ZWS50BAF

EVALUATION DATA

型式データ

TDK-Lambda

A247-53-01A

INDEX

2. 特性データ　Characteristics

使用記号　Terminology used

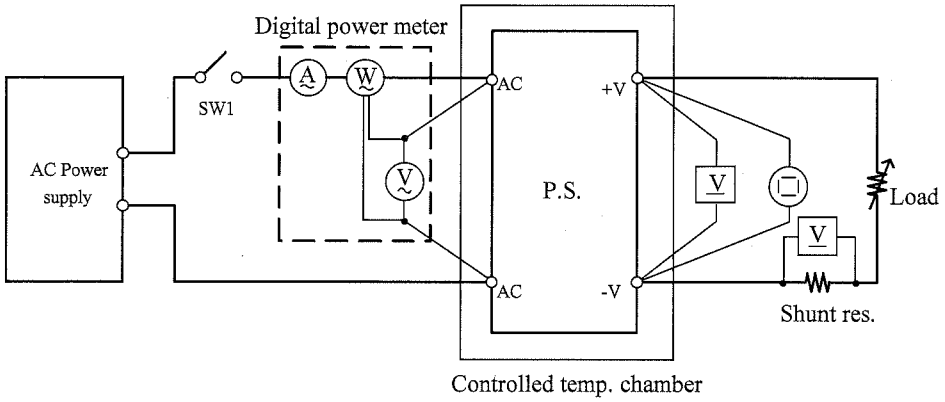
		定義	Definition
Vin	.....	入力電圧	Input voltage
Vout	.....	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Win	.....	入力電力	Input power
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

1. 測定方法　Evaluation method

1.1 測定回路 Circuit used for determination

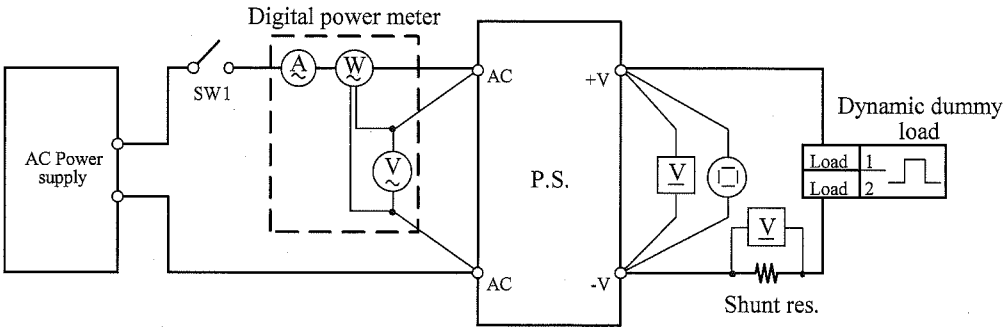
測定回路1 Circuit 1 used for determination

- 静特性　Steady state data
- 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
- 出力保持時間特性　Hold up time characteristics



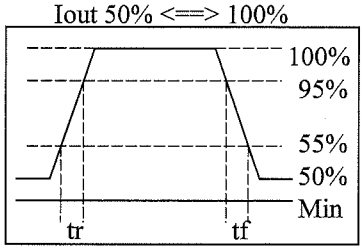
測定回路2 Circuit 2 used for determination

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



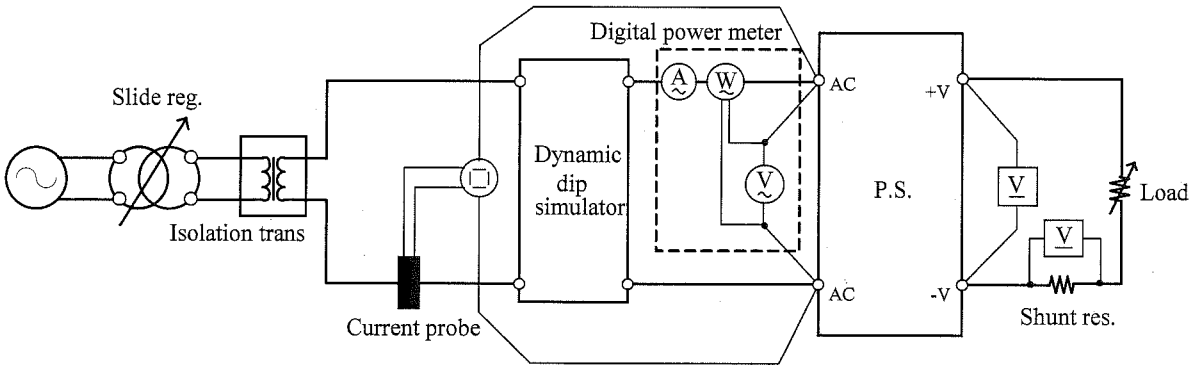
Output current waveform

Iout 50% <==> 100%



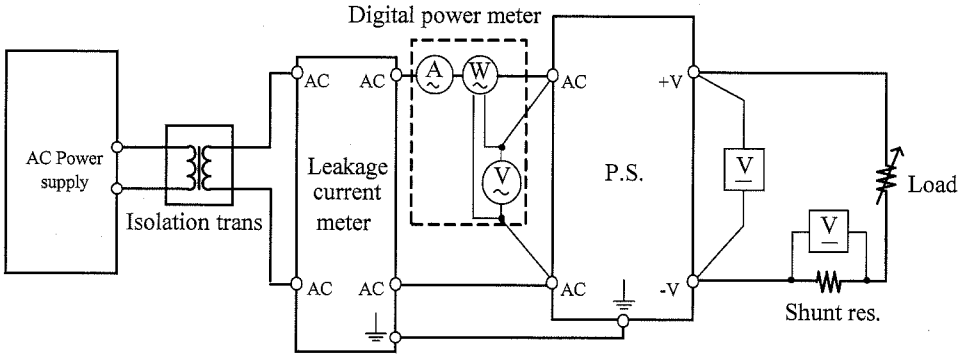
測定回路3 Circuit 3 used for determination

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



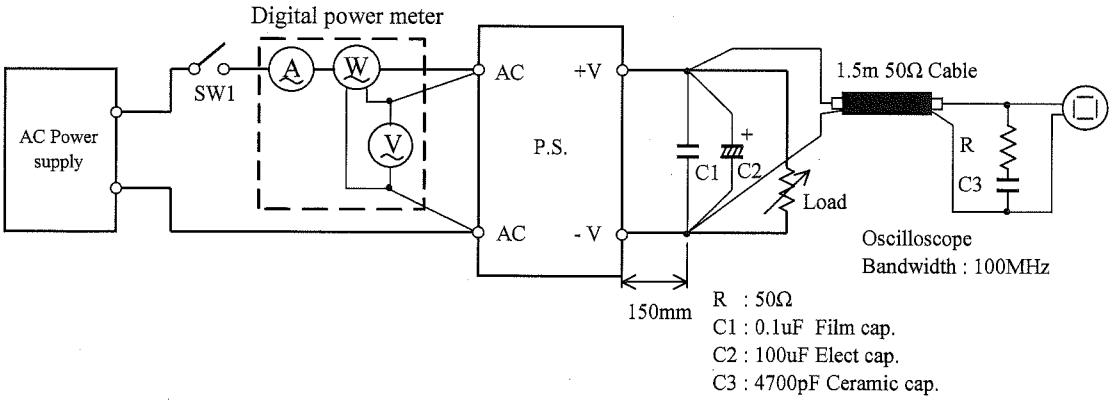
測定回路4 Circuit 4 used for determination

・リーク電流特性　Leakage current characteristics



測定回路5 Circuit 5 used for determination

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

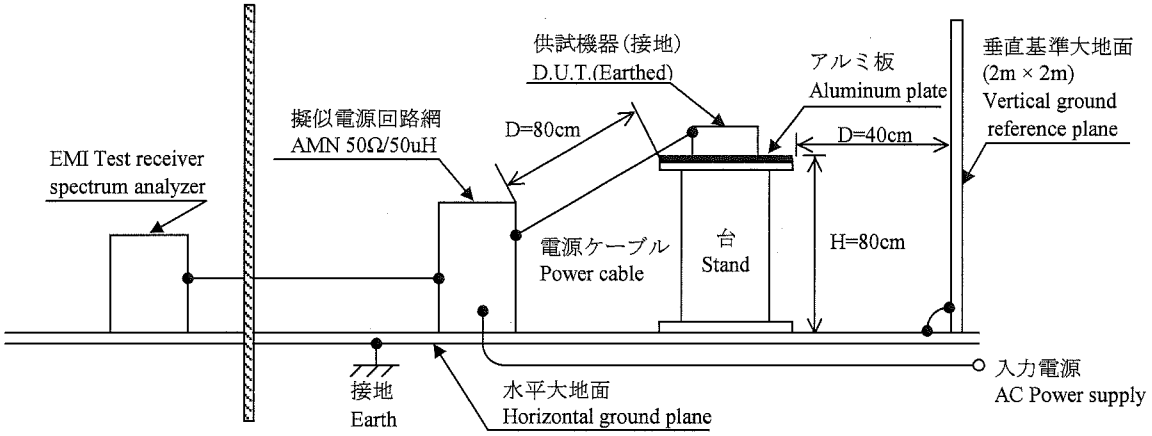


測定構成　Configuration used for determination

・EMI特性　Electromagnetic interference characteristics

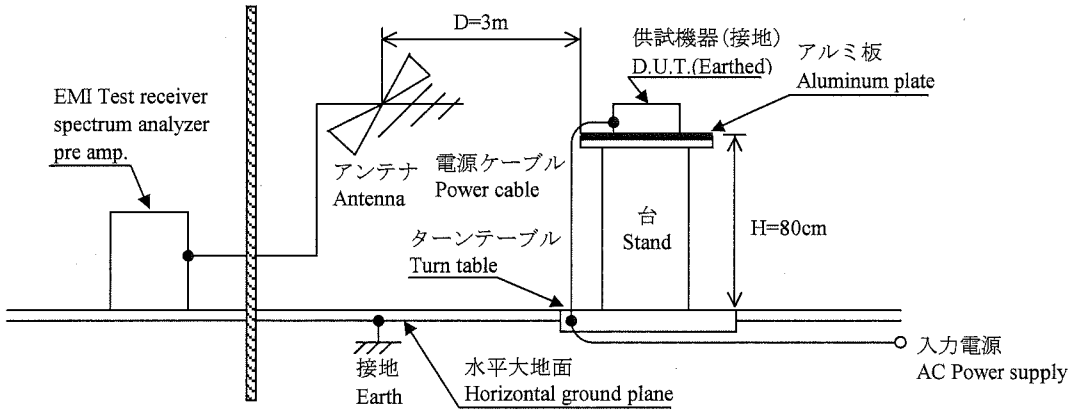
(a) 雑音端子電圧 (帰還ノイズ)

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	TEKTRONIX	TDS220
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740E
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	YOKOGAWA ELECT.	701930 / 701932
6	CURRENT PROBE / AMP.	TEKTRONIX	A6303 / AM503B
7	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
8	DUMMY LOAD	PCN	RHF250 SIRIES
9	SLIDE REGULATOR	MATSUNAGA	S3-24100
10	ISOLATION TRANS	MATSUNAGA	3WTC-50K
11	CVCF	TAKASAGO	AA2000XG
12	CVCF	NF	ES10000S
13	LEAKAGE CURRENT METER	HIOKI	3156
14	DYNAMIC DIP SIMULATOR	TAKAMISAWA	PSA-210
15	CONTROLLED TEMP. CHAMBER	ESPEC	SU-240
16	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
17	PRE AMP.	SONOMA	310N
18	AMN	SCHWARZBECK	NNLK8121
19	ANTENNA	SCHWARZBECK	CBL6111D
20	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
21	SINGLE-PHASE MASTER	NF	4420
22	REFERENCE IMPEDANCE NETWORK 20A	NF	4150
23	MULTI OUTLET UNIT	KIKUSUI	OT01-KHA

2.1 静特性　Steady state data

(1) 入力・負荷・温度変動／出力起動・遮断電圧

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

5V

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

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	5.002V	5.002V	5.002V	5.002V	0mV	0.000%
50%	5.000V	5.000V	5.000V	5.000V	0mV	0.000%
100%	5.000V	5.000V	5.000V	5.000V	0mV	0.000%
Load regulation	2mV	2mV	2mV	2mV		
	0.040%	0.040%	0.040%	0.040%		

2. Temperature drift　Conditions Vin : 100 VAC Iout : 100 %

Ta	-10℃	+25℃	+50℃	Temperature stability	
Vout	5.005V	5.000V	4.988V	17mV	0.340%

3. Start up voltage and Drop out voltage　Conditions Ta : 25 ℃ Iout : 100 %

Start up voltage (Vin)	76VAC
Drop out voltage (Vin)	58VAC

12V

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

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	12.028V	12.028V	12.028V	12.028V	0mV	0.000%
50%	12.026V	12.026V	12.026V	12.026V	0mV	0.000%
100%	12.026V	12.026V	12.026V	12.025V	1mV	0.008%
Load regulation	2mV	2mV	2mV	3mV		
	0.017%	0.017%	0.017%	0.025%		

2. Temperature drift　Conditions Vin : 100 VAC Iout : 100 %

Ta	-10℃	+25℃	+50℃	Temperature stability	
Vout	12.040V	12.026V	12.015V	25mV	0.208%

3. Start up voltage and Drop out voltage　Conditions Ta : 25 ℃ Iout : 100 %

Start up voltage (Vin)	78VAC
Drop out voltage (Vin)	60VAC

24V

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

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	24.012V	24.012V	24.012V	24.012V	0mV	0.000%
50%	24.011V	24.011V	24.011V	24.011V	0mV	0.000%
100%	24.014V	24.013V	24.013V	24.013V	1mV	0.004%
Load regulation	3mV	2mV	2mV	2mV		
	0.013%	0.008%	0.008%	0.008%		

2. Temperature drift　Conditions Vin : 100 VAC Iout : 100 %

Ta	-10℃	+25℃	+50℃	Temperature stability	
Vout	24.071V	24.013V	23.986V	85mV	0.354%

3. Start up voltage and Drop out voltage　Conditions Ta : 25 ℃ Iout : 100 %

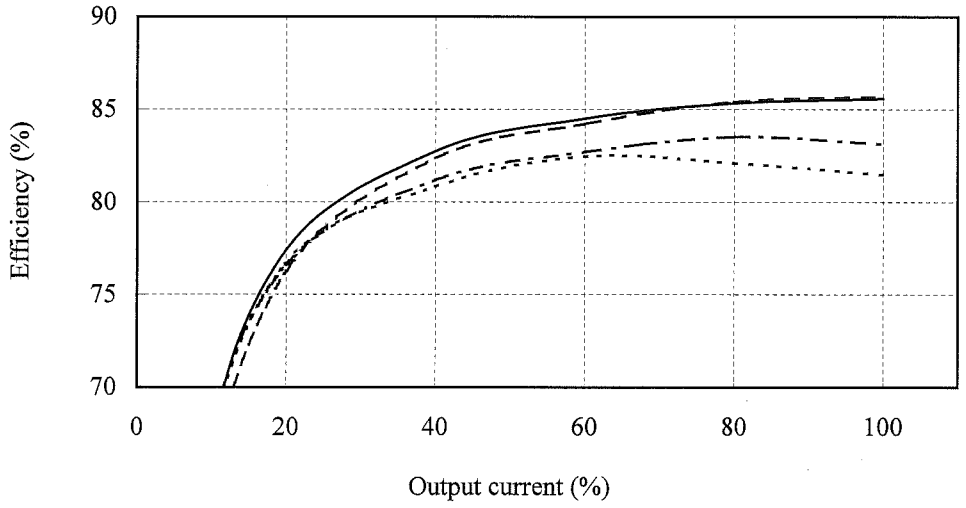
Start up voltage (Vin)	77VAC
Drop out voltage (Vin)	57VAC

(2) 効率対出力電流

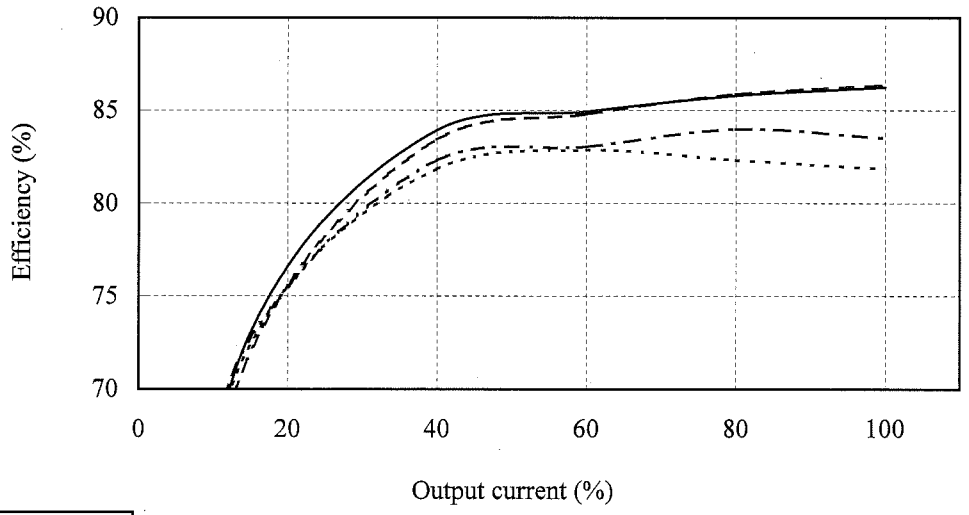
Efficiency vs. Output current

Conditions Vin : 85 VAC ------
: 100 VAC -·-·-·-
: 200 VAC ——
: 265 VAC – – – –
Ta : 25 ℃

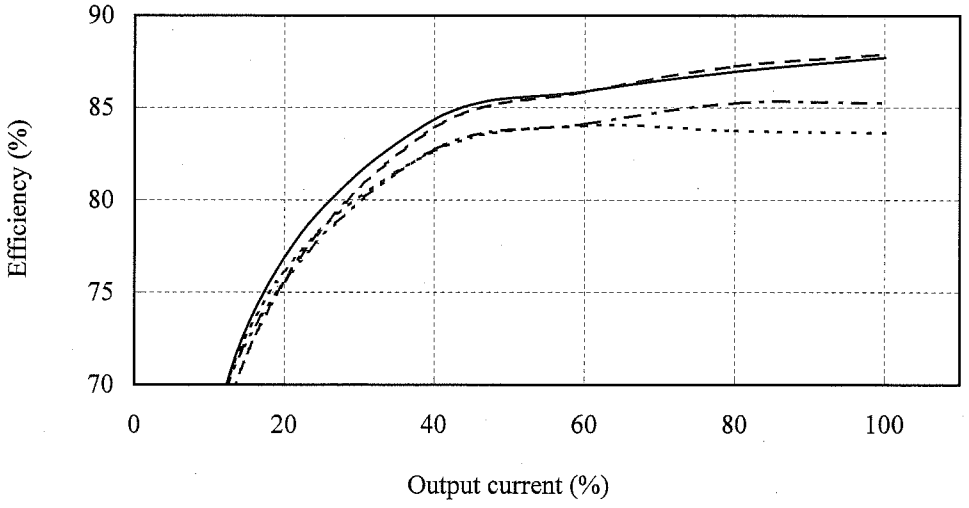
5V



12V



24V

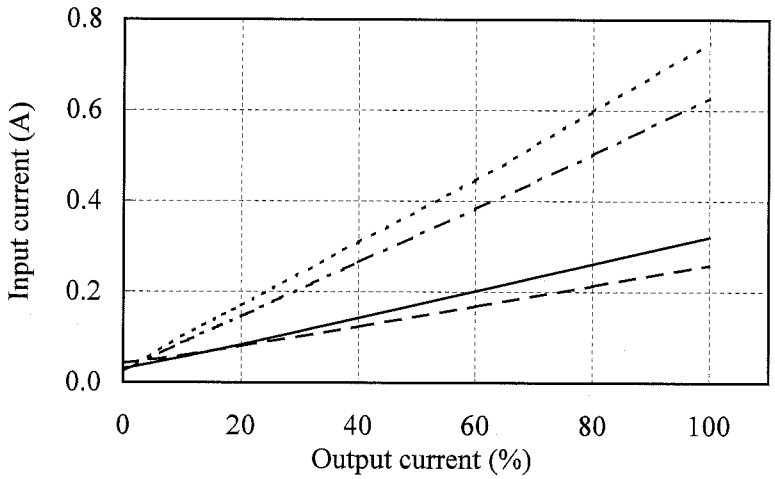


(3) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 85 VAC -----
: 100 VAC -·-·-
: 200 VAC ——
: 265 VAC – – –
Ta : 25 ℃

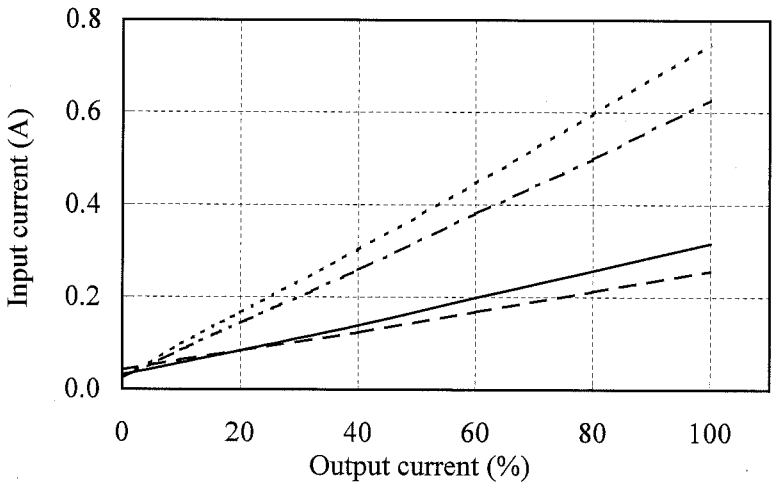
5V

Vin	Input current
	Iout : 0%
85VAC	0.02A
100VAC	0.02A
200VAC	0.03A
265VAC	0.04A



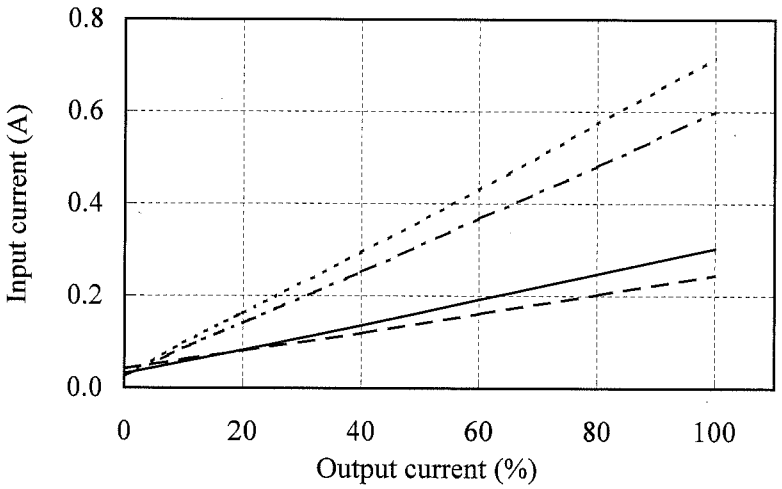
12V

Vin	Input current
	Iout : 0%
85VAC	0.02A
100VAC	0.02A
200VAC	0.03A
265VAC	0.04A



24V

Vin	Input current
	Iout : 0%
85VAC	0.03A
100VAC	0.02A
200VAC	0.03A
265VAC	0.04A

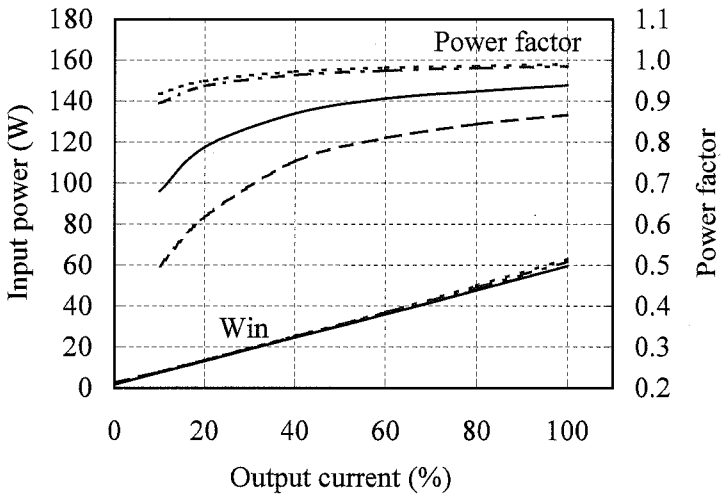


(4) 入力電力・力率対出力電流
Input power and Power factor vs. Output current

Conditions Vin : 85 VAC -----
: 100 VAC -·-·-
: 200 VAC ——
: 265 VAC – – –
Ta : 25 ℃

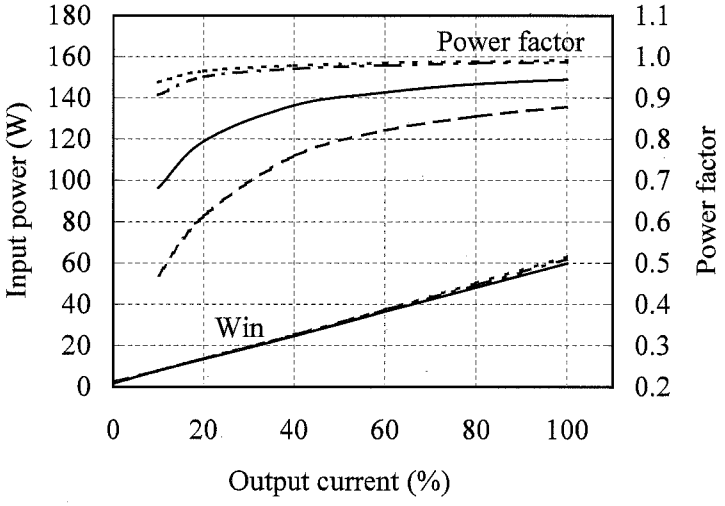
5V

Vin	Input power
	Iout : 0%
85VAC	1.4W
100VAC	1.6W
200VAC	1.7W
265VAC	2.5W



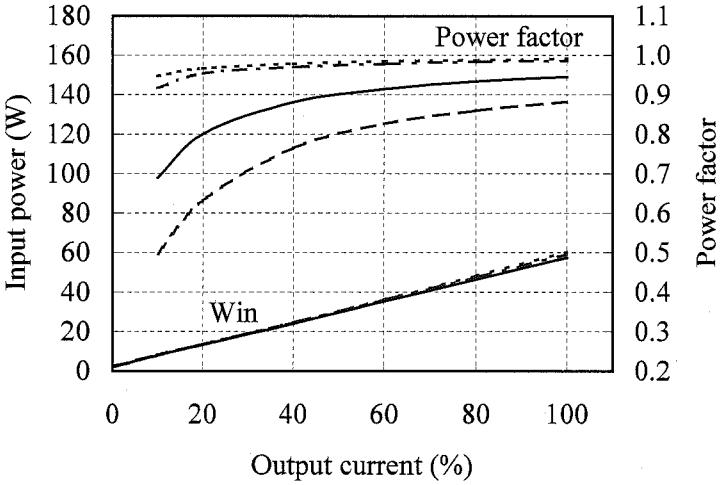
12V

Vin	Input power
	Iout : 0%
85VAC	1.5W
100VAC	1.6W
200VAC	1.7W
265VAC	2.3W



24V

Vin	Input power
	Iout : 0%
85VAC	1.7W
100VAC	1.8W
200VAC	1.9W
265VAC	2.3W



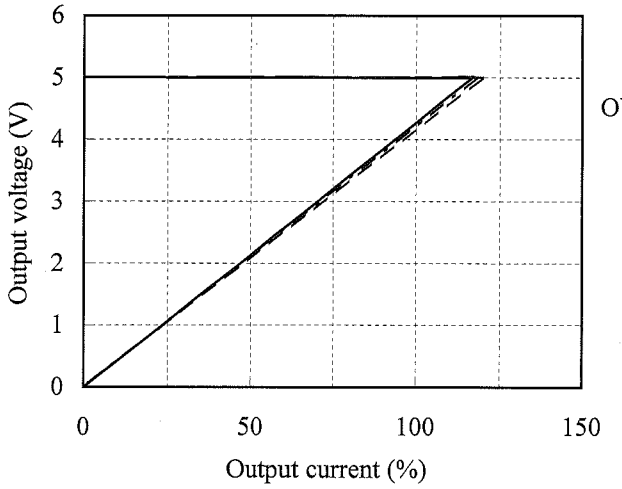
2. 2 過電流保護特性
Over current protection (OCP) characteristics

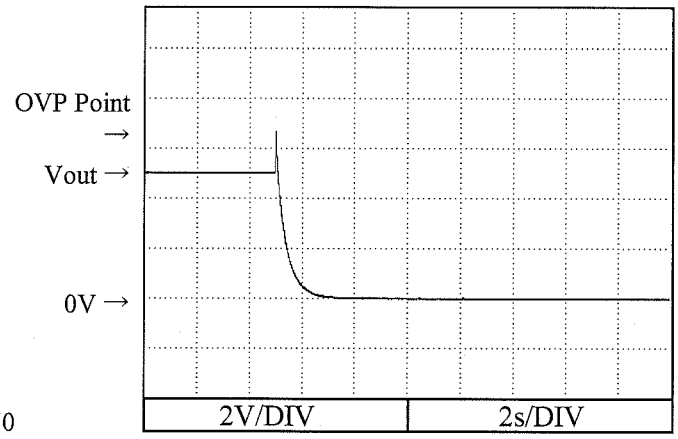
Conditions Vin : 100 VAC
Ta : -10 ℃ ------
25 ℃ —·—·—
50 ℃ ——

2. 3 過電圧保護特性
Over voltage protection (OVP) characteristics

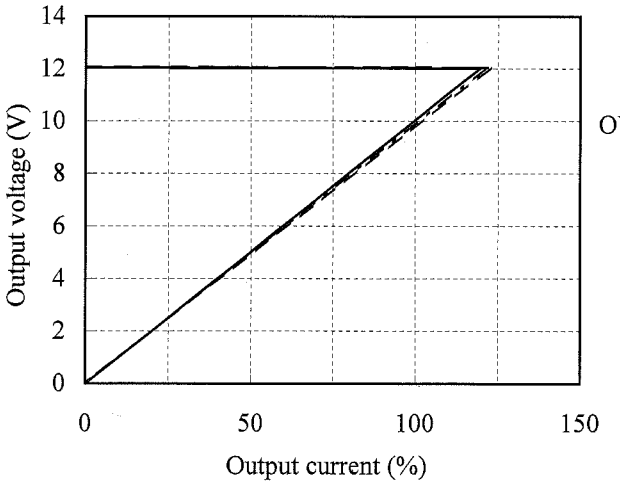
Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 ℃

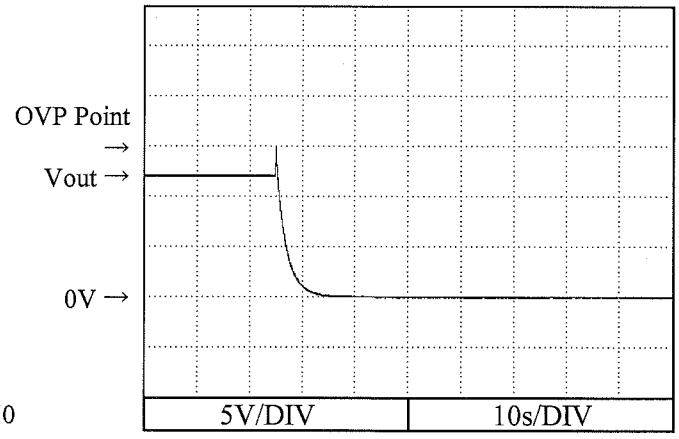
5V



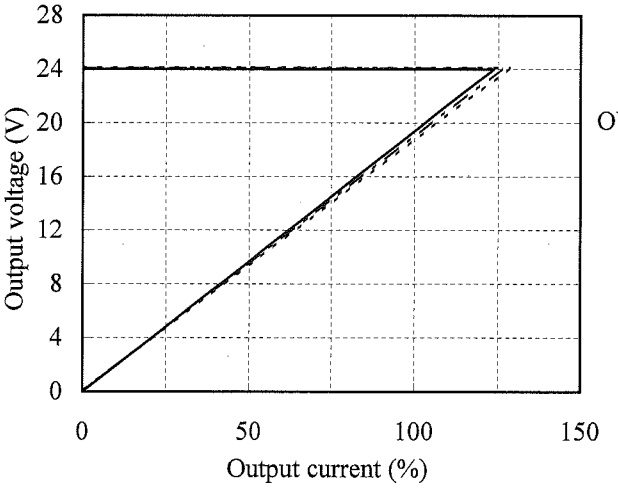


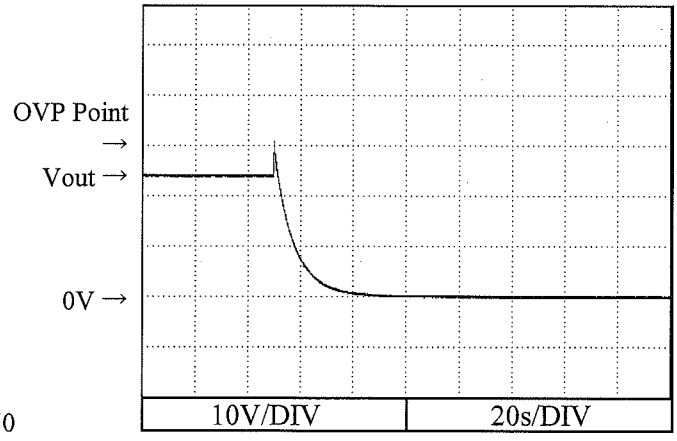
12V





24V

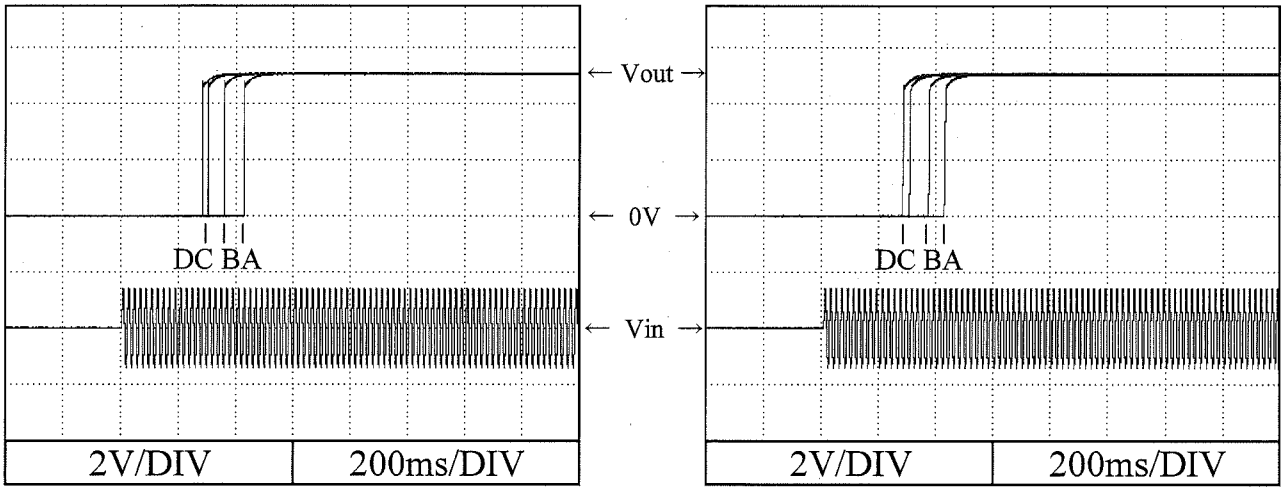




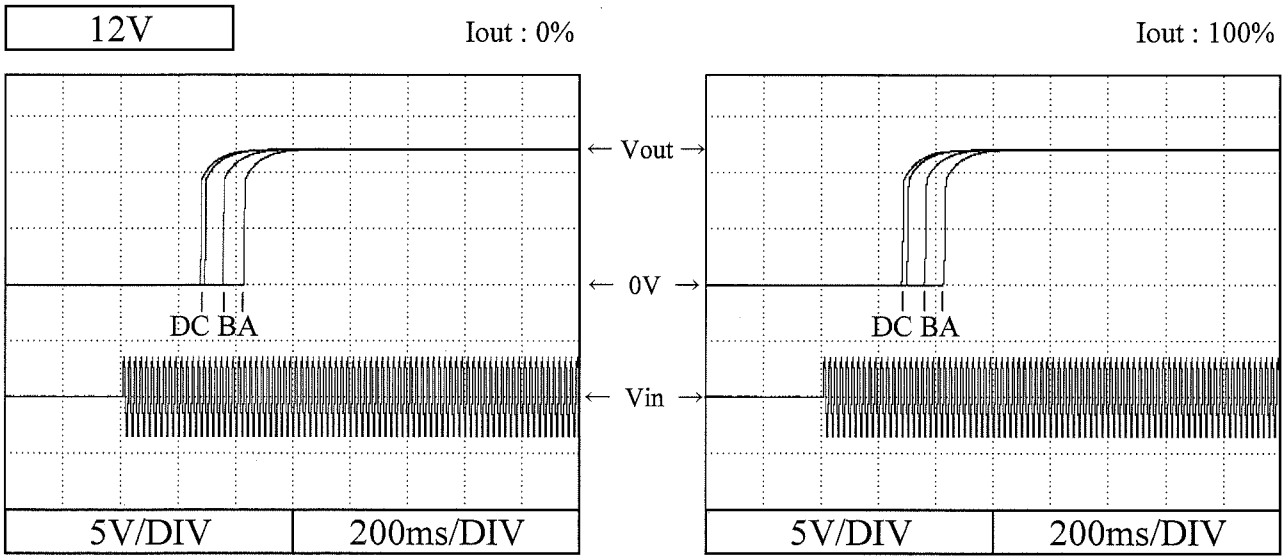
2.4 出力立ち上がり特性
Output rise characteristics

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

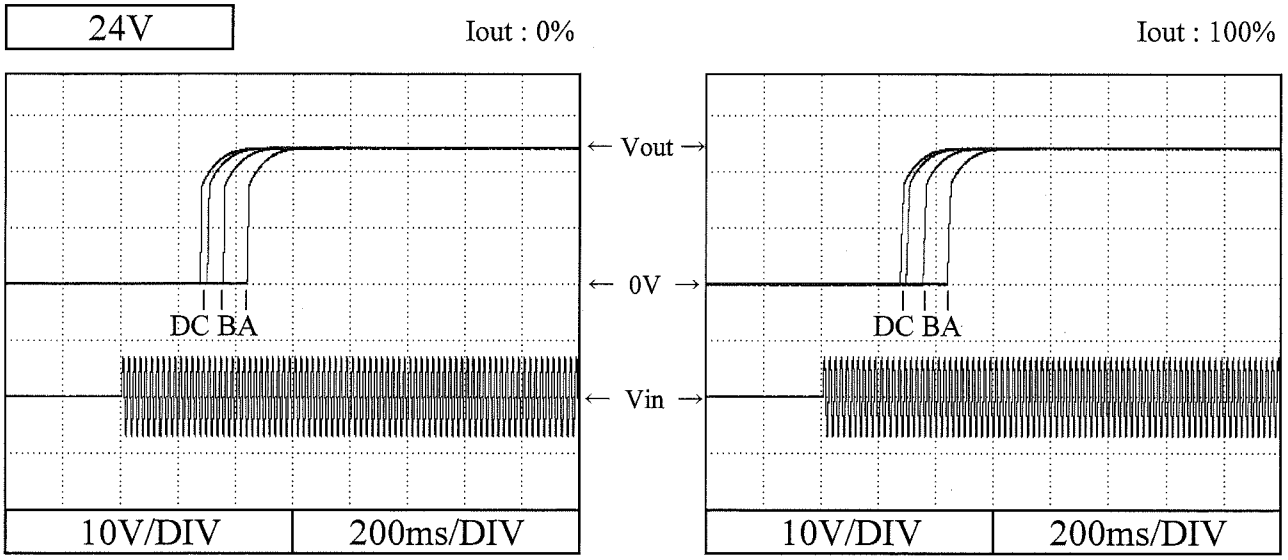
5V



12V



24V

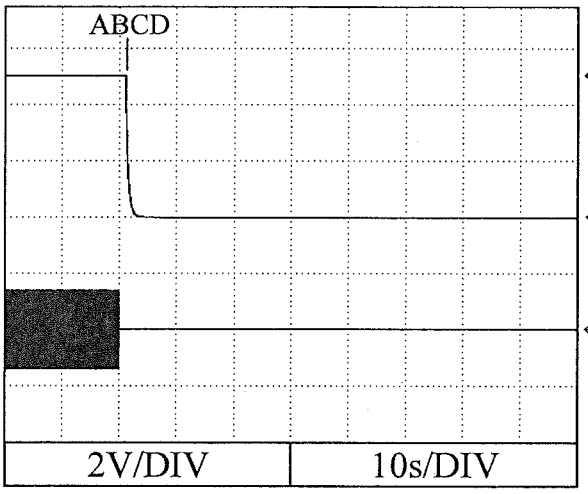


2.5 出力立ち下がり特性
Output fall characteristics

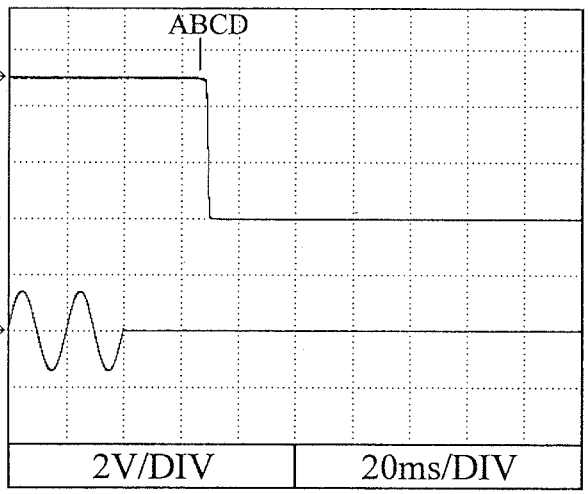
Conditions Vin : 85 VAC (A)
100 VAC (B)
200 VAC (C)
265 VAC (D)
Ta : 25 ℃

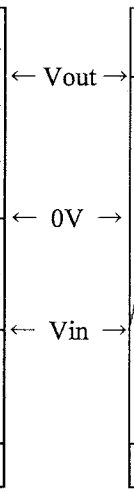
5V

Iout : 0%



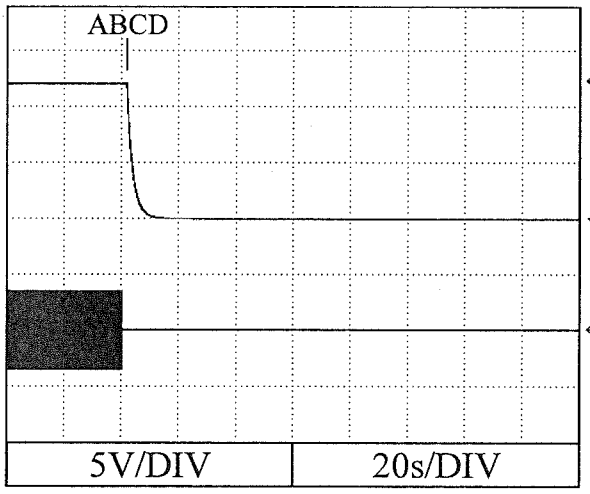
Iout : 100%



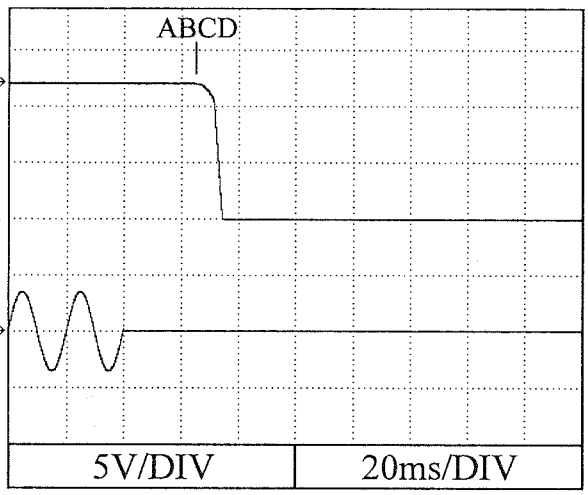


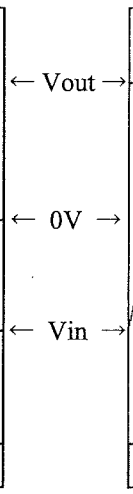
12V

Iout : 0%



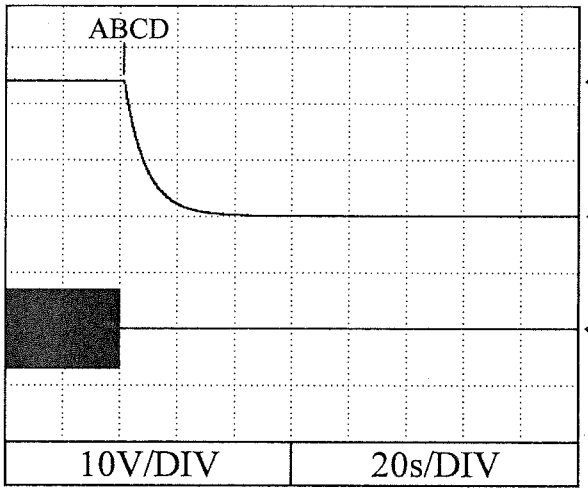
Iout : 100%



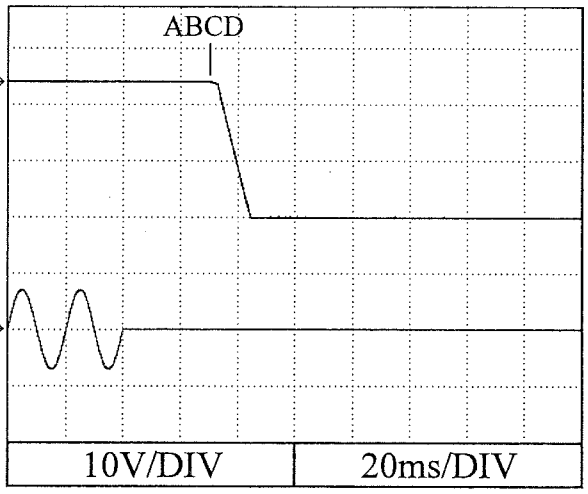


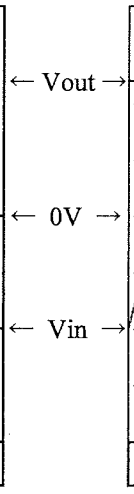
24V

Iout : 0%



Iout : 100%

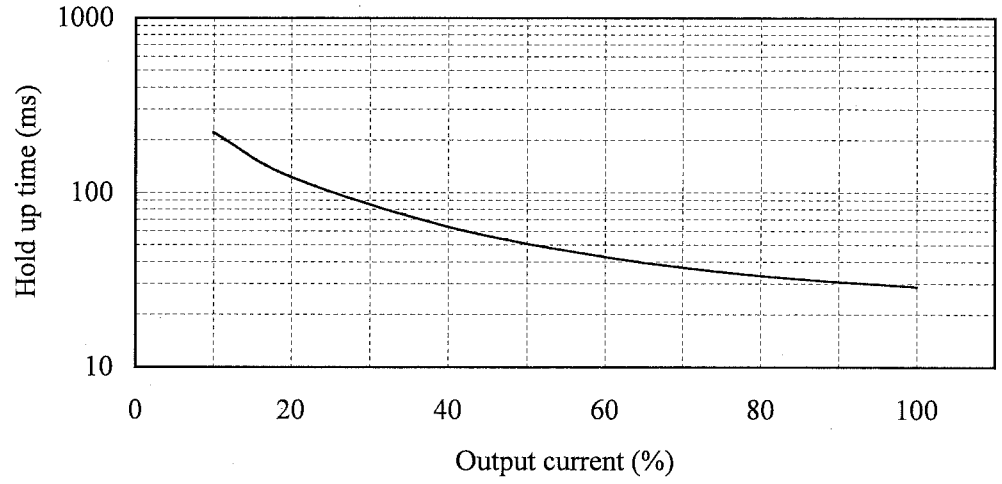




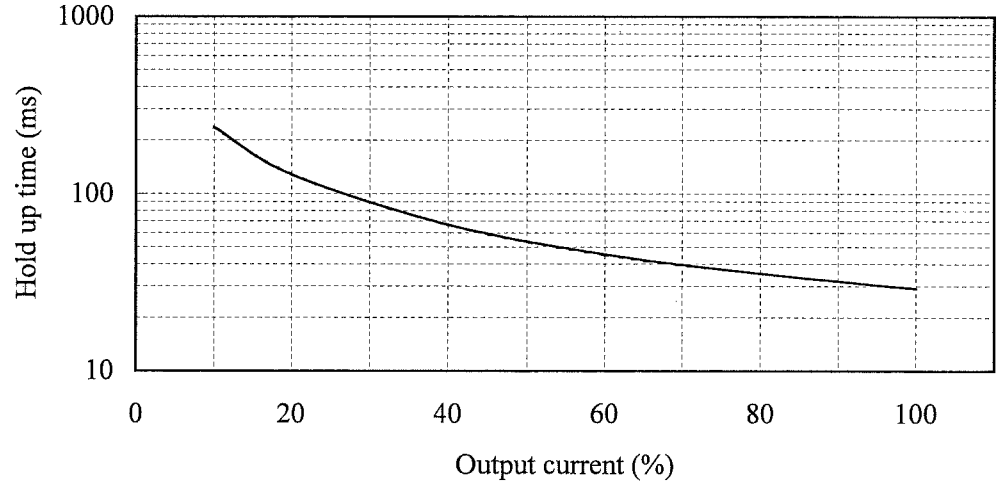
2. 6 出力保持時間特性
Hold up time characteristics

Conditions Vin : 100 VAC ------
200 VAC ——
Ta : 25 ℃

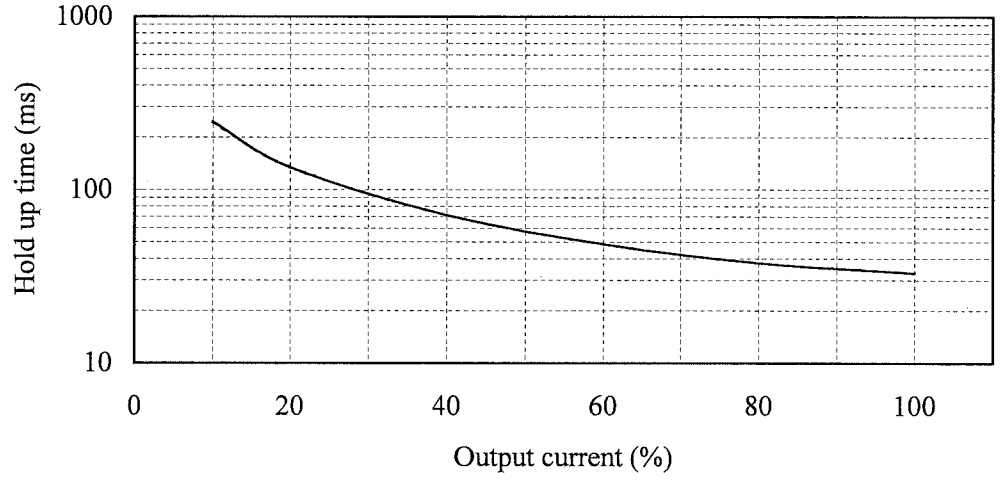
5V



12V



24V



2.7 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 ℃

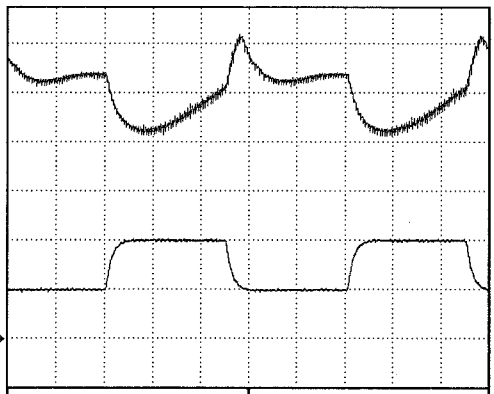
5V

f = 100Hz

200mV/DIV	2ms/DIV
+2.89%	-4.49%

← Vout →
← Iout →
← Iout:0% →

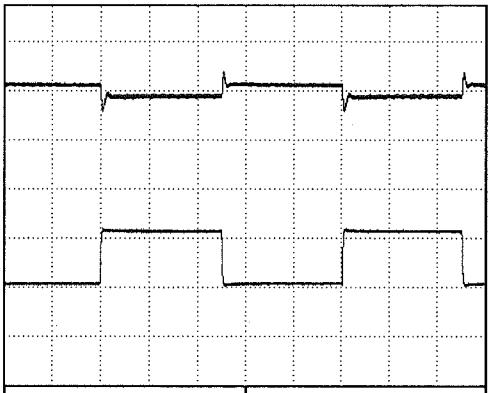
f = 1kHz



200mV/DIV	200 μ s/DIV
+4.78%	-3.56%

12V

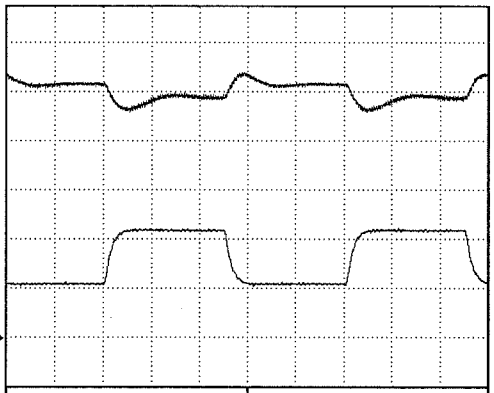
f = 100Hz



200mV/DIV	2ms/DIV
+0.64%	-0.72%

← Vout →
← Iout →
← Iout:0% →

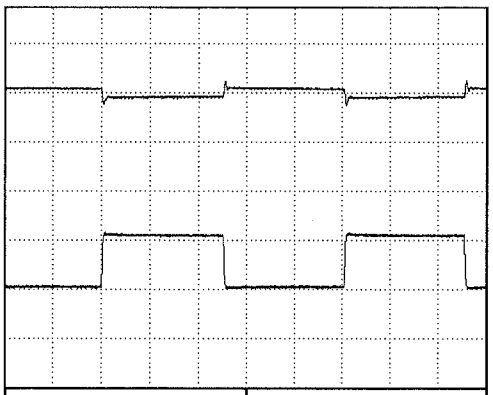
f = 1kHz



200mV/DIV	200 μ s/DIV
+0.66%	-0.71%

24V

f = 100Hz



200mV/DIV	2ms/DIV
+0.20%	-0.21%

← Vout →
← Iout →
← Iout:0% →

f = 1kHz

200mV/DIV	200 μ s/DIV
+0.21%	-0.21%

2.8 入力電圧瞬停特性

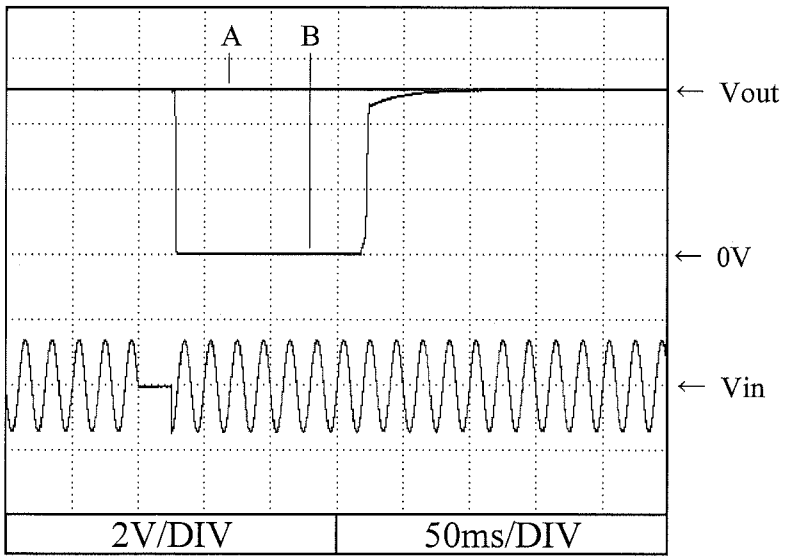
Response to brown out characteristics

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

5V

A = 25ms

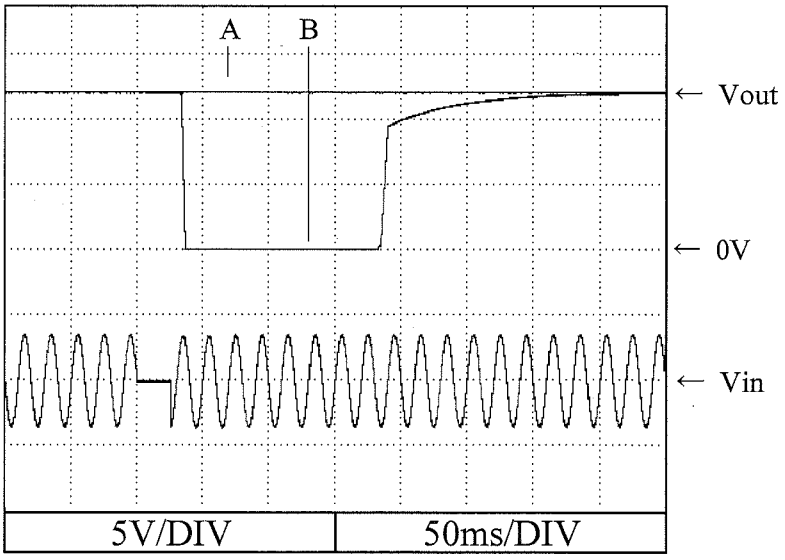
B = 26ms



12V

A = 26ms

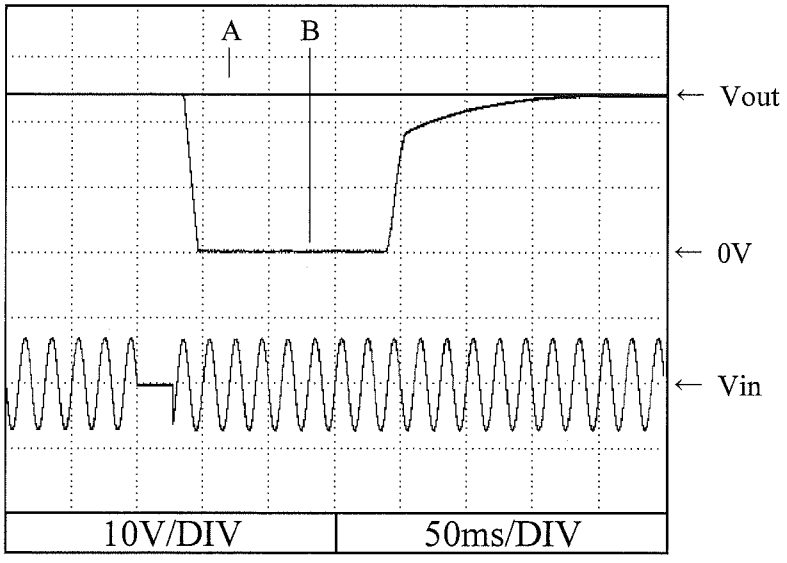
B = 27ms



24V

A = 27ms

B = 28ms



2.8 入力電圧瞬停特性

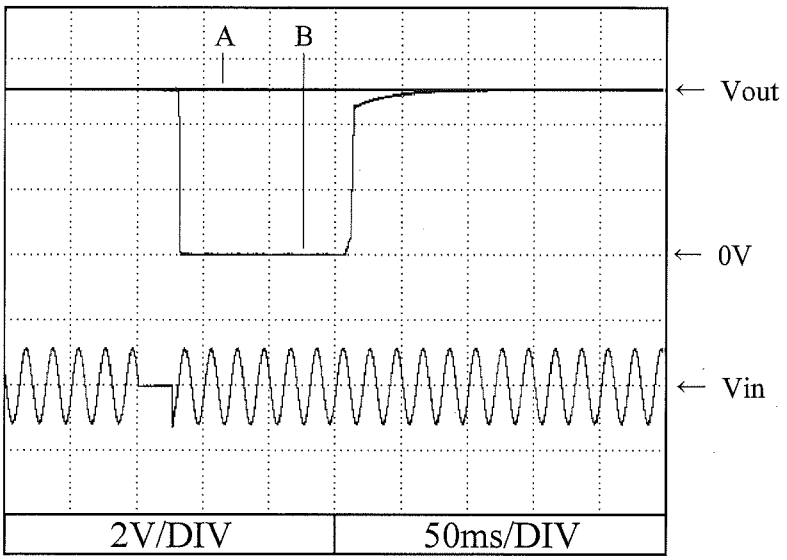
Response to brown out characteristics

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

5V

A = 26ms

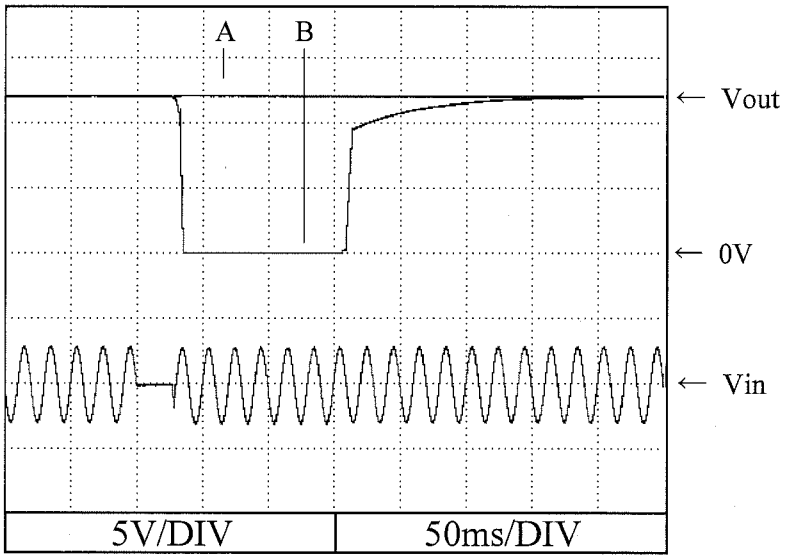
B = 27ms



12V

A = 27ms

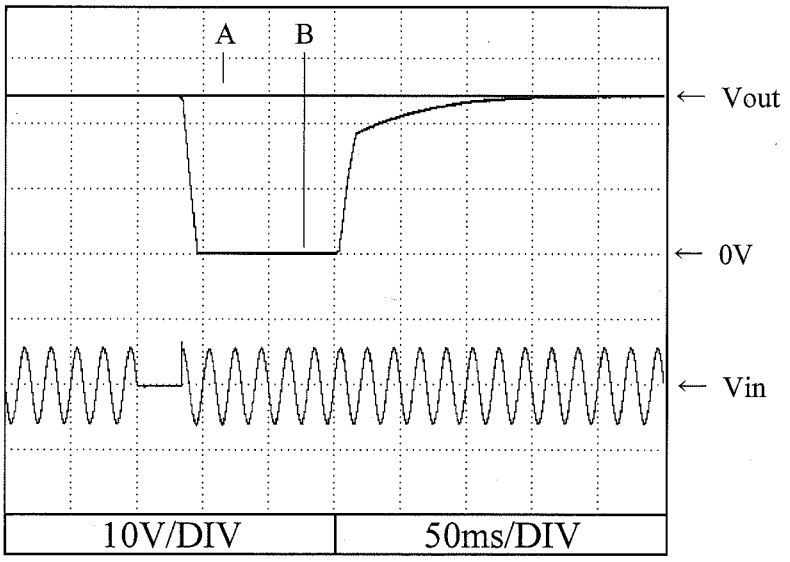
B = 28ms



24V

A = 34ms

B = 35ms

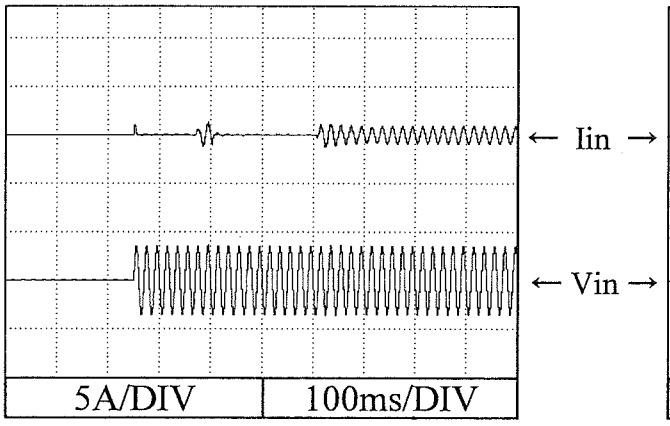


2.9 入力サージ電流（突入電流）波形
Inrush current waveform

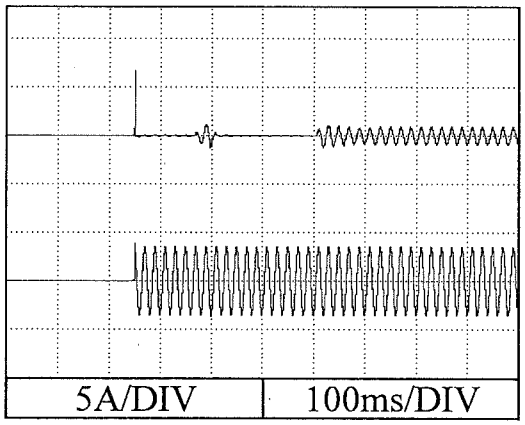
5V

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

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

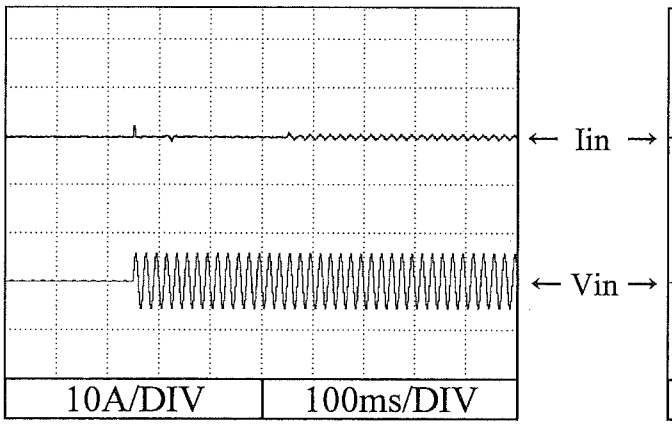


Switch on phase angle of input AC voltage
ϕ = 90°

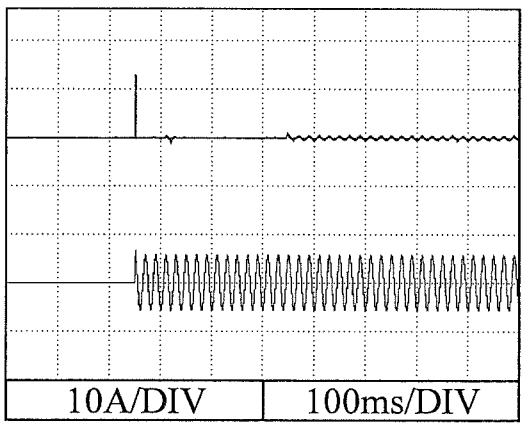


Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

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



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

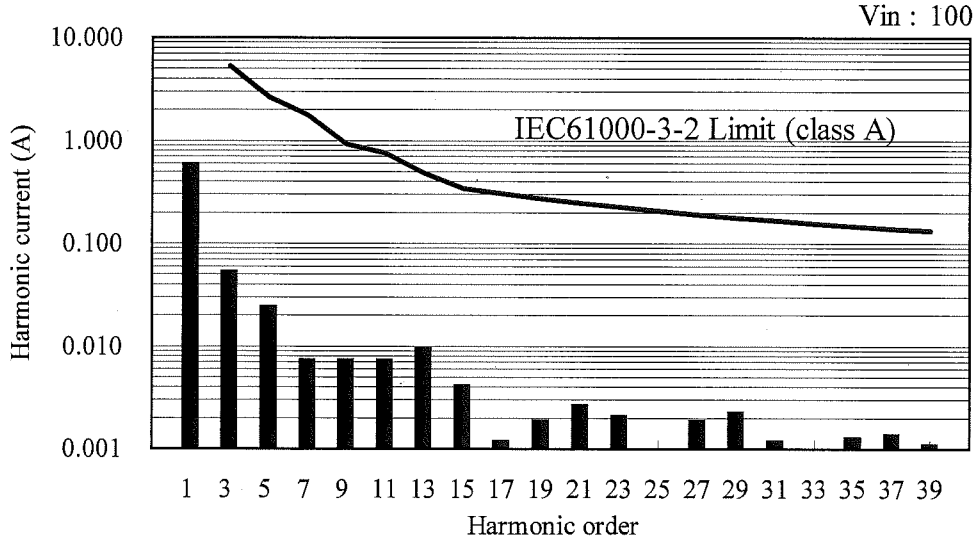


2. 10 高調波成分
Input current harmonics

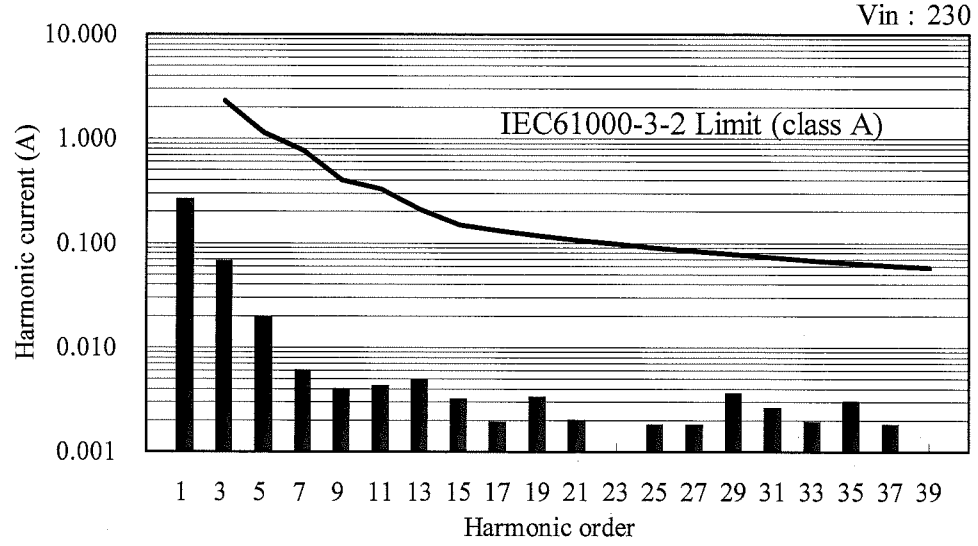
Conditions Iout : 100 %
Ta : 25 ℃

5V

Vin : 100 VAC

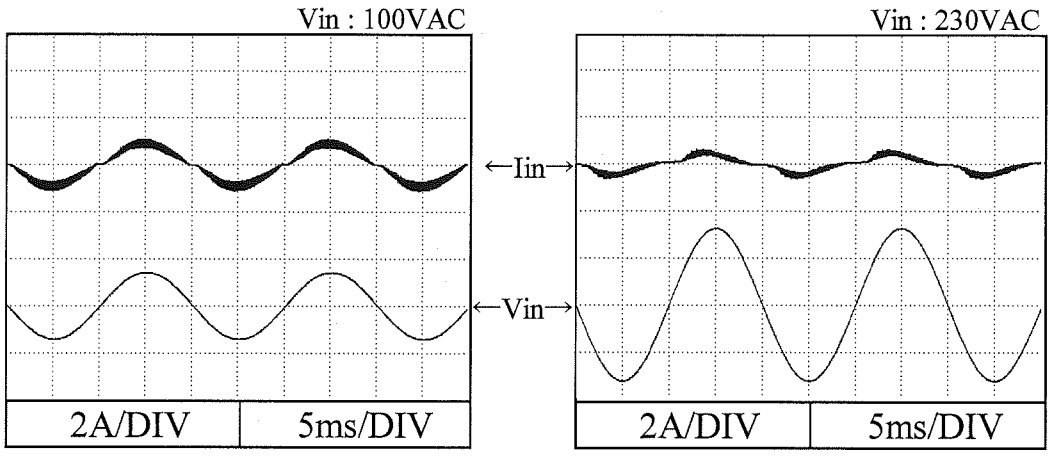


Vin : 230 VAC



2. 11 入力電流波形
Input current waveform

Conditions Iout : 100 %
Ta : 25 ℃

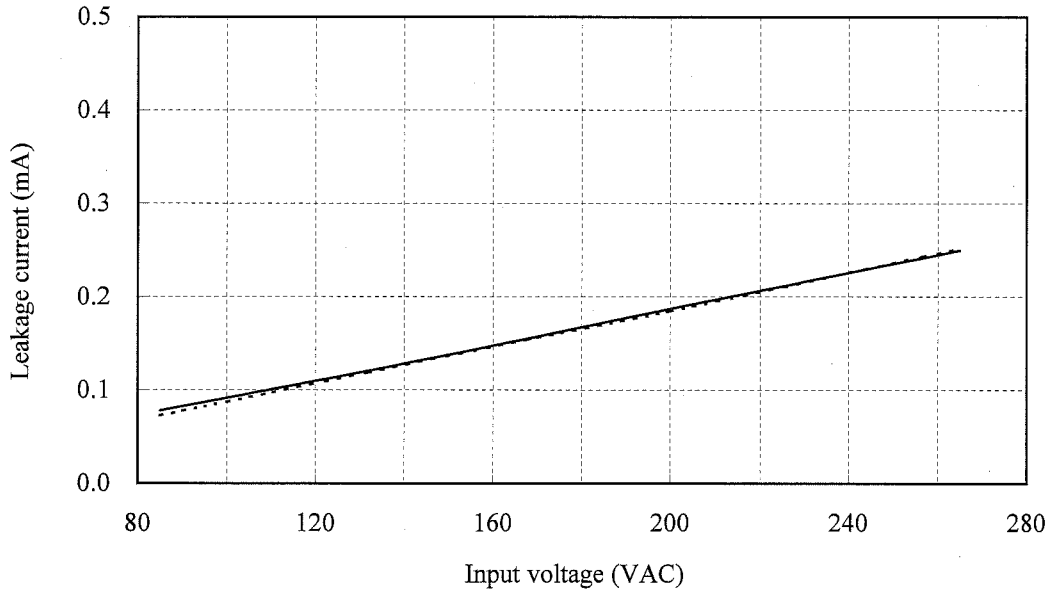


2. 12 リーク電流特性
Leakage current characteristics

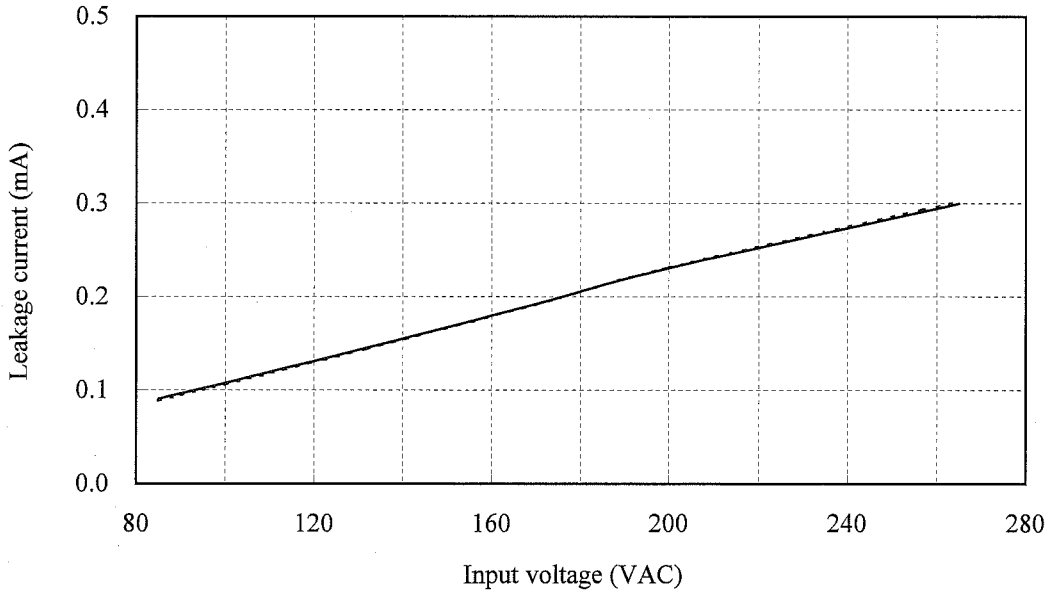
Conditions Iout : 0 % ------
100 % ——
Ta : 25 ℃
Equipment used : 3156 (HIOKI)

5V

f : 50 Hz



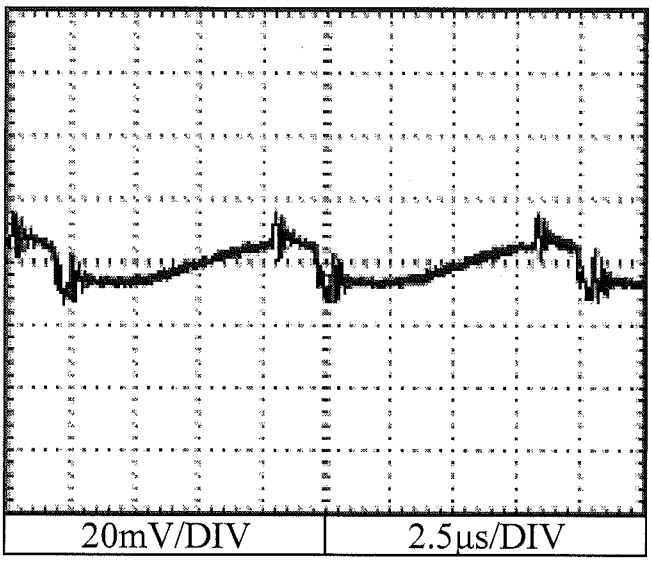
f : 60 Hz



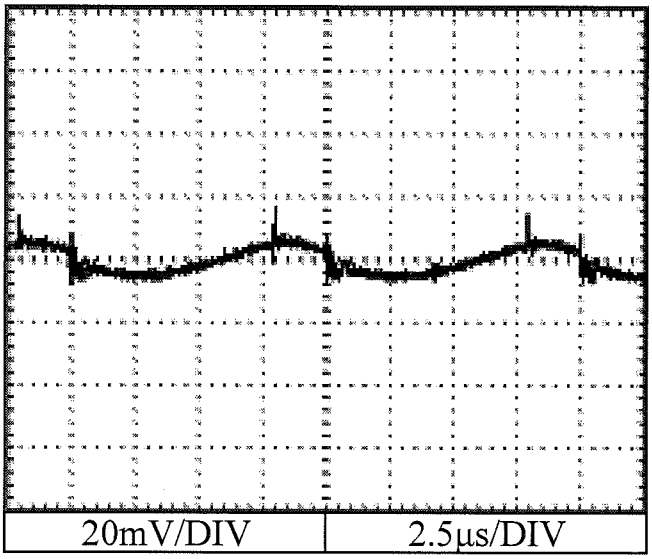
2.13 出力リップル、ノイズ波形
Output ripple and noise waveform

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

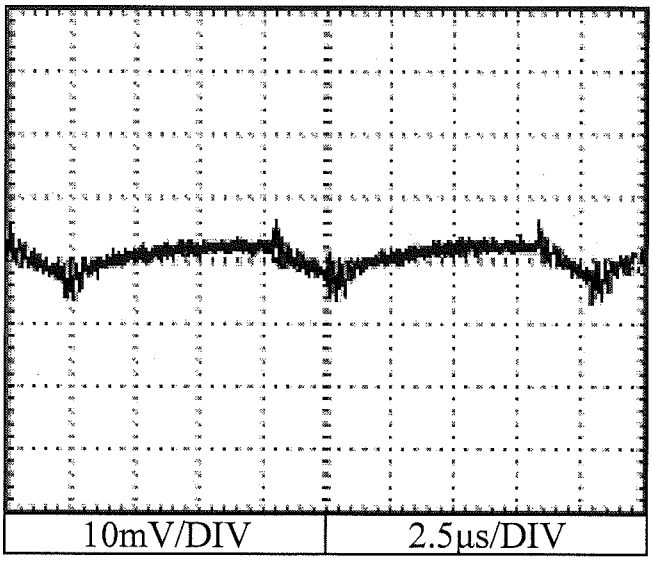
5V



12V



24V



2.14 ＥＭＩ特性

Electromagnetic interference characteristics

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

雑音端子電圧

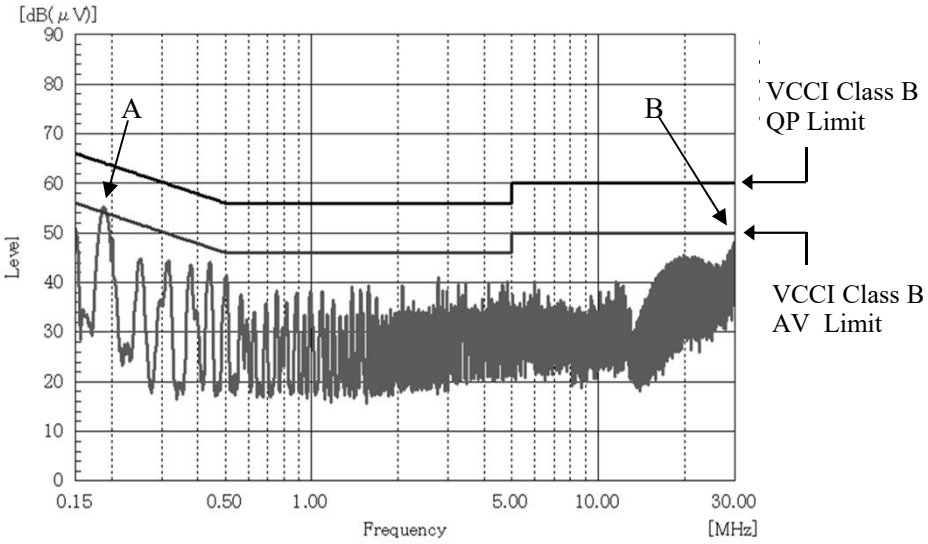
Conducted emission

5V

Ref. Data	Point A (190kHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	53.5
AV	54.0	47.5

Ref. Data	Point B (30MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	46.5
AV	50.0	43.2

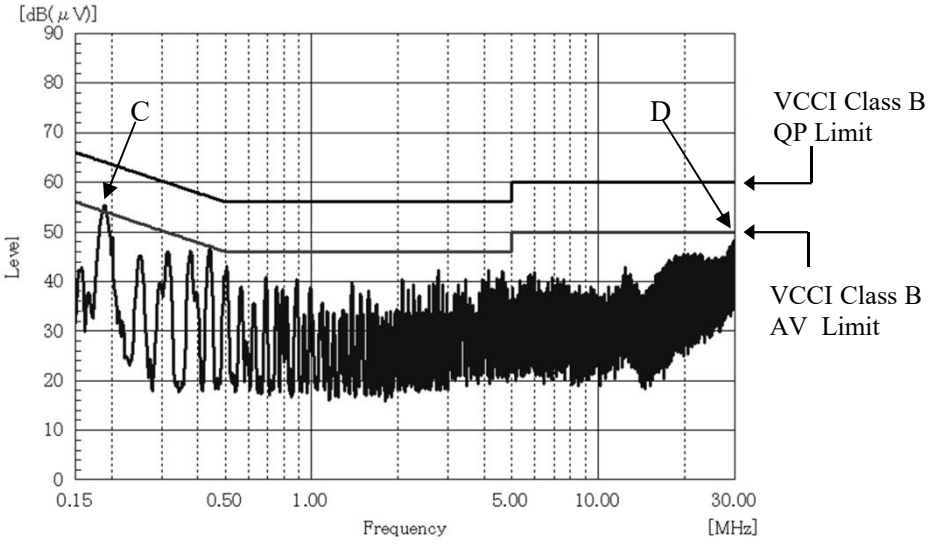
Phase : N



Ref. Data	Point C (187kHz) Limit (dBuV)	Measure (dBuV)
QP	64.2	52.6
AV	54.2	46.7

Ref. Data	Point D (30MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	46.7
AV	50.0	44.4

Phase : L



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

2.14 ＥＭＩ特性

Electromagnetic interference characteristics

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

雑音端子電圧

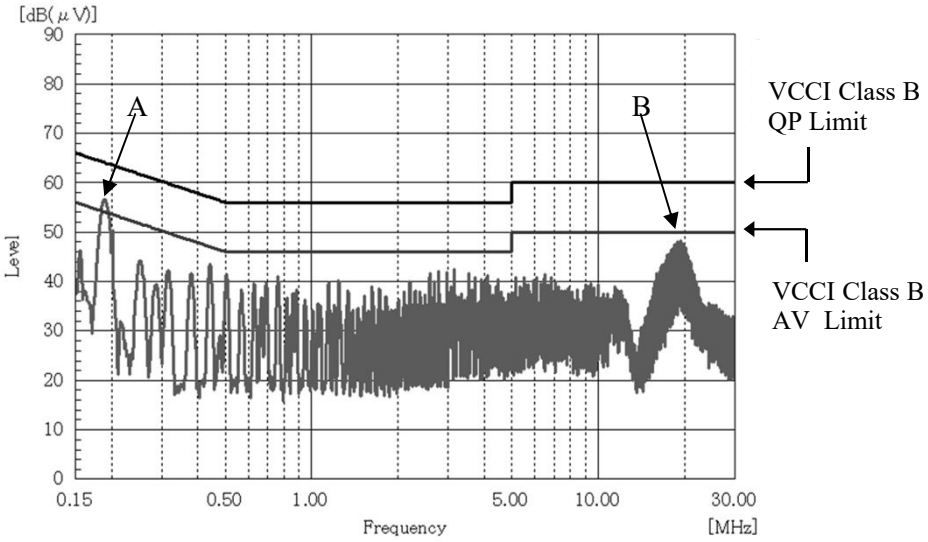
Conducted emission

12V

Ref. Data	Point A (190kHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	55.1
AV	54.0	49.5

Ref. Data	Point B (19MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	46.9
AV	50.0	43.9

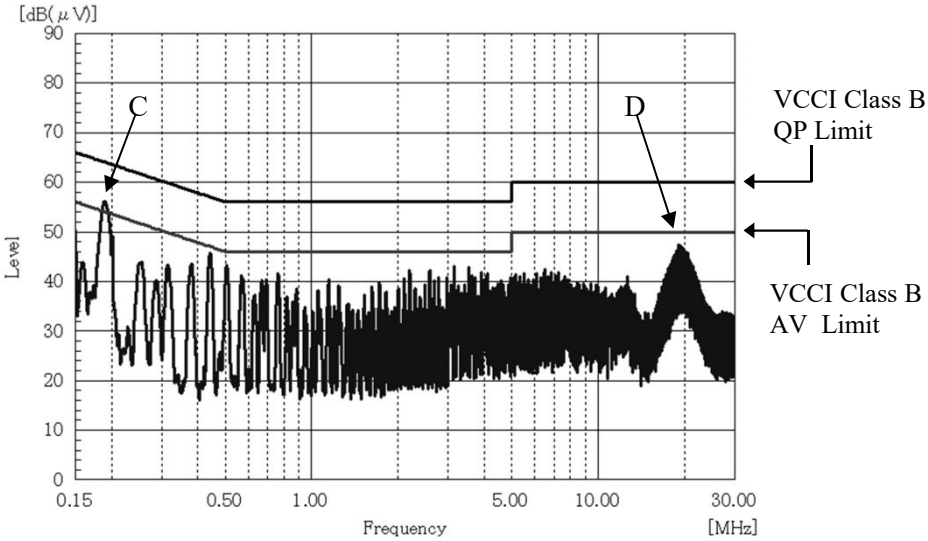
Phase : N



Ref. Data	Point C (191kHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	55.1
AV	54.0	49.7

Ref. Data	Point D (19MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	45.8
AV	50.0	44.1

Phase : L



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

2.14 ＥＭＩ特性

Electromagnetic interference characteristics

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

雑音端子電圧

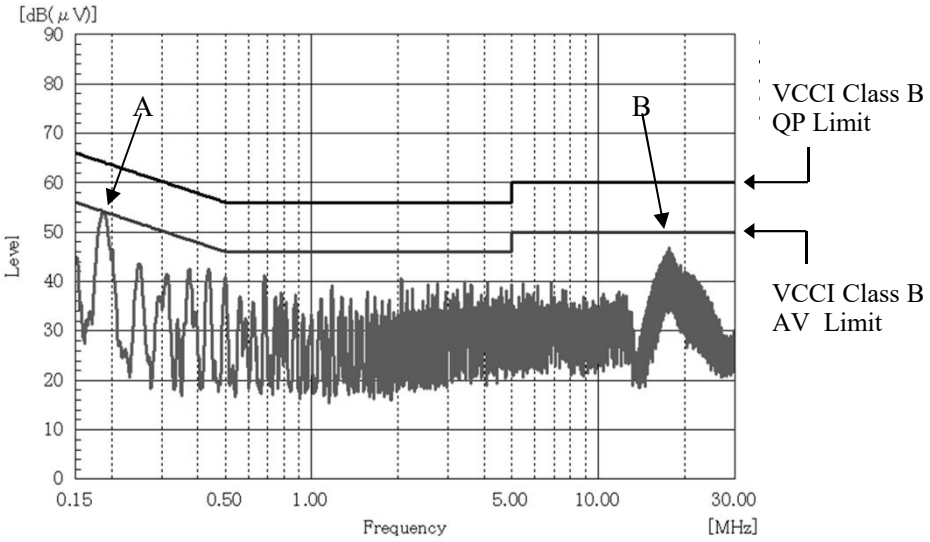
Conducted emission

24V

Ref. Data	Point A (186kHz) Limit (dBuV)	Measure (dBuV)
QP	64.2	52.4
AV	54.2	46.7

Ref. Data	Point B (18MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	44.7
AV	50.0	43.2

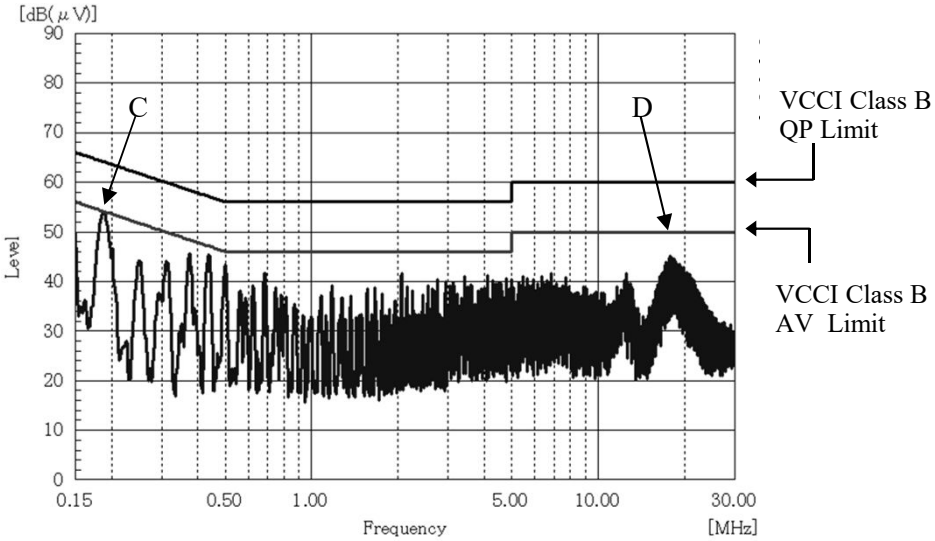
Phase : N



Ref. Data	Point C (187kHz) Limit (dBuV)	Measure (dBuV)
QP	64.1	52.2
AV	54.1	46.5

Ref. Data	Point D (18MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	43.9
AV	50.0	42.9

Phase : L



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

2. 14 ＥＭＩ特性

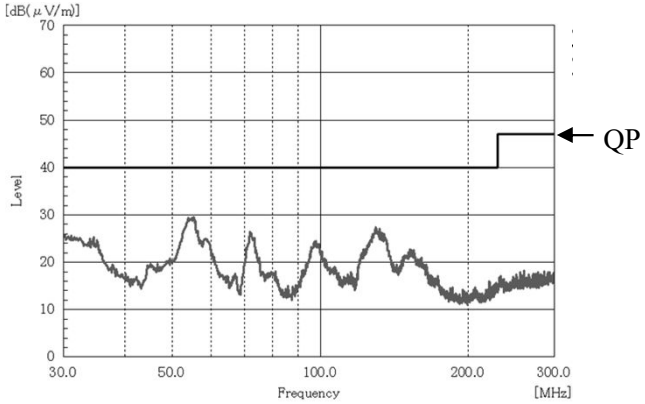
Electromagnetic interference characteristics

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

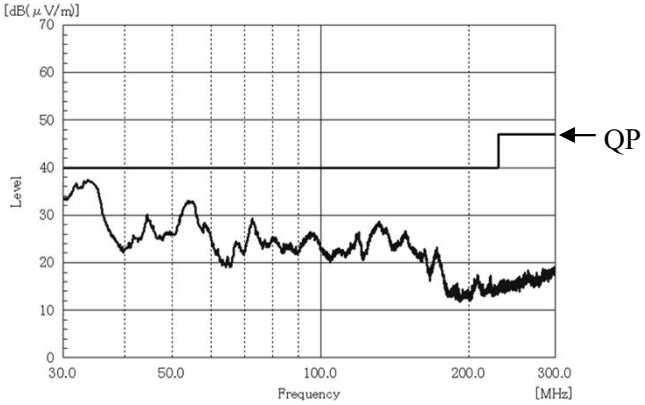
雑音電界強度
Radiated emission

5V

Horizontal

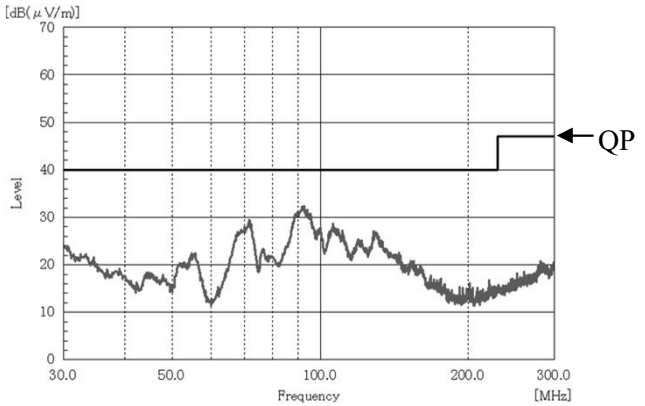


Vertical

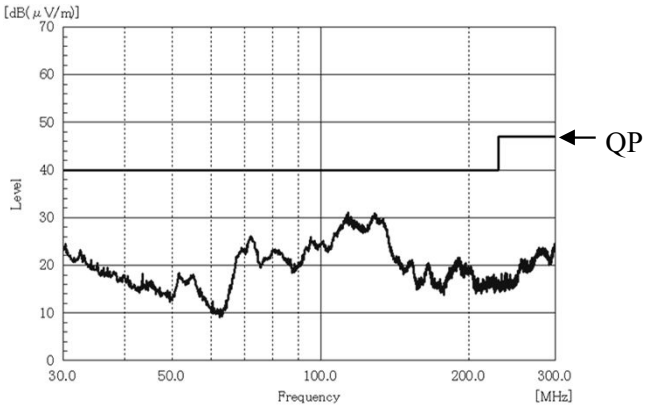


12V

Horizontal

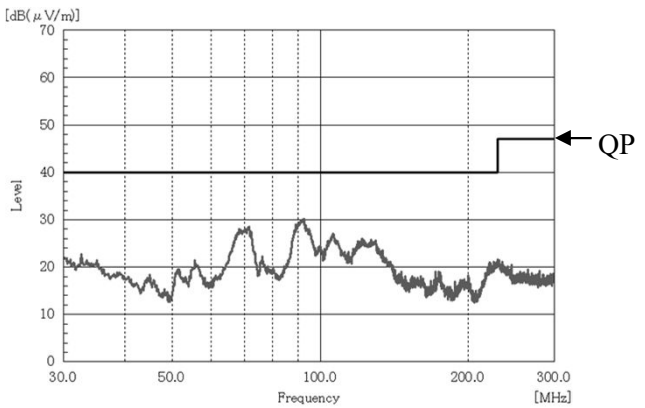


Vertical

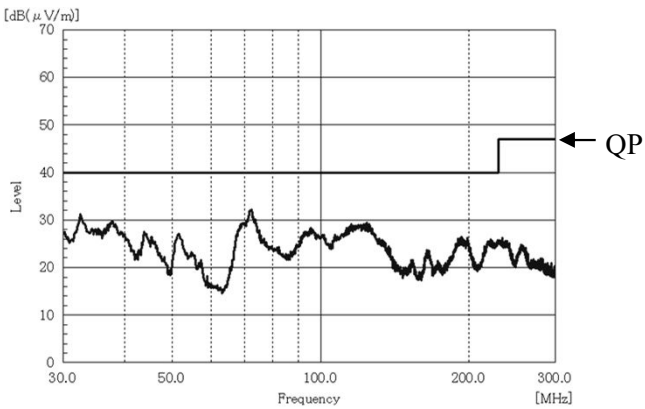


24V

Horizontal



Vertical



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

表示はピーク値
Indication is peak values.