ZWS10B

EVALUATION DATA

型式データ

CA790-53-01A

INDEX

使用記号 Terminology used

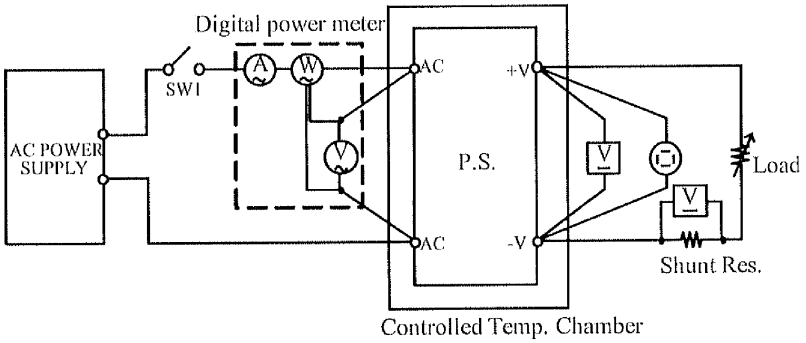
	定義	Definition	
Vin	.....	入力電圧	Input voltage
Vout	.....	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

1. 測定方法　**Evaluation Method**

1.1 測定回路　Circuit used for determination

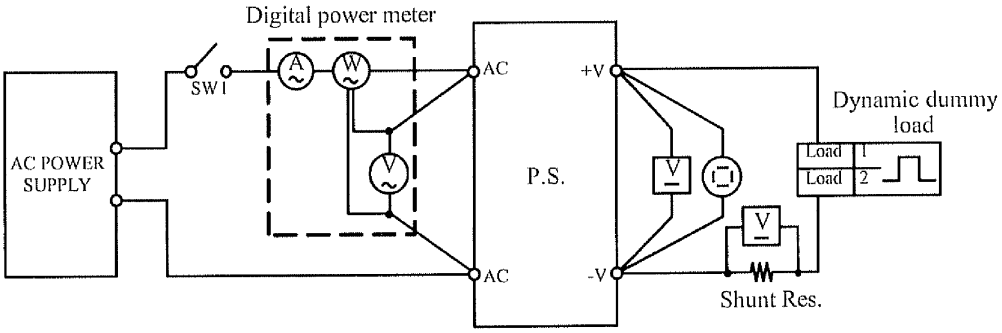
測定回路1 Circuit 1 used for determination

- 静特性　Steady state data
- 過電流保護特性　Over current protection (OCP) characteristics
- 過電圧保護特性　Over voltage protection (OVP) characteristics
- 出力立ち上がり特性　Output rise characteristics
- 出力立ち下がり特性　Output fall characteristics
- 出力保持時間特性　Hold up time characteristics

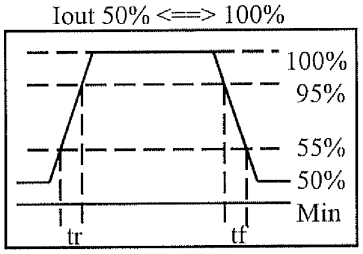


測定回路2 Circuit 2 used for determination

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

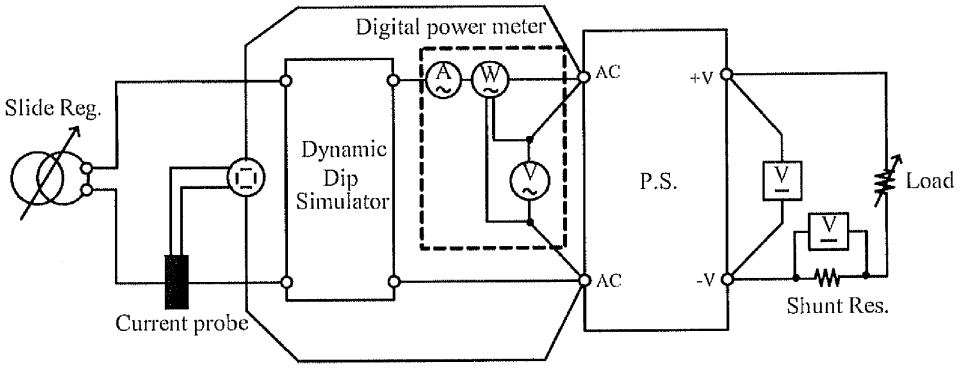


Output current waveform
Iout 50% <==> 100%



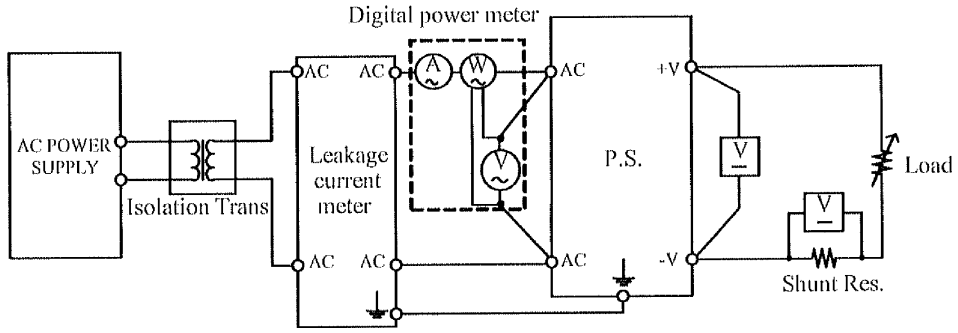
測定回路3 Circuit 3 used for determination

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



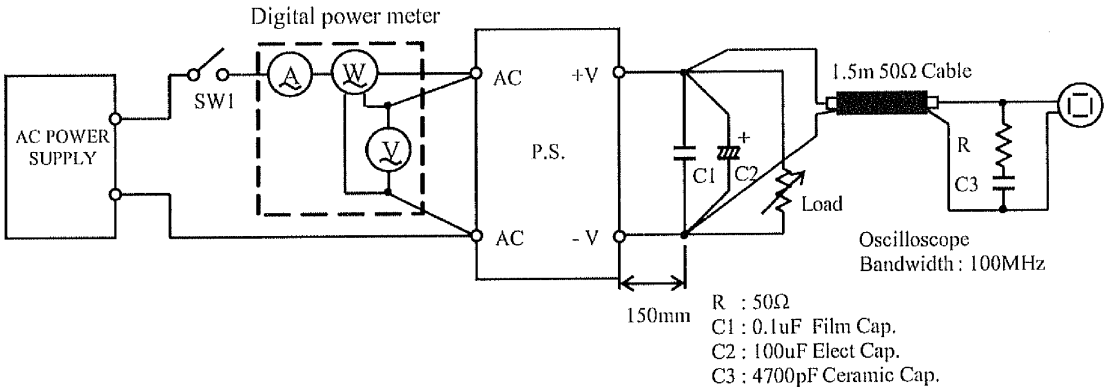
測定回路4 Circuit 4 used for determination

・リーク電流特性　　Leakage current characteristics



測定回路5 Circuit 5 used for determination

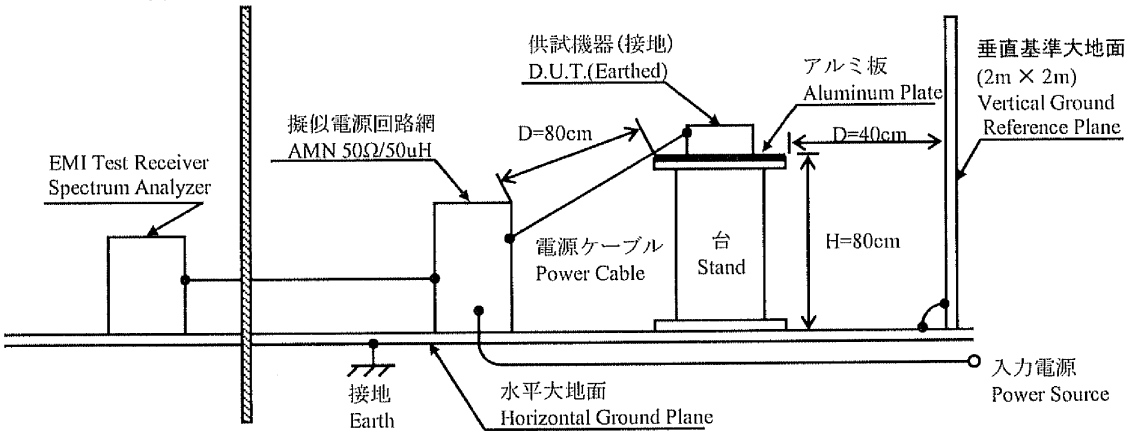
・出力リップル、ノイズ波形　　Output ripple and noise waveform



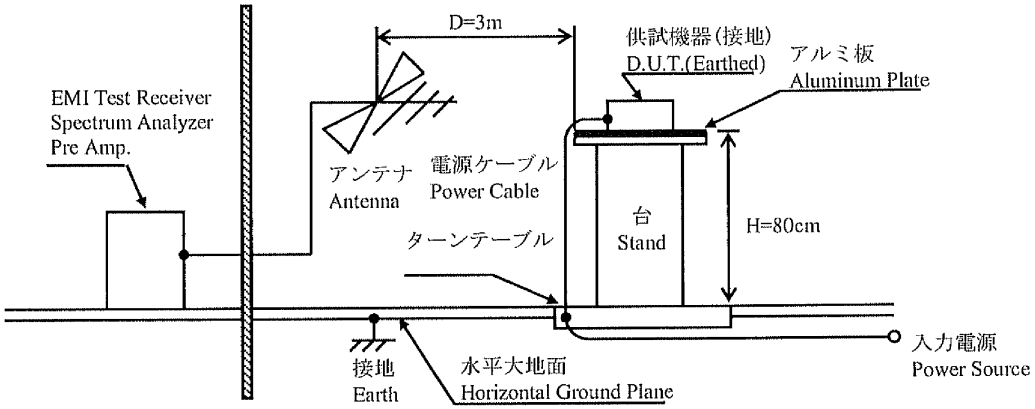
測定構成　Configuration used for determination

・ＥＭＩ特性　　Electro-Magnetic Interference characteristics

(a) 雑音端子電圧（帰還ノイズ）　　Conducted Emission



(b) 雑音電界強度（放射ノイズ）　　Radiated Emission



1.2 使用測定機器　　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS 540A
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1720E
3	DIGITAL MULTIMETER	FLUKE	45
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	TEKTRONIX	63202
6	DC AMPERE METER	TEKTRONIX	P5100
7	DYNAMIC DUMMY LOAD	CHROMA	63030
8	CVCF	KIKUSUI	PCR2000L
9	LEAKAGE CURRENT METER	SIMPSON	228
10	CONTROLLED TEMP. CHAMBER	TABAI-ESPEC	63203
11	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI-03
12	LISN	ROHDE & SCHWARZ	ENV216
13	BICONICAL ANTENNA	EMCO	63208

2. 1 静特性　Steady state data

(1) 入力・負荷・温度変動／出力起動・遮断電圧

Regulation - line and load, Temperature drift / Start up voltage and Drop out voltage

5V

1. Regulation - line and load　Condition　Ta : 25 ℃

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	5.028V	5.028V	5.028V	5.028V	0mV	0.000%
50%	5.027V	5.027V	5.026V	5.026V	1mV	0.020%
100%	5.024V	5.024V	5.024V	5.024V	0mV	0.000%
load	4mV	4mV	4mV	4mV		
regulation	0.080%	0.080%	0.080%	0.080%		

2. Temperature drift　Conditions　Vin : 100 VAC
Iout : 100 %

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	5.032V	5.024V	5.018V	14mV	0.280%

3. Start up voltage and Drop out voltage　Conditions　Ta : 25 ℃
Iout : 100 %

Start up voltage (Vin)	45VAC
Drop out voltage (Vin)	44VAC

12V

1. Regulation - line and load　Condition　Ta : 25 ℃

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	12.010V	12.010V	12.010V	12.010V	0mV	0.000%
50%	12.009V	12.009V	12.009V	12.009V	0mV	0.000%
100%	12.007V	12.007V	12.007V	12.007V	0mV	0.000%
load	3mV	3mV	3mV	3mV		
regulation	0.025%	0.025%	0.025%	0.025%		

2. Temperature drift　Conditions　Vin : 100 VAC
Iout : 100 %

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	12.016V	12.007V	12.001V	15mV	0.125%

3. Start up voltage and Drop out voltage　Conditions　Ta : 25 ℃
Iout : 100 %

Start up voltage (Vin)	45VAC
Drop out voltage (Vin)	44VAC

24V

1. Regulation - line and load　Condition　Ta : 25 ℃

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	24.063V	24.063V	24.063V	24.063V	0mV	0.000%
50%	24.060V	24.060V	24.060V	24.060V	0mV	0.000%
100%	24.057V	24.057V	24.057V	24.057V	0mV	0.000%
load	6mV	6mV	6mV	6mV		
regulation	0.025%	0.025%	0.025%	0.025%		

2. Temperature drift　Conditions　Vin : 100 VAC
Iout : 100 %

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	24.088V	24.057V	24.025V	63mV	0.263%

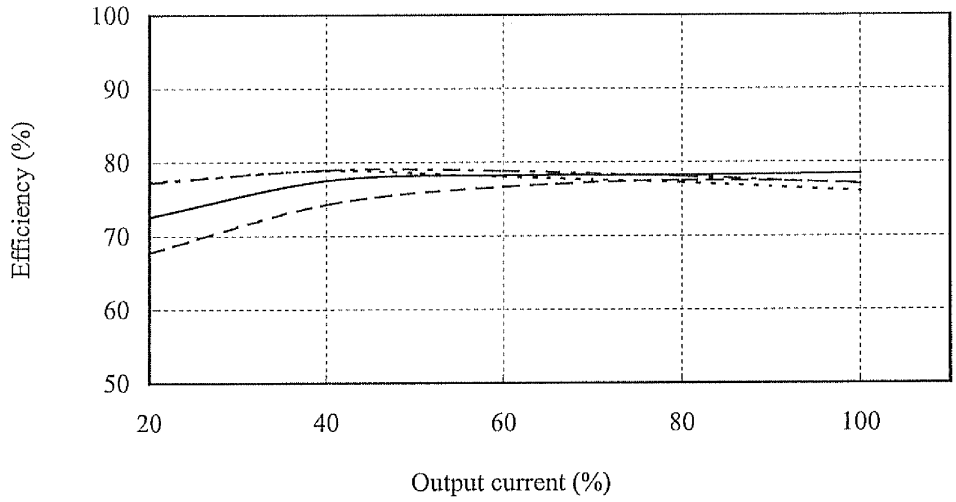
3. Start up voltage and Drop out voltage　Conditions　Ta : 25 ℃
Iout : 100 %

Start up voltage (Vin)	51VAC
Drop out voltage (Vin)	48VAC

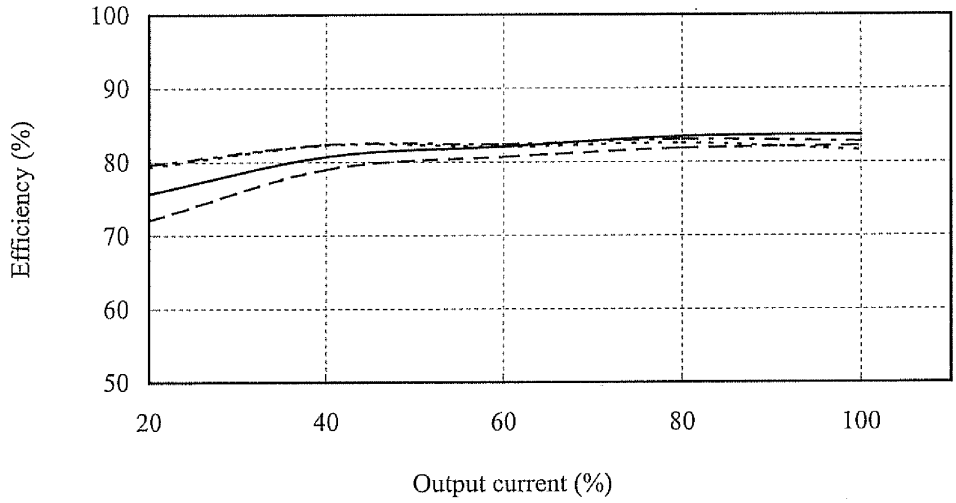
(2) 効率対出力電流
Efficiency vs. Output current

Conditions Vin : 85 VAC ------
: 100 VAC -·-·-
: 200 VAC ———
: 265 VAC – – – –
Ta : 25 ℃

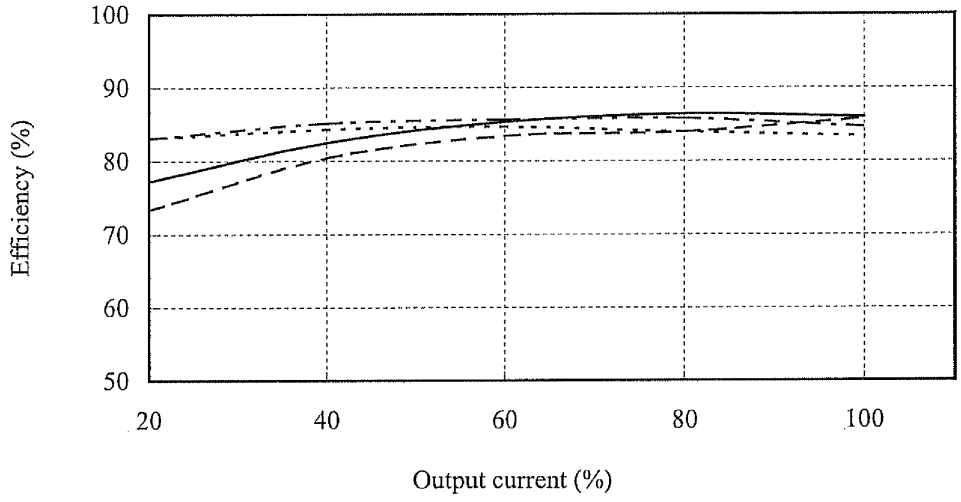
5V



12V



24V



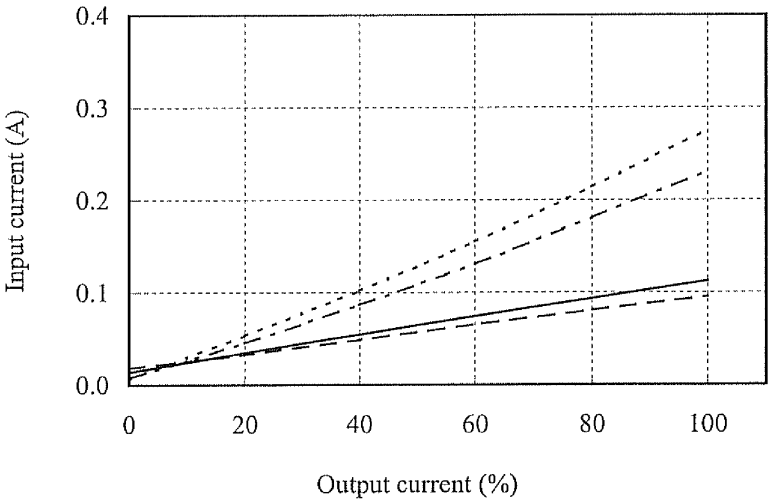
(3) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 85 VAC ------
: 100 VAC -·-·-
: 200 VAC ———
: 265 VAC – – – –
Ta : 25 ℃

5V

Io: 0%

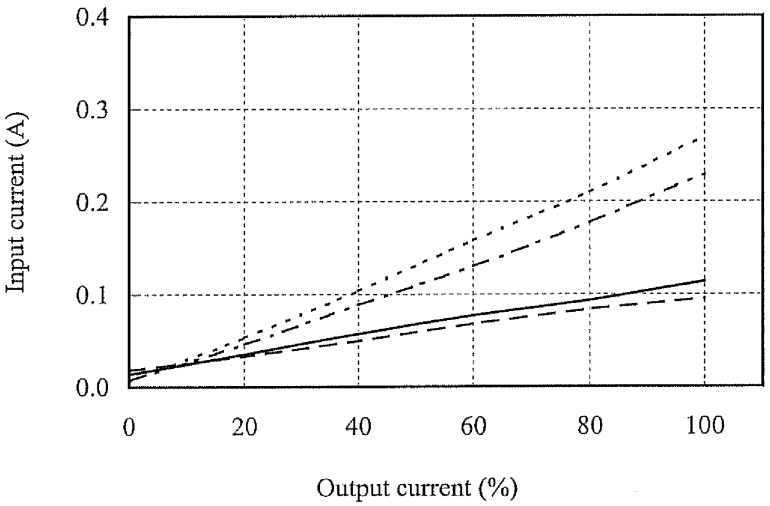
Vin	Input current
85VAC	0.006A
100VAC	0.007A
200VAC	0.014A
265VAC	0.018A



12V

Io: 0%

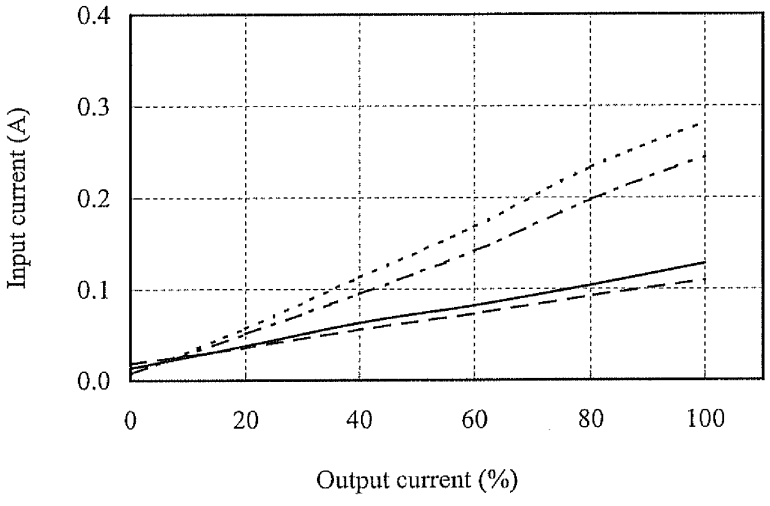
Vin	Input current
85VAC	0.006A
100VAC	0.007A
200VAC	0.014A
265VAC	0.018A



24V

Io: 0%

Vin	Input current
85VAC	0.007A
100VAC	0.007A
200VAC	0.014A
265VAC	0.018A



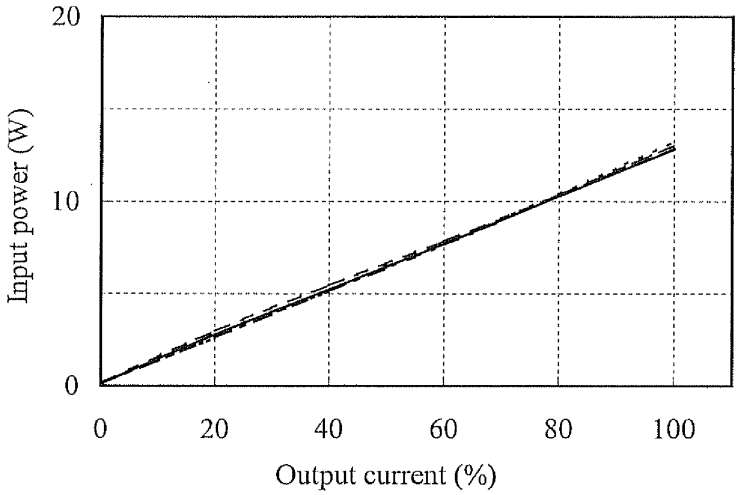
(4) 入力電力対出力電流
Input power vs. Output current

Conditions Vin : 85 VAC - - - - -
: 100 VAC —·—·
: 200 VAC ——
: 265 VAC – – –
Ta : 25 ℃

5V

Io: 0%

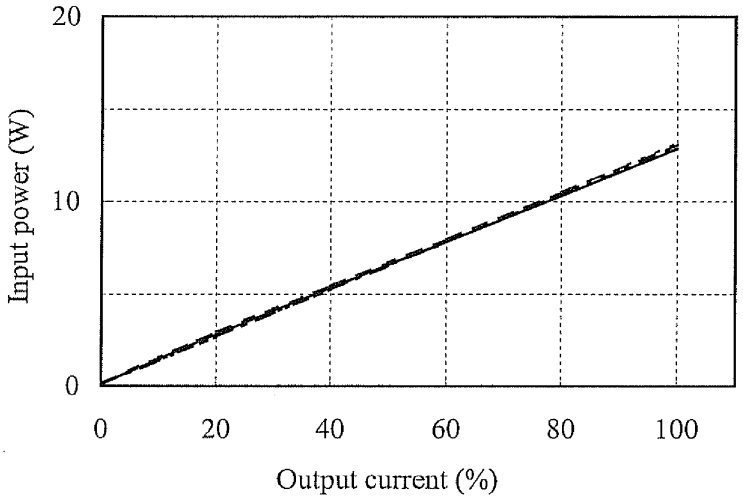
Vin	Input power
85VAC	0.08W
100VAC	0.08W
200VAC	0.12W
265VAC	0.15W



12V

Io: 0%

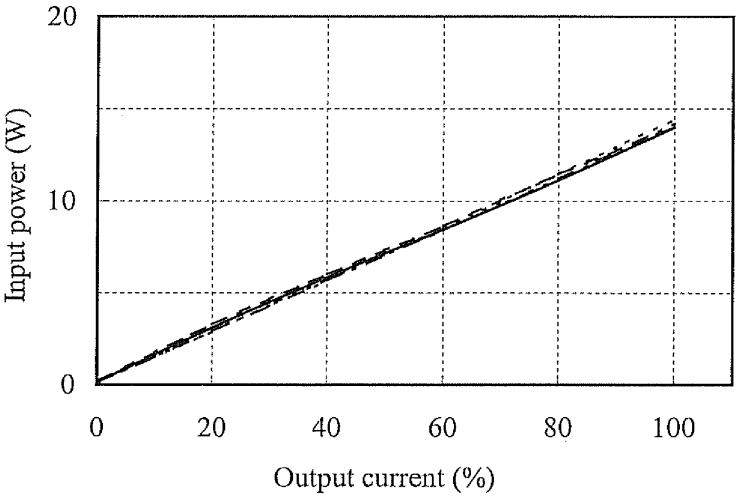
Vin	Input power
85VAC	0.06W
100VAC	0.06W
200VAC	0.10W
265VAC	0.14W



24V

Io: 0%

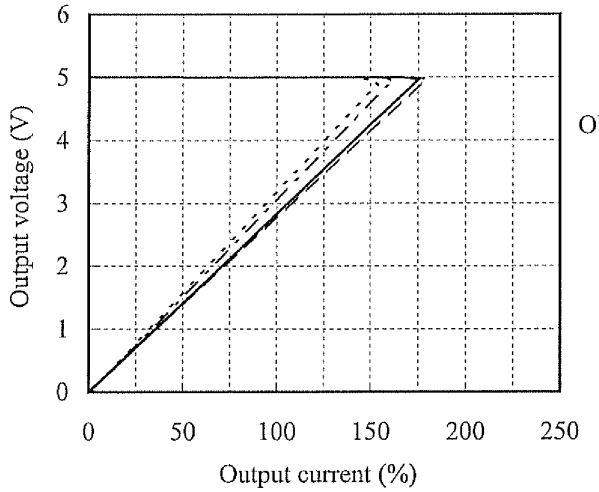
Vin	Input power
85VAC	0.09W
100VAC	0.10W
200VAC	0.14W
265VAC	0.18W



2. 2 過電流保護特性
Over current protection (OCP) characteristics

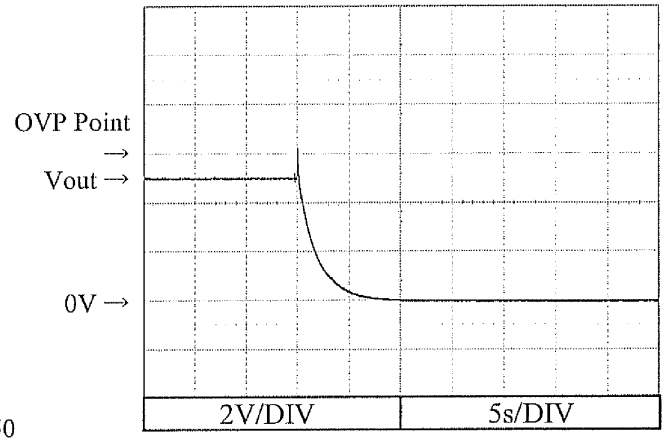
Conditions Vin : 85 VAC ------
100 VAC -·-·-·-
200 VAC ——
265 VAC – – – –
Ta : 25 ℃

5V

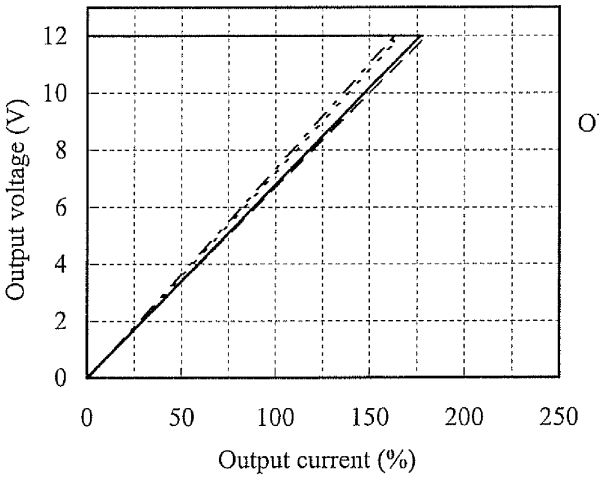


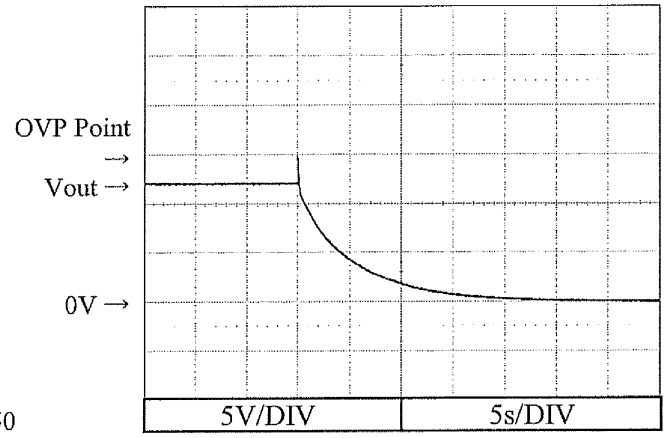
2. 3 過電圧保護特性
Over voltage protection (OVP) characteristics

Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 ℃

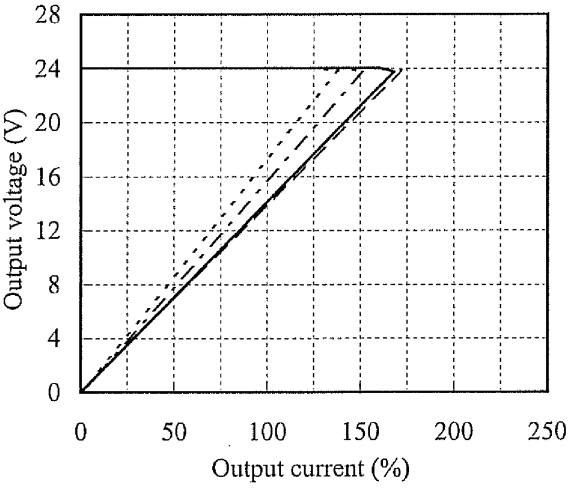


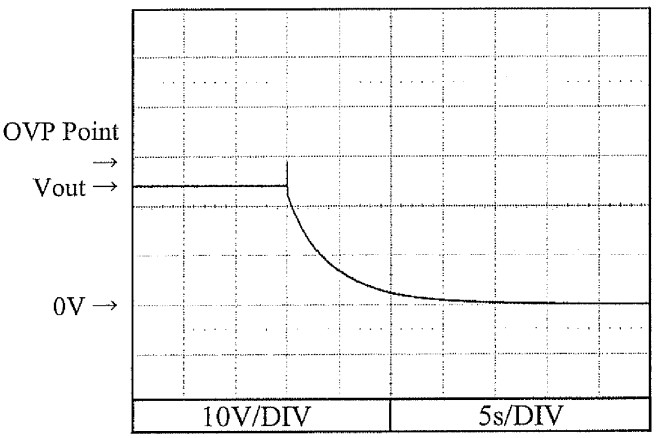
12V





24V



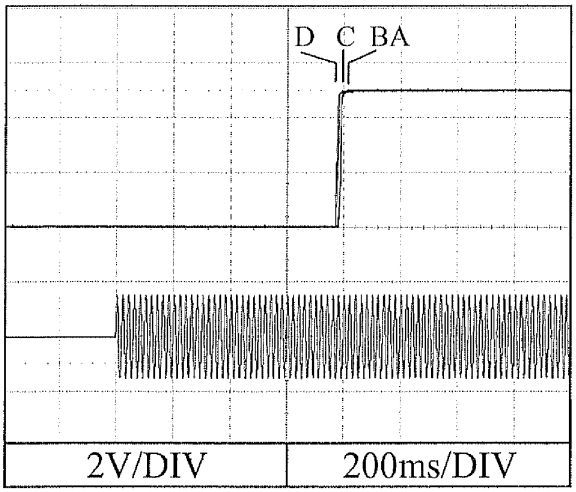


2.4 出力立ち上がり特性
Output rise characteristics

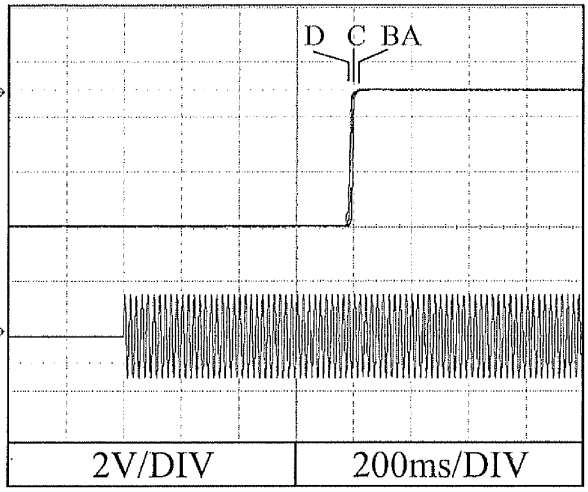
Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

5V

Iout : 0%

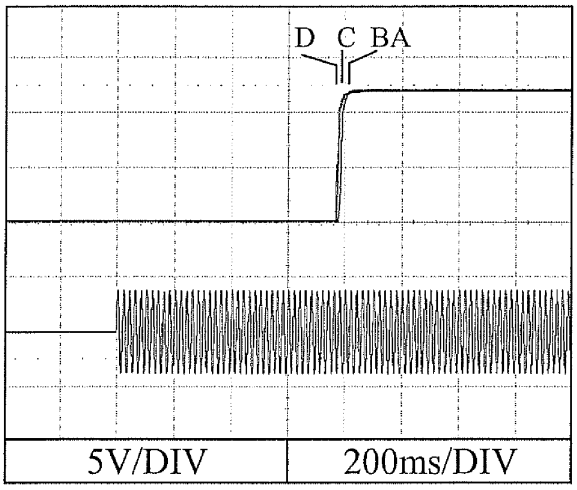


Iout : 100%

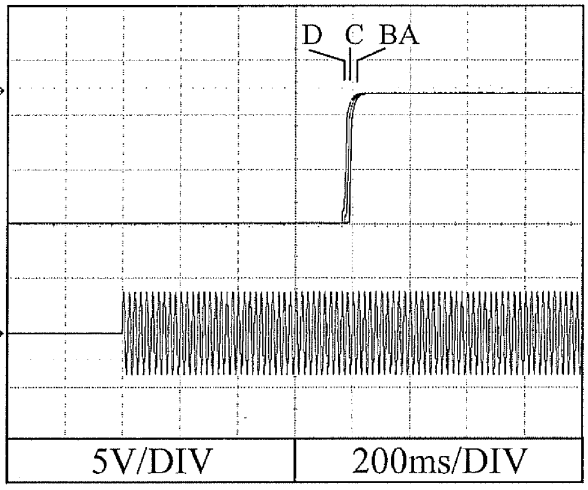


12V

Iout : 0%

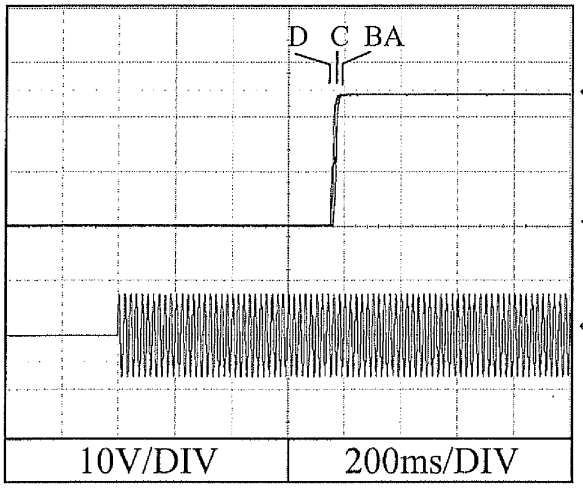


Iout : 100%

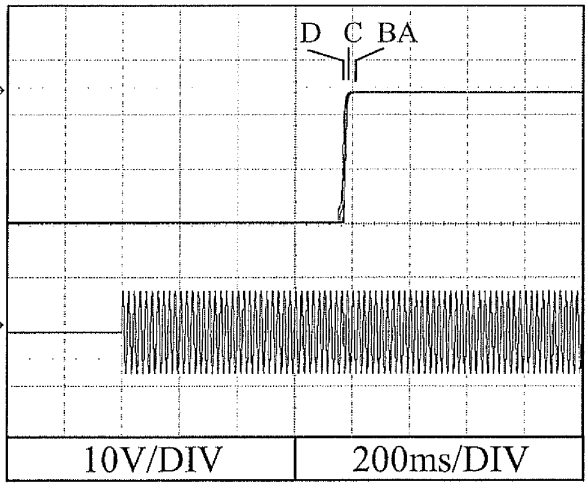


24V

Iout : 0%



Iout : 100%

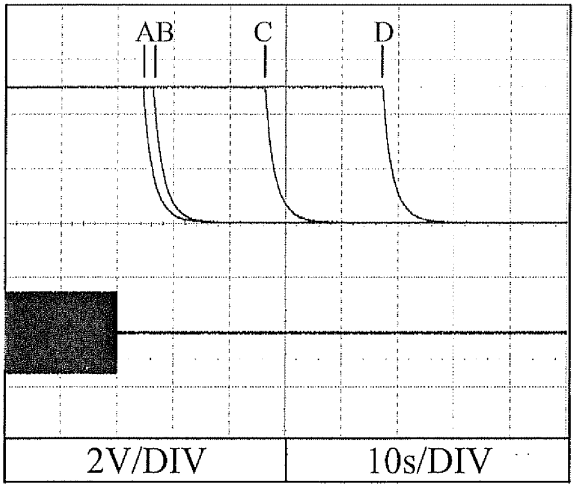


2. 5 出力立ち下がり特性
Output fall characteristics

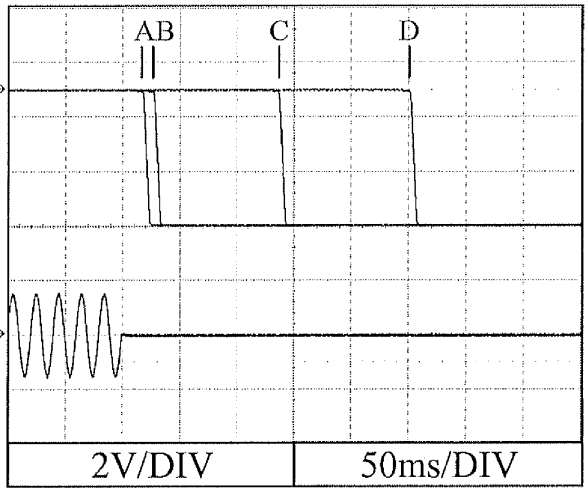
Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

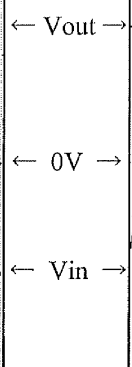
5V

Iout : 0%



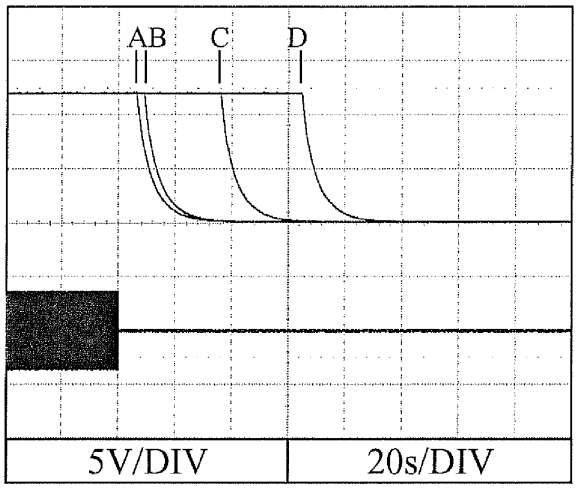
Iout : 100%



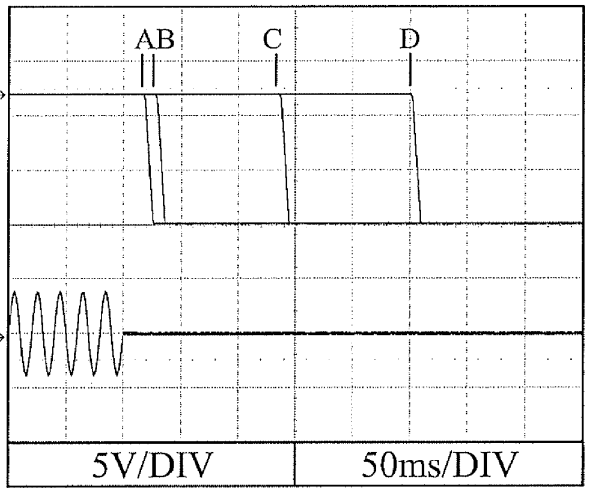


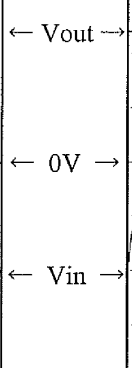
12V

Iout : 0%



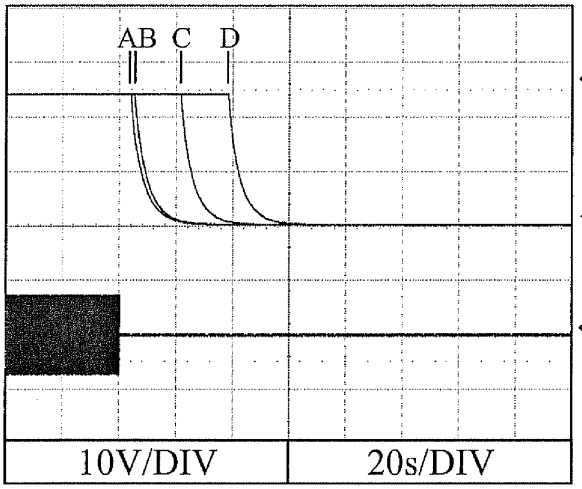
Iout : 100%



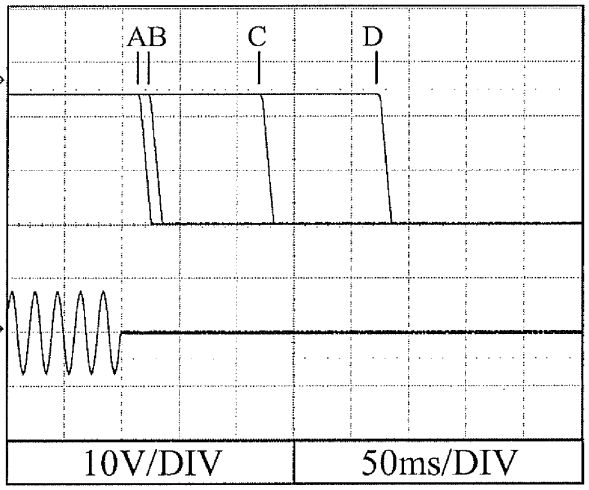


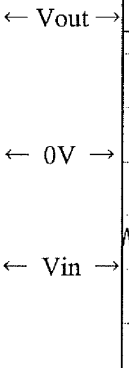
24V

Iout : 0%



Iout : 100%

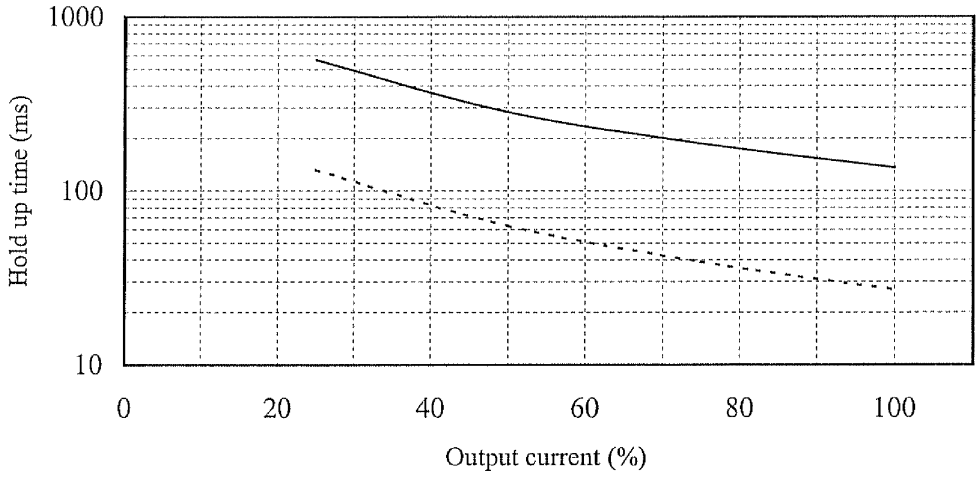




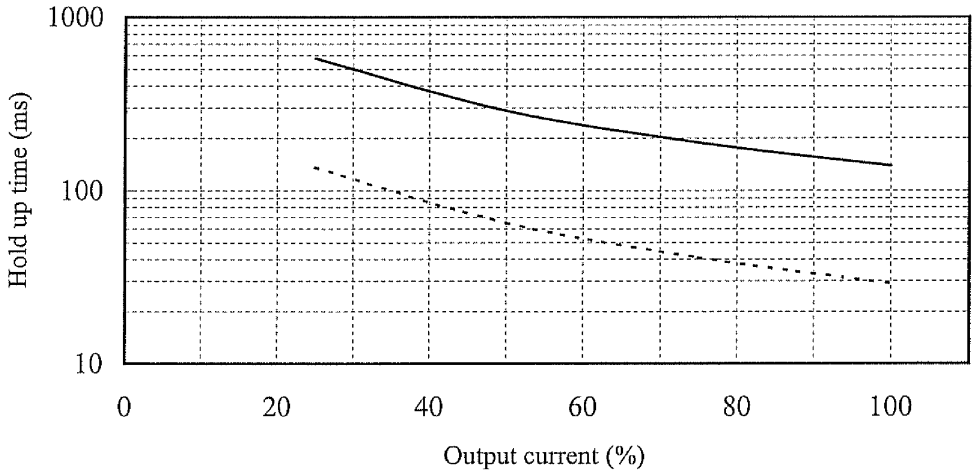
2.6 出力保持時間特性
Hold up time characteristics

Conditions Vin : 100 VAC ------
200 VAC ——
Ta : 25 ℃

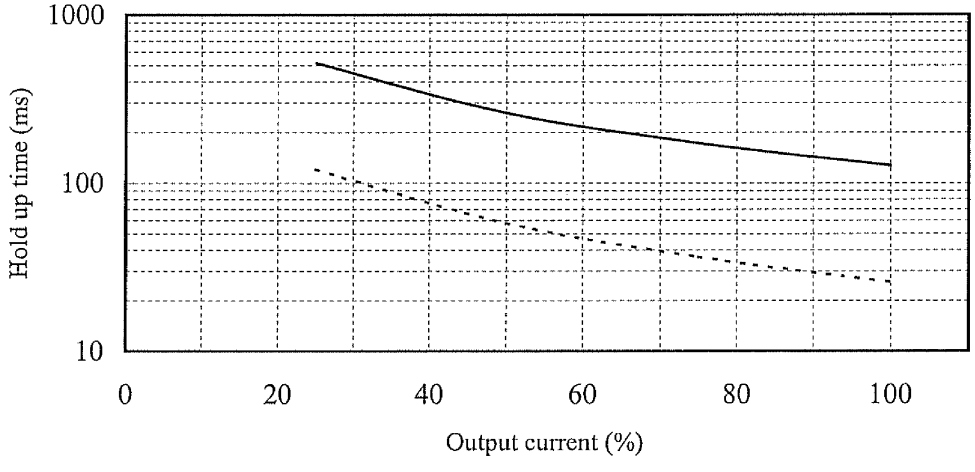
5V



12V



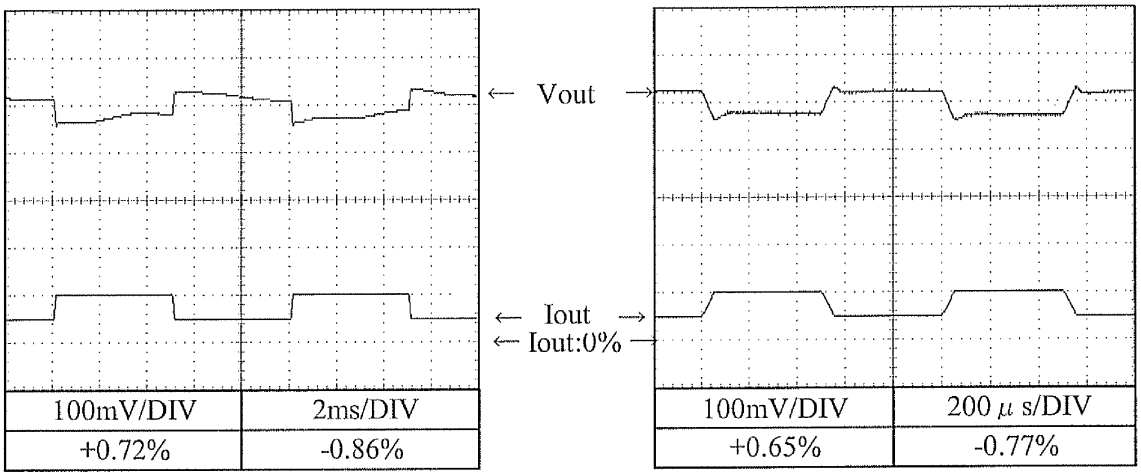
24V



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

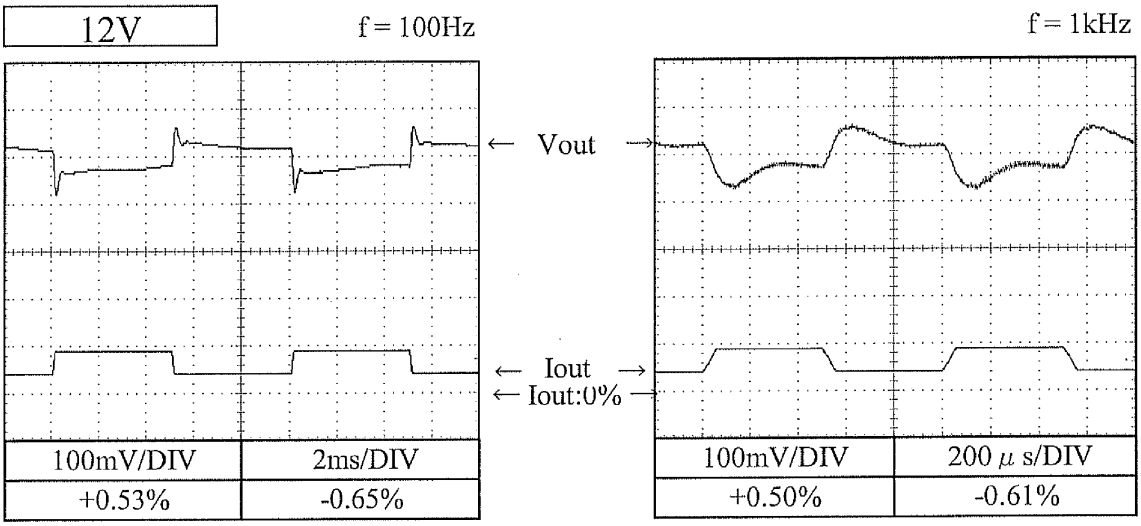
Conditions Vin : 100 VAC
Iout : 50 % ↔ 100 %
(tr = tf = 50us)
Ta : 25 ℃

5V



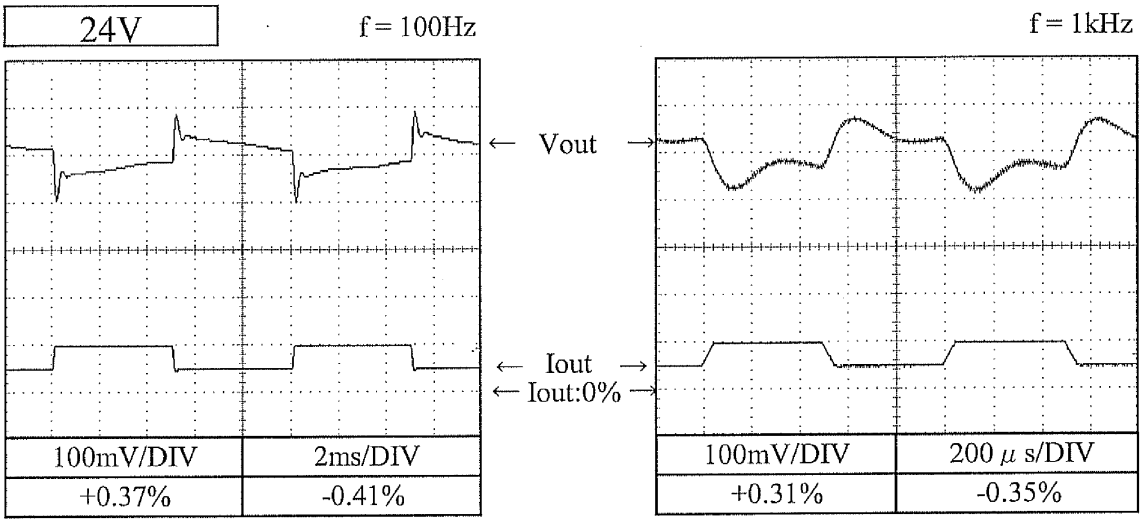
100mV/DIV	2ms/DIV	100mV/DIV	200 μ s/DIV
+0.72%	-0.86%	+0.65%	-0.77%

12V



100mV/DIV	2ms/DIV	100mV/DIV	200 μ s/DIV
+0.53%	-0.65%	+0.50%	-0.61%

24V



100mV/DIV	2ms/DIV	100mV/DIV	200 μ s/DIV
+0.37%	-0.41%	+0.31%	-0.35%

2.8 入力電圧瞬停特性

Response to brown out characteristics

Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

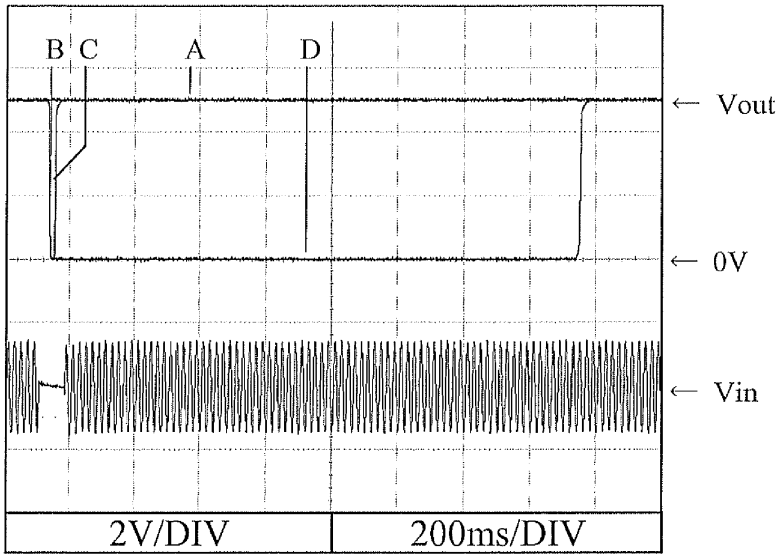
5V

A = 23ms

B = 31ms

C = 48ms

D = 80ms



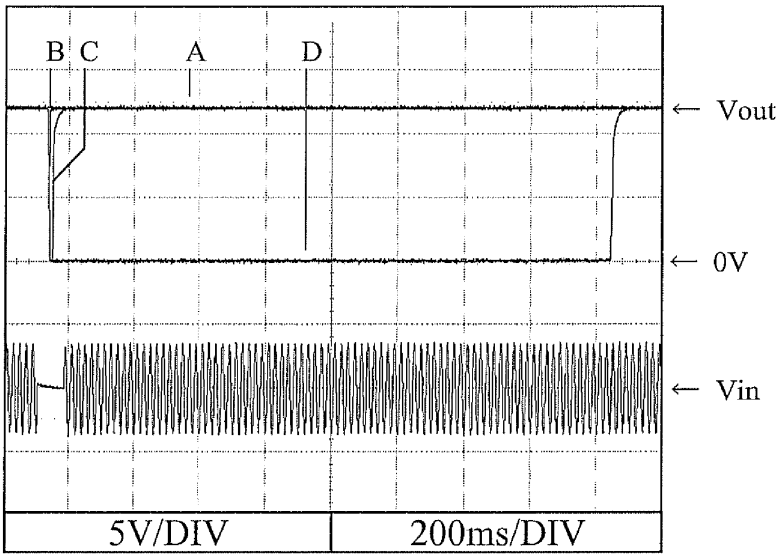
12V

A = 24ms

B = 33ms

C = 44ms

D = 83ms



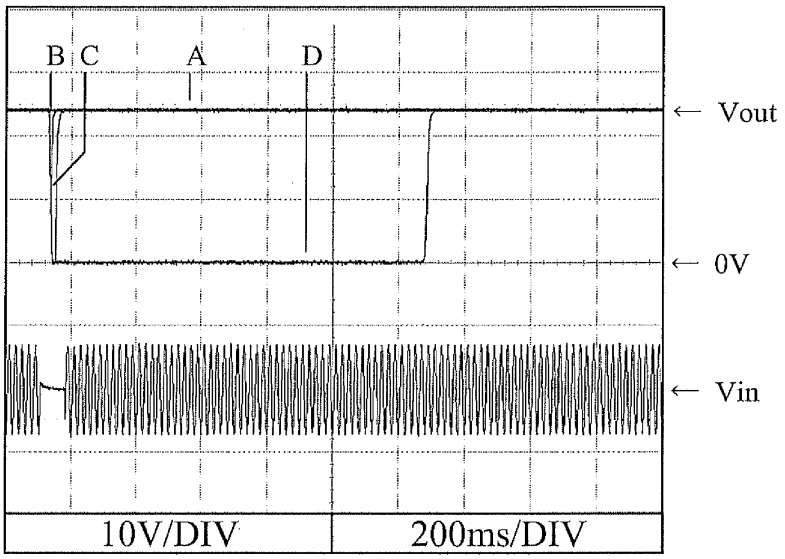
24V

A = 22ms

B = 30ms

C = 46ms

D = 78ms

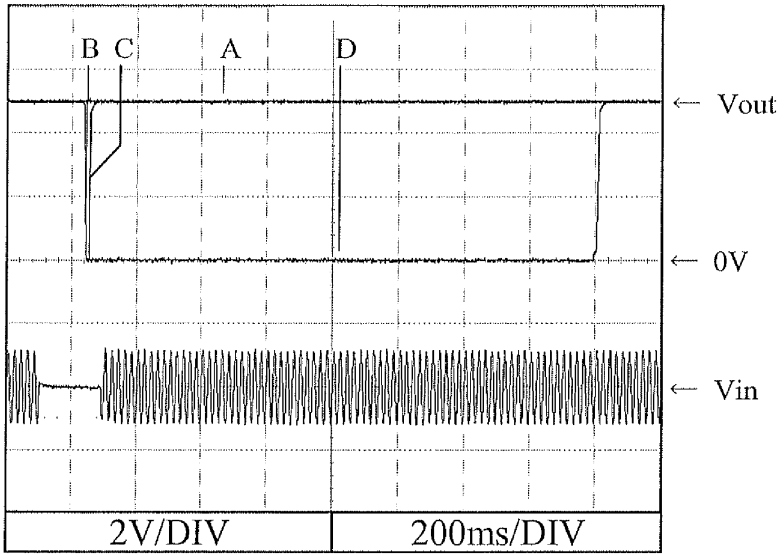


2.8 入力電圧瞬停特性
Response to brown out characteristics

Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

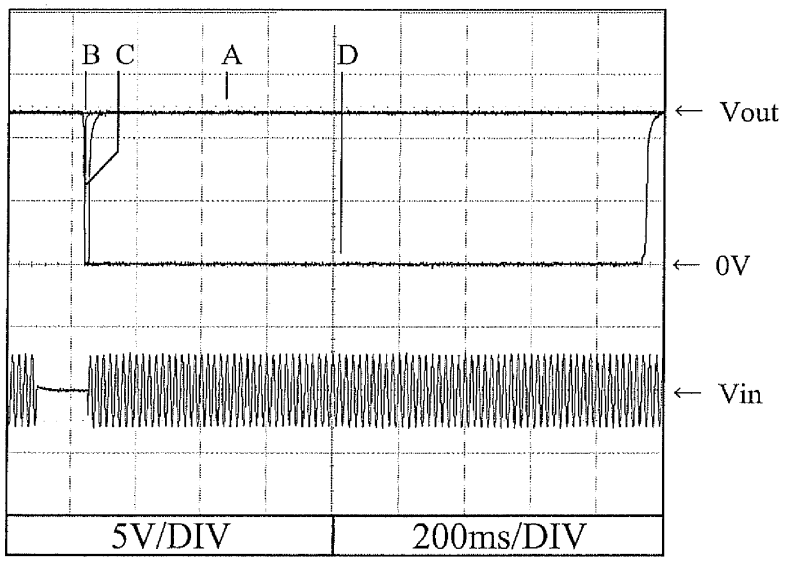
5V

A = 136ms
B = 142ms
C = 154ms
D = 192ms



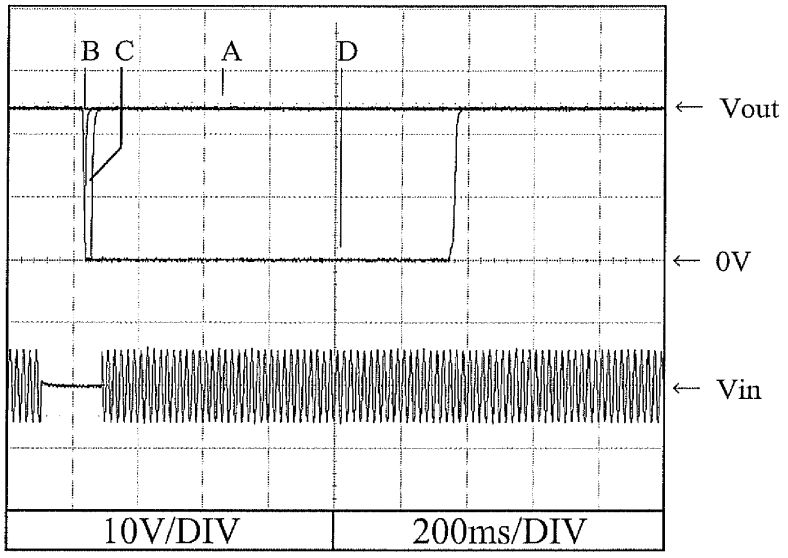
12V

A = 135ms
B = 145ms
C = 158ms
D = 190ms



24V

A = 122ms
B = 131ms
C = 152ms
D = 186ms

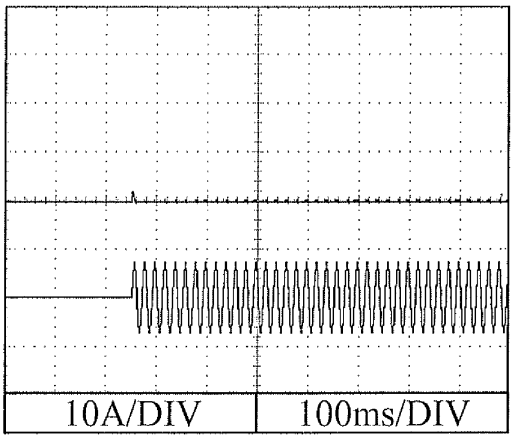


2.9 入力サージ電流（突入電流）波形
Inrush current waveform

5V

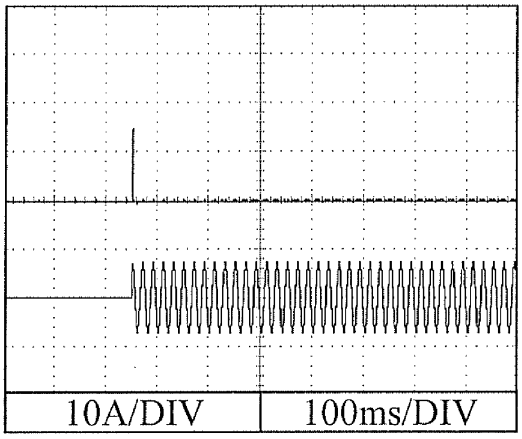
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

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



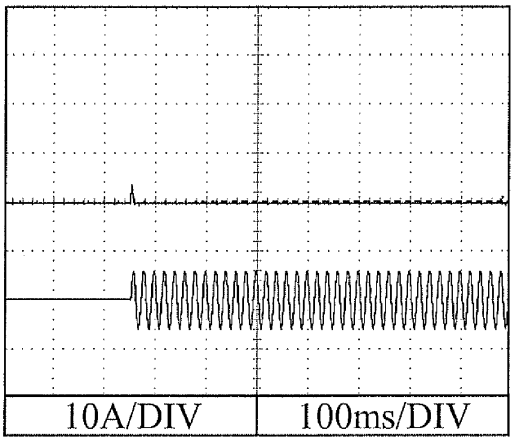
← Iin →
← Vin →

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



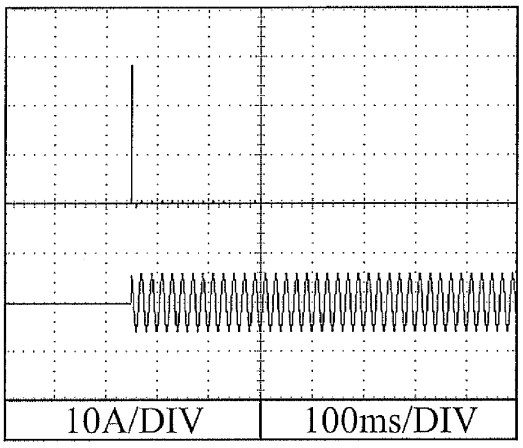
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

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



← Iin →
← Vin →

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

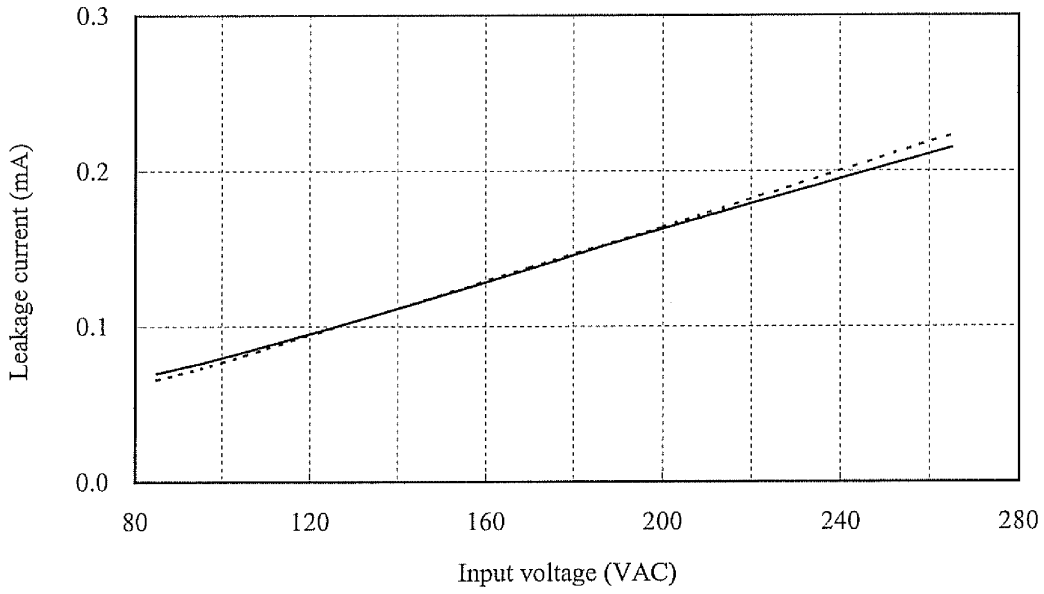


2. 10 リーク電流特性
Leakage current characteristics

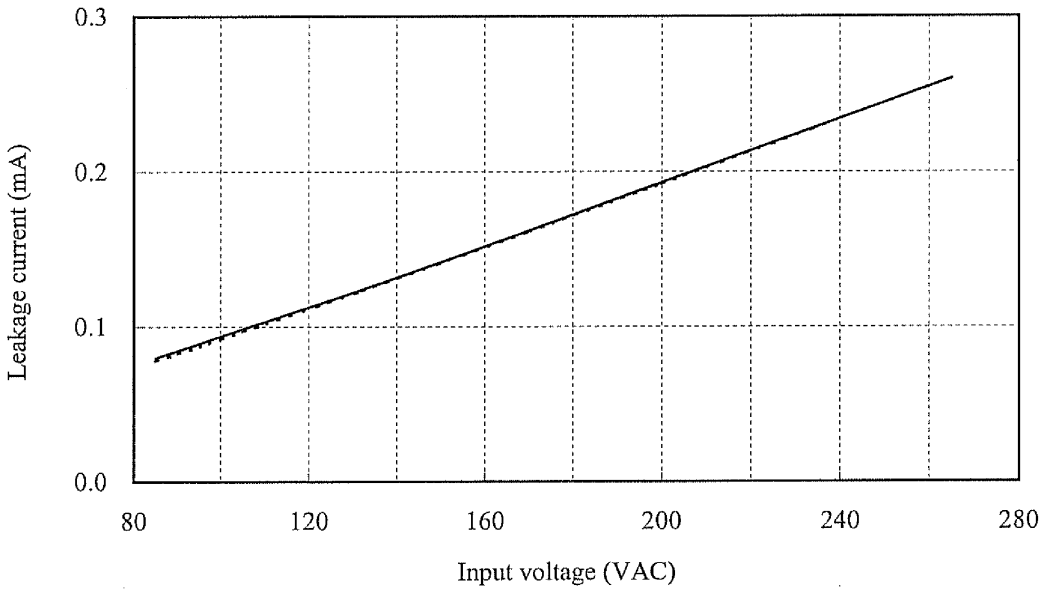
Conditions Iout : 0 % ------
100 % ——
Ta : 25 ℃
Equipment used : 228 (Simpson)

5V

f : 50 Hz



f : 60 Hz

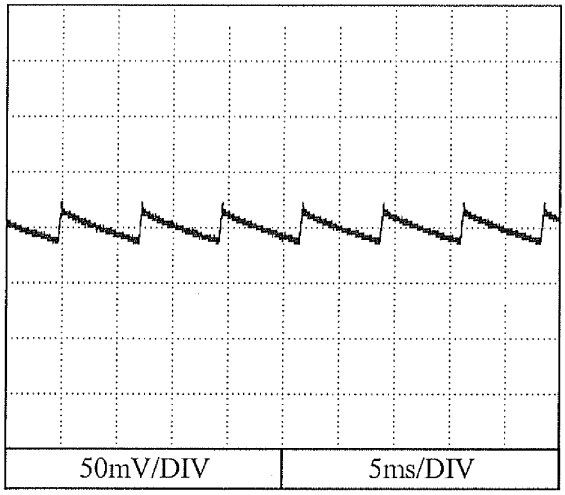


2.11 出力リップル、ノイズ波形
Output ripple and noise waveform

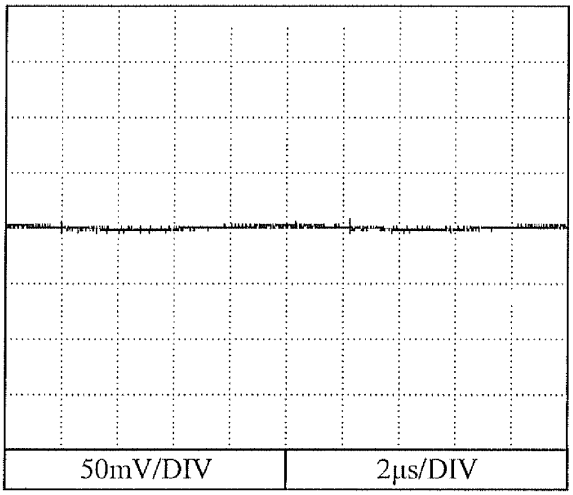
Conditions Vin : 100 VAC
Ta : 25 ℃

5V

Iout : 0%

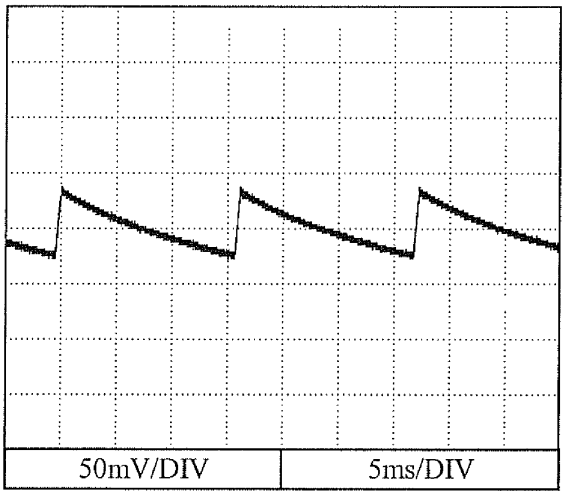


Iout : 100%

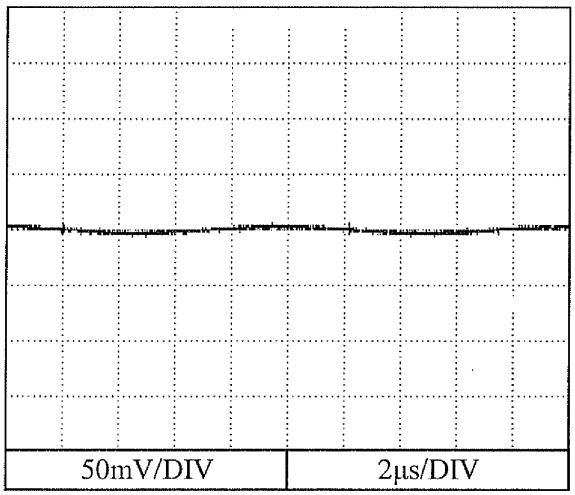


12V

Iout : 0%

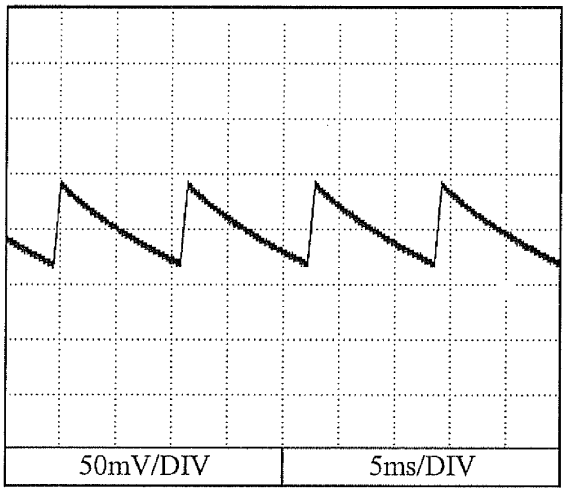


Iout : 100%

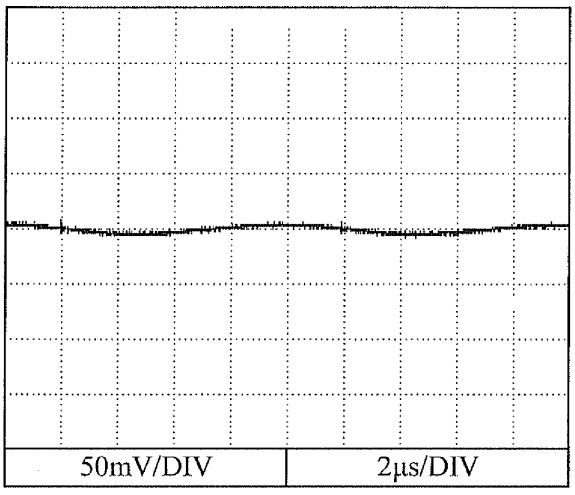


24V

Iout : 0%



Iout : 100%



2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

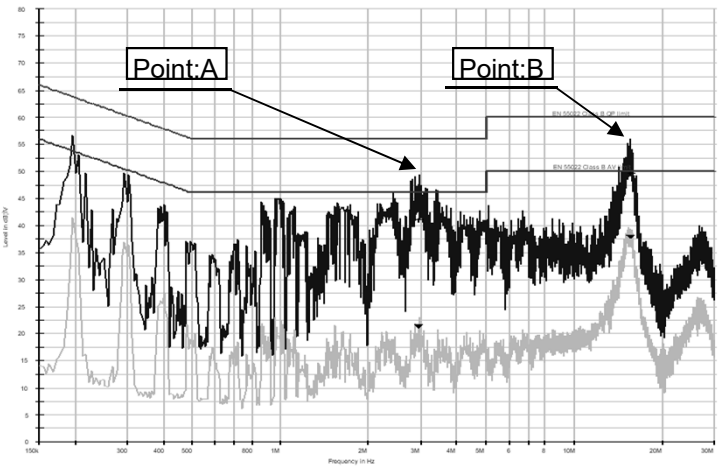
Conducted Emission

5V

Ref. Data	Point A (2.961MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	41.1
AV	46.0	21.4

Ref. Data	Point B (15.558MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	49.6
AV	50.0	37.9

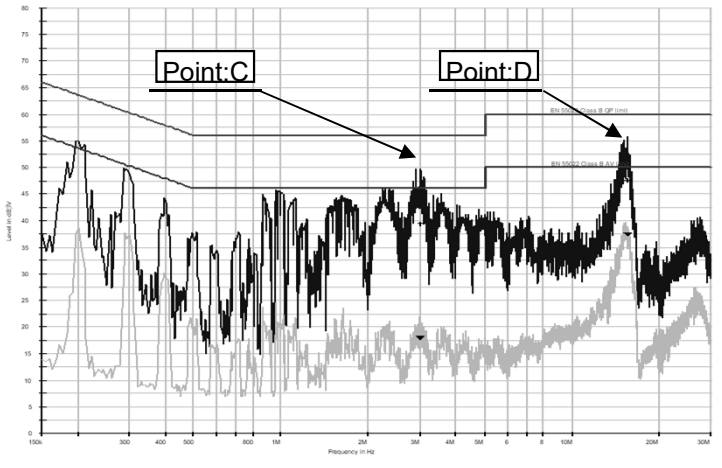
Phase : L



Ref. Data	Point C (3.001MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	39.4
AV	46.0	17.8

Ref. Data	Point D (15.604MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	47.6
AV	50.0	37.4

Phase : N



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

2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

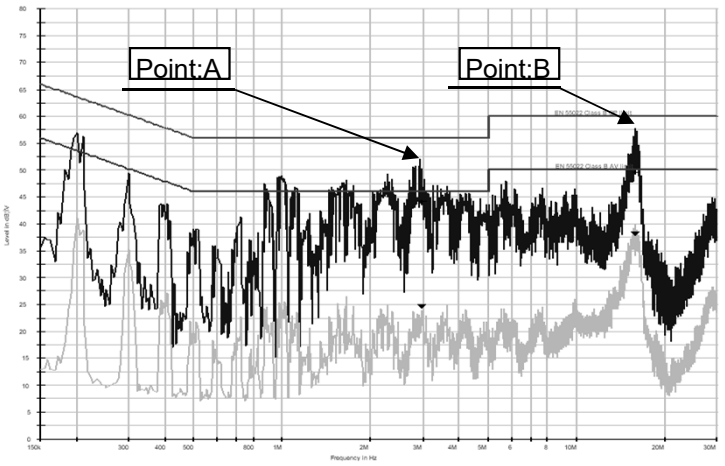
Conducted Emission

12V

Ref. Data	Point A (2.994MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	44.1
AV	46.0	24.6

Ref. Data	Point B (15.923MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	49.7
AV	50.0	38.2

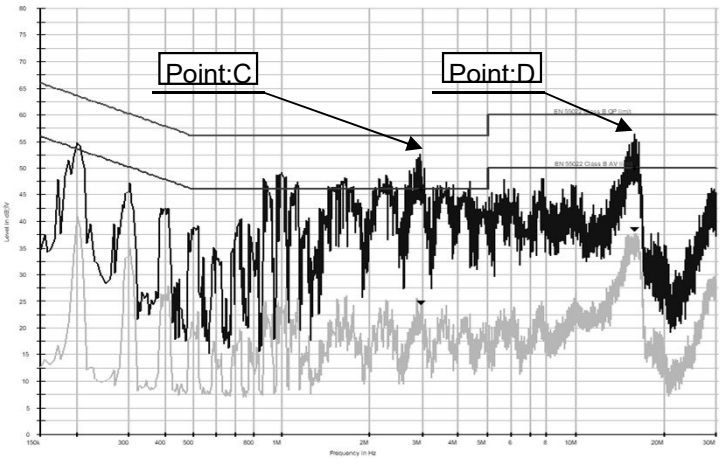
Phase : L



Ref. Data	Point C (2.995MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	46.0
AV	46.0	24.7

Ref. Data	Point D (15.922MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	50.1
AV	50.0	38.3

Phase : N



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

2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

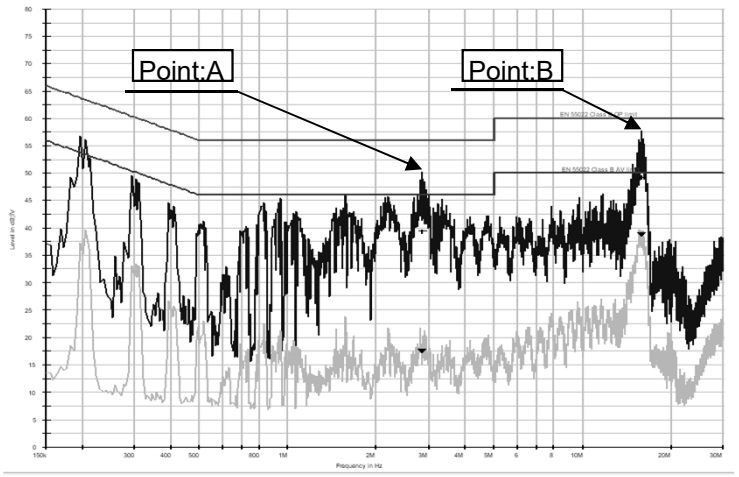
Conducted Emission

24V

Ref. Data	Point A (2.861MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	39.4
AV	46.0	17.5

Ref. Data	Point B (15.866MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	49.3
AV	50.0	38.8

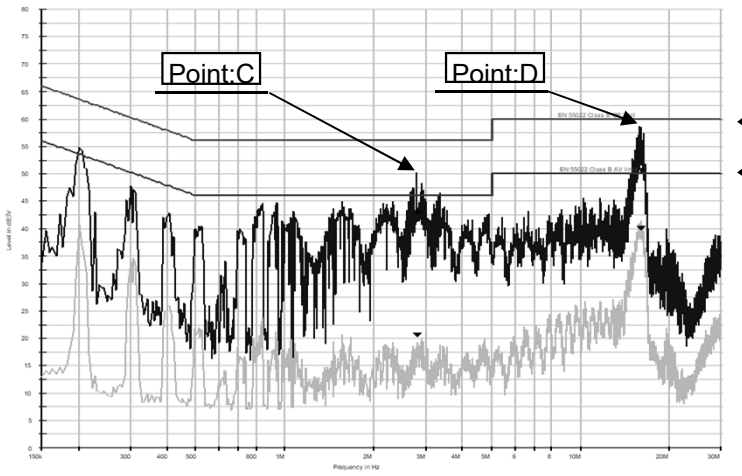
Phase : L



Ref. Data	Point C (2.825MHz) Limit (dBuV)	Measure (dBuV)
QP	56.0	43.0
AV	46.0	20.5

Ref. Data	Point D (16.004MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	50.8
AV	50.0	40.1

Phase : N



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

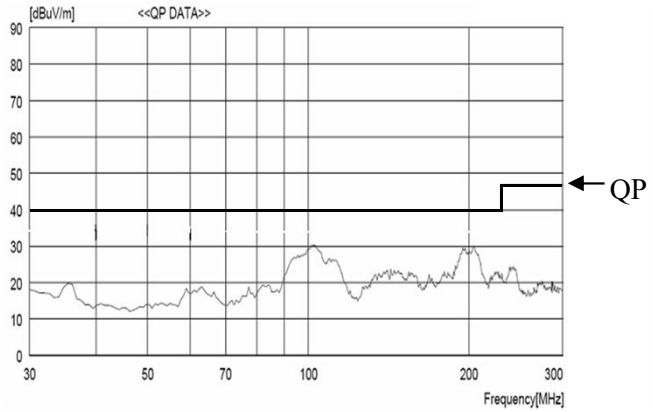
2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Io : 100 %
Ta : 25 ℃

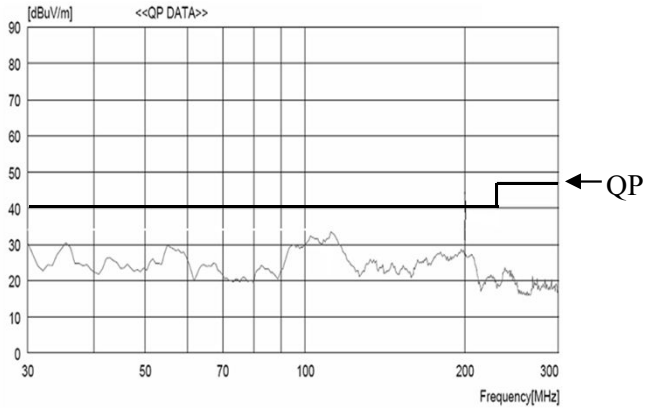
雑音電界強度
Radiated Emission

5V

HORIZONTAL

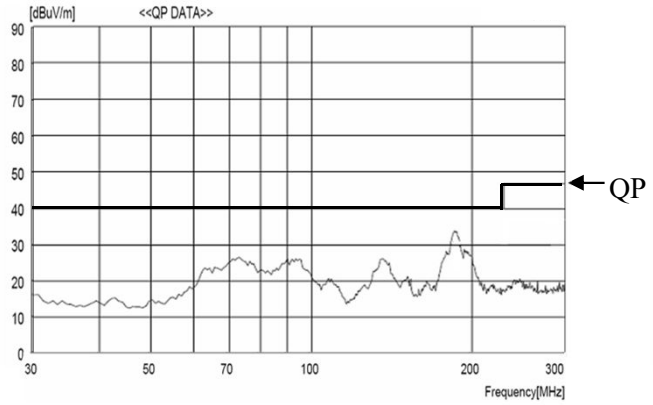


VERTICAL

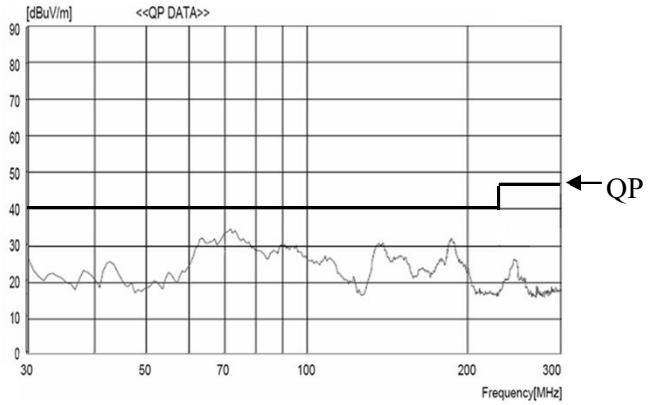


12V

HORIZONTAL

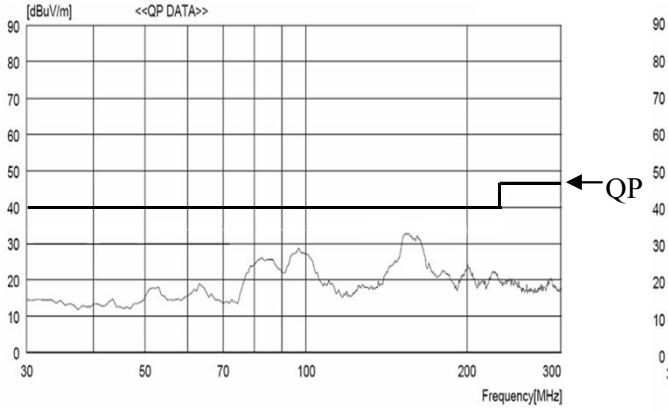


VERTICAL

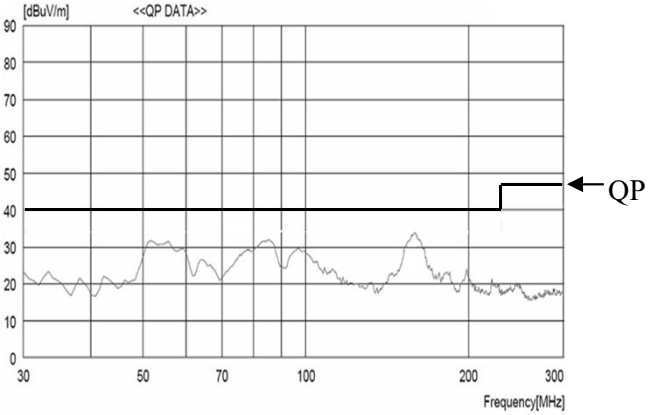


24V

HORIZONTAL



VERTICAL



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

表示はピーク値
Indication is peak values.