DRB30-1

EVALUATION DATA

型式データ

DWG No. CA799-53-01		
APPD	CHK	DWG
26/July/13	Komatsu 26. Jul. '13	R. Ueda 26, Jul, '13

INDEX

使用記号 Terminology used

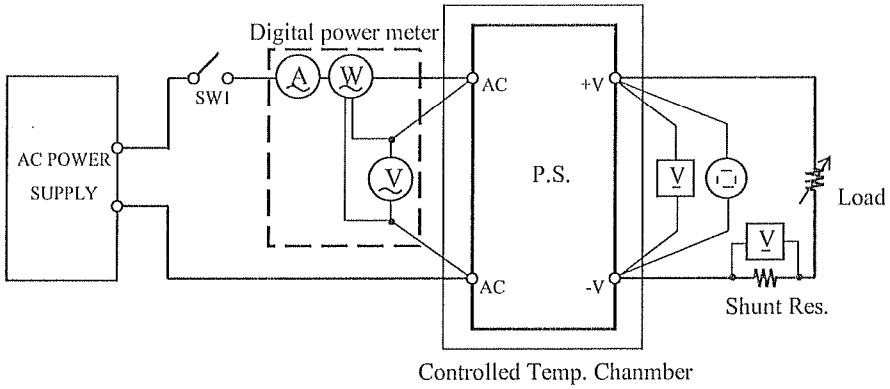
	定義	Definition	
Vin	.....	入力電圧	Input voltage
Vout	.....	出力電圧	Output voltage
Iin	.....	入力電流	Input current
Iout	.....	出力電流	Output current
Ta	.....	周囲温度	Ambient temperature
f	.....	周波数	Frequency

1. 測定方法　　**Evaluation Method**

1. 1　測定回路　　Circuit used for determination

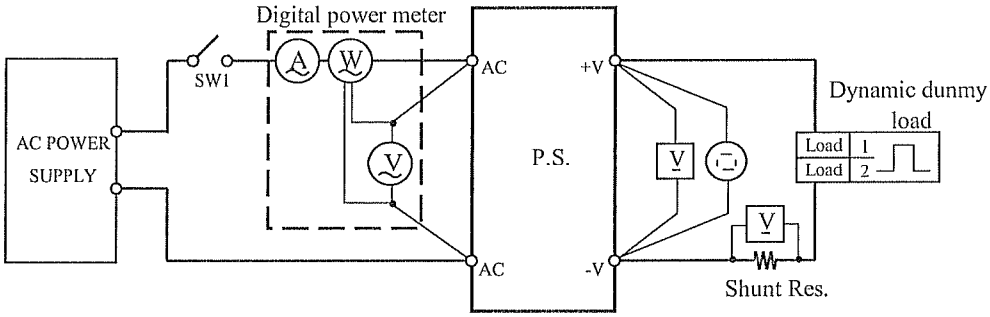
測定回路1 Circuit 1 used for determination

- 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



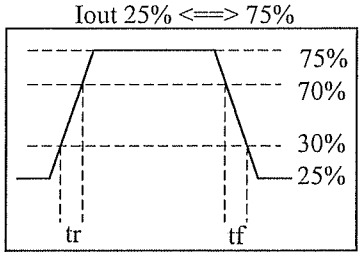
測定回路2 Circuit 2 used for determination

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



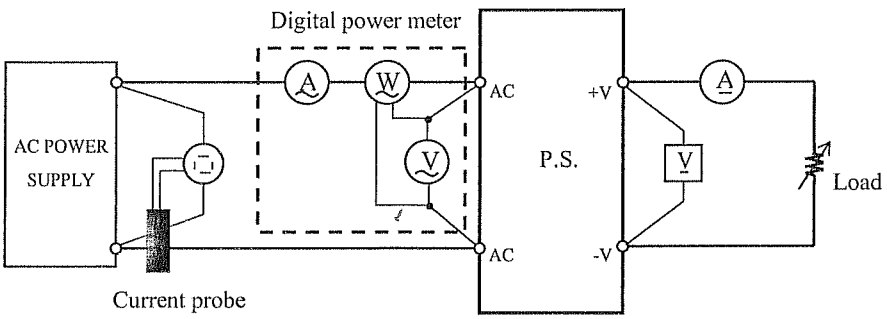
Output current waveform

Iout 25% <==> 75%



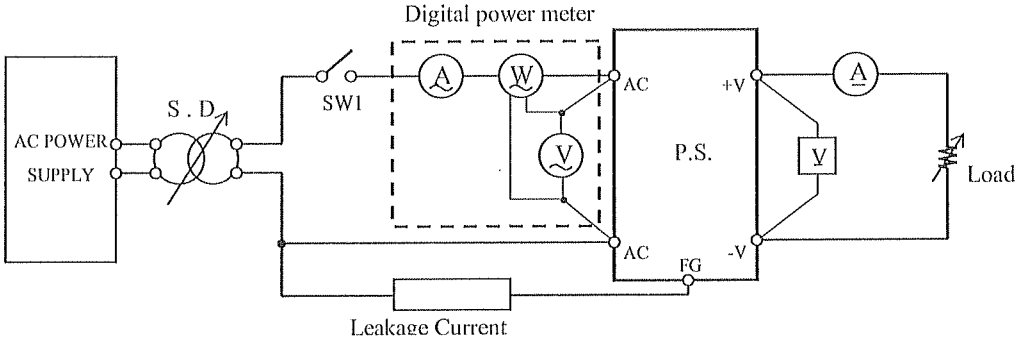
測定回路3 Circuit 3 used for determination

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



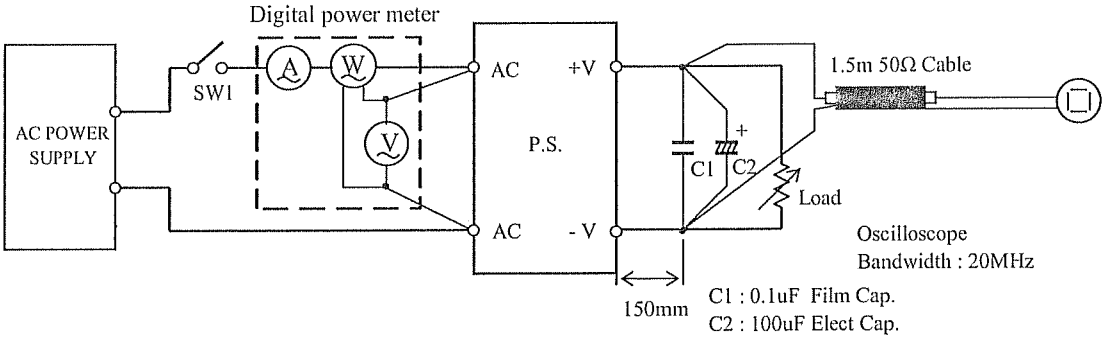
測定回路4 Circuit 4 used for determination

・リーク電流特性　　Leakage current characteristics



測定回路5 Circuit 5 used for determination

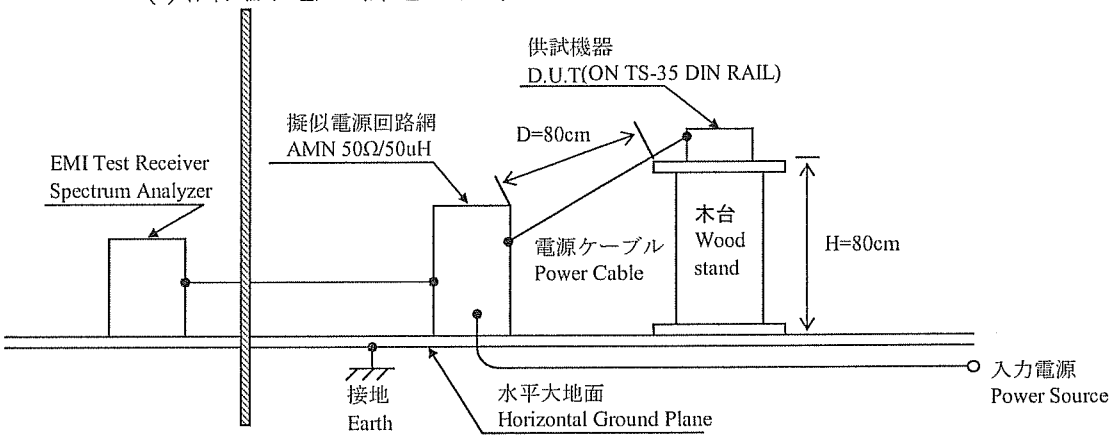
・出力リップル、ノイズ波形　　Output ripple and noise waveform



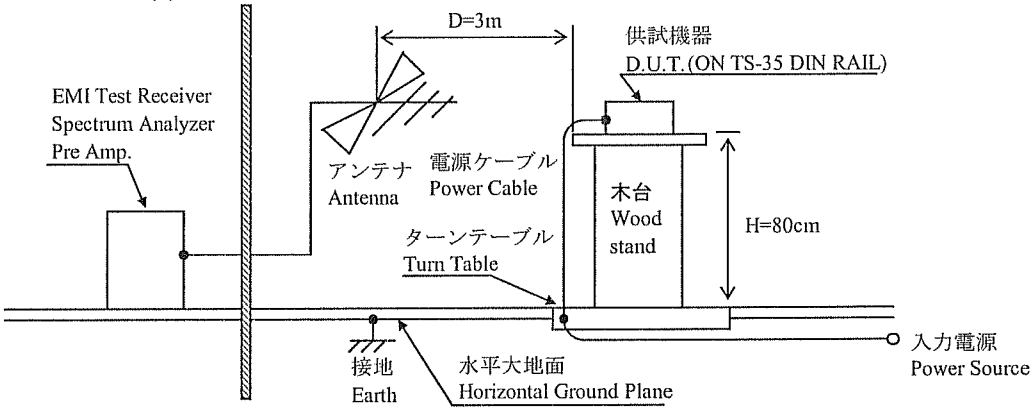
測定構成　Configuration used for determination

・ＥＭＩ特性　　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.	DL2054
2	DIGITAL MULTIMETER	AGILENT	34970A
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
4	CURRENT PROBE	YOKOGAWA ELECT.	701933
5	DYNAMIC DUMMY LOAD	CHROMA	63030/63610
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
7	AC SOURCE	KIKUSUI	PCR2000L
8	LEAKAGE CURRENT METER	SIMPSON	228
9	CONTROLLED TEMP. CHAMBER	TABAI-ESPEC	SH661
10	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI-03
11	LISN	ROHDE & SCHWARZ	ENV216
12	BICONICAL ANTENNA	EMCO	63208

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

12V
(DRB30-12-1)

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

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	12.057V	12.056V	12.056V	12.056V	1mV	0.008%
50%	12.042V	12.042V	12.041V	12.041V	1mV	0.008%
100%	12.026V	12.026V	12.026V	12.025V	1mV	0.008%
load regulation	31mV	30mV	30mV	31mV		
	0.258%	0.250%	0.250%	0.258%		

2. Temperature drift　Conditions　Vin : 115 VAC
Iout : 100 %

Ta	-10℃	+25℃	+55℃	temperature stability	
Vout	12.026V	12.033V	12.009V	24mV	0.200%

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

Start up voltage (Vin)	61.0VAC
Drop out voltage (Vin)	60.0VAC

24V
(DRB30-24-1)

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

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	24.020V	24.019V	24.022V	24.018V	4mV	0.017%
50%	23.993V	23.994V	23.996V	23.997V	4mV	0.017%
100%	23.961V	23.962V	23.960V	23.959V	3mV	0.013%
load regulation	59mV	57mV	62mV	59mV		
	0.246%	0.237%	0.258%	0.246%		

2. Temperature drift　Conditions　Vin : 115 VAC
Iout : 100 %

Ta	-10℃	+25℃	+55℃	temperature stability	
Vout	23.956V	23.962V	23.933V	29mV	0.121%

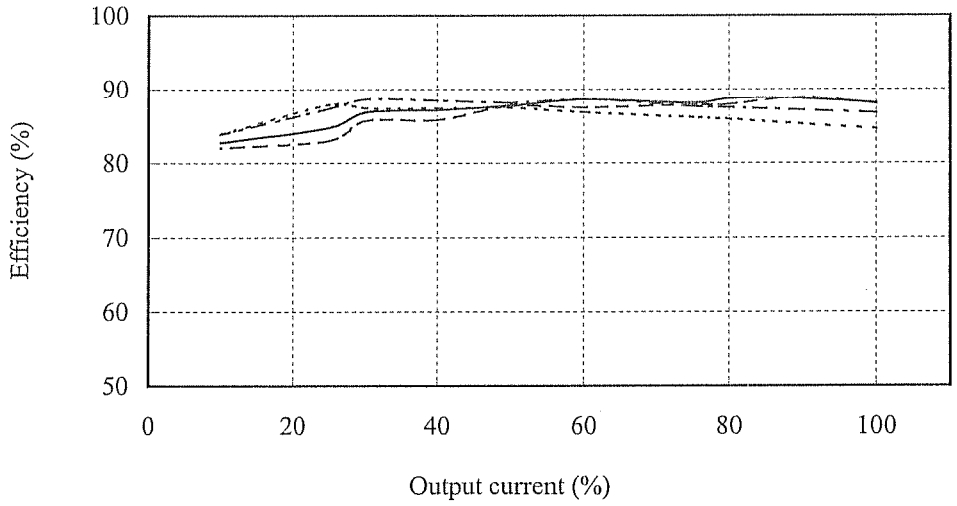
3. Start up voltage and Drop out voltage　Conditions　Ta :　25 ℃
Iout : 100 %

Start up voltage (Vin)	50.0VAC
Drop out voltage (Vin)	48.6VAC

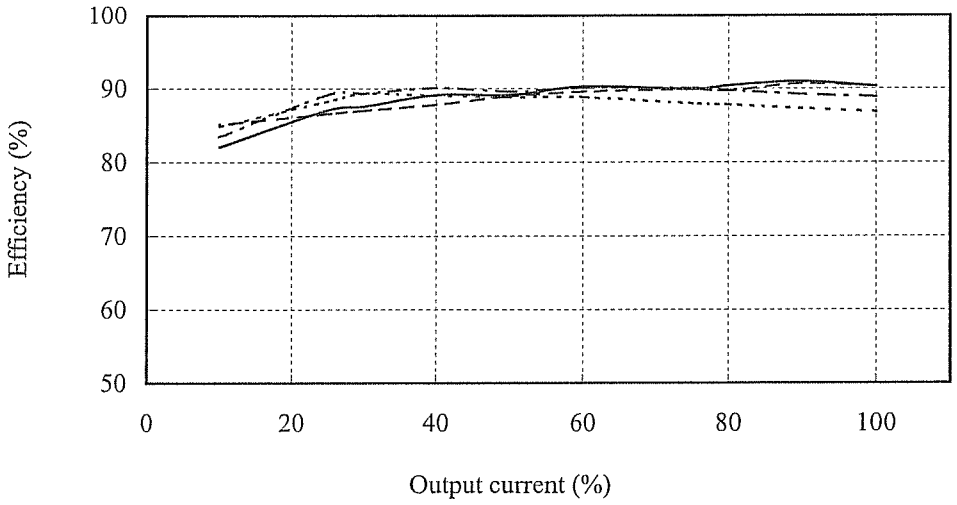
(2) 効率対出力電流
Efficiency vs. Output current

Conditions Vin : 85 VAC ------
: 115 VAC -·-·-
: 230 VAC ———
: 265 VAC – – – –
Ta : 25 ℃

12V
(DRB30-12-1)



24V
(DRB30-24-1)



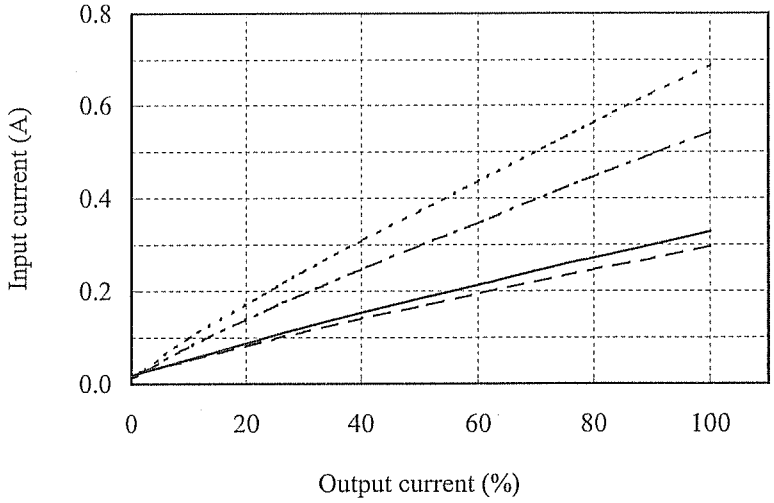
(3) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 85 VAC ------
: 115 VAC -·-·-
: 230 VAC ———
: 265 VAC – – – –
Ta : 25 ℃

12V
(DRB30-12-1)

Io: 0%

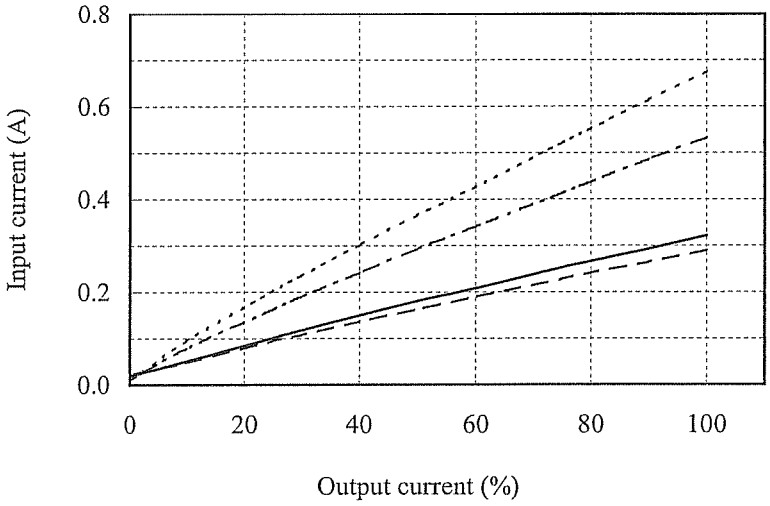
Vin	Input current
85VAC	0.010A
100VAC	0.011A
200VAC	0.019A
265VAC	0.022A



24V
(DRB30-24-1)

Io: 0%

Vin	Input current
85VAC	0.009A
100VAC	0.011A
200VAC	0.020A
265VAC	0.022A



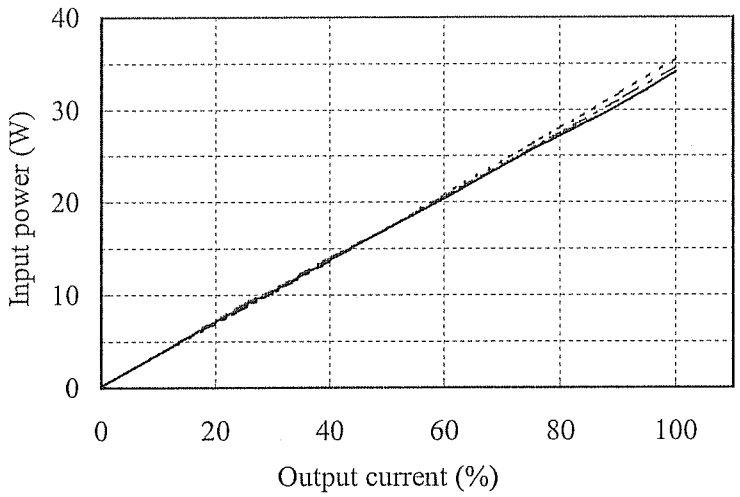
(4) 入力電力対出力電流
Input power vs. Output current

Conditions Vin : 85 VAC - - - - -
: 115 VAC —·—·
: 230 VAC ——
: 265 VAC – – –
Ta : 25 ℃

12V
(DRB30-12-1)

Io: 0%

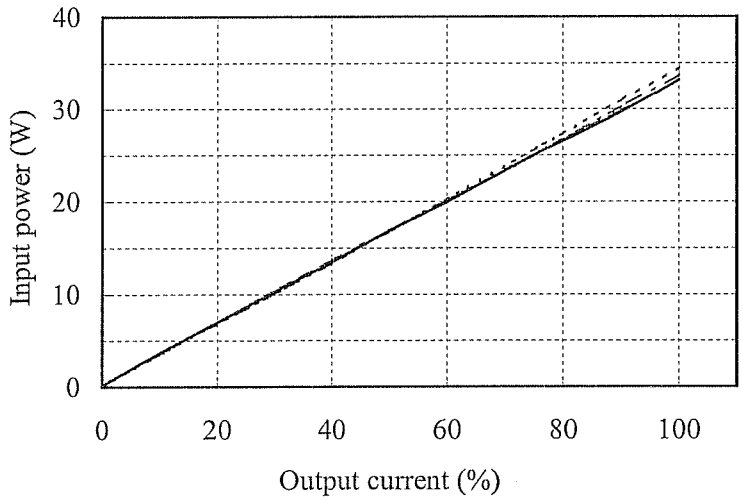
Vin	Input power
115VAC	0.13W
230VAC	0.17W



24V
(DRB30-24-1)

Io: 0%

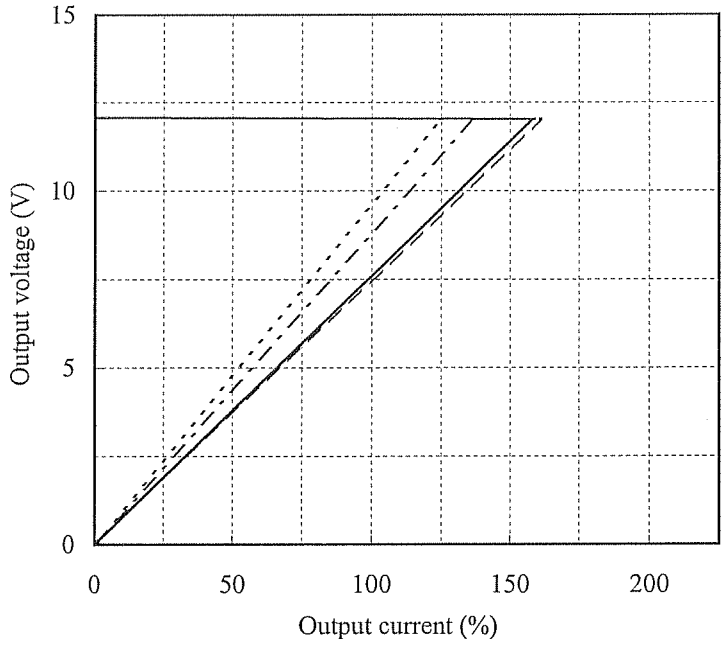
Vin	Input power
115VAC	0.13W
230VAC	0.15W



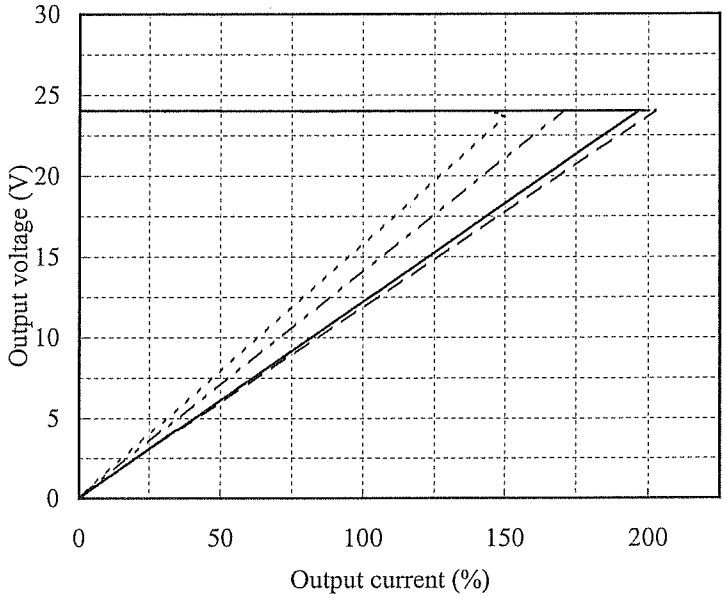
2. 2 過電流保護特性
Over current protection (OCP) characteristics

Conditions Vin : 85 VAC ------
115 VAC -·-·-·-
230 VAC ——
265 VAC – – – –
Ta : 25 ℃

12V
(DRB30-12-1)



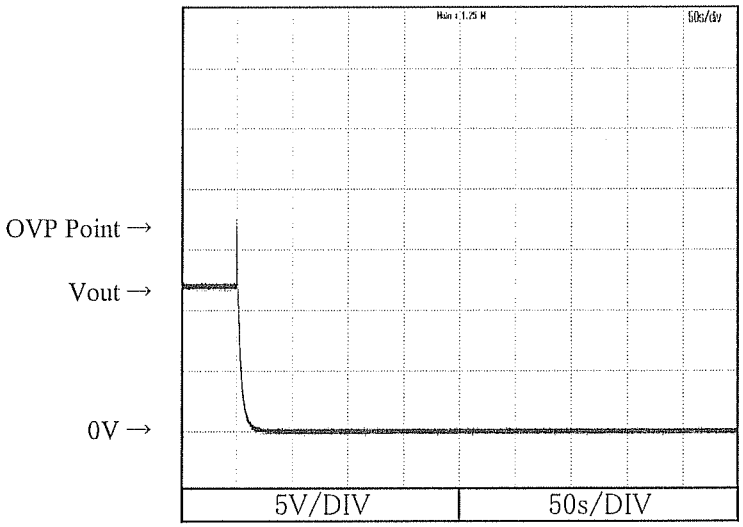
24V
(DRB30-24-1)



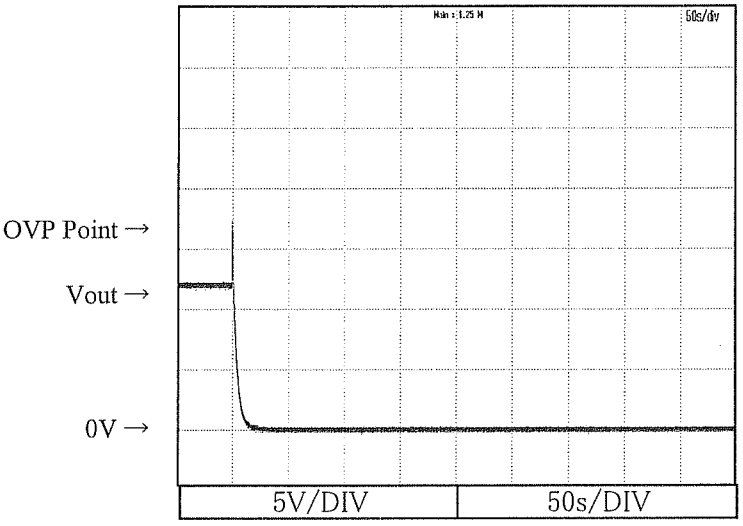
2. 3 過電圧保護特性
Over voltage protection (OVP) characteristics

Conditions Vin : 115 VAC
Iout : 0 %
Ta : 25 ℃

12V
(DRB30-12-1)



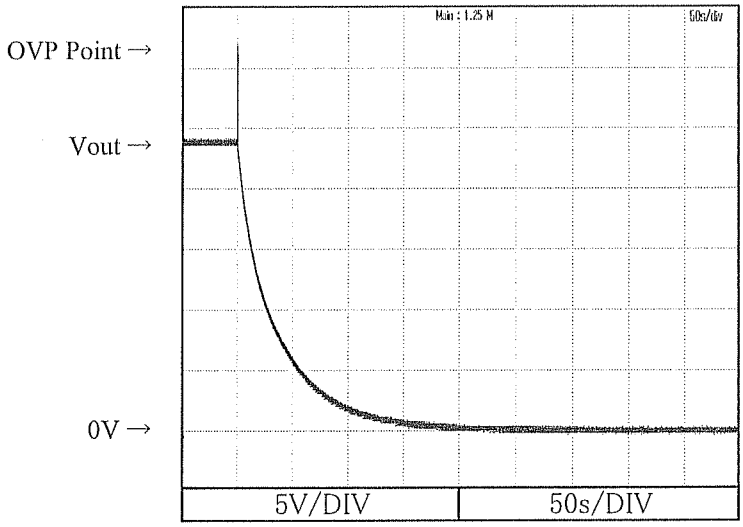
Conditions Vin : 230 VAC
Iout : 0 %
Ta : 25 ℃



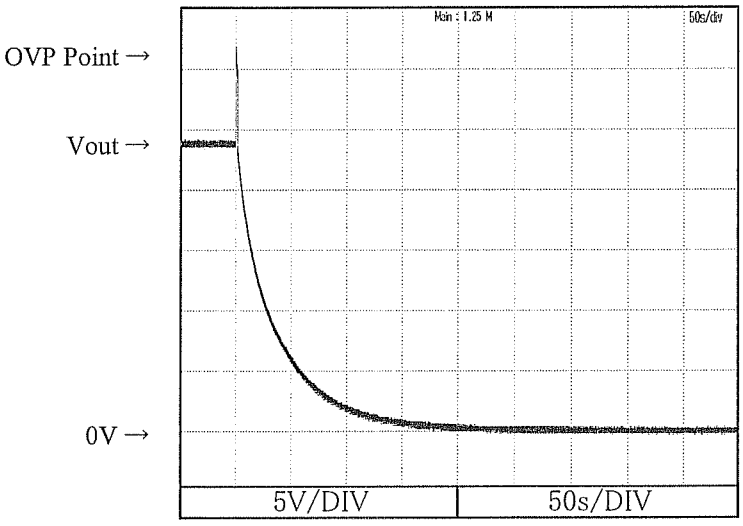
2. 3 過電圧保護特性
Over voltage protection (OVP) characteristics

Conditions Vin : 115 VAC
Iout : 0 %
Ta : 25 ℃

24V
(DRB30-24-1)



Conditions Vin : 230 VAC
Iout : 0 %
Ta : 25 ℃

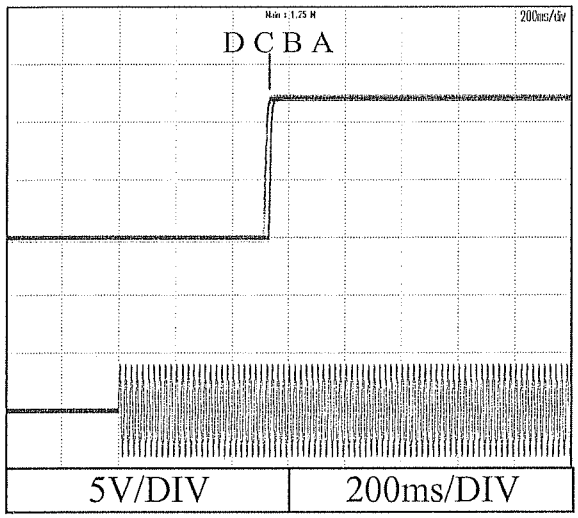


2.4 出力立ち上がり特性
Output rise characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Ta : 25 ℃

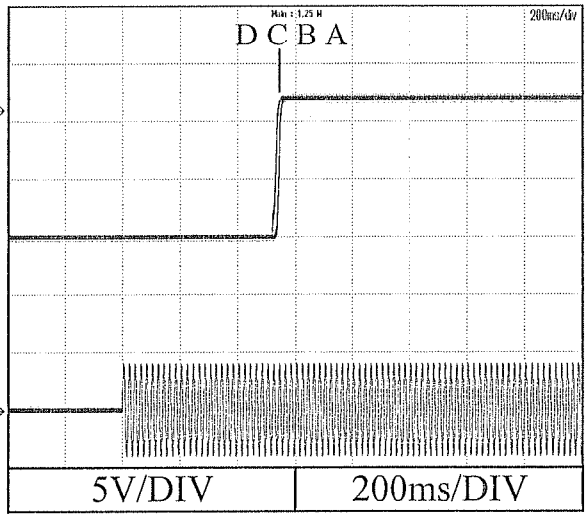
12V
(DR30-12-1)

Iout : 0%



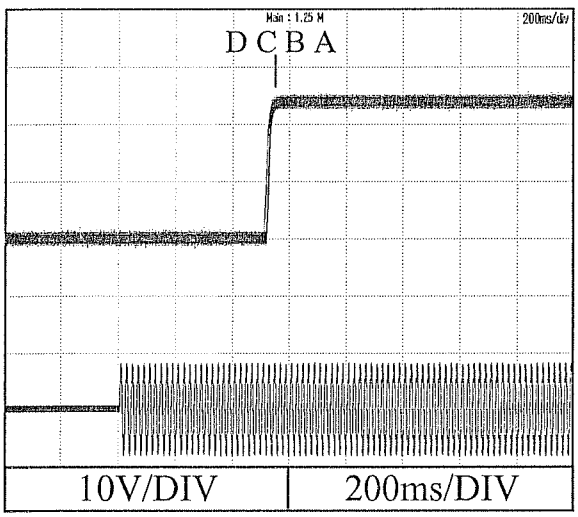
← Vout →
← 0V →
← Vin →

Iout : 100%



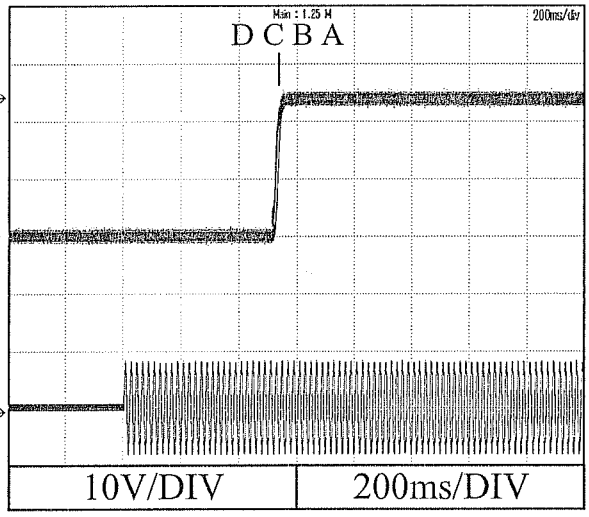
24V
(DRB30-24-1)

Iout : 0%



← Vout →
← 0V →
← Vin →

Iout : 100%

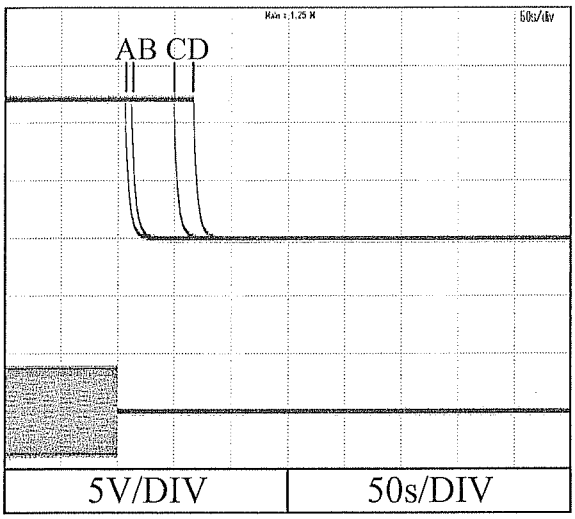


2.5 出力立ち下がり特性
Output fall characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Ta : 25 ℃

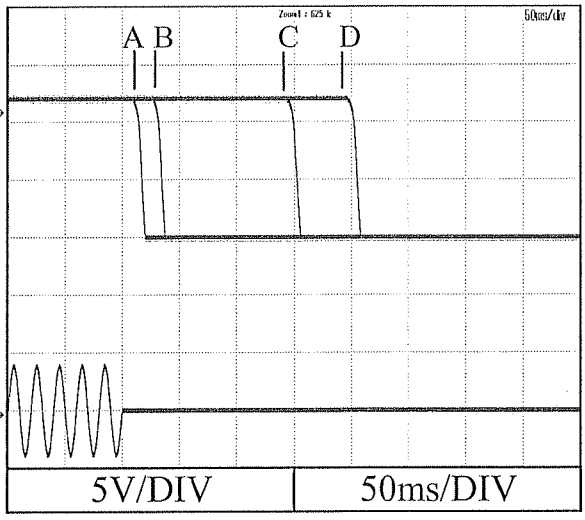
12V
(DRB30-12-1)

Iout : 0%



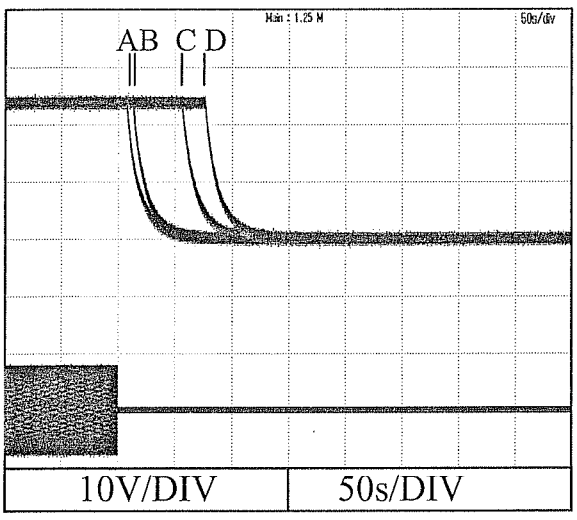
← Vout →
← 0V →
← Vin →

Iout : 100%



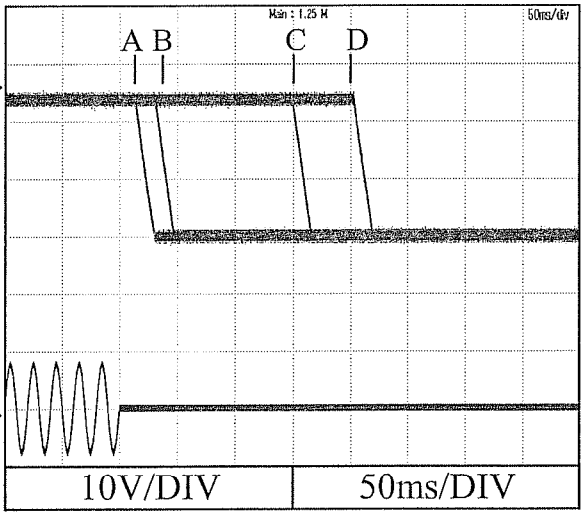
24V
(DRB30-24-1)

Iout : 0%



← Vout →
← 0V →
← Vin →

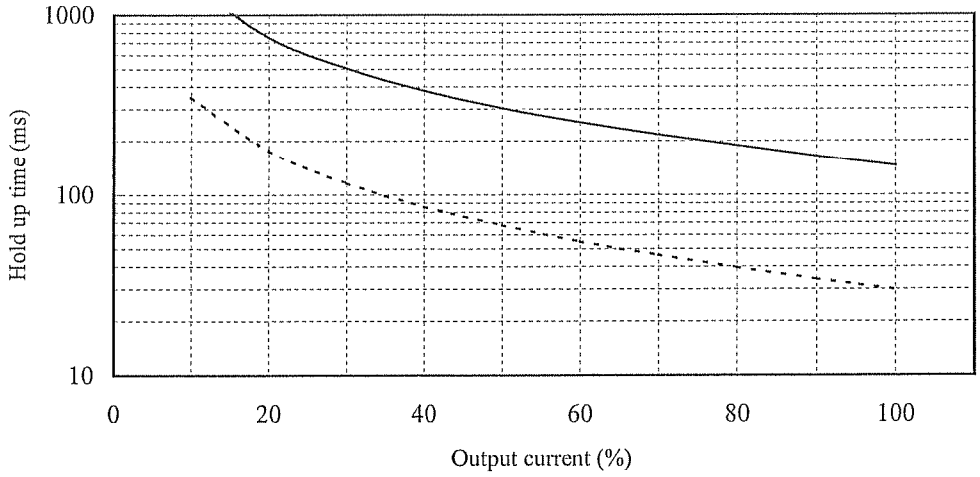
Iout : 100%



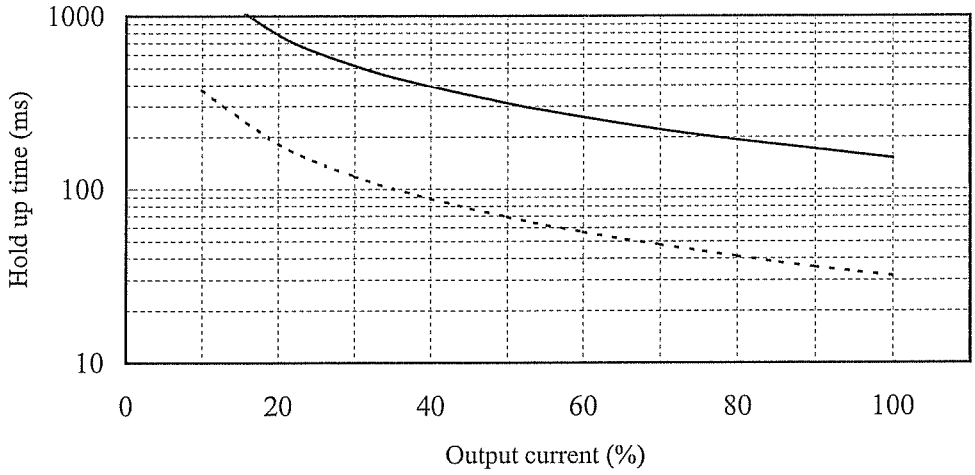
2. 6 出力保持時間特性
Hold up time characteristics

Conditions Vin : 115 VAC ------
230 VAC ———
Ta : 25 ℃

12V
(DRB30-12-1)



24V
(DRB30-24-1)

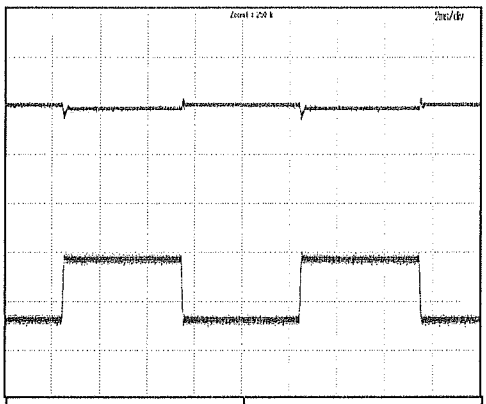


2. 7 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 115 VAC
Iout : 25 % ↔ 75 %
(tr = tf = 75us)
Ta : 25 ℃

12V (DRB30-12-1)

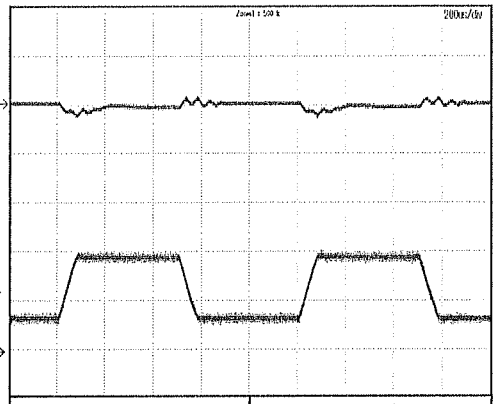
f = 100Hz



500mV/DIV	2ms/DIV
+0.75%	-1.17%

← Vout →
← Iout →
← Iout:0% →

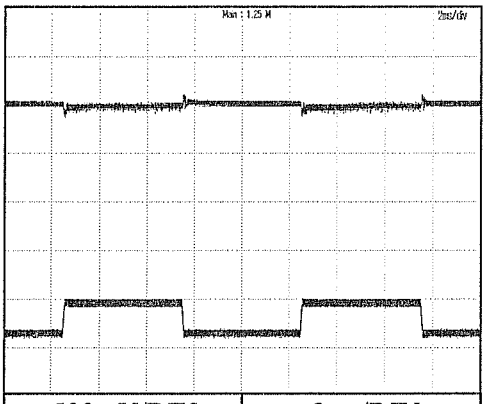
f = 1kHz



500mV/DIV	200 μ s/DIV
+0.83%	-1.17%

24V (DRB30-24-1)

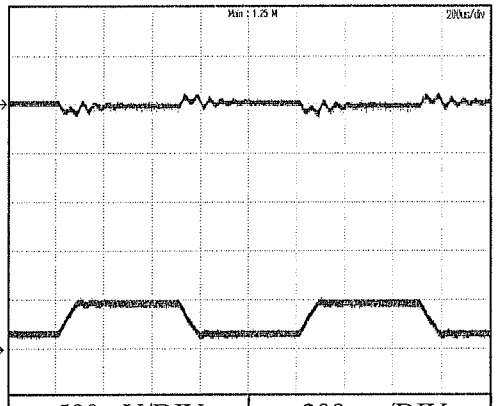
f = 100Hz



500mV/DIV	2ms/DIV
+0.42%	-0.58%

← Vout →
← Iout →
← Iout:0% →

f = 1kHz



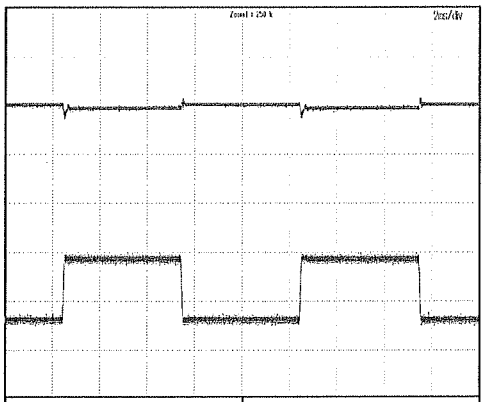
500mV/DIV	200 μ s/DIV
+0.50%	-0.58%

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

Conditions Vin : 230 VAC
Iout : 25 % ⇔ 75 %
(tr = tf = 75us)
Ta : 25 ℃

12V (DRB30-12-1)

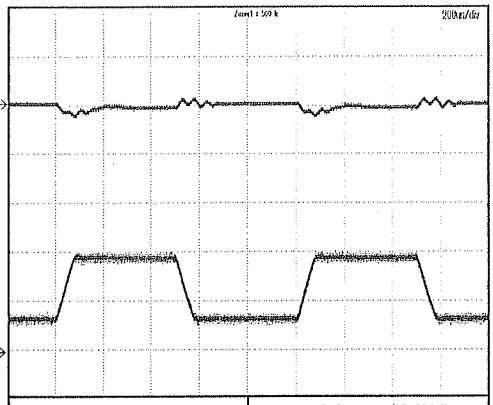
f = 100Hz



500mV/DIV	2ms/DIV
+0.75%	-1.17%

← Vout →
← Iout →
← Iout:0% →

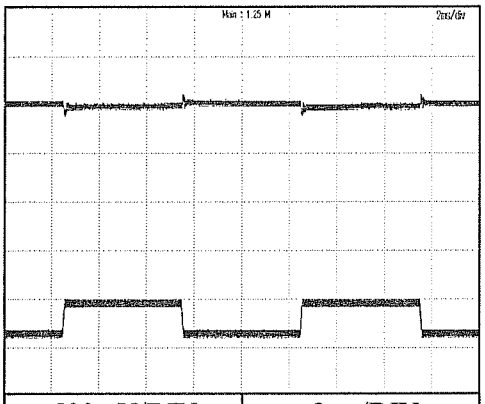
f = 1kHz



500mV/DIV	200 μ s/DIV
+0.83%	-1.00%

24V (DRB30-24-1)

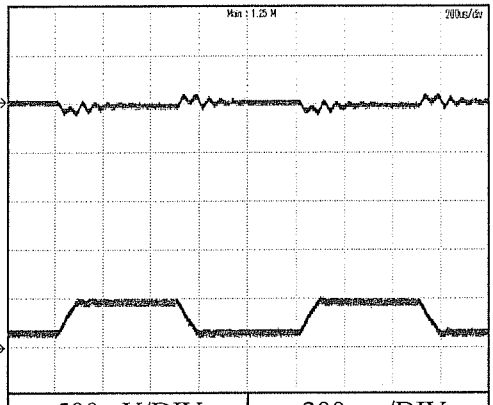
f = 100Hz



500mV/DIV	2ms/DIV
+0.50%	-0.50%

← Vout →
← Iout →
← Iout:0% →

f = 1kHz

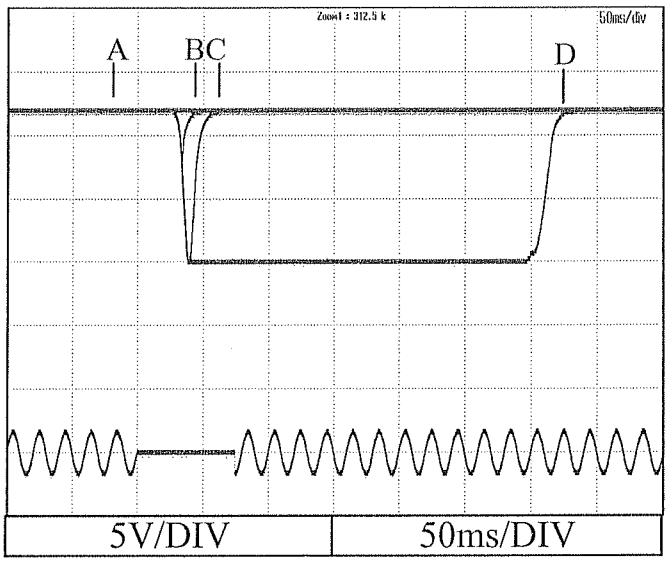


500mV/DIV	200 μ s/DIV
+0.42%	-0.58%

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

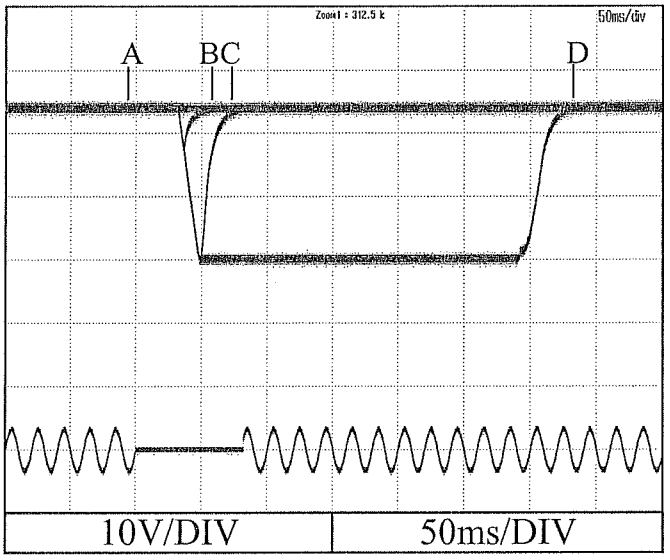
Conditions Vin : 115 VAC
Iout : 100 %
Ta : 25 ℃

12V
(DRB30-12-1)



A = 26ms
B = 33ms
C = 39ms
D = 75ms

24V
(DRB30-24-1)



A = 31ms
B = 36ms
C = 49ms
D = 82ms

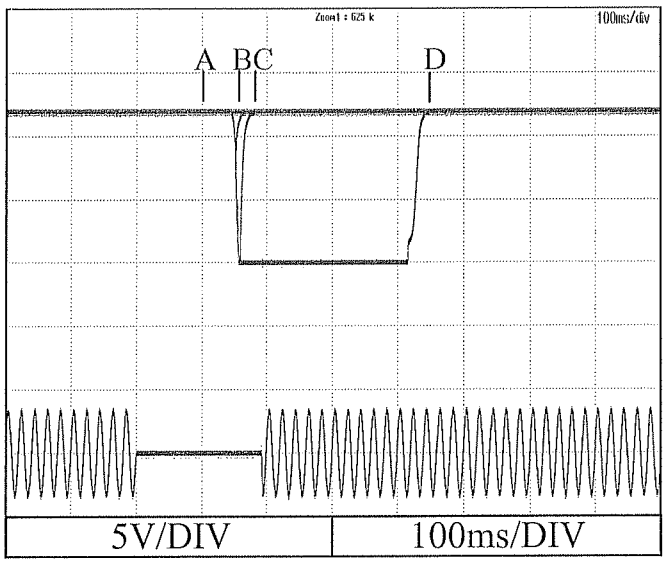
2. 8 入力電圧瞬停特性

Response to brown out characteristics

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

12V

(DRB30-12-1)



A = 146ms

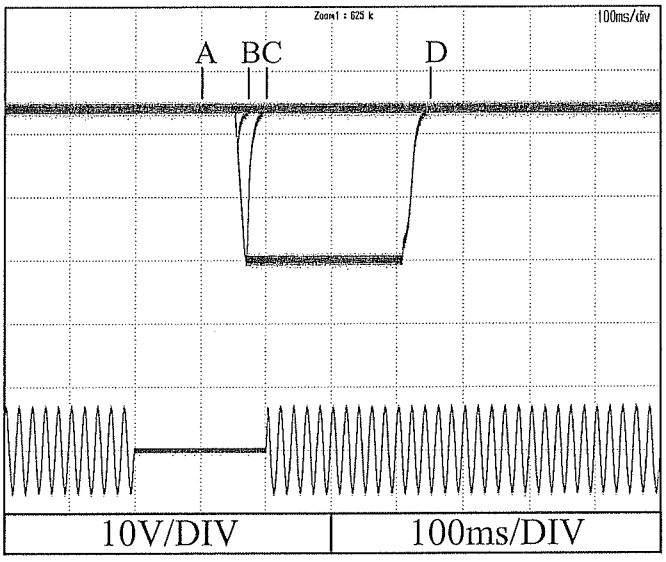
B = 152ms

C =158ms

D =193ms

24V

(DRB30-24-1)



A = 154ms

B = 158ms

C = 172ms

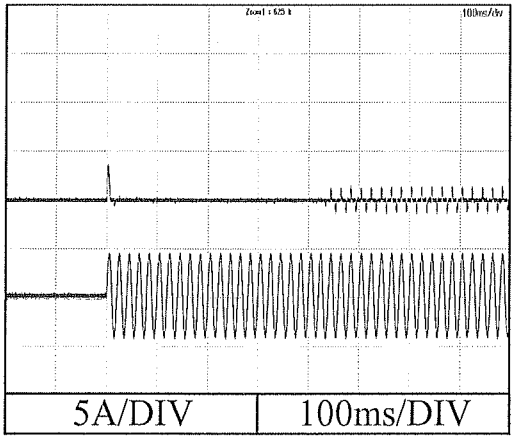
D = 203ms

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

12V
(DRB30-12-1)

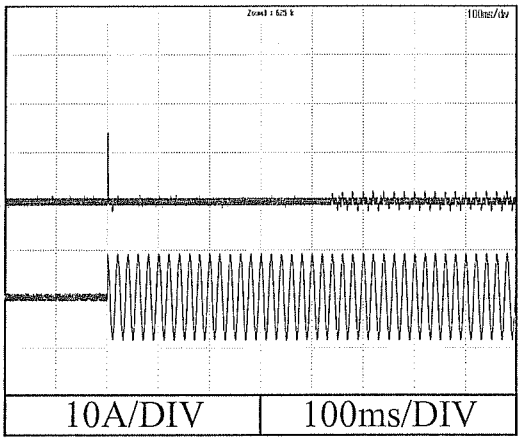
Conditions Vin : 115 VAC
Iout : 100 %
Ta : 25 ℃

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



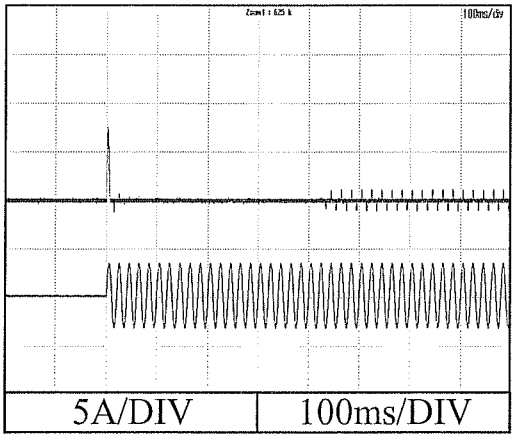
← Iin →
← Vin →

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



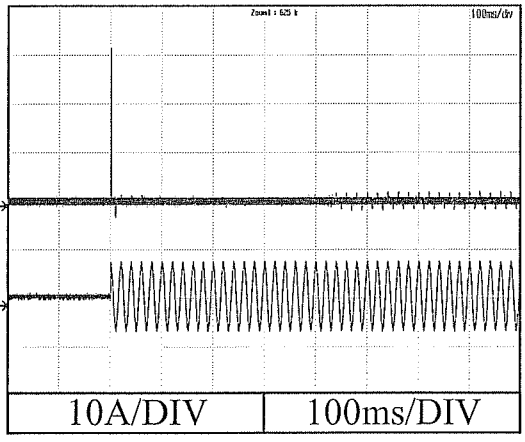
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

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



← Iin →
← Vin →

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

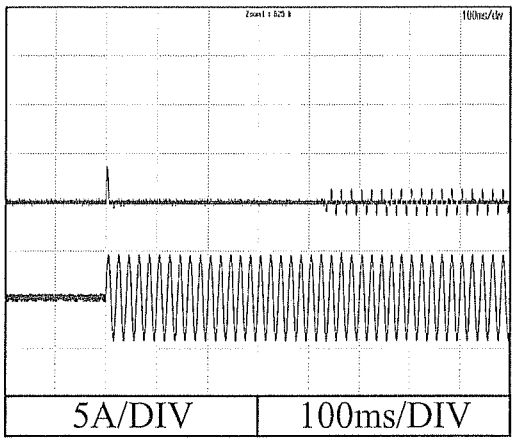


2.9 入力サージ電流（突入電流）波形
Inrush current waveform

24V
(DRB30-24-1)

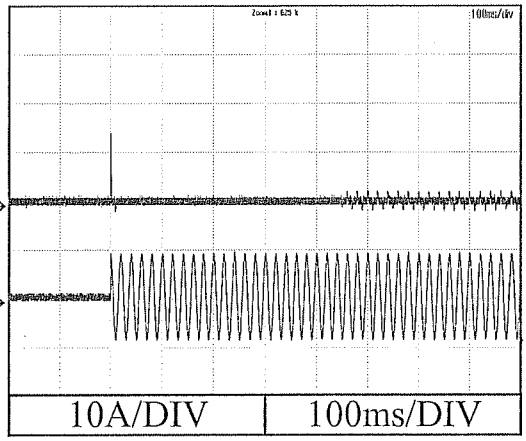
Conditions Vin : 115 VAC
Iout : 100 %
Ta : 25 ℃

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



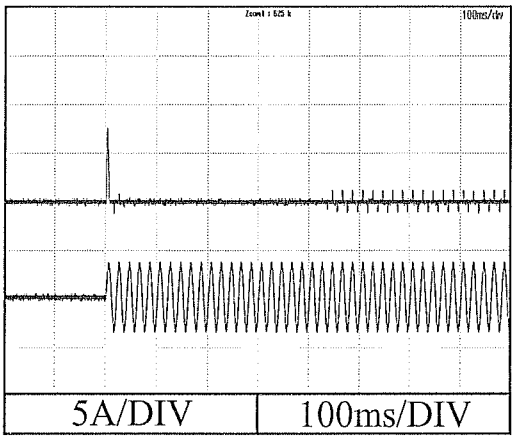
← Iin →
← Vin →

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



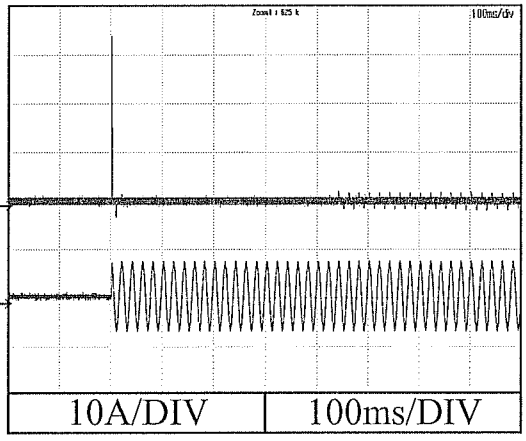
Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

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



← Iin →
← Vin →

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

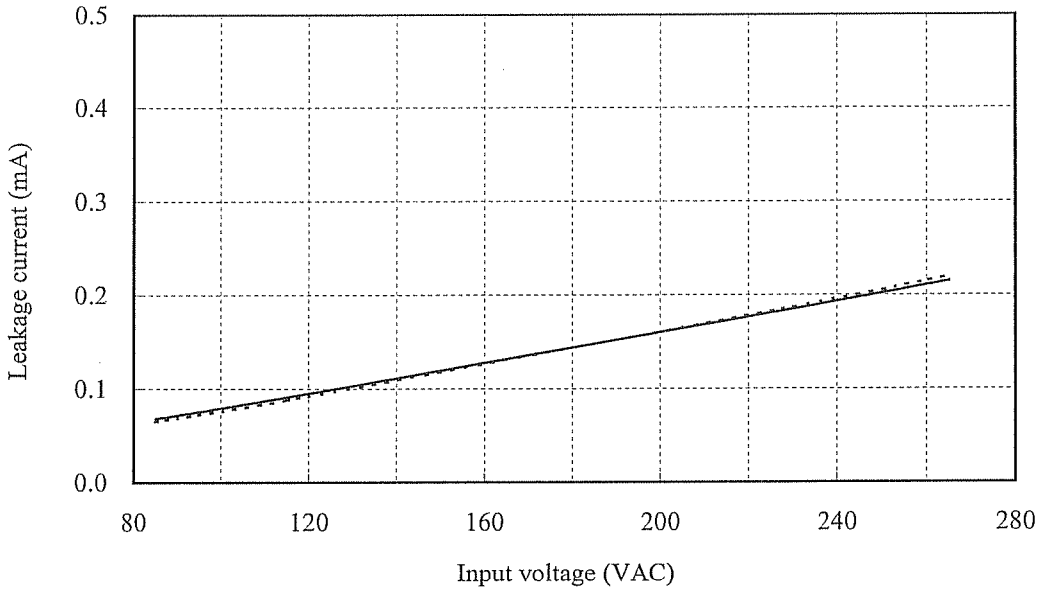


2. 10 リーク電流特性
Leakage current characteristics

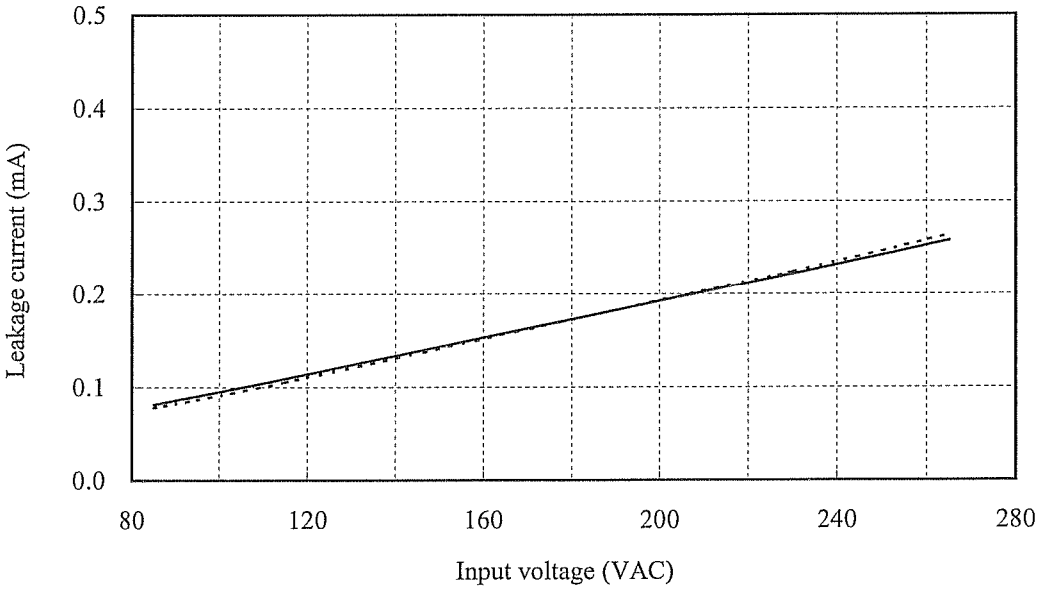
Conditions Iout : 0 % ------
100 % ———
Ta : 25 ℃
Equipment used : 228 (Simpson)

12V
(DRB30-12-1)

f : 50 Hz



f : 60 Hz

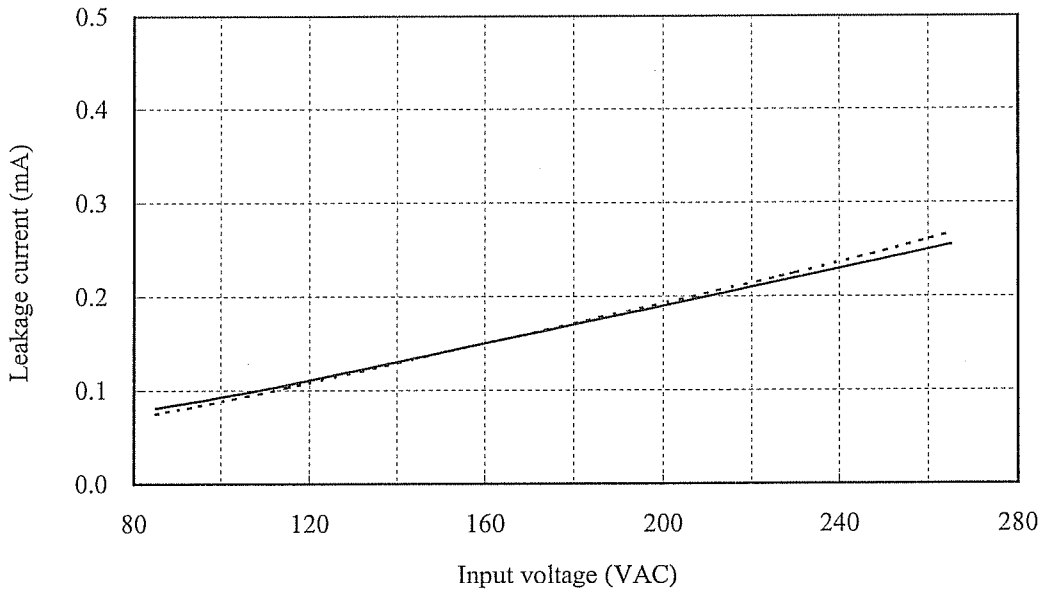


2. 10 リーク電流特性
Leakage current characteristics

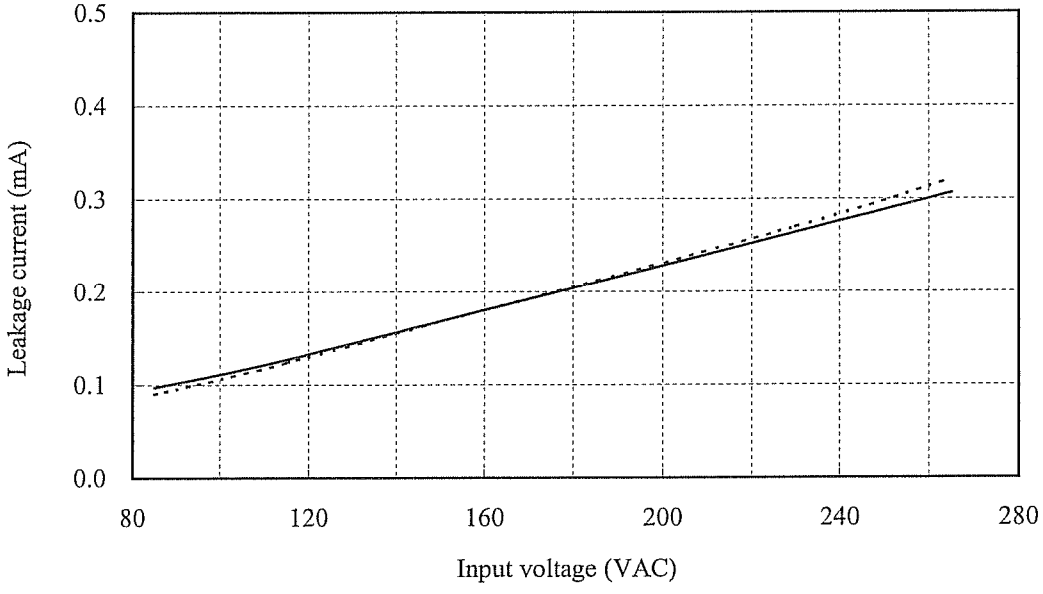
Conditions Iout : 0 % ------
100 % ——
Ta : 25 ℃
Equipment used : 228 (Simpson)

24V
(DRB30-24-1)

f : 50 Hz



f : 60 Hz



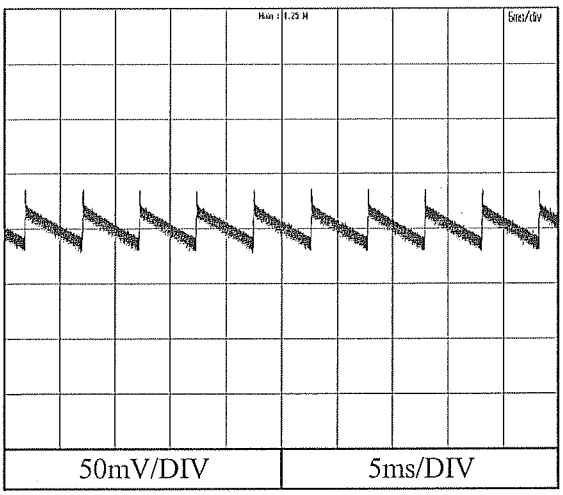
2. 11 出力リップル、ノイズ波形
Output ripple and noise waveform

Conditions Vin : 115 VAC
Ta : 25 ℃

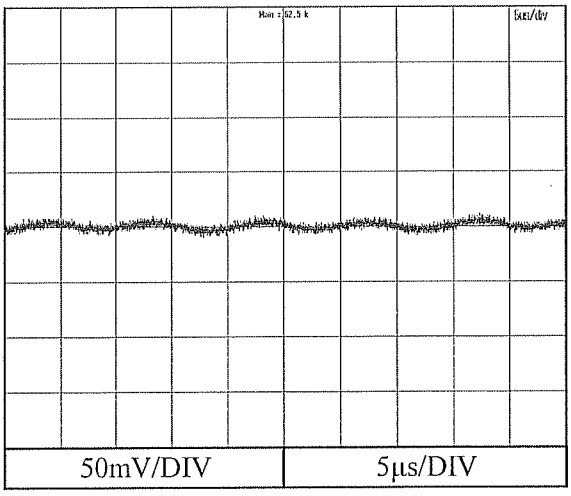
12V

(DRB30-12-1)

Iout : 0%



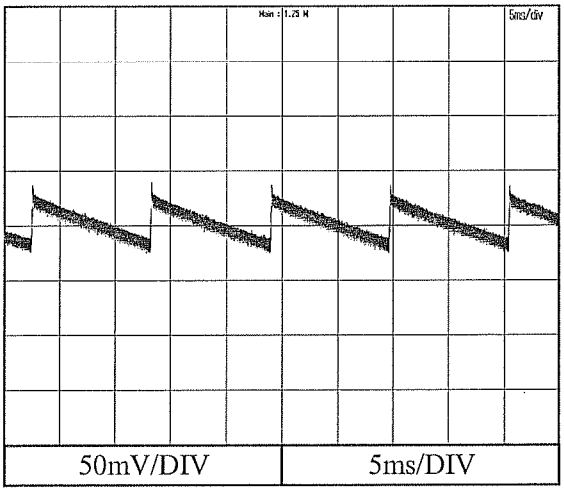
Iout : 100%



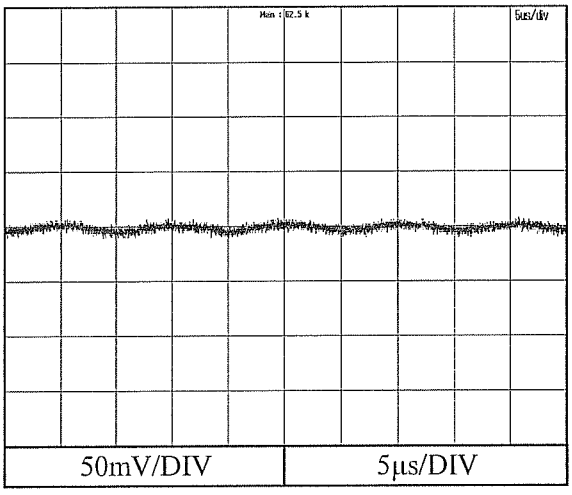
24V

(DRB30-24-1)

Iout : 0%



Iout : 100%

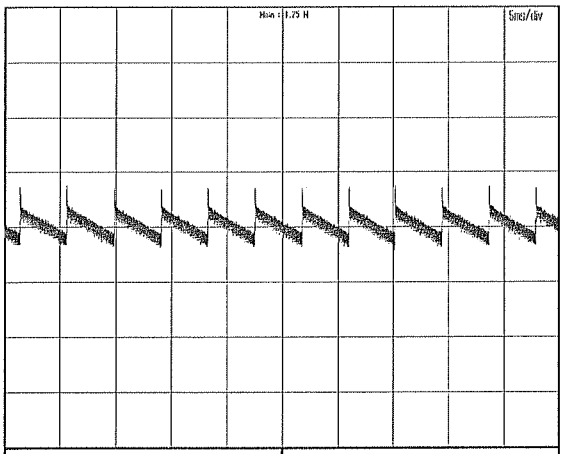


2. 11 出力リップル、ノイズ波形
Output ripple and noise waveform

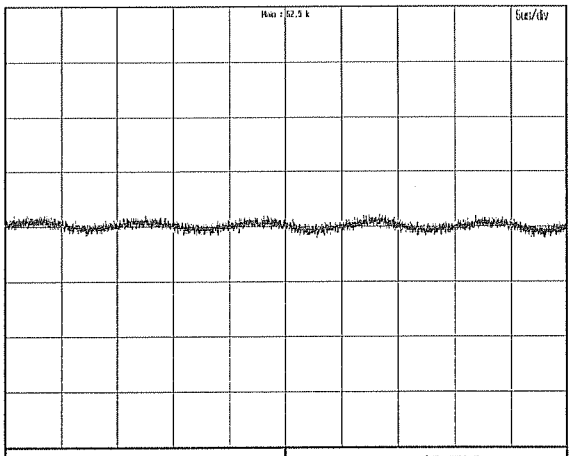
Conditions Vin : 230 VAC
Ta : 25 ℃

12V
(DRB30-12-1)

Iout : 0%

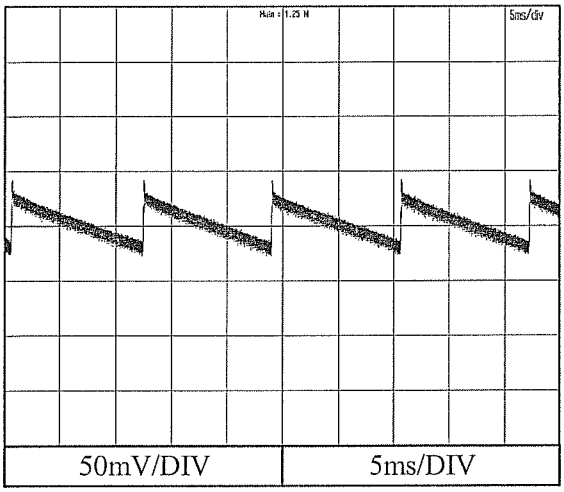


Iout : 100%

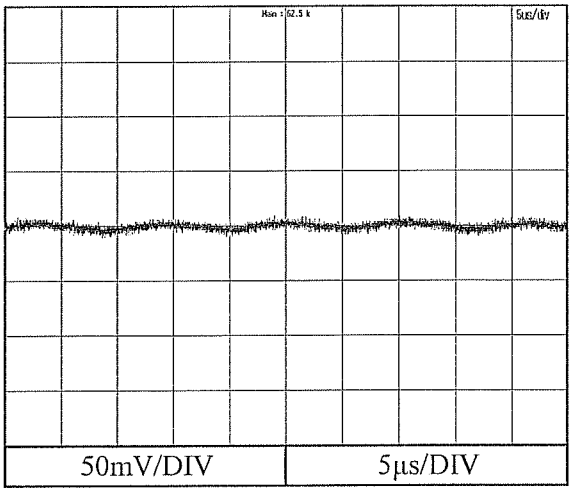


24V
(DRB30-24-1)

Iout : 0%



Iout : 100%



2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Ta : 25 ℃

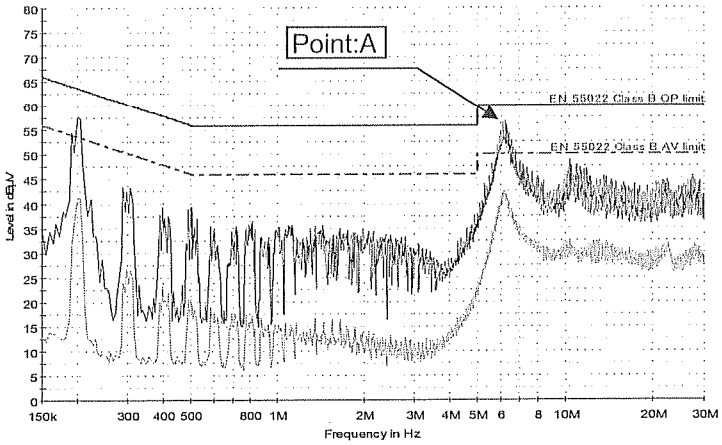
雑音端子電圧
Conducted Emission

12V

(DRB30-12-1)

Ref. Data	Point A (6.20MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	49.7
AV	50.0	42.3

Phase : L

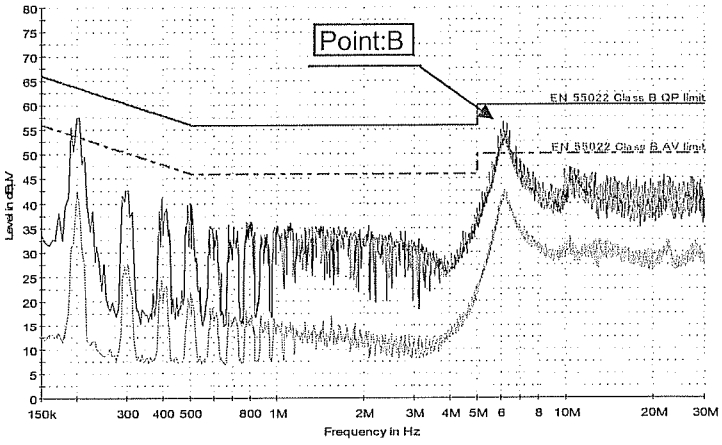


EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

Ref. Data	Point B (6.19MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	49.6
AV	50.0	42.0

Phase : N



EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

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

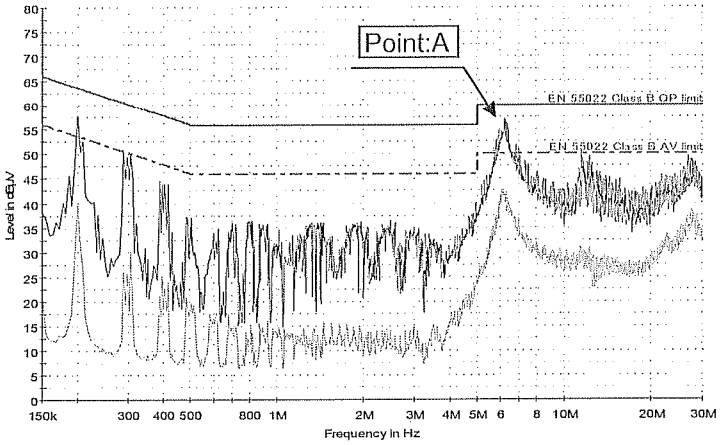
雑音端子電圧
Conducted Emission

12V

(DRB30-12-1)

Ref. Data	Point A (6.22MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	51.1
AV	50.0	42.2

Phase : L

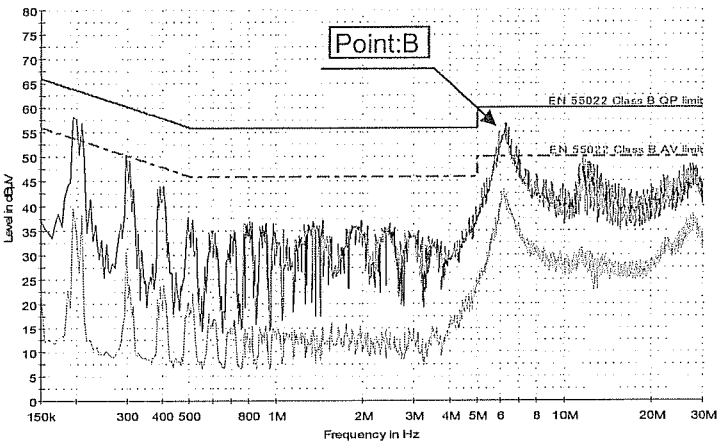


EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

Ref. Data	Point B (6.19MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	50.3
AV	50.0	41.5

Phase : N



EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

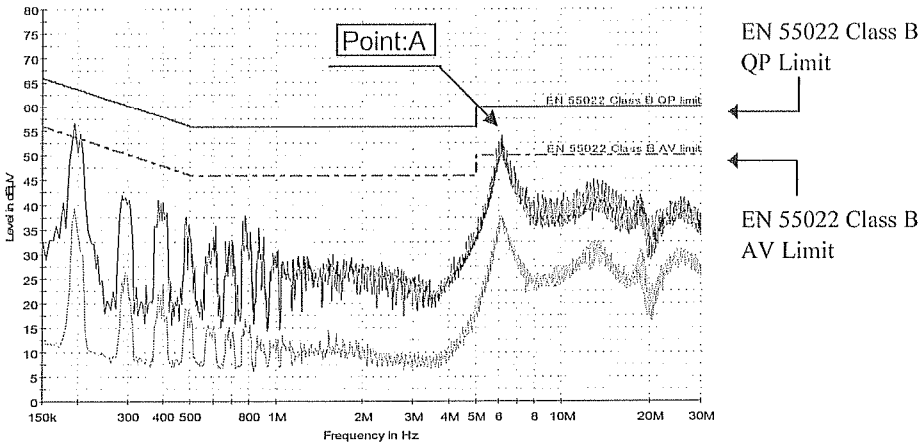
Conducted Emission

24V

(DRB30-24-1)

Ref. Data	Point A (6.17MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	46.7
AV	50.0	36.8

Phase : L

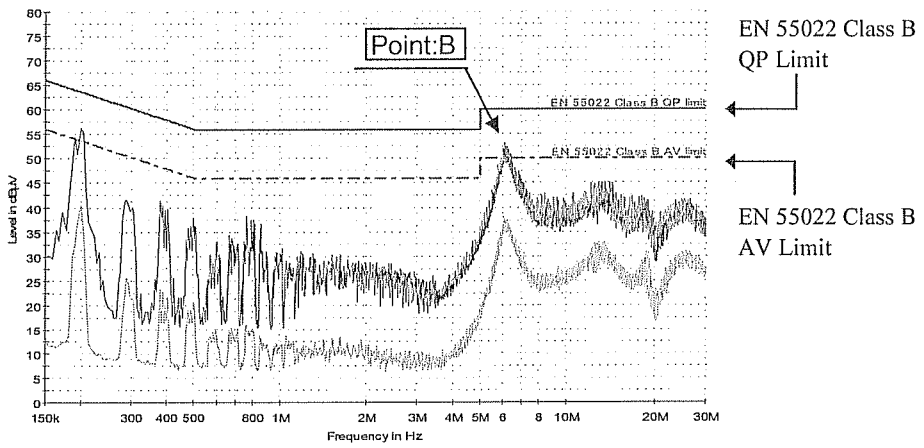


EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

Ref. Data	Point B (6.15MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	46.5
AV	50.0	36.1

Phase : N



EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

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

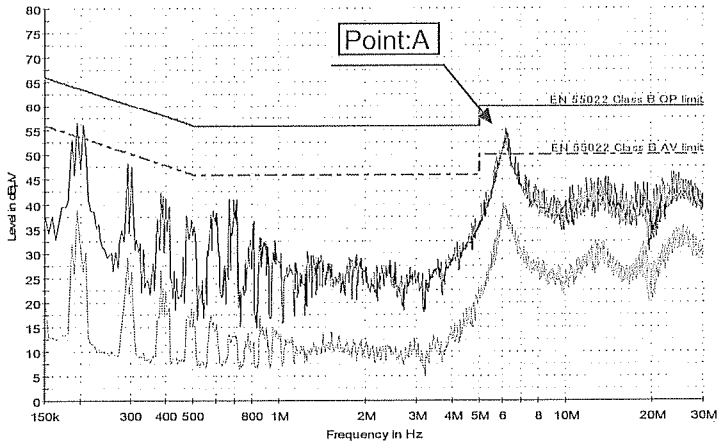
雑音端子電圧
Conducted Emission

24V

(DRB30-24-1)

Ref. Data	Point A (6.15MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	48.9
AV	50.0	37.5

Phase : L

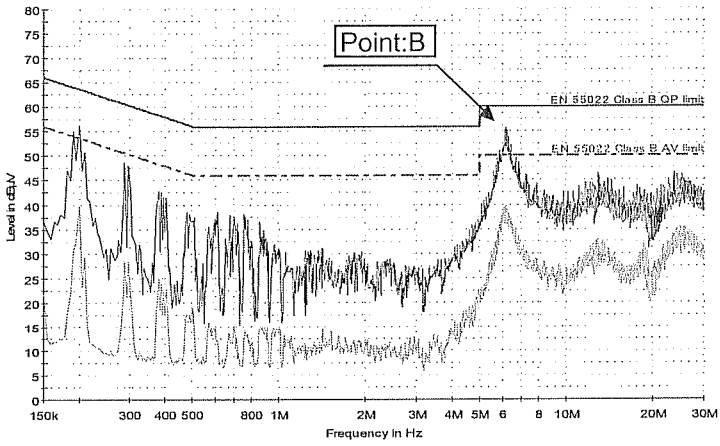


EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

Ref. Data	Point B (6.16MHz) Limit (dBuV)	Measure (dBuV)
QP	60.0	48.9
AV	50.0	38.3

Phase : N



EN 55022 Class B QP Limit

EN 55022 Class B AV Limit

EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

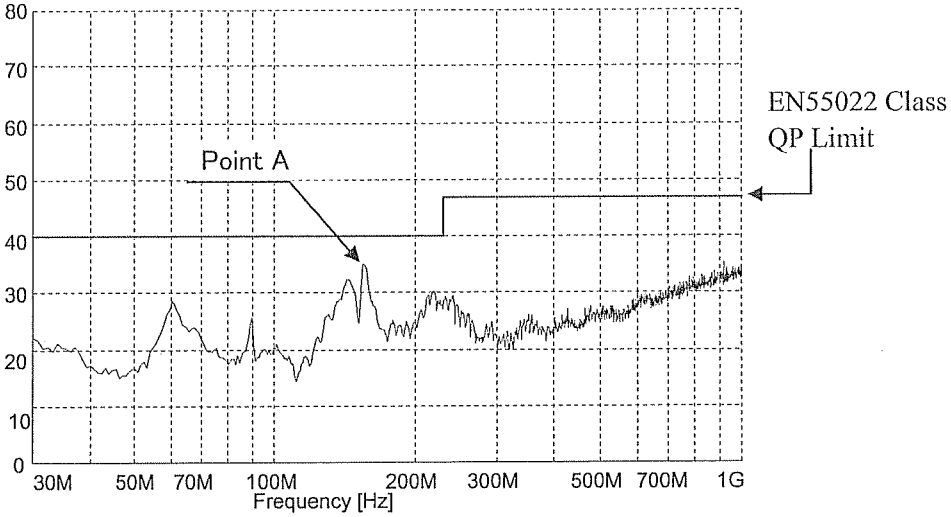
Conditions Vin : 115 VAC
Io : 100 %
Ta : 25 ℃

雑音電界強度
Radiated Emission

12V
(DRB30-12-1)

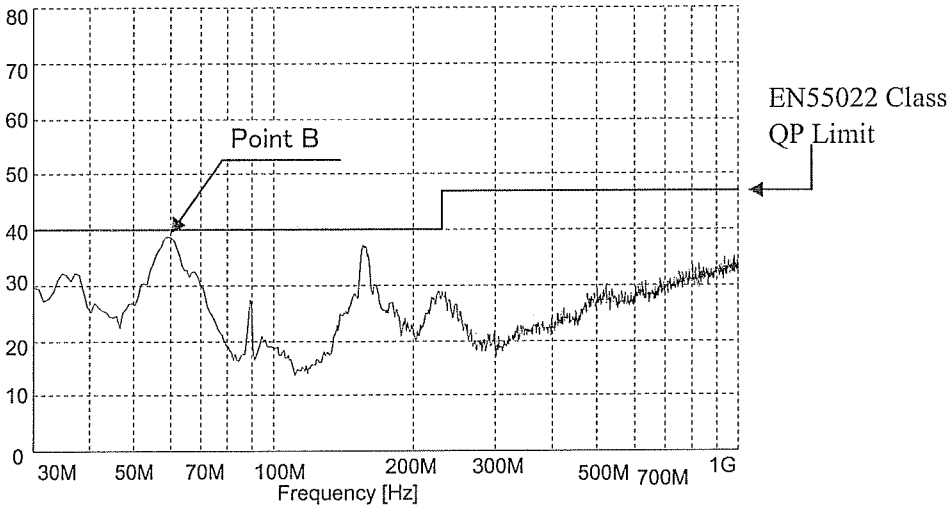
HORIZONTAL

Ref. Data	Point A (154.9MHz) Limit (dBuV)	Measure (dBuV)
H	40.0	35.1



VERTICAL

Ref. Data	Point B (59.4MHz) Limit (dBuV)	Measure (dBuV)
V	40.0	35.2



2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

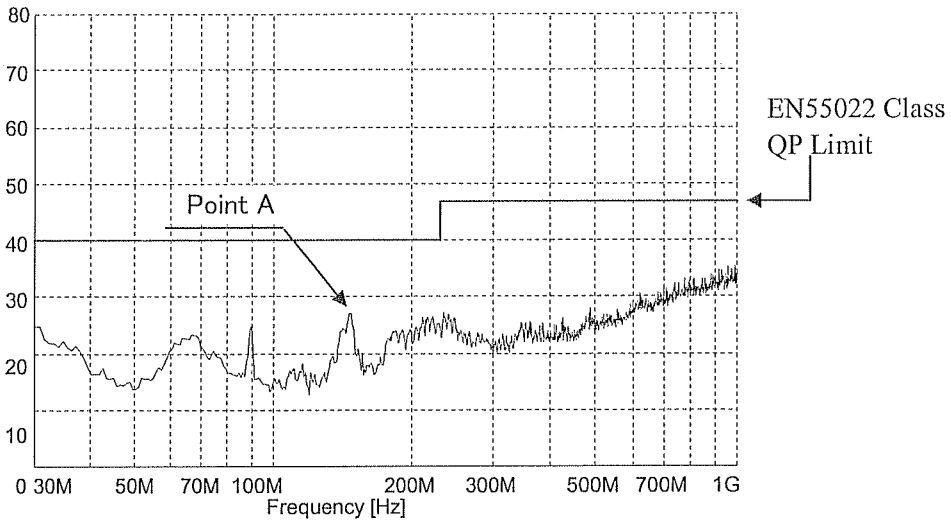
Conditions Vin : 230 VAC
Io : 100 %
Ta : 25 ℃

雑音電界強度
Radiated Emission

12V
(DRB30-12-1)

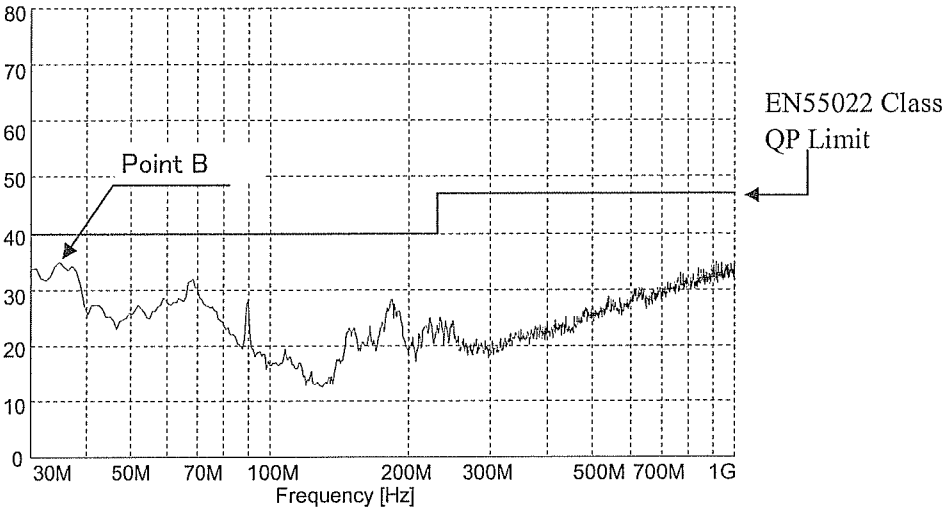
HORIZONTAL

Ref. Data	Point A (145.3MHz) Limit (dBuV)	Measure (dBuV)
H	40.0	27.2



VERTICAL

Ref. Data	Point B (34.9MHz) Limit (dBuV)	Measure (dBuV)
V	40.0	31.6



2. 12 ＥＭＩ特性
Electro-Magnetic Interference characteristics

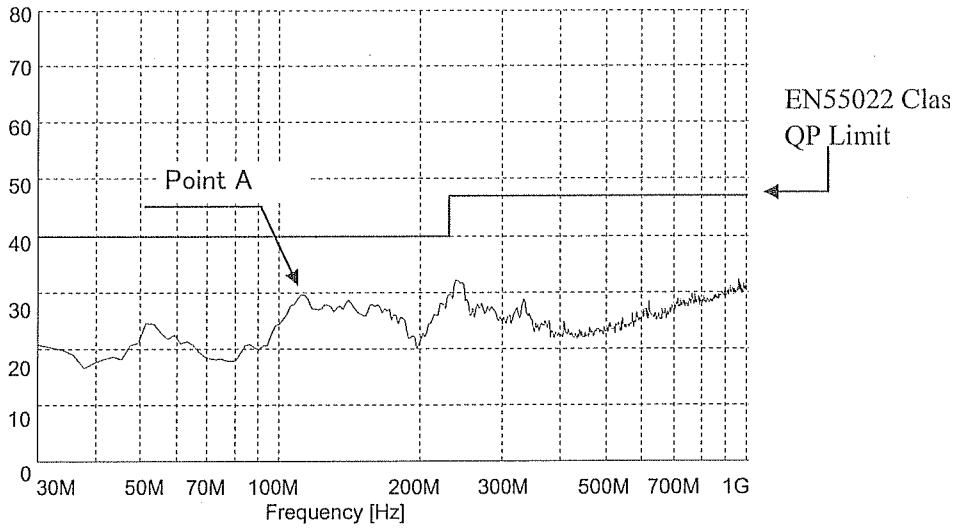
Conditions Vin : 115 VAC
Io : 100 %
Ta : 25 ℃

雑音電界強度
Radiated Emission

24V
(DRB30-24-1)

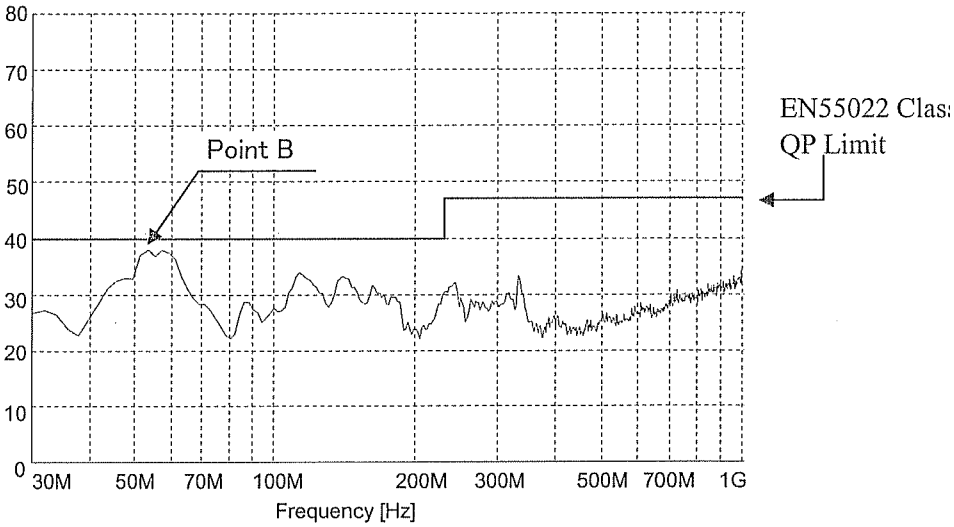
HORIZONTAL

Ref. Data	Point A (119.8MHz) Limit (dBuV)	Measure (dBuV)
H	40.0	30.0



VERTICAL

Ref. Data	Point B (53MHz) Limit (dBuV)	Measure (dBuV)
V	40.0	34.5



2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

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

雑音電界強度

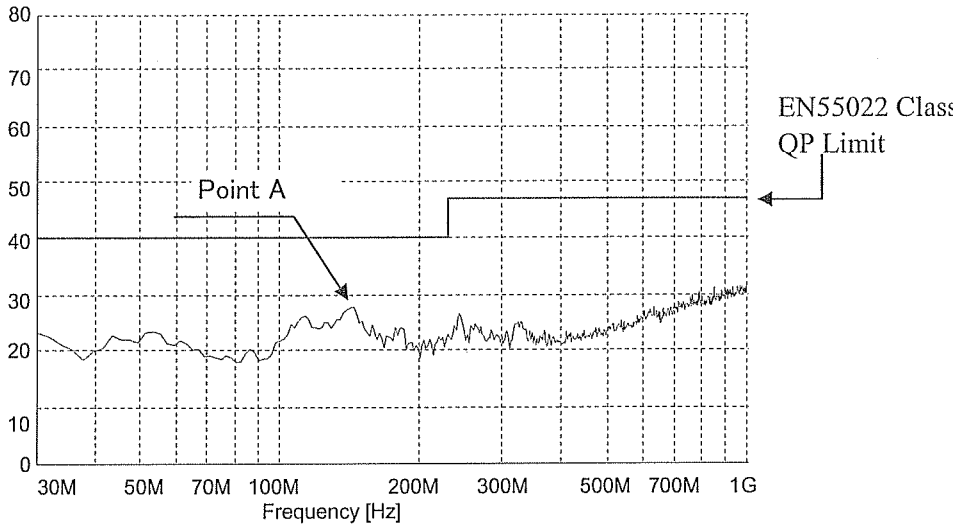
Radiated Emission

24V

(DRB30-24-1)

HORIZONTAL

Ref. Data	Point A (150MHz) Limit (dBuV)	Measure (dBuV)
H	40.0	28.8



VERTICAL

Ref. Data	Point B (43.6MHz) Limit (dBuV)	Measure (dBuV)
V	40.0	35.5