CCG15-24-**D

EVALUATION DATA

型式データ

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使用記号 Terminology used

		定義 Definition	
Vin	·····	入力電圧	Input voltage
+Vo, -Vo	·····	出力電圧	Output voltage
Vrc	·····	RC電圧	RC voltage
Iin	·····	入力電流	Input current
+Io, -Io	·····	出力電流	Output current
Ta	·····	周囲温度	Ambient temperature
f	·····	周波数	Frequency

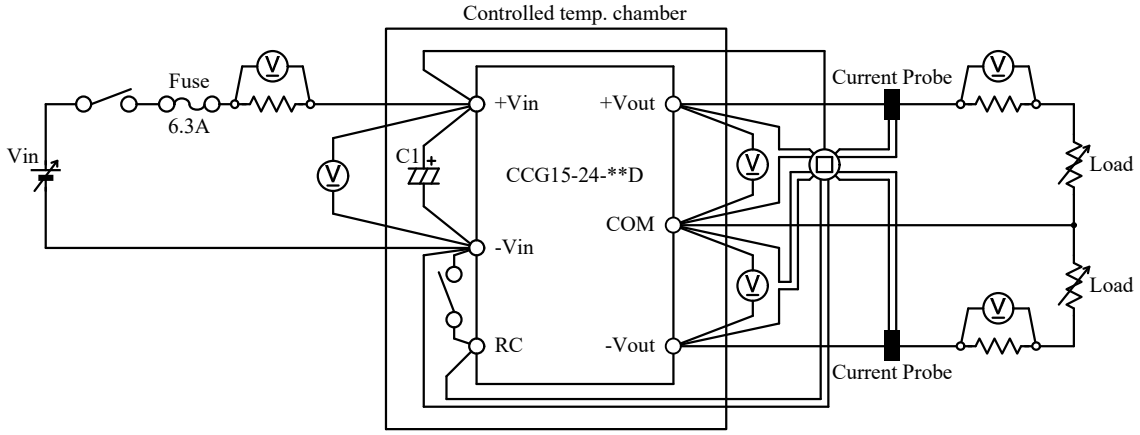
※ 当社測定条件における結果であり、参考値としてお考え願います。
Test results are reference data based on our measurement condition.

1. 測定方法 Evaluation Method

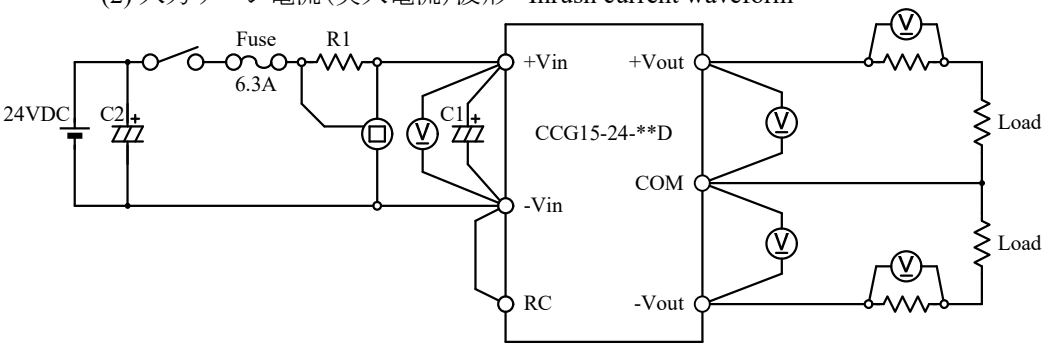
1-1. 測定回路 Measurement Circuits

(1) 静特性 、待機電力特性、通電ドリフト特性、その他特性

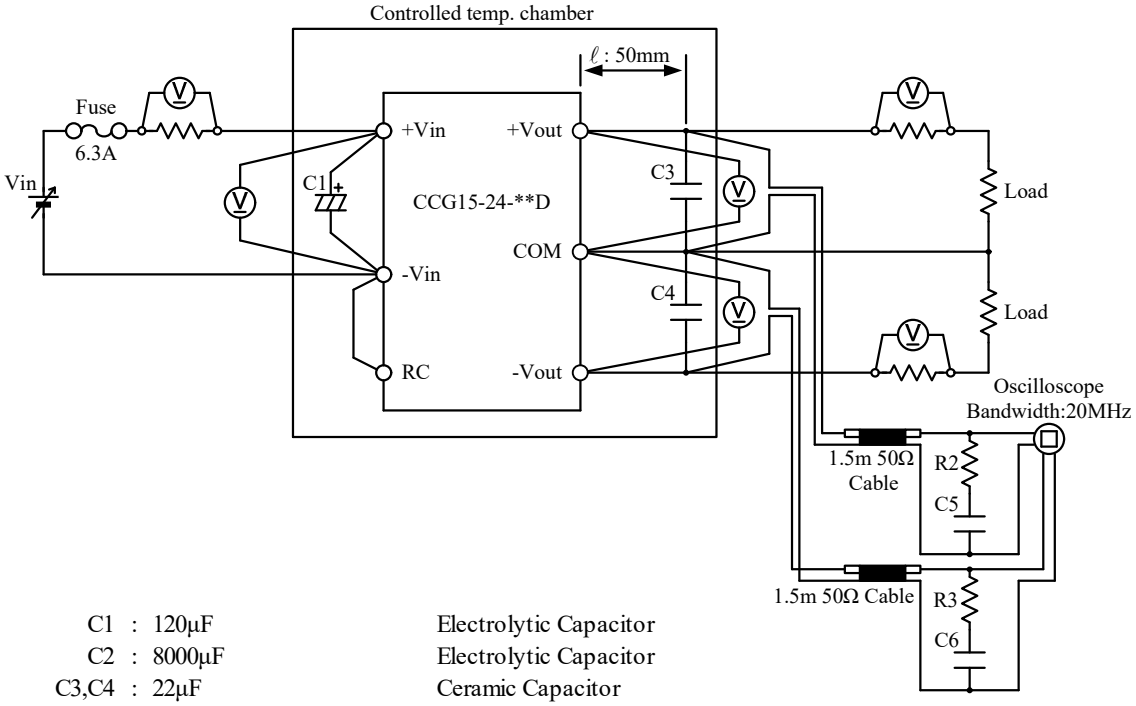
Steady state, Standby power, Warm up voltage drift and Other characteristics



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



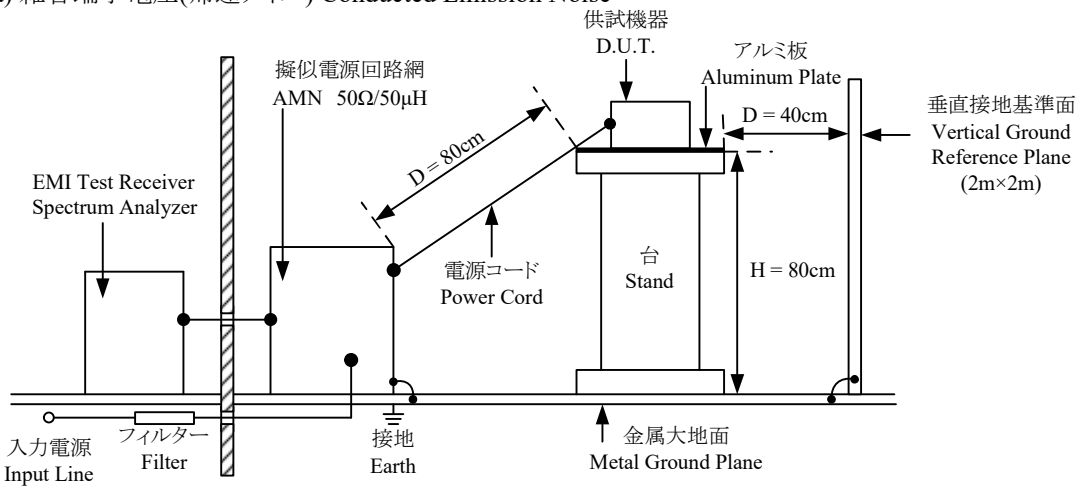
(3) 出力リップル、ノイズ電圧、波形 Output ripple and noise voltage and waveform



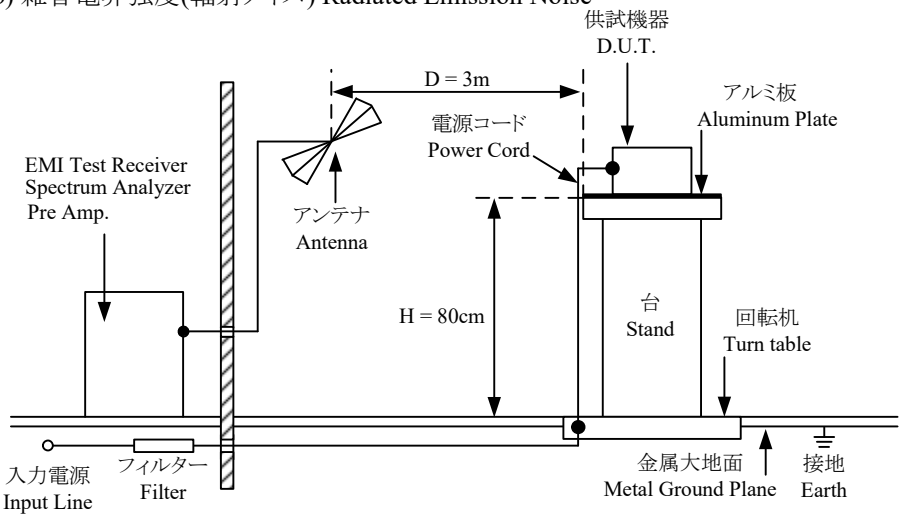
C1	: 120μF	Electrolytic Capacitor
C2	: 8000μF	Electrolytic Capacitor
C3,C4	: 22μF	Ceramic Capacitor
C5,C6	: 4700pF	Ceramic Capacitor
R1	: 0.01Ω	
R2,R3	: 50Ω	

(4) EMI特性　Electro-Magnetic Interference characteristics

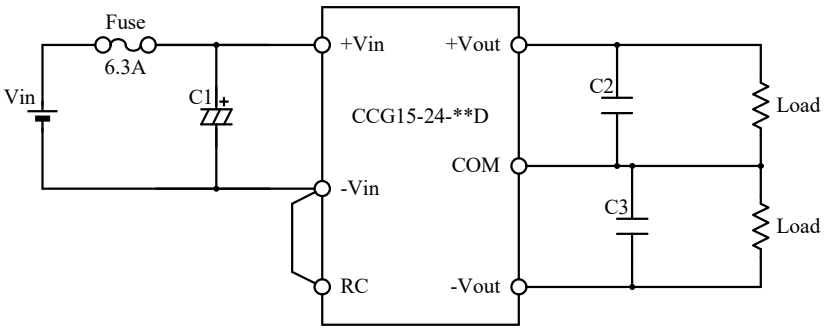
(a) 雑音端子電圧(帰還ノイズ) Conducted Emission Noise



(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 ： 120μF　　Electrolytic Capacitor
C2,C3 ： 22μF　　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

±12V 1. Regulation - line and load Condition Ta : 25 ºC

・+Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	12.098V	12.091V	12.091V	12.087V	11mV	0.092%
50%	12.129V	12.127V	12.122V	12.120V	9mV	0.075%
100%	12.145V	12.133V	12.122V	12.119V	26mV	0.217%
Load	47mV	42mV	31mV	33mV		
regulation	0.392%	0.350%	0.258%	0.275%		

・-Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	-12.089V	-12.098V	-12.097V	-12.101V	12mV	0.100%
50%	-12.057V	-12.060V	-12.064V	-12.066V	9mV	0.075%
100%	-12.039V	-12.053V	-12.065V	-12.065V	26mV	0.217%
Load	50mV	45mV	33mV	36mV		
regulation	0.417%	0.375%	0.275%	0.300%		

・+Vo to -Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	24.187V	24.189V	24.188V	24.188V	2mV	0.017%
50%	24.185V	24.187V	24.186V	24.187V	2mV	0.017%
100%	24.185V	24.186V	24.186V	24.184V	2mV	0.017%
Load	2mV	3mV	2mV	4mV		
regulation	0.017%	0.025%	0.017%	0.033%		

2. Temperature drift Conditions Vin : 24 VDC
Io : 100 %

Ta	-40°C	25°C	85°C	Temperature stability	
+Vo	12.112V	12.122V	12.134V	22mV	0.183%
-Vo	-12.068V	-12.065V	-12.070V	5mV	0.042%
+Vo to -Vo	24.180V	24.186V	24.204V	24mV	0.200%

3. Load Regulation - Unbalance load Conditions Ta : 25 ºC

・-Io : 100%

+Io \ Vin	9VDC	12VDC	24VDC	36VDC
20%	12.285V	12.276V	12.267V	12.265V
100%	12.151V	12.139V	12.127V	12.124V
Load	134mV	137mV	140mV	141mV
regulation	1.117%	1.142%	1.167%	1.175%

・+Io : 100%

-Io \ Vin	9VDC	12VDC	24VDC	36VDC
20%	-12.169V	-12.171V	-12.178V	-12.179V
100%	-12.042V	-12.055V	-12.067V	-12.069V
Load	127mV	116mV	111mV	110mV
regulation	1.058%	0.967%	0.925%	0.917%

±15V 1. Regulation - line and load Condition Ta : 25 ºC

・+Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	15.105V	15.106V	15.112V	15.117V	12mV	0.080%
50%	15.096V	15.097V	15.099V	15.098V	3mV	0.020%
100%	15.093V	15.095V	15.097V	15.097V	4mV	0.027%
Load	12mV	11mV	15mV	20mV		
regulation	0.080%	0.073%	0.100%	0.133%		

・-Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	-15.120V	-15.121V	-15.116V	-15.109V	12mV	0.080%
50%	-15.125V	-15.125V	-15.124V	-15.123V	2mV	0.013%
100%	-15.127V	-15.125V	-15.123V	-15.122V	5mV	0.033%
Load	7mV	4mV	8mV	14mV		
regulation	0.047%	0.027%	0.053%	0.093%		

・+Vo to -Vo

Io \ Vin	9VDC	12VDC	24VDC	36VDC	Line regulation	
0%	30.226V	30.227V	30.228V	30.226V	2mV	0.013%
50%	30.221V	30.222V	30.223V	30.221V	2mV	0.013%
100%	30.219V	30.220V	30.220V	30.219V	1mV	0.007%
Load	7mV	7mV	8mV	7mV		
regulation	0.047%	0.047%	0.053%	0.047%		

2. Temperature drift Conditions Vin : 24 VDC
Io : 100 %

Ta	-40°C	25°C	85°C	Temperature stability	
+Vo	15.124V	15.097V	15.091V	33mV	0.220%
-Vo	-15.149V	-15.123V	-15.119V	30mV	0.200%
+Vo to -Vo	30.273V	30.220V	30.210V	63mV	0.420%

3. Load Regulation - Unbalance load Conditions Ta : 25 ºC

・-Io : 100%

+Io \ Vin	9VDC	12VDC	24VDC	36VDC
20%	15.161V	15.156V	15.155V	15.155V
100%	15.045V	15.046V	15.046V	15.044V
Load	116mV	110mV	109mV	111mV
regulation	0.773%	0.733%	0.727%	0.740%

・+Io : 100%

-Io \ Vin	9VDC	12VDC	24VDC	36VDC
20%	-15.149V	-15.146V	-15.147V	-15.146V
100%	-15.036V	-15.036V	-15.037V	-15.036V
Load	113mV	110mV	110mV	110mV
regulation	0.753%	0.733%	0.733%	0.733%

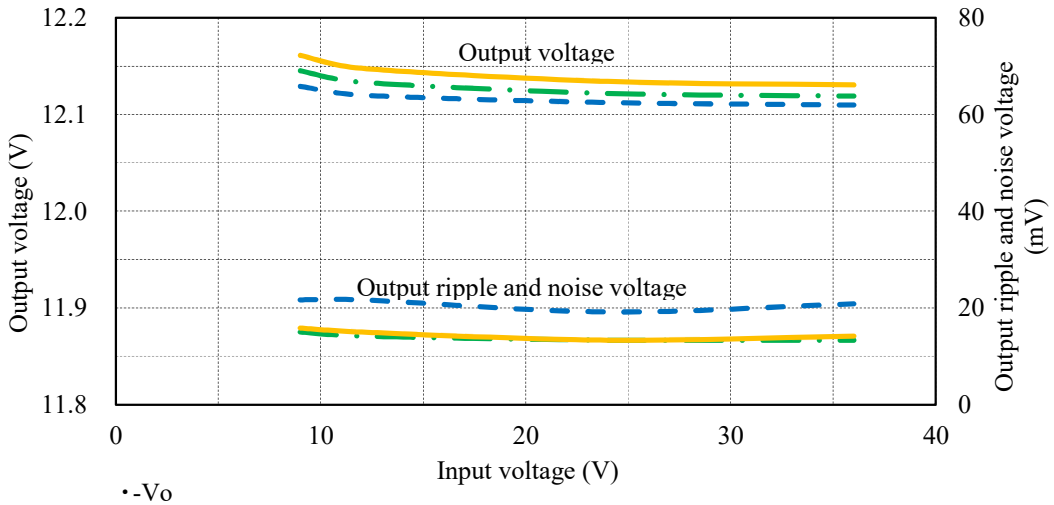
(2) 出力電圧・出力リップルノイズ電圧 対 入力電圧

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

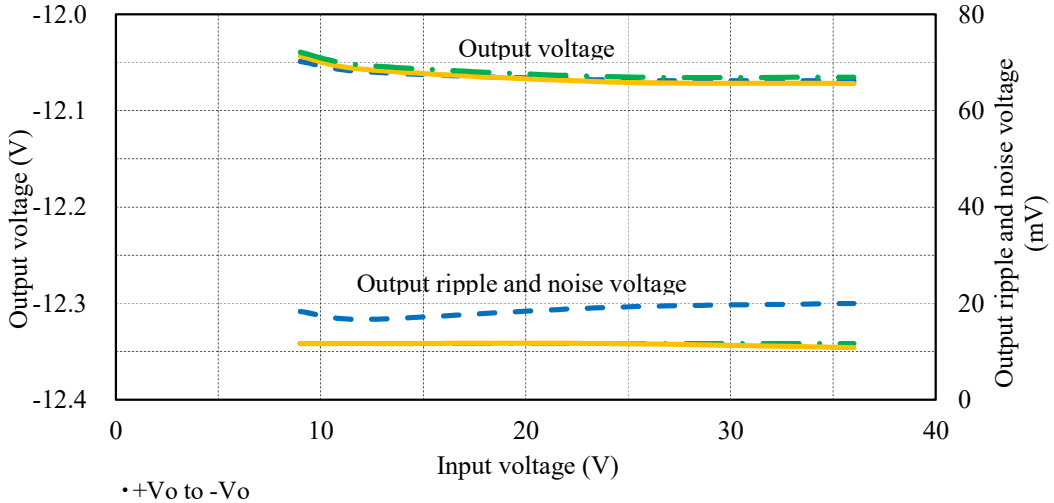
Conditions Io : 100 %
Ta : -40 ºC
: 25 ºC
: 85 ºC

±12V

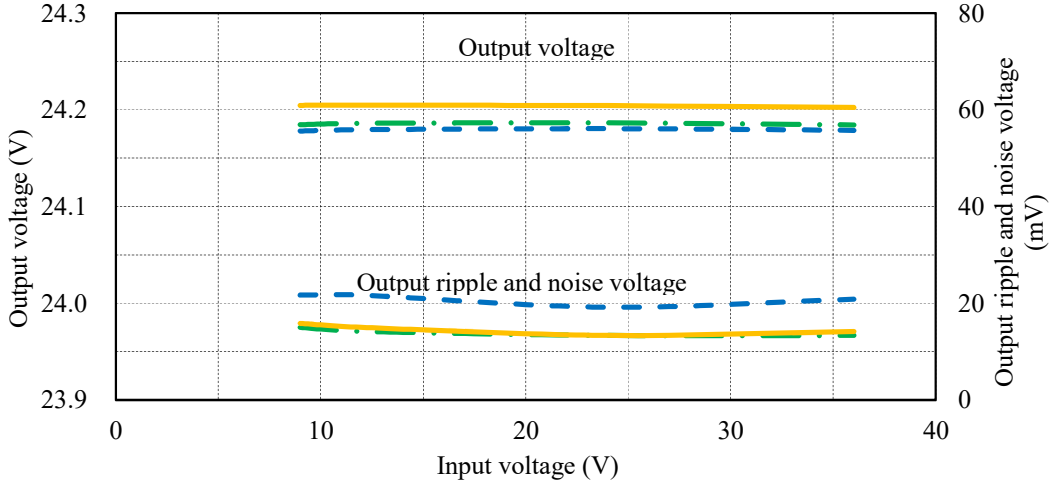
・+Vo



・-Vo



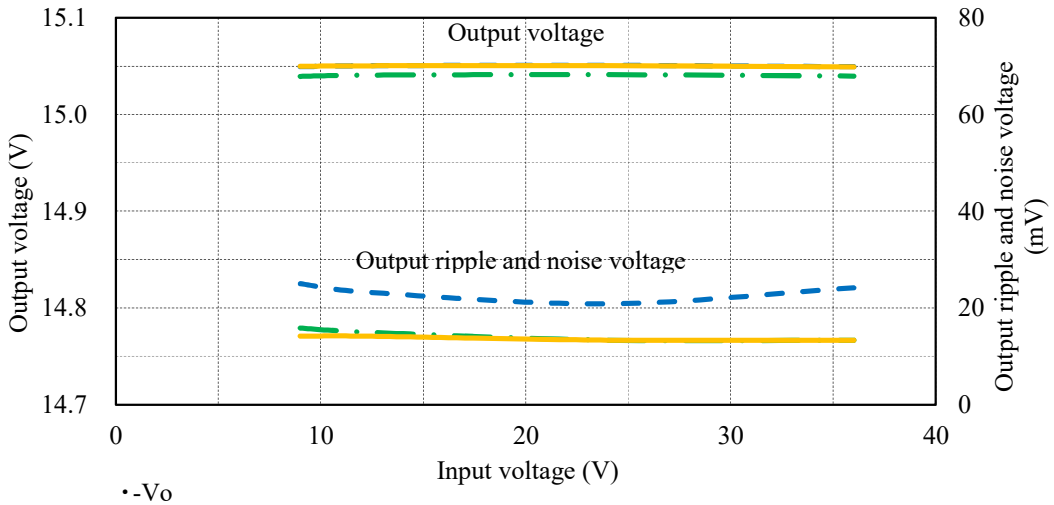
・+Vo to -Vo



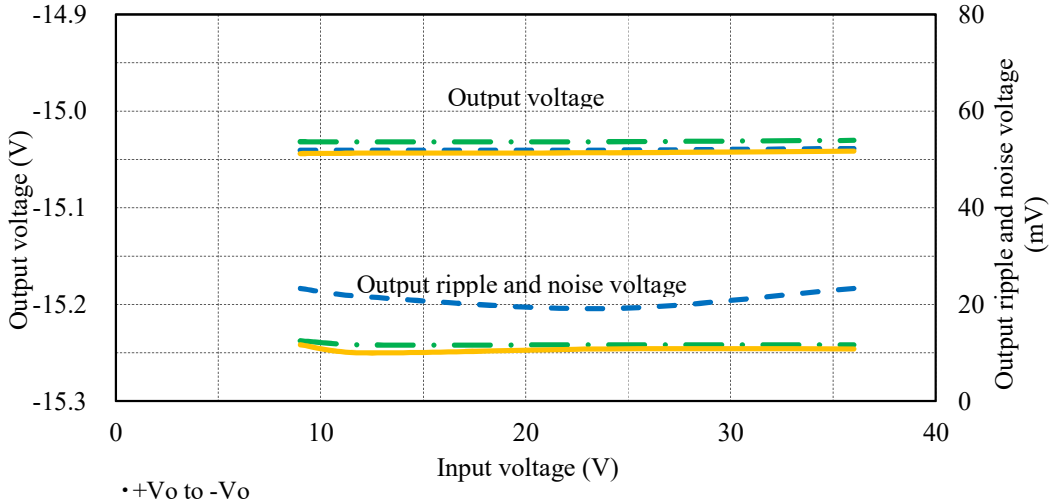
Conditions Io : 100 %
Ta : -40 ºC
: 25 ºC
: 85 ºC

±15V

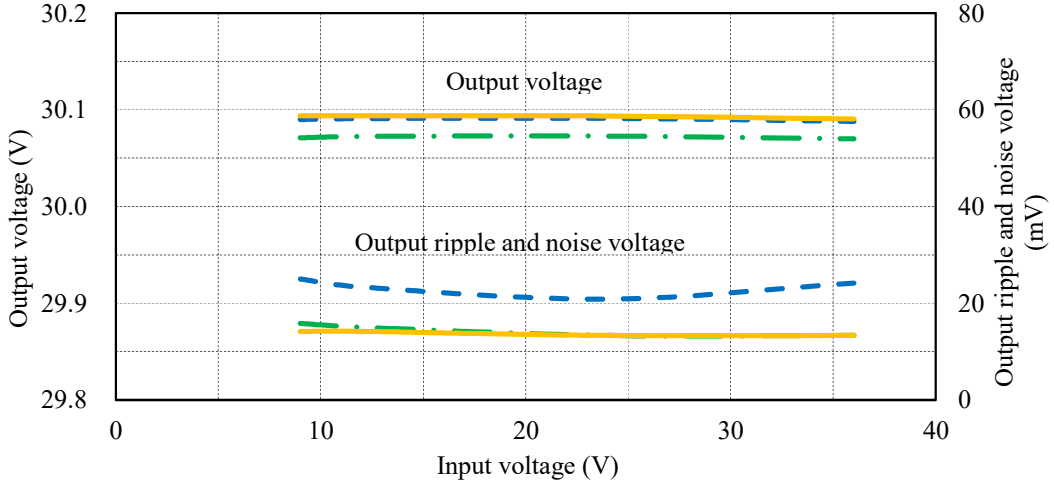
・+Vo



・-Vo



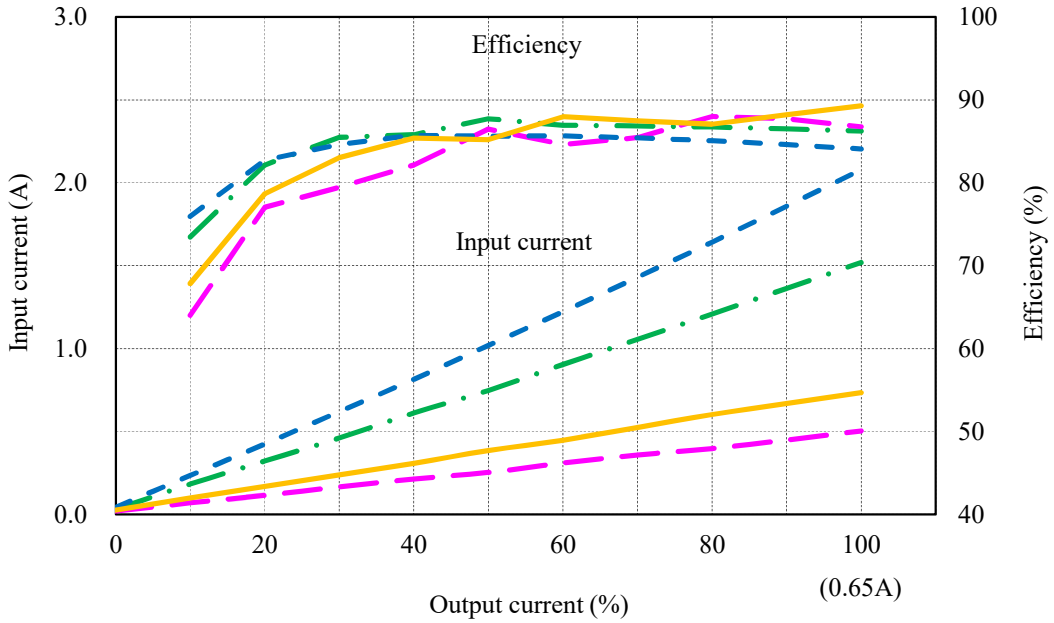
・+Vo to -Vo



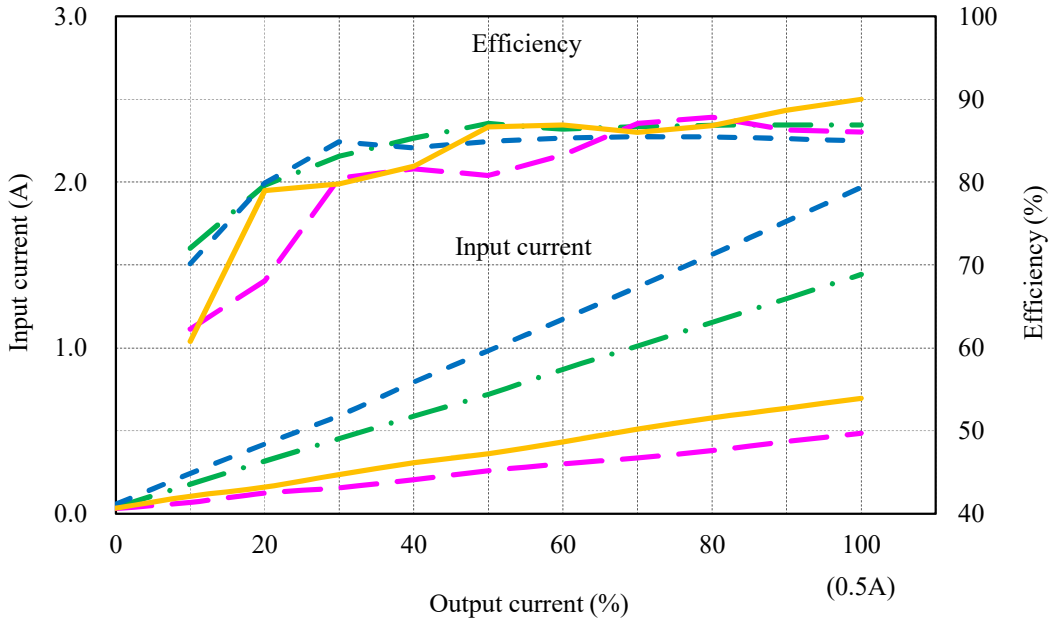
(3) 入力電流･効率 対 出力電流　Input current and Efficiency vs. Output current

Conditions　Vin　:　9 VDC
:　12 VDC
:　24 VDC
:　36 VDC
Ta　:　25 ºC

±12V



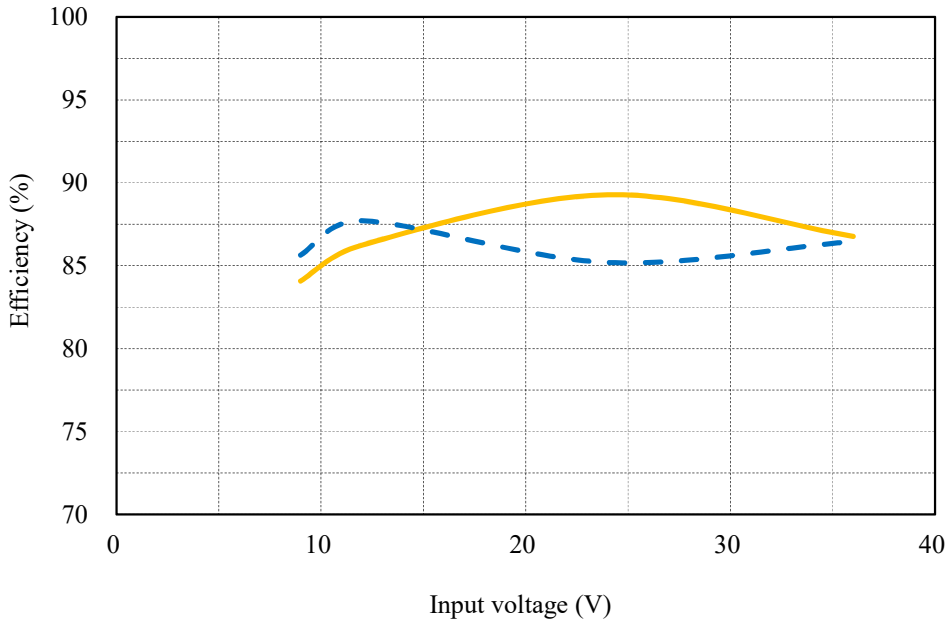
±15V



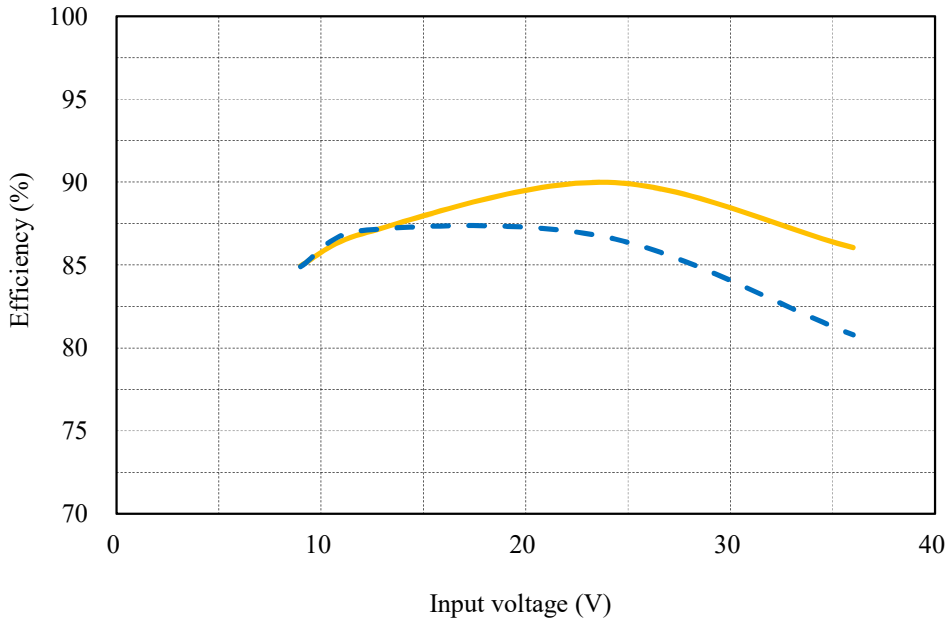
(4) 効率 対 入力電圧 Efficiency vs. Input voltage

Conditions Io : 50 %
: 100 %
Ta : 25 ºC

±12V



±15V



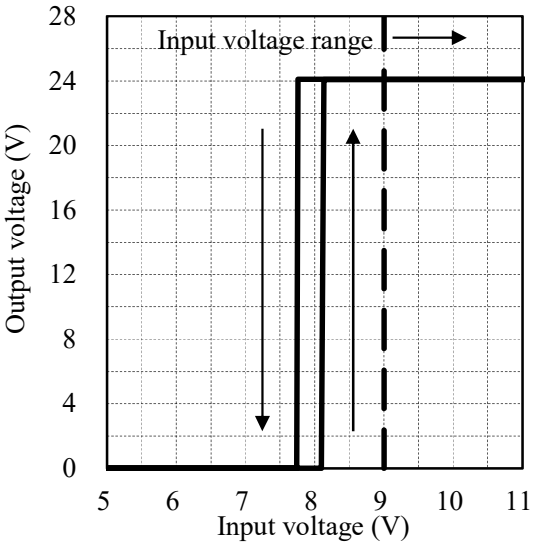
(5) 起動・遮断電圧特性 Start up and Drop out voltage characteristics

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

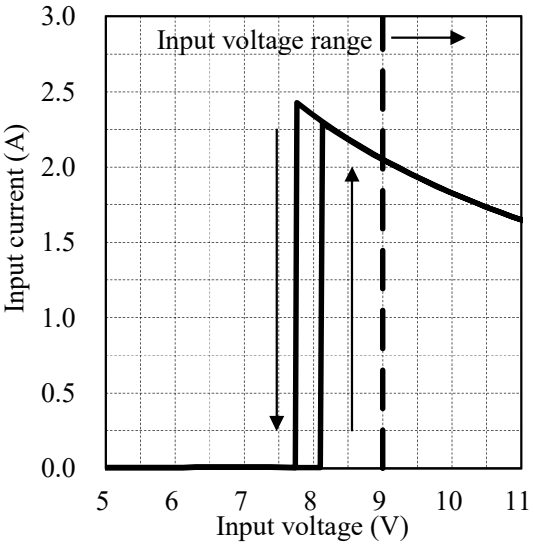
入力電流 対 入力電圧
Input current vs. Input voltage

Conditions Io : 100 %
Ta : 25 ºC

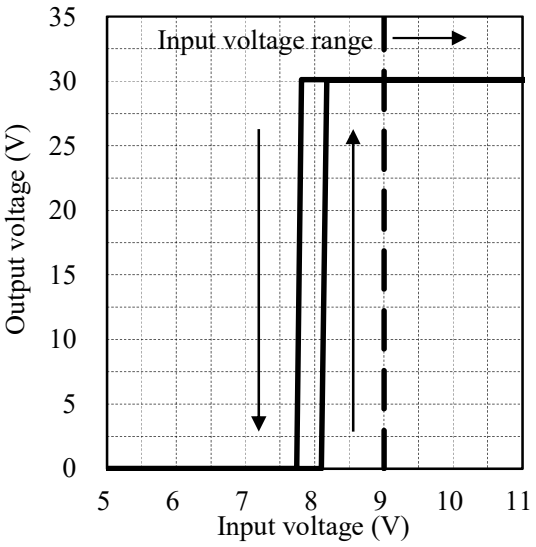
±12V



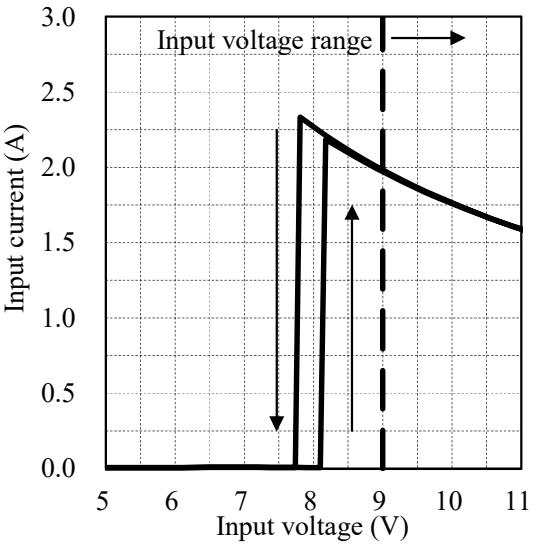
±12V



±15V



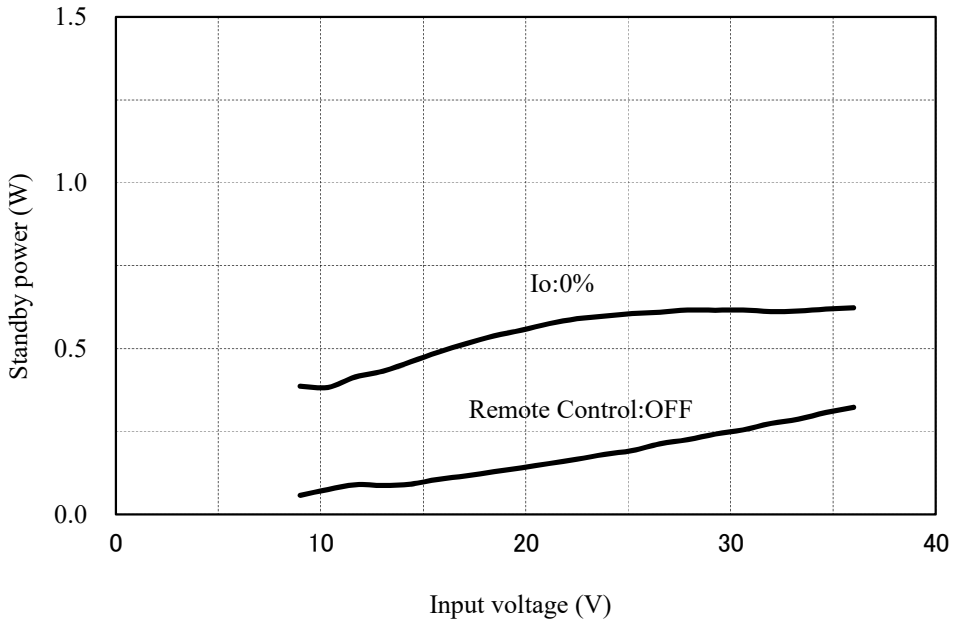
±15V



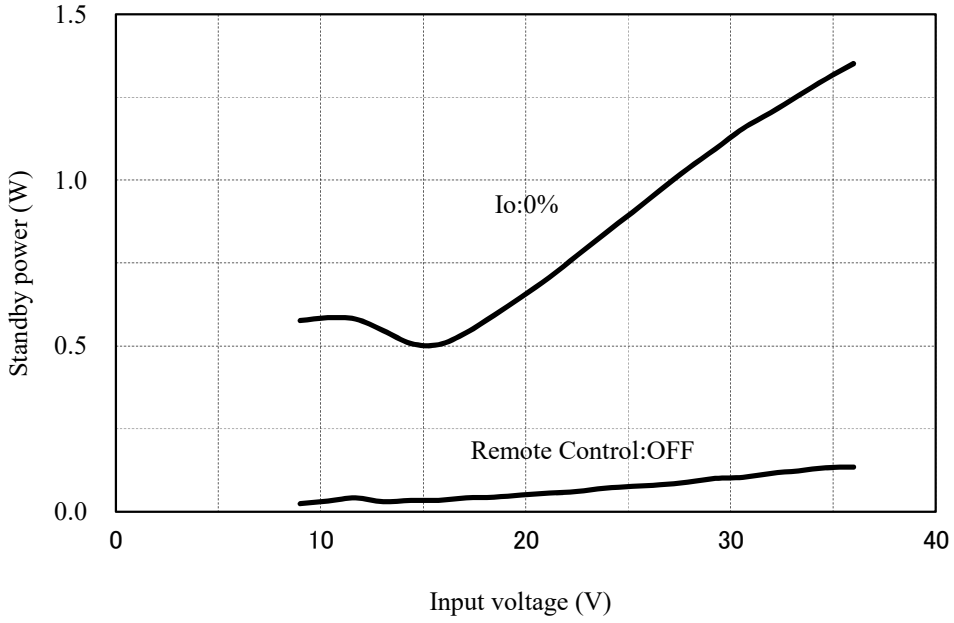
2-2. 待機電力特性 Standby power characteristics

Conditions Ta : 25 ºC

±12V



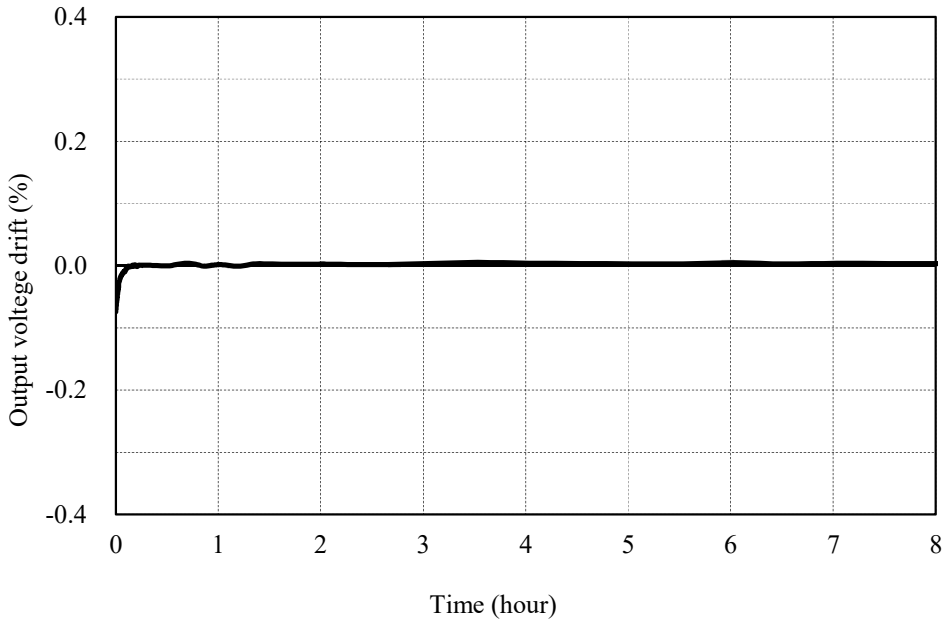
±15V



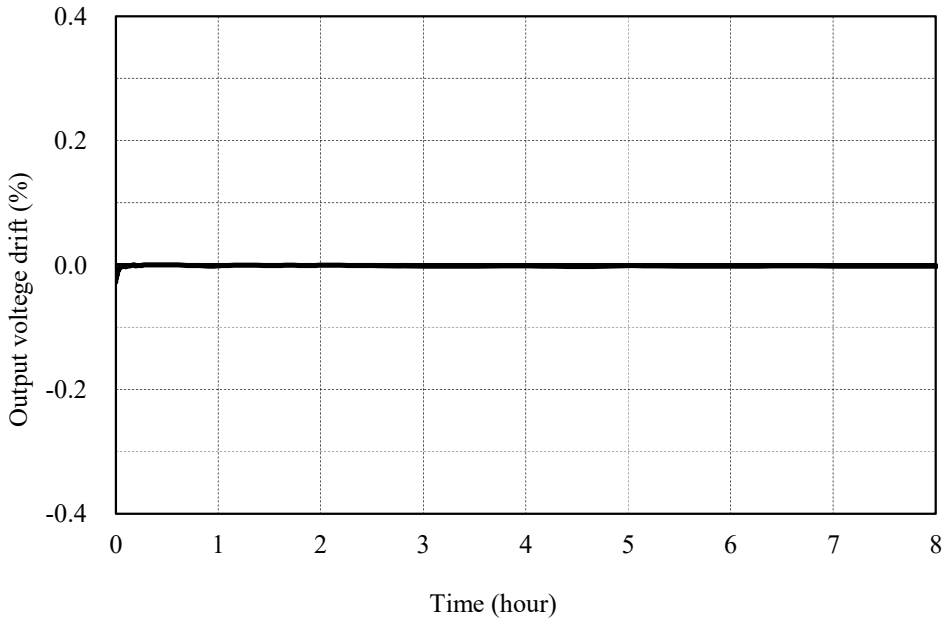
2-3. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V



±15V



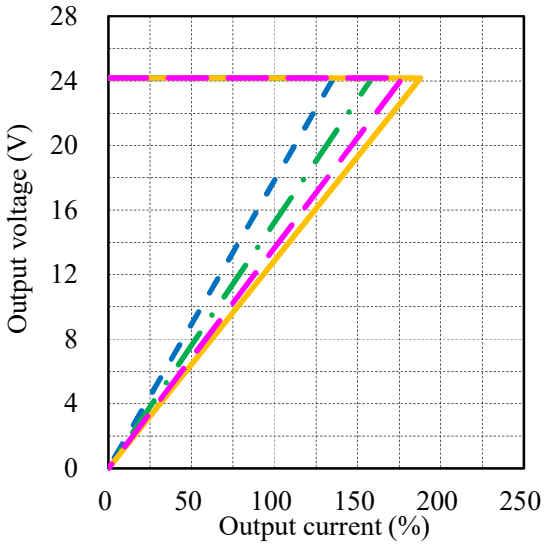
2-4. 過電流保護特性 Over current protection (OCP) characteristics

入力電圧依存性

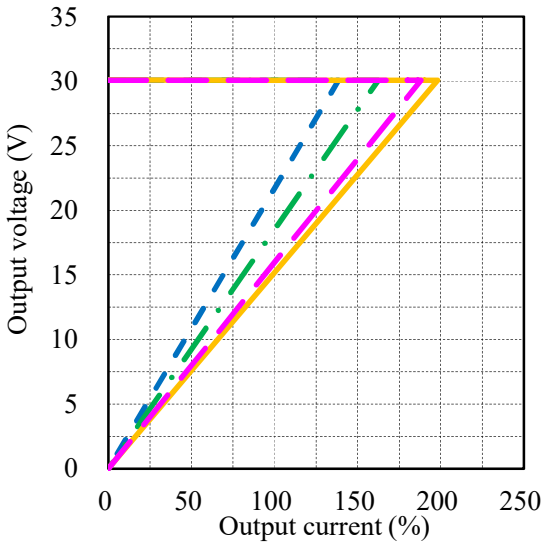
Input voltage dependence

Conditions Vin : 9 VDC
: 12 VDC
: 24 VDC
: 36 VDC
Ta : 25 ℃

±12V



±15V

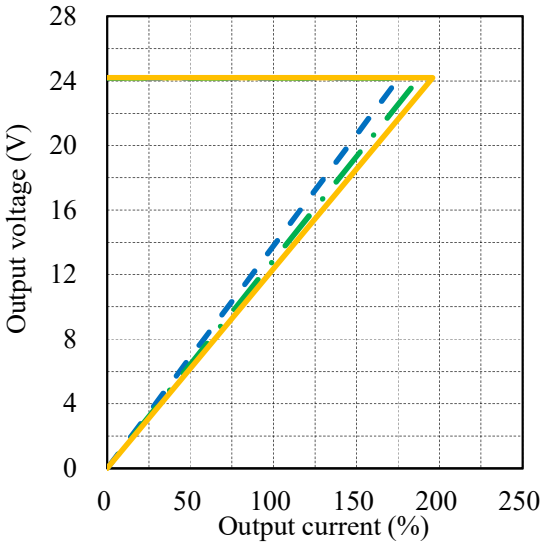


周囲温度依存性

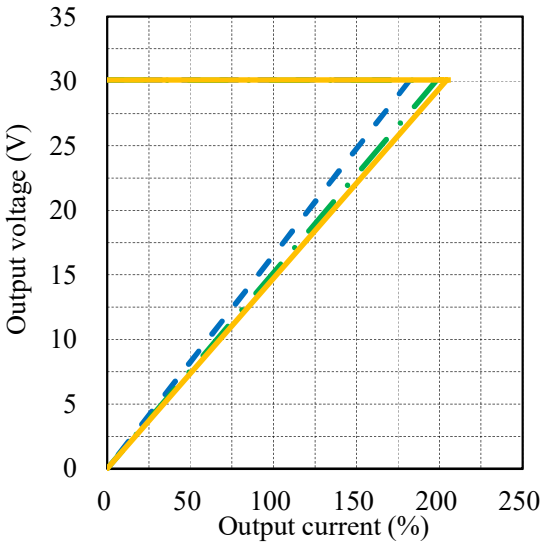
Ambient temperature dependence

Conditions Vin : 24 VDC
Ta : -40 ℃
: 25 ℃
: 85 ℃

±12V



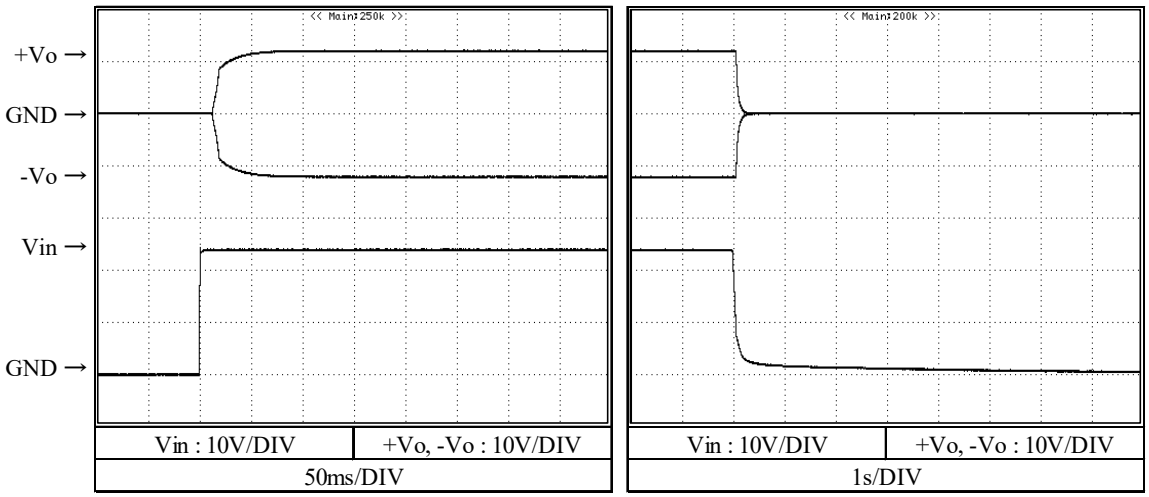
±15V



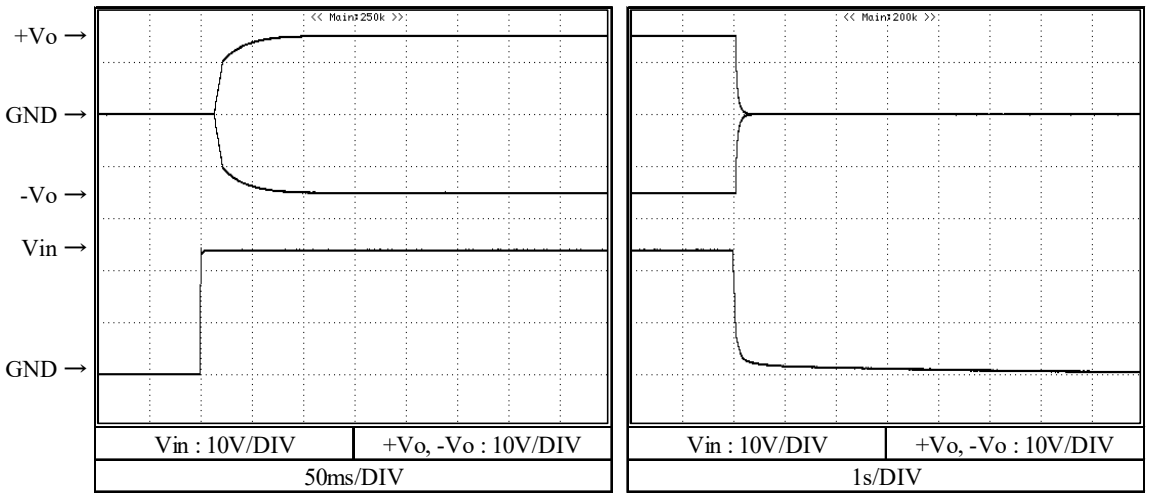
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 0 %
Ta : 25 ºC

±12V



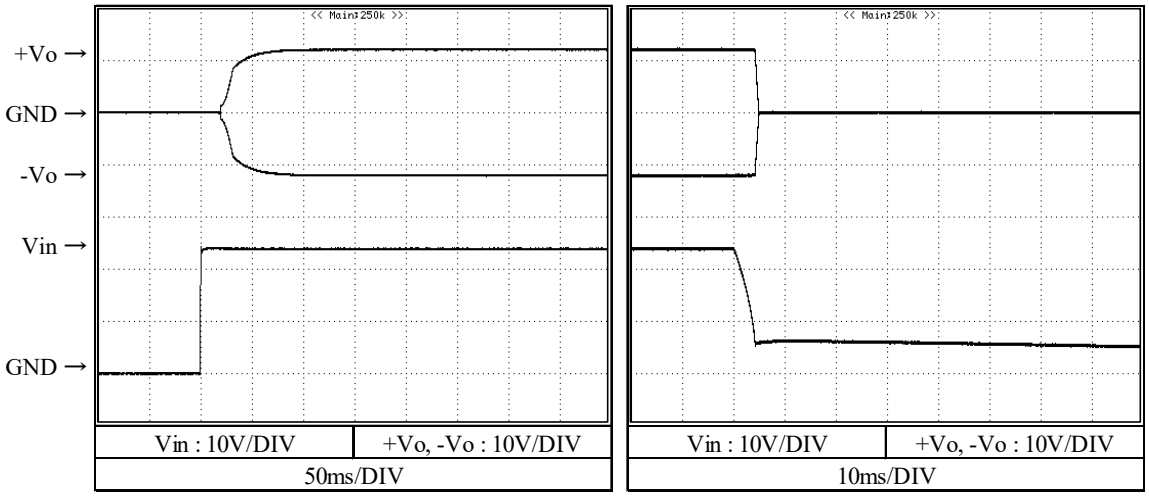
±15V



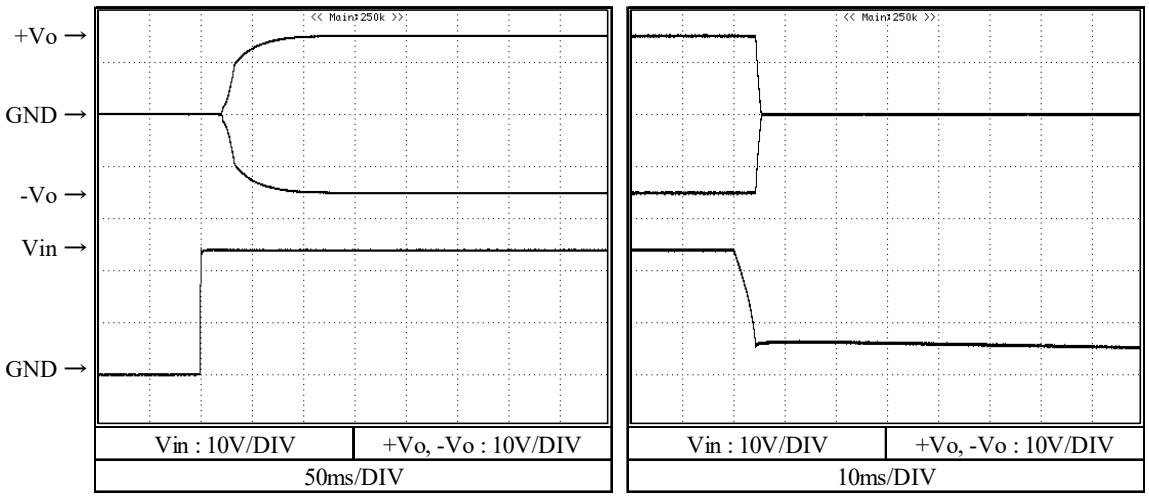
2-5. 出力立ち上がり・立ち下がり特性 Output rise and fall characteristics

Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V



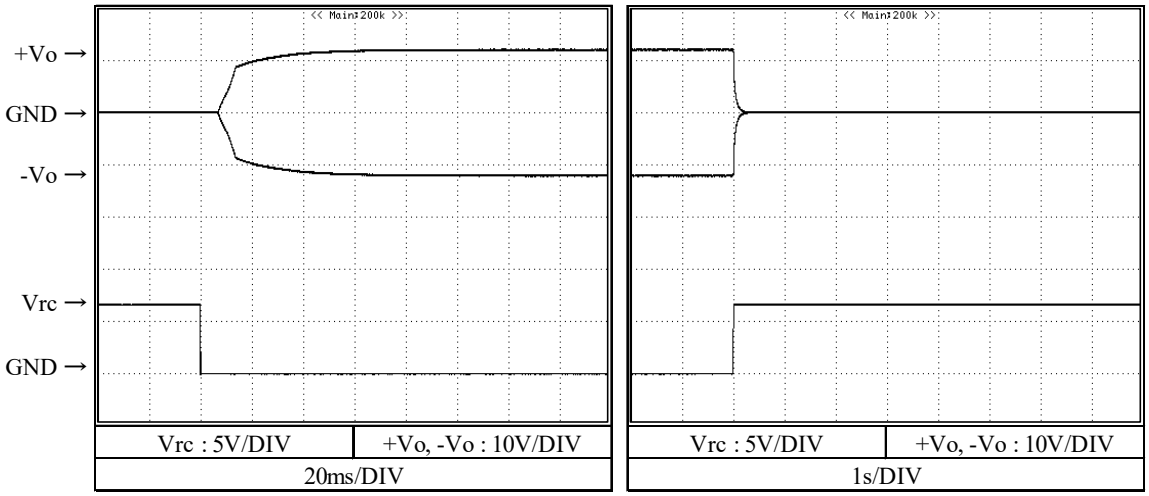
±15V



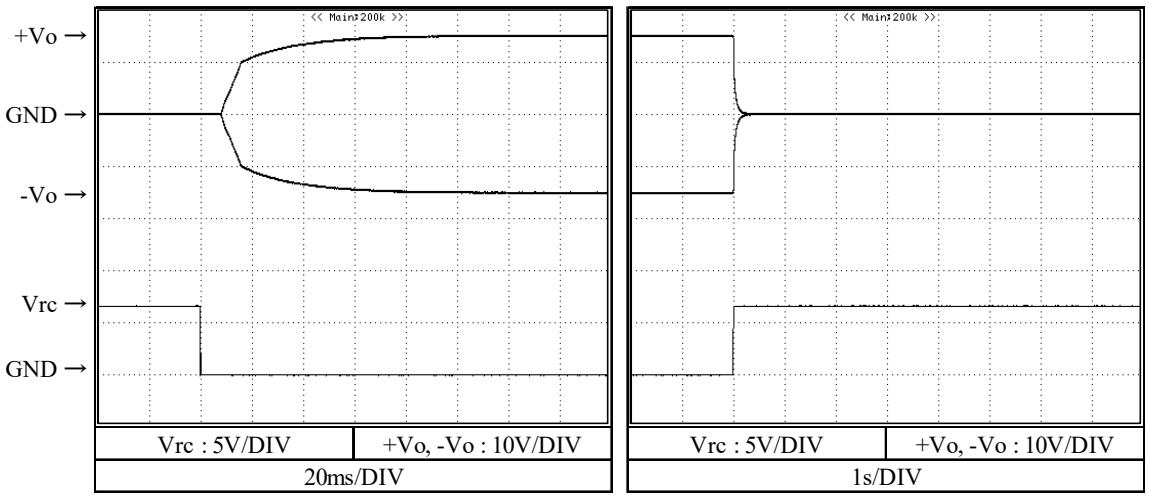
2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 24 VDC
Io : 0 %
Ta : 25 ºC

±12V



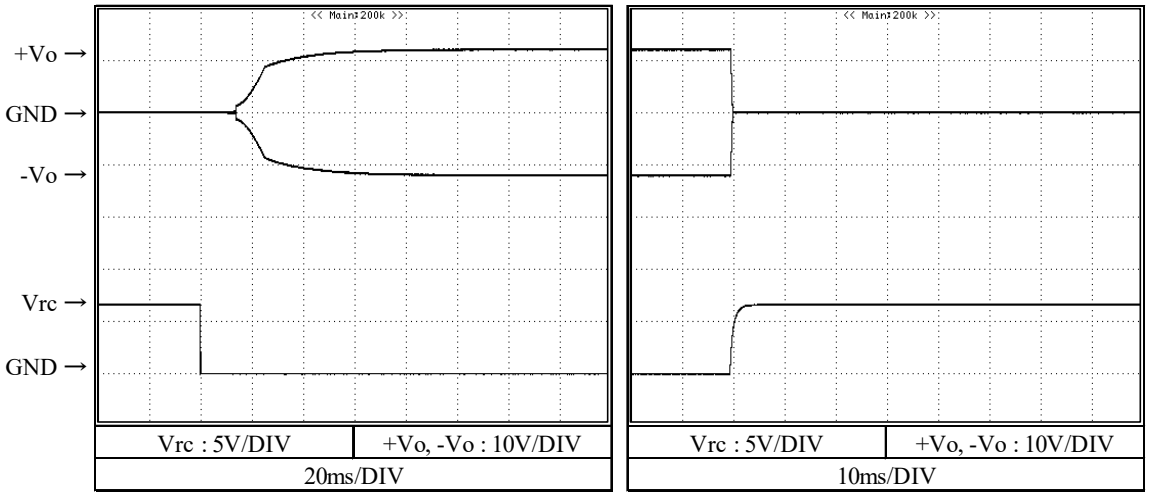
±15V



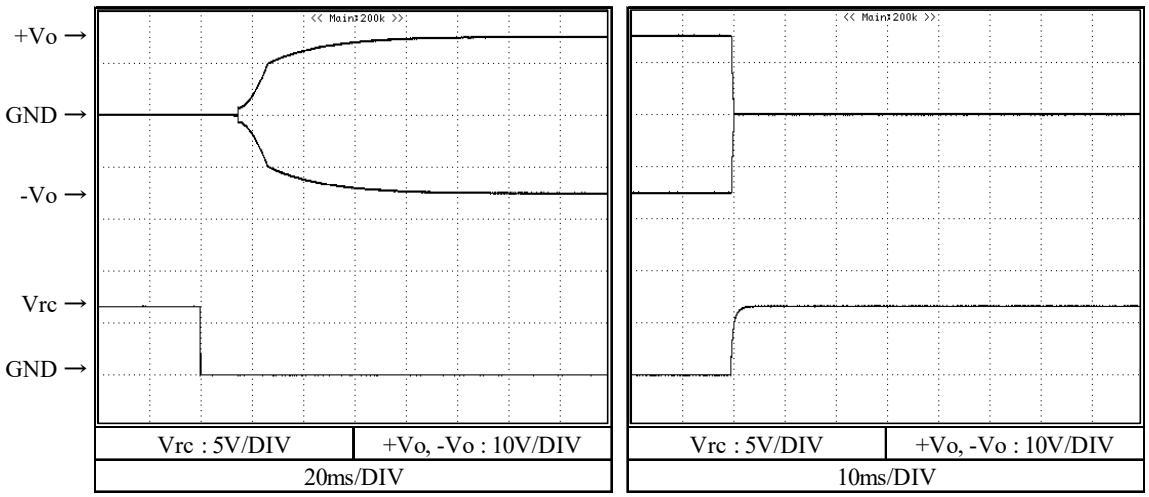
2-5. 出力立ち上がり・立ち下がり特性 (リモートON/OFFコントロール時)
Output rise and fall characteristics with REMOTE ON/OFF CONTROL

Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V



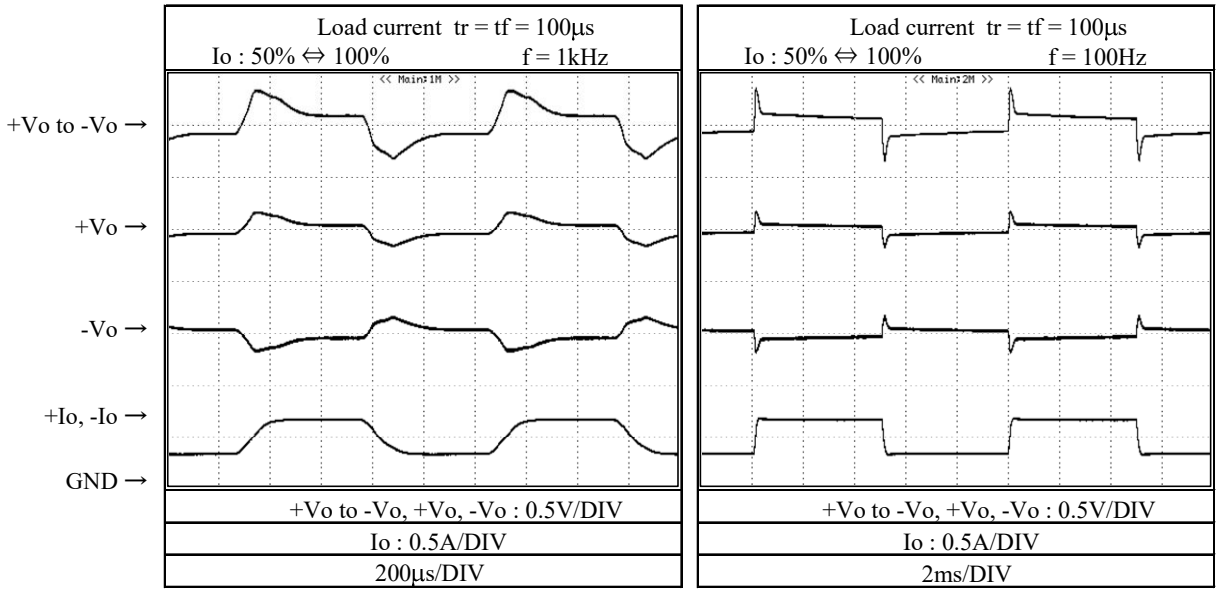
±15V



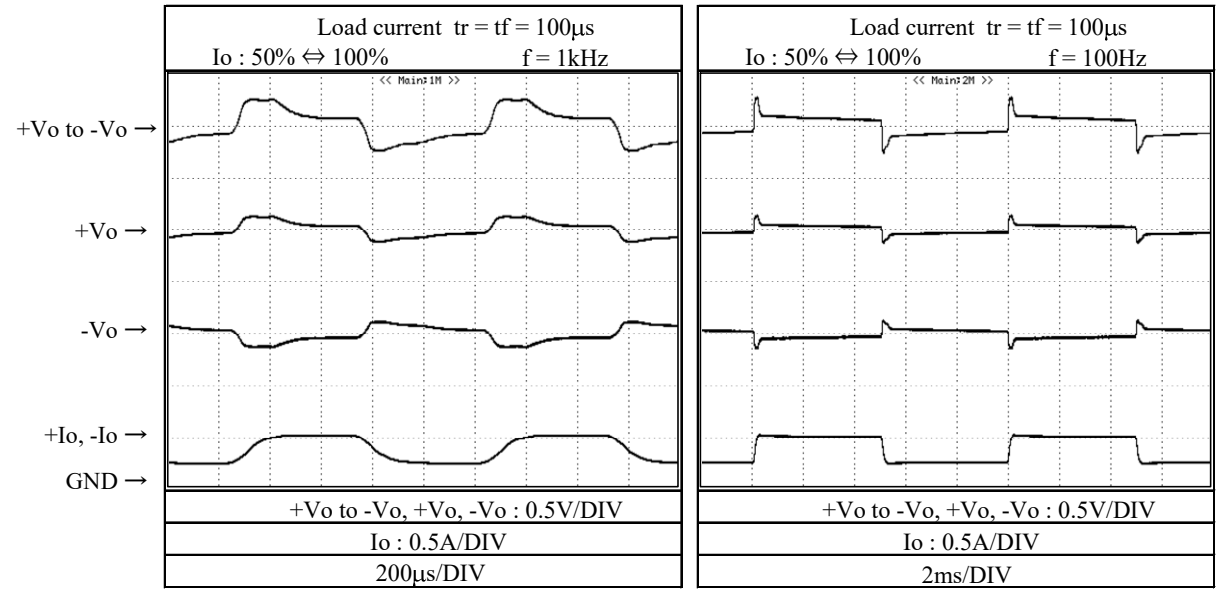
2-6. 過渡応答(負荷急変)特性 Dynamic load response characteristics

Conditions Vin : 24 VDC
Ta : 25 ºC

±12V



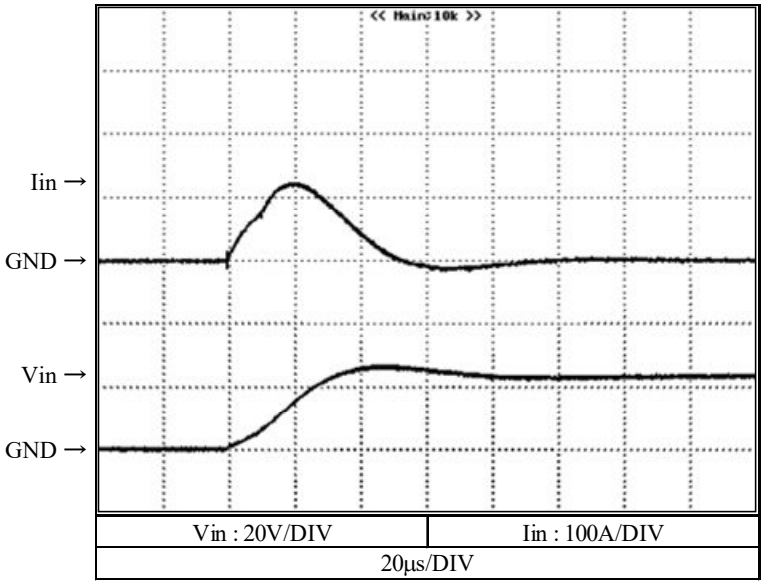
±15V



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

Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

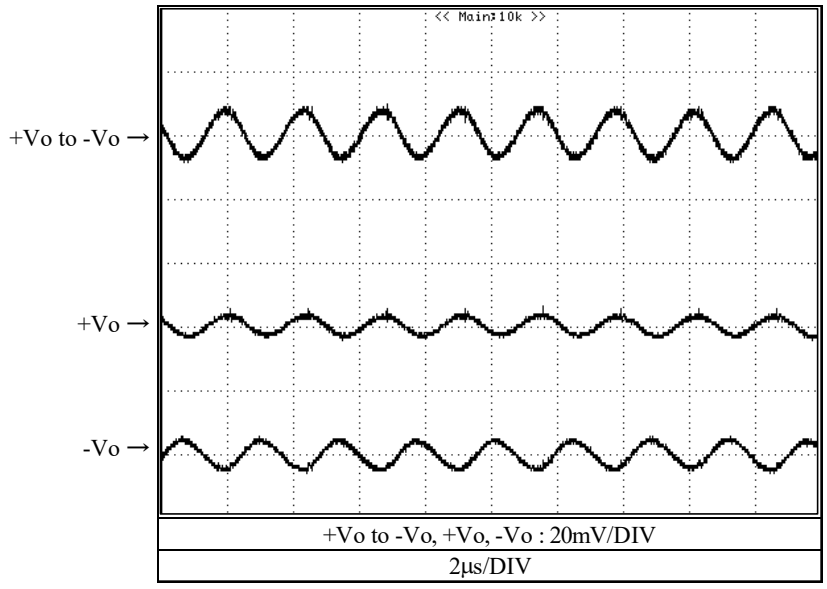
±12V



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

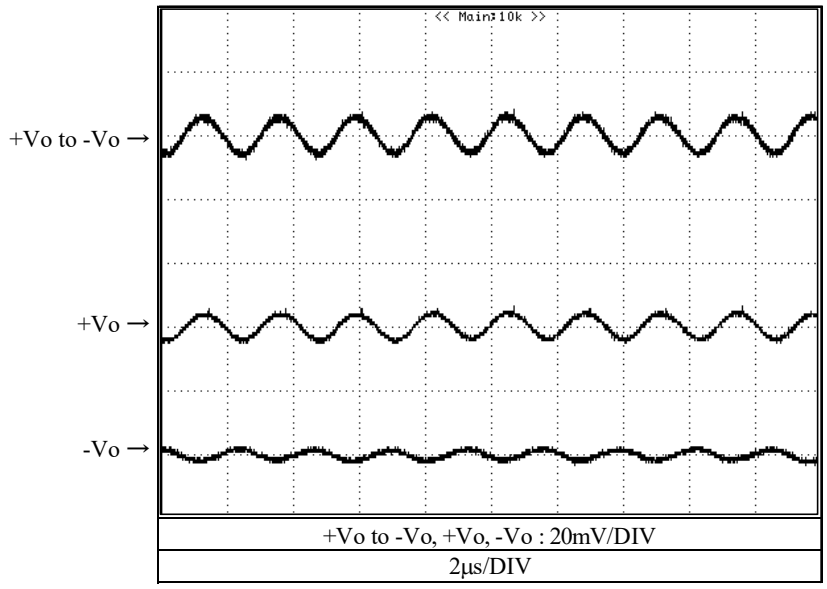
Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V



+Vo to -Vo, +Vo, -Vo : 20mV/DIV
2μs/DIV

±15V



+Vo to -Vo, +Vo, -Vo : 20mV/DIV
2μs/DIV

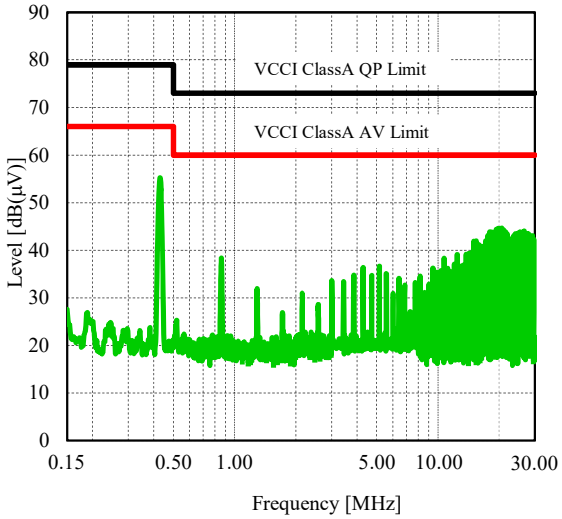
2-9. EMI特性 Electro-Magnetic Interference characteristics

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

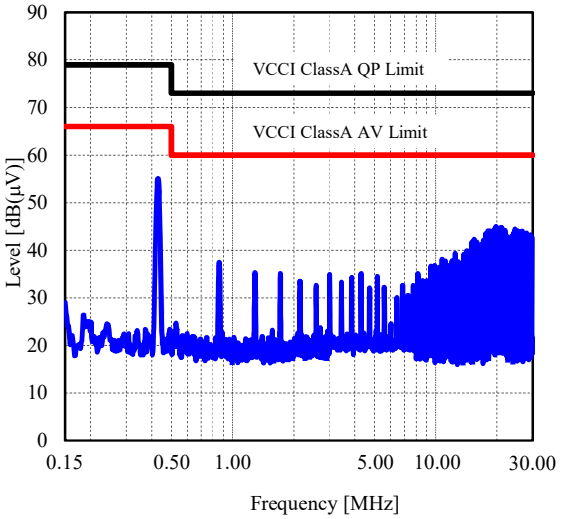
Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V

+Vin

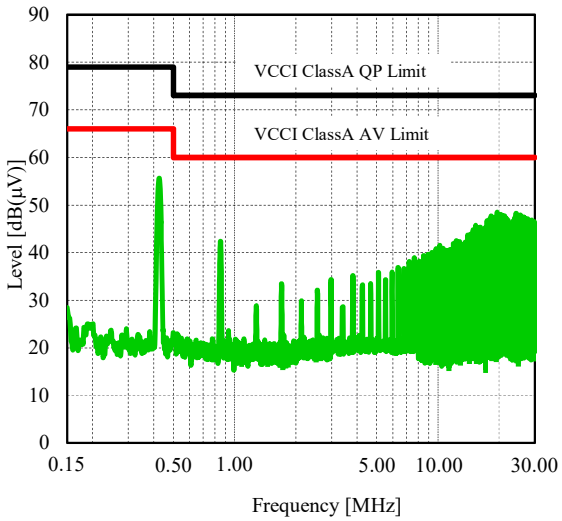


-Vin

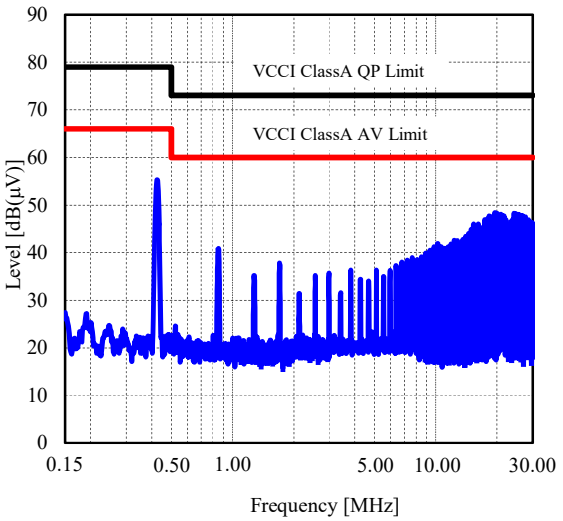


±15V

+Vin



-Vin



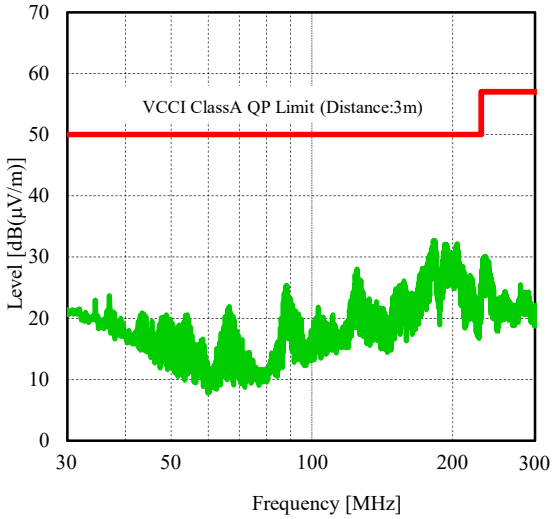
2-9. EMI特性 Electro-Magnetic Interference characteristics

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

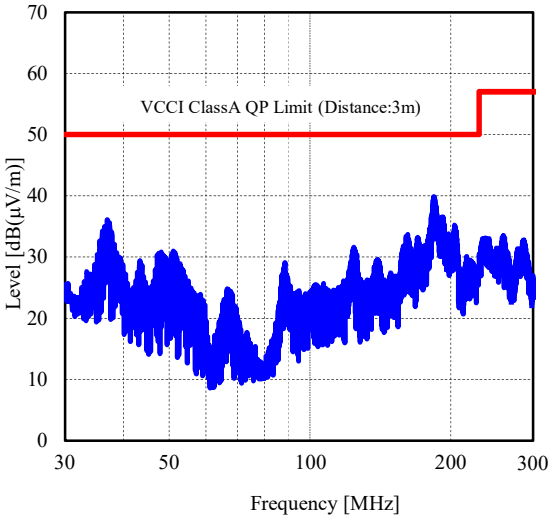
Conditions Vin : 24 VDC
Io : 100 %
Ta : 25 ºC

±12V

HORIZONTAL

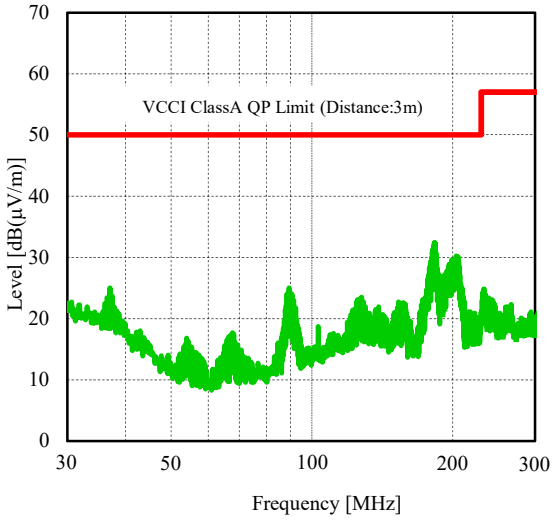


VERTICAL



±15V

HORIZONTAL



VERTICAL