HWS3000GT-250

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。

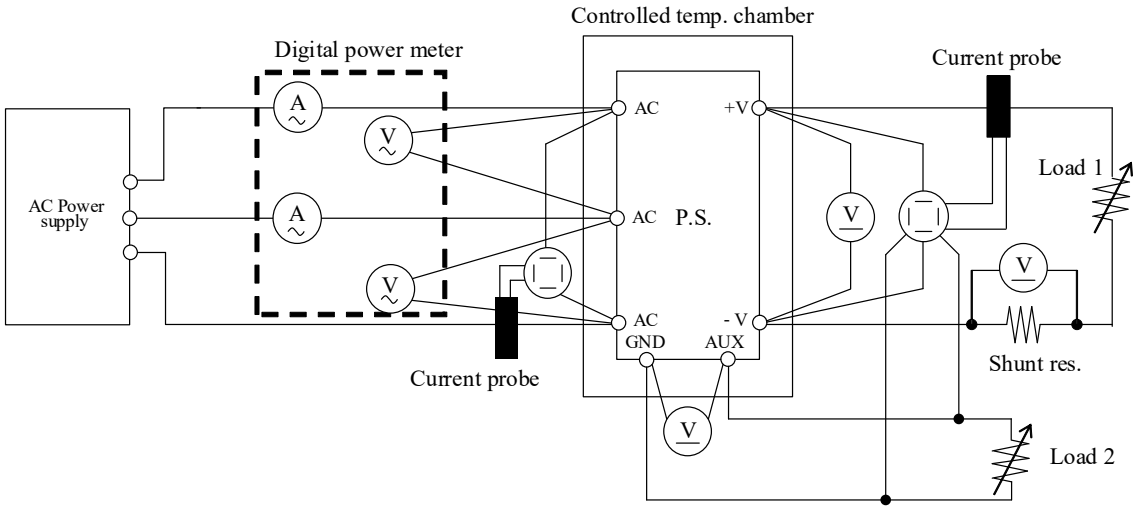
Test results are reference data based on our measurement condition.

1 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

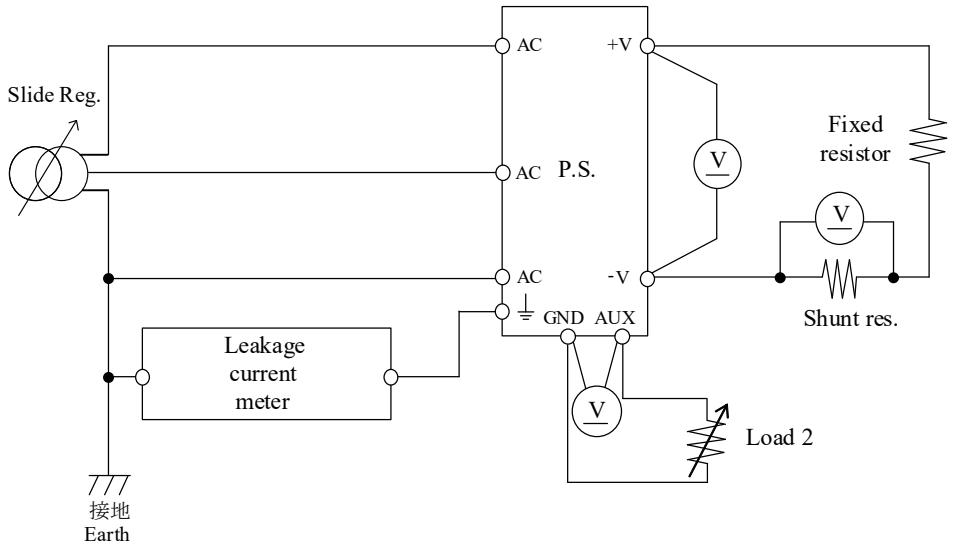
測定回路 1 Circuit 1 used for determination

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



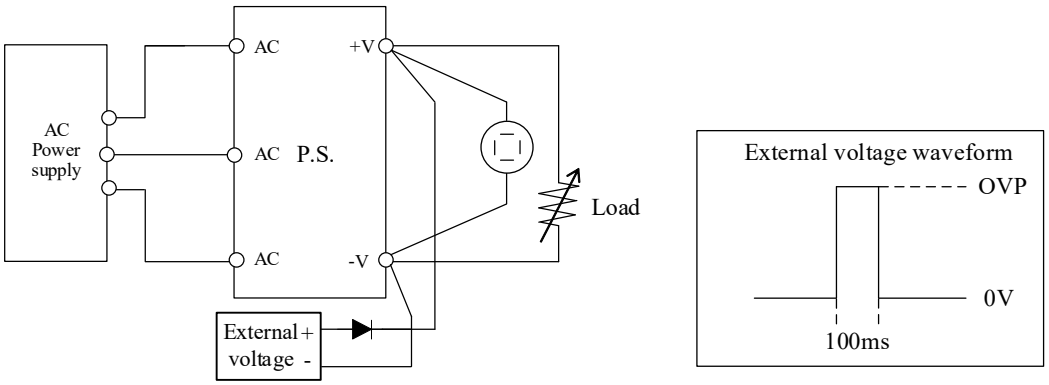
測定回路 2 Circuit 2 used for determination

リーク電流特性 Leakage current characteristics



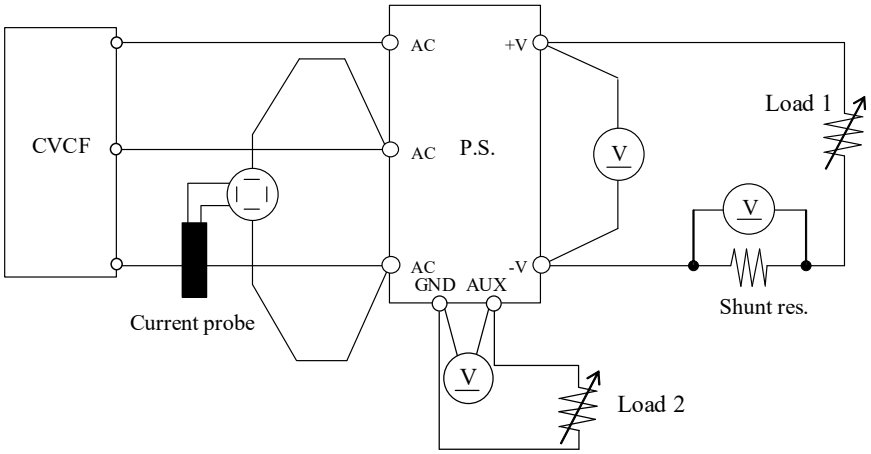
測定回路 3　Circuit 3 used for determination

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



測定回路 4　Circuit 4 used for determination

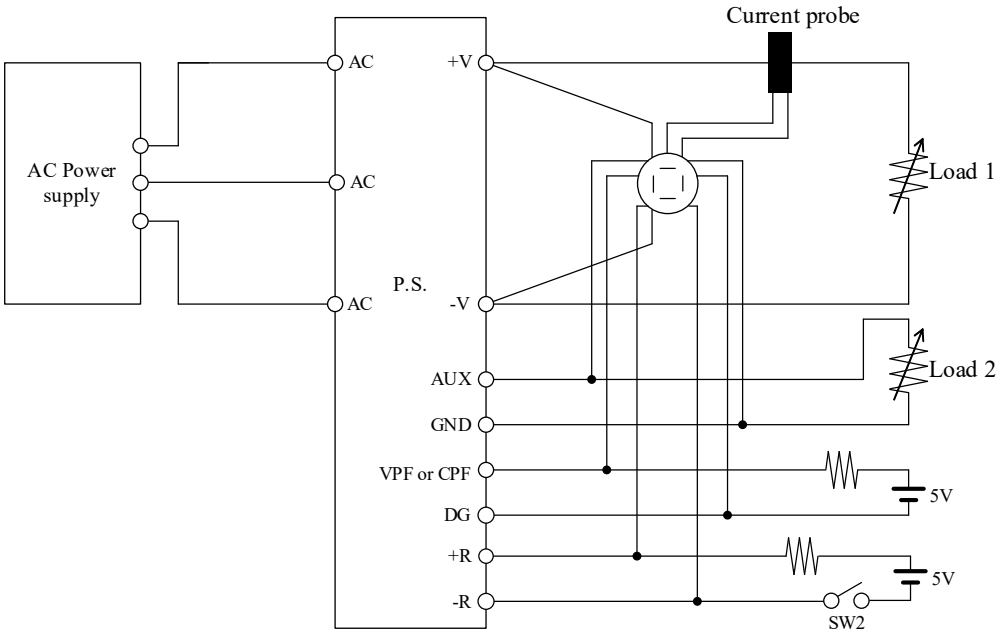
入力サージ電流（突入電流）波形 Inrush current waveform



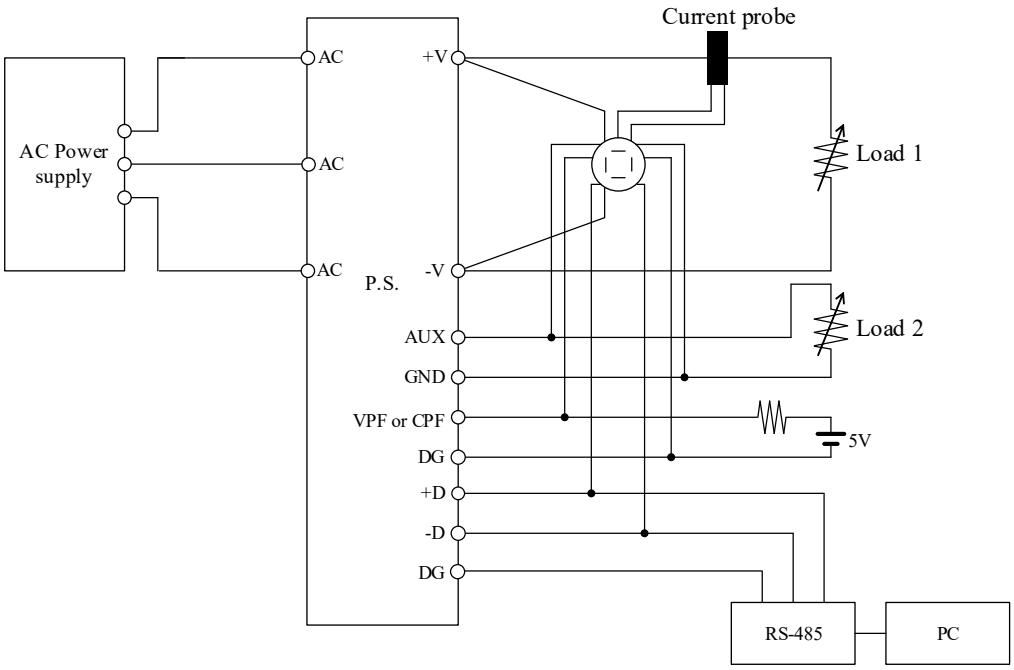
測定回路 5　Circuit 5 used for determination

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
ON/OFF control by remote ON/OFF control terminal

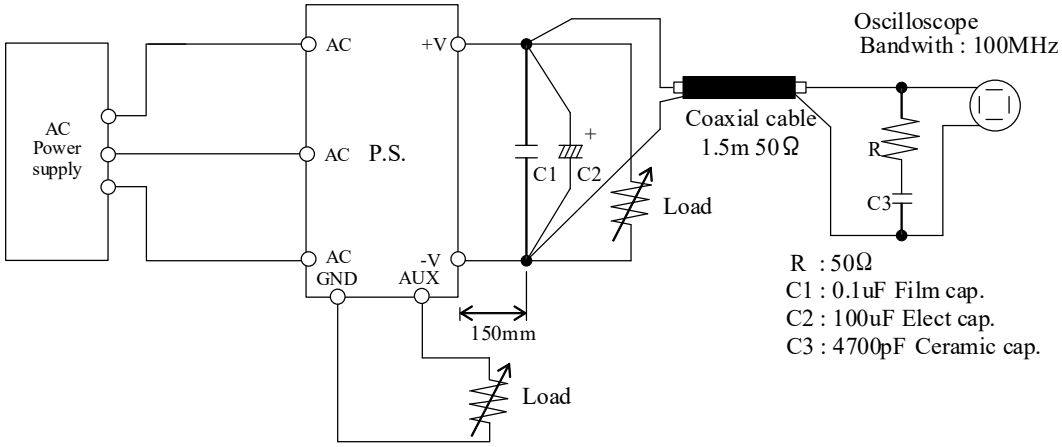


(b) RS-485 通信による ON/OFF ON/OFF control by RS-485



測定回路 6　Circuit 6 used for determination

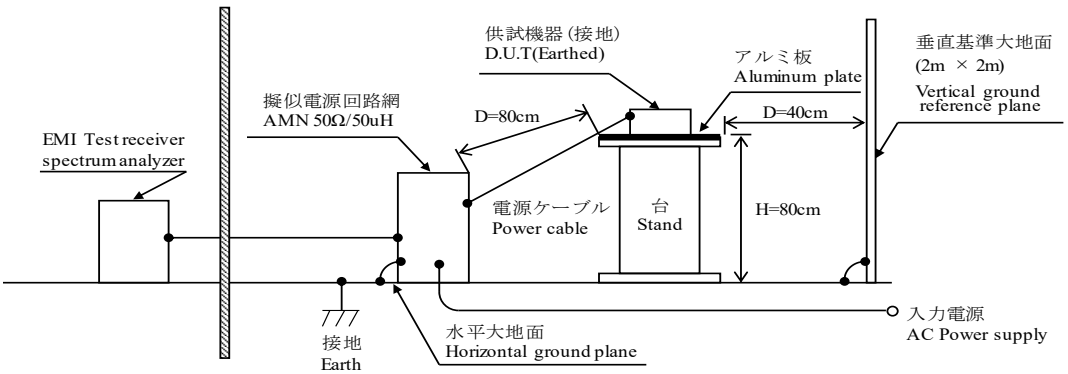
出力リップル、ノイズ電圧波形 Output ripple and noise voltage waveform



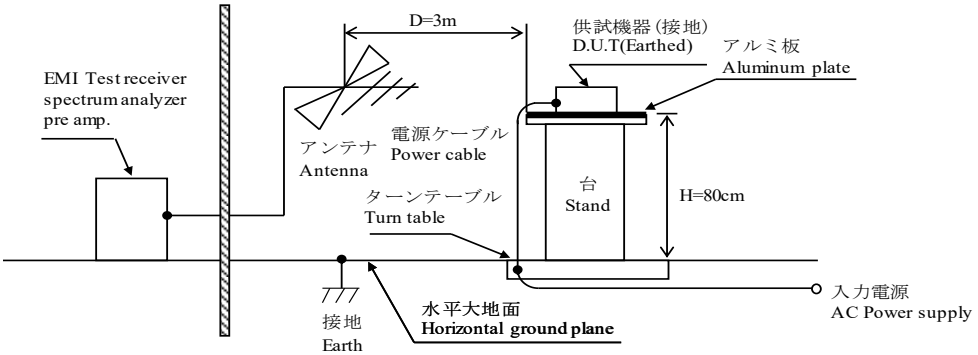
測定構成　Configuration used for determination

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.	DLM3054
2	DIGITAL MULTIMETER	KEYSIGHT	34970A
3	DIGITAL POWER METER	HIOKI	PW3337
4	CURRENT PROBE	YOKOGAWA ELECT.	701931
5	DYNAMIC DUMMY LOAD	KIKUSI	PLZ12005WH2
6	CVCF	KIKUSUI	PCR18000WEA2R
7	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4KP
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	249.966V	249.967V	249.940V	249.960V	27mV	0.011%
6A	249.902V	249.996V	249.948V	249.959V	94mV	0.038%
12A	250.153V	250.132V	250.122V	250.148V	31mV	0.013%
Load regulation	251mV	164mV	182mV	189mV		
	0.100%	0.066%	0.073%	0.076%		

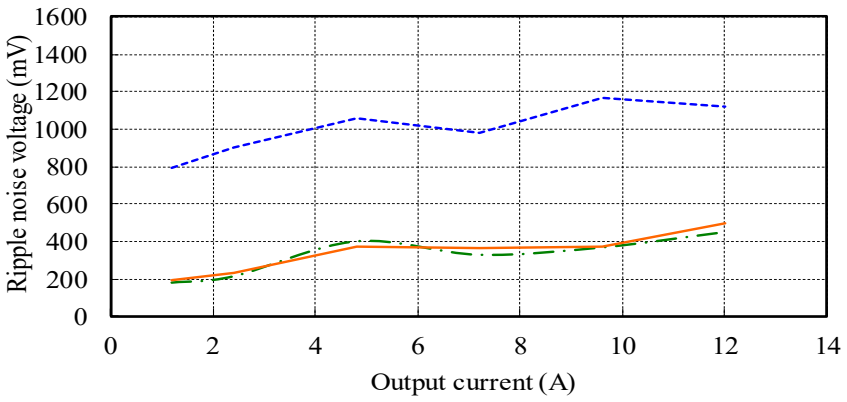
2. Temperature drift

Conditions Vin : 200 VAC
Iout : 12 A

Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	248.898V	250.132V	250.243V	1345mV	0.538%

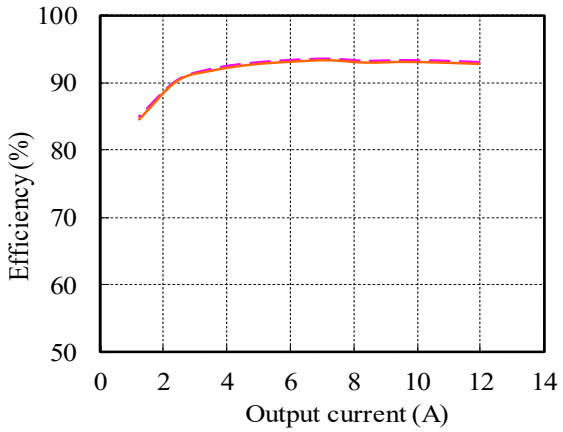
(2) リップルノイズ電圧対出力電流 Ripple noise voltage vs. Output current

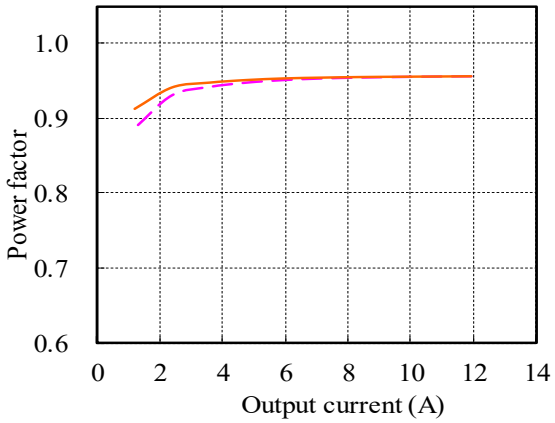
Conditions Vin : 200 VAC
Vout : 250 V
Ta : -20 °C
25 °C
50 °C



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

Conditions Vin : 200 VAC
230 VAC
Vout : 250 V
Iaux : 0 %
Ta : 25 ℃

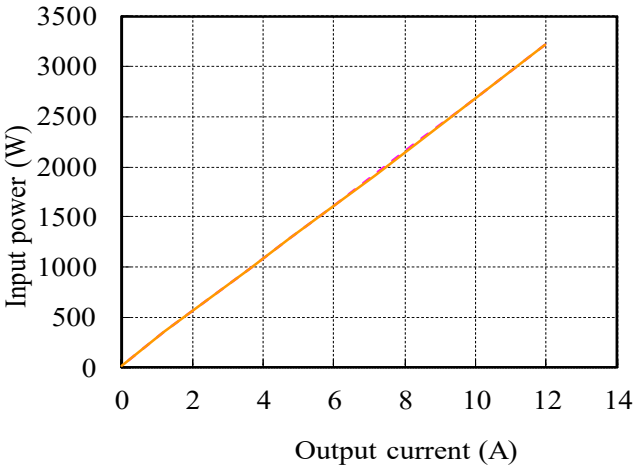




(4) 入力電力対出力電流 Input power vs. Output current

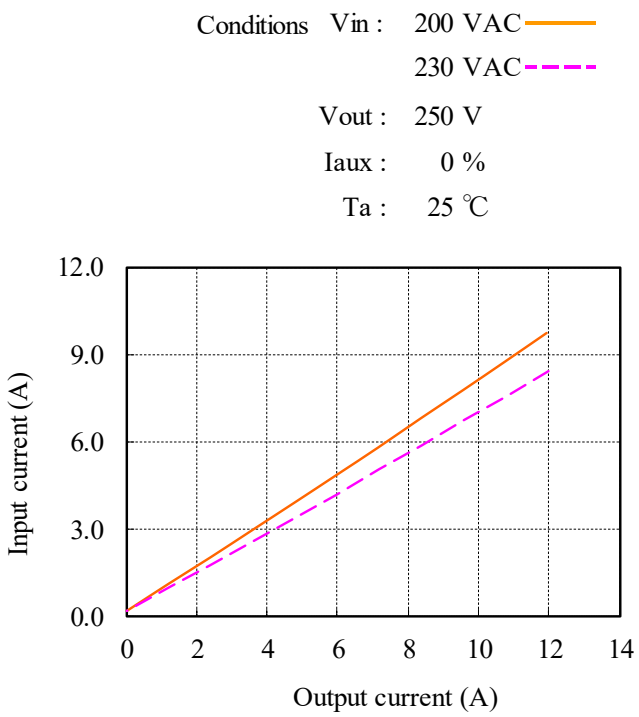
Conditions Vin : 200 VAC
230 VAC
Vout : 250 V
Iaux : 0 %
Ta : 25 ℃

Vin	Input power	
	Iout : 0%	Control OFF
200VAC	11.3W	7.6W
230VAC	11.7W	8.1W



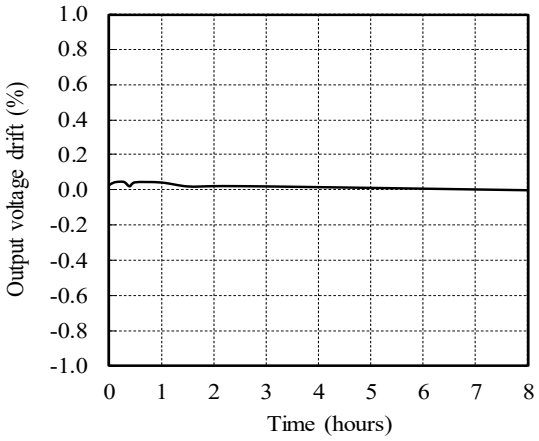
(5) 入力電流対出力電流 Input current vs. Output current

Vin	Input current	
	Iout : 0%	Control OFF
200VAC	0.18A	0.17A
230VAC	0.20A	0.19A



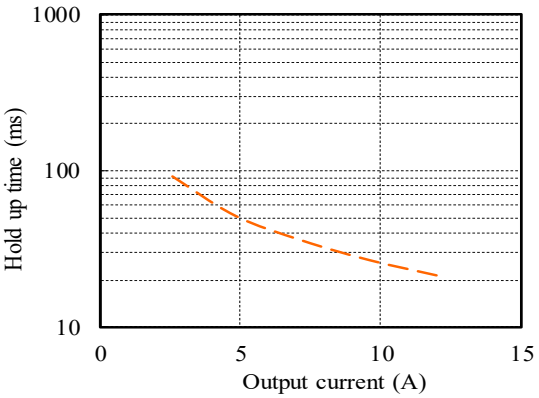
2.1.2 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 200 VAC
Vout : 250 V
Iout : 12 A
Ta : 25 °C



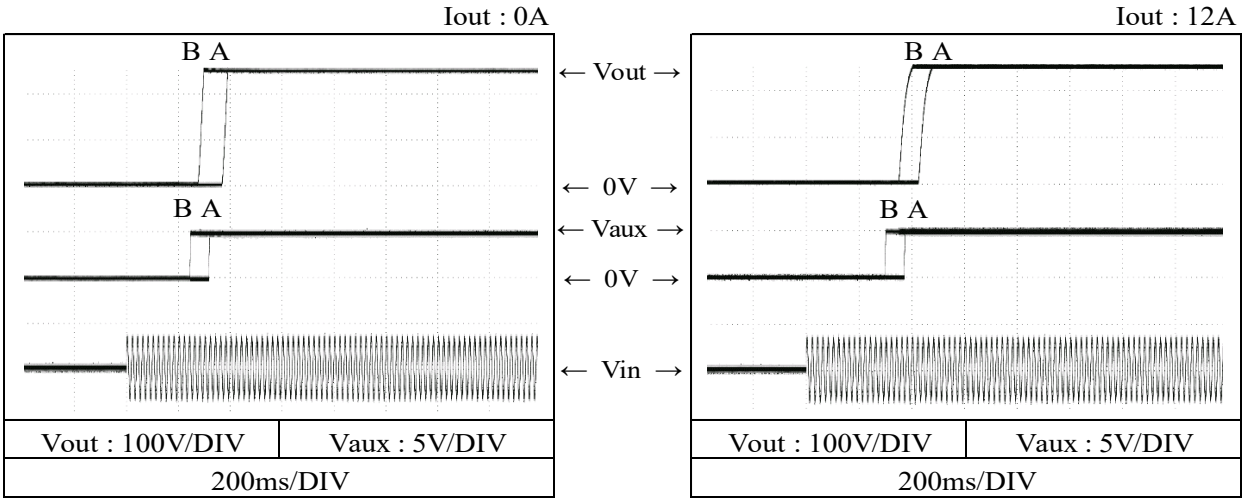
2.1.3 出力保持時間特性 Hold up time characteristics

Conditions Vin : 200 VAC
Vout : 250 V
Ta : 25 °C



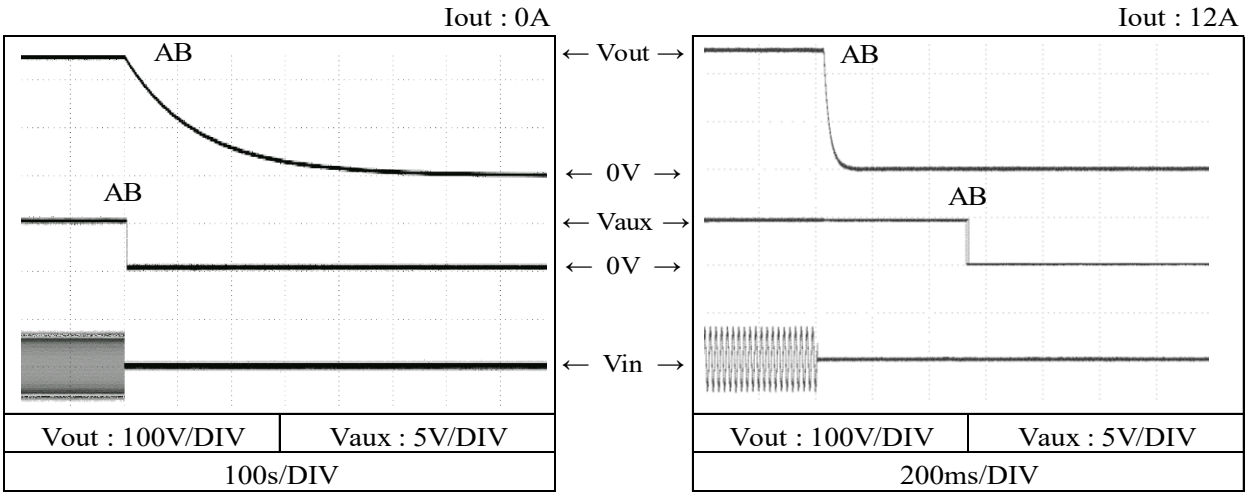
2.1.4 出力電圧立ち上がり特性 Output voltage rise characteristics

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 ℃

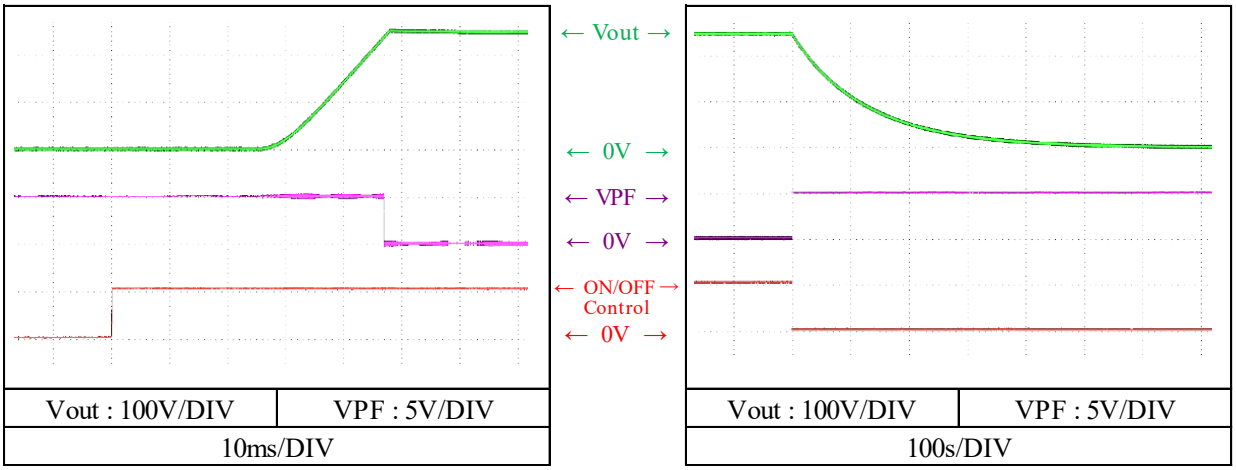


2.1.6 ON/OFF コントロール時出力立ち上がり、立下がり特性
Output rise, fall characteristics with ON/OFF Control

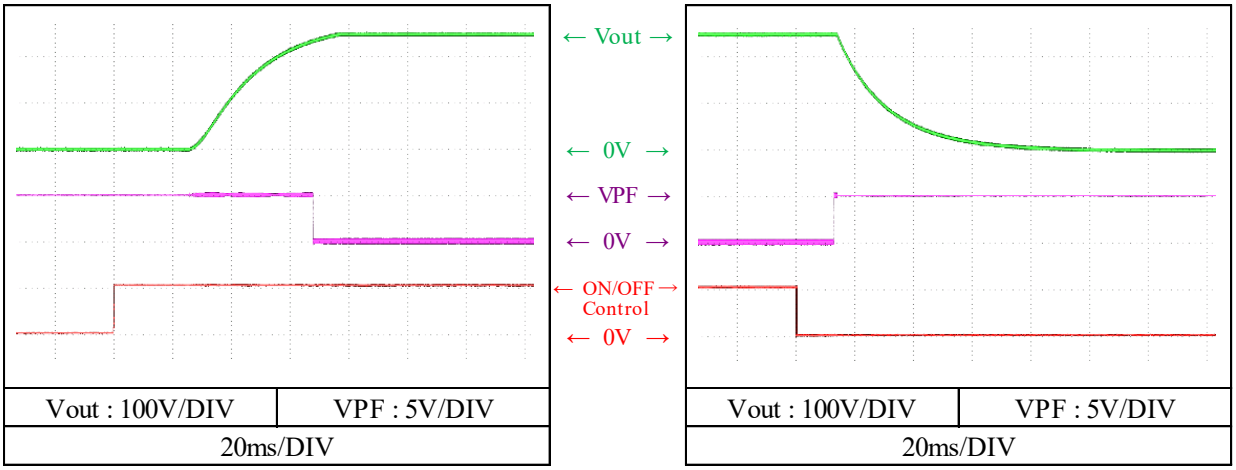
(a) リモート ON/OFF コントロール 端子 による ON/OFF
ON/OFF control by remote ON/OFF control terminal

Conditions Vin : 200 VAC
Ta : 25 ℃

Iout : 0A



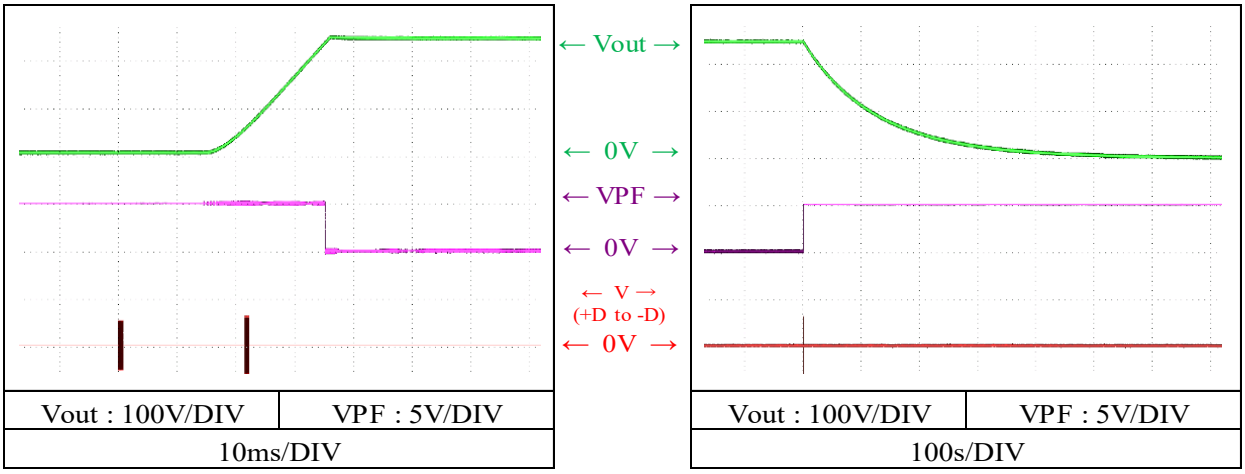
Iout : 12A



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

Conditions Vin : 200 VAC
Ta : 25 ℃

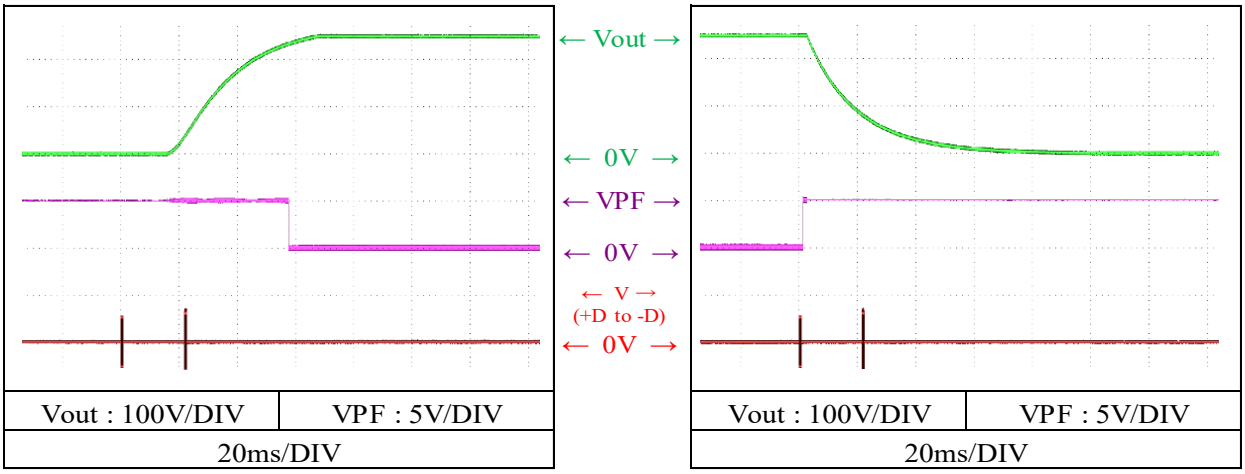
Iout : 0A



Vout : 100V/DIV	VPF : 5V/DIV
10ms/DIV	

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

Iout : 12A



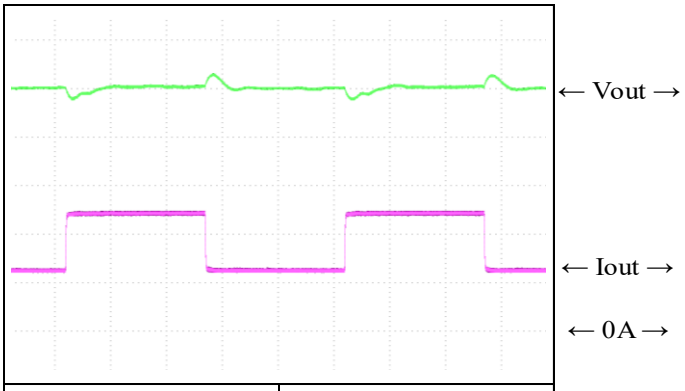
Vout : 100V/DIV	VPF : 5V/DIV
20ms/DIV	

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

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

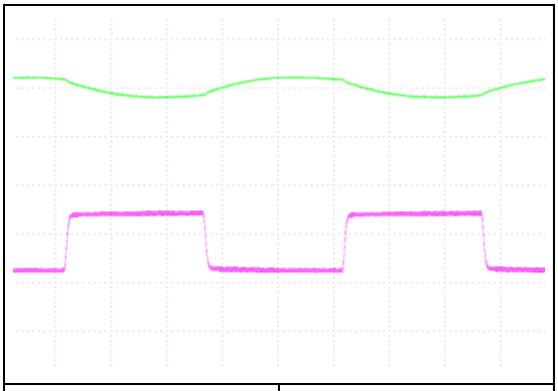
Conditions Vin : 200 VAC
Iout : 6A ⟷ 12A
(tr = tf = 50us)
Ta : 25 ℃

f = 100Hz



Vout : 5V/DIV	2ms/DIV
+0.62%	-0.48%

f = 1kHz



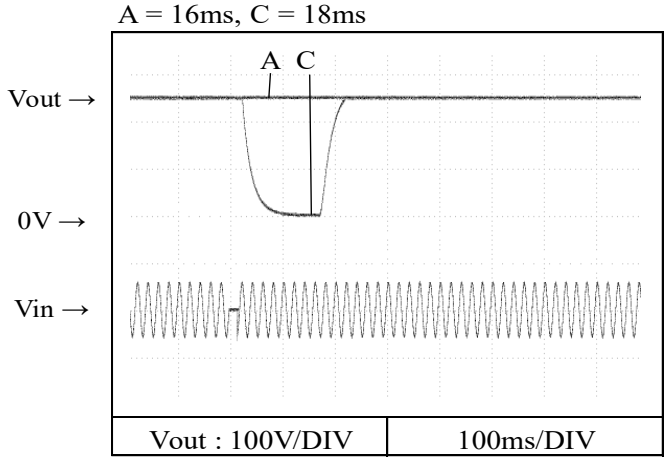
Vout : 5V/DIV	200μs/DIV
+0.48%	-0.44%

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 : 12 A
Ta : 25 °C

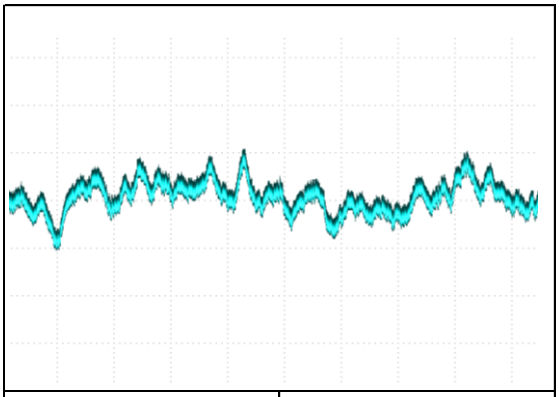
A = 16ms, C = 16ms



Vout : 100V/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 : 250 V
Iout : 12 A
Ta : 25 °C



Vout : 200mV/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	132VAC	200VAC	230VAC	265VAC	Line regulation	
25V	12.030A	12.032A	12.031A	12.031A	2mA	0.017%
125V	12.027A	12.026A	12.028A	12.027A	2mA	0.017%
250V	12.022A	12.023A	12.022A	12.022A	1mA	0.008%
Load regulation	8mA	9mA	9mA	9mA		
	0.067%	0.075%	0.075%	0.075%		

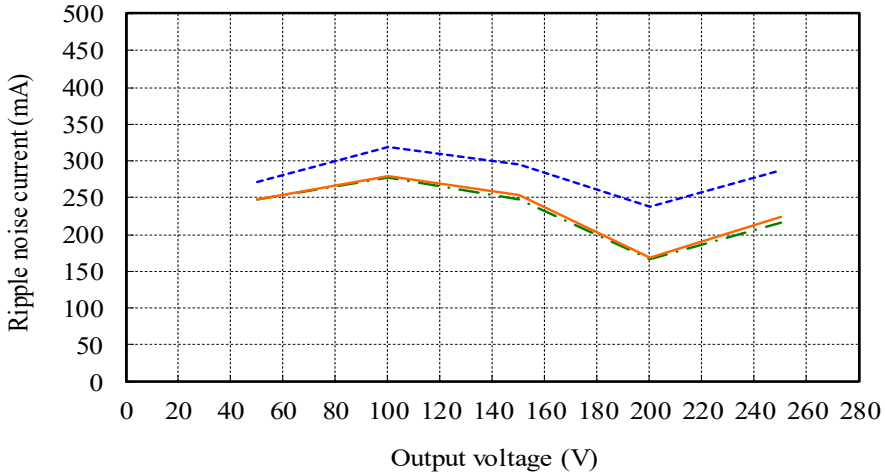
2. Temperature drift

Conditions　Vin :　200 VAC
Vout :　250 V

Ta	-20°C	+25°C	+50°C	Temperature stability	
Iout	12.006A	12.023A	12.020A	17mA	0.142%

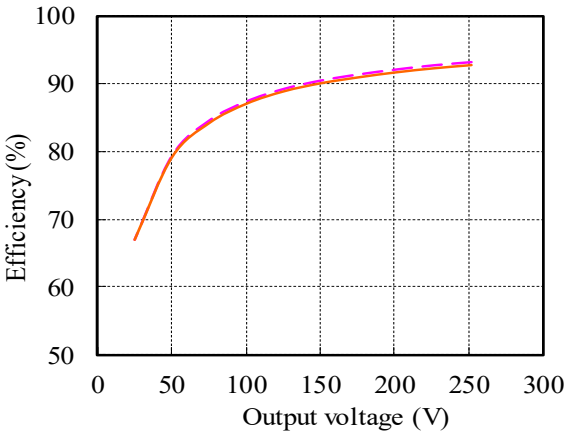
(2) リップルノイズ電流対出力電圧 Ripple noise current vs. Output voltage

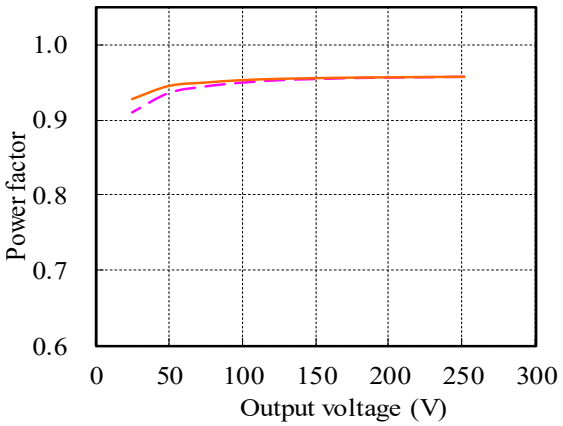
Conditions　Vin :　200 VAC
Iout :　12 A
Ta :　-20 °C
25 °C
50 °C



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

Conditions Vin : 200 VAC
230 VAC
Iout : 12 A
Iaux : 0 %
Ta : 25 ℃

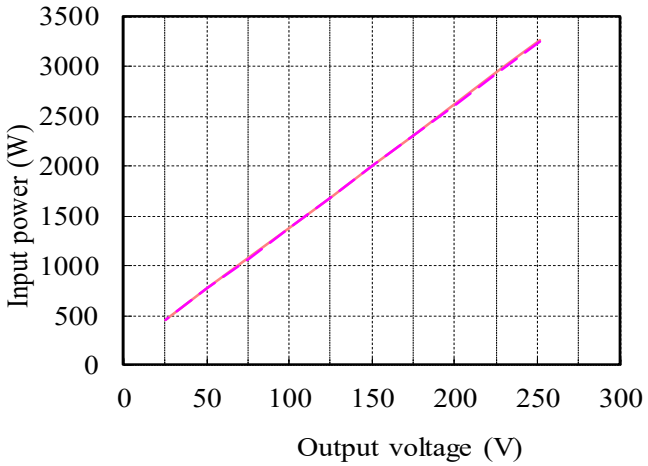




(4) 入力電力対出力電圧 Input power vs. Output voltage

Conditions Vin : 200 VAC
230 VAC
Iout : 12 A
Iaux : 0 %
Ta : 25 ℃

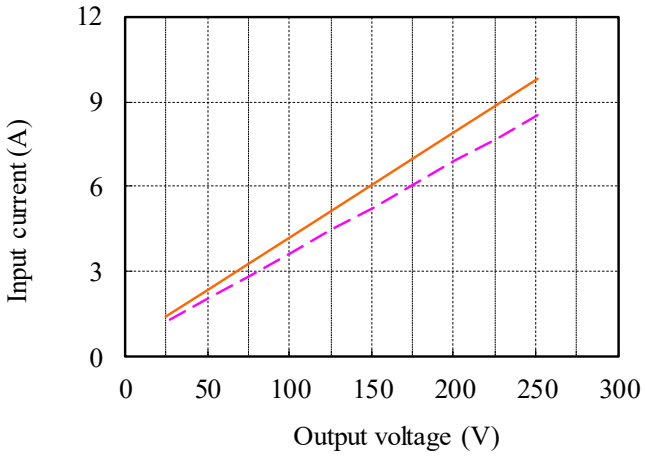
Vin	Input power
	Control OFF
200VAC	7.6W
230VAC	8.1W



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

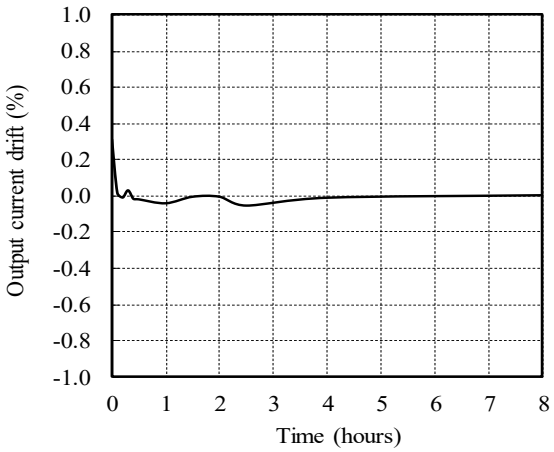
Conditions Vin : 200 VAC
230 VAC
Iout : 12 A
Iaux : 0 %
Ta : 25 ℃

Vin	Input current
	Control OFF
200VAC	0.17A
230VAC	0.19A



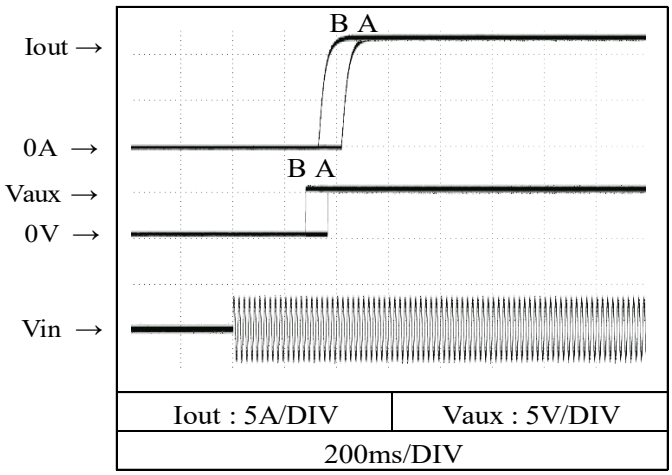
2.2.2 通電ドリフト特性 Warm up current drift characteristics

Conditions Vin : 200 VAC
Vout : 250 V
Iout : 12 A
Ta : 25 °C



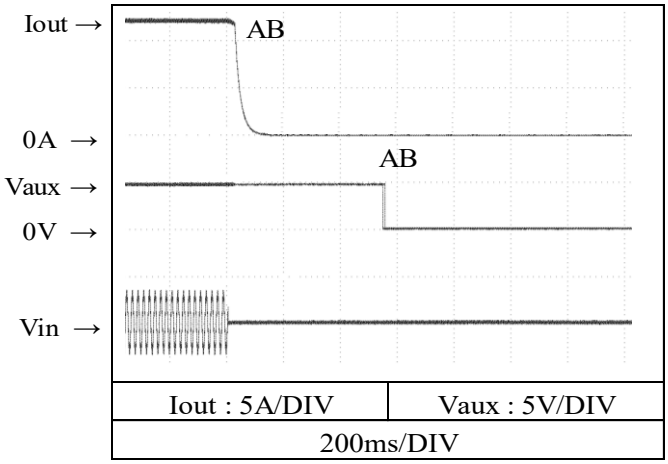
2.2.3 出力電流立ち上がり特性 Output current rise characteristics

Conditions Vin : 200 VAC (A)
230 VAC (B)
Vout : 250 V
Iaux : 100 %
Ta : 25 ℃



2.2.4 出力電流立ち下がり特性 Output current fall characteristics

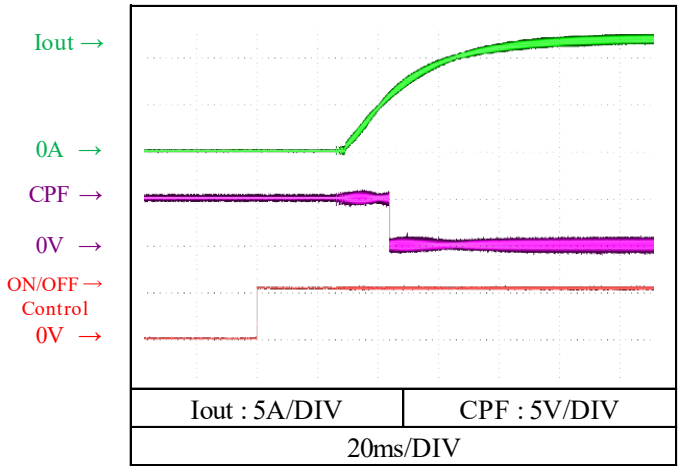
Conditions Vin : 200 VAC (A)
230 VAC (B)
Vout : 250 V
Iaux : 100 %
Ta : 25 ℃

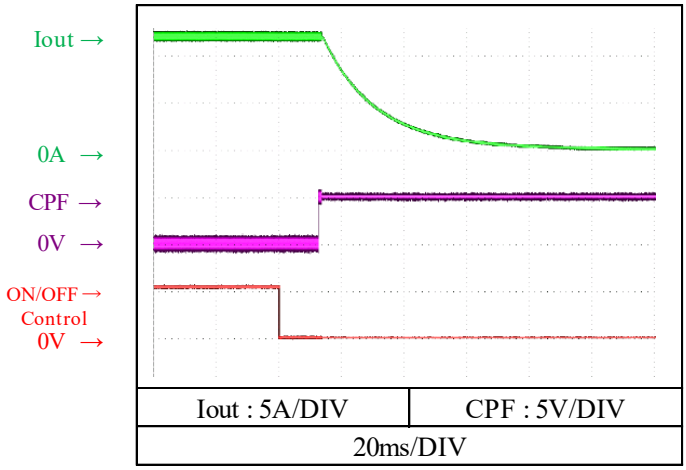


2.2.5 ON/OFF コントロール時出力立ち上がり、立下がり特性
Output rise, fall characteristics with ON/OFF Control

(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

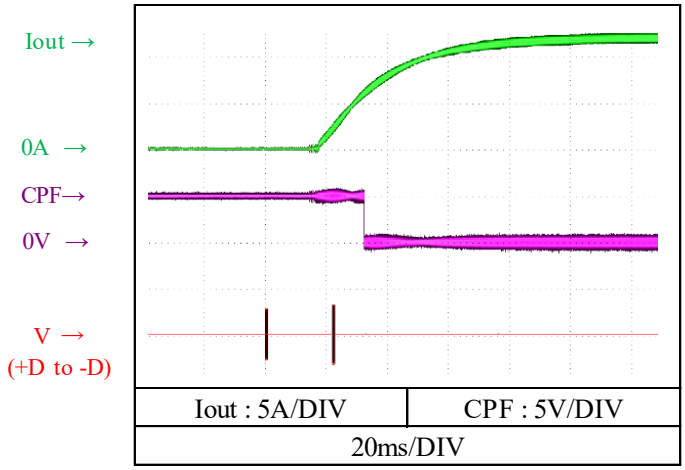
Conditions Vin : 200 VAC
Vout : 250 V
Ta : 25 ℃

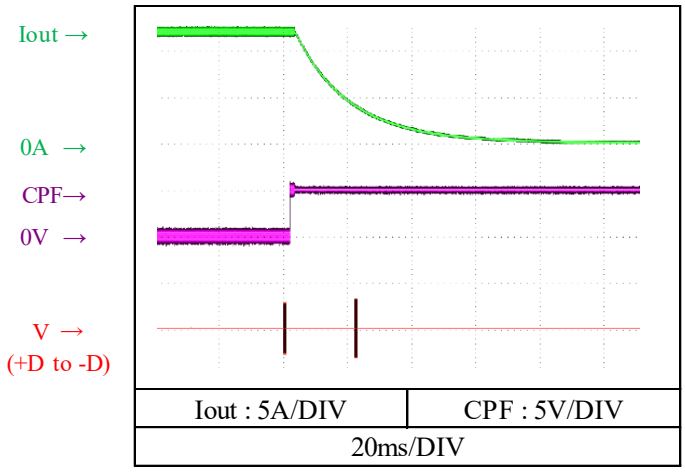




(b) RS-485 通信による ON/OFF　ON/OFF control by RS-485

Conditions　Vin :　200 VAC
Vout :　250 V
Ta :　25 ℃





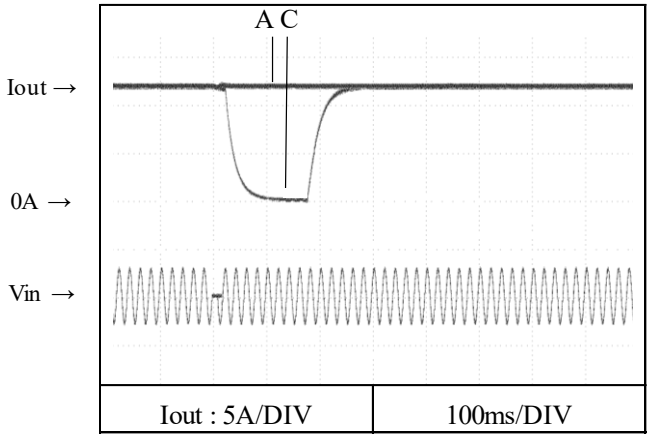
2.2.6　入力電圧瞬停特性 Response to brown out characteristics

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.

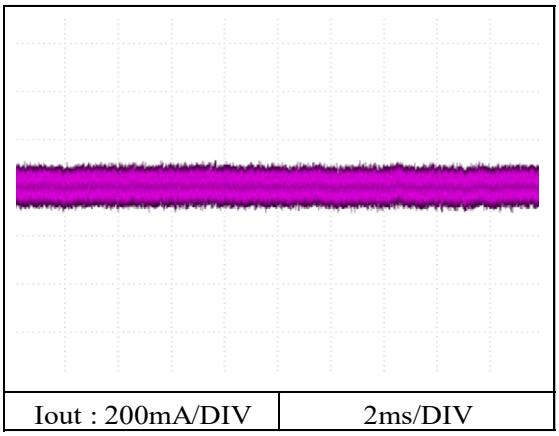
Conditions Vin :　200 VAC
Vout :　250 V
Ta :　25 °C

A = 17ms, C = 18ms

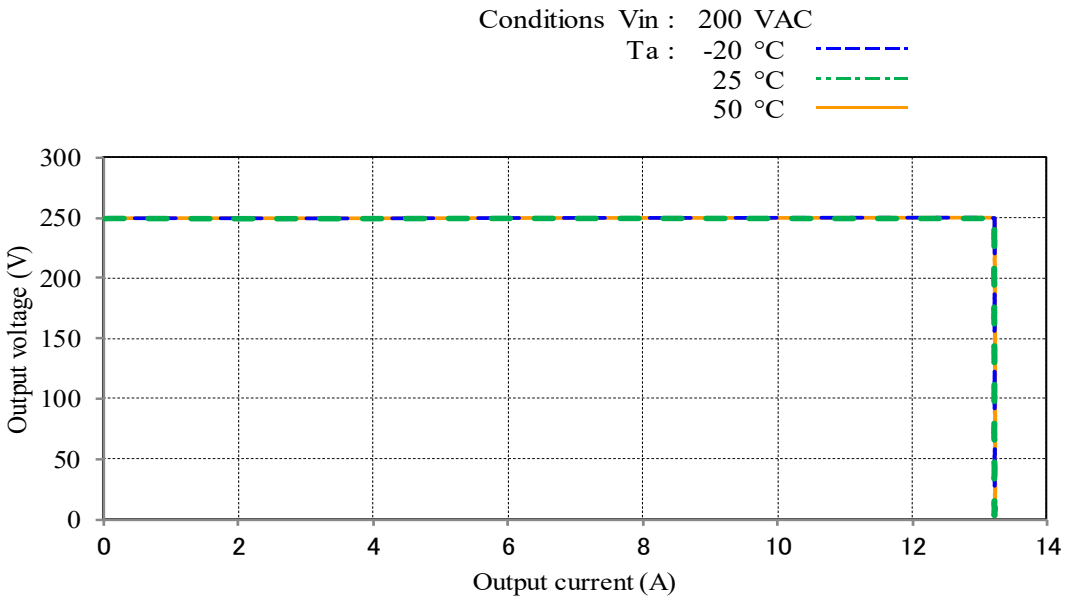


2.2.7　出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions Vin :　200 VAC
Vout :　250 V
Iout :　12 A
Ta :　25 °C

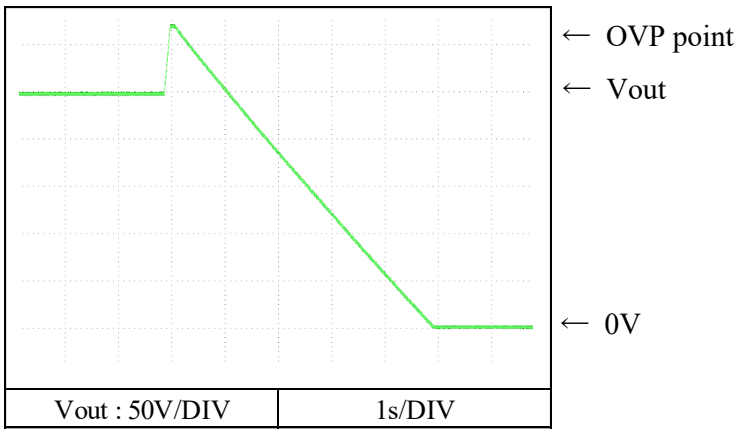


2.3 過電流保護特性 Over current protection (OCP) characteristics



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

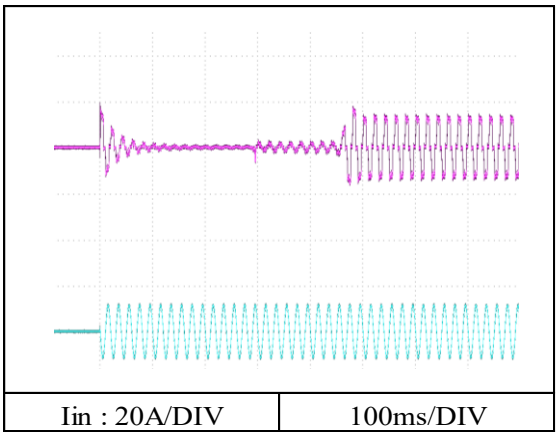
Conditions Vin : 200 VAC
Iout : 0.1 A
Ta : 25 °C



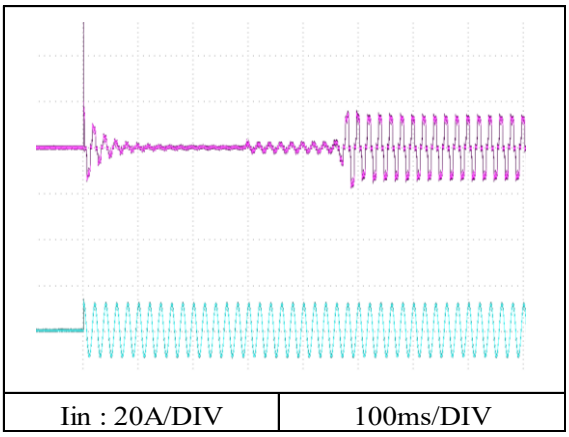
2.5 入力サージ電流(突入電流)波形 Inrush current waveform

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

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

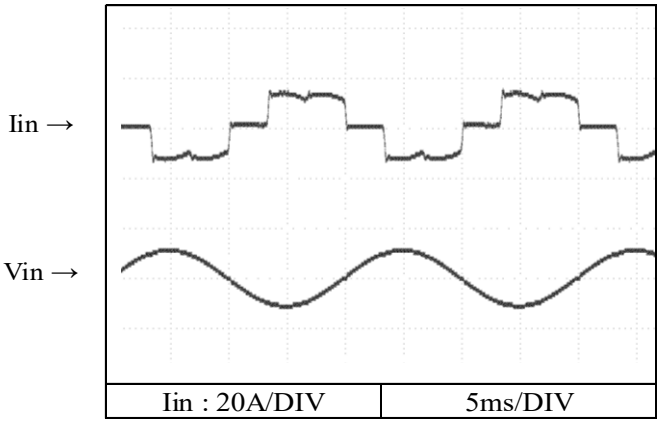


Switch on phase angle of input AC voltage
ϕ = 90°

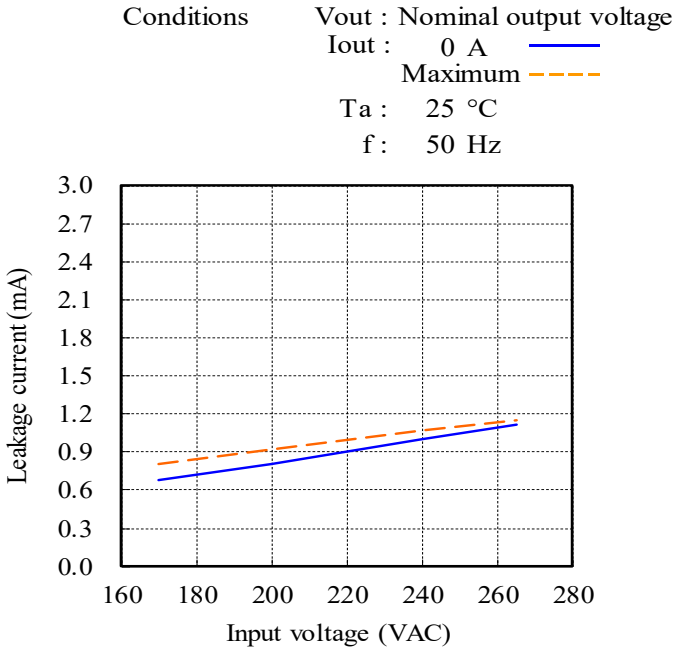


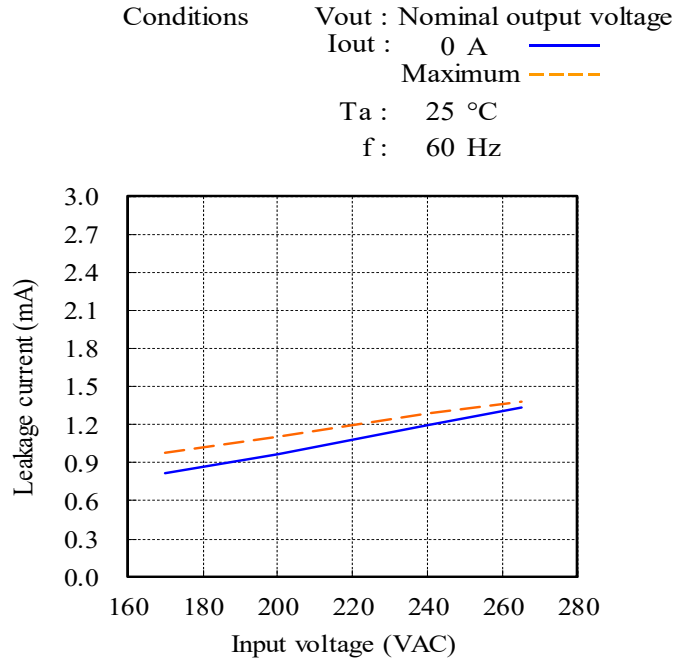
2.6 入力電流波形 Input current waveform

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



2.7 リーク電流特性 Leakage current characteristics





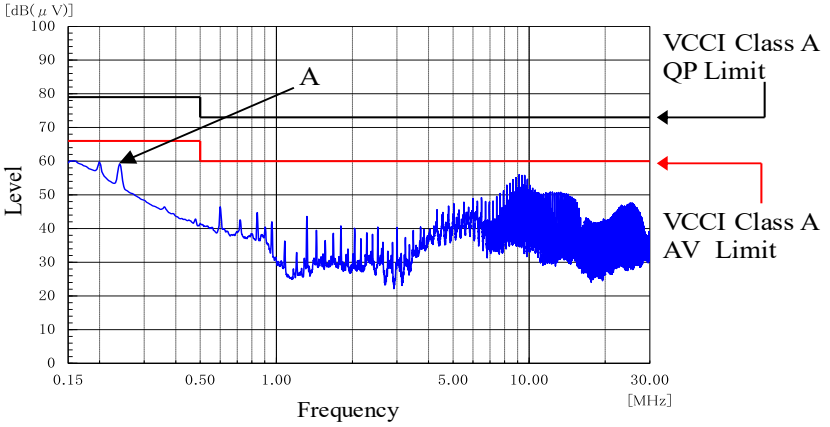
2.8 EMI 特性 Electro-Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions Vin : 230 VAC
Vout : 250 V
Iout : 12 A
Iaux : 100 %
Ta : 25 ℃

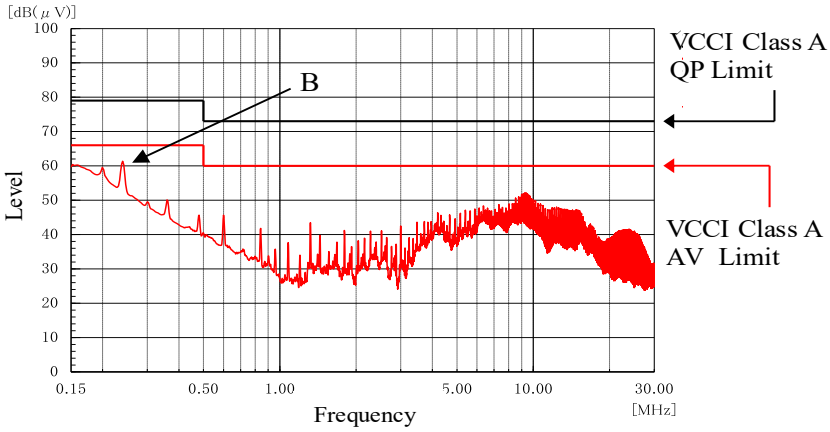
Phase : L1

Ref. Data	Point A (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	56.3
AV	66.0	54.6



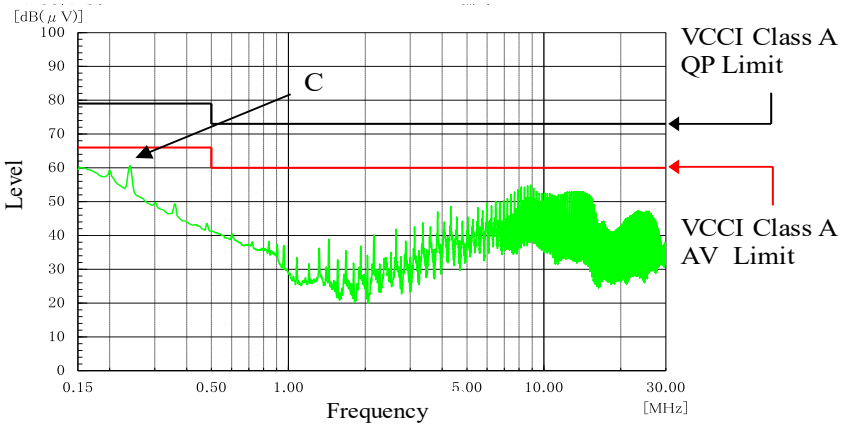
Phase : L2

Ref. Data	Point B (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	60.6
AV	66.0	59.6



Phase : L3

Ref. Data	Point C (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	61.7
AV	66.0	60.4



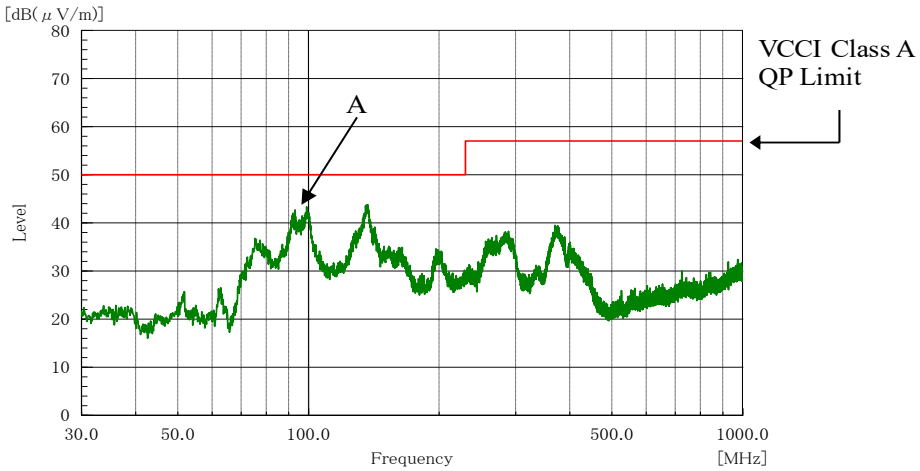
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.
波形はピーク値
Waveform is peak values.

雑音電界強度
Radiated Emission

Conditions Vin : 230 VAC
Vout : 250 V
Iout : 12 A
Iaux : 100 %
Ta : 25 ℃

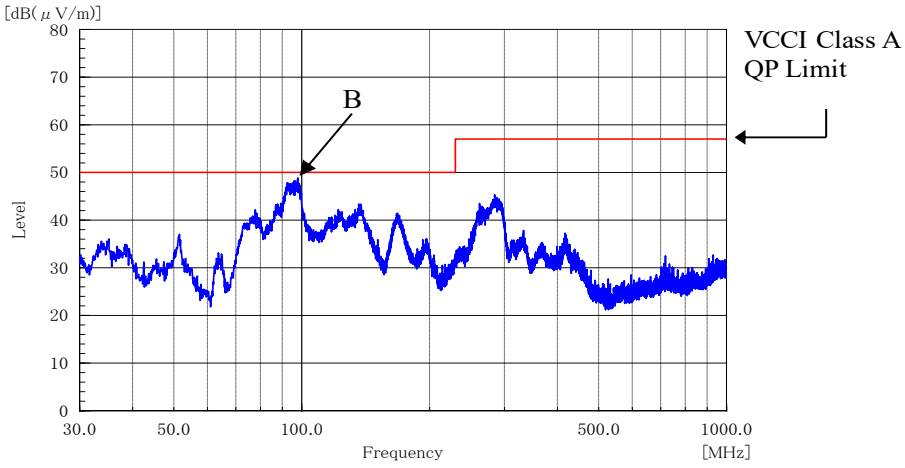
HORIZONTAL

Ref. Data	Point A (95MHz) Limit (dB)	Measure (dB)
QP	50.0	41.3



VERTICAL

Ref. Data	Point B (95MHz) Limit (dB)	Measure (dB)
QP	50.0	45.2



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.