

HWS3000GT-32

EVALUATION DATA

型式データ

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使用記号Terminology used

Ta : 周囲温度	Ambient temperature	f : 周波数	Frequency
Vin : 入力電圧	Input voltage	Iin : 入力電流	Input current
Vout : 出力電圧	Output voltage	Iout : 出力電流	Output current
Vaux : AUX電圧	AUX voltage	Iaux : AUX電流	AUX current

※ 当社測定条件における結果であり、参考値としてお考え願います。
Test results are reference data based on our measurement condition.

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

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

出力保持時間特性 Hold up time characteristics

出力電圧立ち上がり/立ち下がり特性 Output voltage rise/fall characteristics

出力電流立ち上がり/立ち下がり特性 Output current rise/fall characteristics

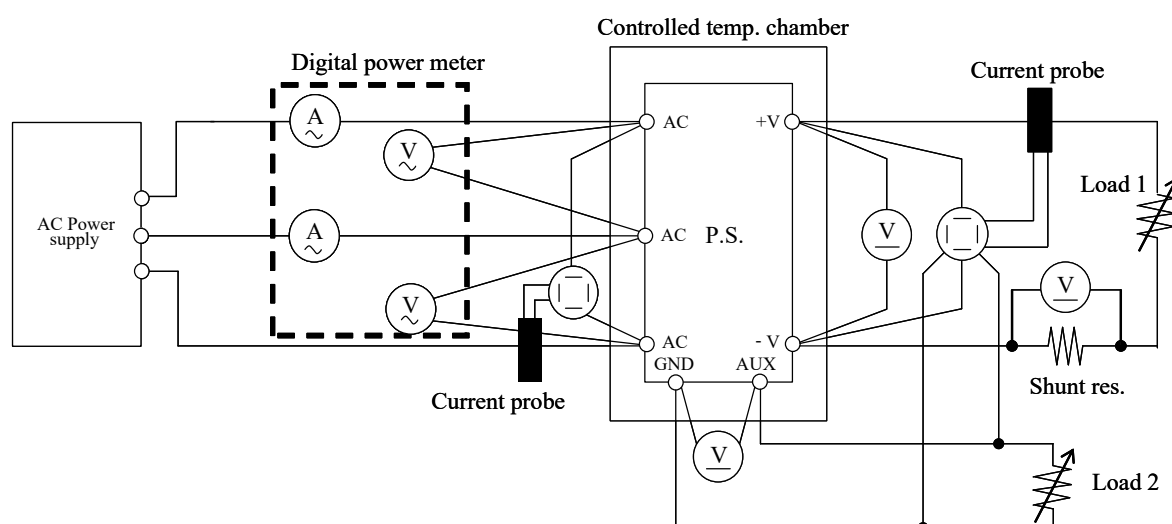
過電流保護特性 Over current protection (OCP) characteristics

入力電圧瞬停特性 Response to brown out characteristics

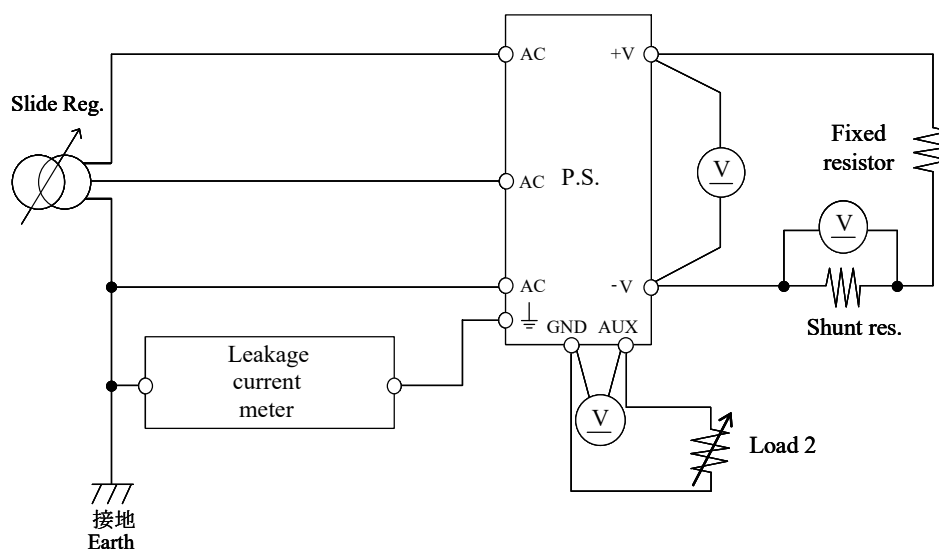
入力電流波形 Input current waveform

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

出力リップル、ノイズ電流波形 Output ripple and noise current waveform

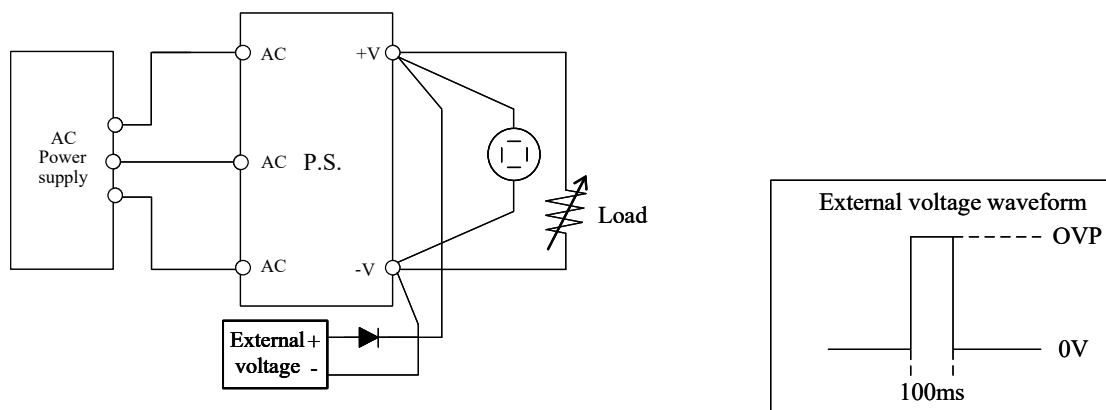
測定回路2 Circuit 2 used for determination

リーク電流特性 Leakage current characteristics

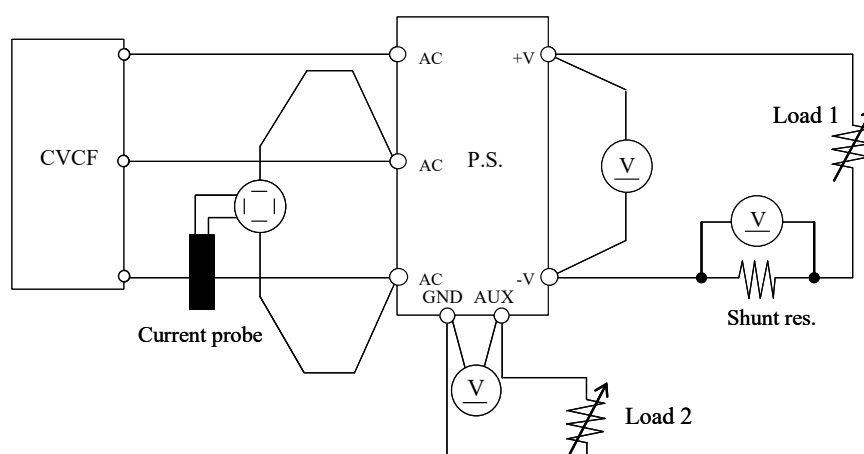


測定回路3 Circuit 3 used for determination

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

測定回路4 Circuit 4 used for determination

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

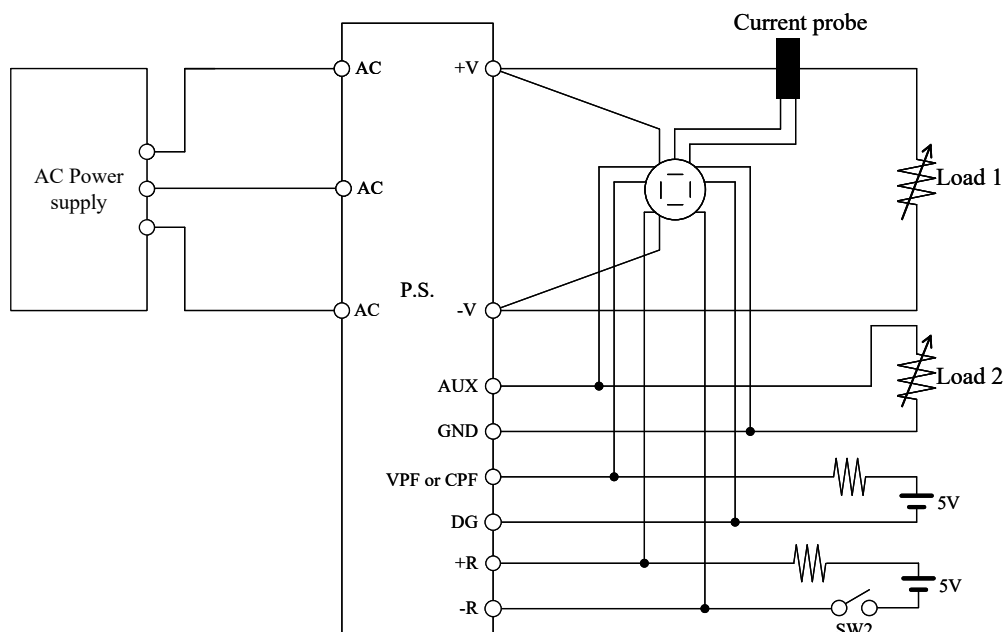


測定回路5 Circuit 5 used for determination

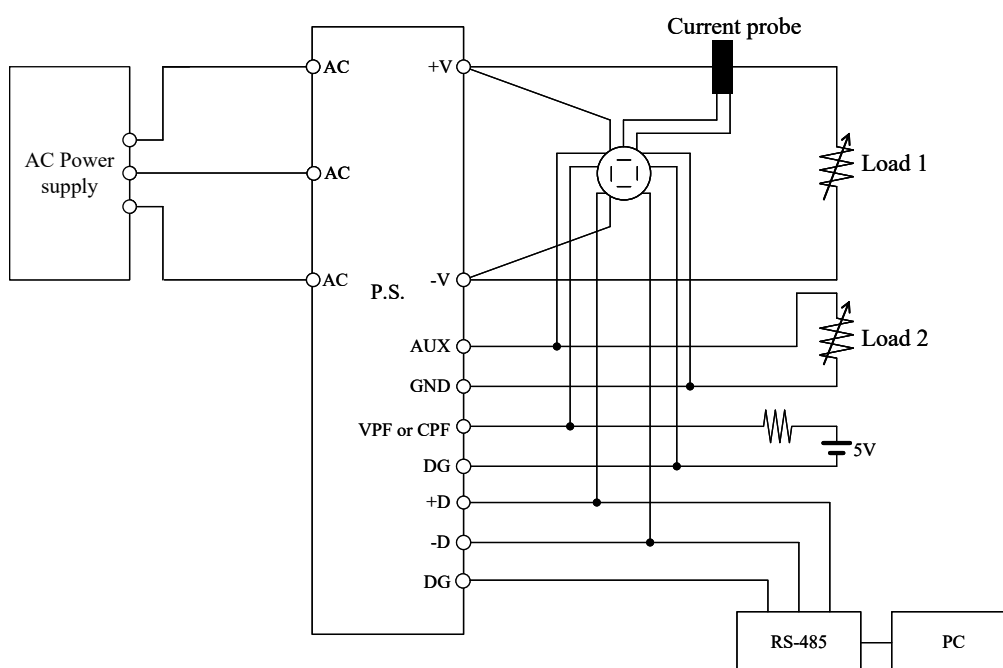
ON/OFFコントロール時出力立ち上がり、立ち下がり特性
Output rise, fall characteristics with ON/OFF Control

(a) リモートON/OFFコントロール端子によるON/OFF

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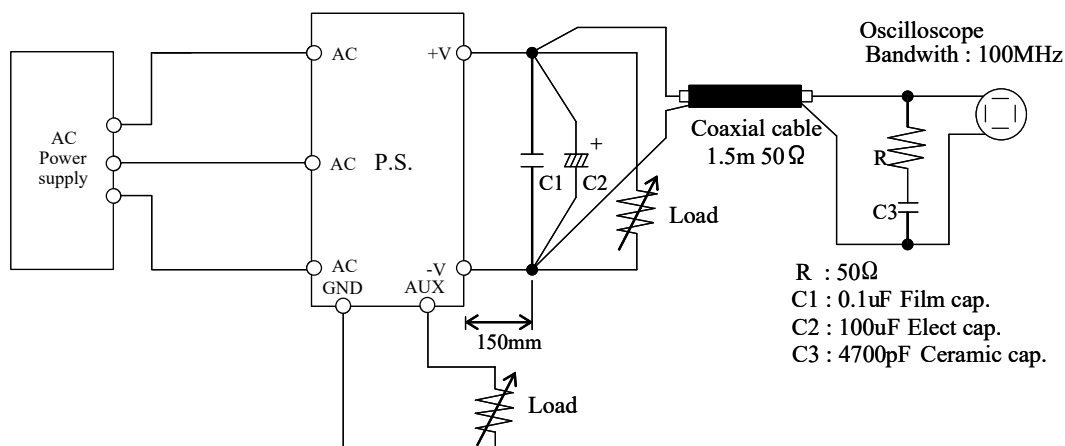


(b) RS-485通信によるON/OFF ON/OFF control by RS-485



測定回路6 Circuit 6 used for determination

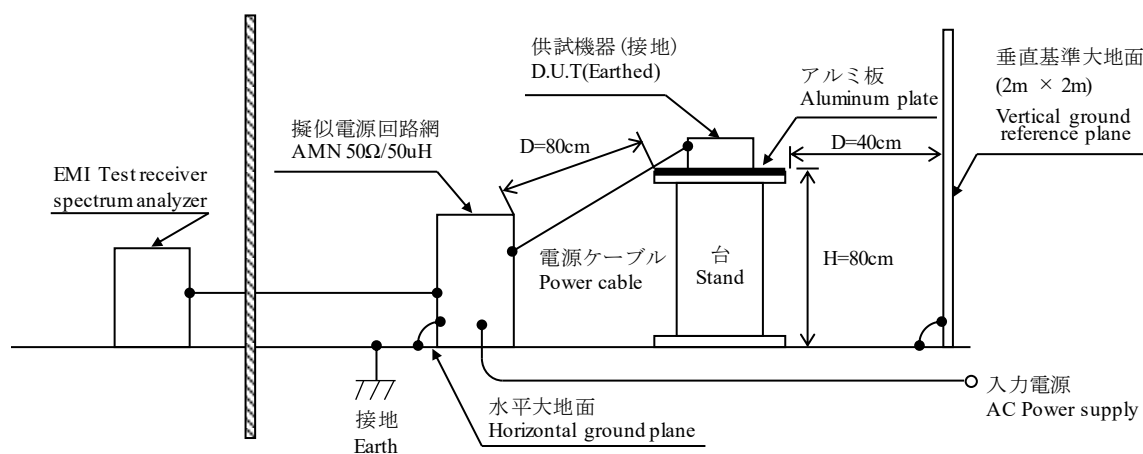
出力リップル、ノイズ電圧波形 Output ripple and noise voltage waveform



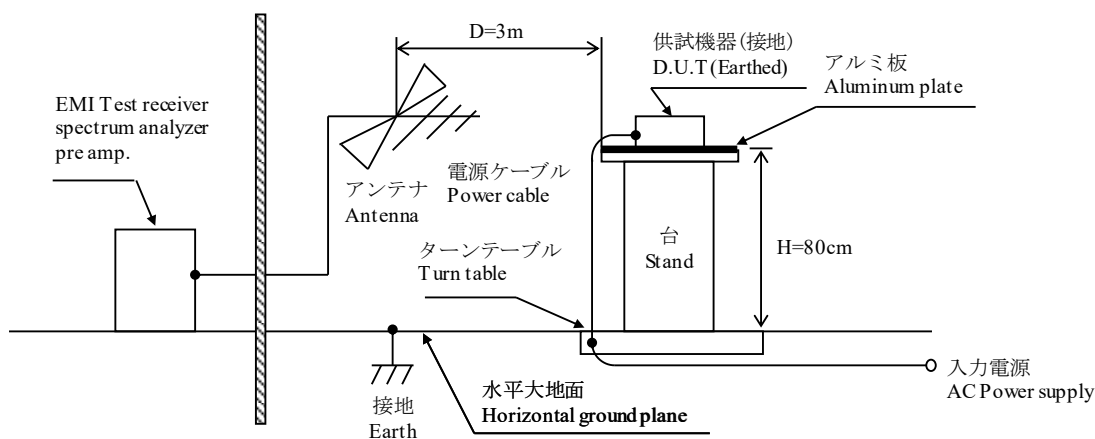
測定構成 Configuration used for determination

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	YOKOGAWA ELECT.	DLM3054
2	DIGITAL MULTIMETER	KEYSIGHT	34970A
3	DIGITAL POWER METER	HIOKI	PW3337
4	CURRENT PROBE	YOKOGAWA ELECT.	701931
5	DYNAMIC DUMMY LOAD	KIKUSI	PLZ10005WSR
6	CVCF	KIKUSUI	PCR12000WEA2R
7	CONTROLLED TEMP. CHAMBER	ESPEC	PSL-4J
8	DYNAMIC DUMMY LOAD	TDK-Lambda	SFL 120-60-300
9	LEAKAGE CURRENT METER	HIOKI	ST5540
10	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESR3
11	PRE AMP.	SONOMA	310N
12	AMN	SCHWARZBECK	NNLK8121
13	ANTENNA	TESEQ	CBL6111D

2. 特性データ Characteristics

2-1. 定電圧出力モード Constant voltage output mode

2-1-1. 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

Condition Ta : 25 °C

Iout \ Vin	170VAC	200VAC	230VAC	265VAC	Line regulation	
0A	32.015V	32.023V	32.019V	32.027V	12mV	0.038%
46.9A	31.981V	31.985V	31.982V	31.977V	8mV	0.026%
93.8A	31.968V	31.977V	31.976V	31.968V	9mV	0.028%
Load regulation	47mV	47mV	43mV	59mV		
	0.147%	0.146%	0.135%	0.185%		

2. Temperature drift

Conditions Vin : 200 VAC

Iout : 93.8 A

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	31.958V	31.977V	31.942V	35mV	0.109%

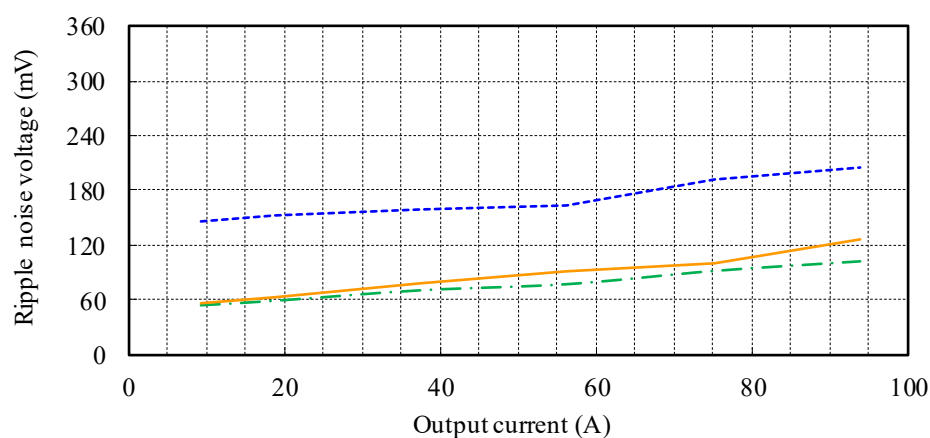
(2) リップルノイズ電圧対出力電流 Ripple noise voltage vs. Output current

Conditions Vin : 200 VAC

Vout : 32 V

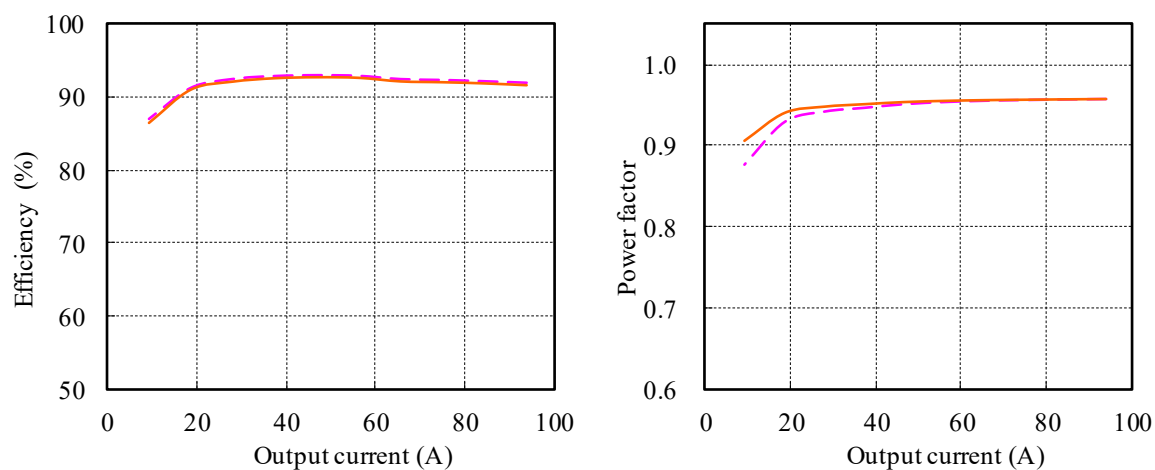
Ta :
-20 °C ---

25 °C ---

50 °C ---


(3) 効率・力率対出力電流 Efficiency and Power factor vs. Output current

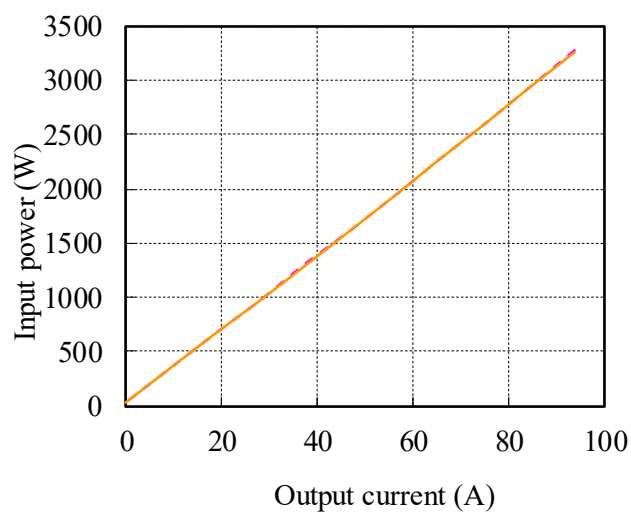
Conditions	V _{in} :	200 VAC	
		230 VAC	
	V _{out} :	32 V	
	I _{aux} :	0 %	
	T _a :	25 °C	



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

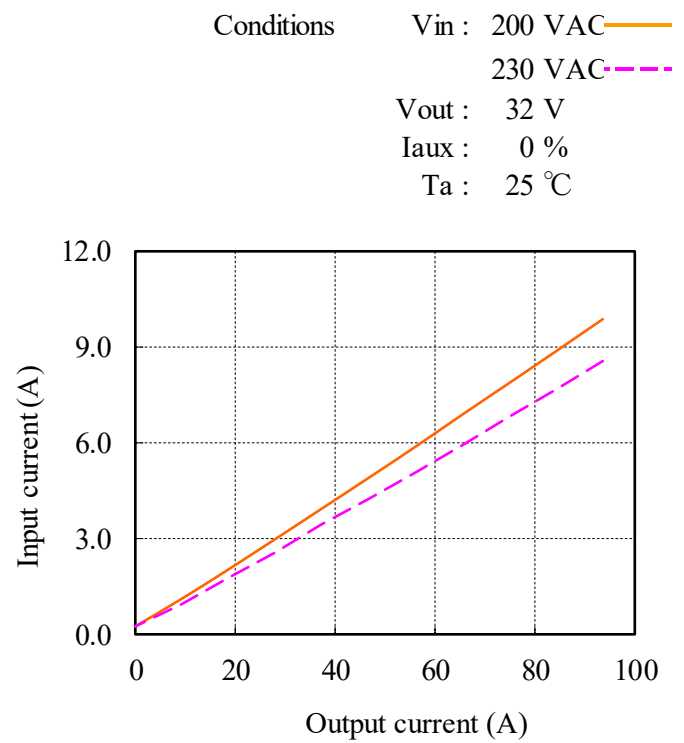
Conditions	Vin :	200 VAC	
		230 VAC	
	Vout :	32 V	
	Iaux :	0 %	
	Ta :	25 °C	

V _{in}	Input power	
	I _{out} : 0%	Control OFF
200VAC	28.4W	7.6W
230VAC	33.4W	7.9W



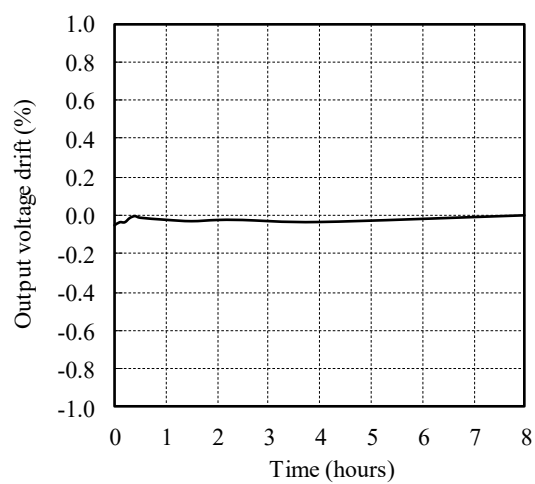
(5) 入力電流対出力電流 Input current vs. Output current

Vin	Input current	
	Iout : 0%	Control OFF
200VAC	0.23A	0.17A
230VAC	0.25A	0.19A



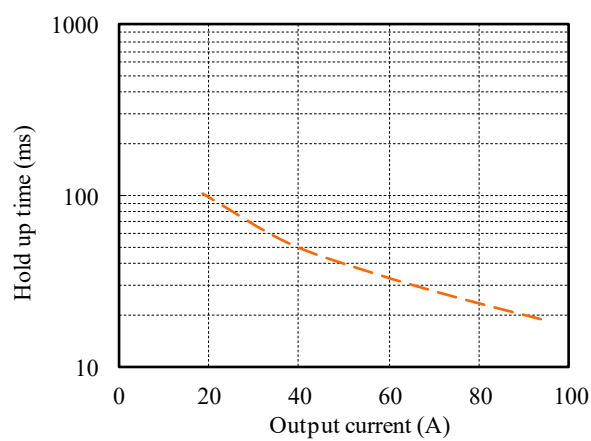
2-1-2. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions V_{in} : 200 VAC
 V_{out} : 32 V
 I_{out} : 93.8 A
 T_a : 25 °C



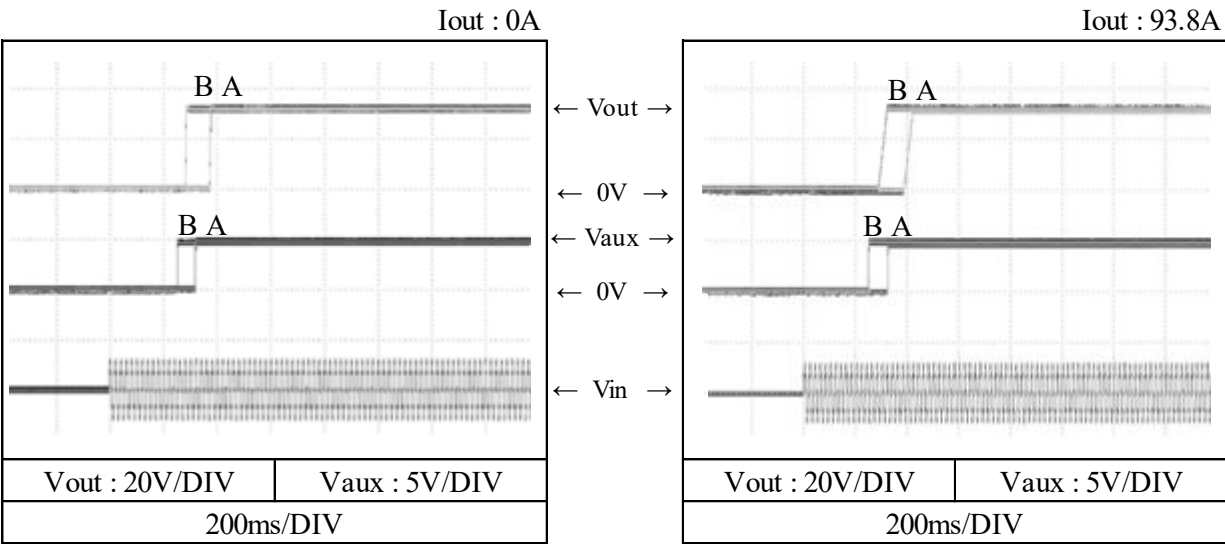
2-1-3. 出力保持時間特性 Hold up time characteristics

Conditions V_{in} : 200 VAC
 V_{out} : 32 V
 T_a : 25 °C



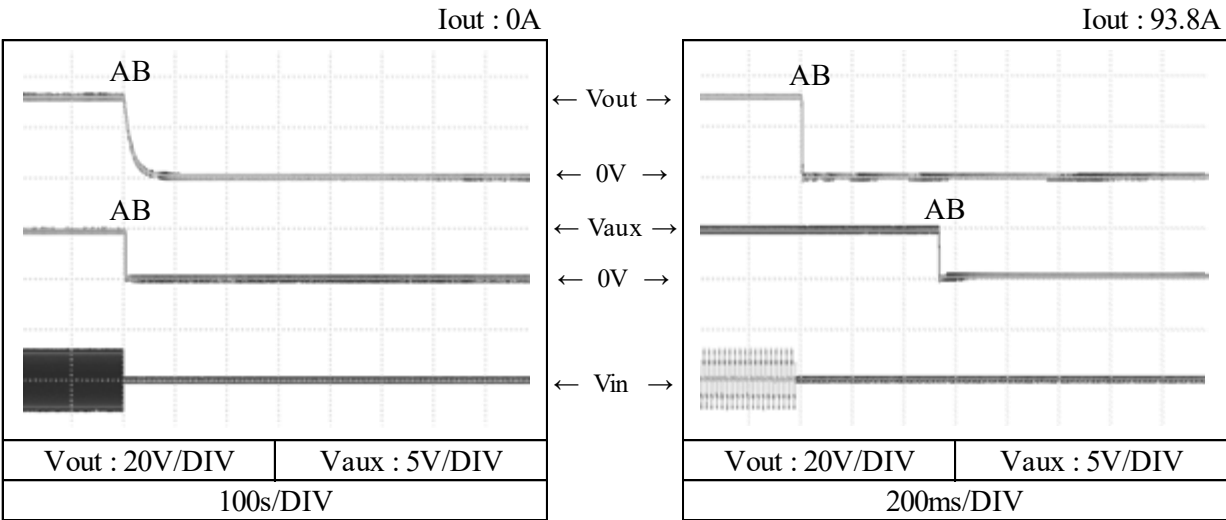
2-1-4. 出力電圧立ち上がり特性 Output voltage rise characteristics

Conditions V_{in} : 200 VAC (A)
 230 VAC (B)
 I_{aux} : 100 %
 T_a : 25 °C



2-1-5. 出力電圧立ち下がり特性 Output voltage fall characteristics

Conditions V_{in} : 200 VAC (A)
 230 VAC (B)
 I_{aux} : 100 %
 T_a : 25 °C

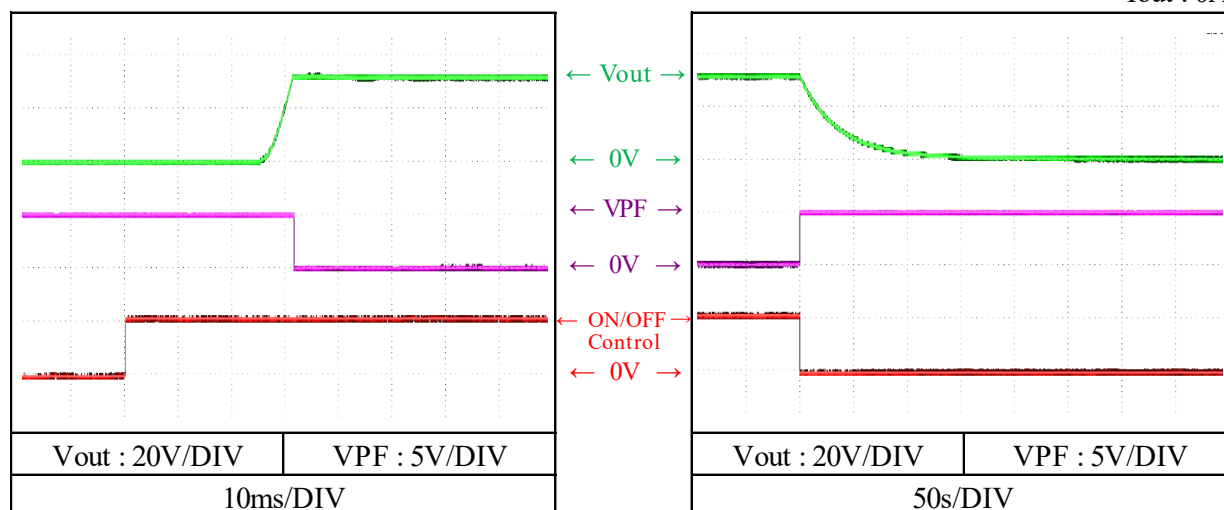
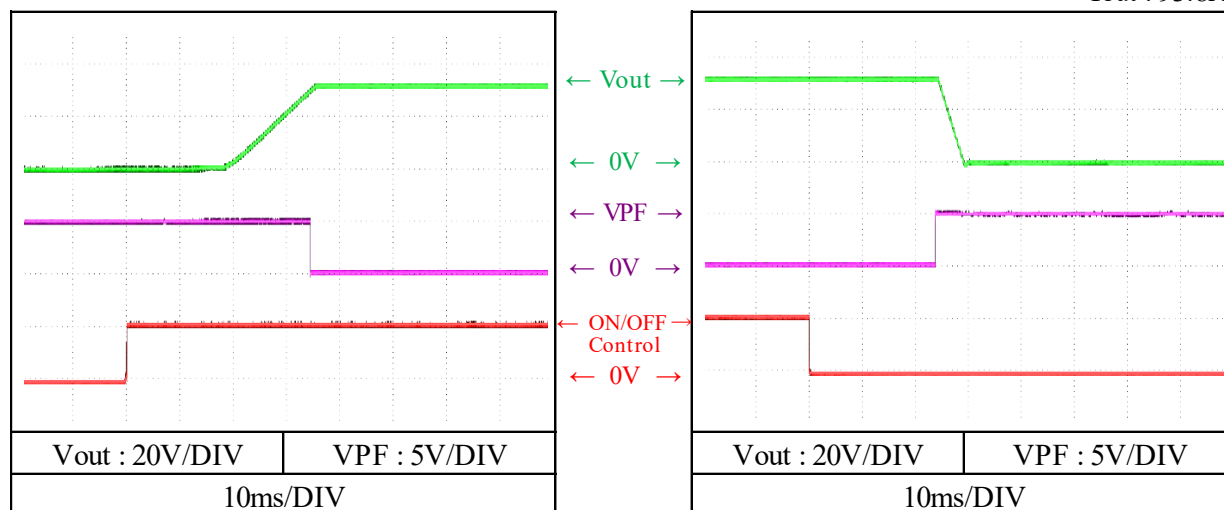


2-1-6. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

Output rise, fall characteristics with ON/OFF Control

(a) リモートON/OFFコントロール端子によるON/OFF

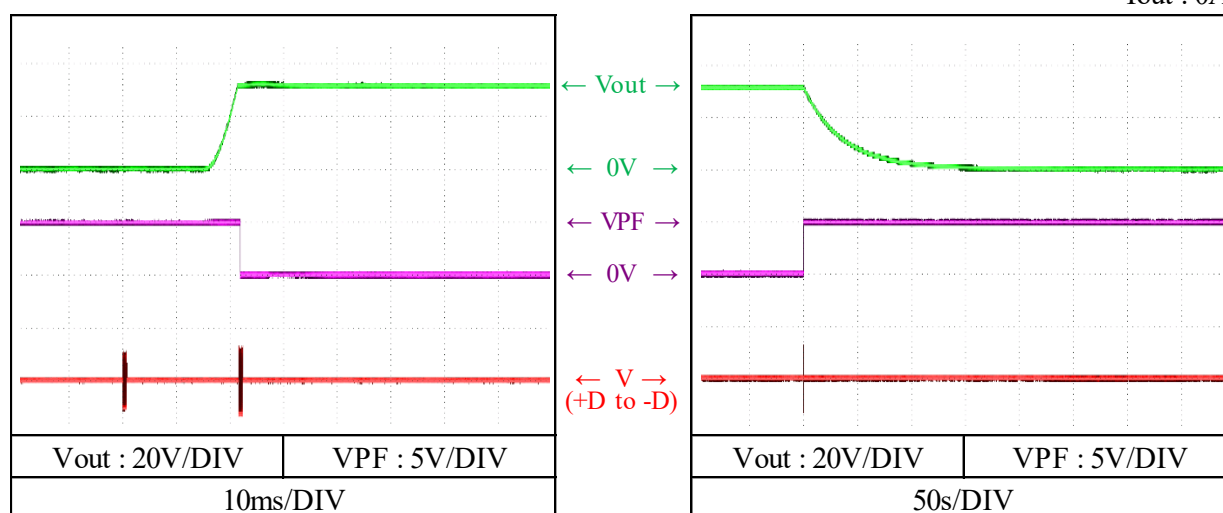
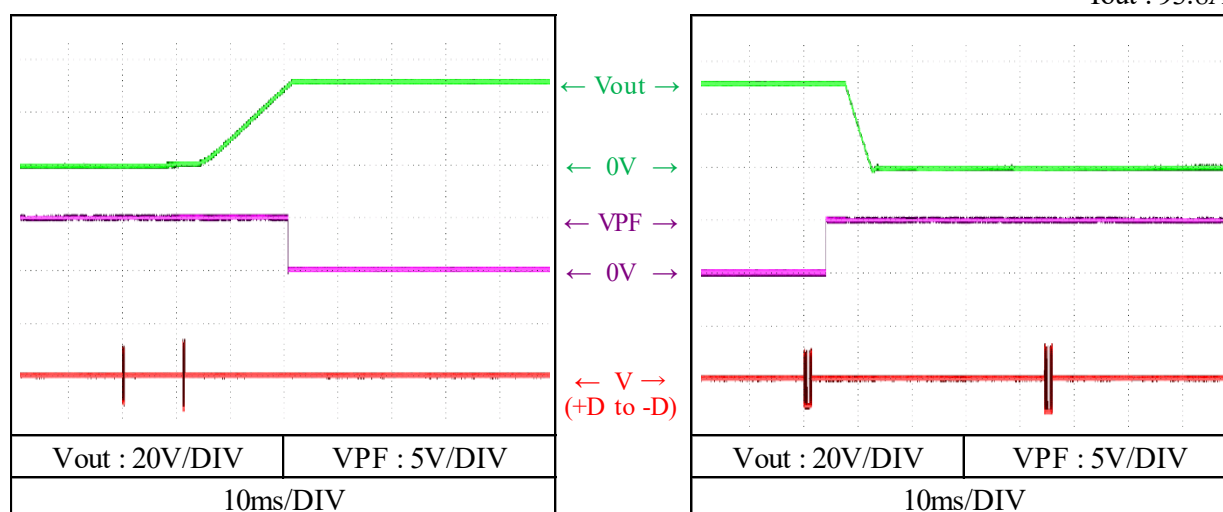
ON/OFF control by remote ON/OFF control terminal

Conditions V_{in} : 200 VAC T_a : 25 °C I_{out} : 0A I_{out} : 93.8A

2-1-6. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

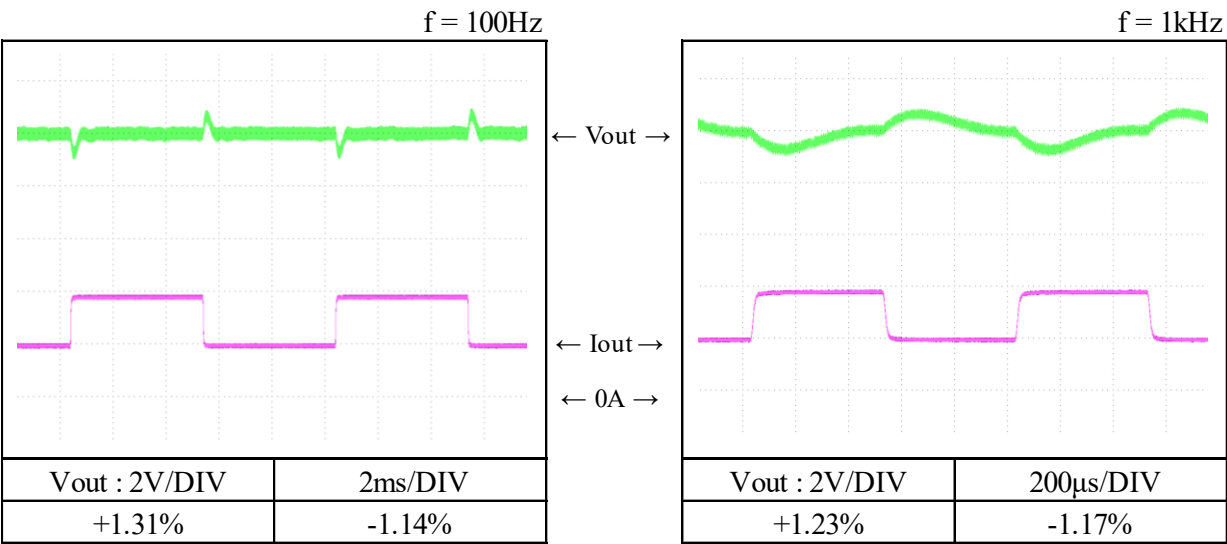
Output rise, fall characteristics with ON/OFF Control

(b) RS-485通信によるON/OFF ON/OFF control by RS-485

Conditions V_{in} : 200 VAC T_a : 25 °C I_{out} : 0A I_{out} : 93.8A

2-1-7. 過渡応答（負荷急変）特性 Dynamic load response characteristics

Conditions V_{in} : 200 VAC
 I_{out} : 46.9A $\longleftrightarrow$ 93.8A
($t_r = t_f = 50\mu s$)
 T_a : 25 °C

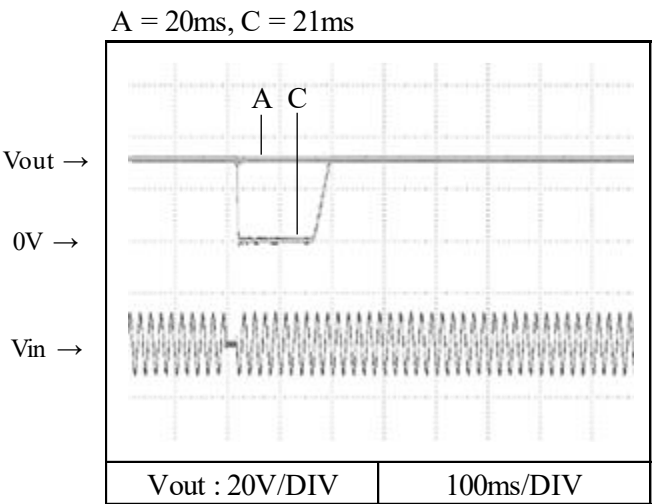


2-1-8. 入力電圧瞬停特性 Response to brown out characteristics

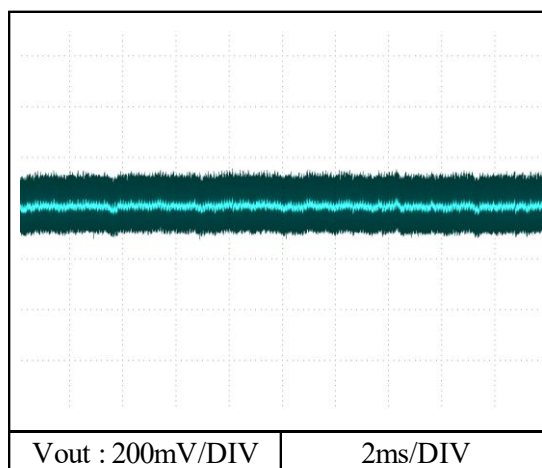
瞬停時間 Interruption time

- A : 出力電圧の低下なし 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.

Conditions V_{in} : 200 VAC
 I_{out} : 93.8 A
 T_a : 25 °C



2-1-9. 出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions V_{in} : 200 VAC V_{out} : 32 V I_{out} : 93.8 A T_a : 25 °C

2-2. 定電流出力モード Constant current output mode

2-2-1. 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

Condition Ta : 25 °C

Vout \ Vin	132VAC	200VAC	230VAC	265VAC	Line regulation	
3V	94.068A	94.076A	94.077A	94.063A	14mA	0.015%
16V	94.018A	94.022A	94.021A	94.020A	4mA	0.004%
32V	93.942A	93.944A	93.957A	93.957A	13mA	0.014%
Load regulation	126mA	132mA	120mA	106mA		
	0.134%	0.141%	0.128%	0.113%		

2. Temperature drift

Conditions Vin : 200 VAC

Vout : 32 V

Ta	-20°C	+25°C	+50°C	Temperature stability	
Iout	93.472A	93.944A	94.192A	720mA	0.768%

(2) リップルノイズ電流対出力電圧 Ripple noise current vs. Output voltage

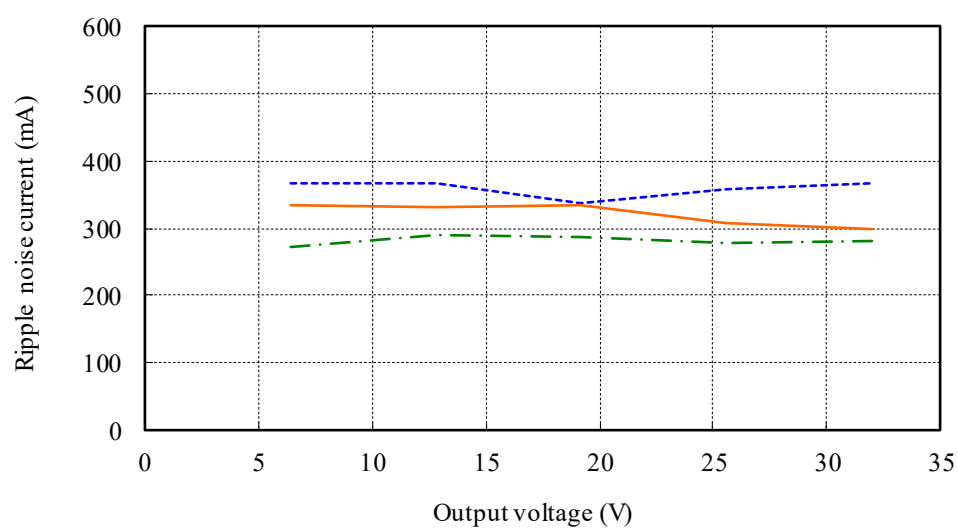
Conditions Vin : 200 VAC

Iout : 93.8 A

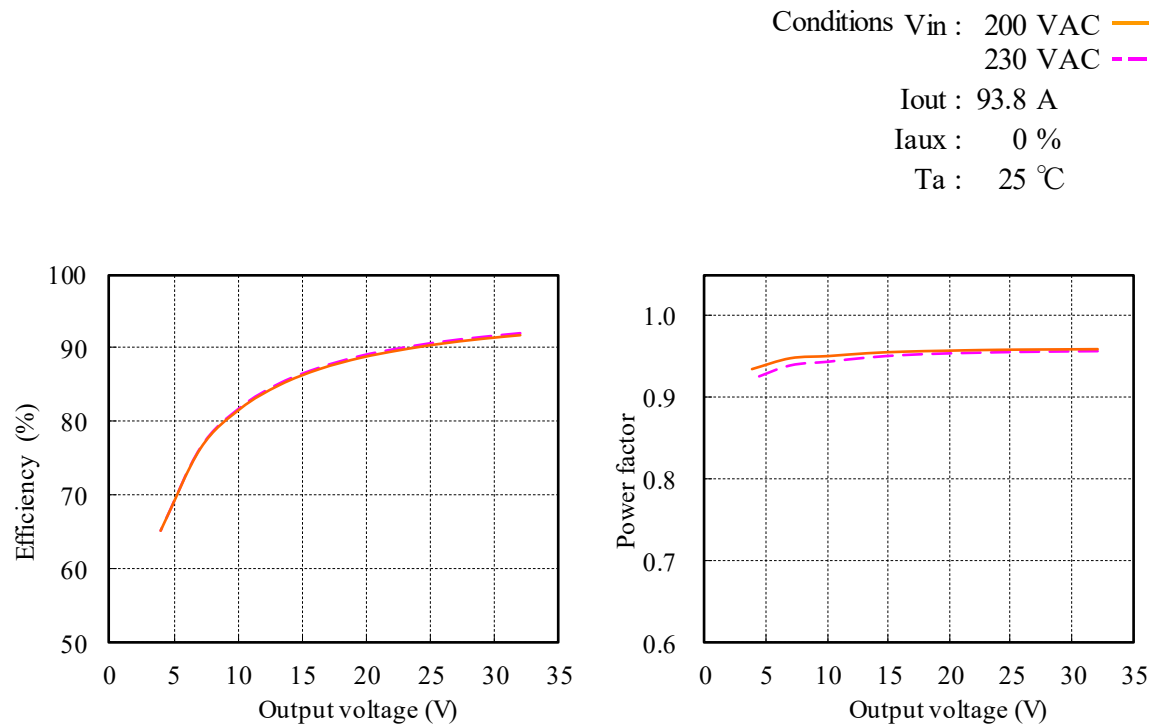
Ta : -20 °C

25 °C

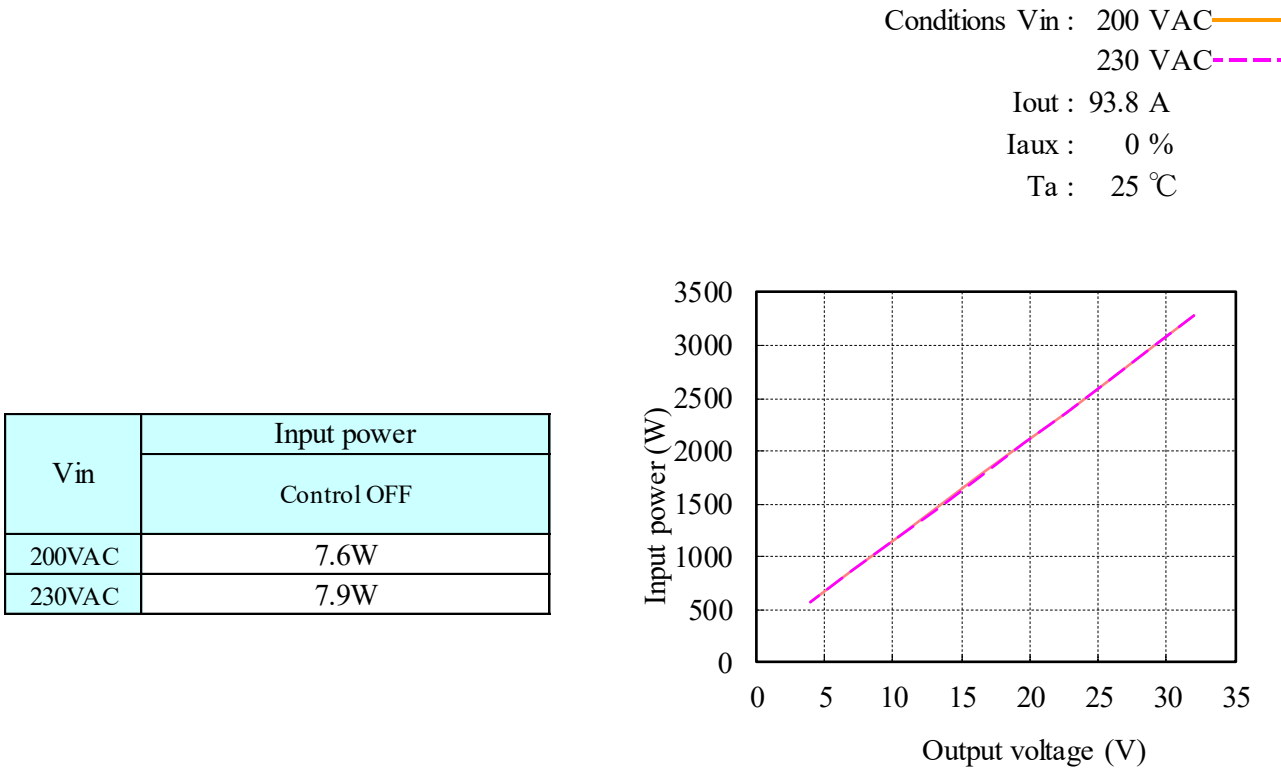
50 °C



(3) 効率・力率対出力電圧 Efficiency and Power factor vs. Output voltage



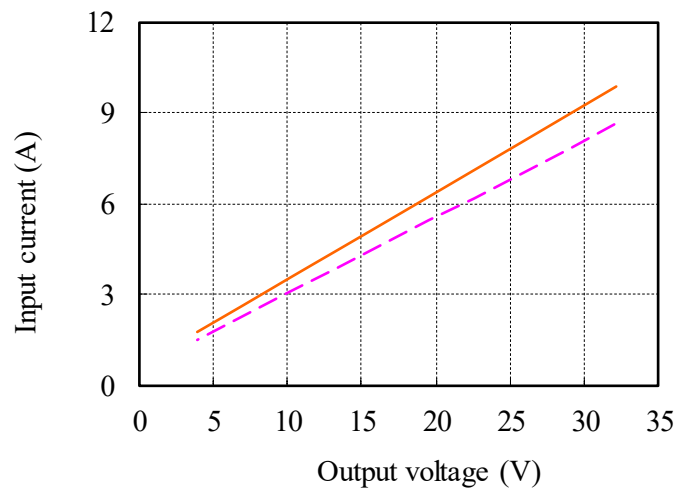
(4) 入力電力対出力電圧 Input power vs. Output voltage



(5) 入力電流対出力電圧 Input current vs. Output voltage

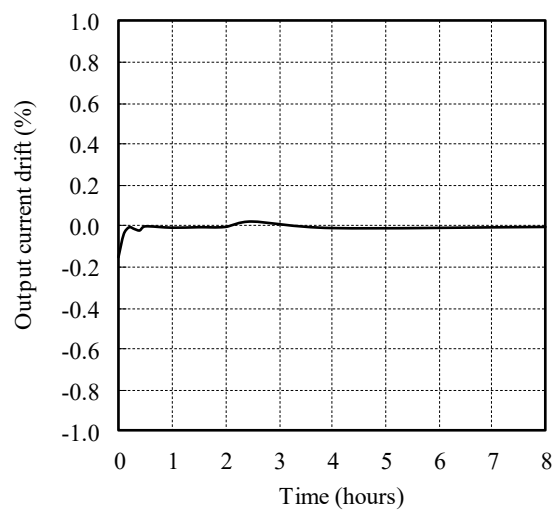
Conditions Vin : 200 VAC 
230 VAC 
Iout : 93.8 A
Iaux : 0 %
Ta : 25 °C

V _{in}	Input current
	Control OFF
200VAC	0.17A
230VAC	0.19A



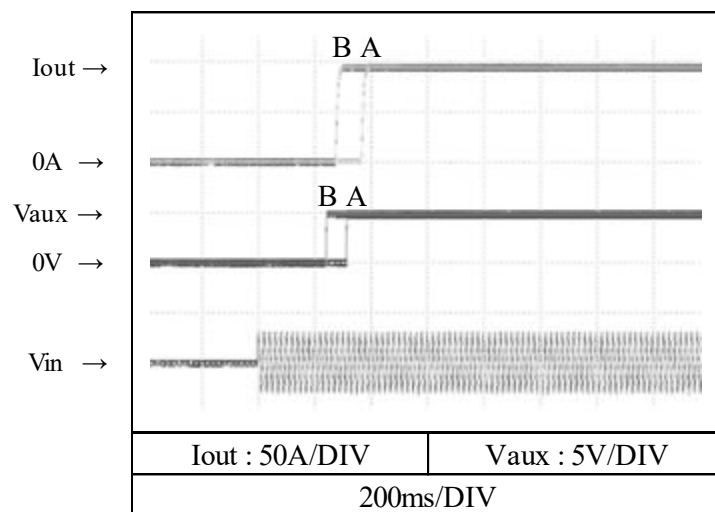
2-2-2. 通電ドリフト特性 Warm up current drift characteristics

Conditions V_{in} : 200 VAC
 V_{out} : 32 V
 I_{out} : 93.8 A
 T_a : 25 °C



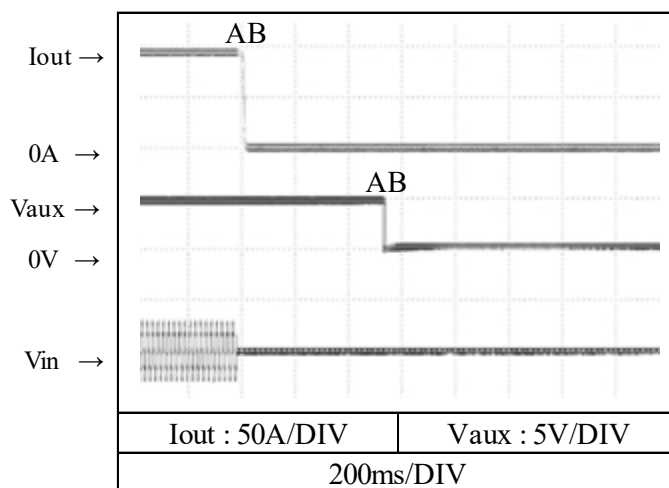
2-2-3. 出力電流立ち上がり特性 Output current rise characteristics

Conditions Vin : 200 VAC (A)
230 VAC (B)
Vout : 32 V
Iaux : 100 %
Ta : 25 °C



2-2-4. 出力電流立ち下がり特性 Output current fall characteristics

Conditions Vin : 200 VAC (A)
230 VAC (B)
Vout : 32 V
Iaux : 100 %
Ta : 25 °C

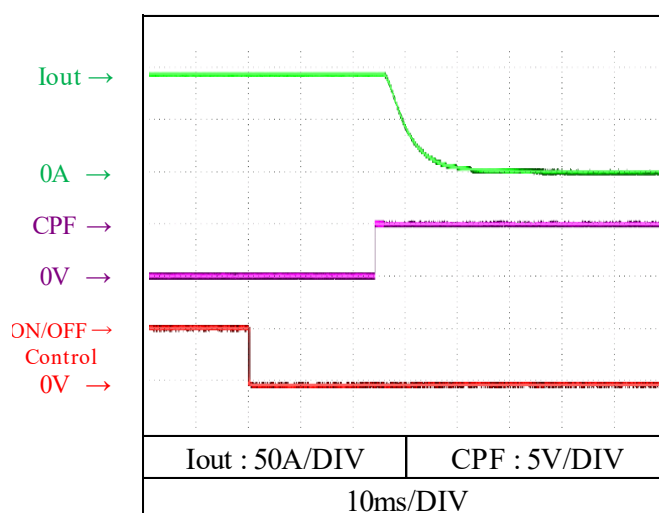
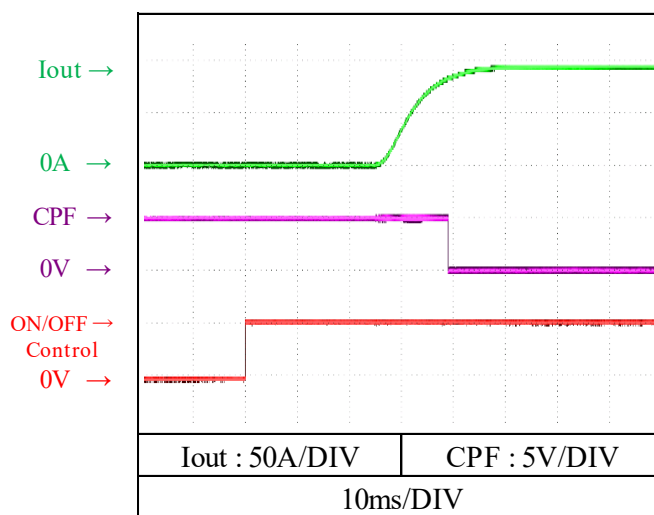


2-2-5. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

Output rise, fall characteristics with ON/OFF Control

(a) リモートON/OFFコントロール端子によるON/OFF

ON/OFF control by remote ON/OFF control terminal

Conditions V_{in} : 200 VAC V_{out} : 32 V T_a : 25 °C

2-2-5. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

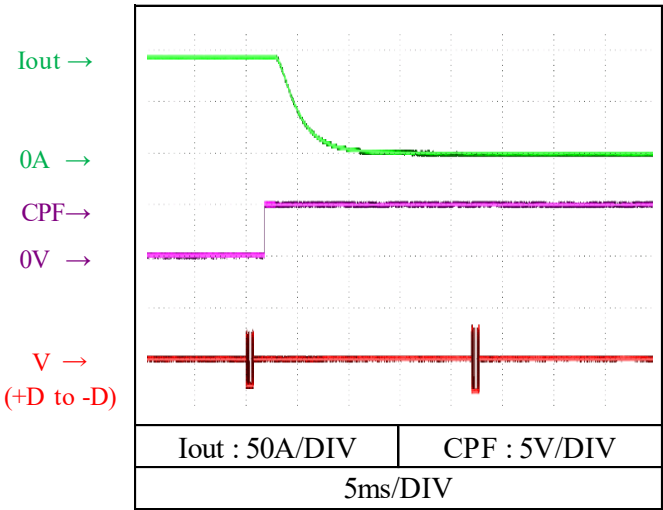
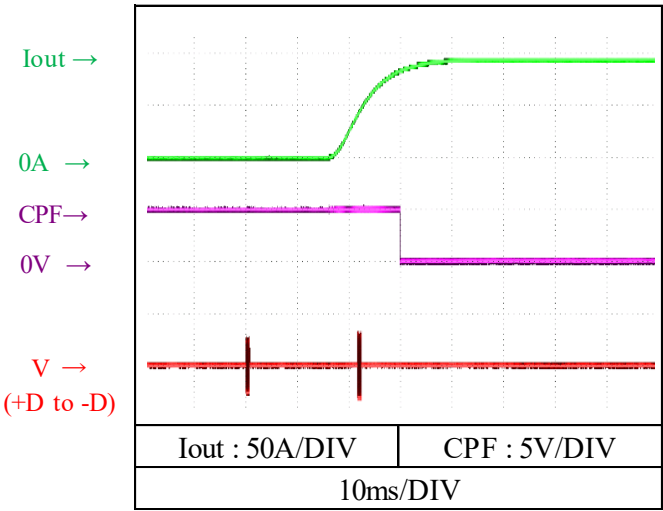
Output rise, fall characteristics with ON/OFF Control

(b) RS-485通信によるON/OFF ON/OFF control by RS-485

Conditions V_{in} : 200 VAC

V_{out} : 32 V

T_a : 25 °C



2-2-6. 入力電圧瞬停特性 Response to brown out characteristics

瞬停時間 Interruption time

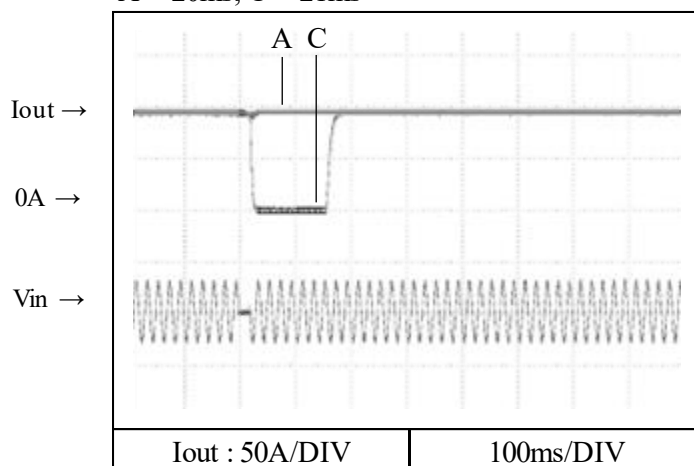
A : 出力電流の低下なし Output current does not drop.

B : 出力電流の低下が0Aまでいかない Output current drop down not reaching 0A.

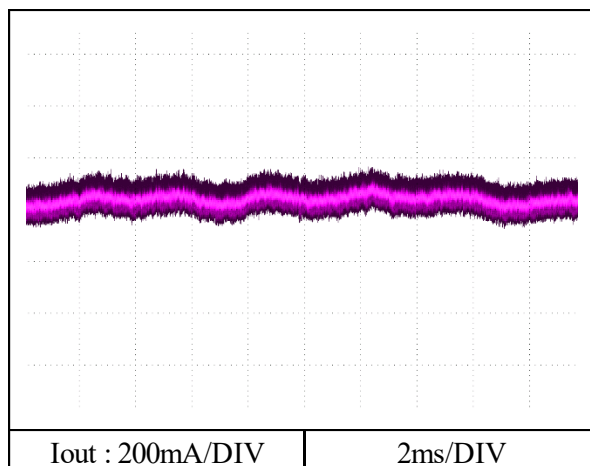
C : 出力電流が0Aまで低下 Output current drops until 0A.

Conditions V_{in} : 200 VAC V_{out} : 32 V T_a : 25 °C

A = 20ms, C = 21ms

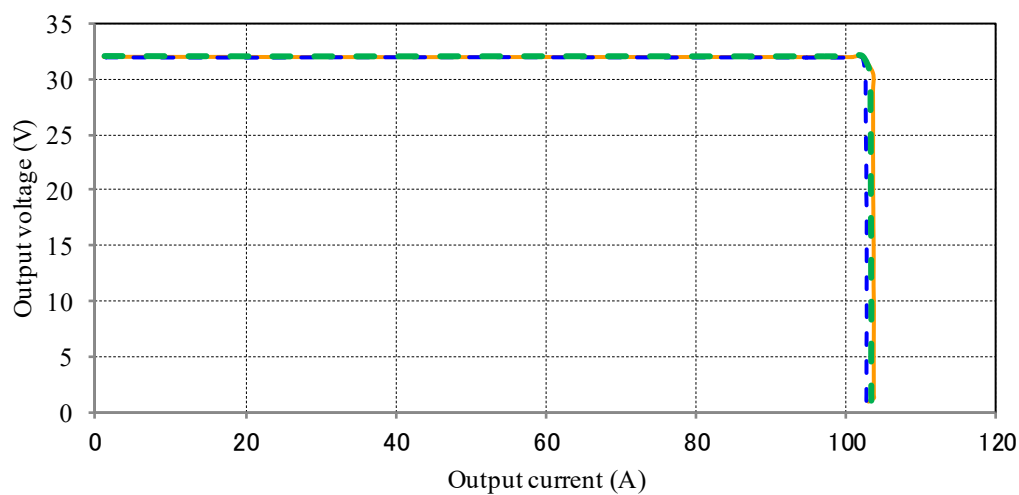


2-2-7. 出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions V_{in} : 200 VAC V_{out} : 32 V I_{out} : 93.8 A T_a : 25 °C

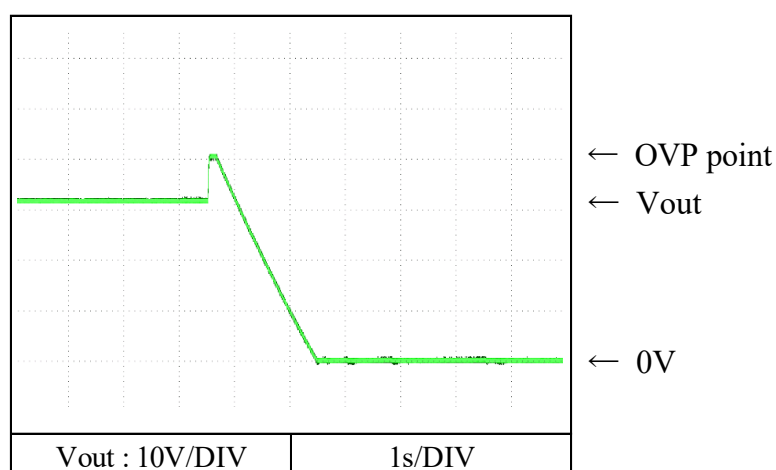
2-3. 過電流保護特性 Over current protection (OCP) characteristics

Conditions V_{in} : 200 VAC
 T_a : -20 °C ---
 25 °C ---
 50 °C ---



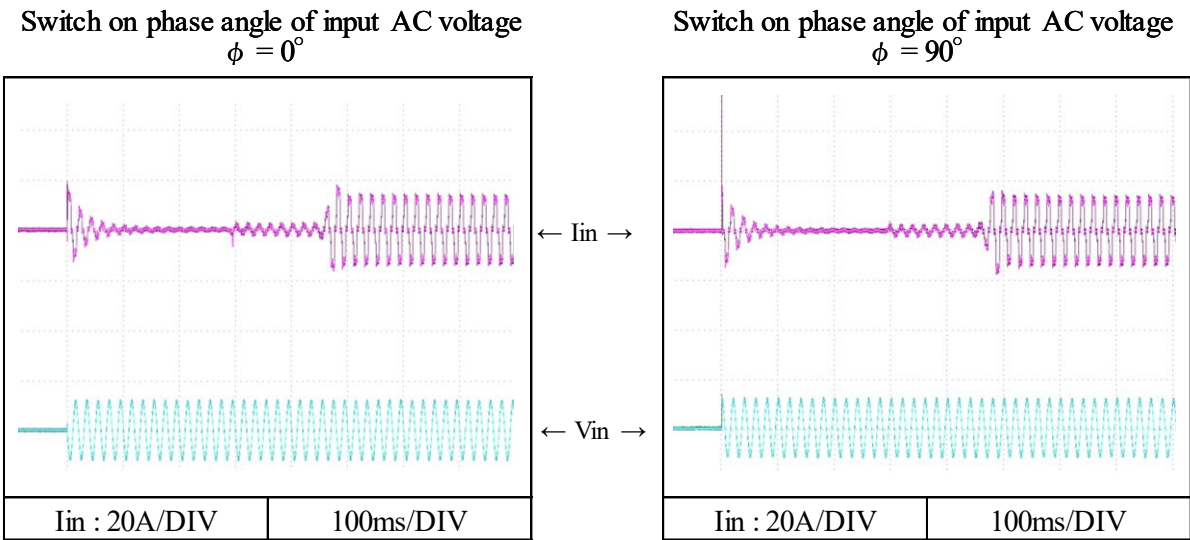
2-4. 過電圧保護特性 Over voltage protection (OVP) characteristics

Conditions V_{in} : 200 VAC
 I_{out} : 1 A
 T_a : 25 °C



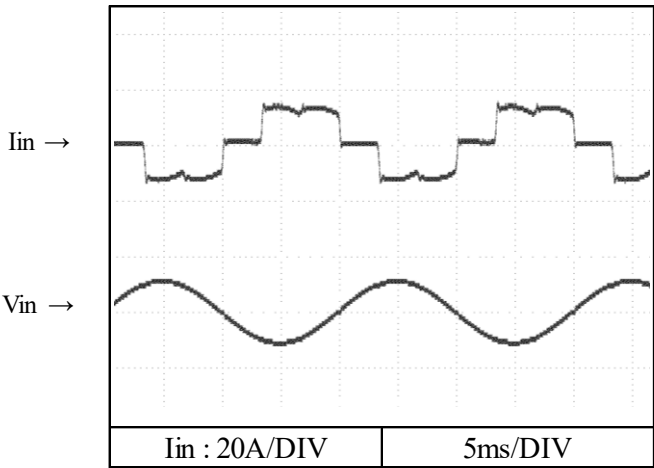
2-5. 入力サージ電流（突入電流）波形 Inrush current waveform

Conditions V_{in} : 200 VAC
 V_{out} : Nominal output voltage
 I_{out} : Maximum output current
 T_a : 25 °C

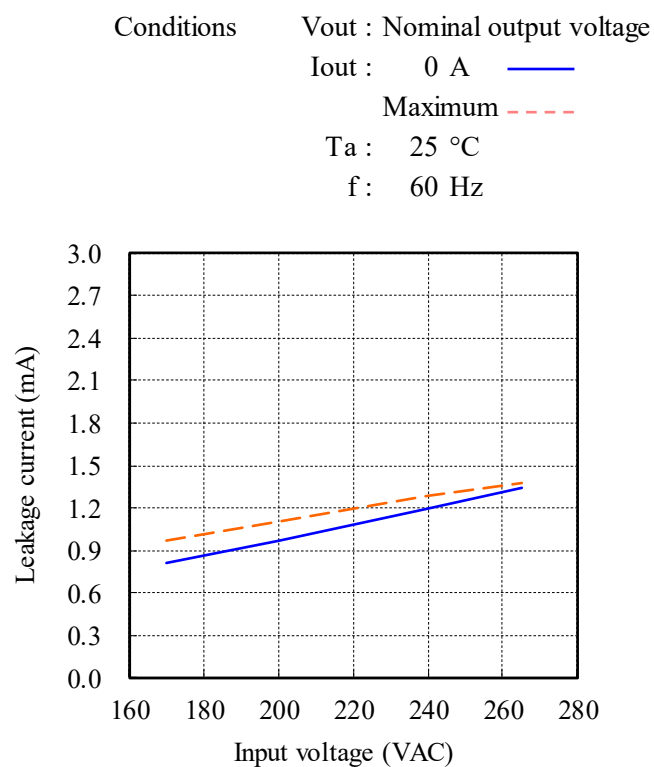
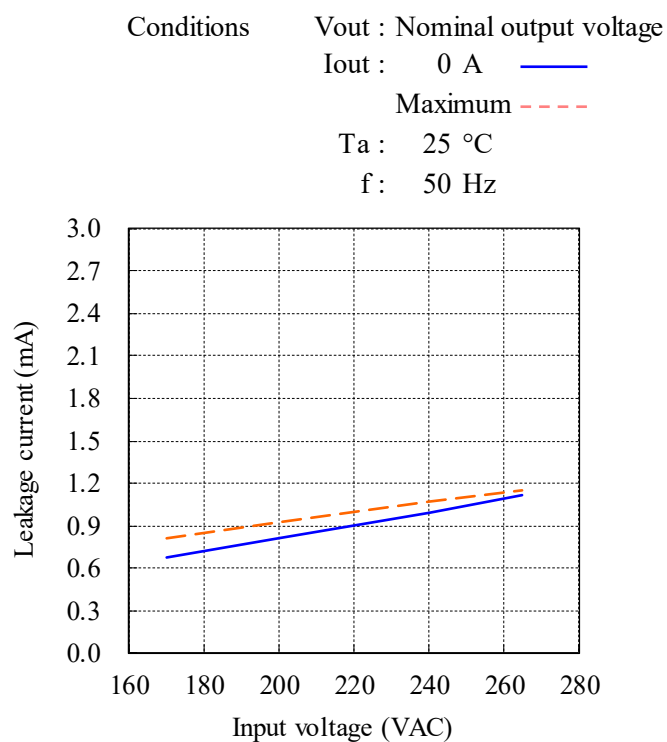


2-6. 入力電流波形 Input current waveform

Conditions V_{in} : 200 VAC
 V_{out} : Nominal output voltage
 I_{out} : Maximum output current
 T_a : 25 °C



2-7. リーク電流特性 Leakage current characteristics



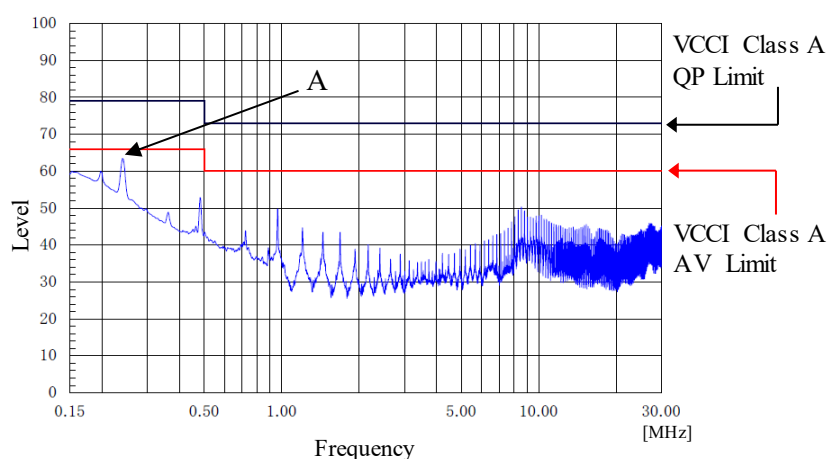
2-8. EMI特性 Electro Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions Vin : 230 VAC
Vout : 32 V
Iout : 93.8 A
Iaux : 100 %
Ta : 25 °C

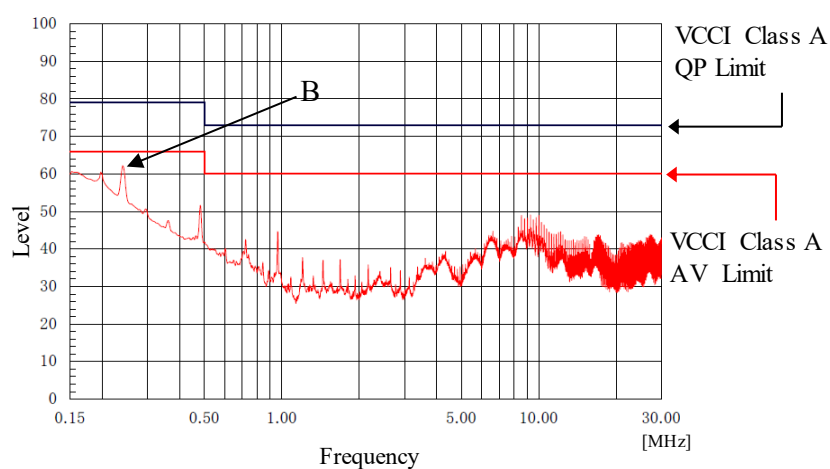
Phase : L1

Point A (0.24MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	61.9
AV	66.0	60.8



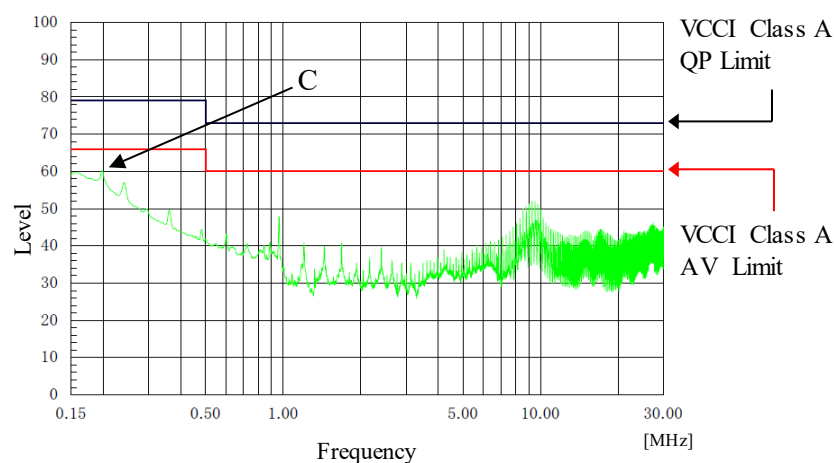
Phase : L2

Point B (0.24MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	60.9
AV	66.0	59.2



Phase : L3

Point C (0.20MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	56.7
AV	66.0	52.2



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

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

波形はピーク値

Waveform is peak values.

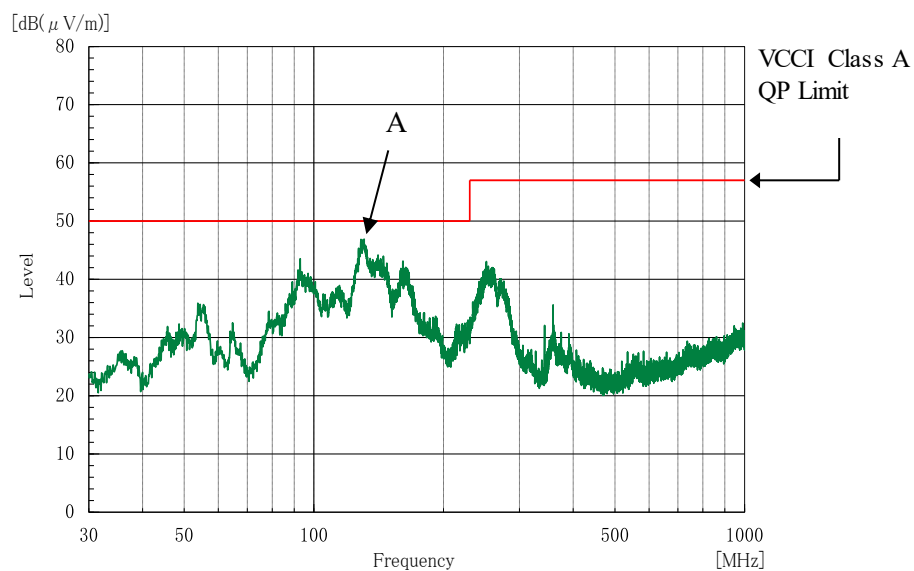
2-8. EMI特性 Electro Magnetic Interference characteristics

雑音電界強度
Radiated Emission

Conditions Vin : 230 VAC
Vout : 32 V
Iout : 93.8 A
Iaux : 100 %
Ta : 25 °C

HORIZONTAL

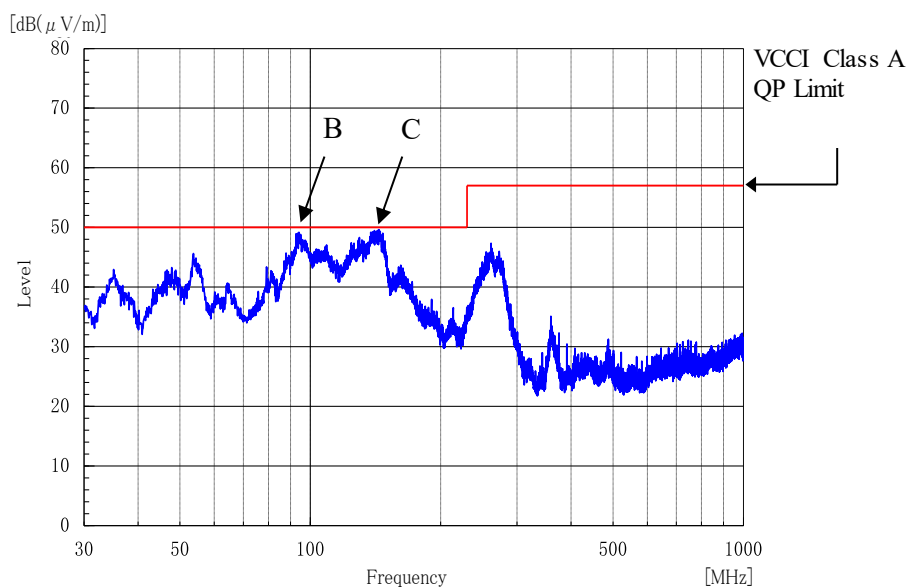
Point A (130.8MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	45.4



VERTICAL

Point B (93.2MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	45.3

Point C (143.8MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	44.4



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

波形はピーク値

Waveform is peak values.