

PFE1000FA

EVALUATION DATA

型式データ

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使用記号 Terminology used

	定義	Definition	
V _{in}	入力電圧	Input voltage
V _o	出力電圧	Output voltage
V _{onoff}	+ON/OFF電圧	+ON/OFF voltage
I _{in}	入力電流	Input current
I _o	出力電流	Output current
T _{bp}	ベースプレート温度	Base plate temperature
T _a	周囲温度	Ambient temperature
f	周波数	Frequency

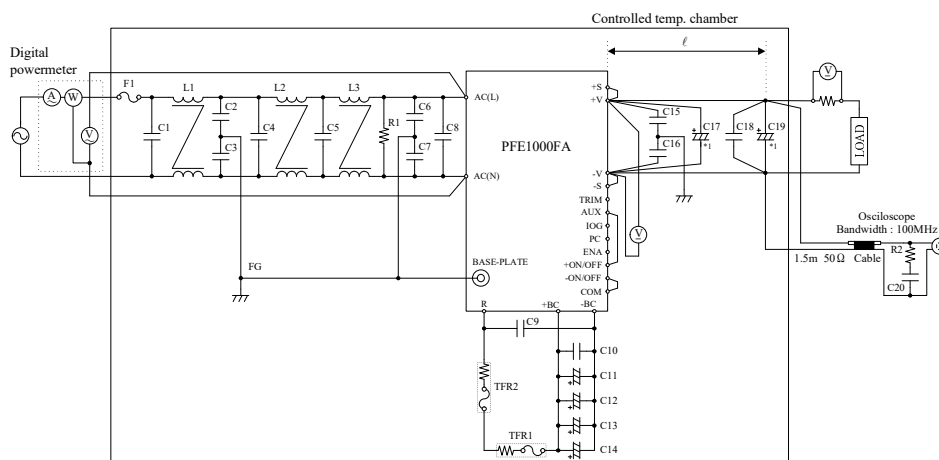
※ 当社測定条件における結果であり、参考値としてお考え願います。
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

1-1. 測定回路 Measurement Circuits

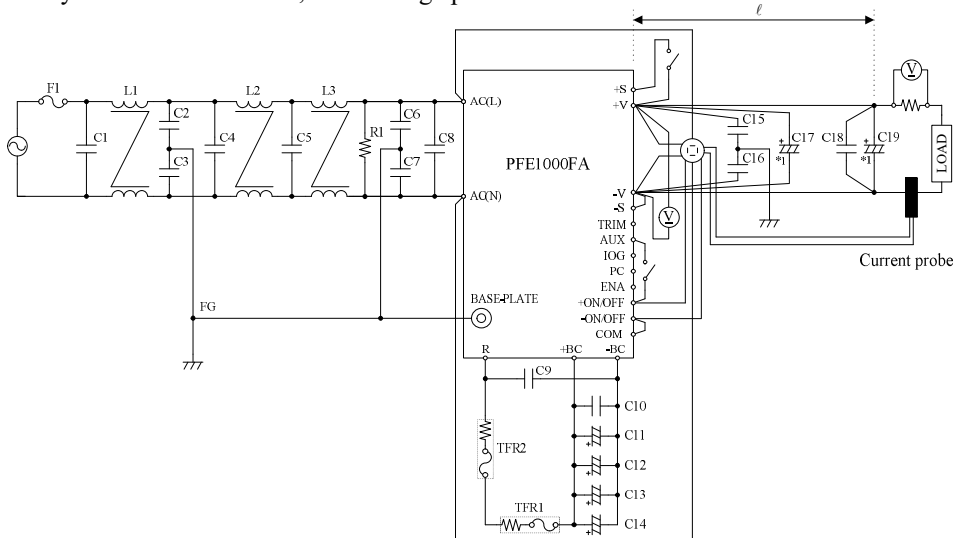
(1) 静特性、出力リップル、ノイズ波形、過電流保護機能

Steady state characteristics, output ripple noise waveform and over current protection

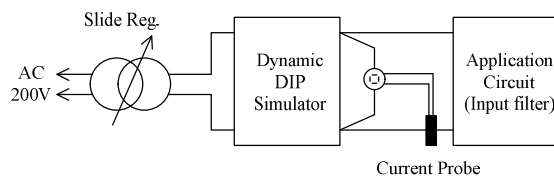


(2) 過渡応答、過電圧保護機能、その他

Dynamic characteristics, over voltage protection and other characteristics

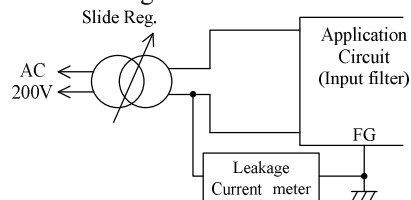


Inrush current characteristics



- C1, C4, C5, C8: 1uF Film Capacitor
- C2, C3: 470pF Ceramic Capacitor
- C6, C7: 4700pF Ceramic Capacitor
- C9, C10: 1uF Film Capacitor
- C11, C12, C13, C14: 390uF Electrolytic Capacitor
- C15, C16: 0.033uF Film Capacitor
- C18: 2.2uF Ceramic Capacitor
- C20: 4700pF Ceramic Capacitor

Leakage current characteristics



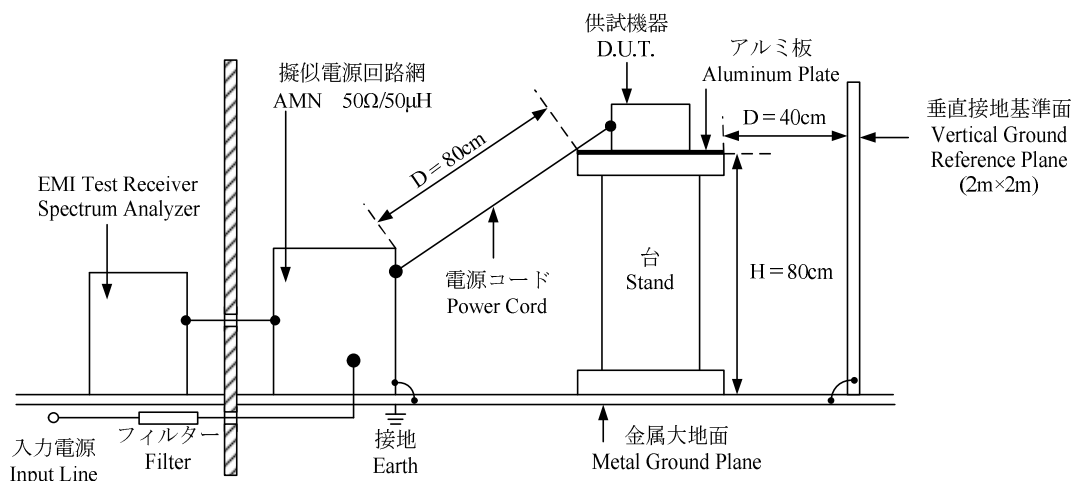
- C17, C19: 12V-1000uF Electrolytic Capacitor
- 28V- 470uF Electrolytic Capacitor
- 48V- 220uF Electrolytic Capacitor
- R1: 0.5W 470kΩ
- R2: 50Ω
- L1, L2, L3: 2mH
- ℓ : 50mm
- TFR1, TFR2: 5.1Ω 139°C
- F1: 250VAC, 25A

==== Note =====

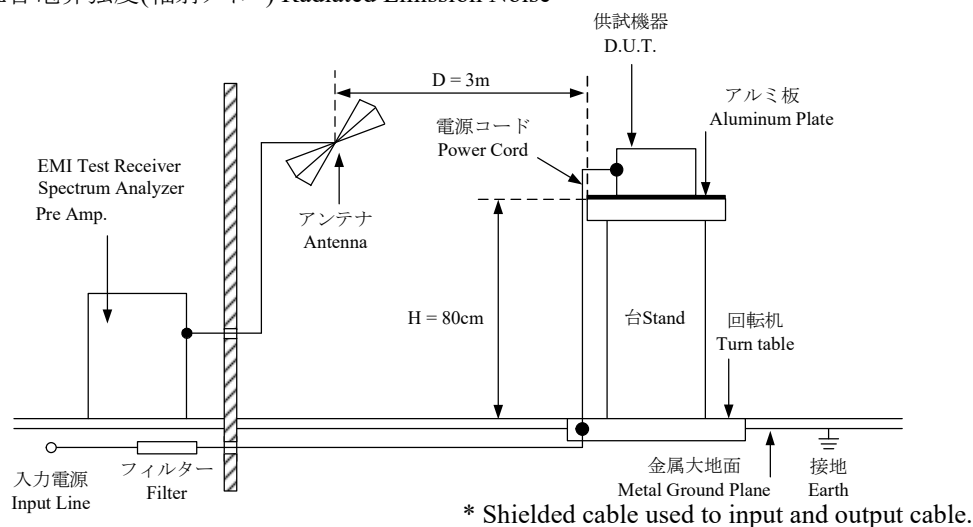
*1. If the ambient temperature is less than -20°C, use twice of the recommended capacitor above.

(3) EMI特性 Electro-Magnetic Interference characteristics

(a) 雑音端子電圧(帰還ノイズ) Conducted Emission Noise

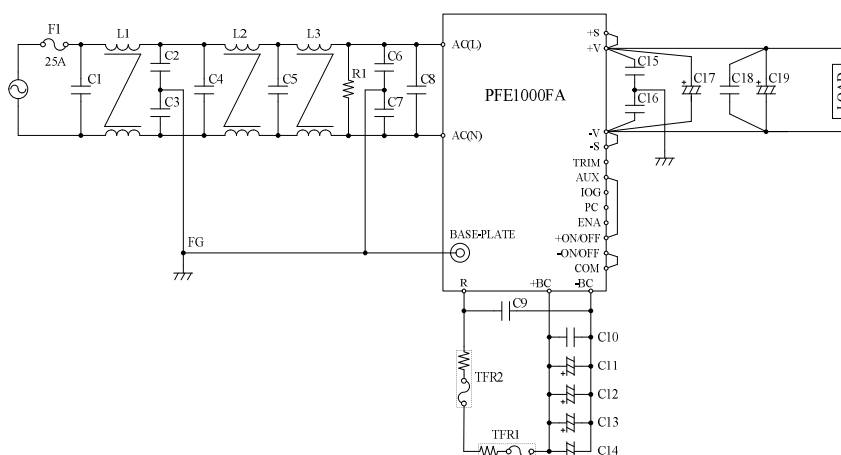


(b) 雑音電界強度(輻射ノイズ) Radiated Emission Noise



* Shielded cable used to input and output cable.

VCCI class A 対応アプリケーションシステム VCCI class A application system



- | | | | |
|---------------------|------------------------------|-------------|-----------------------------------|
| C1, C4, C5, C8: | 1uF Film Capacitor | C17, C19: | 12V-1000uF Electrolytic Capacitor |
| C2, C3: | 470pF Ceramic Capacitor | | 28V- 470uF Electrolytic Capacitor |
| C6, C7: | 4700pF Ceramic Capacitor | | 48V- 220uF Electrolytic Capacitor |
| C9, C10: | 1uF Film Capacitor | R1: | 0.5W 470kΩ |
| C11, C12, C13, C14: | 390uF Electrolytic Capacitor | L1, L2, L3: | 2mH |
| C15, C16: | 0.033uF Film Capacitor | TFR1, TFR2: | 5.1Ω 139°C |
| C18: | 2.2uF Ceramic Capacitor | F1: | 250VAC, 25A |

1-2. 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL PHOSPHOR OSCILLOSCOPE	YOKOGAWA ELECT.	DLM2504
2	DIGITAL STORAGE OSCILLOSCOPE	IWATSU-LECROY	LT364L
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	CURRENT PROBE AMPLIFIER	YOKOGAWA ELECT.	701930
6	CURRENT PROBE	IWATSU-LECROY	AP015
7	SHUNT RESISTER	YOKOGAWA ELECT.	2215
8	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-261
9	HARMONIC / FLICKER ANALYZER	KIKUSUI	KHA1000
10	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
11	PRE AMP	SONOMA	310N
12	AC POWER SUPPLY	NF	ES10000S
13	AMN	SCHWARZBECK	NNLK8121
14	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	CBL6111D
15	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
16	AC POWER SUPPLY	TAKASAGO	AA2000XG
17	INRUSH CURRENT METER	TAKAMISAWA	PSA-210
18	SLIDE REGULATOR	MATSUNAGA	SD-2650
19	A.C. LEAKAGE CURRENT TESTER	HIOKI	3156
20	SINGLE-PHASE MASTER	NF	4420
21	REFERENCE CURRENT METER	NF	4150

2. 特性データ Characteristics

2-1. 静特性 Steady state characteristics

(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift

12V

1. Regulation - line and load Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	12.105V	12.105V	12.106V	12.105V	1mV	0.008%
50%	12.104V	12.104V	12.104V	12.104V	0mV	0.000%
100%	12.103V	12.103V	12.103V	12.102V	1mV	0.008%
Load regulation	2mV	2mV	3mV	3mV		
	0.017%	0.017%	0.025%	0.025%		

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

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vout	12.082V	12.103V	12.034V	69mV	0.575%

28V

1. Regulation - line and load Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	28.040V	28.040V	28.040V	28.040V	0mV	0.000%
50%	28.040V	28.040V	28.040V	28.040V	0mV	0.000%
100%	28.040V	28.040V	28.040V	28.040V	0mV	0.000%
Load regulation	0mV	0mV	0mV	0mV		
	0.000%	0.000%	0.000%	0.000%		

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

Tbp	-40°C	+25°C	+85°C	Temperature stability	
Vout	27.967V	28.040V	27.900V	140mV	0.499%

48V

1. Regulation - line and load Condition Tbp : 25°C

Iout \ Vin	85VAC	100VAC	200VAC	265VAC	Line regulation	
0%	47.935V	47.935V	47.934V	47.934V	1mV	0.002%
50%	47.935V	47.935V	47.934V	47.934V	1mV	0.002%
100%	47.935V	47.935V	47.934V	47.934V	1mV	0.002%
Load regulation	0mV	0mV	0mV	0mV		
	0.000%	0.000%	0.000%	0.000%		

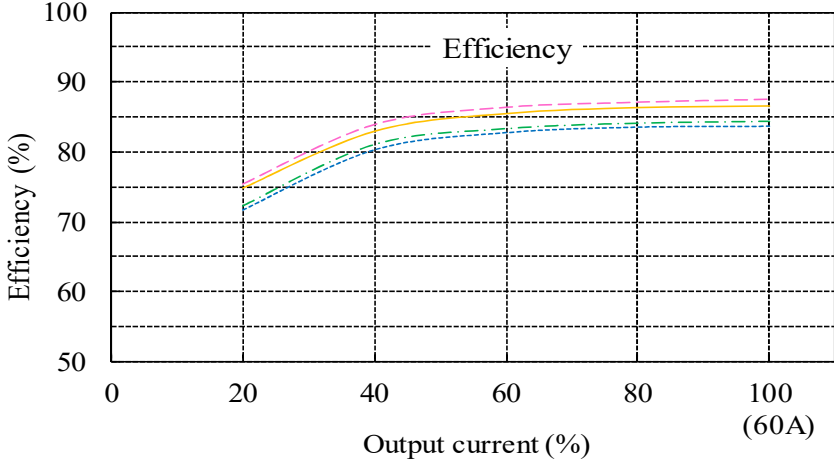
2. Temperature drift Conditions Vin=100VAC
Iout=100%

Tbp	-40°C	+25°C	+85°C	Temperature stability	
Vout	47.920V	48.134V	47.614V	520mV	1.084%

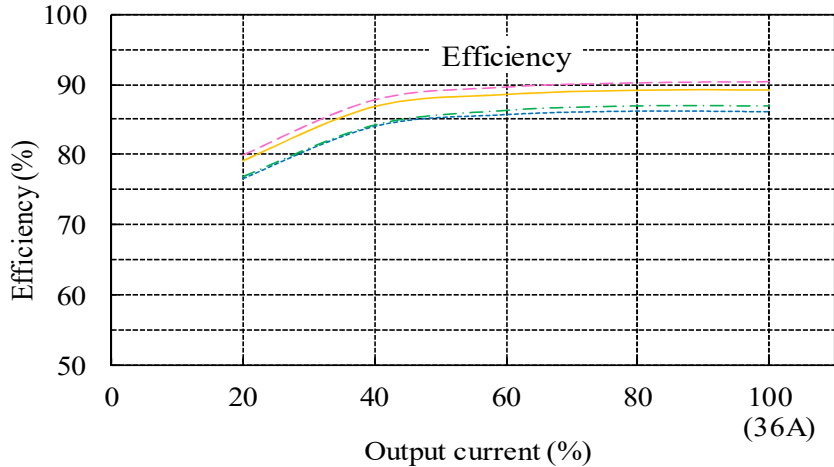
(2) 効率 対 出力電流 Efficiency vs. Output current

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

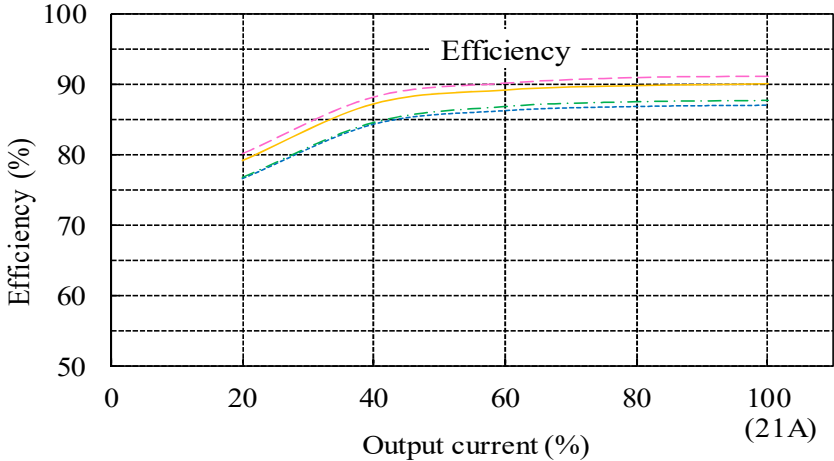
12V



28V



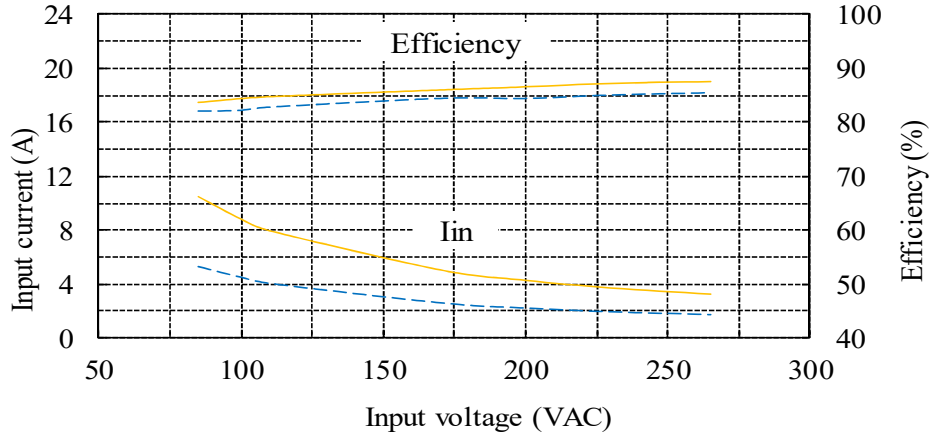
48V



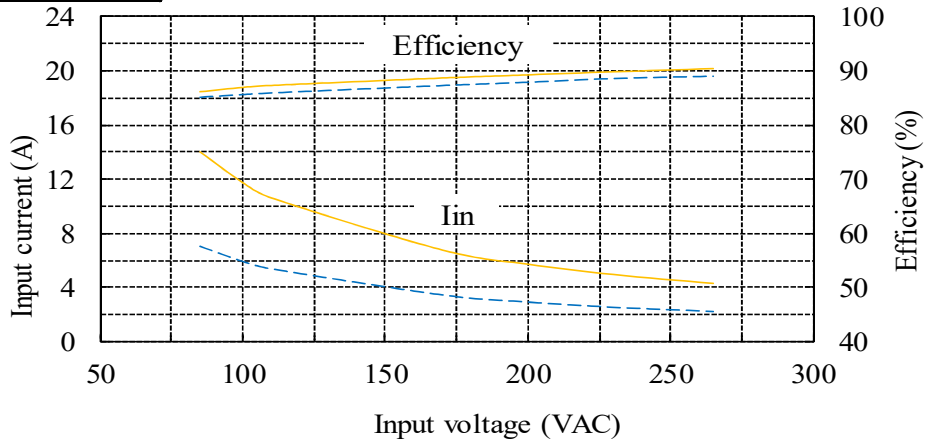
(3) 入力電流・効率 対 入力電圧 Input current and Efficiency vs. Input voltage

Conditions I_o : 50% -----
 : 100% -----
 T_{bp} : 25 °C

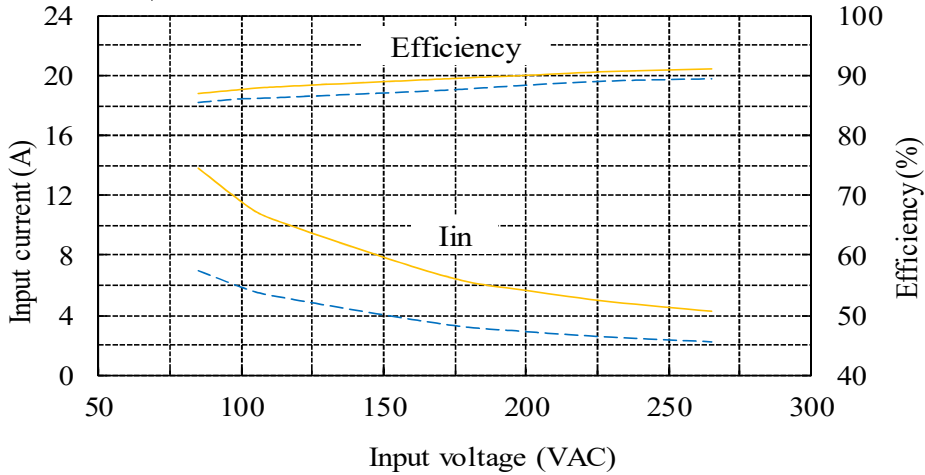
12V



28V



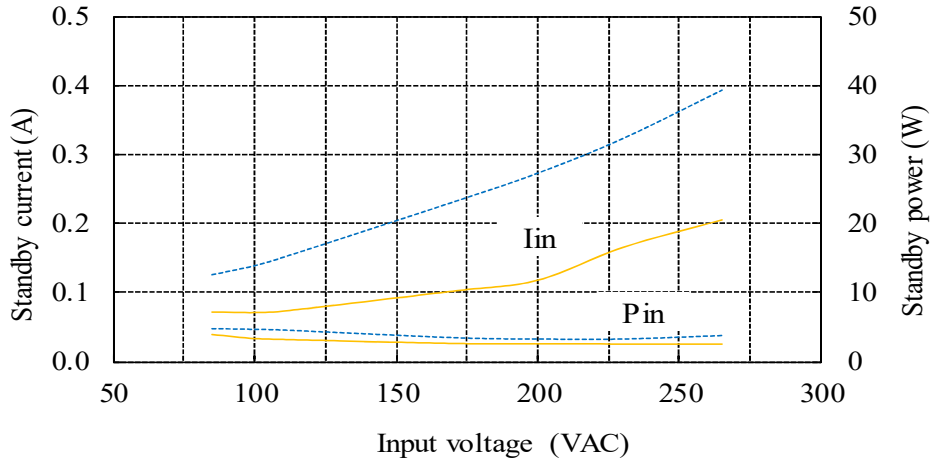
48V



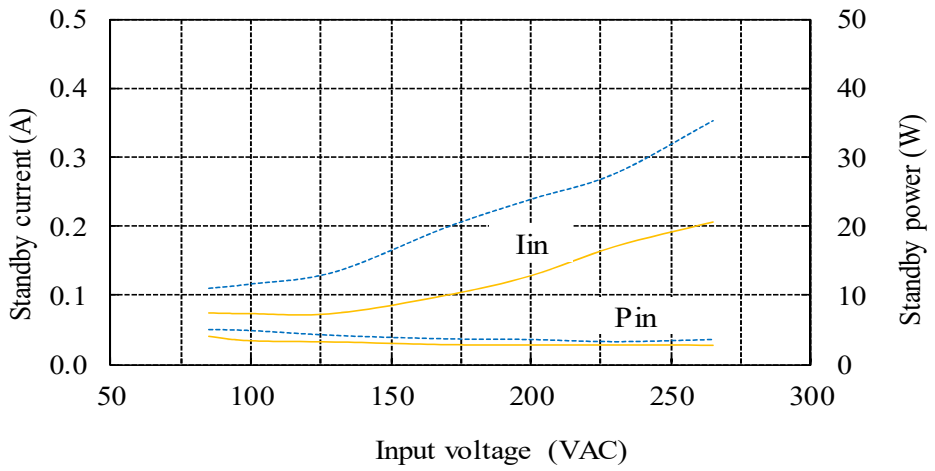
(4) 待機電流・電力特性 Standby current and power characteristics

Conditions No load -----
 Control OFF -----
 Tbp : 25 °C

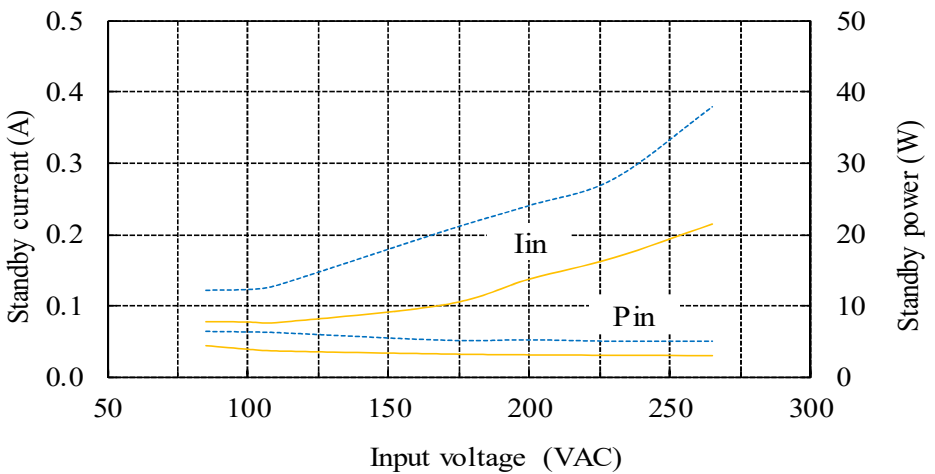
12V



28V



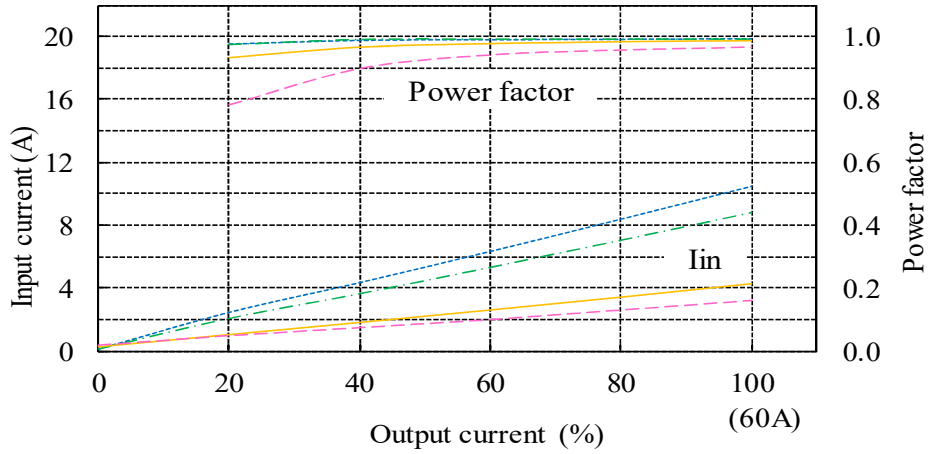
48V



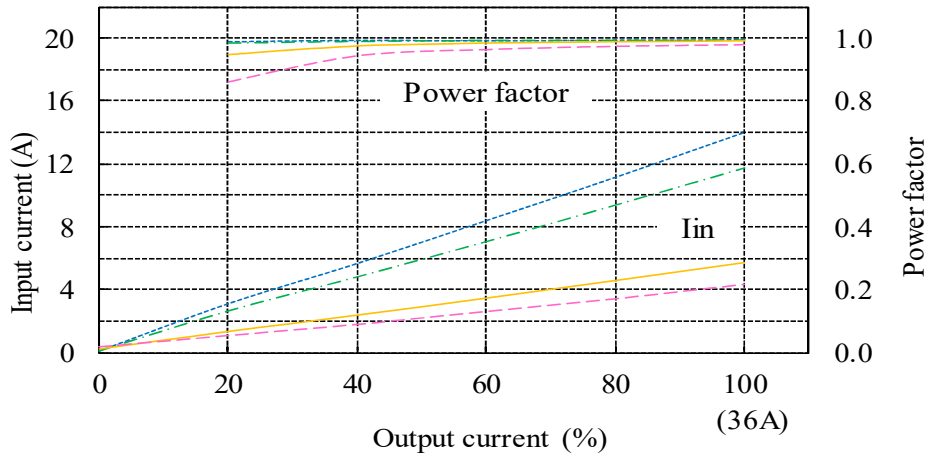
(5) 入力電流・力率 対 出力電流 Input current and Power factor vs. Output current

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

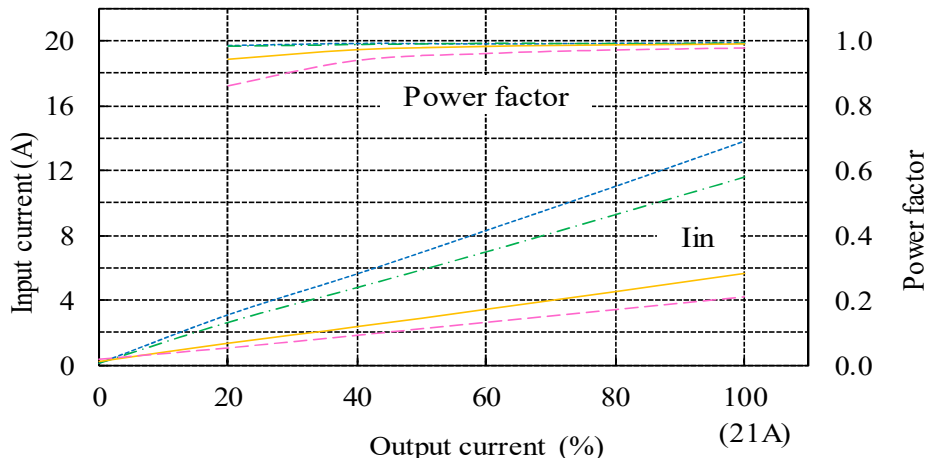
12V



28V



48V

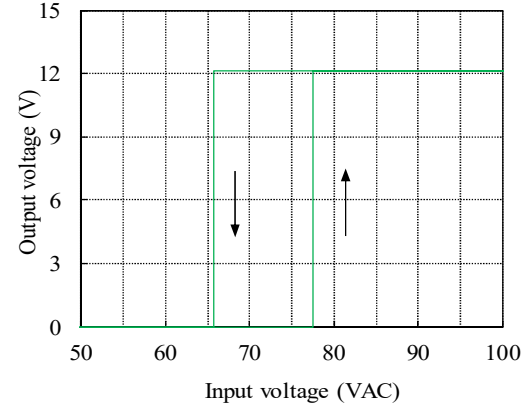
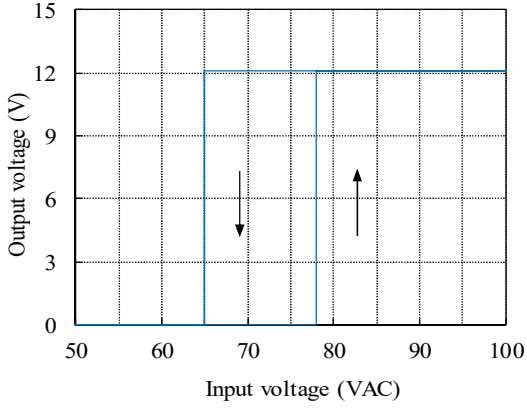


(6) 起動・停止電圧特性 Start and Stop voltage characteristics

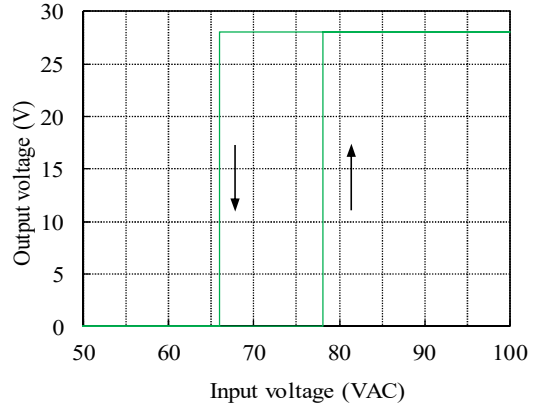
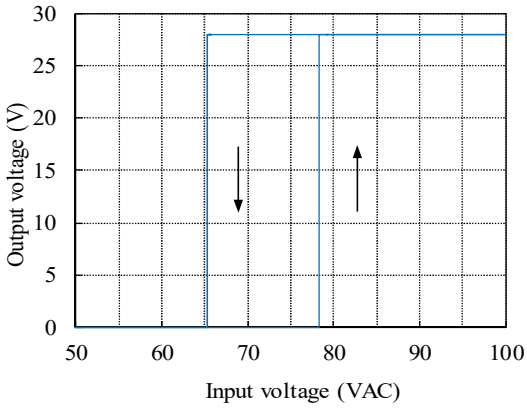
Conditions I_o : 0% —
 T_{bp} : 25 °C

Conditions I_o : 100% —
 T_{bp} : 25 °C

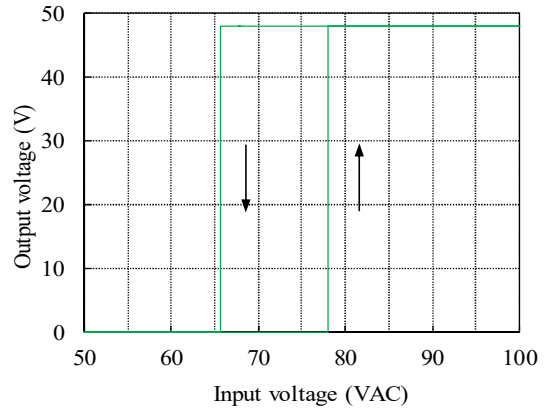
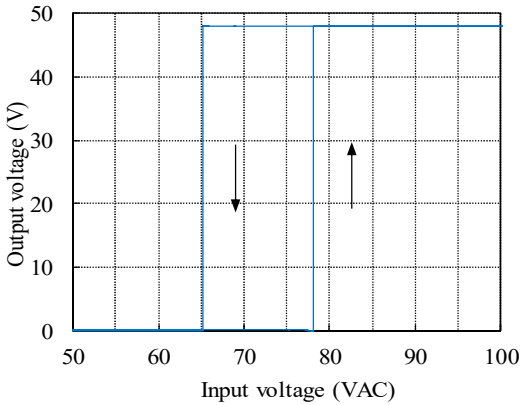
12V



28V



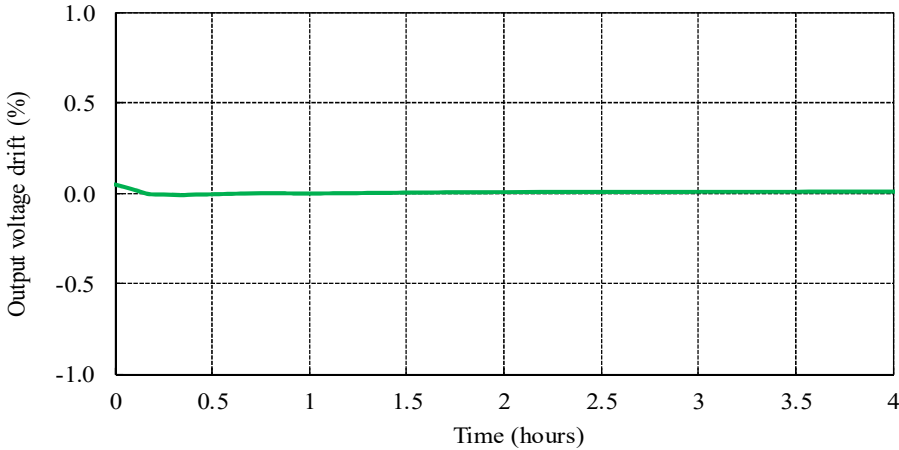
48V



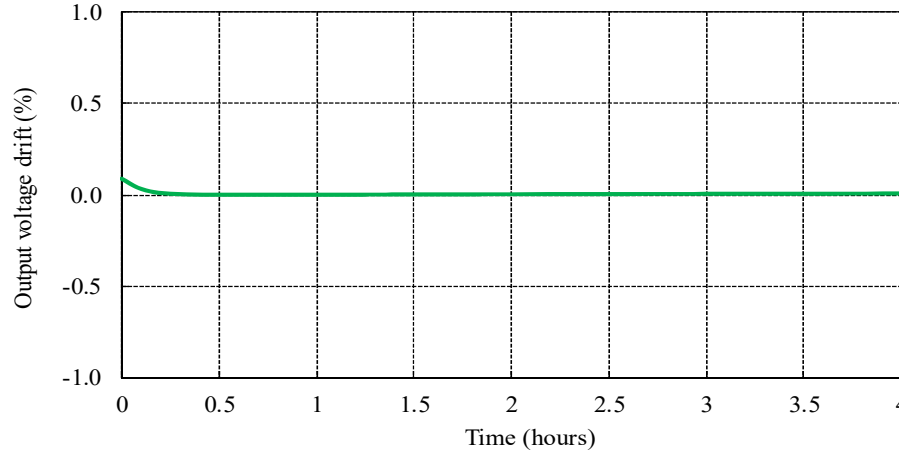
2-2. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 100VAC
Io : 100%
Tbp : 25 °C

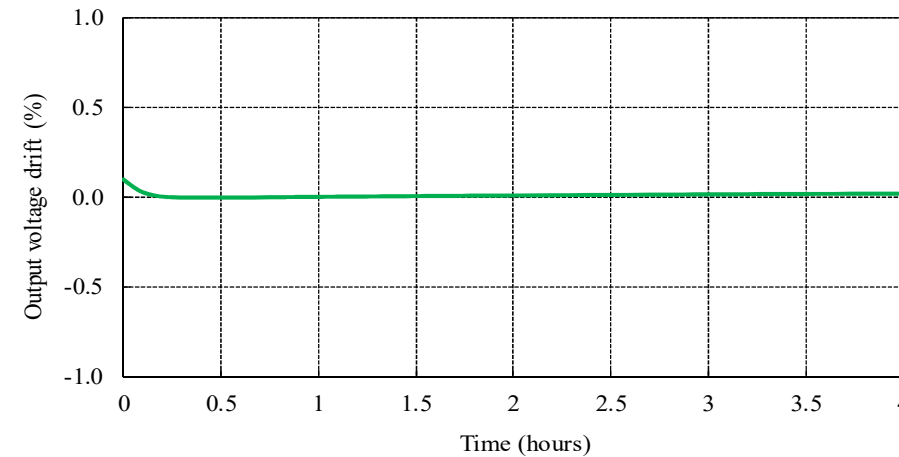
12V



28V



48V

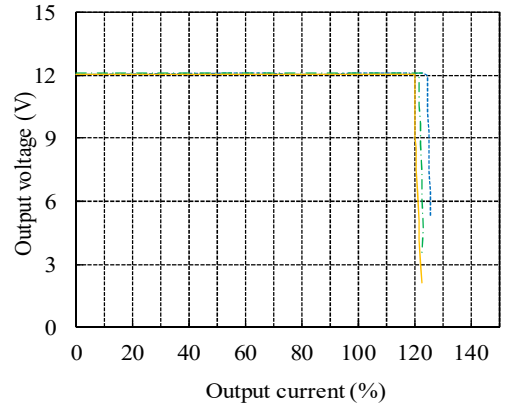
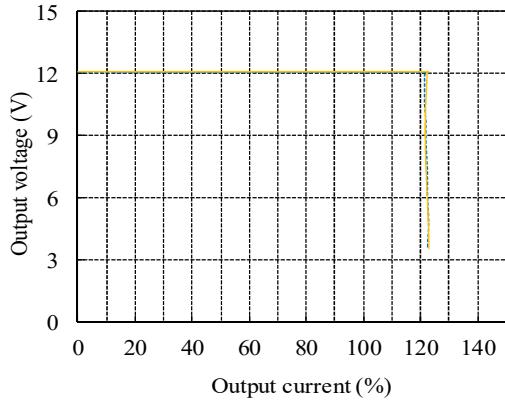


2-3. 過電流保護特性 Over current protection (OCP) characteristics

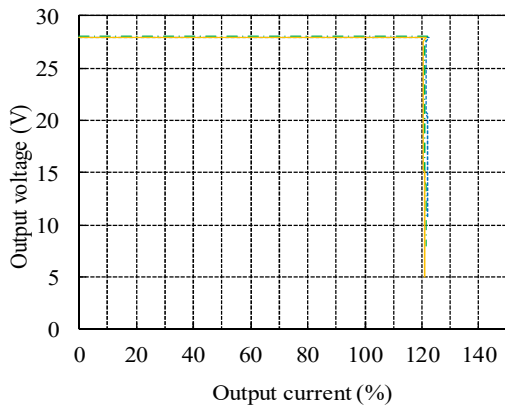
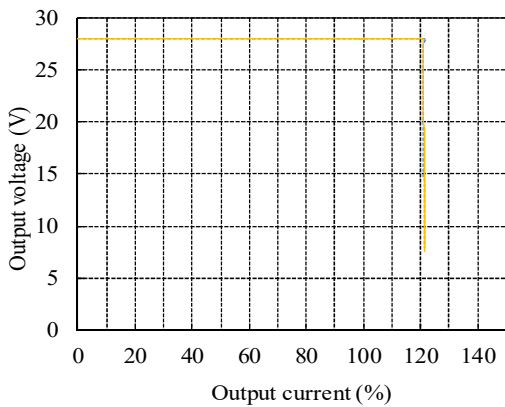
Conditions Vin : 100VAC -----
 200VAC -----
 Tbp : 25 °C

Conditions Vin : 100VAC
 Tbp : -40°C -----
 25 °C -----
 100°C -----

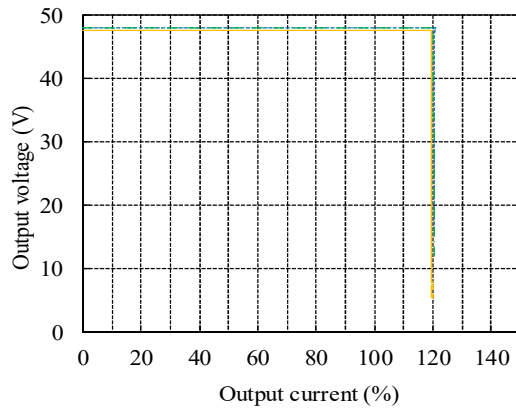
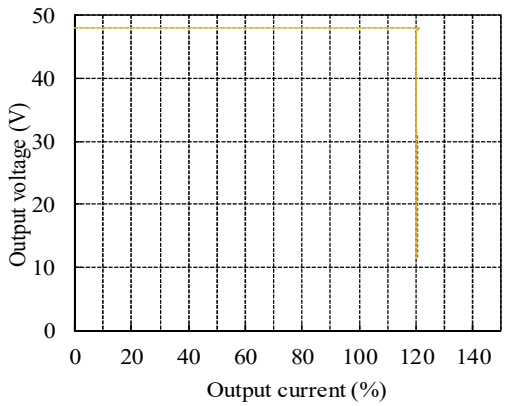
12V



28V



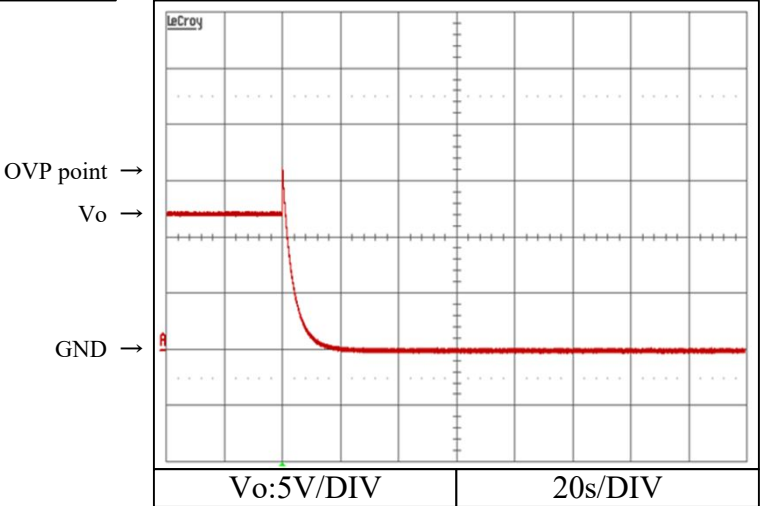
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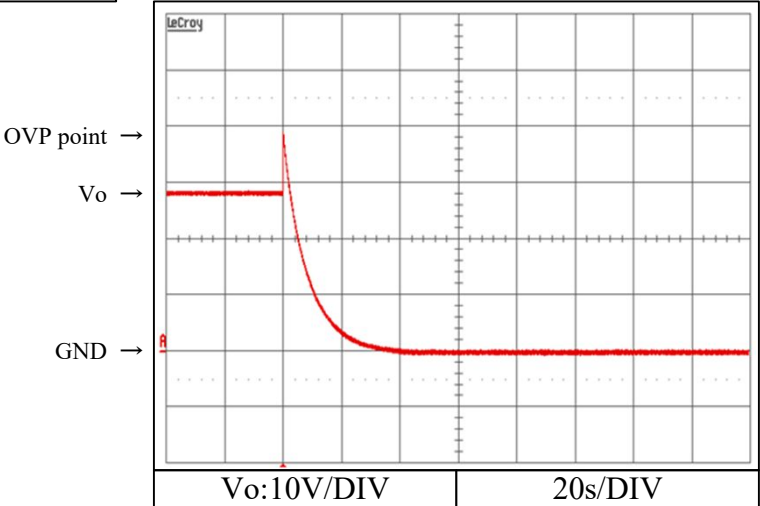
2-4. 過電圧保護特性 Over voltage protection (OVP) characteristics

Conditions Vin : 100VAC
Io : 0%
Tbp : 25 °C

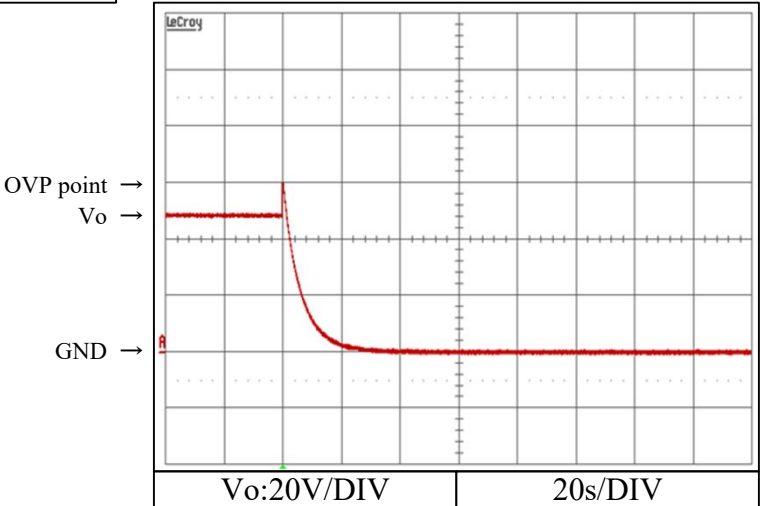
12V



28V



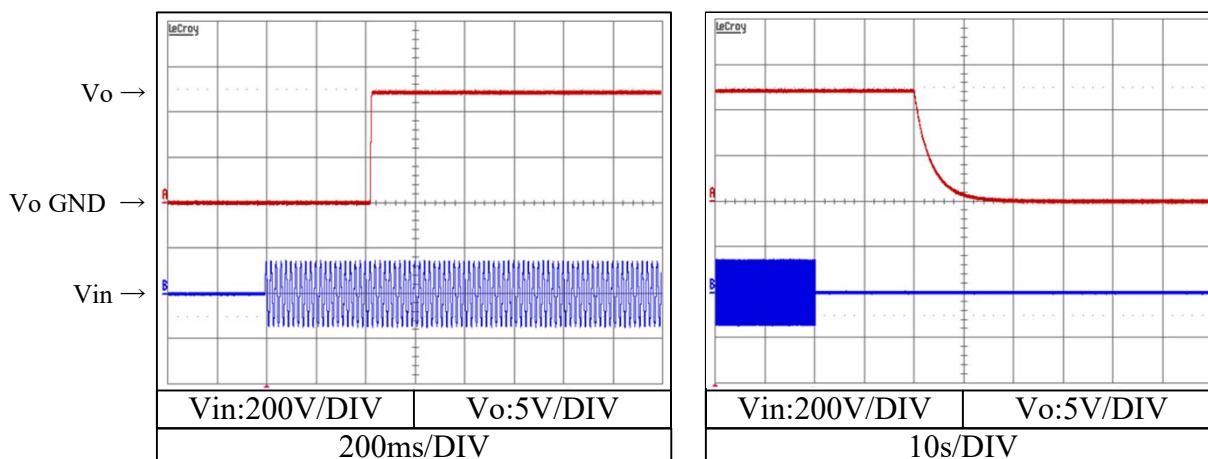
48V



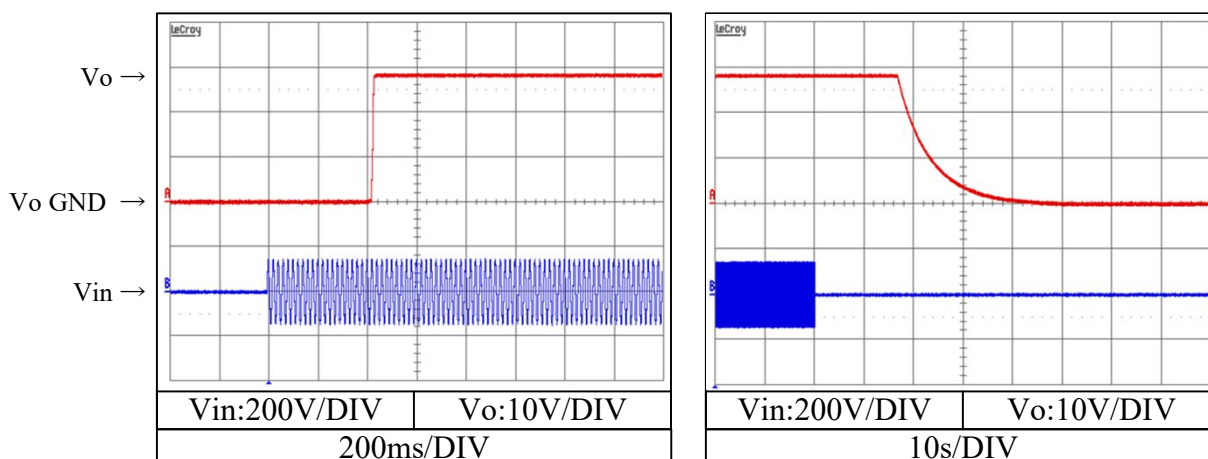
2-5. 出力立ち上がり、立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 100VAC
 Io : 0%
 Tbp : 25 °C

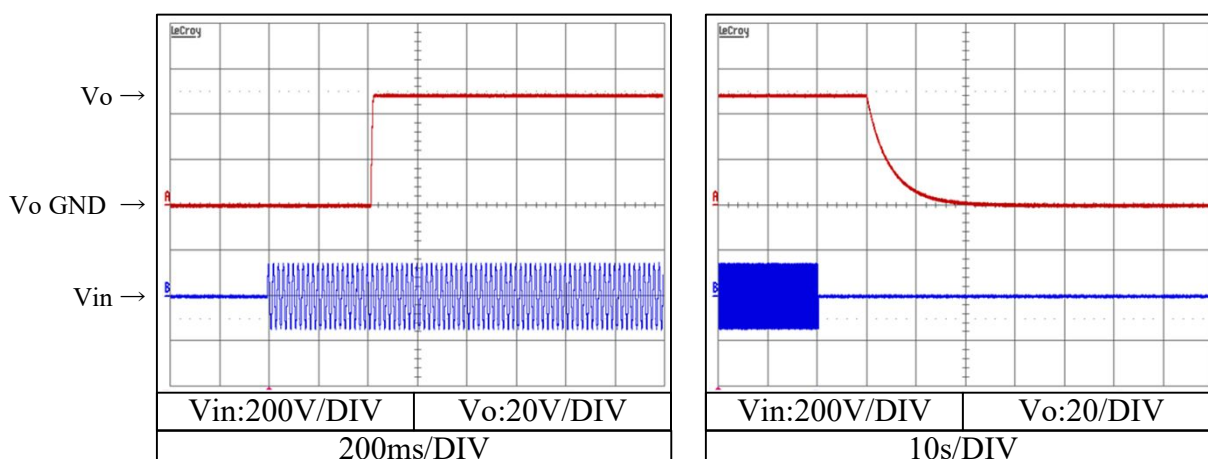
12V



28V

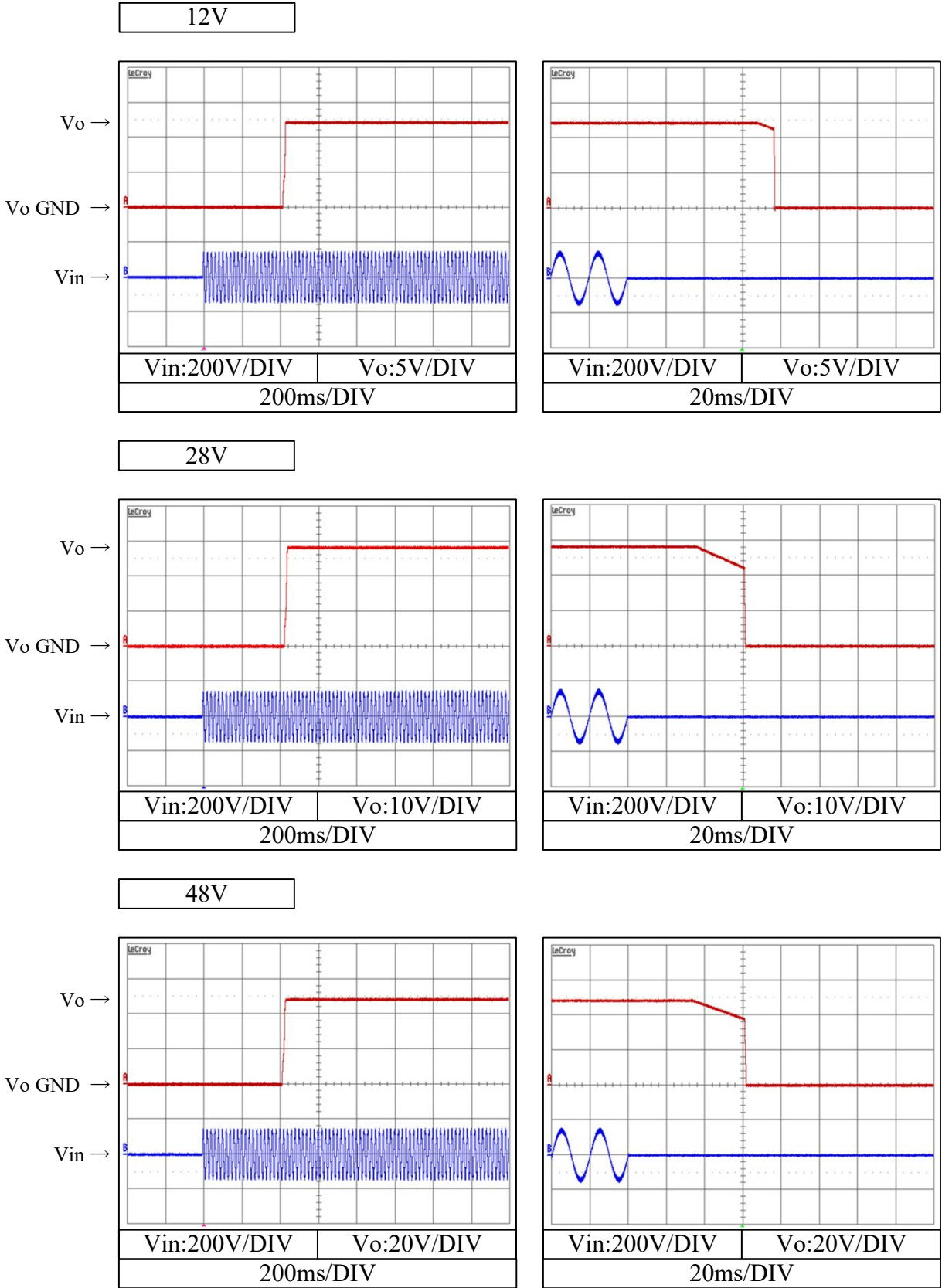


48V



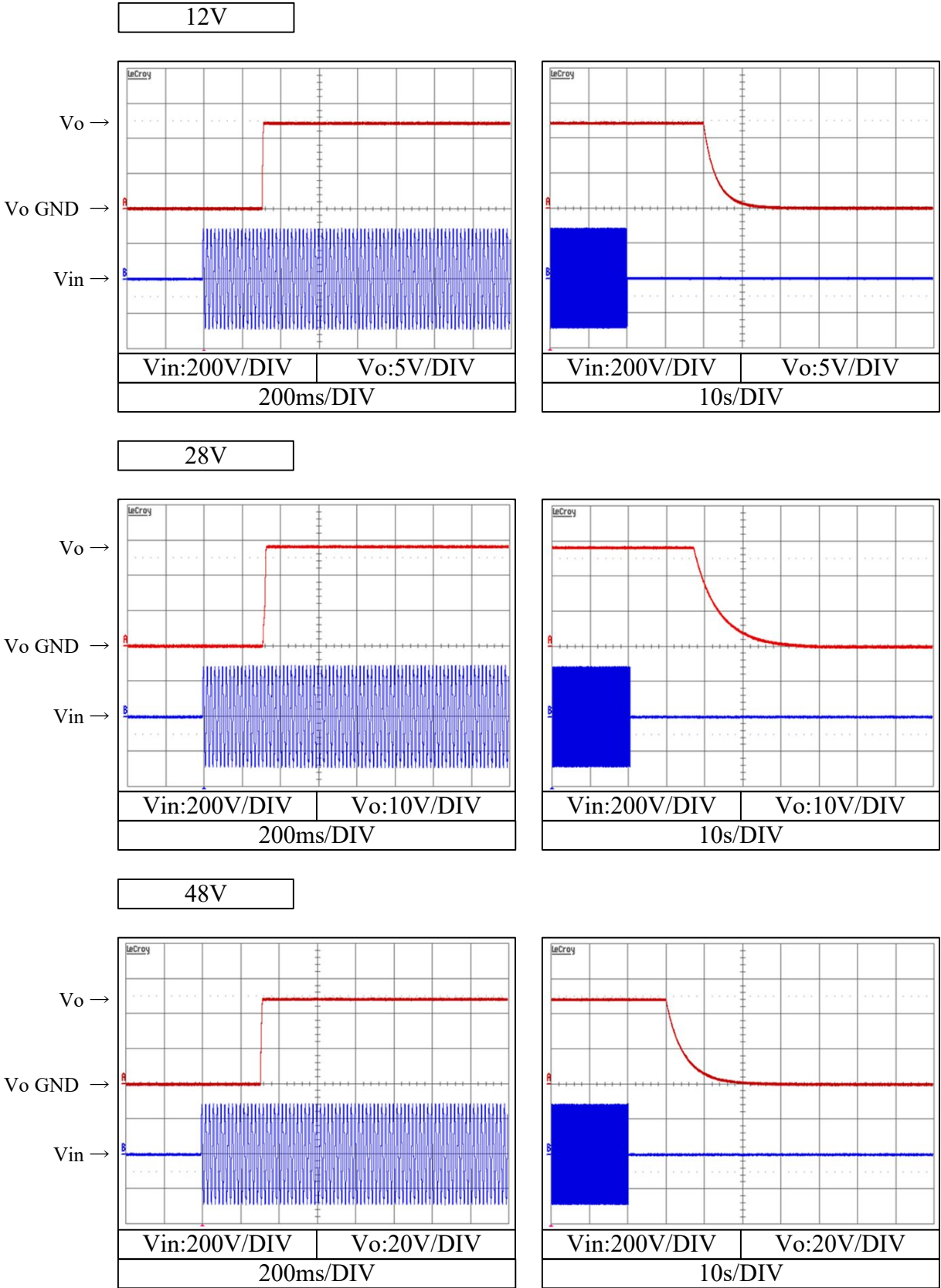
2-5. 出力立ち上がり、立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 100VAC
Io : 100%
Tbp : 25 °C



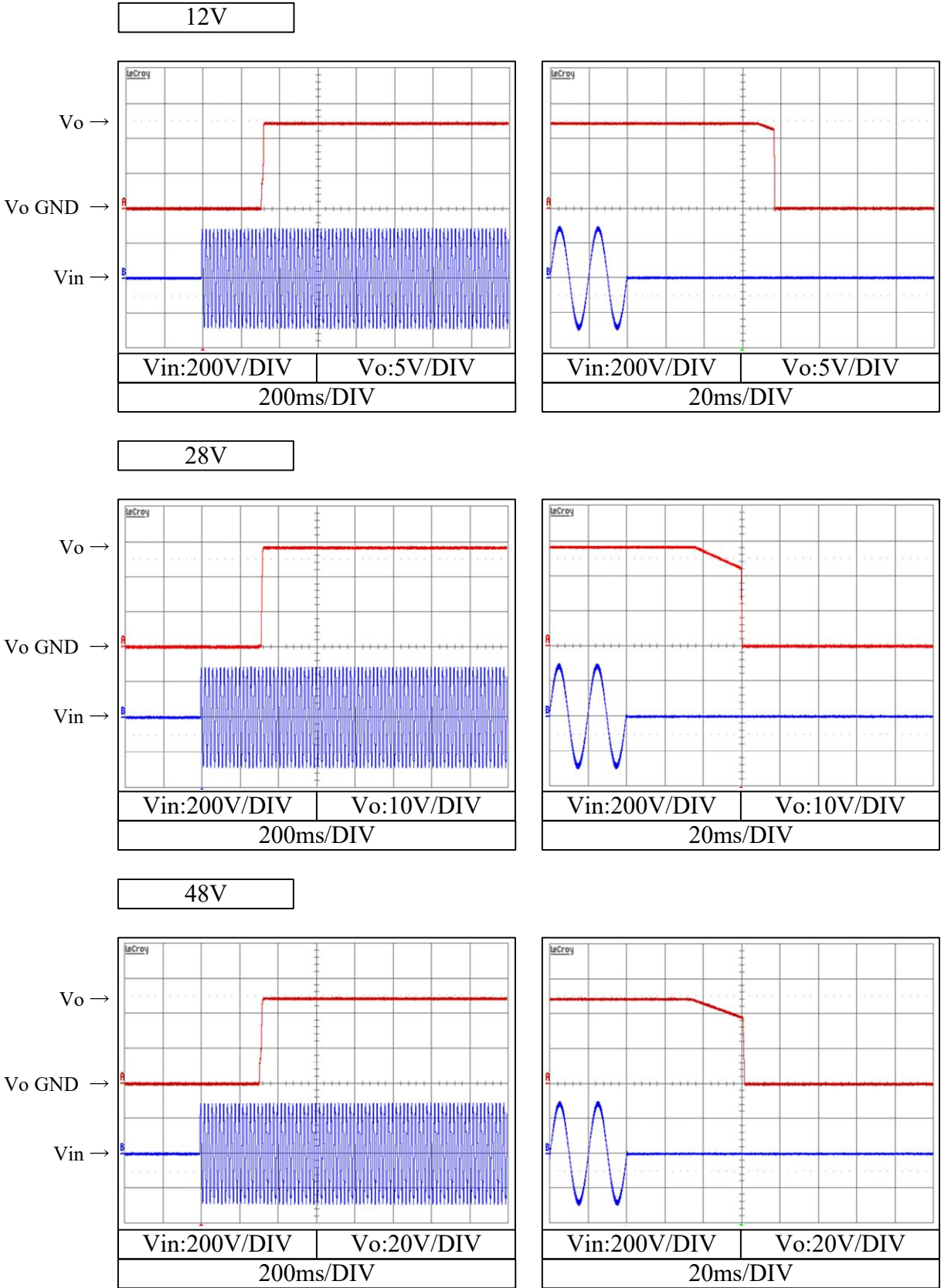
2-5. 出力立ち上がり、立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 200VAC
Io : 0%
Tbp : 25 °C



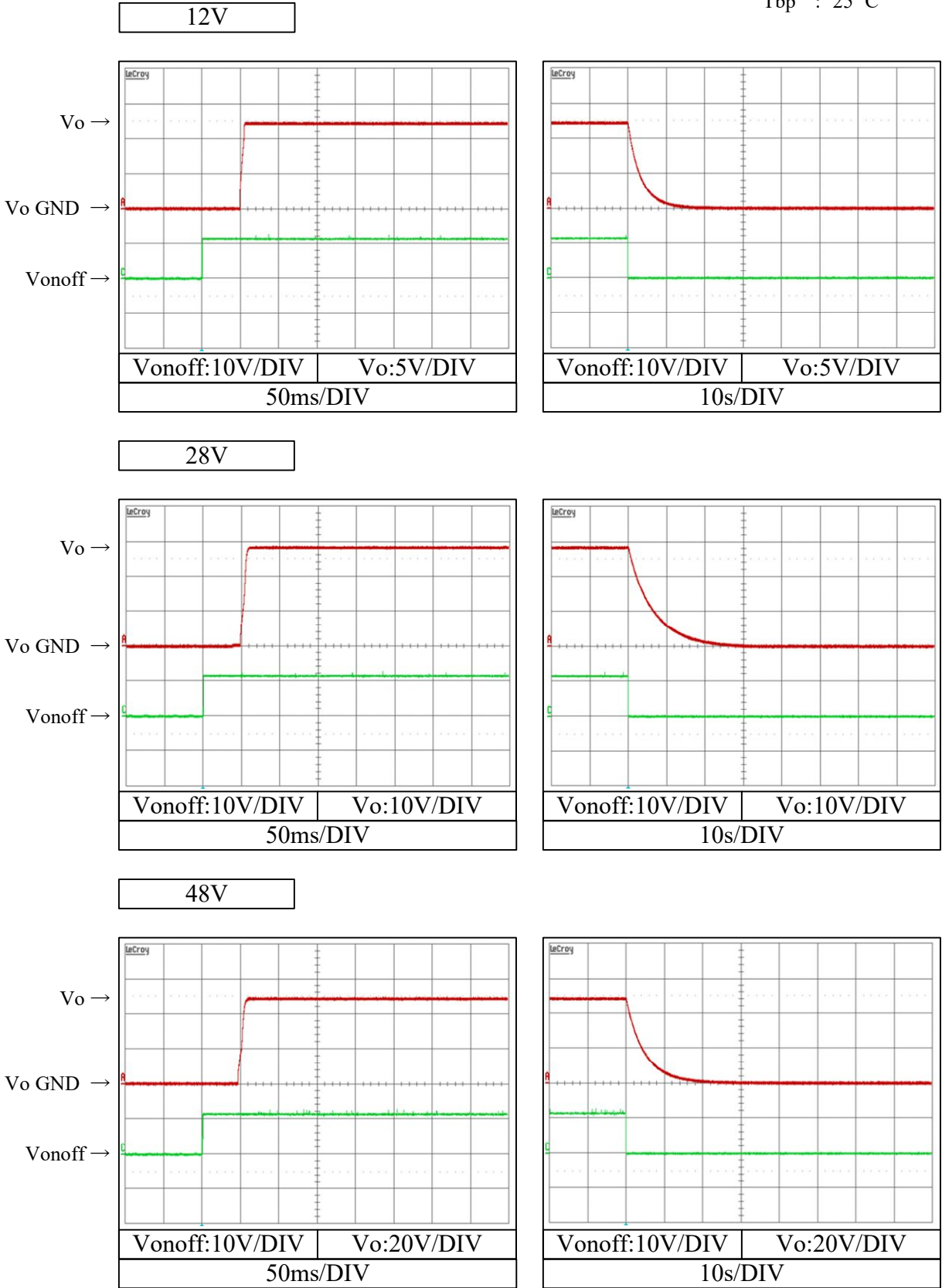
2-5. 出力立ち上がり、立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 200VAC
Io : 100%
Tbp : 25 °C



2-6. 出力立ち上がり、立ち下り特性 (ON/OFFコントロール時)
Output rise and fall characteristics with ON/OFF CONTROL

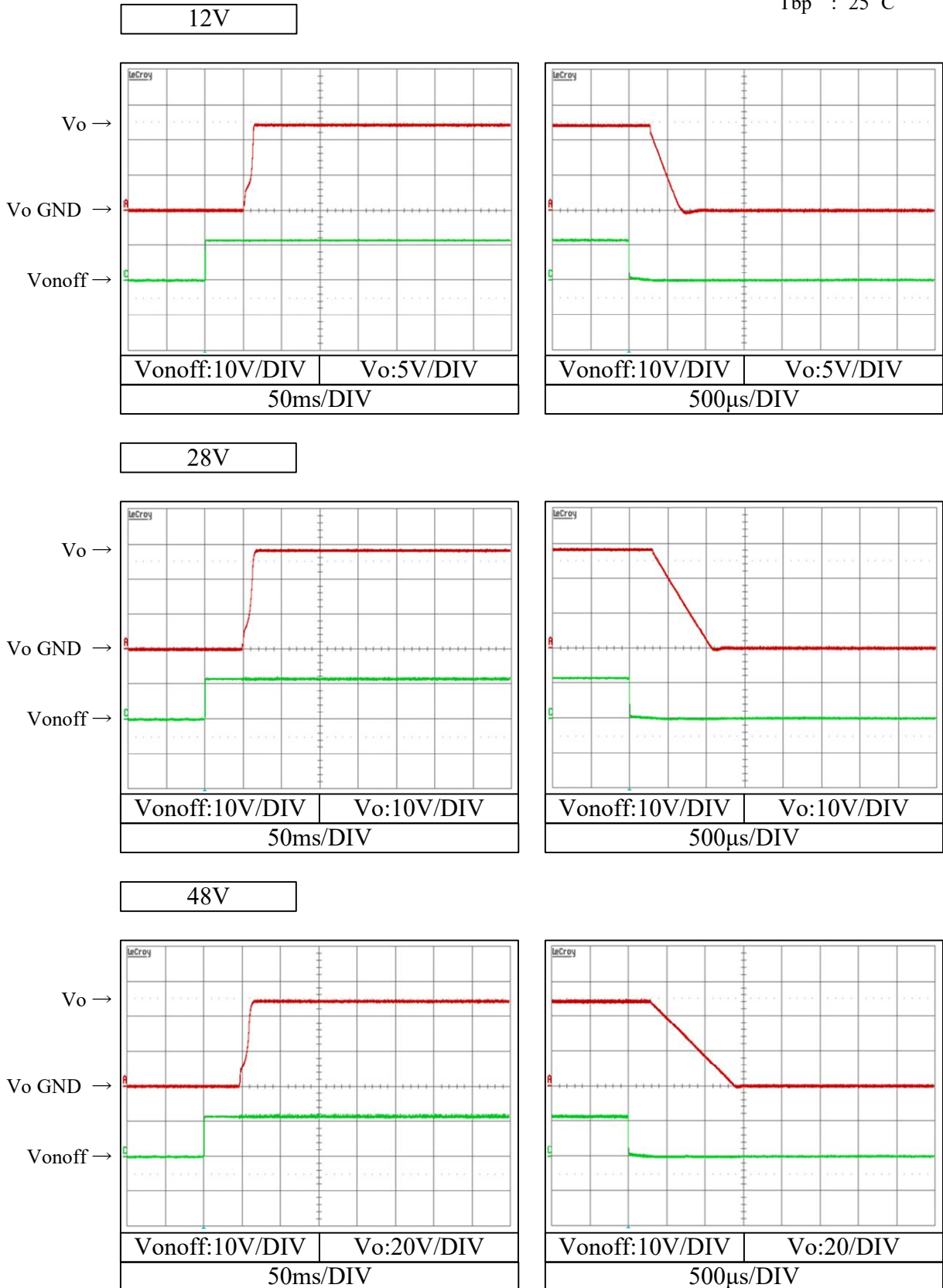
Conditions Vin : 100VAC
Io : 0%
Tbp : 25 °C



Note : 200VAC is same as characteristics of 100VAC

2-6. 出力立ち上がり、立ち下り特性 (ON/OFFコントロール時)
Output rise and fall characteristics with ON/OFF CONTROL

Conditions Vin : 100VAC
Io : 100%
Tbp : 25 °C

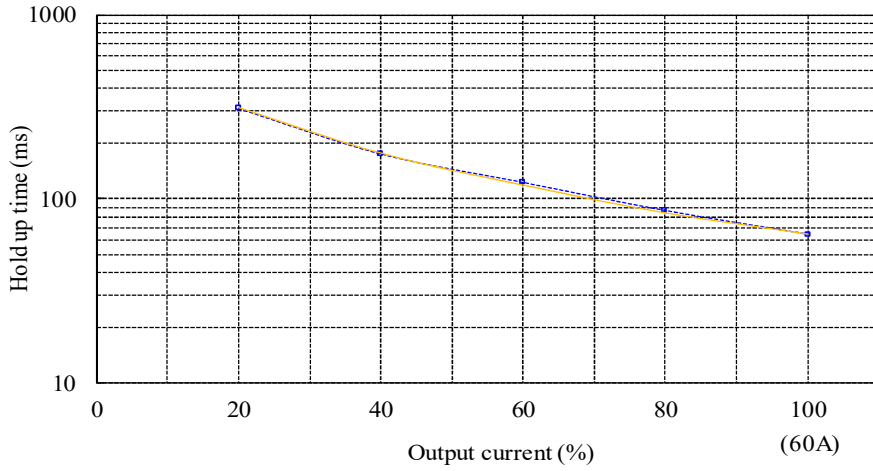


Note : 200VAC is same as characteristics of 100VAC

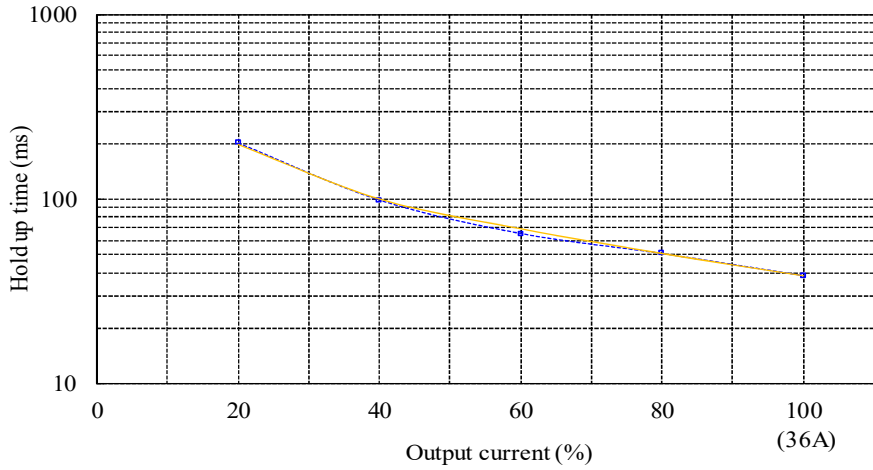
2-7. 出力電圧保持時間特性 Hold up time characteristics

Conditions Vin : 100VAC ---
200VAC —
Tbp : 25 °C

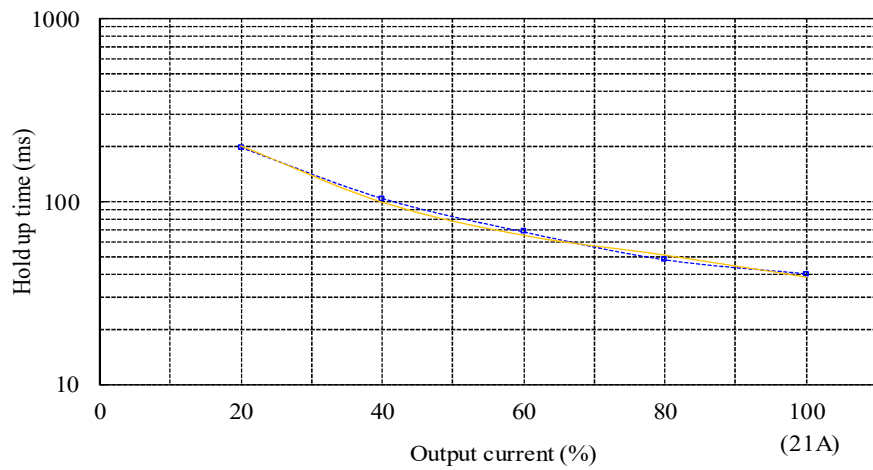
12V



28V



48V



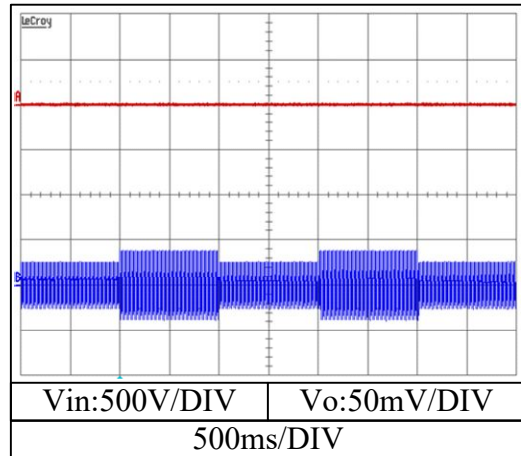
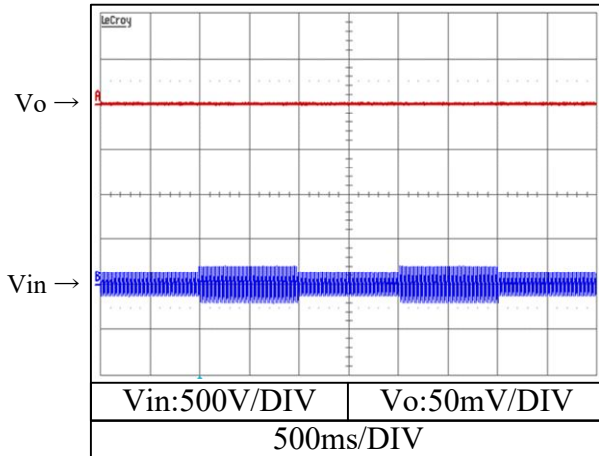
2-8. 過渡応答(入力急変)特性 Dynamic line response characteristics

Conditions I_o : 100%
 T_{bp} : 25 °C

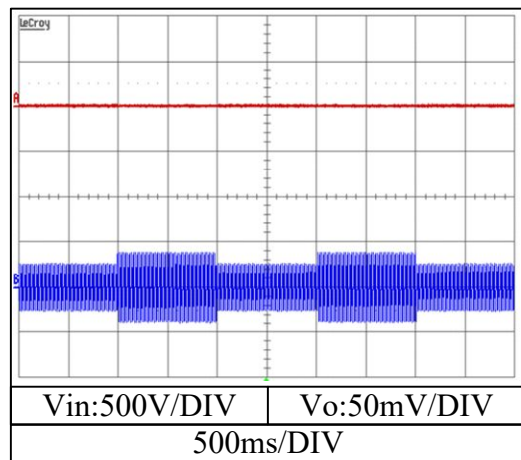
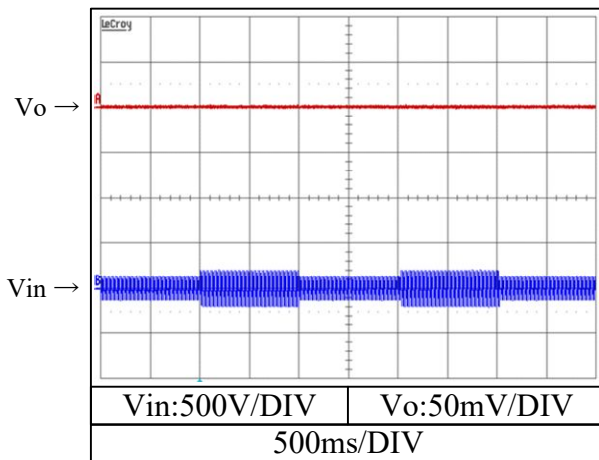
Vin:85VAC ⇔ 130VAC

Vin:170VAC ⇔ 265VAC

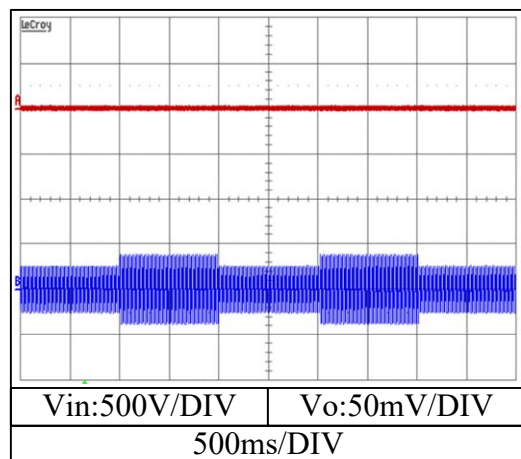
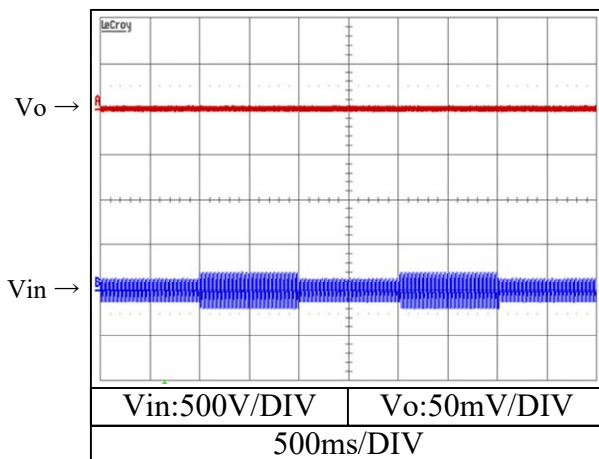
12V



28V



48V

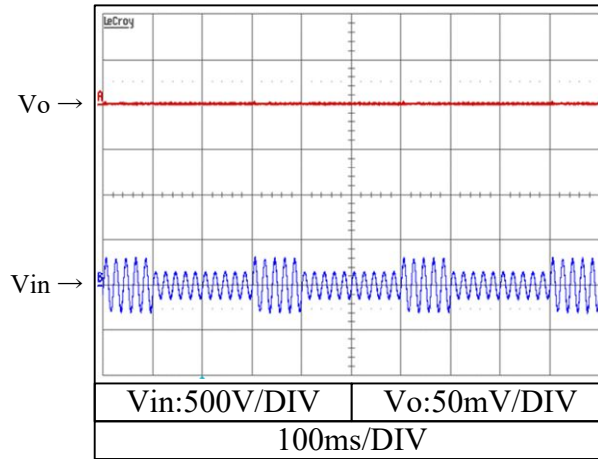


2-8. 過渡応答(入力急変)特性 Dynamic line response characteristics

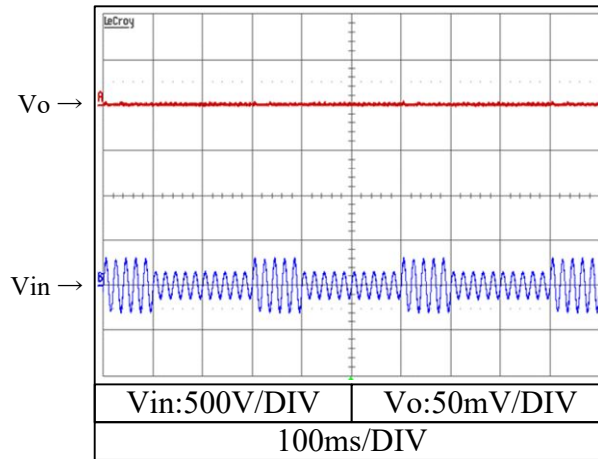
Conditions I_o : 100%
T_{bp} : 25 °C

Vin:100VAC ⇔ 200VAC

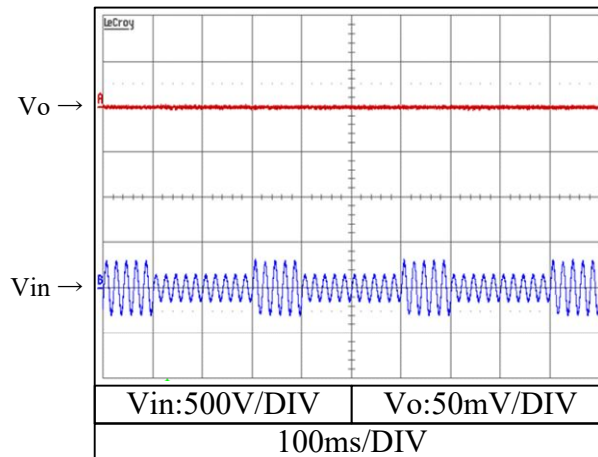
12V



28V



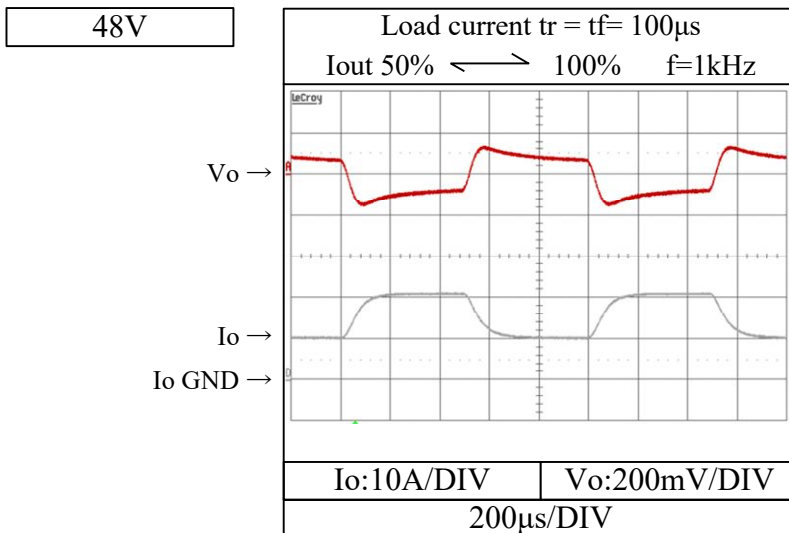
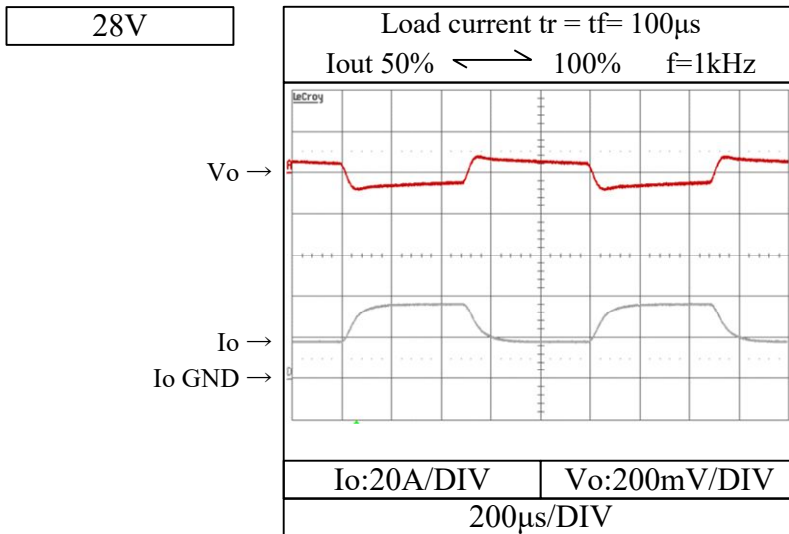
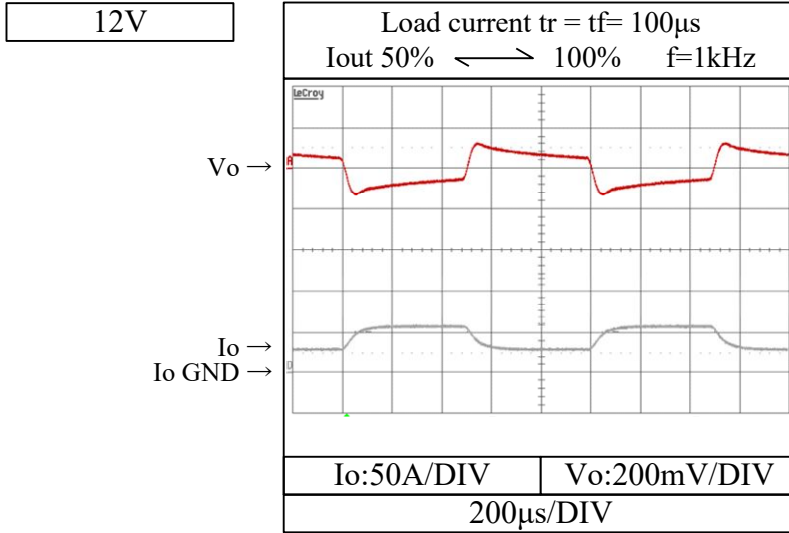
48V



Note : This test follows SEMI F47-0200

2-9. 過渡応答(負荷急変)特性 Dynamic load response characteristics

Conditions Vin : 100VAC
Tbp : 25 °C



2-10. 入力電圧瞬停特性 Response to brownout characteristics

Conditions I_o : 100%

T_{bp} : 25 °C

瞬停時間 Interruption time

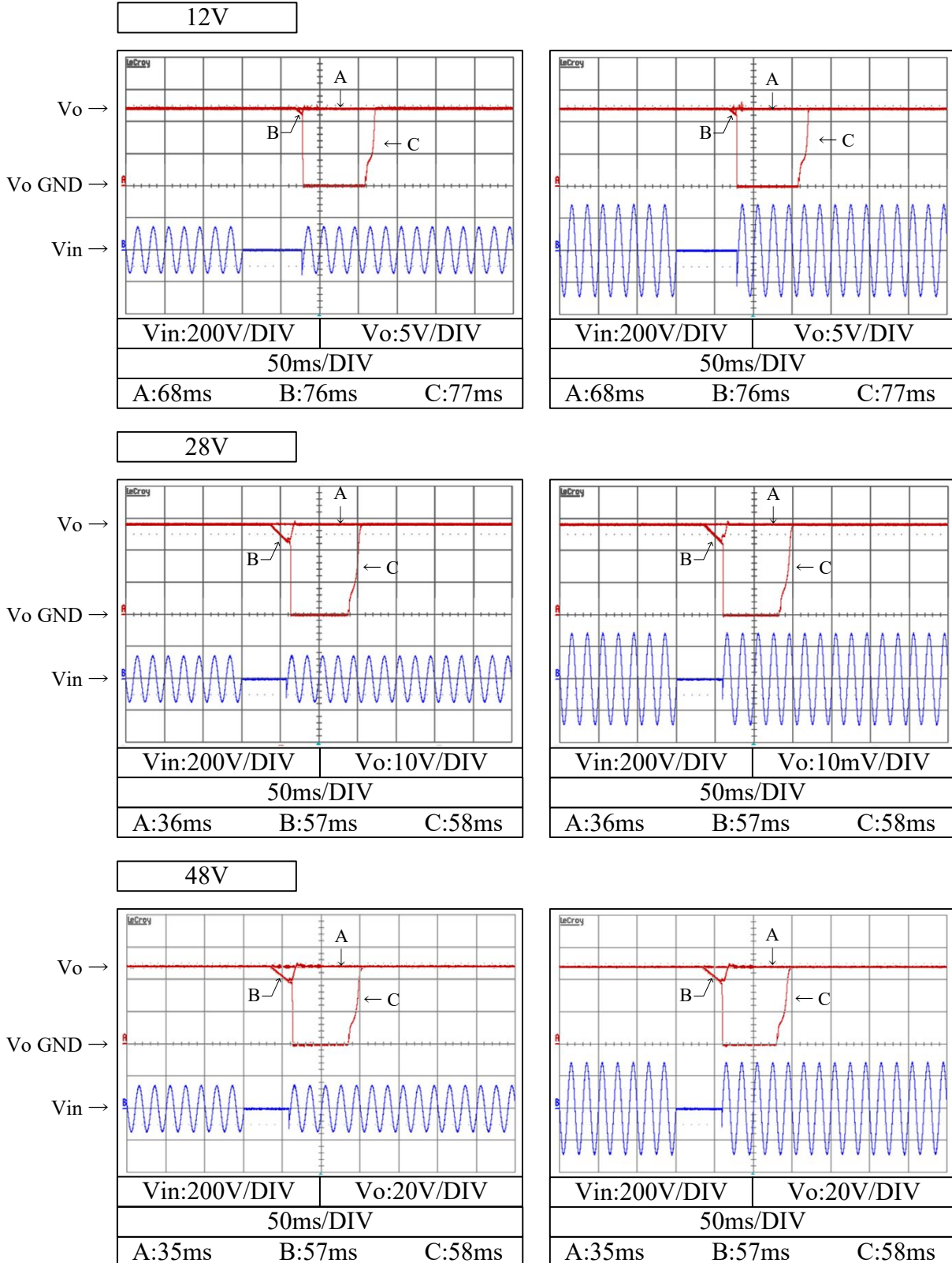
A: 出力電圧が低下なし Output voltage does not drop.

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.

Vin:100VAC

Vin:200VAC

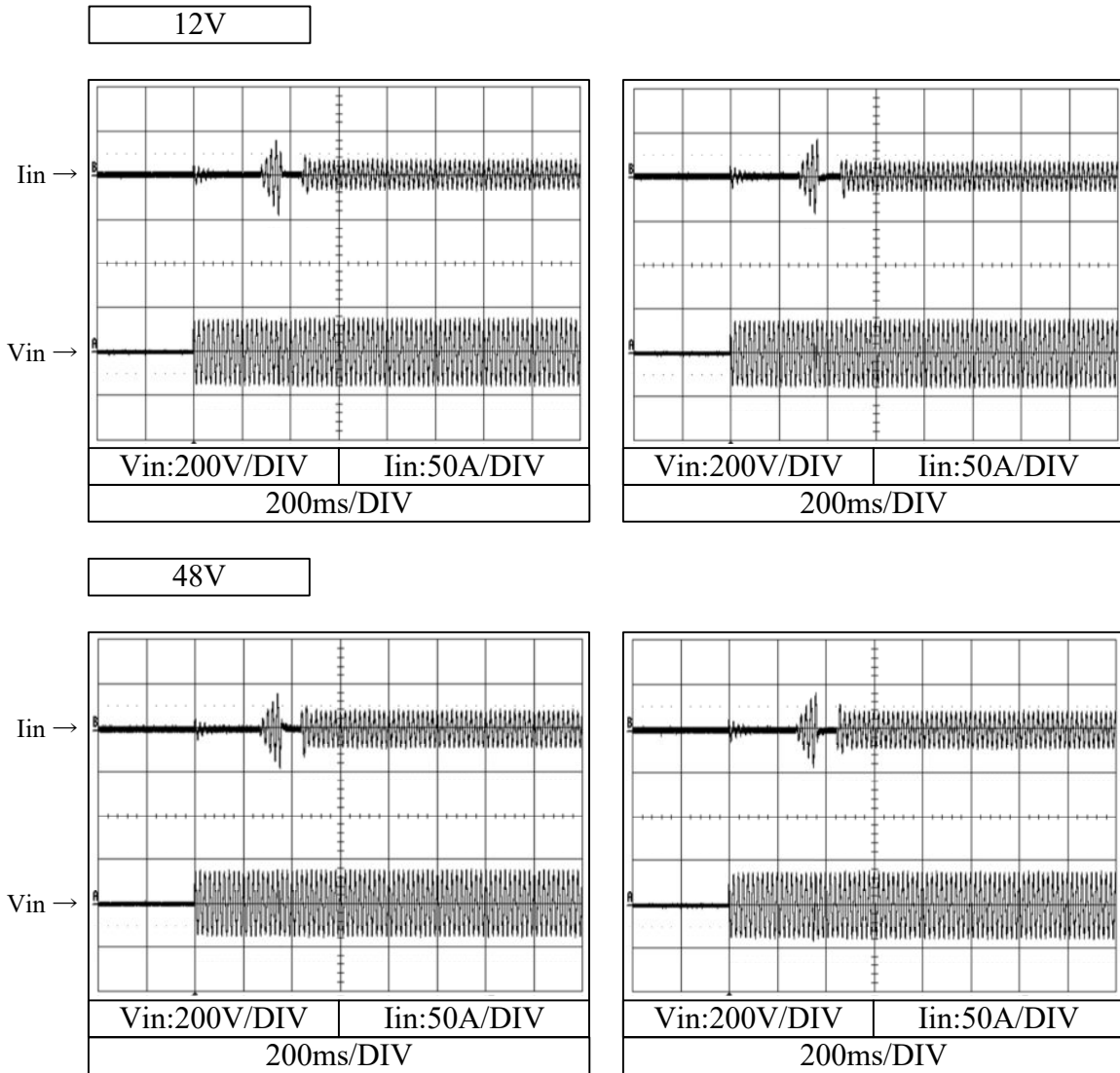


2-11. 入力サージ電流 (突入電流) 特性 Inrush current characteristics

Conditions Vin : 100VAC
Io : 100%
Tbp : 25 °C

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

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



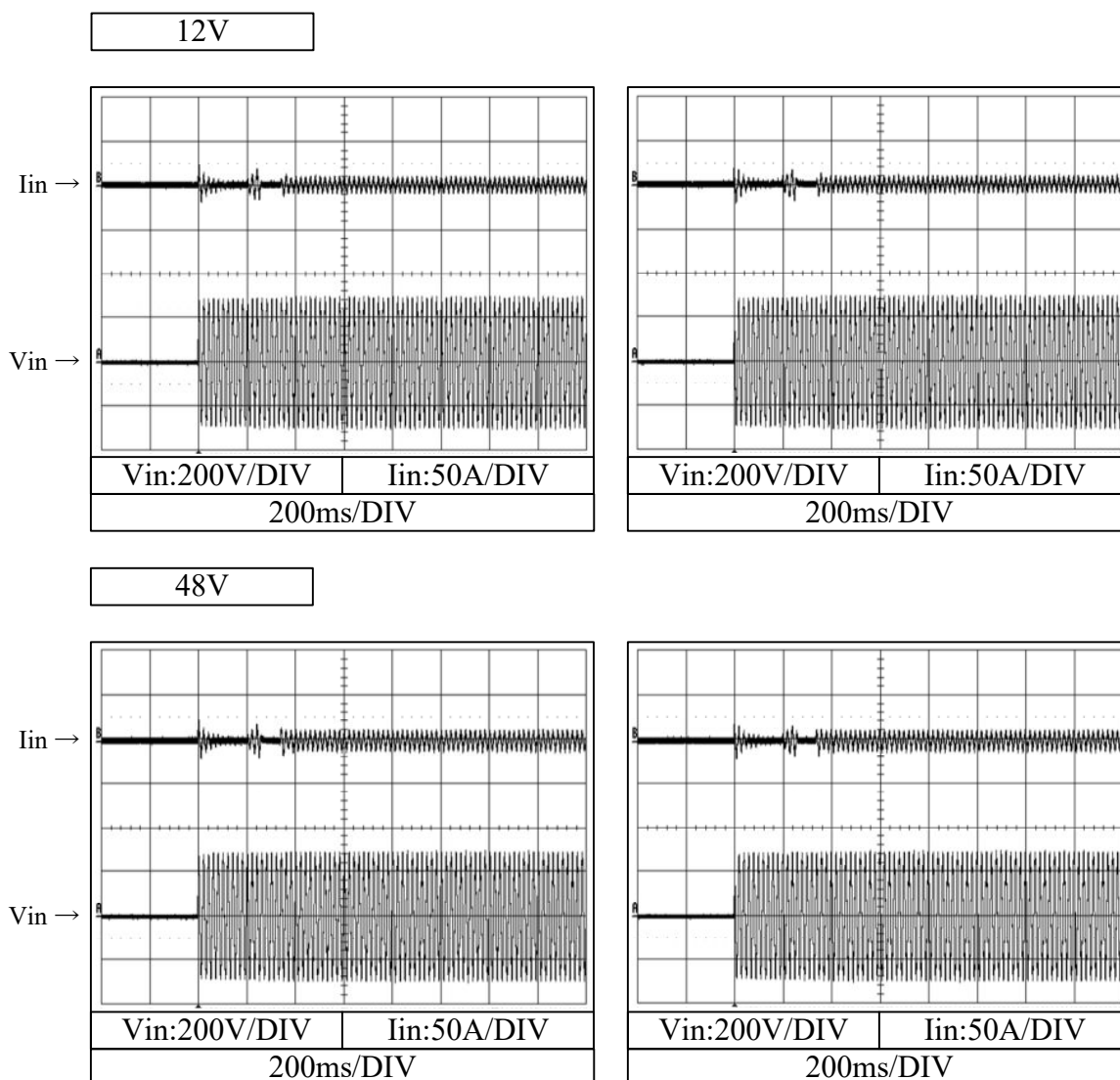
Note : 28V is same as characteristics of 48V

2-11. 入力サージ電流(突入電流)特性 Inrush current characteristics

Conditions Vin : 200VAC
Io : 100%
Tbp : 25 °C

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

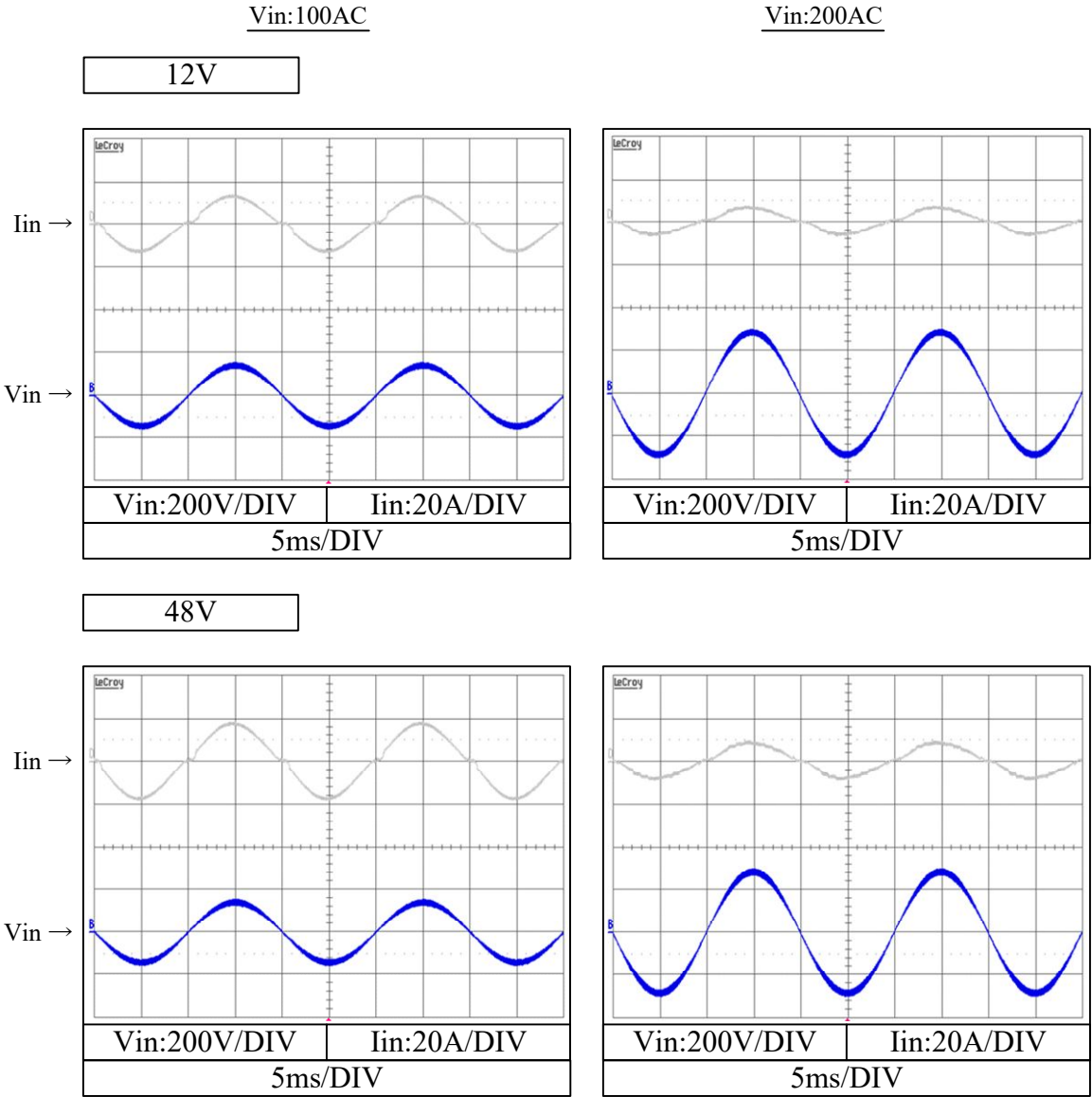
Switch on phase angle
of input AC voltage $\phi = 90^\circ$



Note : 28V is same as characteristics of 48V

2-13. 入力電流波形 Input current waveform

Conditions I_o : 100%
 T_{bp} : 25 °C



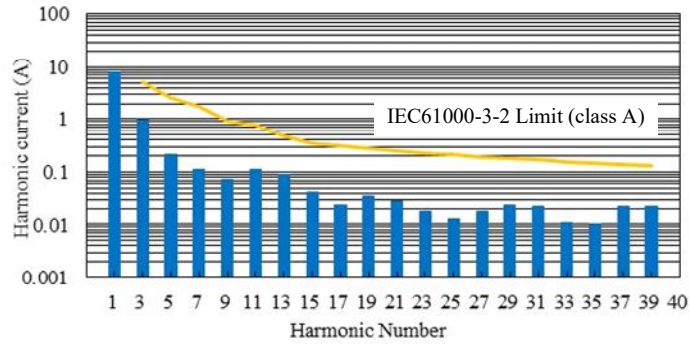
Note : 28V is same as characteristics of 48V

2-14. 高調波成分 Input current harmonics

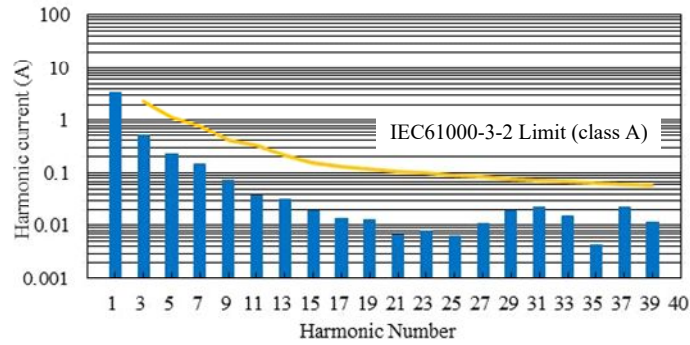
Conditions Io : 100%
Tbp : 25 °C

12V

Vin:100VAC

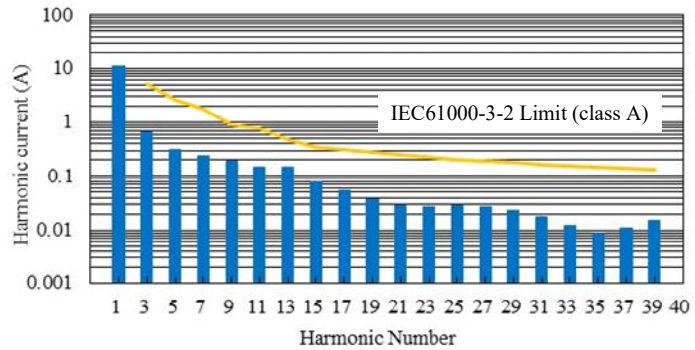


Vin:230VAC

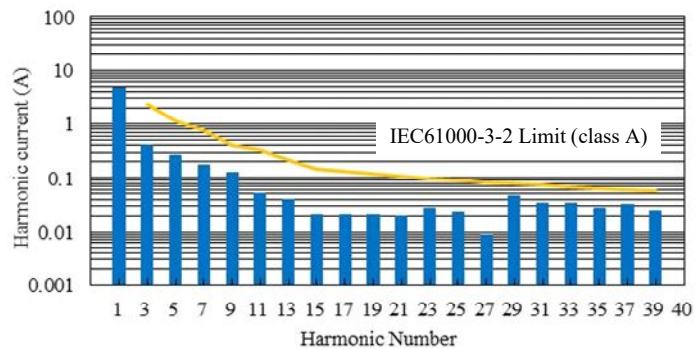


48V

Vin:100VAC



Vin:230VAC

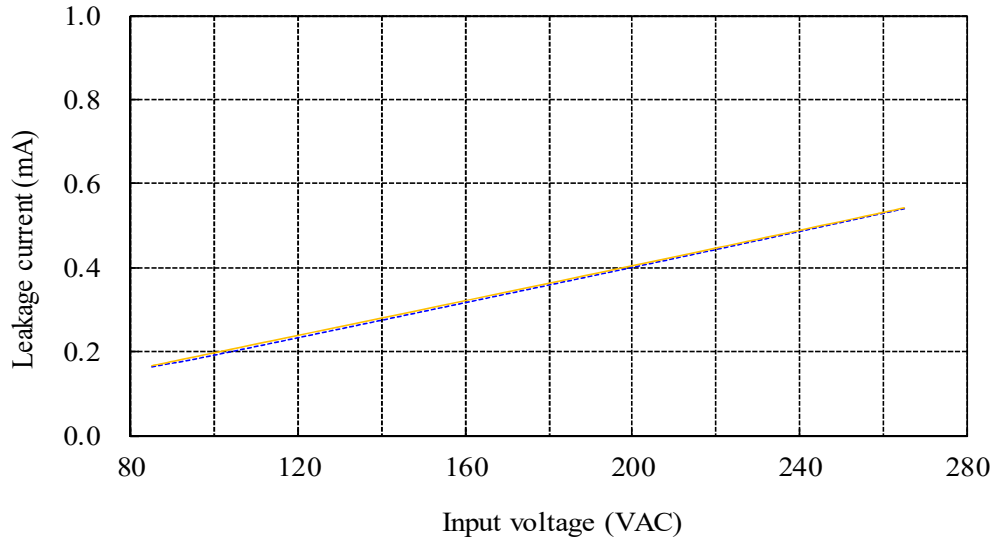


Note : 28V is same as characteristics of 48V

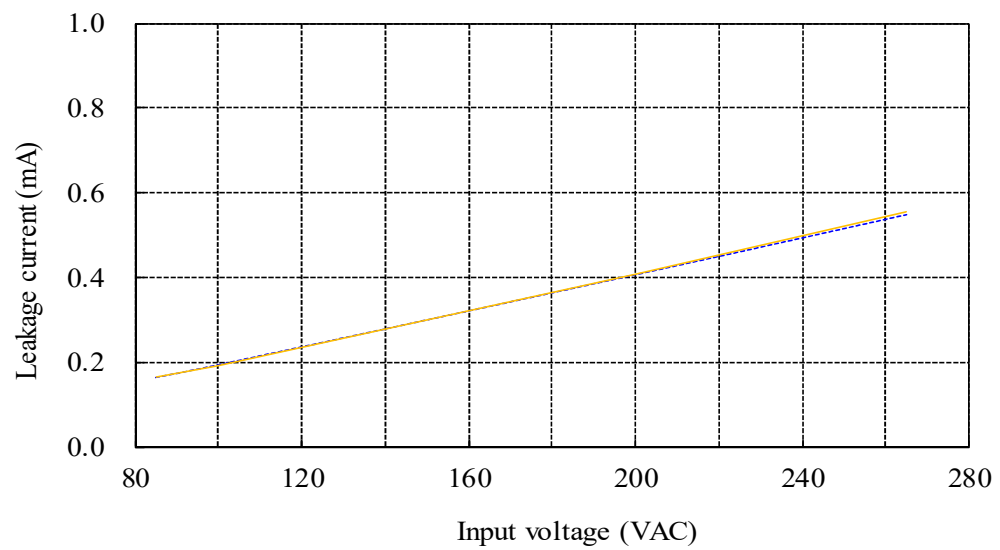
2-15. リーク電流特性 Leakage current characteristics

Conditions Io : 0% ---
 100% —
Tbp : 25 °C
f : 50Hz

12V



48V

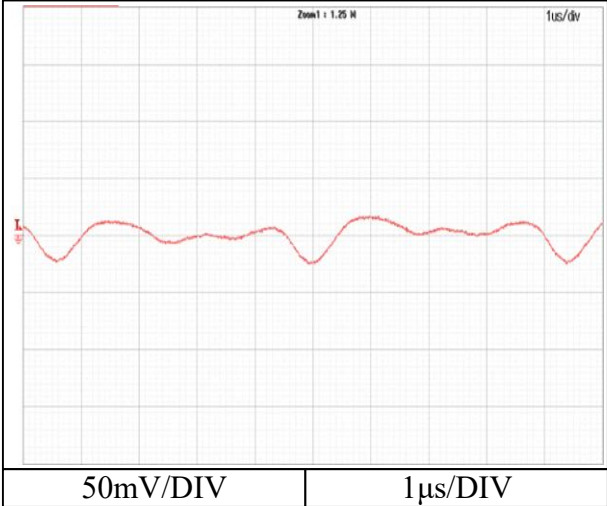


Note : 28V is same as characteristics of 48V

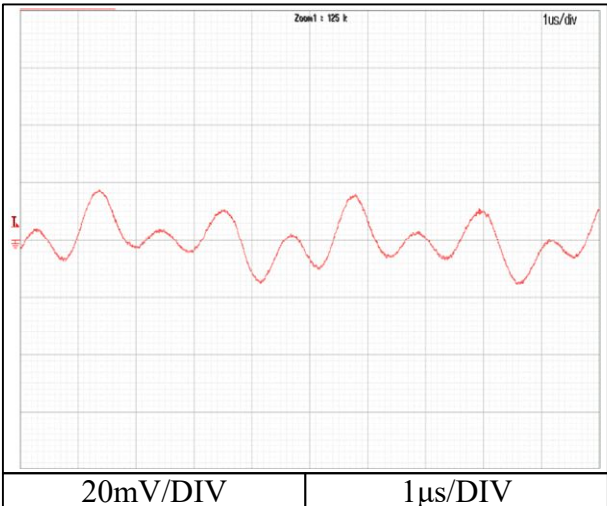
2-16. 出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions Vin : 100VAC
Io : 100%
Tbp : 25 °C

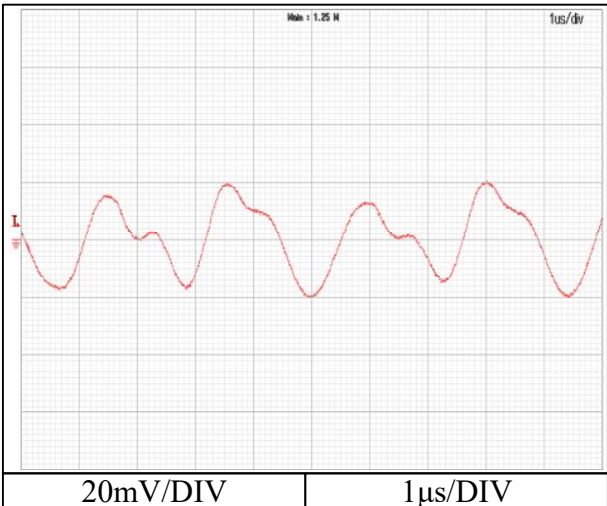
12V



28V



48V



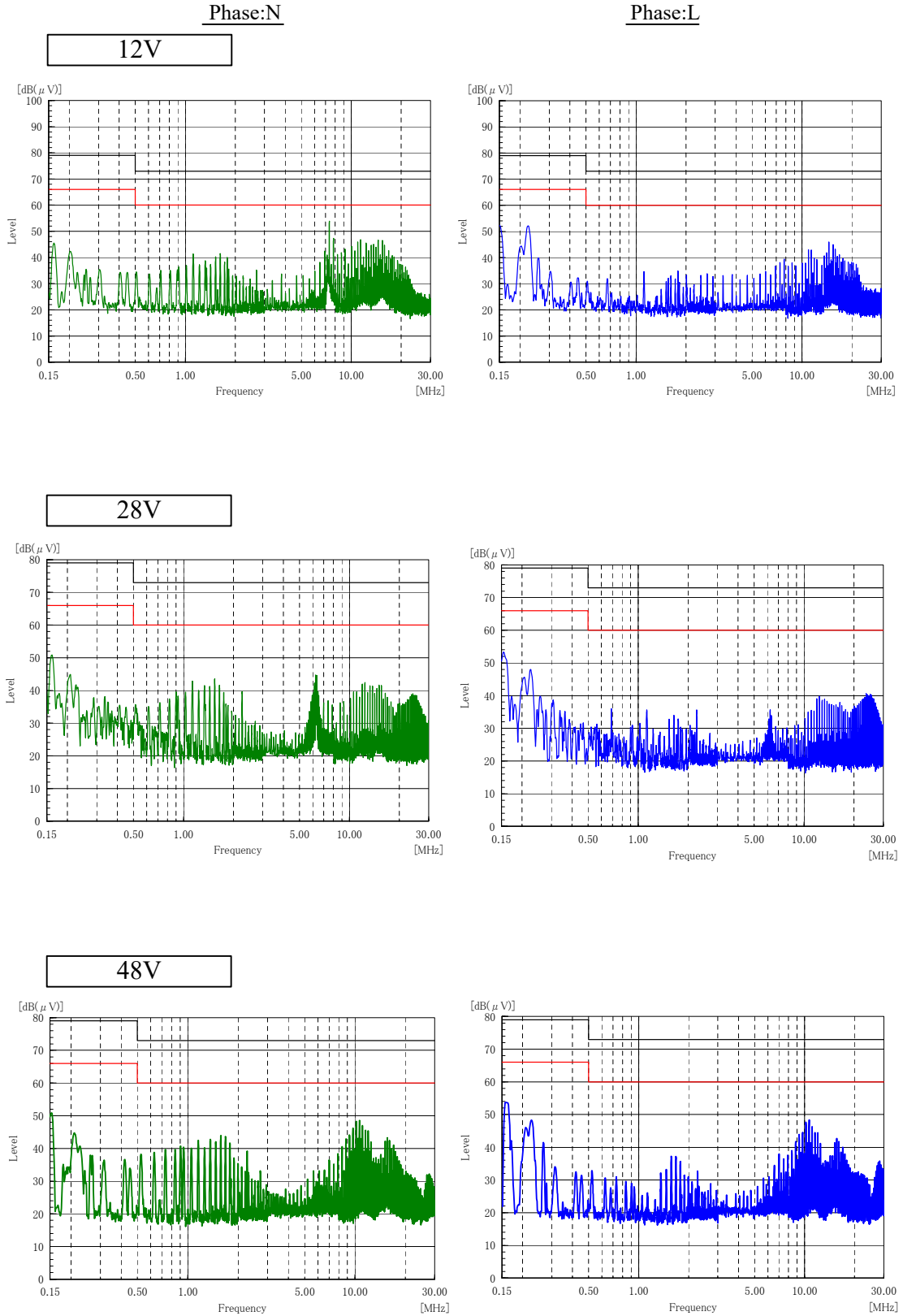
2-17. EMI特性 Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ) Conducted Emission Noise

Conditions V_{in} : 100VAC

I_o : 100%

T_{bp} : 25 °C



2-17. EMI特性 Electro-Magnetic Interference characteristics

(b) 雑音電界強度(輻射ノイズ) Radiated Emission Noise

Conditions Vin : 100VAC

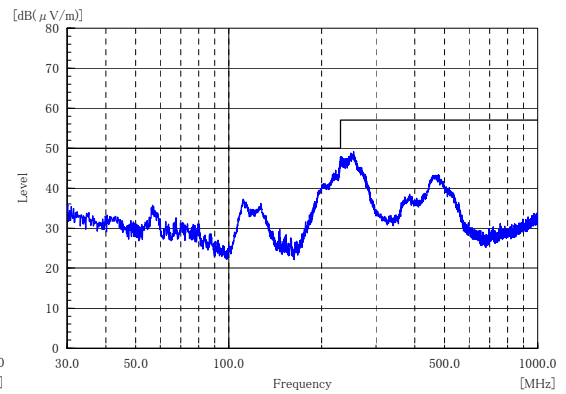
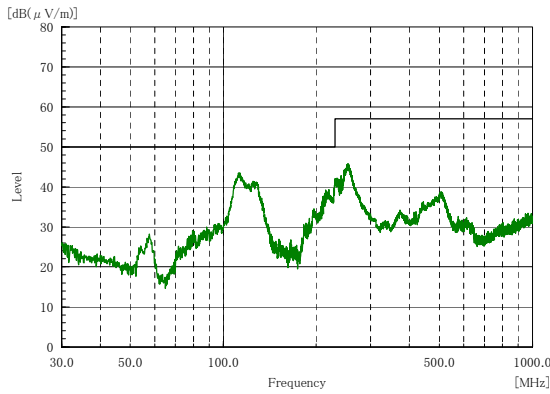
Io : 100%

Tbp : 25 °C

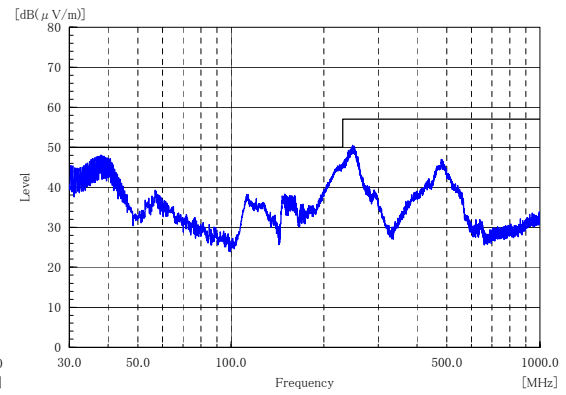
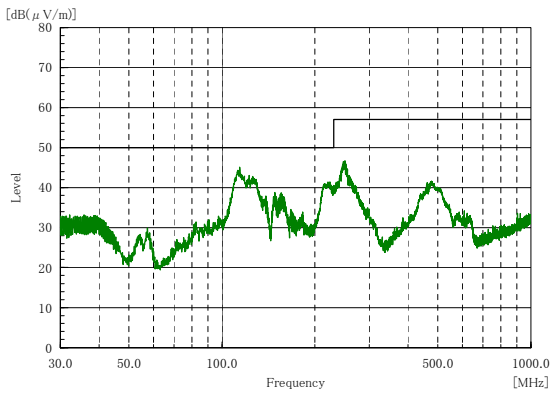
HORIZONTAL

VERTICAL

12V



28V



48V

