

KWS25A

EVALUATION DATA

型式データ

INDEX

PAGE

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.....	4
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	
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	4
過渡応答(負荷急変)特性 Dynamic load response characteristics	
測定回路3 Circuit 3 used for determination	5
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	5
過電圧保護特性 Over voltage protection (OVP) characteristics	
測定回路5 Circuit 5 used for determination	6
出力リップル、ノイズ波形 Output ripple and noise waveform	
測定回路6 Circuit 6 used for determination	6
EMI特性 Electro-Magnetic Interference characteristics	
雑音電界強度(放射ノイズ) Radiated Emission	
測定構成 Configuration used for determination	7
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	8
1-3. 評価負荷条件 Load conditions	8

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 … 9

- (2) リップルノイズ電圧対入力電圧 Ripple noise voltage vs. Input voltage …… 10

- (3) 効率・力率対出力電流 Efficiency and Power factor vs. Output current …… 11

- (4) 入力電力対出力電流 Input power vs. Output current …… 12

- (5) 入力電流対出力電流 Input current vs. Output current …… 13

2-2. 通電ドリフト特性 Warm up voltage drift characteristics …… 14

2-3. 出力保持時間特性 Hold up time characteristics …… 14

2-4. 出力立ち上がり特性 Output rise characteristics …… 15~17

2-5. 出力立ち下がり特性 Output fall characteristics …… 18~20

2-6. 過電流保護特性 Over current protection (OCP) characteristics …… 21

2-7. 過電圧保護特性 Over voltage protection (OVP) characteristics …… 21

2-8. 過渡応答(負荷急変)特性 Dynamic load response characteristics …… 22

2-9. 入力電圧瞬停特性 Response to brown out characteristics …… 23~25

2-10. 入力サージ電流(突入電流)波形 Inrush current waveform …… 26

2-11. 入力電流波形 Input current waveform …… 27

2-12. 出力リップル、ノイズ波形 Output ripple and noise waveform …… 28

2-13. EMI特性 Electro-Magnetic Interference characteristics …… 29~36

使用記号 Terminology used

定義 Definition

V_{in}	……	入力電圧	Input voltage
V_{out}	……	出力電圧	Output voltage
I_{in}	……	入力電流	Input current
I_{out}	……	出力電流	Output current
T_a	……	周囲温度	Ambient temperature
f	……	周波数	Frequency

※ 当社測定条件における結果であり、参考値としてお考え願います。

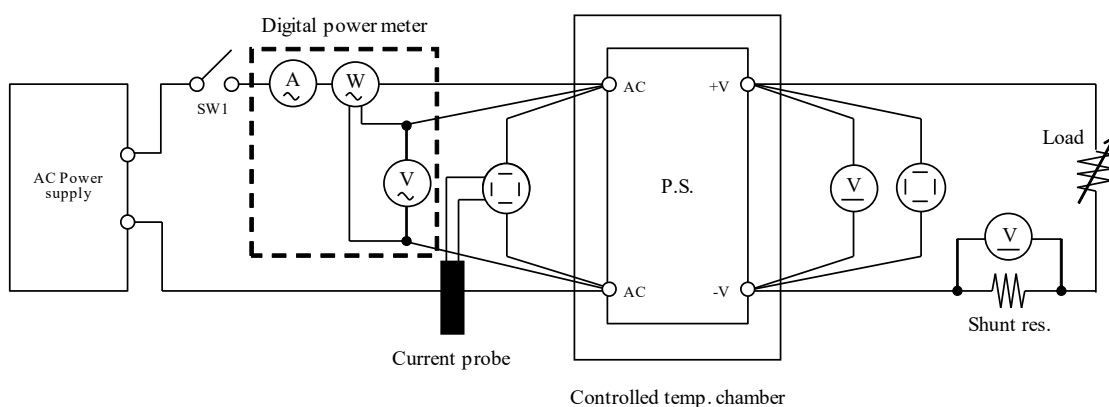
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

1-1. 算出方法 Calculating Method

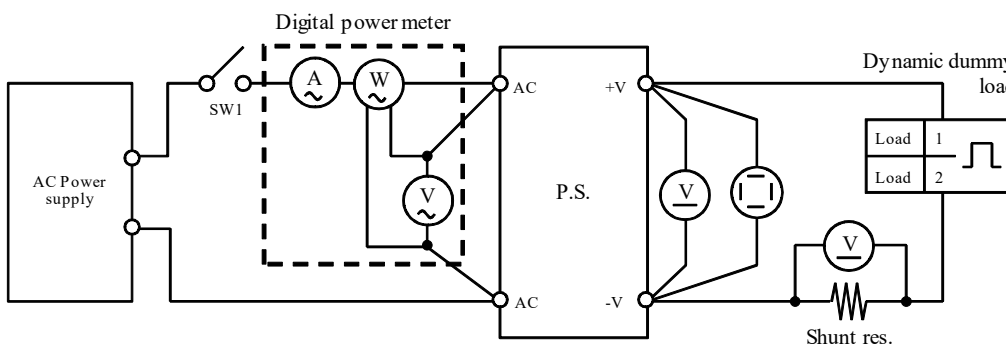
測定回路1 Circuit 1 used for determination

- 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
- 入力電圧瞬停特性 Response to brown out characteristics
- 入力電流波形 Input current waveform

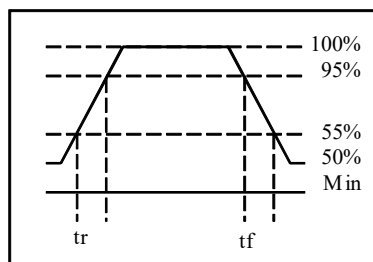


測定回路2 Circuit 2 used for determination

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

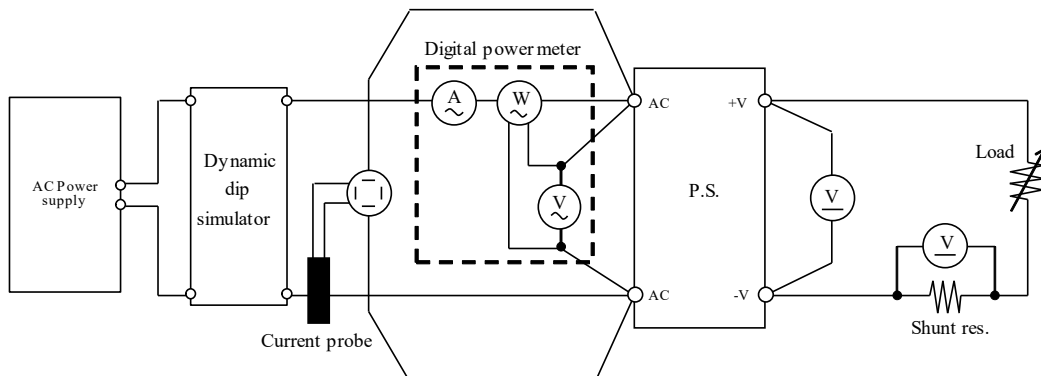


Output current waveform
Iout 50% <==> 100%



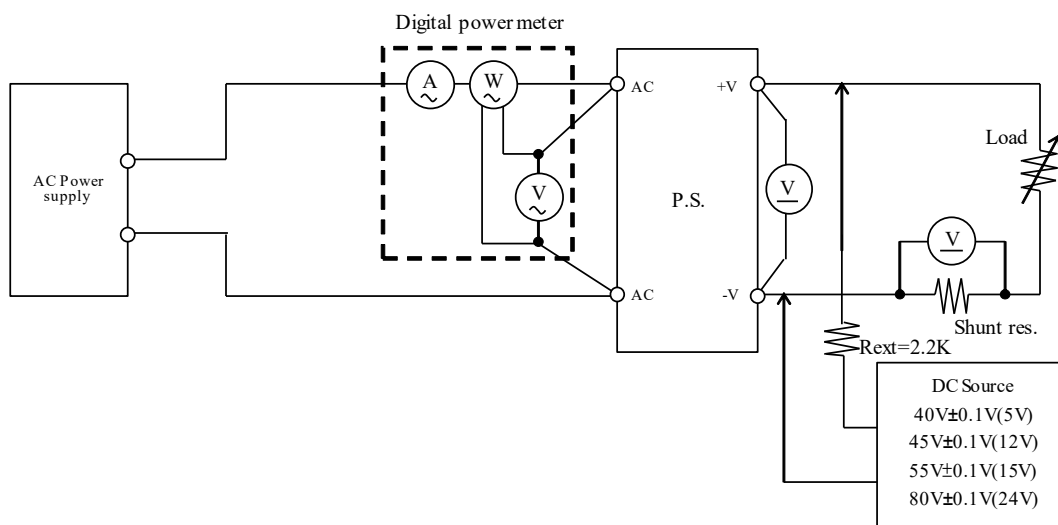
測定回路3 Circuit 3 used for determination

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



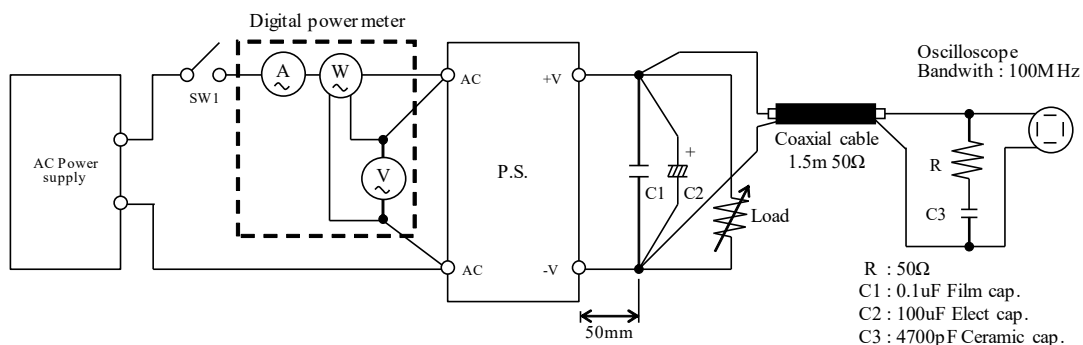
測定回路4 Circuit 4 used for determination

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



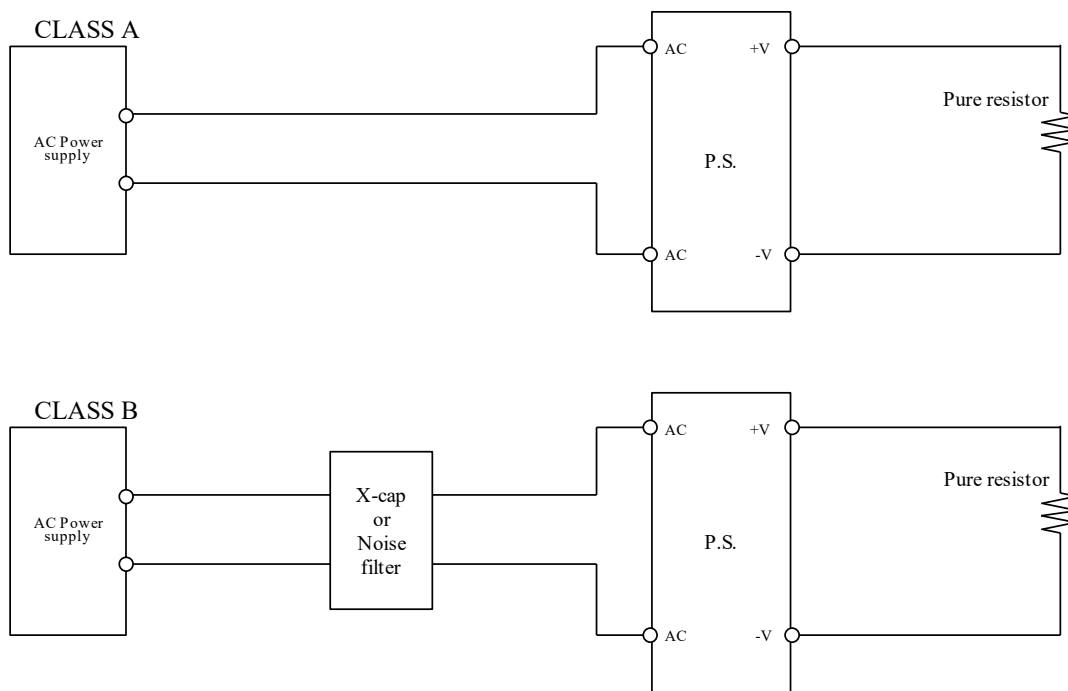
測定回路5 Circuit 5 used for determination

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



測定回路6 Circuit 6 used for determination

- EMI特性 Electro-Magnetic Interference characteristics
 雑音電界強度(放射ノイズ) Radiated Emission

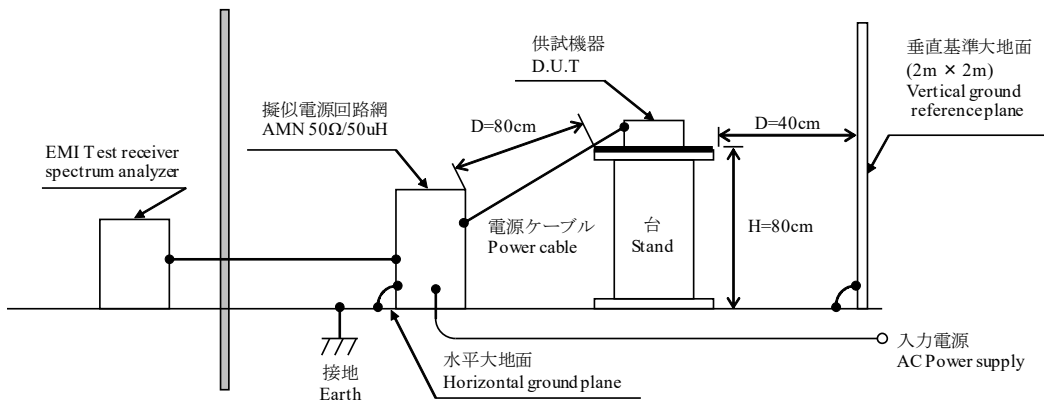


推奨 X-コンデンサ X-cap recommended :
 ECQU3A104MG(PANASONIC) or CTX104K310VP10 (CHENG TUNG).
 推奨ノイズフィルタ Noise filter recommended :
 RSEG-2001 (TDK-Lambda).

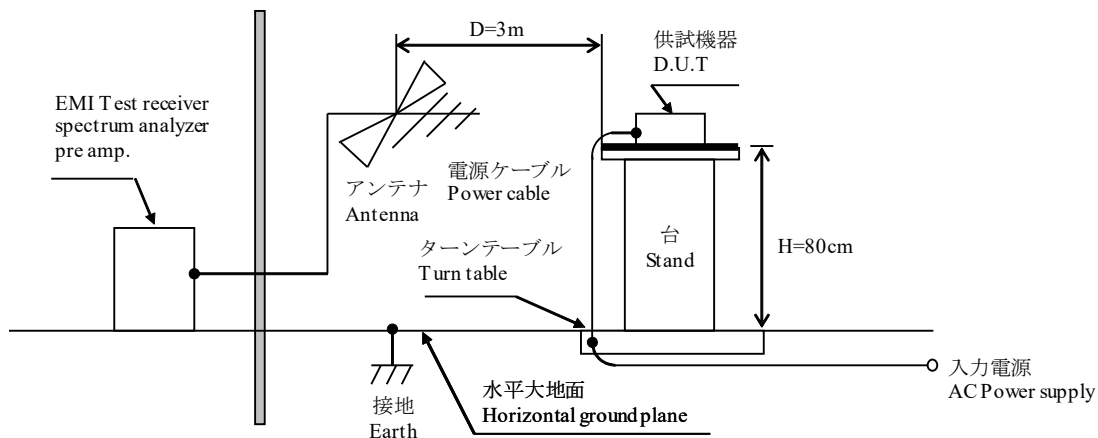
測定構成 Configuration used for determination

- 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	LeCroy	LT345
2	DIGITAL STORAGE OSCILLOSCOPE	TeKtronix	TDS3014B
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE	TeKtronix	TPC 312
6	CURRENT AMP	TeKtronix	TCPA300
7	DYNAMIC DUMMY LOAD	PRODIGIT	3311C
8	CVCF	CHROMA	6530
9	CVCF	KIKUSUI	PCR2000L / PCR2000W
10	S.D	TAI YEESH SING	TRZ SO-45
11	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261 / SU-262
12	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCS 30
13	LISN	ROHDE & SCHWARZ	ESH3-Z5
14	LISN	ROHDE & SCHWARZ	ENV216
15	COAXIAL CABLE	Harbour	RG-400
16	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESC17
17	ANTENNA	Schaffner	CBL6112B
18	Coaxial Cable	Suhner	SF104 / SF106
19	Pre-Amplifier	QuieTek	AP-025C
20	DUMMY LOAD	FUTABA	GR-25 SIRIES

1-3. 評価負荷条件 Load conditions

※ 入力電圧が100VAC以下の場合、下記のとおり出力デレーティングが必要です。

Output derating is needed when input voltage is 100VAC or less.

Output voltage : 5V, 12V, 15V, 24V

V_{in}	I_{out} : Full load	5V	12V	15V	24V
100 - 265VAC	100%	5.000A	2.200A	1.700A	1.100A
90VAC	90%	4.500A	1.980A	1.530A	0.990A
85VAC	80%	4.000A	1.760A	1.360A	0.880A

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

5V 1. Regulation - line and load Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	4.988V	4.988V	4.988V	4.987V	1mV	0.020%
50%	4.982V	4.982V	4.982V	4.982V	0mV	0.000%
Full load	4.979V	4.974V	4.975V	4.975V	5mV	0.100%
Load regulation	9mV	14mV	13mV	12mV		
	0.180%	0.280%	0.260%	0.240%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : Full load

Ta	-10°C	+25°C	+45°C	Temperature stability	
Vout	4.976V	4.974V	4.972V	4mV	0.080%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	60VAC
Drop out voltage (Vin)	59VAC

12V 1. Regulation - line and load Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	11.938V	11.933V	11.936V	11.937V	5mV	0.042%
50%	11.933V	11.933V	11.933V	11.933V	0mV	0.000%
Full load	11.931V	11.928V	11.929V	11.929V	3mV	0.025%
Load regulation	7mV	5mV	7mV	8mV		
	0.058%	0.042%	0.058%	0.067%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : Full load

Ta	-10°C	+25°C	+55°C	Temperature stability	
Vout	11.929V	11.928V	11.916V	13mV	0.108%

3. Start up voltage and Drop out voltage

Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	58VAC
Drop out voltage (Vin)	57VAC

24V 1. Regulation - line and load Condition Ta : 25 °C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	23.922V	23.924V	23.922V	23.923V	2mV	0.008%
50%	23.920V	23.922V	23.922V	23.922V	2mV	0.008%
Full load	23.918V	23.917V	23.917V	23.916V	2mV	0.008%
Load regulation	4mV	7mV	5mV	7mV		
	0.017%	0.029%	0.021%	0.029%		

2. Temperature drift

Conditions Vin : 100 VAC
Iout : Full load

Ta	-10°C	+25°C	+55°C	Temperature stability	
Vout	23.979V	23.917V	23.836V	143mV	0.596%

3. Start up voltage and Drop out voltage

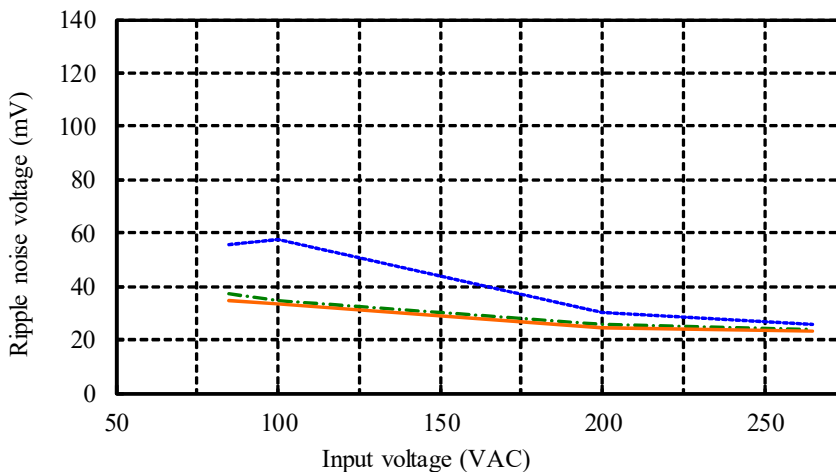
Conditions Ta : 25 °C
Iout : 100 %

Start up voltage (Vin)	58VAC
Drop out voltage (Vin)	57VAC

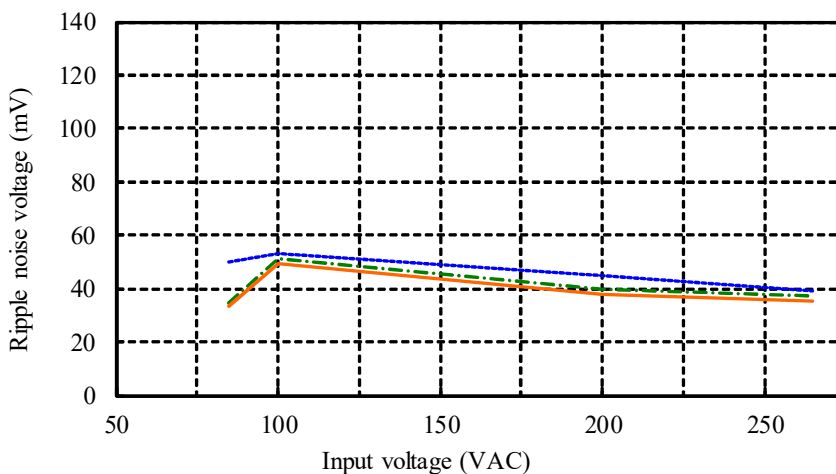
(2) リップルノイズ電圧対入力電圧 Ripple noise voltage vs. Input voltage

Conditions Iout : Full load
 Ta : -10 °C
 25 °C
 55 °C
 5V:45 °C

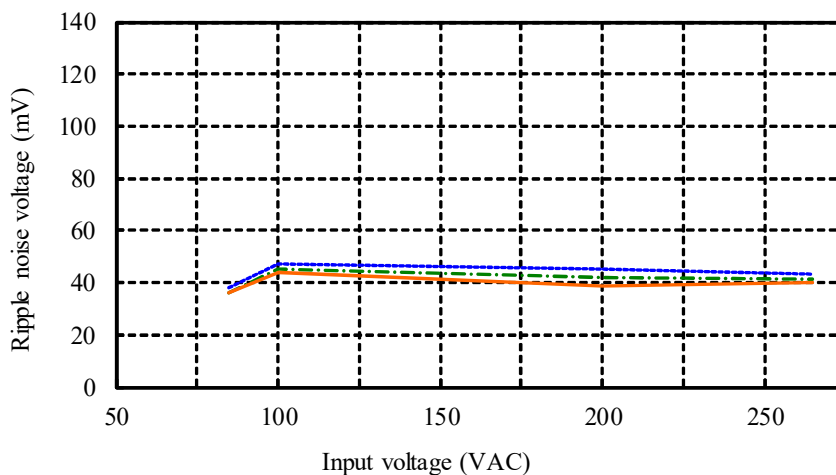
5V



12V



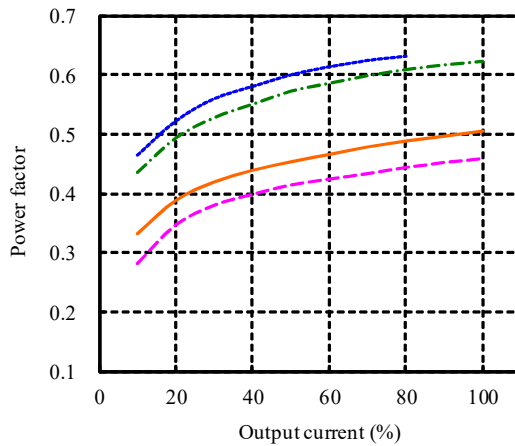
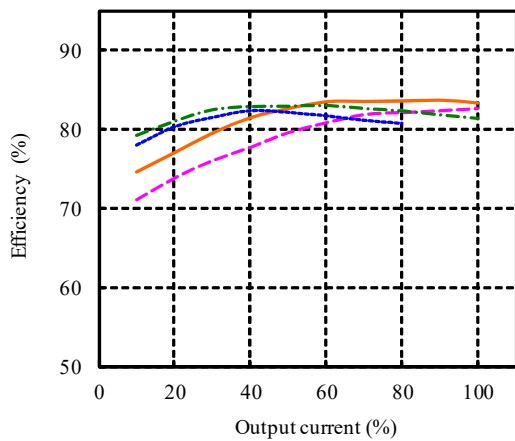
24



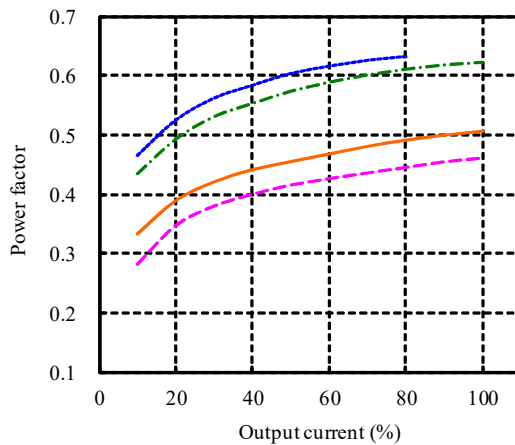
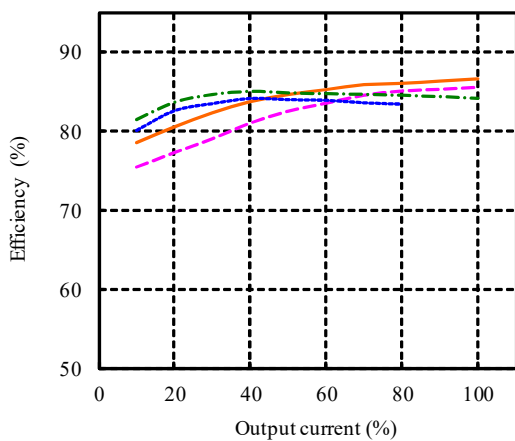
(3) 効率・力率対出力電流 Efficiency and Power factor vs. Output current

Conditions Vin : 85 VAC ---
 100 VAC - - -
 200 VAC ---
 265 VAC - - -
 Ta : 25 °C

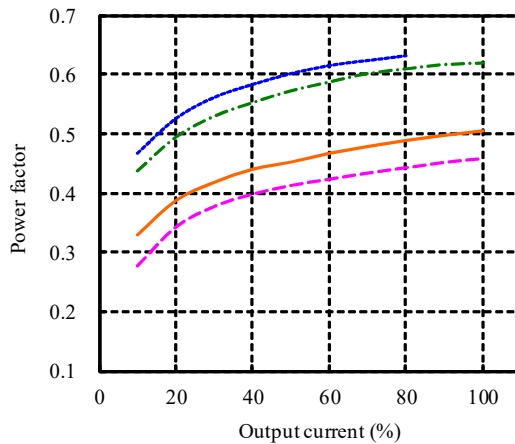
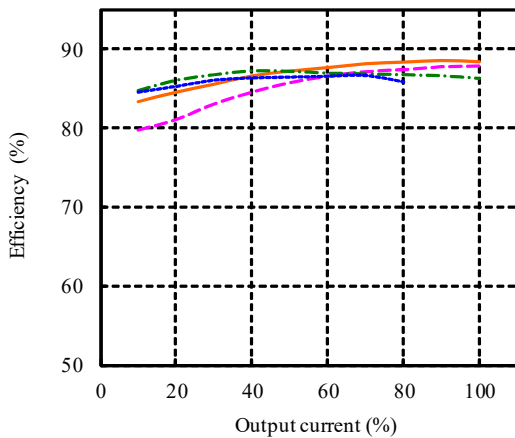
5V



12V



24V

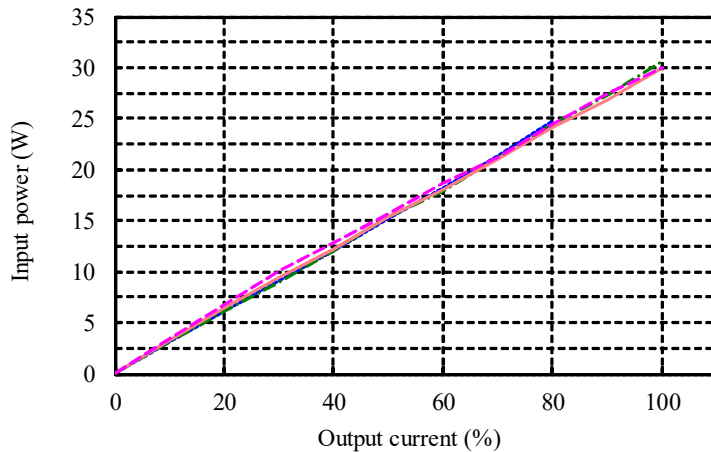


(4) 入力電力対出力電流 Input power vs. Output current

Conditions Vin : 85 VAC
 100 VAC
 200 VAC
 265 VAC
 Ta : 25 °C

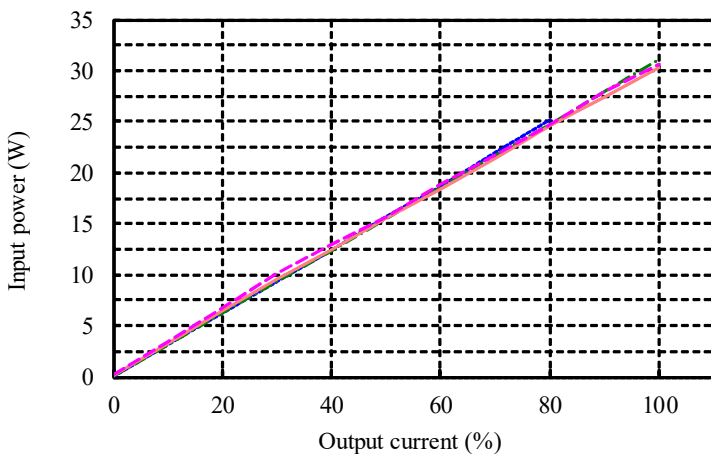
5V

Vin	Input power
	Iout : 0%
85VAC	0.01W
100VAC	0.07W
200VAC	0.11W
265VAC	0.15W



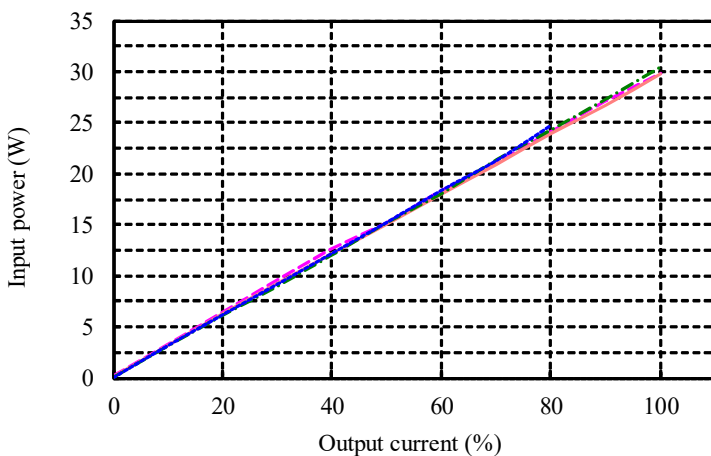
12V

Vin	Input power
	Iout : 0%
85VAC	0.01W
100VAC	0.08W
200VAC	0.12W
265VAC	0.17W



24V

Vin	Input power
	Iout : 0%
85VAC	0.02W
100VAC	0.09W
200VAC	0.12W
265VAC	0.18W

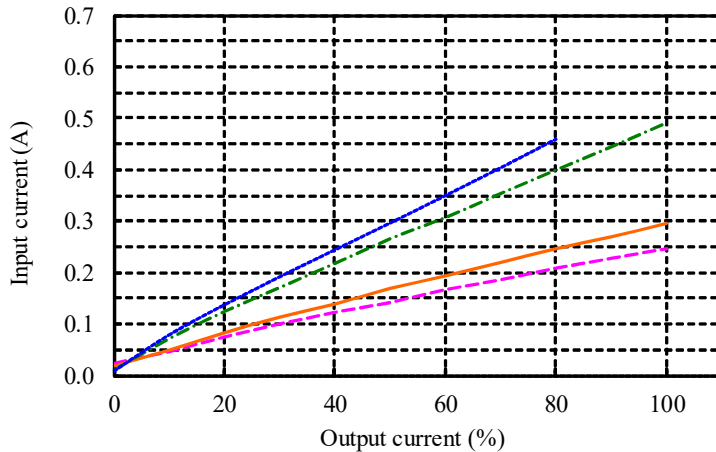


(5) 入力電流対出力電流 Input current vs. Output current

Conditions V_{in} : 85 VAC ---
 100 VAC - - -
 200 VAC ---
 265 VAC - - -
 T_a : 25 °C

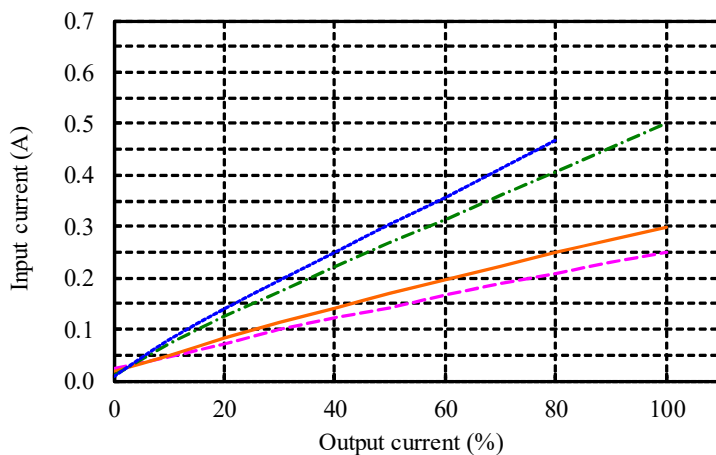
5V

V_{in}	Input current
	$I_{out} : 0\%$
85VAC	0.008A
100VAC	0.010A
200VAC	0.018A
265VAC	0.024A



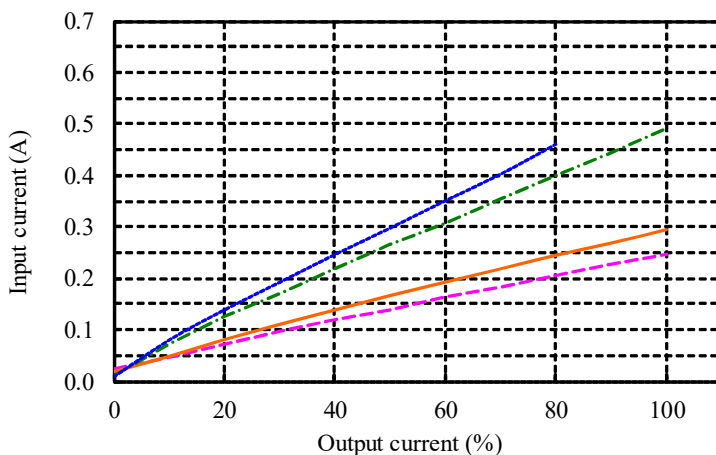
12V

V_{in}	Input current
	$I_{out} : 0\%$
85VAC	0.008A
100VAC	0.010A
200VAC	0.018A
265VAC	0.024A



24V

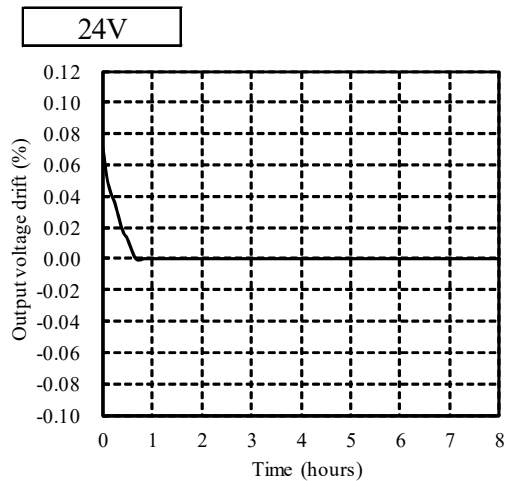
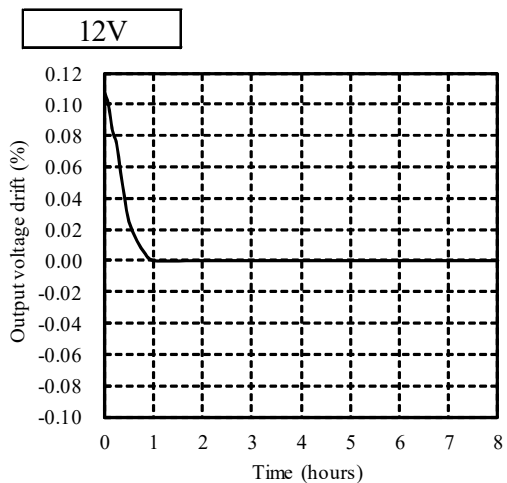
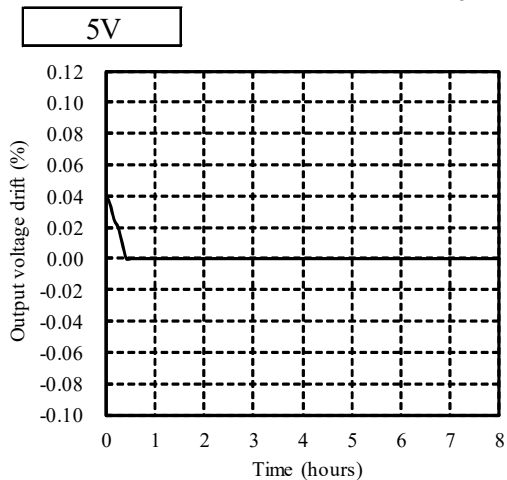
V_{in}	Input current
	$I_{out} : 0\%$
85VAC	0.008A
100VAC	0.010A
200VAC	0.019A
265VAC	0.025A



2-2. 通電ドリフト特性

Warm up voltage drift characteristics

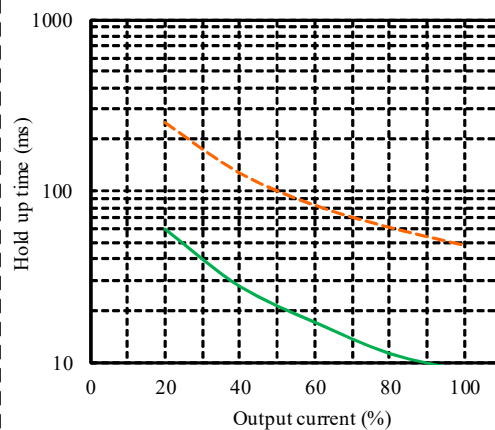
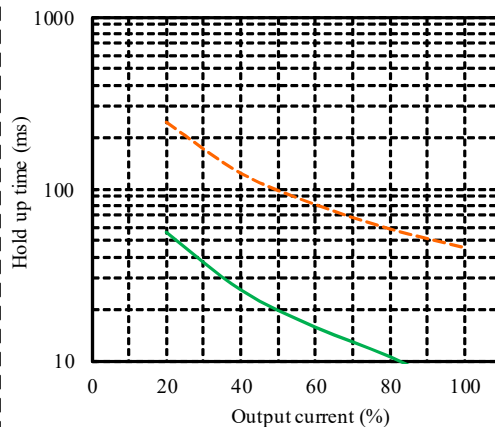
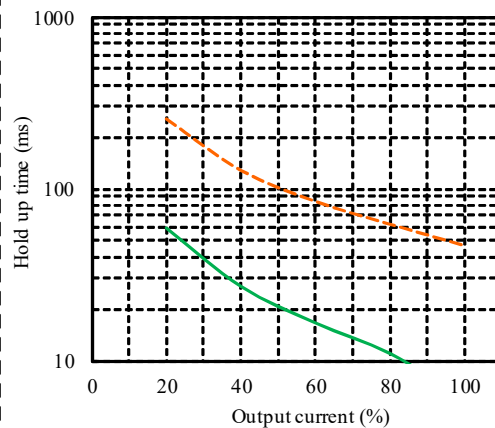
Conditions Vin : 100 VAC
Iout : Full load
Ta : 25 °C



2-3. 出力保持時間特性

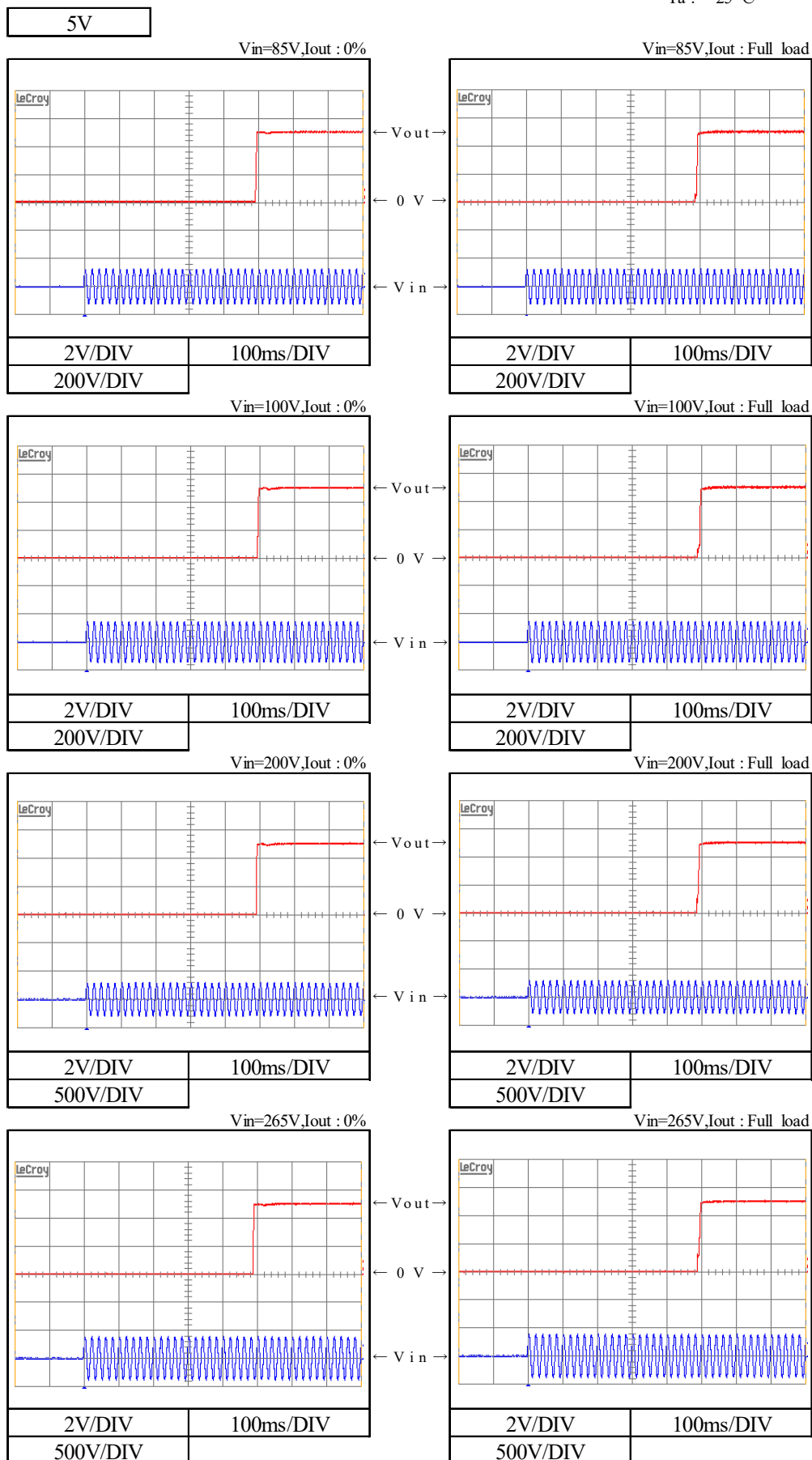
Hold up time characteristics

Conditions Vin : 100 VAC
200 VAC
Ta : 25 °C



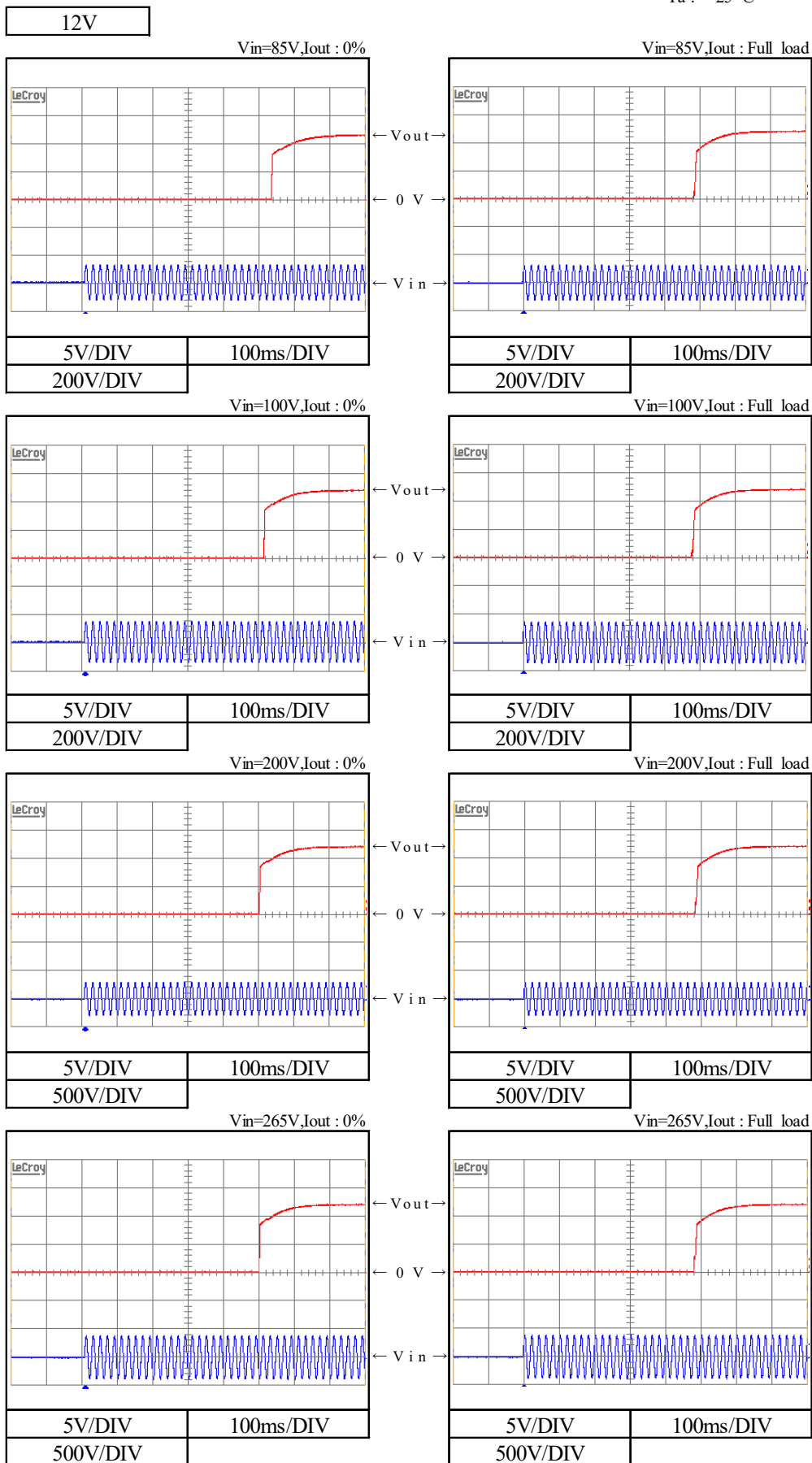
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



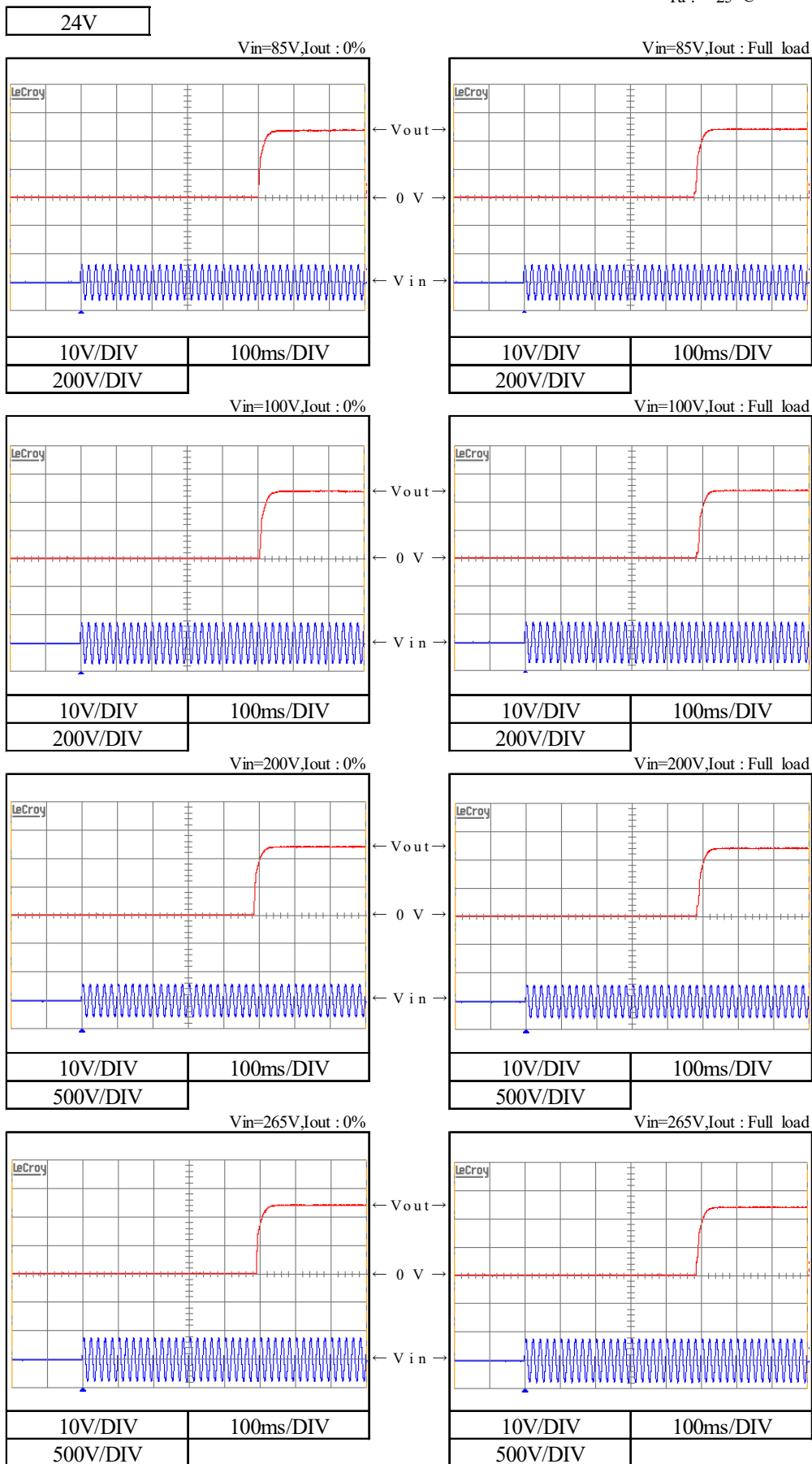
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



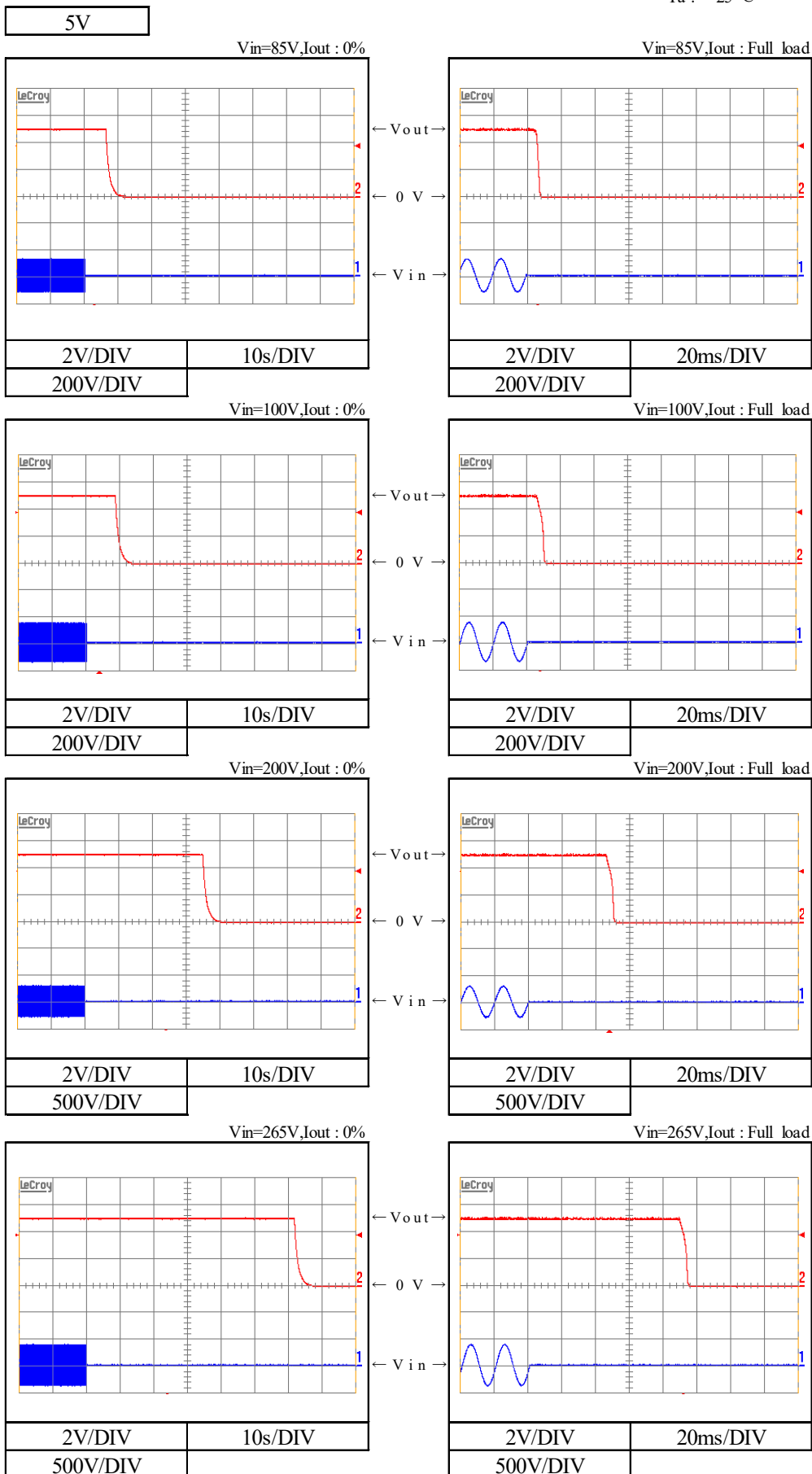
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



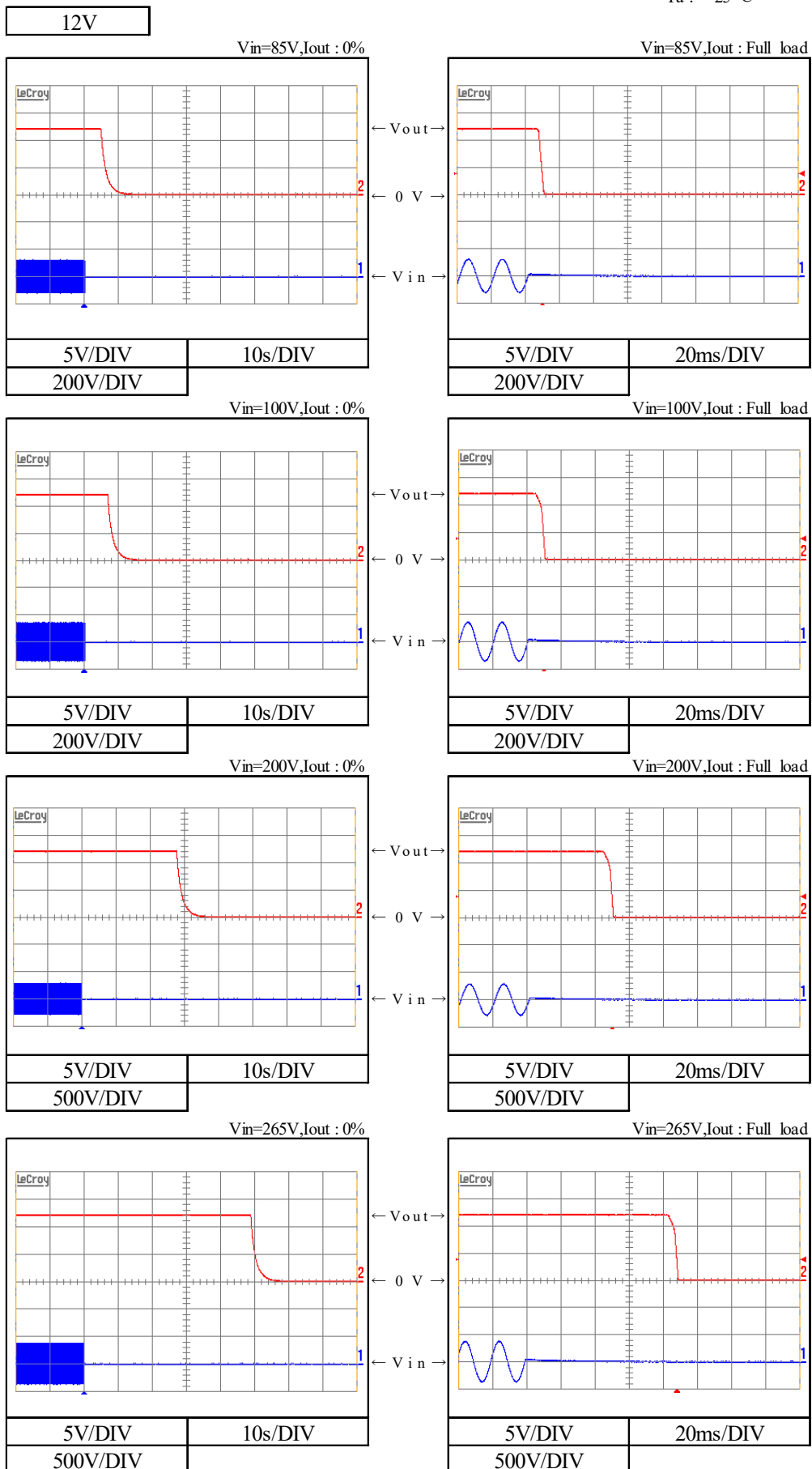
2-5. 出力立ち下がり特性 Output fall characteristics

Ta : 25 °C



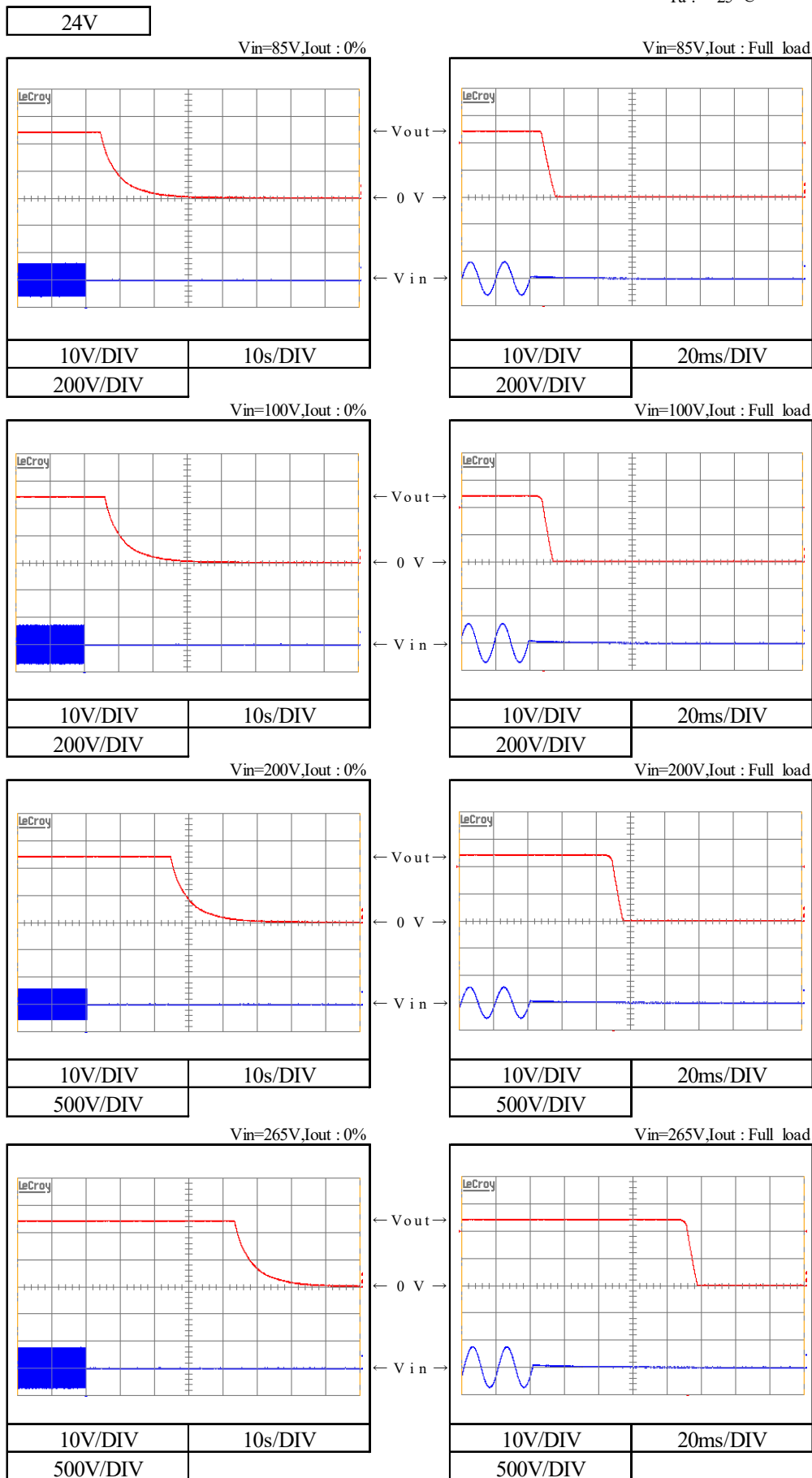
2-5. 出力立ち下がり特性 Output fall characteristics

Ta : 25 °C



2-5. 出力立ち下がり特性 Output fall characteristics

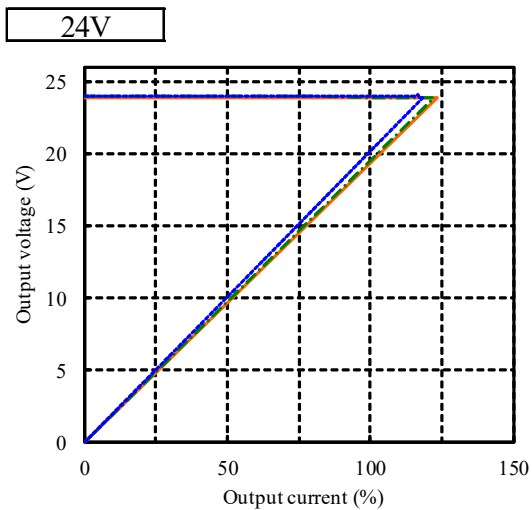
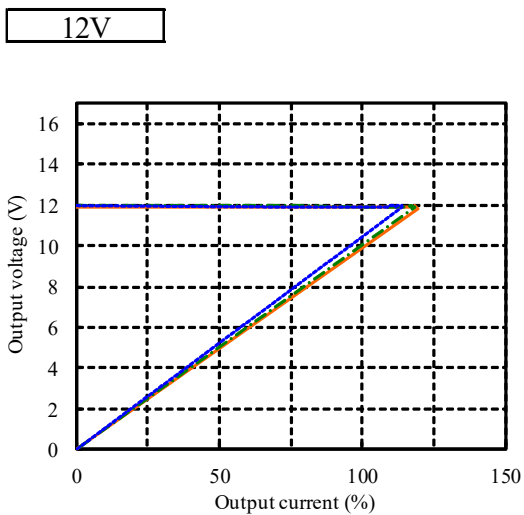
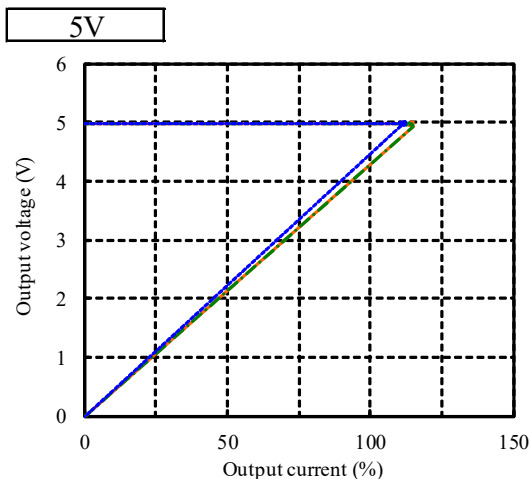
Ta : 25 °C



2-6. 過電流保護特性

Over current protection (OCP) characteristics

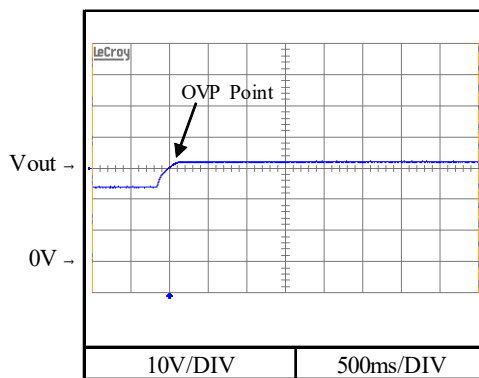
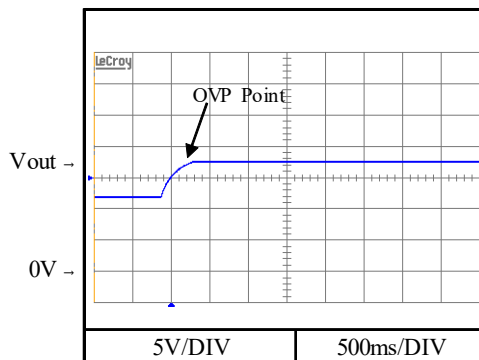
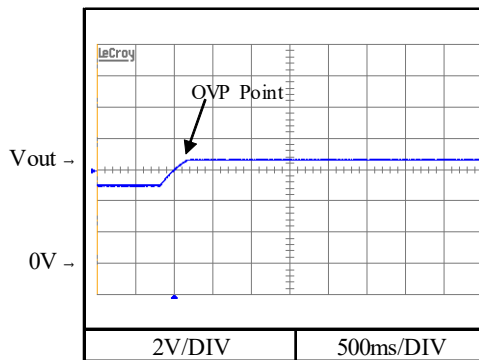
Conditions Vin : 100 VAC
 Ta : -10 °C (---)
 25 °C (---)
 55 °C (---)
 5V:45 °C (—)



2-7. 過電圧保護特性

Over voltage protection (OVP) characteristics

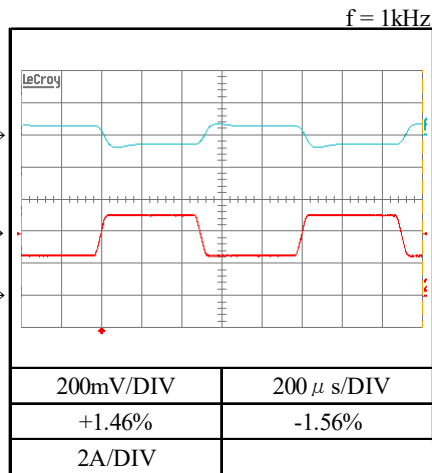
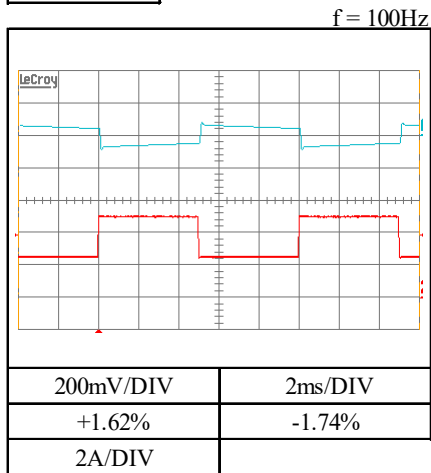
Conditions Vin : 100 VAC
 Iout : 0 %
 Ta : 25 °C



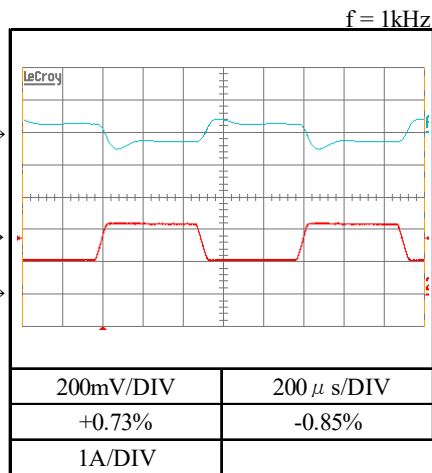
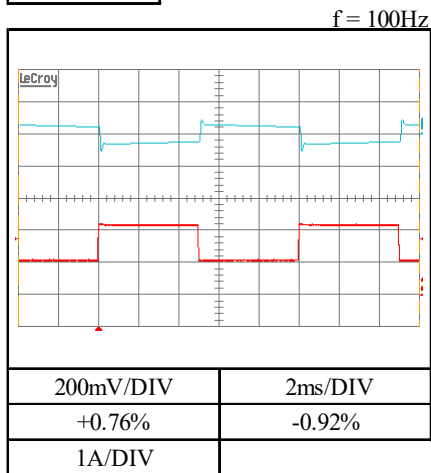
2-8. 過渡応答(負荷急変)特性 Dynamic load response characteristics

Conditions Vin : 100 VAC
 Iout : 50 % ↔ 100 %
 (tr = tf = 50us)
 Ta : 25 °C

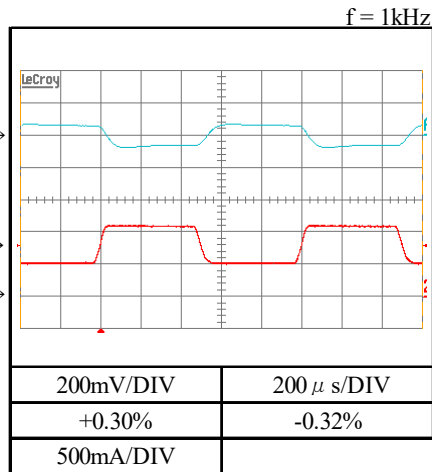
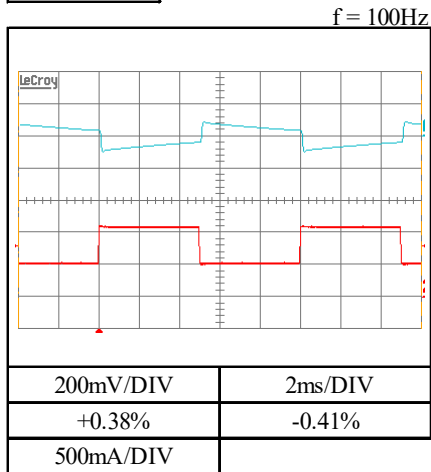
5V



12V



24V

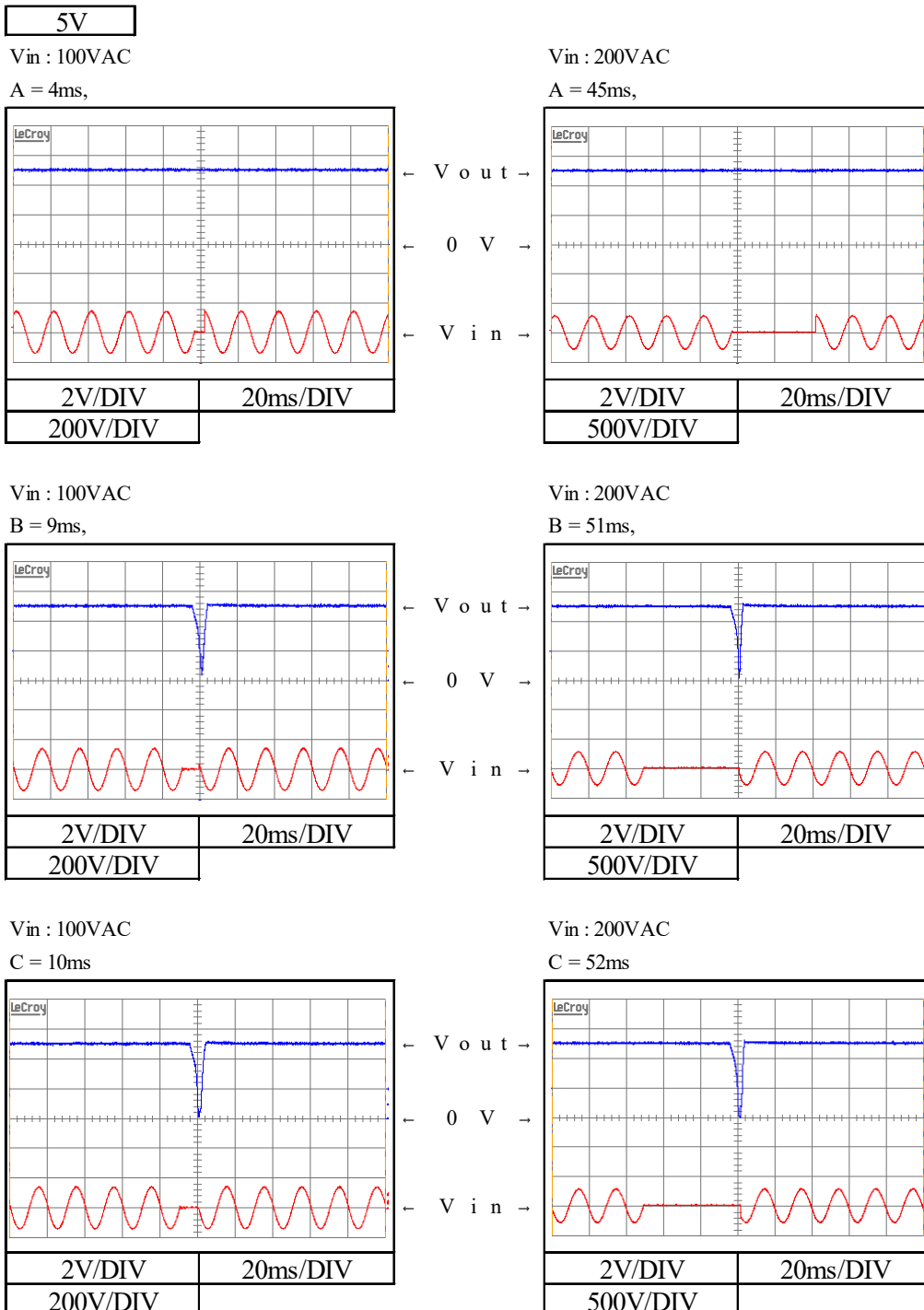


2-9. 入力電圧瞬停特性 Response to brown out characteristics

Conditions Ta : 25 °C
Iout : Full load

瞬停時間 Interruption time

- A : 出力電圧が低下なし Without any output voltage drop.
- B : 出力電圧が20-40%低下 Output voltage to drop down to 20-40%.
- C : 出力電圧が0Vまで低下 Output voltage to drop down to 0V.

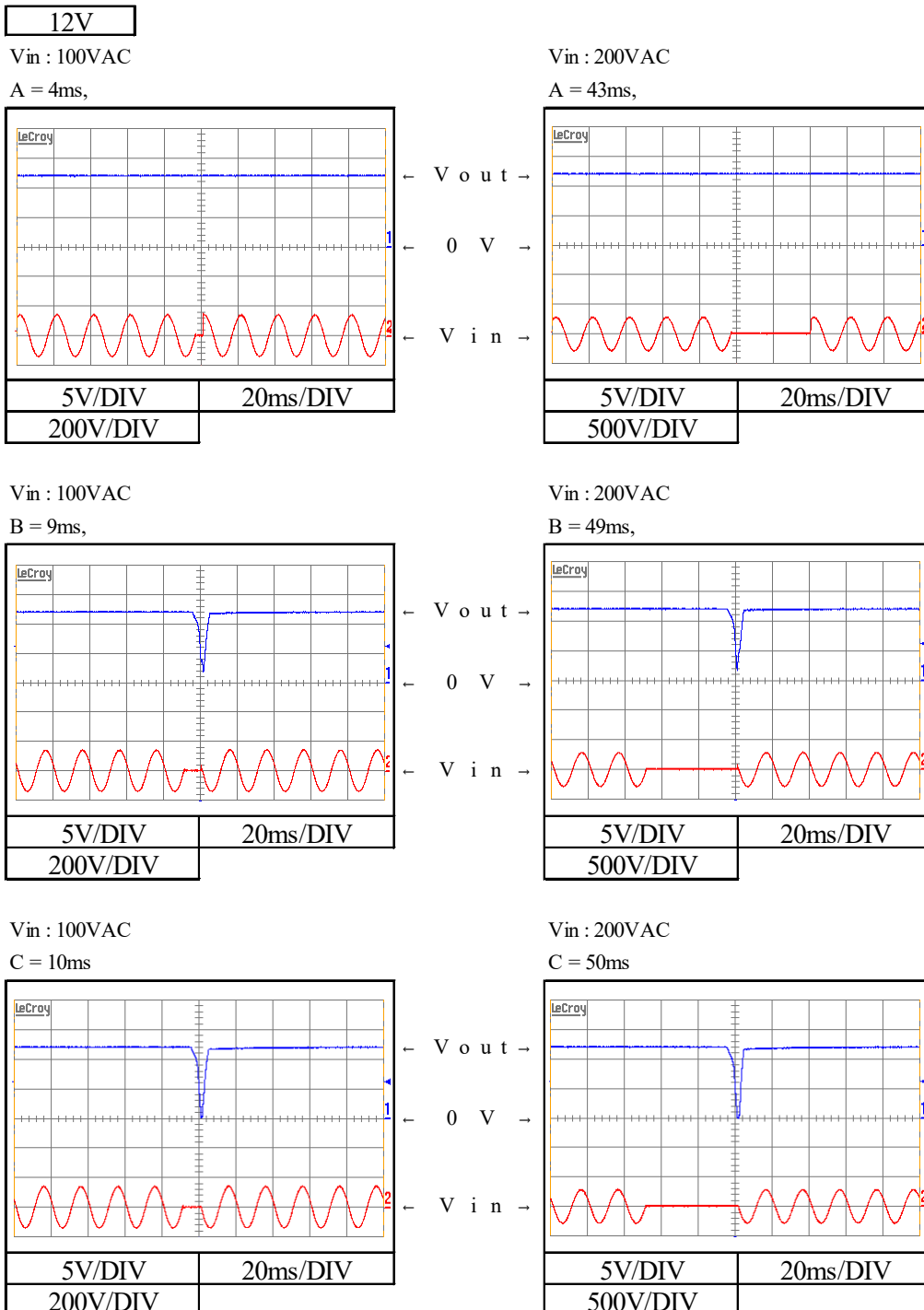


2-9. 入力電圧瞬停特性 Response to brown out characteristics

Conditions Ta : 25 °C
Iout : Full load

瞬停時間 Interruption time

- A : 出力電圧が低下なし Without any output voltage drop.
- B : 出力電圧が20-40%低下 Output voltage to drop down to 20-40%.
- C : 出力電圧が0Vまで低下 Output voltage to drop down to 0V.

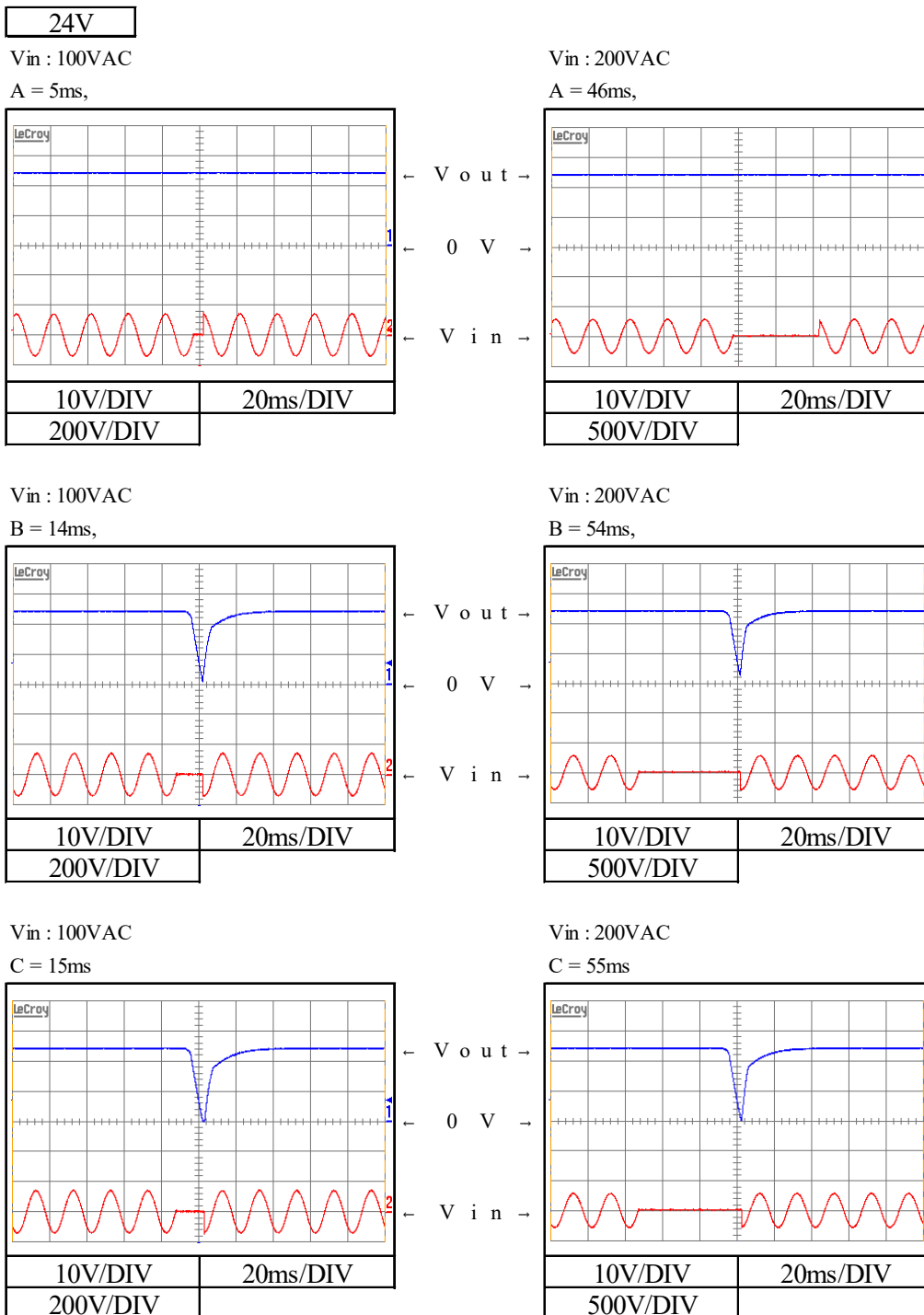


2-9. 入力電圧瞬停特性 Response to brown out characteristics

Conditions Ta : 25 °C
Iout : Full load

瞬停時間 Interruption time

- A : 出力電圧が低下なし Without any output voltage drop.
- B : 出力電圧が20-40%低下 Output voltage to drop down to 20-40%.
- C : 出力電圧が0Vまで低下 Output voltage to drop down to 0V.

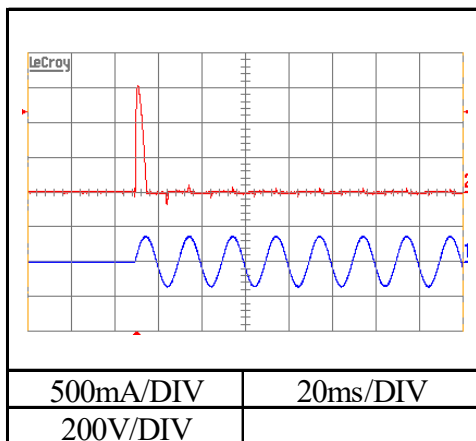


2-10. 入力サージ電流(突入電流)波形 Inrush current waveform

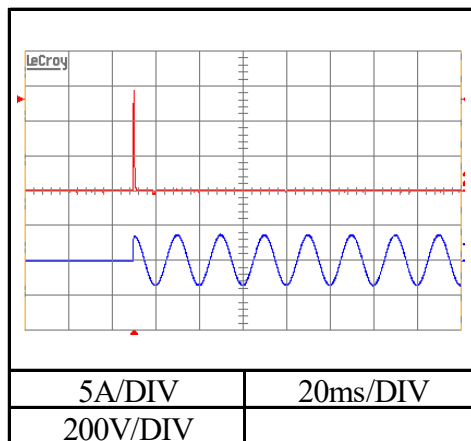
12V

Conditions Vin : 100 VAC
Iout : Full load
Ta : 25°C

Switch on phase angle of input AC voltage
 $\phi = 0^\circ$

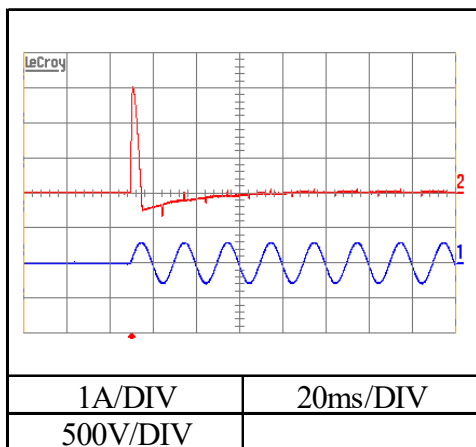


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

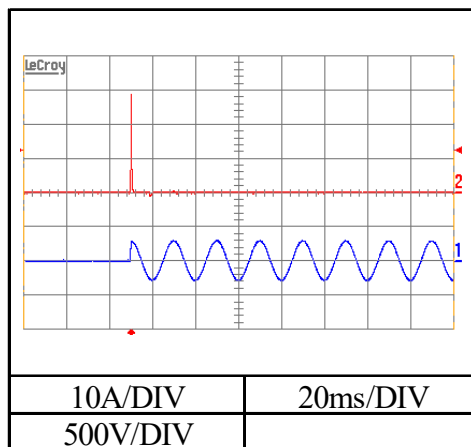


Conditions Vin : 200 VAC
Iout : Full load
Ta : 25°C

Switch on phase angle of input AC voltage
 $\phi = 0^\circ$



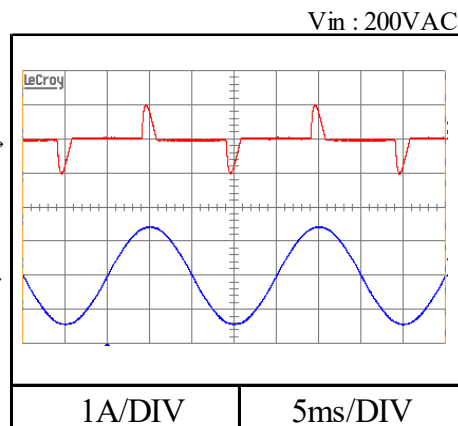
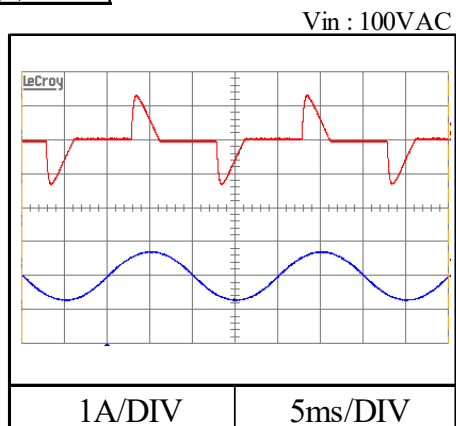
Switch on phase angle of input AC voltage
 $\phi = 90^\circ$



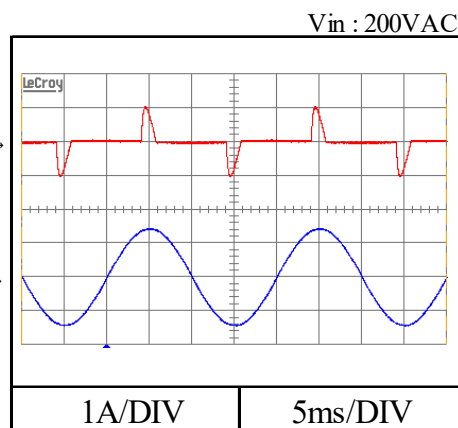
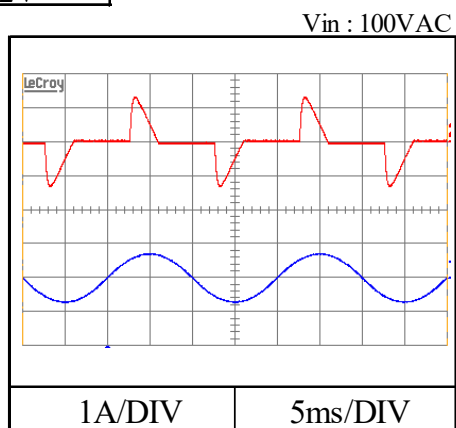
2-11. 入力電流波形 Input current waveform

Conditions Iout : Full load
Ta : 25°C

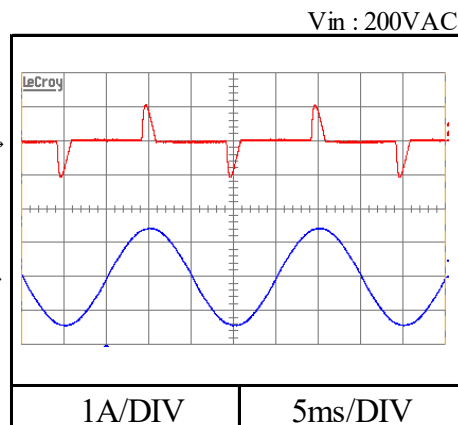
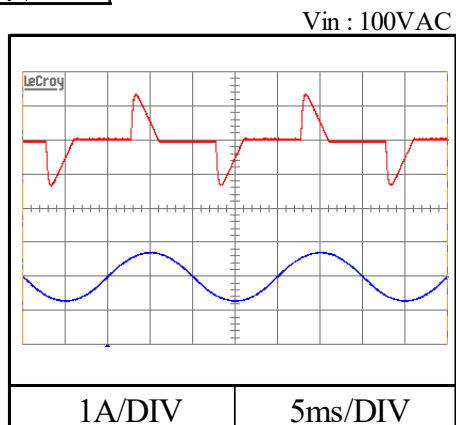
5V



12V



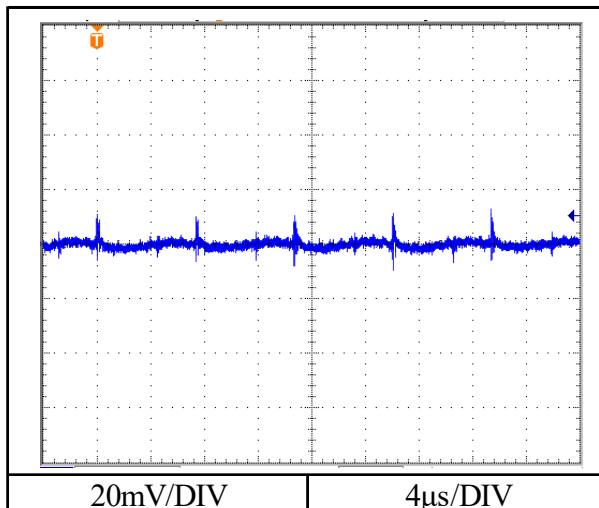
24V



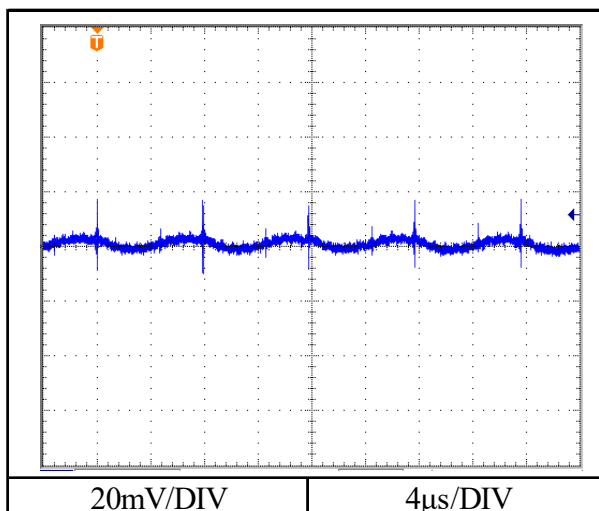
2-12. 出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions Vin : 100 VAC
 Iout : Full load
 Ta : 25°C

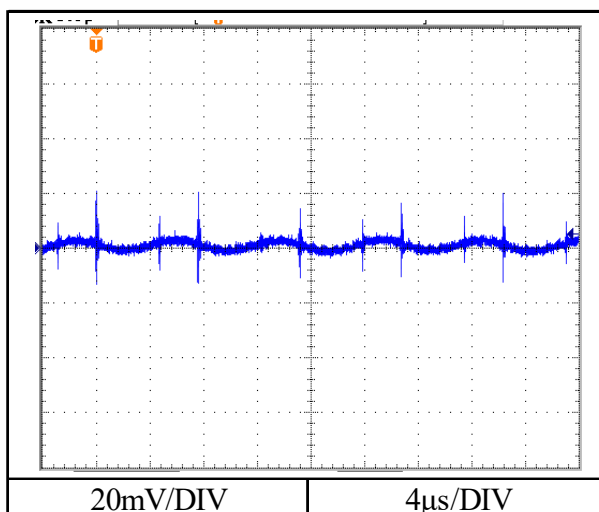
5V



12V



24V



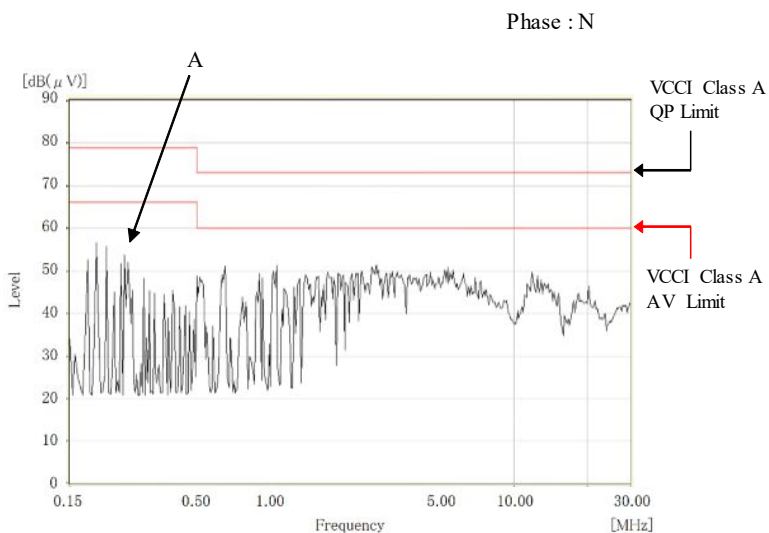
2-13. EMI特性 Electro-Magnetic Interference characteristics

Conditions Vin : 110 VAC
Iout : Full load
Ta : 25 °C

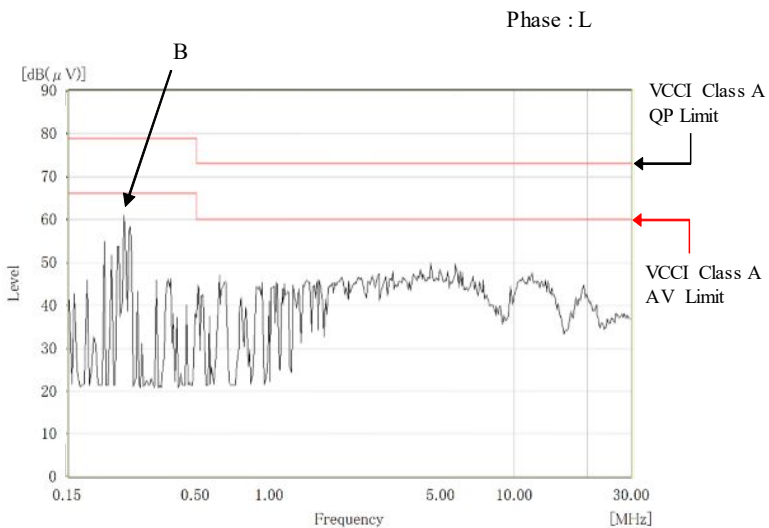
雑音端子電圧
Conducted Emission

5V

Point A (252kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	58.8
AV	66.0	45.2



Point B (252kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	58.7
AV	66.0	45.0



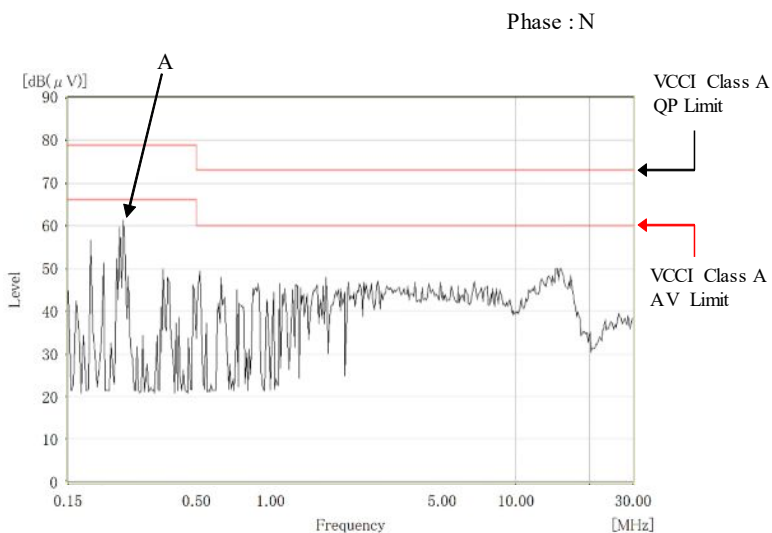
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

Conditions Vin : 110 VAC
Iout : Full load
Ta : 25°C

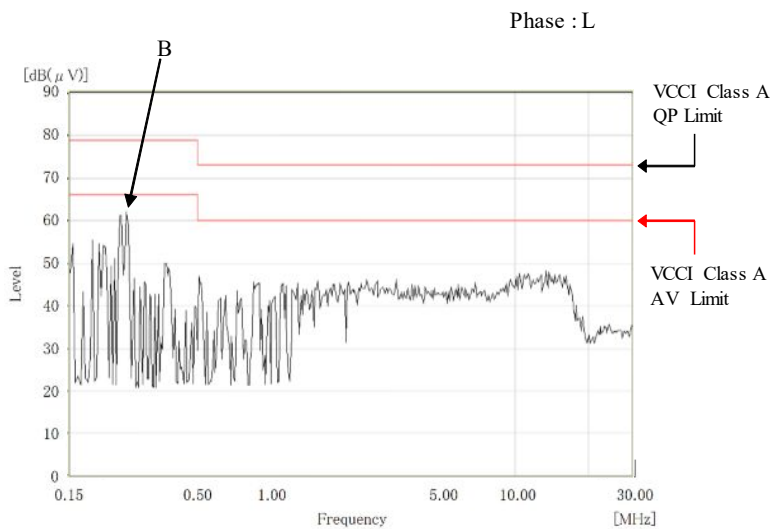
雑音端子電圧
Conducted Emission

12V

Point A (252kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	59.5
AV	66.0	46.0



Point B (255kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	59.8
AV	66.0	46.6



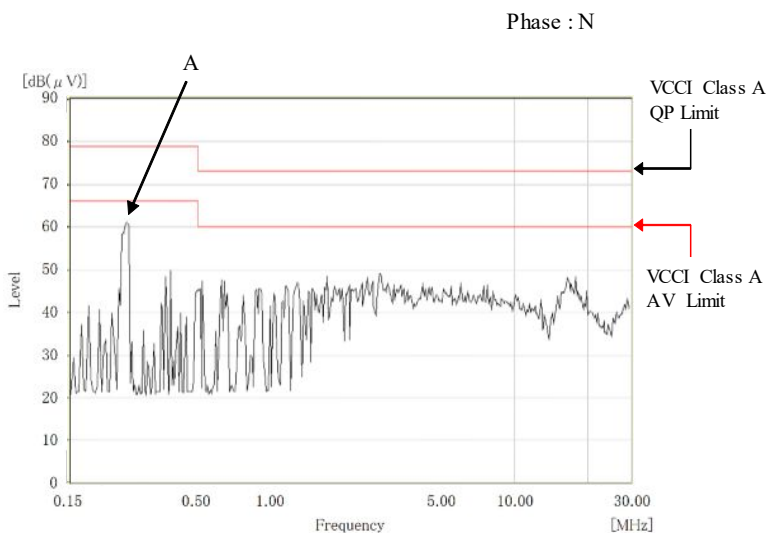
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

Conditions Vin : 110 VAC
Iout : Full load
Ta : 25°C

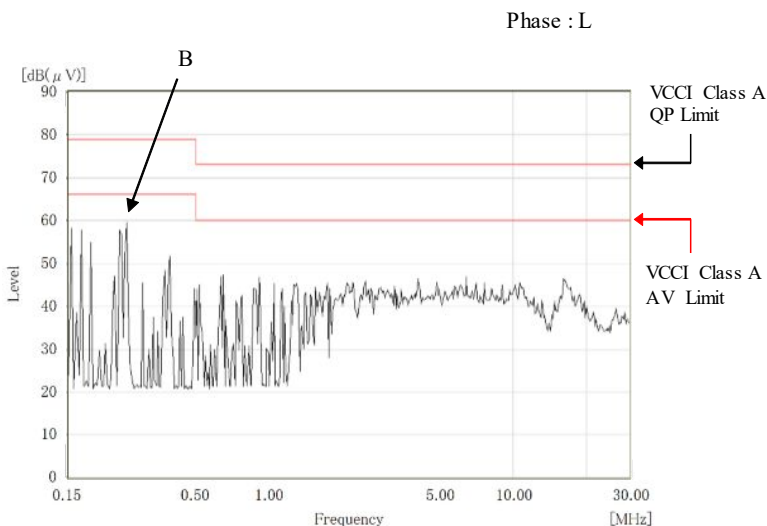
雑音端子電圧
Conducted Emission

24V

Point A (255kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	59.2
AV	66.0	45.8



Point B (259kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	59.5
AV	66.0	45.4



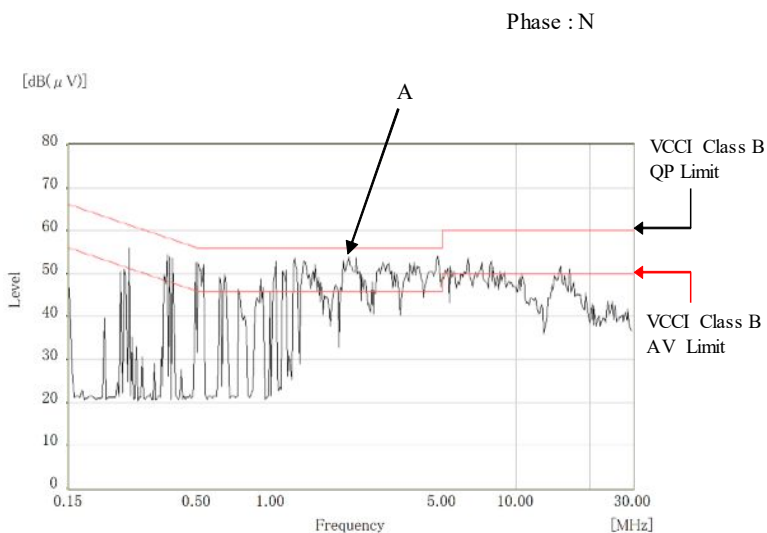
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

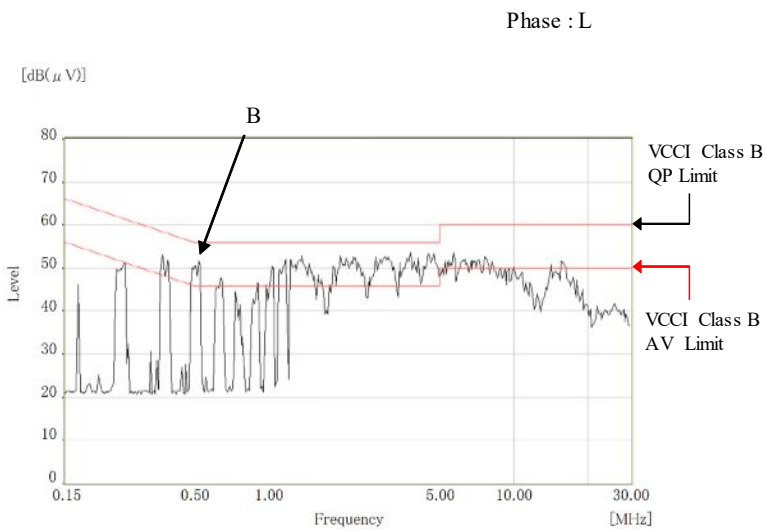
雑音端子電圧
Conducted Emission

5V

Point A (2.084MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	52.3
AV	46.0	36.7



Point B (525kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	51.5
AV	46.0	40.0



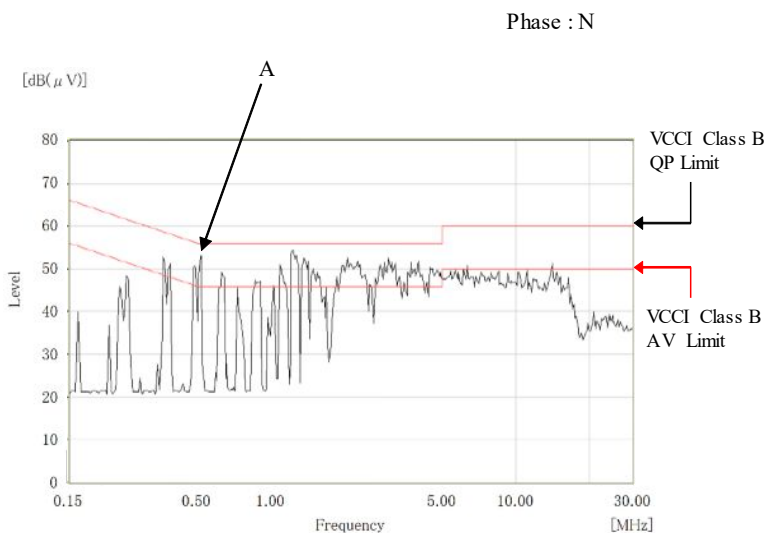
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

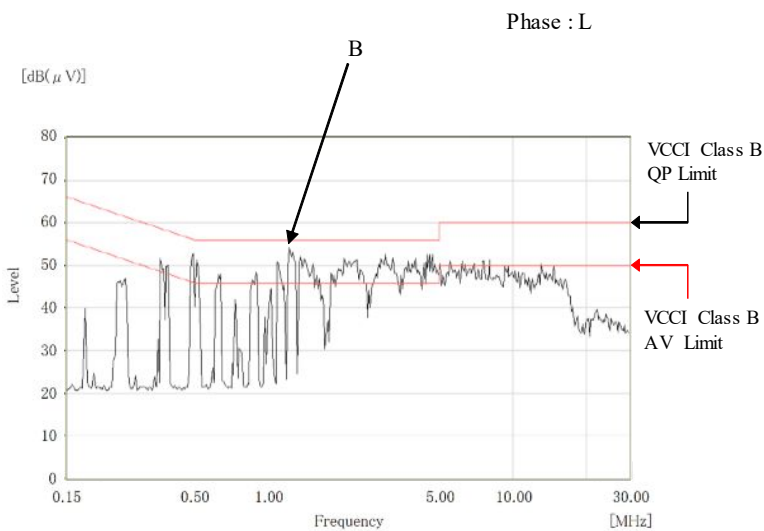
雑音端子電圧
Conducted Emission

12V

Point A (517kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	52.2
AV	46.0	37.7



Point B (1.216MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	51.7
AV	46.0	34.5



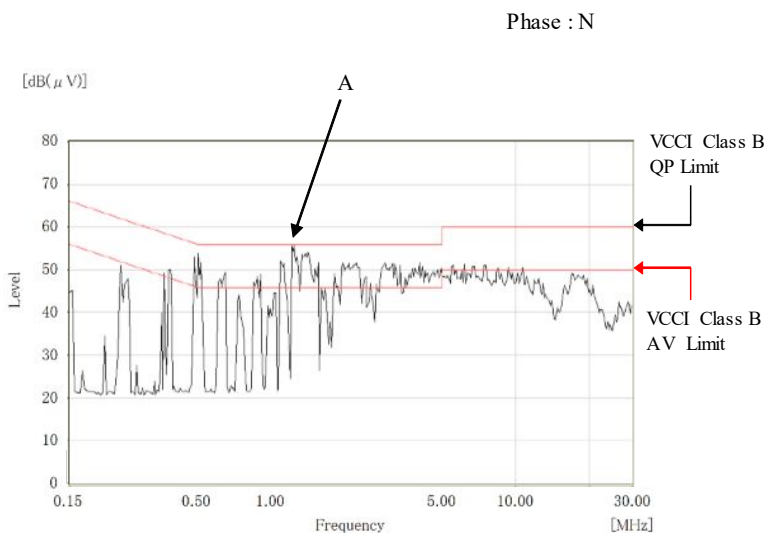
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25 °C

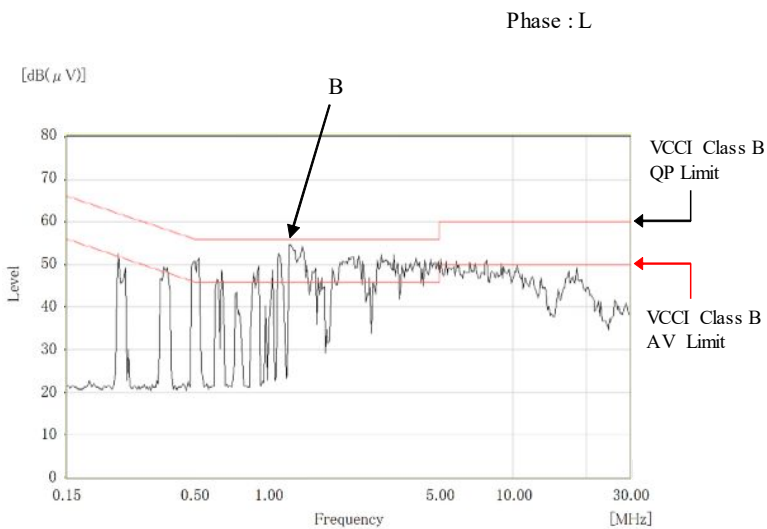
雑音端子電圧
Conducted Emission

24V

Point A (1.231MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	52.7
AV	46.0	36.3



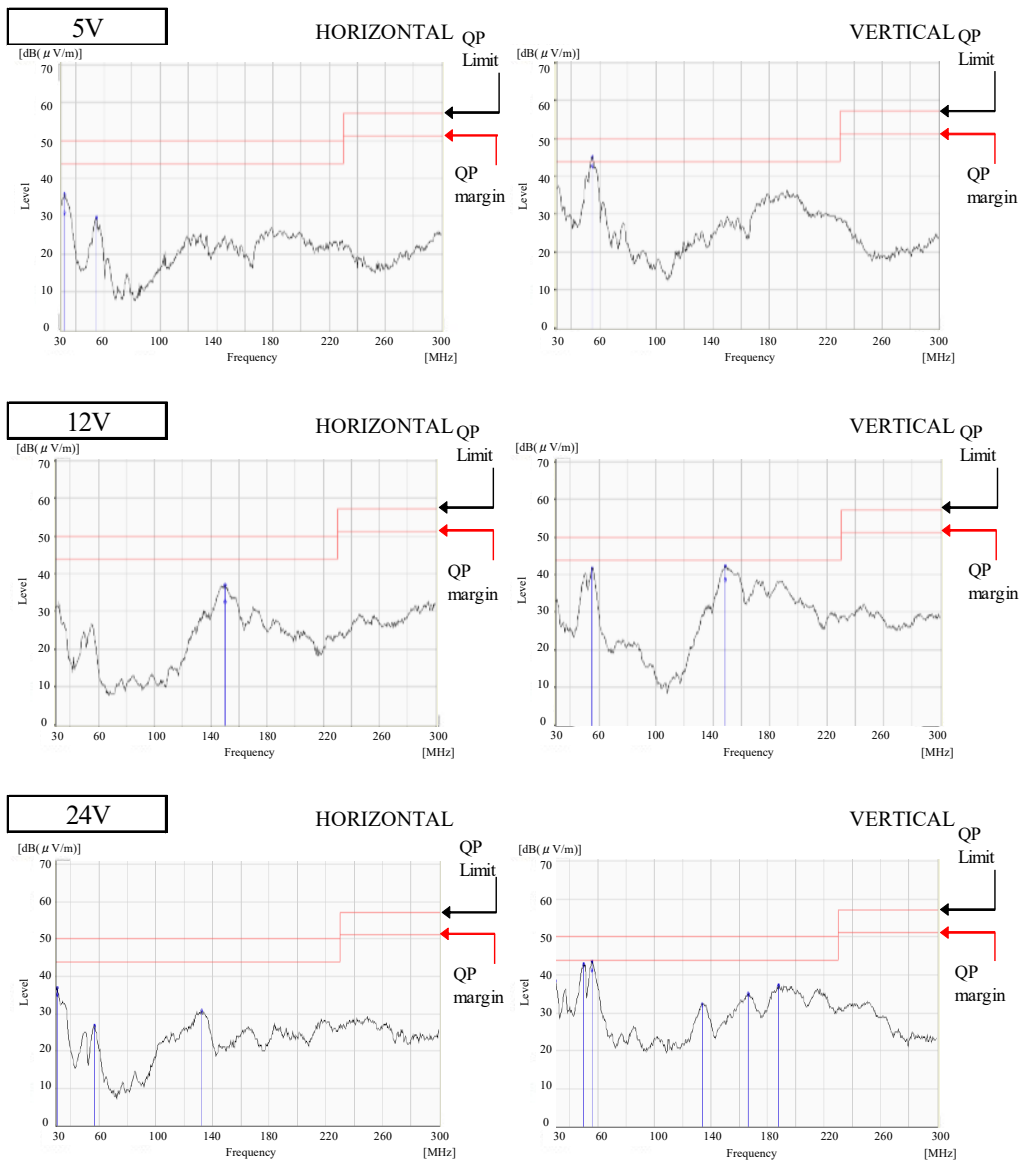
Point B (1.223MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	52.4
AV	46.0	36.4



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.

Conditions Vin : 230 VAC
Iout : Full load
Ta : 25°C

雑音電界強度
Radiated Emission



測定条件は測定回路6を参照

Measurement condition refer Circuit 6 used for determination.

EN55011-A,EN55032-Aの限界値はVCCI class Aの限界値と同じ

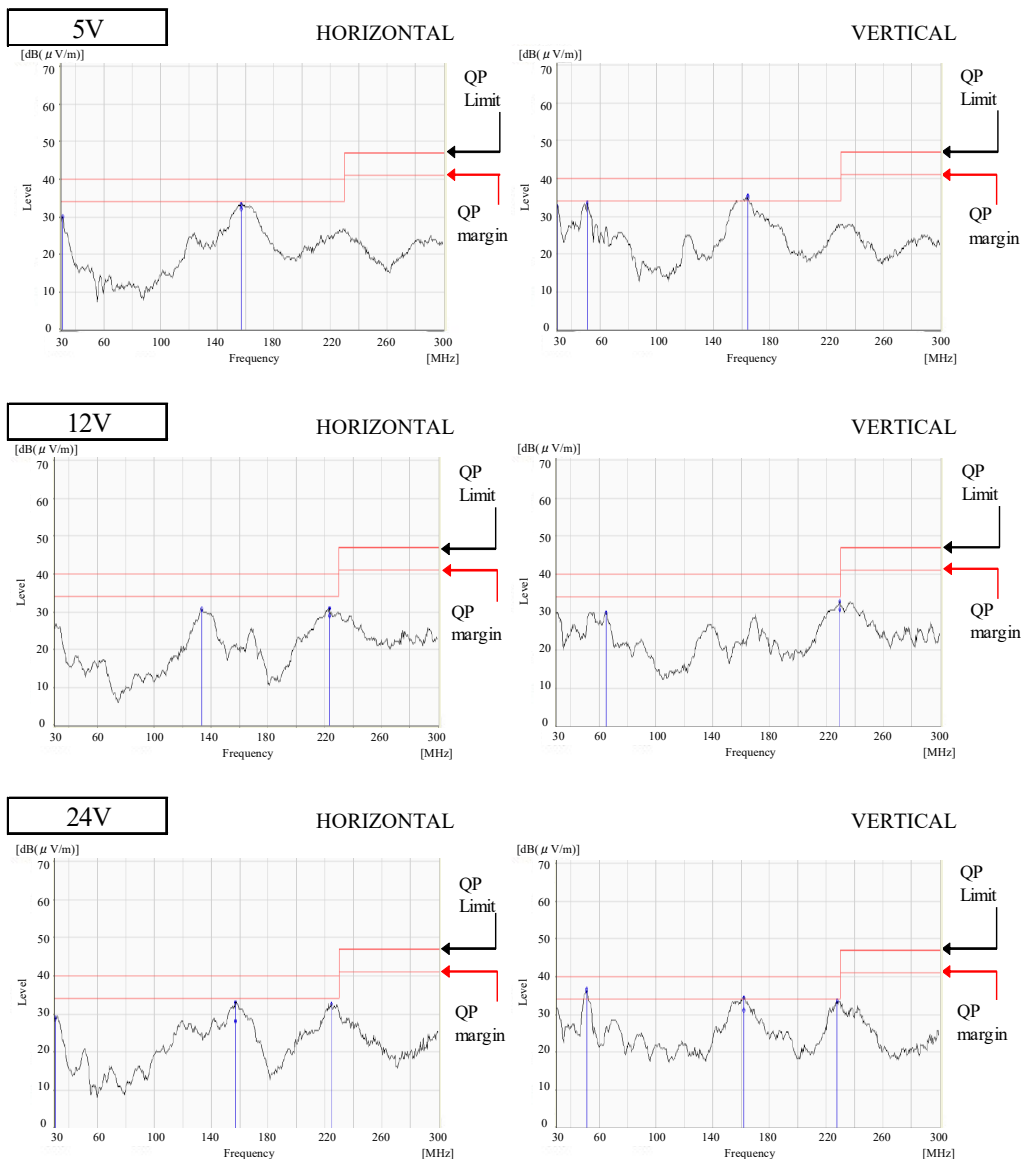
Limit of EN55011-A,EN55032-A are same as its VCCI class A.

表示はピーク値

Indication is peak values.

Conditions Vin : 110 VAC
 Iout : Full load
 Ta : 25°C

雑音電界強度
 Radiated Emission



測定条件は測定回路6を参照

Measurement condition refer Circuit 6 used for determination.

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.