
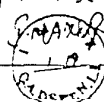


NND15

TEST DATA

DWG. No. IA502-53-01			
Q.A. NLJ	Q.A. NLI	ENG.	APP.
A. Helms		Ooran P. Laid	shimsham
AUG. 9. 92		JUNE - 23 - 92 JUL - 2 - 92	JUL - 1 - 92
			

T. Kava
Jul 14/93

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

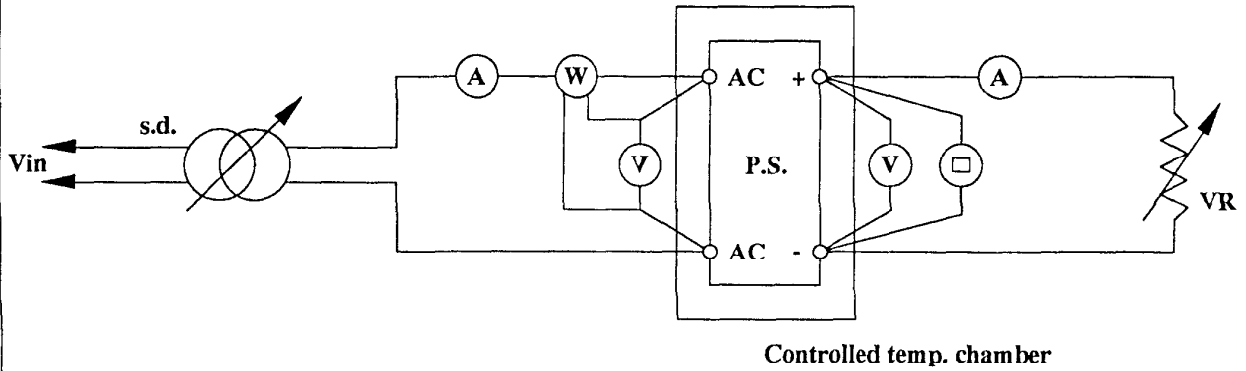
T_a Ambient Temperature

1.EVALUATION METHOD

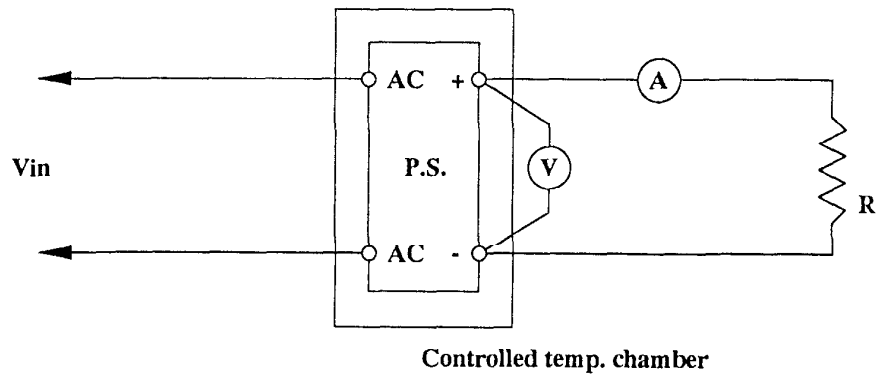
NND15-1212

1-1 Circuits used for determination

(1) Steady state data

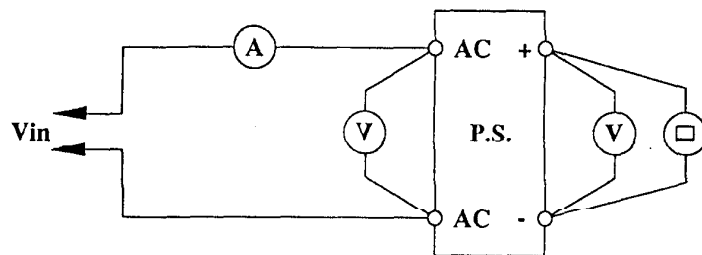


(2) Warm up voltage drift characteristics



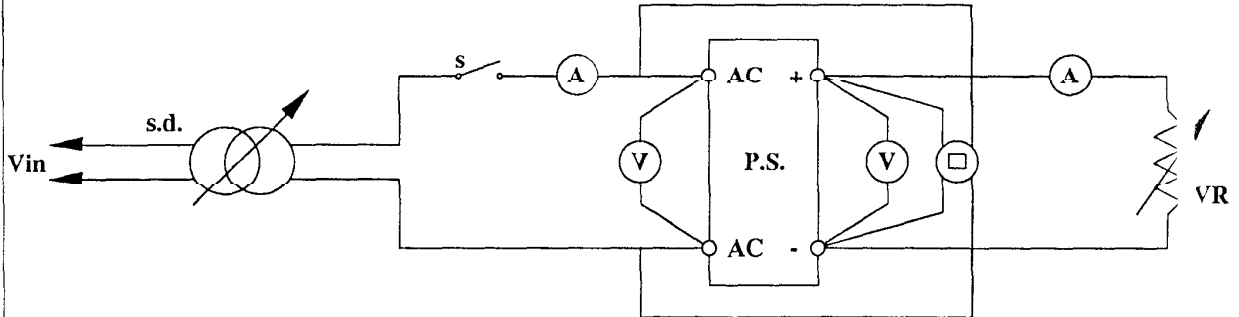
(3) Over current protection (OCP) characteristics Same as steady state data.

(4) Over voltage protection (OVP) characteristics



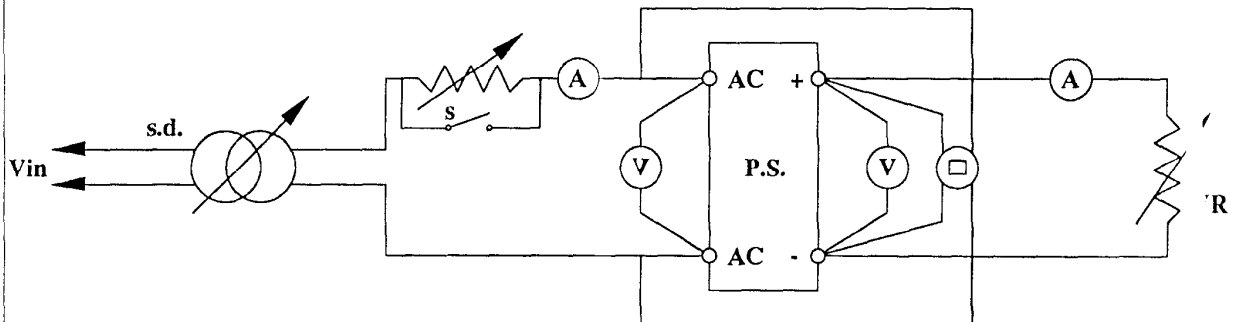
NEMIC-LAMBDA

(5) Output rise characteristics

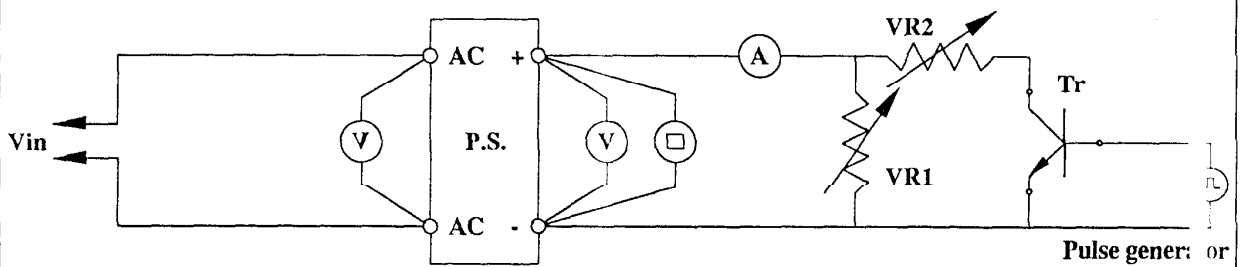


(6) Output fall characteristics
Same as Output rise characteristics

(7) Dynamic line response characteristics

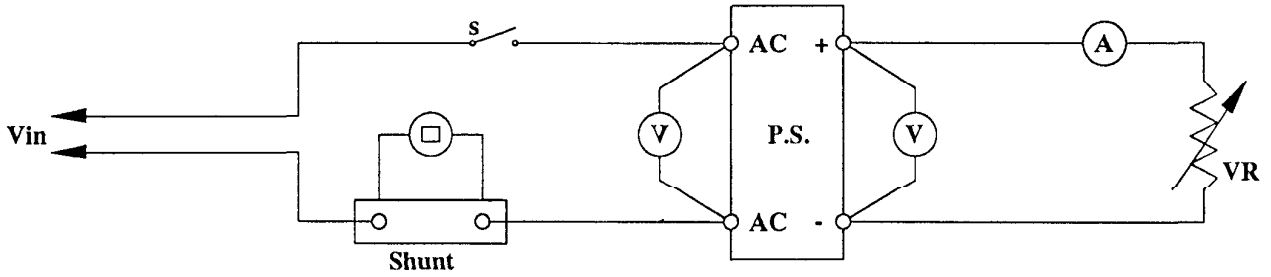


(8) Dynamic load response characteristics

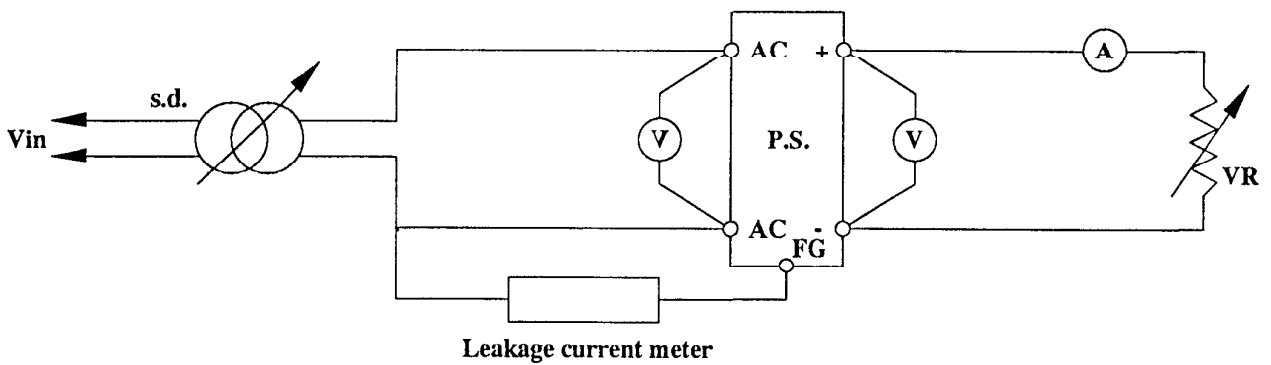


(9) Inrush current characteristics

NND15-1212



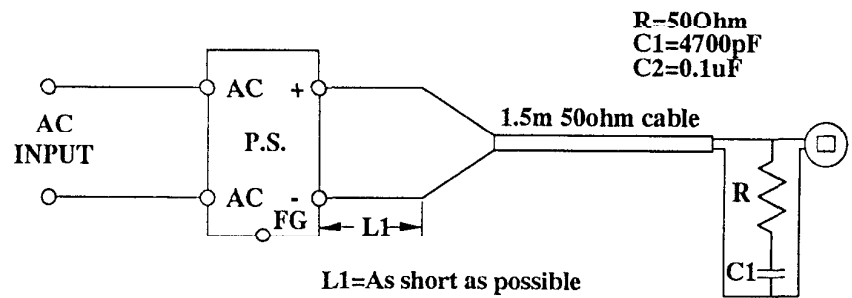
(10) Leakage current characteristics



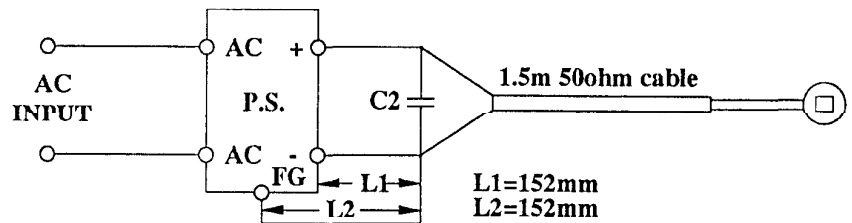
Note: Leakage current measured through a 1Kohm resistor. Range wed: AC+DC

(11) Output-ripple, noise

a) Normal mode



b) Normal + common mode



2. CHARACTERISTICS

NND15-1212

2-1 STEADY STATE DATA

(1) REGULATION - Line and load, Temp. drift

V₁: 12V

1. Regulation-line and load

Condition Ta=25C

CH2: 100%

I _{out} \ V _{in}	AC 85V	AC 100V	AC 115V	Line Regulation	
0%	12.0354	12.0352	12.0349	0.5mV	0.0042%
50%	12.0351	12.0349	12.0346	0.5mV	0.0042%
100%	12.0348	12.0345	12.0343	0.5mV	0.0042%
Load	0.6mV	0.7mV	0.6mV		
Regulation	0.005%	0.0058%	0.005%		

2. Temperature Drift

Conditions V_{in}=AC100V
I_{out}=100%

T _a	0C	25C	50C	Temp. Stability	
V _{out}	11.9896	12.0005	12.0137	0.0241	0.2%

V₁: 12V

1. Regulation-line and load

Condition Ta=25C

CH1: 100%

I _{out} \ V _{in}	AC 85V	AC 100V	AC 115V	Line Regulation	
0%	12.0352	12.0351	12.0347	0.5mV	0.0042%
50%	12.0349	12.0347	12.0342	0.7mV	0.0058%
100%	12.0345	12.0342	12.0339	0.6mV	0.005%
Load	0.7mV	0.9mV	0.8mV		
Regulation	0.0058%	0.0075%	0.0066%		

2. Temperature Drift

Conditions V_{in}=AC100V
I_{out}=100%

T _a	0C	25C	50C	Temp. Stability	
V _{out}	11.9943	12.0045	12.0117	0.0174	0.145%

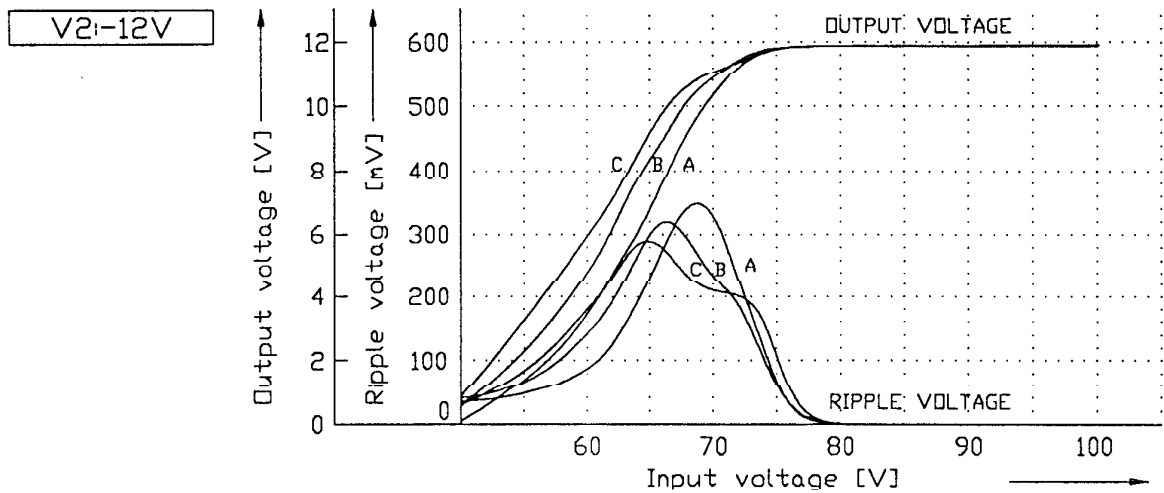
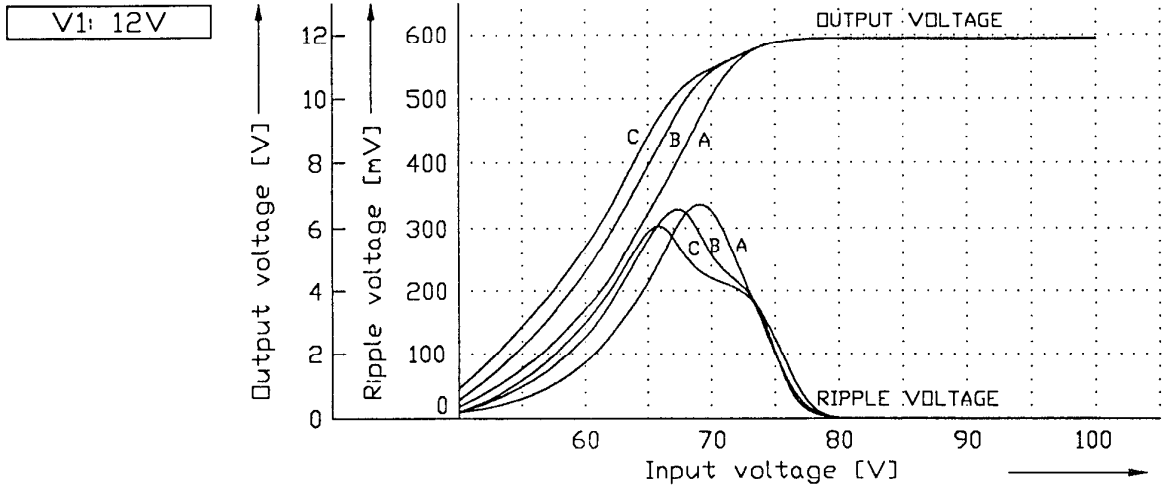
NEMIC-LAMBDA

T-4

NND15-1212

(2) Output voltage and ripple voltage
V.S. input voltage

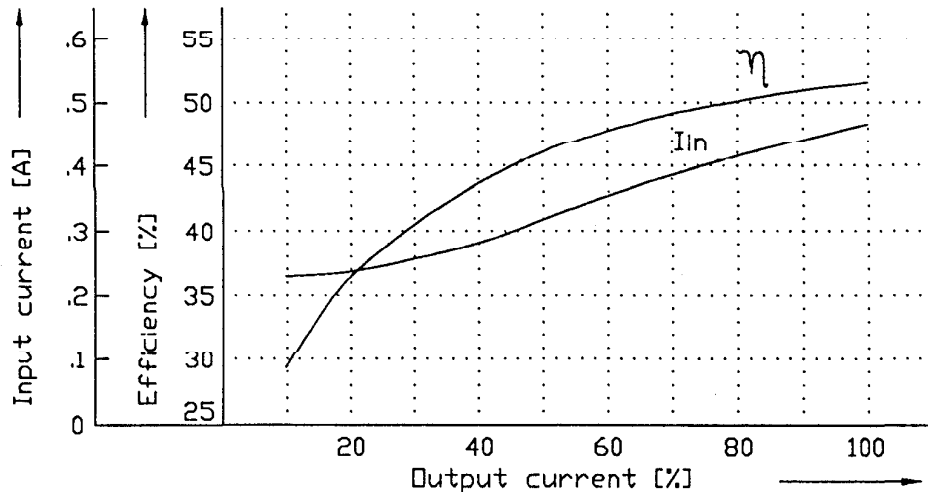
Conditions $I_{out}=100\%$ $T_a: 0C = A$ 100VAC
25C = B
50C = C



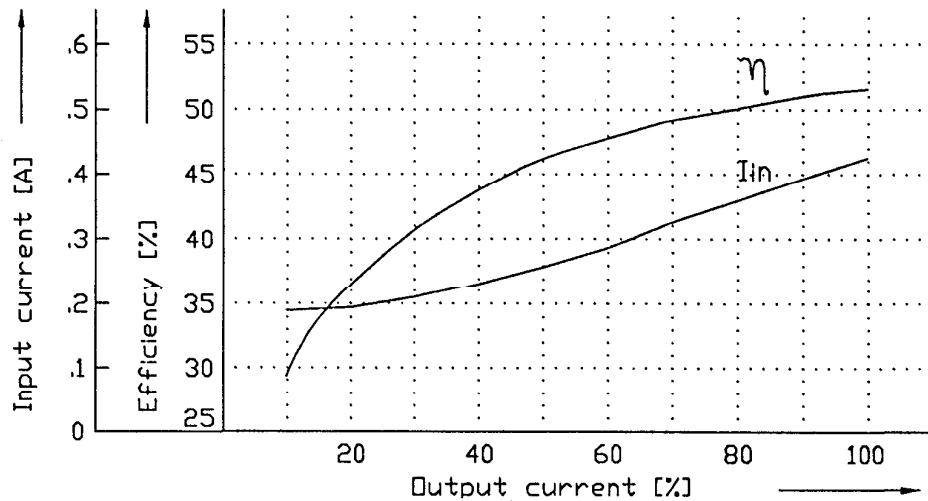
(3) Efficiency and Input current
V.S. output current

Conditions $T_a=25C$

VIN:100VAC



VIN:115VAC

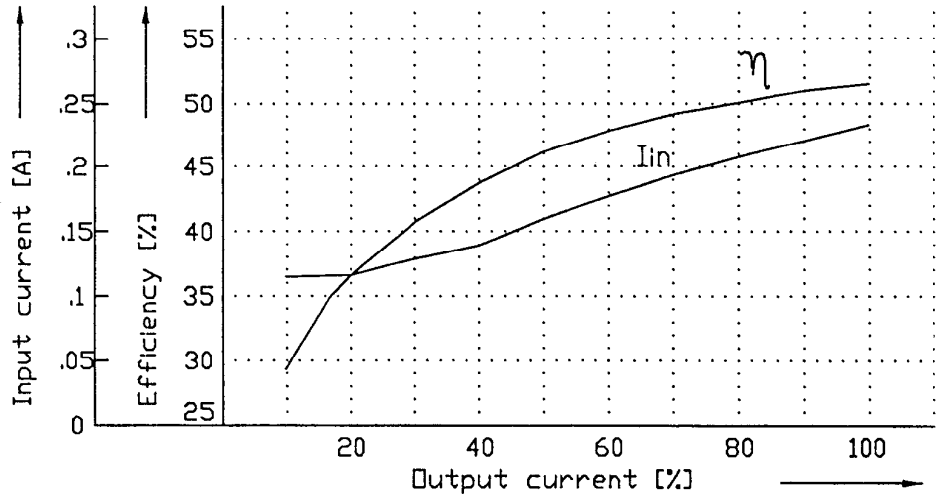


NND15-1212

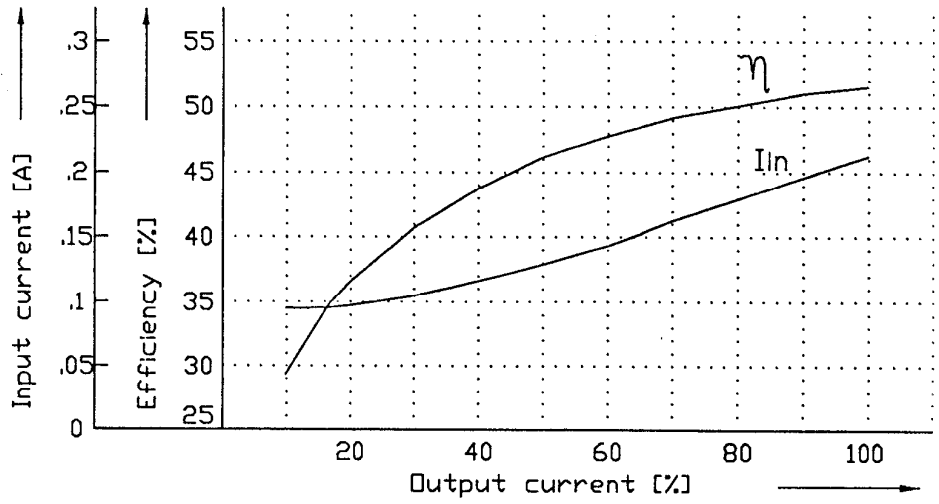
Efficiency and input current
V.S. output current

Conditions $T_a=25C$

VIN:200VAC



VIN:230VAC



NEMIC-LAMBDA

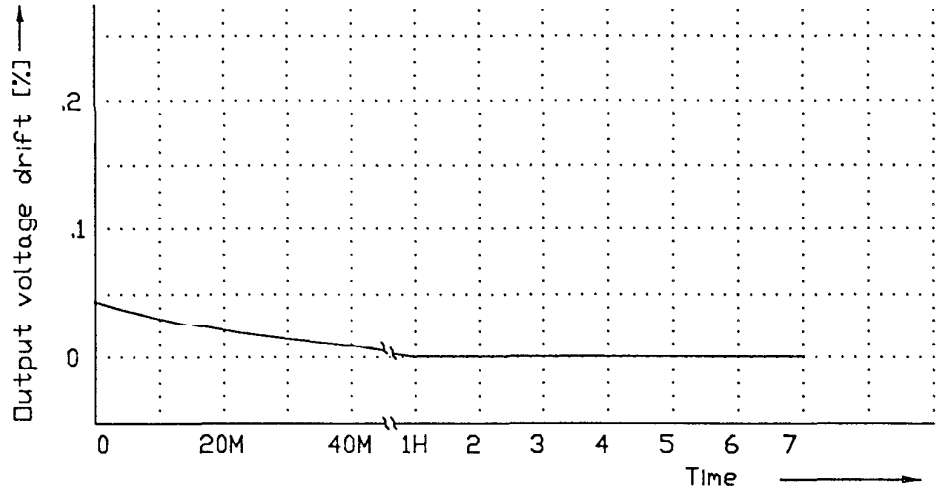
T-7

NND15-1212

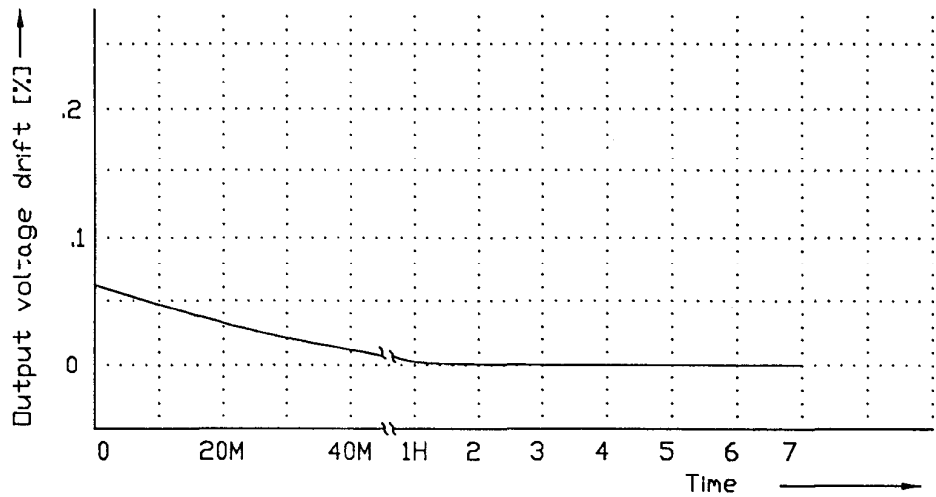
2-2 Warm up voltage drift

Conditions $V_{in}=AC100V$
 $V_{out}, I_{out}=100\%$
 $T_a=25C$

V1: 12V



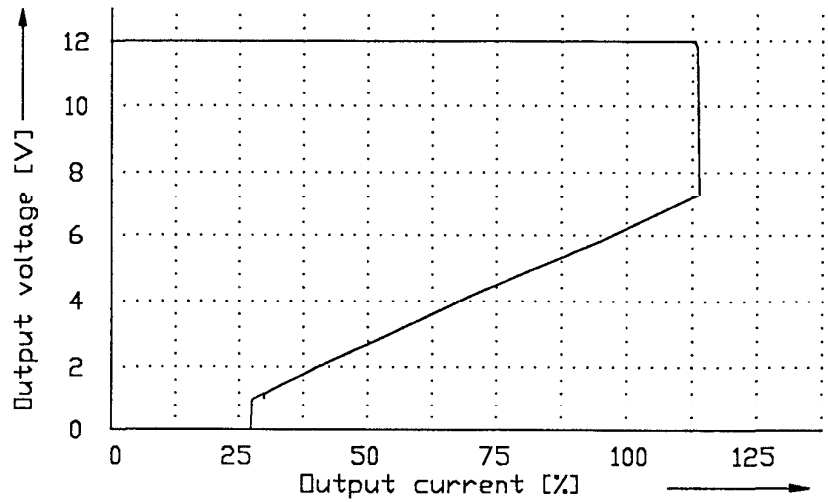
V2: 12V



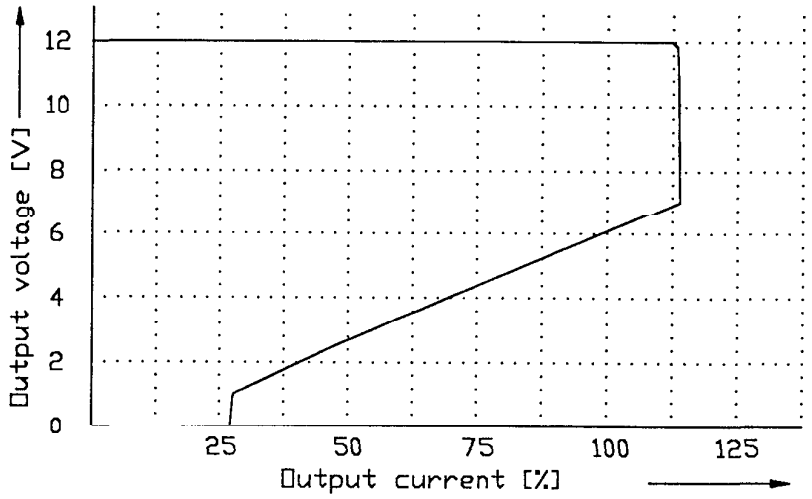
2-3 OCP Characteristics

Conditions $T_a=25^{\circ}\text{C}$
 V_{in} : AC 85V -----
AC 100V -----
AC 115V -----

V1: 12V



V2: 12V

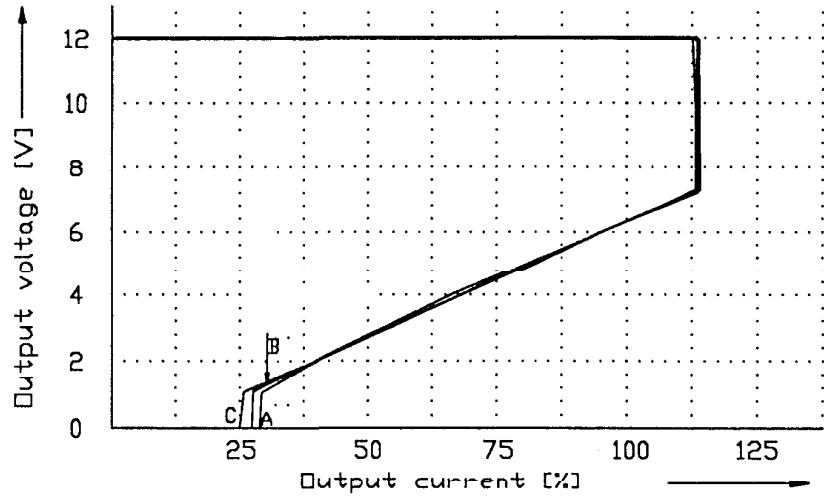


NND15-1212

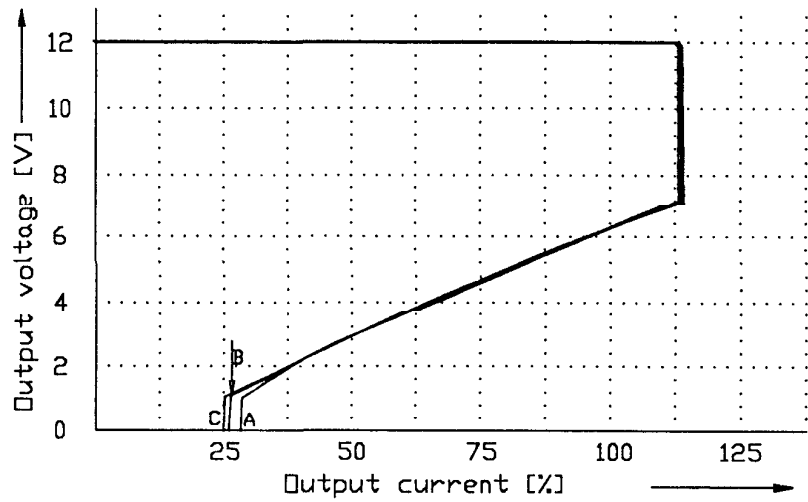
DCP Characteristics

Conditions $V_{in} = AC\ 100V$
 $T_a = 0C = A$
25C = B
50C = C

V1= 12V



V2=12V

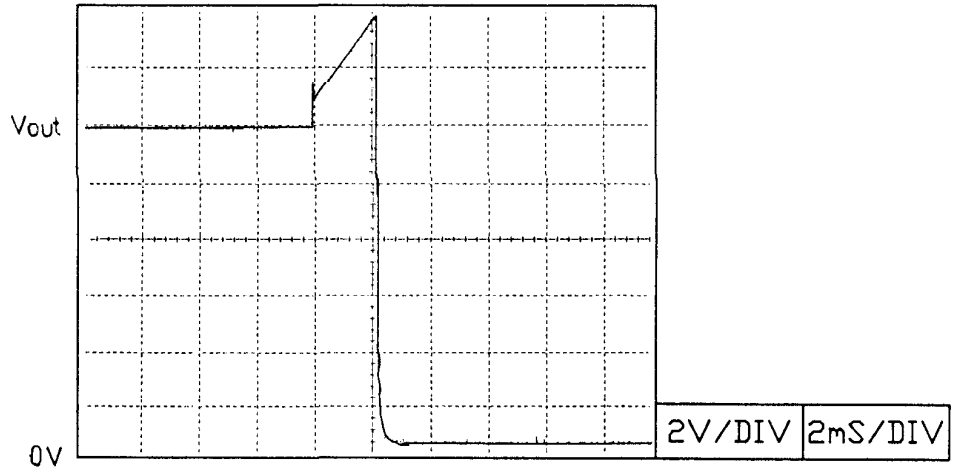


2-4 OVP Characteristics

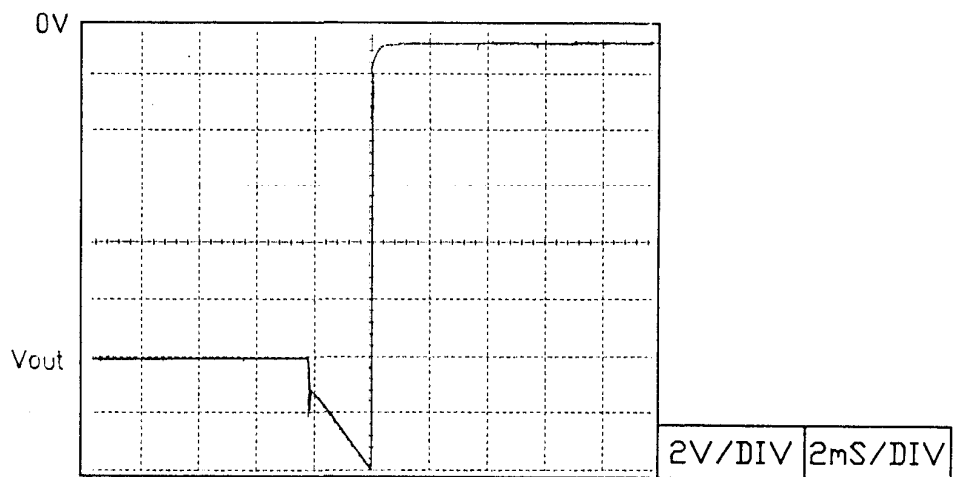
NND15-1212

Conditions $V_{in} = AC\ 100V$
 $I_{out} = 0\%$
 $T_a = 25C$

V1: 12V



V2: 12V



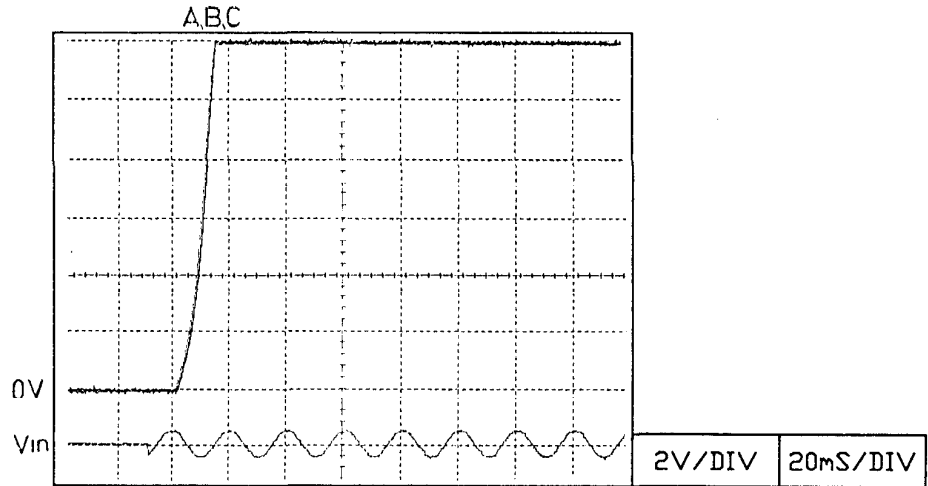
2-5 Output rise time

NND15-1212

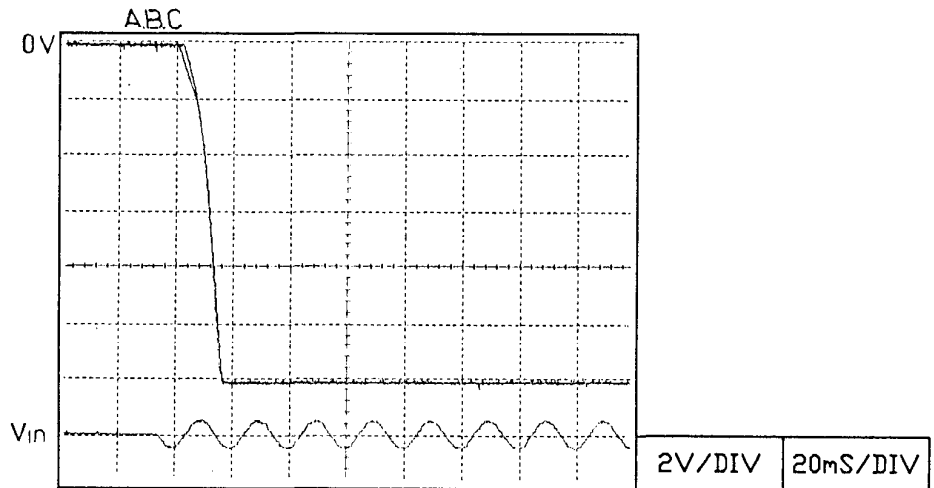
Conditions $V_{in} = 85V_{ac}$ (A)
 $100V_{ac}$ (B)
 $115V_{ac}$ (C)

$I_{out} = 0\%$
 $T_a = 25C$

V1: 12V



V2: -12V



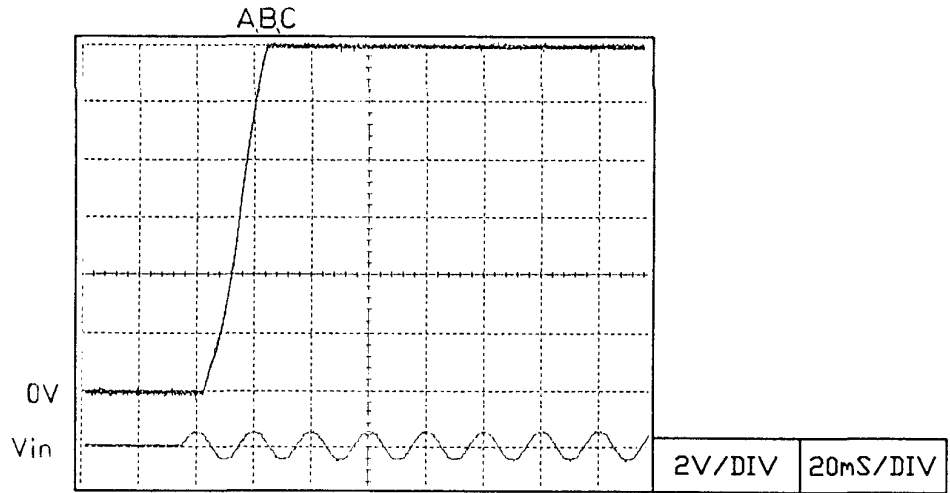
NND15-1212

Output rise time

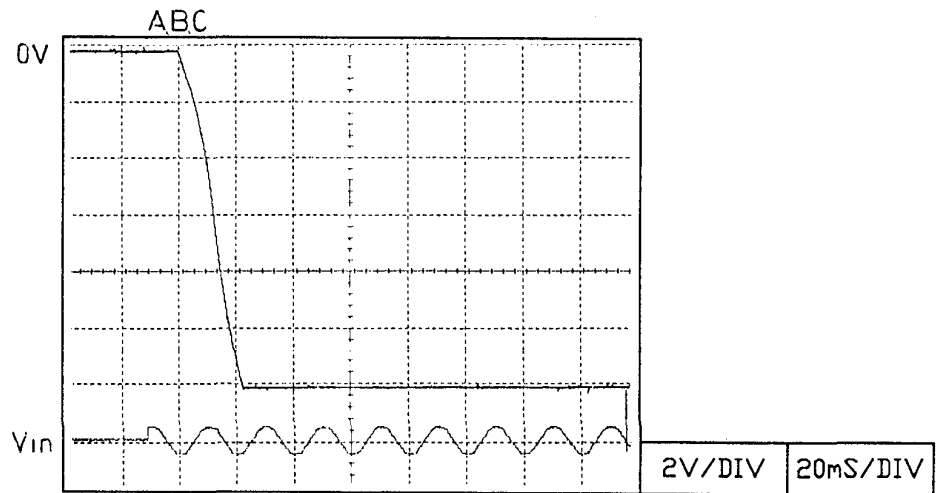
Conditions $V_{in} = 85V_{ac}$ (A)
 $100V_{ac}$ (B)
 $115V_{ac}$ (C)

$I_{out} = 100\%$
 $T_a = 25C$

V1: 12V



V2: 12V



NEMIC-LAMBDA

T-13

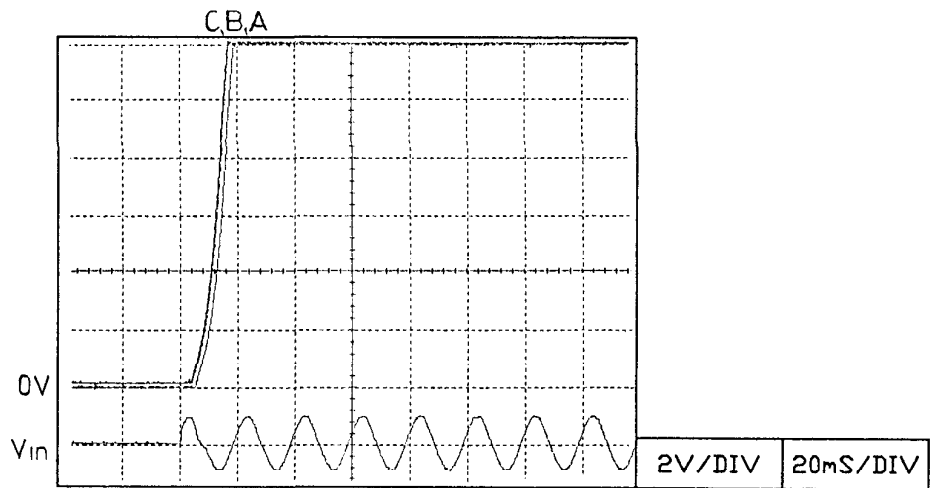
Output rise time

NND15-1212

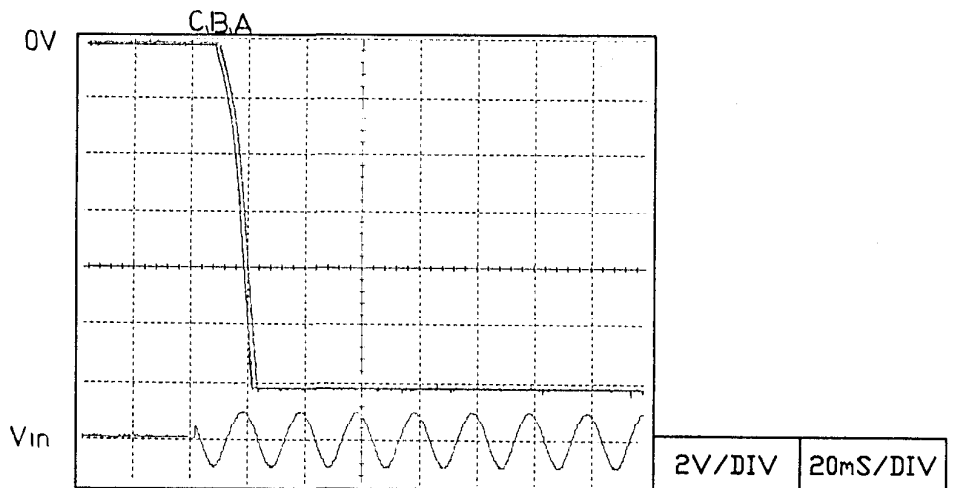
Conditions $V_{in} = 170V_{ac}$ (A)
 $200V_{ac}$ (B)
 $230V_{ac}$ (C)

$I_{out} = 0\%$
 $T_a = 25C$

V1: 12V



V2: 12V



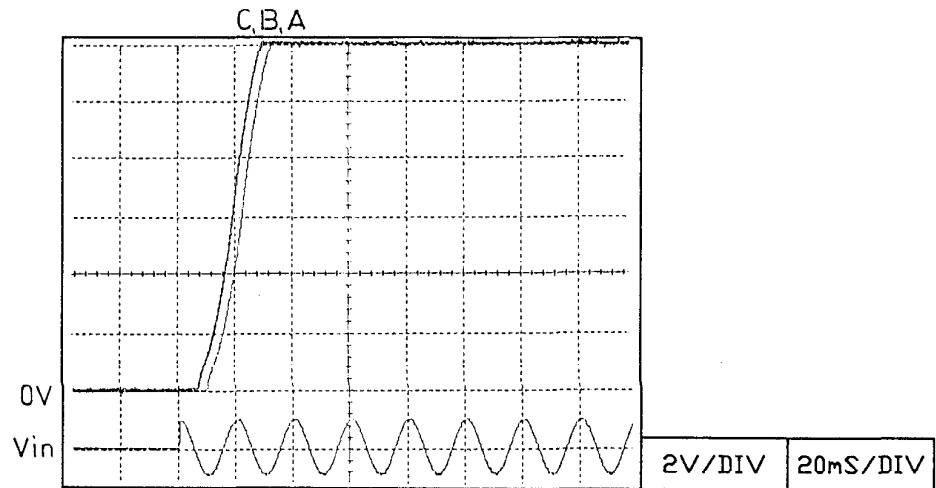
Output rise time

NND15-1212

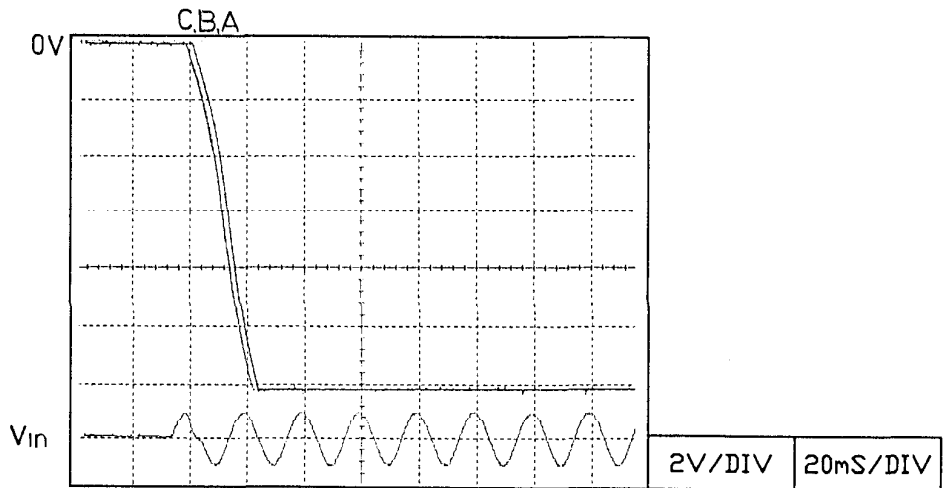
Conditions Vin= 170Vac (A)
200Vac (B)
230Vac (C)

Iout= 100%
Ta= 25C

V1: 12V



V2: -12V



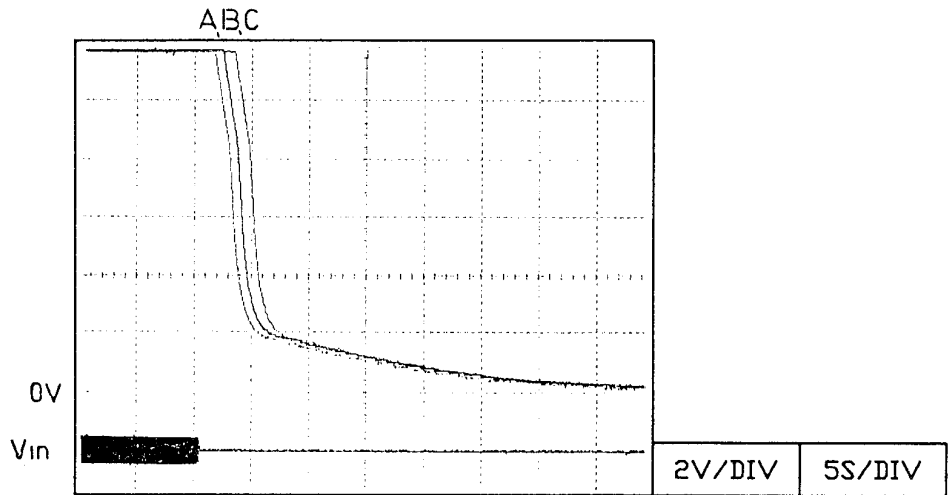
2-6 Output fall time

NND15-1212

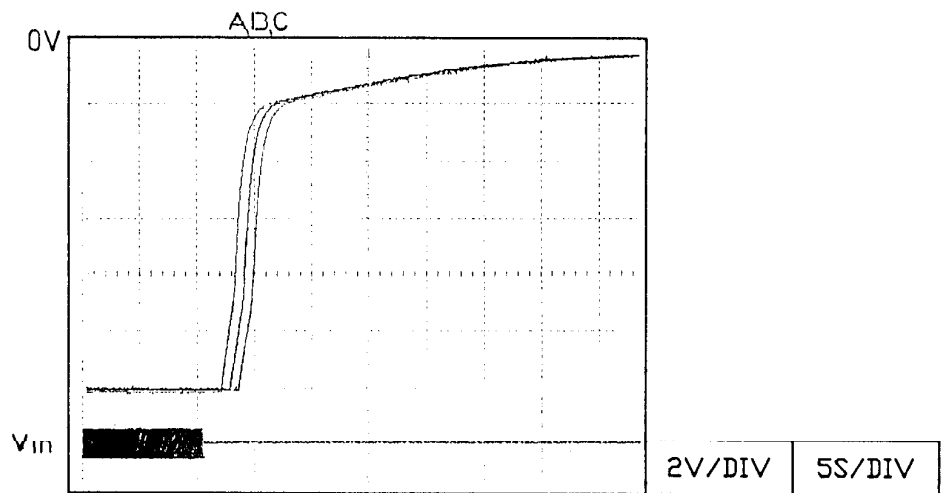
Conditions $V_{in} = 85V_{ac}$ (A)
 $100V_{ac}$ (B)
 $115V_{ac}$ (C)

$I_{out} = 0\%$
 $T_a = 25^{\circ}C$

V1: 12V



V2: 12V



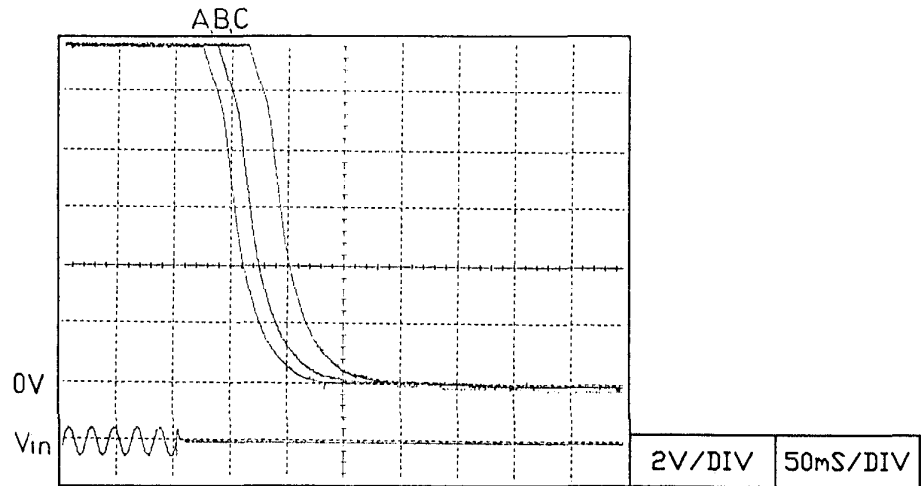
NND15-1212

Output fall time

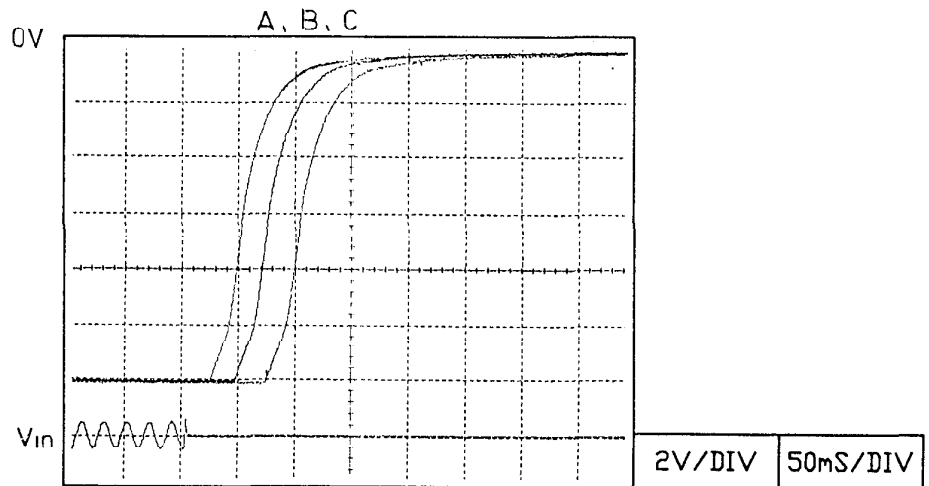
Conditions $V_{in} = 95V_{ac}$ (A)
 $100V_{ac}$ (B)
 $115V_{ac}$ (C)

$I_{out} = 100\%$
 $T_a = 25C$

V1: 12V



V2: 12V



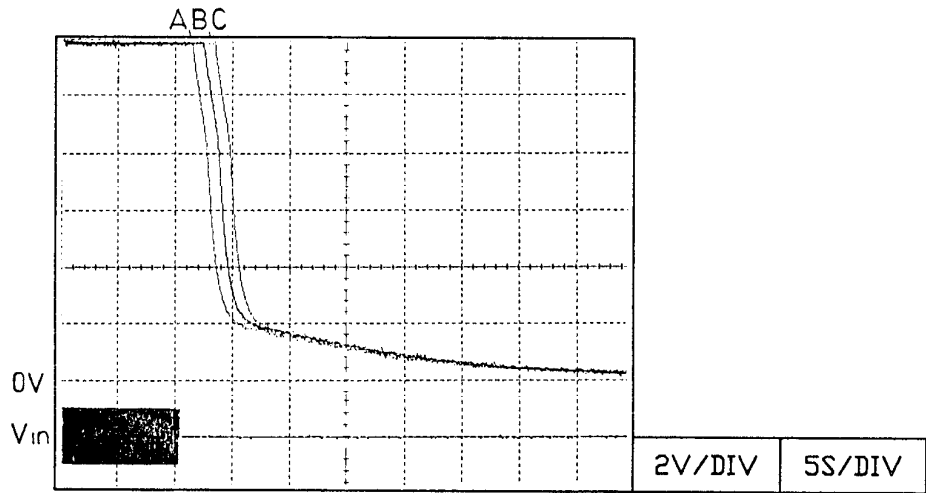
NND15-1212

Output fall time

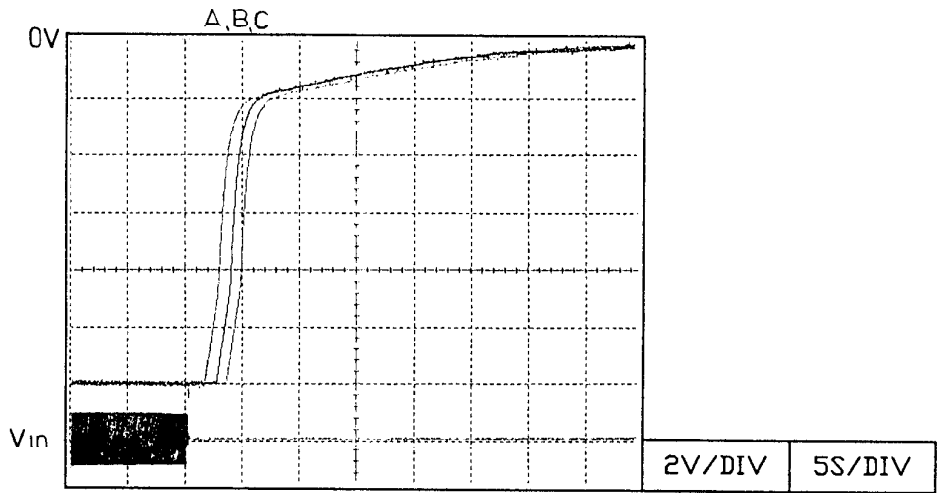
Conditions $V_{in} = 170V_{ac}$ (A)
 $200V_{ac}$ (B)
 $230V_{ac}$ (C)

$I_{out} = 0\%$
 $T_a = 25^{\circ}C$

V1: 12V



V2: 12V



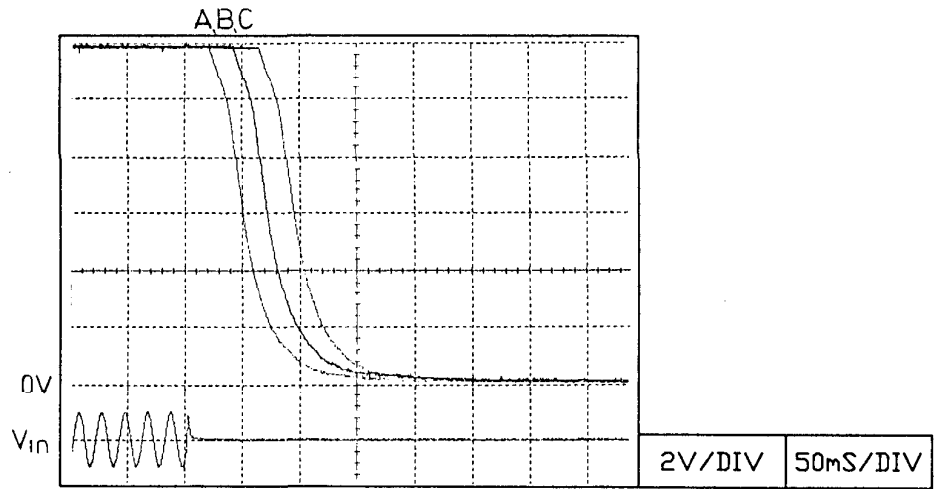
NND15-1212

Output fall time

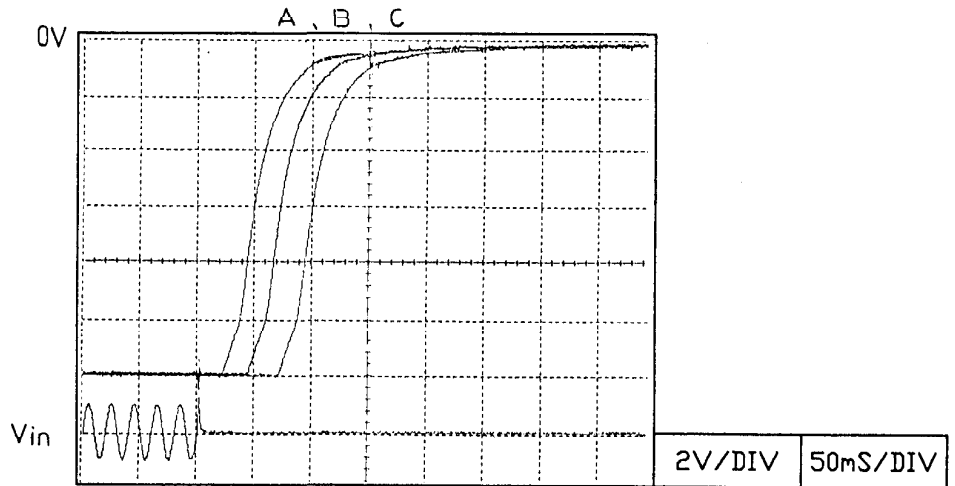
Conditions $V_{in} = 170V_{ac}$ (A)
 $200V_{ac}$ (B)
 $230V_{ac}$ (C)

$I_{out} = 100\%$
 $T_a = 25^{\circ}C$

V1: 12V



V2: 12V

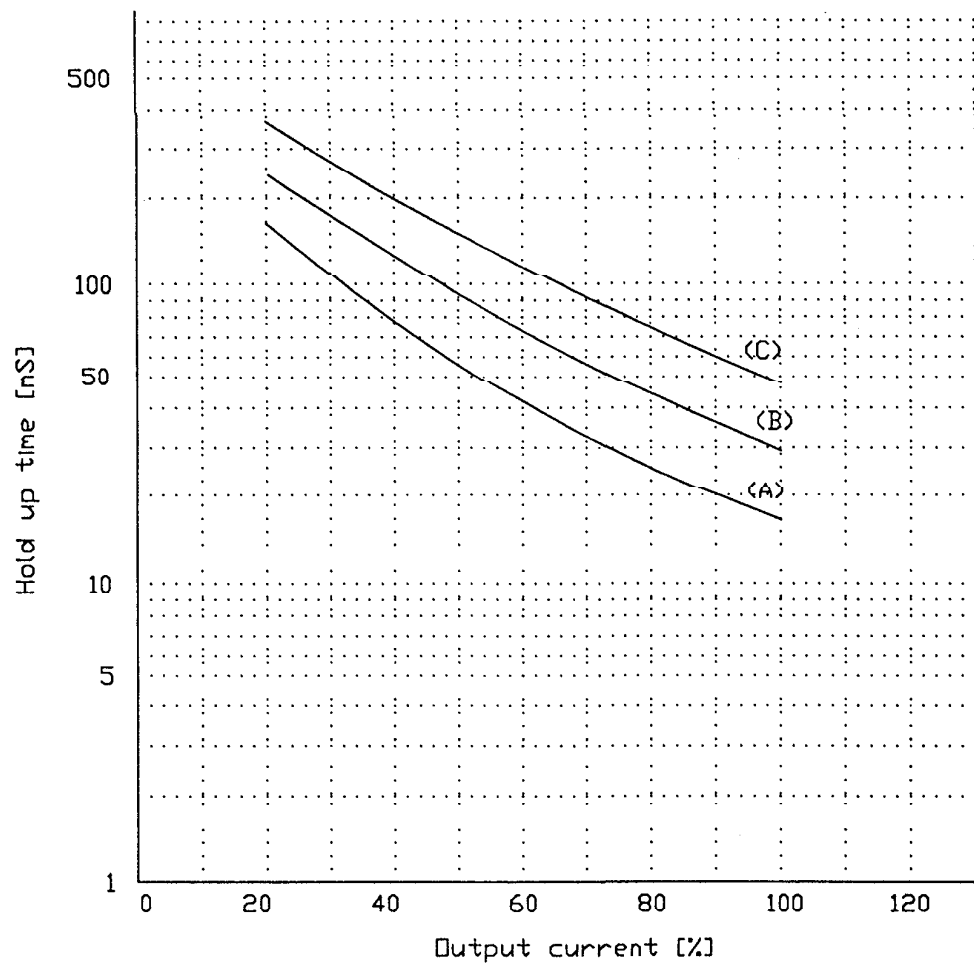


2-7 HOLD UP TIME

NND15-1212

CURVE OF 12V

Conditions
T_a = 25C
V_{in} = 85Vac — (A)
 100Vac — (B)
 115Vac — (C)



HOLD UP TIME

NND15-1212

CURVE OF 12V

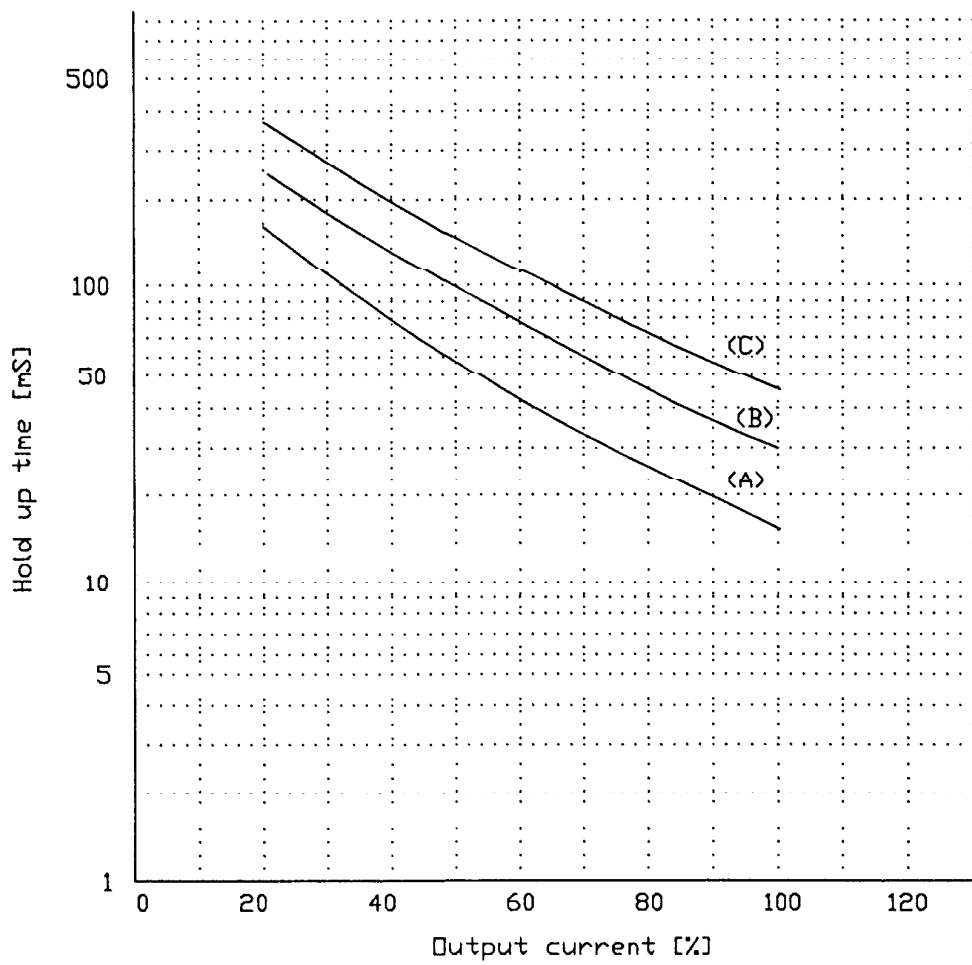
Conditions

$T_a = 25^\circ\text{C}$

$V_{in} = 170\text{Vac}$ — (A)

200Vac — (B)

230Vac — (C)



NND15-1212

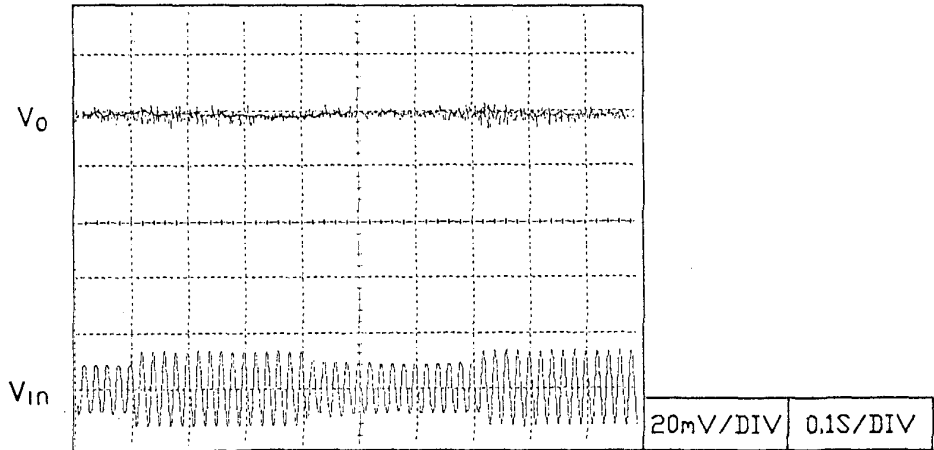
2-8 Dynamic line response

Conditions

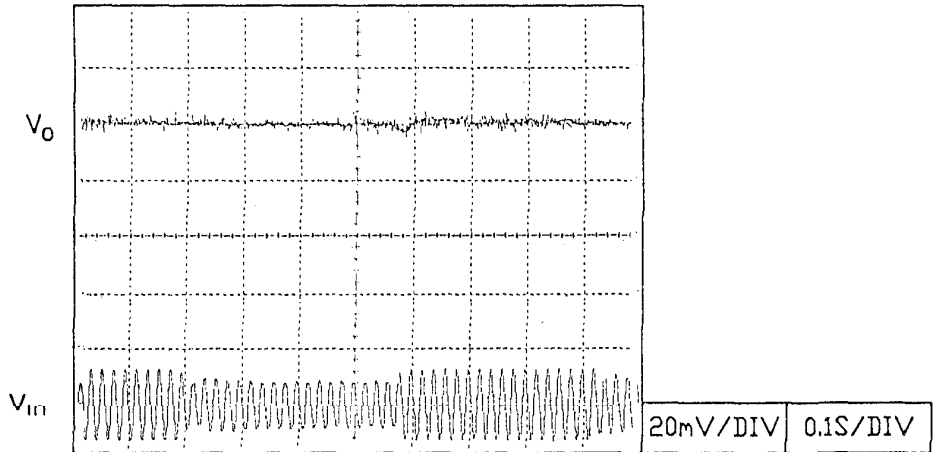
V_{out}=Rated
I_{out}= 100%
T_a= 25C

V_{in}: 85Vac \equiv 115Vac

V1: 12V



V2:-12V



NEMIC-LAMBDA

T-22

NND15-1212

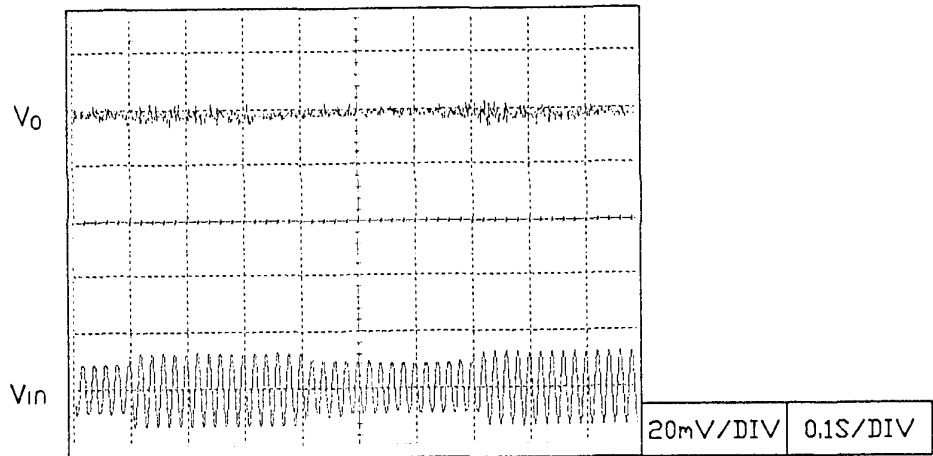
Dynamic line response

V_{in} : 170Vac \rightleftharpoons 230Vac

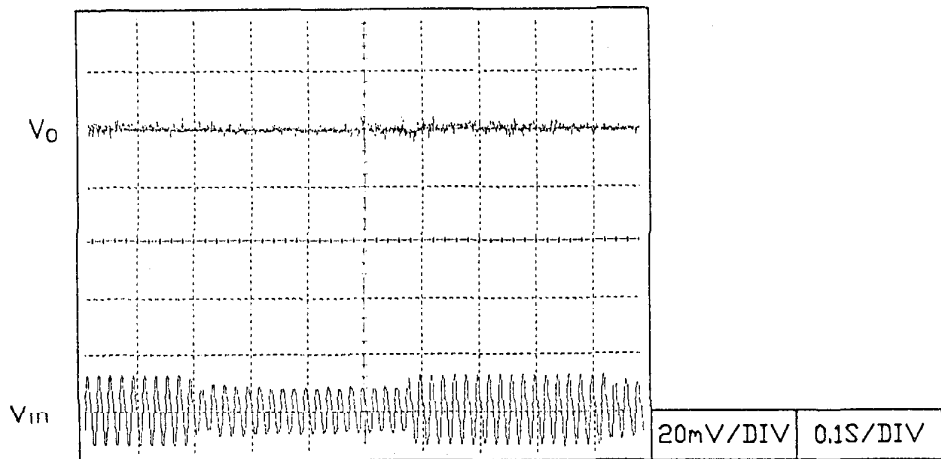
Conditions

V_{out} =Rated
 I_{out} = 100%
 T_a = 25C

V1: 12V



V2: -12V



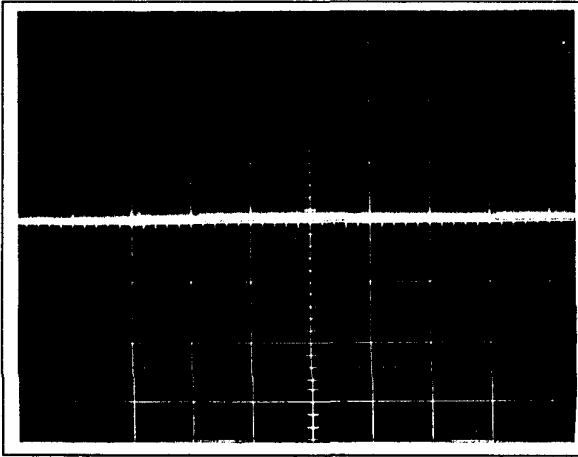
2-9 Dynamic load response

NND15-1212

Conditions
Vout=Rated
Vin=100Vac / 200Vac
Ta= 25C

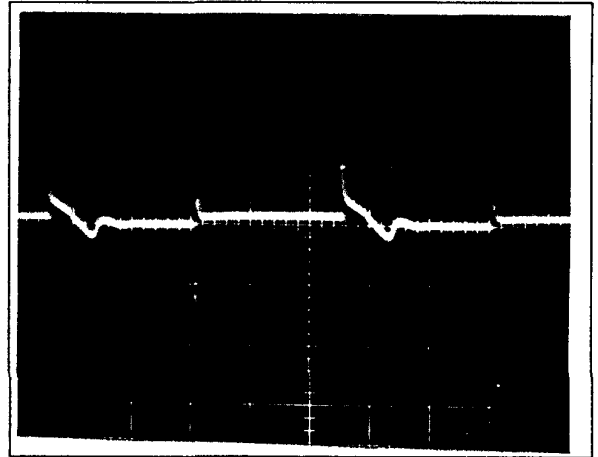
V1: 12V

Iout: 50 \longleftrightarrow 100% f=100Hz



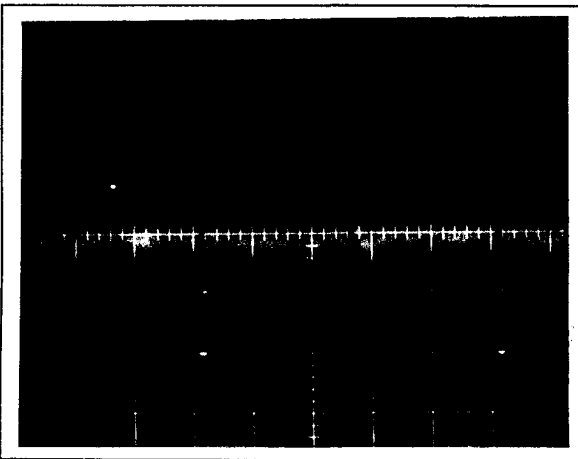
50mV/DIV	2mS/DIV
+0.3%	-0.3%

Iout: 0 \longleftrightarrow 100% f=100Hz



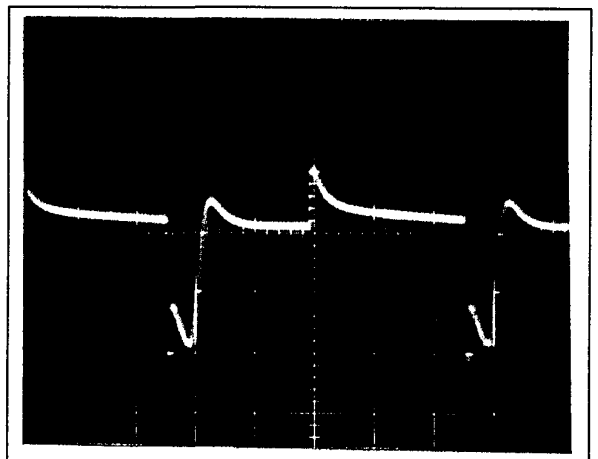
50mV/DIV	2mS/DIV
+0.4%	-0.8%

Iout: 50 \longleftrightarrow 100% f=1KHz



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

Iout: 0 \longleftrightarrow 100% f=1KHz



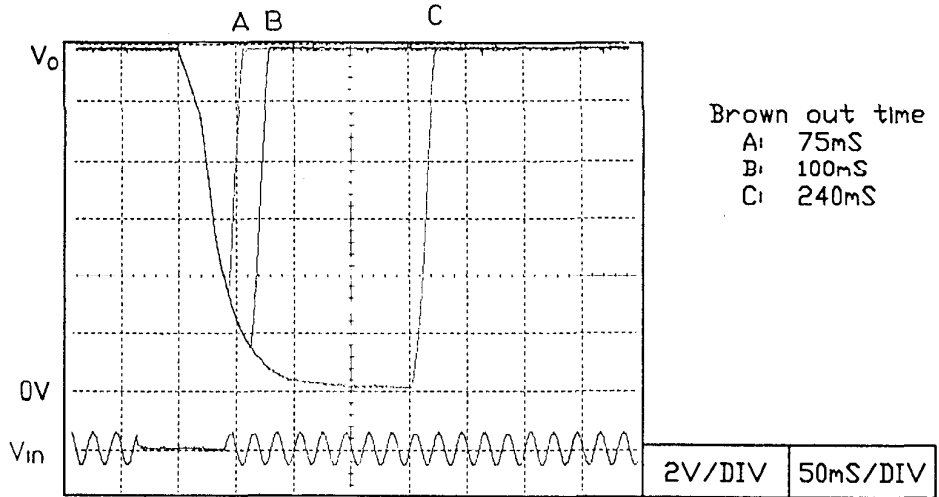
50mV/DIV	0.2mS/DIV
+0.4%	-0.8%

2-10 Response to brown out

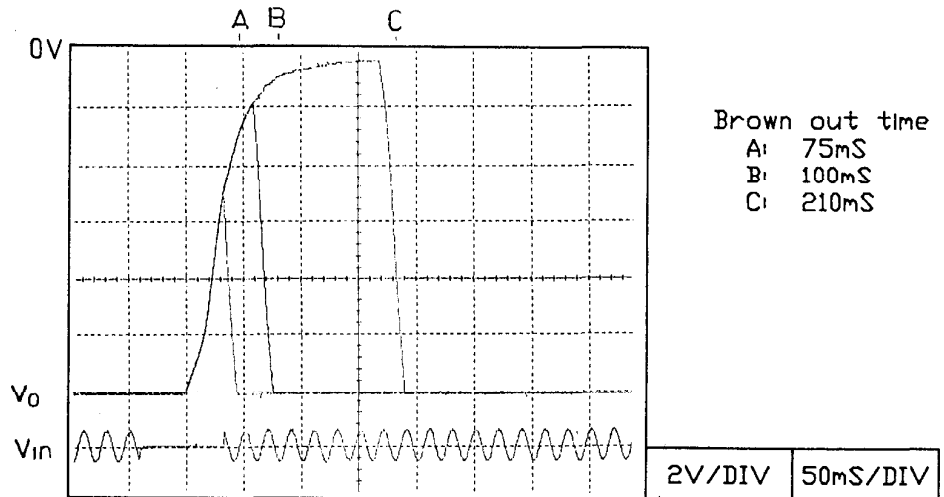
Conditions

V_{in} = 100V_{ac}
I_{out} = 100%
T_a = 25C

V1: 12V



V2: 12V



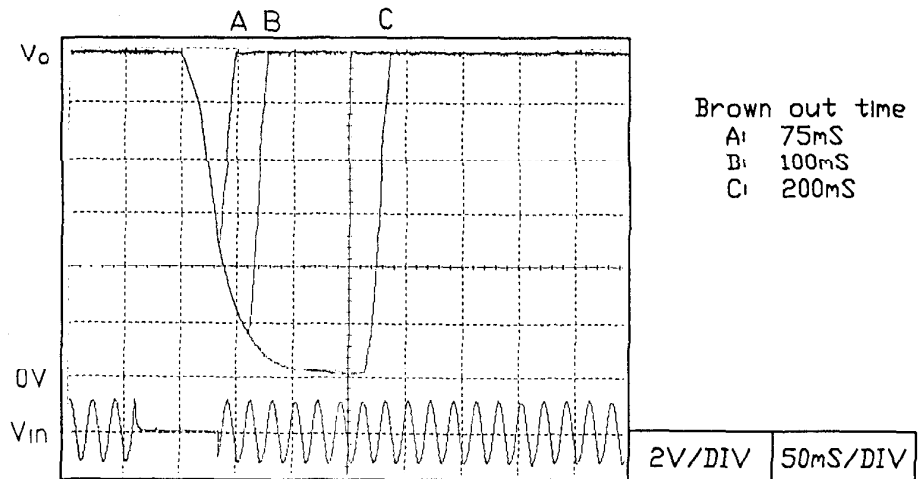
NND15-1212

Response to brown out

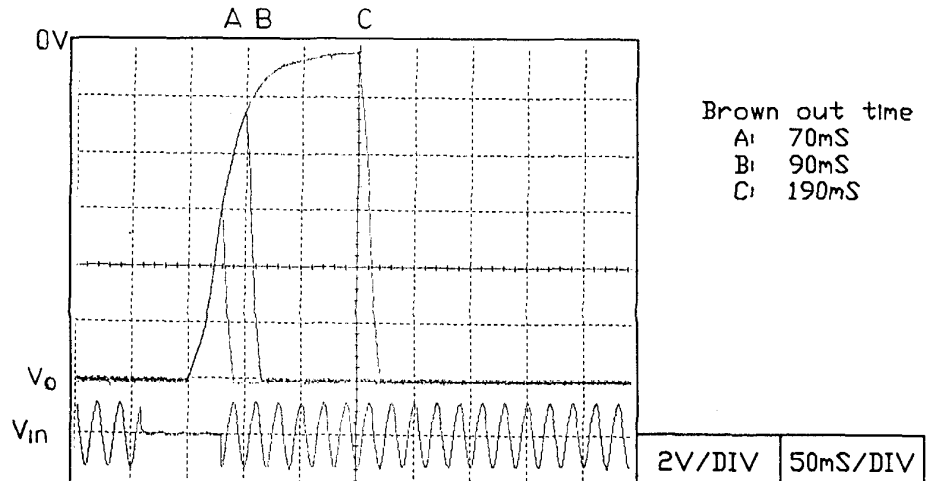
Conditions

$V_{in} = 200V_{ac}$
 $I_{out} = 100\%$
 $T_a = 25C$

V1: 12V



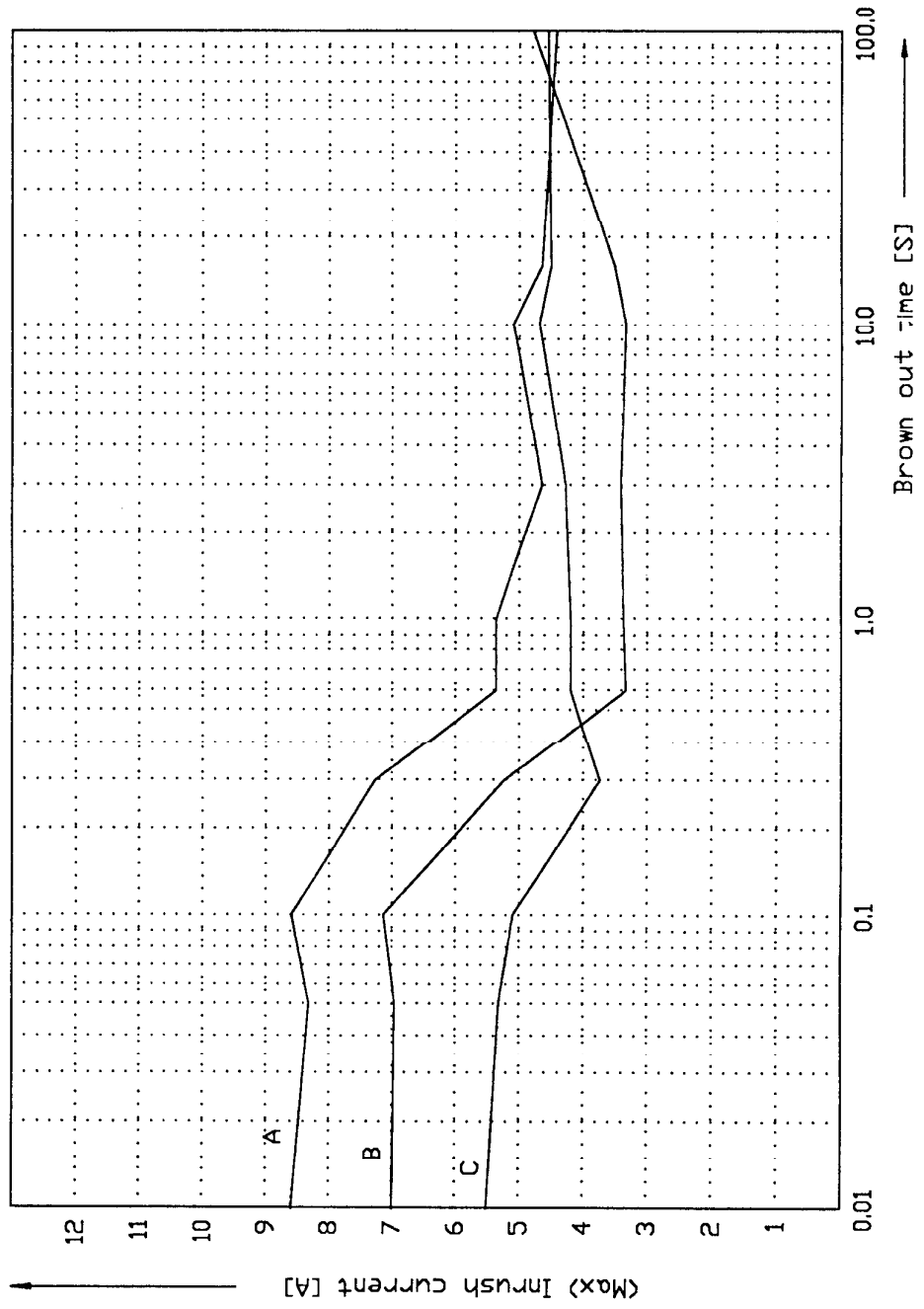
V2: 12V



NND15-1212

2-11 Inrush current characteristics

$V_{in} = 100V_{ac}$
 $I_{out} = 0\% - A$
 50% - B
 100% - C
 $T_a = 25C$



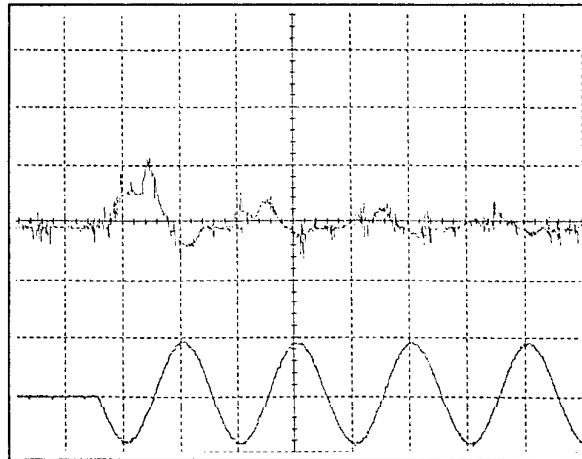
NEMIC-LAMBDA

T-27

Inrush current waveform

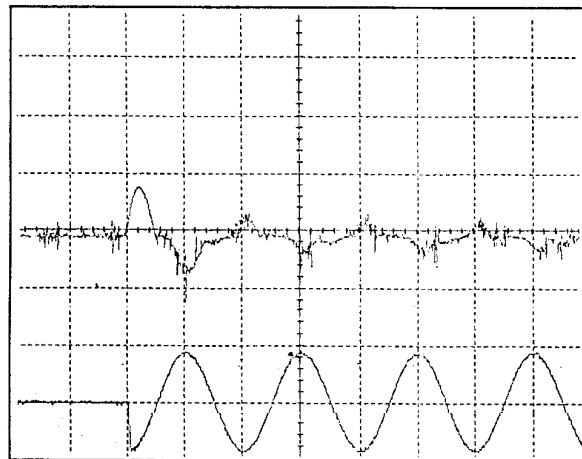
Conditions

V_{in}= 100Vac
I_{out}= 100%
T_a= 25C



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

5A/DIV 10mS/DIV



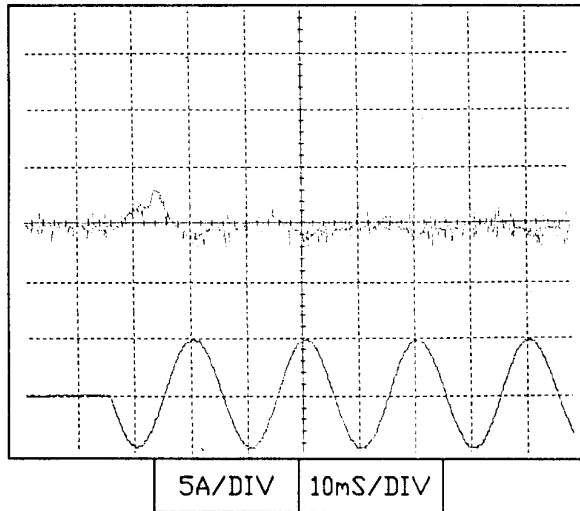
Switch on phase angle
of input AC voltage
 $\phi=90^\circ$

5A/DIV 10mS/DIV

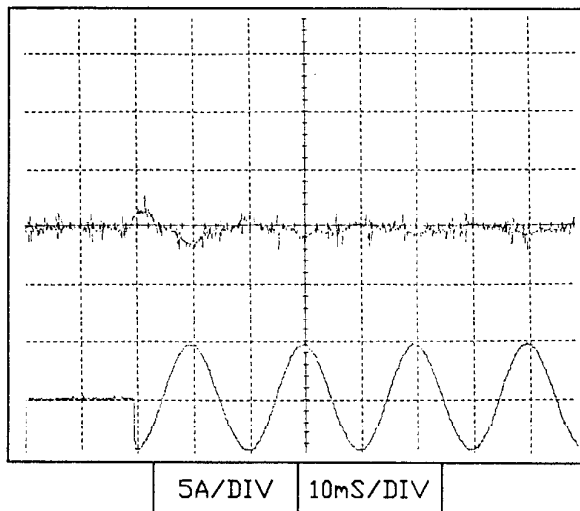
NND15-1212

Inrush current waveform

Conditions
Vin= 200Vac
Iout= 100%
Ta= 25C



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



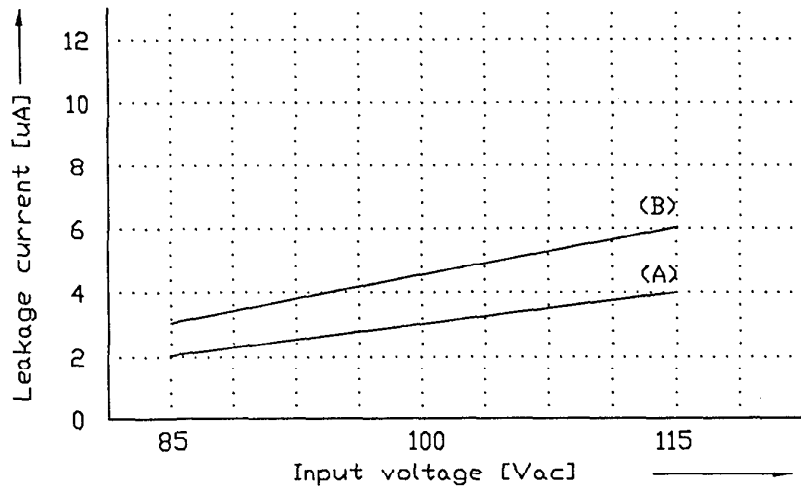
Switch on phase angle
of input AC voltage
 $\phi=90^\circ$

NND15-1212

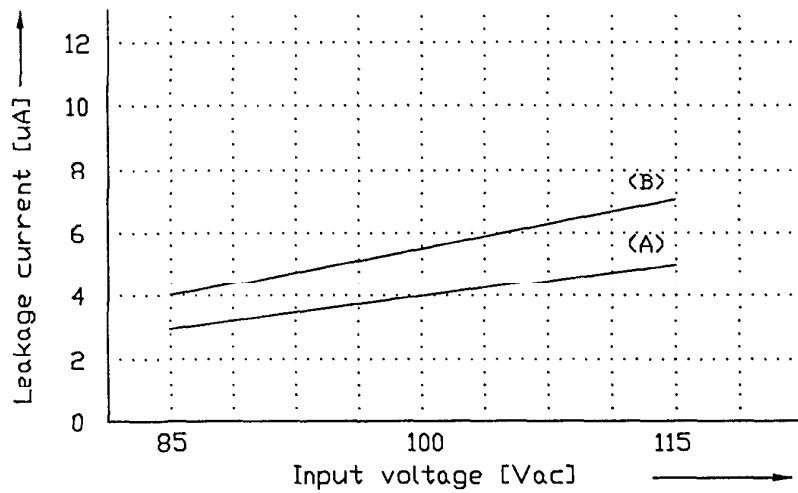
2-12 Leakage current

Conditions $V_{in} = 85-115V_{ac}$ — (A)
 $V_{in} = 170-230V_{ac}$ — (B)
 $T_a = 25C$

$I_{out}=0\%$



$I_{out}=100\%$



NND15-1212

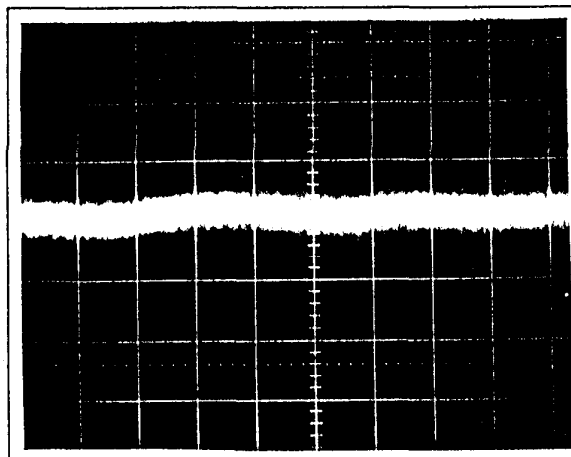
2-13 OUTPUT-RIPPLE, NOISE

Conditions

V_{in}= 100V_{ac}
I_{out}= 100%
T_a= 25C

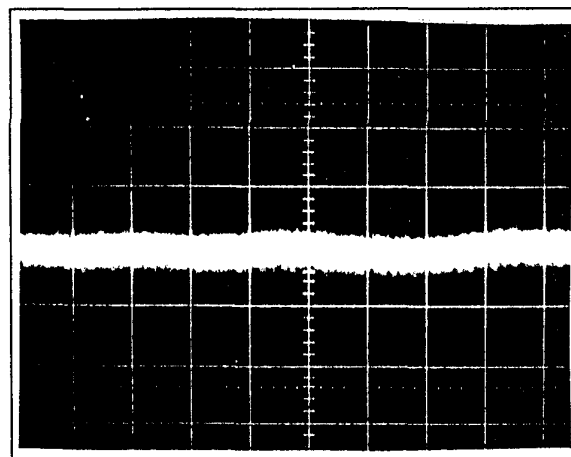
COMMON+NORMAL MODE

V1: 12V



1mV/DIV 2mS/DIV

V2: 12V



1mV/DIV 2mS/DIV

NEMIC-LAMBDA

T-31

OUTPUT-RIPPLE, NOISE

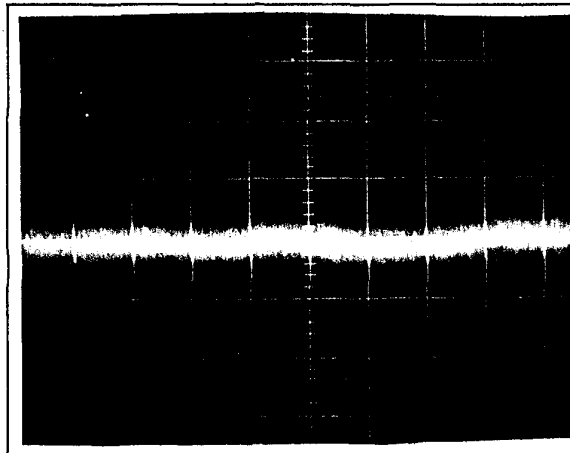
NND15-1212

Conditions

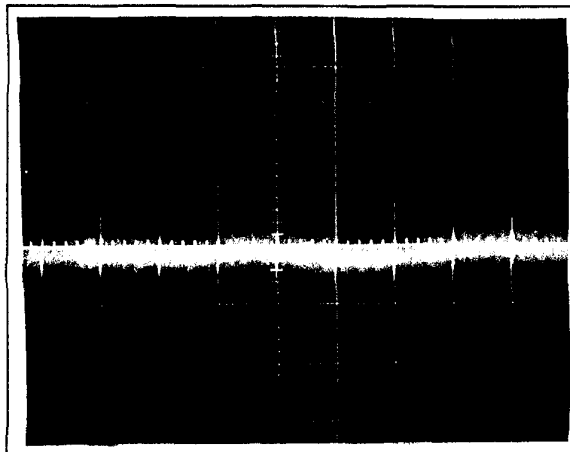
V_{in} = 100V_{ac}
I_{out} = 100%
T_a = 25C

NORMAL MODE

V1-12V



V2-12V



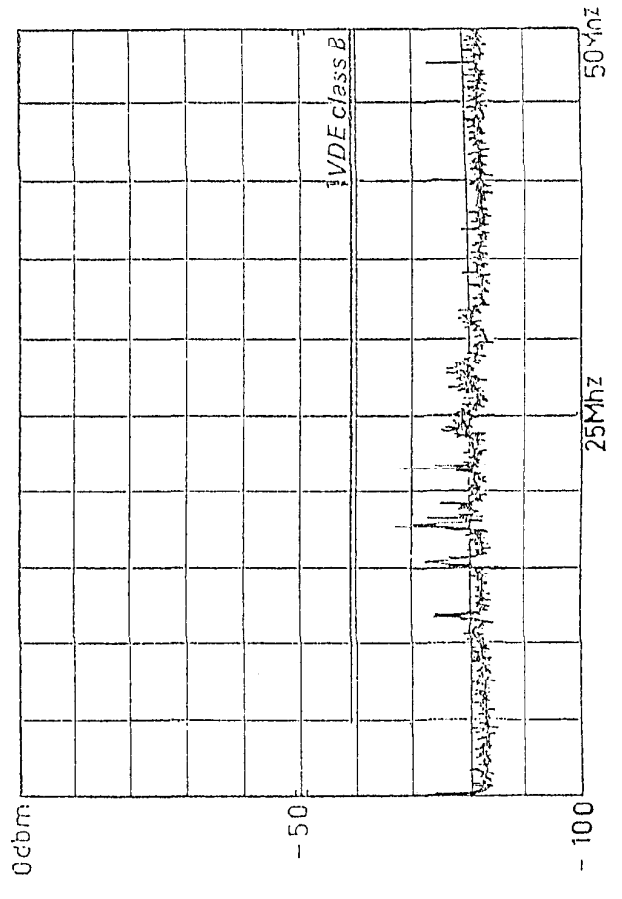
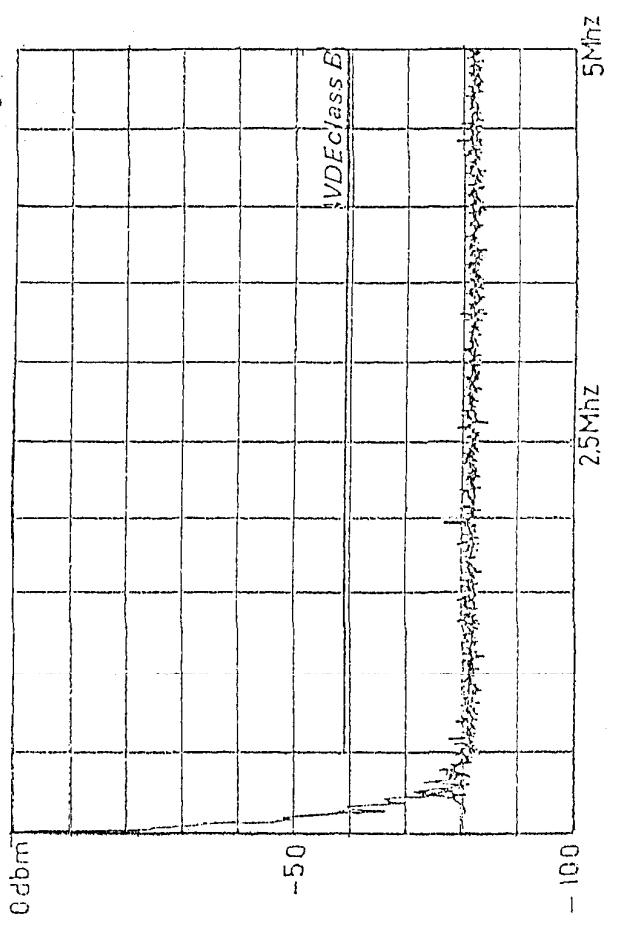
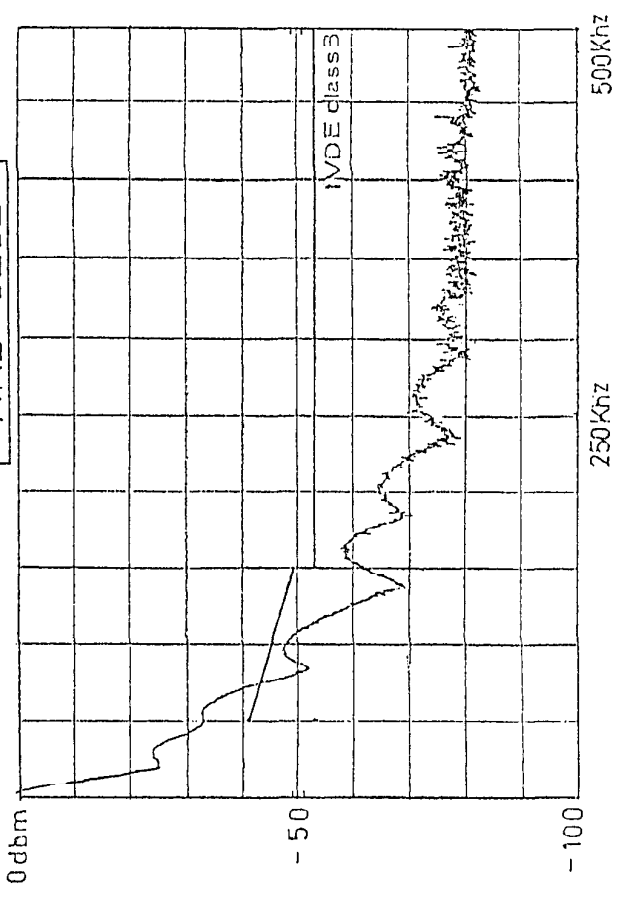
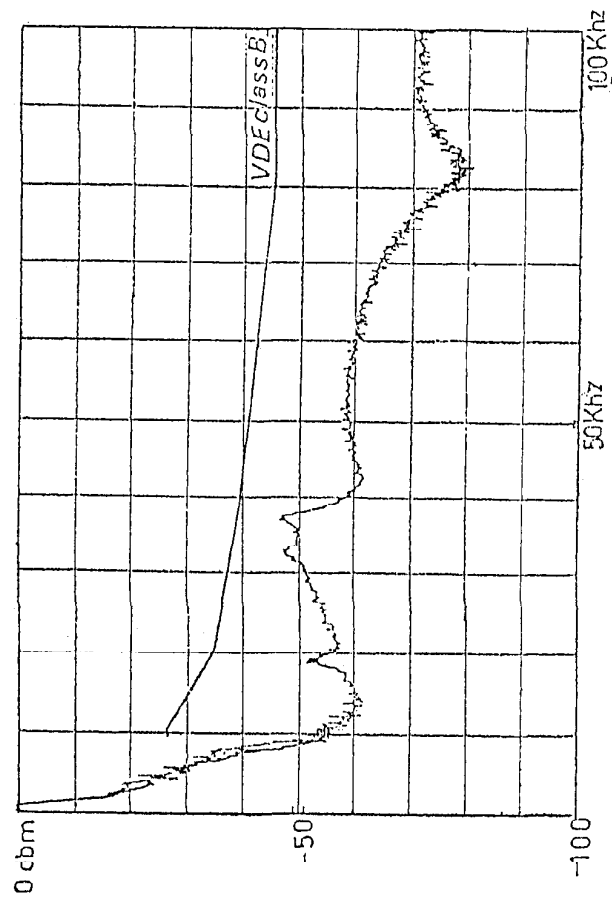
NEMIC-LAMBDA

T-32

CONDUCTED EMISSION

MODEL: NND-1212

NND-1212



3. LIST OF EQUIPMENT USED

	EQUIPMENT USED	MANUFACTURER	MODEL No.
1	Oscilloscope	KENWOOD	CS-2110
2	Digital storage Oscilloscope	GOULD	OS4040
3	Digital Voltmeter	FLUKE	8840A
4	Digital Watt / Current Volt meter	YOKOGAWA	Y2509
5	DC Ampere meter	FLUKE	25
6	Autotransformer	SUPERIOR ELECTRIC	
7	Variable resistive Load	BUILT IN - HOUSE	
8	Dynamic dummy Load	IIP	6050A
9	Digirush Currenter	BUILT IN - HOUSE	
10	Current probe / Amplifier	TEKTRONIX	011-0105
11	Controlled Temp. Chamber	TABAI	PL-2GM
12	Leakage Current meter	FLUKE	8840A
13	Equipment for dynamic line response	BUILT IN - HOUSE	