

ZWS150BP

EVALUATION DATA

型式データ

DWG No. A252-53-01		
APPD	CHK	DWG
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2. 特性データ Characteristics

2.1 静特性 Steady state data

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Regulation - line and load, Temperature drift

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標準品 ZWS150BP-*/R にて対応

For option model ZWS150BP-*/R

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使用記号 Terminology used

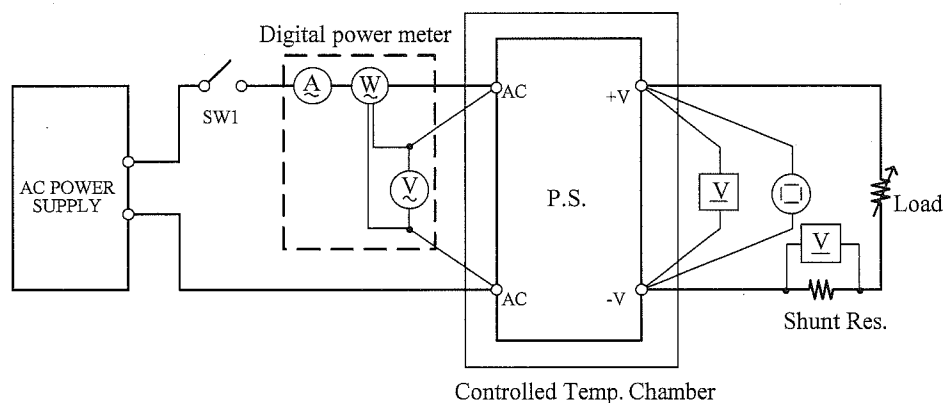
	定義	Definition
Vin	 入力電圧	Input voltage
Vout	 出力電圧	Output voltage
Iin	 入力電流	Input current
Iout	 出力電流	Output current
Ta	 周囲温度	Ambient temperature
f	 周波数	Frequency

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

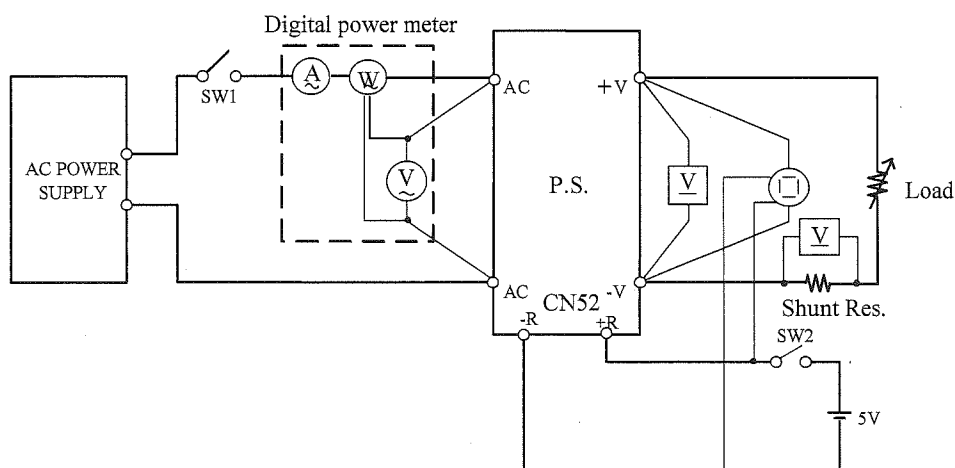
測定回路1 Circuit 1 used for determination

- 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



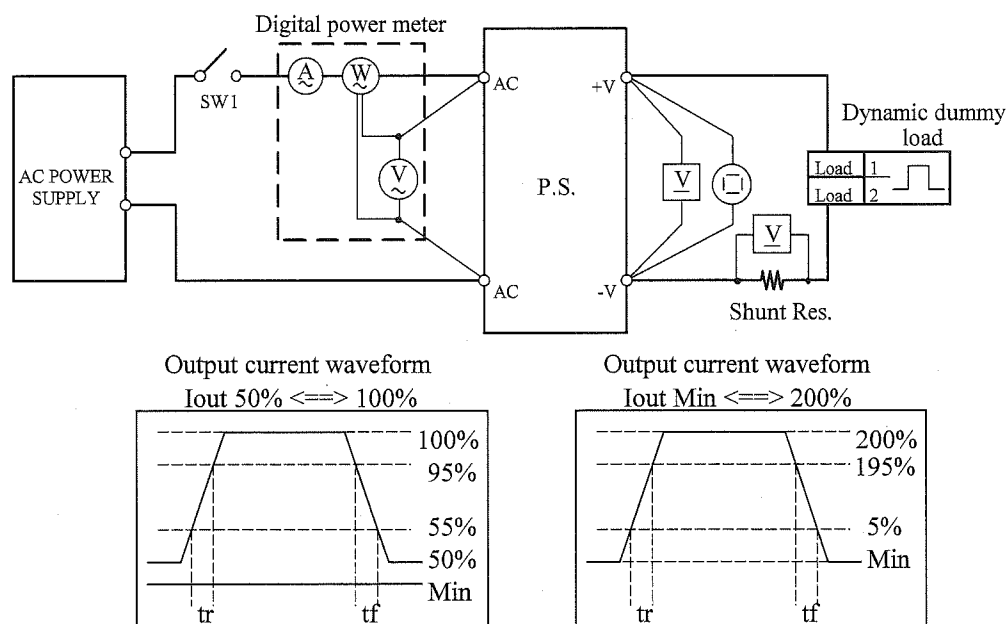
測定回路2 Circuit 2 used for determination

- 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



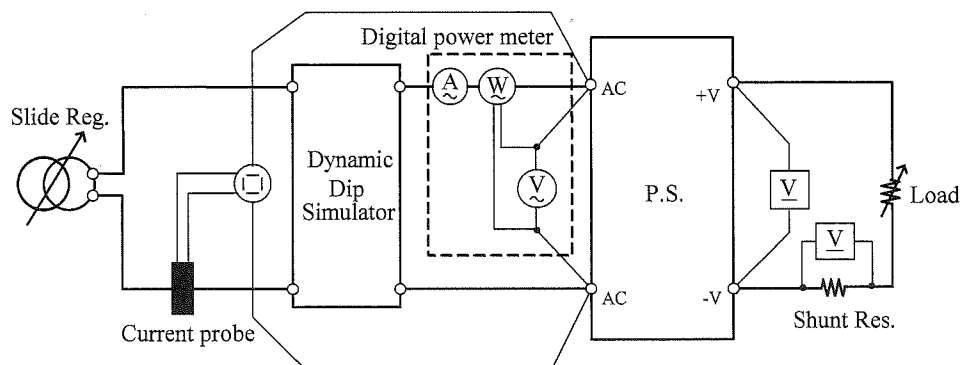
測定回路3 Circuit 3 used for determination

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



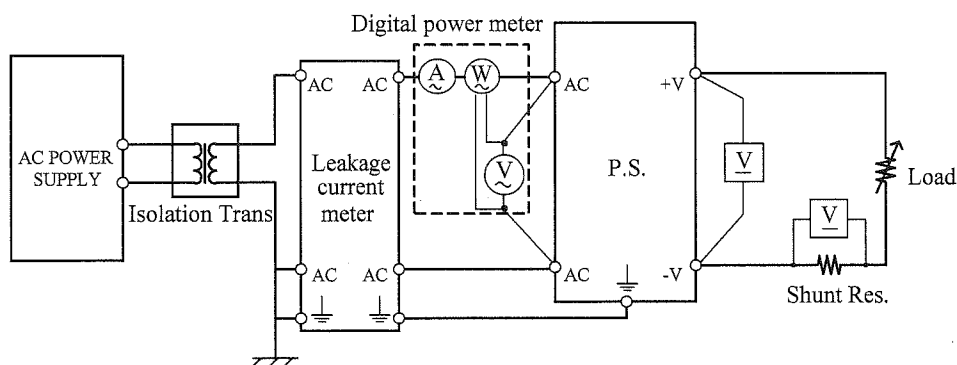
測定回路4 Circuit 4 used for determination

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



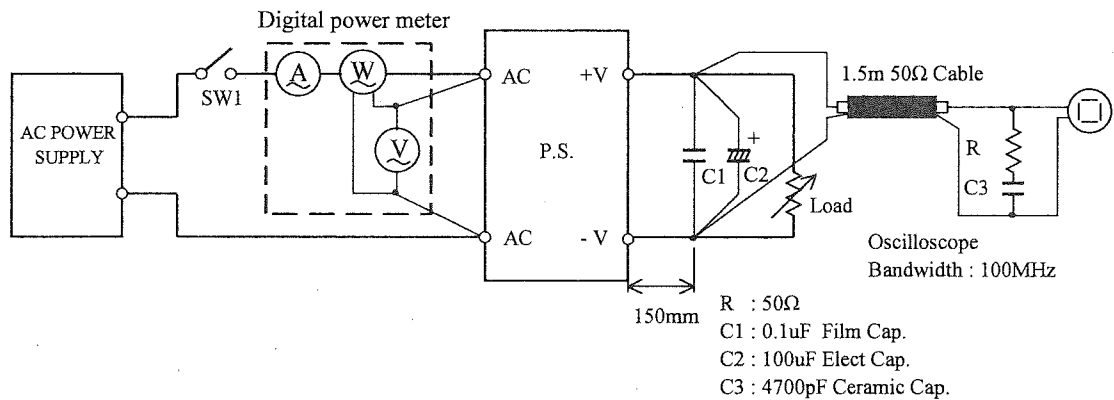
測定回路5 Circuit 5 used for determination

・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

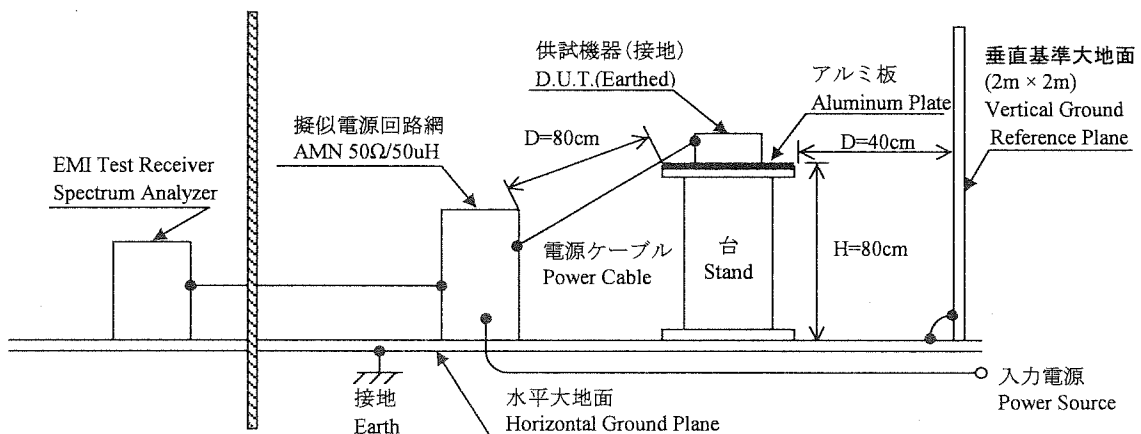


測定構成 Configuration used for determination

・EMI特性 Electro-Magnetic Interference characteristics

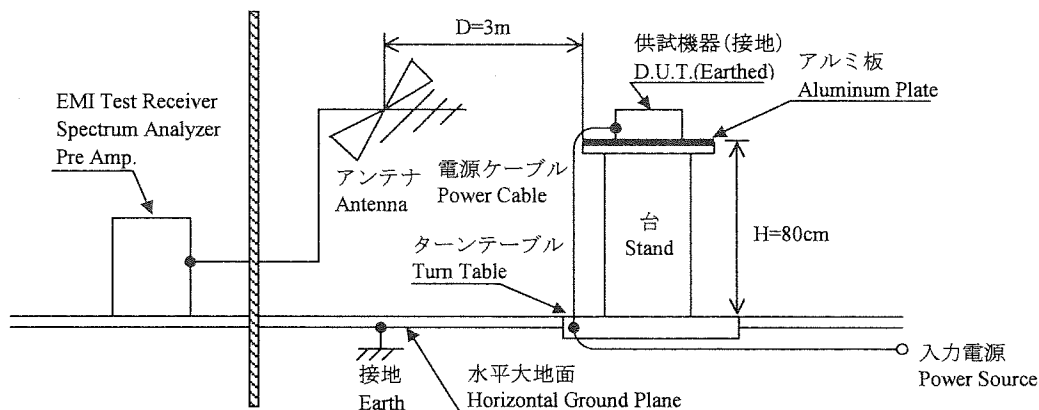
(a) 雑音端子電圧 (帰還ノイズ)

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	CVCVF	TAKASAGO	AA2000XG
11	CVCVF	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 °C

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 regulation	12mV	12mV	11mV	12mV		
	0.050%	0.050%	0.046%	0.050%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

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

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

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

36V

1. Regulation - line and load

Condition Ta : 25 °C

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 regulation	11mV	11mV	11mV	11mV		
	0.031%	0.031%	0.031%	0.031%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

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

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

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

48V

1. Regulation - line and load

Condition Ta : 25 °C

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 regulation	2mV	2mV	3mV	4mV		
	0.004%	0.004%	0.006%	0.008%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

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

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

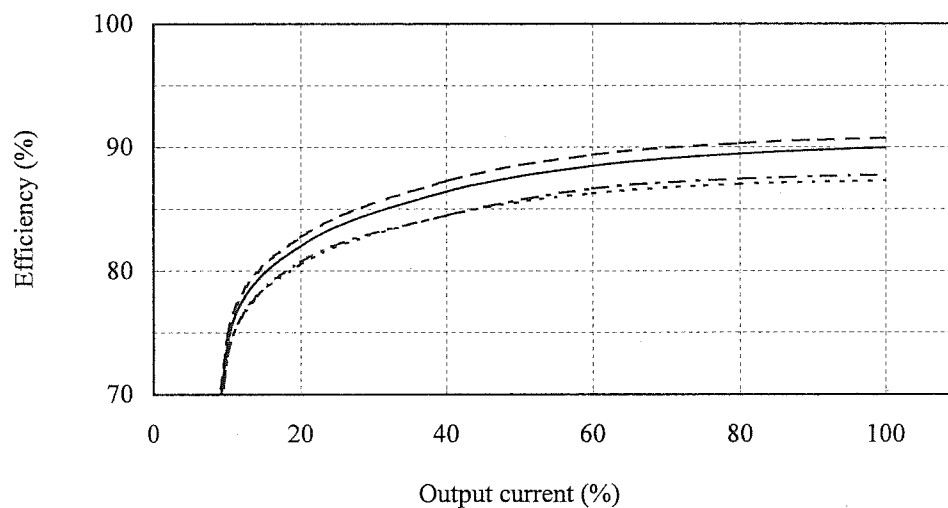
Start up voltage (Vin)	72VAC
Drop out voltage (Vin)	40VAC

(2) 効率対出力電流

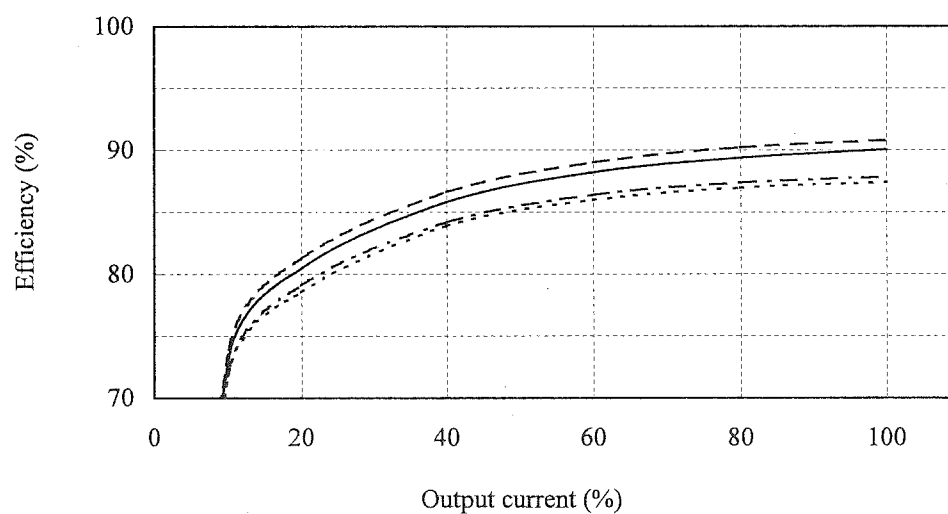
Efficiency vs. Output current

Conditions Vin : 90 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 Ta : 25 °C

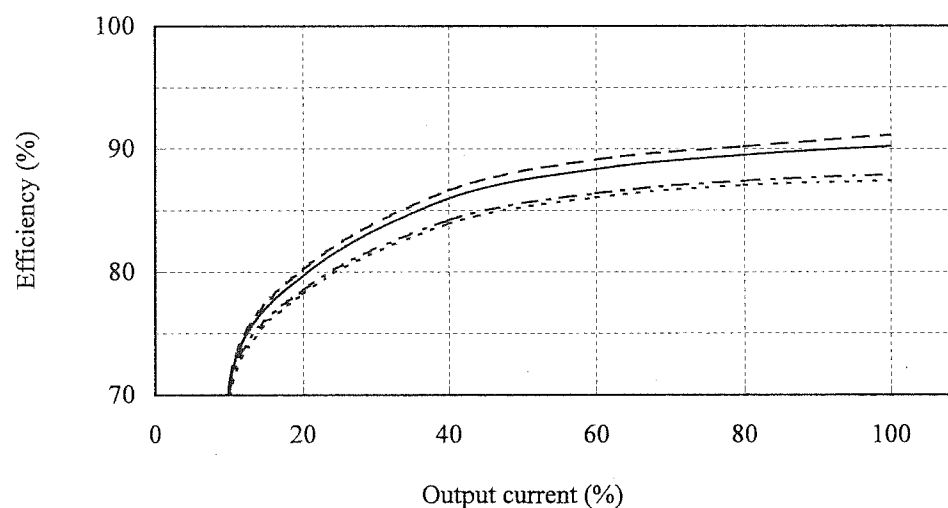
24V



36V



48V



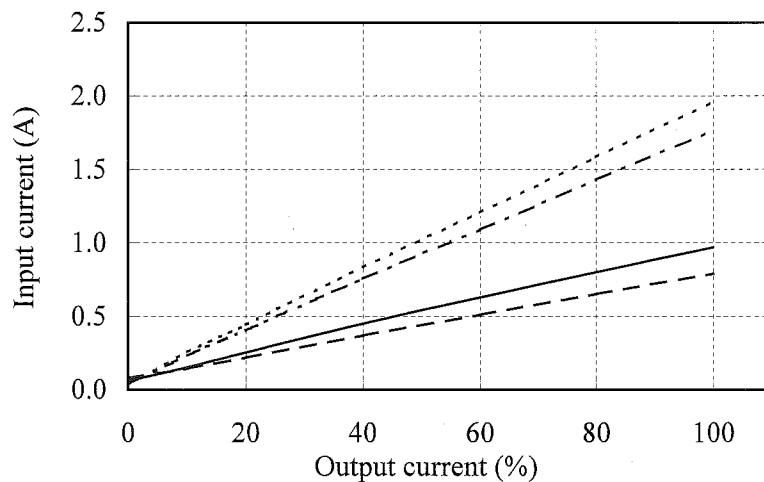
(3) 入力電流対出力電流

Input current vs. Output current

Conditions Vin : 90 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 Ta : 25 °C

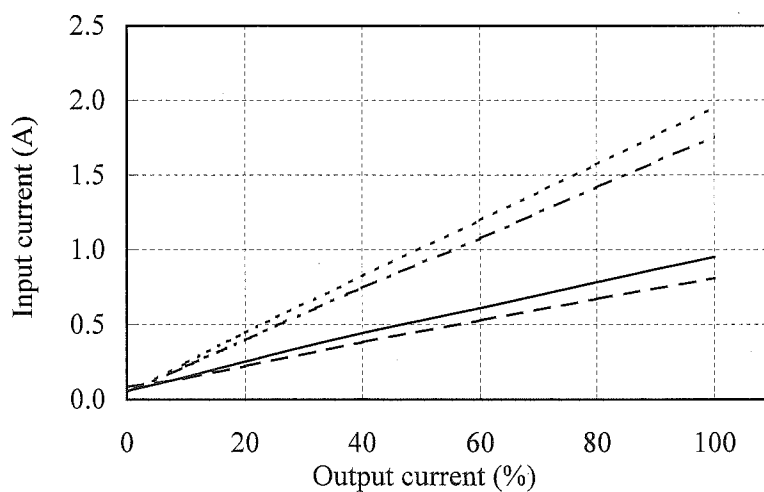
24V

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



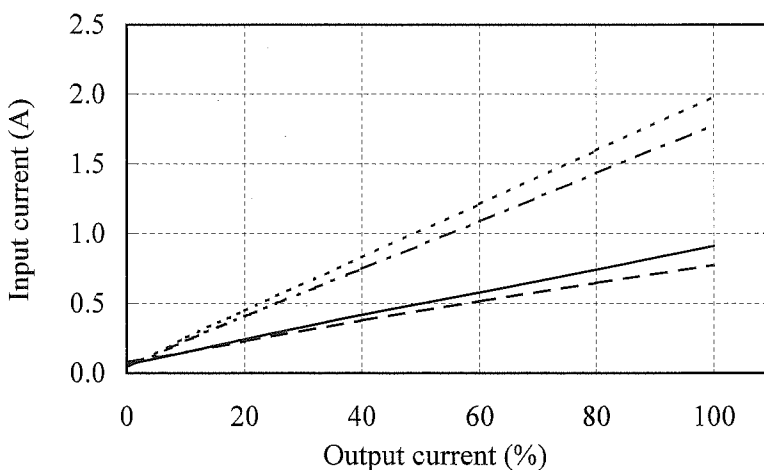
36V

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

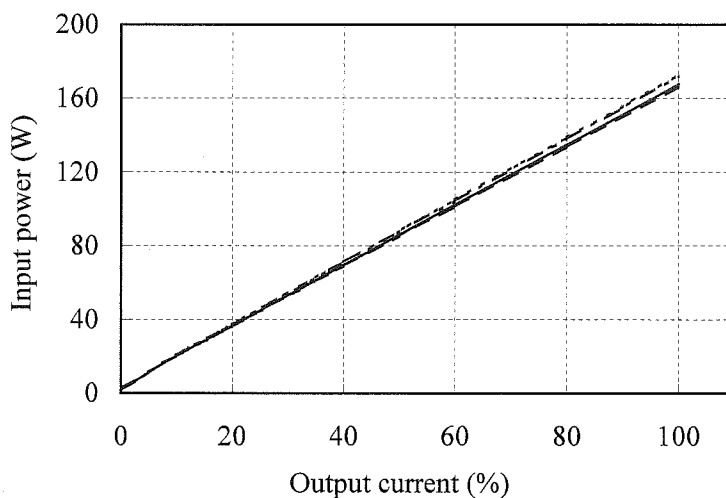
(4) 入力電力対出力電流

Input power vs. Output current

Conditions Vin : 90 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 Ta: 25 °C

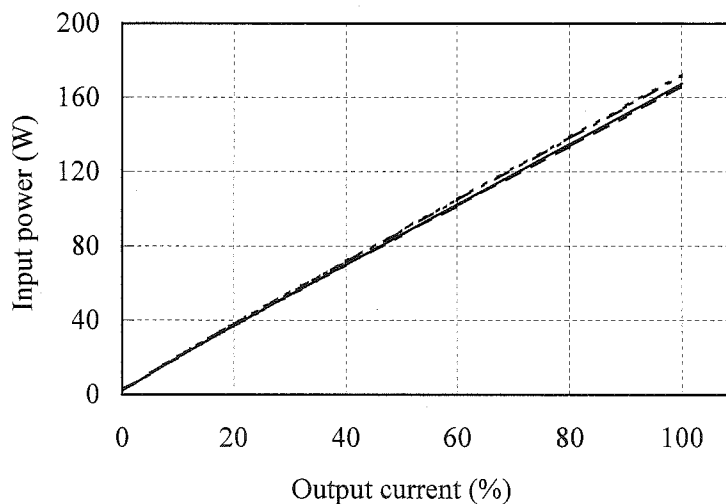
24V

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



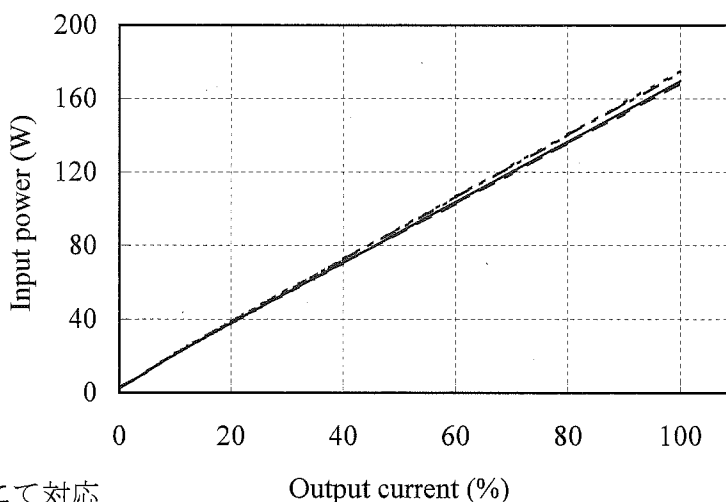
36V

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

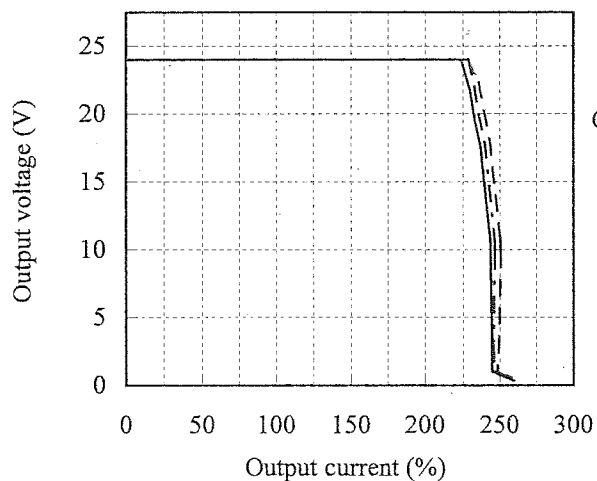
Conditions V_{in} : 100 VAC

T_a : -10 °C

25 °C

50 °C

24V



OVP Point

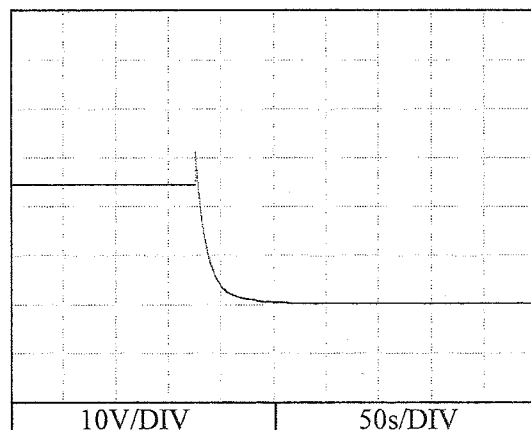
Vout

0V

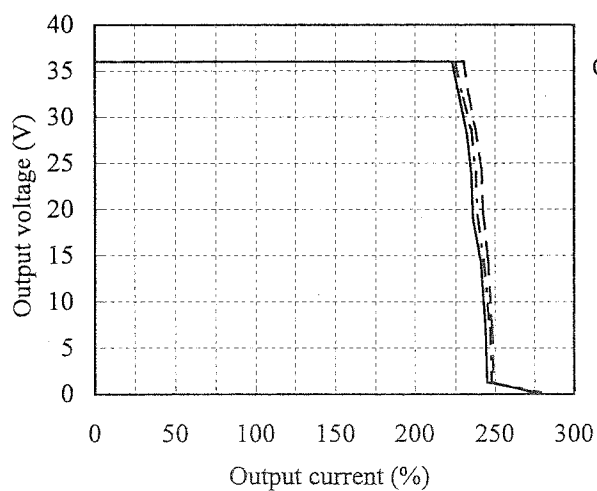
Conditions V_{in} : 100 VAC

I_{out} : 0 %

T_a : 25 °C



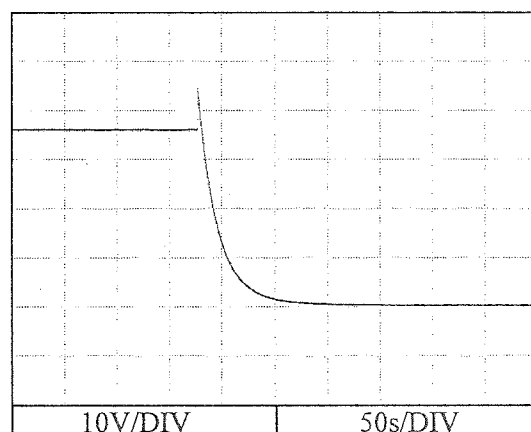
36V



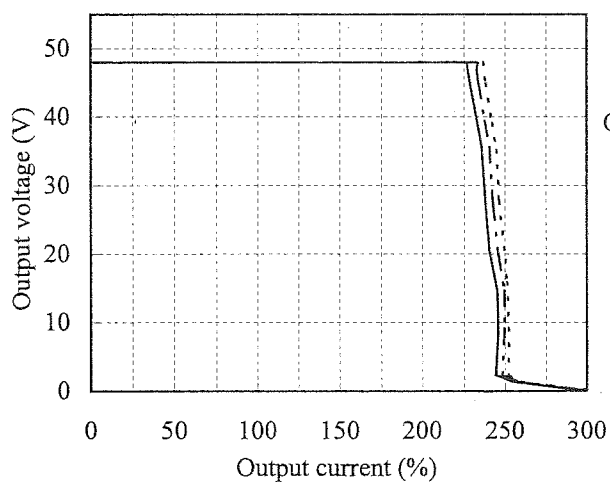
OVP Point

Vout

0V



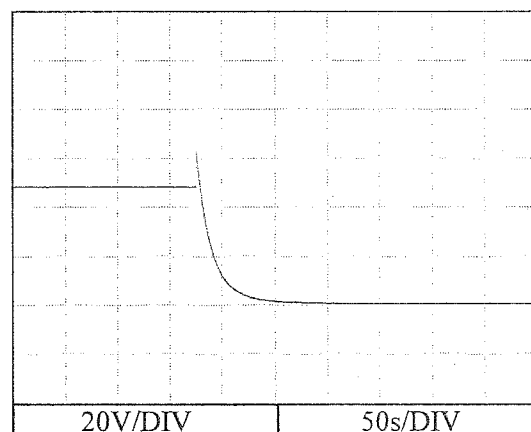
48V



OVP Point

Vout

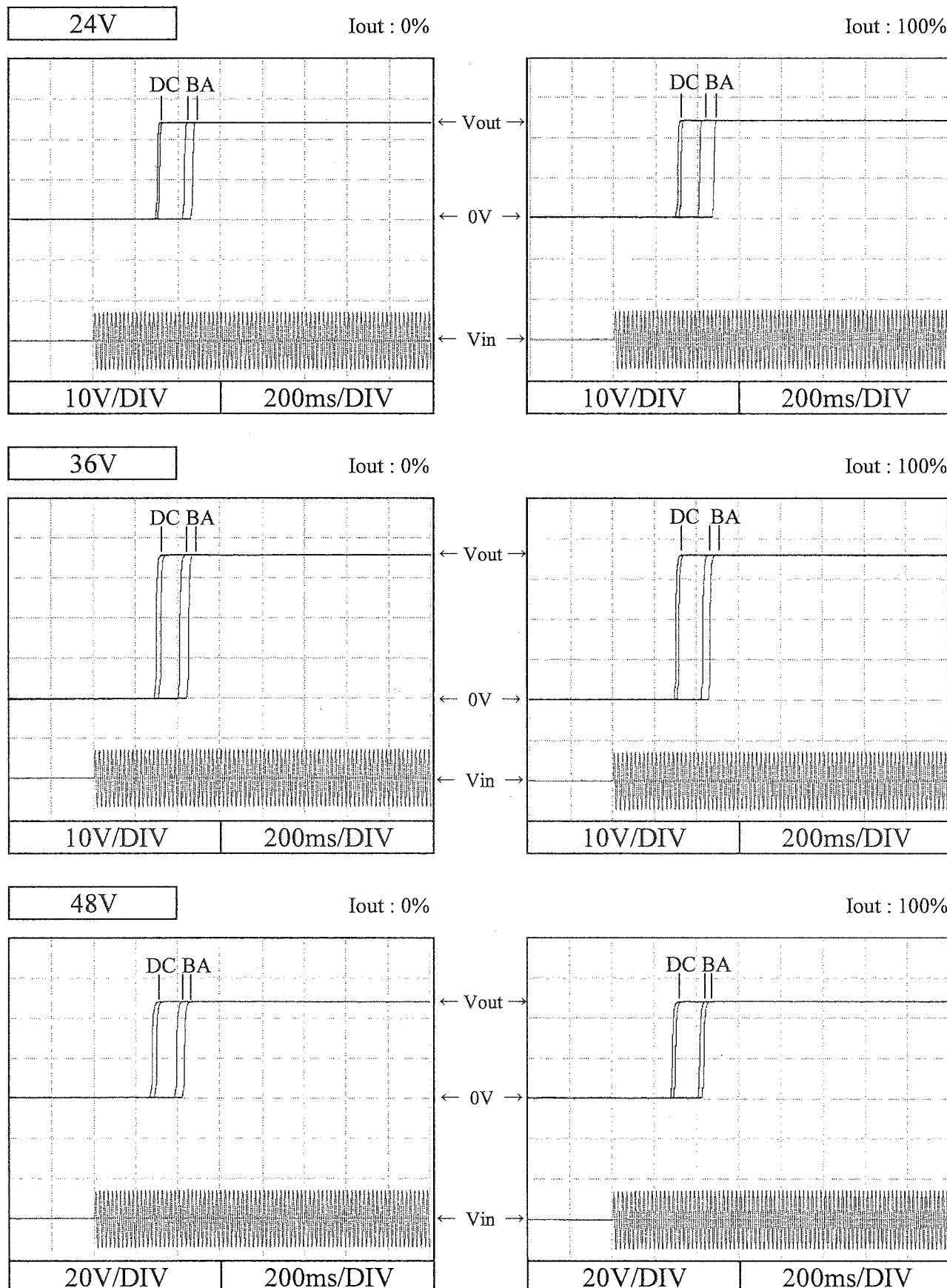
0V



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 °C

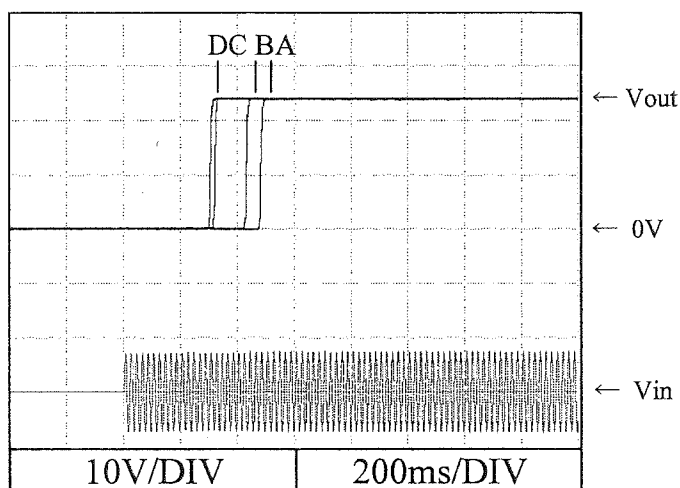


2.4 出力立ち上がり特性 Output rise characteristics

Conditions V_{in} : 90 VAC (A)
 100 VAC (B)
 200 VAC (C)
 265 VAC (D)
 T_a : 25 °C

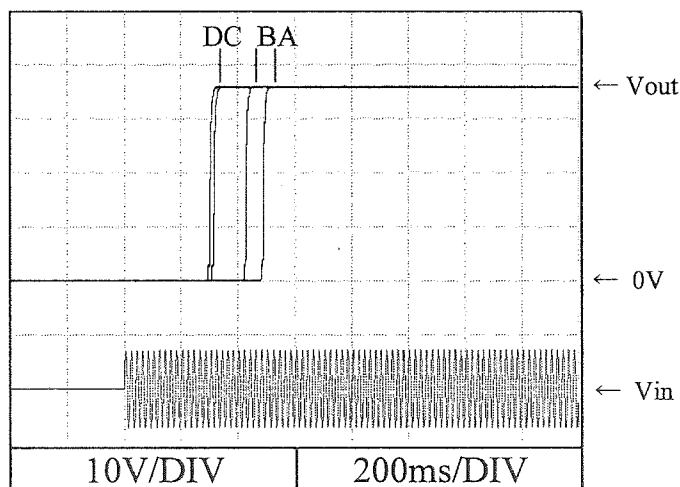
24V

I_{out} : 200%



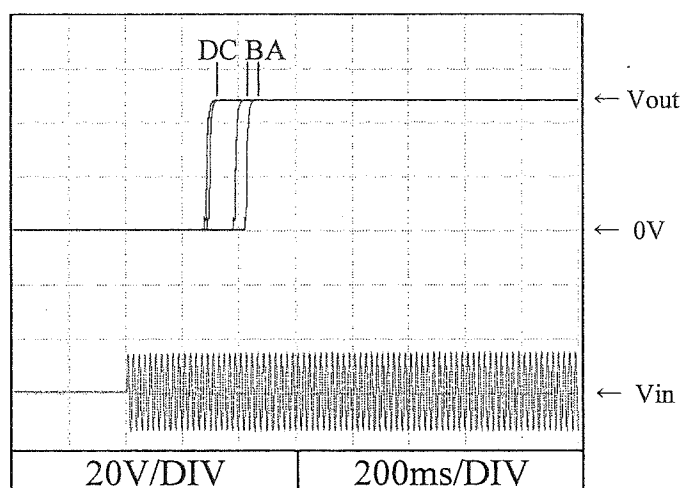
36V

I_{out} : 200%



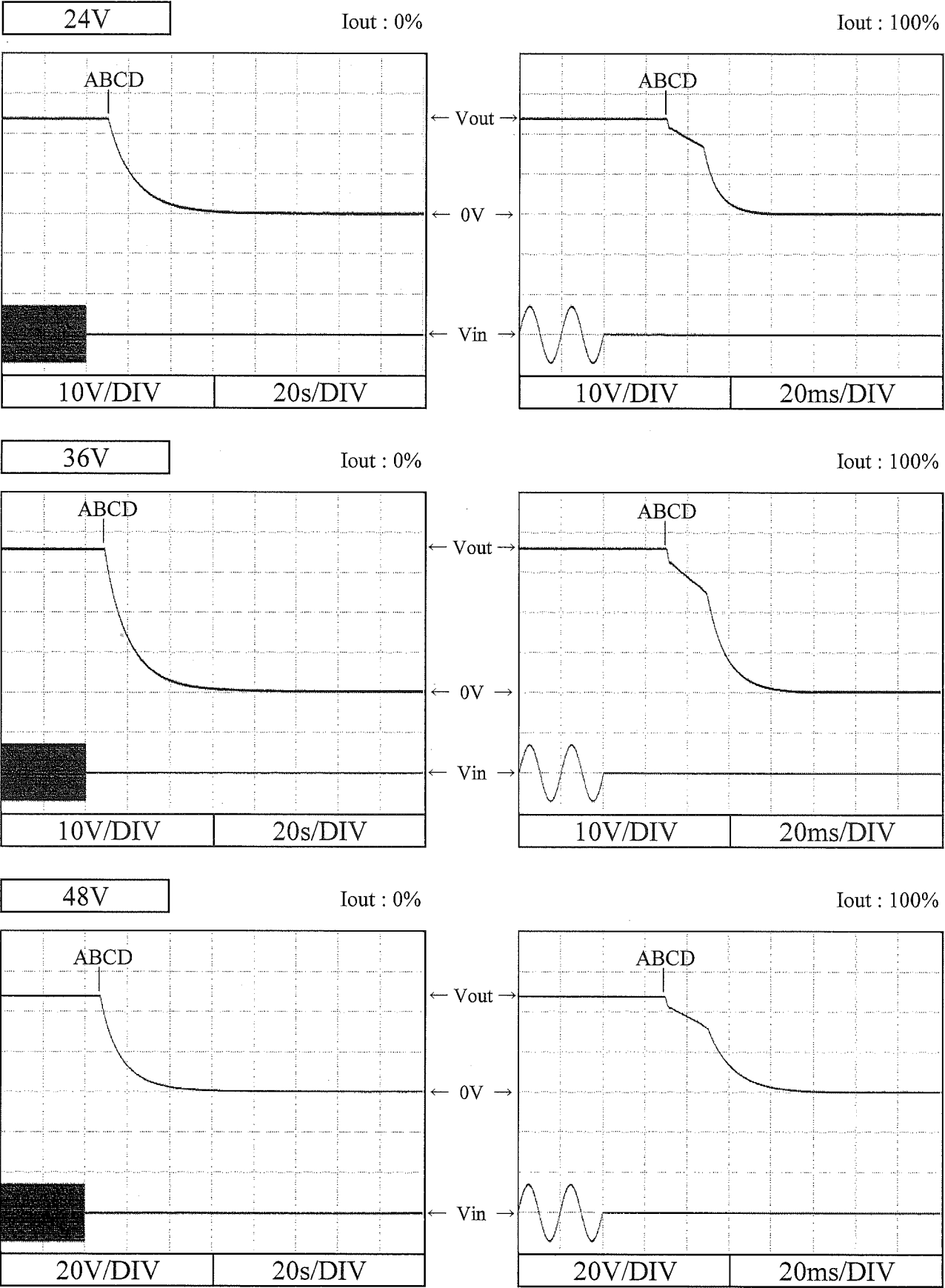
48V

I_{out} : 200%



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

Conditions V_{in} : 90 VAC (A)
 100 VAC (B)
 200 VAC (C)
 265 VAC (D)
 T_a : 25 °C



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

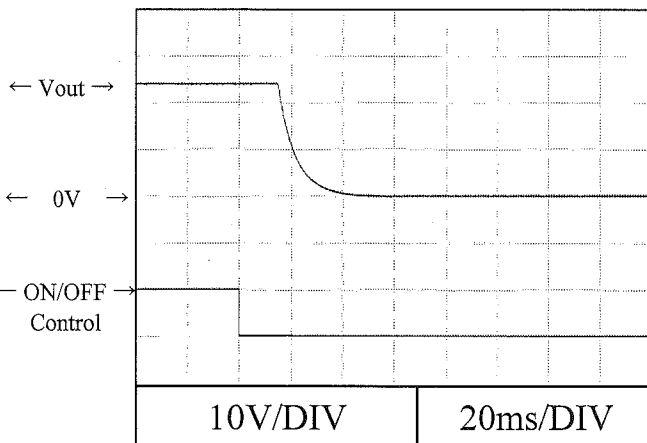
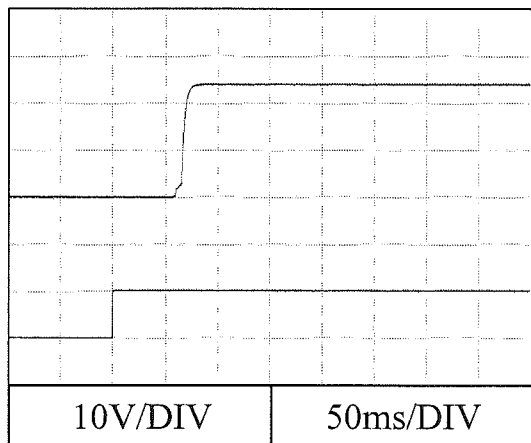
Iout : 100 %

Ta : 25 °C

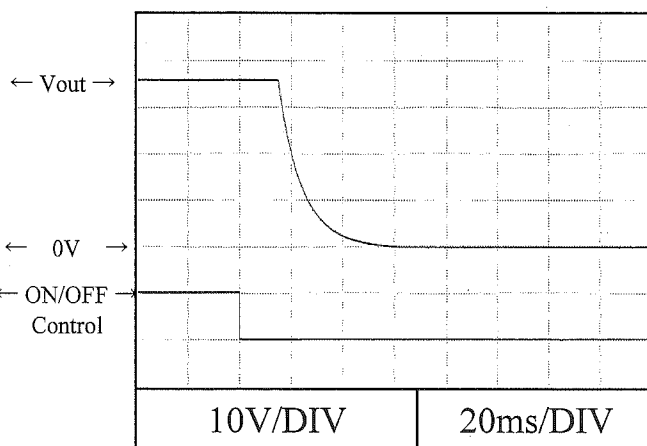
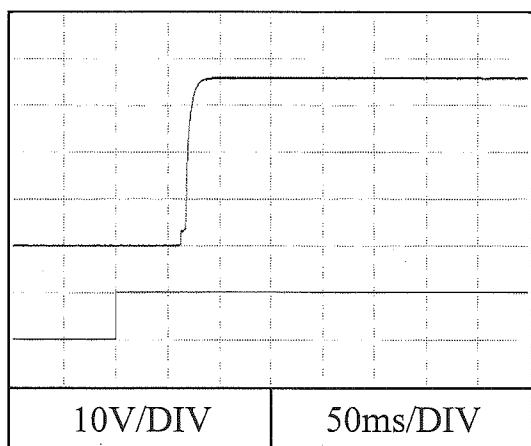
標準品 ZWS150BP-*/R に対応

For option model ZWS150BP-*/R

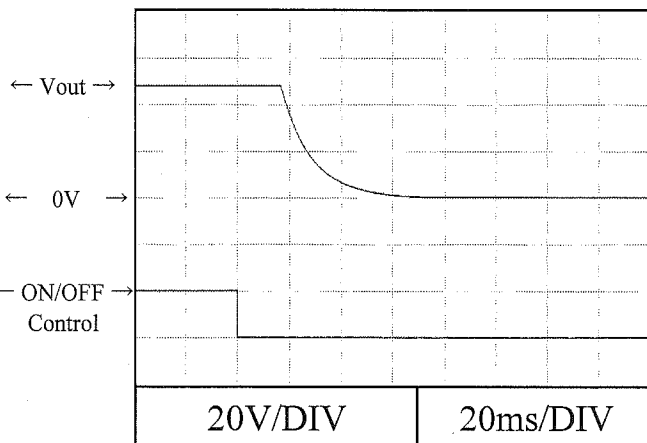
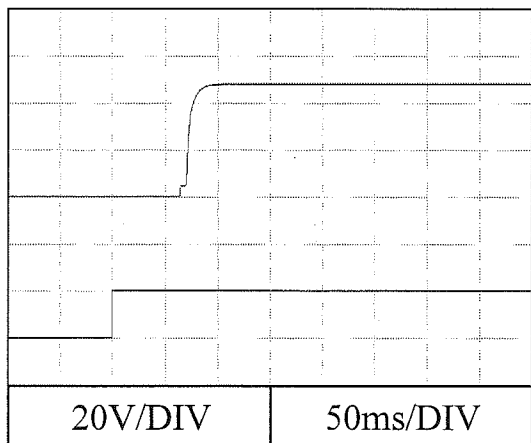
24V



36V



48V

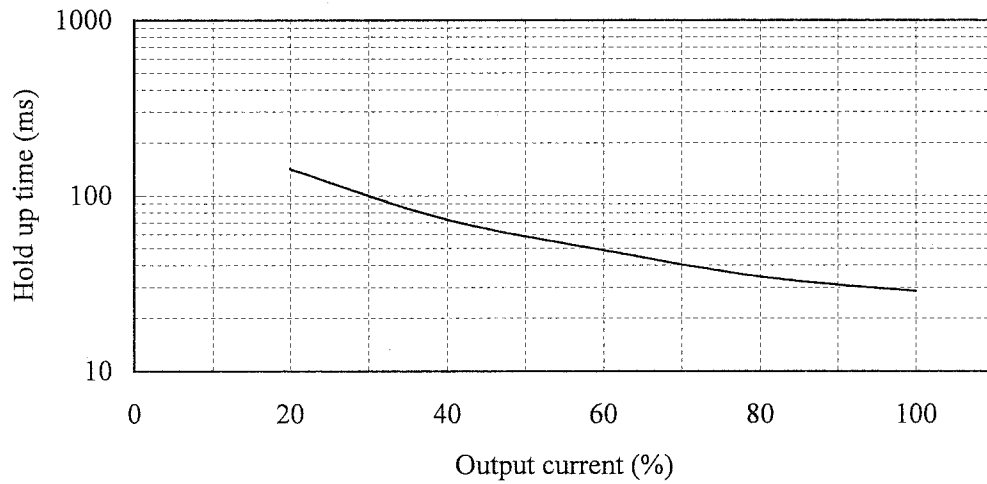


2.7 出力保持時間特性

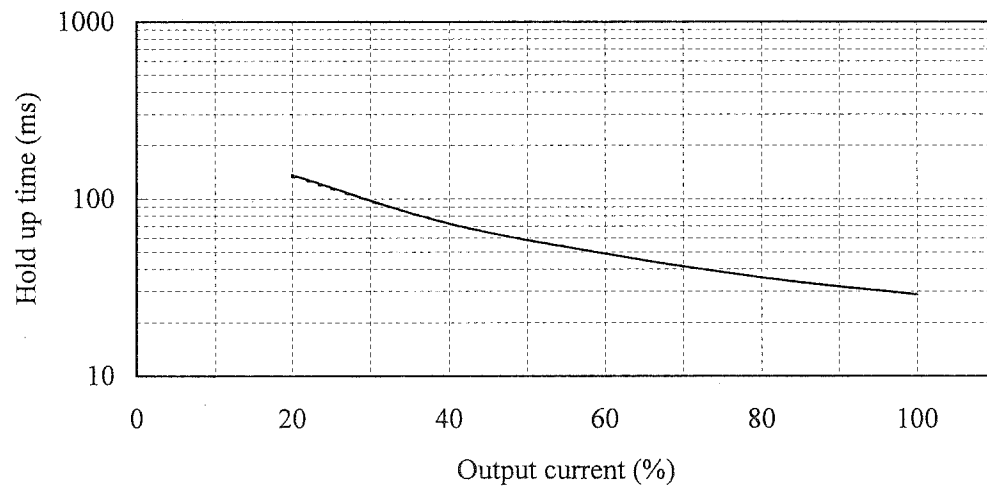
Hold up time characteristics

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

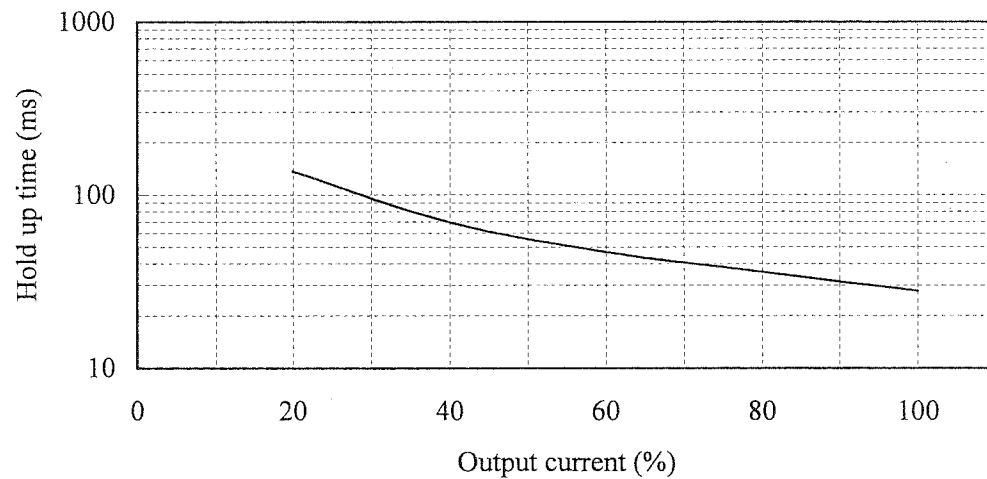
24V



36V



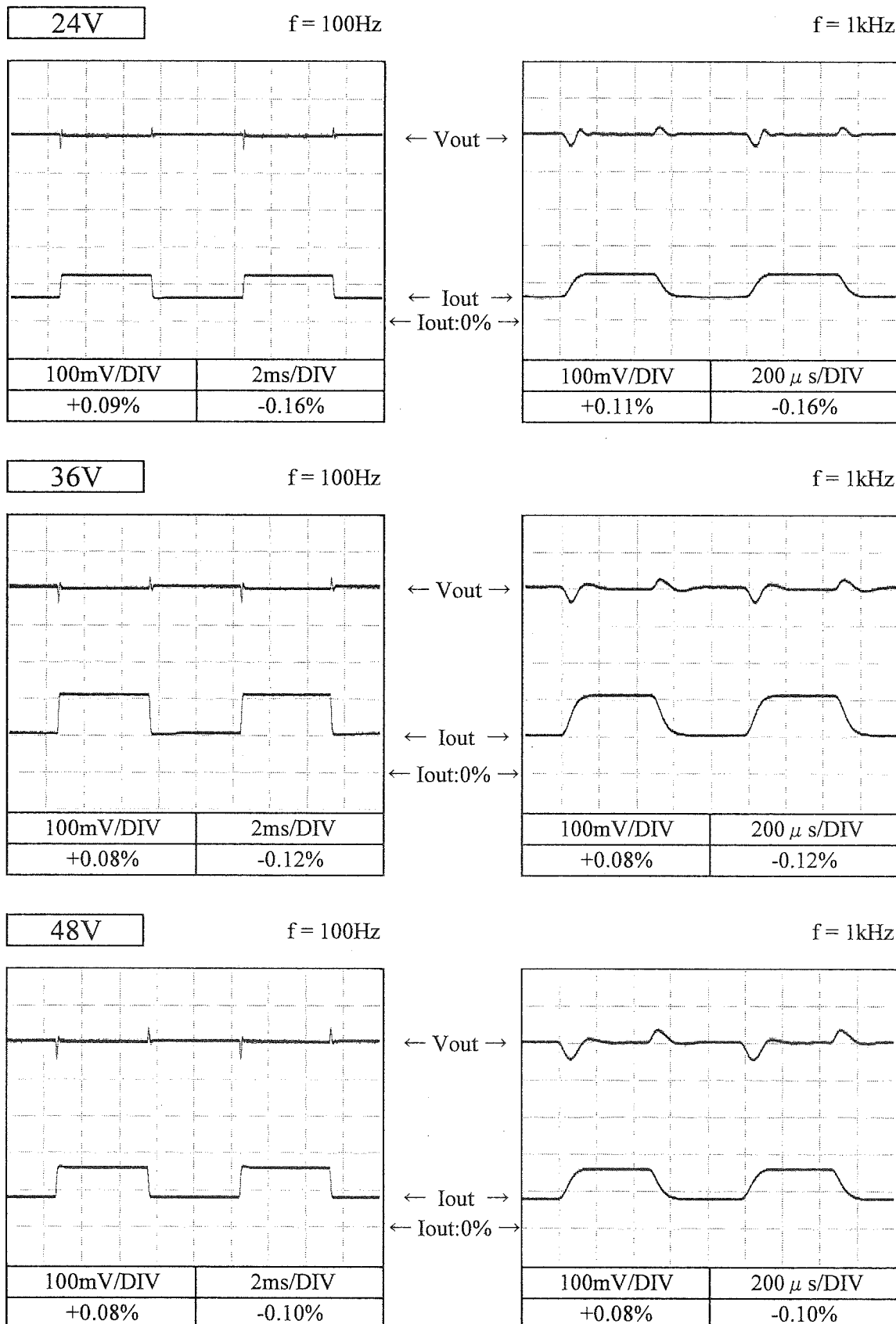
48V



2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

Conditions V_{in} : 100 VAC
 I_{out} : 50 % $\leftrightarrow$ 100 %
 (tr = tf = 50us)
 T_a : 25 °C

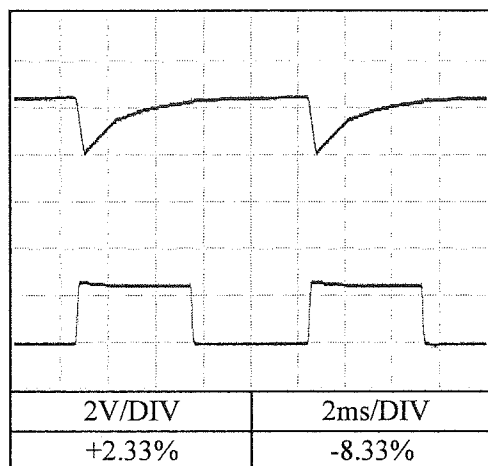


2.8 過渡応答（負荷急変）特性

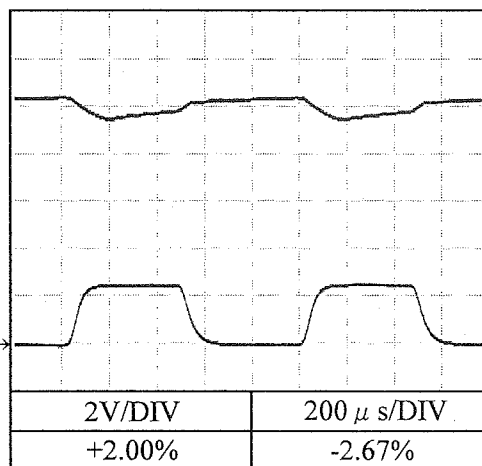
Dynamic load response characteristics

Conditions V_{in} : 100 VAC
 I_{out} : 0 % $\leftrightarrow$ 200 %
 (tr = tf = 50 μ s)
 T_a : 25 $^{\circ}$ C

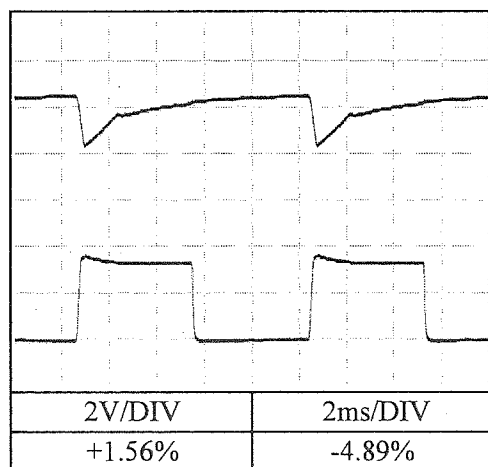
24V $f = 100\text{Hz}$



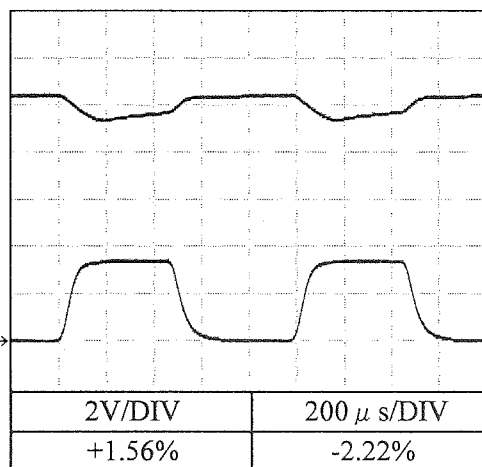
$f = 1\text{kHz}$



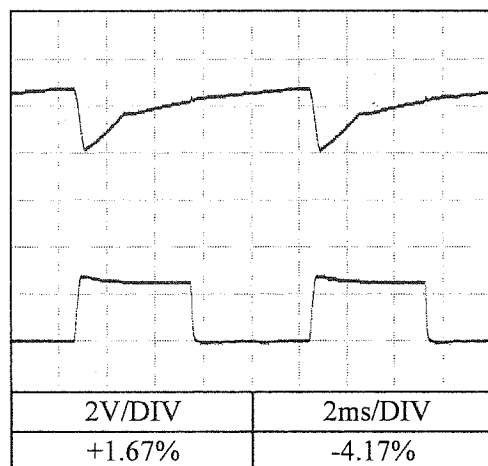
36V $f = 100\text{Hz}$



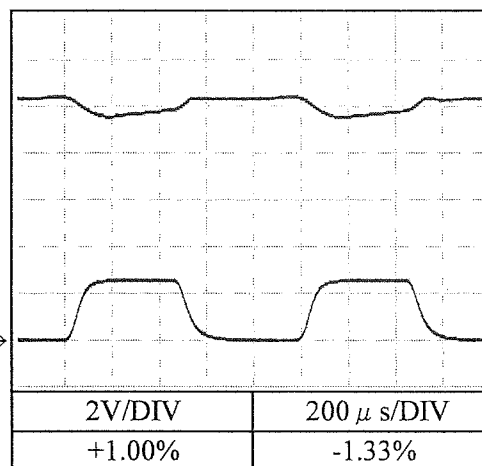
$f = 1\text{kHz}$



48V $f = 100\text{Hz}$



$f = 1\text{kHz}$



2.9 入力電圧瞬停特性

Response to brown out characteristics

Conditions V_{in} : 100 VAC

I_{out} : 100 %

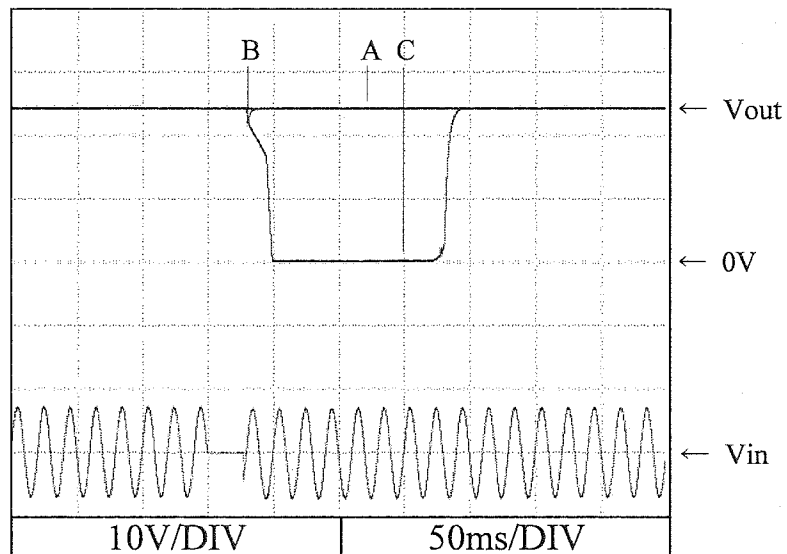
T_a : 25 °C

24V

A = 28ms

B = 31ms

C = 32ms

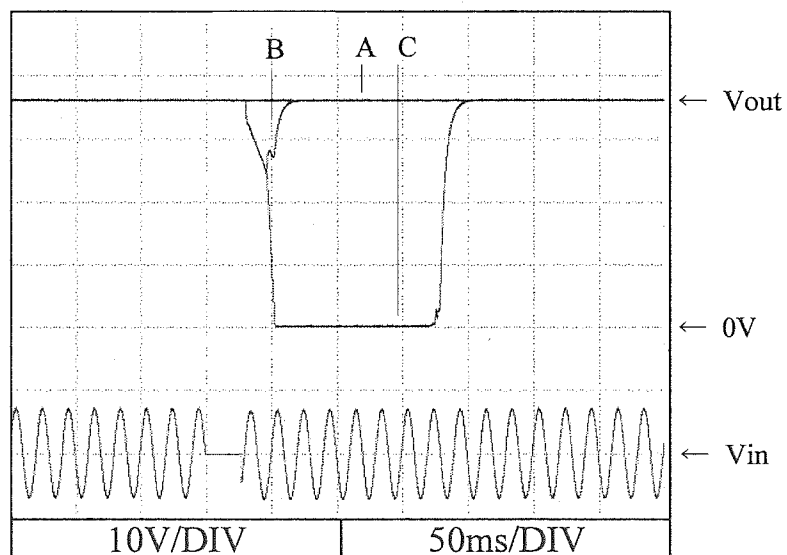


36V

A = 29ms

B = 34ms

C = 35ms

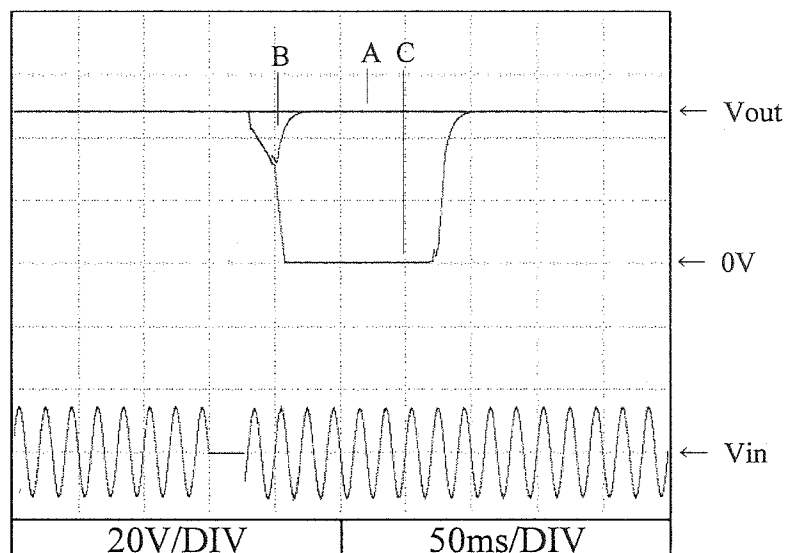


48V

A = 28ms

B = 33ms

C = 34ms



2.9 入力電圧瞬停特性

Response to brown out characteristics

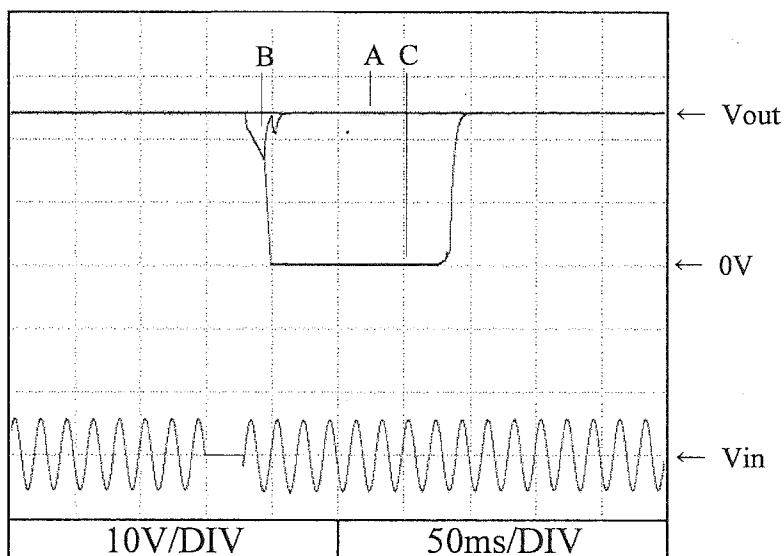
Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

24V

A = 29ms

B = 45ms

C = 46ms

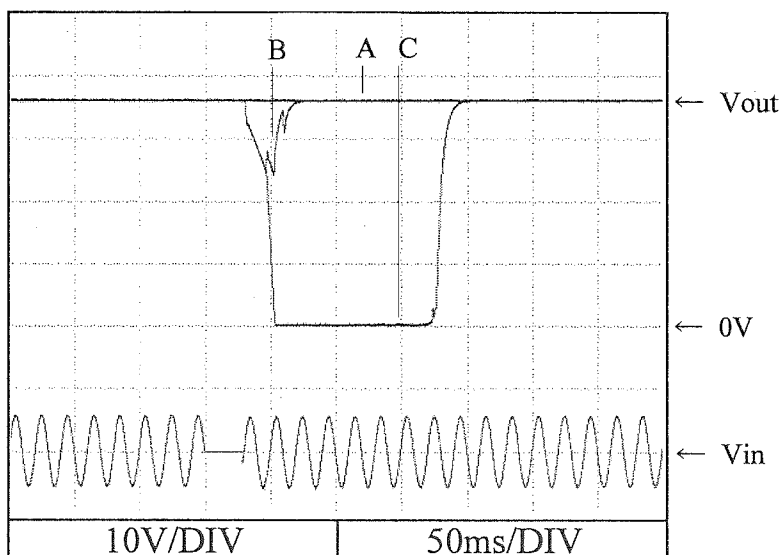


36V

A = 29ms

B = 47ms

C = 48ms

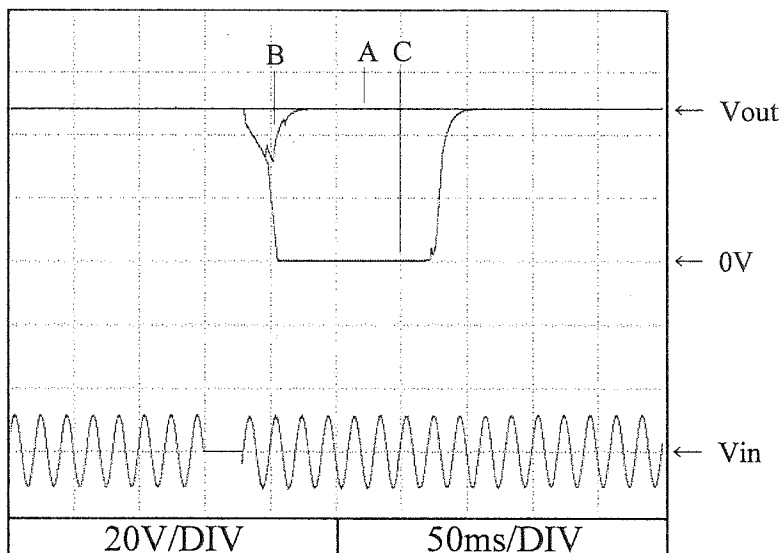


48V

A = 29ms

B = 47ms

C = 48ms

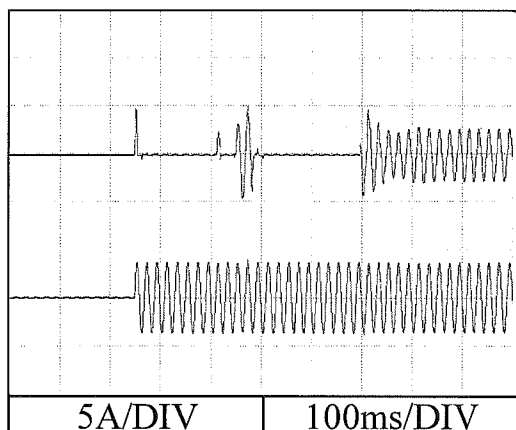


2.10 入力サージ電流（突入電流）波形 Inrush current waveform

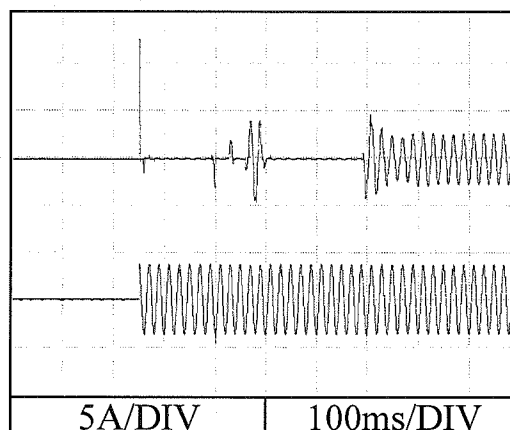
24V

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

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

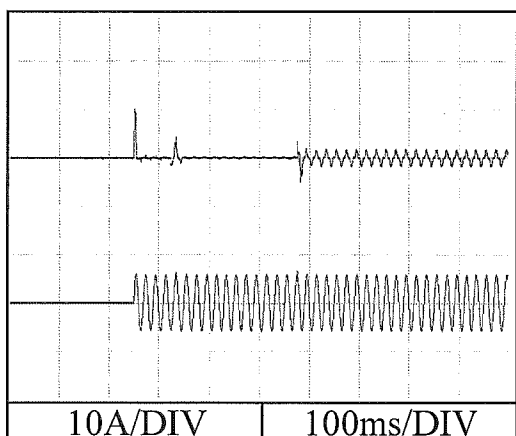


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

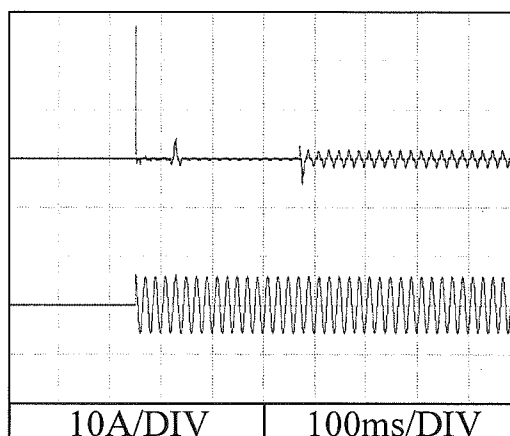


Conditions V_{in} : 200 VAC
 I_{out} : 100 %
 T_a : 25 °C

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



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



2.11 高調波成分

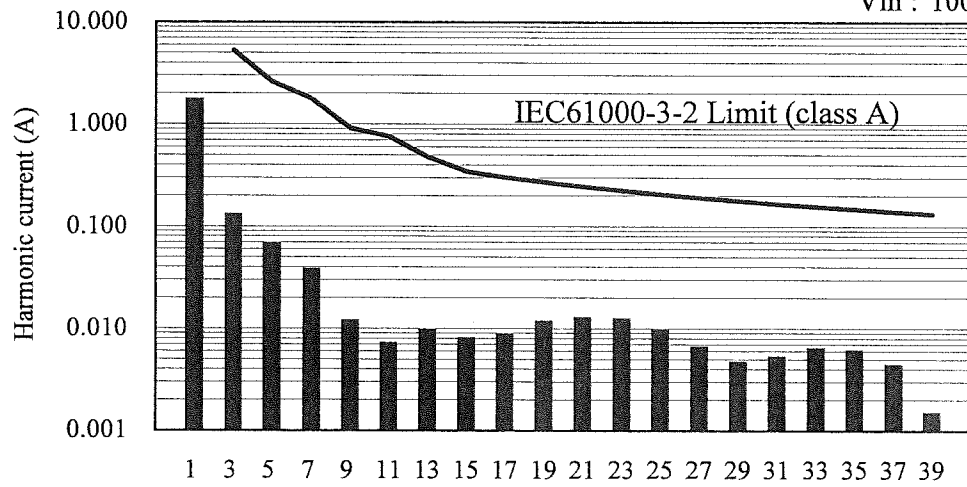
Input current harmonics

Conditions Iout : 100 %

Ta : 25 °C

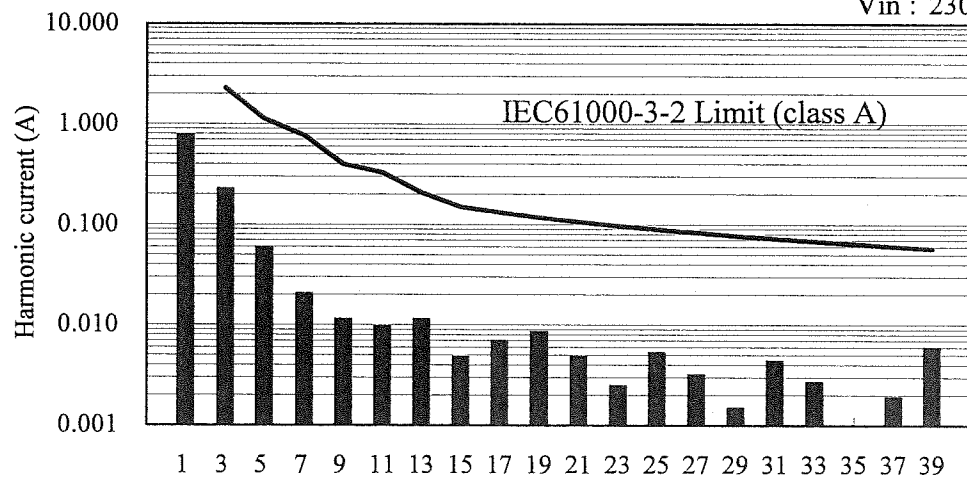
24V

Vin : 100 VAC



Harmonic Order

Vin : 230 VAC



Harmonic Order

2.12 入力電流波形

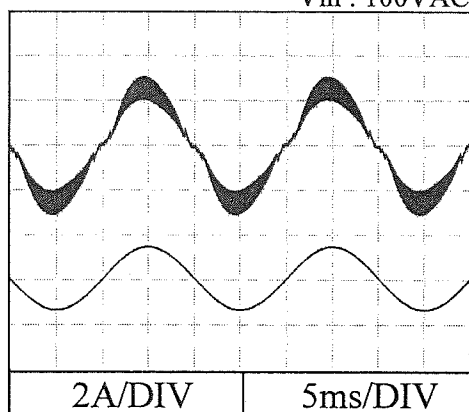
Input current waveform

Conditions Iout : 100 %

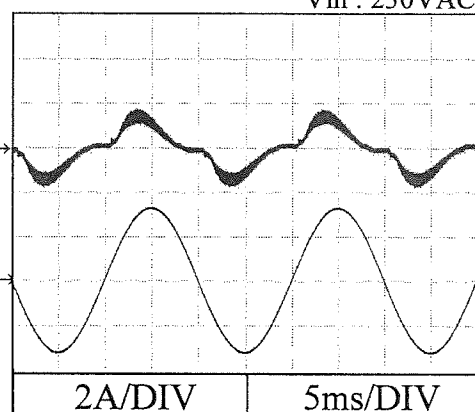
Ta : 25 °C

24V

Vin : 100VAC



Vin : 230VAC



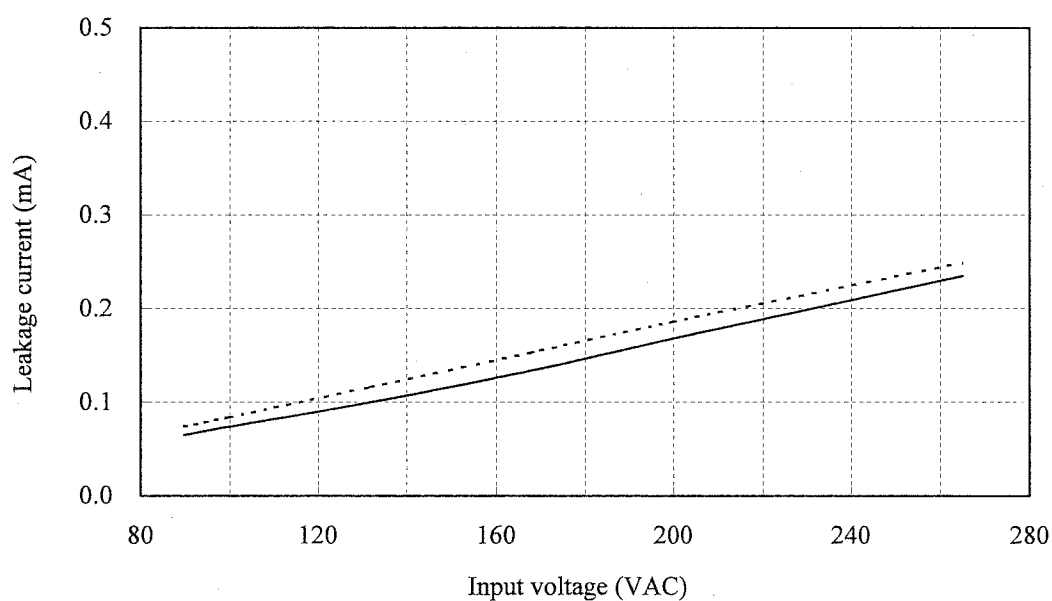
2.13 リーク電流特性

Leakage current characteristics

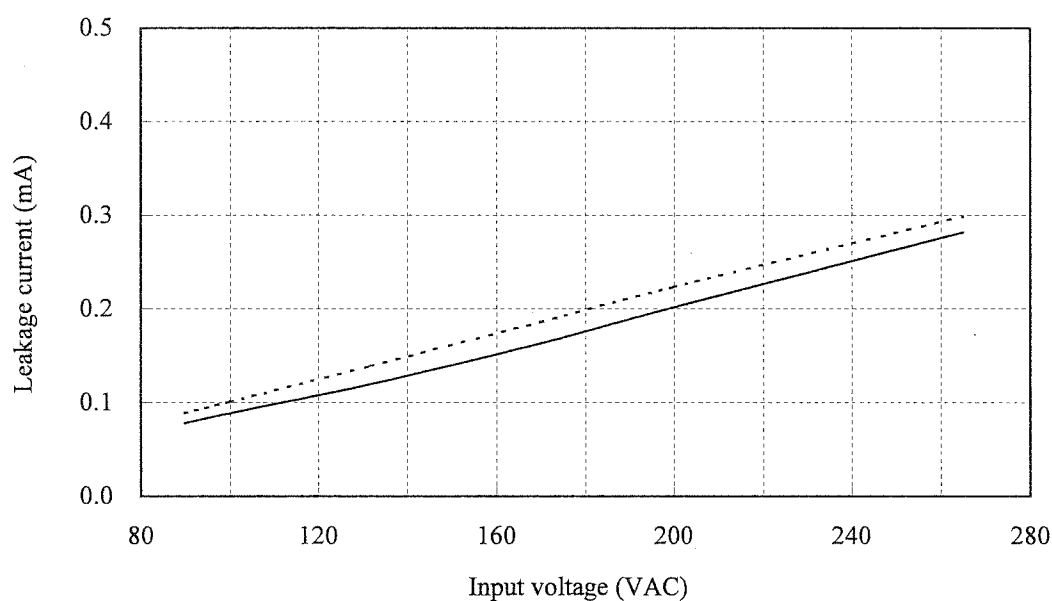
Conditions Iout : 0 % -----
 100 % ———
 Ta : 25 °C
 Equipment used : 3156 (HIOKI)

24V

f: 50 Hz

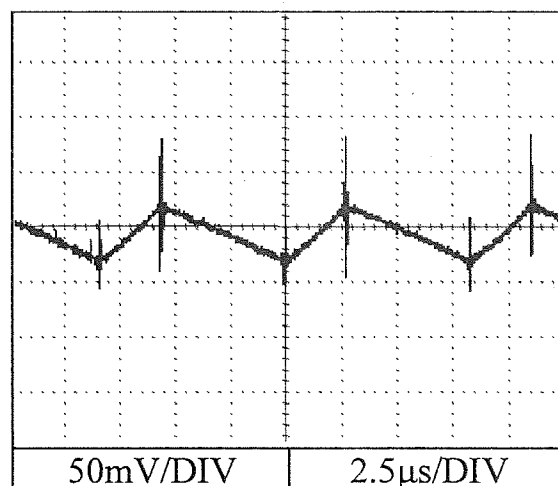
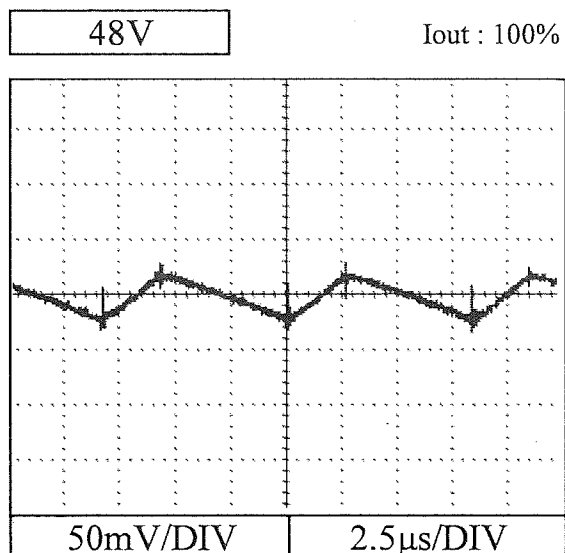
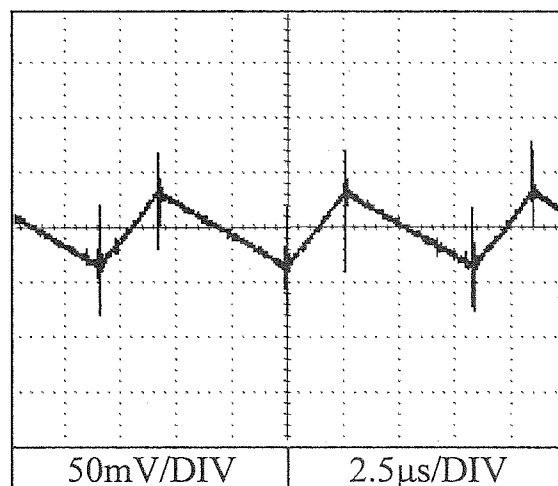
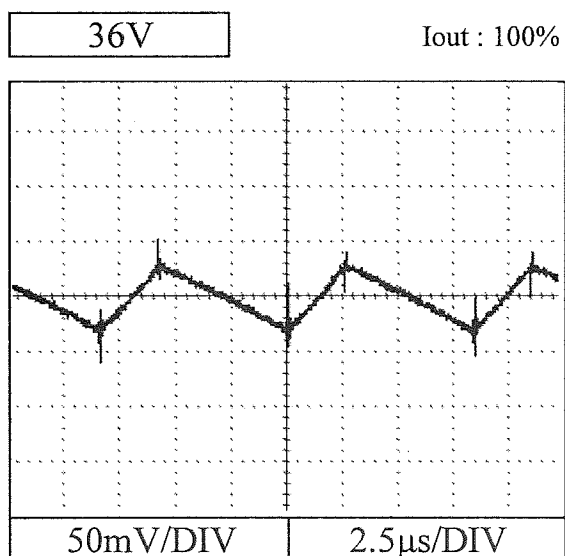
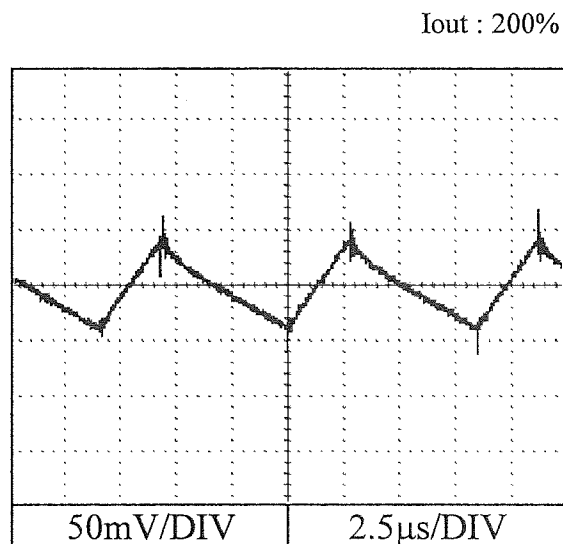
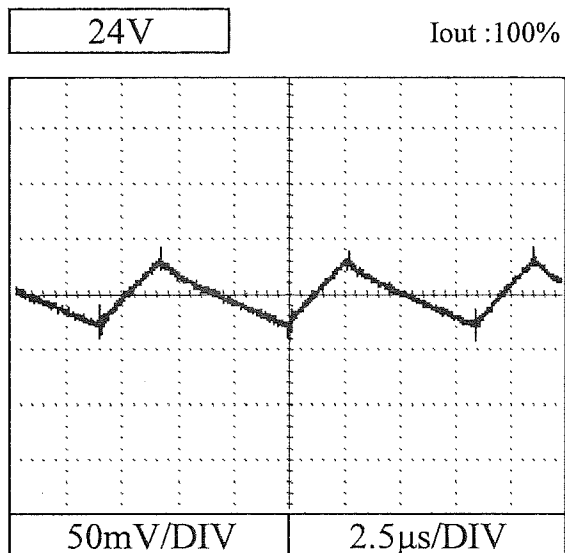


f: 60 Hz



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

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



2.15 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC

Iout : 100 %

Ta : 25 °C

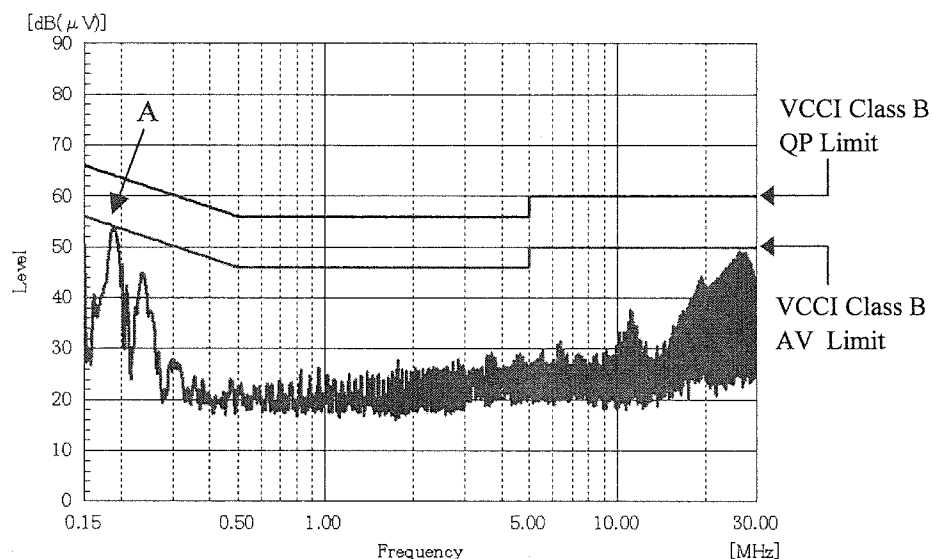
雑音端子電圧

Conducted Emission

24V

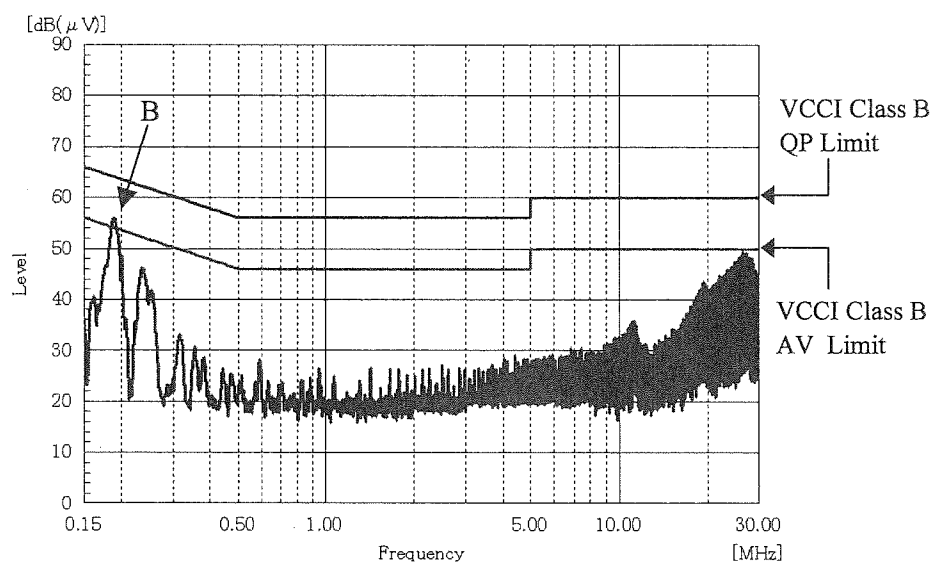
Phase : N

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



Phase : L

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



EN55011-B,EN55022-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55022-B,FCC-B are same as its VCCI class B.

2. 15 E M I 特性
Electro-Magnetic Interference characteristics

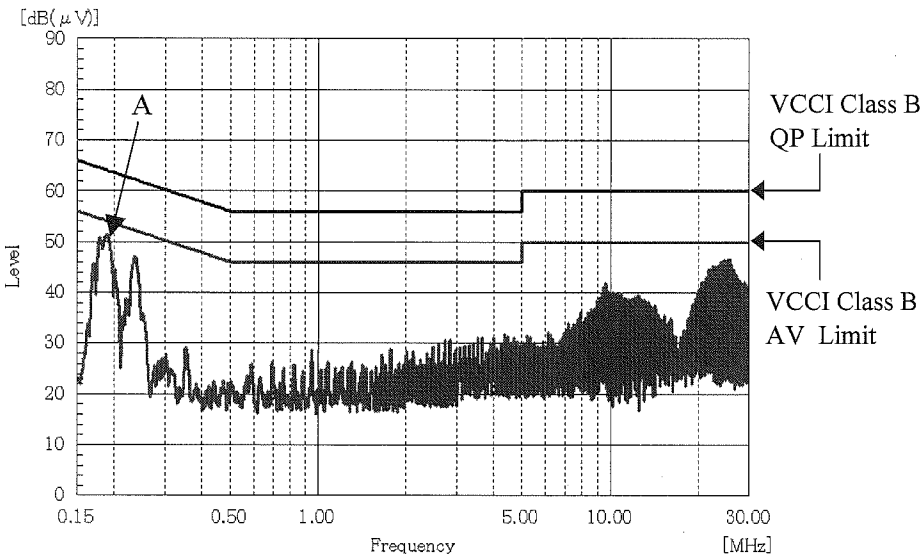
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧
Conducted Emission

36V

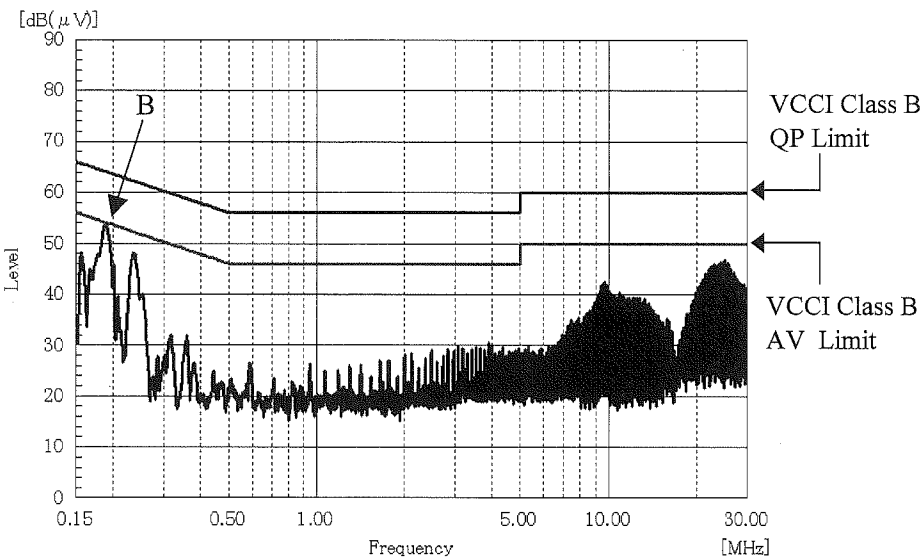
Phase : N

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



Phase : L

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



EN55011-B,EN55022-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55022-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 °C

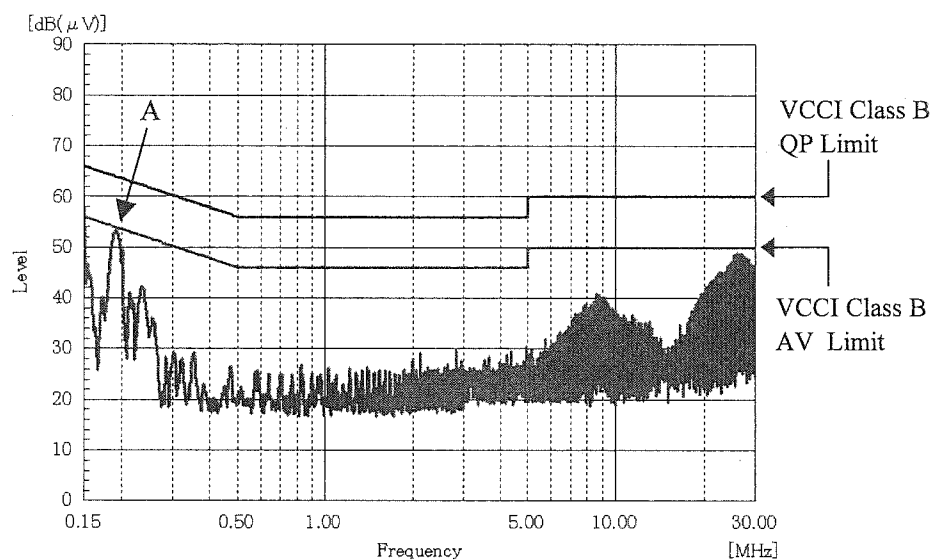
雑音端子電圧

Conducted Emission

48V

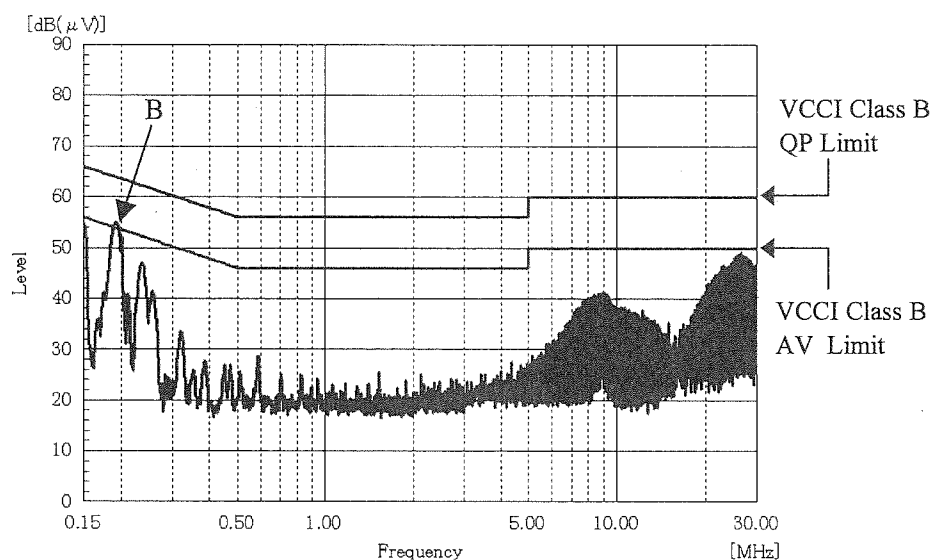
Phase : N

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



Phase : L

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



EN55011-B,EN55022-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55022-B,FCC-B are same as its VCCI class B.

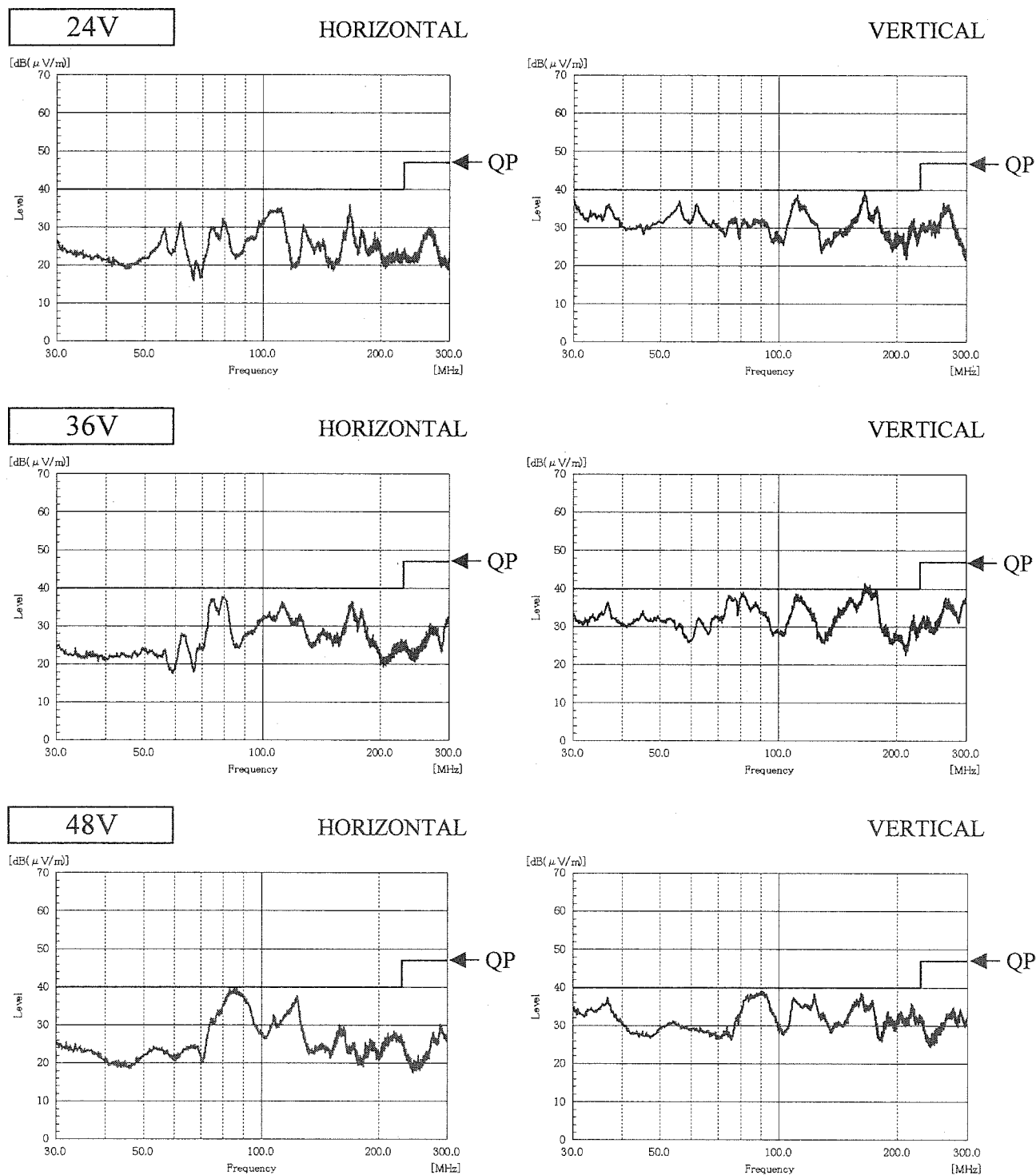
2.15 EMI 特性

Electro-Magnetic Interference characteristics

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

雑音電界強度

Radiated Emission



EN55011-B,EN55022-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55022-B are same as its VCCI class B.

表示はピーク値
Indication is peak values.