

RWS600B

EVALUATION DATA

型式データ

INDEX

1. 測定方法	Evaluation Method	PAGE
1.1	測定回路 Circuit used for determination	
	測定回路1 Circuit 1 used for determination	T-1
	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	
	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	T-1
	過渡応答 (負荷急変) 特性 Dynamic load response characteristics	
	測定回路3 Circuit 3 used for determination	T-2
	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	T-2
	リーク電流特性 Leakage current characteristics	
	測定回路5 Circuit 5 used for determination	T-3
	出力リップル、ノイズ波形 Output ripple and noise waveform	
	測定回路6 Circuit 6 used for determination	T-3
	EMI特性 Electro-Magnetic Interference characteristics	
	雑音電界強度 (放射ノイズ) Radiated Emission	
	測定構成 Configuration used for determination	T-4
	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	T-5
1.3	評価負荷条件 Load conditions	T-5

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 T-6

(2) リップルノイズ電圧対入力電圧

Ripple noise voltage vs. Input voltage T-7

(3) 効率・力率対出力電流 Efficiency and Power factor vs. Output current T-8

(4) 入力電力対出力電流 Input power vs. Output current T-9

(5) 入力電流対出力電流 Input current vs. Output current T-10

2.2 通電ドリフト特性 Warm up voltage drift characteristics T-11

2.3 出力保持時間特性 Hold up time characteristics T-11

2.4 出力立ち上がり特性 Output rise characteristics T-12

2.5 出力立ち下がり特性 Output fall characteristics T-13

2.6 過電流保護特性 Over current protection (OCP) characteristics T-14

2.7 過電圧保護特性 Over voltage protection (OVP) characteristics T-14

2.8 過渡応答（負荷急変）特性 Dynamic load response characteristics T-15

2.9 入力電圧瞬停特性 Response to brown out characteristics T-16

2.10 入力サージ電流（突入電流）波形 Inrush current waveform T-17

2.11 高調波成分 Input current harmonics T-18

2.12 入力電流波形 Input current waveform T-18

2.13 リーク電流特性 Leakage current characteristics T-19

2.14 出力リップル、ノイズ波形 Output ripple and noise waveform T-20

2.15 EMI特性 Electro-Magnetic Interference characteristics T-21～24

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

※ 当社測定条件における結果であり、参考値としてお考え願います。

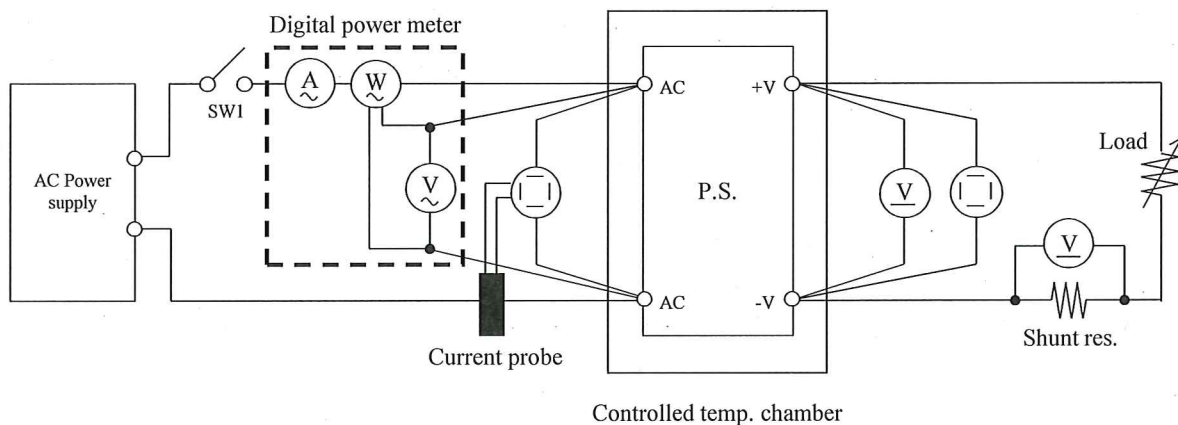
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

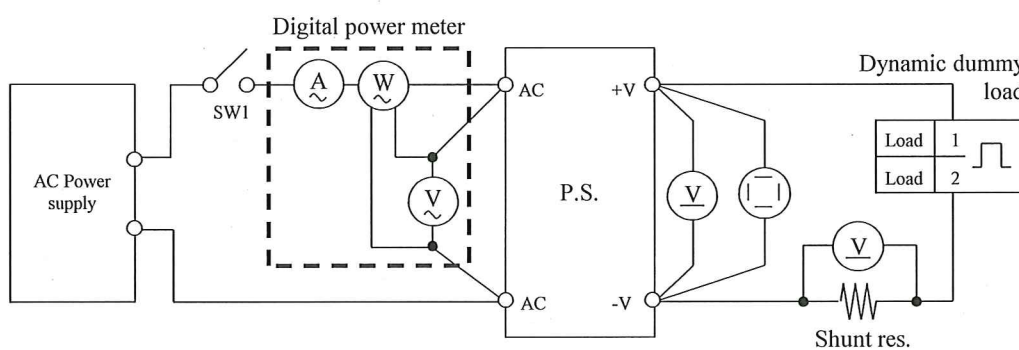
測定回路1 Circuit 1 used for determination

- ・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
- ・入力電圧瞬停特性 Response to brown out characteristics
- ・入力電流波形 Input current waveform

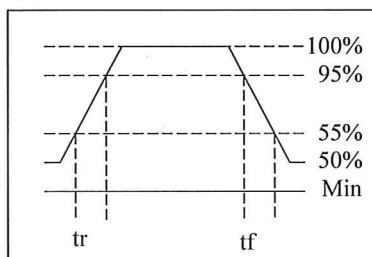


測定回路2 Circuit 2 used for determination

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

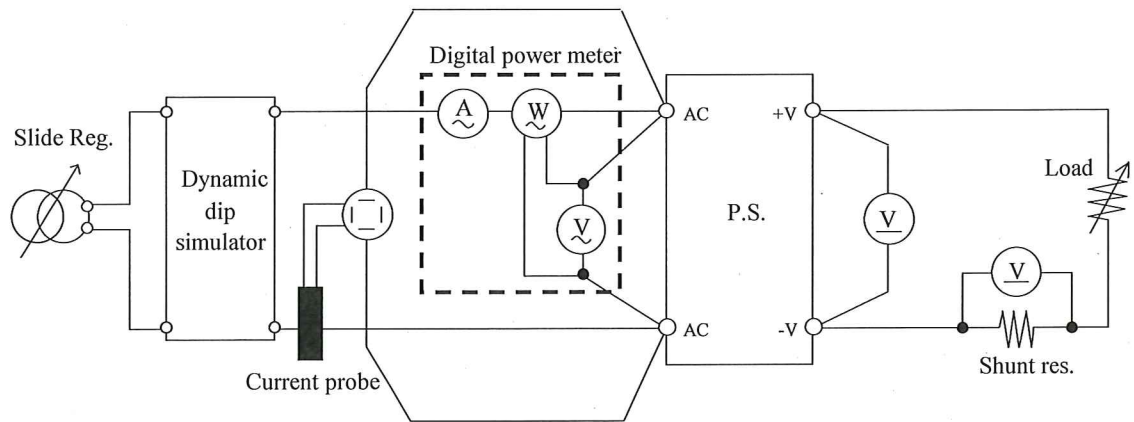


Output current waveform
Iout 50% \rightleftharpoons 100%



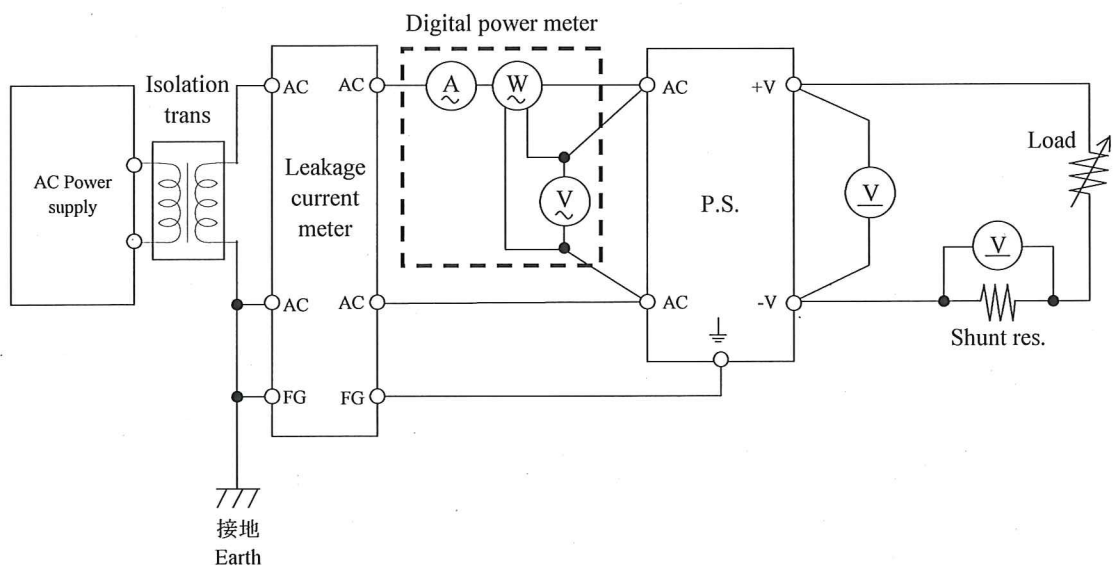
測定回路3 Circuit 3 used for determination

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



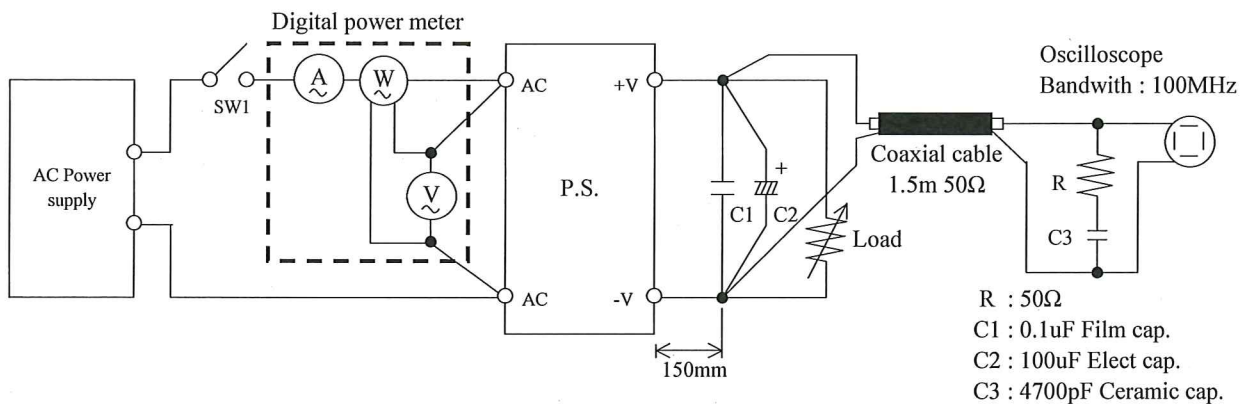
測定回路4 Circuit 4 used for determination

・リーク電流特性 Leakage current characteristics



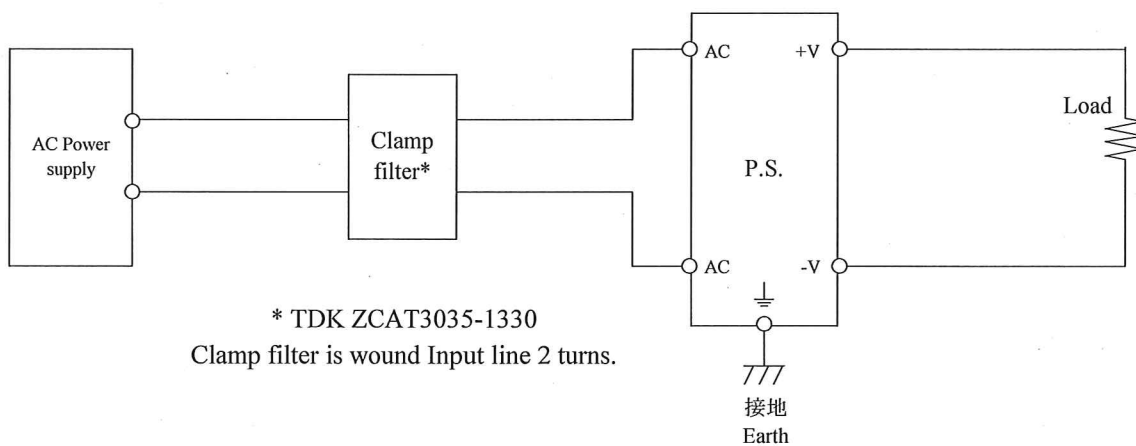
測定回路5 Circuit 5 used for determination

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



測定回路6 Circuit 6 used for determination

•EMI特性 Electro-Magnetic Interference characteristics
雑音電界強度 (放射ノイズ) Radiated Emission

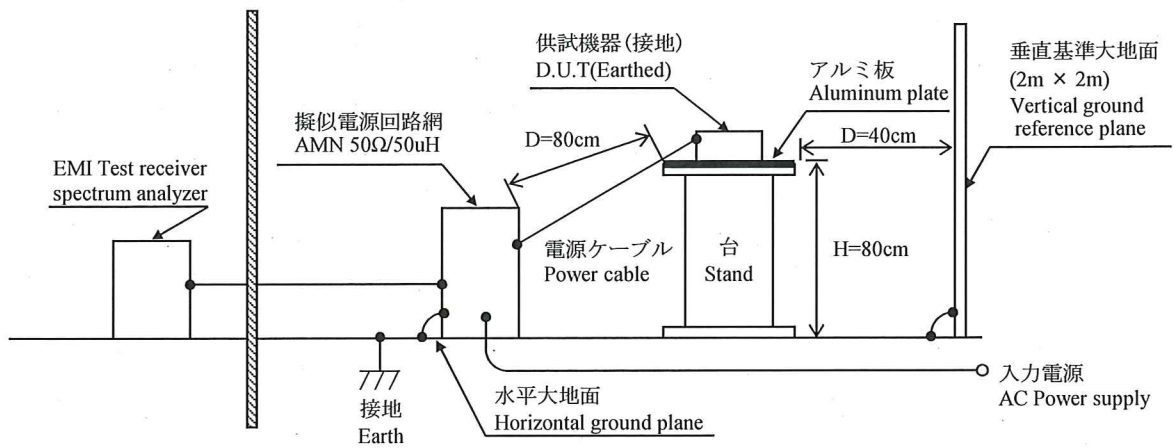


測定構成 Configuration used for determination

•EMI特性 Electro-Magnetic Interference characteristics

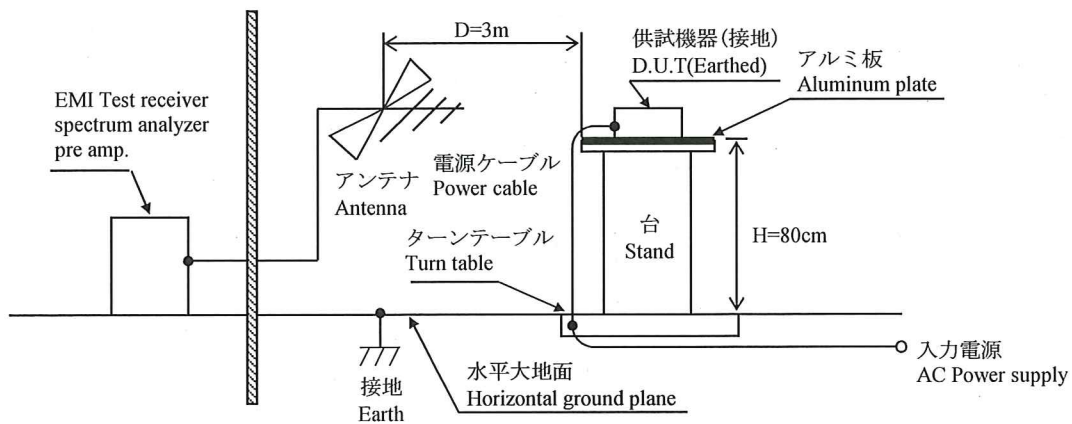
(a) 雑音端子電圧 (帰還ノイズ)

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	YOKOGAWA ELECT.	WT110 / WT210
4	CURRENT PROBE	YOKOGAWA ELECT.	701928 / 701930
5	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
6	DUMMY LOAD	PCN	RHF250 SIRIES
7	SLIDE REGULATOR	MATSUNAGA	SD-2650
8	ISOLATION TRANS	MATSUNAGA	3WTC-50K
9	CVCF	TAKASAGO	AA2000XG
10	CVCF	KIKUSUI	PCR4000L / PCR4000LA
11	LEAKAGE CURRENT METER	HIOKI	3156
12	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
13	CONTROLLED TEMP. CHAMBER	ESPEC	PU-4K
14	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
15	PRE AMP.	SONOMA	310N
16	AMN	SCHWARZBECK	NNLK8121
17	ANTENNA	SCHWARZBECK	CBL6111D
18	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
19	SINGLE-PHASE MASTER	NF	4420
20	REFERENCE IMPEDANCE NETWORK 20A	NF	4150
21	MULTI OUTLET UNIT	KIKUSUI	OT01-KHA

1.3 評価負荷条件 Load conditions

*入力電圧が110VAC以下の場合、下記のとおり出力デレーティングが必要です。

Output derating is needed when input voltage is 110VAC or less.

Output voltage : 5V, 12V, 24V

Vin	Iout : Full load	5V	12V	24V
110 - 265VAC	100%	100A	50A	25A
100VAC	92%	92A	46A	23A
85VAC	80%	80A	40A	20A

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	100VAC	110VAC	200VAC	265VAC	Line regulation	
0%	5.014V	5.014V	5.014V	5.014V	0mV	0.000%
50%	5.008V	5.009V	5.009V	5.009V	1mV	0.020%
Full load	5.003V	5.003V	5.002V	5.002V	1mV ※1	0.020%
Load regulation	11mV	11mV	12mV	12mV		
	0.220%	0.220%	0.240%	0.240%		

2. Temperature drift

Conditions Vin : 110 VAC
Iout : Full load

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	5.001V	5.003V	4.999V	4mV	0.080%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	77VAC
Drop out voltage (Vin)	58VAC

12V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	100VAC	110VAC	200VAC	265VAC	Line regulation	
0%	12.021V	12.021V	12.021V	12.021V	0mV	0.000%
50%	12.017V	12.017V	12.017V	12.018V	1mV	0.008%
Full load	12.015V	12.014V	12.014V	12.014V	0mV ※1	0.000%
Load regulation	6mV	7mV	7mV	7mV		
	0.050%	0.058%	0.058%	0.058%		

2. Temperature drift

Conditions Vin : 110 VAC
Iout : Full load

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	12.012V	12.014V	12.015V	3mV	0.025%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	77VAC
Drop out voltage (Vin)	54VAC

24V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	100VAC	110VAC	200VAC	265VAC	Line regulation	
0%	24.058V	24.057V	24.057V	24.058V	1mV	0.004%
50%	24.052V	24.052V	24.052V	24.053V	1mV	0.004%
Full load	24.048V	24.048V	24.048V	24.048V	0mV ※1	0.000%
Load regulation	10mV	9mV	9mV	10mV		
	0.042%	0.038%	0.038%	0.042%		

2. Temperature drift

Conditions Vin : 110 VAC
Iout : Full load

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	23.987V	24.048V	24.079V	92mV	0.383%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

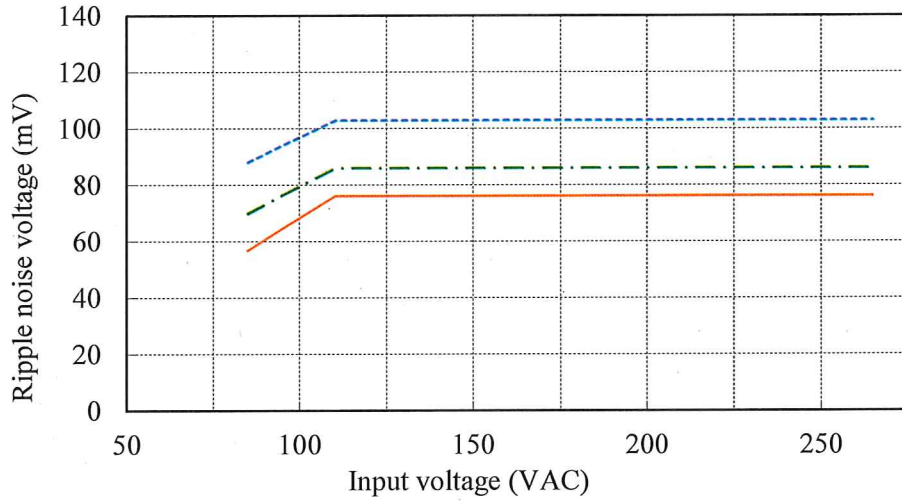
Start up voltage (Vin)	77VAC
Drop out voltage (Vin)	62VAC

※1 Line regulation : 110VAC - 265VAC

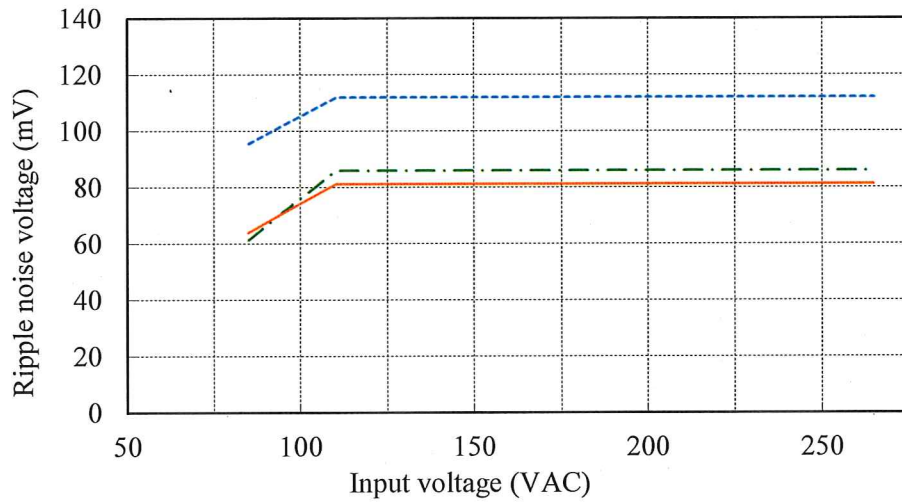
(2) リップルノイズ電圧対入力電圧
Ripple noise voltage vs. Input voltage

Conditions Iout : Full load
Ta : -20 °C ---
25 °C -.-
50 °C —

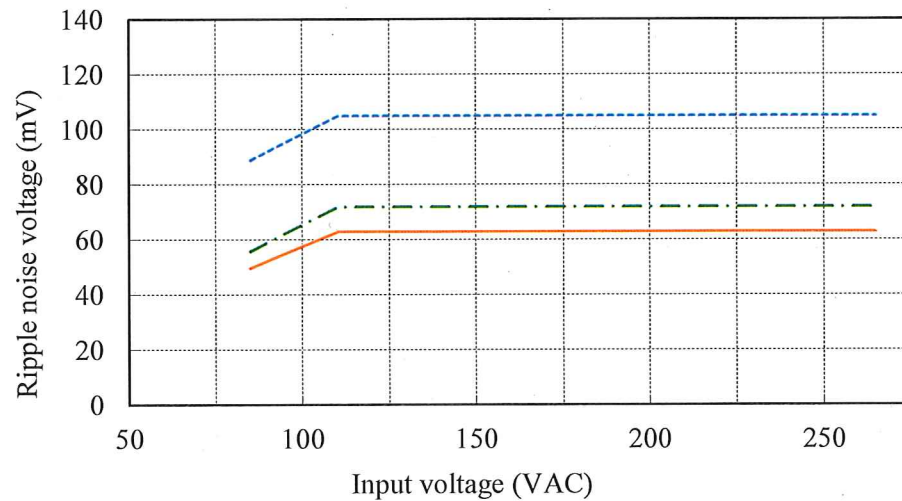
5V



12V



24V

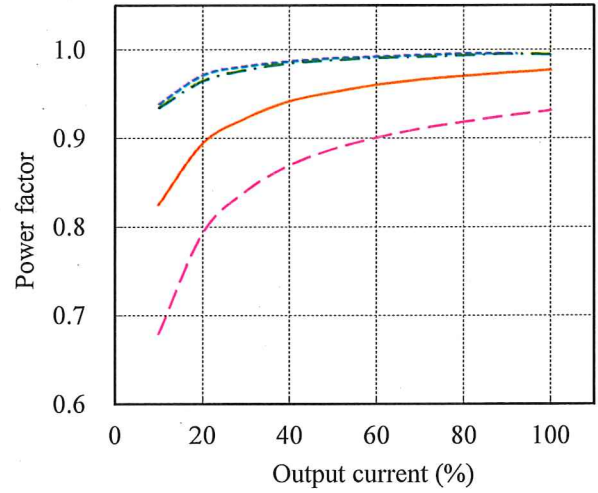
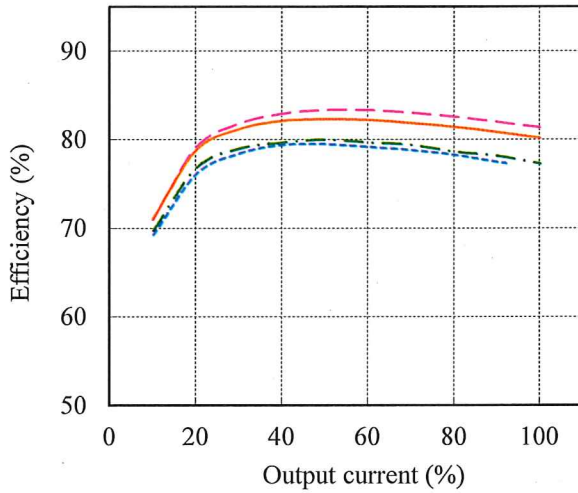


(3) 効率・力率対出力電流

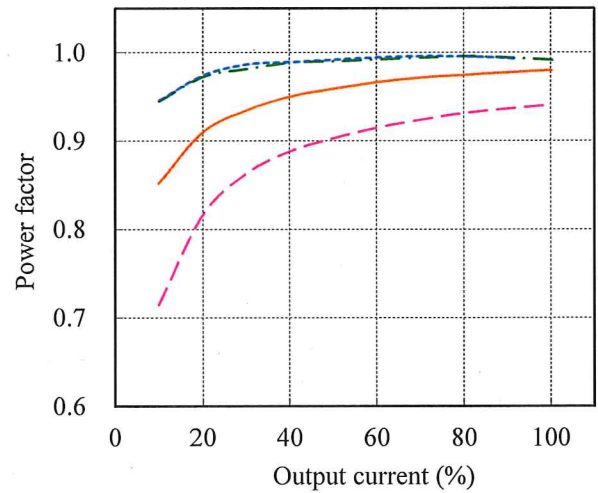
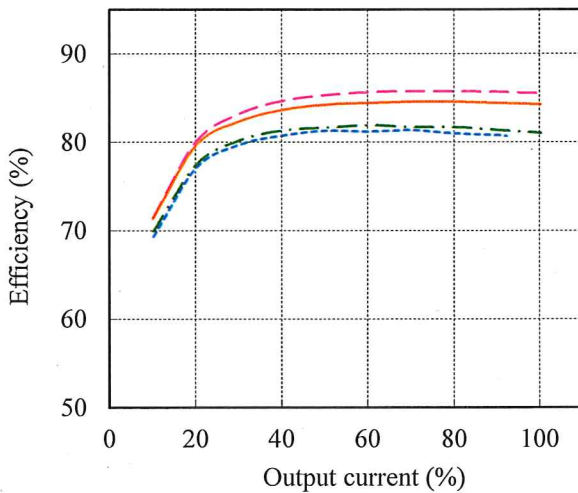
Efficiency and Power factor vs. Output current

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

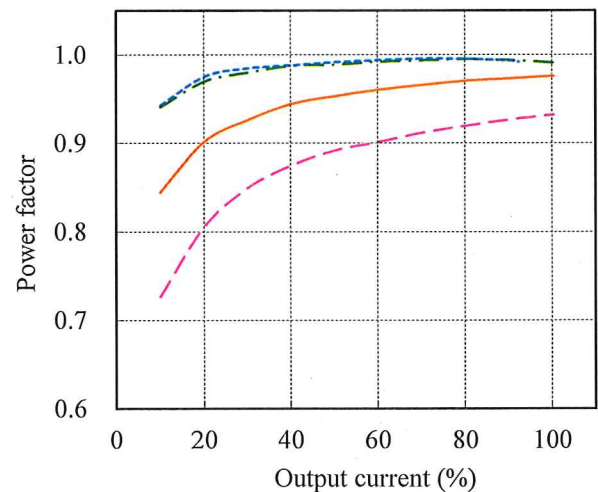
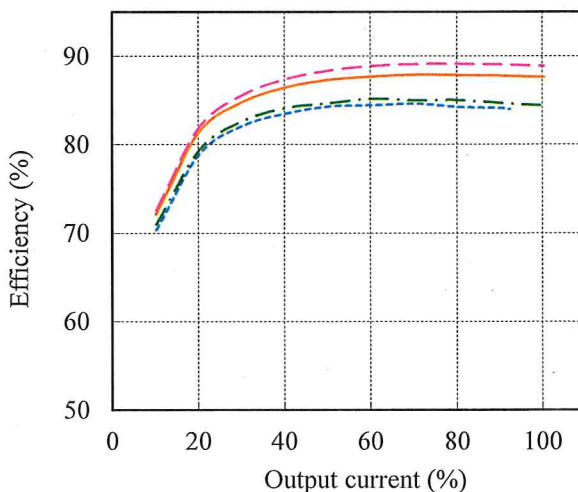
5V



12V



24V



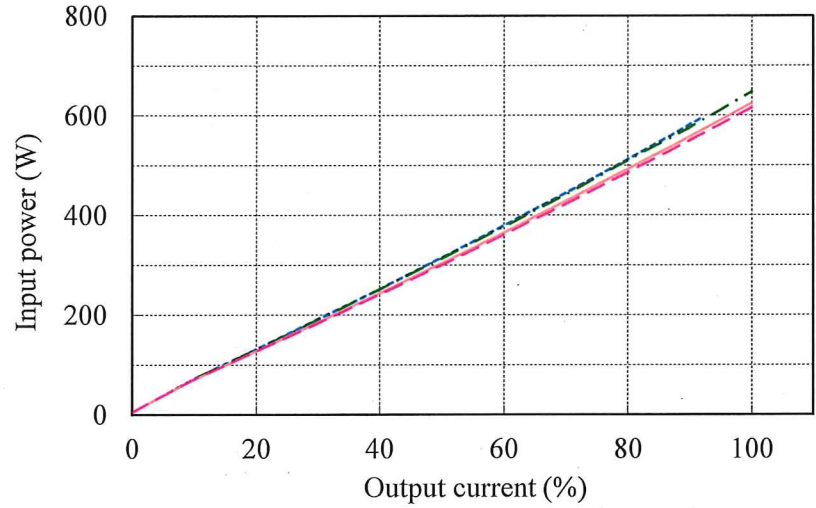
(4) 入力電力対出力電流

Input power vs. Output current

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

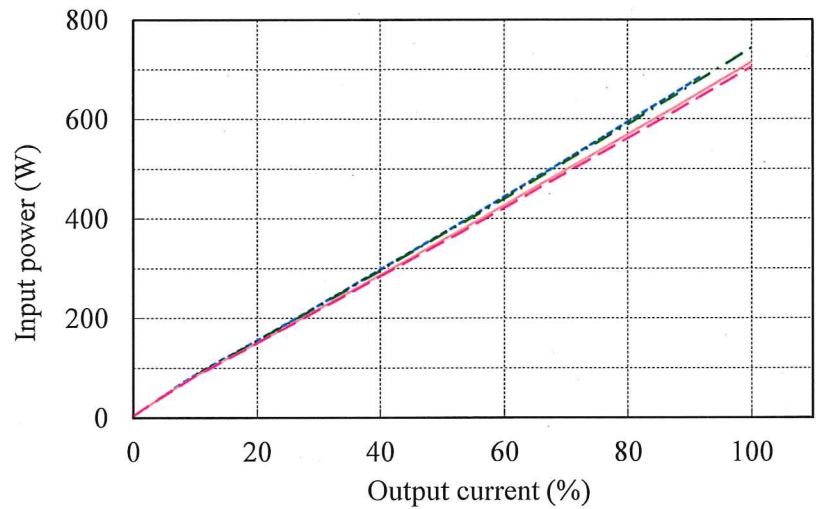
5V

Vin	Input power
	Iout : 0%
100VAC	4.5W
110VAC	4.6W
200VAC	5.3W
265VAC	5.0W



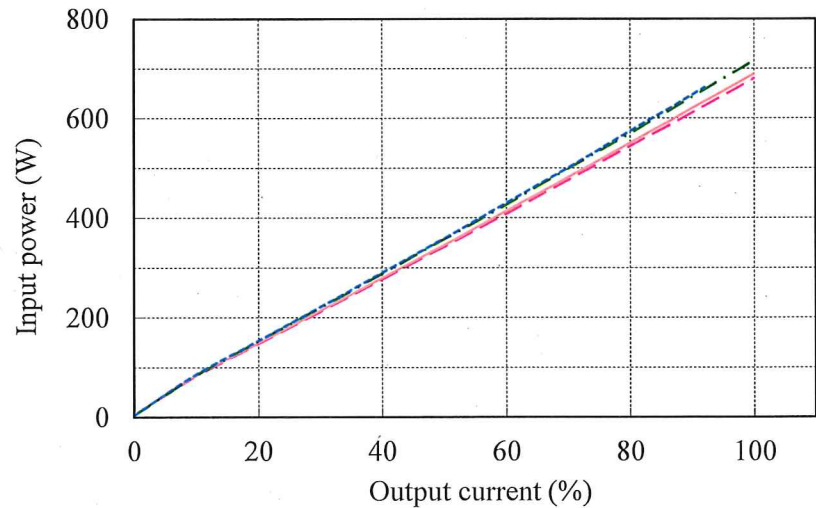
12V

Vin	Input power
	Iout : 0%
100VAC	4.0W
110VAC	4.0W
200VAC	4.7W
265VAC	4.3W



24V

Vin	Input power
	Iout : 0%
100VAC	4.7W
110VAC	4.7W
200VAC	5.2W
265VAC	5.0W



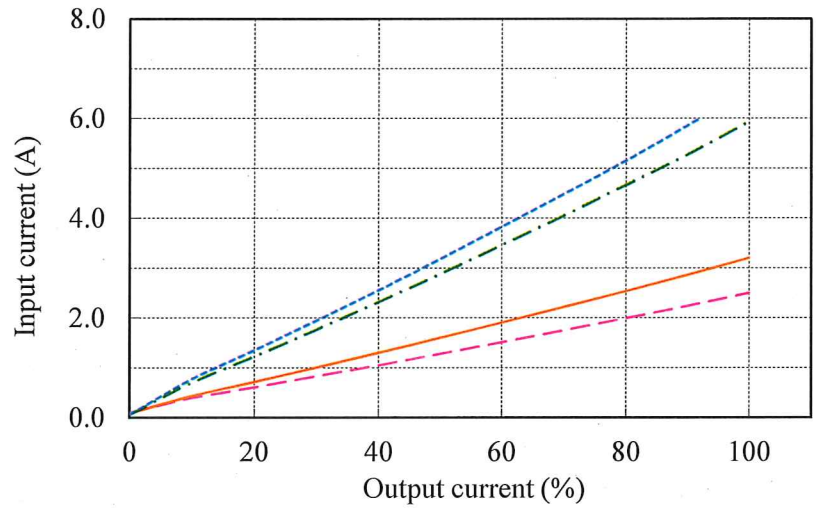
(5) 入力電流対出力電流

Input current vs. Output current

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

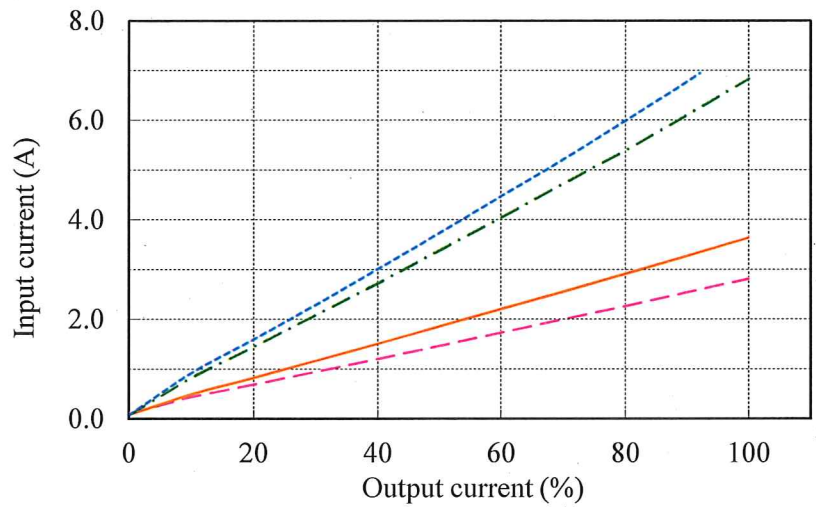
5V

Vin	Input current
	Iout : 0%
100VAC	0.07A
110VAC	0.07A
200VAC	0.09A
265VAC	0.10A



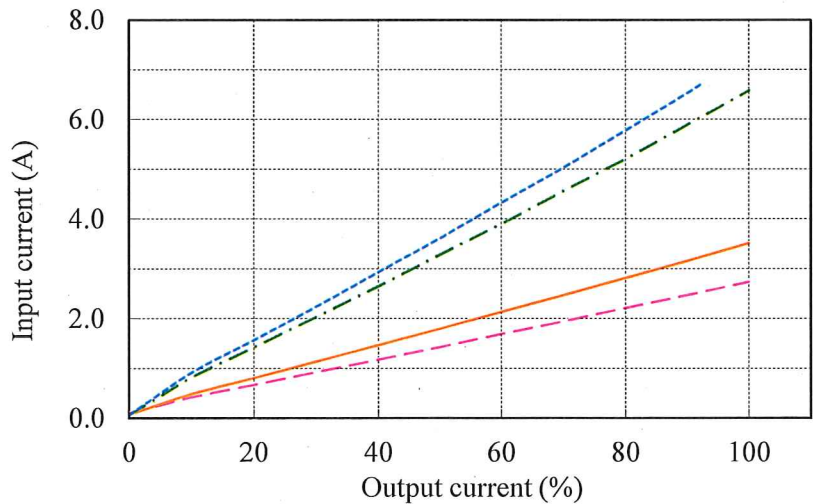
12V

Vin	Input current
	Iout : 0%
100VAC	0.08A
110VAC	0.08A
200VAC	0.09A
265VAC	0.11A



24V

Vin	Input current
	Iout : 0%
100VAC	0.07A
110VAC	0.07A
200VAC	0.09A
265VAC	0.11A

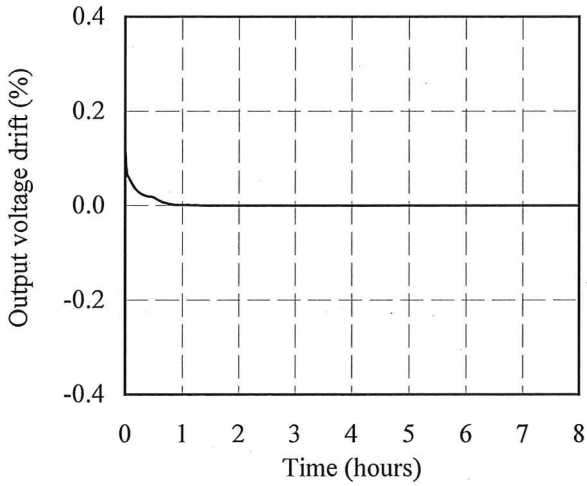


2.2 通電ドリフト特性

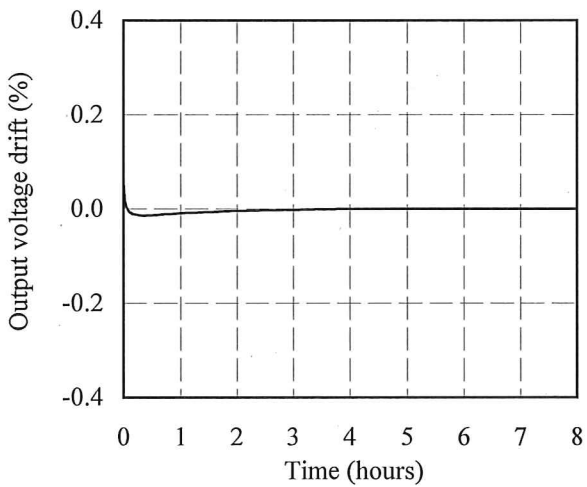
Warm up voltage drift characteristics

Conditions Vin : 110 VAC
Iout : Full load
Ta : 25 °C

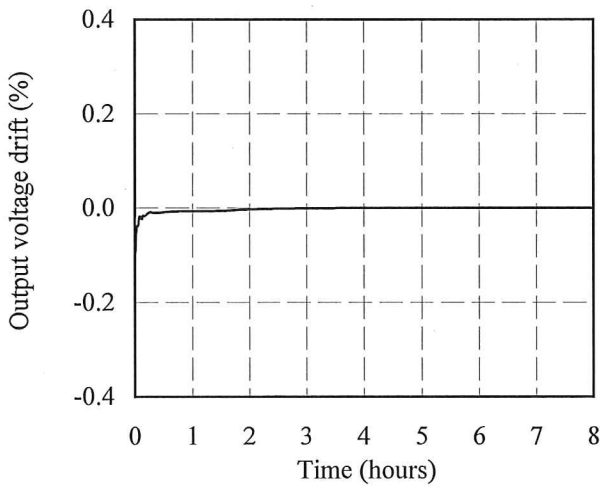
5V



12V



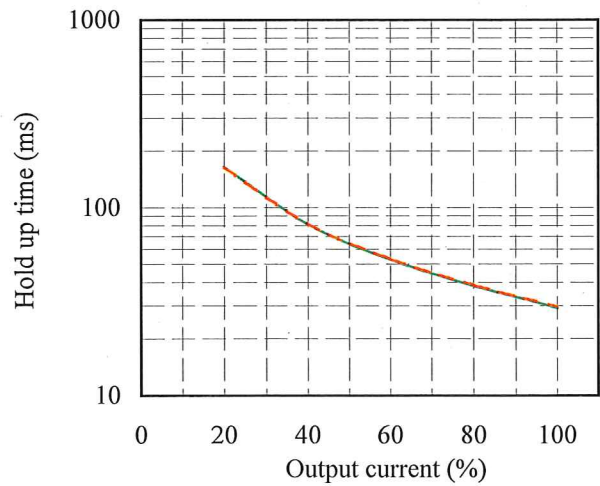
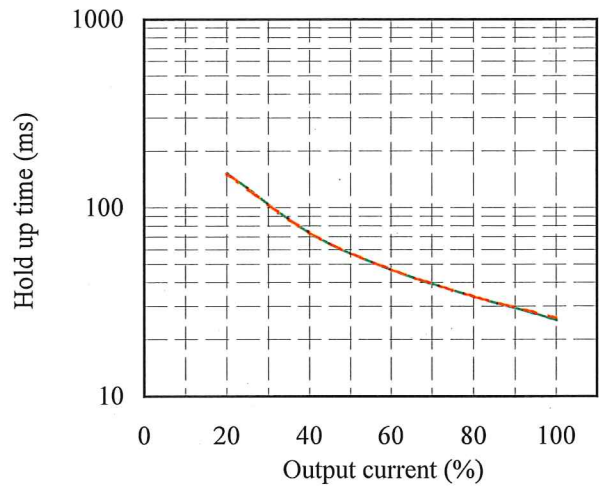
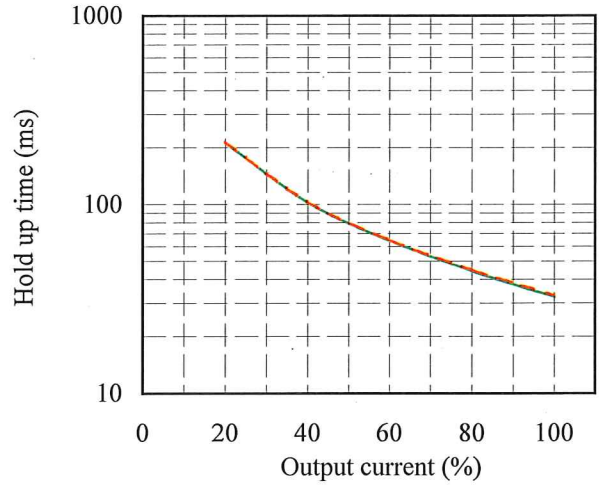
24V



2.3 出力保持時間特性

Hold up time characteristics

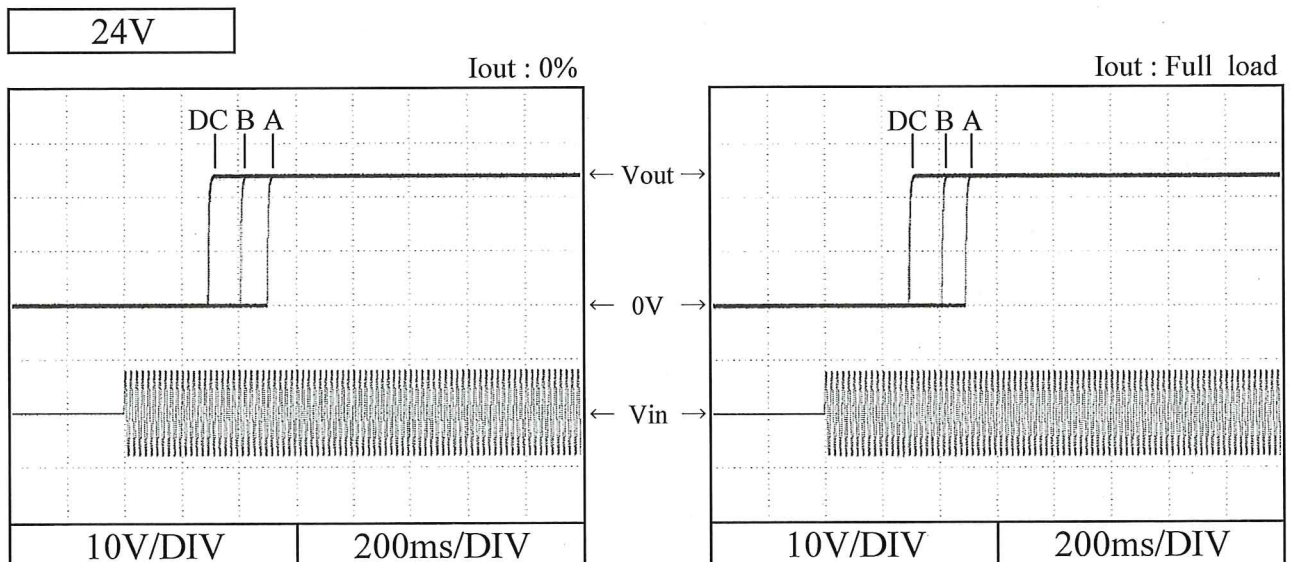
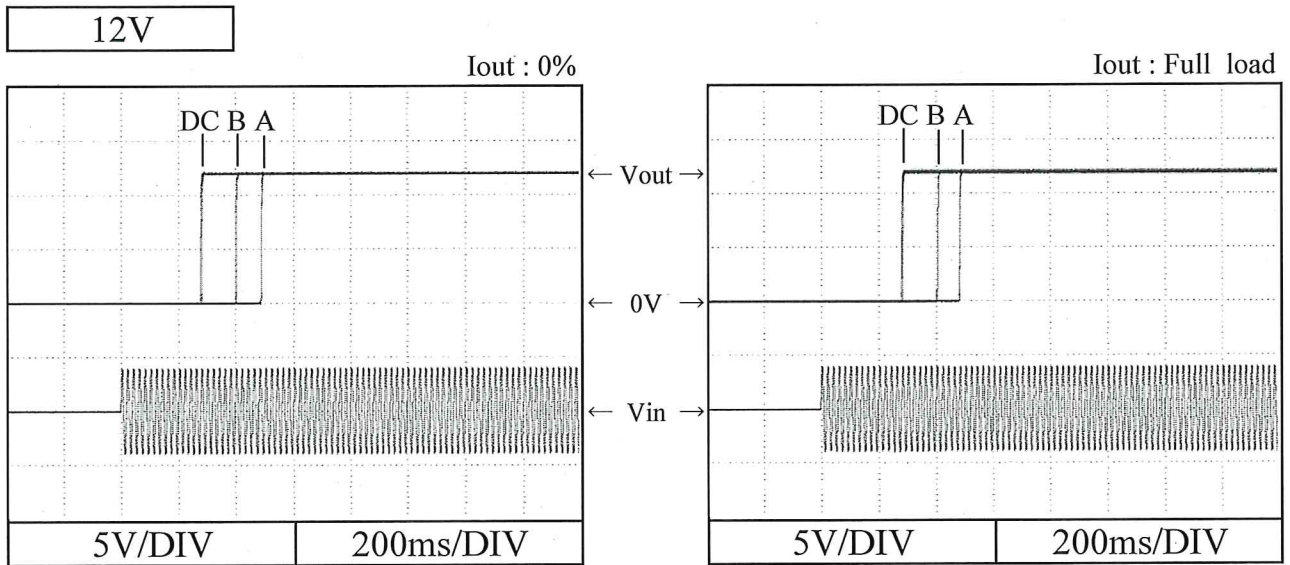
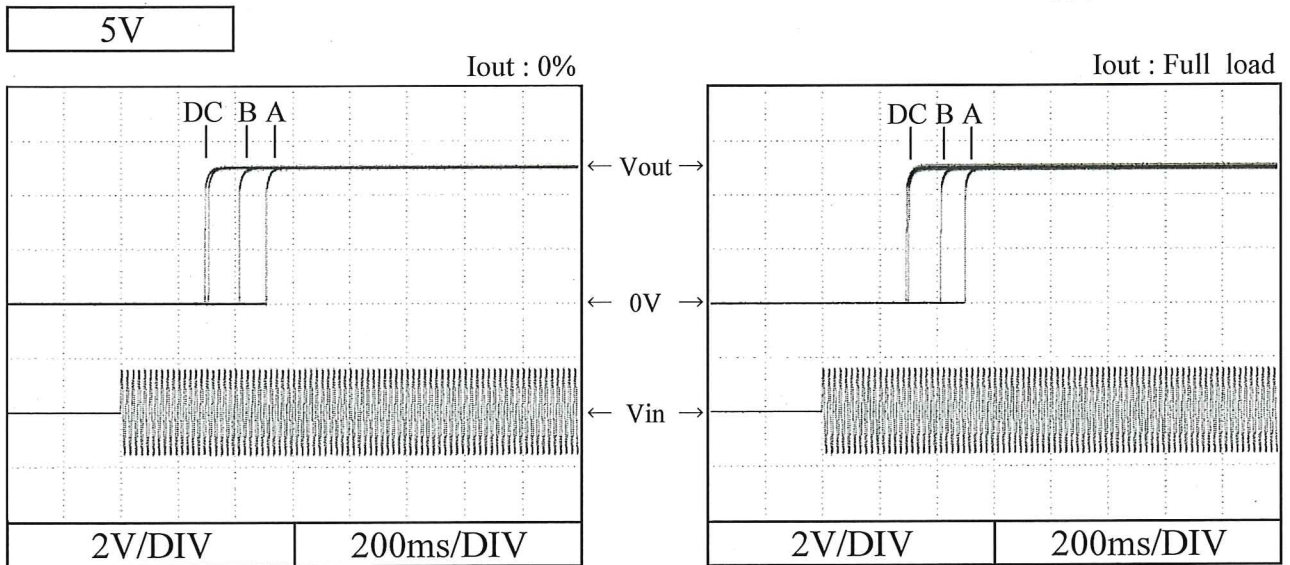
Conditions Vin : 110 VAC ———
200 VAC - - - -
Ta : 25 °C



2.4 出力立ち上がり特性

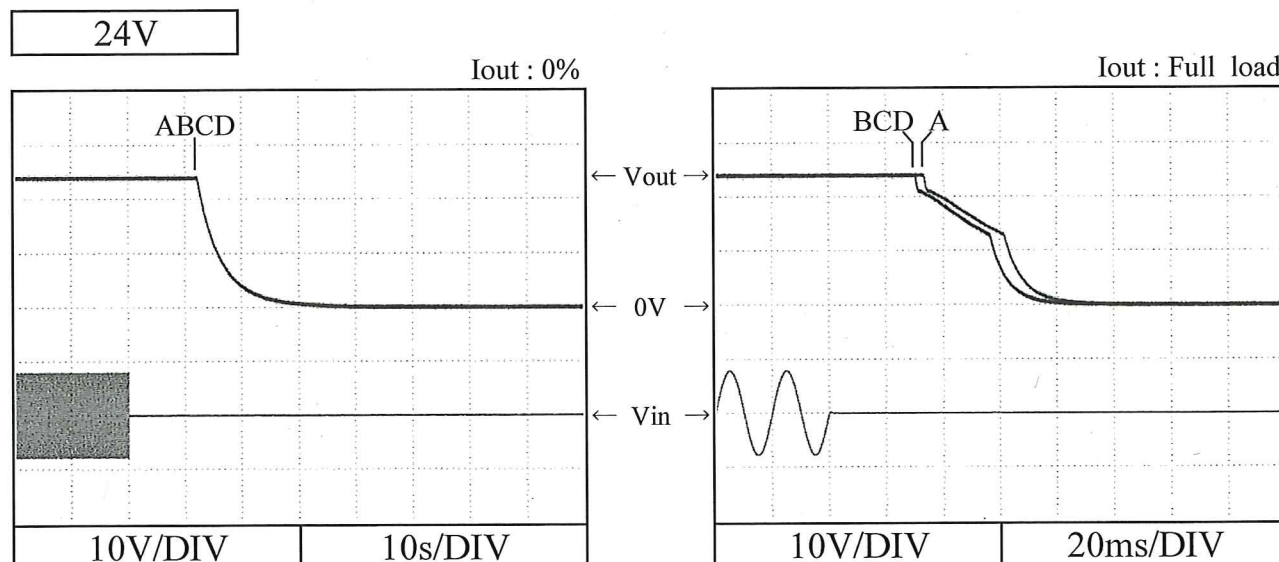
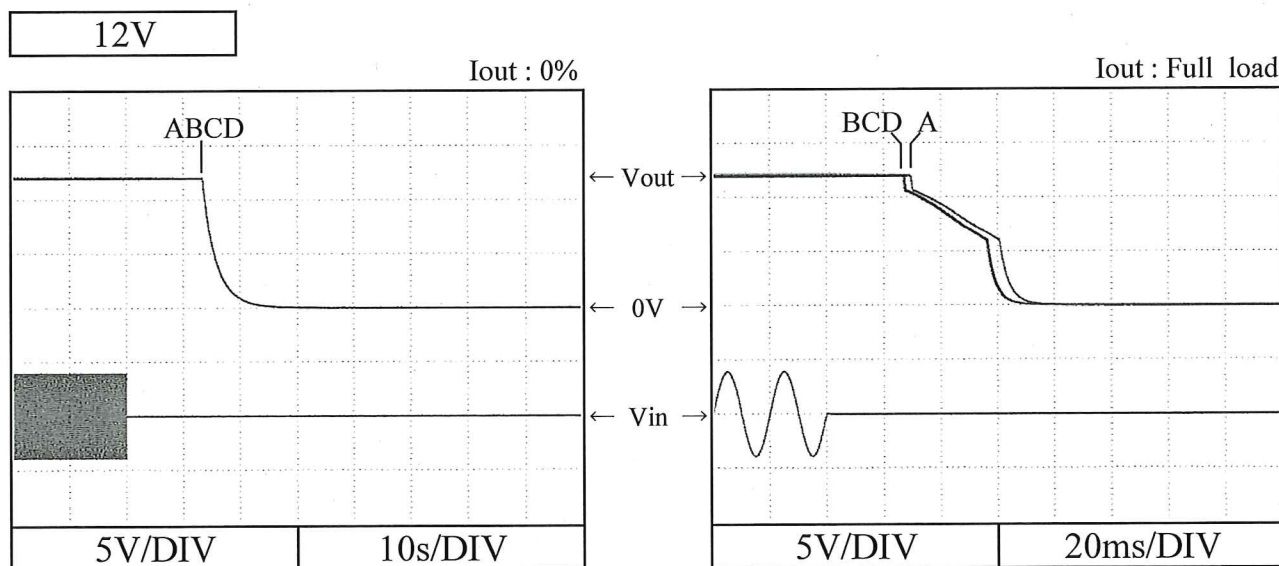
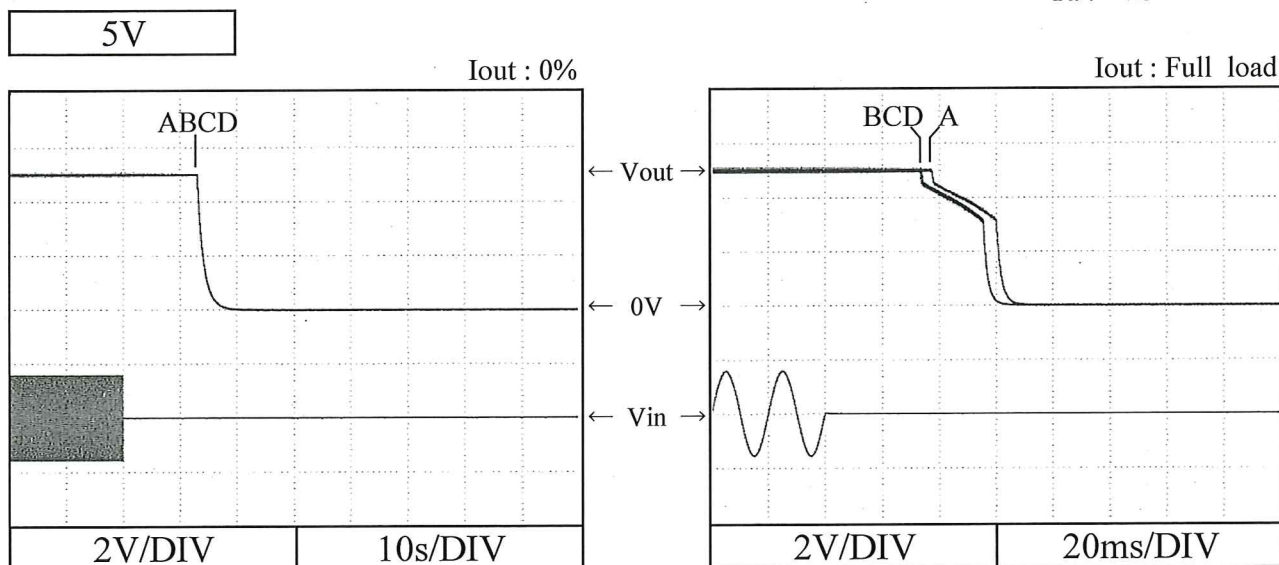
Output rise characteristics

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



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

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



2.6 過電流保護特性

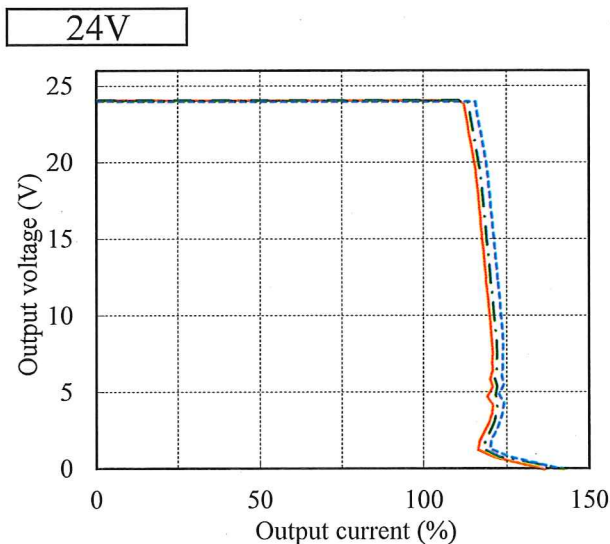
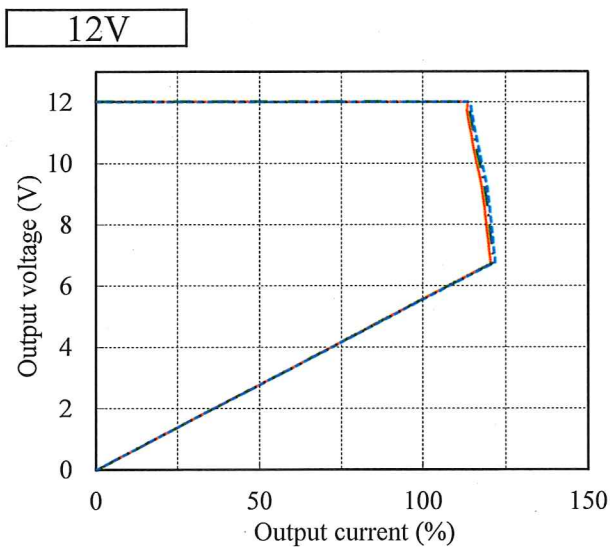
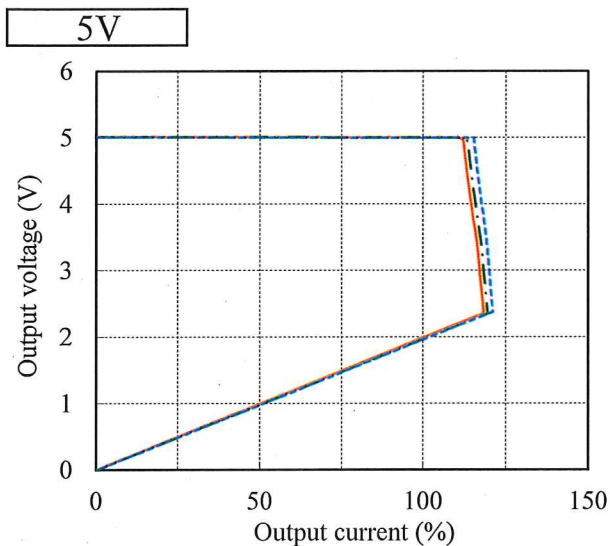
Over current protection (OCP) characteristics

Conditions Vin : 110 VAC

Ta : -20 °C

25 °C

50 °C



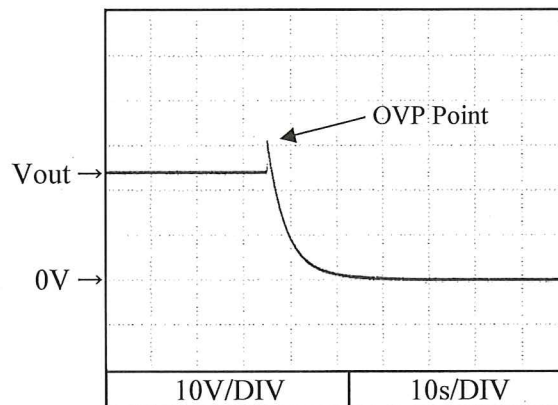
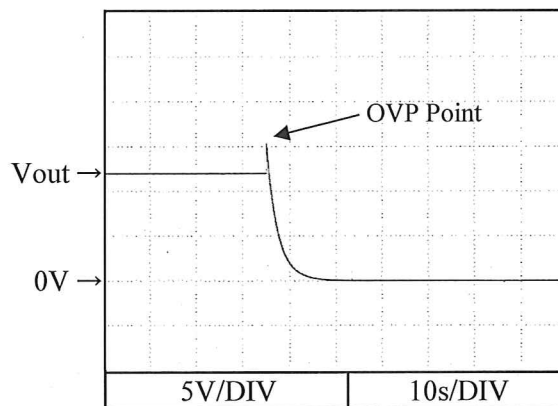
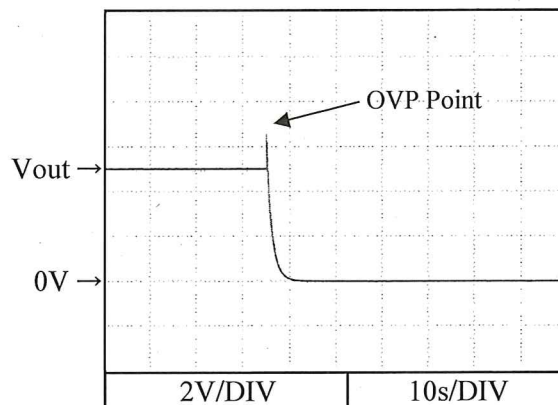
2.7 過電壓保護特性

Over voltage protection (OVP) characteristics

Conditions Vin : 100 VAC

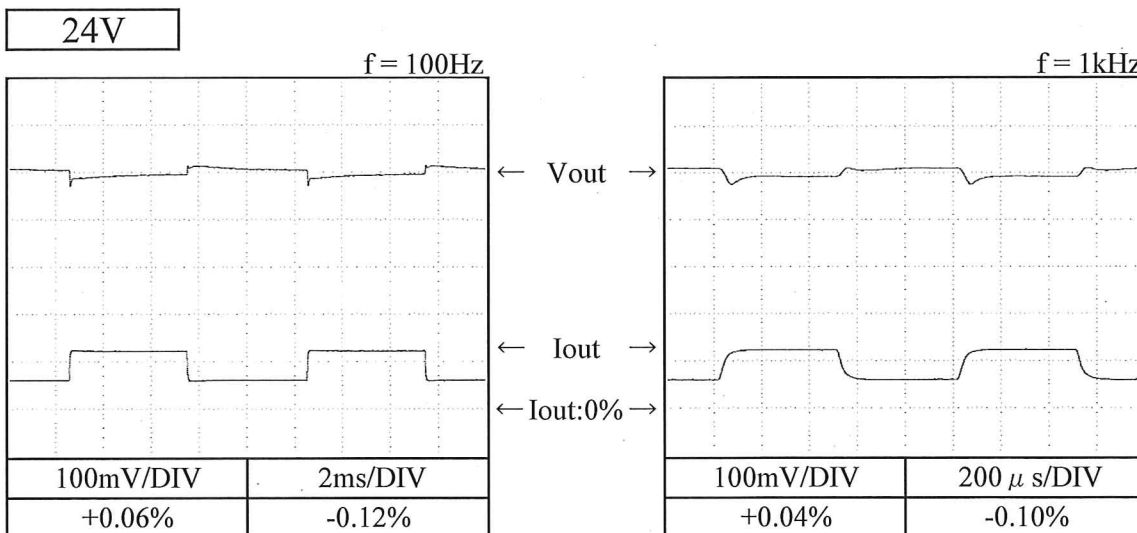
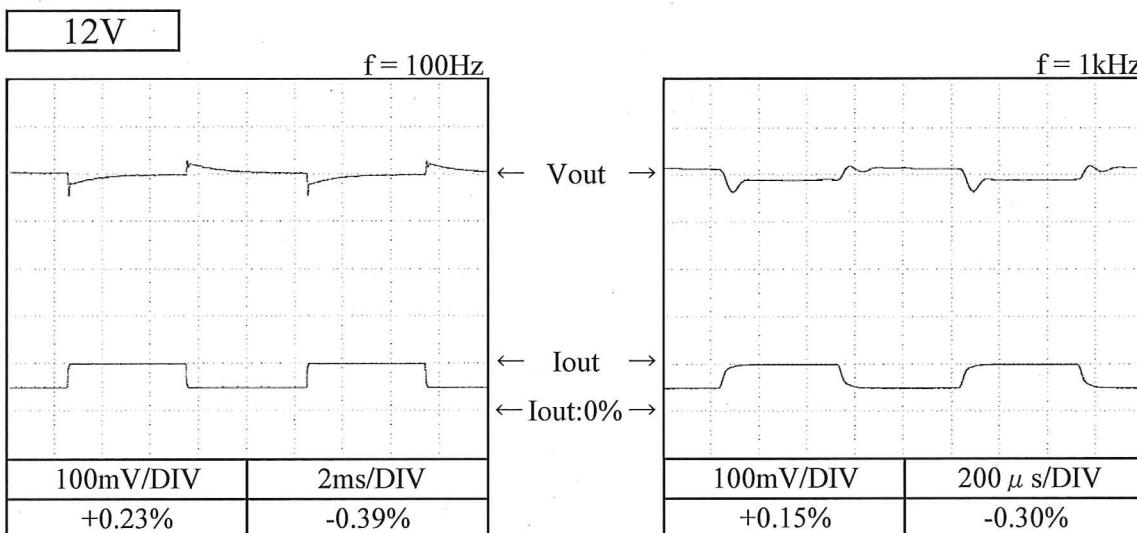
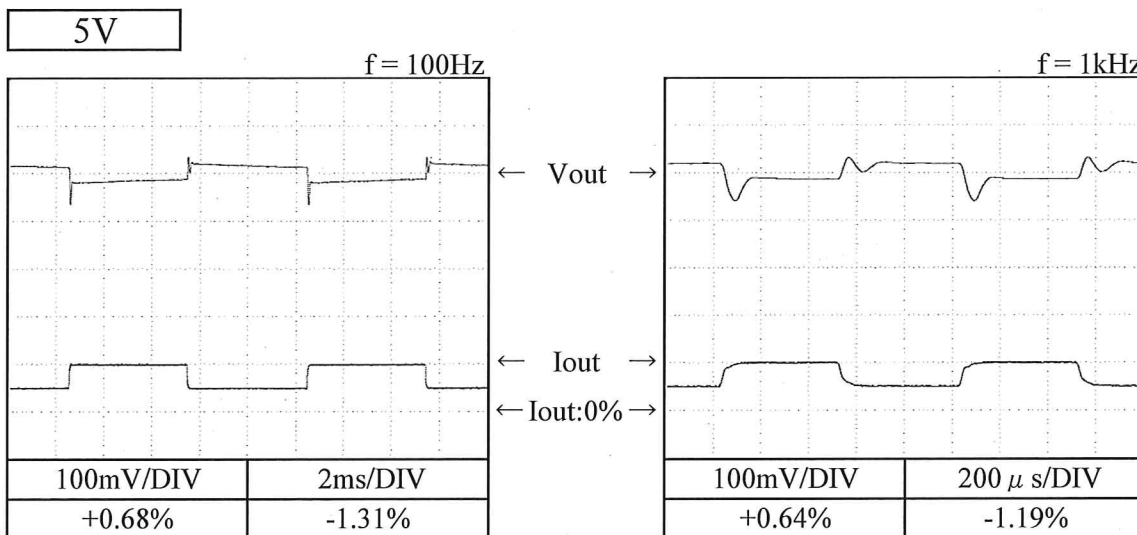
Iout : 0 %

Ta : 25 °C



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

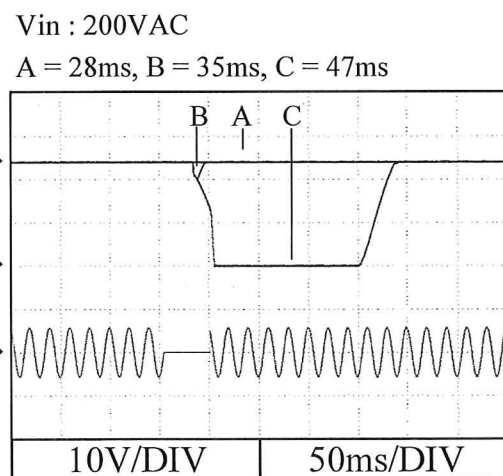
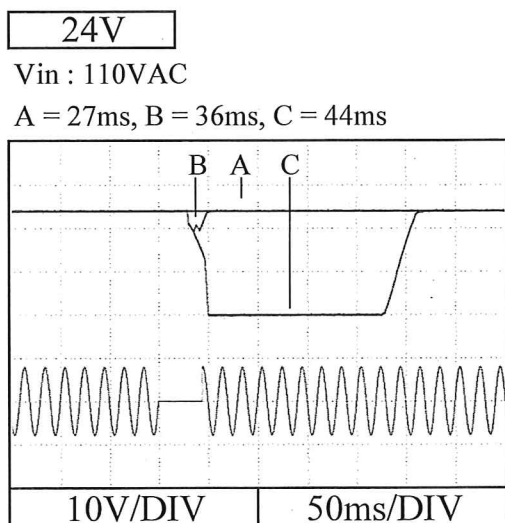
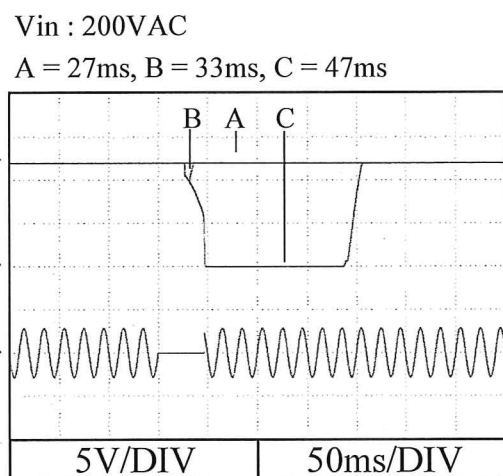
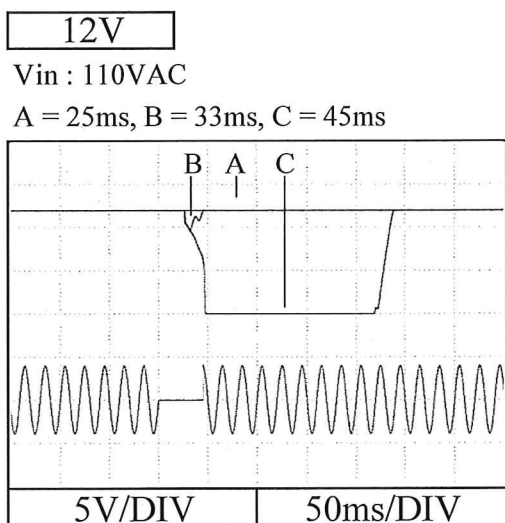
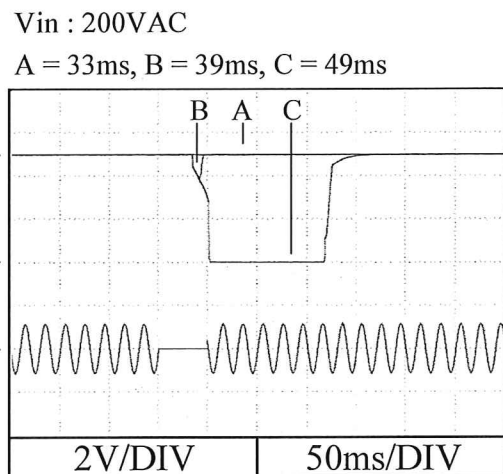
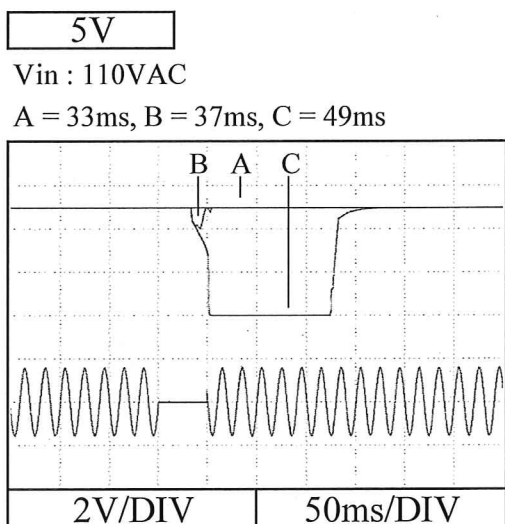
Conditions Vin : 110 VAC
Iout : 50 % ↔ 100 %
(tr = tf = 50us)
Ta : 25 °C



2.9 入力電圧瞬停特性

Response to brown out characteristics

Conditions T_a : 25 °C
 I_{out} : Full load

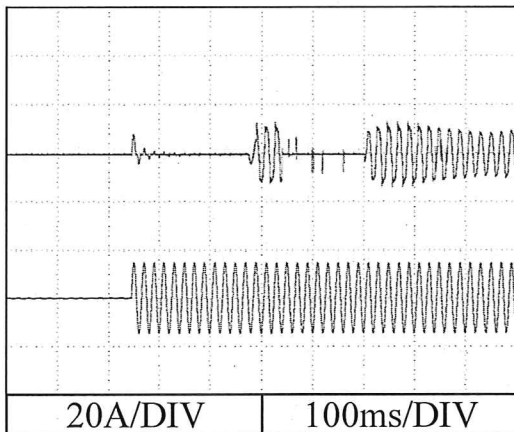


2.10 入力サージ電流 (突入電流) 波形
Inrush current waveform

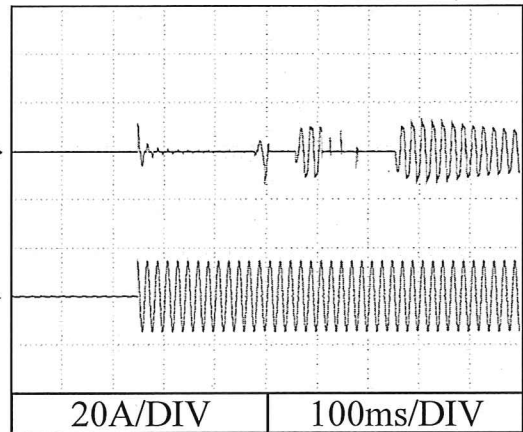
12V

Conditions Vin : 100 VAC
Iout : Full load
Ta : 25 °C

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

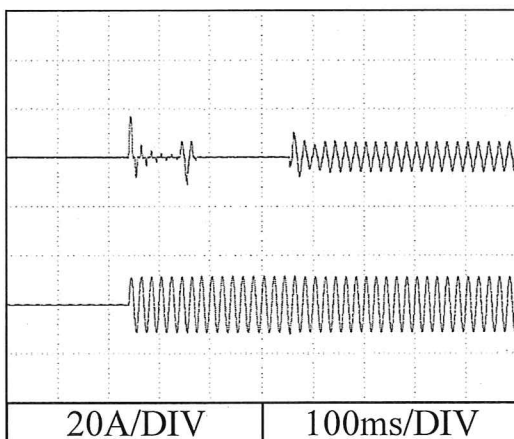


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

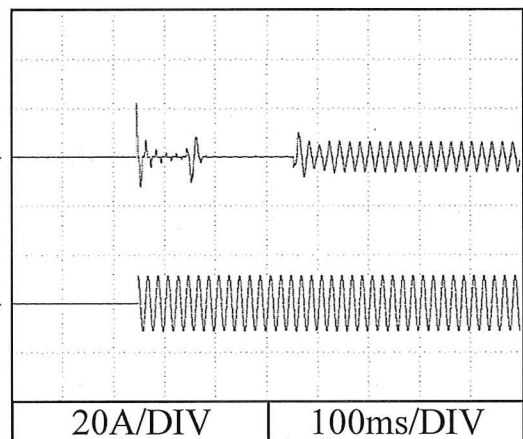


Conditions Vin : 200 VAC
Iout : Full load
Ta : 25 °C

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



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



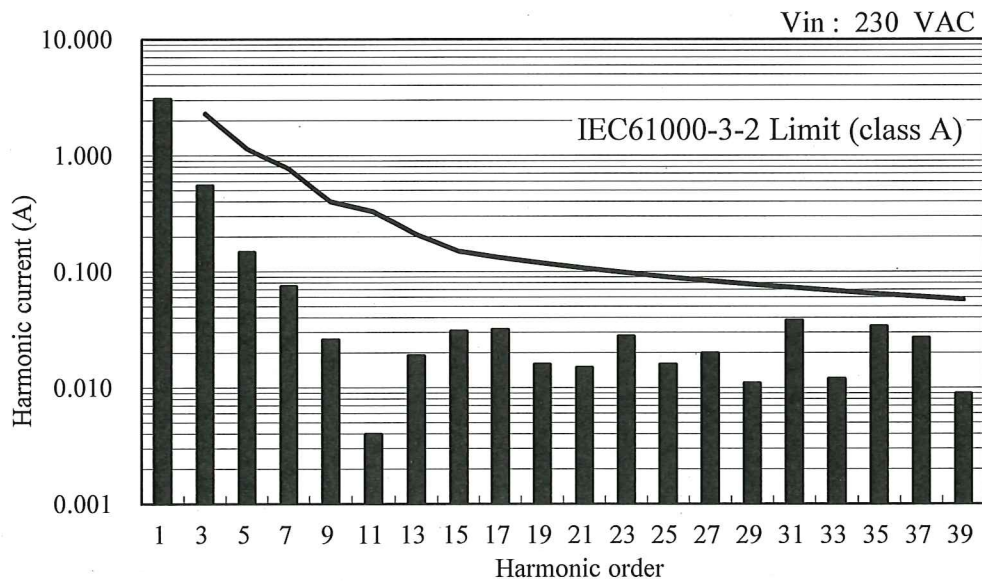
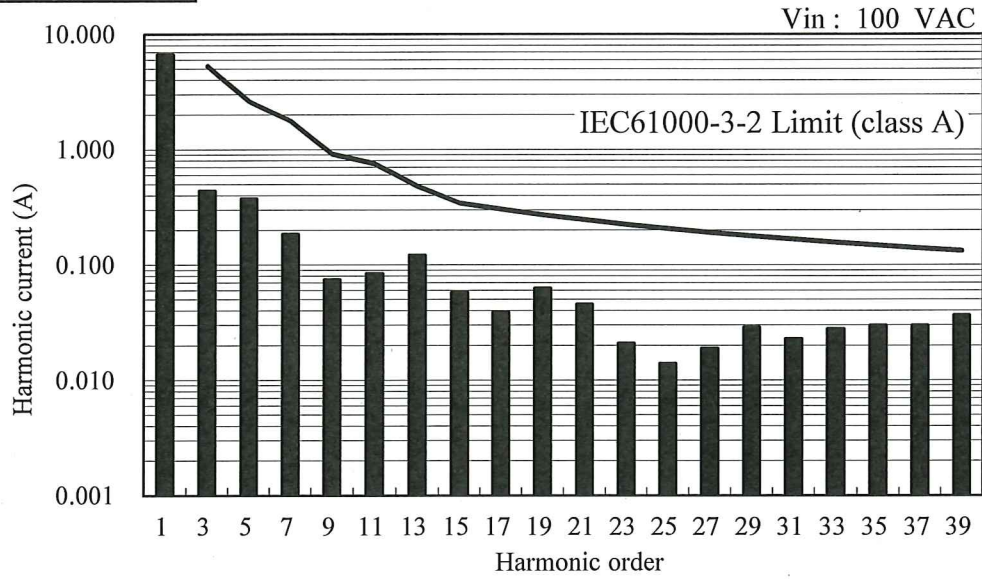
2.11 高調波成分

Input current harmonics

Conditions Iout : Full load

Ta : 25 °C

12V



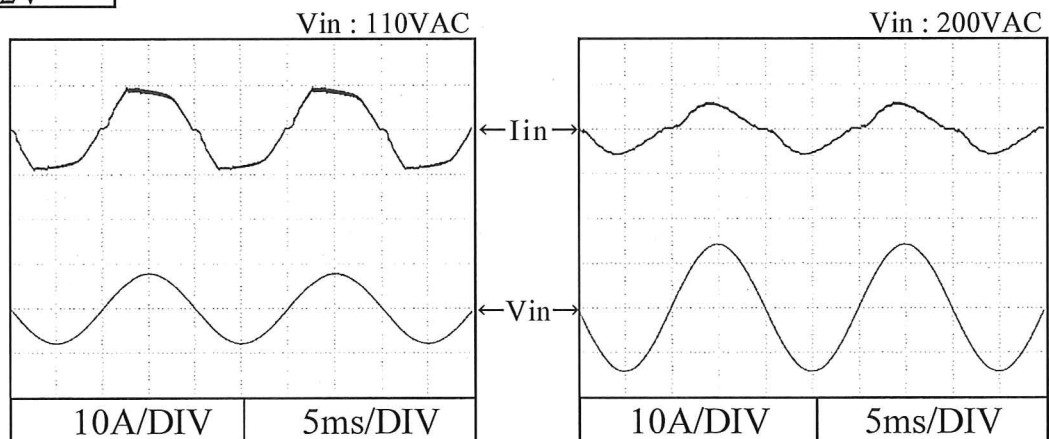
2.12 入力電流波形

Input current waveform

Conditions Iout : Full load

Ta : 25 °C

12V



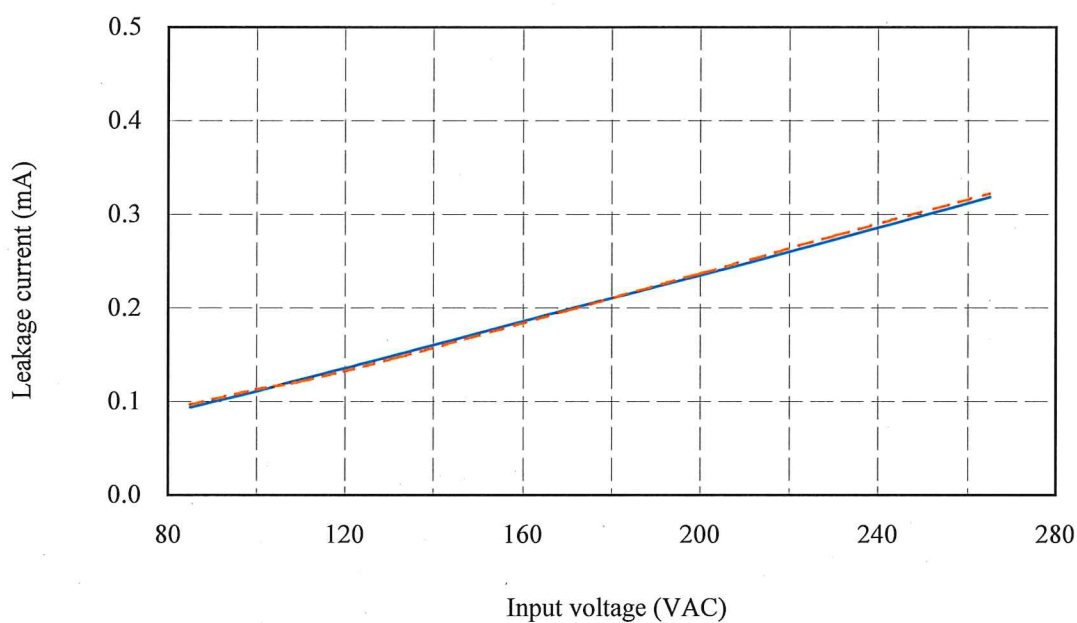
2.13 リーク電流特性

Leakage current characteristics

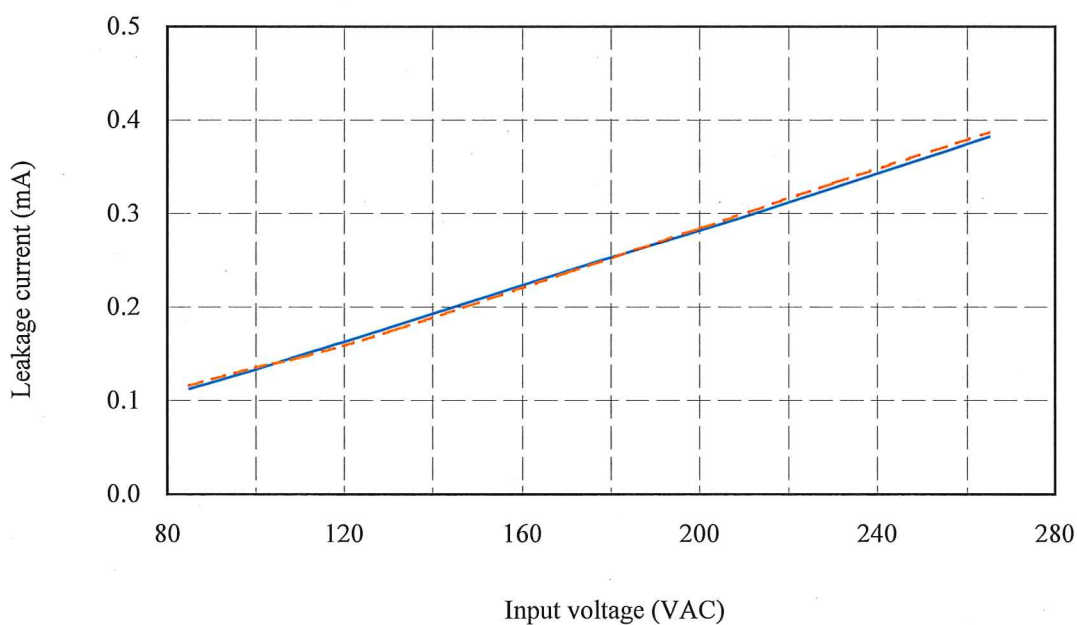
Conditions Iout : 0 % —
Full load - - -
Ta : 25 °C
Equipment used : 3156 (HIOKI)

12V

f : 50 Hz



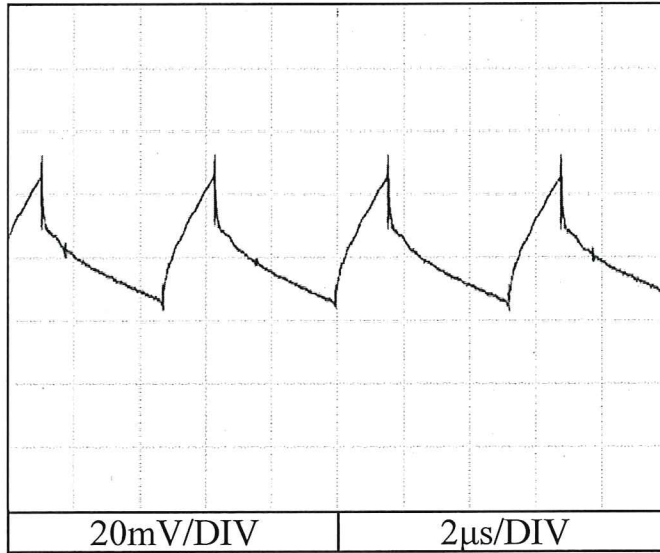
f : 60 Hz



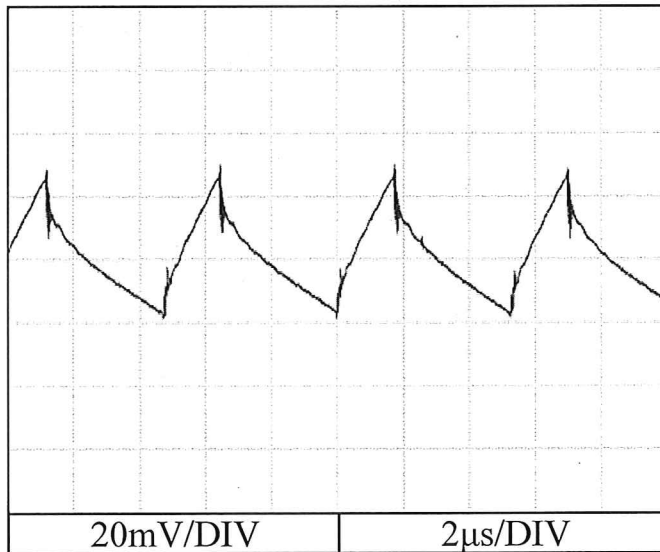
2.14 出力リップル、ノイズ波形
Output ripple and noise waveform

Conditions Vin : 110 VAC
Iout : Full load
Ta : 25 °C

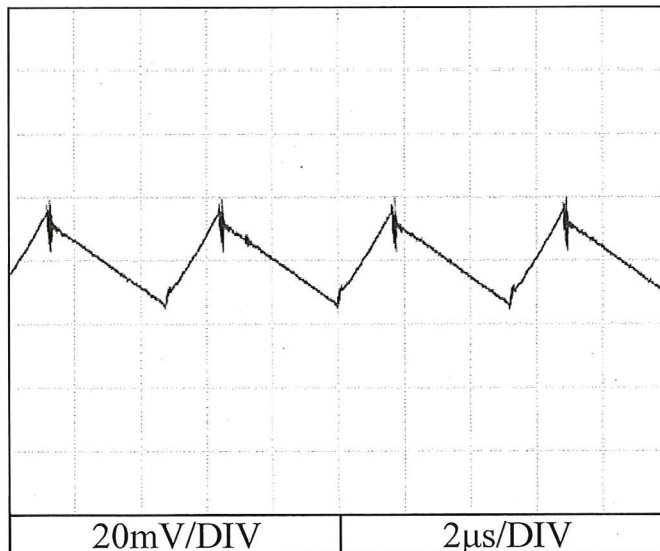
5V



12V



24V



2.15 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

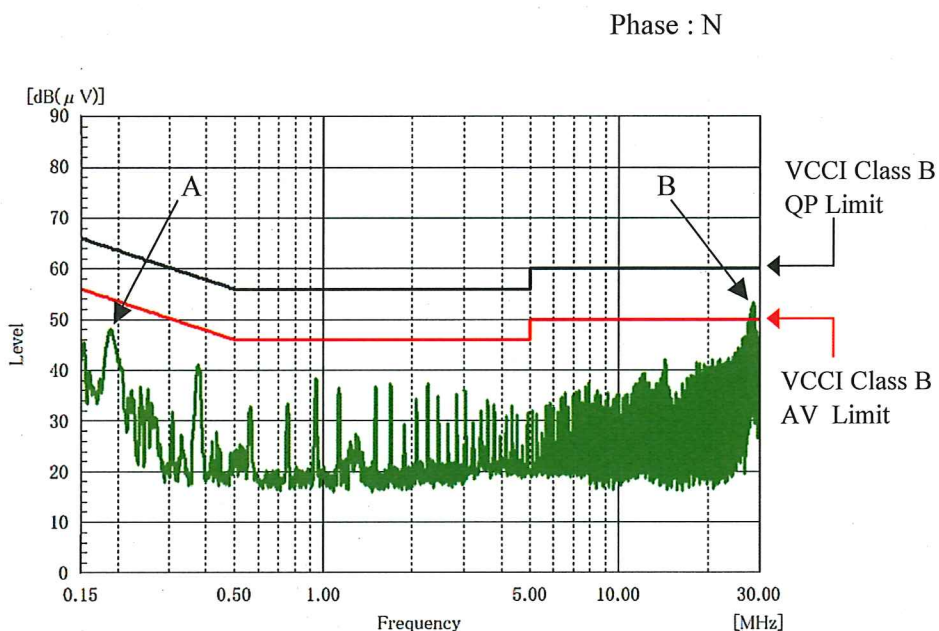
雑音端子電圧

Conducted Emission

5V

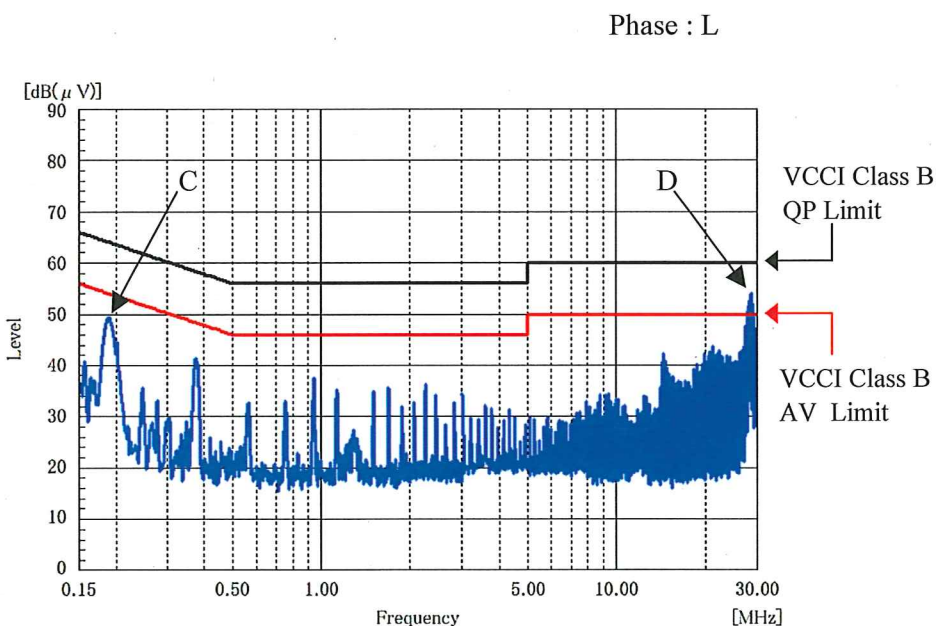
Point A (188kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.1	47.0
AV	54.1	45.4

Point B (28.6MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	51.7
AV	50.0	45.8



Point C (188kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.1	48.5
AV	54.1	47.3

Point D (28.8MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	51.7
AV	50.0	43.6



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

2.15 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

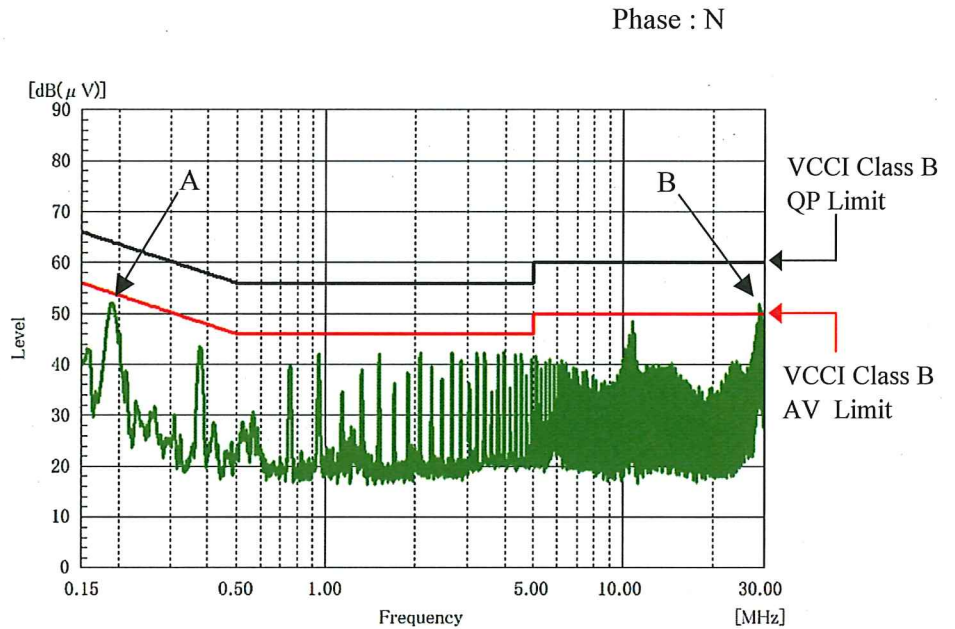
雑音端子電圧

Conducted Emission

12V

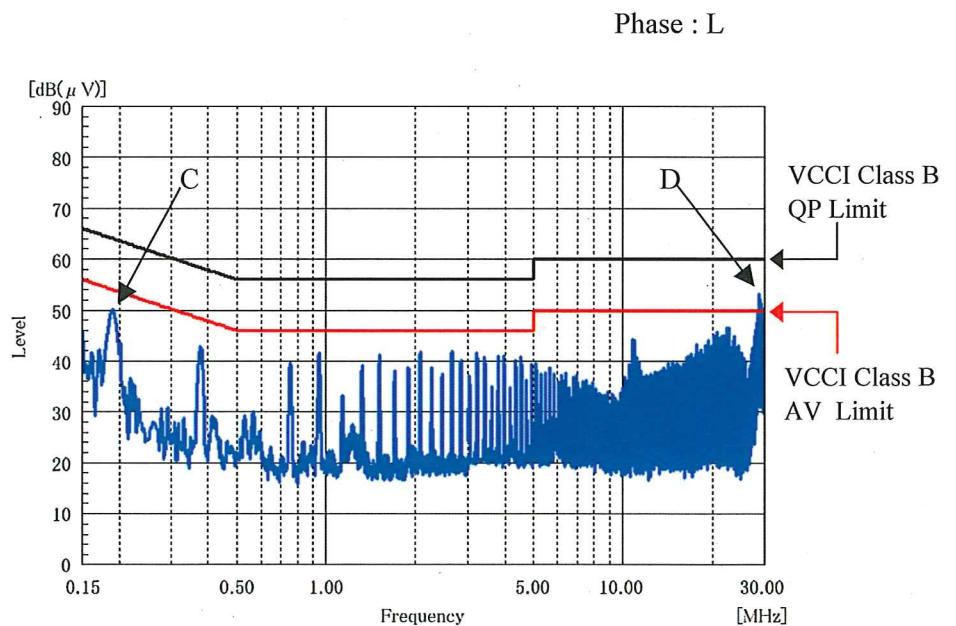
Point A (190kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.0	49.8
AV	54.0	48.5

Point B (28.9MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	49.5
AV	50.0	41.9



Point C (190kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.0	47.5
AV	54.0	45.9

Point D (28.9MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	51.1
AV	50.0	43.2



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

2.15 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

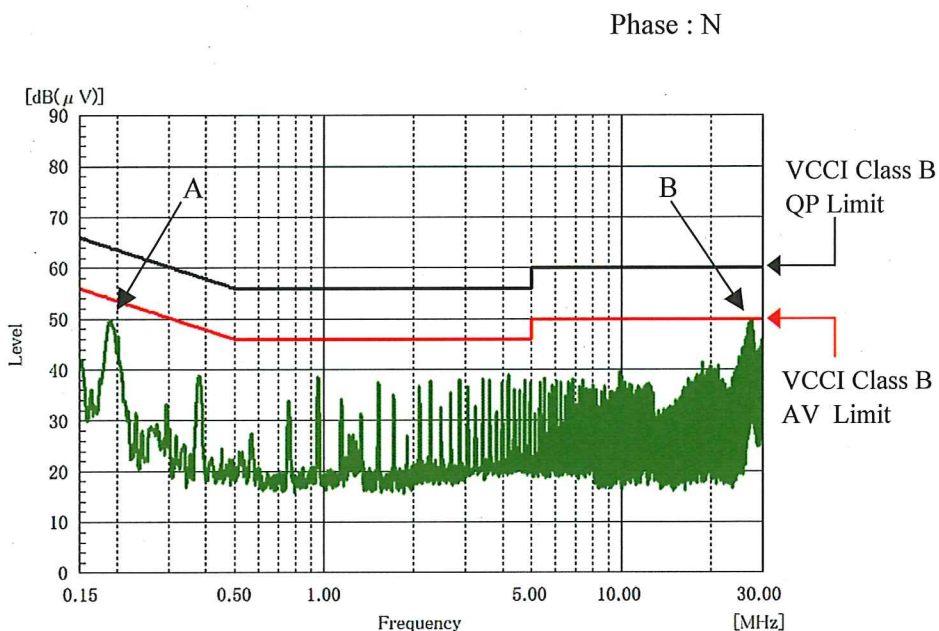
雑音端子電圧

Conducted Emission

24V

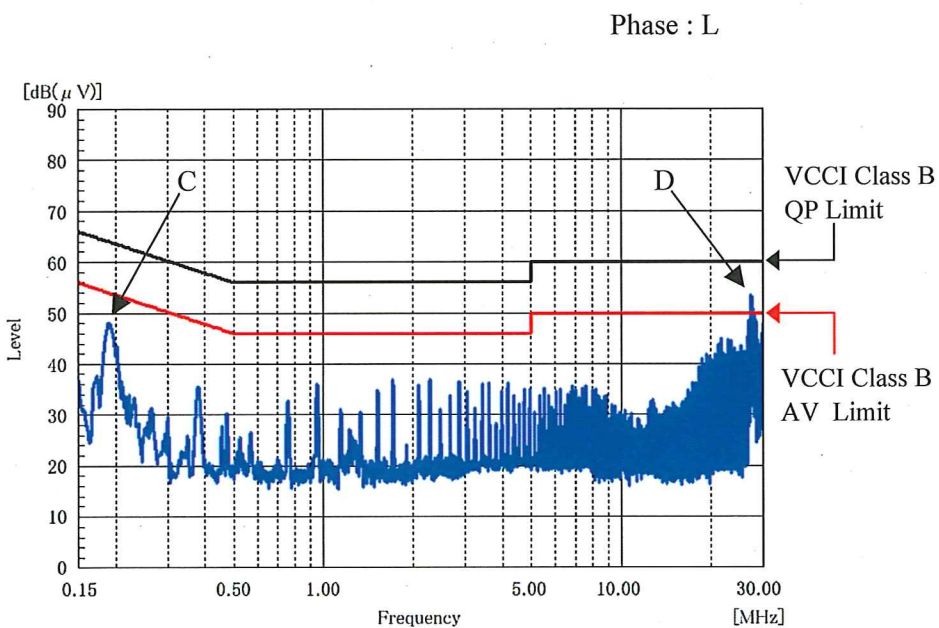
Point A (190kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.0	48.6
AV	54.0	46.9

Point B (27.5MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	49.7
AV	50.0	43.8



Point C (191kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	64.0	46.3
AV	54.0	42.6

Point D (27.5MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	60.0	49.8
AV	50.0	42.3



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

2.15 EMI 特性

Electro-Magnetic Interference characteristics

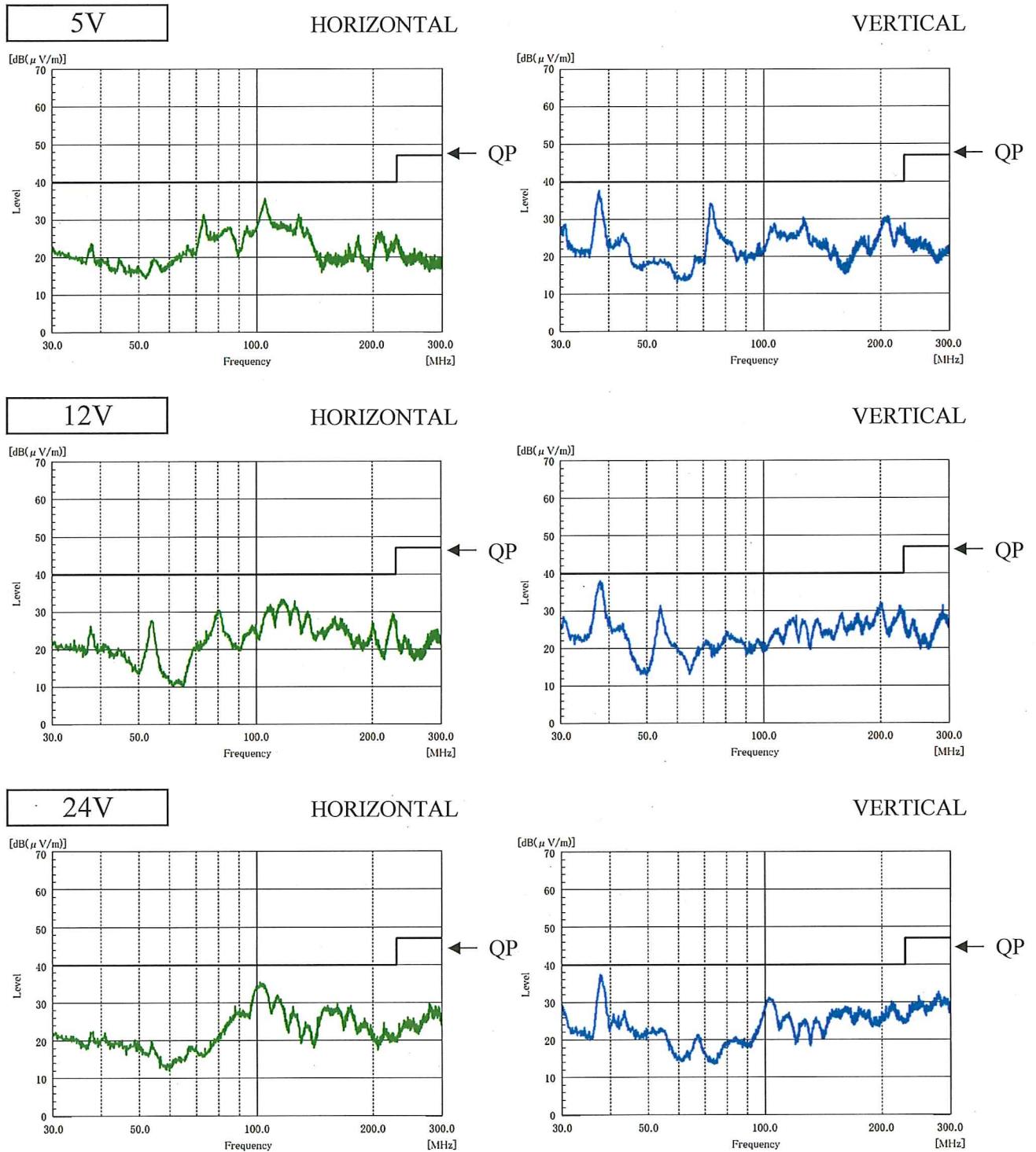
Conditions Vin : 230 VAC

Iout : Full load

Ta : 25 °C

雑音電界強度

Radiated Emission



測定条件は測定回路6を参照

Measurement condition refer Circuit 6 used for determination.

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

表示はピーク値

Indication is peak values.