GUS350

EVALUATION DATA

型式データ

INDEX

2. 特性データ　Characteristics

使用記号　Terminology used

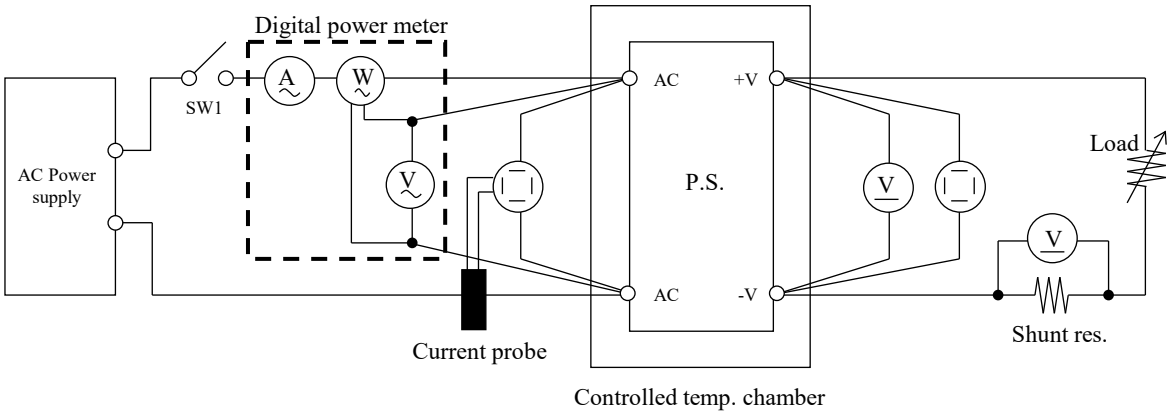
	定義　Definition	
Vin	.....	入力電圧　Input voltage
Vout	.....	出力電圧　Output voltage
Iin	.....	入力電流　Input current
Iout	.....	出力電流　Output current
Ta	.....	周囲温度　Ambient temperature
f	.....	周波数　Frequency

1. 測定方法　Evaluation Method

1.1　測定回路　Circuit used for determination

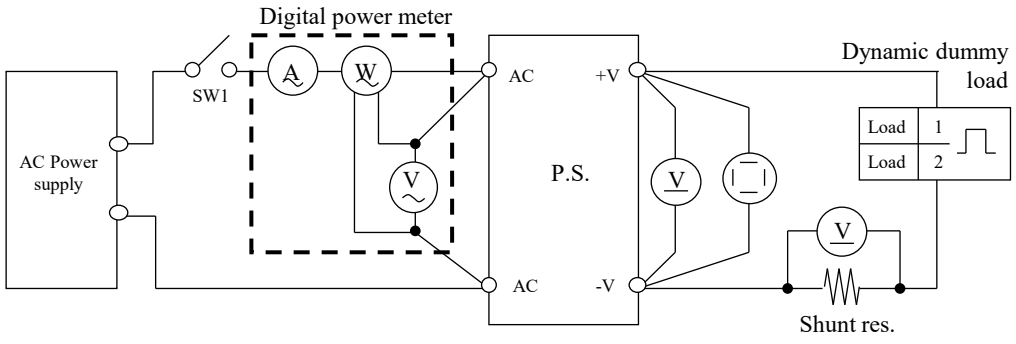
測定回路1 Circuit 1 used for determination

- ・静特性　Steady state data
- ・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
- ・出力立ち上がり特性　Output rise characteristics
- ・出力立ち下がり特性　Output fall 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
- ・入力電圧瞬停特性　Response to brown out characteristics
- ・入力電流波形　Input current waveform

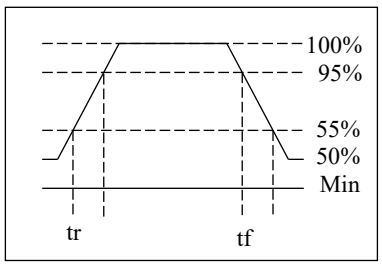


測定回路2 Circuit 2 used for determination

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

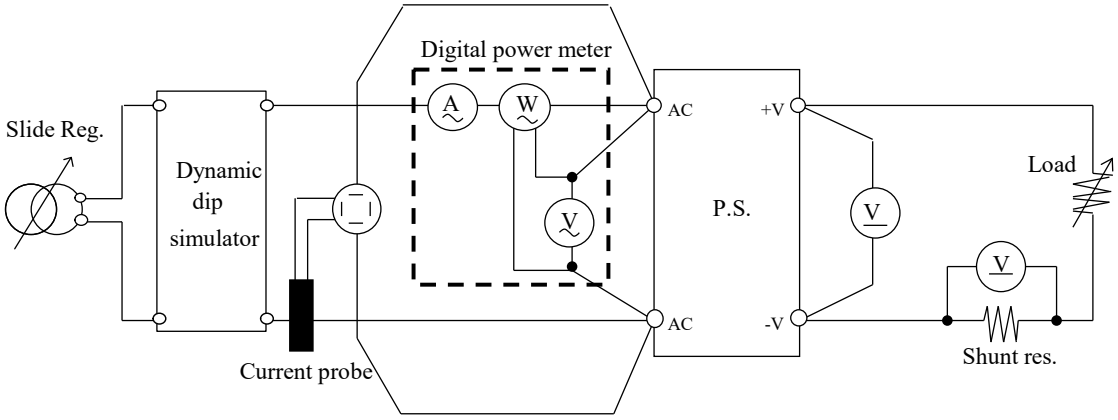


Output current waveform
Iout 50% <==> 100%



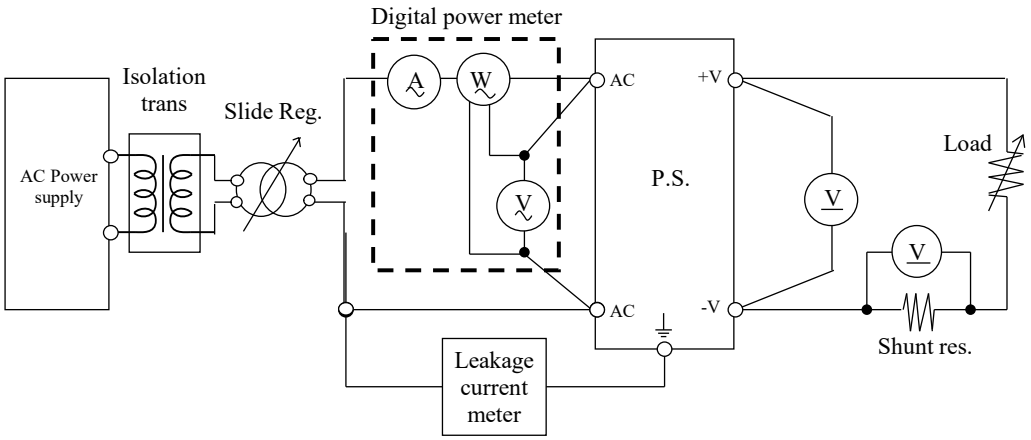
測定回路3 Circuit 3 used for determination

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



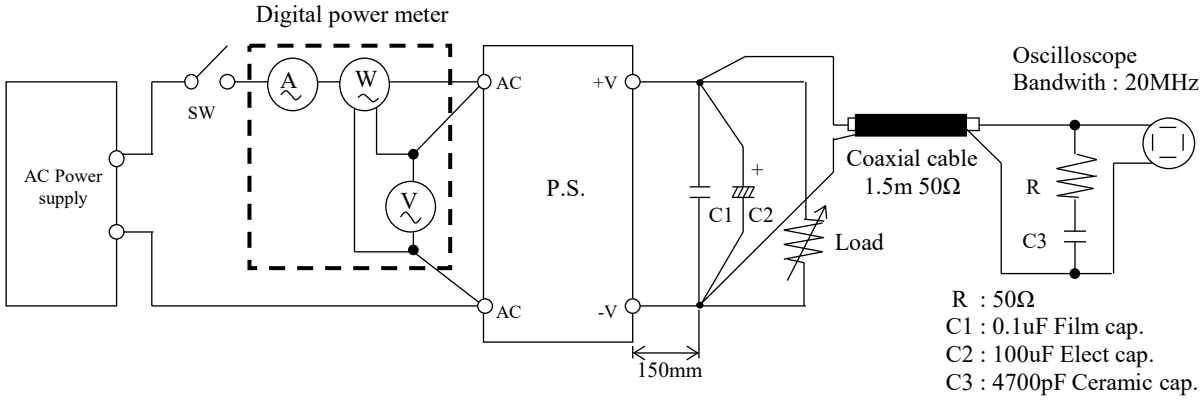
測定回路4 Circuit 4 used for determination

・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

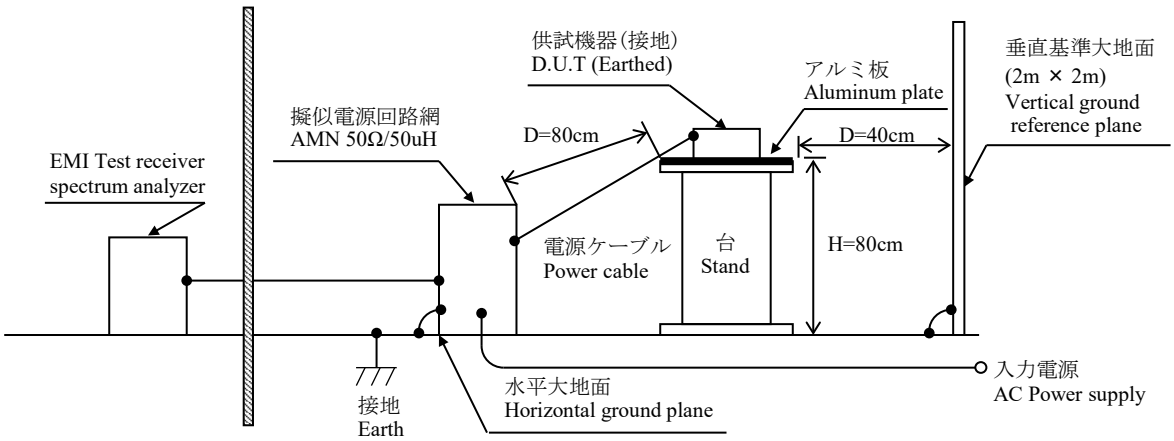


測定構成　Configuration used for determination

・EMI特性　Electro-Magnetic Interference characteristics

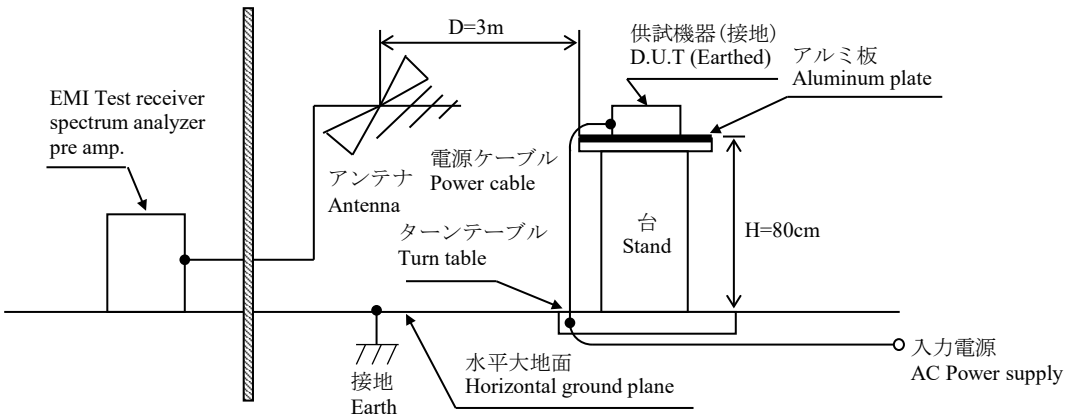
(a) 雑音端子電圧 (帰還ノイズ）

Conducted Emission



(b) 雑音電界強度 (放射ノイズ）

Radiated Emission



1.2 使用測定機器　　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DLM2054
2	DIGITAL MULTIMETER	AGILENT	34405A/34410A
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110 / WT210
4	CURRENT PROBE	YOKOGAWA ELECT.	701930 / 701933
5	DYNAMIC DUMMY LOAD	CHROMA	63640
6	DUMMY LOAD	CHROMA	63640
7	ISOLATION TRANS	TOUZHONG	BJZ-3KVA
8	CVCF	KIKUSUI	PCR2000LE
9	CVCF	CHROMA	61605
10	LEAKAGE CURRENT METER	SIMPSON	228
11	CONTROLLED TEMP. CHAMBER	ESPEC	SU-661 / SH-661
12	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI-03
13	PRE AMP.	AGILENT	8447D
14	AMN	SCHWARZBECK	NNLK8121
15	ANTENNA	SCHWARZBECK	VULB9168
16	HARMONIC / FLICKER ANALYZER	SCHAFFNER	CCN100-1

1.3 評価負荷条件　　Load conditions

*入力電圧が115VAC以下の場合、下記のとおり出力ディレーティングが必要です。
Output derating is needed when input voltage is less than 115VAC.

Output voltage : 12V, 24V, 36V, 48V

Vin	Iout: Full load	12V	24V	36V	48V
85VAC	80%	23.36A	11.68A	7.84A	5.92A
90 - 100VAC	86%	25.12A	12.56A	8.43A	6.37A
115 - 265VAC	100%	29.20A	14.60A	9.80A	7.40A

2. 特性データ　　Characteristics

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

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

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	11.983V	11.983V	11.984V	11.984V	1mV	0.008%
50%	11.981V	11.980V	11.980V	11.980V	1mV	0.008%
Full load	11.982V	11.982V	11.981V	11.980V	2mV※1	0.017%
Load regulation	2mV	3mV	4mV	4mV		
	0.017%	0.025%	0.033%	0.033%		

2. Temperature drift　　Conditions　Vin：115 VAC
Iout：Full load

Ta	-20℃	+25℃	+40℃	temperature stability	
Vout	12.026V	11.972V	11.951V	75mV	0.625%

3. Start up voltage and Drop out voltage　　Conditions　Ta：　25 ℃
Iout：Full load

Start up voltage (Vin)	79VAC
Drop out voltage (Vin)	76VAC

24V

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

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	24.020V	24.005V	23.999V	23.997V	23mV	0.096%
50%	24.008V	23.997V	23.993V	23.990V	18mV	0.075%
Full load	24.002V	23.991V	23.987V	23.985V	6mV※1	0.025%
Load regulation	18mV	14mV	12mV	12mV		
	0.075%	0.058%	0.050%	0.050%		

2. Temperature drift　　Conditions　Vin：115 VAC
Iout：Full load

Ta	-20℃	+25℃	+40℃	temperature stability	
Vout	24.010V	23.991V	23.899V	111mV	0.463%

3. Start up voltage and Drop out voltage　　Conditions　Ta：　25 ℃
Iout：Full load

Start up voltage (Vin)	79VAC
Drop out voltage (Vin)	76VAC

36V

1. Regulation - line and load

Condition Ta : 25 ℃

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	36.017V	36.016V	36.015V	36.015V	2mV	0.006%
50%	36.008V	36.008V	36.007V	36.006V	2mV	0.006%
Full load	36.011V	36.010V	36.009V	36.008V	2mV※1	0.006%
Load regulation	9mV	8mV	8mV	9mV		
	0.025%	0.022%	0.022%	0.025%		

2. Temperature drift

Conditions Vin : 115 VAC
Iout : Full load

Ta	-20℃	+25℃	+40℃	temperature stability	
Vout	36.145V	35.940V	35.867V	278mV	0.772%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 ℃
Iout : Full load

Start up voltage (Vin)	79VAC
Drop out voltage (Vin)	76VAC

48V

1. Regulation - line and load

Condition Ta : 25 ℃

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	line regulation	
0%	48.036V	48.015V	48.002V	47.995V	41mV	0.085%
50%	48.022V	48.006V	47.997V	47.991V	31mV	0.065%
Full load	48.016V	47.997V	47.989V	47.984V	13mV※1	0.027%
Load regulation	20mV	18mV	13mV	11mV		
	0.042%	0.038%	0.027%	0.023%		

2. Temperature drift

Conditions Vin : 115 VAC
Iout : Full load

Ta	-20℃	+25℃	+40℃	temperature stability	
Vout	48.230V	47.997V	47.757V	473mV	0.985%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 ℃
Iout : Full load

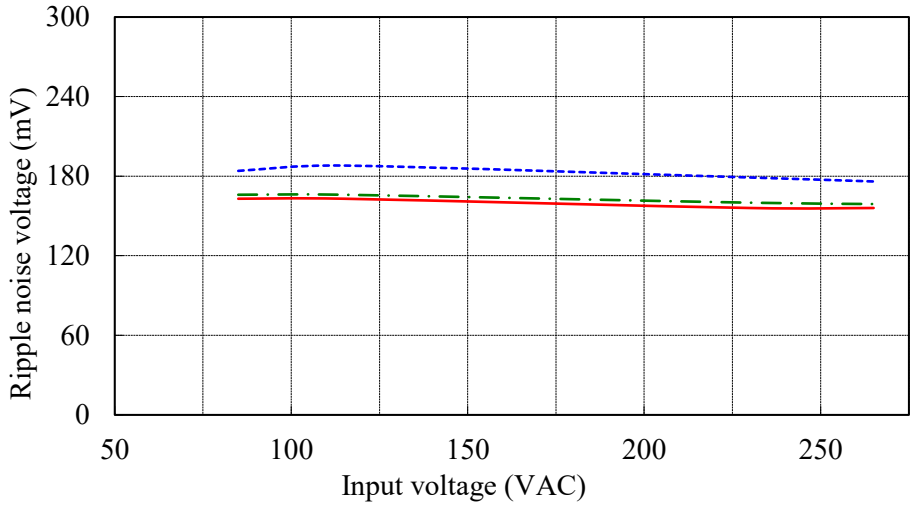
Start up voltage (Vin)	80VAC
Drop out voltage (Vin)	76VAC

※1 Line regulation : 115VAC - 265VAC

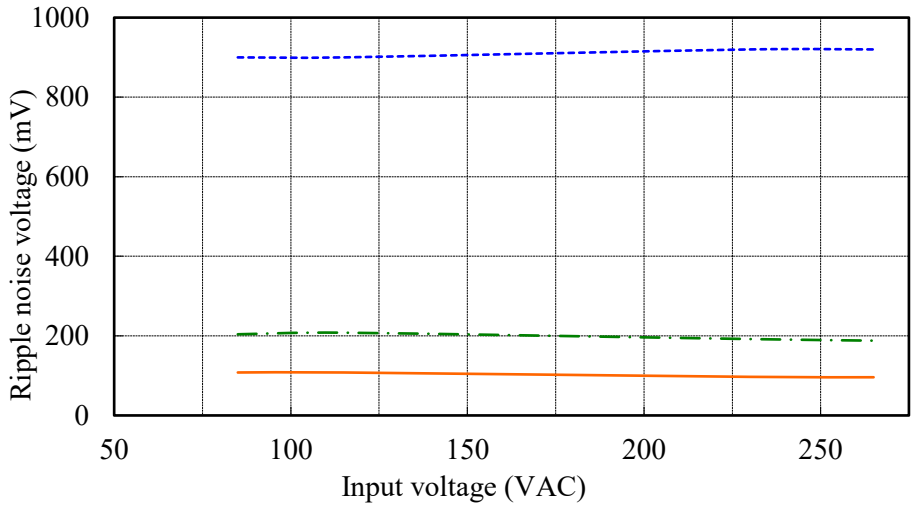
(2) リップルノイズ電圧対入力電圧
Ripple noise voltage vs. Input voltage

Conditions Iout : 100 %
Ta : -20 ℃
25 ℃
40 ℃

12V



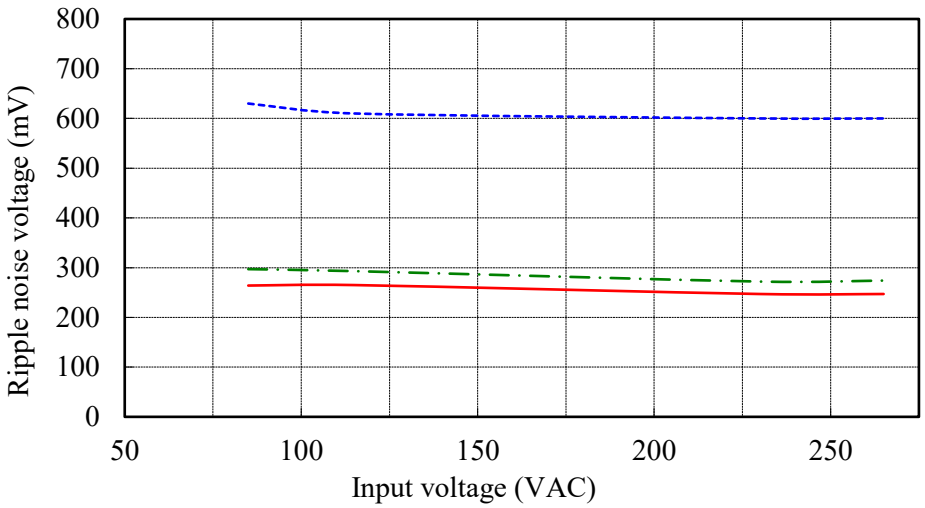
24V



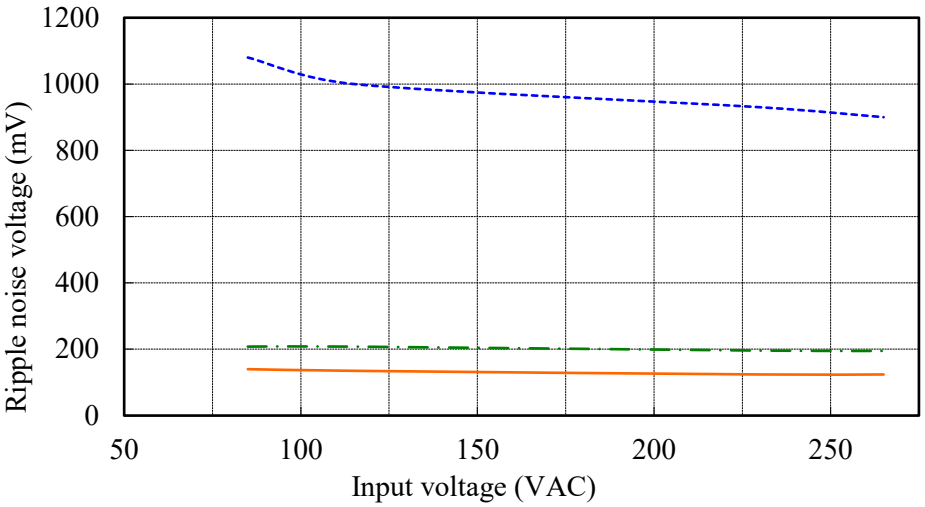
(2) リップルノイズ電圧対入力電圧
Ripple noise voltage vs. Input voltage

Conditions Iout : 100 %
Ta : -20 ℃
25 ℃
40 ℃

36V



48V

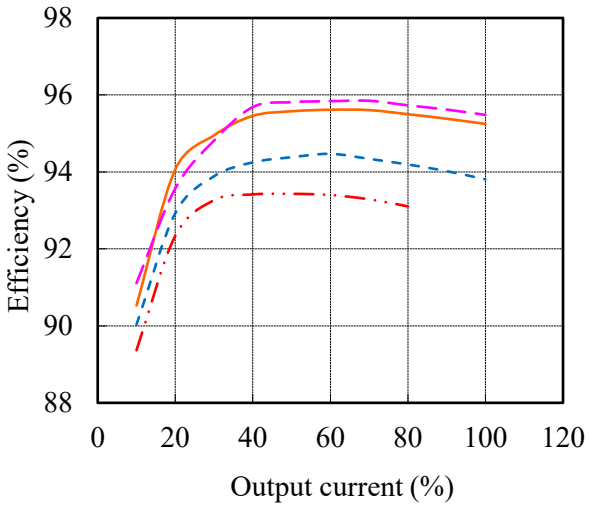


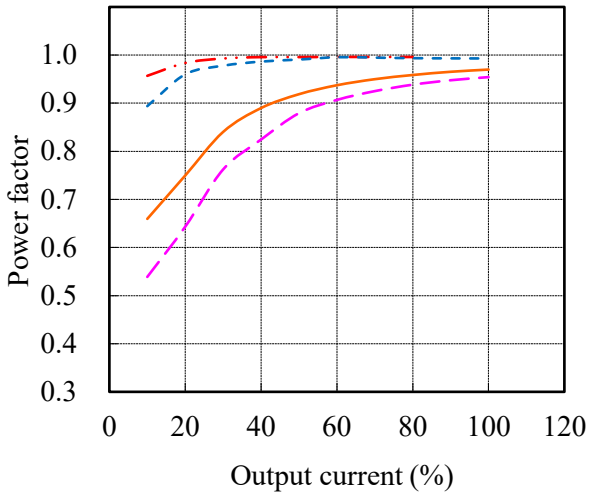
(3) 効率・力率対出力電流

Efficiency and Power factor vs. Output current

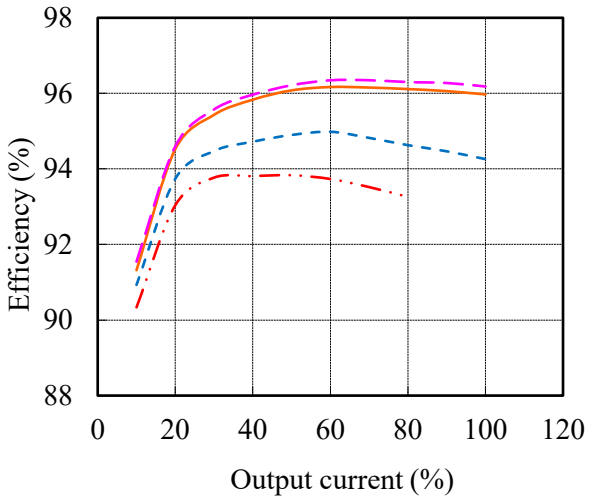
Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

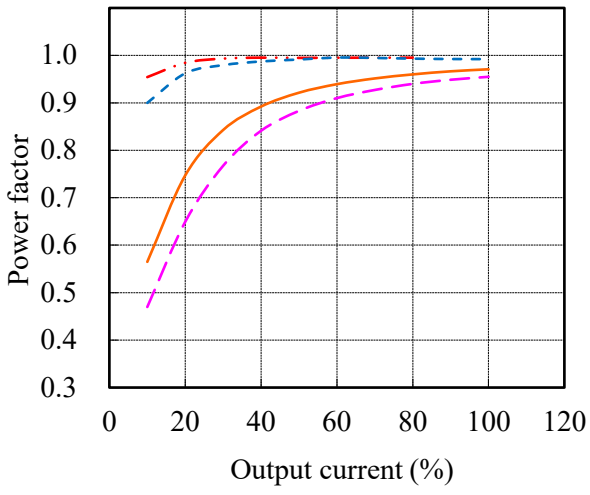
12V





24V



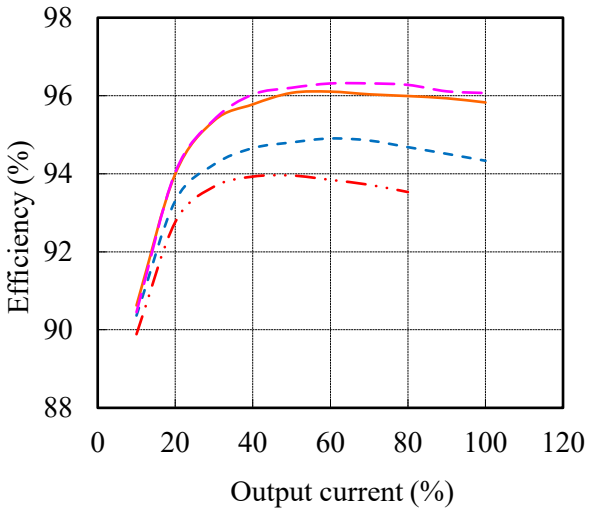


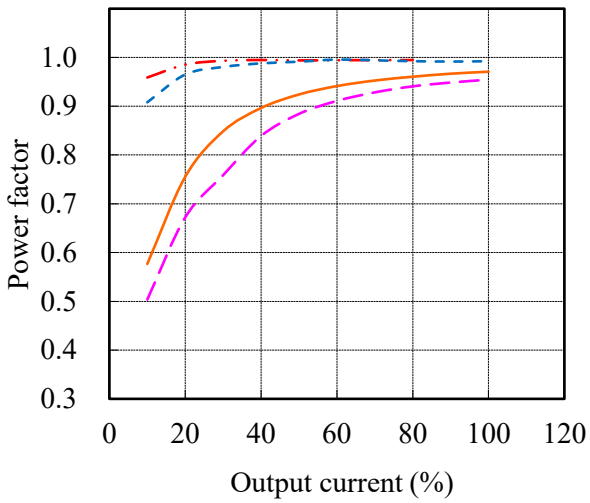
(3) 効率・力率対出力電流

Efficiency and Power factor vs. Output current

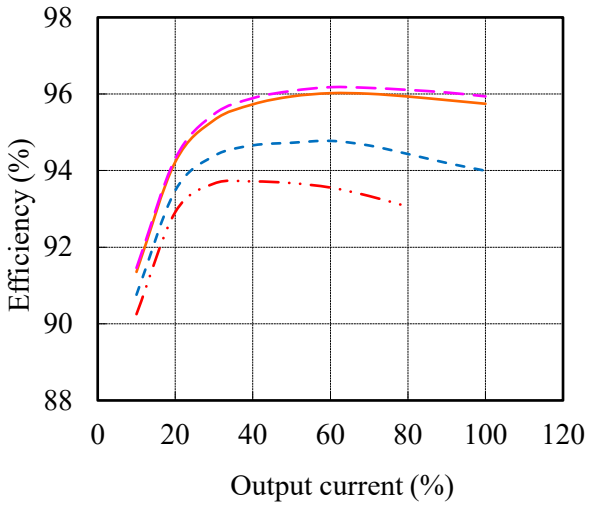
Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

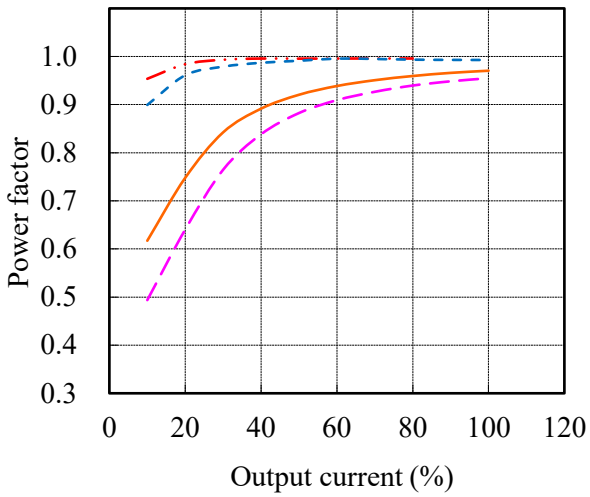
36V





48V





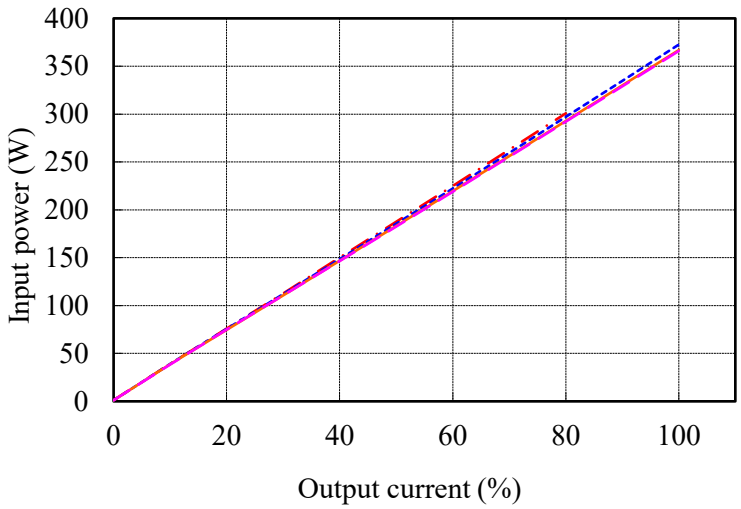
(4) 入力電力対出力電流

Input power vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

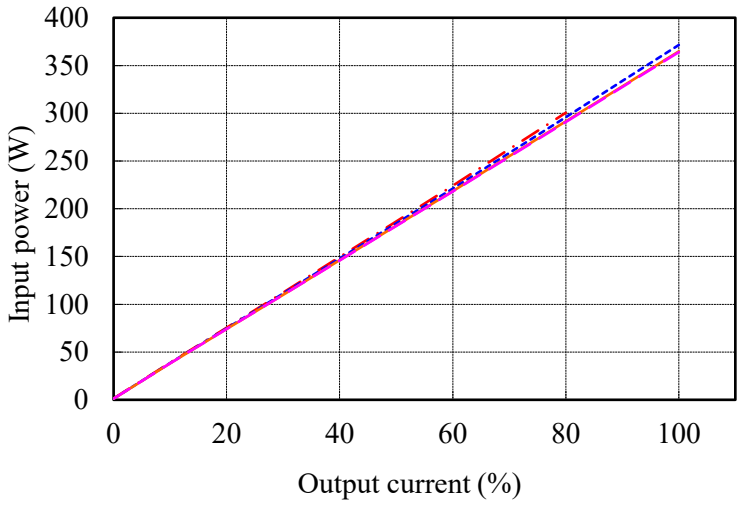
12V

Vin	Input power
	Iout : 0%
85VAC	1.26W
115VAC	1.10W
230VAC	1.09W
265VAC	1.17W



24V

Vin	Input power
	Iout : 0%
85VAC	1.45W
115VAC	1.22W
230VAC	1.13W
265VAC	1.15W



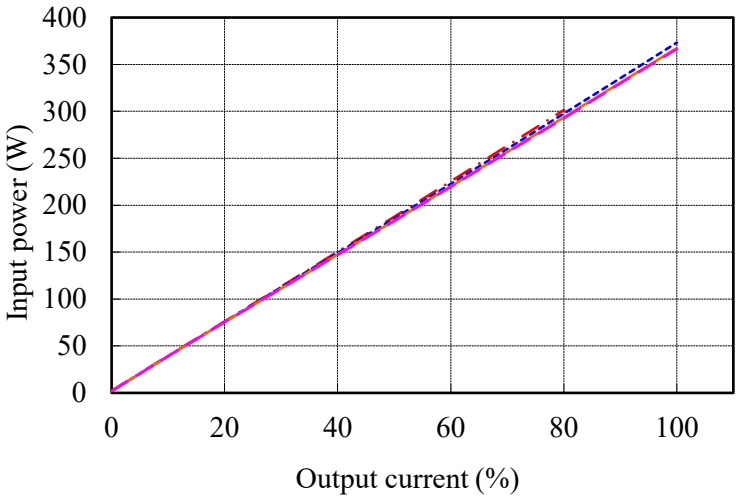
(4) 入力電力対出力電流

Input power vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

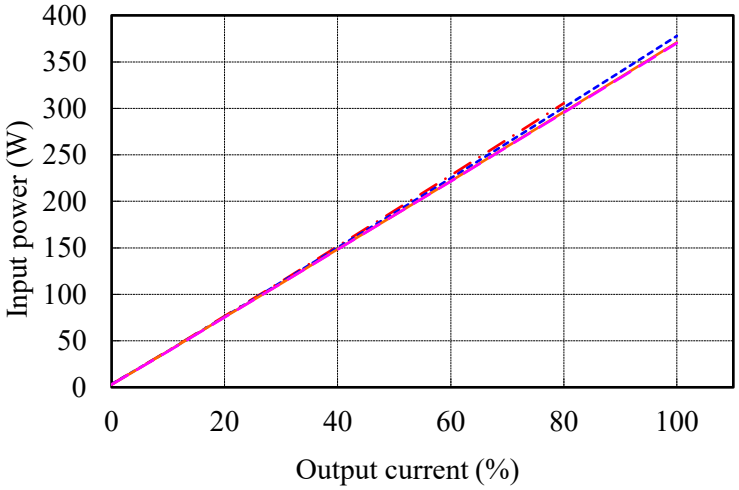
36V

Vin	Input power
	Iout : 0%
85VAC	2.25W
115VAC	2.00W
230VAC	1.82W
265VAC	1.89W



48V

Vin	Input power
	Iout : 0%
85VAC	3.31W
115VAC	3.40W
230VAC	2.86W
265VAC	2.91W



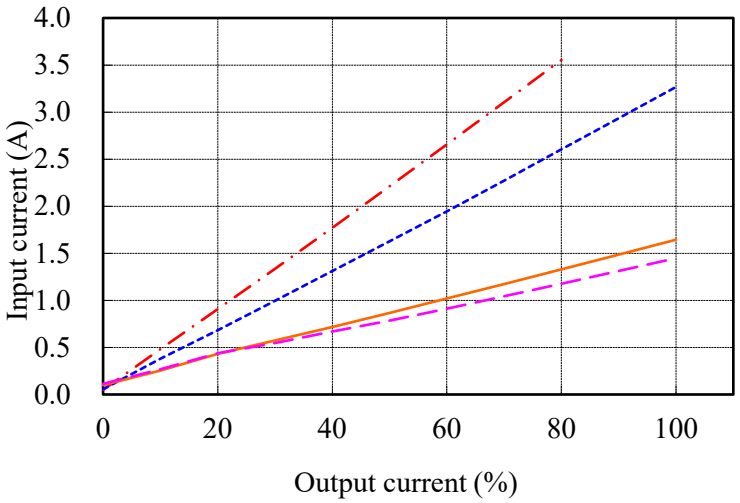
(5) 入力電流対出力電流

Input current vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

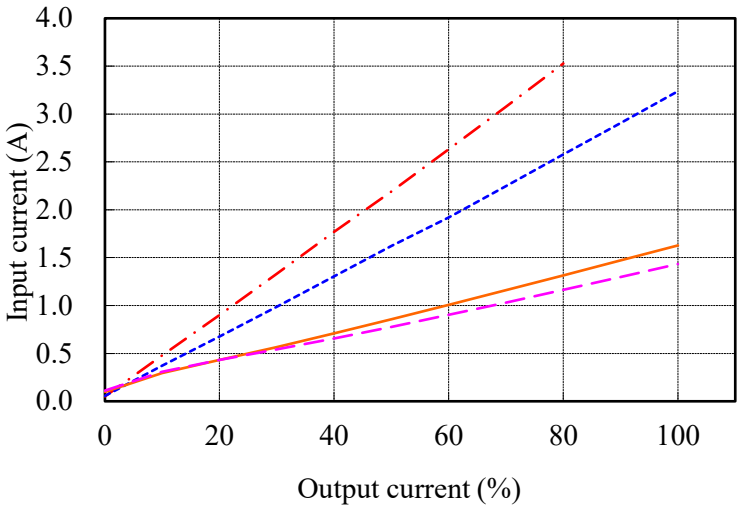
12V

Vin	Input current
	Iout : 0%
85VAC	0.05A
115VAC	0.06A
230VAC	0.10A
265VAC	0.11A



24V

Vin	Input current
	Iout : 0%
85VAC	0.05A
115VAC	0.06A
230VAC	0.10A
265VAC	0.11A



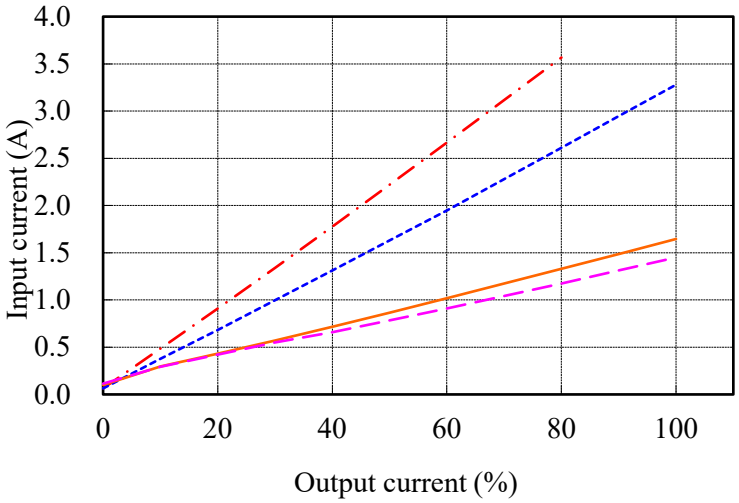
(5) 入力電流対出力電流

Input current vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 ℃

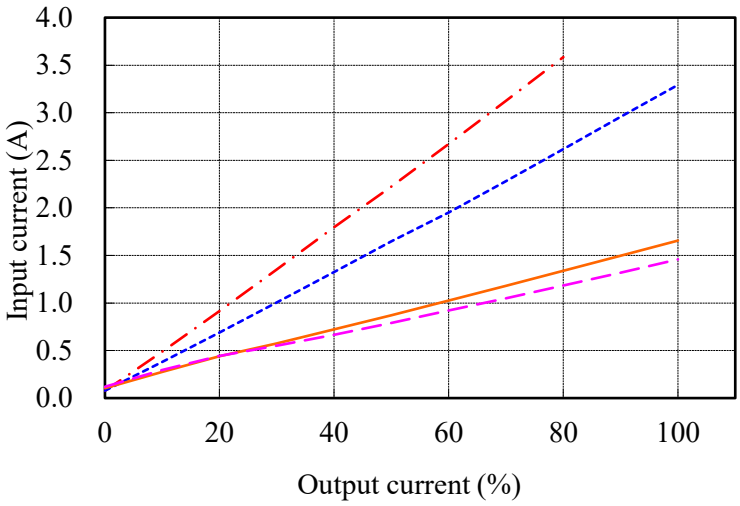
36V

Vin	Input current
	Iout : 0%
85VAC	0.06A
115VAC	0.06A
230VAC	0.10A
265VAC	0.11A



48V

Vin	Input current
	Iout : 0%
85VAC	0.08A
115VAC	0.08A
230VAC	0.10A
265VAC	0.12A

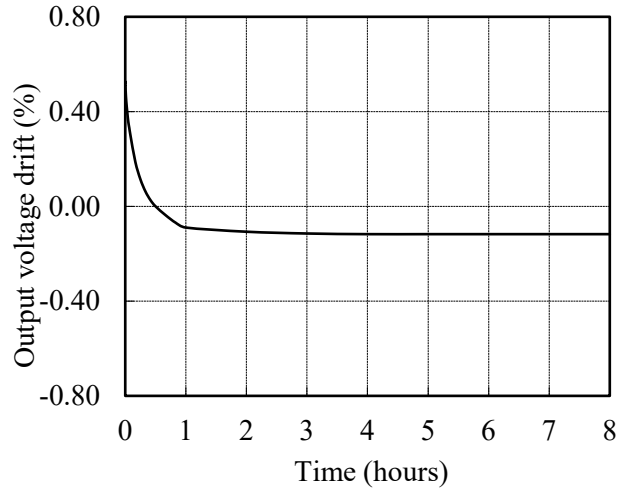


2.2 通電ドリフト特性

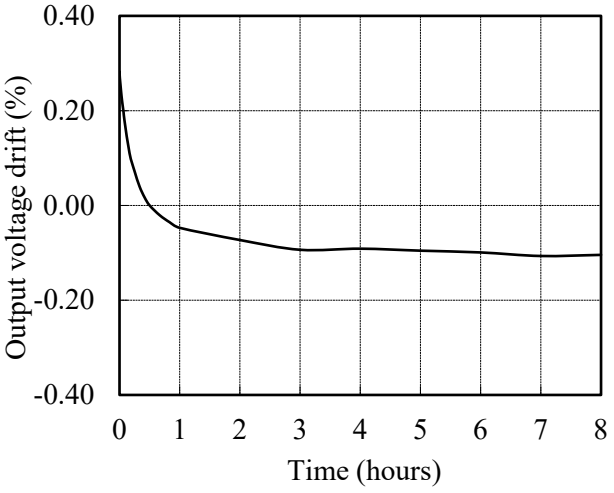
Warm up voltage drift characteristics

Conditions Vin : 115 VAC
Iout : Full load
Ta : 25 ℃

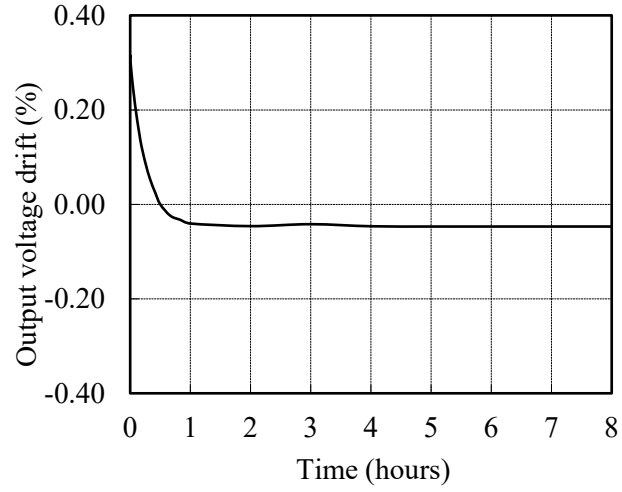
12V



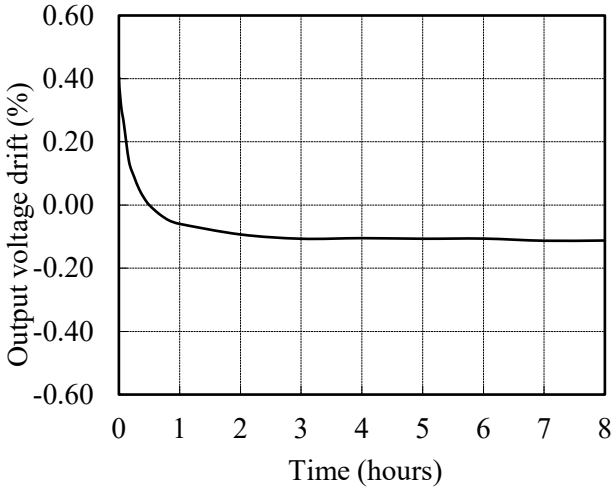
24V



36V



48V

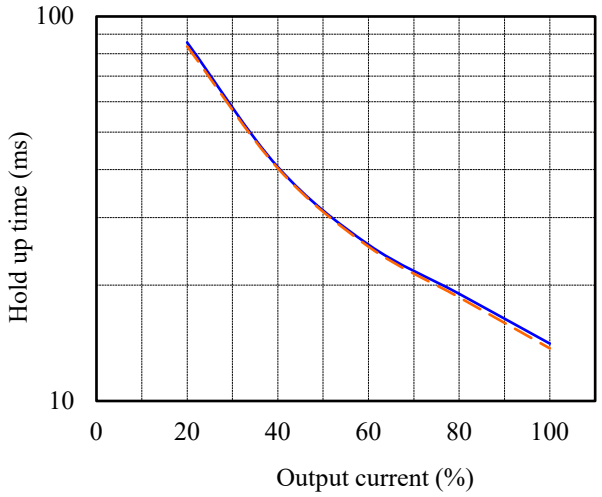


2.3 出力保持時間特性

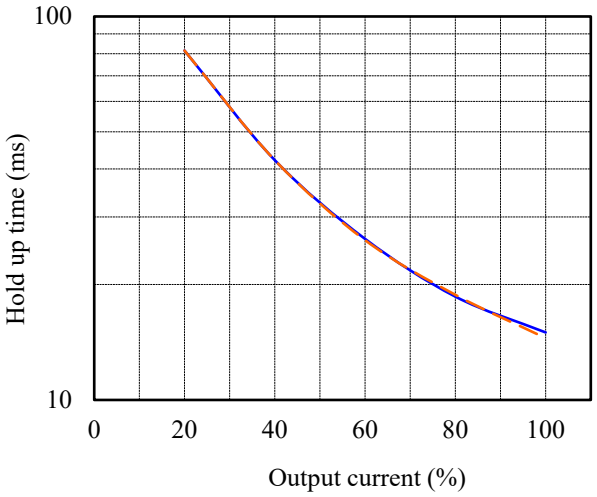
Hold up time characteristics

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

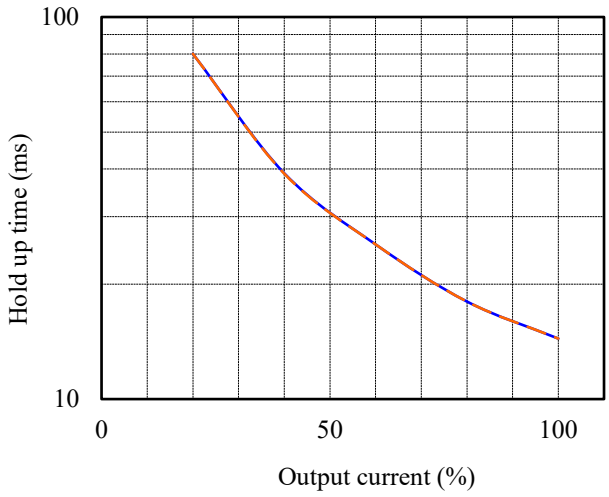
12V



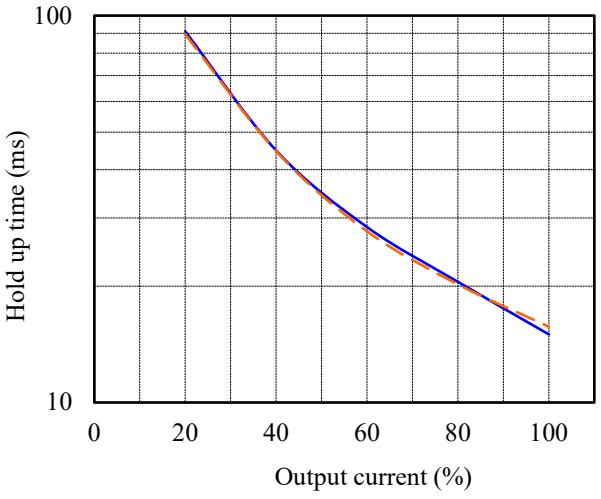
24V



36V



48V



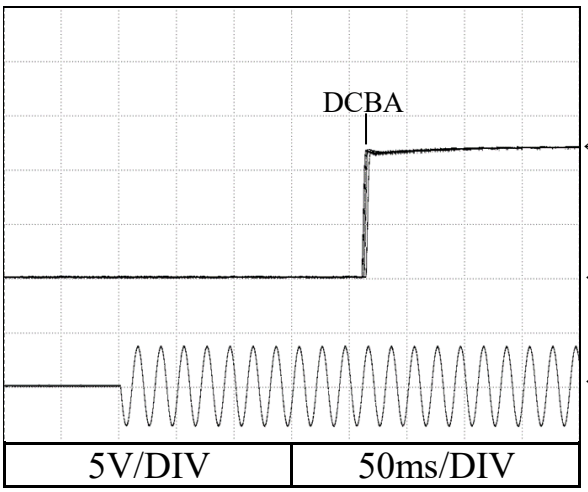
2.4 出力立ち上がり特性

Output rise characteristics

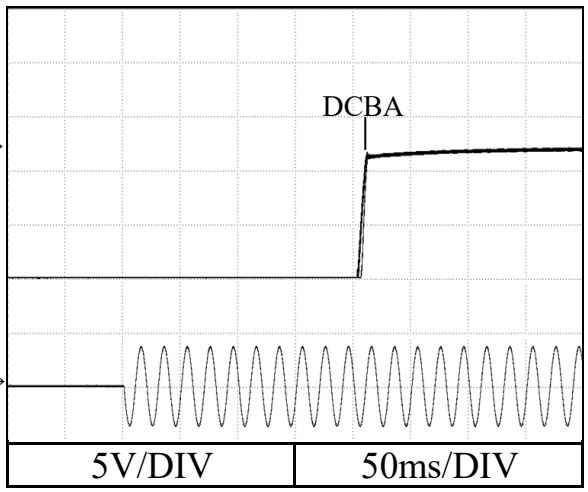
Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Ta : 25 ℃

12V

Iout : 0%

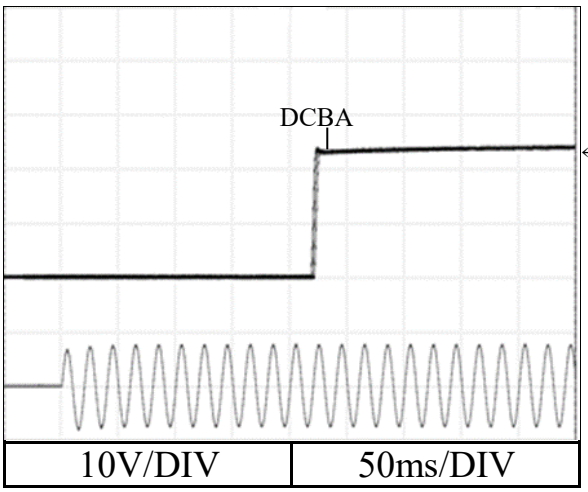


Iout: Full load

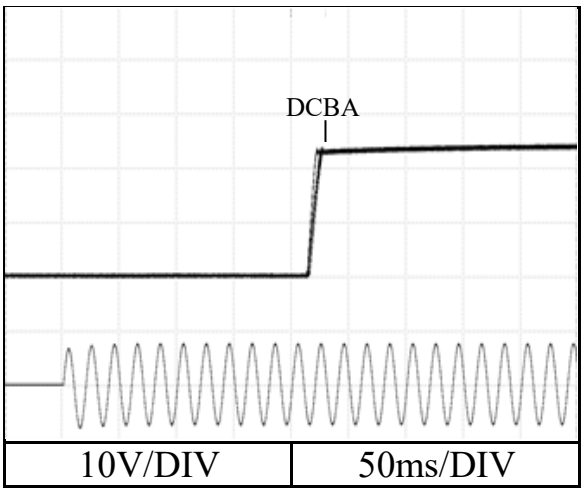


24V

Iout : 0%



Iout: Full load



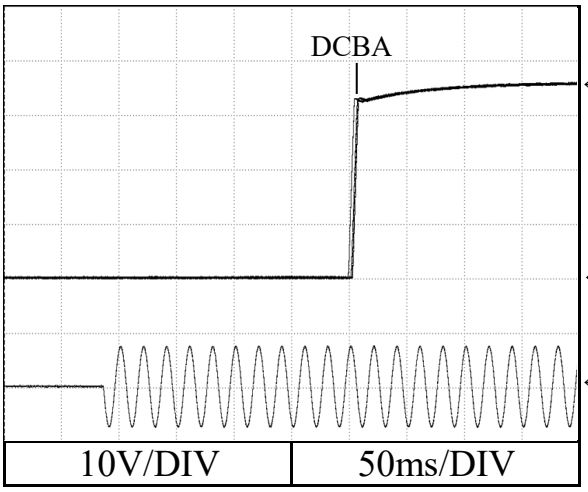
2.4 出力立ち上がり特性

Output rise characteristics

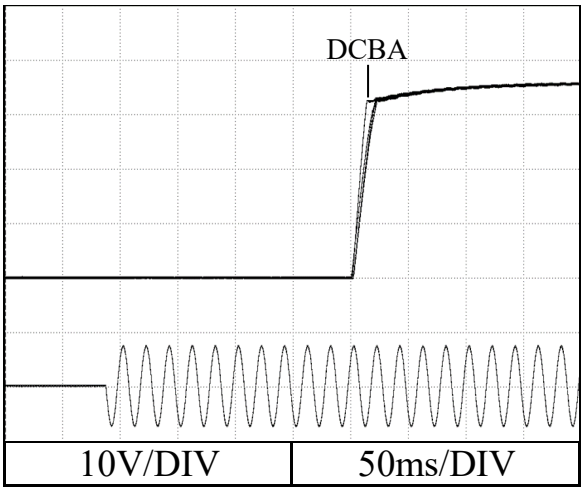
Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Ta : 25 ℃

36V

Iout : 0%

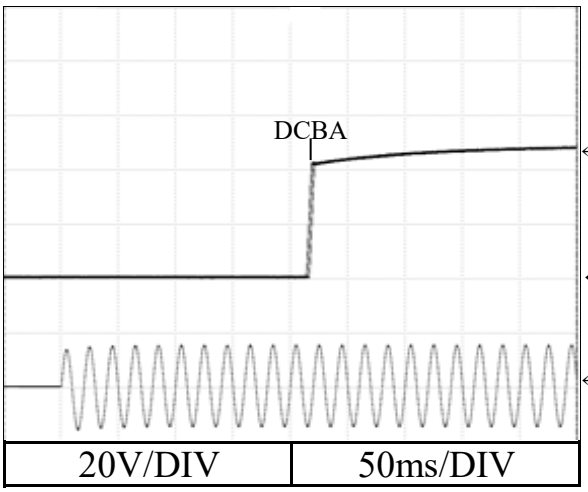


Iout:Full load

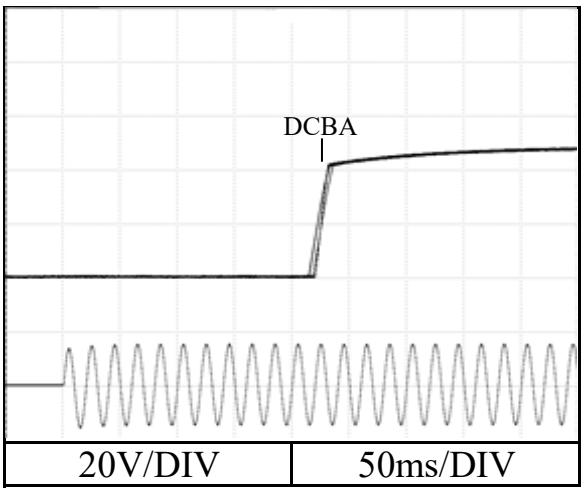


48V

Iout : 0%



Iout:Full load



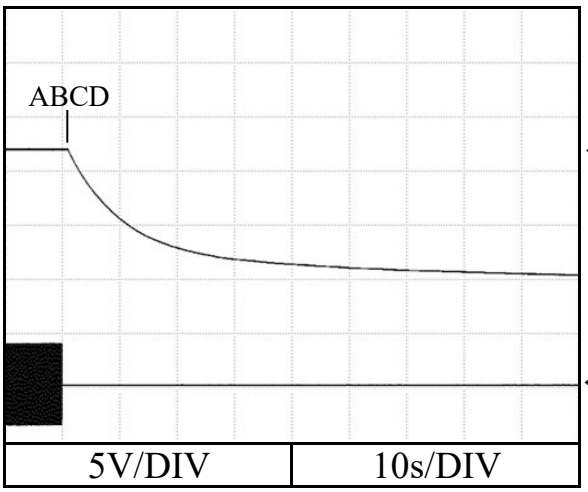
2.5 出力立ち下がり特性

Output fall characteristics

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

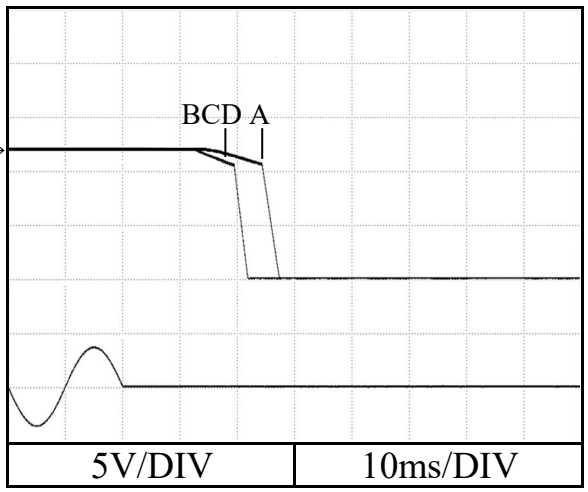
12V

Iout : 0%



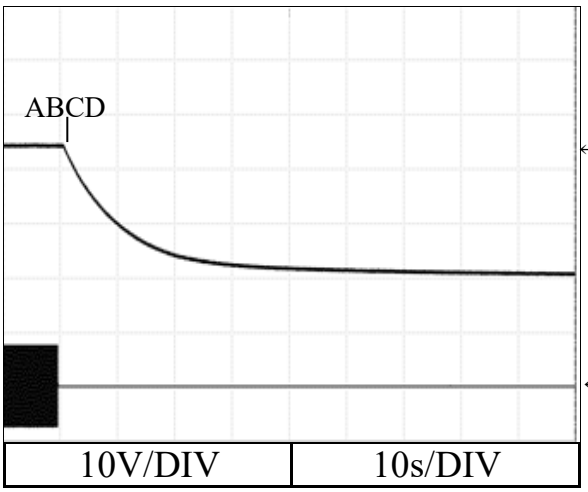
← Vout →
← 0V →
← Vin →

Iout:Full load



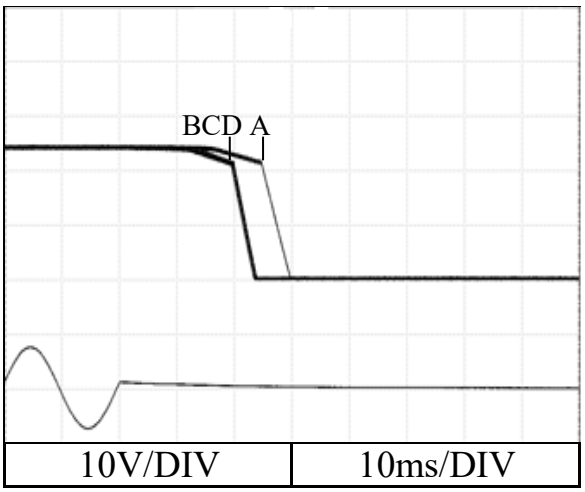
24V

Iout : 0%



← Vout →
← 0V →
← Vin →

Iout:Full load



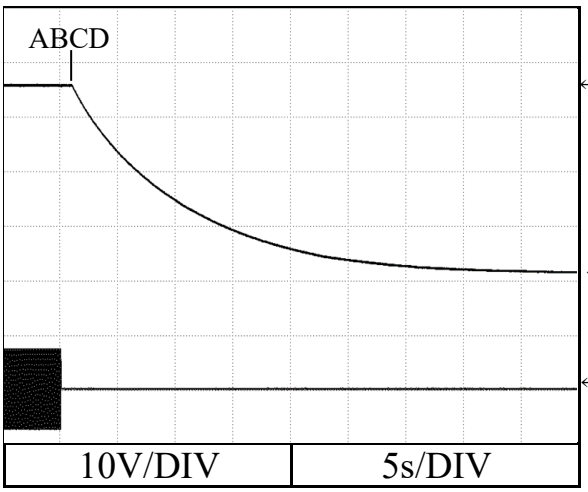
2.5 出力立ち下がり特性

Output fall characteristics

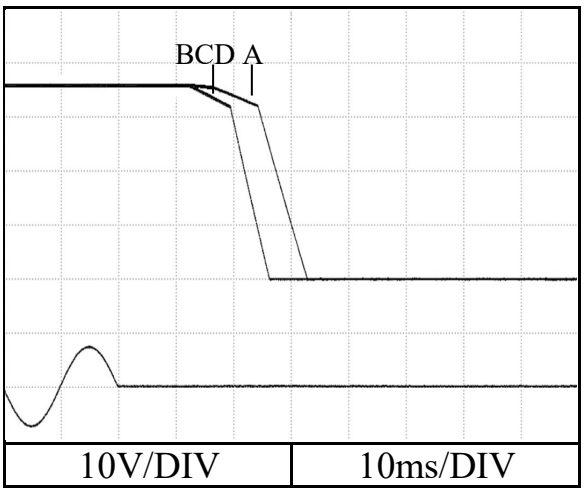
Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Ta : 25 ℃

36V

Iout : 0%

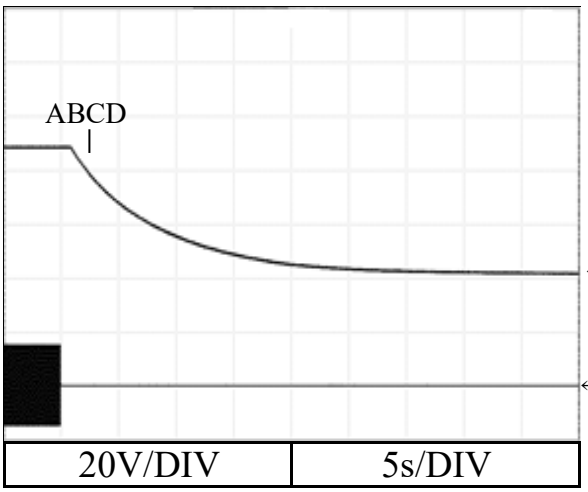


Iout:Full load

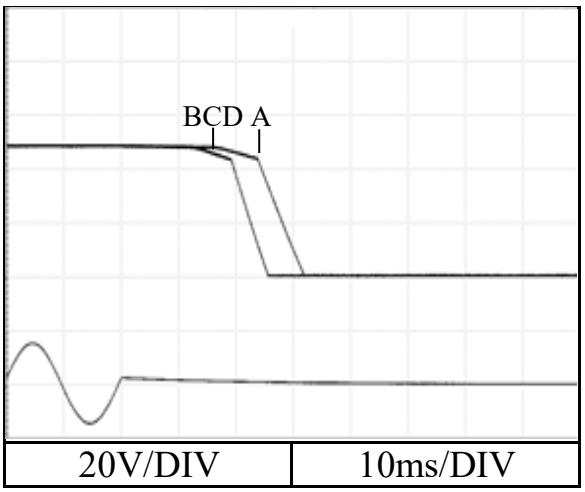


48V

Iout : 0%



Iout:Full load

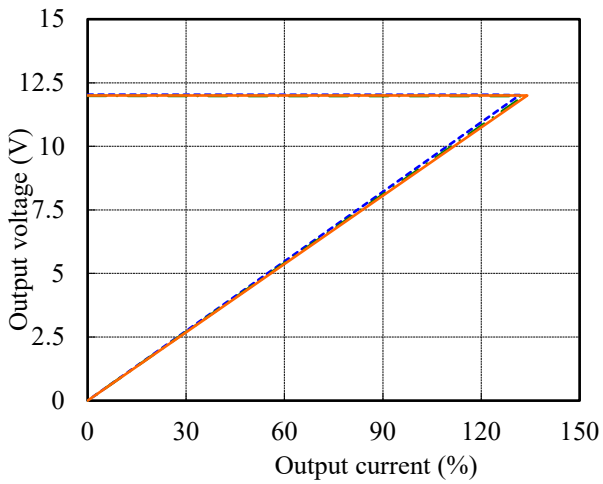


2.6 過電流保護特性

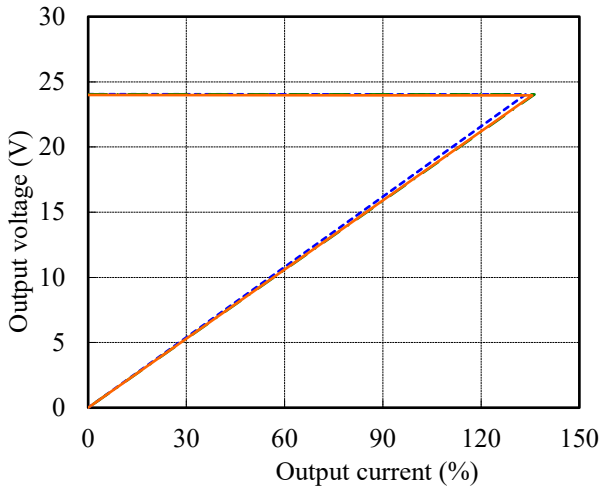
Over current protection (OCP) characteristics

Conditions Vin : 115 VAC
Ta : -20 ℃
25 ℃
40 ℃

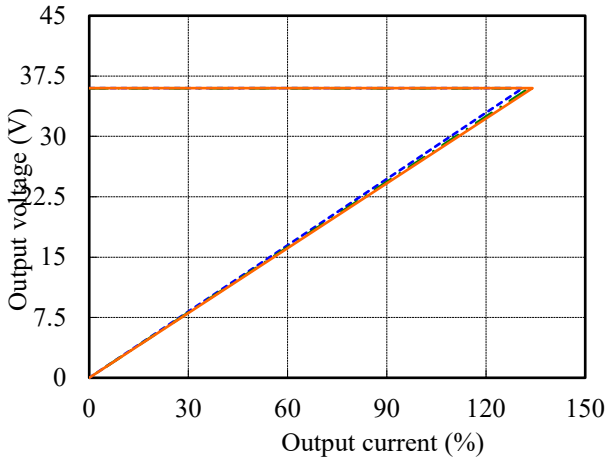
12V



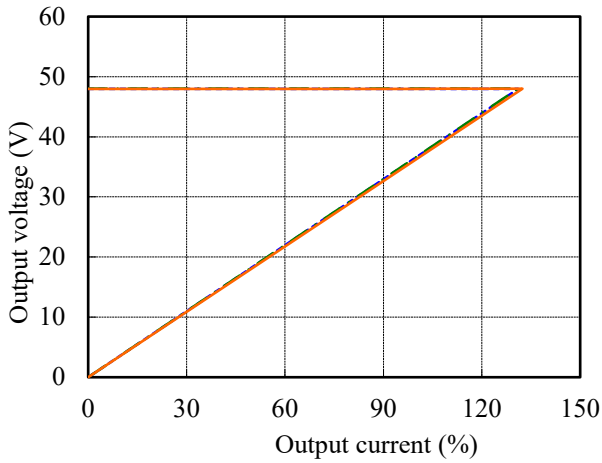
24V



36V



48V

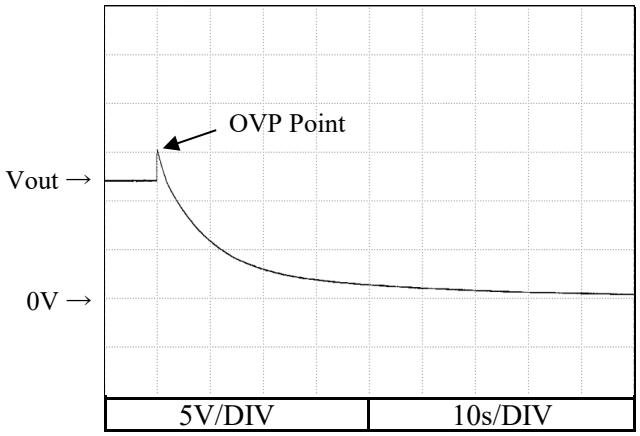


2.7 過電圧保護特性

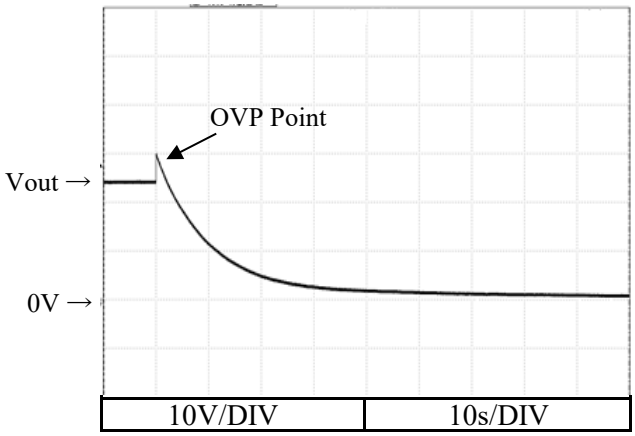
Over voltage protection (OVP) characteristics

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

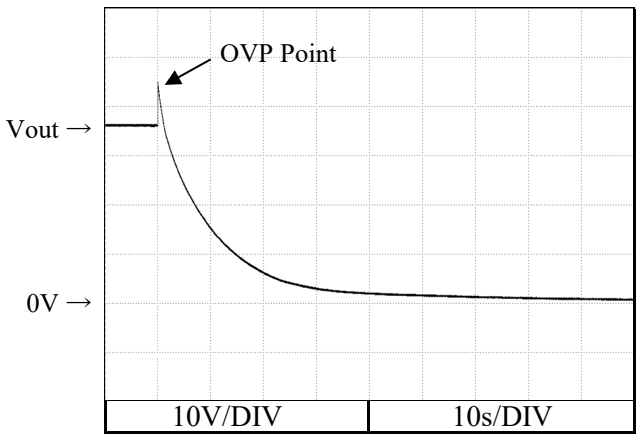
12V



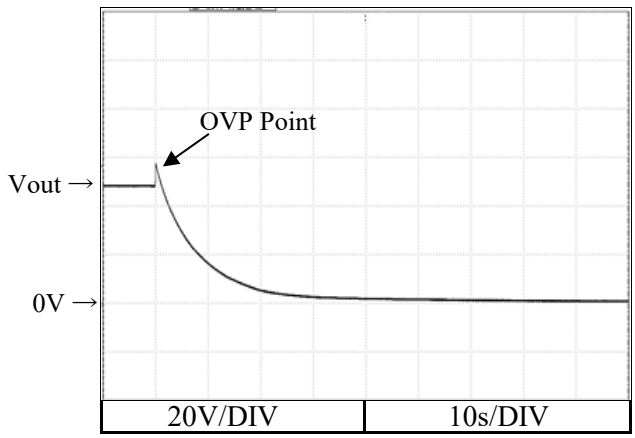
24V



36V



48V

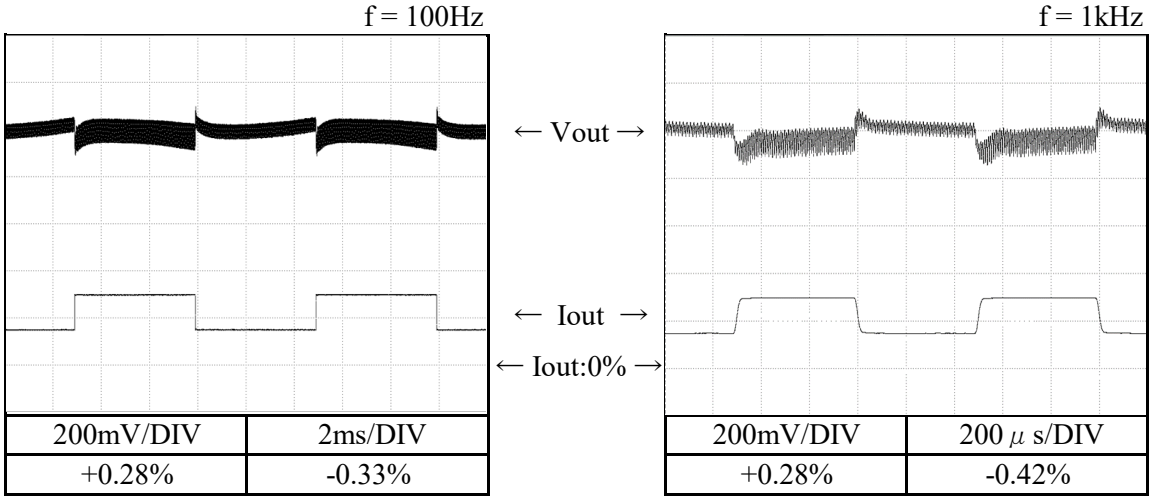


2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

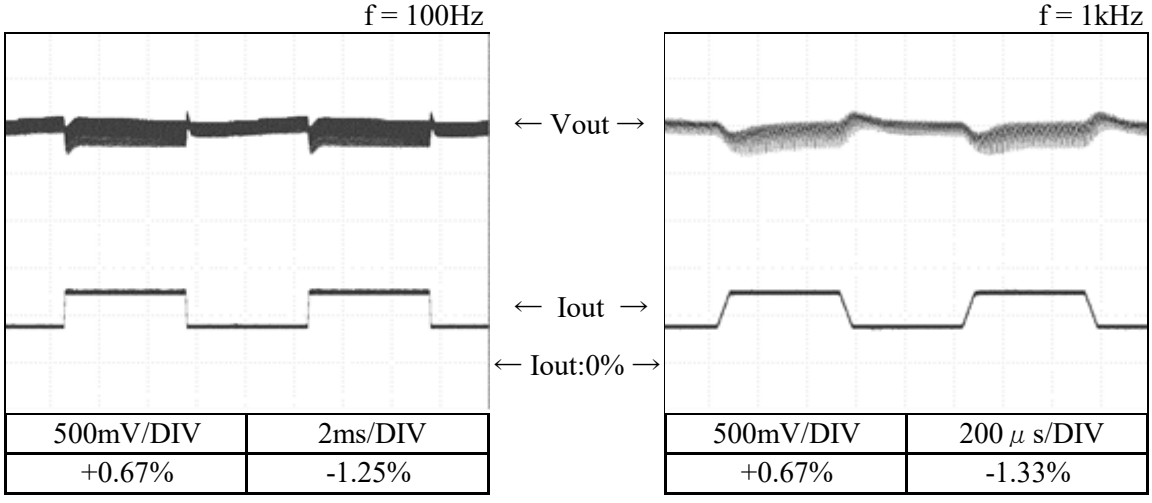
Conditions Vin : 115 VAC
Iout : 50 % ⟷ 100 %
(tr = tf = 50us)
Ta : 25 ℃

12V



200mV/DIV	2ms/DIV	200mV/DIV	200 μ s/DIV
+0.28%	-0.33%	+0.28%	-0.42%

24V



500mV/DIV	2ms/DIV	500mV/DIV	200 μ s/DIV
+0.67%	-1.25%	+0.67%	-1.33%

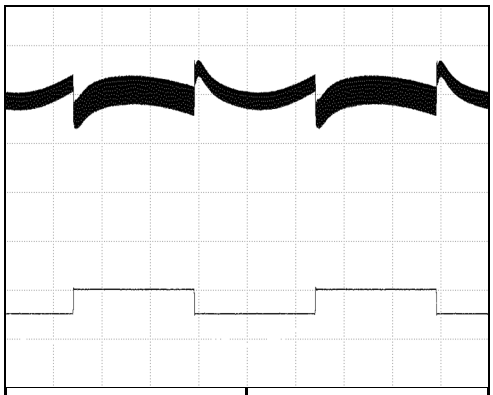
2.8 過渡応答（負荷急変）特性

Dynamic load response characteristics

Conditions Vin : 115 VAC
Iout : 50 % ⟷ 100 %
(tr = tf = 50us)
Ta : 25 ℃

36V

f = 100Hz



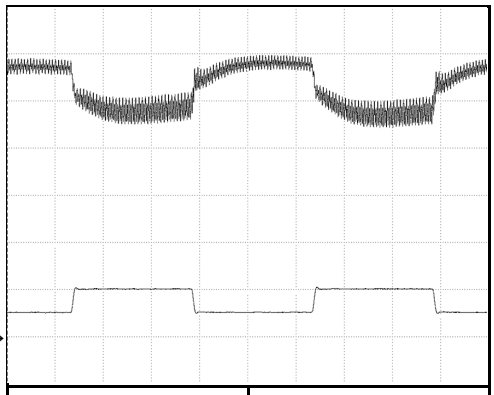
200mV/DIV	2ms/DIV
+0.42%	-0.42%

← Vout →

← Iout →

← Iout:0% →

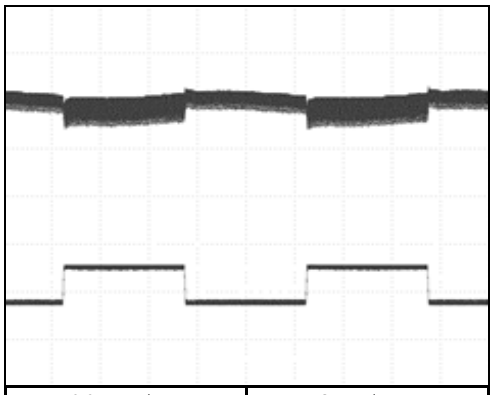
f = 1kHz



200mV/DIV	200 μ s/DIV
+0.56%	-0.33%

48V

f = 100Hz



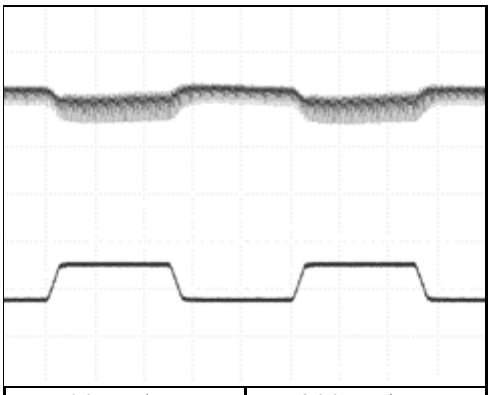
500mV/DIV	2ms/DIV
+0.33%	-0.65%

← Vout →

← Iout →

← Iout:0% →

f = 1kHz



500mV/DIV	200 μ s/DIV
+0.38%	-0.54%

2.9 入力電圧瞬停特性

Response to brown out characteristics

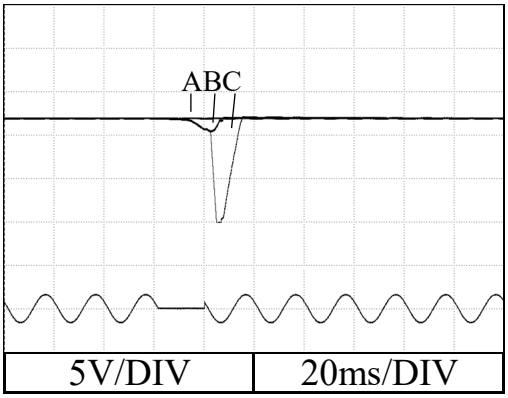
Conditions Ta : 25 ℃
Iout : Full load

瞬停時間 Interruption time

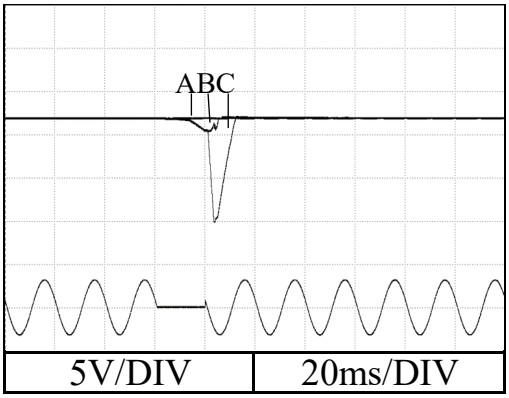
A : 出力電圧が低下なし Output voltage does not drop.
B : 出力電圧の低下が0Vまでいかない Output voltage drop down not reaching 0V.
C : 出力電圧が0Vまで低下 Output voltage drops until 0V.

12V

Vin : 115VAC
A = 11.5ms, B = 18.4ms, C = 18.5ms



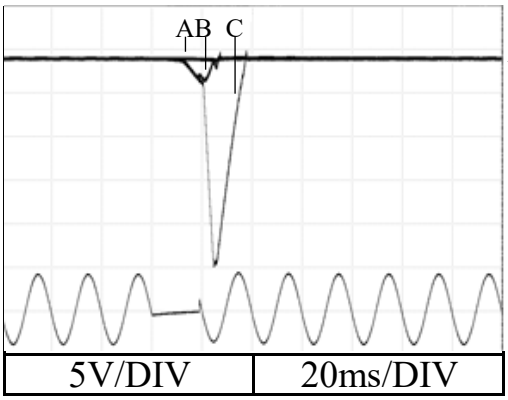
Vin : 230VAC
A = 11.5ms, B = 19.1ms, C = 19.2ms



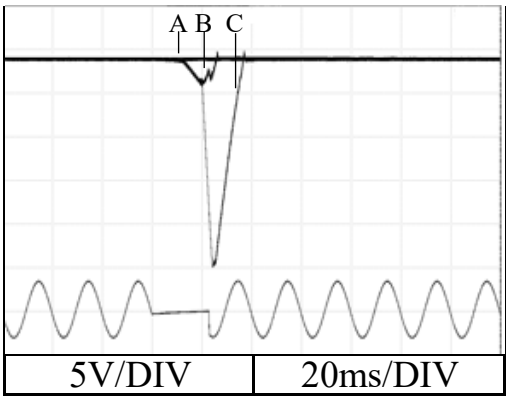
← Vout →
← 0V →
← Vin →

24V

Vin : 115VAC
A = 11ms, B = 18ms, C = 19ms



Vin : 230VAC
A = 11ms, B = 19ms, C = 23ms



← Vout →
← 0V →
← Vin →

2.9 入力電圧瞬停特性

Response to brown out characteristics

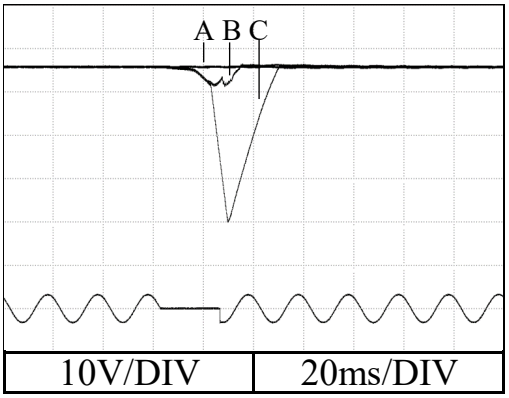
Conditions Ta : 25 ℃
Iout : Full load

瞬停時間 Interruption time

A : 出力電圧が低下なし 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.

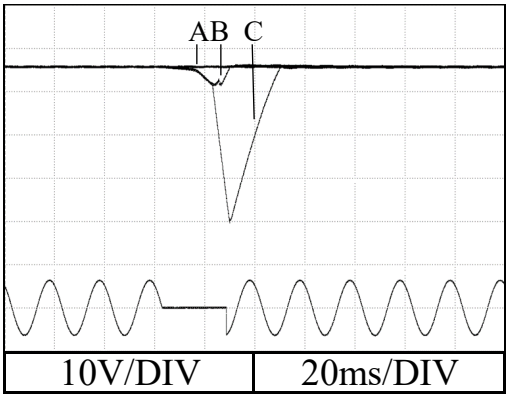
36V

Vin : 115VAC
A = 11ms, B = 18.6ms, C = 23.8ms



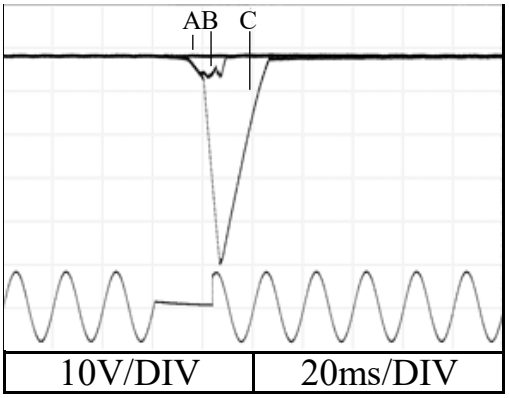
← Vout →
← 0V →
← Vin →

Vin : 230VAC
A = 11ms, B = 19.3ms, C = 25.6ms



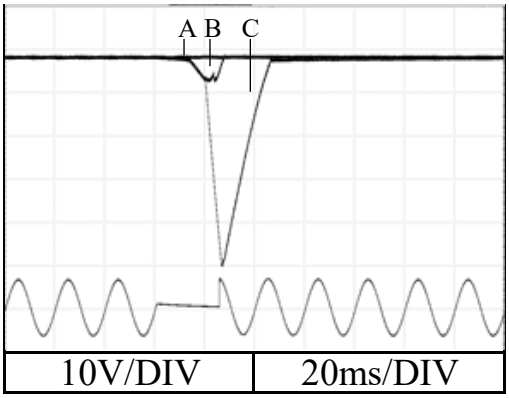
48V

Vin : 115VAC
A = 13ms, B = 18ms, C = 23ms



← Vout →
← 0V →
← Vin →

Vin : 230VAC
A = 12ms, B = 18ms, C = 25ms

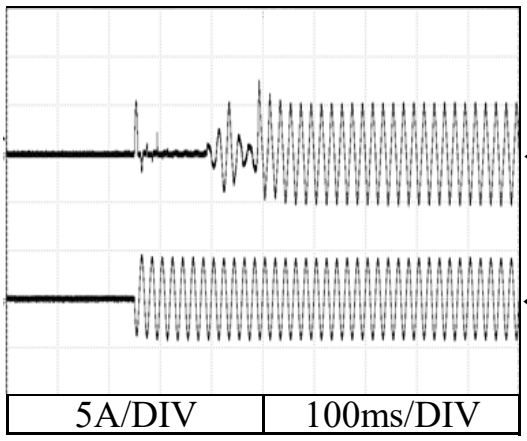


2.10 入力サージ電流（突入電流）波形
Inrush current waveform

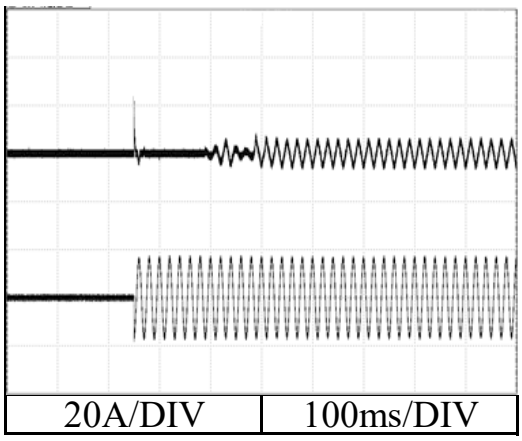
48V

Conditions Vin : 115 VAC
Iout : Full load
Ta : 25 ℃

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

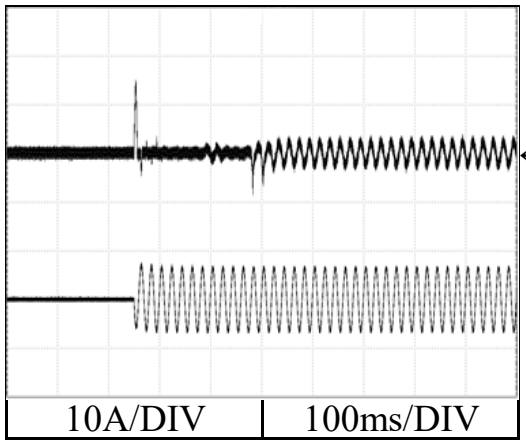


Switch on phase angle of input AC voltage
ϕ = 90°

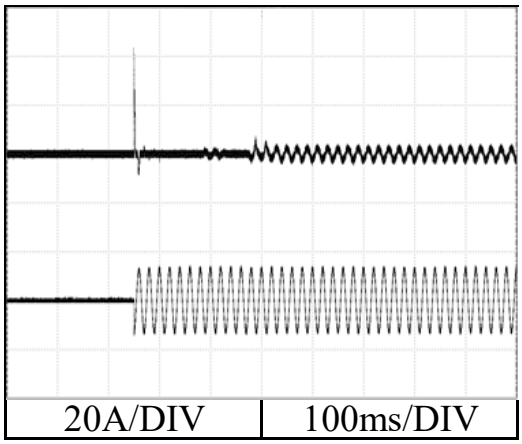


Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 ℃

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



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

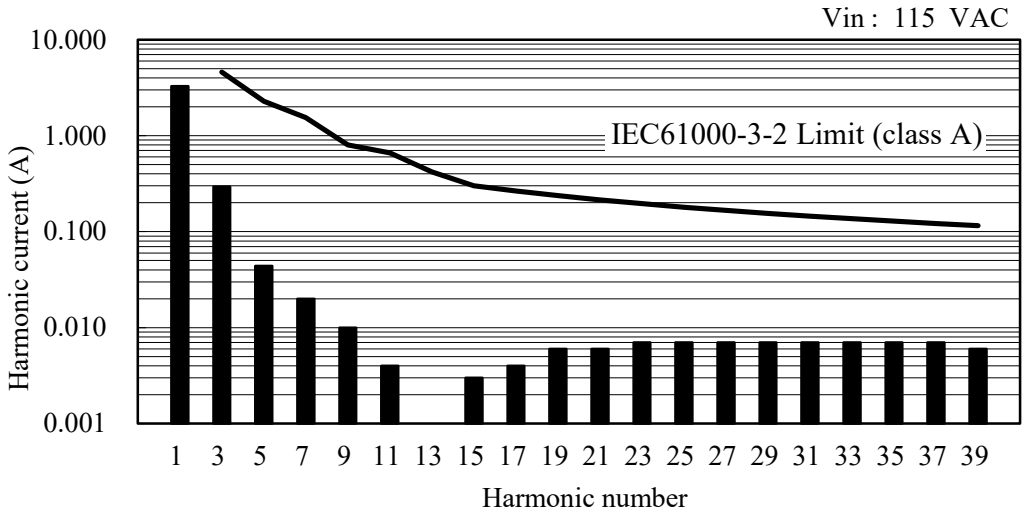


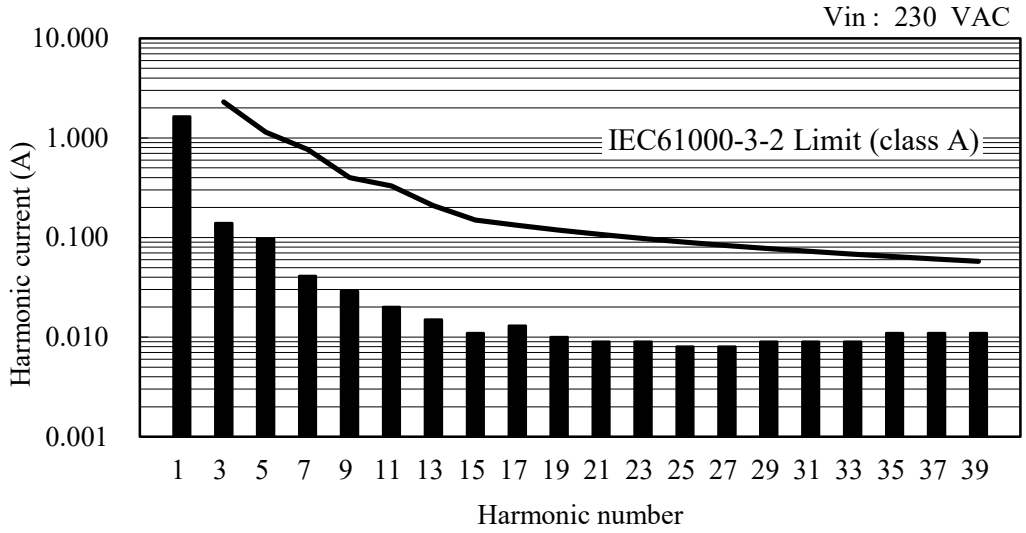
2.11 高調波成分

Input current harmonics

Conditions Iout : Full load
Ta : 25 ℃

48V



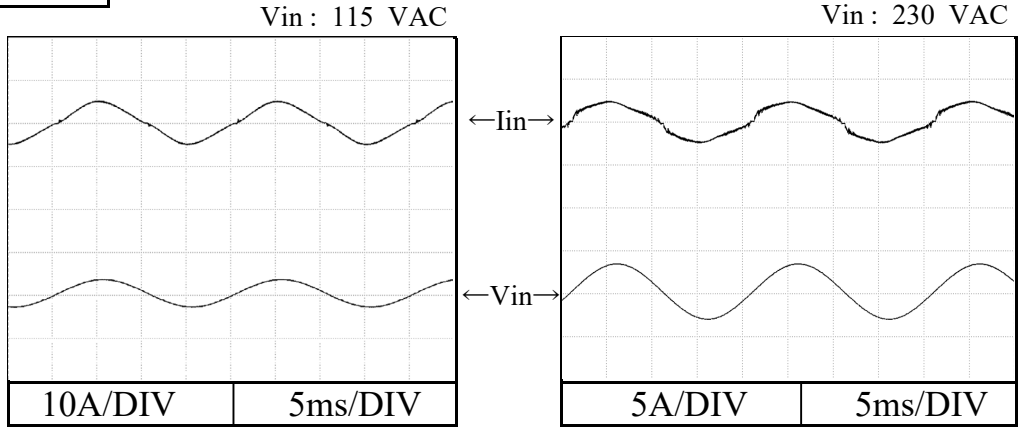


2.12 入力電流波形

Input current waveform

Conditions Iout : Full load
Ta : 25 ℃

48V

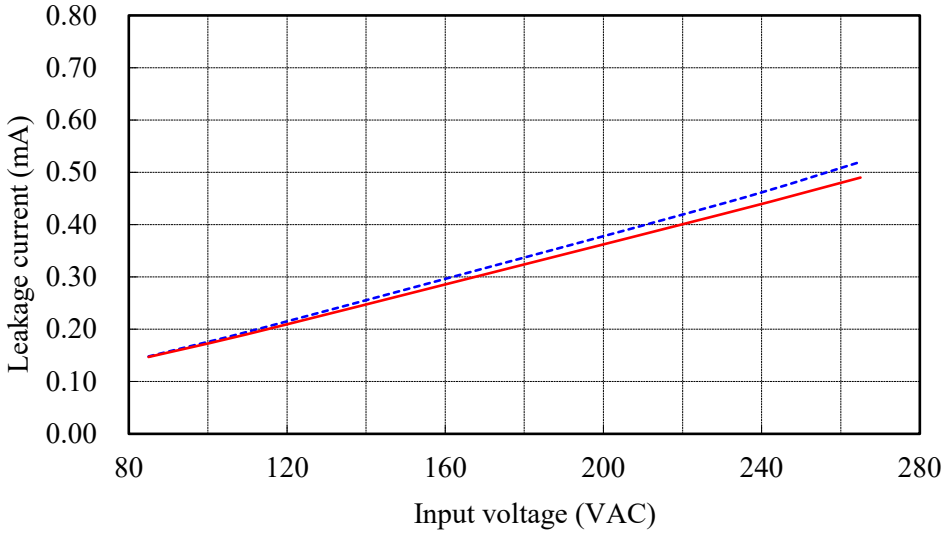


2.13 リーク電流特性
Leakage current characteristics

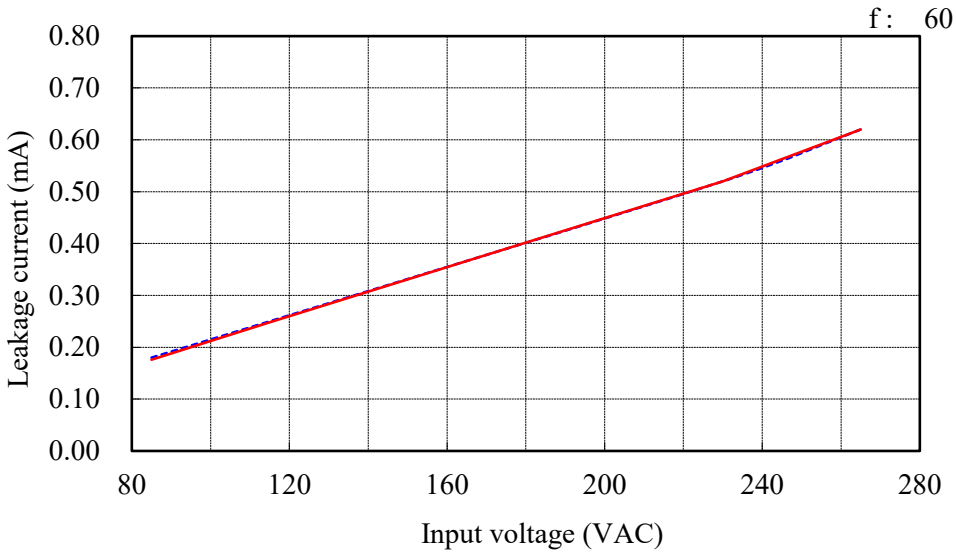
Conditions Iout : 0 %
Full Load
Ta : 25 ℃
Equipment used : MODEL 228
(Simpson)

48V

f : 50 Hz



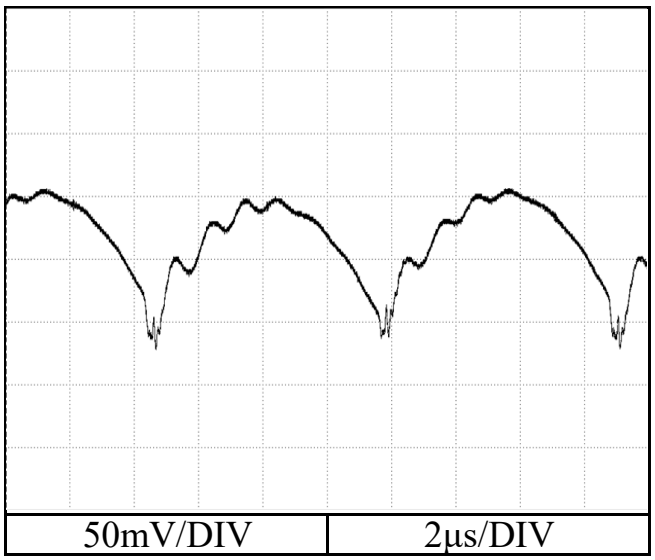
f : 60 Hz



2. 14 出力リップル、ノイズ波形
Output ripple and noise waveform

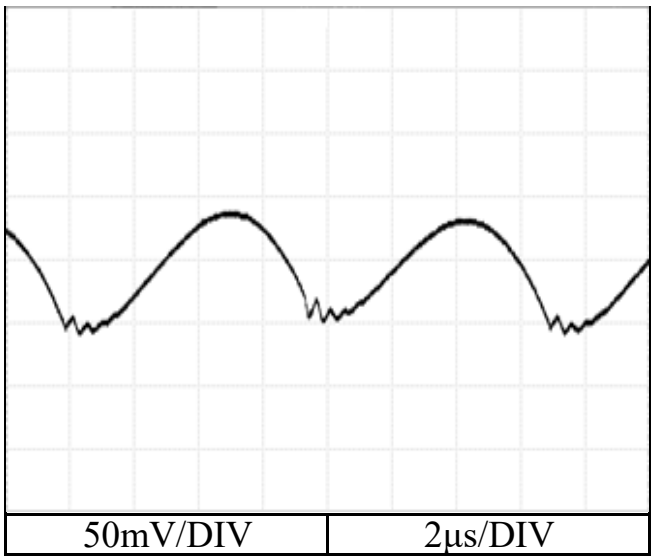
Conditions Vin : 115 VAC
Iout : Full load
Ta : 25 ℃

12V



50mV/DIV	2μs/DIV

24V

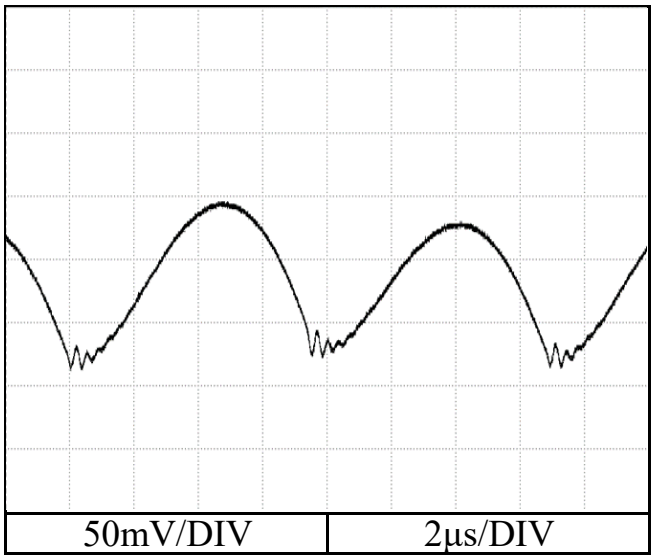


50mV/DIV	2μs/DIV

2. 14 出力リップル、ノイズ波形
Output ripple and noise waveform

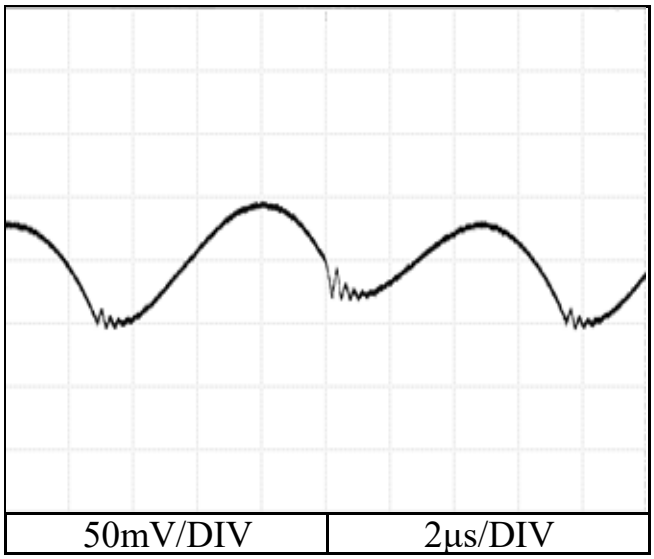
Conditions Vin : 115 VAC
Iout : Full load
Ta : 25 ℃

36V



50mV/DIV	2μs/DIV

48V



50mV/DIV	2μs/DIV

2. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

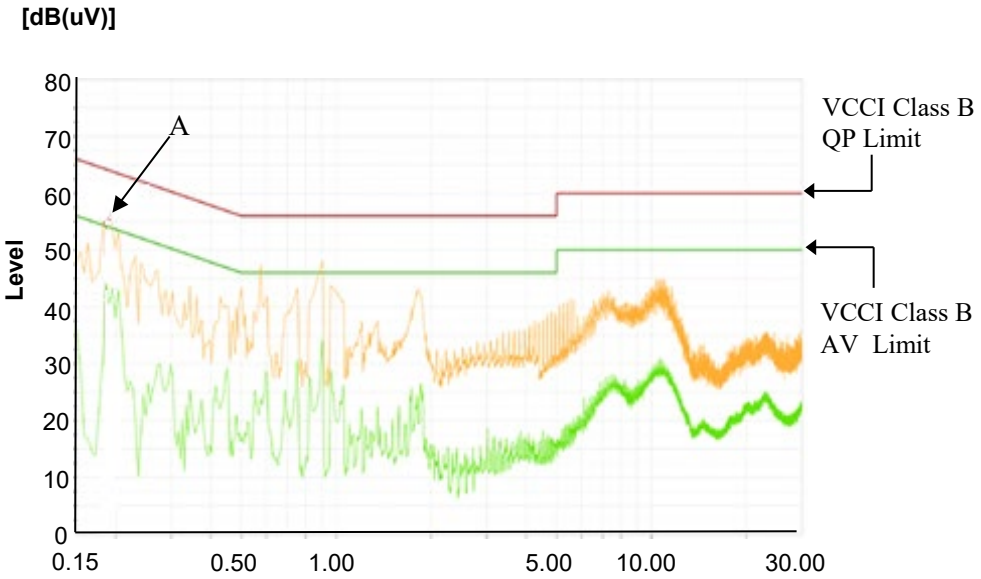
Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 ℃

雑音端子電圧

Conducted Emission

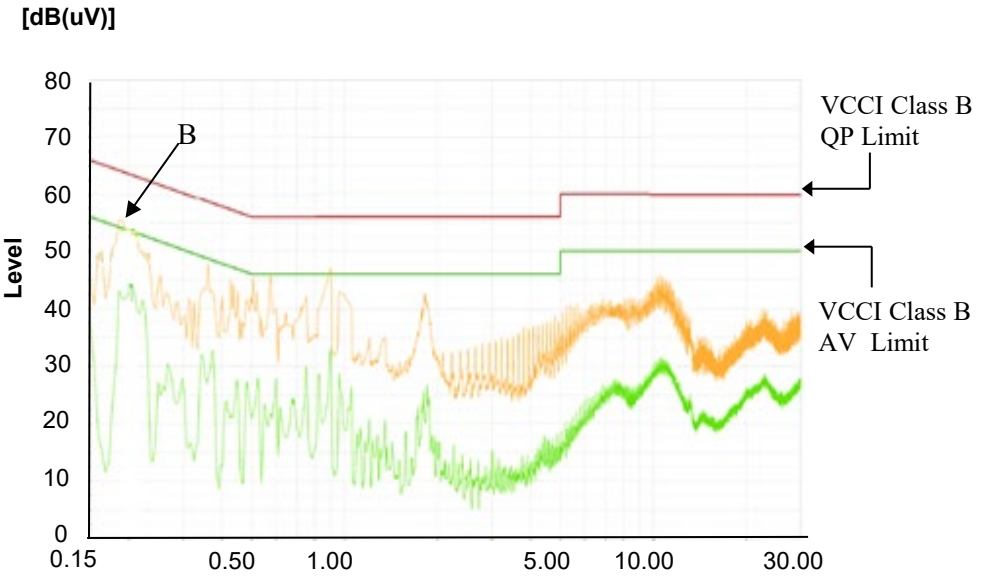
12V

Phase : N



Ref. Data	Point A (0.186MHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	55.4
AV	54.0	45.0

Phase : L



Ref. Data	Point B (0.2MHz) Limit (dBuV)	Measure (dBuV)
QP	63.5	52.0
AV	53.5	44.6

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.

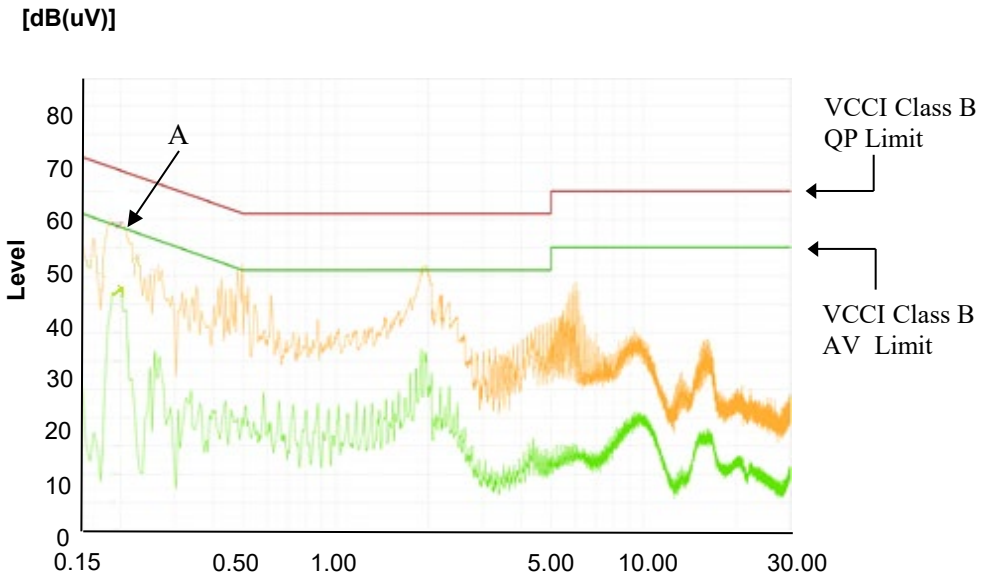
2. 15 ＥＭＩ特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 ℃

雑音端子電圧
Conducted Emission

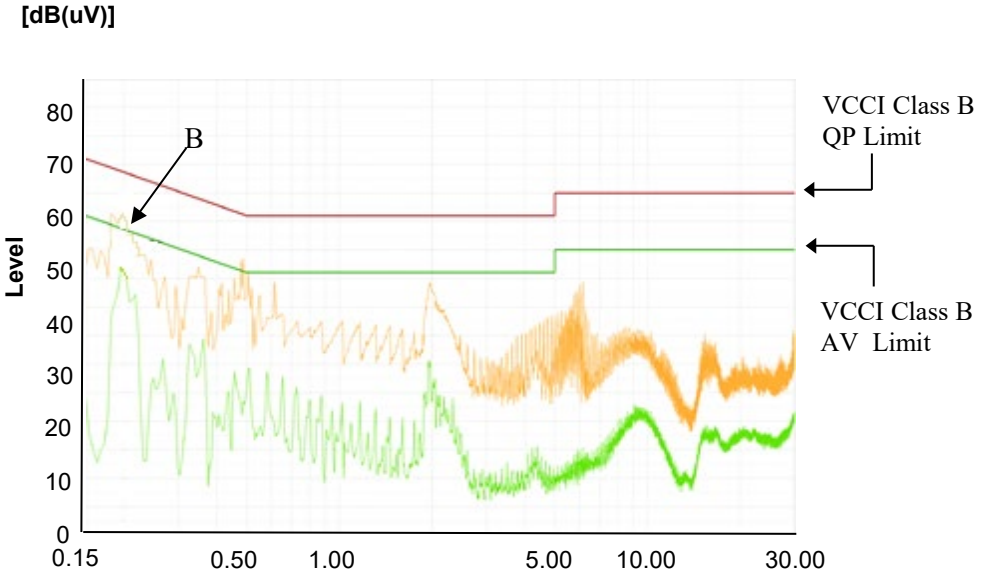
24V

Phase : N



Ref. Data	Point A (0.19MHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	54.4
AV	54.0	42.5

Phase : L



Ref. Data	Point B (0.2MHz) Limit (dBuV)	Measure (dBuV)
QP	63.6	54.8
AV	53.6	46.7

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. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

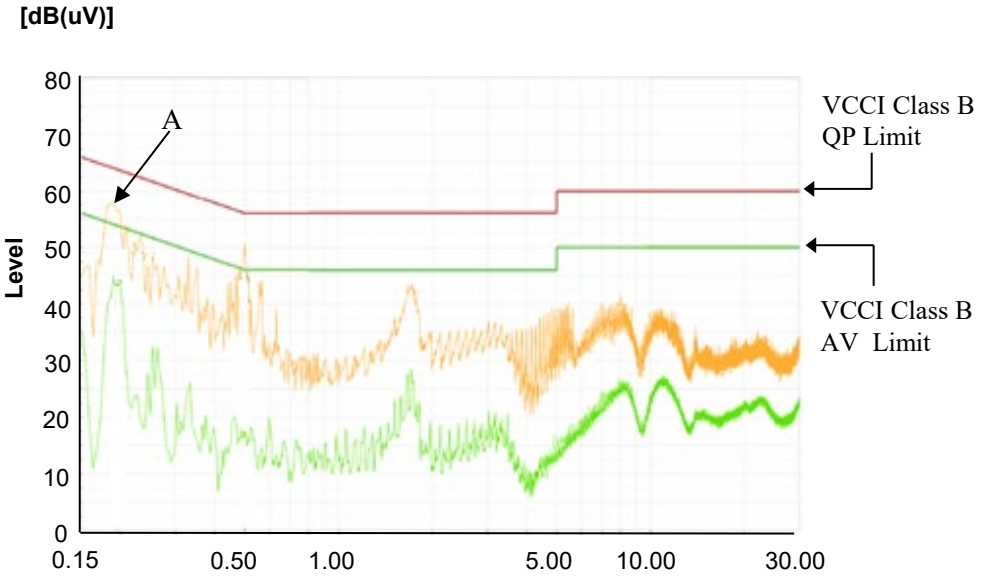
Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 ℃

雑音端子電圧

Conducted Emission

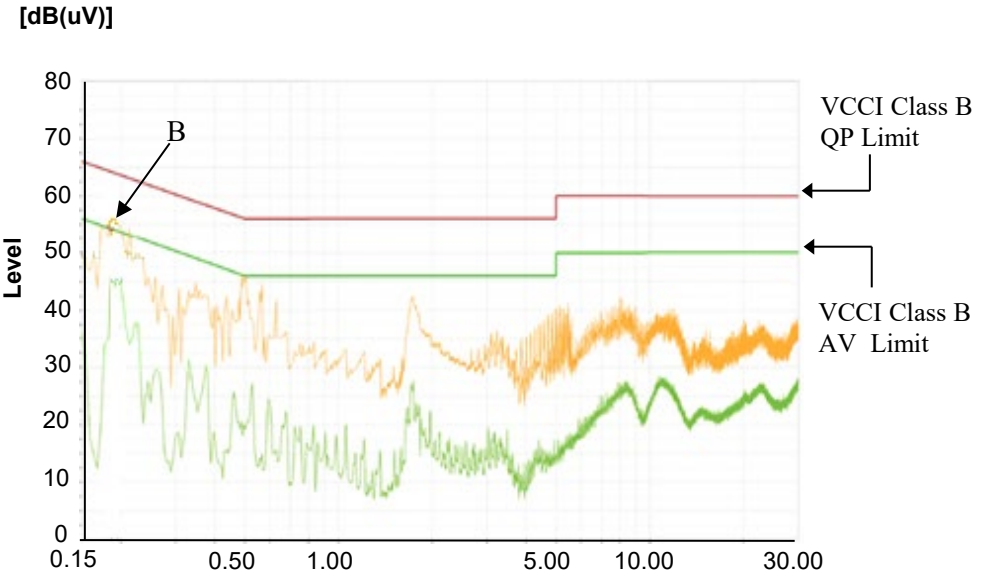
36V

Phase : N



Ref. Data	Point A (0.2Hz) Limit (dBuV)	Measure (dBuV)
QP	63.8	57.2
AV	53.8	44.0

Phase : L



Ref. Data	Point B (0.19MHz) Limit (dBuV)	Measure (dBuV)
QP	64.0	54.6
AV	54.0	45.1

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. 15 ＥＭＩ特性

Electro-Magnetic Interference characteristics

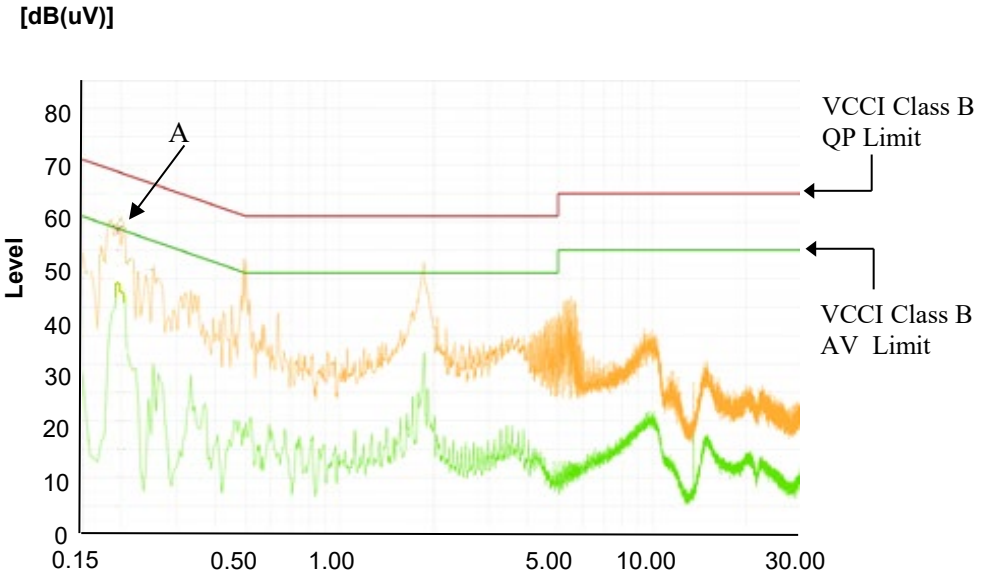
Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 ℃

雑音端子電圧

Conducted Emission

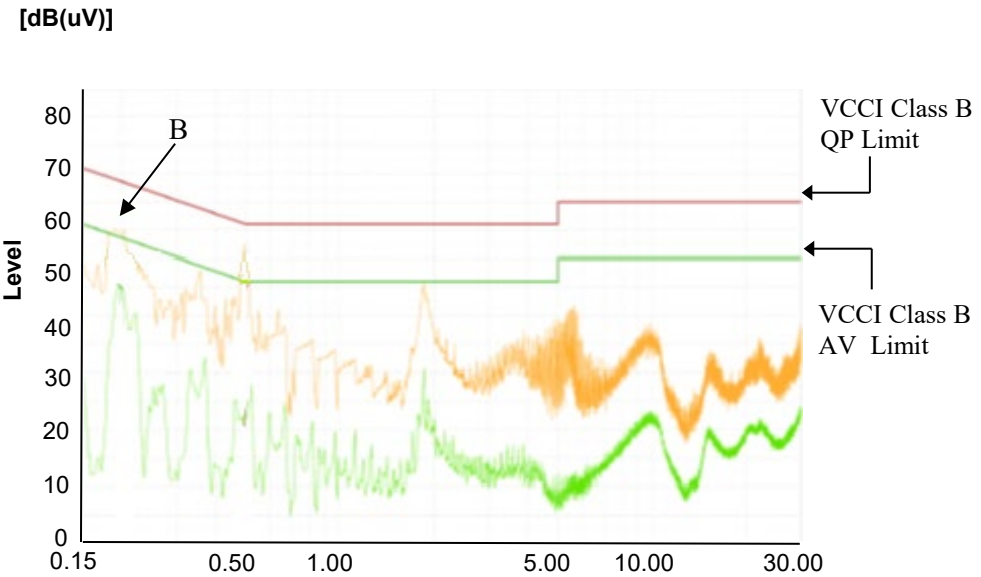
48V

Phase : N



Ref. Data	Point A (0.2MHz) Limit (dBuV)	Measure (dBuV)
QP	63.5	54.3
AV	53.5	42.9

Phase : L



Ref. Data	Point B (0.2MHz) Limit (dBuV)	Measure (dBuV)
QP	63.6	55.1
AV	53.6	45.7

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.

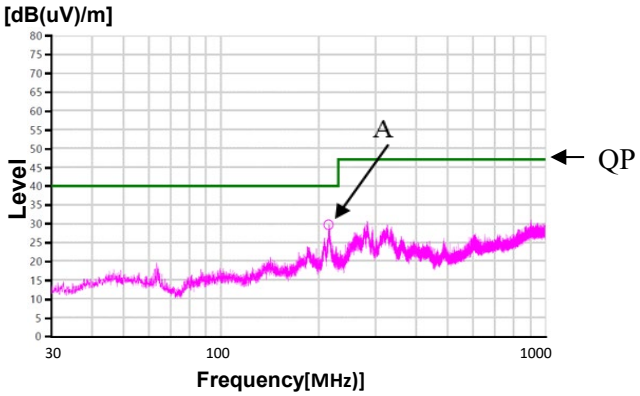
2. 15 ＥＭＩ特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Io : Full load
Ta : 25 ℃

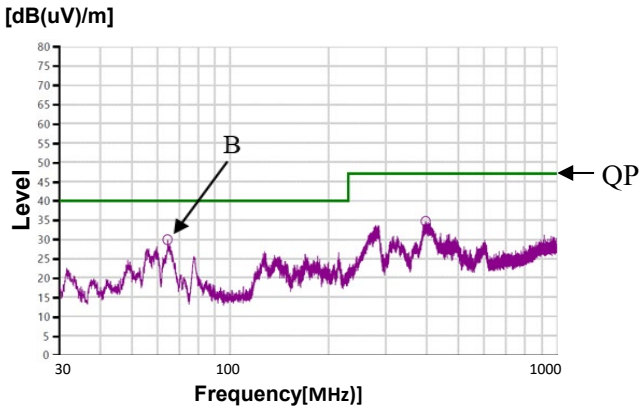
雑音電界強度
Radiated Emission

12V

HORIZONTAL

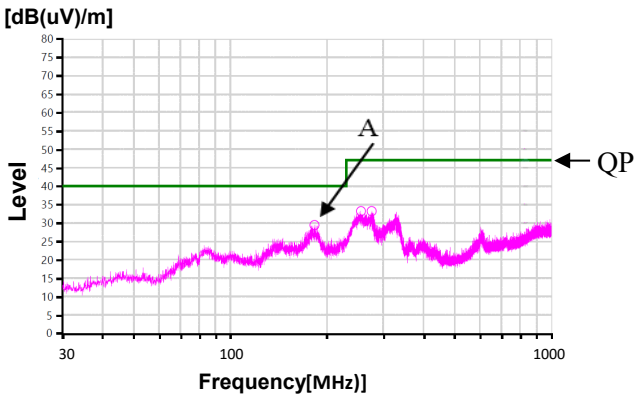


VERTICAL

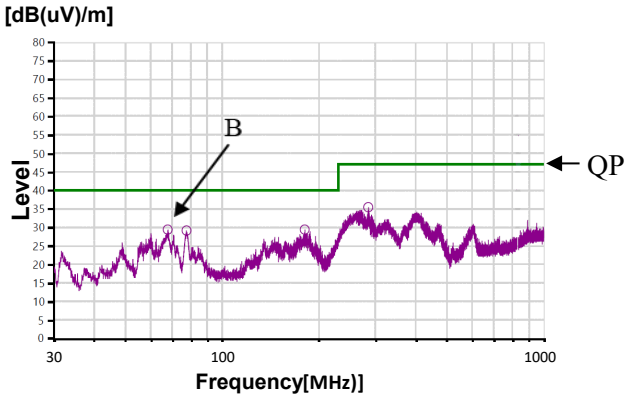


24V

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.

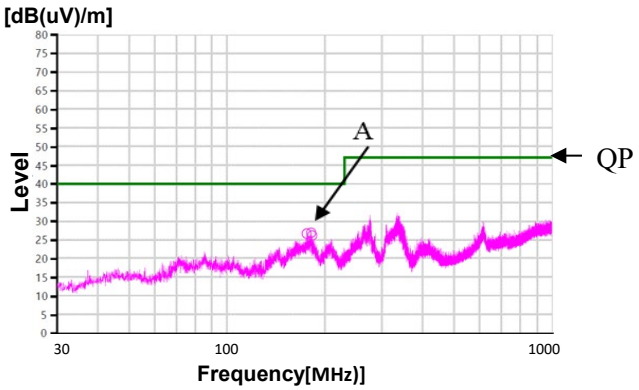
2. 15 ＥＭＩ特性
Electro-Magnetic Interference characteristics

Conditions Vin : 230 VAC
Io : Full load
Ta : 25 ℃

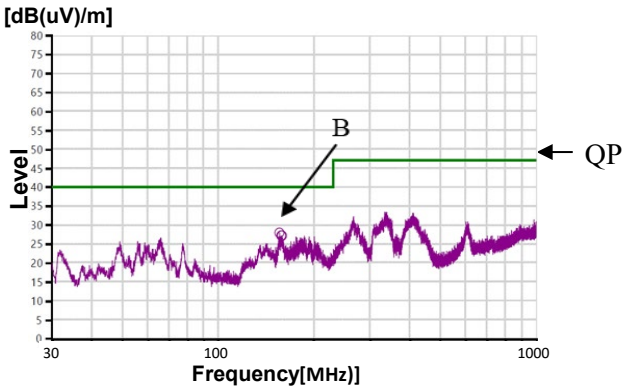
雑音電界強度
Radiated Emission

36V

HORIZONTAL

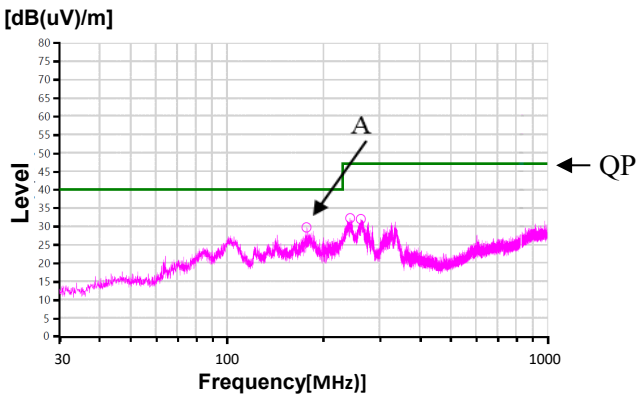


VERTICAL

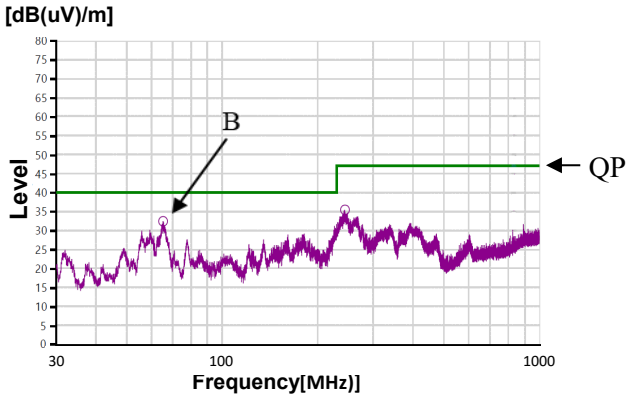


48V

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.