

HWS1500-36

EVALUATION DATA

型式データ

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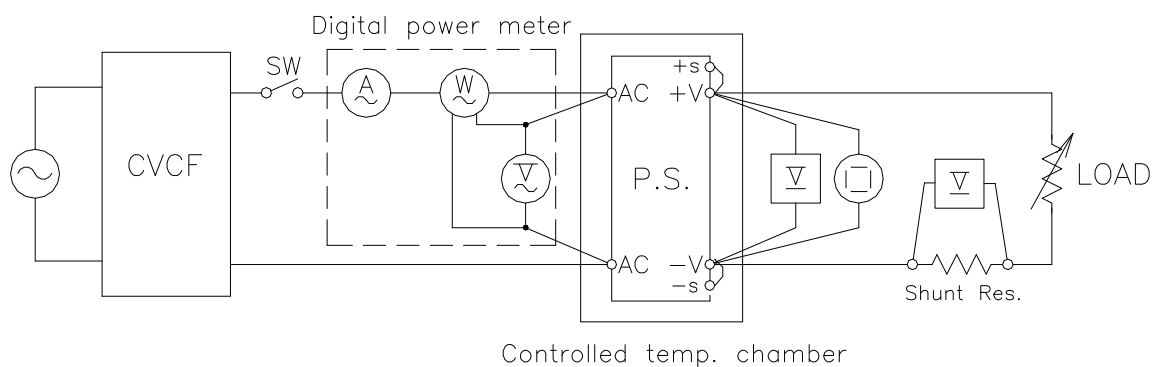
使用記号 Terminology used

	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

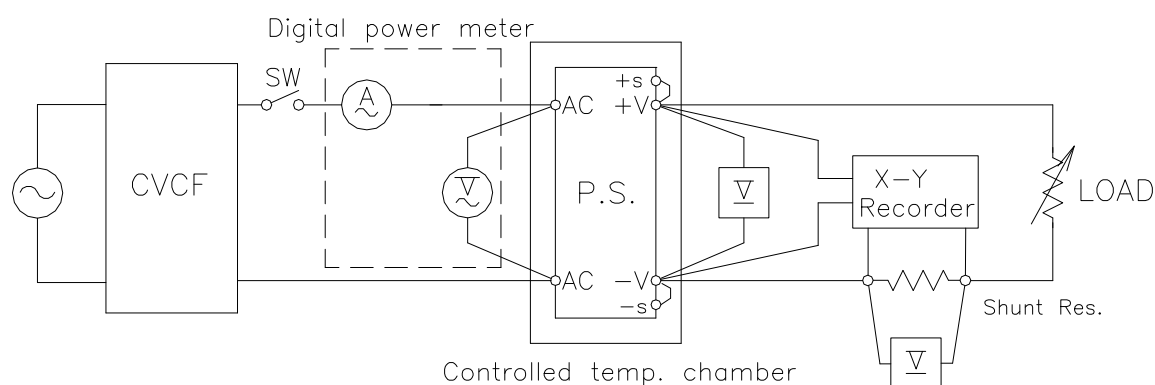
1.1 測定回路 Circuit used for determination

- (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

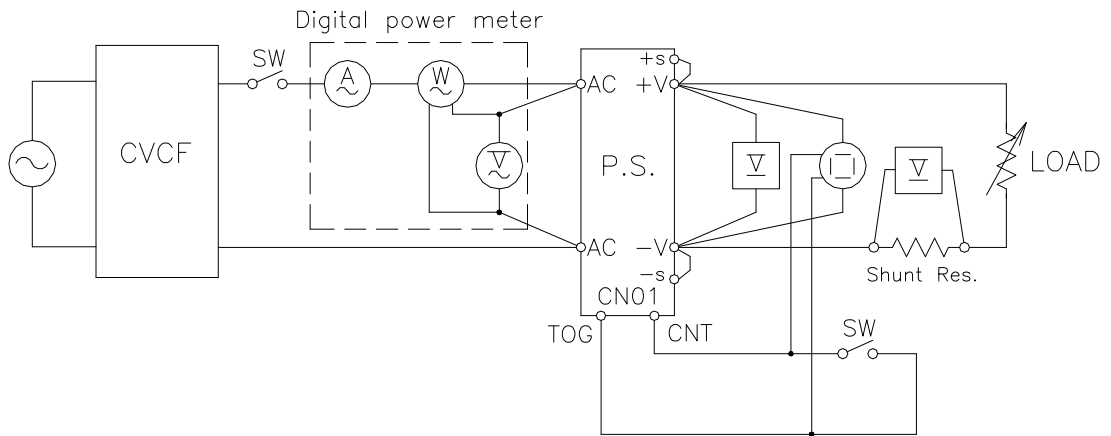


- (4) 過電圧保護特性 Over voltage protection (OVP) characteristics
Same as Steady state data

- (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

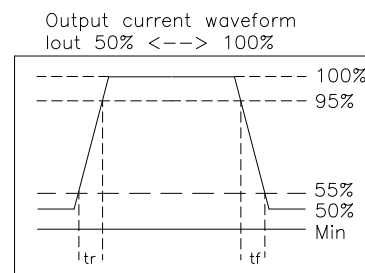
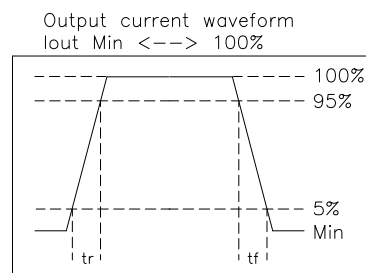
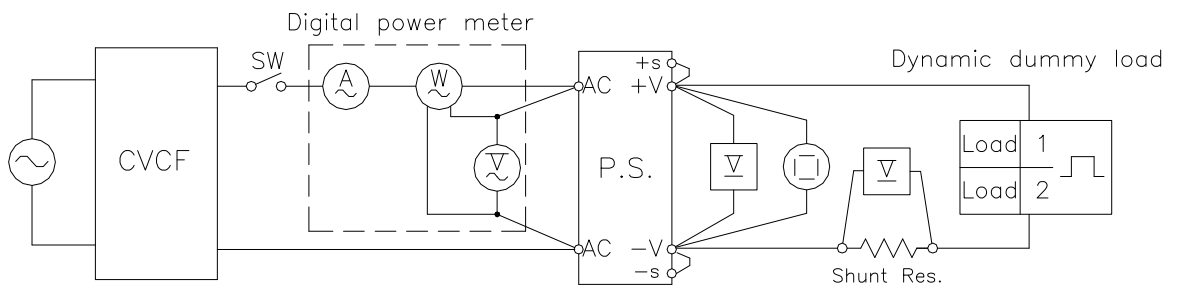
- (7) ON/OFFコントロール時出力立ち上がり特性
Output rise characteristics with ON/OFF CONTROL



- (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

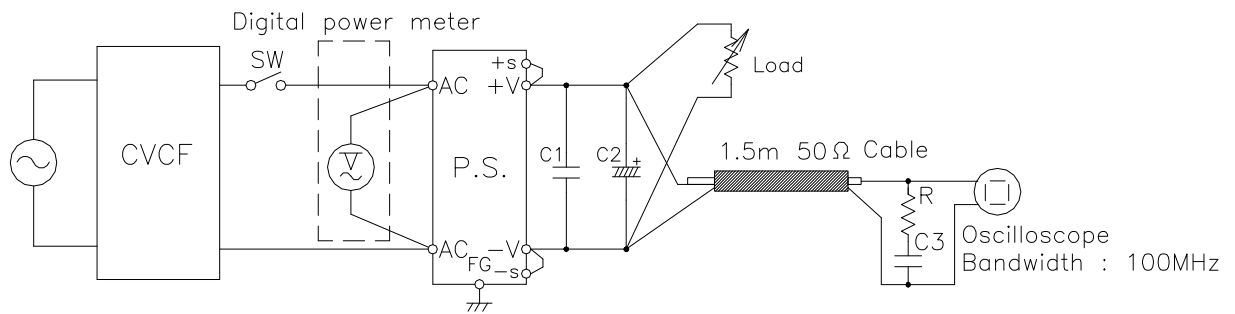
- (9) 過渡応答（入力急変）特性 Dynamic line response characteristics
Same as Steady state data

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



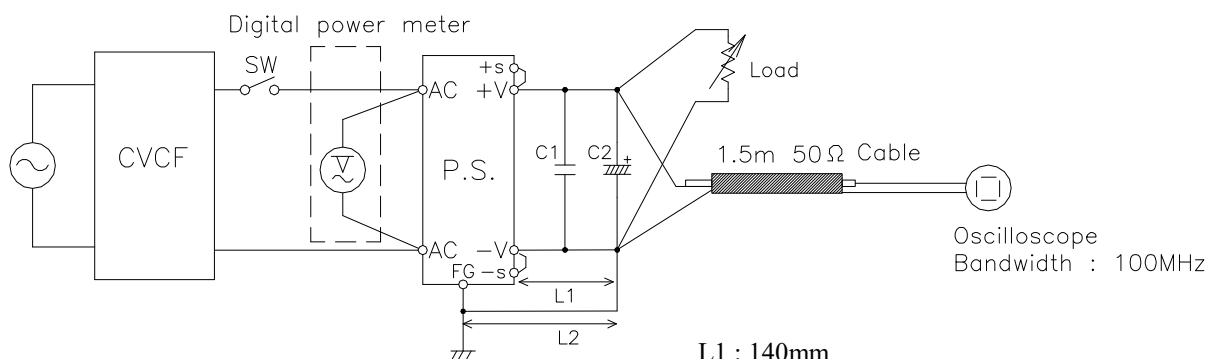
(11) 出力リップル、ノイズ特性 Output ripple and noise characteristics

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



- R : 50 Ω
- C1 : 0.47uF Film capacitor
- C2 : 22uF Electrolytic capacitor
- C3 : 4700pF Film capacitor

(b) Normal + Common Mode



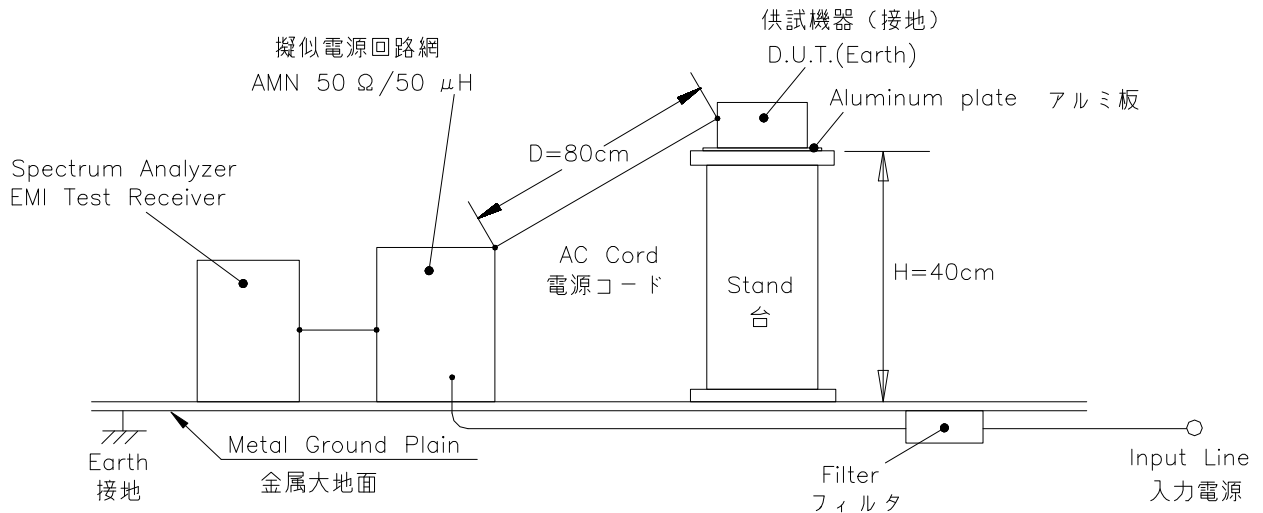
- L1 : 140mm
- L2 : 140mm
- C1 : 0.47uF Film capacitor
- C2 : 22uF Electrolytic capacitor

(12) EMI 特性

Electro-Magnetic Interference characteristics

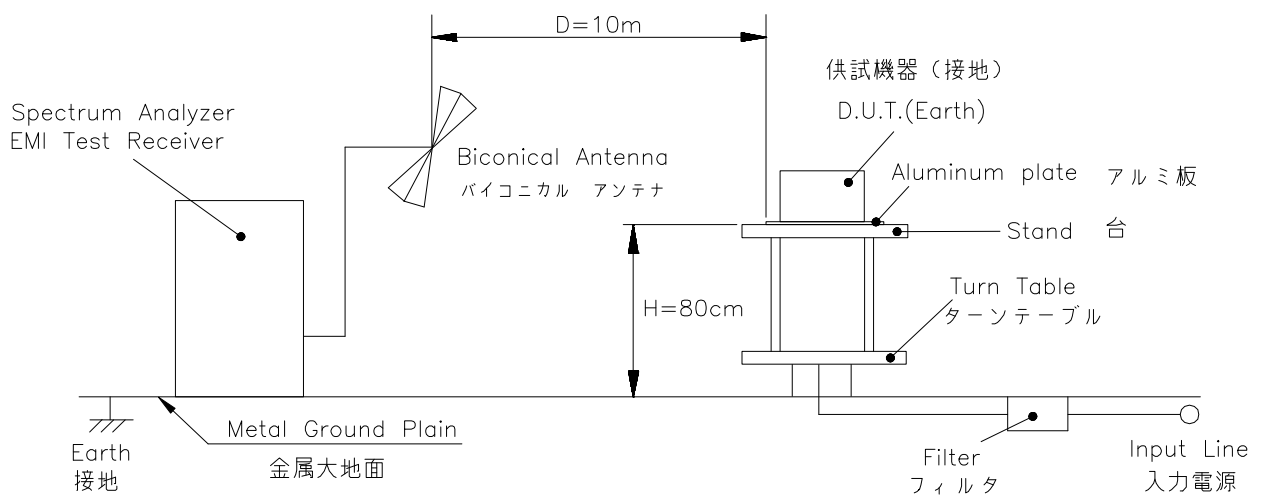
(a) 雑音端子電圧 (帰還ノイズ)

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	OSCILLOSCOPE	HITACHI DENSHI	V-1565
2	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS540C/TDS5054
3	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740EL/DL7480/DL7740
4	DIGITAL MULTIMETER	AGILENT TECHNOLOGY	34970A
5	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110E
6	DIGITAL POWER METER	HIOKI	3331/3332/3187
7	SHUNT RESISTOR	YOKOGAWA ELECT.	2215
8	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503B
9	CURRENT PROBE/AMPLIFIER	YOKOGAWA ELECT.	701930/700937
10	DYNAMIC DUMMY LOAD	FUJITSUDENSO	EUL-1800 α L SLV+EUL-600 α XL
11	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ1004W+PLZ2004WB
12	CVCF	KIKUSUI	PCR2000L \times 2/PCR4000L/PCR4000LA
13	LEAKAGE CURRENT METER	HIOKI	3155
14	X-Y RECORDER	GRAPHTEC	WX3000
15	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
16	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4KP/PL-1K
17	SPECTRUM ANALYZER	Hewlett Packard	8566B
18	EMI TEST RECEIVER	Schwarzbeck	FCKL1528
19	AMN	Schwarzbeck	NNLK8121
20	EMI TEST RECEIVER	Schwarzbeck	FCVU1534
21	ANTENNA(BICONICAL ANTENNA)	CHASE	CBL6111

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

36V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	230VAC	265VAC	line regulation	
0%	36.057V	36.057V	36.056V	36.056V	36.057V	1mV	0.003%
50%	36.055V	36.054V	36.055V	36.055V	36.055V	1mV	0.003%
80%	36.053V	36.053V	36.052V	36.053V	36.054V	2mV	0.006%
100%	—	36.051V	36.050V	36.051V	36.052V	2mV	0.006%
load regulation	4mV 0.011%	6mV 0.017%	6mV 0.017%	5mV 0.014%	5mV 0.014%		

2. Temperature drift

Conditions Vin=100VAC

Iout=100%

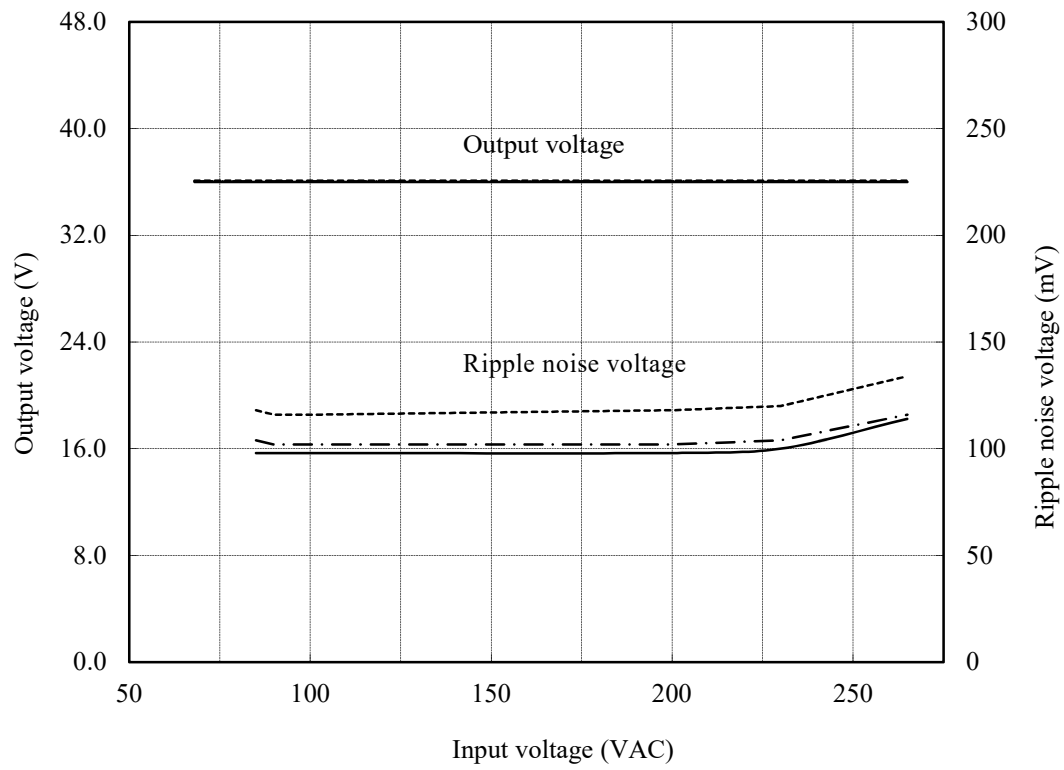
Ta	-10°C	+25°C	+50°C	temperature stability	
Vout	36.095V	36.051V	36.002V	93mV	0.258%

(2) 出力電圧・リップル電圧対入力電圧

Output voltage and Ripple noise voltage vs. Input voltage Conditions Iout : 100 %

Ta : -10 °C
 25 °C - · - · - ·
 50 °C ———

36V

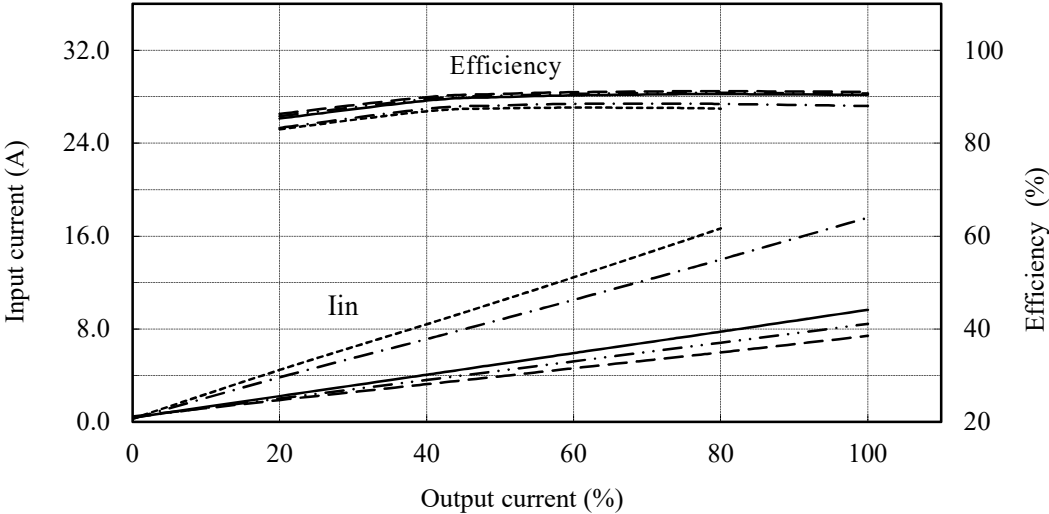


(3) 効率・入力電流対出力電流

Efficiency and Input current vs. Output current

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

36V

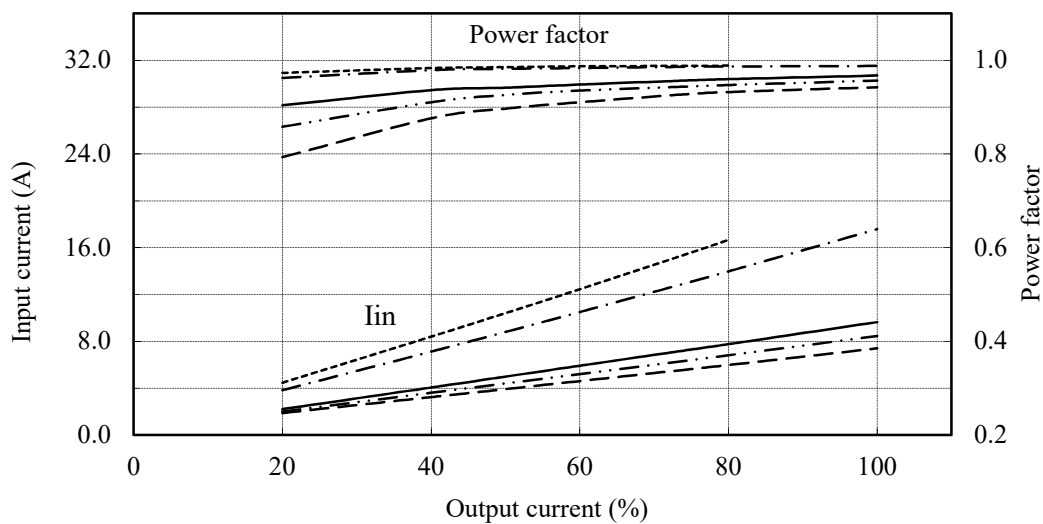


(4) 力率・入力電流対出力電流

Power factor and Input current vs. Output current

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

36V



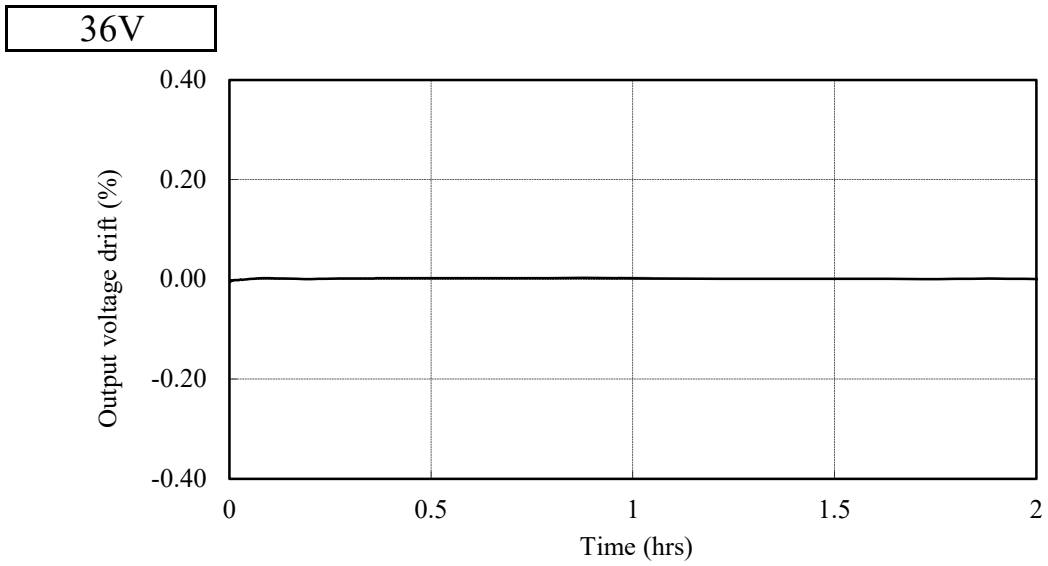
2.2 通電ドリフト特性

Warm up voltage drift characteristics

Conditions V_{in} : 100 VAC

I_{out} : 100 %

T_a : 25 °C

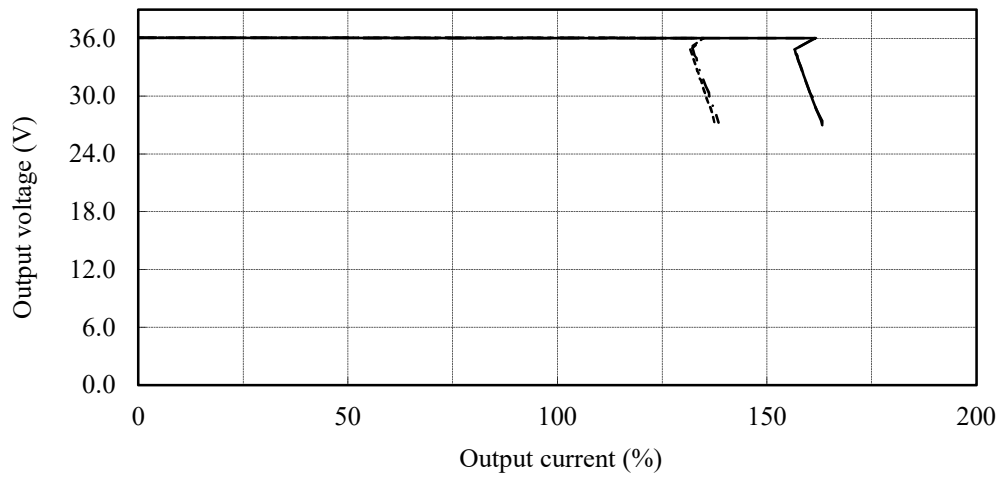


2.3 過電流保護特性

Over current protection (OCP) characteristics

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

36V



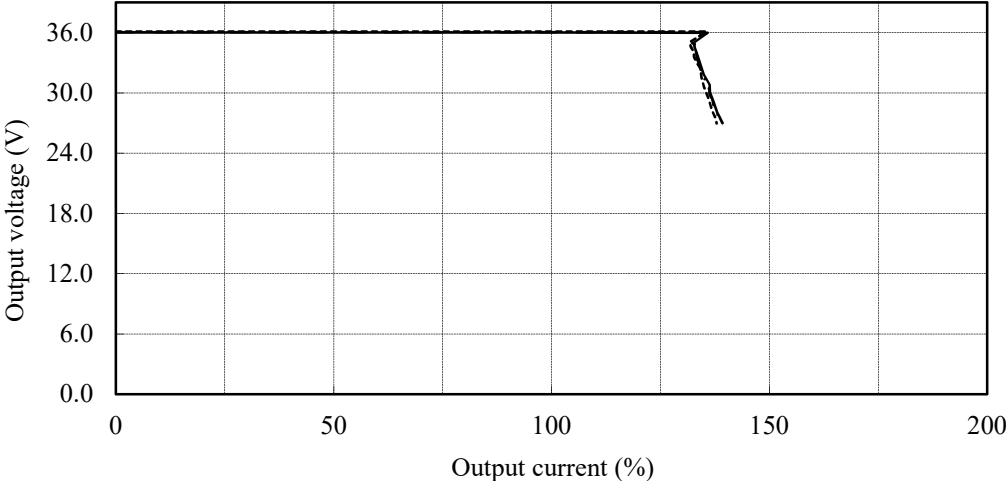
2.3 過電流保護特性

Over current protection (OCP) characteristics

Conditions Vin : 100VAC

Ta : -10 °C
25 °C - · - · - ·
50 °C ———

36V

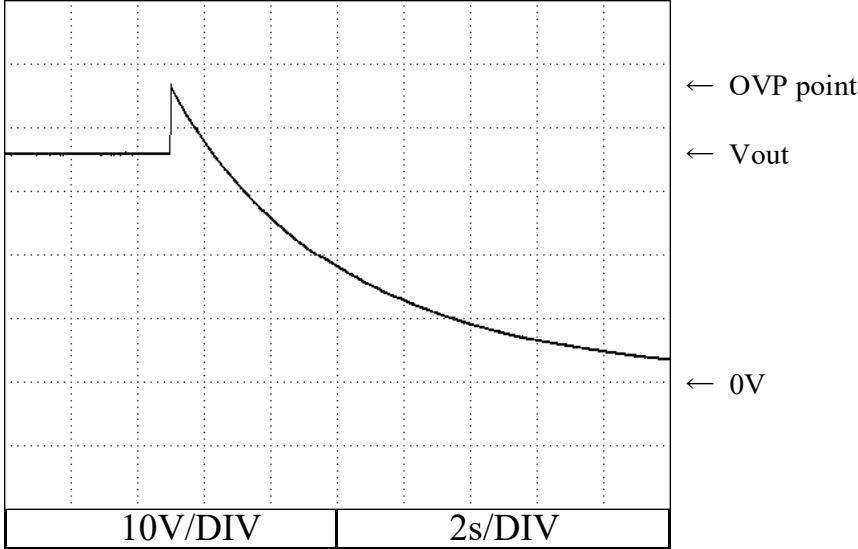


2.4 過電圧保護特性

Over voltage protection (OVP) characteristics

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

36V

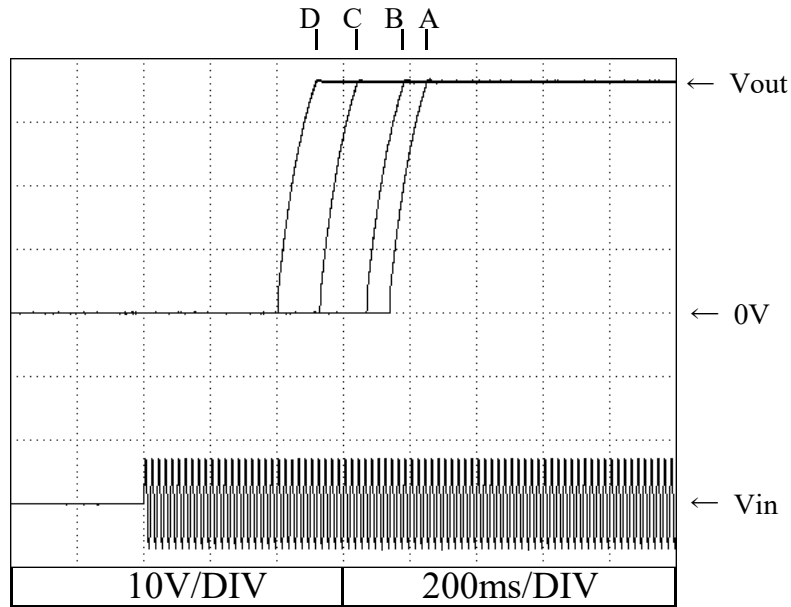


2.5 出力立ち上がり特性

Output rise characteristics

Conditions Vin : 85 VAC (A)
 100 VAC (B)
 200 VAC (C)
 265 VAC (D)
 Iout : 0 %
 Ta : 25 °C

36V

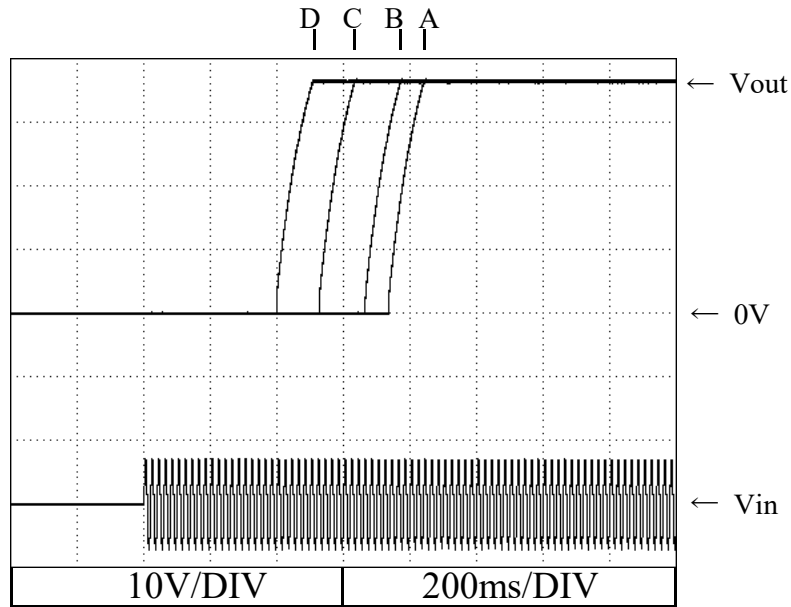


2.5 出力立ち上がり特性

Output rise characteristics

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

36V

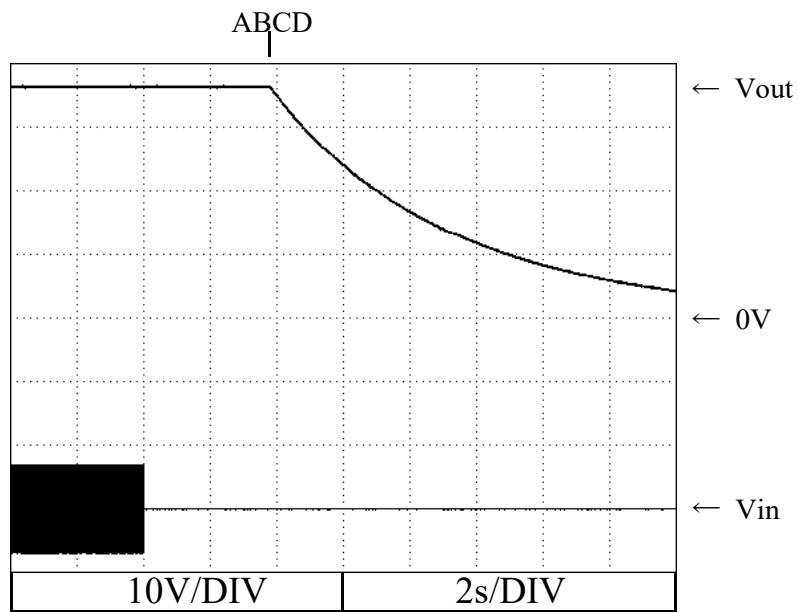


2.6 出力立ち下がり特性

Output fall characteristics

Conditions Vin : 85 VAC (A)
 100 VAC (B)
 200 VAC (C)
 265 VAC (D)
 Iout : 0 %
 Ta : 25 °C

36V

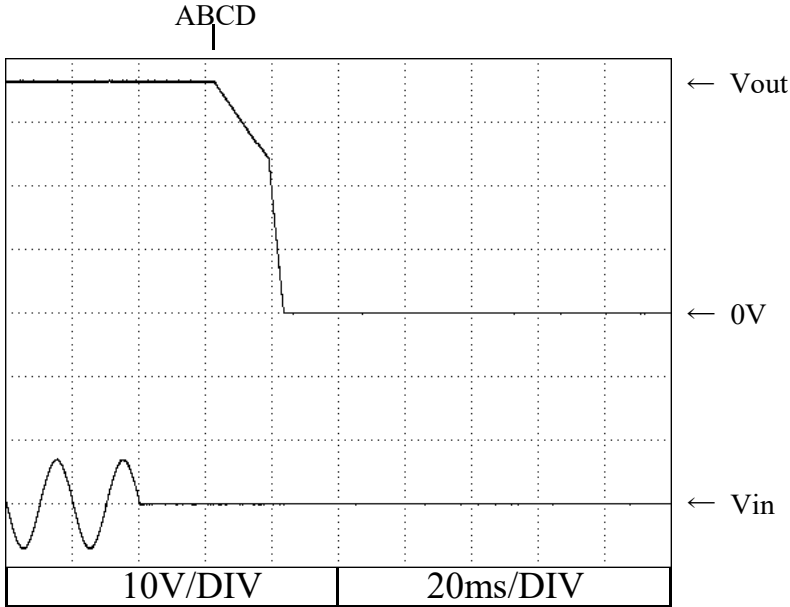


2.6 出力立ち下がり特性

Output fall characteristics

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

36V



2.7 ON/OFFコントロール時出力立ち上がり特性

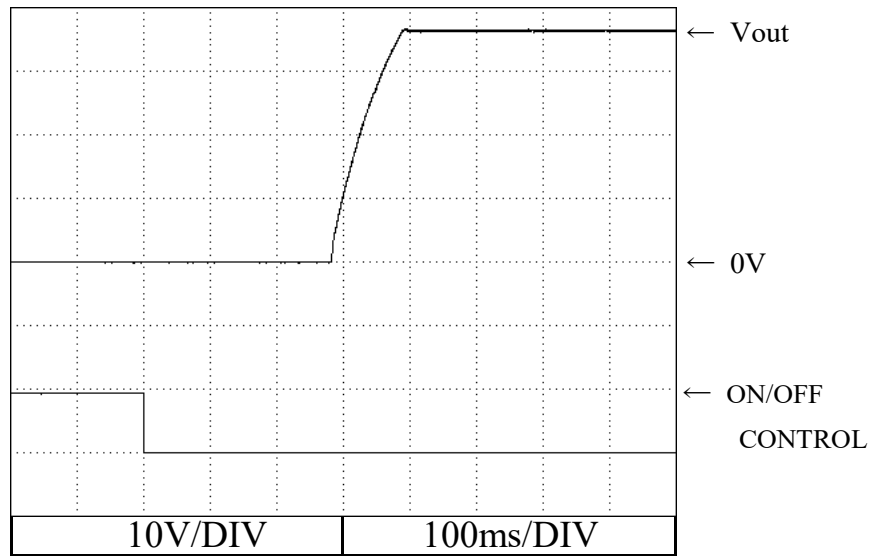
Output rise characteristics with ON/OFF CONTROL

Conditions V_{in} : 100 VAC

I_{out} : 100 %

T_a : 25 °C

36V

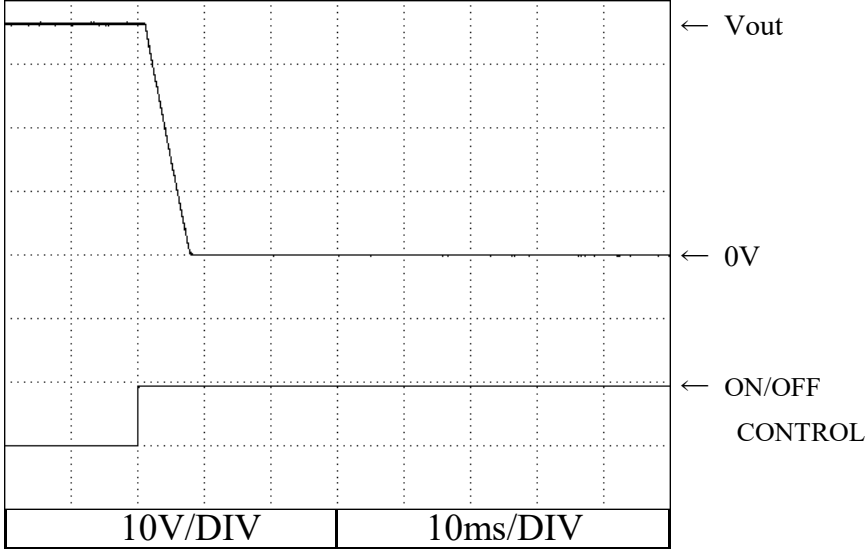


2.8 ON/OFFコントロール時出力立ち下がり特性

Output fall characteristics with ON/OFF CONTROL

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

36V

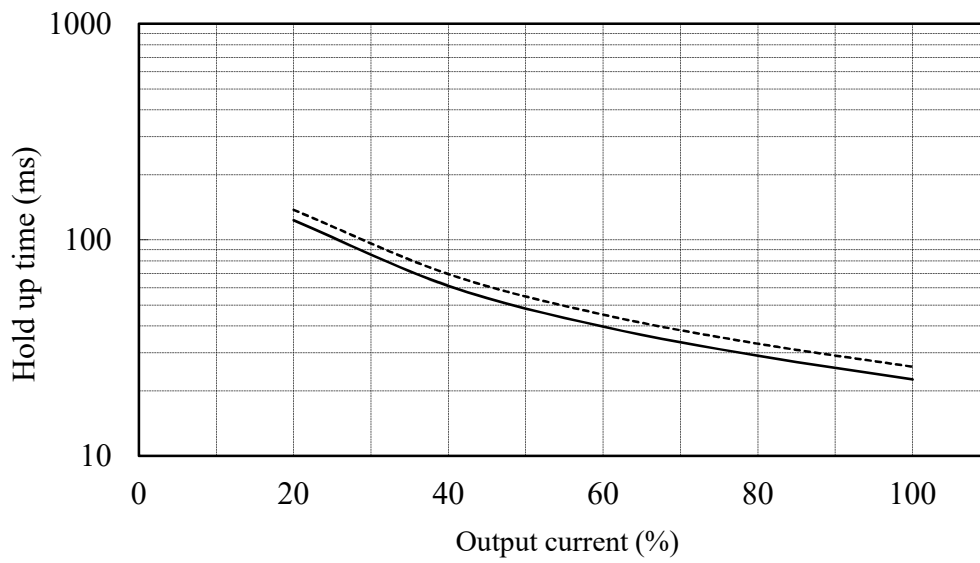


2.9 出力保持時間特性

Hold up time characteristics

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

36V

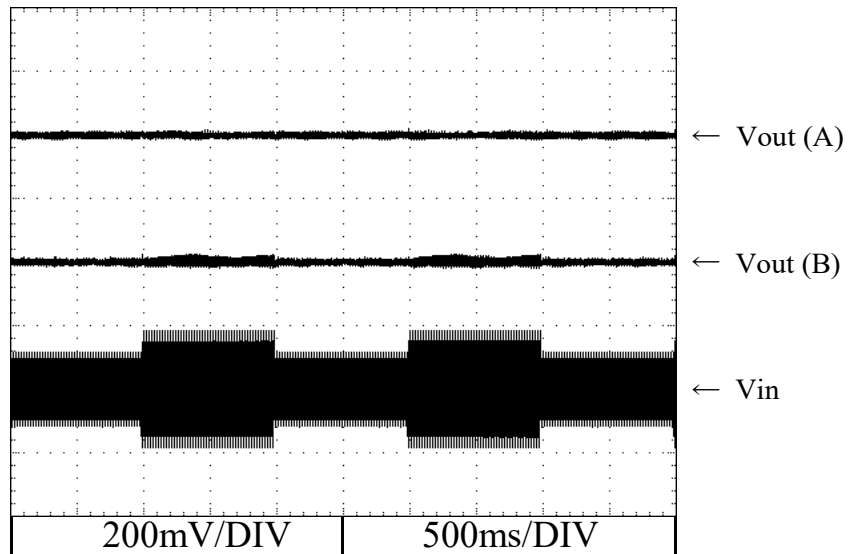


2.10 過渡応答 (入力急変) 特性

Dynamic line response characteristics

Conditions Vin : 85 VAC \leftrightarrow 132VAC (A)
170 VAC \leftrightarrow 265VAC (B)
Iout : 100 %
Ta : 25 °C

36V



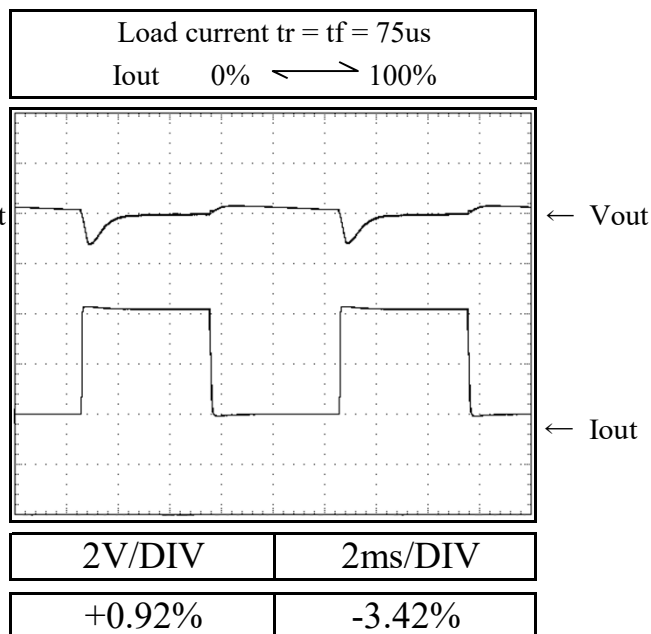
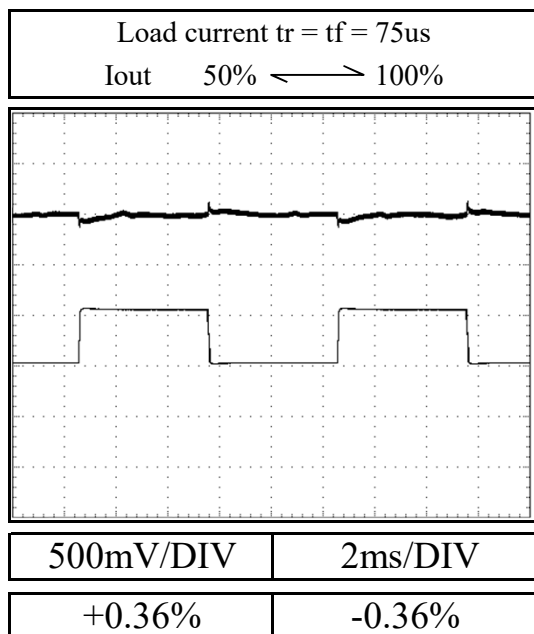
2.11 過渡応答（負荷急変）特性

Dynamic load response characteristics

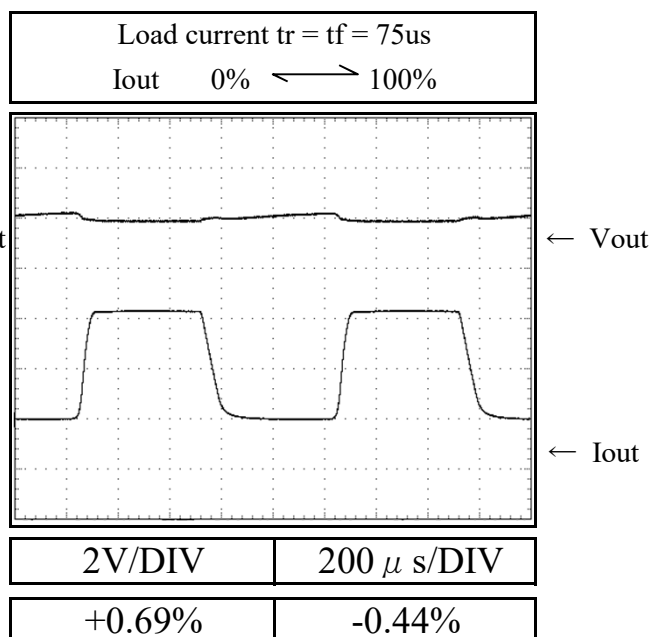
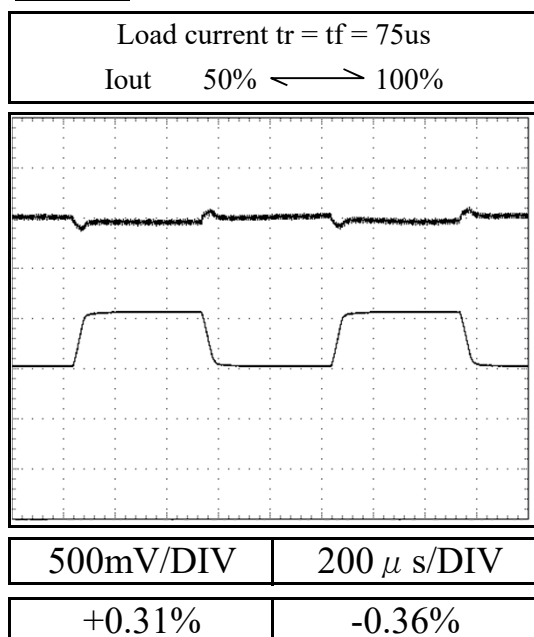
Conditions V_{in} : 100 VAC
 T_a : 25 °C

36V

$f=100\text{Hz}$



$f=1\text{kHz}$



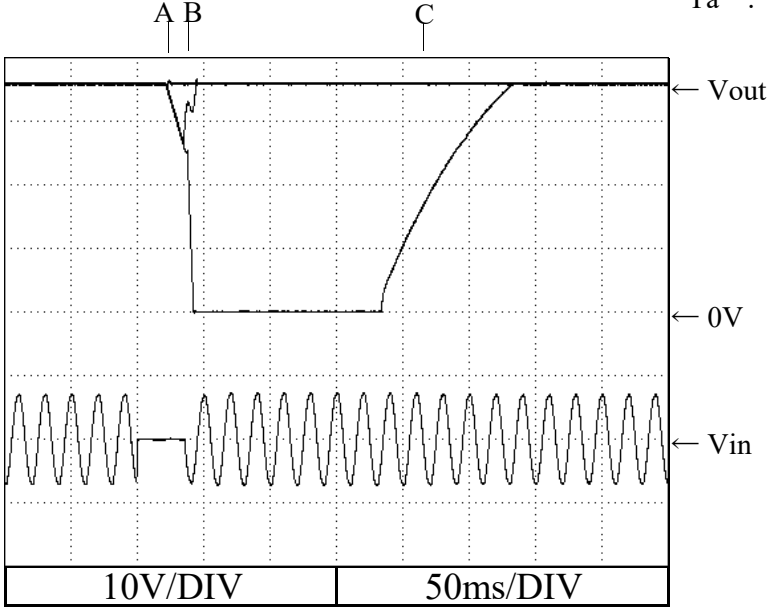
2.12 入力電圧瞬停特性

Response to brown out characteristics

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

36V

A = 19ms
B = 32ms
C = 33ms



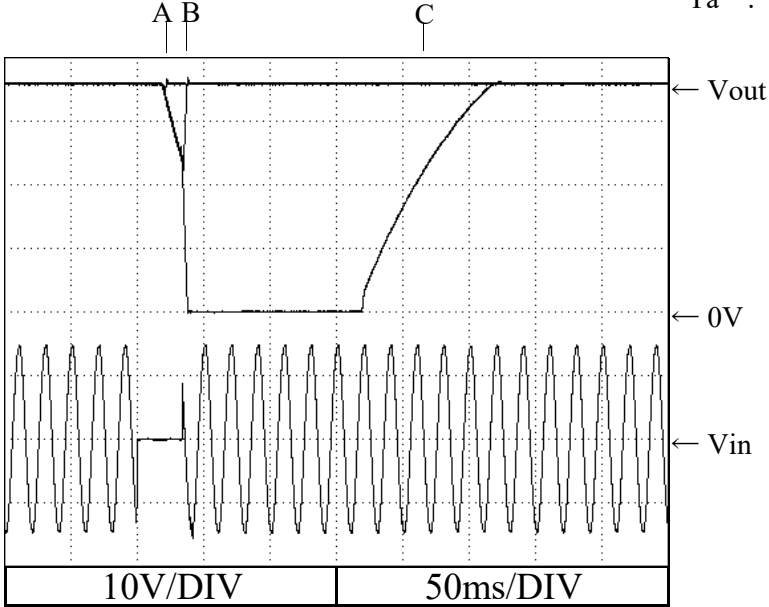
2.12 入力電圧瞬停特性

Response to brown out characteristics

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

36V

A = 19ms
B = 33ms
C = 34ms



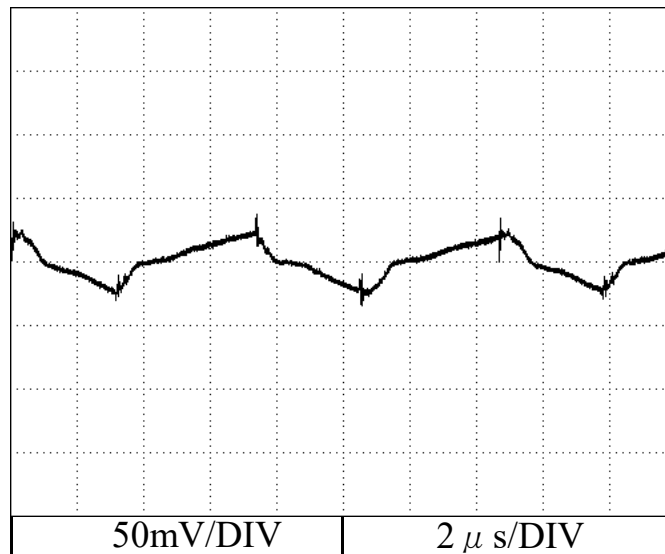
2.13 出力リップル、ノイズ波形

Output ripple and noise waveform

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

NORMAL MODE

36V



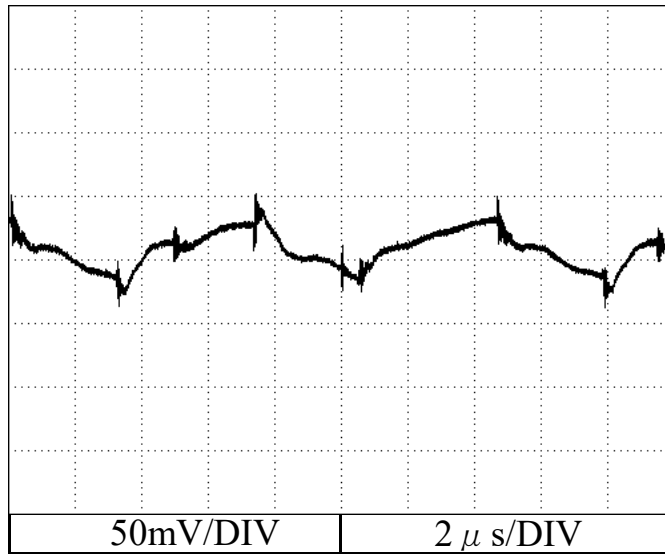
2.13 出力リップル、ノイズ波形

Output ripple and noise waveform

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

NORMAL + COMMON MODE

36V



2.14 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230VAC

Iout : 100%

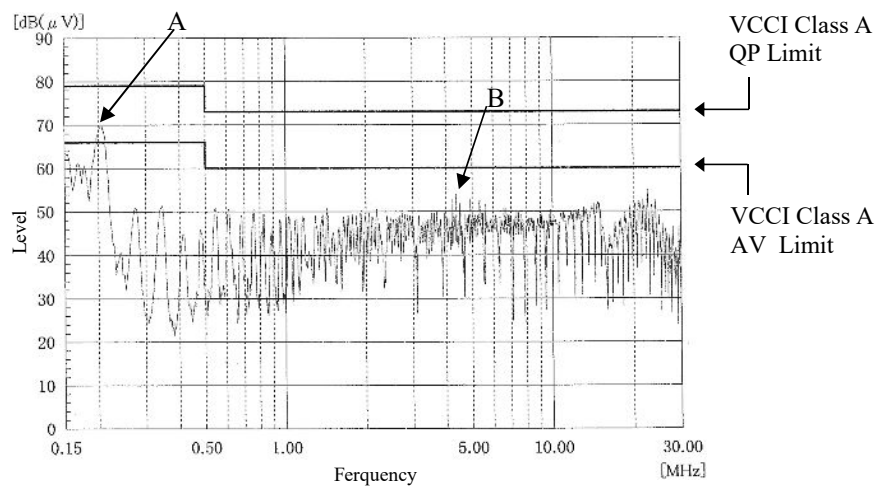
雑音端子電圧

Conducted Emission

36V

Point A (206kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	79.0	57.0
AV	66.0	54.5

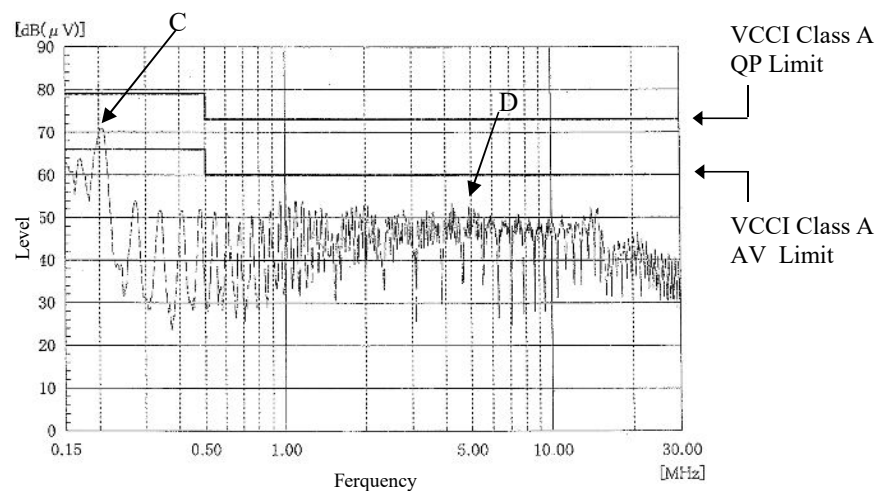
Point B (4.361MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	73.0	51.0
AV	60.0	46.0



Phase : N

Point C (205kHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	79.0	58.0
AV	66.0	53.5

Point D (4.916MHz)		
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	73.0	50.0
AV	60.0	45.0



Phase : L

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.

2.14 EMI 特性

Electro-Magnetic Interference characteristics

Conditions Vin : 100VAC

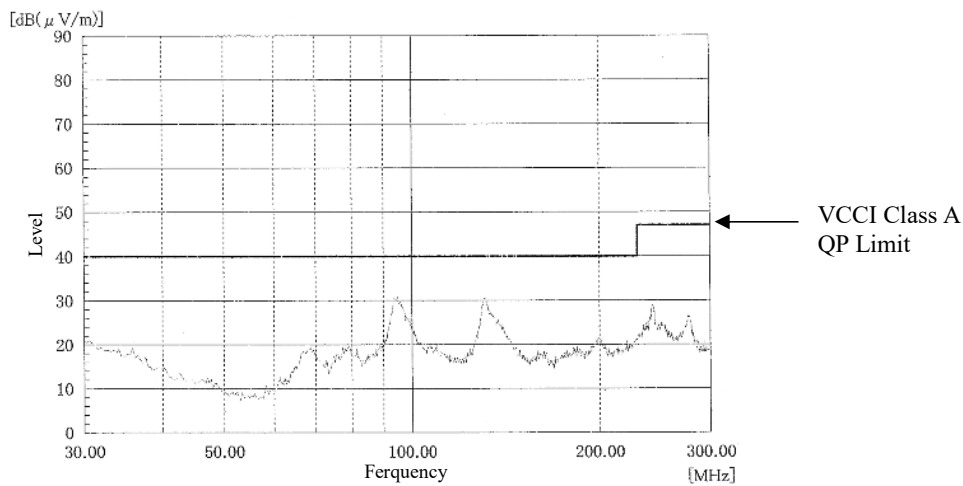
Iout : 100%

雑音電界強度

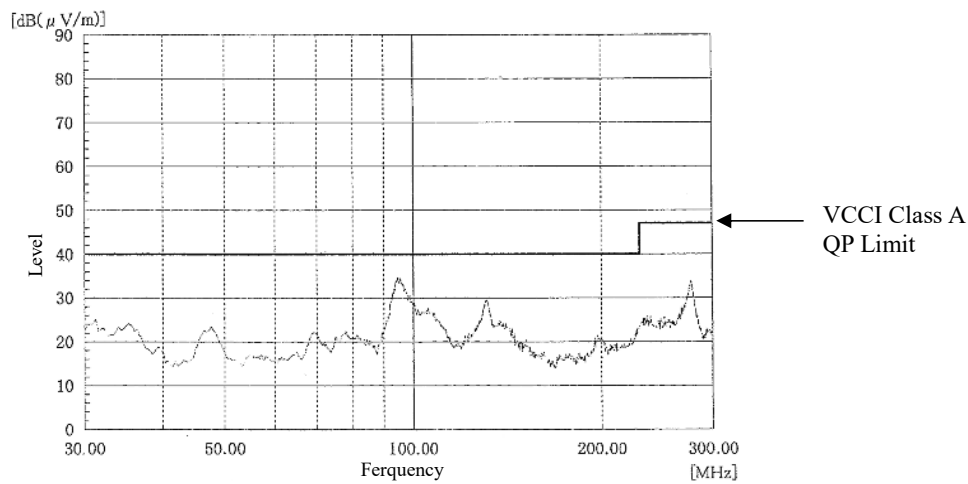
Radiated Emission

36V

HORIZONTAL



VERTICAL



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.