ZWS150BP

EVALUATION DATA

型式データ

INDEX

2. 特性データ　　Characteristics

使用記号　Terminology used

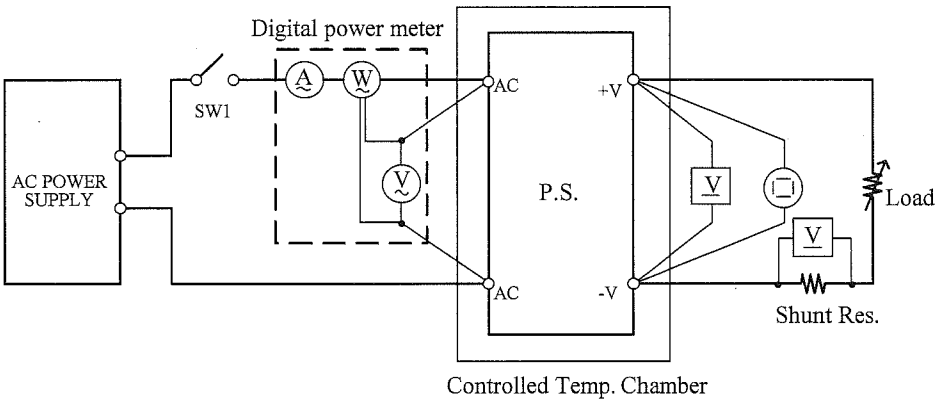
	定義	Definition	
Vin	.....	入力電圧	Input voltage
Vout	.....	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

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

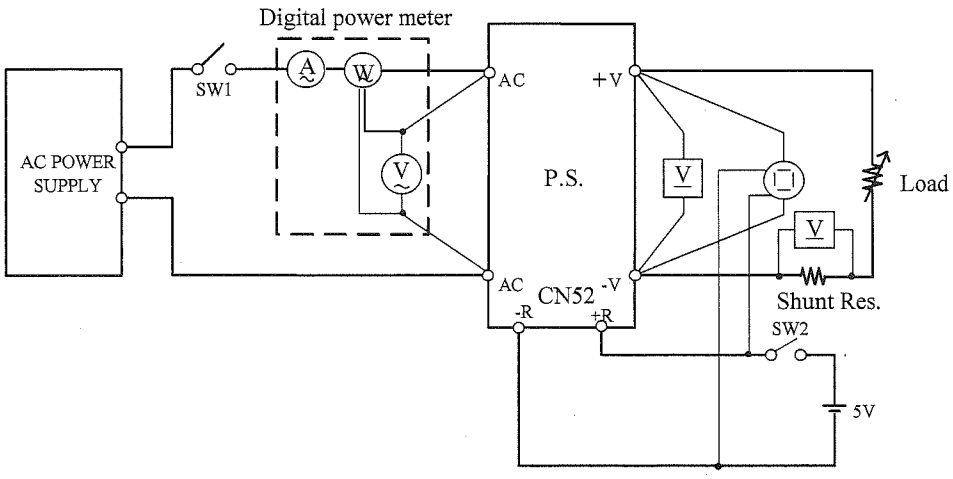
- 静特性　Steady state data
- 過電流保護特性　Over current protection (OCP) characteristics
- 過電圧保護特性　Over voltage protection (OVP) characteristics
- 出力立ち上がり特性　Output rise characteristics
- 出力立ち下がり特性　Output fall characteristics
- 出力保持時間特性　Hold up time characteristics



測定回路2 Circuit 2 used for determination

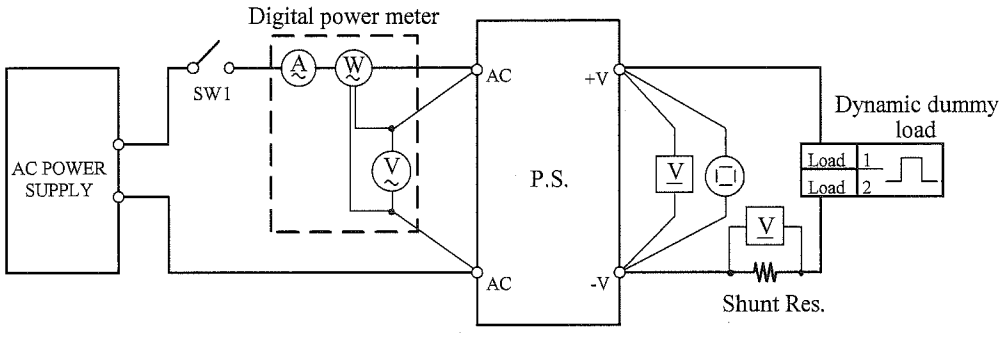
- ON/OFFコントロール時出力立ち上がり、立ち下がり特性
  Output rise, fall characteristics with ON/OFF Control

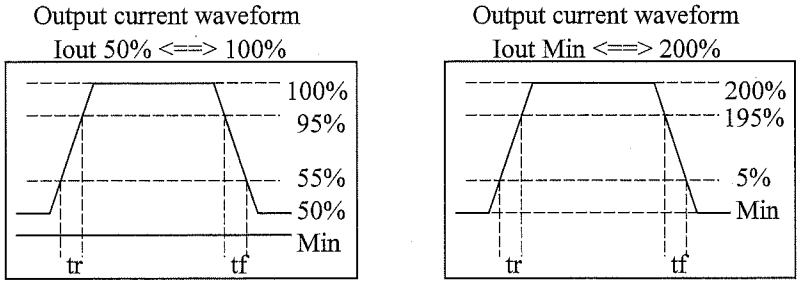
準標準品 ZWS150BP-*/R にて対応
For option model ZWS150BP-*/R



測定回路3 Circuit 3 used for determination

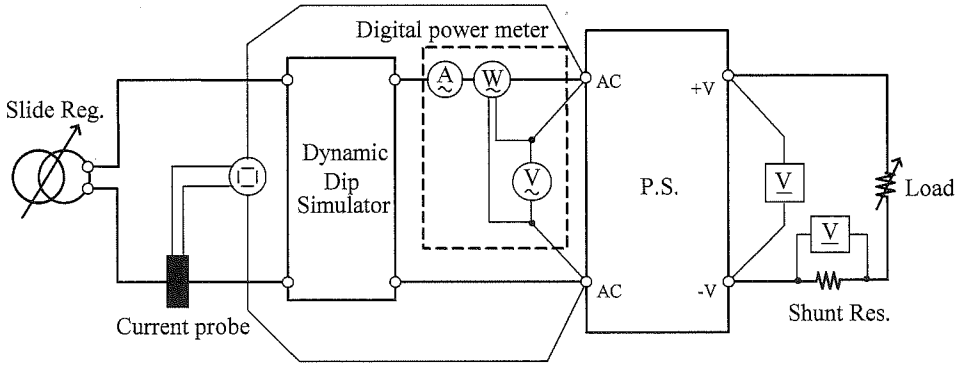
・過渡応答（負荷急変）特性　Dynamic load response characteristics





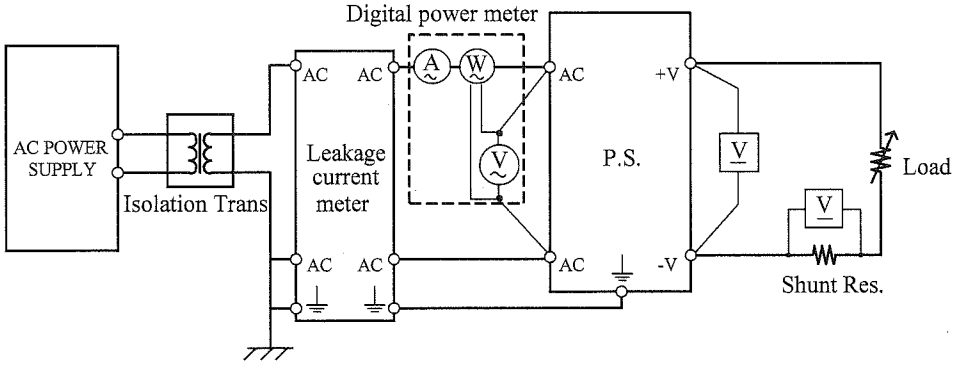
測定回路4 Circuit 4 used for determination

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



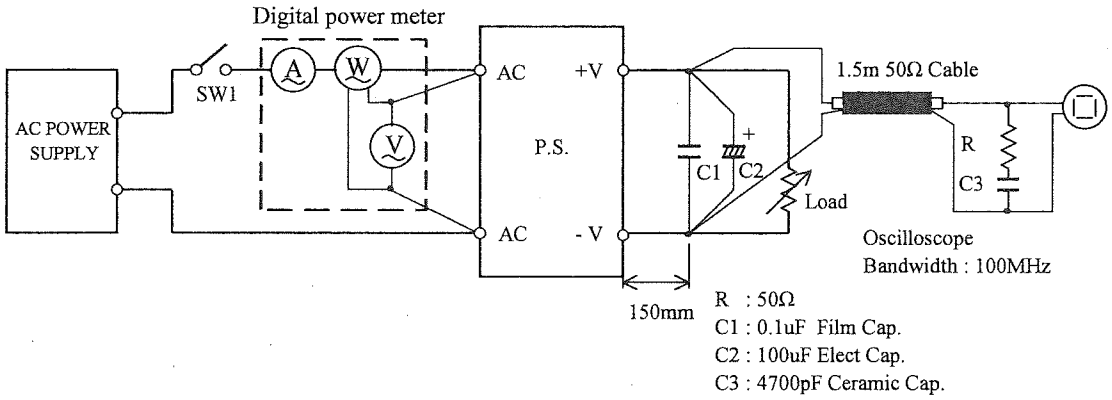
測定回路5 Circuit 5 used for determination

・リーク電流特性　Leakage current characteristics



測定回路6　Circuit 6 used for determination

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

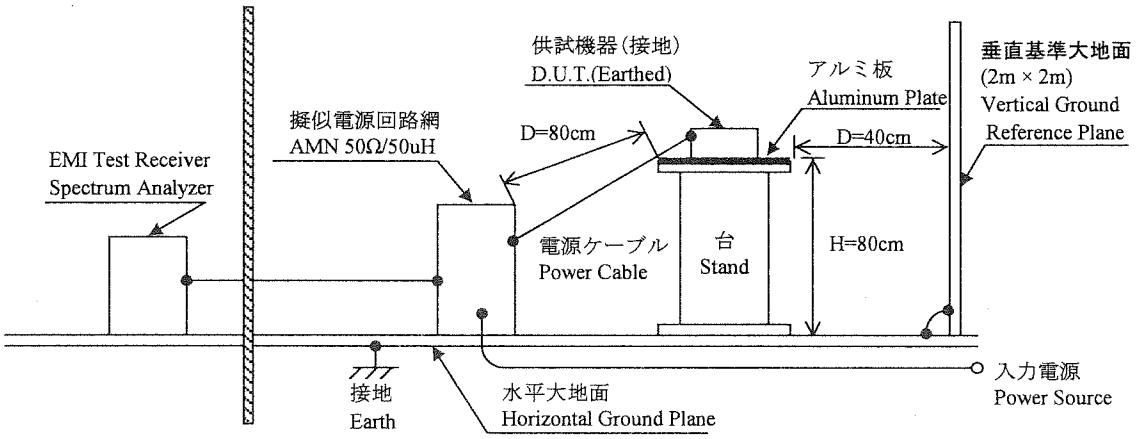


測定構成　Configuration used for determination

・EMI特性　Electro-Magnetic Interference characteristics

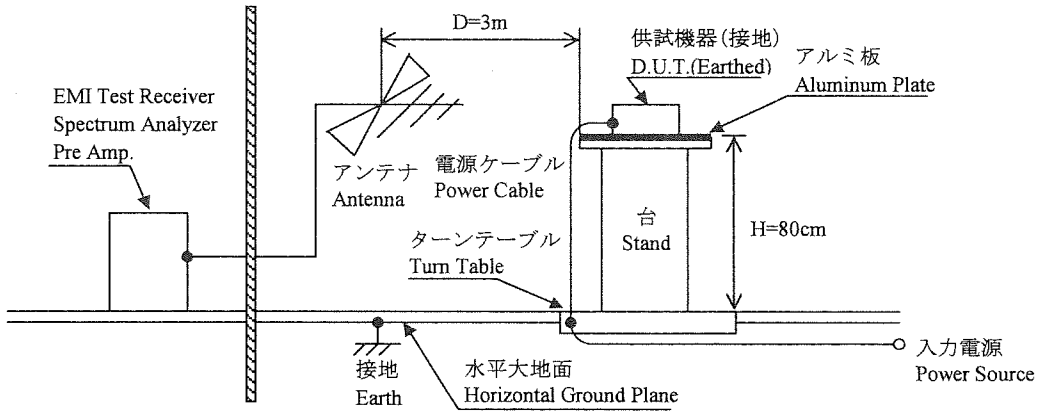
(a) 雑音端子電圧 (帰還ノイズ)

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	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL9040L
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	YOKOGAWA ELECT.	701928 / 701930
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-600L / FK-1000L
7	DUMMY LOAD	PCN	RHF250 SIRIES
8	SLIDE REGULATOR	MATSUNAGA	S3-24100
9	ISOLATION TRANS	MATSUNAGA	3WTC-50K
10	CVCF	TAKASAGO	AA2000XG
11	CVCF	NF	ES10000S
12	LEAKAGE CURRENT METER	HIOKI	3156
13	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
14	CONTROLLED TEMP. CHAMBER	ESPEC	SU-641 / SH-241
15	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
16	PRE AMP.	SONOMA	310N
17	AMN	SCHWARZBECK	NNLK8121
18	ANTENNA	SCHWARZBECK	CBL6111D
19	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
20	SINGLE-PHASE MASTER	NF	4420
21	REFERENCE IMPEDANCE NETWORK 20A	NF	4150
22	MULTI OUTLET UNIT	KIKUSUI	OT01-KHA

1.3 評価負荷条件　　Load condition

Output	Load conditions		
	24V	36V	48V
	Io(A)		
100%	6.3	4.2	3.2
200%	12.6	8.4	6.4

2.1 静特性　Steady state data

(1) 入力・負荷・温度変動／出力起動・低下電圧

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

24V

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

Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
0%	24.050V	24.050V	24.049V	24.050V	1mV	0.004%
50%	24.044V	24.044V	24.043V	24.044V	1mV	0.004%
100%	24.038V	24.038V	24.038V	24.038V	0mV	0.000%
load	12mV	12mV	11mV	12mV		
regulation	0.050%	0.050%	0.046%	0.050%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	24.007V	24.038V	24.085V	78mV	0.325%

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

Start up voltage (Vin)	73VAC
Drop out voltage (Vin)	40VAC

36V

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

Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
0%	36.065V	36.065V	36.066V	36.065V	1mV	0.003%
50%	36.060V	36.060V	36.060V	36.060V	0mV	0.000%
100%	36.054V	36.054V	36.055V	36.054V	1mV	0.003%
load	11mV	11mV	11mV	11mV		
regulation	0.031%	0.031%	0.031%	0.031%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	35.975V	36.054V	36.053V	79mV	0.219%

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

Start up voltage (Vin)	72VAC
Drop out voltage (Vin)	38VAC

48V

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

Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
0%	48.065V	48.065V	48.065V	48.065V	0mV	0.000%
50%	48.064V	48.064V	48.063V	48.063V	1mV	0.002%
100%	48.063V	48.063V	48.062V	48.061V	2mV	0.004%
load	2mV	2mV	3mV	4mV		
regulation	0.004%	0.004%	0.006%	0.008%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	47.960V	48.063V	48.050V	103mV	0.215%

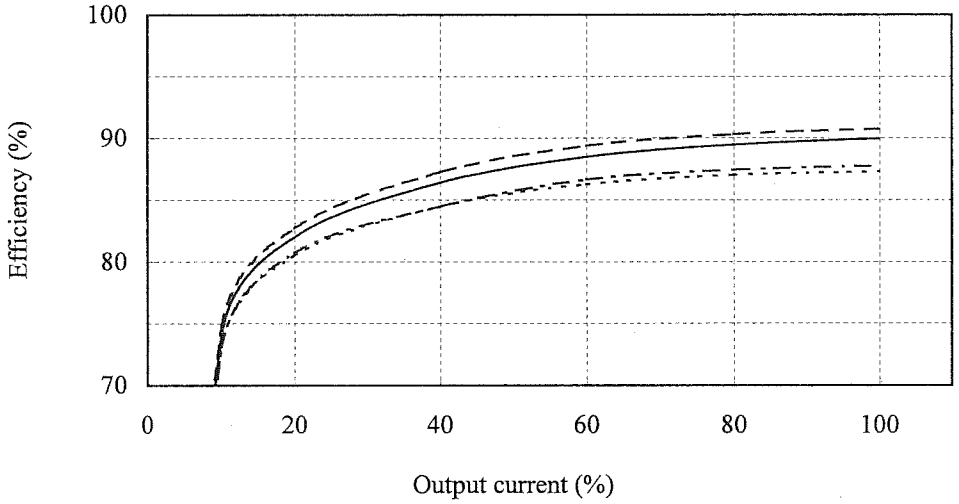
3. Start up voltage and Drop out voltage　Conditions　Ta : 25 ℃
Iout : 100 %

Start up voltage (Vin)	72VAC
Drop out voltage (Vin)	40VAC

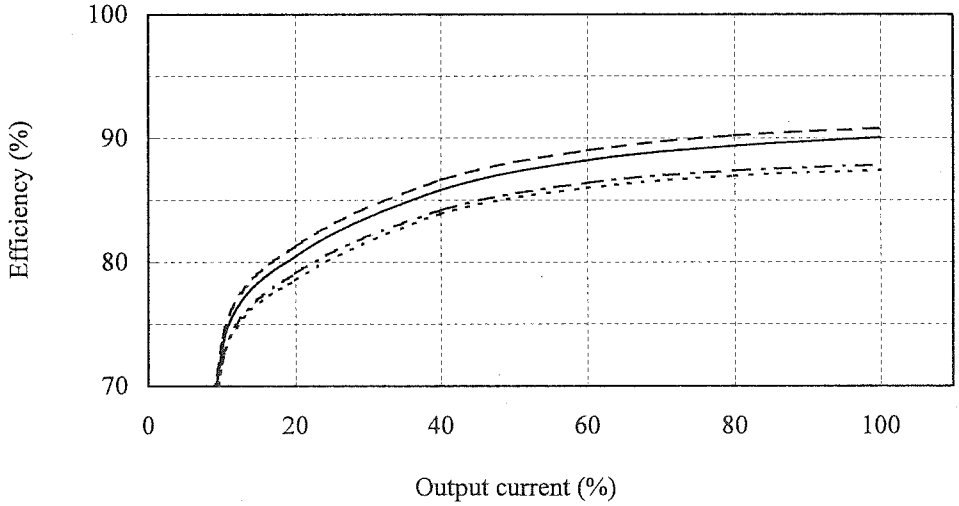
(2) 効率対出力電流
Efficiency vs. Output current

Conditions Vin : 90 VAC ------
: 100 VAC -·-·-·-
: 200 VAC ———
: 265 VAC – – – –
Ta : 25 ℃

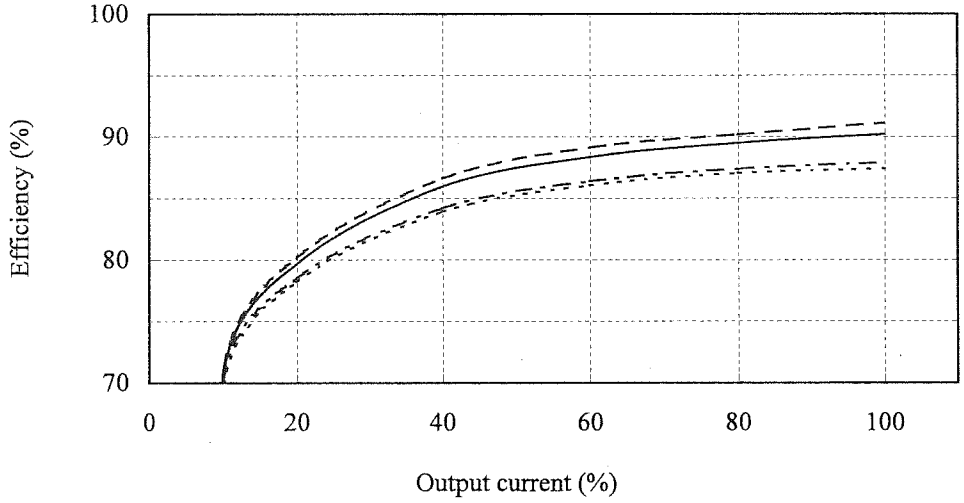
24V



36V



48V

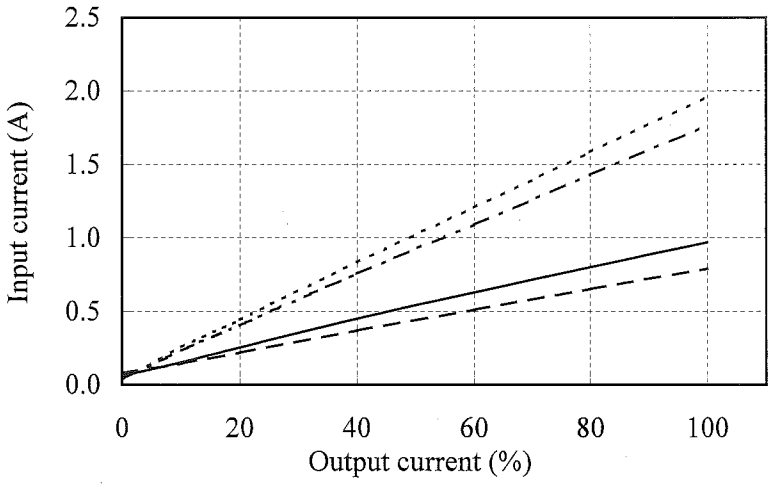


(3) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 90 VAC
: 100 VAC
: 200 VAC
: 265 VAC
Ta : 25 ℃

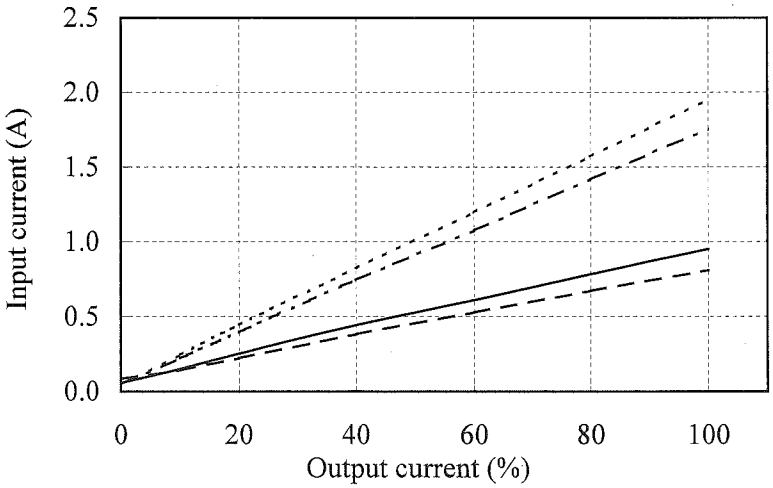
24V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.03A	0.03A
100VAC	0.04A	0.03A
200VAC	0.06A	0.06A
265VAC	0.08A	0.07A



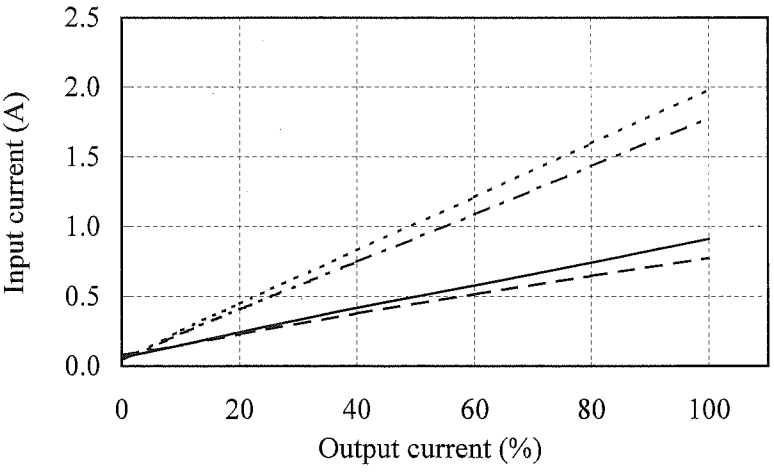
36V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.04A	0.03A
100VAC	0.05A	0.03A
200VAC	0.06A	0.06A
265VAC	0.08A	0.07A



48V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.04A	0.03A
100VAC	0.04A	0.03A
200VAC	0.06A	0.06A
265VAC	0.08A	0.07A



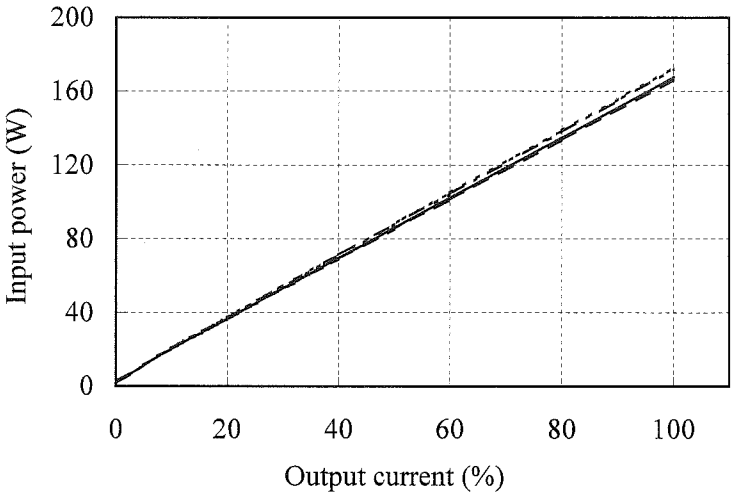
＊ 準標準品 ZWS150BP-*/R にて対応
For option model ZWS150BP-*/R

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

Conditions Vin : 90 VAC -----
: 100 VAC -·-·-
: 200 VAC ——
: 265 VAC – – –
Ta : 25 ℃

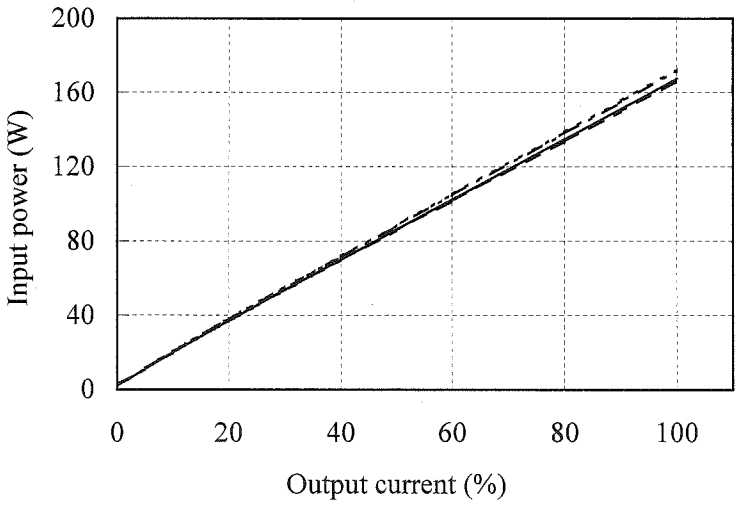
24V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	1.5W	0.1W
100VAC	1.6W	0.1W
200VAC	2.2W	0.5W
265VAC	2.3W	0.8W



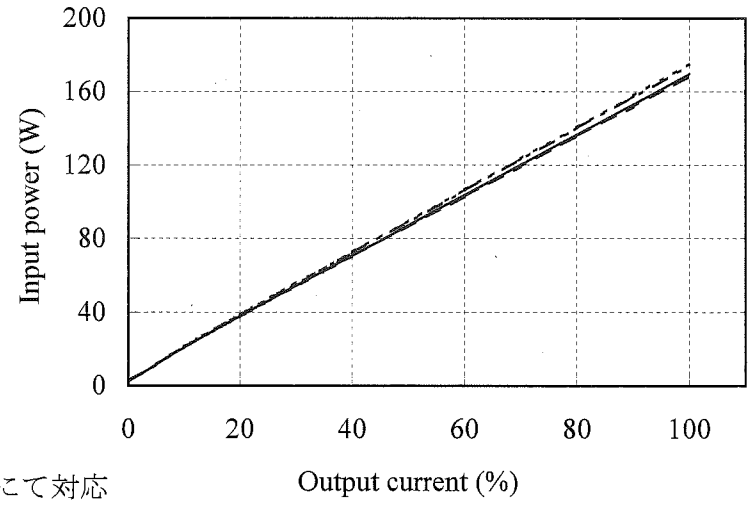
36V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	1.9W	0.1W
100VAC	1.9W	0.1W
200VAC	2.3W	0.5W
265VAC	2.5W	0.8W



48V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	2.0W	0.1W
100VAC	2.0W	0.1W
200VAC	2.4W	0.5W
265VAC	2.7W	0.8W



＊ 準標準品 ZWS150BP-*/R にて対応
For option model ZWS150BP-*/R

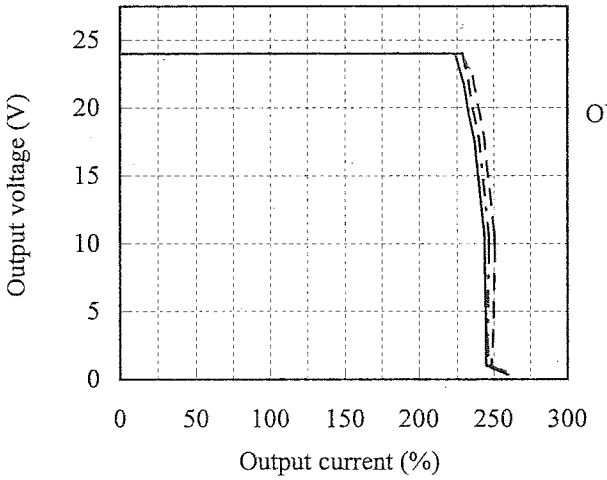
2. 2 過電流保護特性
Over current protection (OCP) characteristics

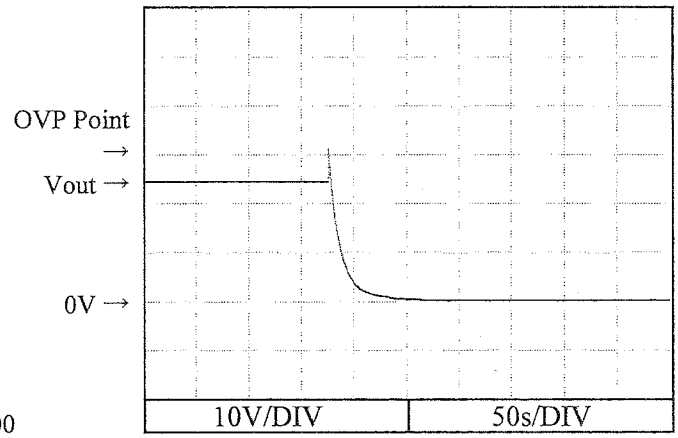
Conditions Vin : 100 VAC
Ta : -10 ℃ ------
25 ℃ -·-·-
50 ℃ ——

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

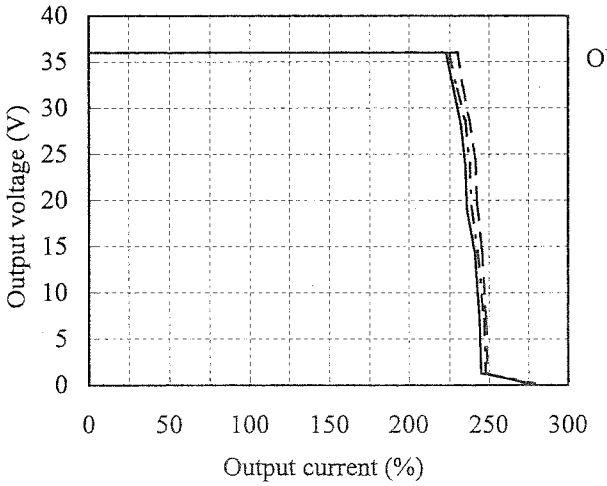
Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 ℃

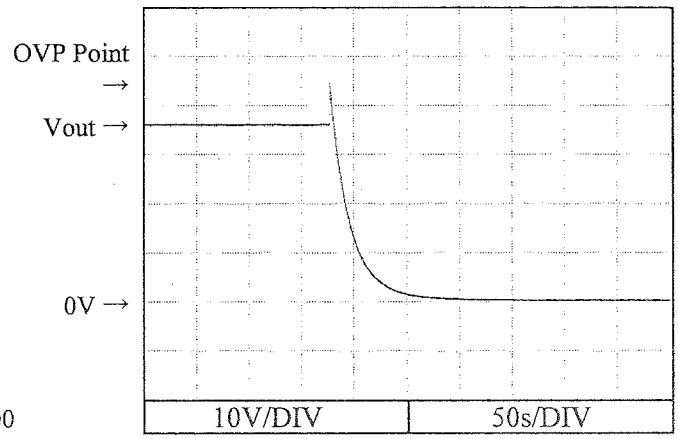
24V



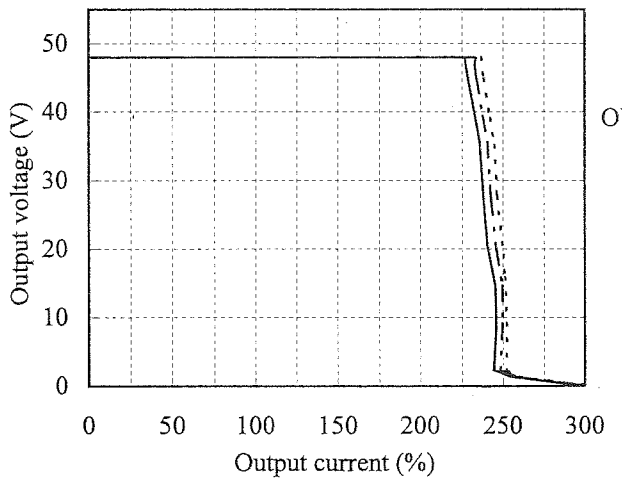


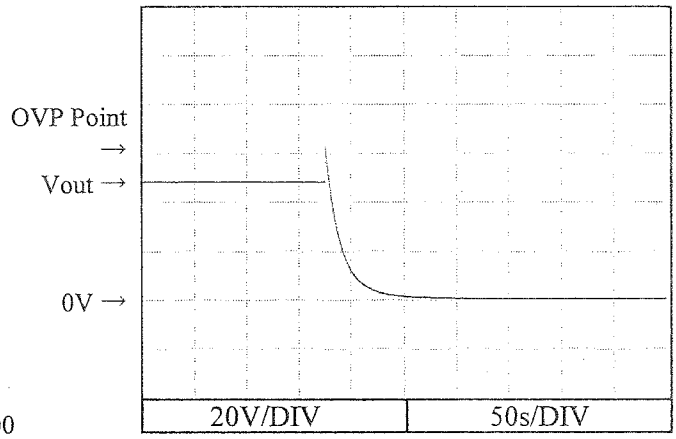
36V





48V



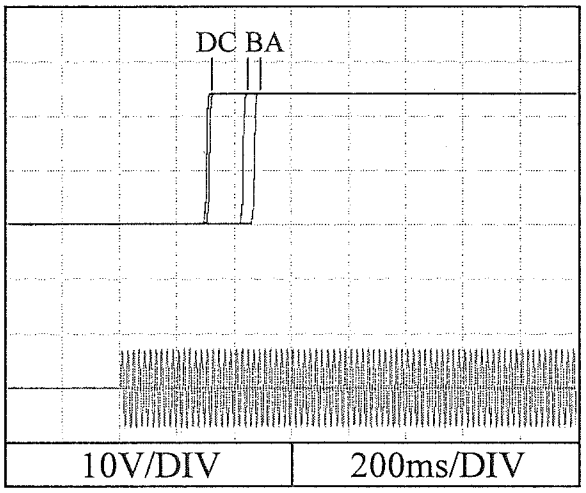


2. 4 出力立ち上がり特性
Output rise characteristics

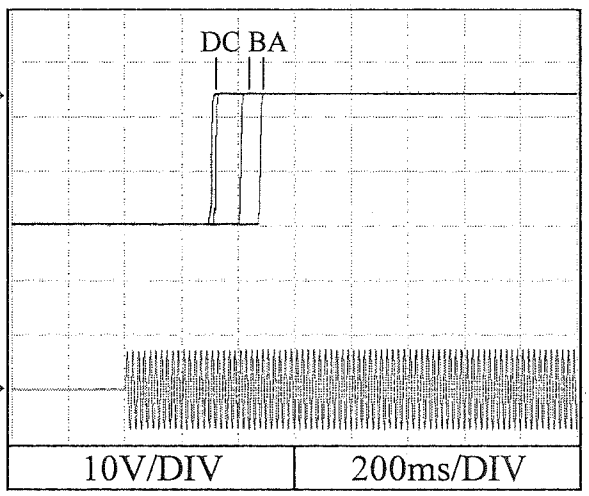
Conditions Vin : 90 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

24V

Iout : 0%

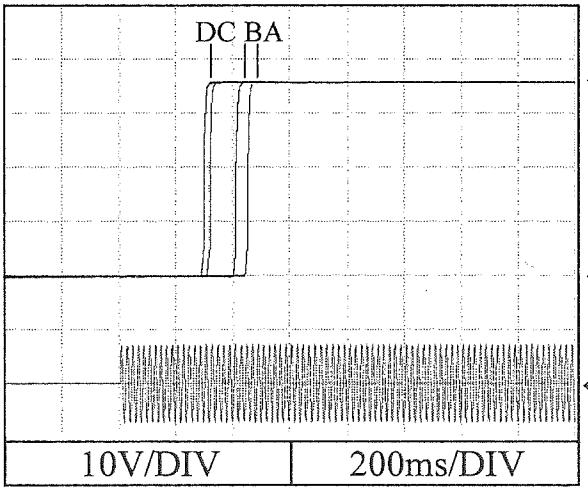


Iout : 100%

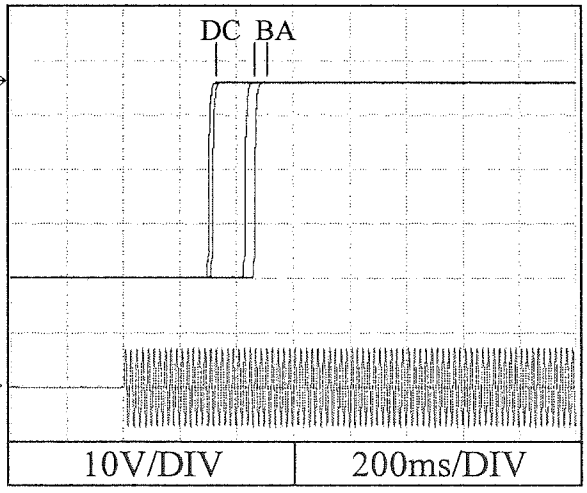


36V

Iout : 0%

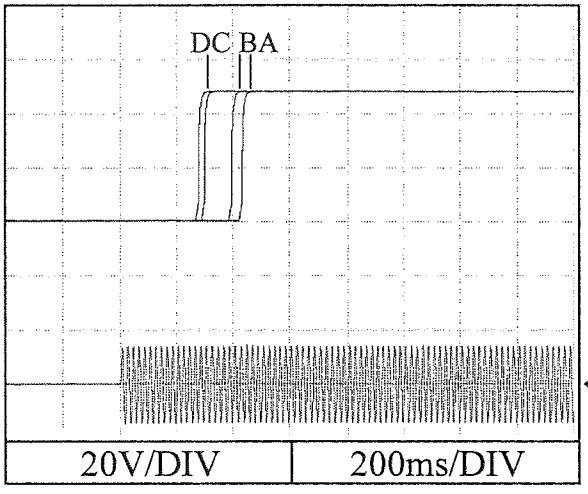


Iout : 100%

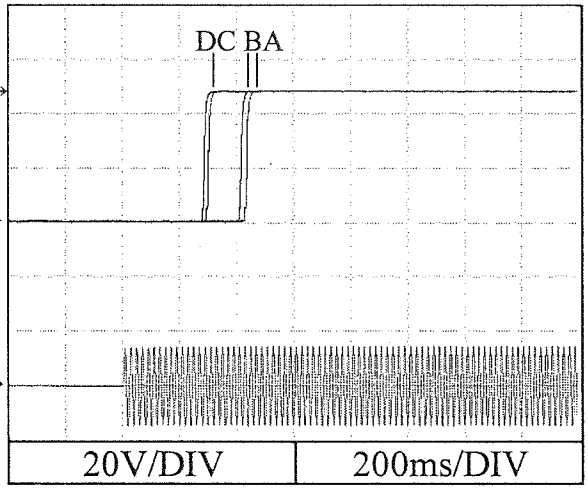


48V

Iout : 0%



Iout : 100%

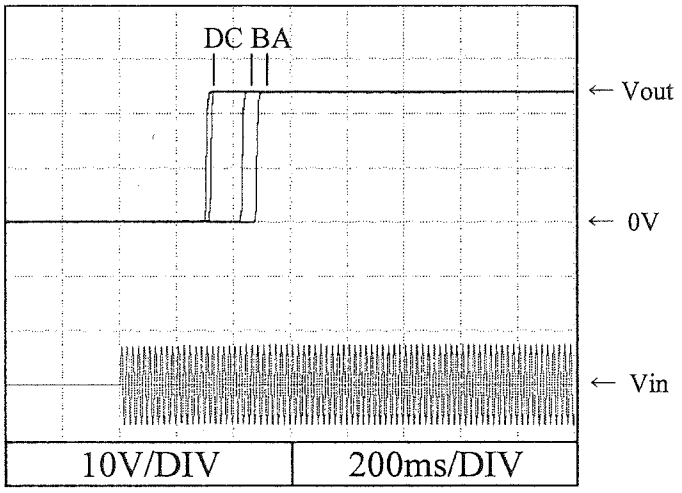


2.4 出力立ち上がり特性
Output rise characteristics

Conditions Vin : 90 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

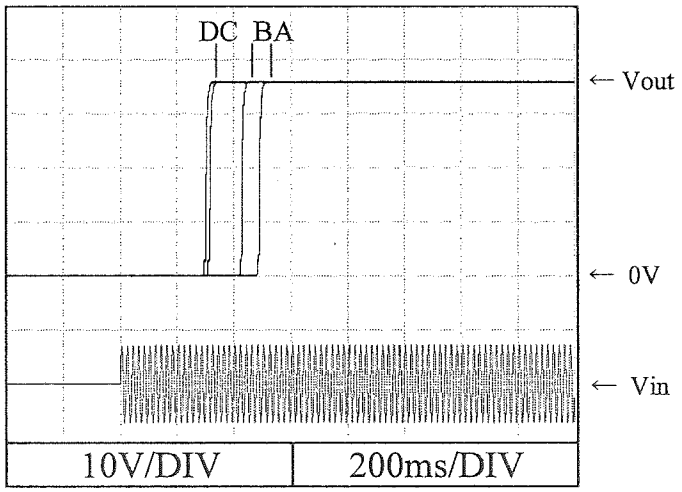
24V

Iout : 200%



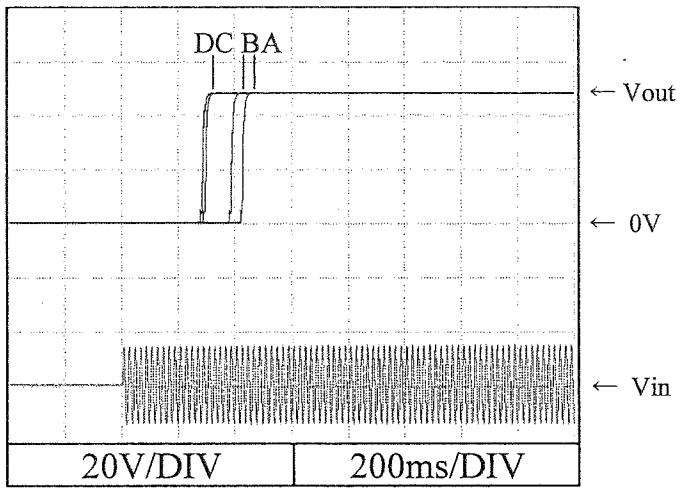
36V

Iout : 200%



48V

Iout : 200%

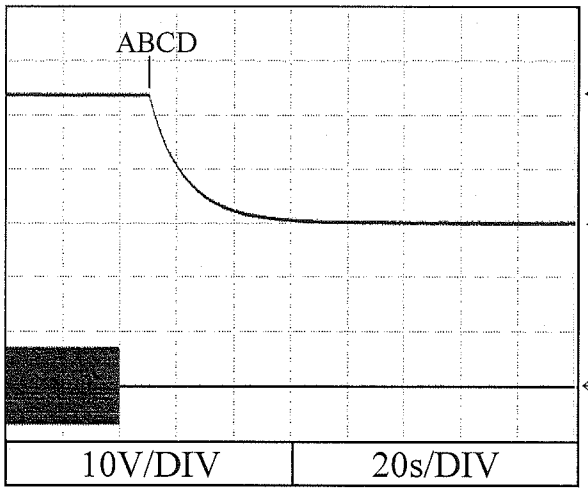


2.5 出力立ち下がり特性
Output fall characteristics

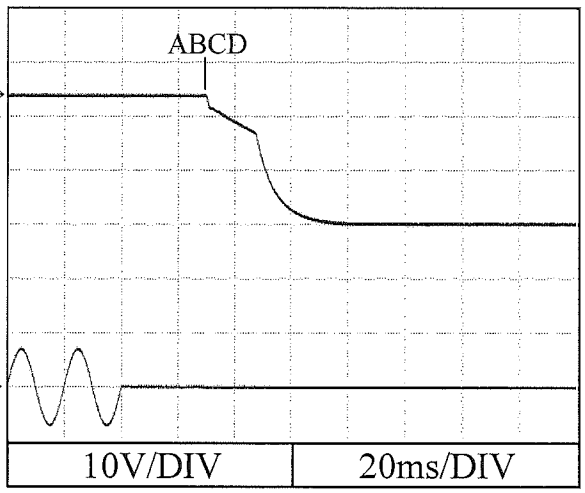
Conditions Vin : 90 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

24V

Iout : 0%



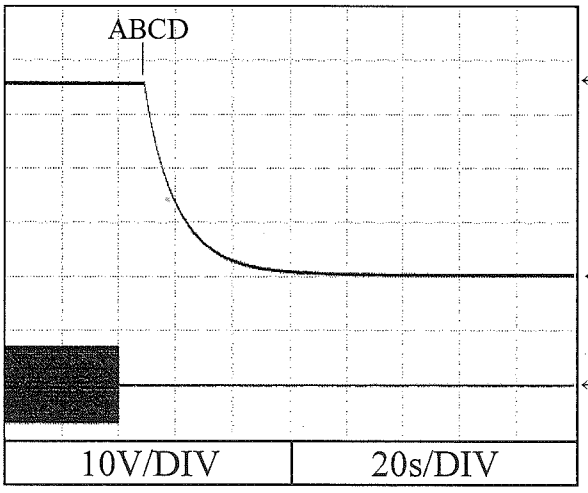
Iout : 100%



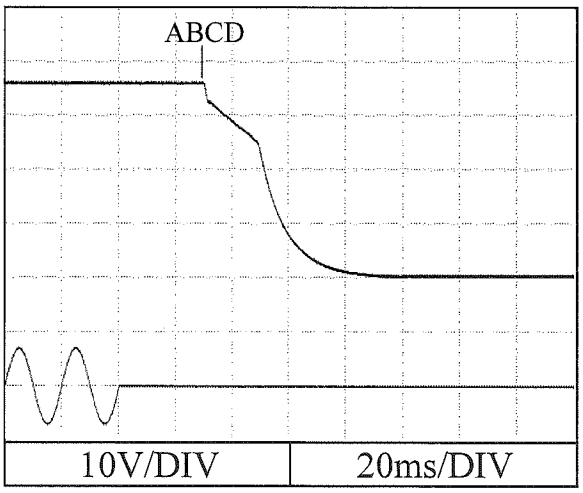
← Vout →
← 0V →
← Vin →

36V

Iout : 0%



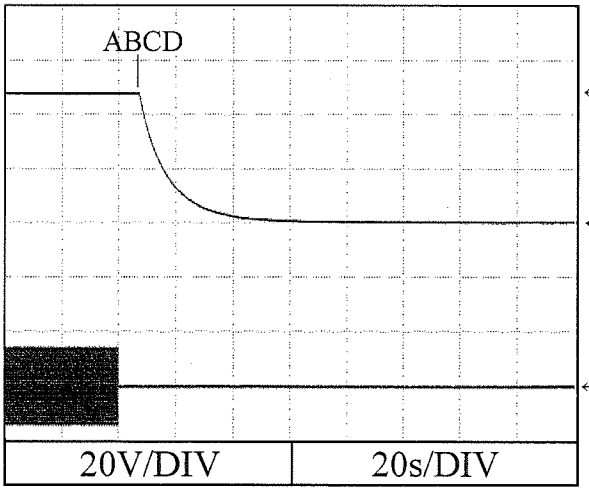
Iout : 100%



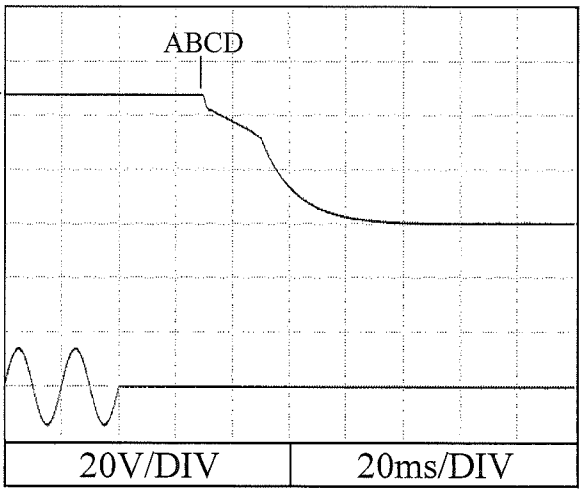
← Vout →
← 0V →
← Vin →

48V

Iout : 0%



Iout : 100%



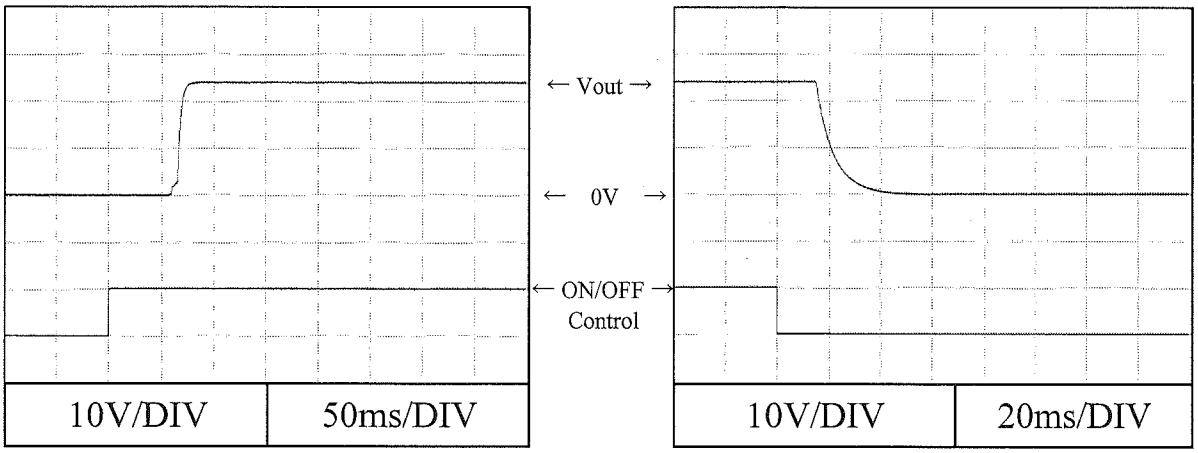
← Vout →
← 0V →
← Vin →

2. 6　ON/OFFコントロール時出力立ち上がり、立ち下がり特性
Output rise, fall characteristics with ON/OFF Control

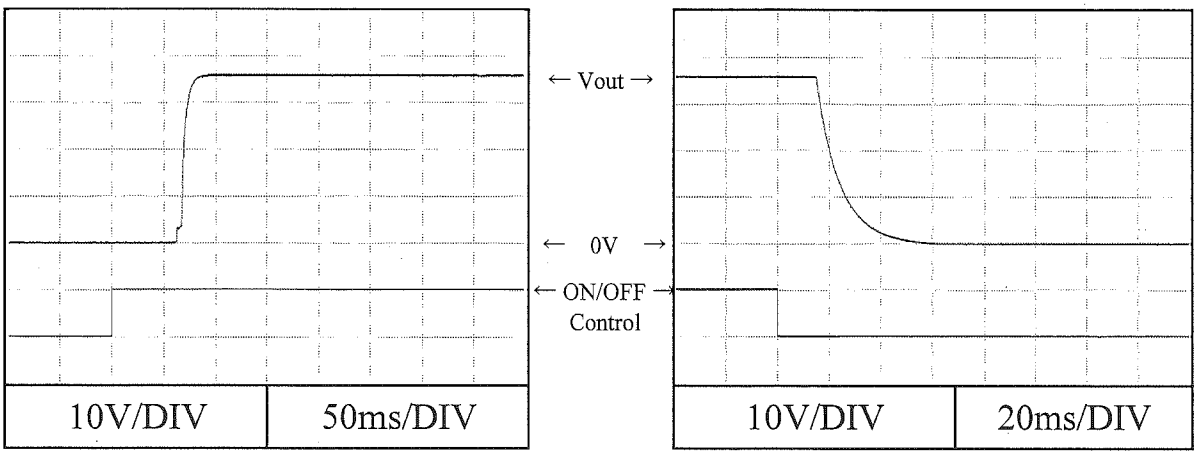
Conditions　Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

準標準品 ZWS150BP-*/R にて対応
For option model ZWS150BP-*/R

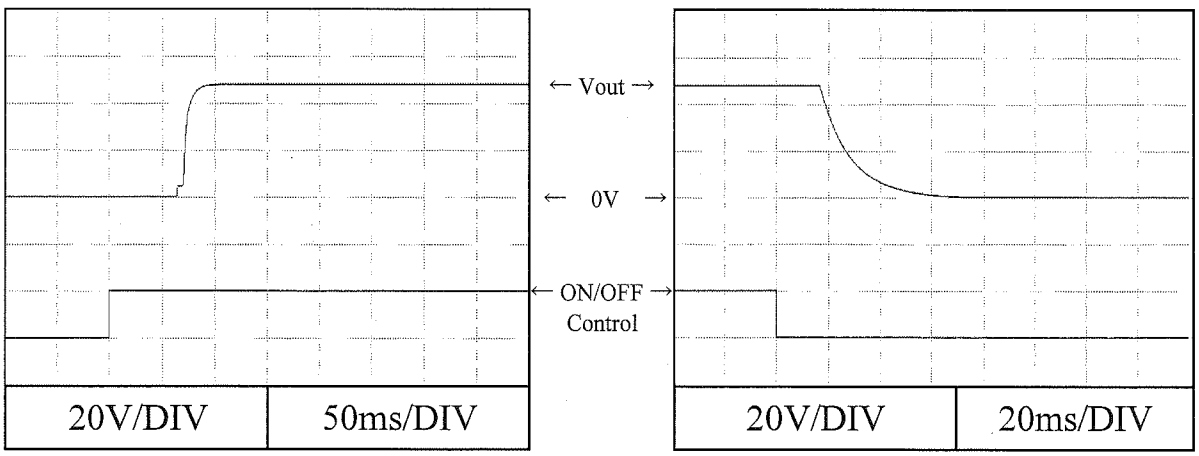
24V



36V



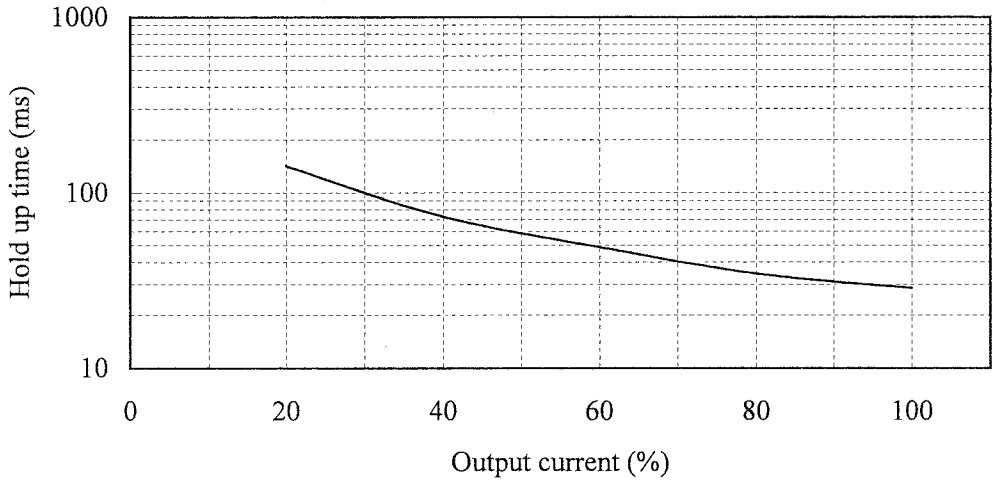
48V



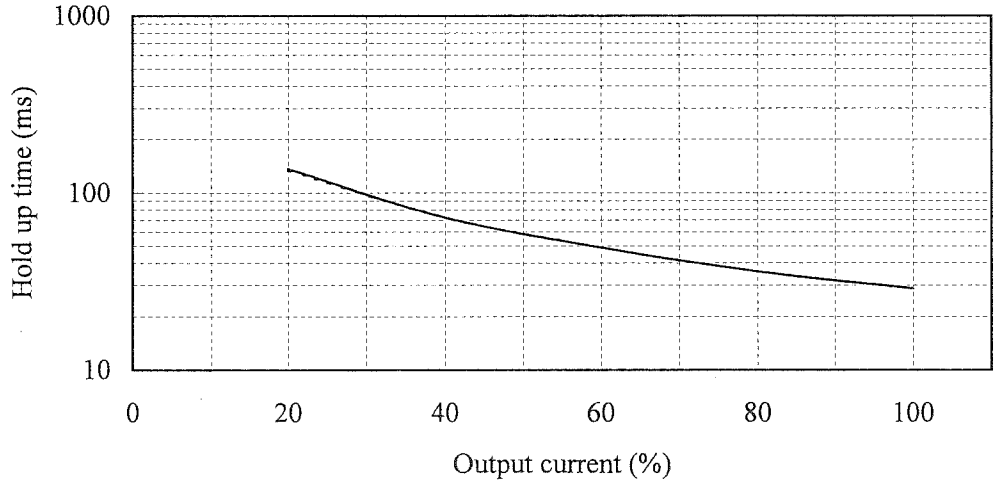
2. 7 出力保持時間特性
Hold up time characteristics

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

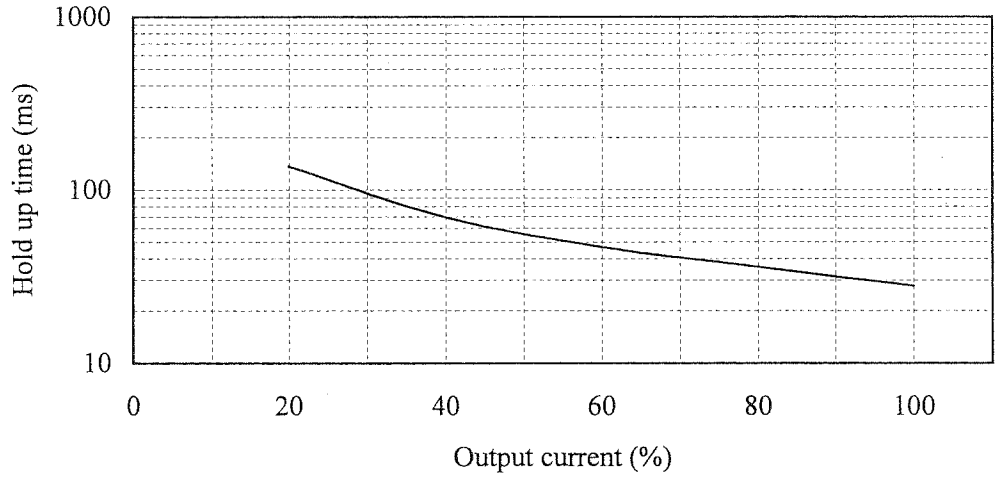
24V



36V



48V

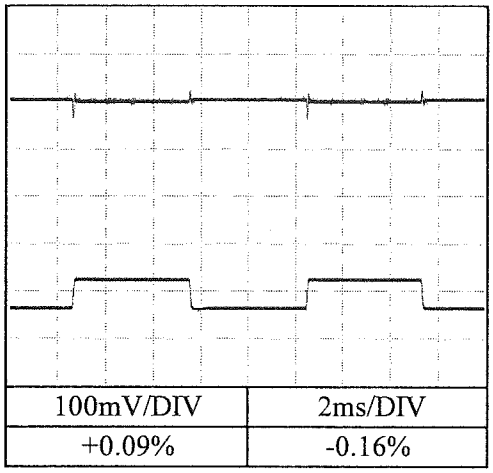


2.8 過渡応答（負荷急変）特性
Dynamic load response characteristics

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

24V

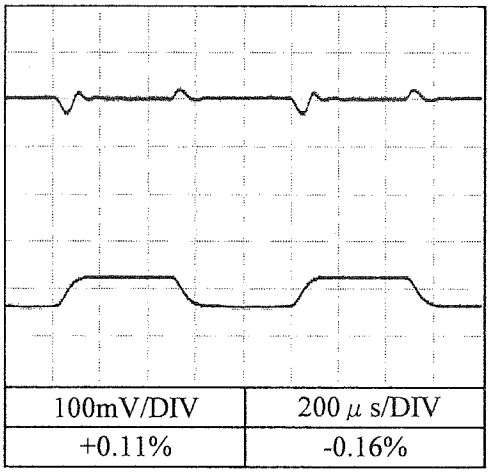
f = 100Hz



100mV/DIV	2ms/DIV
+0.09%	-0.16%

← Vout →
← Iout →
← Iout:0% →

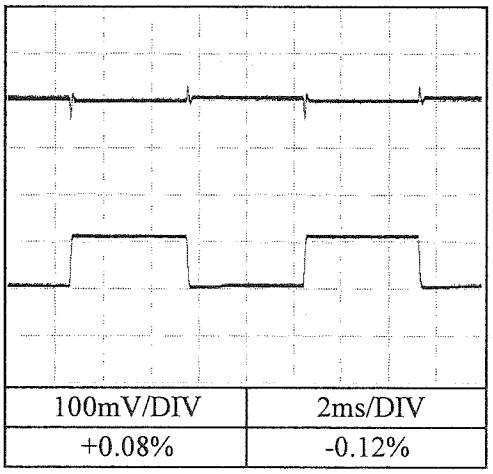
f = 1kHz



100mV/DIV	200 μ s/DIV
+0.11%	-0.16%

36V

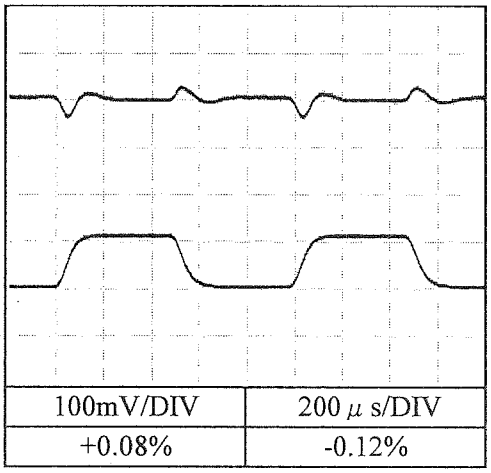
f = 100Hz



100mV/DIV	2ms/DIV
+0.08%	-0.12%

← Vout →
← Iout →
← Iout:0% →

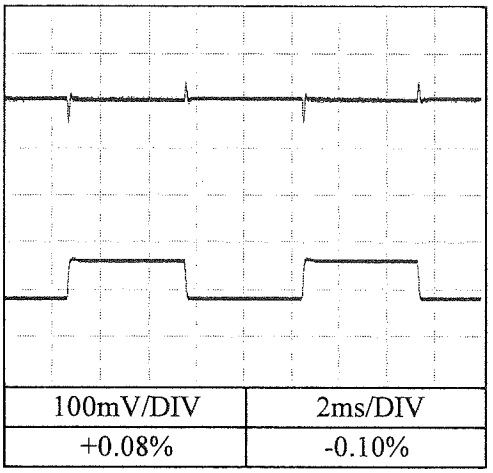
f = 1kHz



100mV/DIV	200 μ s/DIV
+0.08%	-0.12%

48V

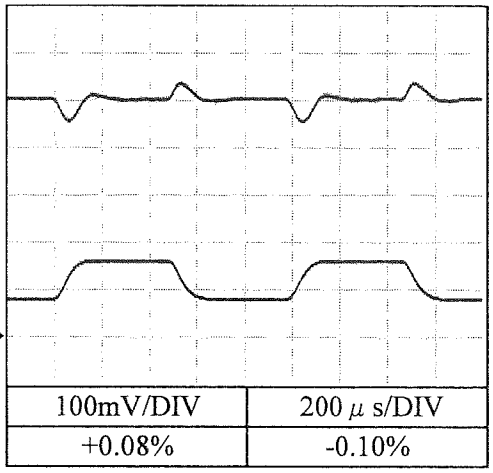
f = 100Hz



100mV/DIV	2ms/DIV
+0.08%	-0.10%

← Vout →
← Iout →
← Iout:0% →

f = 1kHz



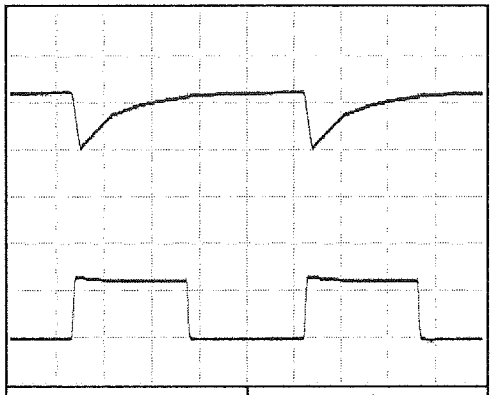
100mV/DIV	200 μ s/DIV
+0.08%	-0.10%

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

Conditions Vin : 100 VAC
Iout : 0 %←→200 %
(tr = tf = 50us)
Ta : 25 ℃

24V

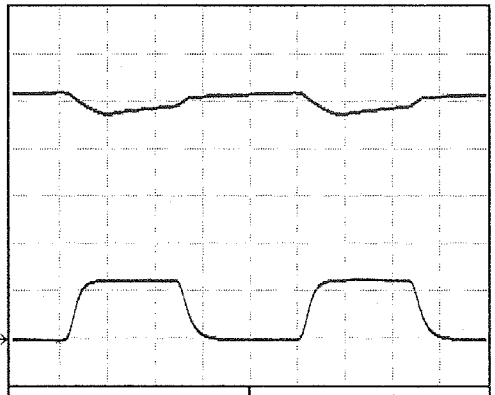
f = 100Hz



2V/DIV	2ms/DIV
+2.33%	-8.33%

← Vout →
← Iout →
← Iout:0% →

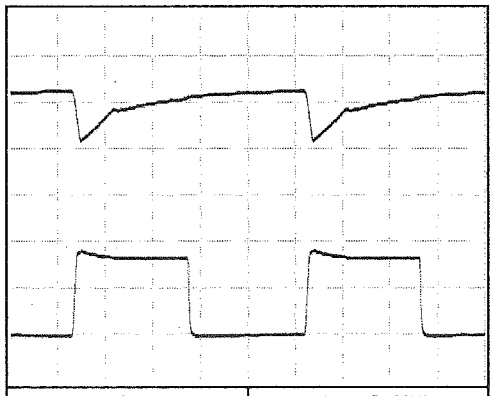
f = 1kHz



2V/DIV	200 μ s/DIV
+2.00%	-2.67%

36V

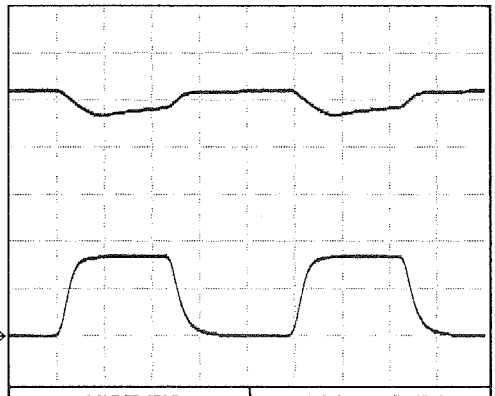
f = 100Hz



2V/DIV	2ms/DIV
+1.56%	-4.89%

← Vout →
← Iout →
← Iout:0% →

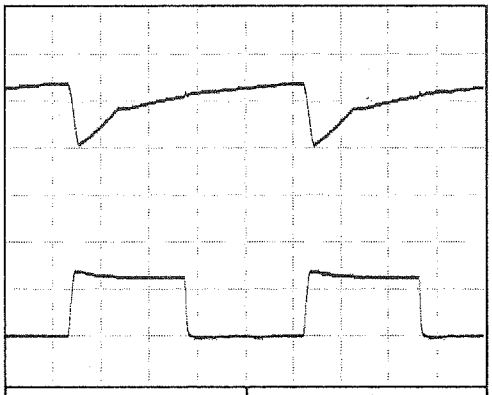
f = 1kHz



2V/DIV	200 μ s/DIV
+1.56%	-2.22%

48V

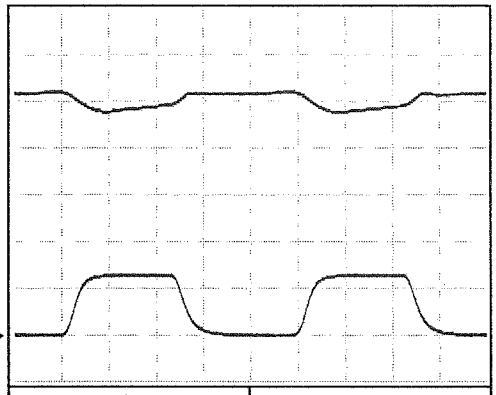
f = 100Hz



2V/DIV	2ms/DIV
+1.67%	-4.17%

← Vout →
← Iout →
← Iout:0% →

f = 1kHz



2V/DIV	200 μ s/DIV
+1.00%	-1.33%

2. 9 入力電圧瞬停特性

Response to brown out characteristics

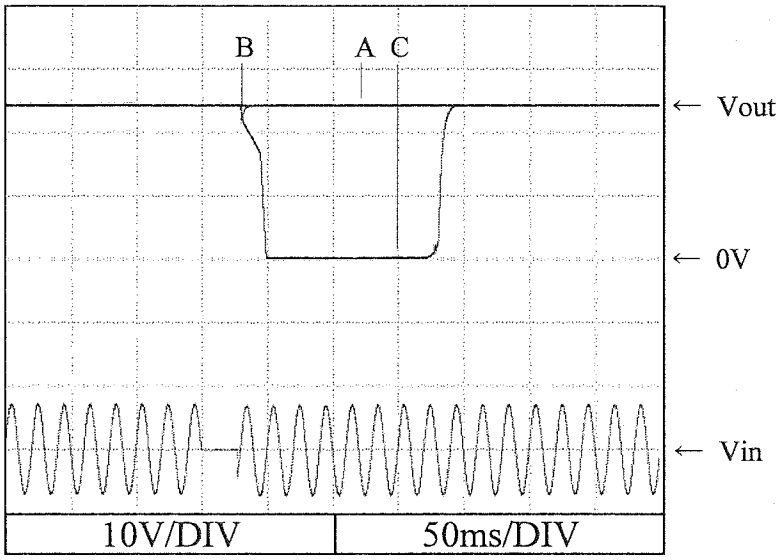
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

24V

A = 28ms

B = 31ms

C = 32ms

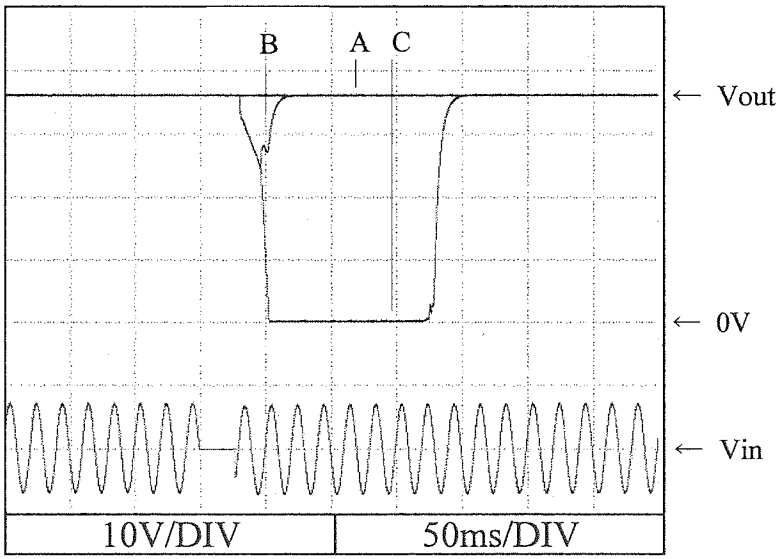


36V

A = 29ms

B = 34ms

C = 35ms

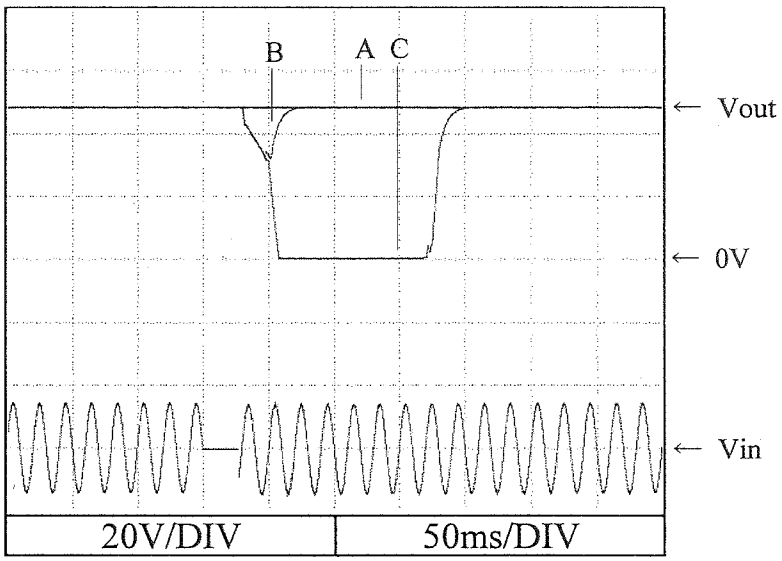


48V

A = 28ms

B = 33ms

C = 34ms



2.9 入力電圧瞬停特性

Response to brown out characteristics

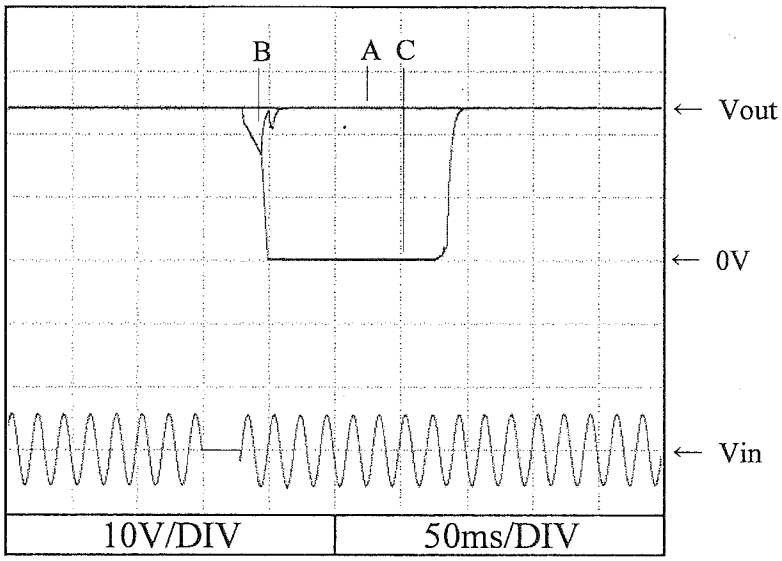
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

24V

A = 29ms

B = 45ms

C = 46ms

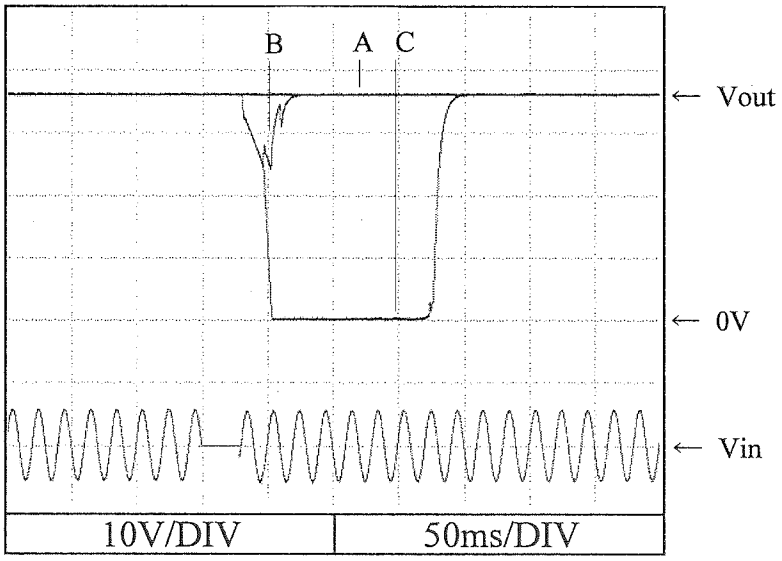


36V

A = 29ms

B = 47ms

C = 48ms

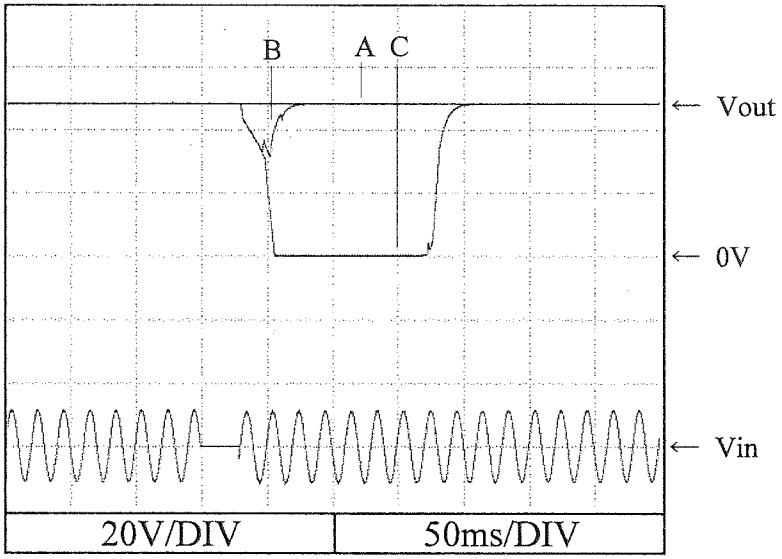


48V

A = 29ms

B = 47ms

C = 48ms

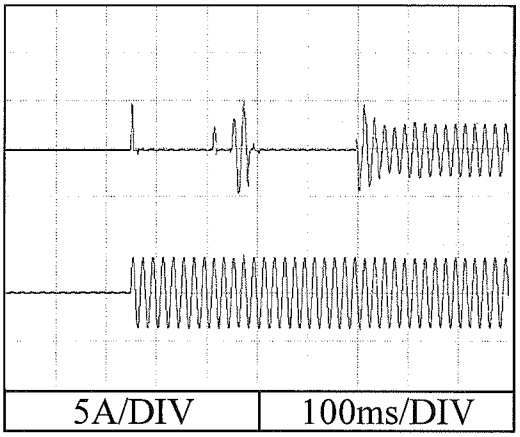


2.10 入力サージ電流（突入電流）波形
Inrush current waveform

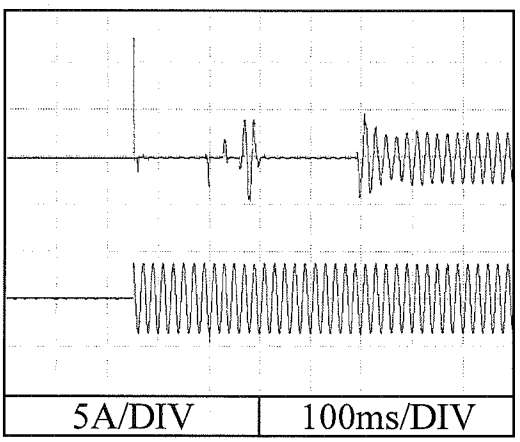
24V

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

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

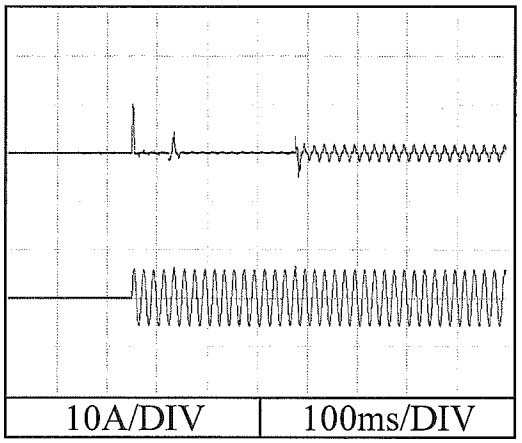


Switch on phase angle of input AC voltage
ϕ = 90°

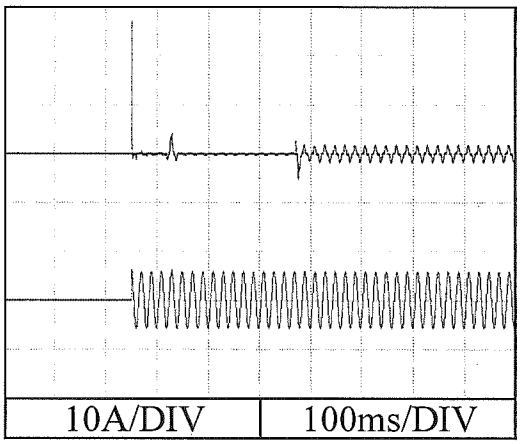


Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

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



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



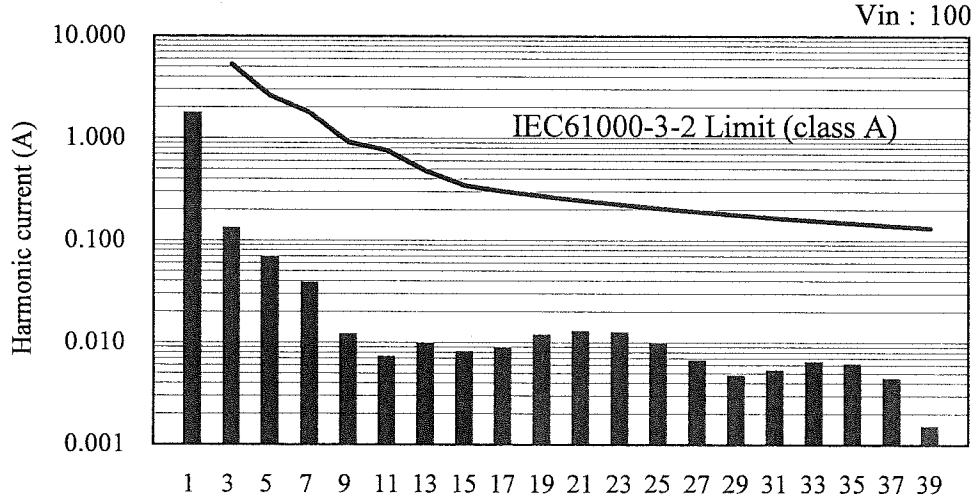
2. 11 高調波成分

Input current harmonics

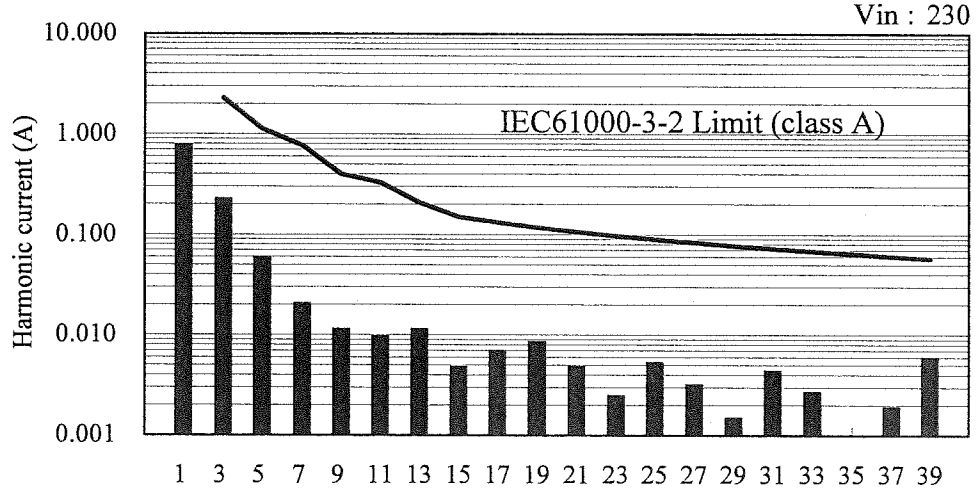
Conditions Iout : 100 %
Ta : 25 ℃

24V

Vin : 100 VAC



Vin : 230 VAC

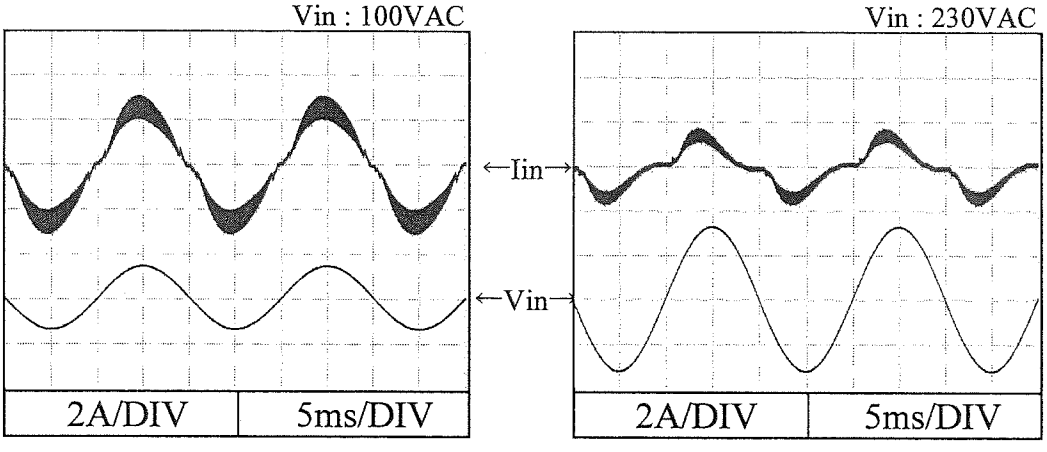


2. 12 入力電流波形

Input current waveform

Conditions Iout : 100 %
Ta : 25 ℃

24V

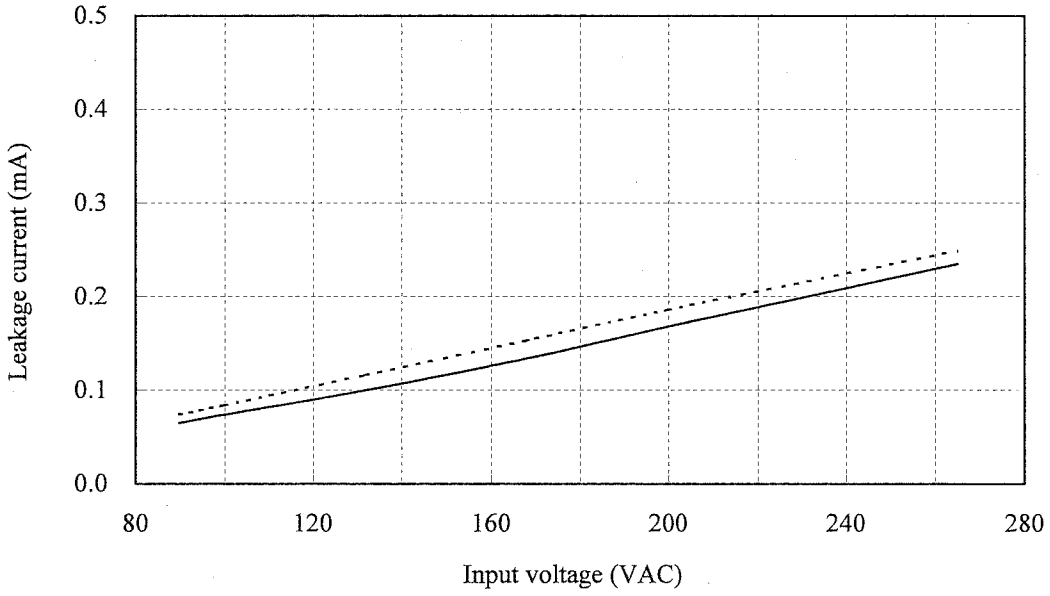


2. 13 リーク電流特性
Leakage current characteristics

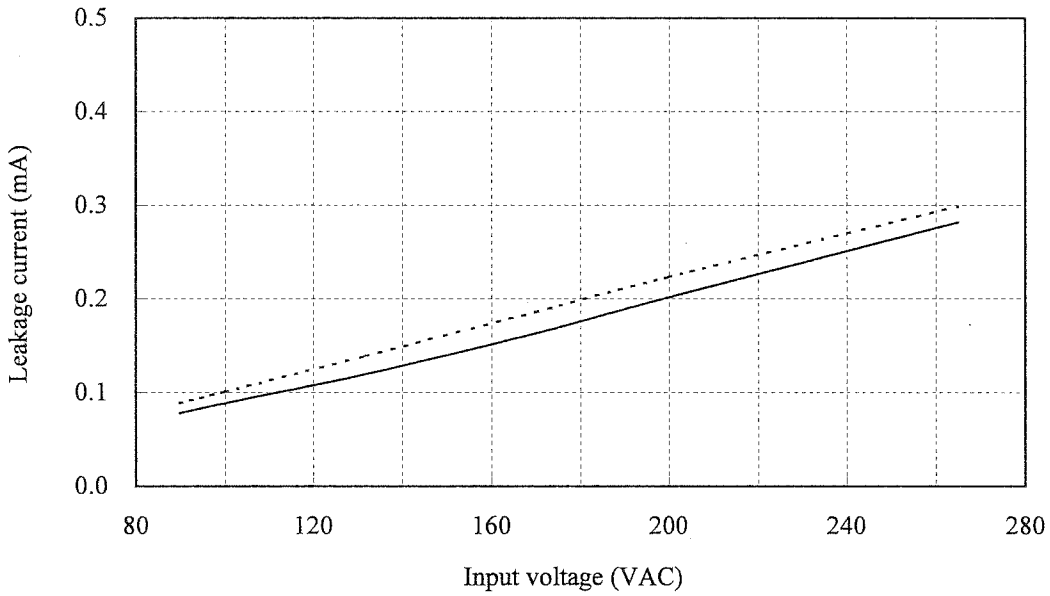
Conditions Iout : 0 % ------
100 % ———
Ta : 25 ℃
Equipment used : 3156 (HIOKI)

24V

f : 50 Hz



f : 60 Hz

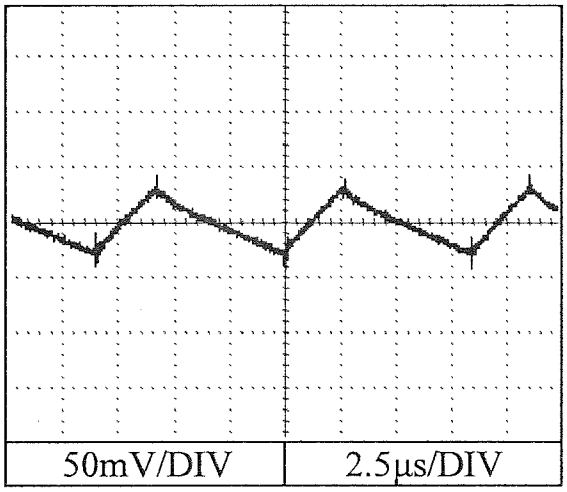


2. 14 出力リップル、ノイズ波形
Output ripple and noise waveform

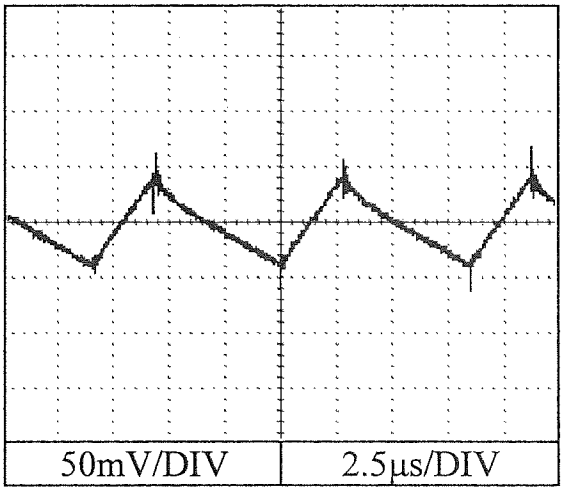
Conditions Vin : 100 VAC
Ta : 25 ℃

24V

Iout :100%

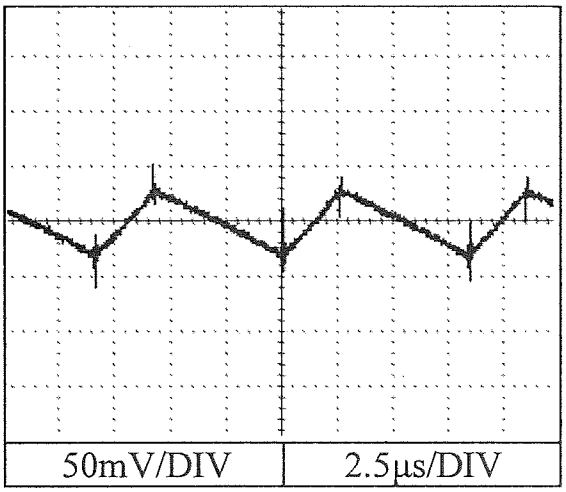


Iout : 200%

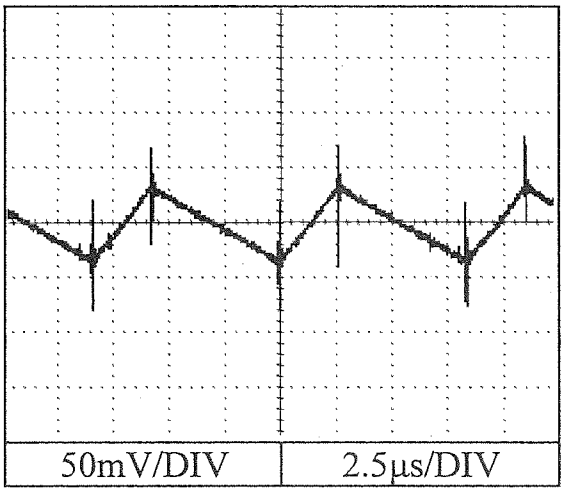


36V

Iout : 100%

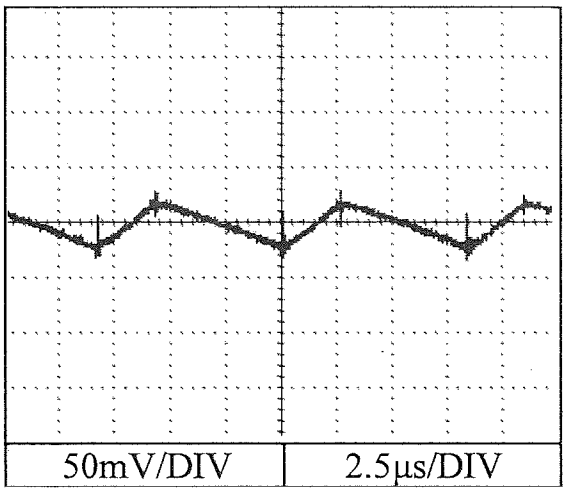


Iout : 200%

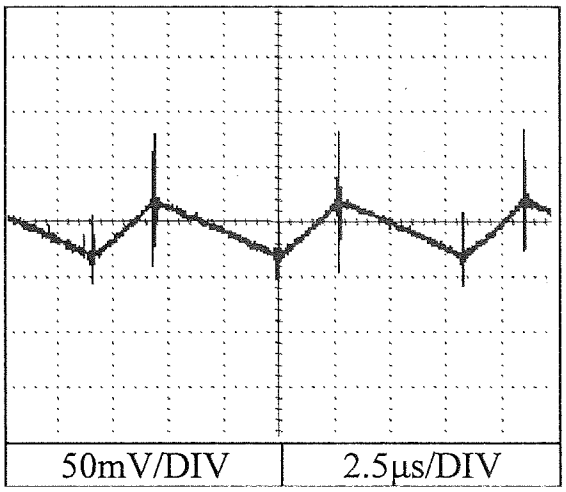


48V

Iout : 100%



Iout : 200%



2. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

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

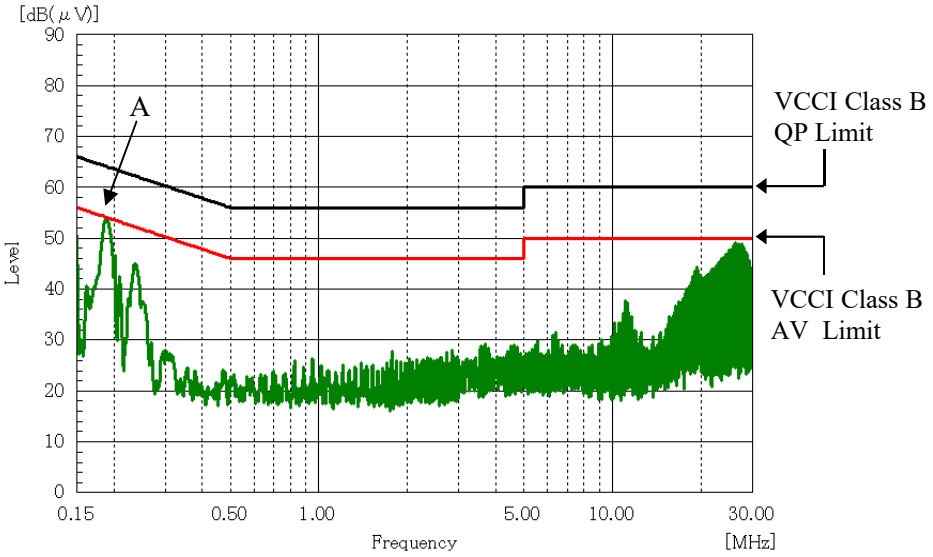
雑音端子電圧

Conducted Emission

24V

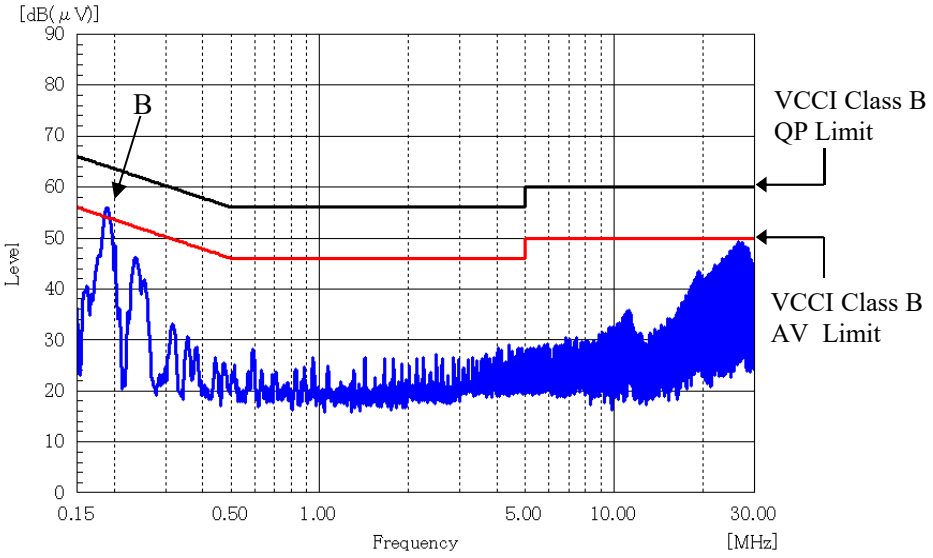
Phase : N

Ref. Data	Point A (188kHz) Limit (dBuV)	Measure (dBuV)
QP	64.1	51.0
AV	54.1	47.0



Phase : L

Ref. Data	Point B (190kHz) Limit (dBuV)	Measure (dBuV)
QP	64.1	53.8
AV	54.1	48.7



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. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

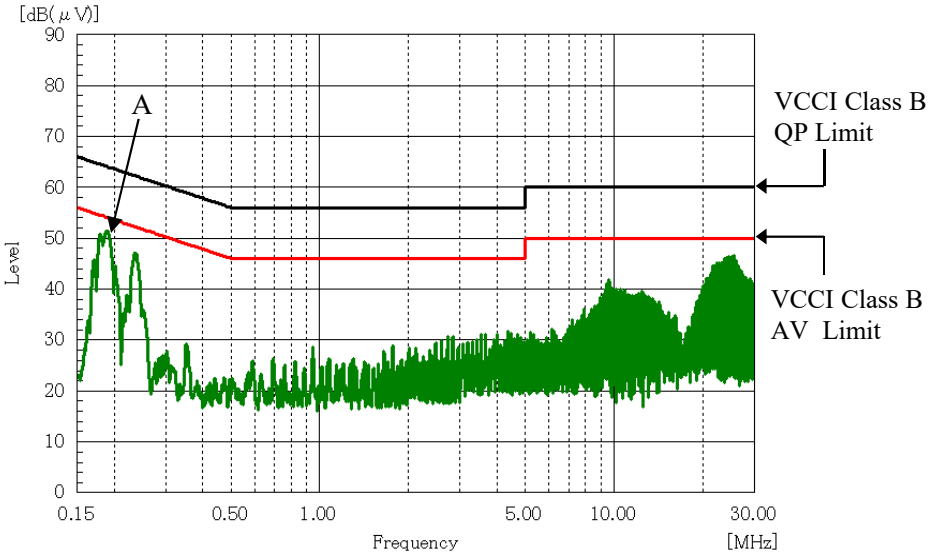
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

Conducted Emission

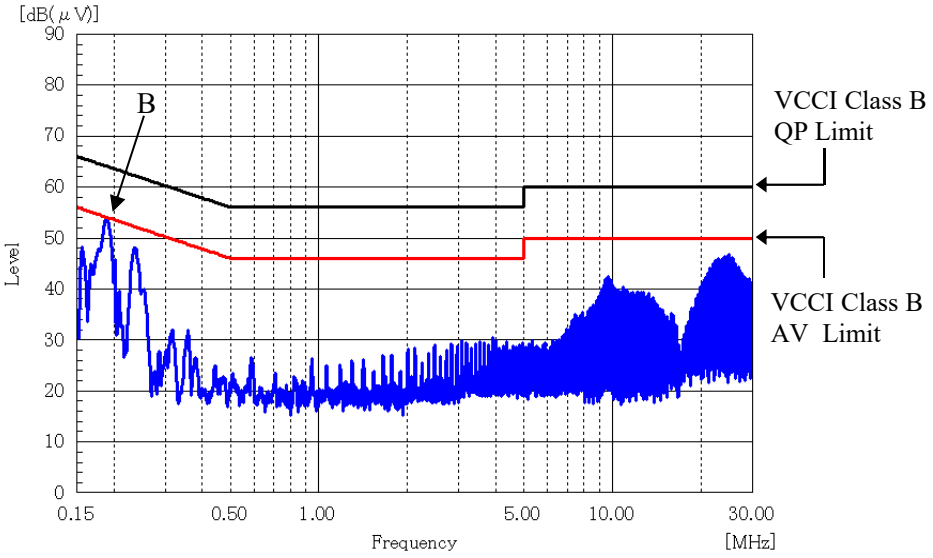
36V

Phase : N



Ref. Data	Point A (194kHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	50.6
AV	54.0	46.4

Phase : L



Ref. Data	Point B (192kHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	52.1
AV	54.0	46.6

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. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

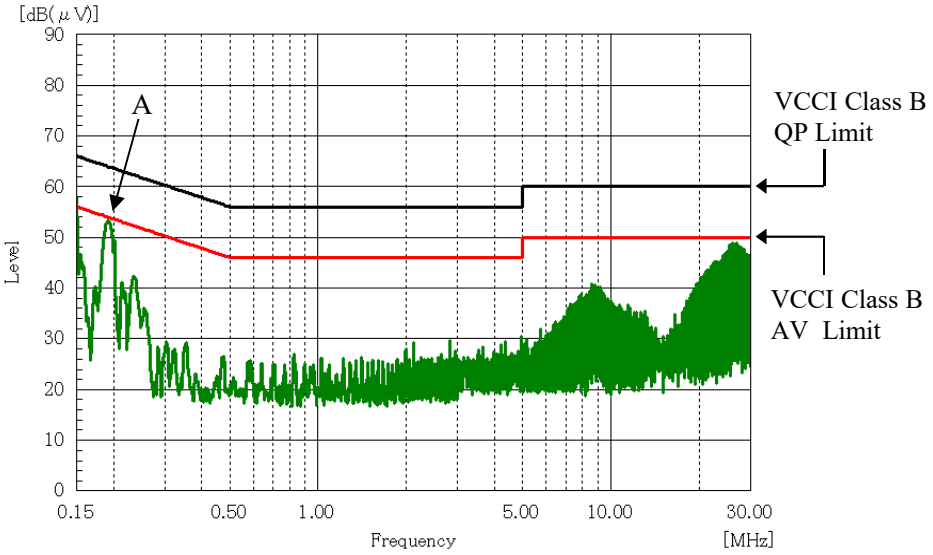
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

Conducted Emission

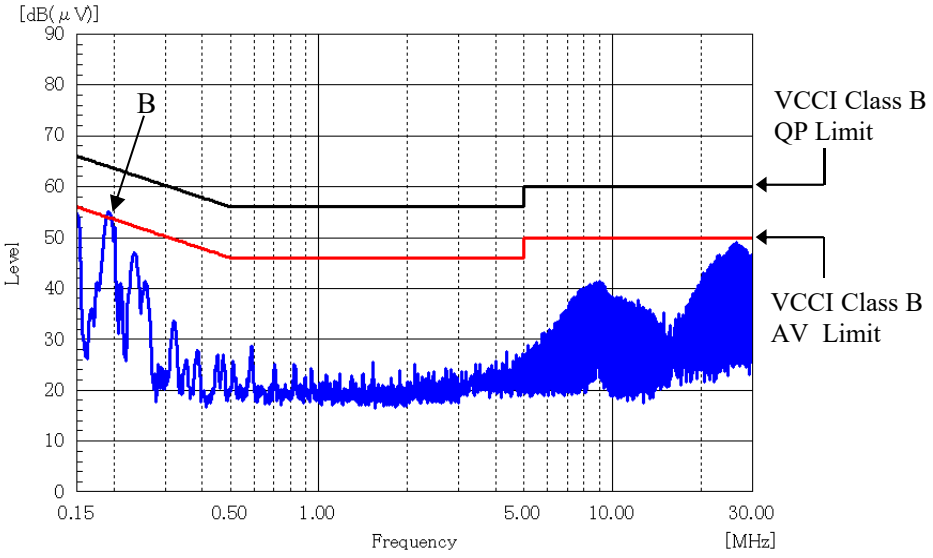
48V

Phase : N



Ref. Data	Point A (192kHz) Limit (dBuV)	Measure (dBuV)
QP	63.9	51.9
AV	53.9	48.4

Phase : L



Ref. Data	Point B (192kHz) Limit (dBuV)	Measure (dBuV)
QP	63.9	53.8
AV	53.9	48.6

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. 15 ＥＭＩ特性

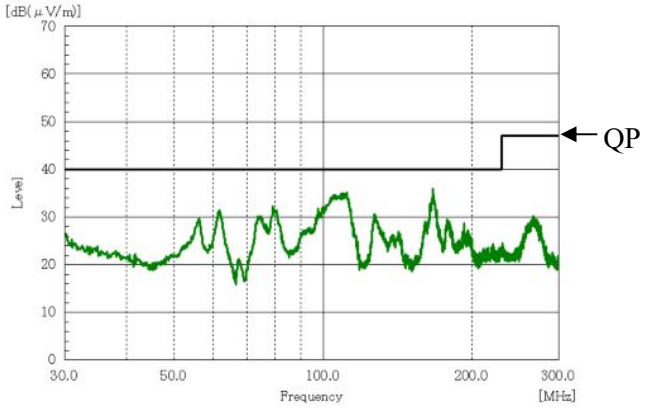
Electro-Magnetic Interference characteristics

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

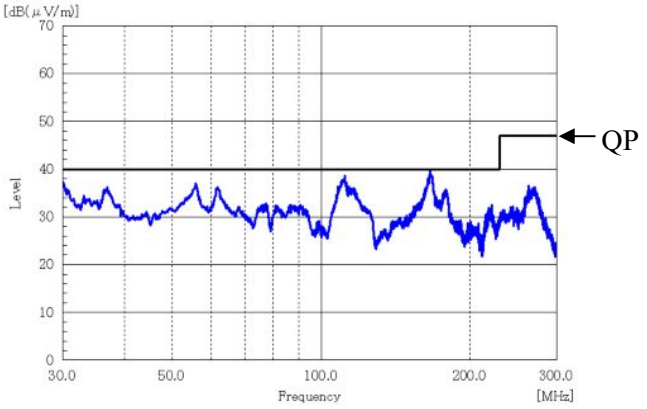
雑音電界強度
Radiated Emission

24V

HORIZONTAL

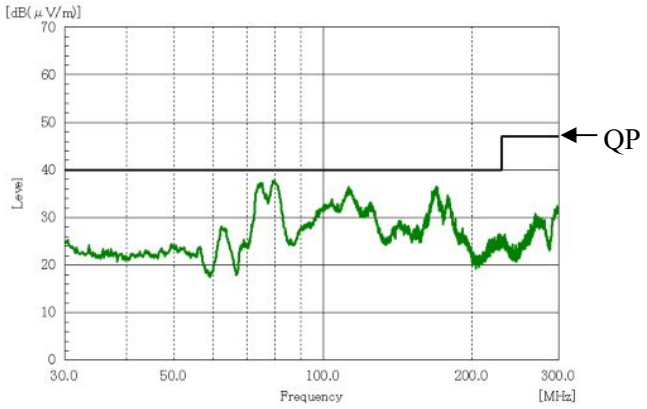


VERTICAL

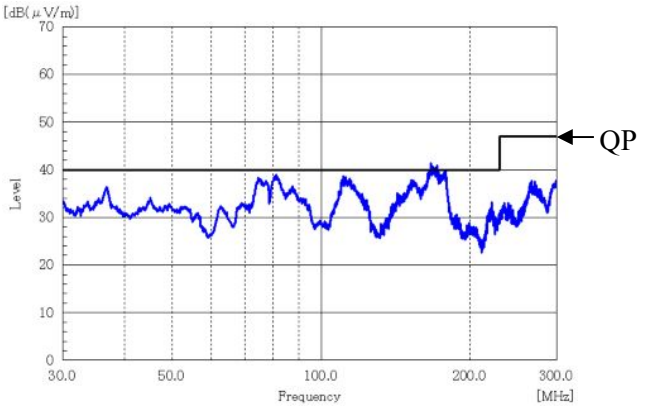


36V

HORIZONTAL

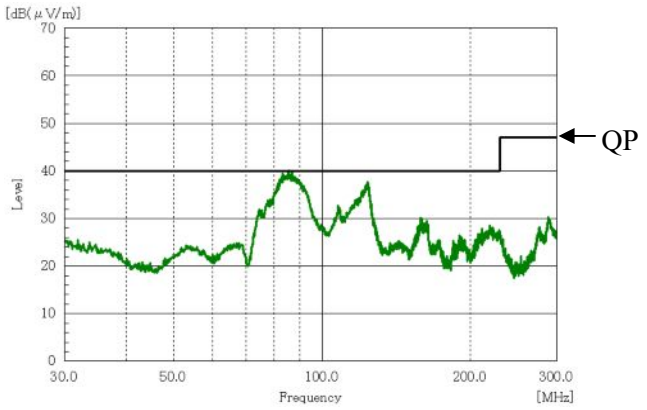


VERTICAL

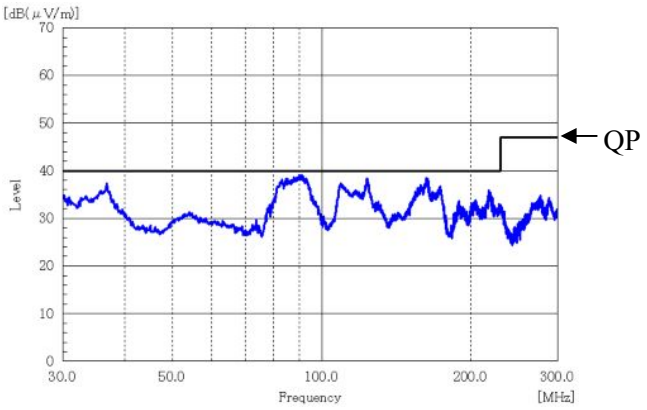


48V

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.