ELV60

EVALUATION DATA

型式データ

TDK-Lambda

V004-53-01A

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使用記号　Terminology used

		定義	Definition
Vin	.....	入力電圧	Input voltage
Vout	.....	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

※ 当社標準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。

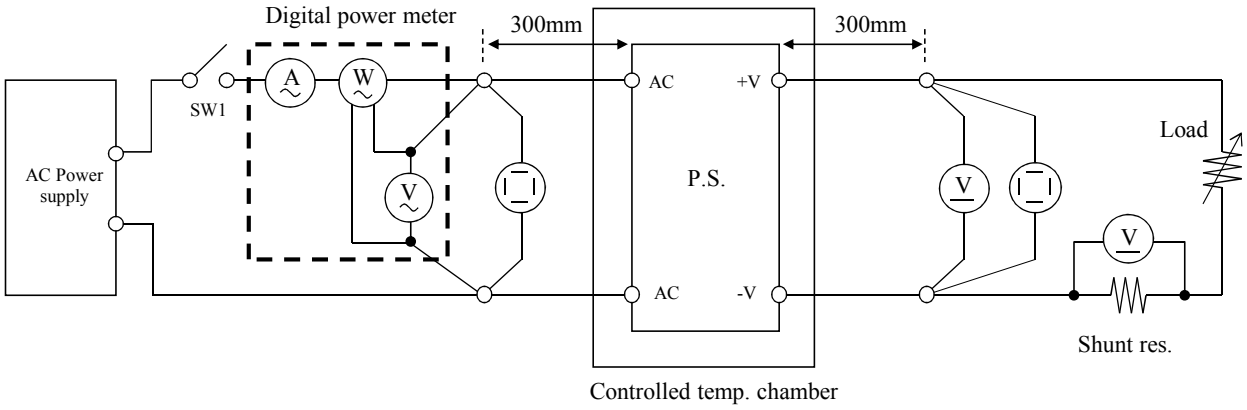
Test results are reference data based on our standard measurement condition.

1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

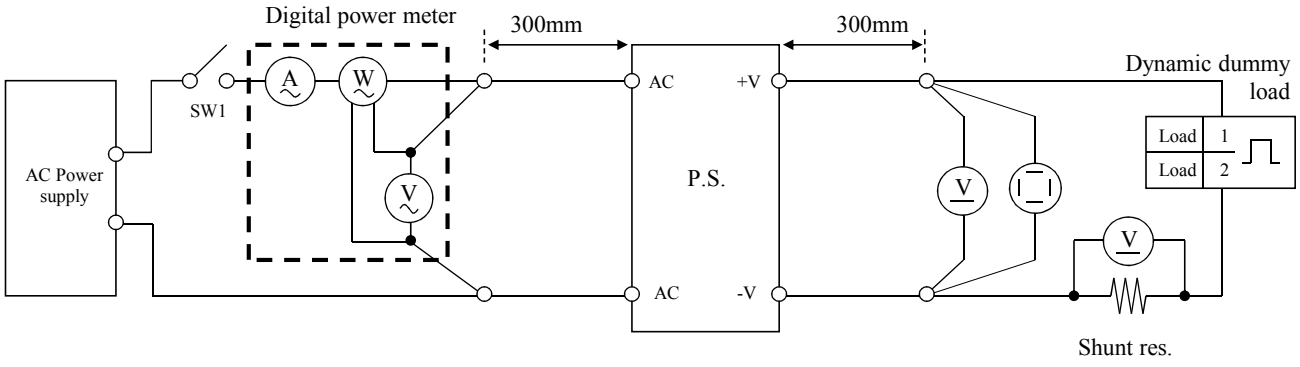
測定回路1 Circuit 1 used for determination

- ・静特性 Steady state data
- ・通電ドリフト特性 Warm up voltage drift characteristics
- ・過電流保護特性 Over current protection (OCP) characteristics
- ・過電圧保護特性 Over voltage protection (OVP) characteristics
- ・出力立ち上がり特性 Output rise characteristics
- ・出力立ち下がり特性 Output fall characteristics
- ・過渡応答(入力急変)特性 Dynamic line response characteristics
- ・入力電圧瞬停特性 Response to brown out characteristics

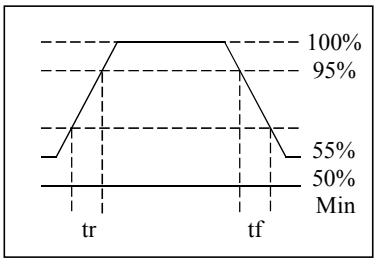


測定回路2 Circuit 2 used for determination

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



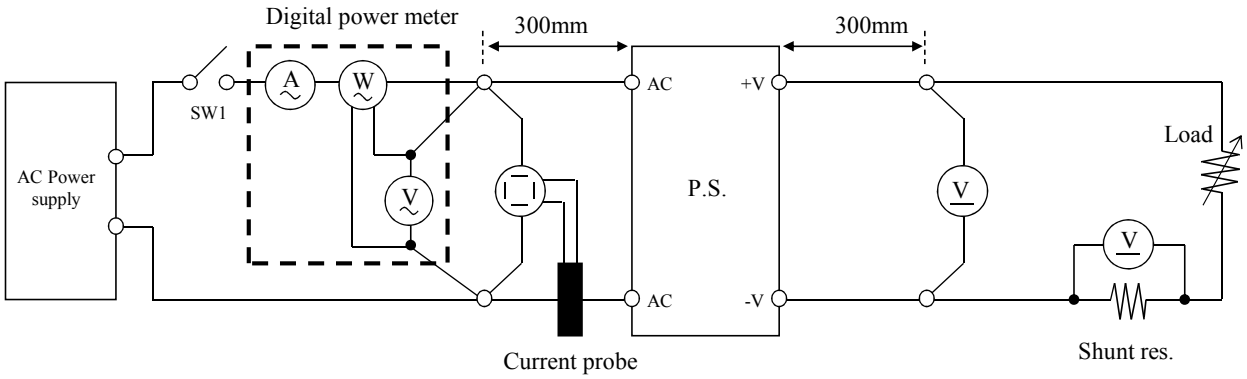
Output current waveform
Iout 50% <==> 100%



測定回路3 Circuit 3 used for determination

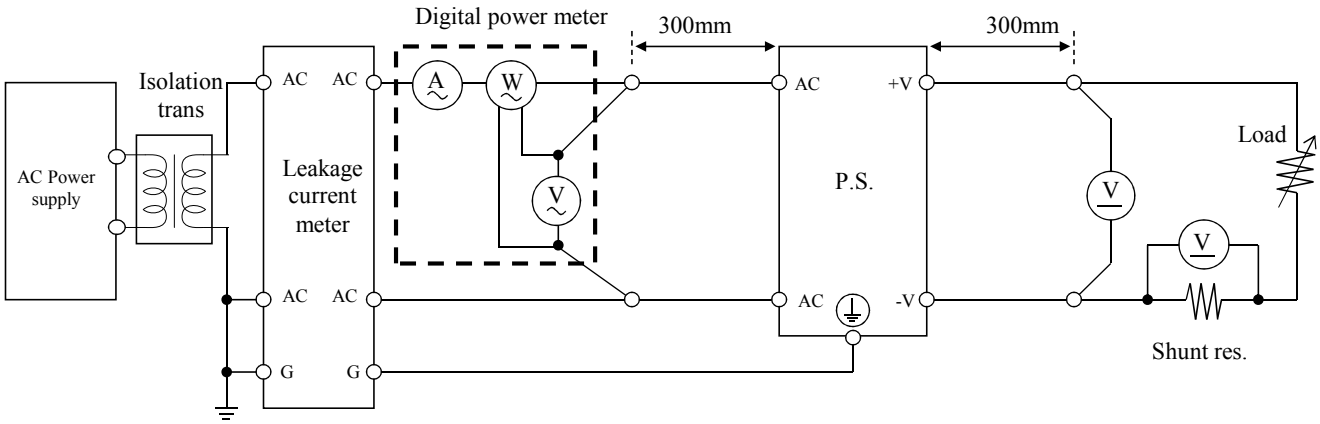
・入力サージ電流（突入電流）波形　Inrush current waveform

・入力電流波形　Input current waveform



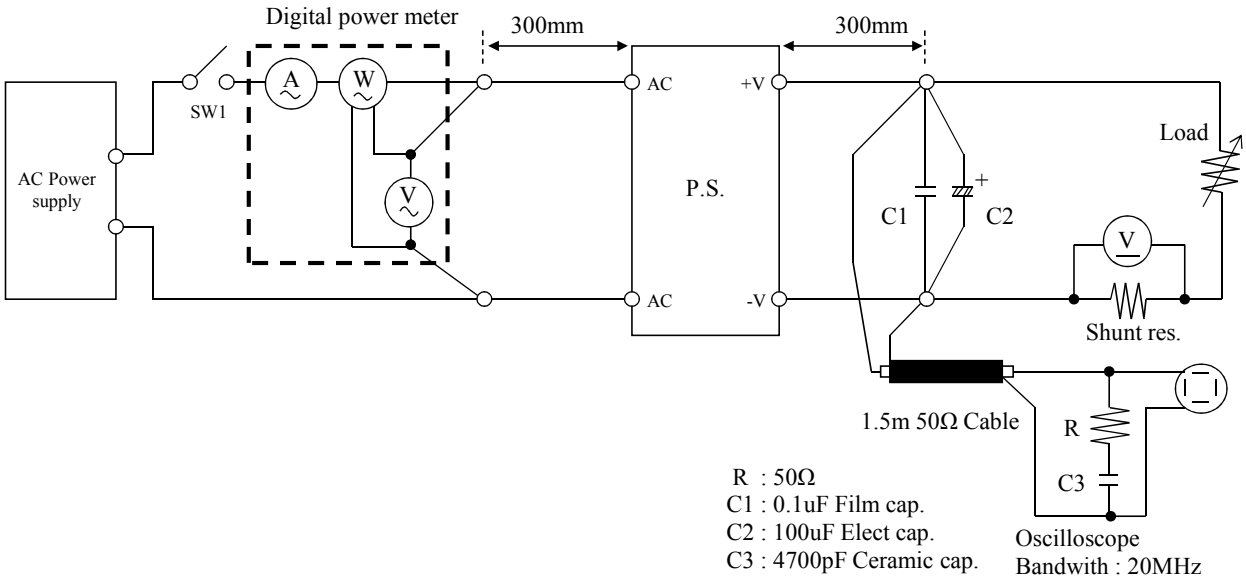
測定回路4 Circuit 4 used for determination

・リーク電流特性　Leakage current characteristics



測定回路5 Circuit 6 used for determination

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

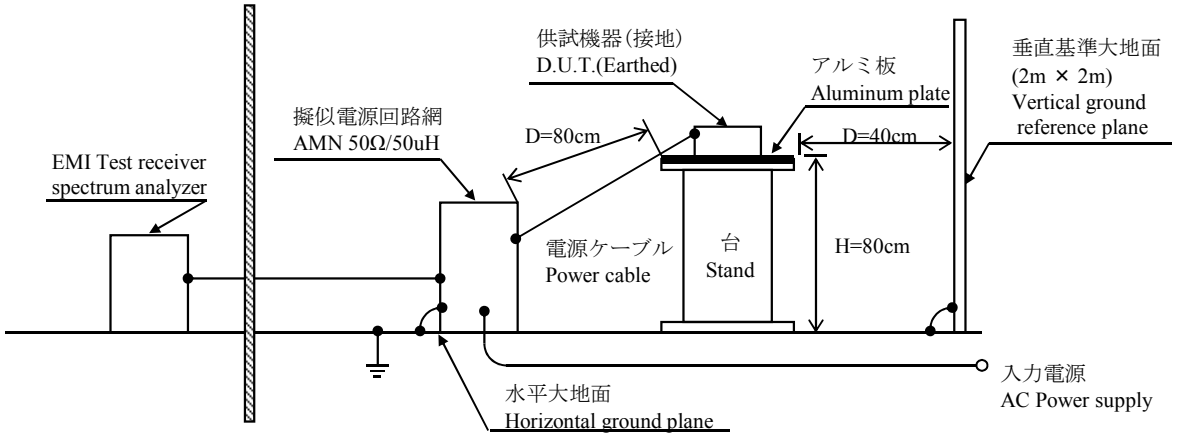


測定構成　Configuration used for determination

・EMI特性　　Electro-Magnetic Interference characteristics

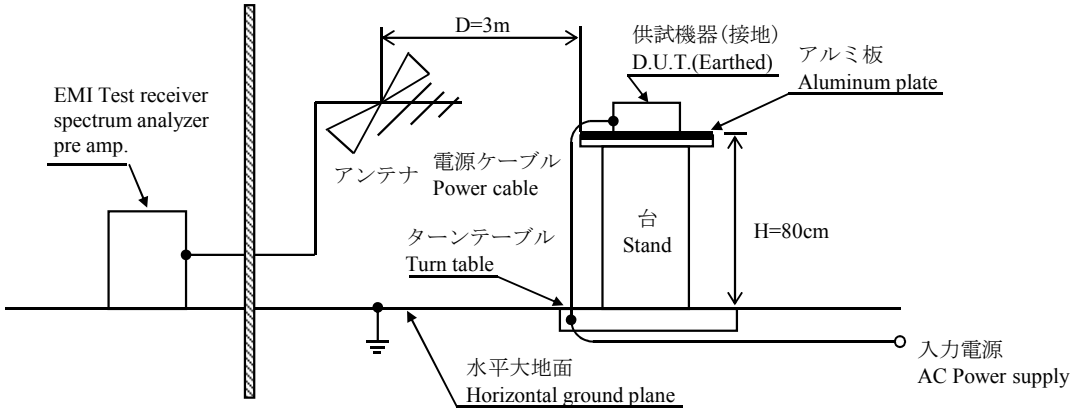
(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission



(b) 雑音電界強度 (放射ノイズ)

Radiated Emission

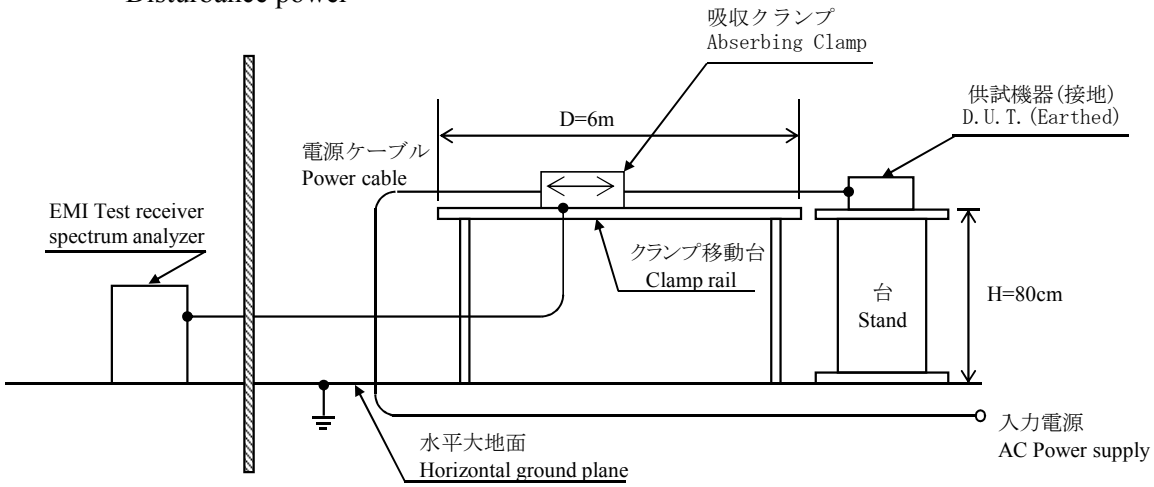


測定構成　Configuration used for determination

・EMI特性　　Electro-Magnetic Interference characteristics

(c) 妨害波電力

Disturbance power



1.2 使用測定機器　　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL9040L
2	DIGITAL MULTIMETER	AGILENT	34970A
3	DIGITAL POWER METER	HIOKI	3334
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110/WT210
5	CURRENT PROBE	YOKOGAWA ELECT.	701928 / 701930
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
7	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ150U
8	ISOLATION TRANS	MATSUNAGA	3WTC-50K
9	CVCF	KIKUSUI	PCR4000L
10	CVCF	NF	ES10000S
11	LEAKAGE CURRENT METER	HIOKI	3156
12	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261 / PL-4KP
13	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
14	PRE AMP.	SONOMA	310N
15	AMN	SCHWARZBECK	NNLK8121
16	ANTENNA	SCHWARZBECK	CBL6111D
17	ABSORBING CLAMP	LUTHI	MDS-21
18	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
19	SINGLE-PHASE MASTER	NF	4420
20	REFERENCE IMPEDANCE NETWORK 20A	NF	4150
21	MULTI OUTLET UNIT	KIKUSUI	OT01-KHA

1.3 評価負荷条件　　Load conditions

Vout	12V	24V
Iout : 100%	5.0A	2.5A
Iout : min	0.2A	0.2A

2.1 静特性　　Steady state data

(1) 入力・負荷・温度変動／出力起動・低下電圧

Regulation - line and load, Temperature drift / Start up voltage and Drop out voltage

12V

1. Regulation - line and load　　Condition　Ta :　25 ℃

Iout \ Vin	90VAC	100VAC	200VAC	305VAC	line regulation	
min	12.362V	12.362V	12.362V	12.361V	1mV	0.008%
50%	12.297V	12.297V	12.297V	12.297V	0mV	0.000%
100%	12.223V	12.223V	12.223V	12.223V	0mV	0.000%
load	139mV	139mV	139mV	138mV		
regulation	1.158%	1.158%	1.158%	1.150%		

2. Temperature drift　　Conditions　Vin : 100 VAC

Iout : 100 %

Ta	-25℃	+25℃	+50℃	temperature stability	
Vout	12.210V	12.223V	12.217V	13mV	0.108%

3. Total regulation

(Total regulation of Line reg, Load reg and Temp. drift)

total regulation	
153mV	1.3%

4. Start up voltage and Drop out voltage　　Conditions　Ta :　25 ℃

Iout : 100 %

Start up voltage (Vin)	66VAC
Drop out voltage (Vin)	50VAC

24V

1. Regulation - line and load　　Condition　Ta :　25 ℃

Iout \ Vin	90VAC	100VAC	200VAC	265VAC	line regulation	
min	24.436V	24.436V	24.436V	24.436V	0mV	0.000%
50%	24.400V	24.400V	24.400V	24.400V	0mV	0.000%
100%	24.366V	24.366V	24.366V	24.366V	0mV	0.000%
load	70mV	70mV	70mV	70mV		
regulation	0.292%	0.292%	0.292%	0.292%		

2. Temperature drift　　Conditions　Vin : 100 VAC

Iout : 100 %

Ta	-25℃	+25℃	+50℃	temperature stability	
Vout	24.337V	24.366V	24.347V	29mV	0.121%

3. Total regulation

(Total regulation of Line reg, Load reg and Temp. drift)

total regulation	
99mV	0.4%

4. Start up voltage and Drop out voltage　　Conditions　Ta :　25 ℃

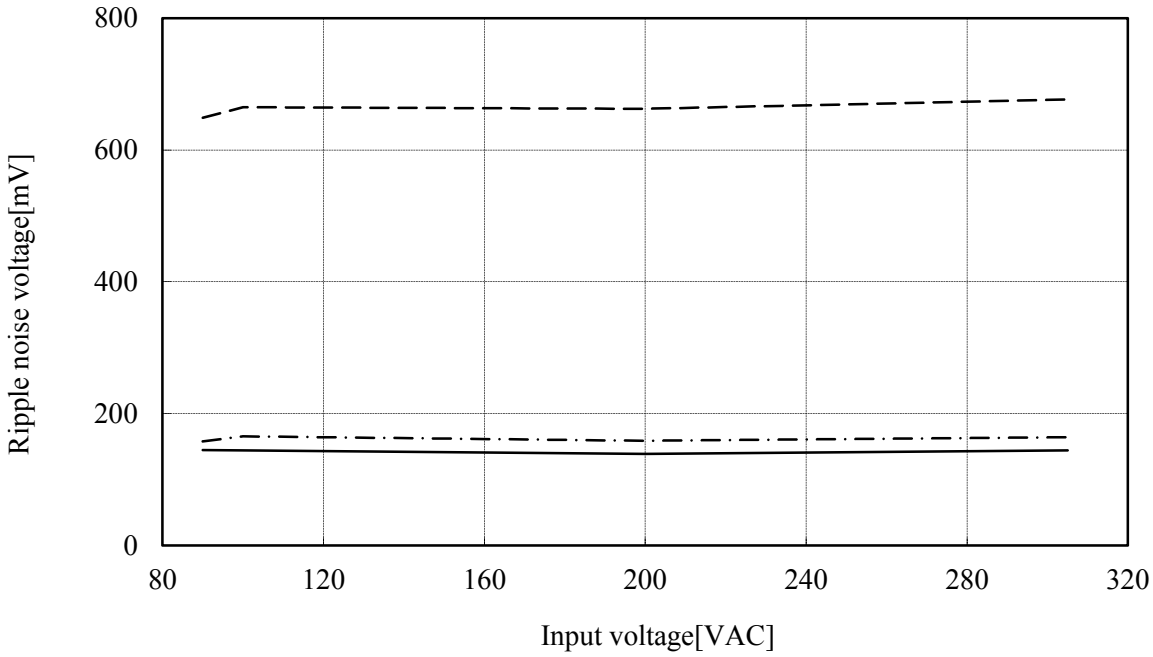
Iout : 100 %

Start up voltage (Vin)	66VAC
Drop out voltage (Vin)	55VAC

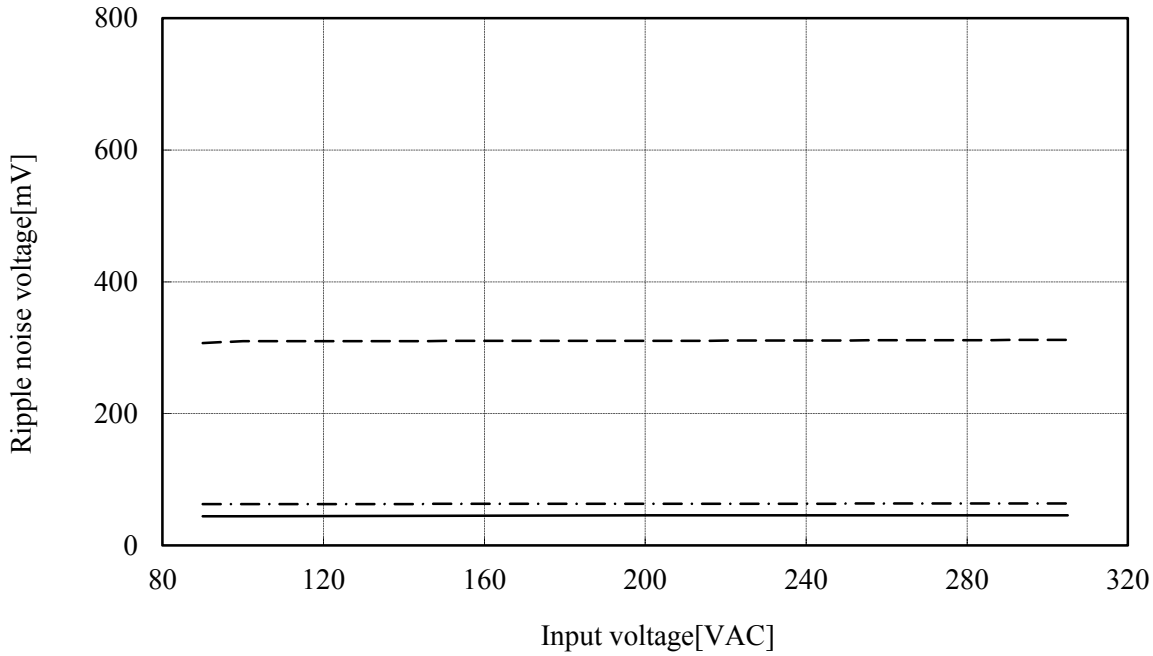
(2) リップル電圧対入力電圧
Ripple noise voltage vs. Input voltage

Conditions Iout : 100 %
Ta : -25 ℃
25 ℃
50 ℃

12V



24V

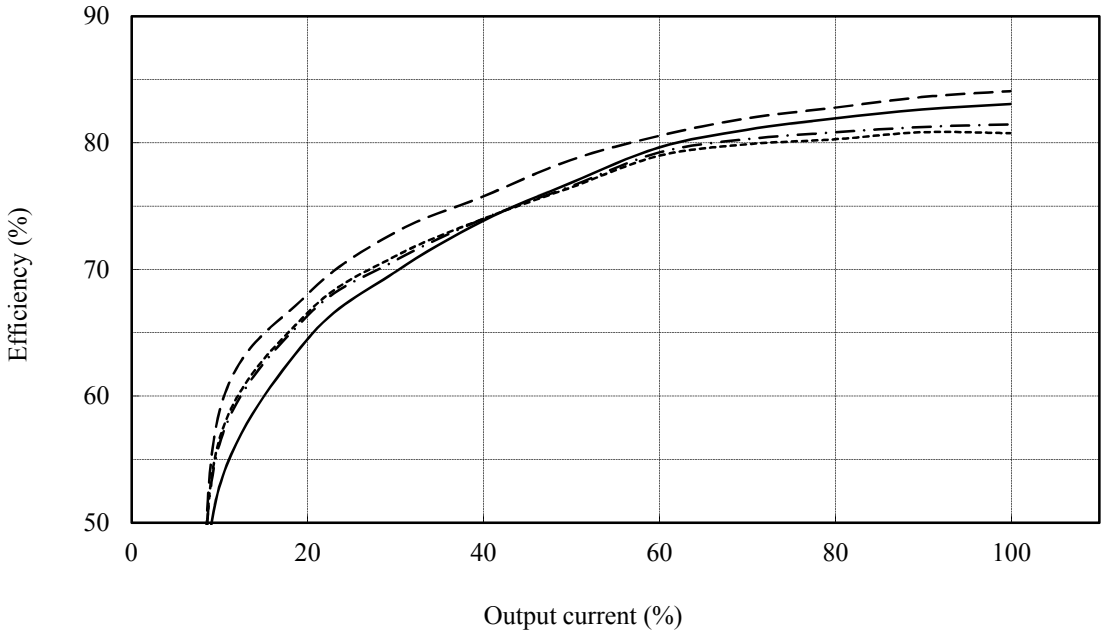


(3) 効率対出力電流

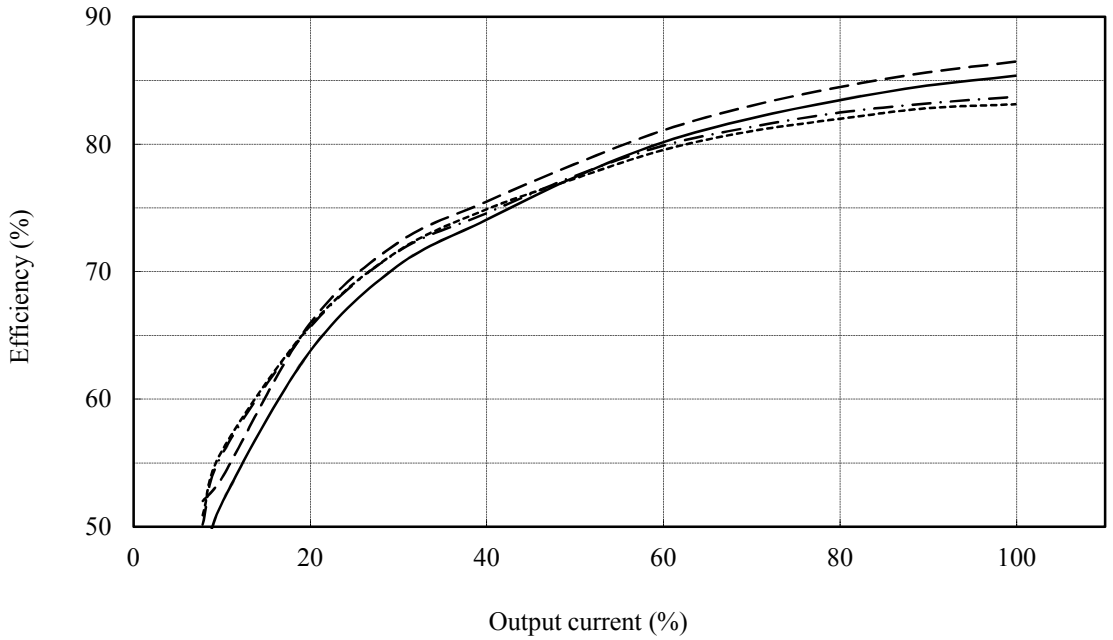
Efficiency vs. Output current

Conditions Vin : 90 VAC ------
100 VAC -·-·-
200 VAC ——
305 VAC – – –
Ta : 25 ℃

12V



24V

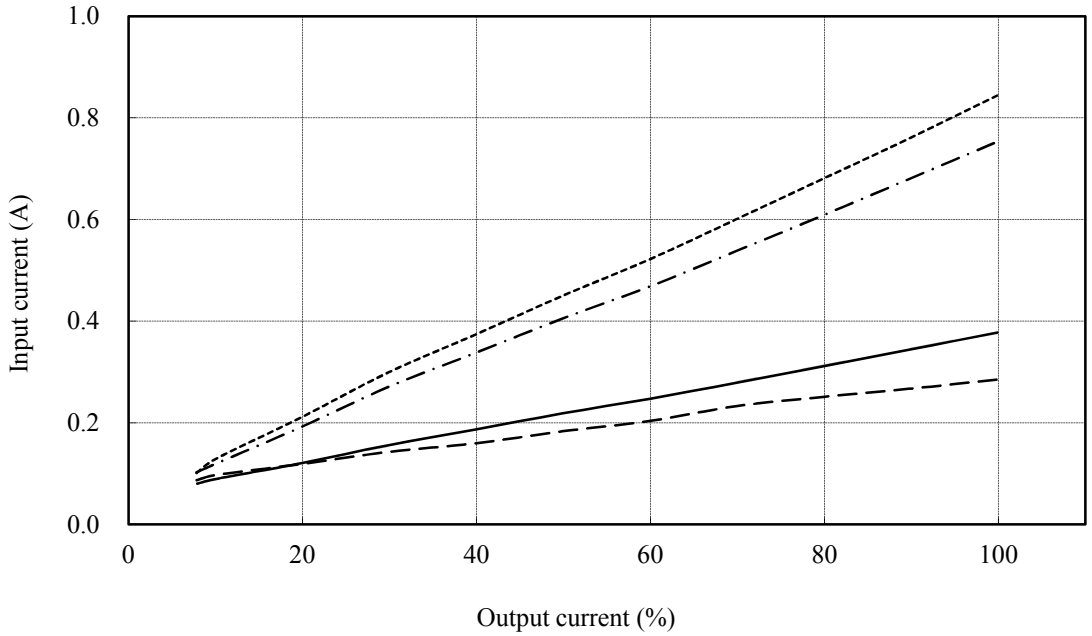


(4) 入力電流対出力電流

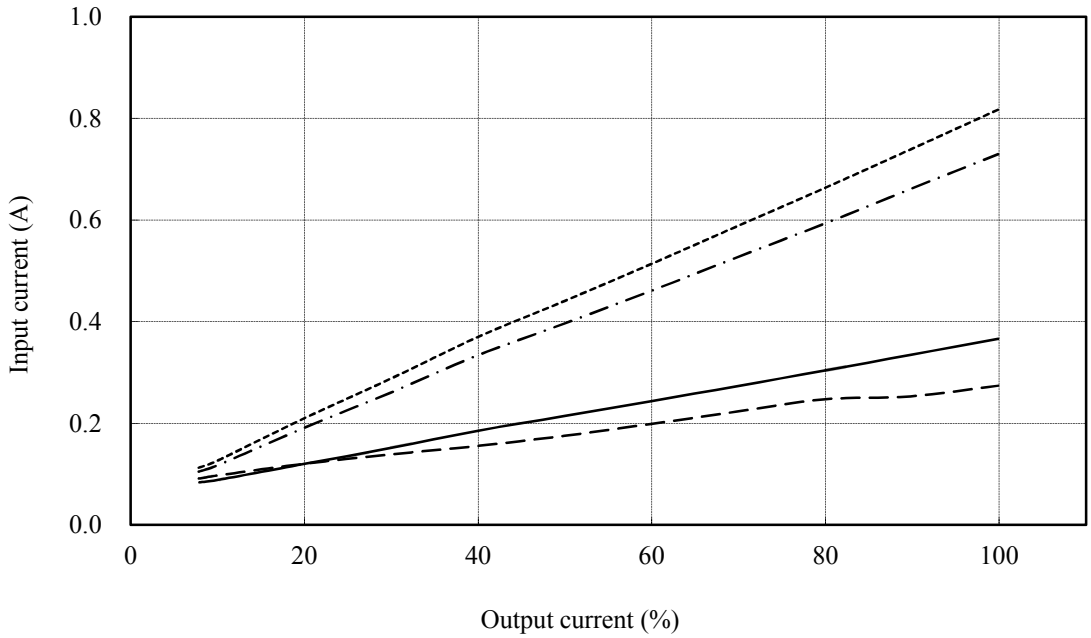
Input current vs. Output current

Conditions Vin : 90 VAC ------
100 VAC –·–·–
200 VAC ——
305 VAC – – –
Ta : 25 ℃

12V



24V

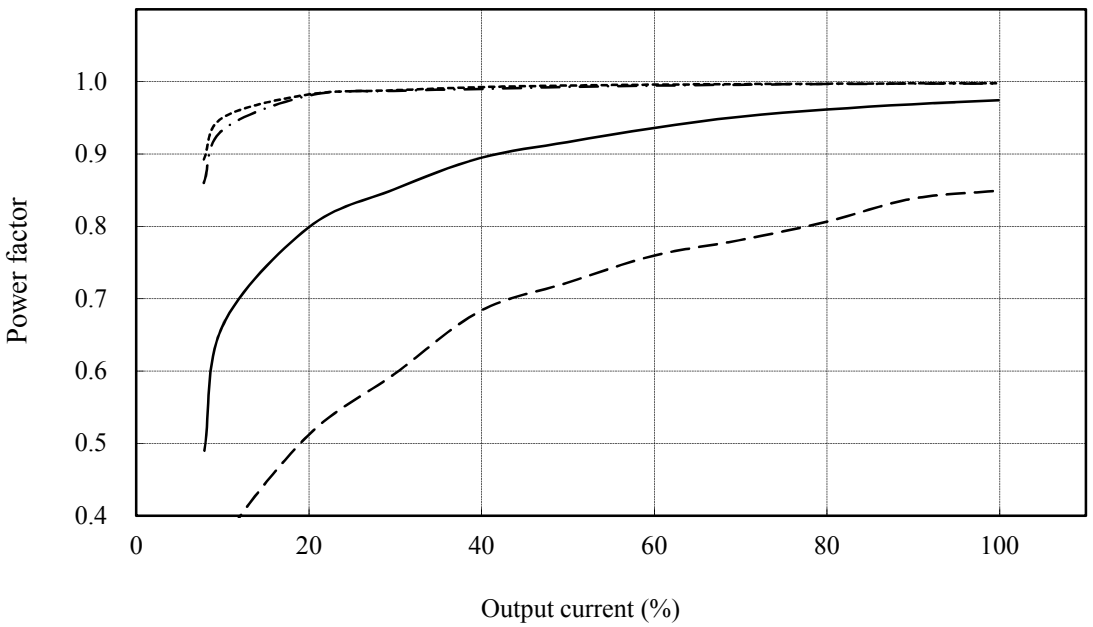


(5) 力率対出力電流

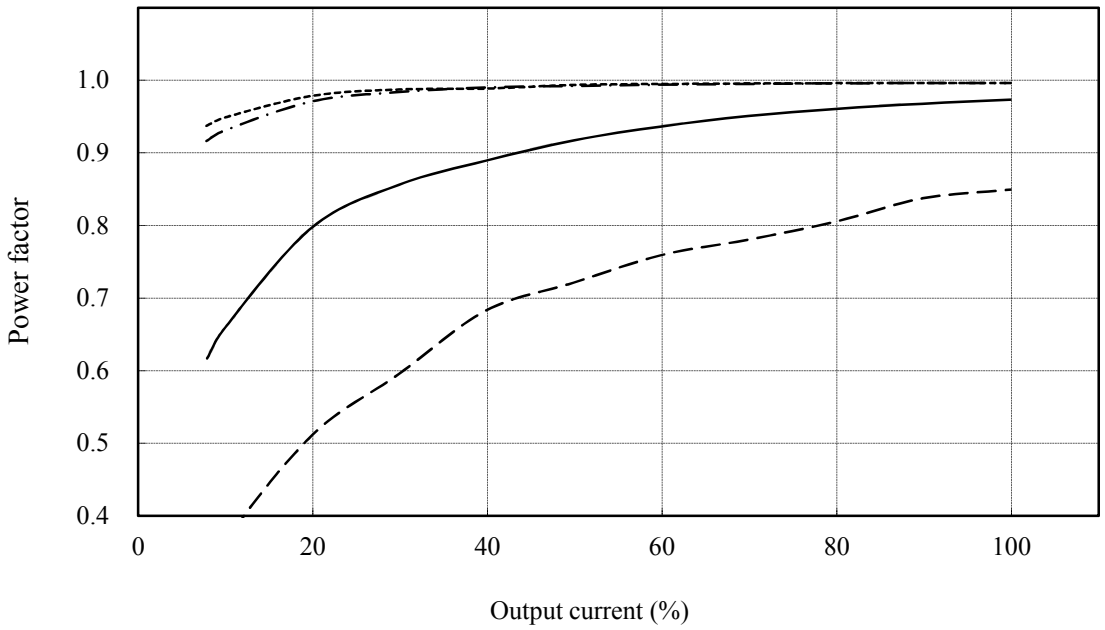
Power factor vs. Output current

Conditions Vin : 90 VAC ------
100 VAC –·–·–
200 VAC ——
305 VAC – – – –
Ta : 25 ℃

12V



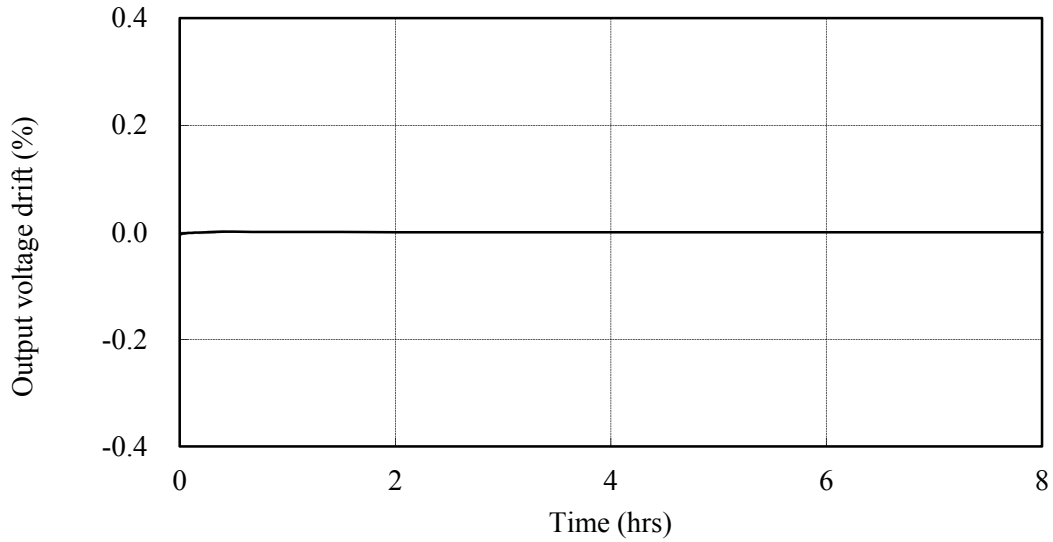
24V



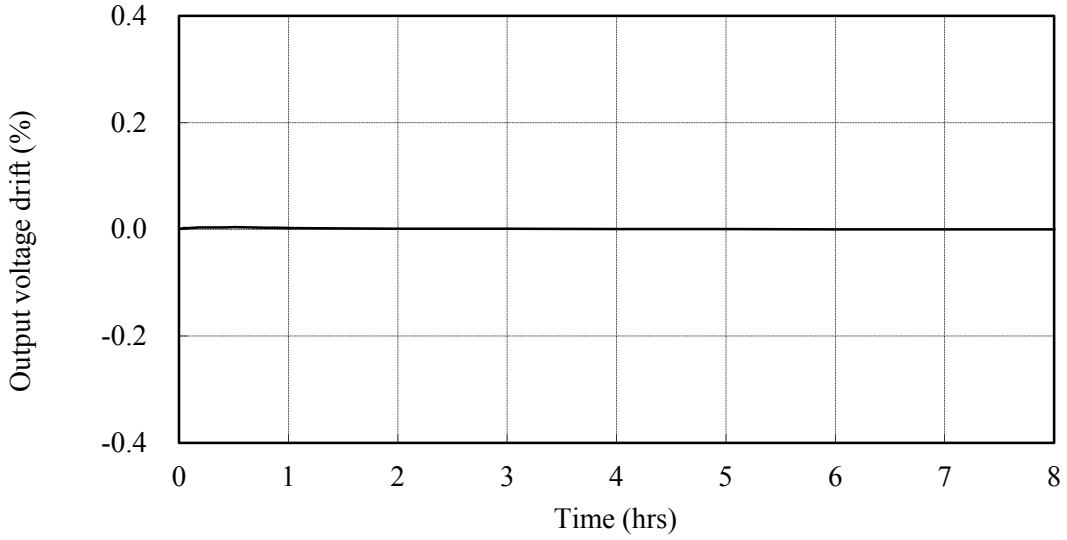
2.2 通電ドリフト特性
Warm up voltage drift characteristics

Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

12V



24V



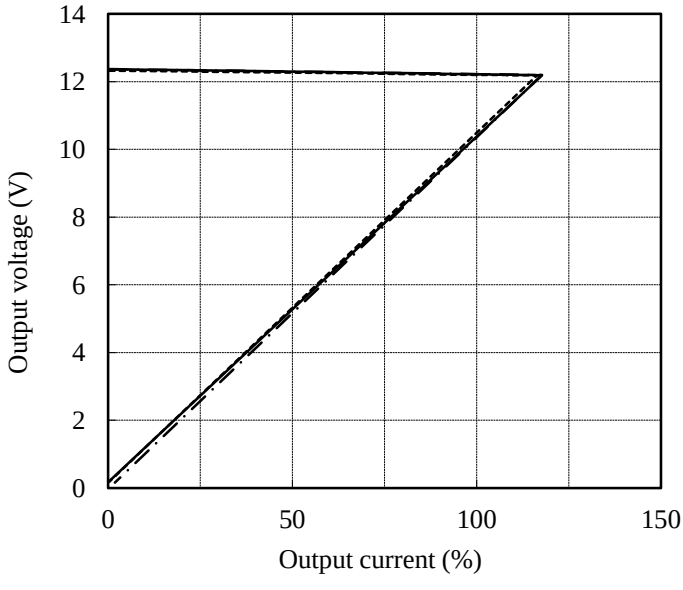
2.3 過電流保護特性
Over current protection (OCP) characteristics

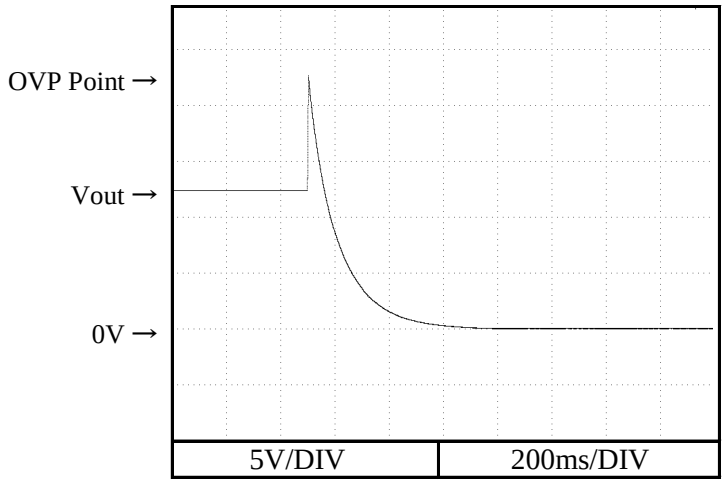
Conditions Vin : 100 VAC
Ta : -25 ℃ -----
25 ℃ —·—·-
50 ℃ ——

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

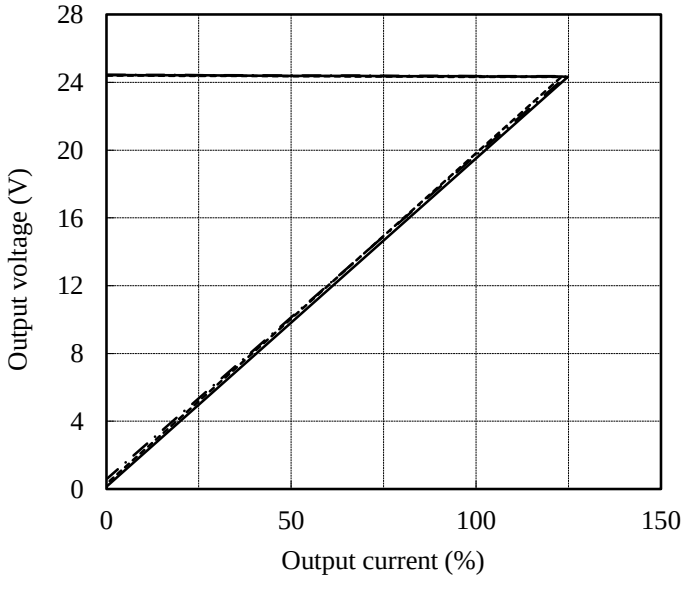
Conditions Vin : 100 VAC
Iout : min
Ta : 25 ℃

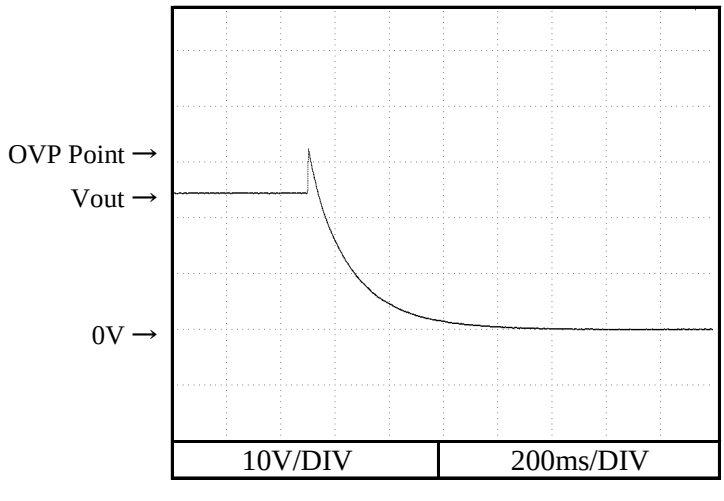
12V





24V





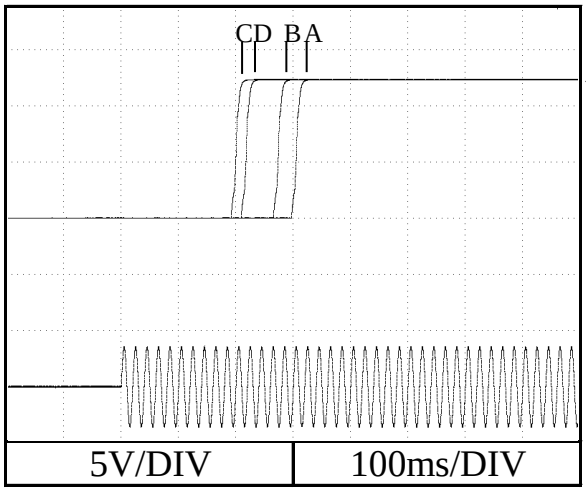
2.5 出力立ち上がり特性

Output rise characteristics

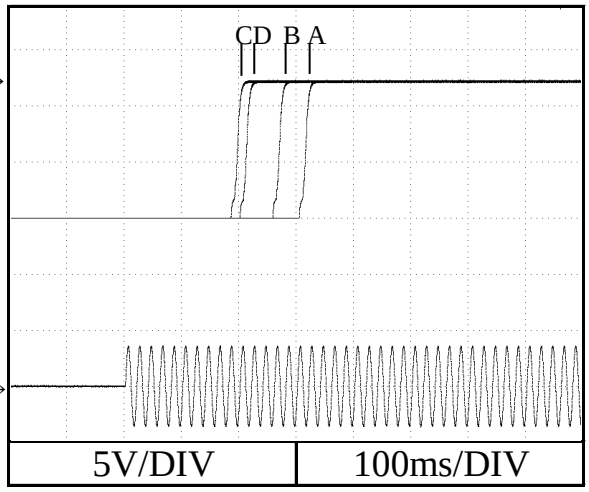
Conditions Vin : 90 VAC (A)
100 VAC (B)
200 VAC (C)
305 VAC (D)
Ta : 25 ℃

12V

Iout : min

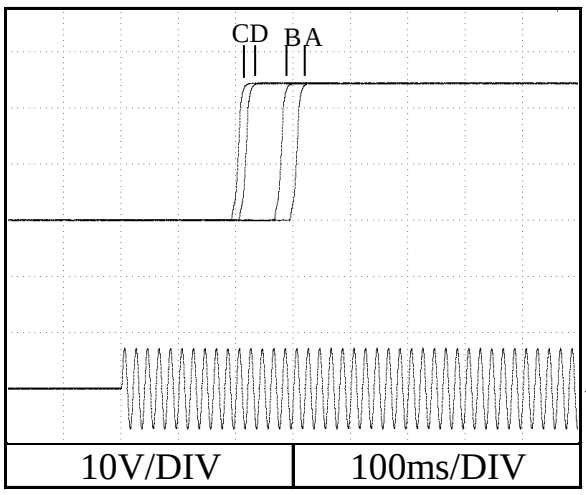


Iout : 100%

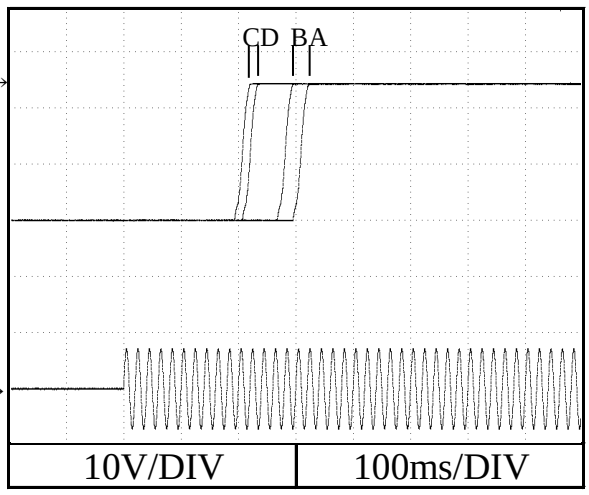


24V

Iout : min



Iout : 100%

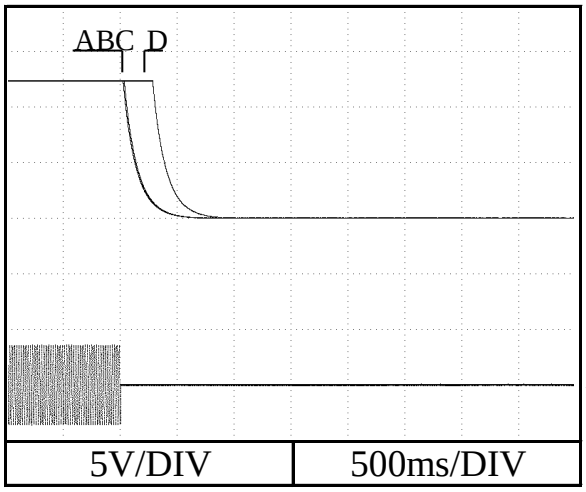


2.6 出力立ち下がり特性
Output fall characteristics

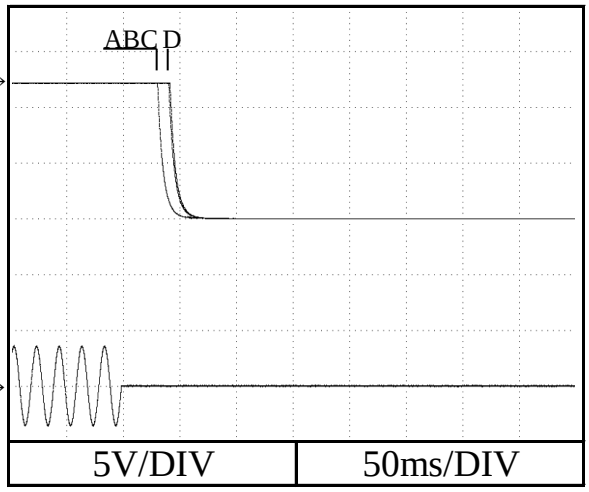
Conditions Vin : 90 VAC (A)
100 VAC (B)
200 VAC (C)
305 VAC (D)
Ta : 25 ℃

12V

Iout : min

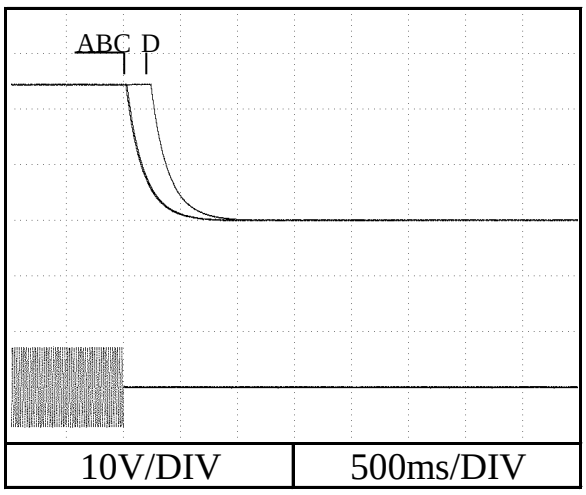


Iout : 100%

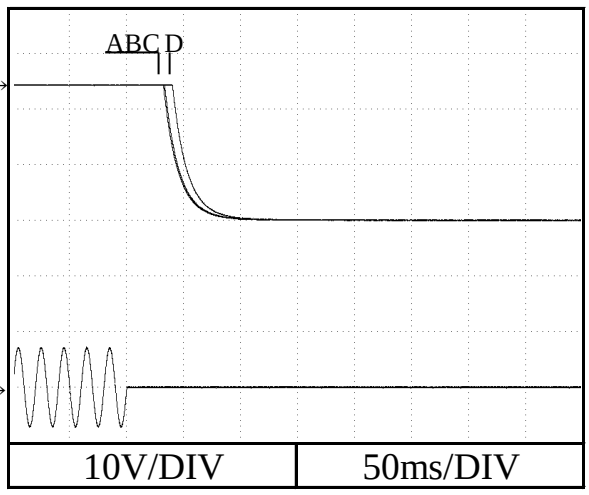


24V

Iout : min



Iout : 100%

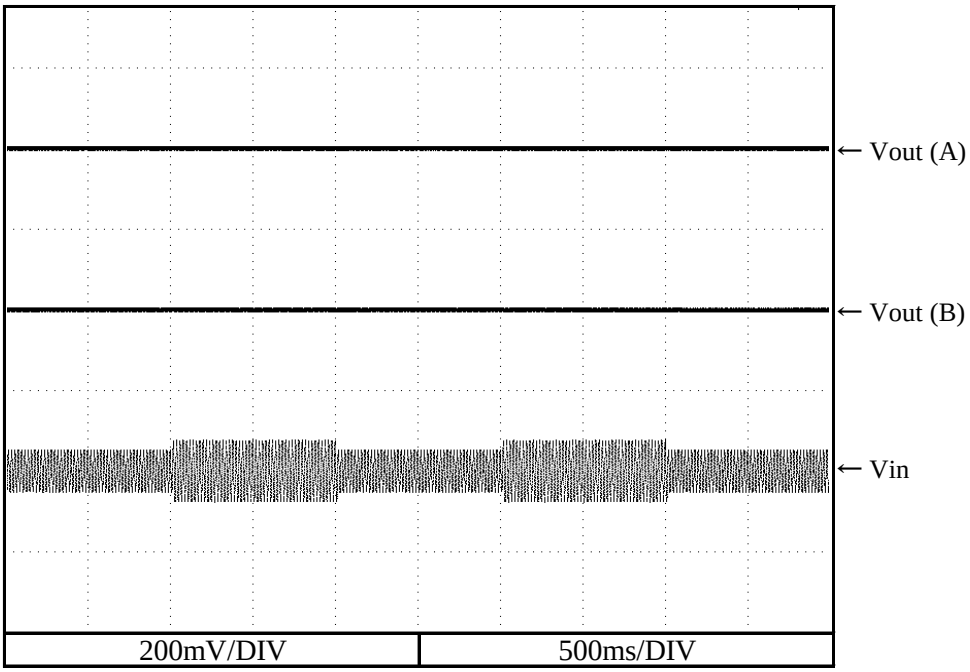


2.7 過渡応答(入力急変)特性

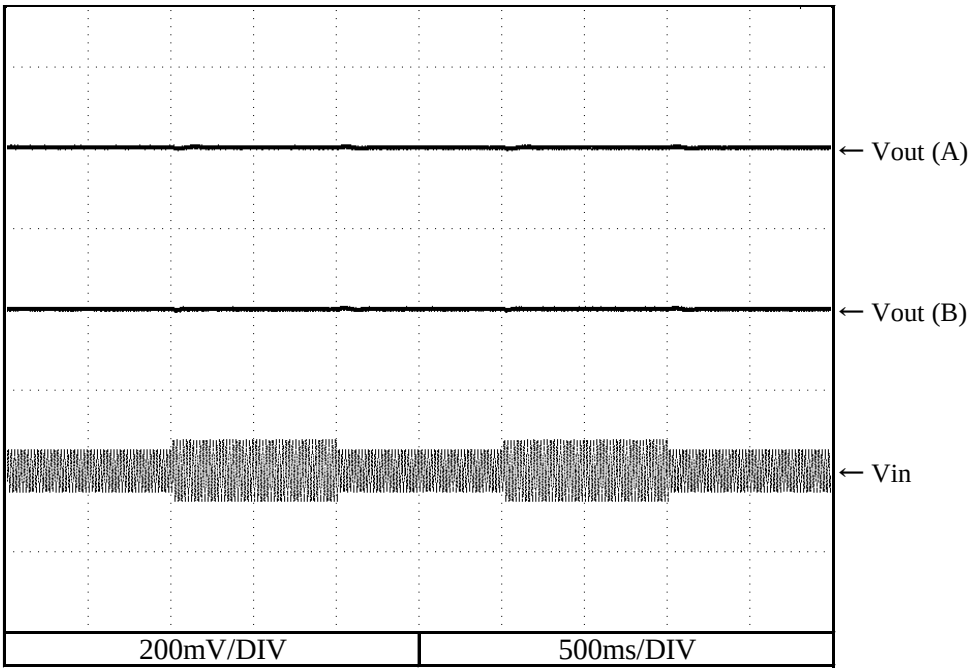
Dynamic line response characteristics

Conditions Vin : 90 VAC ⟷ 132 VAC(A)
170 VAC ⟷ 305 VAC(B)
Iout : 100 %
Ta : 25 ℃

12V



24V

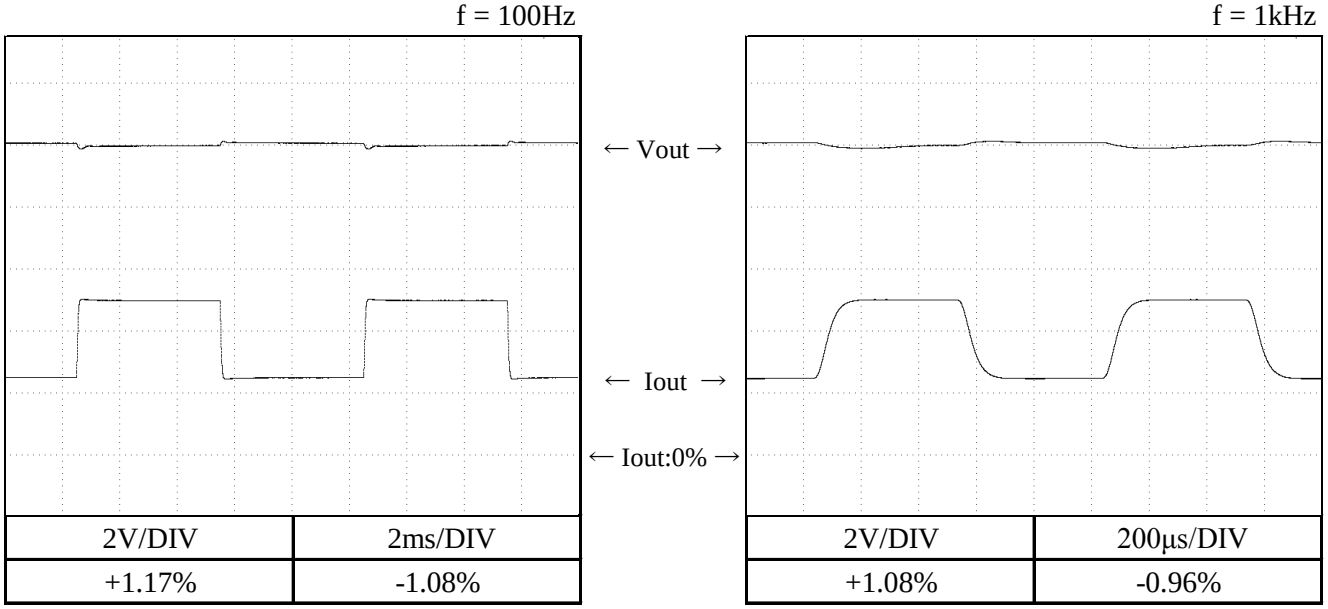


2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

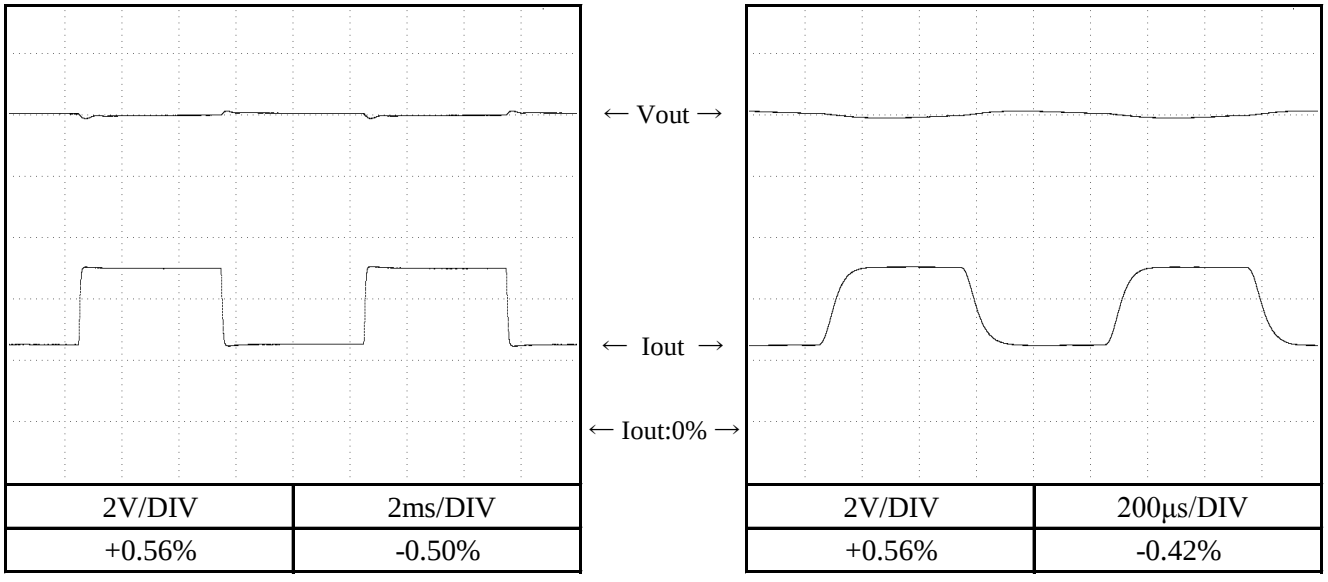
Conditions Vin : 100 VAC
Iout : 50 %←→100 %
(tr = tf = 50us)
Ta : 25 ℃

12V



2V/DIV	2ms/DIV	2V/DIV	200μs/DIV
+1.17%	-1.08%	+1.08%	-0.96%

24V



2V/DIV	2ms/DIV	2V/DIV	200μs/DIV
+0.56%	-0.50%	+0.56%	-0.42%

2.9 入力電圧瞬停特性

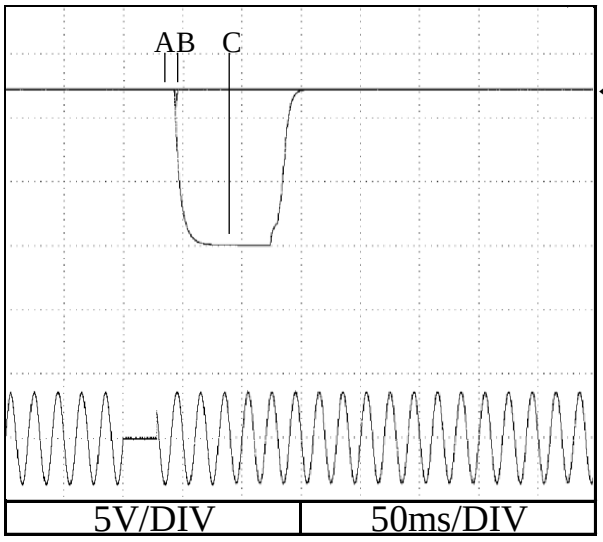
Response to brown out characteristics

Conditions Iout : 100 %
Ta : 25 ℃

12V

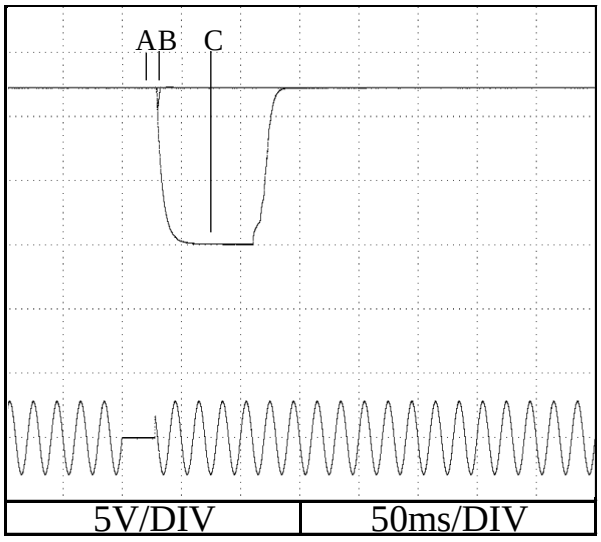
Vin : 100VAC

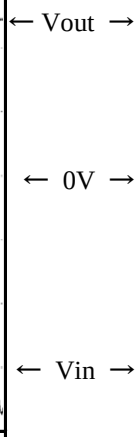
A = 28ms
B = 29ms
C = 30ms



Vin : 200VAC

A = 26ms
B = 27ms
C = 28ms

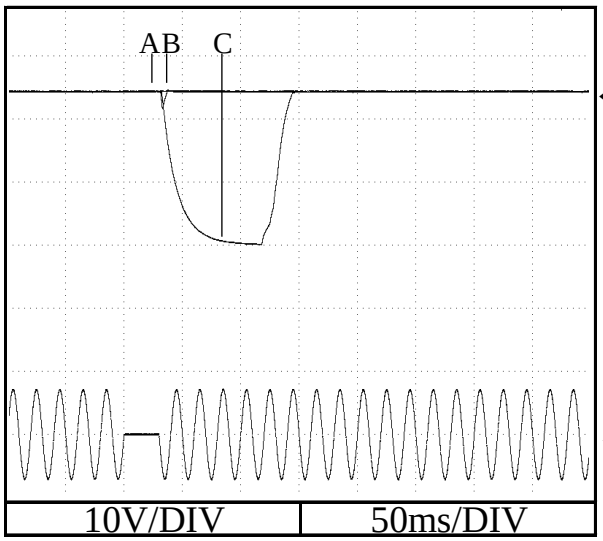




24V

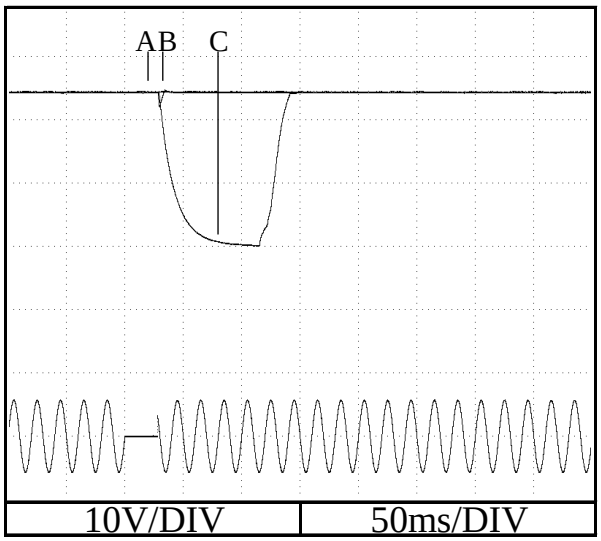
Vin : 100VAC

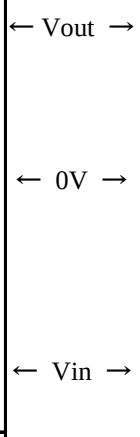
A = 27ms
B = 28ms
C = 30ms



Vin : 200VAC

A = 25ms
B = 26ms
C = 28ms



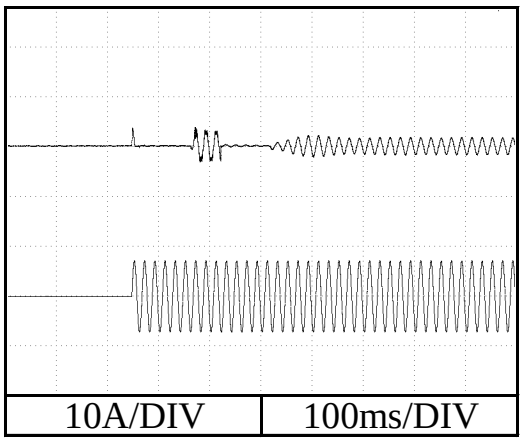


2.10 入力サージ電流（突入電流）波形
Inrush current waveform

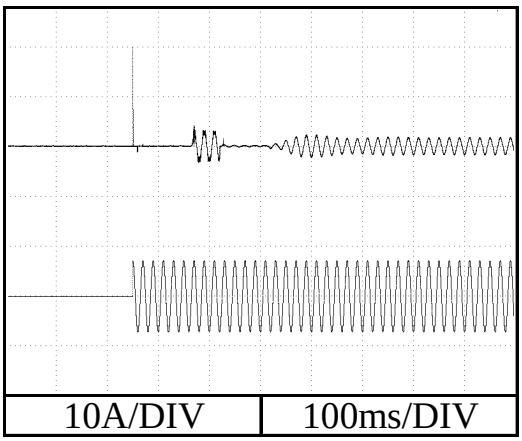
12V

Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

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

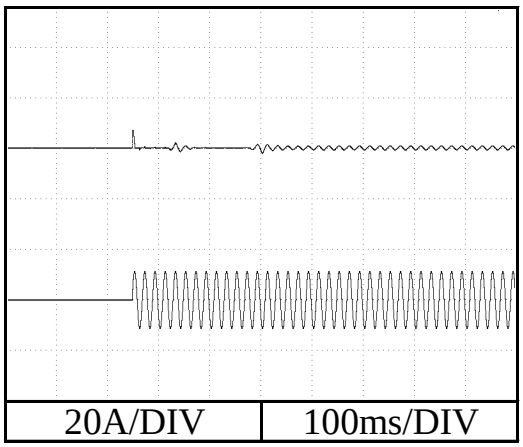


Switch on phase angle of input AC voltage
ϕ = 90°

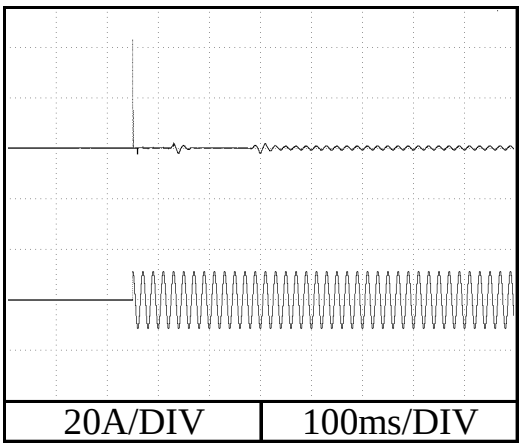


Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

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



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



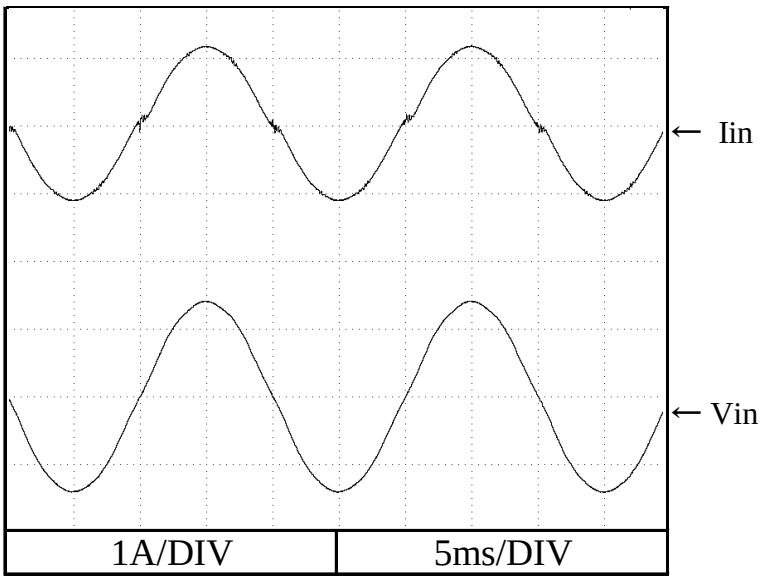
2.11 入力電流波形

Input current waveform

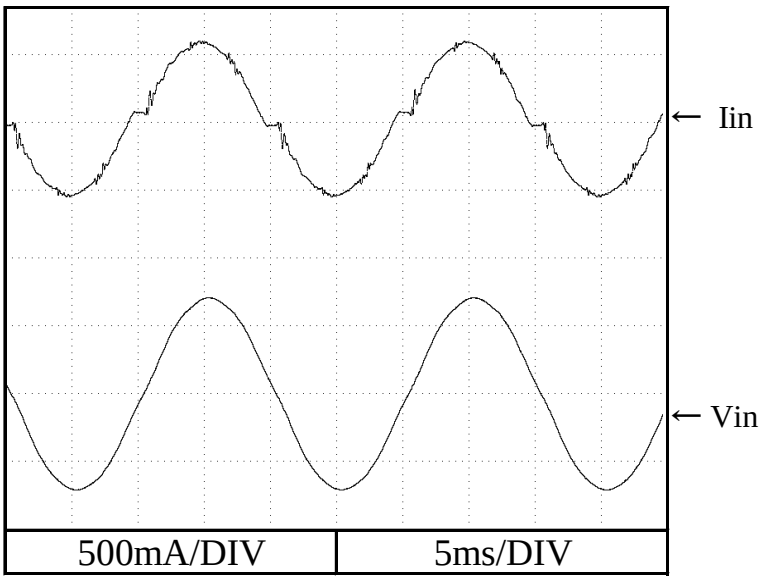
Conditions Iout : 100 %
Ta : 25 ℃

12V

Vin : 100 VAC



Vin : 200 VAC

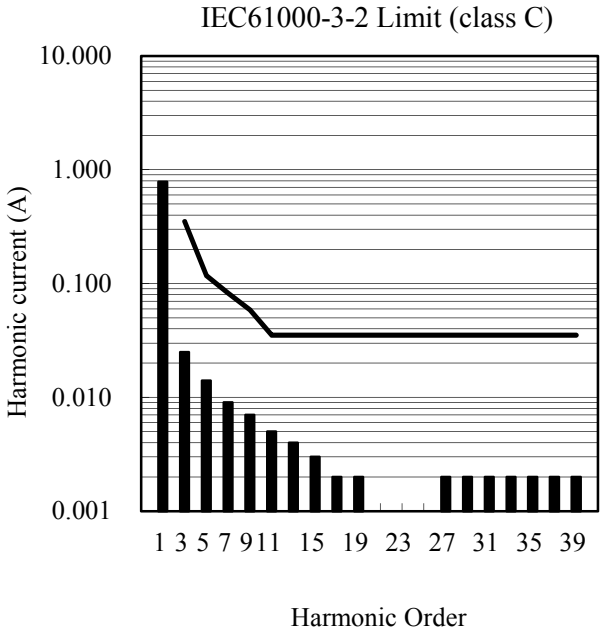


2.12 高調波成分
Input current harmonics

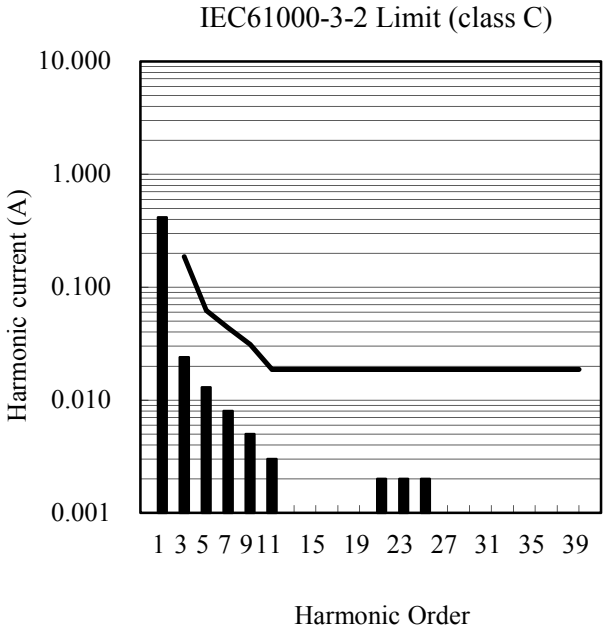
Conditions Vin : 100 VAC
Ta : 25 ℃

12V

Iout : 100%

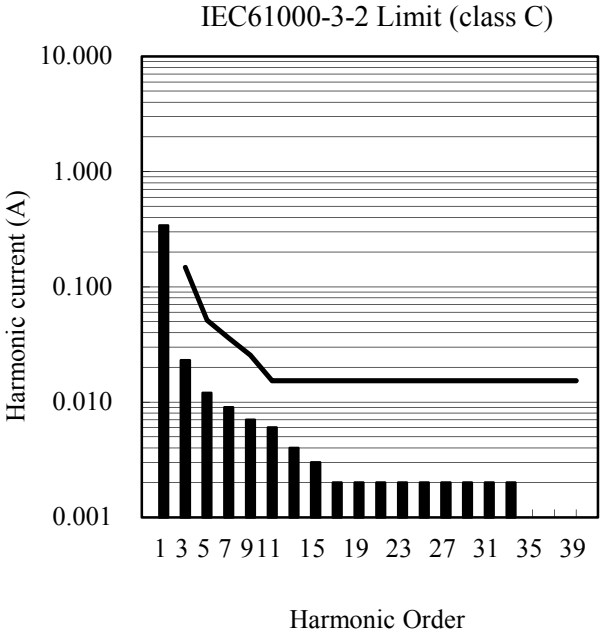


Iout : 50%

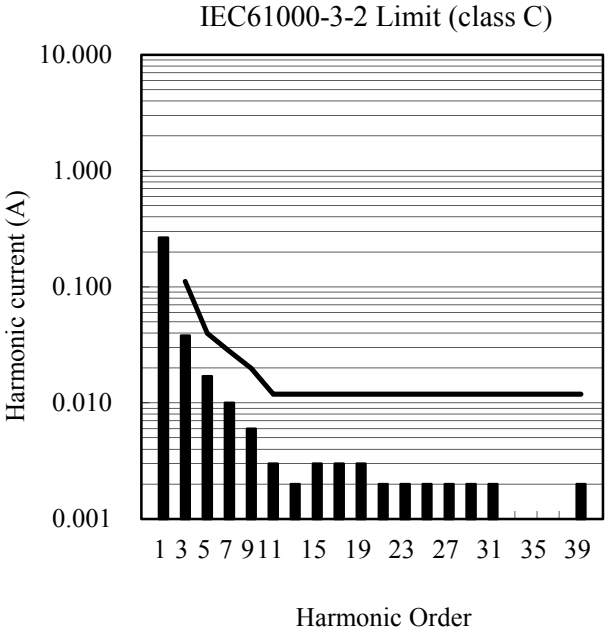


Conditions Vin : 230 VAC
Ta : 25 ℃

Iout : 100%



Iout : 75%



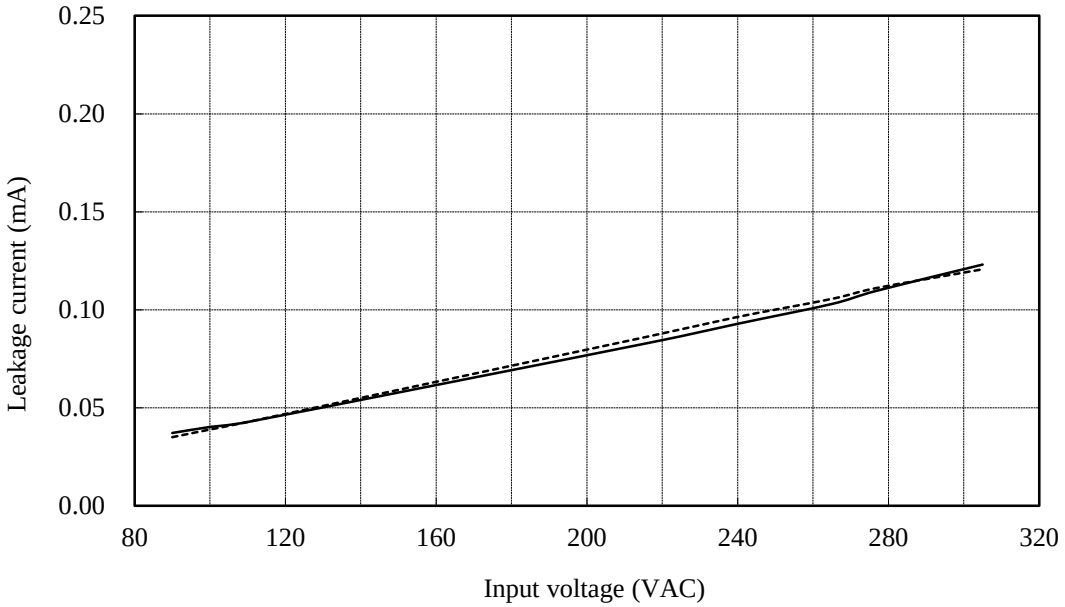
2.13 リーク電流特性

Leakage current characteristics

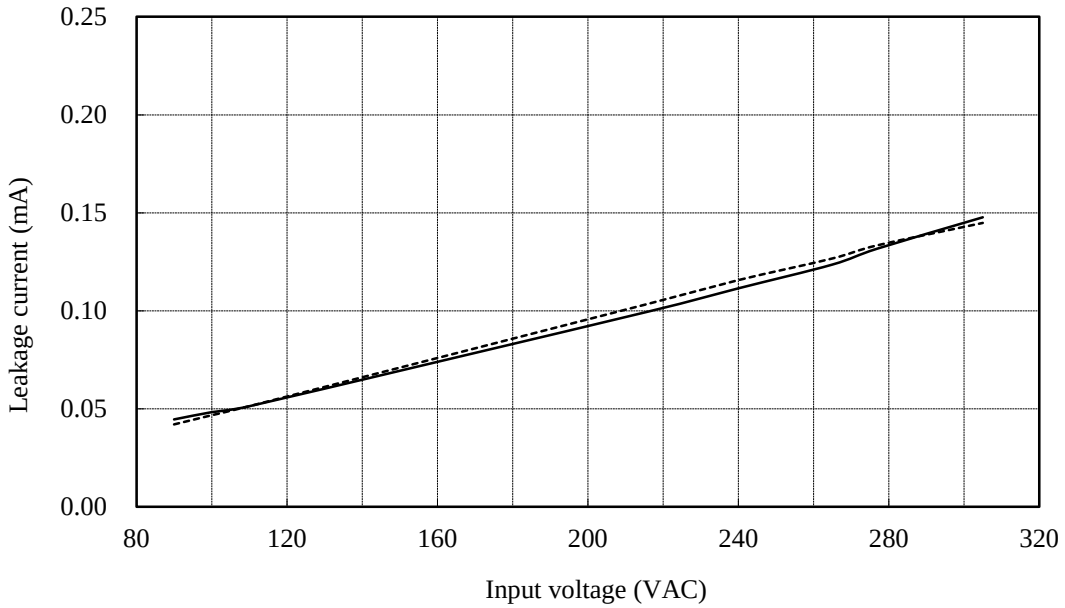
Conditions Iout : min ------
100 % ——
Ta : 25 ℃
Equipment used : 3156 (HIOKI)

12V

f : 50 Hz



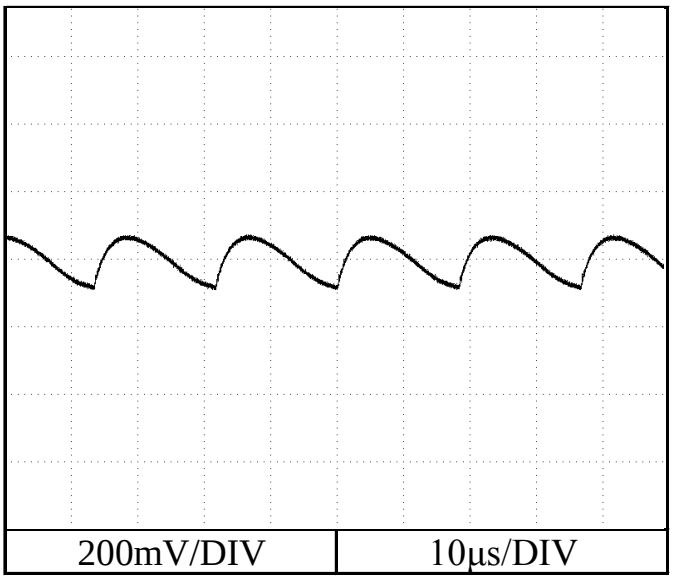
f : 60 Hz



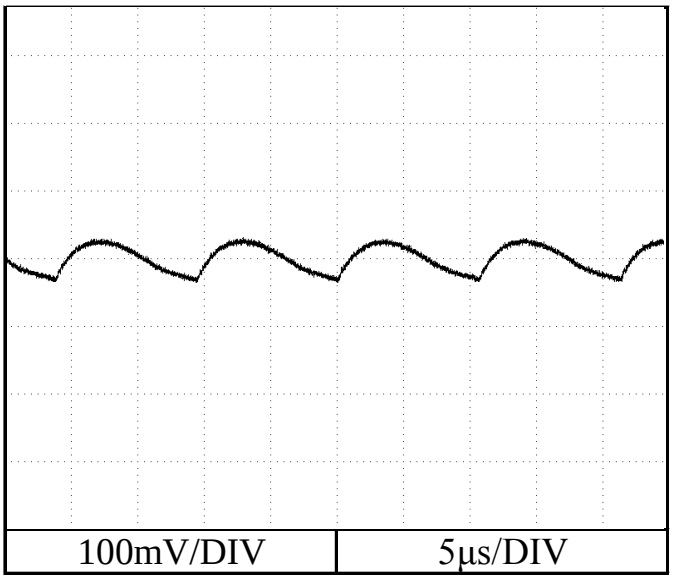
2.14 出力リップル、ノイズ波形
Output ripple and noise waveform

Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

12V



24V



2.15 EMI特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

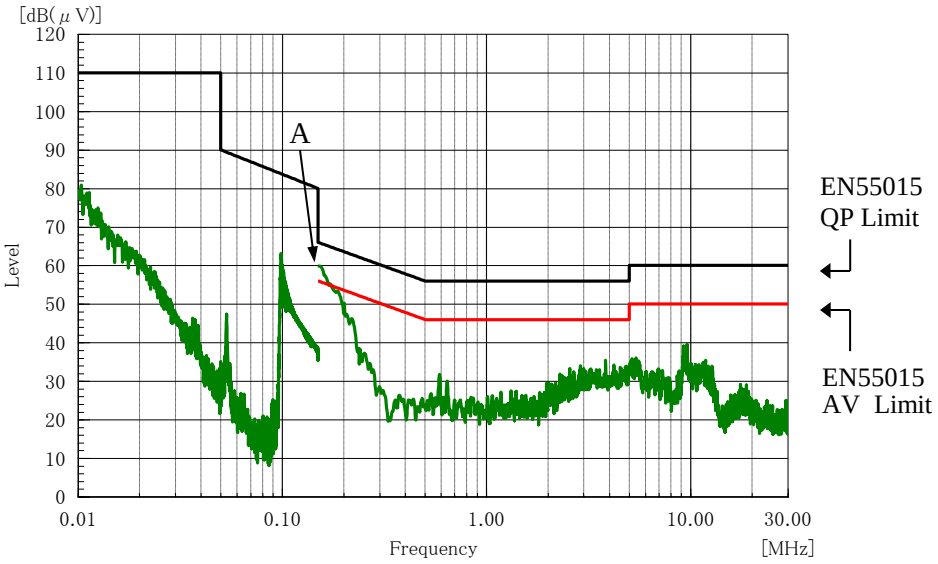
雑音端子電圧

Conducted Emission

12V

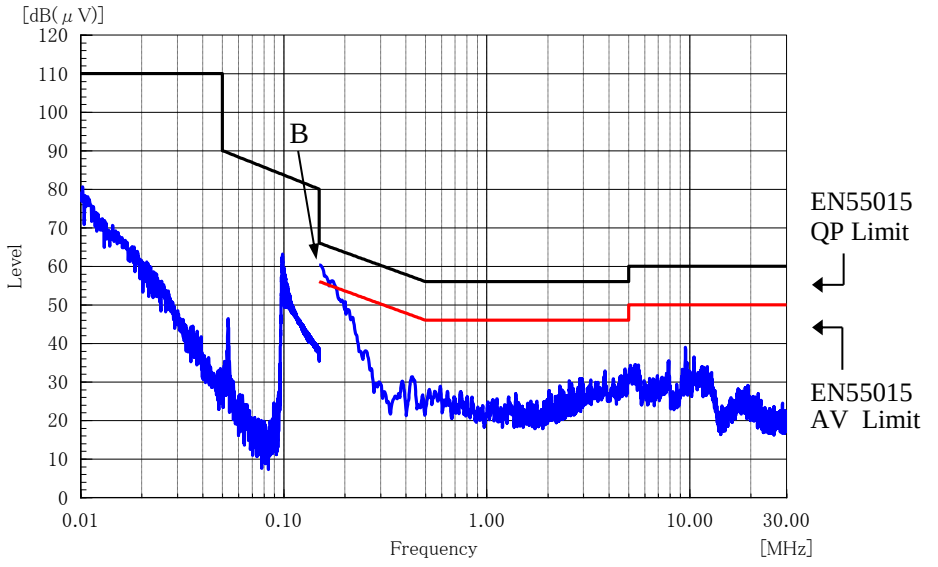
Phase : N

Ref. Data	Point A (150kHz) Limit (dBuV)	Measure (dBuV)
QP	66.0	58.2
AV	56.0	35.2



Phase : L

Ref. Data	Point B (150kHz) Limit (dBuV)	Measure (dBuV)
QP	66.0	58.2
AV	56.0	35.2



EN55022-B,VCCI-B,CISPR22-B,FCC-Bの限界値はEN55015の限界値と同じ(150kHz以上)
Limit of EN55022-B,VCCI-B,CISPR22-B,FCC-B are same as its EN55015.(more than 150kHz)

表示はピーク値
Indication is peak values.

2.15 EMI特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

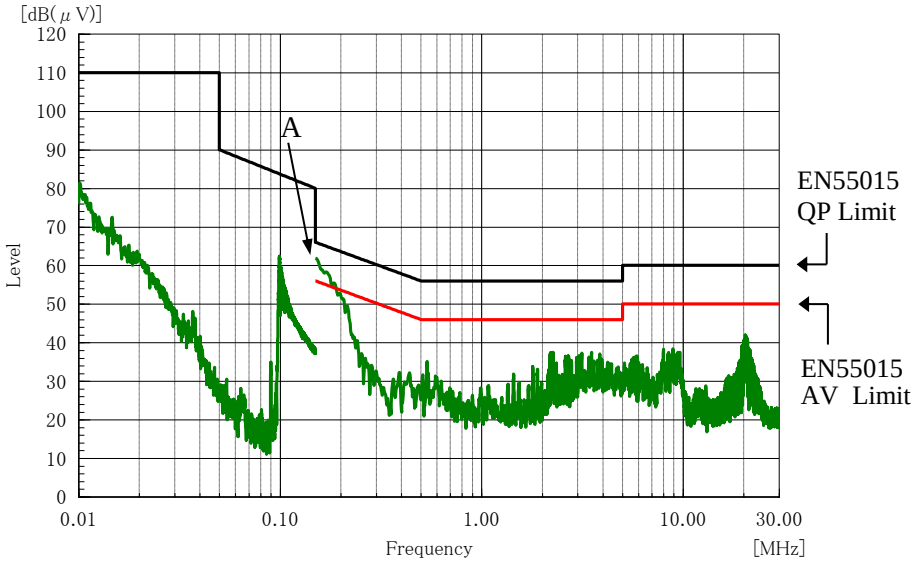
雑音端子電圧

Conducted Emission

24V

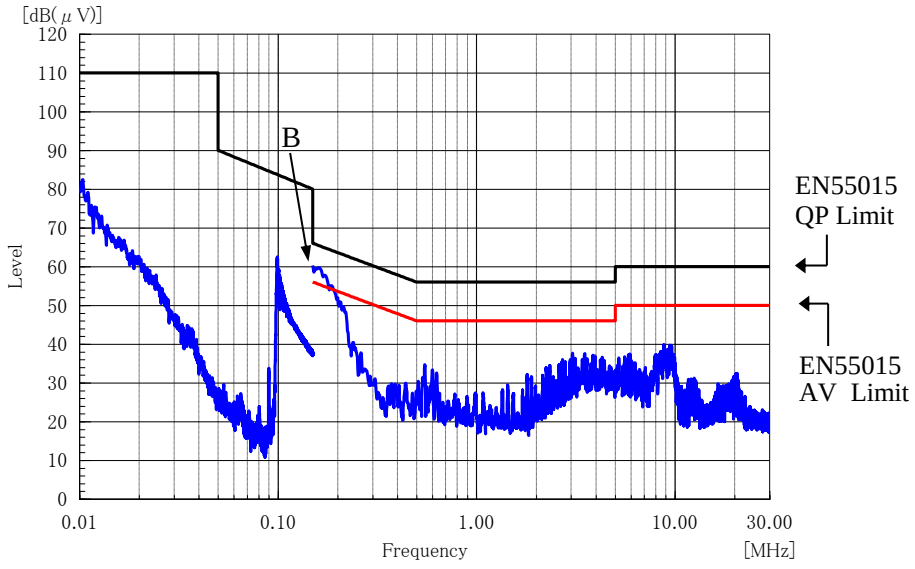
Phase : N

Ref. Data	Point A (150kHz) Limit (dBuV)	Measure (dBuV)
QP	66.0	58.4
AV	56.0	35.3



Phase : L

Ref. Data	Point B (150kHz) Limit (dBuV)	Measure (dBuV)
QP	66.0	58.4
AV	56.0	35.3



EN55022-B,VCCI-B,CISPR22-B,FCC-Bの限界値はEN55015の限界値と同じ(150kHz以上)
Limit of EN55022-B,VCCI-B,CISPR22-B,FCC-B are same as its EN55015.(more than 150kHz)

表示はピーク値
Indication is peak values.

2.15 EMI特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音電界強度

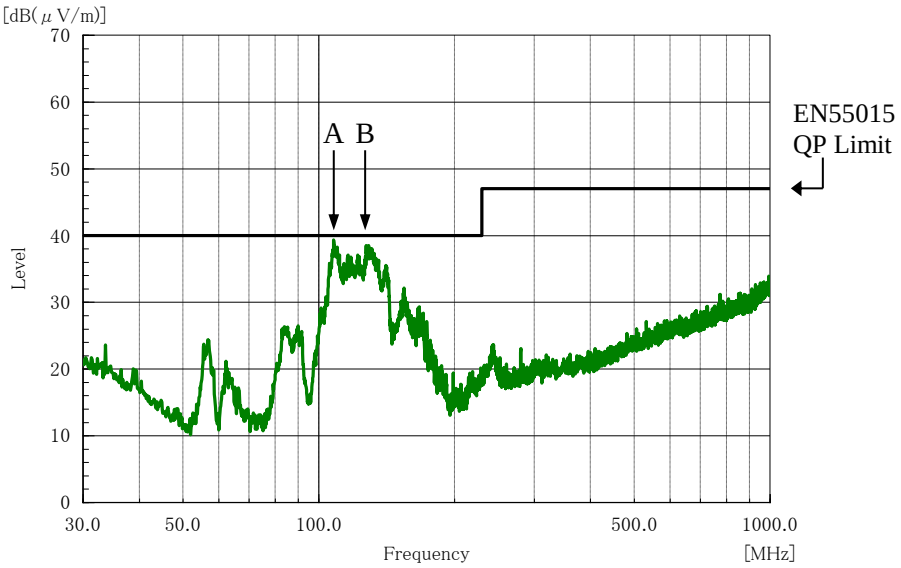
Radiated Emission

12V

HORIZONTAL

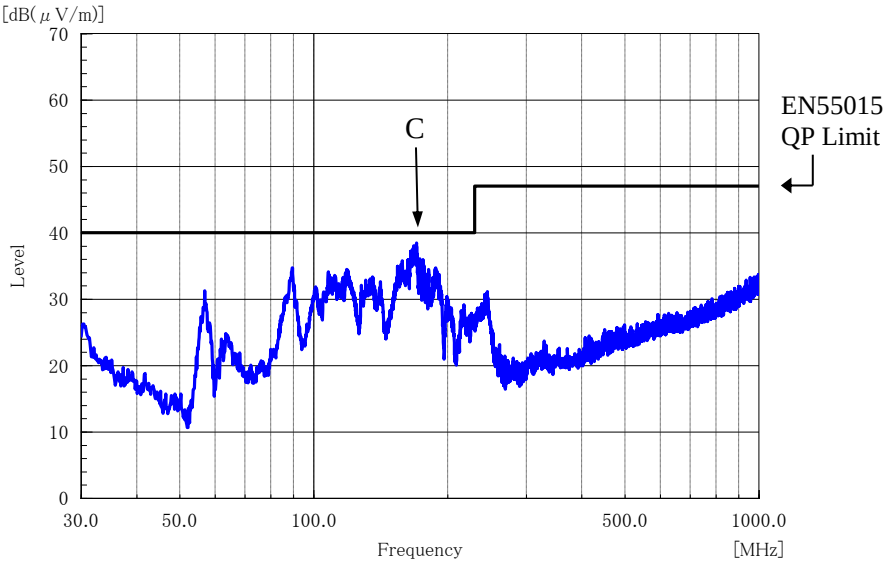
Ref. Data	Point A (108MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	35.7

Ref. Data	Point B (128MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	33.2



VERTICAL

Ref. Data	Point C (170MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	33.2



EN55022-B,VCCI-B,CISPR22-B,FCC-Bの限界値はEN55015の限界値と同じ
Limit of EN55022-B,VCCI-B,CISPR22-B,FCC-B are same as its EN55015.

表示はピーク値
Indication is peak values.

2.15 EMI特性

Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

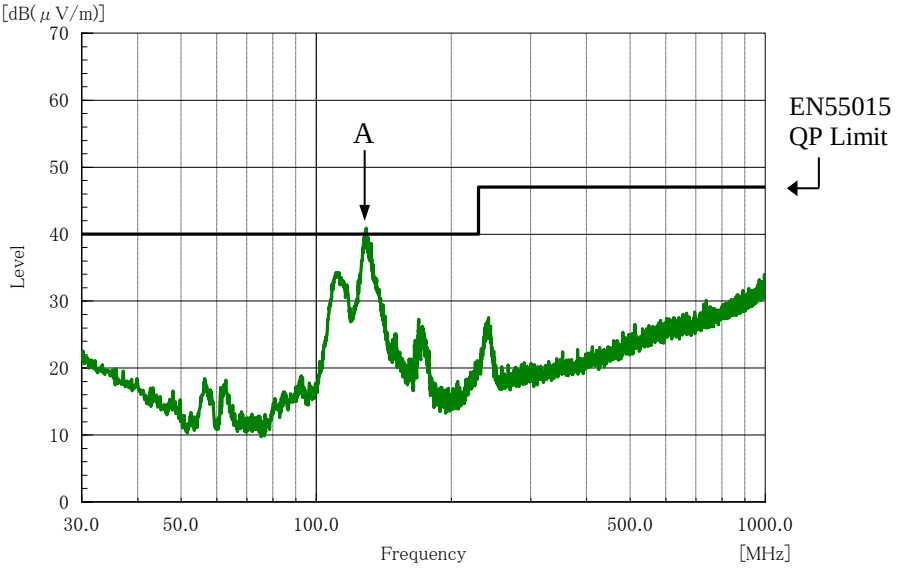
雑音電界強度

Radiated Emission

24V

HORIZONTAL

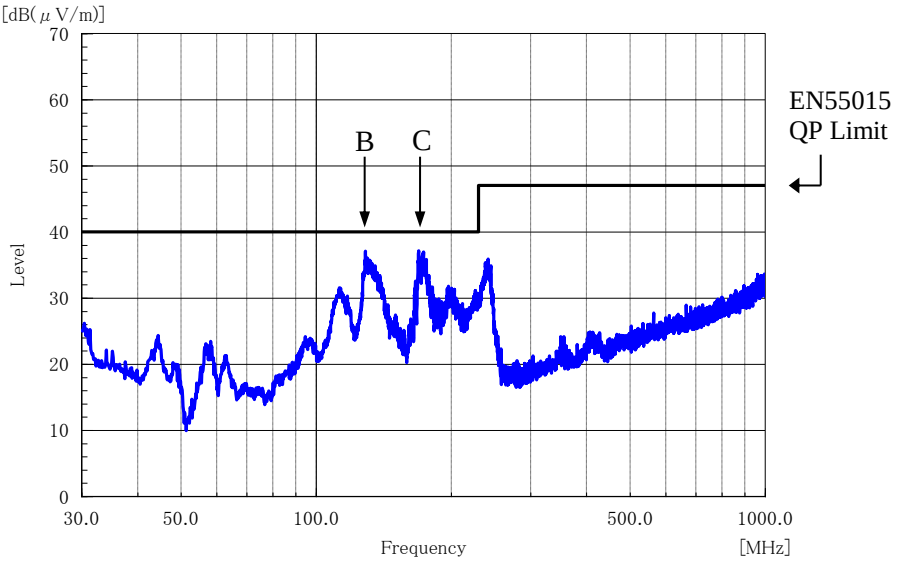
Ref. Data	Point A (129MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	36.9



VERTICAL

Ref. Data	Point B (129MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	32.6

Ref. Data	Point C (170MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	33.1



EN55022-B,VCCI-B,CISPR22-B,FCC-Bの限界値はEN55015の限界値と同じ
Limit of EN55022-B,VCCI-B,CISPR22-B,FCC-B are same as its EN55015.

表示はピーク値
Indication is peak values.

2.15 EMI特性

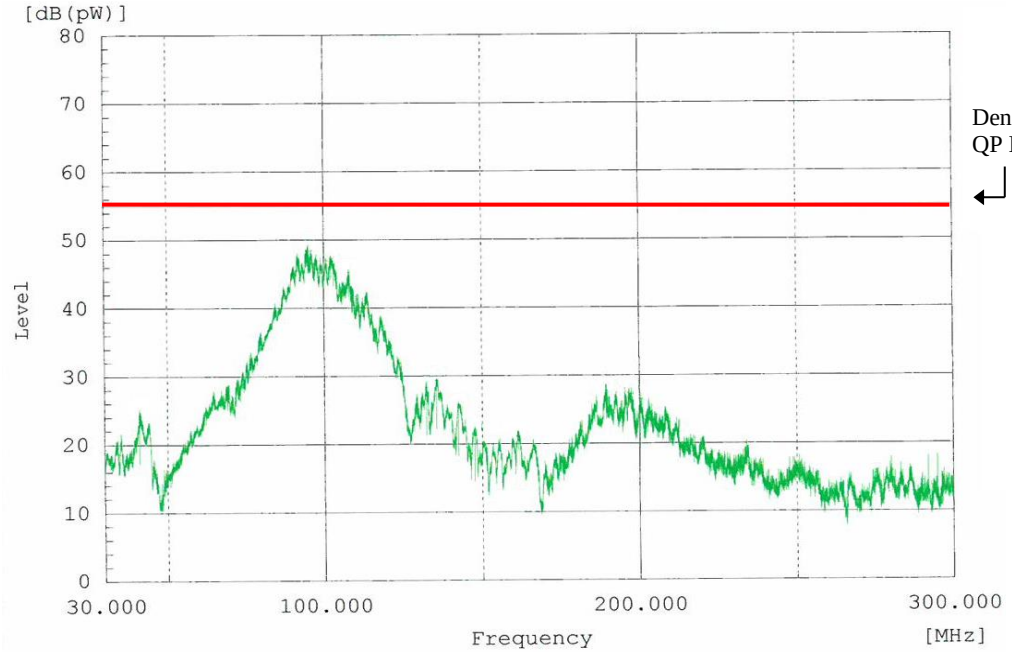
Electro-Magnetic Interference characteristics

Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

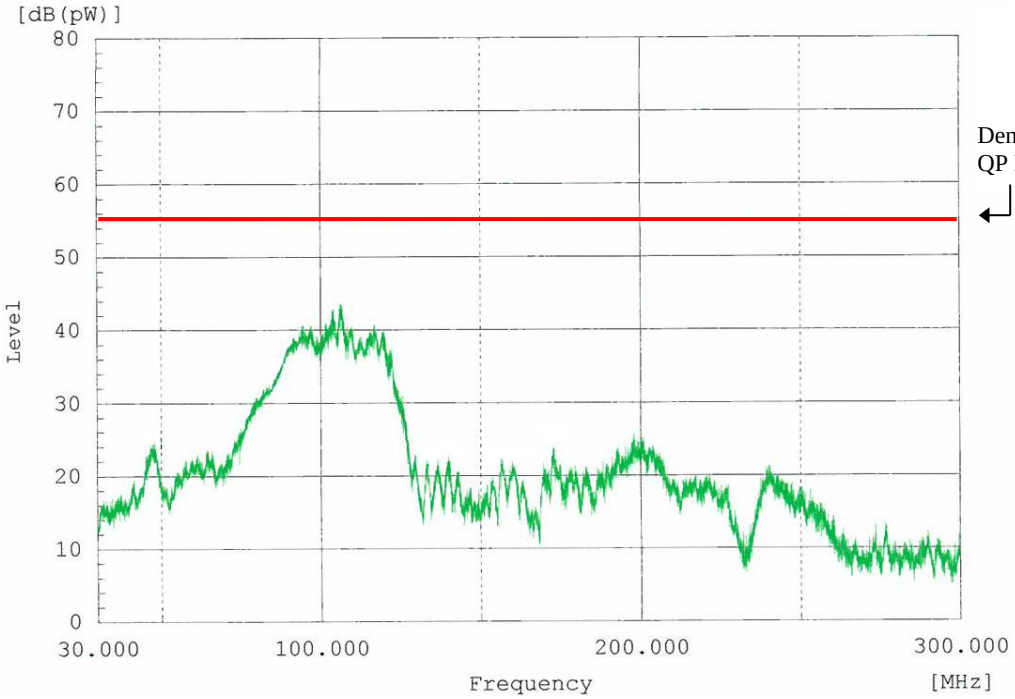
妨害波電力

Disturbance Power

12V



24V



表示はピーク値

Indication is peak values.