

CUS30E

EVALUATION DATA

型式データ

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使用記号 Terminology used

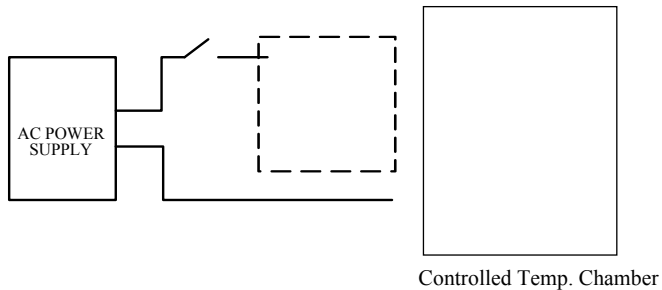
	定義	Definition
Vin 入力電圧	Input voltage
Vout 出力電圧	Output voltage
Iin 入力電流	Input current
Iout 出力電流	Output current
Ta 周囲温度	Ambient temperature
f 周波数	Frequency

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

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

- ・リーク電流特性 Leakage current characteristics



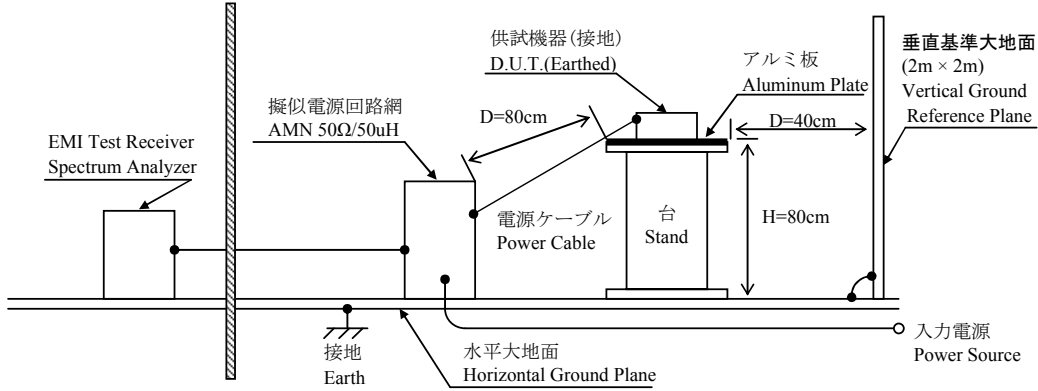
測定回路5 Circuit 5 used for determination

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

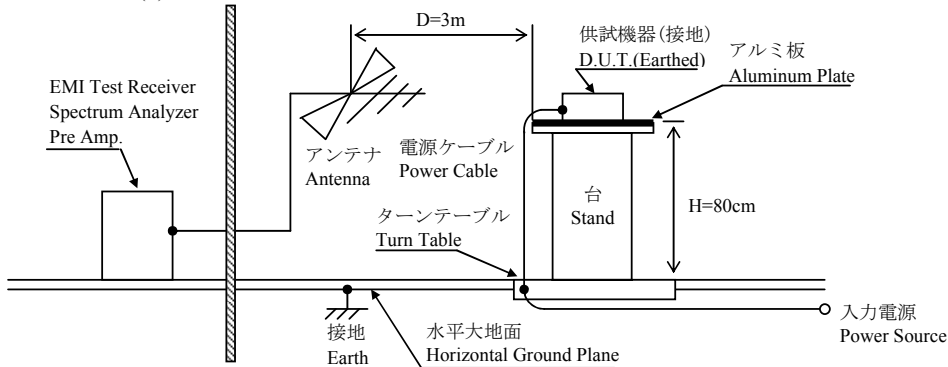
測定構成 Configuration used for determination

- ・ 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	TDS 540A
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1720E
3	DIGITAL MULTIMETER	FLUKE	45
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	TEKTRONIX	63202
6	DC AMPERE METER	TEKTRONIX	P5100
7	DYNAMIC DUMMY LOAD	CHROMA	63030
8	CVCF	KIKUSUI	PCR2000L
9	LEAKAGE CURRENT METER	SIMPSON	228
10	CONTROLLED TEMP. CHAMBER	TABAI-ESPEC	63203
11	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI-03
12	LISN	ROHDE & SCHWARZ	ENV216
13	BICONICAL ANTENNA	EMCO	63208

2. 特性データ Characteristics

CUS30E

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%	4.999V	4.999V	4.999V	4.999V	0mV	0.000%
100%	4.999V	4.999V	4.999V	4.999V	0mV	0.000%
load regulation	1mV	1mV	1mV	1mV		
	0.020%	0.020%	0.020%	0.020%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	5.005V	4.999V	4.994V	11mV	0.220%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	52VAC
Drop out voltage (Vin)	41VAC

12V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	12.003V	12.003V	12.003V	12.003V	0mV	0.000%
50%	12.004V	12.004V	12.004V	12.004V	0mV	0.000%
100%	12.004V	12.004V	12.004V	12.004V	0mV	0.000%
load regulation	1mV	1mV	1mV	1mV		
	0.008%	0.008%	0.008%	0.008%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	12.022V	12.004V	11.968V	54mV	0.450%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	49VAC
Drop out voltage (Vin)	41VAC

24V

1. Regulation - line and load

Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	24.014V	24.014V	24.014V	24.014V	0mV	0.000%
50%	24.014V	24.014V	24.014V	24.014V	0mV	0.000%
100%	24.013V	24.013V	24.013V	24.013V	0mV	0.000%
load regulation	1mV	1mV	1mV	1mV		
	0.004%	0.004%	0.004%	0.004%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : 100 %

Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	24.086V	24.013V	23.970V	116mV	0.483%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

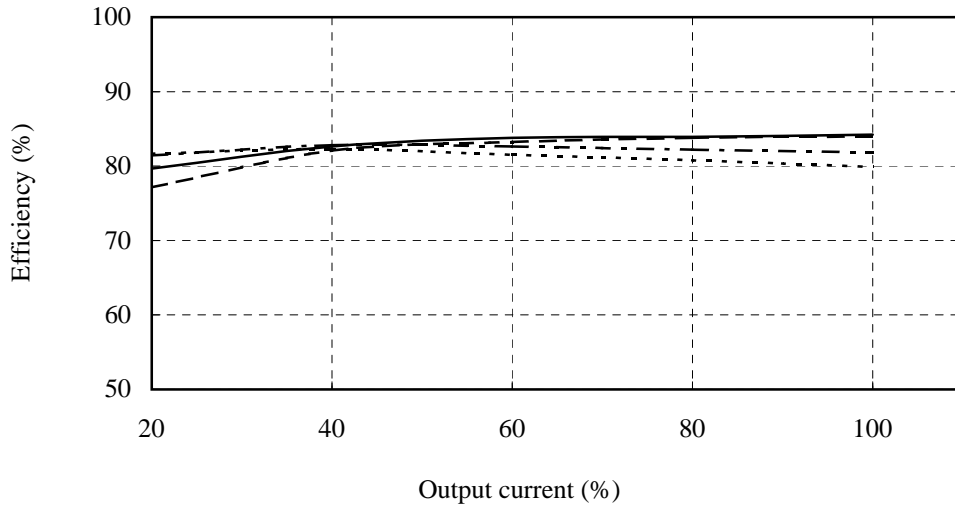
Start up voltage (Vin)	53VAC
Drop out voltage (Vin)	46VAC

(2) 効率対出力電流

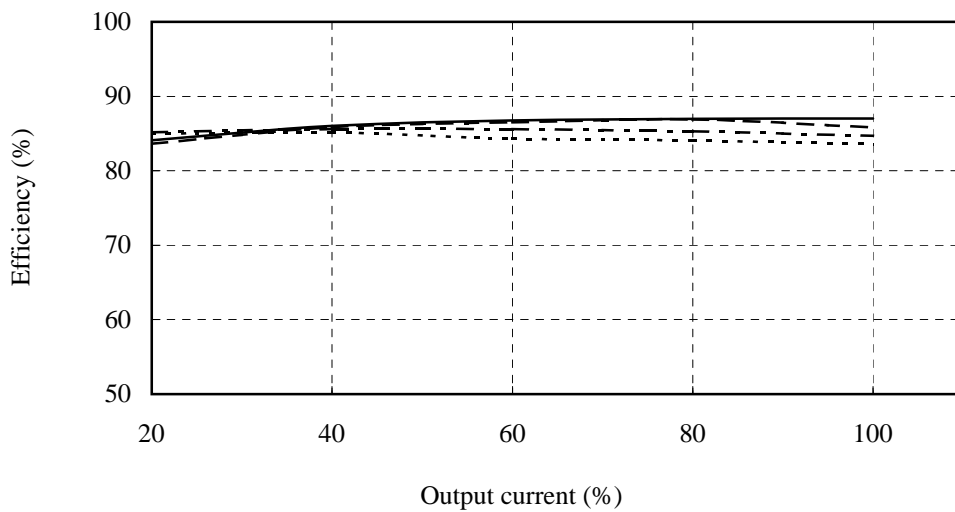
Efficiency vs. Output current

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

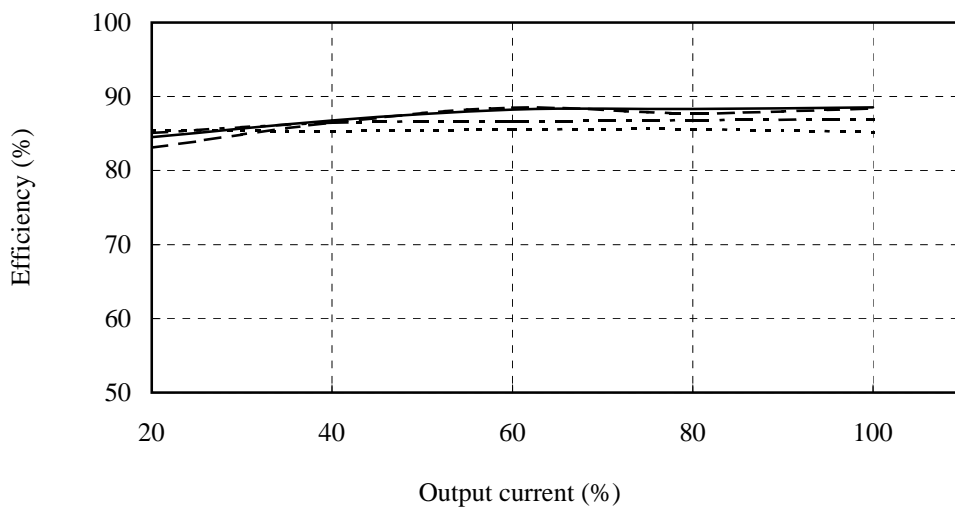
5V



12V



24V



(3) 入力電流対出力電流

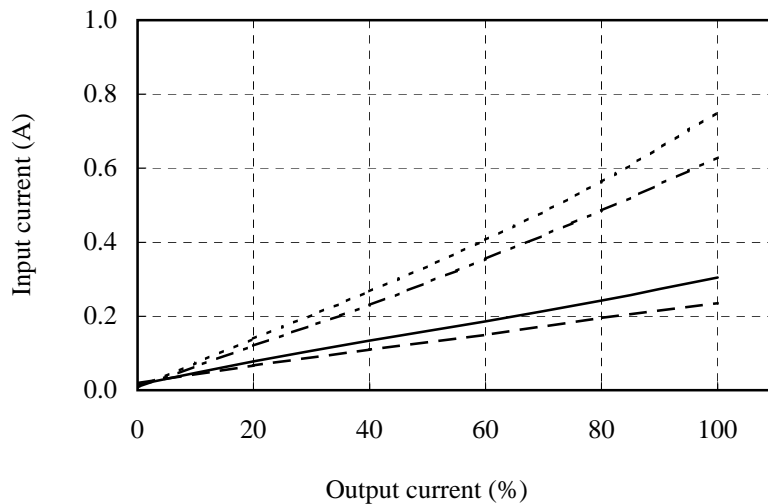
Input current vs. Output current

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

5V

Io: 0%

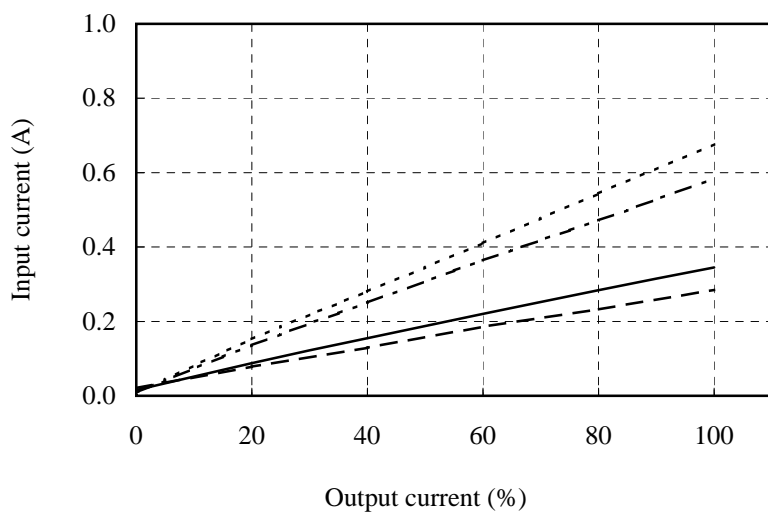
Vin	Input current
85VAC	0.007A
100VAC	0.008A
200VAC	0.015A
265VAC	0.019A



12V

Io: 0%

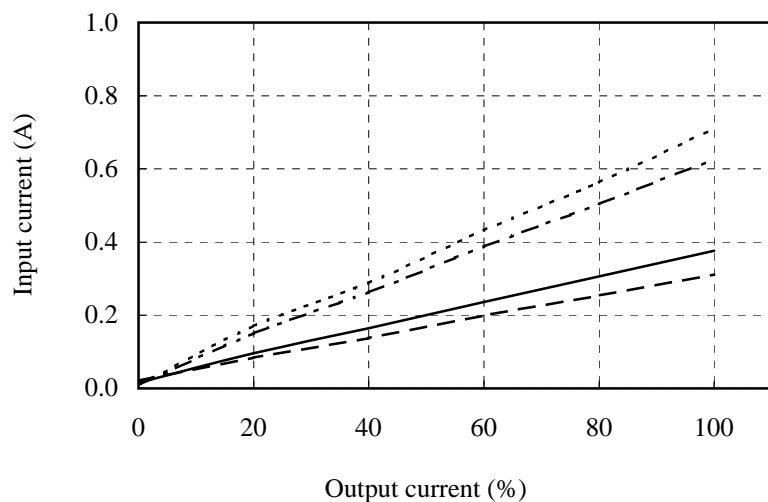
Vin	Input current
85VAC	0.008A
100VAC	0.008A
200VAC	0.016A
265VAC	0.021A



24V

Io: 0%

Vin	Input current
85VAC	0.008A
100VAC	0.009A
200VAC	0.016A
265VAC	0.021A



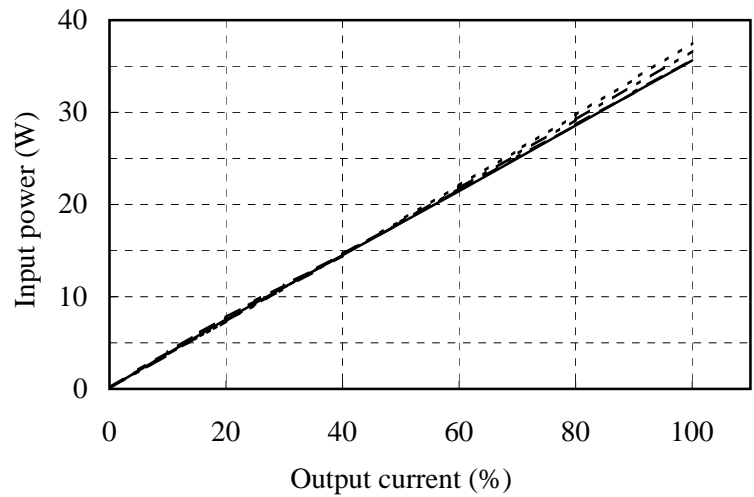
(4) 入力電力対出力電流
Input power vs. Output current

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

5V

Io: 0%

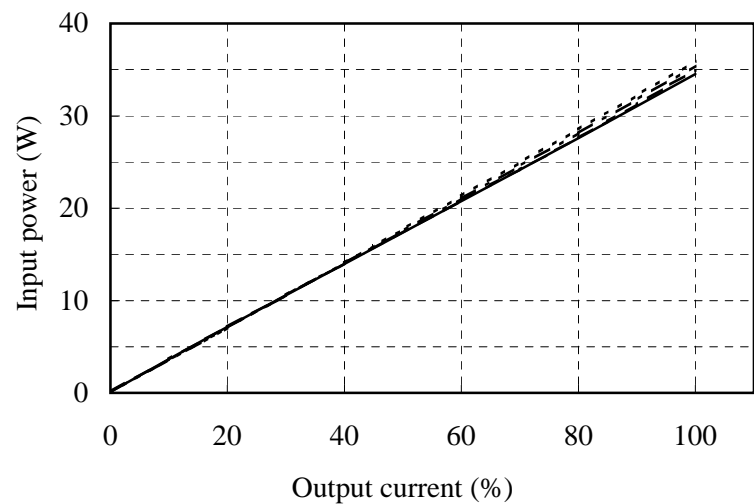
Vin	Input power
85VAC	0.07W
100VAC	0.08W
200VAC	0.11W
265VAC	0.13W



12V

Io: 0%

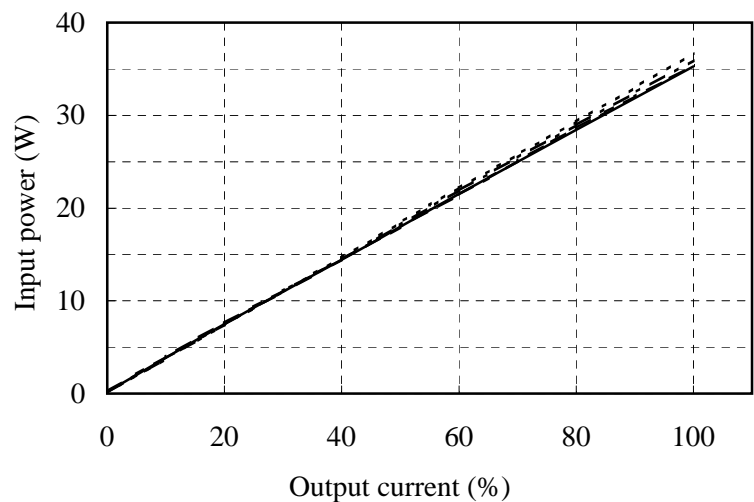
Vin	Input power
85VAC	0.05W
100VAC	0.06W
200VAC	0.10W
265VAC	0.14W



24V

Io: 0%

Vin	Input power
85VAC	0.11W
100VAC	0.11W
200VAC	0.18W
265VAC	0.24W



2.2 過電流保護特性

Over current protection (OCP) characteristics

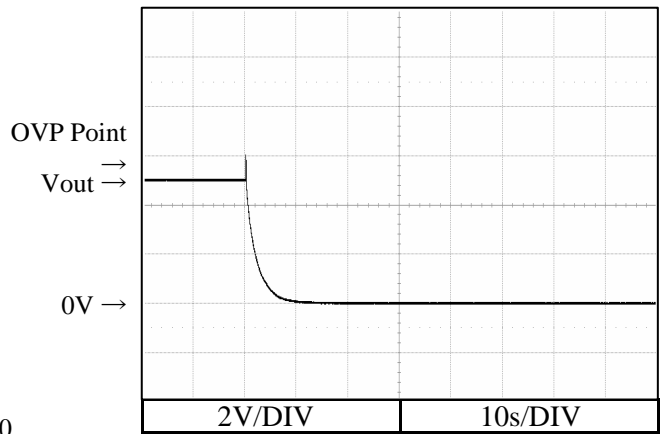
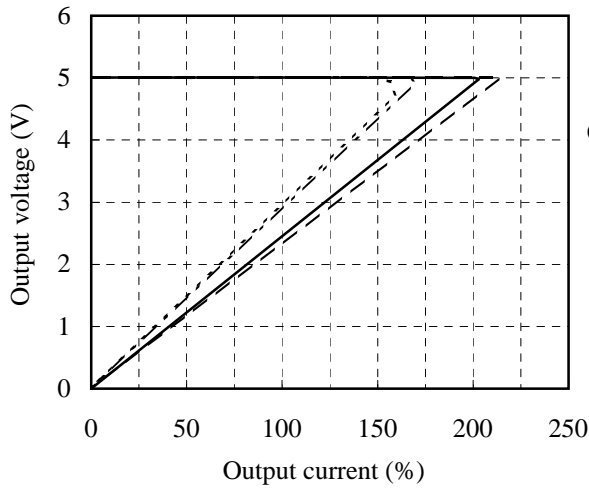
2.3 過電圧保護特性

Over voltage protection (OVP) characteristics

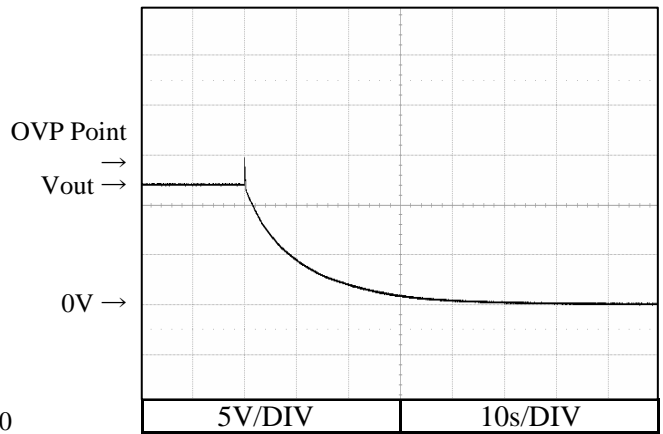
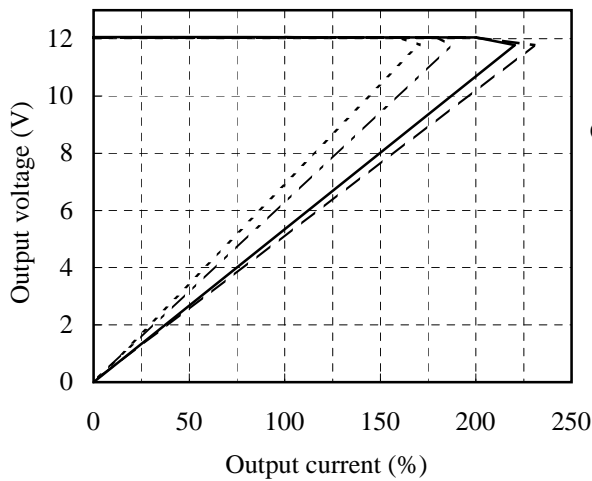
Conditions Vin : 85 VAC -----
 100 VAC - - - - -
 200 VAC ————
 265 VAC - - - - -
 Ta : 25 °C

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

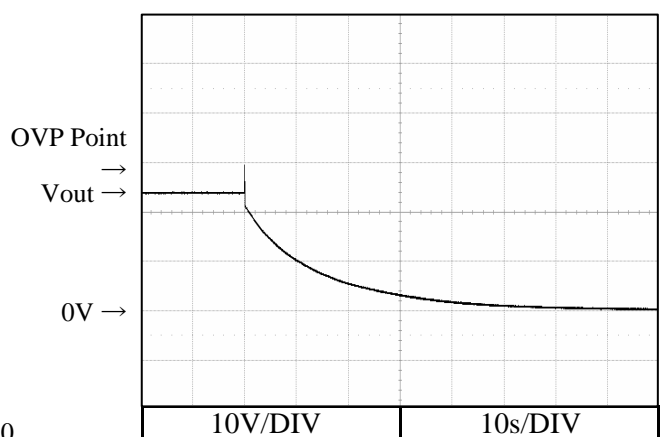
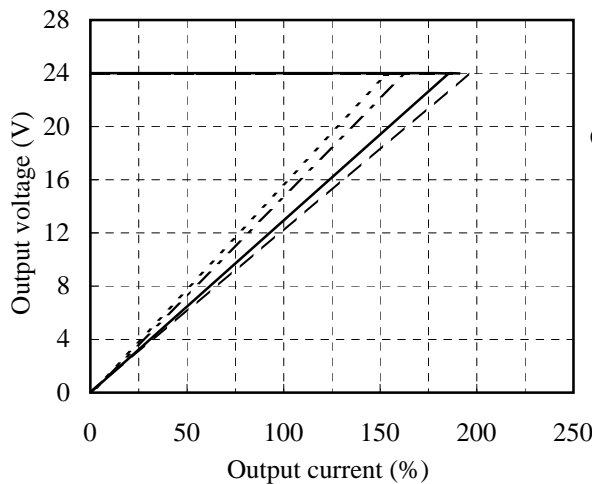
5V



12V

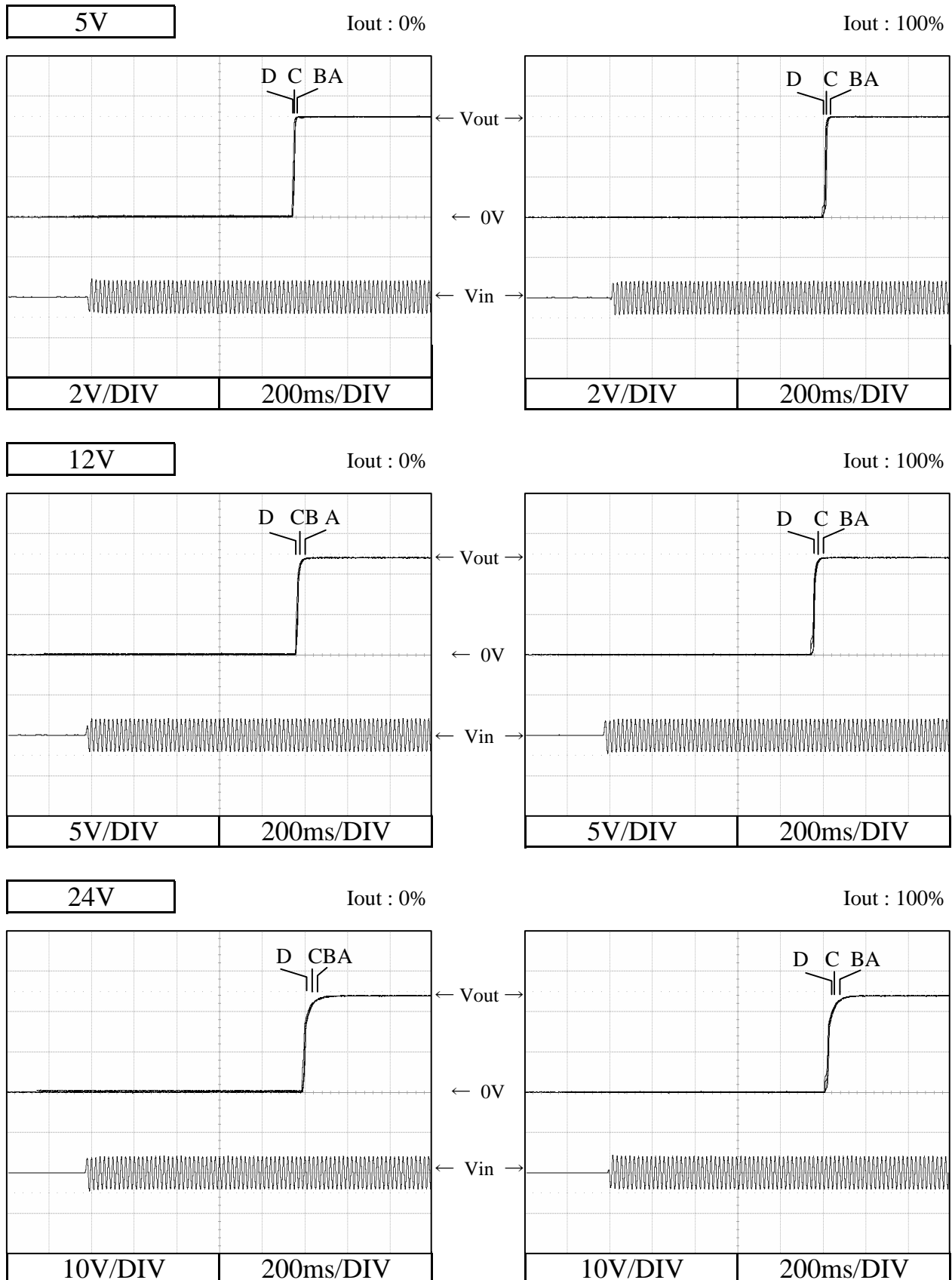


24V



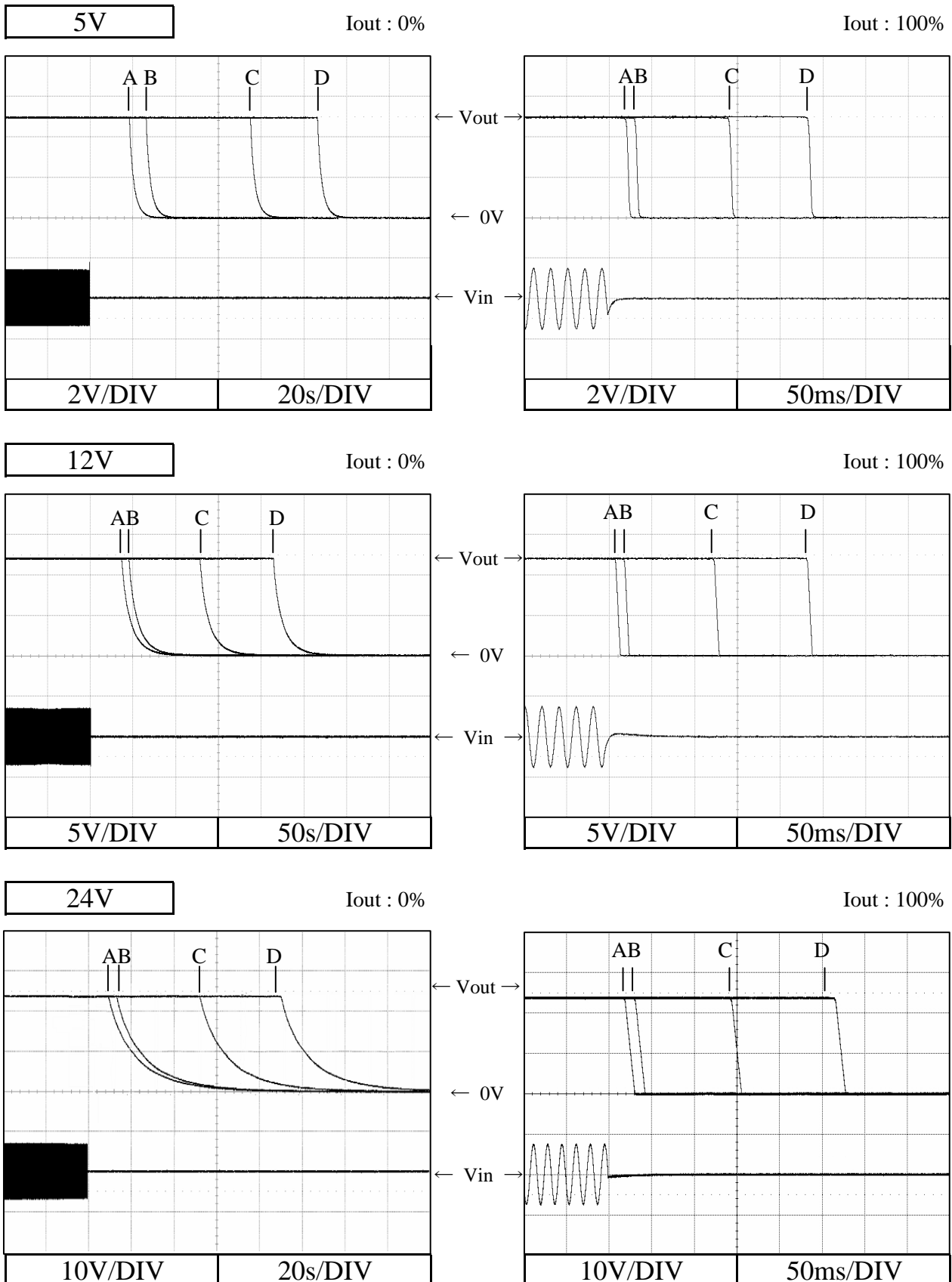
2.4 出力立ち上がり特性
Output rise characteristics

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



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

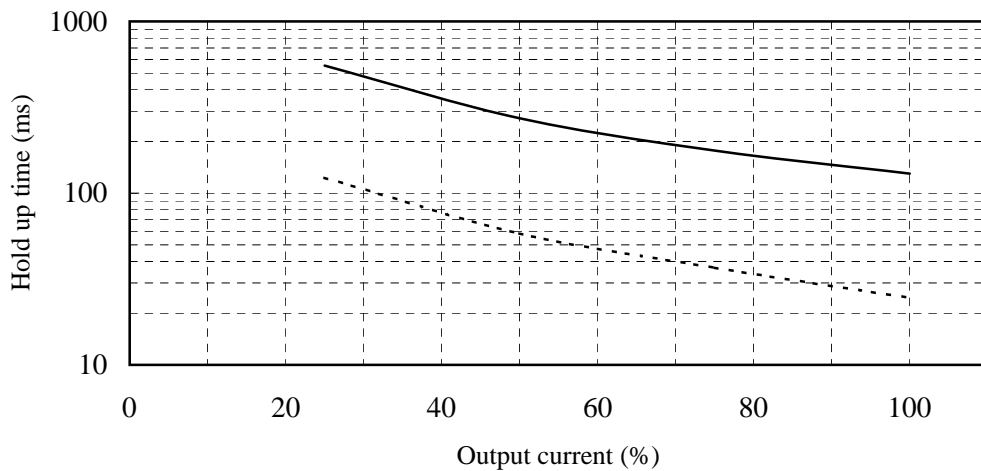
Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 °C



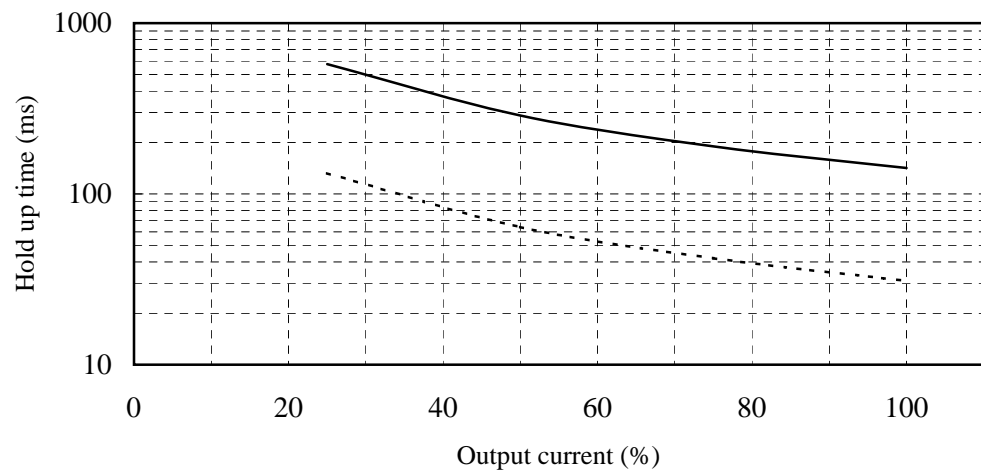
2.6 出力保持時間特性
Hold up time characteristics

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

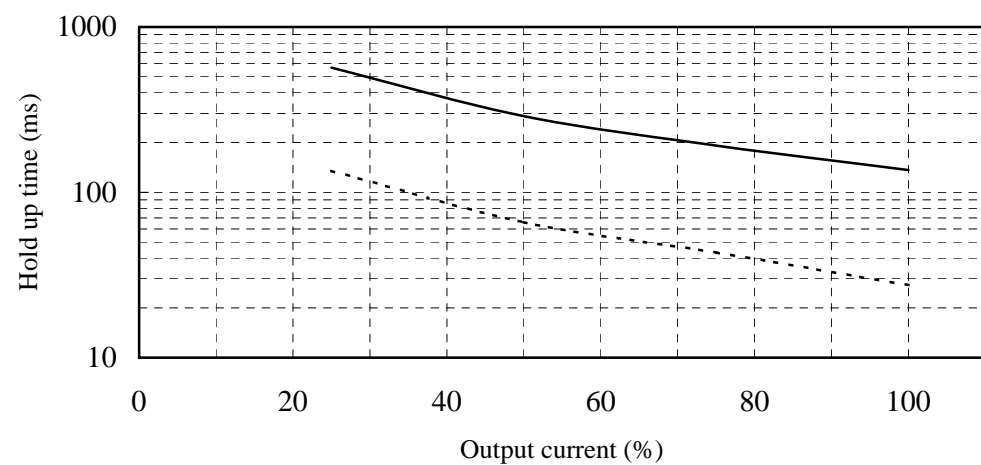
5V



12V



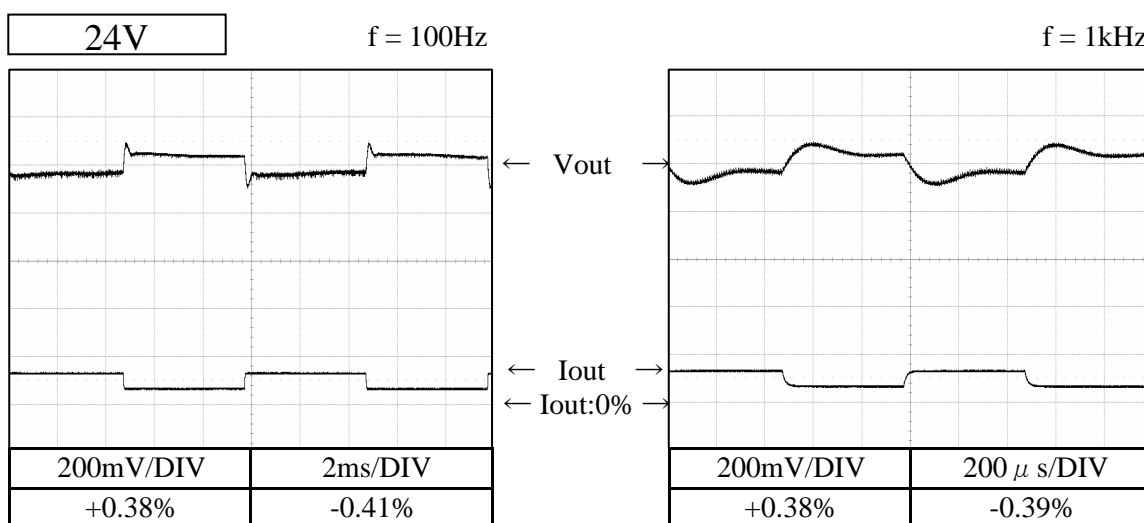
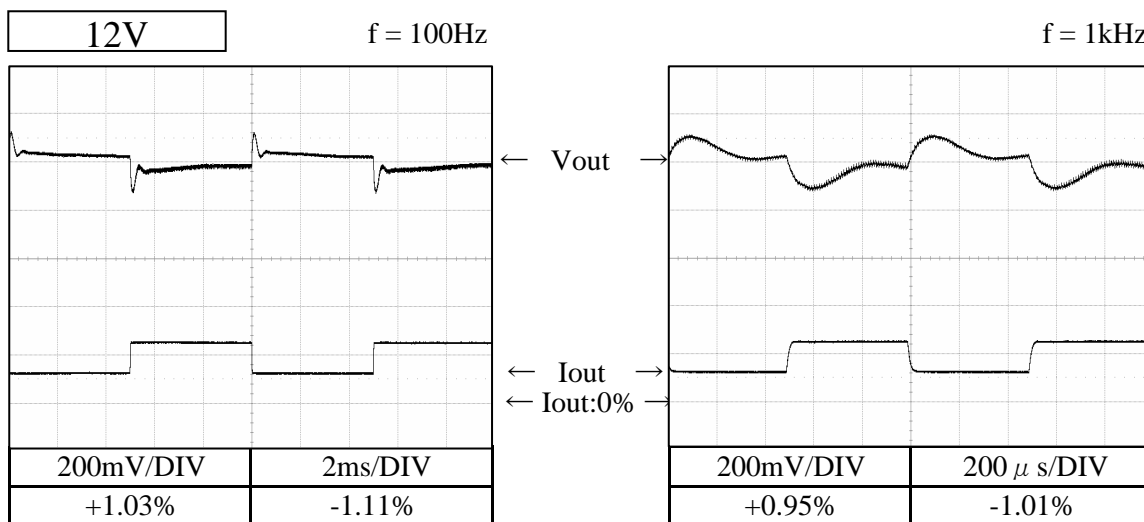
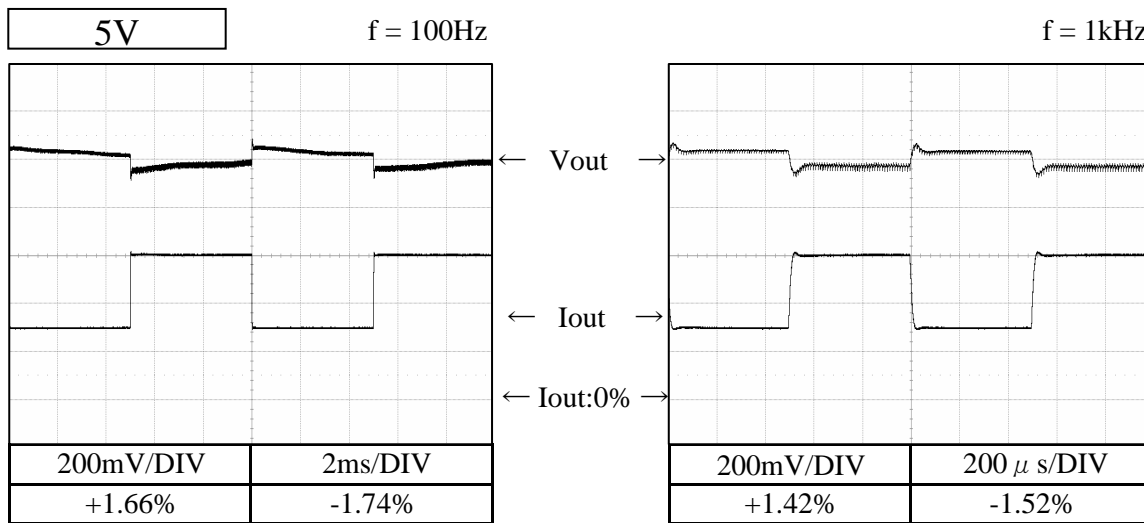
24V



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



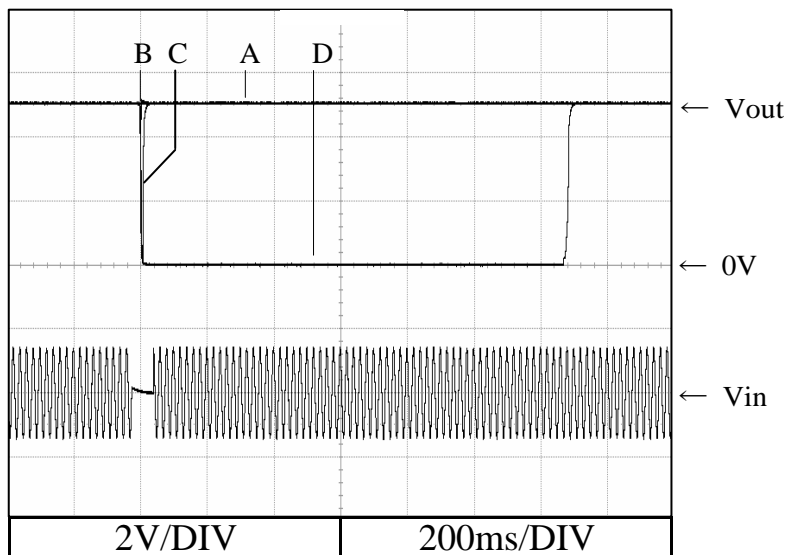
2.8 入力電圧瞬停特性

Response to brown out characteristics

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

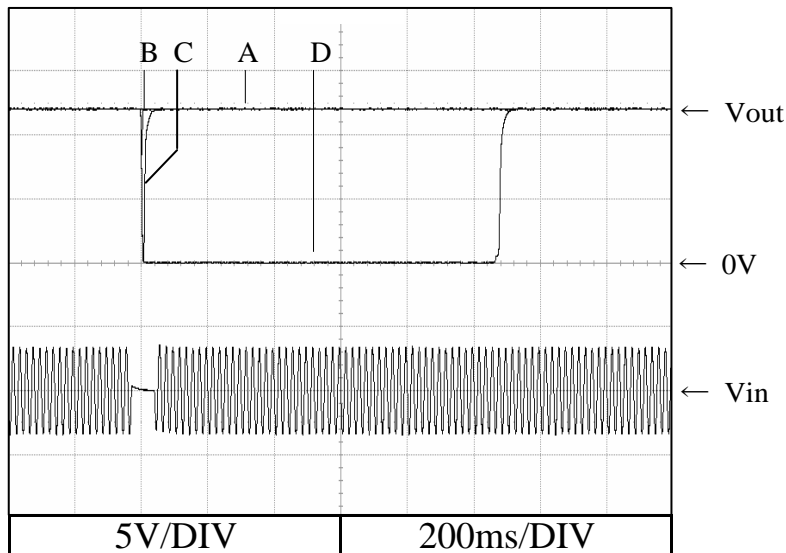
5V

A = 21ms
B = 27ms
C = 35ms
D = 65ms



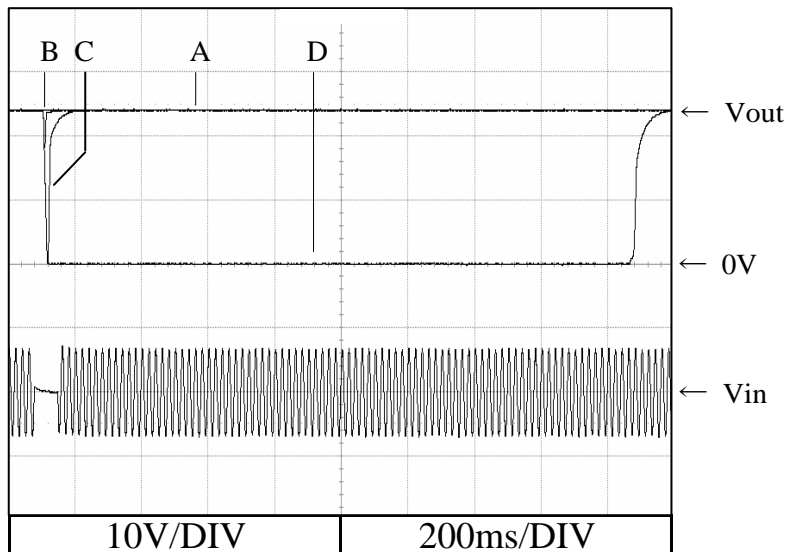
12V

A = 25ms
B = 32ms
C = 38ms
D = 68ms



24V

A = 22ms
B = 29ms
C = 42ms
D = 72ms



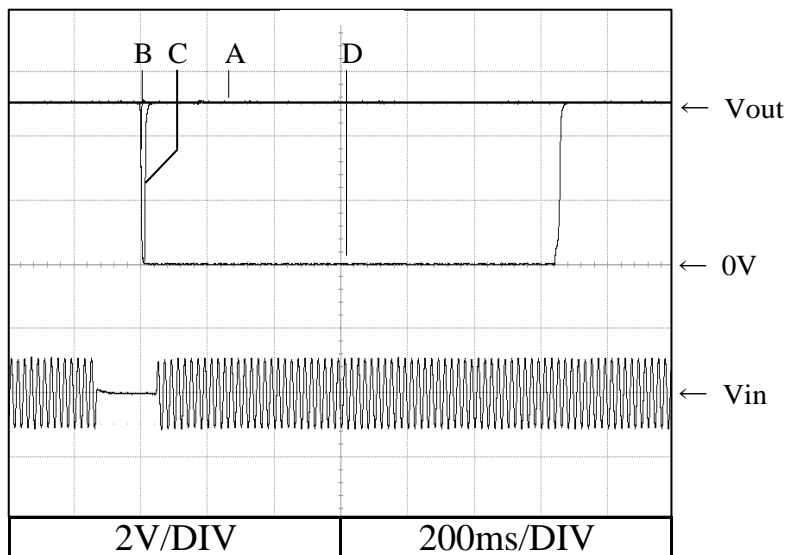
2.8 入力電圧瞬停特性

Response to brown out characteristics

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

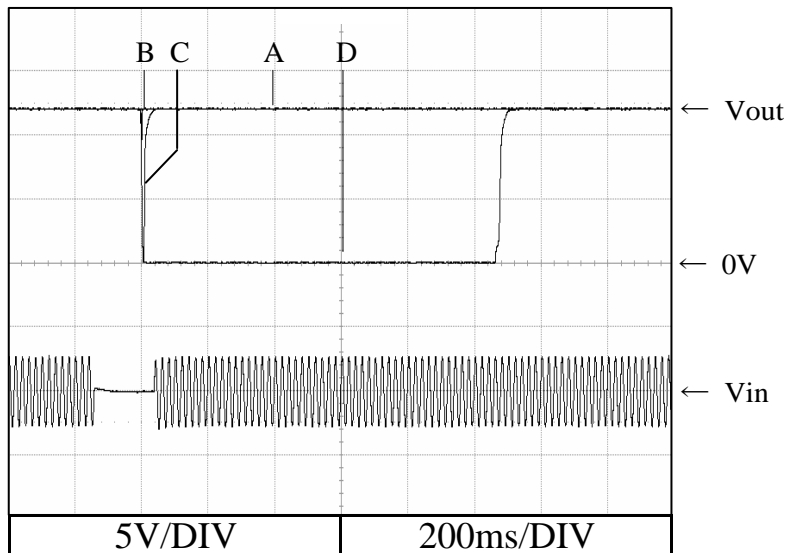
5V

A = 128ms
B = 134ms
C = 145ms
D = 180ms



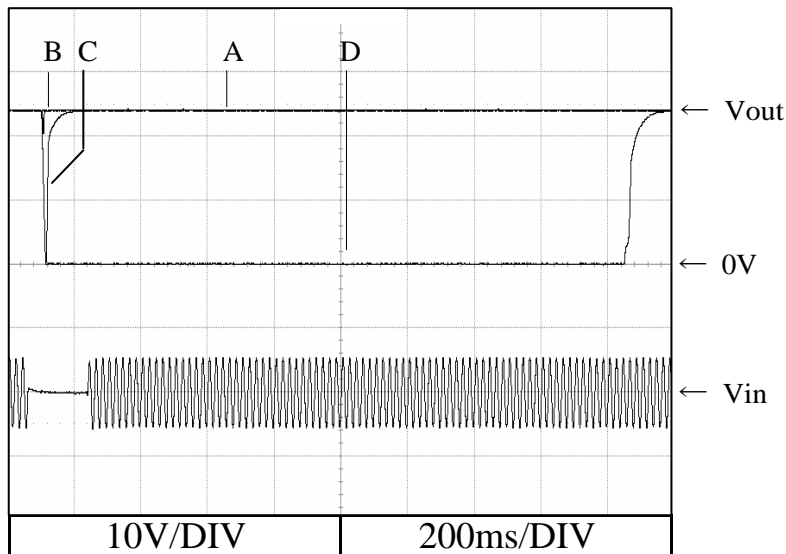
12V

A = 135ms
B = 142ms
C = 150ms
D = 177ms



24V

A = 132ms
B = 137ms
C = 149ms
D = 179ms

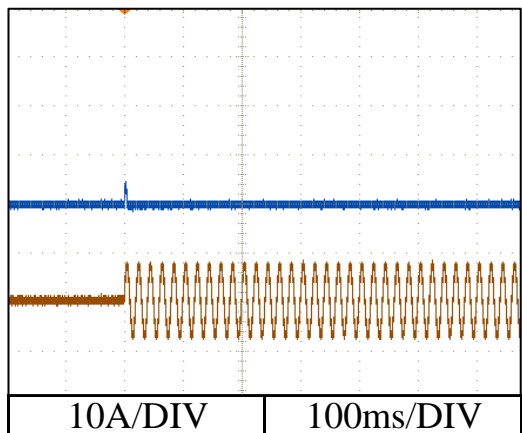


2.9 入力サージ電流 (突入電流) 波形
Inrush current waveform

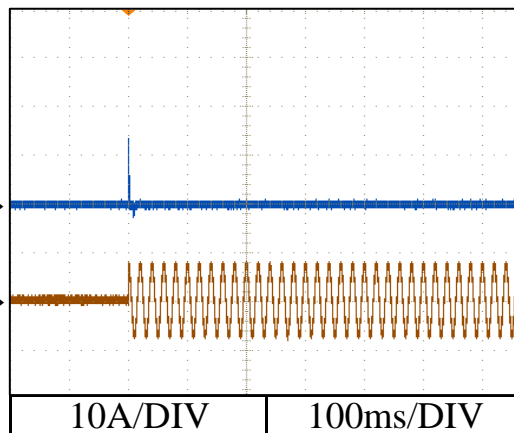
5V

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

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

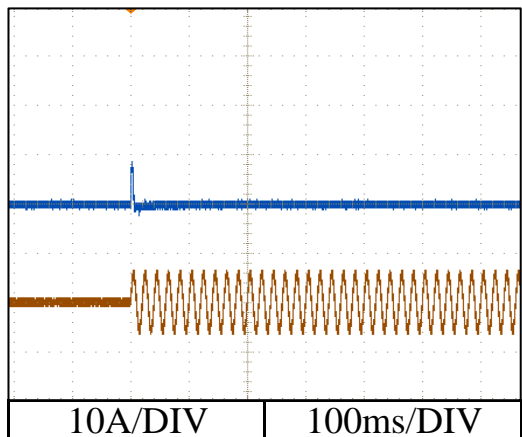


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

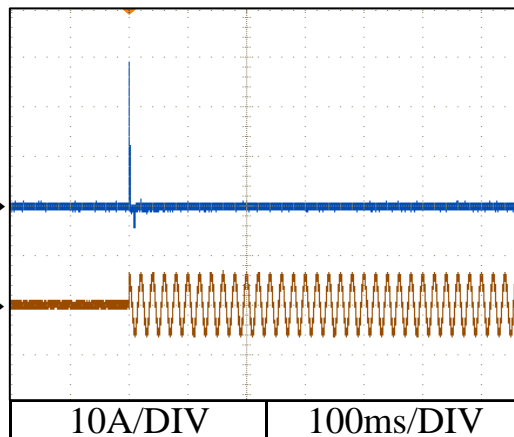


Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 °C

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



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



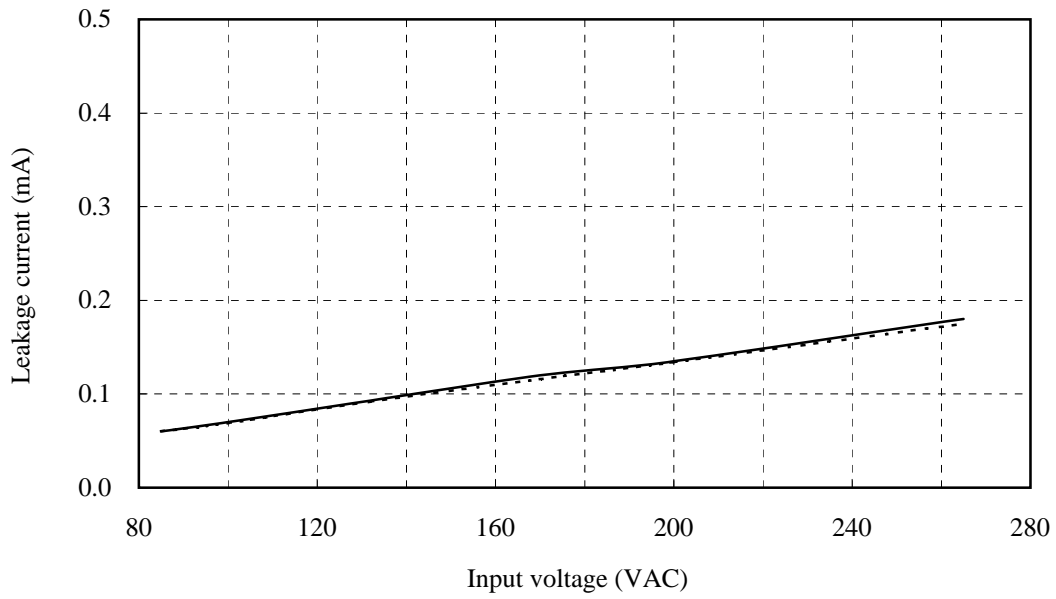
2.10 リーク電流特性
Leakage current characteristics

CUS30E

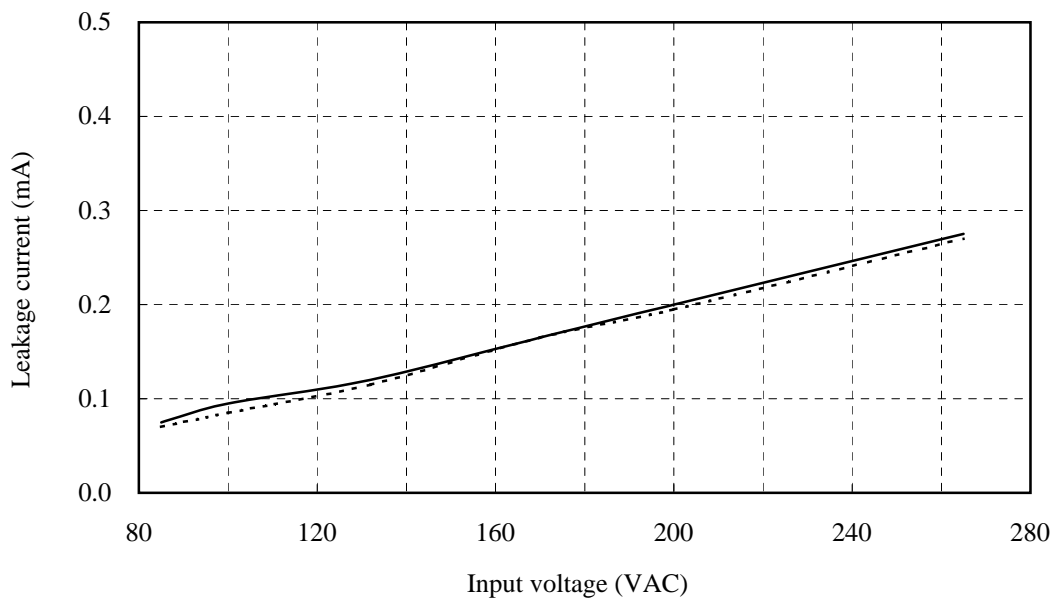
Conditions Iout : 0 % -----
 100 % ————
 Ta : 25 °C
Equipment used : 228 (Simpson)

5V

f : 50 Hz

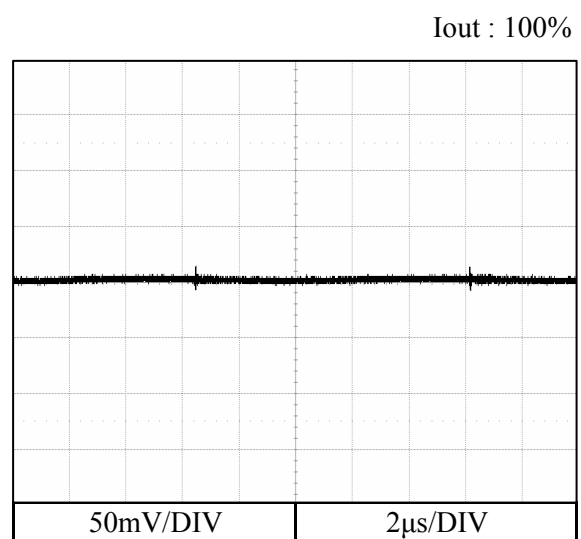
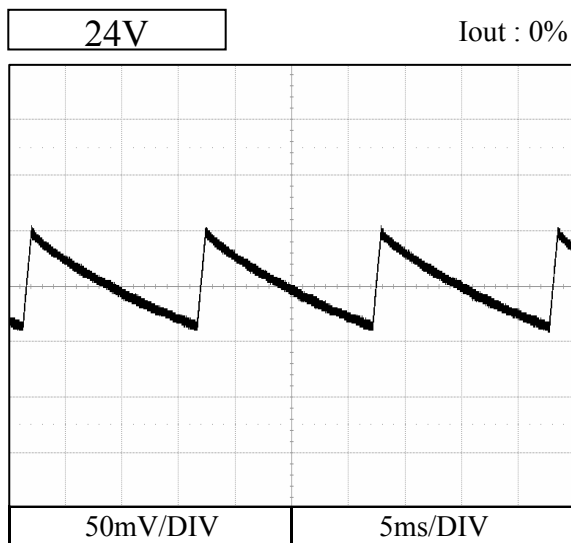
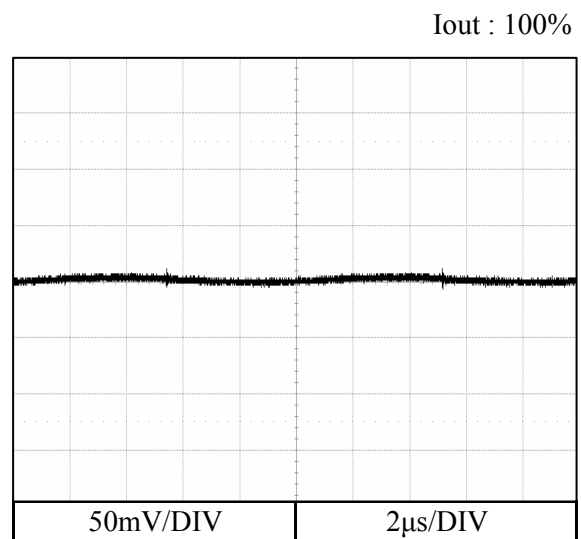
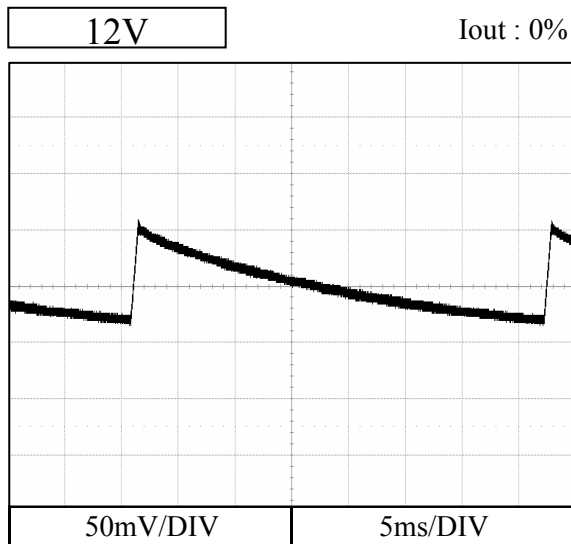
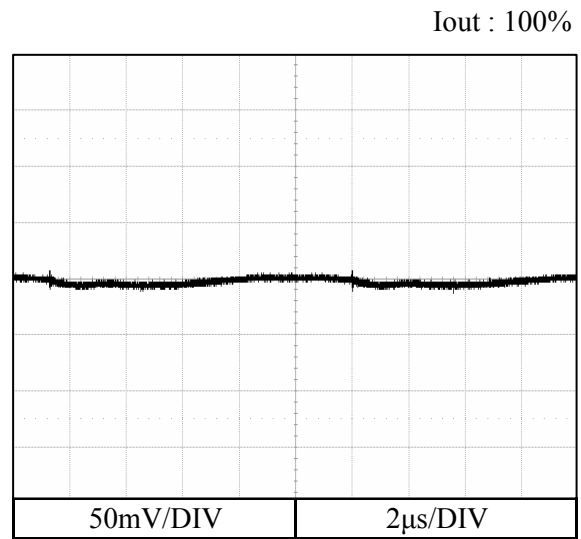
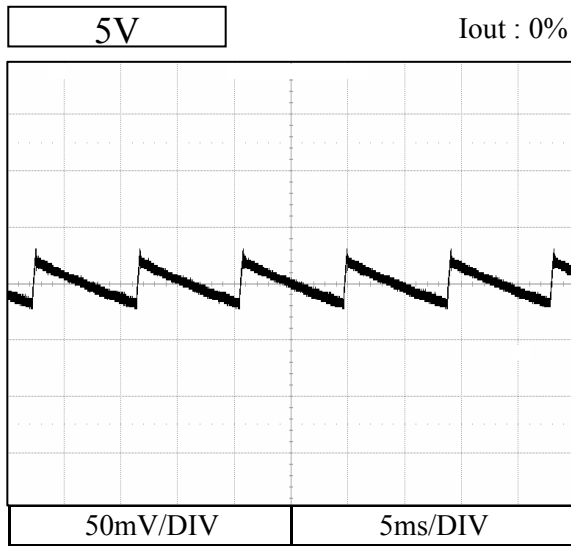


f : 60 Hz



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

Conditions Vin : 100 VAC
Ta : 25 °C



2.12 EMI 特性

Electro-Magnetic Interference characteristics

CUS30E

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

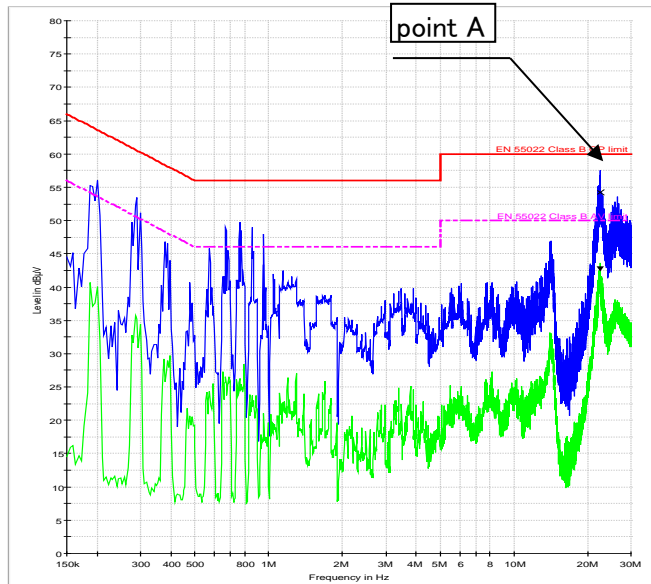
雑音端子電圧

Conducted Emission

5V

Point A (22.49MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	54.2
AV	50.0	42.7

Phase : L

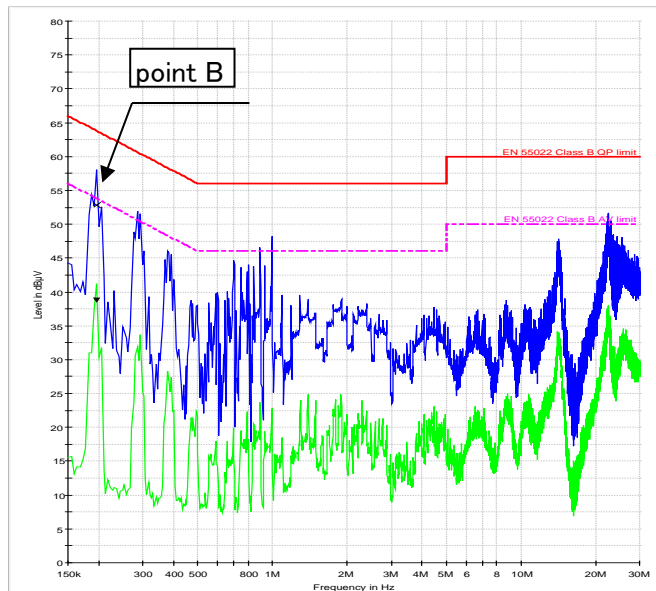


EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

Point B (195.0kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.8	52.8
AV	53.8	38.8

Phase : N



EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

EN55011-B, VCCI-B, FCC-Bの限界値はEN55032 class Bの限界値と同じ
Limit of EN55011-B, VCCI-B, FCC-B are same as its EN55032 class B.

2.12 EMI 特性

Electro-Magnetic Interference characteristics

CUS30E

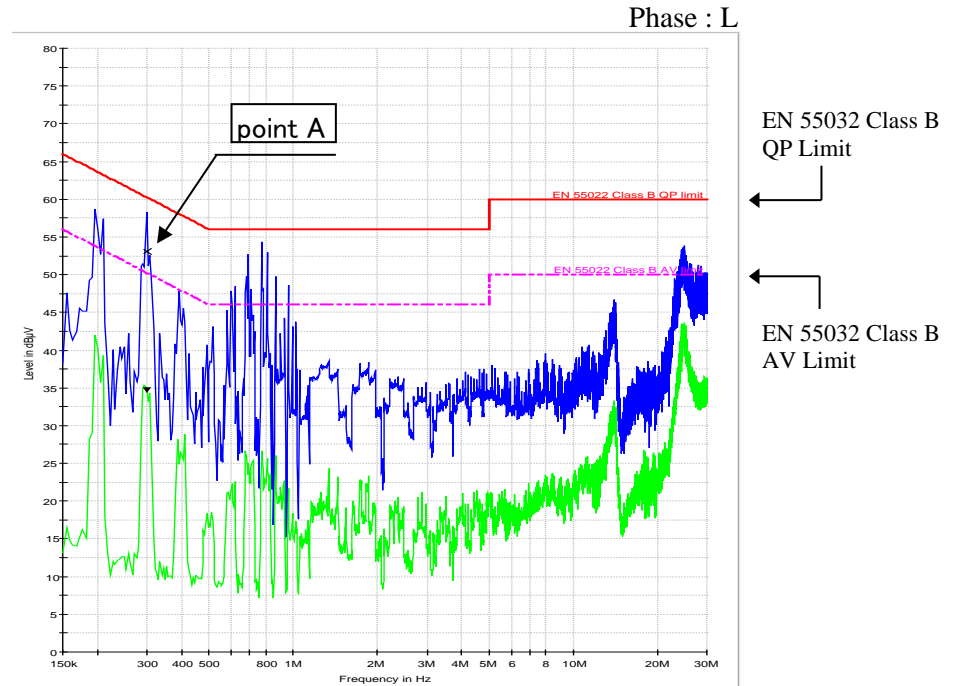
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

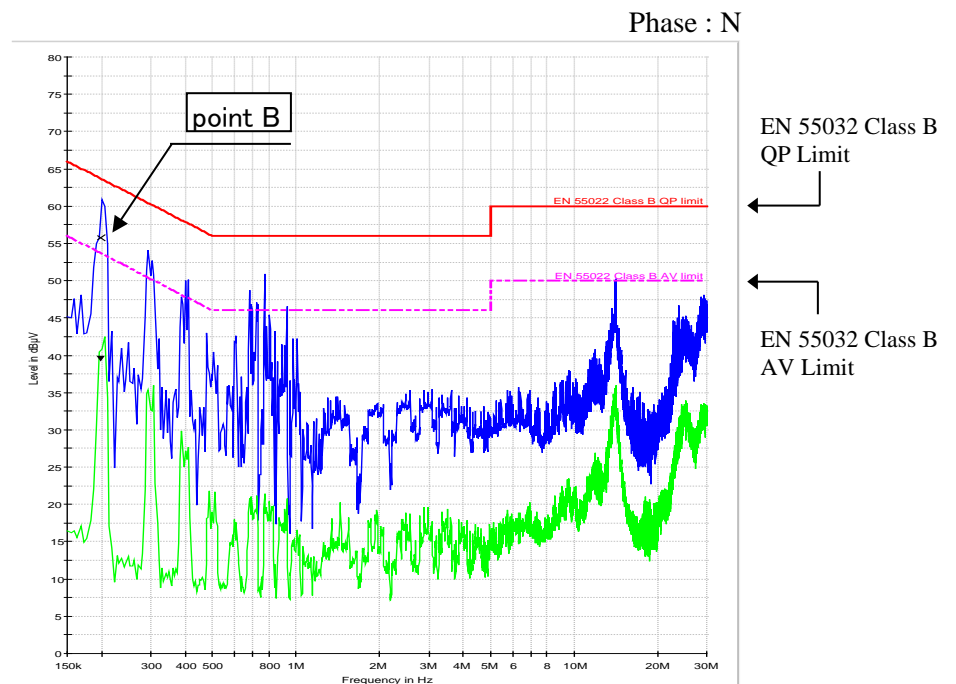
Conducted Emission

12V

Point A (298.5kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.3	53.1
AV	50.3	34.8



Point B (198.5kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.7	55.8
AV	53.7	39.5



EN55011-B,VCCI-B,FCC-Bの限界値はEN55032 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55032 class B.

2.12 EMI 特性

Electro-Magnetic Interference characteristics

CUS30E

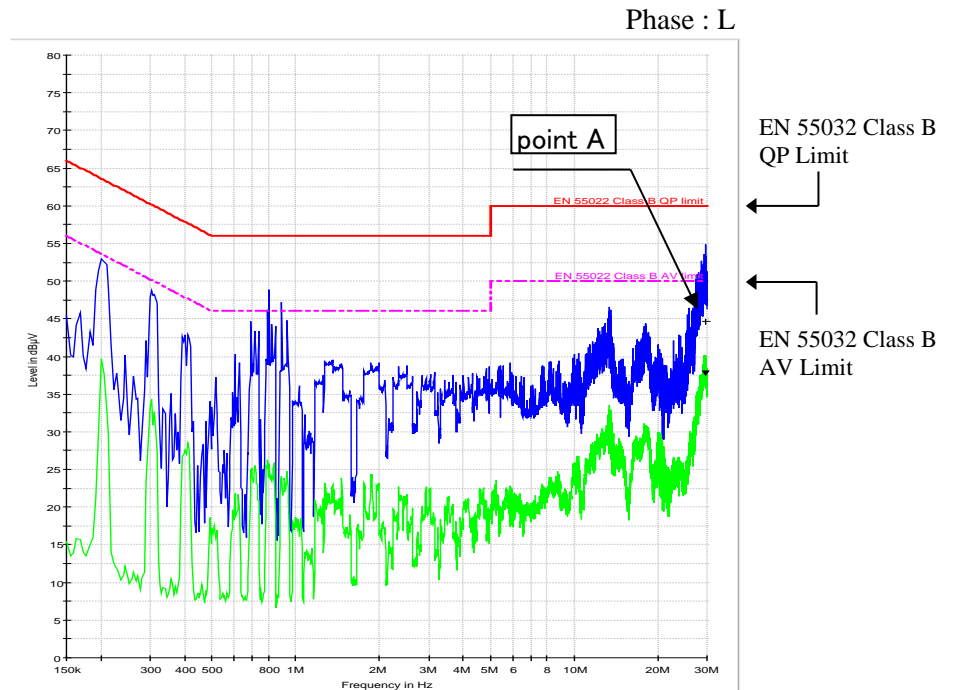
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 °C

雑音端子電圧

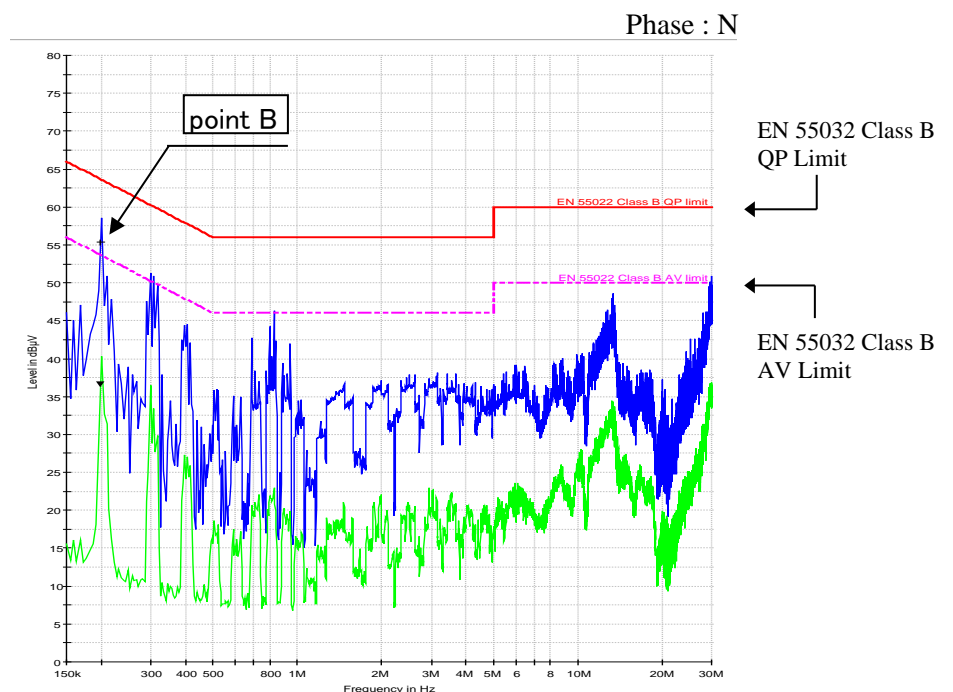
Conducted Emission

24V

Point A (29.5MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	60.0	44.7
AV	50.0	37.8



Point B (198.5kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	63.7	55.4
AV	53.7	36.6



EN55011-B,VCCI-B,FCC-Bの限界値はEN55032 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55032 class B.

2.12 EMI 特性

Electro-Magnetic Interference characteristics

CUS30E

Conditions Vin: 230VAC

Io: 100%

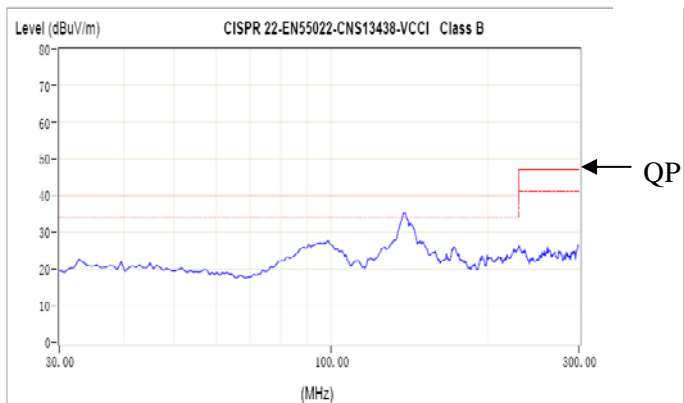
Ta: 25°C

雑音電界強度

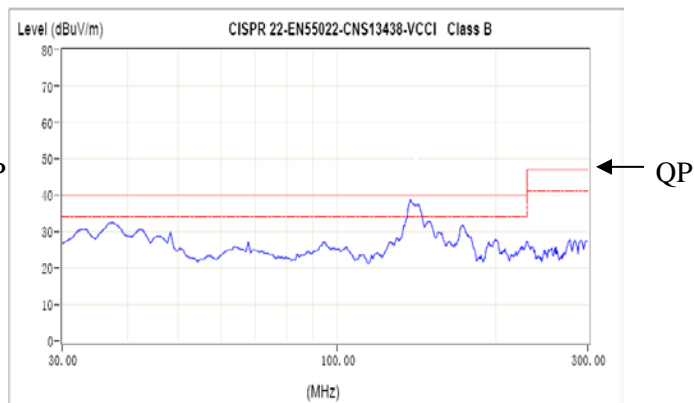
Radiated Emission

5V

HORIZONTAL

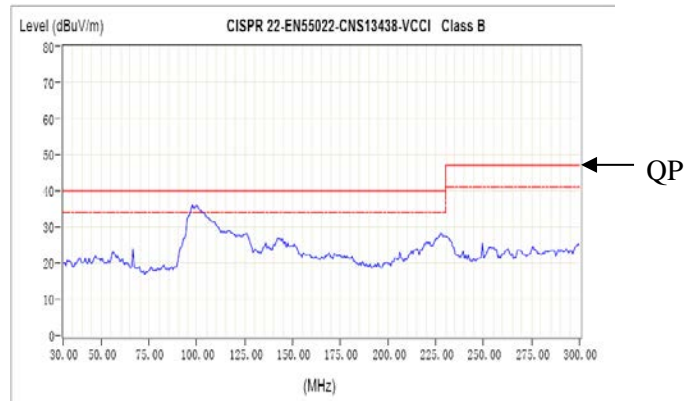


VERTICAL

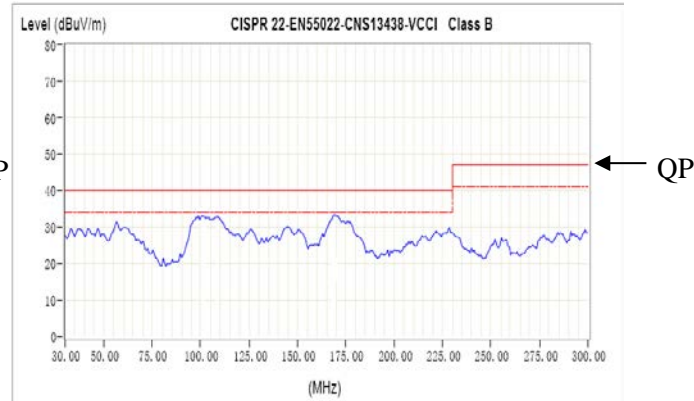


12V

HORIZONTAL

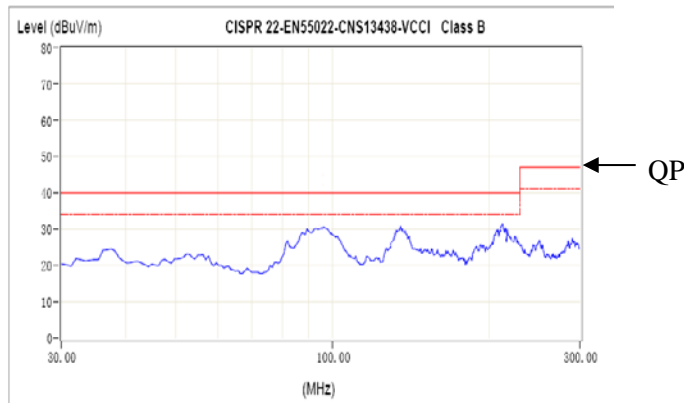


VERTICAL

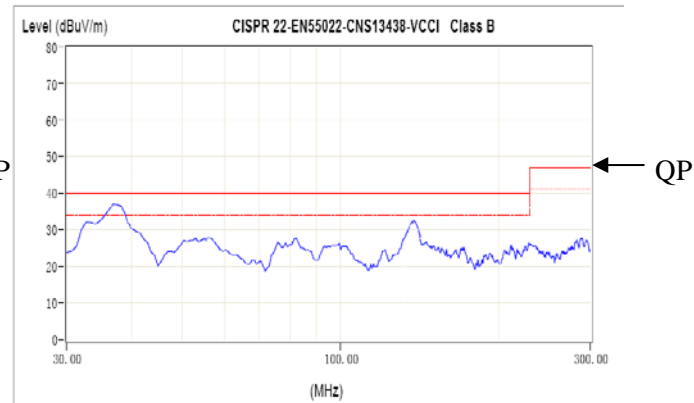


24V

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.