

**CCG10-12-xxS**

**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
$V_{RC}$	..... RC電圧	RC voltage
$I_{in}$	..... 入力電流	Input current
$I_o$	..... 出力電流	Output current
$T_a$	..... 周囲温度	Ambient temperature
$f$	..... 周波数	Frequency

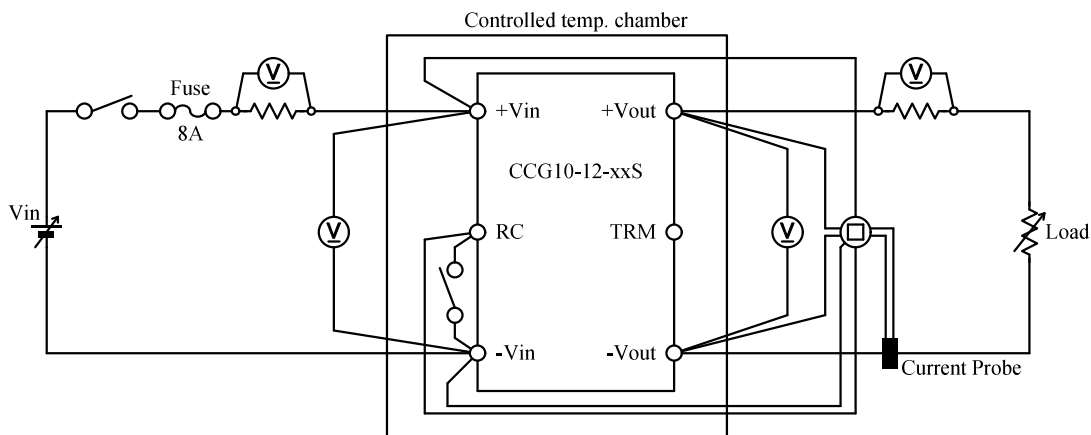
※ 当社測定条件における結果であり、参考値としてお考え願います。  
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

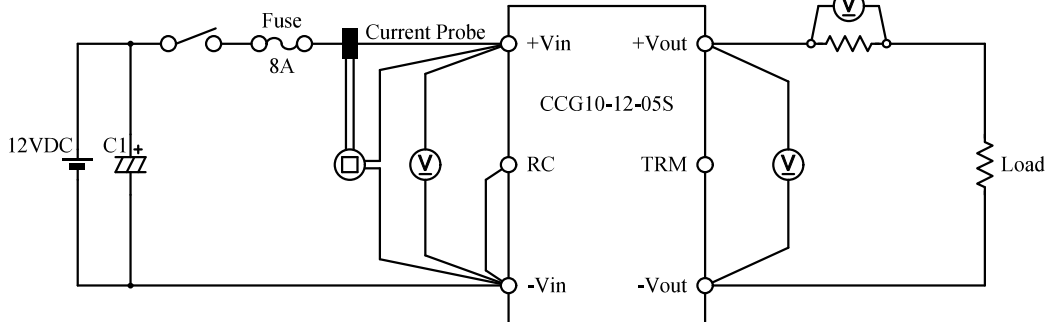
1-1. 測定回路 Measurement Circuits

(1) 静特性、待機電力特性、通電ドリフト特性、その他特性

Steady state, Standby power, Warm up voltage drift and Other characteristics



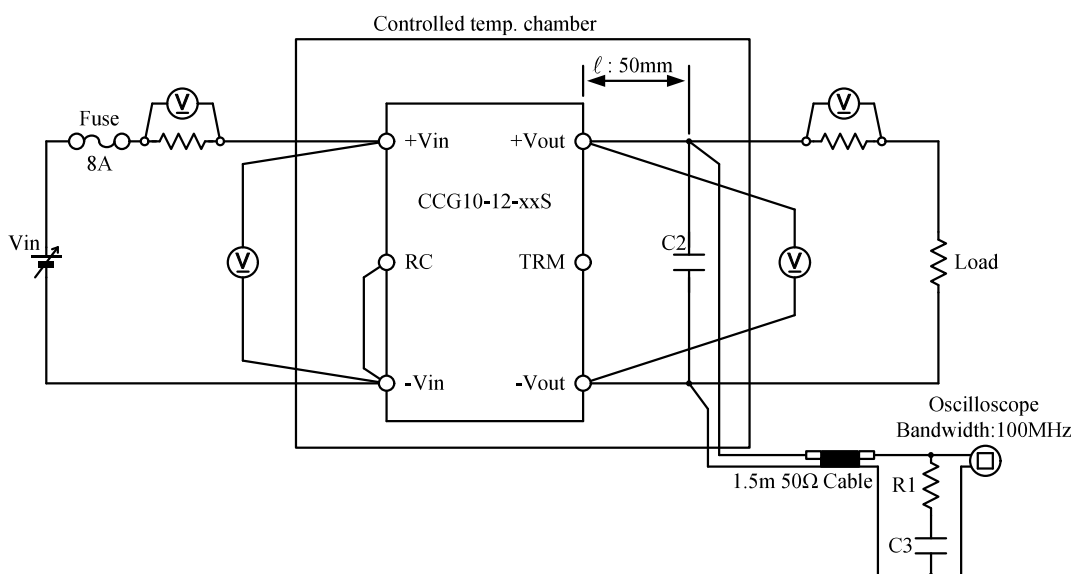
(2) 入力サージ電流（突入電流）波形 Inrush current waveform



CCG10-12-xxSの入力サージ電流特性はCCG10-12-05Sと同等です。

CCG10-12-xxS have the same Inrush current characteristics as CCG10-12-05S data.

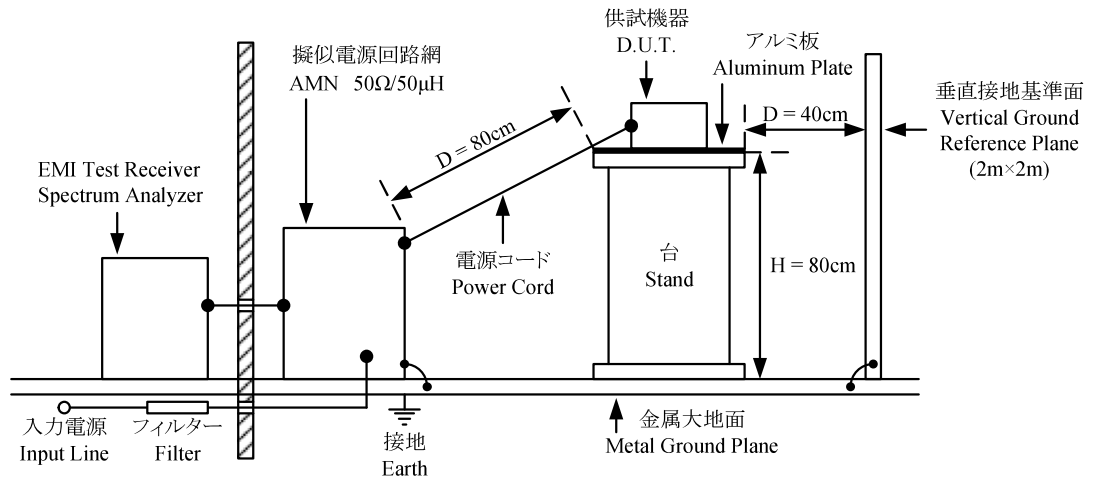
(3) 出力リップルノイズ電圧、波形 Output ripple and noise voltage and waveform



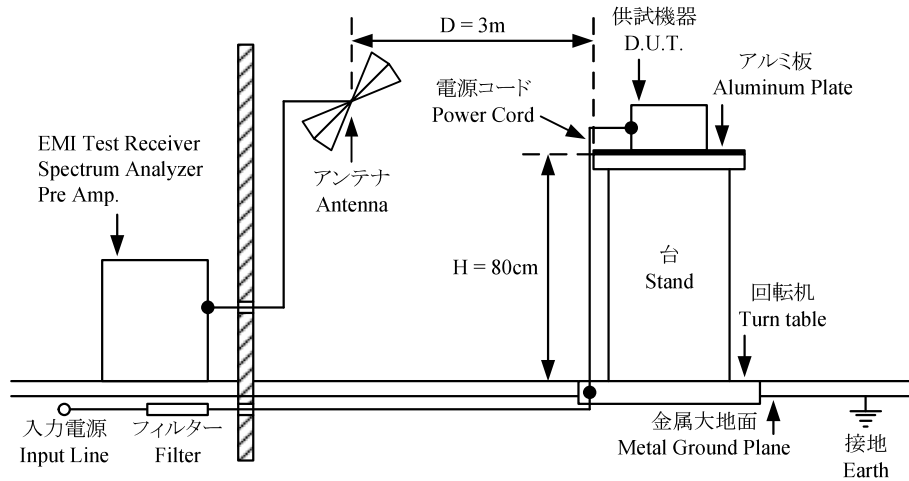
- C1 : 4000uF                      Electrolytic Capacitor
- C2 : 1uF                              Ceramic Capacitor
- C3 : 4700pF                      Ceramic Capacitor
- R1 : 50Ω

(4) EMI特性 Electro-Magnetic Interference characteristics

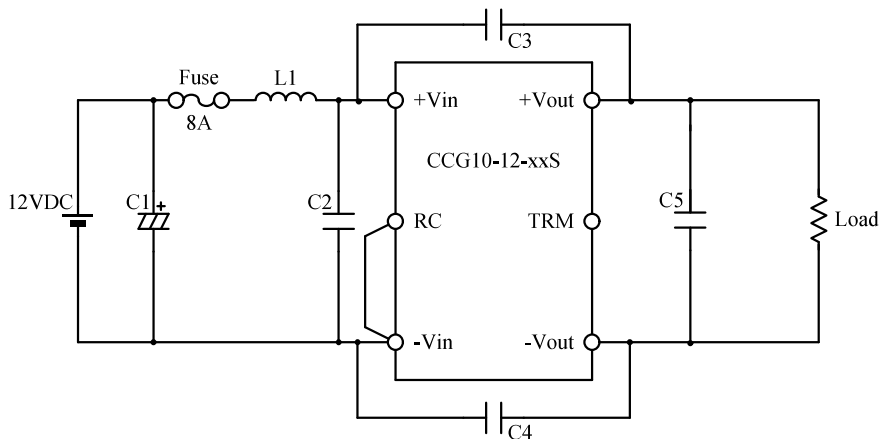
(a) 雑音端子電圧(帰還ノイズ) Conducted Emission Noise



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



VCCI class A 対応アプリケーション VCCI class A application system



- |    |             |                        |                                       |
|----|-------------|------------------------|---------------------------------------|
| C1 | : 25V 470uF | Electrolytic Capacitor | (ELXZ250ELL471MJ16S,Nippon Chemi-con) |
| C2 | : 50V 10uF  | Ceramic Capacitor      | (C3216X7R1H106KT,TDK)                 |
| C3 | : 2kV 470pF | Ceramic Capacitor      | (C3216X7S3D471K130AA,TDK)             |
| C4 | : 2kV 470pF | Ceramic Capacitor      | (C3216X7S3D471K130AA,TDK)             |
| C5 | : 25V 10uF  | Ceramic Capacitor      | (C3216X7R1E106KT,TDK)                 |
| L1 | : 5A 1.5uH  | Normal Mode Choke Coil | (LQH5BPN1R5NT0L,MURATA)               |

## 1-2. 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740E / DL1740EL
2	DIGITAL MULTIMETER	AGILENT	34970A
3	CURRENT PROBE	YOKOGAWA ELECT.	701932
4	CURRENT PROBE	AGILENT	N2774A
5	SHUNT RESISTER	YOKOGAWA ELECT.	2215
6	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ-164WL
7	CVCF	NF	ES10000S
8	DC POWER SUPPLY	TDK-Lambda	GEN80-9.5 / GENH80-9.5
9	DC POWER SUPPLY	TAKASAGO	EX-750H2
10	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261 / SU-262
11	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESR3
12	PRE AMP.	SONOMA	310N
13	AMN	KIKUSUI	KNW-242C
14	ANTENNA	SCHWARZBECK	BBA9106/VHA9103
15	ANTENNA	SCHWARZBECK	UHALP9107

## 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

**3.3V**

#### 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	4.5VDC	5VDC	12VDC	18VDC	Line regulation	
0%	3.3026V	3.3031V	3.3027V	3.3026V	0.5mV	0.015%
50% (1.3A)	3.3023V	3.3024V	3.3024V	3.3024V	0.1mV	0.003%
100% (2.6A)	3.3024V	3.3024V	3.3022V	3.3021V	0.3mV	0.009%
Load regulation	0.3mV	0.7mV	0.5mV	0.5mV		
	0.009%	0.021%	0.015%	0.015%		

#### 2. Temperature drift

Conditions Vin : 12 VDC

Io : 100 %

Ta	-40°C	25°C	65°C	Temperature stability	
Vo	3.2996V	3.3022V	3.3072V	7.6mV	0.230%

**5V**

#### 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	4.5VDC	5VDC	12VDC	18VDC	Line regulation	
0%	4.9900V	4.9907V	4.9907V	4.9907V	0.7mV	0.014%
50% (1A)	4.9900V	4.9903V	4.9905V	4.9906V	0.6mV	0.012%
100% (2A)	4.9905V	4.9906V	4.9905V	4.9907V	0.2mV	0.004%
Load regulation	0.5mV	0.4mV	0.2mV	0.1mV		
	0.010%	0.008%	0.004%	0.002%		

#### 2. Temperature drift

Conditions Vin : 12 VDC

Io : 100 %

Ta	-40°C	25°C	65°C	Temperature stability	
Vo	4.9863V	4.9905V	4.9956V	9.3mV	0.186%

**12V**

#### 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	4.5VDC	5VDC	12VDC	18VDC	Line regulation	
0%	12.0284V	12.0297V	12.0266V	12.0266V	3.1mV	0.026%
50% (0.45A)	12.0271V	12.0278V	12.0261V	12.0255V	2.3mV	0.019%
100% (0.9A)	12.0282V	12.0283V	12.0278V	12.0272V	1.1mV	0.009%
Load regulation	1.3mV	1.9mV	1.7mV	1.7mV		
	0.011%	0.016%	0.014%	0.014%		

#### 2. Temperature drift

Conditions Vin : 12 VDC

Io : 100 %

Ta	-40°C	25°C	65°C	Temperature stability	
Vo	12.0356V	12.0278V	12.0246V	11.0mV	0.092%

**15V**

#### 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	4.5VDC	5VDC	12VDC	18VDC	Line regulation	
0%	15.0716V	15.0746V	15.0711V	15.0708V	3.8mV	0.025%
50% (0.35A)	15.0725V	15.0736V	15.0727V	15.0676V	6.0mV	0.040%
100% (0.7A)	15.0760V	15.0765V	15.0744V	15.0745V	2.1mV	0.014%
Load regulation	4.4mV	2.9mV	3.3mV	6.9mV		
	0.029%	0.019%	0.022%	0.046%		

#### 2. Temperature drift

Conditions Vin : 12 VDC

Io : 100 %

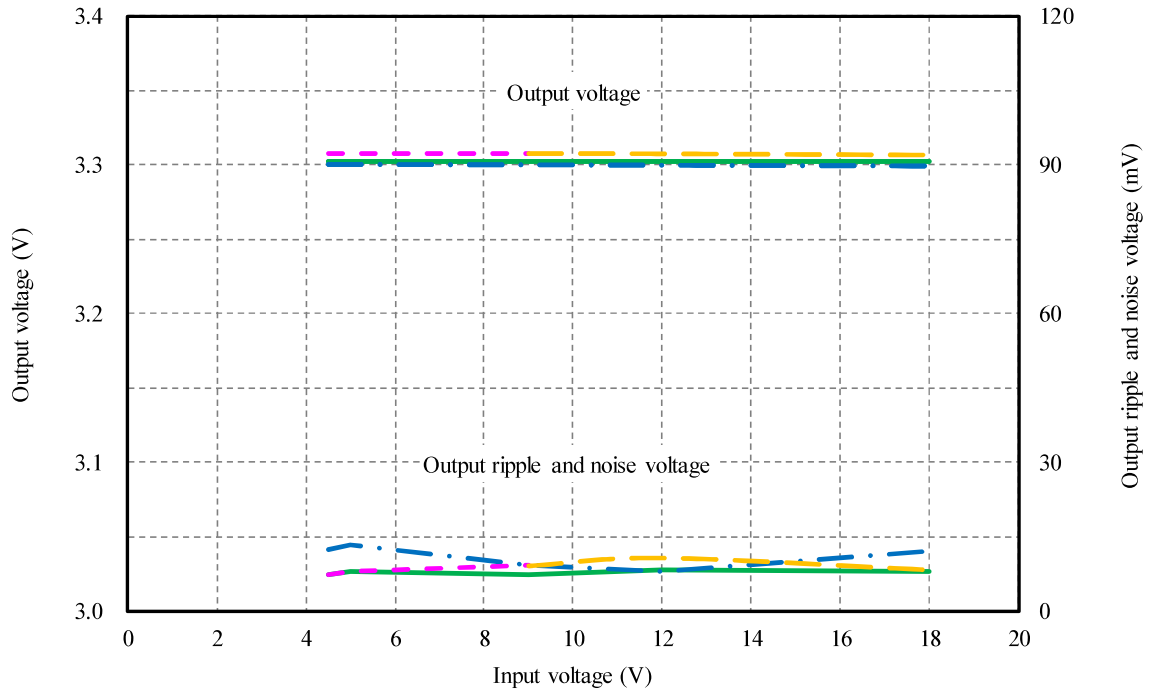
Ta	-40°C	25°C	70°C	Temperature stability	
Vo	15.0250V	15.0744V	15.0971V	72.1mV	0.481%

(2) 出力電圧・出力リップルノイズ電圧 対 入力電圧

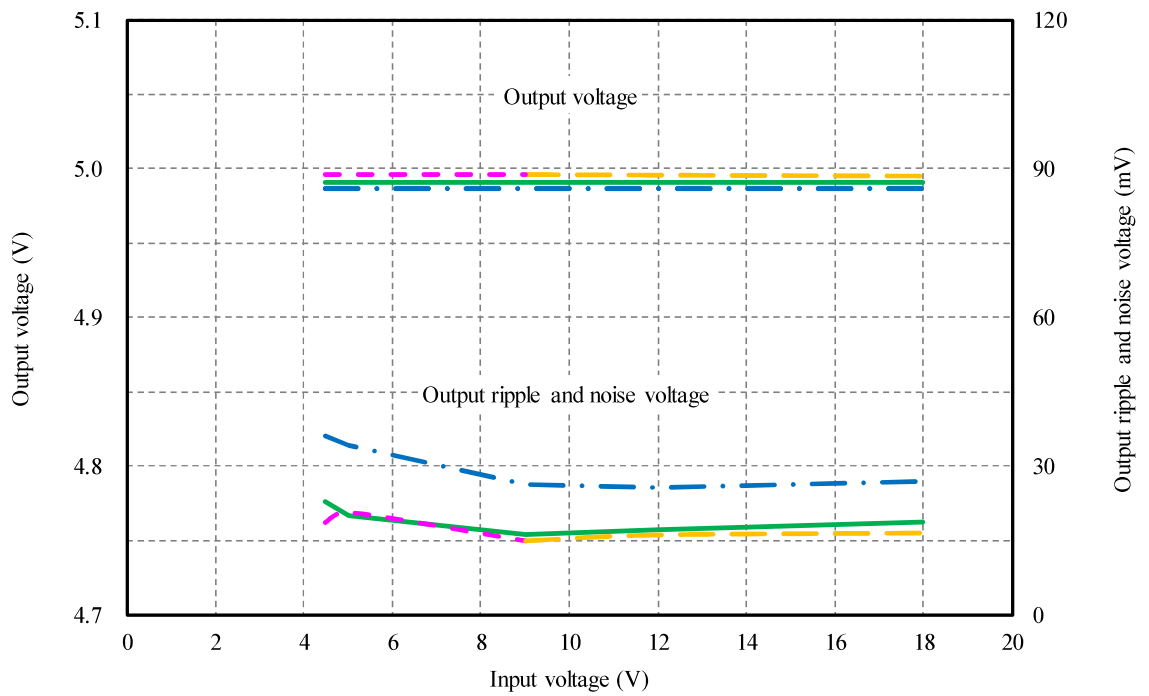
Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions Io : 100 %  
 Ta : -40 °C  
 : 25 °C  
 : 50 °C  
 : 65 °C

3.3V



5V

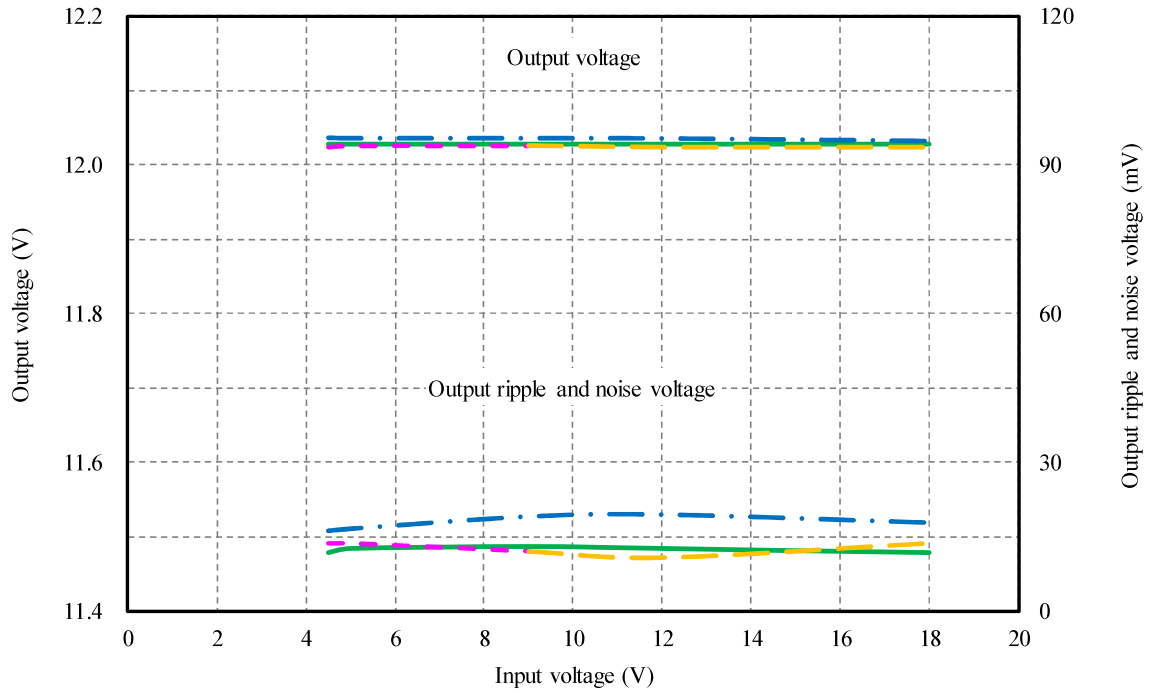


(2) 出力電圧・出力リップルノイズ電圧 対 入力電圧

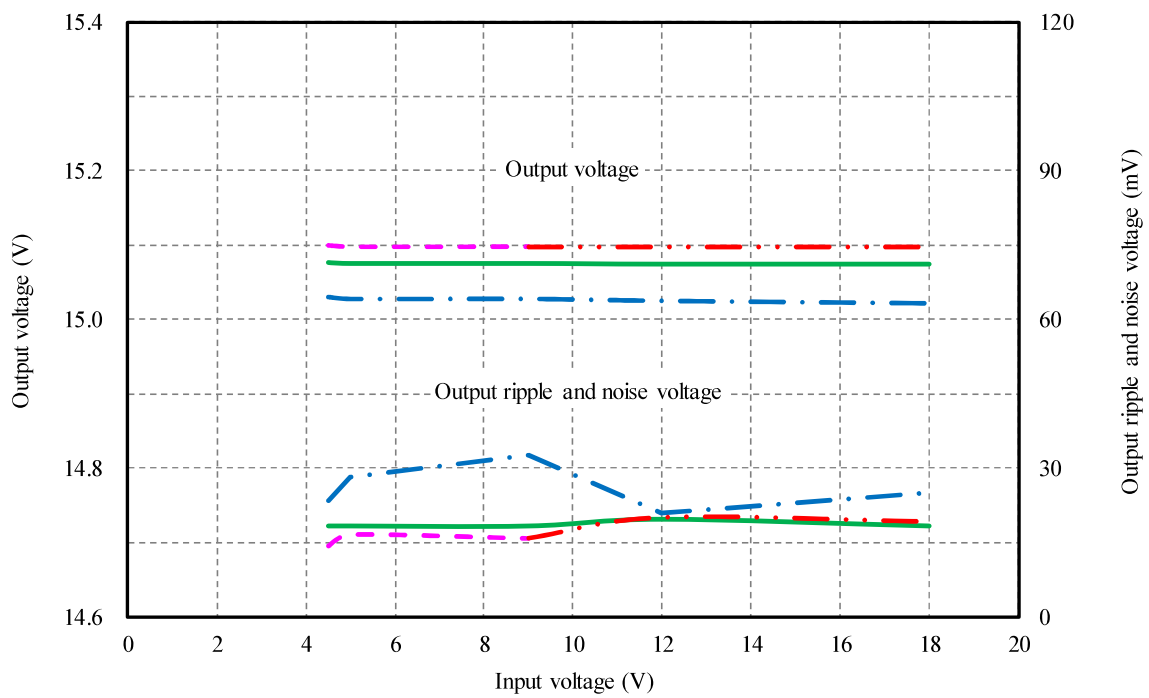
Output voltage and Output ripple and noise voltage vs. Input voltage

- Conditions
- Io : 100 %
  - Ta : -40 °C
  - : 25 °C
  - : 50 °C
  - : 65 °C
  - : 70 °C

12V



15V

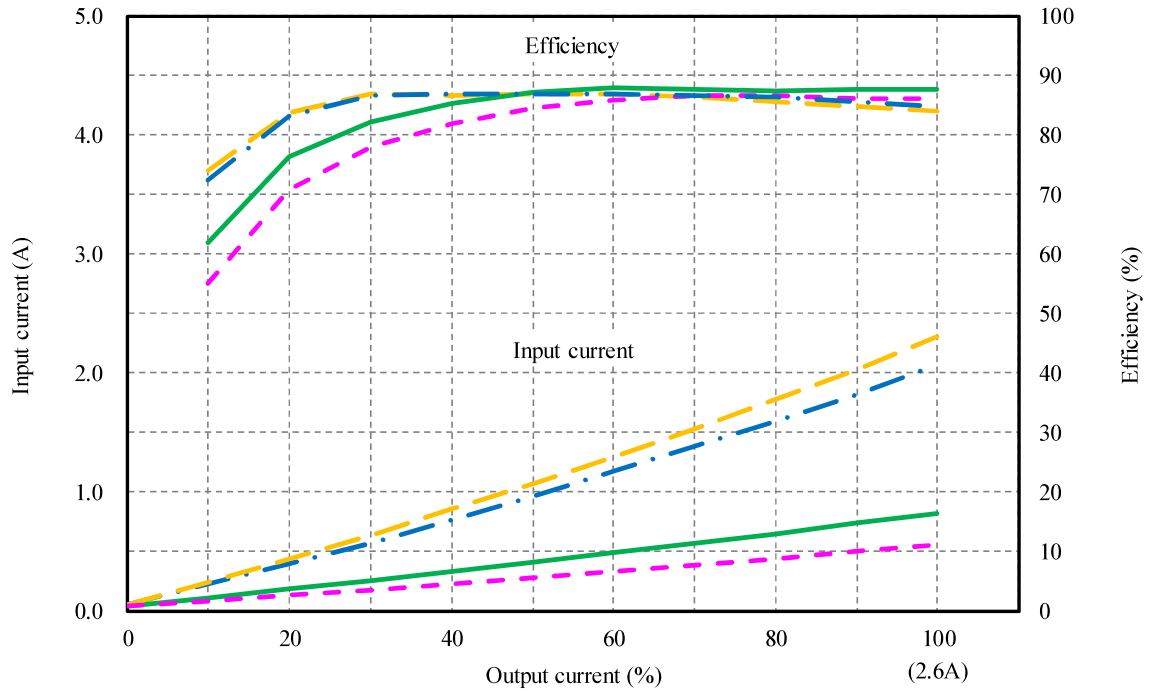




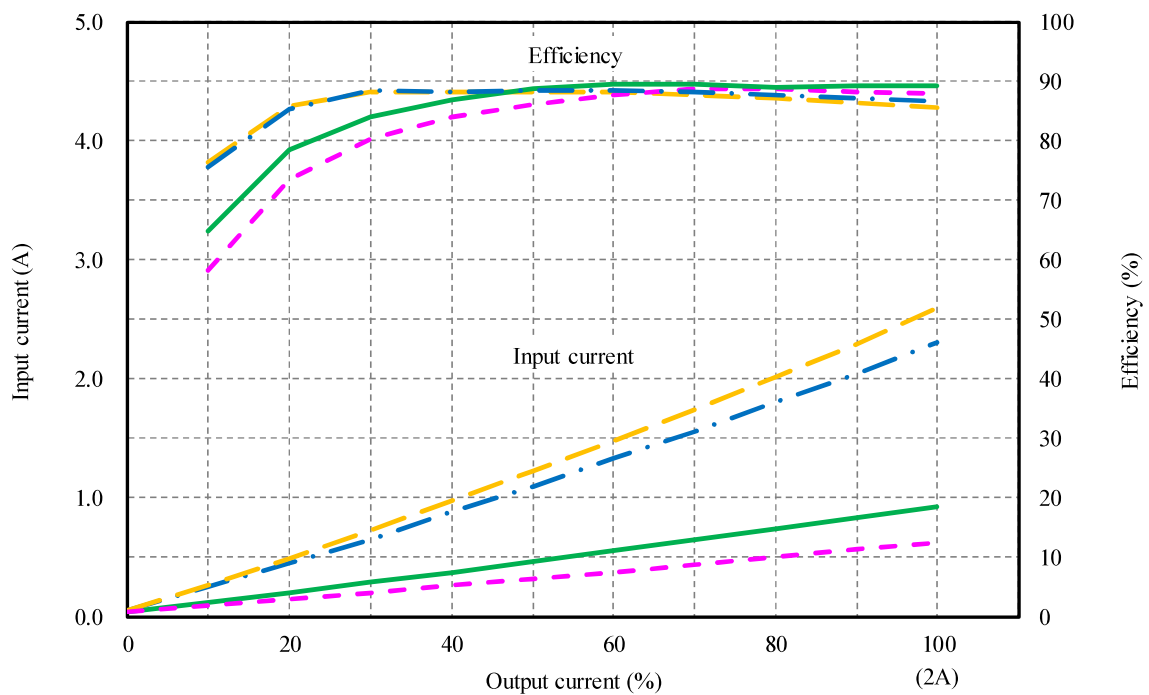
(3) 入力電流・効率 対 出力電流 Input current and Efficiency vs. Output current

Conditions Vin : 4.5 VDC ————  
 : 5 VDC - · - · -  
 : 12 VDC ————  
 : 18 VDC - - - -  
 Ta : 25 °C

3.3V



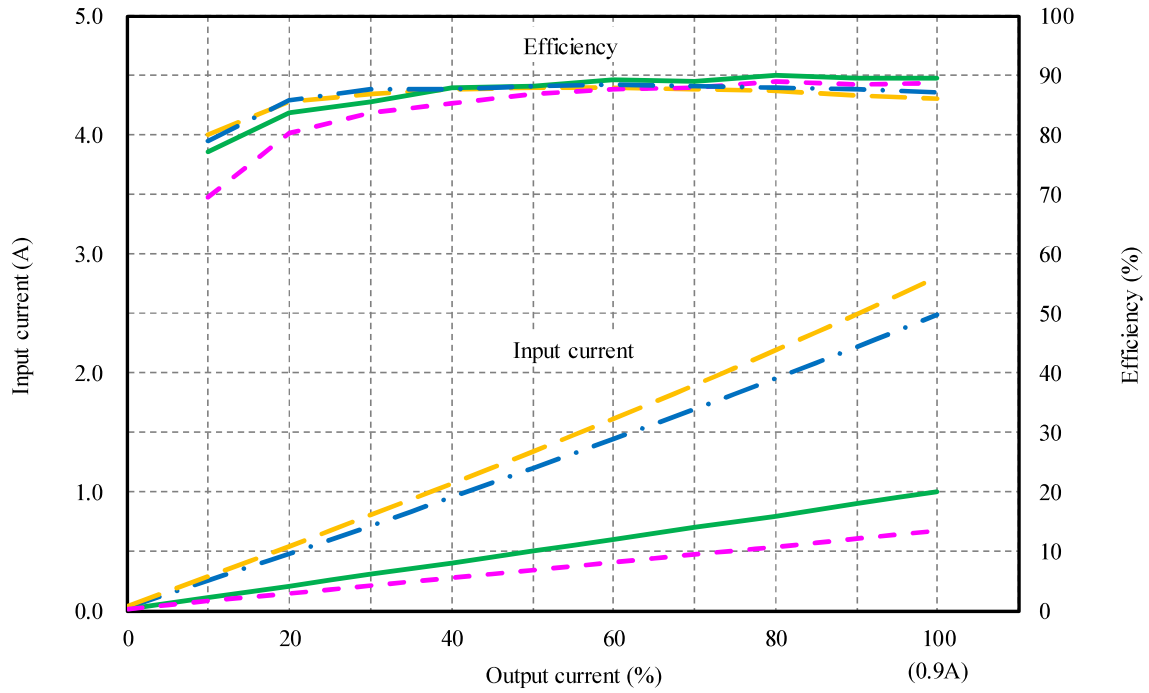
5V



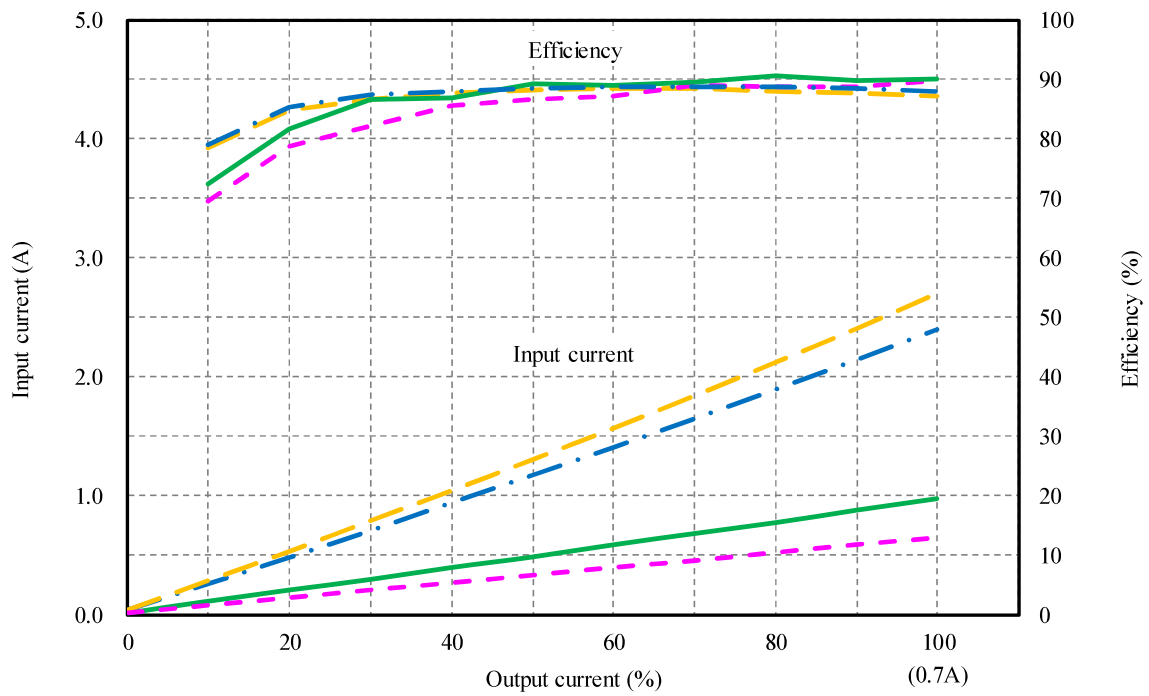
(3) 入力電流・効率 対 出力電流 Input current and Efficiency vs. Output current

Conditions Vin : 4.5 VDC ————  
 : 5 VDC - · - · -  
 : 12 VDC ————  
 : 18 VDC - · - · -  
 Ta : 25 °C

12V



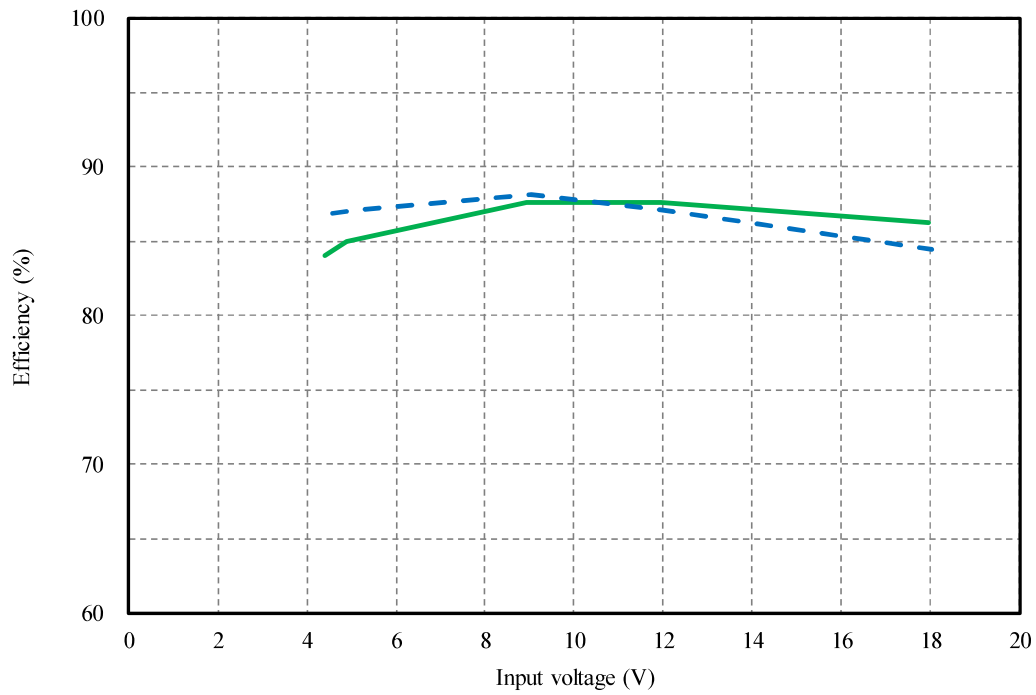
15V



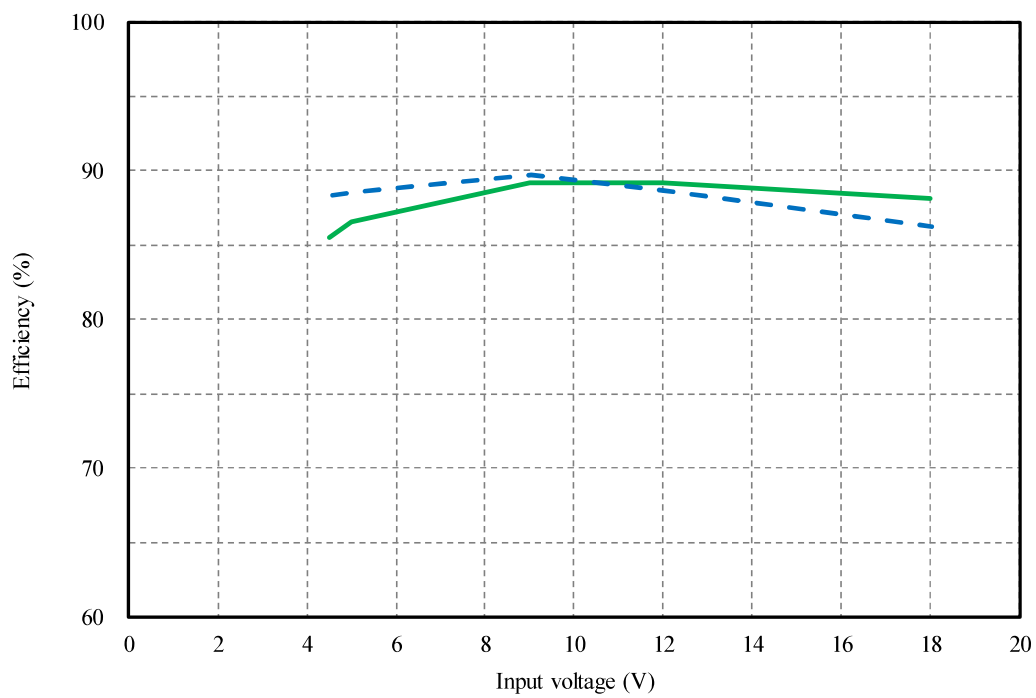
(4) 効率 対 入力電圧 Efficiency vs. Input voltage

Conditions Io : 50 % ---  
 : 100 % —  
 Ta : 25 °C

3.3V



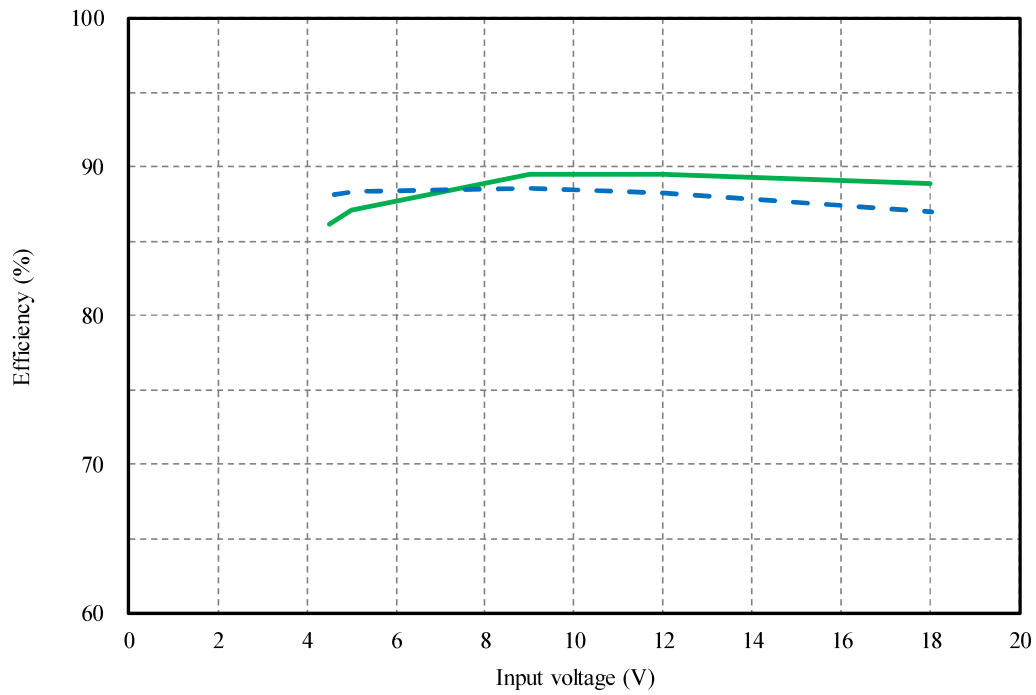
5V



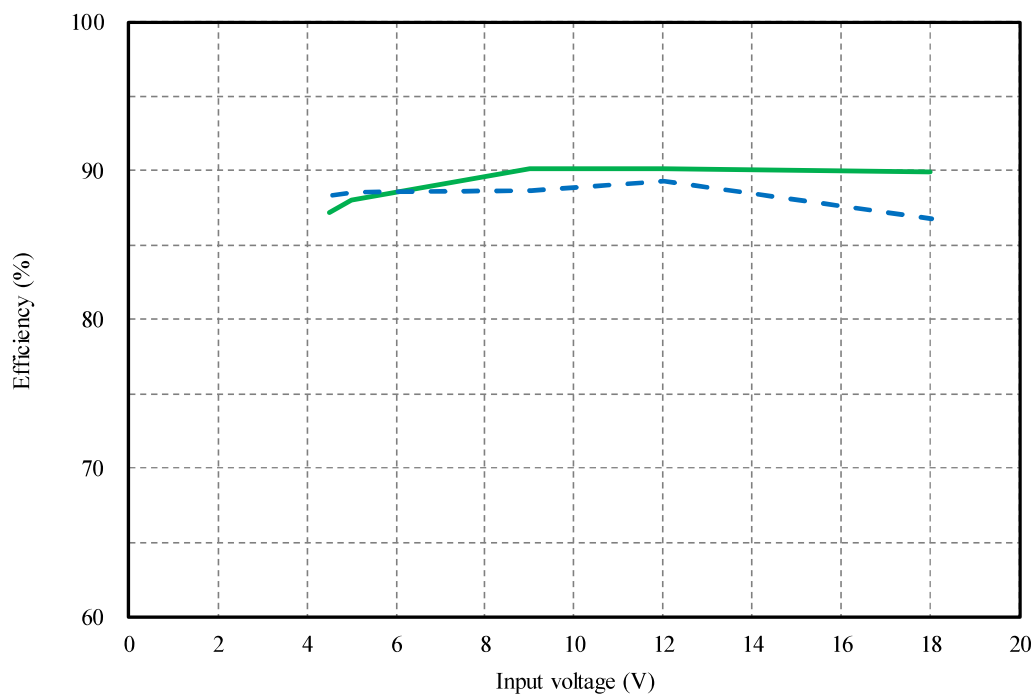
(4) 効率 対 入力電圧 Efficiency vs. Input voltage

Conditions Io : 50 % ---  
 : 100 % —  
 Ta : 25 °C

12V



15V



(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics

出力電圧 対 入力電圧

Output voltage vs. Input voltage

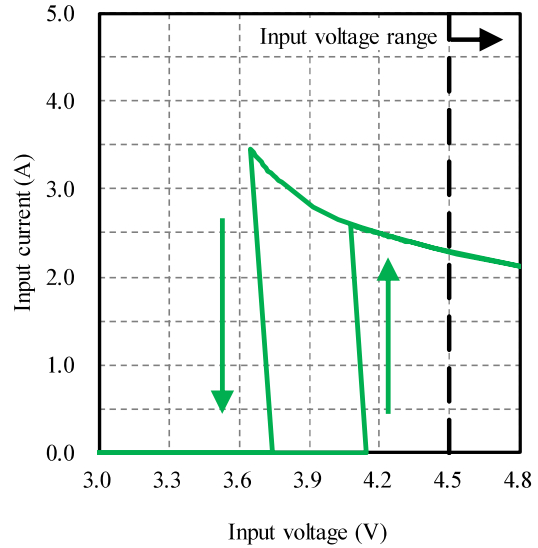
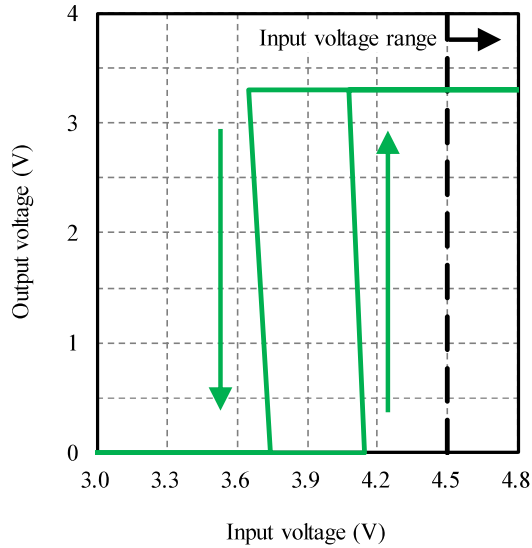
Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C

入力電流 対 入力電圧

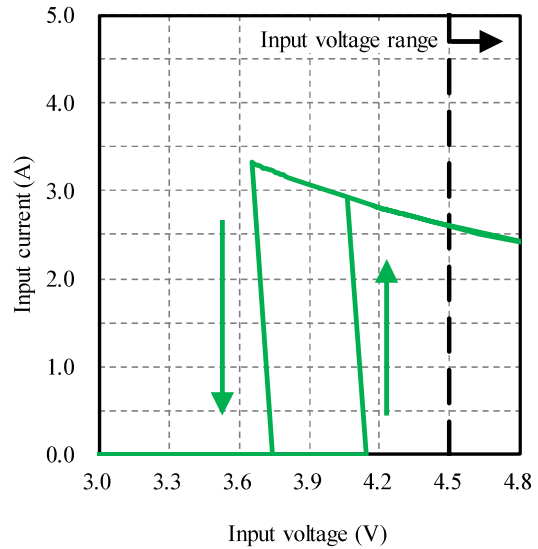
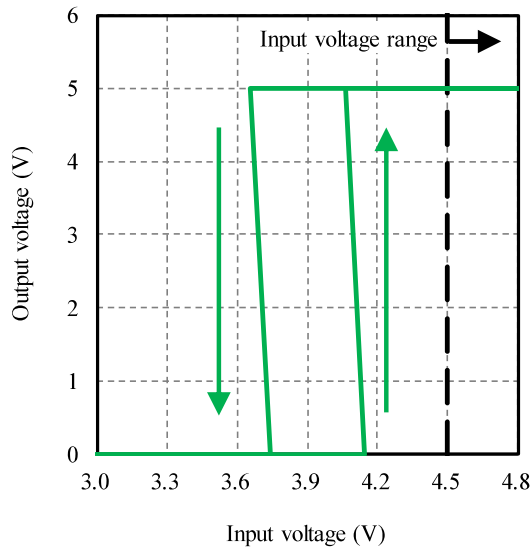
Input current vs. Input voltage

Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C

3.3V



5V



(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics

出力電圧 対 入力電圧

Output voltage vs. Input voltage

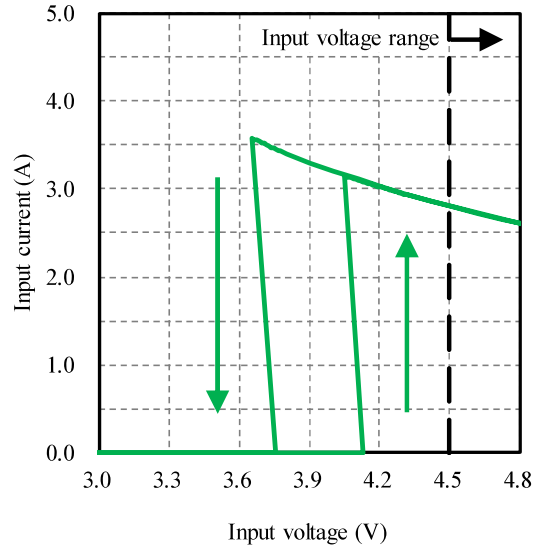
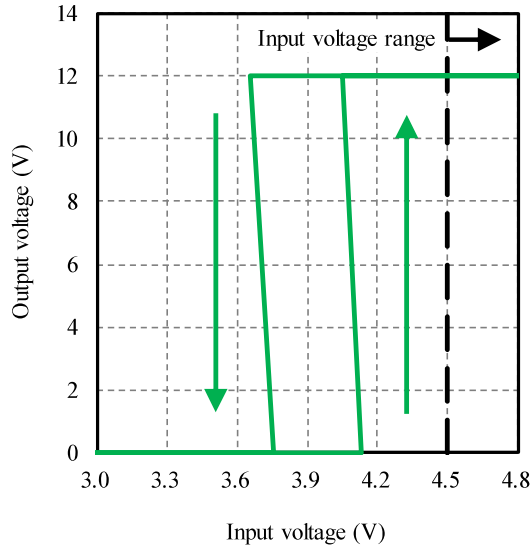
Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C

入力電流 対 入力電圧

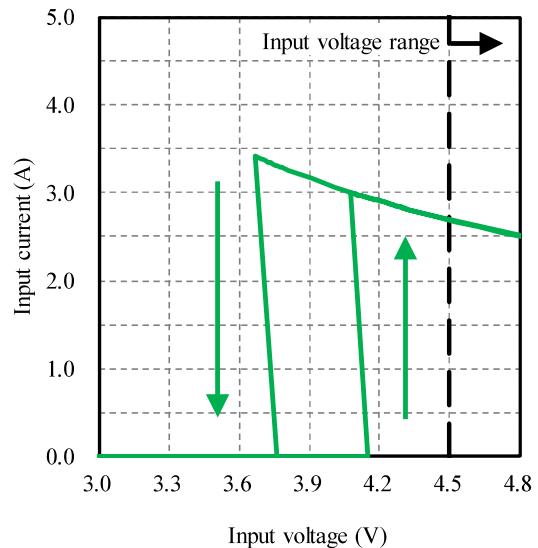
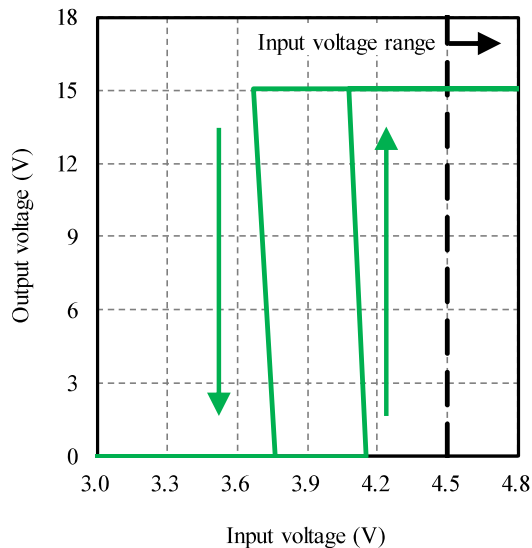
Input current vs. Input voltage

Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C

12V



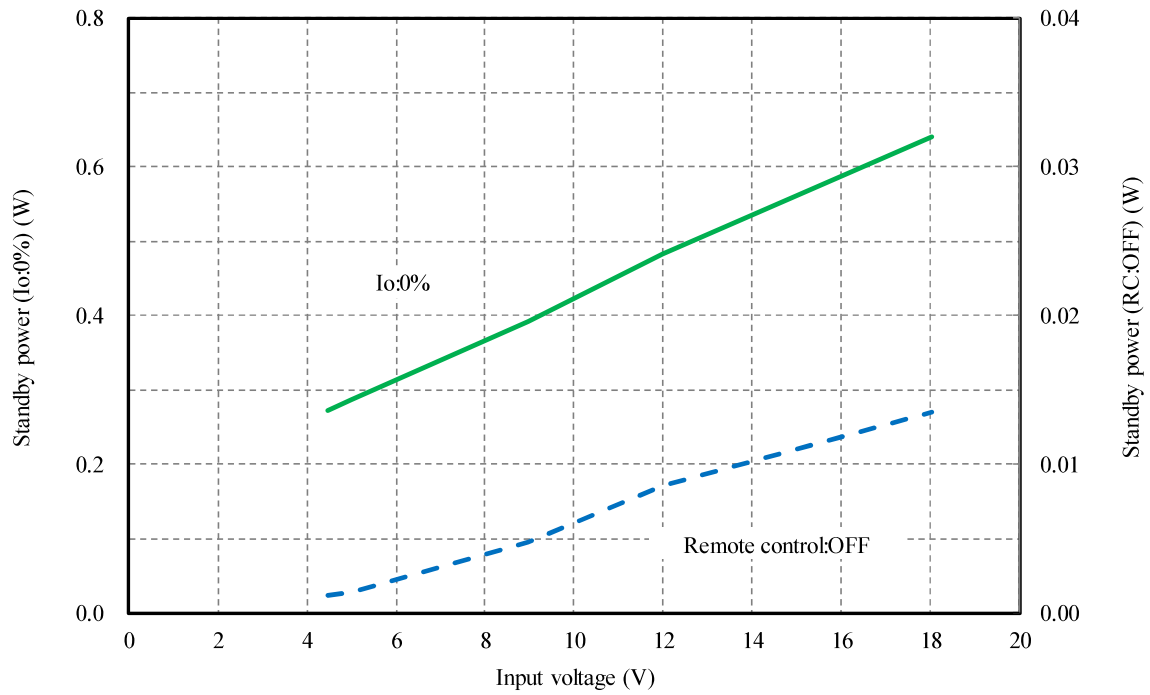
15V



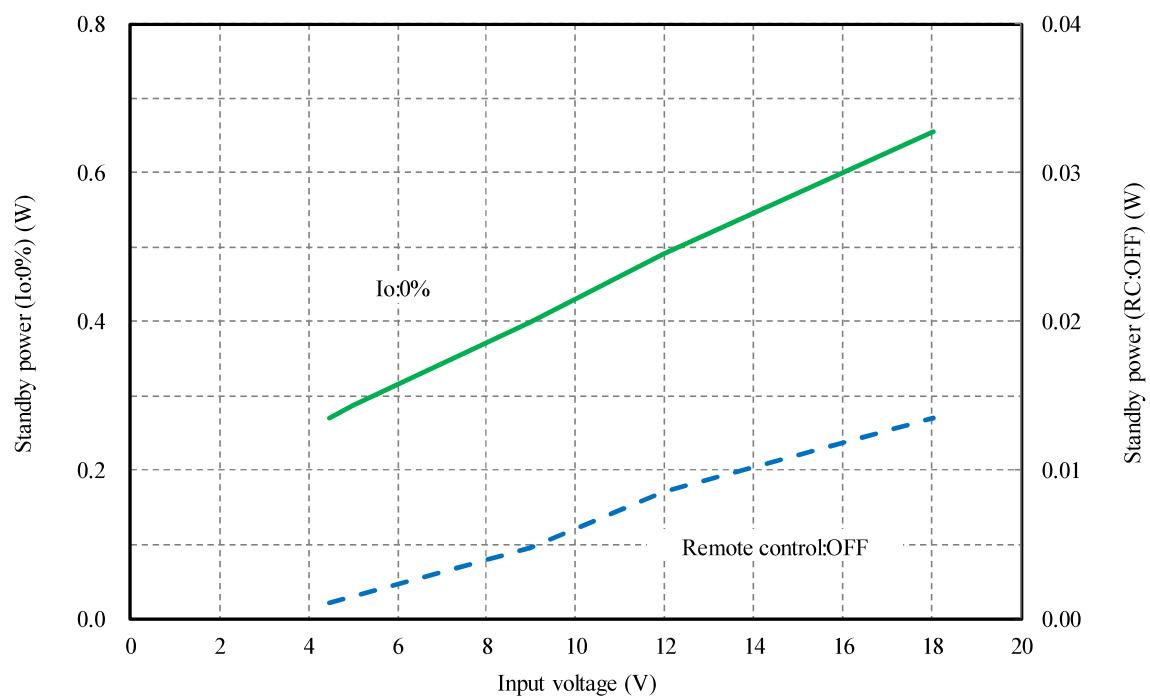
2-2. 待機電力特性 Standby power characteristics

Condition Ta : 25 °C

3.3V



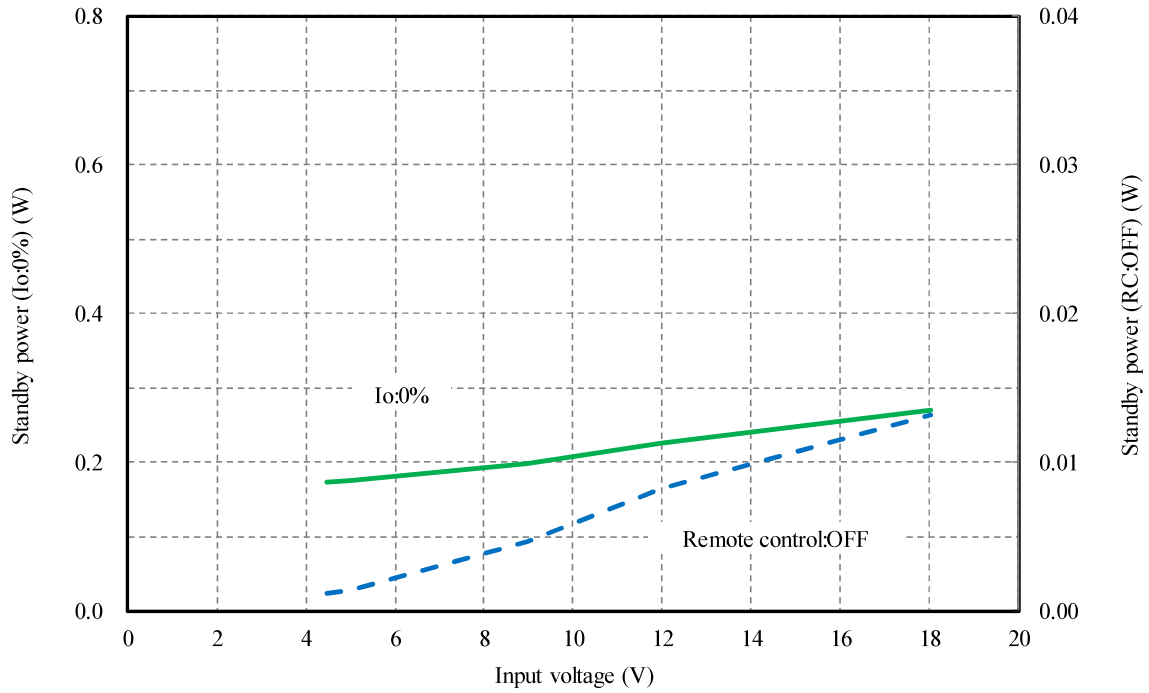
5V



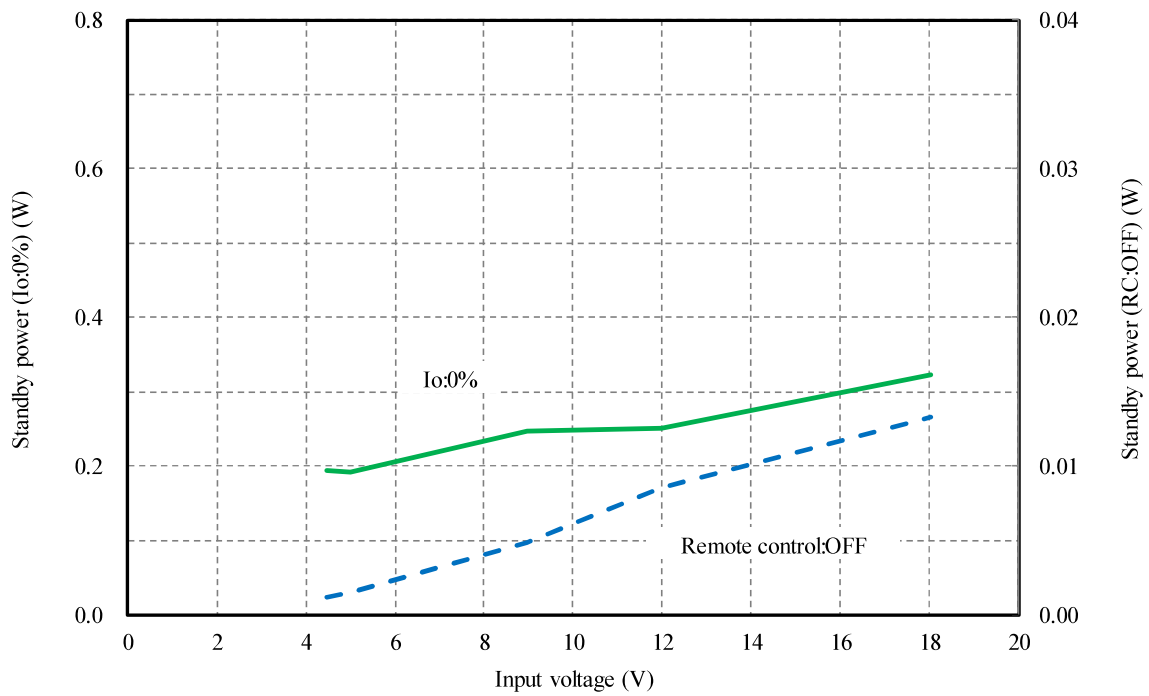
2-2. 待機電力特性 Standby power characteristics

Condition Ta : 25 °C

12V



15V

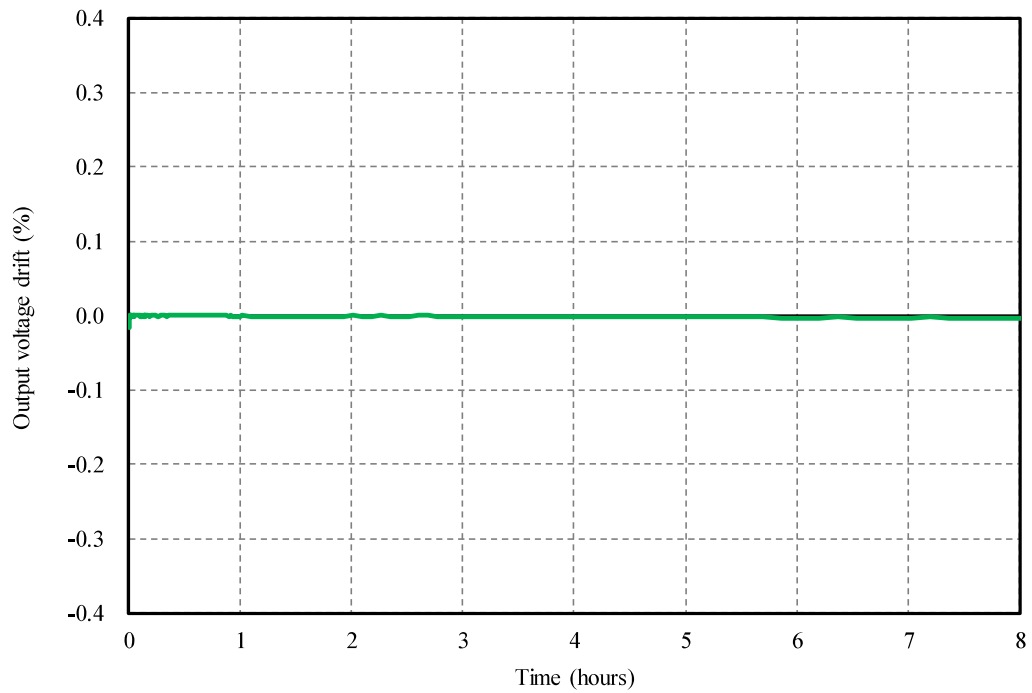




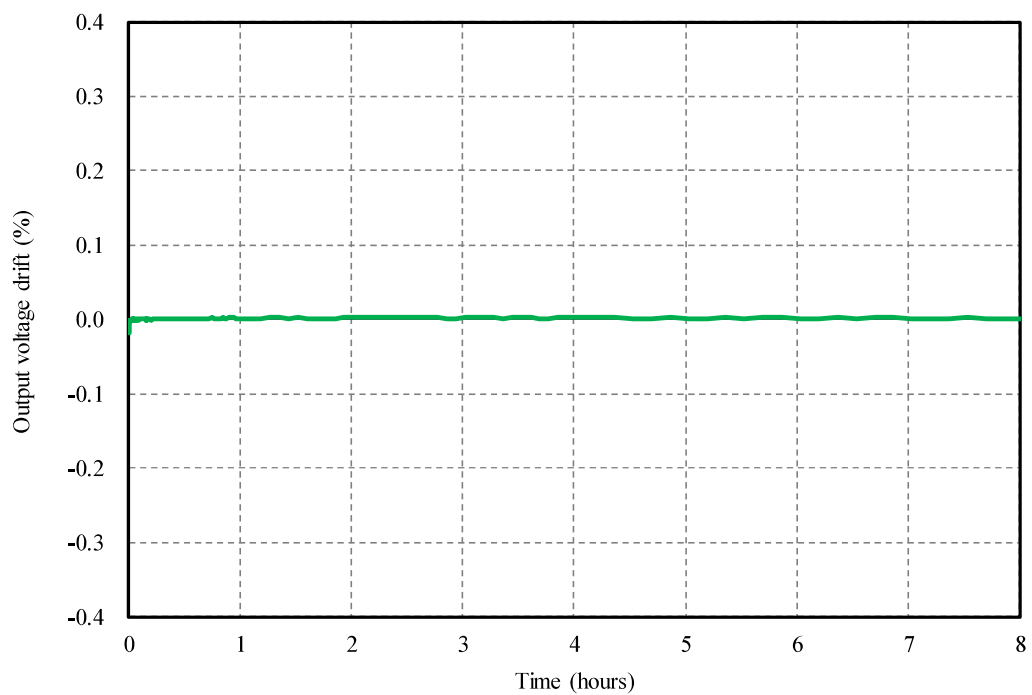
2-3. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 12 VDC  
 Io : 100 %  
 Ta : 25 °C

3.3V



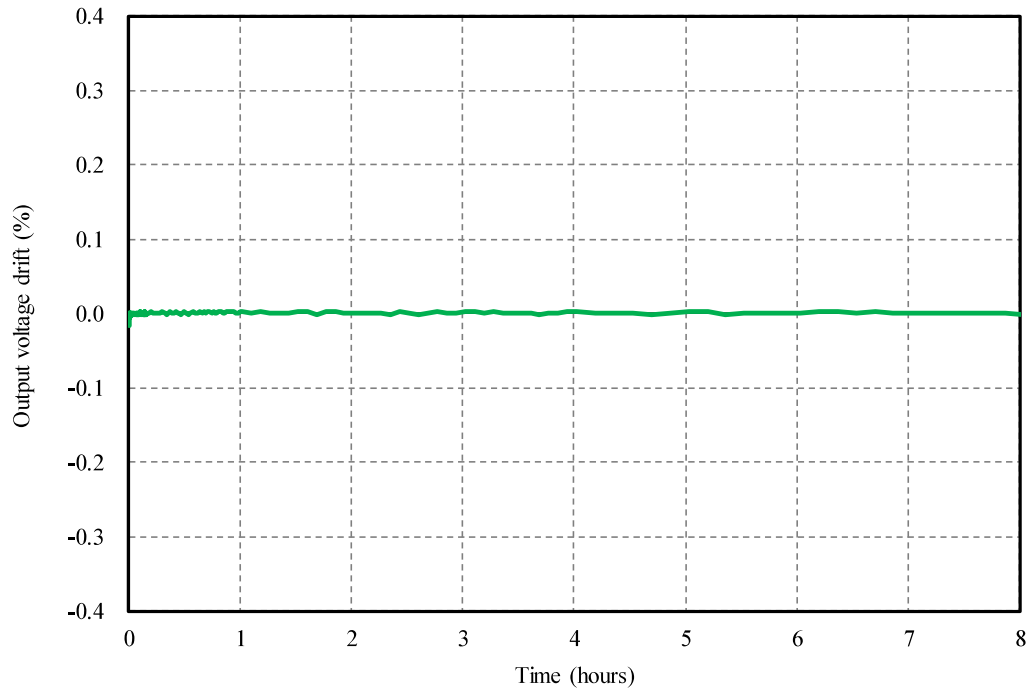
5V



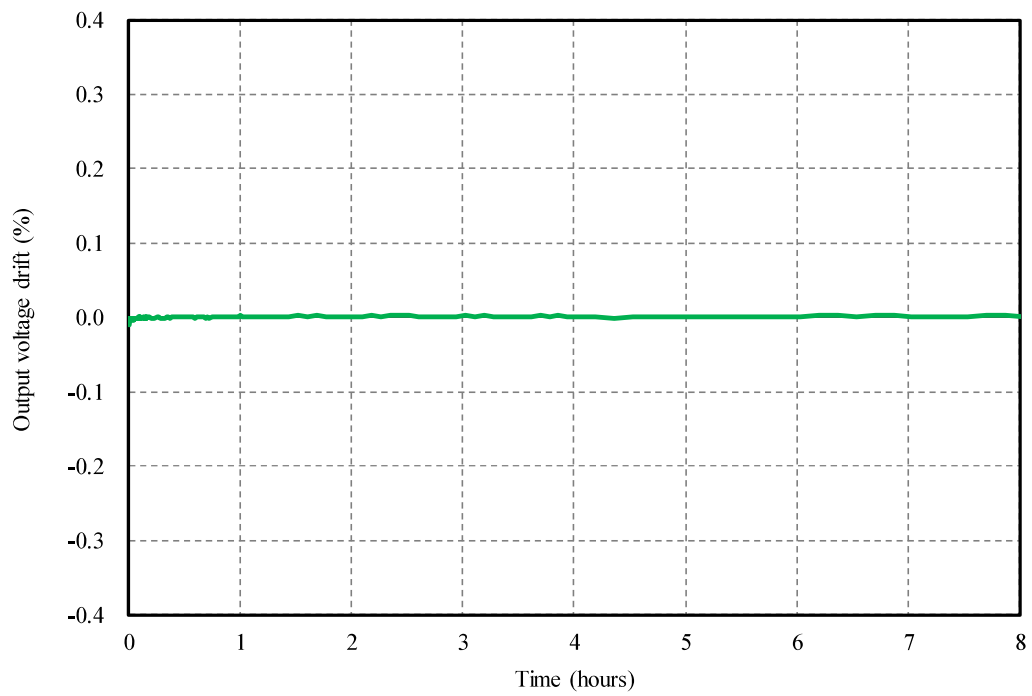
2-3. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 12 VDC  
 Io : 100 %  
 Ta : 25 °C

12V



15V



2-4. 過電流保護特性 Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

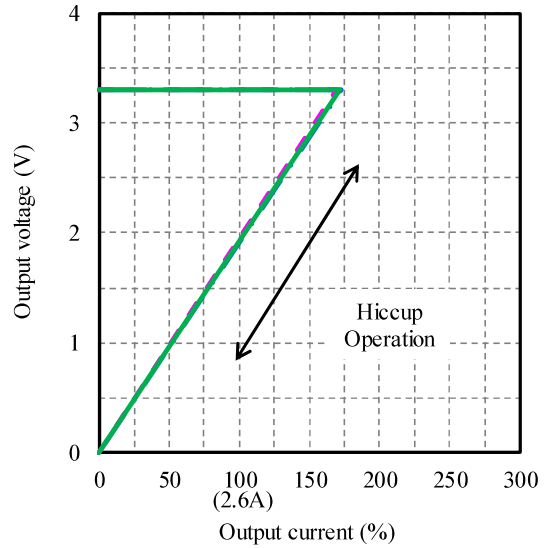
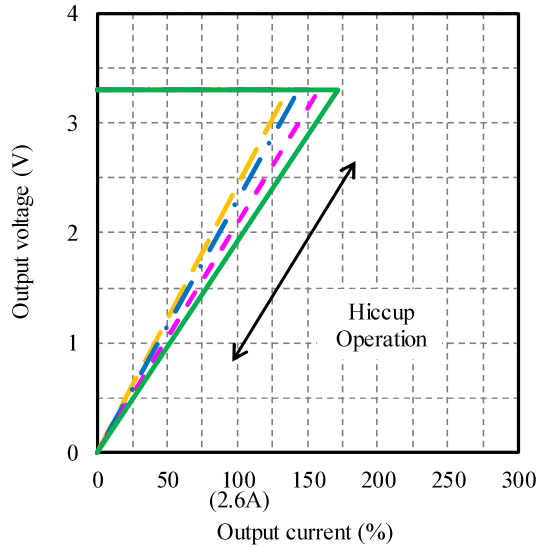
Conditions Vin : 4.5 VDC ———  
 : 5 VDC - - -  
 : 12 VDC ———  
 : 18 VDC - - -  
 Ta : 25 °C

周囲温度依存性

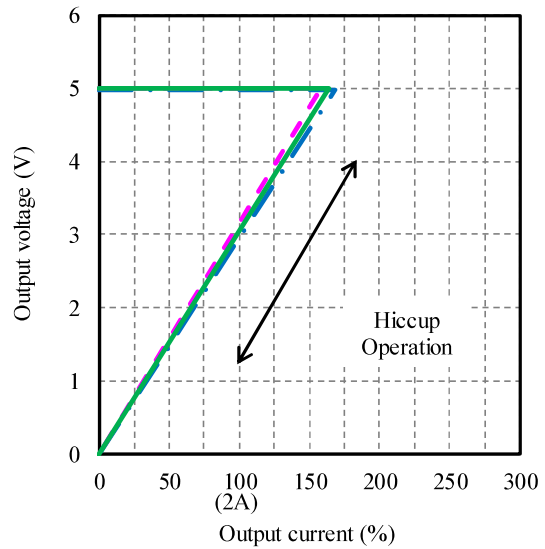
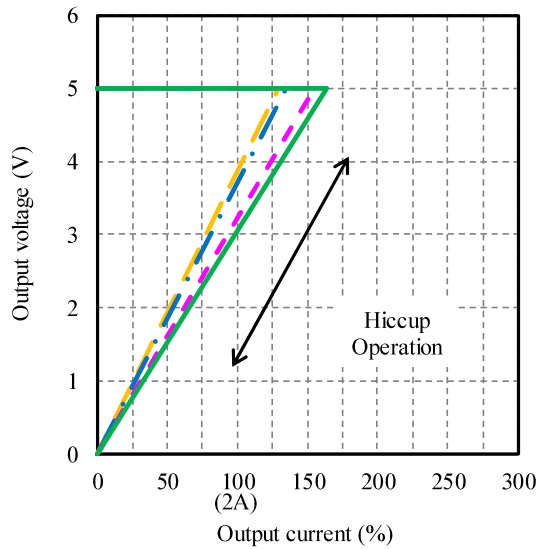
Ambient temperature dependence

Conditions Vin : 12 VDC  
 Ta : -40 °C - - -  
 : 25 °C ———  
 : 65 °C - - -

3.3V



5V



2-4. 過電流保護特性 Over current protection (OCP) characteristics

入力電圧依存性

Input voltage dependence

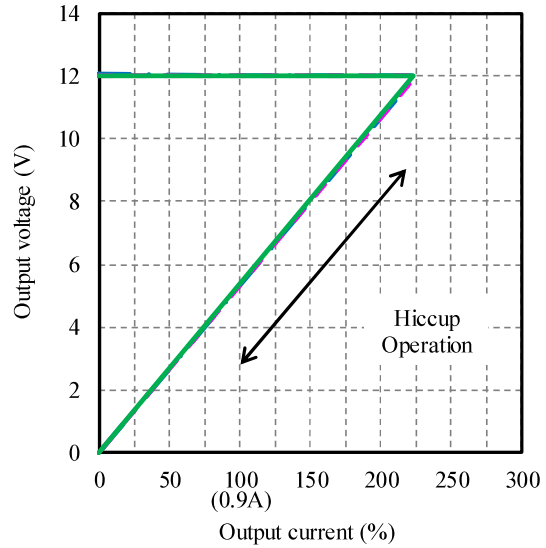
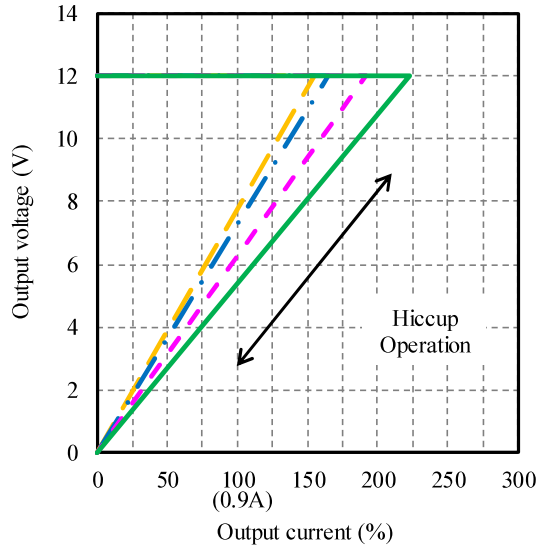
Conditions Vin : 4.5 VDC ———  
 : 5 VDC - - -  
 : 12 VDC ———  
 : 18 VDC - - -  
 Ta : 25 °C

周囲温度依存性

Ambient temperature dependence

Conditions Vin : 12 VDC  
 Ta : -40 °C - - -  
 : 25 °C ———  
 : 65 °C - - -

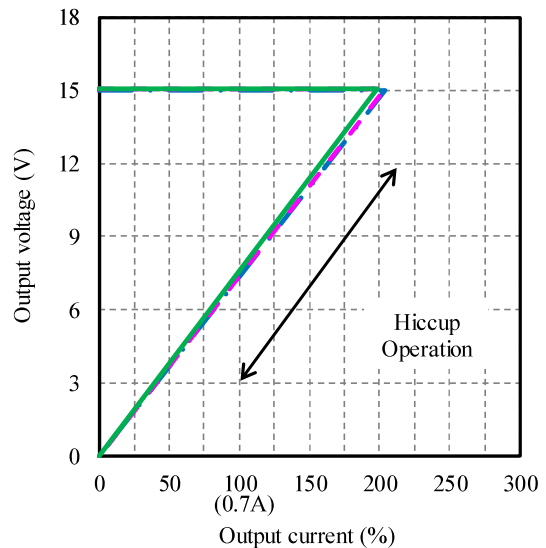
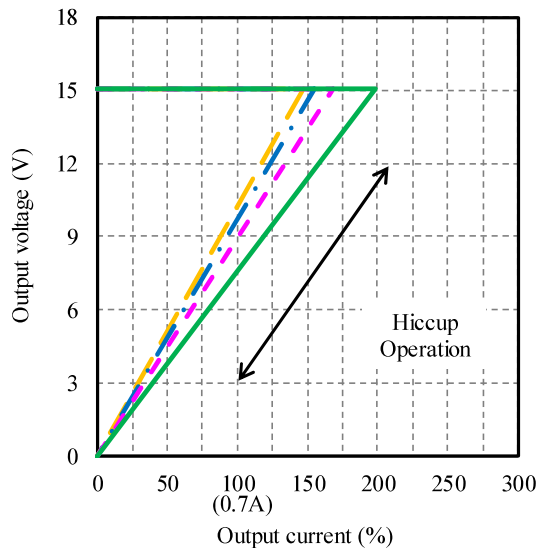
12V



Conditions Vin : 4.5 VDC ———  
 : 5 VDC - - -  
 : 12 VDC ———  
 : 18 VDC - - -  
 Ta : 25 °C

Conditions Vin : 12 VDC  
 Ta : -40 °C - - -  
 : 25 °C ———  
 : 70 °C - - -

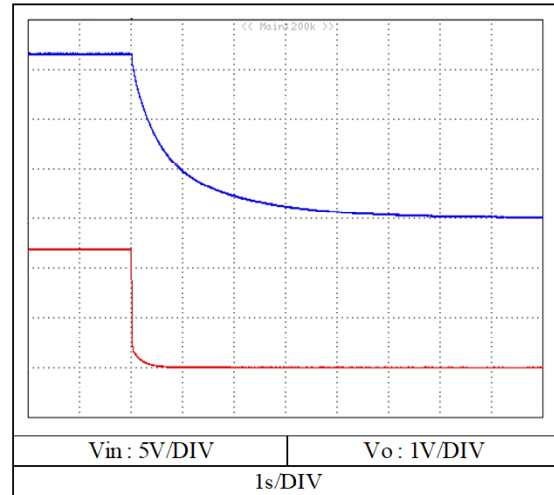
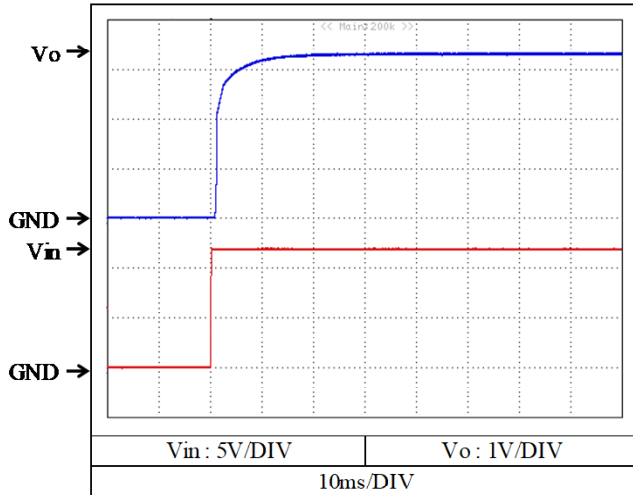
15V



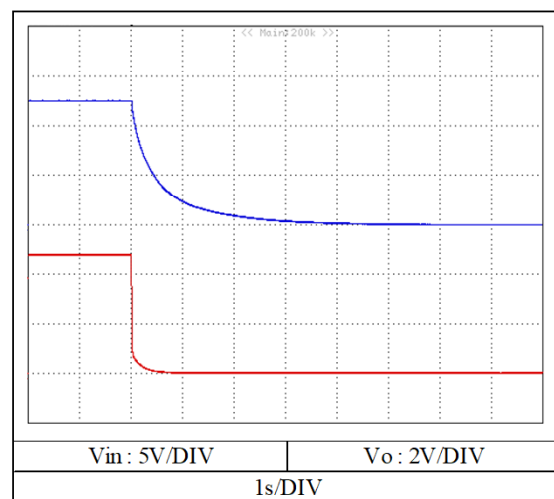
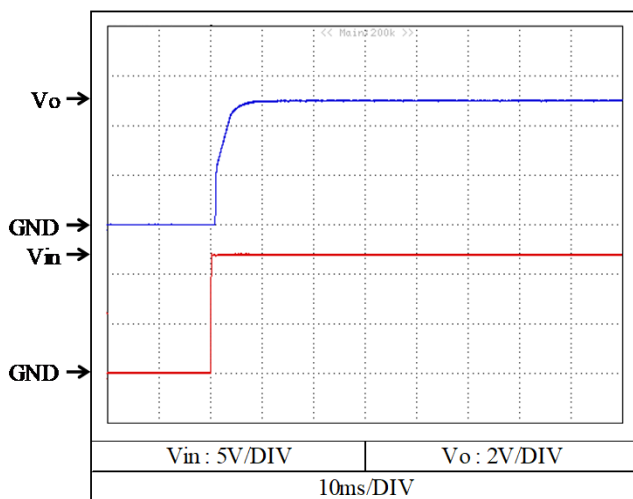
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 0 %  
 $T_a$  : 25 °C

3.3V



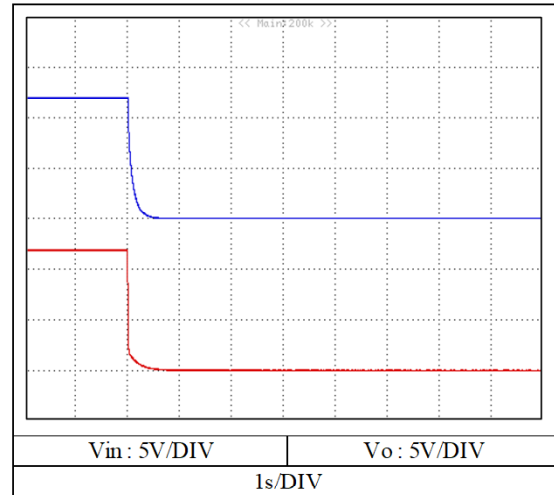
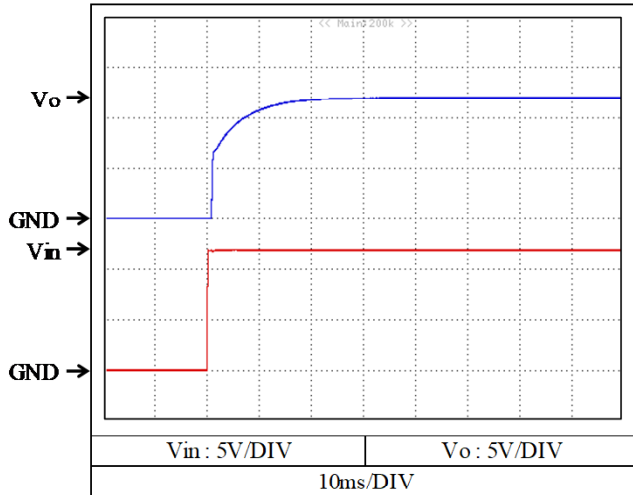
5V



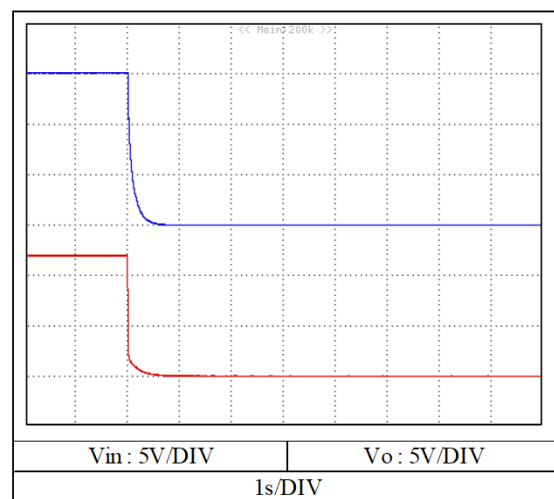
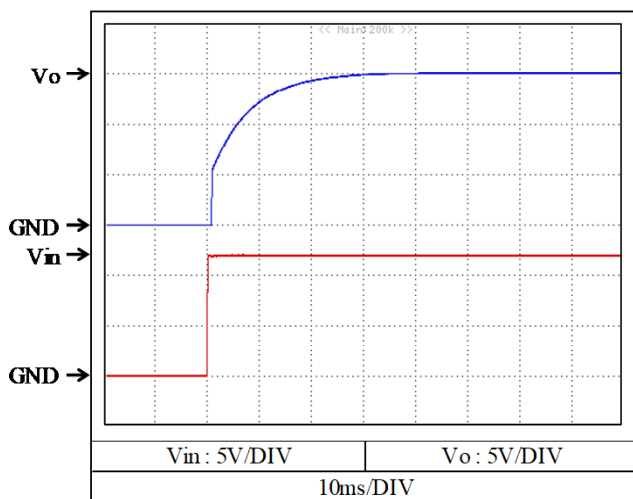
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 0 %  
 $T_a$  : 25 °C

12V



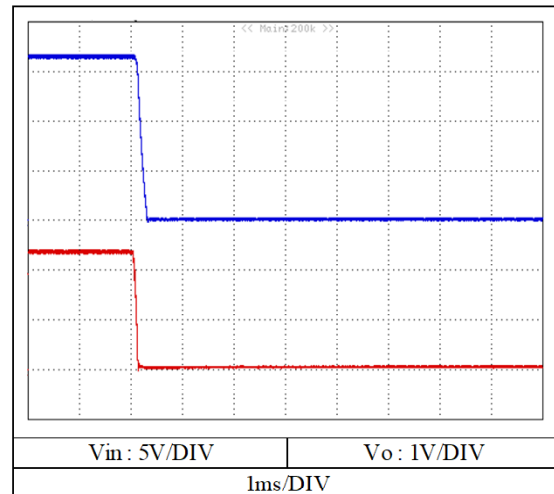
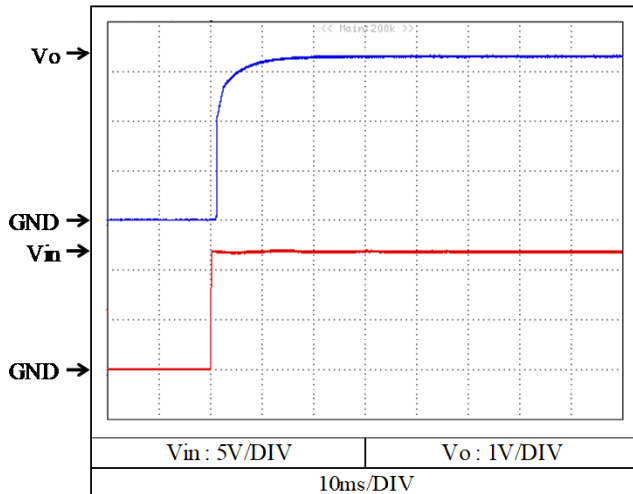
15V



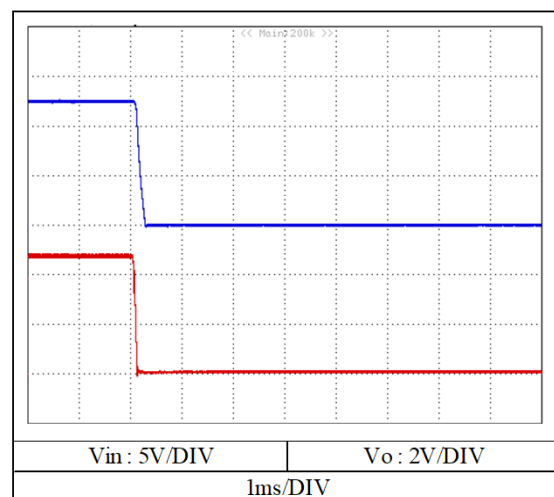
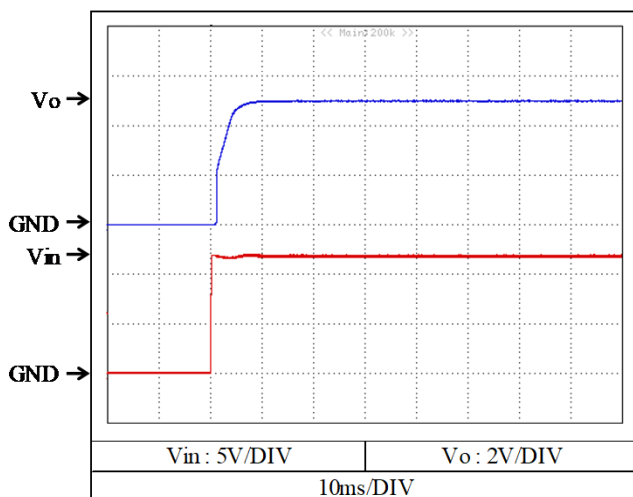
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

3.3V



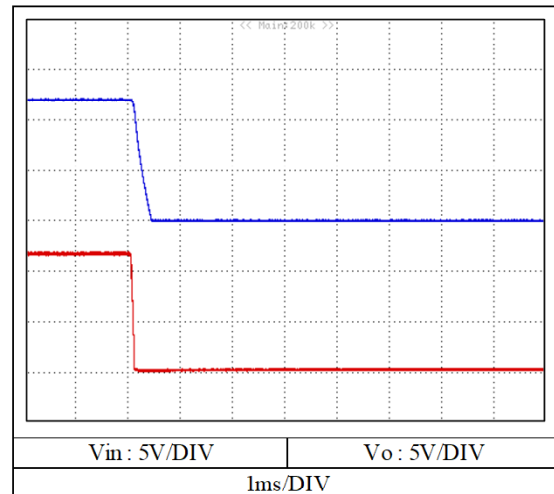
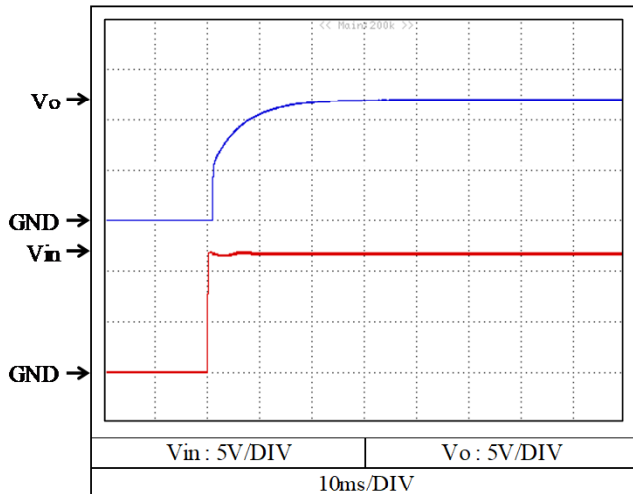
5V



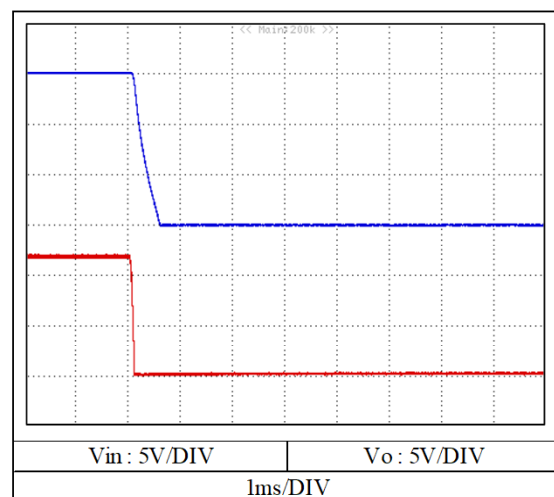
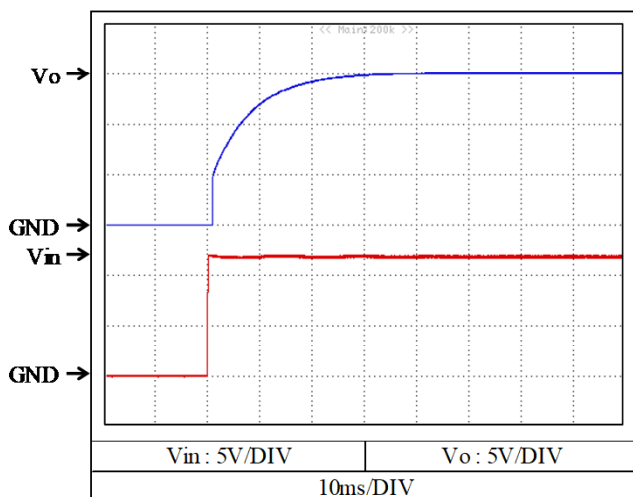
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

12V



15V



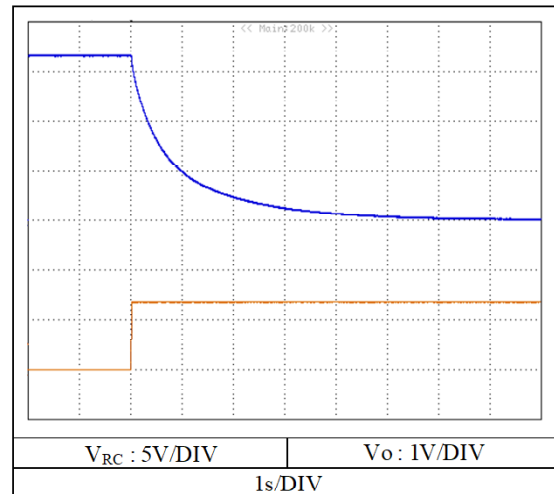
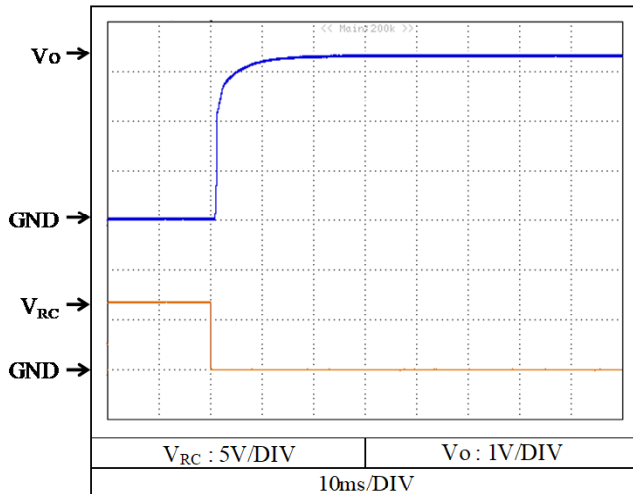


2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)

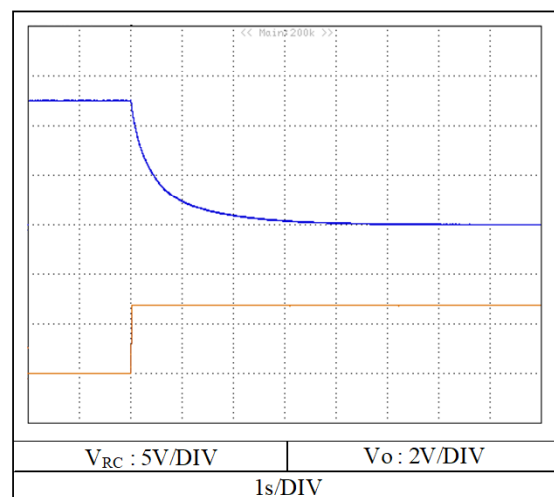
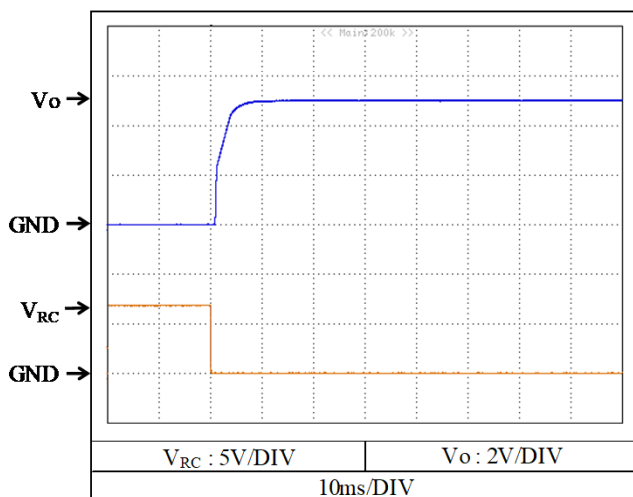
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 0 %  
 $T_a$  : 25 °C

3.3V



5V

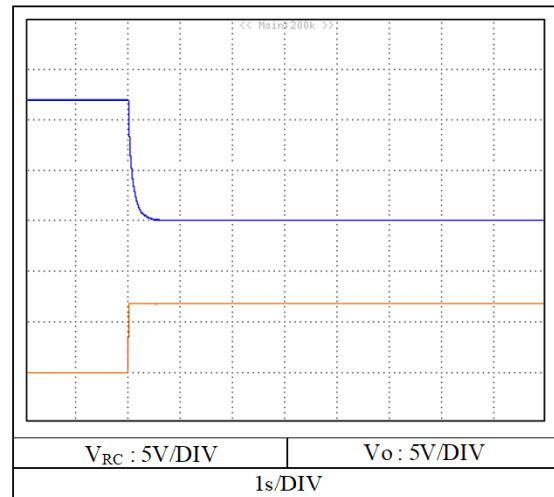
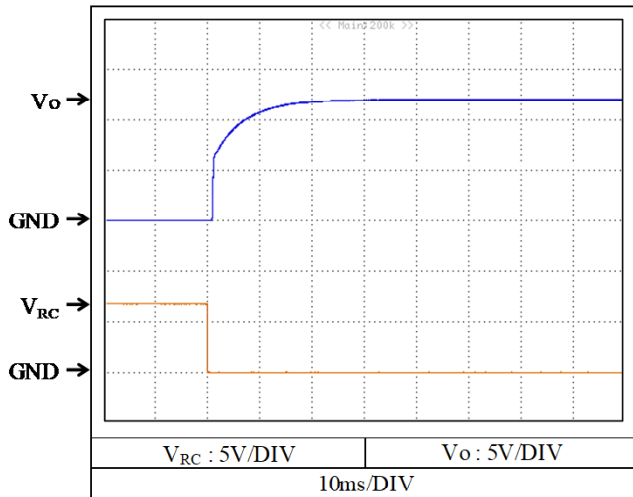


2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)

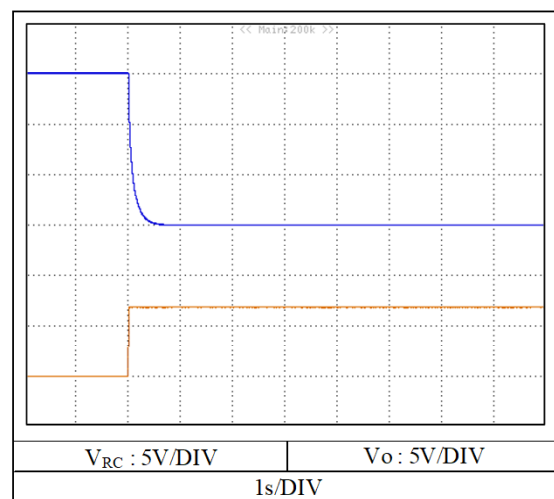
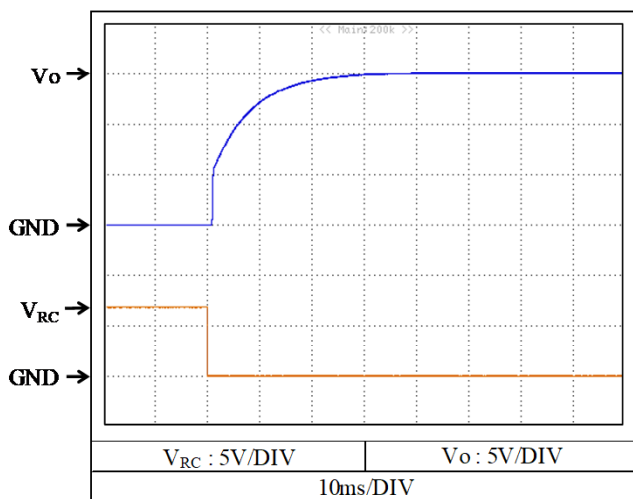
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 0 %  
 $T_a$  : 25 °C

12V



15V

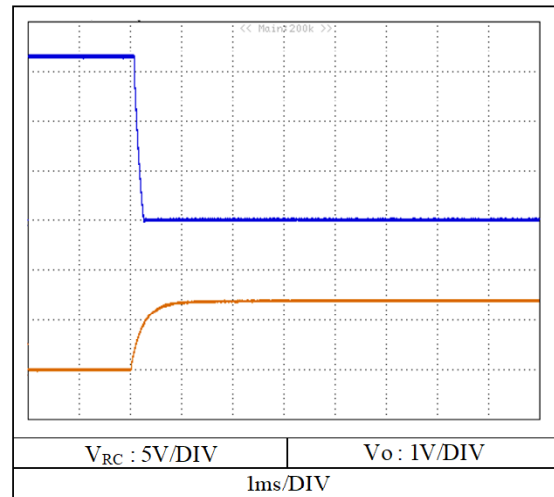
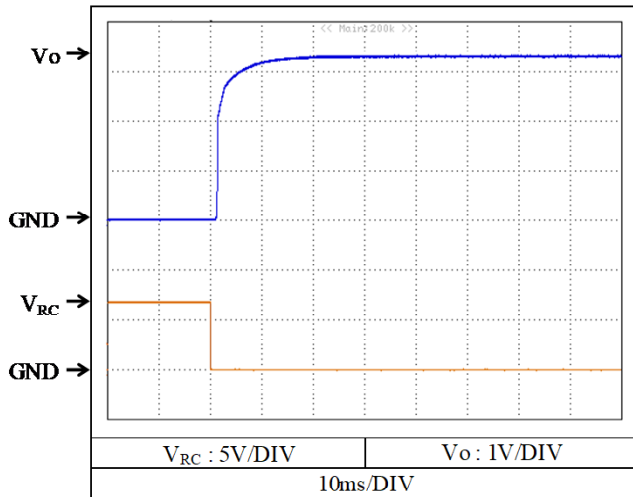


2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)

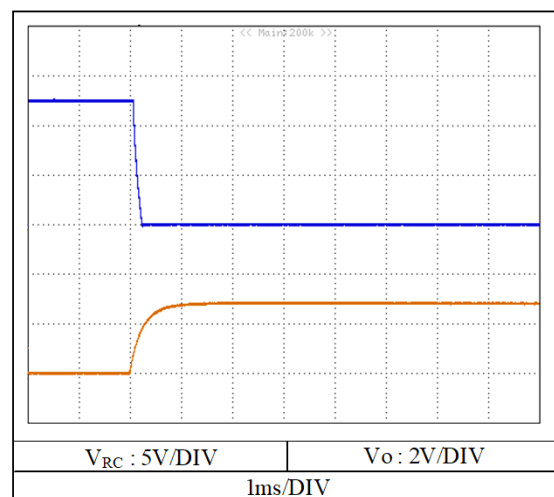
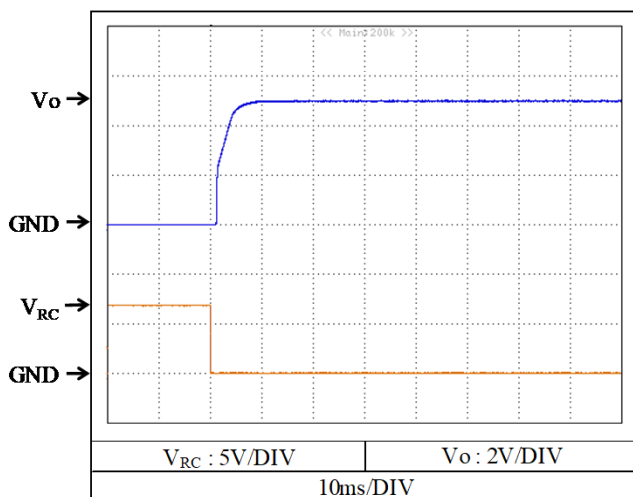
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

3.3V



5V

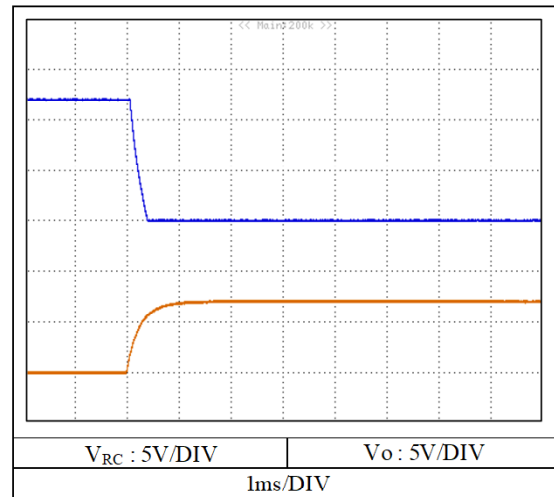
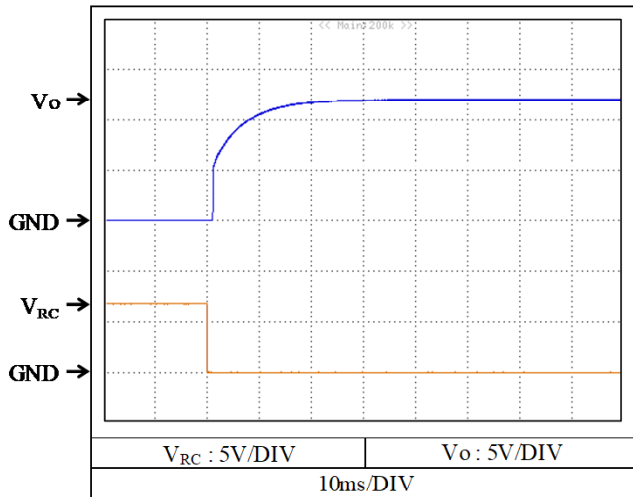


2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)

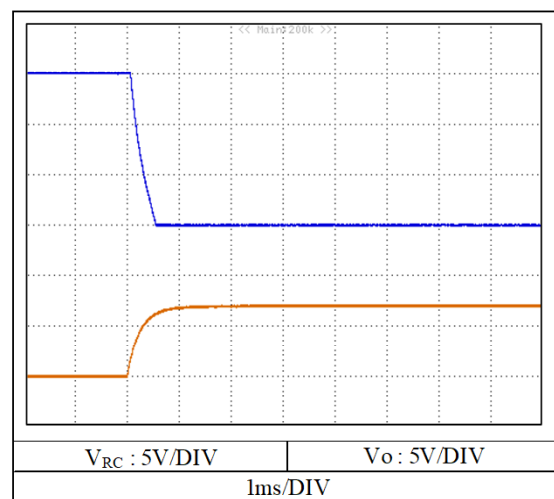
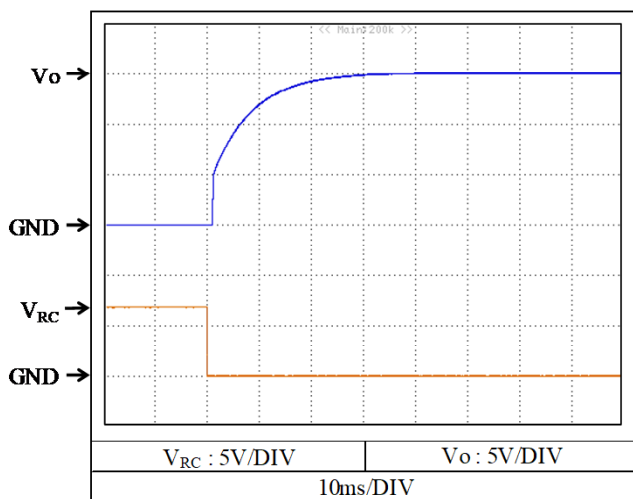
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

12V

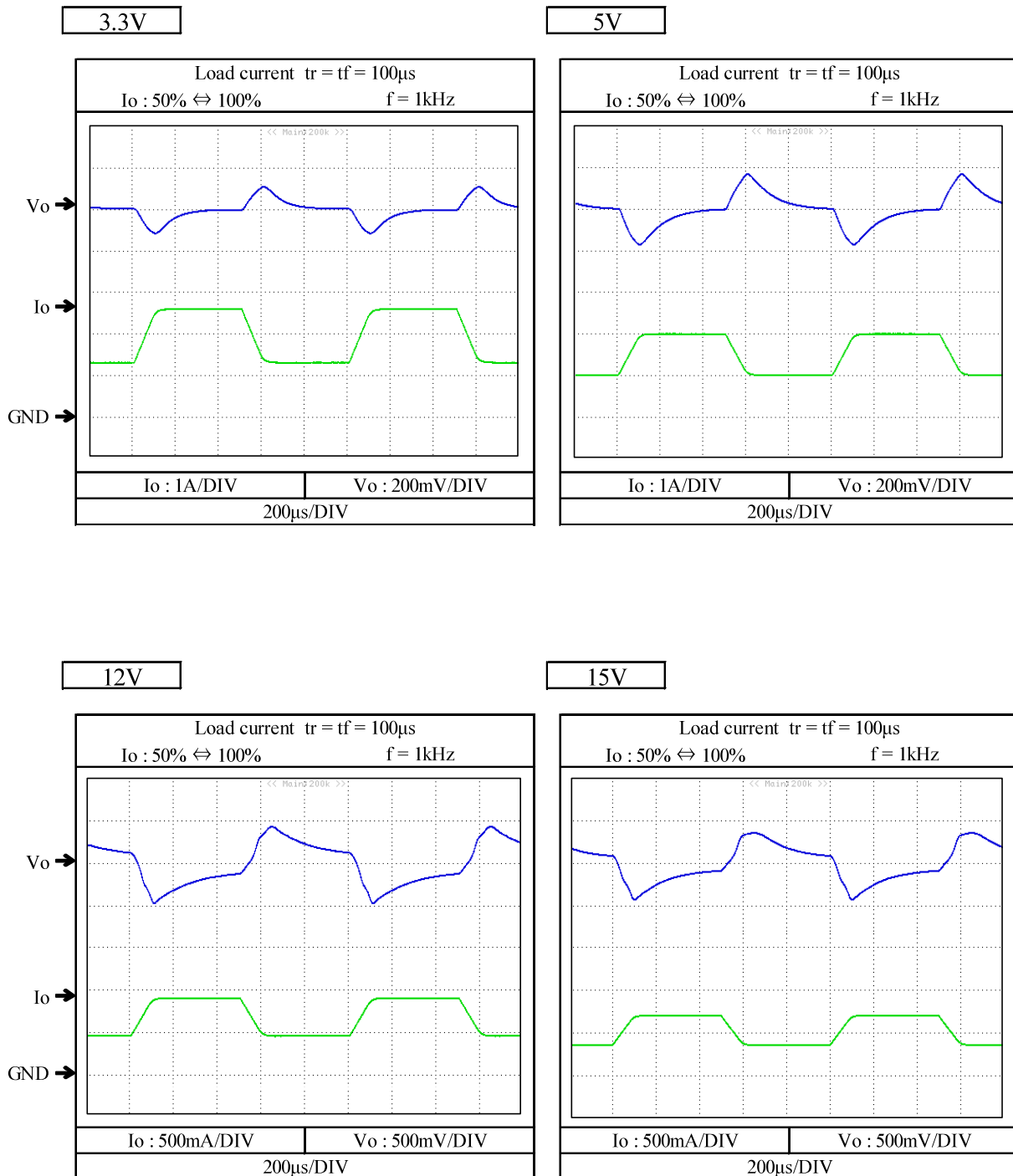


15V



2-6. 過渡応答(負荷急変)特性 Dynamic load response characteristics

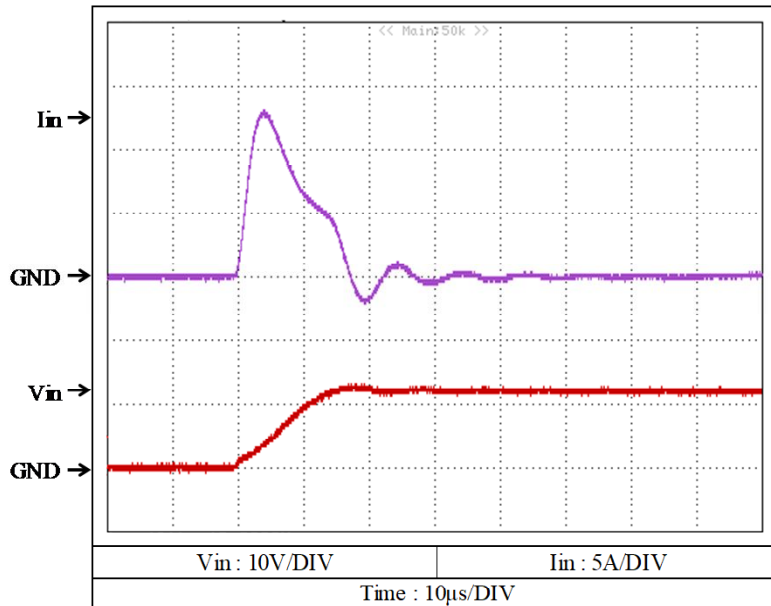
Conditions  $V_{in}$  : 12 VDC  
 $T_a$  : 25 °C



2-7. 入力サージ電流(突入電流)特性 Inrush current characteristics

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

CCG10-12-05S

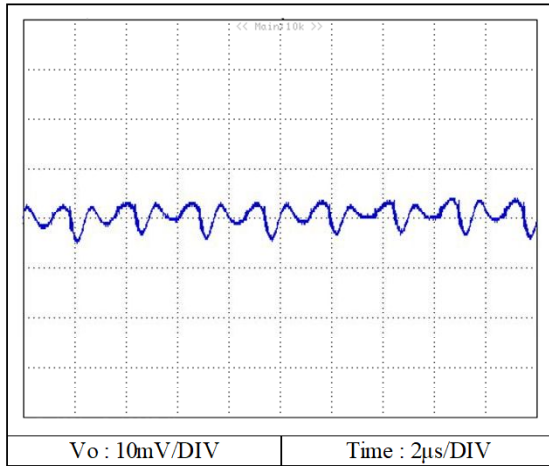


CCG10-12-xxSの入力サージ電流特性は CCG10-12-05S と同等です。  
 CCG10-12-xxS have the same Inrush current characteristics as CCG10-12-05S data.

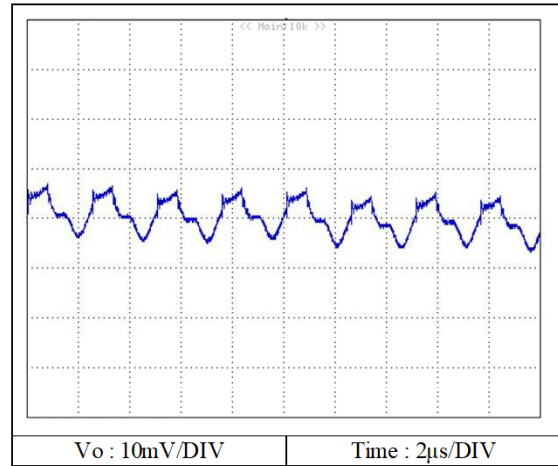
2-8. 出力リップルノイズ波形 Output ripple and noise waveform

Conditions  $V_{in}$  : 12 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

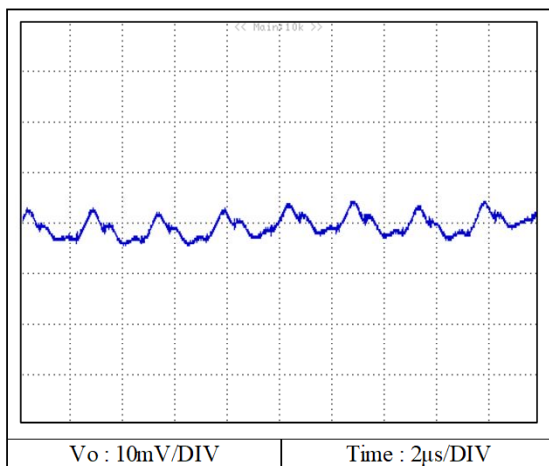
3.3V



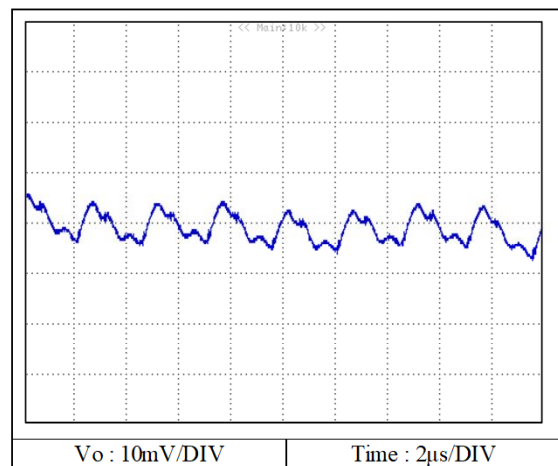
5V



12V



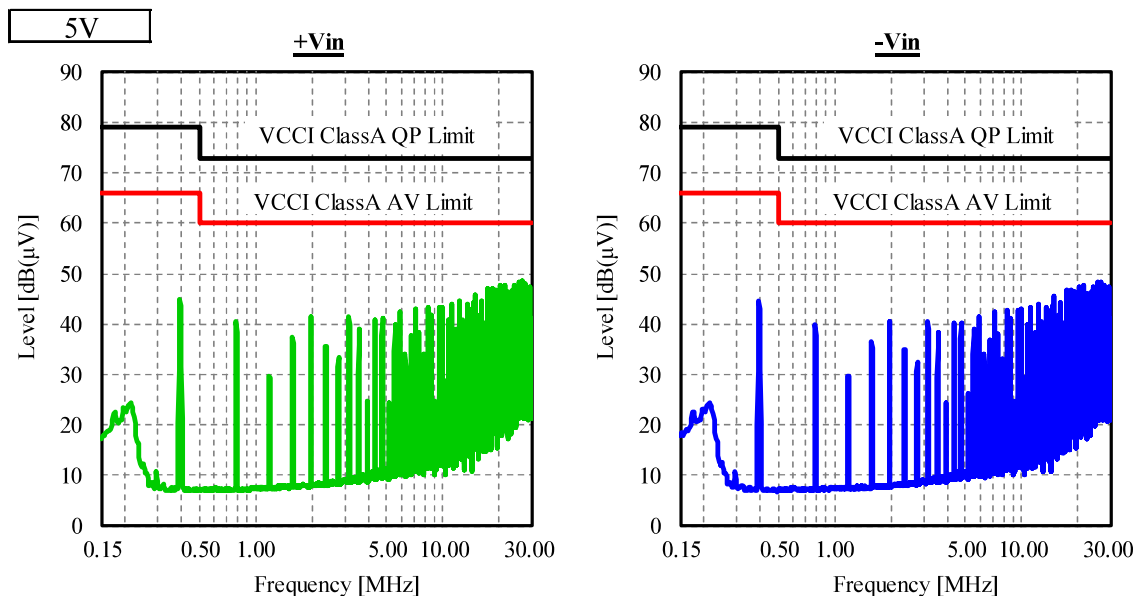
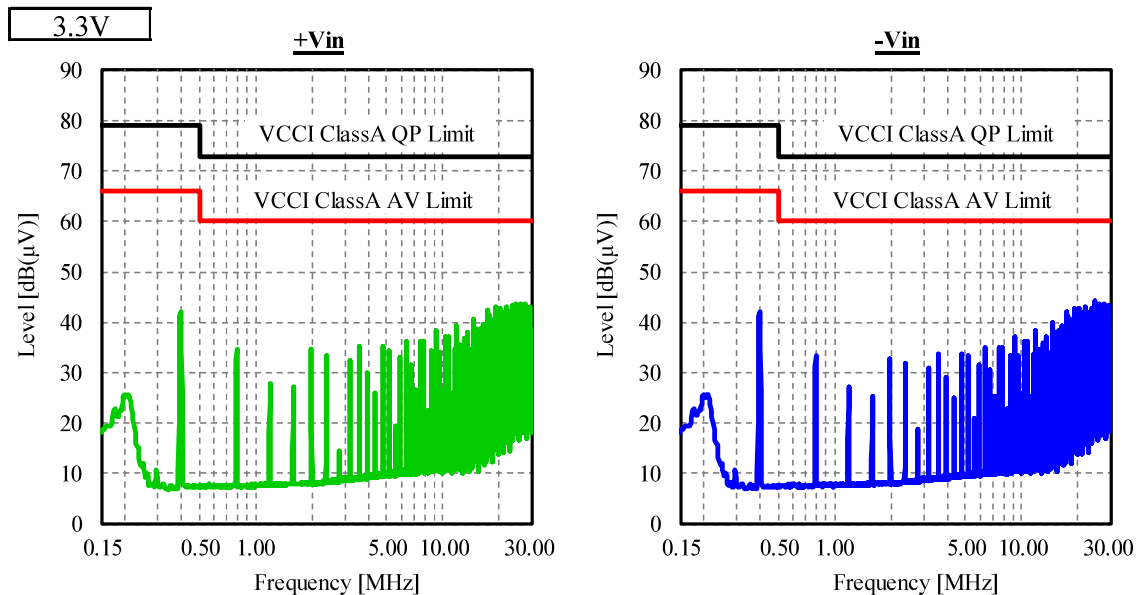
15V



2-9. EMI特性 Electro-Magnetic Interference characteristics

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

Conditions Vin : 12 VDC  
Io : 100 %  
Ta : 25 °C



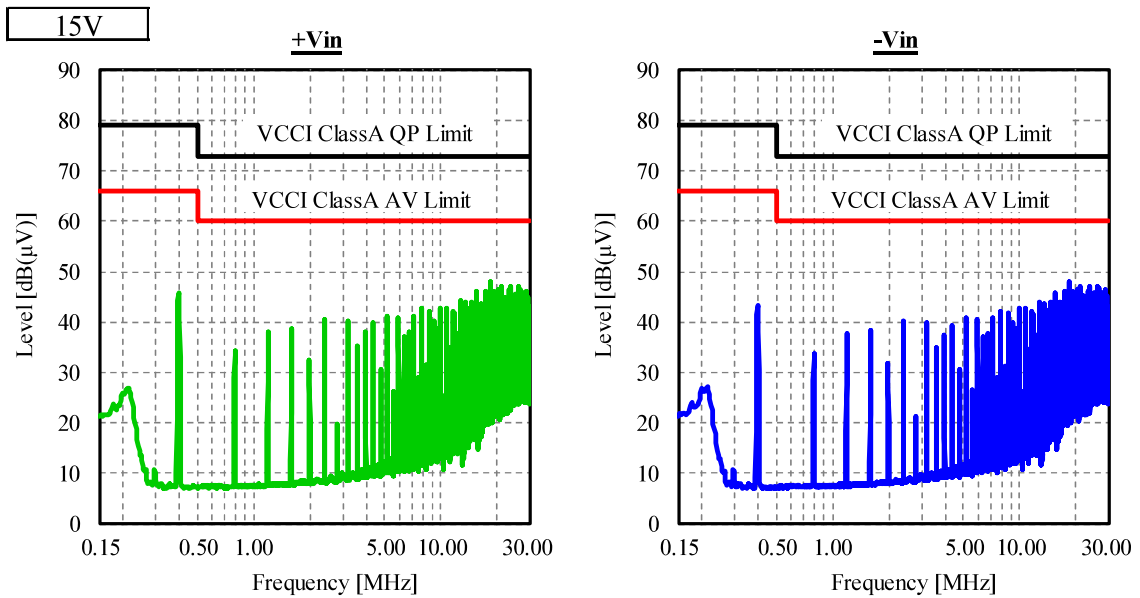
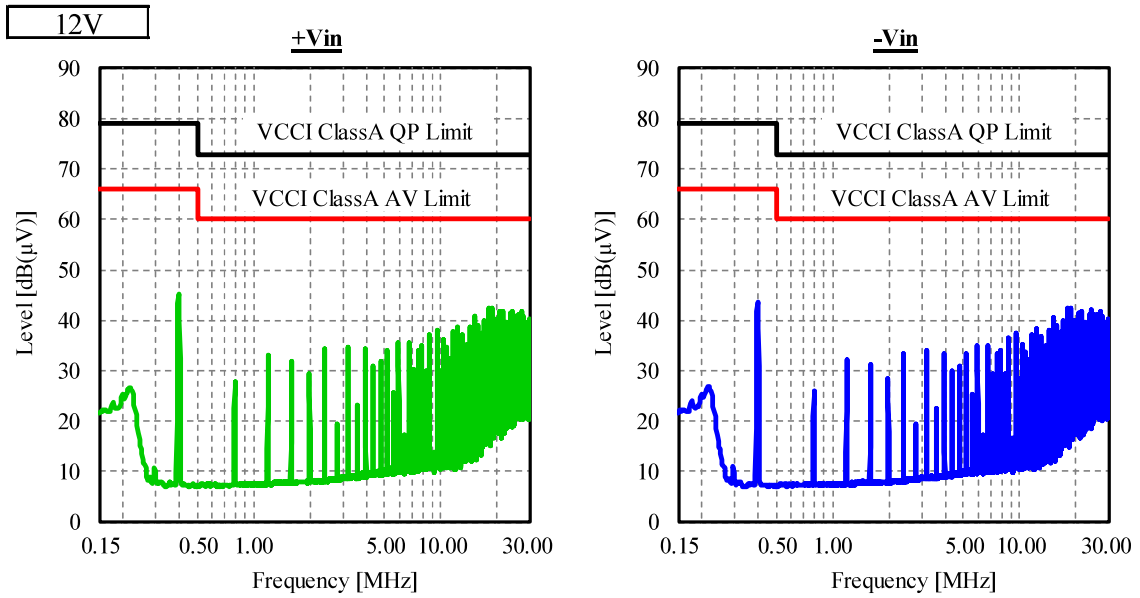
表示はQP値  
Indication is QP values.



2-9. EMI特性 Electro-Magnetic Interference characteristics

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

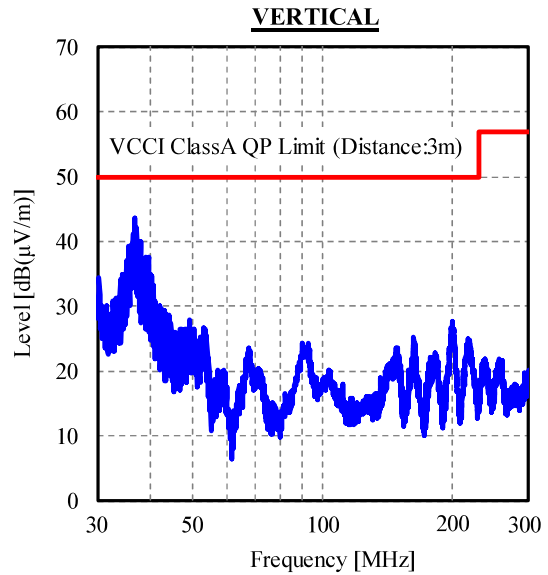
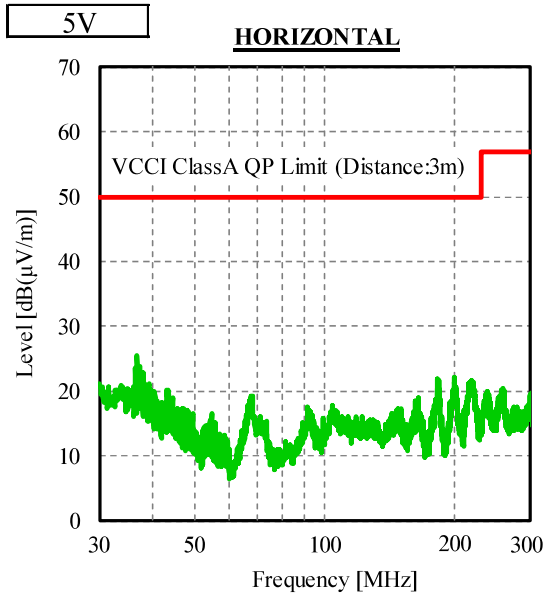
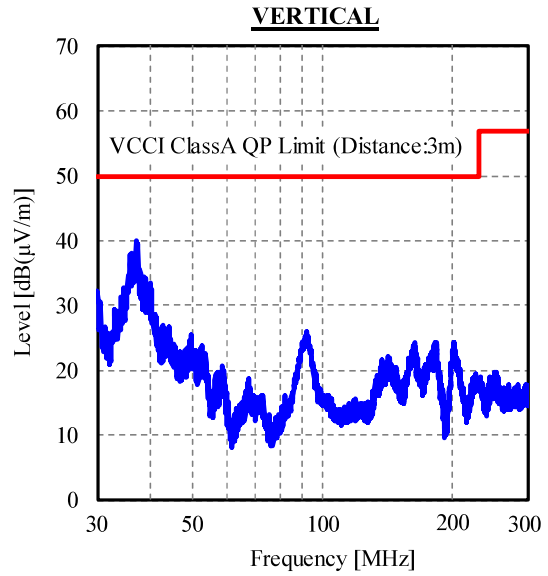
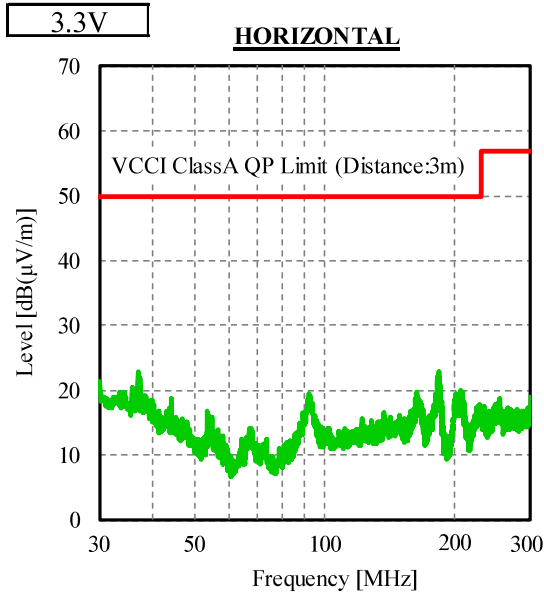
Conditions Vin : 12 VDC  
 Io : 100 %  
 Ta : 25 °C



表示はQP値  
 Indication is QP values.

2-9. EMI特性 Electro-Magnetic Interference characteristics  
 (b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise

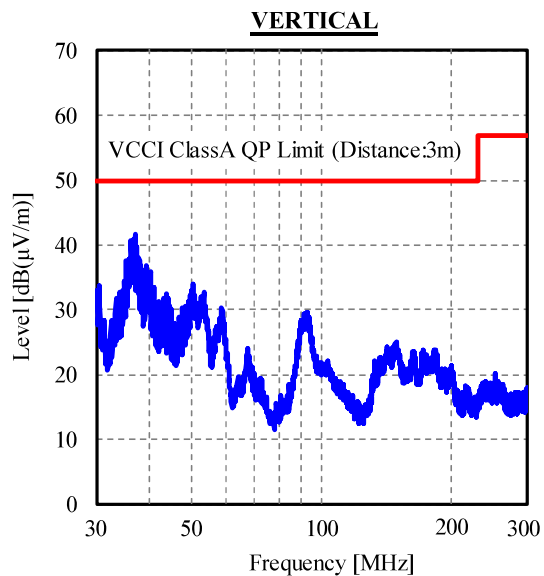
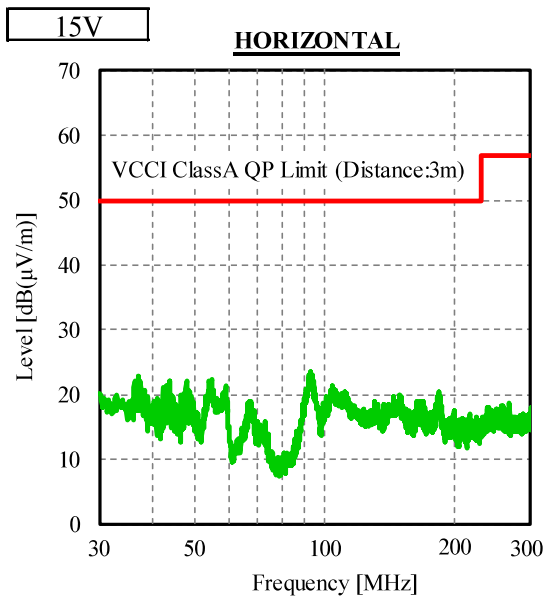
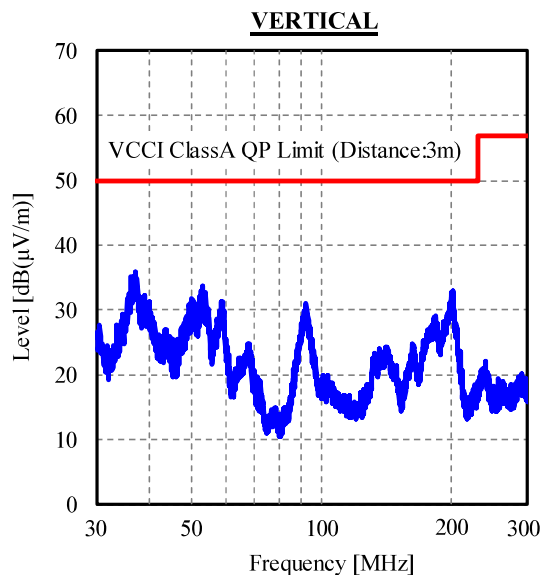
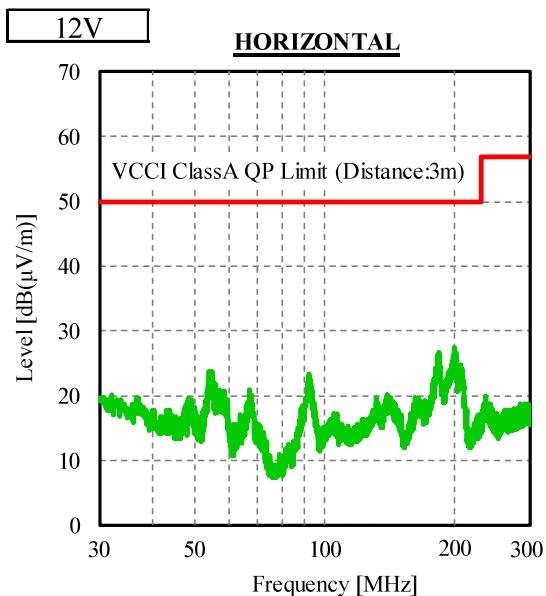
Conditions Vin : 12 VDC  
 Io : 100 %  
 Ta : 25 °C



表示はピーク値  
 Indication is peak values.

2-9. EMI特性 Electro-Magnetic Interference characteristics  
 (b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise

Conditions Vin : 12 VDC  
 Io : 100 %  
 Ta : 25 °C



表示はピーク値  
 Indication is peak values.