

HWS300P

EVALUATION DATA

型式データ

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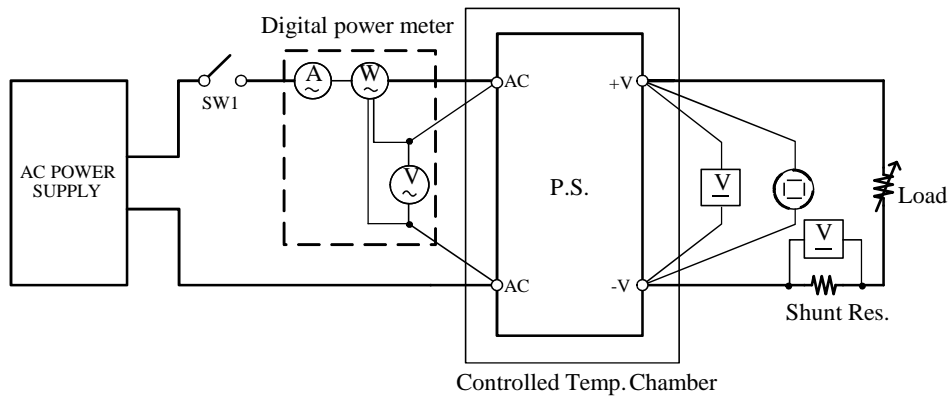
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使用記号 Terminology used

	Definition	
Vin 入力電圧	Input voltage
Vout 出力電圧	Output voltage
Iin 入力電流	Input current
Iout 出力電流	Output current
Ta 周囲温度	Ambient temperature
f 周波数	Frequency

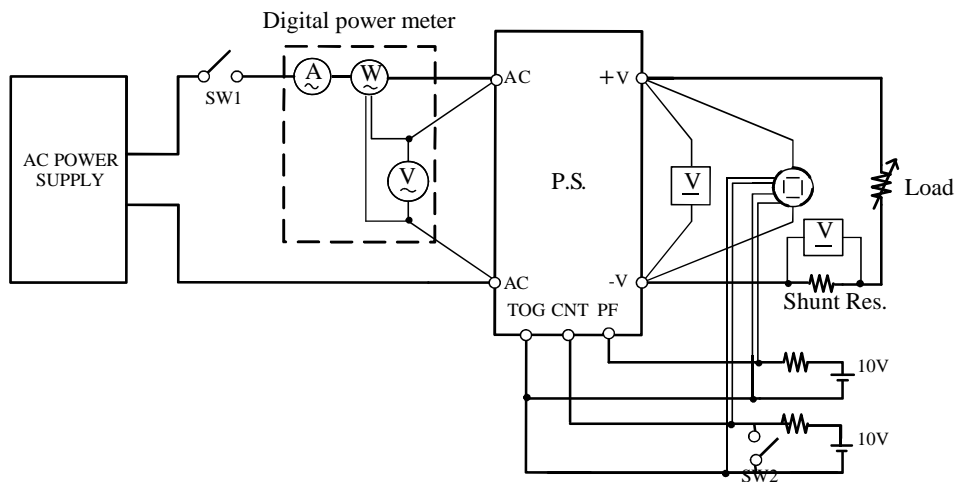
測定回路1 Circuit 1

- | | |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> ・静特性 ・通電ドリフト特性 ・過電圧保護特性 ・過電流保護特性 ・出力立ち上がり特性 ・出力立ち下がり特性 ・過渡応答（入力急変）特性 ・スタンバイ電流特性 | <ul style="list-style-type: none"> Steady state data Warm up voltage drift characteristics Over voltage protection (OVP) characteristics Over current protection (OCP) characteristics Output rise characteristics Output fall characteristics Dynamic line response characteristics Standby current characteristics |
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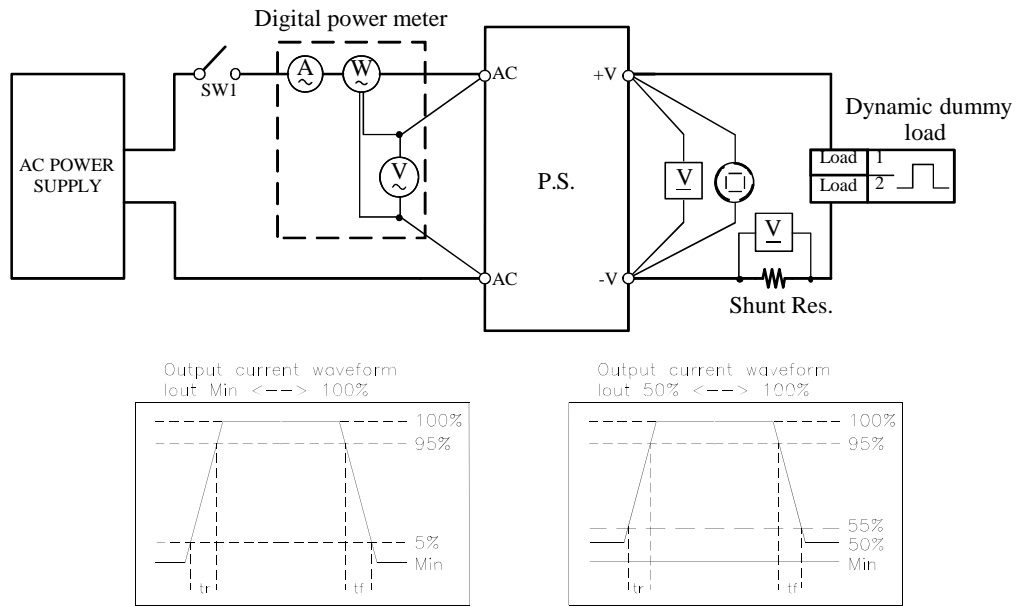
測定回路2 Circuit 2

- ・ON/OFFコントロール時出力立ち上がり特性
Output rise characteristics with ON/OFF Control
- ・ON/OFFコントロール時出力立ち下がり特性
Output fall characteristics with ON/OFF Control



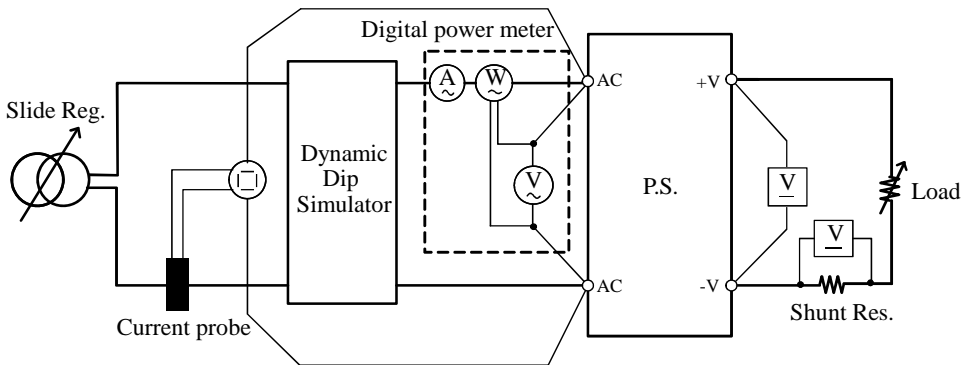
測定回路3 Circuit 3

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



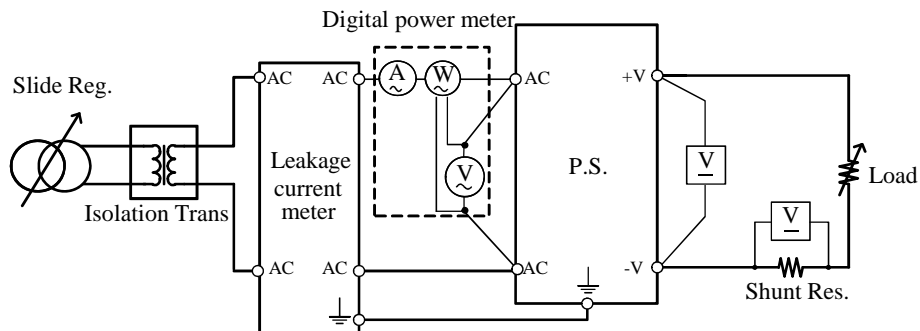
測定回路4 Circuit 4

・入力サージ電流（突入電流）波形 Inrush current waveform
・瞬停時突入電流特性 Inrush current characteristics



測定回路5 Circuit 5

・リーク電流特性 Leakage current characteristics

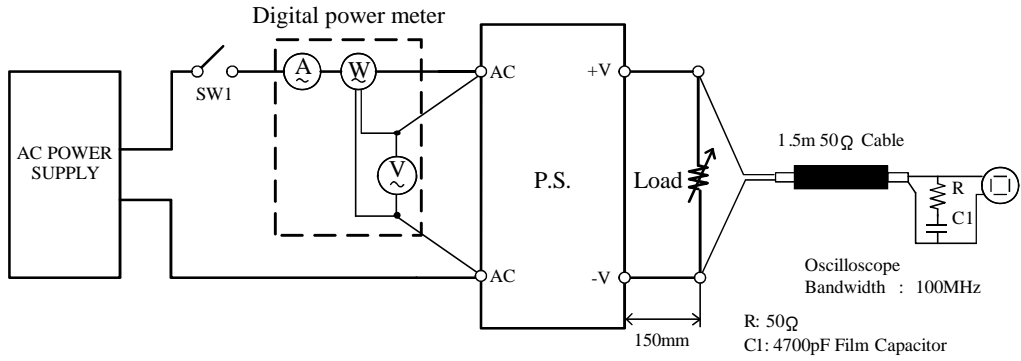


NOTE: Leakage current meter HIOKI TYPE 3156

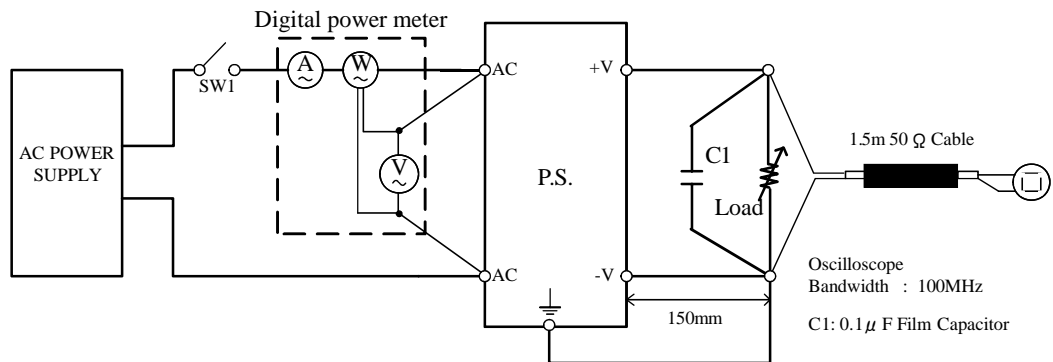
測定回路6 Circuit 6

- 出力リップル、ノイズ波形
- (a) Normal mode

Output ripple and noise waveform

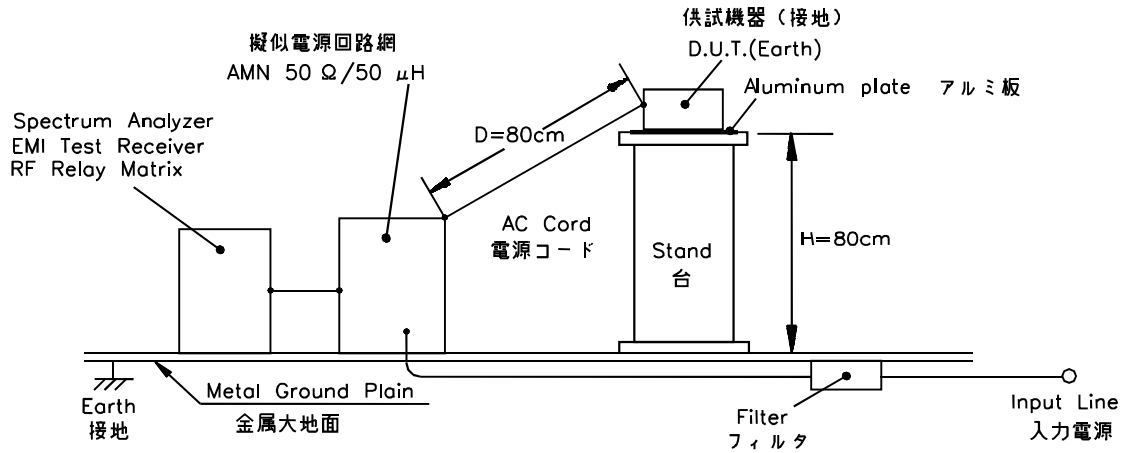


(b) Normal + Common mode

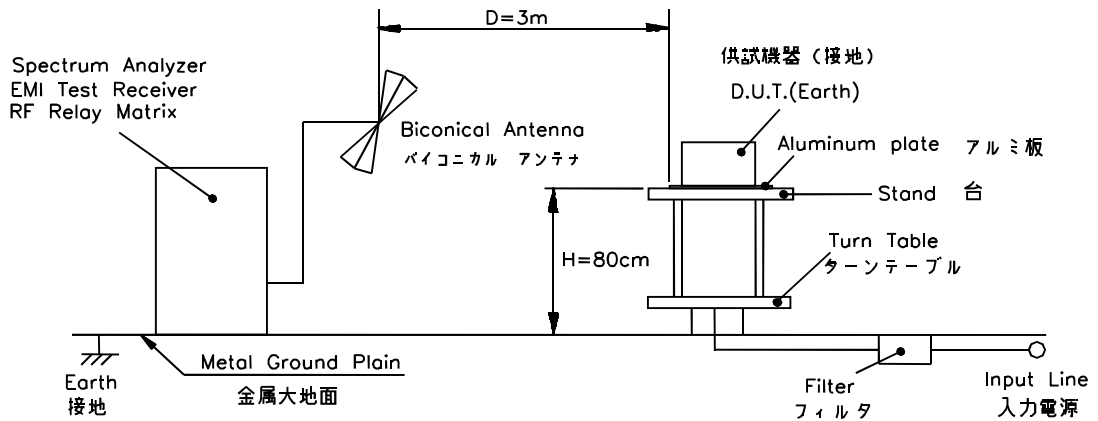


測定構成 Configuration

- EMI特性 Electro-Magnetic Interference characteristics
- (a) 雑音端子電圧 (帰還ノイズ) Conducted Emission Noise



- (b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	OSCILLOSCOPE	HITACHI	V-1100A
2	OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740EL/9040L
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
5	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK600L / 1000L
7	DUMMY LOAD	PCN	RHF250 Series
8	SLIDE REGURATOR	MATSUNAGA	SD-2450
9	AC POWER SUPPLY	KIKUSUI	PCR-4000L
10	AC POWER SUPPLY	TAKASAGO	AA2000XG
11	LEAKAGE CURRENT METER	HIOKI	3156
12	CONTROLLED TEMP. CHAMBER	TABAI ESPEC	SU-641
13	SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESPI3
14	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
15	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
16	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
17	AMN	KYORITU DENSHI	KNW-242
18	ANTENA(BICONICAL ANTENA)	SCHWARZBECK	BBA9106

1.3 評価負荷条件 Load condition

Output	Load conditions		
	24V	36V	48V
	Io(A)		
100%	12.5	8.4	6.3
100VAC_Peak Load	21	14	10.5
200VAC_Peak Load	42	28	21

2. 特性データ

Characteristics

2.1 静特性 Steady state data

(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift

24V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	23.961V	23.959V	23.959V	23.959V	2mV	0.008%
50%	23.959V	23.957V	23.958V	23.958V	2mV	0.008%
100%	23.957V	23.955V	23.956V	23.957V	2mV	0.008%
load	4mV	4mV	3mV	2mV		
regulation	0.017%	0.017%	0.013%	0.008%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	23.860V	23.955V	24.004V	144mV	0.600%

36V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	36.003V	35.999V	35.998V	35.999V	5mV	0.014%
50%	36.001V	35.996V	35.998V	35.998V	5mV	0.014%
100%	35.999V	35.995V	35.996V	35.997V	4mV	0.011%
load	4mV	4mV	2mV	2mV		
regulation	0.011%	0.011%	0.006%	0.006%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	35.843V	35.995V	36.101V	258mV	0.717%

48V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	47.976V	47.973V	47.972V	47.973V	4mV	0.008%
50%	47.973V	47.971V	47.971V	47.971V	2mV	0.004%
100%	47.970V	47.968V	47.969V	47.968V	2mV	0.004%
load	6mV	5mV	3mV	5mV		
regulation	0.013%	0.010%	0.006%	0.010%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	47.787V	47.968V	48.074V	287mV	0.598%

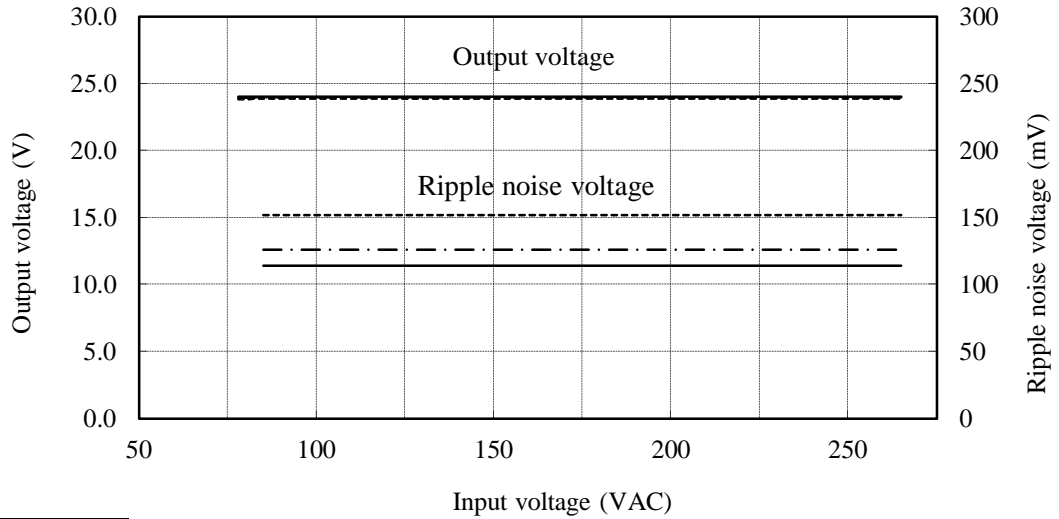
(2) 出力電圧・リップルノイズ電圧対入力電圧

Output voltage and Ripple noise voltage vs. Input voltage

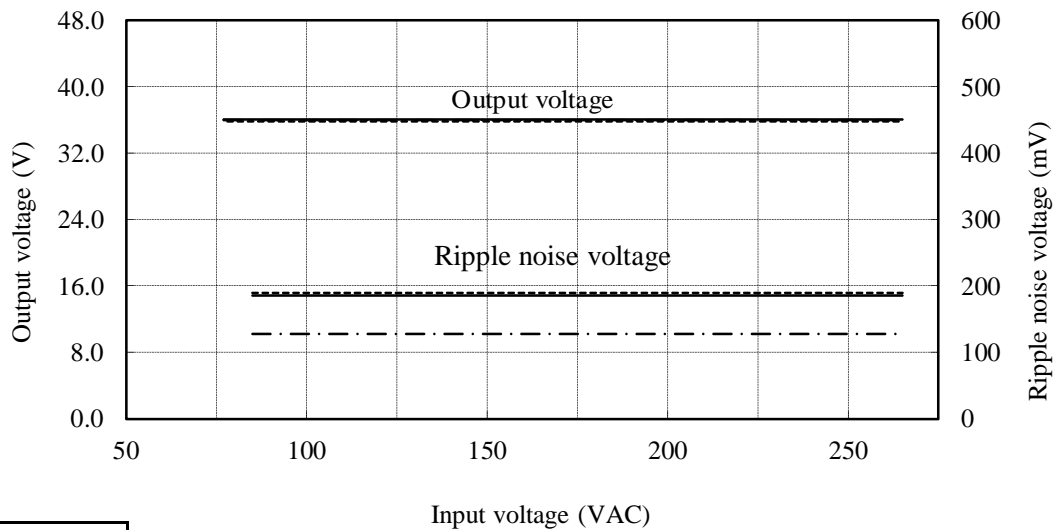
Conditions

Iout : 100 %
 Ta : -10 °C -----
 25 °C -.-.-.-
 50 °C _____

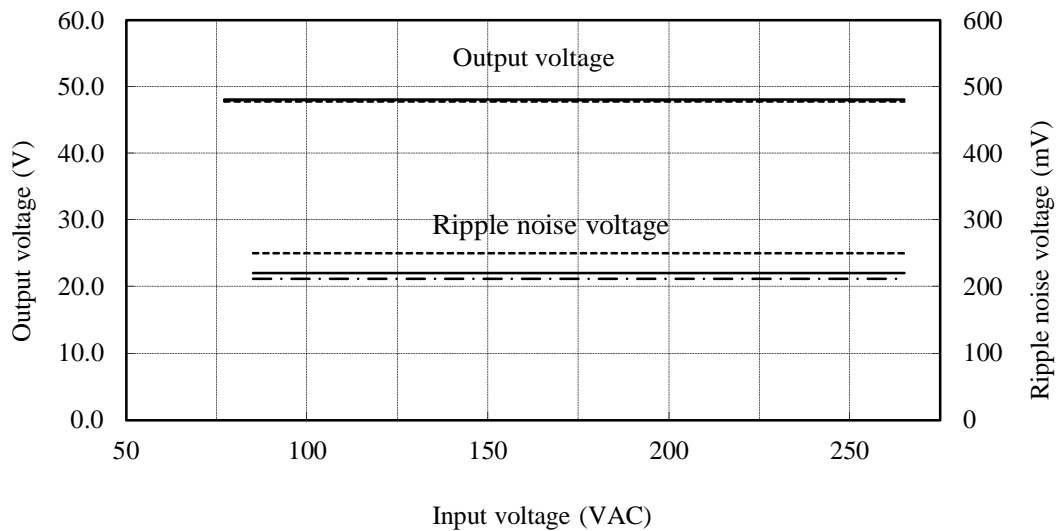
24V



36V



48V

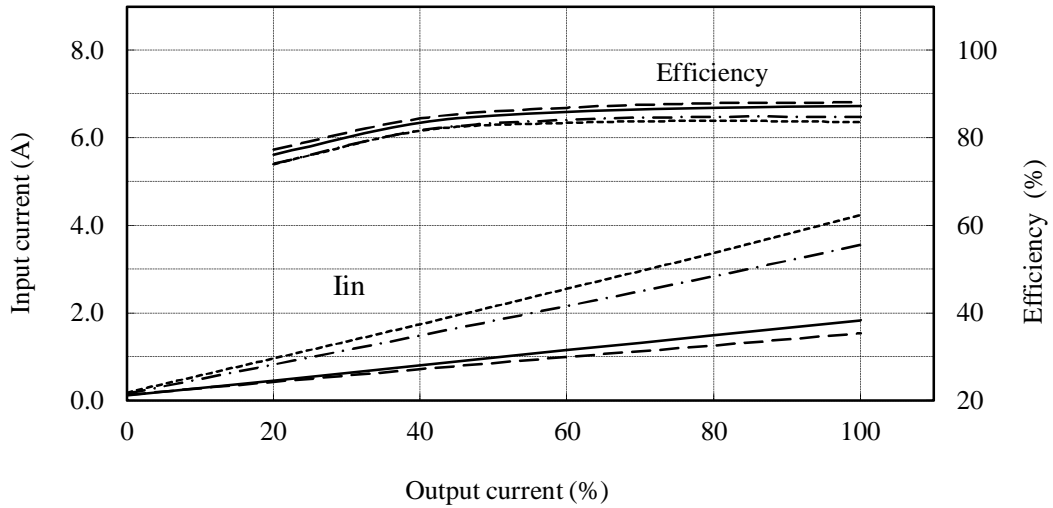


(3) 効率・入力電流対出力電流

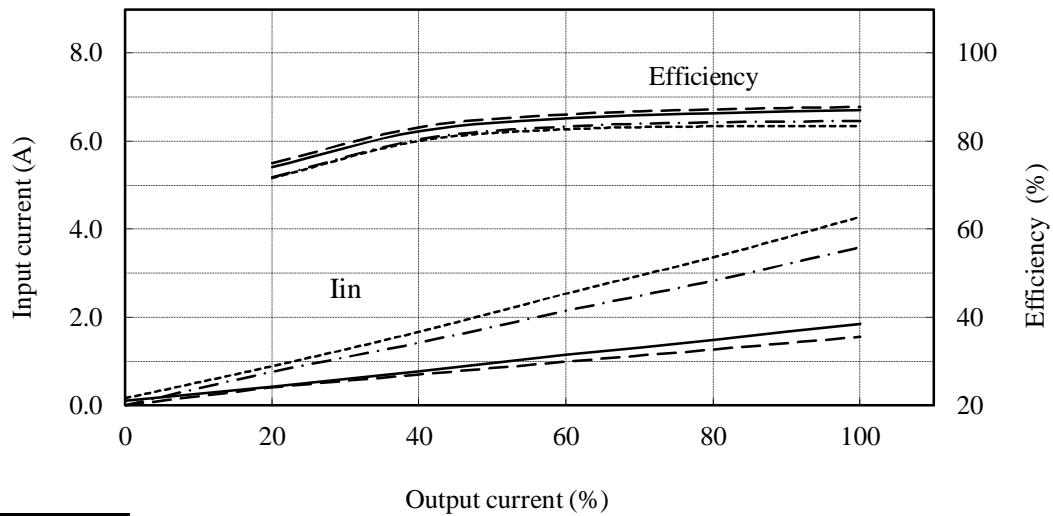
Efficiency and Input current vs. Output current

Conditions Vin : 85 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 Ta : 25 °C

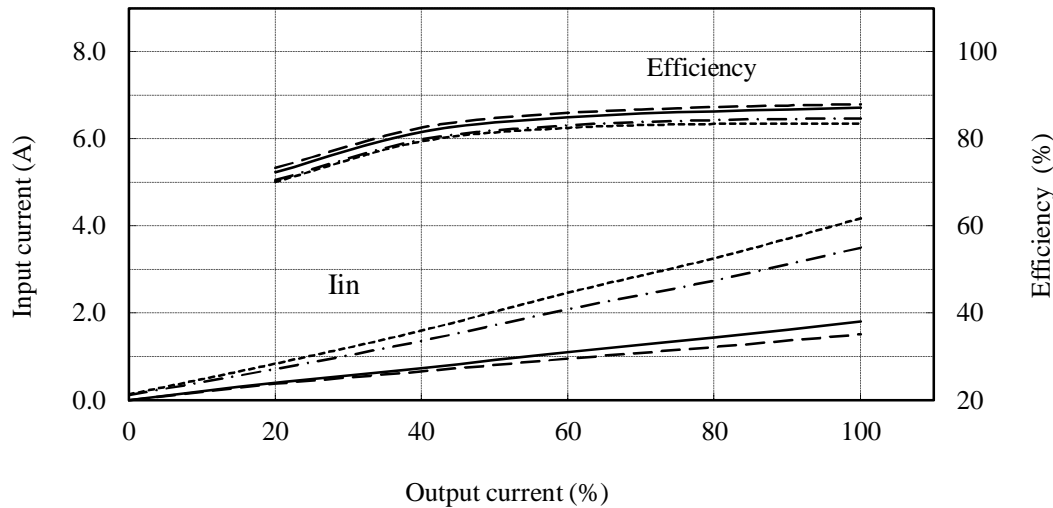
24V



36V



48V

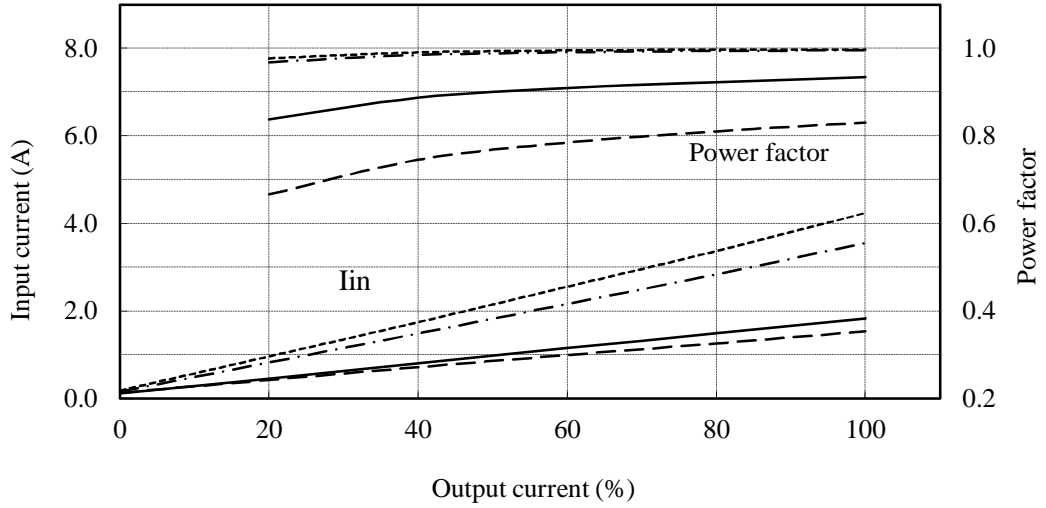


(4) 力率・入力電流対出力電流

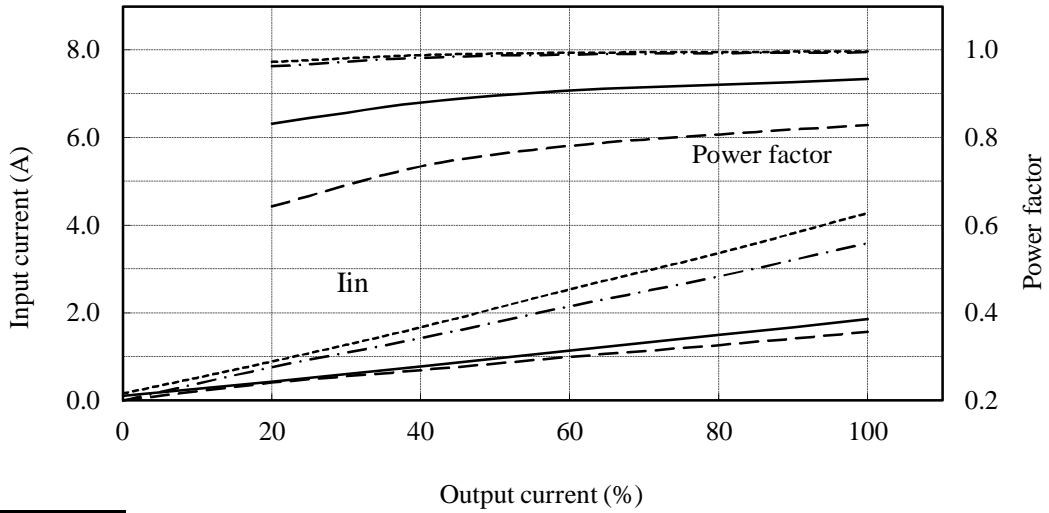
Power factor and Input current vs. Output current

Conditions Vin : 85 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 Ta : 25 °C

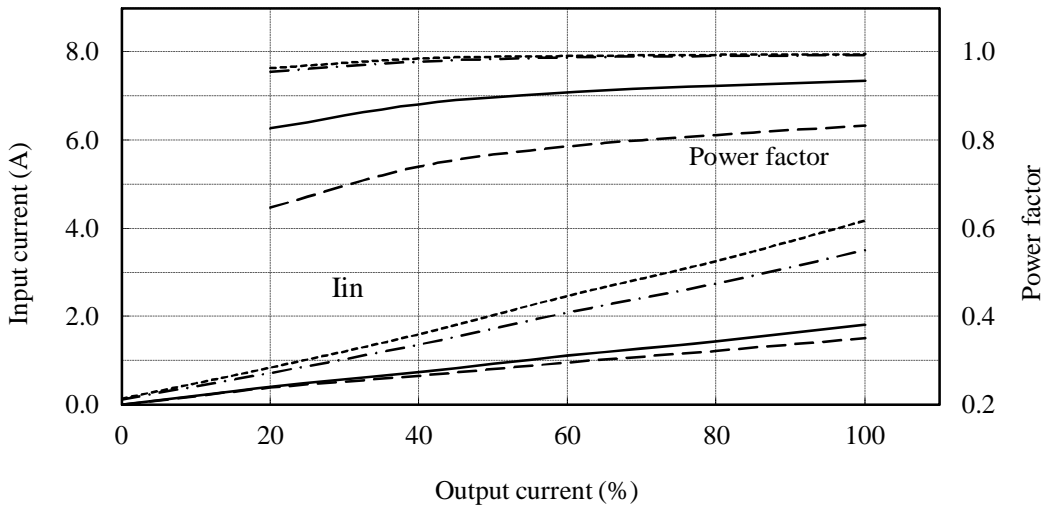
24V



36V



48V



2.2 通電ドリフト特性

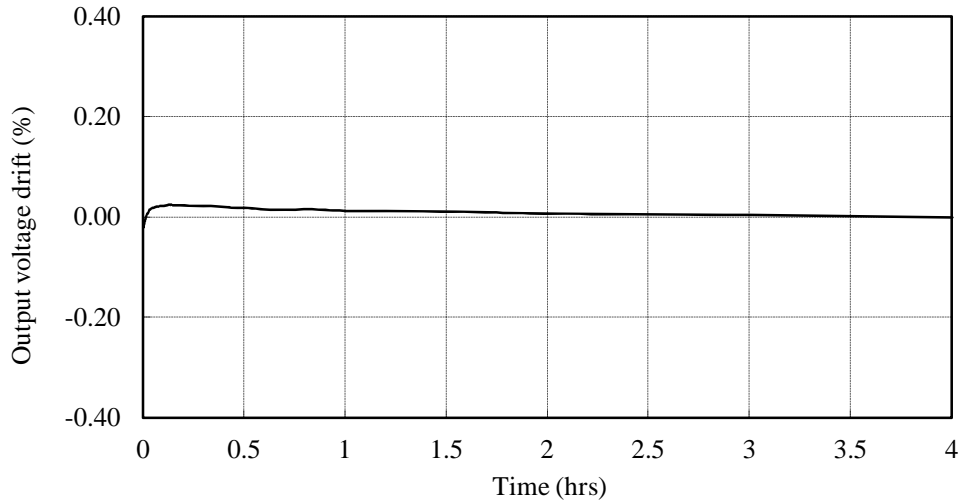
Warm up voltage drift characteristics

Conditions V_{in} : 100 VAC

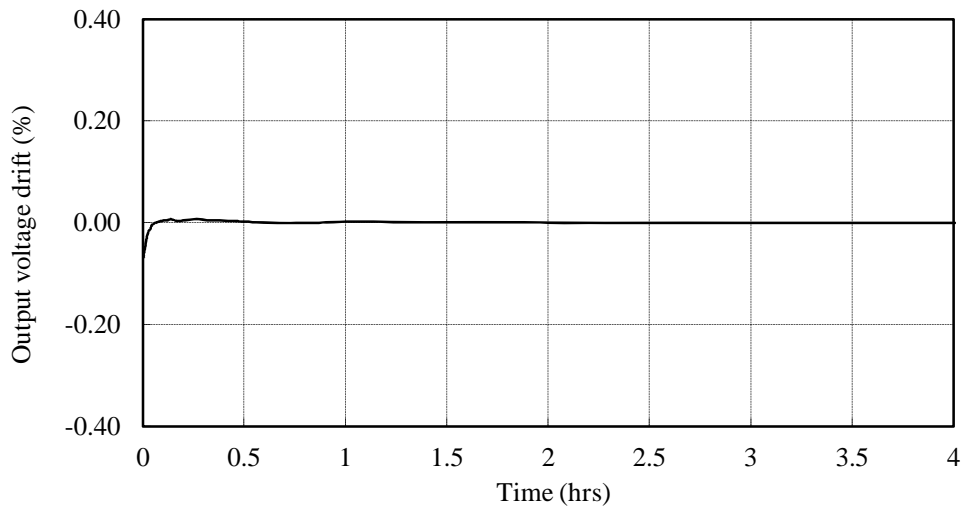
I_{out} : 100 %

T_a : 25 °C

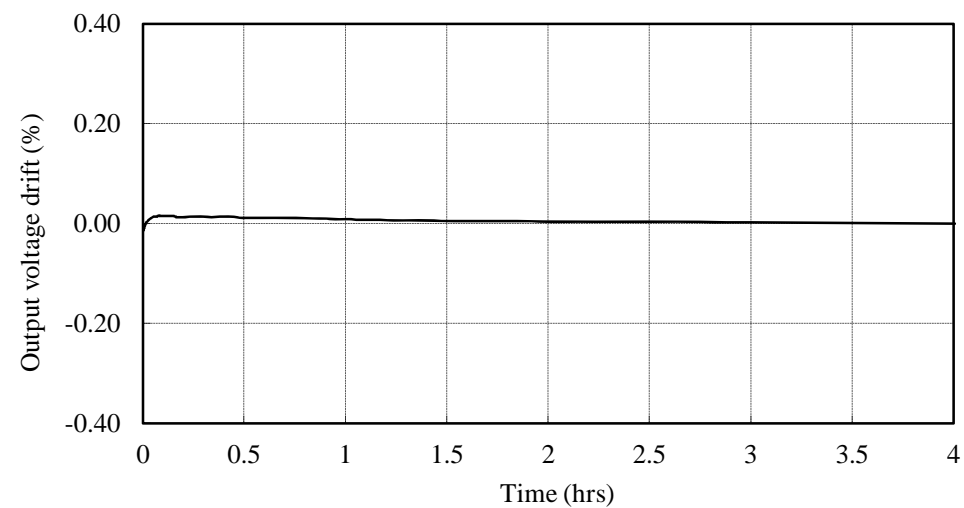
24V



36V



48V



2.3 過電流保護特性

Over current protection (OCP) characteristics

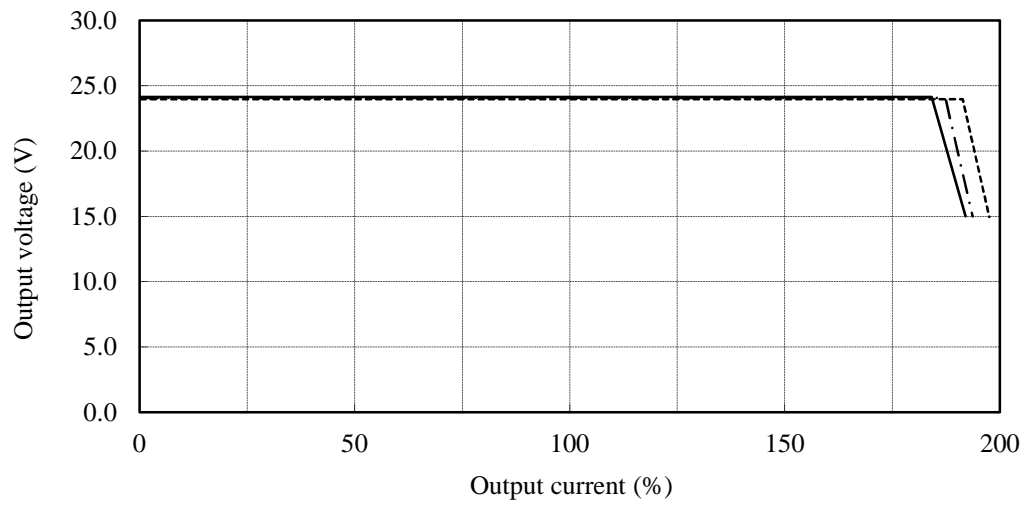
Conditions V_{in} : 100 VAC

T_a : -10 °C -----

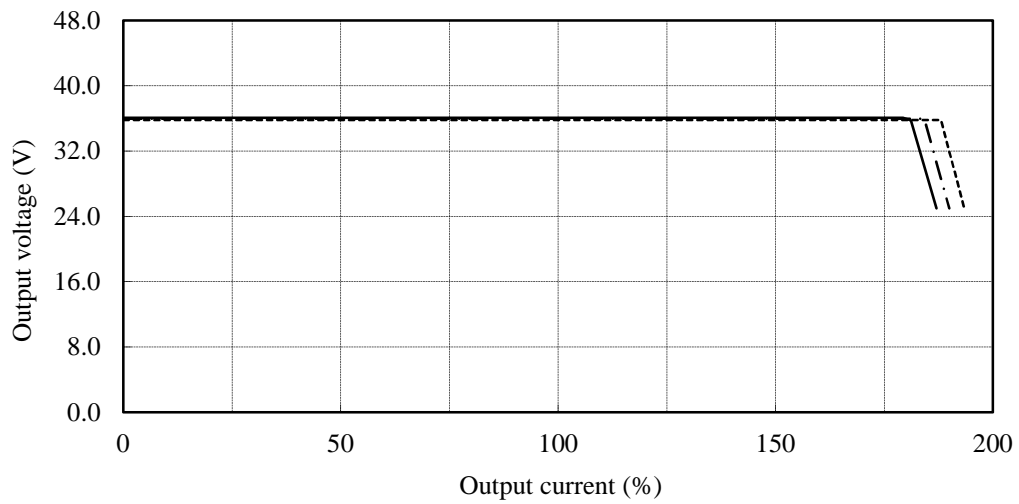
25 °C - · - · -

50 °C _____

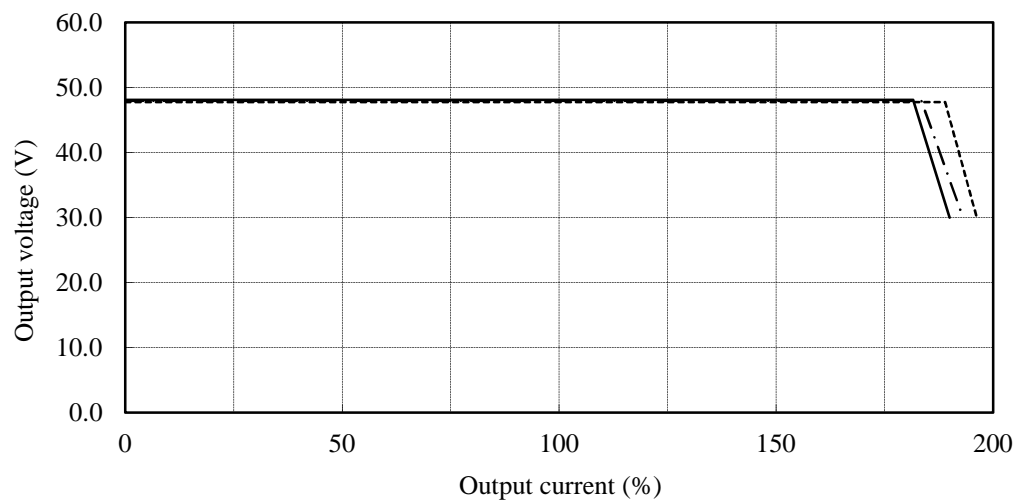
24V



36V



48V



2.3 過電流保護特性

Over current protection (OCP) characteristics

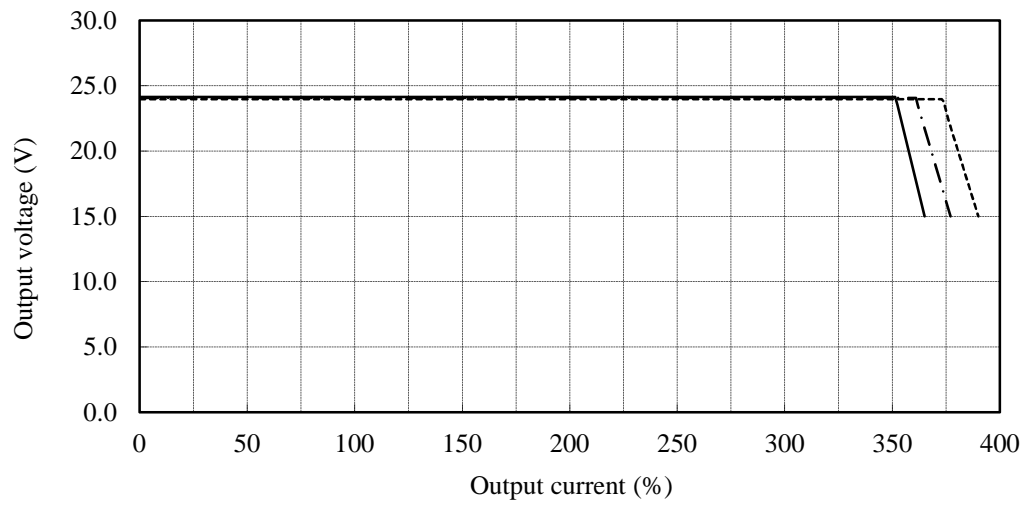
Conditions V_{in} : 200 VAC

T_a : -10 °C -----

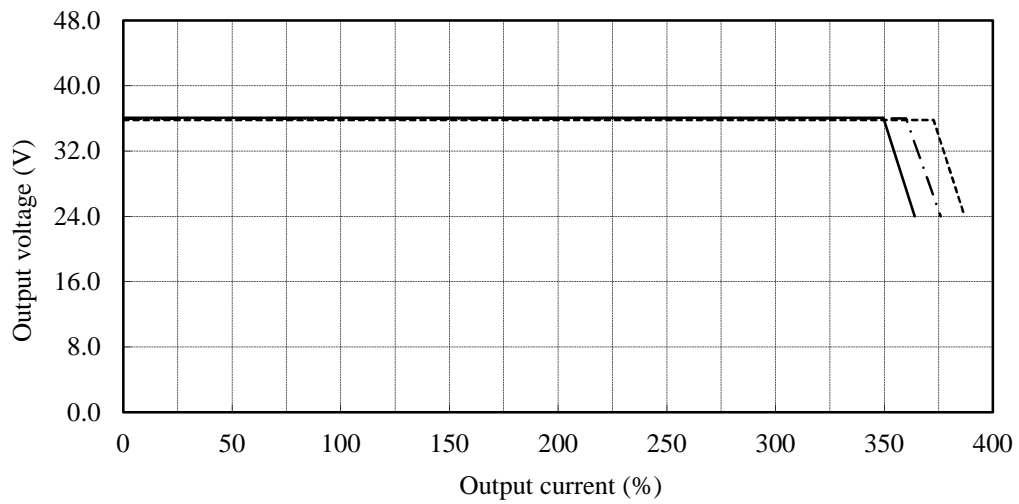
25 °C - · - · -

50 °C _____

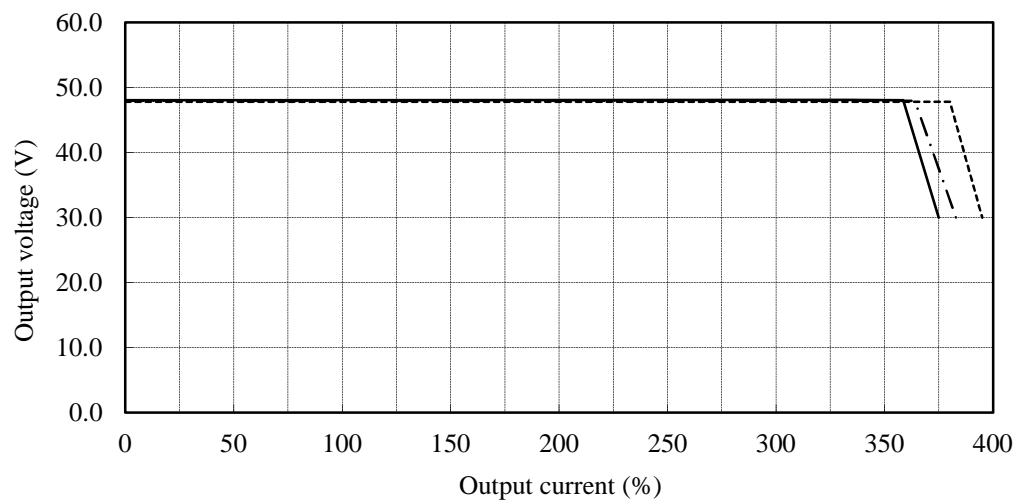
24V



36V



48V

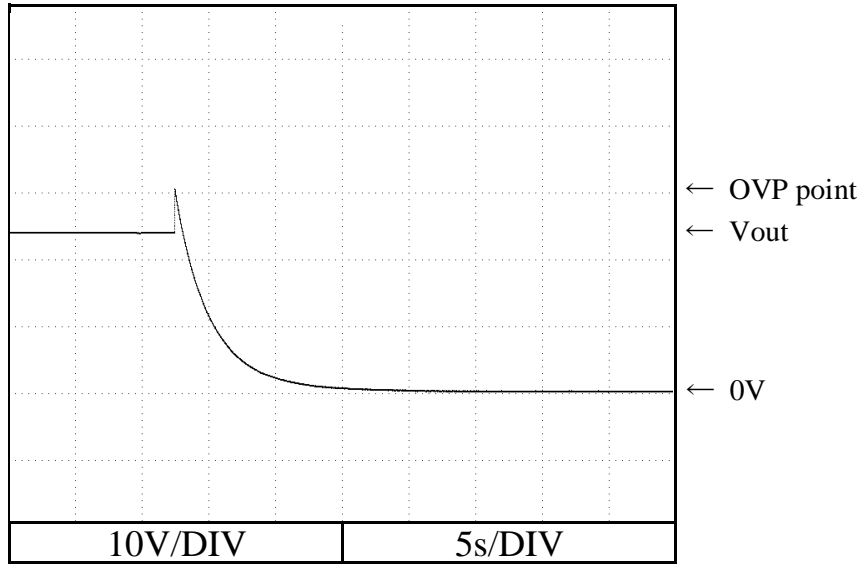


2.4 過電圧保護特性

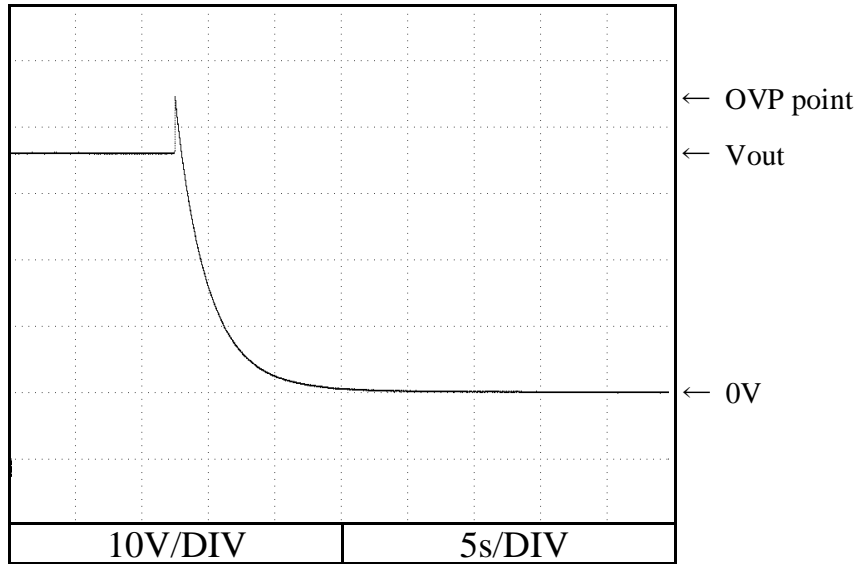
Over voltage protection (OVP) characteristic:

Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 °C

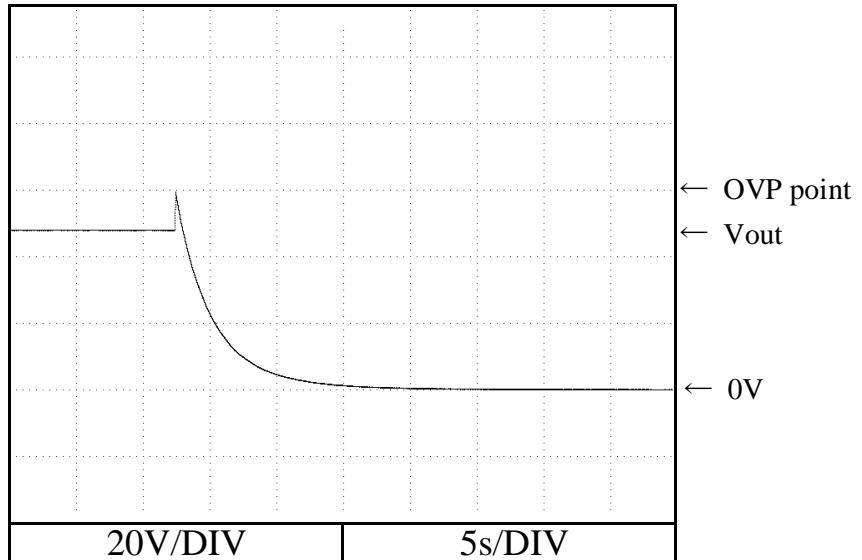
24V



36V



48V

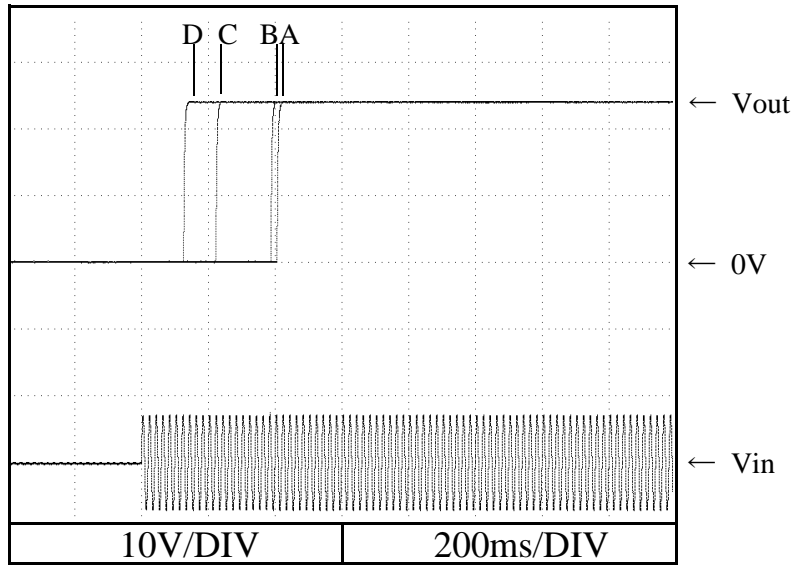


2.5 出力立ち上がり特性

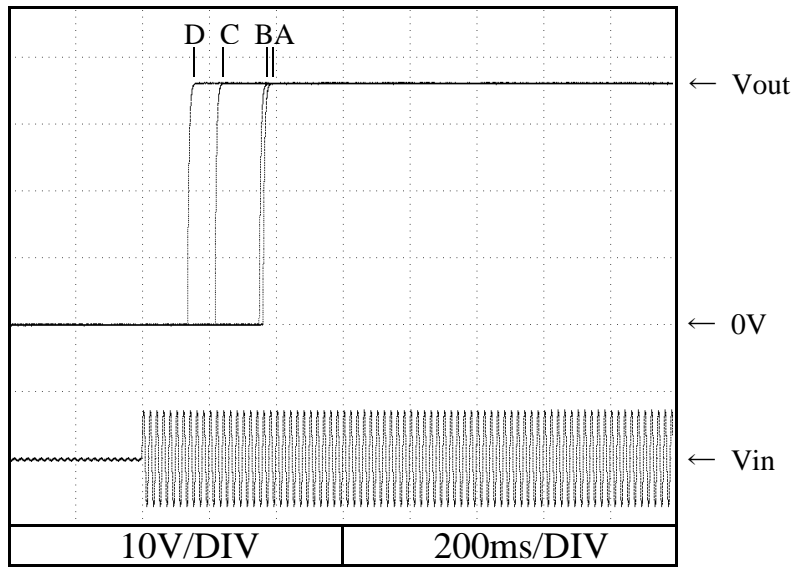
Output rise characteristics

Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Iout : 0 %
Ta : 25 °C

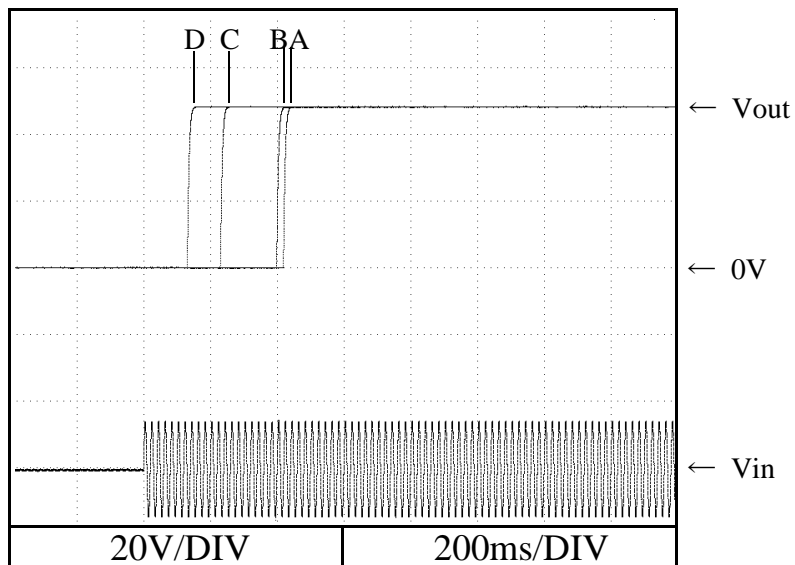
24V



36V



48V

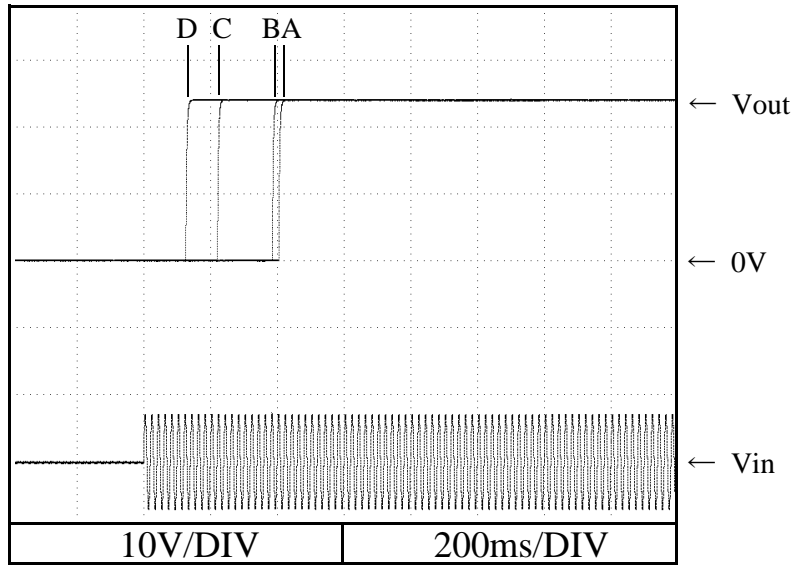


2.5 出力立ち上がり特性

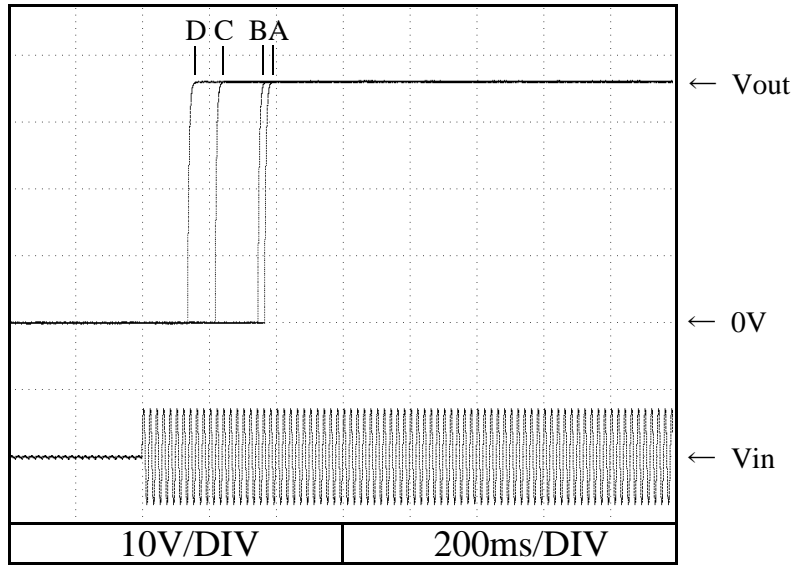
Output rise characteristics

Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Iout : 100 %
Ta : 25 °C

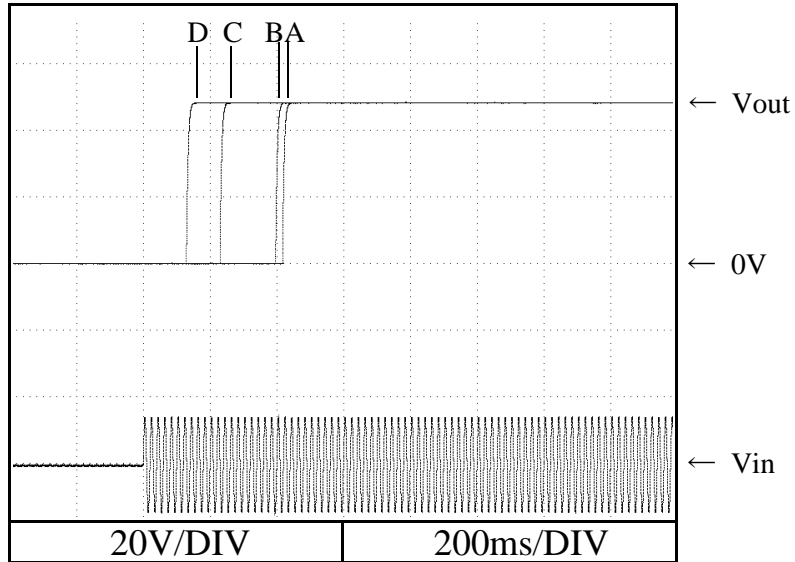
24V



36V



48V

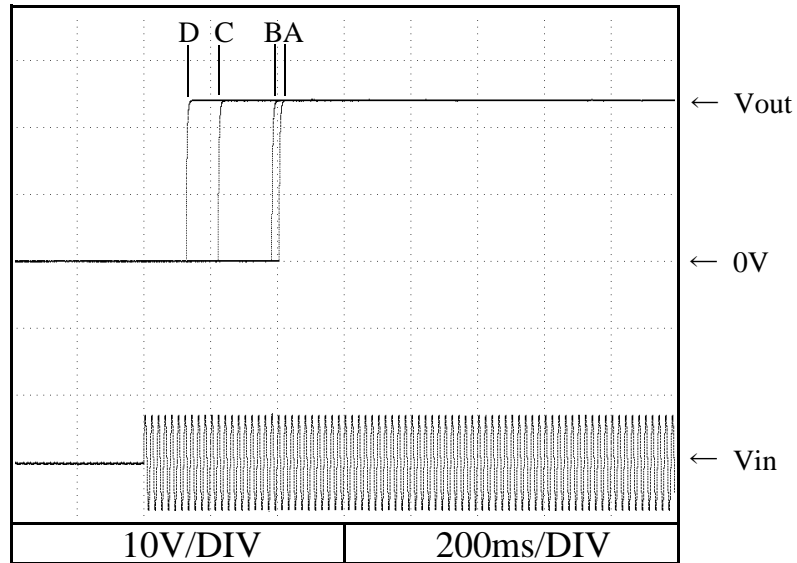


2.5 出力立ち上がり特性

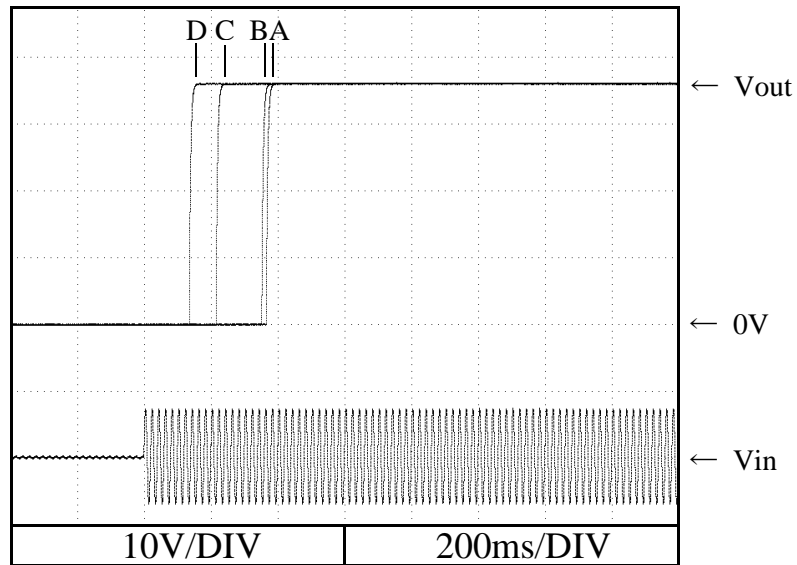
Output rise characteristics

Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Iout : Peak load
Ta : 25 °C

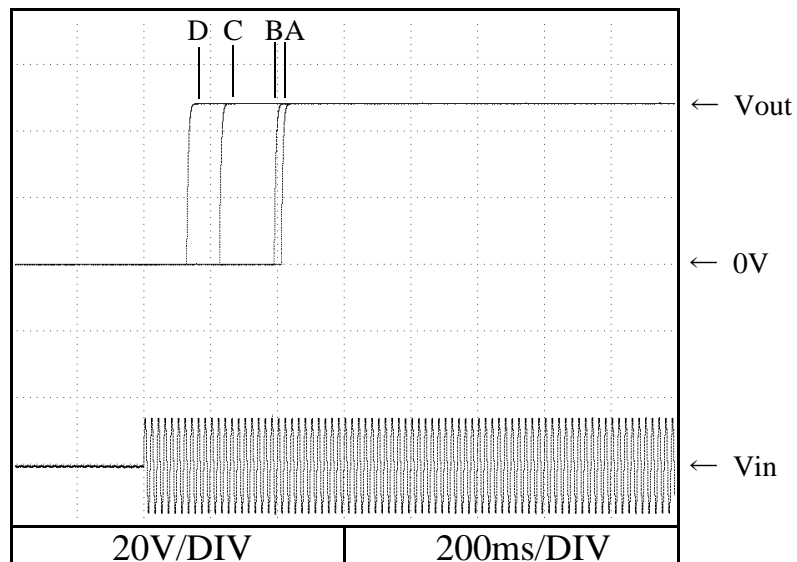
24V



36V



48V

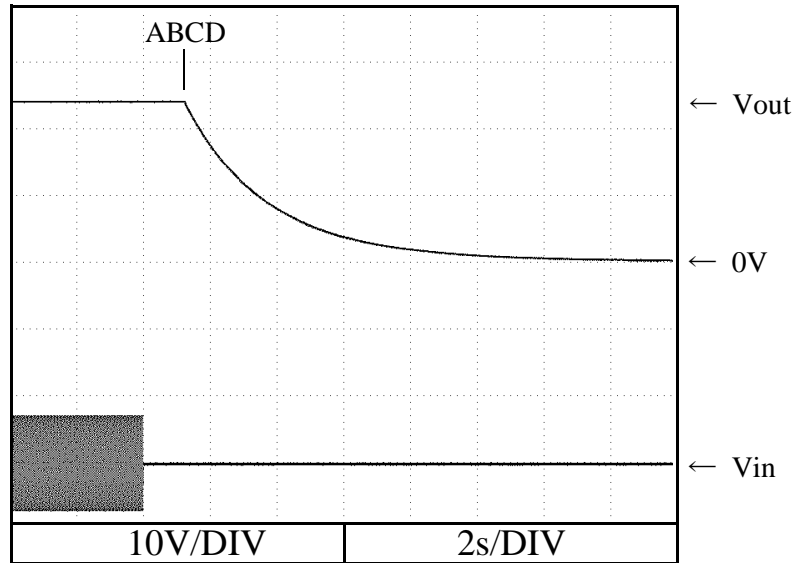


2.6 出力立ち下がり特性

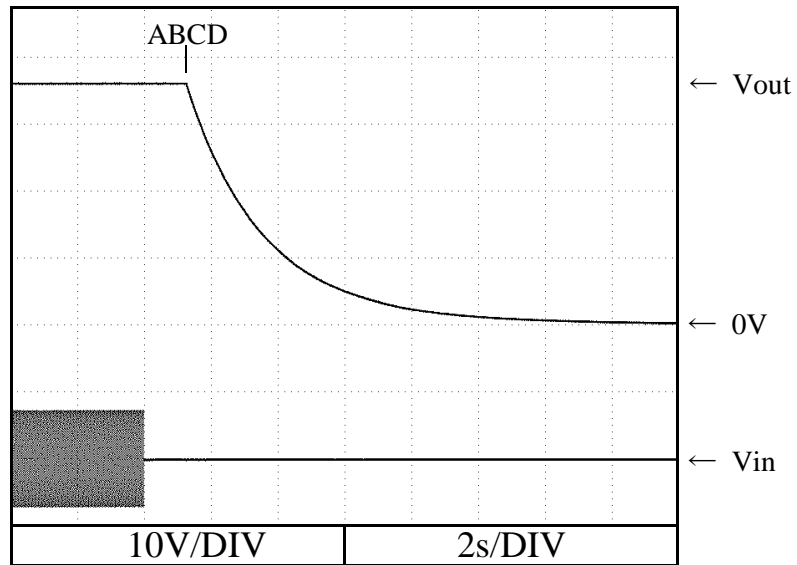
Output fall characteristics

Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Iout : 0 %
Ta : 25 °C

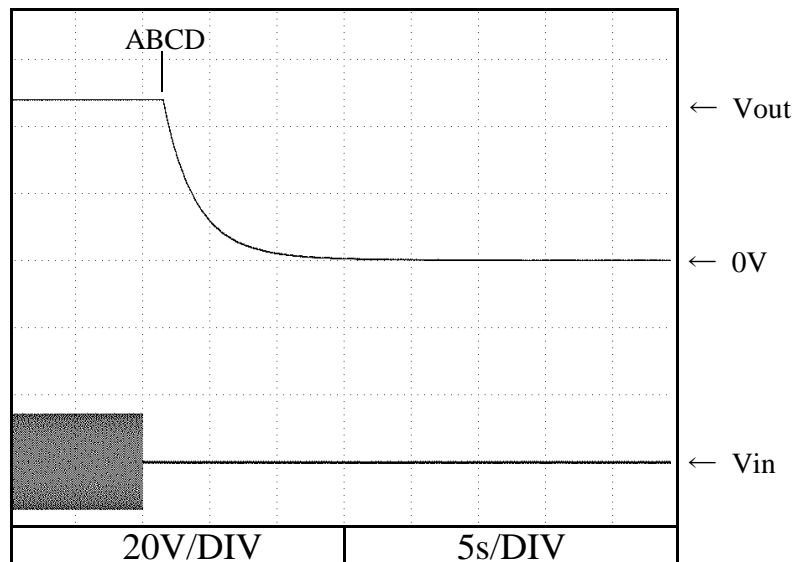
24V



36V



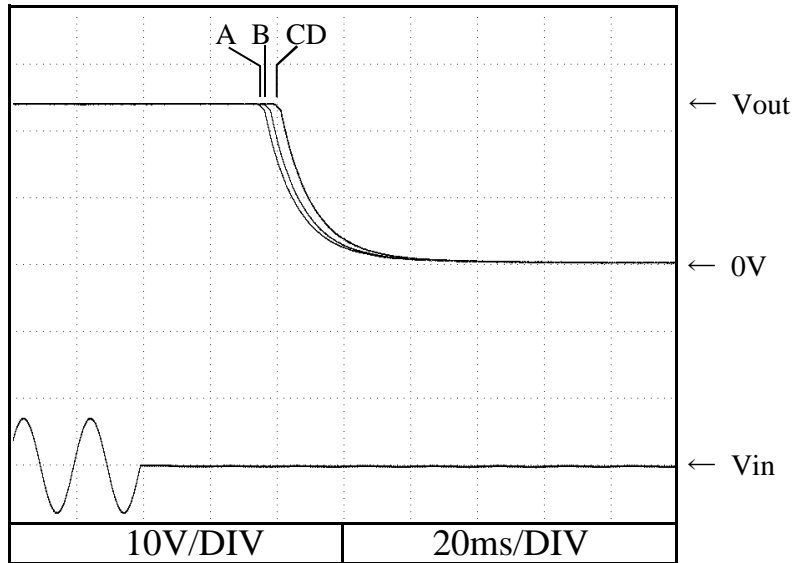
48V



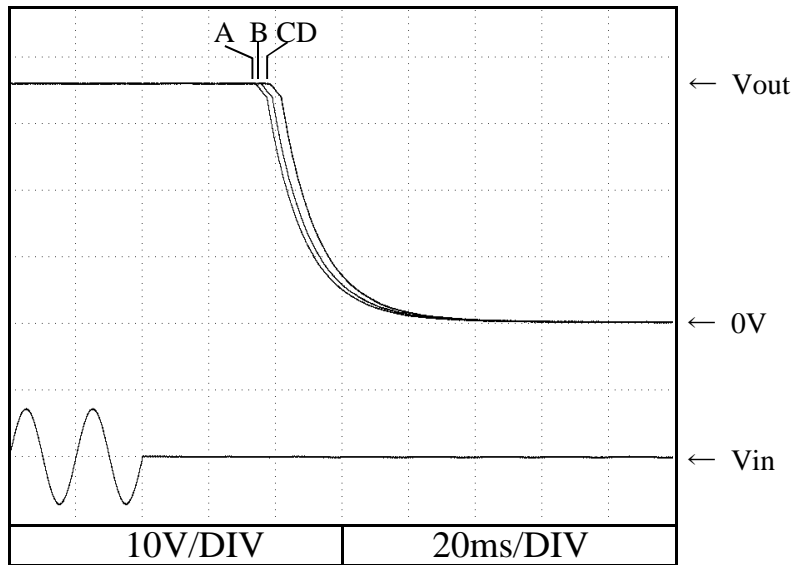
2.6 出力立ち下がり特性
Output fall characteristics

Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Iout : 100 %
Ta : 25 °C

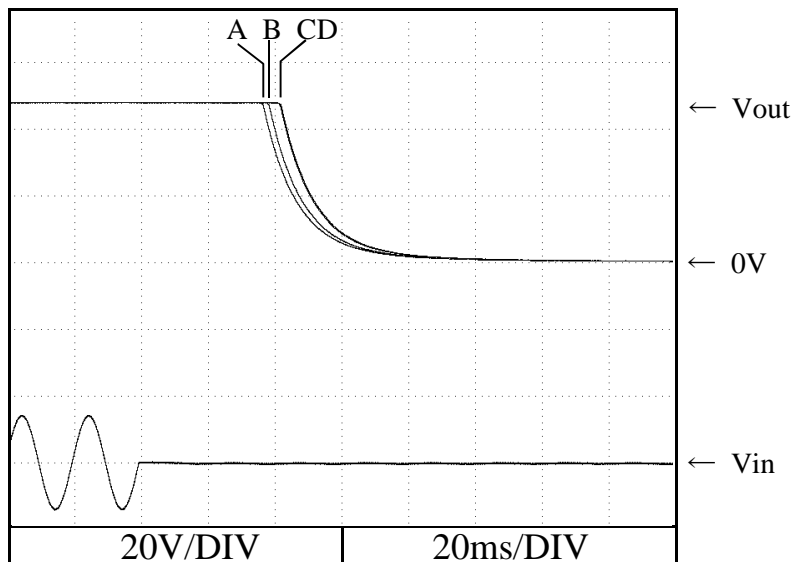
24V



36V



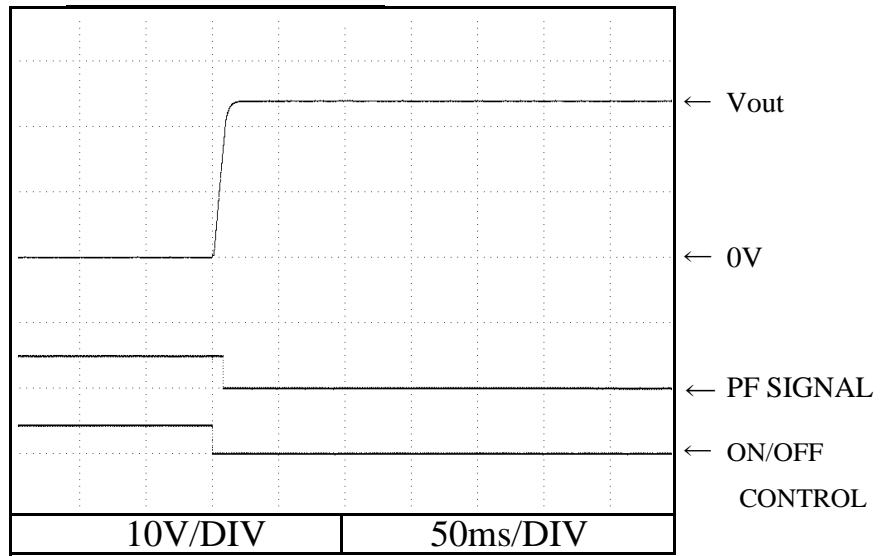
48V



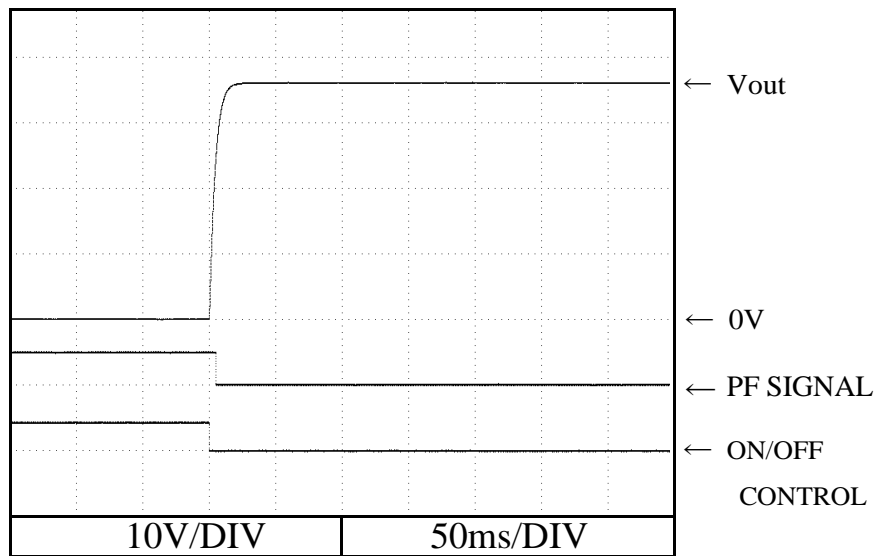
2.7 ON/OFFコントロール時出力立ち上がり特性
Output rise characteristics with ON/OFF Control

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

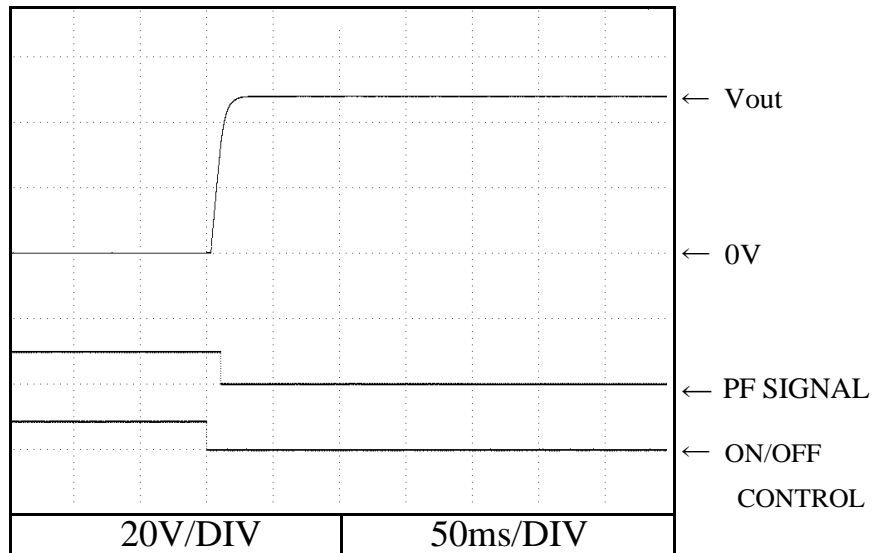
24V



36V



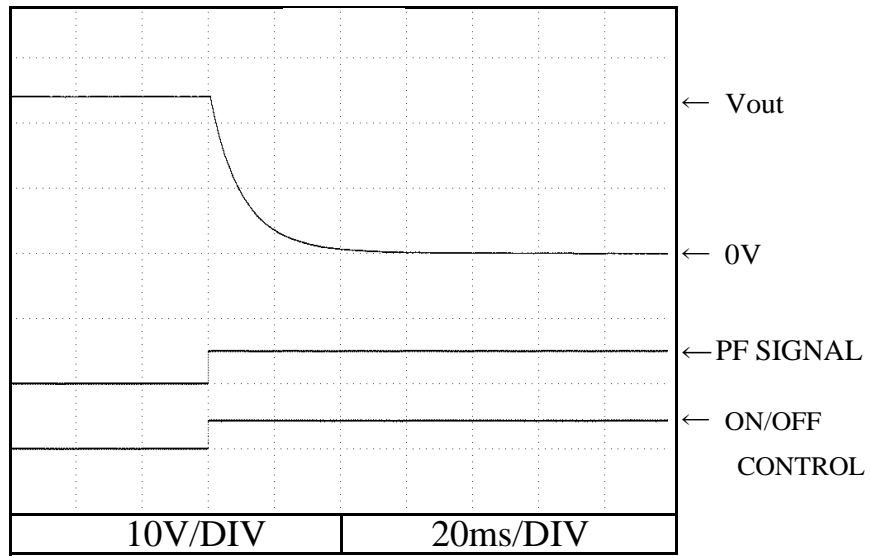
48V



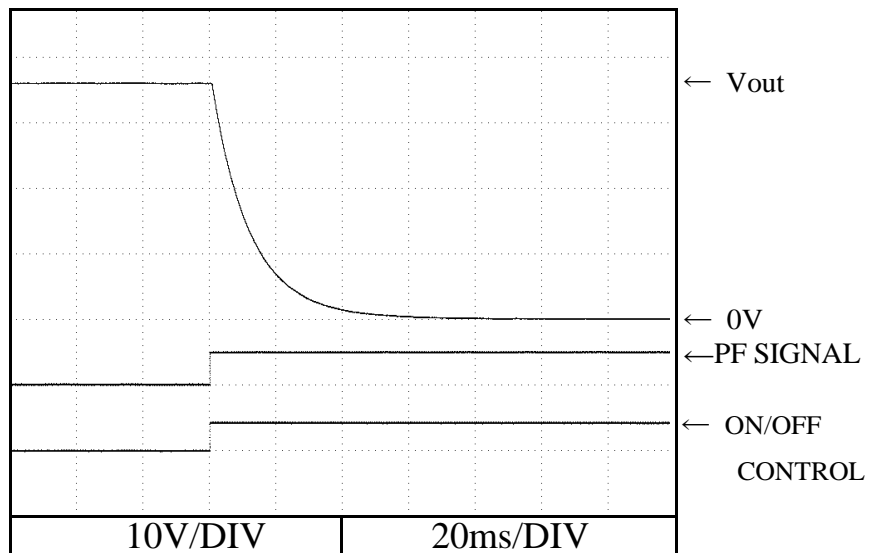
2.8 ON/OFFコントロール時出力立ち下がり特性 Output fall characteristics with ON/OFF Control

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

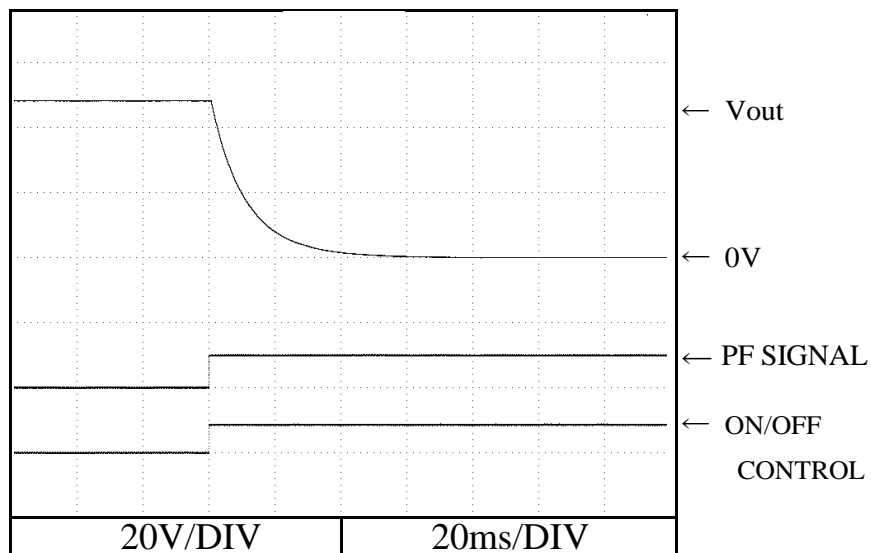
24V



36V



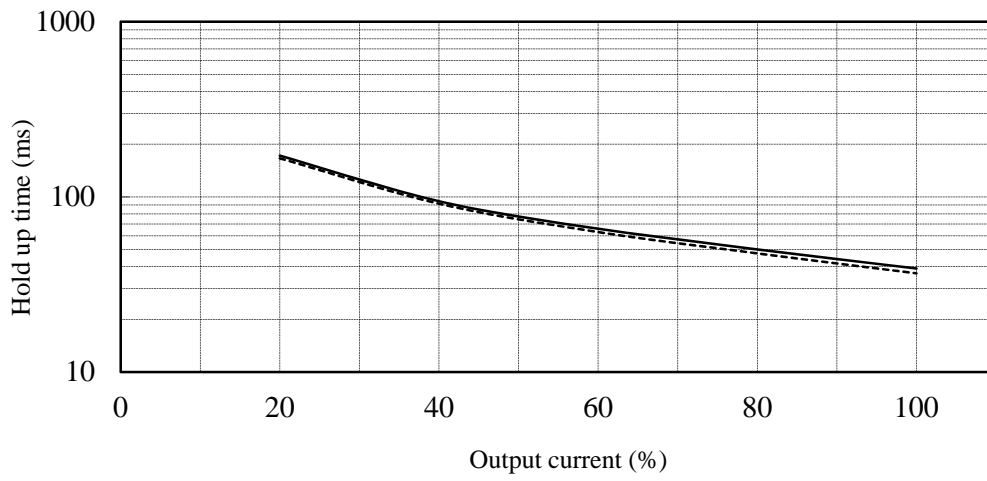
48V



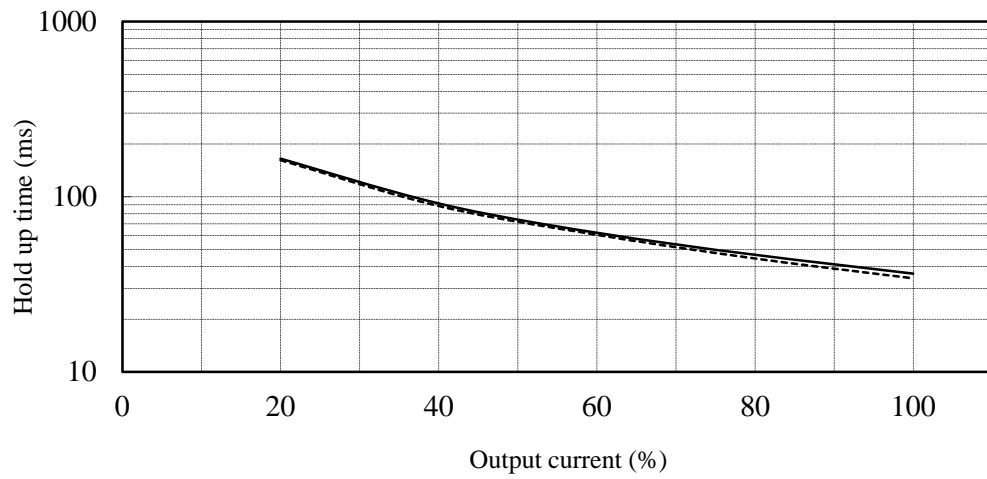
2.9 出力保持時間特性 Hold up time characteristics

Conditions V_{in} : 100 VAC -----
 200 VAC —
 T_a : 25 °C

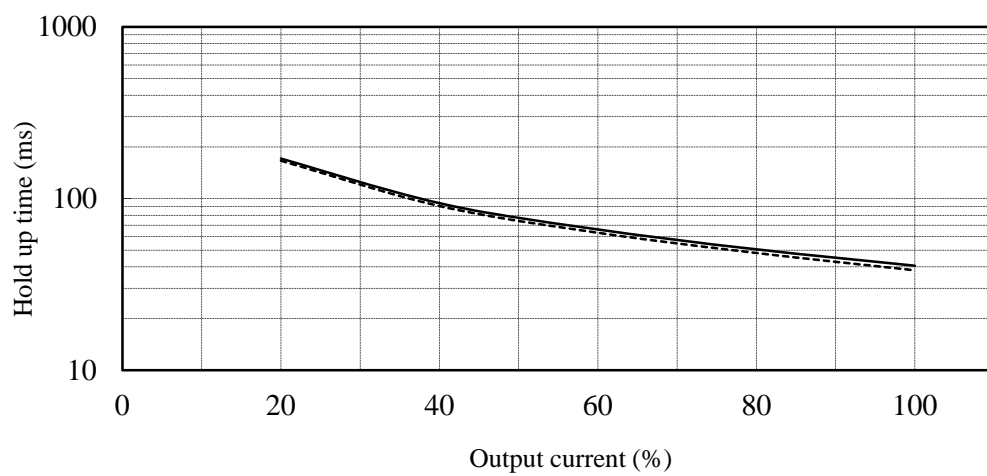
24V



36V



48V

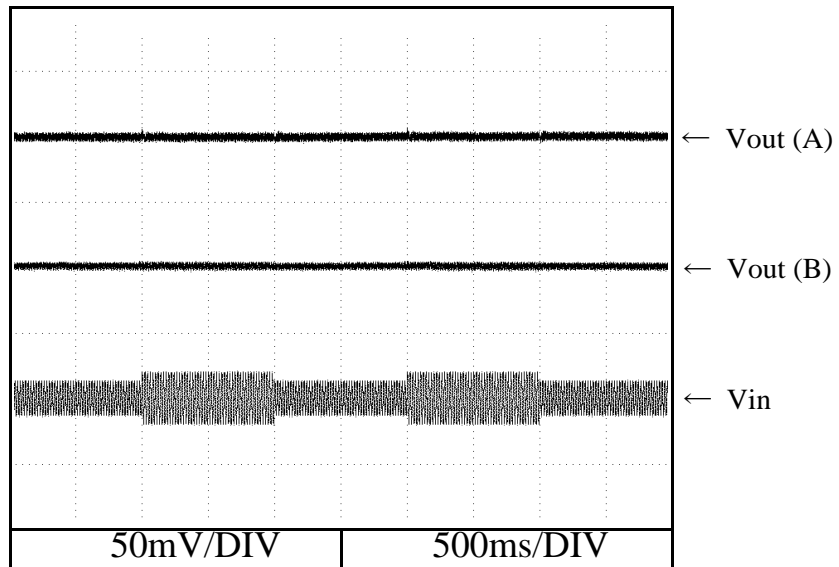


2.10 過渡応答 (入力急変) 特性

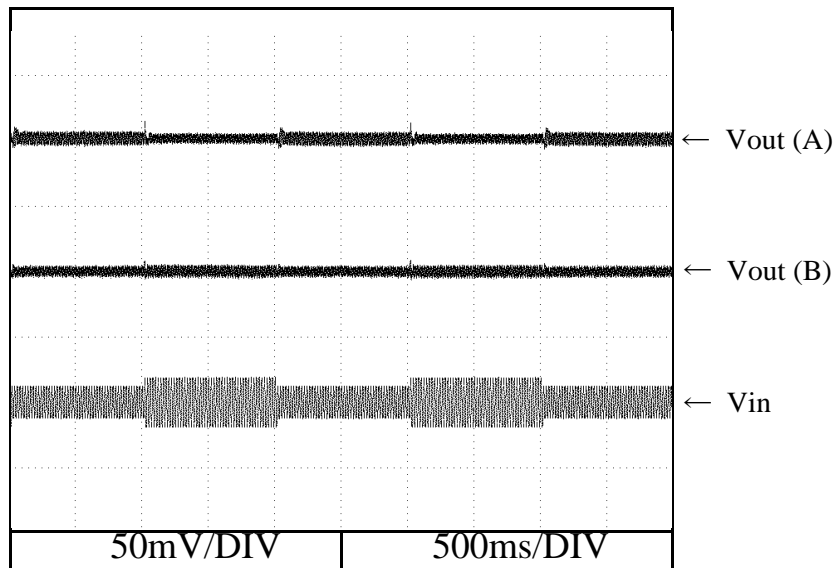
Dynamic line response characteristics

Conditions Vin : 85 VAC \longleftrightarrow 132VAC (A)
170 VAC \longleftrightarrow 265VAC (B)
Iout : 100 %
Ta : 25 °C

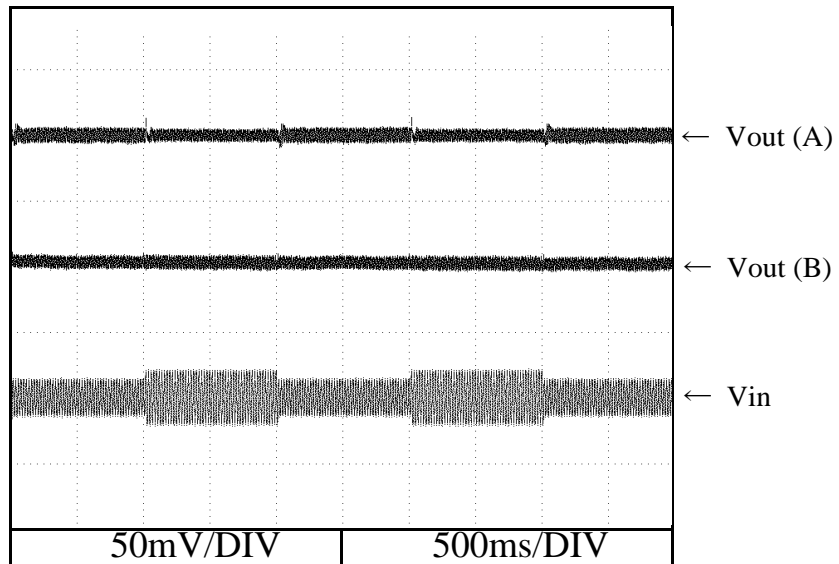
24V



36V



48V

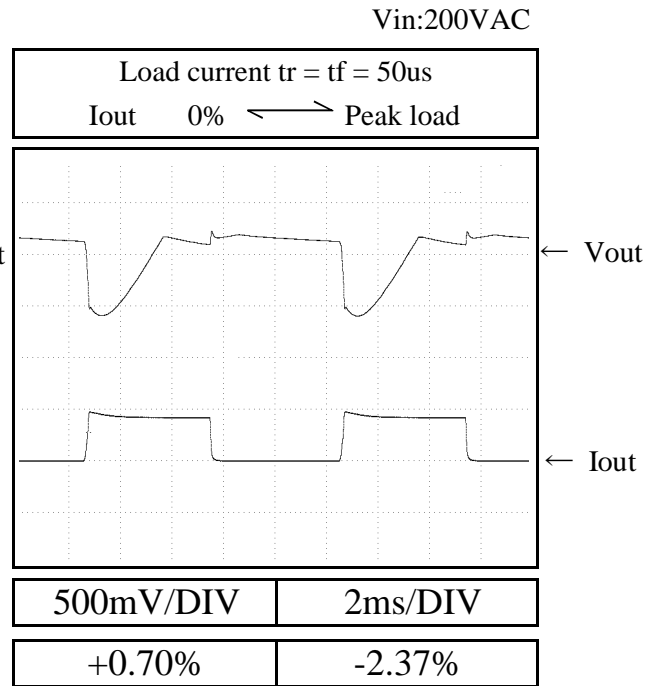
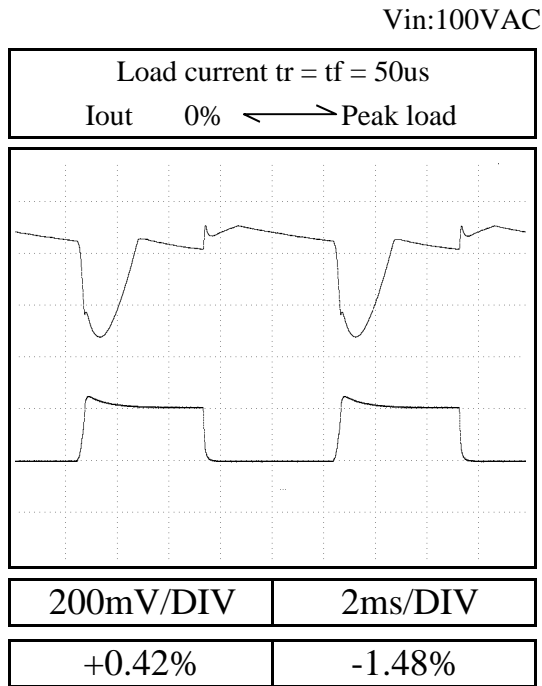


2.11 過渡応答（負荷急変）特性
Dynamic load response characteristics

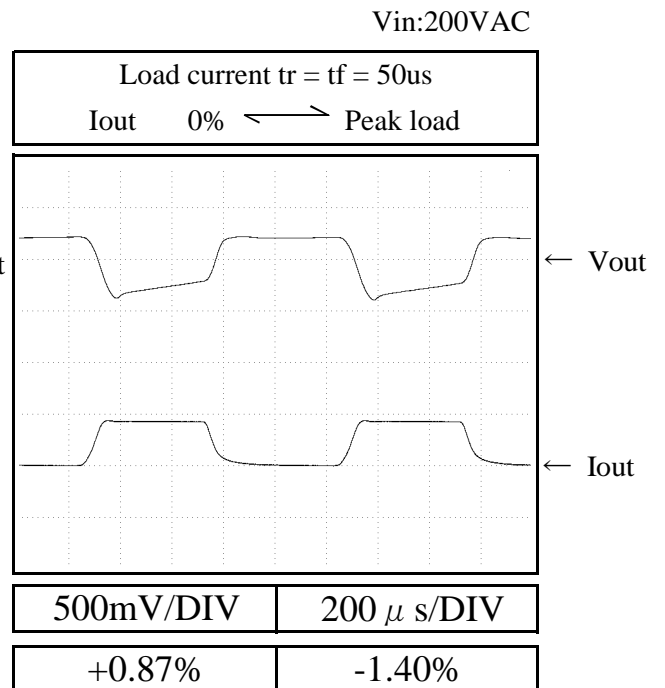
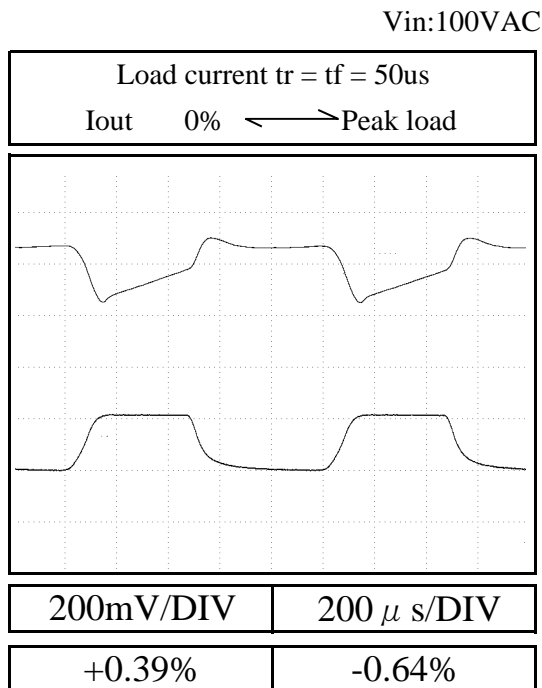
Conditions Ta : 25 °C

24V

f=100Hz



f=1kHz

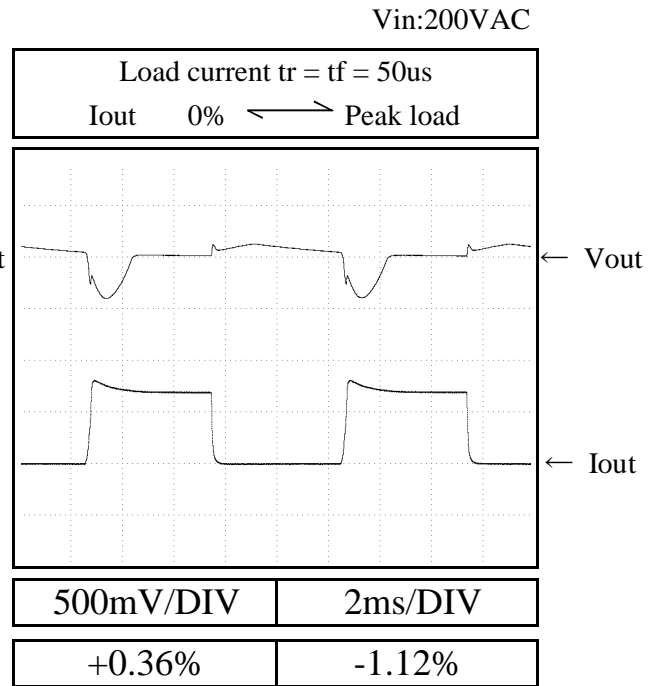
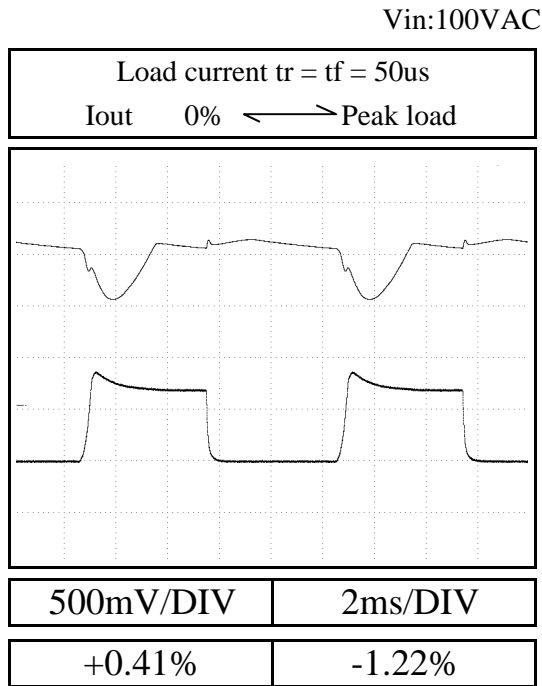


2.11 過渡応答（負荷急変）特性
Dynamic load response characteristics

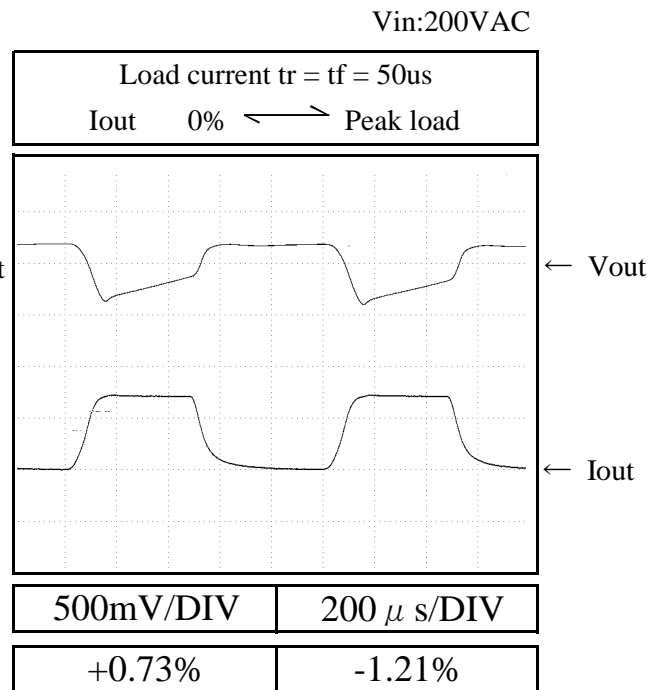
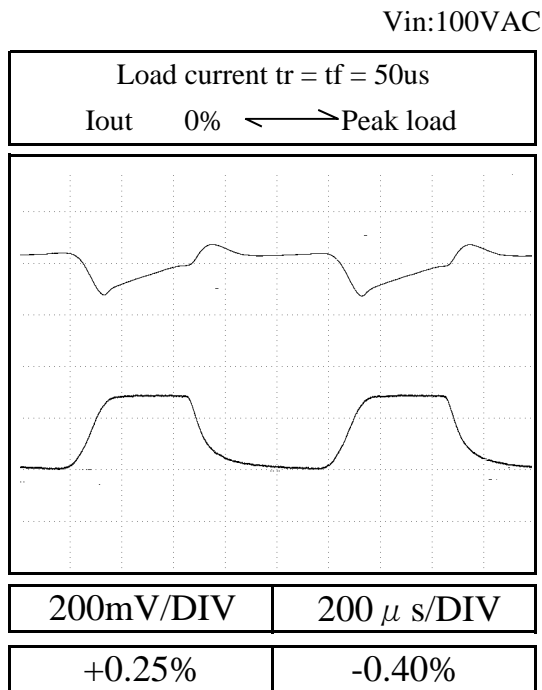
Conditions Ta : 25 °C

36V

f=100Hz



f=1kHz

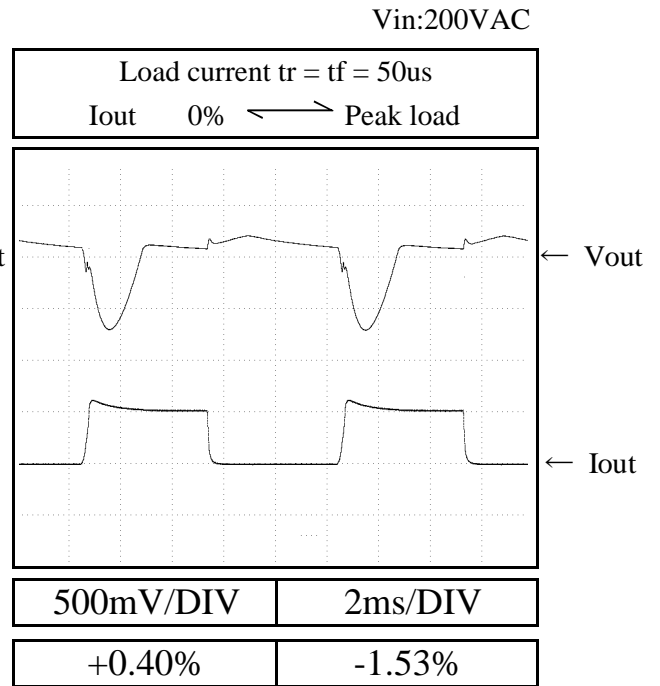
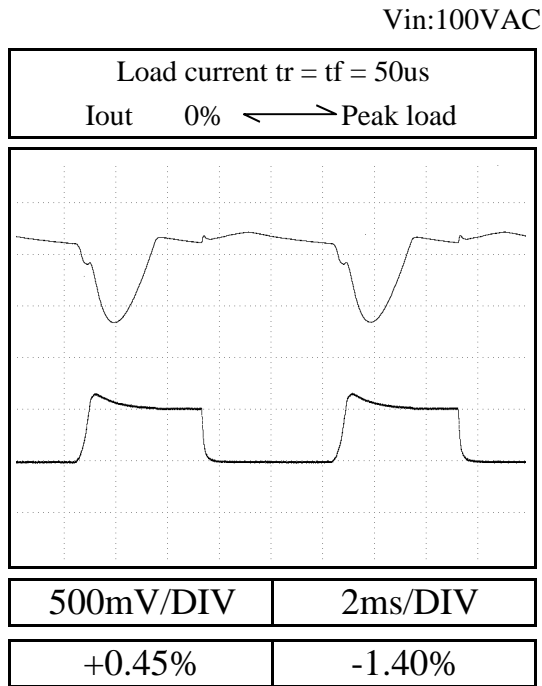


2.11 過渡応答（負荷急変）特性
Dynamic load response characteristics

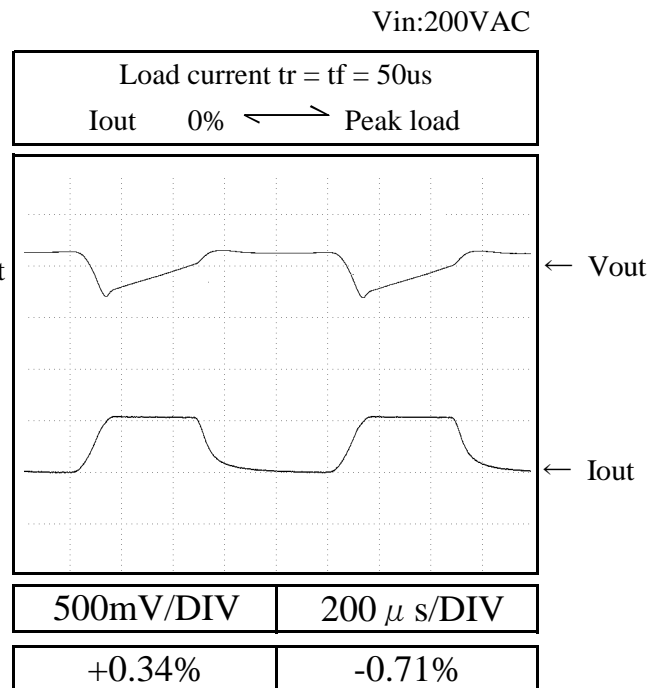
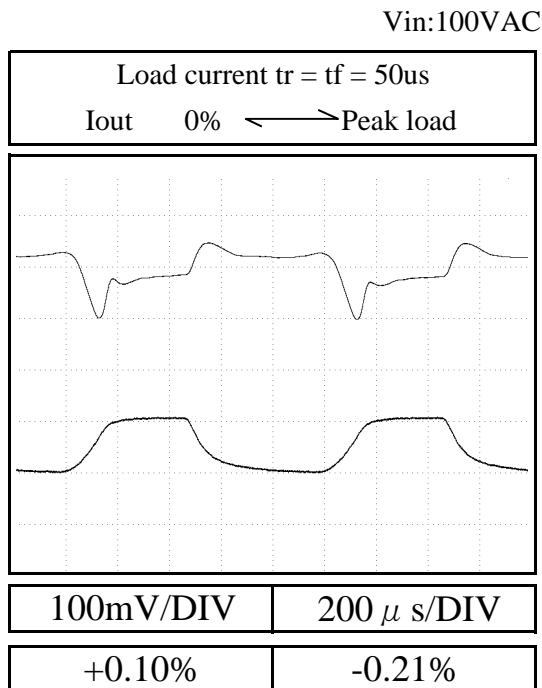
Conditions Ta : 25 °C

48V

f=100Hz



f=1kHz



2.12 入力電圧瞬停特性

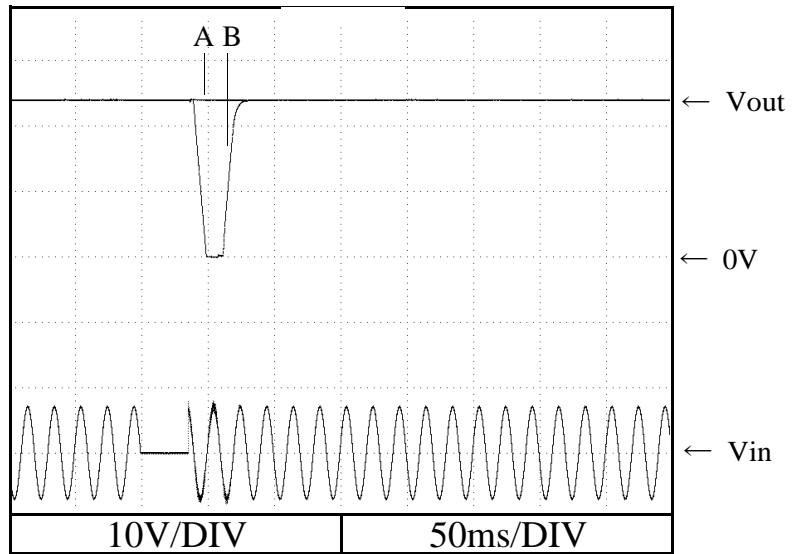
Response to brown out characteristics

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

24V

A = 36ms

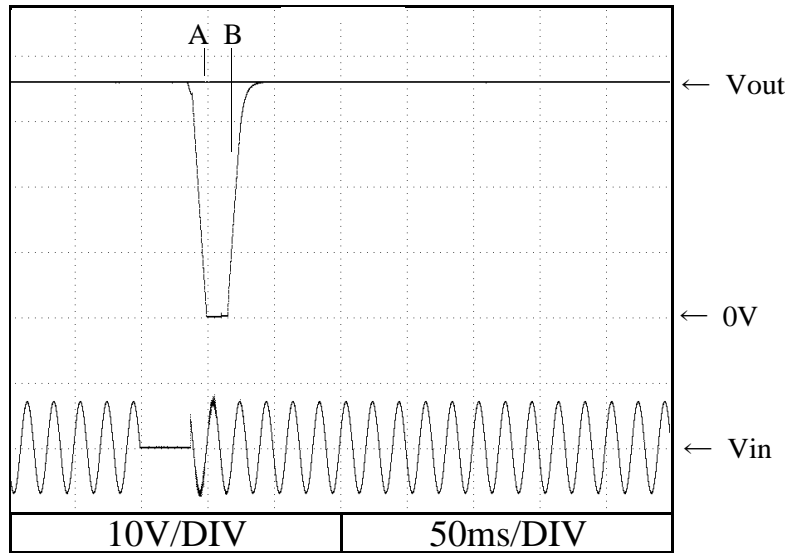
B = 37ms



36V

A = 36ms

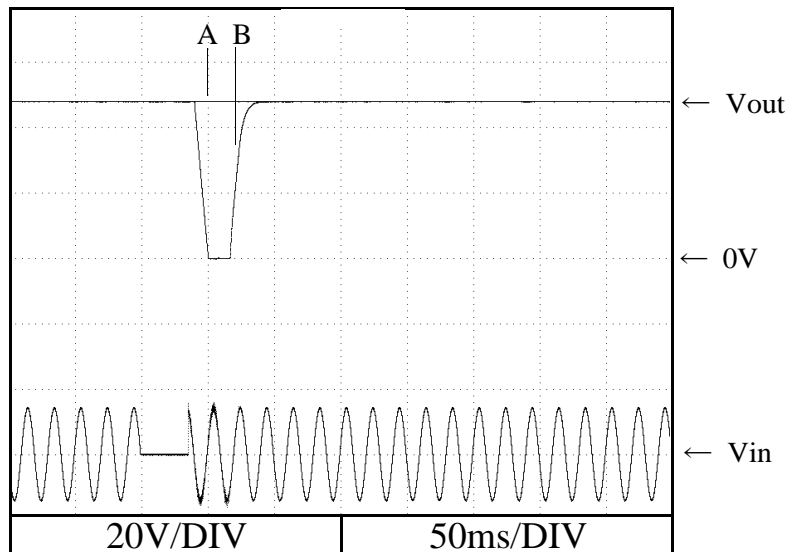
B = 37ms



48V

A = 36ms

B = 37ms



2.12 入力電圧瞬停特性

Response to brown out characteristics

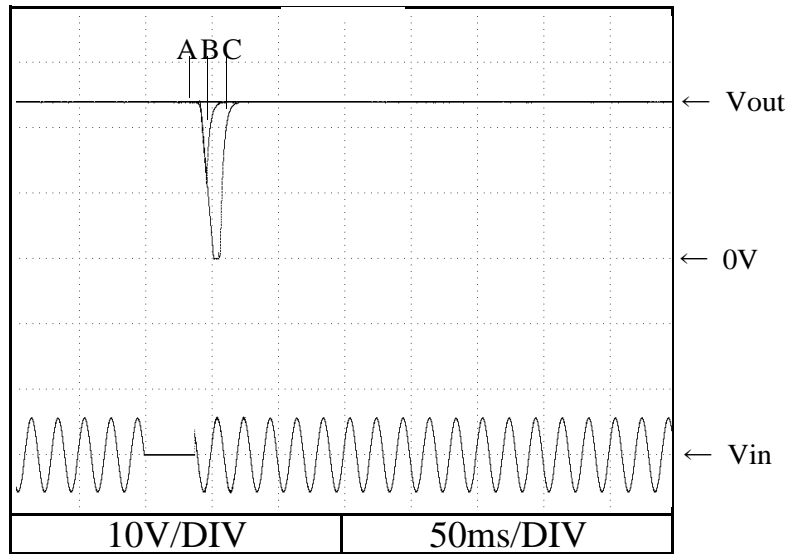
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

24V

A = 38ms

B = 44ms

C = 45ms

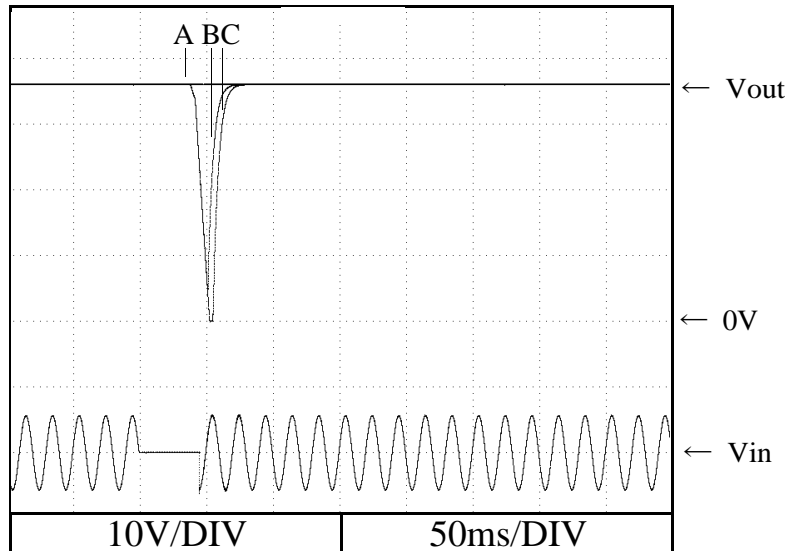


36V

A = 38ms

B = 44ms

C = 45ms

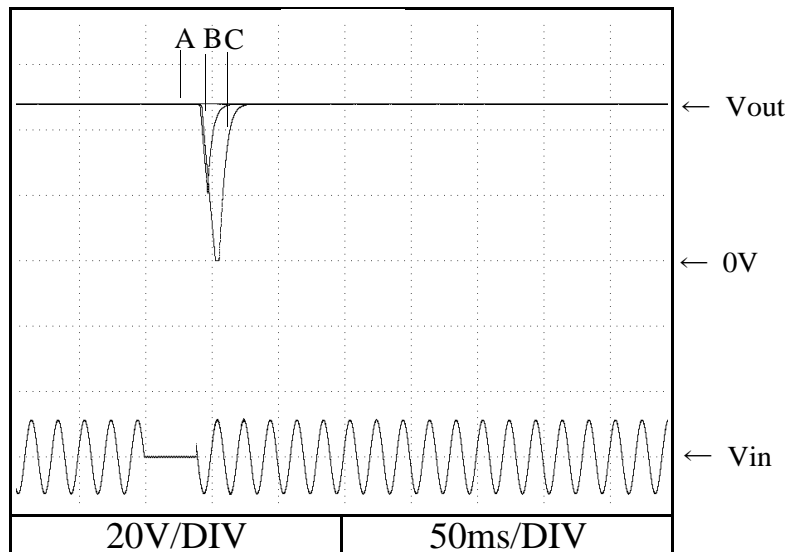


48V

A = 39ms

B = 44ms

C = 45ms

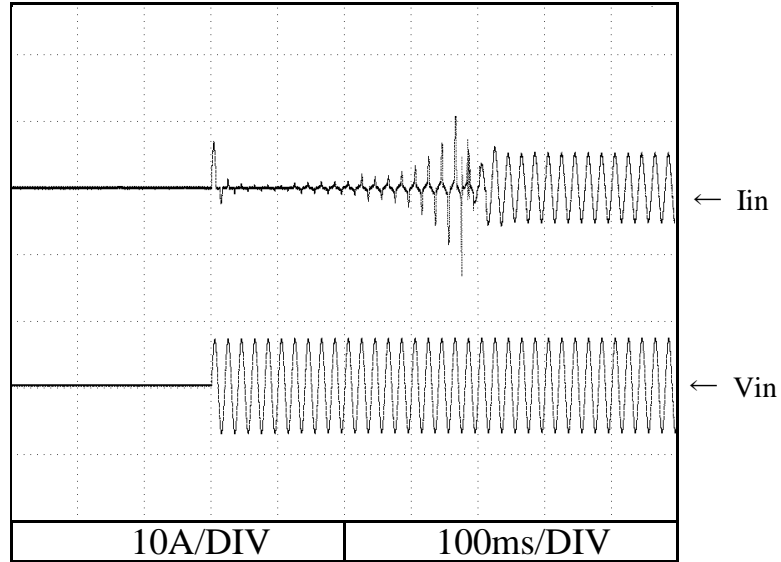


2.13 入力サージ電流（突入電流）波形
Inrush current waveform

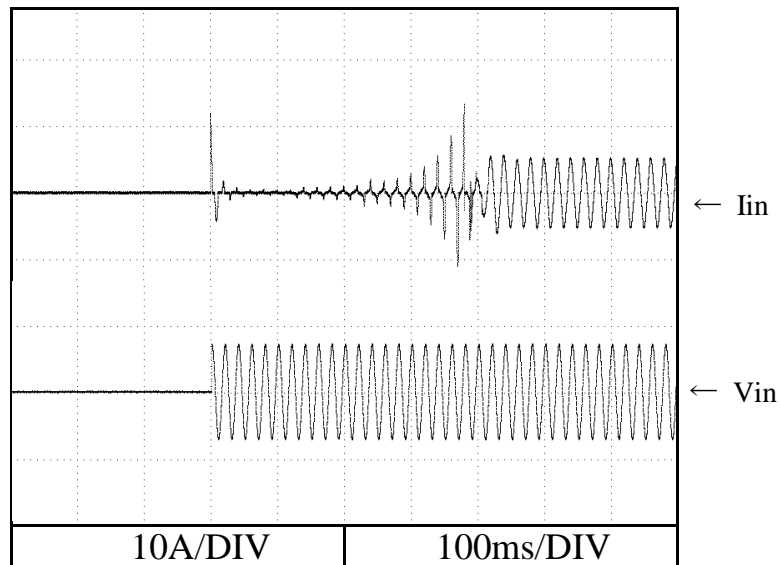
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 °C

24V

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



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

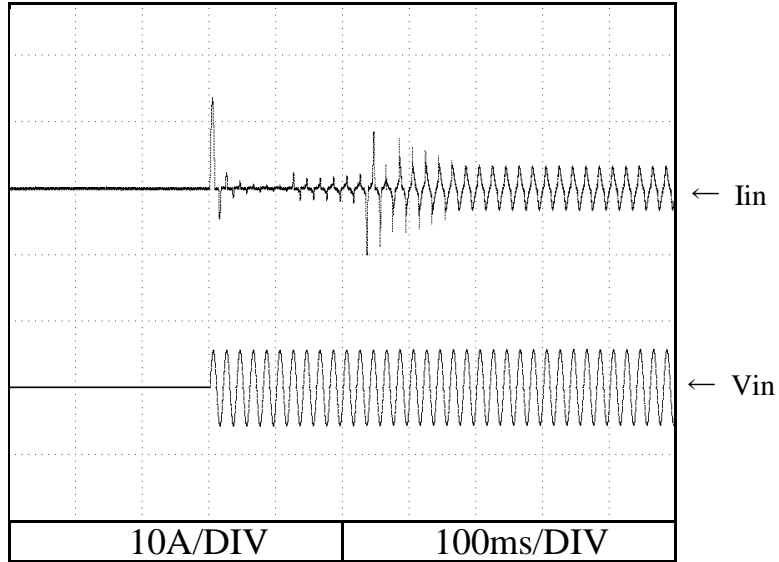


2.13 入力サージ電流（突入電流）波形
Inrush current waveform

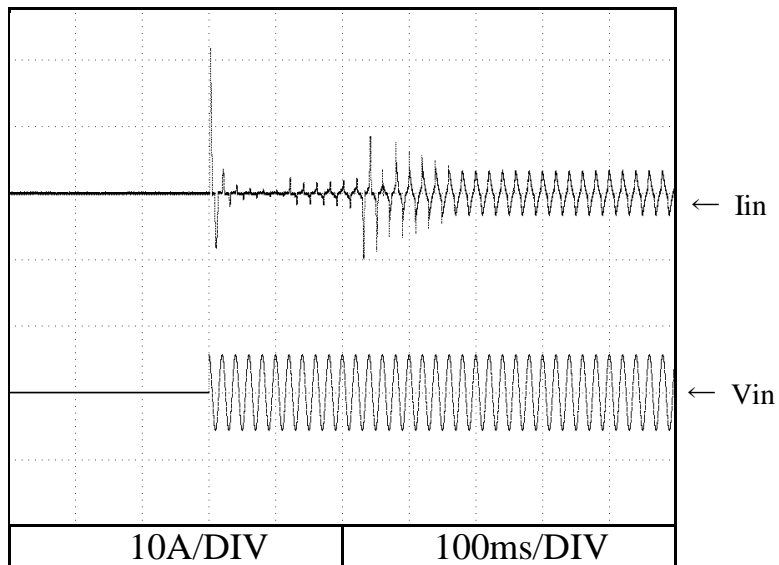
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

24V

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



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



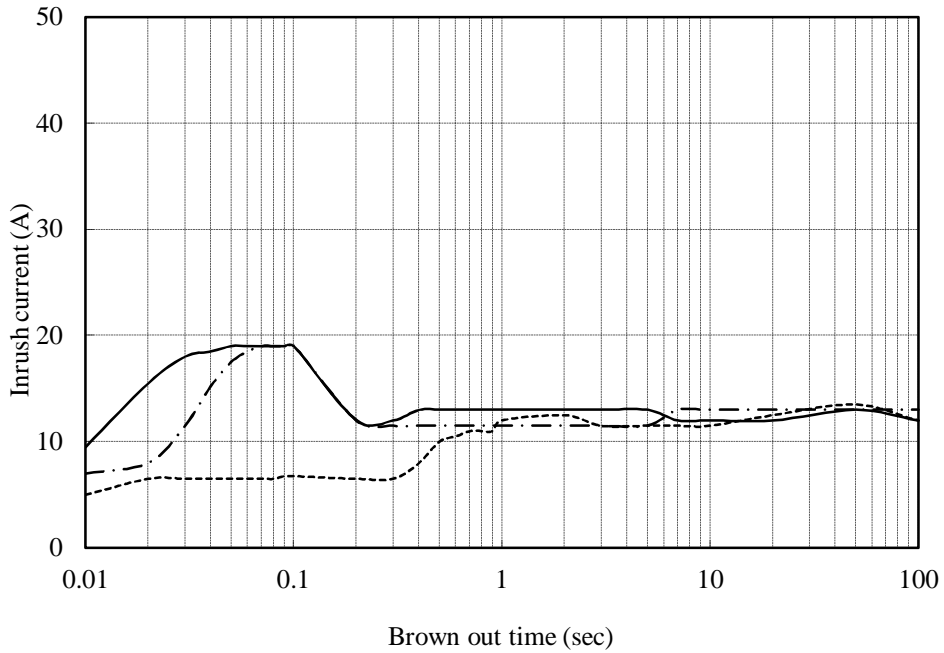
2.14 瞬停時突入電流特性
Inrush current characteristics

Conditions Iout : 0 % -----
50 % -.-.-.
100 % _____

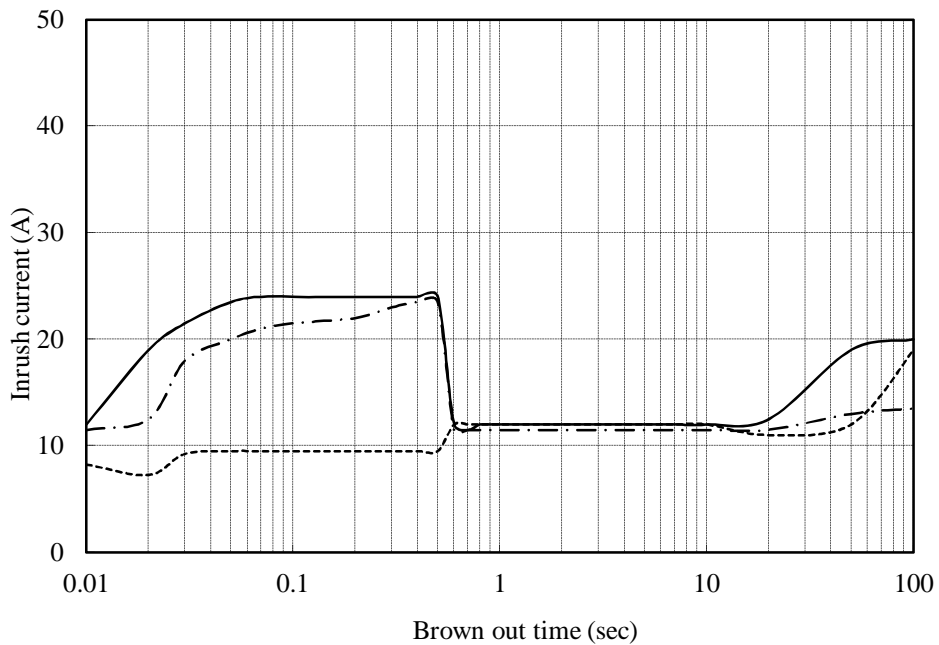
Ta : 25 °C

24V

Vin : 100 VAC



Vin : 200 VAC



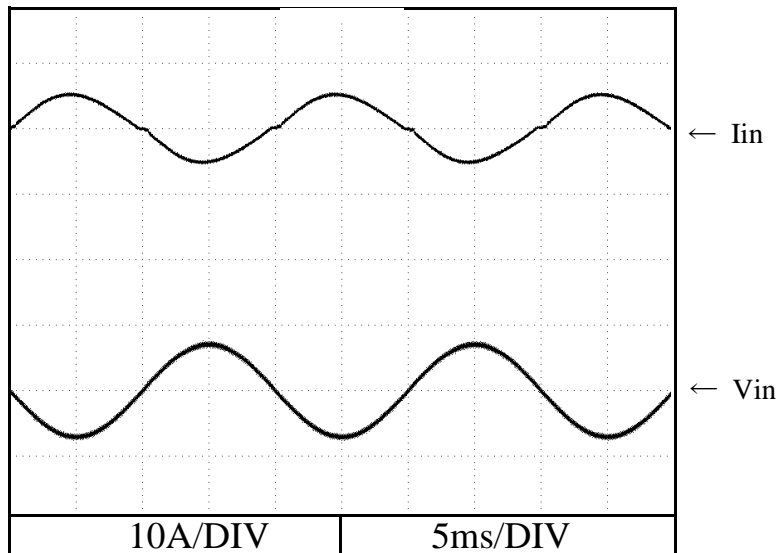
※ 上記値は、2次突入電流を含んだ値である。
Above data includes secondary inrush current

2.15 入力電流波形
Input current waveform

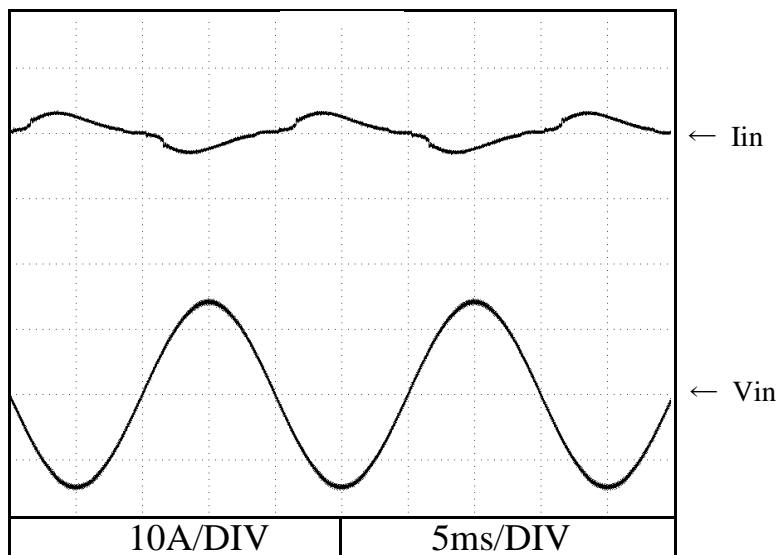
Conditions Iout : 100 %
Ta : 25 °C

24V

Vin : 100 VAC



Vin : 200 VAC

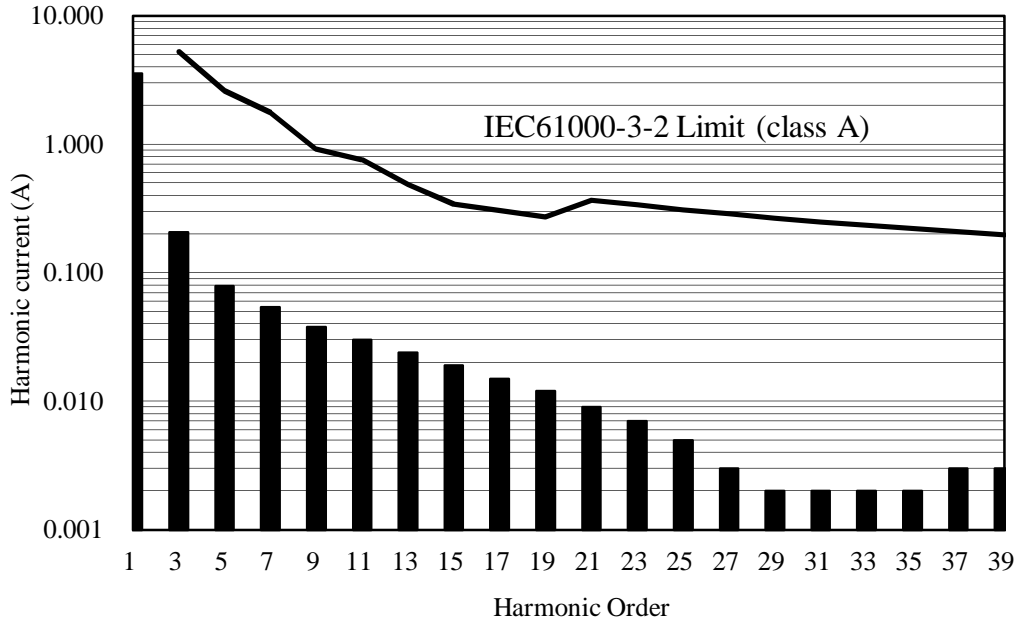


2.16 高調波成分

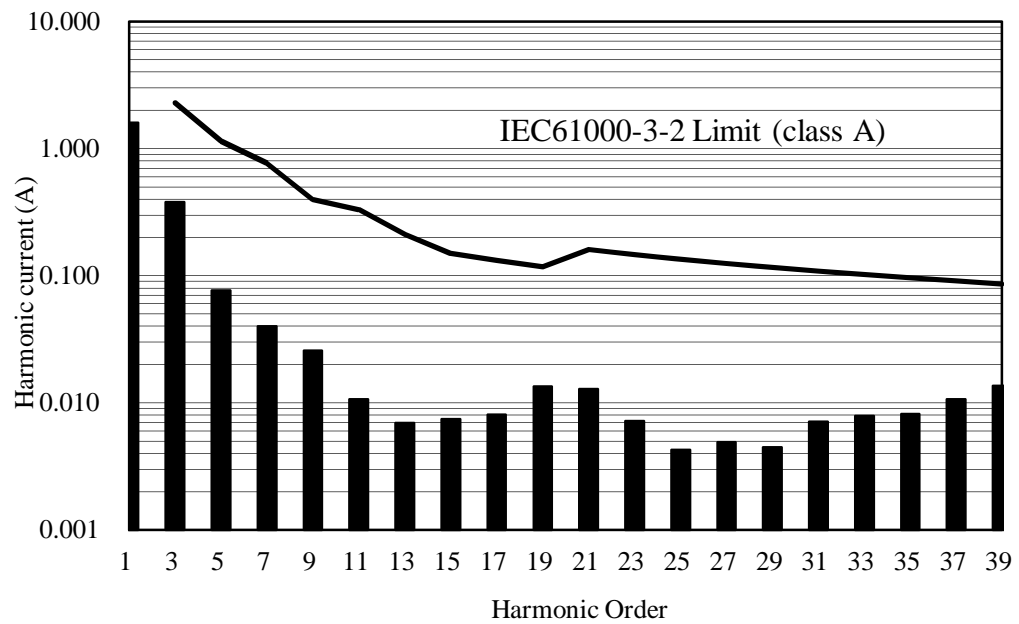
Input current harmonics

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

24V



Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

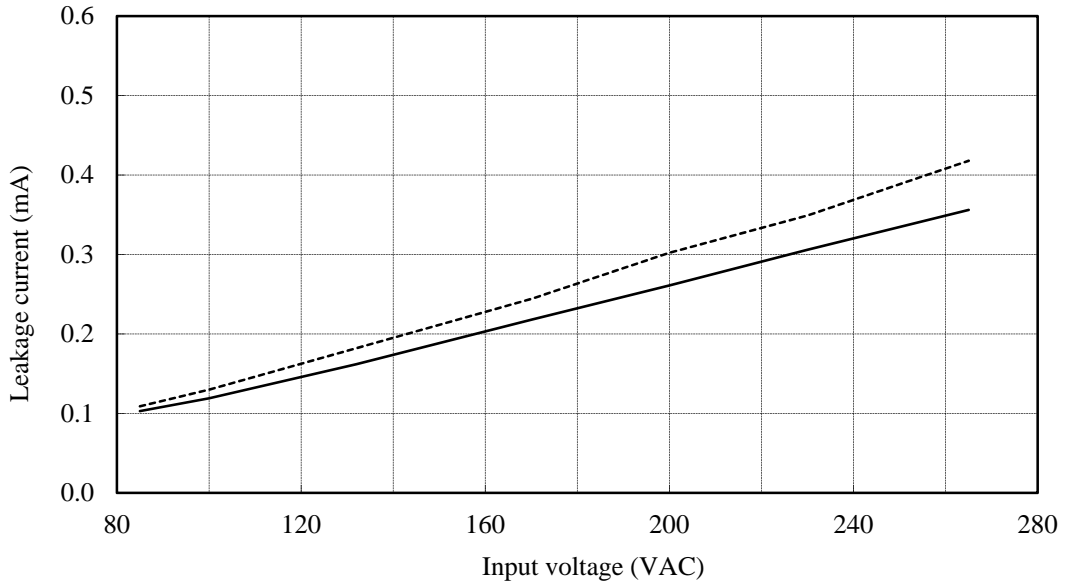


2.17 リーク電流特性
Leakage current characteristics

24V

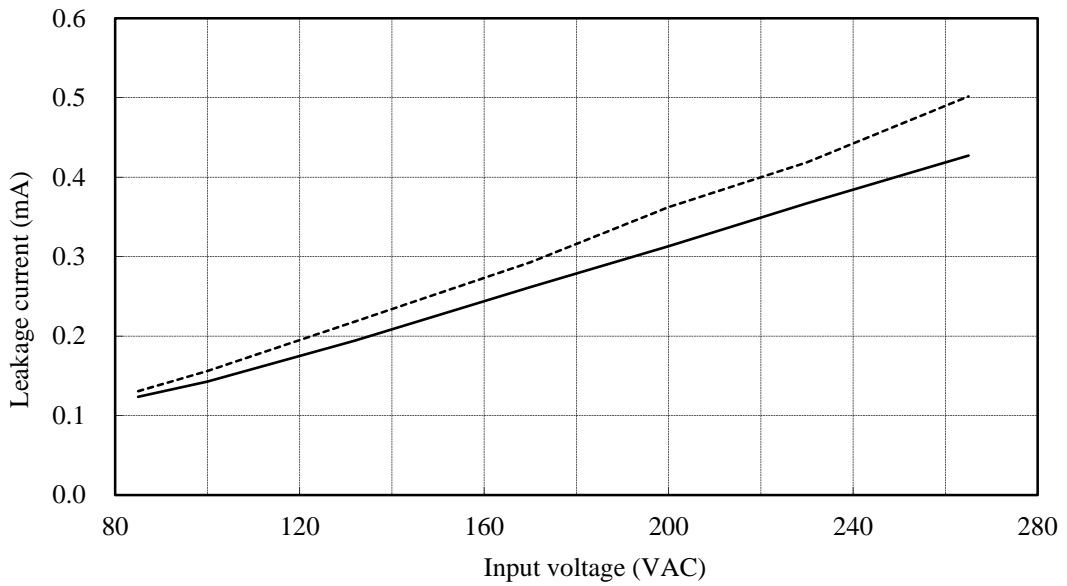
Conditions Iout : 0% -----
 : 100% —————
 Ta : 25°C
 f : 50Hz

Equipment used : MODEL 3156 (HIOKI)



Conditions Iout : 0% -----
 : 100% —————
 Ta : 25°C
 f : 60Hz

Equipment used : MODEL 3156 (HIOKI)

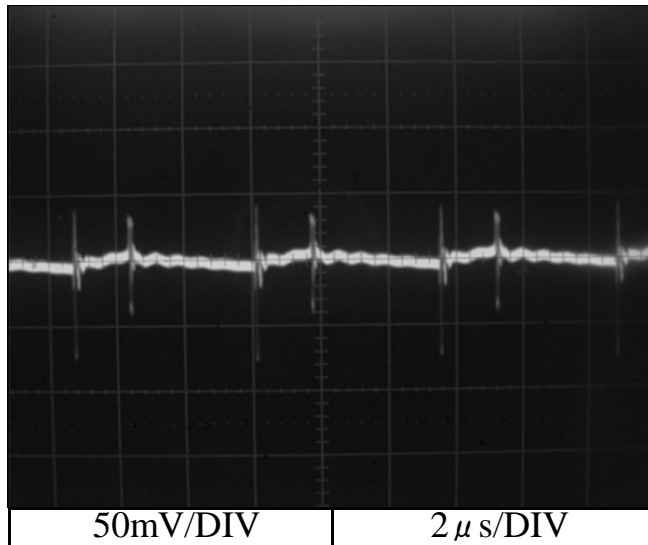


2.18 出力リップル、ノイズ波形 Output ripple and noise waveform

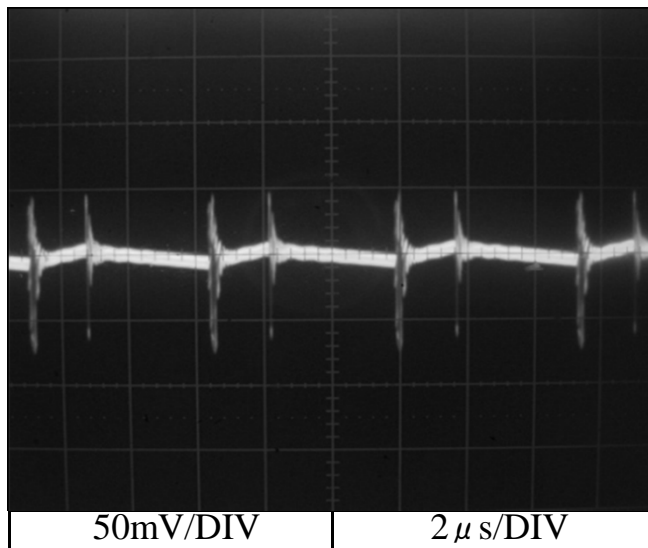
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

NORMAL MODE

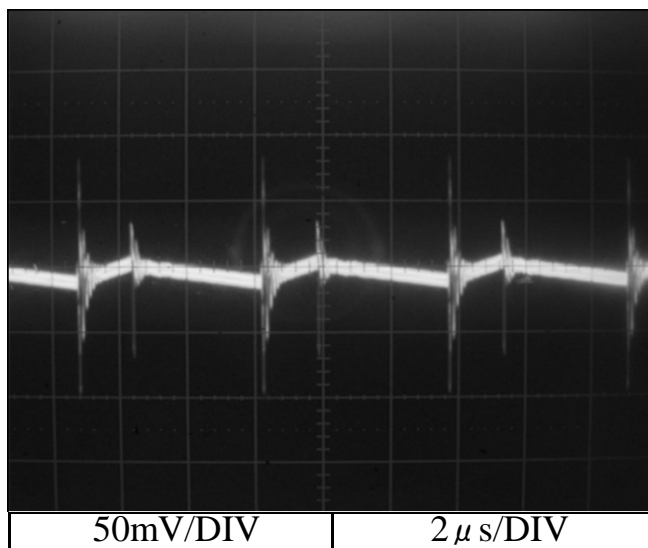
24V



36V



48V

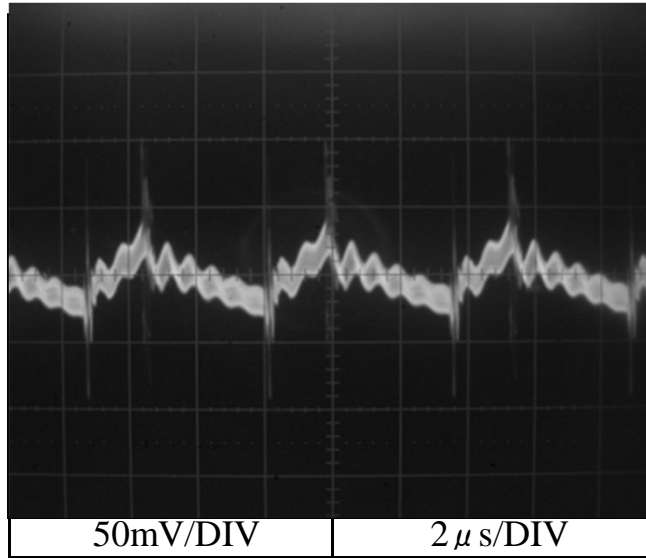


2.18 出力リップル、ノイズ波形 Output ripple and noise waveform

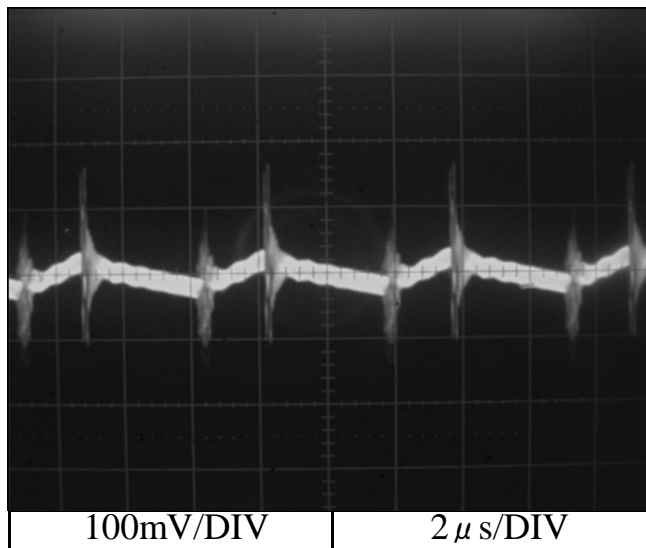
Conditions Vin : 200 VAC
Iout : Peak load
Ta : 25 °C

NORMAL MODE

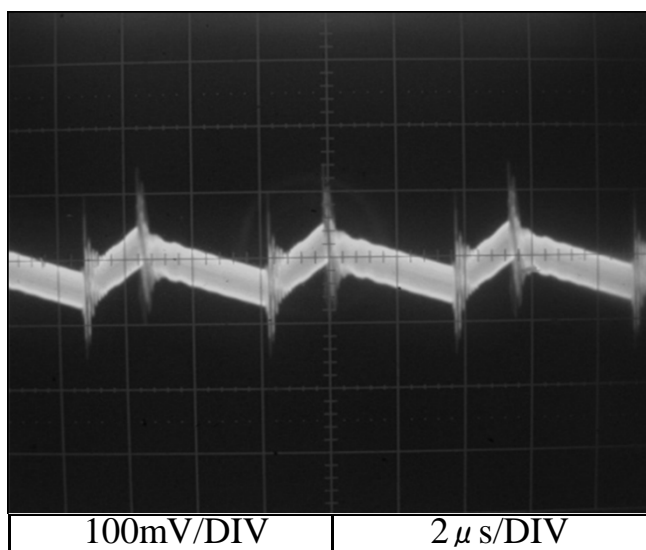
24V



36V



48V

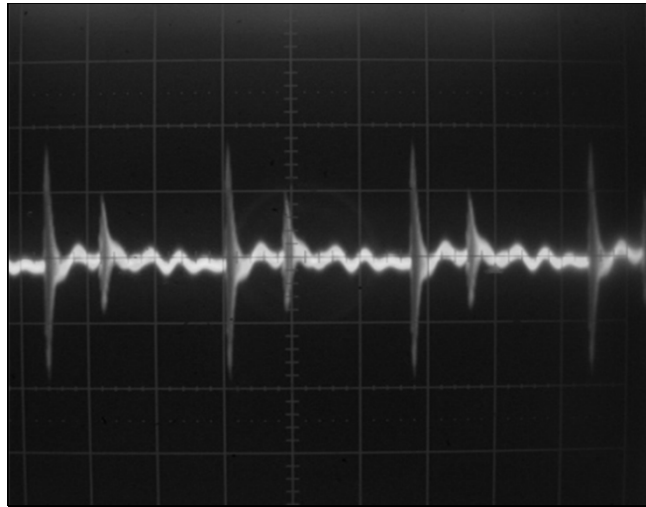


2.18 出力リップル、ノイズ波形 Output ripple and noise waveform

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

NORMAL + COMMON MODE

24V



50mV/DIV

2 μ s/DIV

36V



50mV/DIV

2 μ s/DIV

48V



50mV/DIV

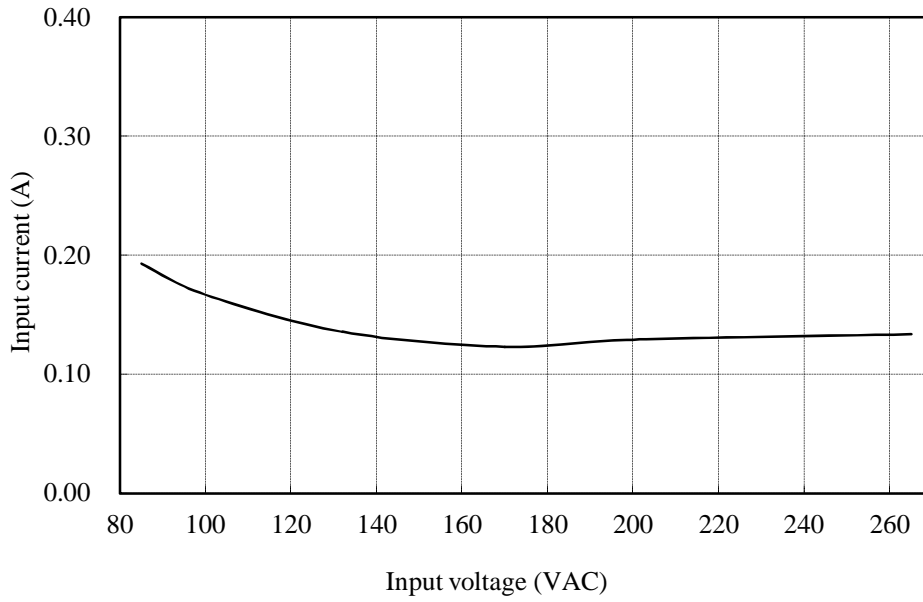
2 μ s/DIV

2.19 スタンバイ電流
Standby current

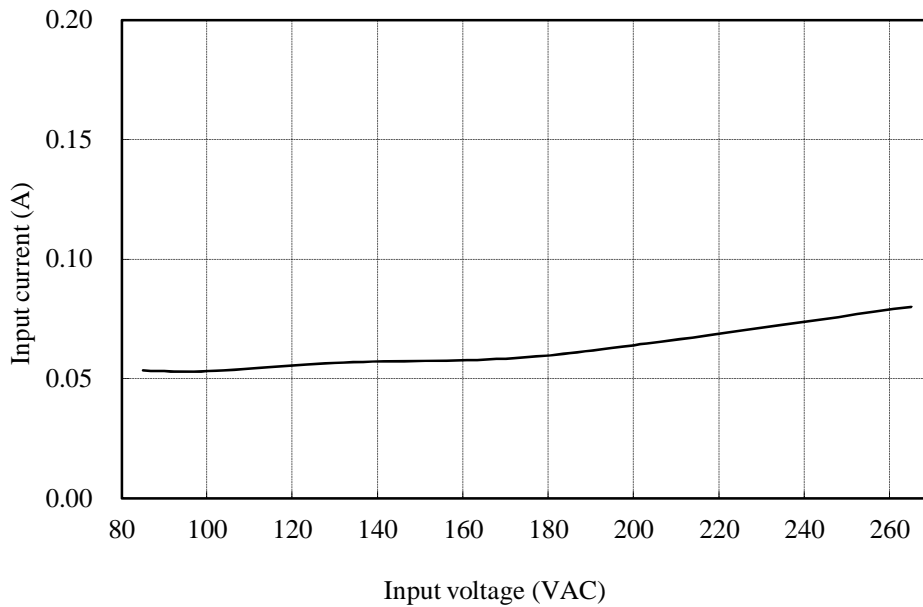
Condition Ta: 25 °C

24V

Io = 0%



Remote control OFF



2.20 EMI 特性
Electro-Magnetic Interference characteristics

HWS300P

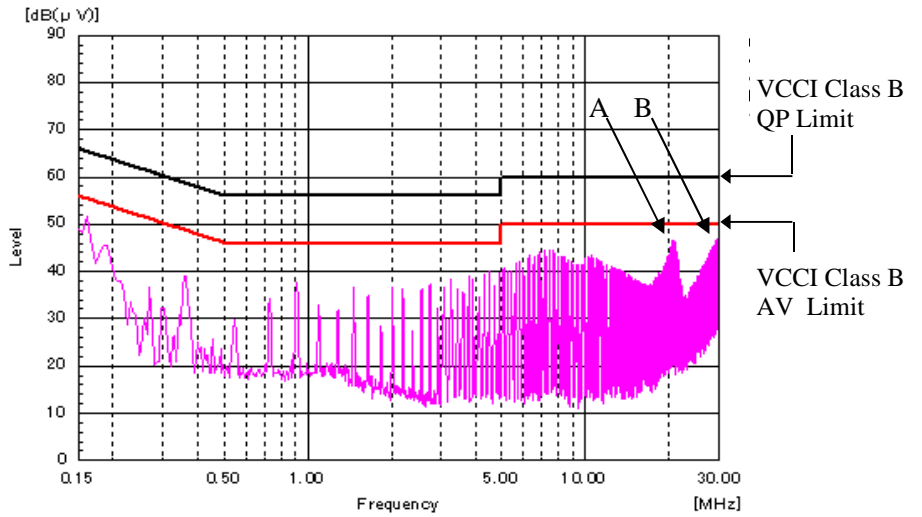
Conditions Vin : 230VAC
Iout : 100%

雑音端子電圧
Conducted Emission

24V

Point A (21MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	44.7
AV	50.0	43.0

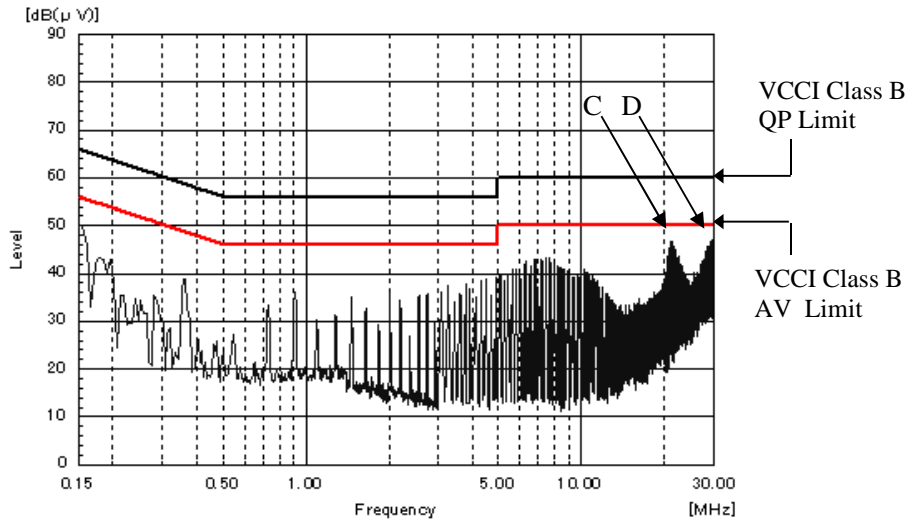
Point B (29MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	45.0
AV	50.0	43.7



Phase : N

Point C (21MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	44.7
AV	50.0	43.3

Point D (29MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	45.4
AV	50.0	43.5



Phase : L

EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

2.20 EMI 特性
Electro-Magnetic Interference characteristics

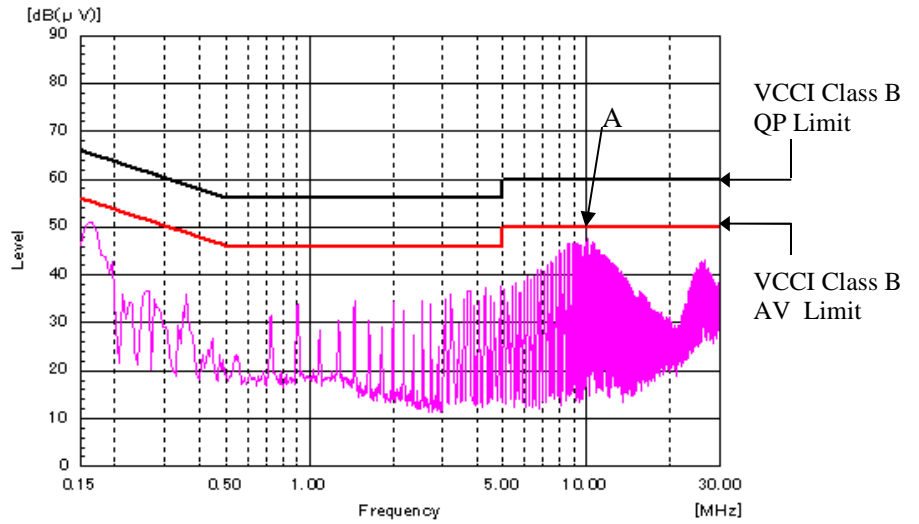
HWS300P

Conditions Vin : 230VAC
Iout : 100%

雑音端子電圧
Conducted Emission

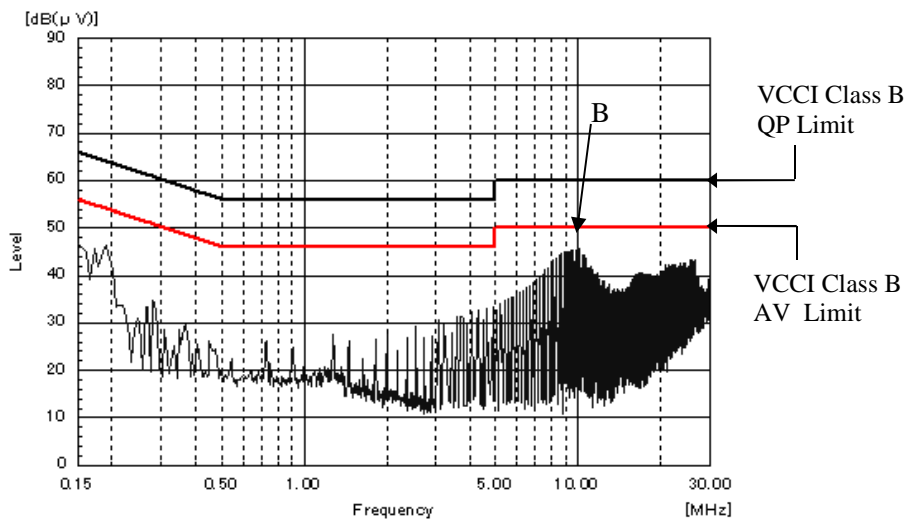
36V

Point A (10MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	46.8
AV	50.0	46.3



Phase : N

Point B (10MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	45.1
AV	50.0	45.1



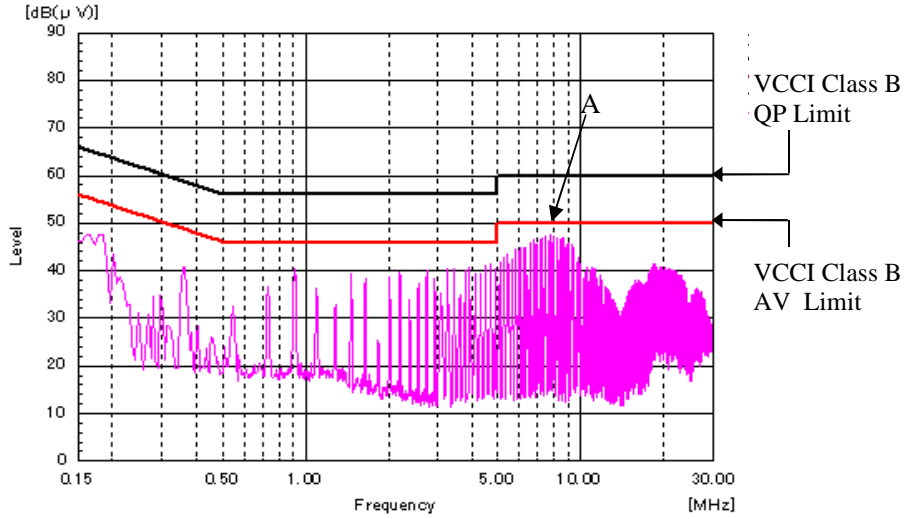
Phase : L

EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

雑音端子電圧
Conducted Emission

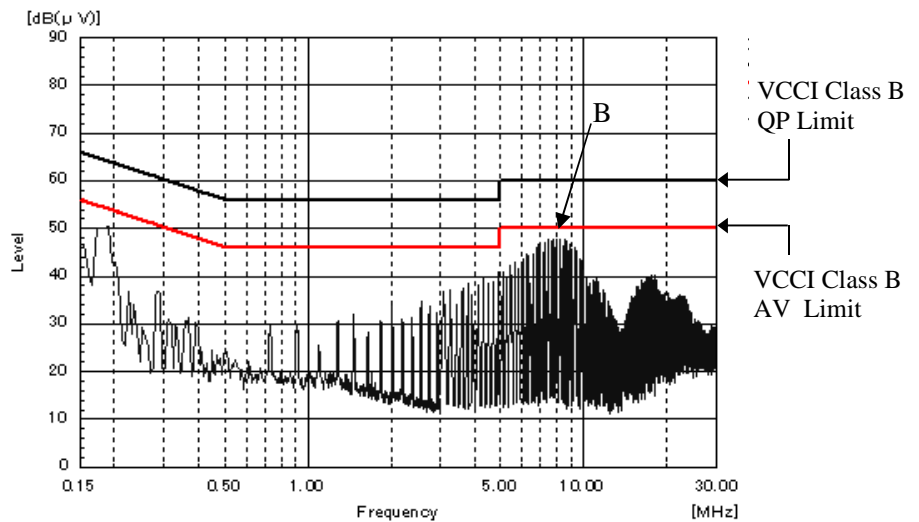
48V

Point A (8MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	46.3
AV	50.0	45.9



Phase : N

Point B (8MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	47.0
AV	50.0	46.4



Phase : L

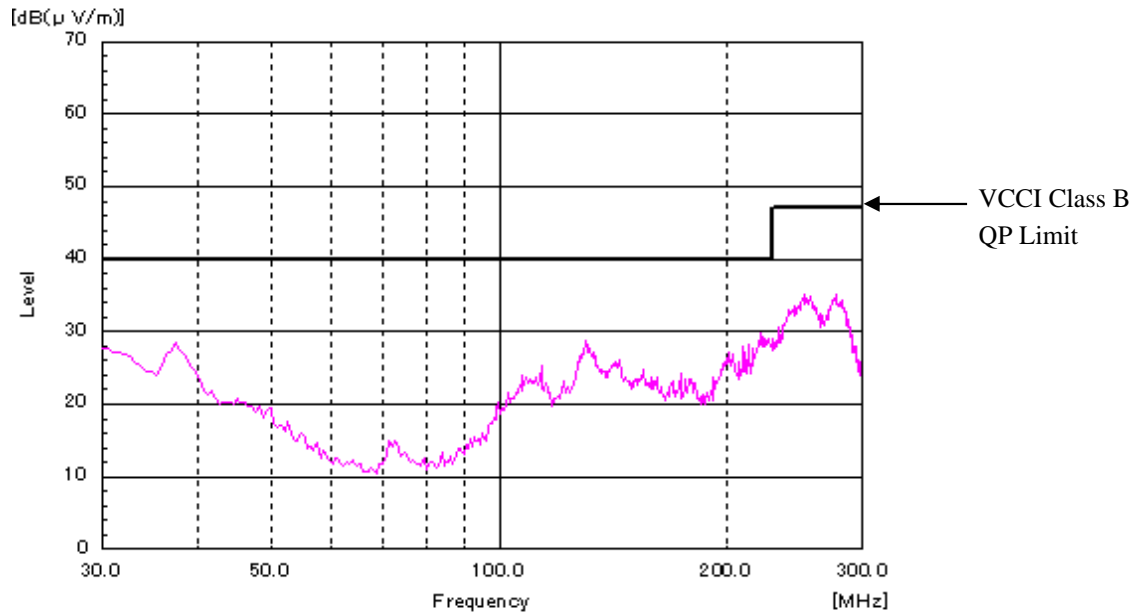
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

雑音電界強度

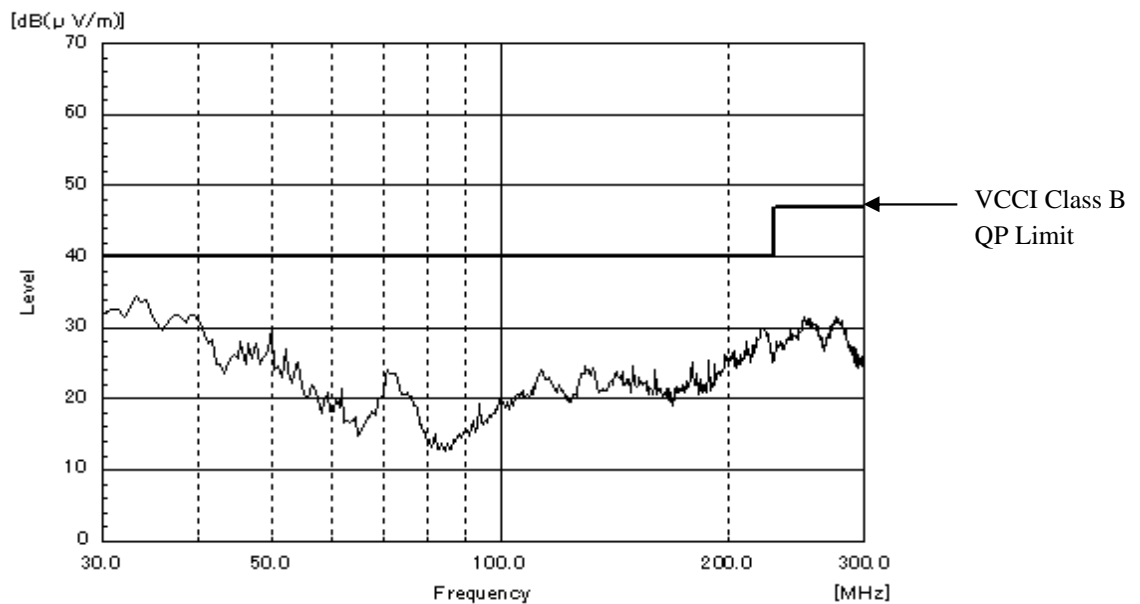
Radiated Emission

24V

HORIZONTAL



VERTICAL



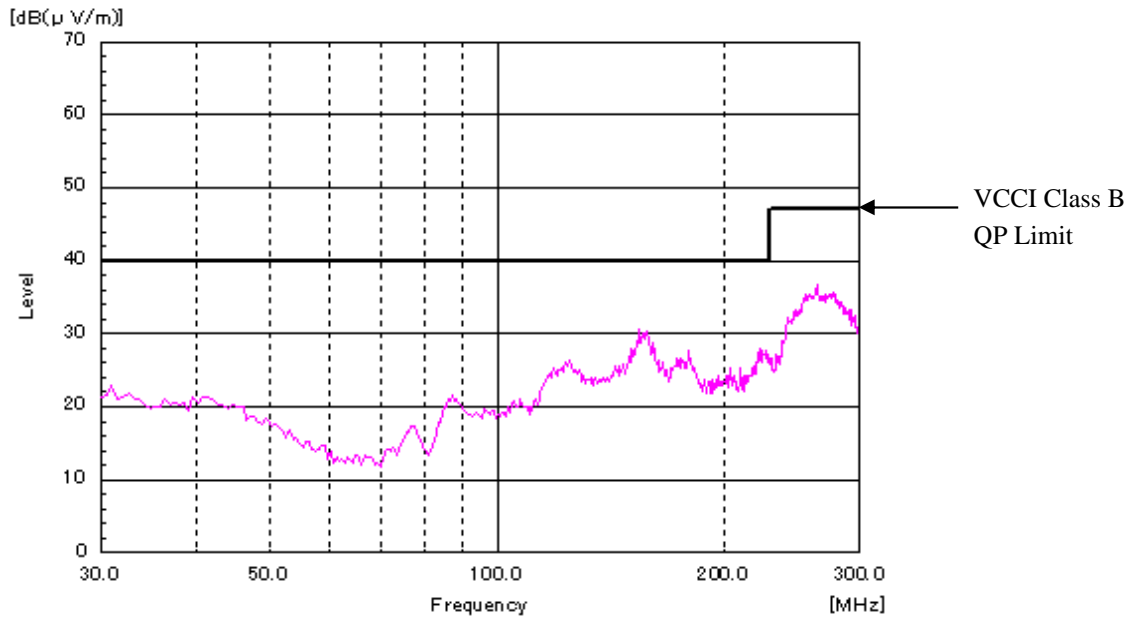
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

雑音電界強度

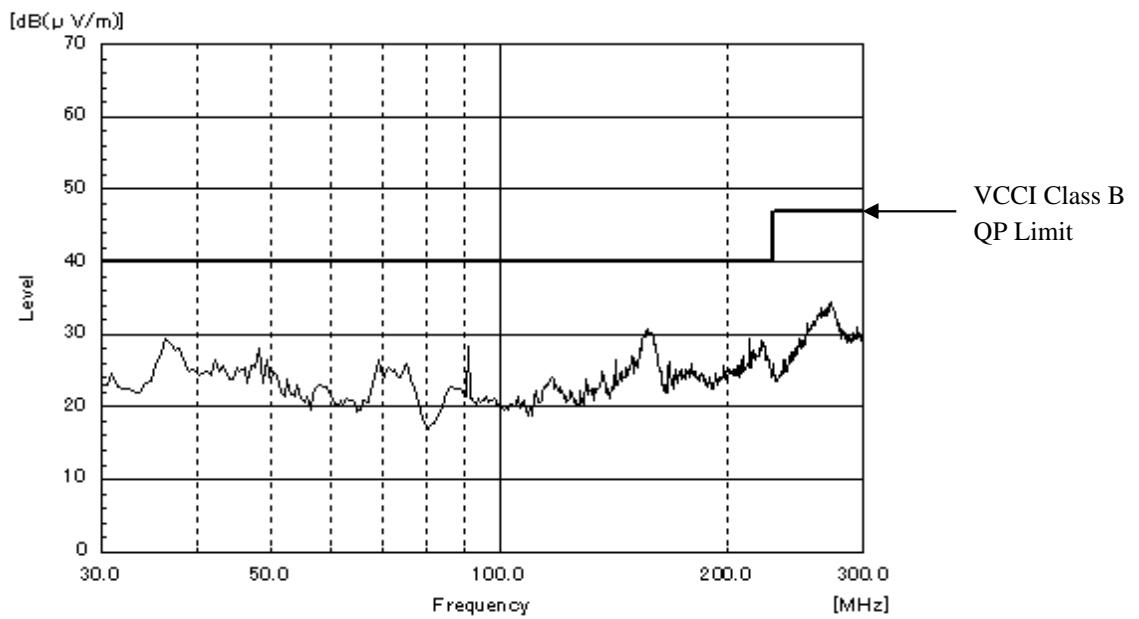
Radiated Emission

36V

HORIZONTAL



VERTICAL



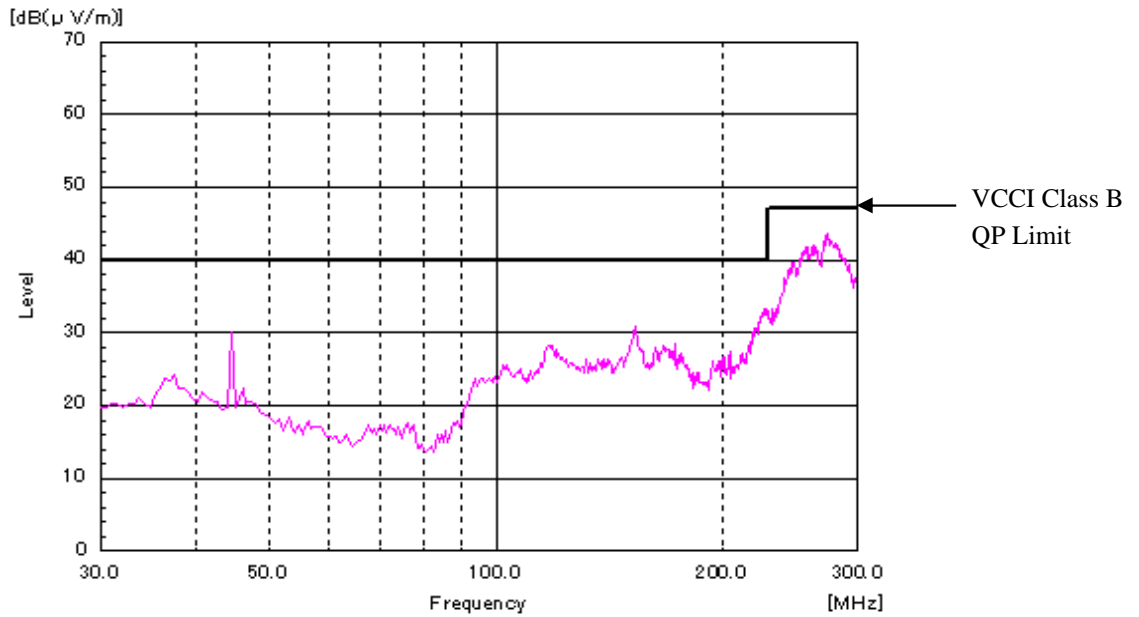
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

雑音電界強度

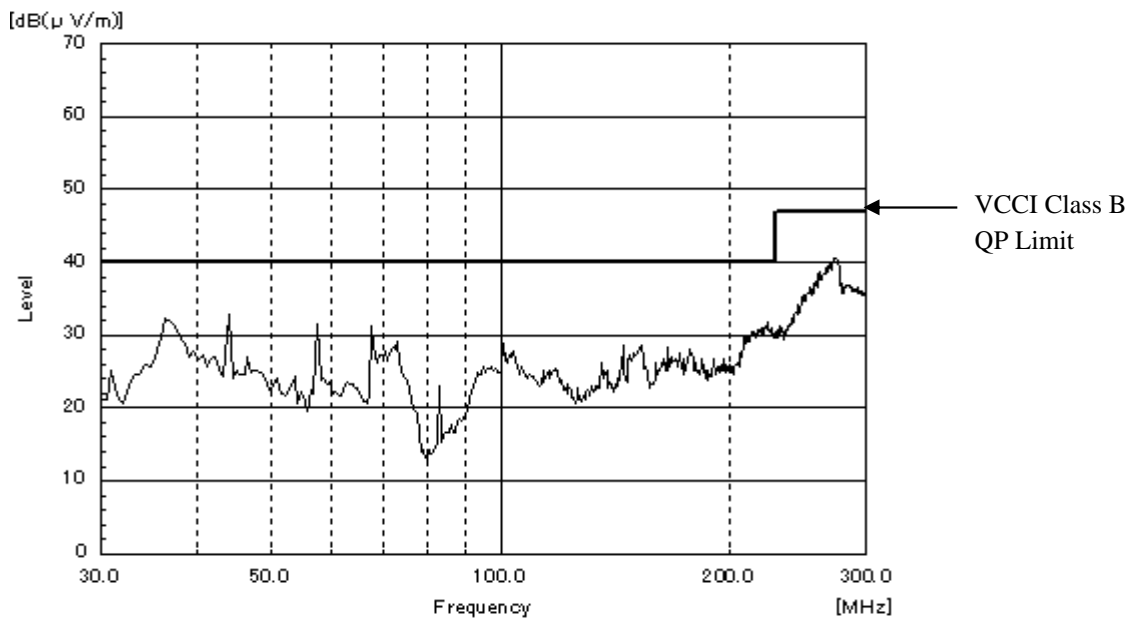
Radiated Emission

48V

HORIZONTAL



VERTICAL



EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
 Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.