

PFE300SA

EVALUATION DATA

型式データ

INDEX

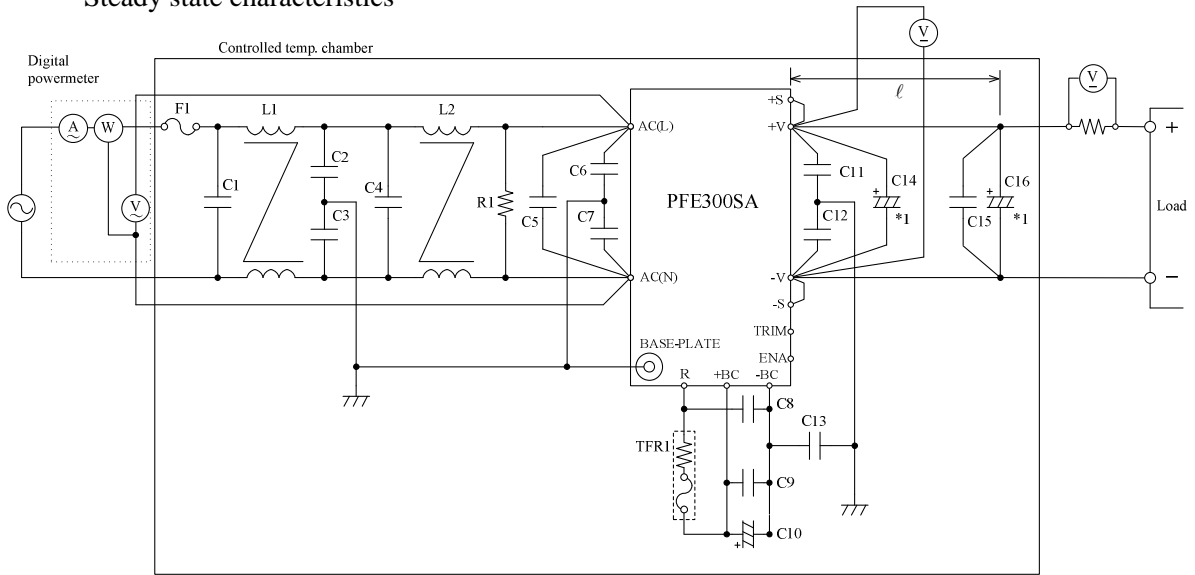
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使用記号 Terminology used

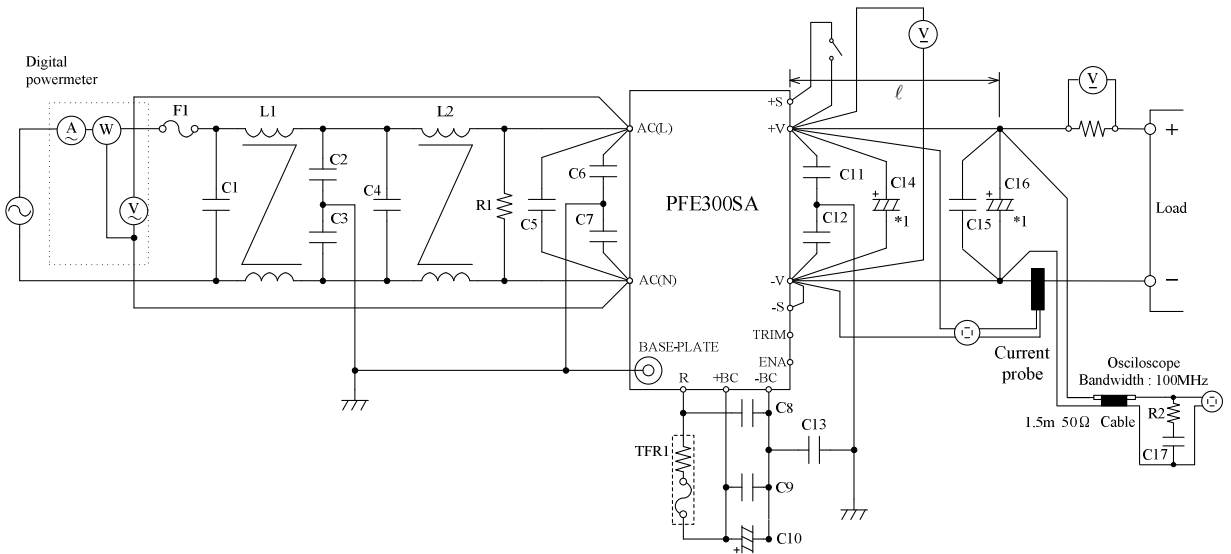
Definition		
V_{in}	入力電圧 Input Voltage
V_o	出力電圧 Output Voltage
I_{in}	.....	入力電流 Input Current
I_o	.....	出力電流 Output Current
T_{bp}	.....	ベースプレート温度 Baseplate Temperature
T_a	.....	周囲温度 Ambient Temperature
f	.....	周波数 Frequency

1. 測定方法 Evaluation Method
 1.1 測定回路 Measurement Circuits

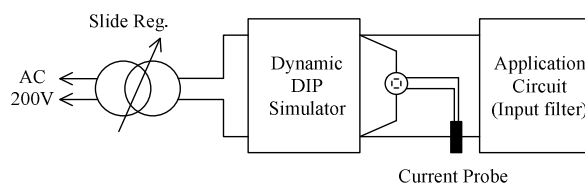
(1) 静特性 Steady state characteristics



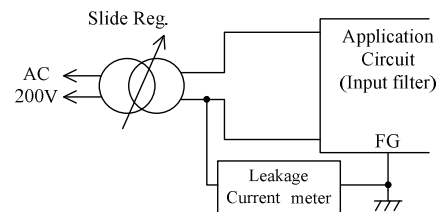
(2) 過渡応答、保護機能、出力リップル、ノイズ波形、その他
 Dynamic, protection and Output ripple noise waveform other characteristics



Inrush current characteristics



Leakage current characteristics



- C1, C4, C5: 1uF Film Capacitor
- C2, C3: 4700pF Ceramic Capacitor
- C6, C7, C13: 1000pF Ceramic Capacitor
- C8, C9: 1uF Film Capacitor
- C10: 470uF Electrolytic Capacitor
- C11, C12: 0.033uF Film Capacitor
- C15: 2.2uF Ceramic Capacitor
- C17: 4700pF Ceramic Capacitor

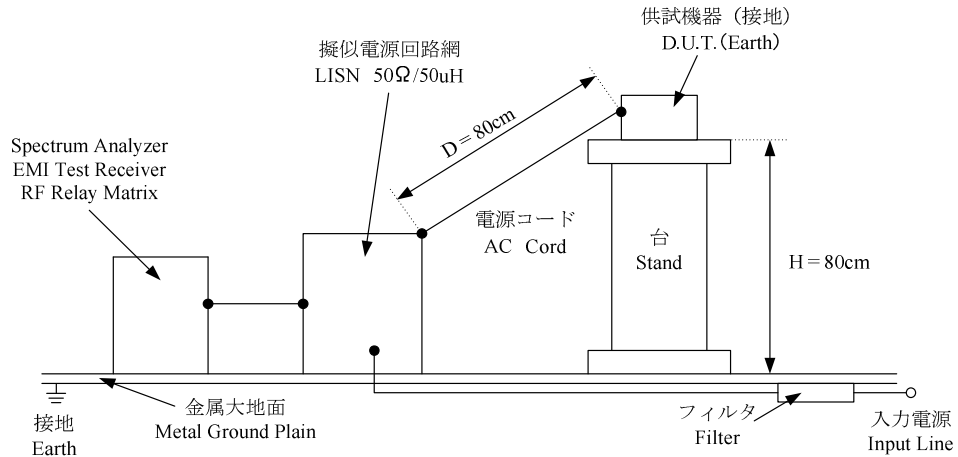
- C14, C16: 12V-1000uF Electrolytic Capacitor
- 28V- 470uF Electrolytic Capacitor
- 48V- 220uF Electrolytic Capacitor
- R1: 0.5W 470k Ω
- R2: 50 Ω
- L1, L2: 6mH
- ℓ : 50mm
- TFR1: 10 Ω more 139°C

==== Note ====

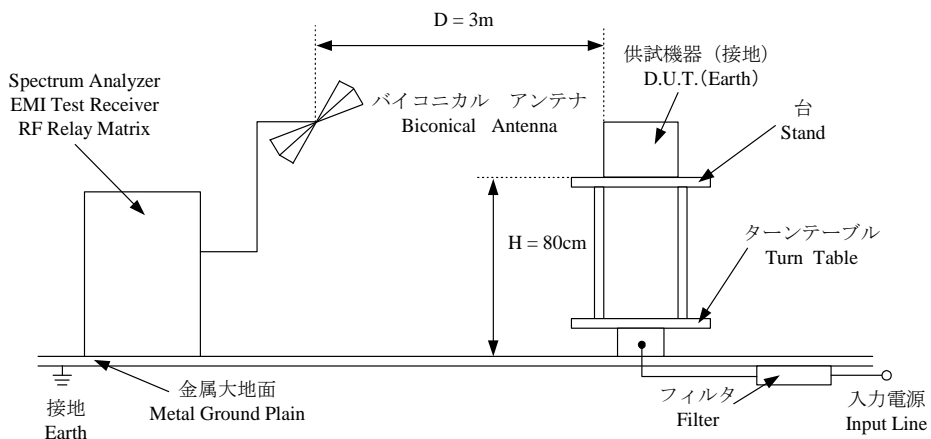
*1: At ambient temperature less than -20°C, measurement was done using twice of the recommended capacitor above.

(3) EMI特性 Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ) Conducted Emission Noise

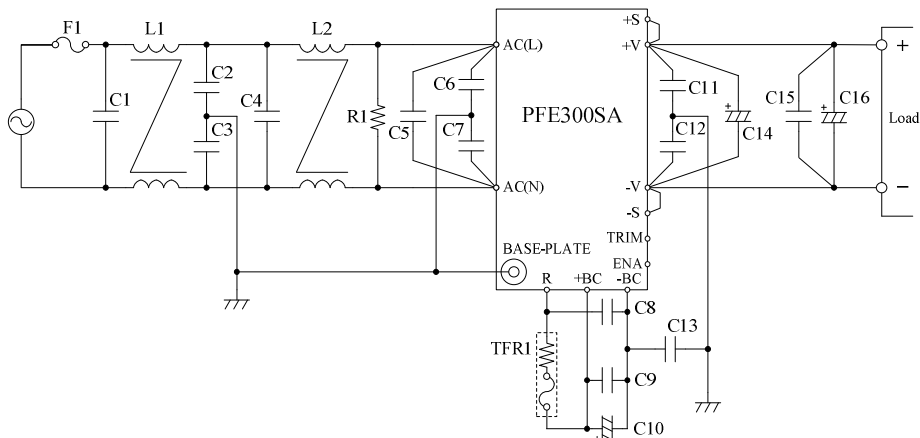


(b) 雑音電界強度(輻射ノイズ) Radiated Emission Noise



* 入出力の線材にはシールド線を使用しました。
 * Shielded cable used to input and output cable.

VCCI class A対応アプリケーションシステム
 VCCI class A application system



- | | |
|---------------------------------------|---|
| C1, C4, C5: 1uF Film Capacitor | C14, C16: 12V-1000uF Electrolytic Capacitor |
| C2, C3: 4700pF Ceramic Capacitor | 28V- 470uF Electrolytic Capacitor |
| C6, C7, C13: 1000pF Ceramic Capacitor | 48V- 220uF Electrolytic Capacitor |
| C8, C9: 1uF Film Capacitor | R1: 0.5W 470k Ω |
| C10: 470uF Electrolytic Capacitor | L1, L2: 6mH |
| C11, C12: 0.033uF Film Capacitor | TFR1: 10 Ω more 139°C |
| C15: 2.2uF Ceramic Capacitor | |

1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL PHOSPHOR OSCILLOSCOPE	TEKTRONIX	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL9040L
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	CURRENT PROBE	YOKOGAWA ELECT.	701928
6	SHUNT RESISTER	YOKOGAWA ELECT.	2215
7	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
8	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
9	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
10	PRE AMP	SONOMA	310N
11	INRUSH CURRENT METER	TAKAMISAWA	PSA-210
12	AMN	SCHWARZBECK	NNLK8121
13	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	CBL6111D
14	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
15	AC POWER SUPPLY	TAKASAGO	AA-2000XG
16	SLIDE REGULATOR	MATSUNAGA	SD-2650
17	AC POWER SUPPLY	NF	ES10000S
18	SINGLE-PHASE MASTER	NF	4420
19	REFERENCE IMPEDANCE NETWORK	NF	4150

2. 特性データ Characteristics

2.1 静特性 Steady state data

(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift

12V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	12.010V	12.010V	12.010V	12.010V	0mV	0.000%
50%	12.005V	12.005V	12.005V	12.005V	0mV	0.000%
100%	12.000V	12.000V	12.000V	12.000V	0mV	0.000%
load regulation	10mV	10mV	10mV	10mV		
	0.083%	0.083%	0.083%	0.083%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Tbp	-40°C	+25°C	+100°C	temperature stability	
Vout	11.942V	12.000V	11.989V	58mV	0.483%

28V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	28.031V	28.031V	28.031V	28.031V	0mV	0.000%
50%	28.025V	28.025V	28.025V	28.025V	0mV	0.000%
100%	28.025V	28.025V	28.025V	28.025V	0mV	0.000%
load regulation	6mV	6mV	6mV	6mV		
	0.021%	0.021%	0.021%	0.021%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

Tbp	-40°C	+25°C	+100°C	temperature stability	
Vout	27.911V	28.025V	27.981V	114mV	0.407%

48V

1. Regulation - line and load

Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	48.242V	48.242V	48.243V	48.243V	1mV	0.002%
50%	48.225V	48.225V	48.226V	48.226V	1mV	0.002%
100%	48.225V	48.225V	48.226V	48.226V	1mV	0.002%
load regulation	17mV	17mV	17mV	17mV		
	0.035%	0.035%	0.035%	0.035%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

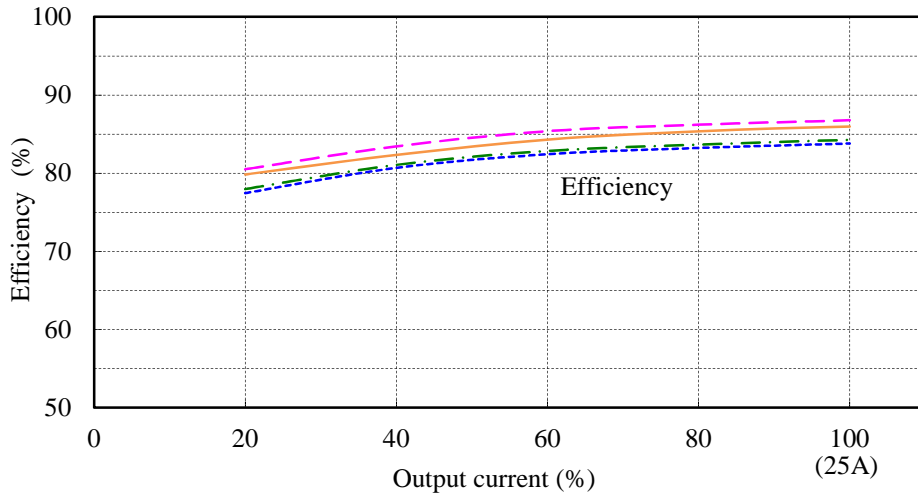
Tbp	-40°C	+25°C	+100°C	temperature stability	
Vout	48.011V	48.225V	48.225V	214mV	0.446%

(2) 効率 対 出力電流

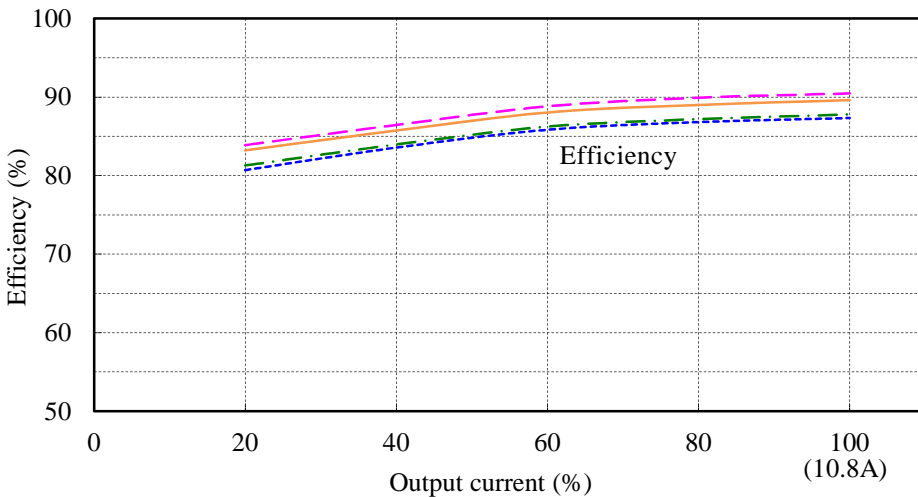
Efficiency vs. Output current

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

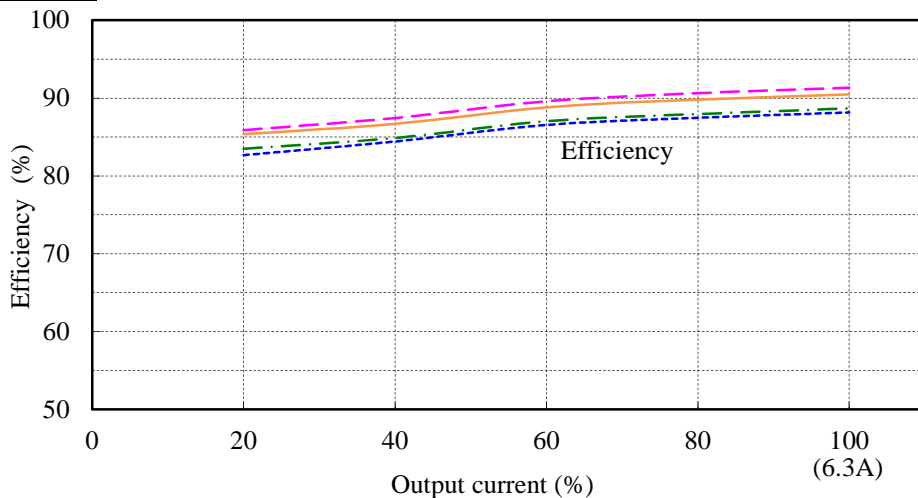
12V



28V



48V

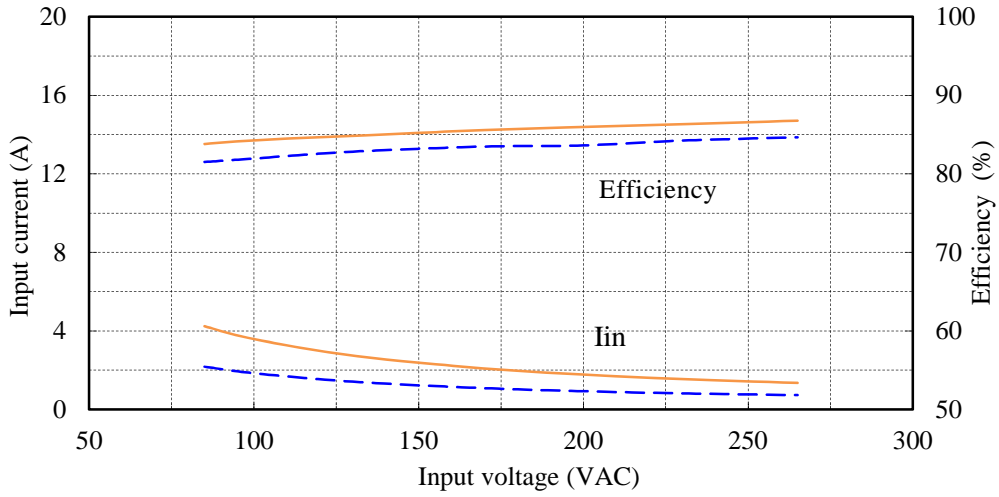


(3) 入力電流・効率 対 入力電圧

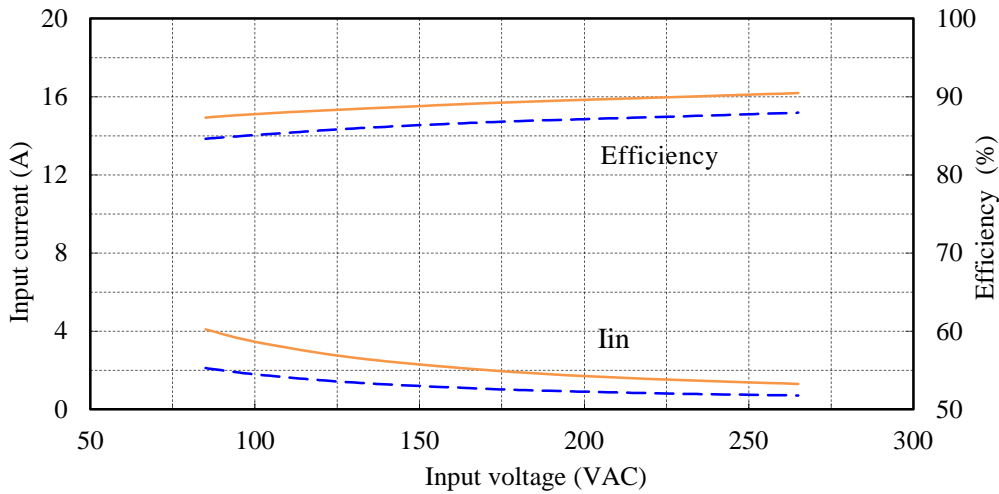
Input current and Efficiency vs. Output current

Conditions I_o : 50 % ---
 : 100 % —
 T_{bp} : 25 °C

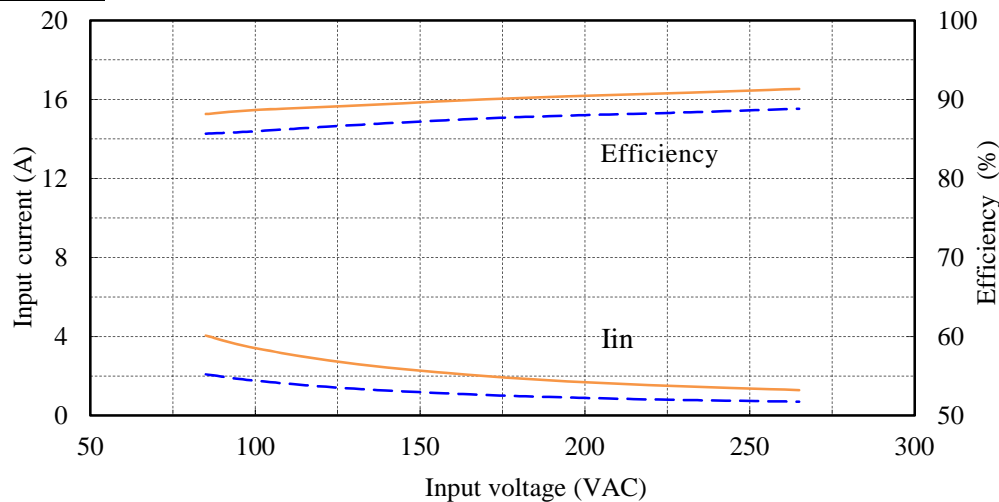
12V



28V



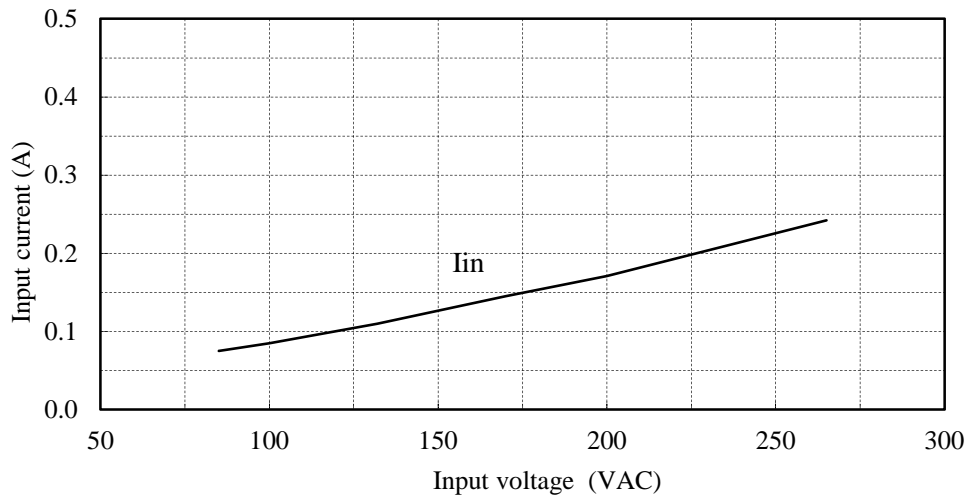
48V



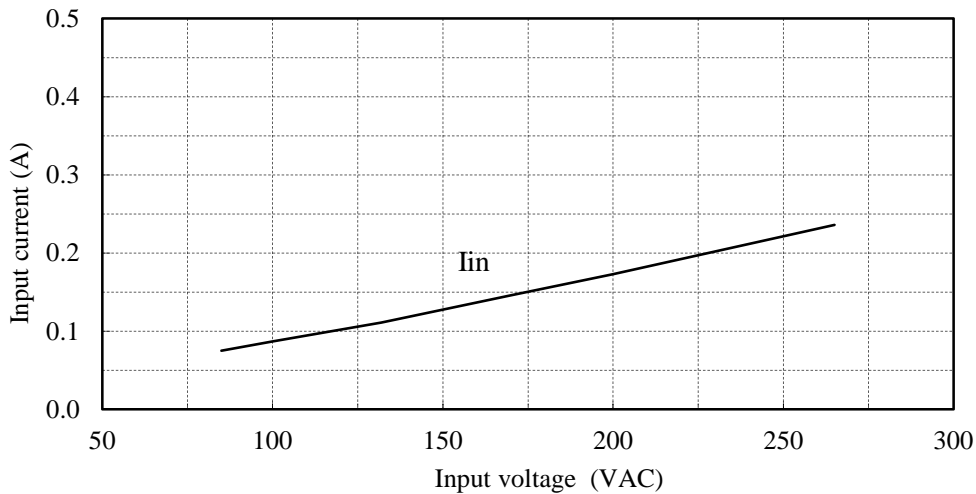
(4) 入力電流 対 入力電圧 (無負荷時)
Input current vs. Input voltage with No load

Conditions I_o : 0 % —
 T_{bp} : 25 °C

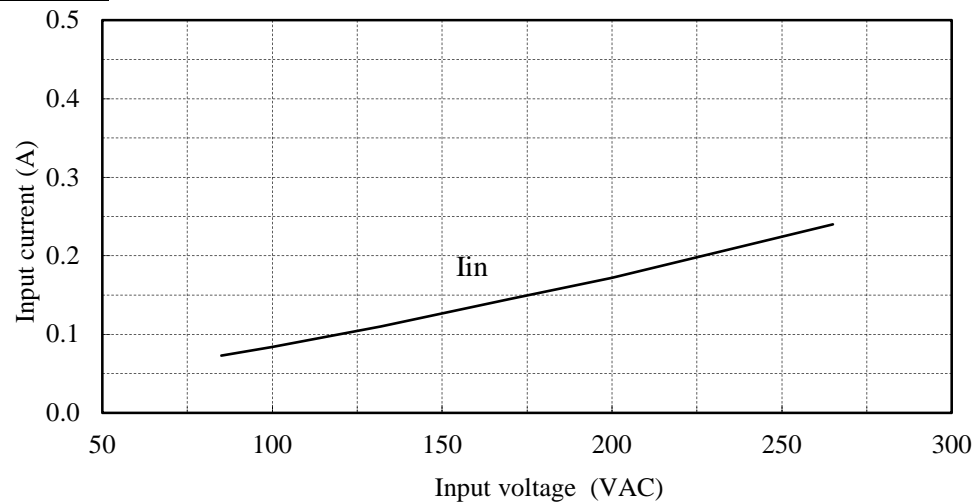
12V



28V



48V

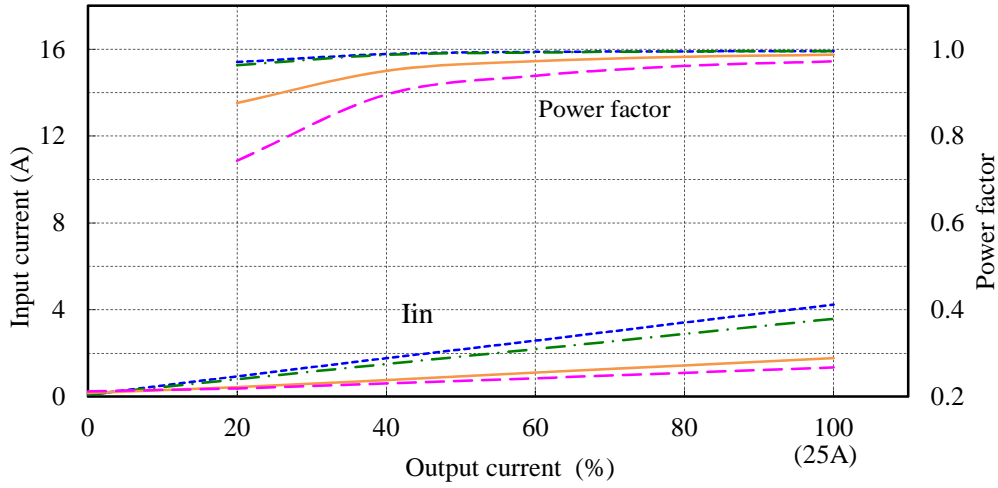


(5) 入力電流・力率 対 出力電流

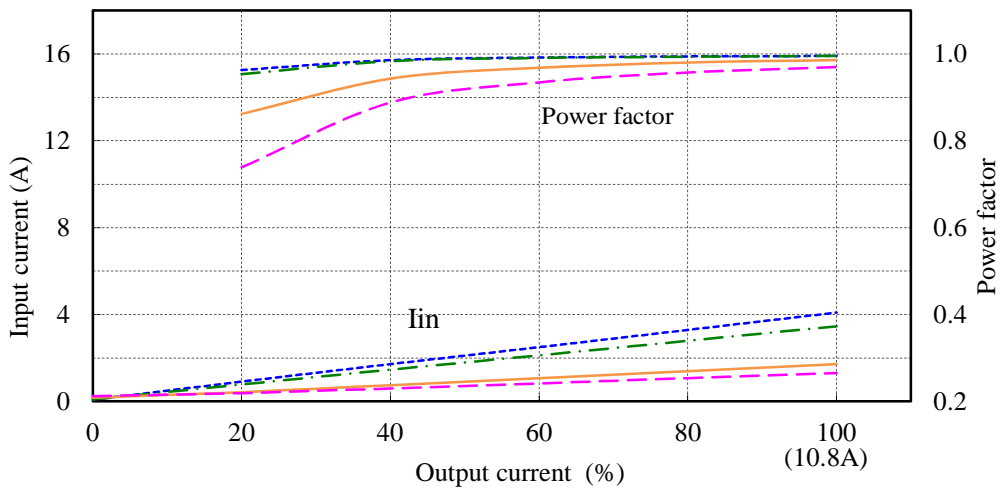
Input current and Power factor vs. Output current

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

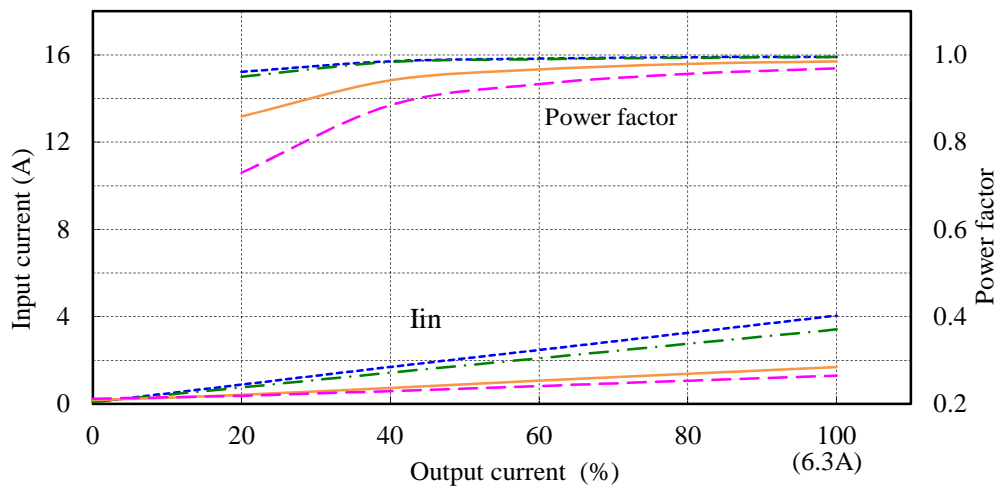
12V



28V



48V

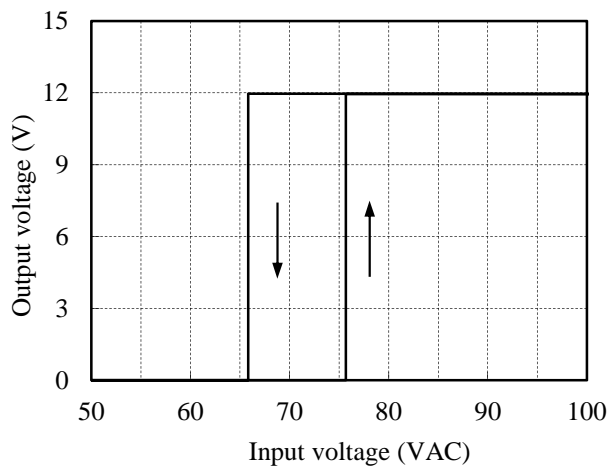
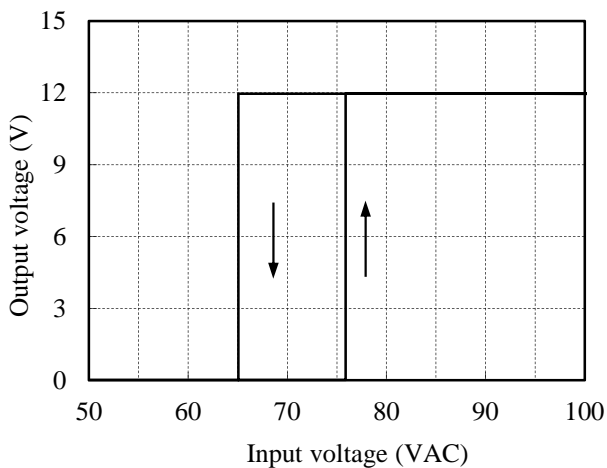


(6) 起動・停止電圧特性
Start and Stop voltage characteristics

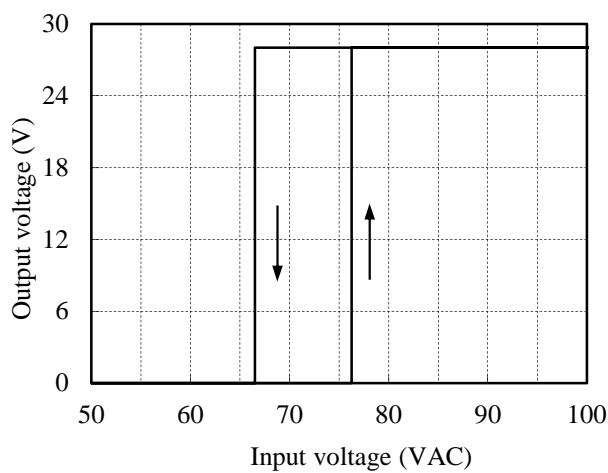
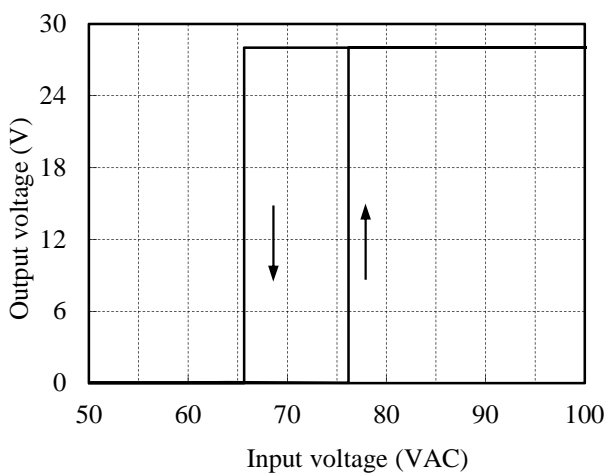
Conditions $I_o : 0\%$ ———
 $T_{bp} : 25\text{ }^\circ\text{C}$

Conditions $I_o : 100\%$ ———
 $T_{bp} : 25\text{ }^\circ\text{C}$

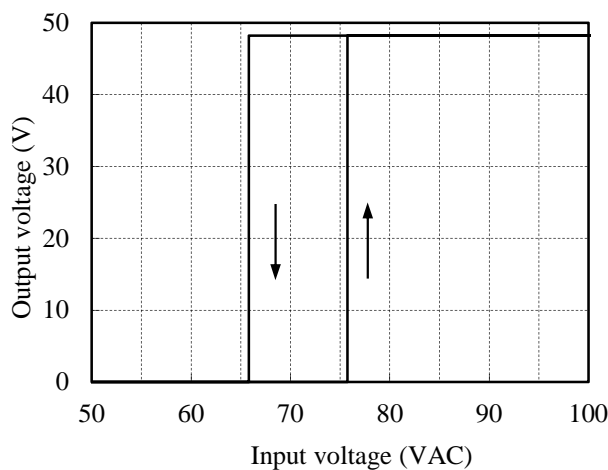
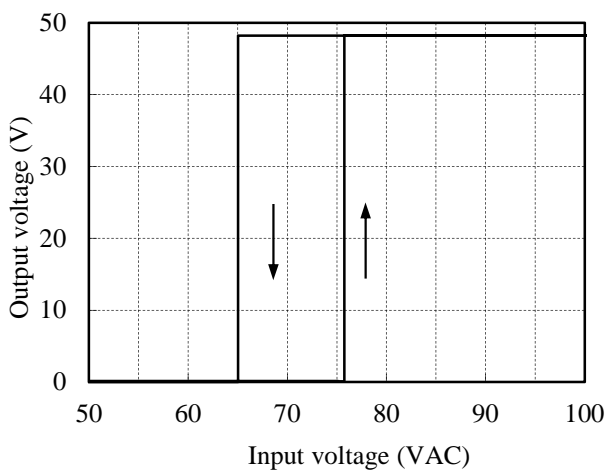
12V



28V



48V



2.2 通電ドリフト特性

Warm up voltage drift characteristics

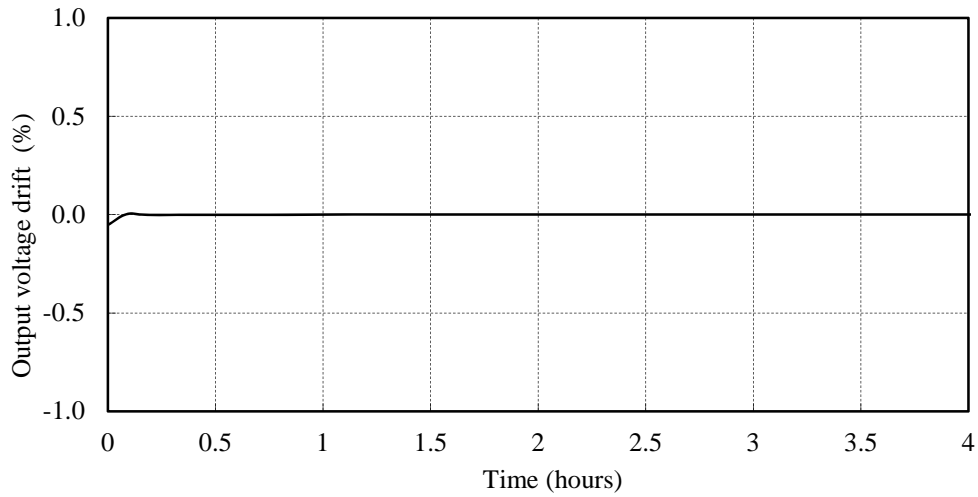
Conditions

Vin : 100 VAC

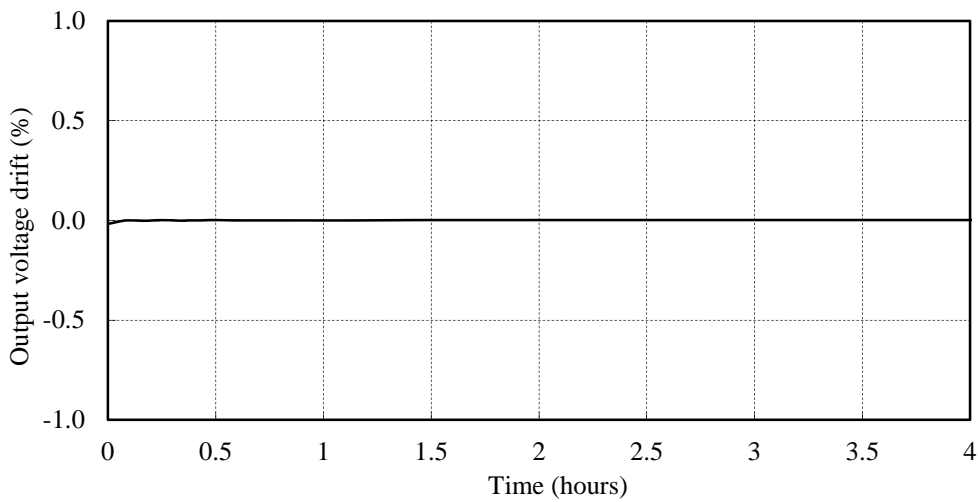
Io : 100 %

Ta : 25 °C

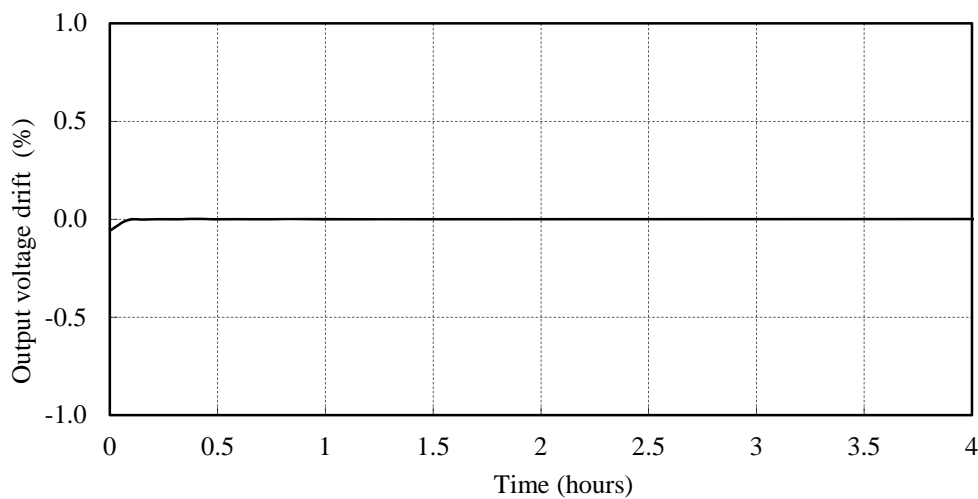
12V



28V



48V



2.3 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

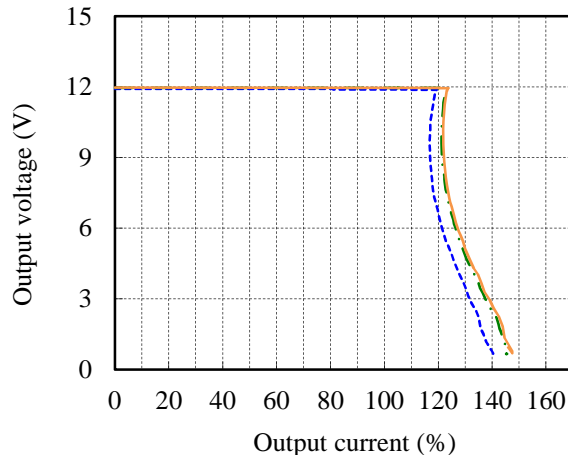
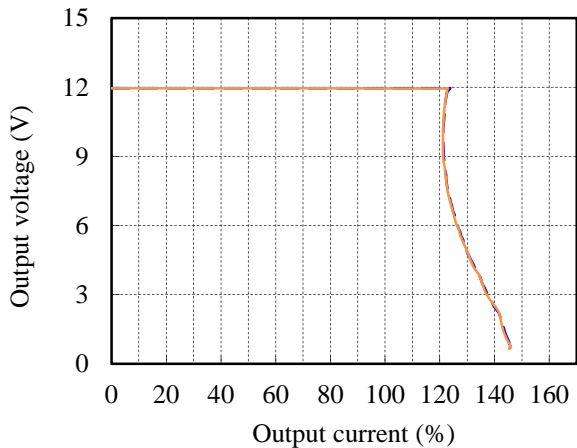
Conditions Vin : 100 VAC -----
 : 200 VAC -----
 Tbp : 25 °C

ベースプレート温度依存性

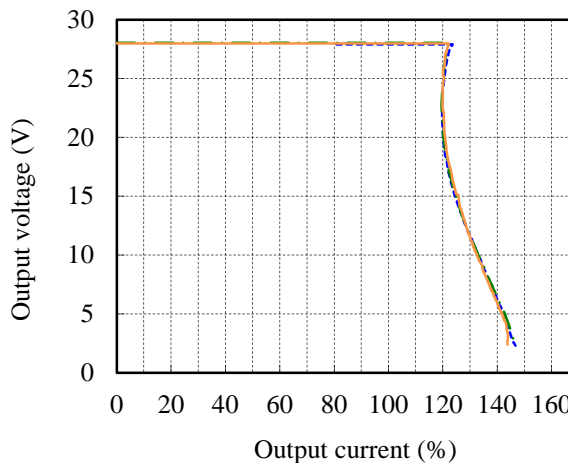
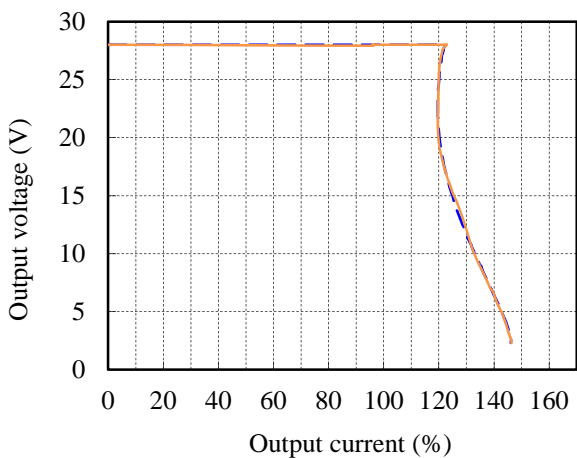
Baseplate temperature dependence

Conditions Vin : 100 VAC -----
 Tbp : -40 °C -----
 : 25 °C -----
 : 100 °C -----

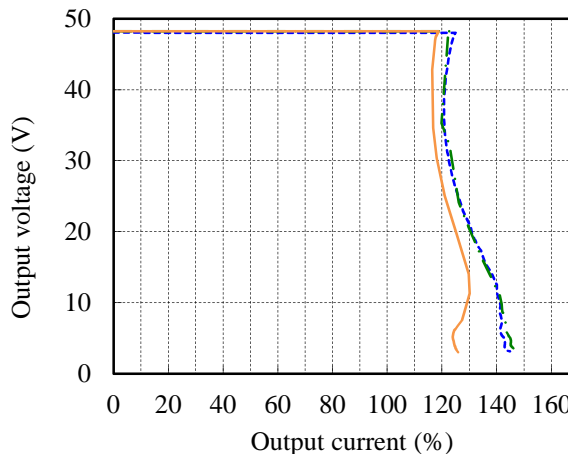
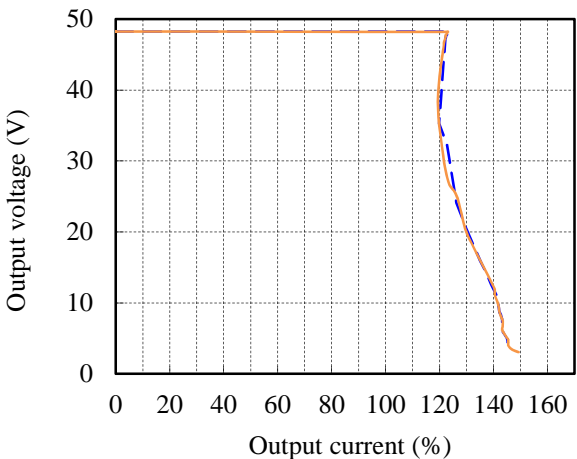
12V



28V



48V



2.4 過電圧保護特性

Over voltage protection (OVP) characteristics

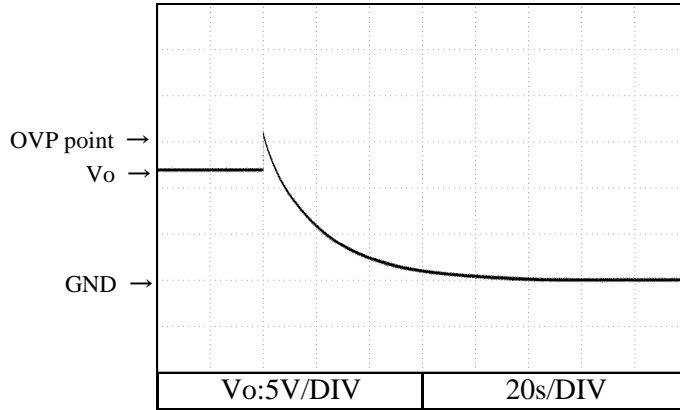
Conditions

Vin : 100 VAC

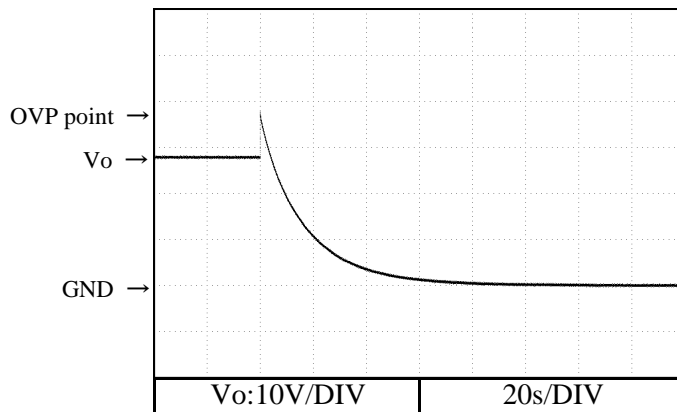
Io : 0 %

Tbp : 25 °C

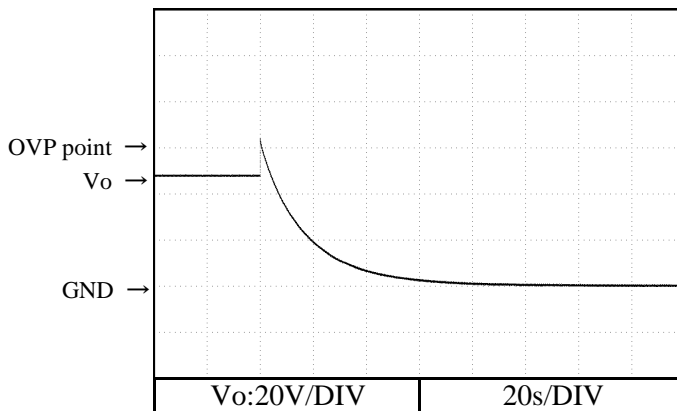
12V



28V



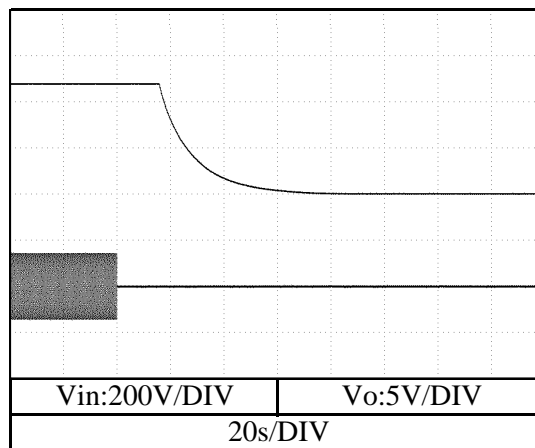
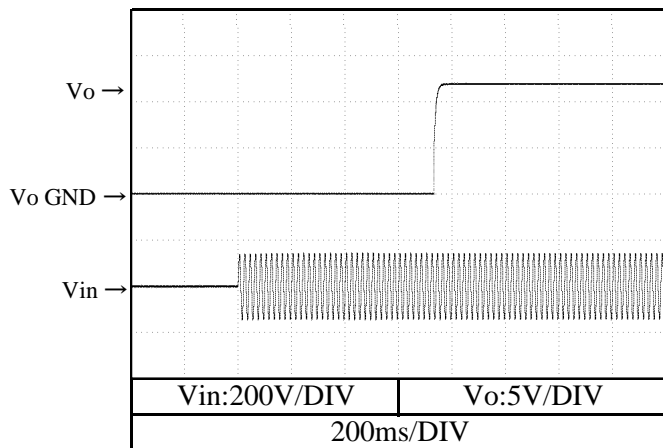
48V



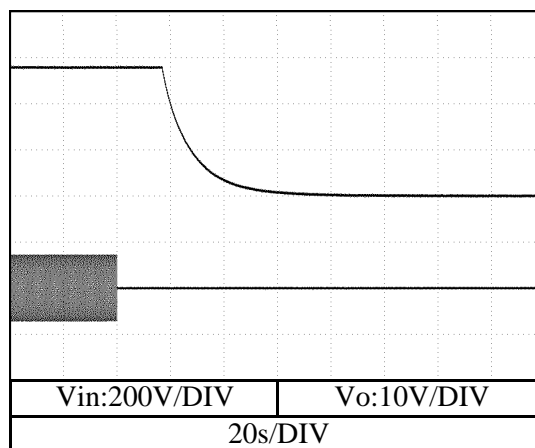
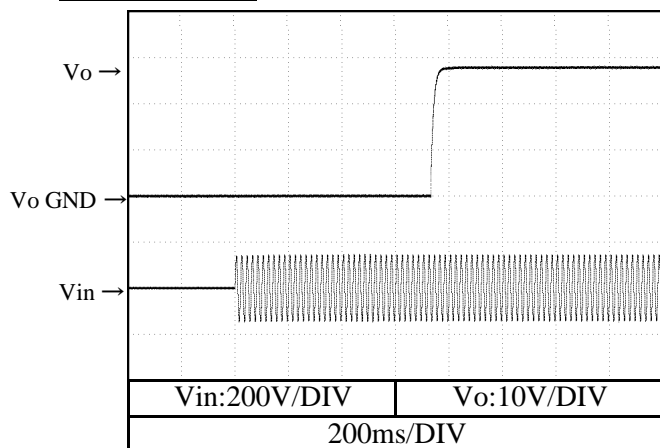
2.5 出力立ち上がり、立ち下り特性 Output rise , fall characteristics

Conditions Vin : 100 VAC
Io : 0 %
Tbp : 25 °C

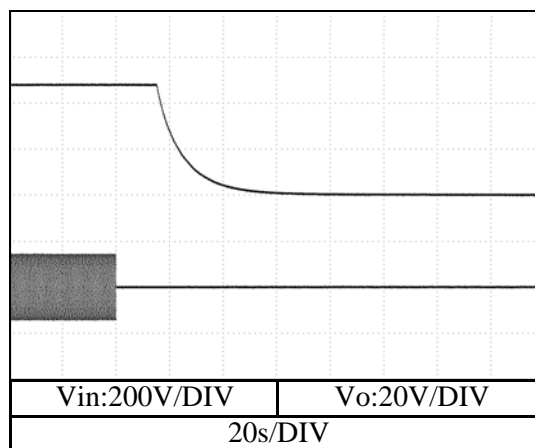
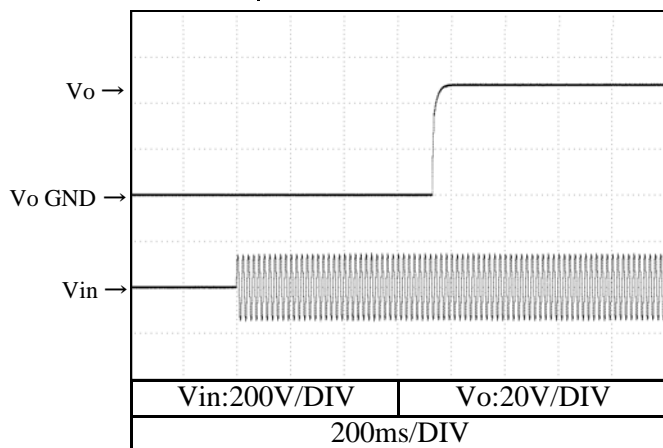
12V



28V



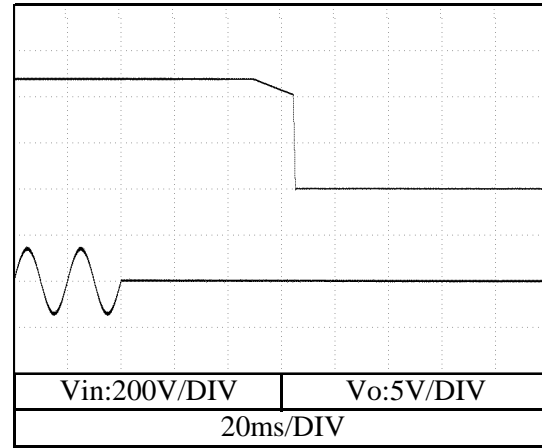
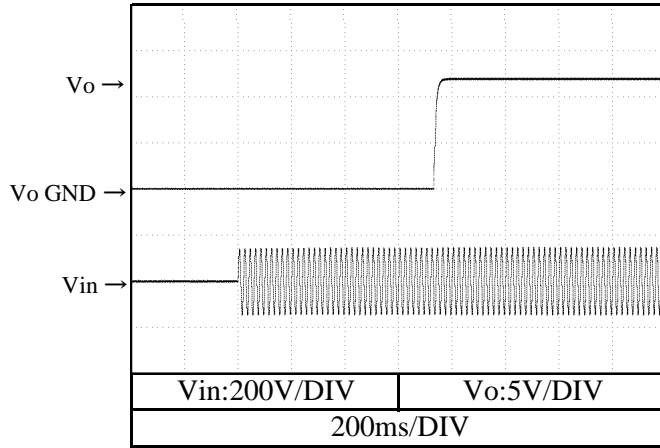
48V



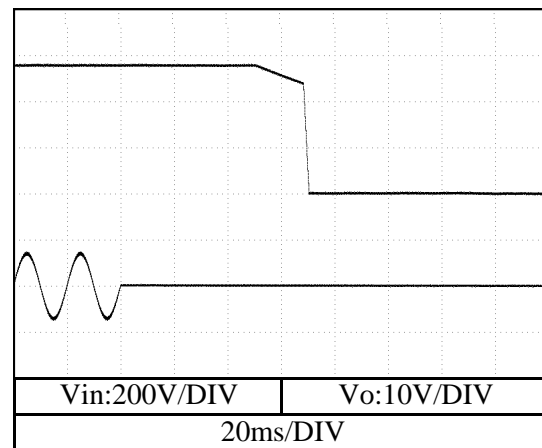
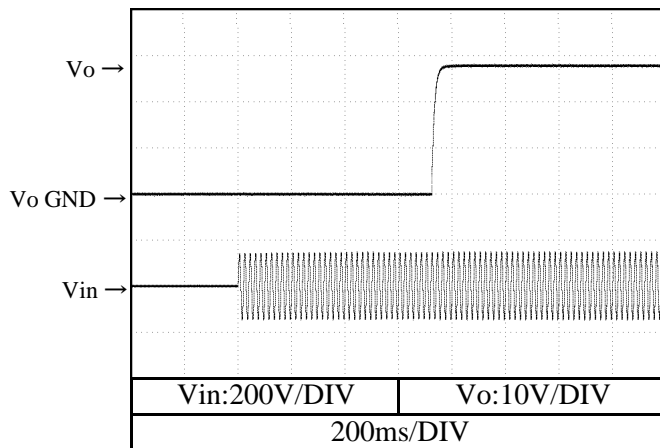
2.5 出力立ち上がり、立ち下り特性 Output rise , fall characteristics

Conditions Vin : 100 VAC
Io : 100 %
Tbp : 25 °C

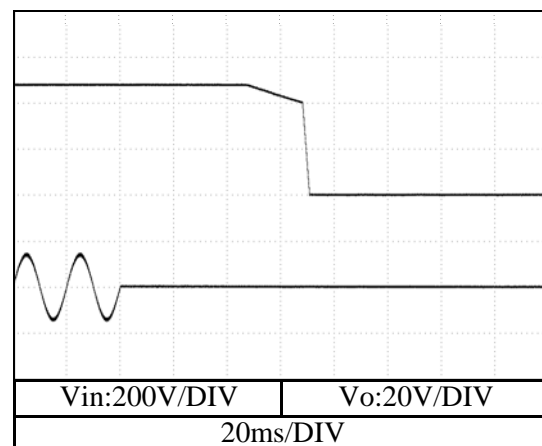
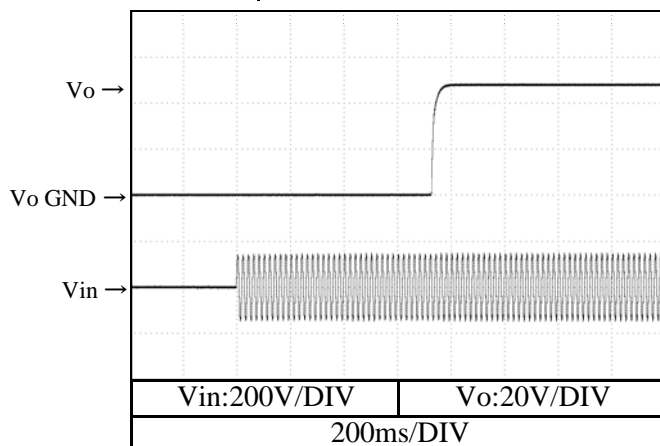
12V



28V



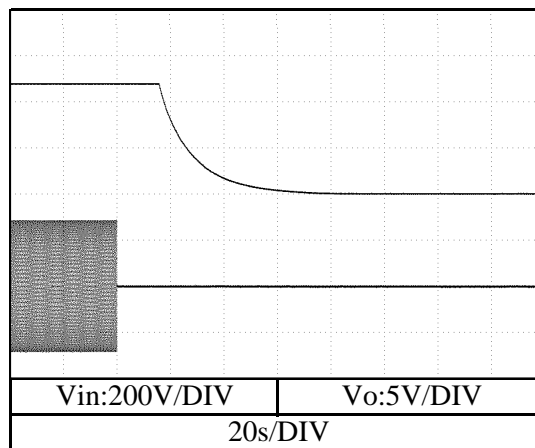
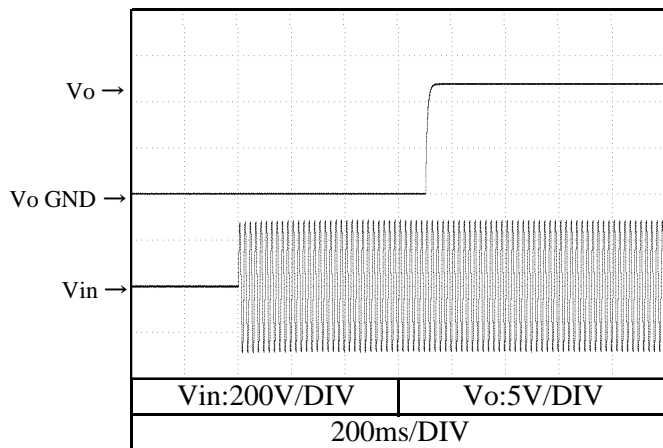
48V



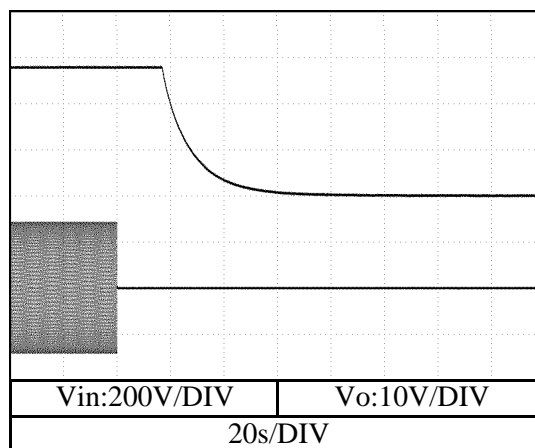
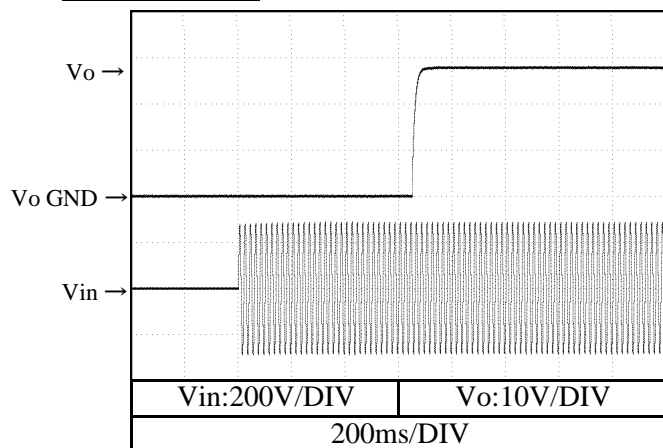
2.5 出力立ち上がり、立ち下り特性 Output rise , fall characteristics

Conditions Vin : 200 VAC
Io : 0 %
Tbp : 25 °C

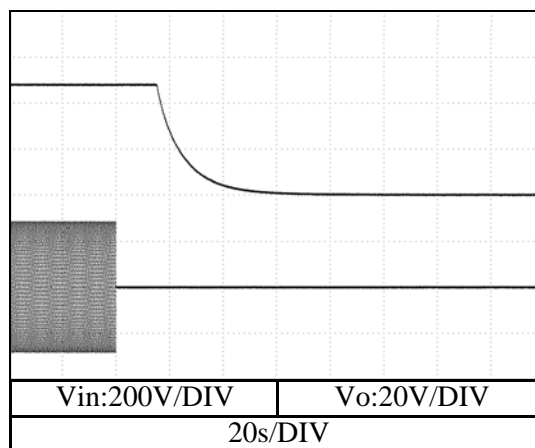
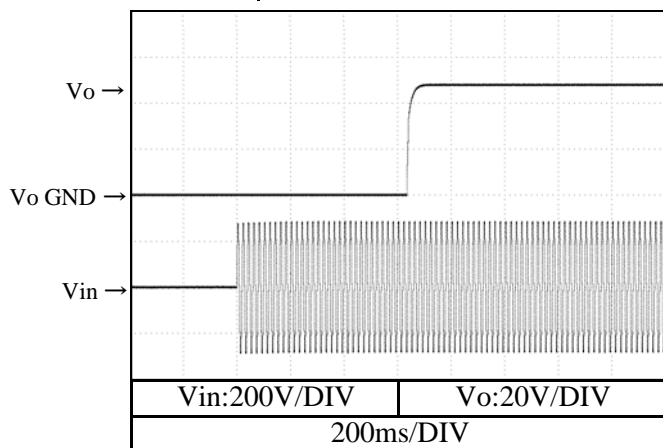
12V



28V



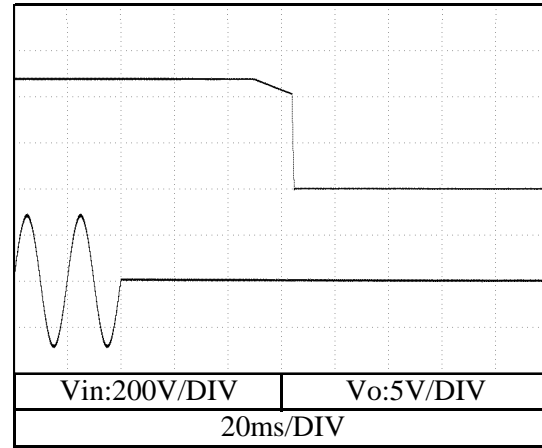
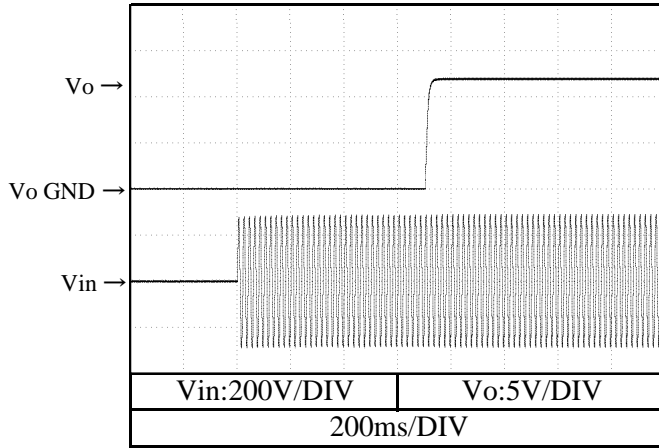
48V



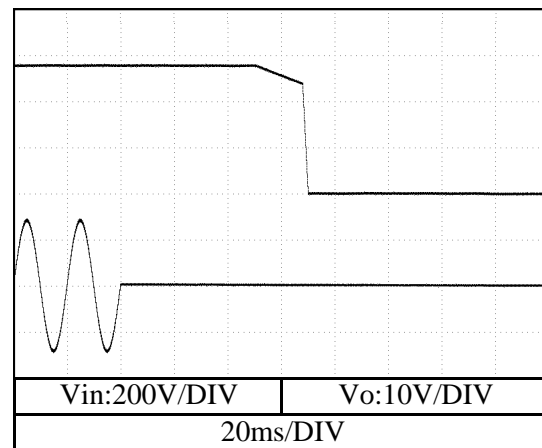
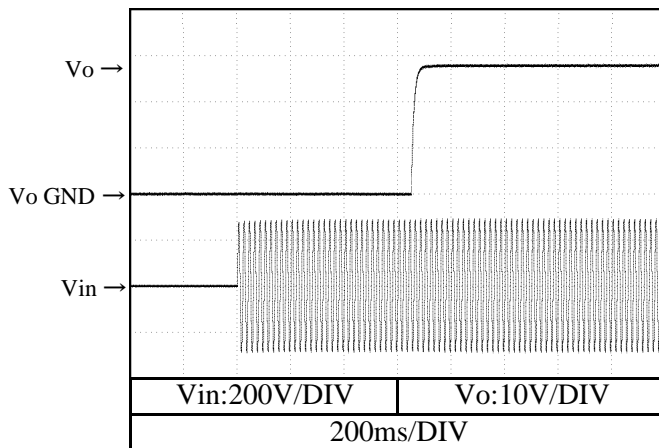
2.5 出力立ち上がり、立ち下り特性 Output rise , fall characteristics

Conditions Vin : 200 VAC
Io : 100 %
Tbp : 25 °C

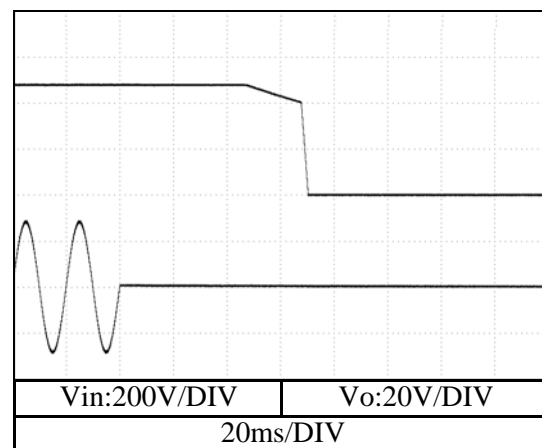
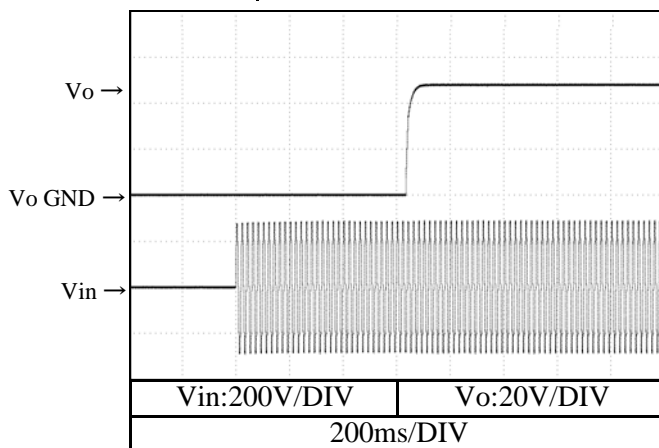
12V



28V



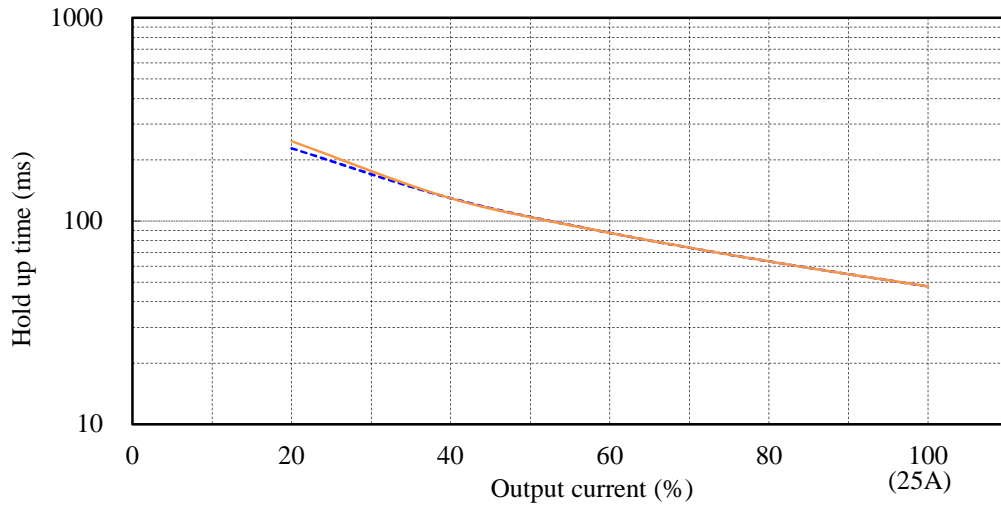
48V



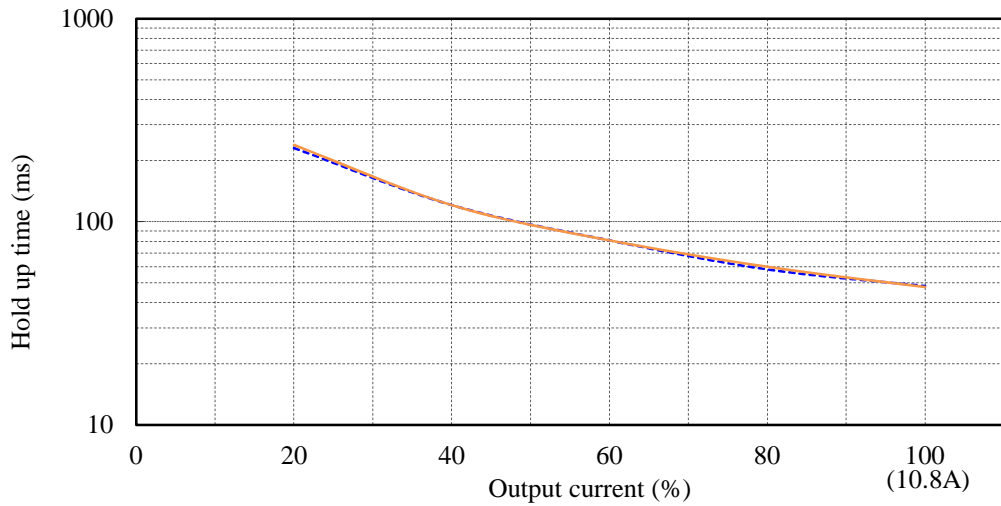
2.6 出力電圧保持時間特性
Hold up time characteristics

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

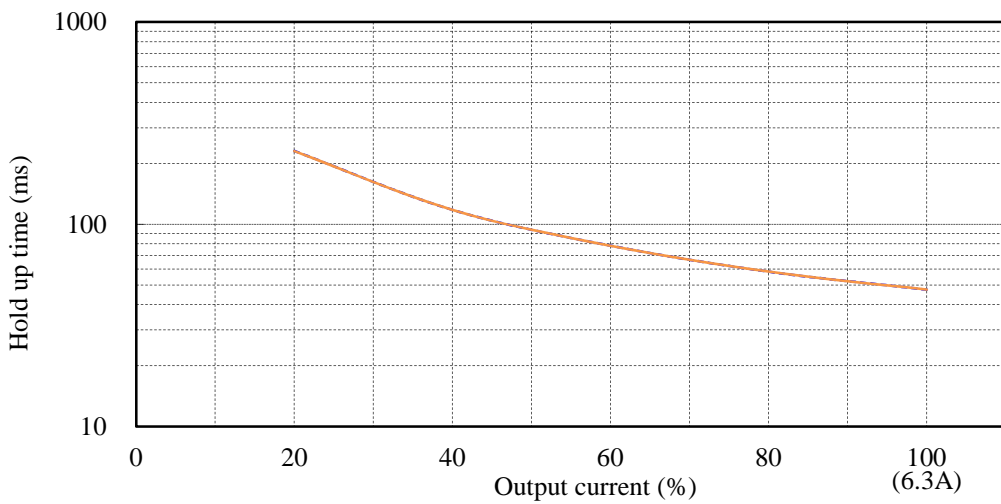
12V



28V



48V



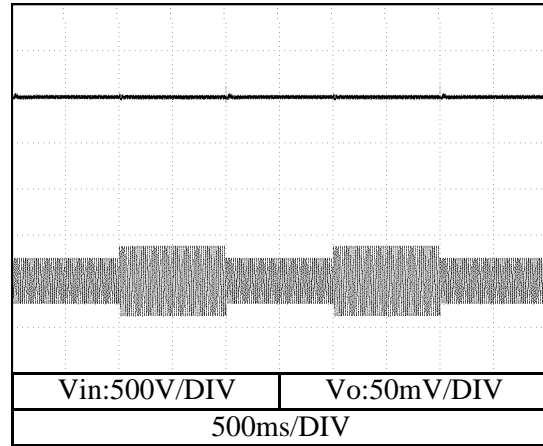
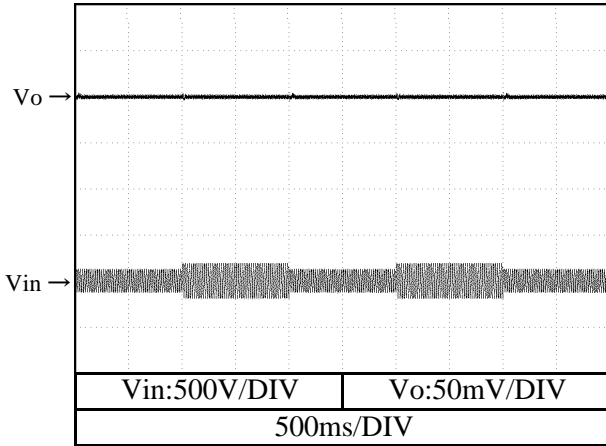
2.7 過渡応答 (入力急変) 特性
Dynamic line response characteristics

Conditions I_o : 100 %
 T_{bp} : 25 °C

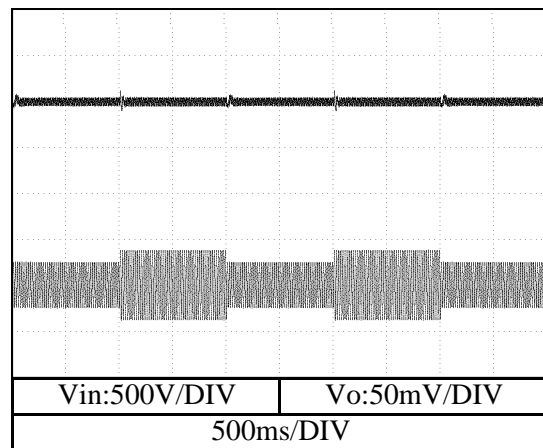
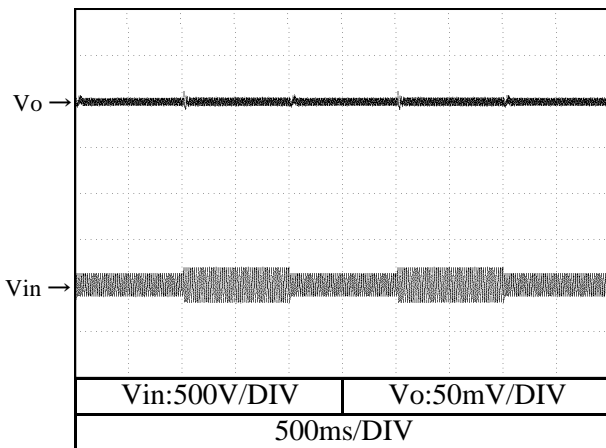
Vin:85VAC <=> 130VAC

Vin:170VAC <=> 265VAC

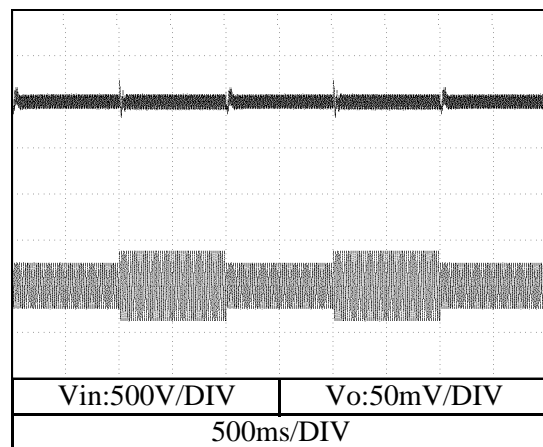
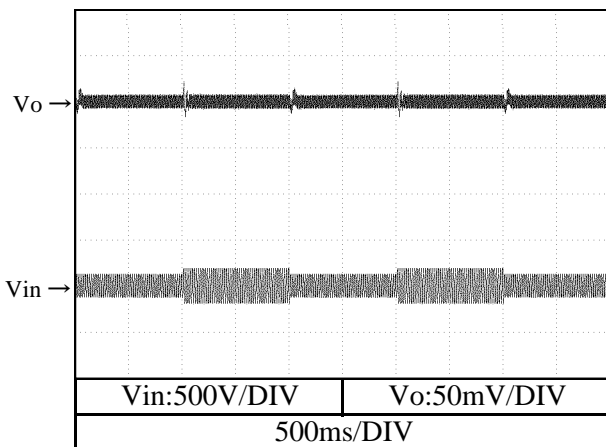
12V



28V



48V

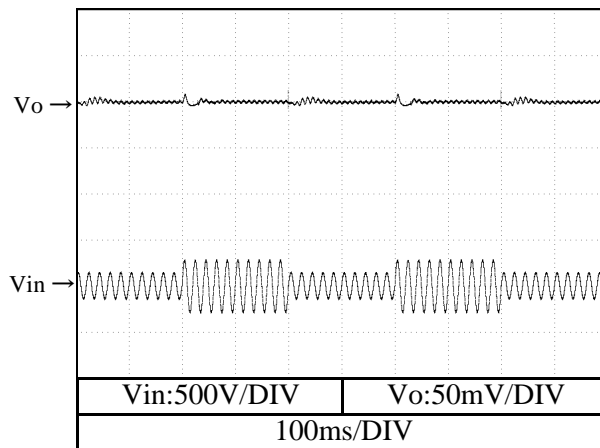


2.7 過渡応答（入力急変）特性
Dynamic line response characteristics

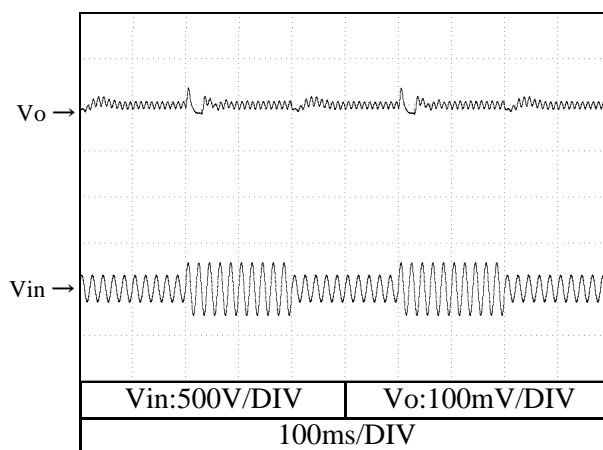
Conditions $I_o : 100\%$
 $T_{bp} : 25\text{ }^\circ\text{C}$

Vin:100VAC <=> 200VAC

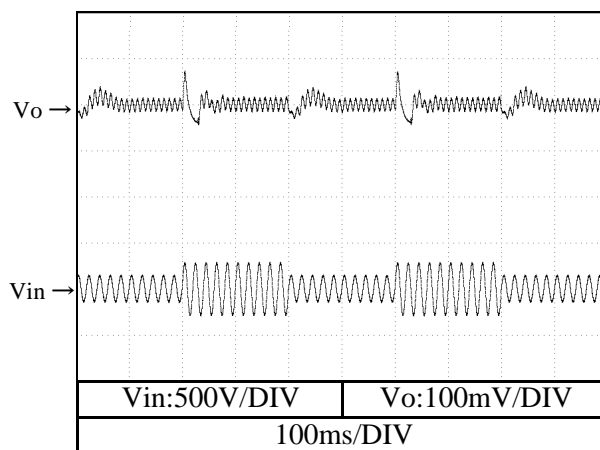
12V



28V



48V



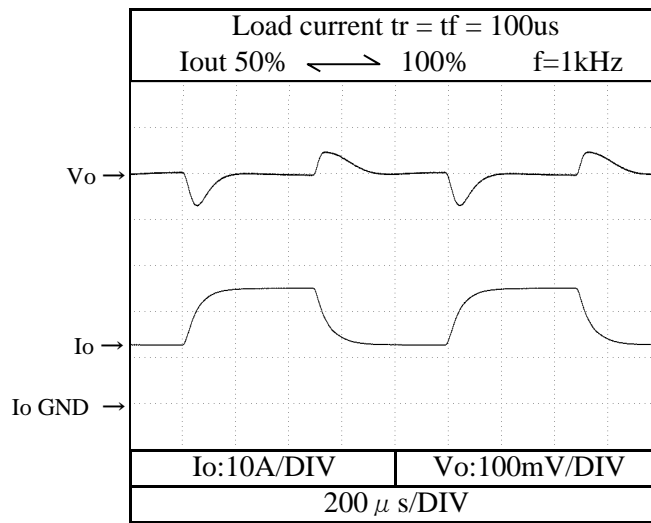
Note:This test follows SEMI F47-0200.

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

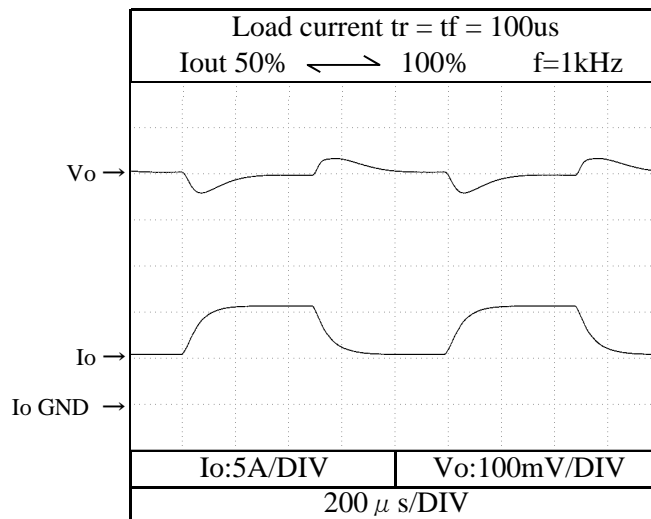
Conditions

Vin : 100 VAC
Tbp : 25 °C

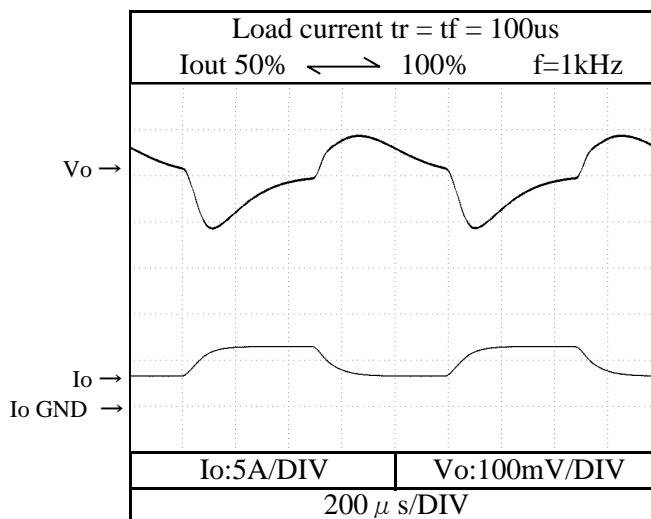
12V



28V



48V



2.9 入力電圧瞬停特性

Response to brownout characteristics

Conditions

I_o : 100 %

T_{bp} : 25 °C

瞬停時間 Interruption time

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

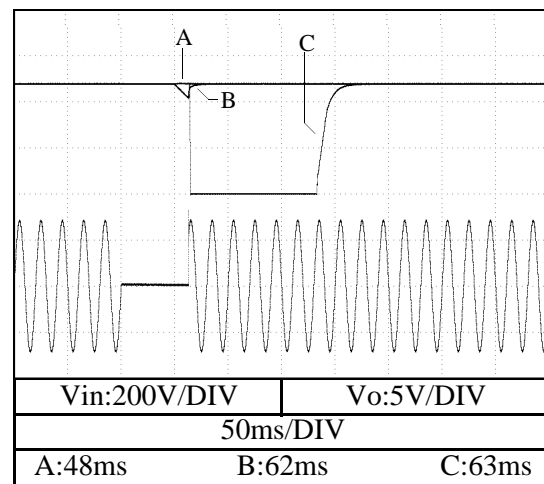
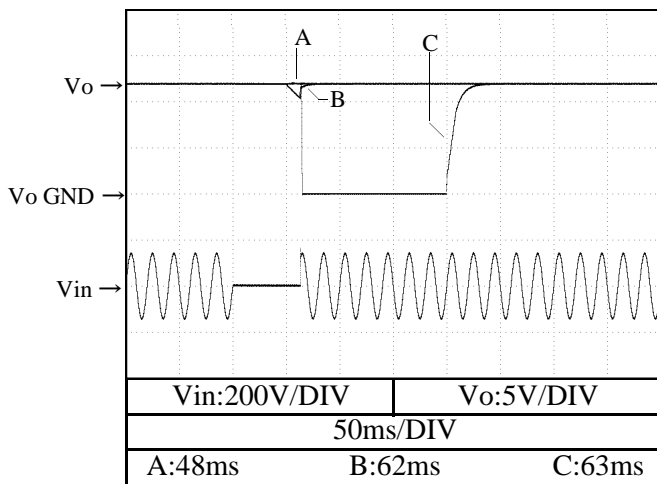
B : 出力電圧の低下が0Vまでいかない Output voltage drop down not reaching 0V.

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

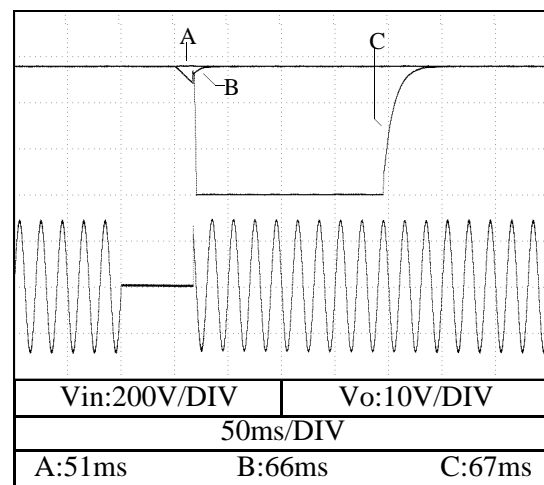
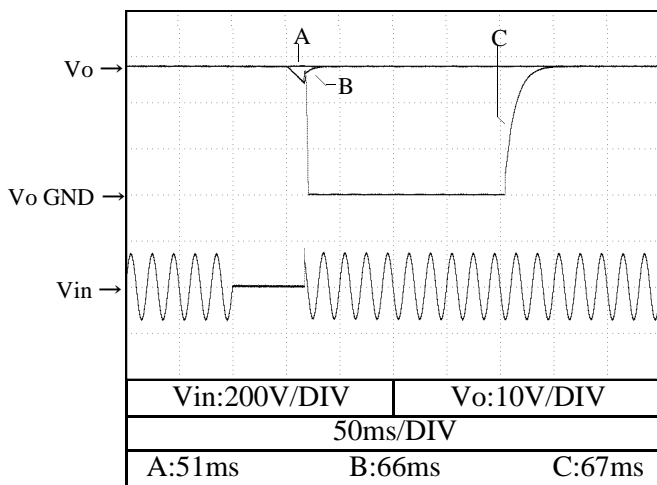
Vin : 100VAC

Vin : 200VAC

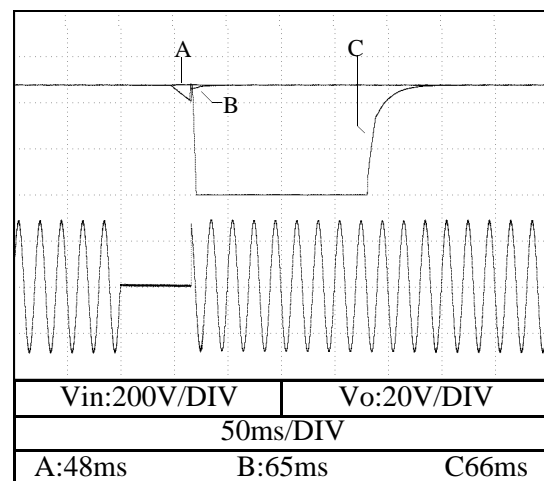
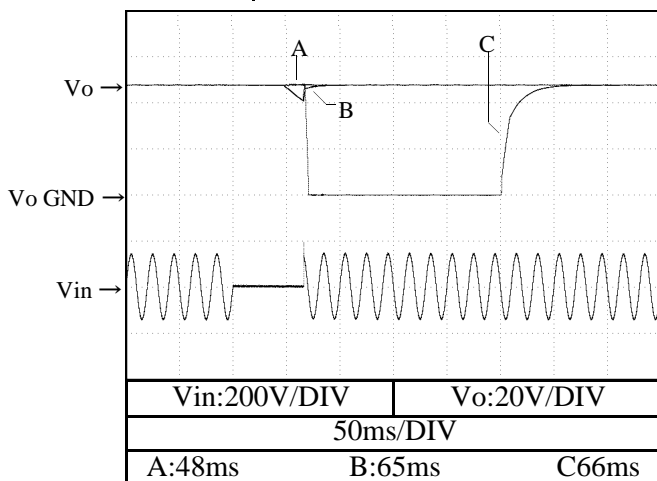
12V



28V



48V

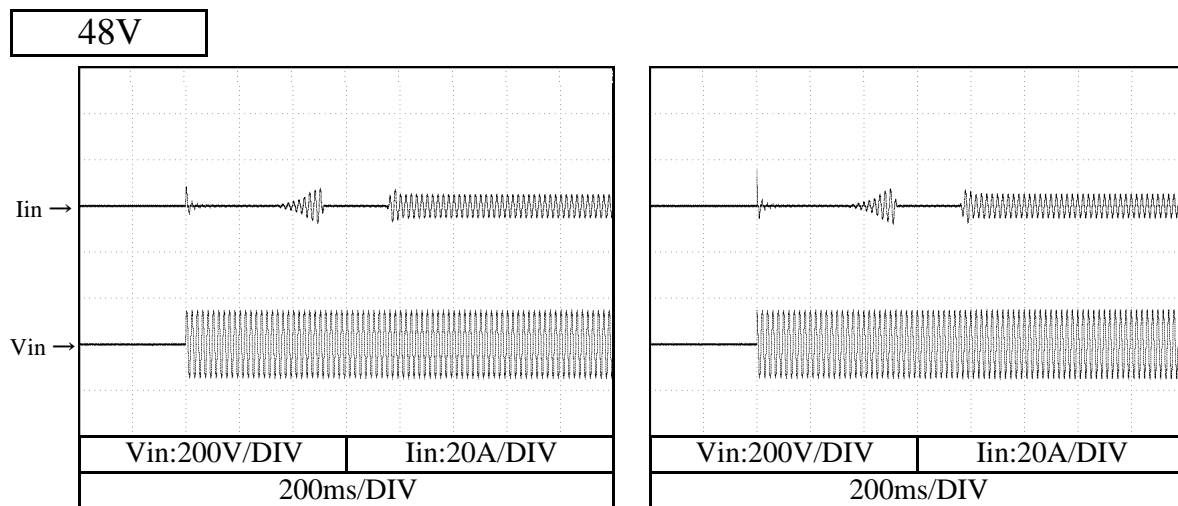
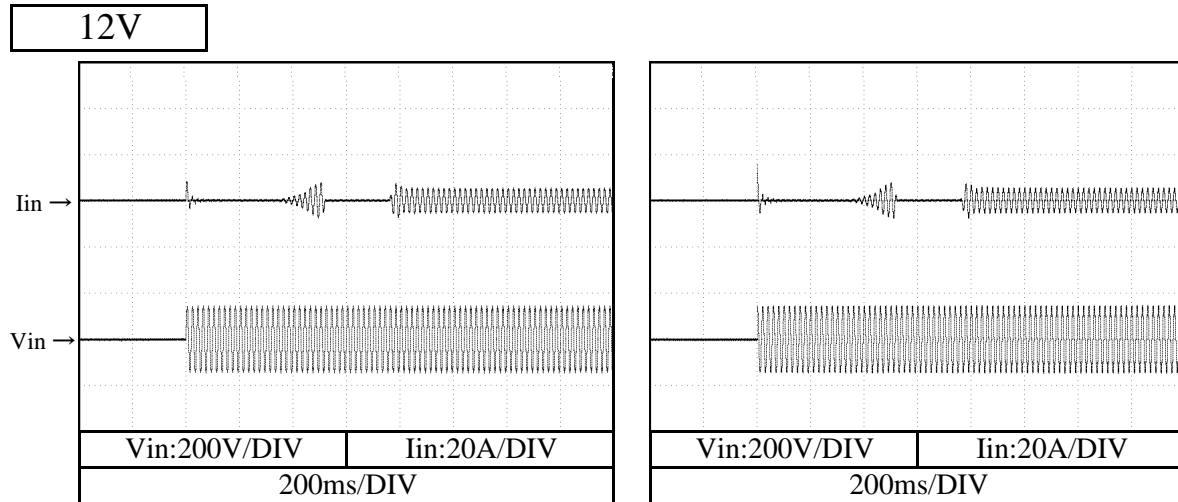


2.10 入力サージ電流（突入電流）特性 Inrush current characteristics

Conditions Vin : 100 VAC
Io : 100 %
Tbp : 25 °C

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

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



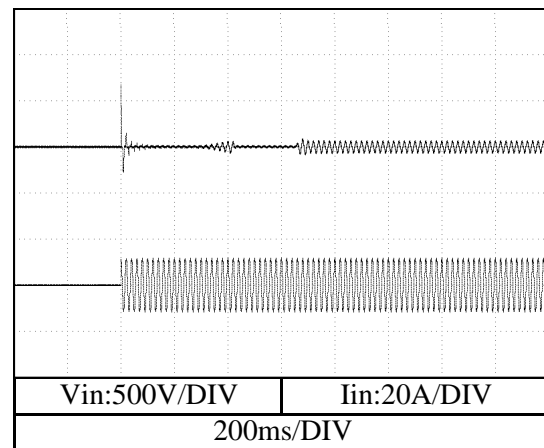
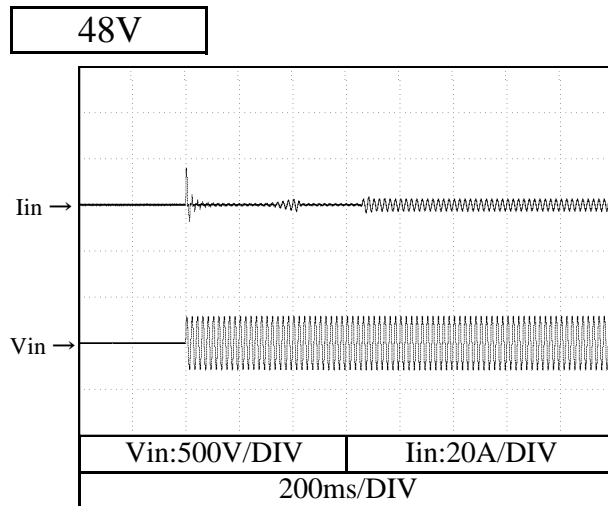
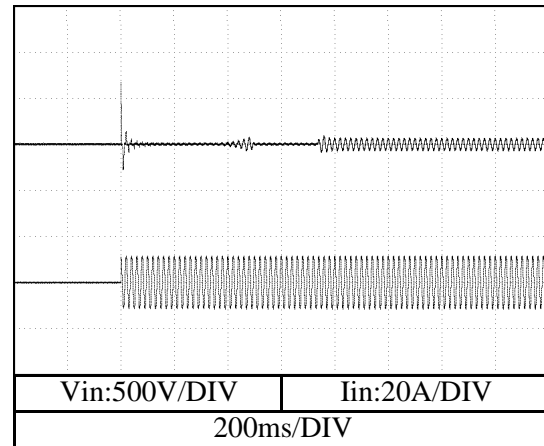
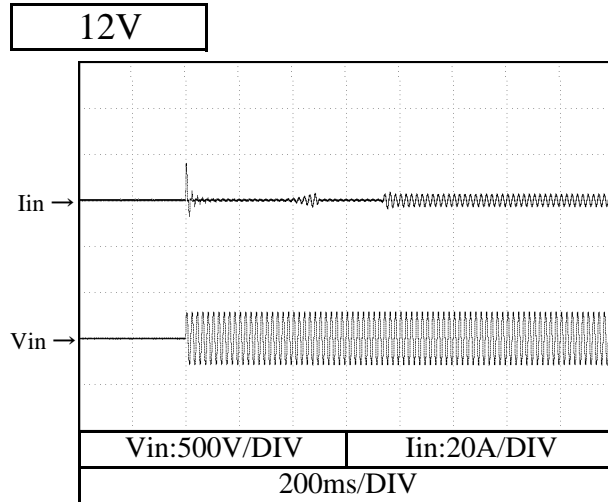
Note : 28V is same as characteristics of 48V

2.10 入力サージ電流（突入電流）特性
Inrush current characteristics

Conditions Vin : 200 VAC
Io : 100 %
Tbp : 25 °C

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

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



Note : 28V is same as characteristics of 48V

2.11 瞬停突入電流特性

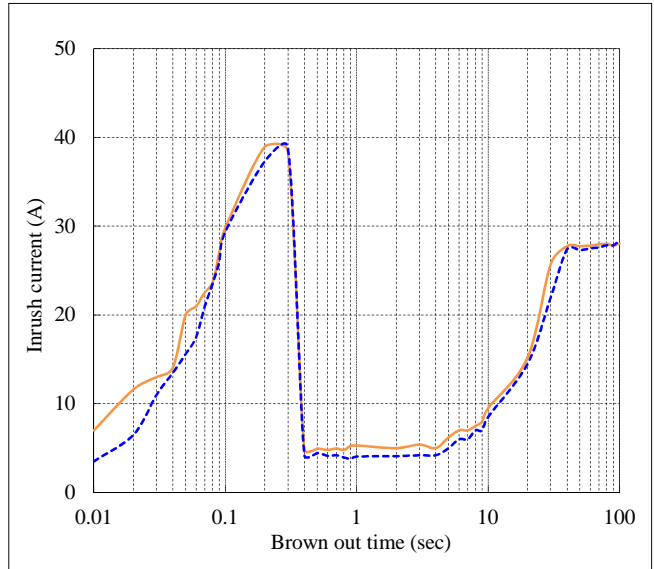
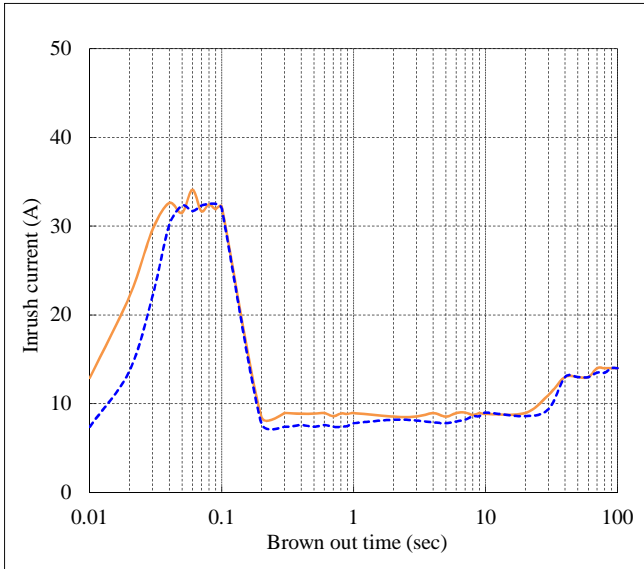
Brown of Inrush current characteristics

Conditions I_o : 50 % ---
 : 100 % ---
 T_{bp} : 25 °C

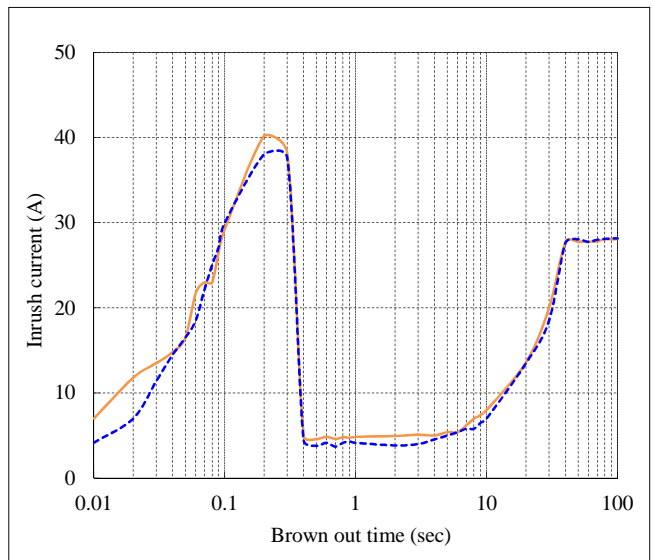
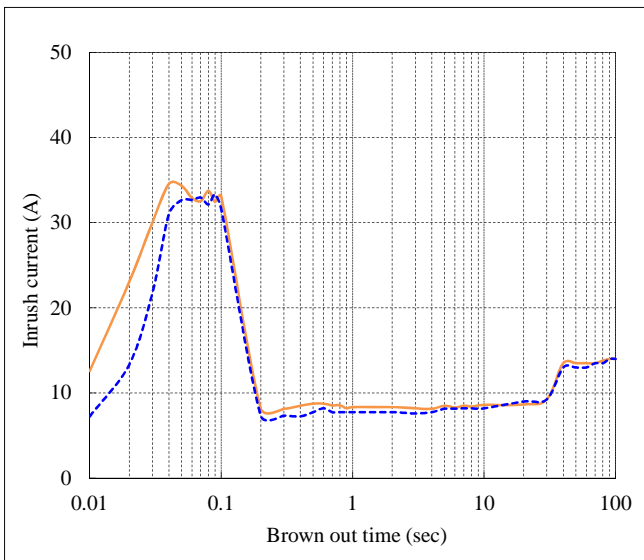
Vin:100VAC

Vin:200VAC

12V



48V



Note : Above data includes secondary inrush current.
 : 28V is same as characteristics of 48V

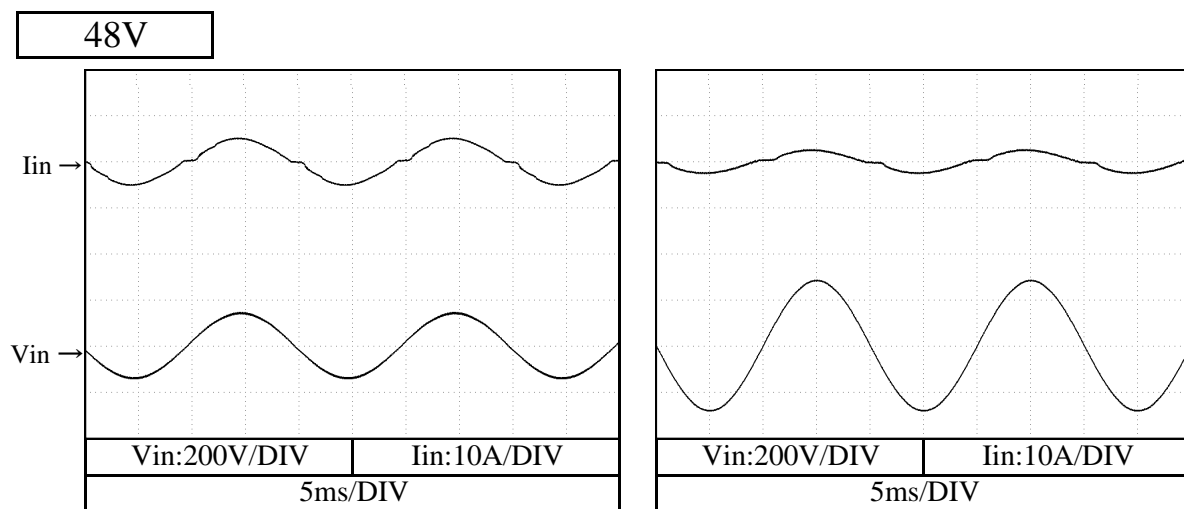
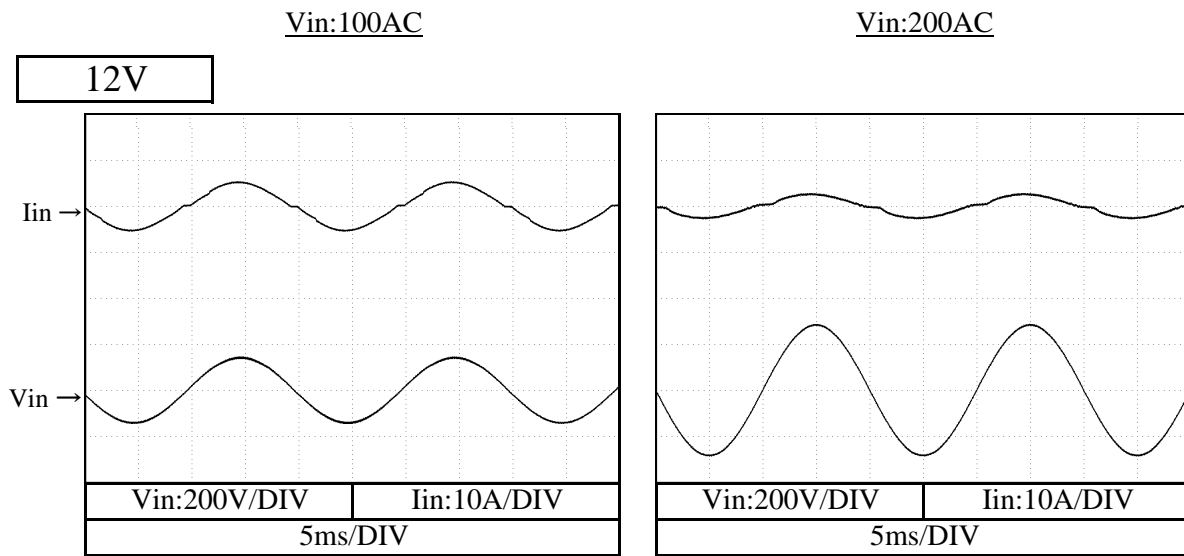
2.12 入力電流波形

Input current waveform

Conditions

I_o : 100 %

T_{bp} : 25 °C



Note : 28V is same as characteristics of 48V

2.13 高調波成分

Input current harmonics

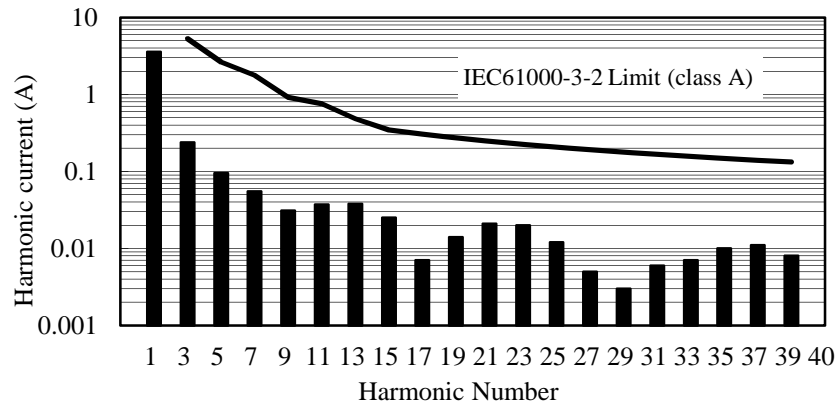
Conditions

I_o : 100 %

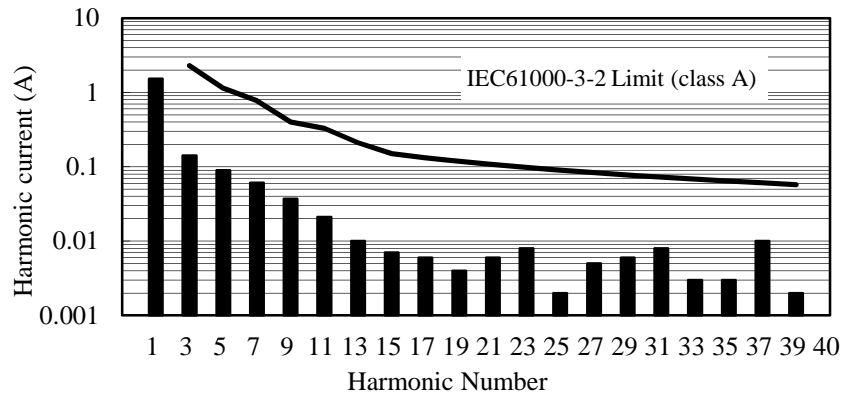
T_{bp} : 25 °C

12V

Vin:100VAC

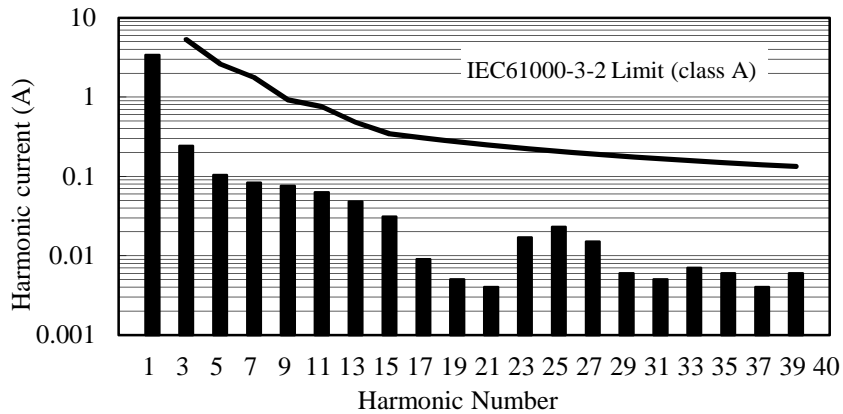


Vin:230VAC

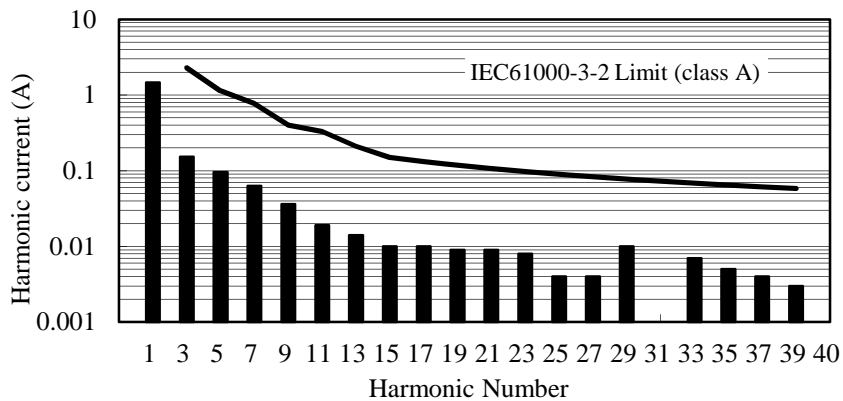


48V

Vin:100VAC



Vin:230VAC



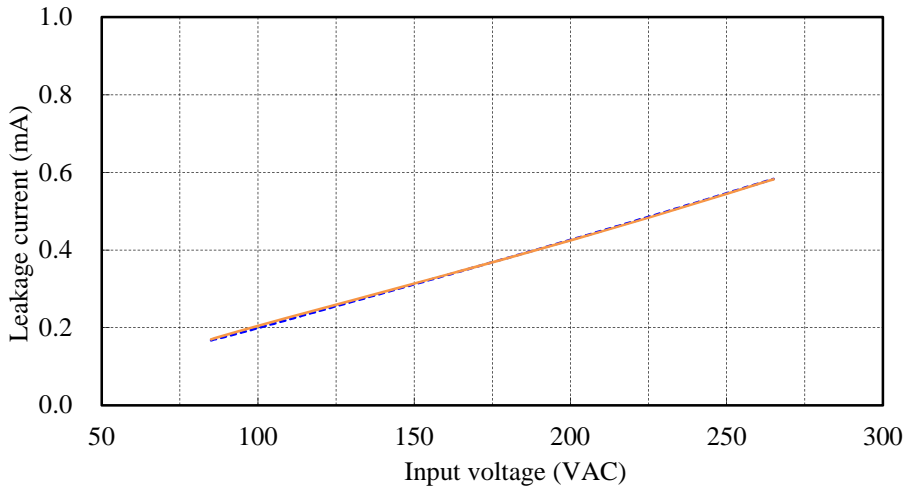
Note : 28V is same as characteristics of 48V

2.14 リーク電流特性

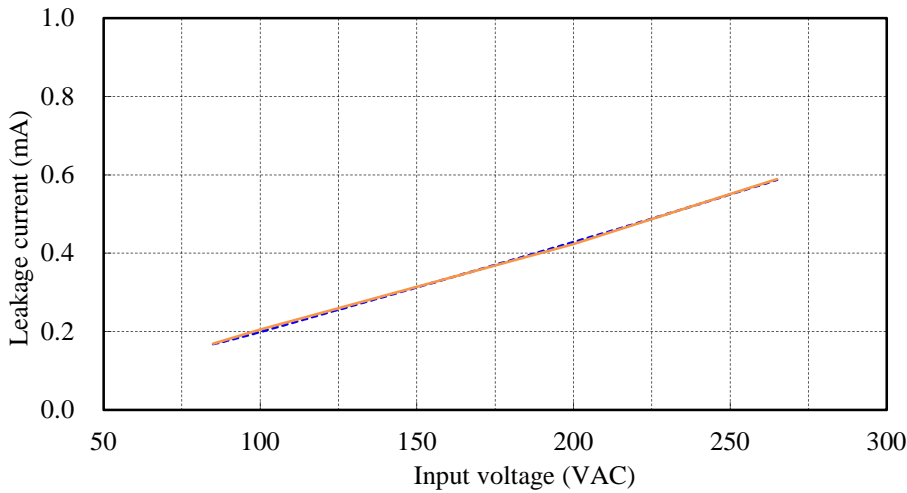
Leakage current characteristics

Conditions Io : 0 % - - - - -
 : 100 % ————
 Tbp : 25 °C
 f : 50 Hz
Equipment used : 3156 (HIOKI)

12V



48V



Note : 28V is same as characteristics of 48V

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

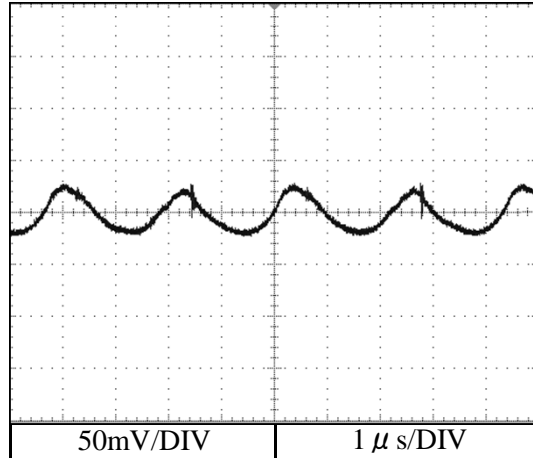
Conditions

Vin : 100 VAC

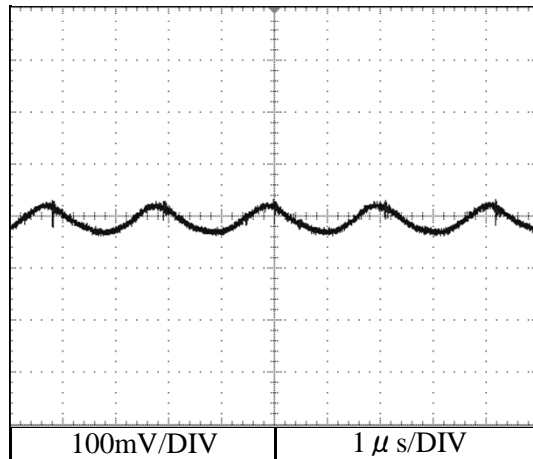
Io : 100 %

Tbp : 25 °C

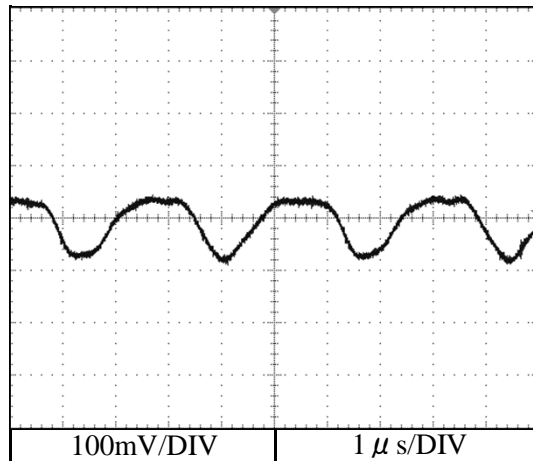
12V



28V



48V



2.16 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission

Conditions

Vin : 100 VAC

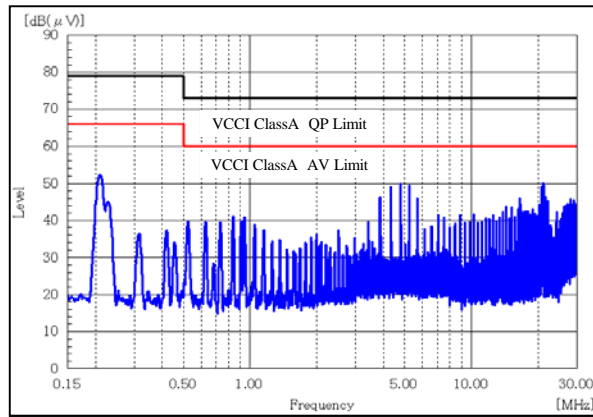
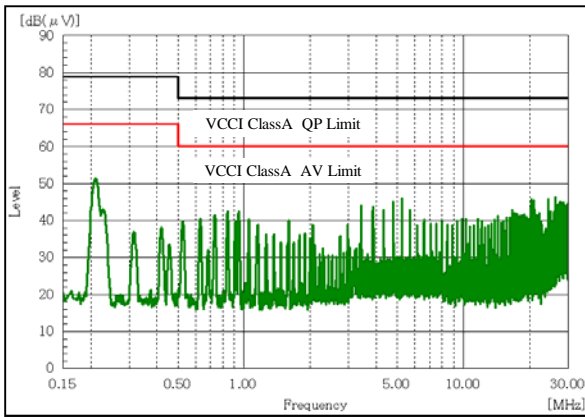
Io : 100 %

Tbp : 25 °C

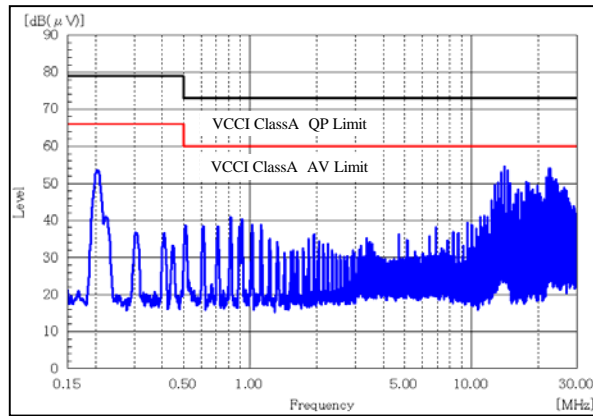
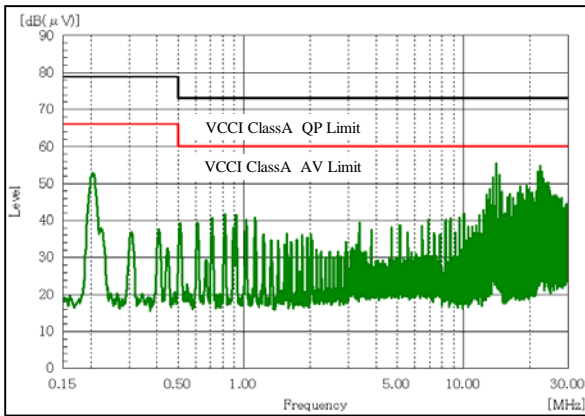
Phase:N

Phase:L

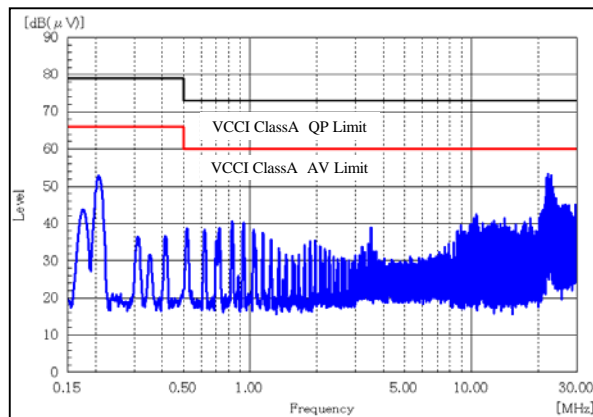
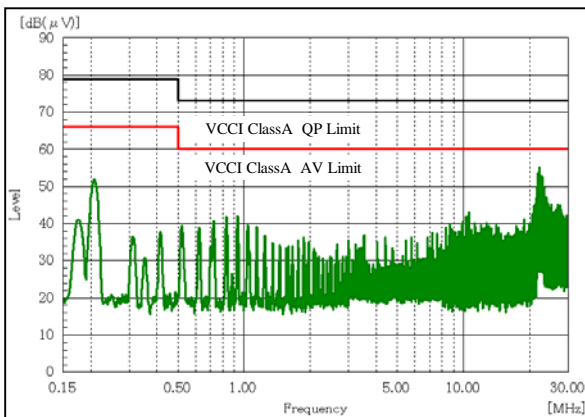
12V



28V



48V



2.16 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

Conditions

Vin : 100 VAC

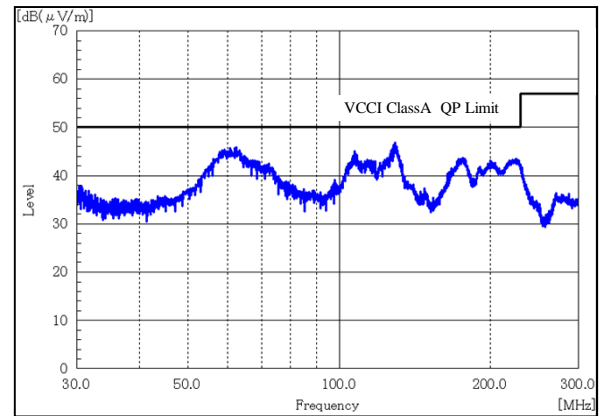
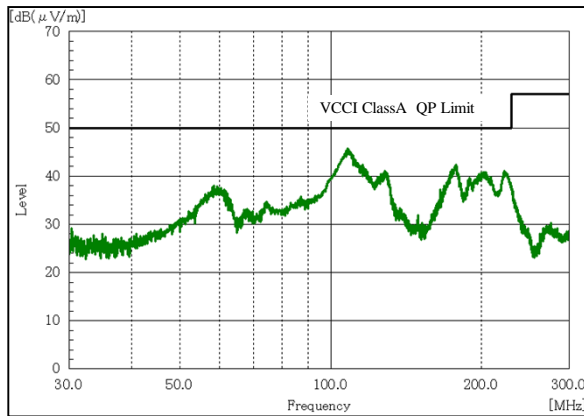
Io : 100 %

Tbp : 25 °C

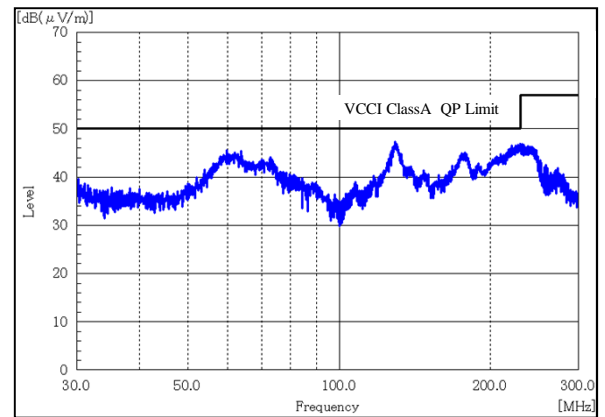
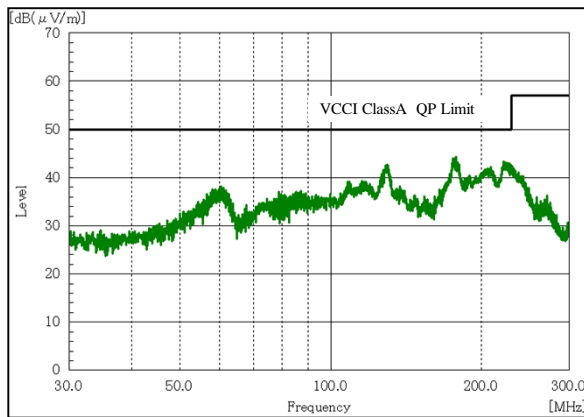
HORIZONTAL

VERTICAL

12V



28V



48V

