NNS30

TEST DATA

DWG. No. IA501-53-01			
Q.A. NLJ	Q.A. NLI	ENG.	APP.
J. Murayama '93.9.27	JUNE-N-92 T. MAKOTO	JUNE-8-92 Daron Pelli	S. Shimshan JUN-14-92

T. Kasa
'93.9.25

NEMIC-LAMBDA

INDEX

Terminology used:

Definition:

Vin .....Input Voltage

Vout .....Output Voltage

Iin .....Input Current

Iout .....Output Current

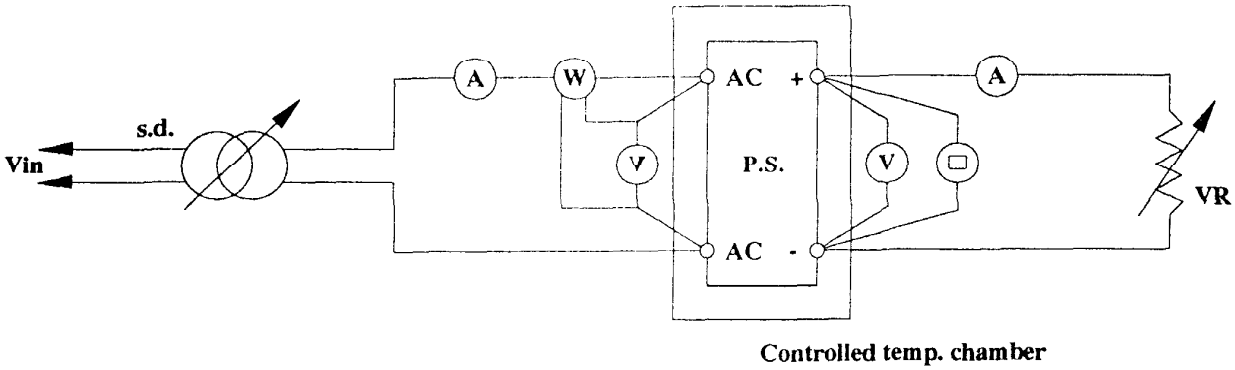
Ta .....Ambient Temperature

1.EVALUATION METHOD

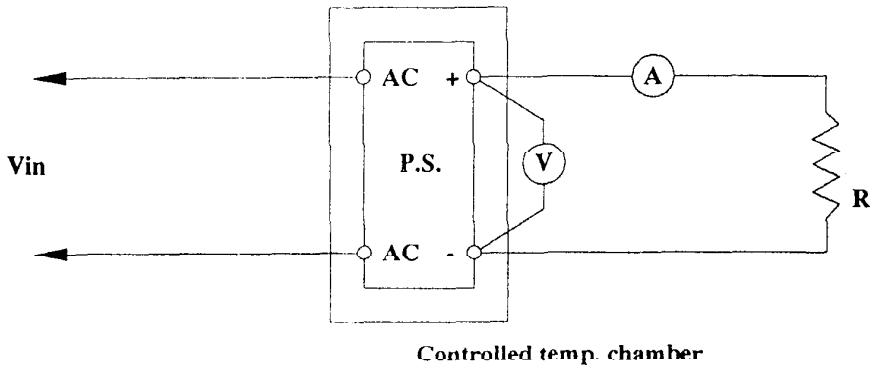
NNS30

1-1 Circuits used for determination

(1) Steady state data



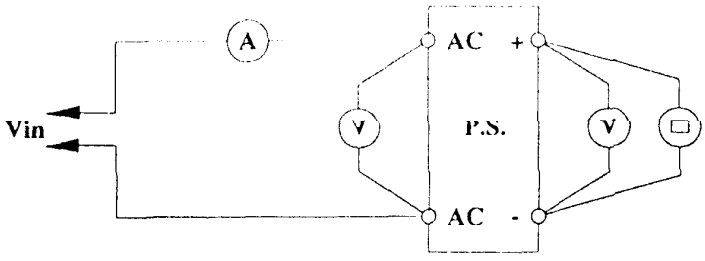
(2) Warm up voltage drift characteristics



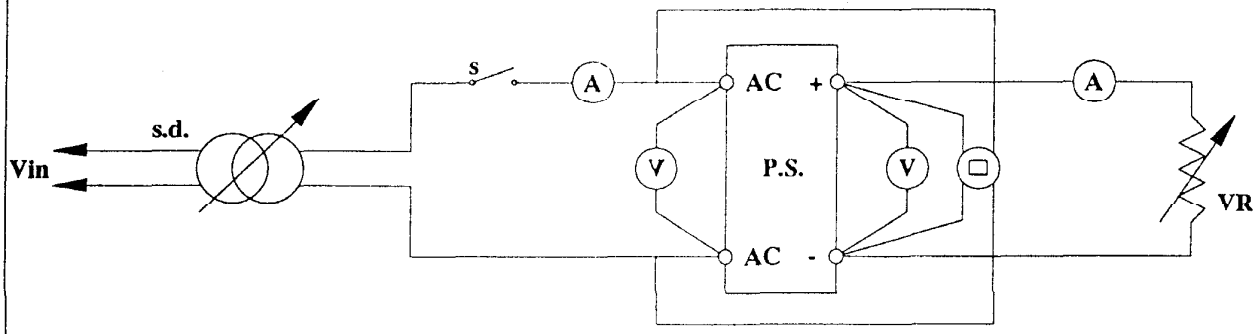
(3) Over current protection (OCP) characteristics

Same as steady state data.

(4) Over voltage protection (OVP) characteristics



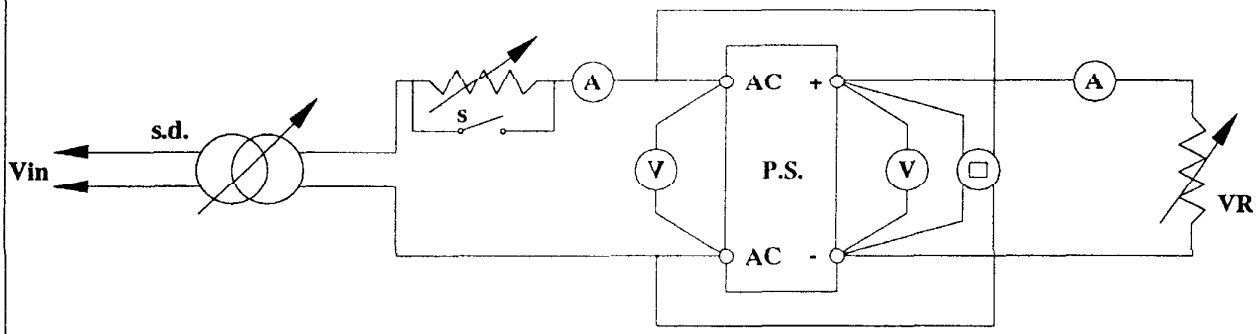
(5) Output rise characteristics



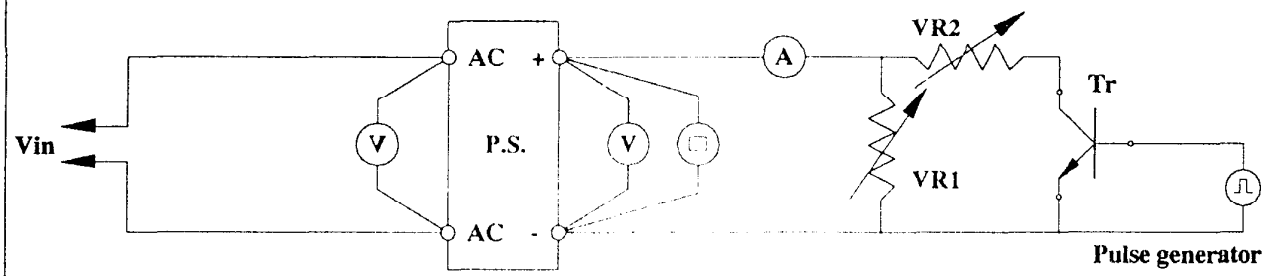
(6) Ouput fall characteristics

Same as Ouput rise characteristics

(7) Dynamic line response characteristics



(8) Dynamic load response characteristics



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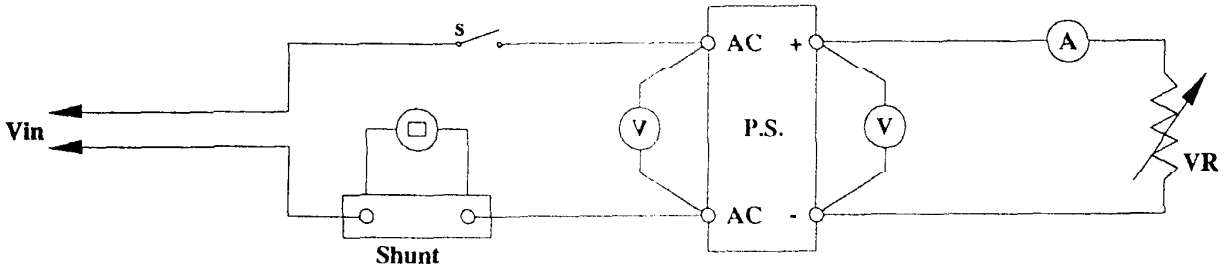
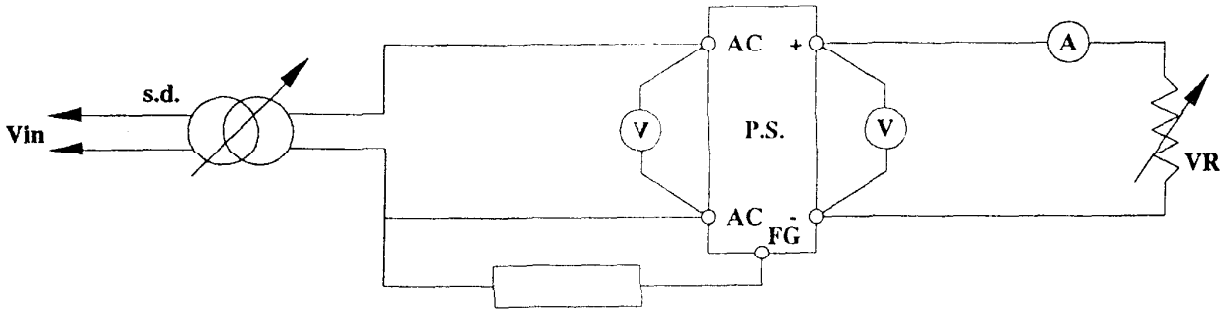
(9) Inrush current characteristics



(10) Leakage current characteristics

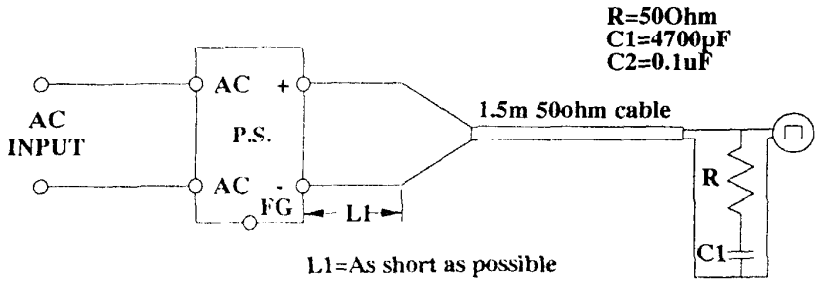


Leakage current meter

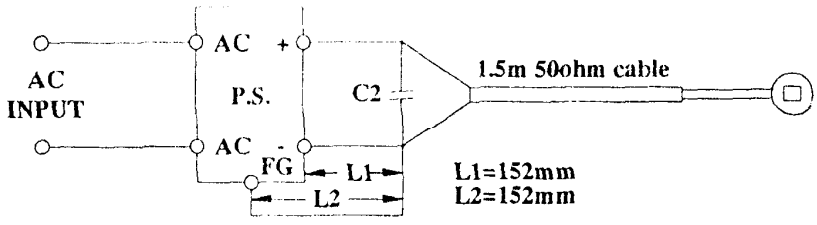
Note: Leakage current measured through a 1Kohm resistor. Range wed: AC

(11) Output-ripple, noise

a) Normal mode



b) Normal + common mode



2. CHARACTERISTICS

2-1 STEADY STATE DATA

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

5V

1. Regulation-line and load Condition Ta=25C

SELECTOR 100V

Iout \ Vin	AC 85V	AC 100V	AC 115V	Line Regulation	
0%	5.0151V	5.0152V	5.0152V	0.1mV	0.002%
50%	5.0151V	5.0152V	5.0152V	0.1mV	0.002%
100%	5.0151V	5.0152V	5.0152V	0.1mV	0.002%
Load	0mV	0mV	0mV		
Regulation	0%	0%	0%		

SELECTOR 200V

Iout \ Vin	AC 170V	AC 200V	AC 230V	Line Regulation	
0%	5.0150V	5.0150V	5.0151V	0.1mV	0.002%
50%	5.0150V	5.0151V	5.0151V	0.1mV	0.002%
100%	5.0150V	5.0151V	5.0151V	0.1mV	0.002%
Load	0mV	0.1mV	0mV		
Regulation	0%	0.002%	0%		

2. Temperature Drift Conditions Vin=AC100V Iout=100%

Ta	0C	25C	50C	Temp. Stability	
Vout	5.0004V	4.9994V	4.9953V	5.1mV	0.102 %

REGULATION - Line and load, Temp. drift

12V

1. Regulation-line and load Condition Ta=25C

SELECTOR 100V

Iout \ Vin	AC 85V	AC 100V	AC 115V	Line Regulation	
0%	12.0123V	12.0123V	12.0124V	0.1mV	0.001 %
50%	12.0123V	12.0124V	12.0124V	0.1mV	0.001 %
100%	12.0123V	12.0123V	12.0124V	0.1mV	0.001 %
Load Regulation	0mV	0.1mV	0mV		
	0%	0.001 %	0%		

SELECTOR 200V

Iout \ Vin	AC 170V	AC 200V	AC 230V	Line Regulation	
0%	12.0124V	12.0125V	12.0125V	0.1mV	0.001 %
50%	12.0124V	12.0124V	12.0125V	0.1mV	0.001 %
100%	12.0124V	12.0124V	12.0125V	0.1mV	0.001 %
Load Regulation	0mV	0.1mV	0mV		
	0%	0.001 %	0%		

2. Temperature Drift Conditions Vin=AC100V
Iout=100%

Ta	0C	25C	50C	Temp. Stability	
Vout	11.9996V	12.0027V	11.9850V	17.7mV	0.148 %

REGULATION - Line and load, Temp. drift

24V

1. Regulation-line and load Condition Ta=25C

SELECTOR 100V

Iout \ Vin	AC 85V	AC 100V	AC 115V	Line Regulation	
0%	24.006V	24.007V	24.007V	1mV	0.004 %
50%	24.006V	24.007V	24.007V	1mV	0.004 %
100%	24.006V	24.007V	24.007V	1mV	0.004 %
Load Regulation	0mV	0mV	0mV		
	0%	0%	0%		

SELECTOR 200V

Iout \ Vin	AC 170V	AC 200V	AC 230V	Line Regulation	
0%	24.007V	24.008V	24.008V	1mV	0.004 %
50%	24.007V	24.008V	24.008V	1mV	0.004 %
100%	24.008V	24.008V	24.008V	0mV	0%
Load Regulation	1mV	0mV	0mV		
	0.004 %	0%	0%		

2. Temperature Drift Conditions Vin=AC100V Iout=100%

Ta	0C	25C	50C	Temp. Stability	
Vout	24.004V	24.012V	23.998V	14mv	0.058%

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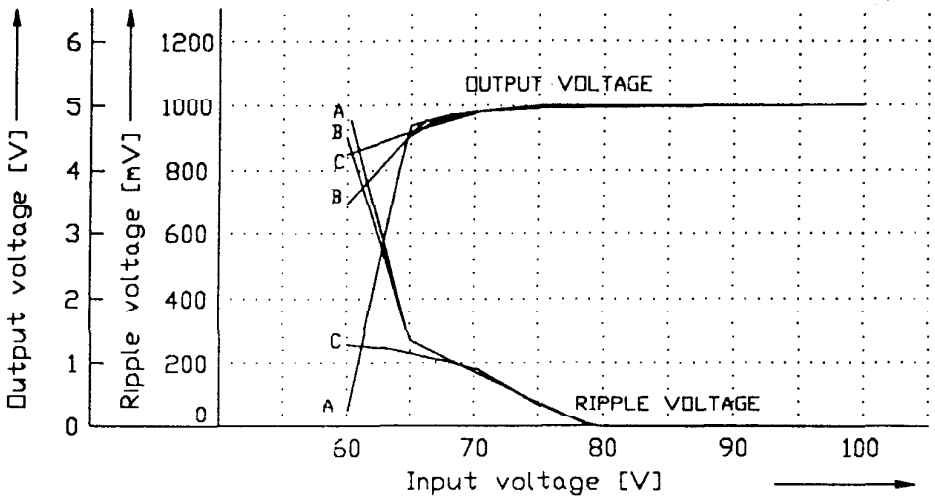
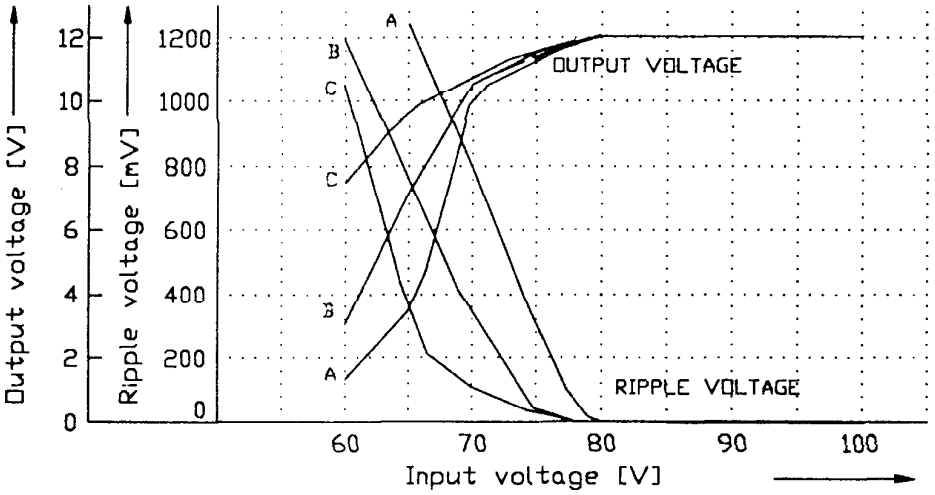
(2) Output voltage and ripple voltage V.S. Input voltage

Iout=100%
Conditions Ta: 0C - A 100VAC
25C - B
50C - C

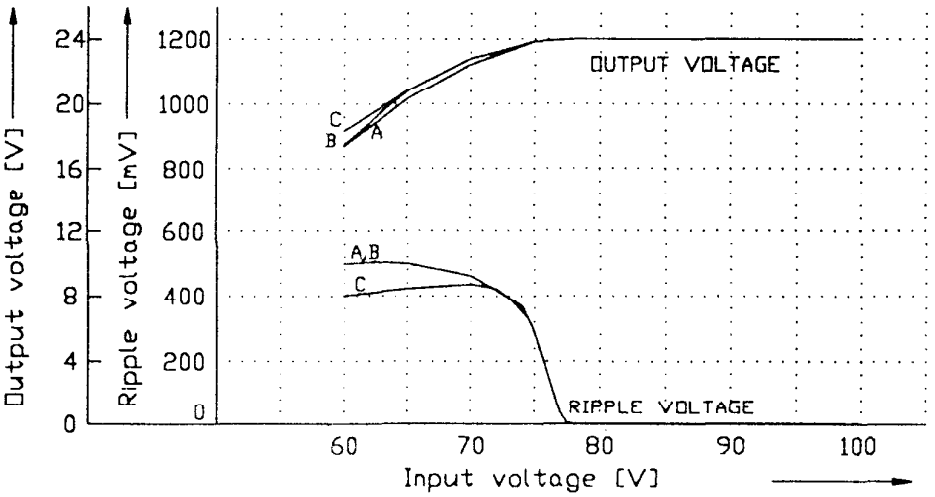
5V



12V



24V



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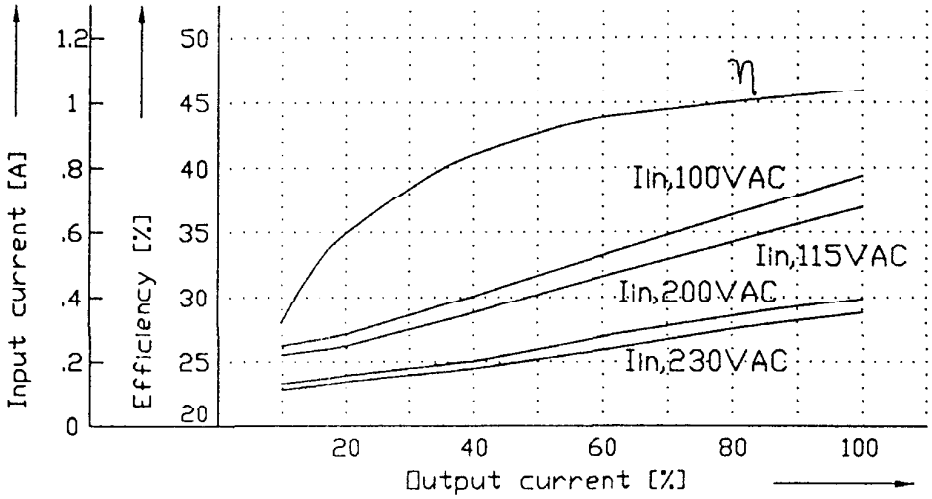
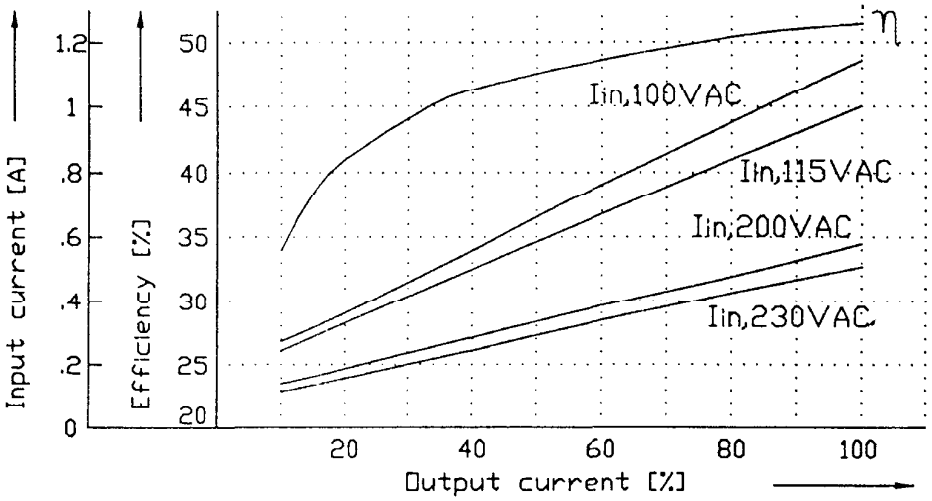
(3) Efficiency and input current
V.S. output current

Conditions Ta=25C

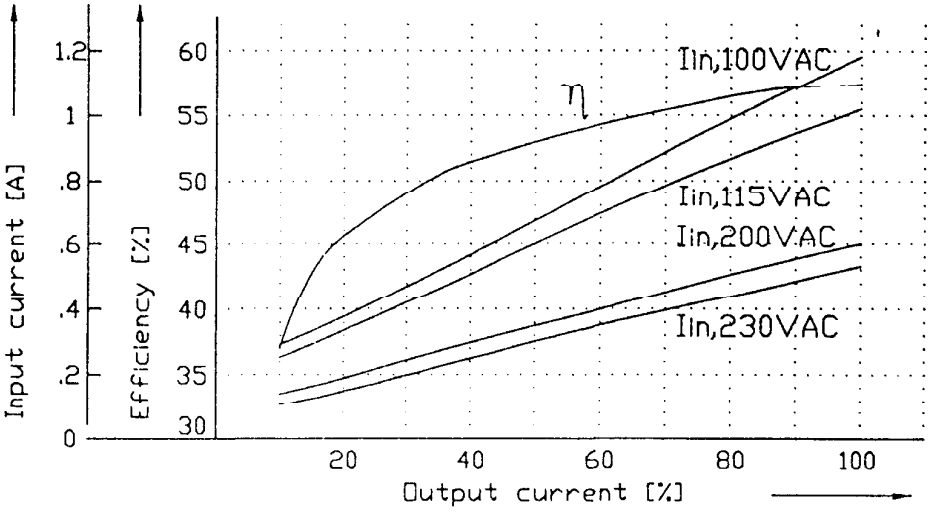
5V



12V



24V



2-2 Warm up voltage drift

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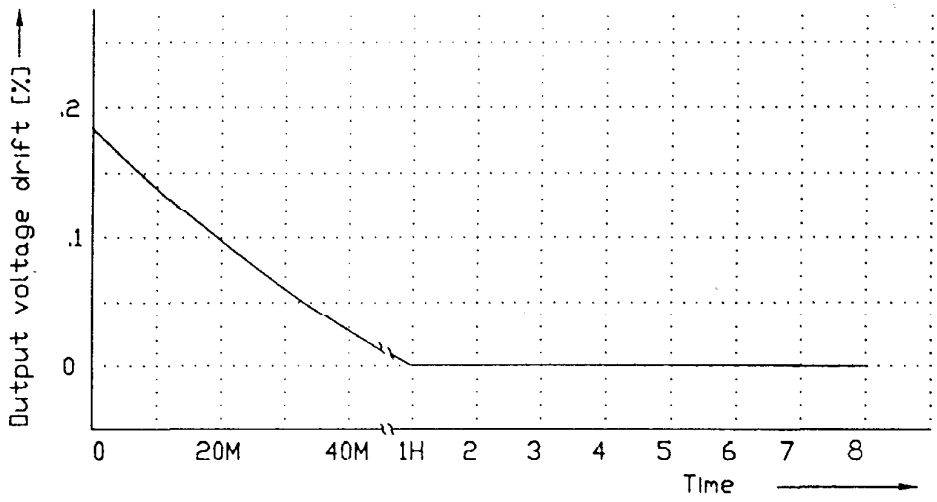
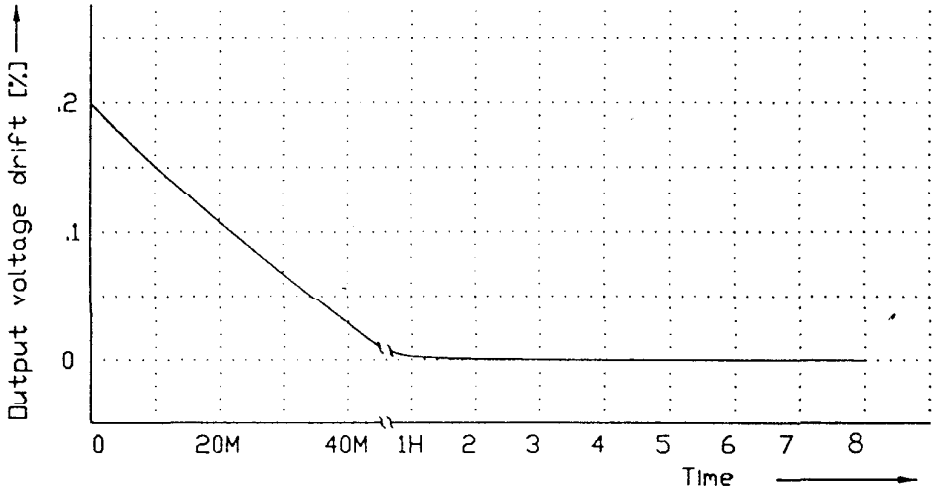
Conditions Vin=AC100V
Vout,Iout=100%
Ta=25C

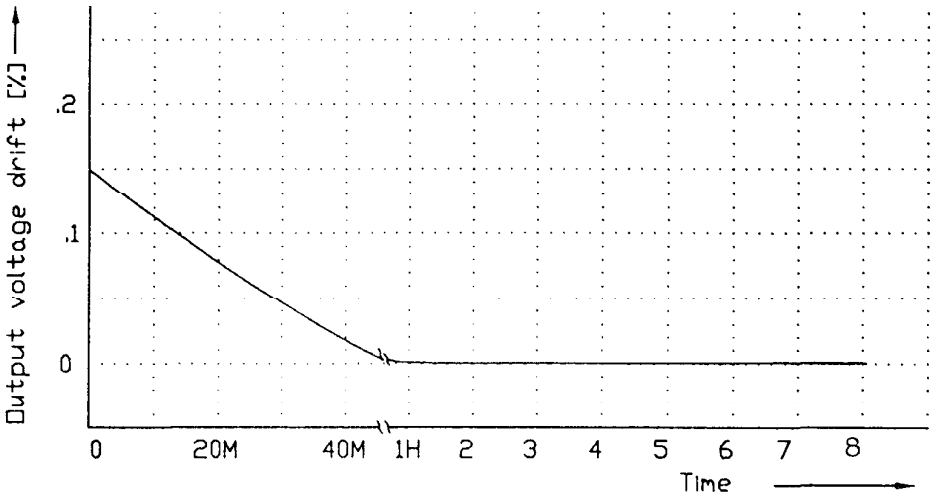
5V



12V



24V



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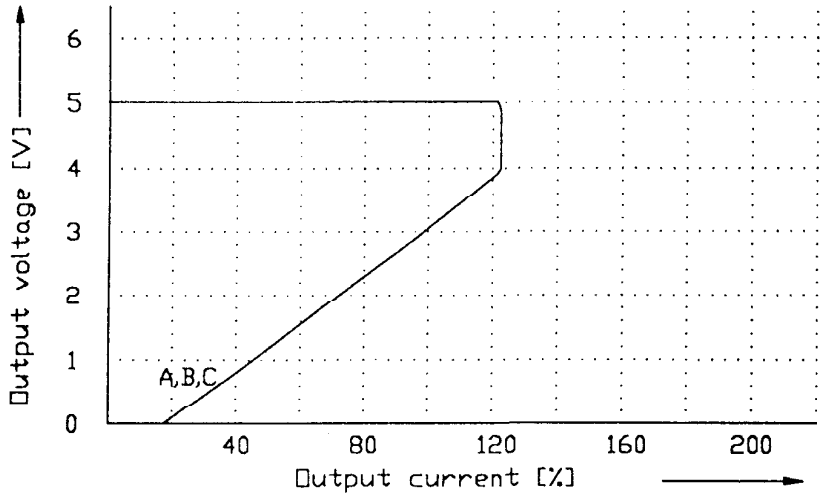
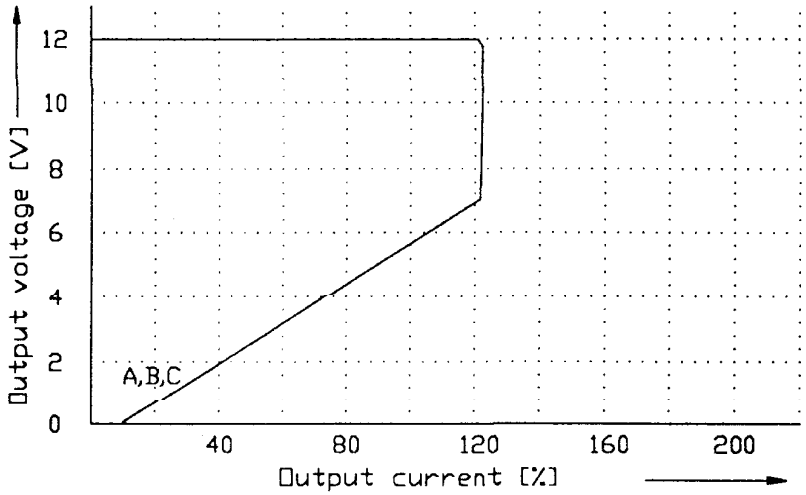
OCP Characteristics

Conditions Ta=25C
Vin: AC 85V - A
AC 100V - B
AC 115V - C

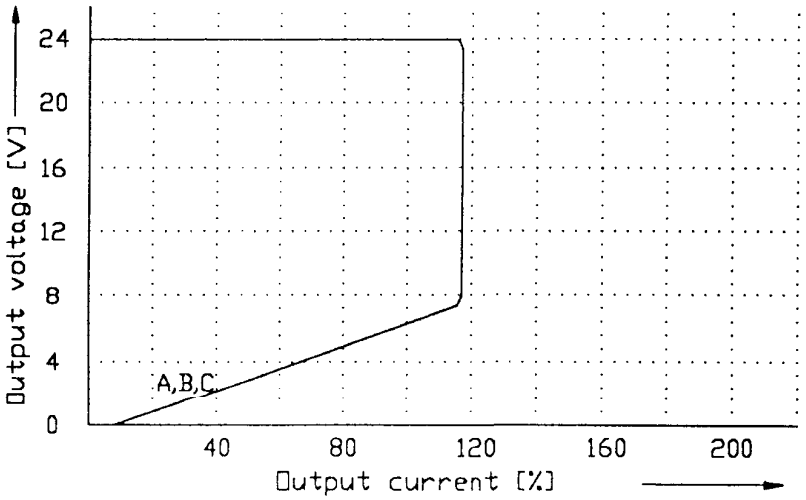
5V



12V



24V

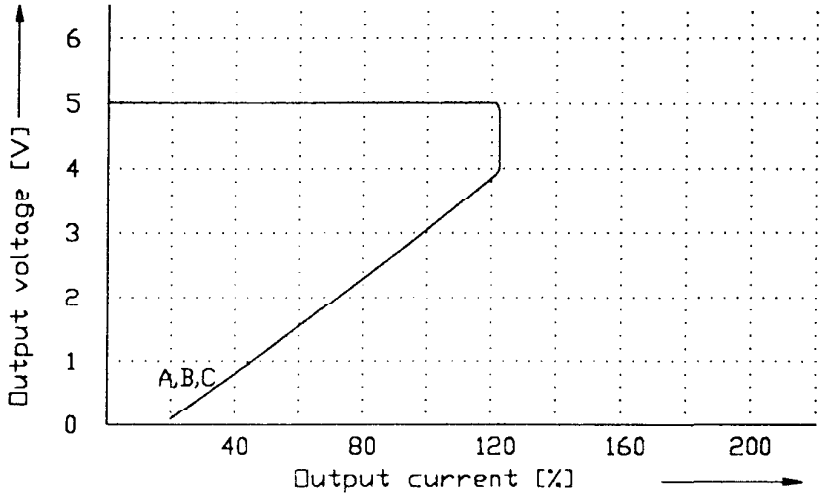


NNS30

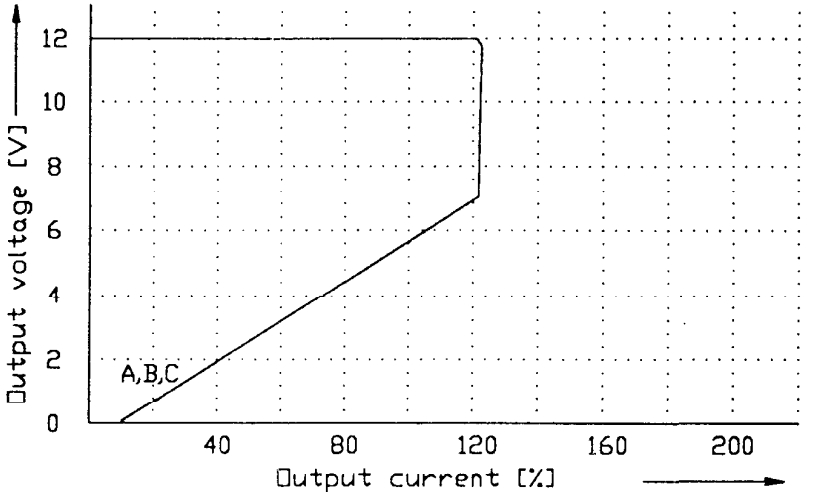
OCP Characteristics

Conditions Vin= AC 100V
Ta= 0C—A
25C—B
50C—C

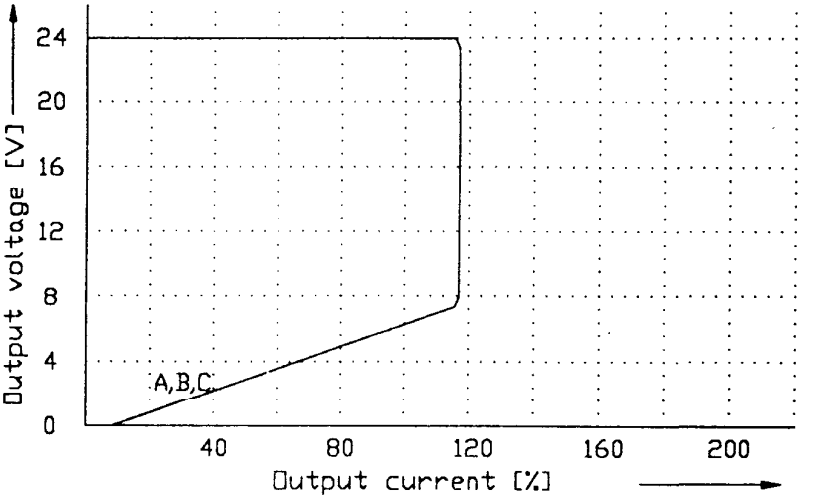
5V



12V



24V

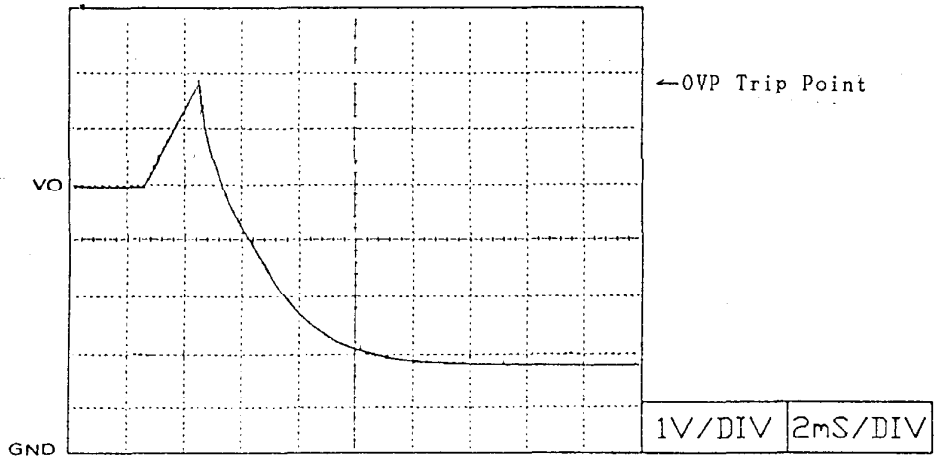


2-4 OVP Characteristics

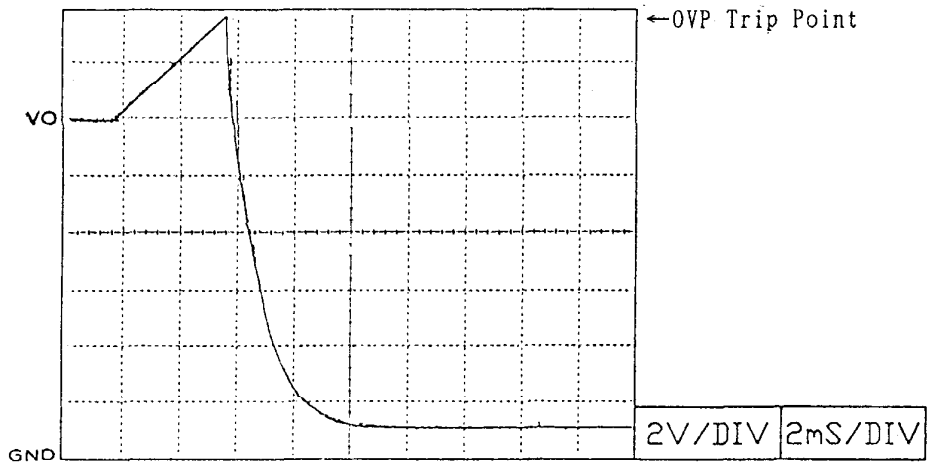
NNS30

Conditions Vin= AC 100V
Iout= 0%
Ta= 25C

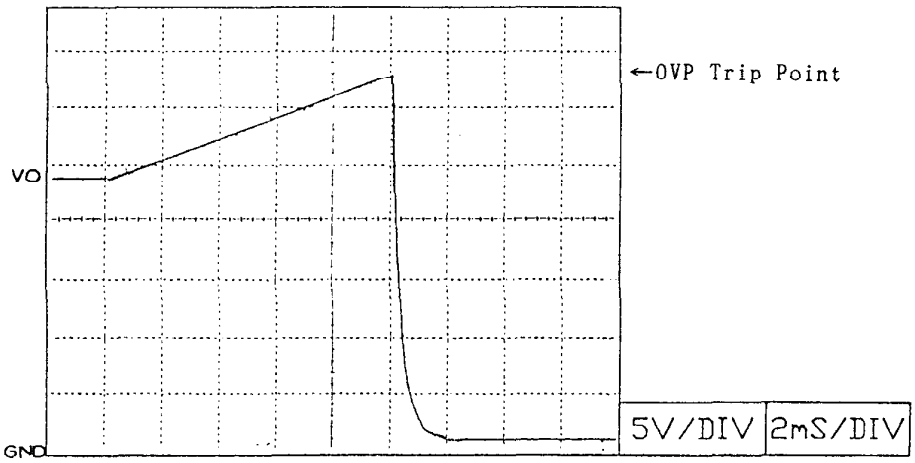
5V



12V



24V



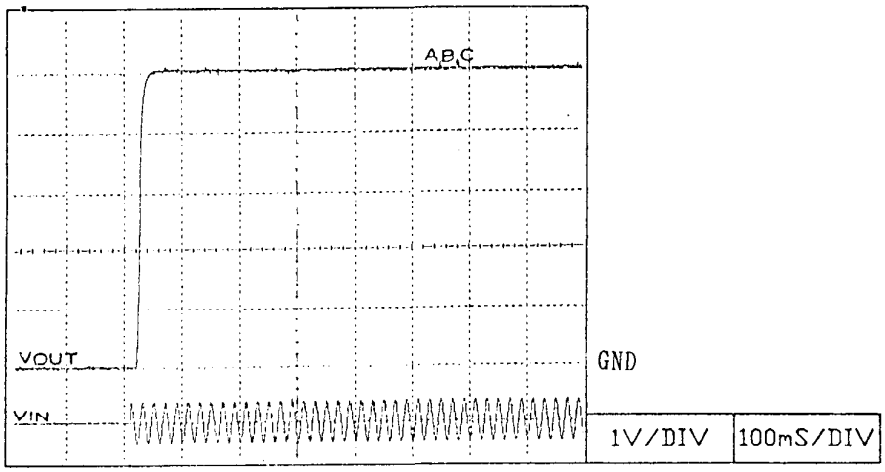
2-5 Output rise time

NNS30

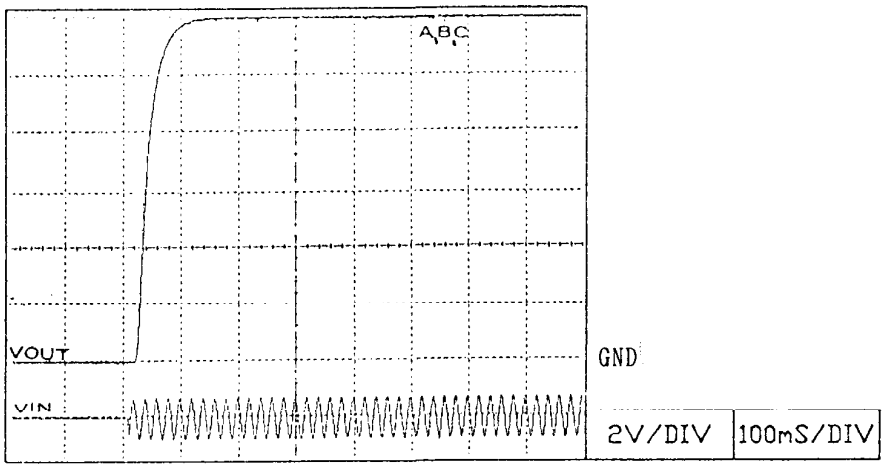
Conditions Vin= 85Vac (A)
100Vac (B)
115Vac (C)

Iout= 100%
Ta= 25C

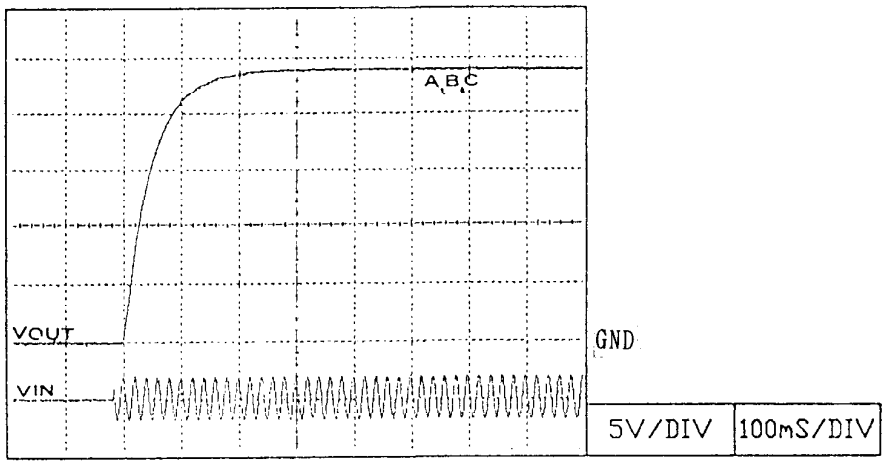
5V



12V



24V



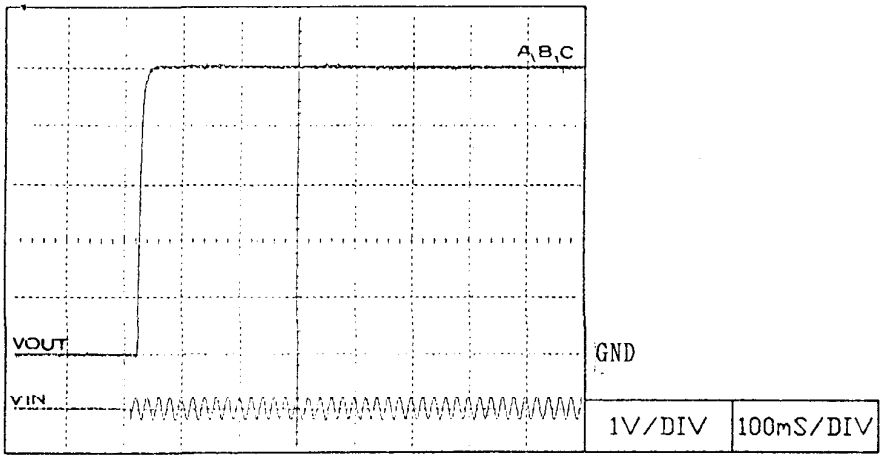
NNS30

Output rise time

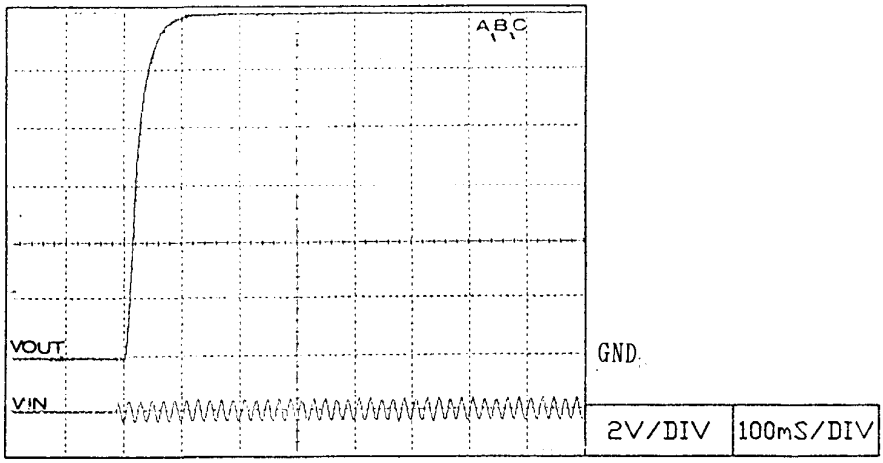
Conditions Vin= 85Vac (A)
100Vac (B)
115Vac (C)

Iout= 0%
Ta= 25C

5V



12V



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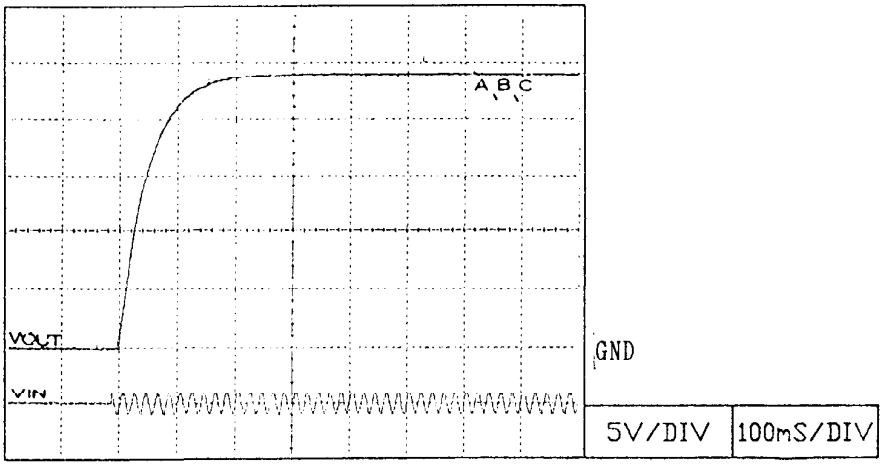


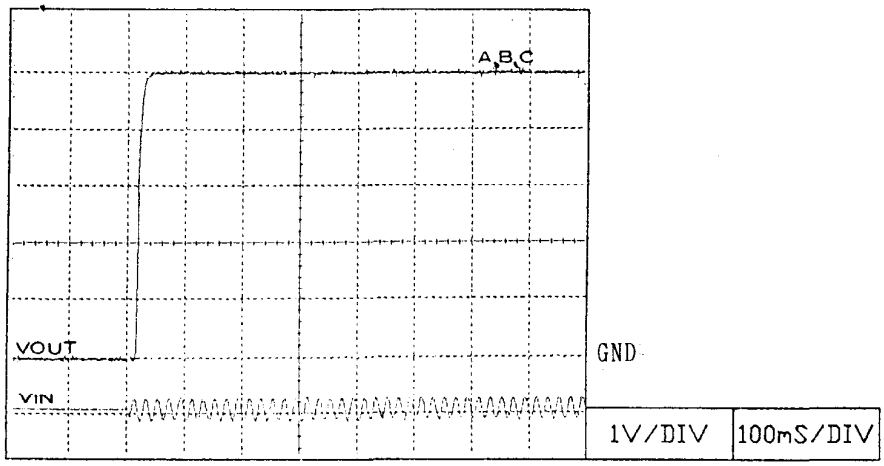
Output rise time

NNS30

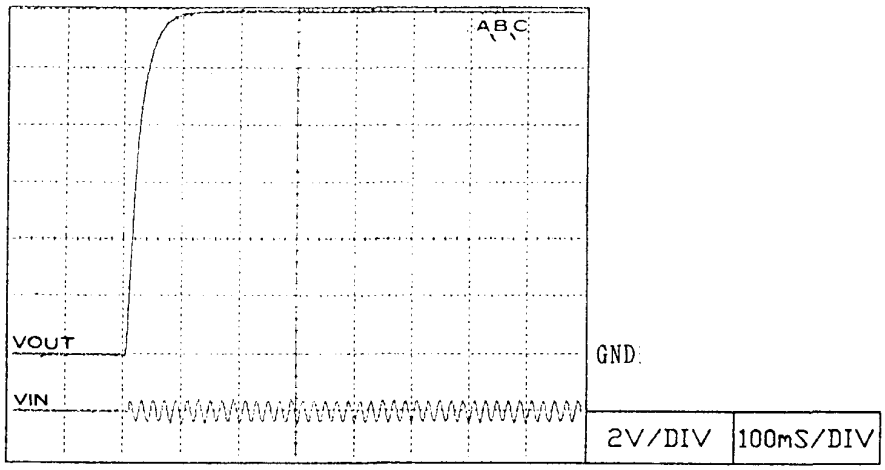
Conditions Vin= 170Vac (A)
200Vac (B)
230Vac (C)

Iout= 100%
Ta= 25C

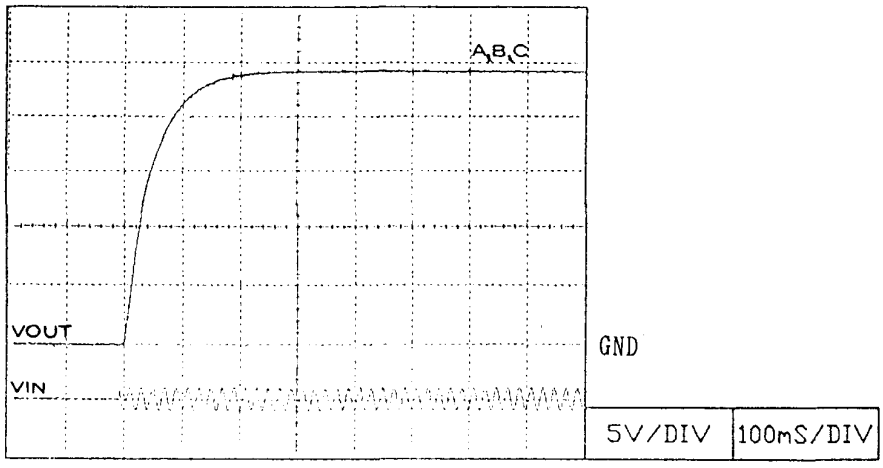
5V



12V



24V



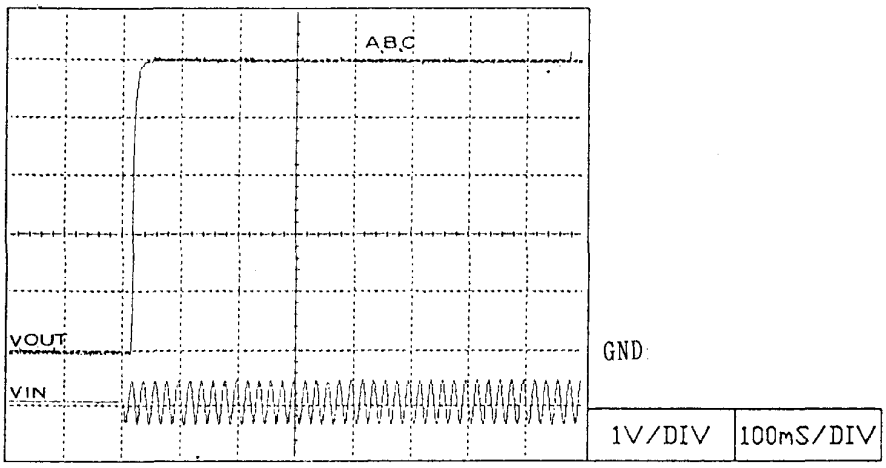
Output rise time

NNS30

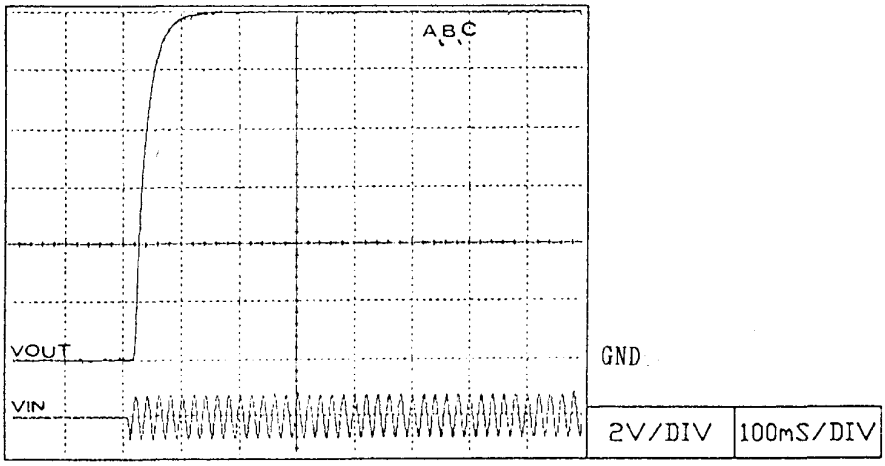
Conditions Vin= 170Vac (A)
200Vac (B)
230Vac (C)

Iout= 0%
Ta= 25C

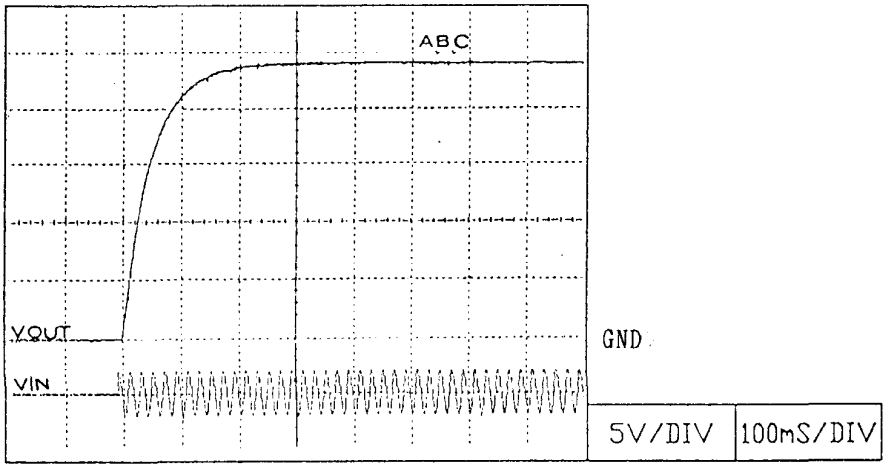
5V



12V



24V



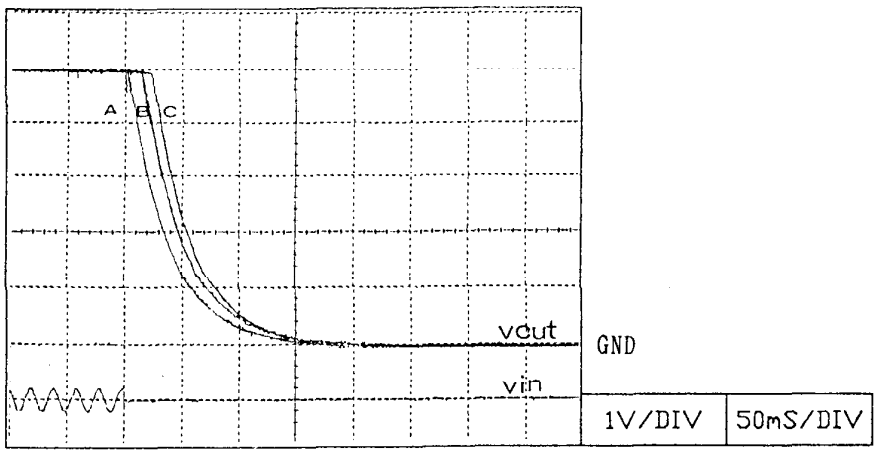
2-6 Output fall time

NNS30

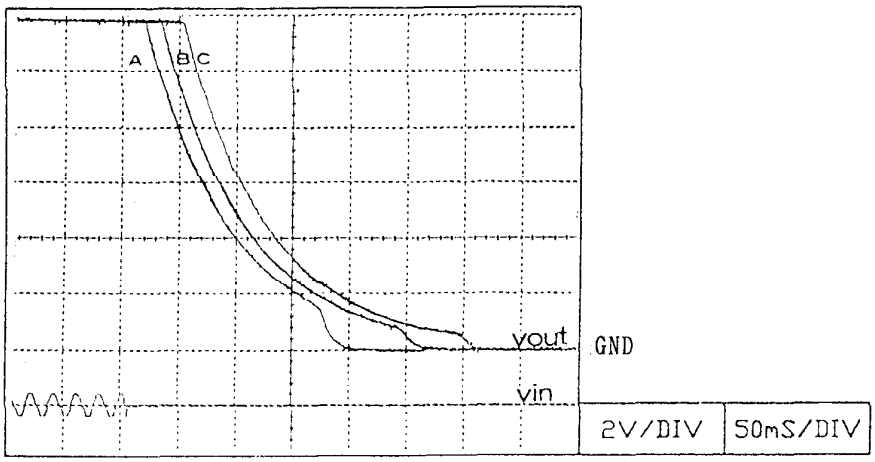
Conditions Vin= 85Vac (A)
100Vac (B)
115Vac (C)

Iout= 100%
Ta= 25C

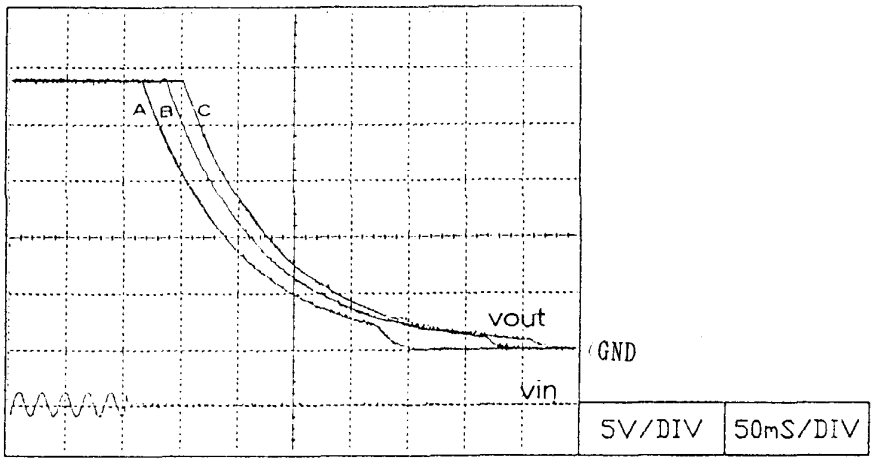
5V



12V



24V



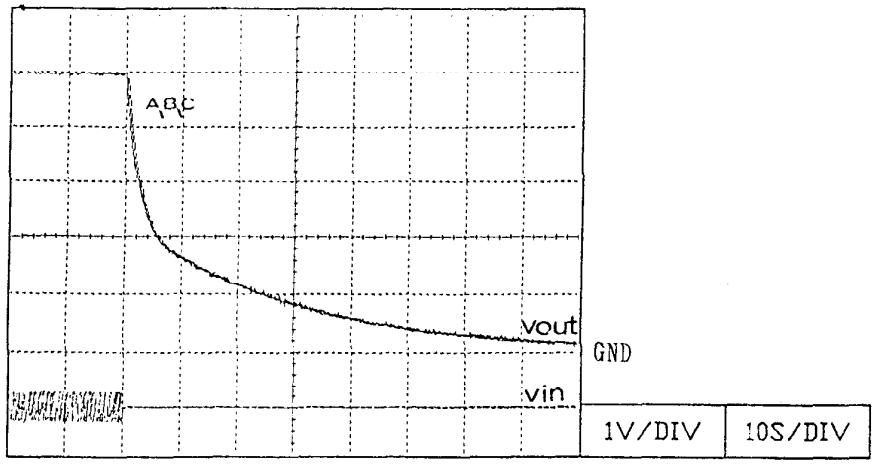
Output fall time

NNS30

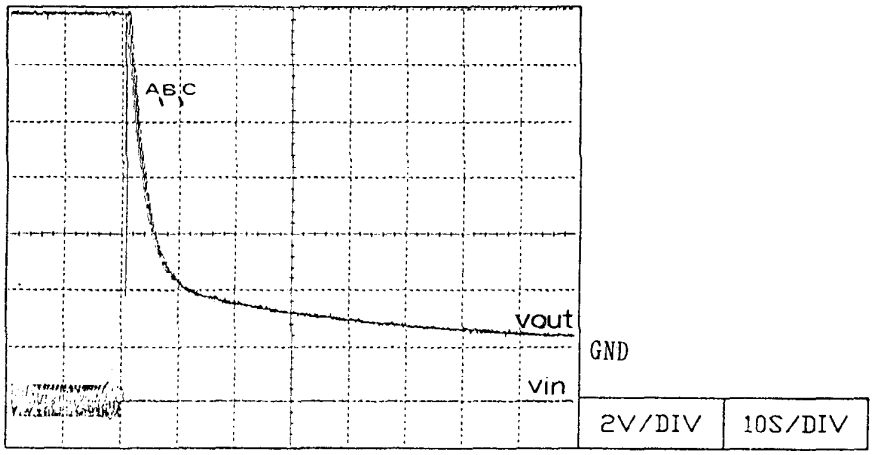
Conditions Vin= 85Vac (A)
100Vac (B)
115Vac (C)

Iout= 0%
Ta= 25C

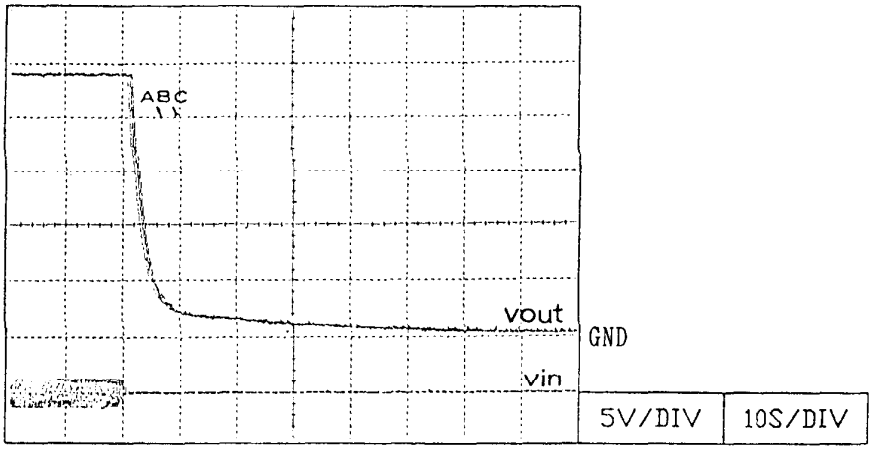
5V



12V



24V



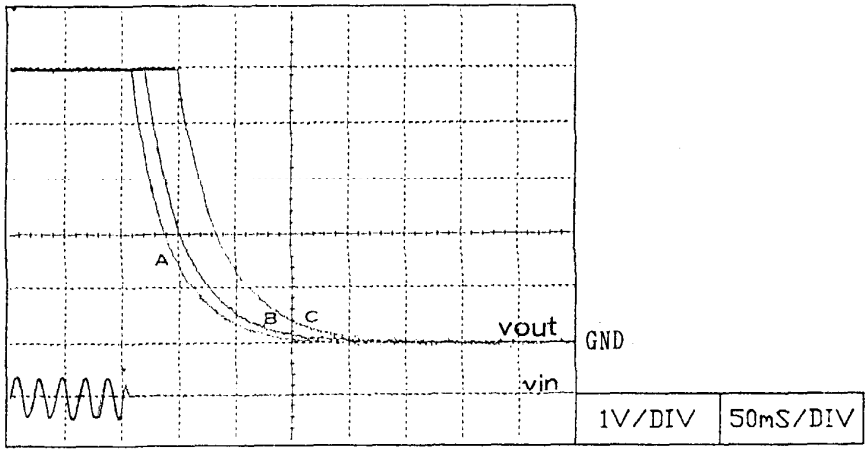
NNS30

Output fall time

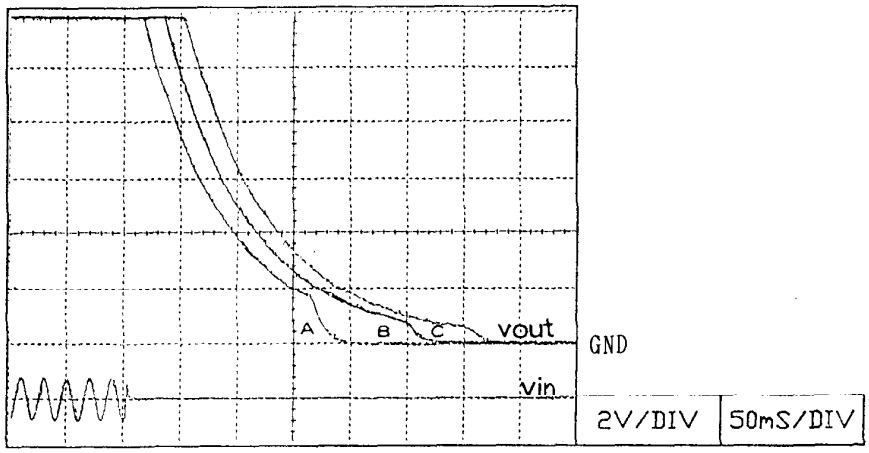
Conditions Vin= 170Vac (A)
200Vac (B)
230Vac (C)

Iout= 100%
Ta= 25C

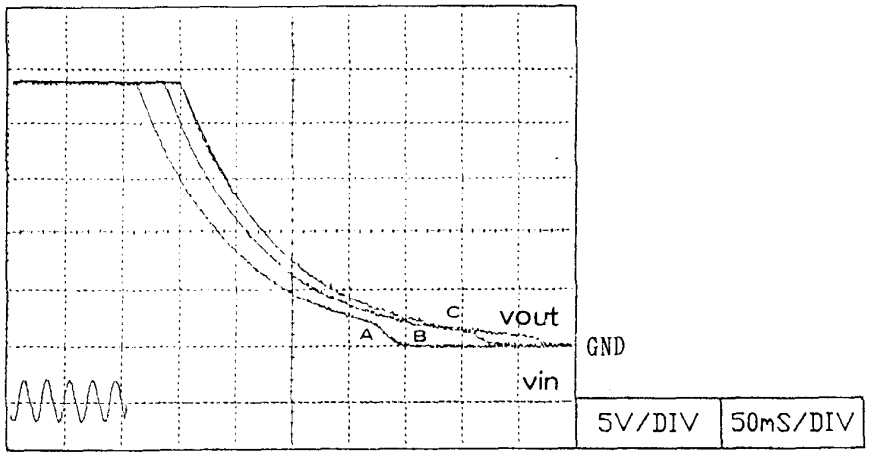
5V



12V



24V



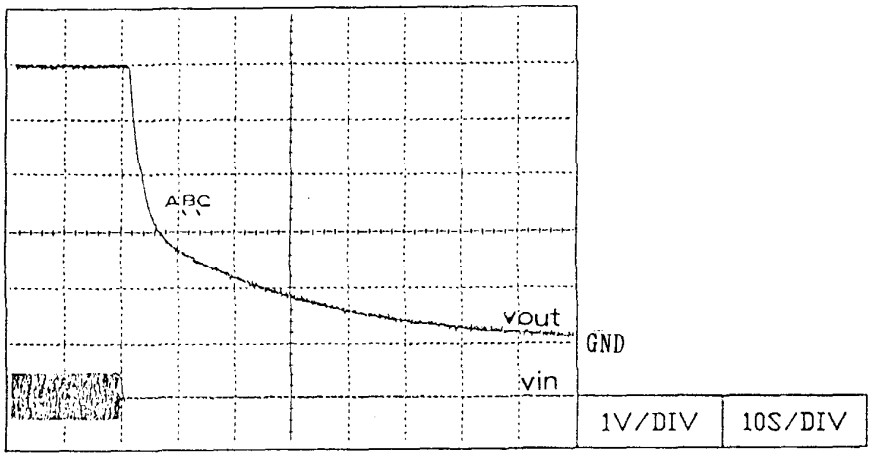
NNS30

Output fall time

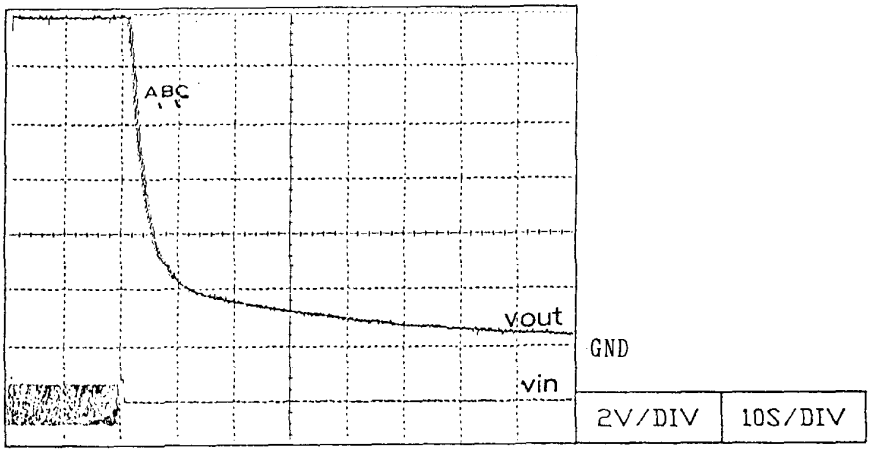
Conditions Vin= 170Vac (A)
200Vac (B)
230Vac (C)

Iout= 0%
Ta= 25C

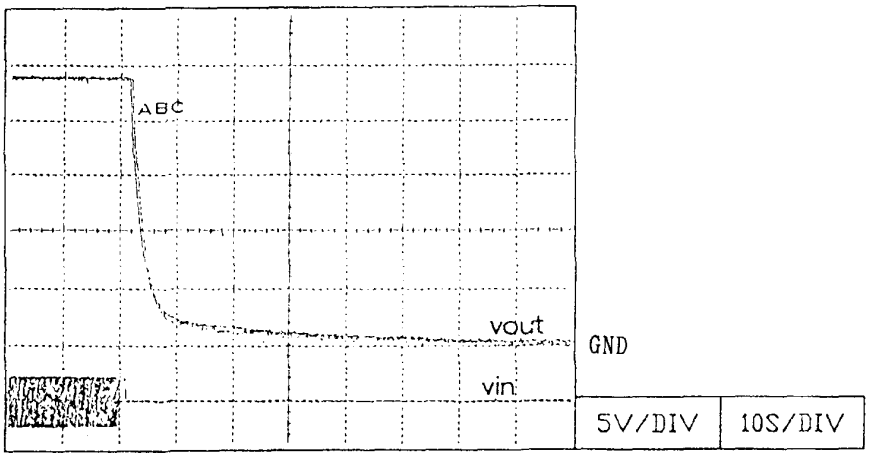
5V



12V



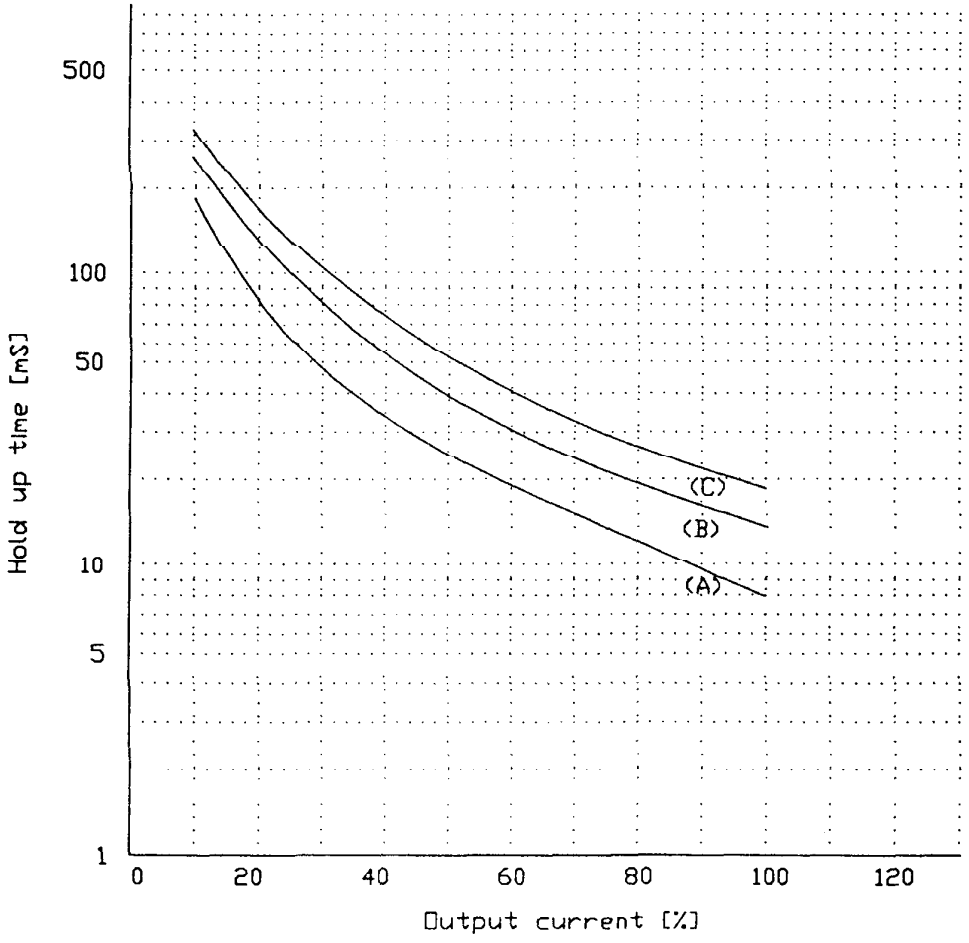
24V



2-7 HOLD UP TIME

CURVE OF 5V

Conditions
Ta= 25C
Vin= 85Vac —— (A)
100Vac —— (B)
115Vac ------ (C)

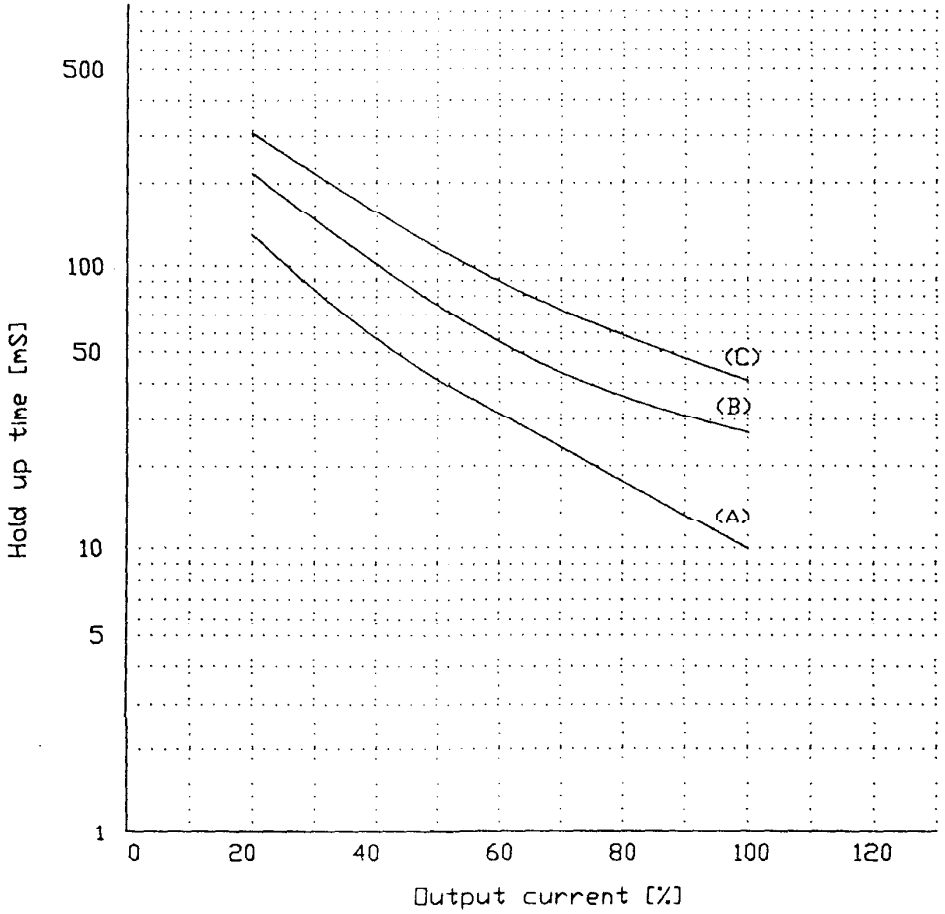


NNS30

HOLD UP TIME

CURVE OF 12V

Conditions
Ta= 25C
Vin= 85Vac —— (A)
100Vac —— (B)
115Vac —— (C)

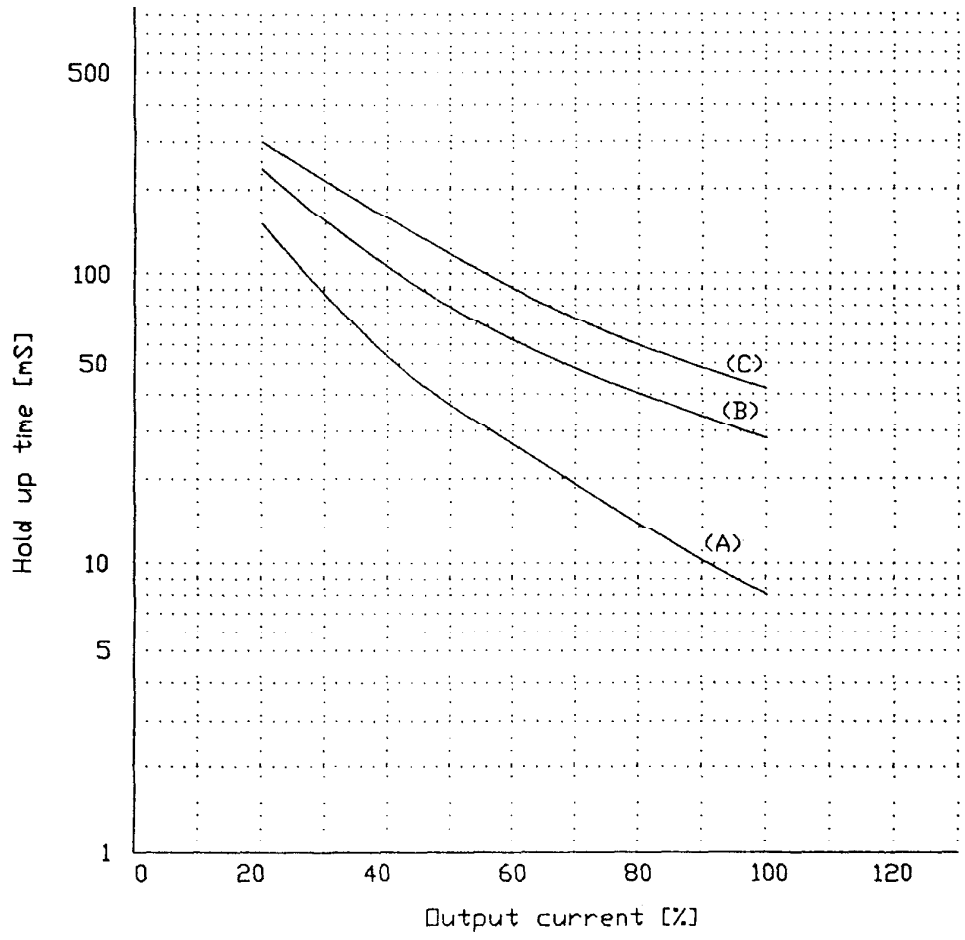


NNS30

HOLD UP TIME

CURVE OF 24V

Conditions
Ta= 25C
Vin= 85Vac —— (A)
100Vac —— (B)
115Vac —— (C)



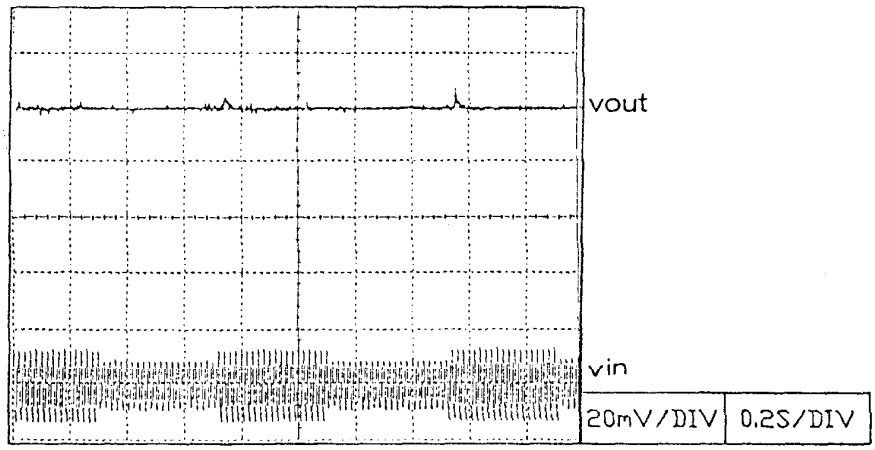
NNS30

2-8 Dynamic line response

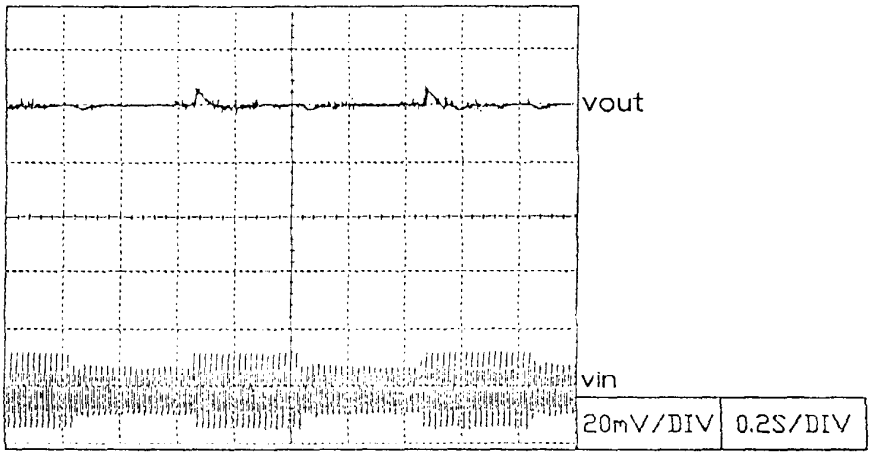
Conditions
Vout=Rated
Iout= 100%
Ta= 25C

Vin 85Vac ═══ 115Vac

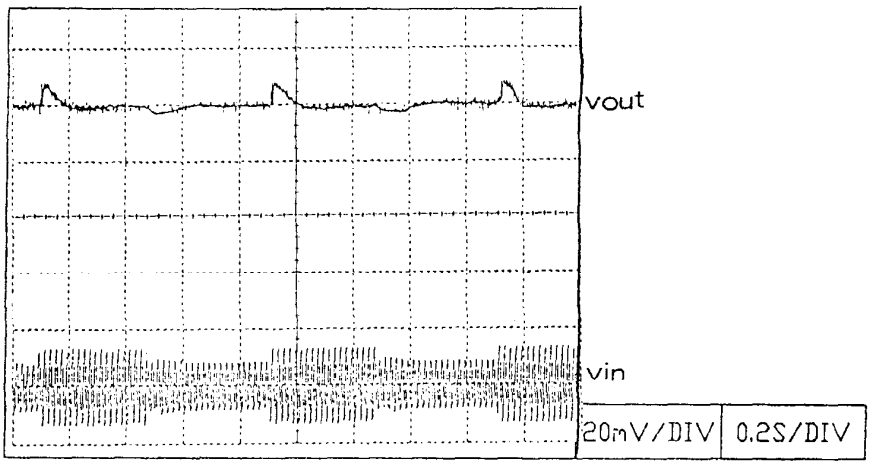
5V



12V



24V



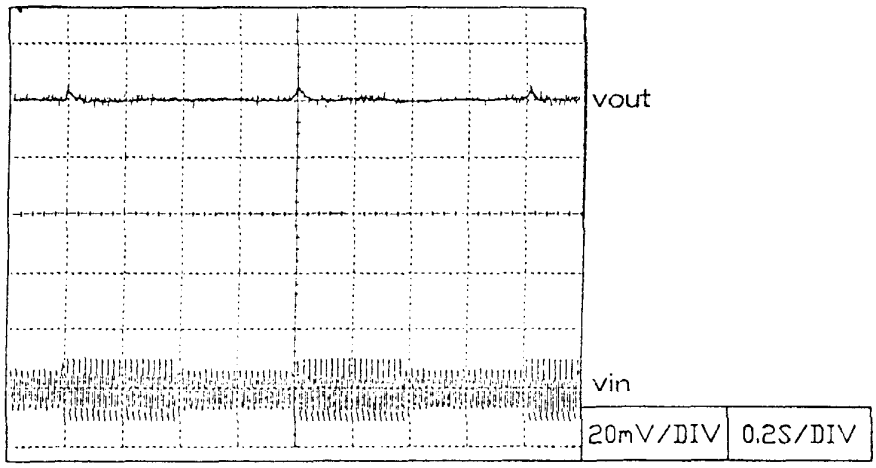
NNS30

Dynamic line response

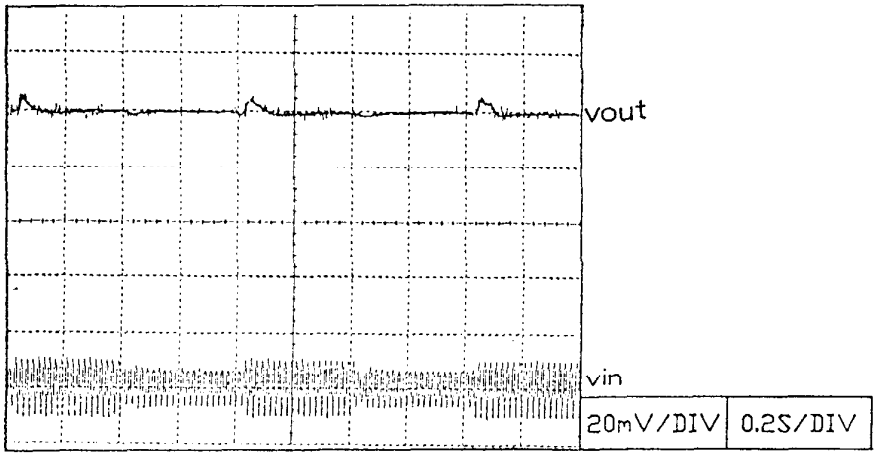
Conditions
Vout=Rated
Iout= 100%
Ta= 25C

Vin: 170Vac ⟷ 230Vac

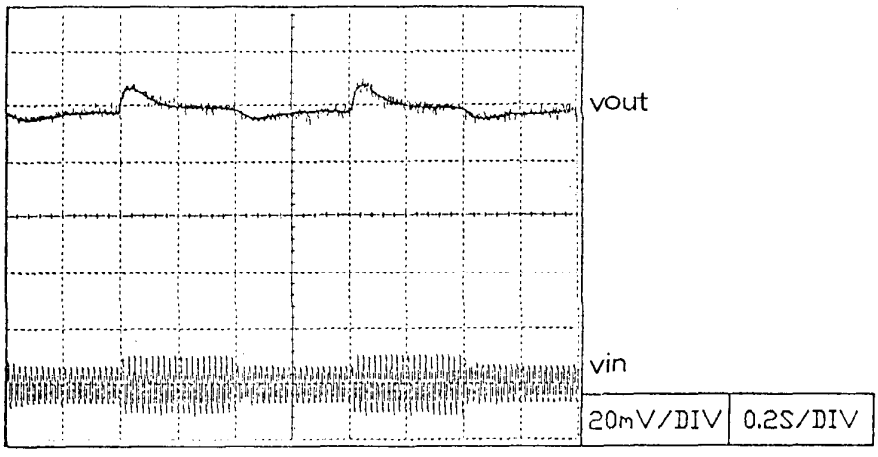
5V



12V



24V



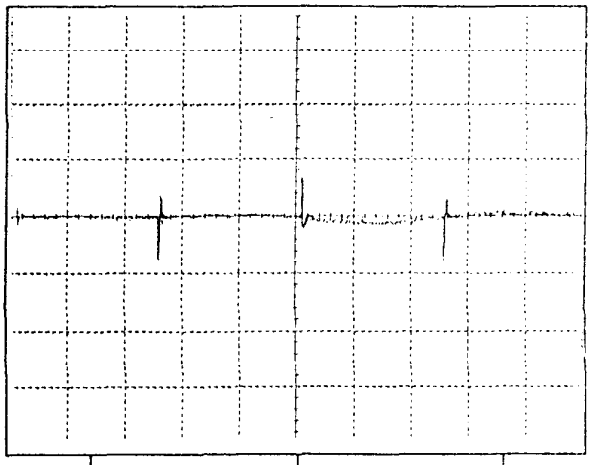
2-9 Dynamic load response

NNS30

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

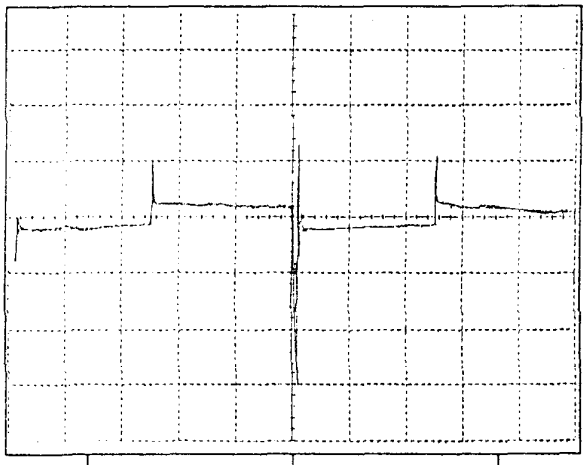
5V

Iout: 50 ⟷ 100% f=100Hz



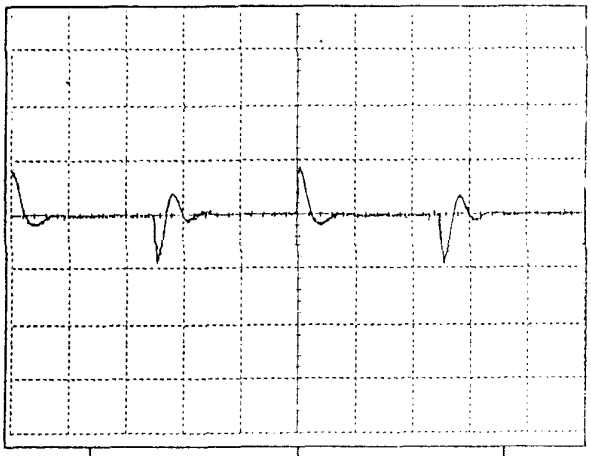
100mV/DIV	2mS/DIV
+1.5%	-1.5%

Iout: 0 ⟷ 100% f=100Hz



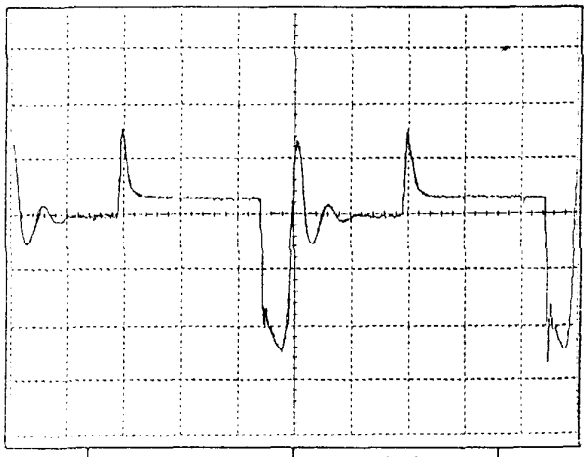
100mV/DIV	2mS/DIV
+1.4%	-6%

Iout: 50 ⟷ 100% f=1KHz



100mV/DIV	0.2mS/DIV
+2%	-2%

Iout: 0 ⟷ 100% f=1KHz



100mV/DIV	0.2mS/DIV
+3%	-5%

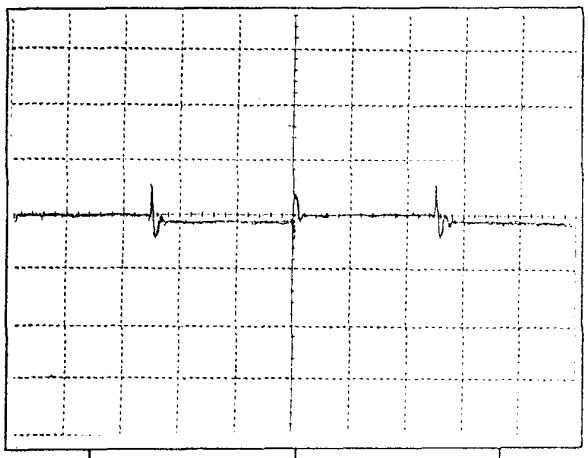
Dynamic load response

NNS30

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

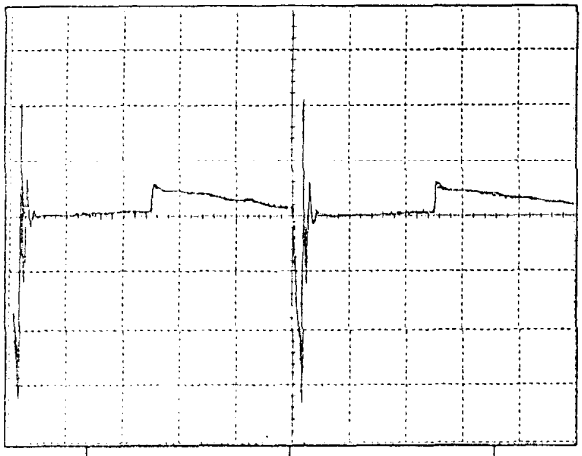
12V

Iout: 50 ⟷ 100% f=100Hz



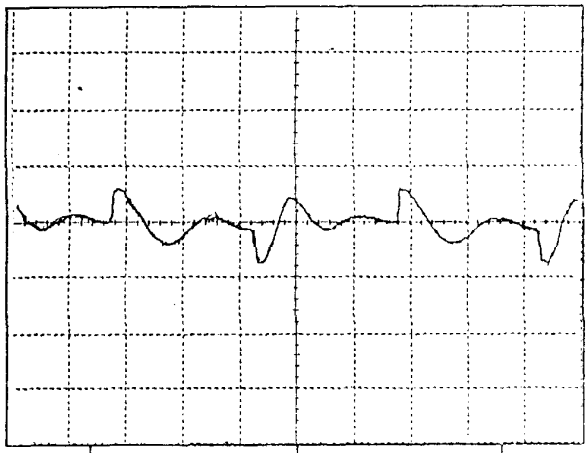
100mV/DIV	2mS/DIV
+0.6%	-0.6%

Iout: 0 ⟷ 100% f=100Hz



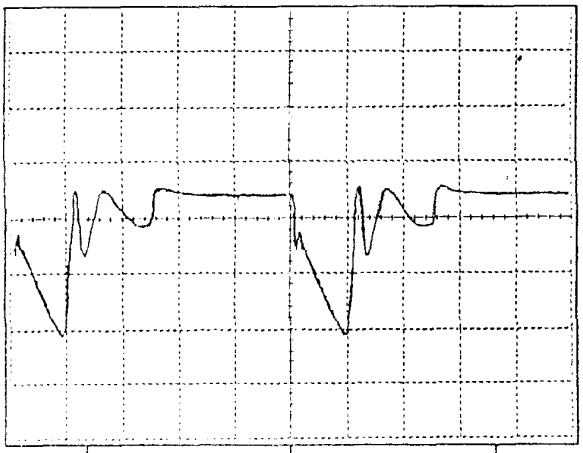
100mV/DIV	2mS/DIV
+1%	-2.4%

Iout: 50 ⟷ 100% f=1KHz



100mV/DIV	0.2mS/DIV
+0.6%	-0.6%

Iout: 0 ⟷ 100% f=1KHz



100mV/DIV	0.2mS/DIV
+1%	-2%

Dynamic load response

NNS30

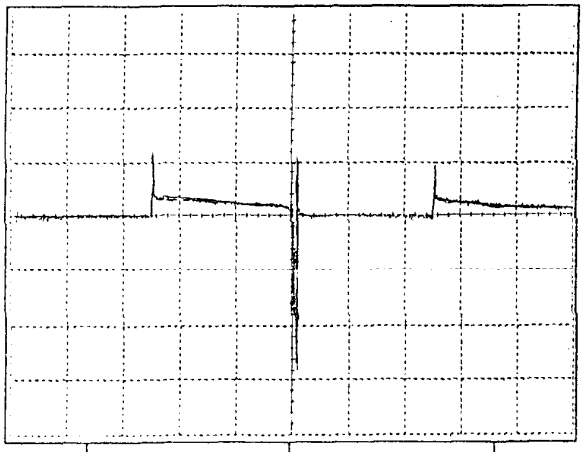
Conditions
Vout=Rated
Vin=100Vac / 200Vac
Ta= 25C

24V

Iout: 50 ⟷ 100% f=100Hz

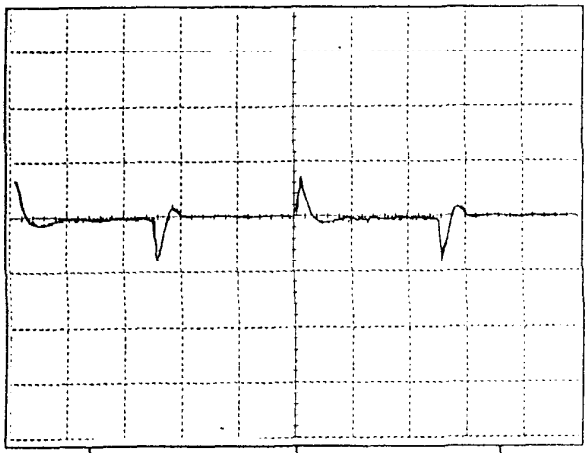
100mV/DIV	2mS/DIV
+0.2%	-0.2%

Iout: 0 ⟷ 100% f=100Hz



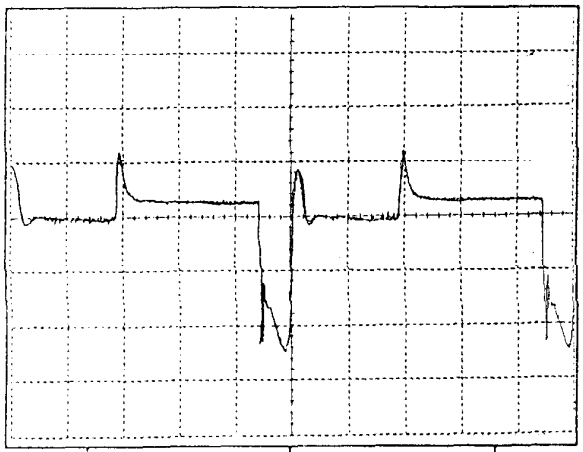
200mV/DIV	2mS/DIV
+1.6%	-2.5%

Iout: 50 ⟷ 100% f=1KHz



100mV/DIV	0.2mS/DIV
+0.3%	-0.3%

Iout: 0 ⟷ 100% f=1KHz



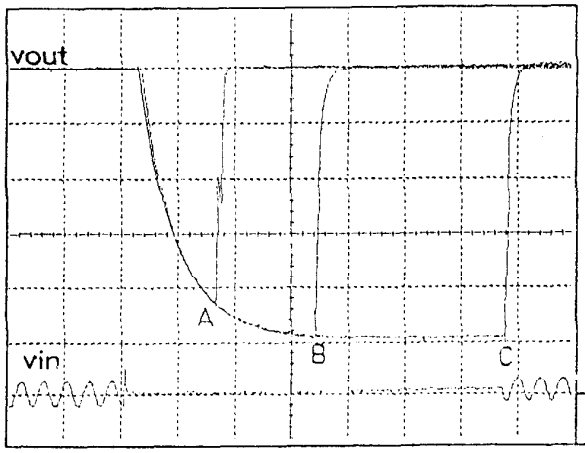
200mV/DIV	0.2mS/DIV
+0.4%	-1.6%

2-10 Response to brown out

NNS30

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

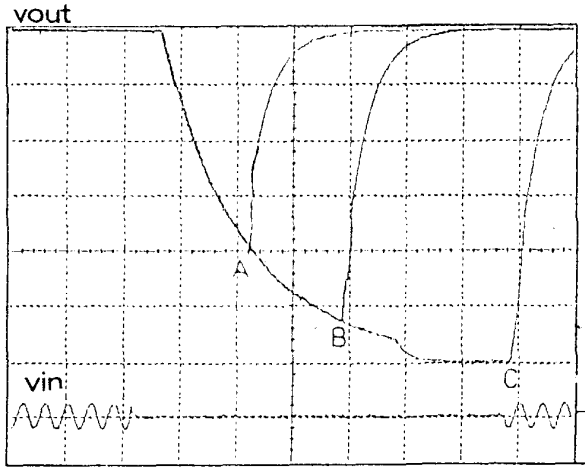
5V



Brown out time
A: 80mS
B: 170mS
C: 340mS

1V/DIV | 50mS/DIV

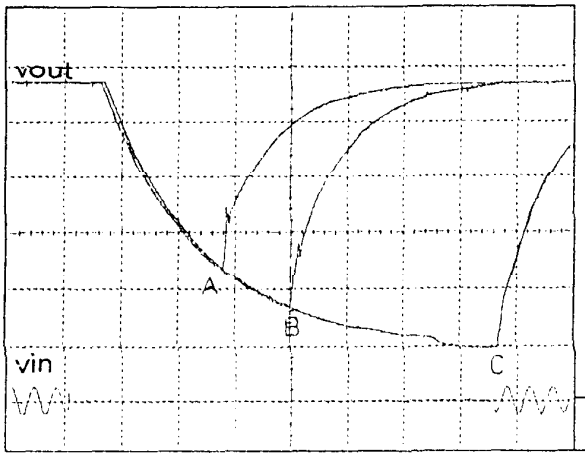
12V



Brown out time
A: 100mS
B: 190mS
C: 340mS

2V/DIV | 50mS/DIV

24V



Brown out time
A: 80mS
B: 160mS
C: 330mS

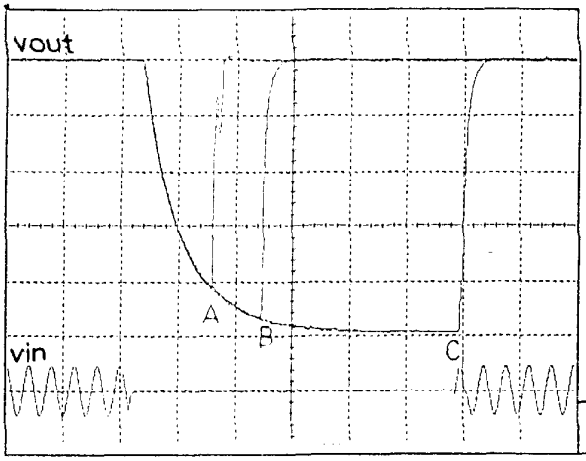
5V/DIV | 50mS/DIV

NNS30

Response to brown out

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

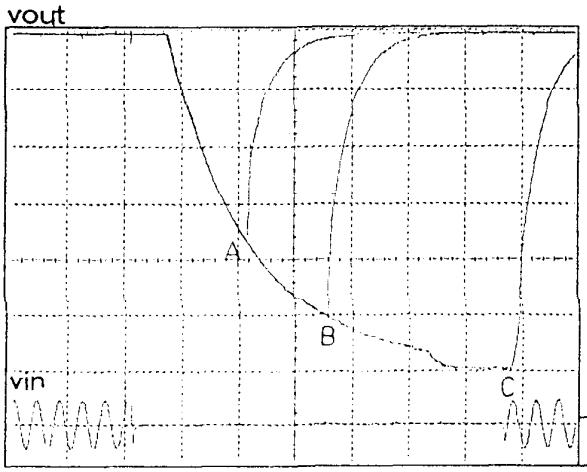
5V



Brown out time
A: 60mS
B: 110mS
C: 290mS

1V/DIV	50mS/DIV

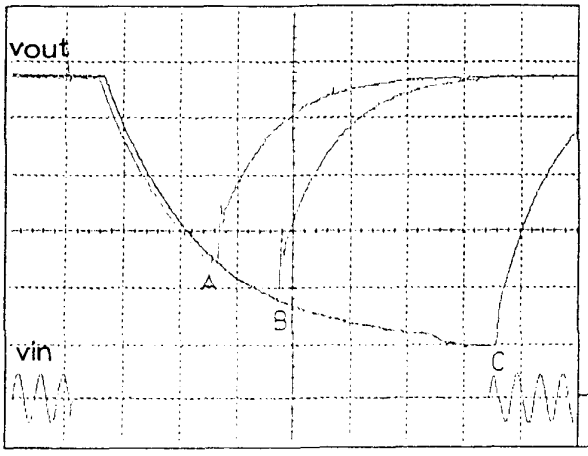
12V



Brown out time
A: 100mS
B: 170mS
C: 330mS

2V/DIV	50mS/DIV

24V

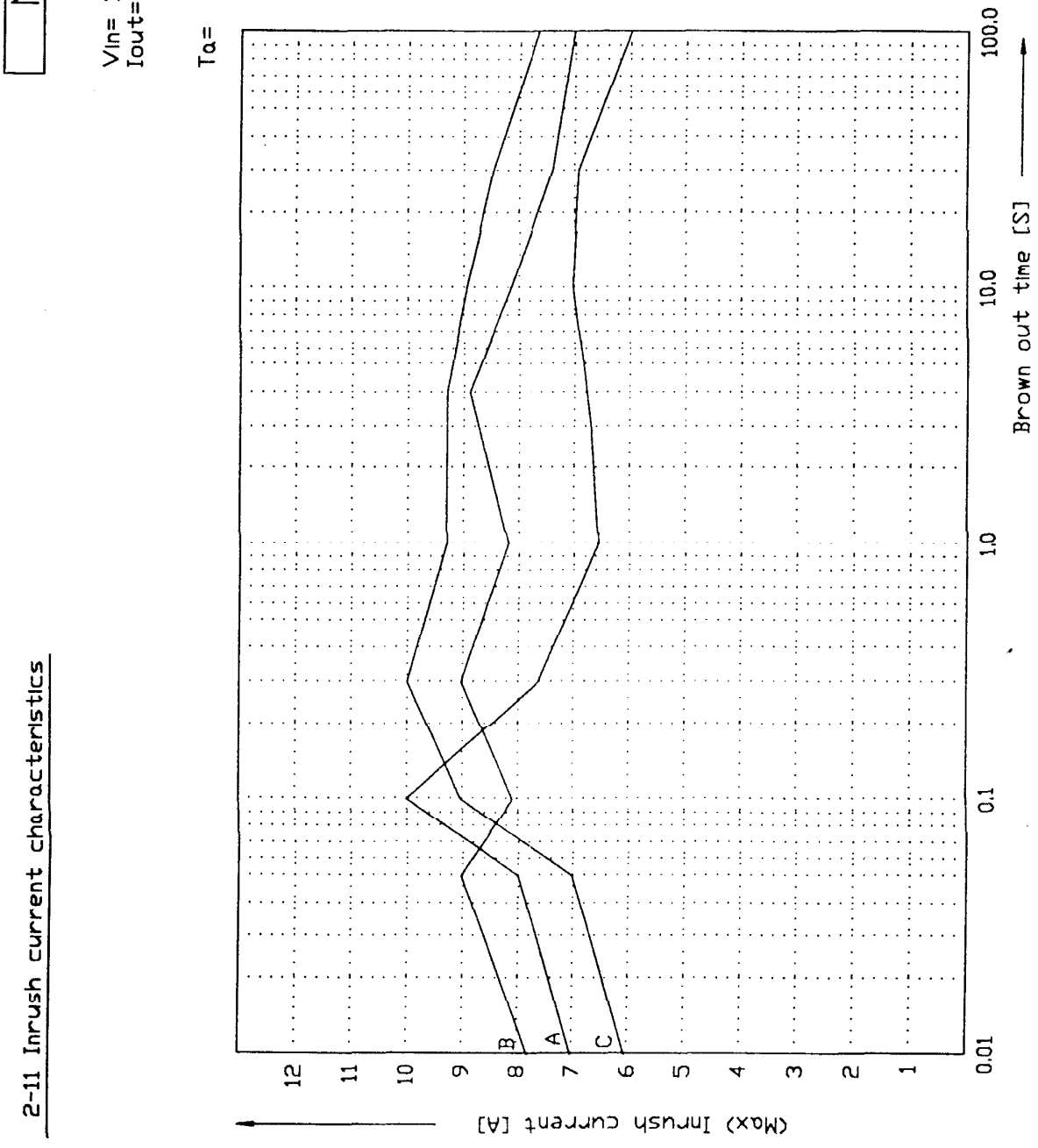


Brown out time
A: 120mS
B: 180mS
C: 360mS

5V/DIV	50mS/DIV

NNS30

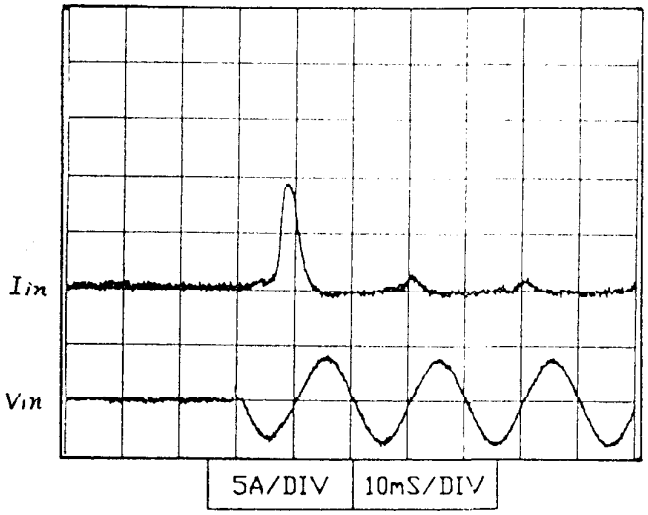
2-11 Inrush current characteristics



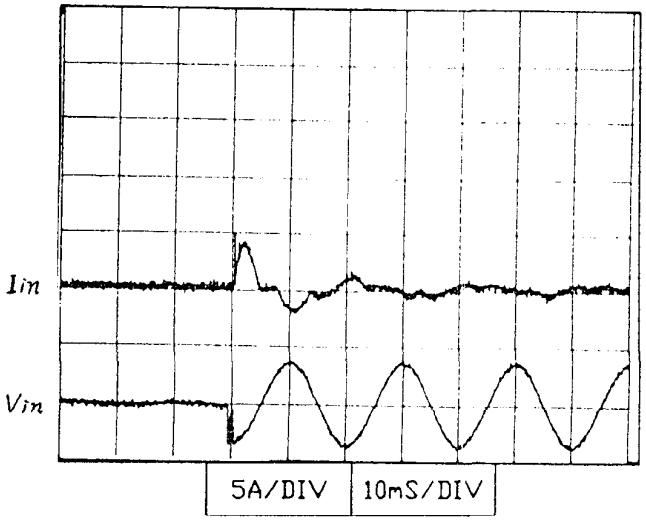
Inrush current waveform

NNS30

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



Switch on phase angle
of input AC voltage
ϕ=0°

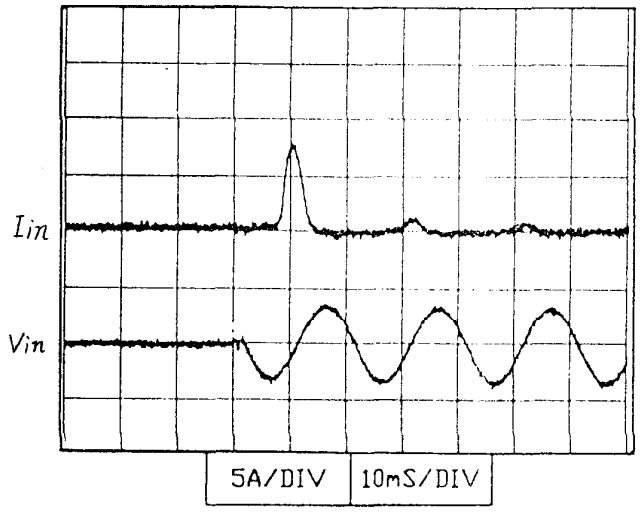


Switch on phase angle
of input AC voltage
ϕ=90°

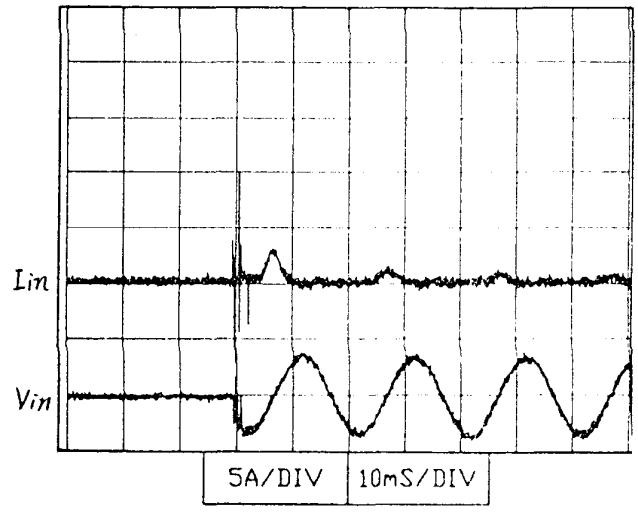
NNS30

Inrush current waveform

Conditions
Vin= 230Vac
Iout= 100%
Ta= 25C



Switch on phase angle of Input AC voltage
ø=0°



Switch on phase angle of Input AC voltage
ø=90°

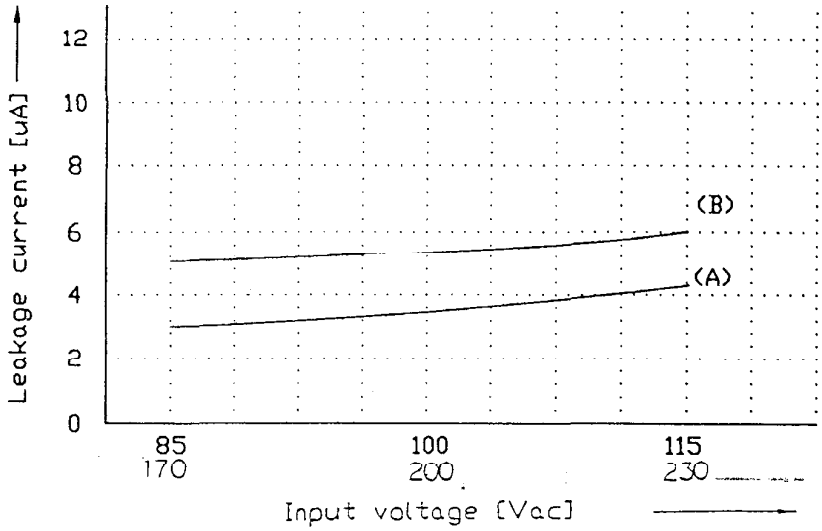
2-12 Leakage current

NNS30

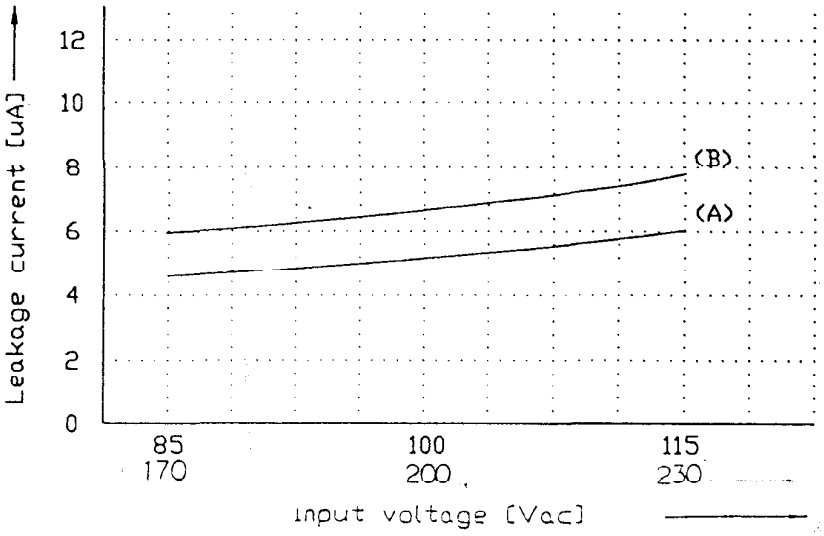
Conditions Vin= 85-115Vac ——— (A)
Vin= 170-230Vac ——— (B)
Ta= 25C

5V

Iout=0%



Iout=100%



2-13 OUTPUT-RIPPLE, NOISE

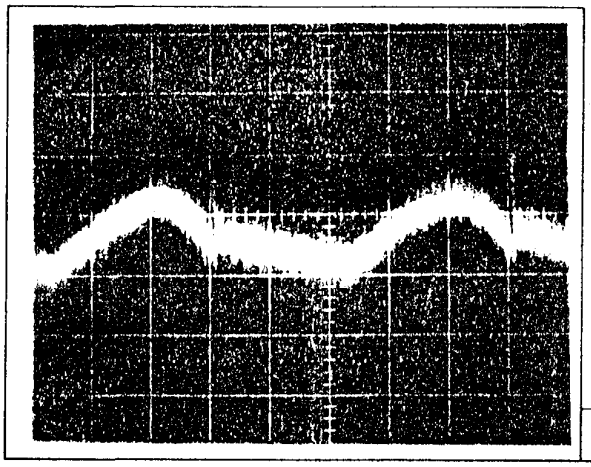
NNS30

Conditions

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

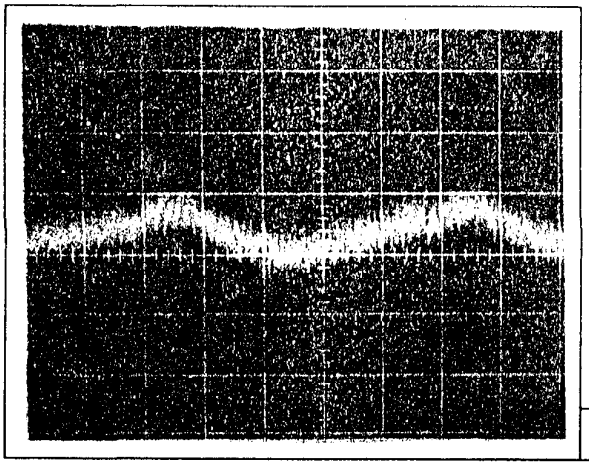
NORMAL MODE

5V



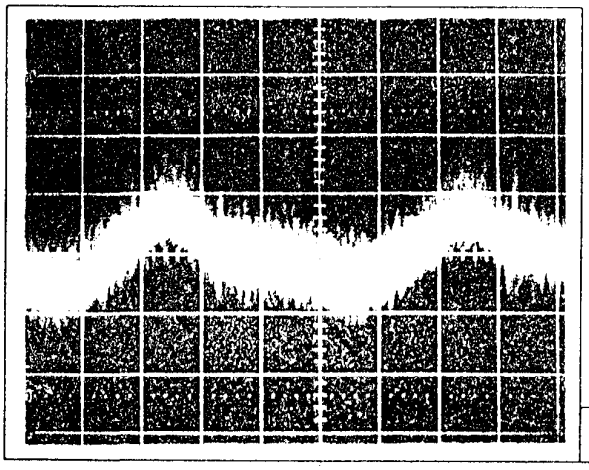
1mV/DIV | 2mS/DIV

12V



1mV/DIV | 2mS/DIV

24V



1mV/DIV | 2mS/DIV

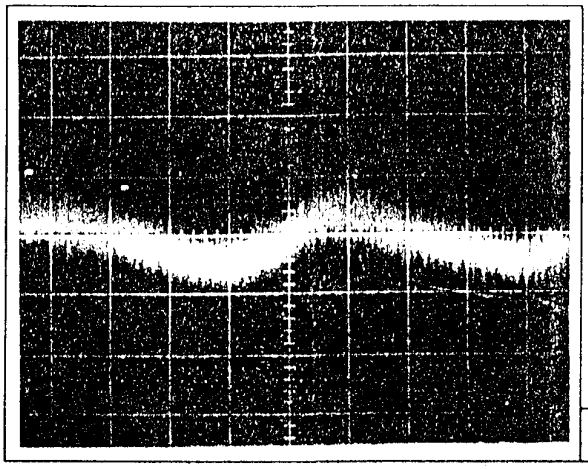
NNS30

OUTPUT-RIPPLE, NOISE

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

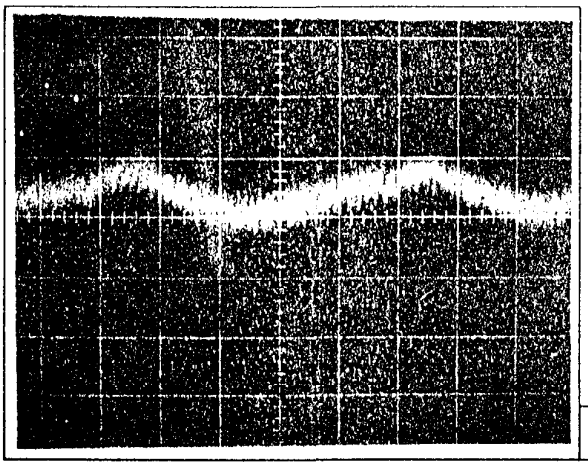
COMMON+NORMAL MODE

5V



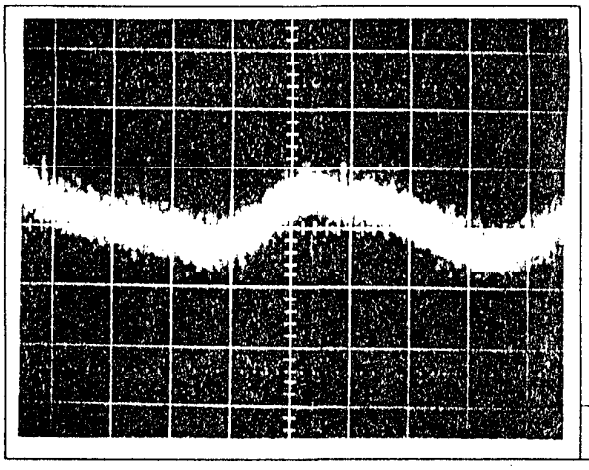
1mV/DIV | 2mS/DIV

12V



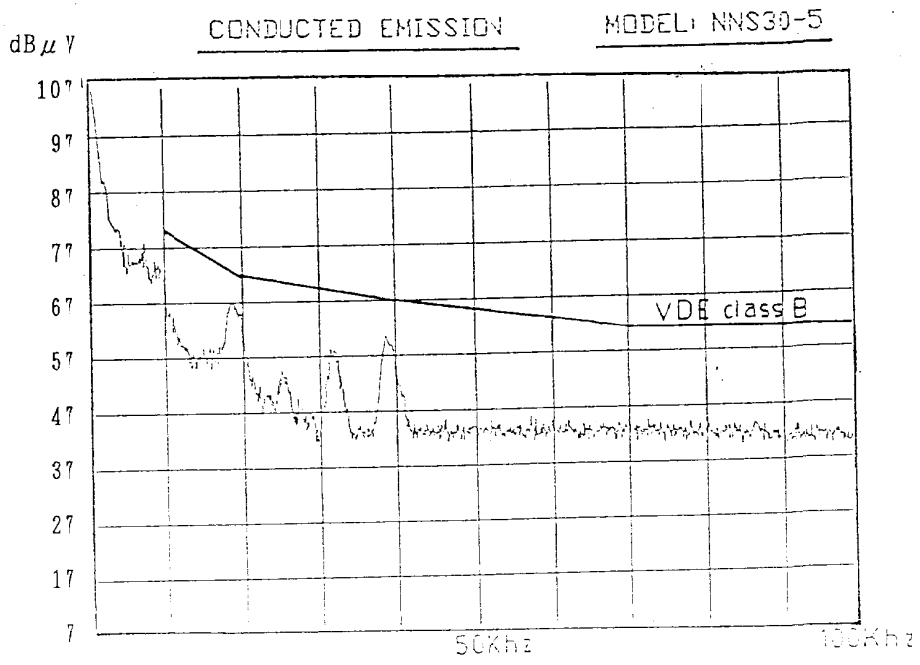
1mV/DIV | 2mS/DIV

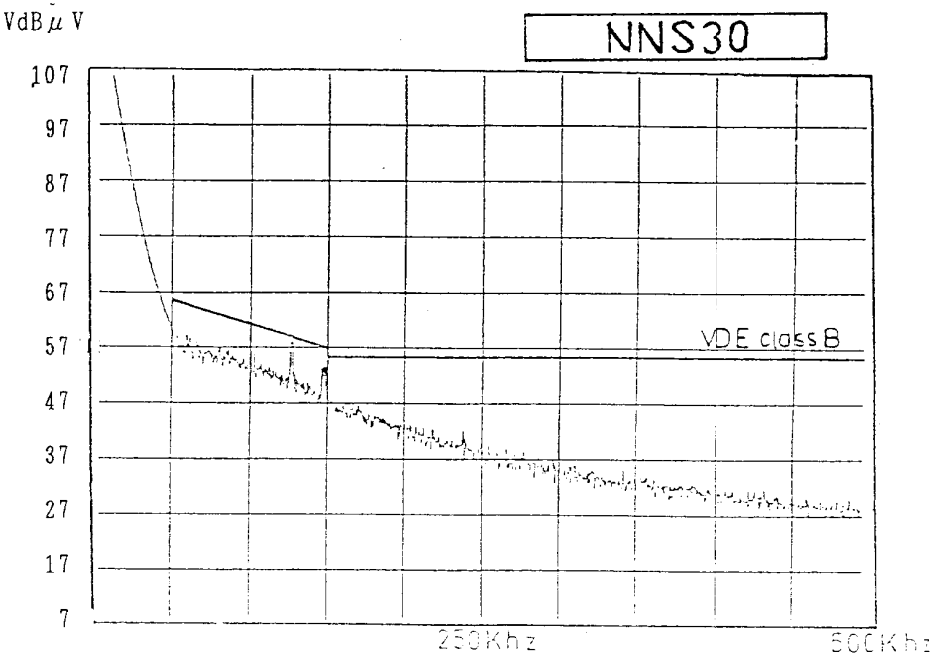
24V

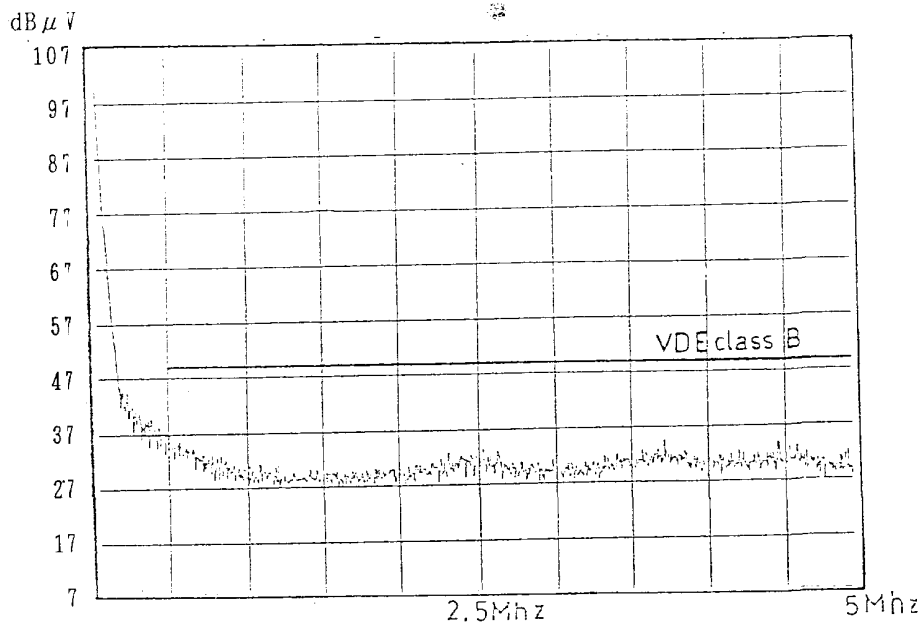


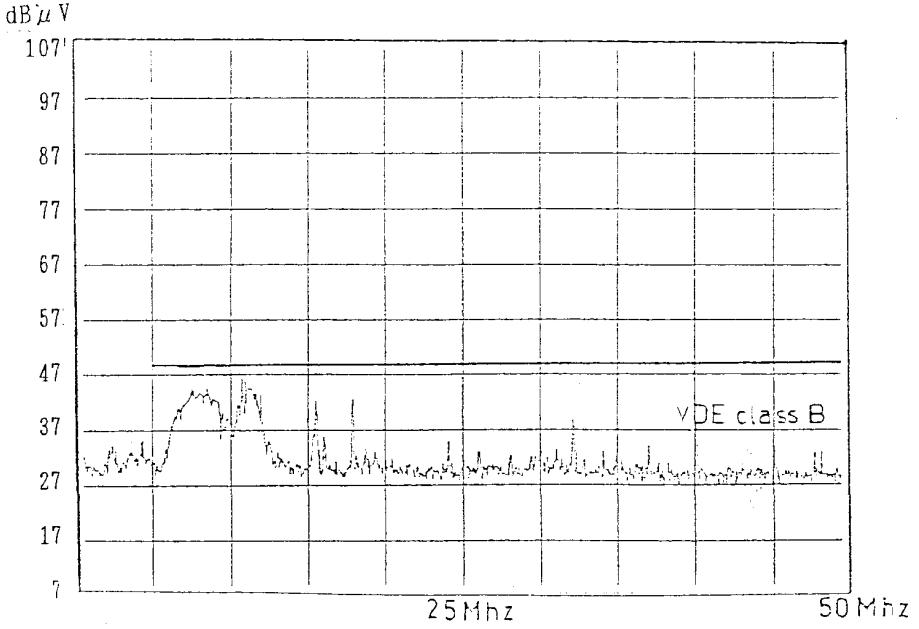
1mV/DIV | 2mS/DIV

CONDUCTED EMISSION MODEL: NNS30-5









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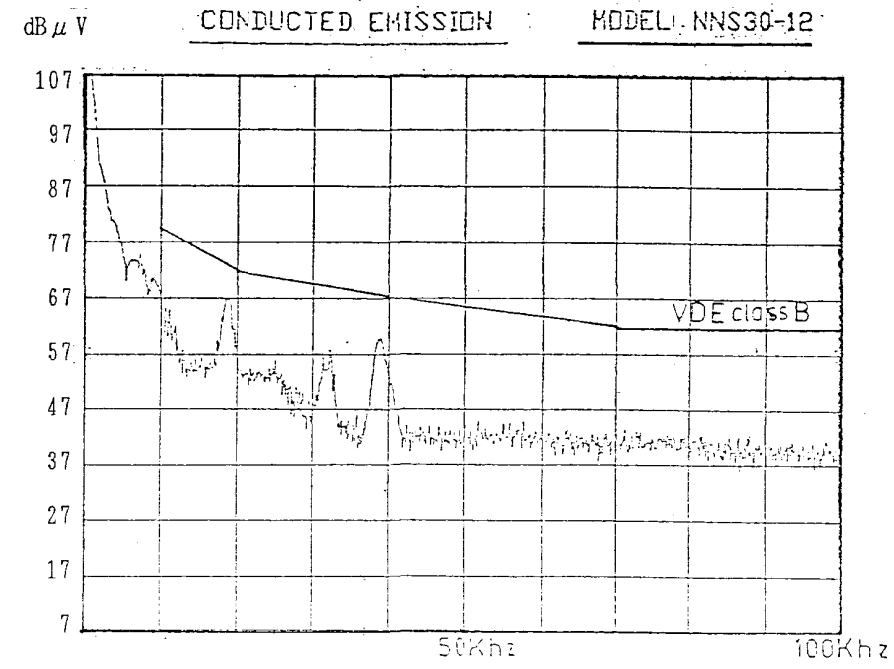
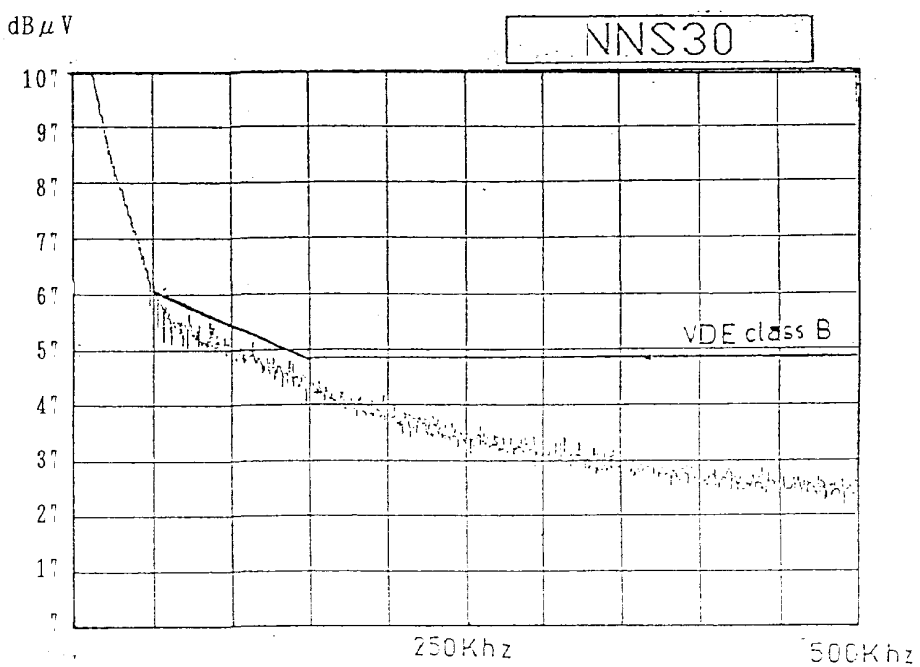
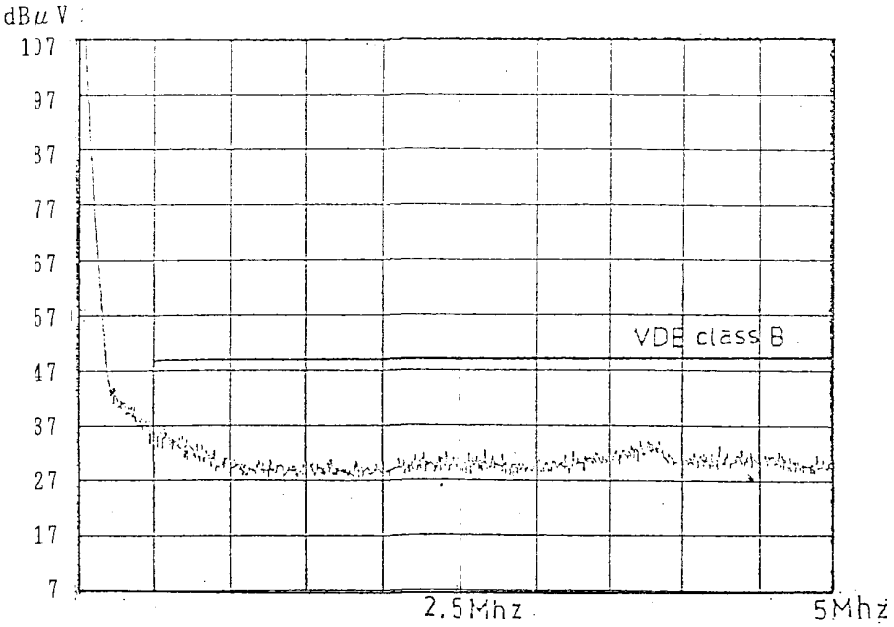
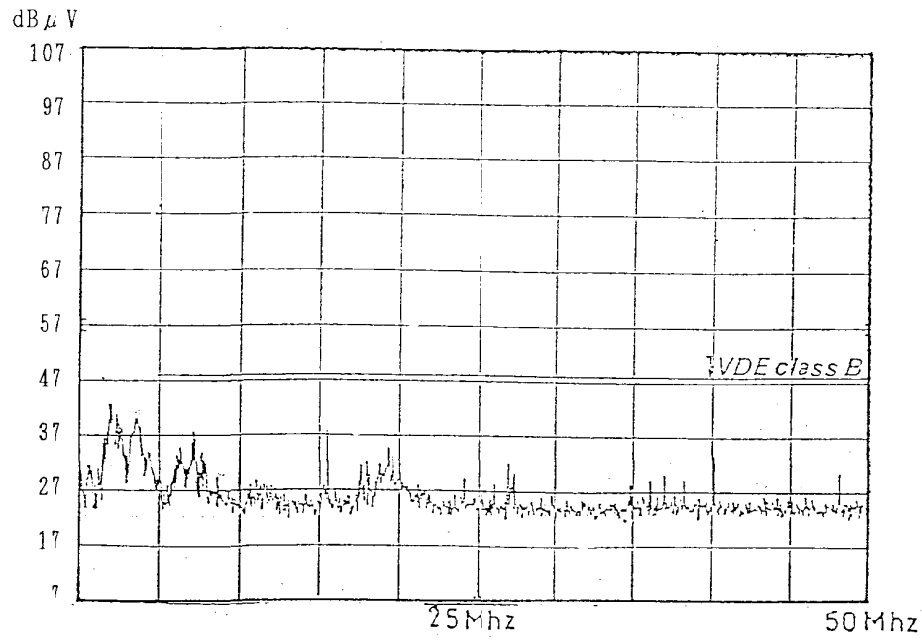
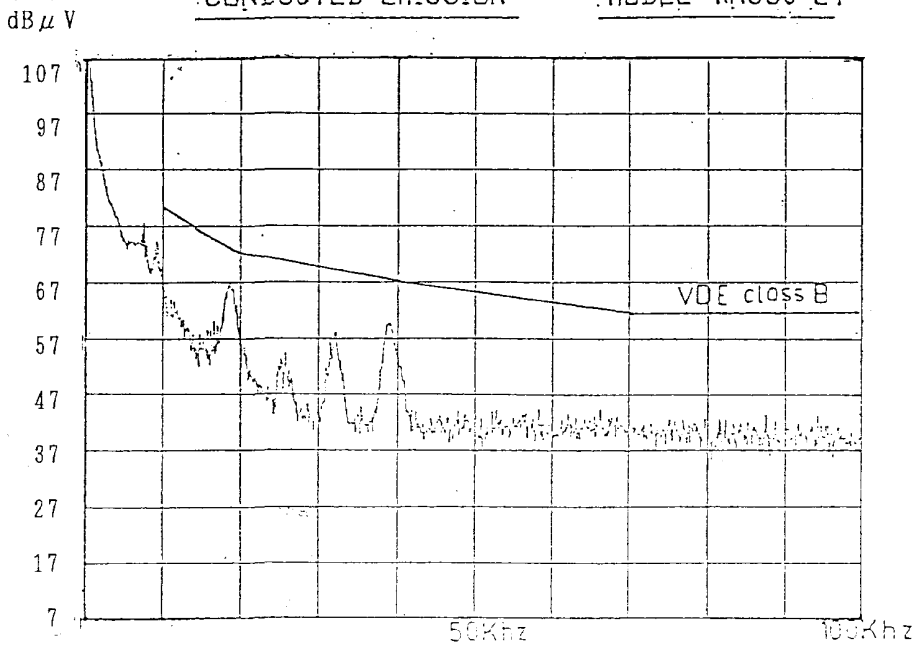

dBμV
CONDUCTED EMISSION
MODEL: NNS30-12
107
97
87
77
67
57
47
37
27
17
7
VDE class B
50Khz
100Khz


dBμV
NNS30
VDE class B
250Khz
500Khz

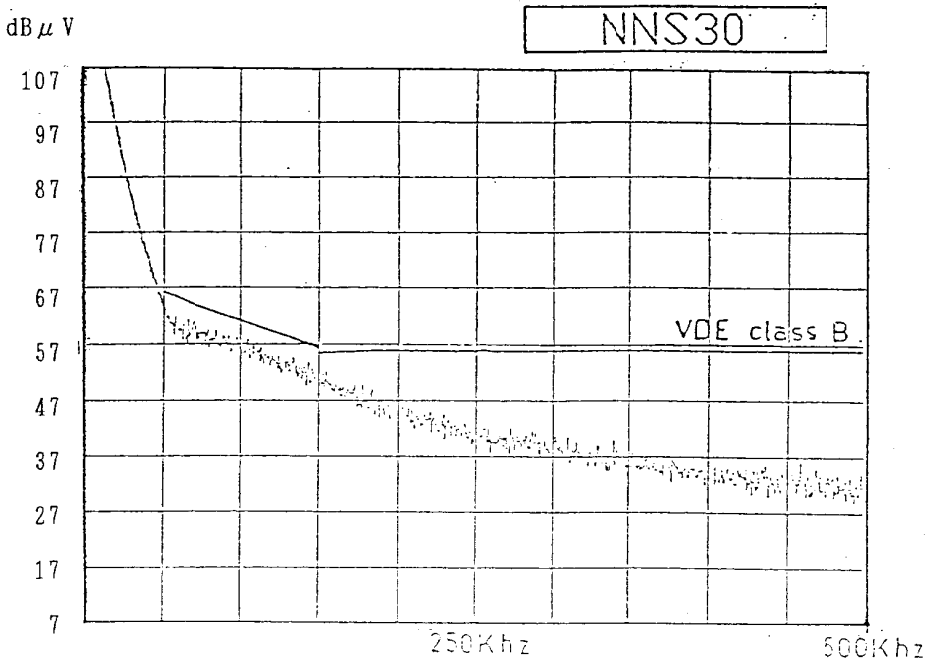

dBμV
VDE class B
2.5Mhz
5Mhz

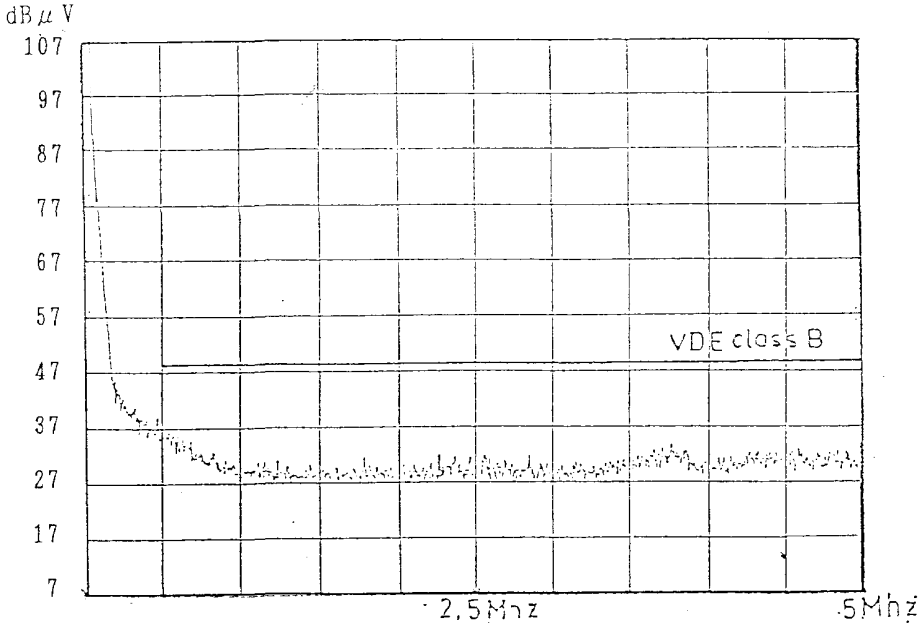

dBμV
VDE class B
25Mhz
50Mhz

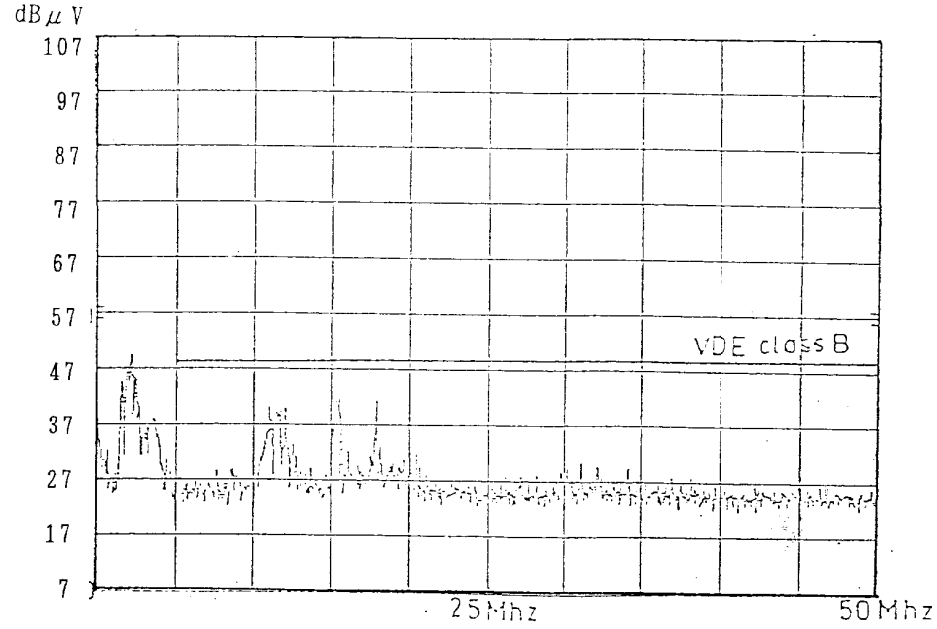
CONDUCTED EMISSION MODEL NNS30-24



NNS30







NEMIC-LAMBDA

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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	HP	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	