

**ZWS240BP**

**EVALUATION DATA**

**型式データ**

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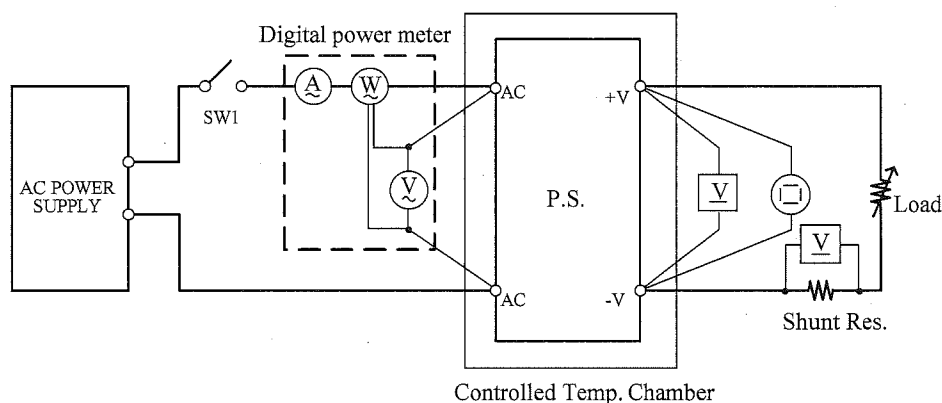
### 使用記号 Terminology used

	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

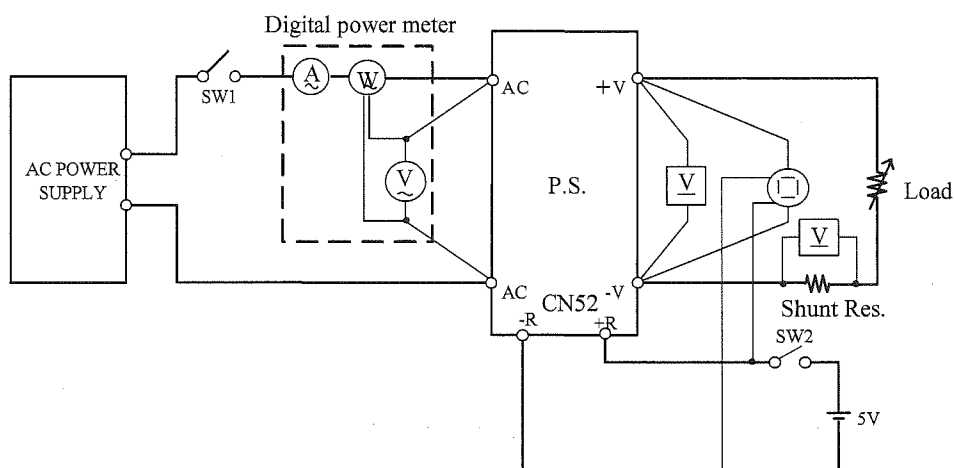
測定回路1 Circuit 1 used for determination

- ・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



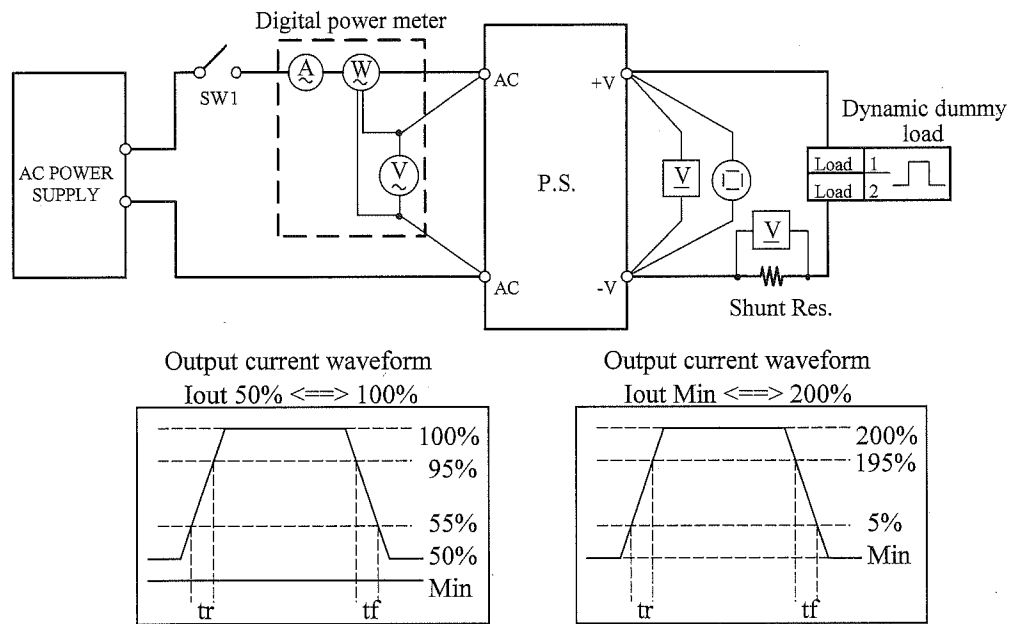
測定回路2 Circuit 2 used for determination

- ・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 ZWS240BP-\*/R にて対応  
 For option model ZWS240BP-\*/R



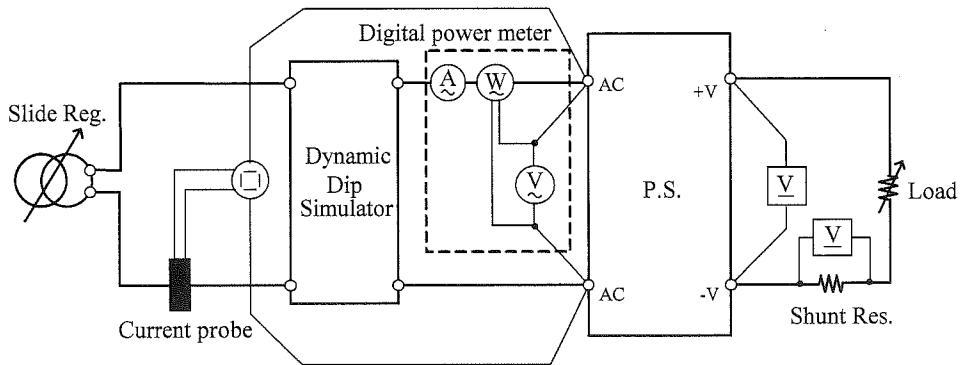
測定回路3 Circuit 3 used for determination

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



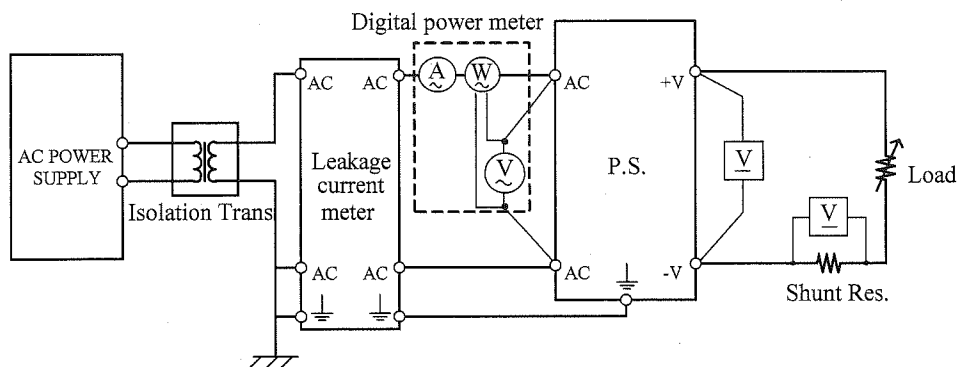
測定回路4 Circuit 4 used for determination

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



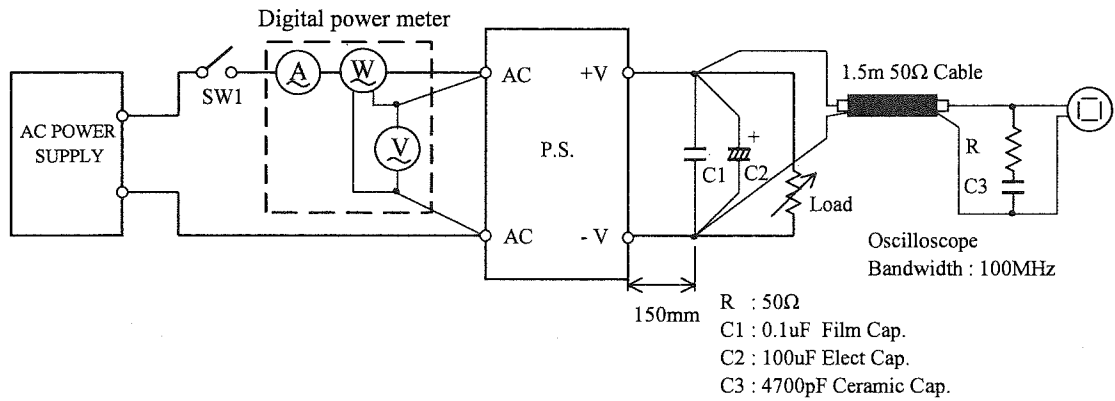
測定回路5 Circuit 5 used for determination

・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

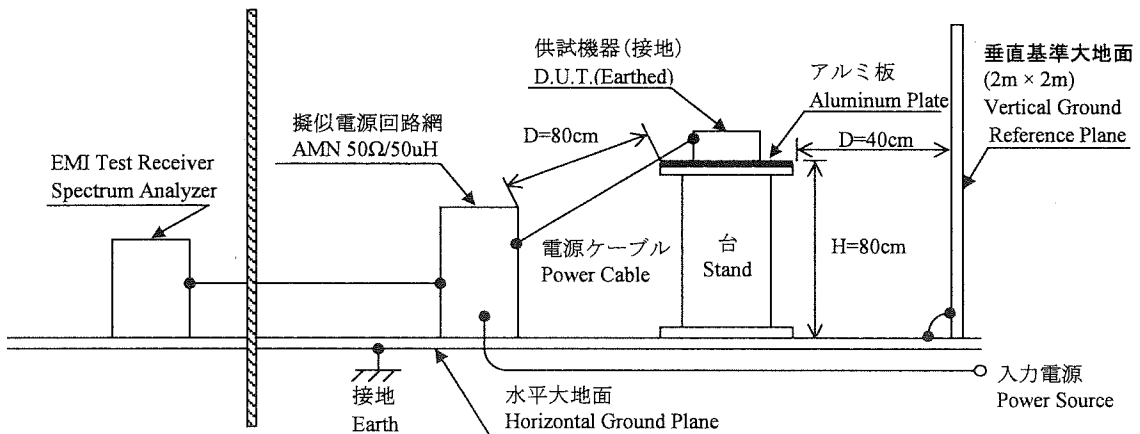


測定構成 Configuration used for determination

・EMI特性 Electro-Magnetic Interference characteristics

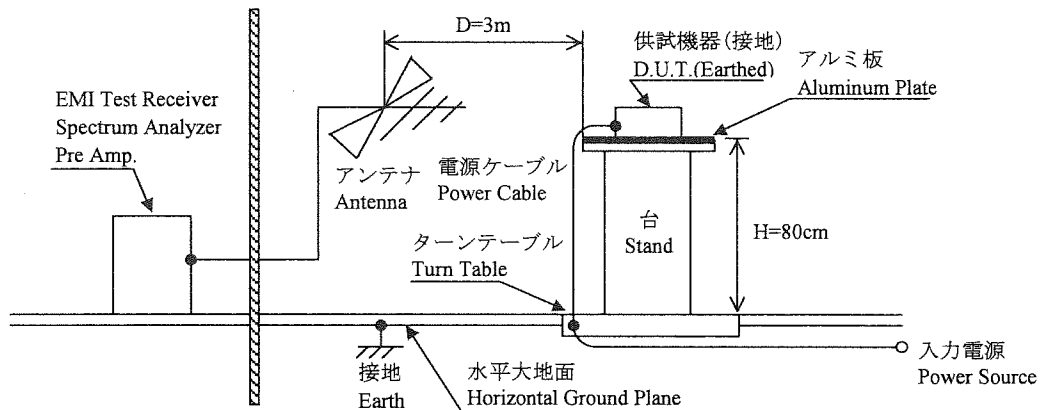
(a) 雑音端子電圧 (帰還ノイズ)

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%	10	6.7	5
200%	20	13.4	10

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

<b>24V</b>	1. Regulation - line and load					Condition Ta : 25 °C	
	Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
	0%	24.009V	24.009V	24.010V	24.010V	1mV	0.004%
	50%	24.011V	24.009V	24.010V	24.010V	2mV	0.008%
	100%	24.013V	24.013V	24.013V	24.014V	1mV	0.004%
	load regulation	4mV	4mV	3mV	4mV		
		0.017%	0.017%	0.013%	0.017%		

2. Temperature drift

Conditions Vin : 100 VAC  
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	23.943V	24.013V	24.028V	85mV	0.354%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C  
Iout : 100 %

Start up voltage (Vin)	71VAC
Drop out voltage (Vin)	39VAC

<b>36V</b>	1. Regulation - line and load					Condition Ta : 25 °C	
	Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
	0%	36.004V	36.004V	36.004V	36.004V	0mV	0.000%
	50%	36.004V	36.004V	36.004V	36.004V	0mV	0.000%
	100%	36.005V	36.005V	36.005V	36.005V	0mV	0.000%
	load regulation	1mV	1mV	1mV	1mV		
		0.003%	0.003%	0.003%	0.003%		

2. Temperature drift

Conditions Vin : 100 VAC  
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	35.979V	36.004V	36.037V	58mV	0.161%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C  
Iout : 100 %

Start up voltage (Vin)	72VAC
Drop out voltage (Vin)	39VAC

<b>48V</b>	1. Regulation - line and load					Condition Ta : 25 °C	
	Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
	0%	48.011V	48.011V	48.011V	48.010V	1mV	0.002%
	50%	48.011V	48.011V	48.012V	48.012V	1mV	0.002%
	100%	48.010V	48.010V	48.010V	48.011V	1mV	0.002%
	load regulation	1mV	1mV	2mV	2mV		
		0.002%	0.002%	0.004%	0.004%		

2. Temperature drift

Conditions Vin : 100 VAC  
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	47.954V	48.011V	48.027V	73mV	0.152%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C  
Iout : 100 %

Start up voltage (Vin)	72VAC
Drop out voltage (Vin)	41VAC

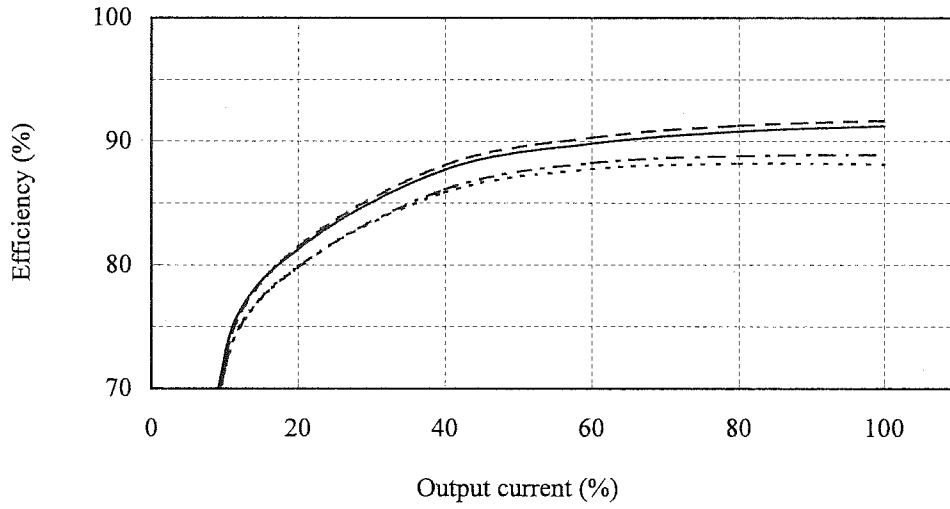


(2) 効率対出力電流

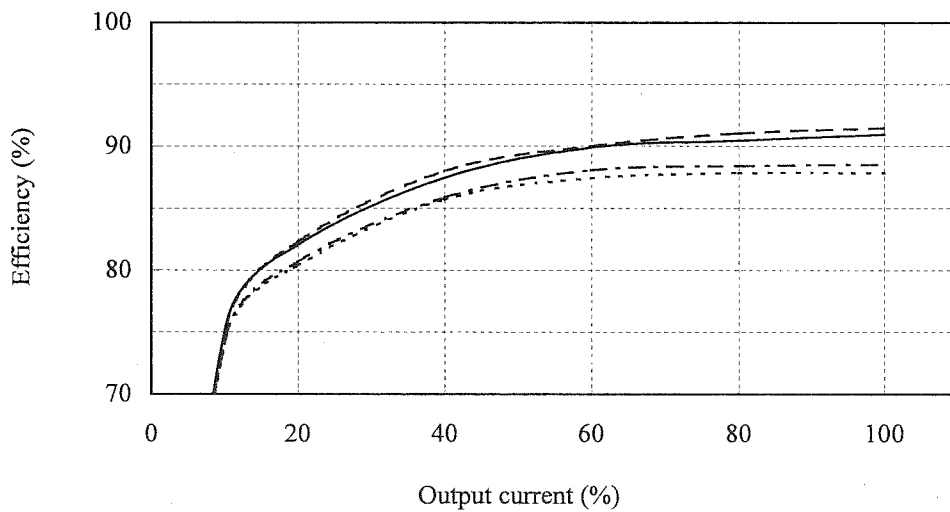
Efficiency vs. Output current

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

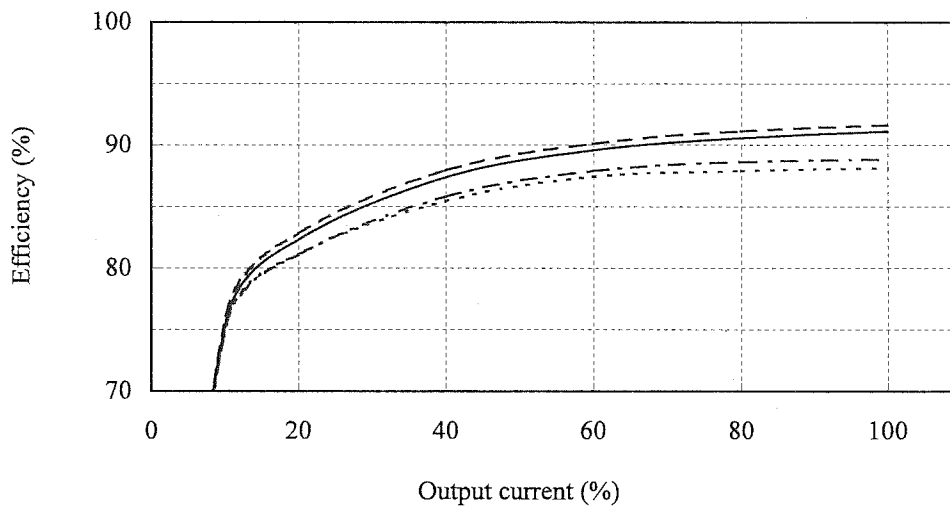
24V



36V



48V



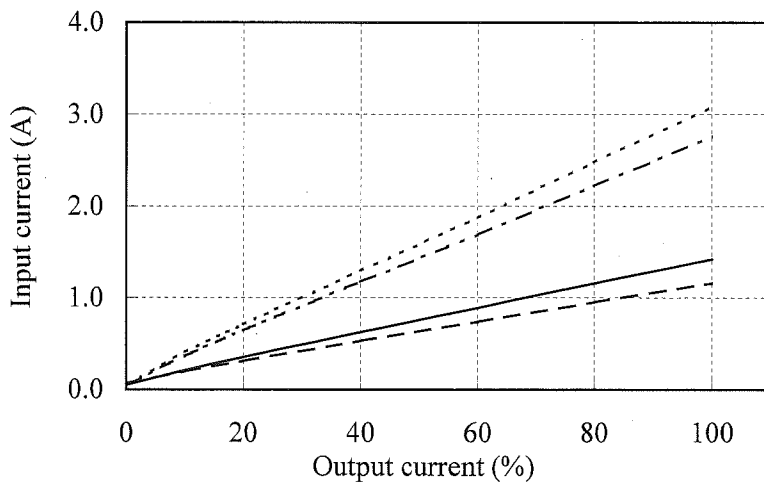
## (3) 入力電流対出力電流

Input current vs. Output current

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

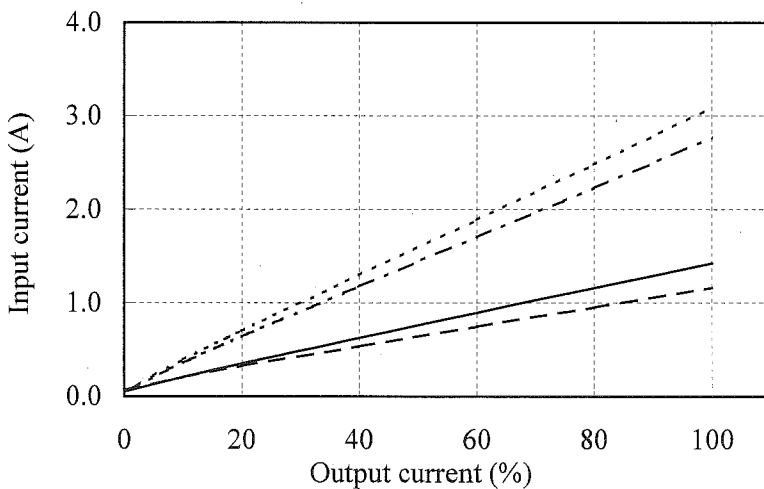
### 24V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.04A	0.02A
100VAC	0.04A	0.02A
200VAC	0.05A	0.05A
265VAC	0.06A	0.06A



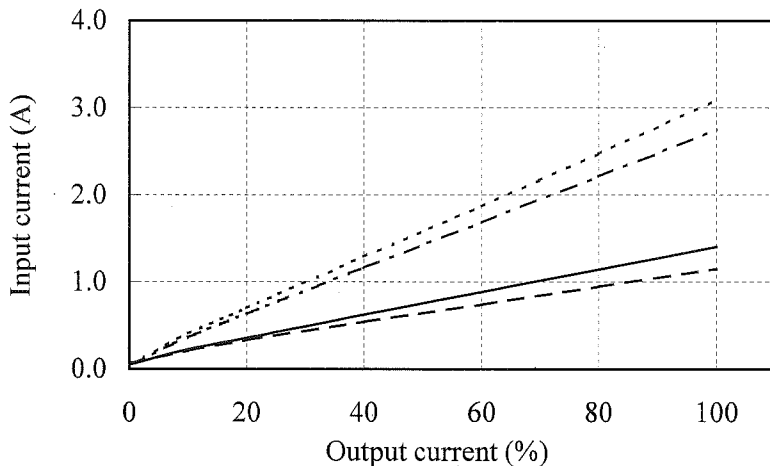
### 36V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.04A	0.02A
100VAC	0.05A	0.02A
200VAC	0.05A	0.05A
265VAC	0.06A	0.06A



### 48V

Vin	Input current	
	Iout : 0%	Control OFF*
90VAC	0.04A	0.02A
100VAC	0.04A	0.02A
200VAC	0.05A	0.05A
265VAC	0.06A	0.06A



\* 準標準品 ZWS240BP-\*/R にて対応  
 For option model ZWS240BP-\*/R

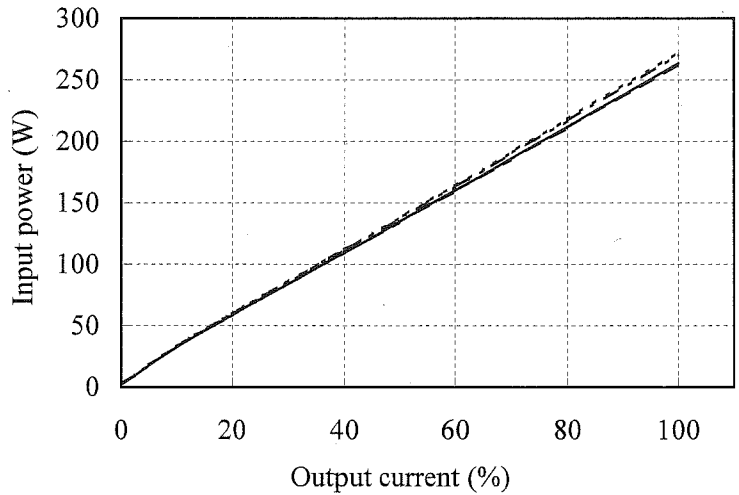
(4) 入力電力対出力電流

Input power vs. Output current

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

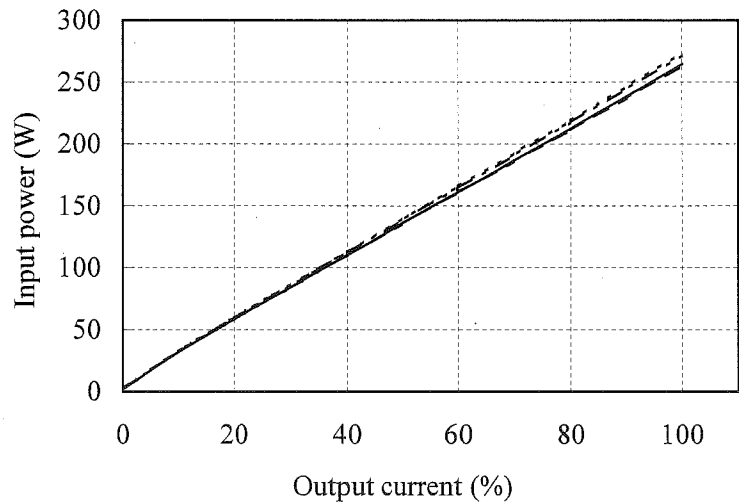
24V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	2.1W	0.1W
100VAC	2.1W	0.1W
200VAC	2.2W	0.5W
265VAC	2.6W	0.8W



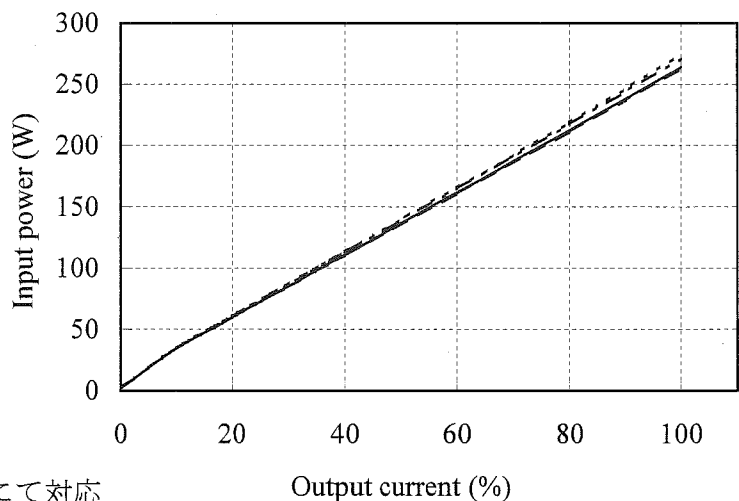
36V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	2.0W	0.1W
100VAC	2.0W	0.1W
200VAC	2.0W	0.5W
265VAC	2.6W	0.8W



48V

Vin	Input power	
	Iout : 0%	Control OFF*
90VAC	2.1W	0.1W
100VAC	2.1W	0.1W
200VAC	2.2W	0.5W
265VAC	2.5W	0.8W



\* 準標準品 ZWS240BP-\*/R にて対応  
 For option model ZWS240BP-\*/R

2.2 過電流保護特性

Over current protection (OCP) characteristics

2.3 過電圧保護特性

Over voltage protection (OVP) characteristics

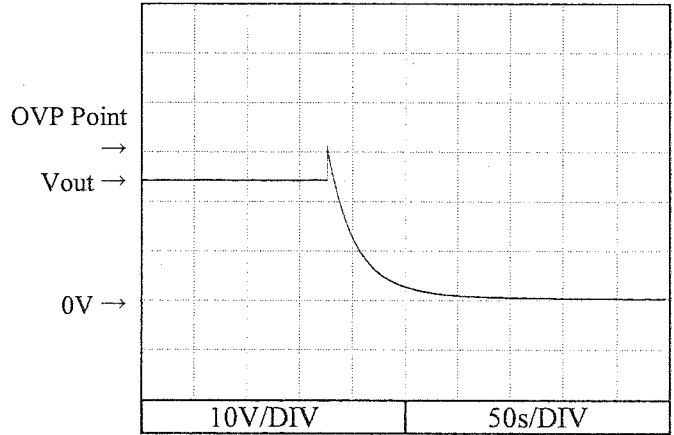
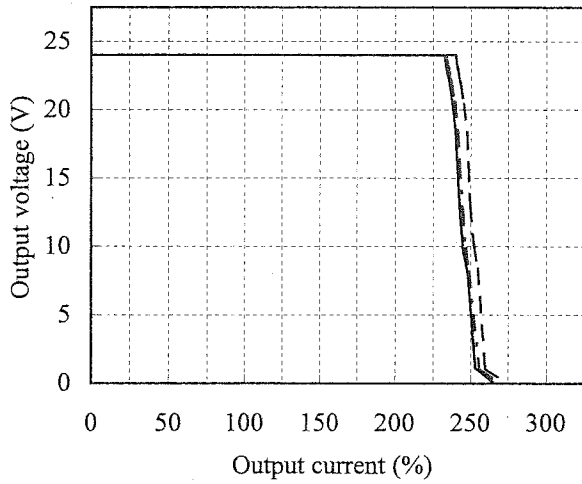
Conditions Vin : 100 VAC

Ta : -10 °C -----  
 25 °C - - - - -  
 50 °C \_\_\_\_\_

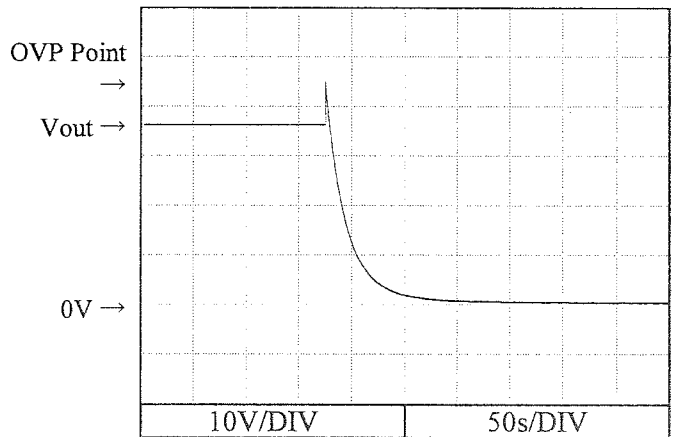
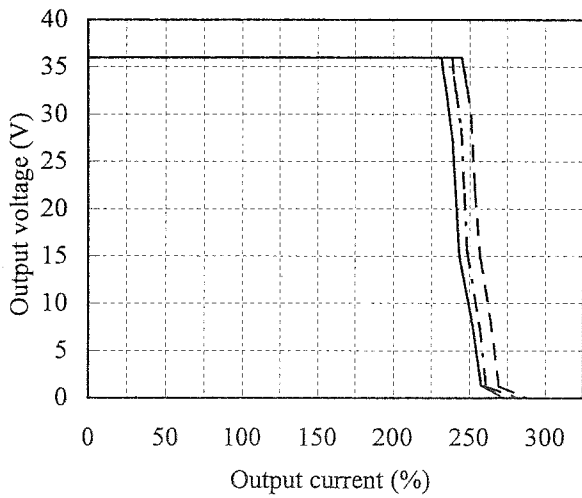
Conditions Vin : 100 VAC

Iout : 0 %  
 Ta : 25 °C

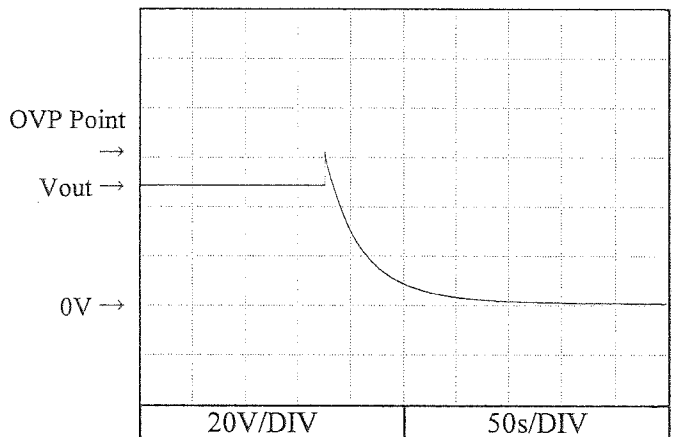
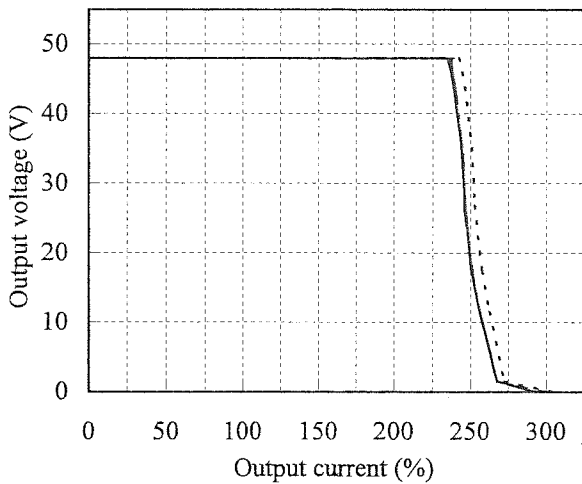
24V



36V



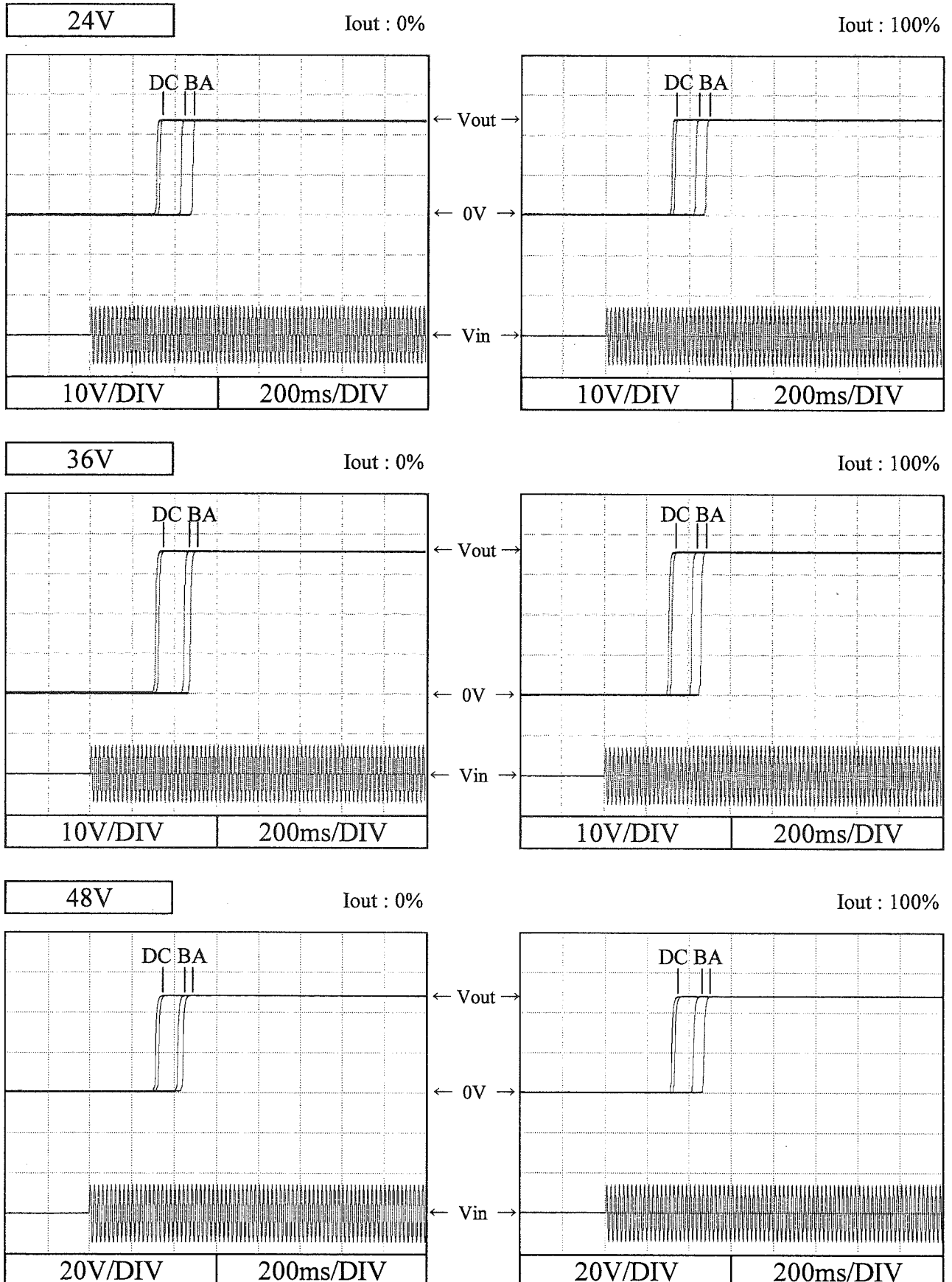
48V



## 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 °C

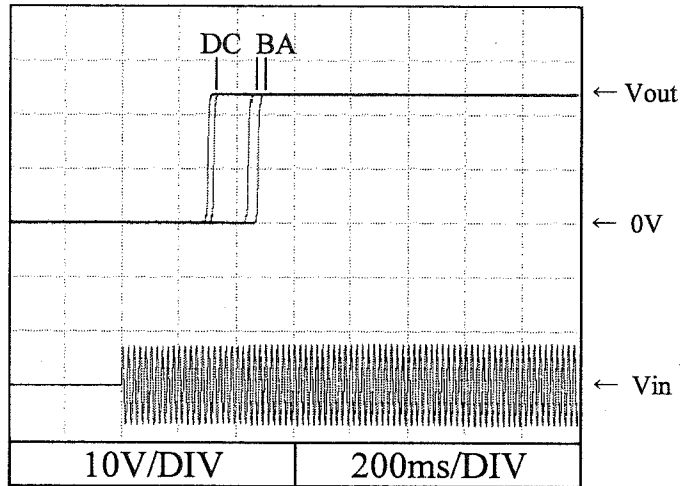


## 2.4 出力立ち上がり特性 Output rise characteristics

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

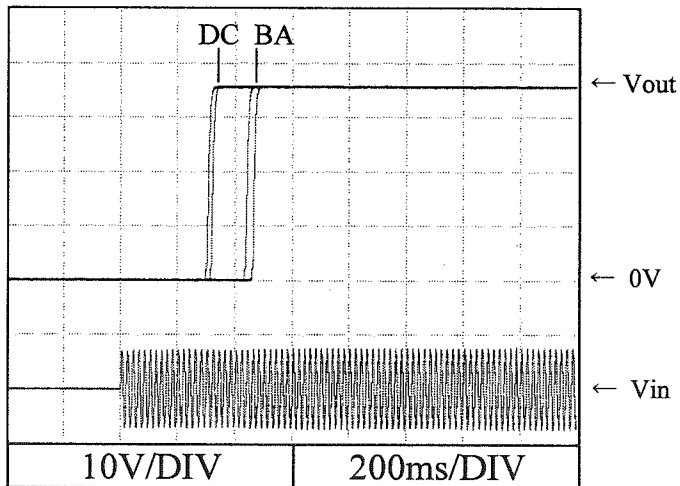
24V

Iout : 200%



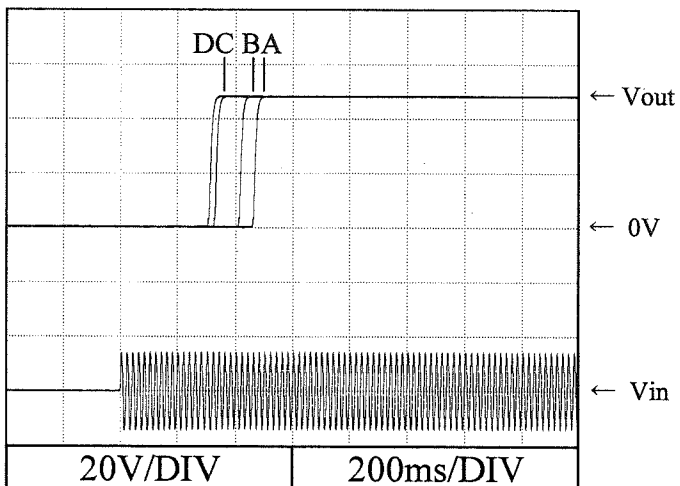
36V

Iout : 200%



48V

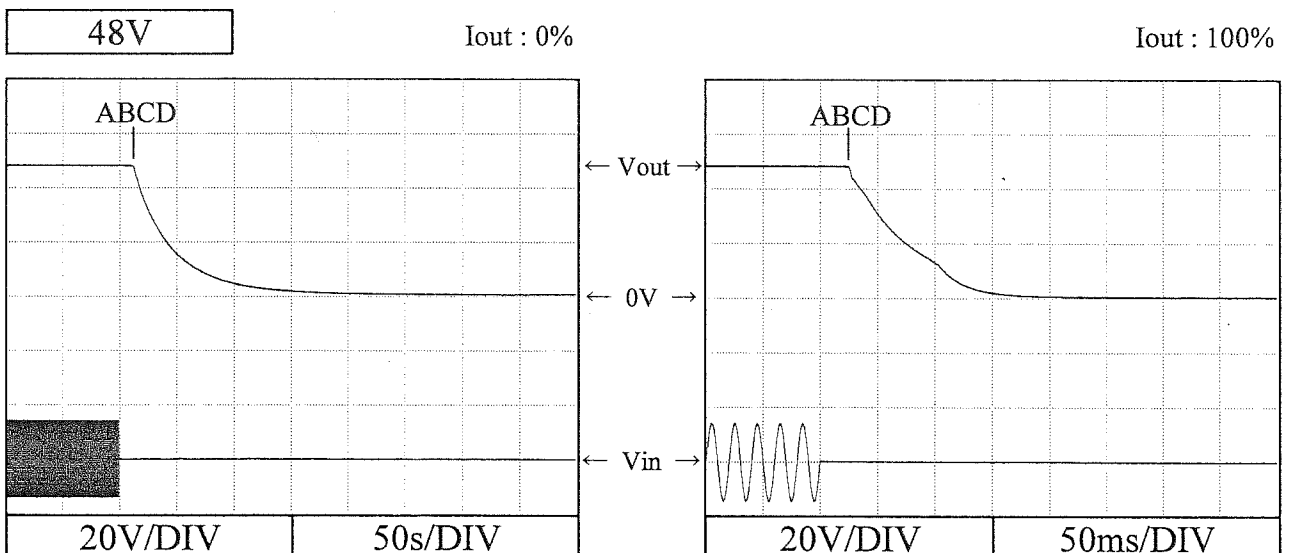
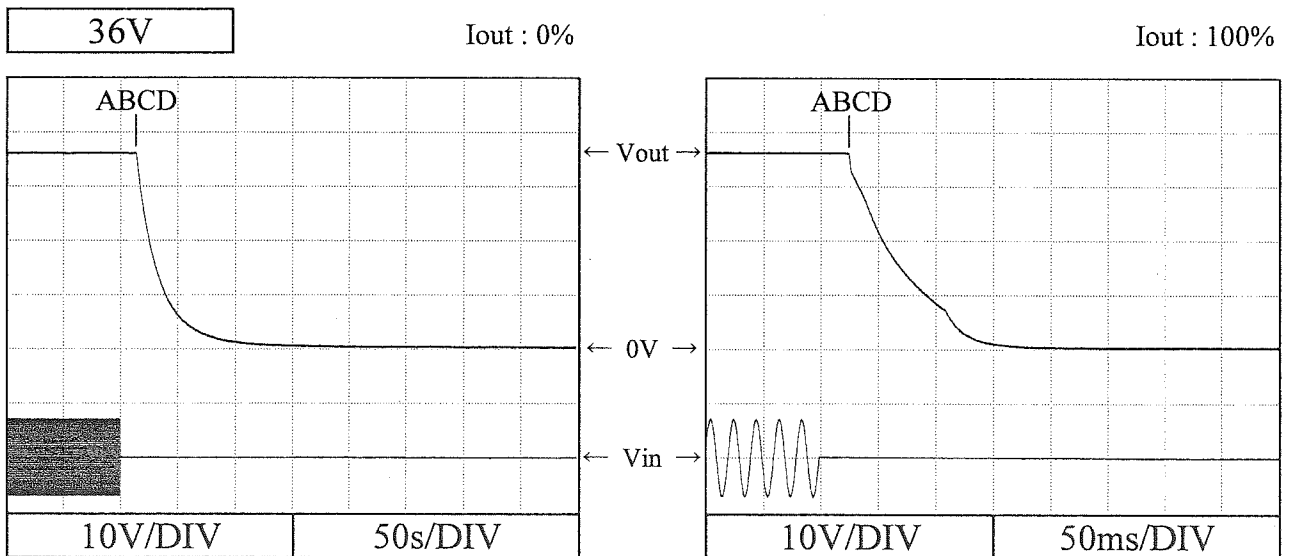
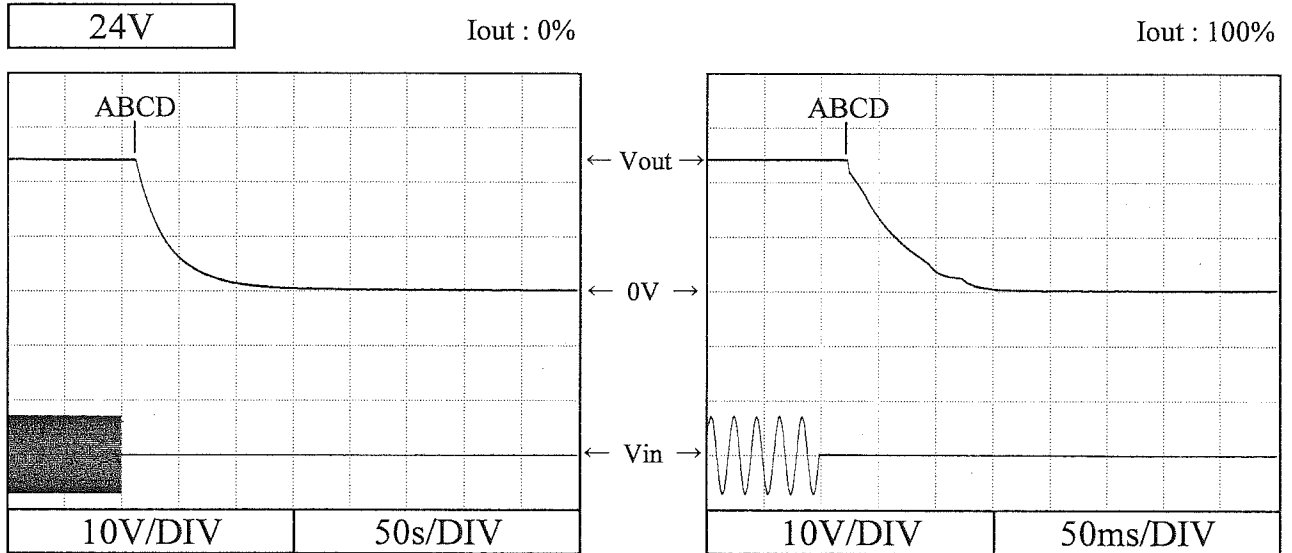
Iout : 200%



## 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 °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  $V_{in}$  : 100 VAC

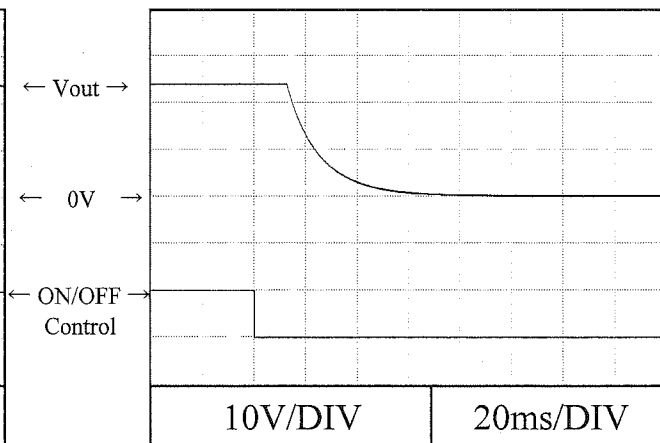
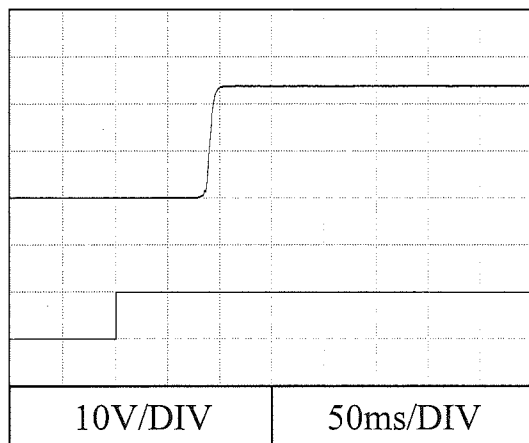
$I_{out}$  : 100 %

$T_a$  : 25 °C

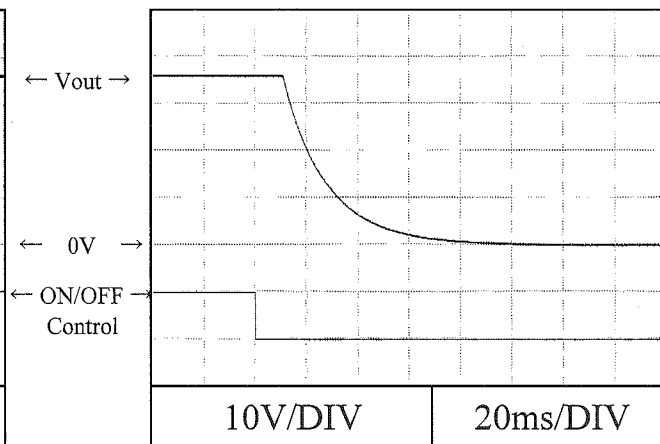
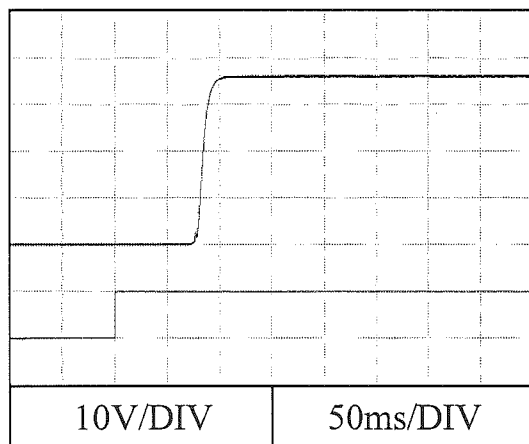
準標準品 ZWS240BP-\*/R にて対応

For option model ZWS240BP-\*/R

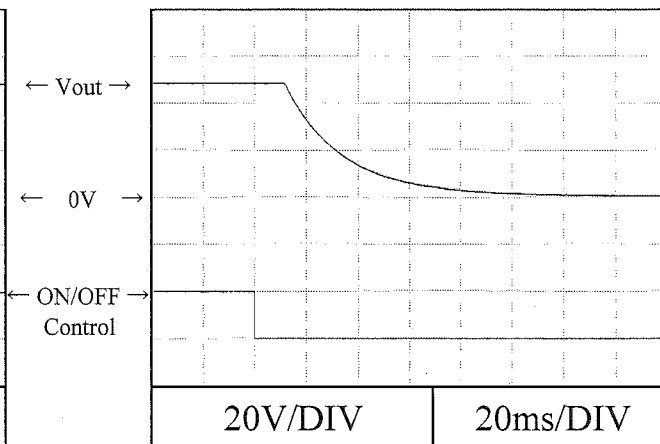
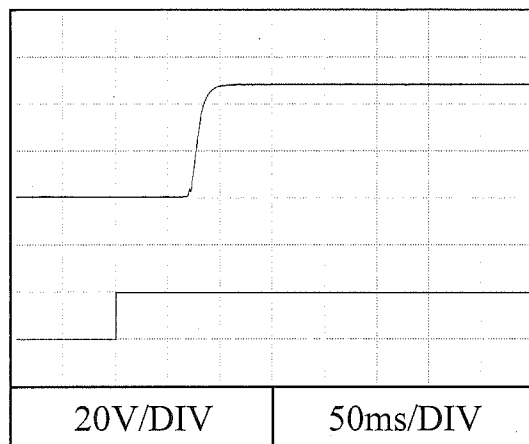
24V



36V



48V



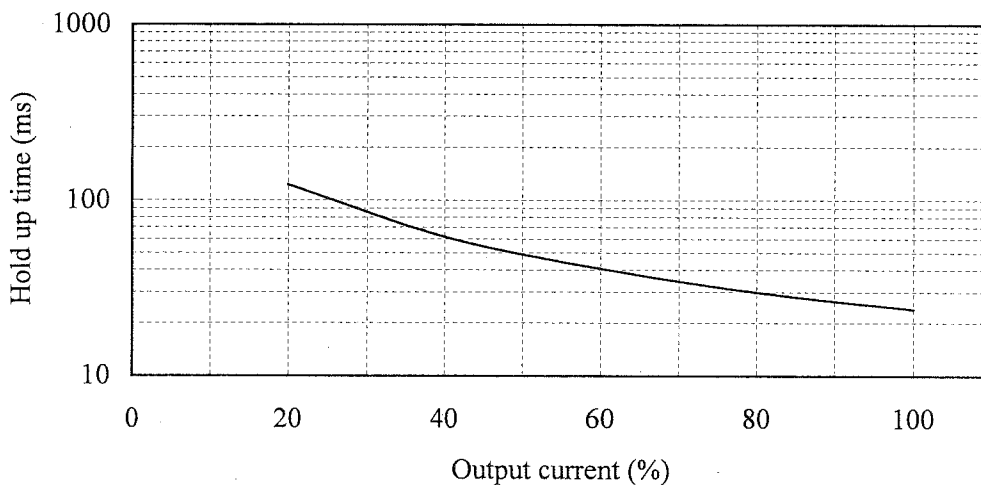


2.7 出力保持時間特性

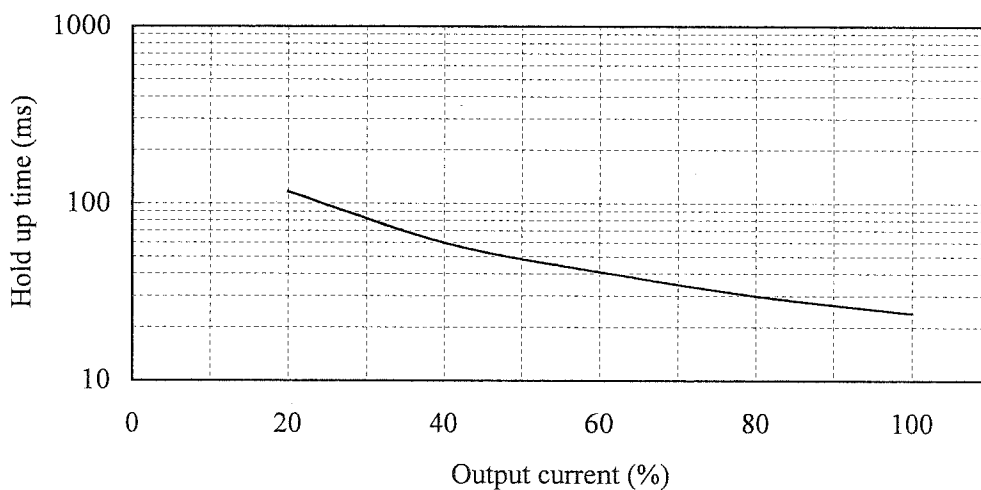
Hold up time characteristics

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

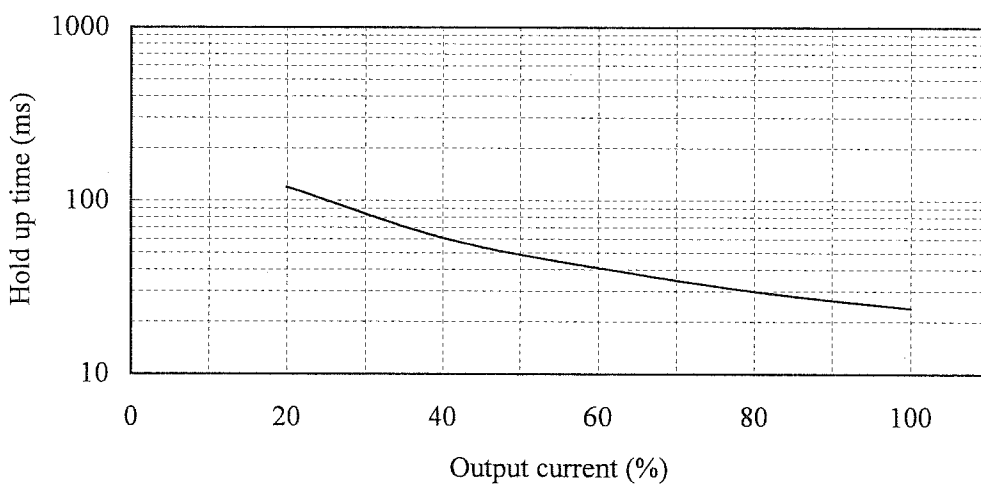
24V



36V



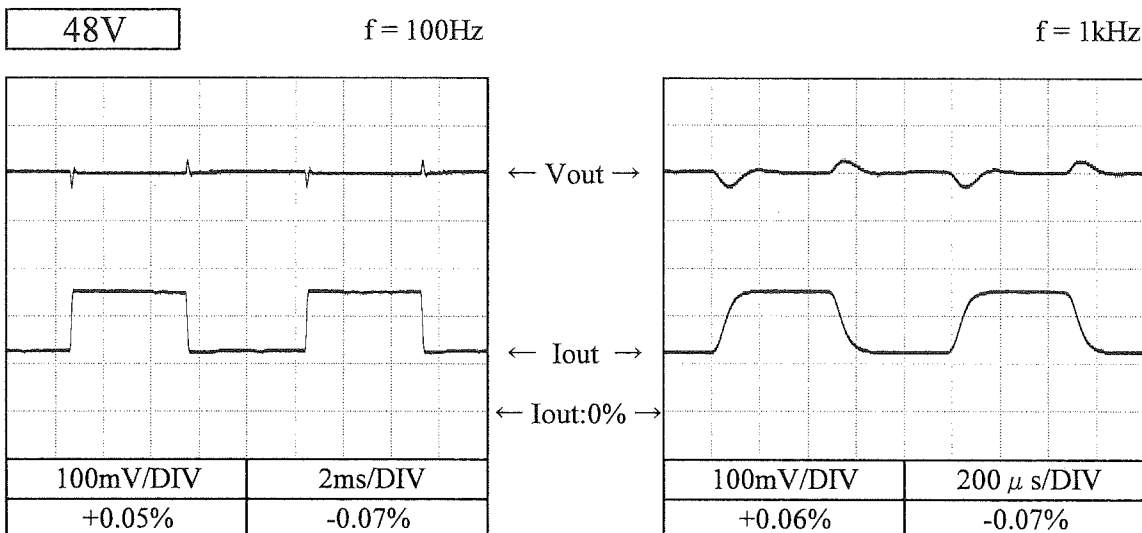
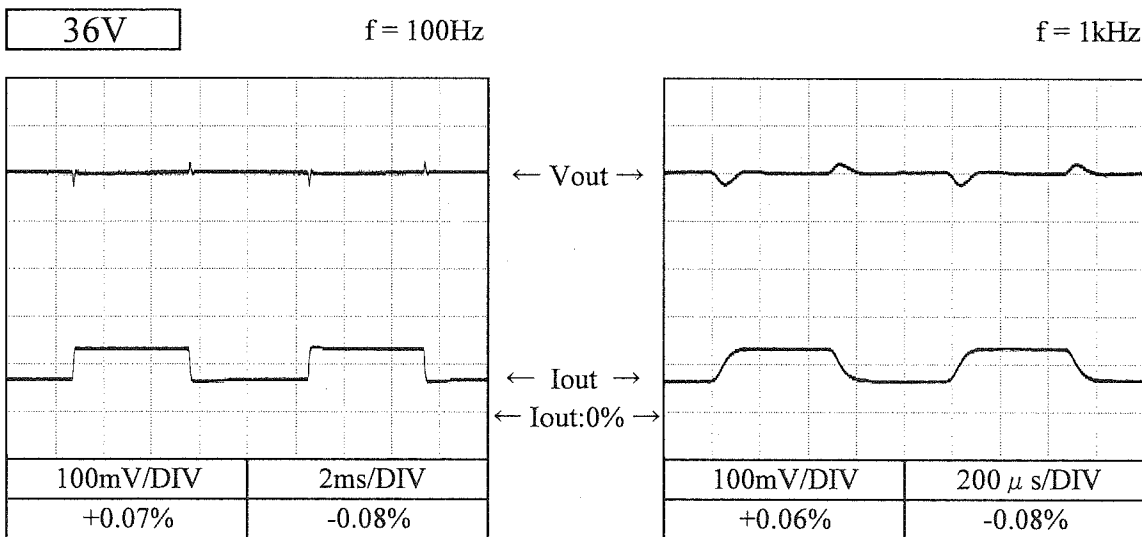
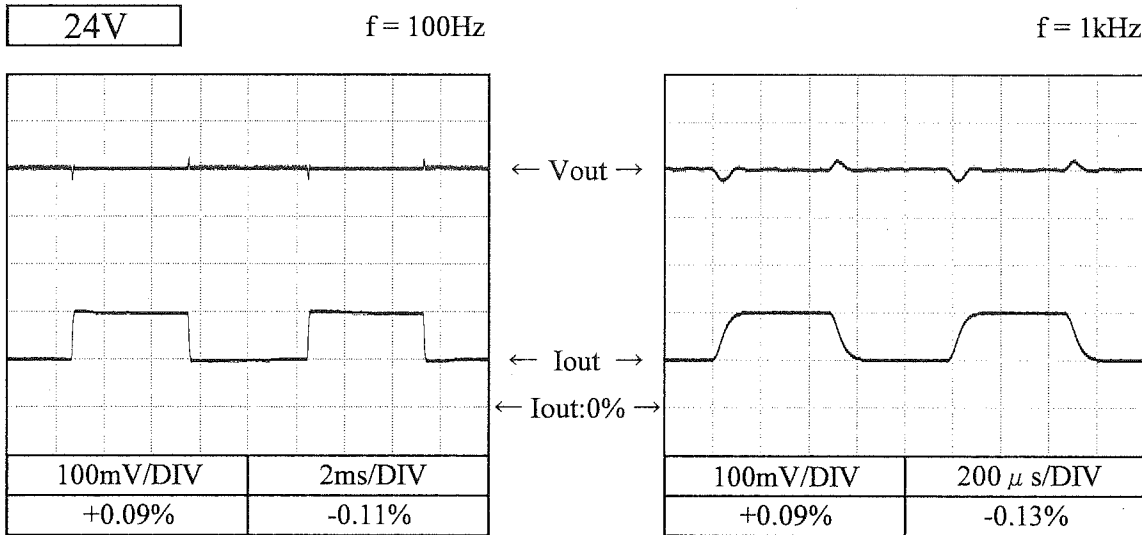
48V



## 2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

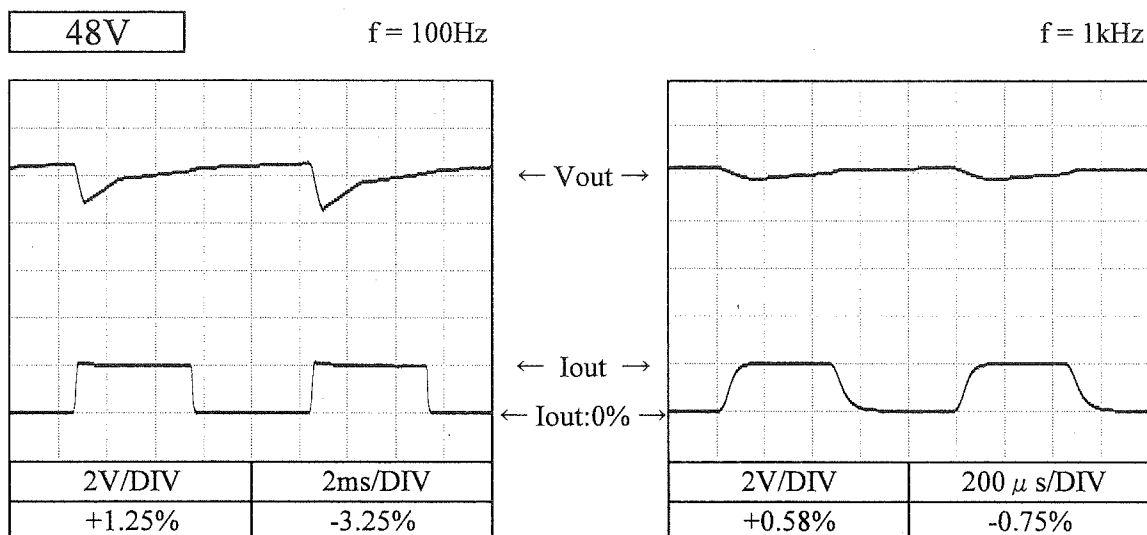
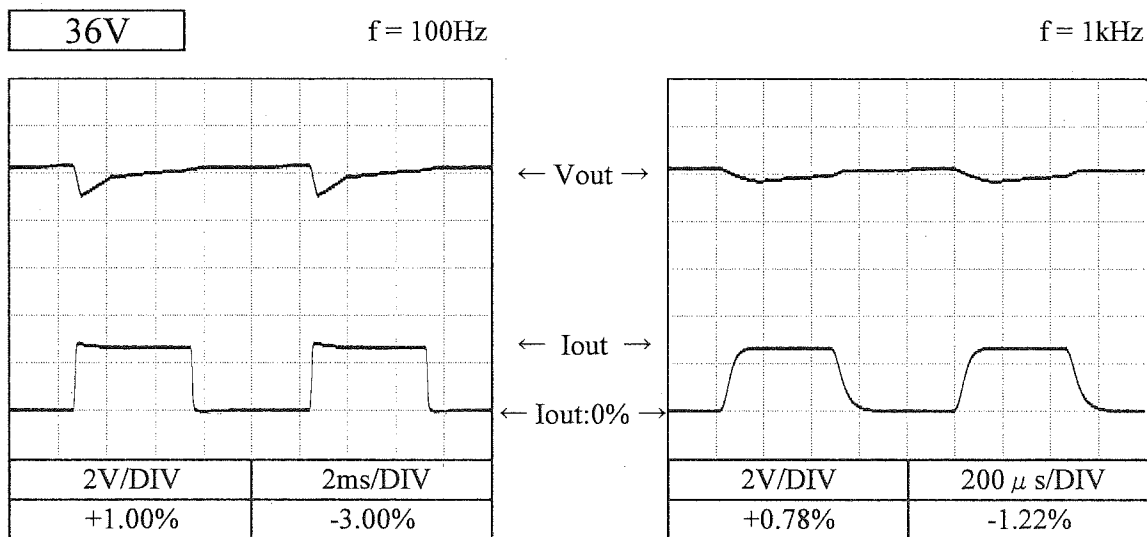
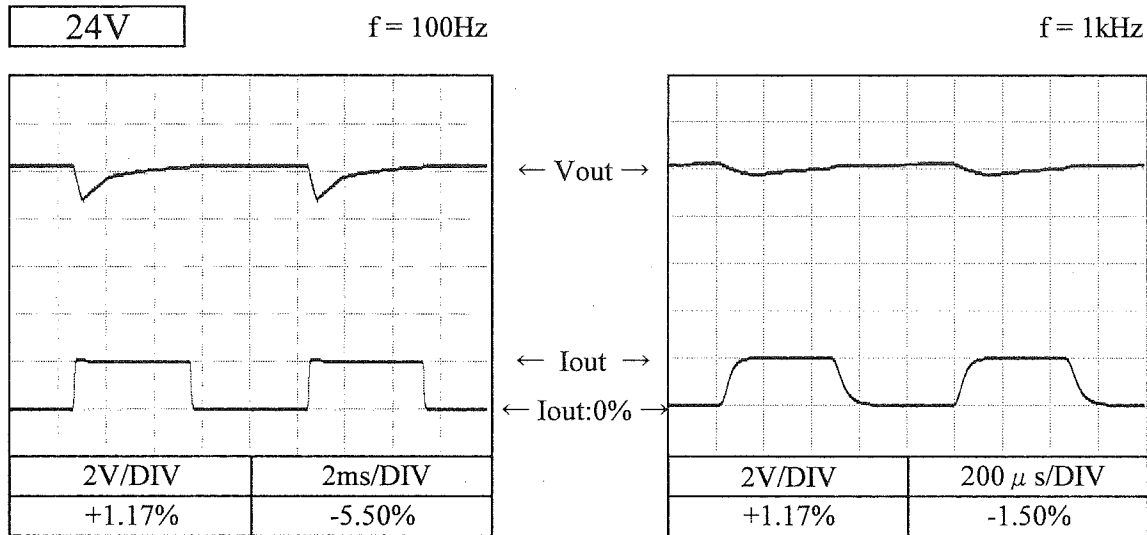
Conditions Vin : 100 VAC  
 Iout : 50 % ↔ 100 %  
 (tr = tf = 50us)  
 Ta : 25 °C



## 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 °C



2.9 入力電圧瞬停特性

Response to brown out characteristics

Conditions Vin : 100 VAC

Iout : 100 %

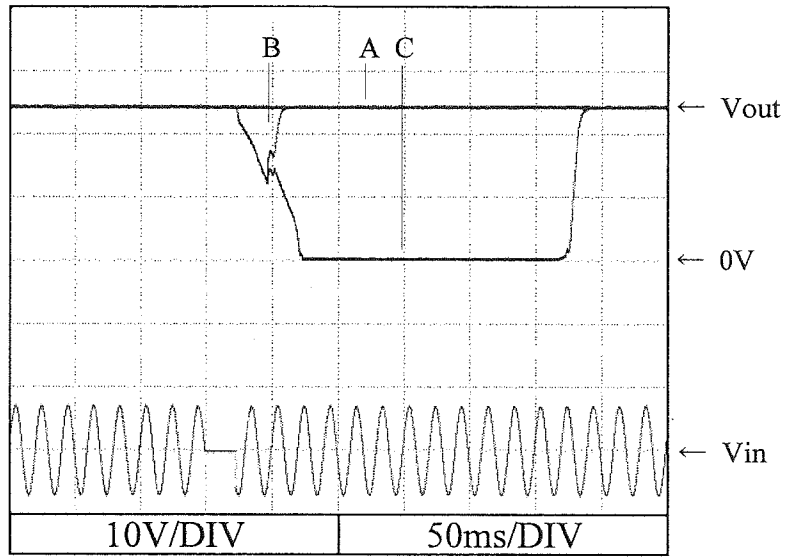
Ta : 25 °C

24V

A = 23ms

B = 46ms

C = 47ms

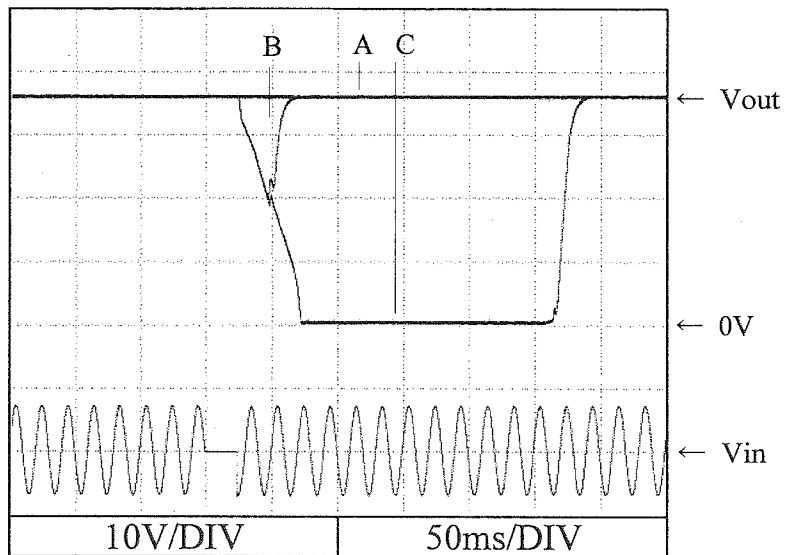


36V

A = 24ms

B = 47ms

C = 48ms

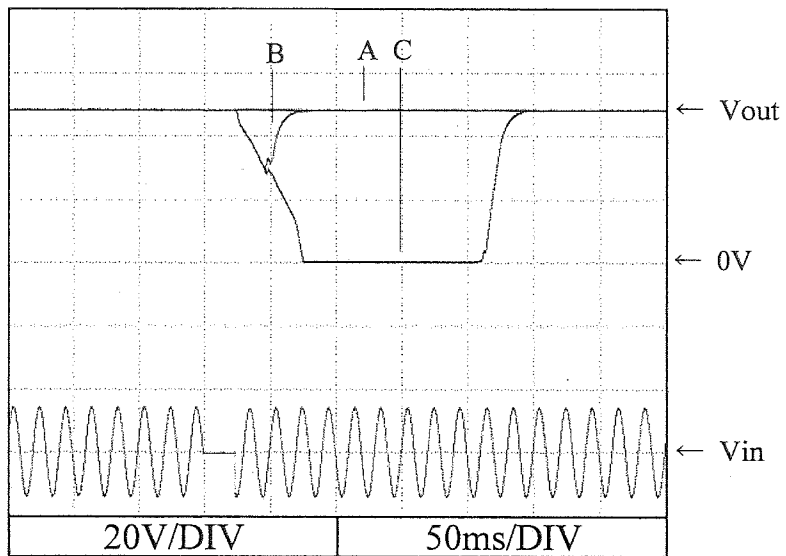


48V

A = 25ms

B = 47ms

C = 48ms



2.9 入力電圧瞬停特性

Response to brown out characteristics

Conditions Vin : 200 VAC

Iout : 100 %

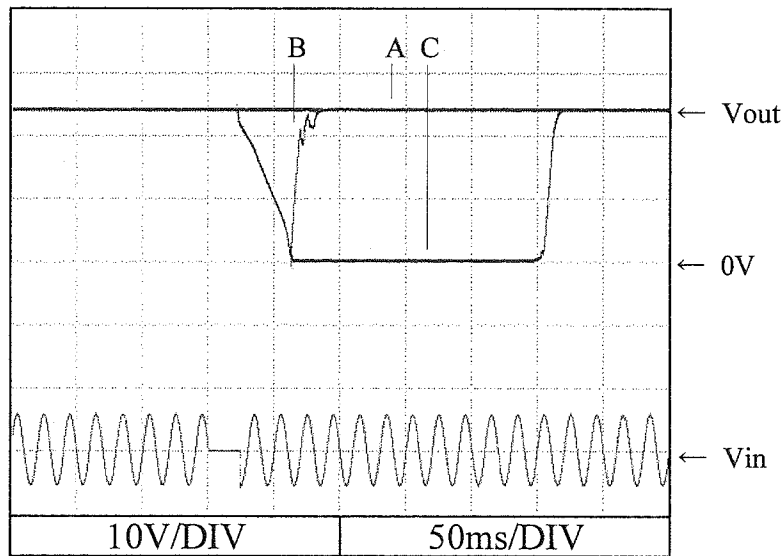
Ta : 25 °C

24V

A = 23ms

B = 64ms

C = 65ms

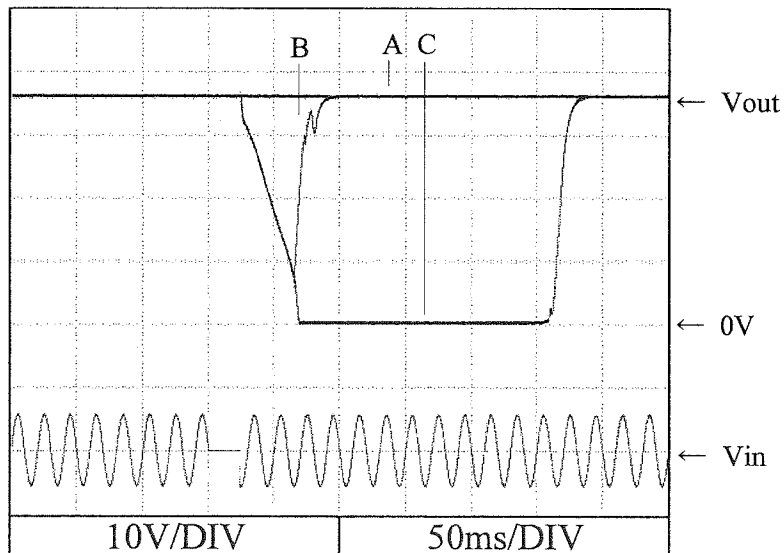


36V

A = 24ms

B = 65ms

C = 66ms

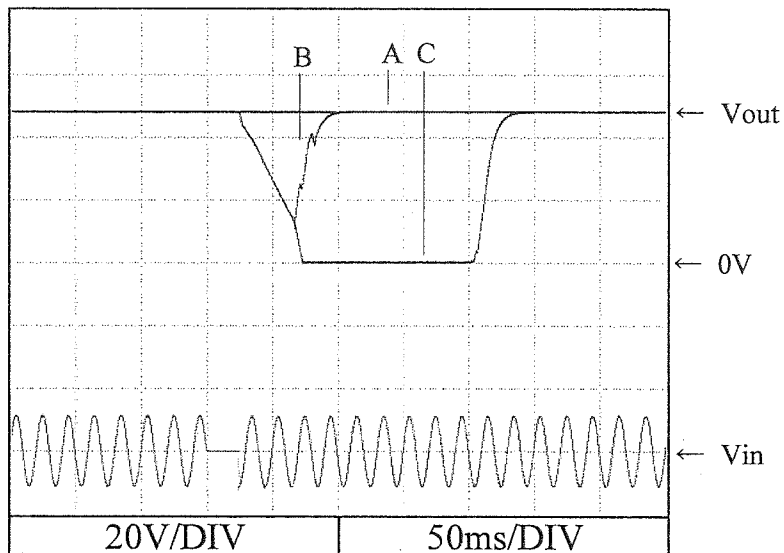


48V

A = 25ms

B = 67ms

C = 68ms

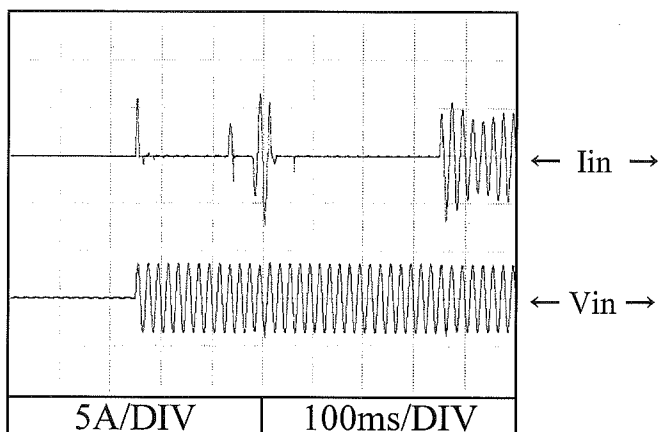


2.10 入力サージ電流 (突入電流) 波形  
Inrush current waveform

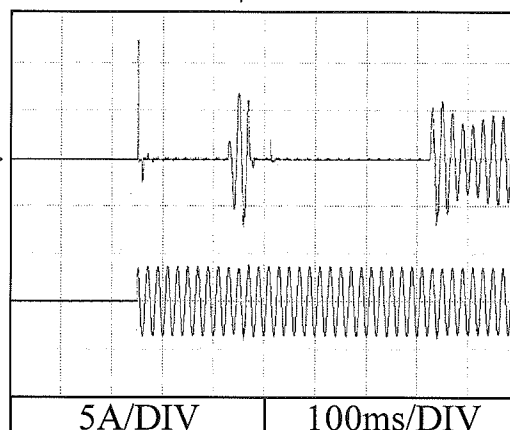
24V

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

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

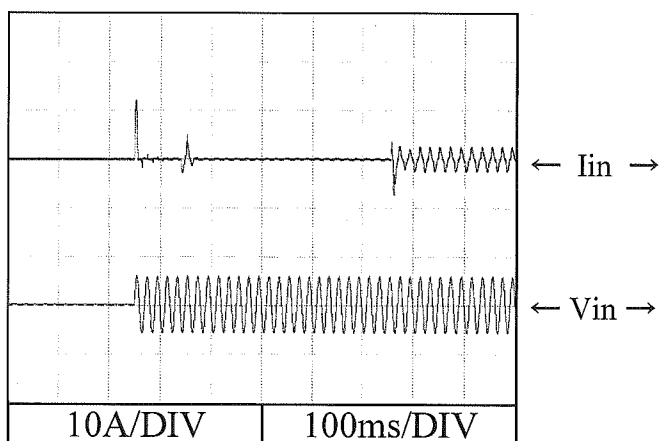


Switch on phase angle of input AC voltage  
 $\phi = 90^\circ$

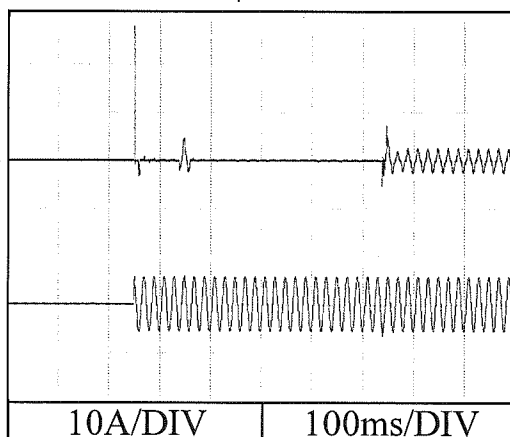


Conditions  $V_{in}$  : 200 VAC  
 $I_{out}$  : 100 %  
 $T_a$  : 25 °C

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

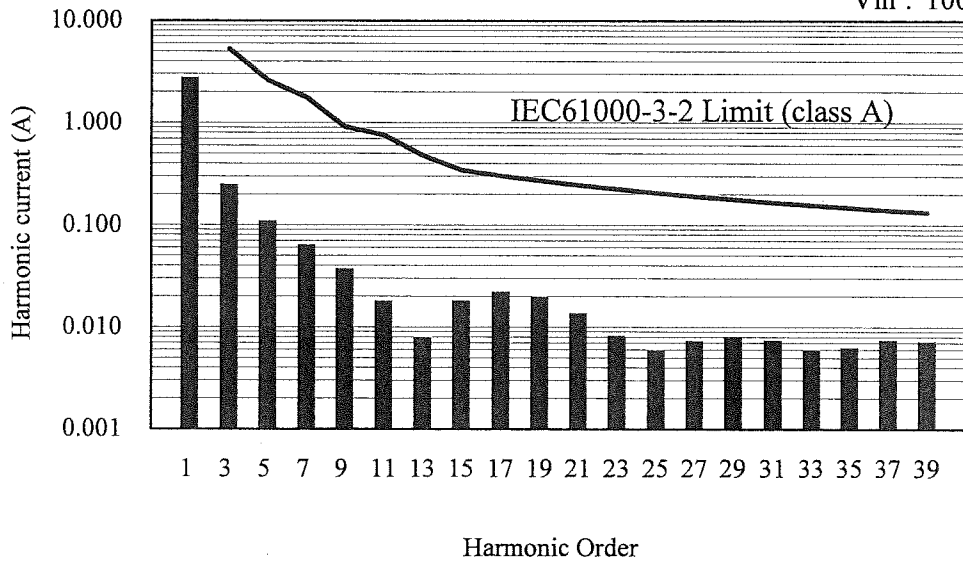
Input current harmonics

Conditions Iout : 100 %

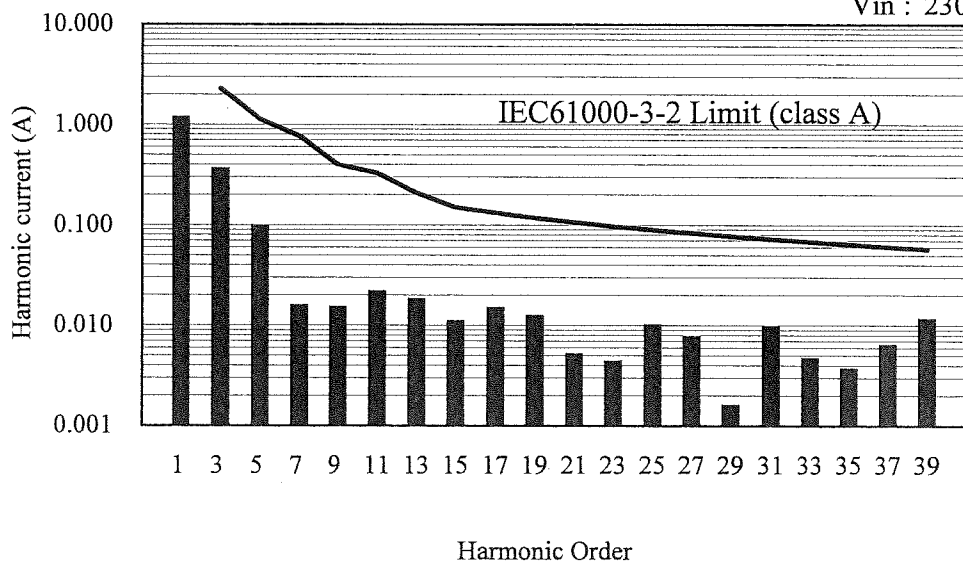
Ta : 25 °C

24V

Vin : 100 VAC



Vin : 230 VAC



2.12 入力電流波形

Input current waveform

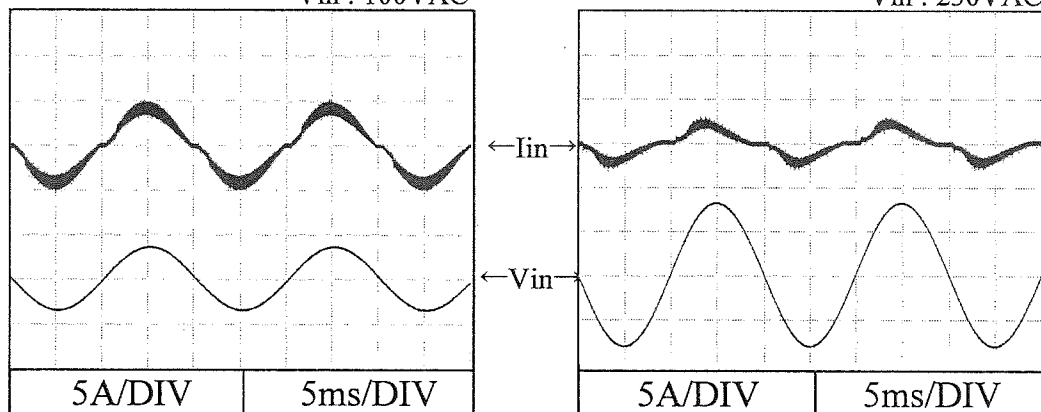
Conditions Iout : 100 %

Ta : 25 °C

24V

Vin : 100VAC

Vin : 230VAC



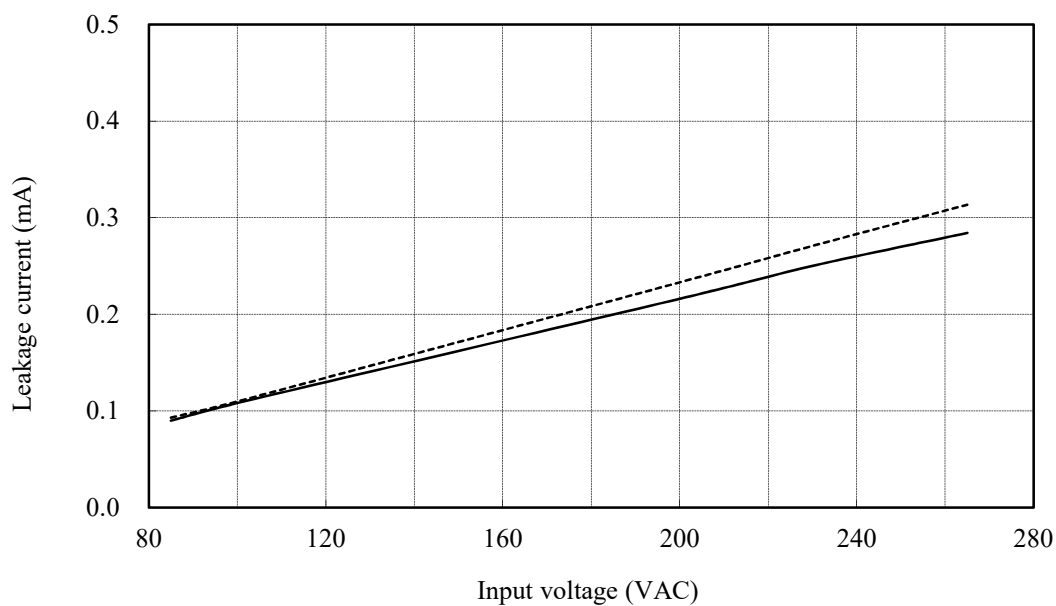
2.13 リーク電流特性  
Leakage current characteristics

# ZWS240BP

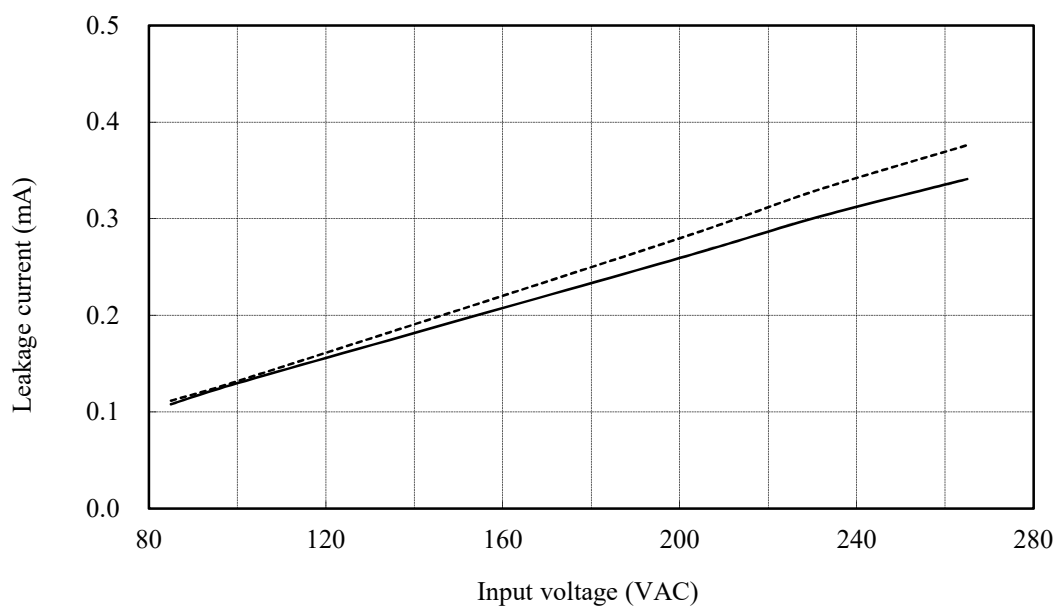
Conditions Iout : 0 % -----  
                  100 % ———  
                  Ta : 25 °C  
Equipment used : 3156 (HIOKI)

24V

f: 50 Hz



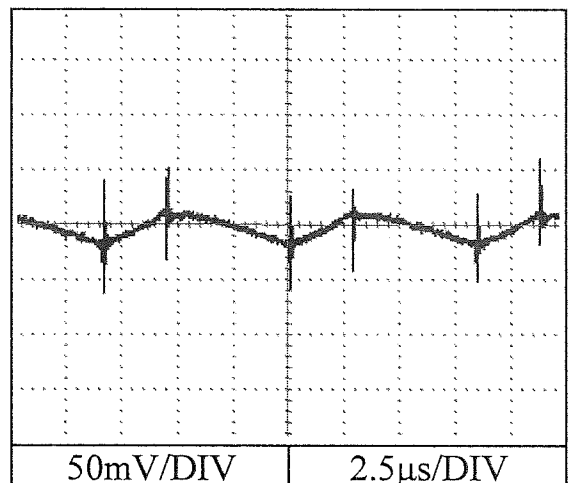
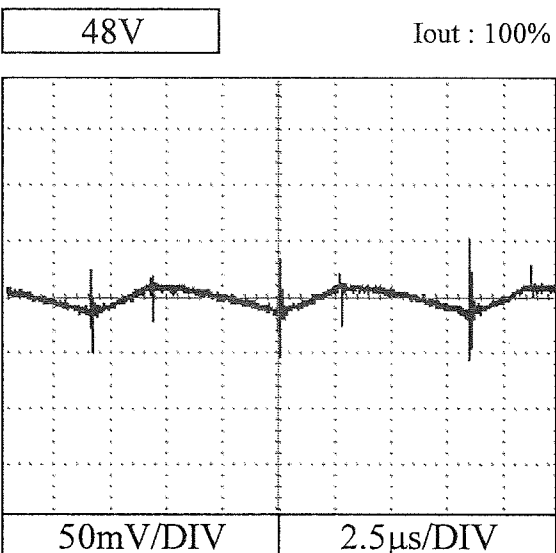
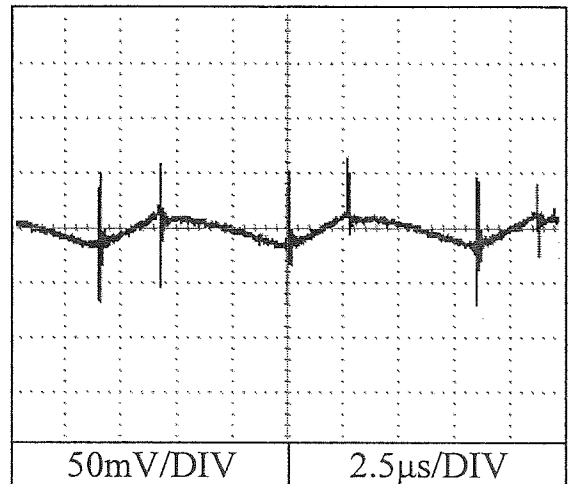
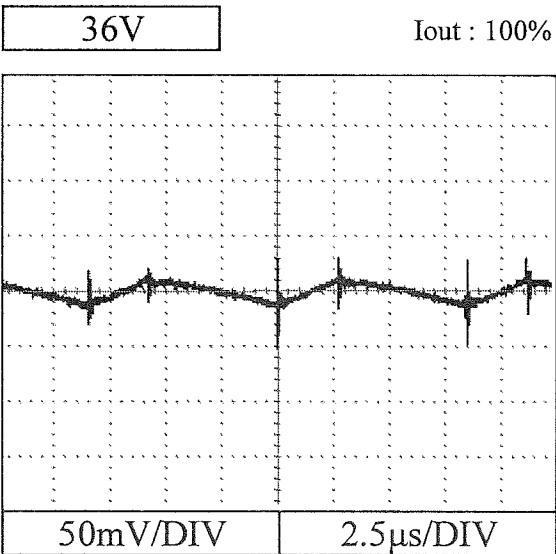
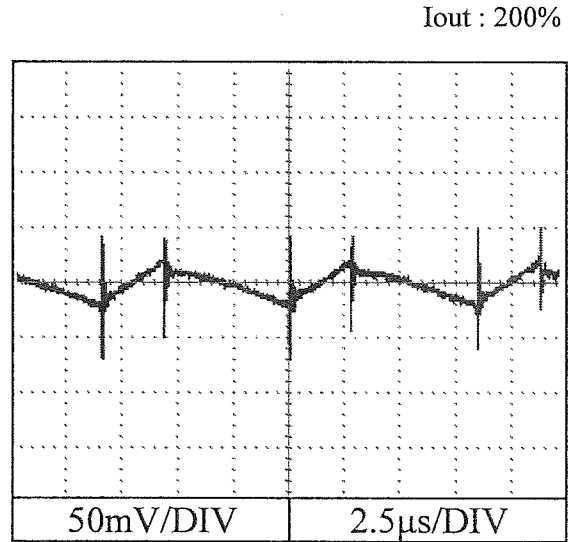
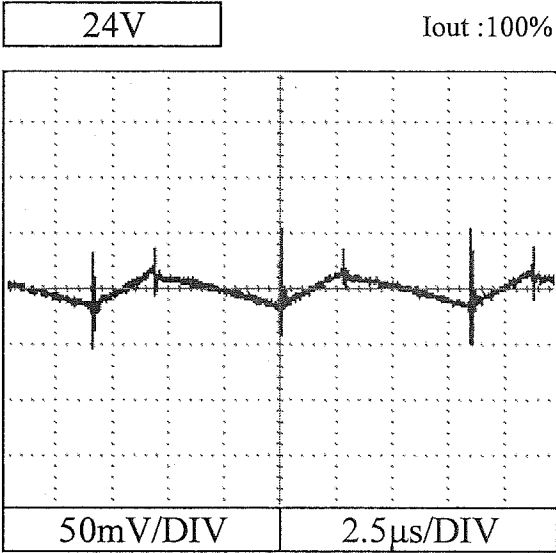
f: 60 Hz





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

Conditions Vin : 100 VAC  
Ta : 25 °C



2.15 EMI 特性

Electro-Magnetic Interference characteristics

**ZWS240BP**

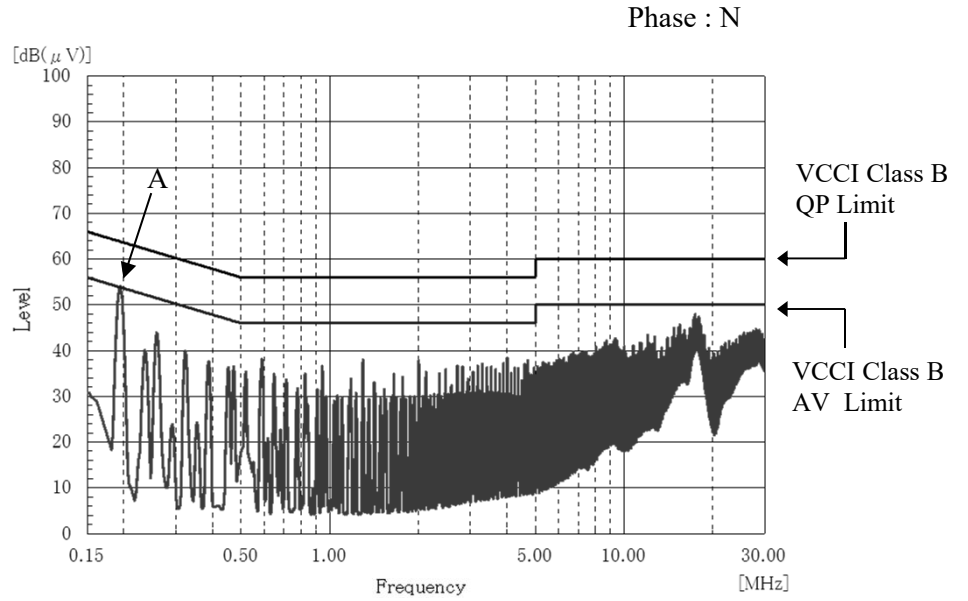
Conditions Vin : 230 VAC  
Iout : 100 %  
Ta : 25 °C

雑音端子電圧

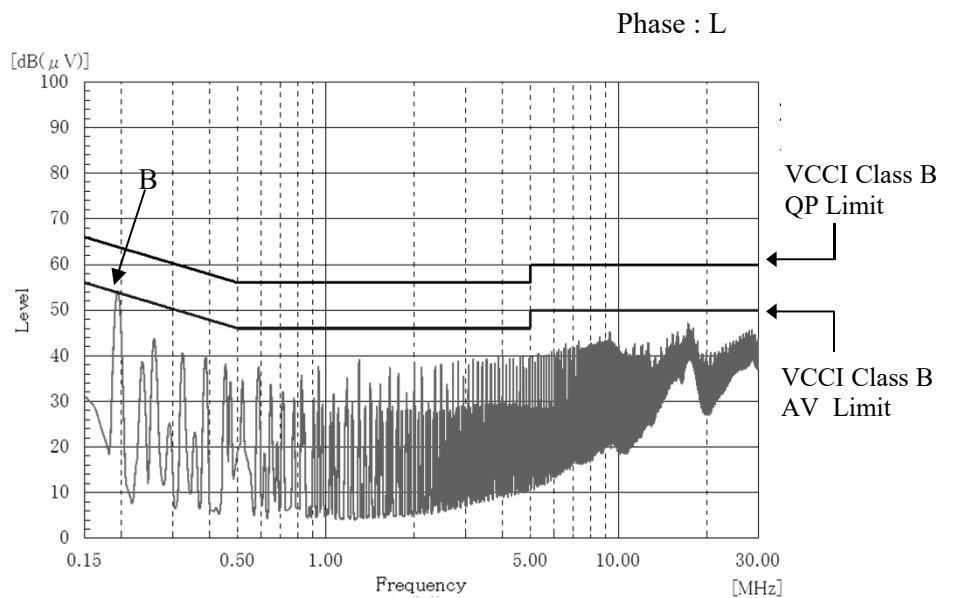
Conducted Emission

24V

Ref. Data	Point A (194kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.8	54.0
AV	53.8	47.8



Ref. Data	Point B (193kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.9	53.8
AV	53.9	47.8



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

**ZWS240BP**

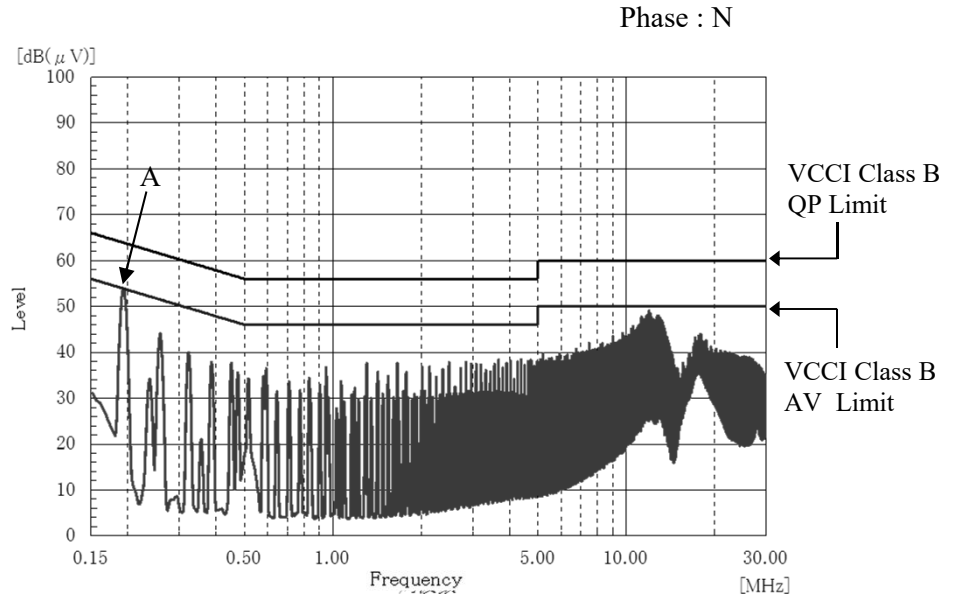
Conditions Vin : 230 VAC  
Iout : 100 %  
Ta : 25 °C

雑音端子電圧

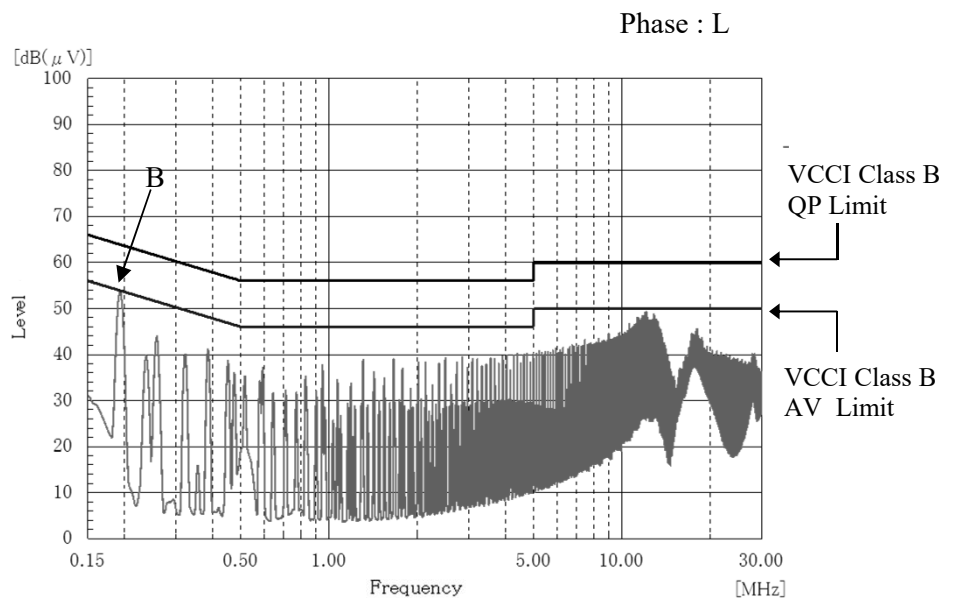
Conducted Emission

36V

Ref. Data	Point A (193kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.9	53.9
AV	53.9	48.5



Ref. Data	Point B (192kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.9	53.6
AV	53.9	48.3



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

**ZWS240BP**

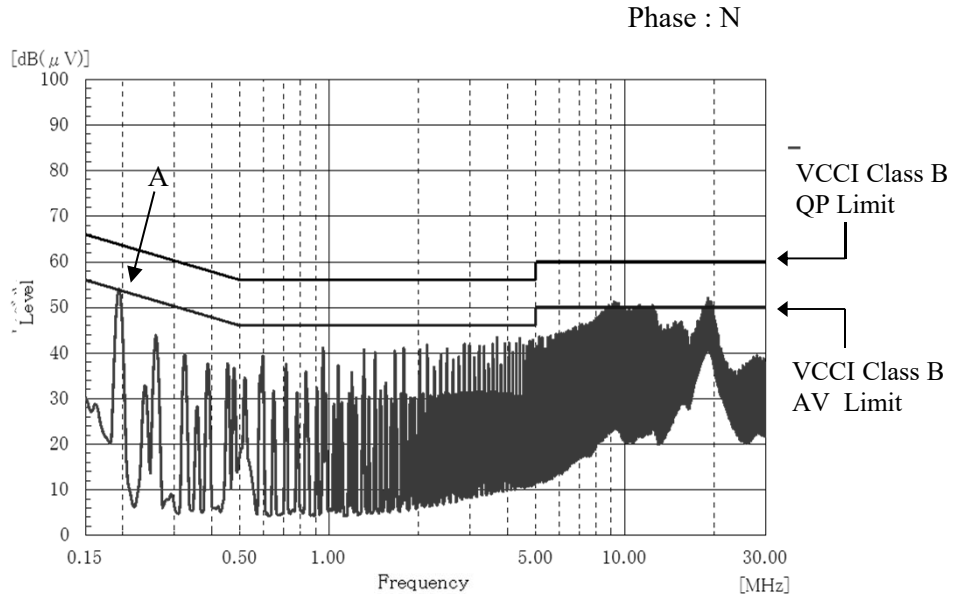
Conditions Vin : 230 VAC  
Iout : 100 %  
Ta : 25 °C

雑音端子電圧

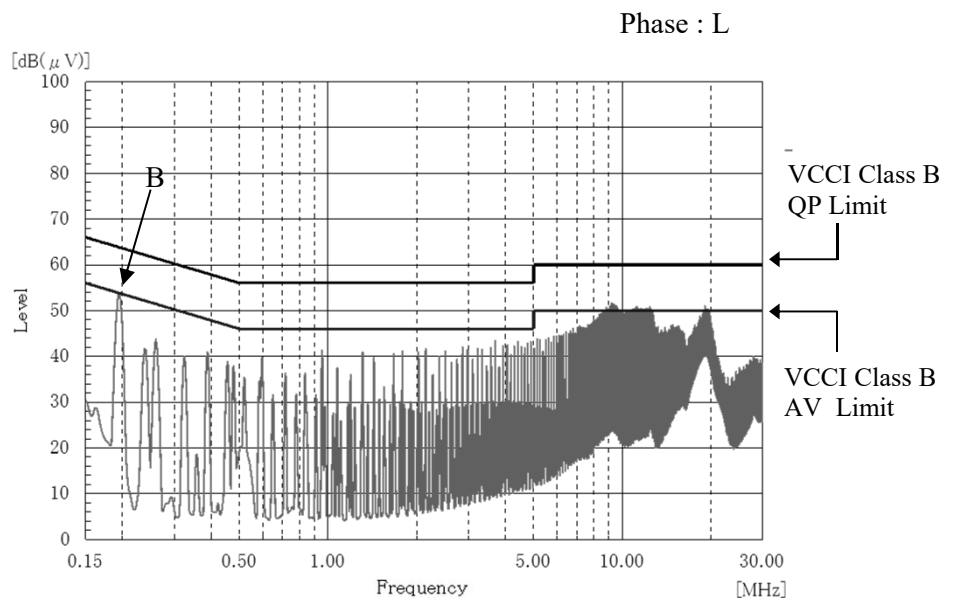
Conducted Emission

48V

Ref. Data	Point A (195kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.8	53.9
AV	53.8	48.4



Ref. Data	Point B (194kHz)	
	Limit (dBuV)	Measure (dBuV)
QP	63.8	53.7
AV	53.8	48.3



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

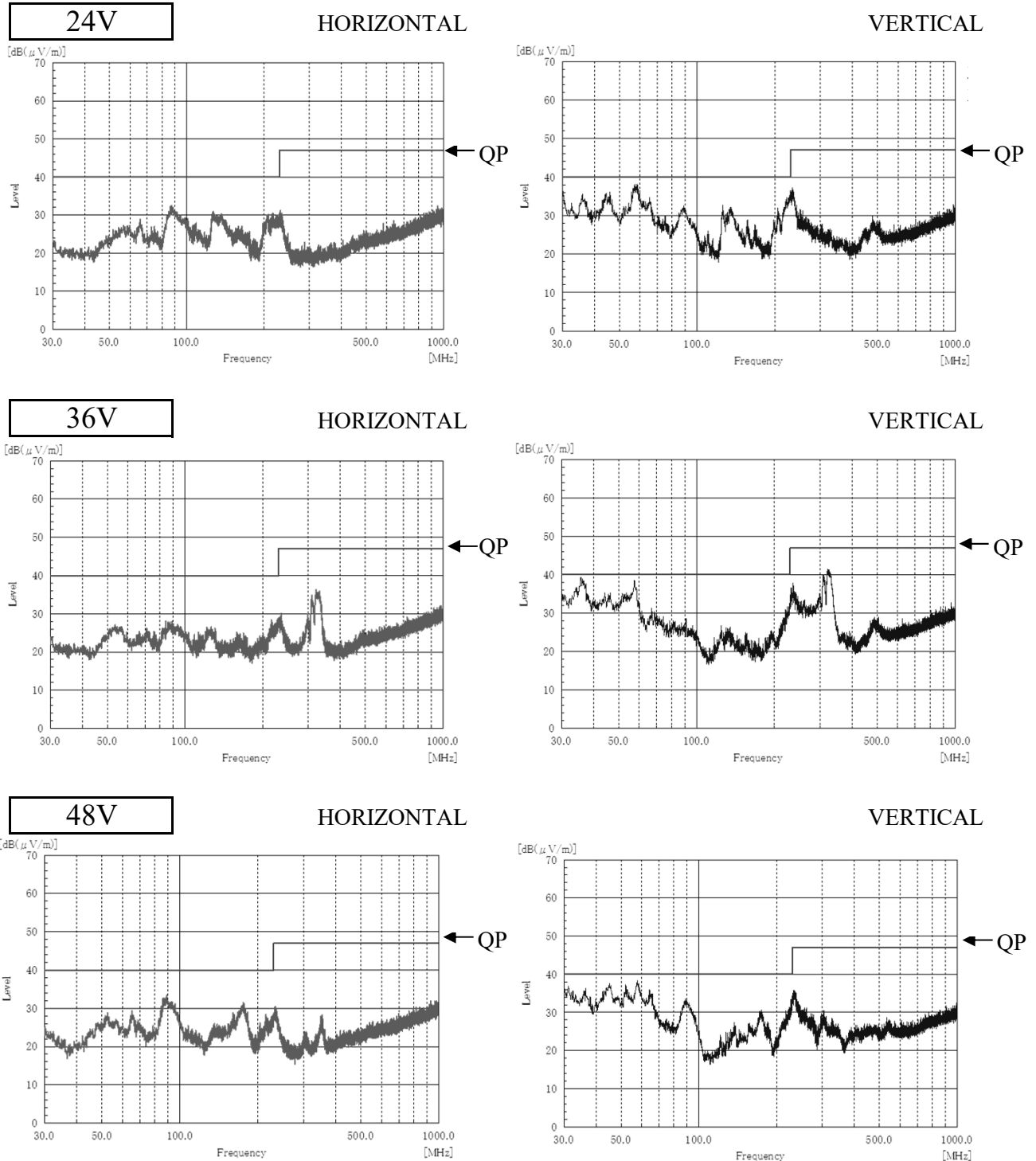
Electro-Magnetic Interference characteristics

**ZWS240BP**

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

雑音電界強度

Radiated Emission



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.