

**HWS1800T-48**

**EVALUATION DATA**

**型式データ**

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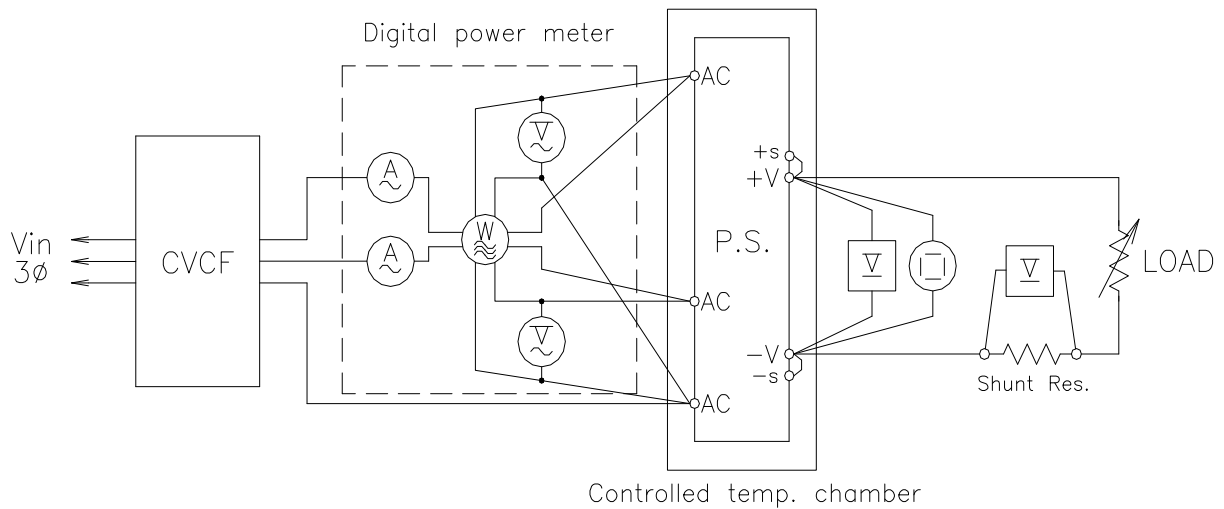
#### 使用記号 Terminology used

	Definition
$V_{in}$	..... 入力電圧 Input voltage
$V_{out}$	..... 出力電圧 Output voltage
$I_{in}$	..... 入力電流 Input current
$I_{out}$	..... 出力電流 Output current
$T_a$	..... 周囲温度 Ambient temperature
$f$	..... 周波数 Frequency

## 1. 測定方法 Evaluation Method

### 1.1 測定回路 Circuit used for determination

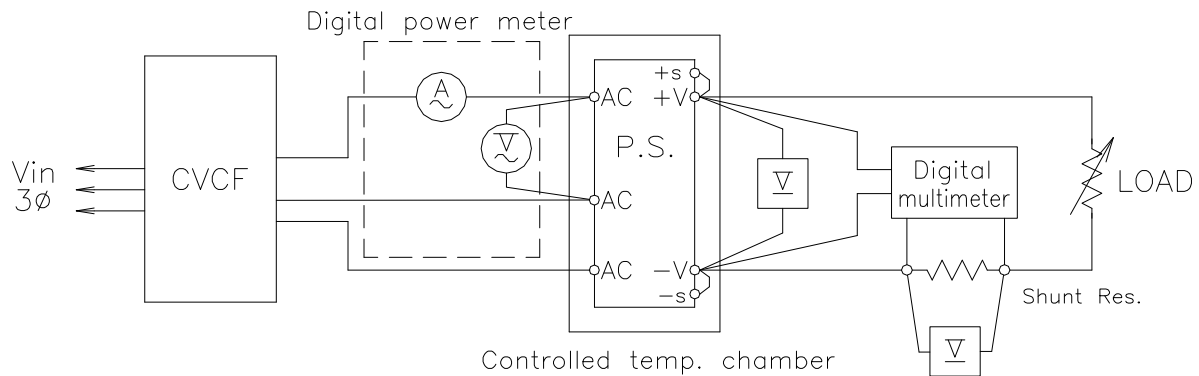
#### (1) 静特性 Steady state data



#### (2) 通電ドリフト特性 Warm up voltage drift characteristics

Same as Steady state data

#### (3) 過電流保護特性 Over current protection (OCP) characteristics



#### (4) 過電圧保護特性 Over voltage protection (OVP) characteristics

Same as Steady state data

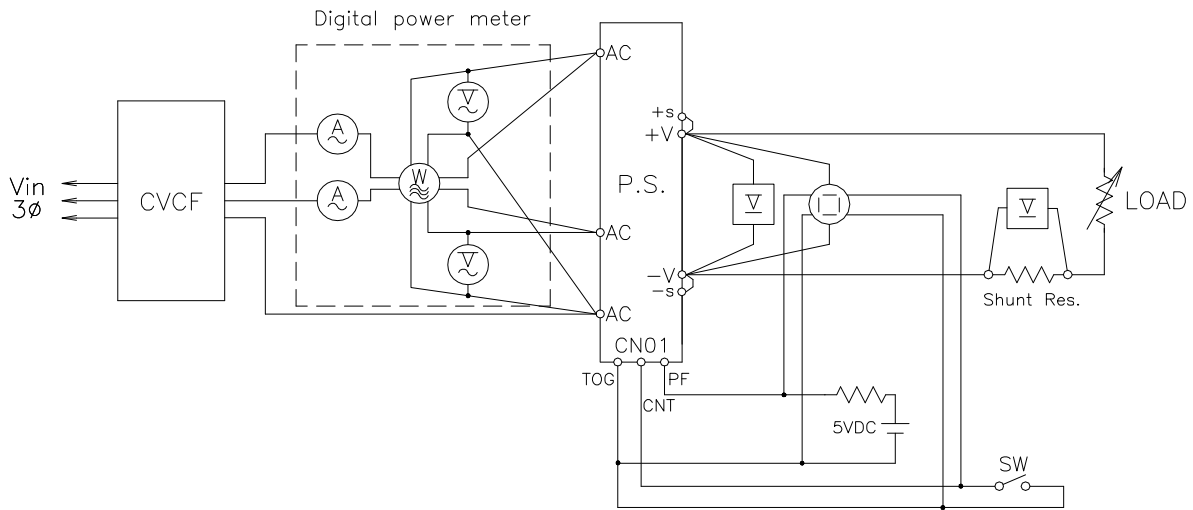
#### (5) 出力立ち上がり特性 Output rise characteristics

Same as Steady state data

#### (6) 出力立ち下がり特性 Output fall characteristics

Same as Steady state data

(7) ON/OFFコントロール時出力立ち上がり特性  
Output rise characteristics with ON/OFF CONTROL



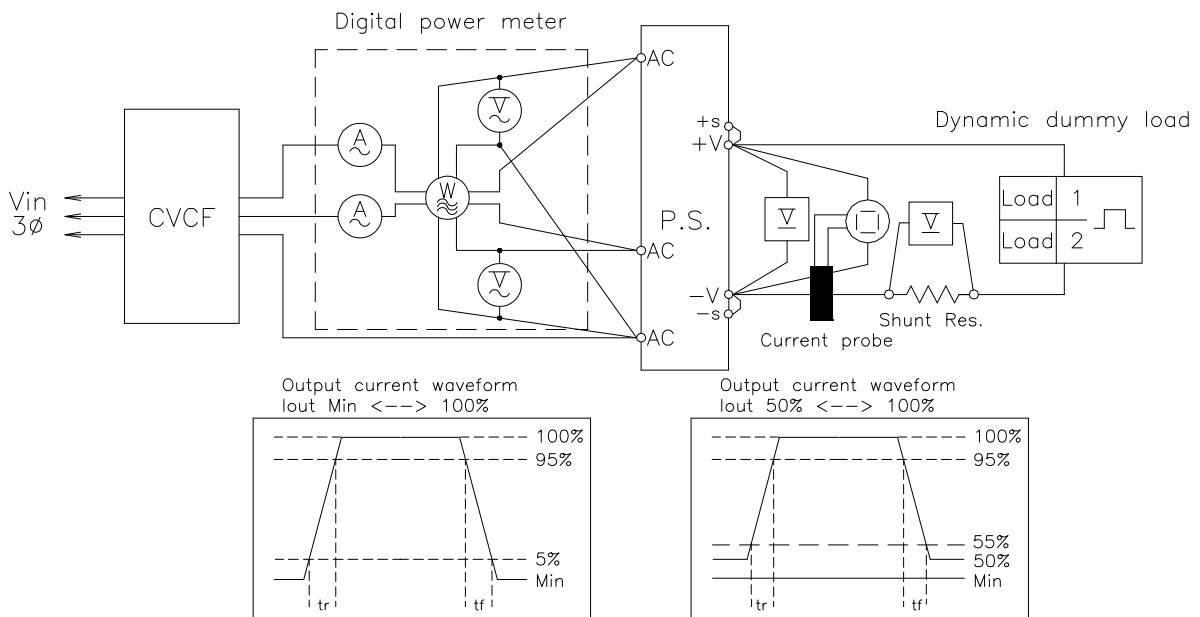
(8) ON/OFFコントロール時出力立ち下がり特性  
Output fall characteristics with ON/OFF CONTROL

Same as Output rise characteristics with ON/OFF CONTROL

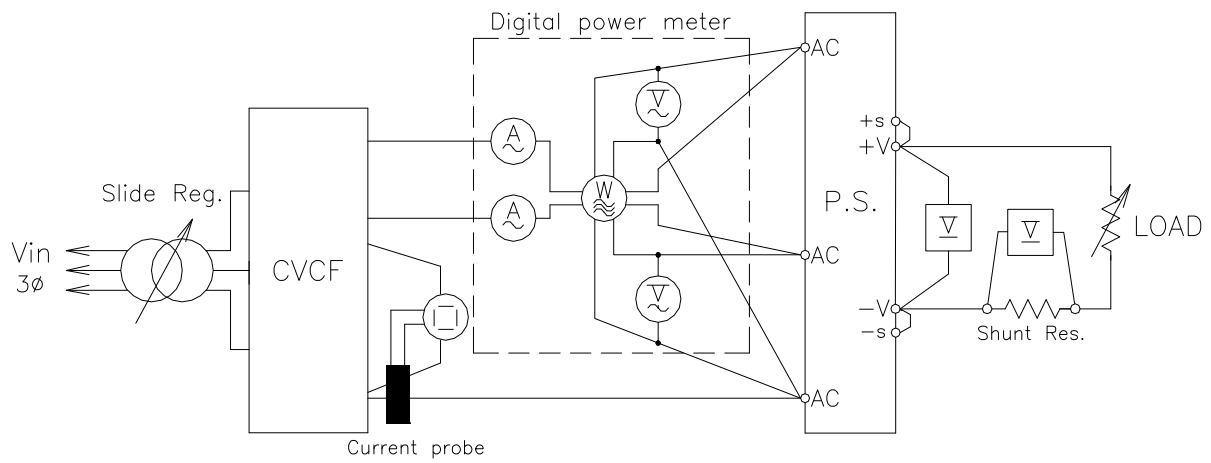
(9) 過渡応答(入力急変)特性    Dynamic line response characteristics

Same as Steady state data

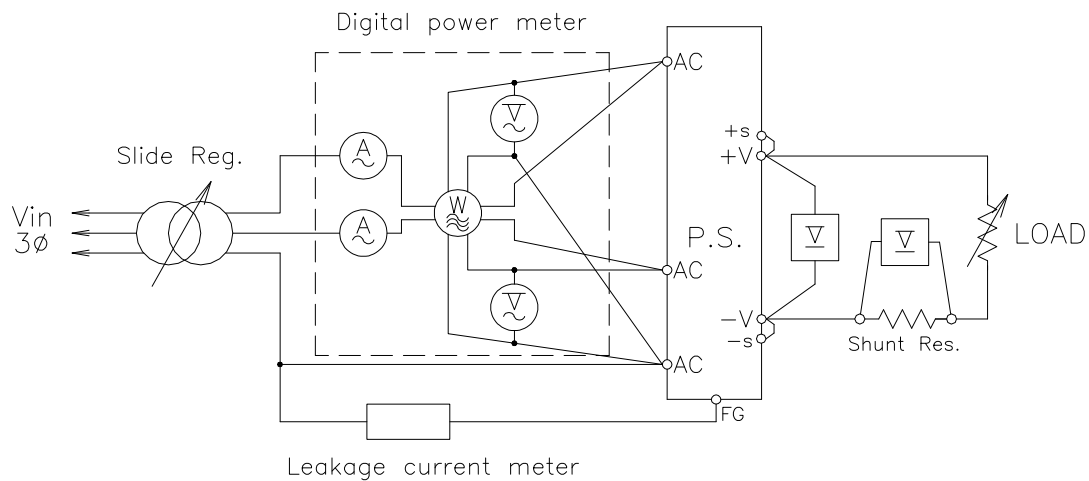
(10) 過渡応答(負荷急変)特性    Dynamic load response characteristics



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



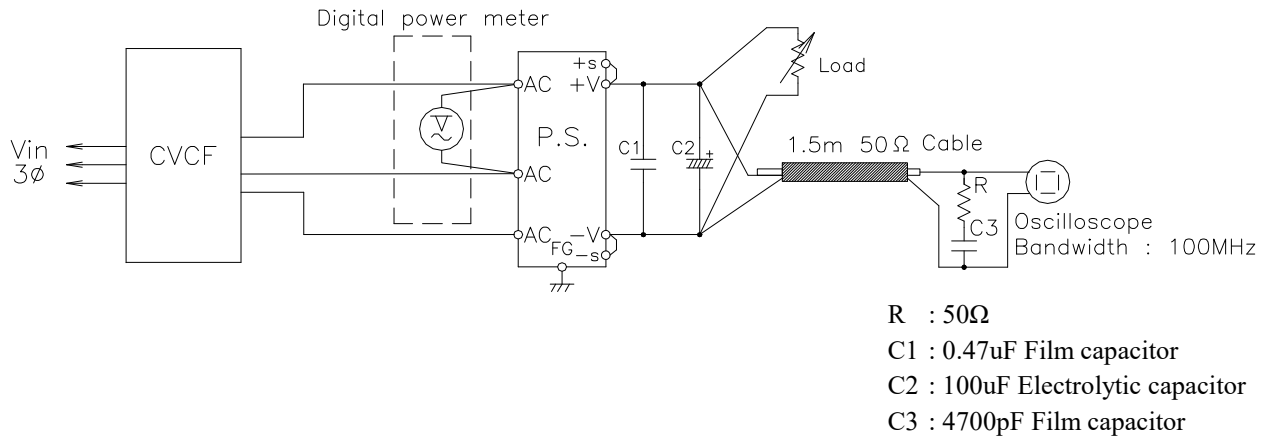
## (12) リーク電流特性 Leakage current characteristics



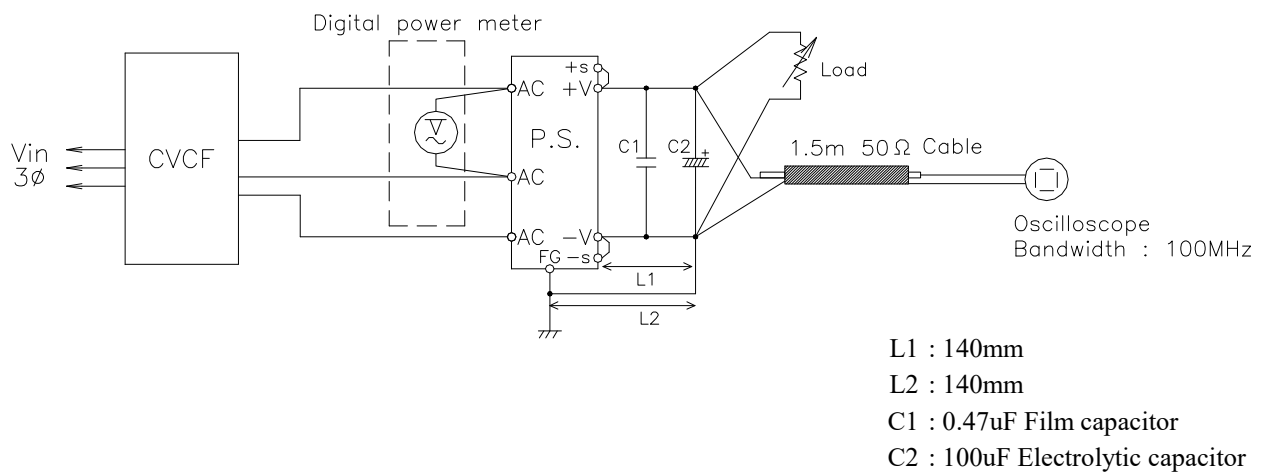
NOTE : Leakage current measured through the 1k $\Omega$  resistor.  
 Range used --- AC (For HIOKI MODEL 3155)

(13) 出力リップル、ノイズ特性 Output ripple and noise characteristics

(a) Normal Mode (JEITA Standard RC-9131A)



(b) Normal + Common Mode

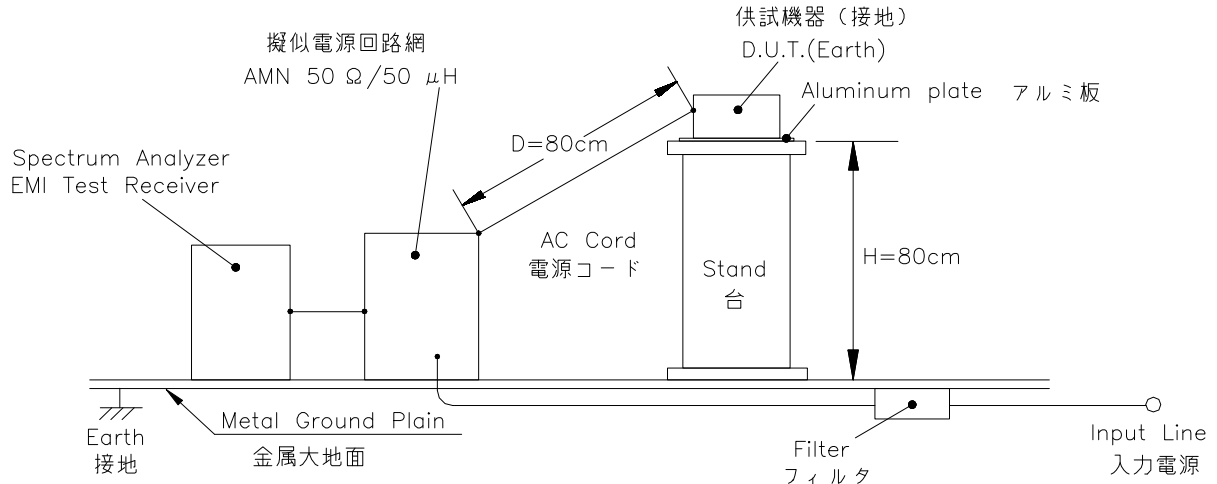


(14) スタンバイ電流 Stand-by current

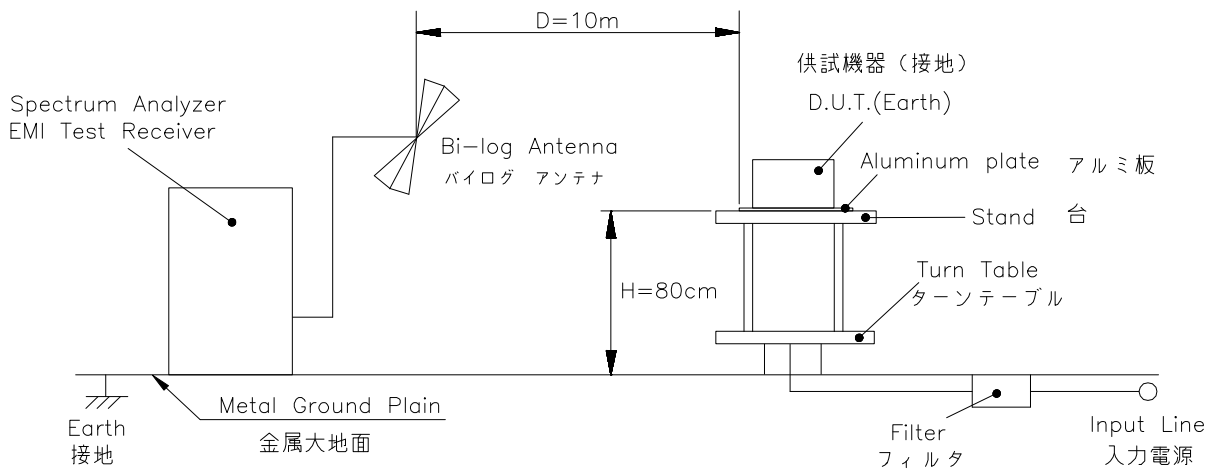
Same as Steady state data

(15) 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





## 1.2 使用測定機器 List of equipment used

No.	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS540C/TDS5054
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740EL/DL7480/DL7440
3	DIGITAL MULTIMETER	AGILENT TECHNOLOGY	34970A
4	DIGITAL POWER METER	HIOKI	3331
5	SHUNT RESISTOR	YOKOGAWA ELECT.	2215/2216
6	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503B
7	CURRENT PROBE/AMPLIFIER	YOKOGAWA ELECT.	701930/700937
8	DYNAMIC DUMMY LOAD	FUJITSUDENSO	EUL-1800 $\alpha$ L SLV+EUL-600 $\alpha$ XL
9	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ1004W+PLZ2004WB
10	CVCF	KIKUSUI	PCR2000L $\times$ 3/PCR6000LT/PCR4000LA $\times$ 3
11	LEAKAGE CURRENT METER	HIOKI	3155
12	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4KP
13	SPECTRUM ANALYZER	ROHDE&SCHWARZ	FSAC
14	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESHS10
15	AMN	ROHDE&SCHWARZ	ESH2-Z5
16	SPECTRUM ANALYZER	Agilent	E4401B/E4411B
17	EMI TEST RECEIVER	Schwarzbeck	FCVU1534
18	ANTENNA(BI-LOG ANTENNA)	Schwarzbeck	VULB9168

## 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

48V

## 1. Regulation - line and load

Condition Ta : 25°C

load \ Vin	170VAC	200VAC	265VAC	line regulation	
0%	48.038V	48.041V	48.042V	4mV	0.008%
50%	48.037V	48.040V	48.040V	3mV	0.006%
72%	48.038V	48.039V	48.041V	3mV	0.006%
100%	48.037V	48.039V	48.039V	2mV	0.004%
load regulation	1mV	2mV	3mV		
	0.002%	0.004%	0.006%		

## 2. Temperature drift

Conditions Vin=200VAC

Iout=100%

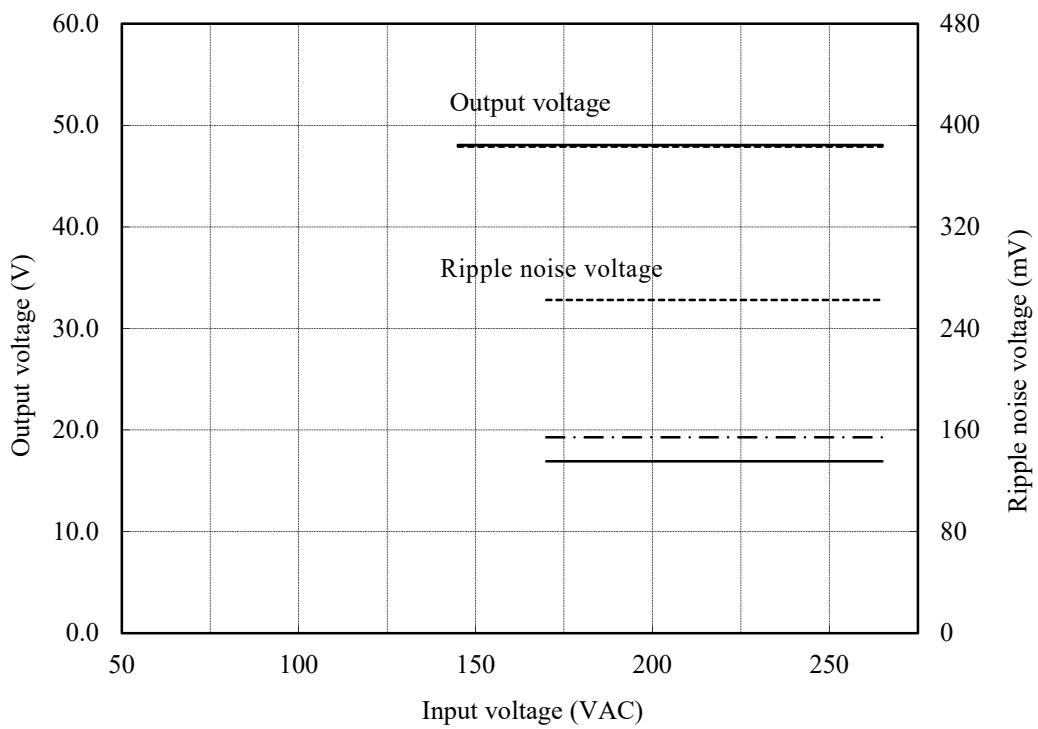
Ta	-10°C	+25°C	+40°C	temperature stability	
Vout	47.912V	48.039V	48.075V	163mV	0.340%

(2) 出力電圧・リップルノイズ電圧対入力電圧

Output voltage and Ripple noise voltage vs. Input voltage

Conditions Iout : 100 %  
 Ta : -10 °C -----  
 25 °C -.-.-.-  
 40 °C \_\_\_\_\_

48V

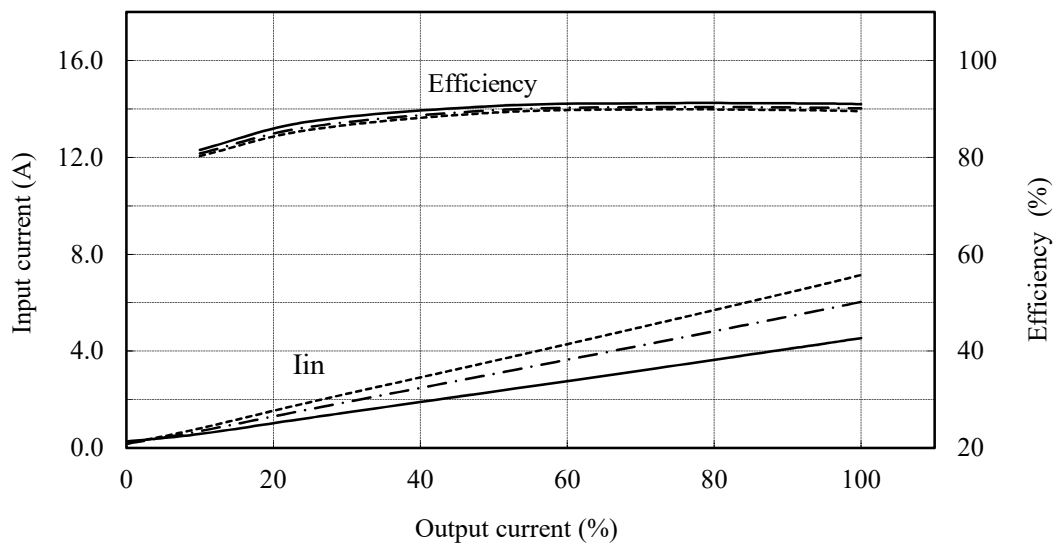


(3) 効率・入力電流対出力電流

Efficiency and Input current vs. Output current

Conditions  $V_{in}$  : 170 VAC .....  
 : 200 VAC - - - - -  
 : 265 VAC ————  
 $T_a$  : 25 °C

48V

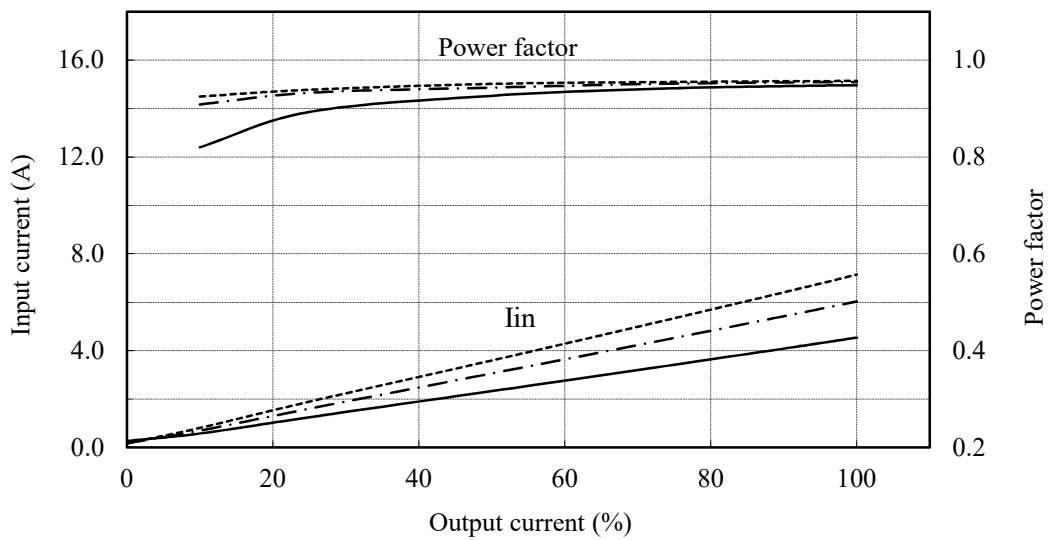


(4) 力率・入力電流対出力電流

Power factor and Input current vs. Output current

Conditions  $V_{in}$  : 170 VAC - - - - -  
 : 200 VAC - · - · -  
 : 265 VAC ———  
 $T_a$  : 25 °C

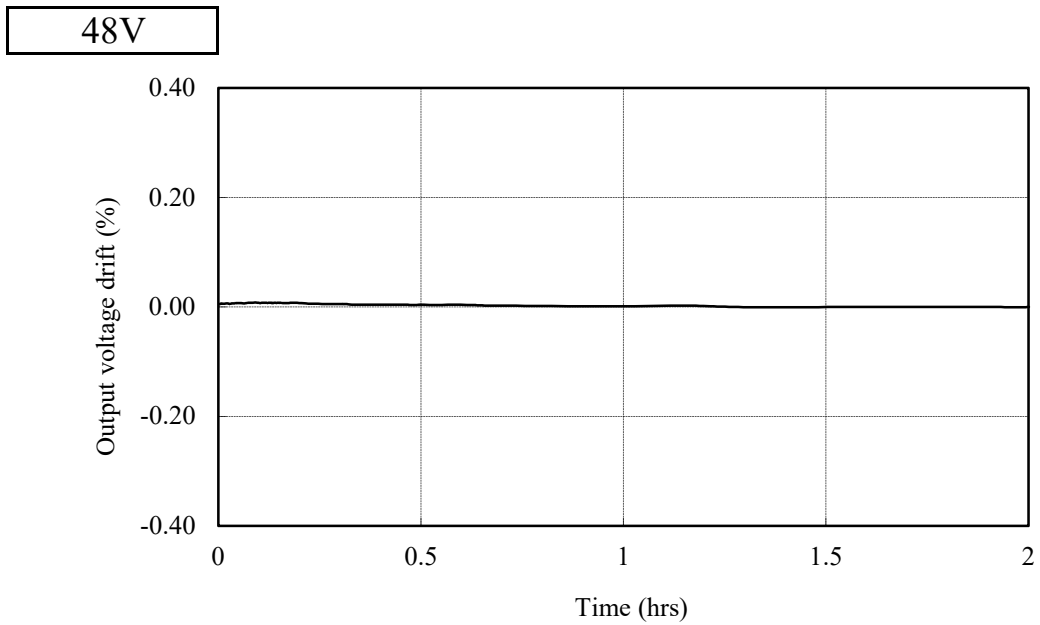
48V



## 2.2 通電ドリフト特性

Warm up voltage drift characteristics

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

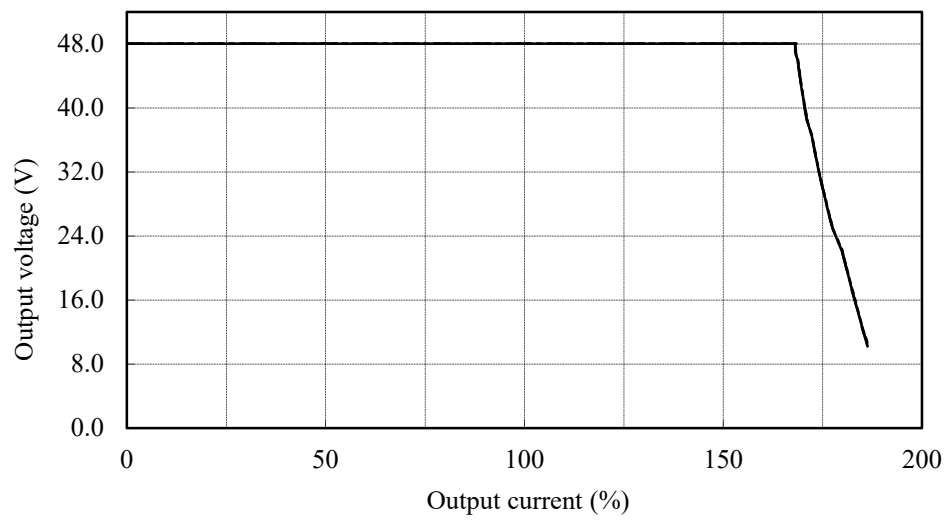


## 2.3 過電流保護特性

Over current protection (OCP) characteristics

Conditions Vin : 170 VAC .....  
                  200 VAC -.-.-.-  
                  265 VAC ————  
                  Ta : 25 °C

48V



## 2.3 過電流保護特性

Over current protection (OCP) characteristics

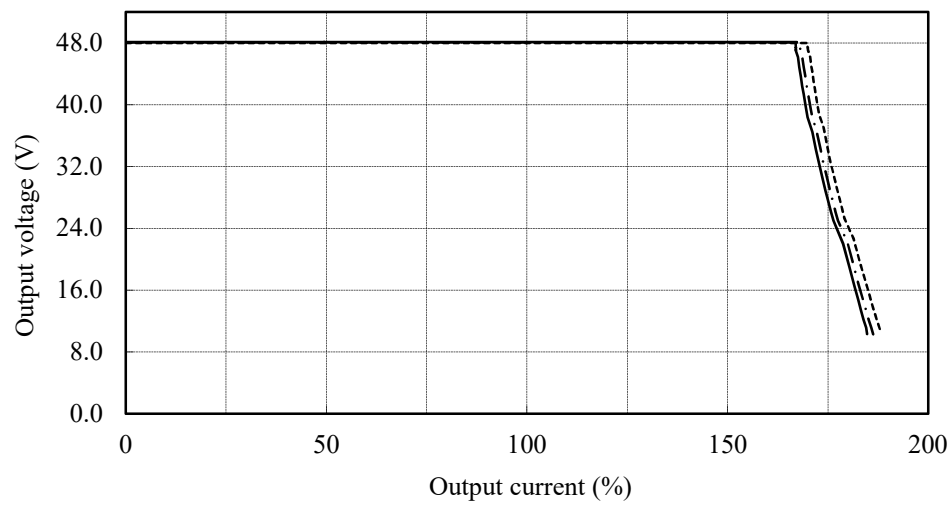
Conditions Vin : 200 VAC

Ta : -10 °C - - - - -

25 °C - · - · - ·

40 °C ———

48V



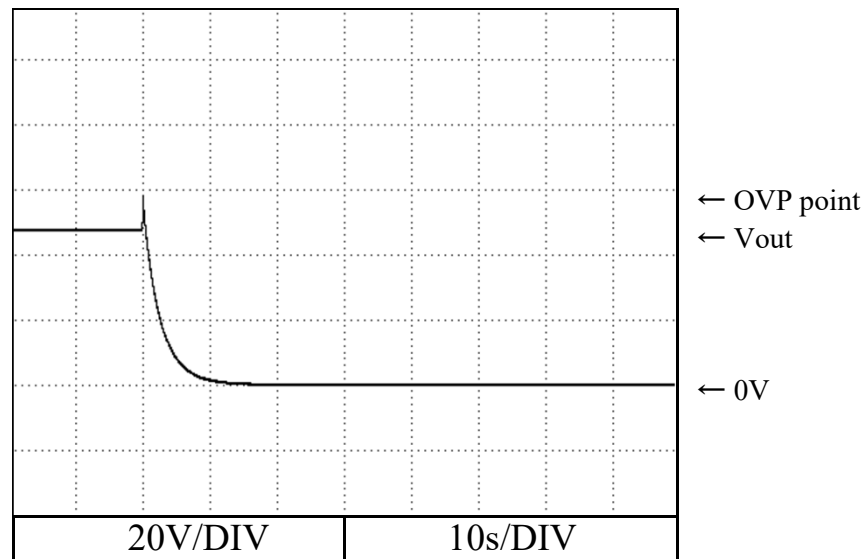


## 2.4 過電圧保護特性

Over voltage protection (OVP) characteristics

Conditions Vin : 200 VAC  
Iout : 0 %  
Ta : 25 °C

48V



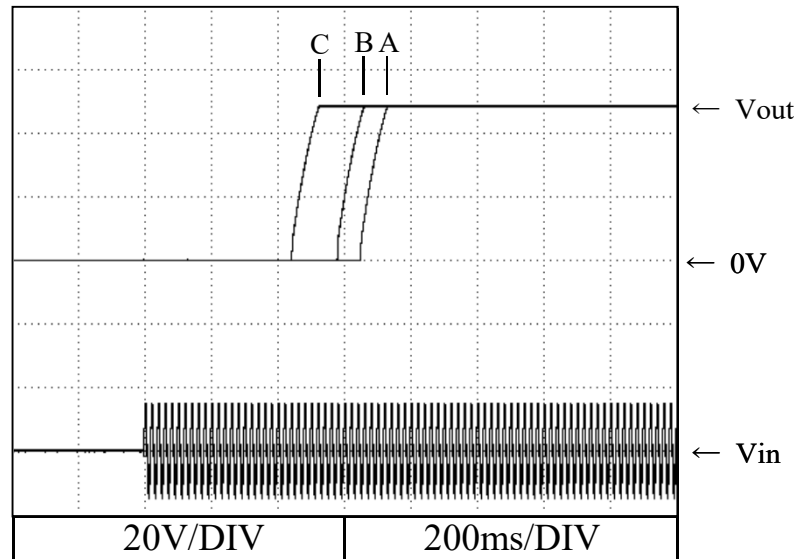


## 2.5 出力立ち上がり特性

Output rise characteristics

Conditions  $V_{in}$  : 170 VAC (A)  
200 VAC (B)  
265 VAC (C)  
 $I_{out}$  : 100 %  
 $T_a$  : 25 °C

48V

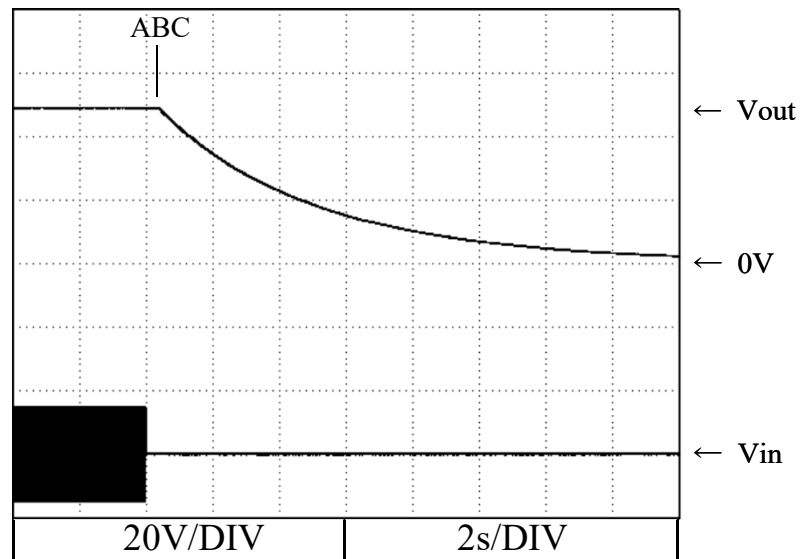


## 2.6 出力立ち下がり特性

Output fall characteristics

Conditions Vin : 170 VAC (A)  
200 VAC (B)  
265 VAC (C)  
Iout : 0 %  
Ta : 25 °C

48V

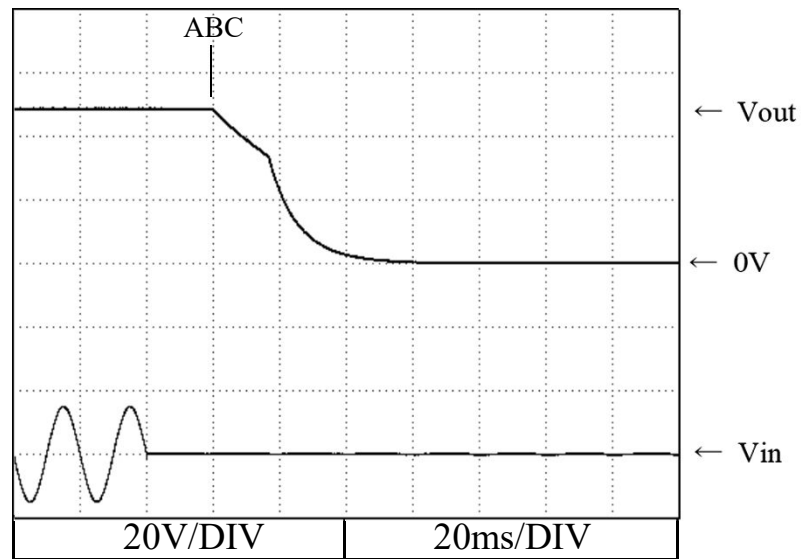


## 2.6 出力立ち下がり特性

Output fall characteristics

Conditions  $V_{in}$  : 170 VAC (A)  
                  200 VAC (B)  
                  265 VAC (C)  
 $I_{out}$  : 100 %  
 $T_a$  : 25 °C

48V

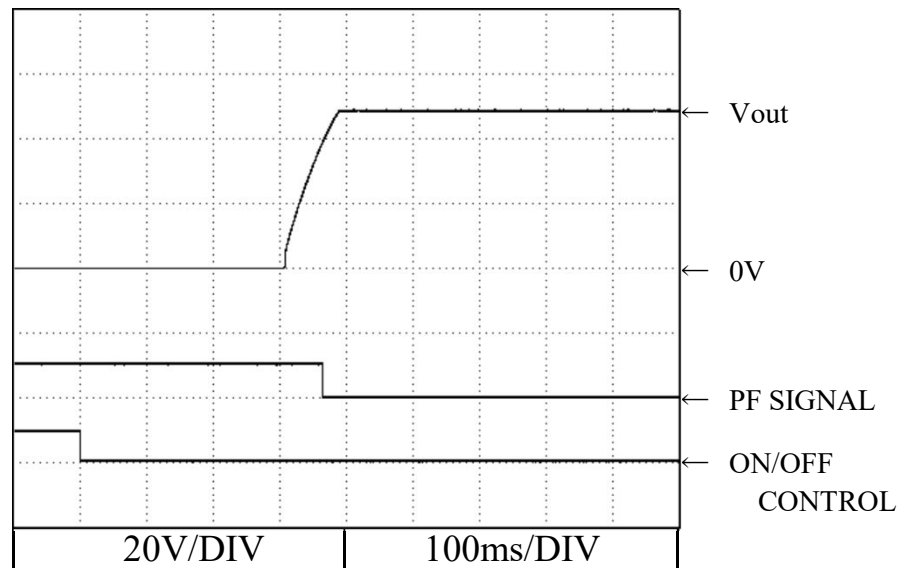


## 2.7 ON/OFFコントロール時出力立ち上がり特性

Output rise characteristics with ON/OFF CONTROL

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

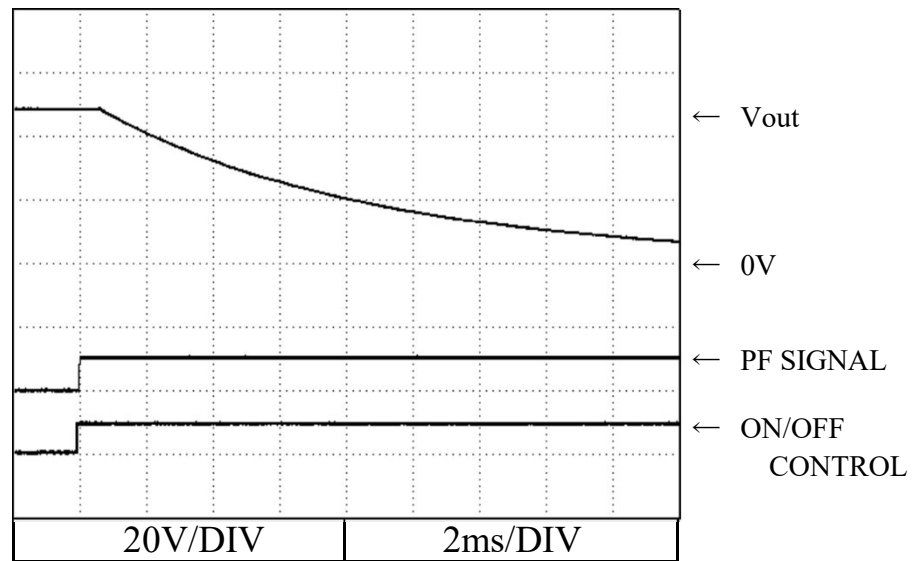
48V



## 2.8 ON/OFF コントロール時出力立ち下がり特性 Output fall characteristics with ON/OFF CONTROL

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

48V



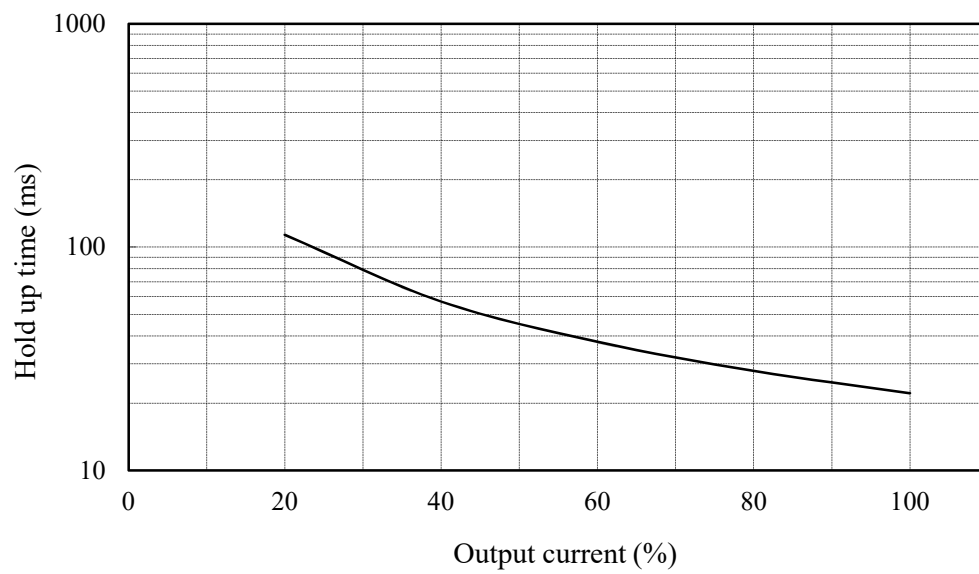
## 2.9 出力保持時間特性

Hold up time characteristics

Conditions  $V_{in}$  : 200 VAC

$T_a$  : 25 °C

48V



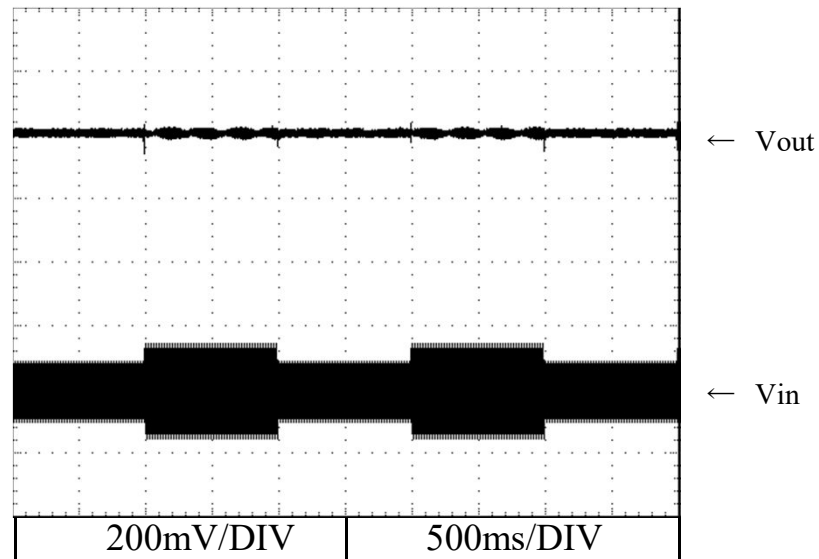


## 2.10 過渡応答（入力急変）特性

Dynamic line response characteristics

Conditions Vin : 170 VAC $\leftrightarrow$ 265VAC  
Iout : 100 %  
Ta : 25 °C

48V



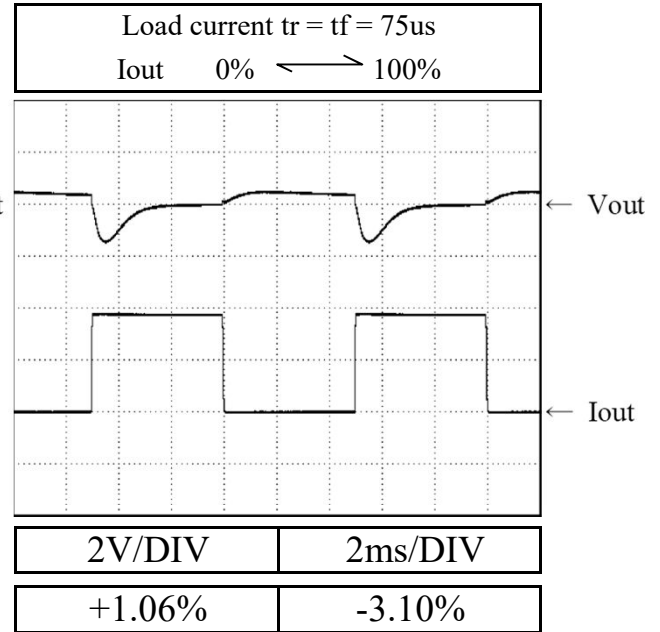
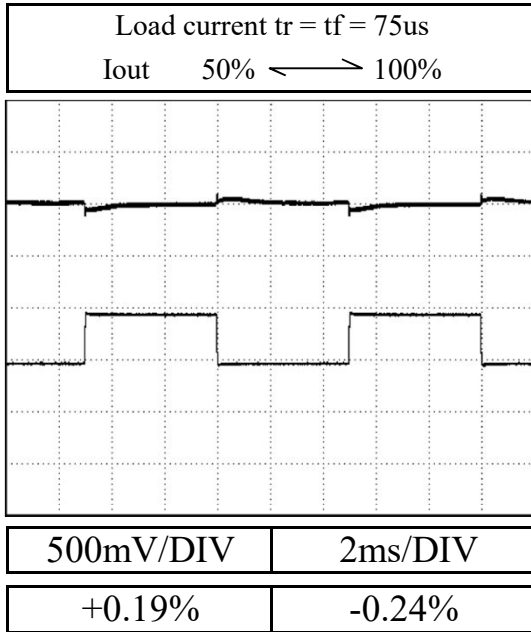
## 2.11 過渡応答(負荷急変)特性

Dynamic load response characteristics

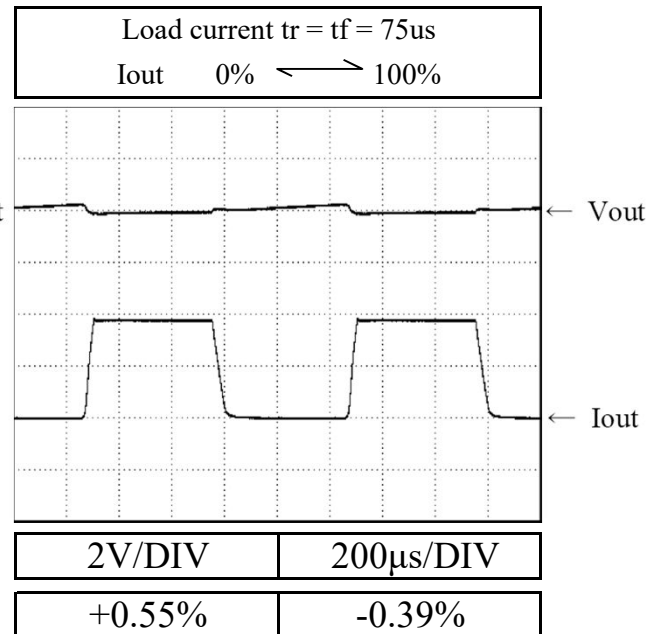
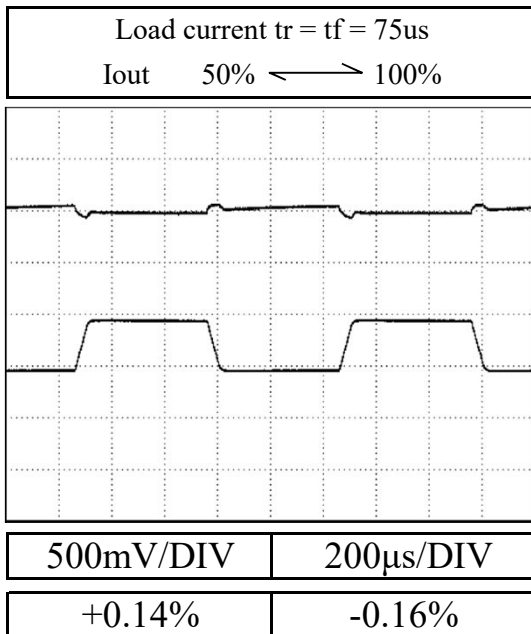
Conditions  $V_{in}$  : 200 VAC  
 $T_a$  : 25 °C

48V

$f=100\text{Hz}$



$f=1\text{kHz}$



## 2.12 入力電圧瞬停特性

Response to brown out characteristics

Conditions  $V_{in}$  : 200 VAC

$I_{out}$  : 100 %

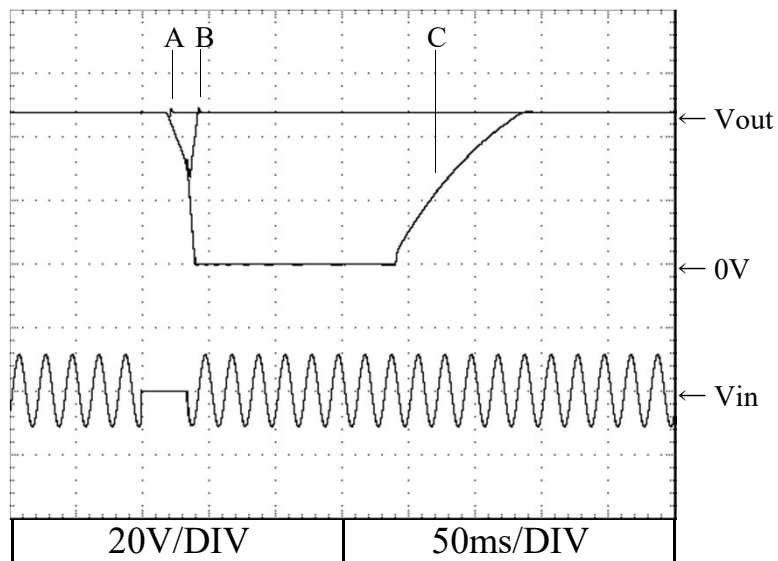
$T_a$  : 25 °C

48V

A = 20ms

B = 33ms

C = 34ms

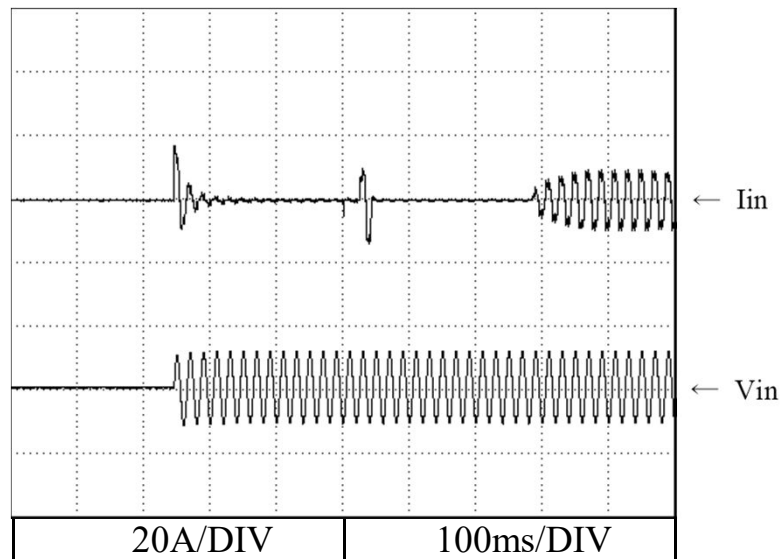


2.13 入力サージ電流（突入電流）特性  
Inrush current waveform

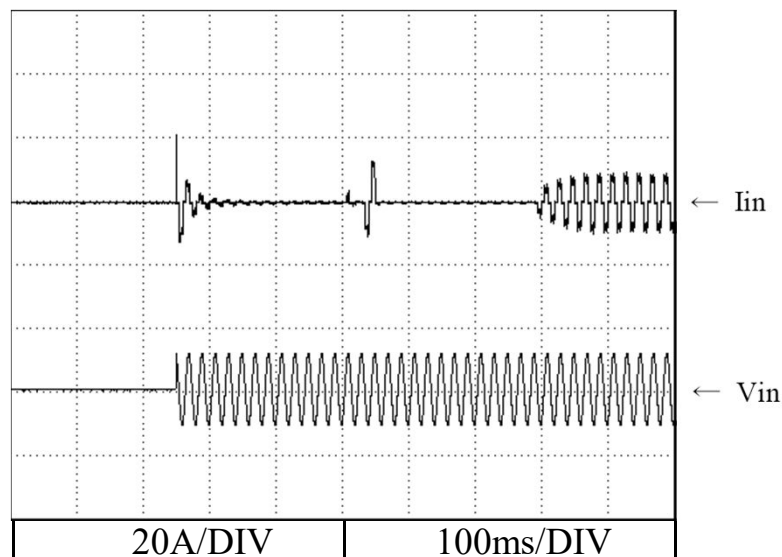
Conditions Vin : 200 VAC  
Iout : 100 %  
Ta : 25 °C

24V  
(参考)

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



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

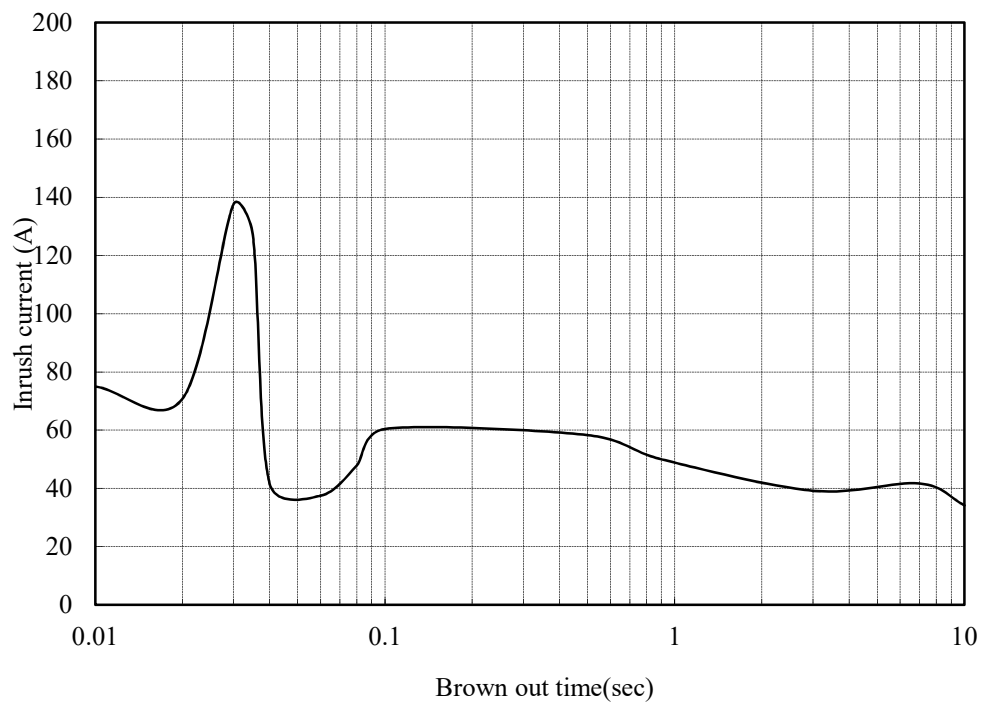


## 2.14 瞬停時突入電流特性

Inrush current characteristics

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

24V  
(参考)



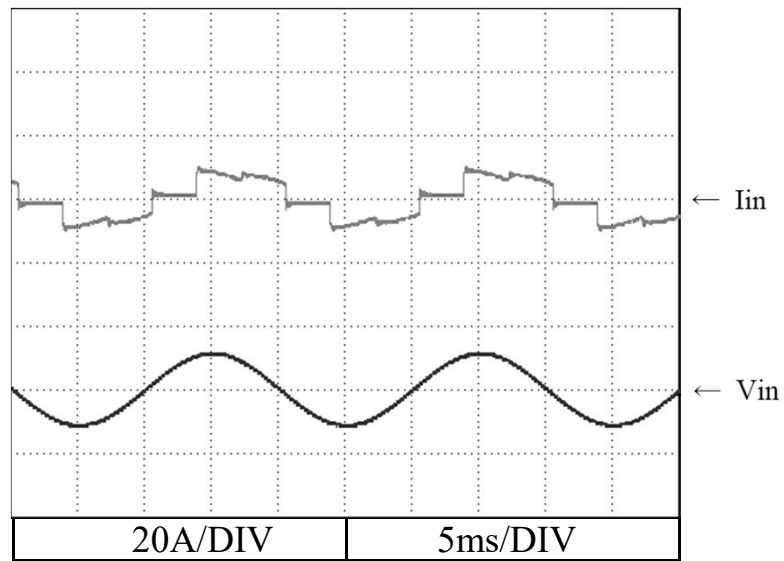
※ 上記値は、2次突入電流を含んだ値である。  
Above data includes secondary inrush current.

## 2.15 入力電流波形

Input current waveform

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

24V  
(参考)

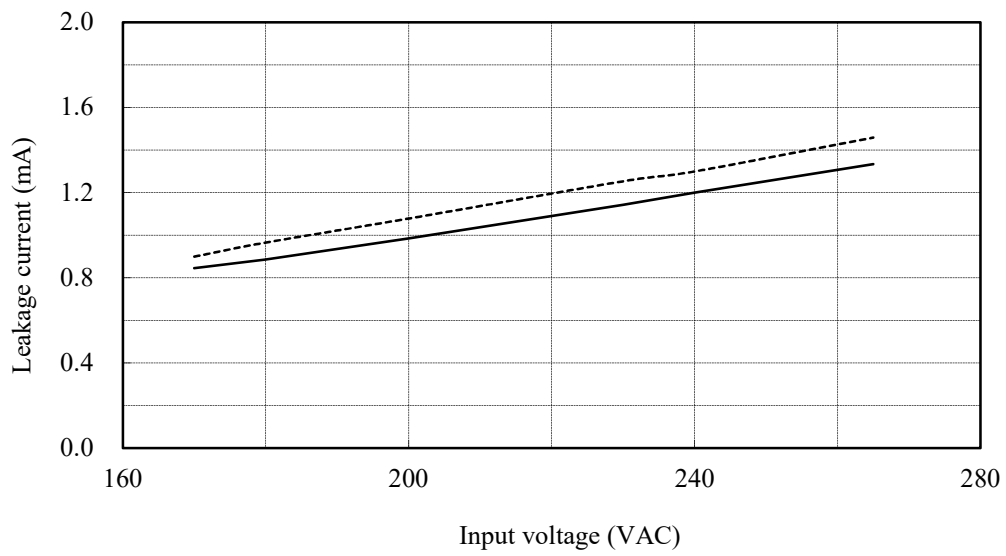


## 2.16 リーク電流特性

Leakage current characteristics

Conditions Iout : 0 %    - - - - -  
                  100 %    ————  
          Ta : 25 °C  
          f : 50 Hz  
Equipment used : 3155(HIOKI)

48V



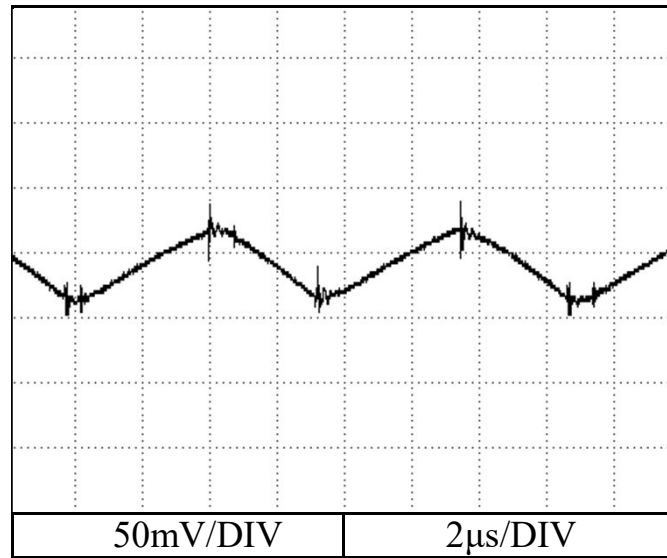
## 2.17 出力リップル、ノイズ波形

Output ripple and noise waveform

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

NORMAL MODE

48V





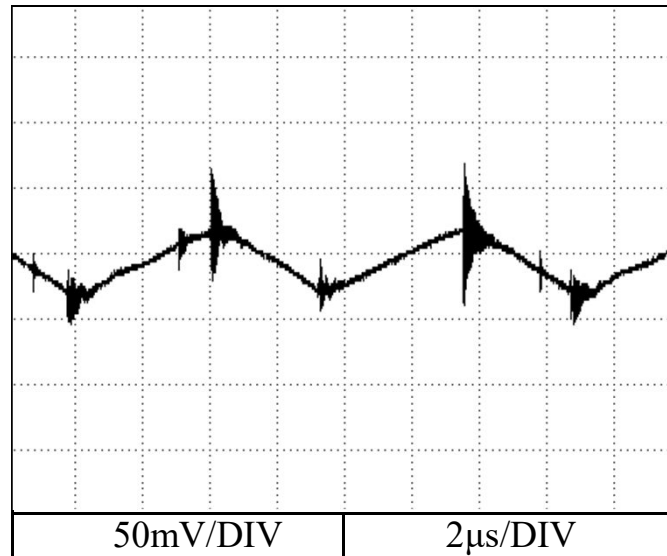
## 2.17 出力リップル、ノイズ波形

Output ripple and noise waveform

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

NORMAL + COMMON MODE

48V



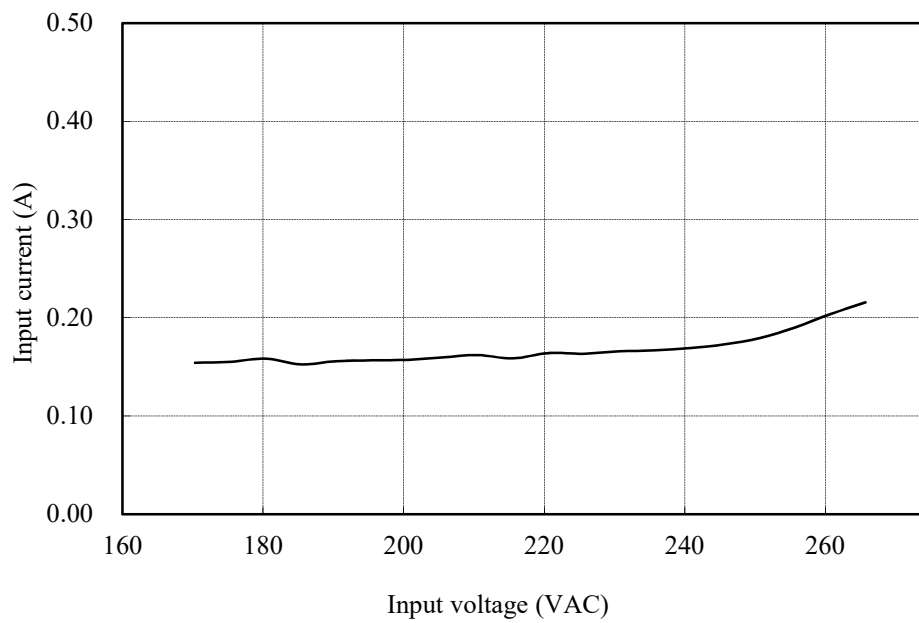
## 2.18 スタンバイ電流

Stand-by current

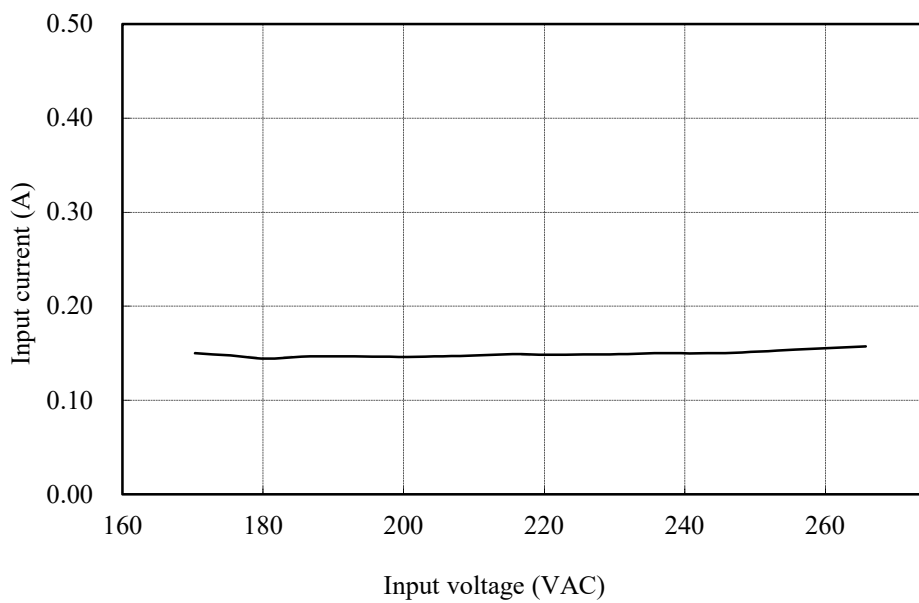
Condition Ta: 25 °C

24V  
(参考)

**Io = 0%**



**Remote control OFF**



## 2.19 EMI特性

### Electro-Magnetic Interference characteristics

雑音端子電圧

Conducted Emission

Conditions Vin : 200VAC

Iout : 100%

48V

Point A (199kHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	79.0	57.3
AV	66.0	47.7

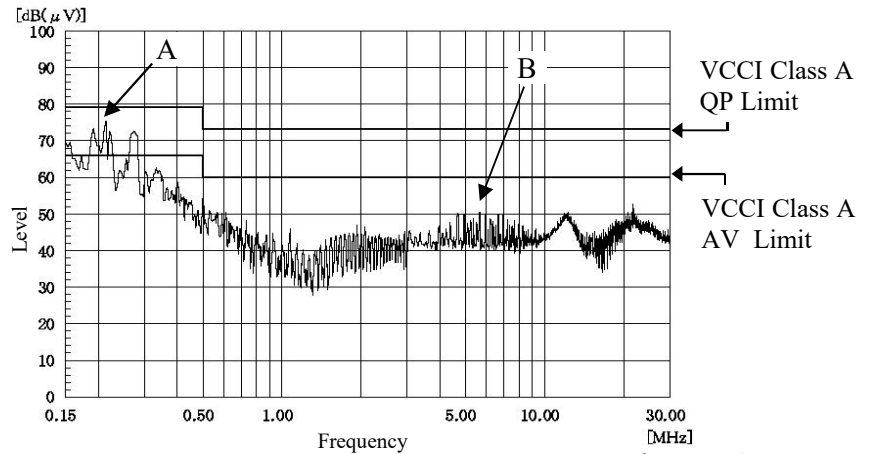
Point B (5.918MHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	73.0	50.2
AV	60.0	49.9

Point C (212kHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	79.0	53.5
AV	66.0	50.1

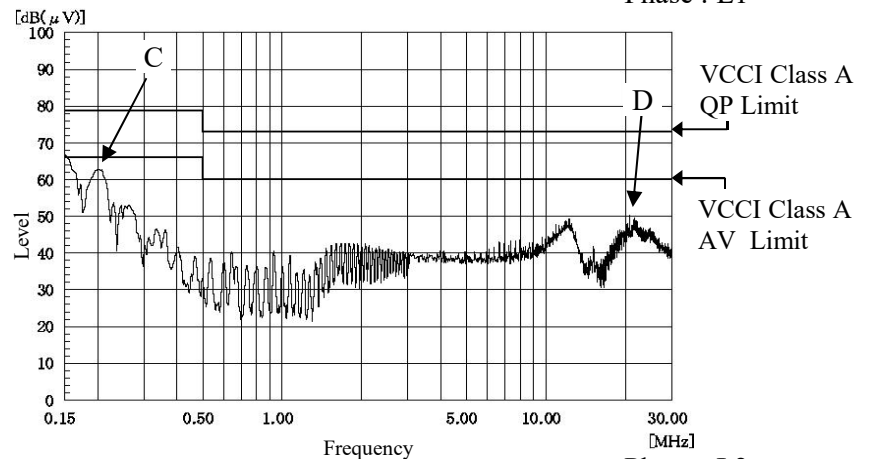
Point D (21.747MHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	73.0	47.4
AV	60.0	44.8

Point E (212kHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	79.0	53.4
AV	66.0	52.7

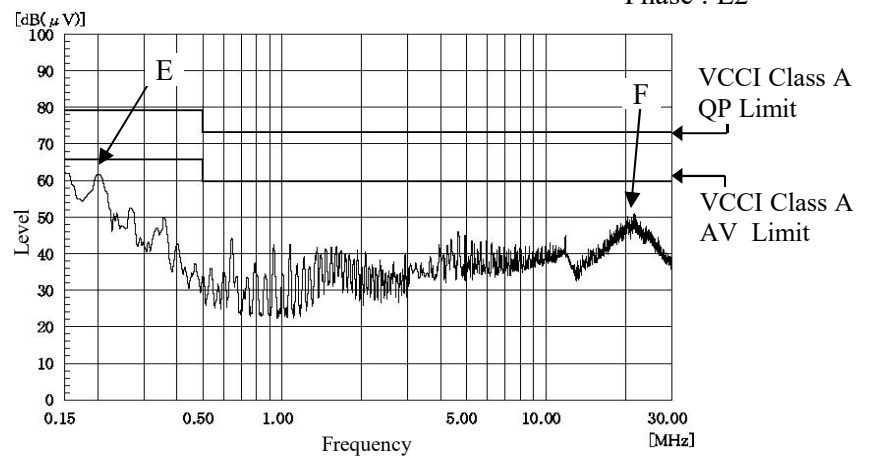
Point F (21.461MHz)		
Ref.	Limit	Measure
Data	(dBuV)	(dBuV)
QP	73.0	48.5
AV	60.0	46.1



Phase : L1



Phase : L2



Phase : L3

EN55011-A,EN55032-Aの限界値はVCCI class Aの限界値と同じ

Limit of EN55011-A,EN55032-A are same as its VCCI class A.

上記は、尖頭値検波(PK)方式にて測定した波形です。

The above is wave measured by the peak detection mode.

## 2.19 EMI特性

Electro-Magnetic Interference characteristics

雑音電界強度

Radiated Emission

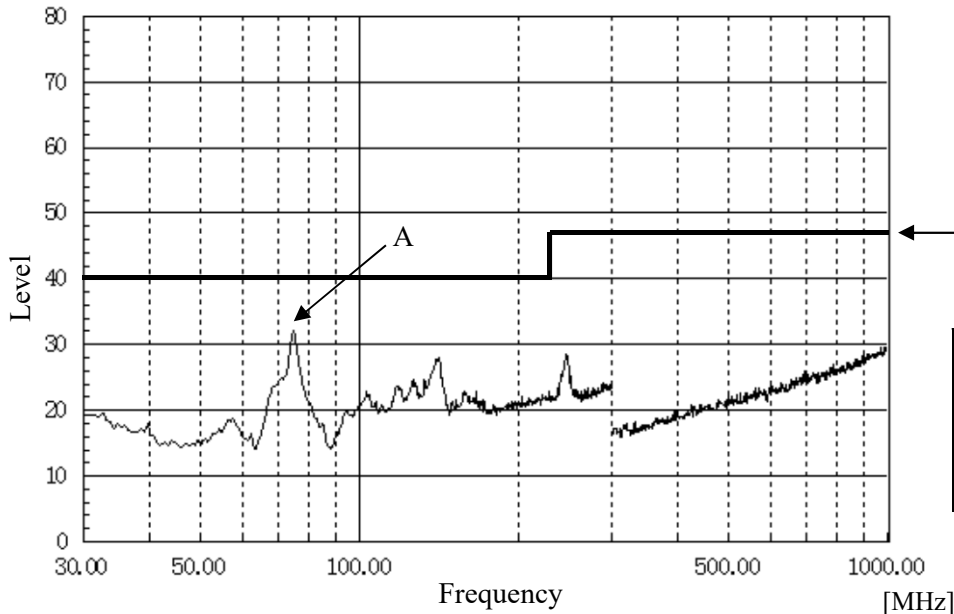
Conditions Vin : 200VAC

Iout : 100%

48V

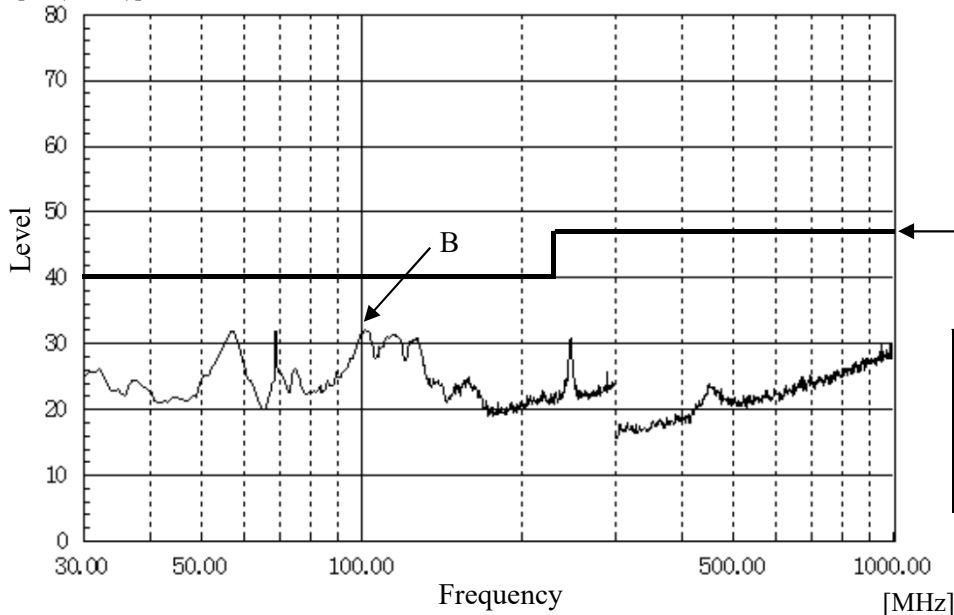
HORIZONTAL

[dB(uV/m)]



VERTICAL

[dB(uV/m)]



EN55011-A,EN55032-Aの限界値はVCCI class Aの限界値と同じ

Limit of EN55011-A,EN55032-A are same as its VCCI class A.

上記は、尖頭値検波(PK)方式にて測定した波形です。

The above is wave measured by the peak detection mode.