

ZWS50B

EVALUATION DATA

型式データ

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使用記号 Terminology used

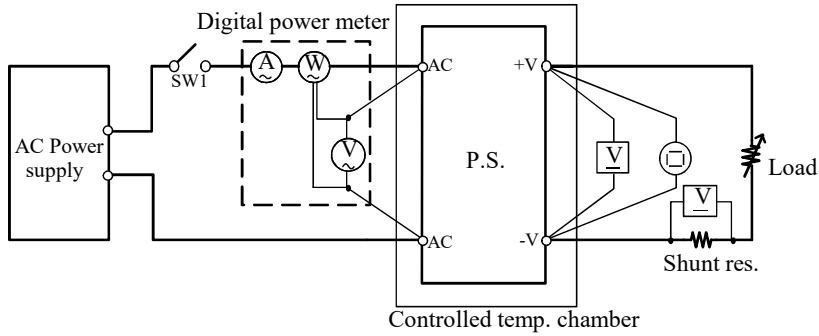
		定義	Definition
Vin	入力電圧	Input voltage
Vout	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

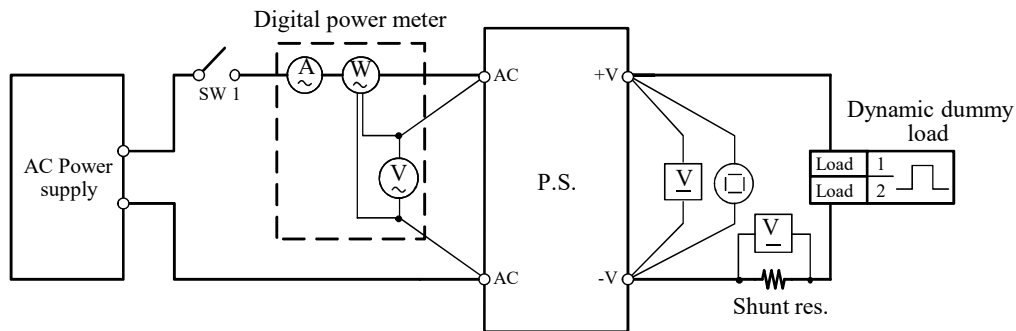
測定回路1 Circuit 1 used for determination

- 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

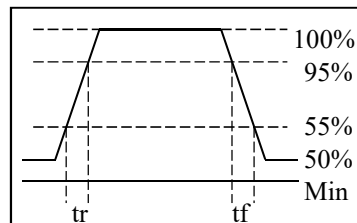


測定回路2 Circuit 2 used for determination

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

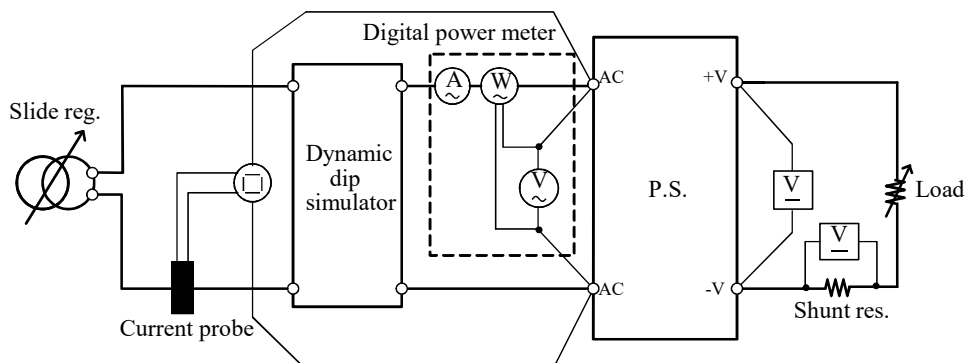


Output current waveform



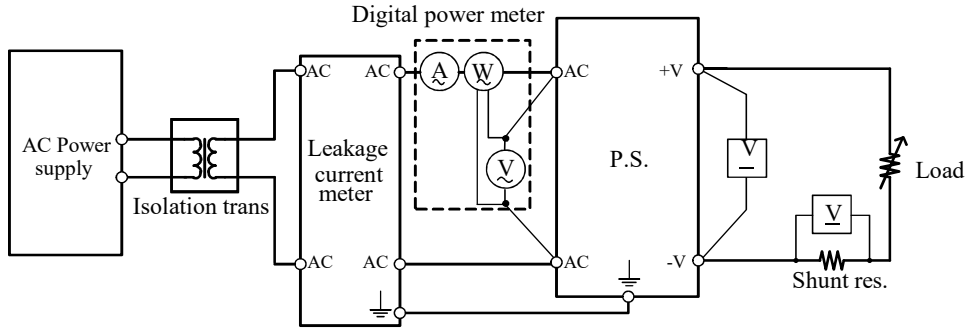
測定回路3 Circuit 3 used for determination

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



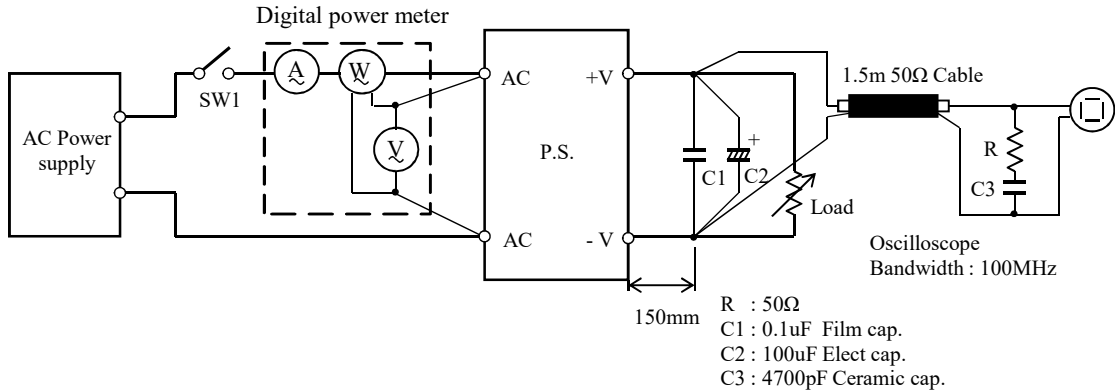
測定回路4 Circuit 4 used for determination

- ・リーク電流特性 Leakage current characteristics



測定回路5 Circuit 5 used for determination

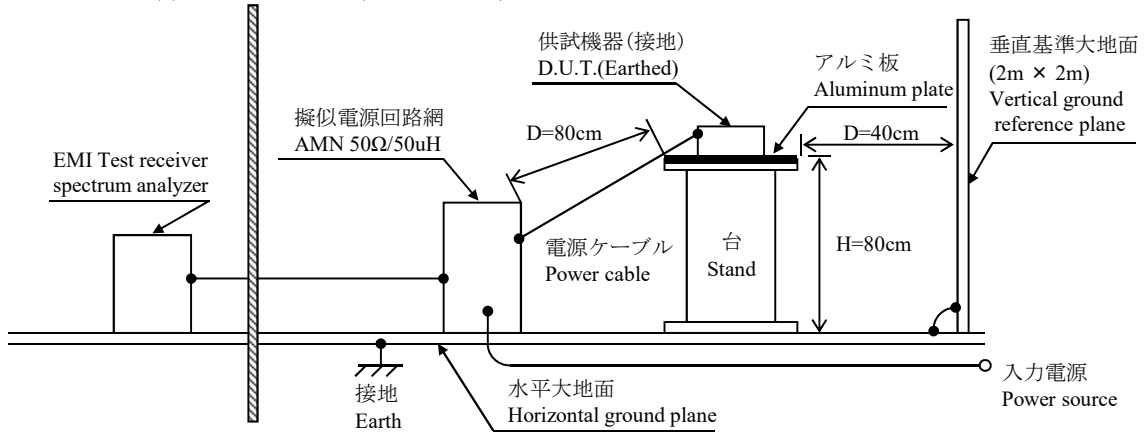
- ・出力リップル、ノイズ波形 Output ripple and noise waveform



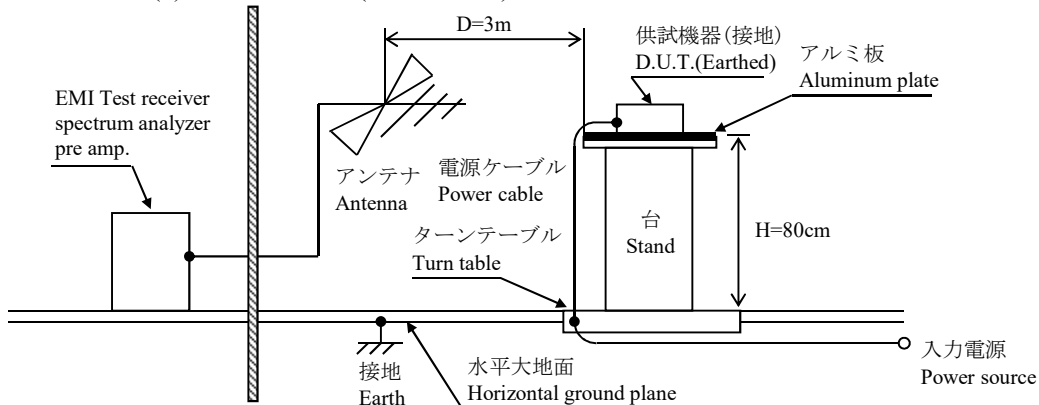
測定構成 Configuration used for determination

- ・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	TDS220
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL9040L
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	YOKOGAWA ELECT.	701930 / 701932
7	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
8	DUMMY LOAD	PCN	RHF250 SERIES
9	SLIDE REGULATOR	MATSUNAGA	S3-24100
10	ISOLATION TRANS	MATSUNAGA	3WTC-50K
11	CVCF	TAKASAGO	AA2000XG
12	CVCF	NF	ES10000S
13	LEAKAGE CURRENT METER	HIOKI	3156
14	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
15	CONTROLLED TEMP. CHAMBER	ESPEC	SU-240
16	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
17	PRE AMP.	SONOMA	310N
18	AMN	SCHWARZBECK	NNLK8121
19	ANTENNA	SCHWARZBECK	CBL6111D

2.1 静特性 Steady state data

(1) 入力・負荷・温度変動／起動電圧・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%	4.999V	4.998V	4.999V	4.999V	1mV	0.020%
50%	4.997V	4.997V	4.997V	4.997V	0mV	0.000%
100%	4.994V	4.994V	4.995V	4.994V	1mV	0.020%
load regulation	5mV	4mV	4mV	5mV		
	0.100%	0.080%	0.080%	0.100%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	4.993V	4.994V	4.990V	4mV	0.080%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	74VAC
Drop out voltage (Vin)	66VAC

12V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	12.014V	12.014V	12.015V	12.014V	1mV	0.008%
50%	12.012V	12.012V	12.012V	12.012V	0mV	0.000%
100%	12.012V	12.012V	12.012V	12.012V	0mV	0.000%
load regulation	2mV	2mV	3mV	2mV		
	0.017%	0.017%	0.025%	0.017%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	12.014V	12.012V	11.991V	23mV	0.192%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	73VAC
Drop out voltage (Vin)	68VAC

24V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	23.948V	23.948V	23.949V	23.949V	1mV	0.004%
50%	23.948V	23.949V	23.948V	23.948V	1mV	0.004%
100%	23.952V	23.952V	23.951V	23.951V	1mV	0.004%
load regulation	4mV	4mV	3mV	3mV		
	0.017%	0.017%	0.013%	0.013%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	24.034V	23.952V	23.947V	87mV	0.362%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

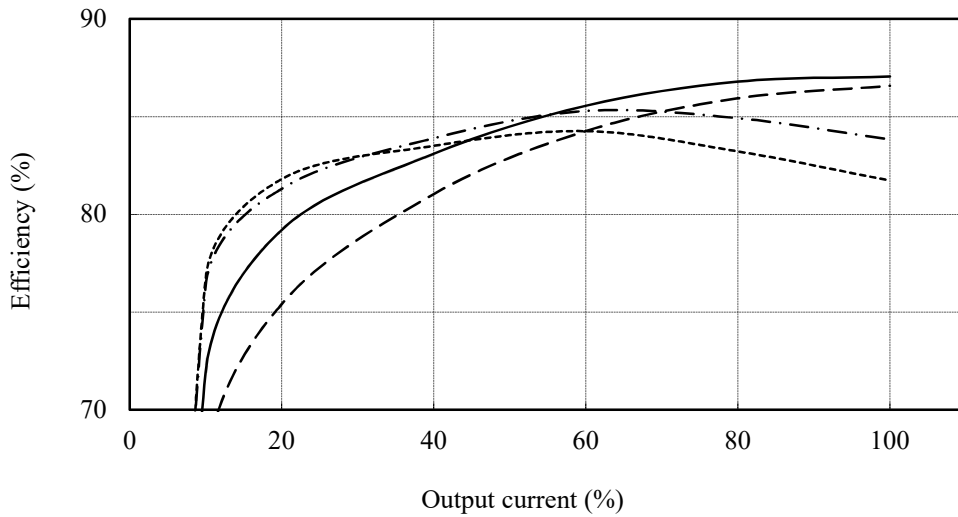
Start up voltage (Vin)	73VAC
Drop out voltage (Vin)	65VAC

(2) 効率が出力電流

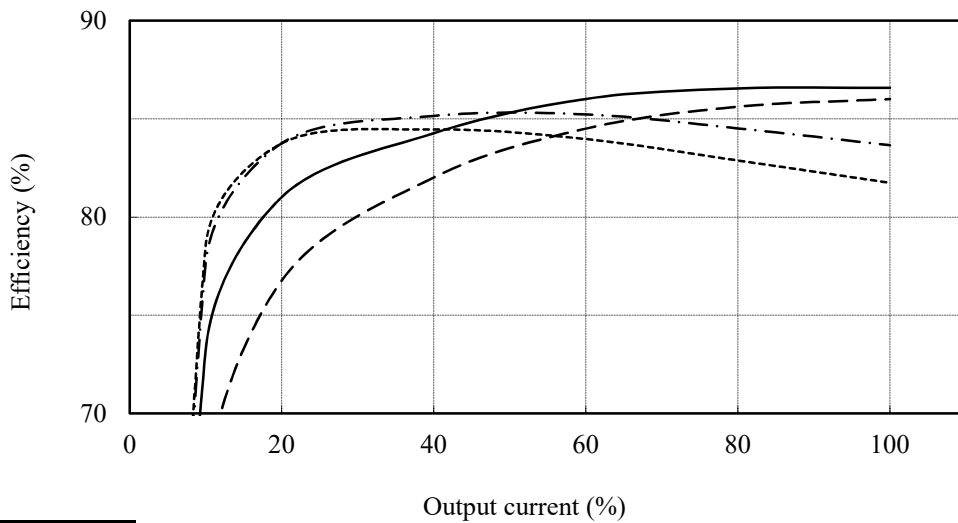
Efficiency vs. Output current

Conditions V_{in} : 85 VAC -----
 : 100 VAC - - - - -
 : 200 VAC ————
 : 265 VAC - - - - -
 T_a : 25 °C

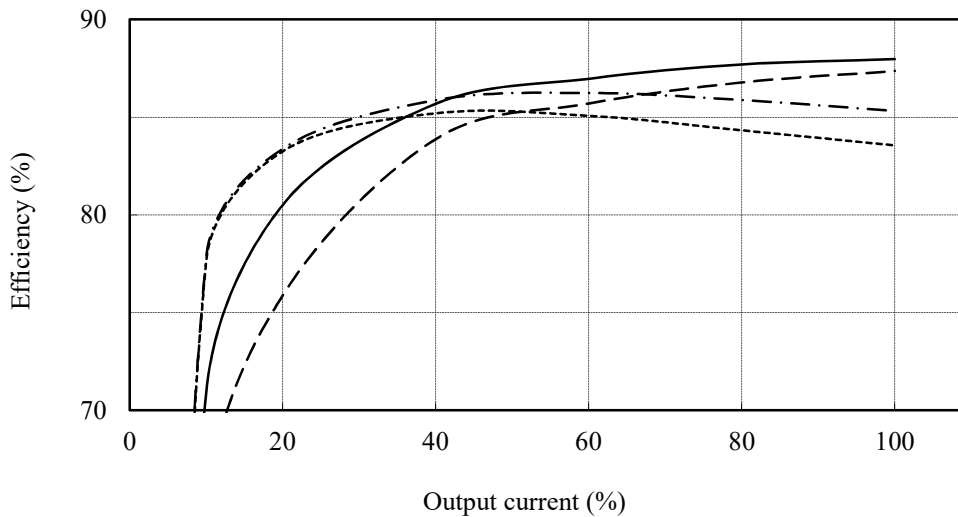
5V



12V



24V



(3) 入力電流対出力電流

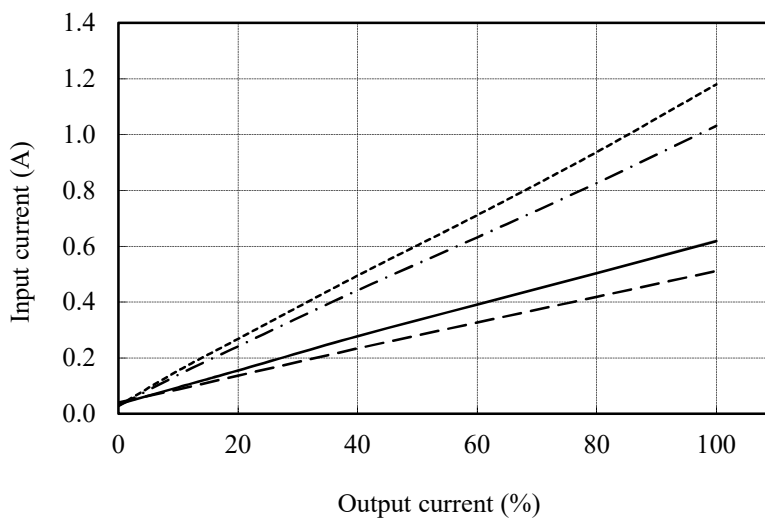
Input current vs. Output current

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

5V

Iout : 0%

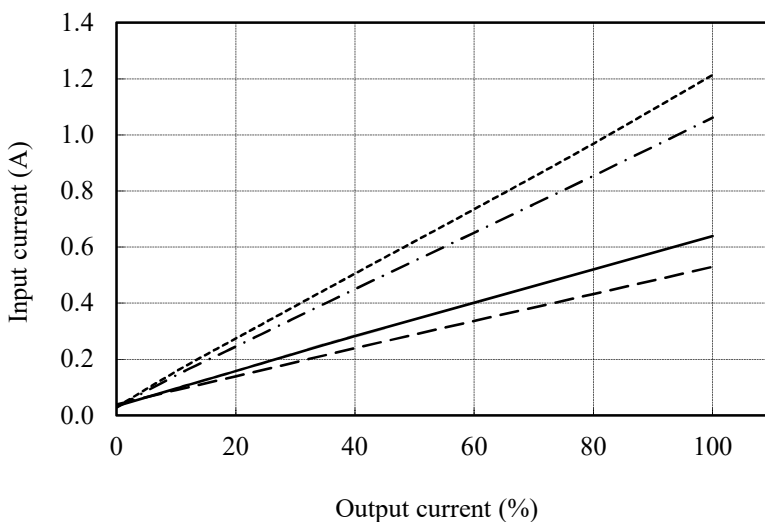
Vin	Input current
85VAC	0.029A
100VAC	0.028A
200VAC	0.035A
265VAC	0.040A



12V

Iout : 0%

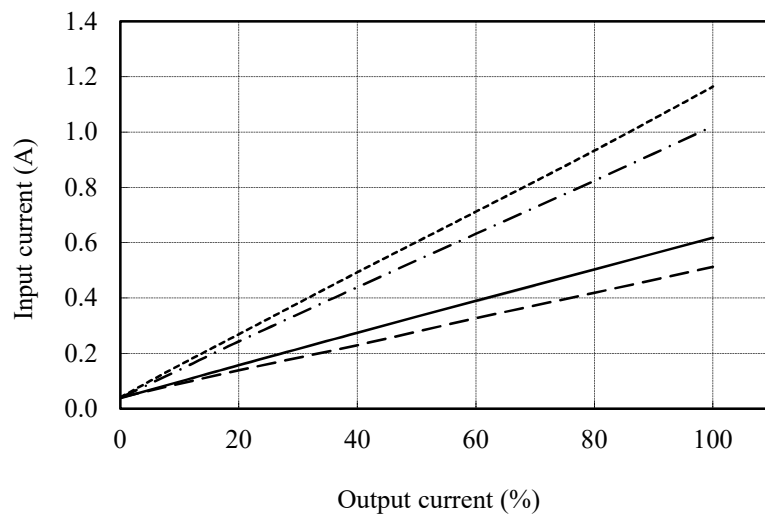
Vin	Input current
85VAC	0.030A
100VAC	0.028A
200VAC	0.033A
265VAC	0.039A



24V

Iout : 0%

Vin	Input current
85VAC	0.041A
100VAC	0.039A
200VAC	0.038A
265VAC	0.040A



(4) 入力電力対出力電流

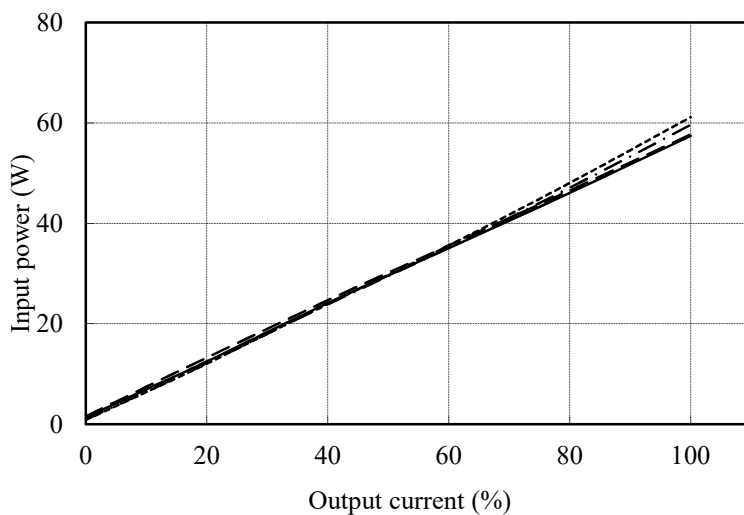
Input power vs. Output current

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

5V

Iout : 0%

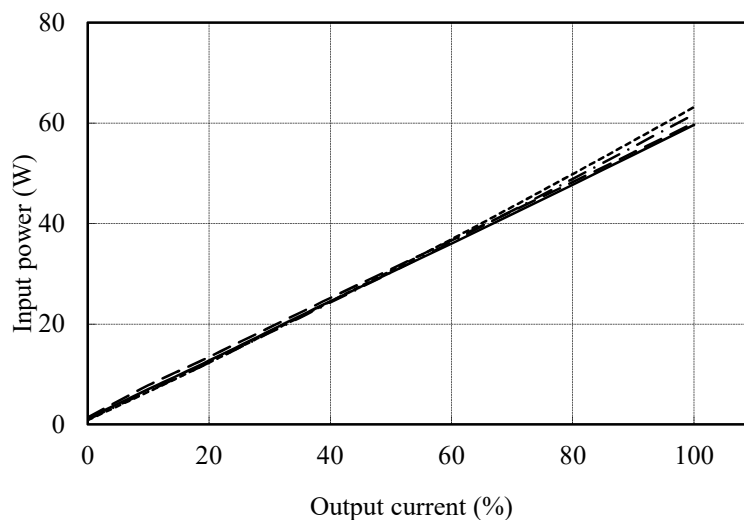
Vin	Input power
85VAC	0.9W
100VAC	1.0W
200VAC	1.4W
265VAC	1.6W



12V

Iout : 0%

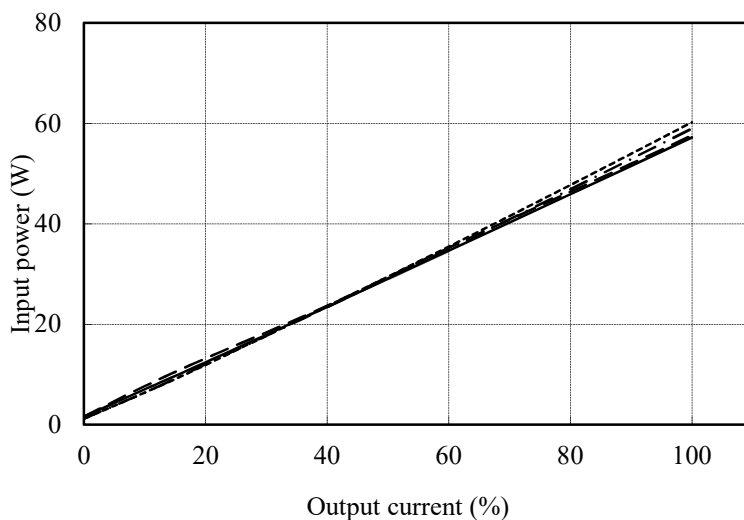
Vin	Input power
85VAC	0.9W
100VAC	0.9W
200VAC	1.2W
265VAC	1.4W



24V

Iout : 0%

Vin	Input power
85VAC	1.2W
100VAC	1.2W
200VAC	1.6W
265VAC	1.6W

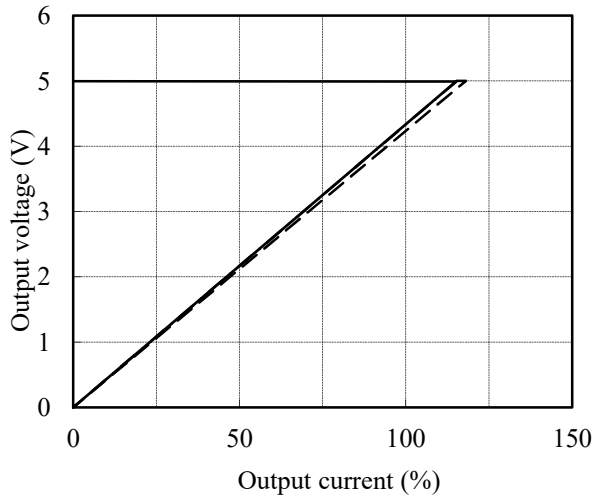


2.2 過電流保護特性

Over current protection (OCP) characteristics

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

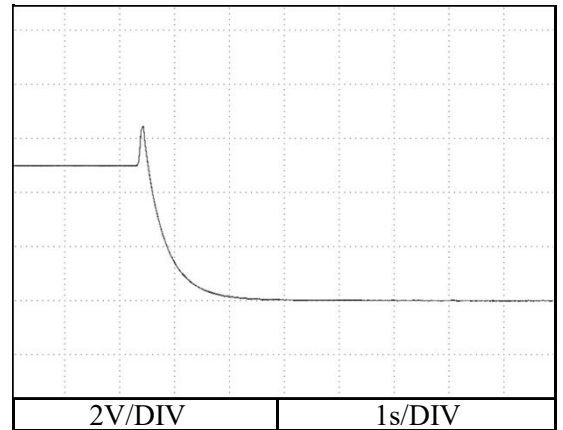
5V



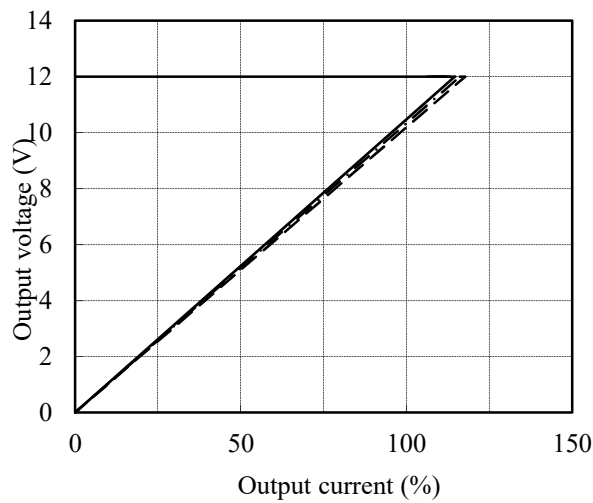
OVP Point →

Vout →

0V →



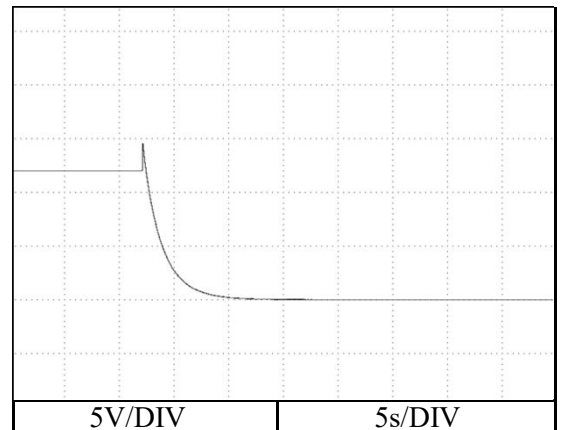
12V



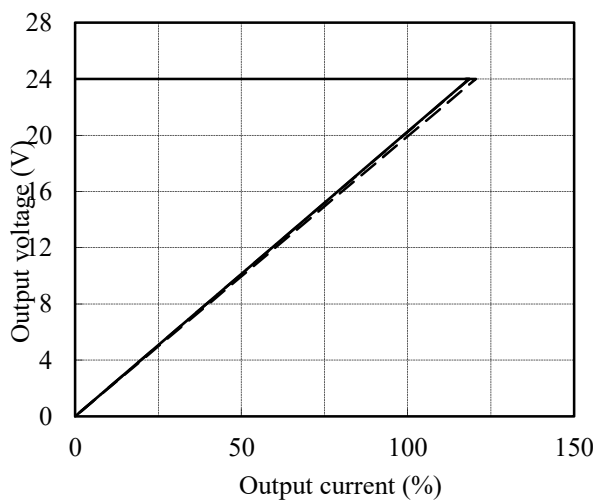
OVP Point →

Vout →

0V →



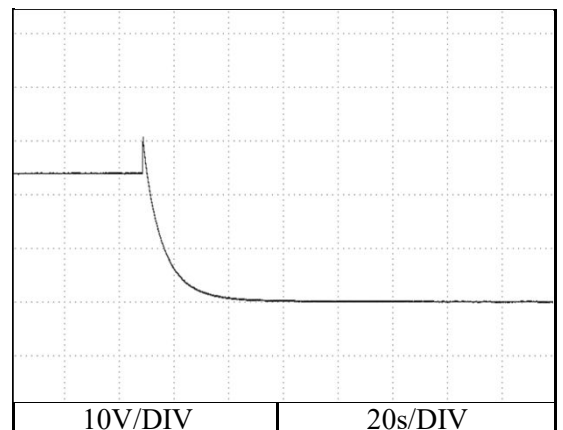
24V



OVP Point →

Vout →

0V →

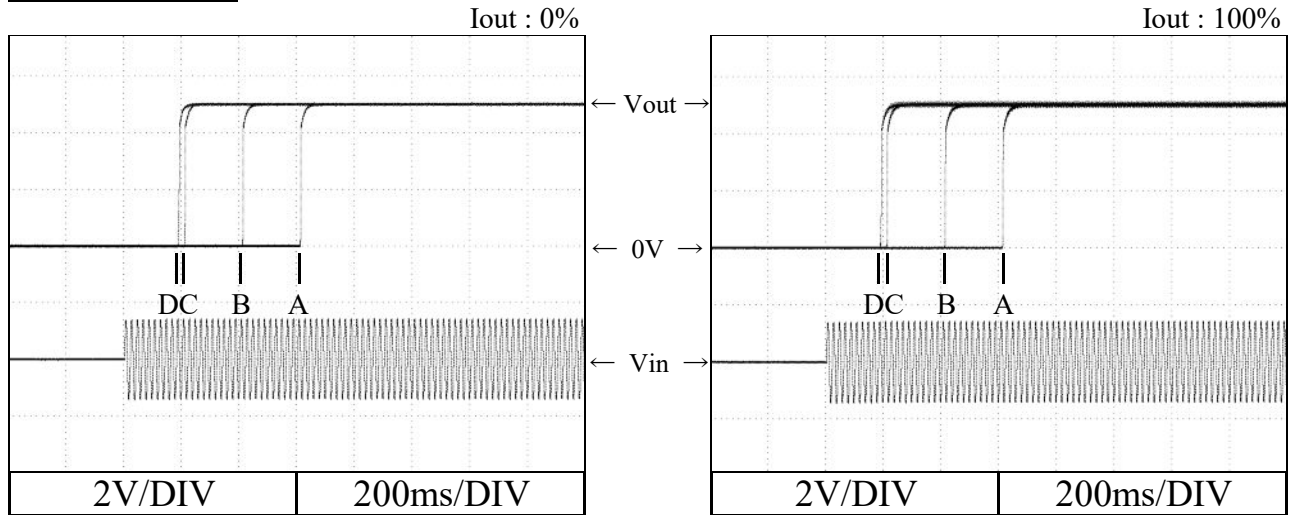


2.4 出力立ち上がり特性

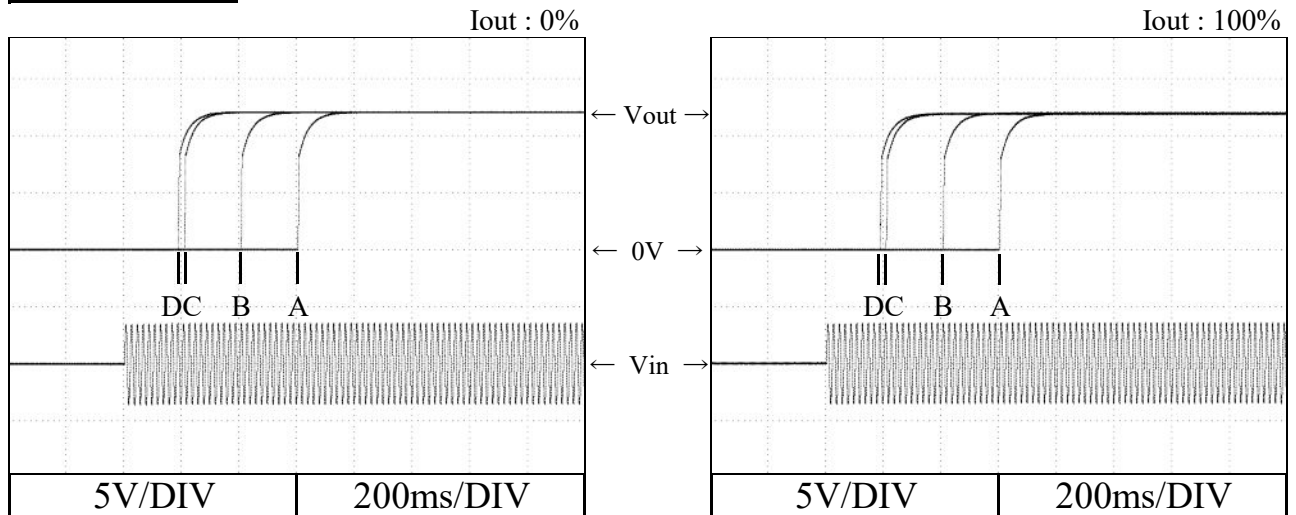
Output rise characteristics

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

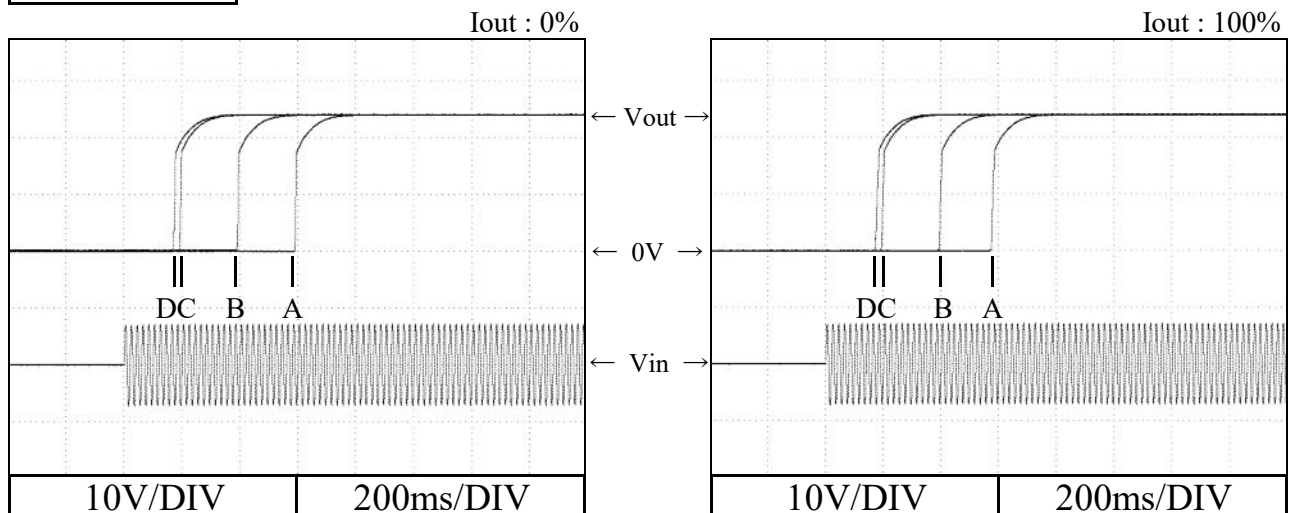
5V



12V



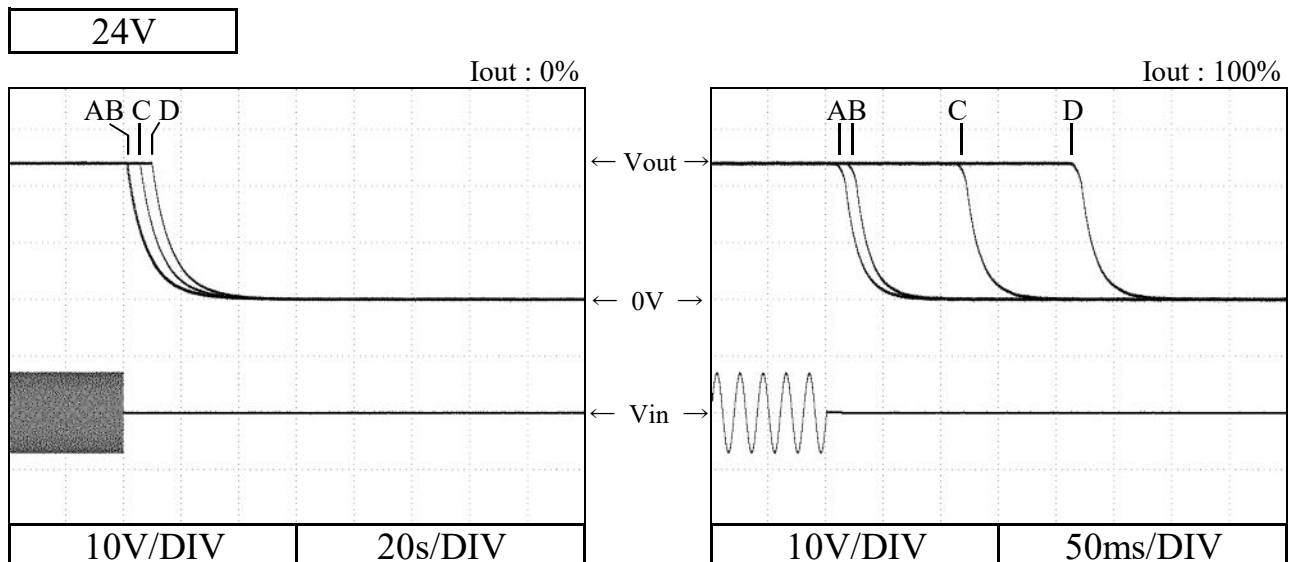
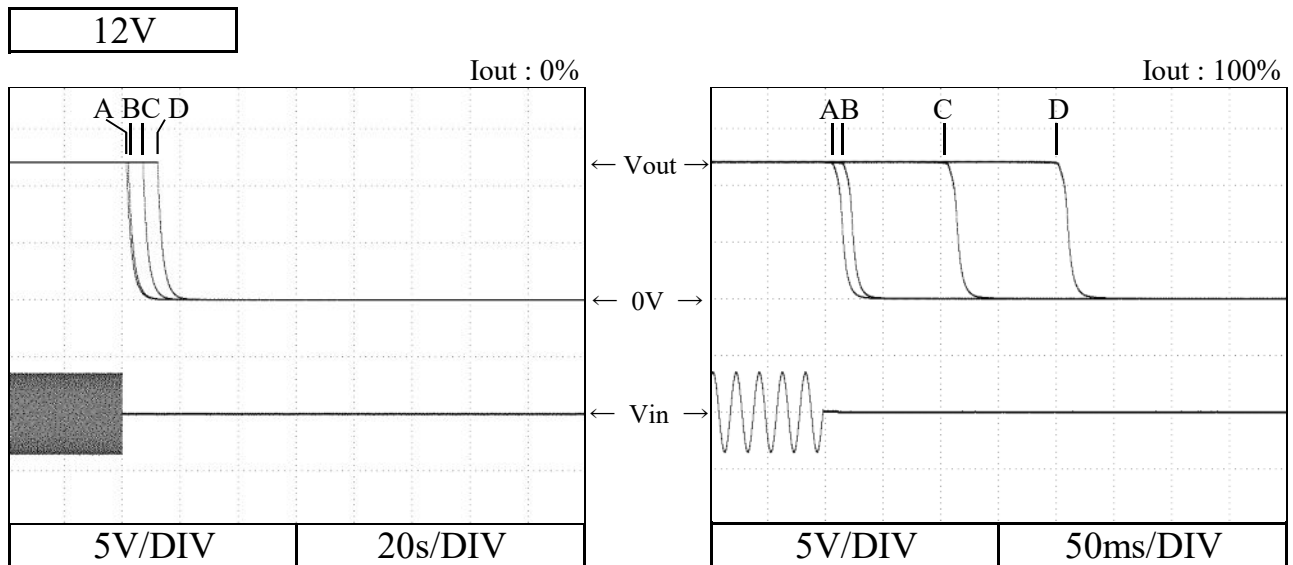
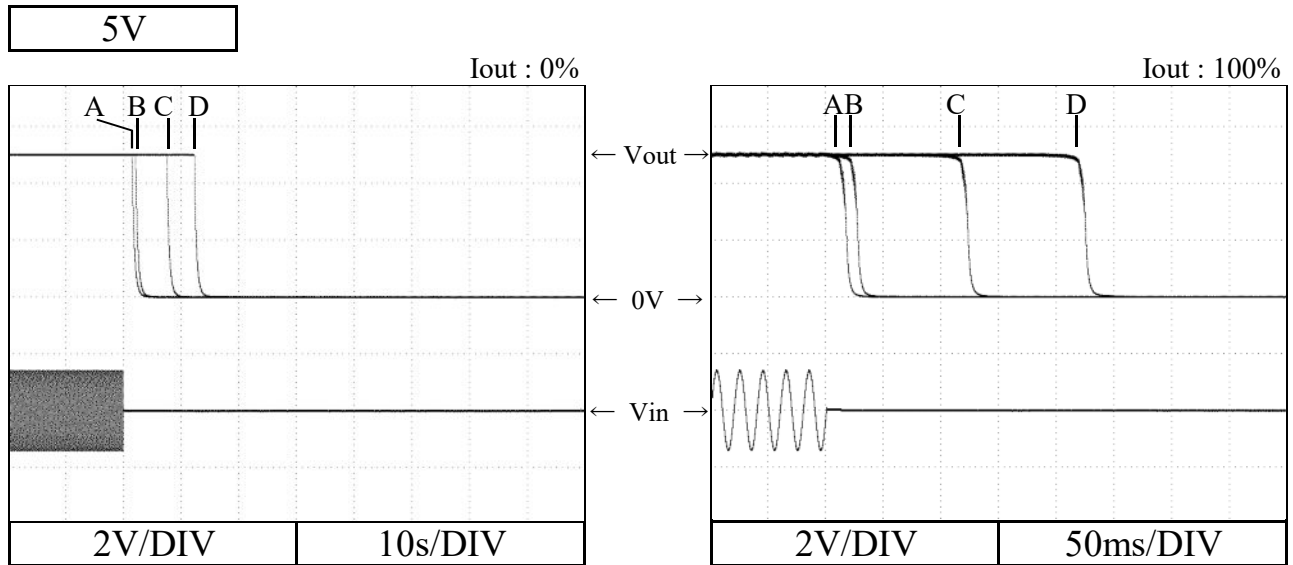
24V



2.5 出力立ち下がり特性

Output fall characteristics

Conditions V_{in} : 85 VAC (A)
 100 VAC (B)
 200 VAC (C)
 265 VAC (D)
 T_a : 25 °C

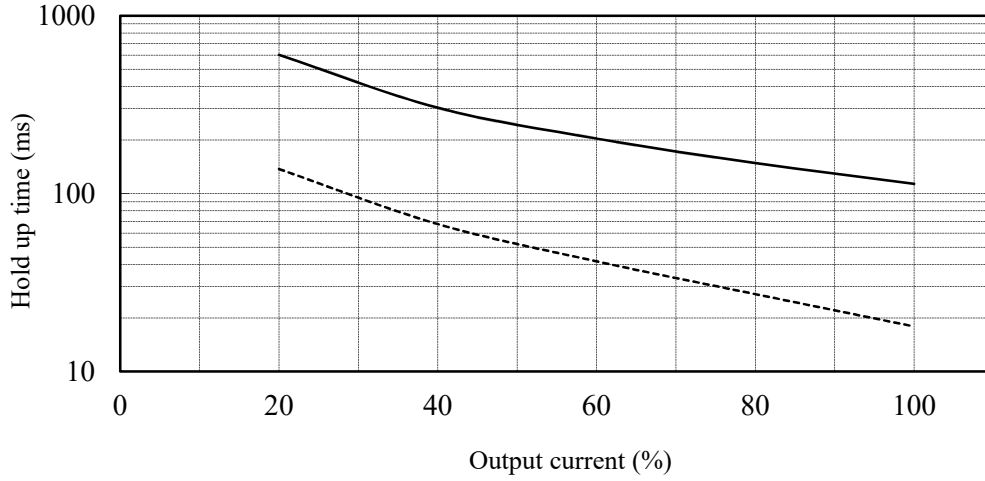


2.6 出力保持時間特性

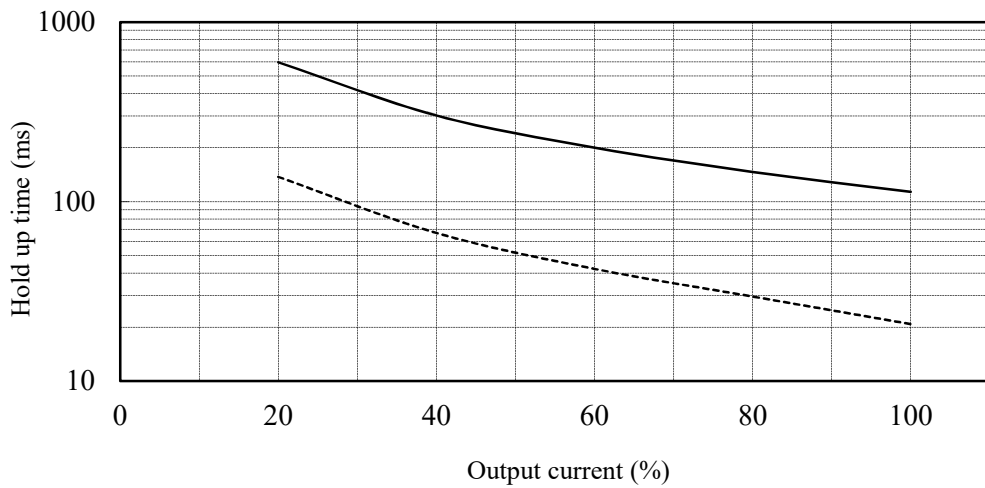
Hold up time characteristics

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

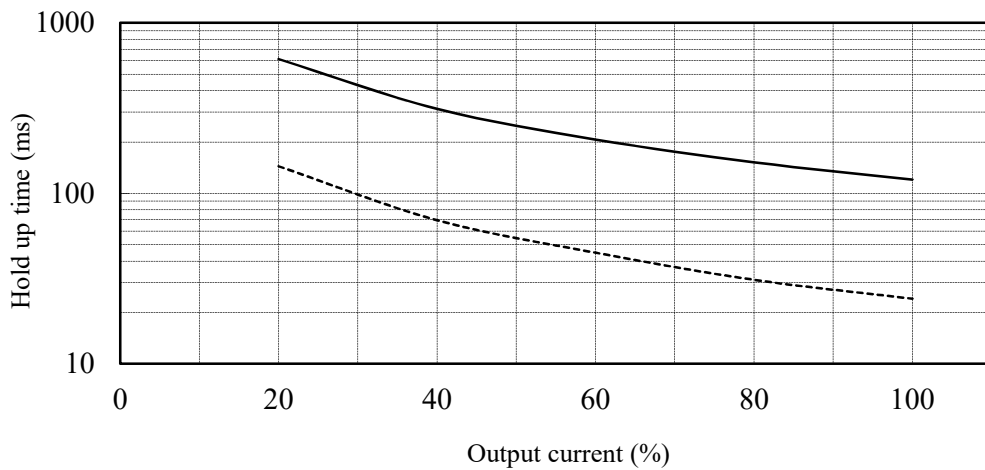
5V



12V



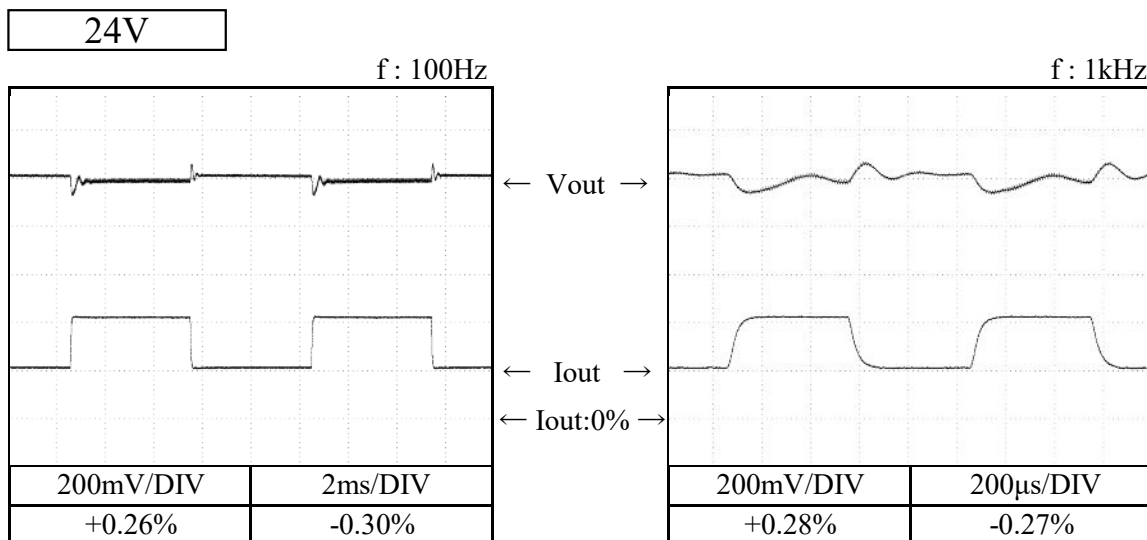
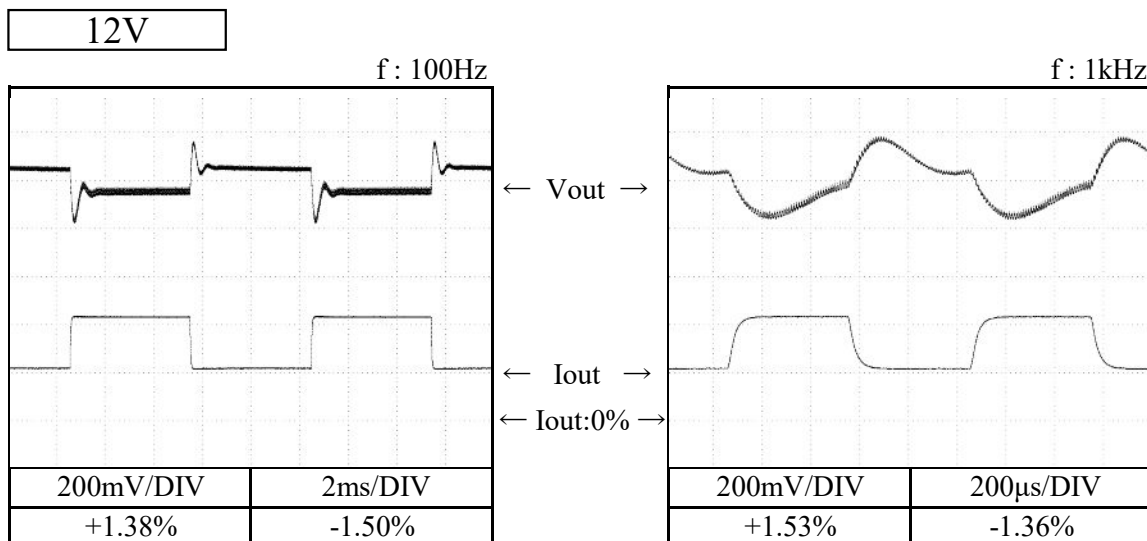
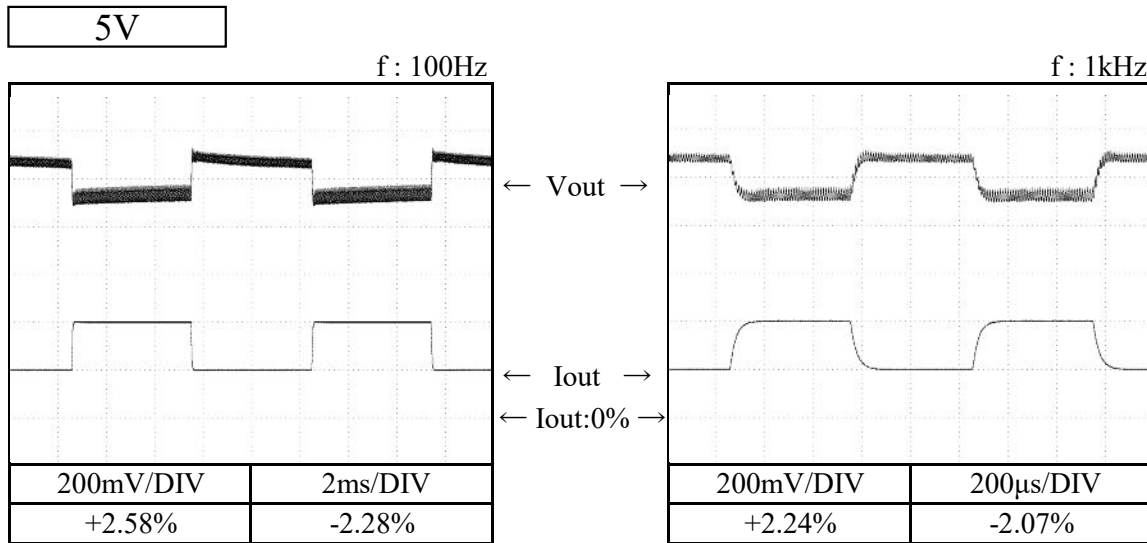
24V



2.7 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



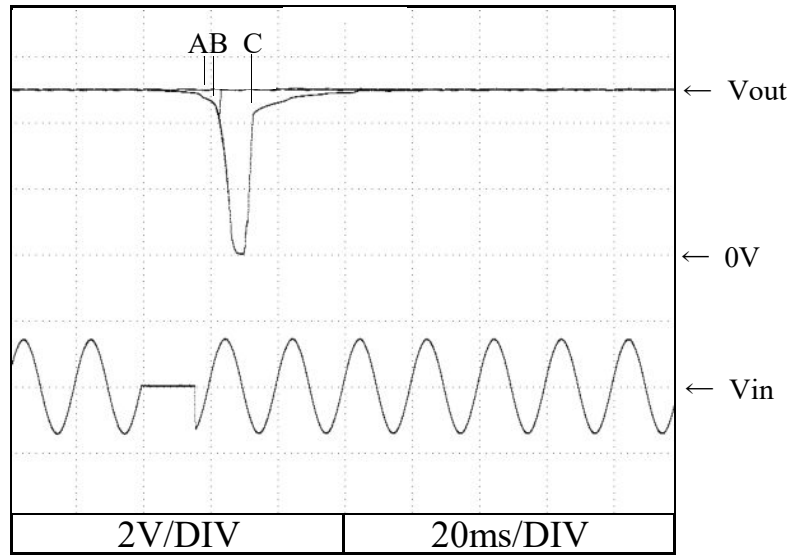
2.8 入力電圧瞬停特性

Response to brown out characteristics

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

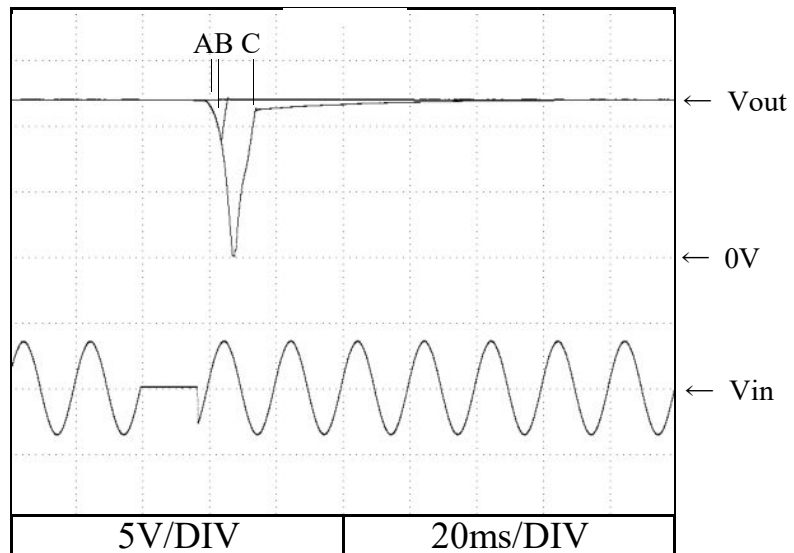
5V

A = 16ms
B = 23ms
C = 30ms



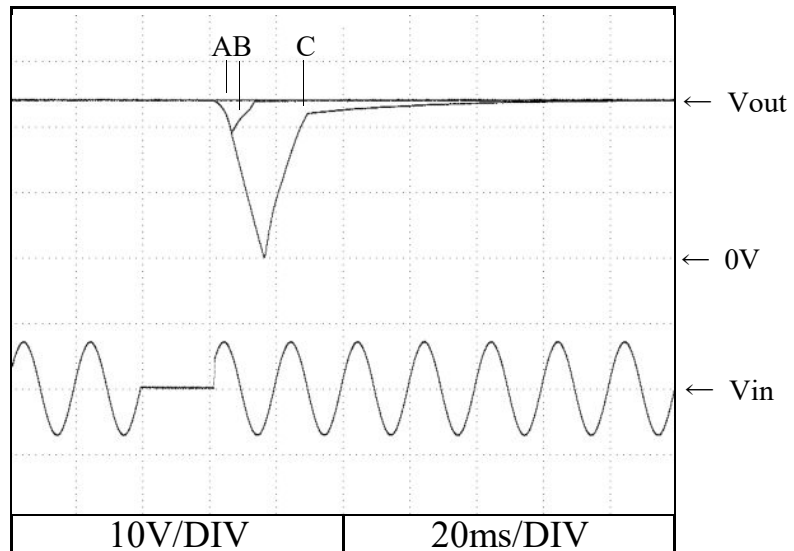
12V

A = 17ms
B = 24ms
C = 28ms



24V

A = 22ms
B = 27ms
C = 37ms



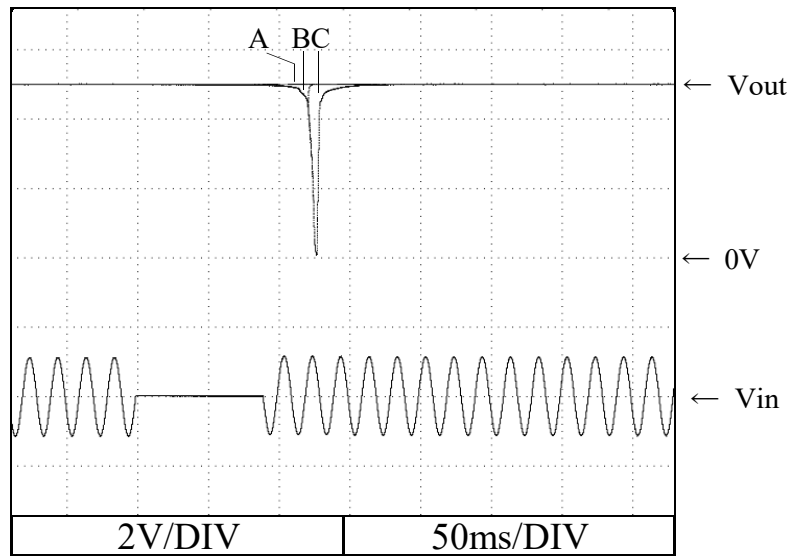
2.8 入力電圧瞬停特性

Response to brown out characteristics

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

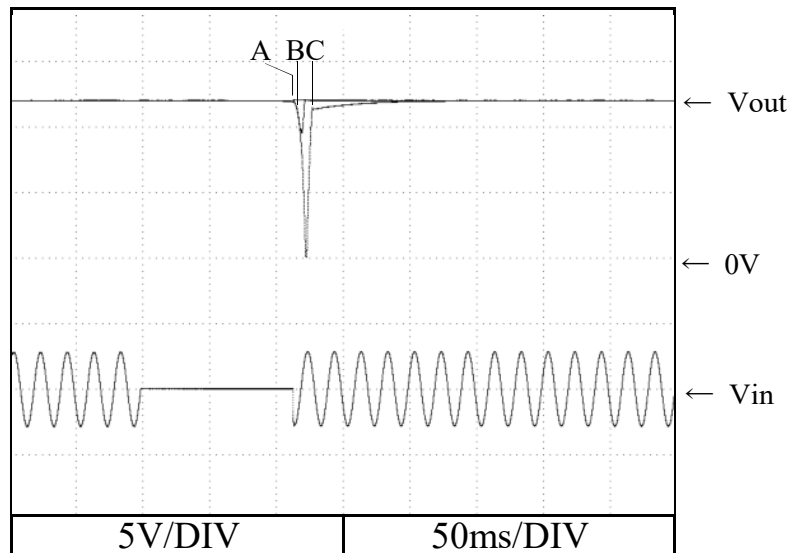
5V

A = 90ms
B = 122ms
C = 128ms



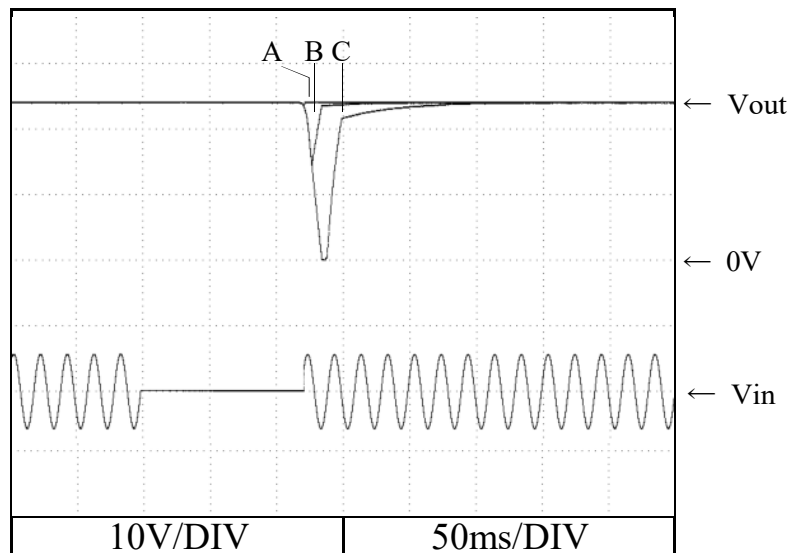
12V

A = 114ms
B = 119ms
C = 124ms



24V

A = 122ms
B = 128ms
C = 138ms

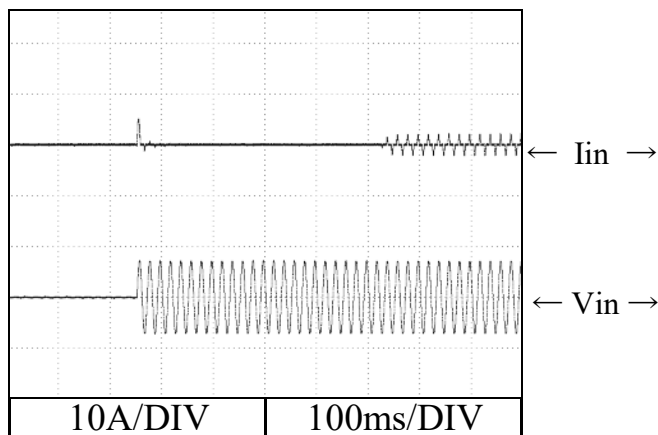


2.9 入力サージ電流 (突入電流) 波形
Inrush current waveform

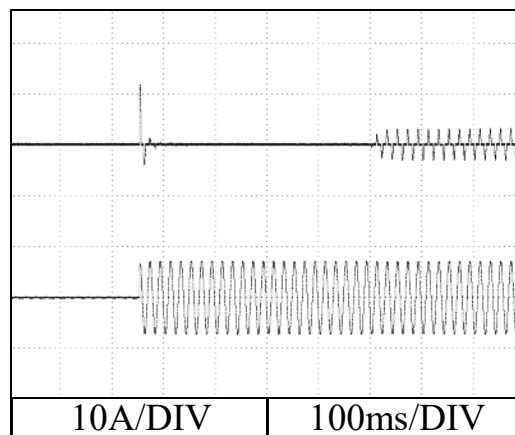
5V

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

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

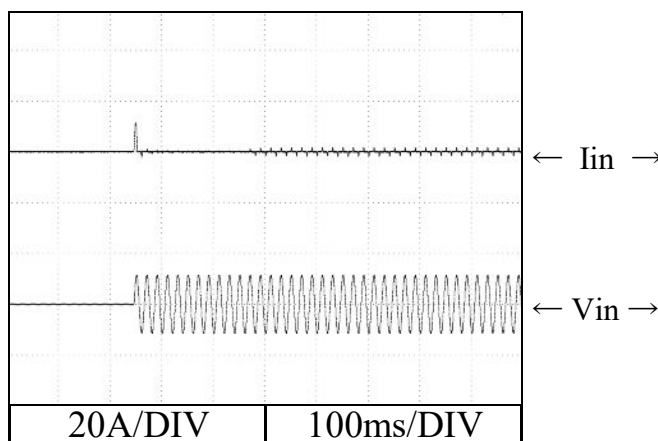


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

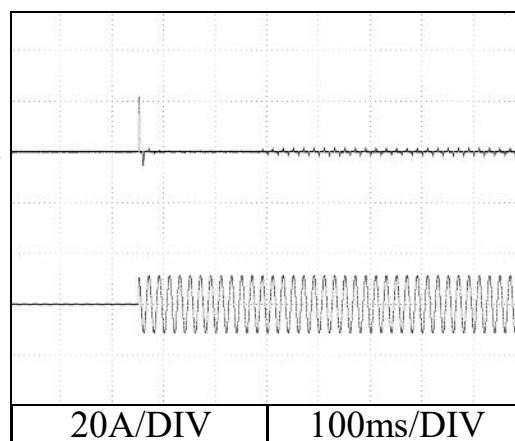


Conditions V_{in} : 200 VAC
 I_{out} : 100 %
 T_a : 25 °C

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



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



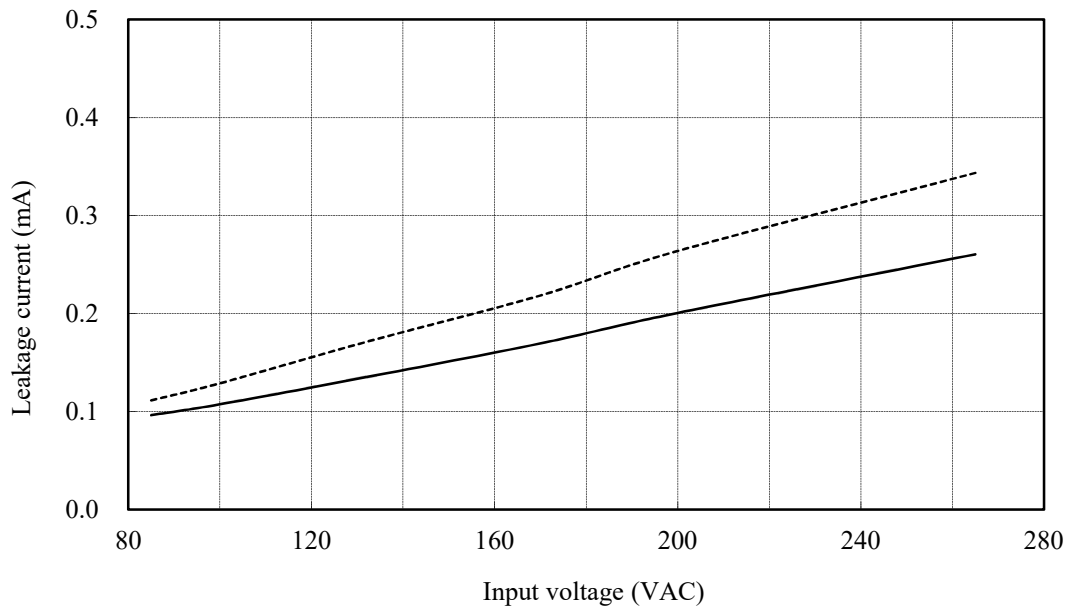
2.10 リーク電流特性

Leakage current characteristics

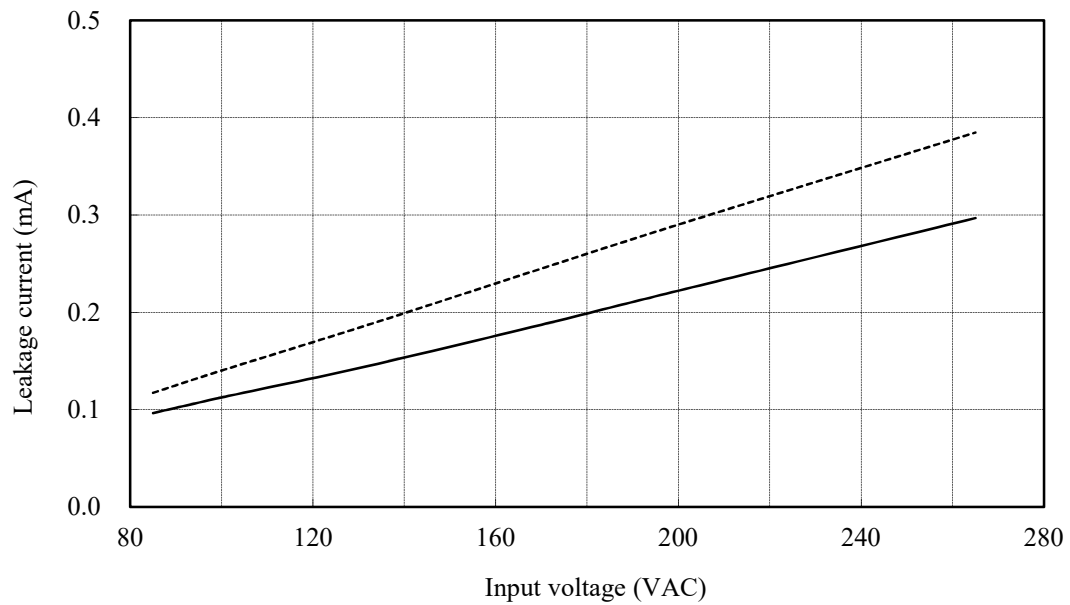
Conditions Iout : 0 % -----
 100 % ———
 Ta : 25 °C
Equipment used : 3156 (HIOKI)

5V

f : 50 Hz



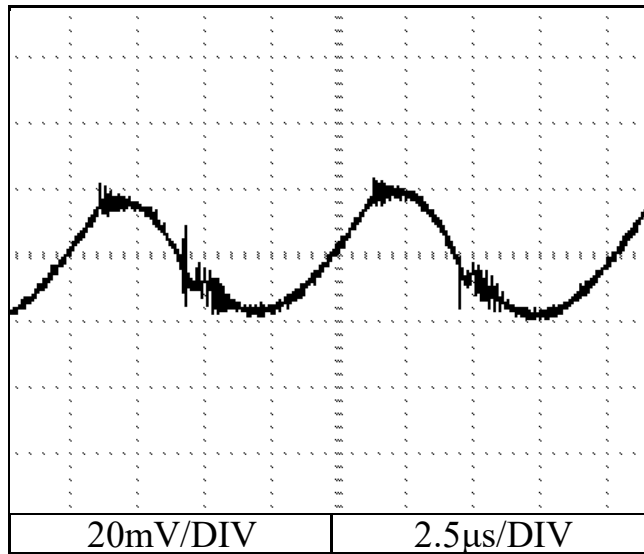
f : 60 Hz



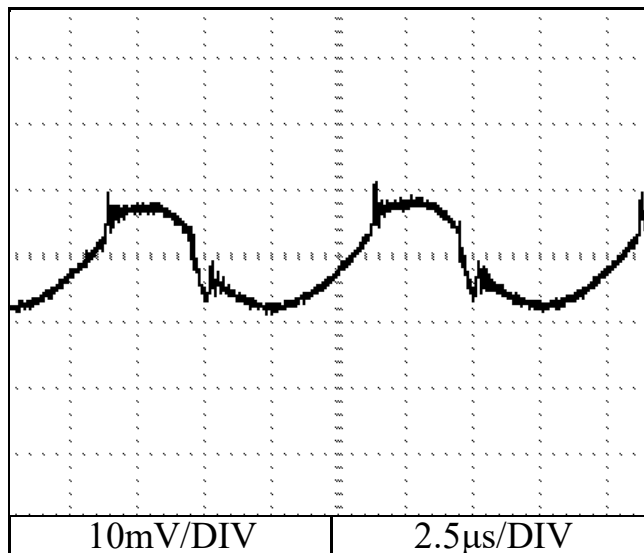
2.11 出力リップル、ノイズ波形
Output ripple and noise waveform

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

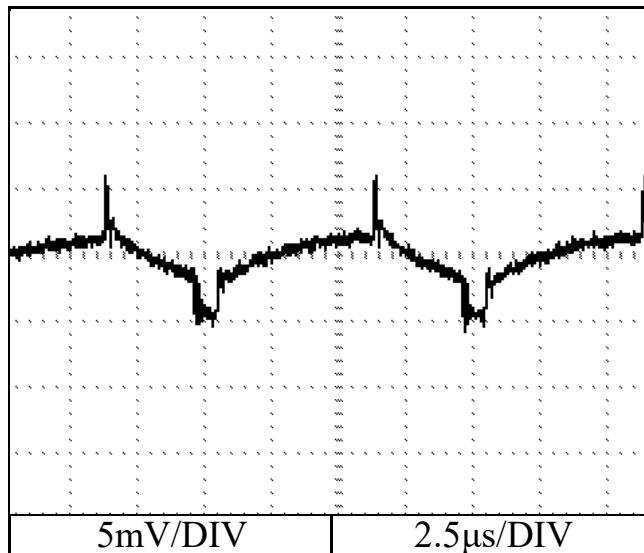
5V



12V



24V



2.12 EMI特性

Electro-Magnetic Interference characteristics

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

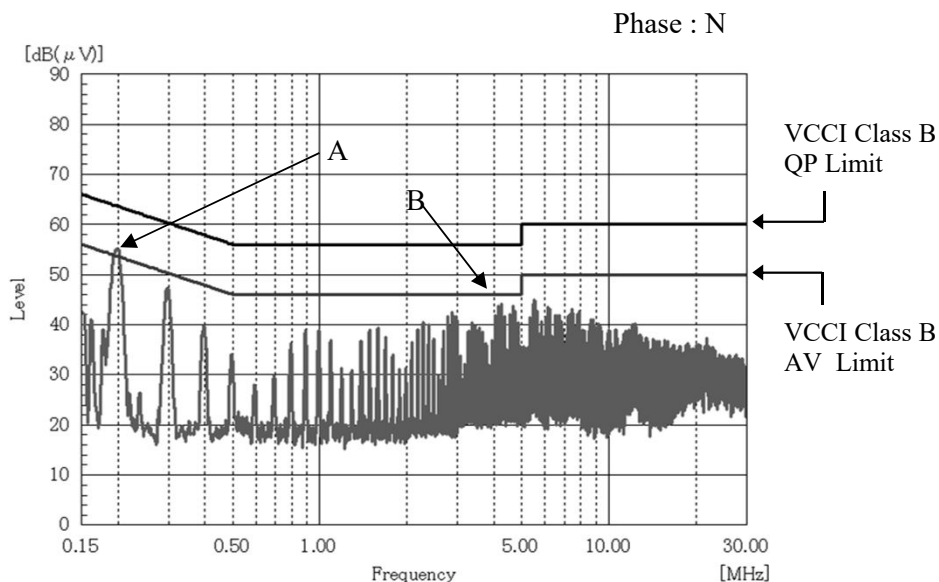
雑音端子電圧

Conducted Emission

5V

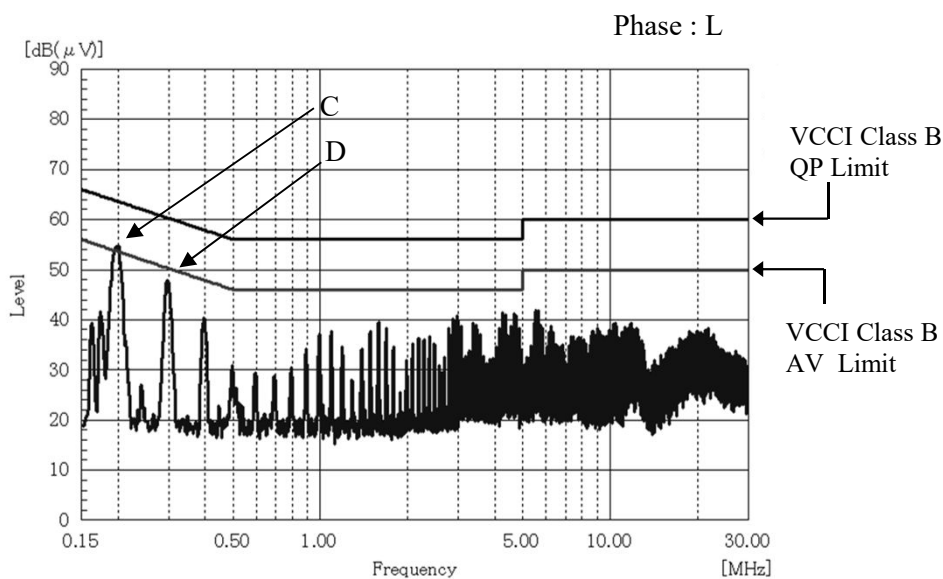
Point A (198kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.7	53.8
AV	53.7	44.8

Point B (4.2MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	56.0	43.0
AV	46.0	34.5



Point C (198kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.7	53.6
AV	53.7	44.7

Point D (297kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.3	46.6
AV	50.3	39.0



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.

2.12 EMI特性

Electro-Magnetic Interference characteristics

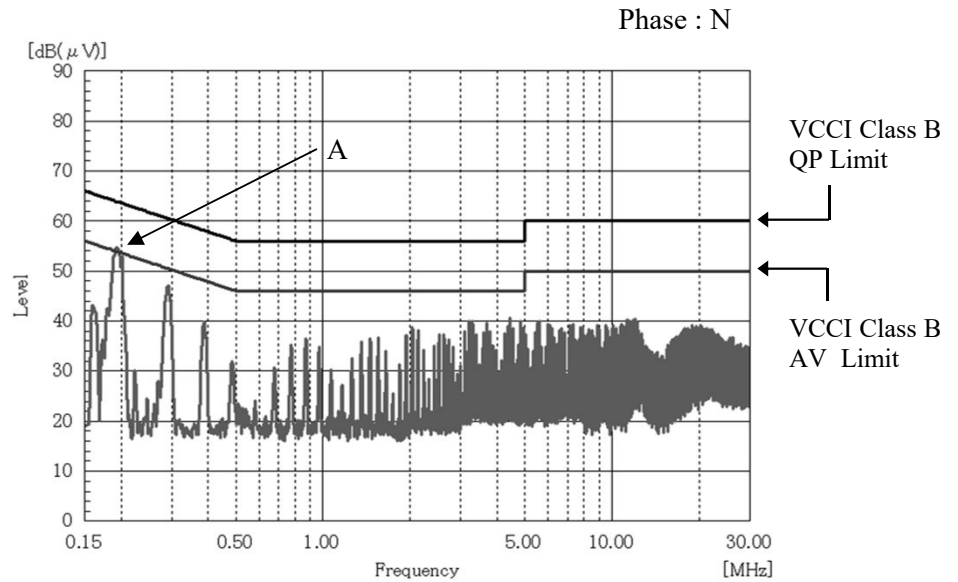
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

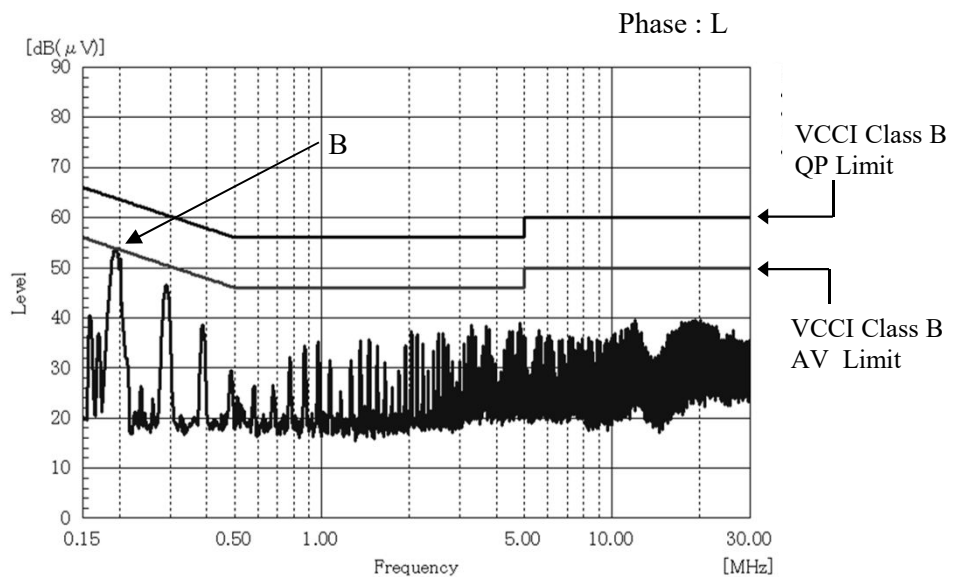
Conducted Emission

12V

Point A (193kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.9	52.9
AV	53.9	44.6



Point B (193kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.9	52.0
AV	53.9	43.0



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.

2.12 EMI特性

Electro-Magnetic Interference characteristics

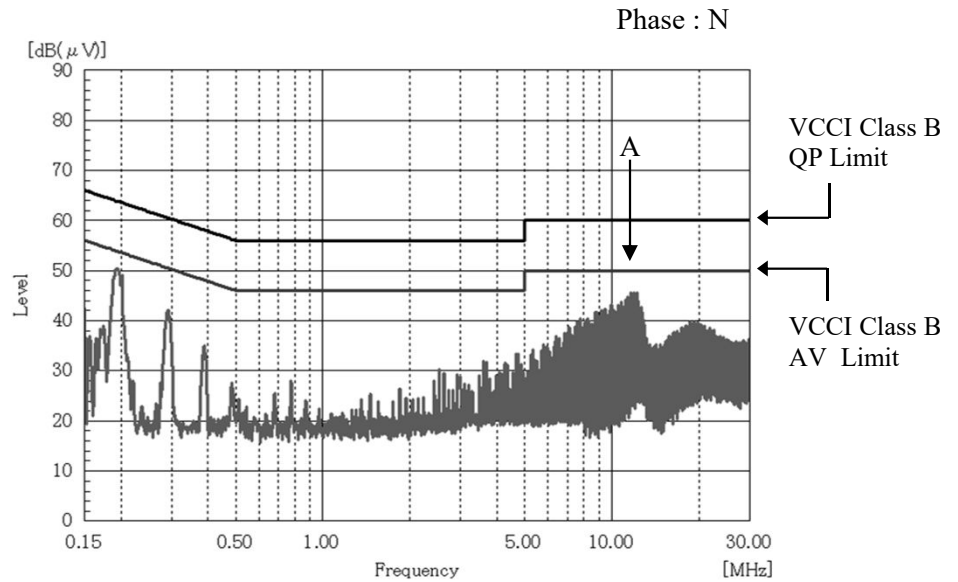
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

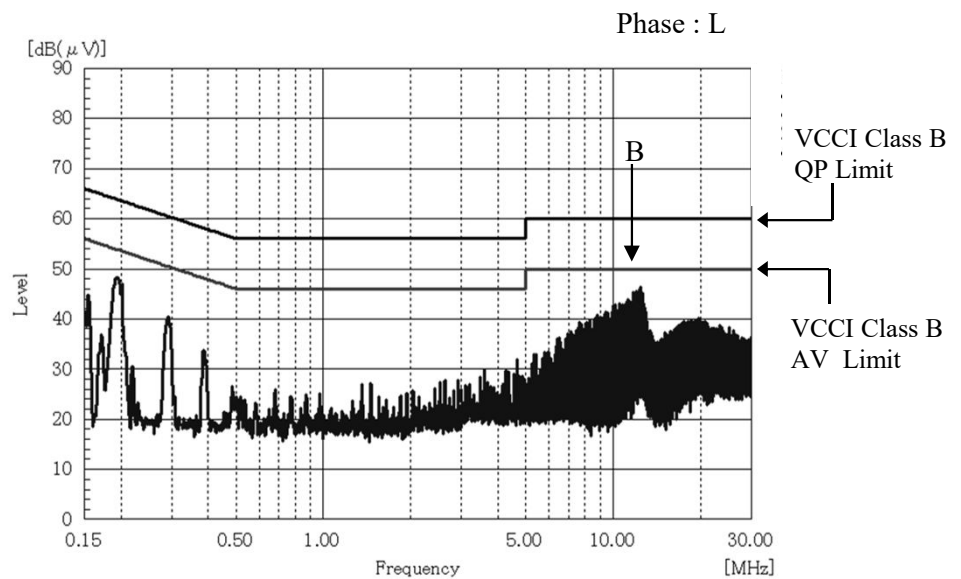
Conducted Emission

24V

Ref. Data	Point A (11.8MHz)	
	Limit (dBuV)	Measure (dBuV)
QP	60.0	45.3
AV	50.0	38.5



Ref. Data	Point B (12.3MHz)	
	Limit (dBuV)	Measure (dBuV)
QP	60.0	45.5
AV	50.0	38.6



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.

2.12 EMI特性

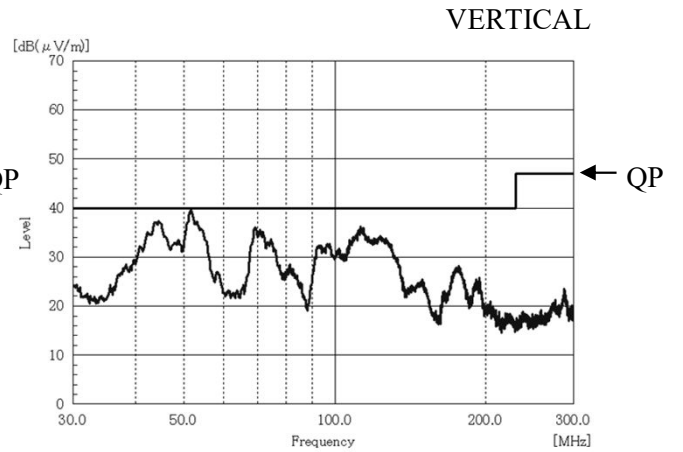
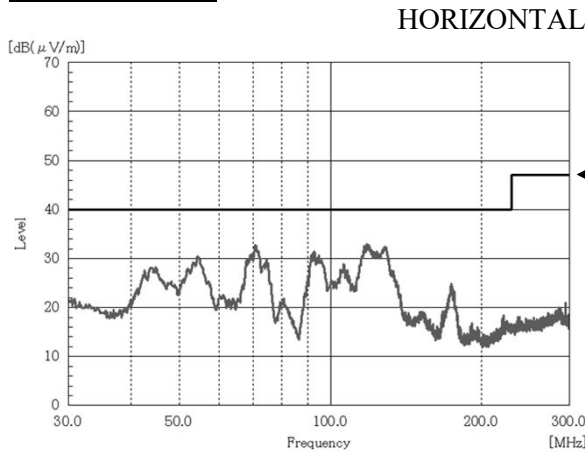
Electro-Magnetic Interference characteristics

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

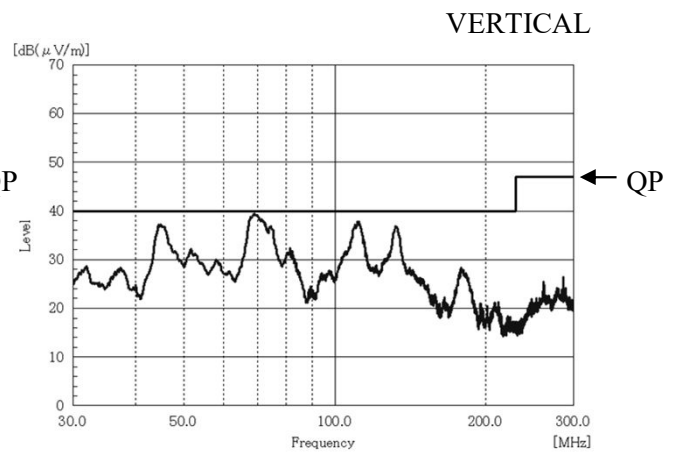
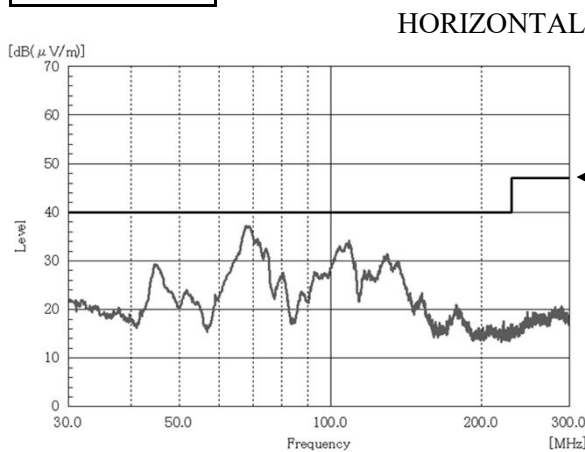
雑音電界強度

Radiated Emission

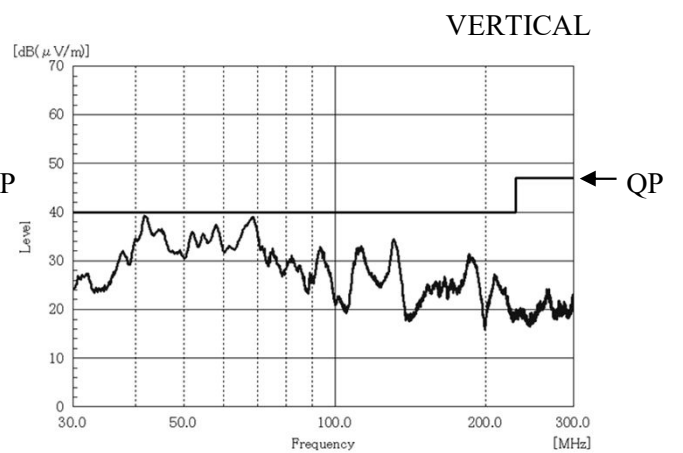
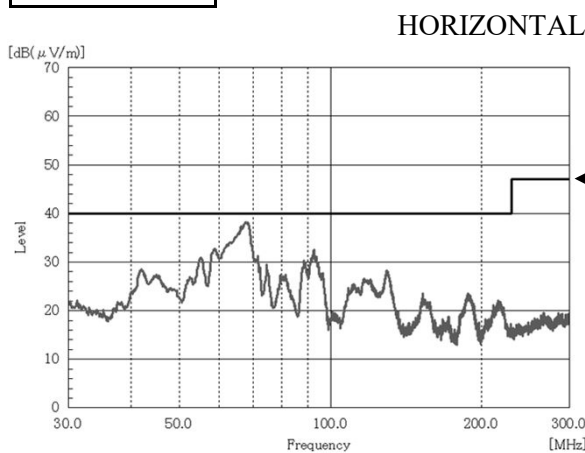
5V



12V



24V



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.