

**CCG15-48-\*\*\*S**

**EVALUATION DATA**

型式データ

## INDEX

	PAGE
<b>1. 測定方法 Evaluation Method</b>	
1-1. 測定回路 Measurement Circuits .....	3
(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	
(3) 出力リップル、ノイズ波形 Output ripple and noise waveform	
(4) EMI特性 Electro-Magnetic Interference characteristics	
1-2. 使用測定機器 List of equipment used .....	5
<b>2. 特性データ Characteristics</b>	
2-1. 静特性 Steady state characteristics	
(1) 入力・負荷・温度変動 Regulation - line and load, Temperature drift .....	6
(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 .....	7
(3) 入力電流・効率 対 出力電流 Input current and Efficiency vs. Output current .....	9
(4) 効率 対 入力電圧 Efficiency vs. Input voltage .....	11
(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics .....	13
2-2. 待機電力特性 Standby power characteristics .....	15
2-3. 通電ドリフト特性 Warm up voltage drift characteristics .....	17
2-4. 過電流保護特性 Over current protection (OCP) characteristics .....	19
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics .....	21
2-6. 過渡応答(負荷急変)特性 Dynamic load response characteristics .....	29
2-7. 入力サージ電流(突入電流)特性 Inrush current characteristics .....	30
2-8. 出力リップル、ノイズ波形 Output ripple and noise waveform .....	31
2-9. EMI特性 Electro-Magnetic Interference characteristics .....	32

## 使用記号 Terminology used

	定義	Definition
V <sub>in</sub>	..... 入力電圧	Input voltage
V <sub>o</sub>	..... 出力電圧	Output voltage
V <sub>rc</sub>	..... RC電圧	RC voltage
I <sub>in</sub>	..... 入力電流	Input current
I <sub>o</sub>	..... 出力電流	Output current
T <sub>a</sub>	..... 周囲温度	Ambient temperature
f	..... 周波数	Frequency

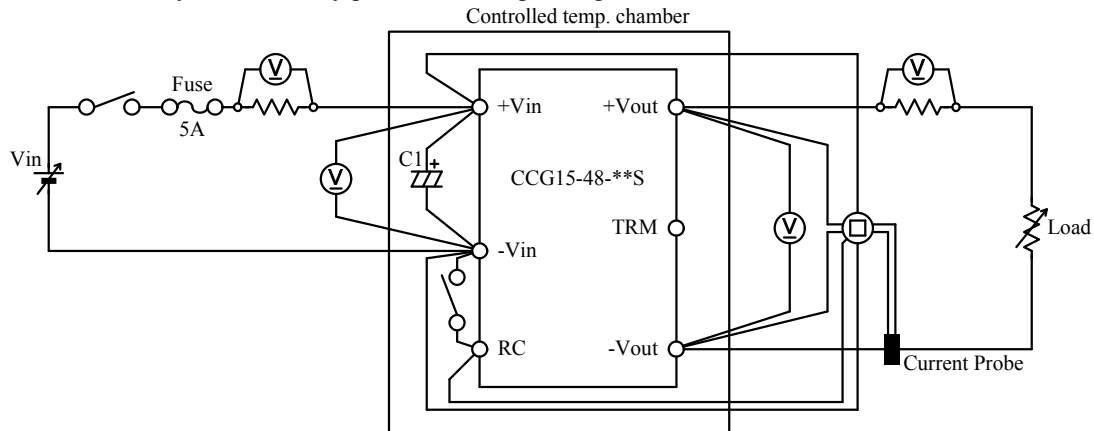
※ 当社測定条件における結果であり、参考値としてお考え願います。  
Test results are reference data based on our measurement condition.

## 1. 測定方法 Evaluation Method

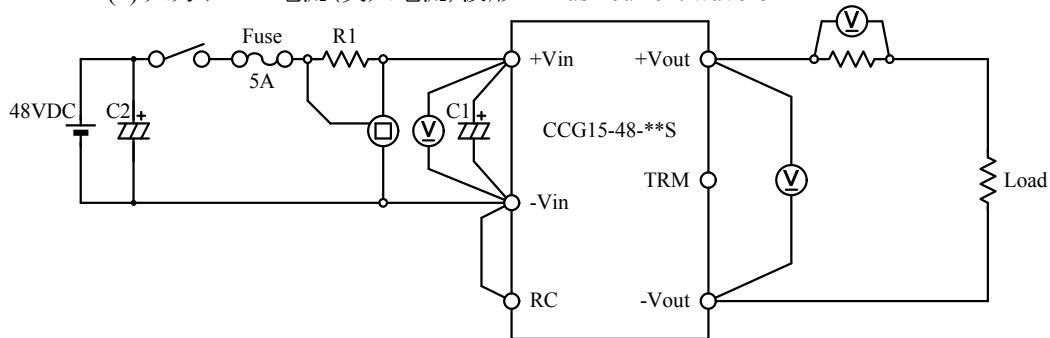
### 1-1. 測定回路 Measurement Circuits

#### (1) 静特性、待機電力特性、通電ドリフト特性、その他特性

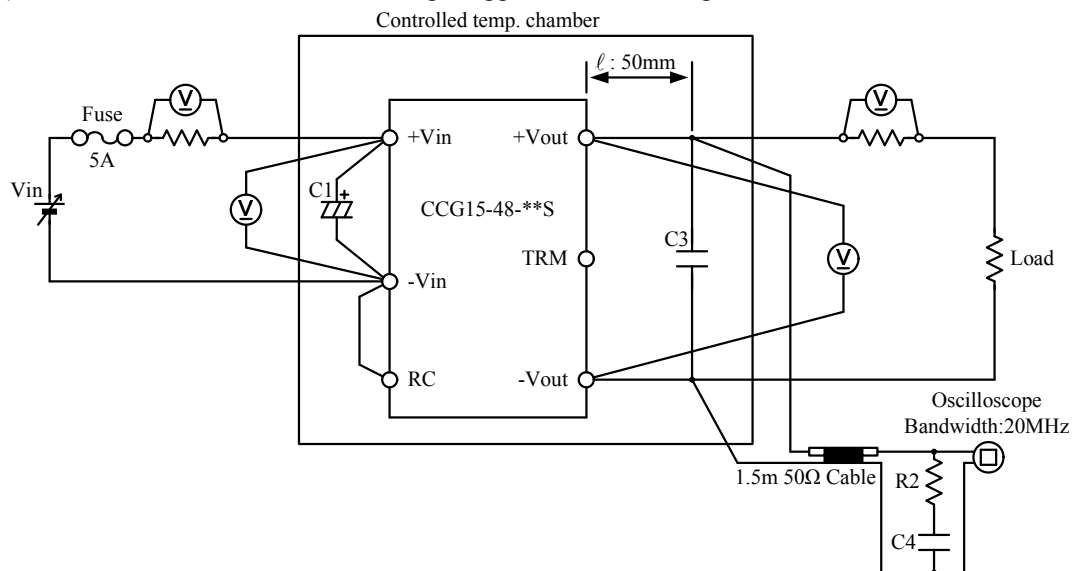
Steady state, Standby power, Warm up voltage drift and Other characteristics



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



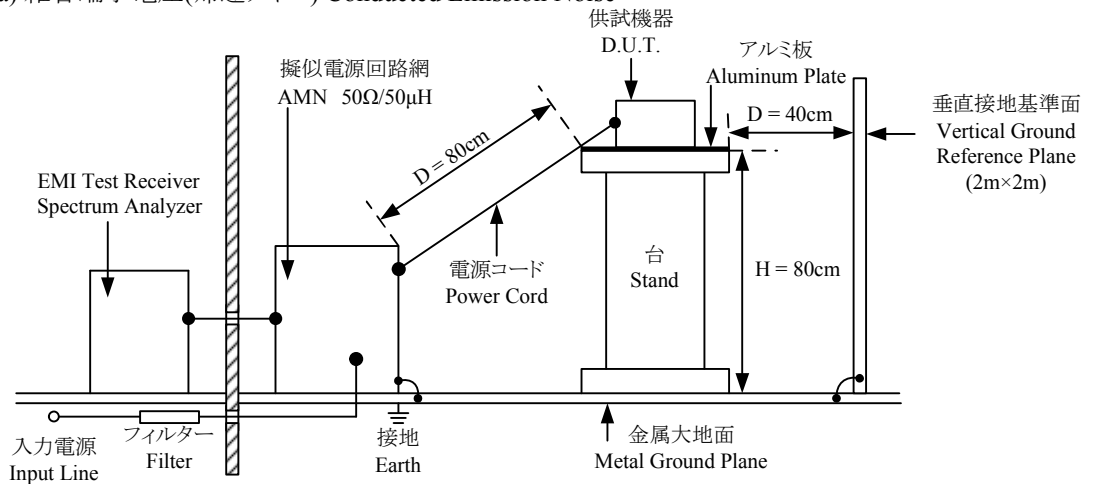
#### (3) 出力リップル、ノイズ電圧、波形 Output ripple and noise voltage and waveform



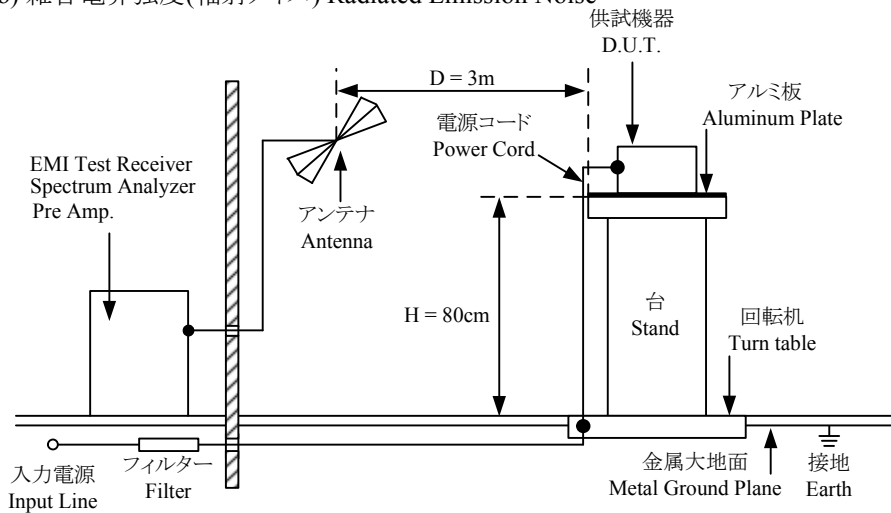
C1 : 47 $\mu$ F	Electrolytic Capacitor
C2 : 8000 $\mu$ F	Electrolytic Capacitor
C3 : 22 $\mu$ F	Ceramic Capacitor
C4 : 4700pF	Ceramic Capacitor
R1 : 0.01 $\Omega$	
R2 : 50 $\Omega$	

(4) EMI特性 Electro-Magnetic Interference characteristics

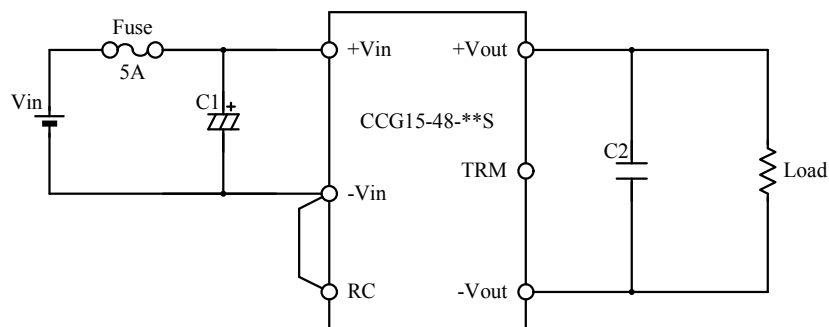
(a) 雑音端子電圧(帰還ノイズ) Conducted Emission Noise



(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 : 82μF  
C2 : 22μF

Electrolytic Capacitor  
Ceramic Capacitor

## 1-2. 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740 / DL1740E
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	TAKASAGO	FK-200L / FK-600L
7	CVCF	TAKASAGO	AA2000XG
8	CVCF	NF	ES1000S / ES10000S
9	DC POWER SUPPLY	TDK-Lambda	Z+100-8
10	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261 / SU-641
11	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESCI
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	18VDC	24VDC	48VDC	76VDC	Line regulation	
0%	3.301V	3.301V	3.301V	3.300V	1mV	0.030%
50%	3.300V	3.300V	3.300V	3.300V	0mV	0.000%
100%	3.299V	3.299V	3.299V	3.298V	1mV	0.030%
Load regulation	2mV	2mV	2mV	2mV		
	0.061%	0.061%	0.061%	0.061%		

## 2. Temperature drift

Conditions Vin : 48 VDC  
Io : 100 %

Ta	-40°C	25°C	85°C	Temperature stability	
Vo	3.278V	3.299V	3.302V	24mV	0.727%

5V

## 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	18VDC	24VDC	48VDC	76VDC	Line regulation	
0%	5.011V	5.011V	5.011V	5.009V	2mV	0.040%
50%	5.010V	5.010V	5.010V	5.009V	1mV	0.020%
100%	5.009V	5.009V	5.009V	5.008V	1mV	0.020%
Load regulation	2mV	2mV	2mV	1mV		
	0.040%	0.040%	0.040%	0.020%		

## 2. Temperature drift

Conditions Vin : 48 VDC  
Io : 100 %

Ta	-40°C	25°C	85°C	Temperature stability	
Vo	4.976V	5.009V	5.016V	40mV	0.800%

12V

## 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	18VDC	24VDC	48VDC	76VDC	Line regulation	
0%	12.054V	12.055V	12.054V	12.054V	1mV	0.008%
50%	12.053V	12.053V	12.053V	12.053V	0mV	0.000%
100%	12.052V	12.053V	12.052V	12.053V	1mV	0.008%
Load regulation	2mV	2mV	2mV	1mV		
	0.017%	0.017%	0.017%	0.008%		

## 2. Temperature drift

Conditions Vin : 48 VDC  
Io : 100 %

Ta	-40°C	25°C	85°C	Temperature stability	
Vo	12.062V	12.052V	12.058V	10mV	0.083%

15V

## 1. Regulation - line and load

Condition Ta : 25 °C

Io \ Vin	18VDC	24VDC	48VDC	76VDC	Line regulation	
0%	15.121V	15.122V	15.121V	15.120V	2mV	0.013%
50%	15.120V	15.120V	15.119V	15.120V	1mV	0.007%
100%	15.120V	15.120V	15.119V	15.119V	1mV	0.007%
Load regulation	1mV	2mV	2mV	1mV		
	0.007%	0.013%	0.013%	0.007%		

## 2. Temperature drift

Conditions Vin : 48 VDC  
Io : 100 %

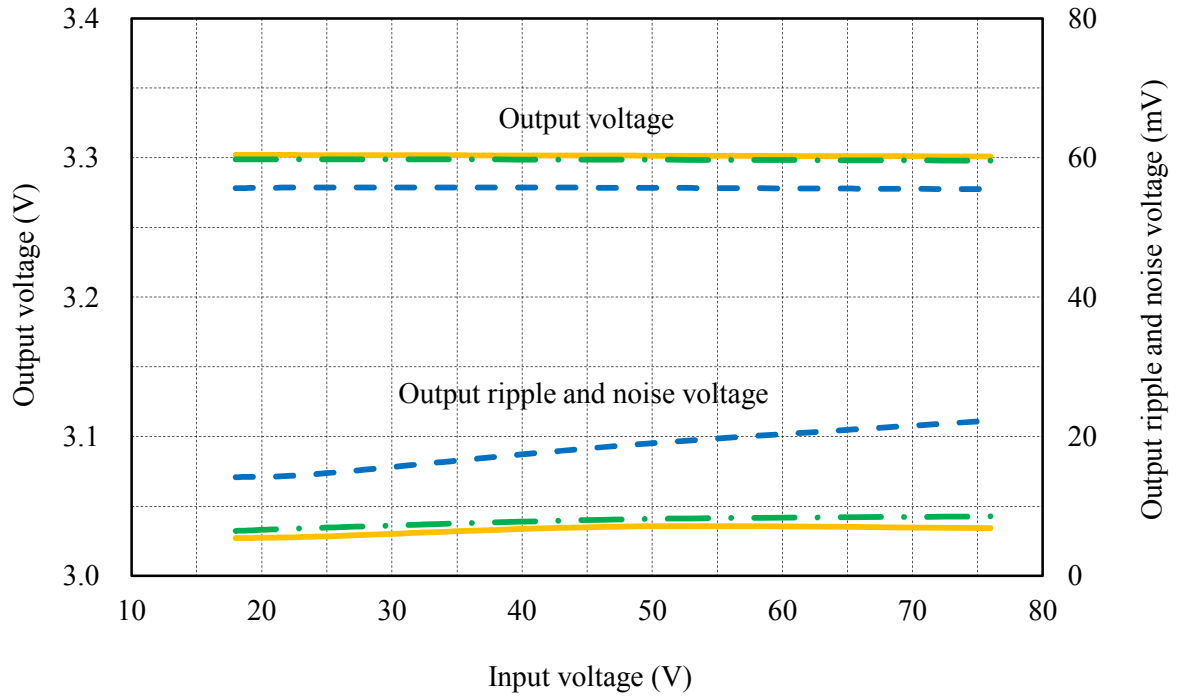
Ta	-40°C	25°C	85°C	Temperature stability	
Vo	15.115V	15.119V	15.118V	4mV	0.027%

(2) 出力電圧・出力リップルノイズ電圧 対 入力電圧

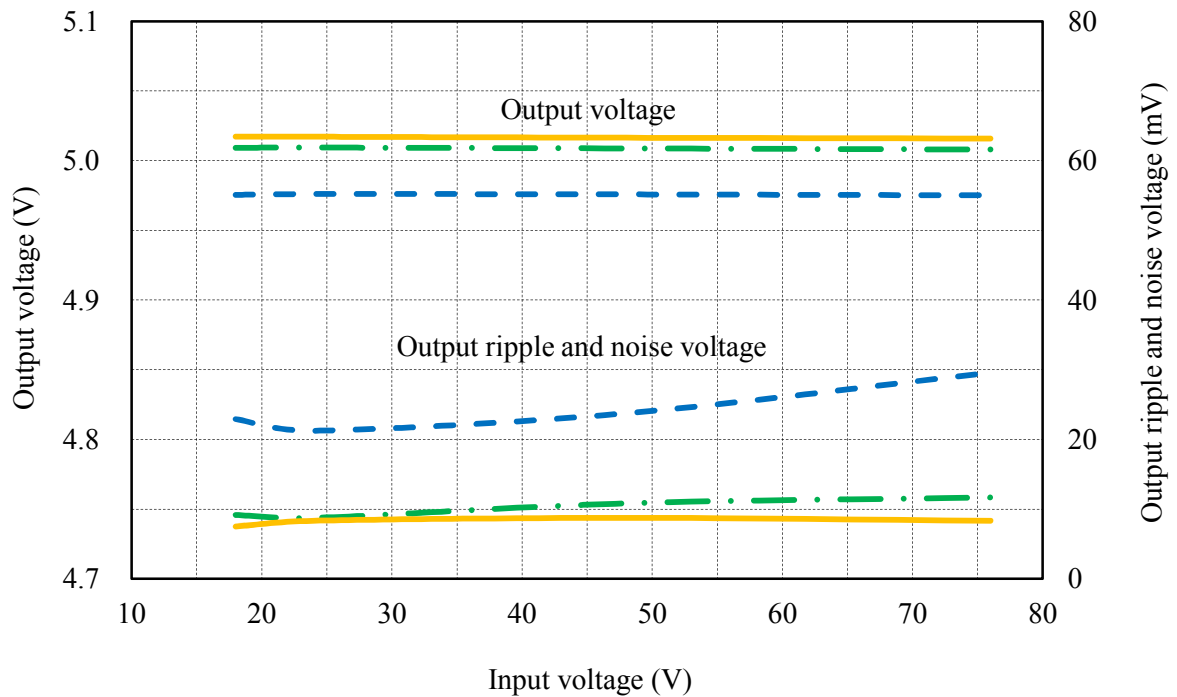
Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions I<sub>o</sub> : 100 %  
 Ta : -40 °C  
 : 25 °C  
 : 85 °C

3.3V



5V

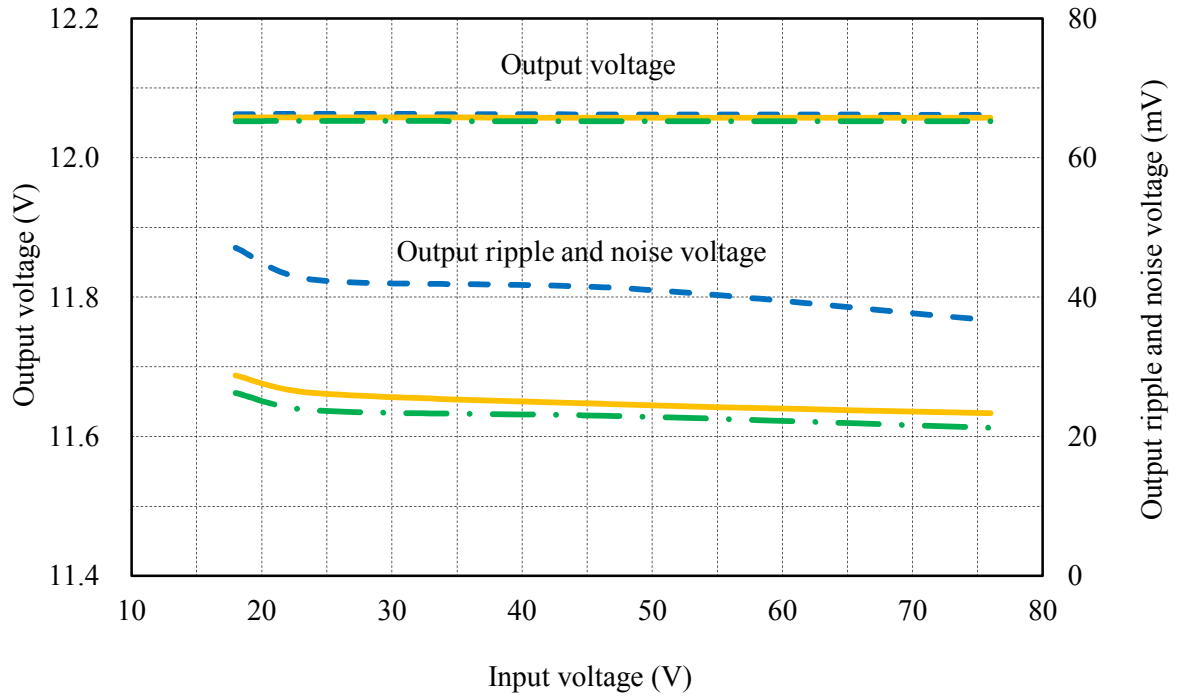


(2) 出力電圧・出力リップルノイズ電圧 対 入力電圧

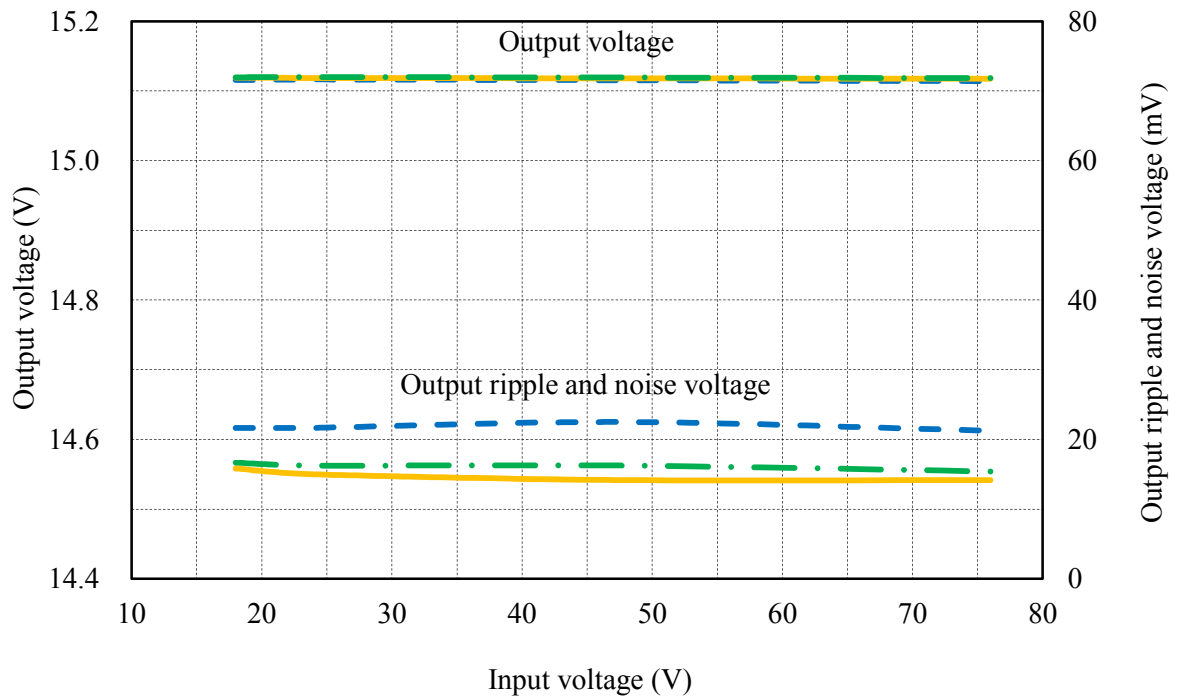
Output voltage and Output ripple and noise voltage vs. Input voltage

Conditions  $I_o$  : 100 %  
 $T_a$  : -40 °C — — — —  
           : 25 °C — · — · —  
           : 85 °C — — — —

12V



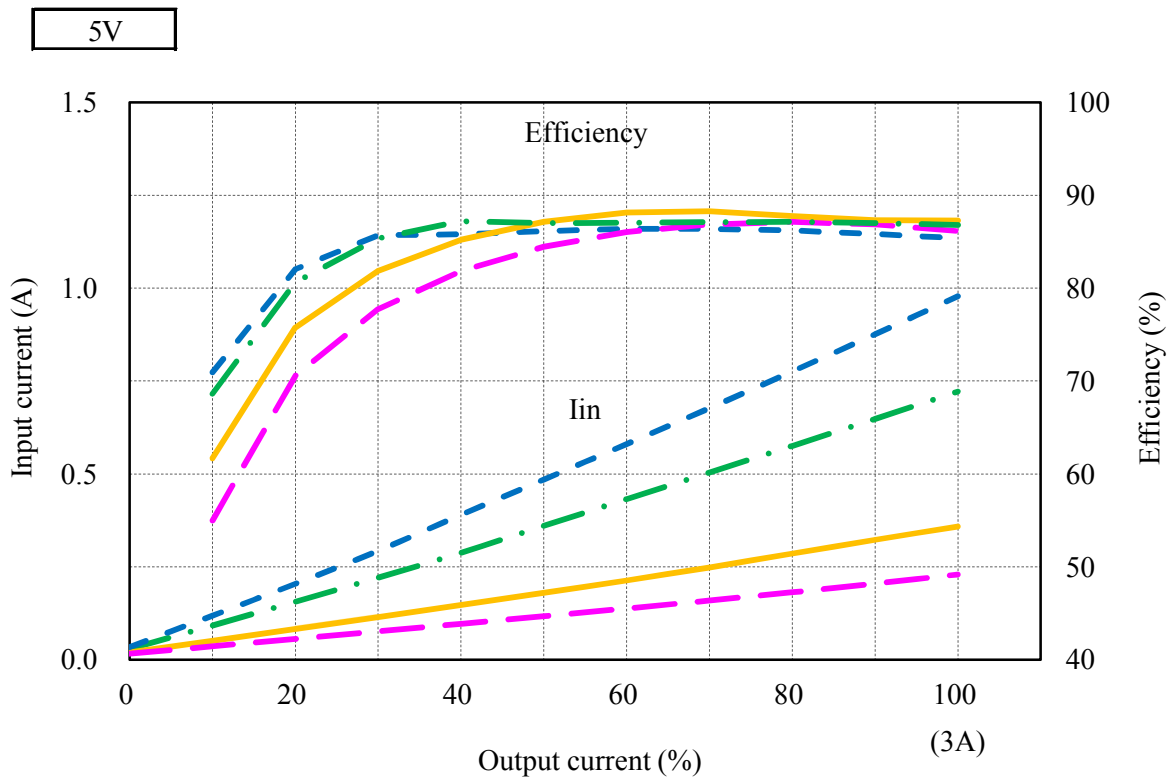
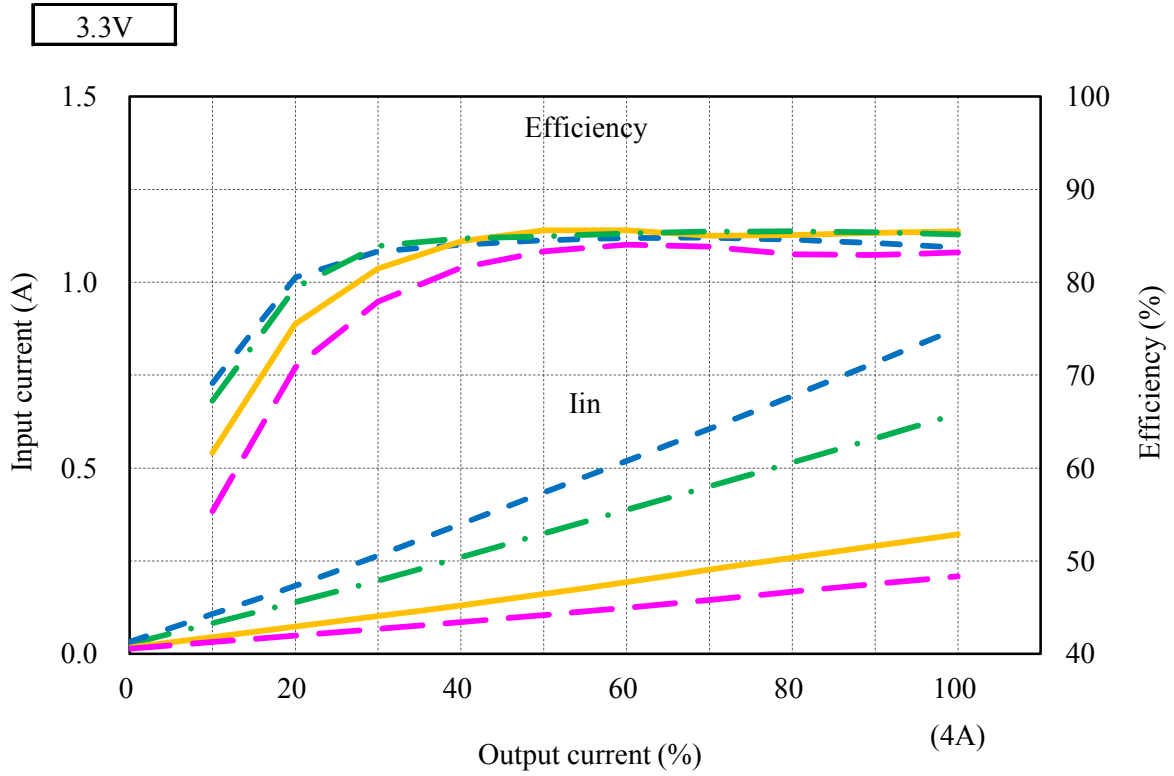
15V





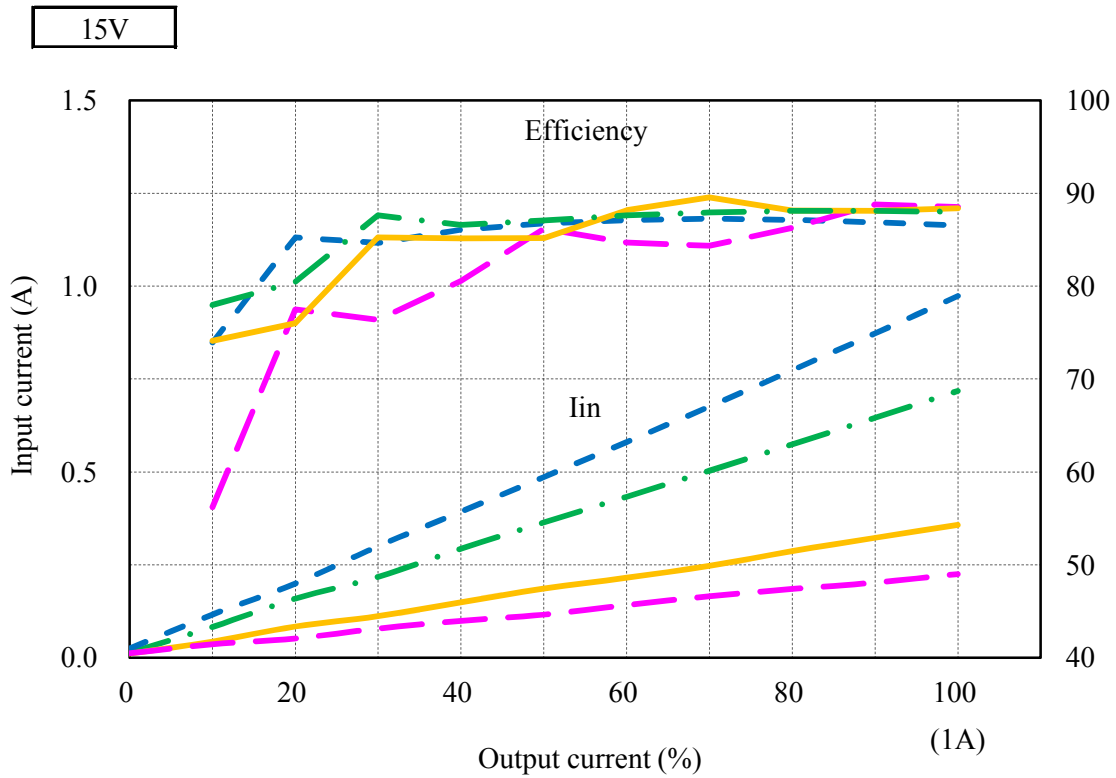
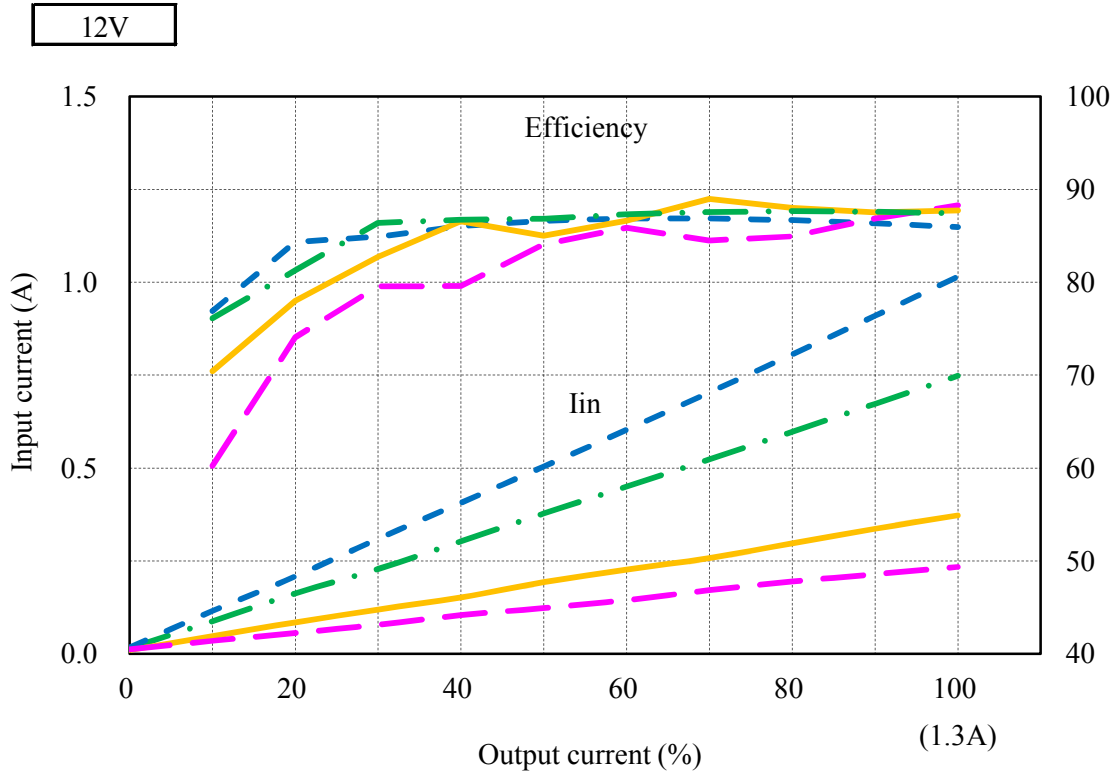
(3) 入力電流・効率 対 出力電流 Input current and Efficiency vs. Output current

Conditions Vin : 18 VDC ---  
 : 24 VDC -.-  
 : 48 VDC —  
 : 76 VDC - - -  
 Ta : 25 °C



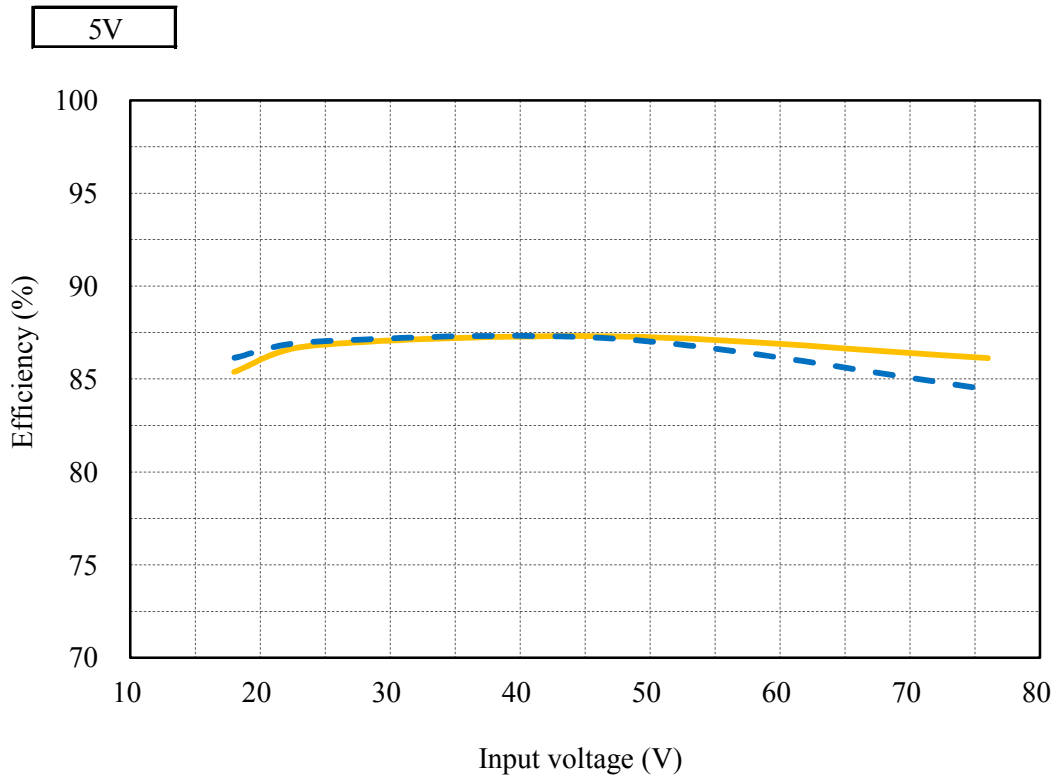
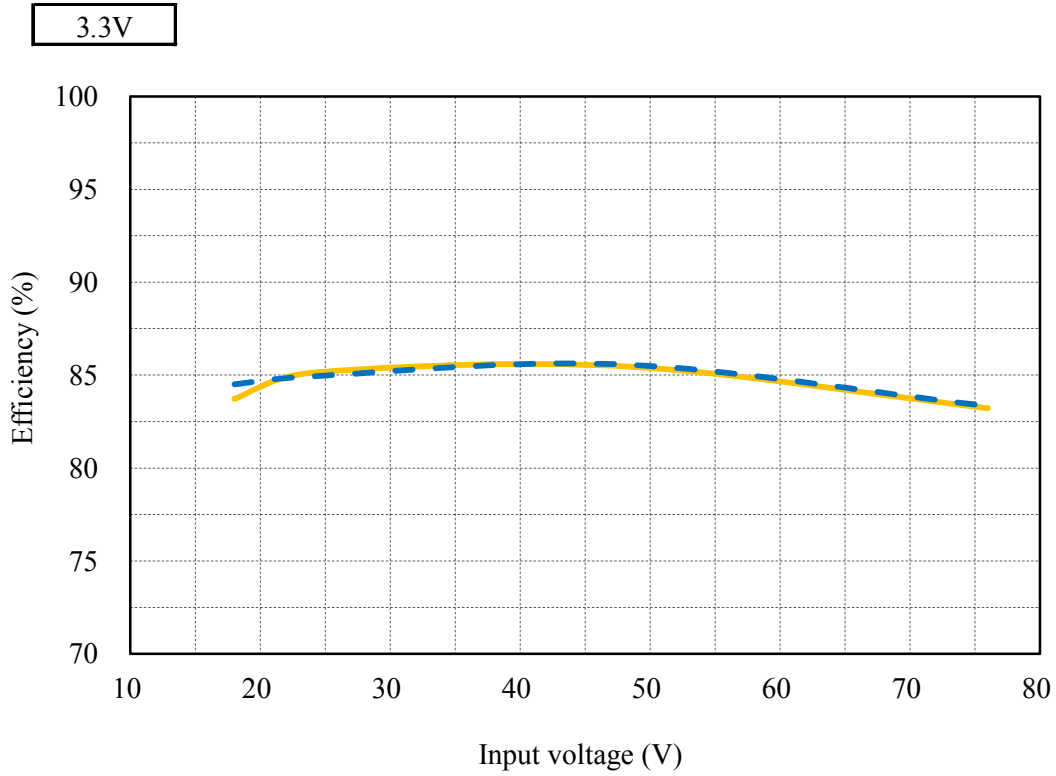
(3) 入力電流・効率 対 出力電流 Input current and Efficiency vs. Output current

Conditions Vin : 18 VDC ---  
 : 24 VDC -.-  
 : 48 VDC —  
 : 76 VDC -.-  
 Ta : 25 °C



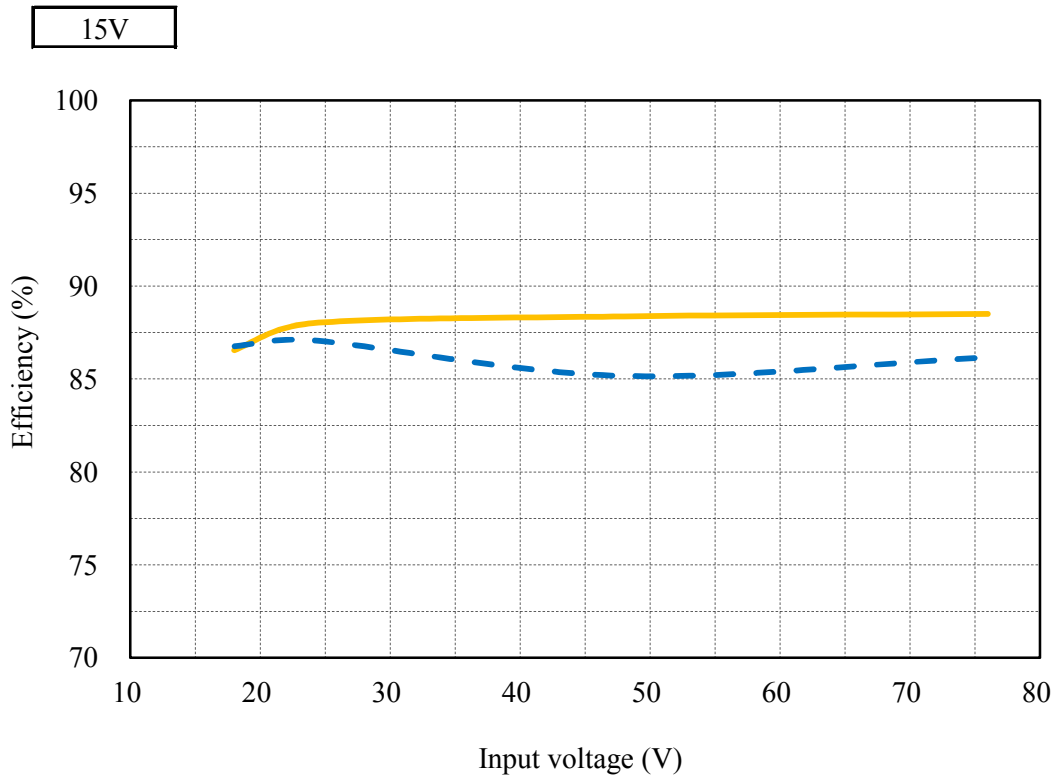
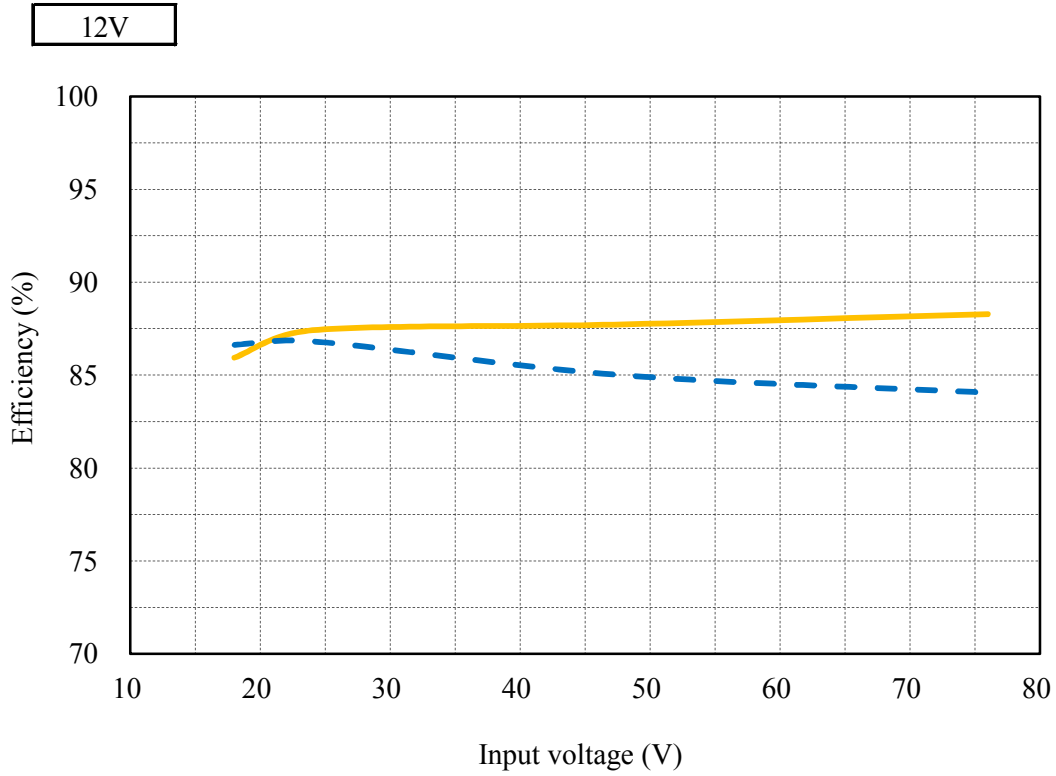
(4) 効率 対 入力電圧 Efficiency vs. Input voltage

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



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

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

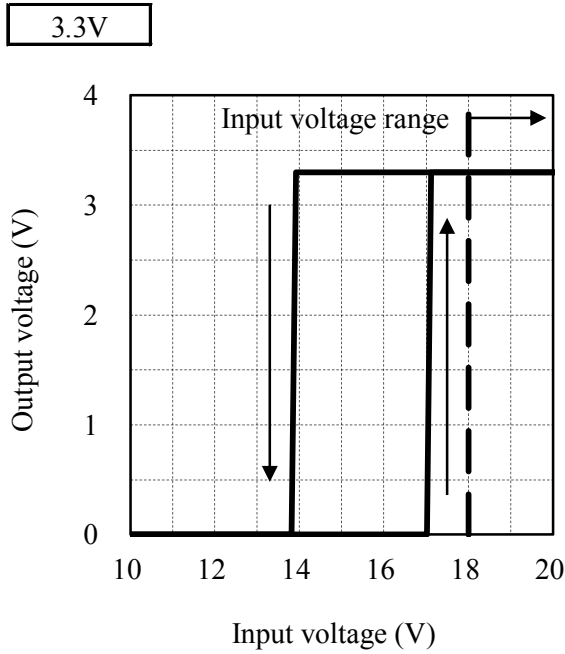


(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics

出力電圧 対 入力電圧

Output voltage vs. Input voltage

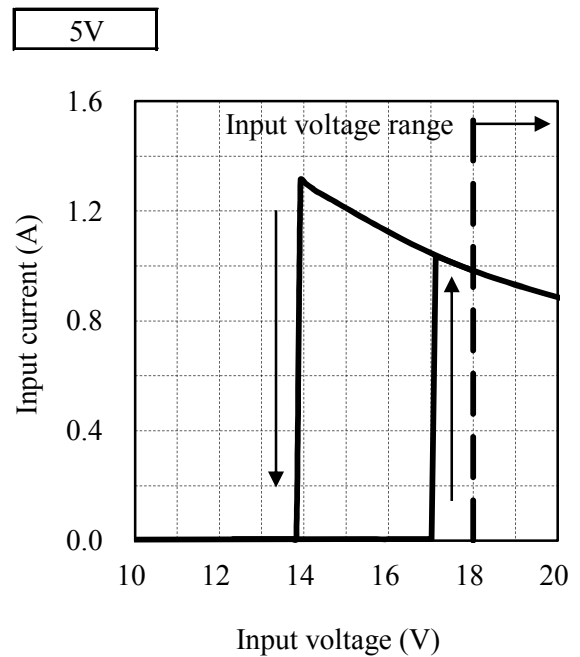
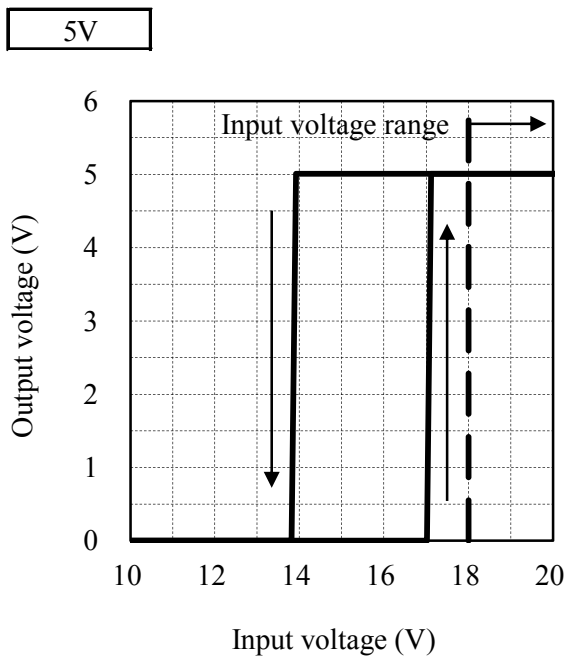
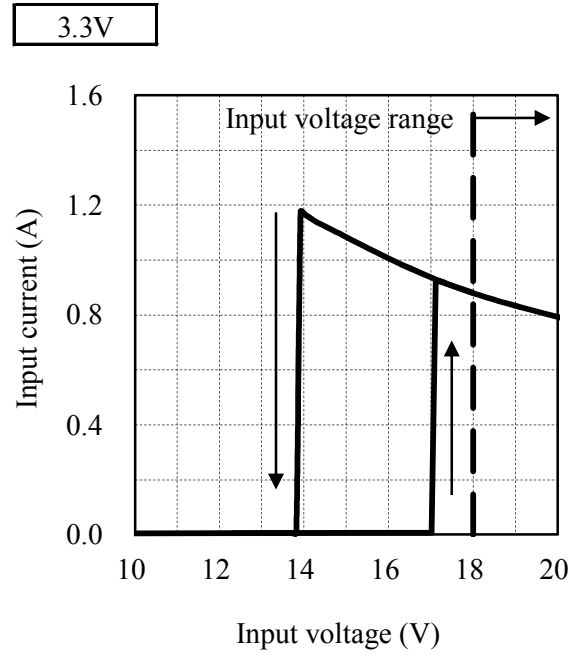
Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C



入力電流 対 入力電圧

Input current vs. Input voltage

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

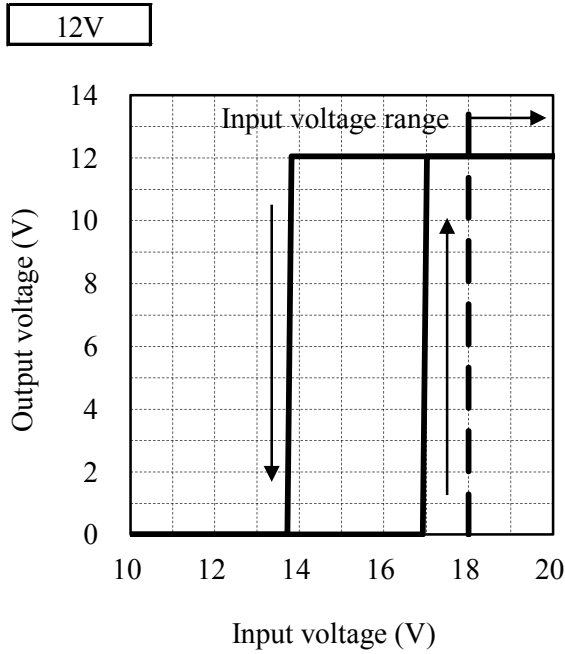


(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics

出力電圧 対 入力電圧

Output voltage vs. Input voltage

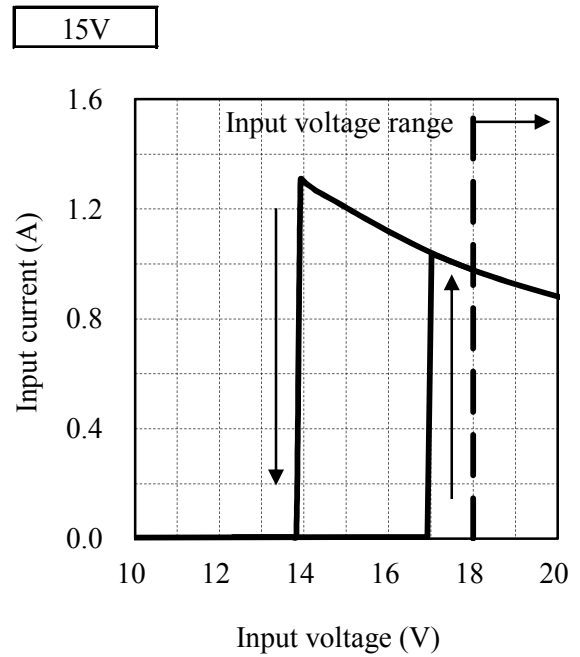
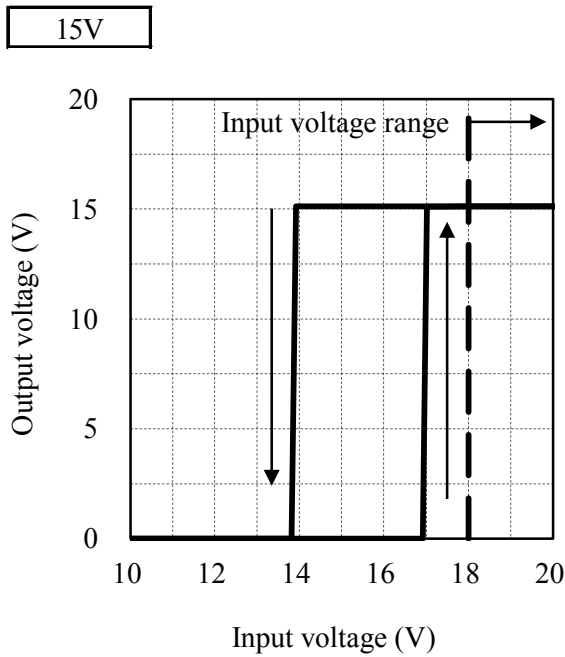
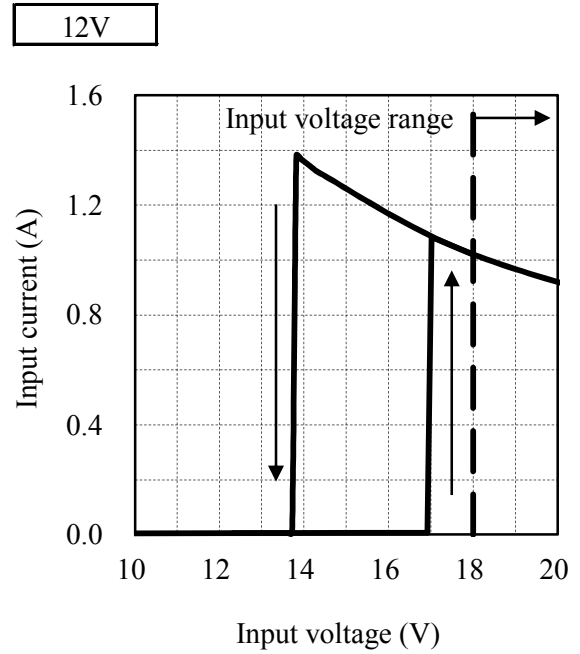
Conditions  $I_o$  : 100 %  
 $T_a$  : 25 °C



入力電流 対 入力電圧

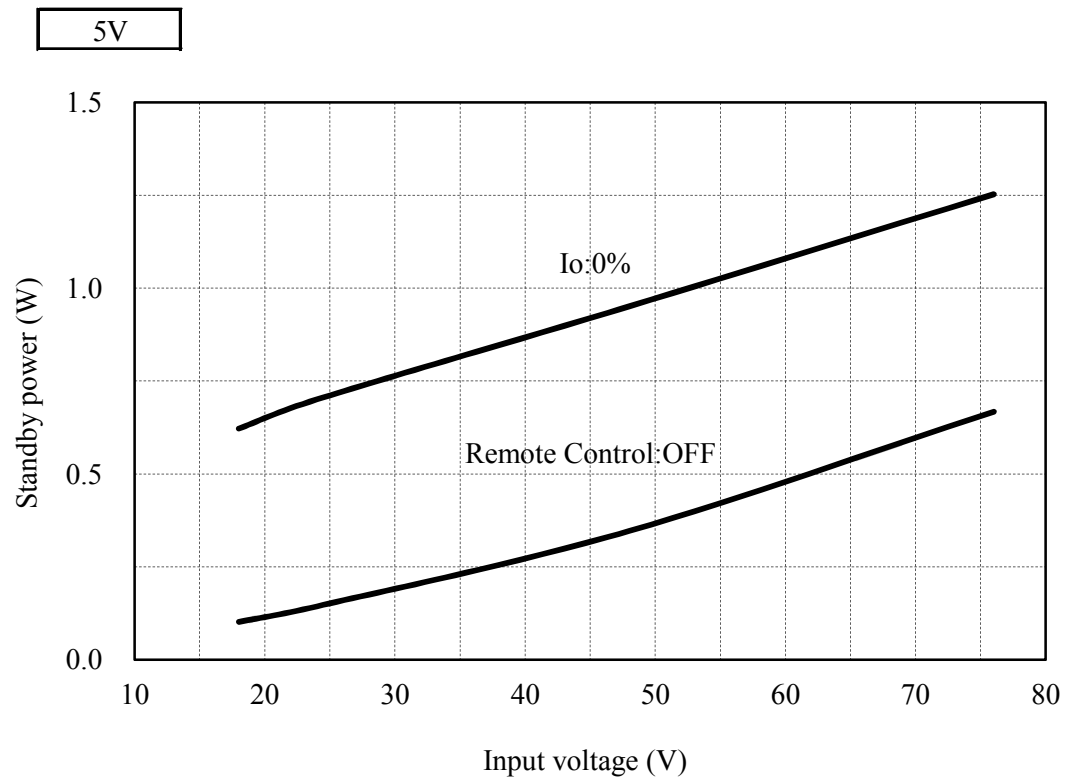
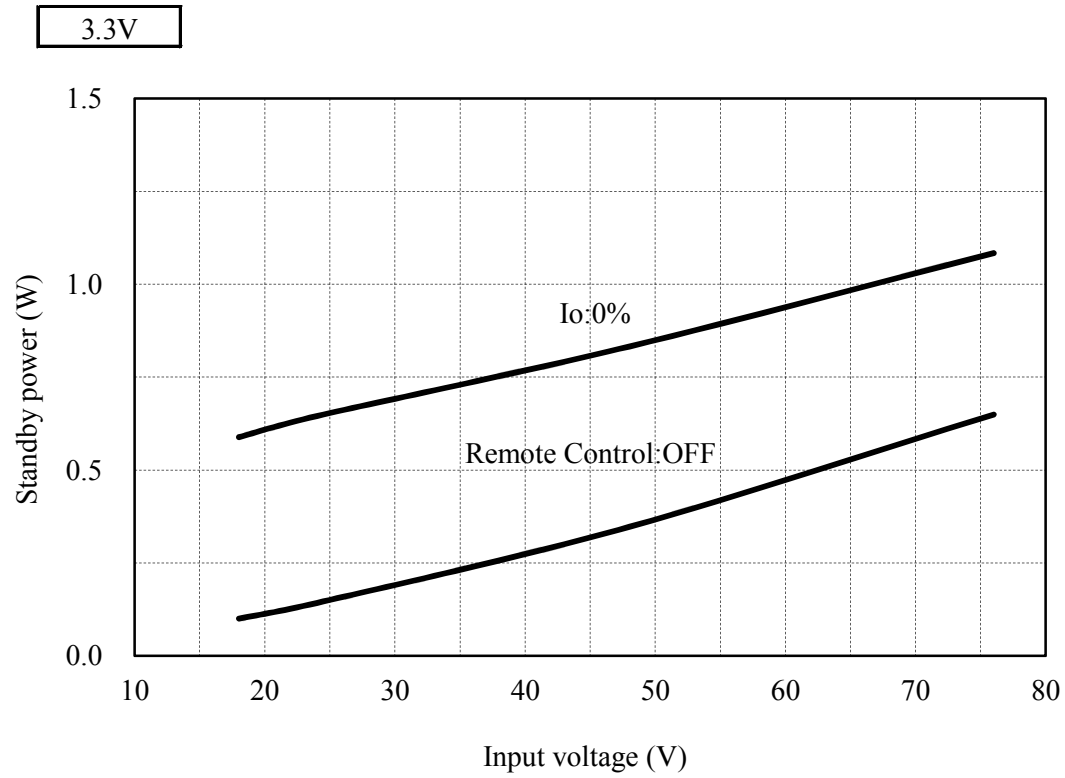
Input current vs. Input voltage

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



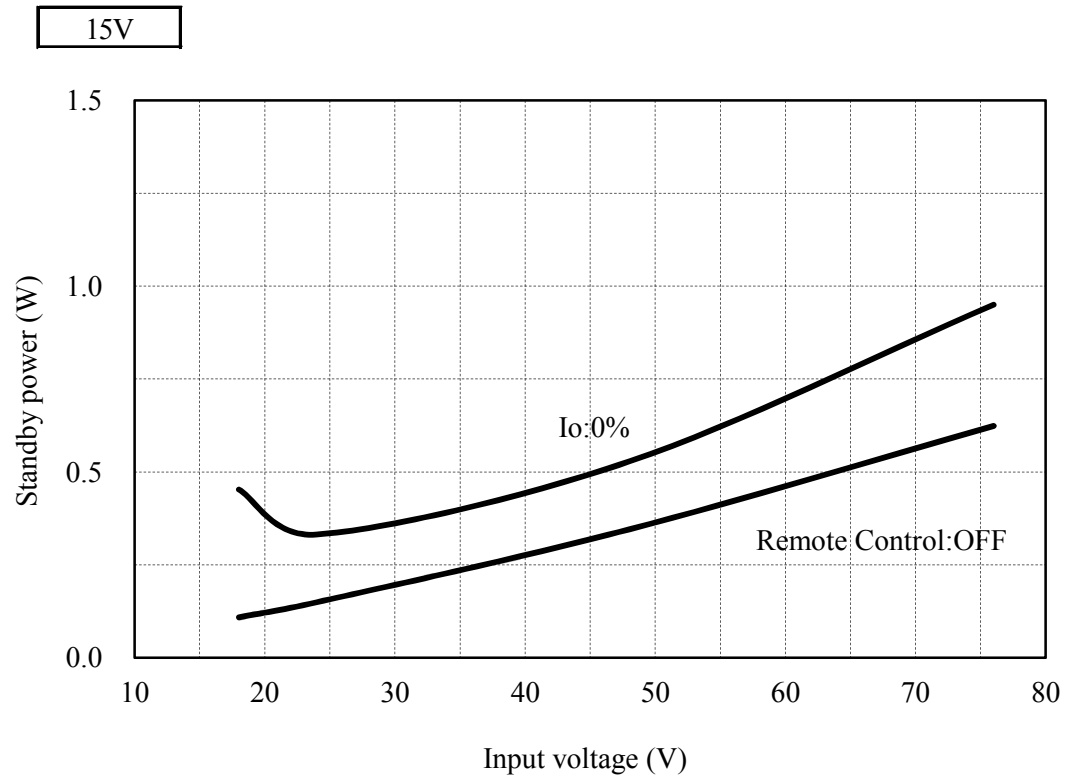
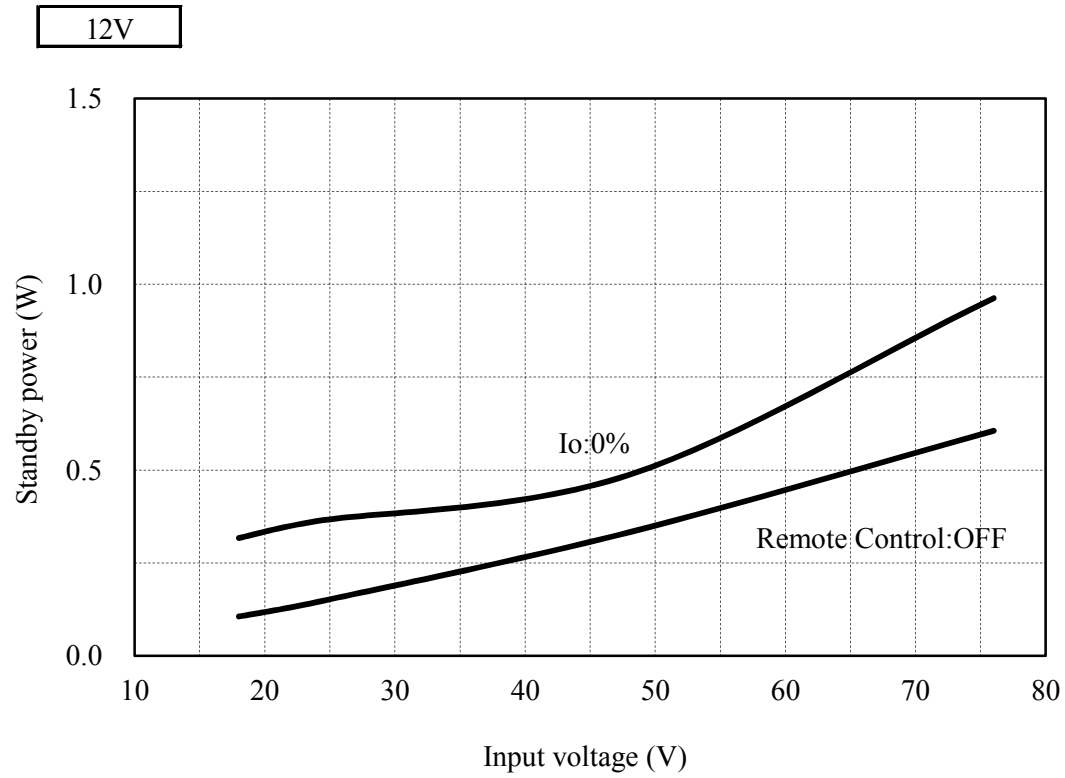
2-2. 待機電力特性 Standby power characteristics

Condition Ta : 25 °C



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

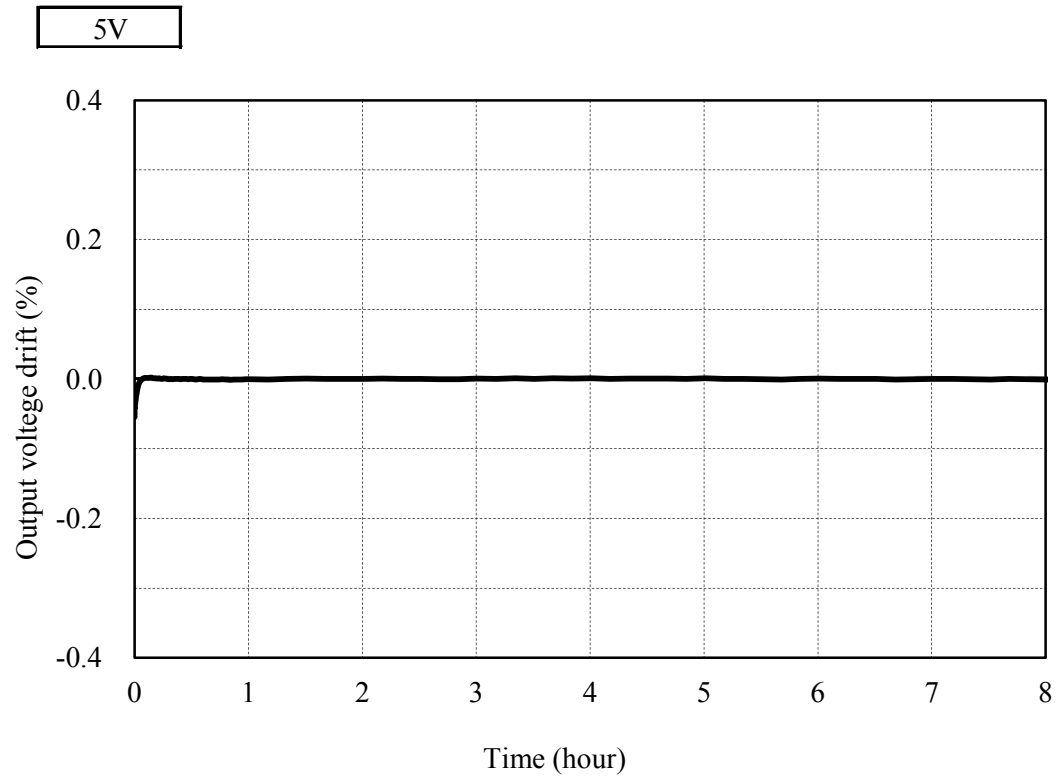
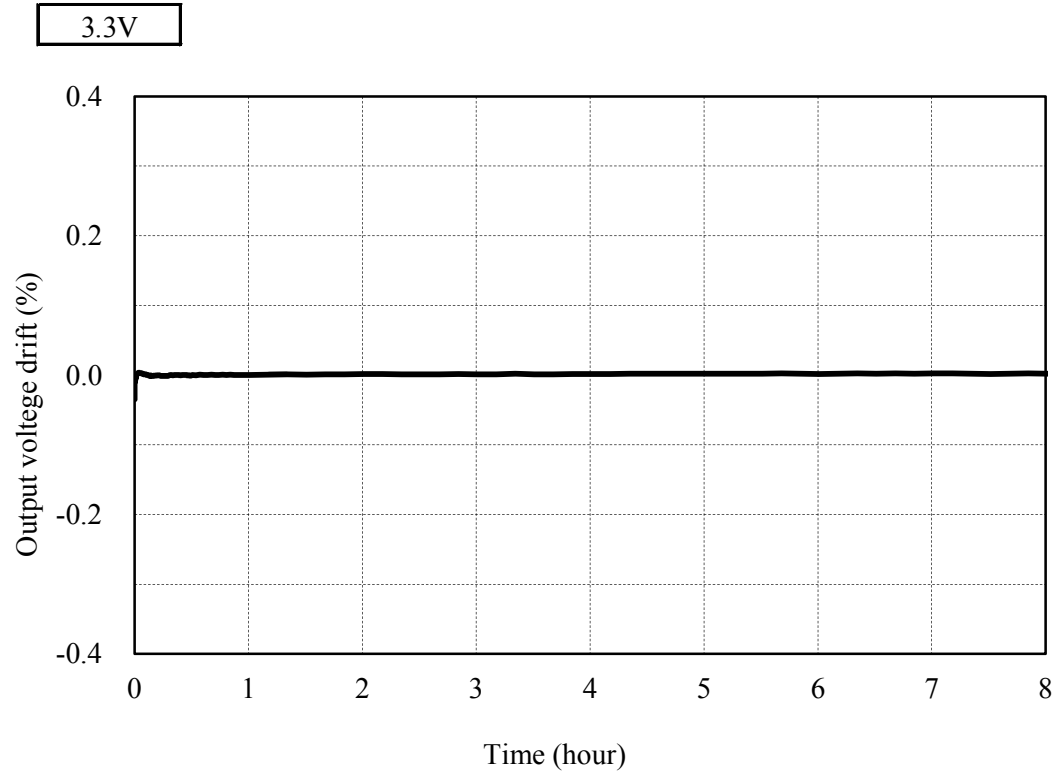
Condition Ta : 25 °C





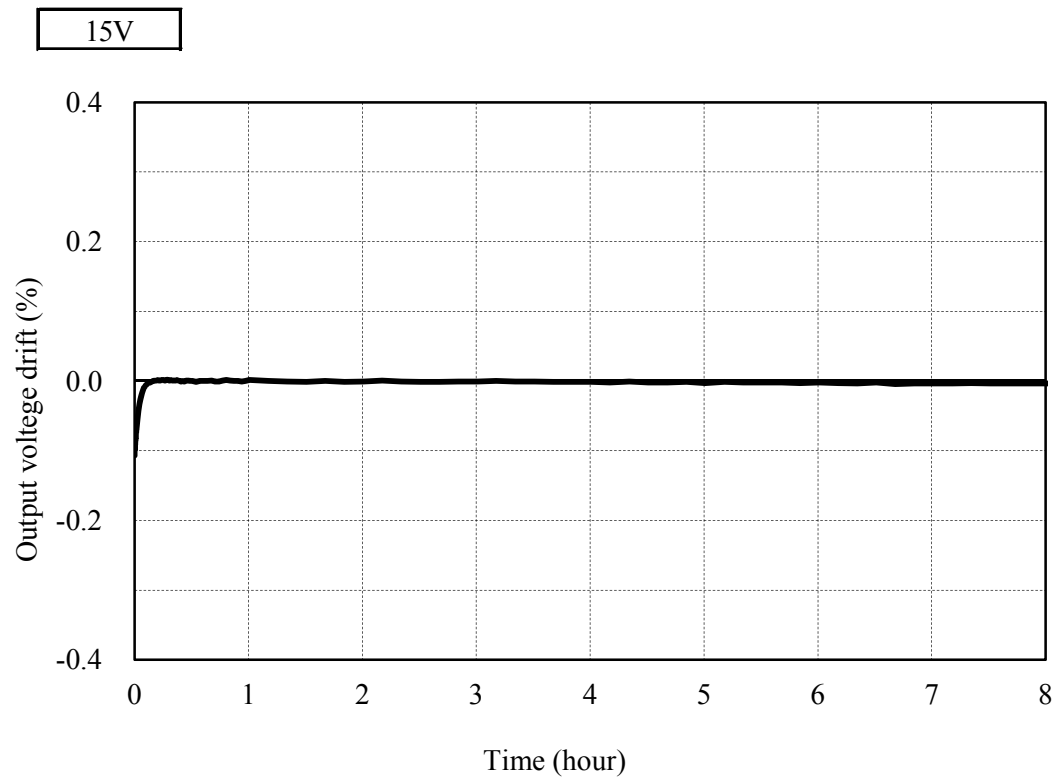
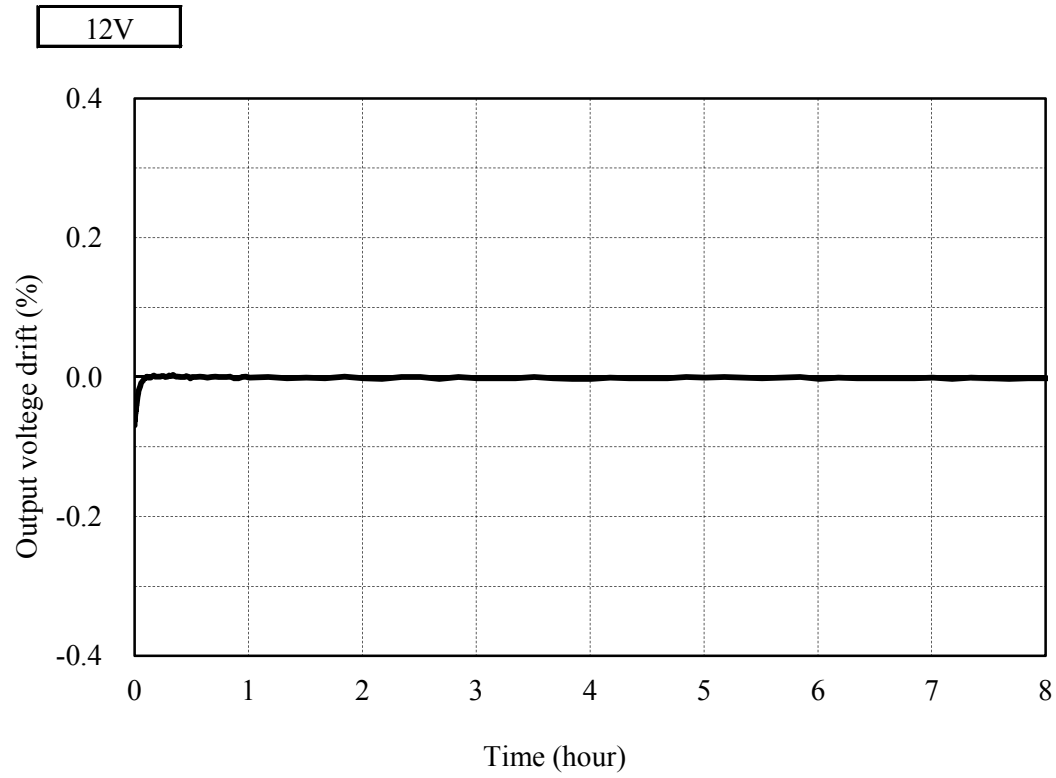
2-3. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 48 VDC  
 Io : 100 %  
 Ta : 25 °C



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

Conditions Vin : 48 VDC  
Io : 100 %  
Ta : 25 °C



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

入力電圧依存性

Input voltage dependence

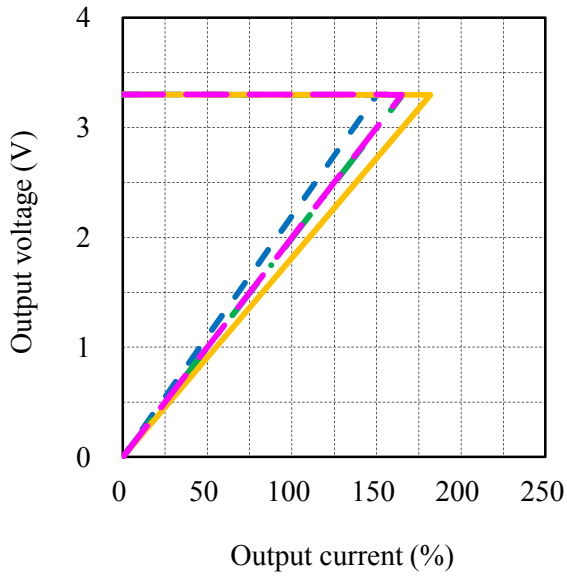
Conditions Vin : 18 VDC — — — —  
 : 24 VDC - · - · -  
 : 48 VDC —————  
 : 76 VDC ————  
 Ta : 25 °C

周囲温度依存性

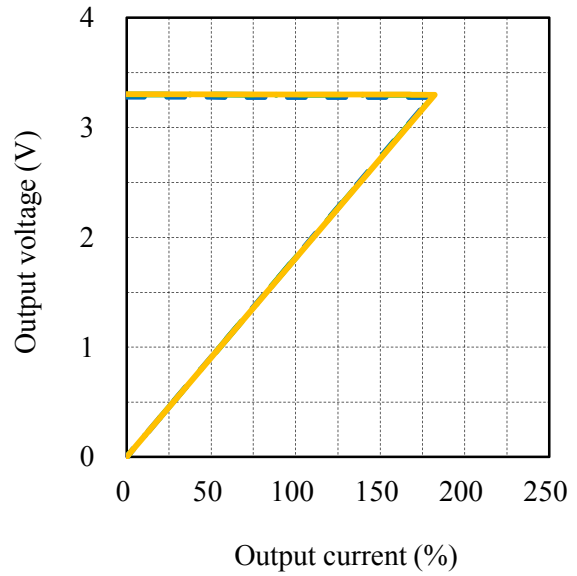
Ambient temperature dependence

Conditions Vin : 48 VDC  
 Ta : -40 °C — — — —  
 : 25 °C - · - · -  
 : 85 °C —————

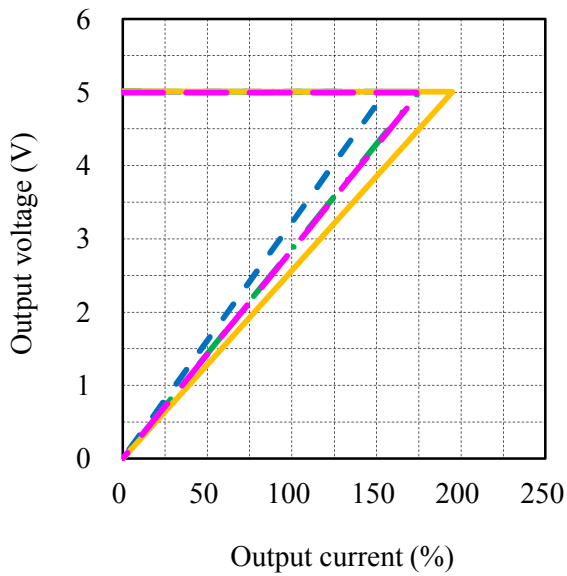
3.3V



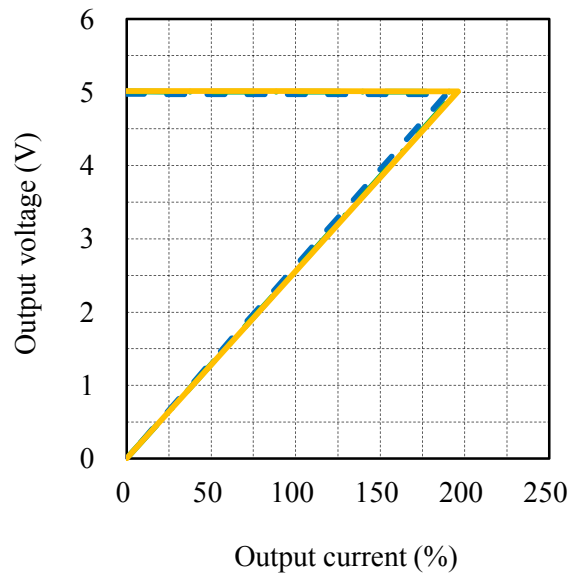
3.3V



5V



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

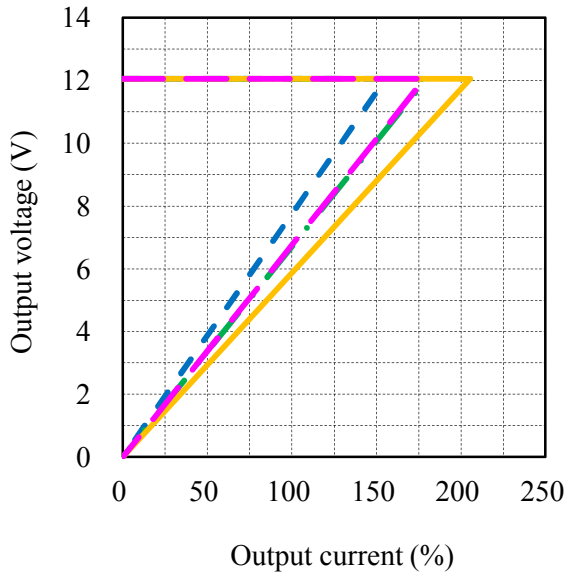
Conditions Vin : 18 VDC — — — —  
 : 24 VDC - - - - -  
 : 48 VDC —————  
 : 76 VDC ————  
 Ta : 25 °C

周囲温度依存性

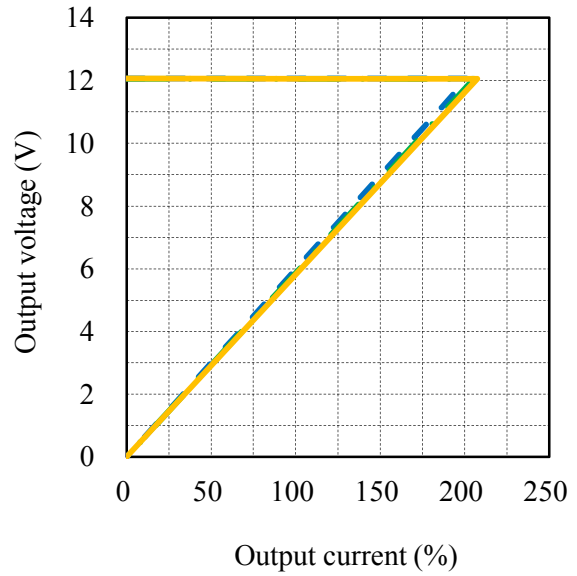
Ambient temperature dependence

Conditions Vin : 48 VDC  
 Ta : -40 °C — — — —  
 : 25 °C - - - - -  
 : 85 °C —————

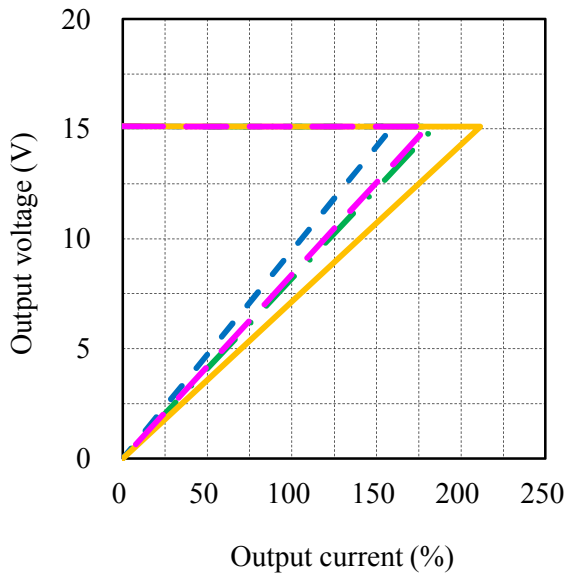
12V



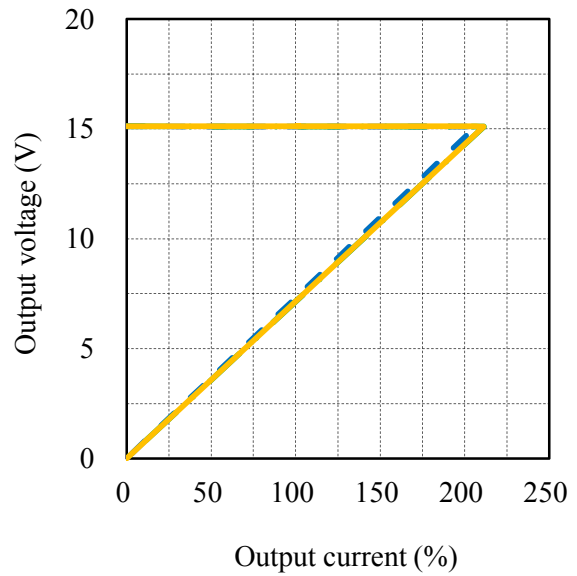
12V



15V



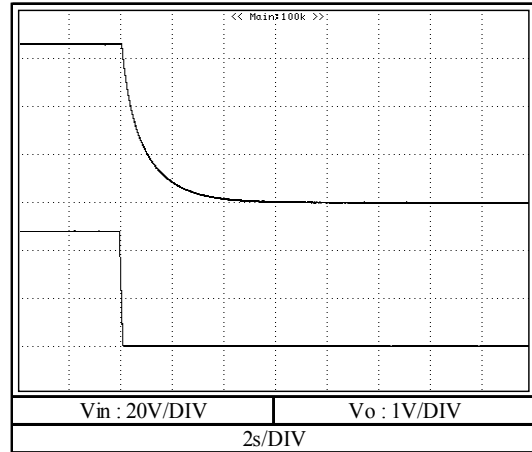
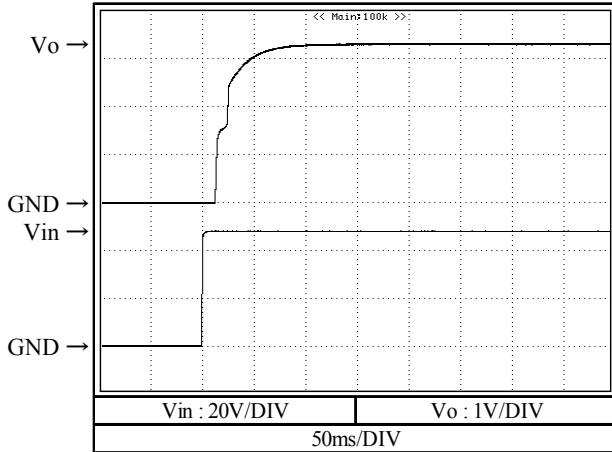
15V



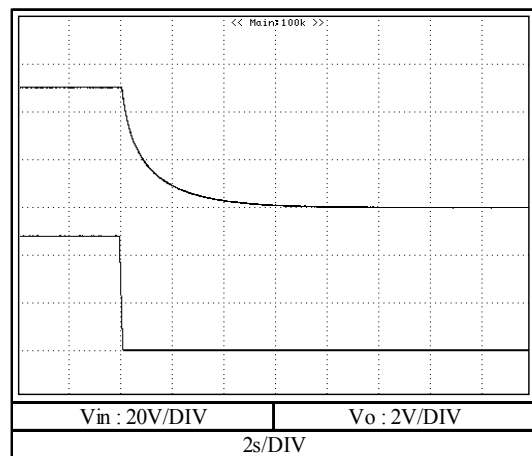
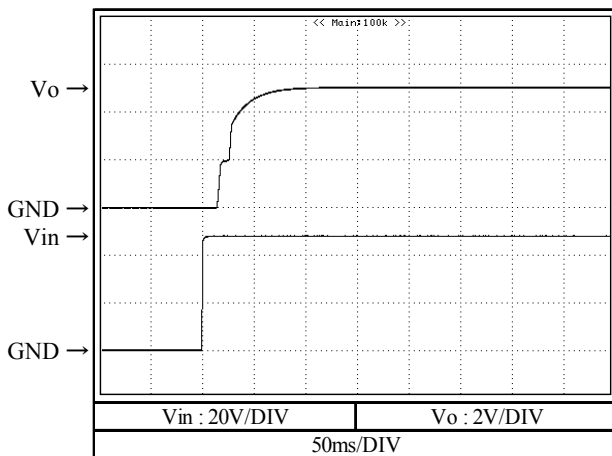
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 48 VDC  
 Io : 0 %  
 Ta : 25 °C

3.3V



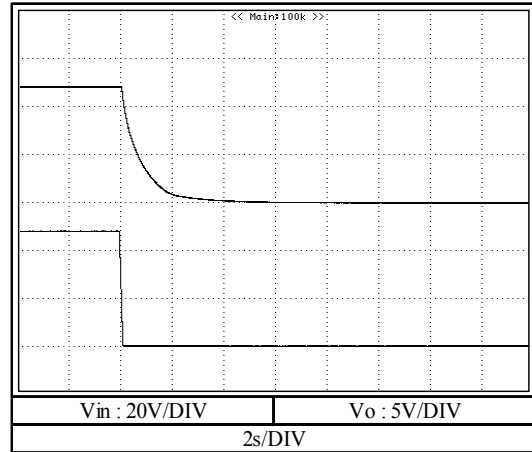
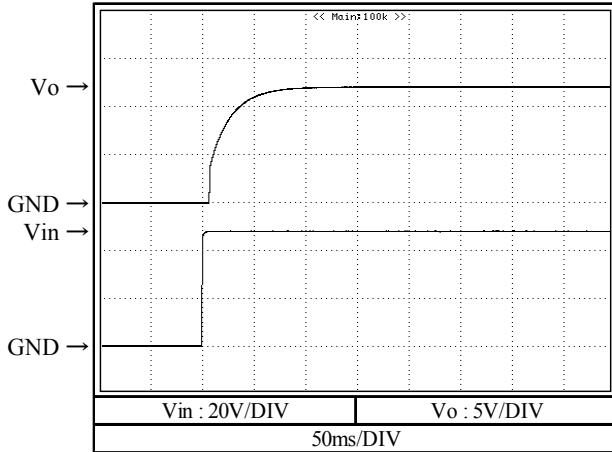
5V



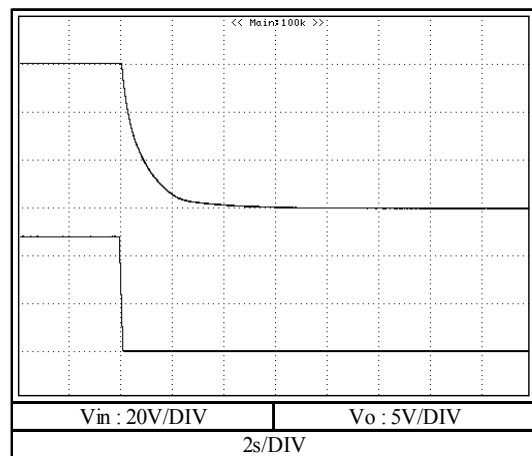
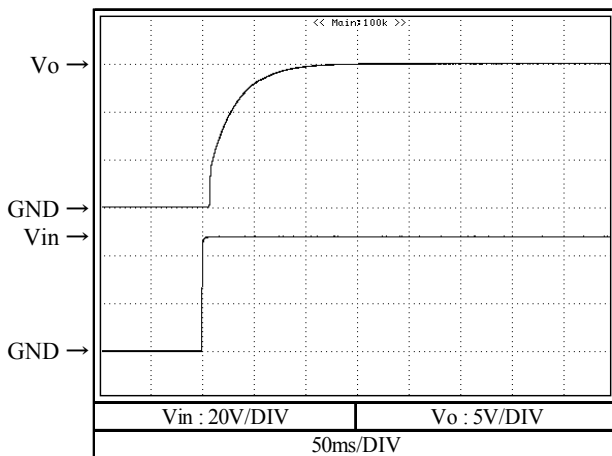
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 48 VDC  
 Io : 0 %  
 Ta : 25 °C

12V



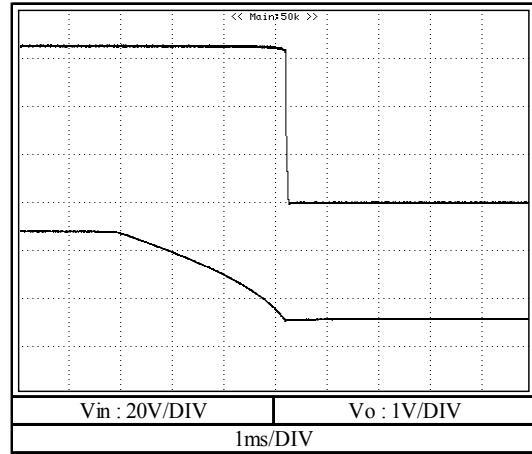
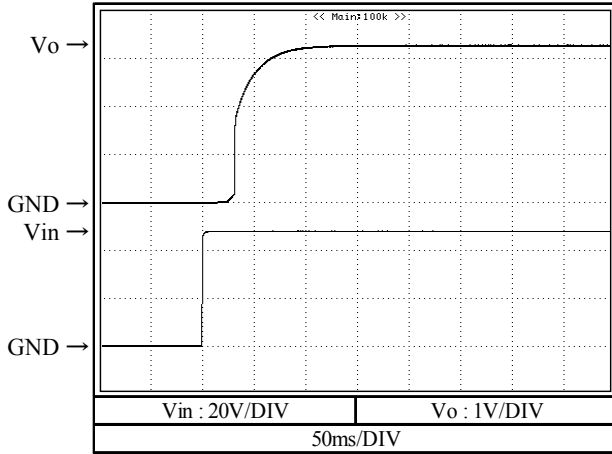
15V



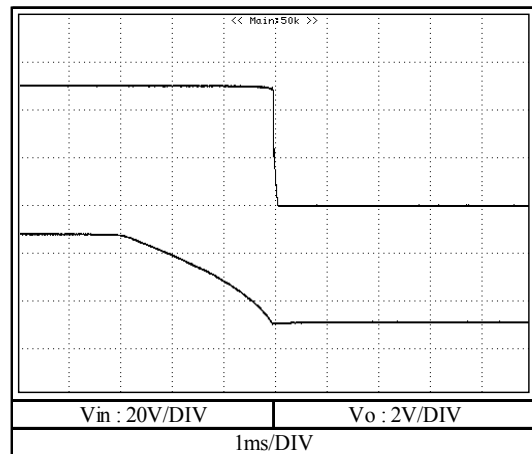
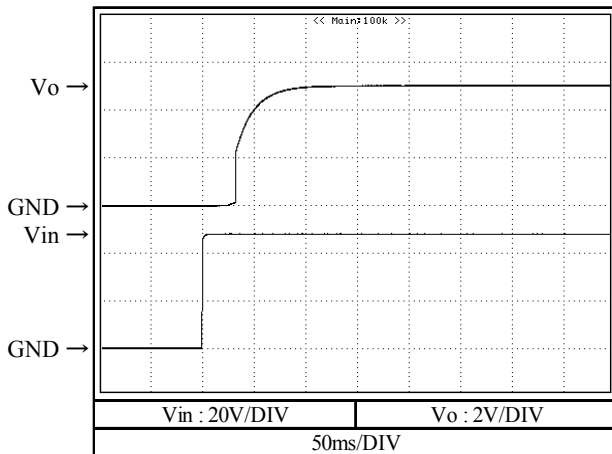
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 48 VDC  
 Io : 100 %  
 Ta : 25 °C

3.3V



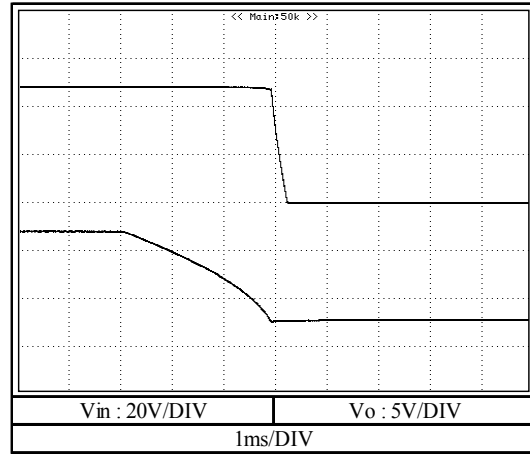
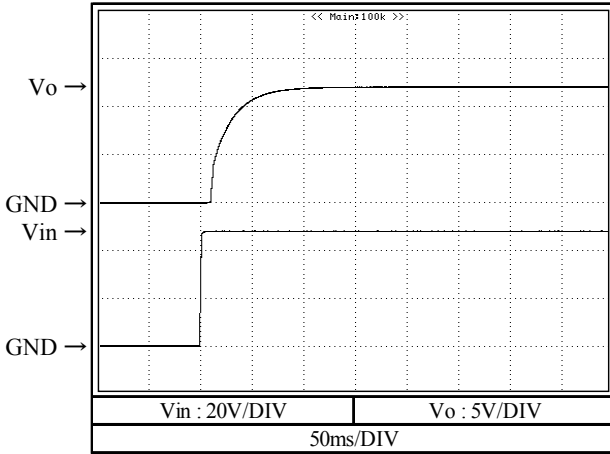
5V



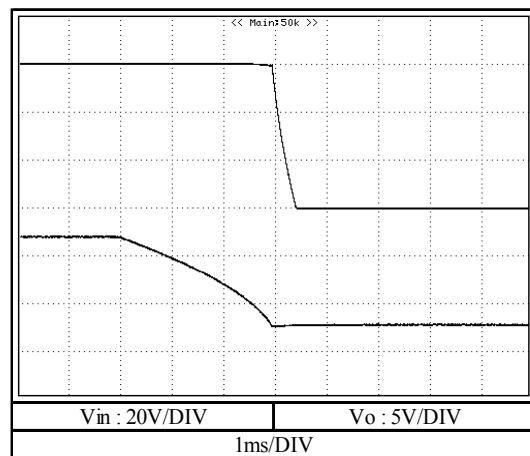
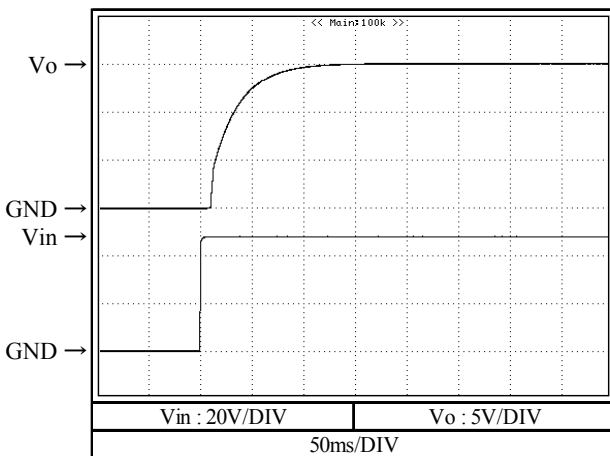
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 48 VDC  
 Io : 100 %  
 Ta : 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)

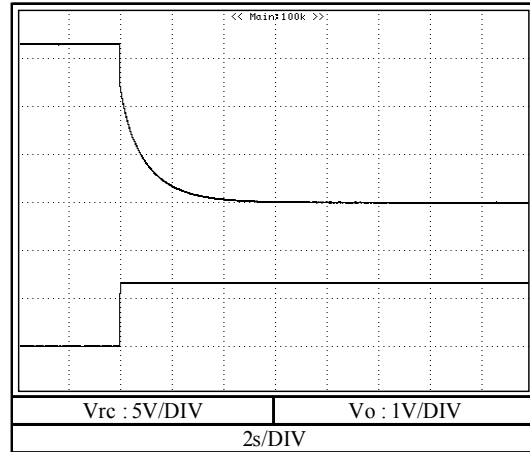
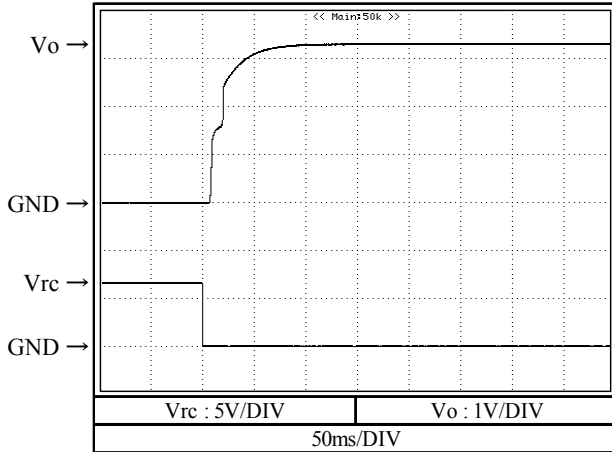
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 48 VDC

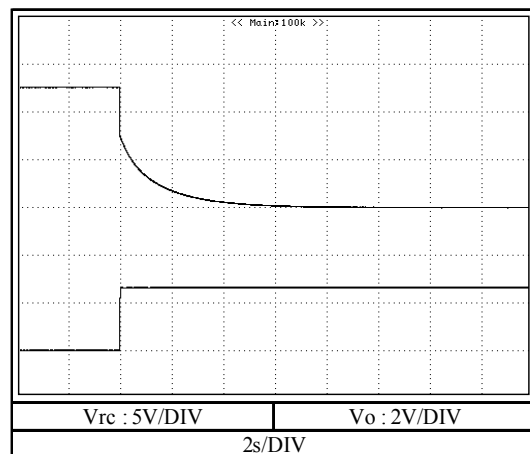
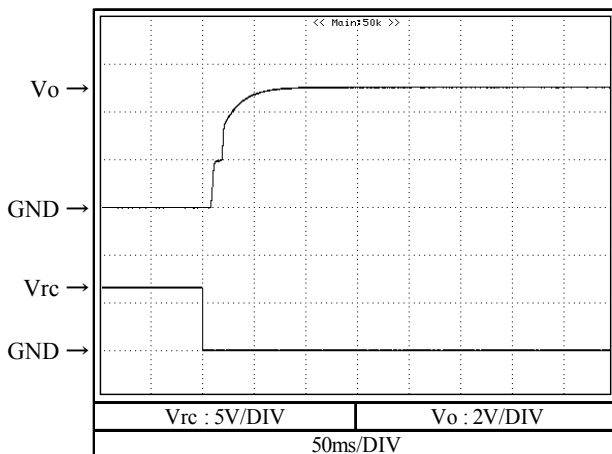
Io : 0 %

Ta : 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)

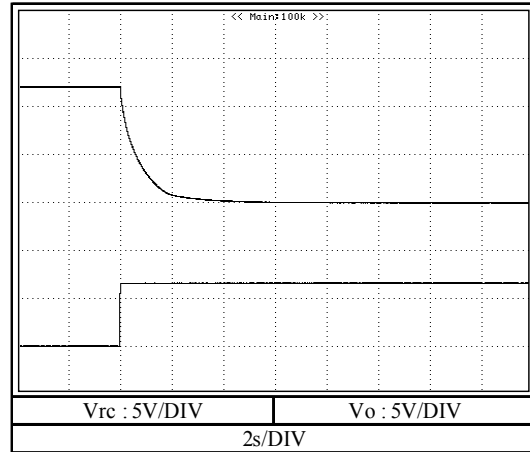
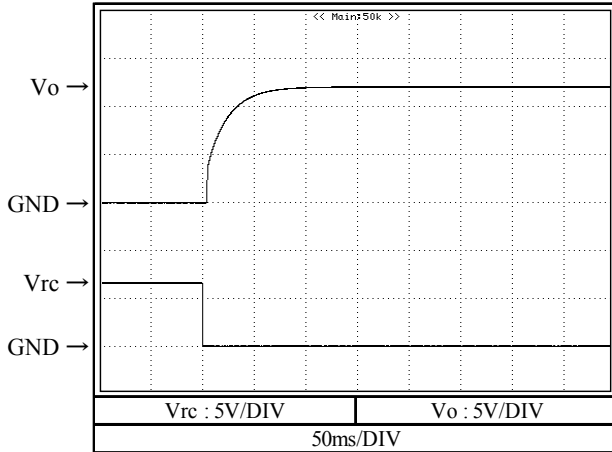
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 48 VDC

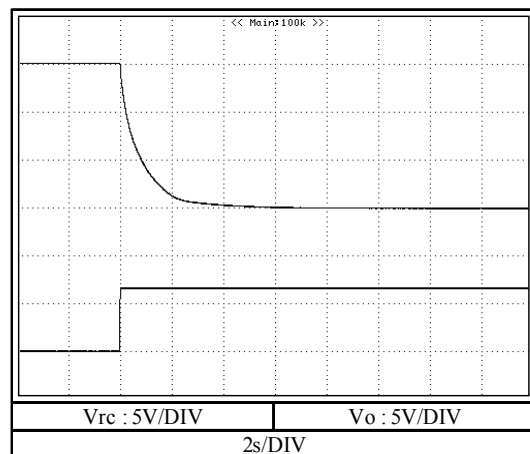
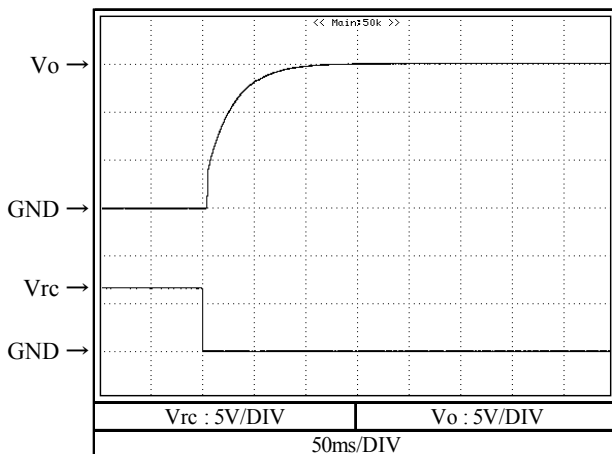
Io : 0 %

Ta : 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)

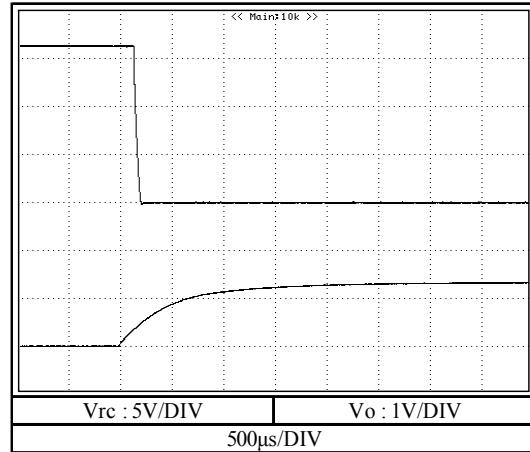
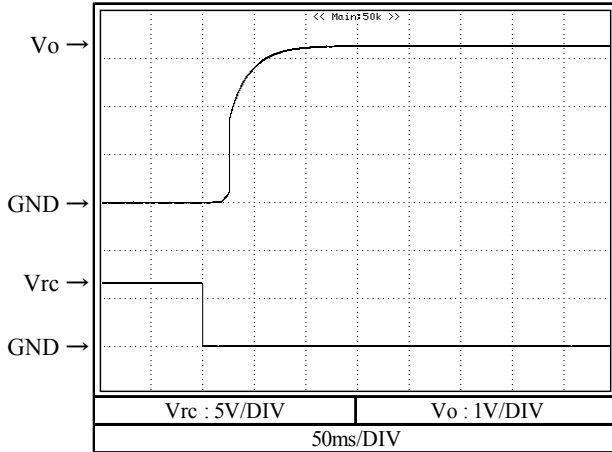
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 48 VDC

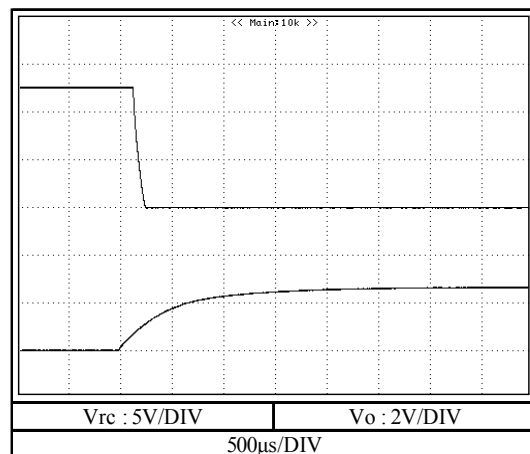
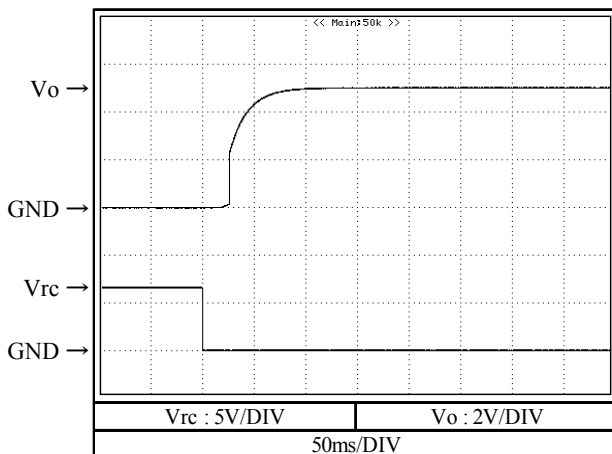
Io : 100 %

Ta : 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)

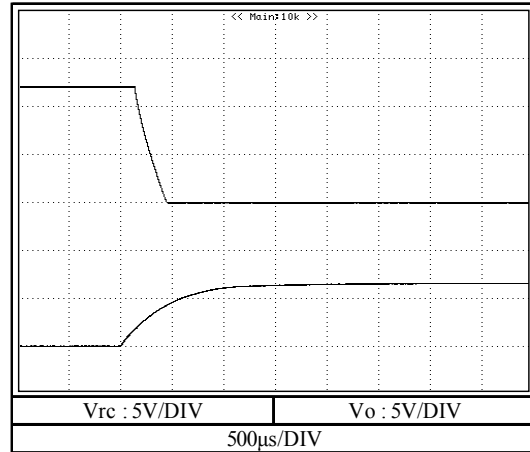
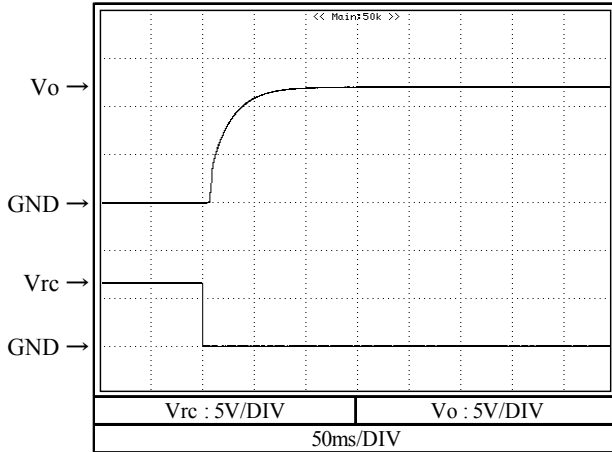
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 48 VDC

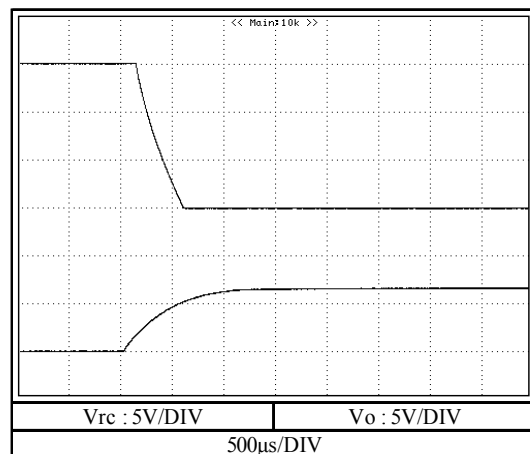
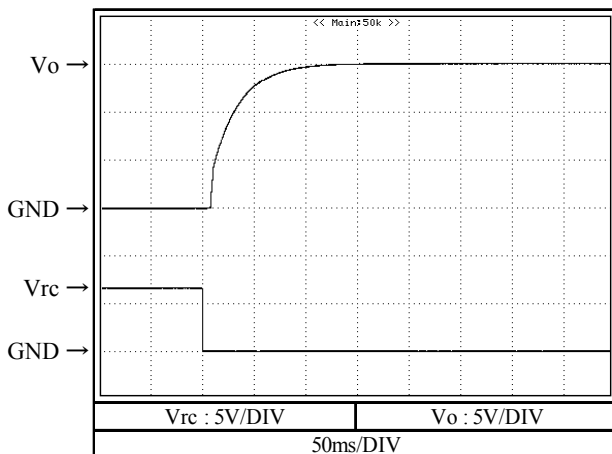
Io : 100 %

Ta : 25 °C

12V

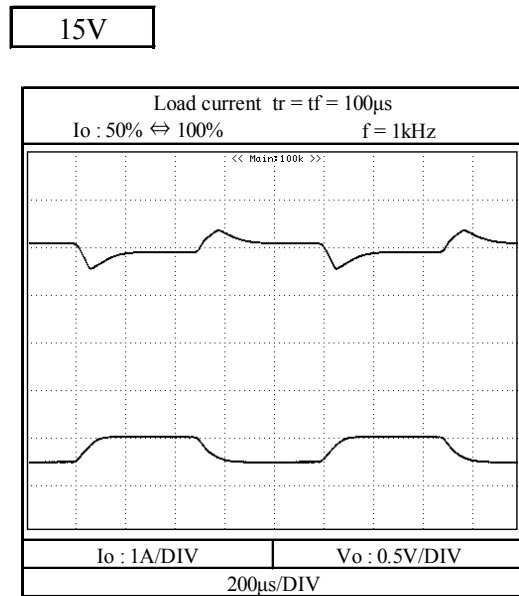
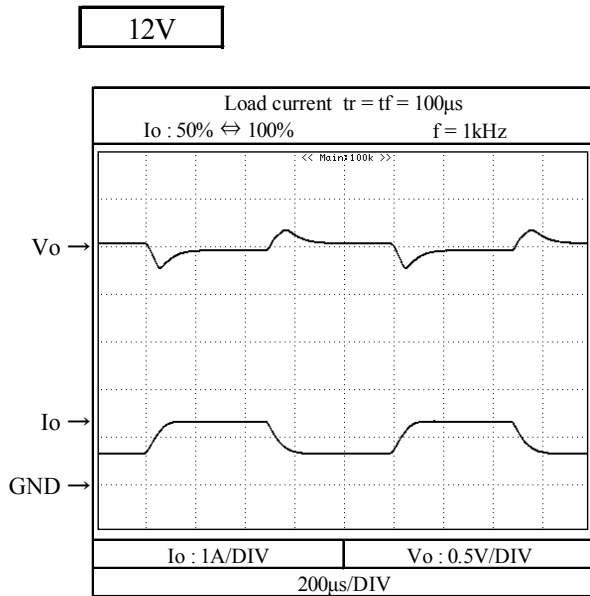
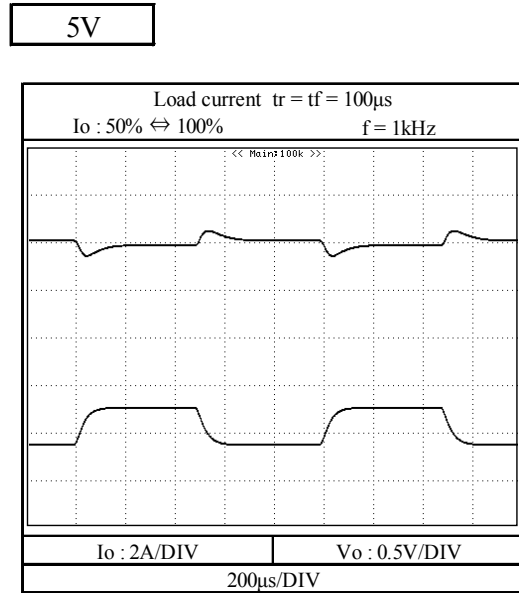
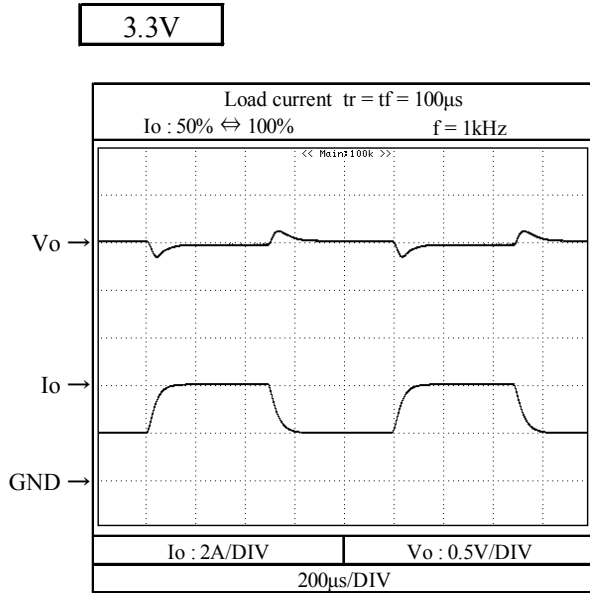


15V



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

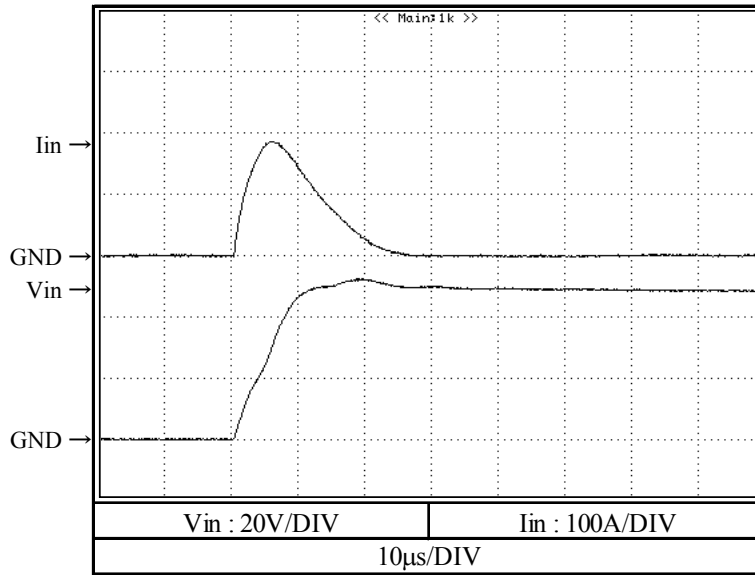
Conditions  $V_{in}$  : 48 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C



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

Conditions Vin : 48 VDC  
 Io : 100 %  
 Ta : 25 °C

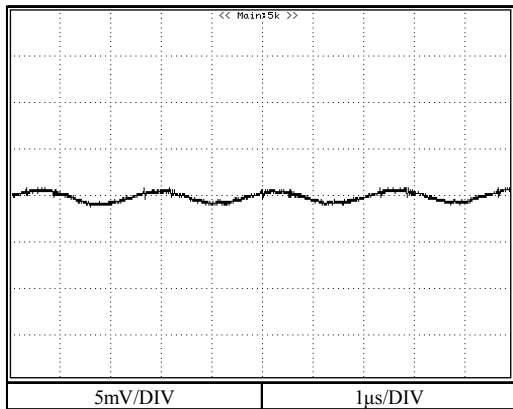
5V



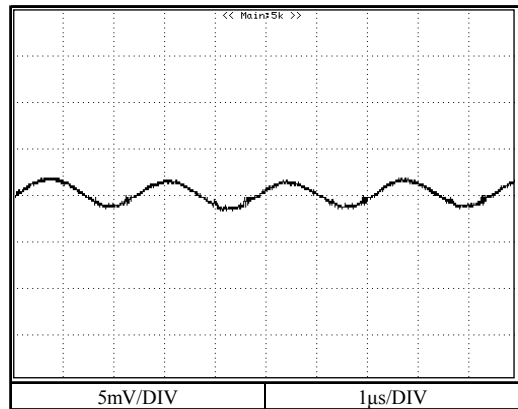
2-8. 出力リップル、ノイズ波形 Output ripple and noise waveform

Conditions Vin : 48 VDC  
 Io : 100 %  
 Ta : 25 °C

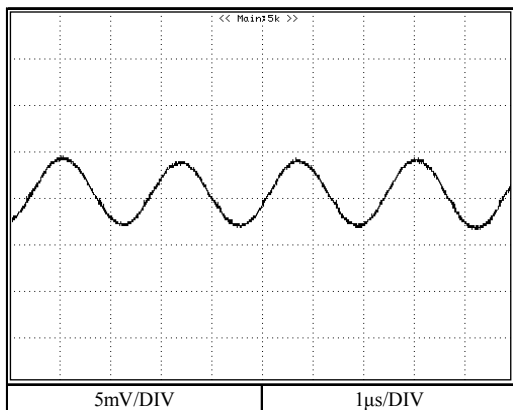
3.3V



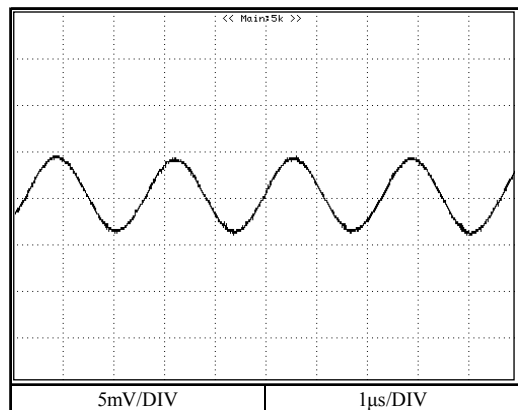
5V



12V



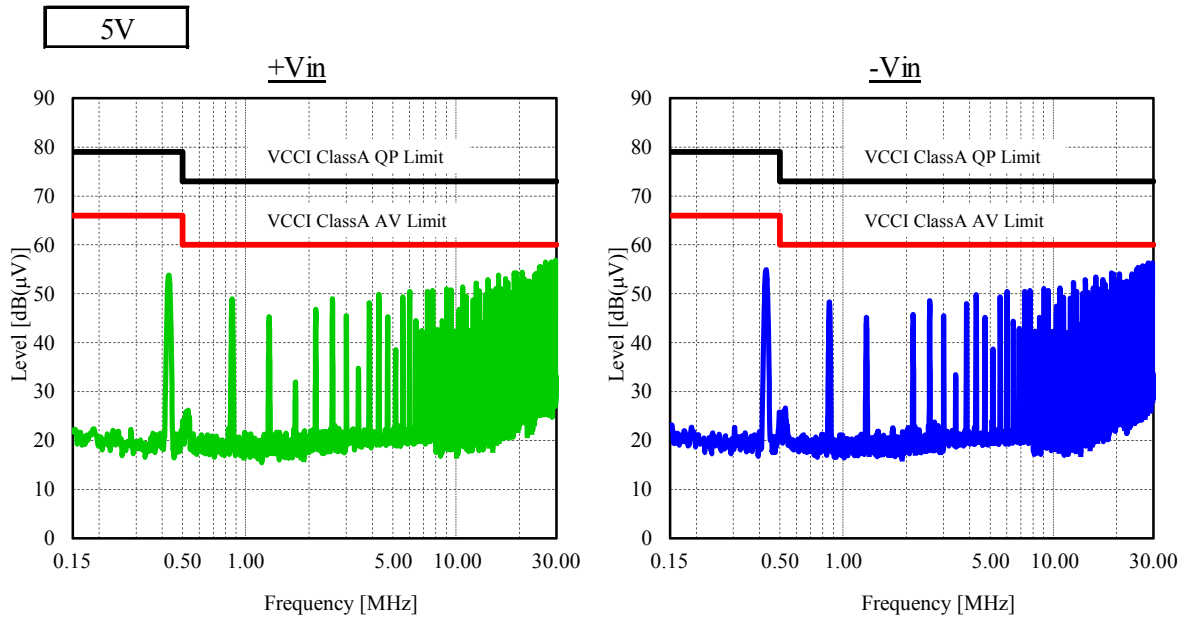
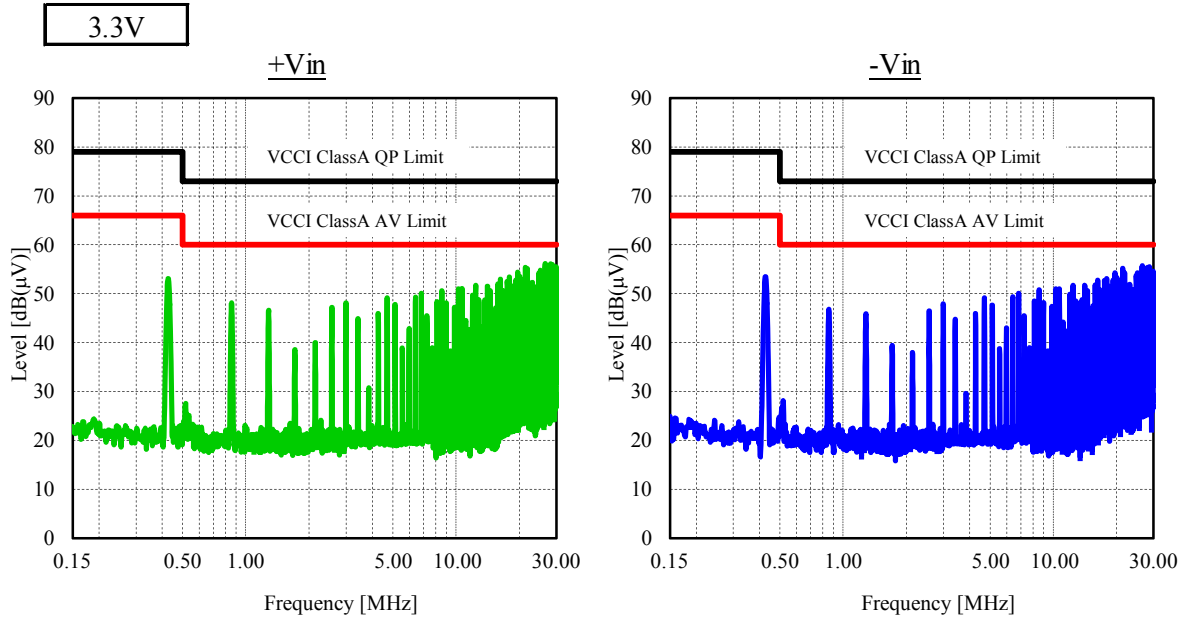
15V



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  $V_{in}$  : 48 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C

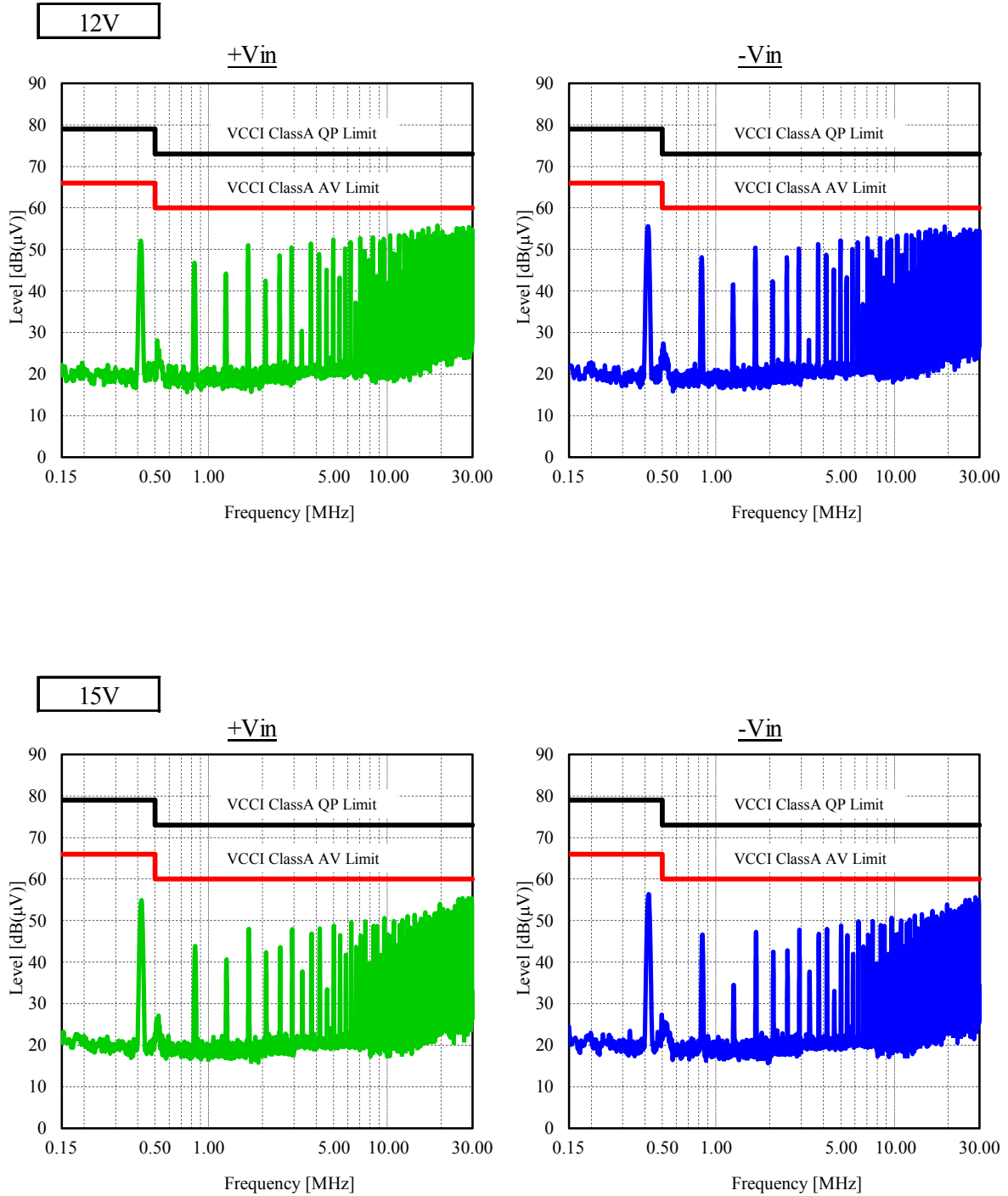




2-9. EMI特性 Electro-Magnetic Interference characteristics

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

Conditions  $V_{in}$  : 48 VDC  
 $I_o$  : 100 %  
 $T_a$  : 25 °C



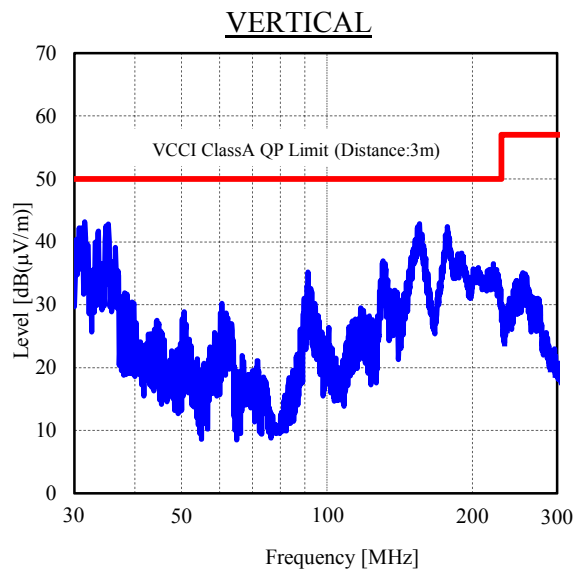
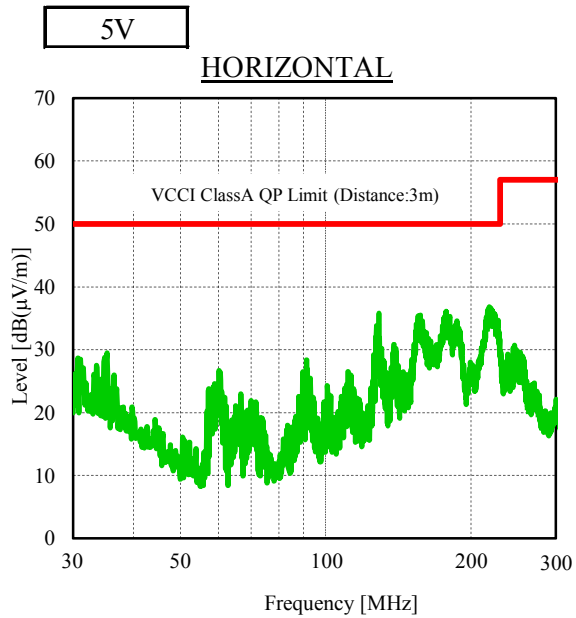
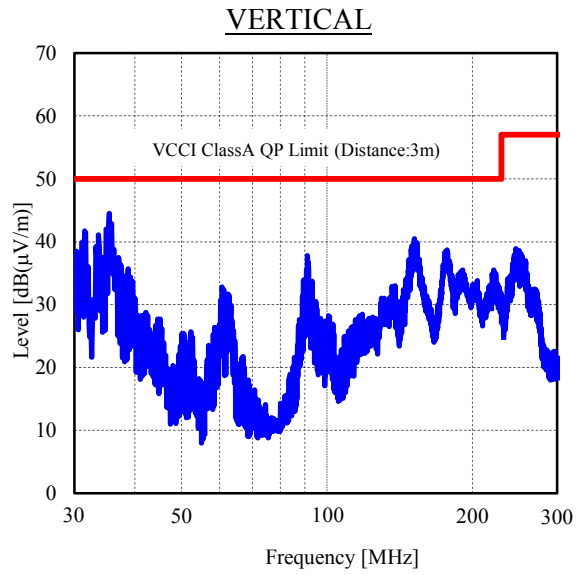
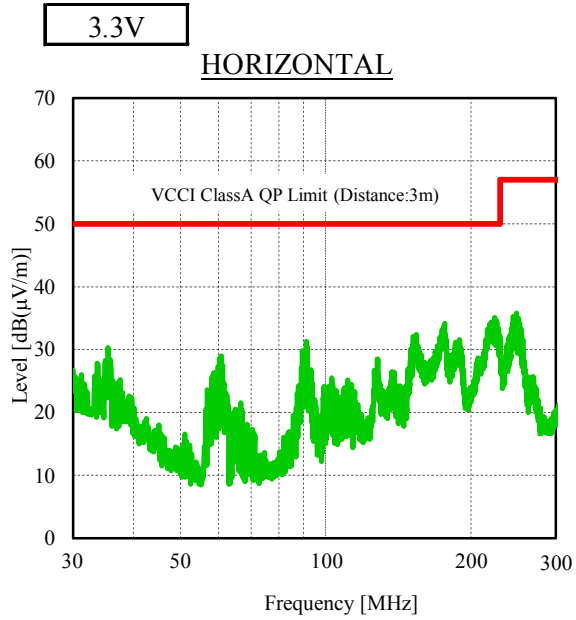
2-9. EMI特性 Electro-Magnetic Interference characteristics

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

Conditions Vin : 48 VDC

Io : 100 %

Ta : 25 °C



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 : 48 VDC

Io : 100 %

Ta : 25 °C

