

**CN200B110-\***

**EVALUATION DATA**

型式データ

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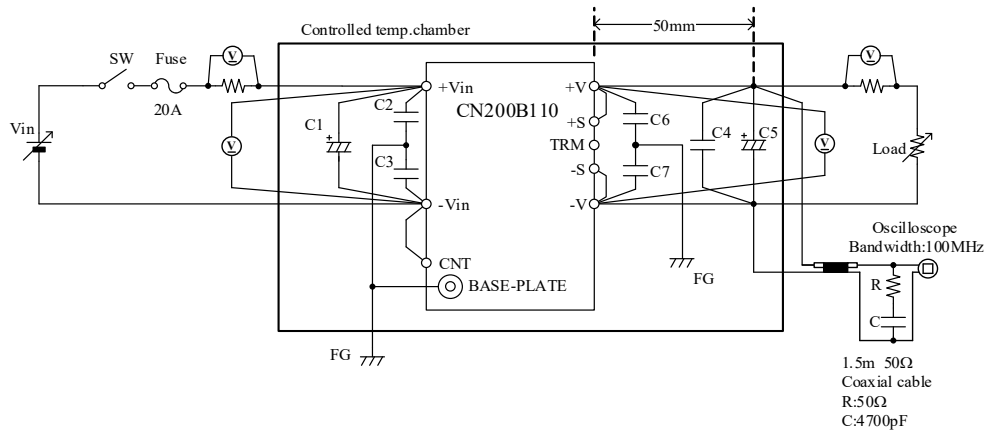
## 使用記号 Terminology used

Definition		
$V_{in}$ .....	入力電圧	Input voltage
$V_o$ .....	出力電圧	Output voltage
$V_{cnt}$ .....	CNT電圧	CNT 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

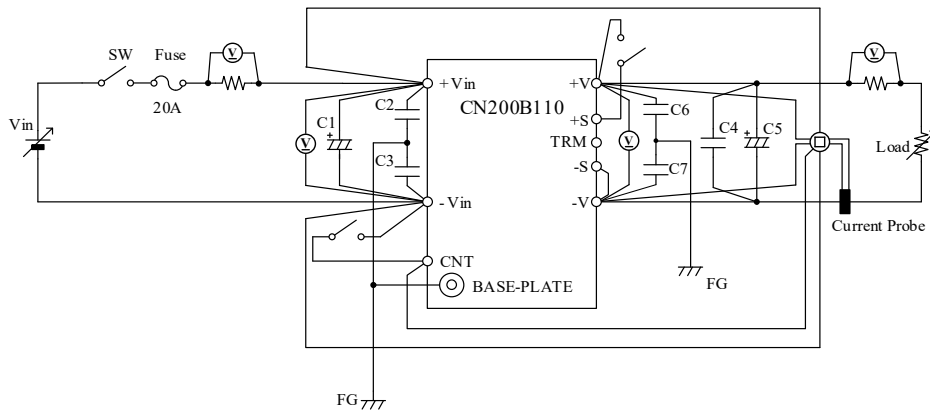
1. 評価方法 Evaluation Method

1.1 測定回路 Measurement Circuits

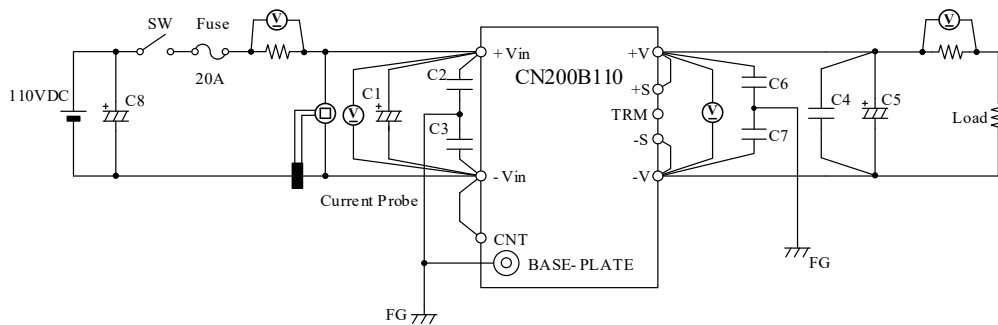
- (1) 静特性、過電流保護特性、出力リップル・ノイズ波形  
 Steady state characteristics, Over current protection (OCP) characteristics  
 and Output ripple and noise waveform



- (2) 過渡応答、過電圧保護特性、その他  
 Dynamic response, Over voltage protection (OVP) characteristics  
 and Other characteristics



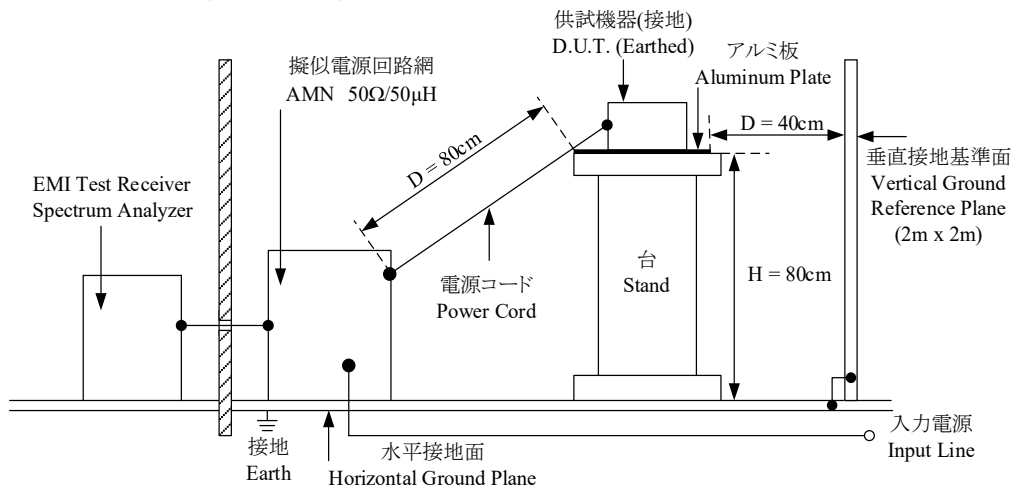
- (3) 入力サージ電流 (突入電流) 特性  
 Inrush current characteristics



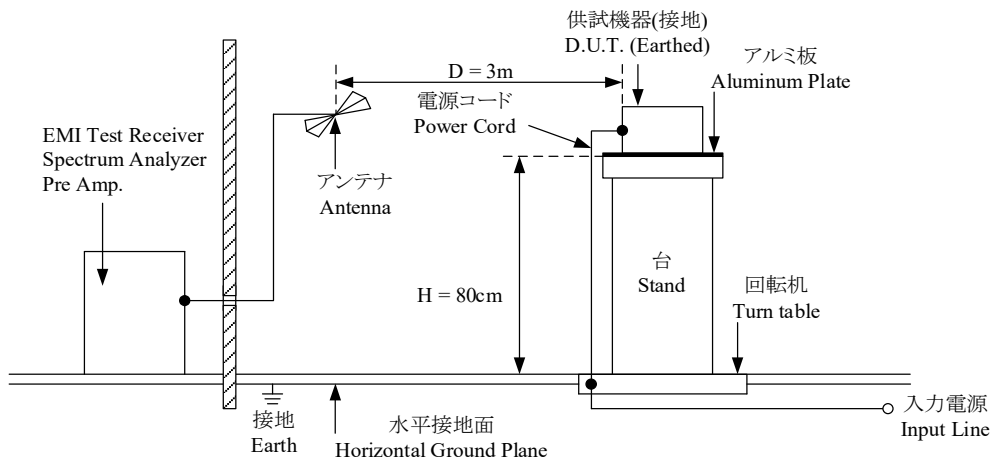
C1 : 220μF Electrolytic Capacitor	C5 : 12V- 1000μF Electrolytic Capacitor
C2,C3 : 4700pF Ceramic Capacitor	: 13.8V- 1000μF Electrolytic Capacitor
C4 : 10μF Ceramic Capacitor	: 15V- 1000μF Electrolytic Capacitor
C6,C7 : 0.022μF Film Capacitor	: 24V- 470μF Electrolytic Capacitor
C8 : 20000μF Electrolytic Capacitor	

(4) EMI特性 Electro-Magnetic Interference characteristics

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



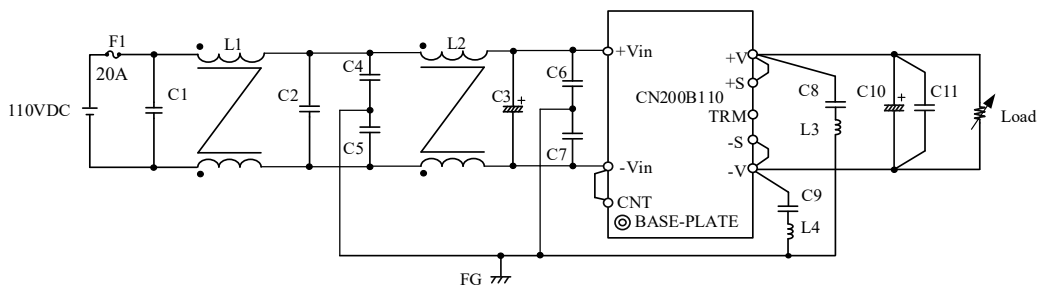
(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



\* 入出力ケーブルとしてシールドケーブルを使用  
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



- |                                   |  |
|-----------------------------------|--|
| F1 : 500VDC, 20A (WN30-20)        | C10 : 12V- 1000μF Electrolytic Capacitor |
| C1,C2 : 1μF Film Capacitor        | : 13.8V- 1000μF Electrolytic Capacitor   |
| C3 : 220μF Electrolytic Capacitor | : 15V- 1000μF Electrolytic Capacitor     |
| C4,C5 : 2200pF Ceramic Capacitor  | : 24V- 470μF Electrolytic Capacitor      |
| C6,C7 : 4700pF Ceramic Capacitor  | L1 : 1mH                                 |
| C8,C9 : 0.1μF Ceramic Capacitor   | L2 : 2.5mH                               |
| C11 : 10μF Ceramic Capacitor      | L3,L4 : Bead Core (HF57BB3.35X2X2)       |

\* 詳細なパラメータ情報については、次ページをご参照ください。  
Refer to the next page for detailed parameter information.

\*詳細な周辺パラメータ情報(参照用)

The detailed peripheral parameter information ( for reference )

	SYMBOL	PRODUCT TYPE	ITEM DESCRIPTION	NOTE	MANUFACTURER	
1	F1	Fuse	WN30-20	500VDC, 20A	WALTER	
2	C1,C2	Film Capacitor	LE105-MX-C3.5	310V, 1 $\mu$	OKAYA	
3	C3	Electrolytic Capacitor	EKXJ201ELL221MK40S	200V, 220 $\mu$	NI-CHEMI	
4	C4,C5	Ceramic Capacitor	DE1E3KX222MJ4BN04F	250V, 2200p	MURATA	
5	C6,C7	Ceramic Capacitor	DE1E3KX472MJ4BN04F	250V, 4700p	MURATA	
6	C8,C9	Ceramic Capacitor	RDER72J104K8K1C11B	630VDC, 0.1 $\mu$	MURATA	
7	C10	12V Model	Electrolytic Capacitor	ELXY250ELL102MK25S	25V, 1000 $\mu$	NI-CHEMI
8		13.8V Model	Electrolytic Capacitor	ELXY250ELL102MK25S	25V, 1000 $\mu$	NI-CHEMI
9		15V Model	Electrolytic Capacitor	ELXY250ELL102MK25S	25V, 1000 $\mu$	NI-CHEMI
10		24V Model	Electrolytic Capacitor	ELXY500ELL471MK25S	50V, 470 $\mu$	NI-CHEMI
11	C11	Ceramic Capacitor	GRM32ER71H106KA12L	50V, 10 $\mu$	MURATA	
12	L1	Noise Filter Coil	CH5A5009	1mH	TNC	
13	L2	Noise Filter Coil	CH5A2025	2.5mH	TNC	
14	L3,L4	Bead Core	HF57BB3.35X2X2		TDK	

## 1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	AMN	SCHWARZBECK	NNLK8121
2	ANTENNA(BI-LOG ANTENNA)	TESEQ	CBL6111D
3	CONTROLLED TEMP. CHAMBER	ESPEC CORP.	SU-662
4	CURRENT PROBE	YOKOGAWA	701930
5	CURRENT PROBE AMPLIFIER	YOKOGAWA	700938
6	CVCF	KIKUSUI	PCR2000L
7	DC POWER SUPPLY	TDK-Lambda	GEN200-25
8	DIGITAL MULTIMETER	Agilent	34970A
9	DIGITAL POWER METER	YOKOGAWA	WT210
10	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA	DLM2054
11	DYNAMIC DUMMY LOAD	Chroma	63030
12	EMI TEST RECEIVER SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
13	PRE AMP.	SONOMA	310N
14	SHUNT RESISTER	YOKOGAWA ELECT.	2215

## 2. 特性データ Characteristics

## 2.1 静特性 Steady state data

(1) 入力変動、負荷変動、温度変動 Line regulation, Load regulation, Temperature drift

12V

## 1. Line regulation and Load regulation

Condition Tbp : 25°C

Io \ Vin	43VDC	72VDC	110VDC	160VDC	Line regulation	
0%	12.000V	11.999V	11.999V	11.999V	1mV	0.008%
50%	12.000V	11.999V	11.999V	11.999V	1mV	0.008%
100%	12.000V	11.999V	11.999V	11.999V	1mV	0.008%
Load regulation	0mV	0mV	0mV	0mV		
	0.000%	0.000%	0.000%	0.000%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	12.026V	11.999V	11.900V	126mV	1.050%

13.8V

## 1. Line regulation and Load regulation

Condition Tbp : 25°C

Io \ Vin	48.2VDC	72VDC	110VDC	160VDC	Line regulation	
0%	13.802V	13.802V	13.801V	13.801V	1mV	0.007%
50%	13.802V	13.802V	13.802V	13.802V	0mV	0.000%
100%	13.802V	13.801V	13.801V	13.801V	1mV	0.007%
Load regulation	0mV	1mV	1mV	1mV		
	0.000%	0.007%	0.007%	0.007%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	13.832V	13.801V	13.722V	110mV	0.797%

(1) 入力変動、負荷変動、温度変動 Line regulation, Load regulation, Temperature drift

15V

## 1. Line regulation and Load regulation

Condition Tbp : 25°C

Io \ Vin	43VDC	72VDC	110VDC	160VDC	Line regulation	
0%	15.036V	15.036V	15.035V	15.035V	1mV	0.007%
50%	15.035V	15.035V	15.036V	15.036V	1mV	0.007%
100%	15.035V	15.036V	15.035V	15.035V	1mV	0.007%
Load regulation	1mV	1mV	1mV	1mV		
	0.007%	0.007%	0.007%	0.007%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	15.063V	15.035V	14.912V	151mV	1.007%

24V

## 1. Line regulation and Load regulation

Condition Tbp : 25°C

Io \ Vin	43VDC	72VDC	110VDC	160VDC	Line regulation	
0%	24.051V	24.051V	24.051V	24.051V	0mV	0.000%
50%	24.051V	24.051V	24.051V	24.052V	1mV	0.004%
100%	24.051V	24.051V	24.051V	24.051V	0mV	0.000%
Load regulation	0mV	0mV	0mV	1mV		
	0.000%	0.000%	0.000%	0.004%		

## 2. Temperature drift

Conditions Vin : 110VDC

Io : 100%

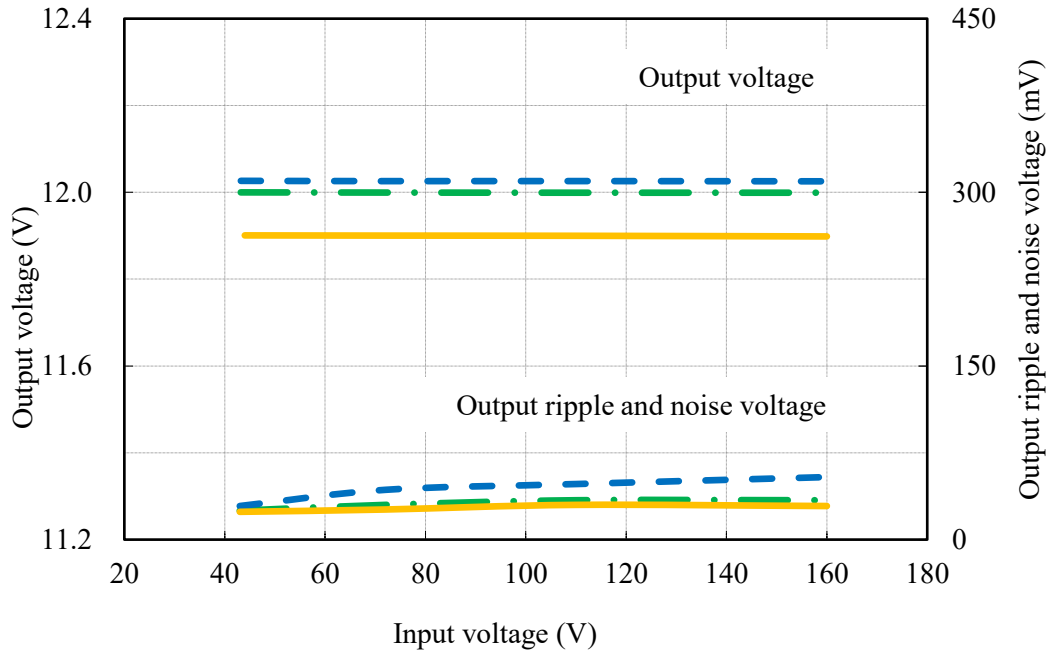
Tbp	-40°C	+25°C	+100°C	Temperature stability	
Vo	24.088V	24.051V	23.890V	198mV	0.825%

(2) 出力電圧、出力リップル・ノイズ電圧 対 入力電圧

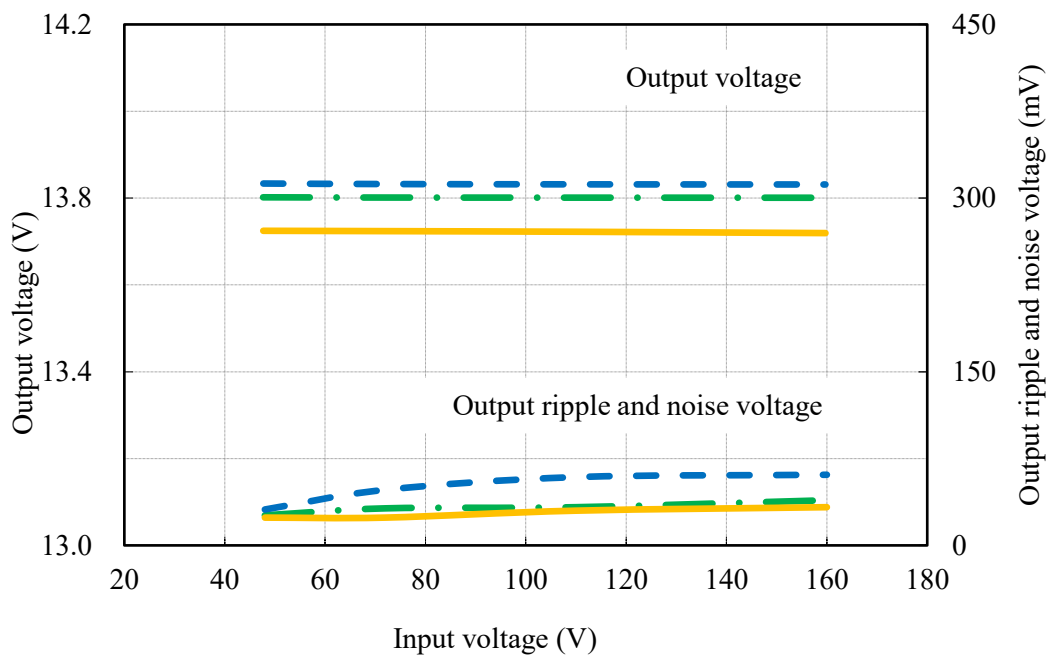
Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions  
 Io : 100 %  
 Tbp : -40 °C ---  
 : 25 °C -.-  
 : 100 °C —

12V



13.8V



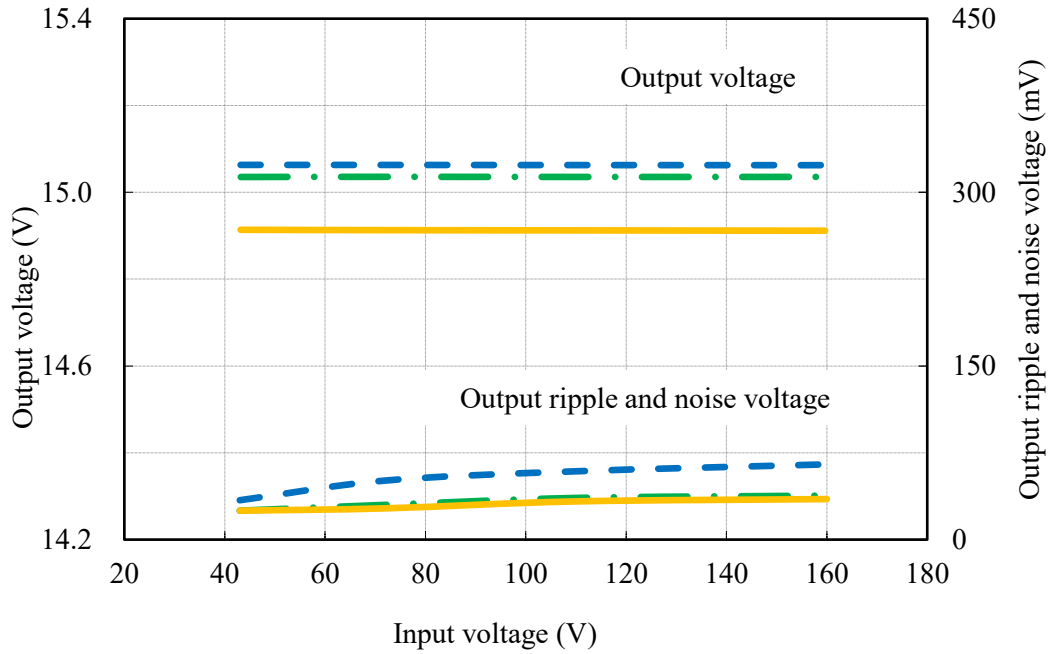


(2) 出力電圧、出力リップル・ノイズ電圧 対 入力電圧

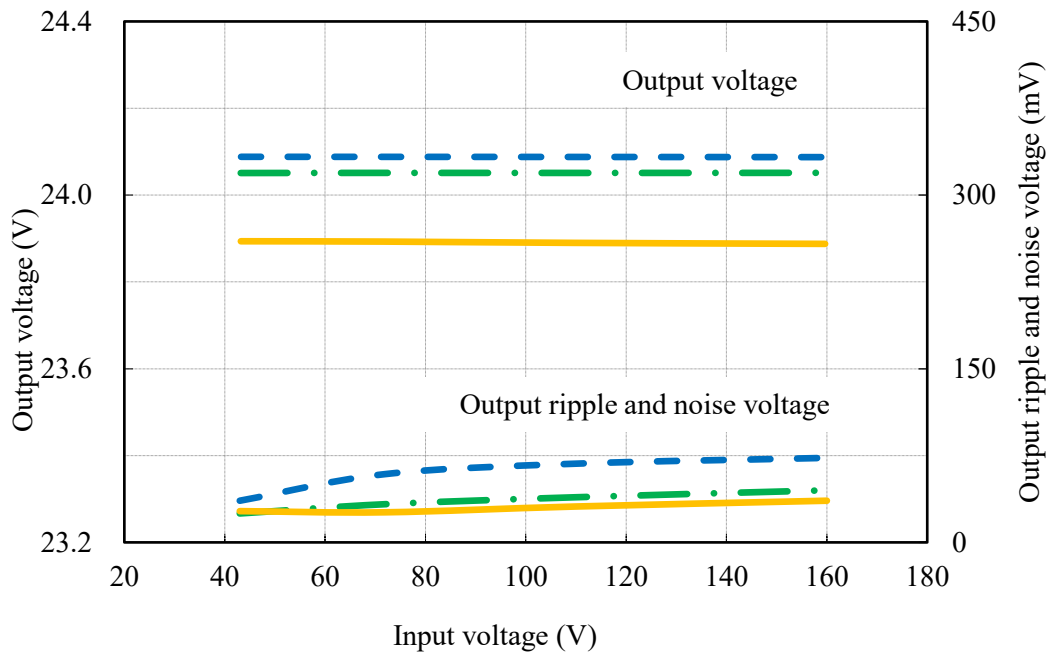
Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions    I<sub>o</sub> : 100 %  
                   T<sub>bp</sub> : -40 °C    - - - -  
                   : 25 °C        - · - · -  
                   : 100 °C        ————

15V



24V

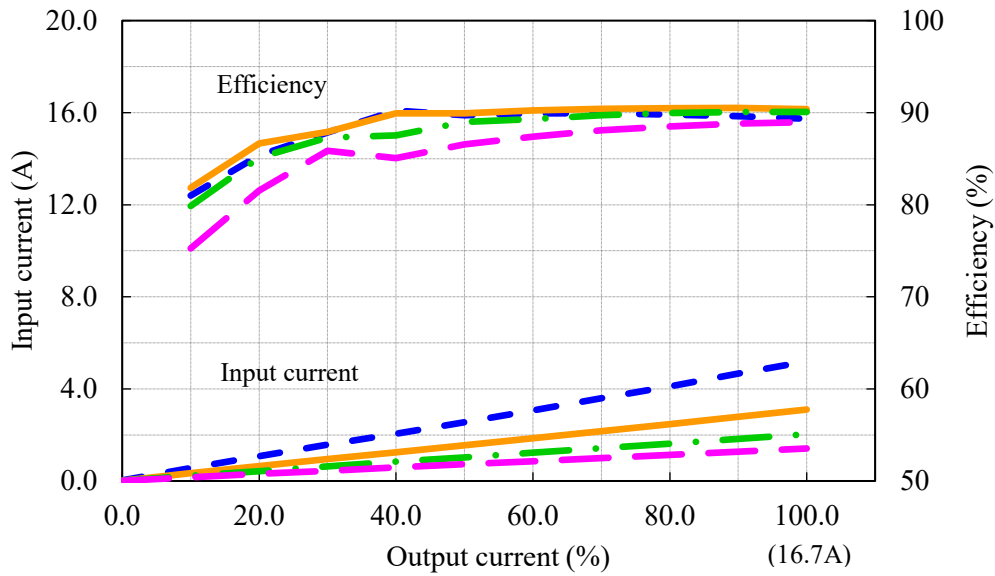


(3) 入力電流、効率 対 出力電流

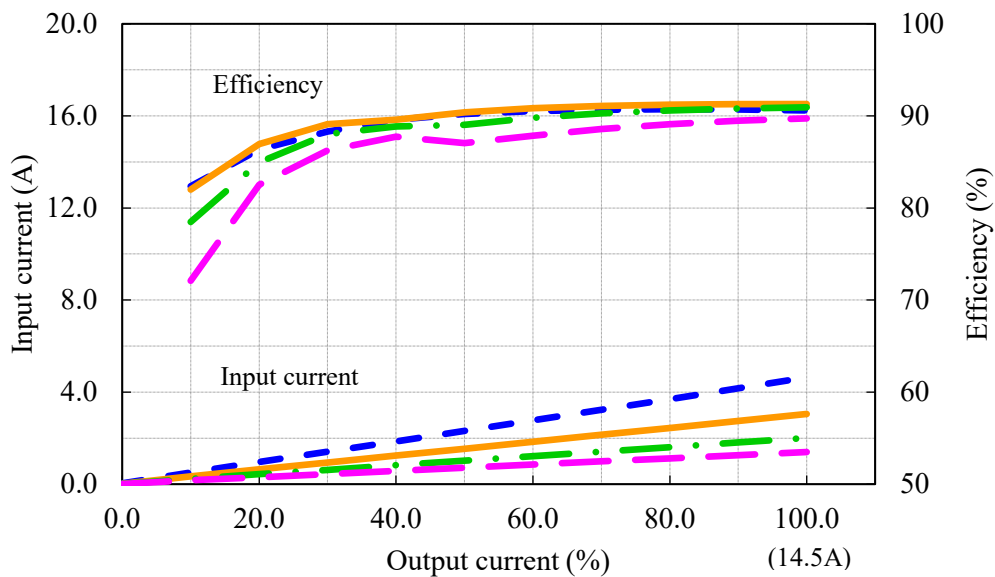
Input current and Efficiency vs. Output current

Conditions Vin : 43 VDC ---  
 : 72 VDC —  
 : 110 VDC - · - ·  
 : 160 VDC - · - ·  
 Tbp : 25 °C

12V



13.8V

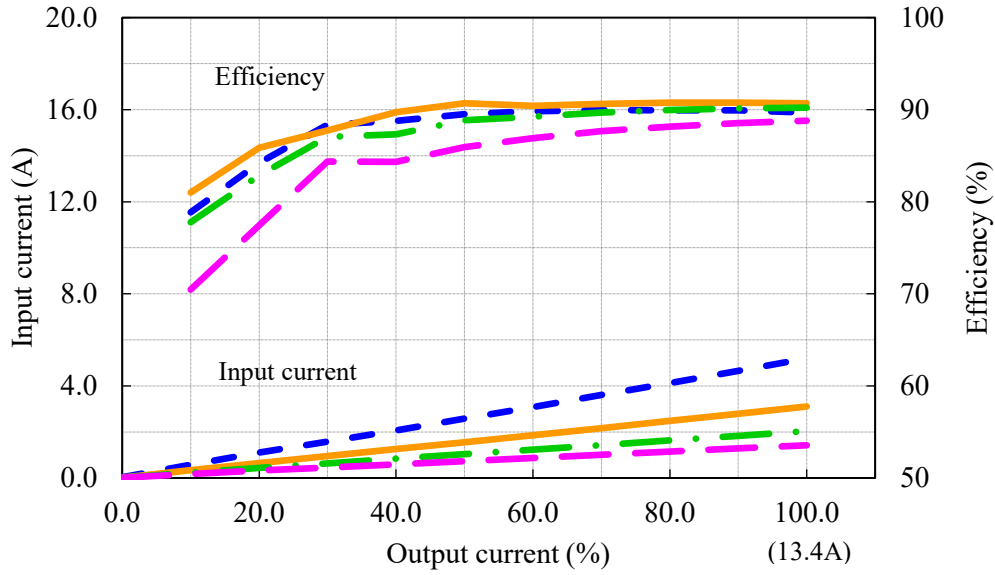


(3) 入力電流、効率 対 出力電流

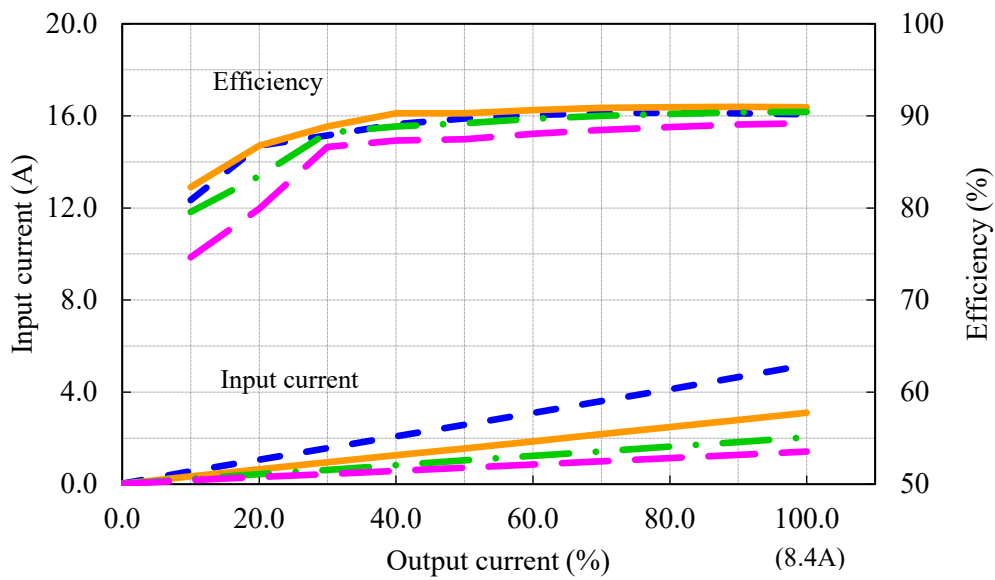
Input current and Efficiency vs. Output current

Conditions Vin : 43 VDC ---  
 : 72 VDC ---  
 : 110 VDC -.-  
 : 160 VDC -.-  
 Tbp : 25 °C

15V



24V

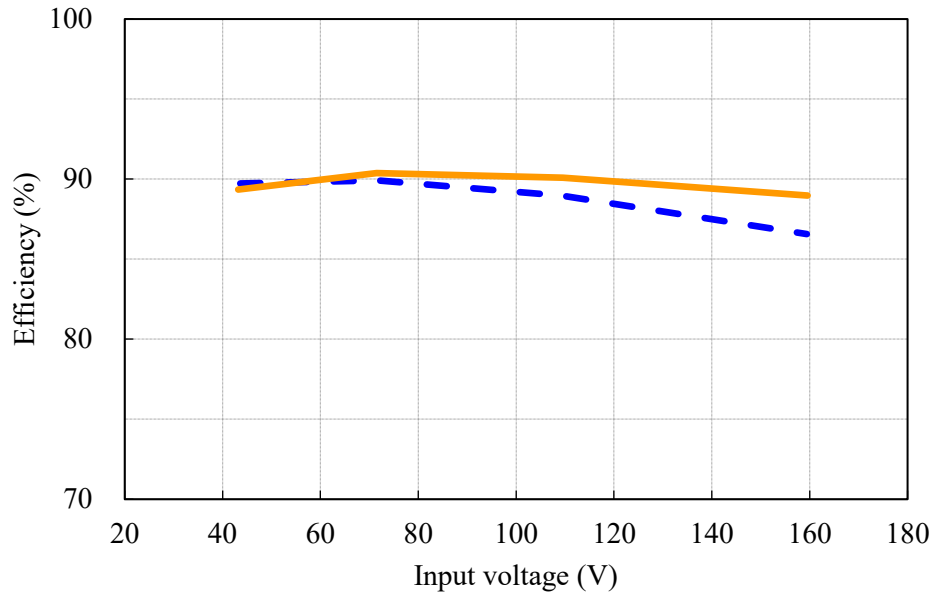


(4) 効率 対 入力電圧

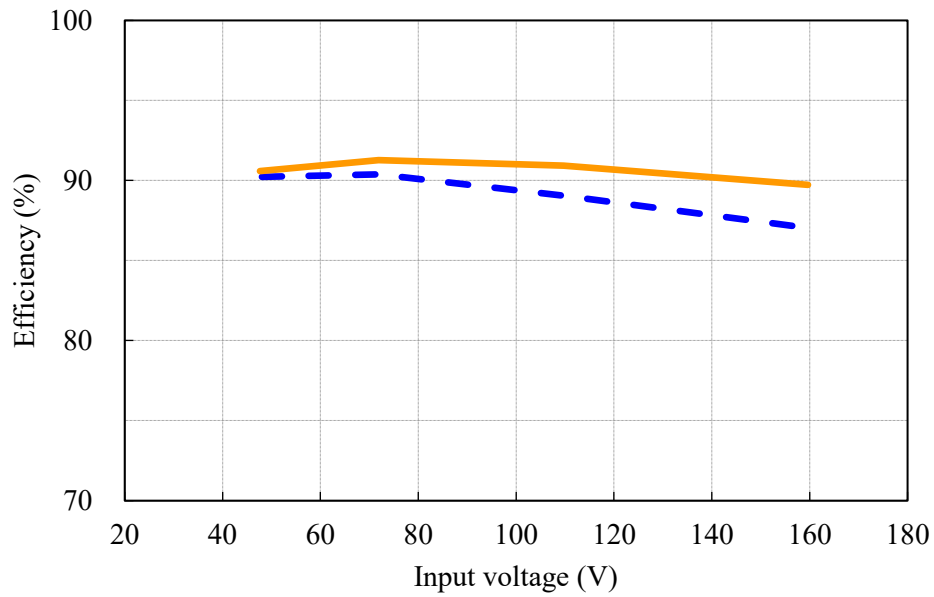
Efficiency vs. Input voltage

Conditions    I<sub>o</sub> : 50 %    - - - -  
                       : 100 %    ————  
                       T<sub>bp</sub> : 25 °C

12V



13.8V

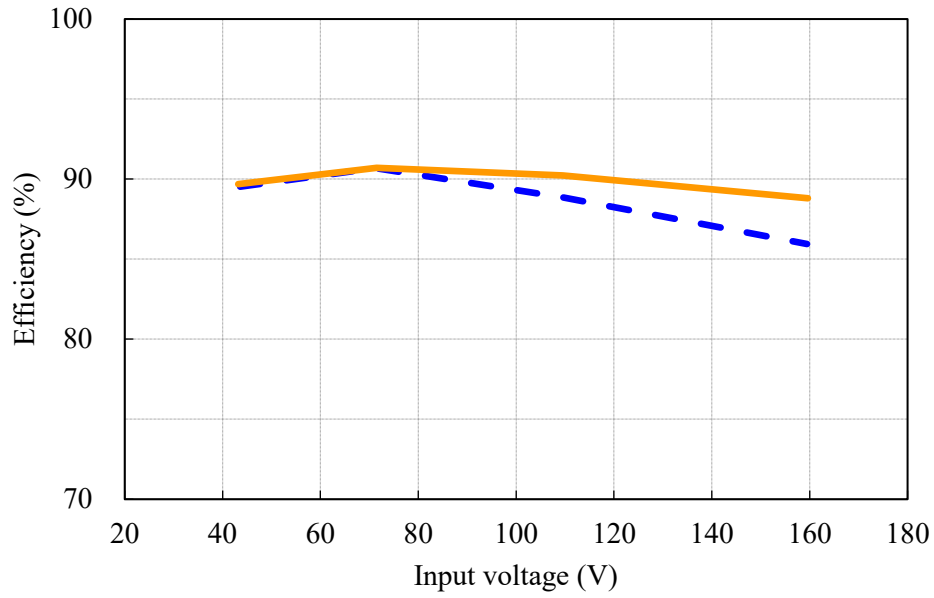


(4) 効率 対 入力電圧

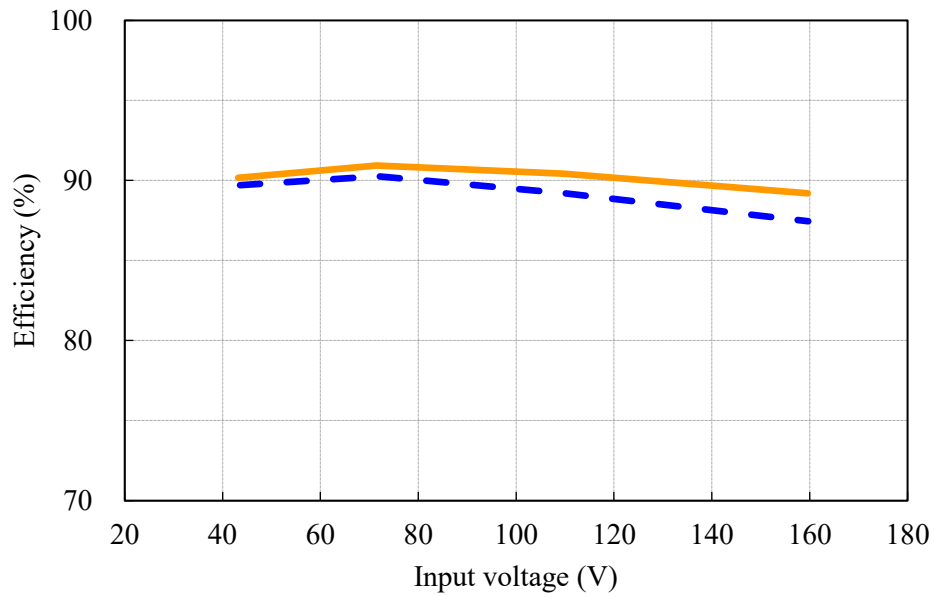
Efficiency vs. Input voltage

Conditions    I<sub>o</sub> : 50 %    - - - -  
                       : 100 %    ————  
                       T<sub>bp</sub> : 25 °C

15V



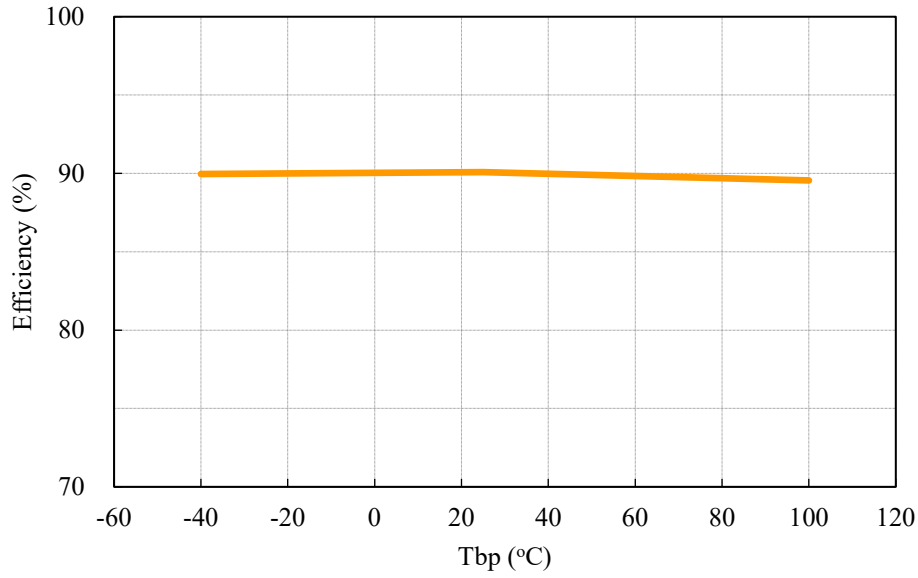
24V



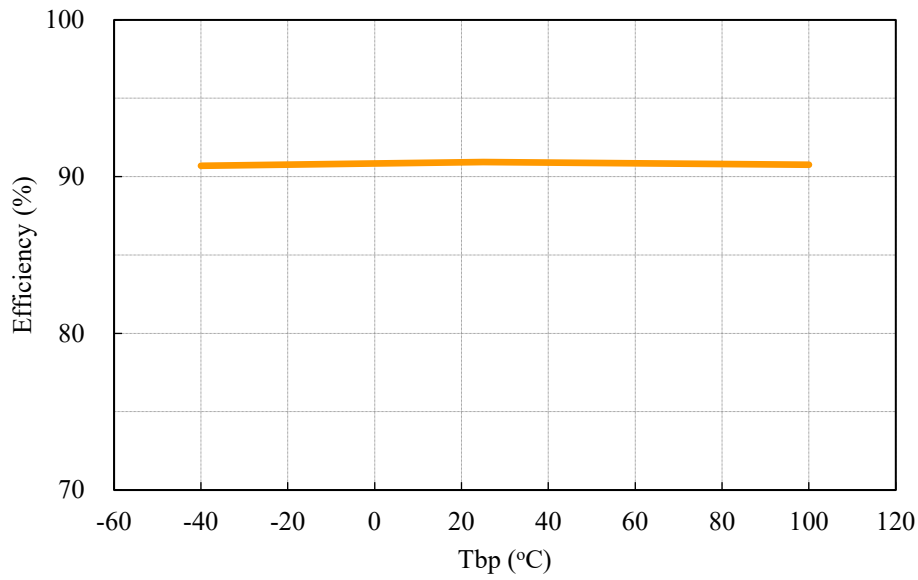
(5) 効率 対 ベースプレート温度  
Efficiency vs. Base-plate temperature

Conditions Vin : 110 VDC  
Io : 100 %

12V



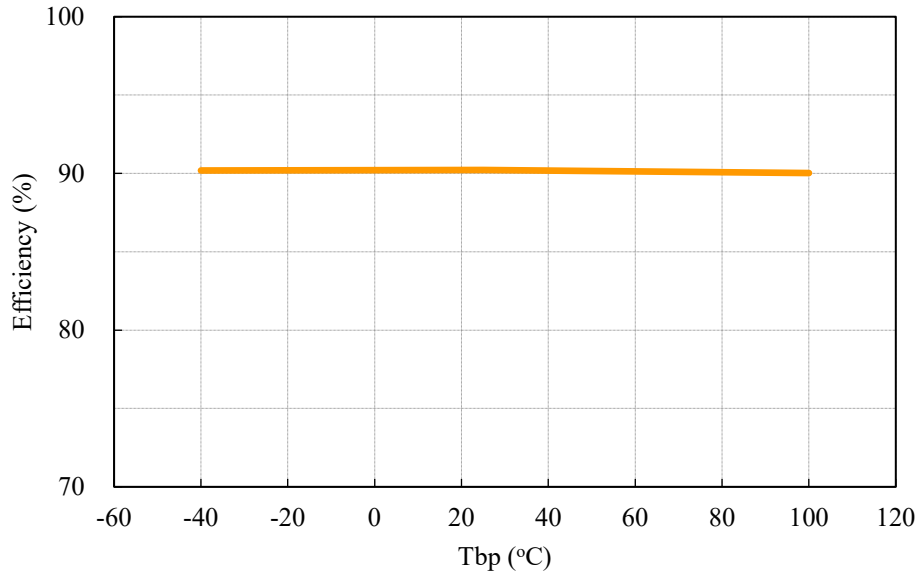
13.8V



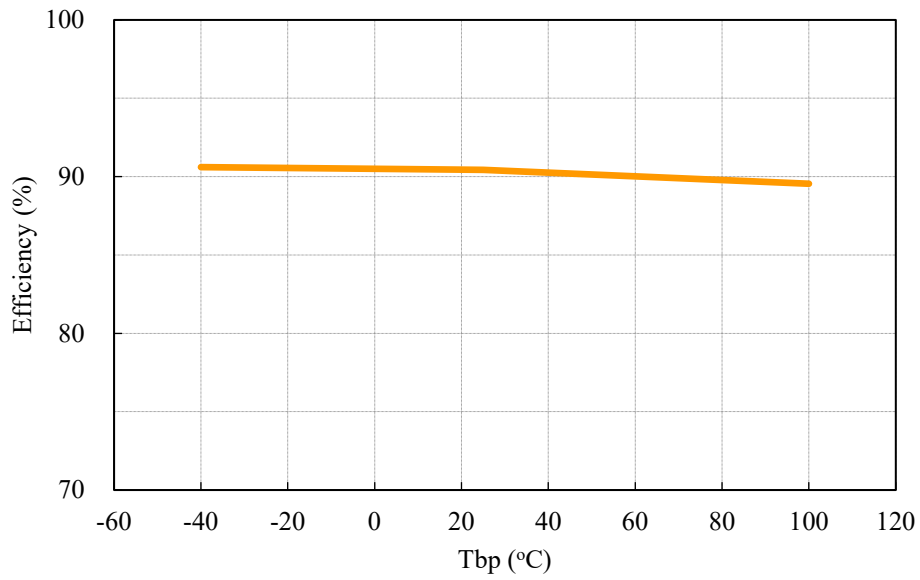
(5) 効率 対 ベースプレート温度  
Efficiency vs. Base-plate temperature

Conditions Vin : 110 VDC  
Io : 100 %

15V



24V



(6) 起動、停止電圧特性

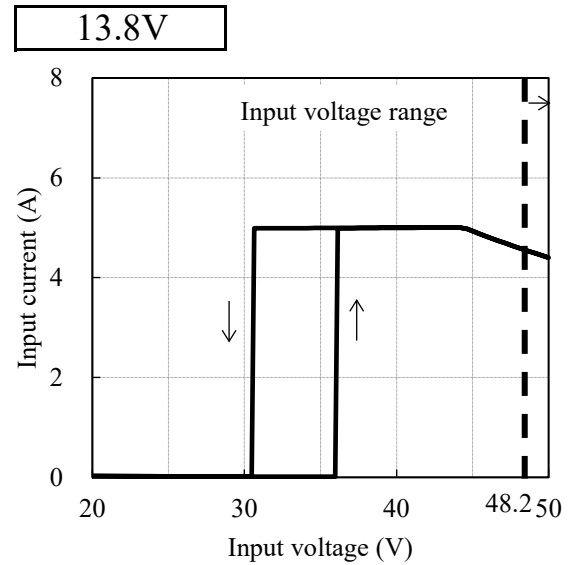
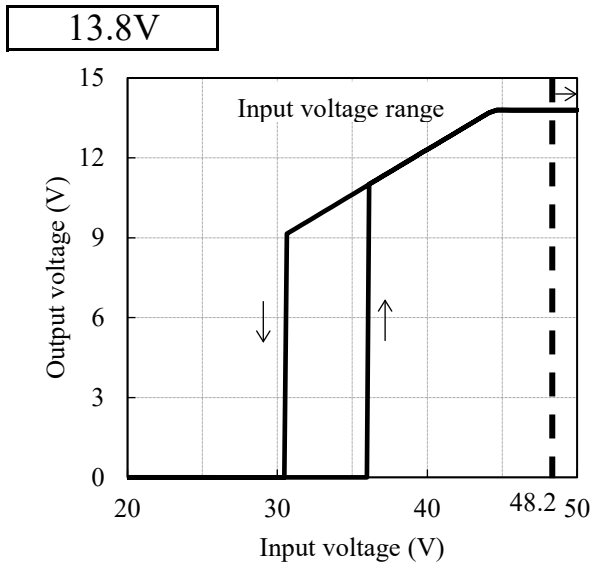
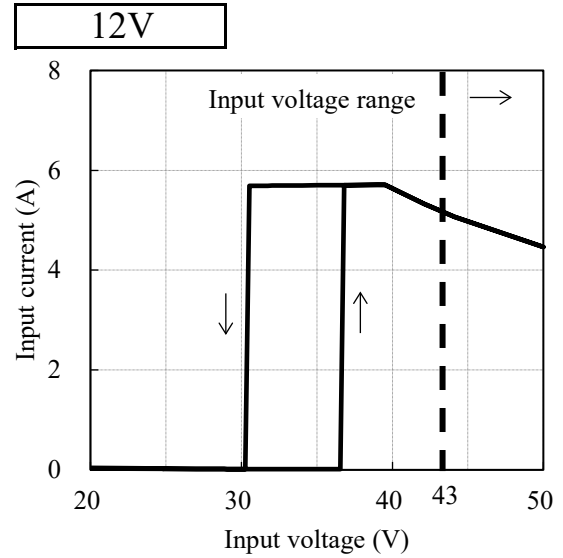
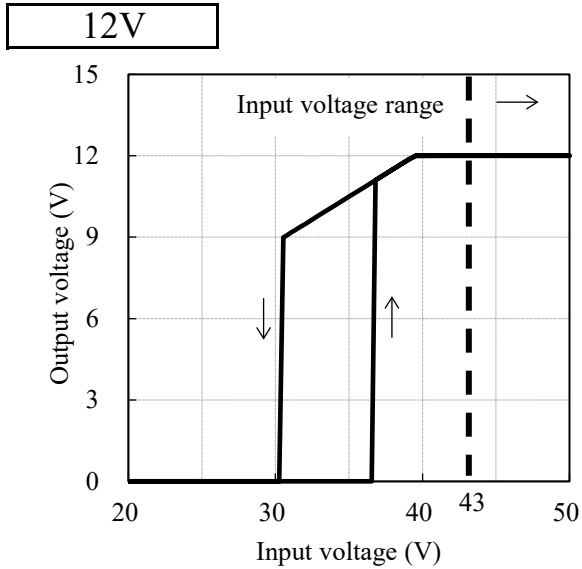
Start and Stop voltage characteristics

出力電圧 対 入力電圧  
Output voltage vs. Input voltage

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

入力電流 対 入力電圧  
Input current vs. Input voltage

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





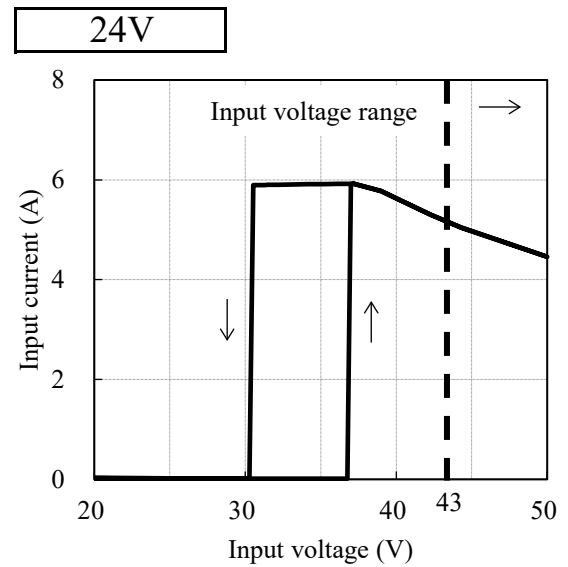
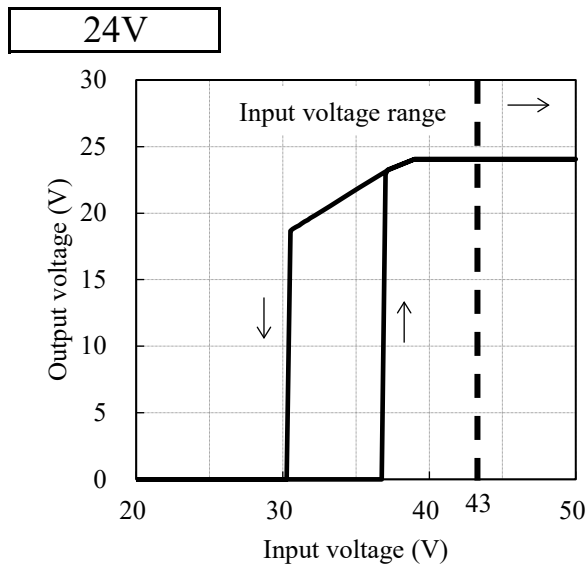
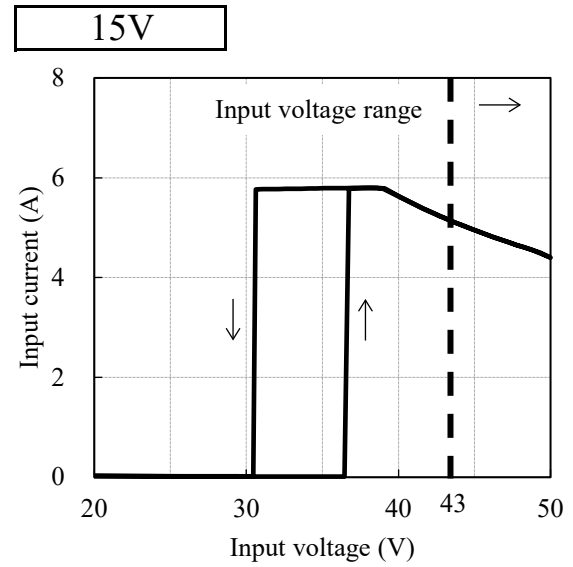
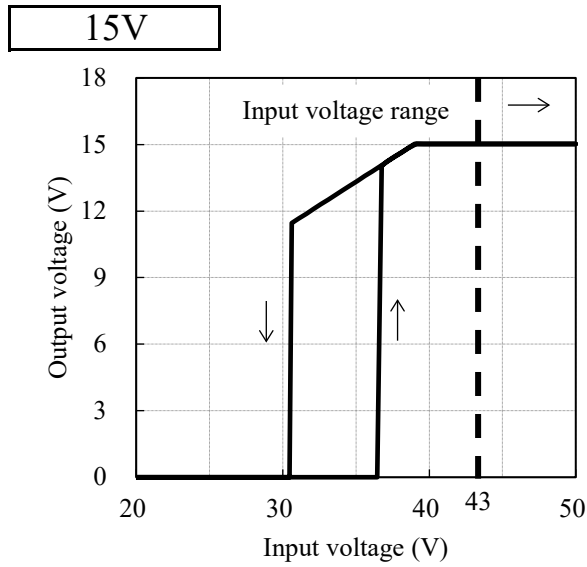
(6) 起動、停止電圧特性  
Start and Stop voltage characteristics

出力電圧 対 入力電圧  
Output voltage vs. Input voltage

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

入力電流 対 入力電圧  
Input current vs. Input voltage

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



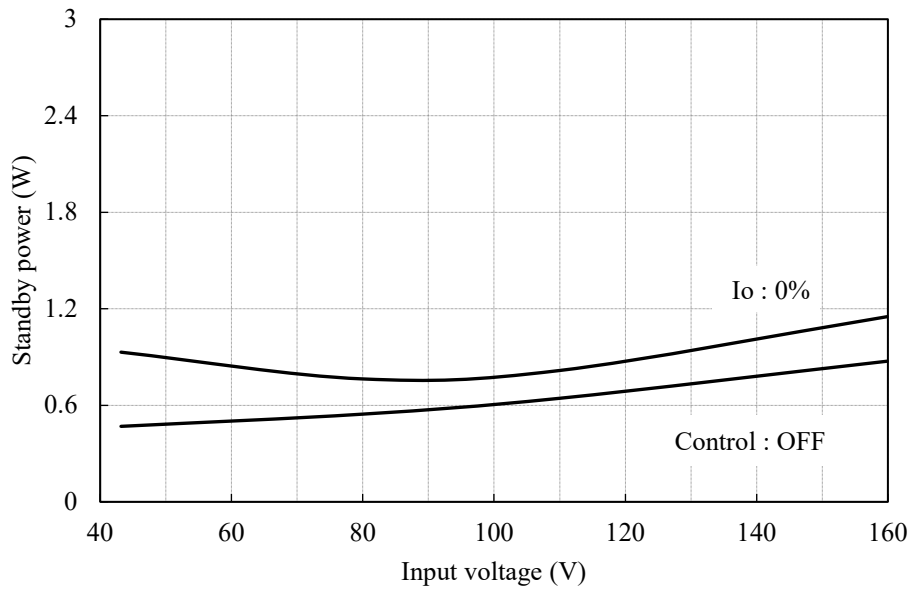
2.2 待機電力特性

Standby power characteristics

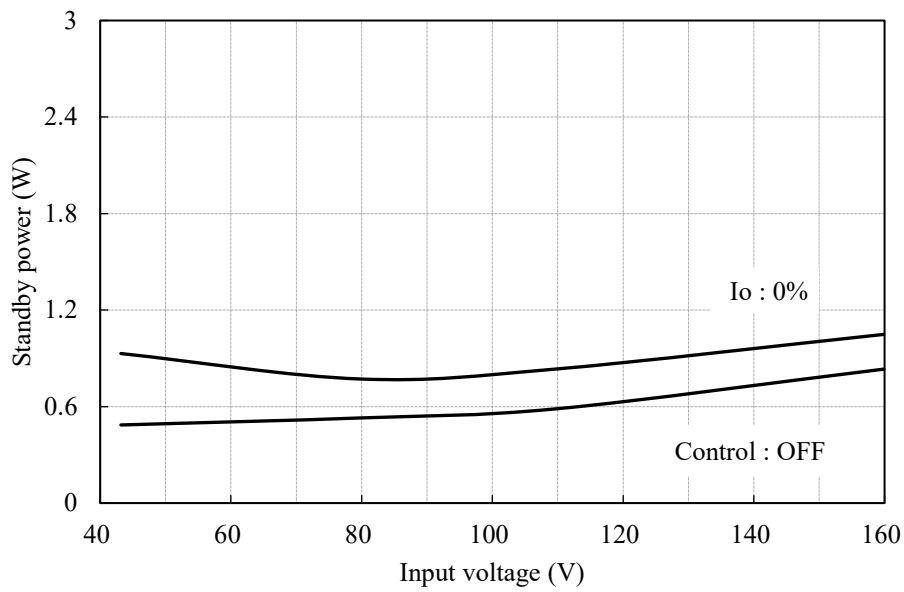
Conditions

Tbp: 25°C

12V



13.8V



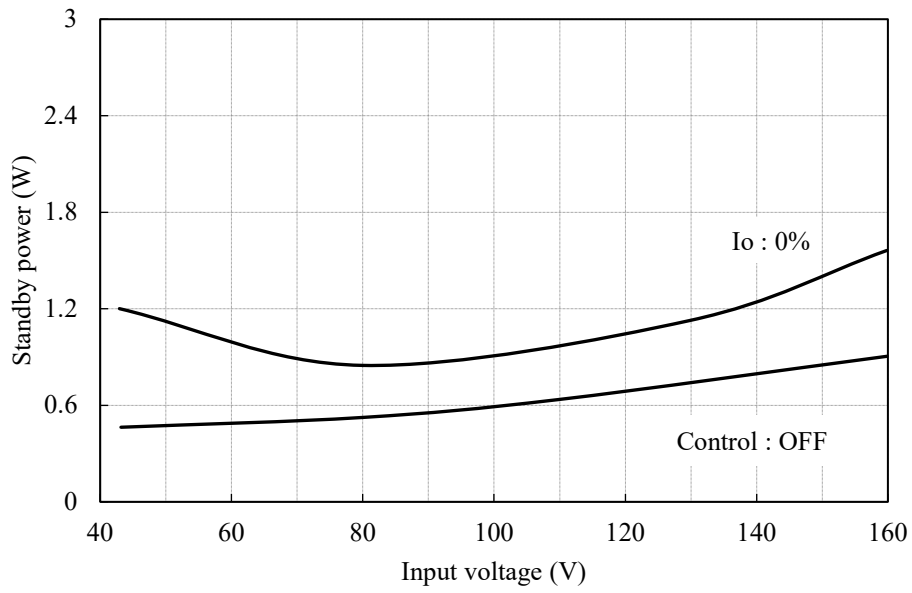
2.2 待機電力特性

Standby power characteristics

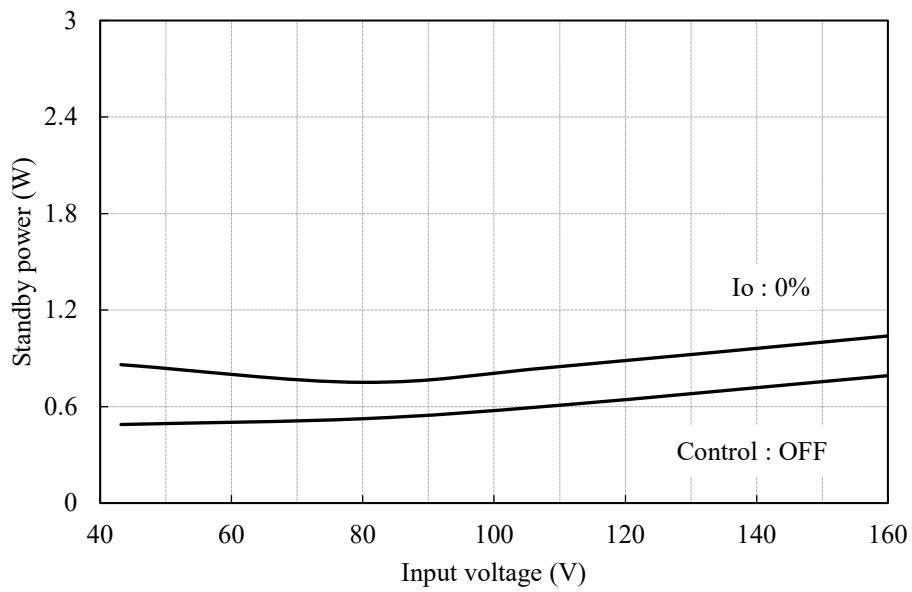
Conditions

Tbp: 25°C

15V



24V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

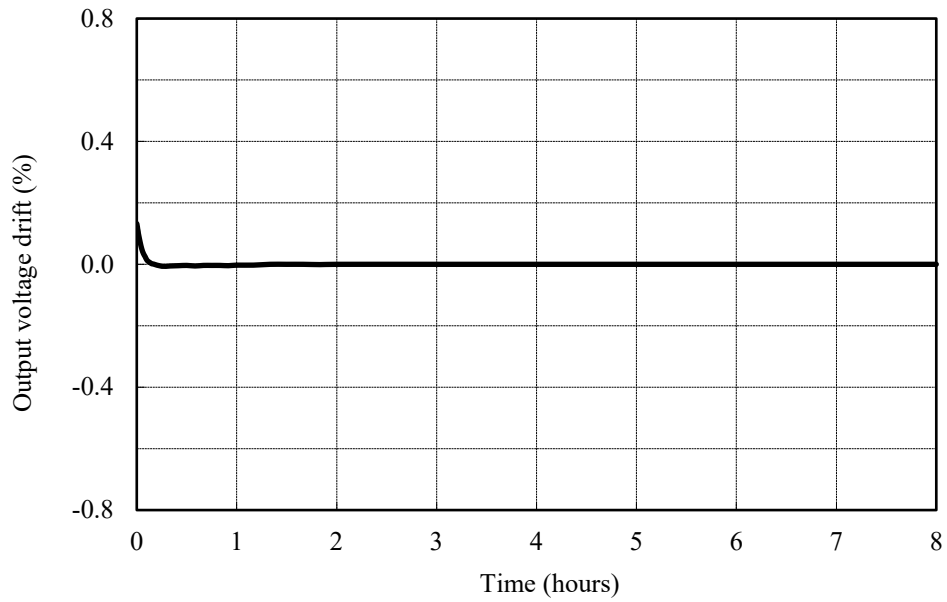
Conditions

Vin : 110VDC

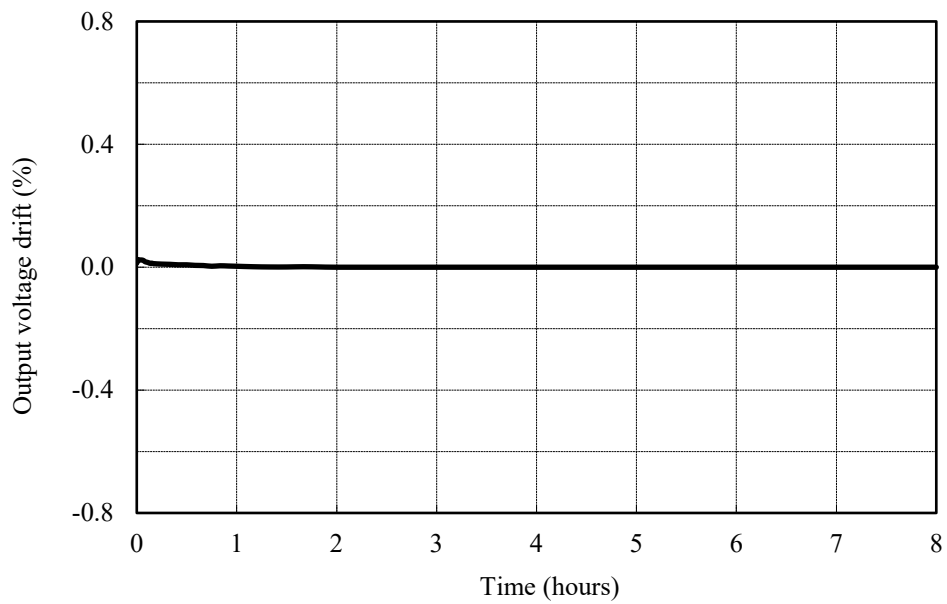
Io : 100%

Ta : 25°C

12V



13.8V



2.3 通電ドリフト特性

Warm up voltage drift characteristics

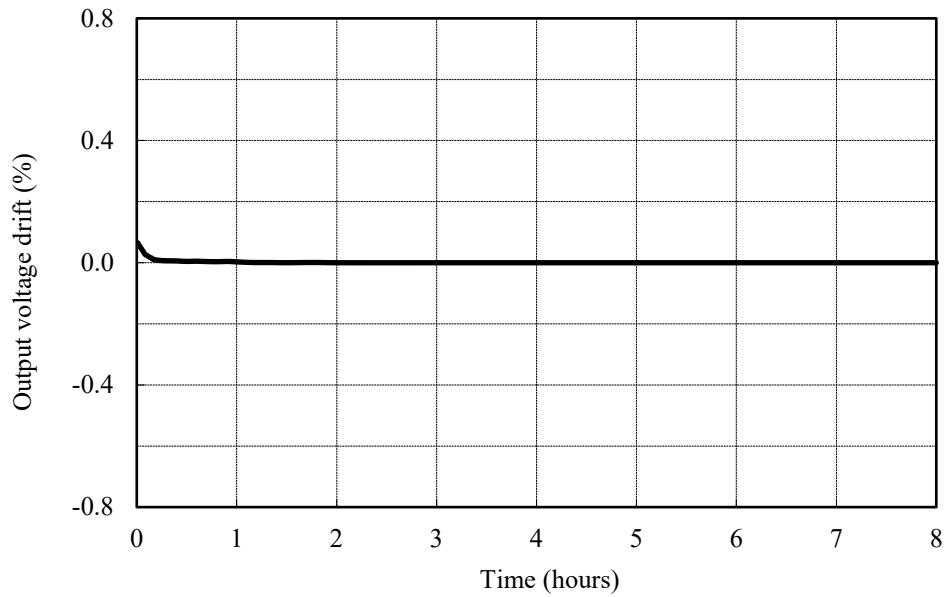
Conditions

Vin : 110VDC

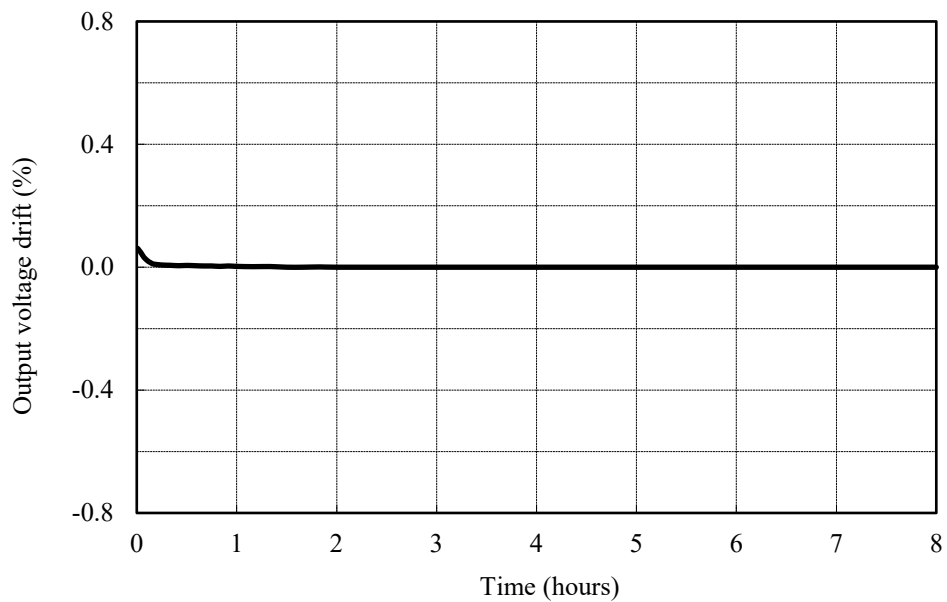
Io : 100%

Ta : 25°C

15V



24V



2.4 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

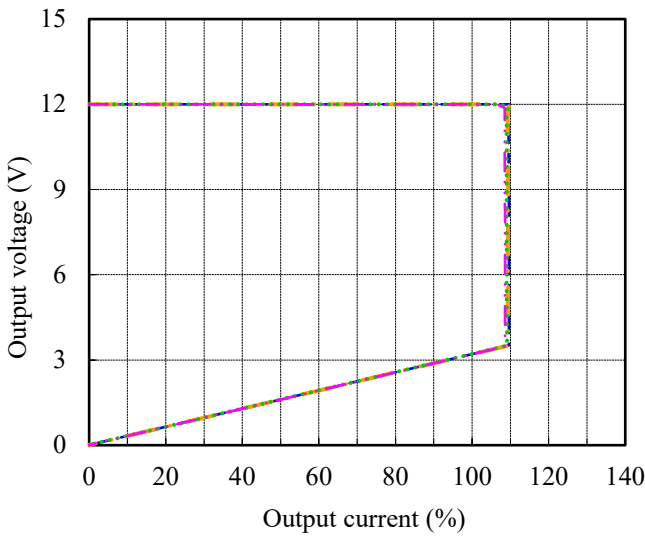
Conditions Vin : 43 VDC ---  
 : 72 VDC -.-  
 : 110 VDC ...  
 : 160 VDC -.-  
 Tbp : 25 °C

ベースプレート温度依存性

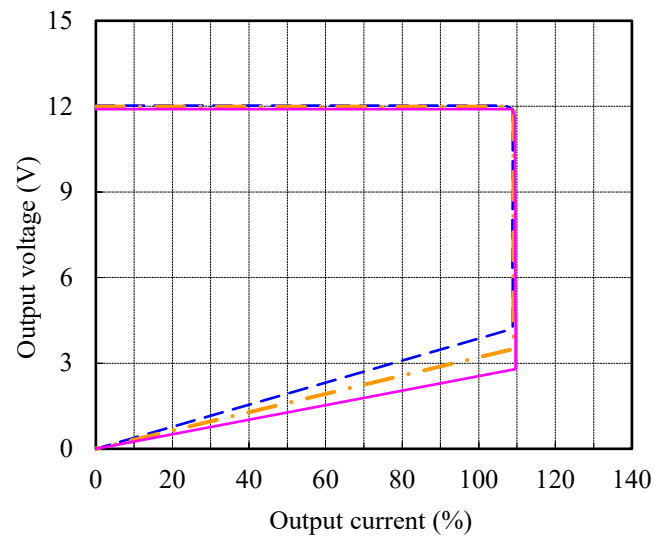
Base-plate temperature dependence

Conditions Vin : 110 VDC  
 Tbp : -40 °C ---  
 : 25 °C -.-  
 : 100 °C ---

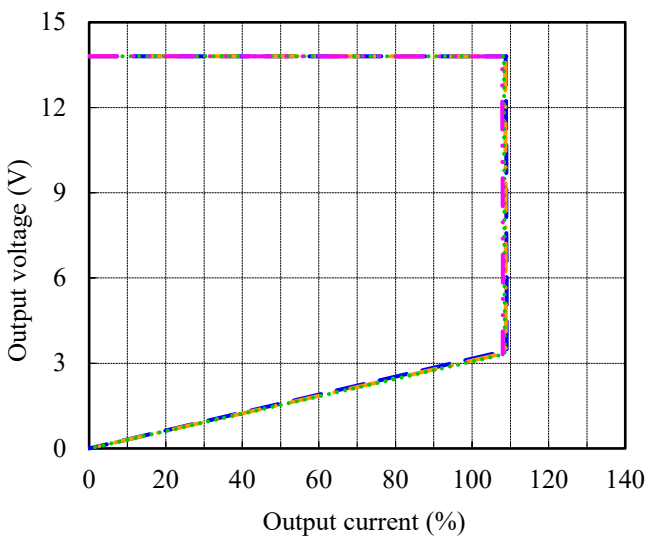
12V



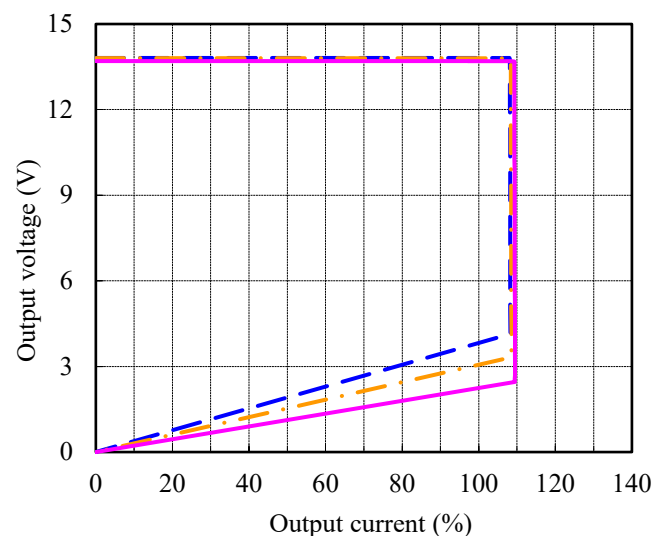
12V



13.8V



13.8V



2.4 過電流保護特性

Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

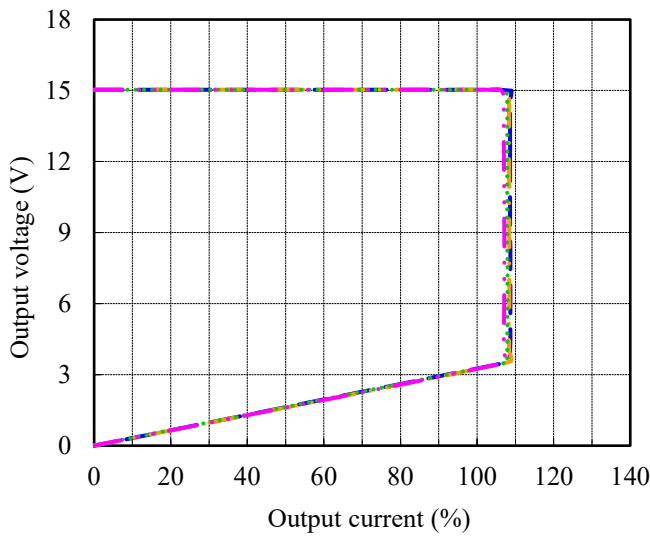
Conditions Vin : 43 VDC ---  
 : 72 VDC -.-  
 : 110 VDC ...  
 : 160 VDC -.-  
 Tbp : 25 °C

ベースプレート温度依存性

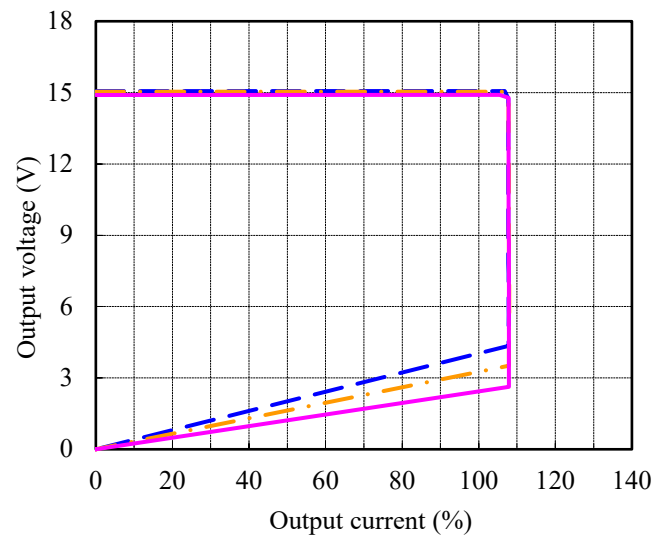
Base-plate temperature dependence

Conditions Vin : 110 VDC  
 Tbp : -40 °C ---  
 : 25 °C -.-  
 : 100 °C ---

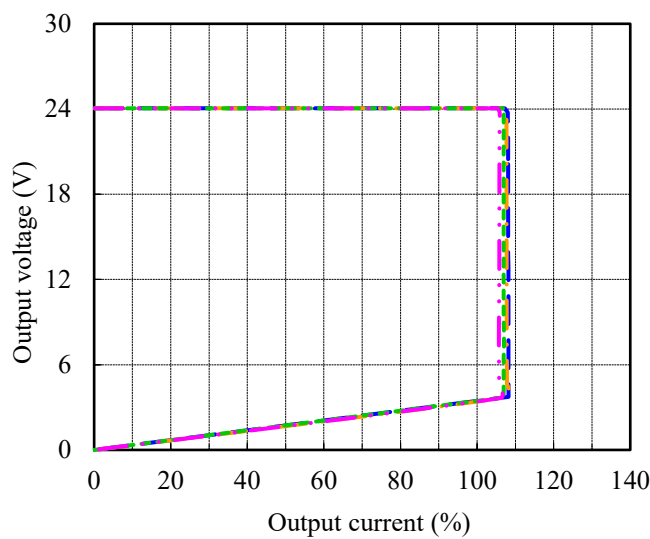
15V



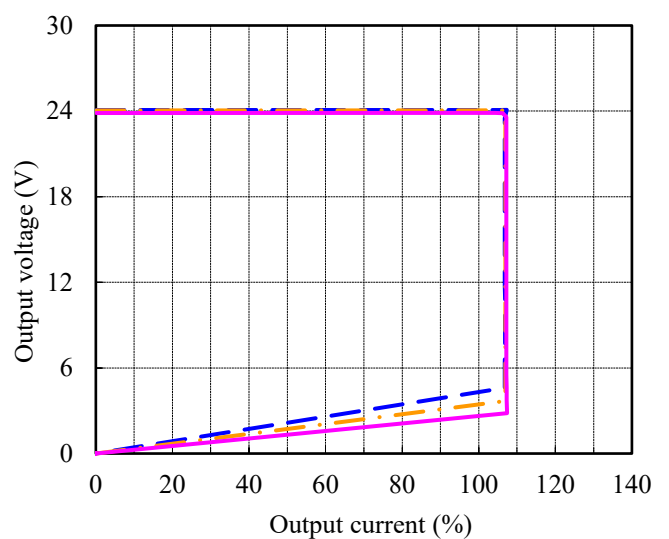
15V



24V



24V

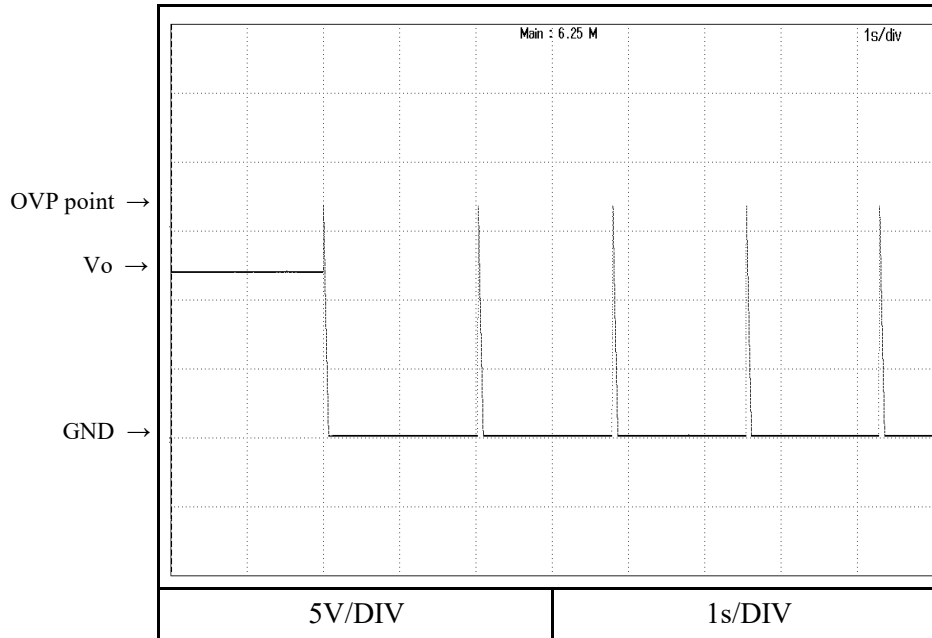


2.5 過電圧保護特性

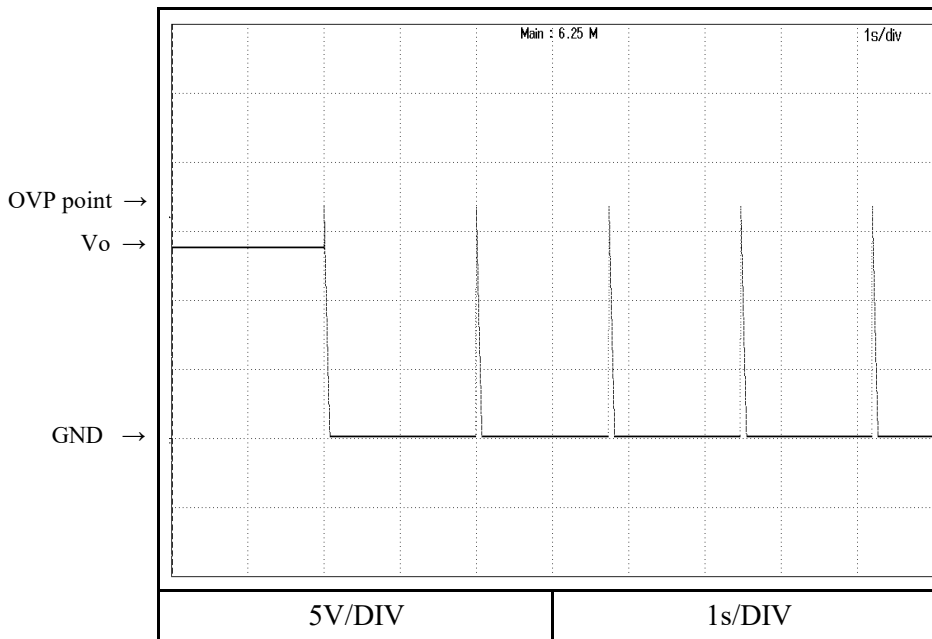
Over voltage protection (OVP) characteristics

Conditions Vin : 110VDC  
 Io : 1%  
 Tbp : 25°C

12V



13.8V



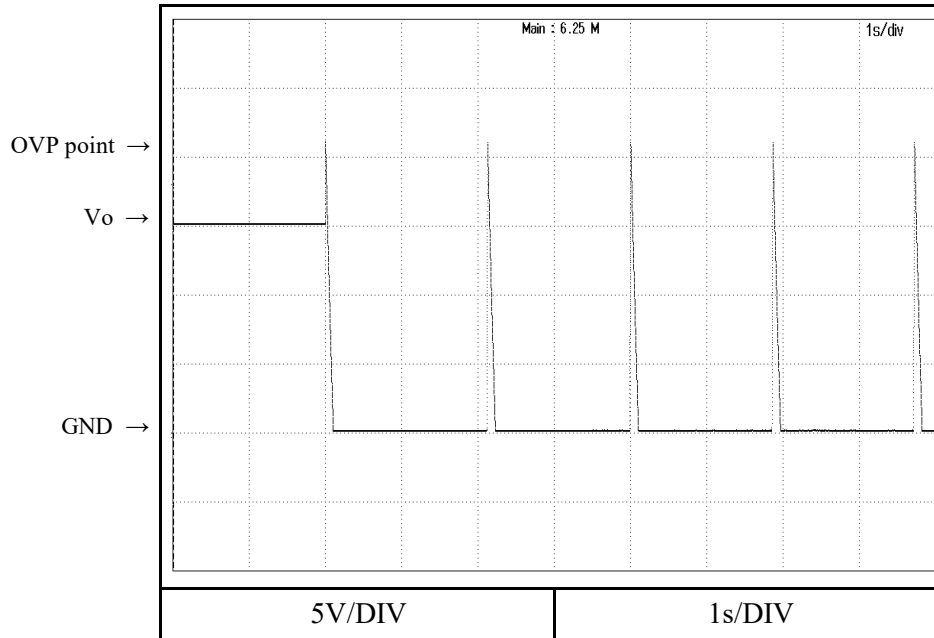


2.5 過電圧保護特性

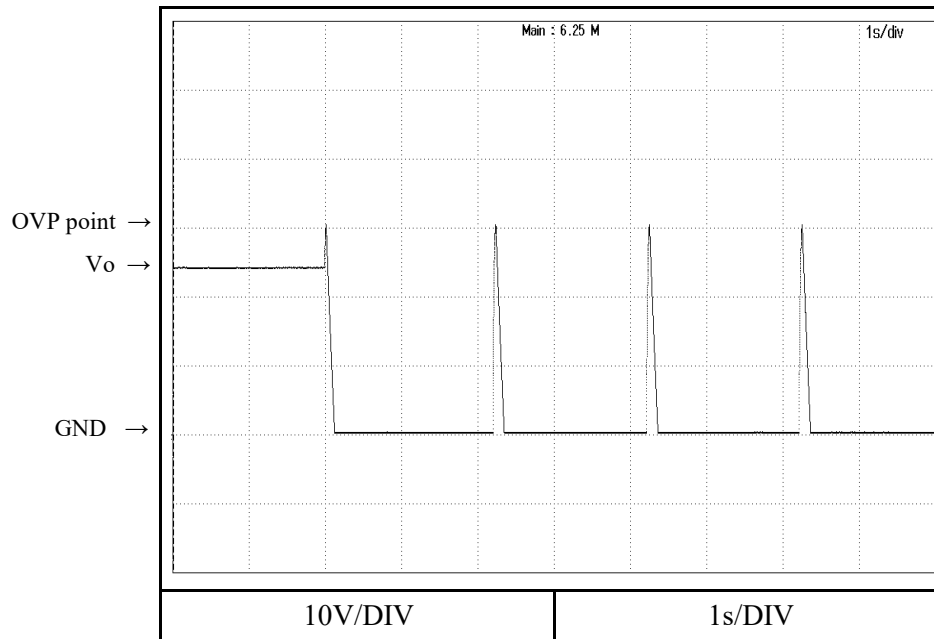
Over voltage protection (OVP) characteristics

Conditions Vin : 110VDC  
 Io : 1%  
 Tbp : 25°C

15V



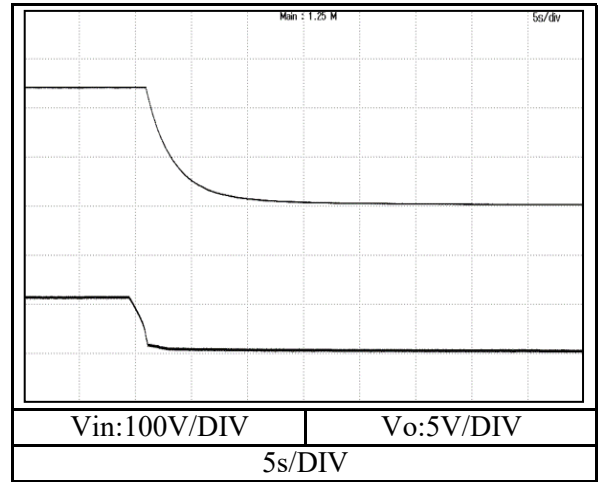
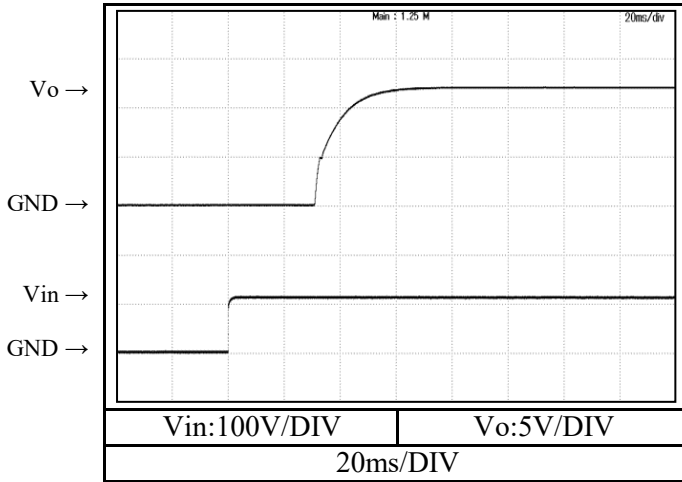
24V



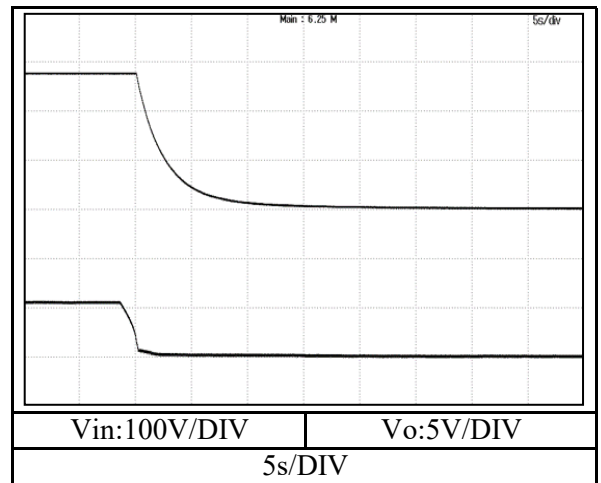
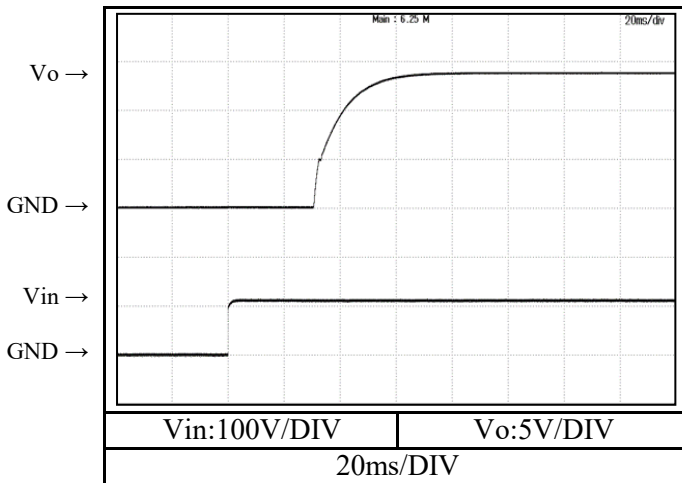
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

Conditions       $V_{in} : 110VDC$   
 $I_o : 0\%$   
 $T_{bp} : 25^{\circ}C$

12V



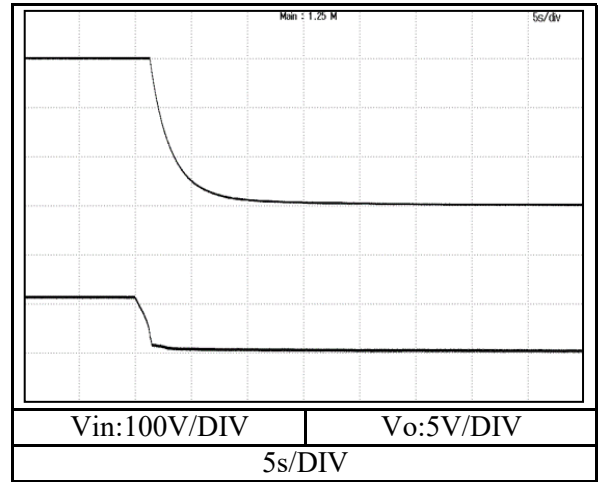
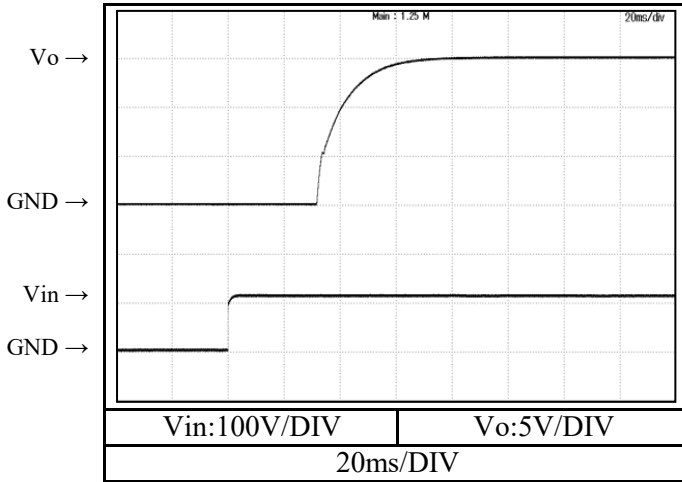
13.8V



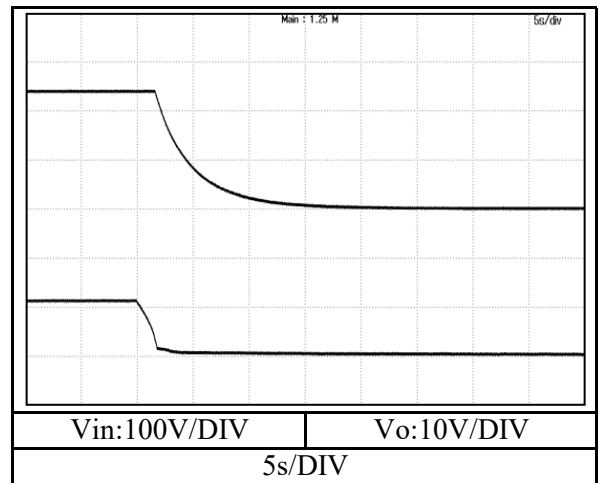
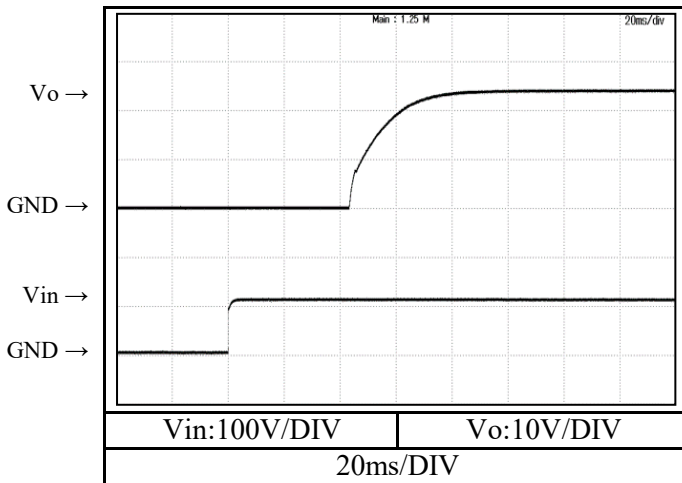
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

Conditions       $V_{in} : 110VDC$   
 $I_o : 0\%$   
 $T_{bp} : 25^{\circ}C$

15V



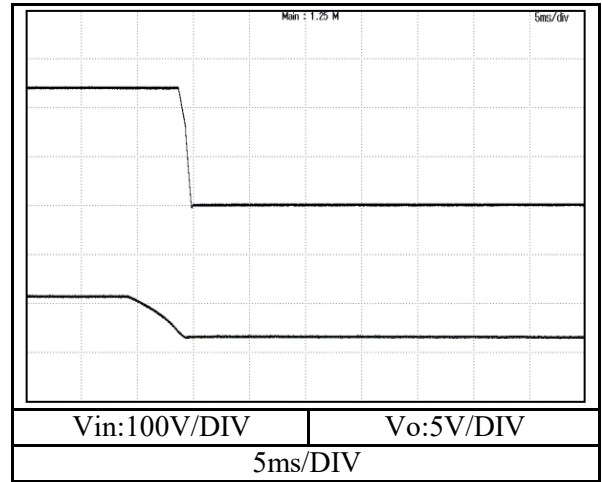
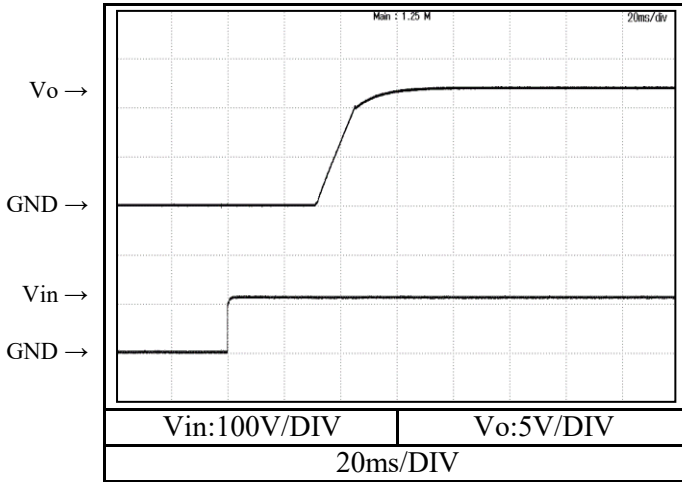
24V



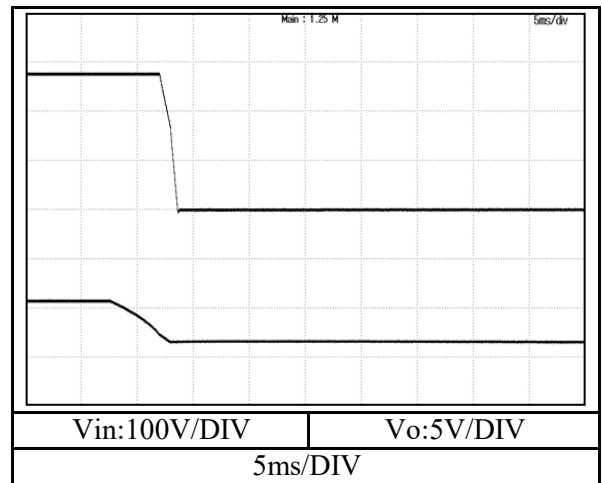
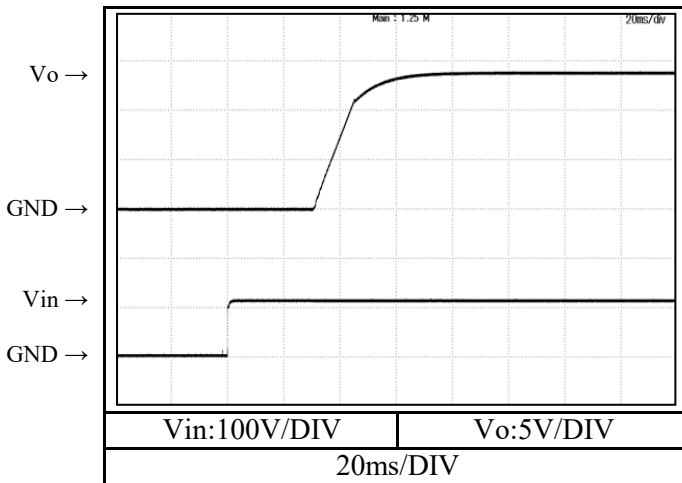
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

Conditions       $V_{in} : 110VDC$   
                           $I_o : 100\%$   
                           $T_{bp} : 25^{\circ}C$

12V



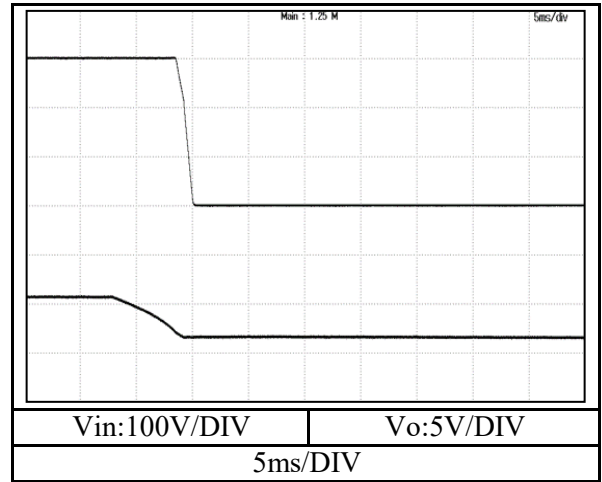
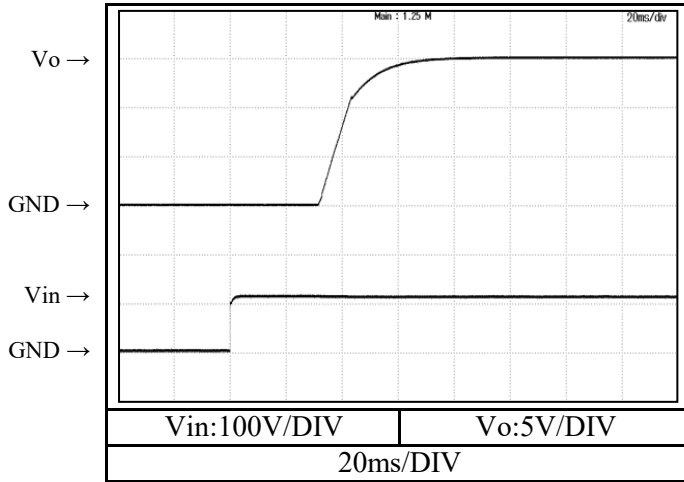
13.8V



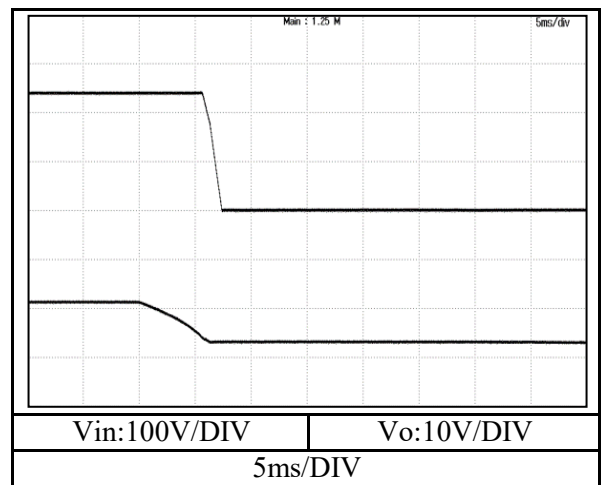
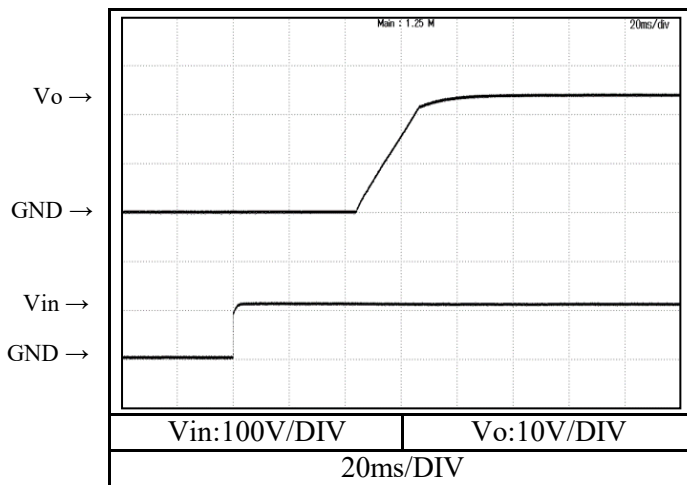
2.6 出力立ち上がり、立ち下がり特性  
Output rise and fall characteristics

Conditions Vin : 110VDC  
Io : 100%  
Tbp : 25°C

15V



24V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

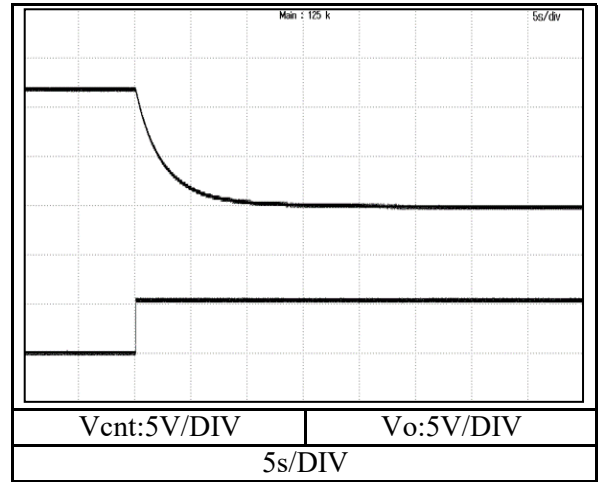
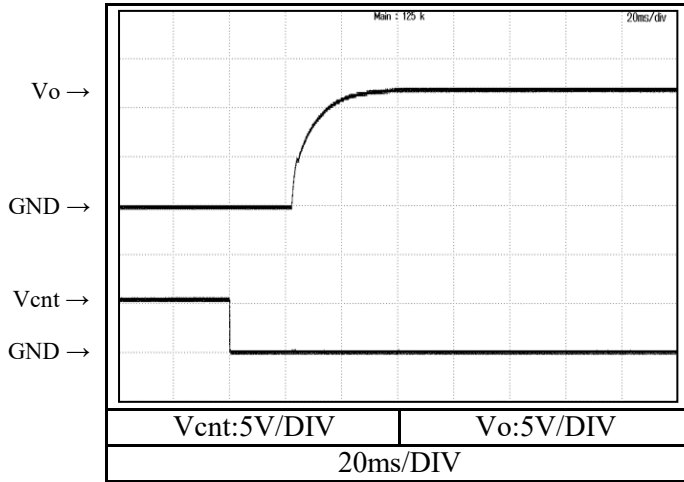
Conditions

$V_{in}$  : 110VDC

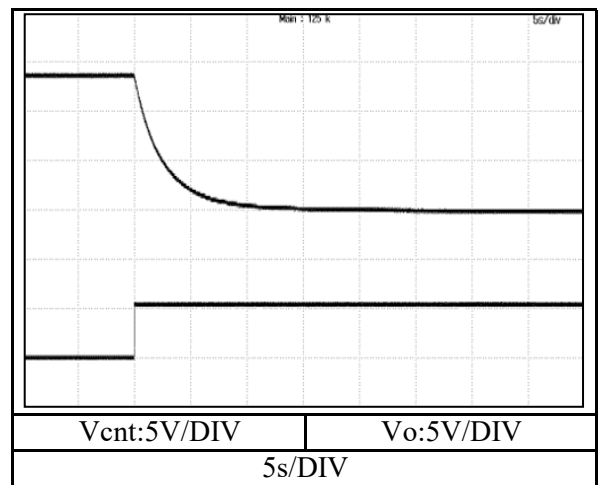
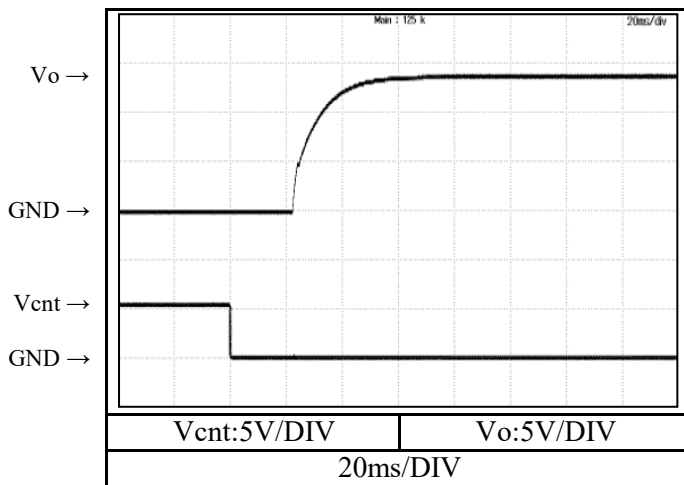
$I_o$  : 0%

$T_{bp}$  : 25°C

12V



13.8V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

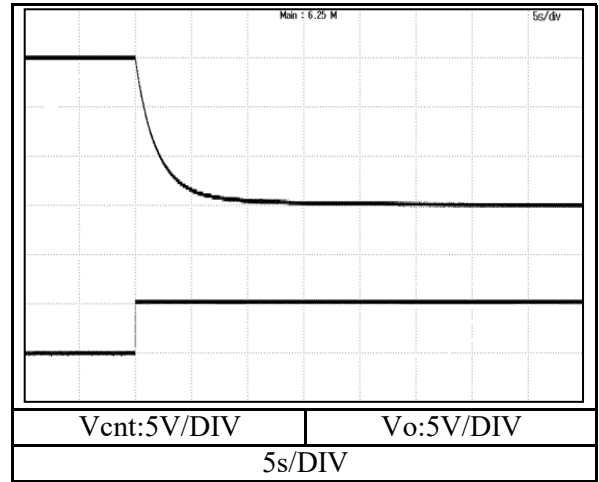
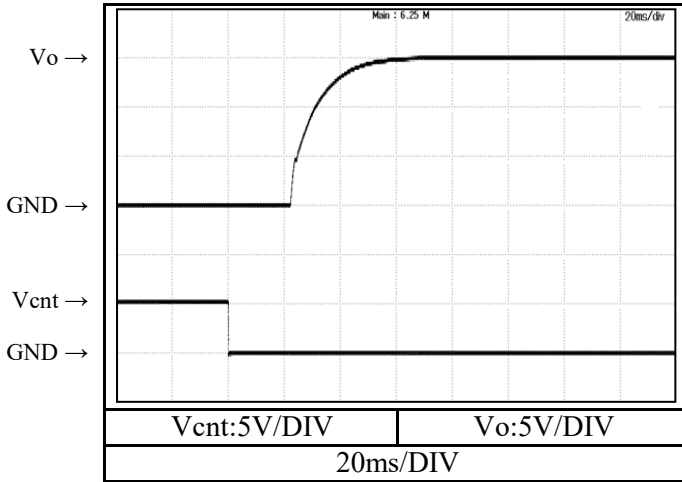
Conditions

$V_{in}$  : 110VDC

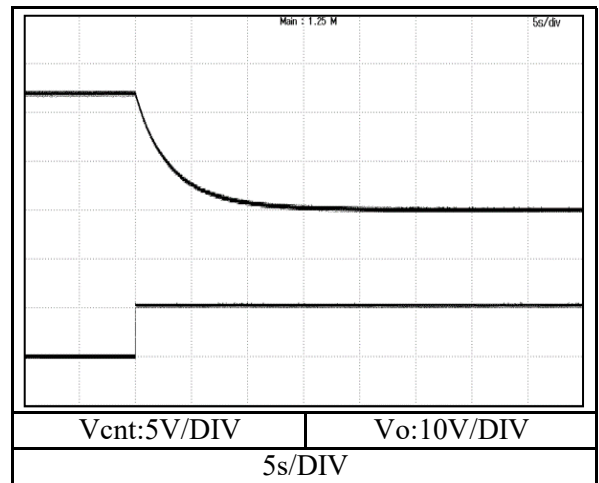
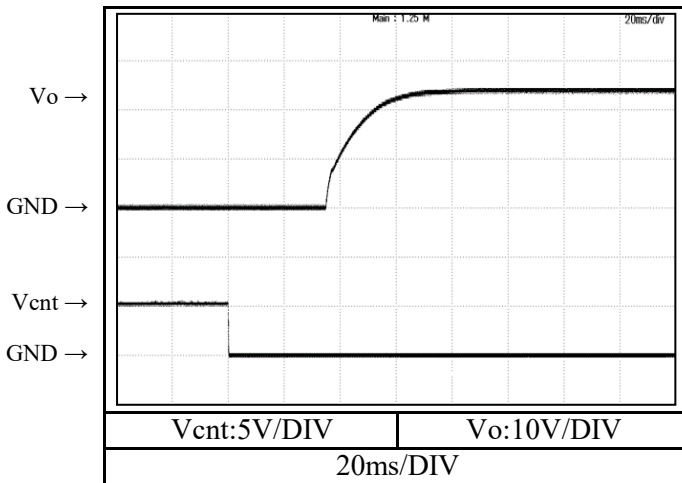
$I_o$  : 0%

$T_{bp}$  : 25°C

15V



24V



2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

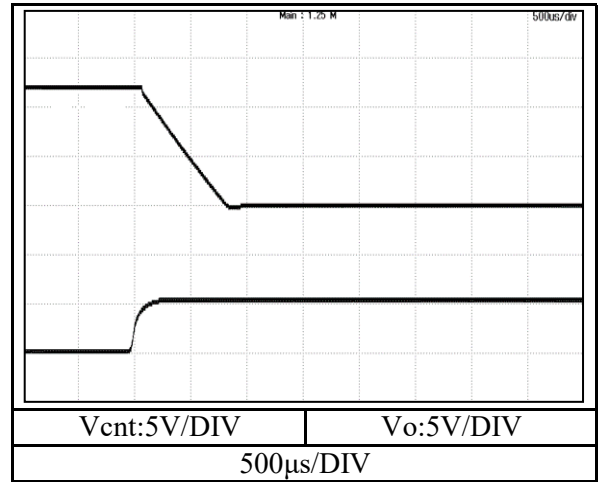
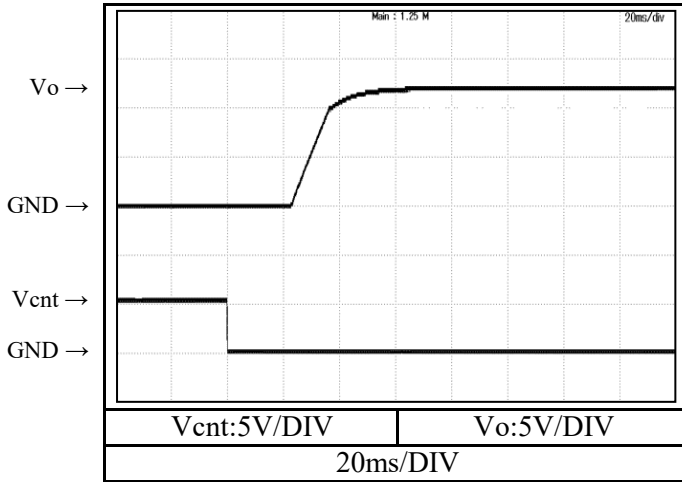
Conditions

$V_{in}$  : 110VDC

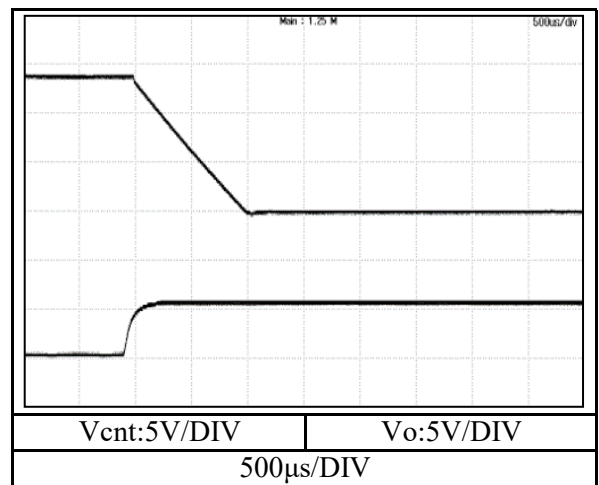
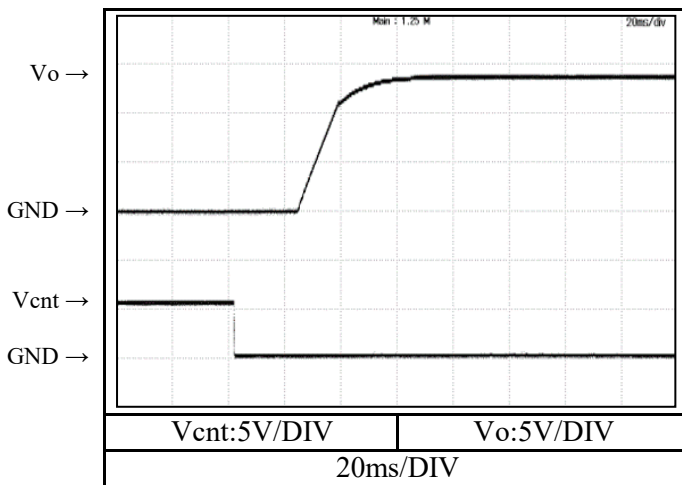
$I_o$  : 100%

$T_{bp}$  : 25°C

12V



13.8V





2.6 出力立ち上がり、立ち下がり特性 (ON/OFFコントロール時)

Output rise and fall characteristics with ON/OFF CONTROL

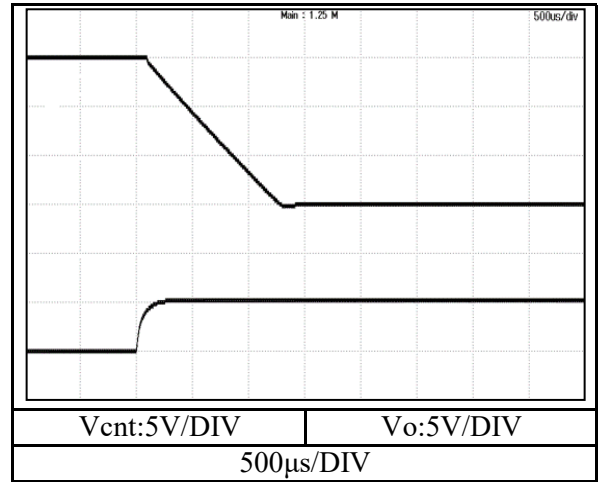
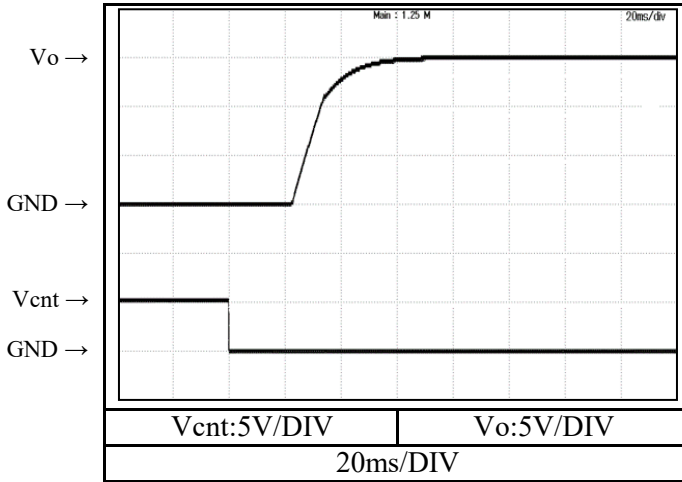
Conditions

$V_{in}$  : 110VDC

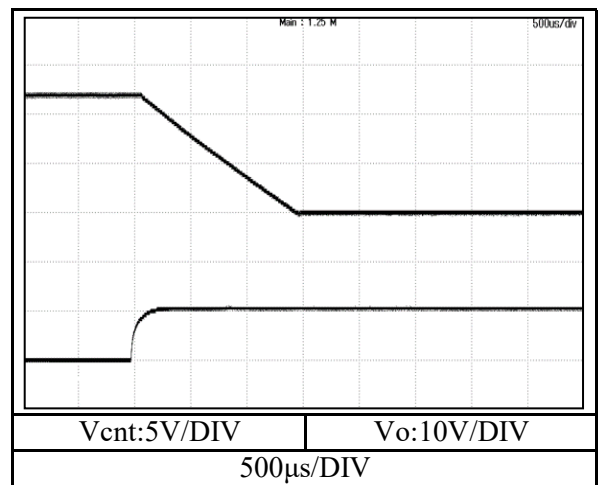
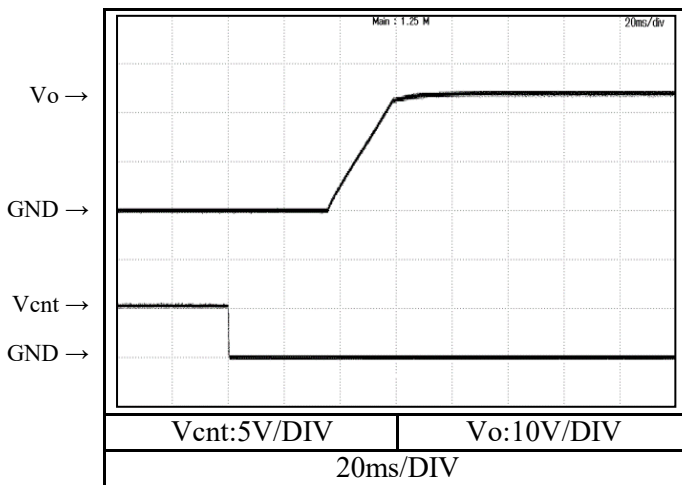
$I_o$  : 100%

$T_{bp}$  : 25°C

15V



24V



2.7 過渡応答(負荷急変)特性

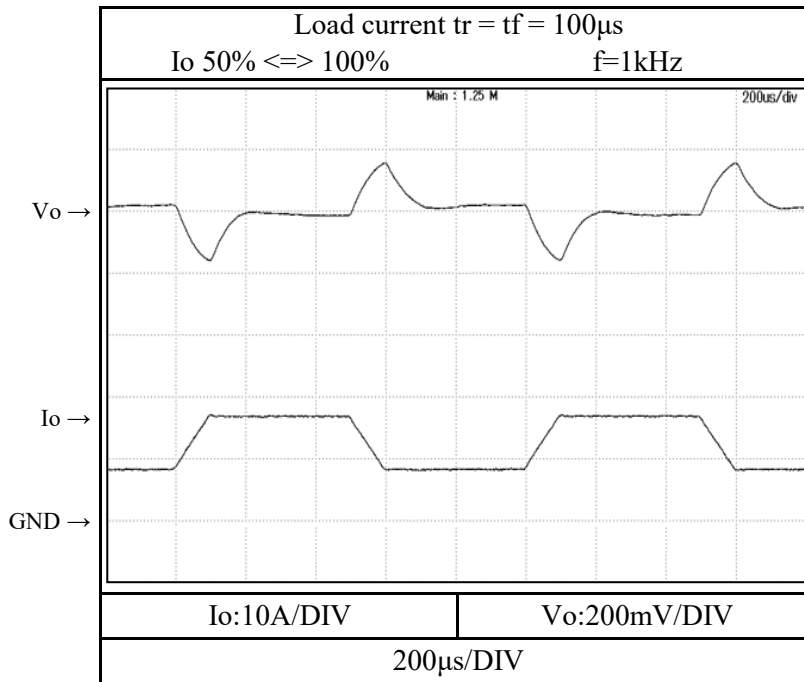
Dynamic load response characteristics

Conditions

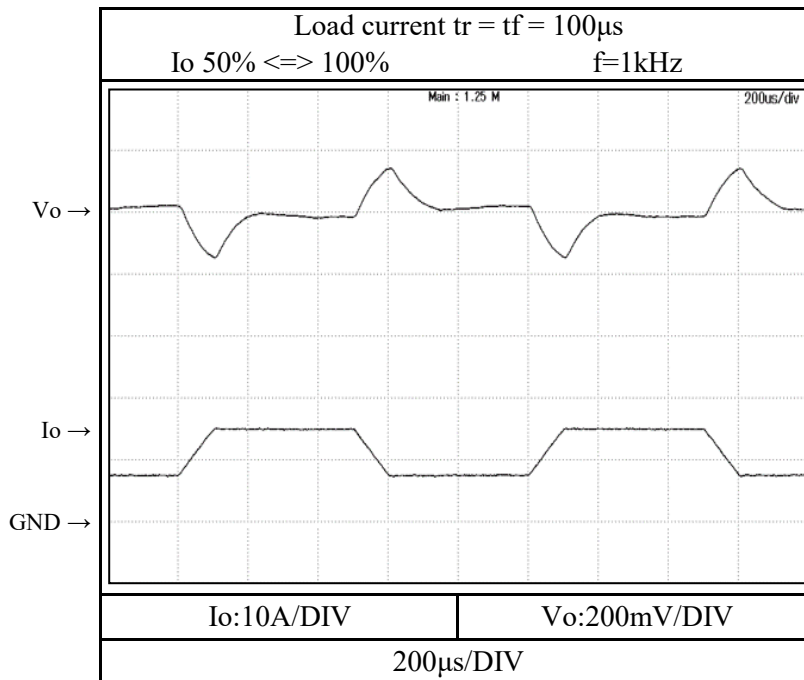
$V_{in} : 110VDC$

$T_{bp} : 25^{\circ}C$

12V



13.8V



2.7 過渡応答(負荷急変)特性

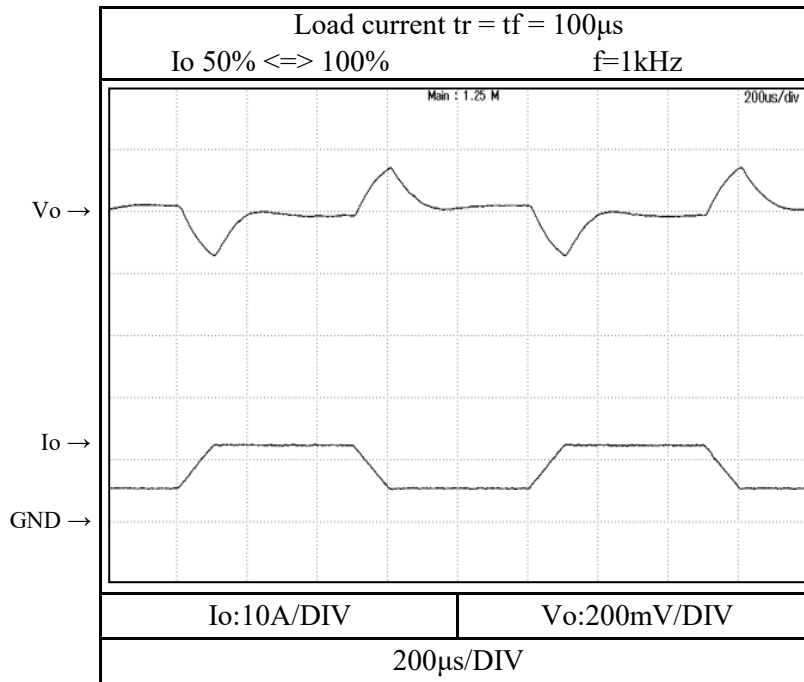
Dynamic load response characteristics

Conditions

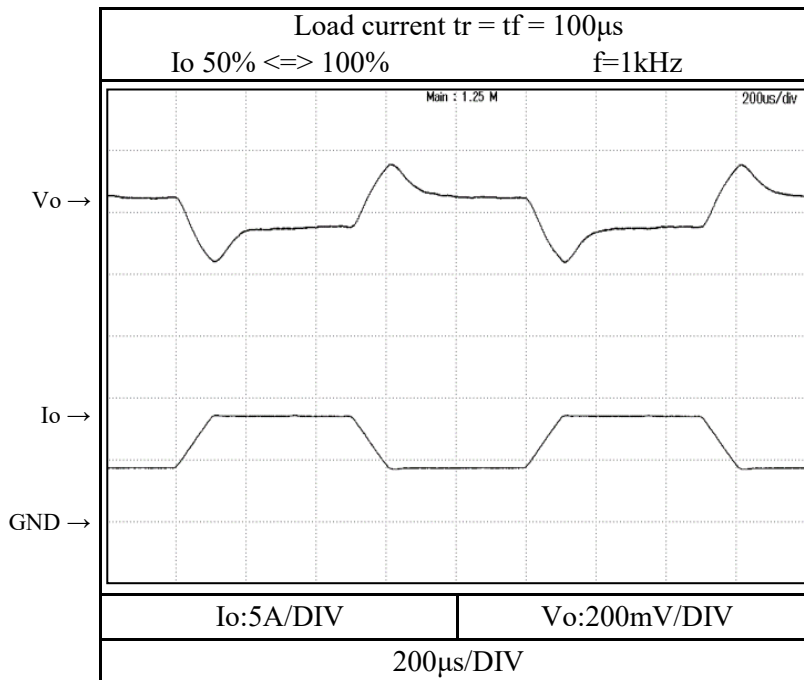
V<sub>in</sub> : 110VDC

T<sub>bp</sub> : 25°C

15V



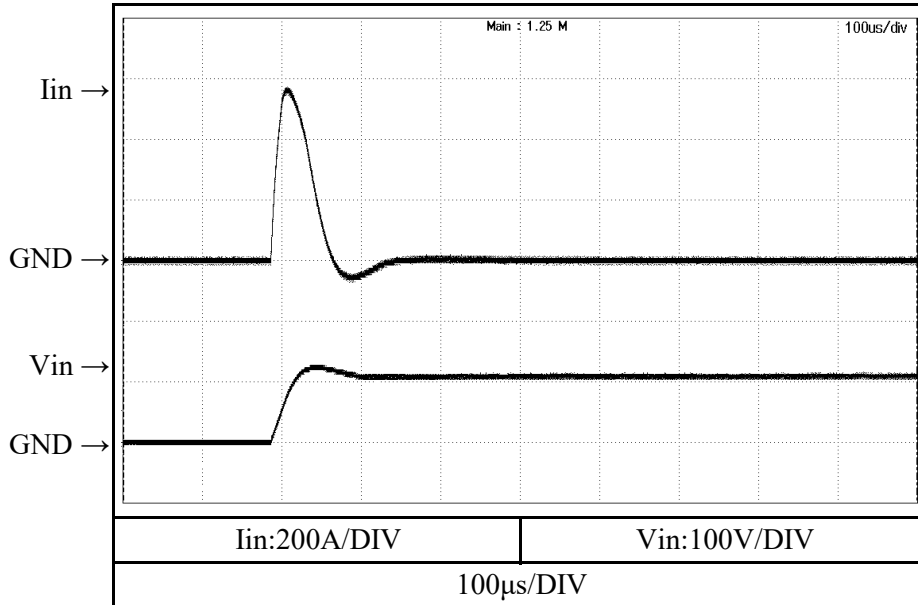
24V



2.8 入力サージ電流(突入電流)特性  
Inrush current characteristics

Conditions Vin : 110VDC  
Io : 100%  
Tbp : 25°C

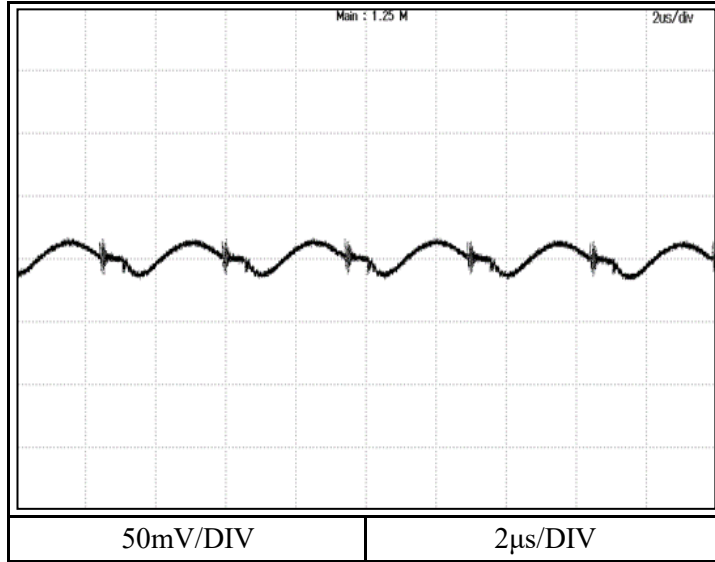
24V



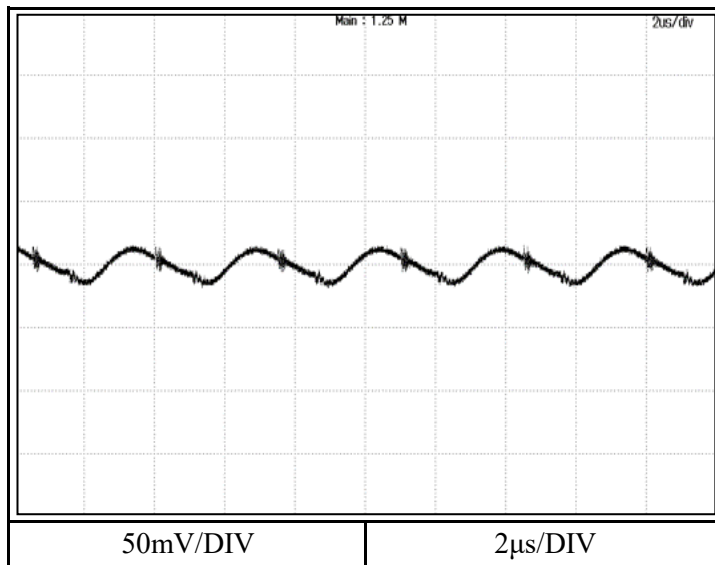
2.9 出力リップル・ノイズ波形  
Output ripple and noise waveform

Conditions     $V_{in}$  : 110VDC  
                   $I_o$  : 100%  
                   $T_{bp}$  : 25°C

12V



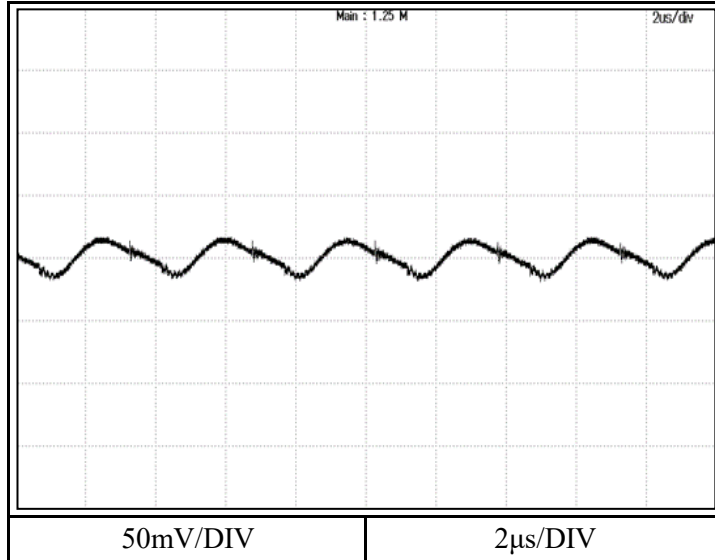
13.8V



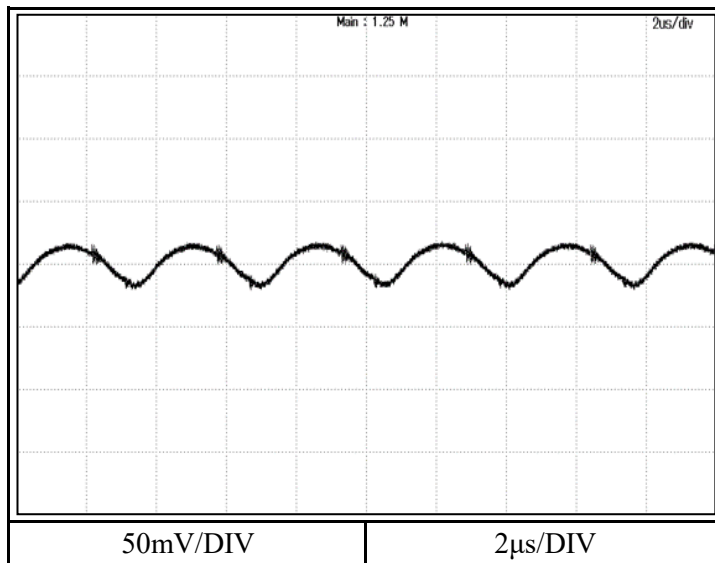
2.9 出力リップル・ノイズ波形  
Output ripple and noise waveform

Conditions Vin : 110VDC  
Io : 100%  
Tbp : 25°C

15V



24V



2.10 EMI特性

Electro-Magnetic Interference characteristics

(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise

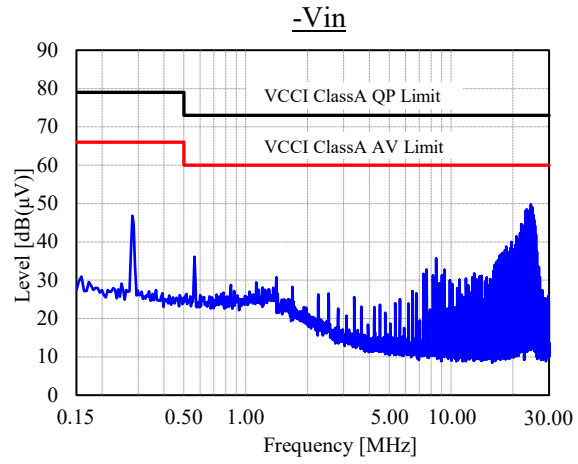
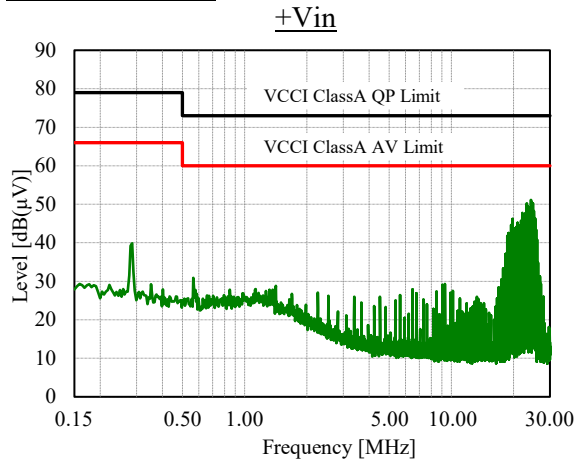
Conditions

Vin : 110VDC

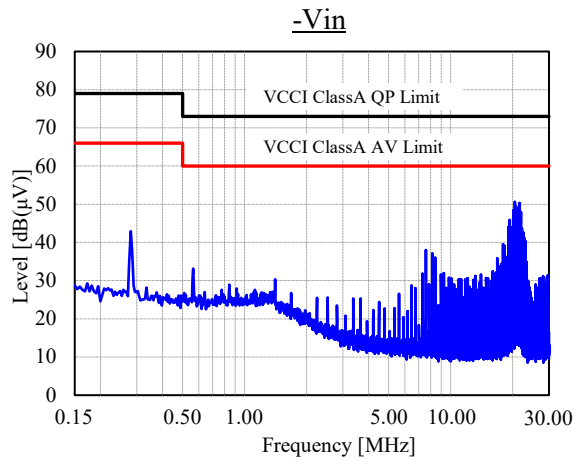
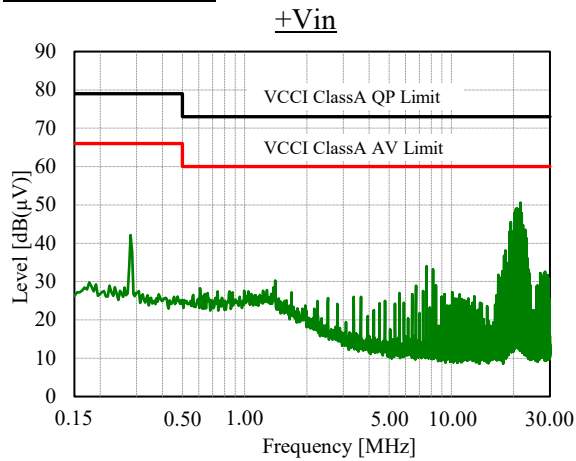
Io : 100%

Tbp : 25°C

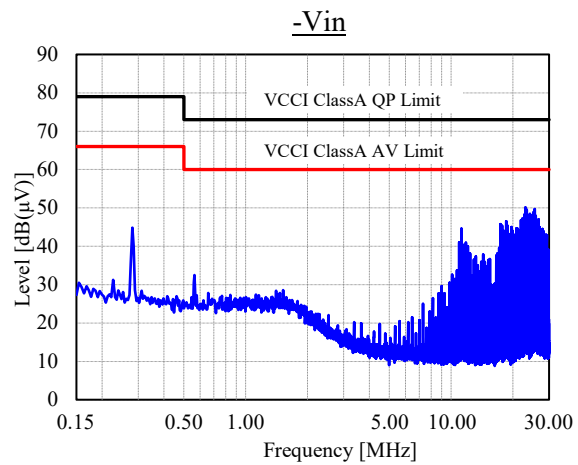
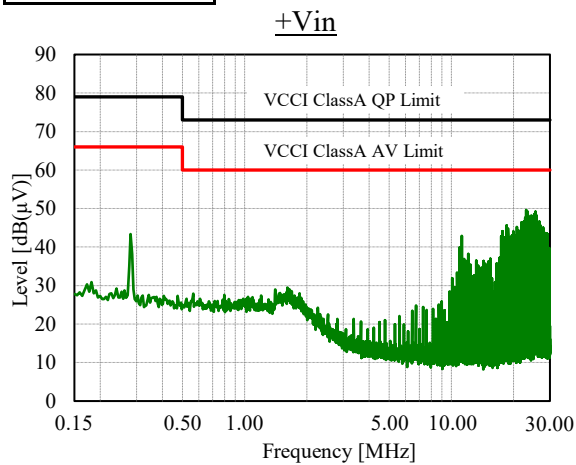
12V



15V



24V



2.10 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Radiated Emission Noise

Conditions

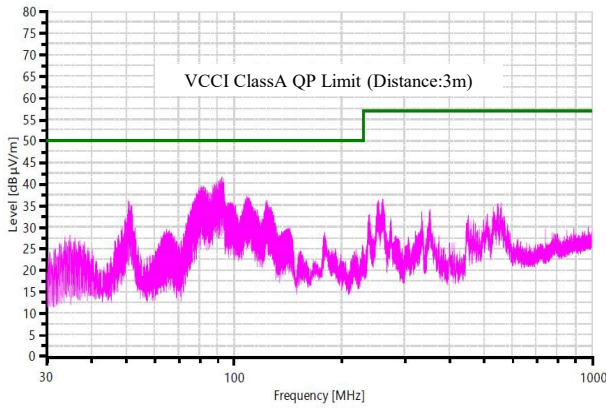
Vin : 110VDC

Io : 100%

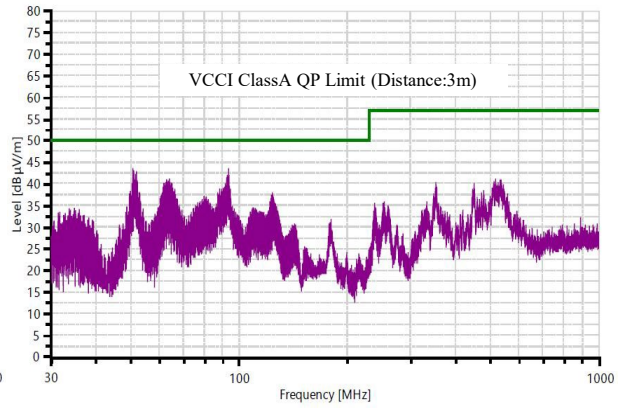
Tbp : 25°C

12V

HORIZONTAL

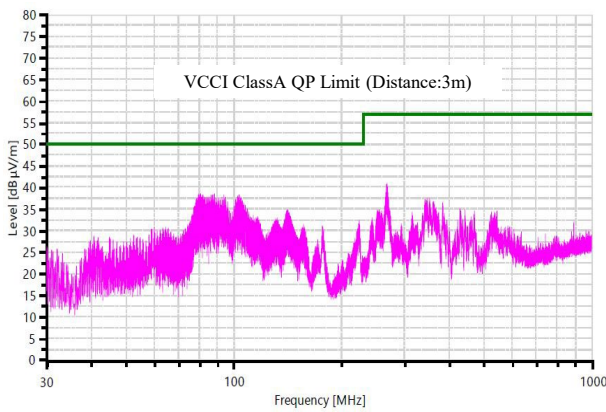


VERTICAL

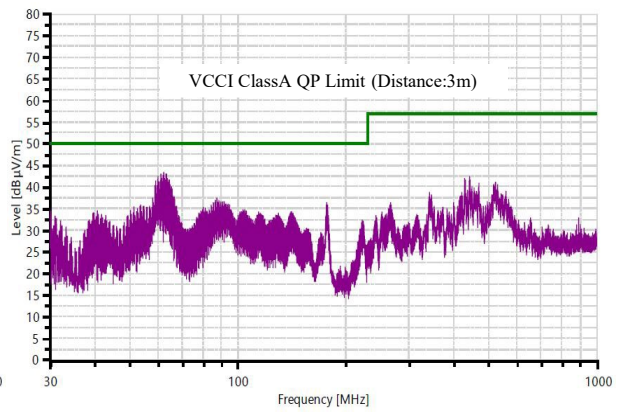


15V

HORIZONTAL

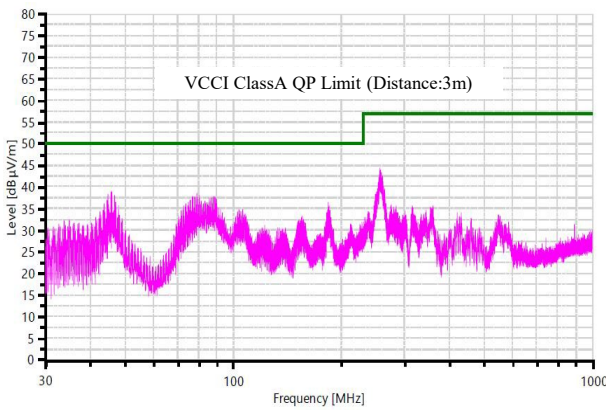


VERTICAL



24V

HORIZONTAL



VERTICAL

