

**PFE700SA**

**EVALUATION DATA**

**型式データ**

## INDEX

1. 測定方法	Evaluation Method	PAGE
1.1	測定回路 Measurement Circuits	
(1)	静特性 Steady state characteristics.....	T-1
(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 ,Output ripple noise waveform and other characteristics .....	T-1
(3)	EMI 特性 Electro-Magnetic Interference characteristics .....	T-2
1.2	使用測定機器 List of equipments used .....	T-3
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 .....	T-4
(2)	出力電圧 対 出力電流 Output voltage vs. Output current .....	T-4
(3)	効率 対 出力電流 Efficiency vs. Output current .....	T-4
(4)	入力電流・効率 対 入力電圧 Input current and Efficiency vs. Input voltage .....	T-5
(5)	入力電流・力率 対 出力電流 Input current and Power factor vs. Output current .....	T-5
(6)	入力電流 対 入力電圧(無負荷時) Input current vs. Input voltage with No load .....	T-5
(7)	起動・停止電圧特性 Start and Stop voltage characteristics .....	T-6
2.2	通電ドリフト特性 Warm up voltage drift characteristics .....	T-6
2.3	過電流保護特性 Over current protection (OCP) characteristics .....	T-7
2.4	過電圧保護特性 Over voltage protection (OVP) characteristics .....	T-7
2.5	立ち上がり、立ち下がり特性 Output rise, fall characteristics.....	T-8
2.6	出力電圧保持時間特性 Hold up time characteristics .....	T-9
2.7	過渡応答(入力急変)特性 Dynamic line response characteristics .....	T-9
2.8	過渡応答(負荷急変)特性 Dynamic load response characteristics .....	T-10
2.9	入力電圧瞬停特性 Response to brownout characteristics .....	T-10
2.10	入力サージ電流(突入電流)特性 Inrush current characteristics .....	T-11
2.11	瞬停突入電流特性 Inrush current characteristics at brownout .....	T-11
2.12	入力電流波形 Input current waveform .....	T-12
2.13	高調波成分 Input current harmonics .....	T-12
2.14	リーク電流特性 Leakage current characteristics .....	T-13
2.15	出力リップル、ノイズ波形 Output ripple and noise waveform .....	T-13
2.16	EMI特性 Electro-Magnetic Interference characteristics .....	T-14

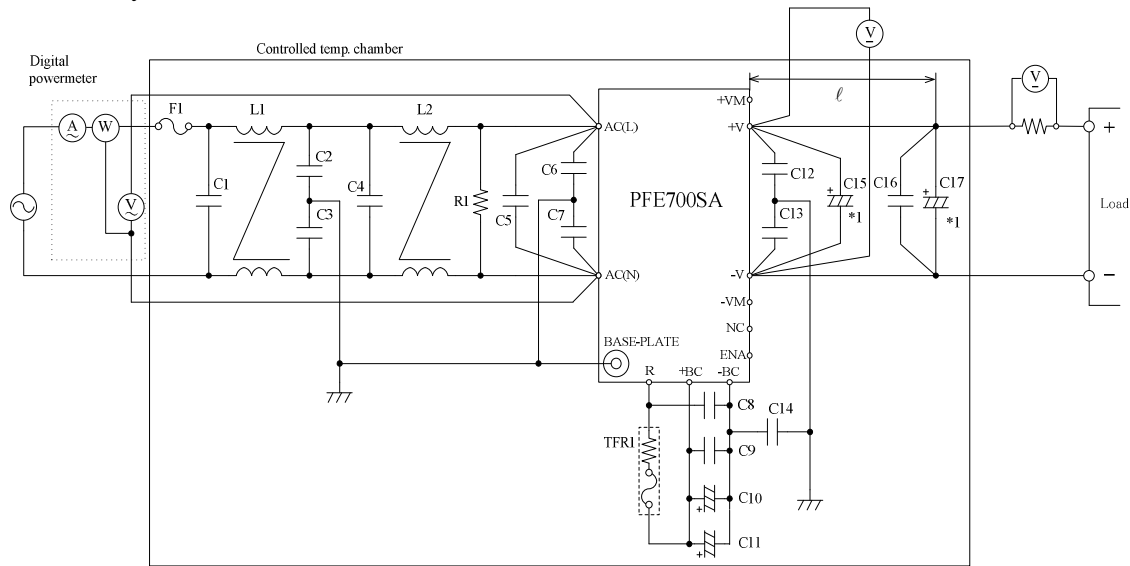
## 使用記号 Terminology used

Definition		
Vin	.....	入力電圧 Input Voltage
Vo	.....	出力電圧 Output Voltage
Iin	.....	入力電流 Input Current
Io	.....	出力電流 Output Current
Tbp	.....	ベースプレート温度 Baseplate Temperature
Ta	.....	周囲温度 Ambient Temperature
f	.....	周波数 Frequency

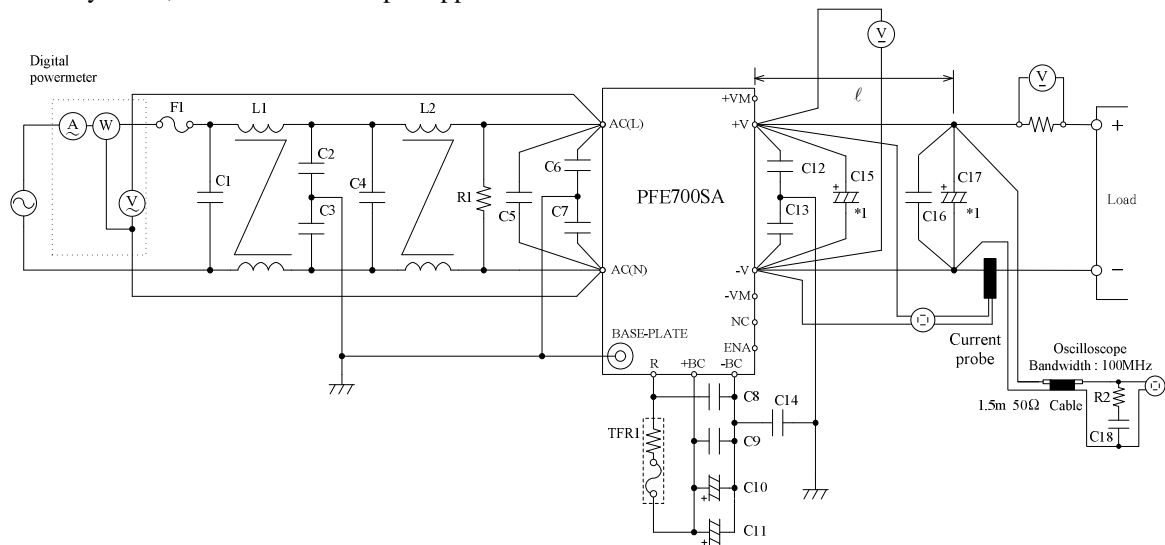
## 1. 測定方法 Evaluation Method

### 1.1 測定回路 Measurement Circuits

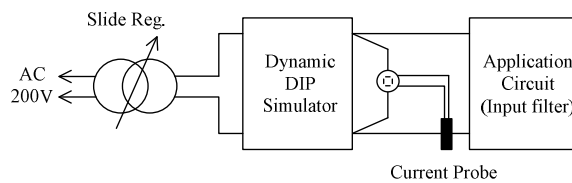
#### (1) 静特性 Steady state characteristics



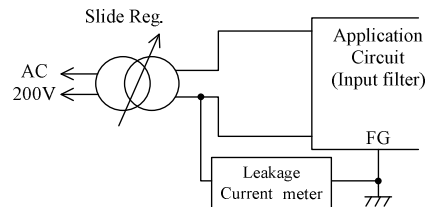
#### (2) 過渡応答、保護機能、出力リップル、ノイズ波形、その他 Dynamic, Protection and Output ripple noise waveform other characteristics



#### Inrush current characteristics



#### Leakage current characteristics



C1, C4, C5: 1uF Film Capacitor  
 C2, C3: 4700pF Ceramic Capacitor  
 C6, C7, C14: 1000pF Ceramic Capacitor  
 C8, C9: 1uF Film Capacitor  
 C10, C11: 390uF Electrolytic Capacitor  
 C12, C13: 0.033uF Film Capacitor  
 C15, C17: 220uF Electrolytic Capacitor

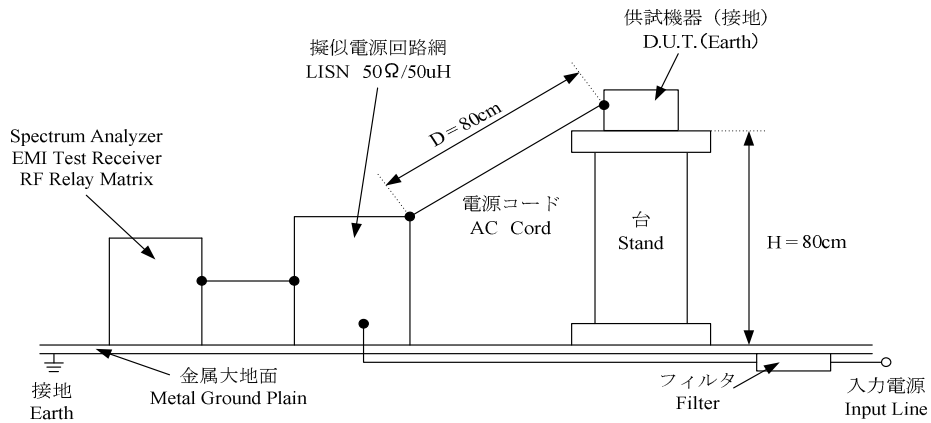
C16: 2.2uF Ceramic Capacitor  
 C18: 4700pF Ceramic Capacitor  
 R1: 0.5W 470k Ω  
 R2: 50 Ω  
 L1, L2: 6mH  
 ℓ : 50mm  
 TFR1: 10 Ω more 139°C

==== Note =====

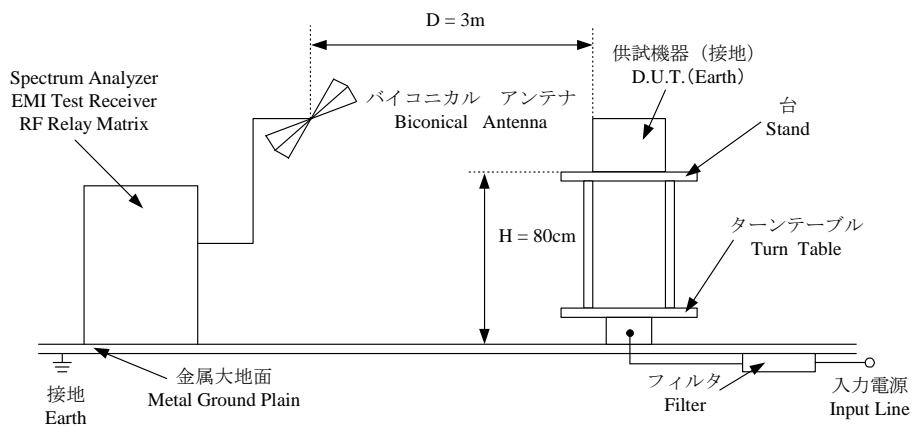
\*1: At ambient temperature less than -20°C, measurement was done using twice of the recommended capacitor above.

(3) EMI特性 Electro-Magnetic Interference characteristics

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

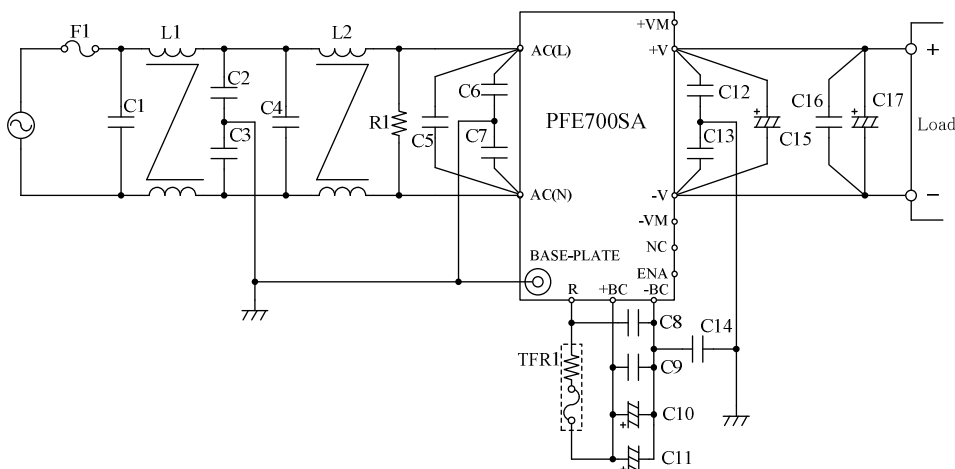


(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



\* 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         | C15, C17: 220uF Electrolytic Capacitor |
| C2, C3: 4700pF Ceramic Capacitor       | C16: 2.2uF Ceramic Capacitor           |
| C6, C7, C14: 1000pF Ceramic Capacitor  | R1: 0.5W 470kΩ                         |
| C8, C9: 1uF Film Capacitor             | L1, L2: 6mH                            |
| C10, C11: 390uF Electrolytic Capacitor | TFR1: 10Ω more 139°C                   |
| C12, C13: 0.033uF Film 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.	WT110
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	CURRENT PROBE	YOKOGAWA ELECT.	701932
6	SHUNT RESISTER	YOKOGAWA ELECT.	2215
7	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
8	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
9	AC POWER SUPPLY	TAKASAGO	AA-2000X
10	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
11	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
12	PRE AMP	SONOMA	310N
13	AMN	SCHWARZBECK	NNLK8121
14	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	CBL6111D
15	AC POWER SUPPLY	NF	ES10000S
16	INRUSH CURRENT METER	TAKAMISAWA	PSA-210
17	SLIDE REGULATOR	MATSUNAGA	SD-2650
18	SINGLE-PHASE MASTER	NF	4420
19	REFERENCE IMPEDANCE NETWORK	NF	4150
20	LEAKAGE CURRENT METER	HIOKI	3156

## 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

#### 1. Regulation - line and load

Conditions Tbp : 25 °C

Io \ Vin	85VAC	100VAC	200VAC	265VAC	line regulation	
0%	55.759V	55.757V	55.756V	55.756V	3mV	0.006%
50%	51.990V	51.989V	51.986V	51.987V	4mV	0.008%
70%	51.583V	51.584V	51.580V	51.581V	4mV	0.008%
100%	51.583V	51.007V	51.005V	51.007V	2mV	0.004%
load regulation	4.176V	4.750V	4.751V	4.749V		
	8.188%	9.314%	9.316%	9.312%		

#### 2. Temperature drift

Conditions Vin : 100 VAC

Io : 100 %

Tbp	-40°C	25°C	85°C	temperature stability	
Vo	51.051V	51.007V	50.725V	326mV	0.639%

#### (2) 出力電圧 対 出力電流

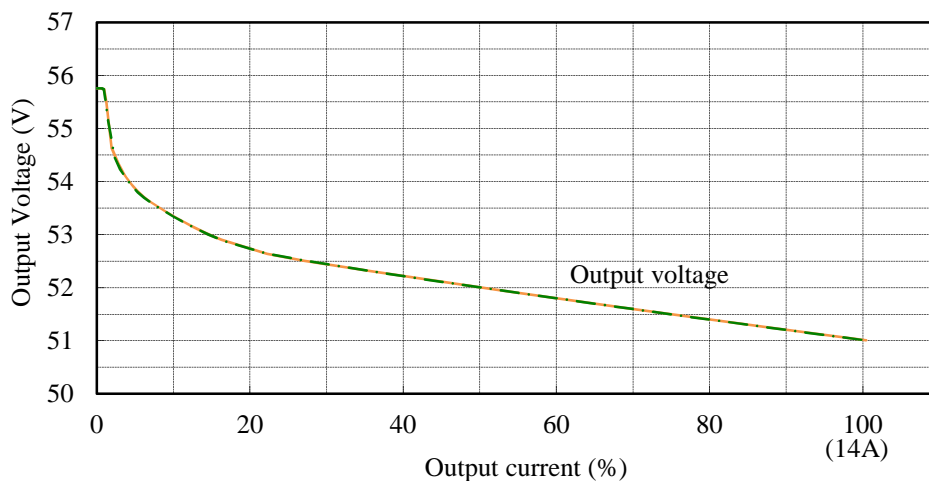
Output voltage vs. Output current

Conditions

Vin : 100 VAC

200 VAC

Tbp : 25 °C



#### (3) 効率 対 出力電流

Efficiency vs. Output current

Conditions

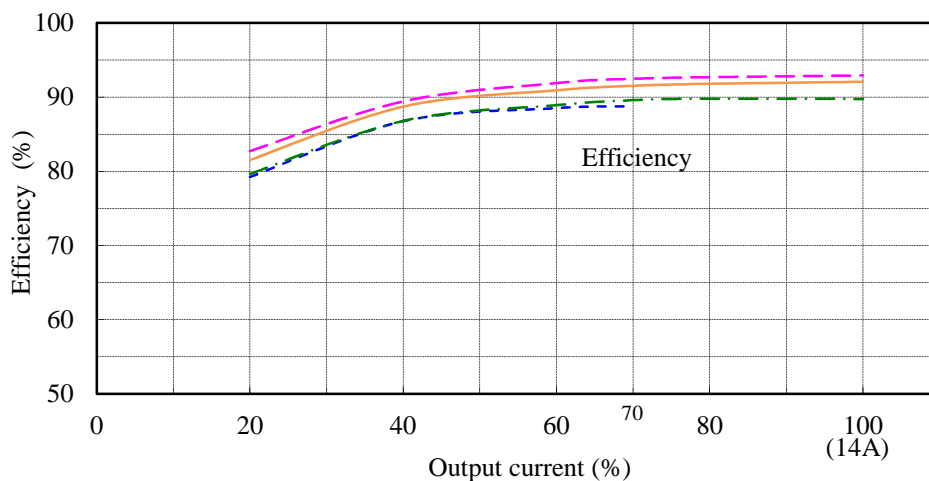
Vin : 85 VAC

100 VAC

200 VAC

265 VAC

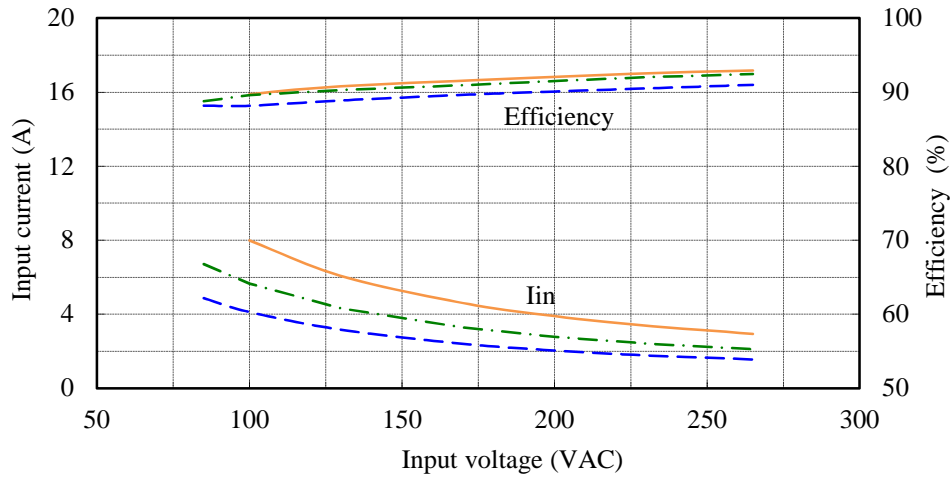
Tbp : 25 °C



(4) 入力電流・効率 対 入力電圧

Input current and Efficiency vs. Input voltage

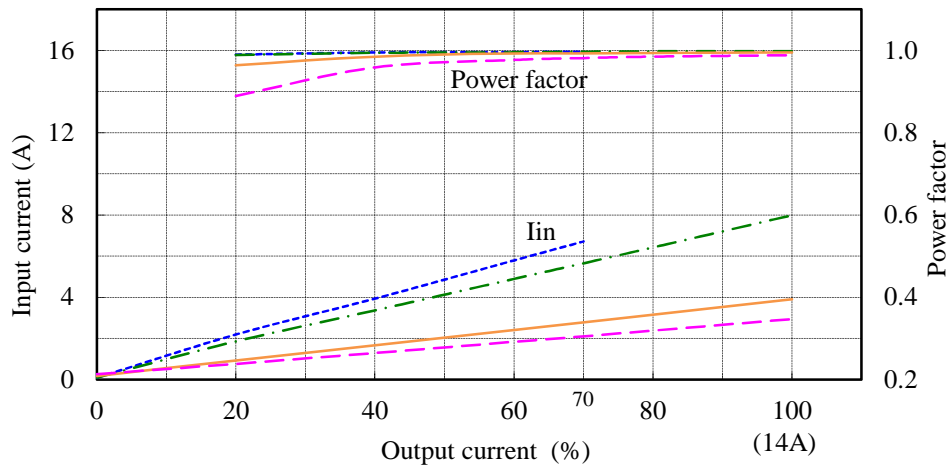
Conditions  $I_o$  : 50 % ---  
 70 % - · - · -  
 100 % —  
 $T_{bp}$  : 25 °C



(5) 入力電流・力率 対 出力電流

Input current and Power factor vs. Output current

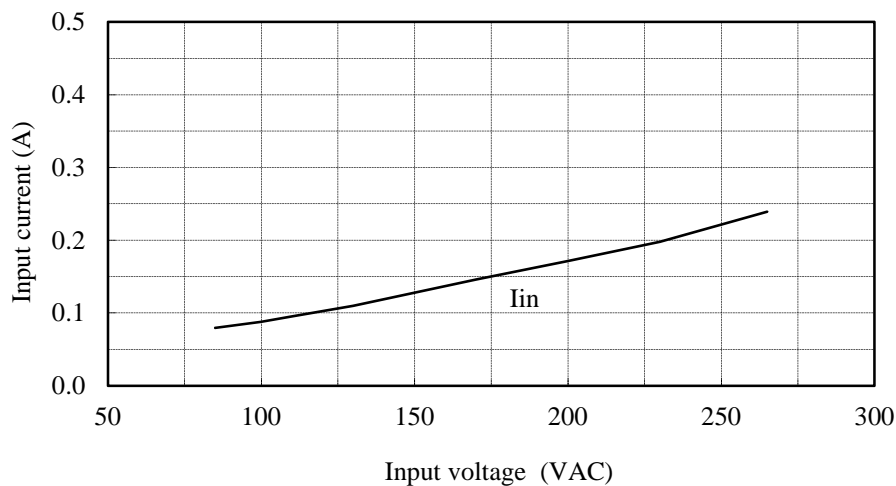
Conditions  $V_{in}$  : 85 VAC ---  
 100 VAC - · - · -  
 200 VAC —  
 265 VAC - - - - -  
 $T_{bp}$  : 25 °C



(6) 入力電流 対 入力電圧 (無負荷時)

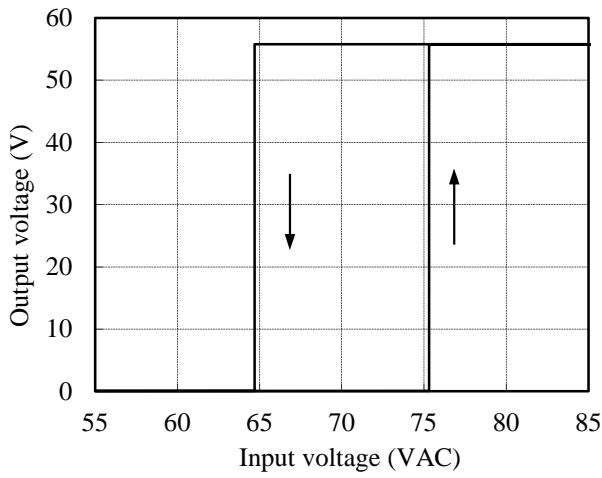
Input current vs. Input voltage with No load

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

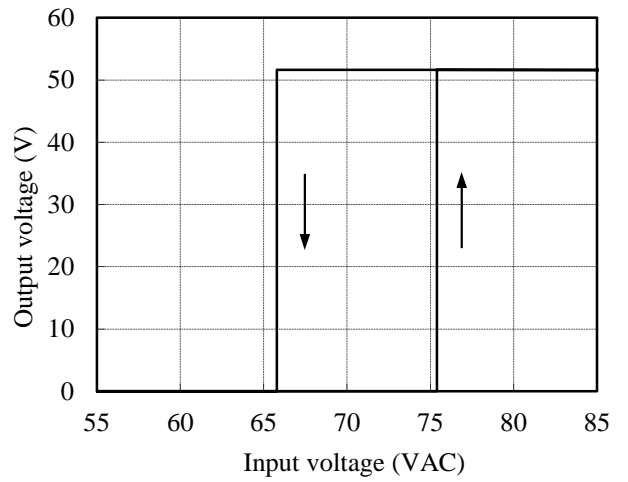


(7) 起動・停止電圧特性  
Start and Stop voltage characteristics

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

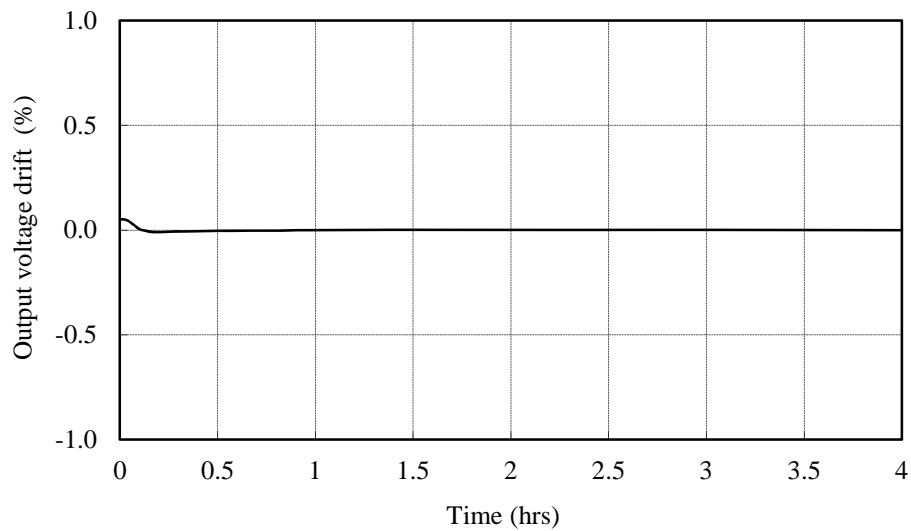


Conditions  $I_o$  : 70 % ———  
 $T_{bp}$  : 25 °C



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

Conditions  $V_{in}$  : 100 VAC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C





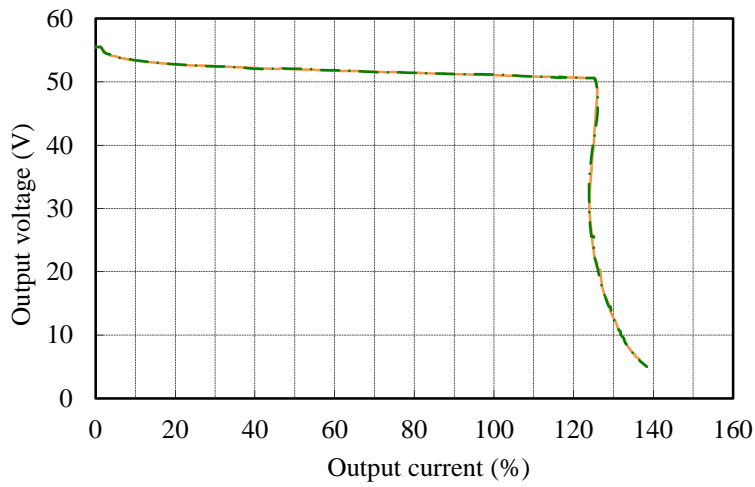
2.3 過電流保護特性

Over current protection (OCP) characteristics

(1) 入力電圧依存性

Input voltage dependence

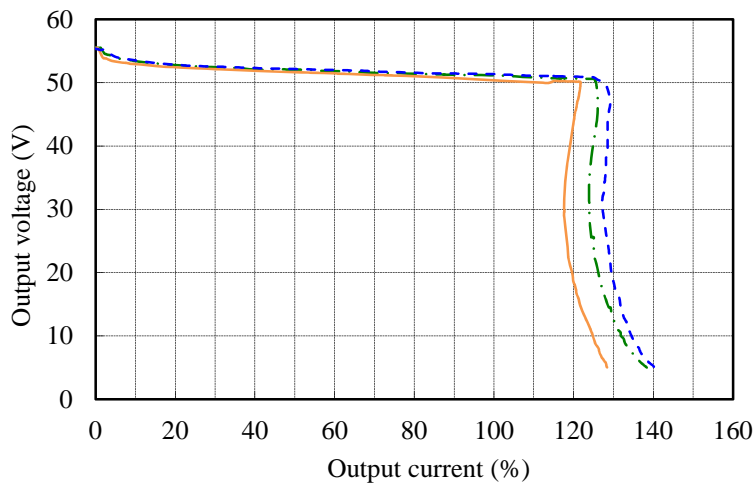
Conditions Vin : 100 VAC ---  
 200 VAC —  
 Tbp : 25 °C



(2) ベースプレート温度依存性

Baseplate temperature dependence

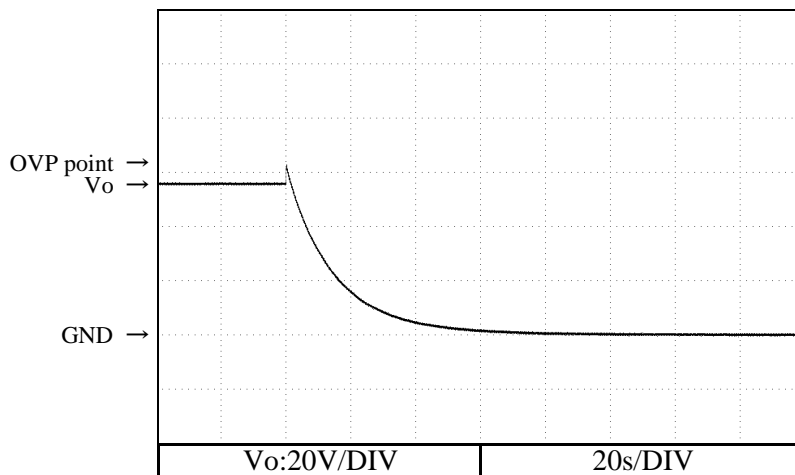
Conditions Vin : 100 VAC  
 Tbp : -40 °C ---  
 25 °C ---  
 85 °C —



2.4 過電圧保護特性

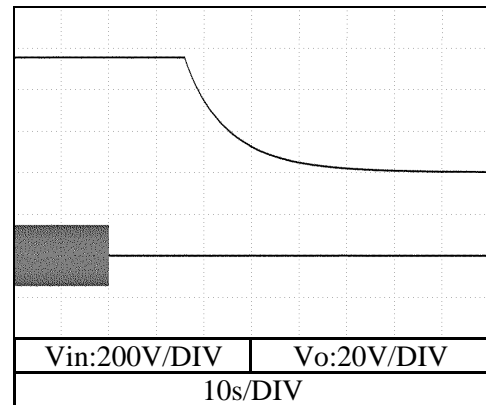
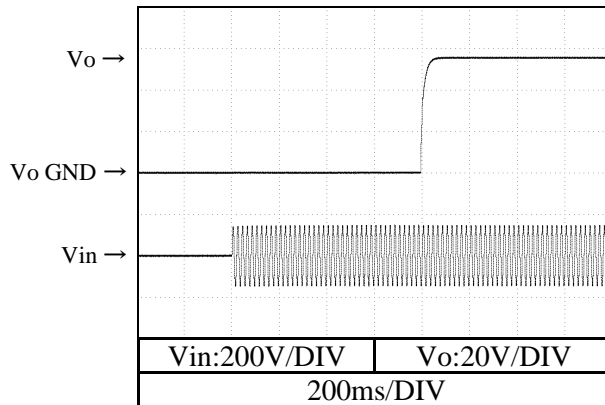
Over voltage protection (OVP) characteristics

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

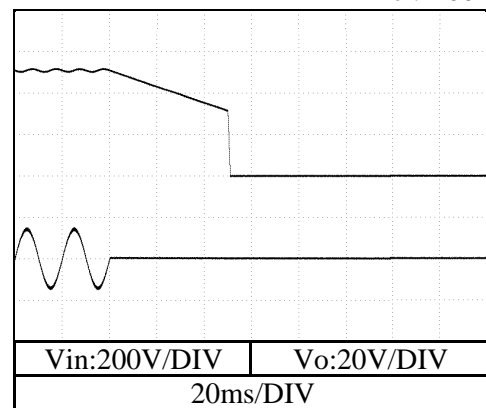
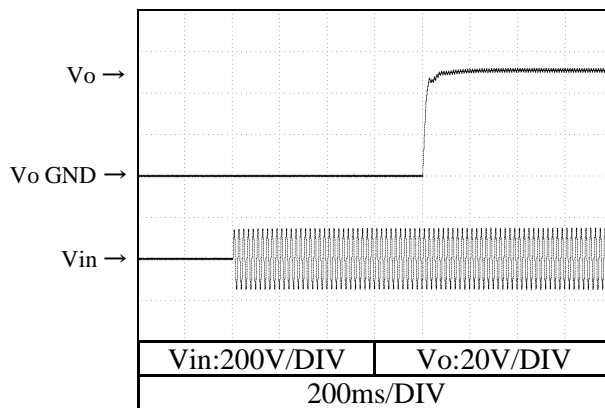


## 2.5 出力立ち上がり、立ち下り特性 Output rise and fall characteristics

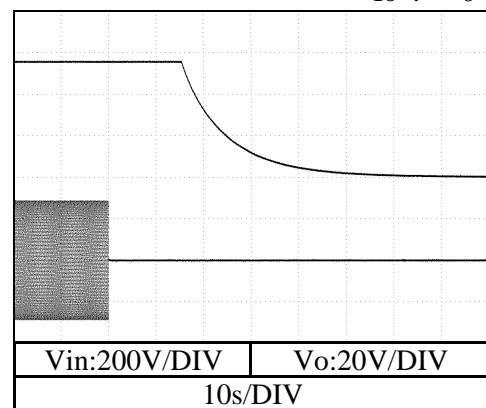
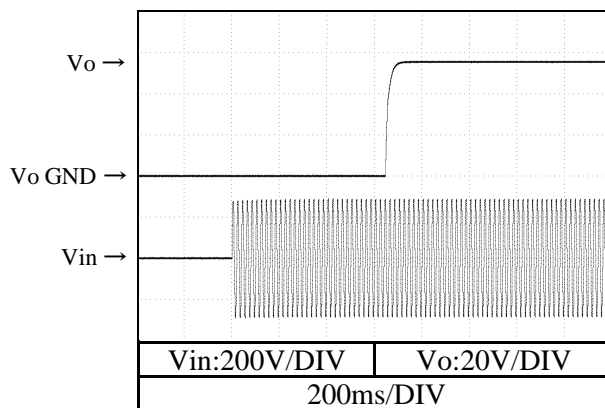
Conditions Vin : 100 VAC  
Tbp : 25 °C  
Io : 0 %



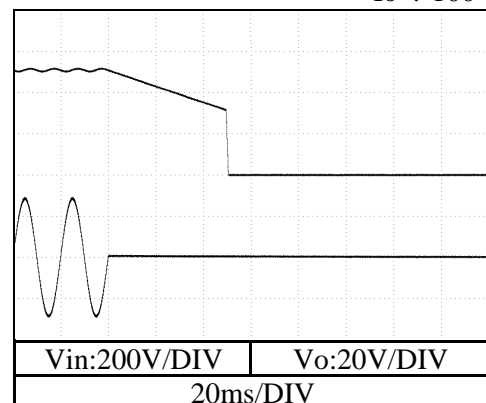
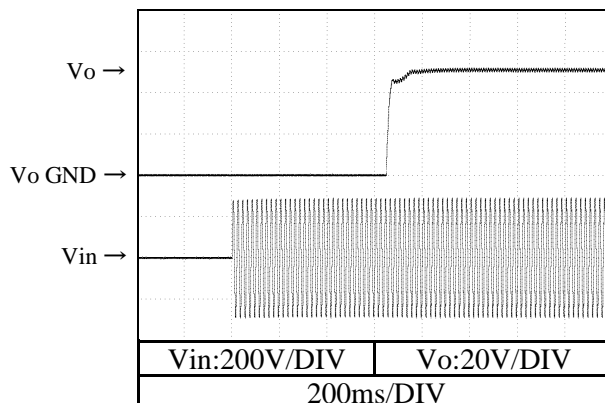
Io : 100 %



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

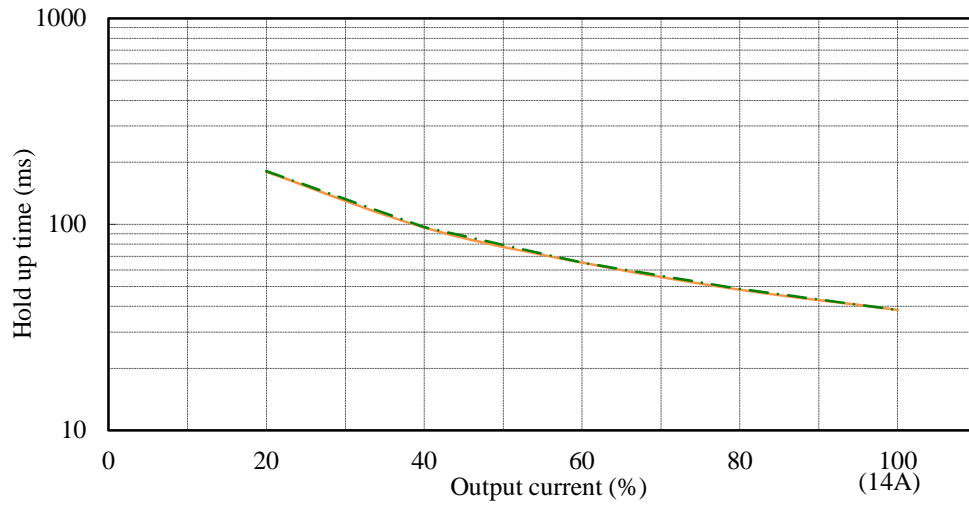


Io : 100 %



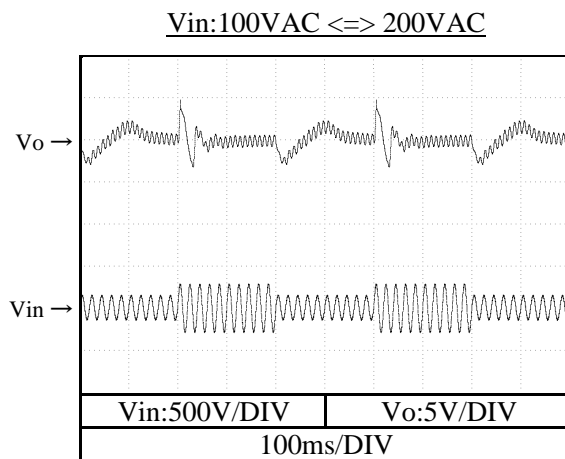
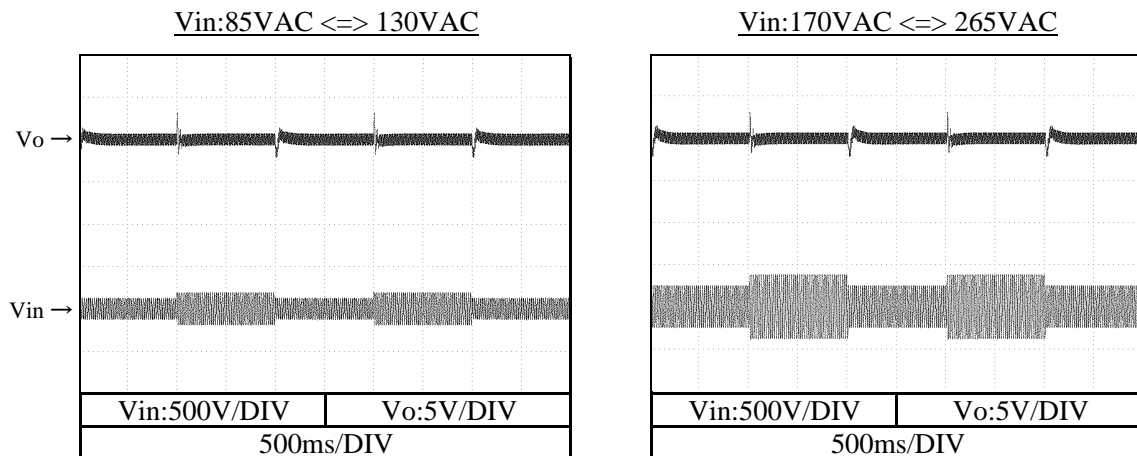
## 2.6 出力保持時間特性 Hold up time characteristics

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



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

Conditions Io : 100 %  
Tbp : 25 °C



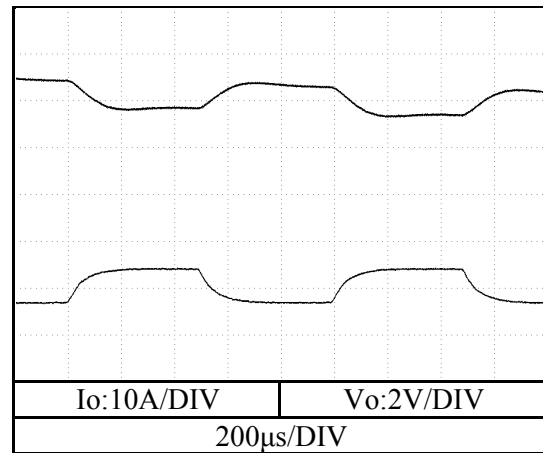
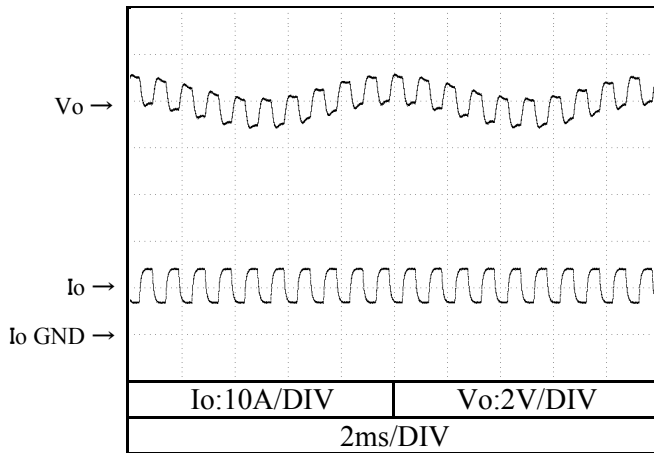
Note: This test follows SEMI F47-0200.

2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

Conditions Vin : 100 VAC  
Tbp : 25 °C

Load current  $t_r = t_f = 100\mu s$   
Io : 50%  $\longleftrightarrow$  100%  $f=1kHz$



2.9 入力電圧瞬停特性

Response to brownout characteristics

Conditions Io : 100 %  
Tbp : 25 °C

瞬停時間 Interruption time

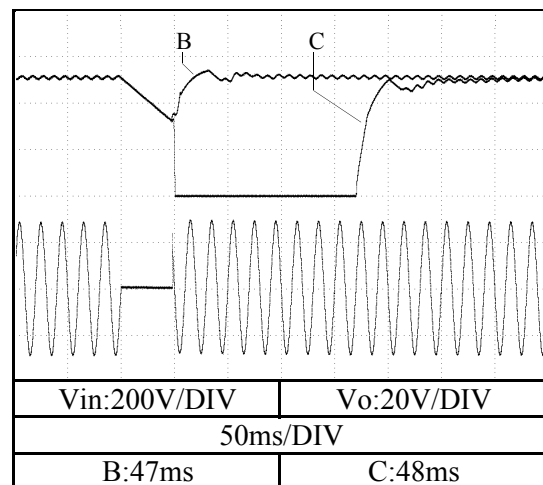
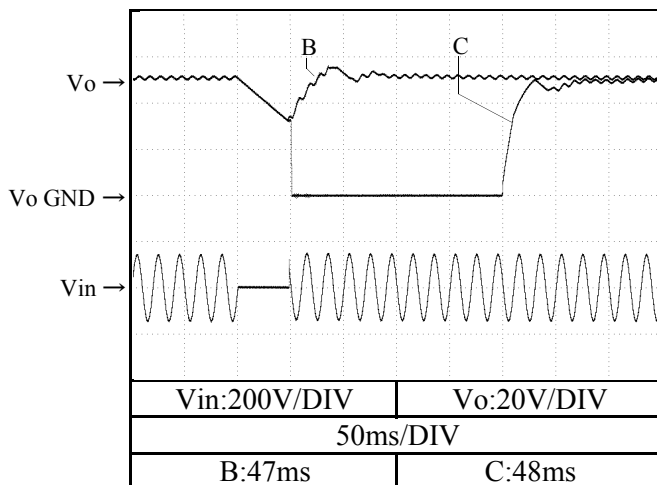
A : 出力電圧が低下なし Output voltage does not drop.

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

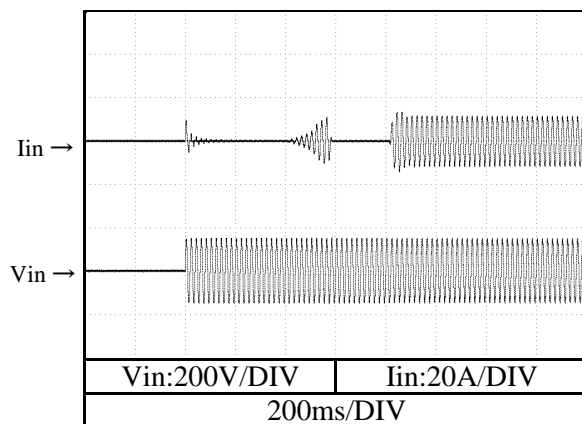
Vin : 200VAC



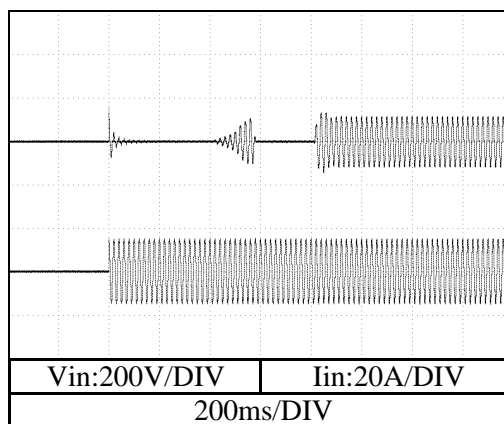
## 2.10 入力サージ電流（突入電流）特性 Inrush current characteristics

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

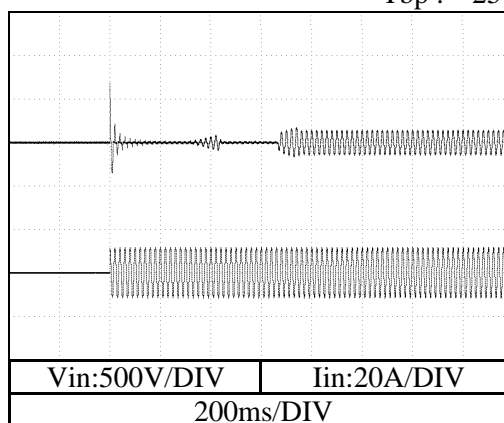
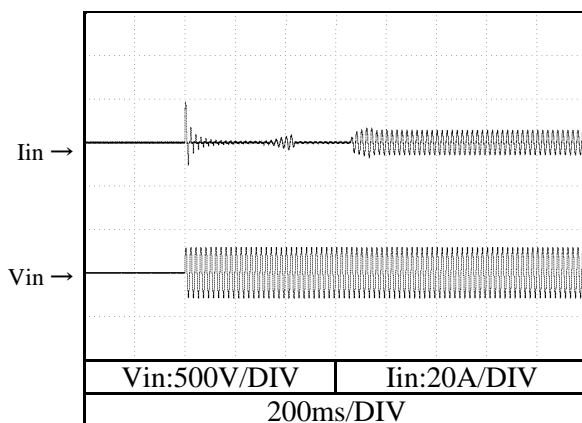
Switch on phase angle  
of input AC voltage  $\phi = 0^\circ$



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



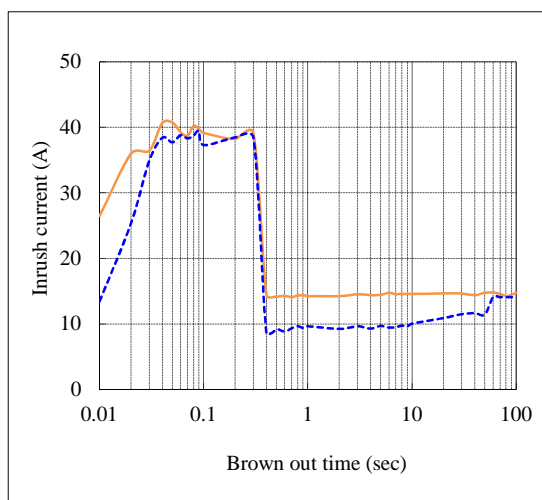
Conditions Vin : 200 VAC  
Io : 100 %  
Tbp : 25 °C



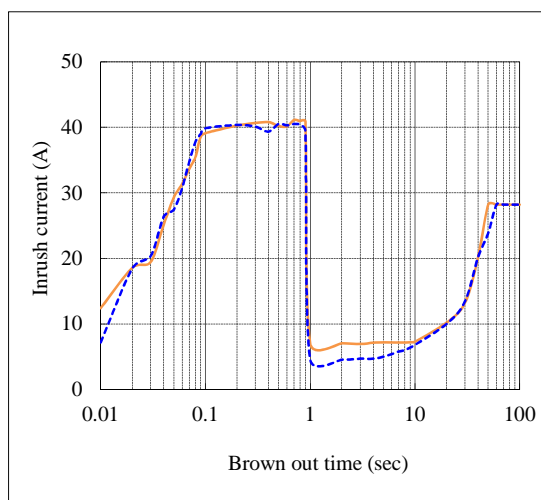
## 2.11 瞬停時突入電流特性 Inrush current characteristics at brownout

Conditions Io : 50 % ---  
100 % —  
Tbp : 25 °C

Vin : 100VAC



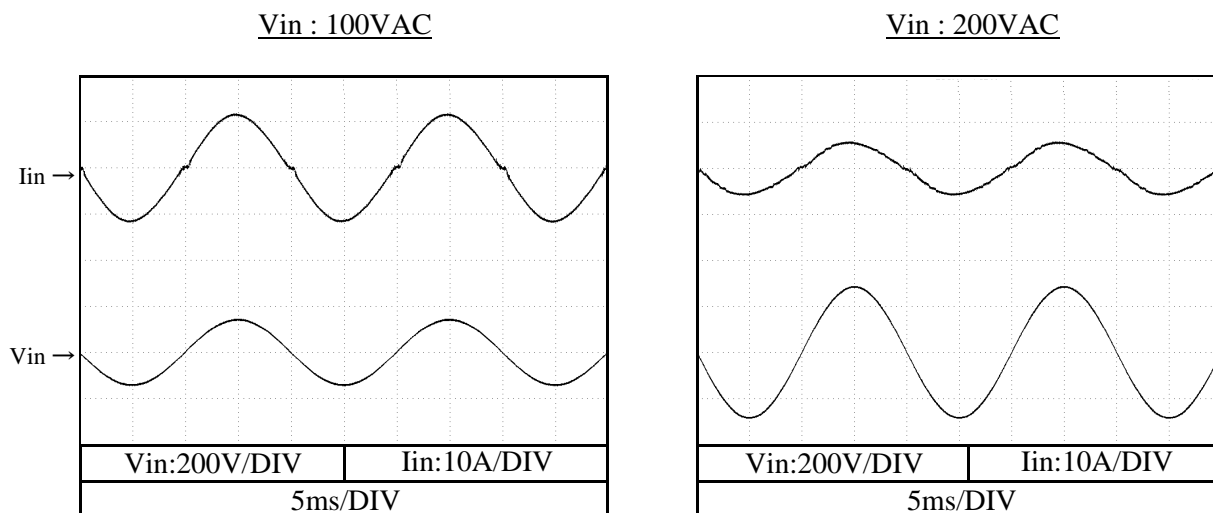
Vin : 200VAC



2.12 入力電流波形

Input current waveform

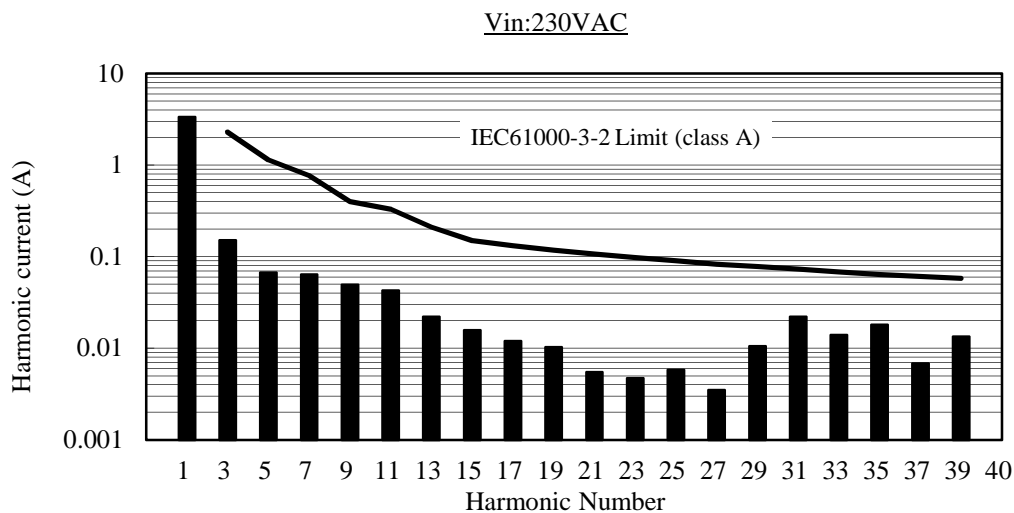
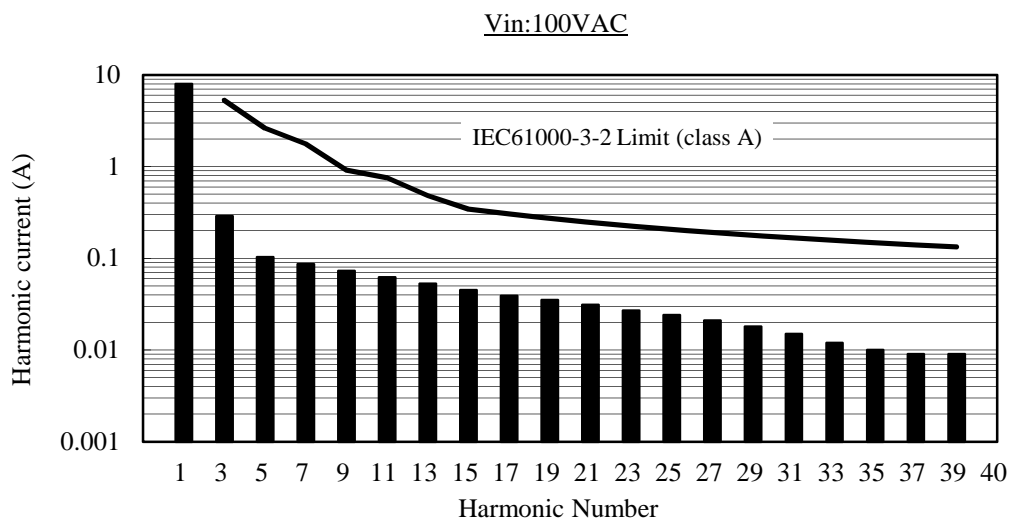
Conditions  $I_o$  : 100 %  
 $T_{bp}$  : 25 °C



2.13 高調波成分

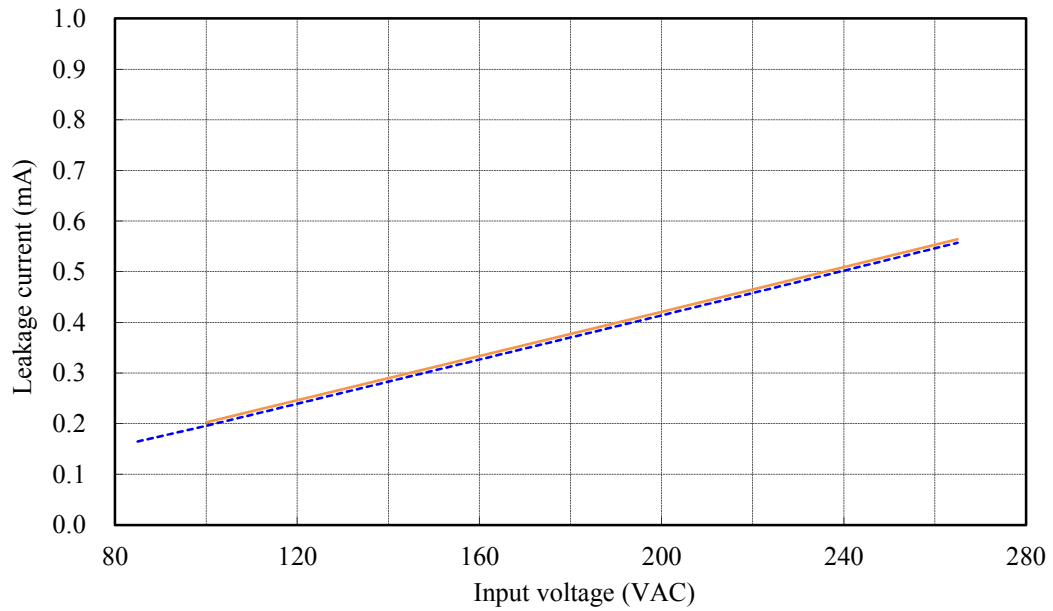
Input current harmonics

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



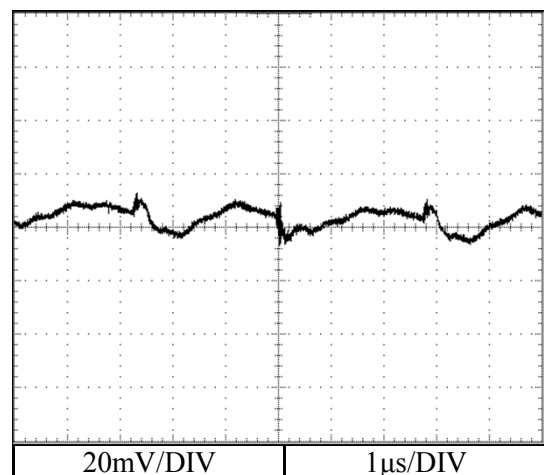
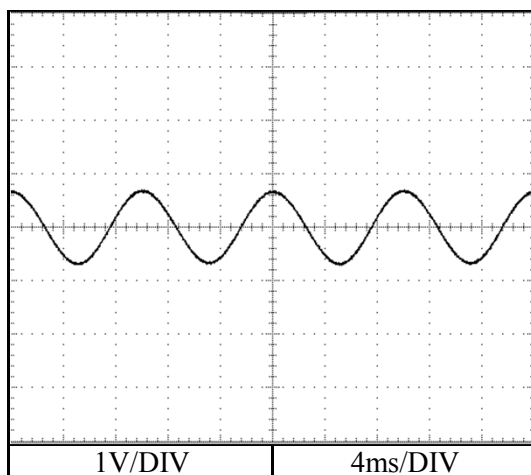
2.14 リーク電流特性  
Leakage current characteristics

Conditions  $I_o$  : 0 % ---  
 100 % —  
 $T_{bp}$  : 25 °C  
 $f$  : 50 Hz



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

Conditions  $V_{in}$  : 100 VAC  
 $I_o$  : 100 %  
 $T_{bp}$  : 25 °C



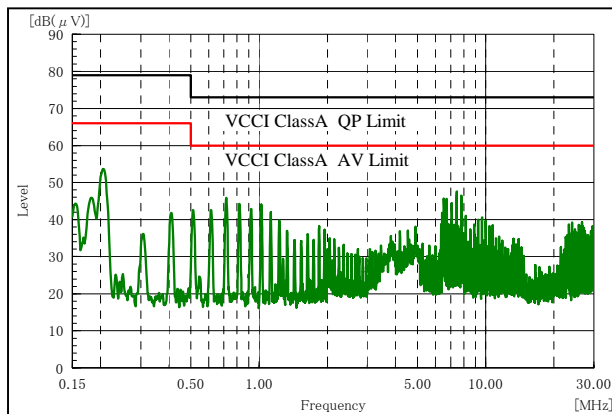
## 2.16 EMI特性 Electro-Magnetic Interference characteristics

### (a) 雑音端子電圧 (帰還ノイズ)

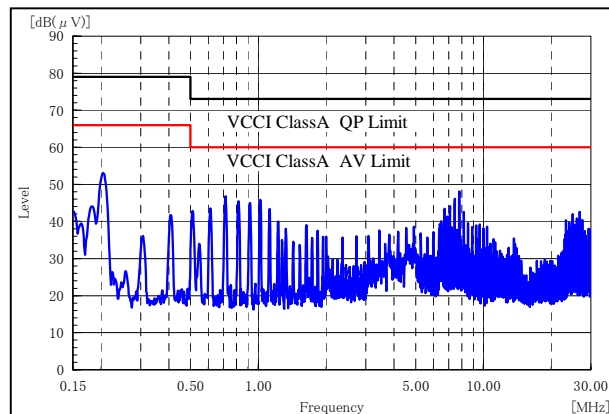
Conducted Emission

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

Phase:N



Phase:L

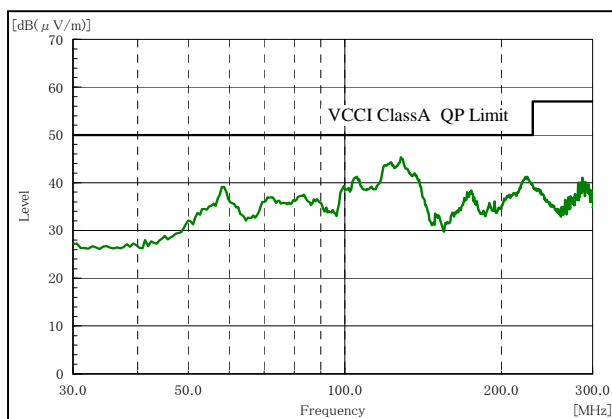


### (b) 雑音電界強度 (輻射ノイズ)

Radiated Emission

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

HORIZONTAL



VERTICAL

