

KWS15A

EVALUATION DATA

型式データ

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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

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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。

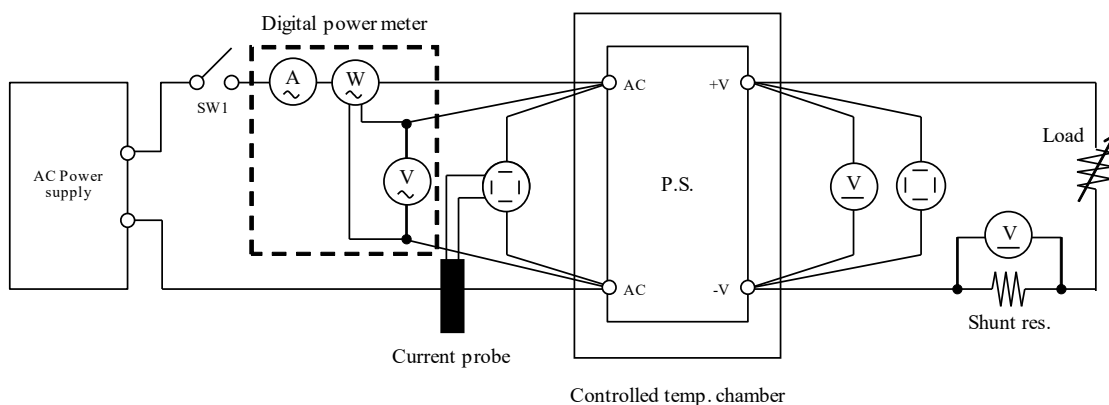
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

1-1. 算出方法 Calculating Method

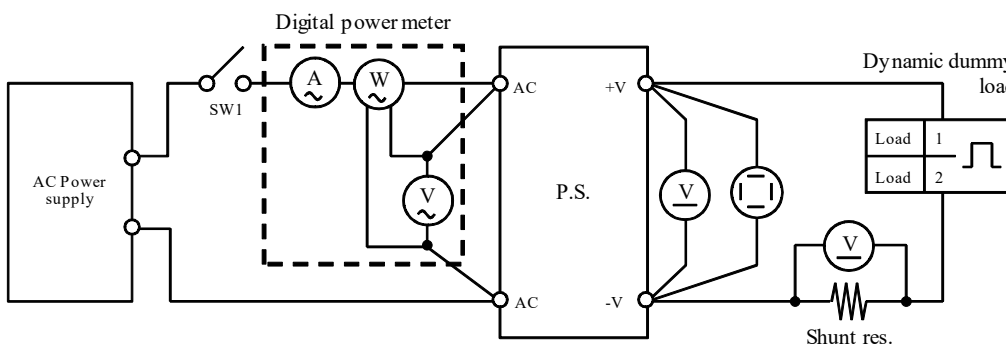
測定回路1 Circuit 1 used for determination

- 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

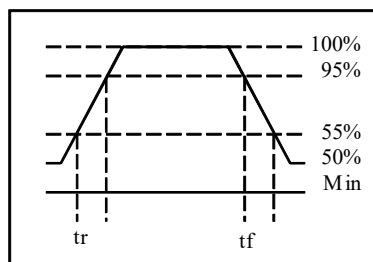


測定回路2 Circuit 2 used for determination

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

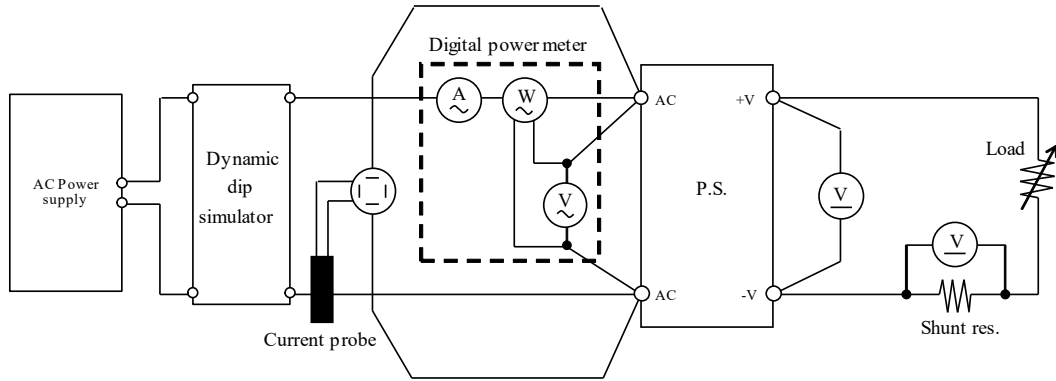


Output current waveform
Iout 50% <==> 100%



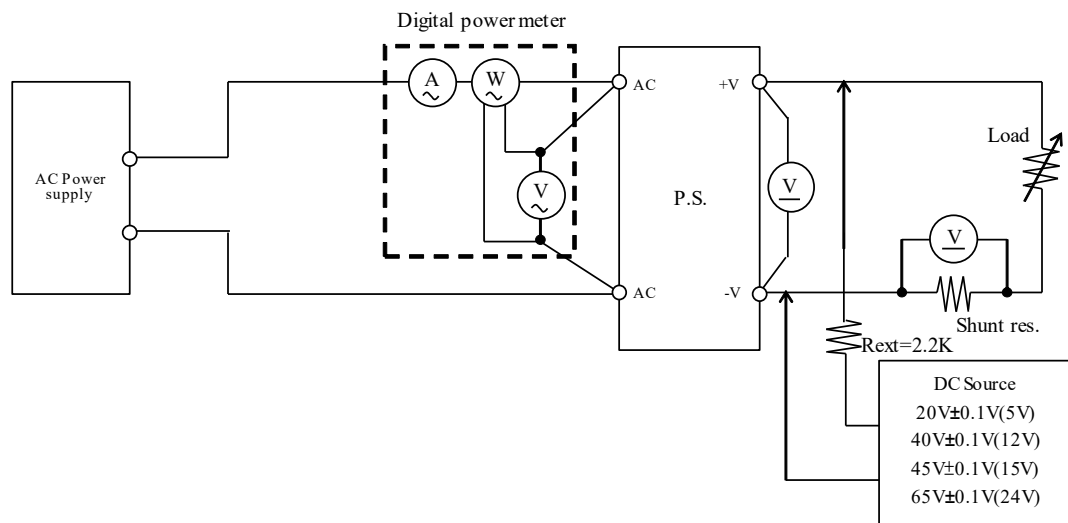
測定回路3 Circuit 3 used for determination

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



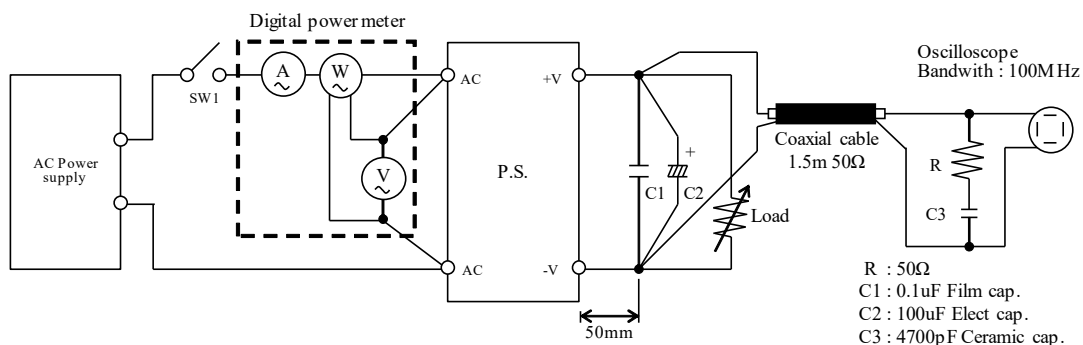
測定回路4 Circuit 4 used for determination

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



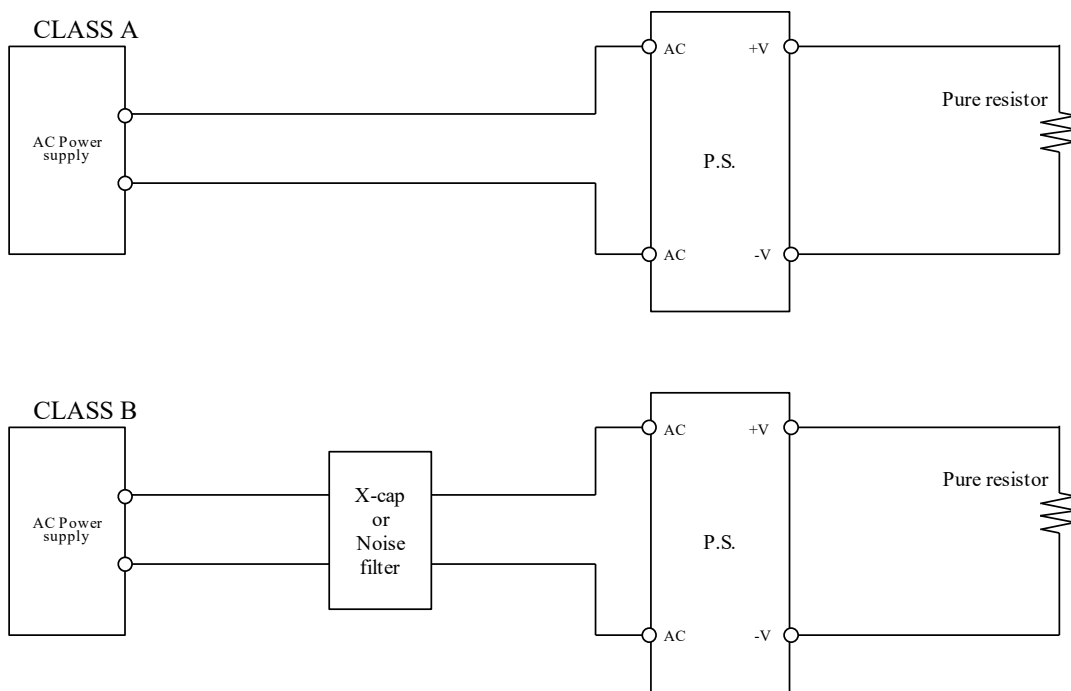
測定回路5 Circuit 5 used for determination

- 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

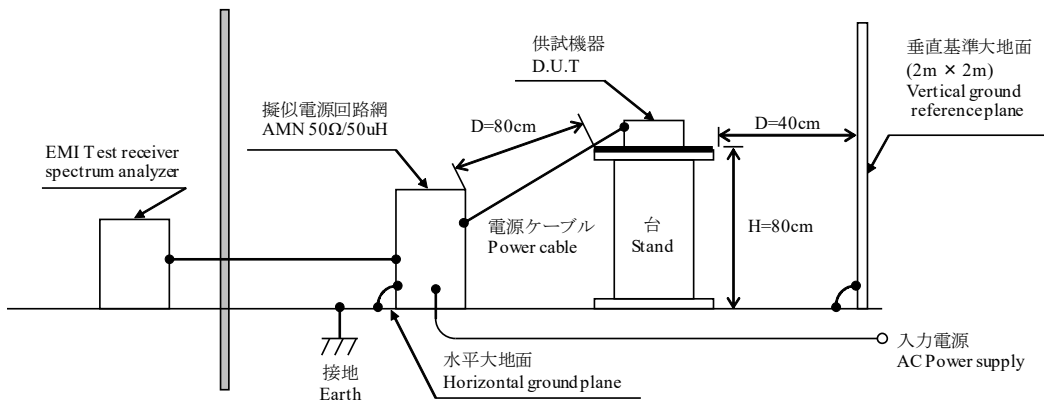


推奨 X-コンデンサ X-cap recommended :
 ECQU3A104MG(PANASONIC) or CTX104K310VP10 (CHENG TUNG).
 推奨ノイズフィルタ Noise filter recommended :
 RSEG-2001 (TDK-Lambda).

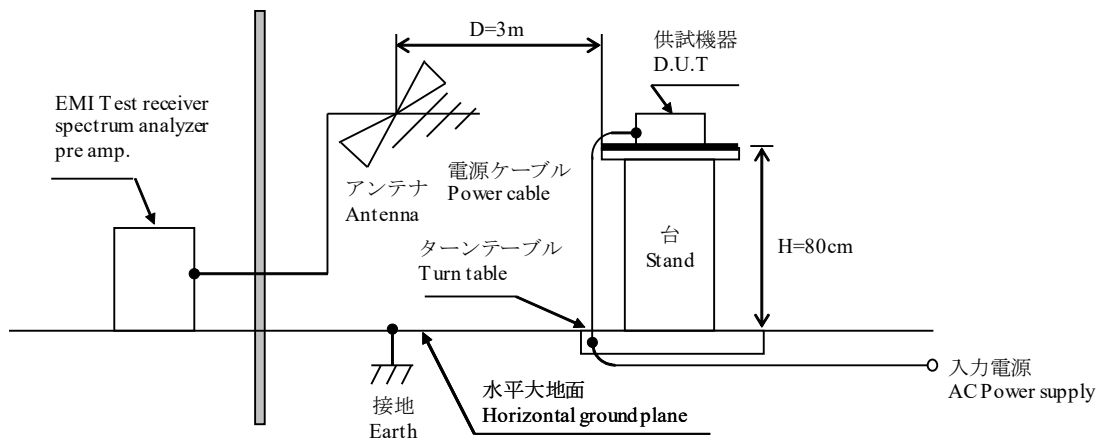
測定構成 Configuration used for determination

- 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%	3.000A	1.300A	1.000A	0.700A
90VAC	90%	2.700A	1.170A	0.900A	0.630A
85VAC	80%	2.400A	1.040A	0.800A	0.560A

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

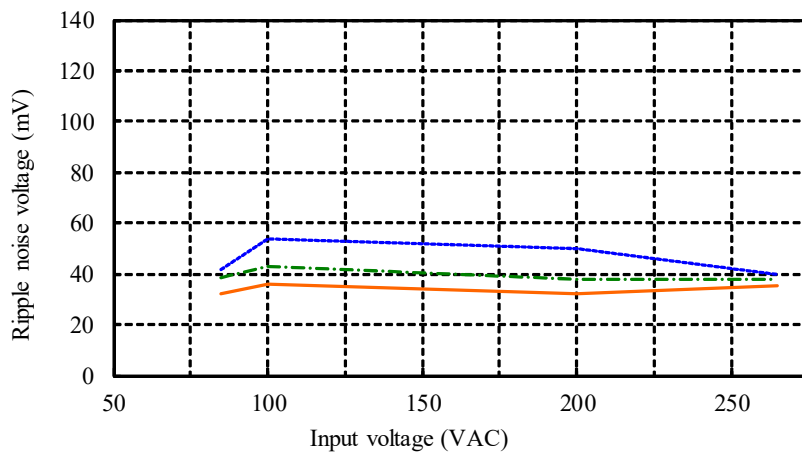
Regulation - line and load, Temperature drift / Start up voltage and Drop out voltage

5V		1. Regulation - line and load				Condition Ta : 25 °C	
Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation		
0%	4.992V	4.993V	4.989V	4.989V	4mV	0.080%	
50%	4.990V	4.990V	4.990V	4.990V	0mV	0.000%	
Full load	4.989V	4.987V	4.987V	4.987V	2mV	0.040%	
Load regulation	3mV	6mV	3mV	3mV			
	0.060%	0.120%	0.060%	0.060%			
2. Temperature drift		Conditions Vin : 100 VAC				Iout : Full load	
Ta	-10°C	+25°C	+45°C	Temperature stability			
Vout	4.992V	4.987V	4.982V	10mV	0.200%		
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%	11.910V	11.910V	11.913V	11.911V	3mV	0.025%	
50%	11.913V	11.913V	11.914V	11.914V	1mV	0.008%	
Full load	11.909V	11.911V	11.912V	11.912V	3mV	0.025%	
Load regulation	4mV	3mV	2mV	3mV			
	0.033%	0.025%	0.017%	0.025%			
2. Temperature drift		Conditions Vin : 100 VAC				Iout : Full load	
Ta	-10°C	+25°C	+55°C	Temperature stability			
Vout	11.915V	11.911V	11.895V	20mV	0.167%		
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%	23.770V	23.769V	23.761V	23.762V	9mV	0.038%	
50%	23.768V	23.766V	23.762V	23.761V	7mV	0.029%	
Full load	23.769V	23.763V	23.758V	23.757V	12mV	0.050%	
Load regulation	2mV	6mV	4mV	5mV			
	0.008%	0.025%	0.017%	0.021%			
2. Temperature drift		Conditions Vin : 100 VAC				Iout : Full load	
Ta	-10°C	+25°C	+55°C	Temperature stability			
Vout	23.824V	23.763V	23.699V	125mV	0.521%		
3. Start up voltage and Drop out voltage		Conditions Ta : 25 °C				Iout : 100 %	
Start up voltage (Vin)		56VAC					
Drop out voltage (Vin)		54VAC					

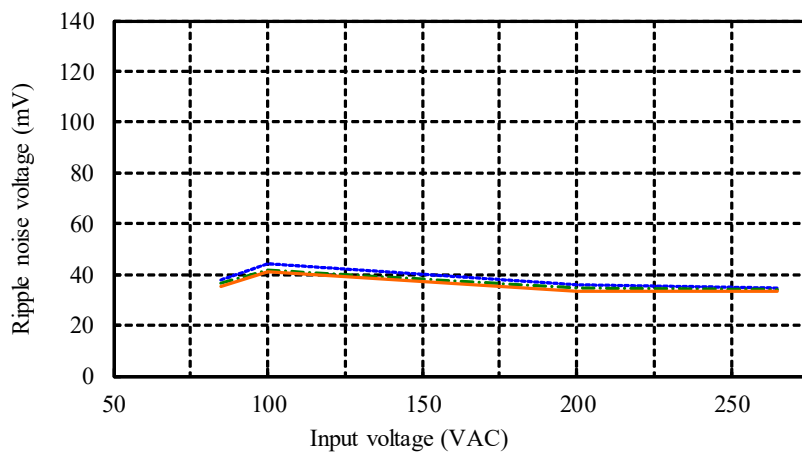
(2) リップルノイズ電圧対入力電圧 Ripple noise voltage vs. Input voltage

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

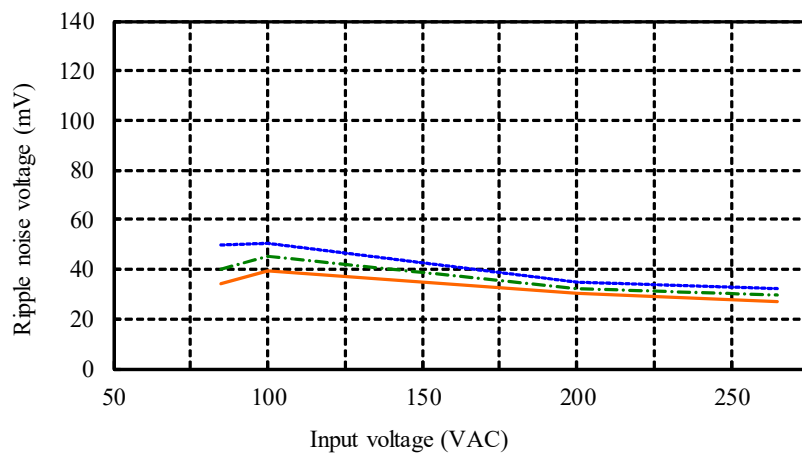
5V



12V



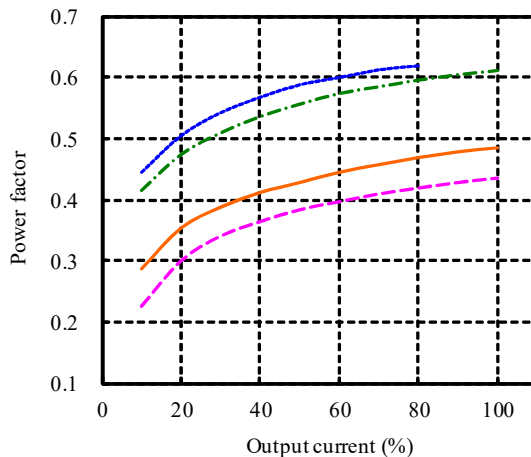
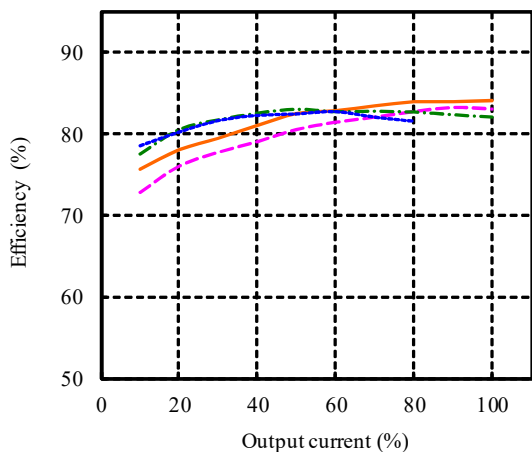
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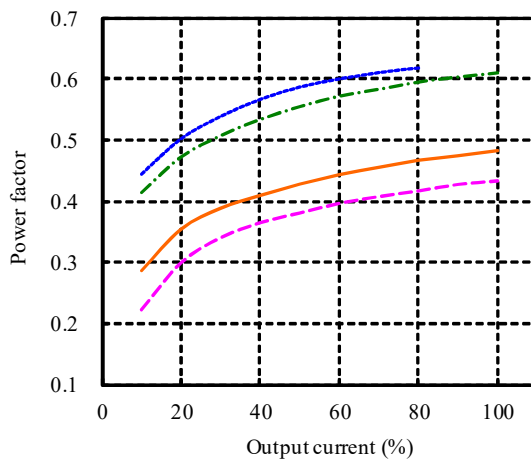
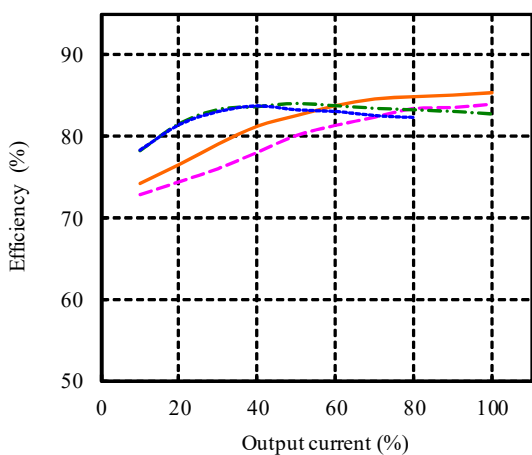
(3) 効率・力率対出力電流 Efficiency and Power factor vs. Output current

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

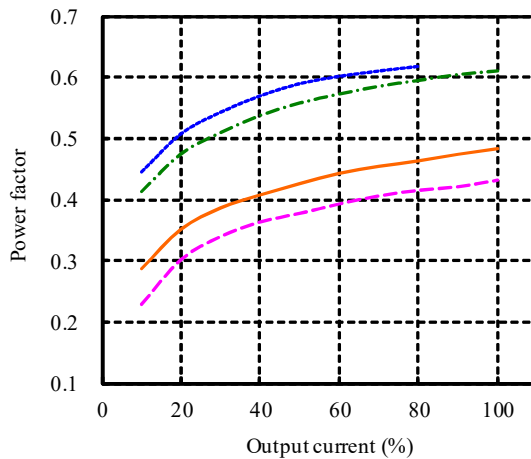
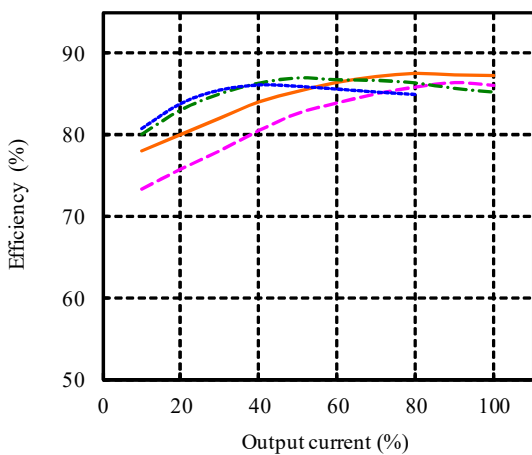
5V



12V



24V

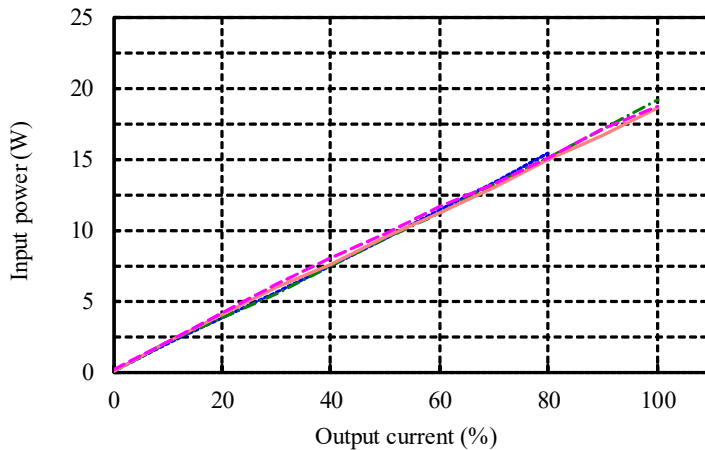


(4) 入力電力対出力電流 Input power vs. Output current

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

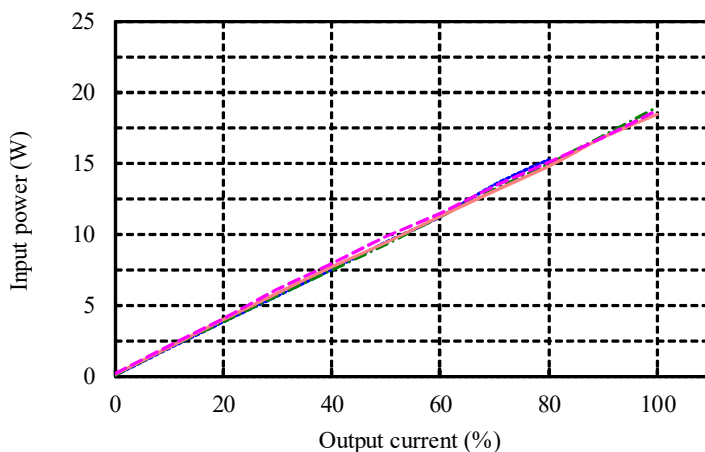
5V

V_{in}	Input power
	$I_{out} : 0\%$
85VAC	0.02W
100VAC	0.03W
200VAC	0.10W
265VAC	0.20W



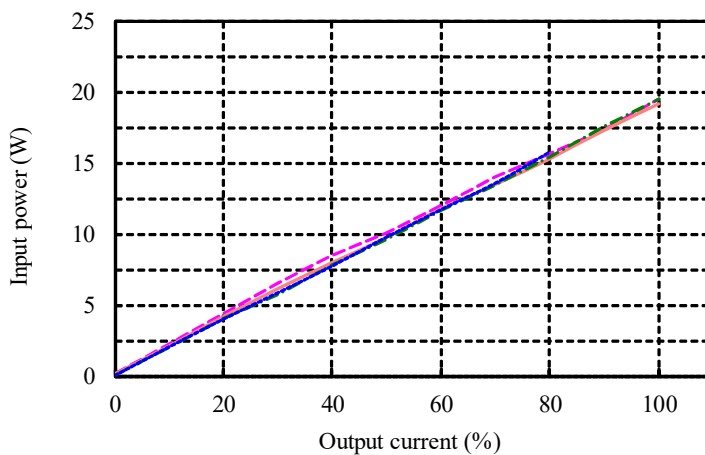
12V

V_{in}	Input power
	$I_{out} : 0\%$
85VAC	0.02W
100VAC	0.06W
200VAC	0.09W
265VAC	0.15W



24V

V_{in}	Input power
	$I_{out} : 0\%$
85VAC	0.01W
100VAC	0.08W
200VAC	0.12W
265VAC	0.16W

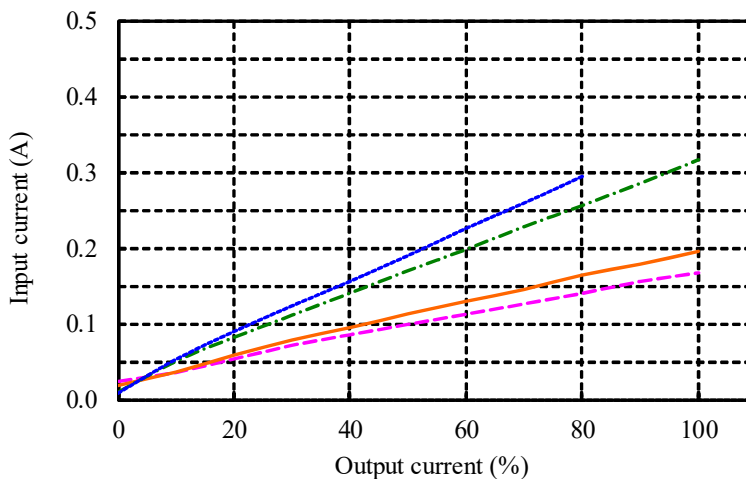


(5) 入力電流対出力電流 Input current vs. Output current

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

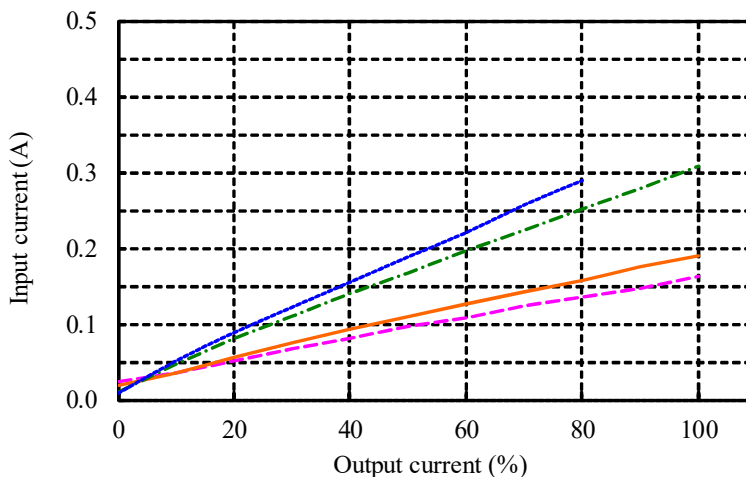
5V

Vin	Input current
	Iout : 0%
85VAC	0.008A
100VAC	0.010A
200VAC	0.019A
265VAC	0.024A



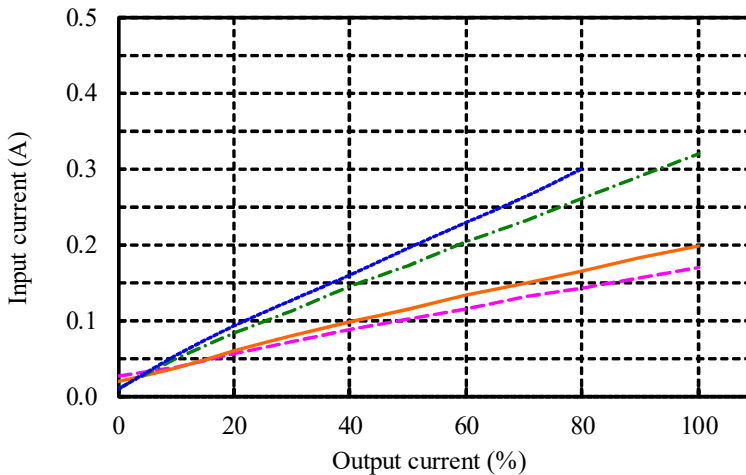
12V

Vin	Input current
	Iout : 0%
85VAC	0.008A
100VAC	0.010A
200VAC	0.019A
265VAC	0.025A



24V

Vin	Input current
	Iout : 0%
85VAC	0.008A
100VAC	0.010A
200VAC	0.019A
265VAC	0.025A

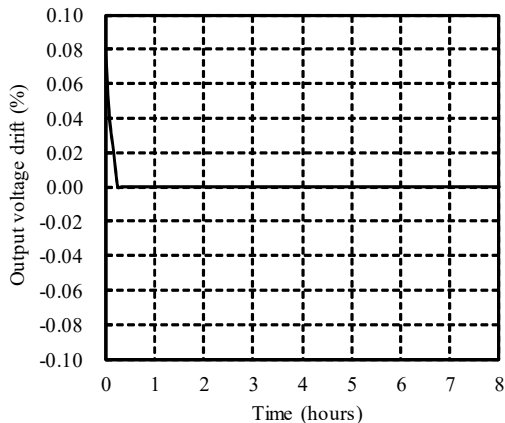


2-2. 通電ドリフト特性

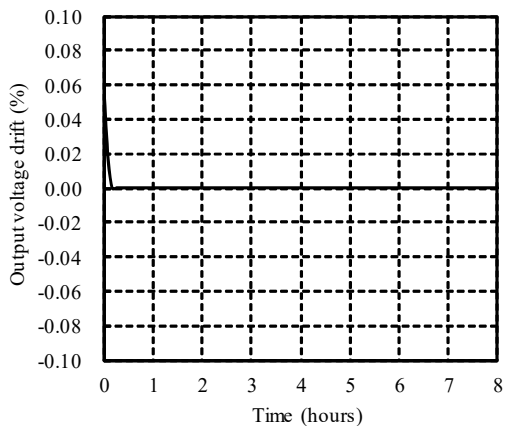
Warm up voltage drift characteristics

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

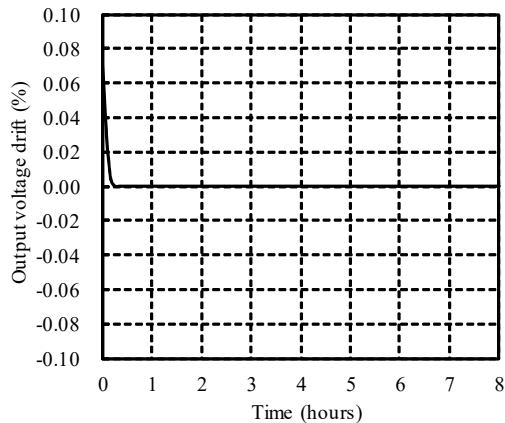
5V



12V



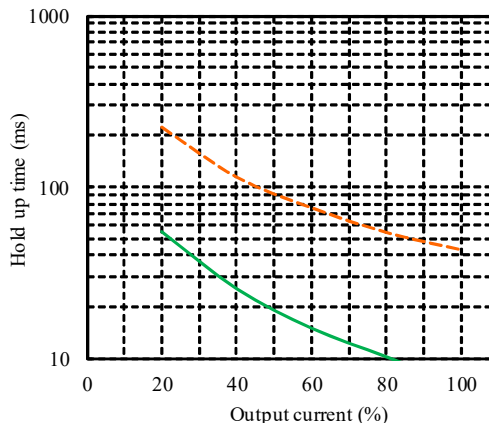
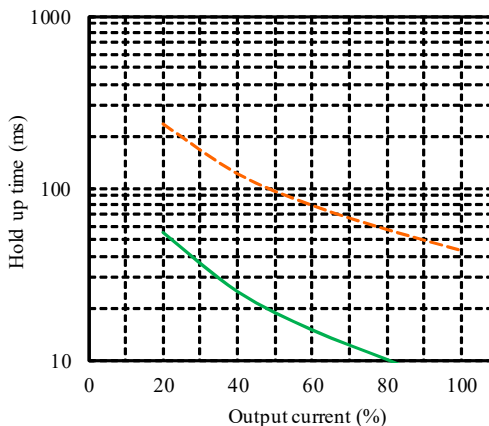
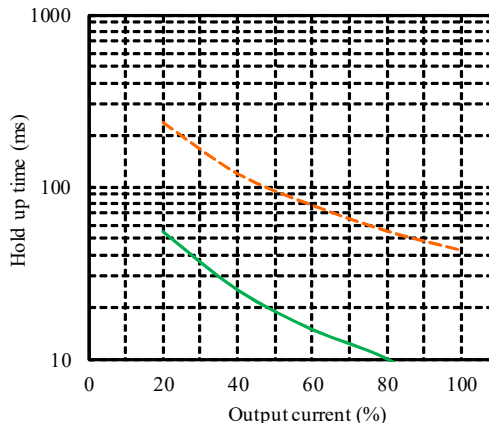
24V



2-3. 出力保持時間特性

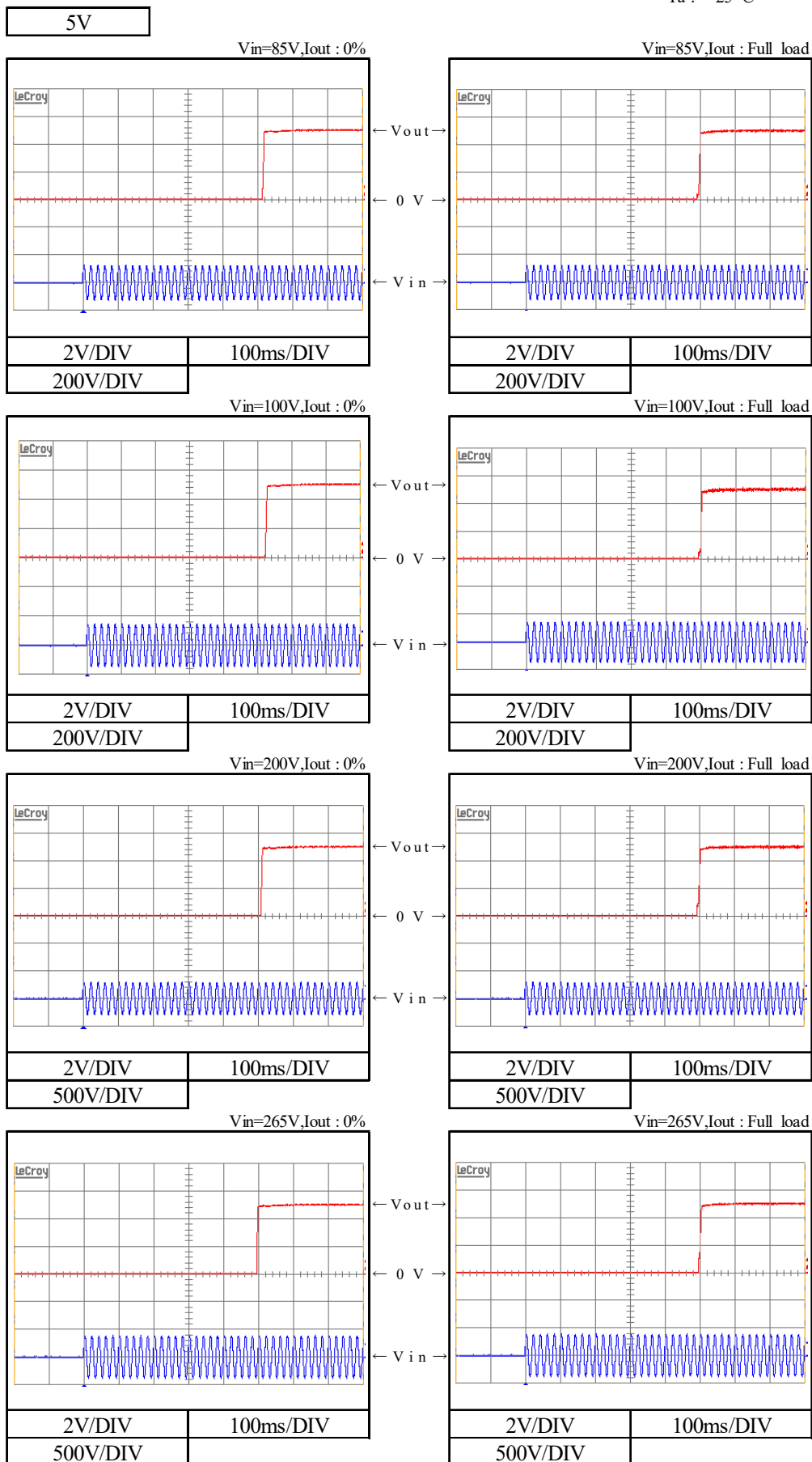
Hold up time characteristics

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



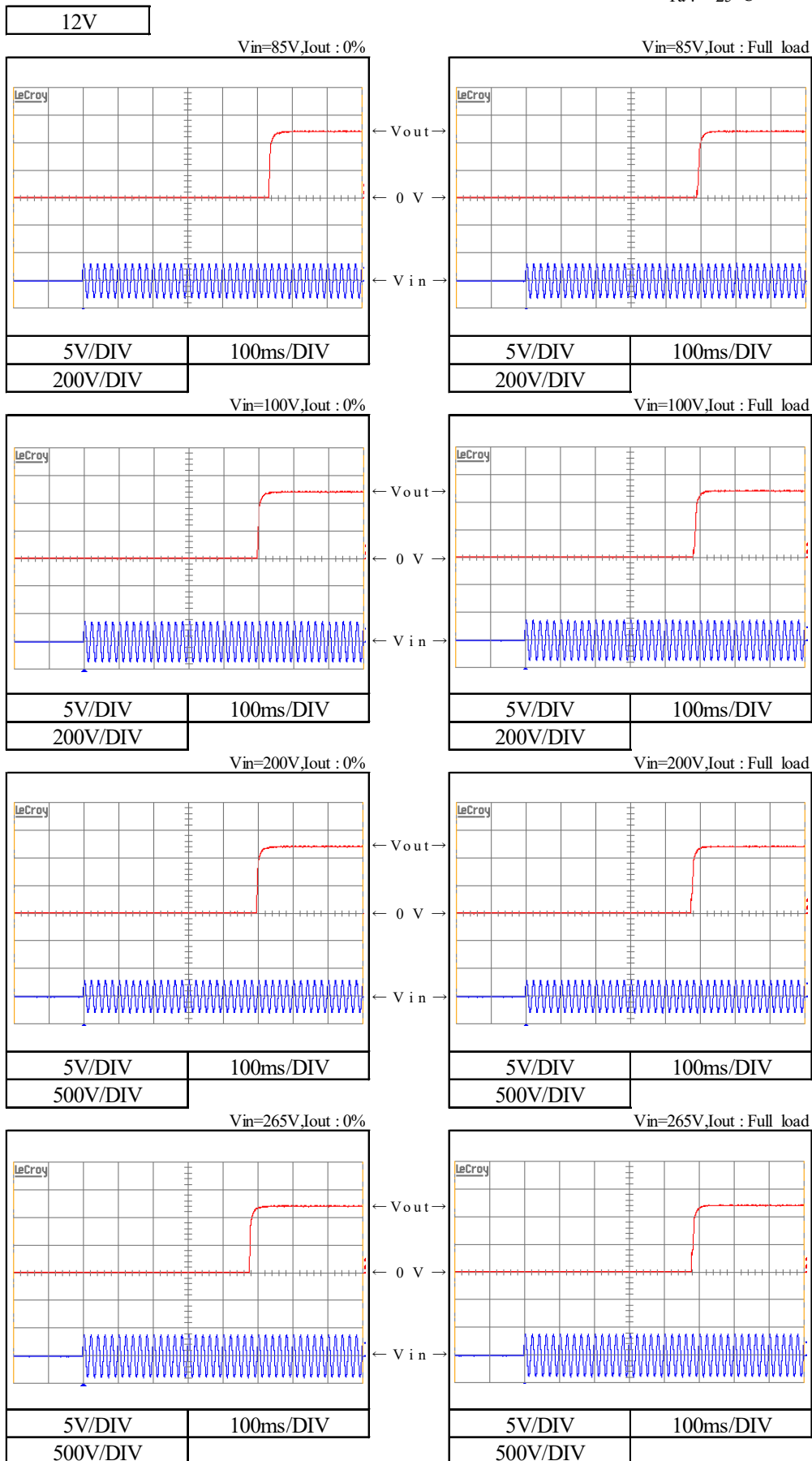
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



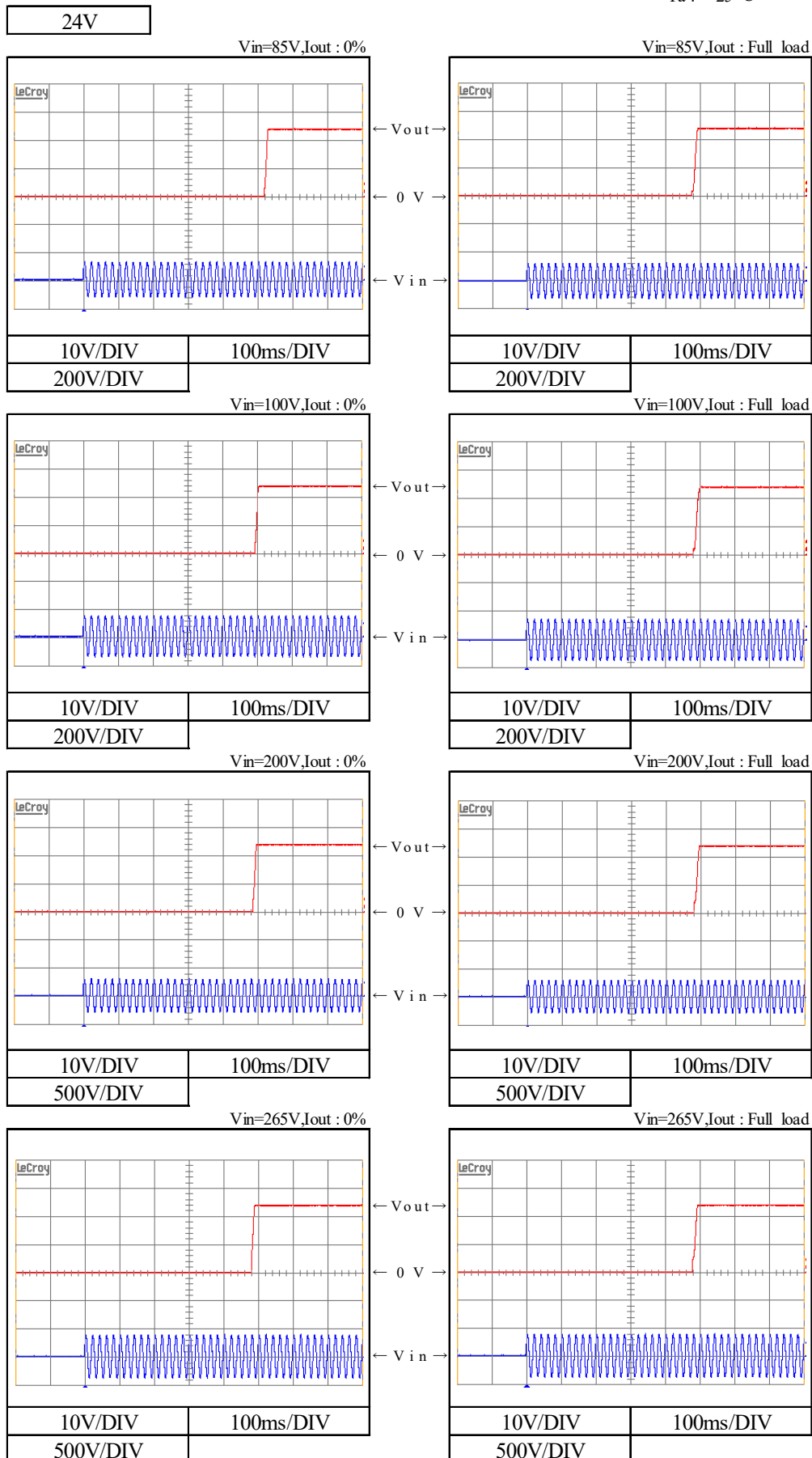
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



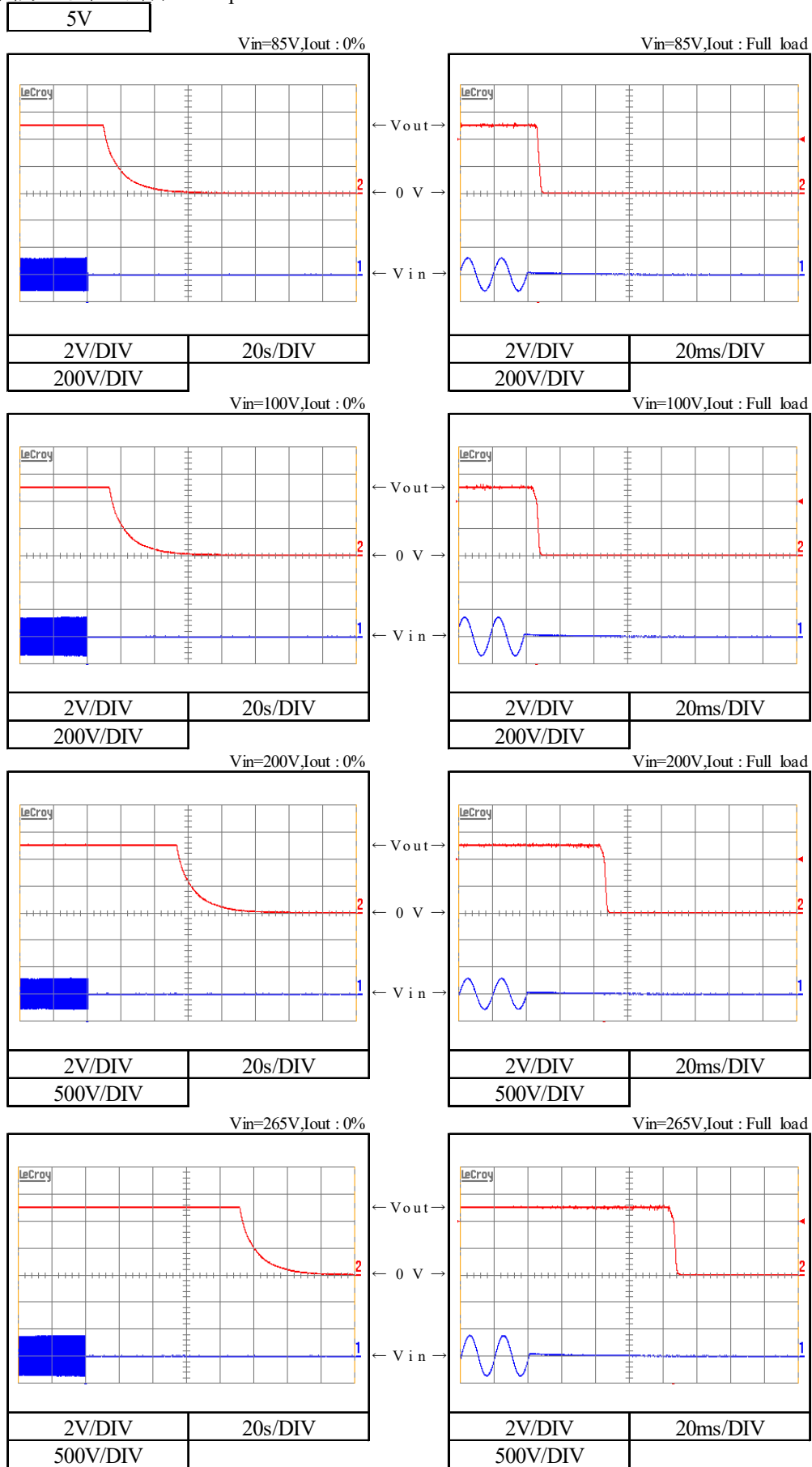
2-4. 出力立ち上がり特性 Output rise characteristics

Ta : 25 °C



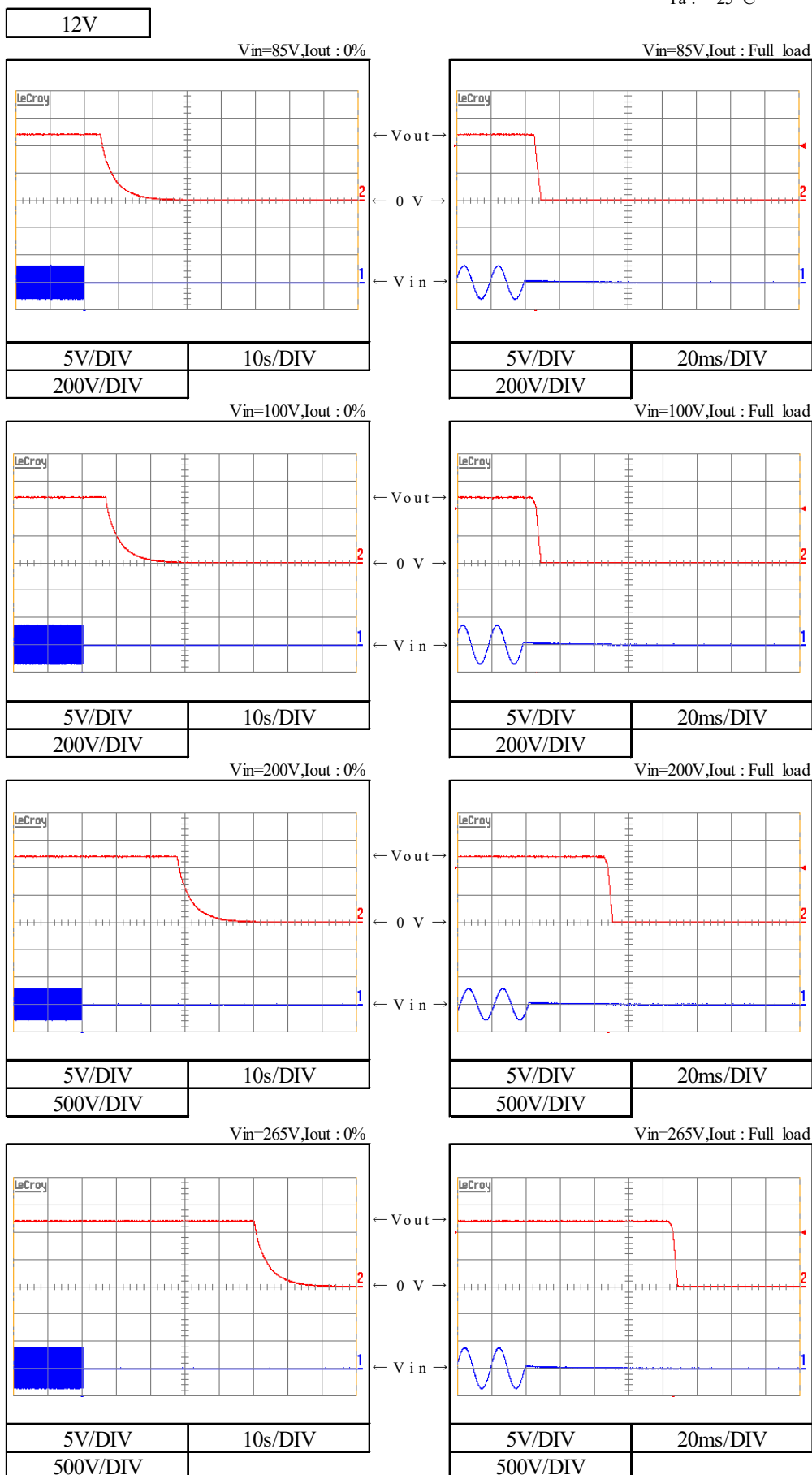
2-5. 出力立ち下がり特性 Output fall characteristics

Ta : 25 °C



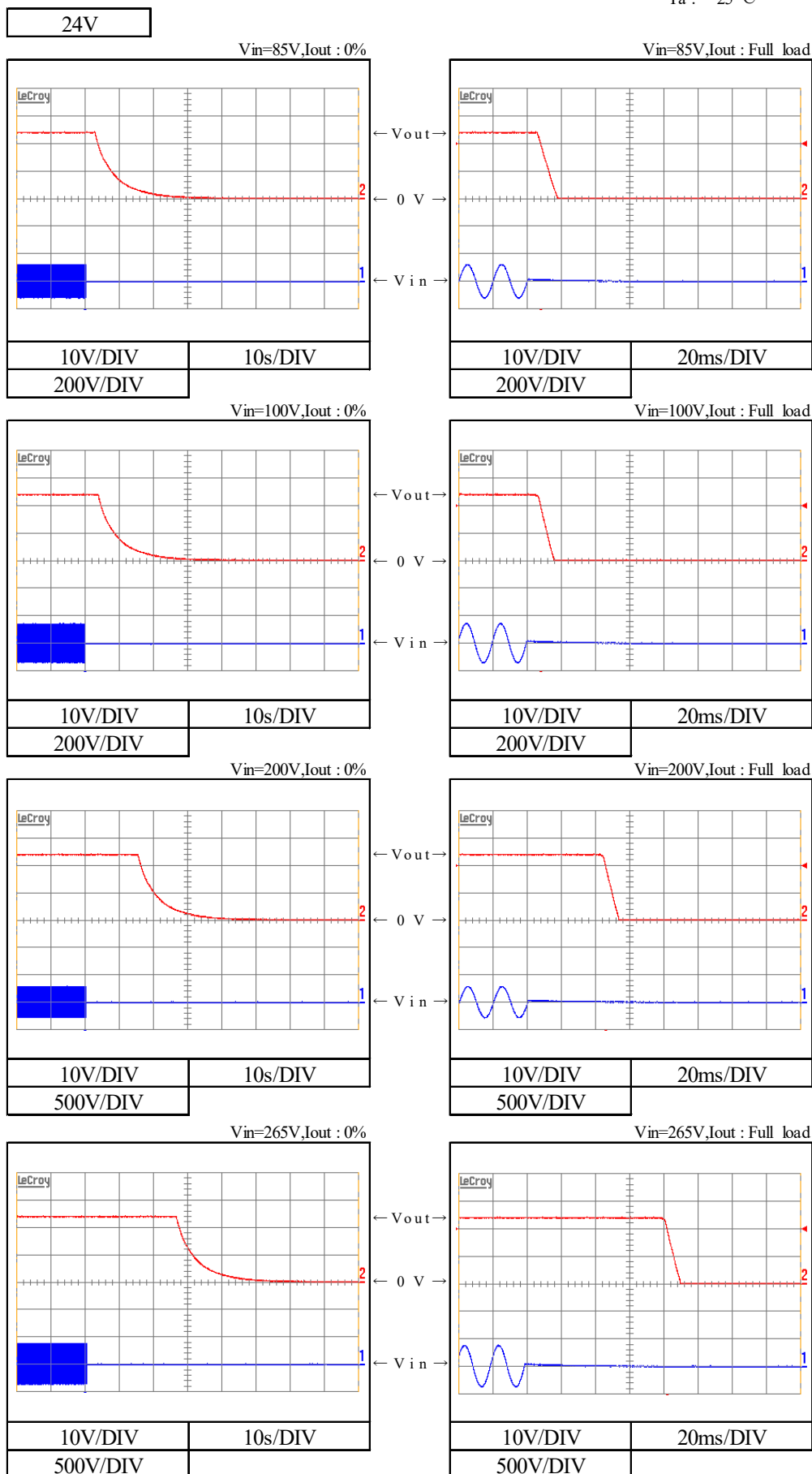
2-5. 出力立ち下がり特性 Output fall characteristics

Ta : 25 °C



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

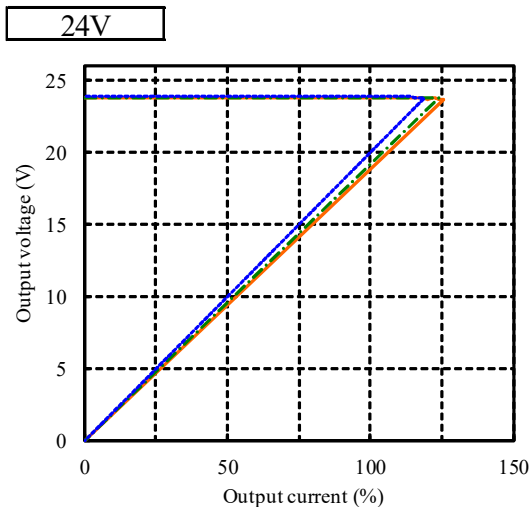
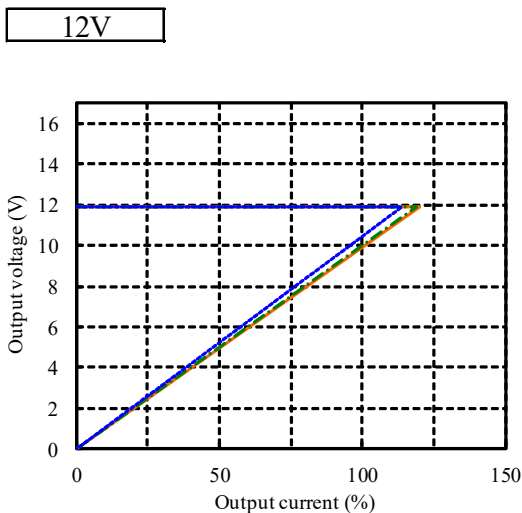
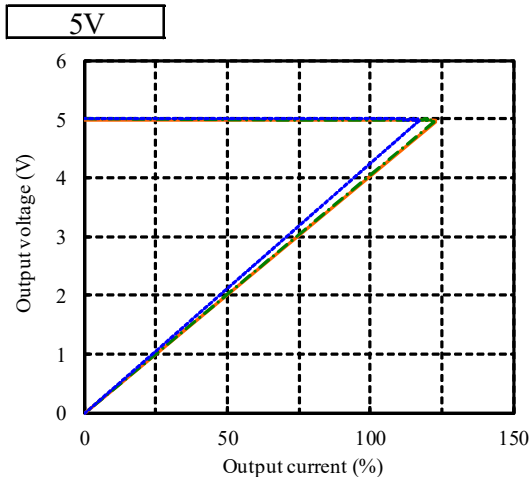
Ta : 25 °C



2-6. 過電流保護特性

Over current protection (OCP) characteristics

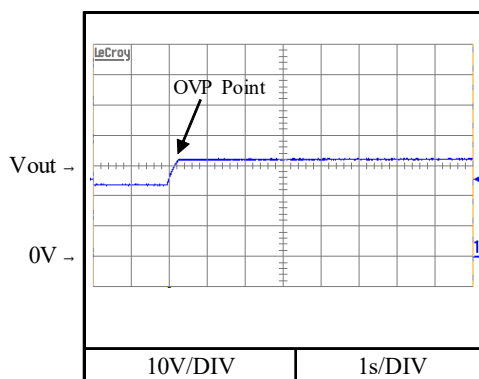
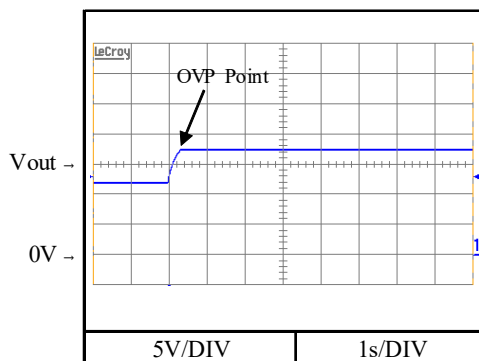
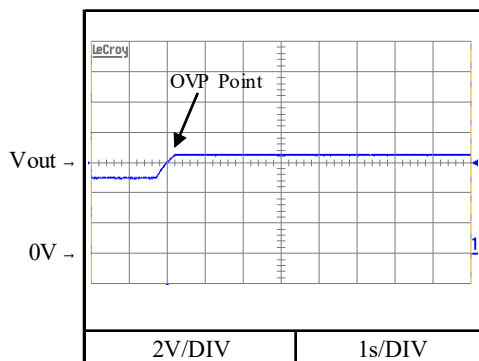
Conditions Vin : 100 VAC
 Ta : -10 °C (---)
 25 °C (---)
 55 °C (---)
 5V:45 °C (---)



2-7. 過電圧保護特性

Over voltage protection (OVP) characteristics

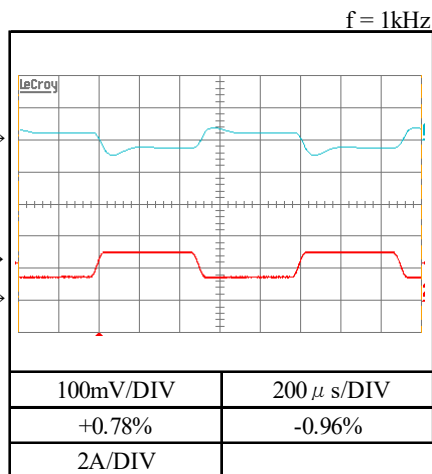
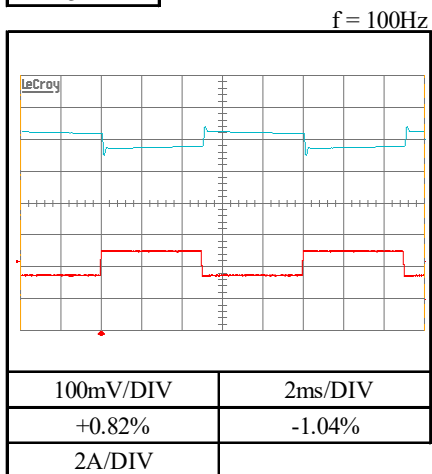
Conditions Vin : 100 VAC
 Iout : 0 %
 Ta : 25 °C



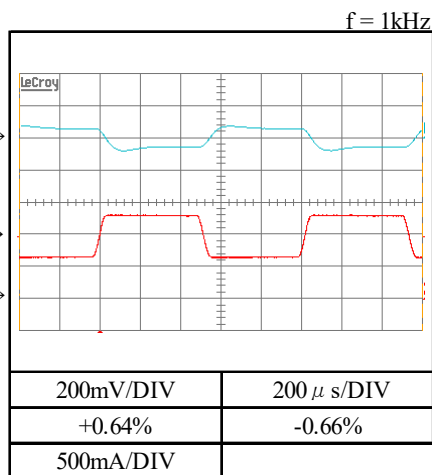
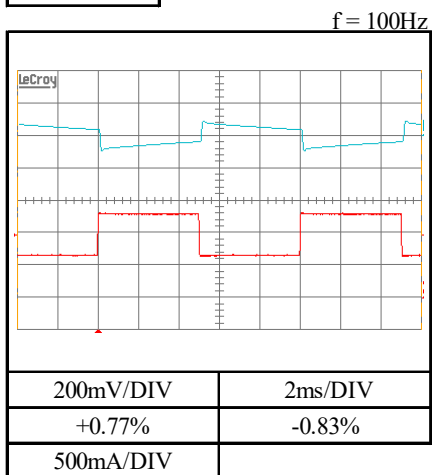
2-8. 過渡応答(負荷急変)特性 Dynamic load response characteristics

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

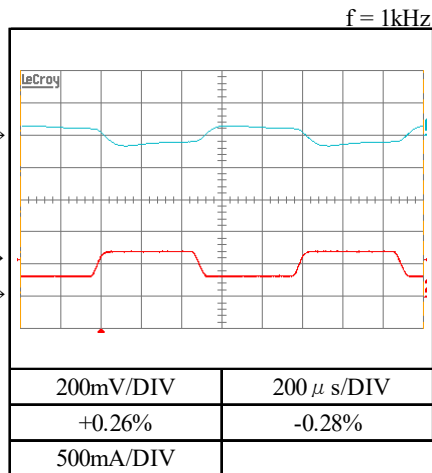
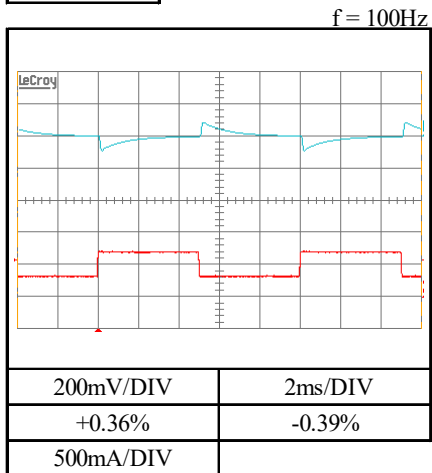
5V



12V



24V



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

Conditions Ta : 25 °C
Iout : Full load

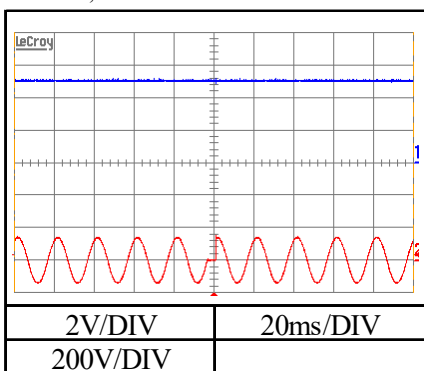
瞬停時間 Interruption time

- 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.

5V

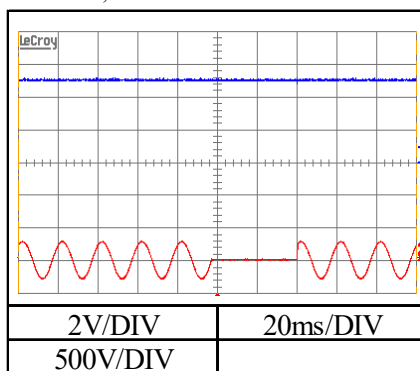
Vin : 100VAC

A = 4ms,



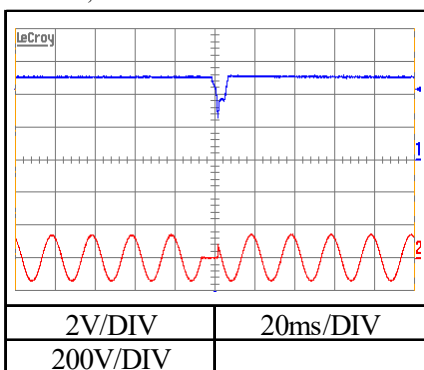
Vin : 200VAC

A = 43ms,



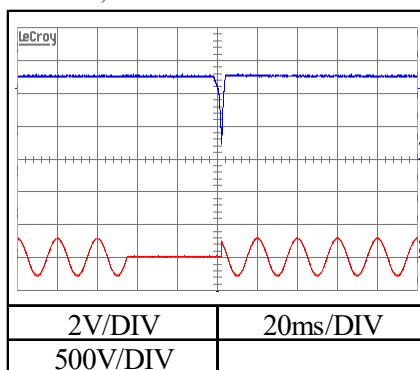
Vin : 100VAC

B = 8ms,



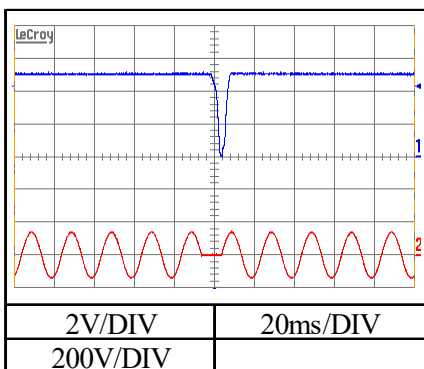
Vin : 200VAC

B = 47ms,



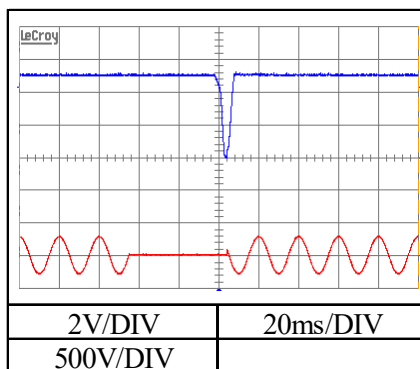
Vin : 100VAC

C = 10ms



Vin : 200VAC

C = 48ms



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

Conditions Ta : 25 °C
Iout : Full load

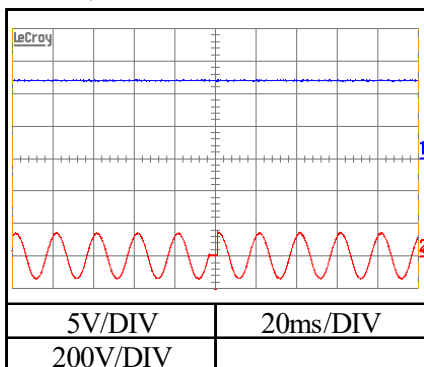
瞬停時間 Interruption time

- 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.

12V

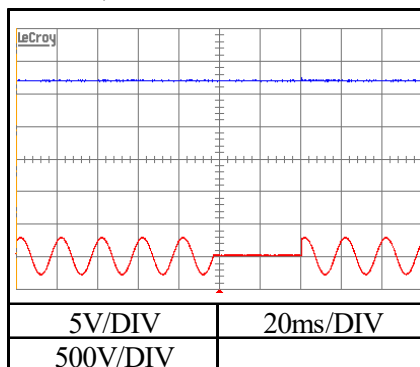
Vin : 100VAC

A = 4ms,



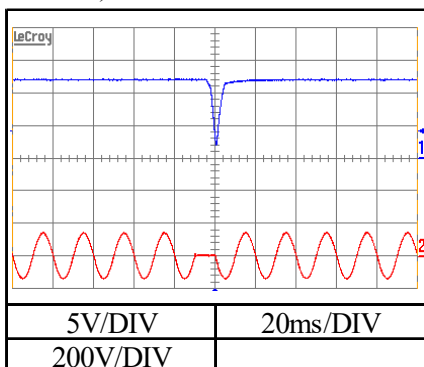
Vin : 200VAC

A = 43ms,



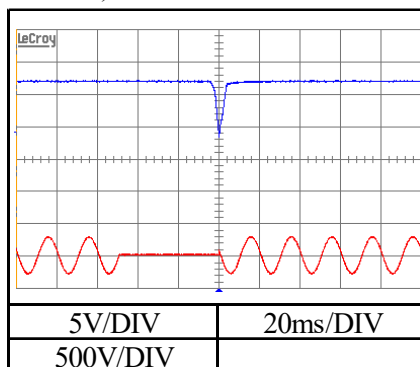
Vin : 100VAC

B = 10ms,



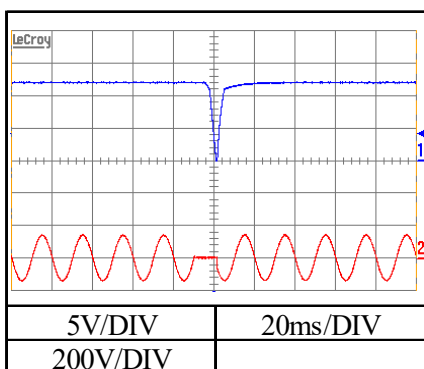
Vin : 200VAC

B = 49ms,



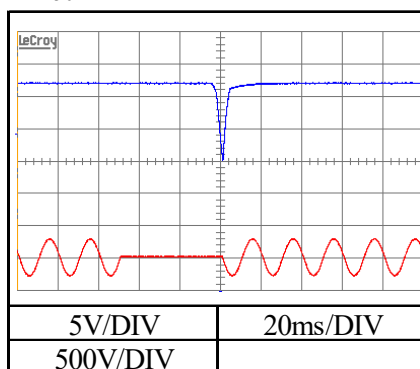
Vin : 100VAC

C = 11ms



Vin : 200VAC

C = 50ms

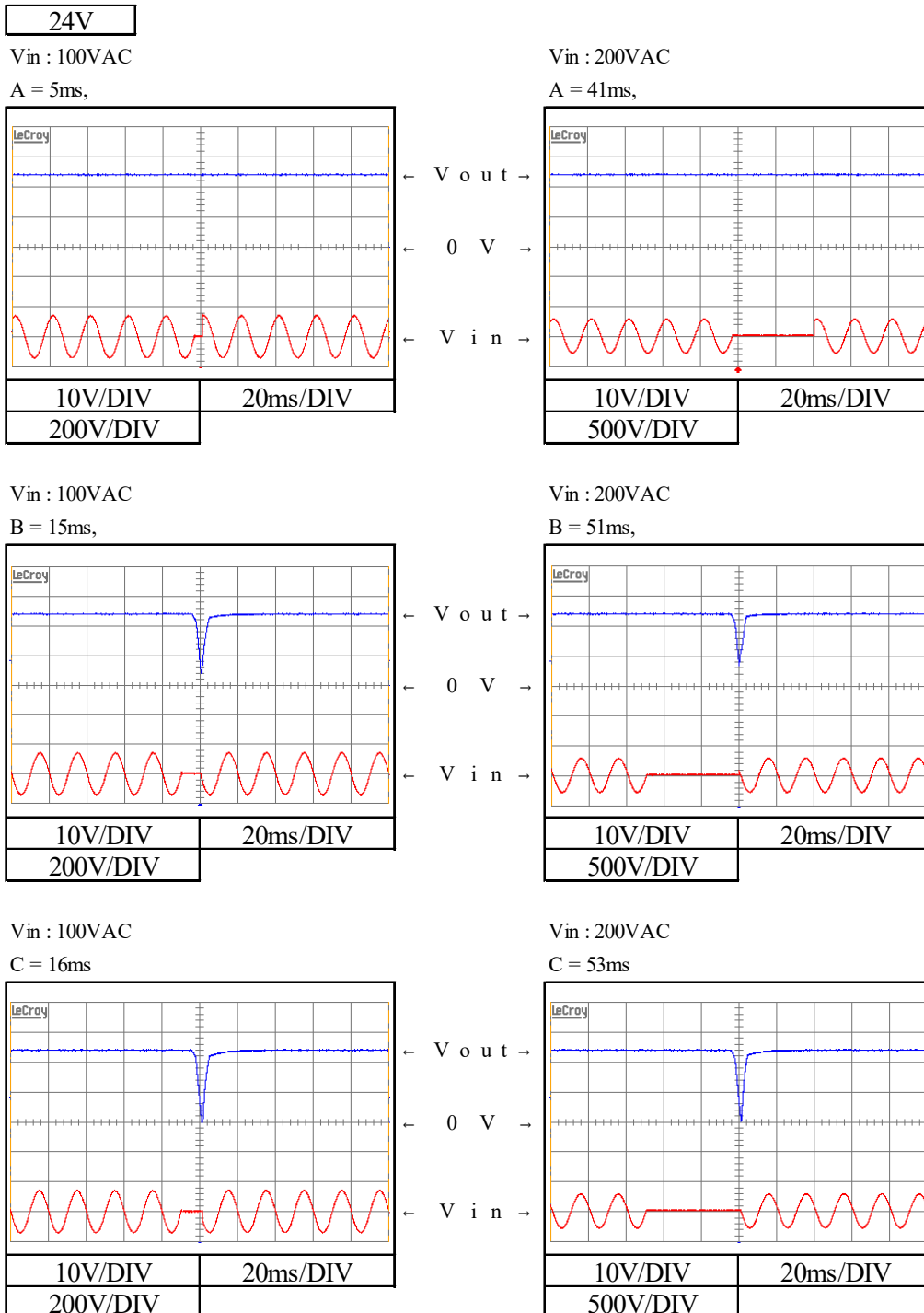


2-9. 入力電圧瞬停特性 Response to brown out characteristics

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.

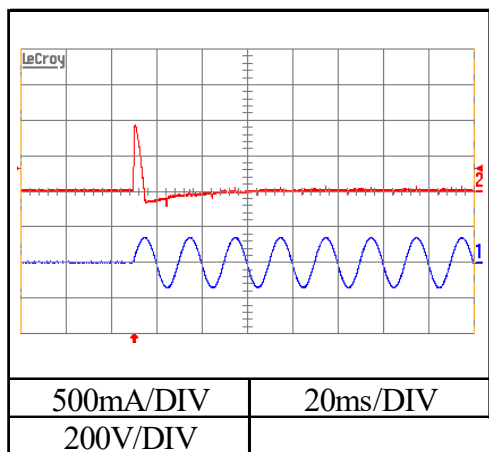


2-10. 入力サージ電流(突入電流)波形 Inrush current waveform

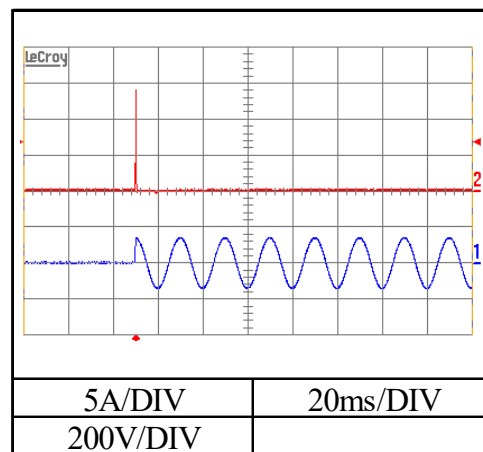
24V

Conditions V_{in} : 100 VAC
 I_{out} : Full load
 T_a : 25°C

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

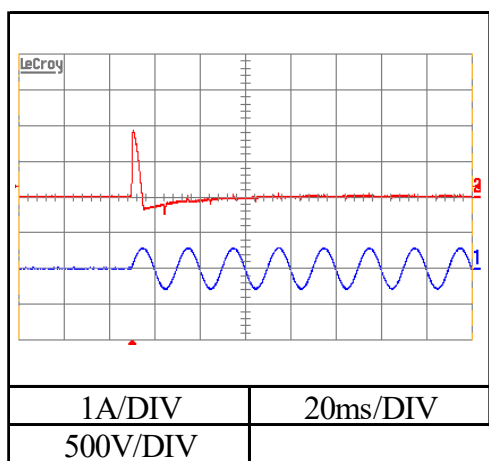


Switch on phase angle of input AC voltage
 $\phi = 90^\circ$

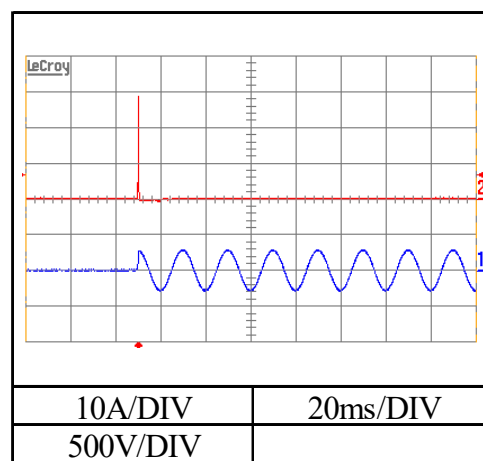


Conditions V_{in} : 200 VAC
 I_{out} : Full load
 T_a : 25°C

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



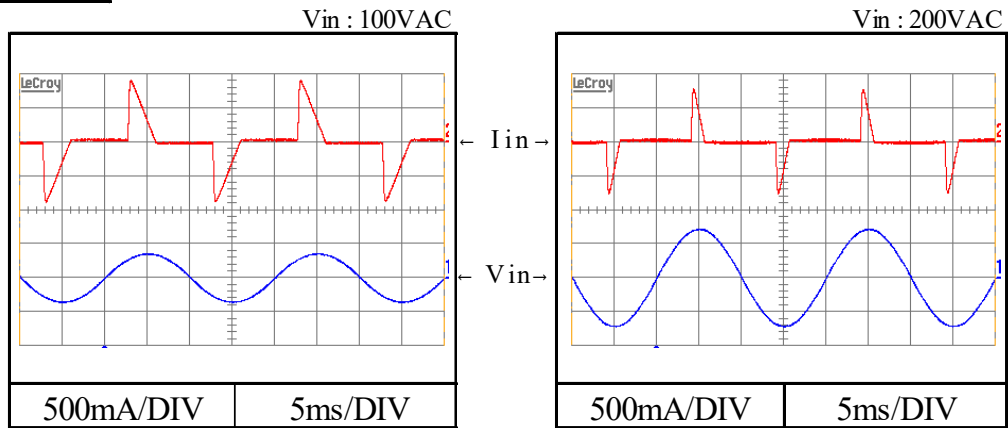
Switch on phase angle of input AC voltage
 $\phi = 90^\circ$



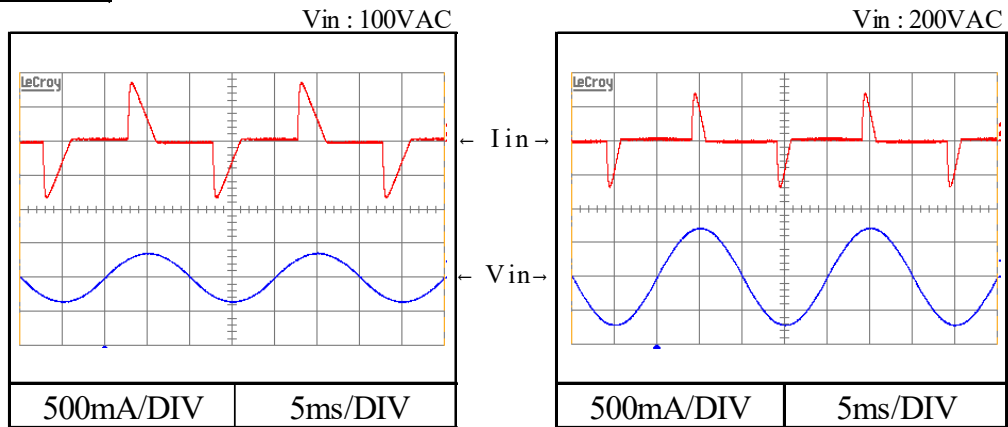
2-11. 入力電流波形 Input current waveform

Conditions Iout : Full load
Ta : 25°C

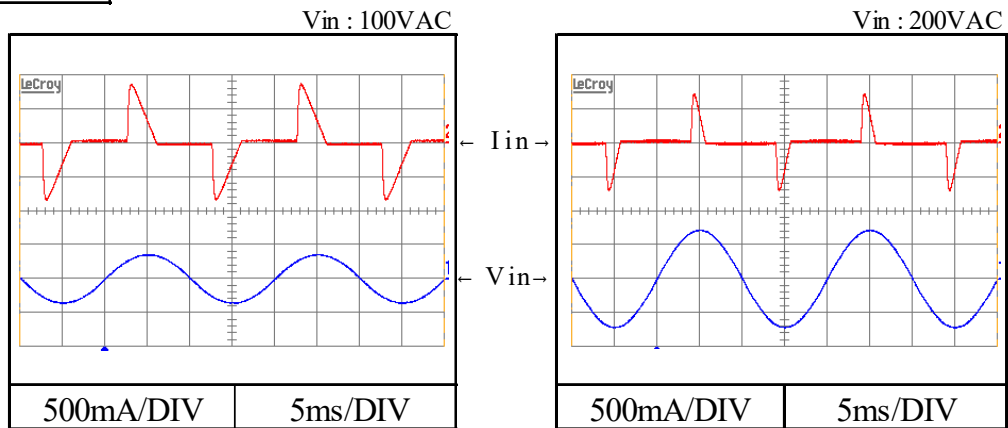
5V



12V



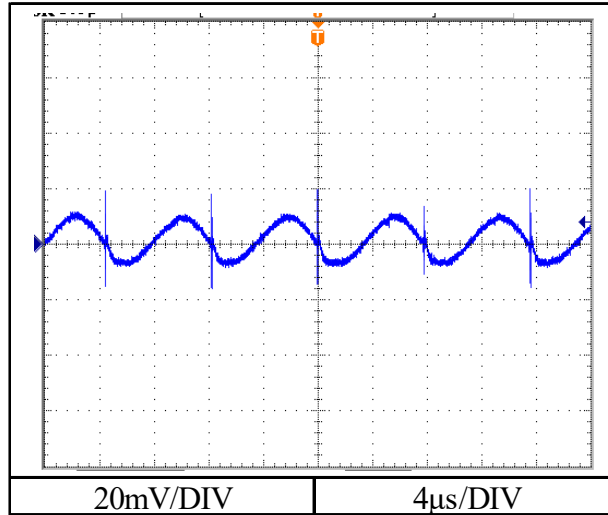
24V



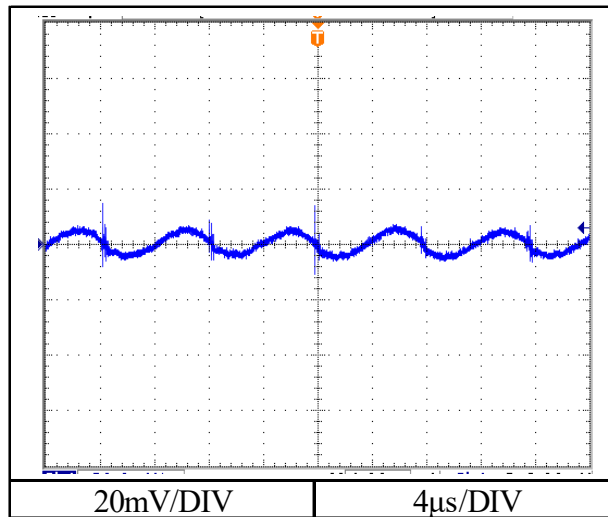
2-12. 出力リップル、ノイズ波形 Output ripple and noise waveform

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

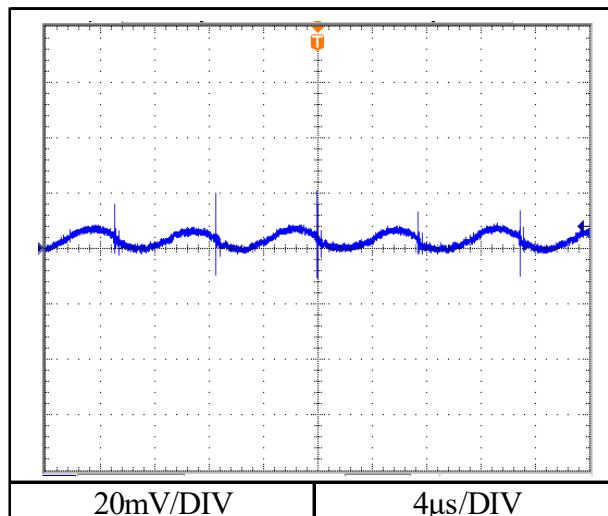
5V



12V



24V



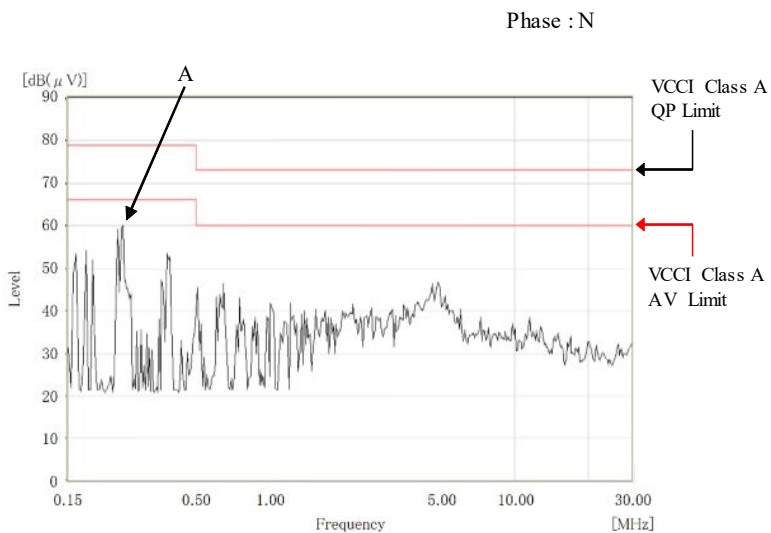
2-13. EMI特性 Electro-Magnetic Interference characteristics

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

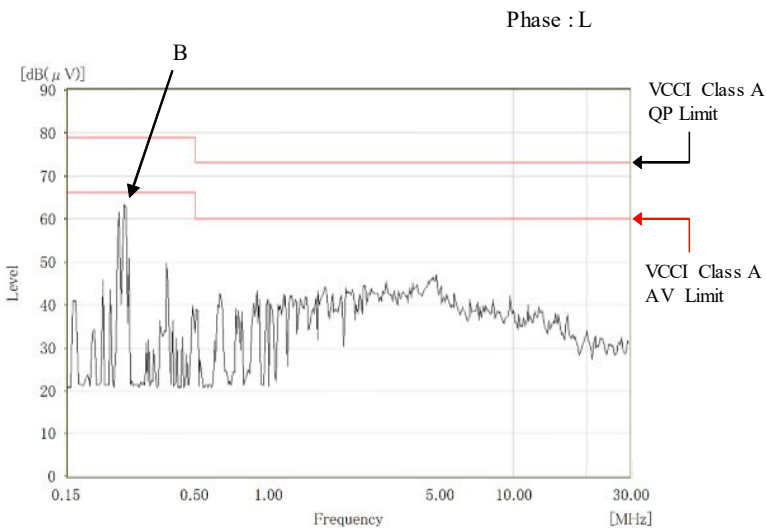
雑音端子電圧
Conducted Emission

5V

Point A (252kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	62.8
AV	66.0	48.8



Point B (255kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	62.7
AV	66.0	49.3



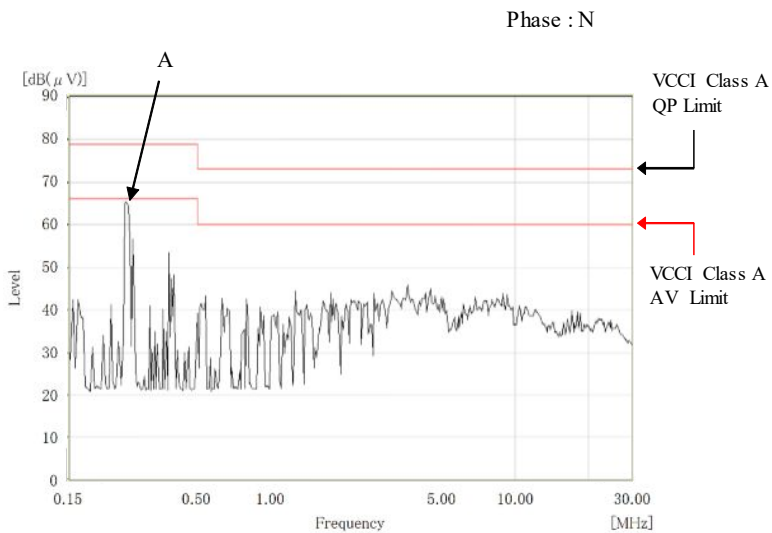
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

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

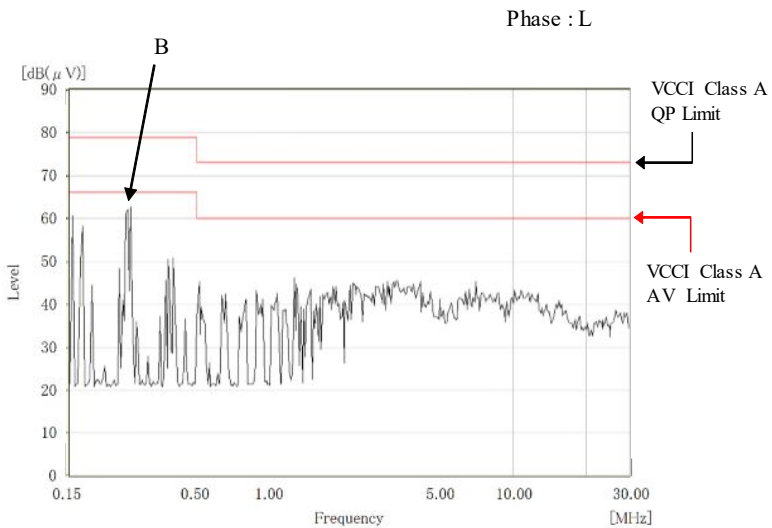
雑音端子電圧
Conducted Emission

12V

Point A (255kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	62.7
AV	66.0	49.1



Point B (267kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	62.4
AV	66.0	47.5



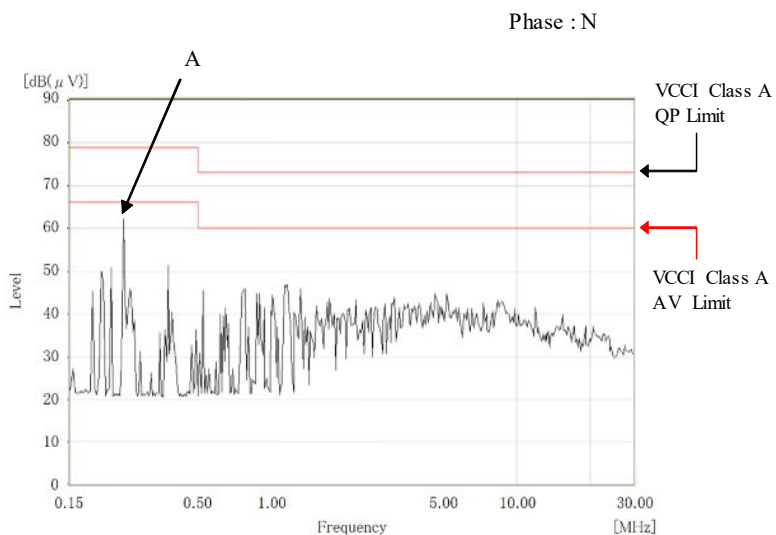
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

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

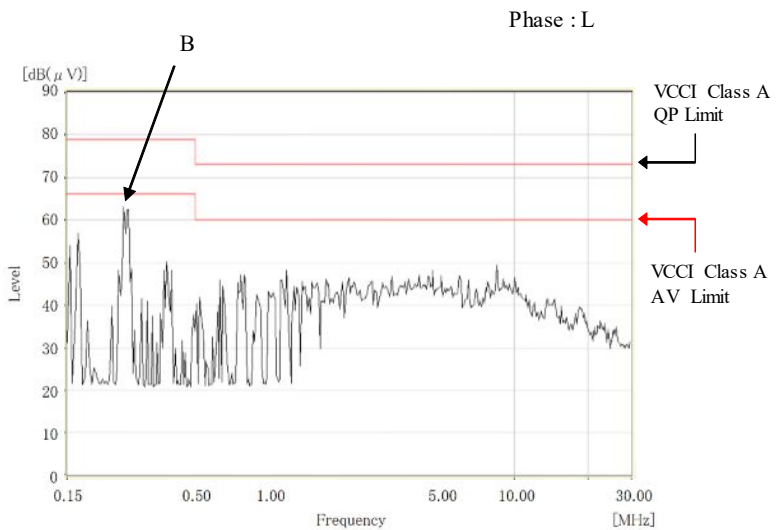
雑音端子電圧
Conducted Emission

24V

Point A (248kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	63.1
AV	66.0	46.1



Point B (255kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	79.0	62.4
AV	66.0	49.3



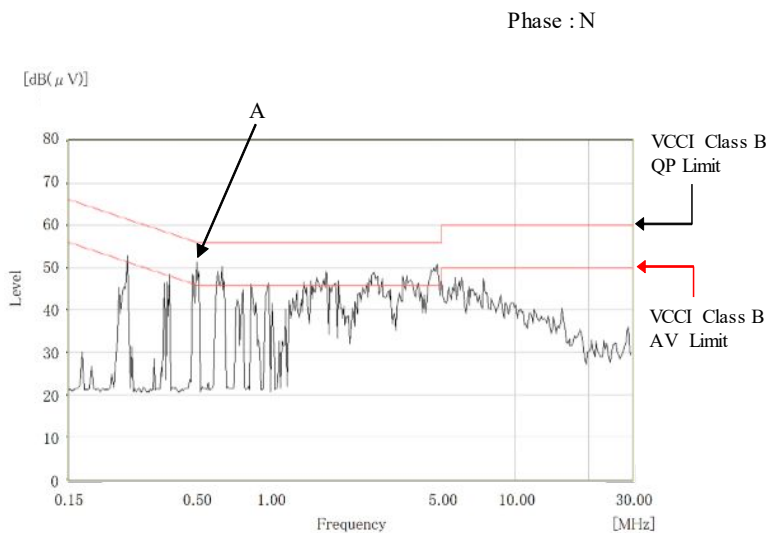
EN55011-A,EN55032-A,FCC-Aの限界値はVCCI class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI class A.

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

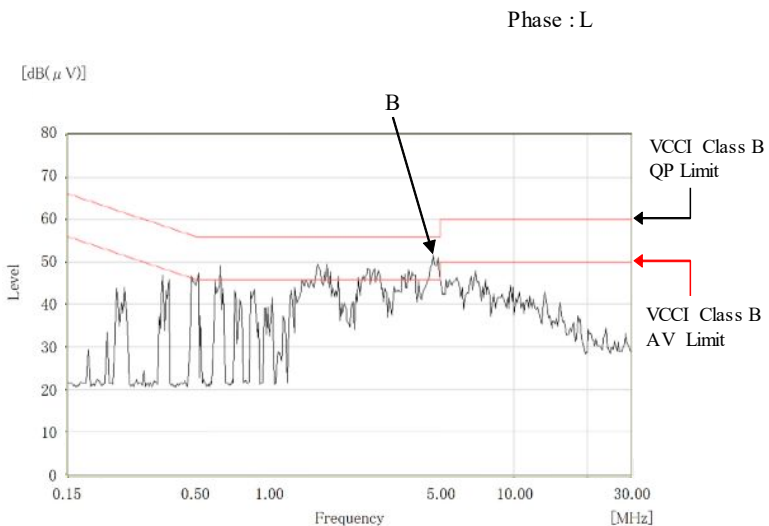
雑音端子電圧
Conducted Emission

5V

Point A (499kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	49.5
AV	46.0	36.1



Point B (4.662MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	49.3
AV	46.0	36.1



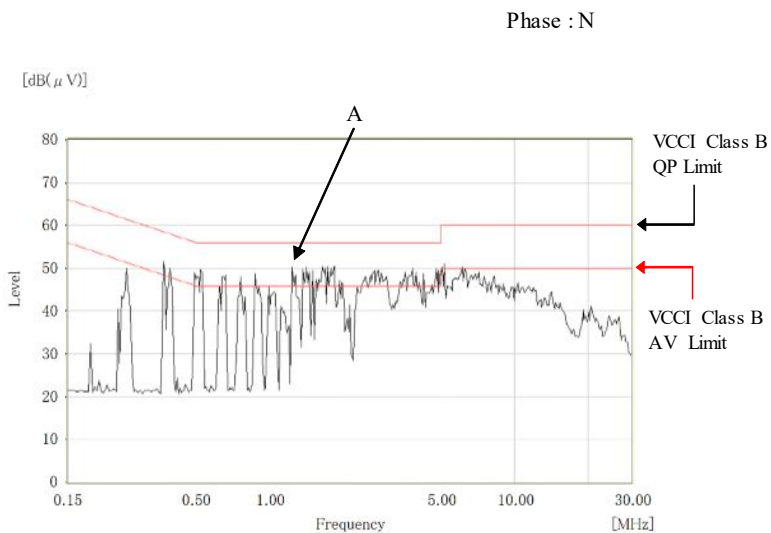
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

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

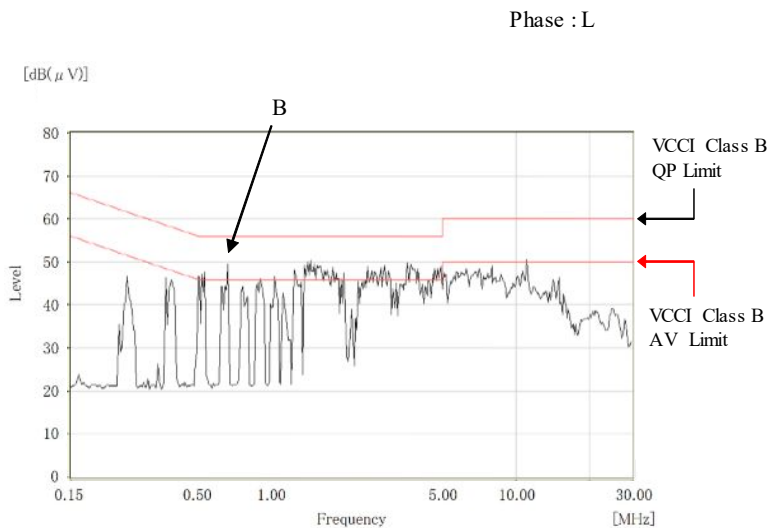
雑音端子電圧
 Conducted Emission

12V

Point A (1.236MHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	47.3
AV	46.0	31.1



Point B (529kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	49.2
AV	46.0	35.9



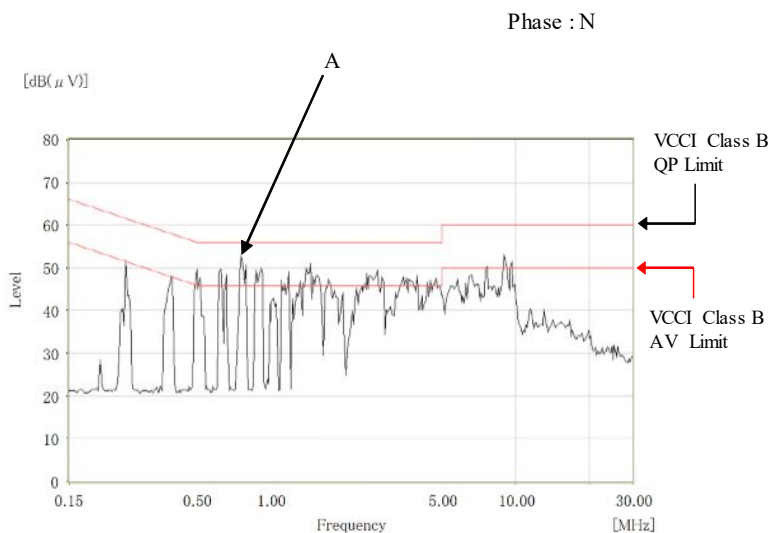
EN55011-B,EN55032-B,FCC-Bの限界値はVCCI class Bの限界値と同じ
 Limit of EN55011-B,EN55032-B,FCC-B are same as its VCCI class B.

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

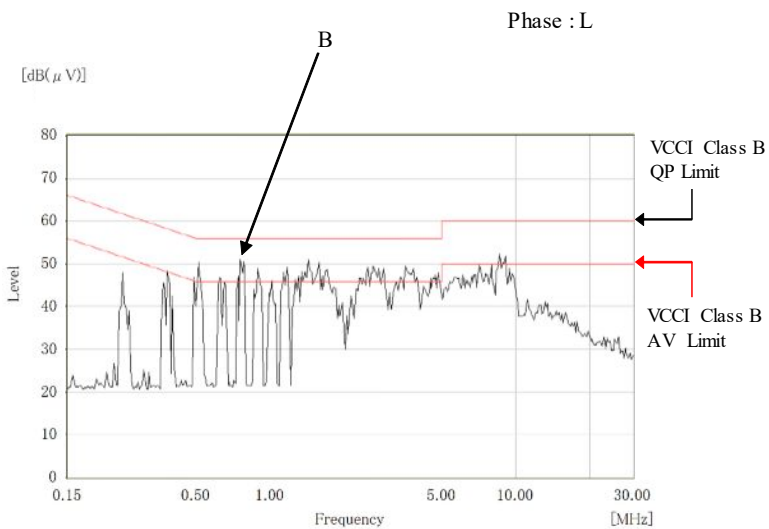
雑音端子電圧
Conducted Emission

24V

Point A (755kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	49.6
AV	46.0	34.1



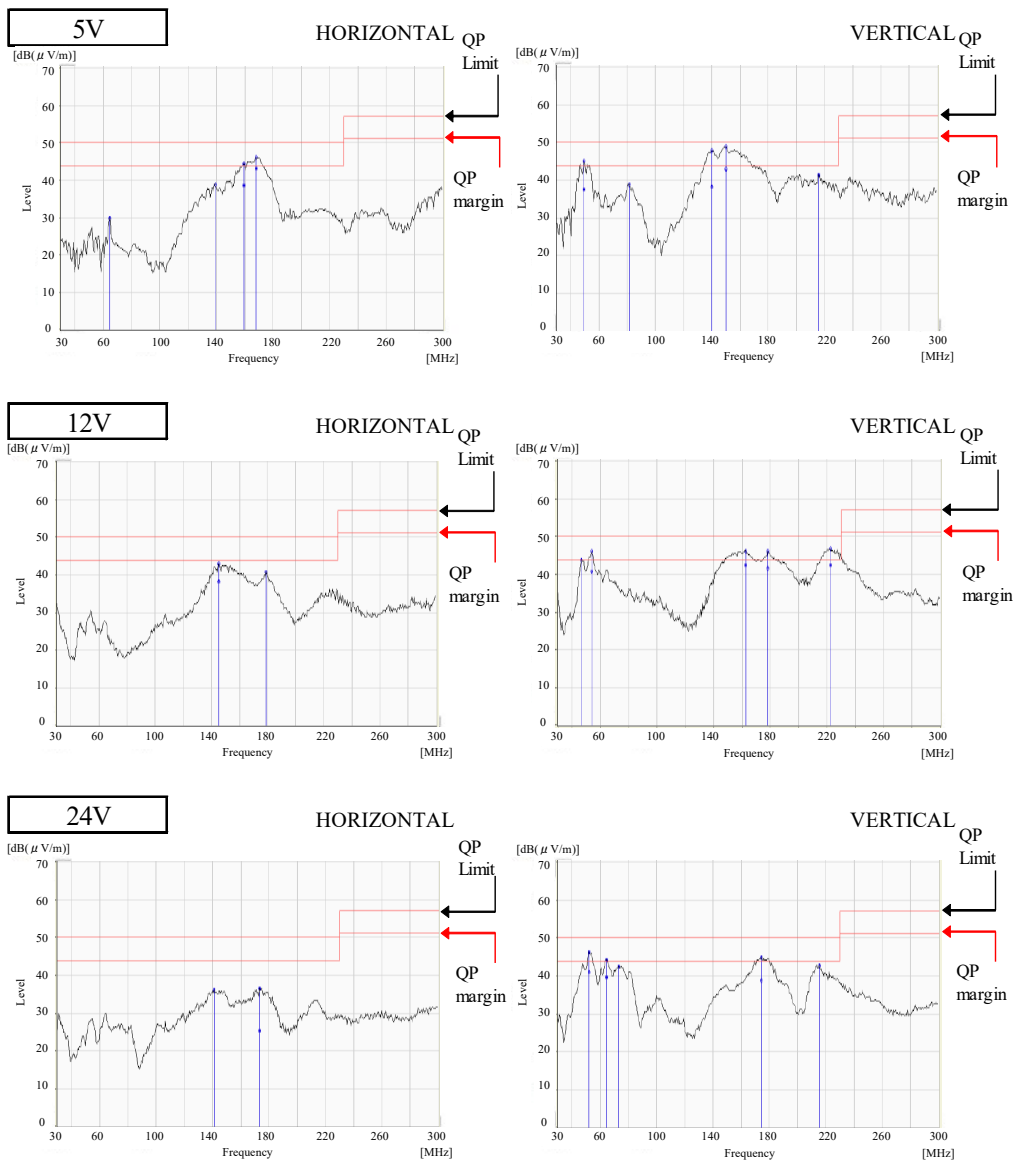
Point B (755kHz)		
Ref. Data	Limit (dB)	Measure (dB)
QP	56.0	48.3
AV	46.0	34.1



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.

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-A,EN55032-Aの限界値はVCCI class Aの限界値と同じ

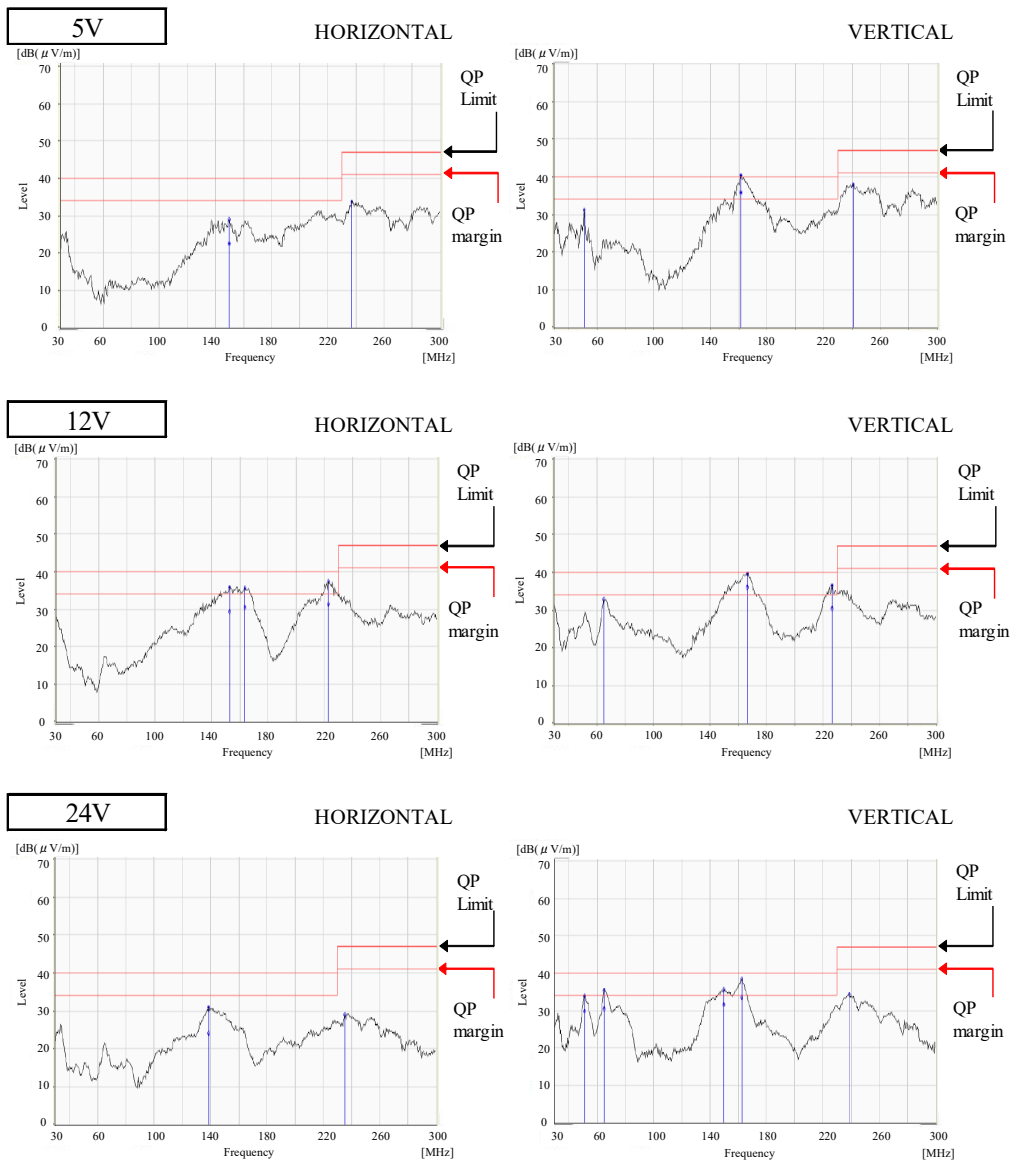
Limit of EN55011-A,EN55032-A are same as its VCCI class A.

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.