

HWS150A

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

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(*) 準標準品 HWS150A-*/R にて対応 For alternative standard model HWS150A-*/R

使用記号 Terminology used

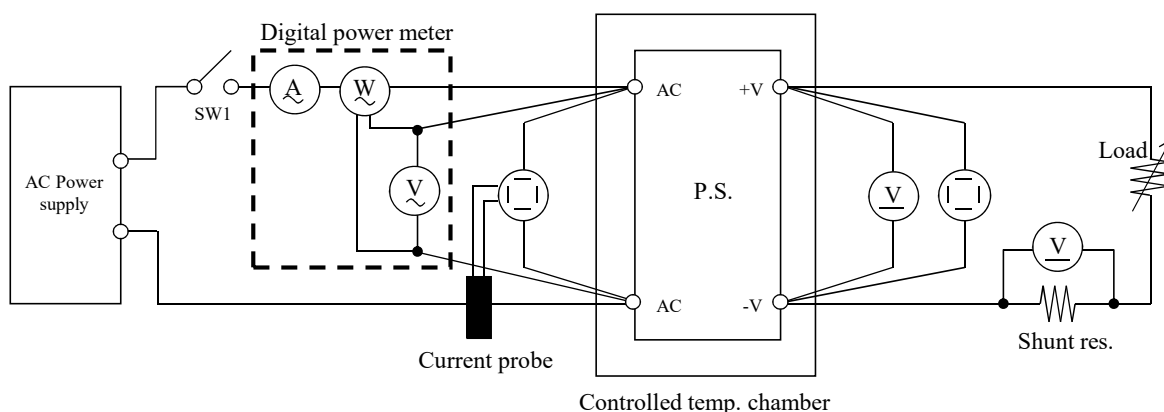
	定義	Definition
Vin	入力電圧 Input voltage
Vout	出力電圧 Output voltage
Iin	入力電流 Input current
Iout	出力電流 Output current
Ta	周囲温度 Ambient temperature
f	周波数 Frequency

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

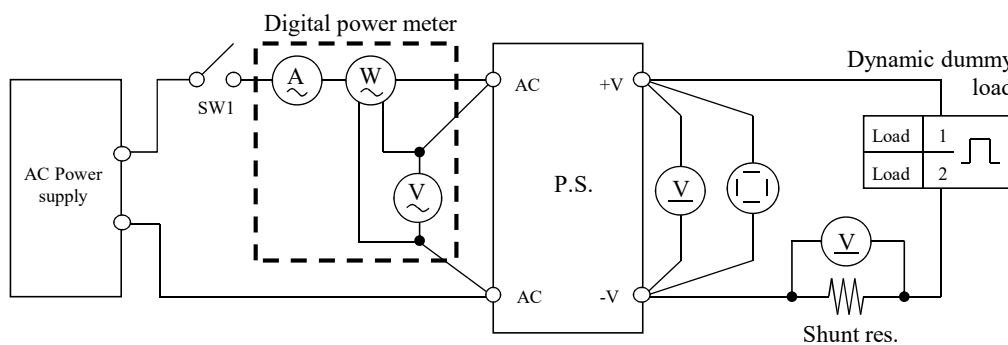
測定回路1 Circuit 1 used for determination

- ・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

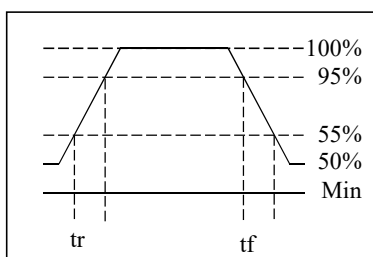


測定回路2 Circuit 2 used for determination

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

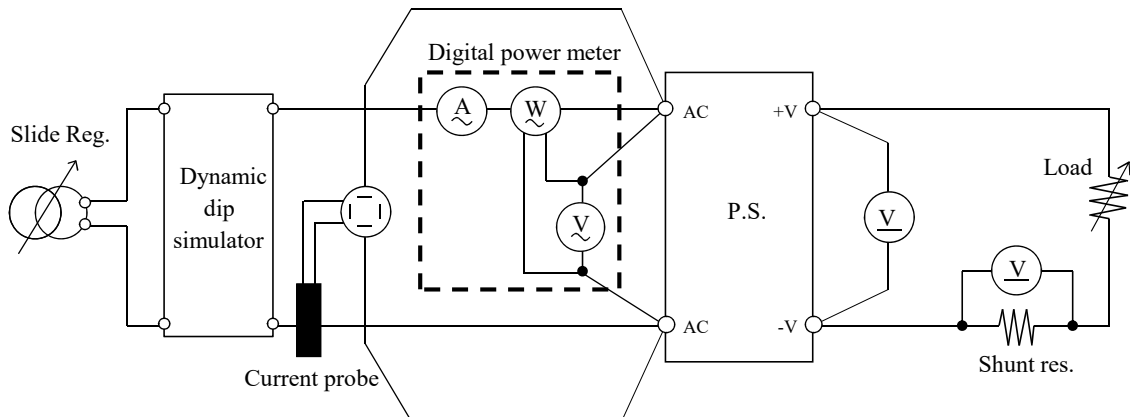


Output current waveform
Iout 50% \longleftrightarrow 100%



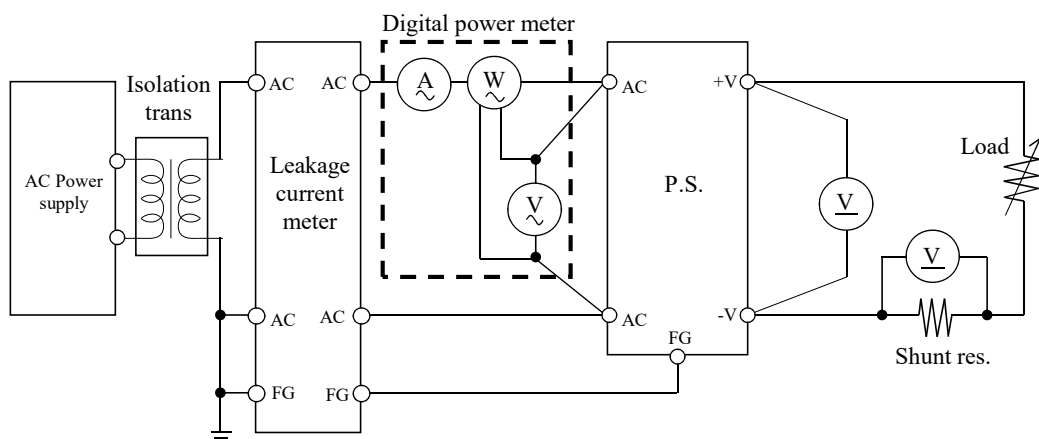
測定回路3 Circuit 3 used for determination

・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

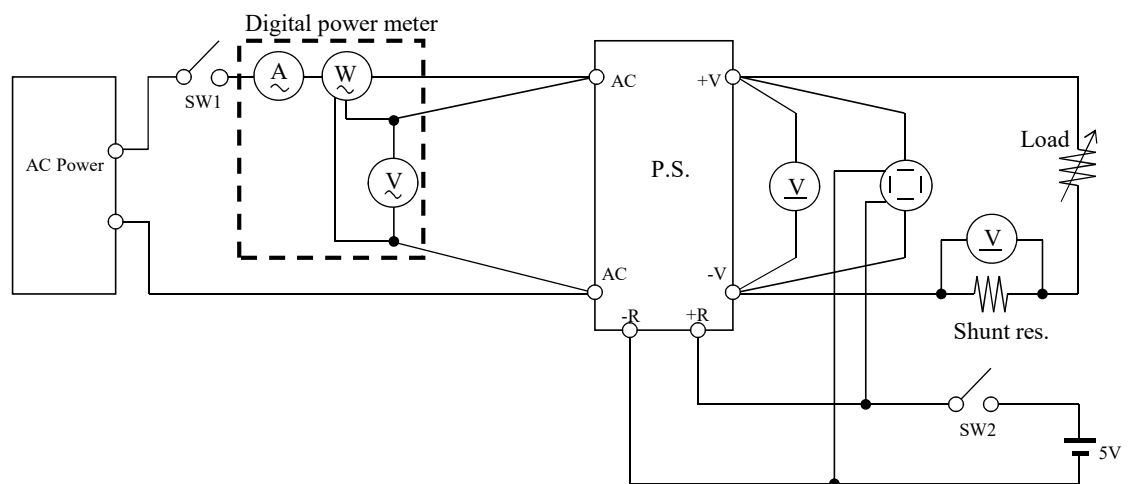


測定回路5 Circuit 5 used for determination

・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

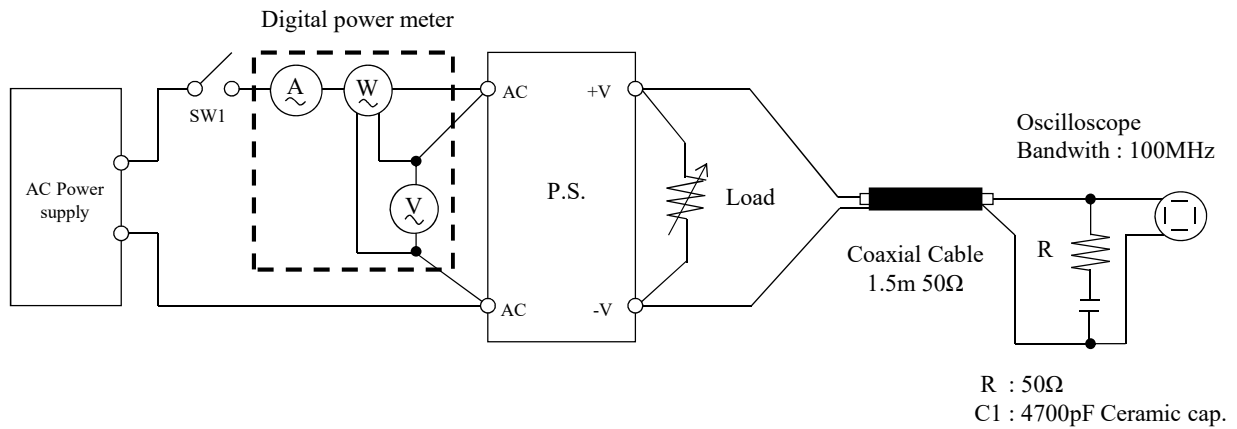
準標準品 HWS150A-*/R にて対応

For alternative standard model HWS150A-*/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

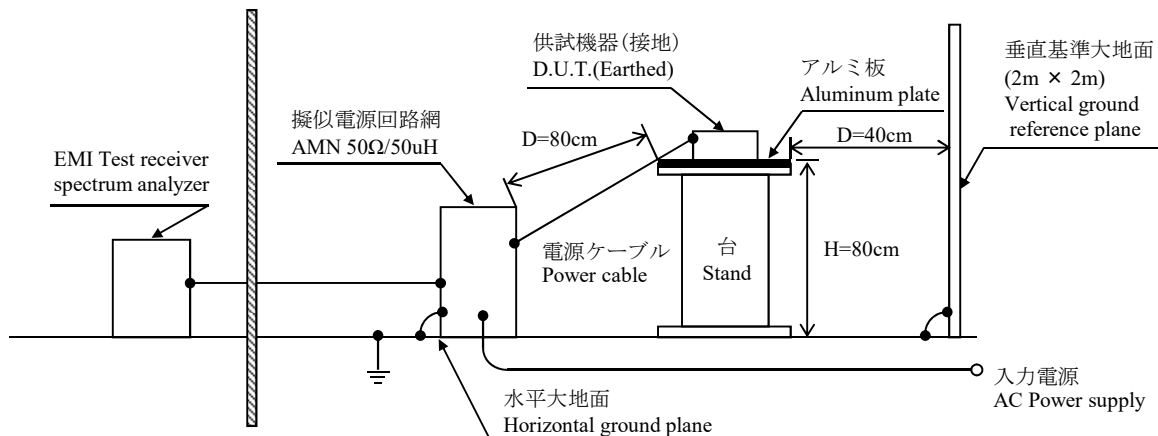


測定構成 Configuration used for determination

・EMI特性 Electro-Magnetic Interference characteristics

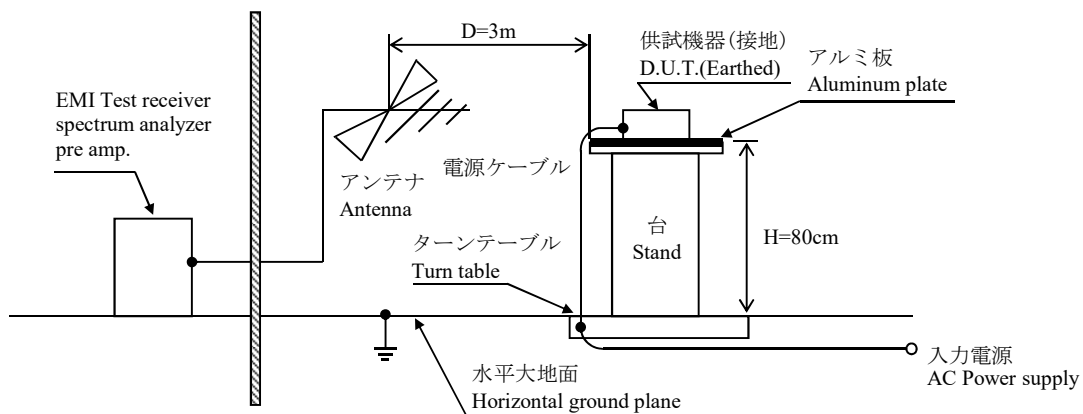
(a) 雑音端子電圧 (帰還ノイズ)

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

2.1 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%	4.998V	4.998V	4.998V	4.998V	0mV	0.000%	
50%	4.994V	4.994V	4.994V	4.994V	0mV	0.000%	
100%	4.992V	4.992V	4.992V	4.992V	0mV	0.000%	
load	6mV	6mV	6mV	6mV			
regulation	0.120%	0.120%	0.120%	0.120%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	4.990V	4.992V	4.995V	5mV	0.100%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		76VAC					
Drop out voltage (Vin)		57VAC					

12V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation		
0%	12.047V	12.048V	12.048V	12.048V	1mV	0.008%	
50%	12.047V	12.047V	12.047V	12.048V	1mV	0.008%	
100%	12.048V	12.048V	12.048V	12.048V	0mV	0.000%	
load	1mV	1mV	1mV	0mV			
regulation	0.008%	0.008%	0.008%	0.000%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	12.056V	12.048V	12.041V	15mV	0.125%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		75VAC					
Drop out voltage (Vin)		61VAC					

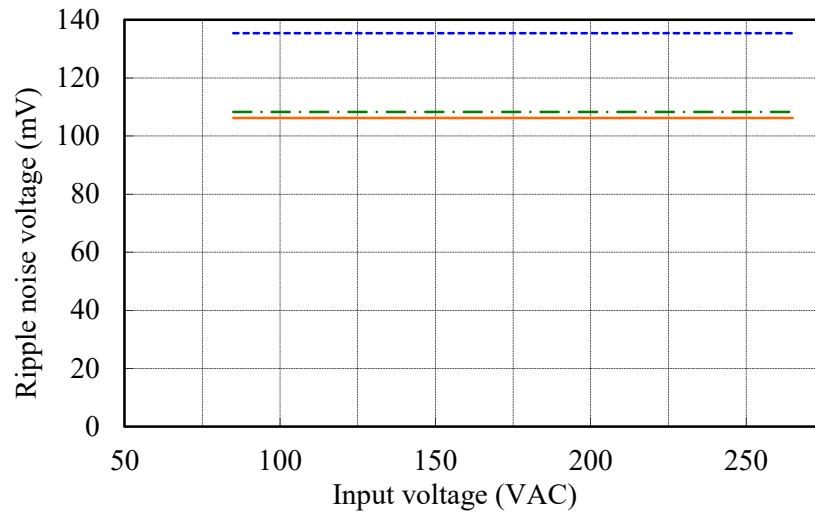
24V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation		
0%	24.071V	24.071V	24.072V	24.072V	1mV	0.004%	
50%	24.067V	24.067V	24.067V	24.067V	0mV	0.000%	
100%	24.066V	24.065V	24.066V	24.066V	1mV	0.004%	
load	5mV	6mV	6mV	6mV			
regulation	0.021%	0.025%	0.025%	0.025%			
		2. Temperature drift				Conditions Vin : 100 VAC Iout : 100 %	
Ta	-10°C	+25°C	+50°C	temperature stability			
Vout	24.109V	24.065V	24.023V	86mV	0.358%		
		3. Start up voltage and Drop out voltage				Conditions Ta : 25 °C Iout : 100 %	
Start up voltage (Vin)		76VAC					
Drop out voltage (Vin)		57VAC					

(2) リップルノイズ電圧対入力電圧

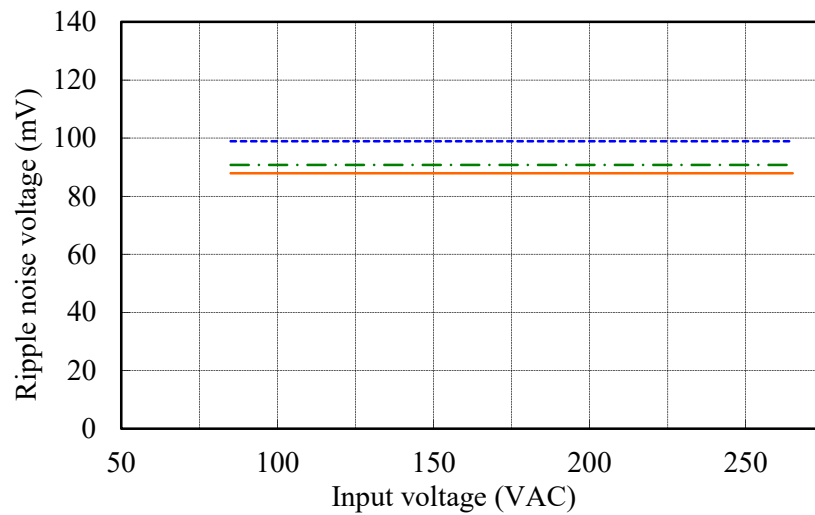
Ripple noise voltage vs. Input voltage

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

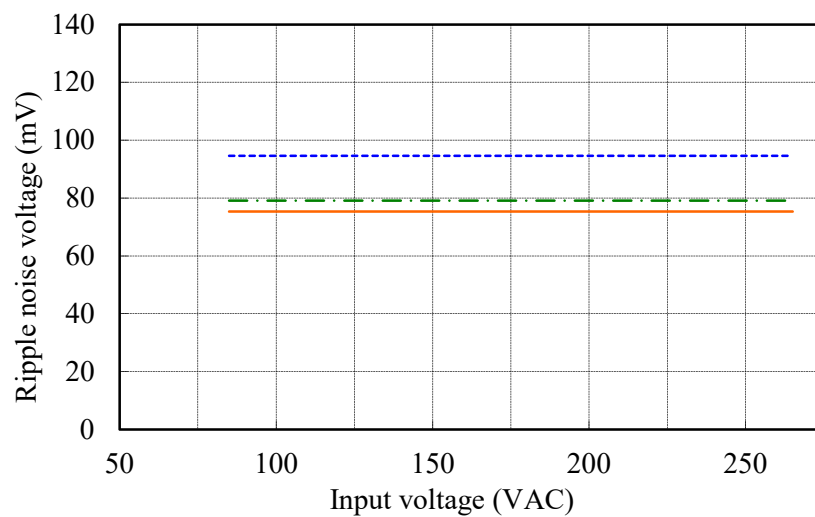
5V



12V



24V



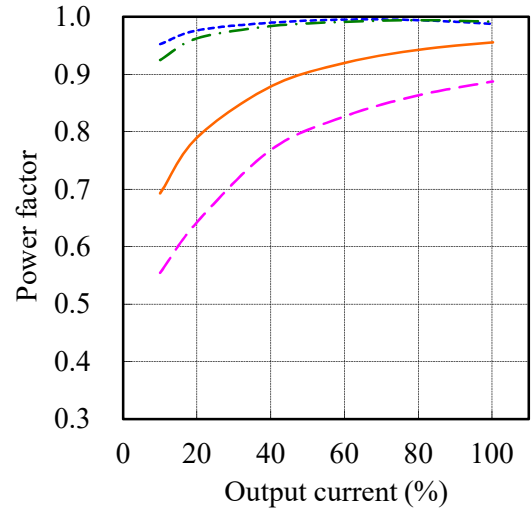
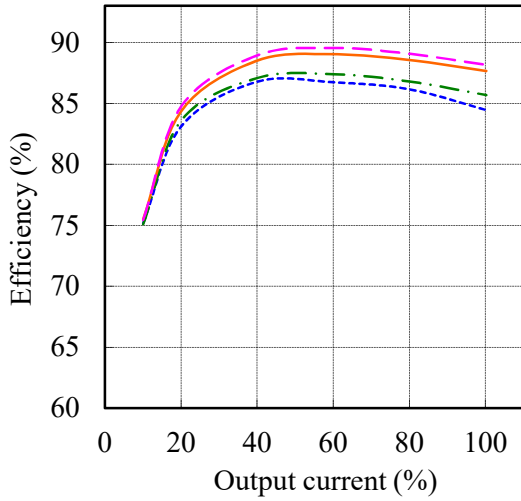
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(3) 効率・力率対出力電流

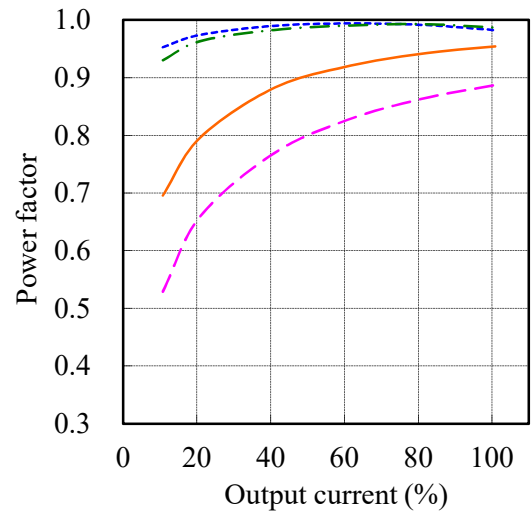
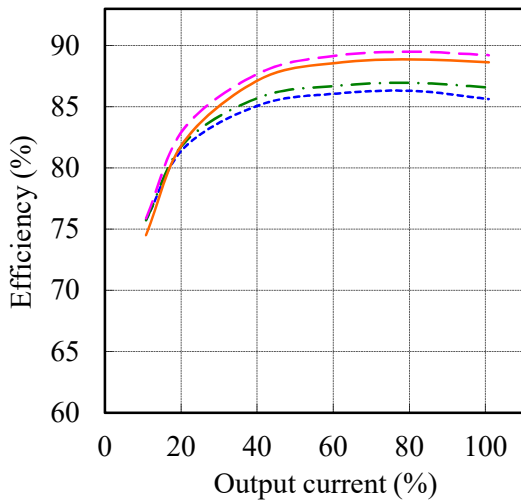
Efficiency and Power factor vs. Output current

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

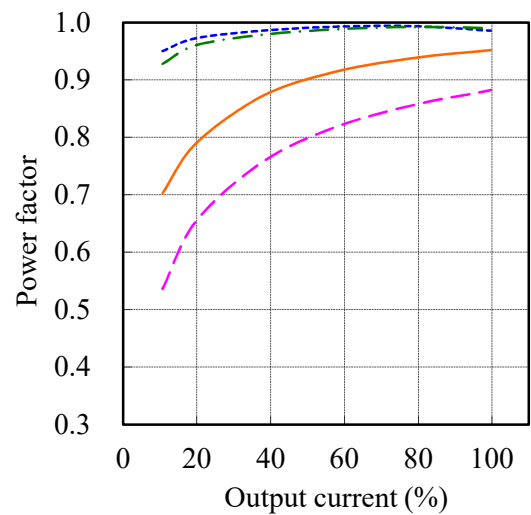
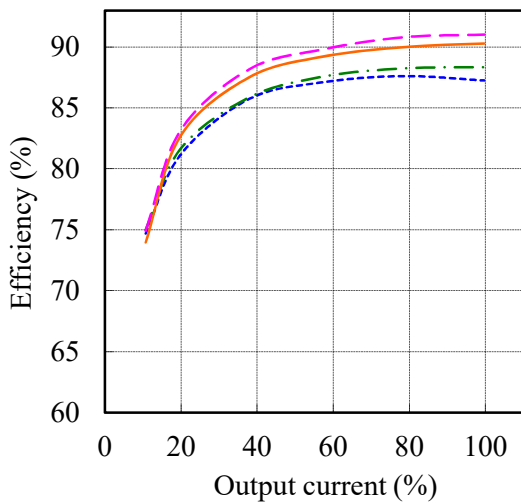
5V



12V



24V



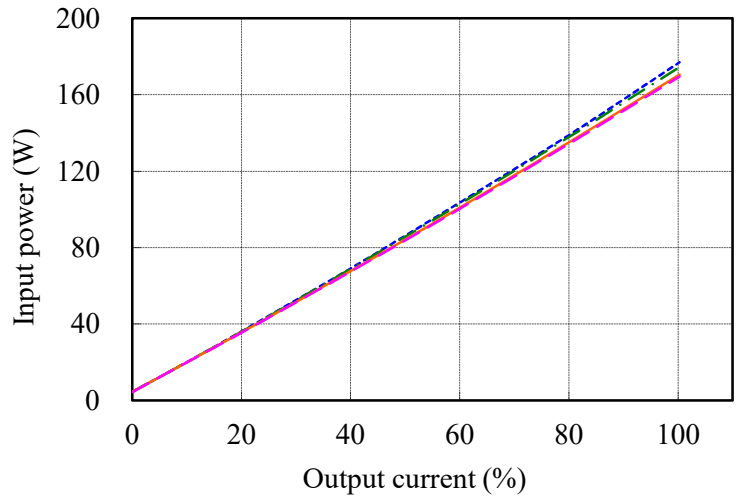
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(4) 入力電力対出力電流 Input power vs. Output current

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

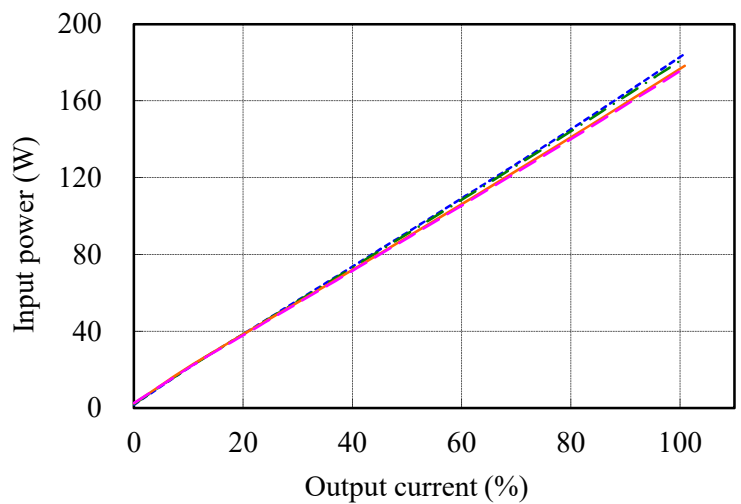
5V

Vin	Input power
	Iout : 0%
85VAC	4.5W
100VAC	4.6W
200VAC	4.5W
265VAC	4.4W



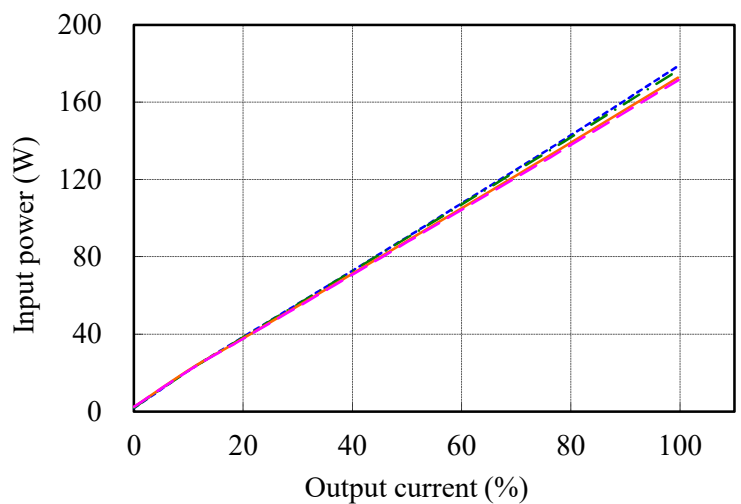
12V

Vin	Input power
	Iout : 0%
85VAC	1.6W
100VAC	2.0W
200VAC	2.5W
265VAC	2.5W



24V

Vin	Input power
	Iout : 0%
85VAC	1.8W
100VAC	2.0W
200VAC	2.5W
265VAC	2.5W



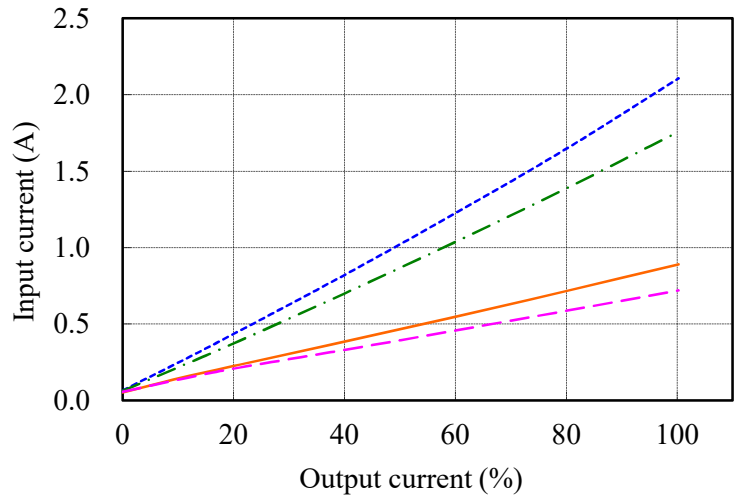
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(5) 入力電流対出力電流 Input current vs. Output current

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

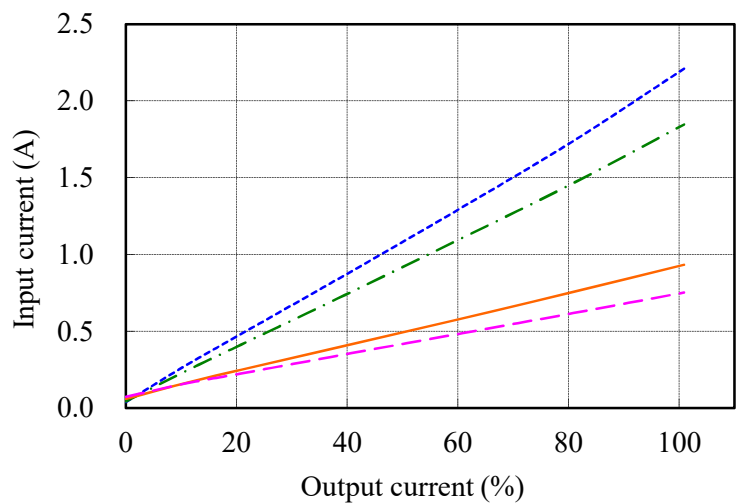
5V

Vin	Input current
	Iout : 0%
85VAC	0.07A
100VAC	0.06A
200VAC	0.05A
265VAC	0.06A



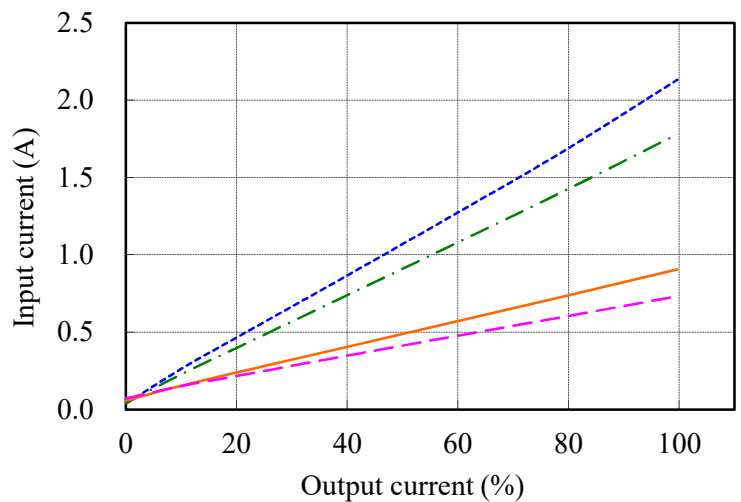
12V

Vin	Input current
	Iout : 0%
85VAC	0.04A
100VAC	0.04A
200VAC	0.06A
265VAC	0.07A



24V

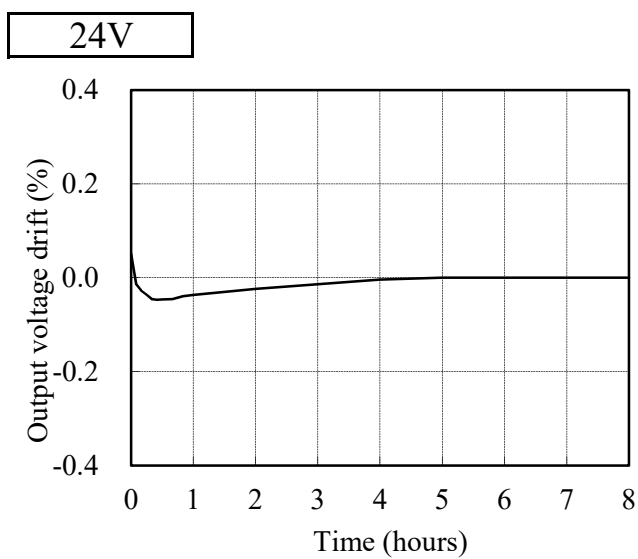
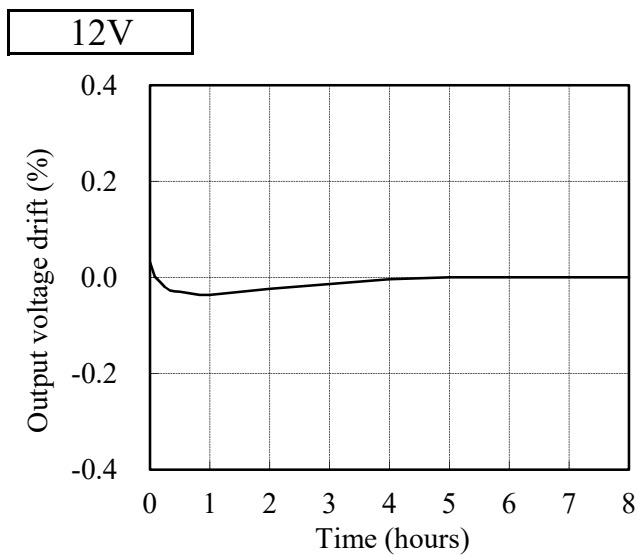
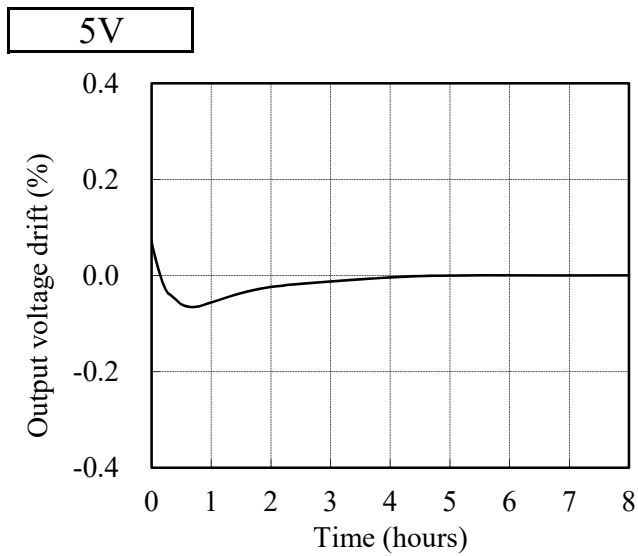
Vin	Input current
	Iout : 0%
85VAC	0.04A
100VAC	0.04A
200VAC	0.06A
265VAC	0.07A



2.2 通電ドリフト特性

Warm up voltage drift characteristics

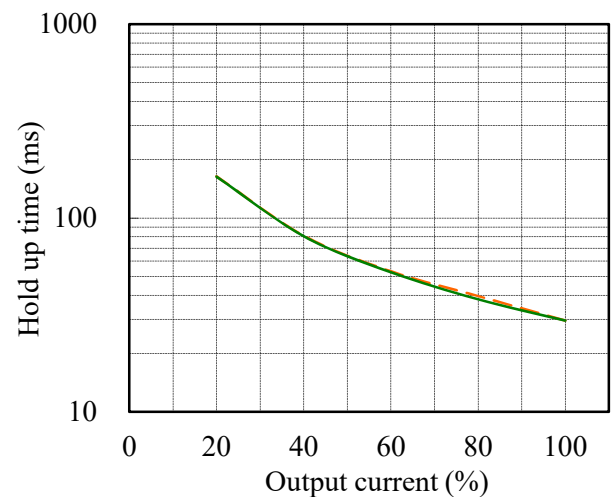
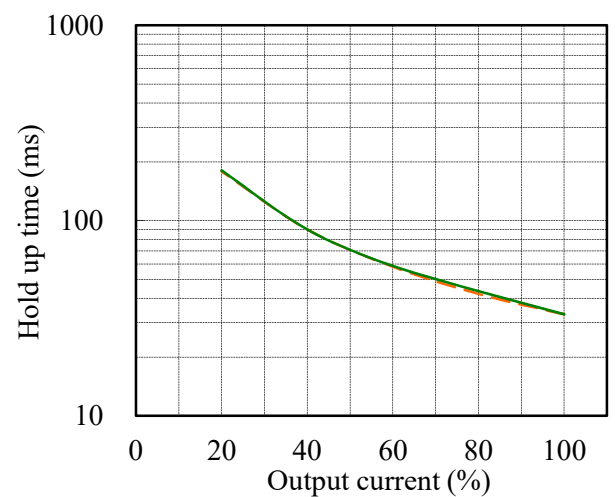
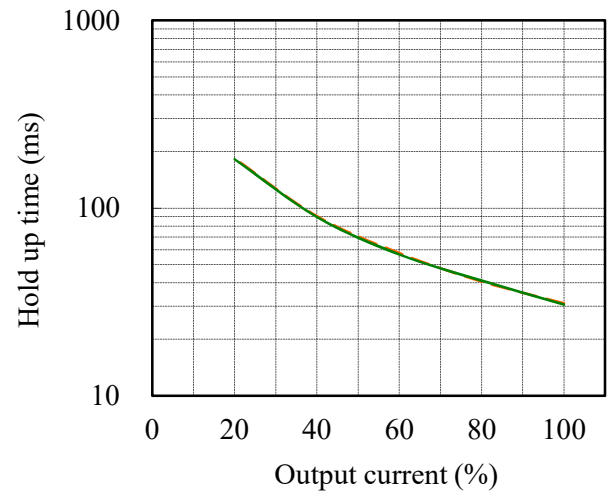
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 °C



2.3 出力保持時間特性

Hold up time characteristics

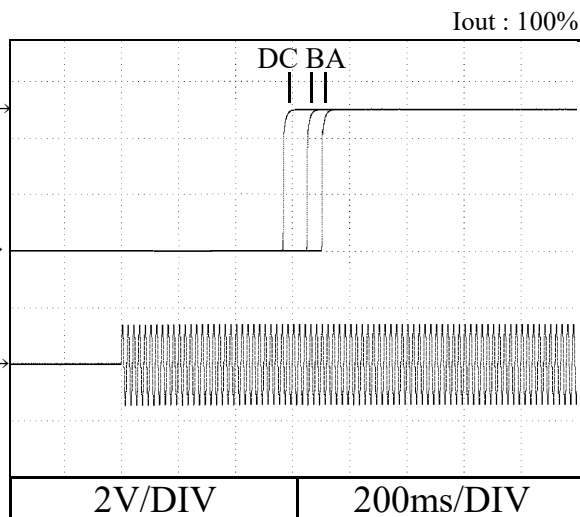
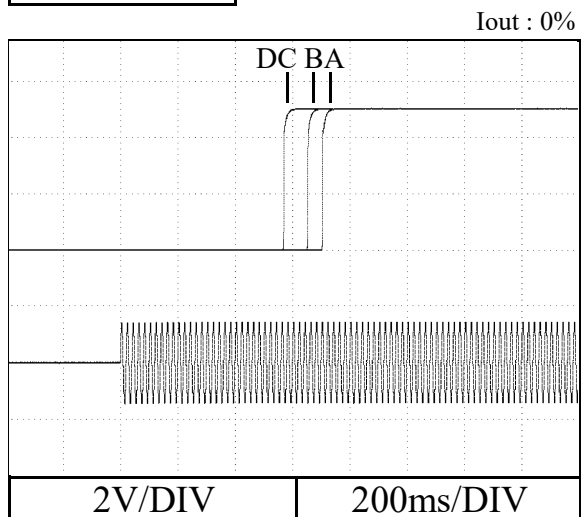
Conditions Vin : 100 VAC ———
200 VAC - - - -
Ta : 25 °C



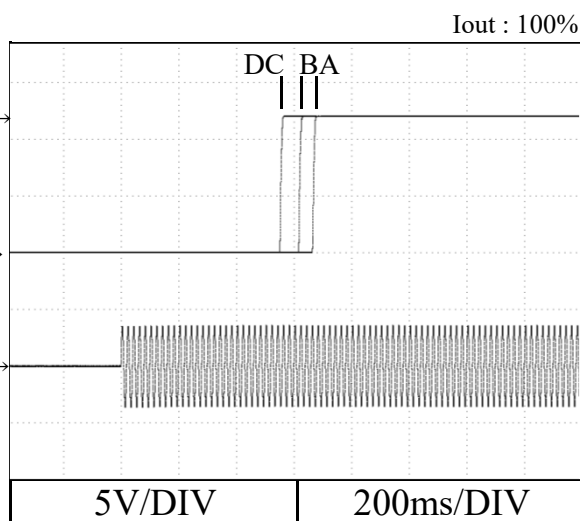
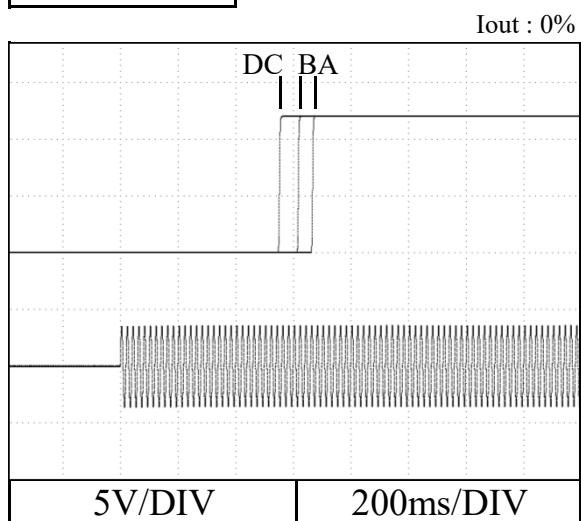
2.4 出力立ち上がり特性 Output rise characteristics

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

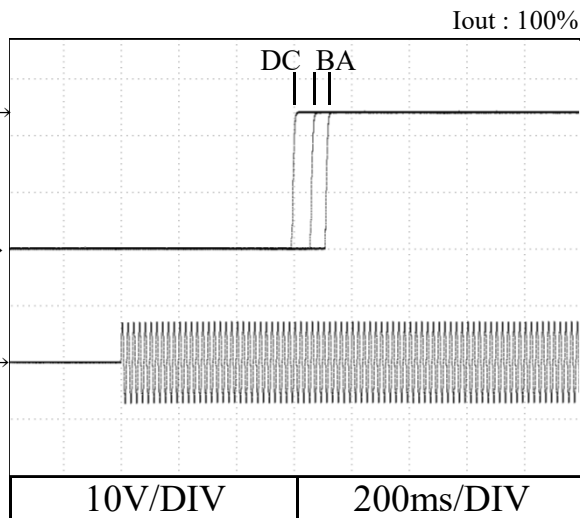
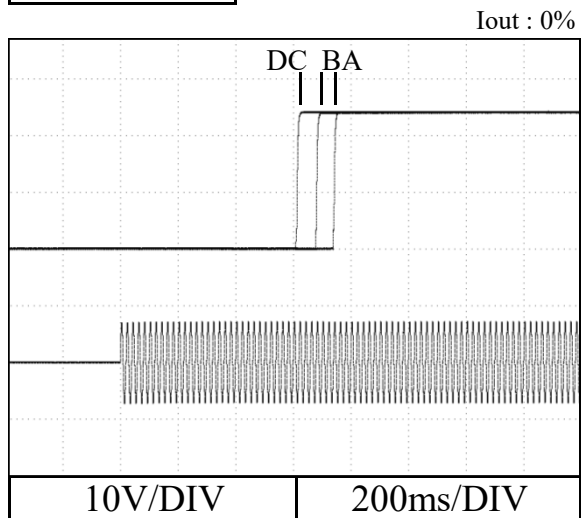
5V



12V



24V

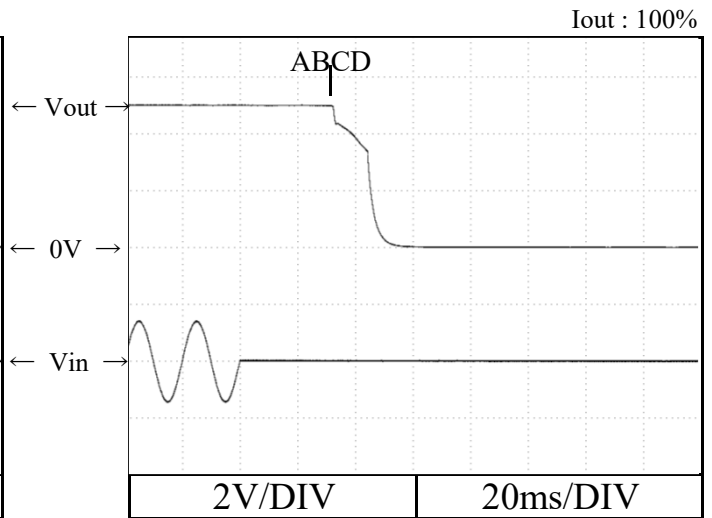
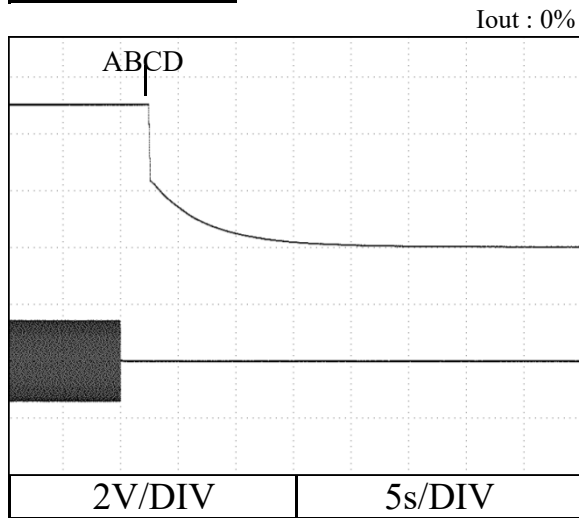


2.5 出力立ち下がり特性
Output fall characteristics

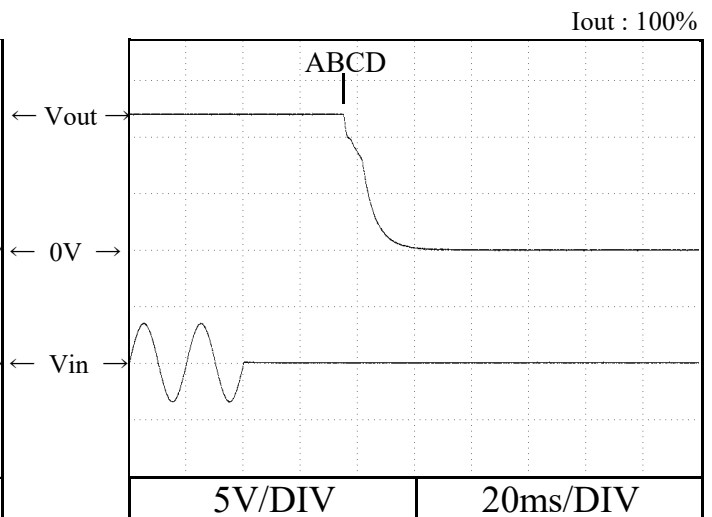
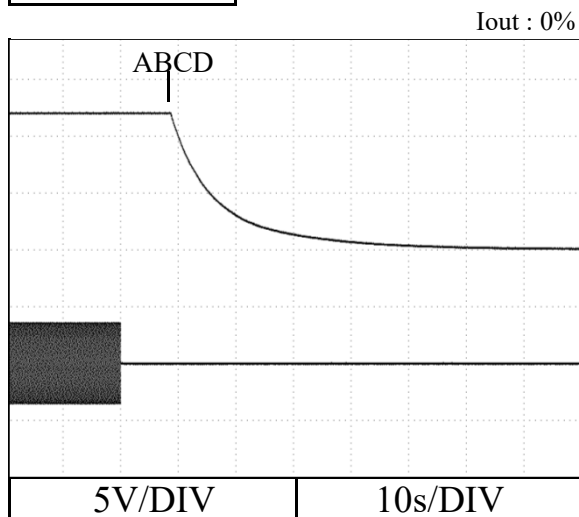
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Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 °C

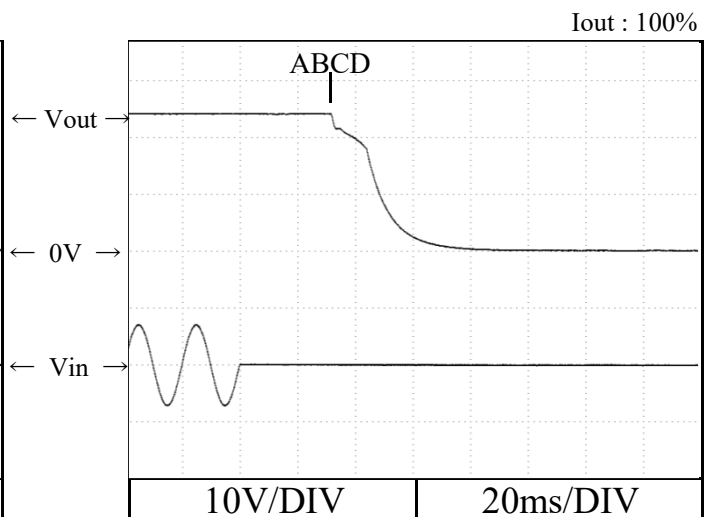
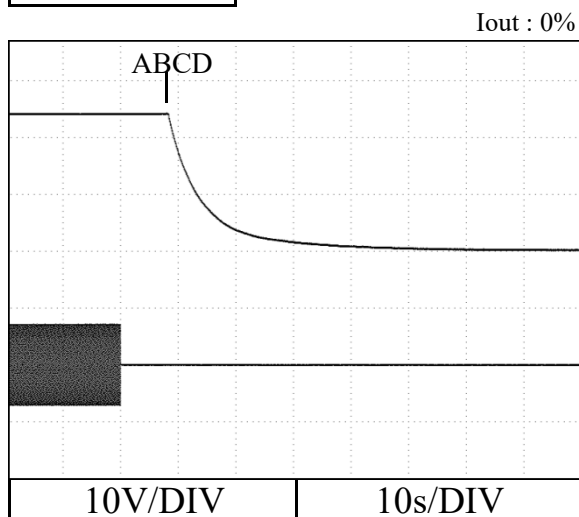
5V



12V



24V

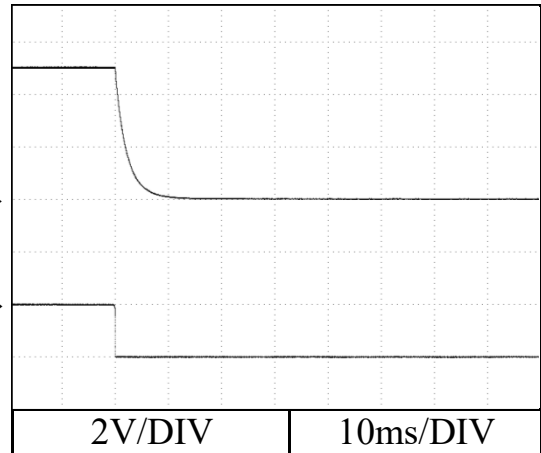
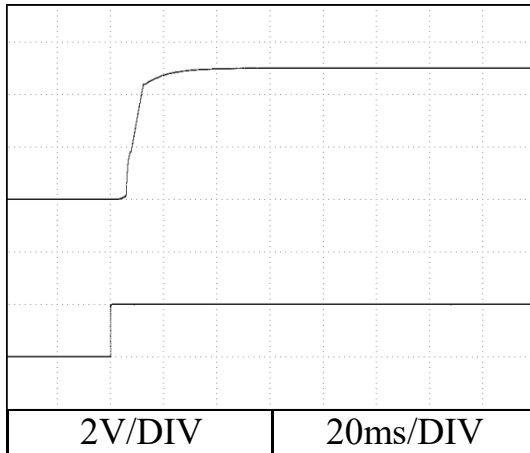


2.6 ON/OFFコントロール時出力立ち上がり、立ち下がり特性 Output rise, fall characteristics with ON/OFF Control

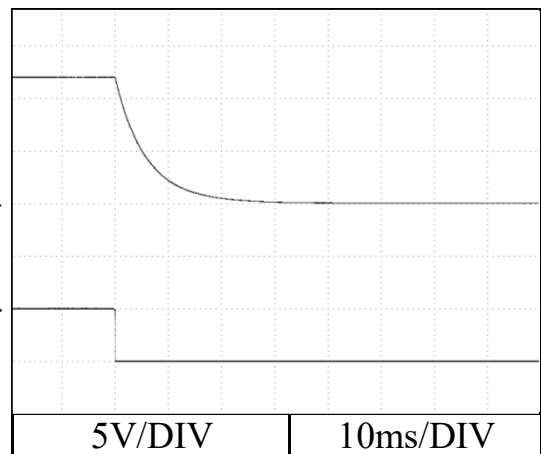
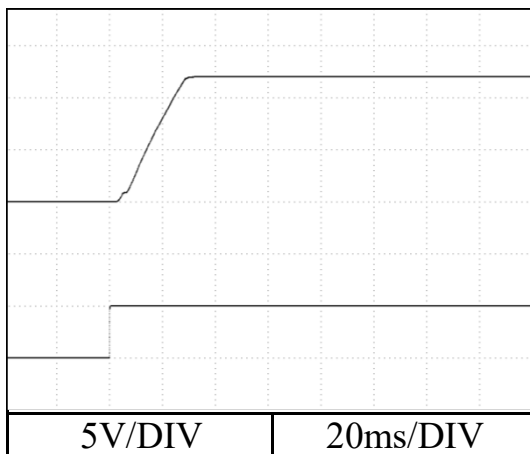
Conditions V_{in} : 100 VAC
 I_{out} : 100 %
 T_a : 25 °C

準標準品 HWS150A-*/R にて対応
For alternative standard model HWS150A-*/R

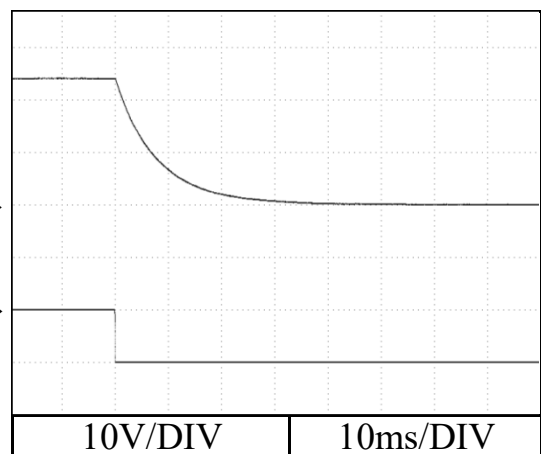
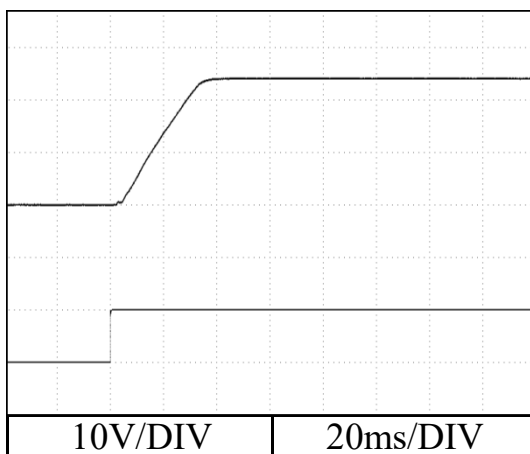
5V



12V



24V

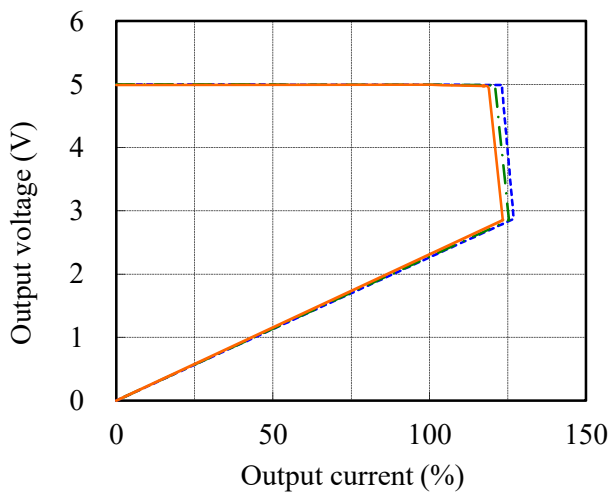


2.7 過電流保護特性

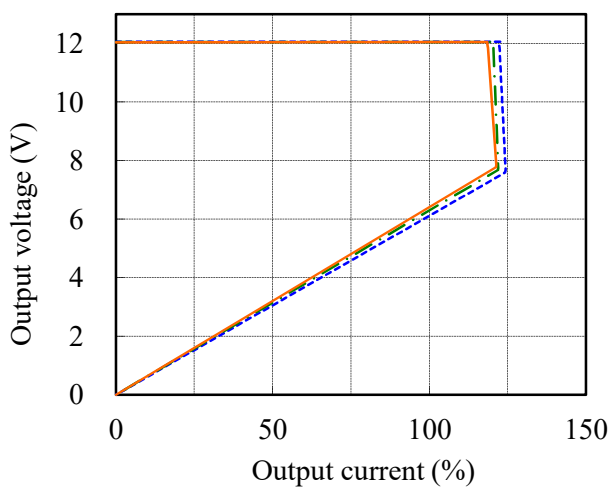
Over current protection (OCP) characteristics

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

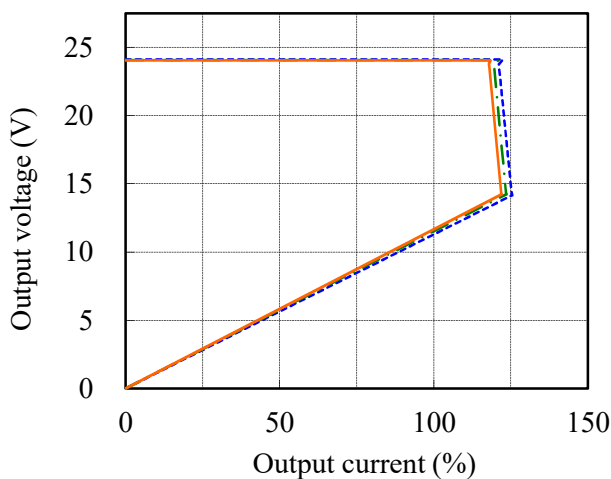
5V



12V



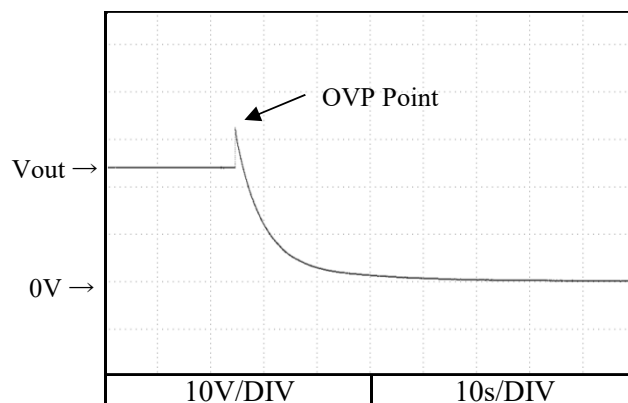
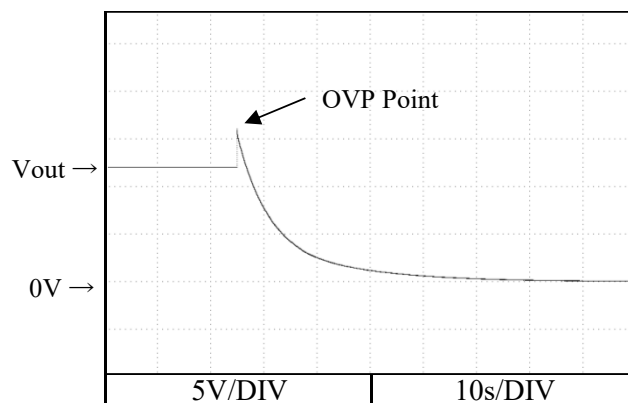
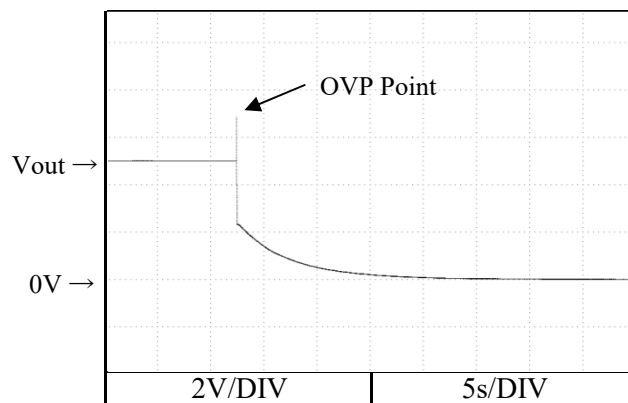
24V



2.8 過電圧保護特性

Over voltage protection (OVP) characteristics

Conditions Vin : 100 VAC
 Iout : 0 %
 Ta : 25 °C

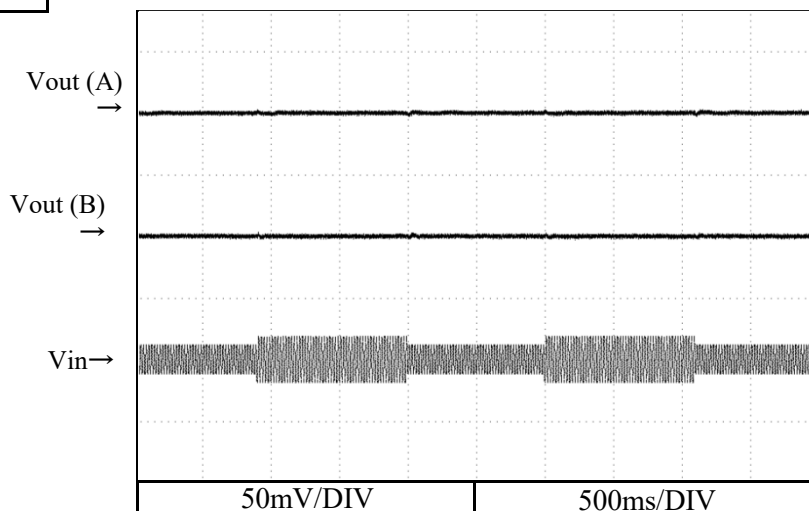


2.9 過渡応答 (入力急変) 特性

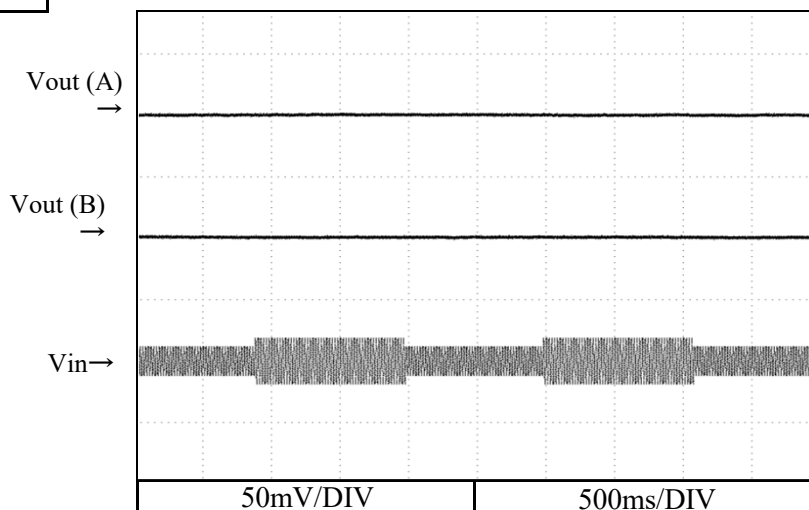
Dynamic line response characteristics

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

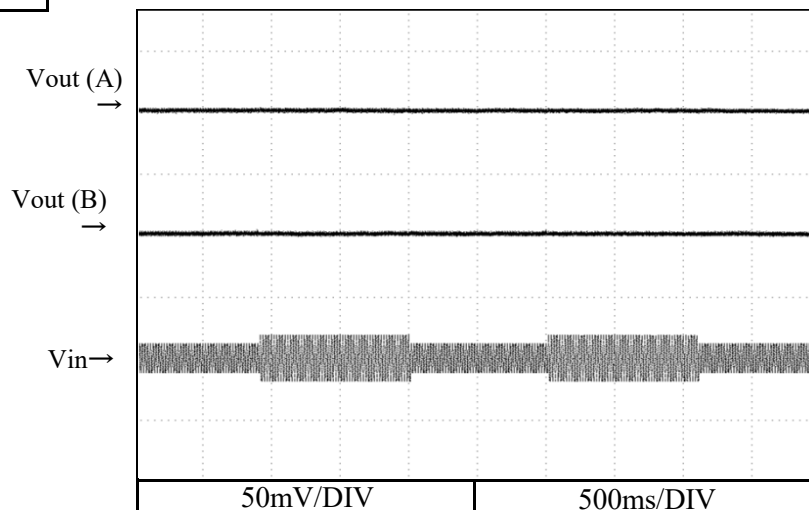
5V



12V



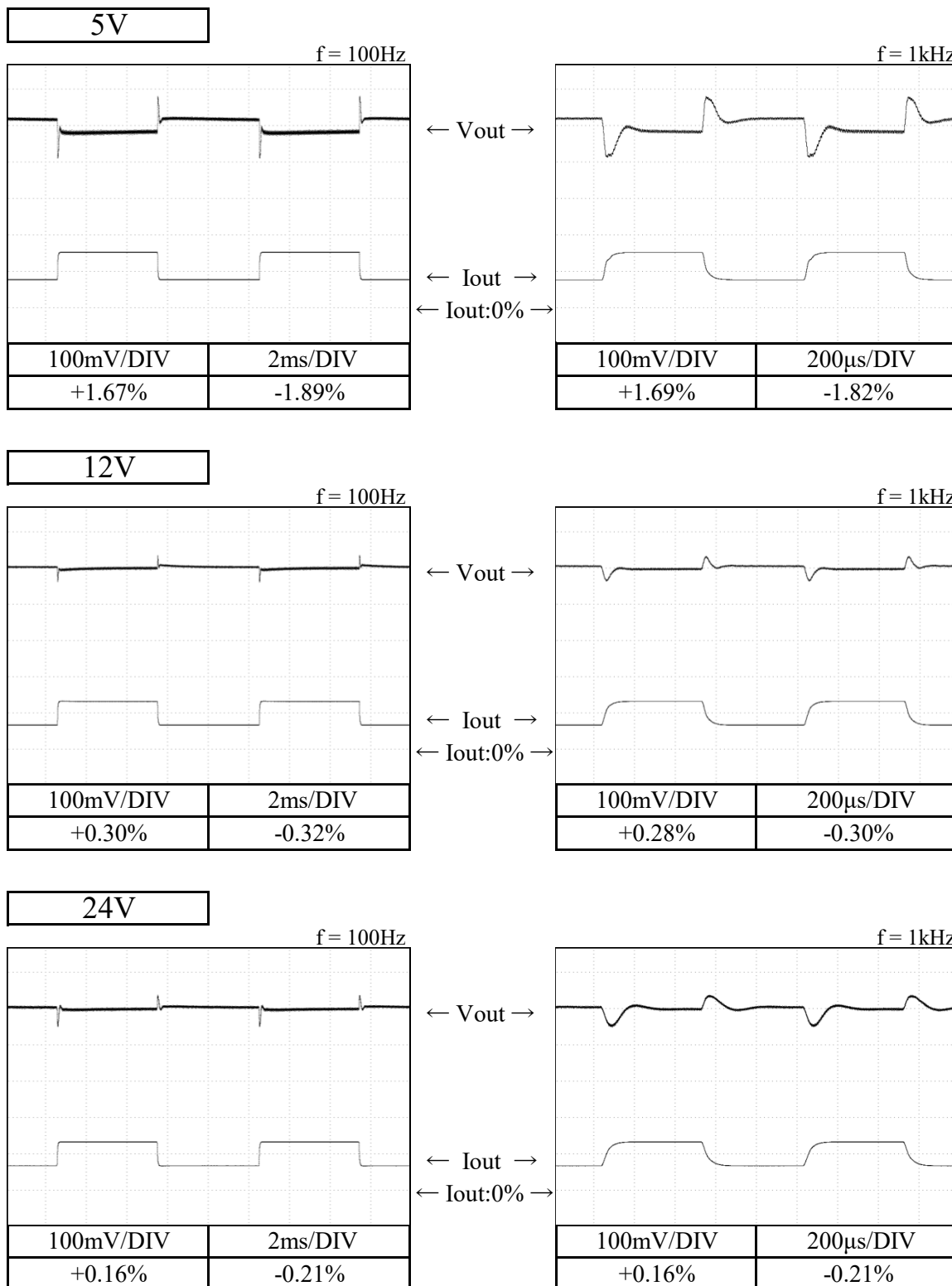
24V



2.10 過渡応答（負荷急変）特性

Dynamic load response characteristics

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



2.11 入力電圧瞬停特性

Response to brown out characteristics

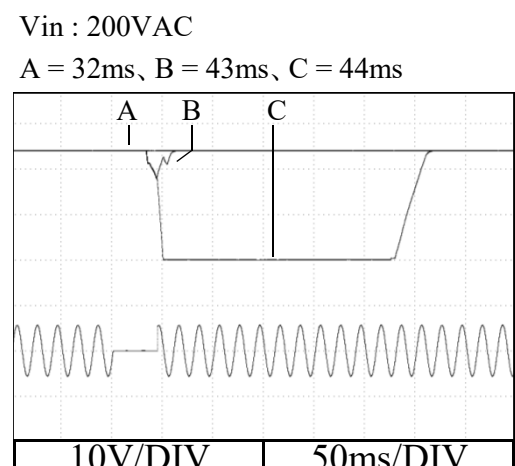
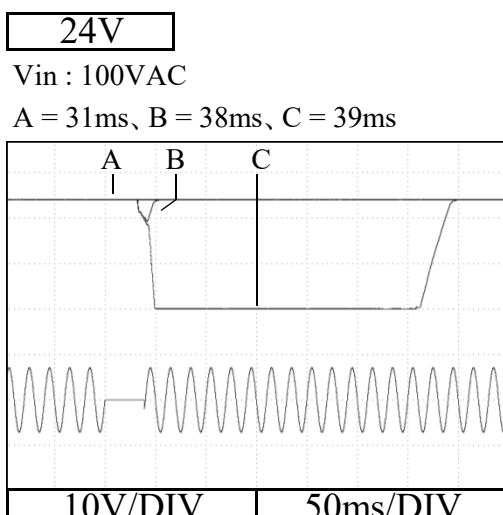
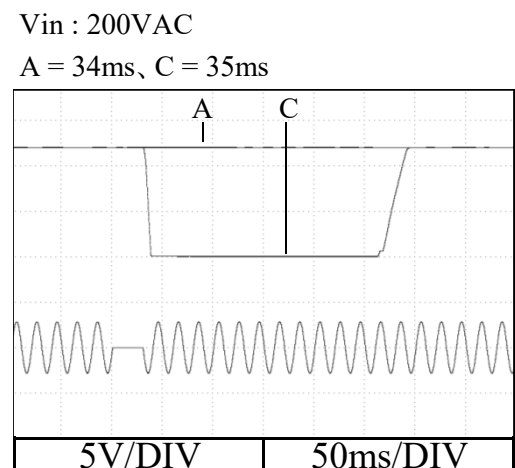
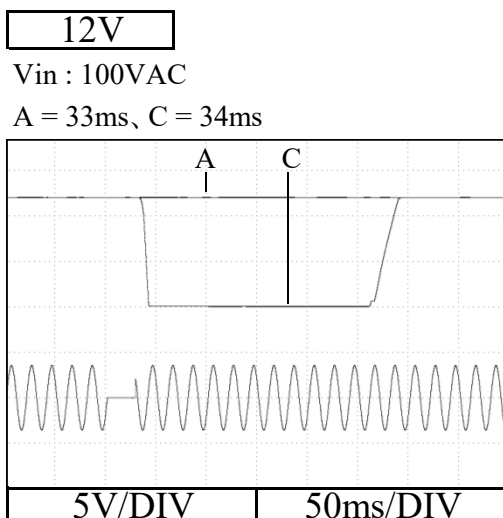
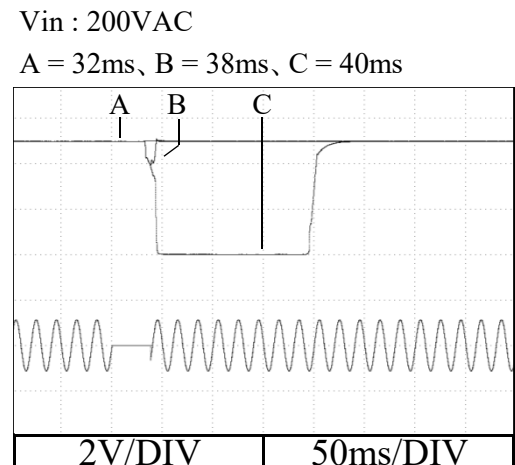
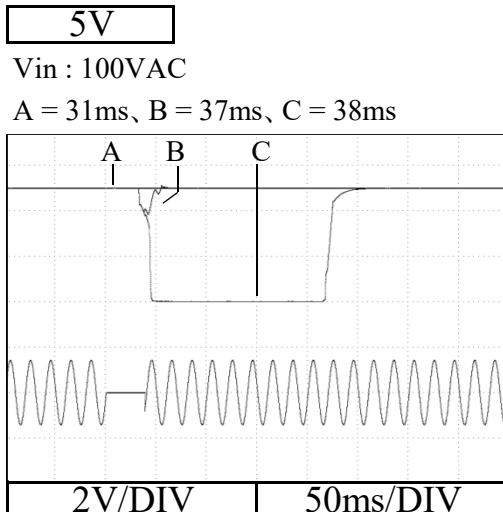
Conditions $I_{out} : 100\%$
 $T_a : 25\text{ }^\circ\text{C}$

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.

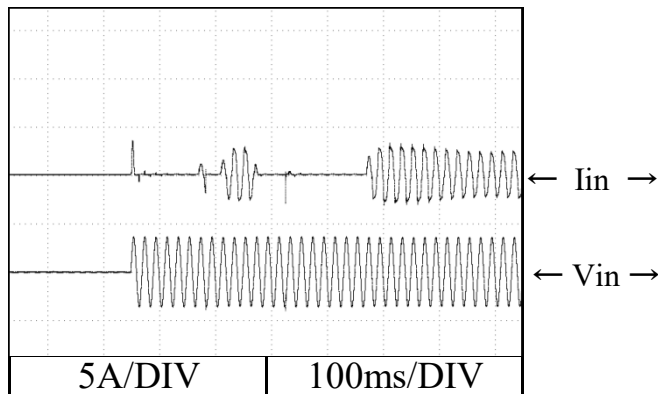


2.12 入力サージ電流（突入電流）波形 Inrush current waveform

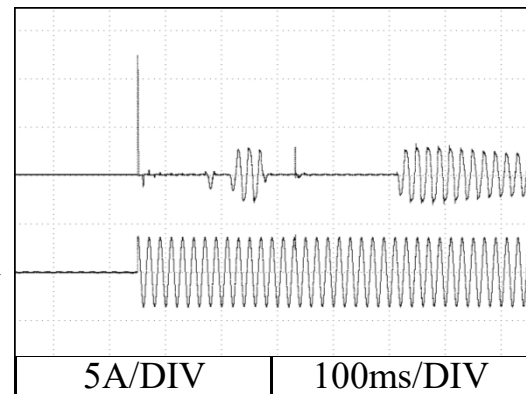
5V

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

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

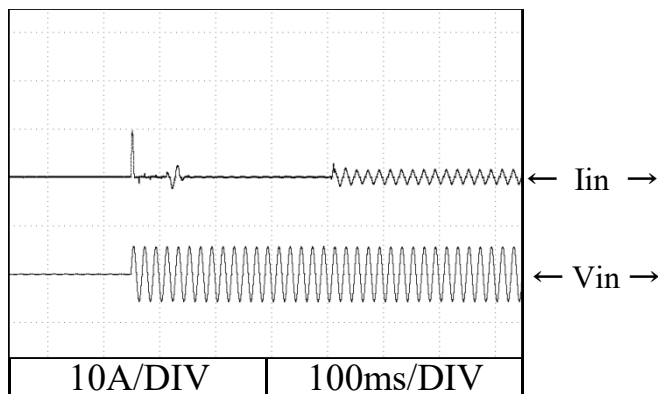


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

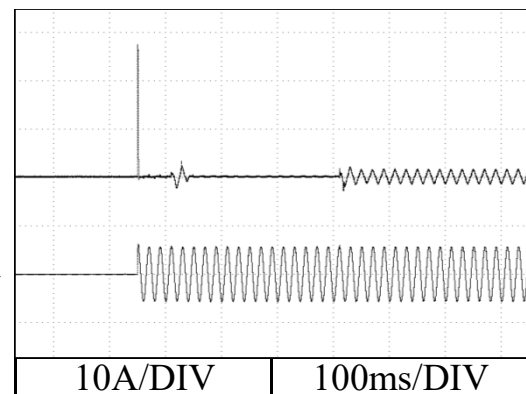


Conditions V_{in} : 200 VAC
 I_{out} : 100 %
 T_a : 25 °C

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



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



2.13 高調波成分

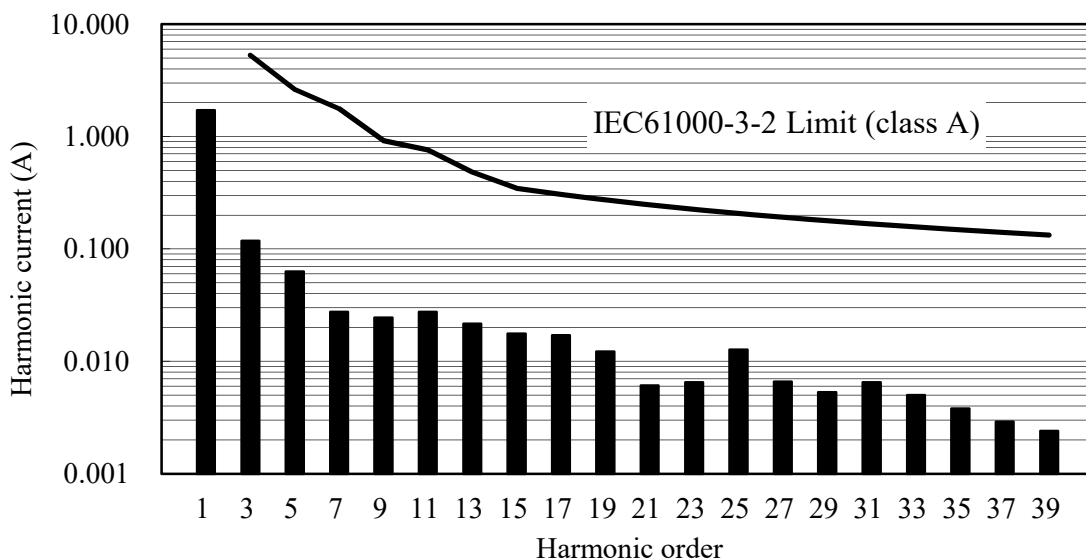
Input current harmonics

Conditions $I_{out} : 100\%$

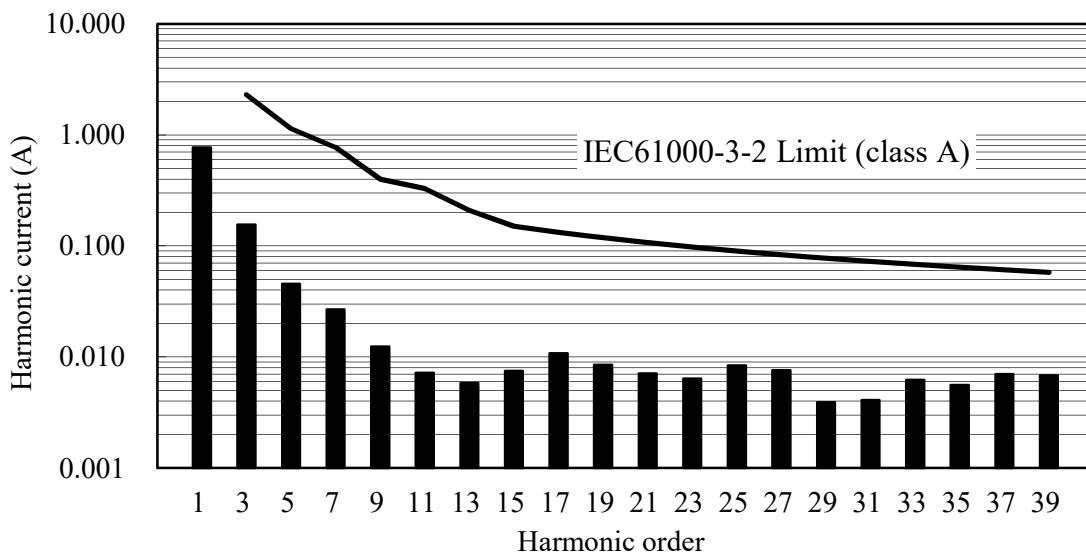
$T_a : 25\text{ }^\circ\text{C}$

5V

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



$V_{in} : 230\text{ VAC}$

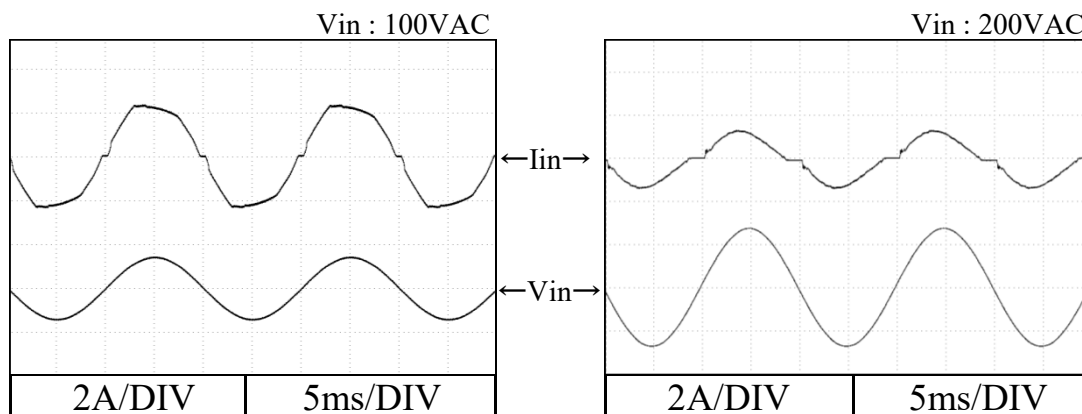


2.14 入力電流波形

Input current waveform

Conditions $I_{out} : 100\%$

$T_a : 25\text{ }^\circ\text{C}$



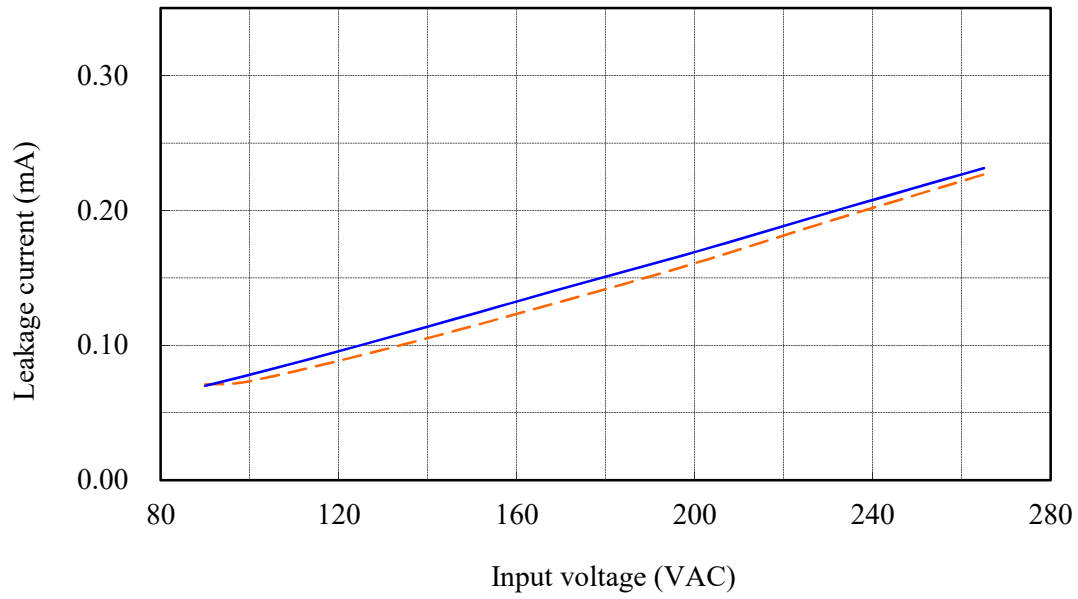
2.15 リーク電流特性
Leakage current characteristics

HWS150A

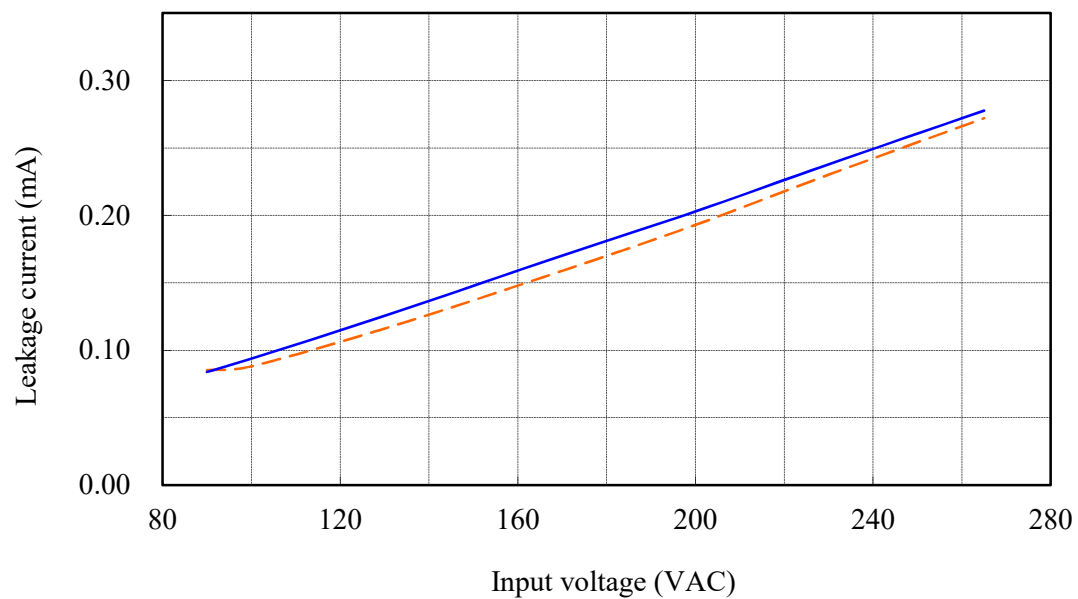
Conditions Iout : 0 % ———
 100 % - - - - -
 Ta : 25 °C
Equipment used : 3156 (HIOKI)

5V

f: 50 Hz



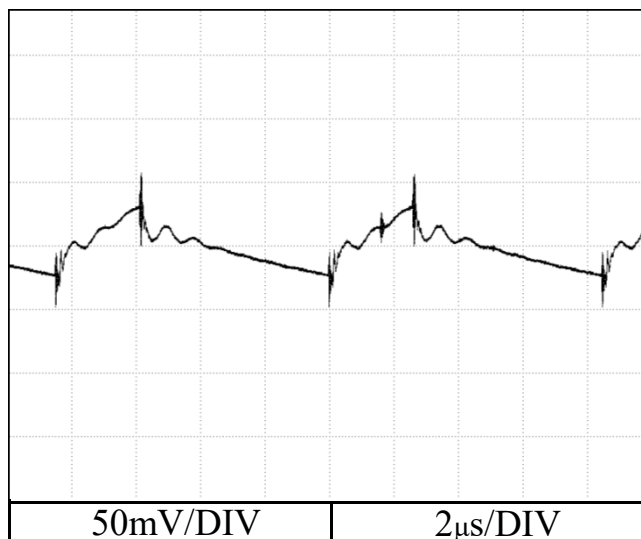
f: 60 Hz



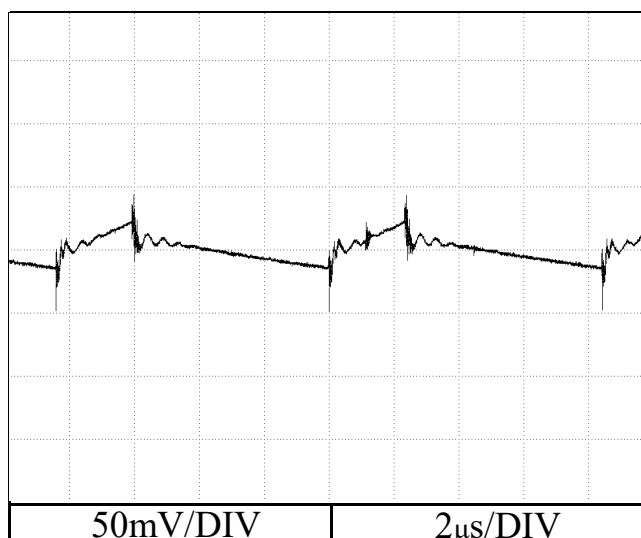
2.16 出力リップル、ノイズ波形 Output ripple and noise waveform

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

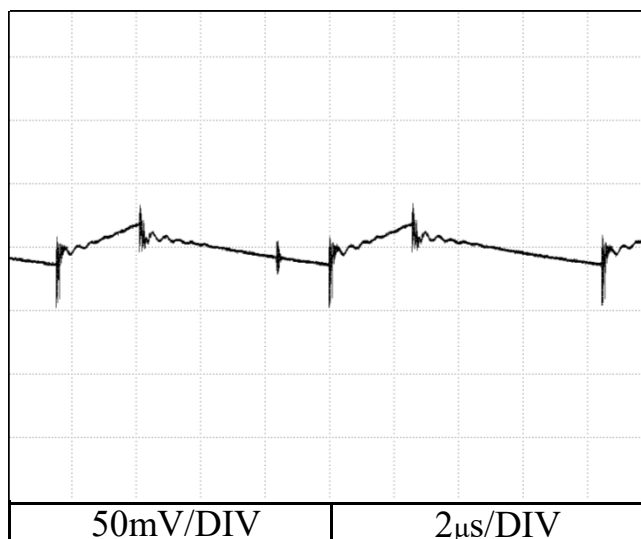
5V



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

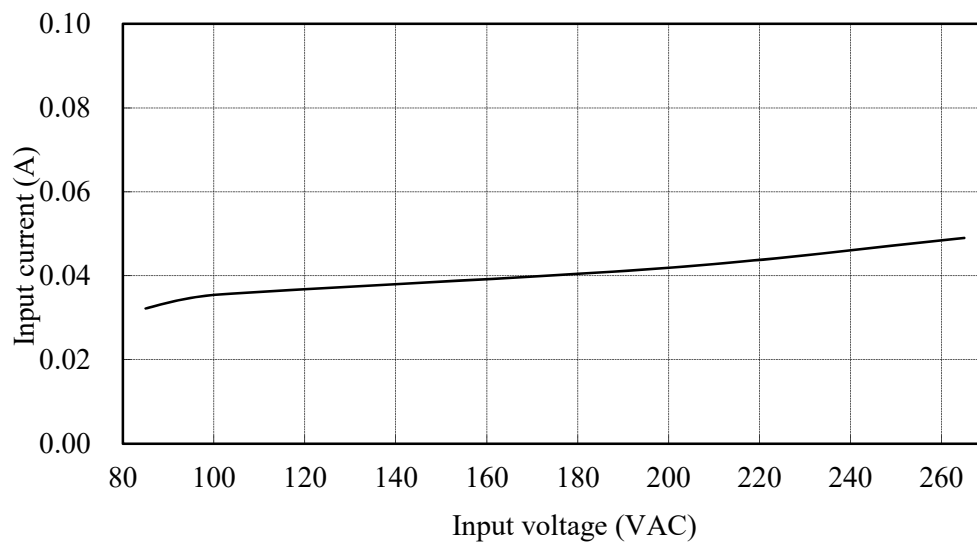
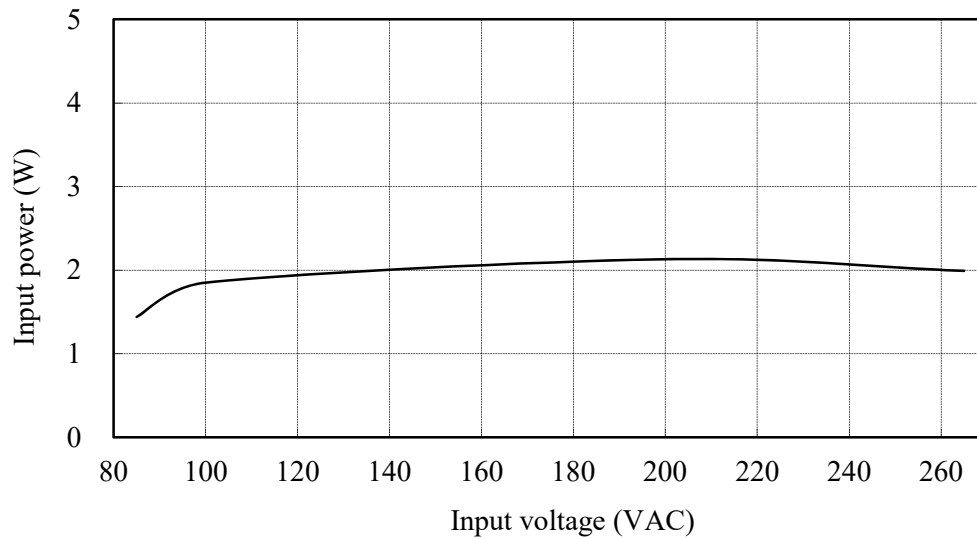
Input power and Input current vs. Input voltage with Remote control OFF

準標準品 HWS150A-*/R にて対応

For alternative standard model HWS150A-*/R

Condition Ta : 25 °C

5V



2.18 EMI 特性

Electro-Magnetic Interference characteristics

HWS150A

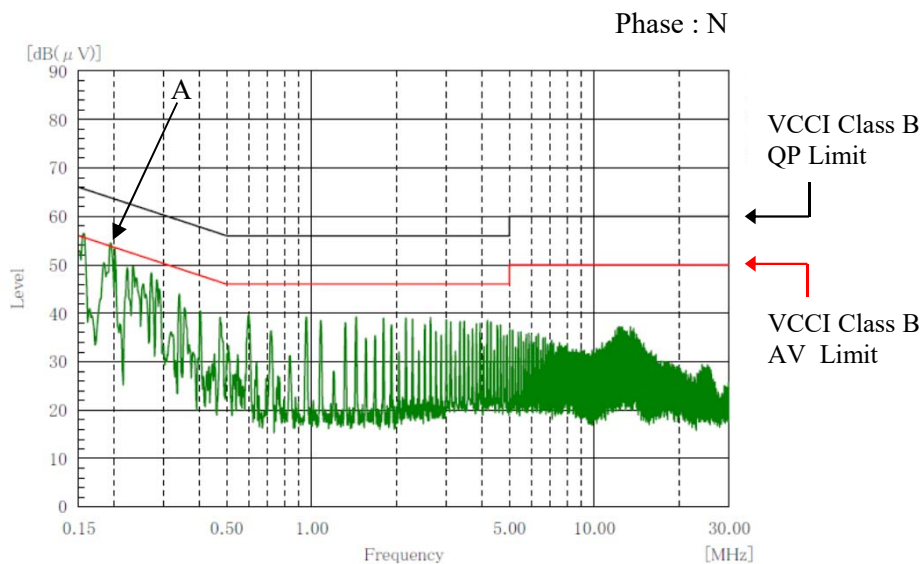
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

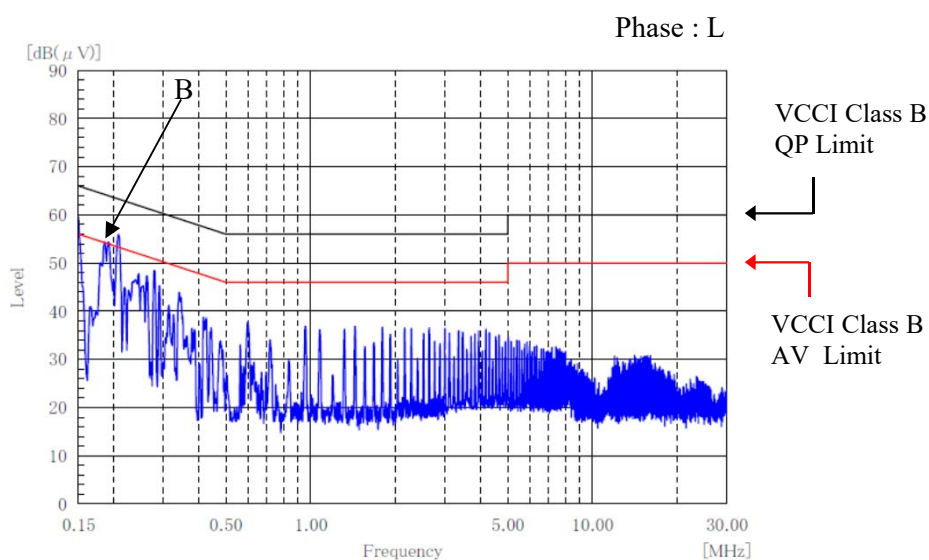
Conducted Emission

5V

Ref. Data	Point A (191kHz)	
	Limit (dB)	Measure (dB)
QP	64.0	51.0
AV	54.0	43.5



Ref. Data	Point B (190kHz)	
	Limit (dB)	Measure (dB)
QP	64.0	50.9
AV	54.0	42.3



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.

2.18 EMI 特性

Electro-Magnetic Interference characteristics

HWS150A

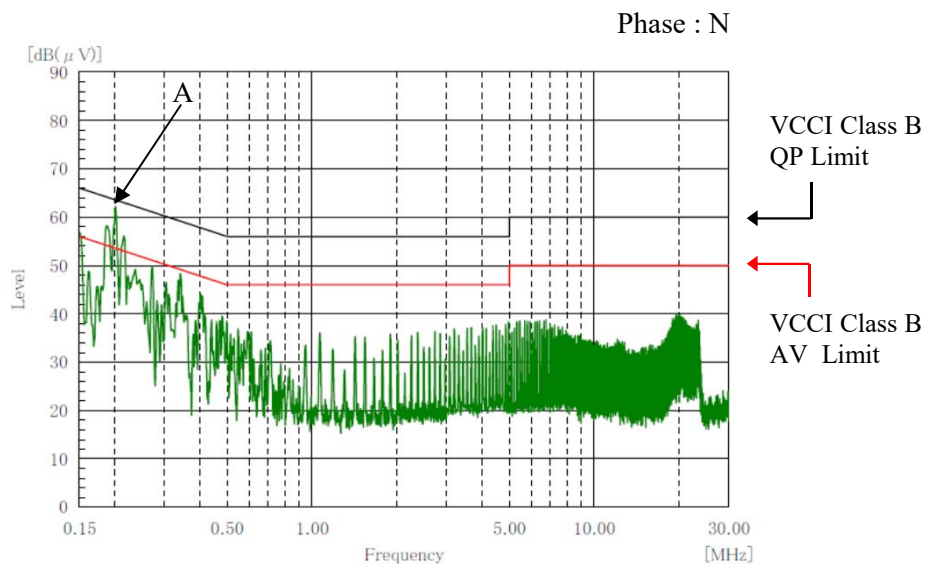
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

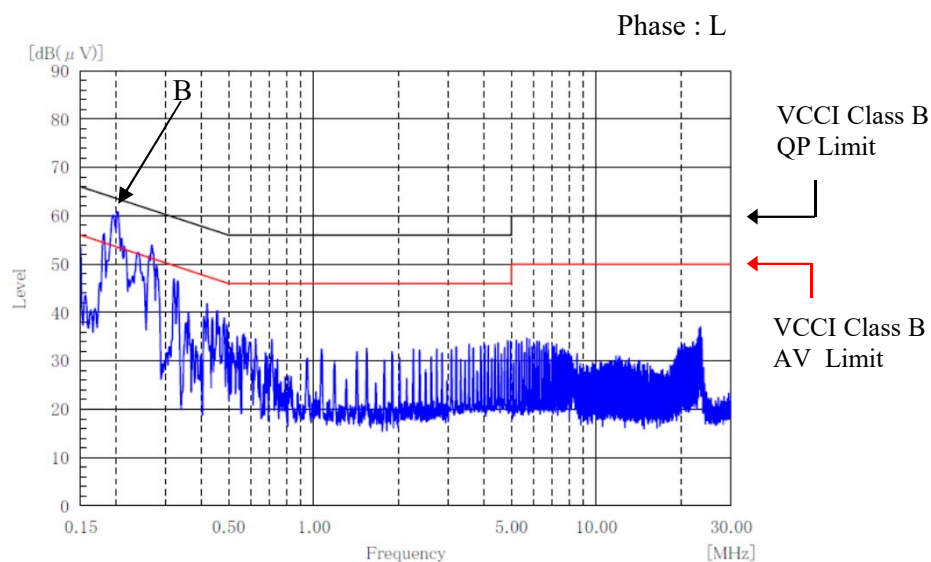
Conducted Emission

12V

Ref. Data	Point A (194kHz)	
	Limit (dB)	Measure (dB)
QP	63.9	54.9
AV	53.9	43.9



Ref. Data	Point B (197kHz)	
	Limit (dB)	Measure (dB)
QP	63.7	53.6
AV	53.7	39.6



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.

2.18 EMI 特性
Electro-Magnetic Interference characteristics

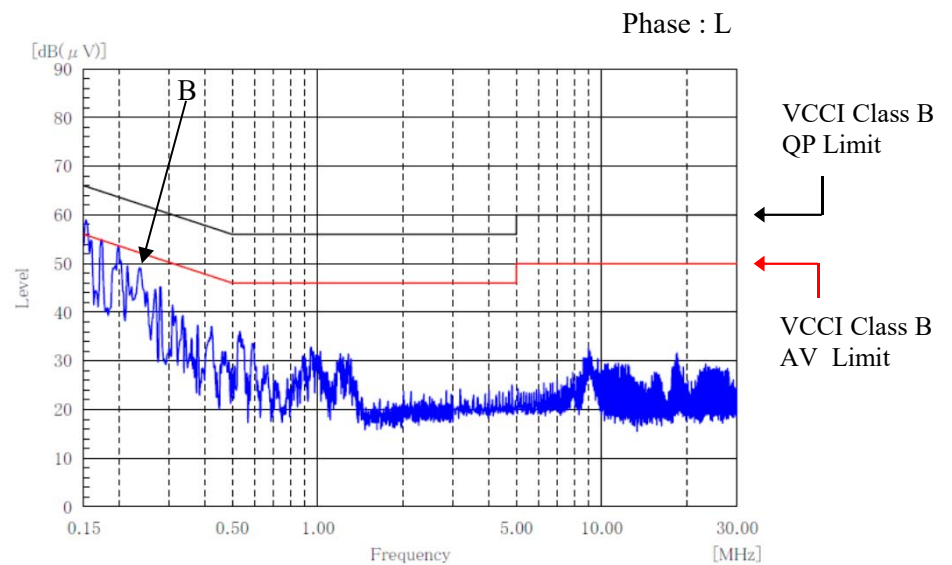
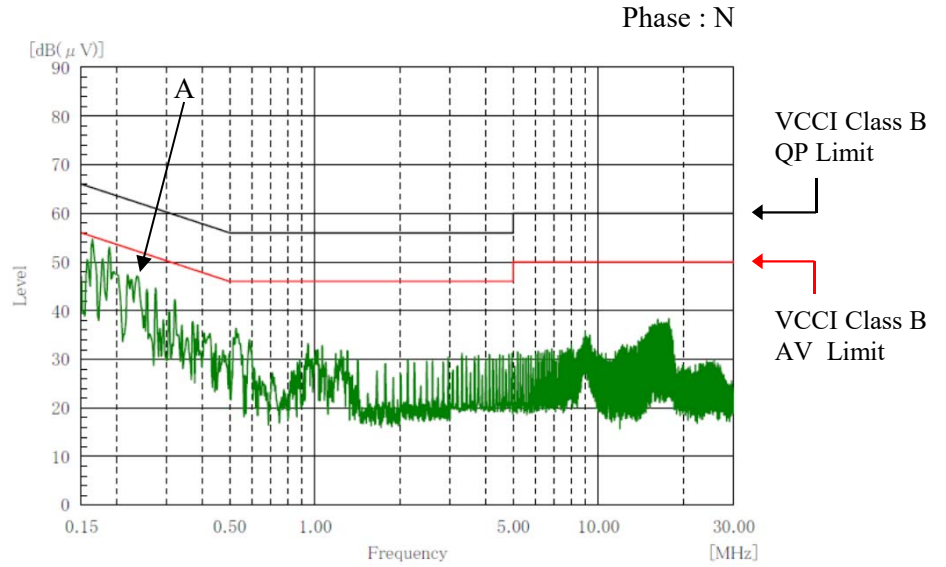
HWS150A

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

雑音端子電圧
Conducted Emission

24V

Ref. Data	Point A (236kHz)	
	Limit (dB)	Measure (dB)
QP	62.3	44.4
AV	52.3	43.2



Ref. Data	Point B (235kHz)	
	Limit (dB)	Measure (dB)
QP	62.3	45.4
AV	52.3	42.7

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.

2.18 EMI 特性

Electro-Magnetic Interference characteristics

HWS150A

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

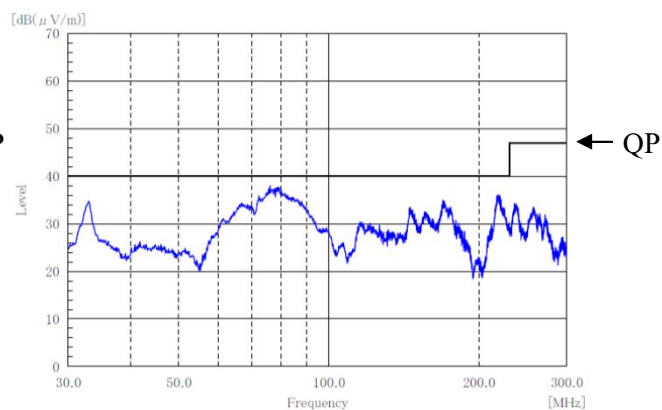
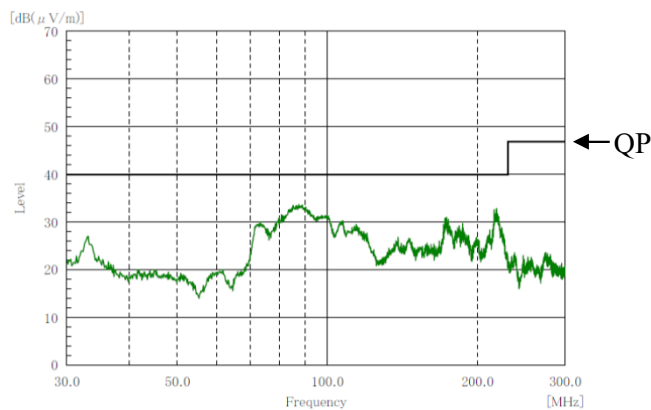
雑音電界強度

Radiated Emission

5V

HORIZONTAL

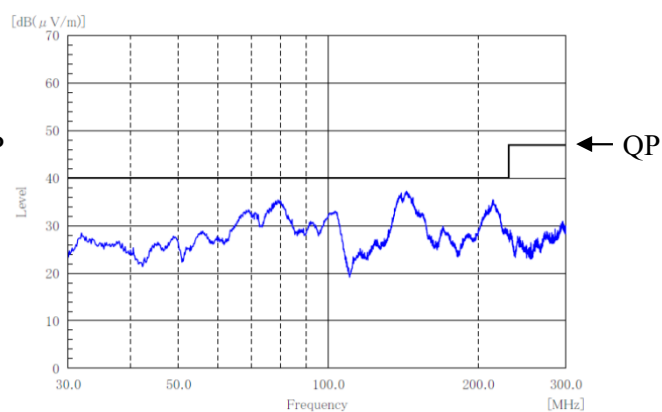
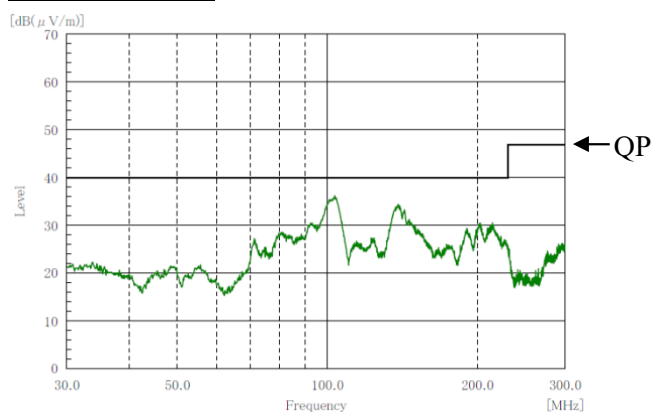
VERTICAL



12V

HORIZONTAL

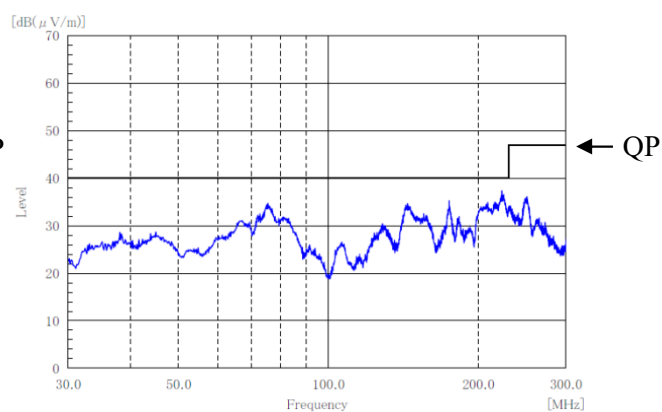
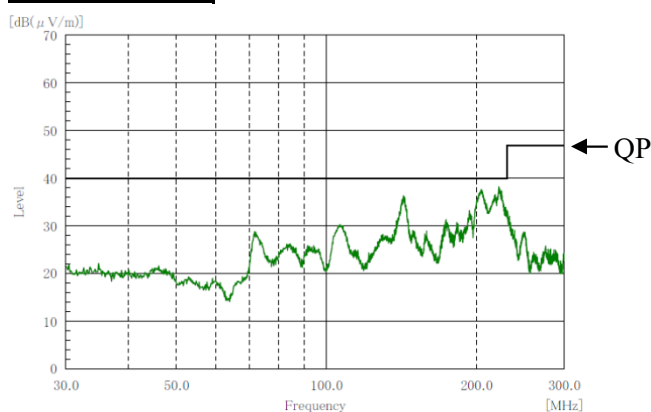
VERTICAL



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.