

HWS1000L-*/BAT

EVALUATION DATA

型式データ

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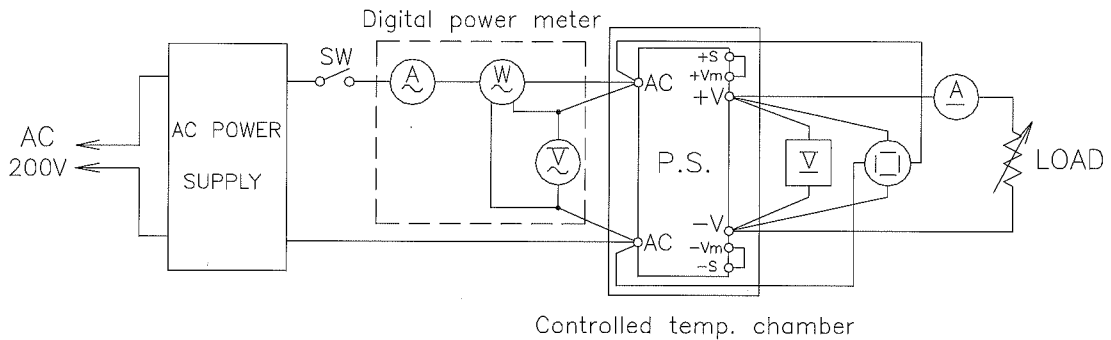
使用記号 Terminology used

	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

1. 測定方法 Evaluation Method

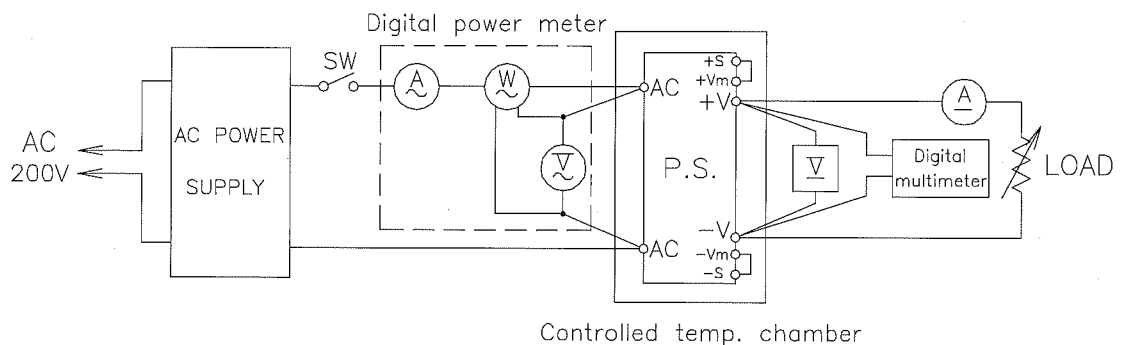
1.1 測定回路 Circuit used for determination

(1) 静特性 Steady state data



(2) 通電ドリフト特性 Warm up voltage drift characteristics
Same as Steady state data

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

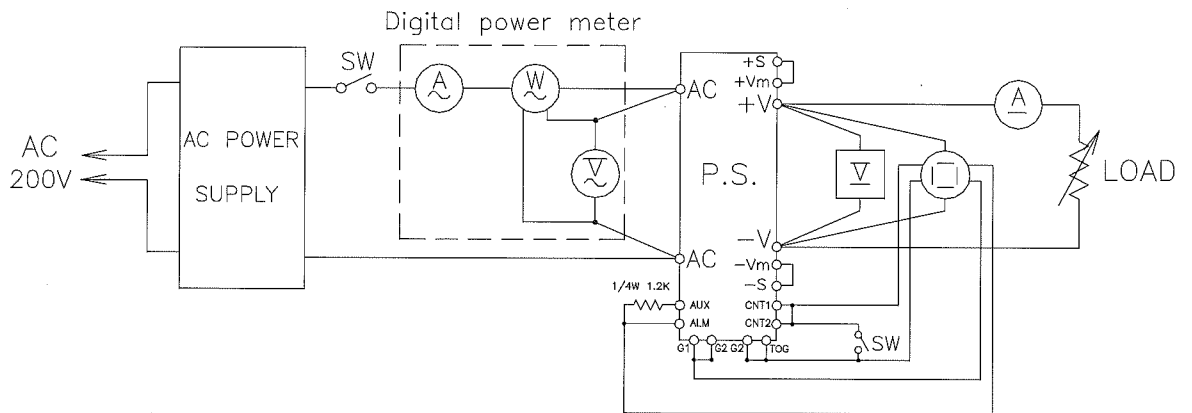


(4) 過電圧保護特性 Over voltage protection (OVP) characteristics
Same as Steady state data

(5) 出力立ち上がり特性 Output rise characteristics
Same as Steady state data

(6) 出力立ち下がり特性 Output fall characteristics
Same as Steady state data

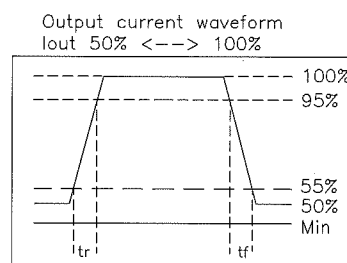
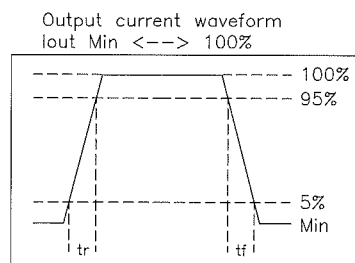
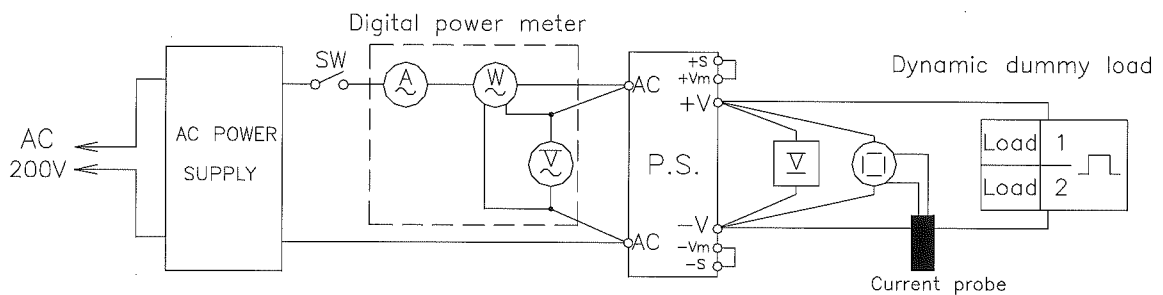
- (7) ON/OFFコントロール時出力立ち上がり特性
Output rise characteristics with ON/OFF CONTROL



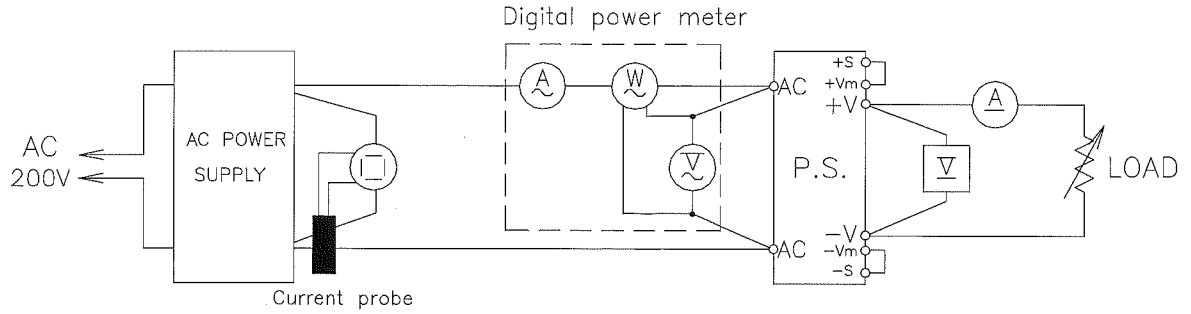
- (8) ON/OFFコントロール時出力立ち下がり特性
Output fall characteristics with ON/OFF CONTROL
Same as Output rise characteristics with ON/OFF CONTROL

- (9) 過渡応答（入力急変）特性 Dynamic line response characteristics
Same as Steady state data

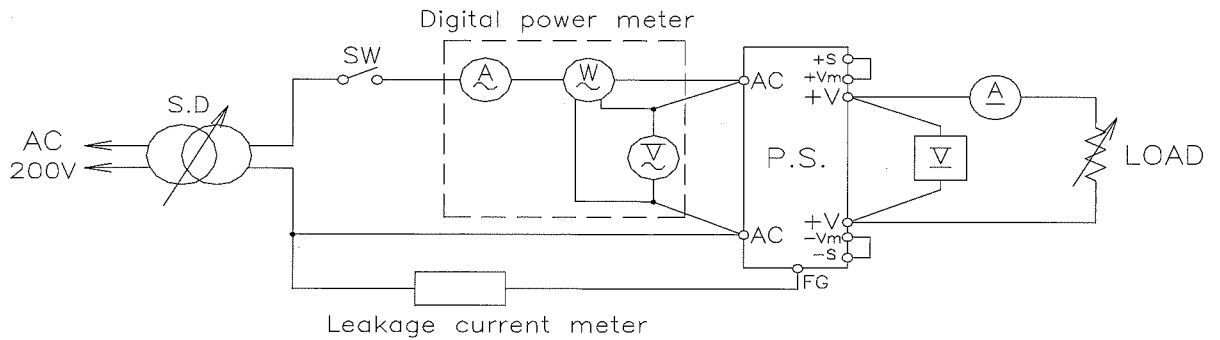
- (10) 過渡応答（負荷急変）特性 Dynamic load response characteristics



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



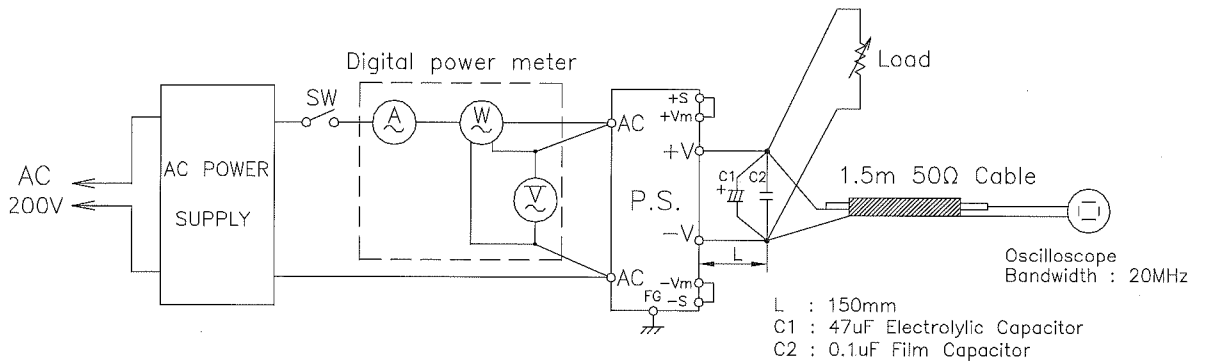
(12) リーク電流特性 Leakage current characteristics



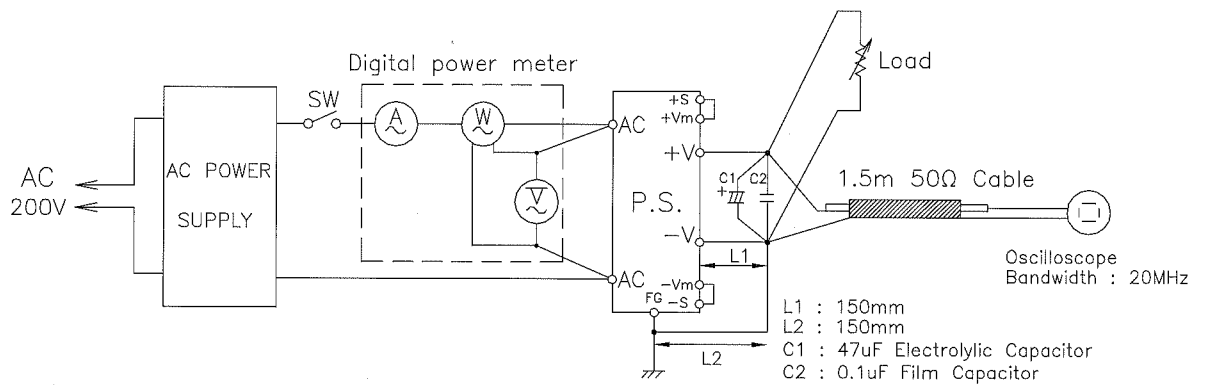
Range used---AC (For SIMPSON TYPE 228)

(13) 出力リップル、ノイズ特性 Output ripple and noise characteristics

(a) Normal Mode (JEITA Standard RC-9131A)



(b) Normal + Common Mode



(14) スタンバイ電流 Stand-by current

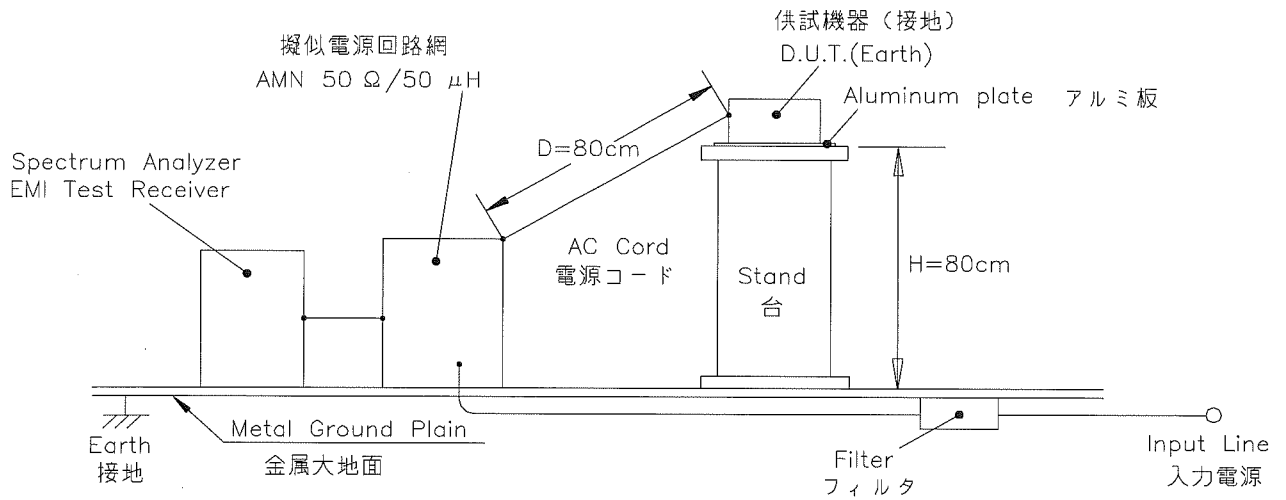
Same as Steady state data

(15) EMI 特性

Electro-Magnetic Interference characteristics

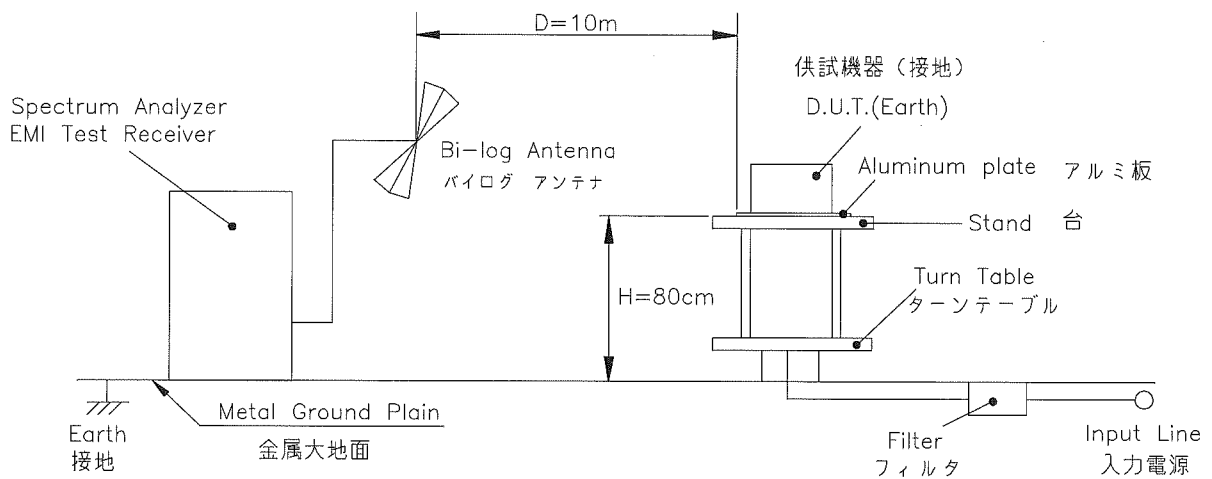
(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise



(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission Noise



1.2 使用測定機器 List of equipment used

No.	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS540C/TDS5054/TDS7054/ TDS5052/TDS460A
2	OSCILLOSCOPE	TEKTRONIX	TAS475
3	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740EL/DL7480/DL7440/DL1620
4	DIGITAL MULTIMETER	AGILENT TECHNOLOGY	34970A
5	DIGITAL MULTIMETER	Fluke	45
6	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210/WT110
7	DIGITAL POWER METER	HIOKI	3331/3332/3187
8	SHUNT RESISTOR	YOKOGAWA ELECT.	2215/2216
9	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503B/TCP404XL/TCPA400
10	CURRENT PROBE/AMPLIFIER	YOKOGAWA ELECT.	701930/700937
11	DYNAMIC DUMMY LOAD	FUJITSUDENSO	EUL-600 α XL+EUL-1800 α L SLV
12	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ1004W+PLZ2004WB
13	DYNAMIC DUMMY LOAD	CHROMA	63201
14	CVCF	KIKUSUI	PCR2000L \times 2/PCR4000L/PCR4000LA
15	CVCF	CHROMA	61605/6530
16	LEAKAGE CURRENT METER	SIMPSON	228
17	POWER ANALYZER	SCHAFFNER	NSG1007
18	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4KP/PL-1K
19	SPECTRUM ANALYZER	ROHDE&SCHWARZ	FSAC
20	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESHS10
21	AMN	ROHDE&SCHWARZ	ESH2-Z5
22	POWER ANALYZER	SCHAFFNER	NSG1007
23	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI
24	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESI26

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

36V

1. Regulation - line and load

Condition Ta : 25°C

Io/Vin	85VAC	115VAC	200VAC	230VAC	265VAC	line regulation	
0%	36.051V	36.053V	36.053V	36.052V	36.053V	2mV	0.006%
50%	36.053V	36.054V	36.053V	36.053V	36.053V	1mV	0.003%
80%	36.054V	36.054V	36.053V	36.053V	36.053V	1mV	0.003%
100%	36.054V	36.054V	36.053V	36.053V	36.053V	1mV	0.003%
load regulation	3mV	1mV	0mV	1mV	0mV		
	0.008%	0.003%	0.000%	0.003%	0.000%		

2. Temperature drift

Conditions Vin=200VAC

Iout=100%

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	35.996V	36.054V	36.038V	58mV	0.161%

60V

1. Regulation - line and load

Condition Ta : 25°C

Io/Vin	85VAC	115VAC	200VAC	230VAC	265VAC	line regulation	
0%	60.119V	60.119V	60.117V	60.115V	60.113V	6mV	0.010%
50%	60.124V	60.123V	60.122V	60.119V	60.117V	7mV	0.012%
80%	60.127V	60.124V	60.122V	60.119V	60.116V	11mV	0.018%
100%	60.128V	60.125V	60.123V	60.120V	60.117V	11mV	0.018%
load regulation	9mV	6mV	6mV	5mV	4mV		
	0.015%	0.010%	0.010%	0.008%	0.007%		

2. Temperature drift

Conditions Vin=200VAC

Iout=100%

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	59.958V	60.125V	60.150V	192mV	0.320%

(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 %

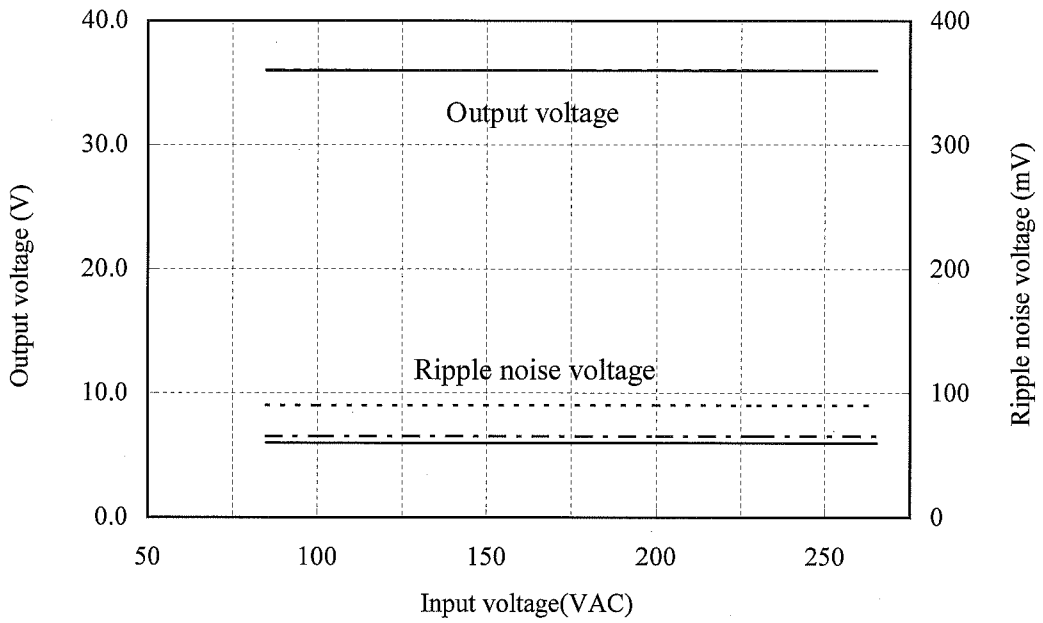
Ta : -20 °C

25 °C

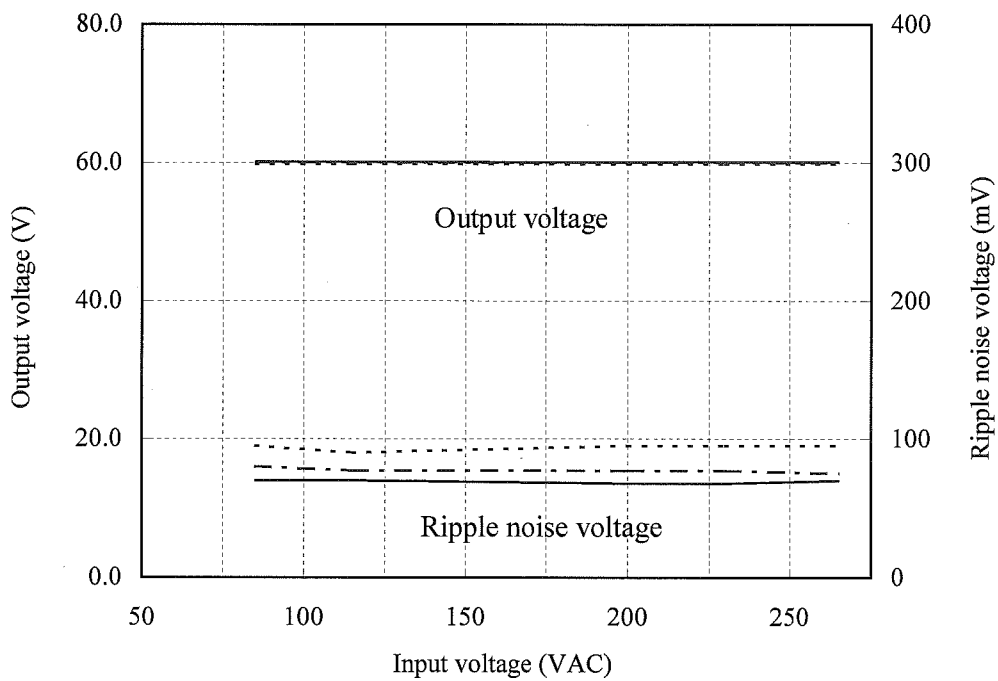
50 °C

 - - - - -

36V



60V

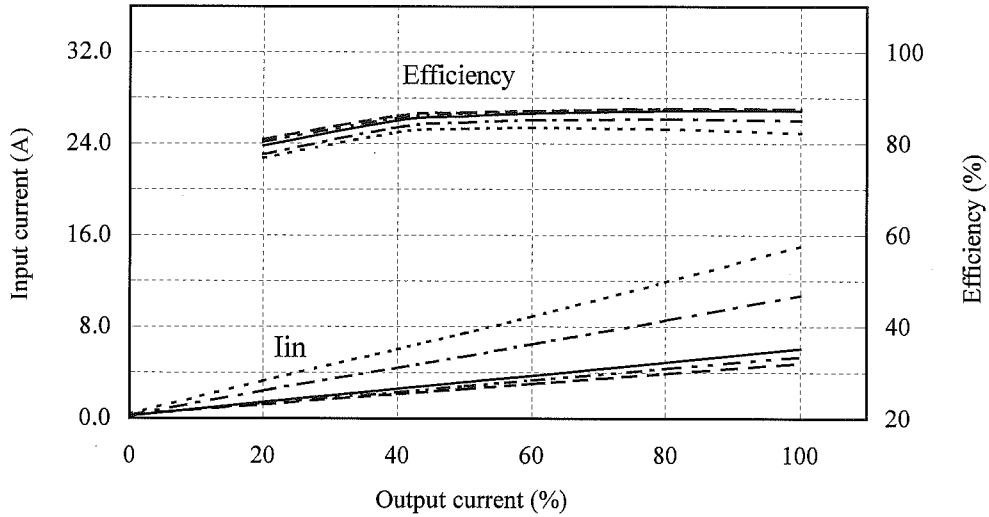


(3) 効率・入力電流対出力電流

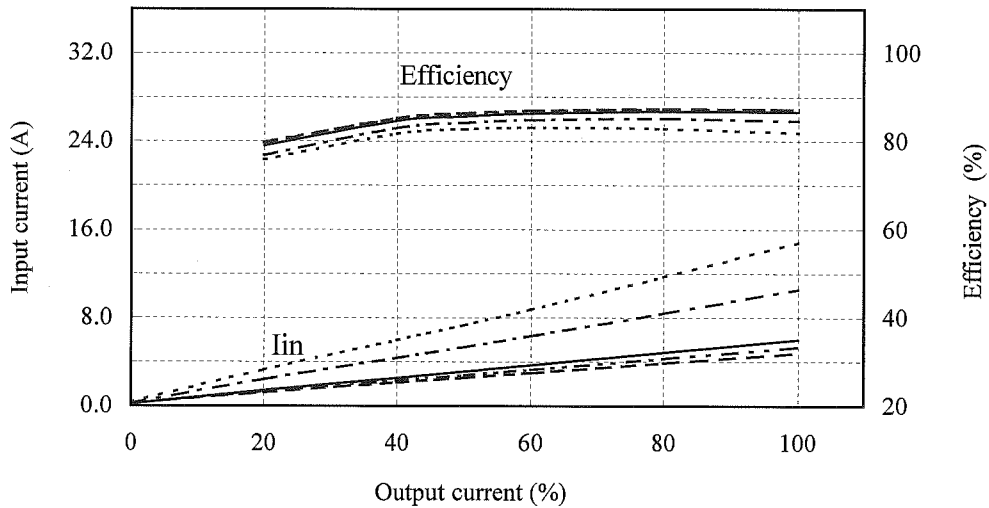
Efficiency and Input current vs. Output current

Conditions Vin : 85 VAC
 : 115 VAC
 : 200 VAC
 : 230 VAC
 : 265 VAC
 Ta : 25 °C

36V



60V

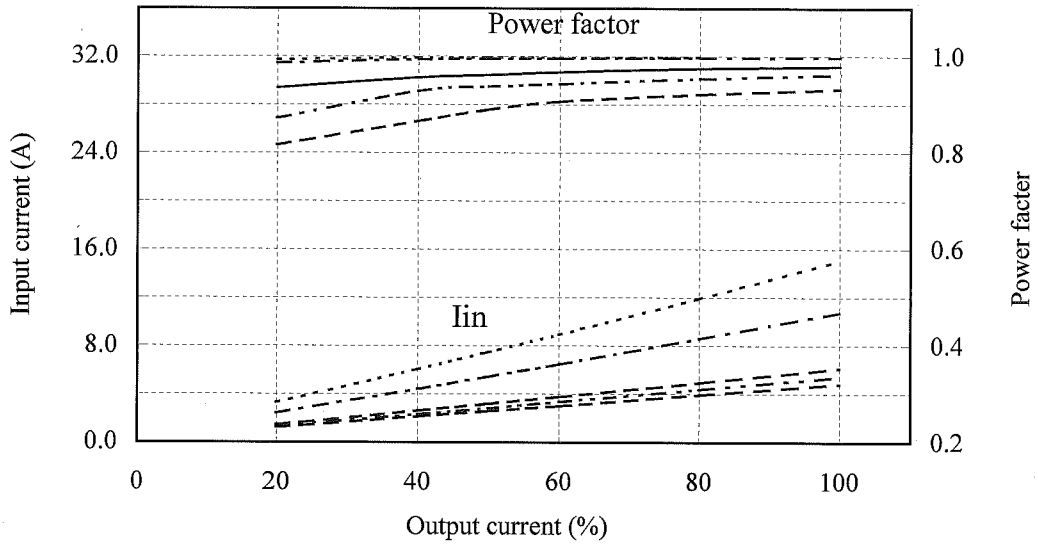


(4) 力率・入力電流対出力電流

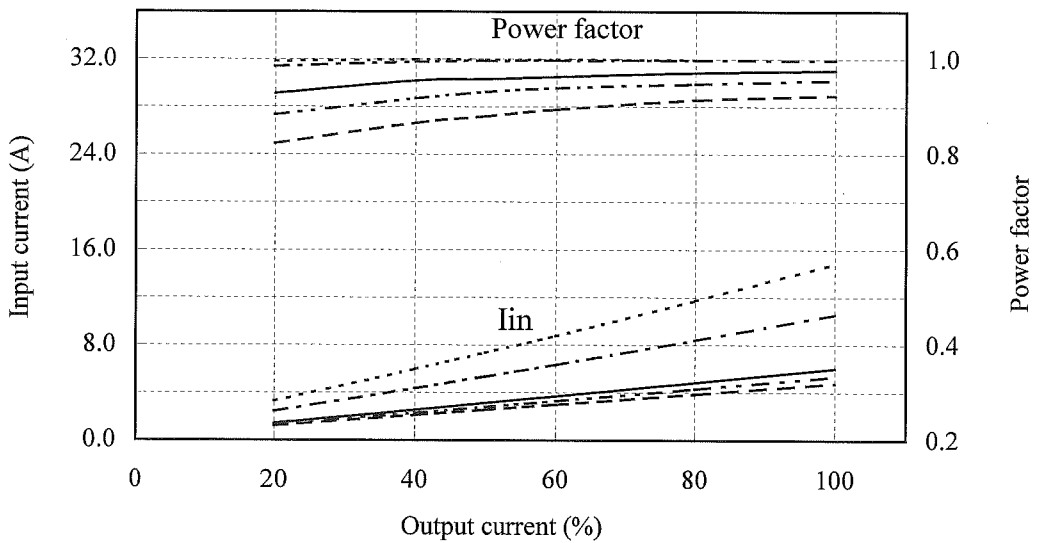
Power factor and Input current vs. Output current

Conditions V_{in} : 85 VAC - - - - -
 : 100 VAC - - - - -
 : 200 VAC - - - - -
 : 230 VAC - - - - -
 : 265 VAC - - - - -
 T_a : 25 °C

36V



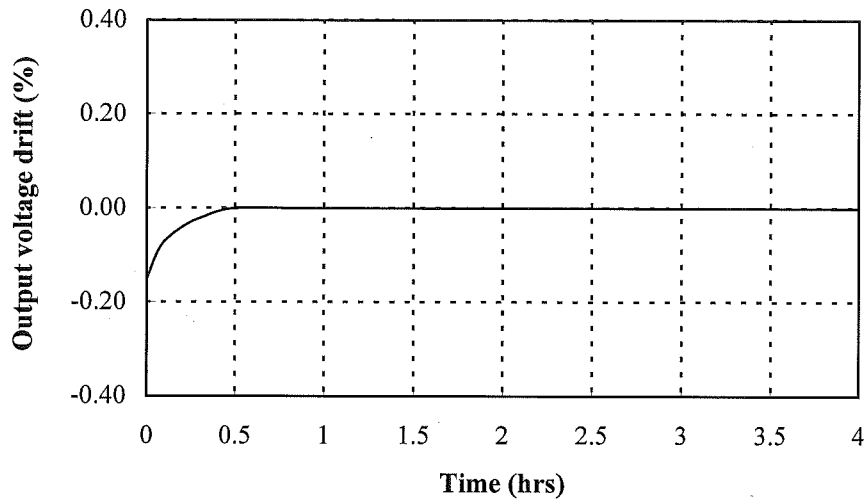
60V



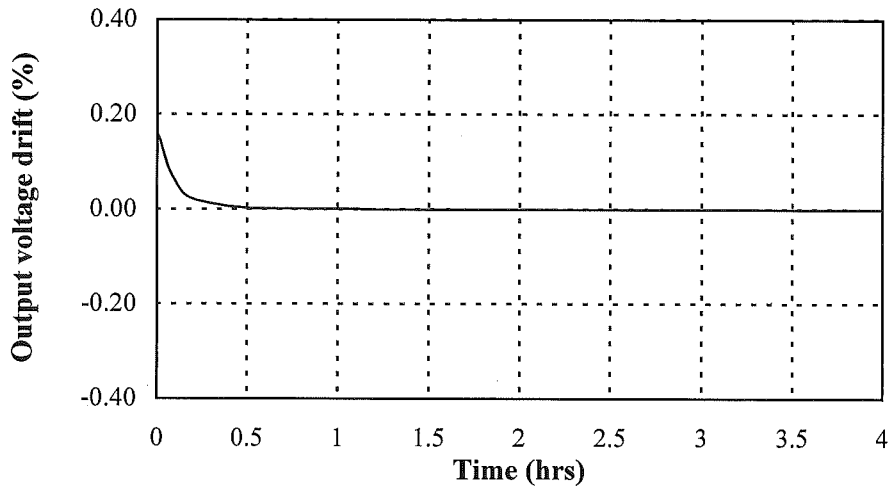
2.2 通電ドリフト特性 Warm up voltage drift characteristics

Condition: Vin : 115VAC
Iout : 100%
Ta : 25°C

36V



60V



2.3 過電流保護特性

Over current protection (OCP) characteristics

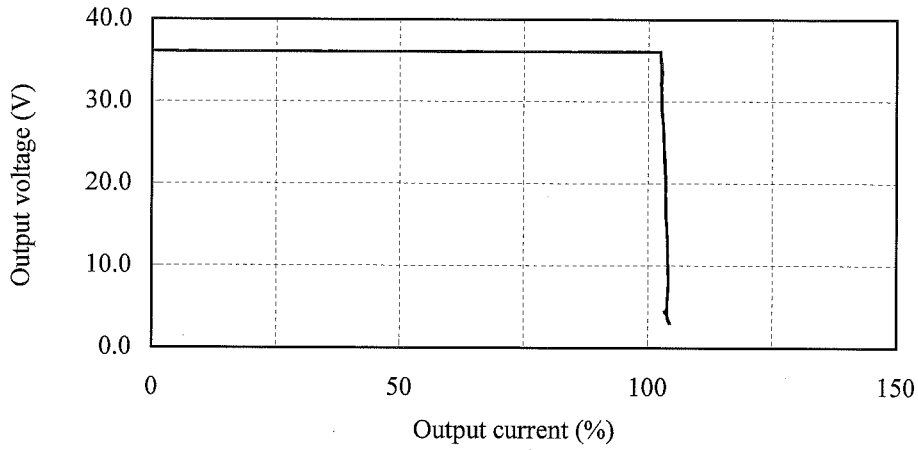
Conditions Vin : 85 VAC -----
 100 VAC -----
 200 VAC -----
 265 VAC -----

Vo setting Typ. 36V

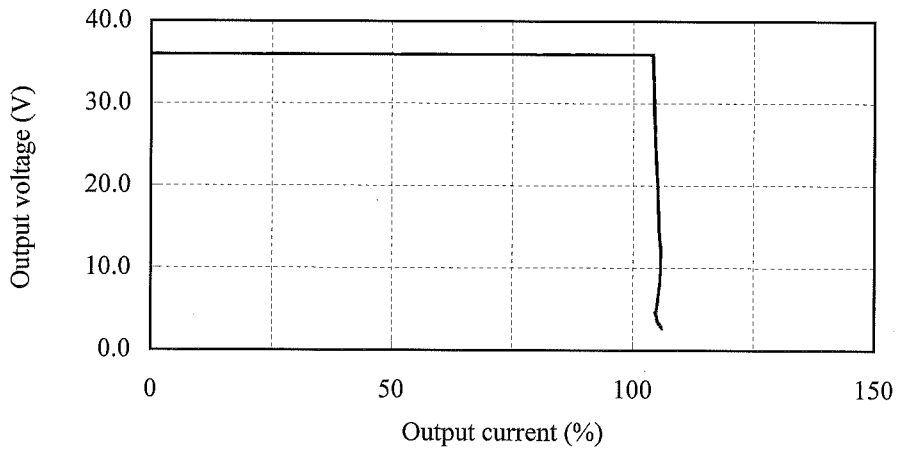
OCP setting : 105%

36 V

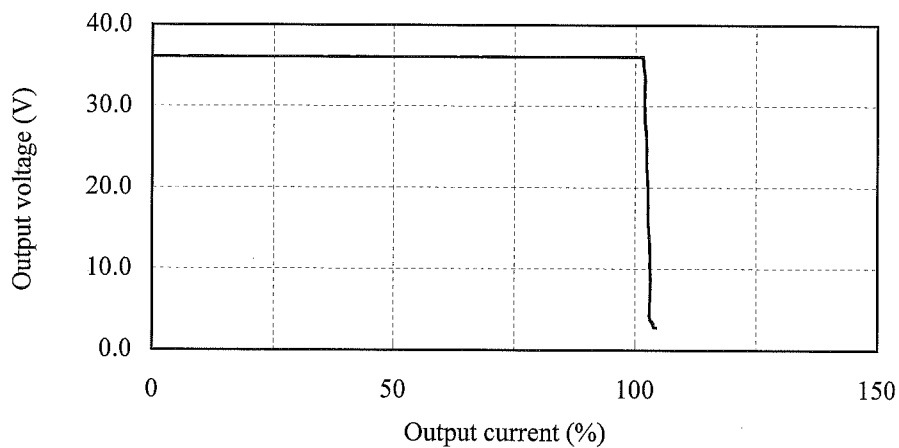
Ta : 25 °C



Ta : -20 °C



Ta : 50 °C



2.3 過電流保護特性

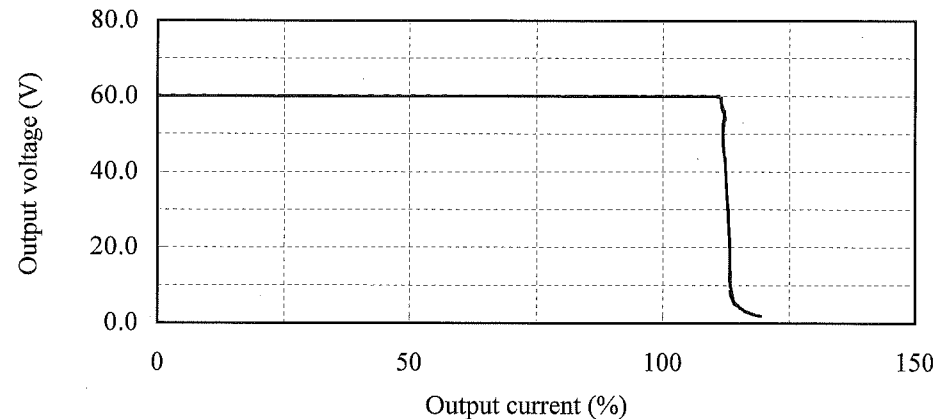
Over current protection (OCP) characteristics

Conditions Vin : 85 VAC
 100 VAC - - - - -
 200 VAC ————
 265 VAC - - - - -

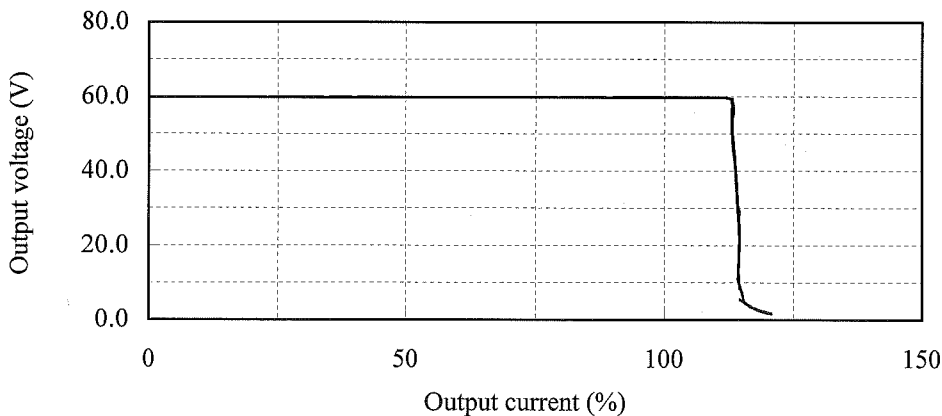
Vo setting Typ. 60V
 OCP setting : 110%

60 V

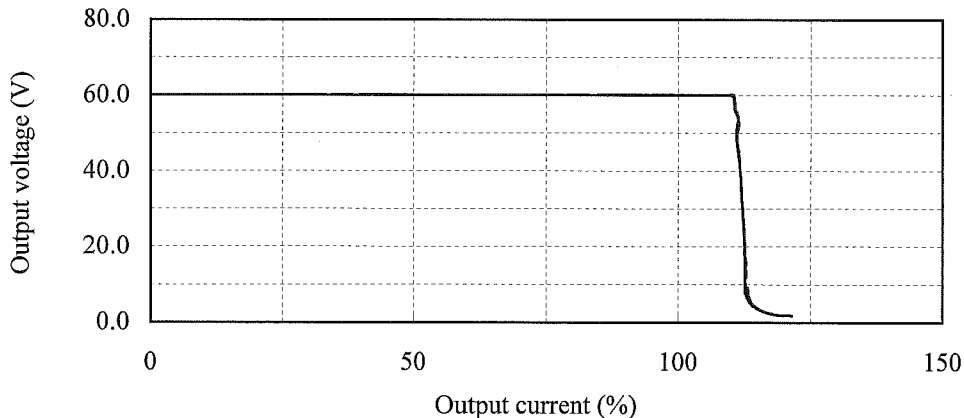
Ta : 25 °C



Ta : -20 °C



Ta : 50 °C



2.3 過電流保護特性

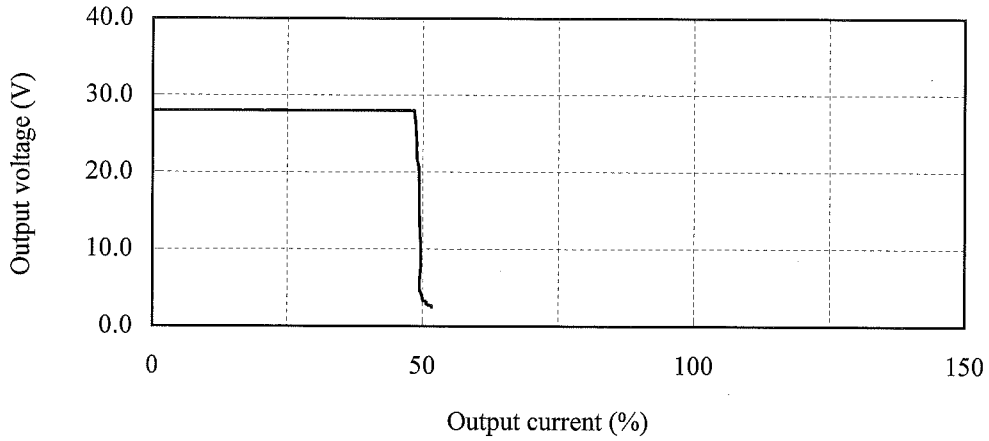
Over current protection (OCP) characteristics

Conditions Vin : 85 VAC
 100 VAC
 200 VAC
 265 VAC

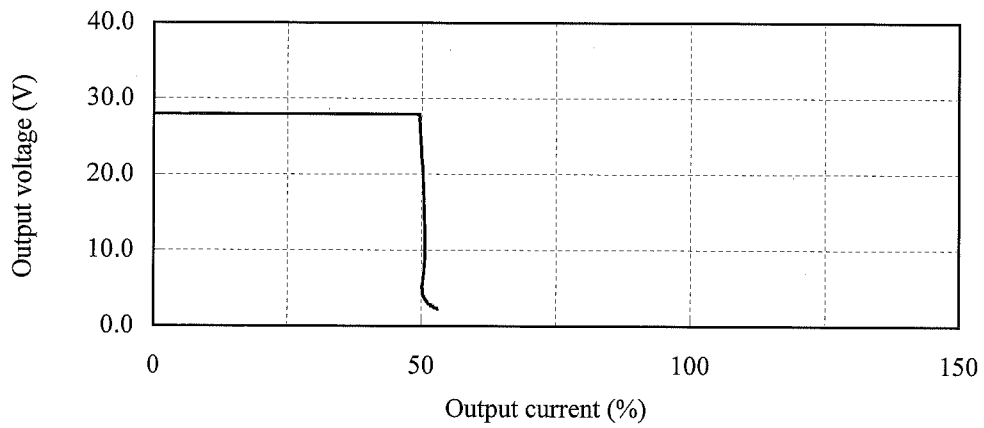
Vo setting Min. 28V
 OCP setting Min. 55%

36 V

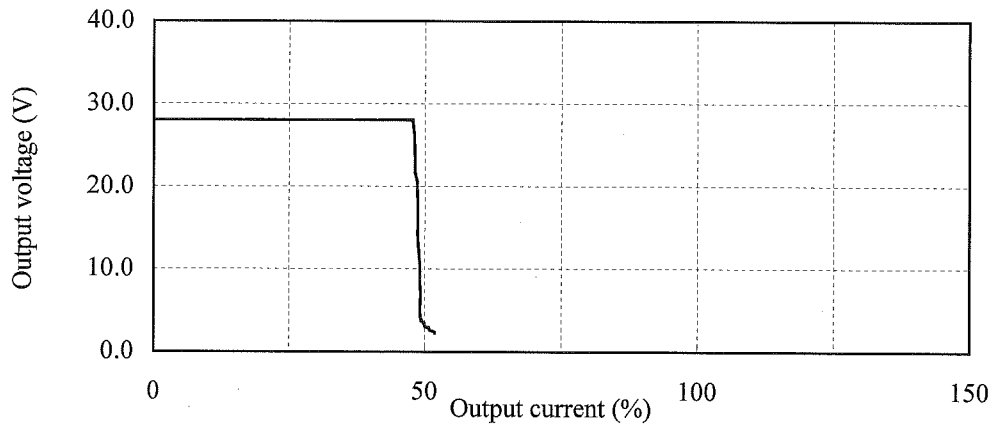
Ta : 25 °C



Ta : -20 °C



Ta : 50 °C



2.3 過電流保護特性

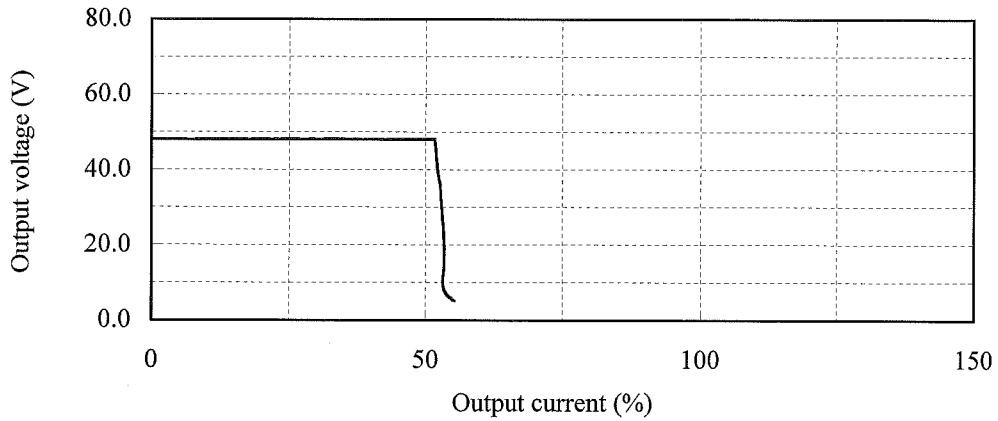
Over current protection (OCP) characteristics

Conditions Vin : 85 VAC
 100 VAC
 200 VAC
 265 VAC

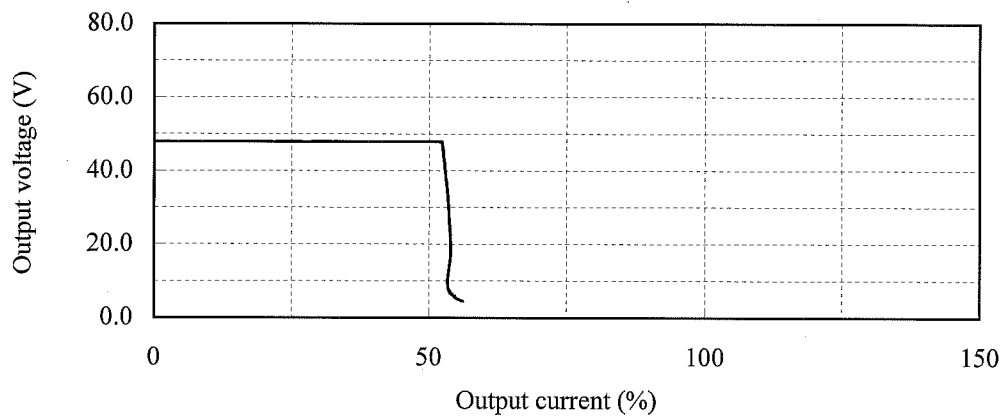
Vo setting Min. 48V
 OCP setting Min. 55%

60 V

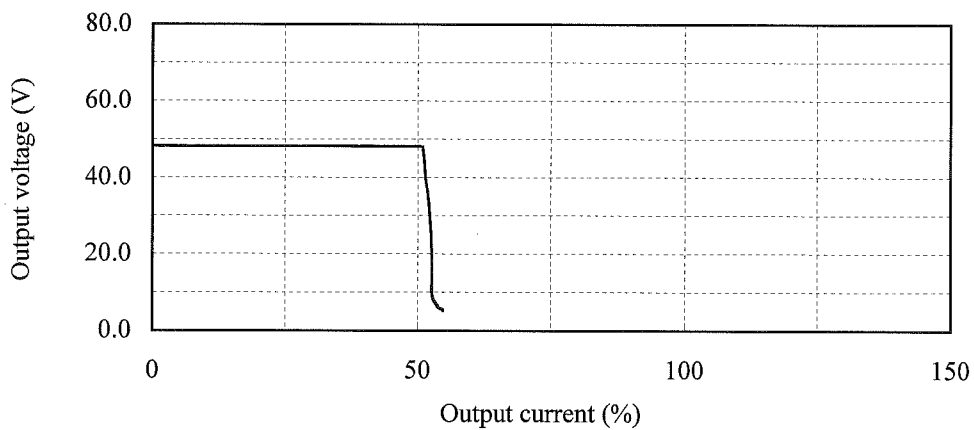
Ta : 25 °C



Ta : -20 °C



Ta : 50 °C



2.4 過電圧保護特性

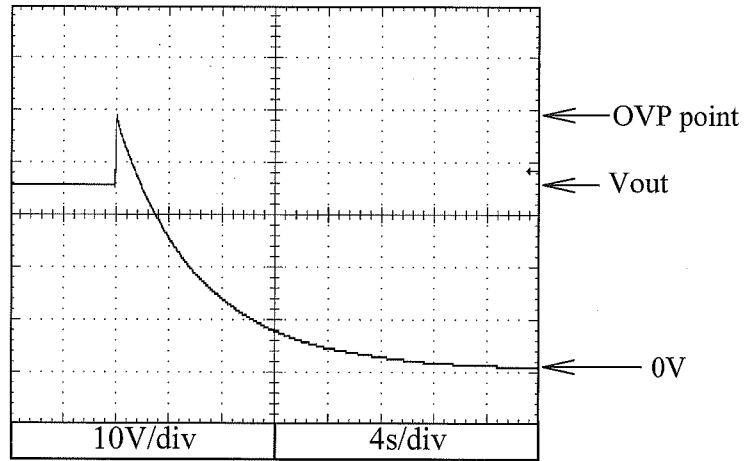
Over voltage protection (OVP) characteristics

Conditions; Vin : 115VAC

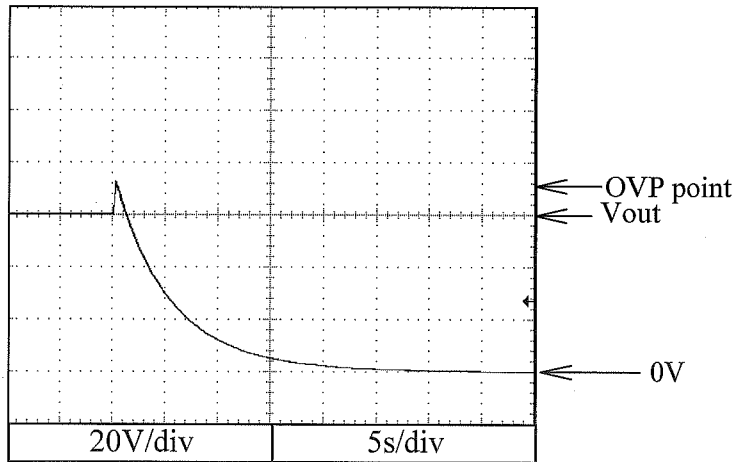
Iout : 0%

Ta : 25°C

36V



60V

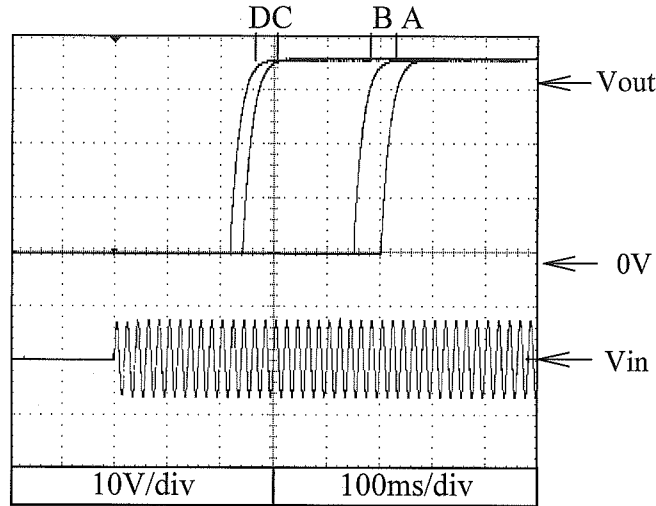


2.5 出力立ち上がり特性
Output rise characteristics

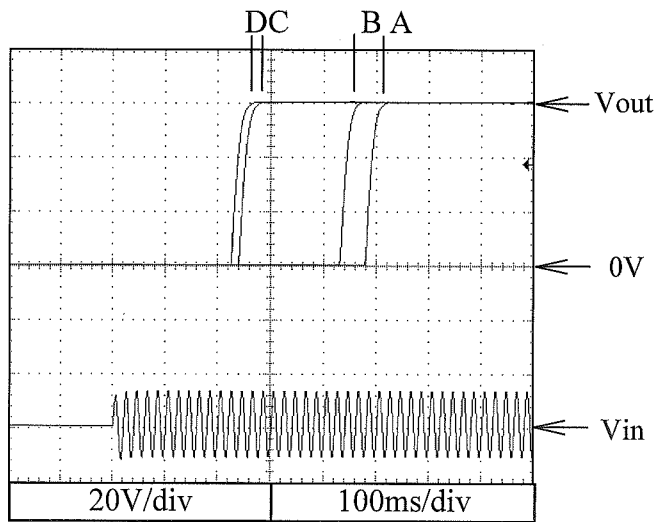
Conditions; Vin : 85VAC (A)
: 115VAC (B)
: 230VAC (C)
: 265VAC (D)

Iout : 0%
Ta : 25°C

36V



60V

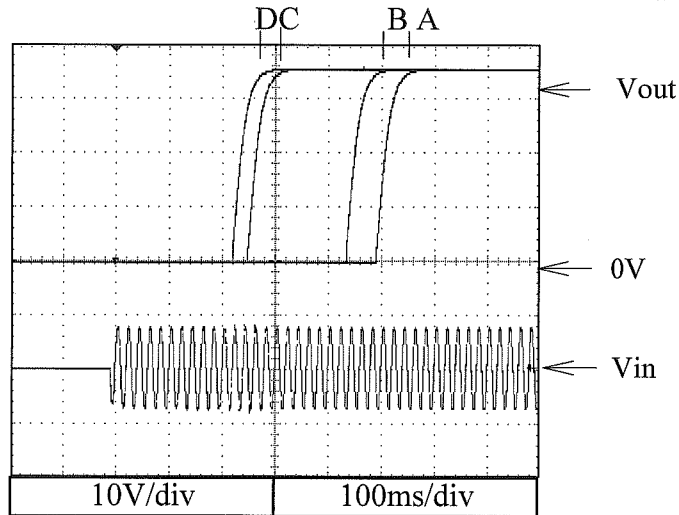


2.5 出力立ち上がり特性
Output rise characteristics

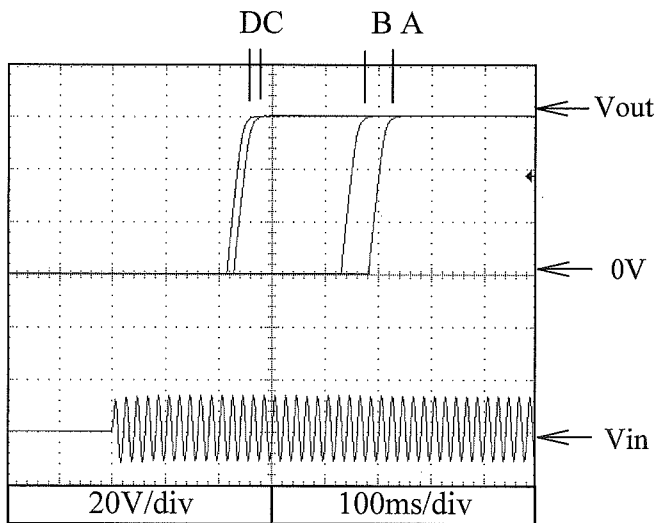
Conditions; Vin : 85VAC (A)
: 115VAC (B)
: 230VAC (C)
: 265VAC (D)

Iout : 100%
Ta : 25°C

36V



60V

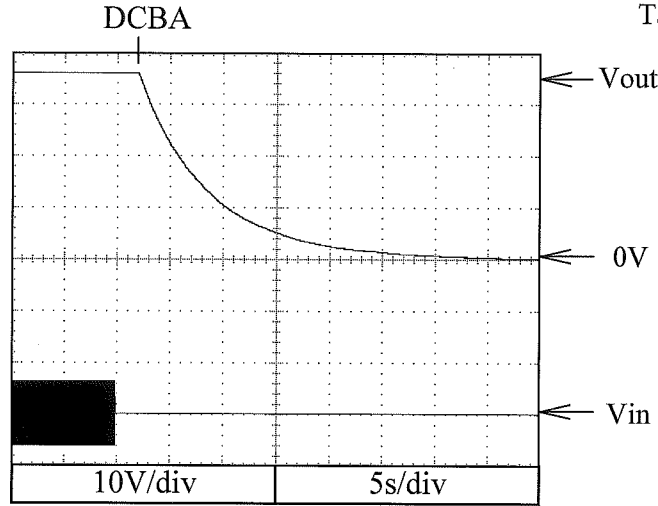


2.6 出力立ち下がり特性
Output fall characteristics

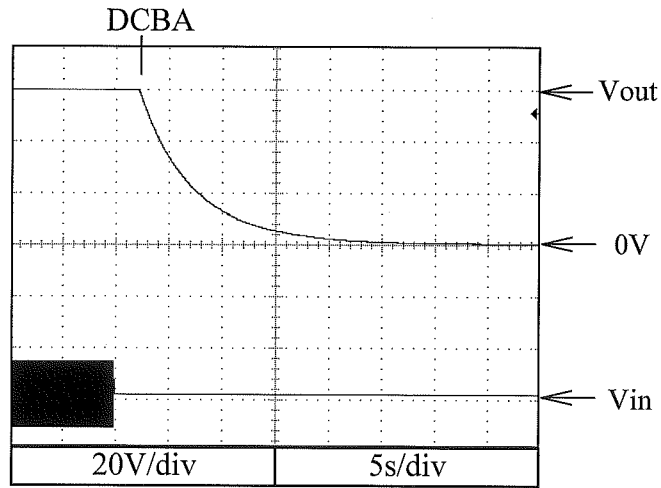
Conditions; V_{in} : 85VAC (A)
: 115VAC (B)
: 230VAC (C)
: 265VAC (D)

I_{out} : 0%
 T_a : 25°C

36V



60V

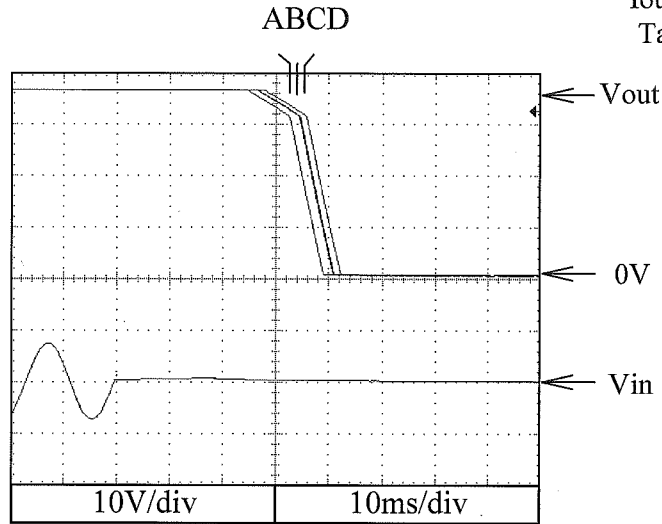


2.6 出力立ち下がり特性
Output fall characteristics

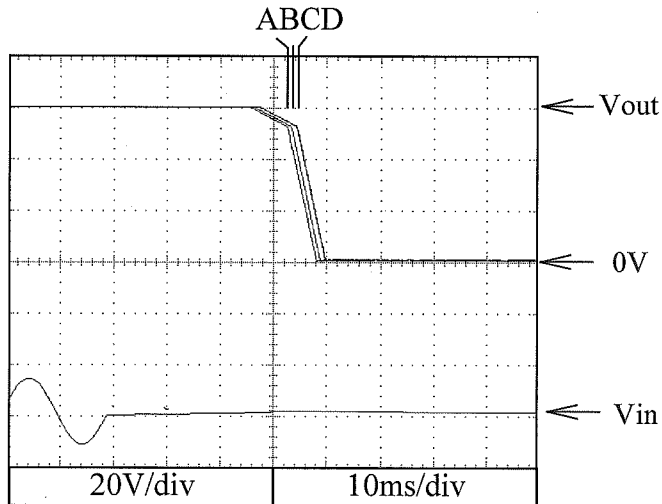
Conditions; Vin : 85VAC (A)
: 115VAC (B)
: 230VAC (C)
: 265VAC (D)

Iout : 100%
Ta : 25°C

36V



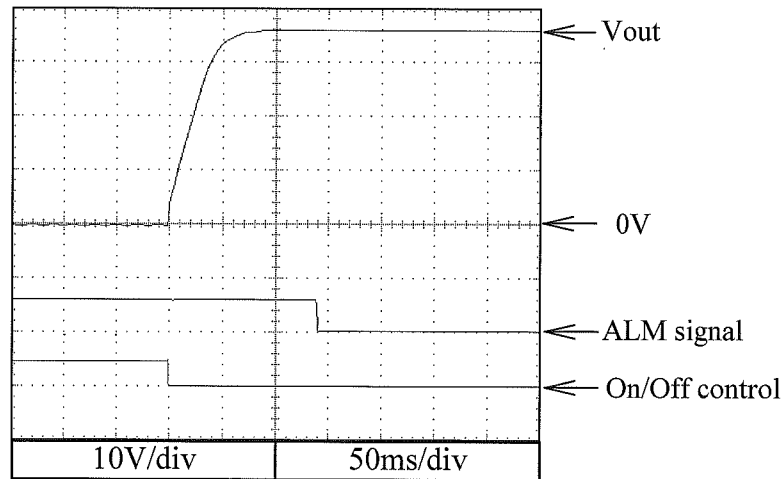
60V



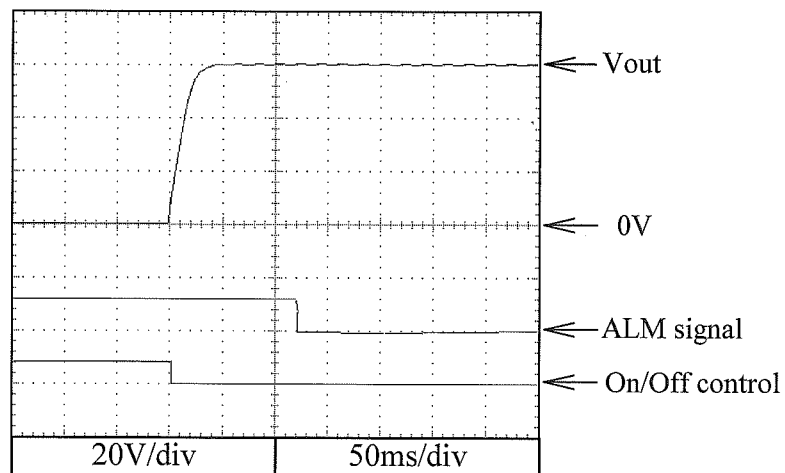
2.7 ON/OFFコントロール時出力立ち上がり特性
Output rise characteristics with On/Off control

Conditions; V_{in} : 115VAC
 I_{out} : 100%
 T_a : 25°C

36V



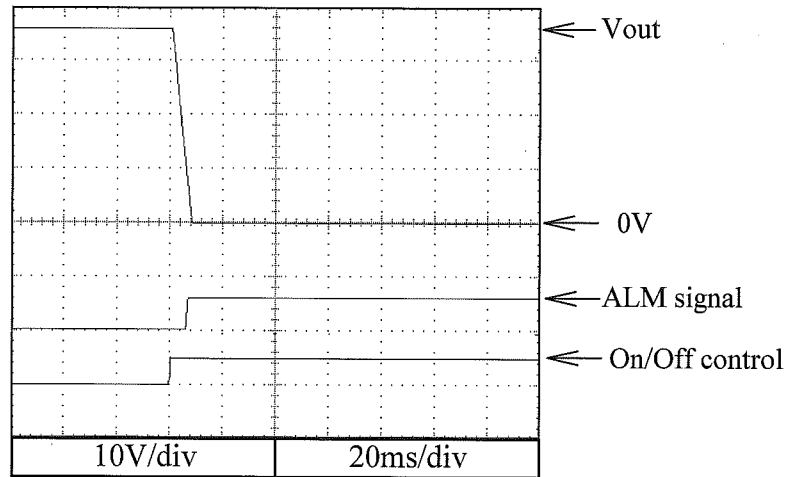
60V



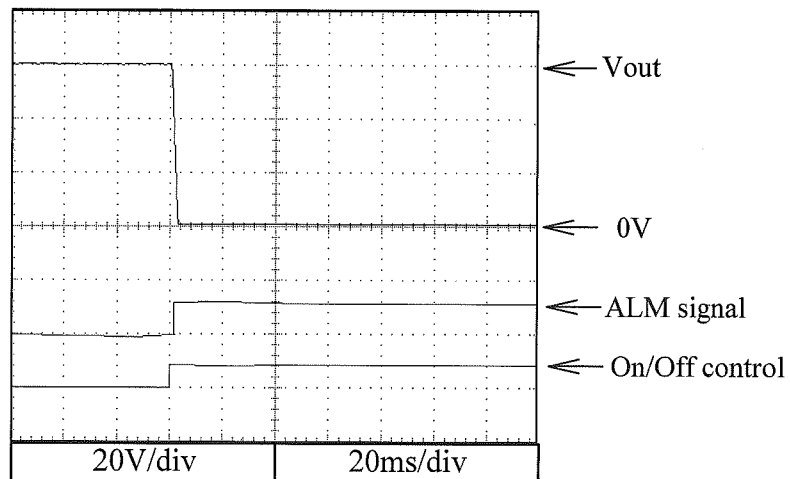
2.8 ON/OFFコントロール時出力立ち下がり特性
Output fall characteristics with On/Off control

Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C

36V



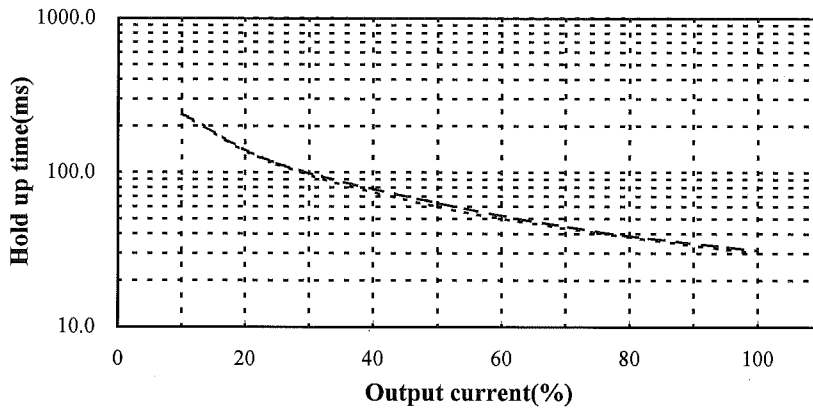
60V



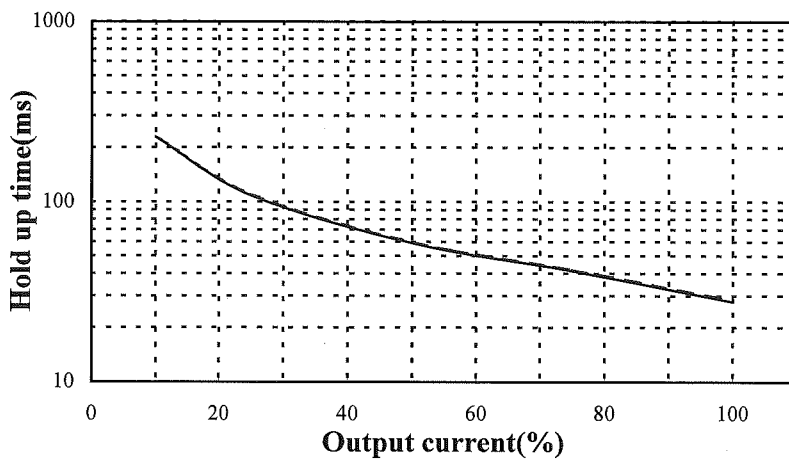
2.9 出力保持時間特性
Hold up time characteristics

Conditions; Vin : 115VAC-----
 : 230VAC———
 Ta : 25°C

36V

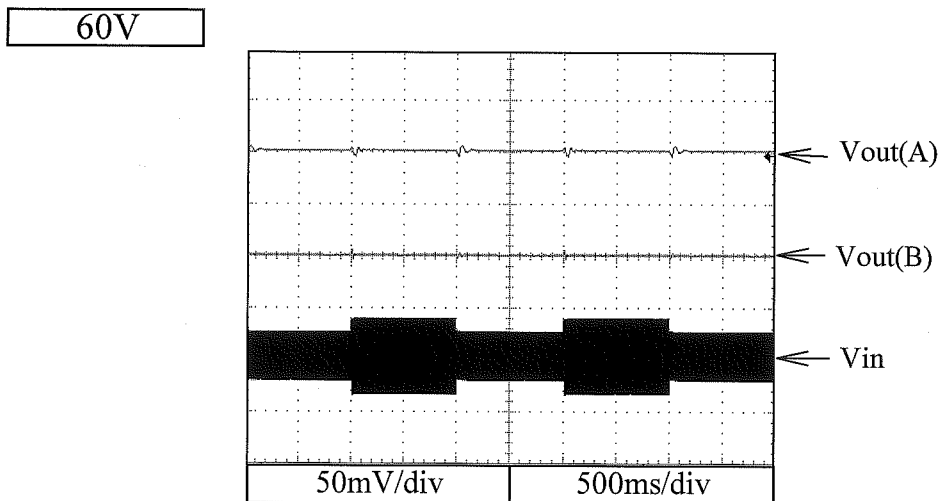
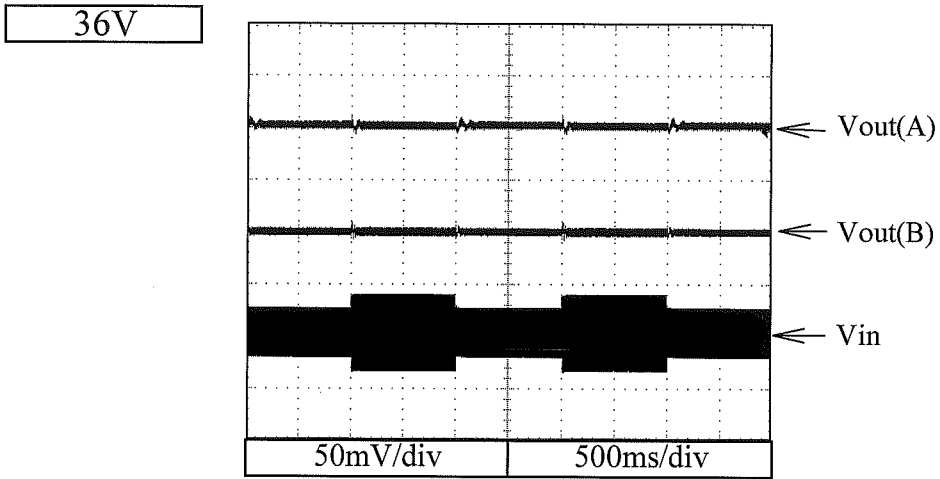


60V



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

Conditions V_{in} : 85VAC \leftrightarrow 132VAC(A)
 170VAC \leftrightarrow 265VAC(B)
 I_{out} : 100%
 T_a : 25°C



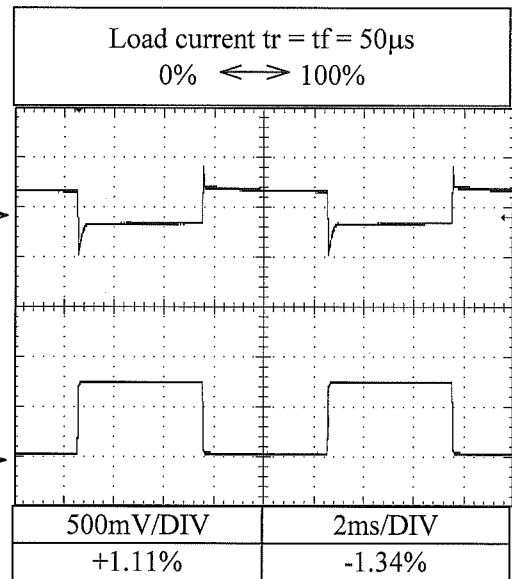
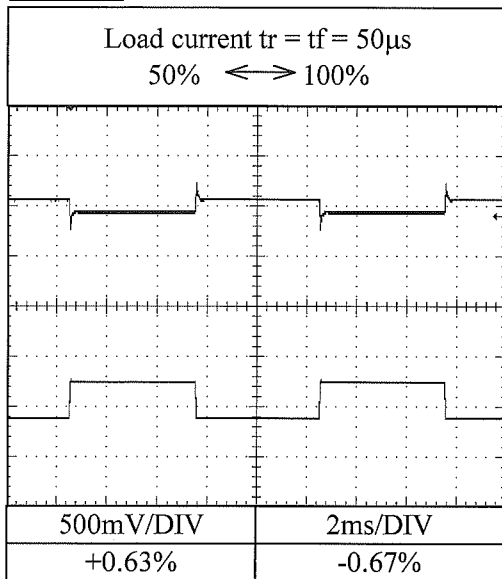
2.11 過渡応答(負荷急変)特性

Dynamic load response characteristics

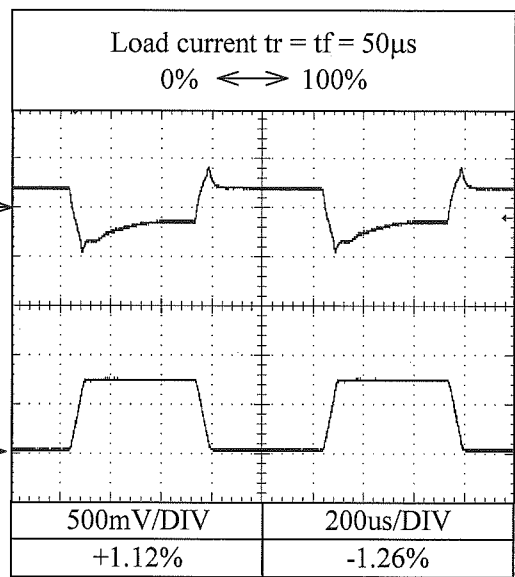
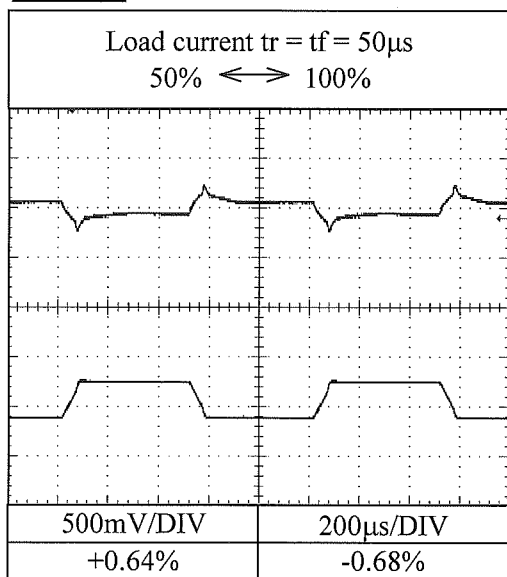
Conditions; V_{in} : 115VAC
 T_a : 25°C

36V

f=100Hz



f=1kHz

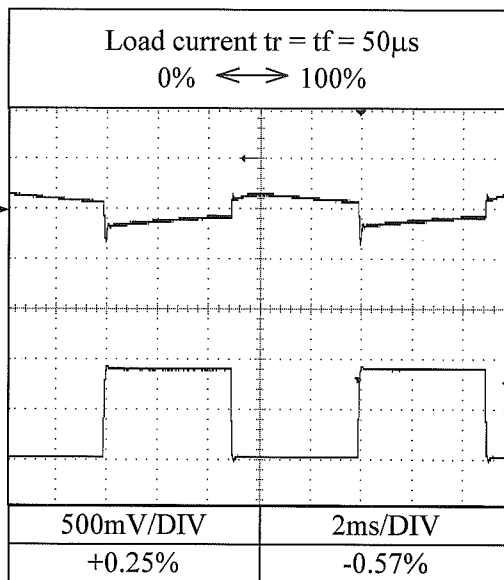
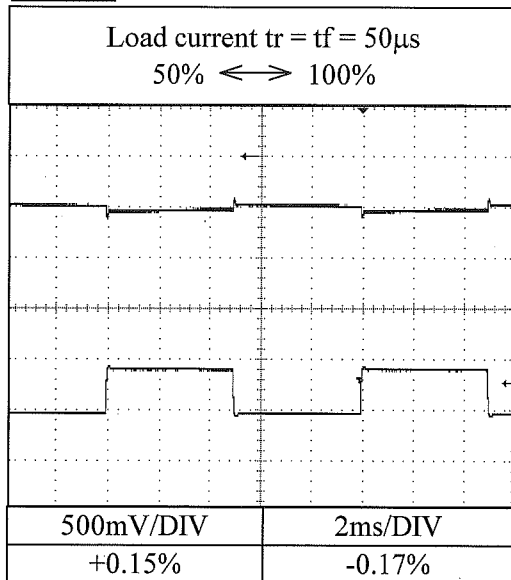


2.11 過渡応答(負荷急変)特性
Dynamic load response characteristics

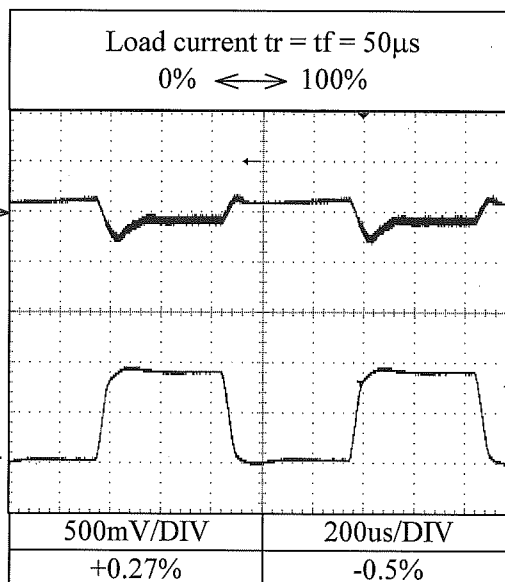
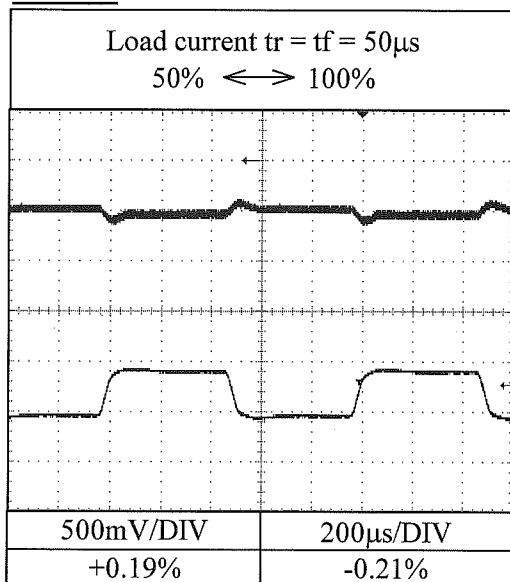
Conditions; V_{in} : 115VAC
 T_a : 25°C

60V

f=100Hz



f=1kHz

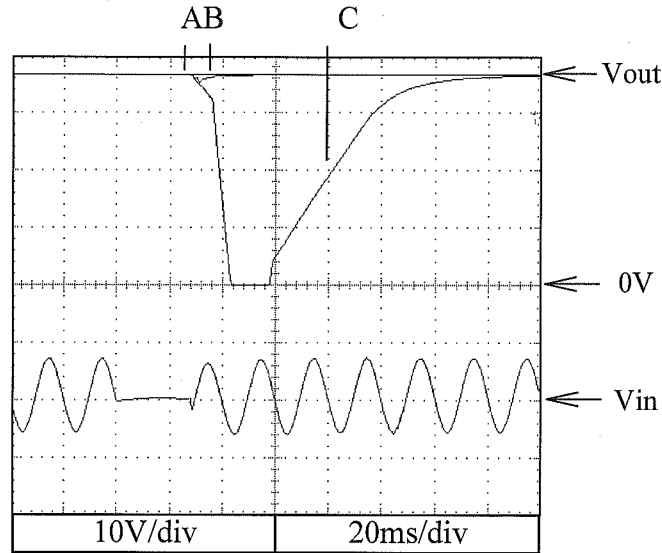


2.12 入力電圧瞬停特性
Response to brownout characteristics

Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C

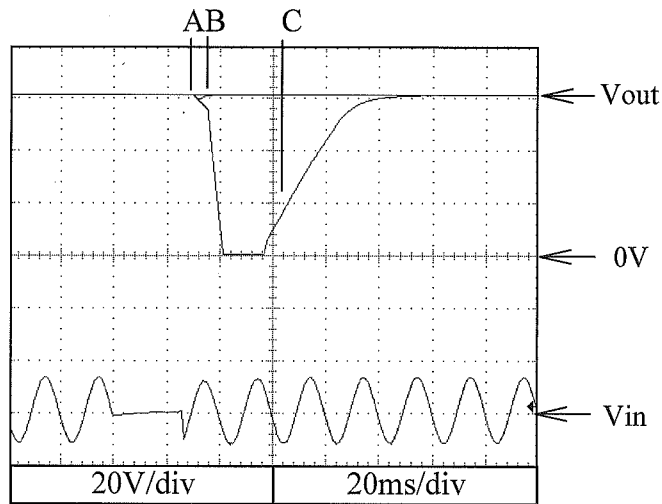
36V

A=26ms
B=27ms
C=29ms



60V

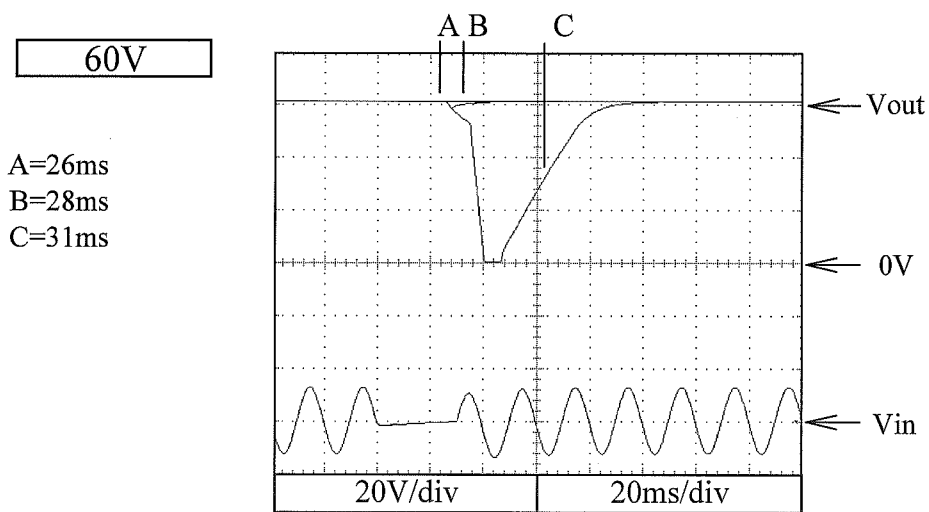
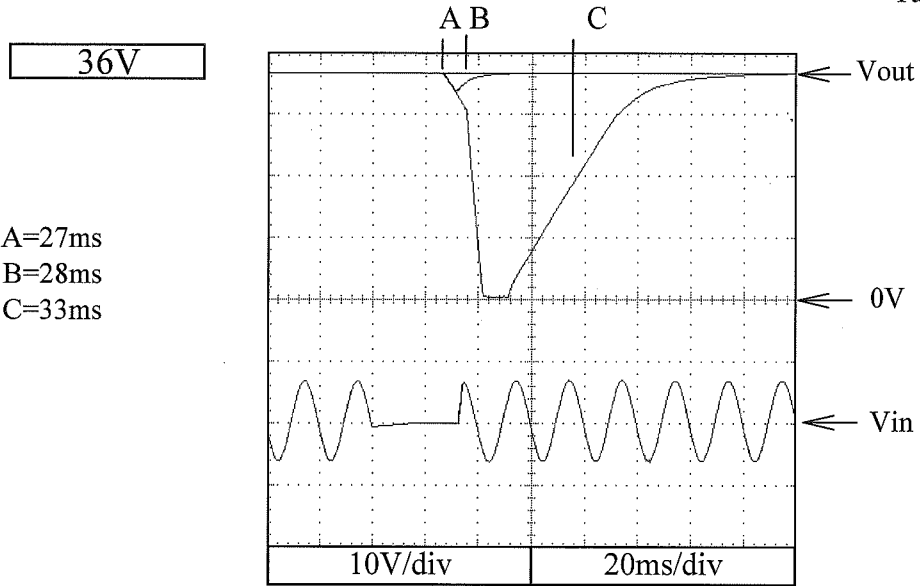
A=25ms
B=26ms
C=27ms



2.12 入力電圧瞬停特性

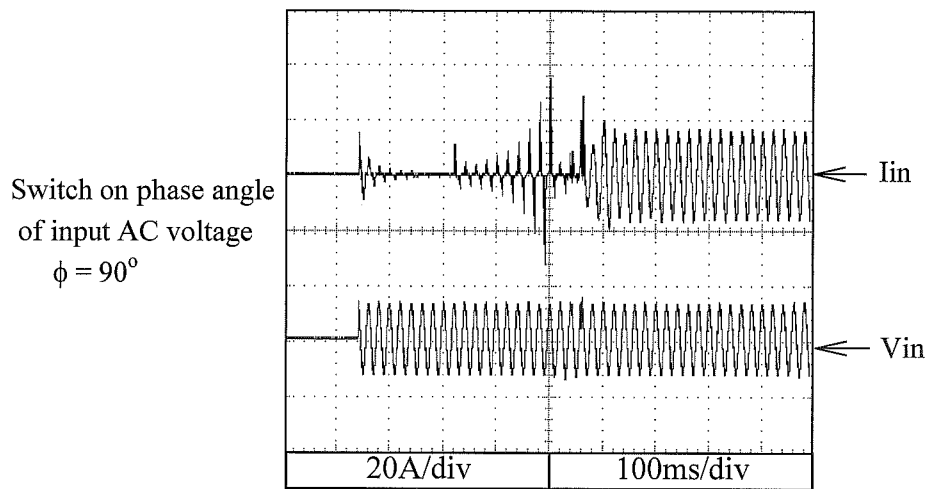
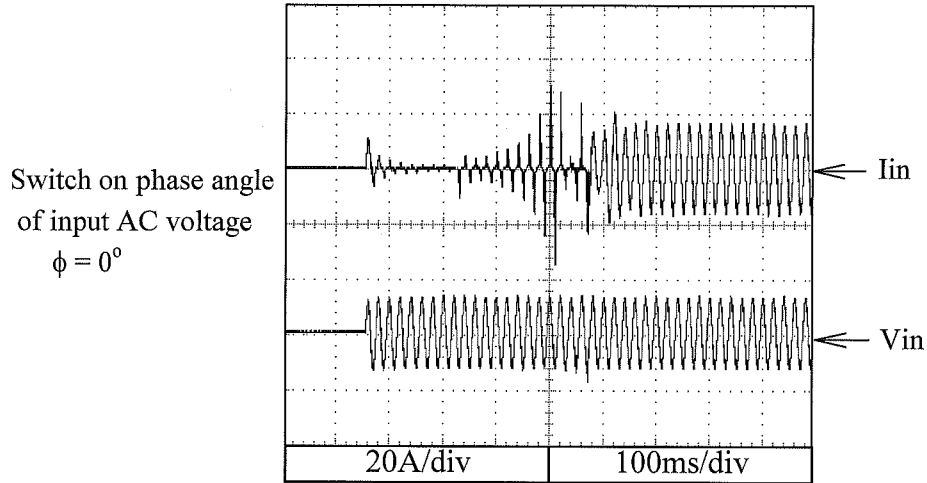
Response to brownout characteristics

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



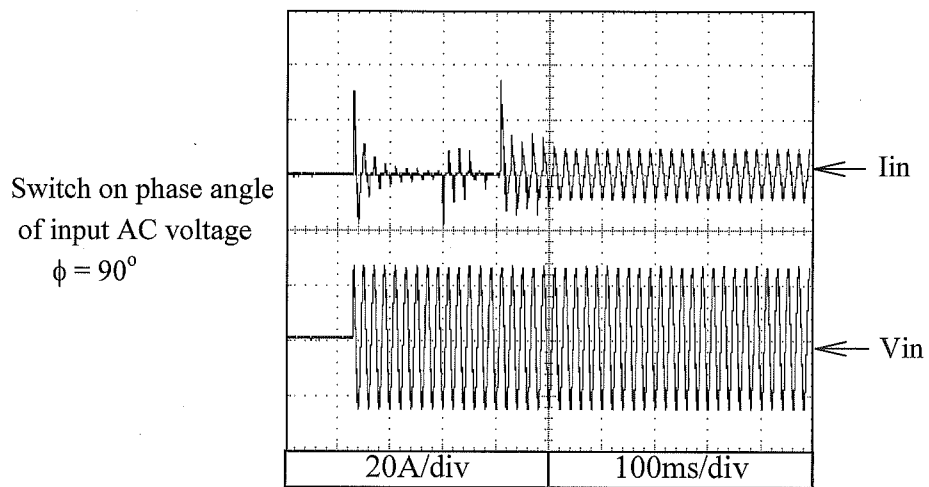
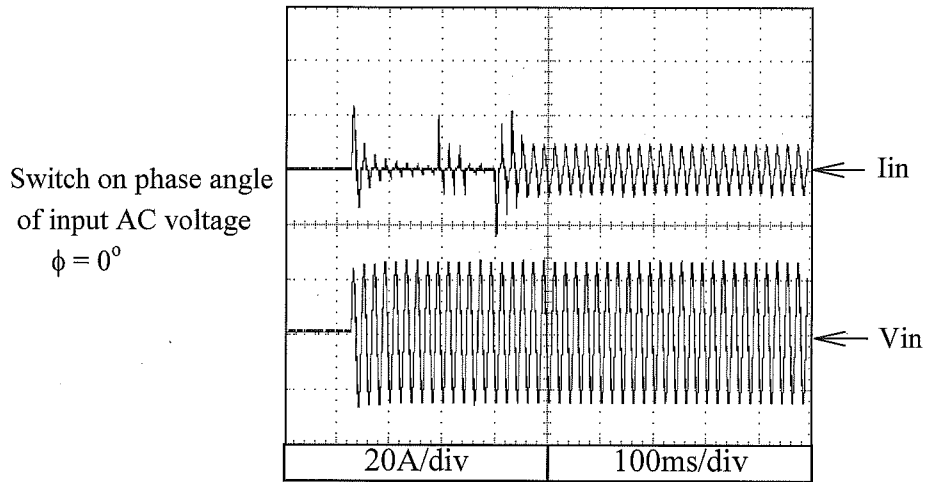
2.13 入力サージ電流(突入電流)特性
Inrush current waveform

Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C



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

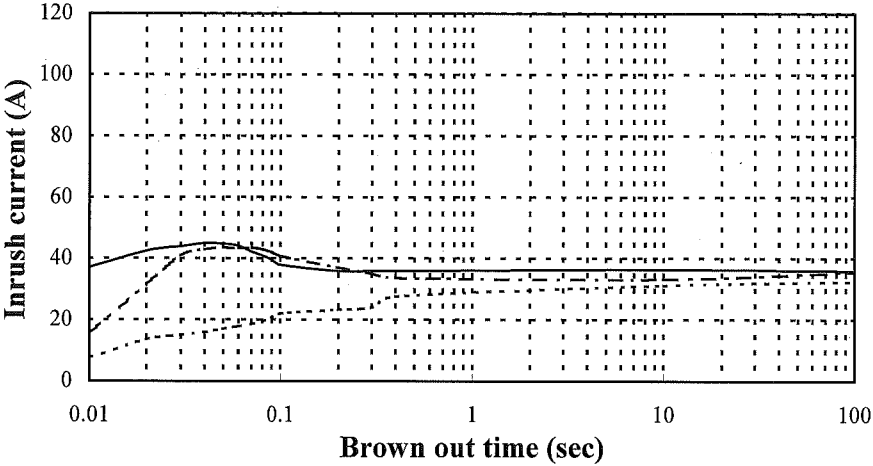
Conditions; Vin : 230VAC
Iout : 100%
Ta : 25°C



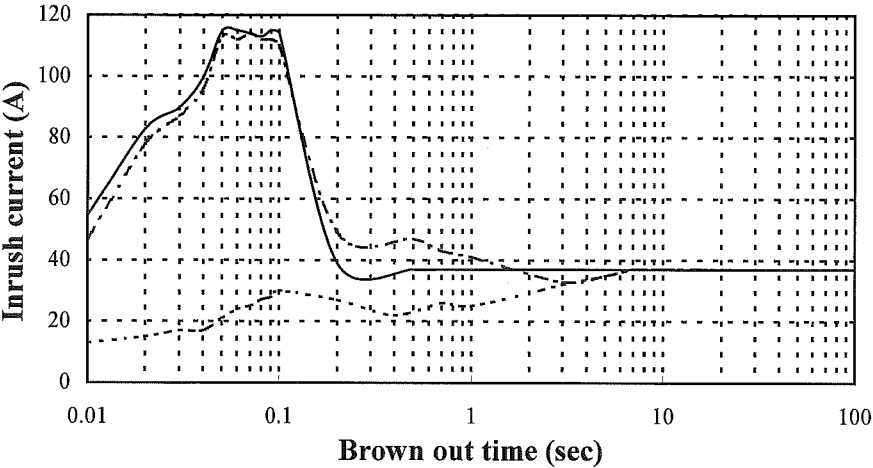
2.14 瞬停時突入電流特性
Inrush current characteristics

Conditions Iout : 0% -----
 : 50% -.-.-.-.-
 : 100% _____
 Ta : 25°C

Vin: 115VAC



Vin: 230VAC

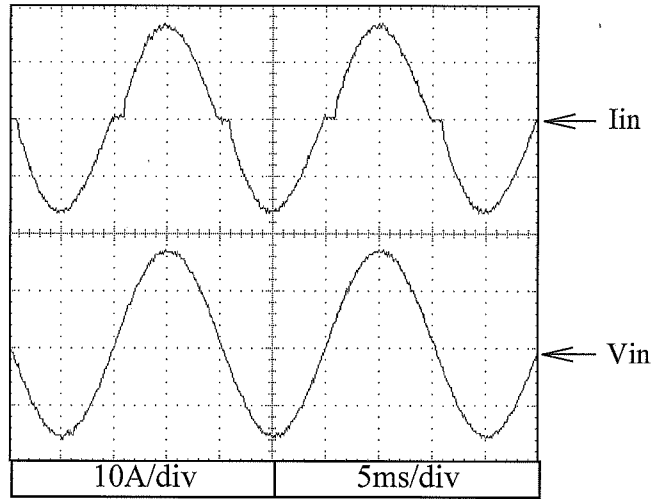


Above data included secondary inrush current.

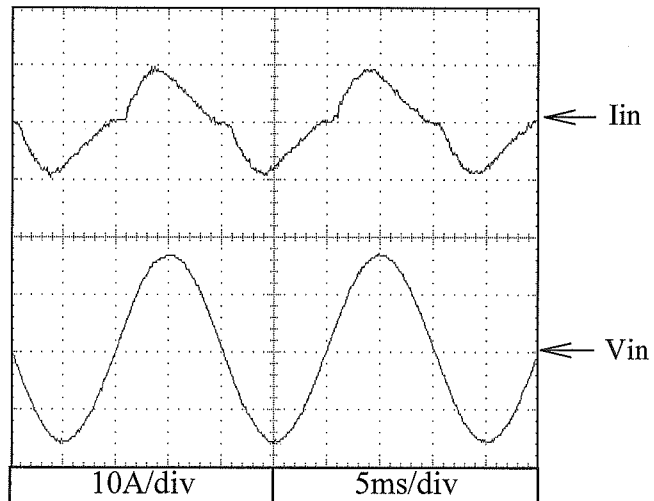
2.15 入力電流波形
Input current waveform

Conditions; Iout : 100%
Ta : 25°C

Vin = 115VAC



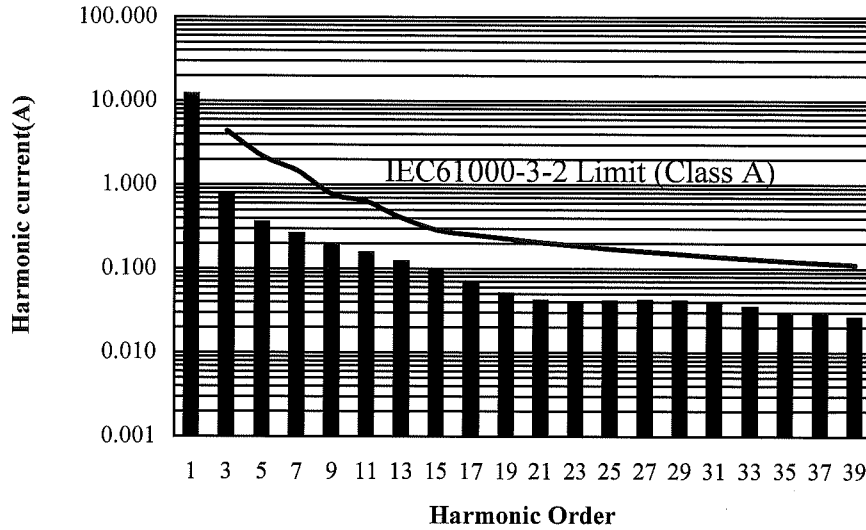
Vin = 230VAC



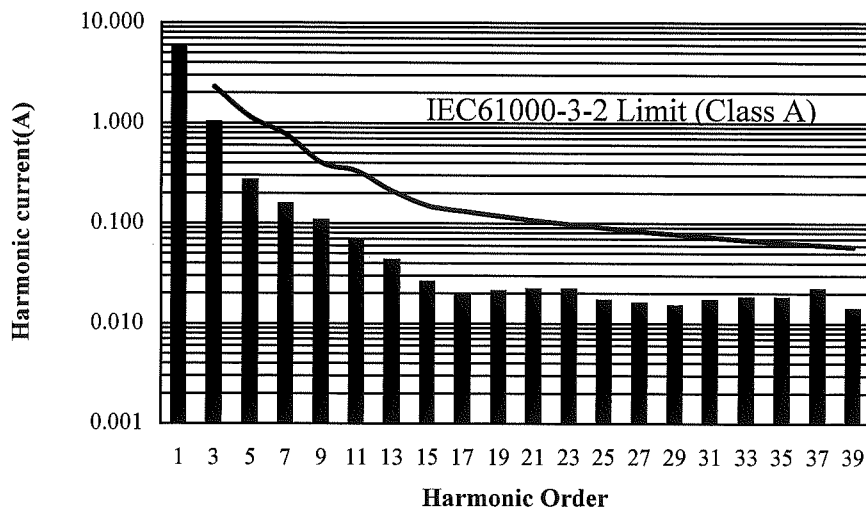
2.16 高調波成分

Input current harmonics

Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C



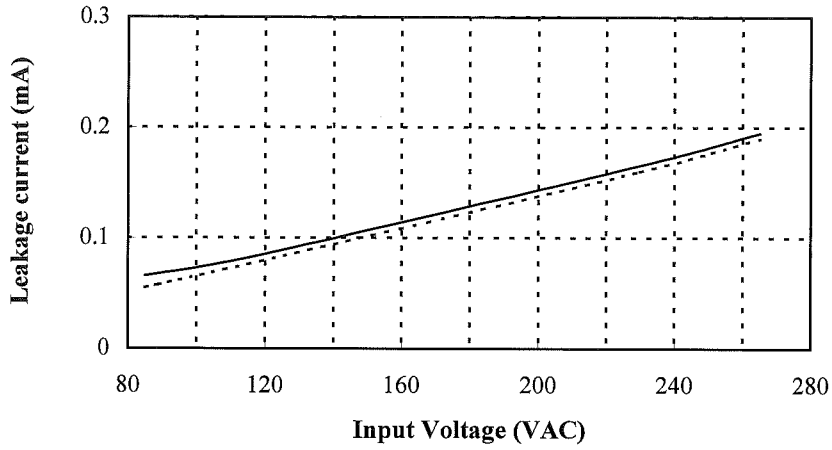
Conditions; Vin : 230VAC
Iout : 100%
Ta : 25°C



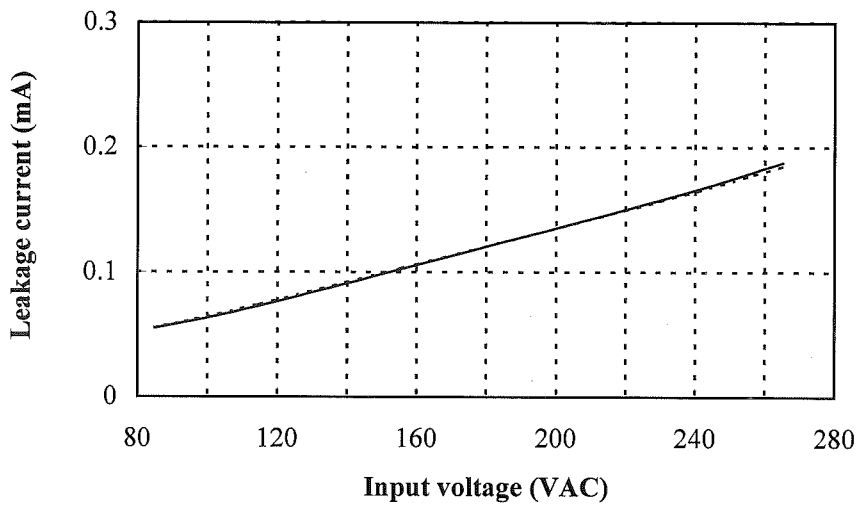
2.17 リーク電流特性
Leakage current characteristics

Conditions; Iout : 0% ———
 : 100% - - - - -
 Ta : 25°C
 f : 50Hz
 Equipment used : MODEL 228
 (Simpson)

36V



60V

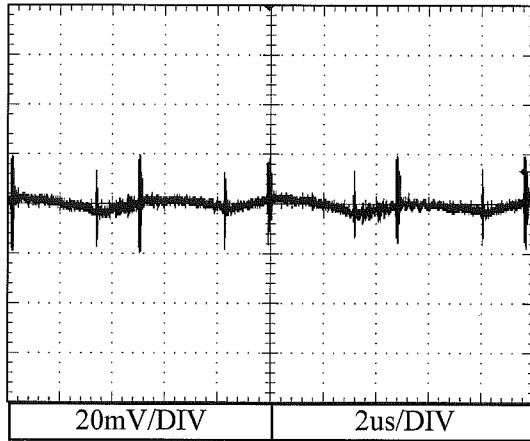


2.18 出力リップル、ノイズ波形
Output ripple and noise waveform

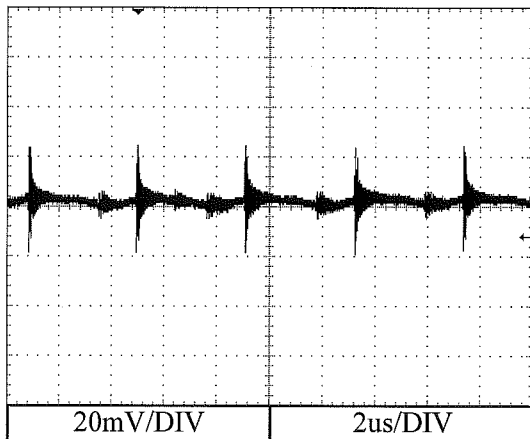
Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C

NORMAL MODE

36V



60V

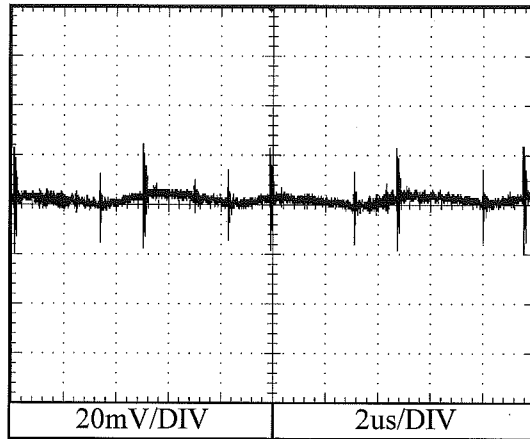


2.18 出力リップル、ノイズ波形
Output ripple and noise waveform

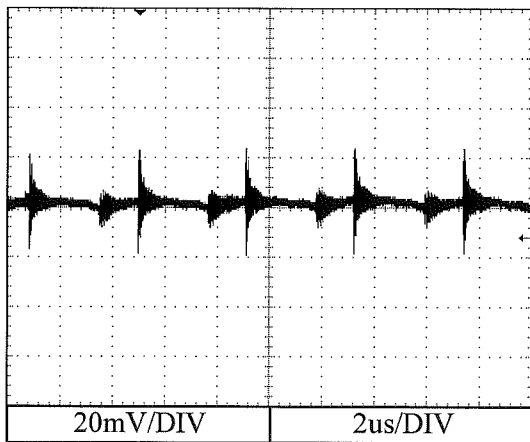
Conditions; Vin : 115VAC
Iout : 100%
Ta : 25°C

NORMAL+COMMON MODE

36V

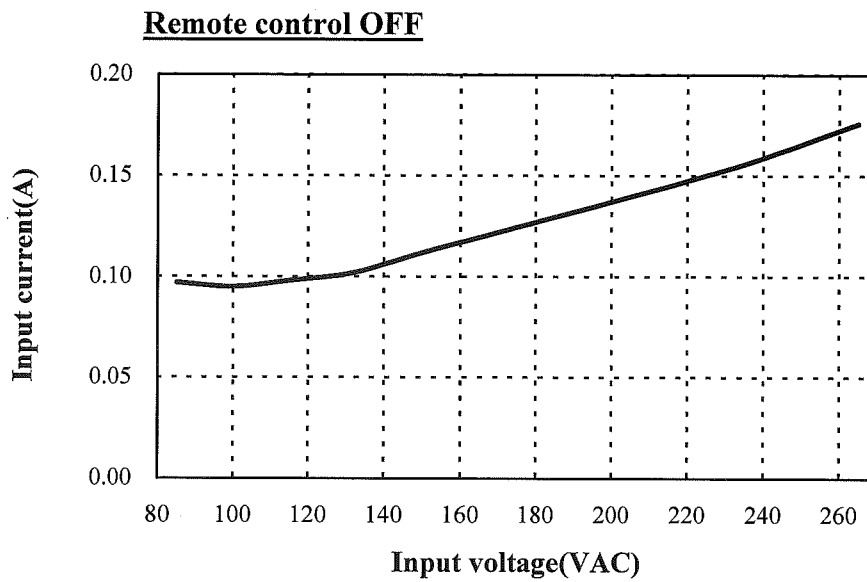
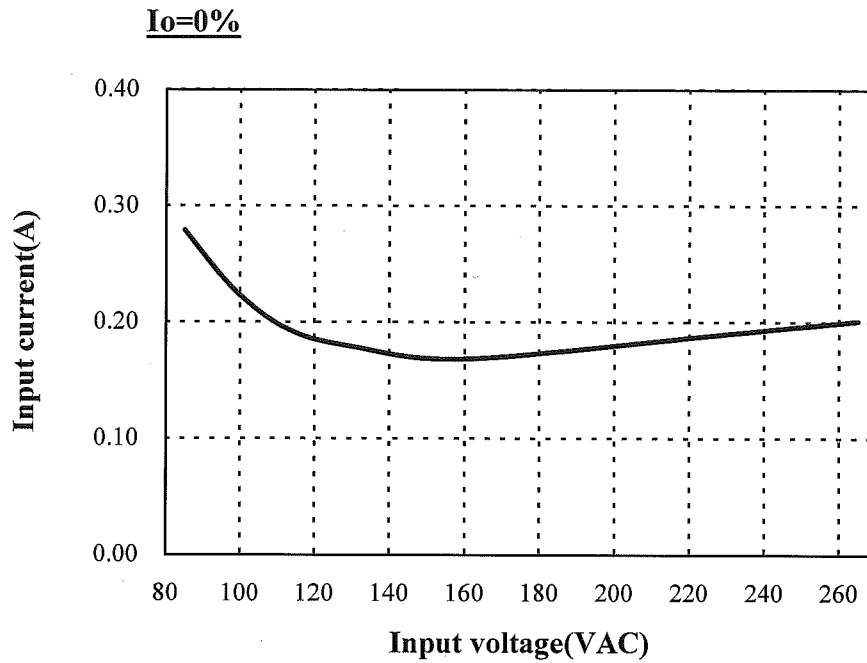


60V



2.19 スタンバイ電流
Standby current

Conditions; Ta : 25°C



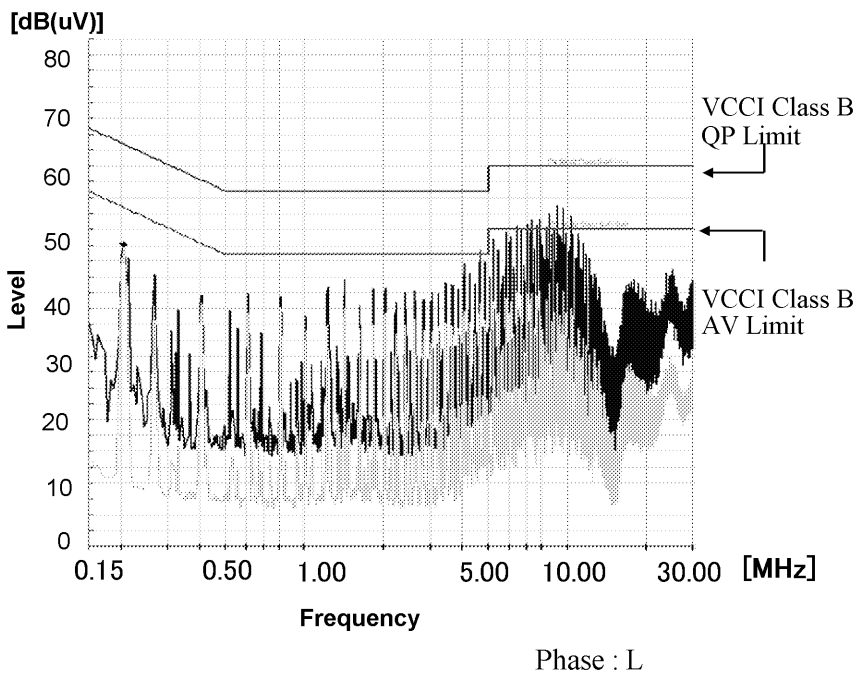
2.20 EMI特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230VAC
Iout : 100%

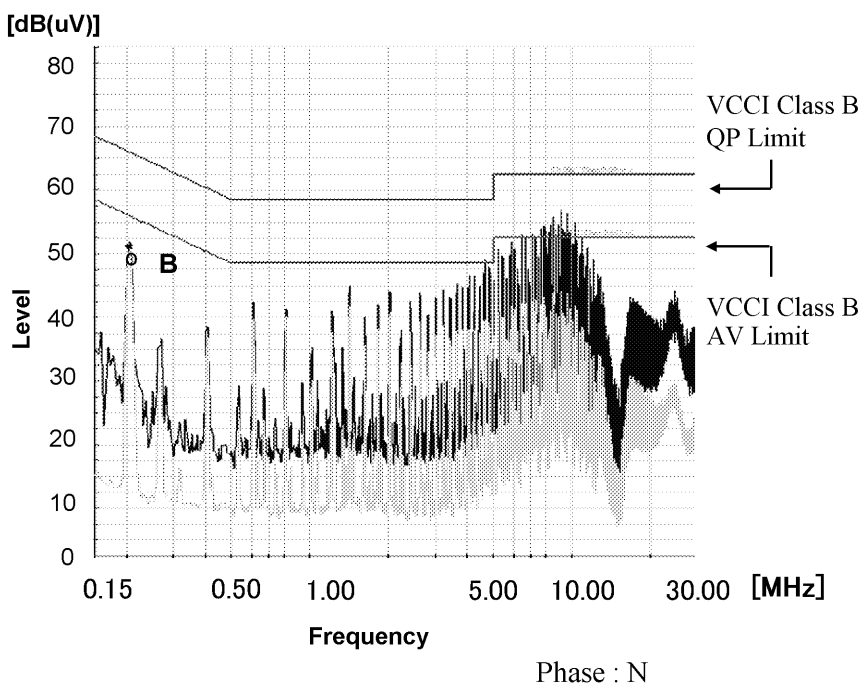
Conducted Emission

36V

Ref.	Point A (0.202MHz)	
	Limit (dBμV)	Measure (dBμV)
QP	63.5	47.6
AV	53.5	47.5



Ref.	Point B (0.202MHz)	
	Limit (dBμV)	Measure (dBμV)
QP	63.5	48.4
AV	53.5	48.4



Limit of EN55011-B,EN55032-B are same as its VCCI Class B.

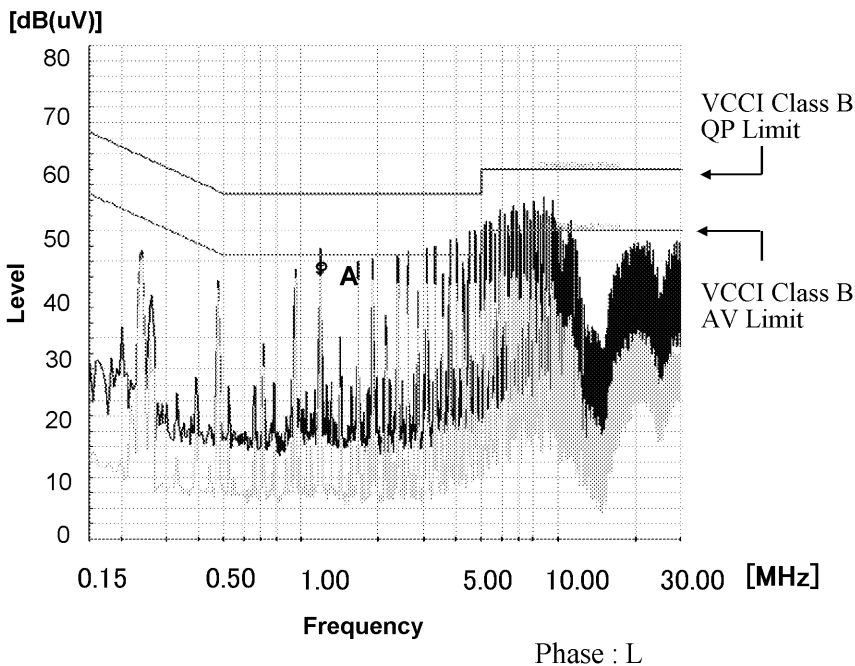
2.20 EMI特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230VAC
Iout : 100%

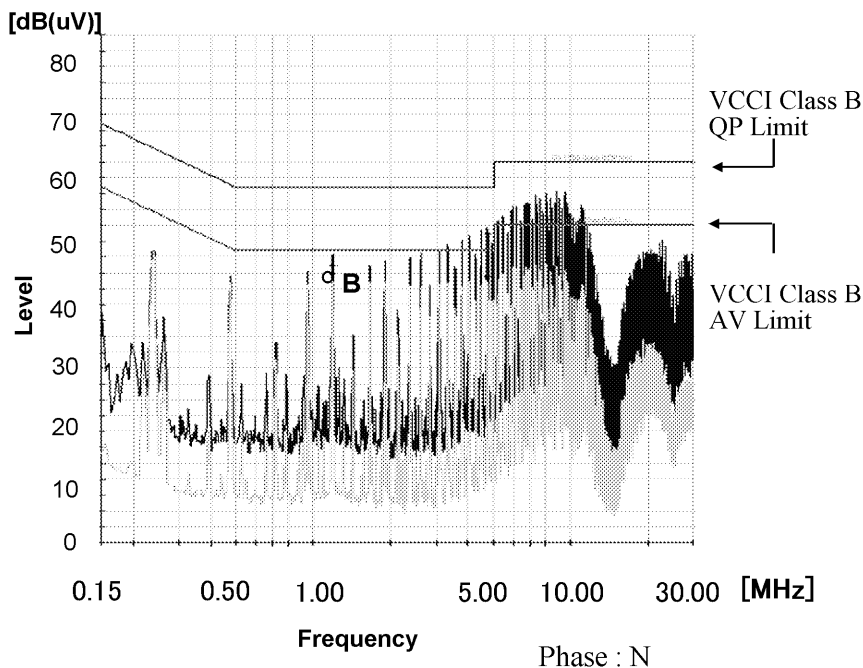
Conducted Emission

60V

Ref.	Point A (1.1865MHz)	
	Limit (dB μ V)	Measure (dB μ V)
QP	56.0	44.4
AV	46.0	42.2



Ref.	Point B (1.1875MHz)	
	Limit (dB μ V)	Measure (dB μ V)
QP	56.0	43.6
AV	46.0	42.0



Limit of EN55011-B,EN55032-B are same as its VCCI Class B.

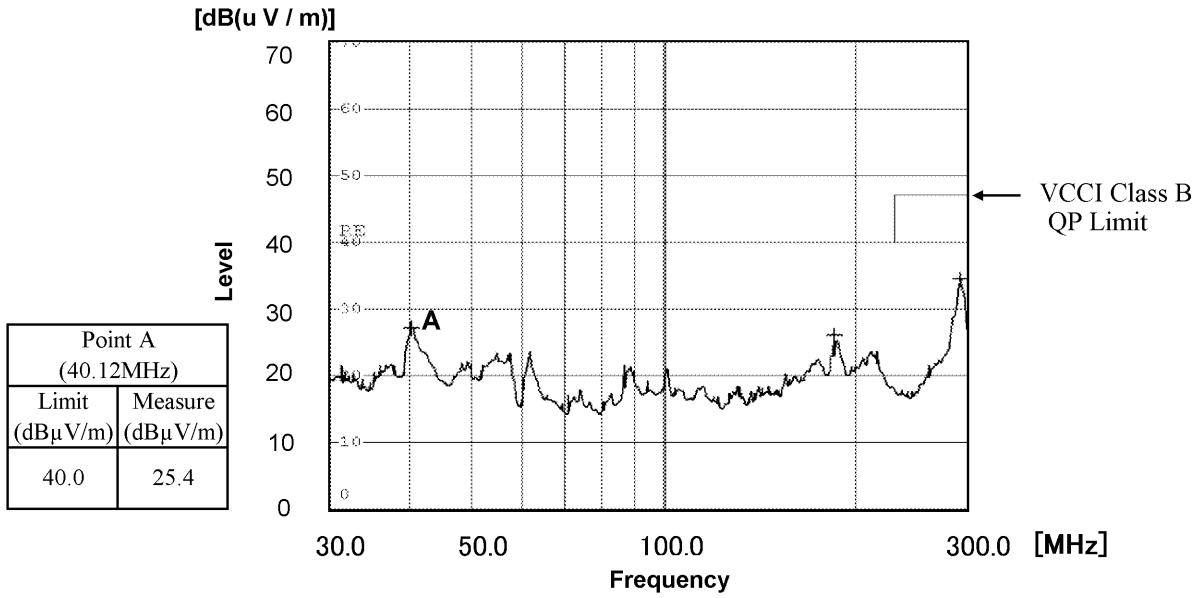
2.20 EMI特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230VAC
Iout : 100%

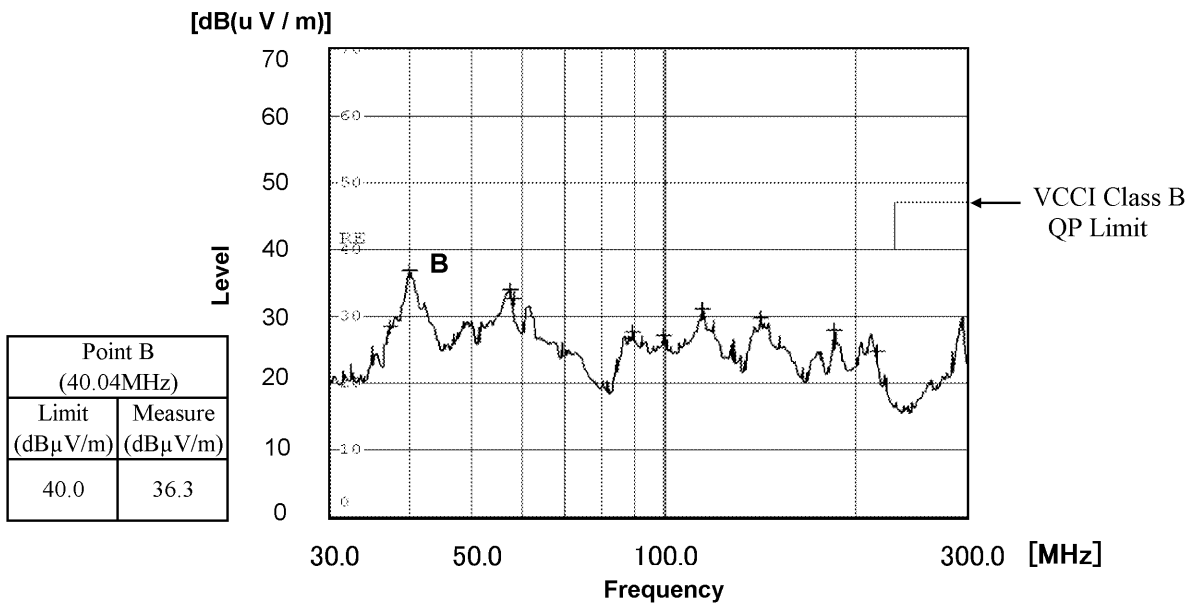
Radiated Emission

36V

HORIZONTAL



VERTICAL



Limit of EN55011-B,EN55032-B are same as its VCCI Class B.

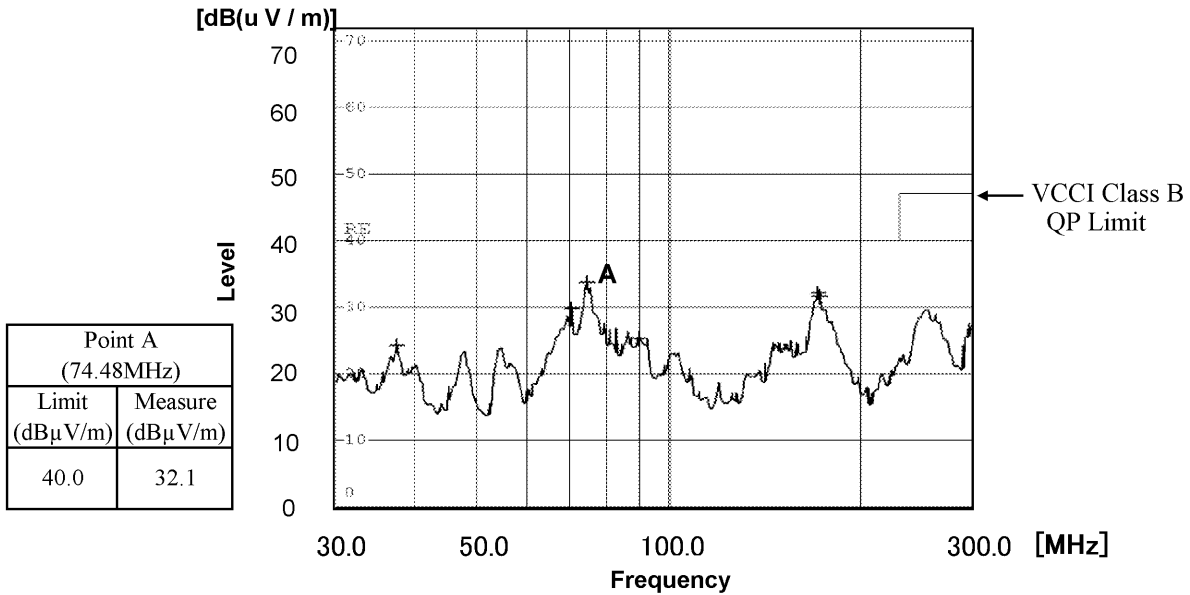
2.20 EMI特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230VAC
Iout : 100%

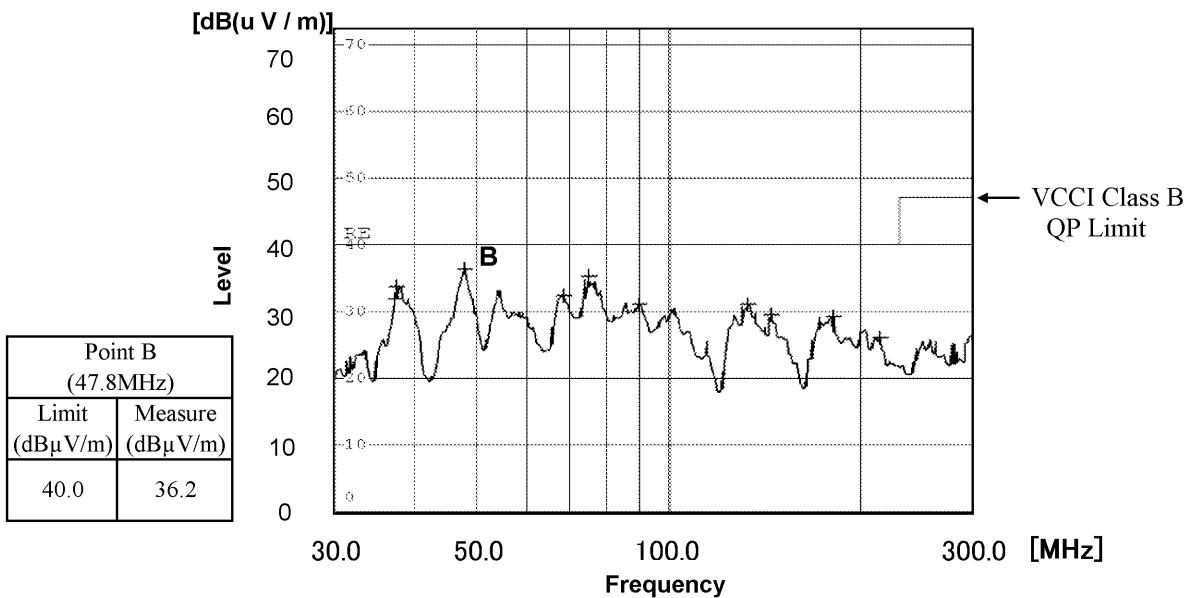
Radiated Emission

60V

HORIZONTAL



VERTICAL



Limit of EN55011-B,EN55032-B are same as its VCCI Class B.