EDCM3000-60

EVALUATION DATA

型式データ

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使用記号 Terminology used

Ta	:	周囲温度 Ambient temperature	f	:	周波数 Frequency
Vin	:	入力電圧 Input voltage	Iin	:	入力電流 Input current
Vout	:	出力電圧 Output voltage	Iout	:	出力電流 Output current
Vaux	:	AUX 電圧 AUX voltage	Iaux	:	AUX 電流 AUX current
tr	:	立ち上がり時間 Rise time	tf	:	立ち下がり時間 Fall time

※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　Circuit used for determination

測定回路 1　Circuit 1 used for determination

静特性　Steady state data

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

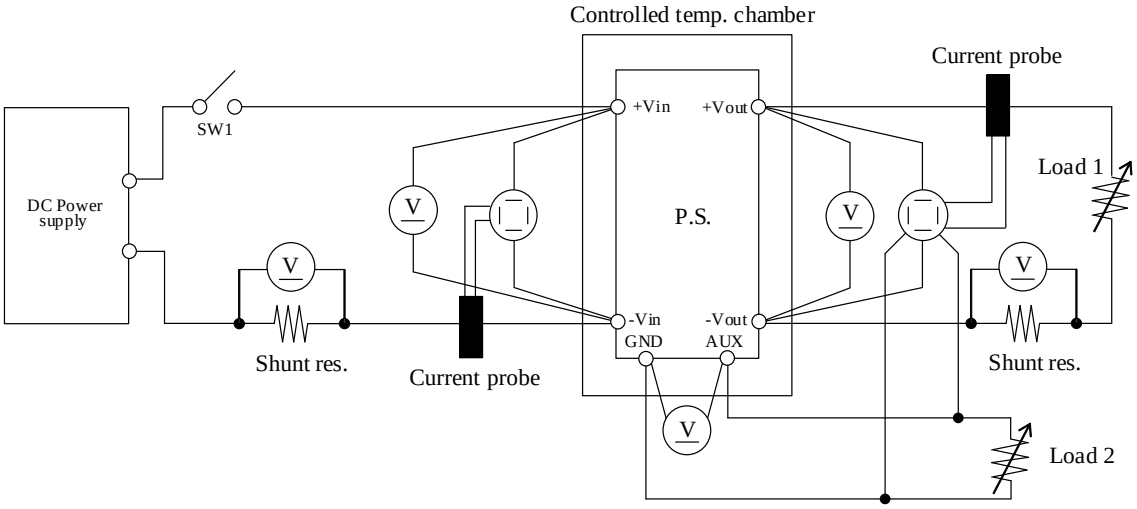
出力電圧立ち上がり、立ち下がり特性　Output voltage rise/fall characteristics

出力電流立ち上がり、立ち下がり特性　Output current rise/fall characteristics

過電流保護特性　Over current protection (OCP) characteristics

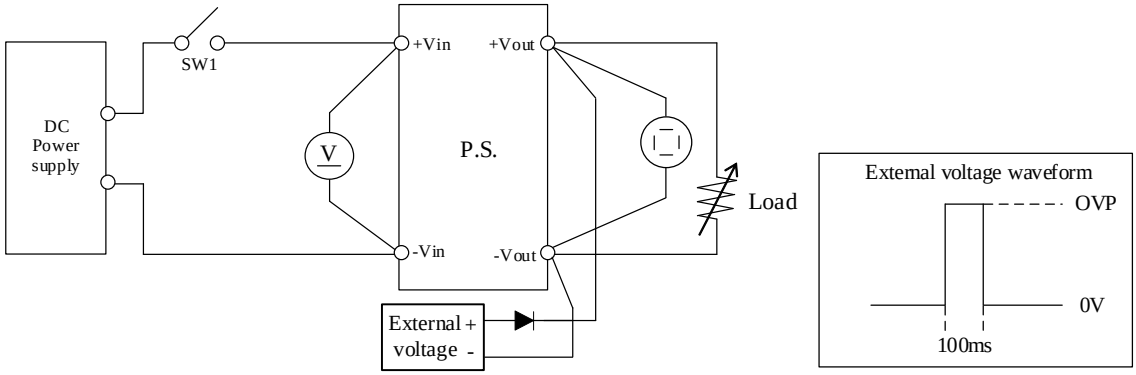
過渡応答負荷急変特性　Dynamic load response characteristics

出力リップル、ノイズ電流波形　Output ripple and noise current waveform



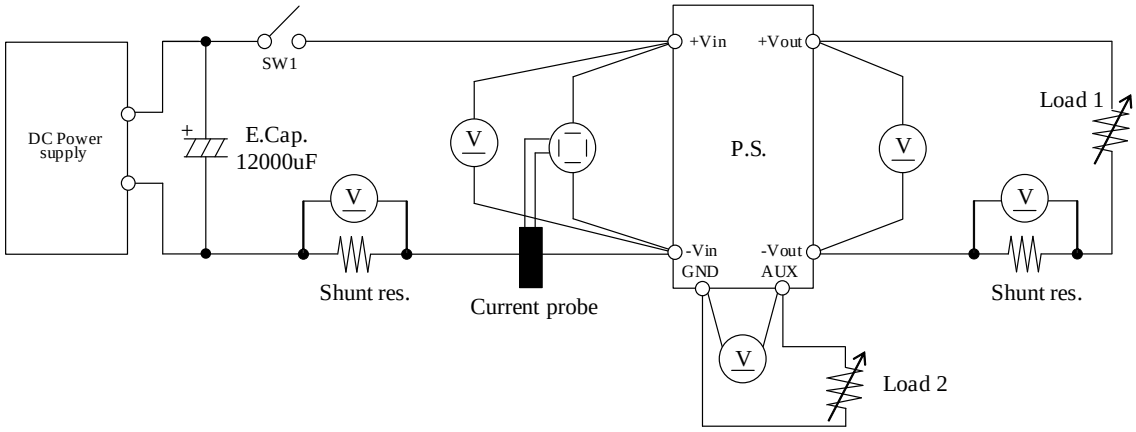
測定回路 2　Circuit 2 used for determination

過電圧保護特性　Over voltage protection (OVP) characteristics



測定回路 3　Circuit 3 used for determination

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



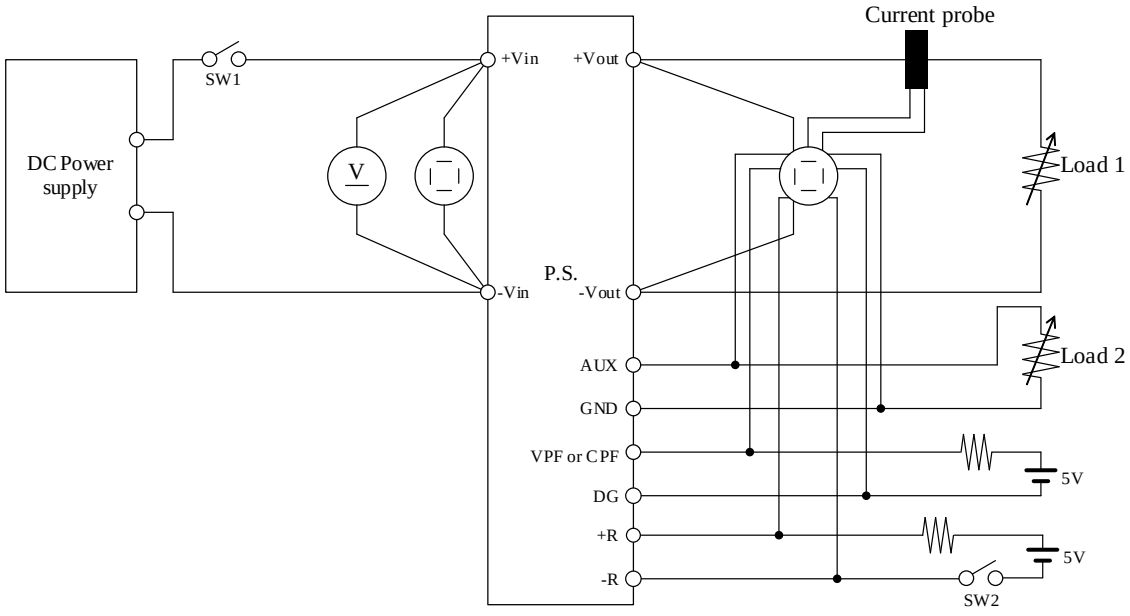
測定回路 4　Circuit 4 used for determination

ON/OFF コントロール時出力立ち上がり、立ち下がり特性

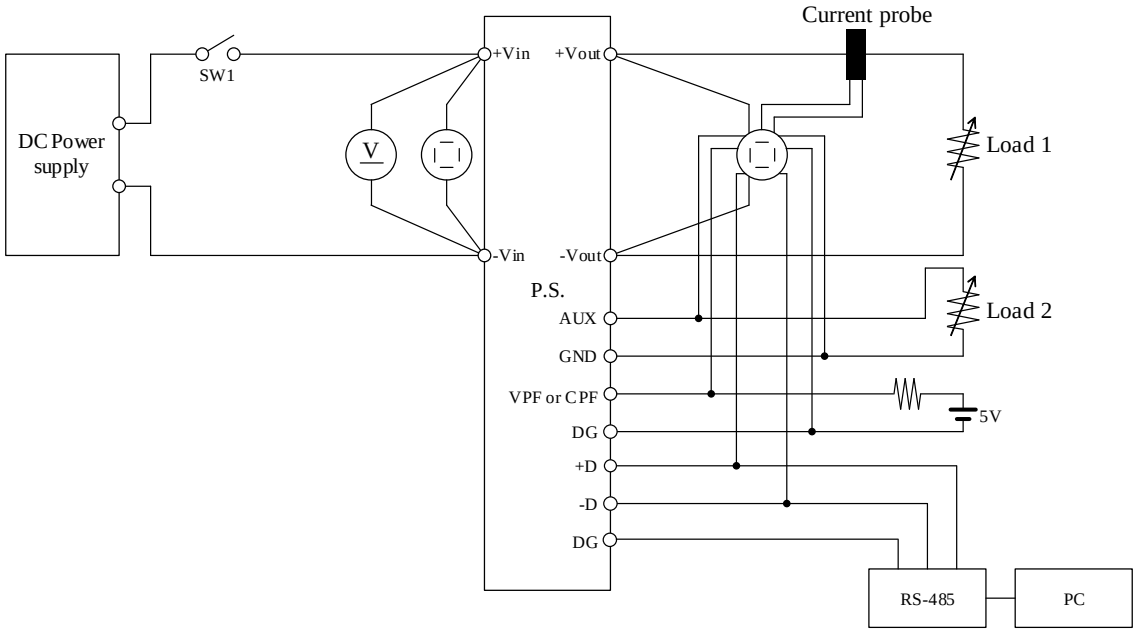
Output rise/fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

ON/OFF control by remote ON/OFF control terminal

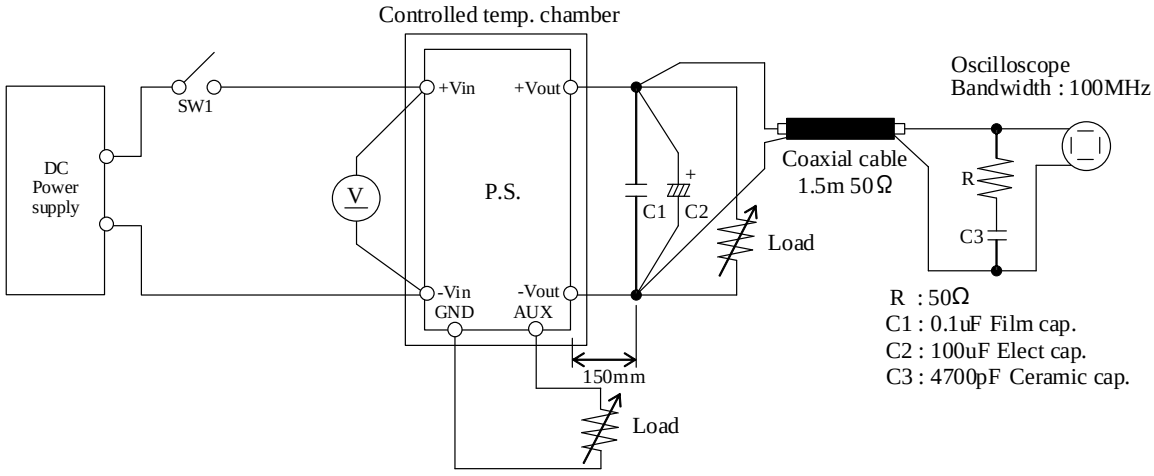


(b) RS-485 通信による ON/OFF　ON/OFF control by RS-485



測定回路 5　Circuit 5 used for determination

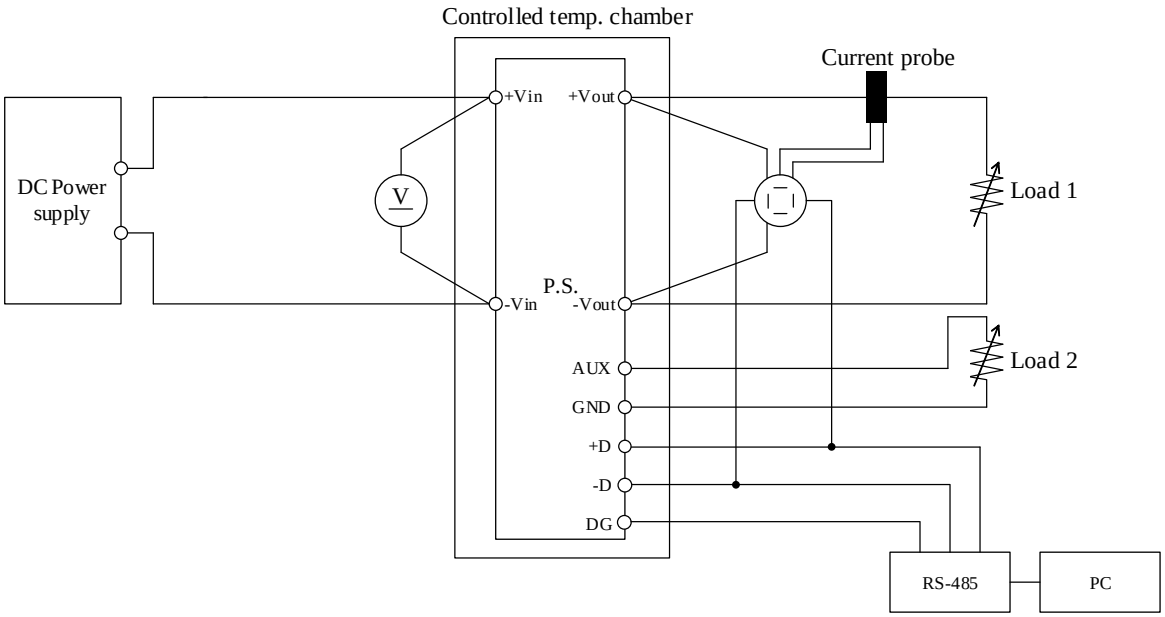
出力リップル、ノイズ電圧波形　Output ripple and noise voltage waveform



測定回路 6　Circuit 6 used for determination

出力電圧指令応答特性　Output voltage command response characteristics

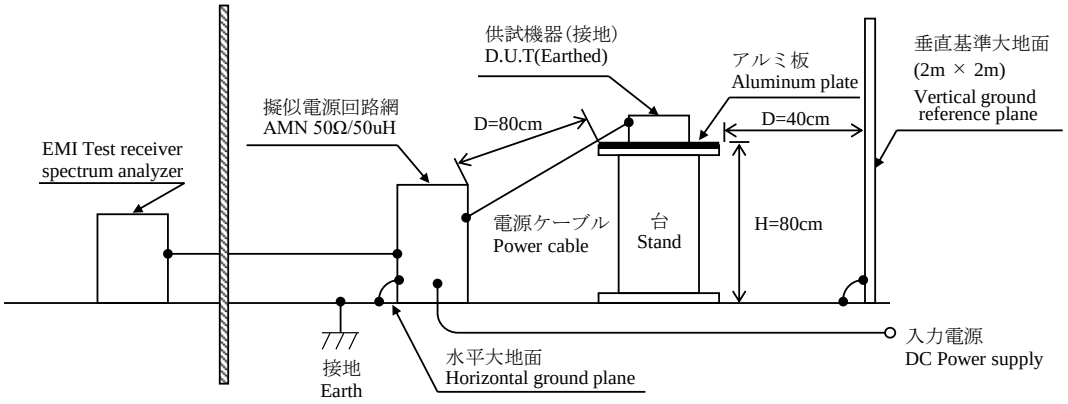
出力電流指令応答特性　Output current command response characteristics



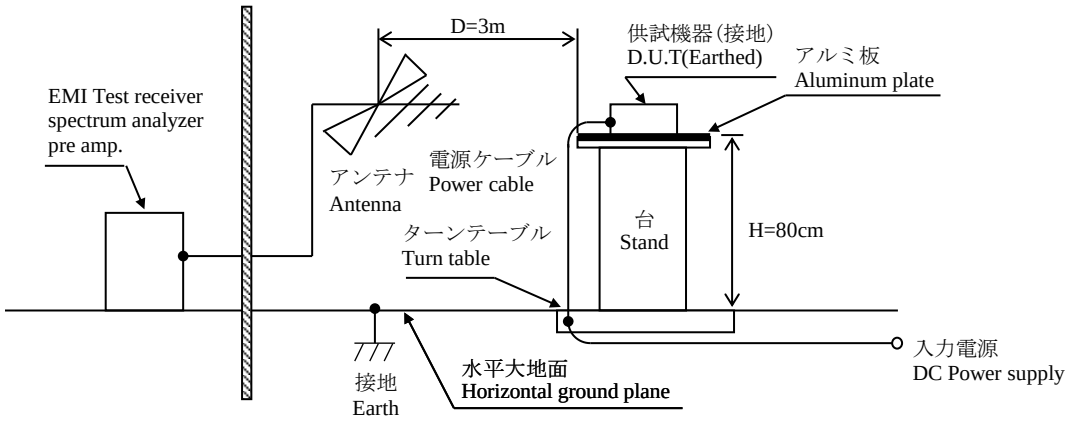
測定構成　Configuration used for determination

EMI 特性　Electro-Magnetic Interference characteristics

(a)　雑音端子電圧（帰還ノイズ）　Conducted Emission



(b)　雑音電界強度（放射ノイズ）　Radiated Emission



1-2. 使用測定機器　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DLM5054
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DLM5058
3	DIGITAL MULTIMETER	KEYSIGHT	34970A
4	DIGITAL MULTIMETER	KEYSIGHT	34401A
5	CURRENT PROBE	YOKOGAWA ELECT.	701930
6	CURRENT PROBE	YOKOGAWA ELECT.	701931
7	DYNAMIC DUMMY LOAD	KIKUSI	PLZ1004W
8	DYNAMIC DUMMY LOAD BOOSTER	KIKUSI	PLZ2004WB
9	DYNAMIC DUMMY LOAD	CHROMA	63220E-1200-800
10	DYNAMIC DUMMY LOAD	TDK-LAMBDA	SFL120-60-300
11	CVCC	TDK-LAMBDA	GEN600-8.5
12	CVCC	KIKUSUI	PCR18000WEA2R
13	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4J
14	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESR3
15	PRE AMP.	SONOMA	310N
16	AMN	SCHWARZBECK	NNLK8121
17	ANTENNA	TESEQ	CBL6111D

2. 特性データ　Characteristics

2-1. 定電圧出力モード　Constant voltage output mode

2-1-1. 静特性　Steady state data

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

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

Iout \ Vin	160VDC	190VDC	220VDC	320VDC	420VDC	Line regulation	
0%	60.31V	60.32V	60.31V	60.32V	60.34V	27mV	0.044%
50%	59.97V	59.99V	59.99V	60.00V	59.99V	26mV	0.044%
100%	60.00V	60.01V	60.01V	60.00V	60.01V	15mV	0.025%
Load regulation	344mV	338mV	323mV	324mV	354mV		
	0.573%	0.563%	0.538%	0.540%	0.590%		

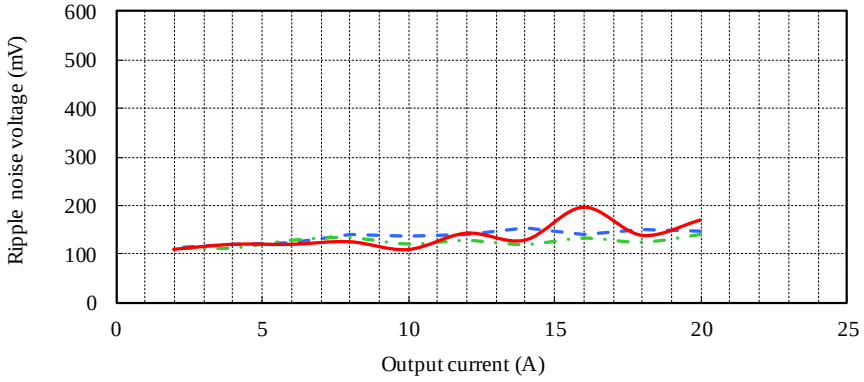
2. Temperature drift

Conditions　　Vin :　320 VDC
Iout :　50 A

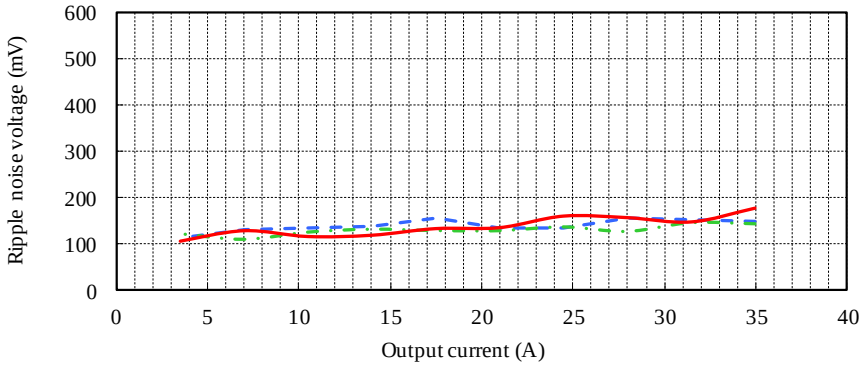
Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	60.05V	60.00V	59.93V	119mV	0.199%

(2) リップルノイズ・電圧対・出力電流　Ripple noise voltage vs. Output current

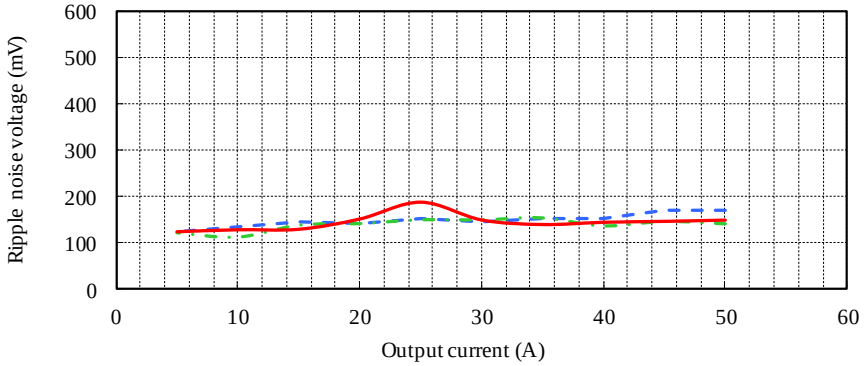
Conditions　Vin : 160 VDC
Vout : 60 V
Ta : -20 °C
25 °C
50 °C



Conditions　Vin : 190 VDC
Vout : 60 V
Ta : -20 °C
25 °C
50 °C

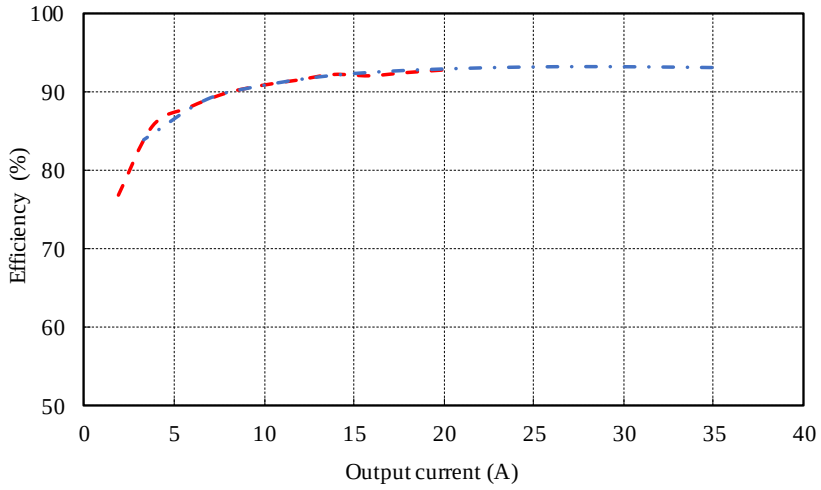


Conditions　Vin : 320 VDC
Vout : 60 V
Ta : -20 °C
25 °C
50 °C

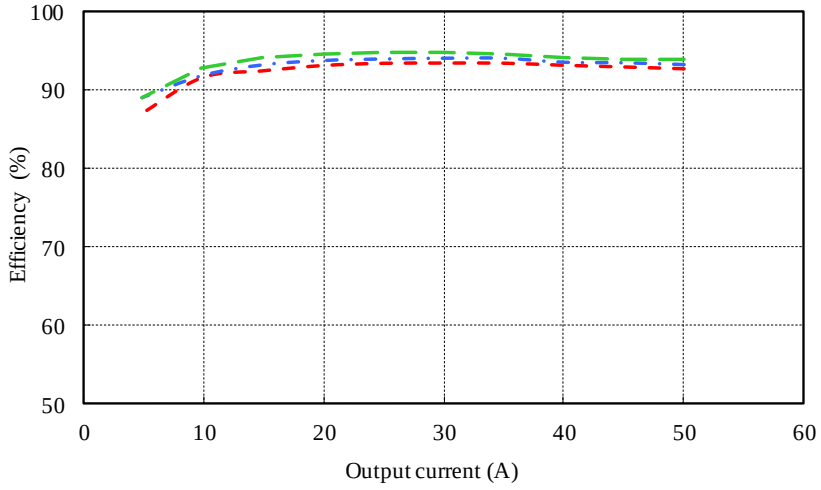


(3) 効率対出力電流 Efficiency vs. Output current

Conditions Vin : 160 VDC
190 VDC
Vout : 60 V
Iaux : 0 %
Ta : 25 ℃

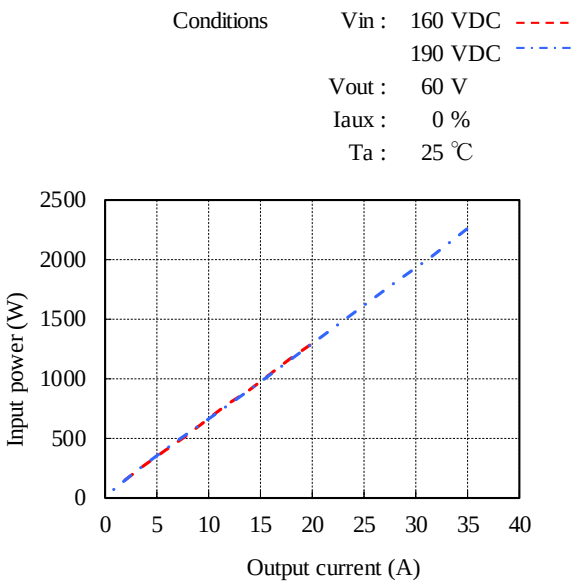


Conditions Vin : 220 VDC
320 VDC
420 VDC
Vout : 60 V
Iaux : 0 %
Ta : 25 ℃

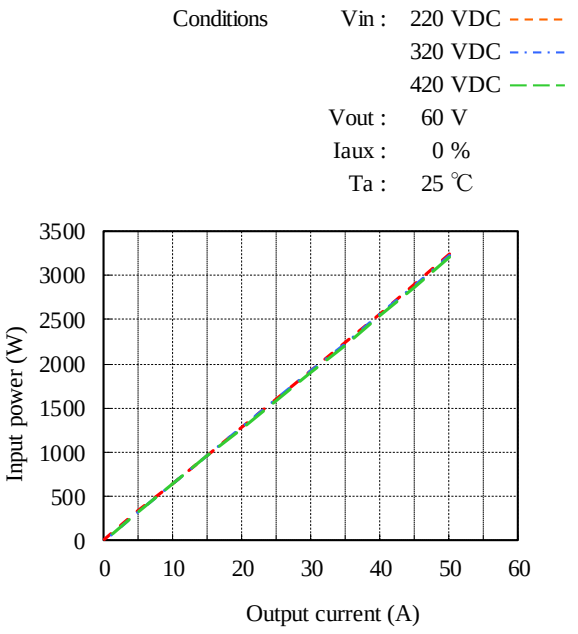


(4) 入力電力対出力電流 Input power vs. Output current

Vin	Input power	
	Iout : 0%	Control OFF
160VDC	8.1W	7.8W
190VDC	8.0W	7.7W

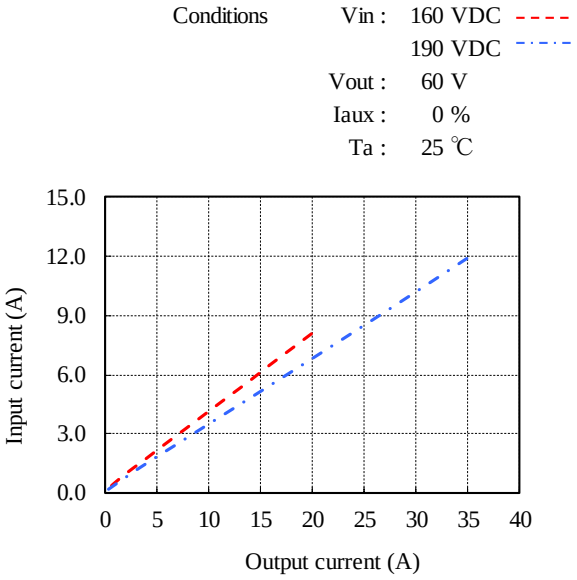


Vin	Input power	
	Iout : 0%	Control OFF
220VDC	7.4W	7.5W
320VDC	7.0W	5.9W
420VDC	6.4W	6.8W

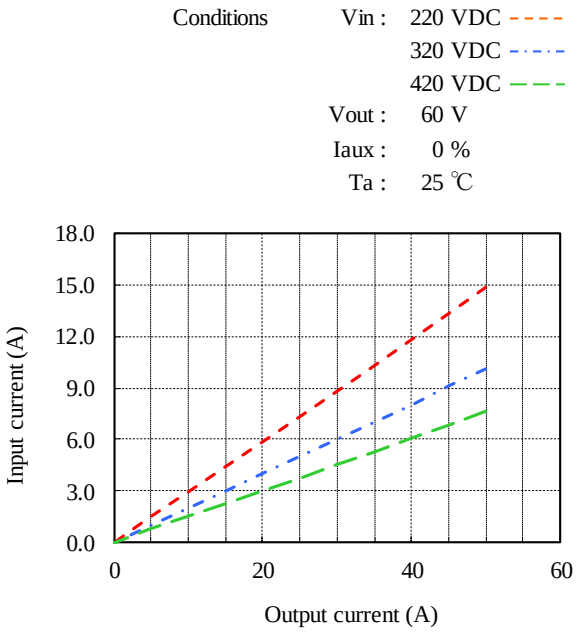


(5) 入力電流対出力電流 Input current vs. Output current

Vin	Input current	
	Iout : 0%	Control OFF
160VDC	0.05A	0.05A
190VDC	0.04A	0.04A

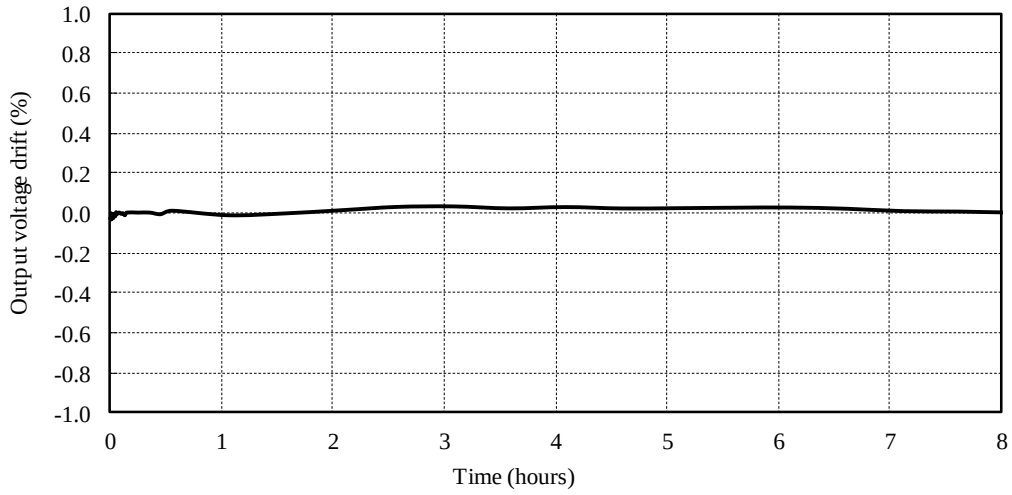


Vin	Input current	
	Iout : 0%	Control OFF
220VDC	0.03A	0.03A
320VDC	0.02A	0.02A
420VDC	0.02A	0.02A



2-1-2. 通電ドリフト特性　Warm up voltage drift characteristics

Conditions	Vin :	320	VDC
	Vout :	60	V
	Iout :	50	A
	Ta :	25	°C

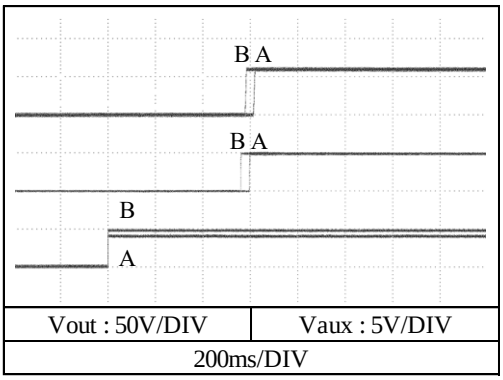


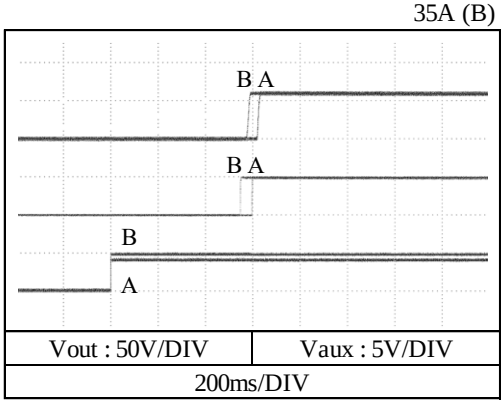
2-1-3. 出力電圧立ち上がり特性　Output voltage rise characteristics

Conditions　Vin :　160 VDC (A)
　　190 VDC (B)
　　Iaux :　100 %
　　Ta :　25 ℃

Iout :　20A (A)
　　35A (B)

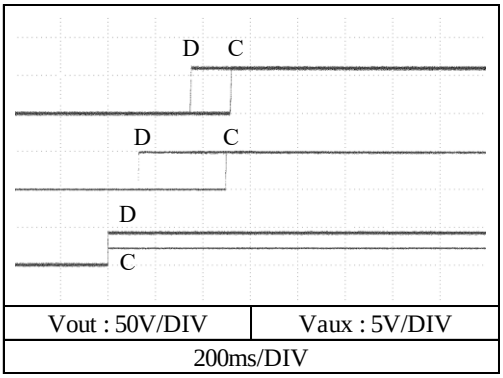
Iout : 0A



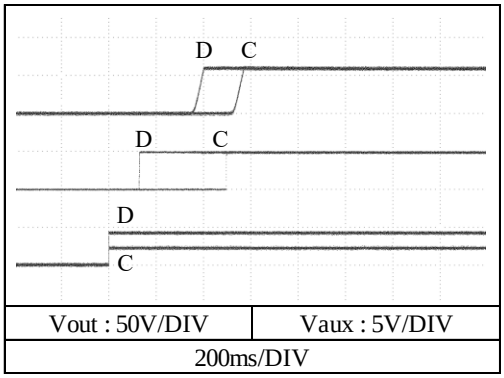


Conditions　Vin :　220 VDC (C)
　　420 VDC (D)
　　Iaux :　100 %
　　Ta :　25 ℃

Iout : 0A



Iout : 50A

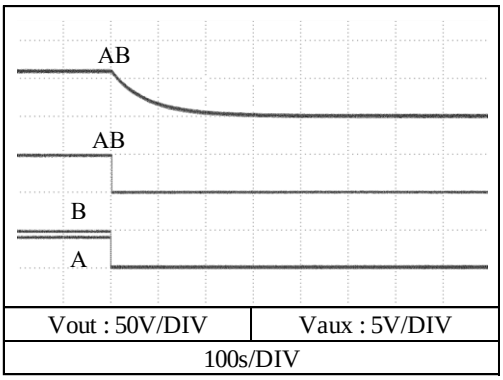


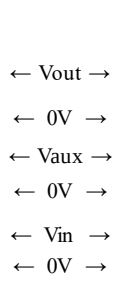
2-1-4. 出力電圧立ち下がり特性　Output voltage fall characteristics

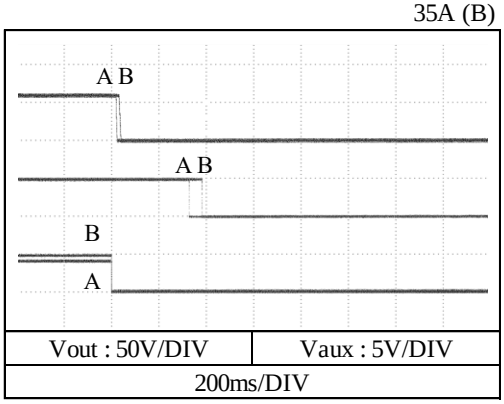
Conditions　Vin :　160 VDC (A)
　　190 VDC (B)
　　Iaux :　100 %
　　Ta :　25 ℃

Iout :　20A (A)
　　35A (B)

Iout : 0A

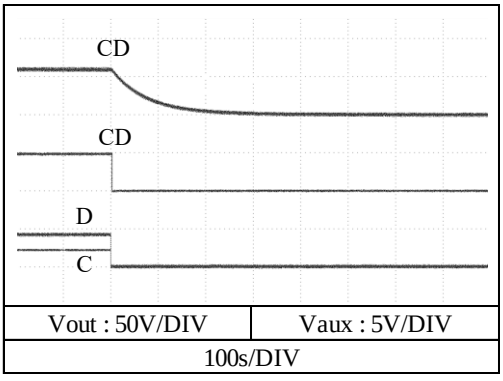


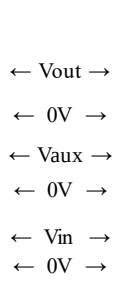




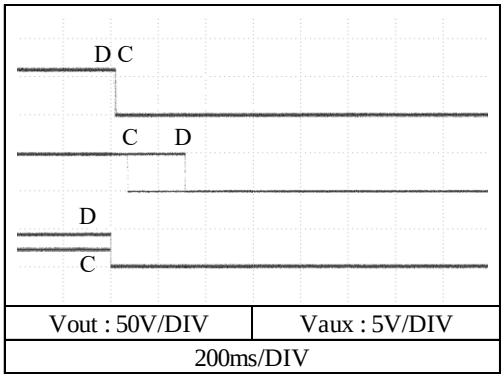
Conditions　Vin :　220 VDC (C)
　　420 VDC (D)
　　Iaux :　100 %
　　Ta :　25 ℃

Iout : 0A





Iout : 50A



2-1-5. ON/OFF コントロール時出力立ち上がり、立ち下がり特性

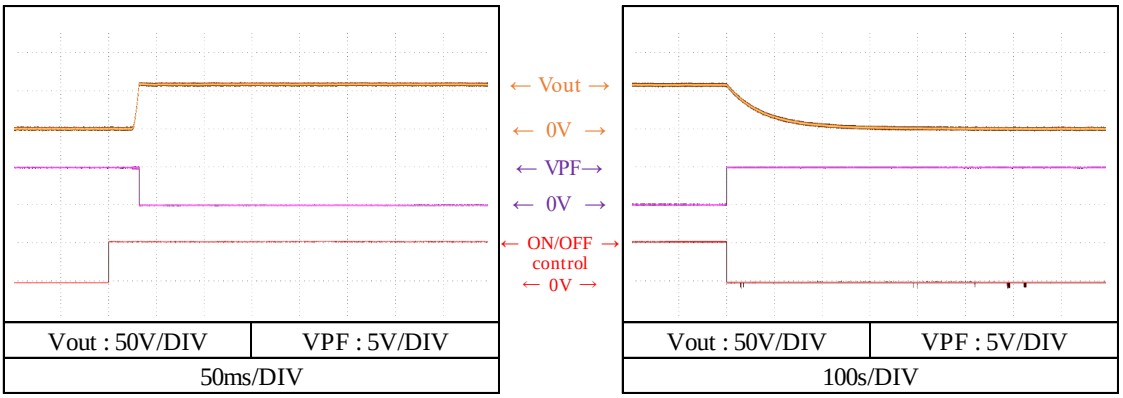
Output rise/fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

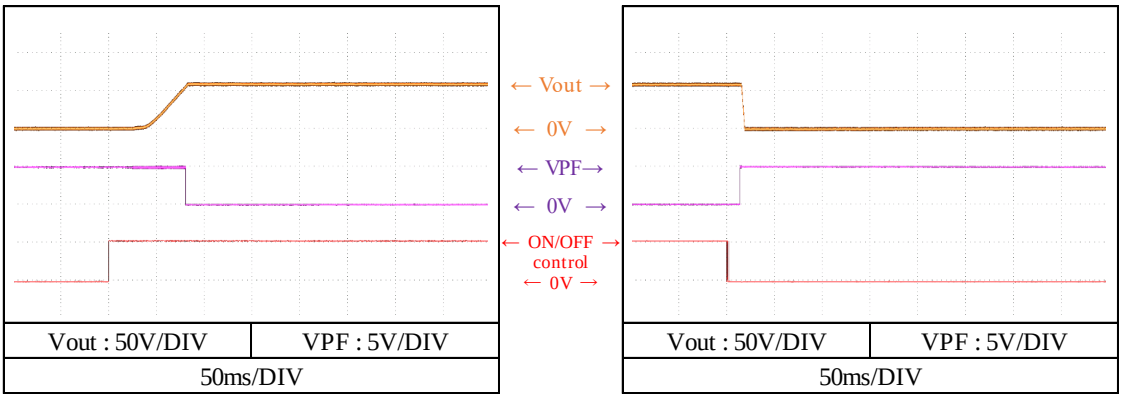
ON/OFF control by remote ON/OFF control terminal

Conditions Vin : 320 VDC
Ta : 25 ℃

Iout : 0A



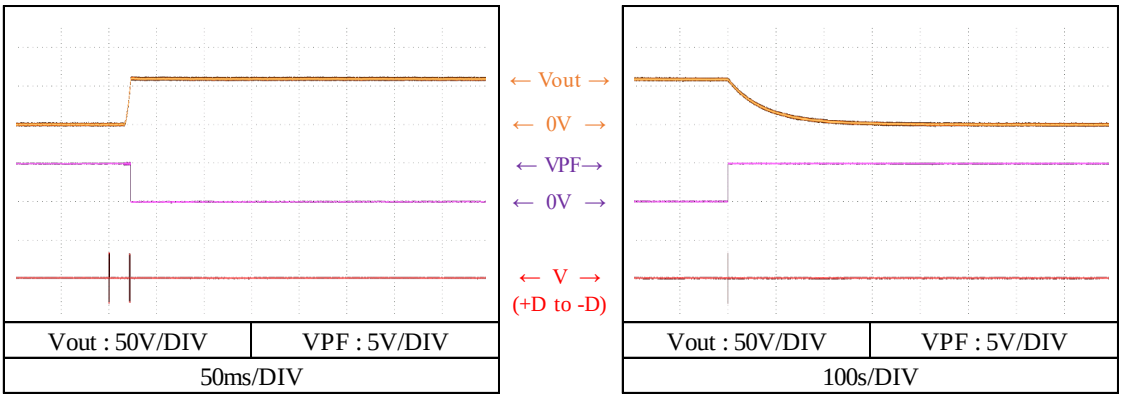
Iout : 50A



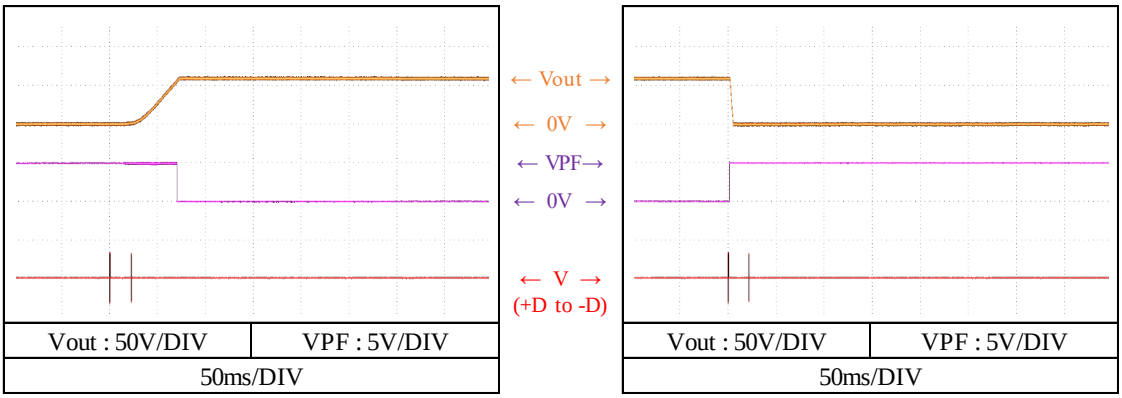
(b) RS-485 通信による ON/OFF ON/OFF control by RS-485

Conditions Vin : 320 VDC
Ta : 25 ℃

Iout : 0A



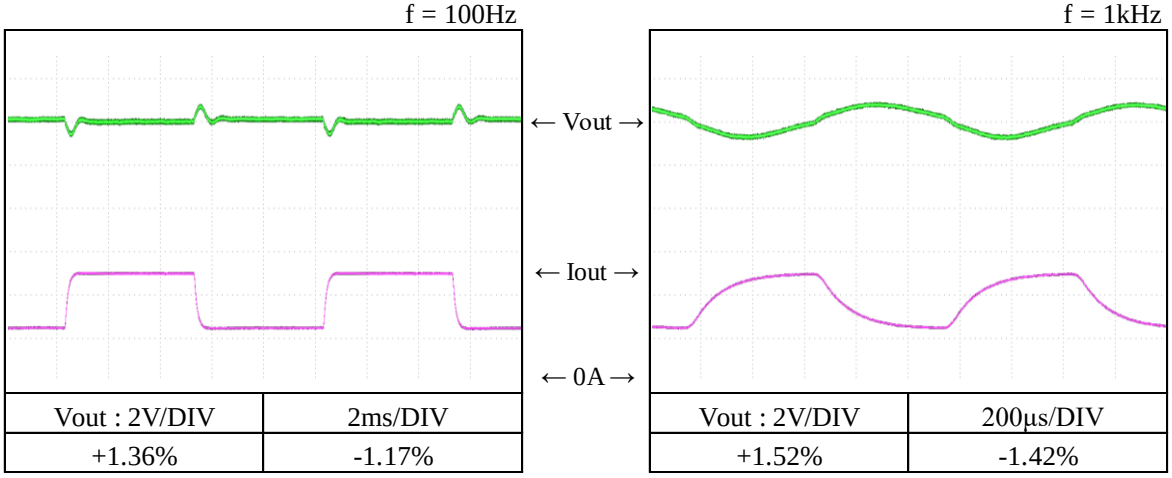
Iout : 50A



2-1-6. 過渡応答 (負荷急変) 特性　Dynamic load response characteristics

Conditions　Vin : 320 VDC
Iout : 25A ↔ 50A
(tr = tf = 50us)
Ta : 25 ℃

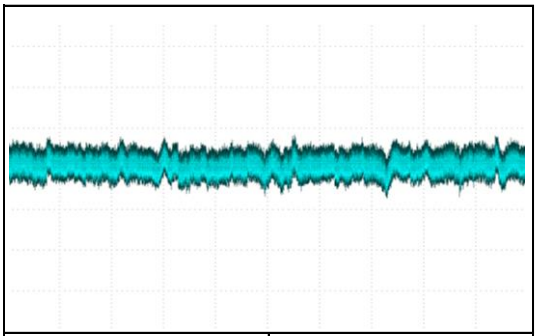
f = 100Hz　　f = 1kHz



Vout : 2V/DIV	2ms/DIV	Vout : 2V/DIV	200µs/DIV
+1.36%	-1.17%	+1.52%	-1.42%

2-1-7. 出力リップル、ノイズ波形　Output ripple and noise waveform

Conditions　Vin : 320 VDC
Vout : 60 V
Iout : 50 A
Ta : 25 ℃

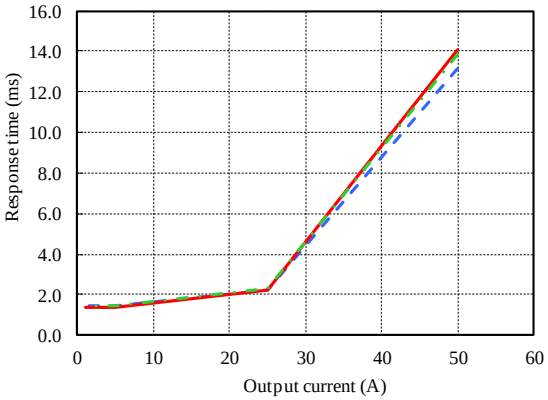


Vout : 100mV/DIV	2ms/DIV

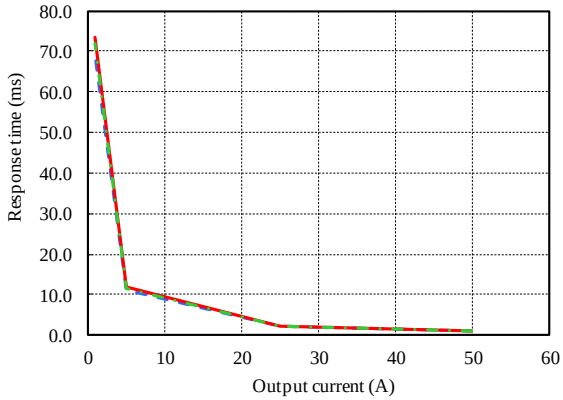
2-1-8. 出力電圧指令応答特性　Output voltage command response characteristics

Conditions　Vin : 320 VDC
Ta : -20 ℃
25 ℃
50 ℃

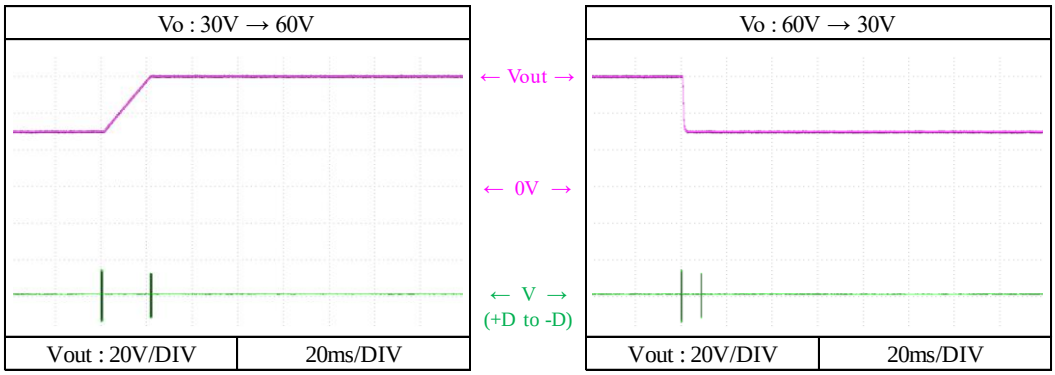
Vo : 30V → 60V



Vo : 60V → 30V



Conditions　Vin : 320 VDC
Iout : 50 A
Ta : 25 ℃



2-2. 定電流出力モード Constant current output mode

2-2-1. 静特性　Steady state data

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

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

Vout \ Vin	160VDC	190VDC
10%	19.98A	34.95A
50%	19.95A	34.91A
100%	19.93A	34.92A
Load regulation	53mA	36mA
	0.265%	0.103%

Vout \ Vin	220VDC	320VDC	420VDC	Line regulation	
10%	49.93A	49.92A	49.91A	14mA	0.028%
50%	49.87A	49.86A	49.85A	24mA	0.047%
100%	49.89A	49.87A	49.86A	35mA	0.071%
Load regulation	52mA	53mA	62mA		
	0.104%	0.107%	0.123%		

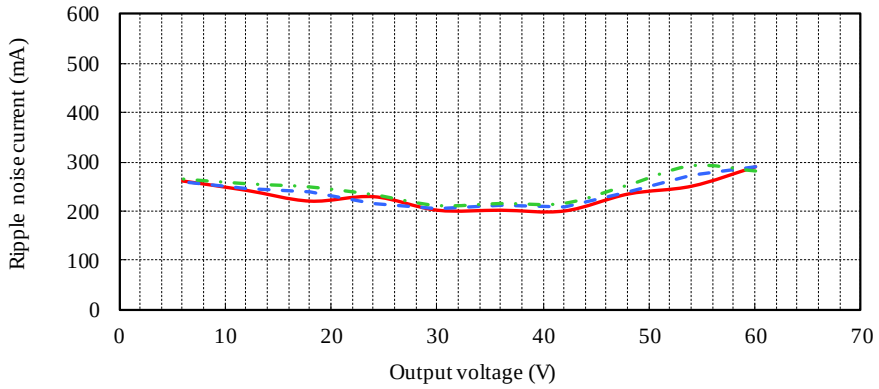
2. Temperature drift

Conditions　Vin：　320 VDC
Vout：　60 V

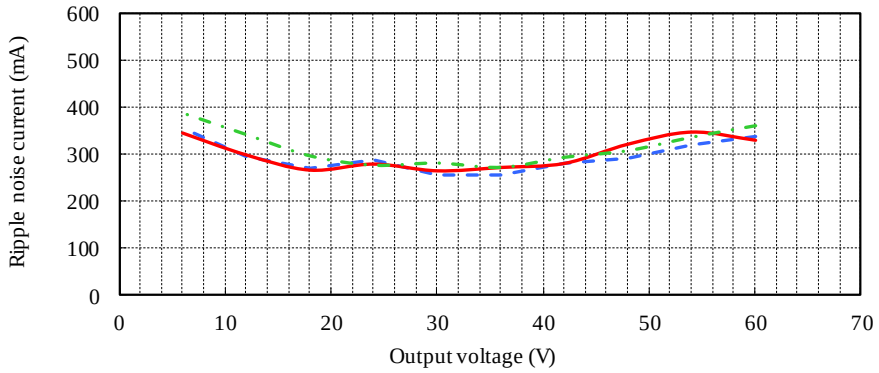
Ta	-20°C	+25°C	+50°C	Temperature stability	
Iout	49.97A	49.87A	49.84A	124mA	0.249%

(2) リップルノイズ電流対出力電圧　Ripple noise current vs. Output voltage

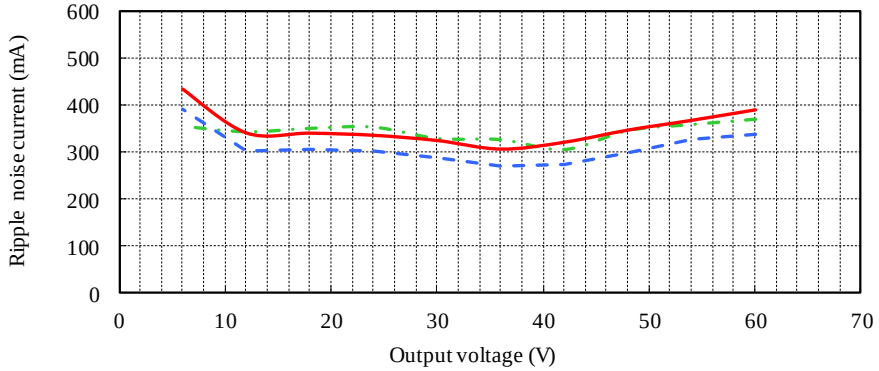
Conditions　Vin : 160 VDC
Iout : 20 A
Ta : -20 °C
25 °C
50 °C



Conditions　Vin : 190 VDC
Iout : 35 A
Ta : -20 °C
25 °C
50 °C

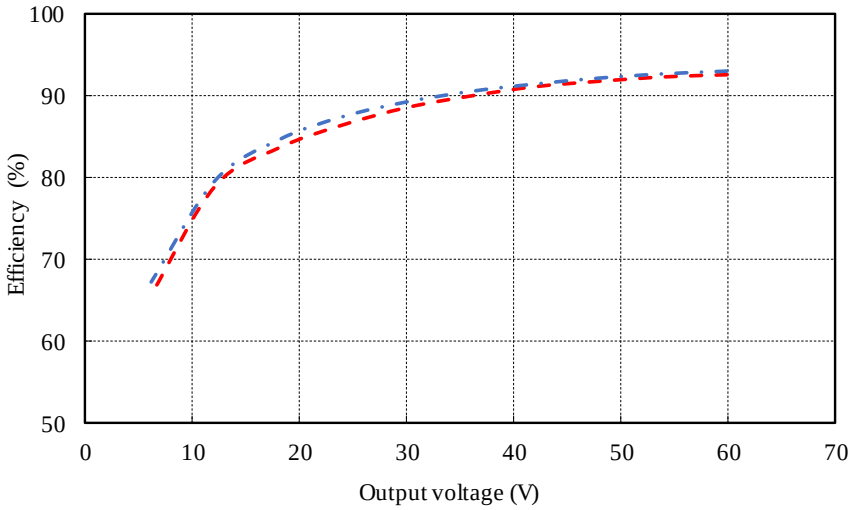


Conditions　Vin : 320 VDC
Iout : 50 A
Ta : -20 °C
25 °C
50 °C

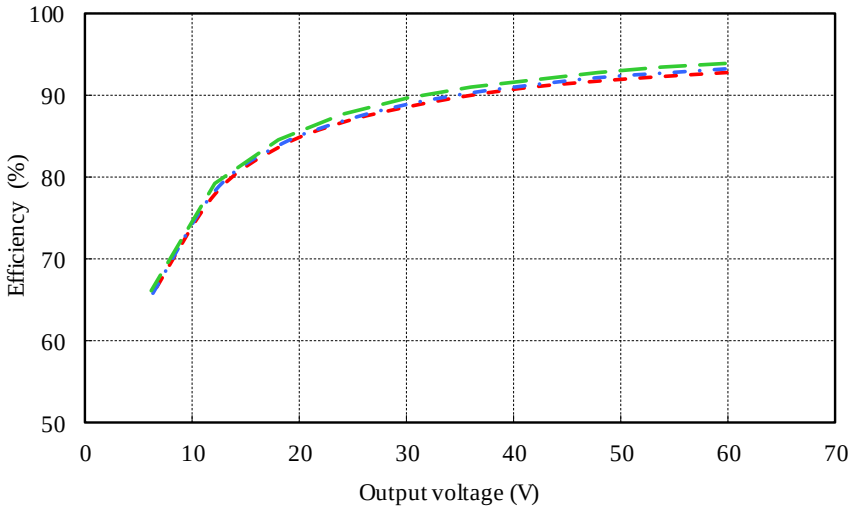


(3) 効率対出力電圧 Efficiency vs. Output voltage

Conditions Vin : 160 VDC
190 VDC
Iout : 20 A (160VDC)
35 A (190VDC)
Iaux : 0 %
Ta : 25 ℃



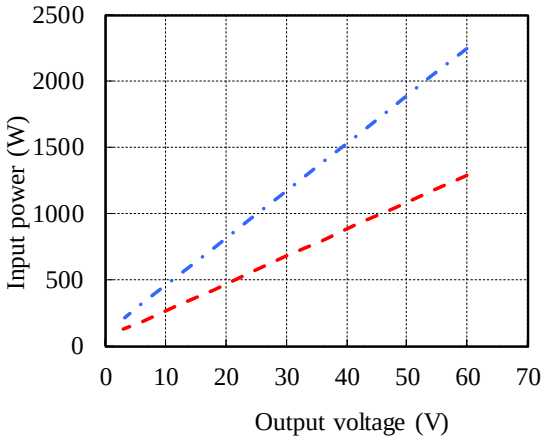
Conditions Vin : 220 VDC
320 VDC
420 VDC
Iout : 50 A
Iaux : 0 %
Ta : 25 ℃



(4) 入力電力対出力電圧 Input power vs. Output voltage

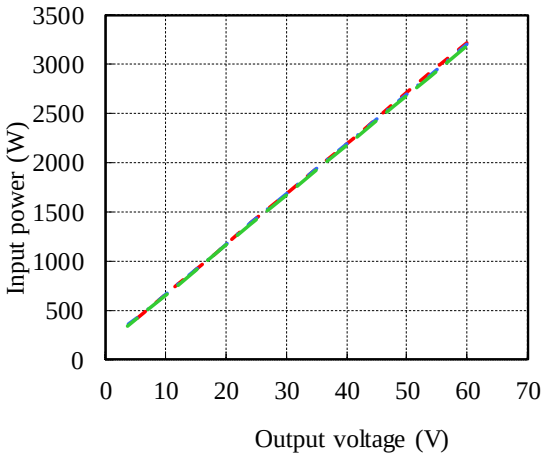
Conditions Vin : 160 VDC
190 VDC
Iout : 20 A (160VDC)
35 A (190VDC)
Iaux : 0 %
Ta : 25 ℃

Vin	Input power
	Control OFF
160VDC	7.8W
190VDC	7.7W



Conditions Vin : 220 VDC
320 VDC
420 VDC
Iout : 50 A
Iaux : 0 %
Ta : 25 ℃

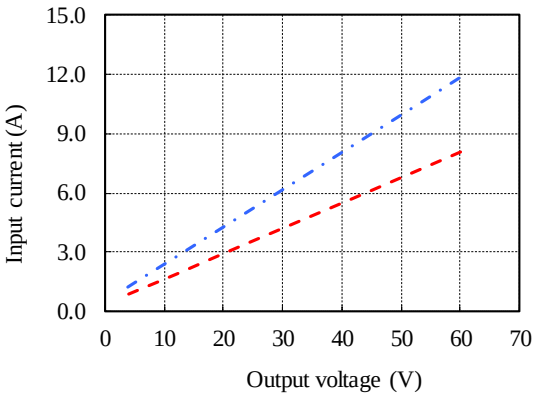
Vin	Input power
	Control OFF
220VDC	7.5W
320VDC	5.9W
420VDC	6.8W



(5) 入力電流対出力電圧 Input current vs. Output voltage

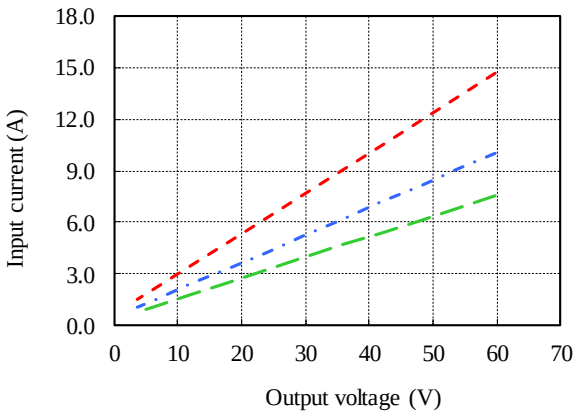
Conditions Vin : 160 VDC
190 VDC
Iout : 20 A (160VDC)
35 A (190VDC)
Iaux : 0 %
Ta : 25 ℃

Vin	Input current
	Control OFF
160VDC	0.05A
190VDC	0.04A



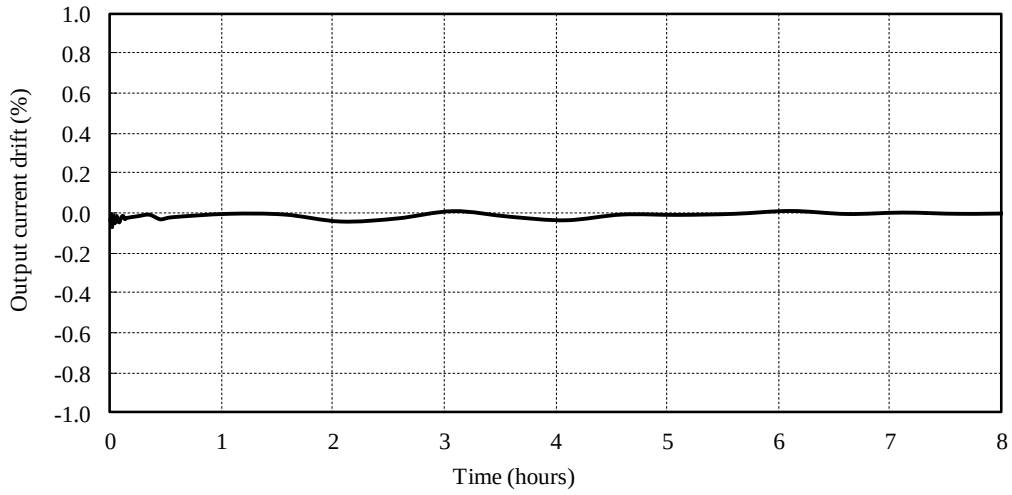
Conditions Vin : 220 VDC
320 VDC
420 VDC
Iout : 50 A
Iaux : 0 %
Ta : 25 ℃

Vin	Input current
	Control OFF
220VDC	0.03A
320VDC	0.02A
420VDC	0.02A



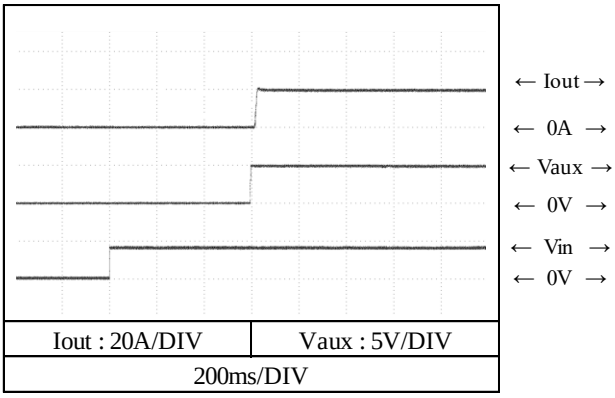
2-2-2. 通電ドリフト特性　Warm up current drift characteristics

Conditions	Vin :	320	VDC
	Vout :	60	V
	Iout :	50	A
	Ta :	25	°C

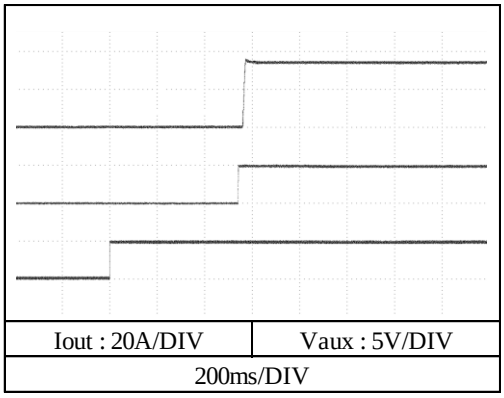


2-2-3. 出力電流立ち上がり特性　Output current rise characteristics

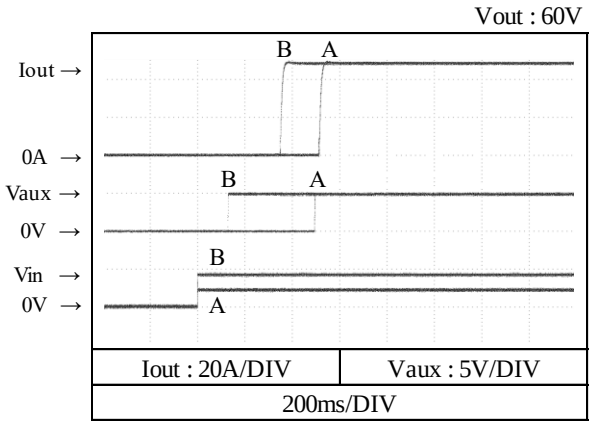
Conditions Vin : 160 VDC
Iaux : 100 %
Ta : 25 ℃



Conditions Vin : 190 VDC
Iaux : 100 %
Ta : 25 ℃

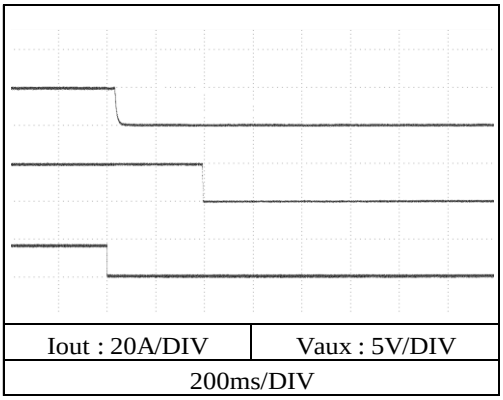


Conditions Vin : 220 VDC (A)
420 VDC (B)
Iaux : 100 %
Ta : 25 ℃

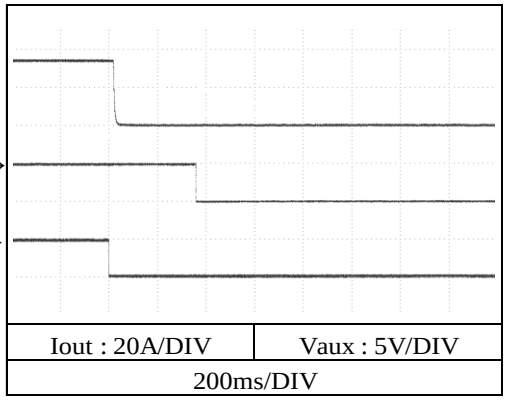


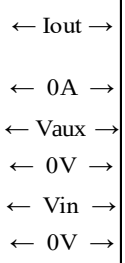
2-2-4. 出力電流立ち下がり特性　Output current fall characteristics

Conditions Vin : 160 VDC
Iaux : 100 %
Ta : 25 ℃

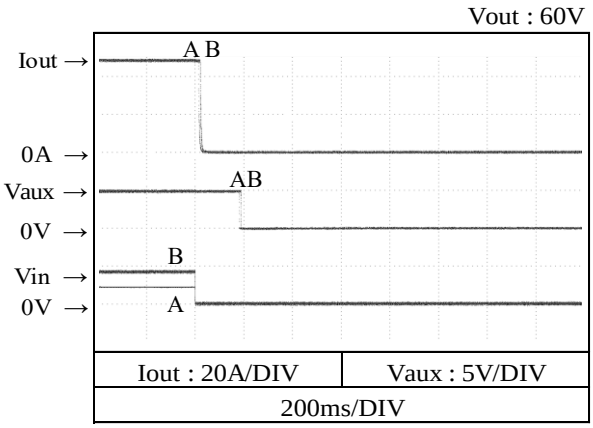


Conditions Vin : 190 VDC
Iaux : 100 %
Ta : 25 ℃





Conditions Vin : 220 VDC (A)
420 VDC (B)
Iaux : 100 %
Ta : 25 ℃



2-2-5. ON/OFF コントロール時出力立ち上がり、立ち下がり特性

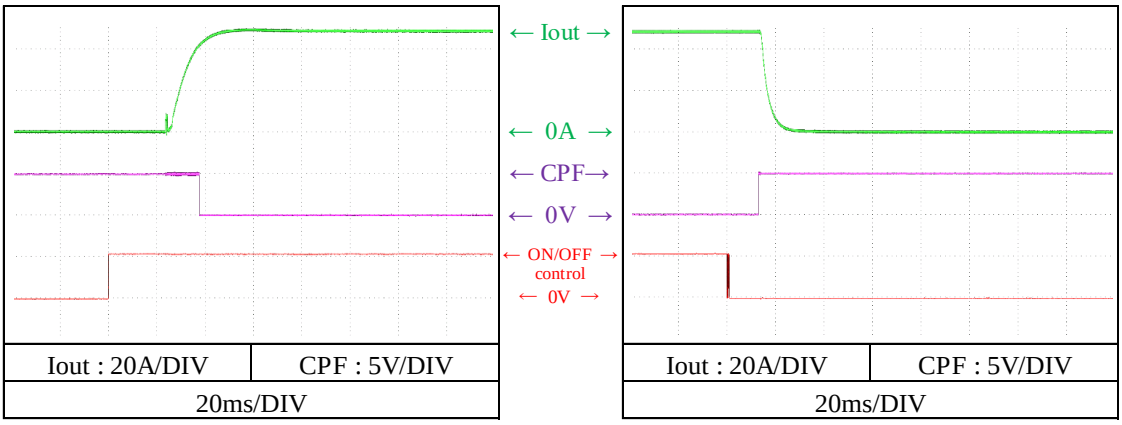
Output rise/fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

ON/OFF control by remote ON/OFF control terminal

Conditions Vin : 320 VDC
Ta : 25 ℃

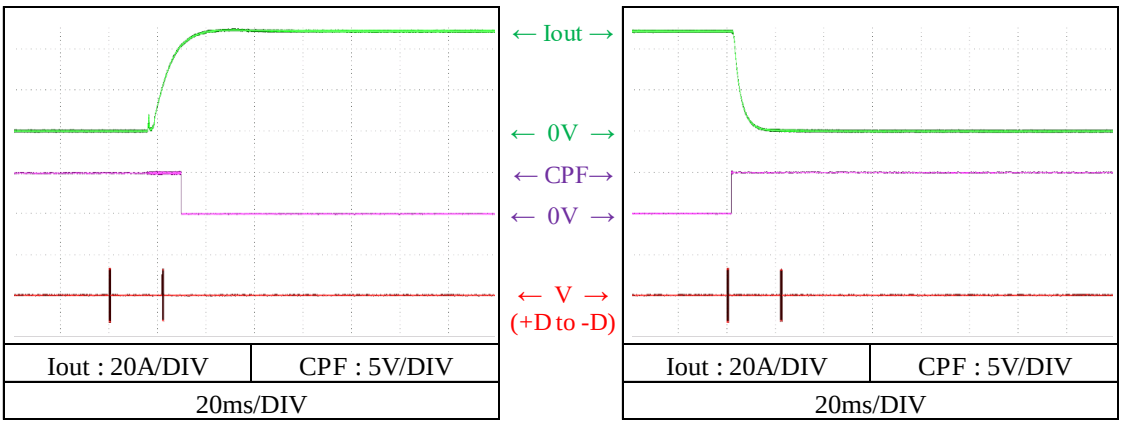
Vout : 60V



(b) RS-485 通信による ON/OFF ON/OFF control by RS-485

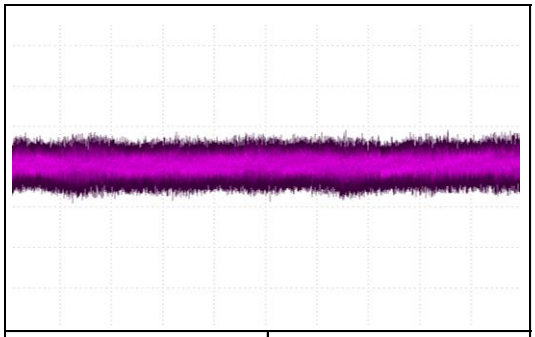
Conditions Vin : 320 VDC
Ta : 25 ℃

Vout : 60V



2-2-6. 出力リップル、ノイズ波形　Output ripple and noise waveform

Conditions	Vin :	320 VDC
	Vout :	60 V
	Iout :	50 A
	Ta :	25 ℃

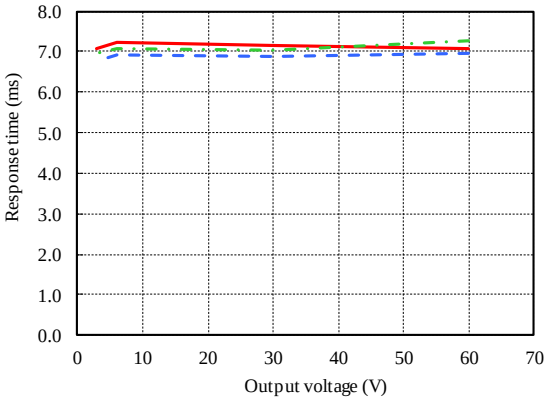


Iout : 200mA/DIV	2ms/DIV

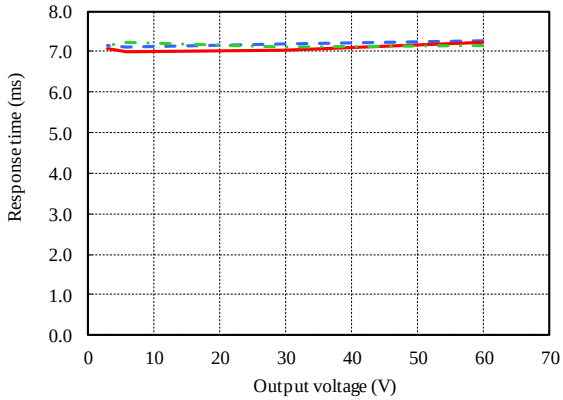
2-2-7. 定電流指令応答特性　Constant current command response characteristics

Conditions　Vin : 320 VDC
Ta : -20 °C
25 °C
50 °C

Io : 25A → 50A

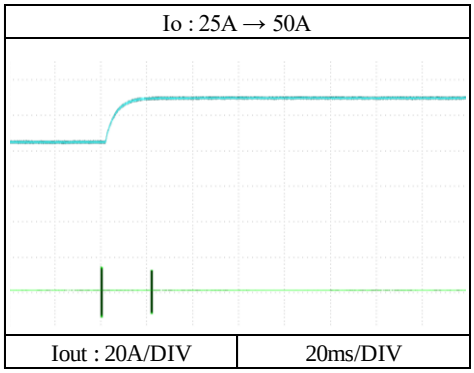


Io : 50A → 25A



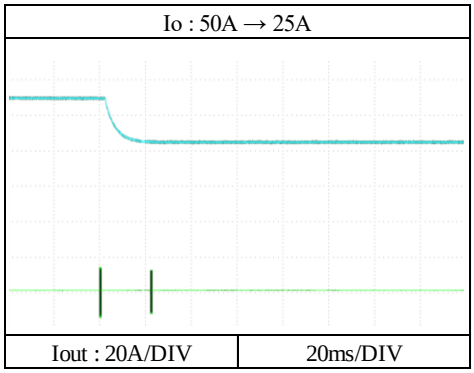
Conditions　Vin : 320 VDC
Vout : 60 V
Ta : 25 ℃

Io : 25A → 50A

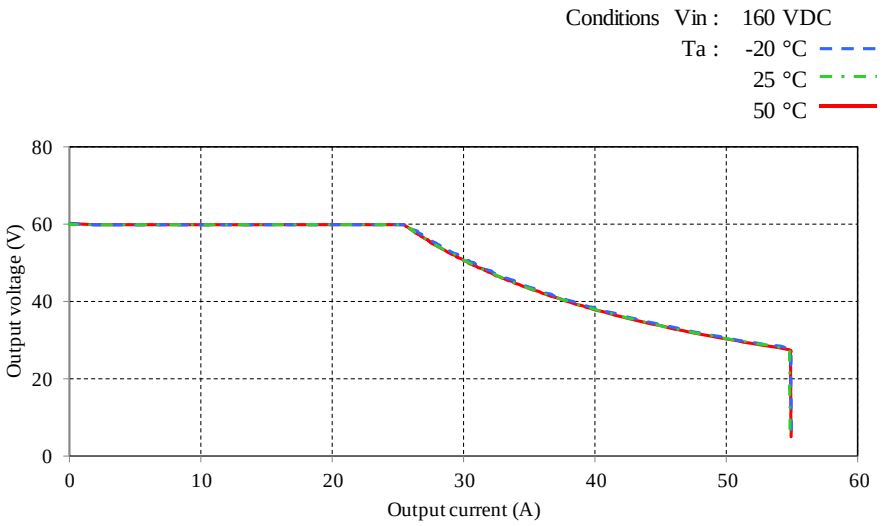


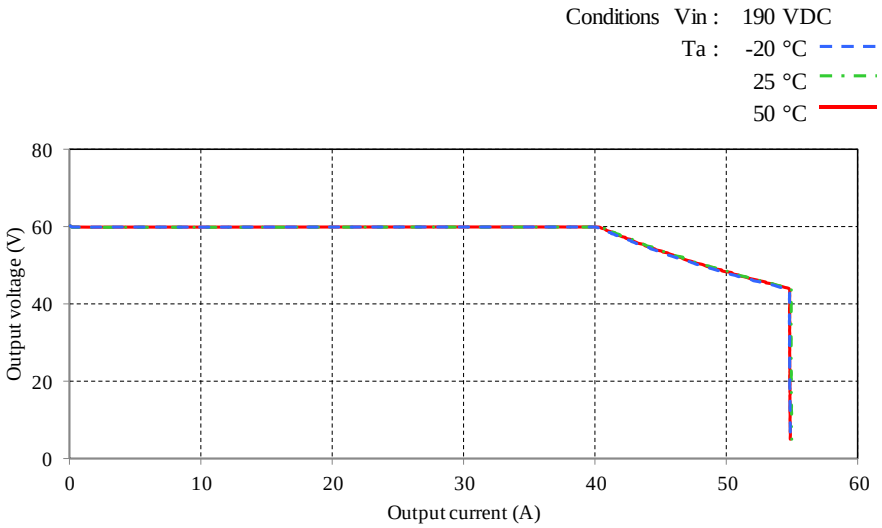
← Iout →
← 0A →
← V →
(+D to -D)

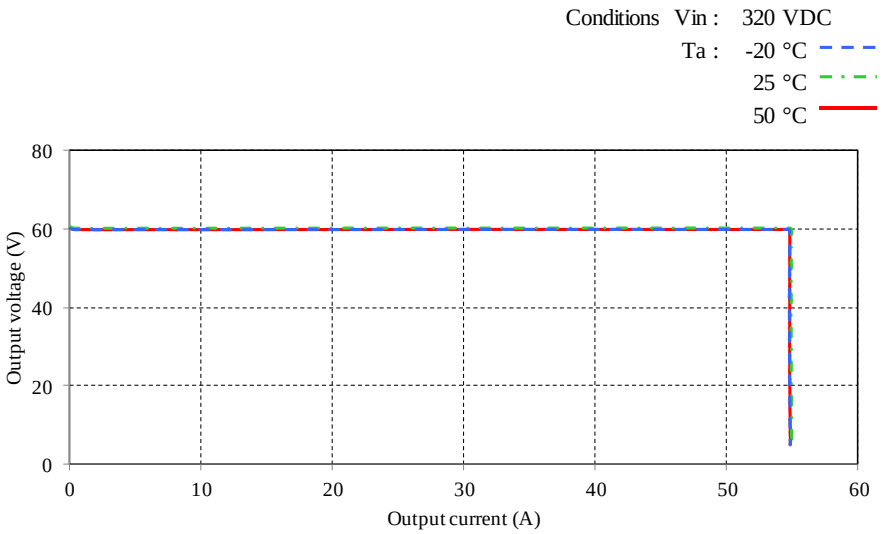
Io : 50A → 25A



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

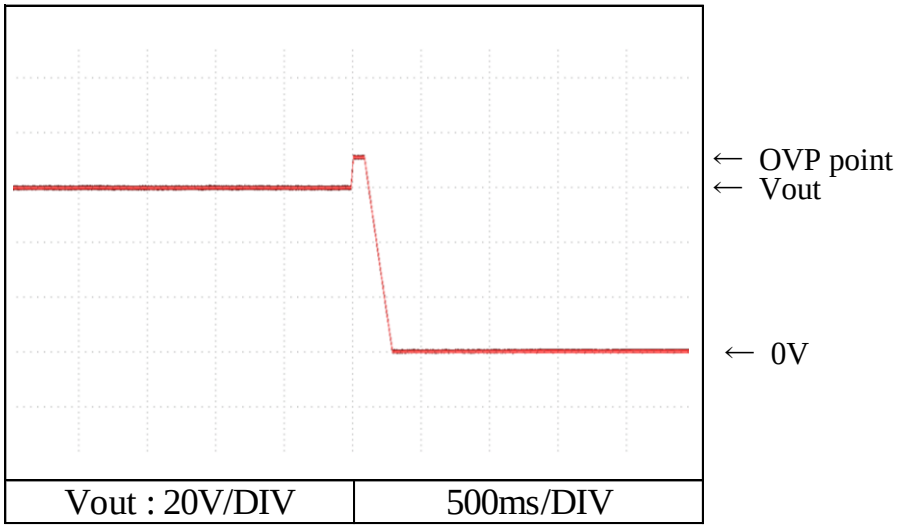






2-4. 過電圧保護特性　Over voltage protection (OVP) characteristics

Conditions　Vin　:　320 VDC
　　Iout　:　1 A
　　Ta　:　25 ℃



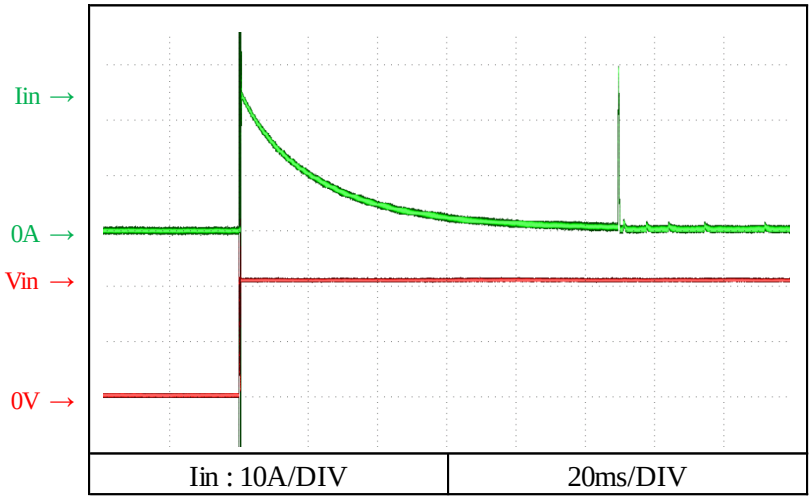
2-5. 入力サージ電流(突入電流)波形　Inrush current waveform

Conditions　Vin :　420 VDC

Vout :　60 V

Iout :　50 A

Ta :　25 °C



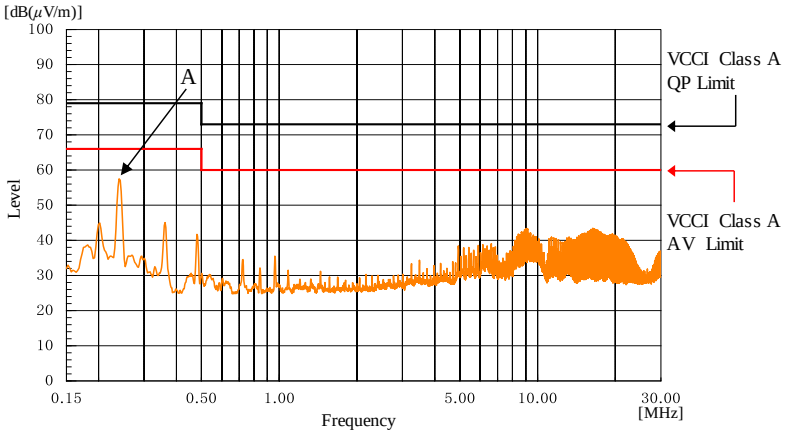
2-6. EMI 特性　Electro Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions　Vin :　320 VDC
Iout :　50 A
Iaux :　100 %
Ta :　25 ℃

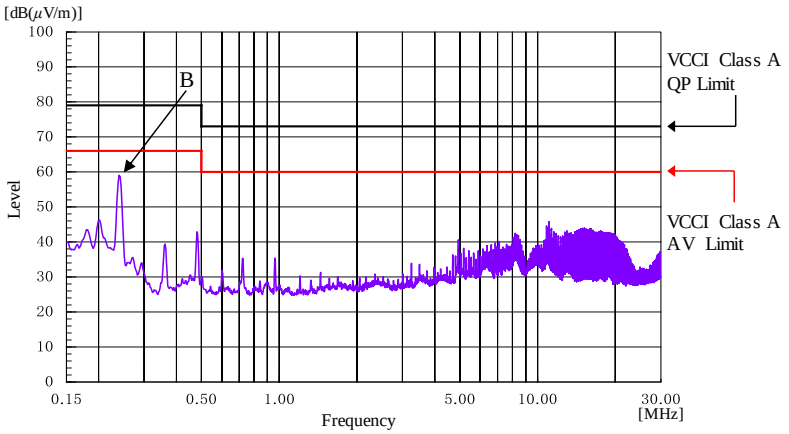
Phase : -Vin

Ref. Data	Point A (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	57.3
AV	66.0	57.4



Phase : +Vin

Ref. Data	Point B (0.24MHz) Limit (dB)	Measure (dB)
QP	79.0	59.0
AV	66.0	59.1

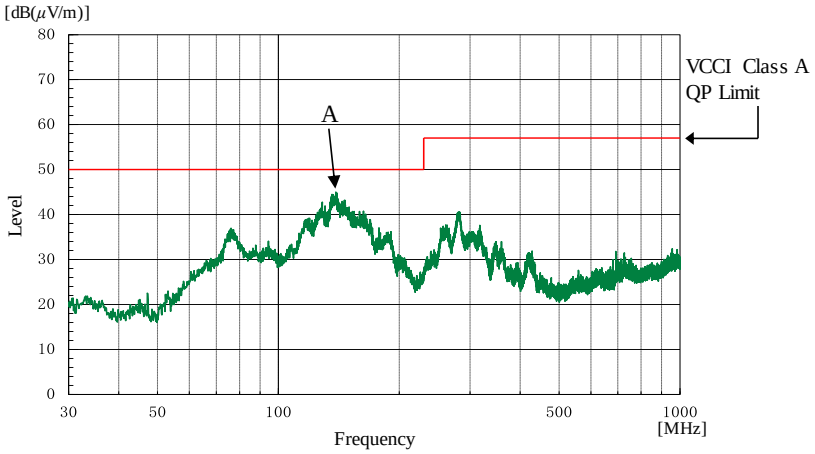


雑音電界強度
Radiated Emission

Conditions Vin : 320 VDC
Iout : 50 A
Iaux : 100 %
Ta : 25 ℃

HORIZONTAL

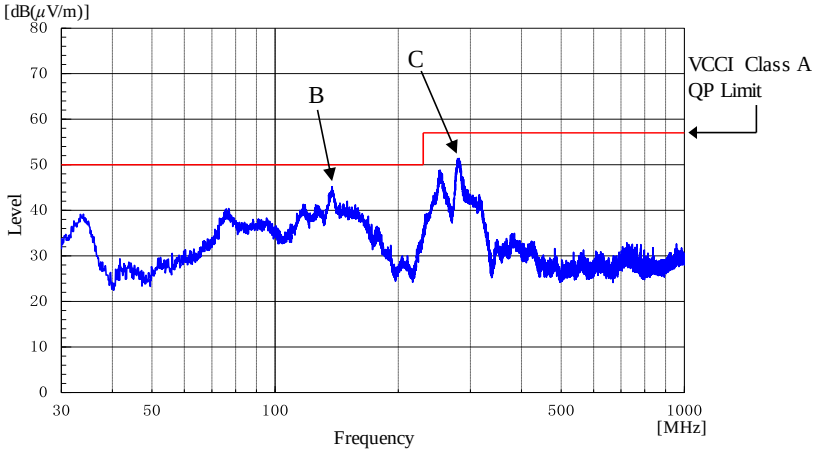
Ref. Data	Point A (138MHz) Limit (dB)	Measure (dB)
QP	50.0	41.8



VERTICAL

Ref. Data	Point B (137MHz) Limit (dB)	Measure (dB)
QP	50.0	42.5

Ref. Data	Point C (280MHz) Limit (dB)	Measure (dB)
QP	57.0	47.9



EN55011-A,EN55032-A,FCC-Aの限界値はVCCI Class Aの限界値と同じ
Limit of EN55011-A,EN55032-A,FCC-A are same as its VCCI Class A.
波形はピーク値
Waveform is peak values.