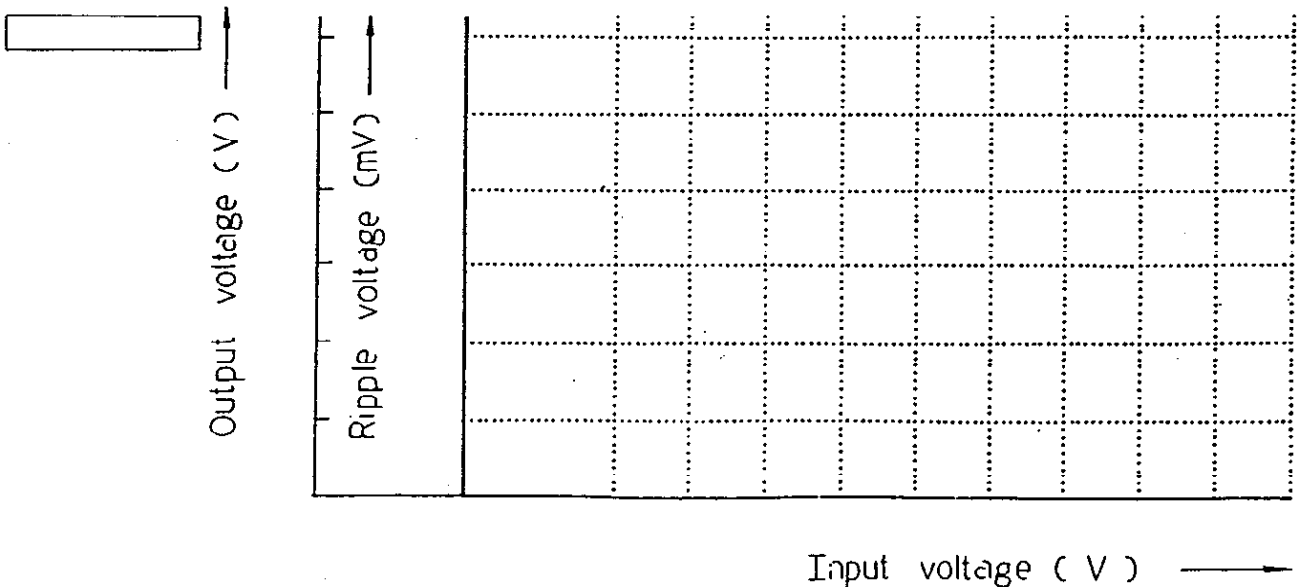
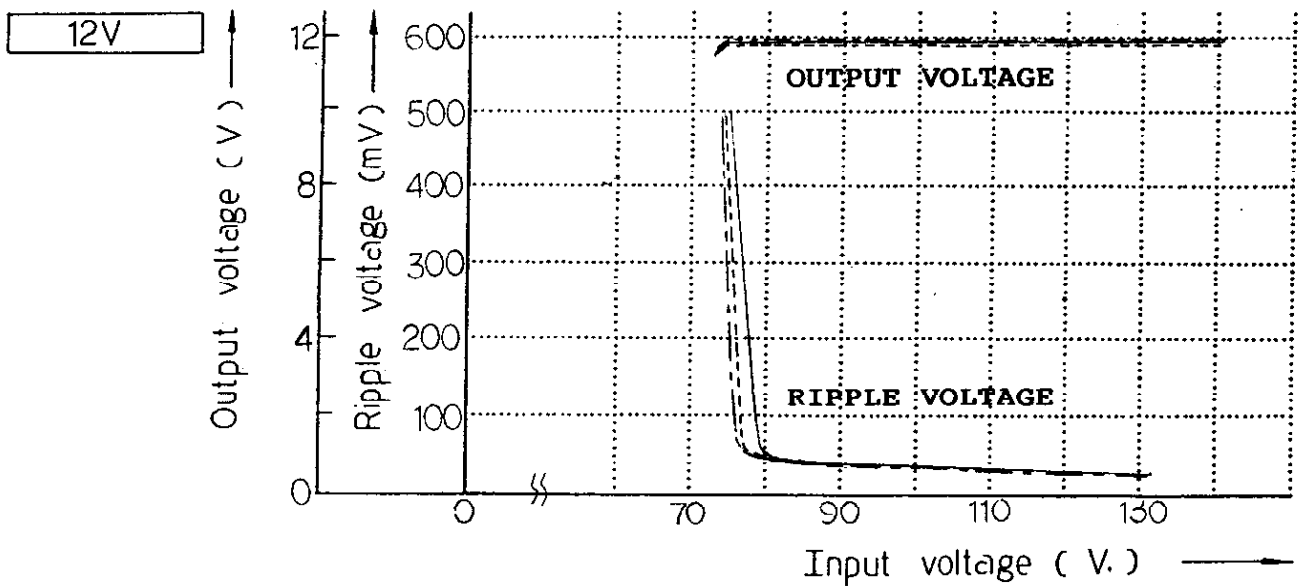
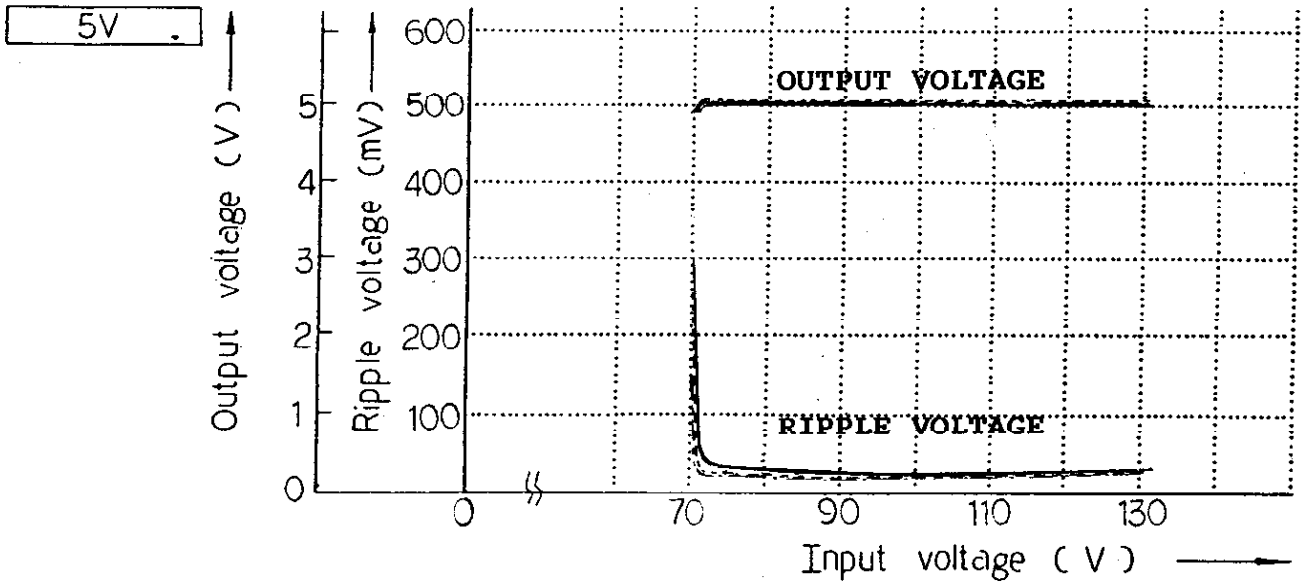
Ta	0 °C	25 °C	50 °C	Temp. Stability
Vout	11.911 v	11.930v	11.942 v	31 mv 0.26 %

Output voltage and ripple voltage
v.s input voltage

KS 10

I_{out} : 100%

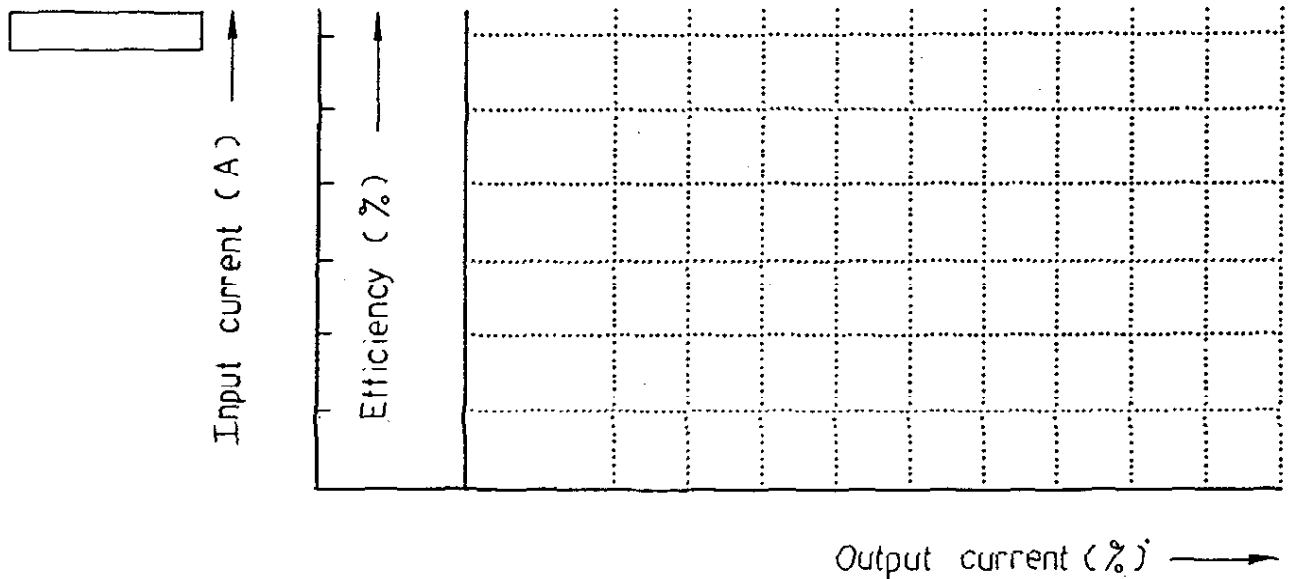
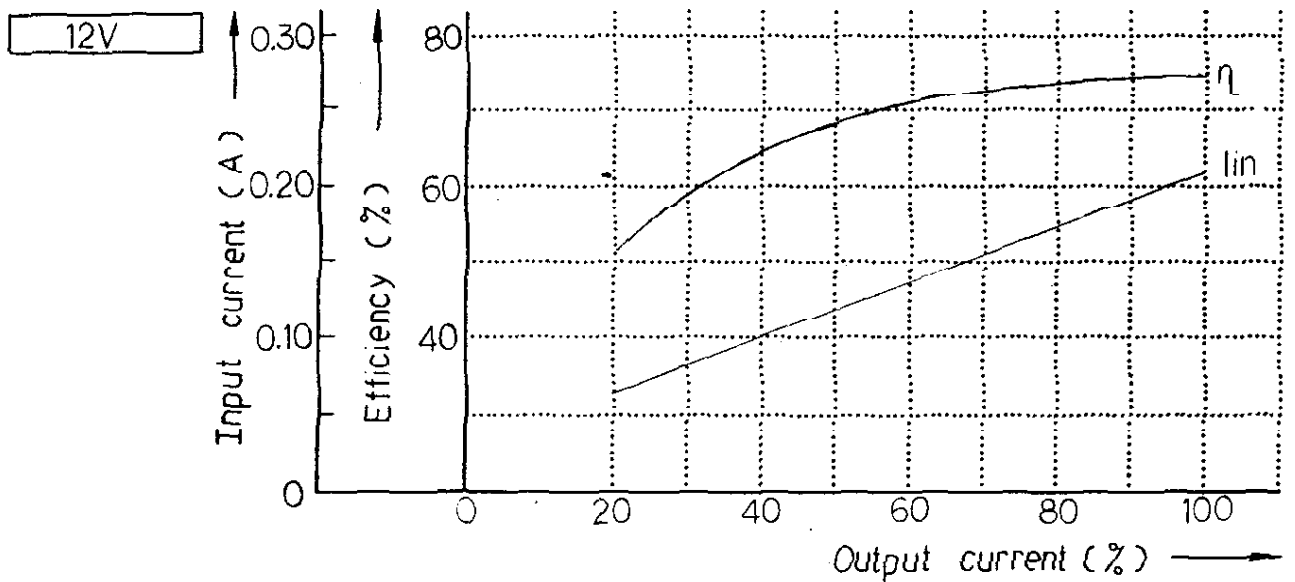
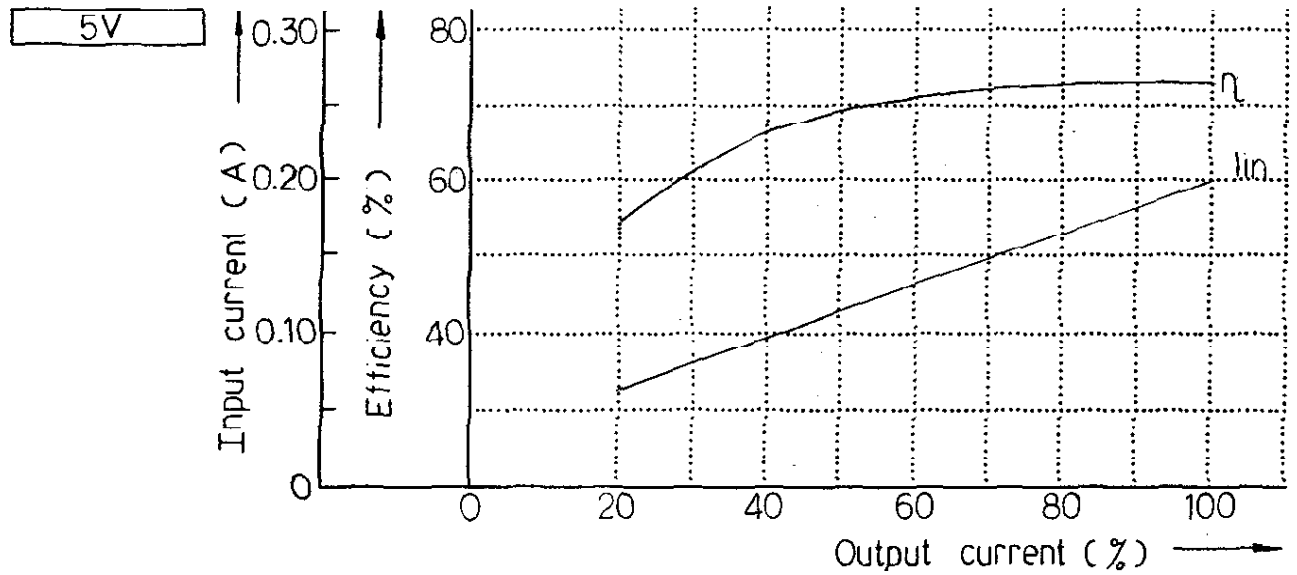
Conditions Ta : 0°C -----
25°C -----
50°C -----



Efficiency and input current v.s
output current

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

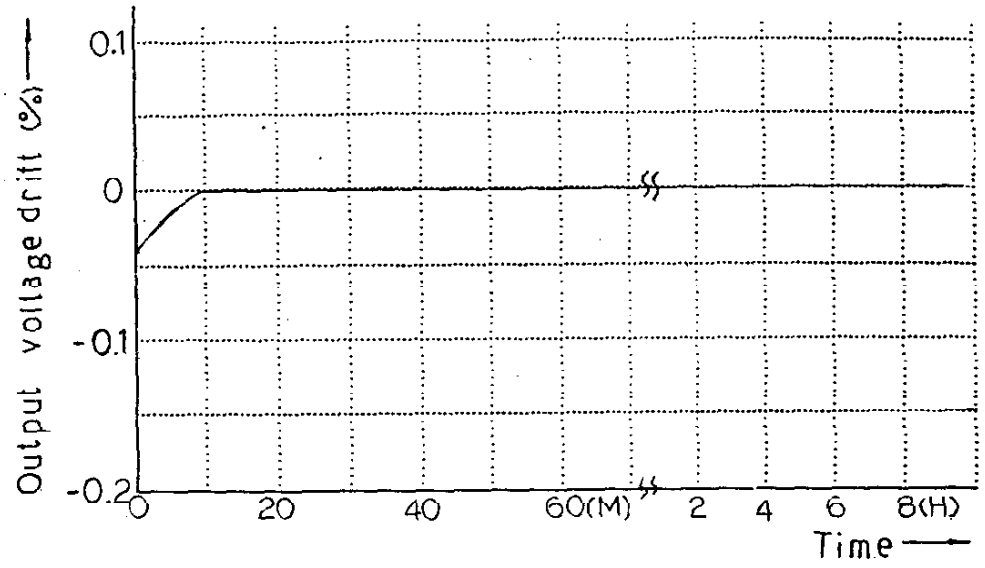


Warm up voltage drift

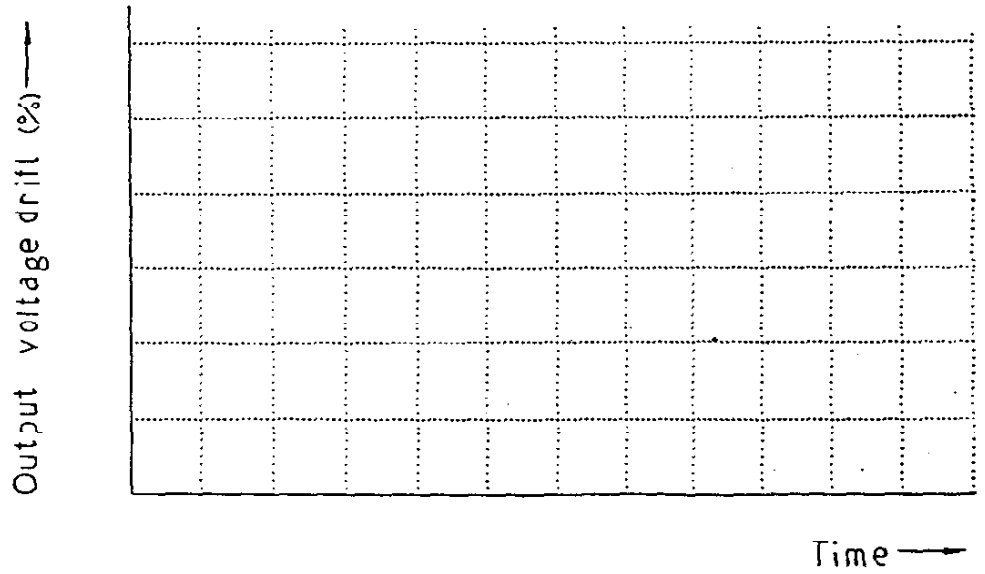
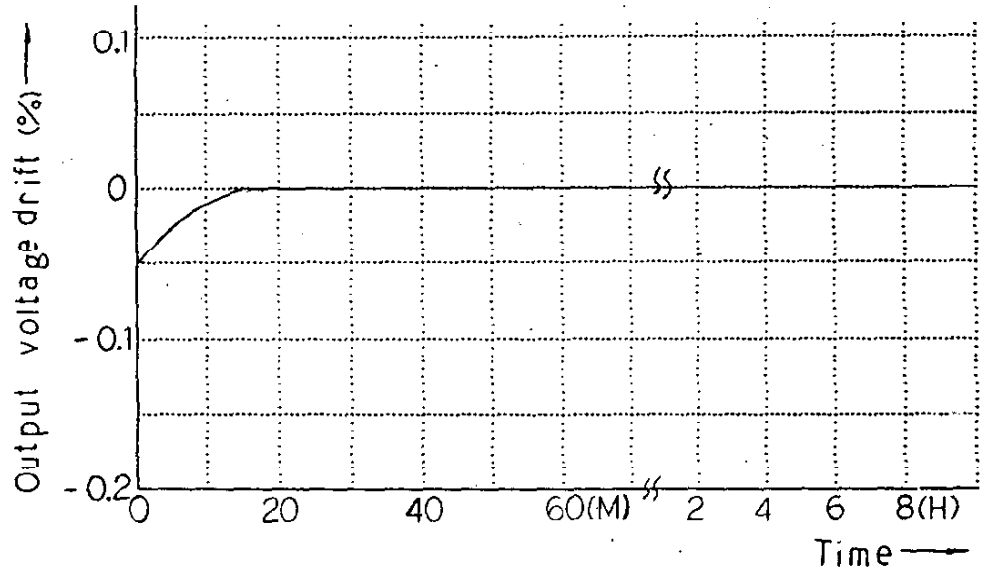
KS 10

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

5V



12V



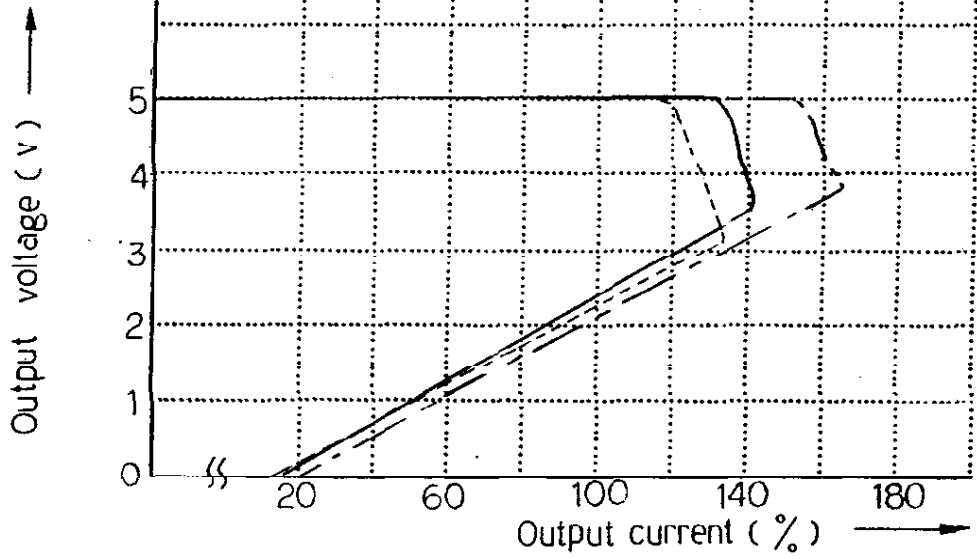
O.C.P Characteristics

KS10

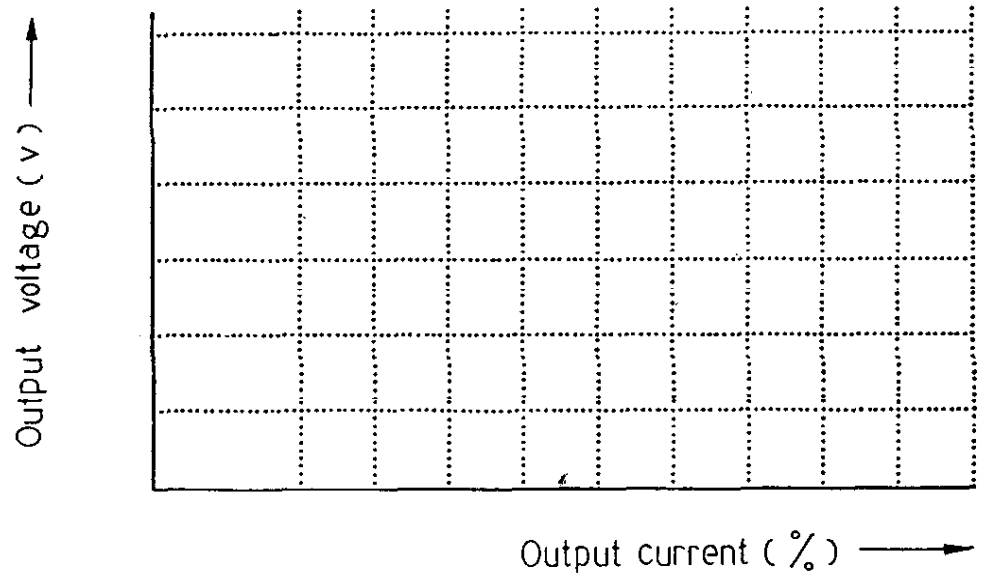
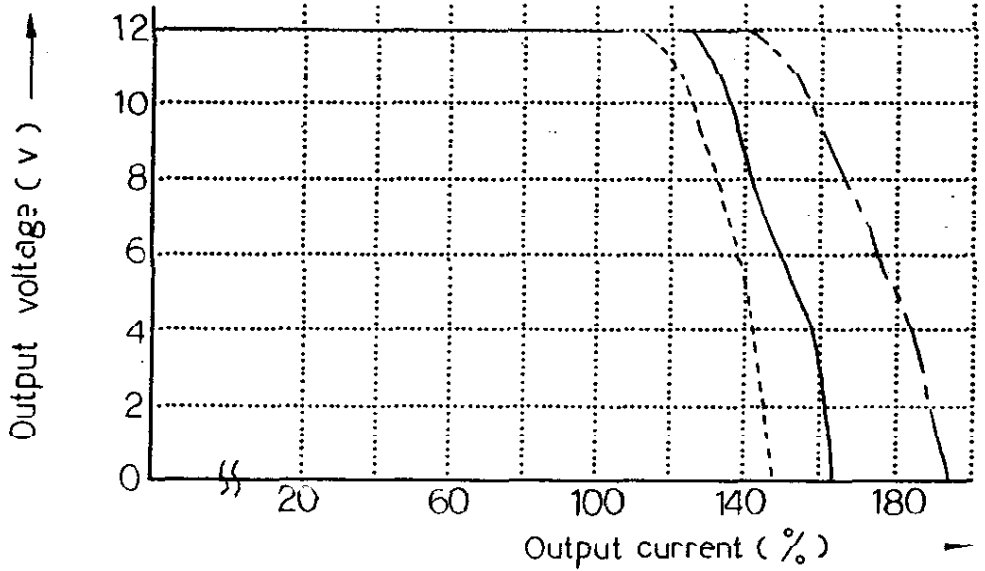
Conditions Vin: AC 85 v - - - -
AC 100 v - - -
AC 132 v - - - -

Ta: 25°C

5V



12V

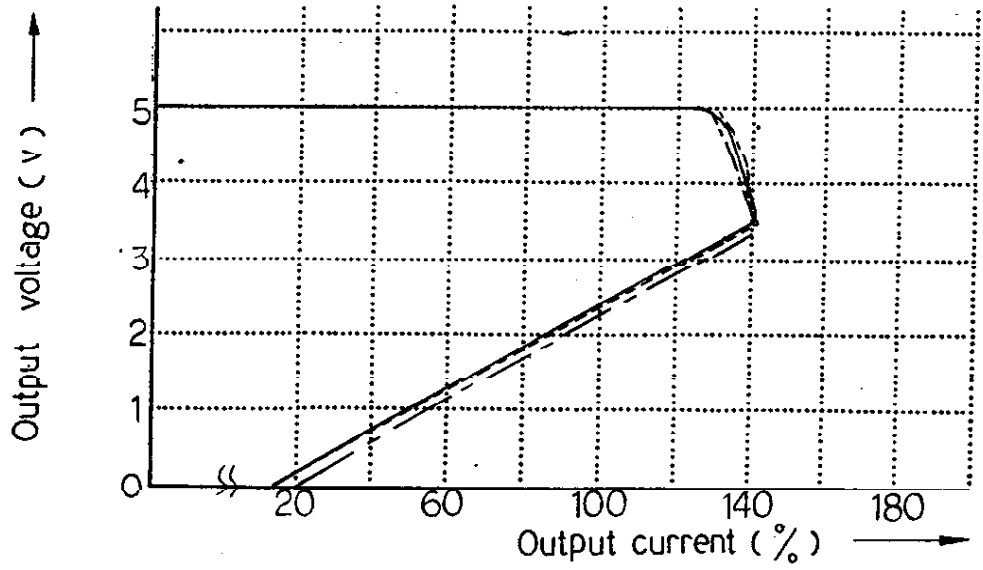


O.C.P Characteristics

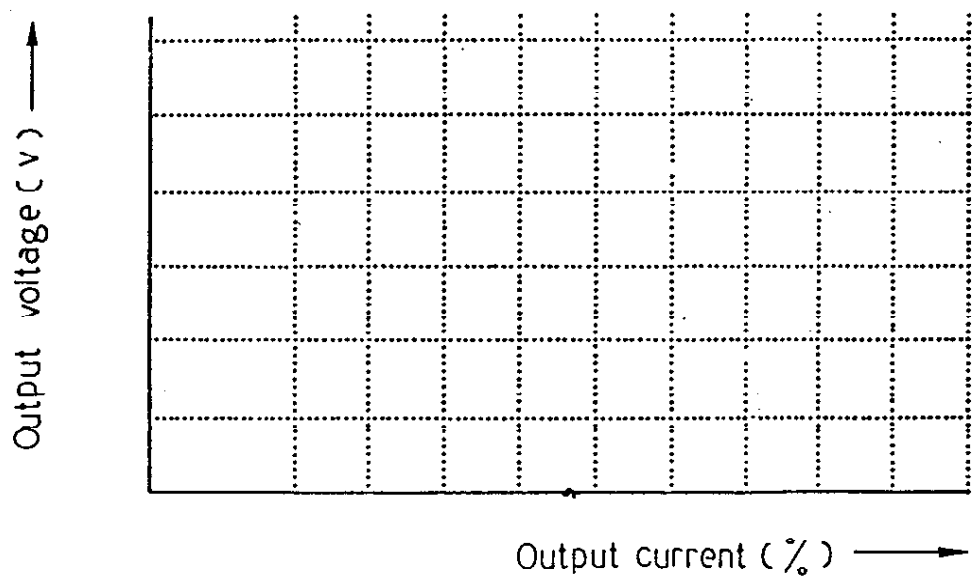
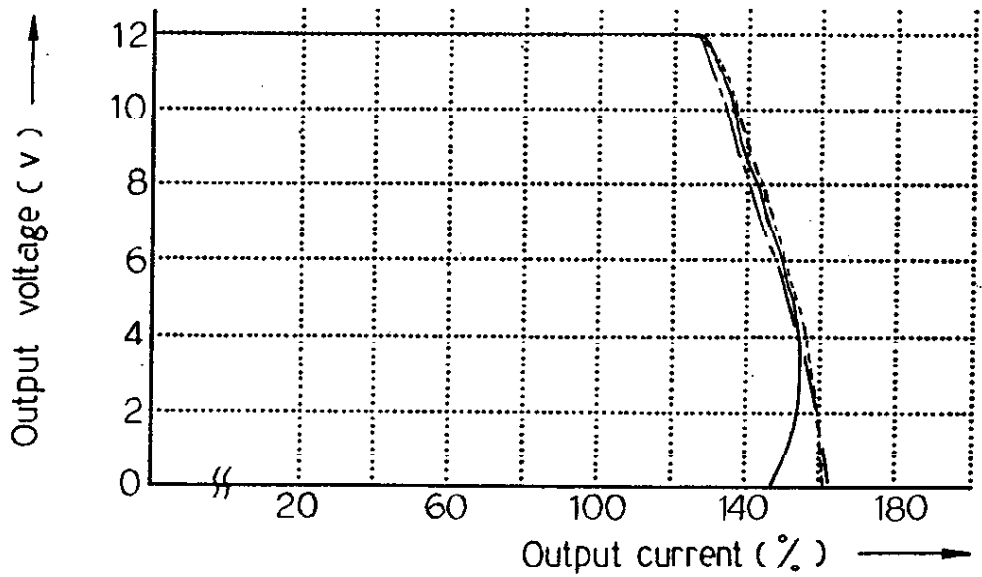
KS 10

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

5V



12V



O.V.P Characteristics

KS 10

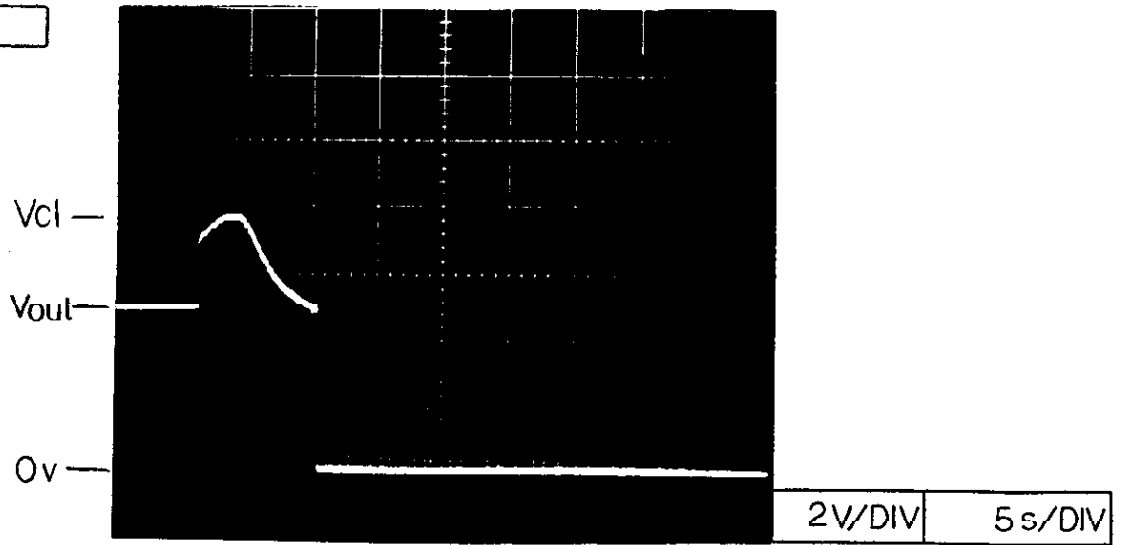
Conditions

Vin: AC 100 v

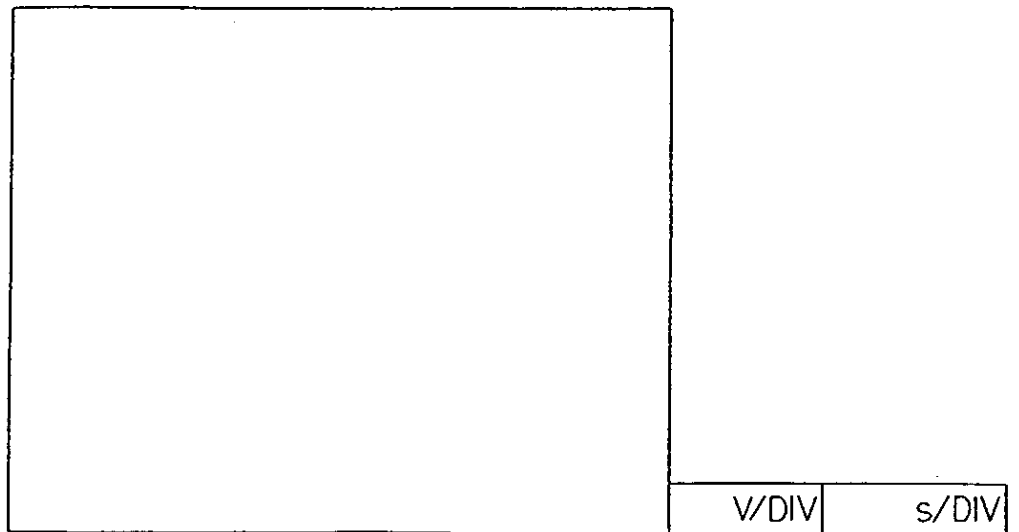
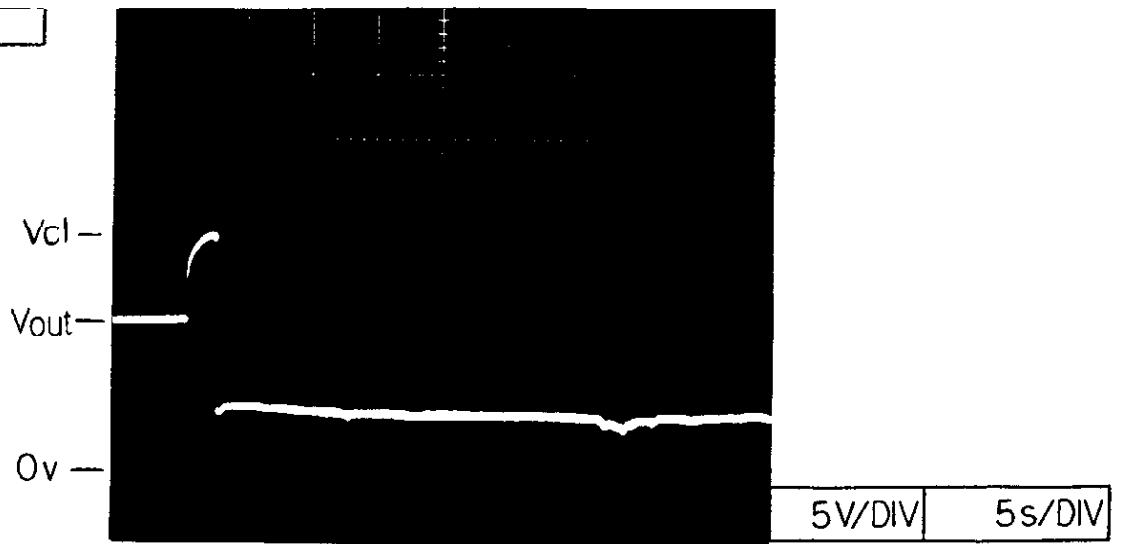
Iout: 0 %

Ta: 25°C

5V



12V

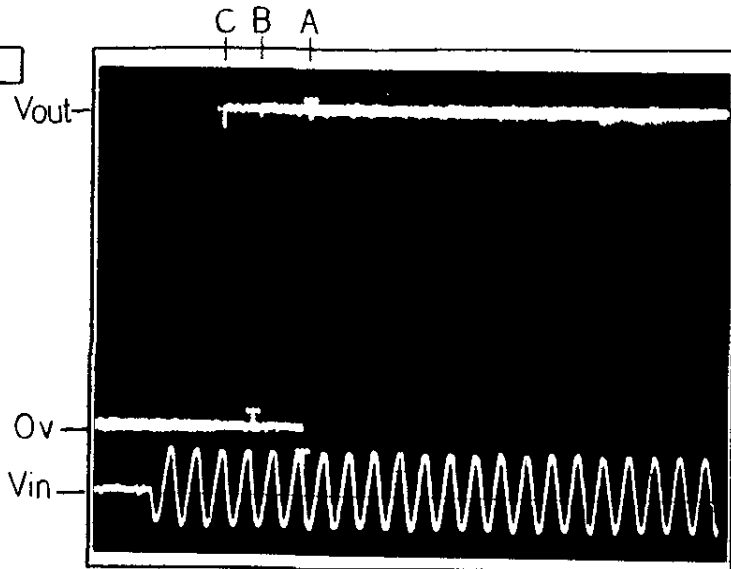


Output rise time

KS10

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

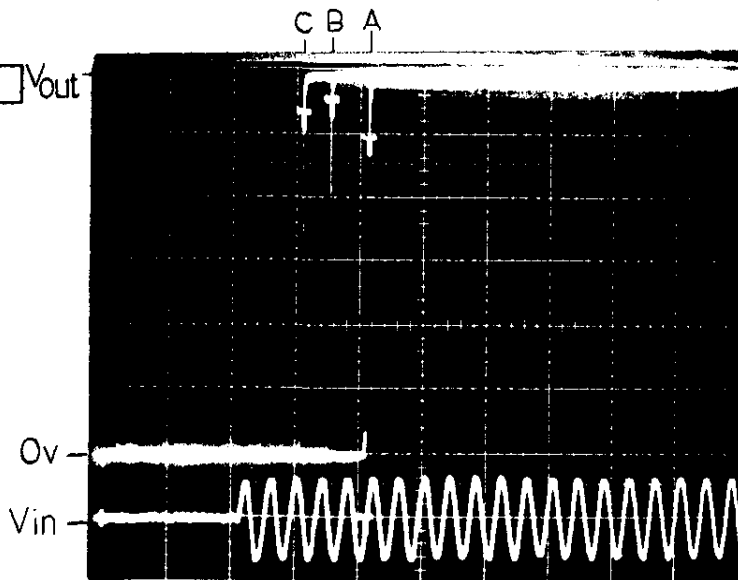
5V



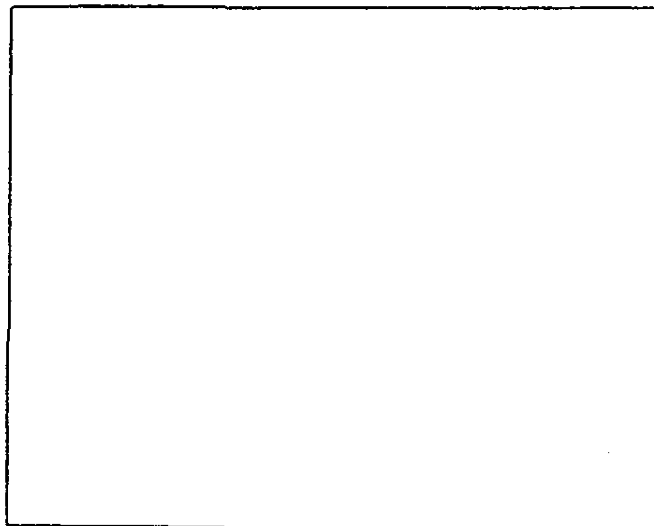
Iout: 0%
Ta: 25°C

1V/DIV 50ms/DIV

12V



2V/DIV 50ms/DIV

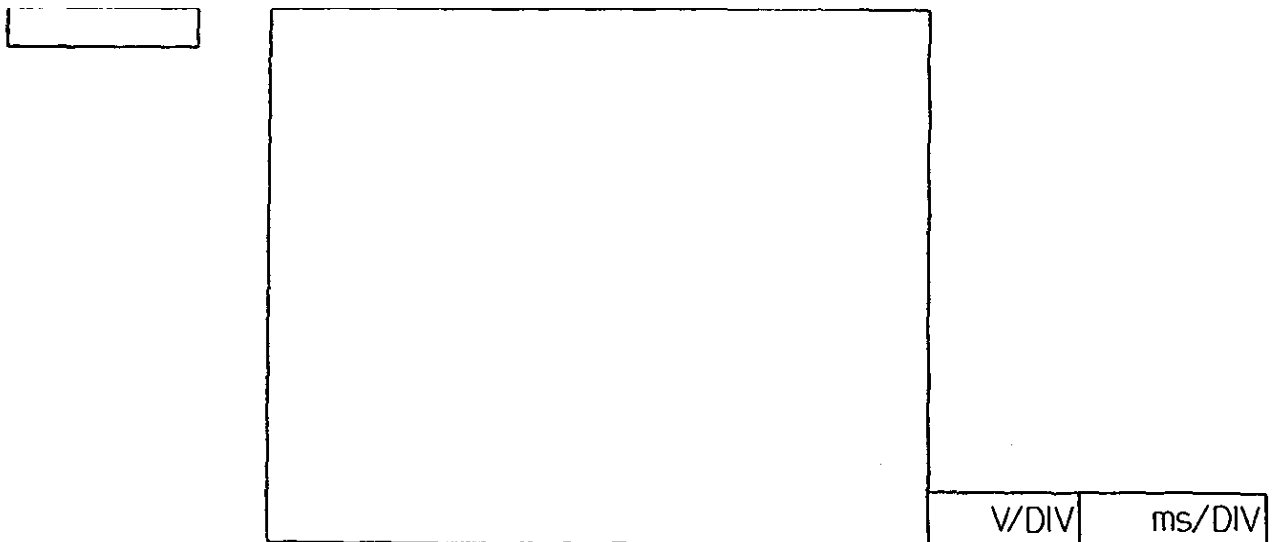
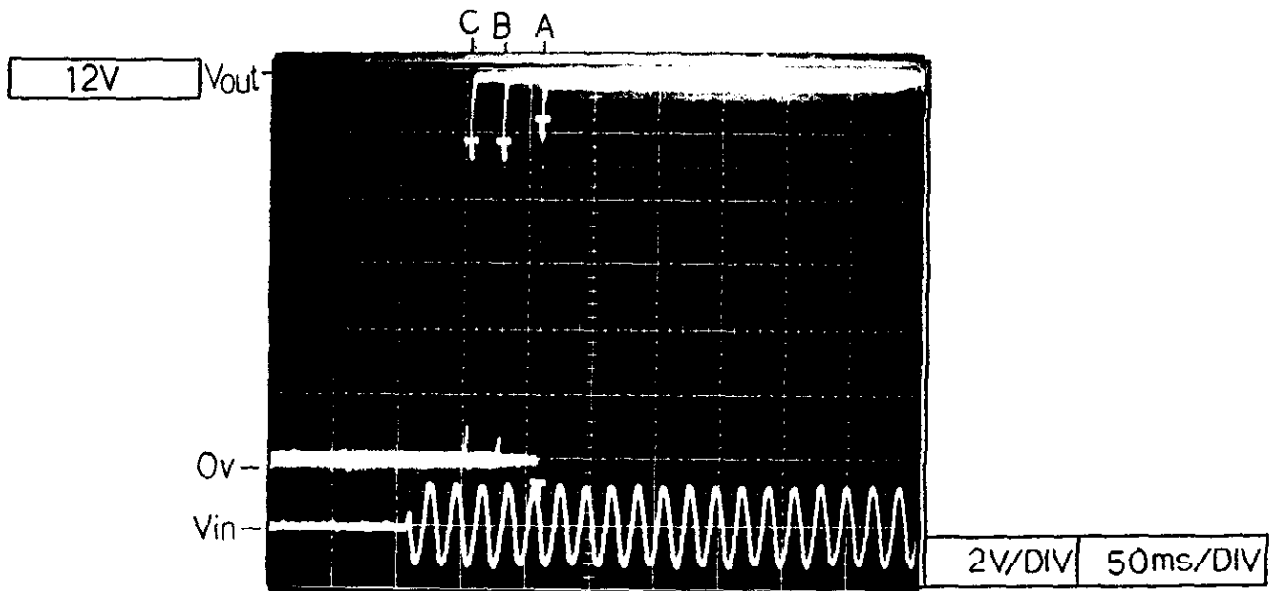
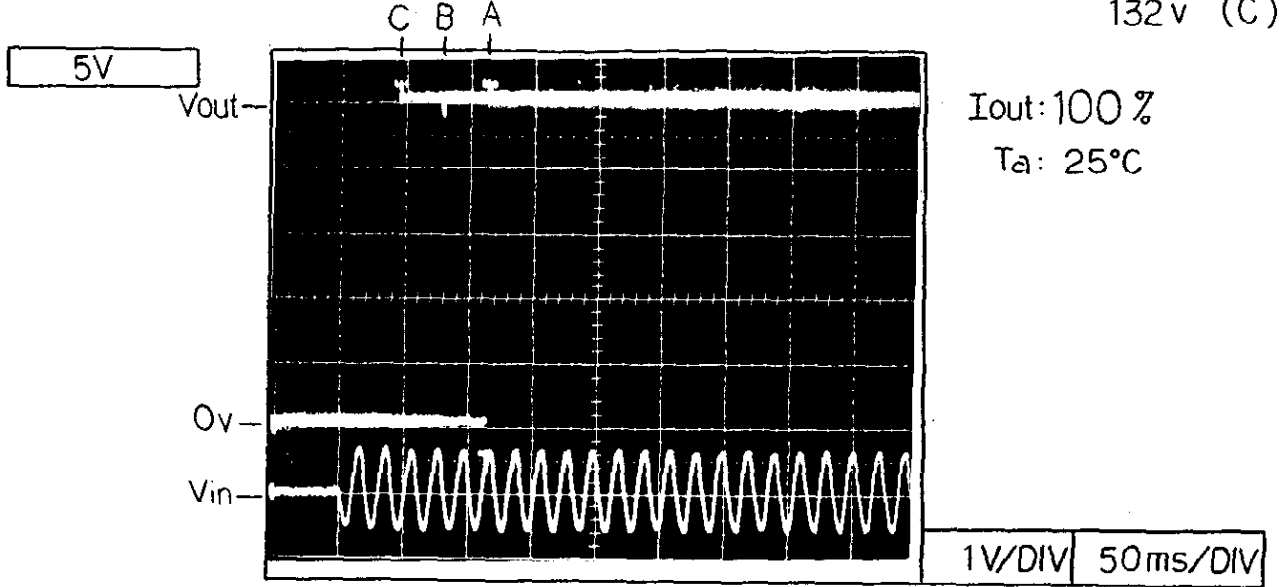


V/DIV ms/DIV

Output rise time

KS10

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

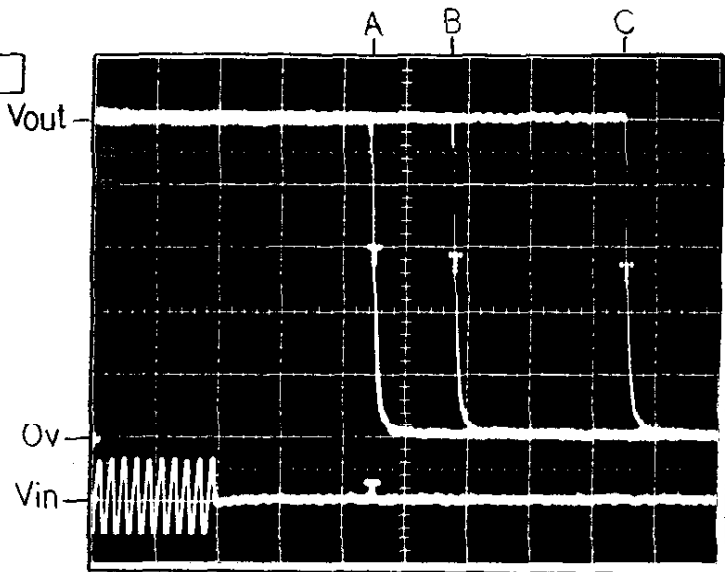


Output fall time

KS10

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

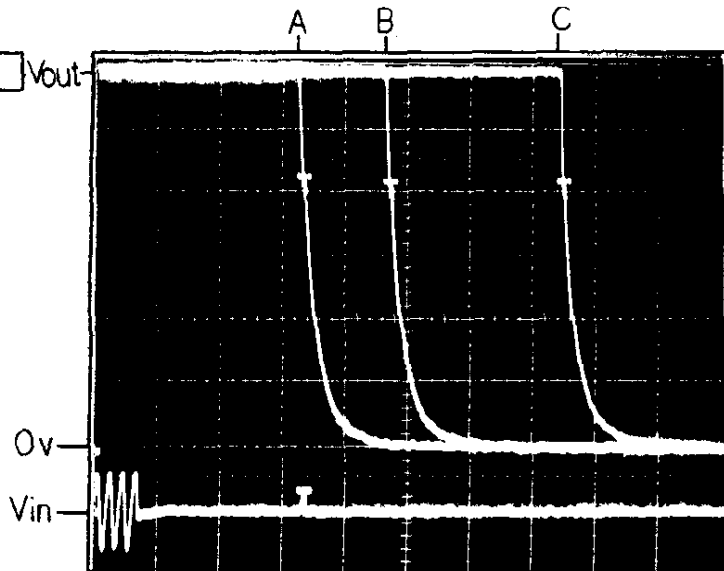
5V



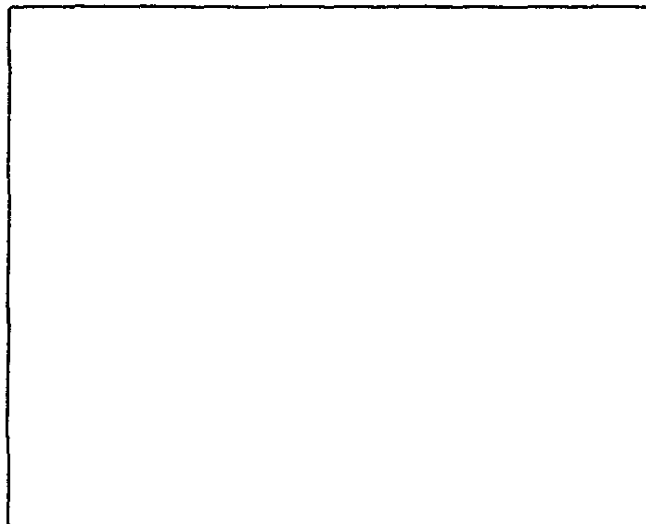
Iout: 0%
Ta: 25°C

1V/DIV 0.1s/DIV

12V



2V/DIV 0.1s/DIV



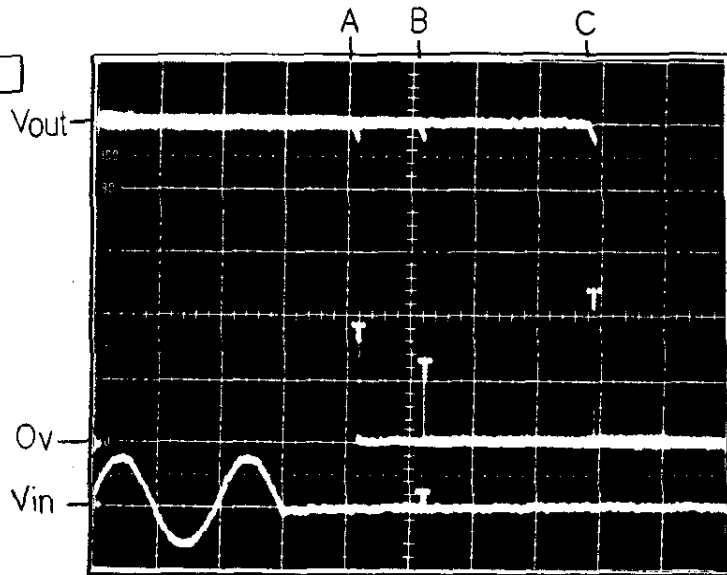
V/DIV s/DIV

Output fall time

KS10

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

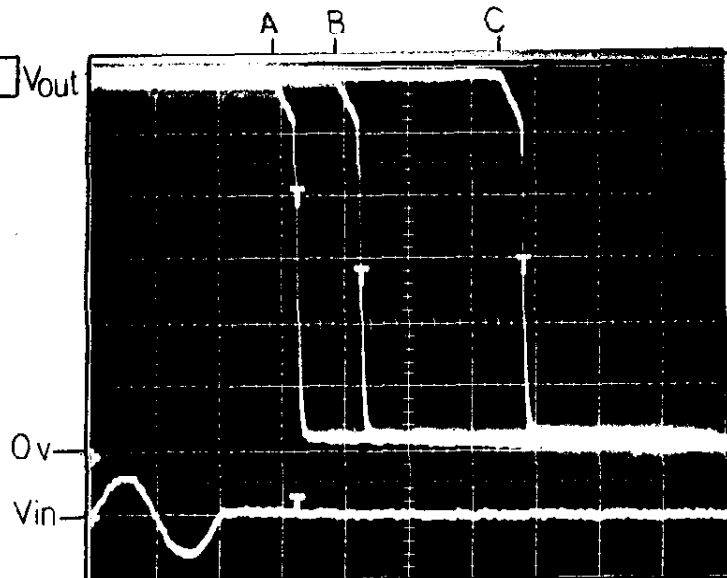
5V



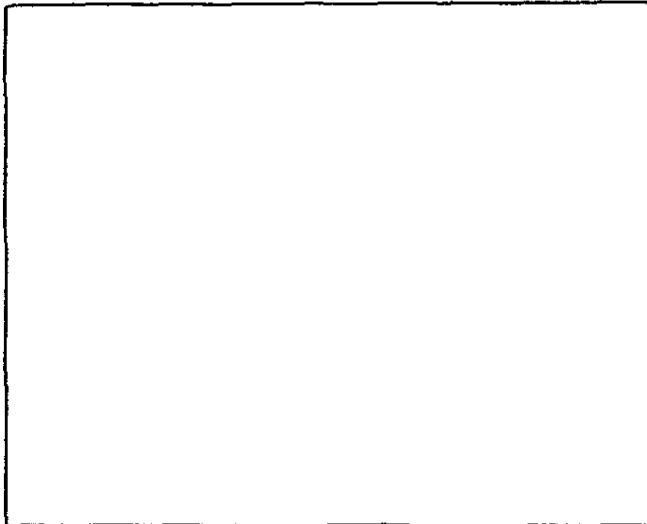
Iout: 100%
Ta: 25°C

1V/DIV 10ms/DIV

12V



2V/DIV 10ms/DIV



V/DIV s/DIV

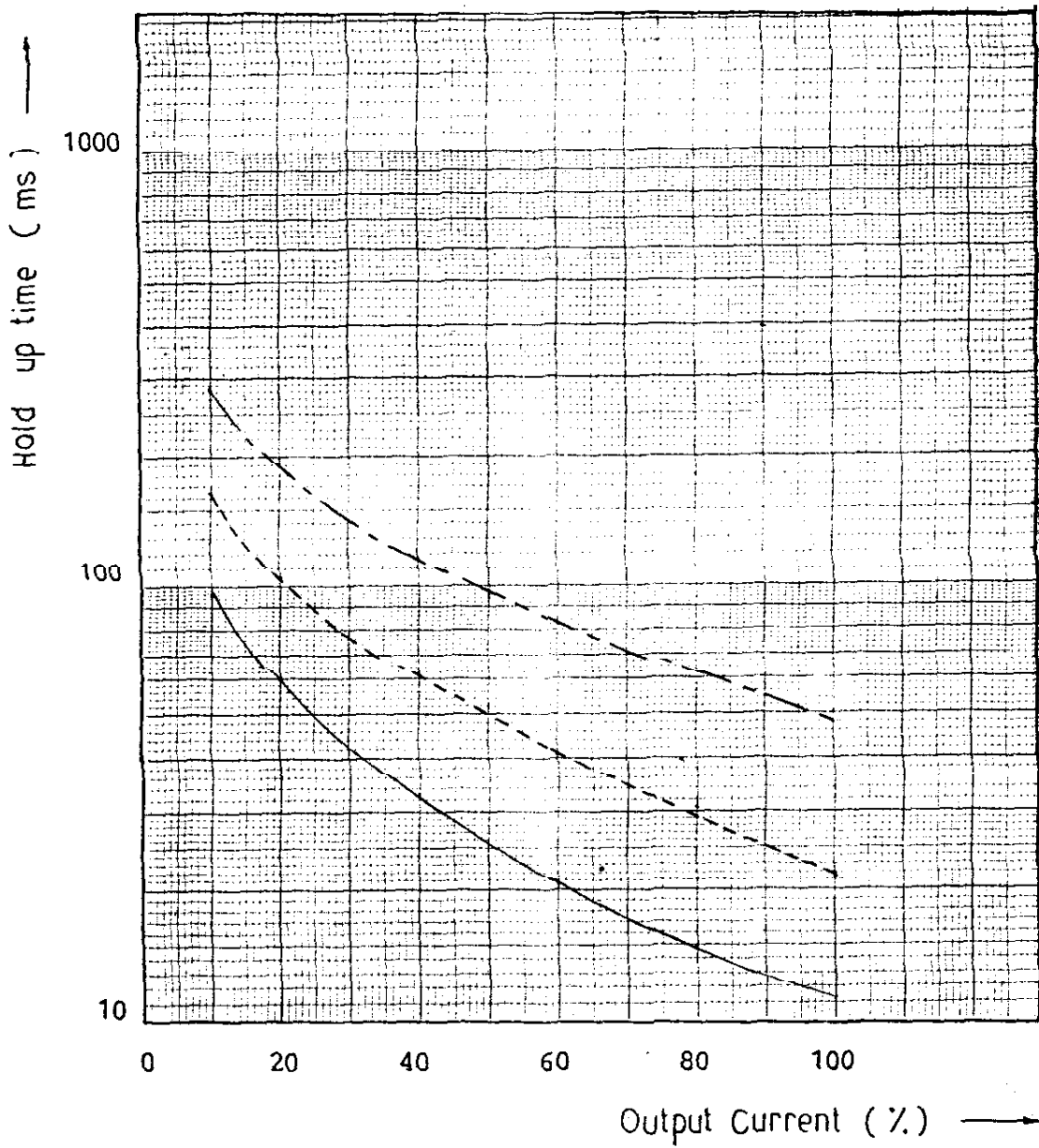
Hold Up Time

KS 10

5V

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

Ta : 25°C



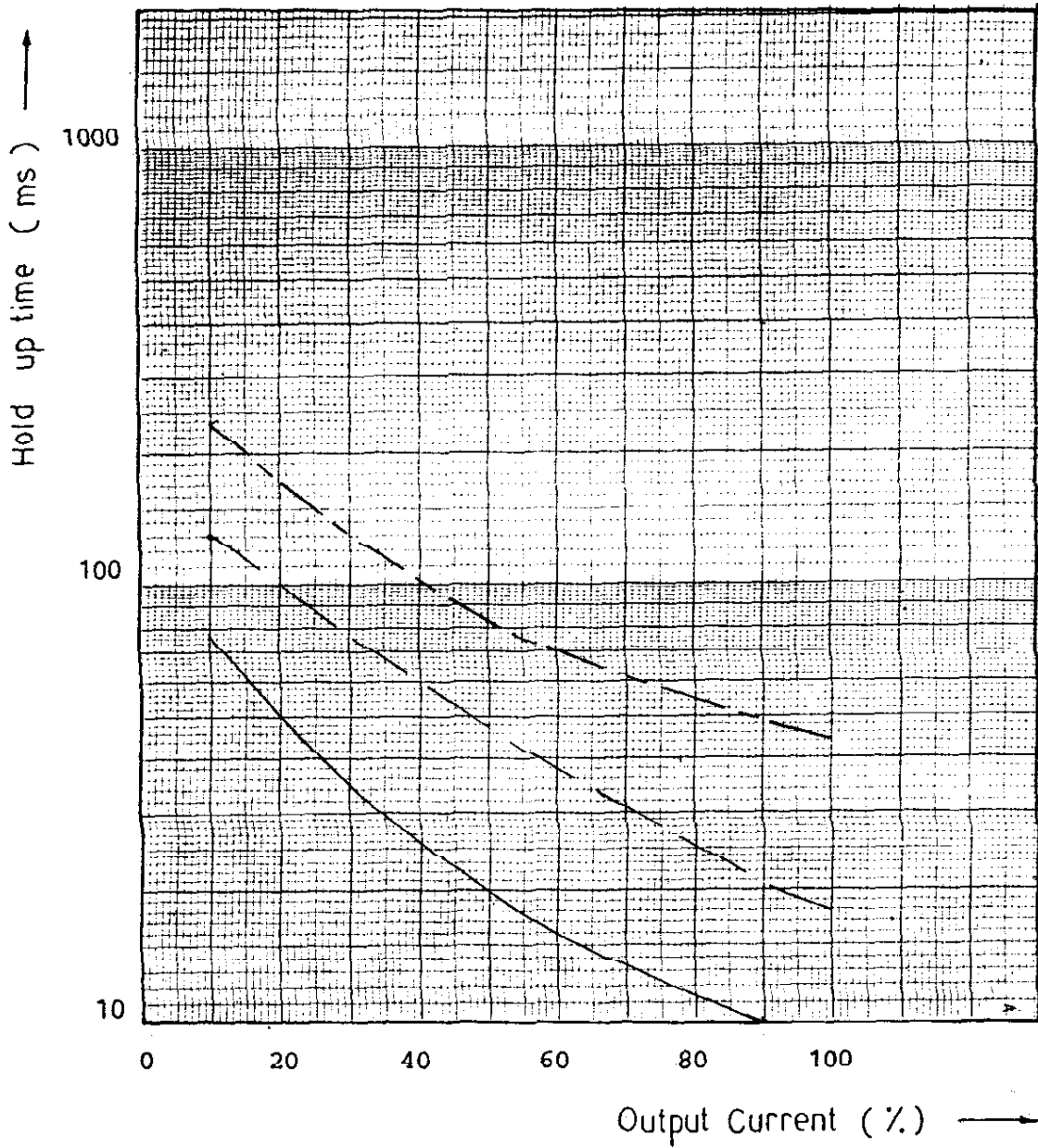
Hold Up Time

KS10

12V

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

Ta : 25°C

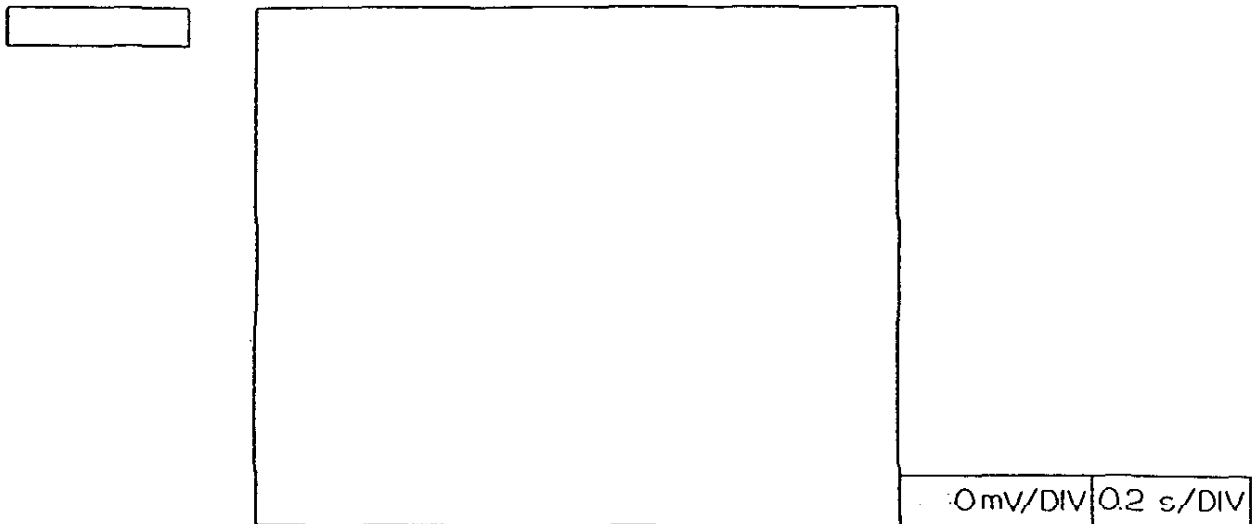
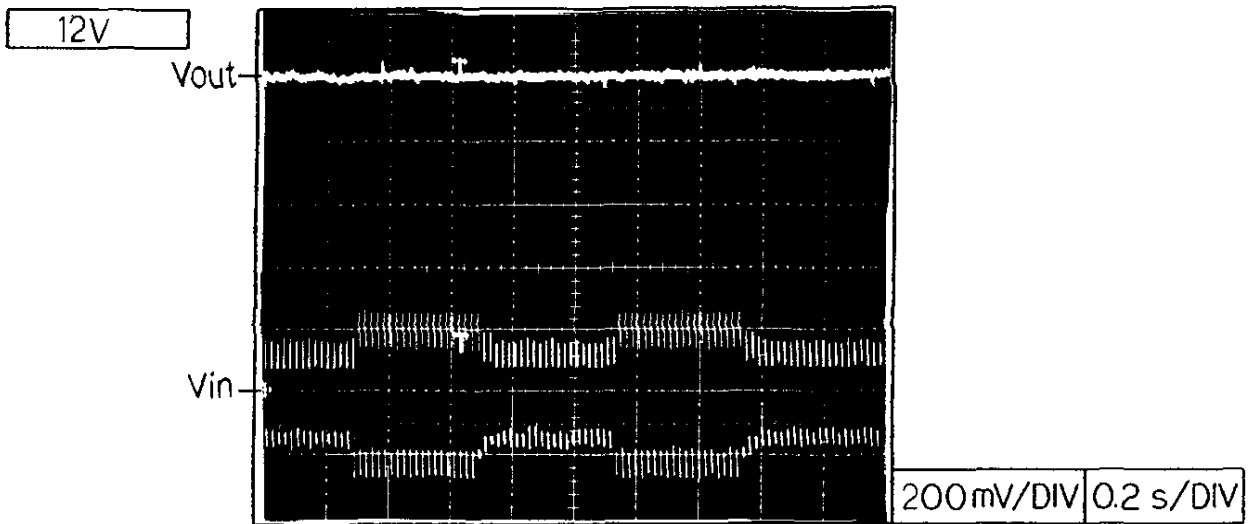
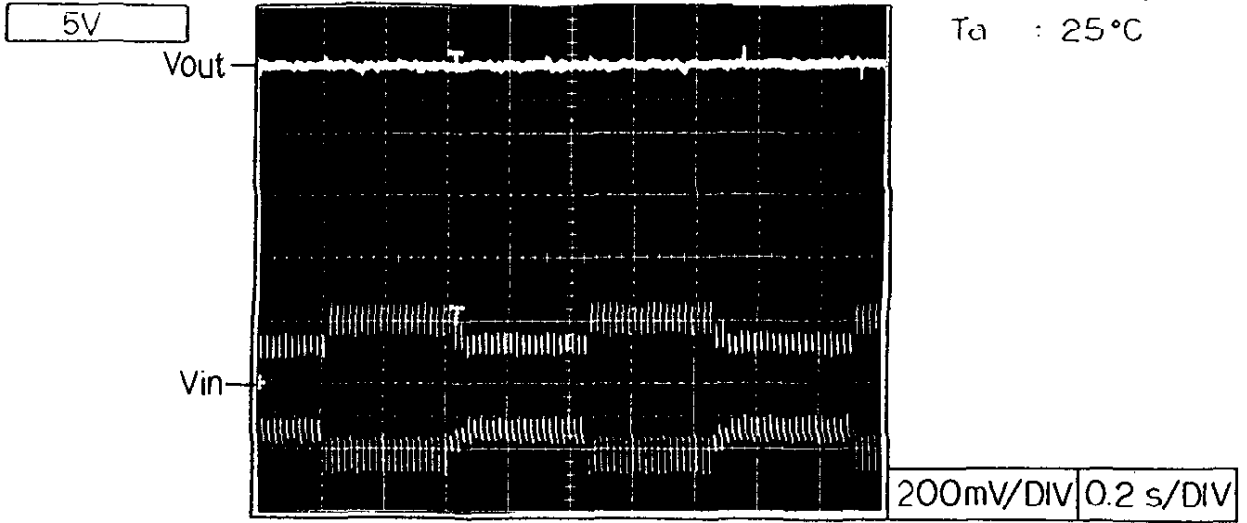


Dynamic line response

KS10

Vin : AC 85 v \rightleftharpoons AC 132 v

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



Dynamic load response

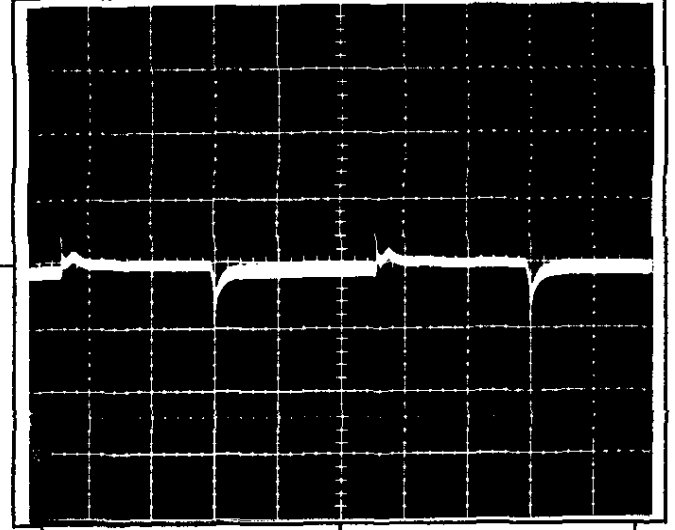
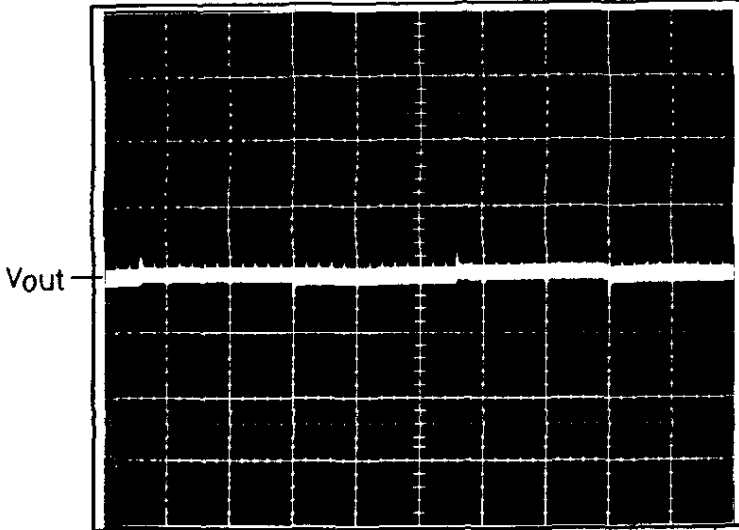
KS10

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

5V

I_{out} 50 \longleftrightarrow 100% $f=100\text{Hz}$

I_{out} 0 \longleftrightarrow 100% $f=100\text{Hz}$

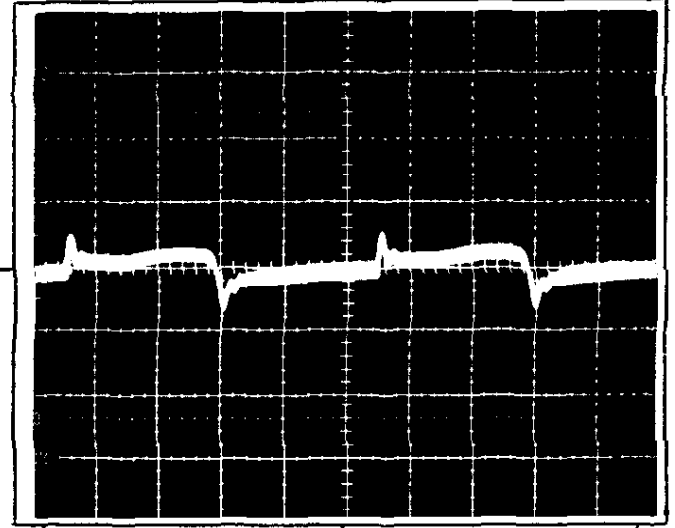
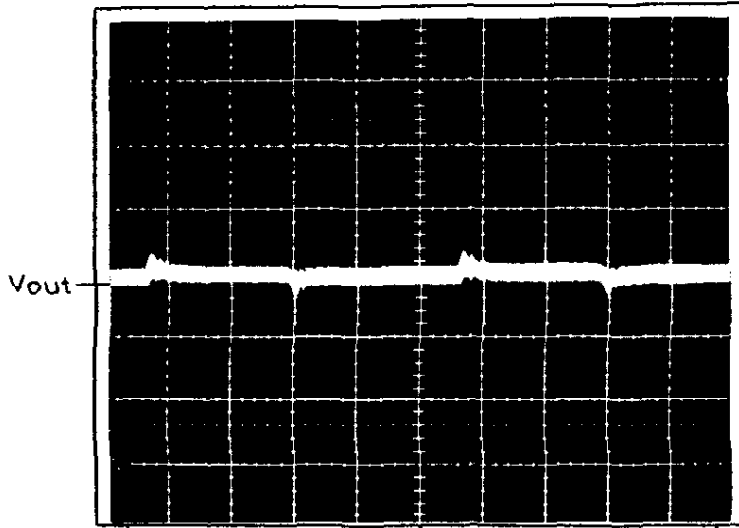


100 mV/DIV	2 ms / DIV
+ 0.4%	- 0.4%

100 mV/DIV	2 ms / DIV
+ 0.8%	- 2.0%

I_{out} 50 \longleftrightarrow 100% $f=1\text{kHz}$

I_{out} 0 \longleftrightarrow 100% $f=1\text{kHz}$



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

100 mV/DIV	0.2 ms / DIV
+ 1.2%	- 1.4%

Dynamic load response

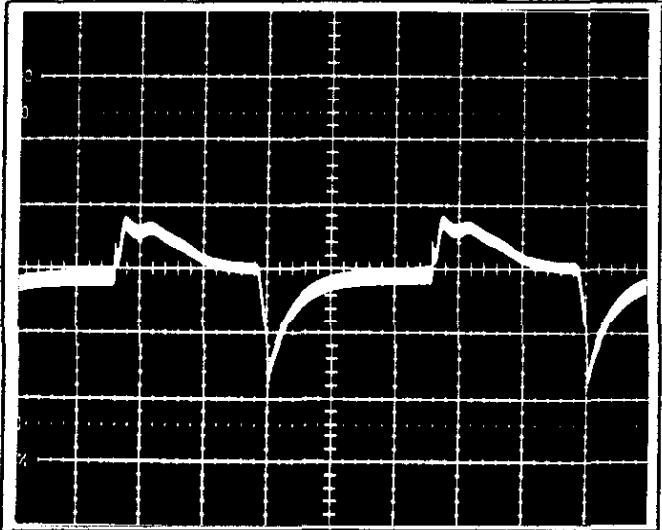
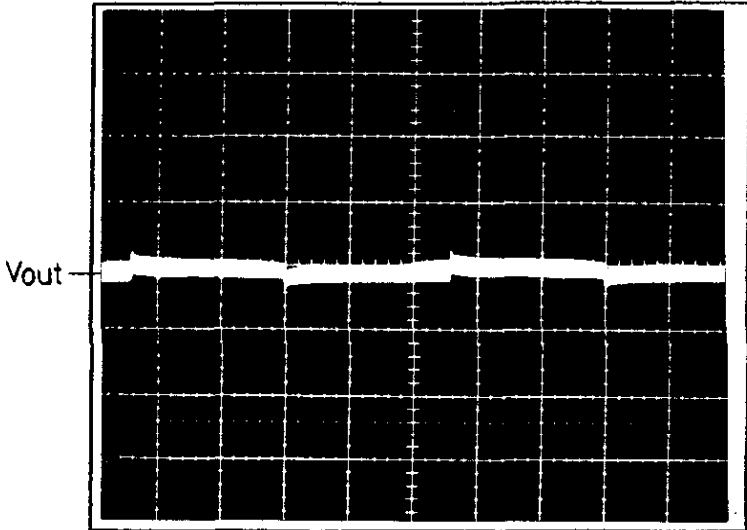
KS10

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

12V

I_{out} 50 \longleftrightarrow 100% $f=100\text{Hz}$

I_{out} 0 \longleftrightarrow 100% $f=100\text{Hz}$

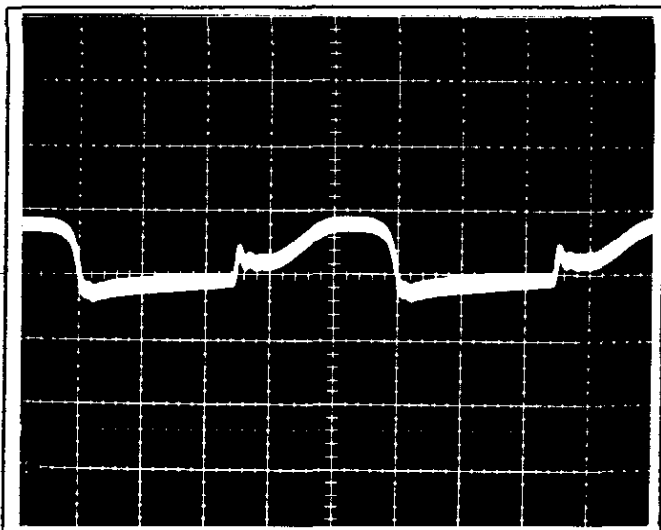
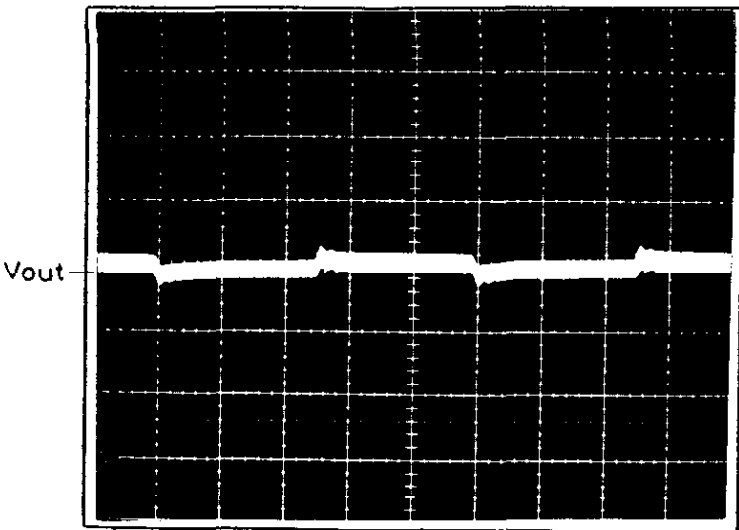


100 mV/DIV	2 ms / DIV
+ 0.2%	- 0.33%

100 mV/DIV	2 ms / DIV
+ 0.67%	- 15%

I_{out} 50 \longleftrightarrow 100% $f=1\text{kHz}$

I_{out} 0 \longleftrightarrow 100% $f=1\text{kHz}$



100 mV/DIV	0.2 ms / DIV
+ 0.25%	- 0.25%

100 mV/DIV	0.2 ms / DIV
+ 0.75%	- 0.33%

Response to brown out

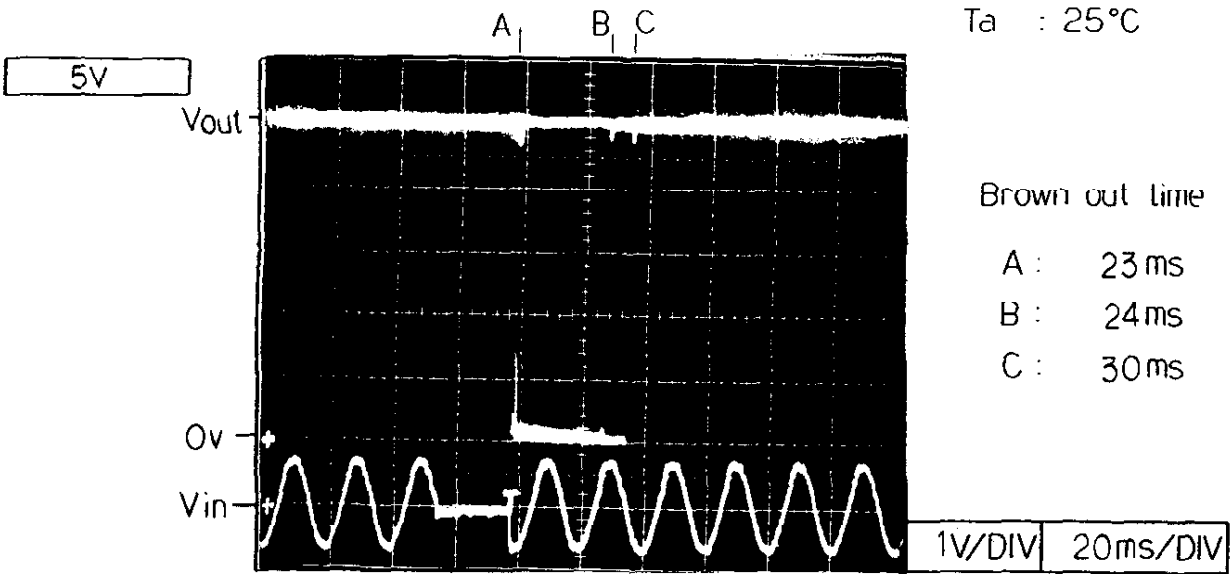
KS10

Conditions

Vin : AC 100 v

Iout : 100 %

Ta : 25 °C

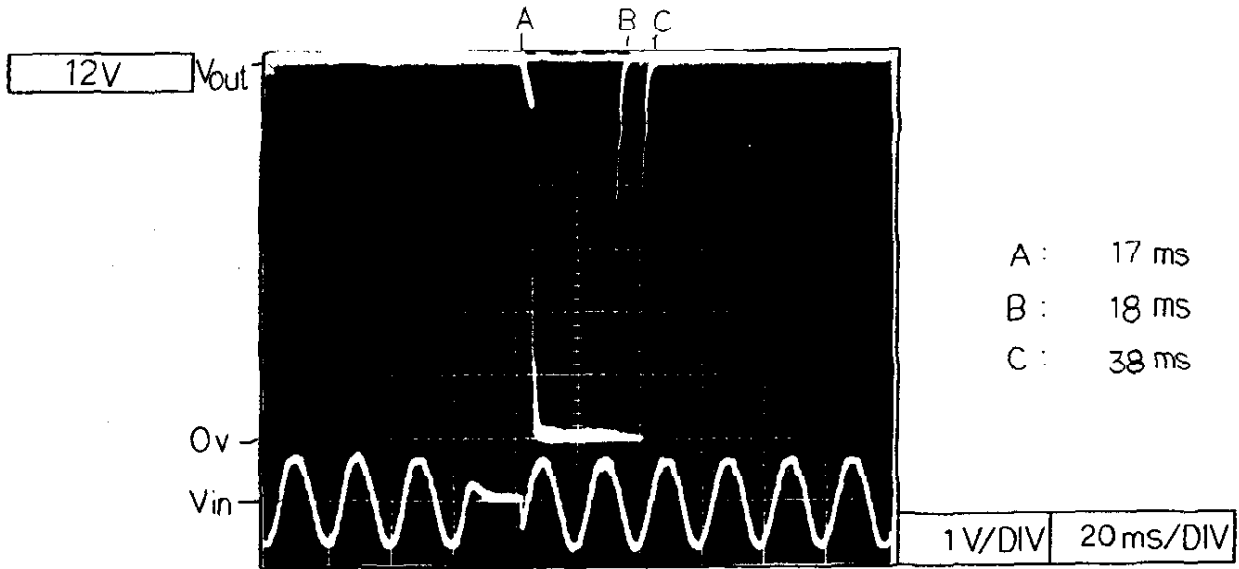


Brown out time

A : 23 ms

B : 24 ms

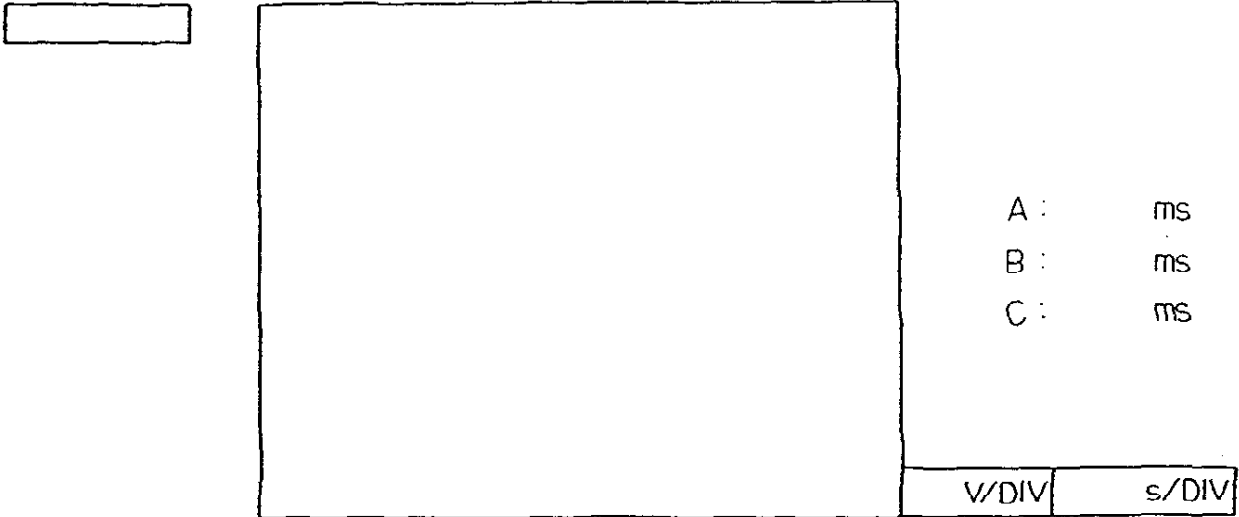
C : 30 ms



A : 17 ms

B : 18 ms

C : 38 ms



A : ms

B : ms

C : ms

Inrush Current Characteristics

KS 10

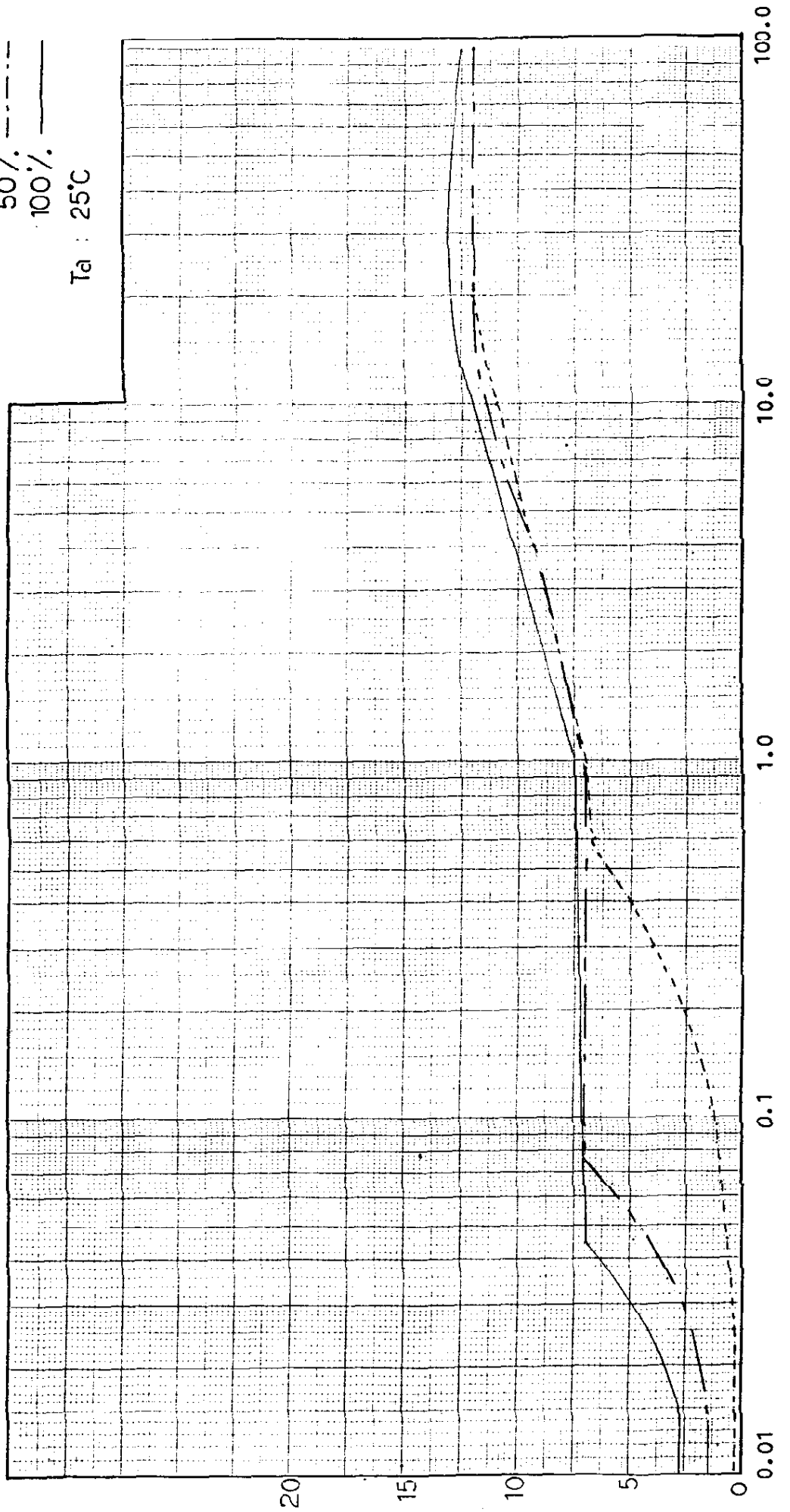
V_{in} : AC 100 V

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

50% - - - - -

100% - - - - -

T_a : 25°C



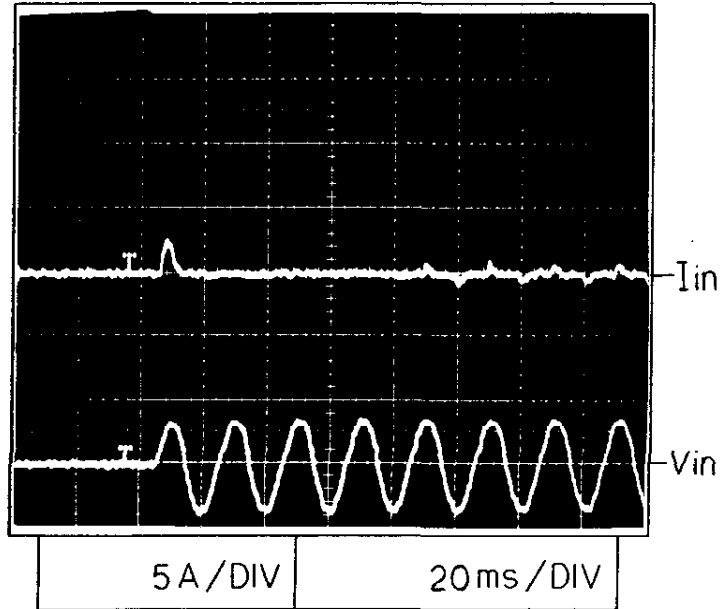
← (Max) Inrush Current (A)
NEMIC-LAMBDA

Inrush current waveform

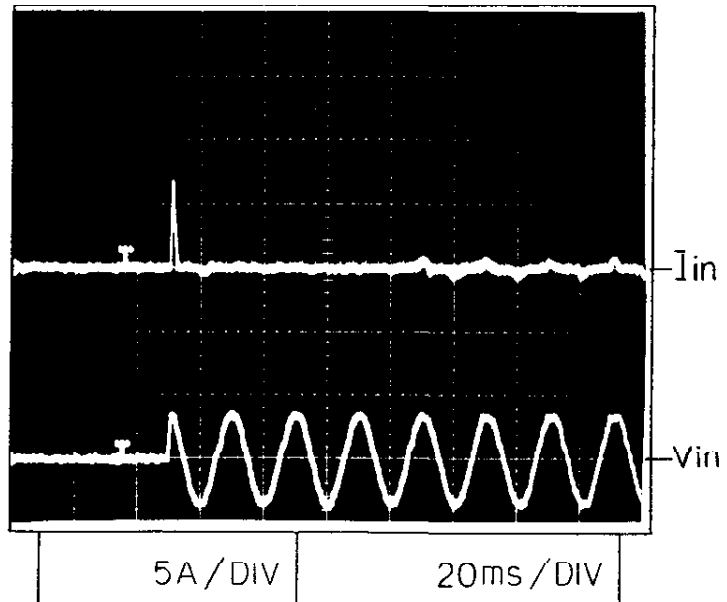
KS10

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

KS 10

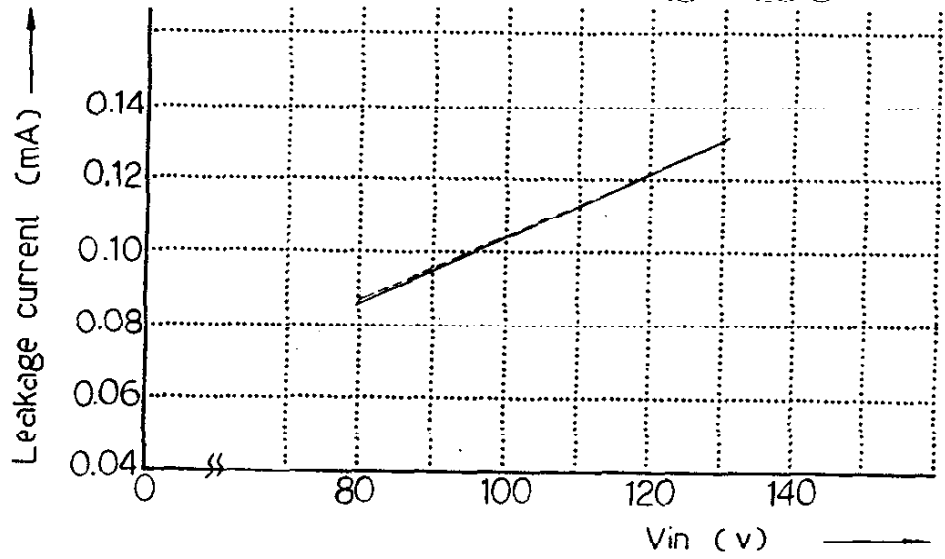
Conditions

I_{out} : 100 % ———

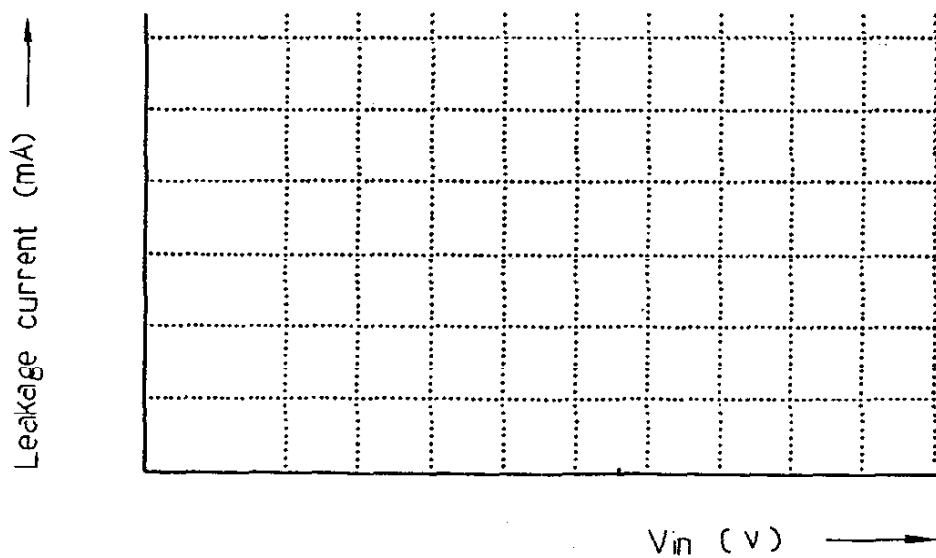
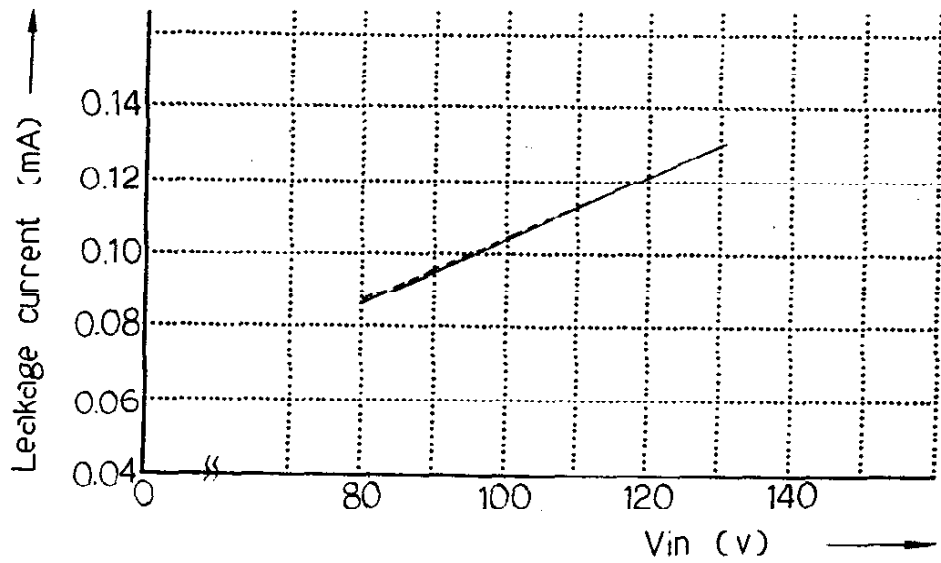
0 % - - - -

T_a : 25°C

5V



12V



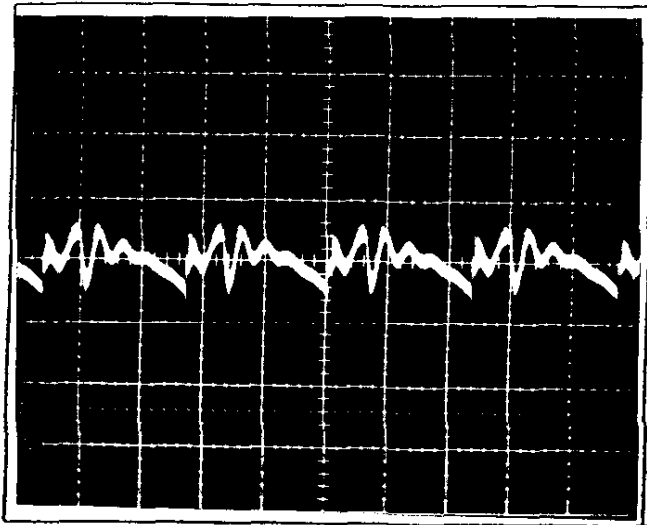
OUTPUT-RIPPLE, NOISE

KS10

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

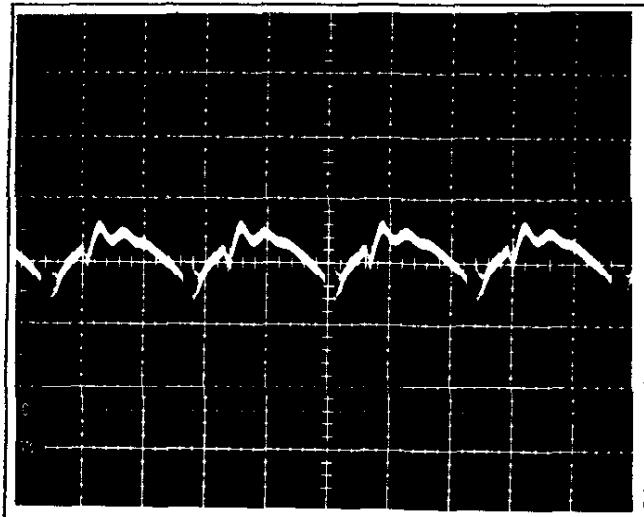
NORMAL MODE

5V

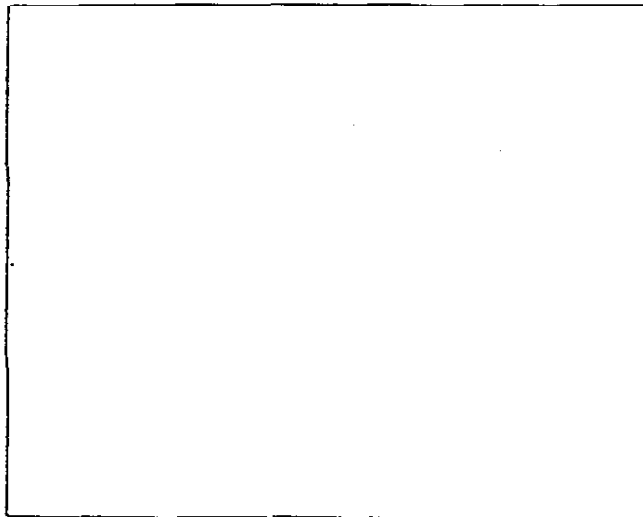


20mV/DIV 2µs/DIV

12V



20mV/DIV 2µs/DIV



mV/DIV 1µs/DIV

OUTPUT-RIPPLE, NOISE

KS10

Conditions

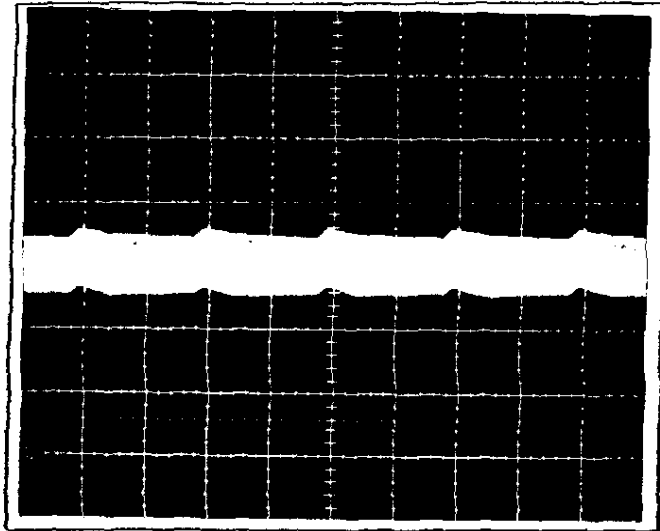
Vin: AC 100 v

Iout: 100 %

Ta: 25°C

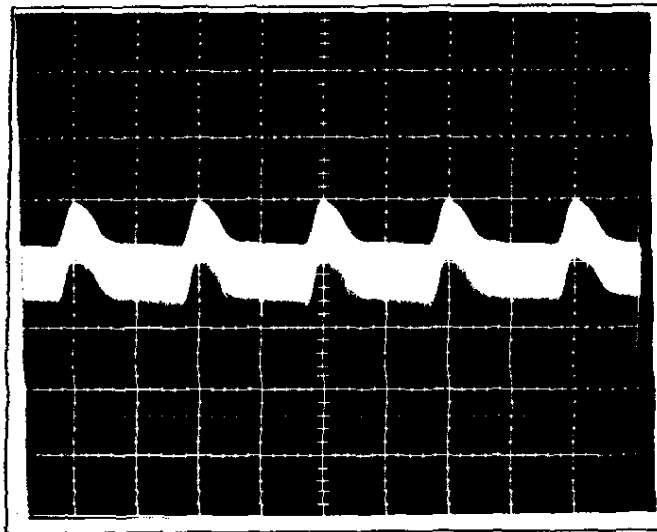
NORMAL MODE

5V

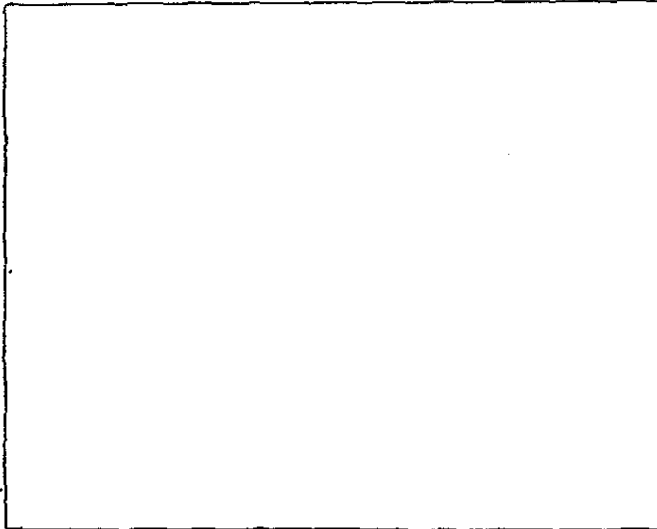


20mV/DIV | 5ms/DIV

12V



20mV/DIV | 5ms/DIV



mV/DIV | μ s/DIV

OUTPUT-RIPPLE, NOISE

KS10

Conditions

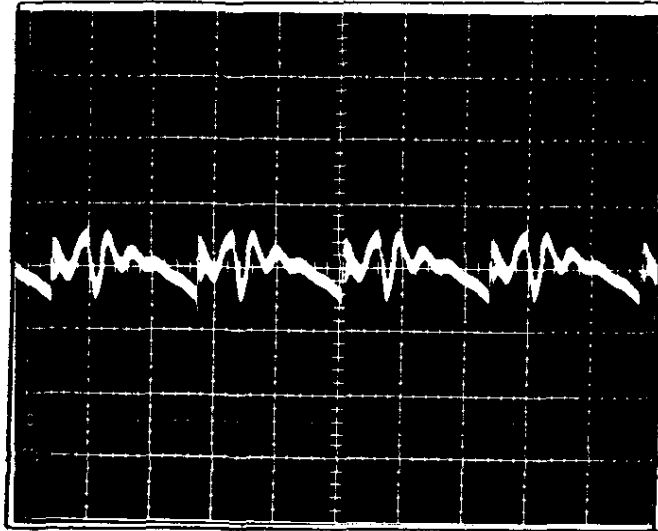
Vin: AC 100 v

Iout: 100 %

Ta: 25°C

COMMON + NORMAL MODE

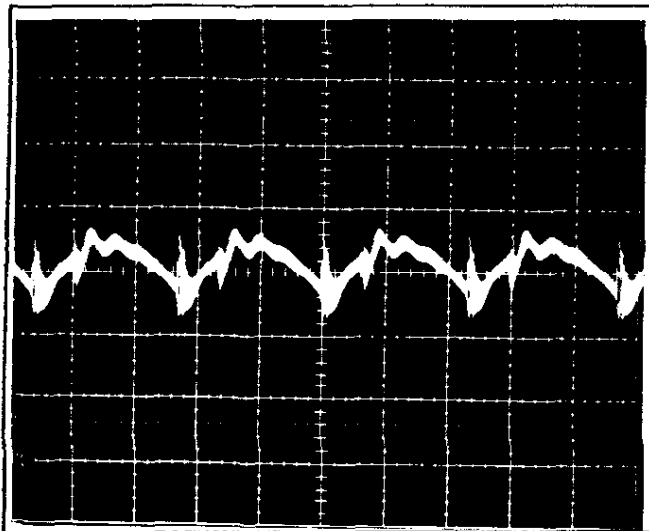
5V



20mV/DIV

2µs/DIV

12V



20mV/DIV

2µs/DIV

mV/DIV

µs/DIV

OUTPUT-RIPPLE, NOISE

KS10

Conditions

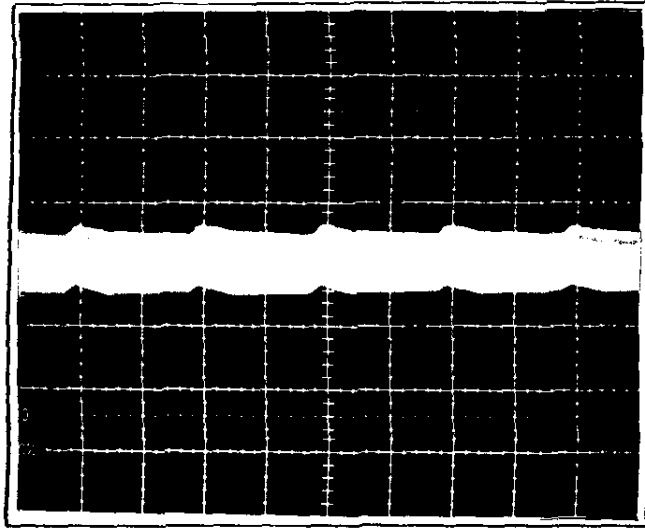
Vin: AC 100 v

Iout: 100 %

Ta: 25°C

COMMON + NORMAL MODE

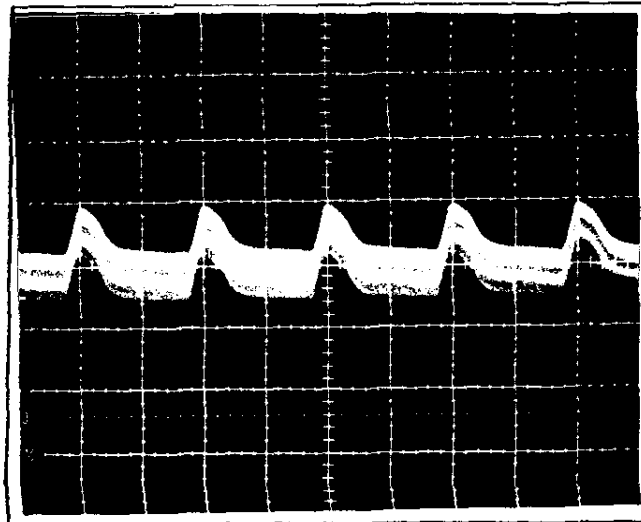
5V



20mV/DIV

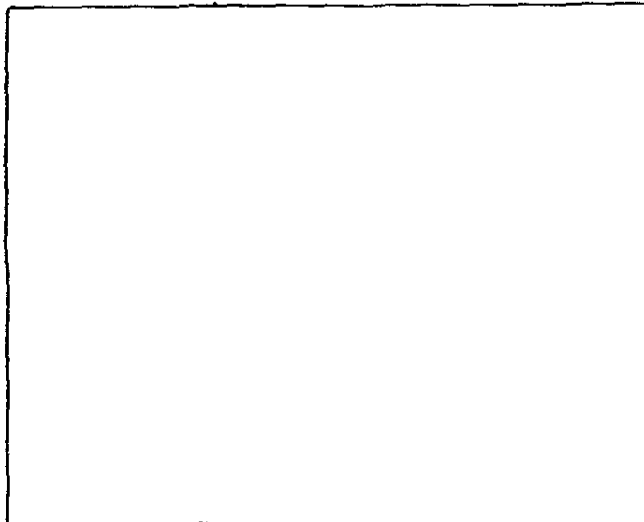
5ms/DIV

12V



20mV/DIV

5ms/DIV



mV/DIV

µs/DIV