HWS3000GT-48

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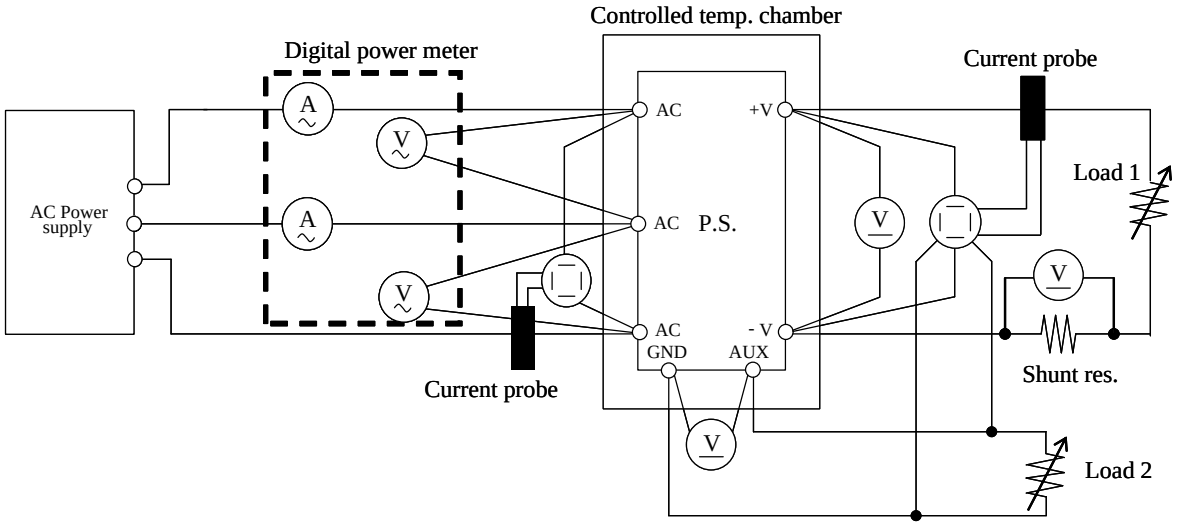
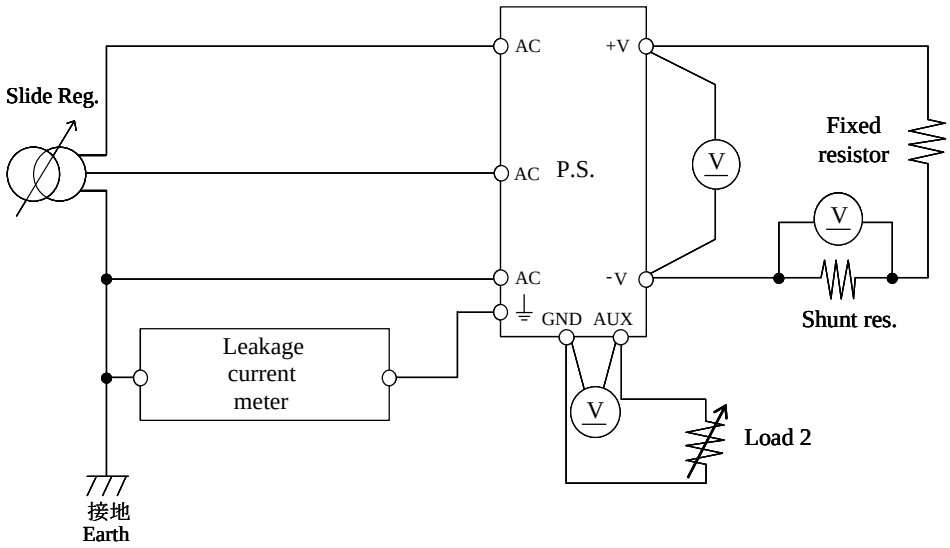


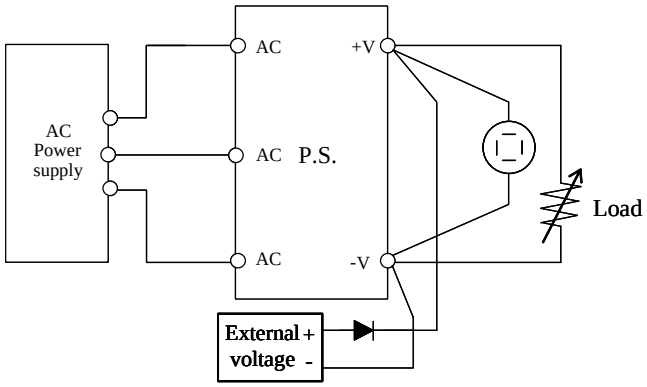
測定回路2 Circuit 2 used for determination

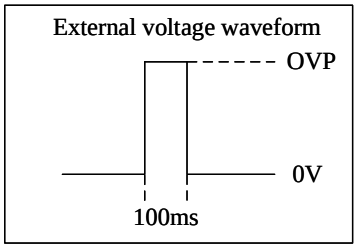
リーク電流特性 Leakage current characteristics



測定回路3　Circuit 3 used for determination

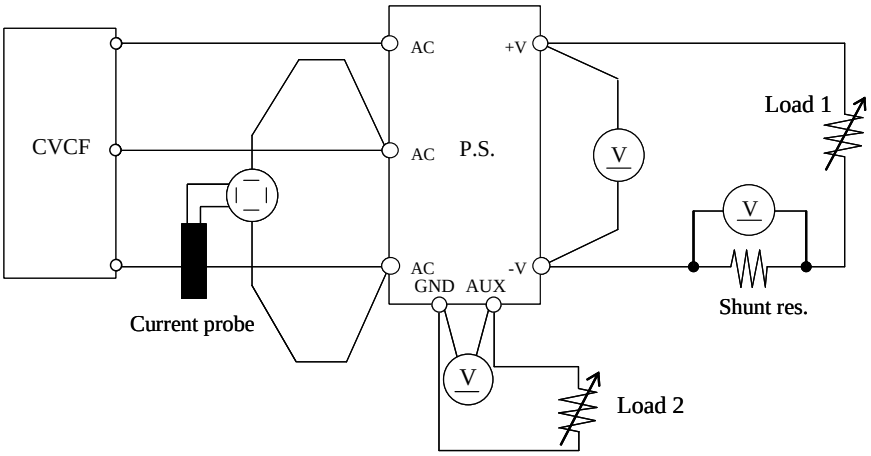
過電圧保護特性　Over voltage protection (OVP) characteristics





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



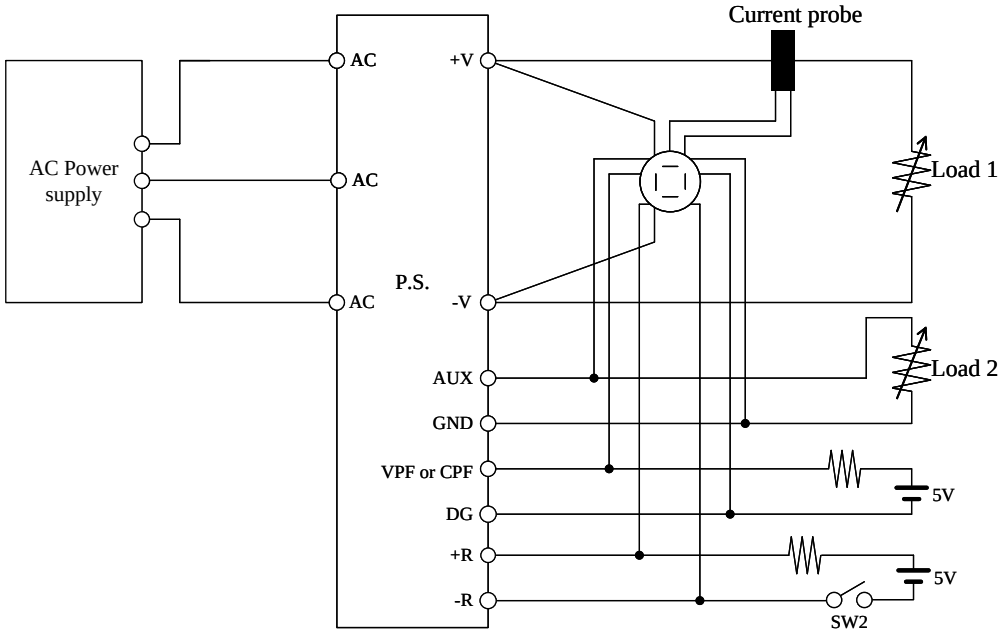
測定回路5　Circuit 5 used for determination

ＯＮ／ＯＦＦコントロール時出力立ち上がり、立ち下がり特性

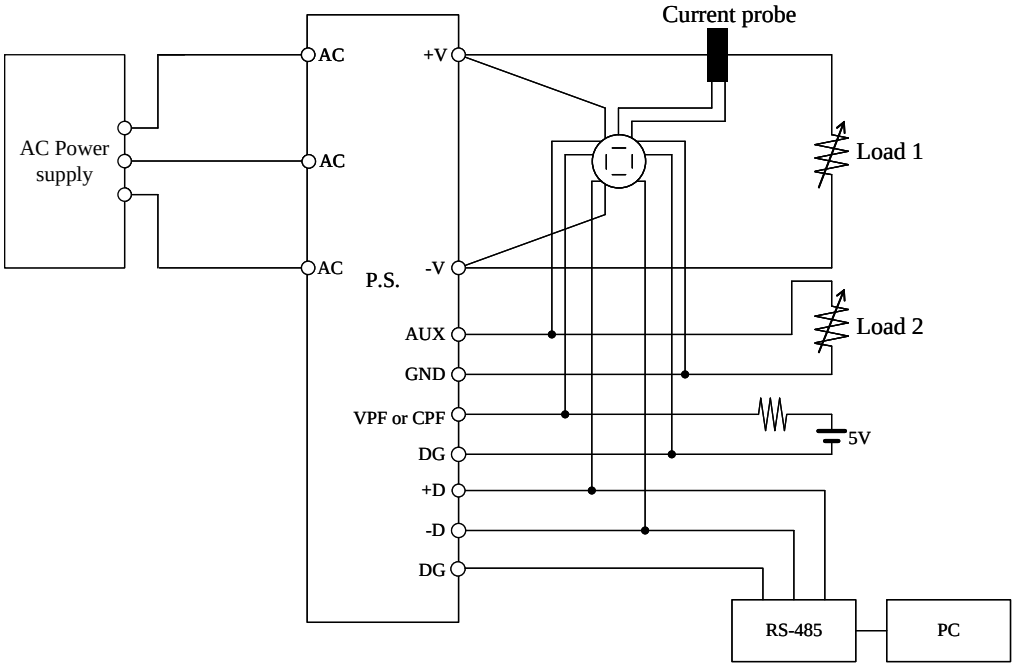
Output rise, fall characteristics with ON/OFF Control

(a) リモートON/OFFコントロール端子によるON/OFF

ON/OFF control by remote ON/OFF control terminal

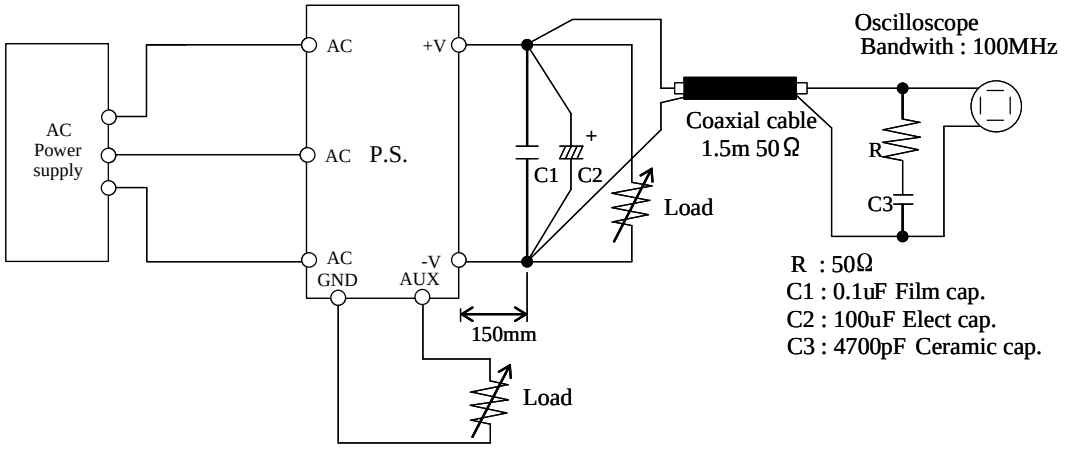


(b) RS-485通信によるON/OFF　ON/OFF control by RS-485



測定回路6　Circuit 6 used for determination

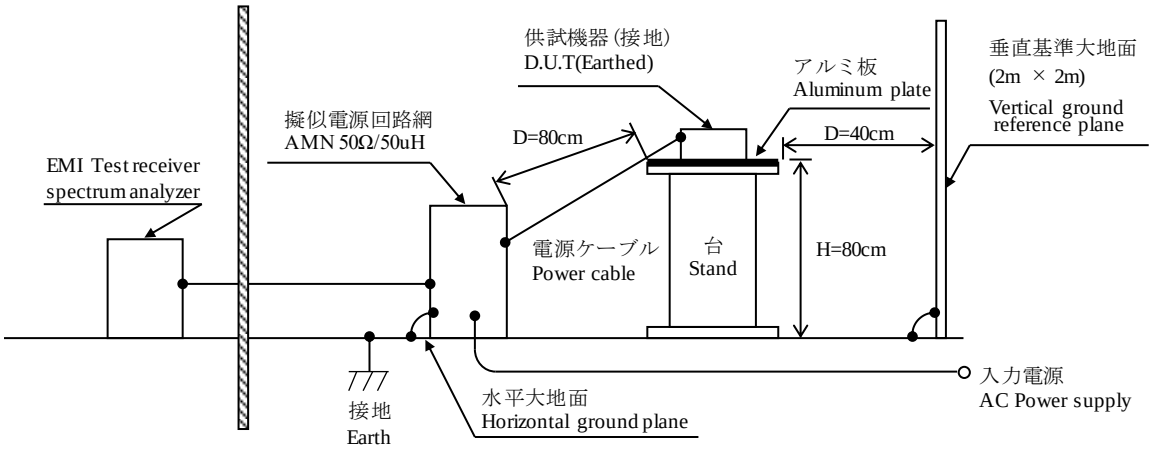
出力リップル、ノイズ電圧波形　Output ripple and noise voltage waveform



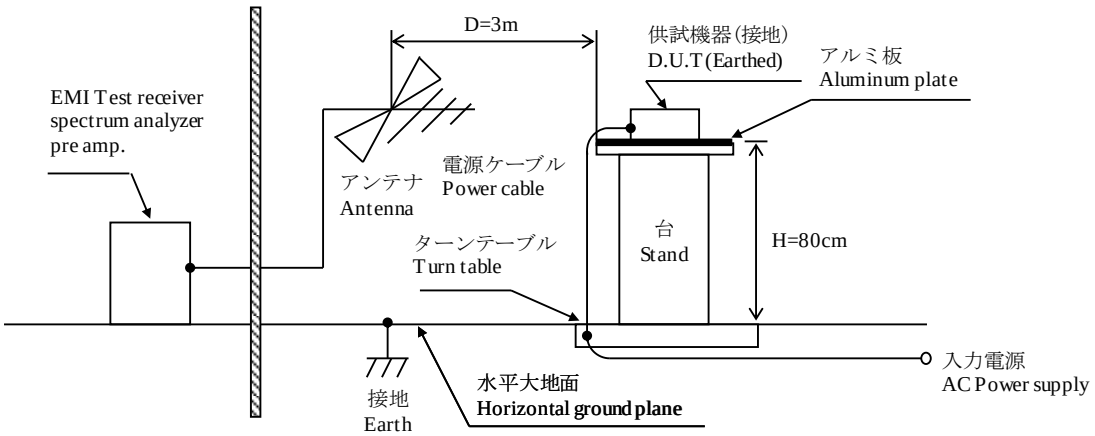
測定構成　Configuration used for determination

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.	DLM2054
2	DIGITAL MULTIMETER	KEYSIGHT	34970A
3	DIGITAL POWER METER	HIOKI	PW3337
4	CURRENT PROBE	YOKOGAWA ELECT.	701930
5	DYNAMIC DUMMY LOAD	KIKUSI	PLZ10005WSR
6	CVCF	KIKUSUI	PCR18000WEA2R
7	CONTROLLED TEMP. CHAMBER	ESPEC	PSL-4J
8	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
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	48.145V	48.150V	48.153V	48.161V	16mV	0.033%
31.3A	47.967V	47.969V	47.975V	47.969V	8mV	0.017%
62.6A	48.034V	48.036V	48.034V	48.039V	5mV	0.010%
Load regulation	178mV	181mV	178mV	192mV		
	0.371%	0.377%	0.371%	0.400%		

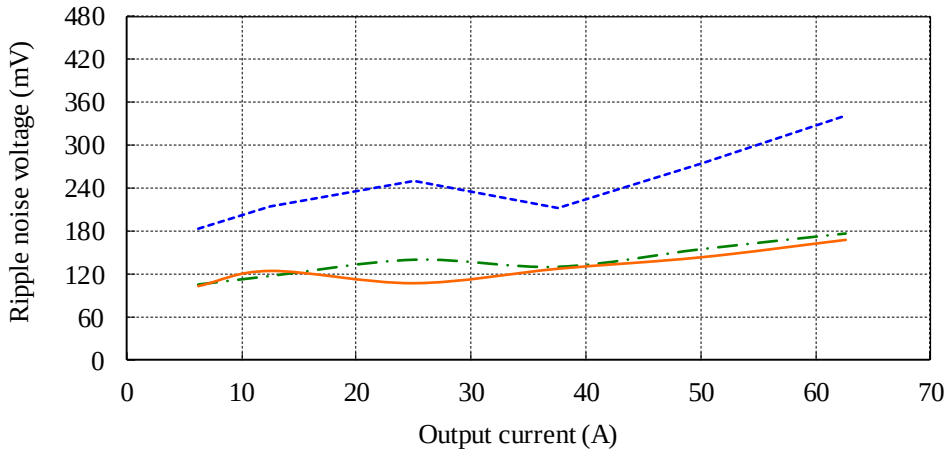
2. Temperature drift

Conditions　Vin :　200 VAC
Iout :　62.6 A

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	47.960V	48.036V	47.933V	103mV	0.215%

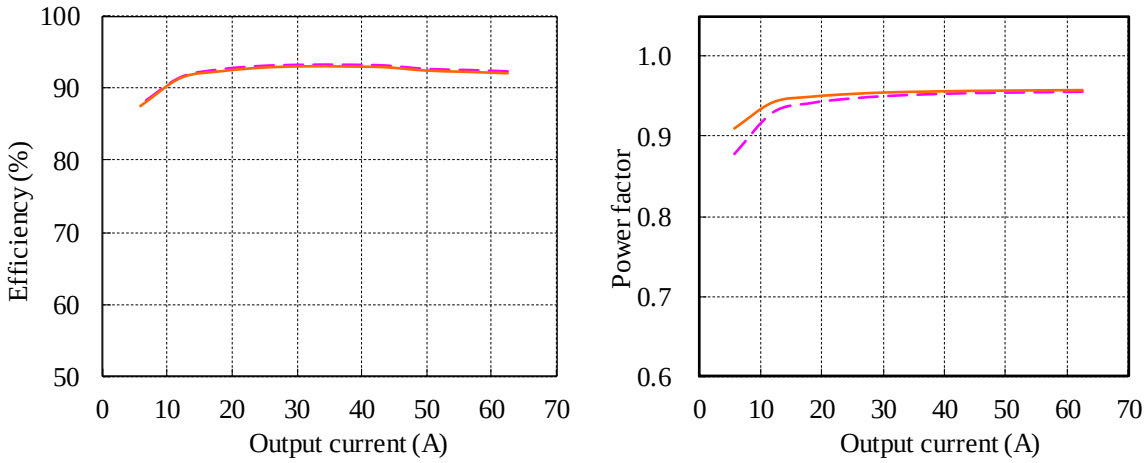
(2) リップルノイズ電圧対出力電流　Ripple noise voltage vs. Output current

Conditions　Vin :　200 VAC
Vout :　48 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

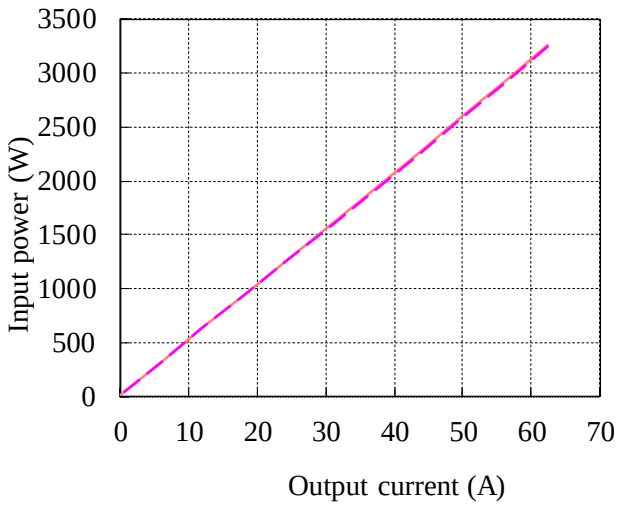
Conditions　Vin : 200 VAC
230 VAC
Vout : 48 V
Iaux : 0 %
Ta : 25 ℃



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

Conditions　Vin : 200 VAC
230 VAC
Vout : 48 V
Iaux : 0 %
Ta : 25 ℃

Vin	Input power	
	Iout : 0%	Control OFF
200VAC	9.5W	7.0W
230VAC	9.8W	7.0W



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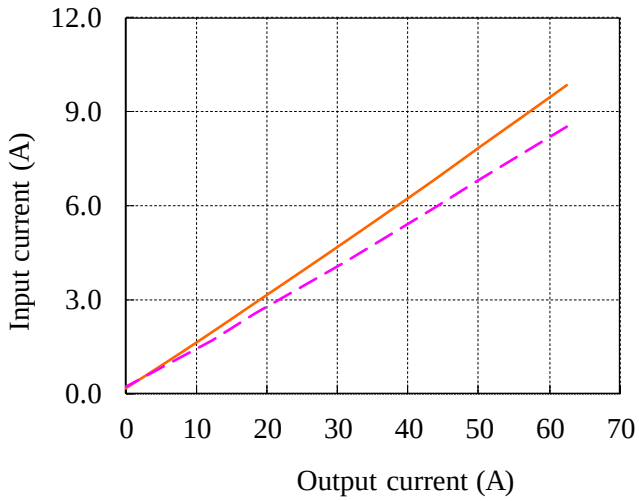
(5) 入力電流対出力電流　Input current vs. Output current

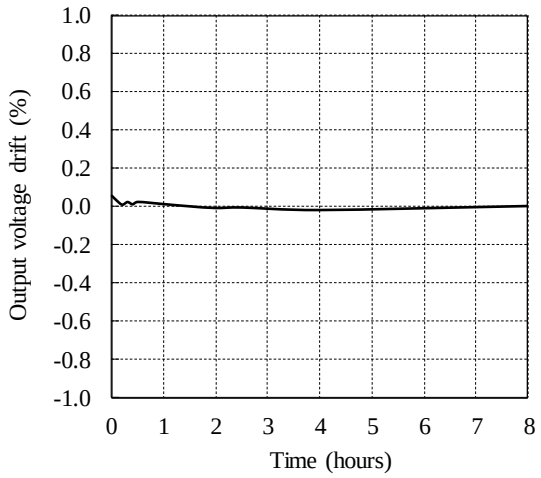
Conditions　Vin : 200 VAC
230 VAC
Vout : 48 V
Iaux : 0 %
Ta : 25 ℃

Vin	Input current	
	Iout : 0%	Control OFF
200VAC	0.17A	0.22A
230VAC	0.20A	0.25A



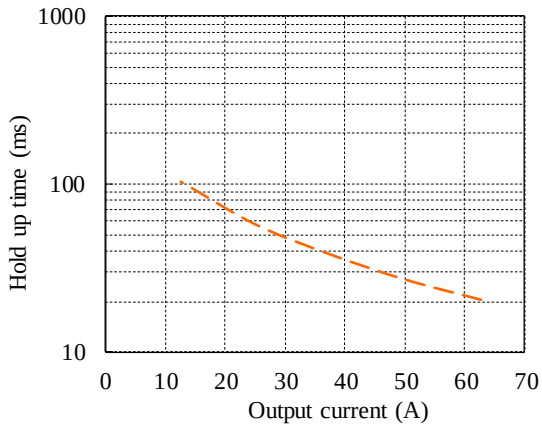
2-1-2.　通電ドリフト特性　Warm up voltage drift characteristics

Conditions　Vin :　200　VAC
Vout :　48　V
Iout :　62.6　A
Ta :　25　℃



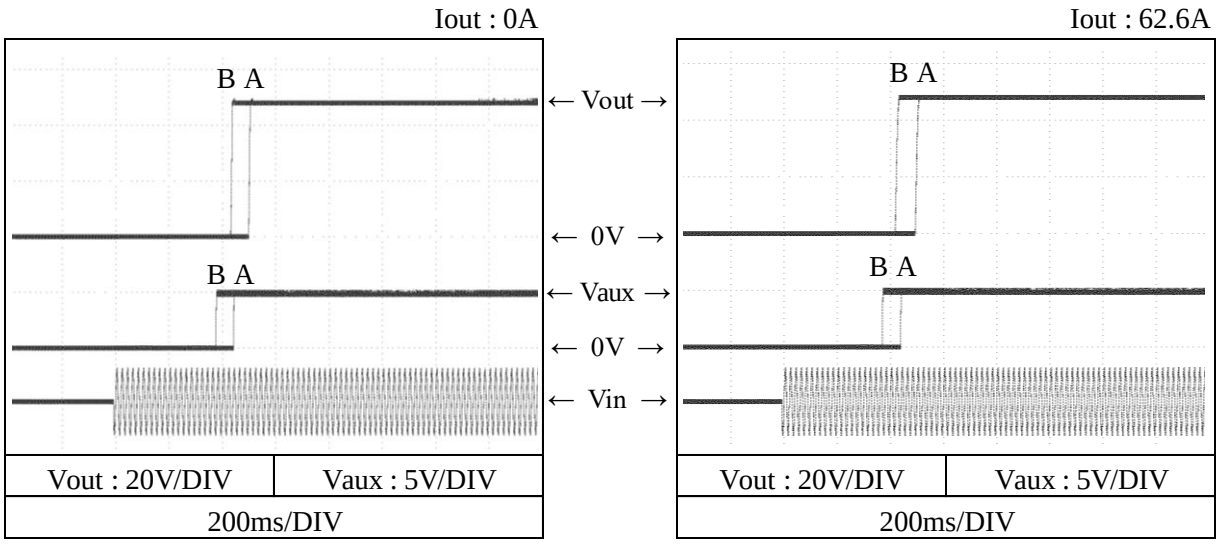
2-1-3.　出力保持時間特性　Hold up time characteristics

Conditions　Vin :　200　VAC
Vout :　48　V
Ta :　25　℃



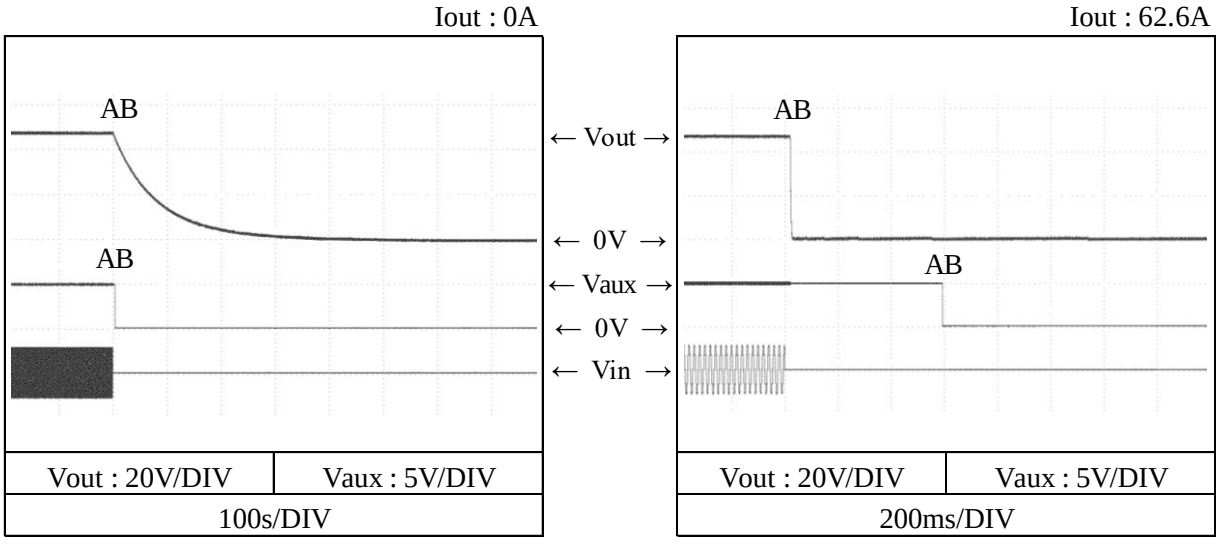
2-1-4.　出力電圧立ち上がり特性　Output voltage rise characteristics

Conditions Vin : 200 VAC (A)
230 VAC (B)
Iaux : 100 %
Ta : 25 ℃



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

Conditions Vin : 200 VAC (A)
230 VAC (B)
Iaux : 100 %
Ta : 25 ℃



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

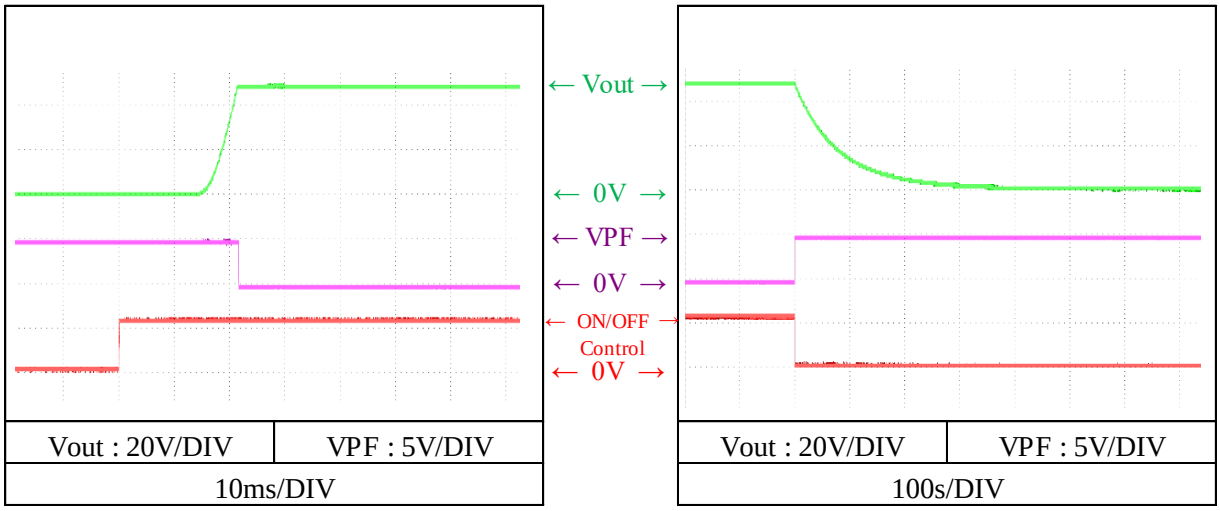
Output rise, fall characteristics with ON/OFF Control

(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 Vin : 200 VAC
Ta : 25 ℃

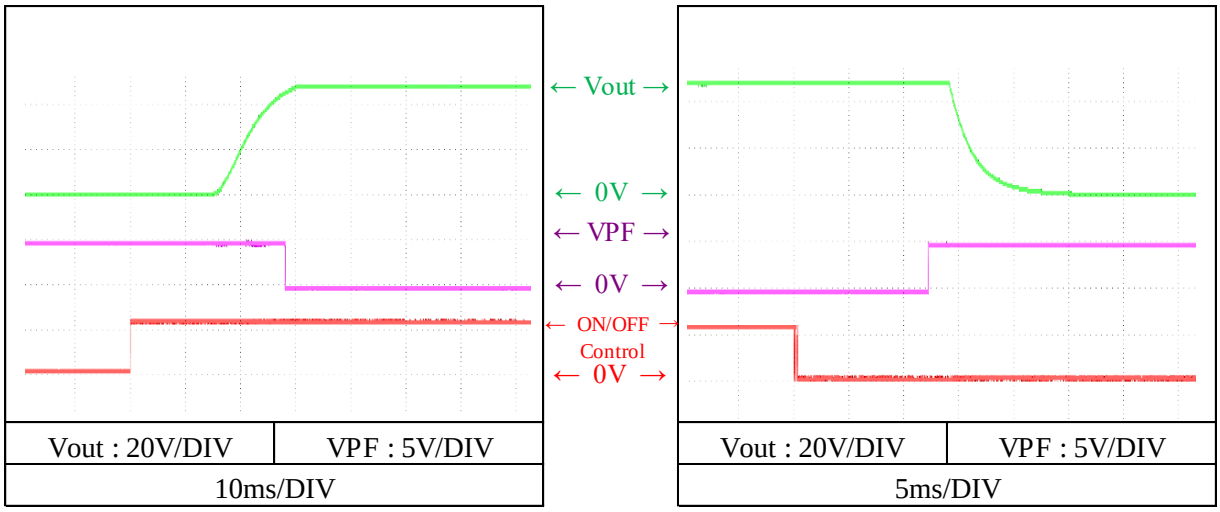
Iout : 0A



Vout : 20V/DIV	VPF : 5V/DIV
10ms/DIV	

Vout : 20V/DIV	VPF : 5V/DIV
100s/DIV	

Iout : 62.6A



Vout : 20V/DIV	VPF : 5V/DIV
10ms/DIV	

Vout : 20V/DIV	VPF : 5V/DIV
5ms/DIV	

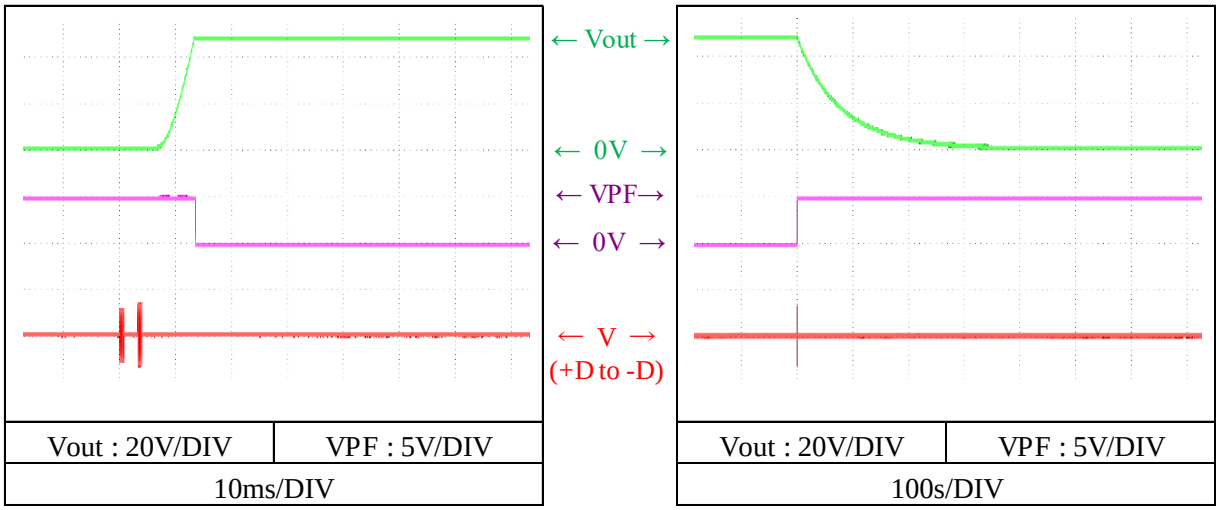
2-1-6. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

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 Vin : 200 VAC
Ta : 25 ℃

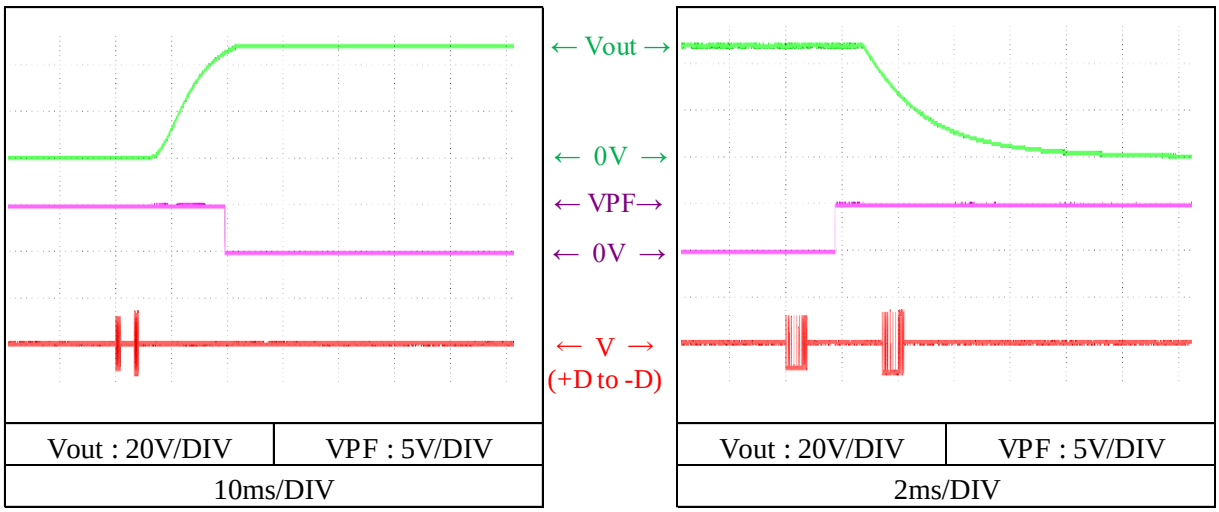
Iout : 0A



Vout : 20V/DIV	VPF : 5V/DIV
10ms/DIV	

Vout : 20V/DIV	VPF : 5V/DIV
100s/DIV	

Iout : 62.6A



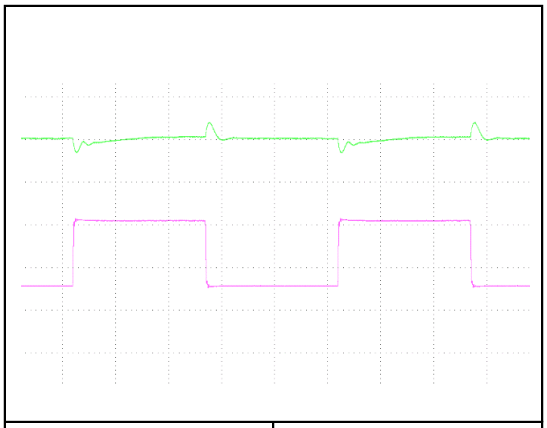
Vout : 20V/DIV	VPF : 5V/DIV
10ms/DIV	

Vout : 20V/DIV	VPF : 5V/DIV
2ms/DIV	

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

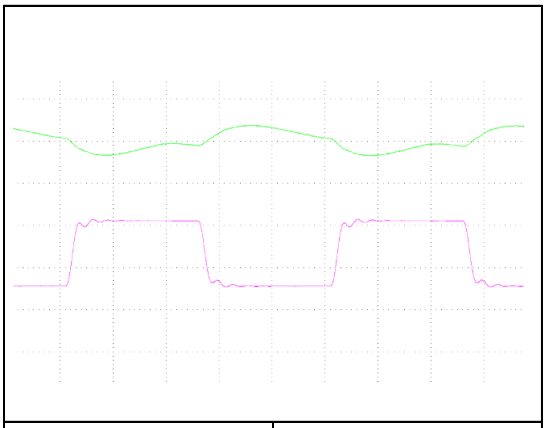
Conditions Vin :　200 VAC
Iout :　31.3A ⟷ 62.6A
(tr = tf = 50us)
Ta :　25 ℃

f = 100Hz



Vout : 2V/DIV	2ms/DIV
+1.68%	-1.29%

f = 1kHz



Vout : 2V/DIV	200μs/DIV
+1.59%	-1.47%

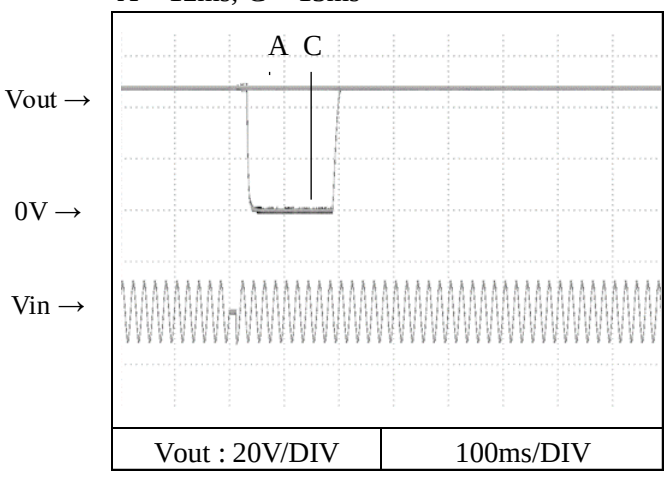
2-1-8.　入力電圧瞬停特性　Response to brown out characteristics

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 Vin :　200 VAC
Iout :　62.6 A
Ta :　25 °C

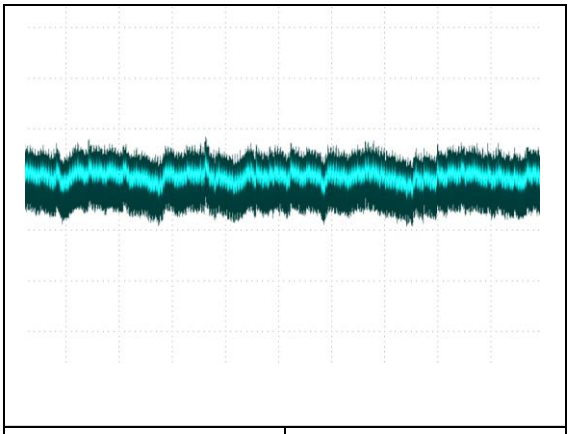
A = 12ms, C = 13ms



Vout : 20V/DIV	100ms/DIV

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

Conditions Vin : 200 VAC
Vout : 48 V
Iout : 62.6 A
Ta : 25 ℃



Vout : 100mV/DIV	2ms/DIV

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	170VAC	200VAC	230VAC	265VAC	Line regulation	
4.8V	62.61A	62.60A	62.60A	62.60A	12mA	0.019%
24V	62.55A	62.56A	62.57A	62.55A	17mA	0.027%
48V	62.57A	62.55A	62.57A	62.57A	19mA	0.030%
Load regulation	54mA	44mA	30mA	47mA		
	0.086%	0.070%	0.048%	0.075%		

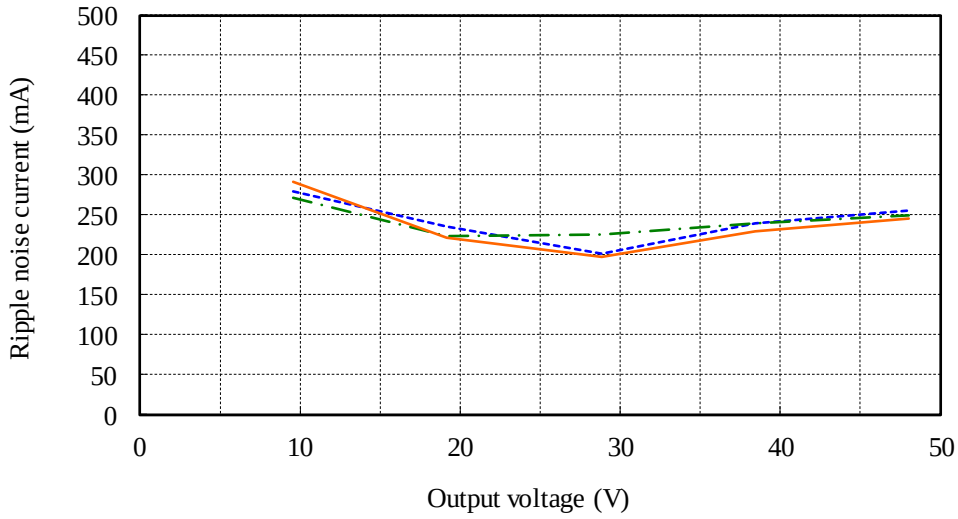
2. Temperature drift

Conditions Vin : 200 VAC
Vout : 48 V

Ta	-20°C	+25°C	+50°C	Temperature stability	
Iout	62.48A	62.55A	62.57A	94mA	0.150%

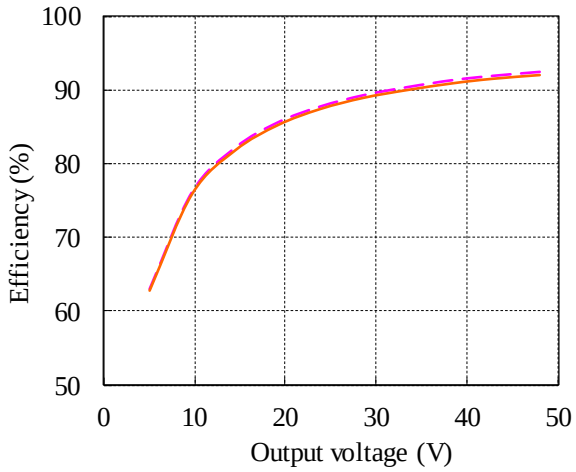
(2) リップルノイズ電流対出力電圧 Ripple noise current vs. Output voltage

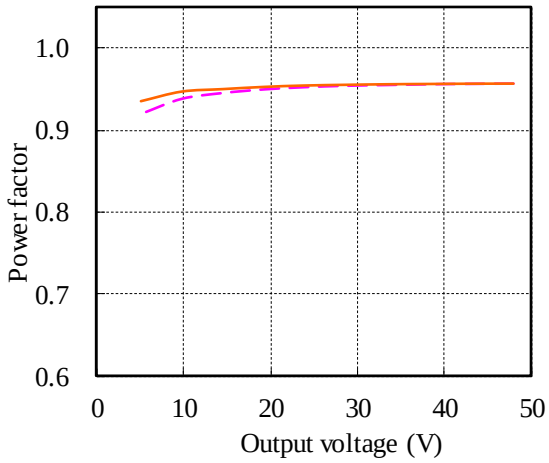
Conditions Vin : 200 VAC
Iout : 62.6 A
Ta : -20 °C
25 °C
50 °C



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

Conditions　Vin : 200 VAC
230 VAC
Iout : 62.6 A
Iaux : 0 %
Ta : 25 ℃

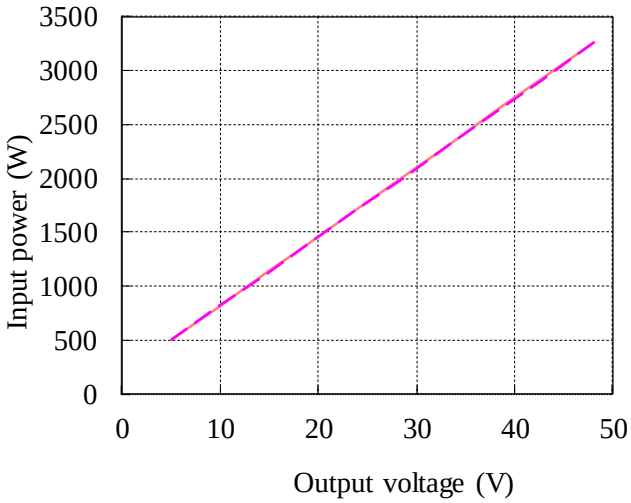




(4) 入力電力対出力電圧　Input power vs. Output voltage

Conditions　Vin : 200 VAC
230 VAC
Iout : 62.6 A
Iaux : 0 %
Ta : 25 ℃

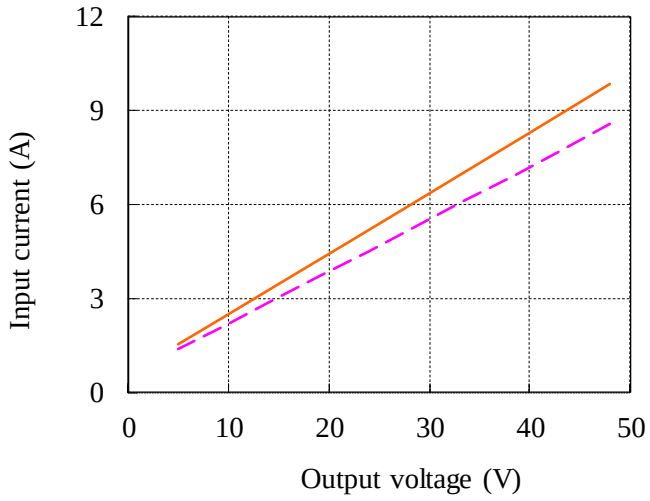
Vin	Input power
	Control OFF
200VAC	7.0W
230VAC	7.0W



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

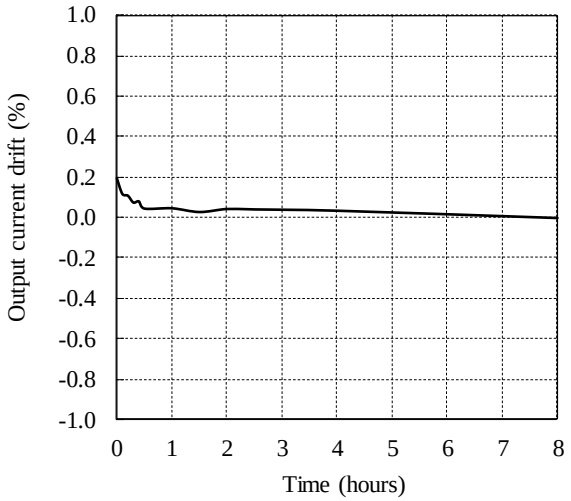
Conditions　Vin : 200 VAC
230 VAC
Iout : 62.6 A
Iaux : 0 %
Ta : 25 ℃

Vin	Input current
	Control OFF
200VAC	0.22A
230VAC	0.25A



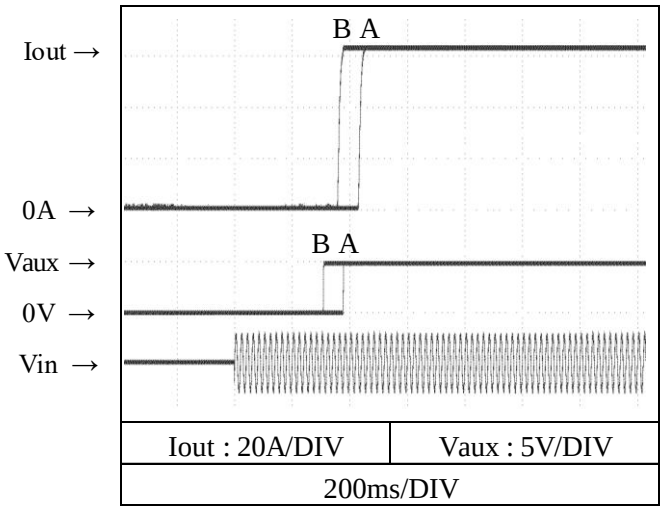
2-2-2. 通電ドリフト特性　Warm up current drift characteristics

Conditions			
	Vin :	200	VAC
	Vout :	48	V
	Iout :	62.6	A
	Ta :	25	℃



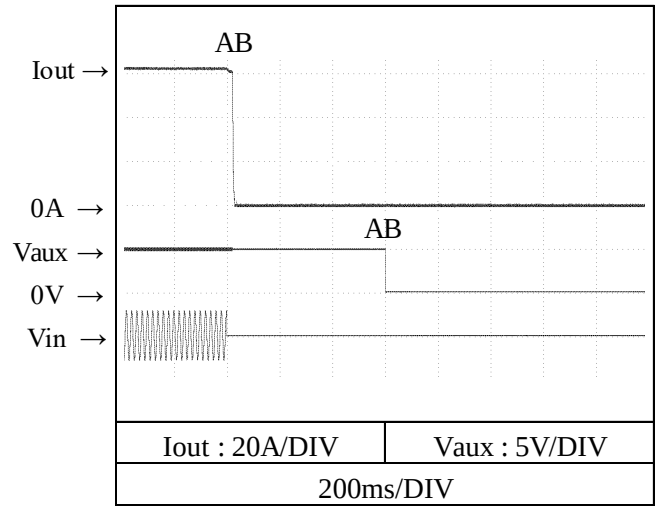
2-2-3.　出力電流立ち上がり特性　Output current rise characteristics

Conditions Vin : 200 VAC (A)
230 VAC (B)
Vout : 48 V
Iaux : 100 %
Ta : 25 ℃



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 : 48 V
Iaux : 100 %
Ta : 25 ℃



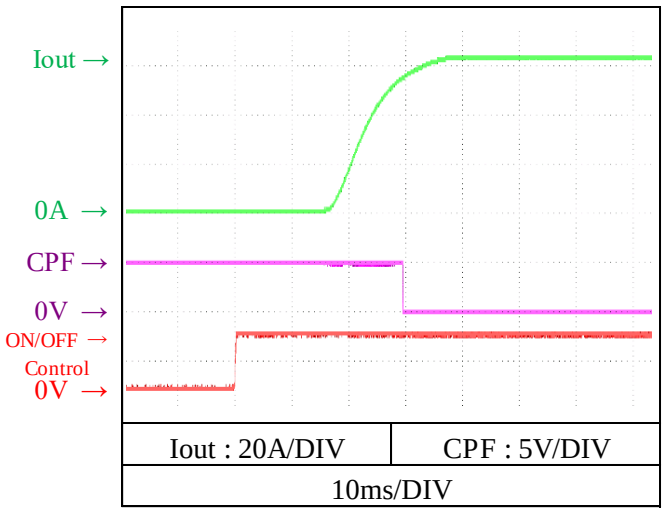
2-2-5. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

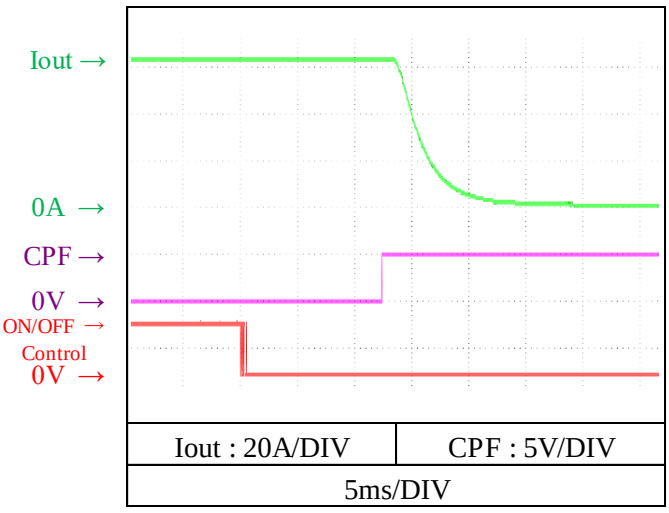
Output rise, fall characteristics with ON/OFF Control

(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 Vin : 200 VAC
Vout : 48 V
Ta : 25 ℃



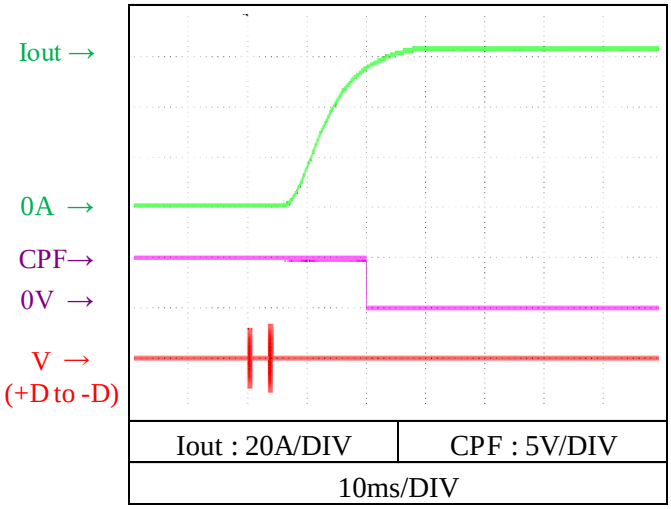


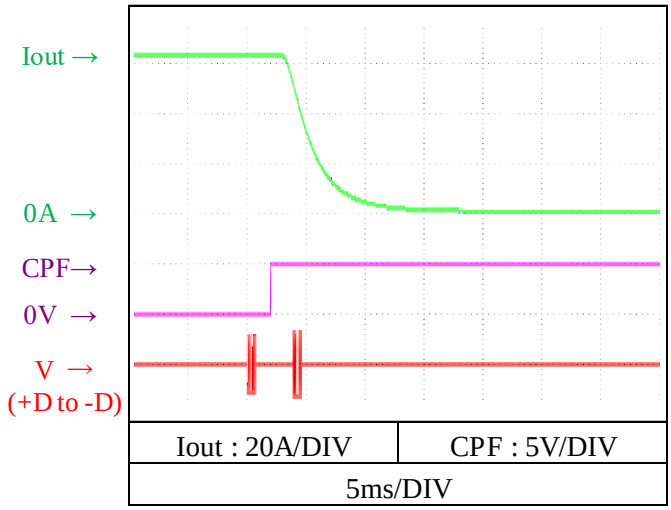
2-2-5. ON/OFFコントロール時出力立ち上がり、立ち下がり特性

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 Vin : 200 VAC
Vout : 48 V
Ta : 25 ℃





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

瞬停時間　Interruption time

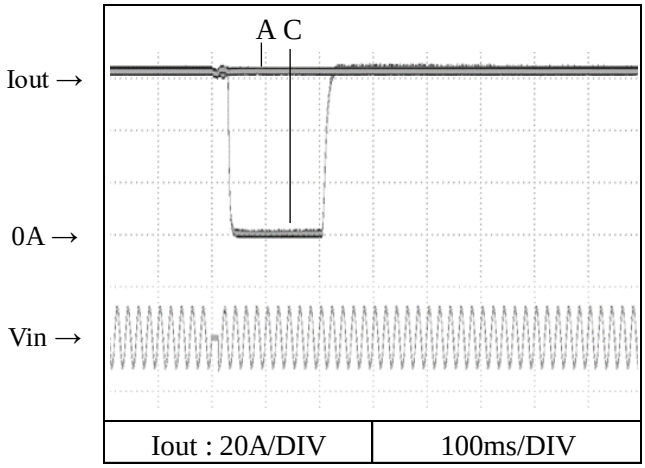
A : 出力電圧の低下なし　Output voltage does not drop.

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 Vin :　200 VAC
Vout :　48 V
Ta :　25 ℃

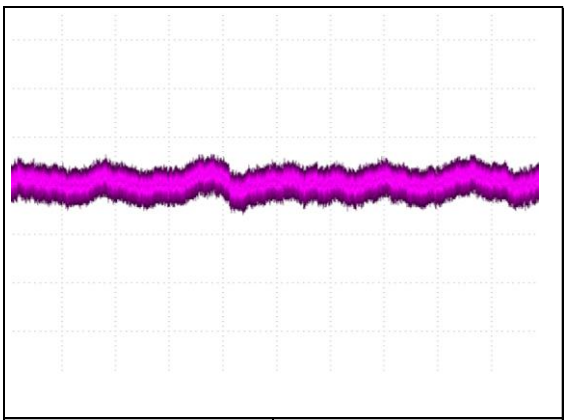
A = 12ms, C = 13ms



Iout : 20A/DIV	100ms/DIV

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

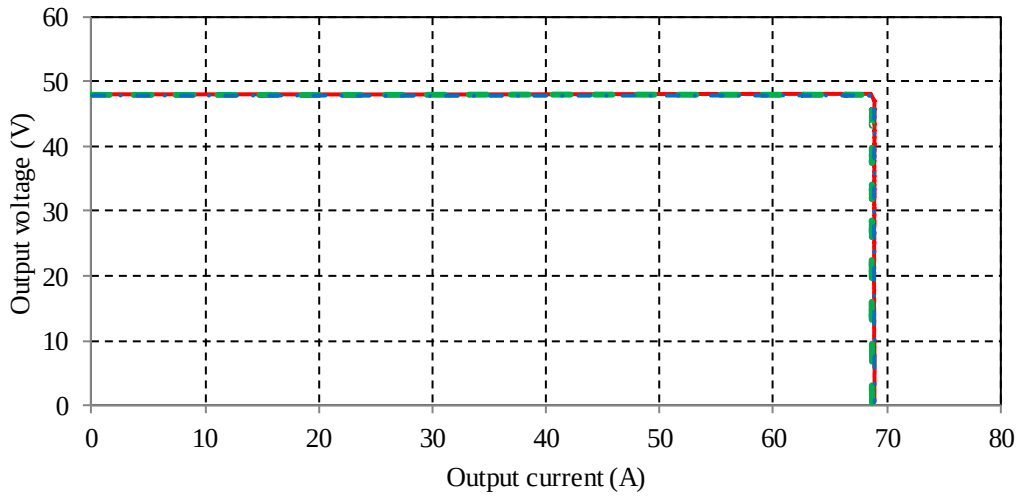
Conditions Vin :　200 VAC
Vout :　48 V
Iout :　62.6 A
Ta :　25 ℃



Iout : 200mA/DIV	2ms/DIV

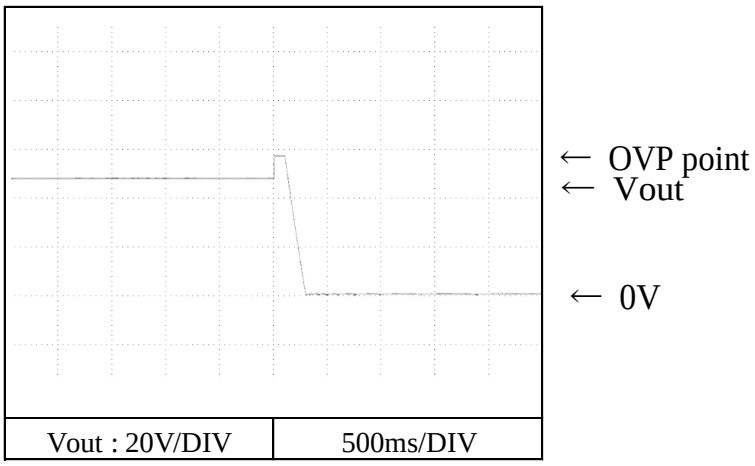
2-3. 過電流保護特性 Over current protection (OCP) characteristics

Conditions Vin : 200 VAC
Ta : -20 ℃
25 ℃
50 ℃



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

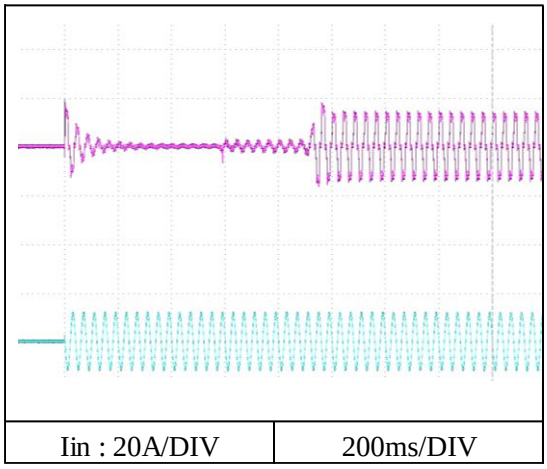
Conditions Vin : 200 VAC
Iout : 1 A
Ta : 25 ℃



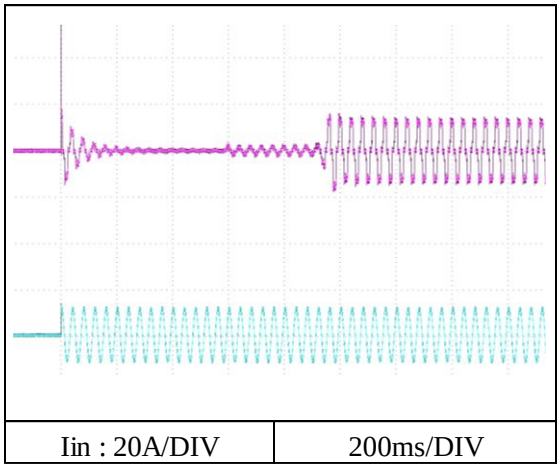
2-5. 入力サージ電流（突入電流）波形 Inrush current waveform

Conditions Vin : 200 VAC
Vout : Nominal output voltage
Iout : Maximum output current
Ta : 25 ℃

Switch on phase angle of input AC voltage
ϕ = 0°

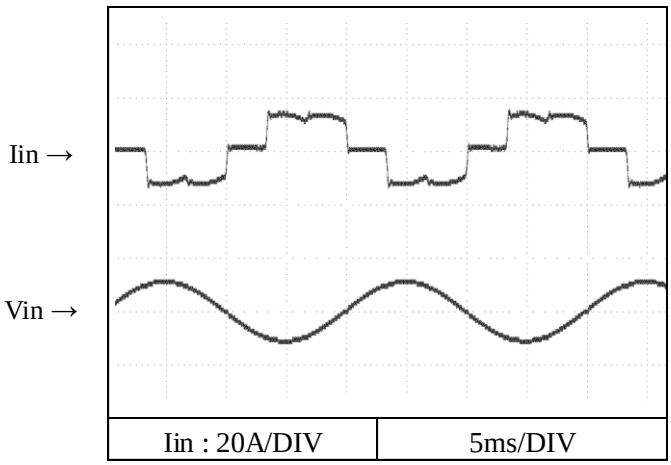


Switch on phase angle of input AC voltage
ϕ = 90°



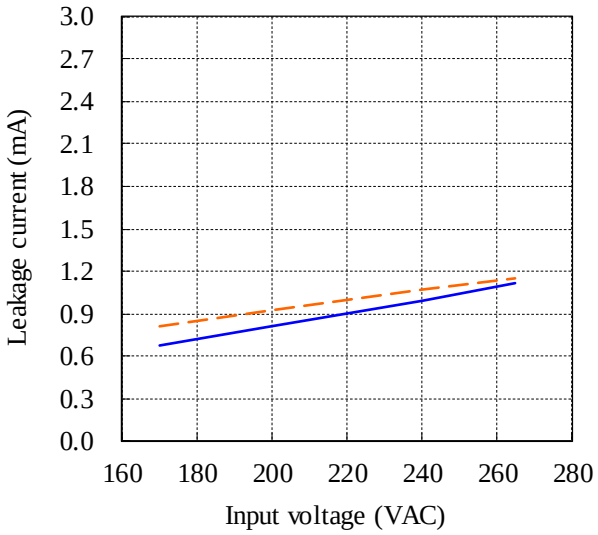
2-6. 入力電流波形 Input current waveform

Conditions Vin : 200 VAC
Vout : Nominal output voltage
Iout : Maximum output current
Ta : 25 ℃

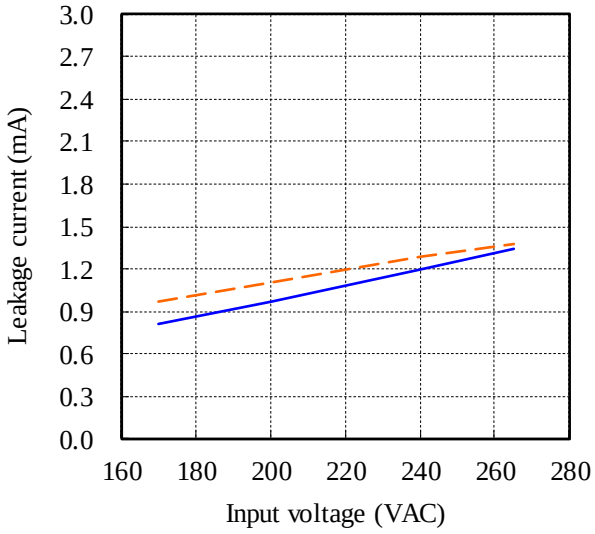


2-7. リーク電流特性　Leakage current characteristics

Conditions　Vout : Nominal output voltage
Iout : 0 A
Maximum
Ta : 25 °C
f : 50 Hz



Conditions　Vout : Nominal output voltage
Iout : 0 A
Maximum
Ta : 25 °C
f : 60 Hz



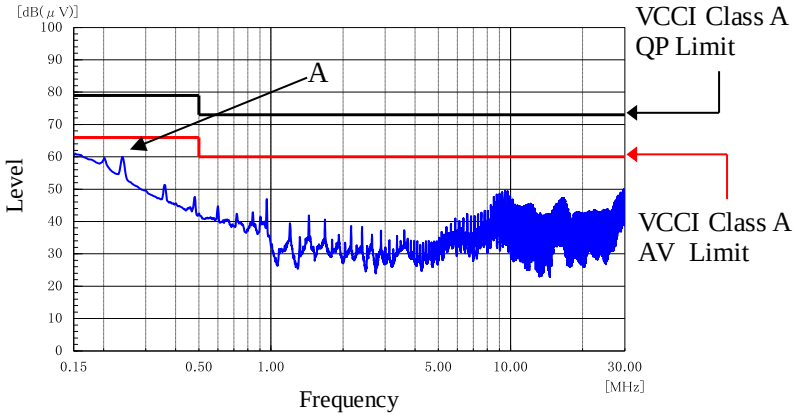
2-8. EMI特性　Electro Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions　Vin :　200 VAC
Vout :　48 V
Iout :　62.6 A
Iaux :　100 %
Ta :　25 ℃

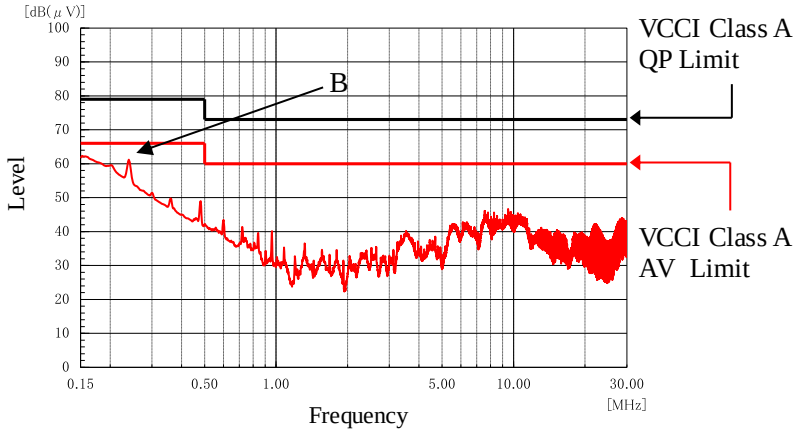
Phase : L1

Ref. Data	Point A (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	57.7
AV	66.0	55.3



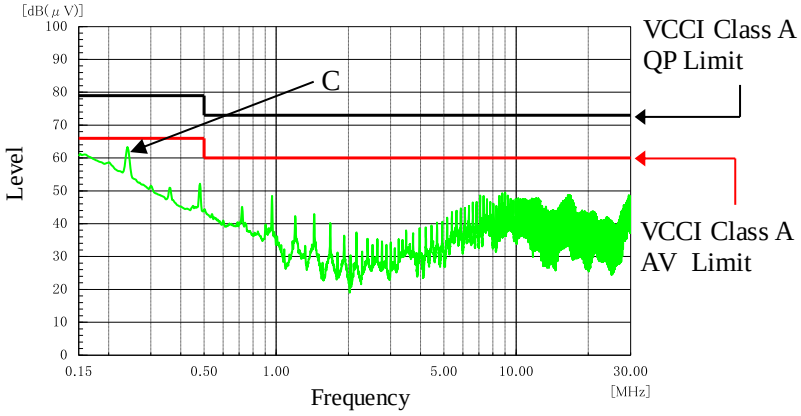
Phase : L2

Ref. Data	Point B (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	58.6
AV	66.0	56.5



Phase : L3

Ref. Data	Point C (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	61.0
AV	66.0	59.9



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.

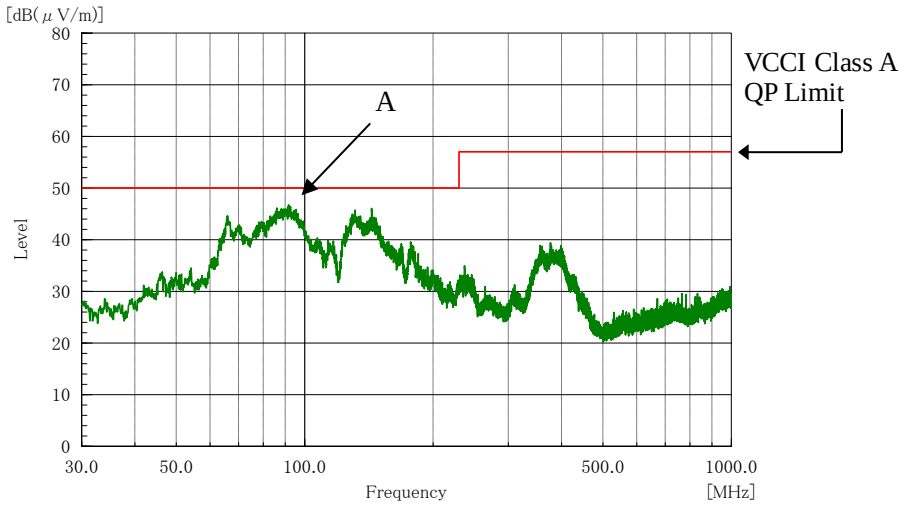
2-8. EMI特性　Electro Magnetic Interference characteristics

雑音電界強度
Radiated Emission

Conditions　Vin :　200 VAC
Vout :　48 V
Iout :　62.6 A
Iaux :　100 %
Ta :　25 ℃

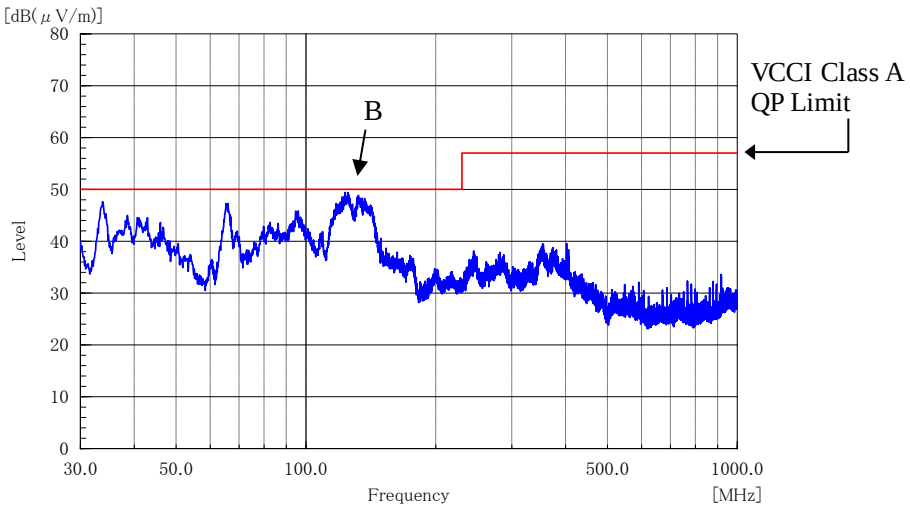
HORIZONTAL

Ref. Data	Point A (89MHz) Limit (dB)	Measure (dB)
QP	50.0	45.1



VERTICAL

Ref. Data	Point B (125MHz) Limit (dB)	Measure (dB)
QP	50.0	46.9



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.