

HWS50A

EVALUATION DATA

型式データ

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2. 特性データ Characteristics

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

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(*) 準標準品 HWS50A-*/R にて対応 For alternative standard model HWS50A-*/R

使用記号 Terminology used

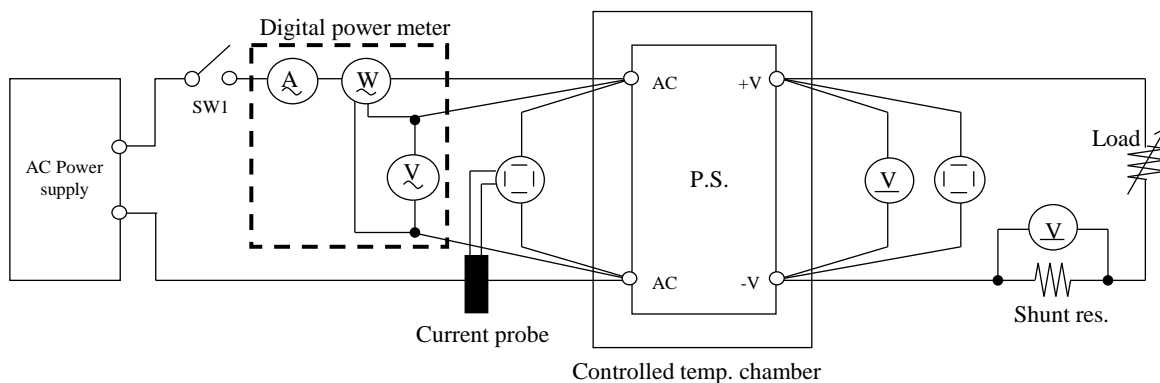
	定義	Definition
Vin	入力電圧 Input voltage
Vout	出力電圧 Output voltage
Iin	入力電流 Input current
Iout	出力電流 Output current
Ta	周囲温度 Ambient temperature
f	周波数 Frequency

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

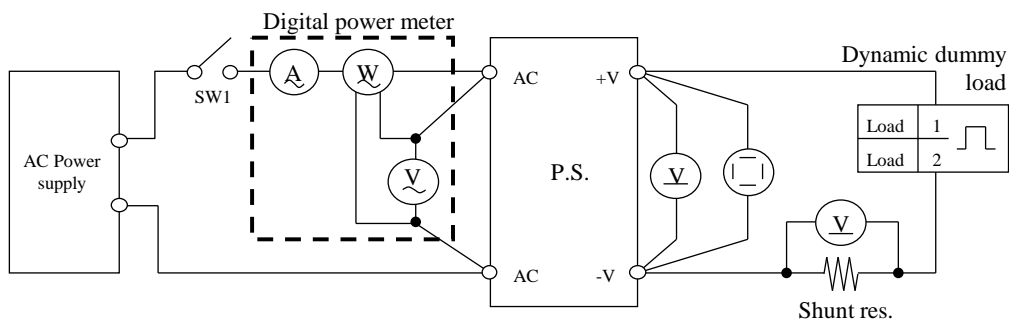
測定回路1 Circuit 1 used for determination

- ・静特性 Steady state data
- ・通電ドリフト特性 Warm up voltage drift characteristics
- ・出力保持時間特性 Hold up time 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
- ・過電流保護特性 Over current protection (OCP) characteristics
- ・過電圧保護特性 Over voltage protection (OVP) characteristics
- ・過渡応答(入力急変)特性 Dynamic line response characteristics
- ・入力電圧瞬停特性 Response to brown out characteristics
- ・入力電流波形 Input current waveform

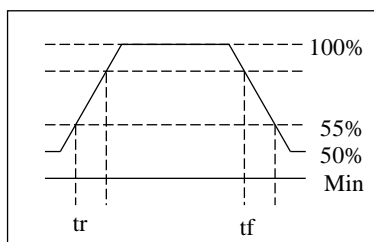


測定回路2 Circuit 2 used for determination

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

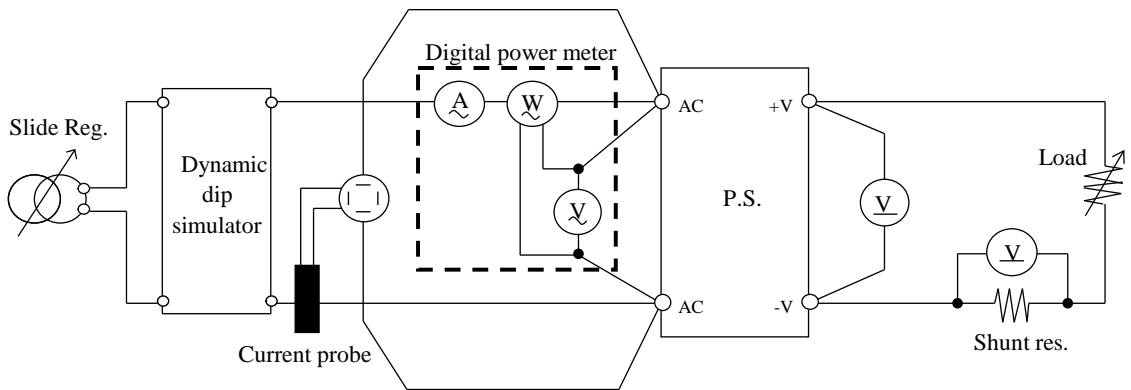


Output current waveform
Iout 50% <=> 100%



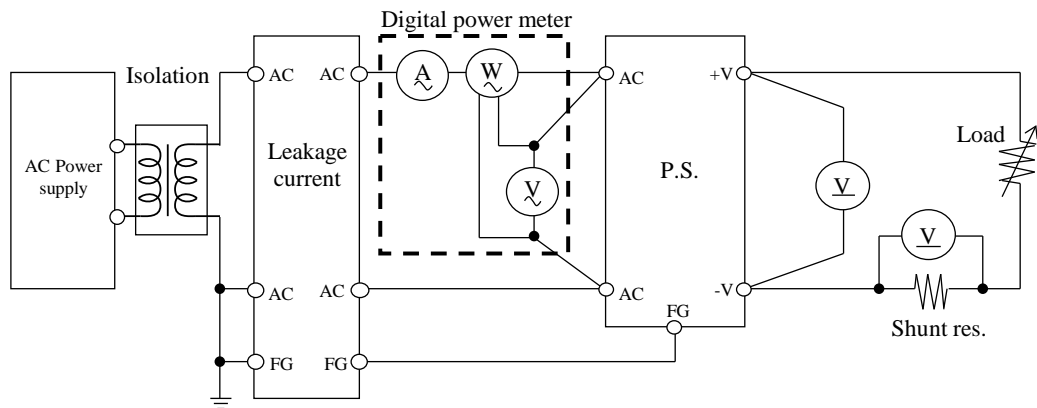
測定回路3 Circuit 3 used for determination

・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

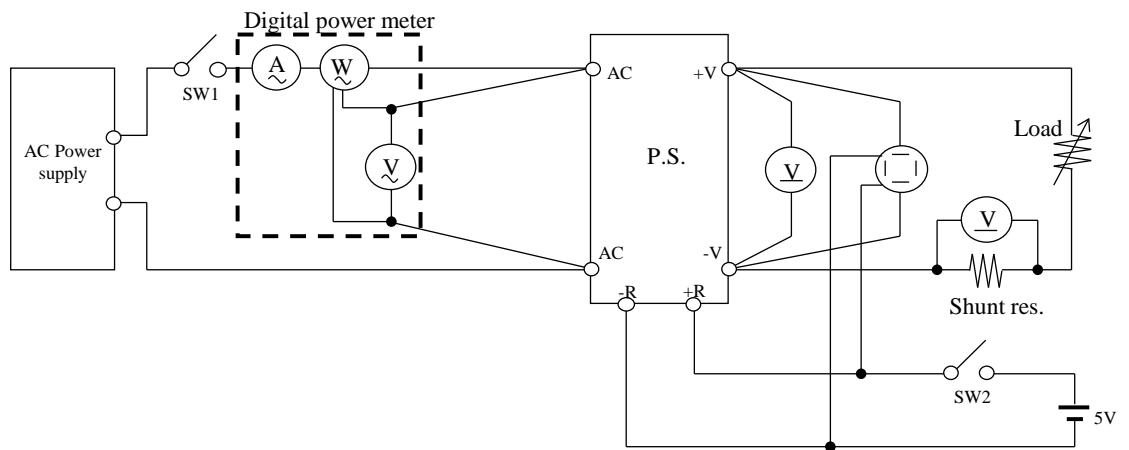
・リーク電流特性 Leakage current characteristics



測定回路5 Circuit 5 used for determination

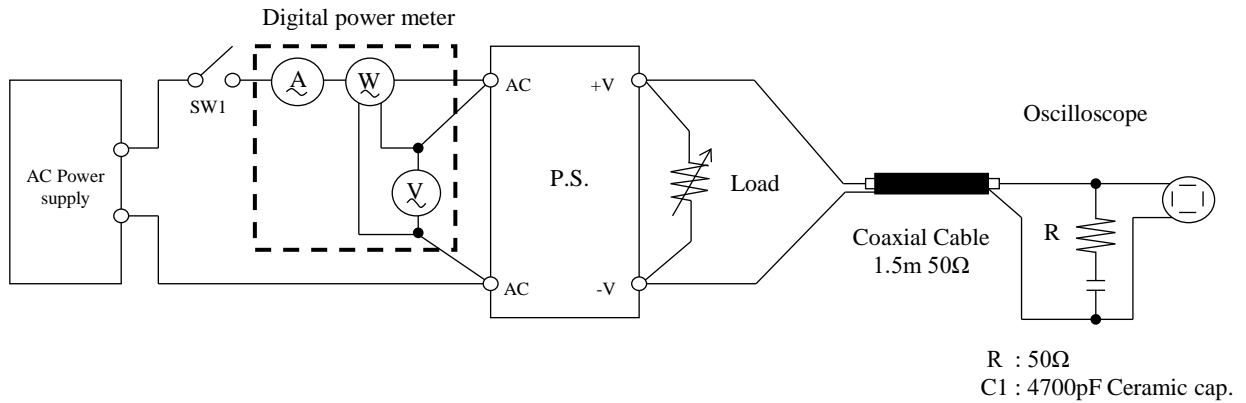
・ON/OFFコントロール時出力立ち上がり、立ち下がり特性
Output rise, fall characteristics with ON/OFF Control

準標準品 HWS50A-*/R にて対応
For alternative standard model HWS50A-*/R



測定回路6 Circuit 5 used for determination

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

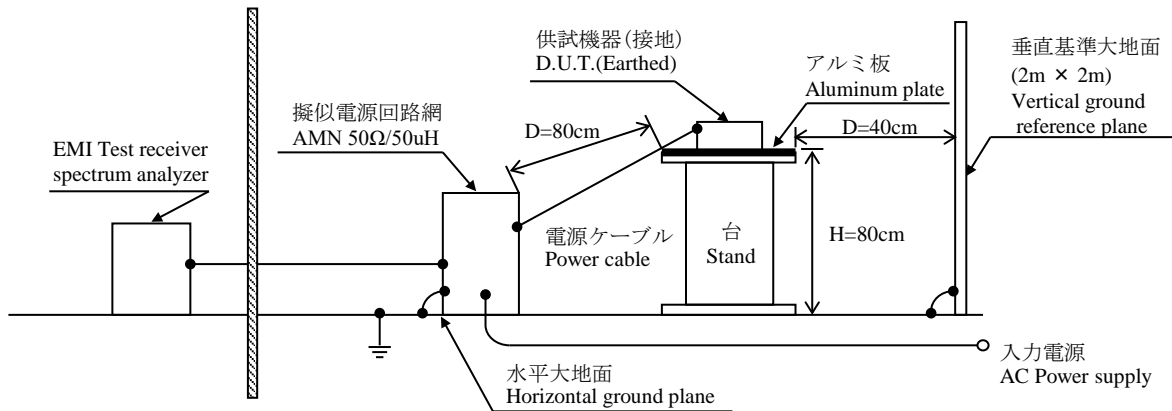


測定構成 Configuration used for determination

・EMI特性 Electro-Magnetic Interference characteristics

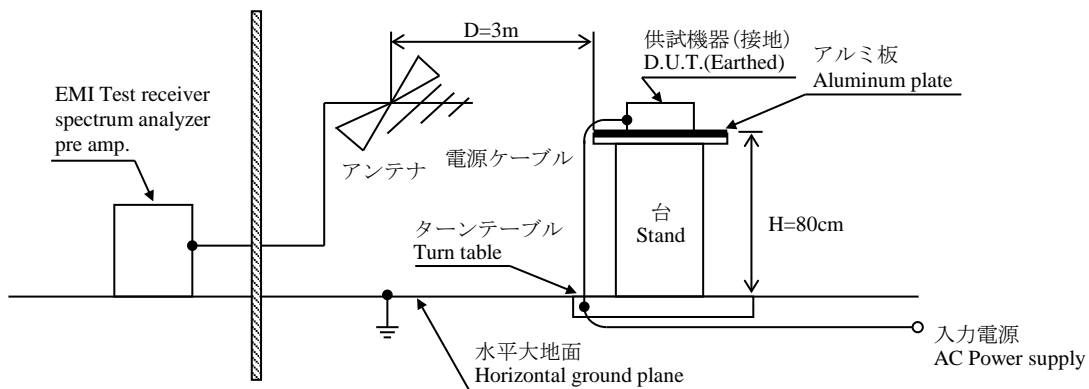
(a) 雑音端子電圧 (帰還ノイズ)

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	YOKOGAWA ELECT.	DL9040L / DLM2054
2	DIGITAL MULTIMETER	AGILENT	34970A
3	DIGITAL POWER METER	HIOKI	3334
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110 / WT210
5	CURRENT PROBE	YOKOGAWA ELECT.	701928 / 701930
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-400L / FK-600L
7	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ1004W / PLZ150U
8	DUMMY LOAD	PCN	PHF250 SERIES
9	ISOLATION TRANS	MATSUNAGA	3WTC-50K
10	CVCF	TAKASAGO	AA2000XG
11	CVCF	KIKUSUI	PCR4000L
12	CVCF	NF	ES10000S
13	LEAKAGE CURRENT METER	HIOKI	3156
14	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
15	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261 / SH-240
16	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
17	PRE AMP.	SONOMA	310N
18	AMN	SCHWARZBECK	NNLK8121
19	ANTENNA	SCHWARZBECK	CBL6111D
20	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
21	SINGLE-PHASE MASTER	NF	4420
22	REFERENCE IMPEDANCE NETWORK 20A	NF	4150
23	MULTI OUTLET UNIT	KIKUSUI	OT01-KHA

2. 特性データ

Characteristics

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

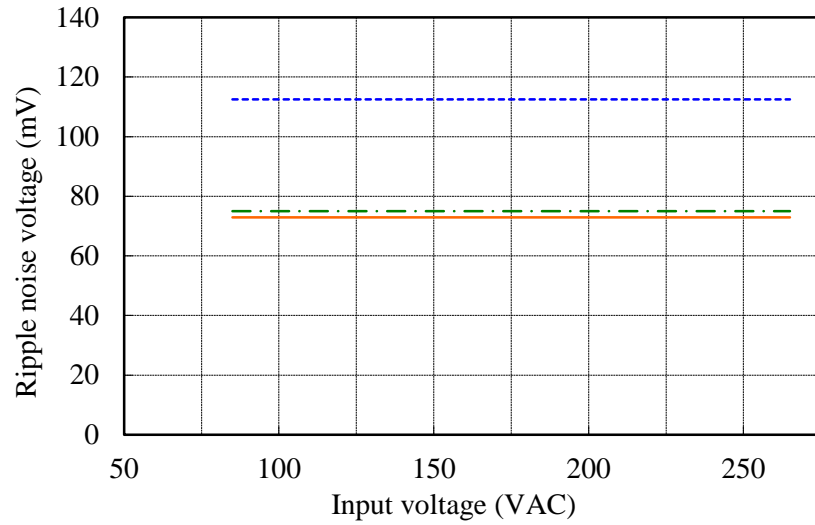
5V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation		
0%	5.014V	5.014V	5.014V	5.014V	0mV	0.000%	
50%	5.007V	5.007V	5.007V	5.007V	0mV	0.000%	
100%	5.000V	5.000V	5.000V	5.000V	0mV	0.000%	
load regulation	14mV	14mV	14mV	14mV			
	0.280%	0.280%	0.280%	0.280%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	4.997V	5.000V	4.998V	3mV	0.060%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		76VAC					
Drop out voltage (Vin)		69VAC					
12V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation		
0%	12.017V	12.018V	12.018V	12.018V	1mV	0.008%	
50%	12.014V	12.015V	12.015V	12.015V	1mV	0.008%	
100%	12.012V	12.012V	12.012V	12.012V	0mV	0.000%	
load regulation	5mV	6mV	6mV	6mV			
	0.042%	0.050%	0.050%	0.050%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	12.026V	12.012V	12.004V	22mV	0.183%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		76VAC					
Drop out voltage (Vin)		69VAC					
24V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation		
0%	24.041V	24.041V	24.041V	24.041V	0mV	0.000%	
50%	24.038V	24.038V	24.039V	24.039V	1mV	0.004%	
100%	24.038V	24.038V	24.039V	24.038V	1mV	0.004%	
load regulation	3mV	3mV	2mV	3mV			
	0.013%	0.013%	0.008%	0.013%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	23.989V	24.038V	23.946V	92mV	0.383%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		76VAC					
Drop out voltage (Vin)		71VAC					

(2) リップルノイズ電圧対入力電圧

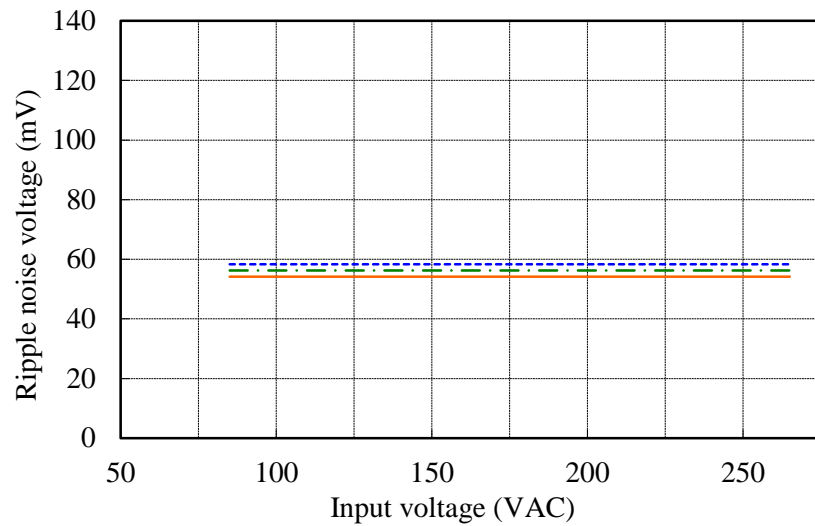
Ripple noise voltage vs. Input voltage

Conditions Iout : 100 %
 Ta : -10 °C ---
 25 °C - - -
 50 °C ———

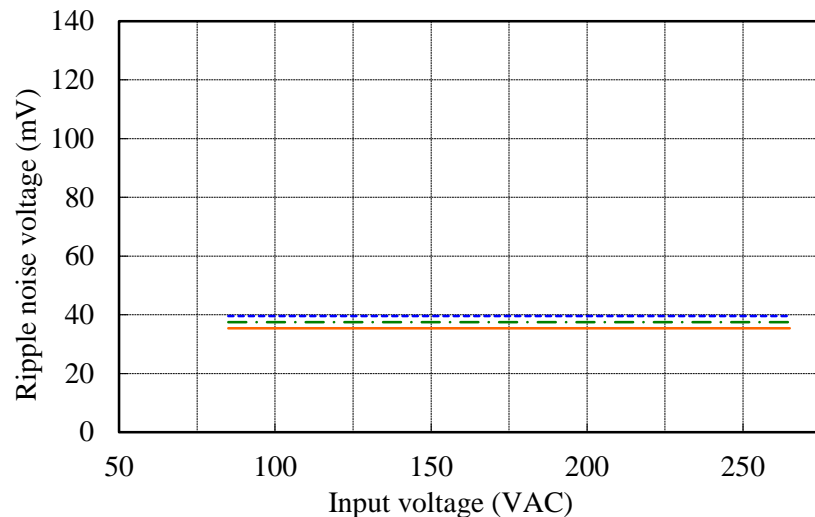
5V



12V



24V

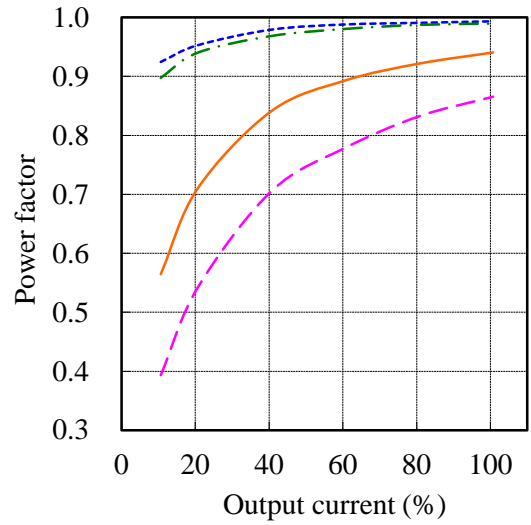
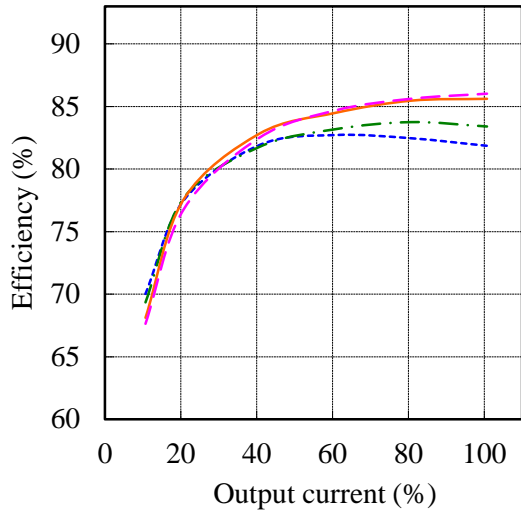


(3) 効率・力率対出力電流

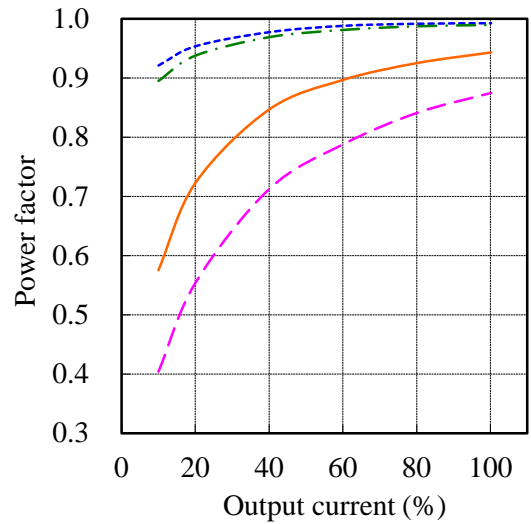
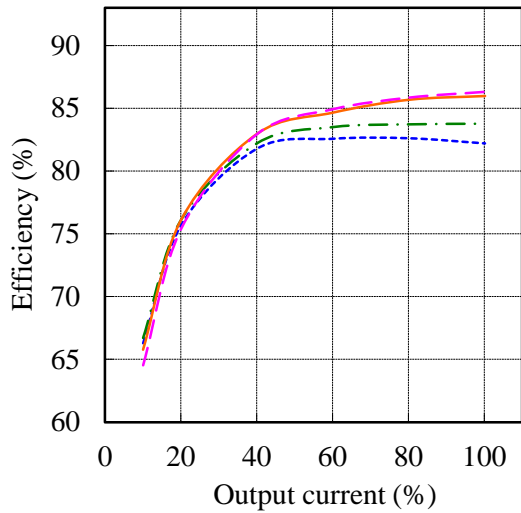
Efficiency and Power factor vs. Output current

Conditions Vin : 85 VAC ---
 100 VAC - - -
 200 VAC ———
 265 VAC - · - · -
 Ta : 25 °C

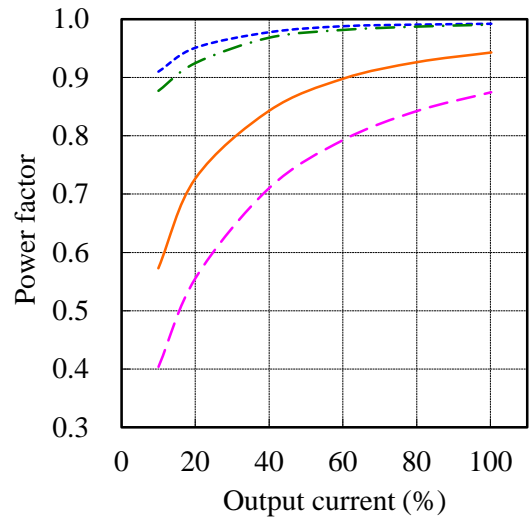
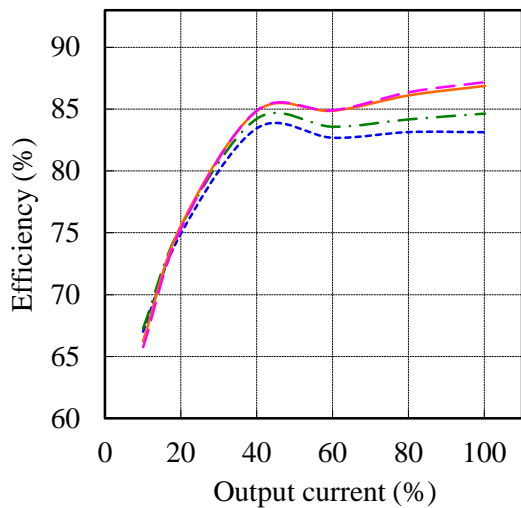
5V



12V



24V

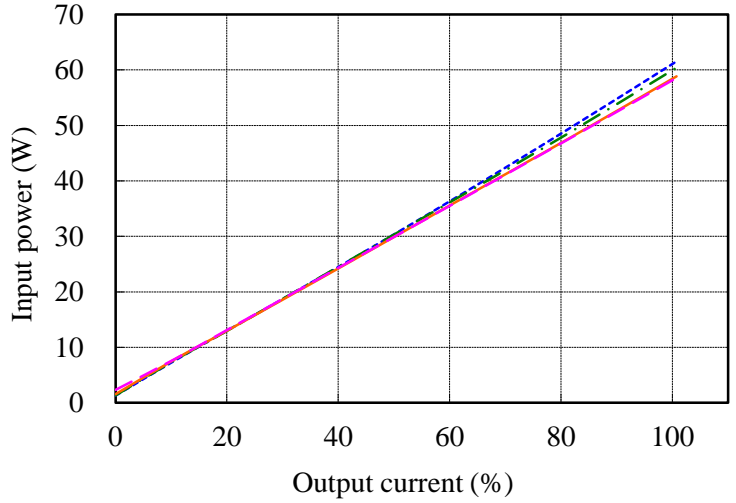


(4) 入力電力対出力電流
Input power vs. Output current

Conditions Vin : 85 VAC ---
 100 VAC - - -
 200 VAC ---
 265 VAC - - -
 Ta : 25 °C

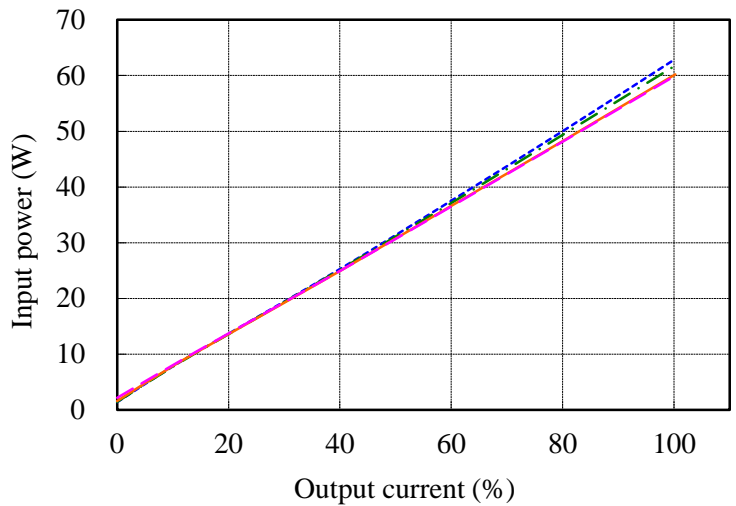
5V

Vin	Input power
	Iout : 0%
85VAC	1.3W
100VAC	1.3W
200VAC	1.6W
265VAC	2.3W



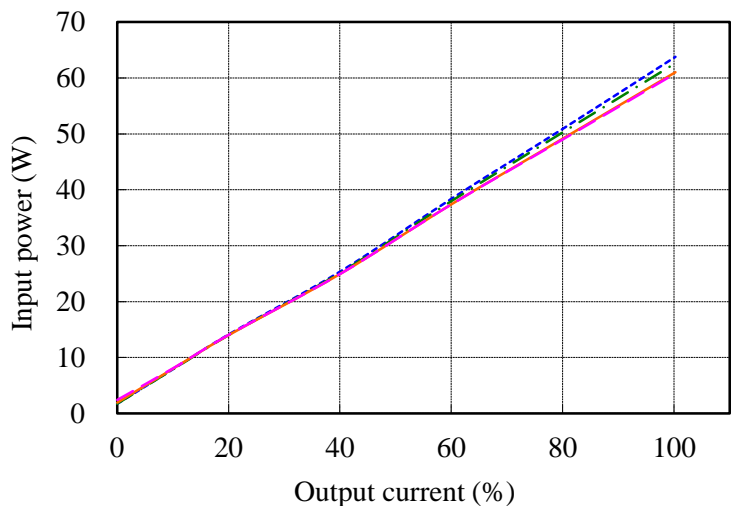
12V

Vin	Input power
	Iout : 0%
85VAC	1.4W
100VAC	1.4W
200VAC	1.6W
265VAC	2.2W



24V

Vin	Input power
	Iout : 0%
85VAC	1.8W
100VAC	1.7W
200VAC	2.0W
265VAC	2.4W

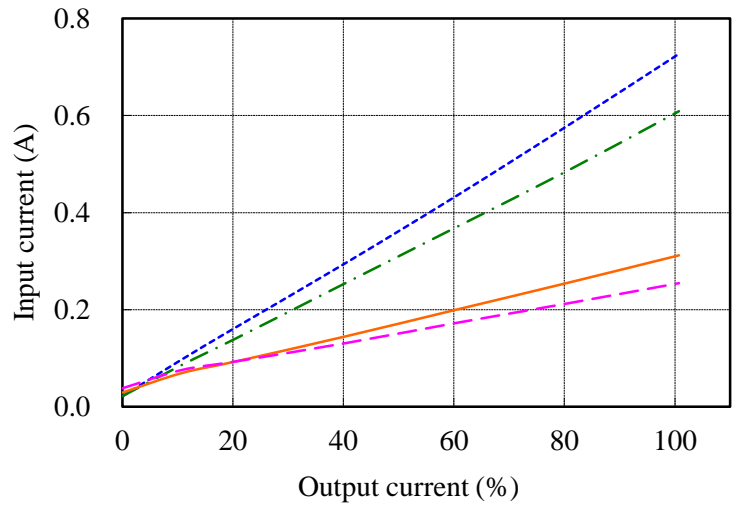


(5) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 85 VAC ---
 100 VAC - - -
 200 VAC ---
 265 VAC - - -
 Ta : 25 °C

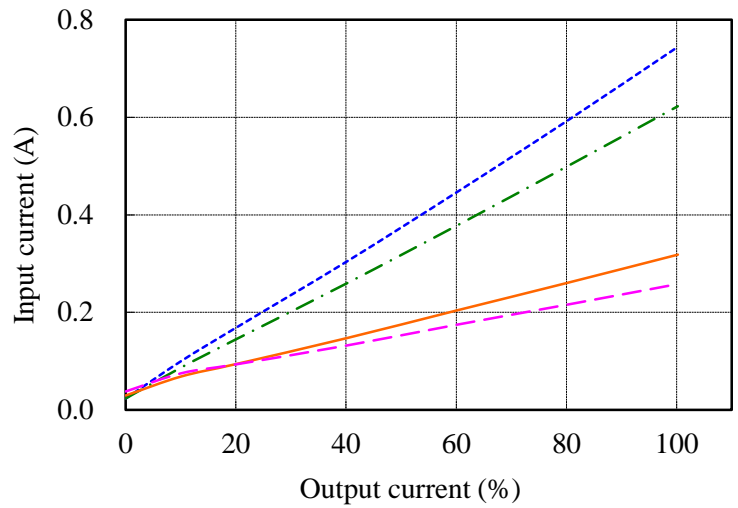
5V

Vin	Input current
	Iout : 0%
85VAC	0.02A
100VAC	0.02A
200VAC	0.03A
265VAC	0.04A



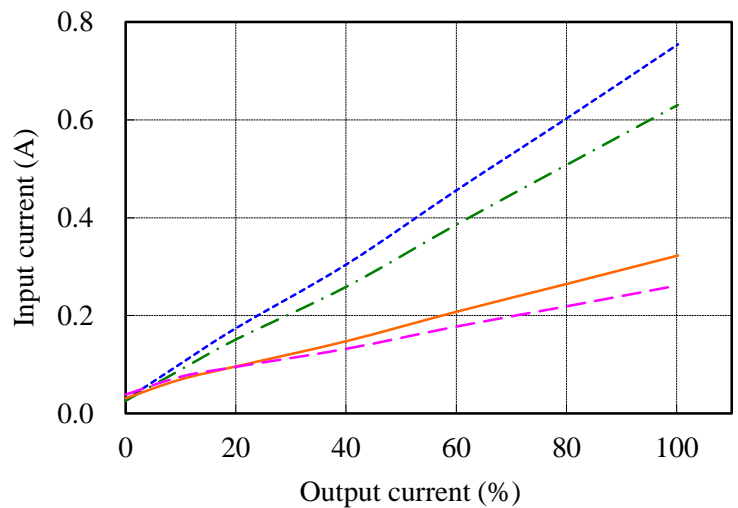
12V

Vin	Input current
	Iout : 0%
85VAC	0.02A
100VAC	0.02A
200VAC	0.03A
265VAC	0.04A



24V

Vin	Input current
	Iout : 0%
85VAC	0.03A
100VAC	0.03A
200VAC	0.03A
265VAC	0.04A

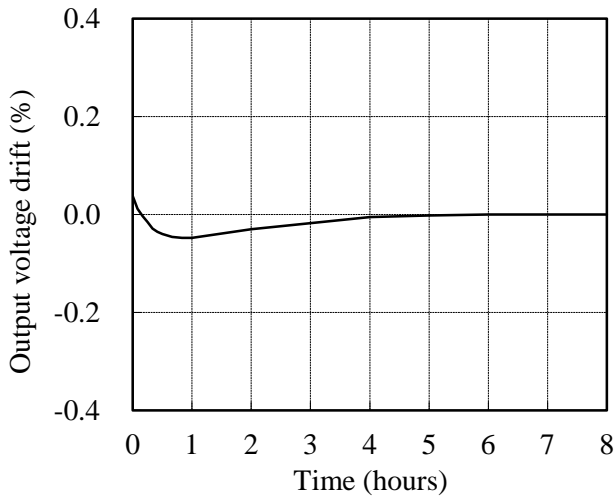


2.2 通電ドリフト特性

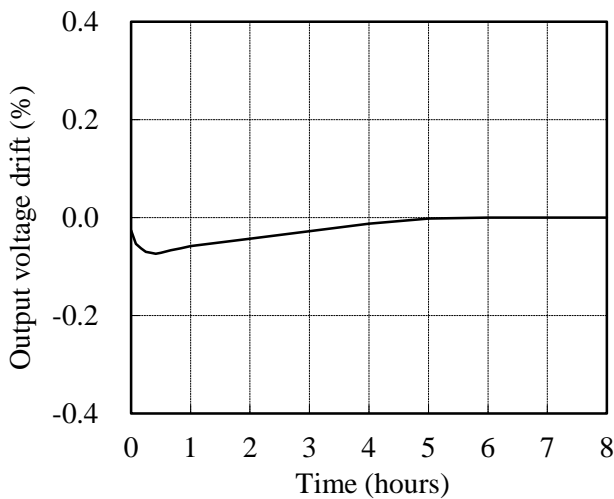
Warm up voltage drift characteristics

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

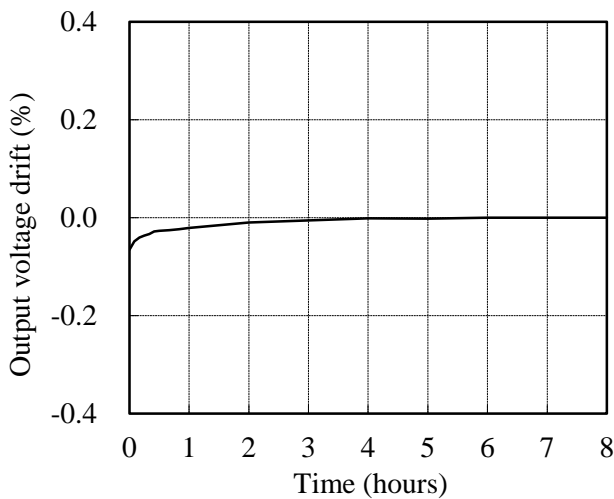
5V



12V



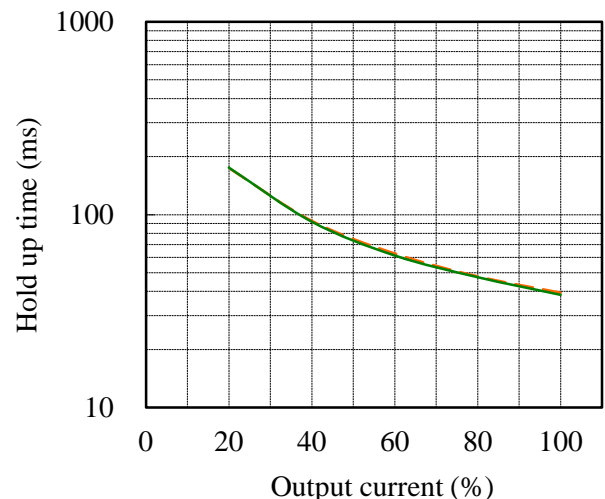
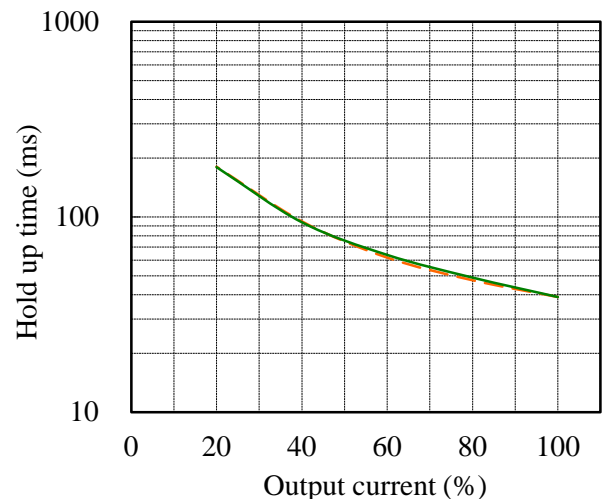
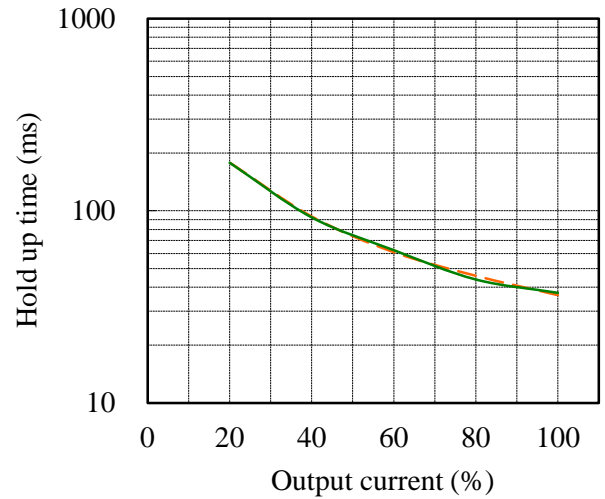
24V



2.3 出力保持時間特性

Hold up time characteristics

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

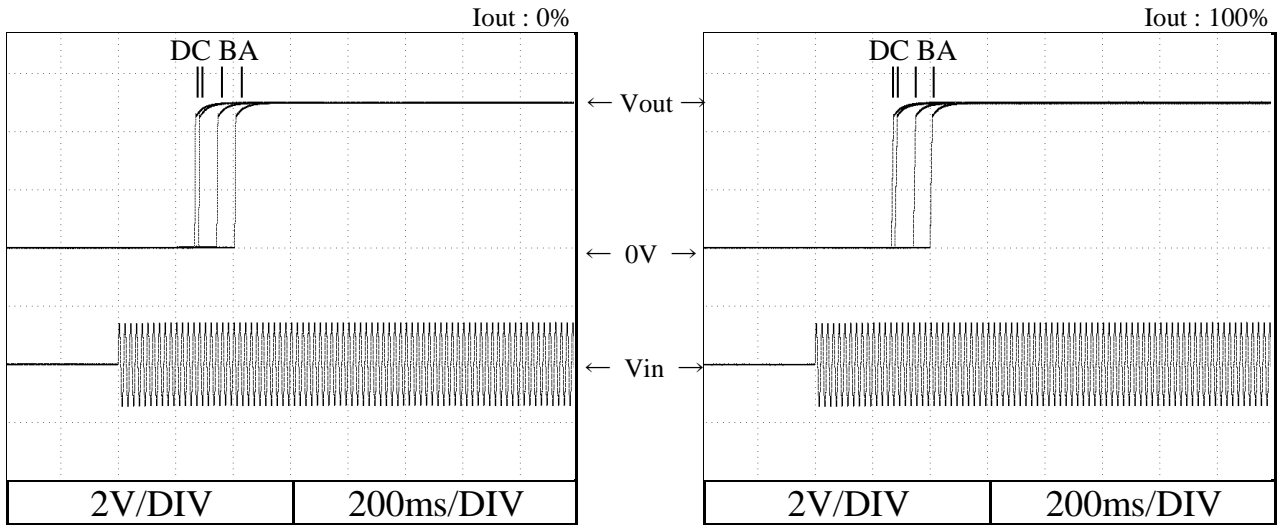


2.4 出力立ち上がり特性

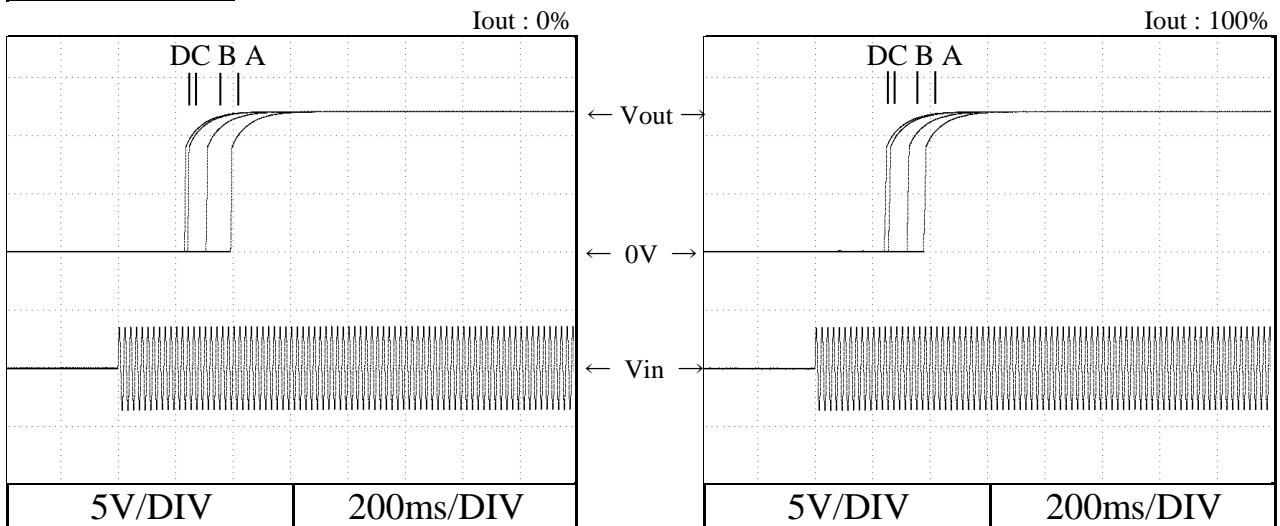
Output rise characteristics

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

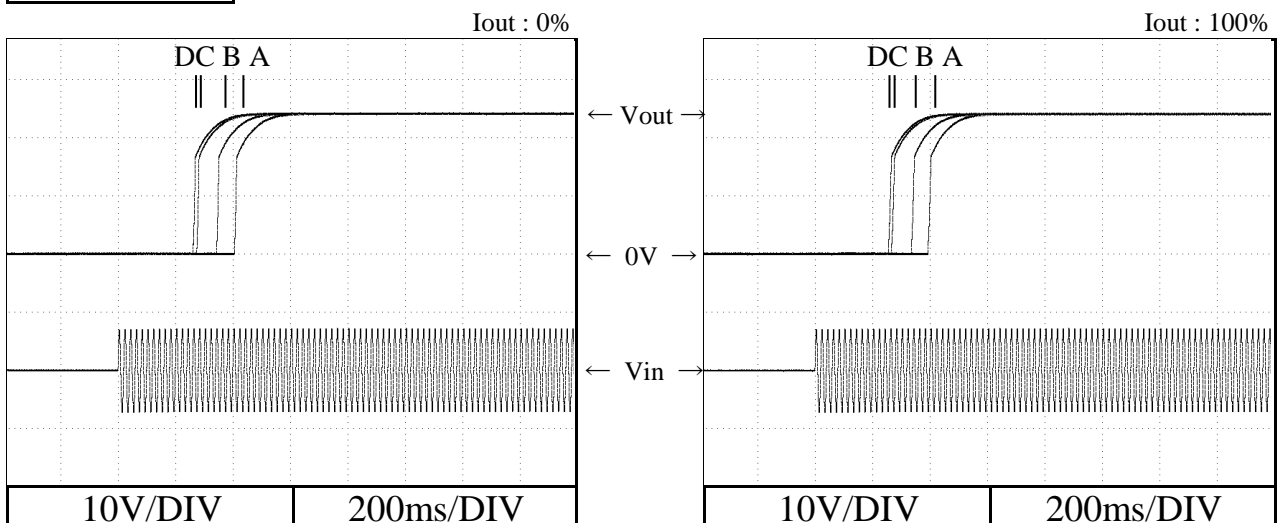
5V



12V



24V

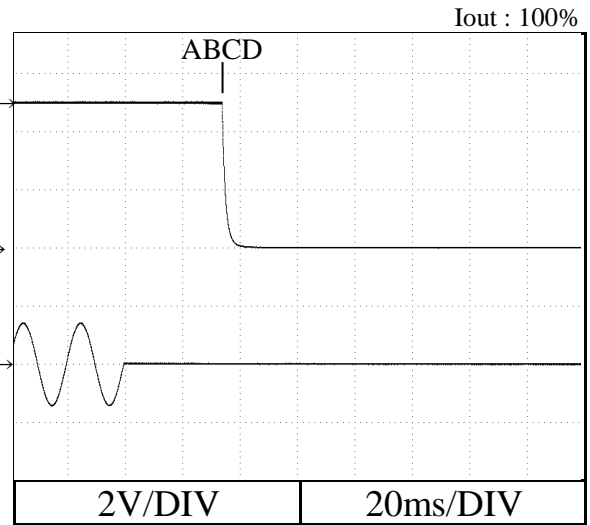
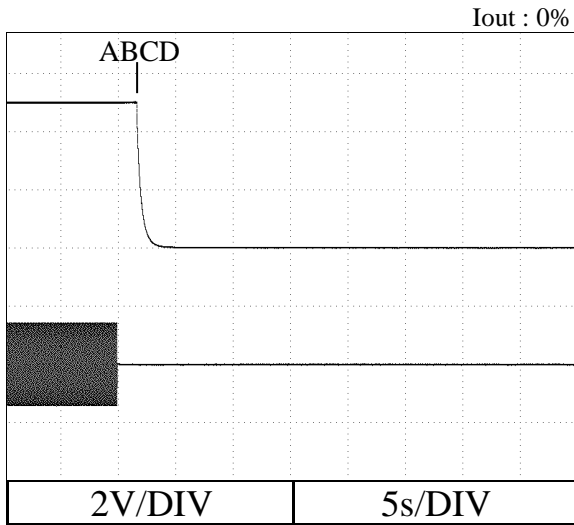


2.5 出力立ち下がり特性

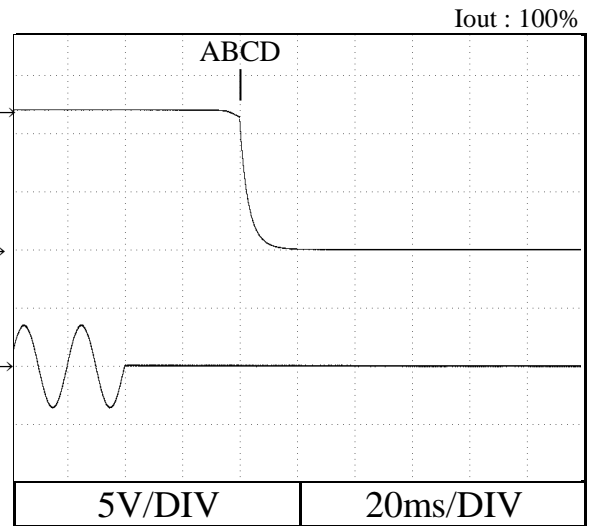
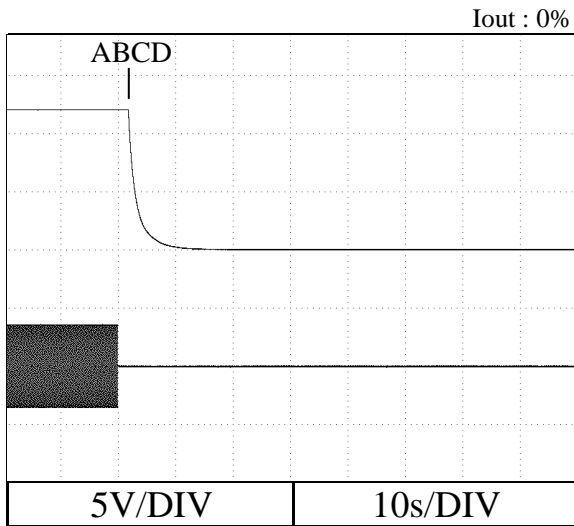
Output fall characteristics

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

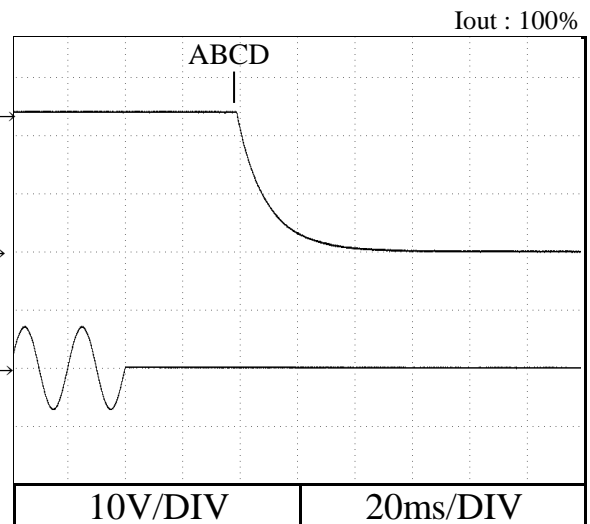
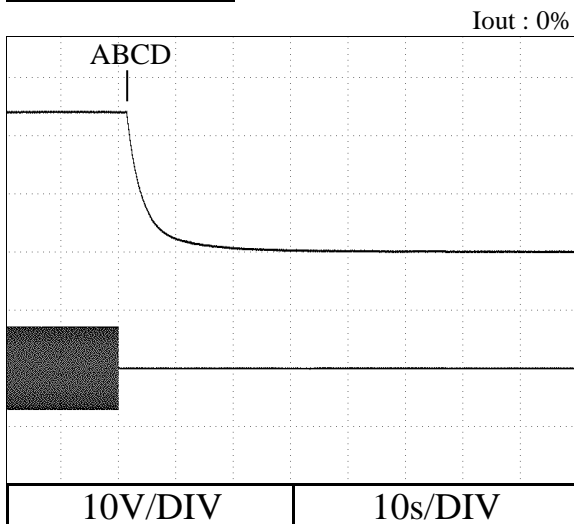
5V



12V



24V



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

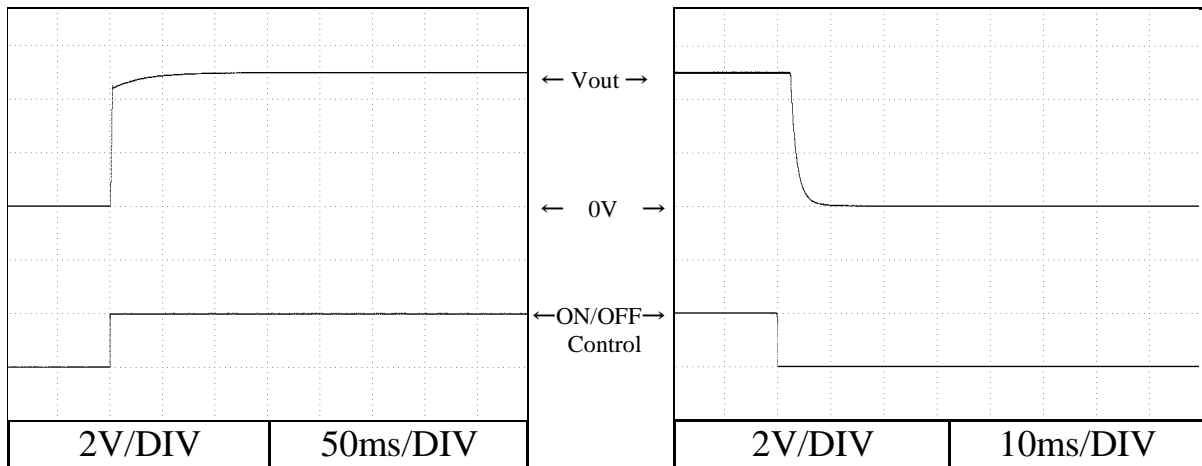
Iout : 100 %

Ta : 25 °C

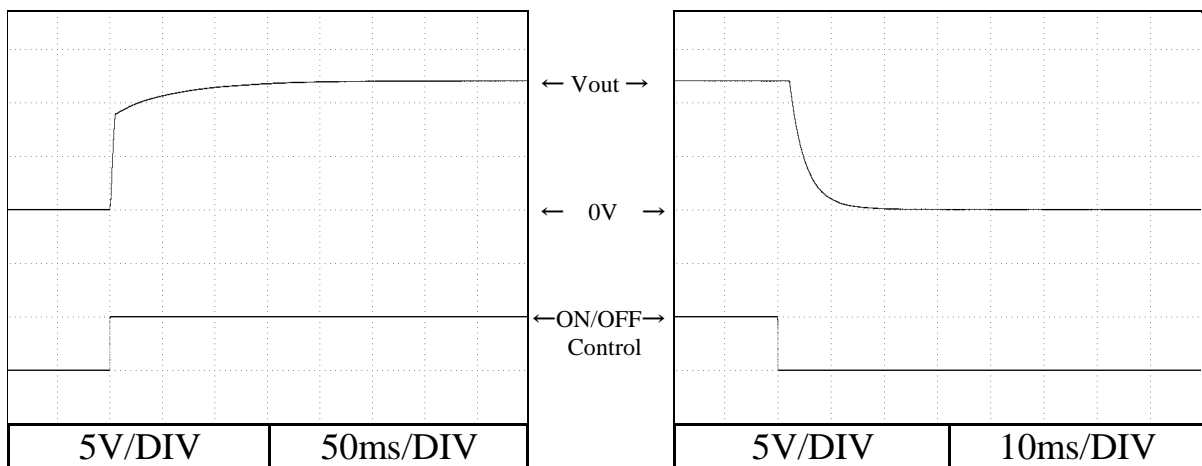
準標準品 HWS50A-*/R にて対応

For alternative standard model HWS50A-*/R

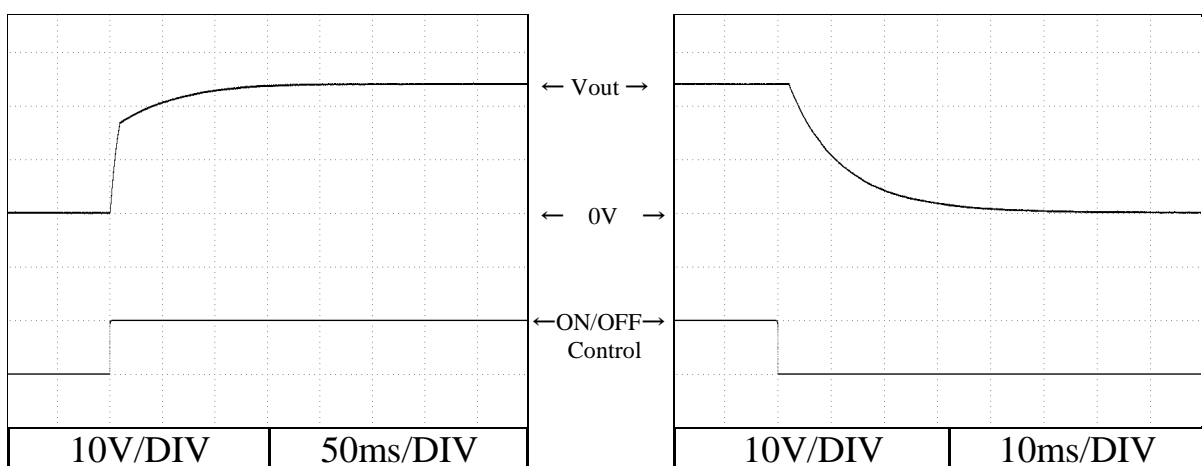
5V



12V



24V

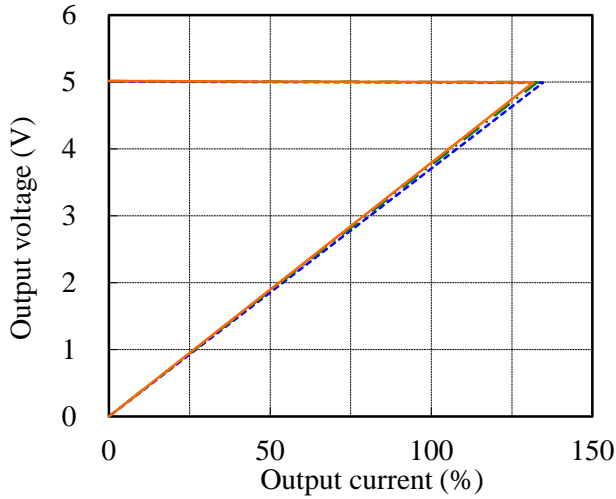


2.7 過電流保護特性

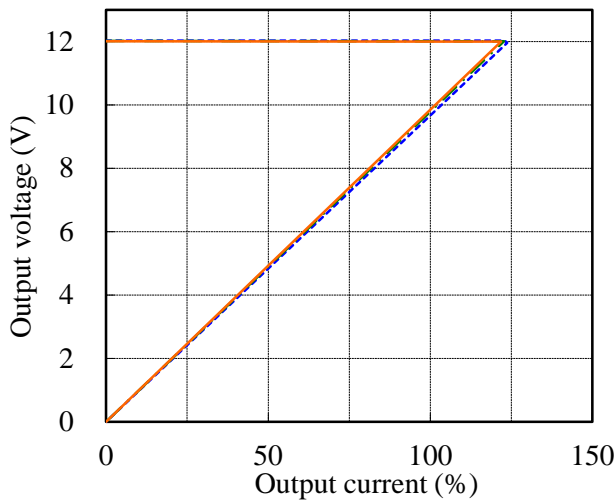
Over current protection (OCP) characteristics

Conditions V_{in} : 100 VAC
 T_a : -10 °C ---
 25 °C - - -
 50 °C ———

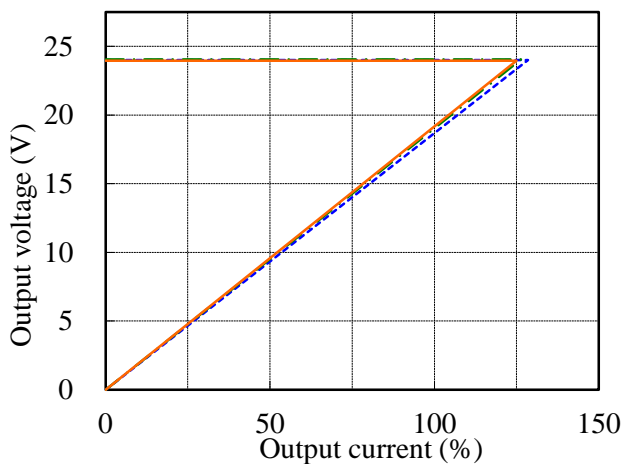
5V



12V



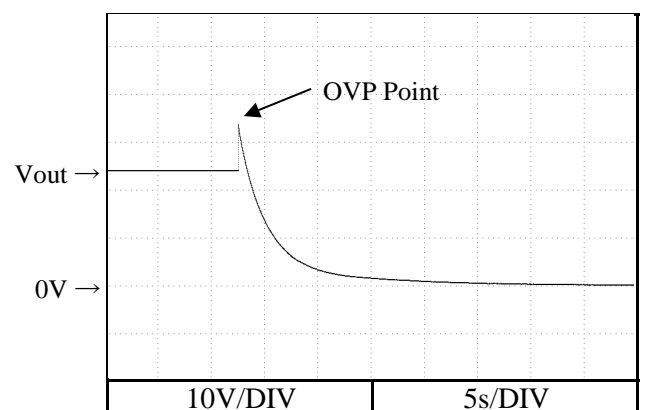
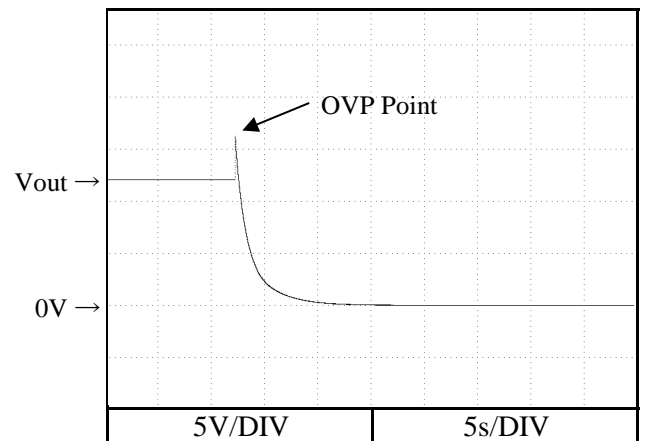
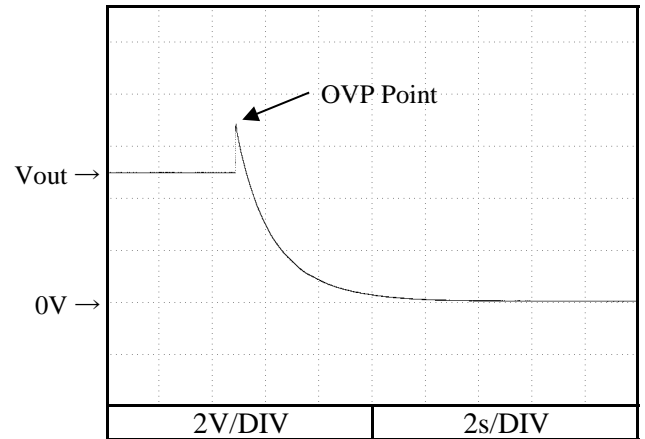
24V



2.8 過電圧保護特性

Over voltage protection (OVP) characteristics

Conditions V_{in} : 100 VAC
 I_{out} : 0 %
 T_a : 25 °C

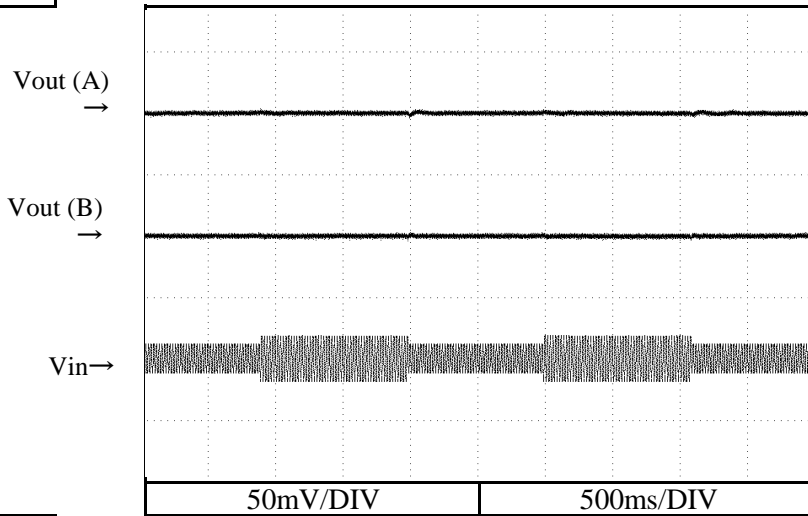


2.9 過渡応答 (入力急変) 特性

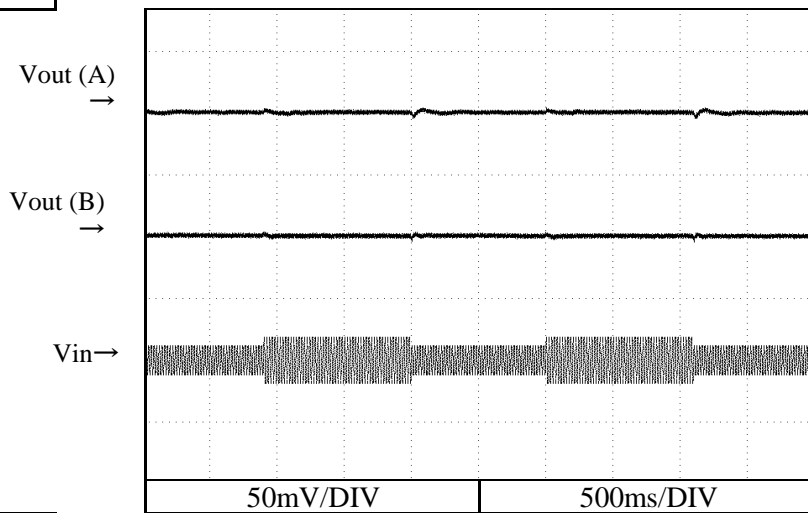
Dynamic line response characteristics

Conditions Vin : 85 VAC \leftrightarrow 132VAC (A)
 170 VAC \leftrightarrow 265VAC (B)
 Iout : 100 %
 Ta : 25 °C

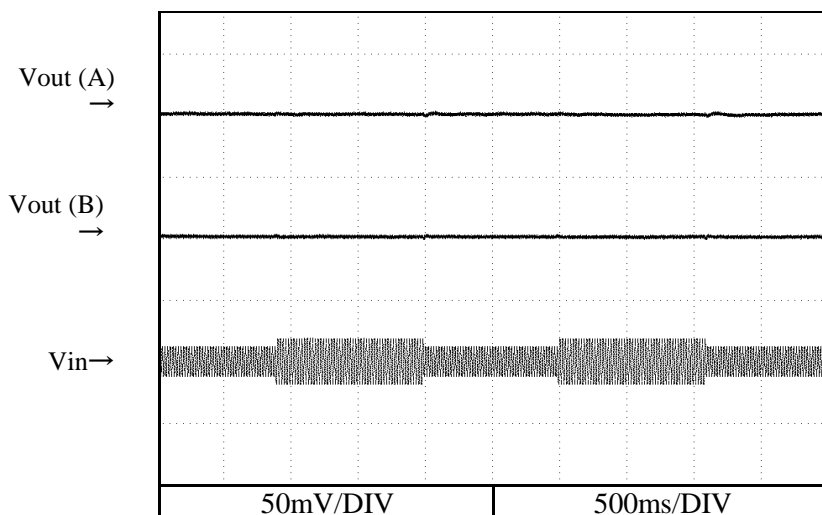
5V



12V



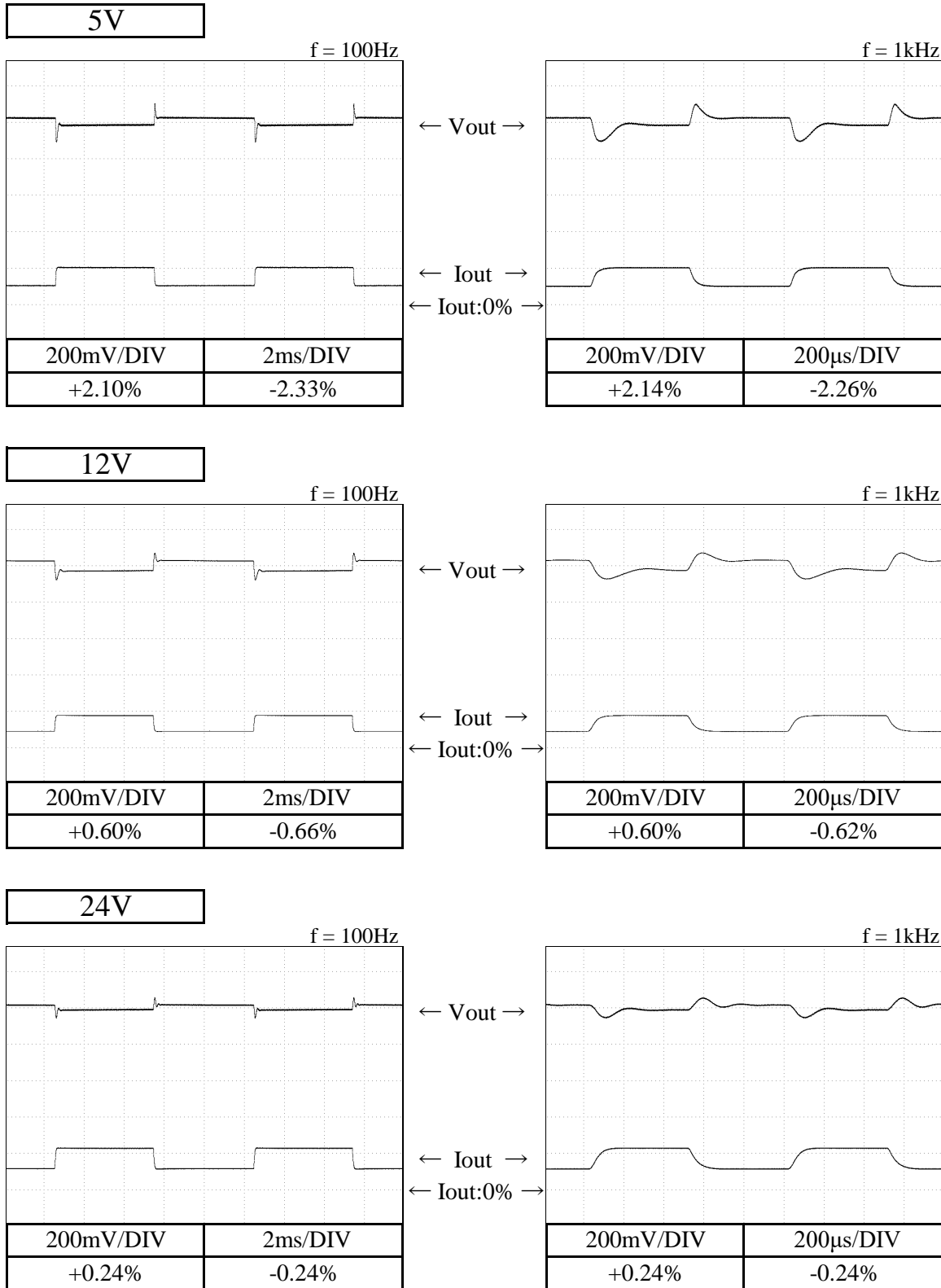
24V



2.10 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



2.11 入力電圧瞬停特性

Response to brown out characteristics

Conditions $I_{out} : 100\%$
 $T_a : 25\text{ }^\circ\text{C}$

瞬停時間 Interruption time

A : 出力電圧が低下なし Output voltage does not drop.

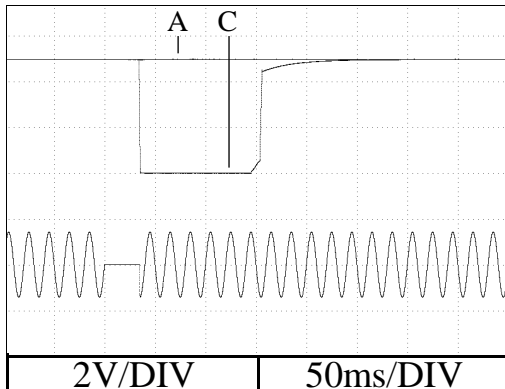
B : 出力電圧の低下が0Vまでいかない Output voltage drop down not reaching 0V.

C : 出力電圧が0Vまで低下 Output voltage drops until 0V.

5V

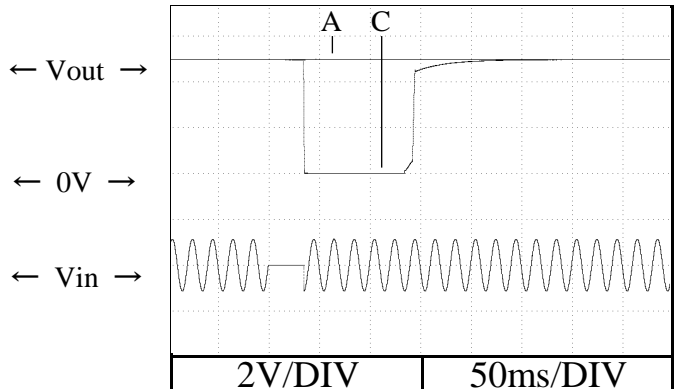
$V_{in} : 100\text{VAC}$

$A = 34\text{ms}$, $C = 35\text{ms}$



$V_{in} : 200\text{VAC}$

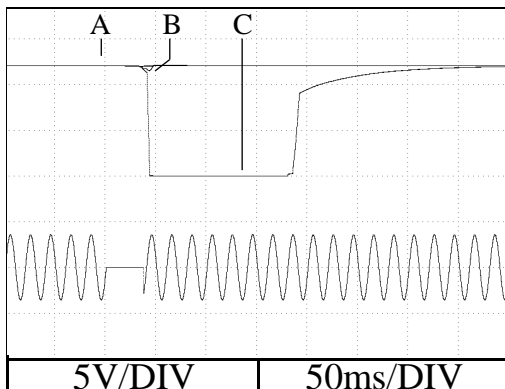
$A = 34\text{ms}$, $C = 35\text{ms}$



12V

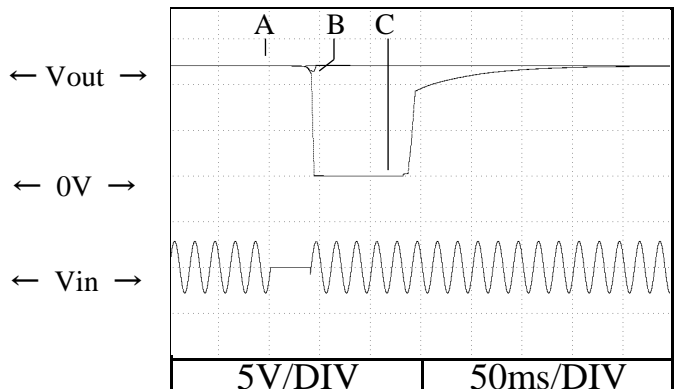
$V_{in} : 100\text{VAC}$

$A = 34\text{ms}$, $B = 36\text{ms}$, $C = 37\text{ms}$



$V_{in} : 200\text{VAC}$

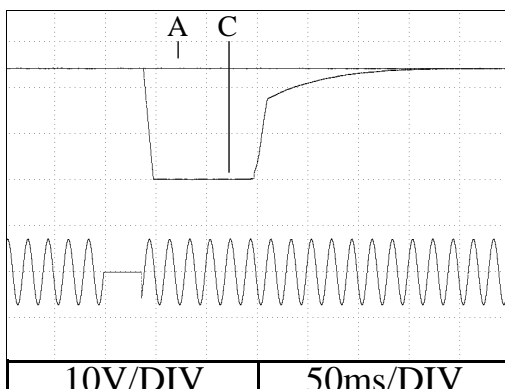
$A = 35\text{ms}$, $B = 38\text{ms}$, $C = 39\text{ms}$



24V

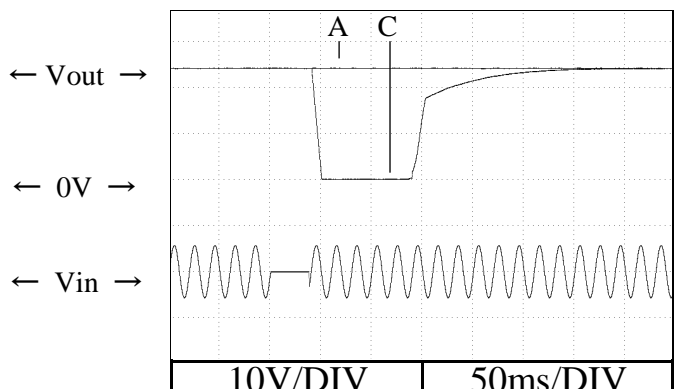
$V_{in} : 100\text{VAC}$

$A = 36\text{ms}$, $C = 37\text{ms}$



$V_{in} : 200\text{VAC}$

$A = 37\text{ms}$, $C = 38\text{ms}$

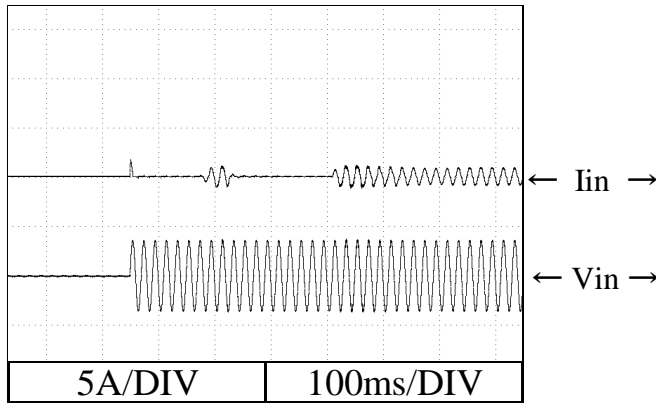


2.12 入力サージ電流（突入電流）波形
Inrush current waveform

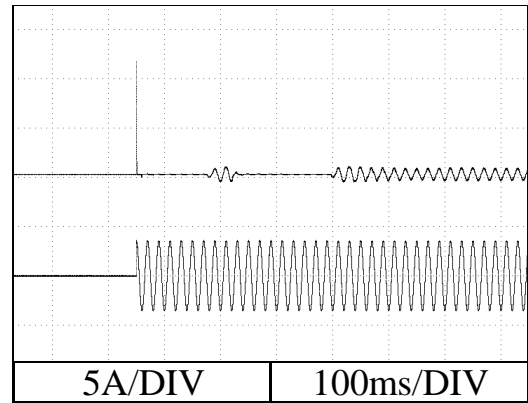
5V

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

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

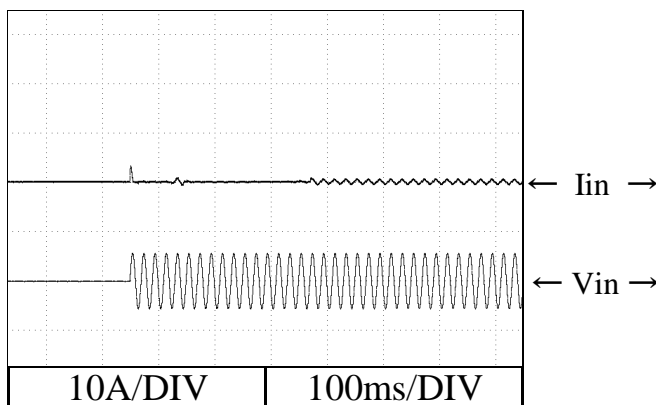


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

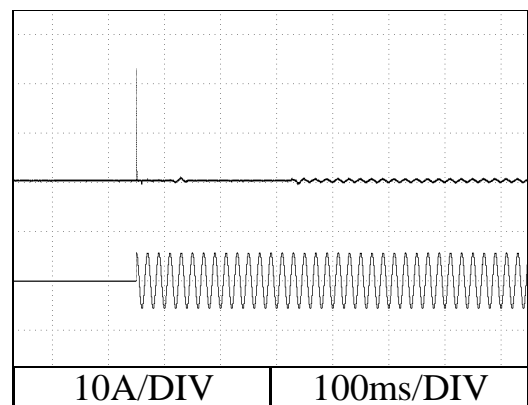


Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

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



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



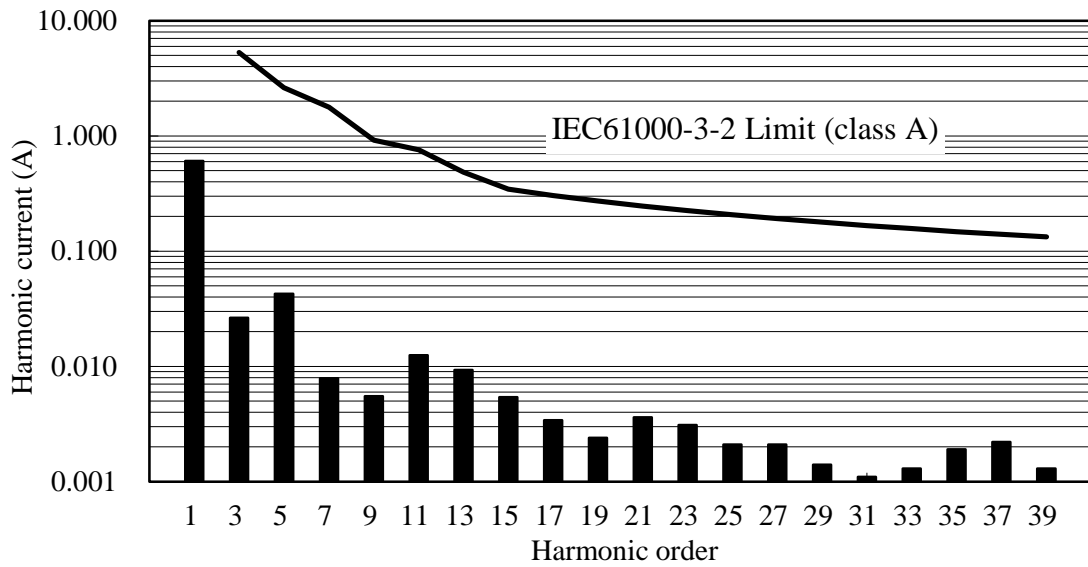
2.13 高調波成分

Input current harmonics

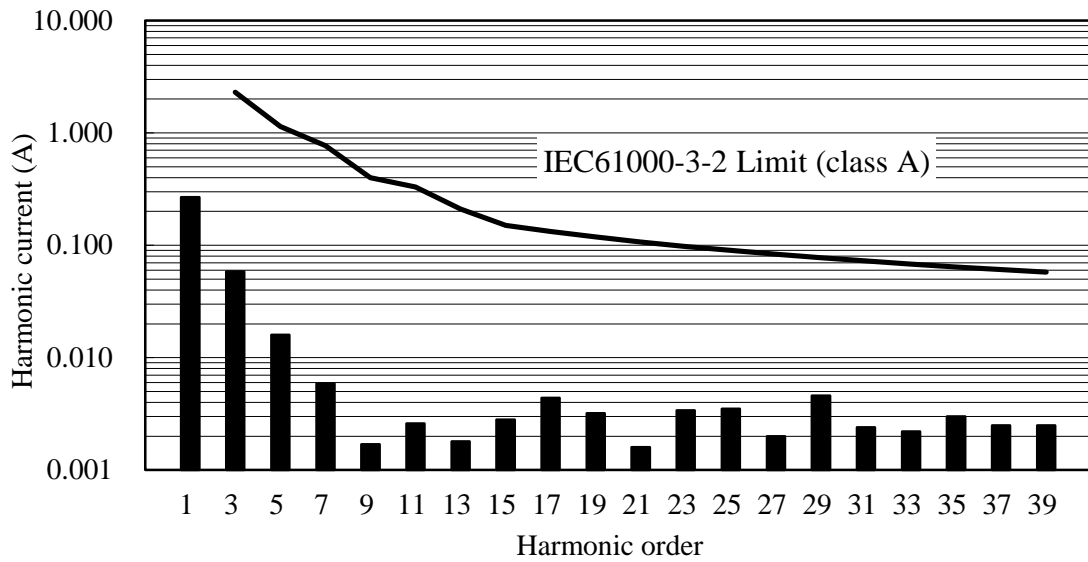
Conditions Iout : 100 %
Ta : 25 °C

5V

Vin : 100 VAC



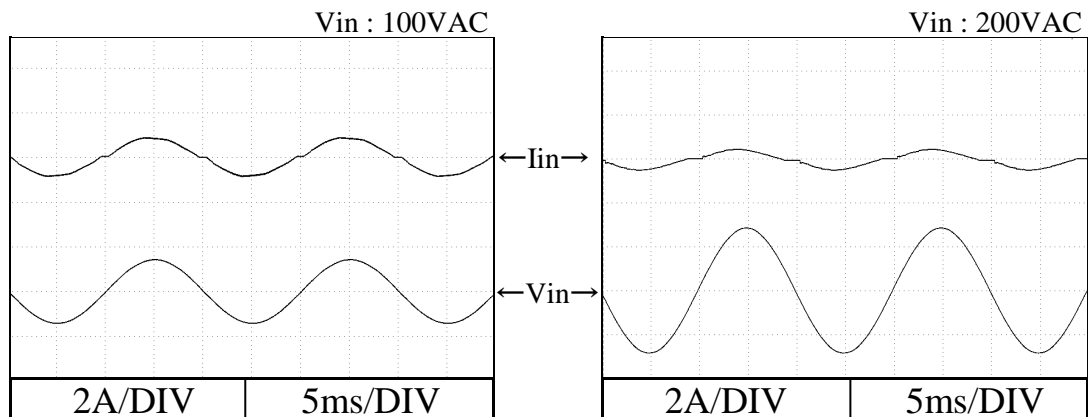
Vin : 230 VAC



2.14 入力電流波形

Input current waveform

Conditions Iout : 100 %
Ta : 25 °C



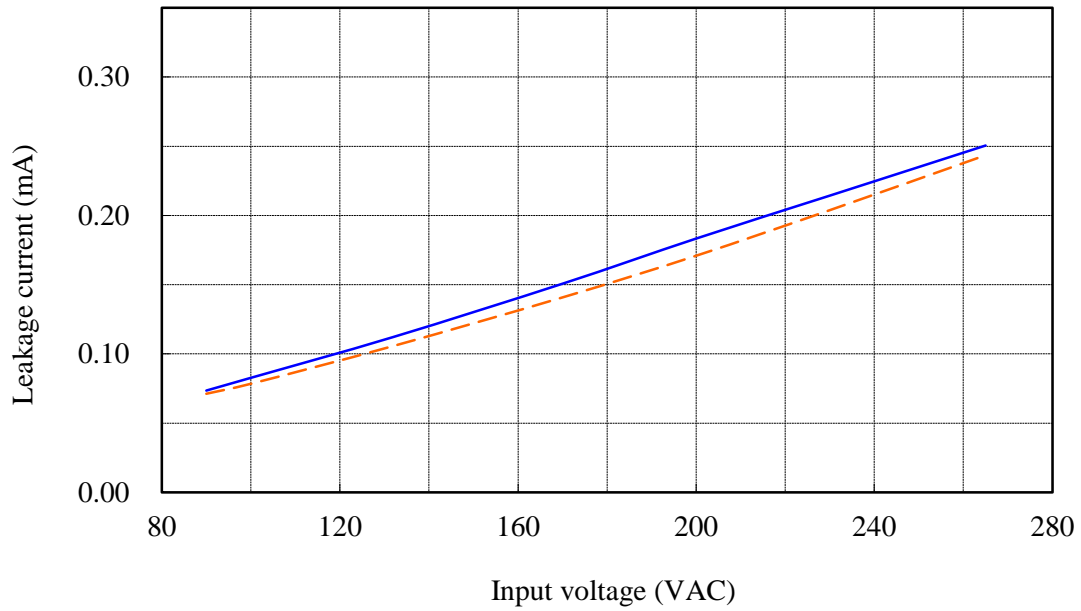
2.15 リーク電流特性

Leakage current characteristics

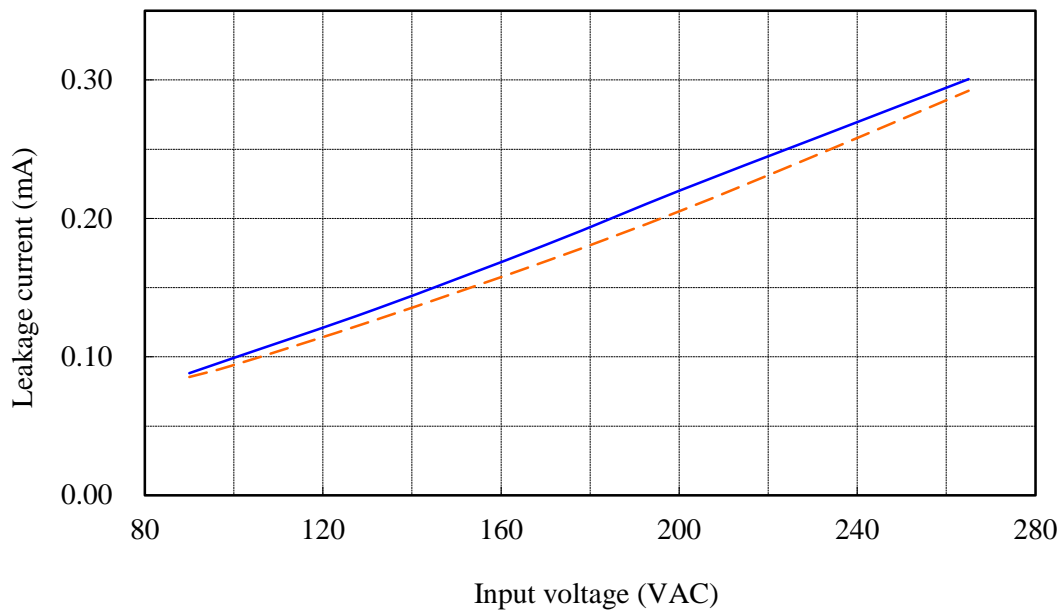
Conditions Iout : 0 % —
100 % - - -
Ta : 25 °C
Equipment used : 3156 (HIOKI)

5V

f : 50 Hz



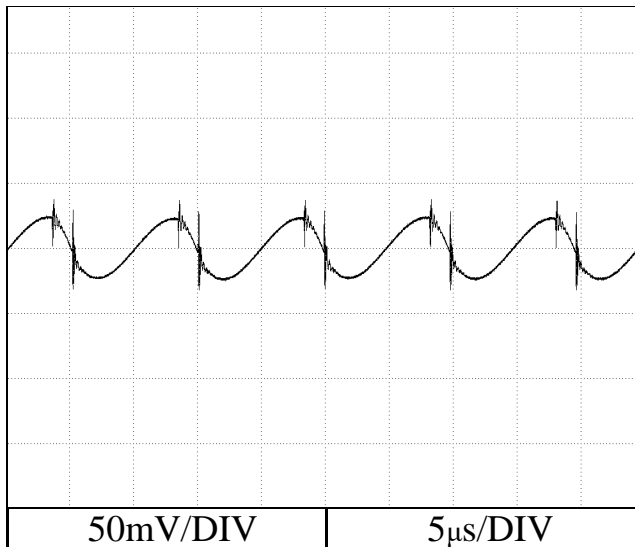
f : 60 Hz



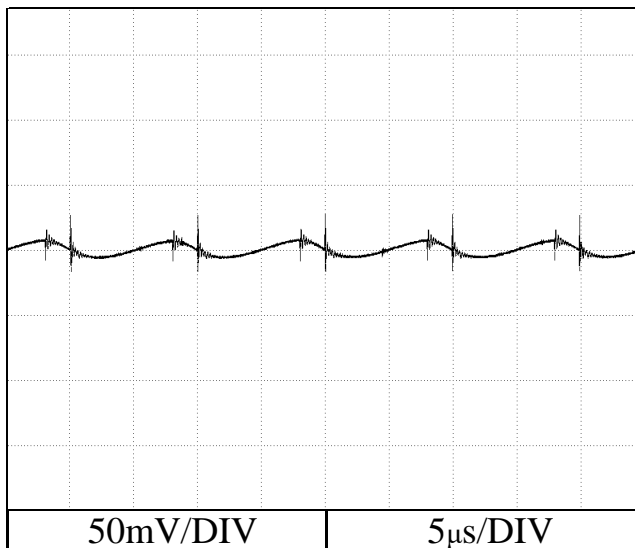
2.16 出力リップル、ノイズ波形
Output ripple and noise waveform

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

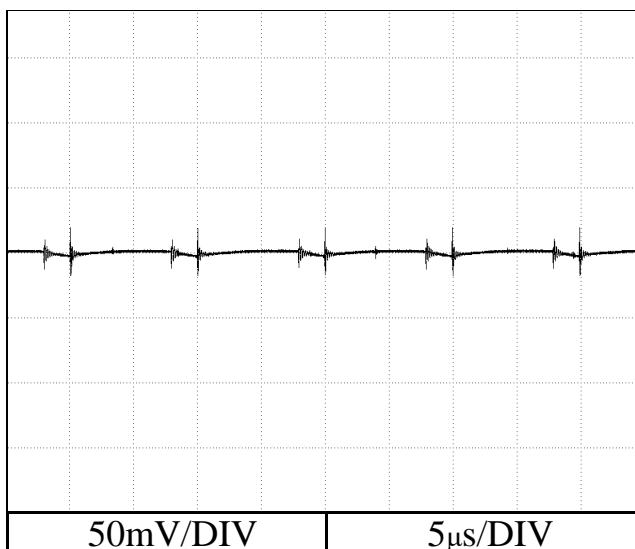
5V



12V



24V

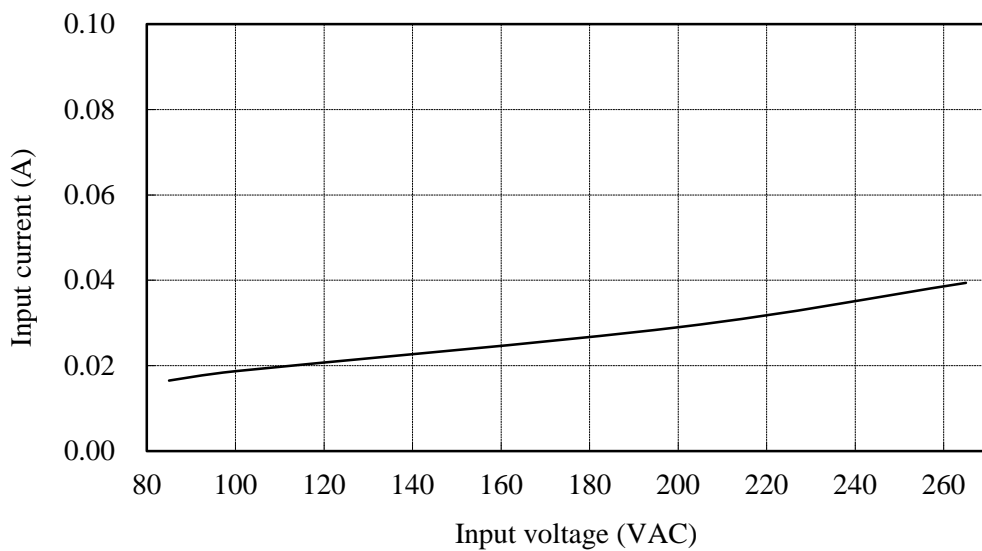
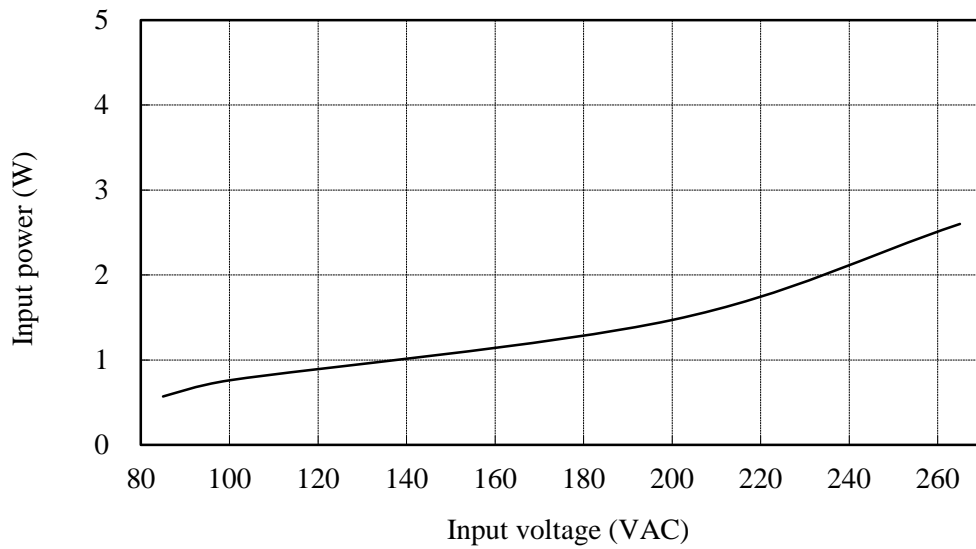


2.17 リモートコントロールOFF時入力電力・入力電流対入力電圧 Input power and Input current vs. Input voltage with Remote control OFF

準標準品 HWS50A-*/R にて対応
For alternative standard model HWS50A-*/R

Condition Ta : 25 °C

5V



2.18 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC

Iout : 100 %

Ta : 25 °C

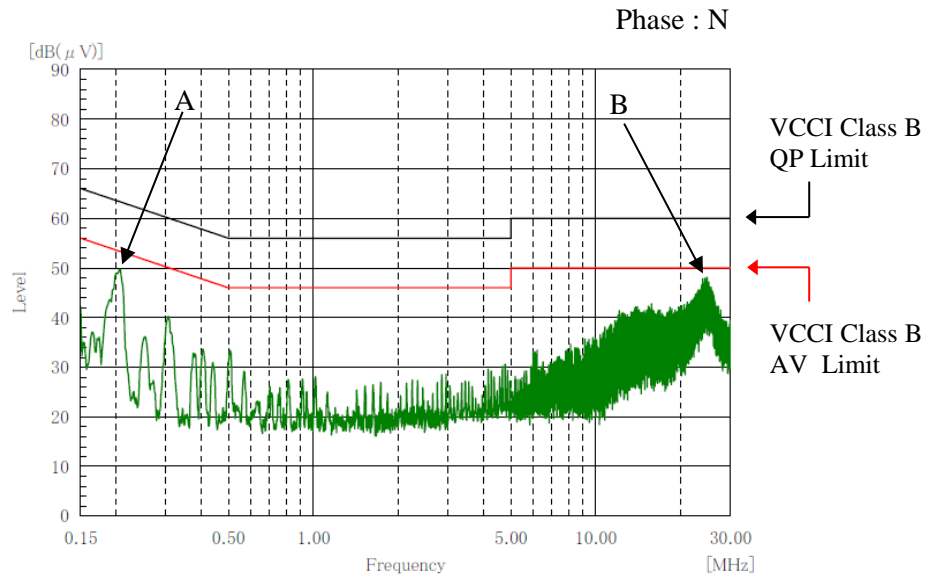
雑音端子電圧

Conducted Emission

5V

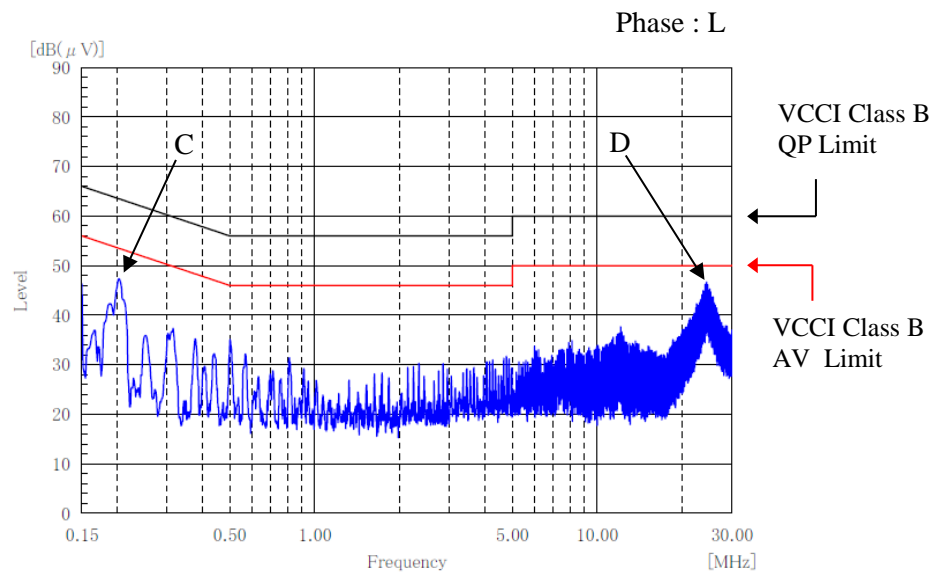
Point A (205kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.4	47.7
AV	53.4	44.0

Point B (25MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	45.5
AV	50.0	42.3



Point C (202kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.5	45.7
AV	53.5	31.9

Point D (24MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	44.1
AV	50.0	41.4



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.

2.18 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC

Iout : 100 %

Ta : 25 °C

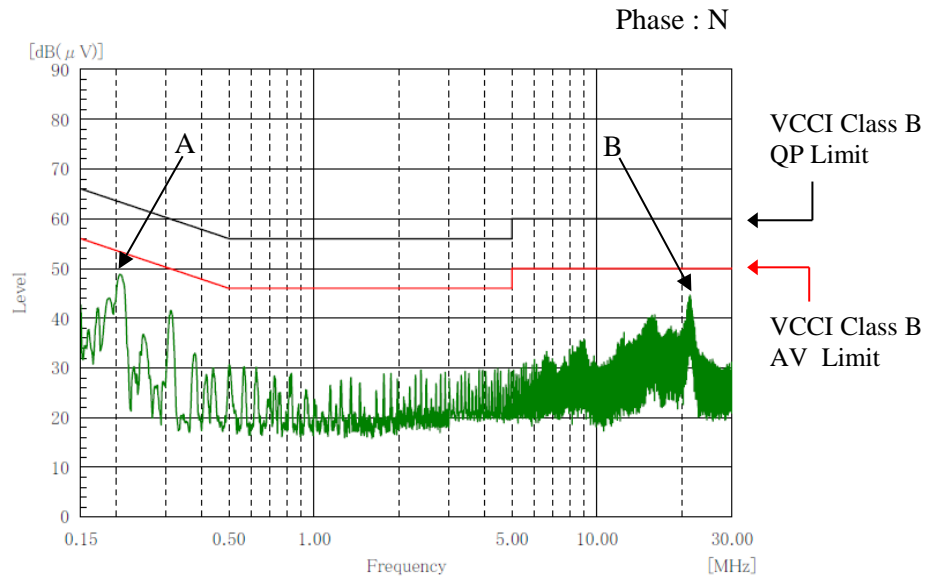
雑音端子電圧

Conducted Emission

12V

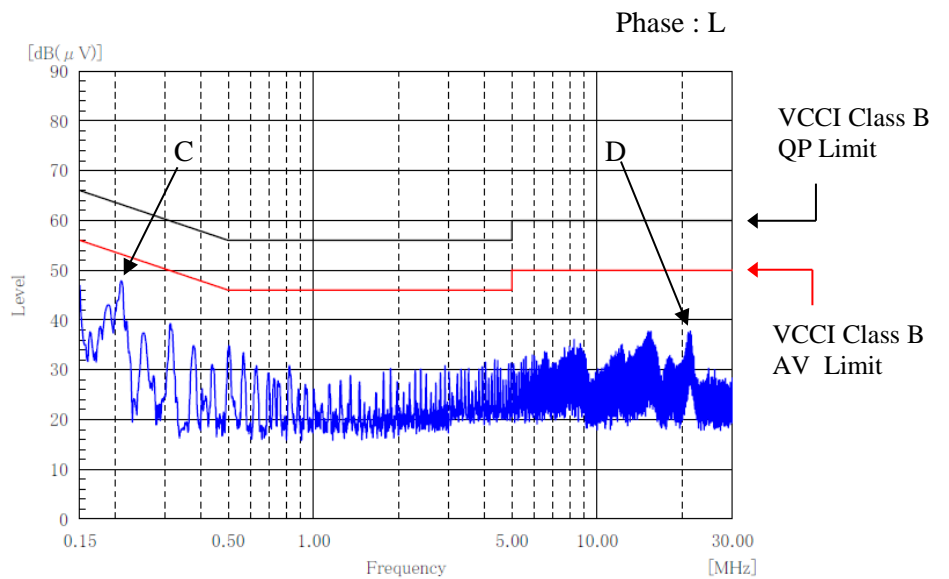
Point A (208kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.3	46.8
AV	53.3	43.4

Point B (21MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	42.5
AV	50.0	40.0



Point C (210kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.2	43.7
AV	53.2	32.1

Point D (21MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	35.7
AV	50.0	31.9



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.

2.18 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC

Iout : 100 %

Ta : 25 °C

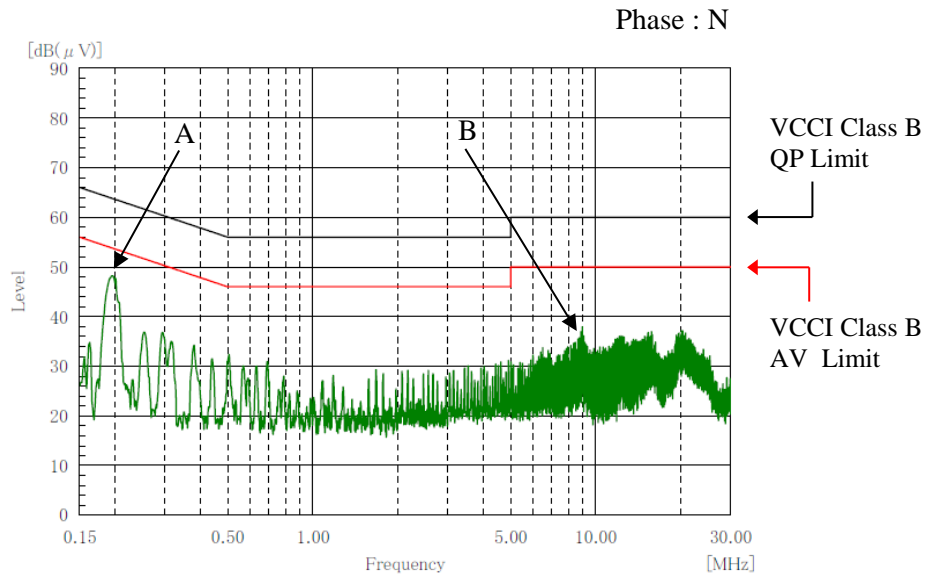
雑音端子電圧

Conducted Emission

24V

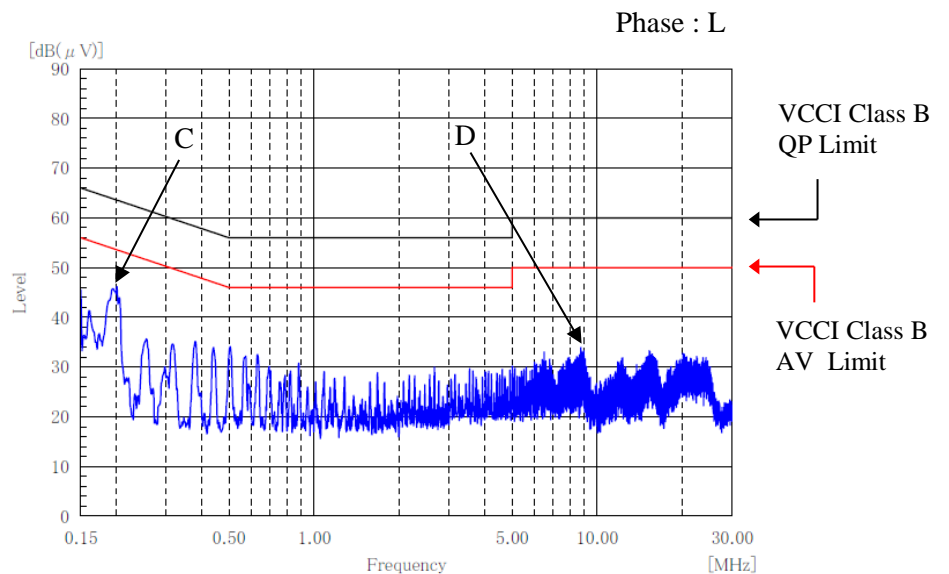
Point A (196kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.8	45.6
AV	53.8	43.1

Point B (9MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	35.2
AV	50.0	32.5



Point C (196kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	63.8	43.8
AV	53.8	33.9

Point D (9MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	32.0
AV	50.0	30.1



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.

2.18 EMI 特性

Electro-Magnetic Interference characteristics

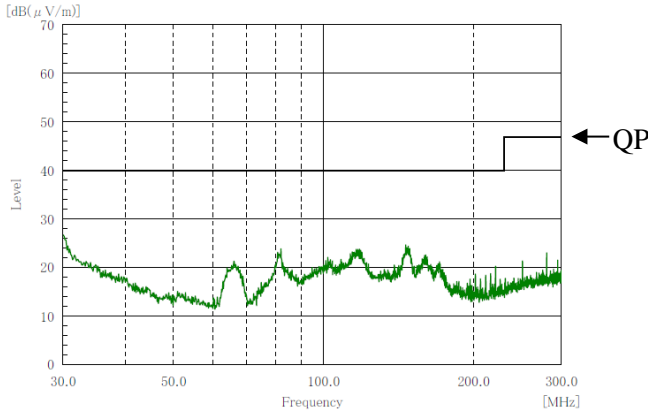
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音電界強度

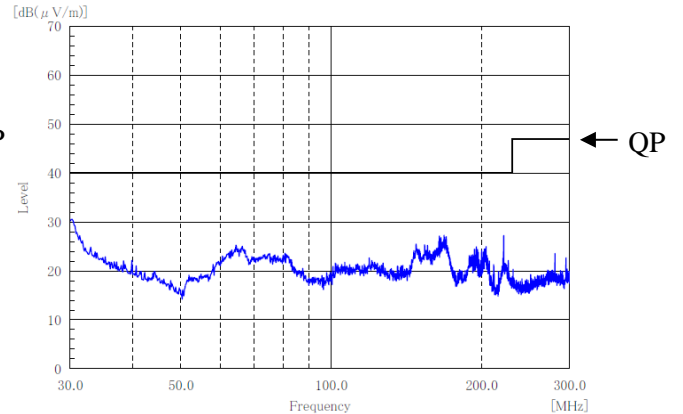
Radiated Emission

5V

HORIZONTAL

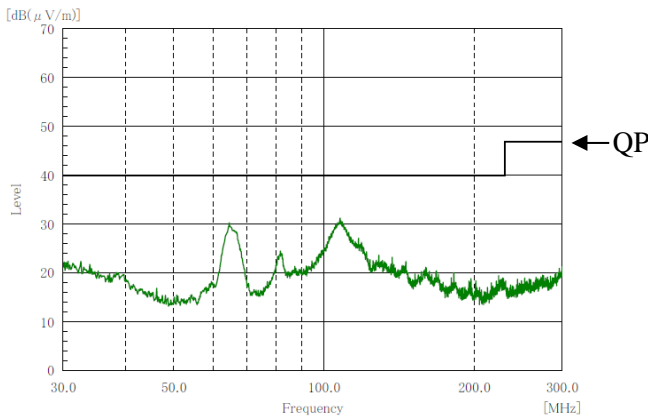


VERTICAL

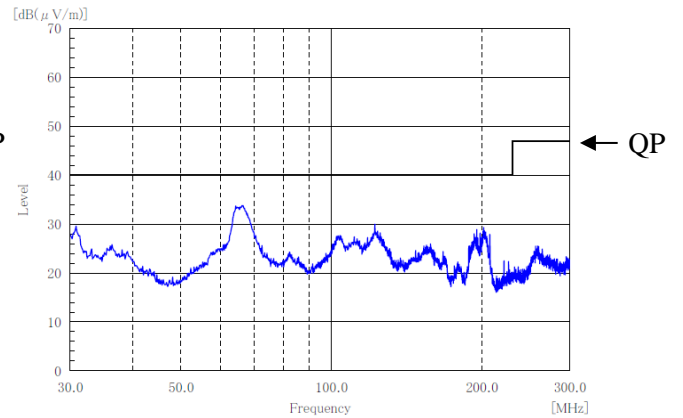


12V

HORIZONTAL

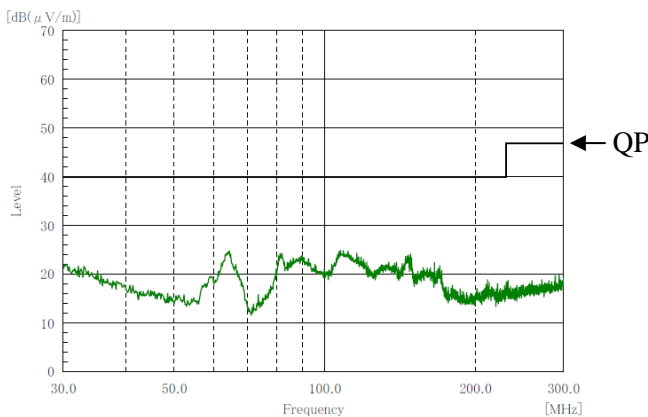


VERTICAL

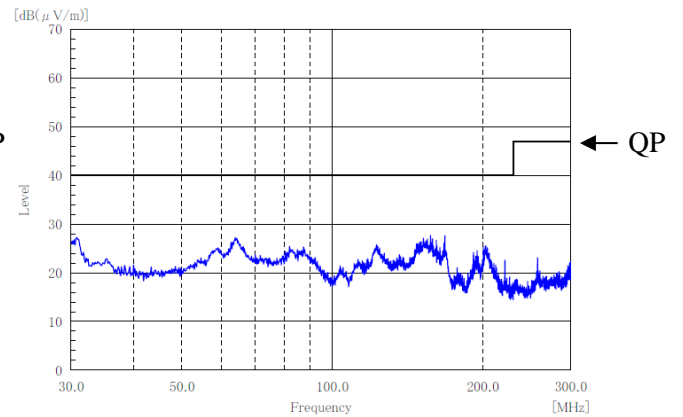


24V

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.