

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

※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

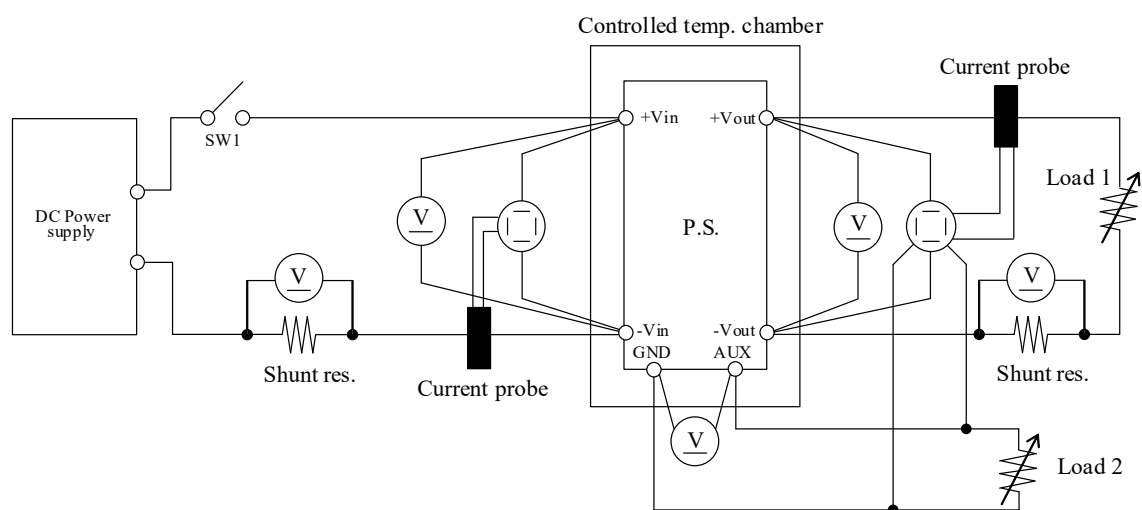
出力電圧立ち上がり立ち下がり特性 Output voltage rise/fall characteristics

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

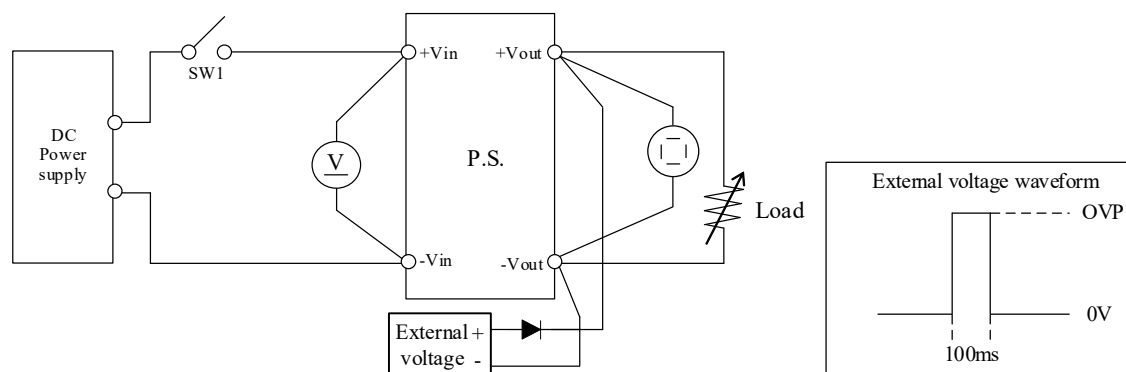
過渡応答負荷急変特性 Dynamic load response characteristics

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



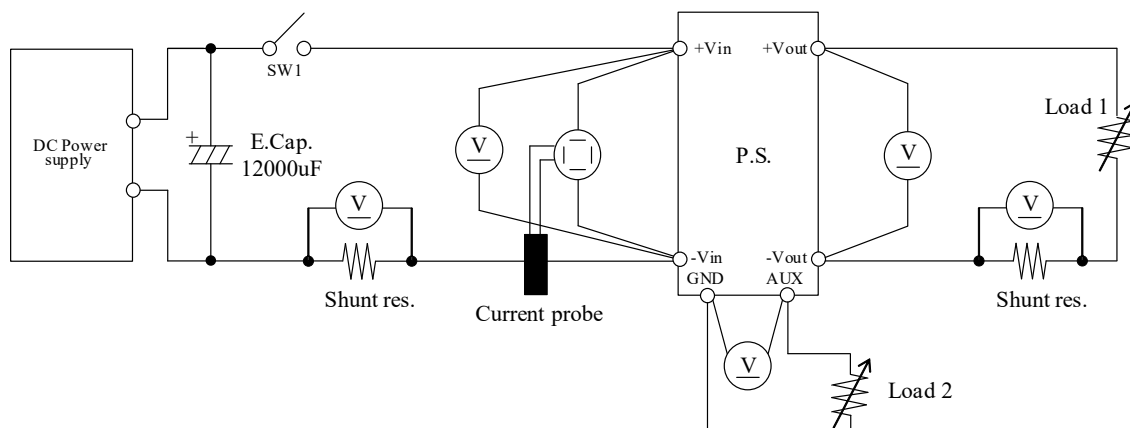
測定回路 2 Circuit 2 used for determination

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

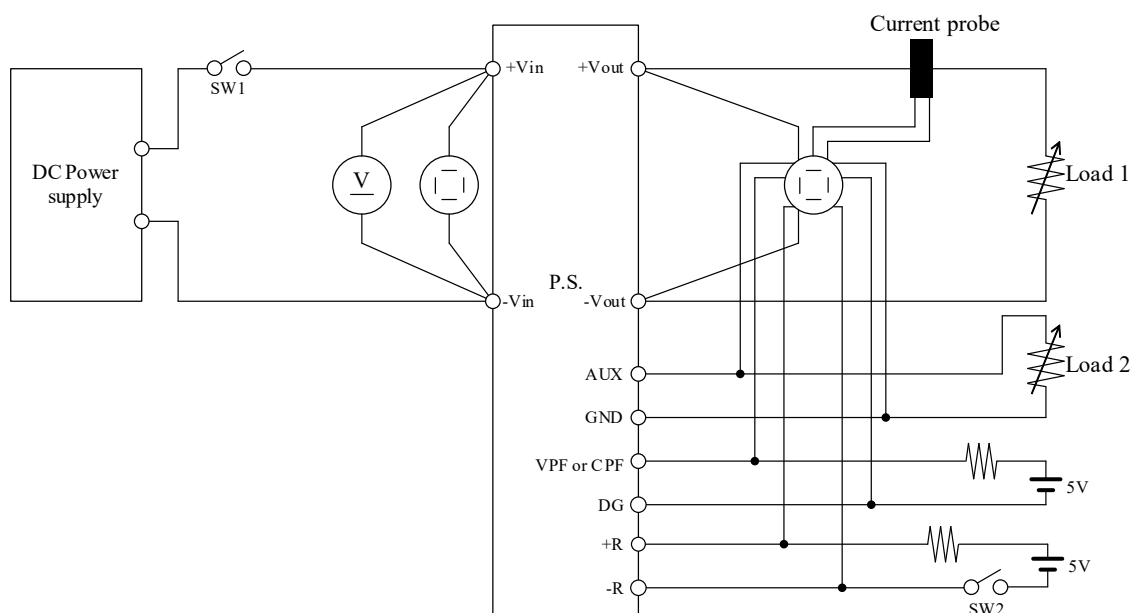
測定回路 4 Circuit 4 used for determination

ON/OFF コントロール時出力立ち上がり、立ち下がり特性

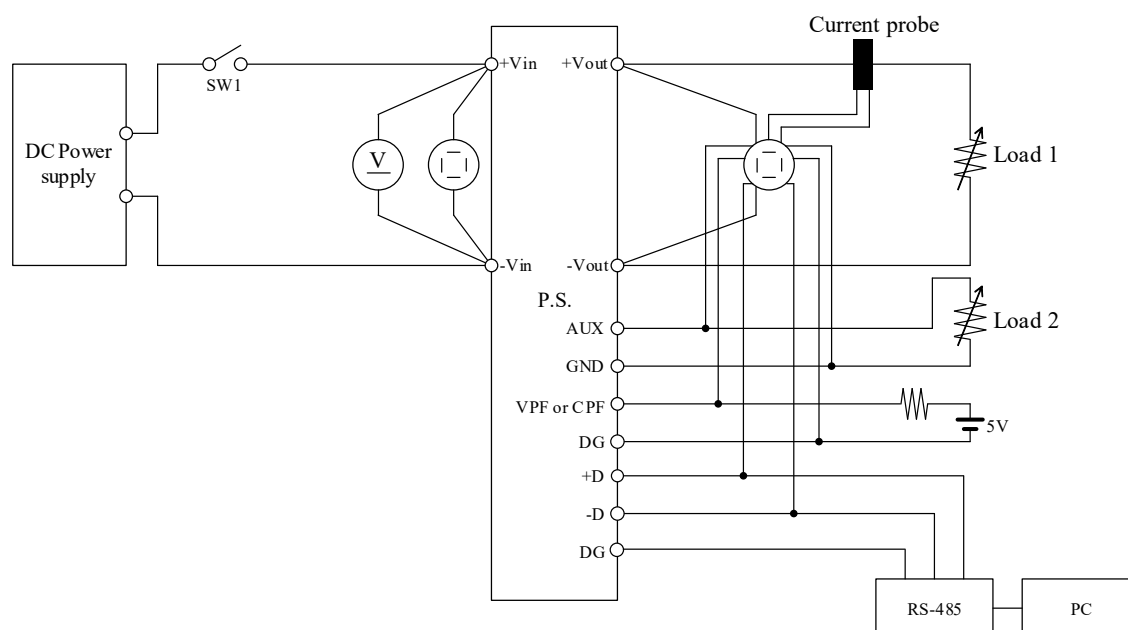
Output rise, fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

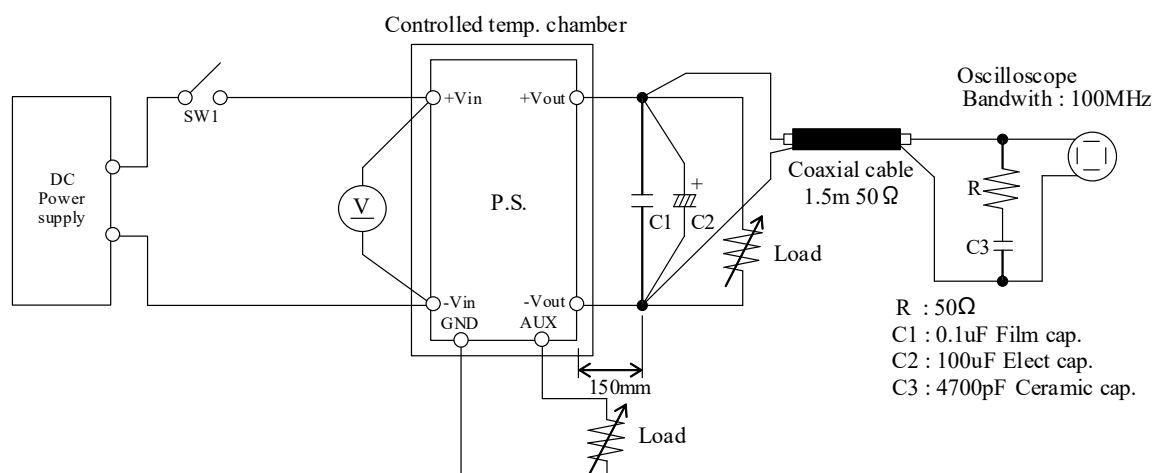
ON/OFF control by remote ON/OFF control terminal



(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

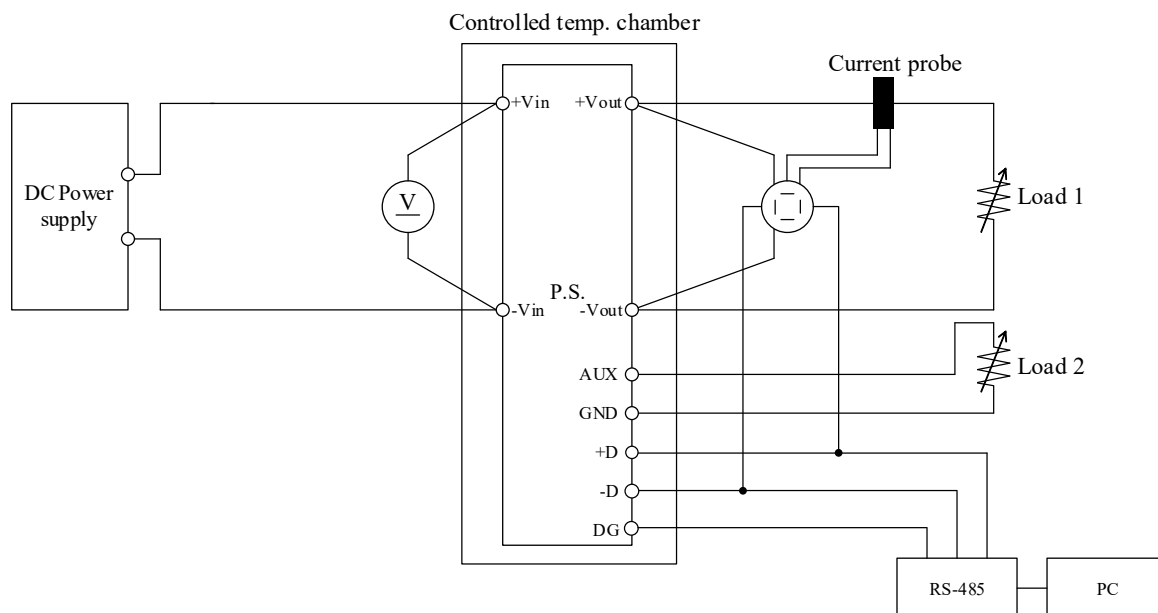
出力リップル、ノイズ電圧波形 Output ripple and noise voltage waveform



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

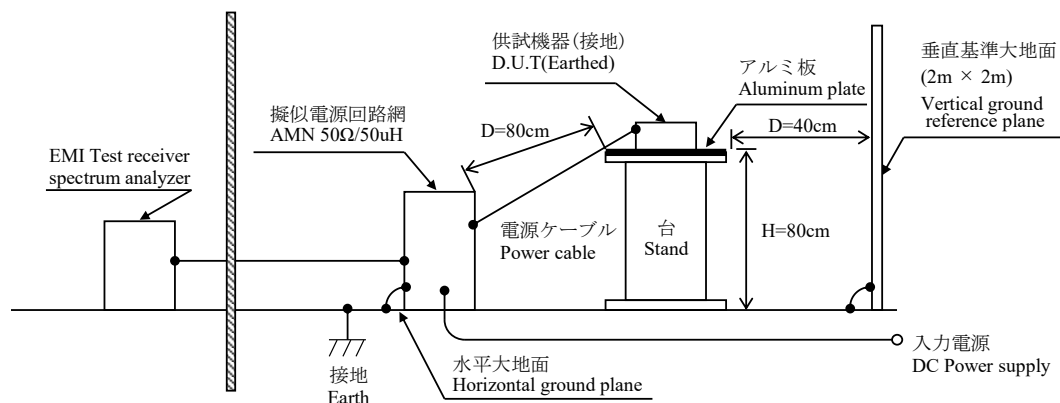
出力電流指令応答特性 Output current command response characteristics



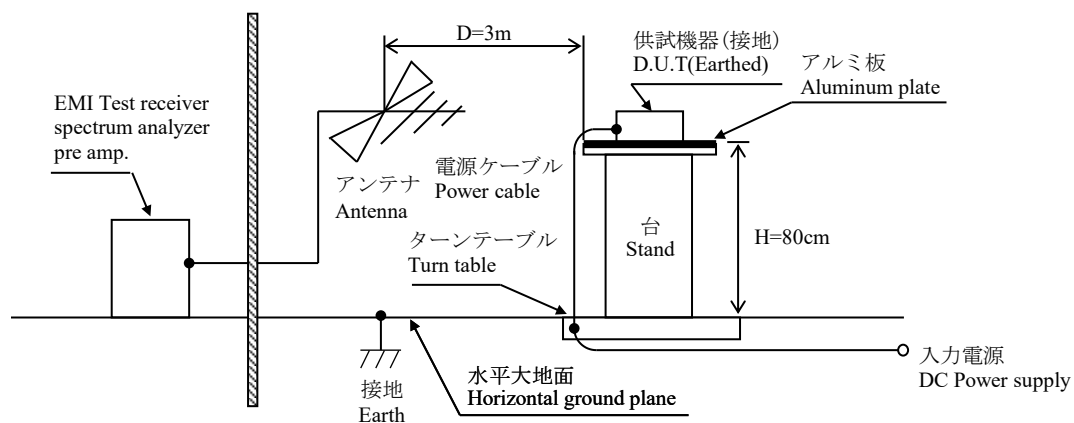
測定構成 Configuration used for determination

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%		

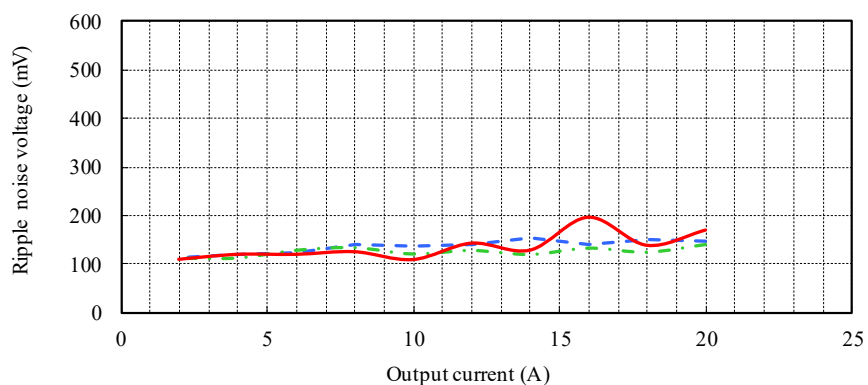
2. Temperature drift

Conditions Vin : 320 VDC
Iout : 50 A

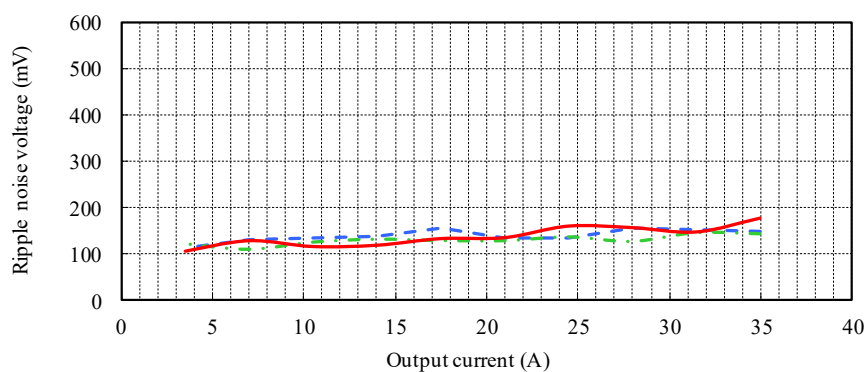
Ta	-20°C	+25°C	+50°C	Temperature stability	
Vout	60.05V	60.00V	59.93V	119mV	0.199%

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

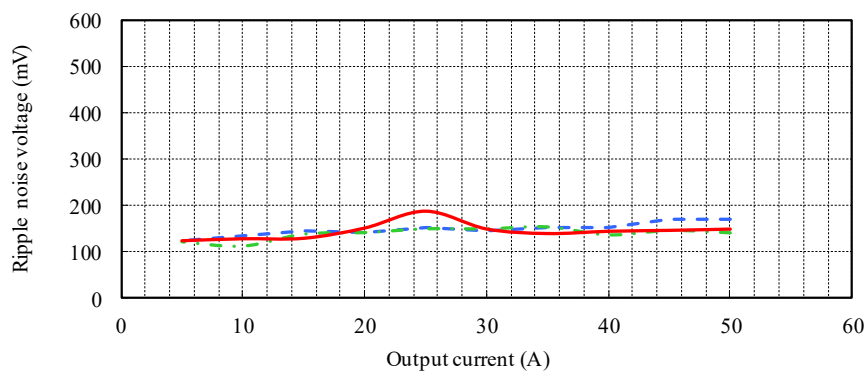
Conditions
 Vin : 160 VDC
 Vout : 60 V
 Ta : -20 °C ---
 25 °C ---
 50 °C ---



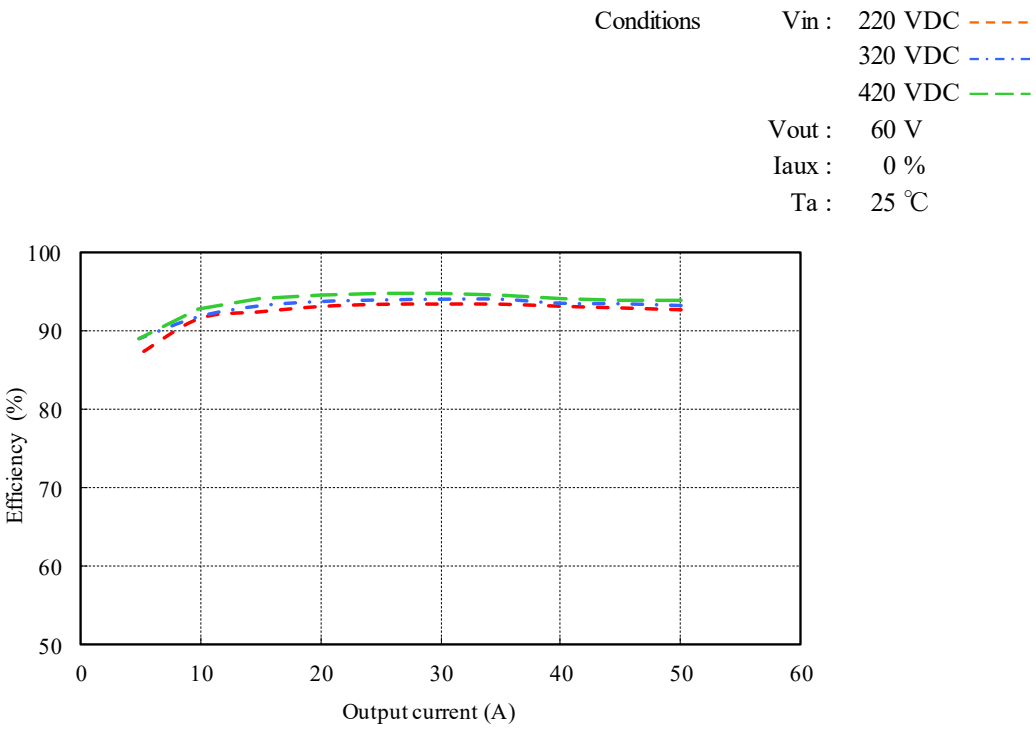
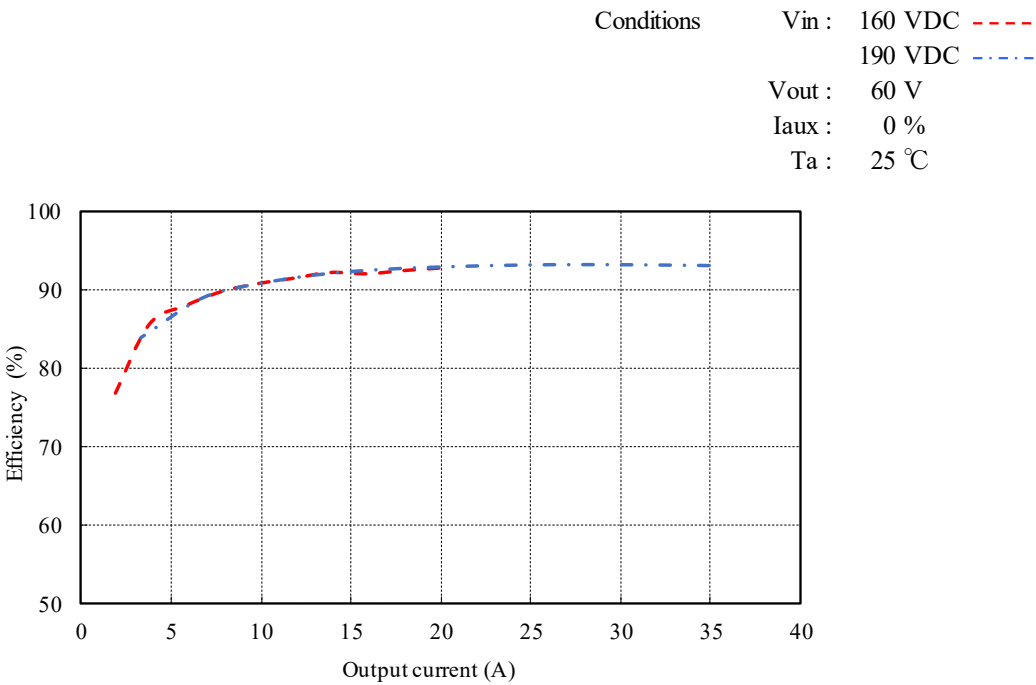
Conditions
 Vin : 190 VDC
 Vout : 60 V
 Ta : -20 °C ---
 25 °C ---
 50 °C ---



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

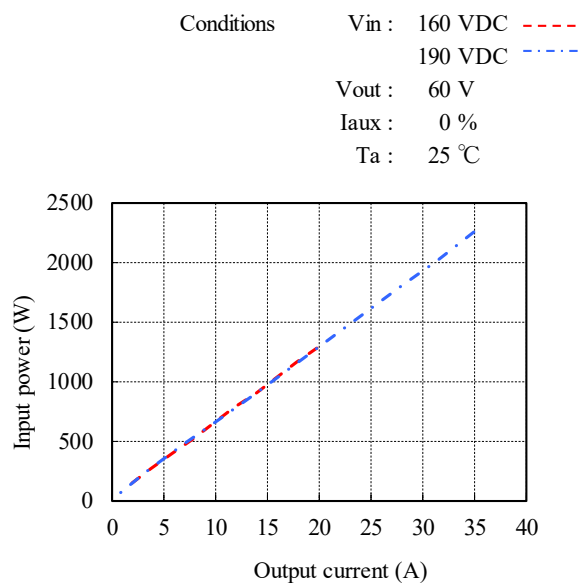


(3) 効率対出力電流 Efficiency vs. Output current

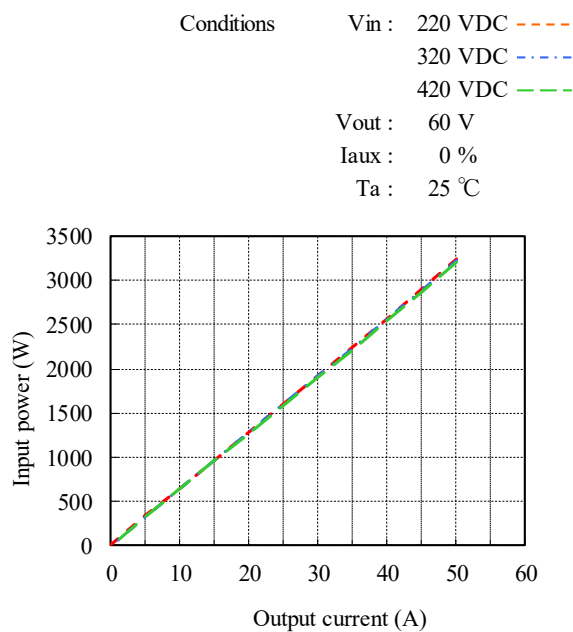


(4) 入力電力対出力電流 Input power vs. Output current

V _{in}	Input power	
	I _{out} : 0%	Control OFF
160VDC	8.1W	7.8W
190VDC	8.0W	7.7W

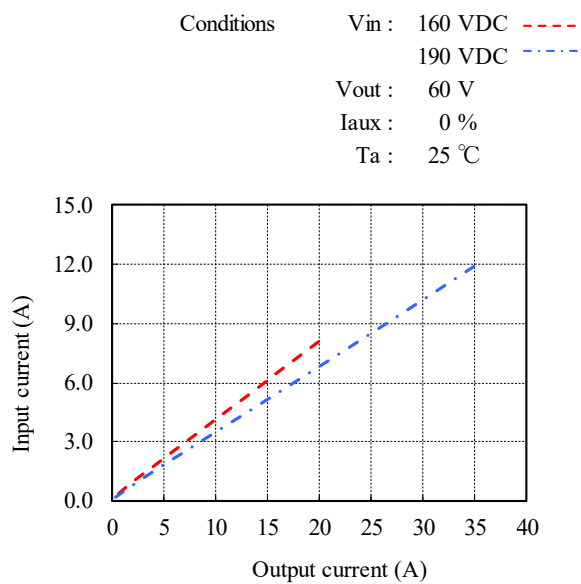


V _{in}	Input power	
	I _{out} : 0%	Control OFF
220VDC	7.4W	7.5W
320VDC	7.0W	5.9W
420VDC	6.4W	6.8W

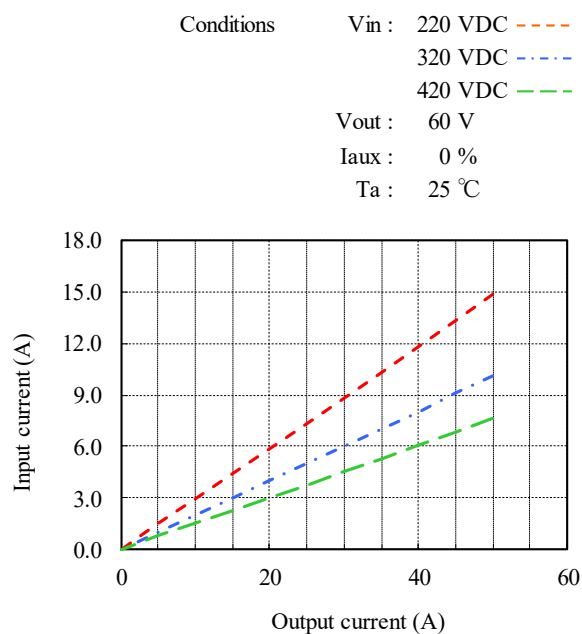


(5) 入力電流対出力電流 Input current vs. Output current

V _{in}	Input current	
	I _{out} : 0%	Control OFF
160VDC	0.05A	0.05A
190VDC	0.04A	0.04A

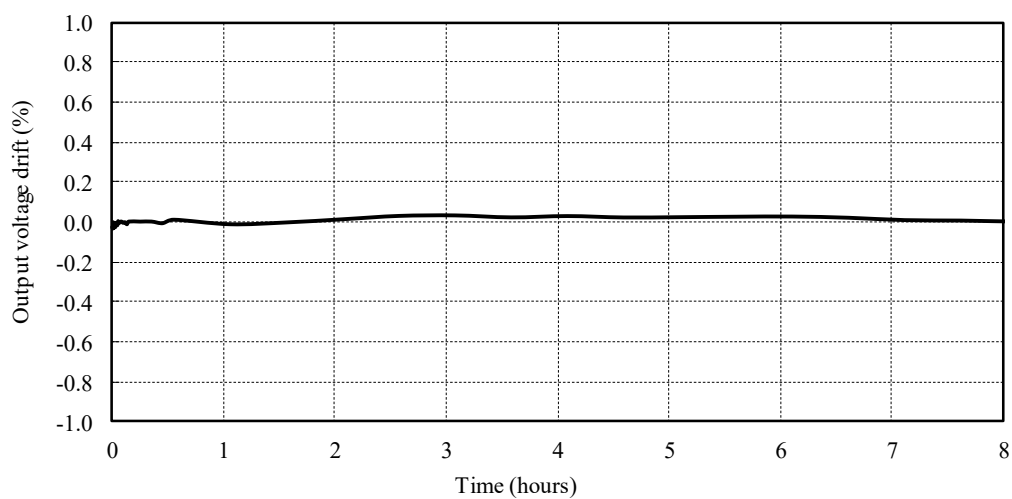


V _{in}	Input current	
	I _{out} : 0%	Control OFF
220VDC	0.03A	0.03A
320VDC	0.02A	0.02A
420VDC	0.02A	0.02A



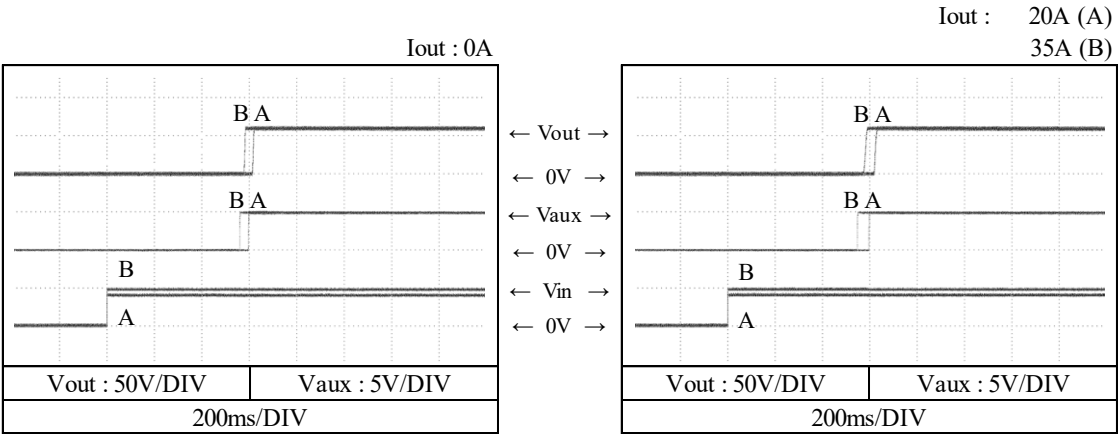
2-1-2. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions V_{in} : 320 VDC
 V_{out} : 60 V
 I_{out} : 50 A
 T_a : 25 °C

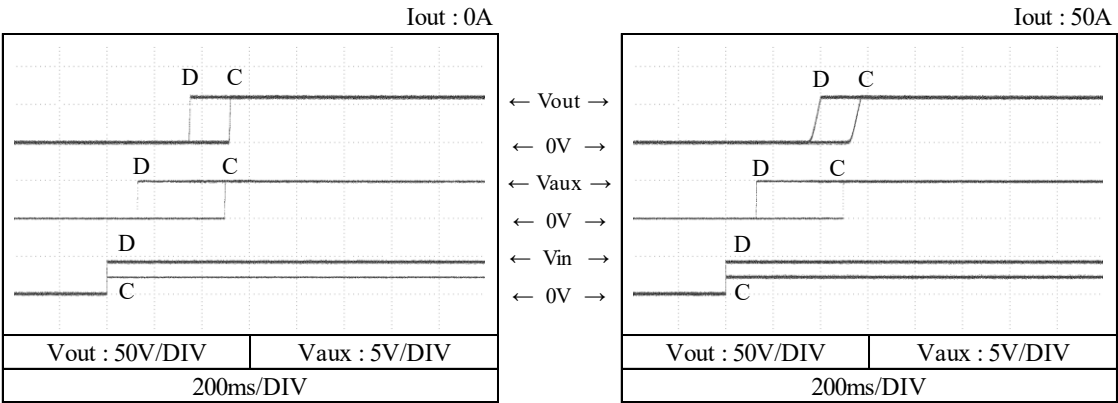


2-1-3. 出力電圧立ち上がり特性 Output voltage rise characteristics

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

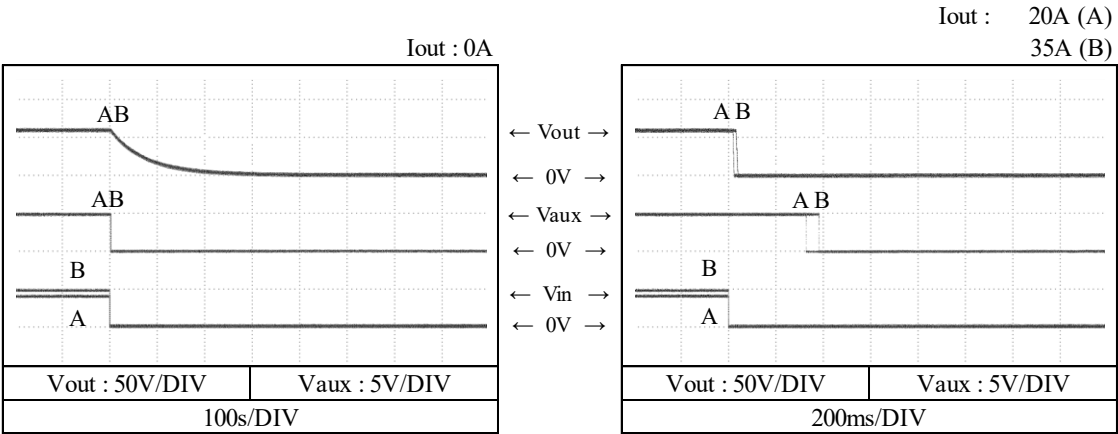


Conditions Vin : 220 VDC (C)
 420 VDC (D)
 Iaux : 100 %
 Ta : 25 °C

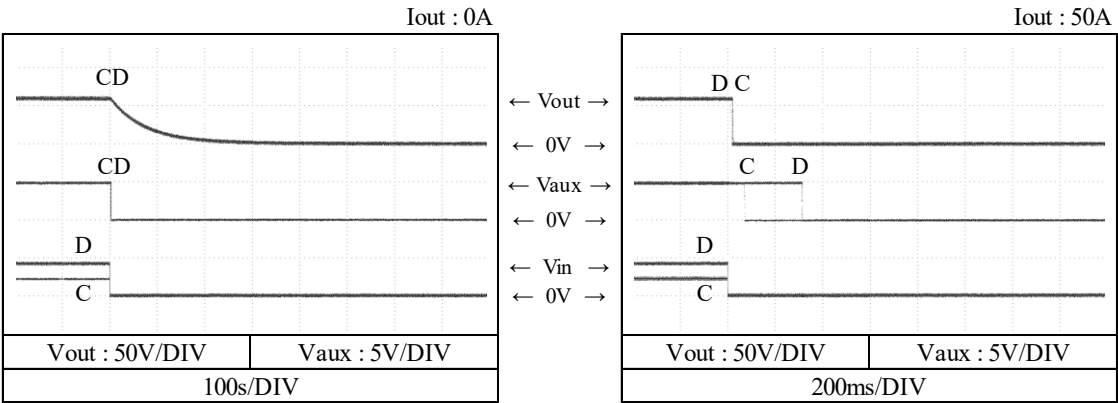


2-1-4. 出力電圧立ち下がり特性 Output voltage fall characteristics

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



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

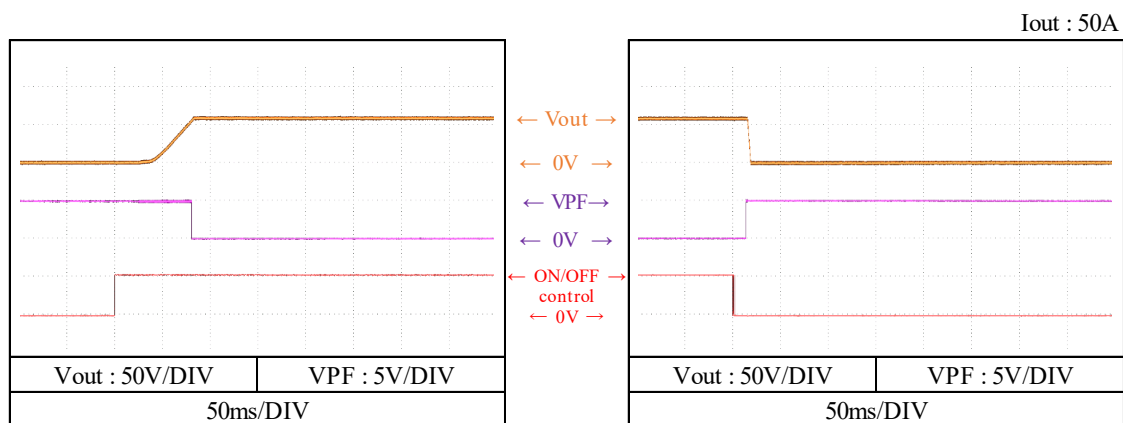
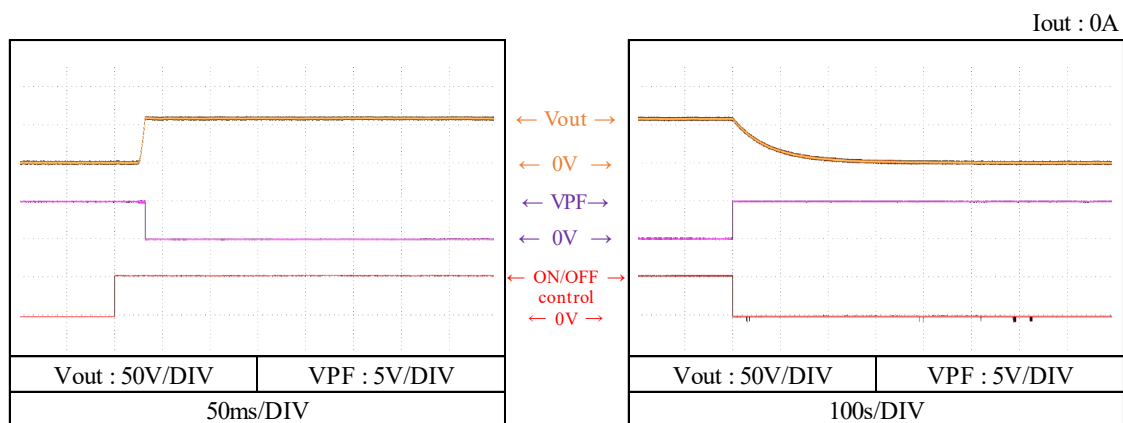


2-1-5. ON/OFF コントロール時出力立ち上がり、立ち下がり特性

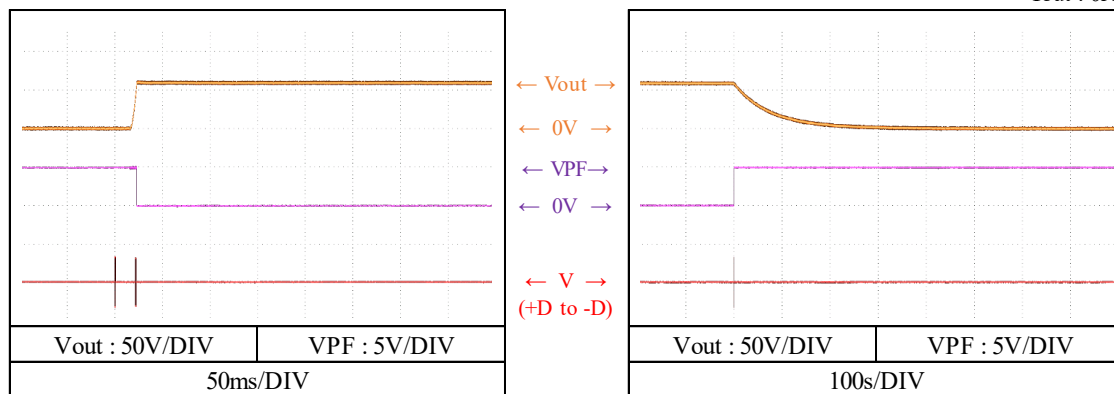
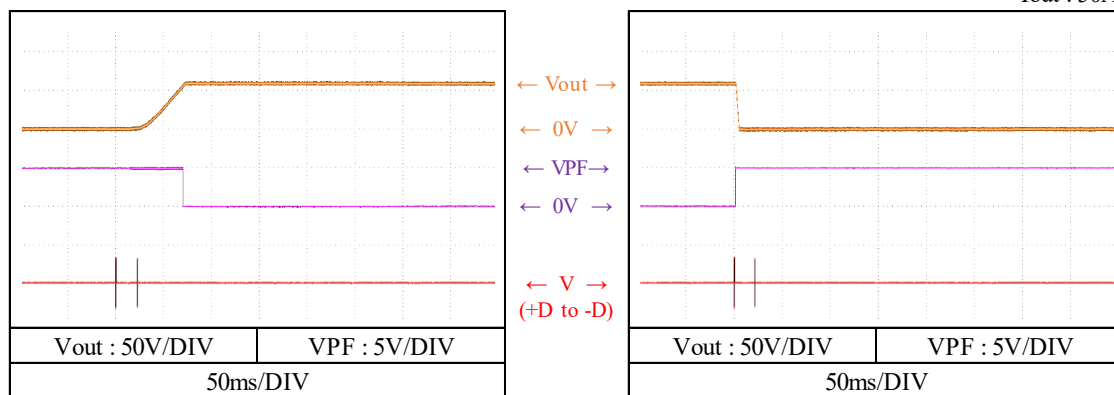
Output rise, fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

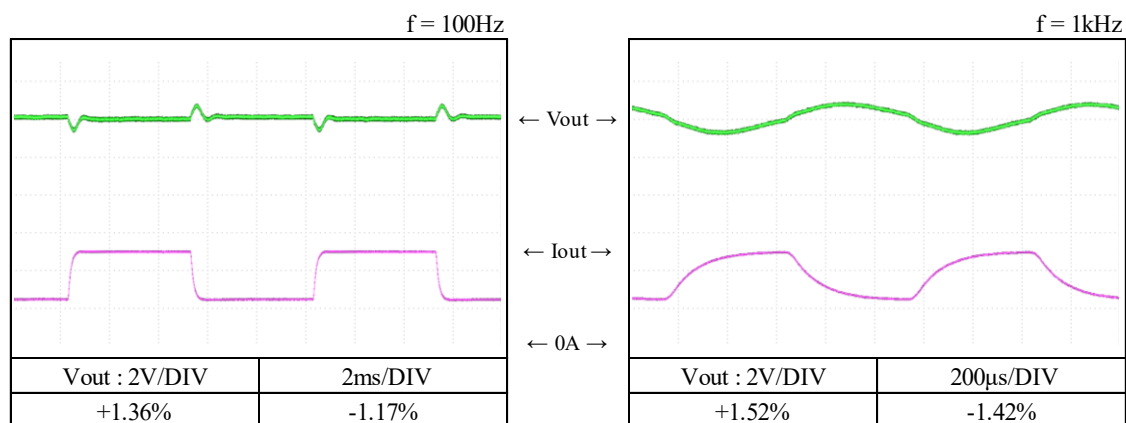
ON/OFF control by remote ON/OFF control terminal

Conditions V_{in} : 320 VDC T_a : 25 °C

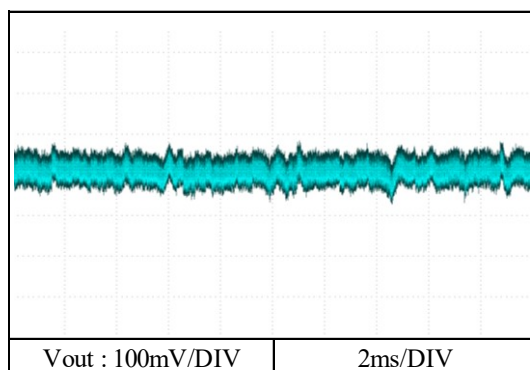
(b) RS-485 通信による ON/OFF ON/OFF control by RS-485

Conditions V_{in} : 320 VDC T_a : 25 °C I_{out} : 0A I_{out} : 50A

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



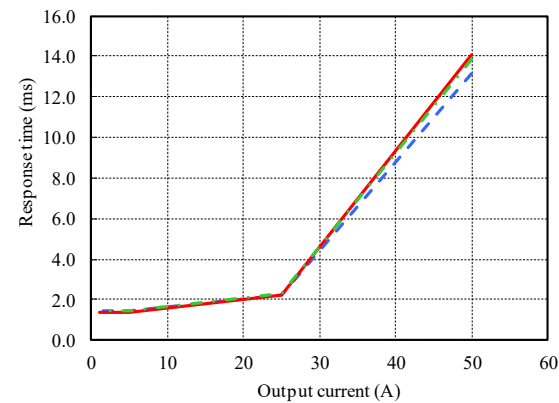
Conditions	V _{in} :	320 VDC
	V _{out} :	60 V
	I _{out} :	50 A
	T _a :	25 °C



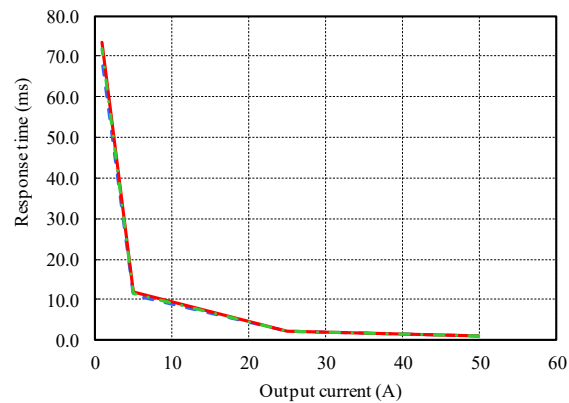
2-1-8. 出力電圧指令応答特性 Output voltage command response characteristics

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

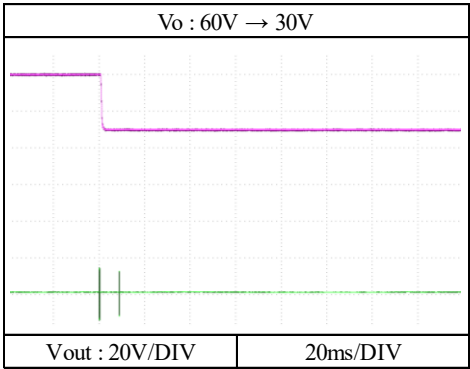
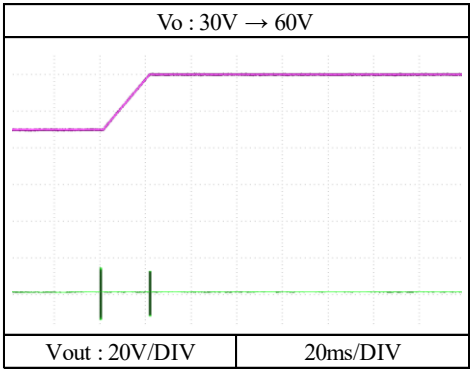
Vo : 30V → 60V



Vo : 60V → 30V



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



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
6V	19.98A	34.95A
30V	19.95A	34.91A
60V	19.93A	34.92A
Load	53mA	36mA
regulation	0.265%	0.103%

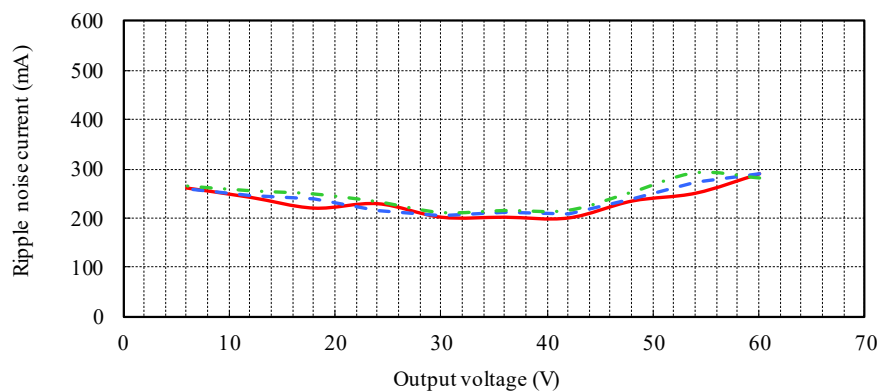
Iout \ Vin	220VDC	320VDC	420VDC	Line regulation	
0%	49.93A	49.92A	49.91A	14mA	0.028%
50%	49.87A	49.86A	49.85A	24mA	0.047%
100%	49.89A	49.87A	49.86A	35mA	0.071%
Load	52mA	53mA	62mA		
regulation	0.104%	0.107%	0.123%		

2. Temperature driftConditions Vin : 320 VDC
Iout : 60 V

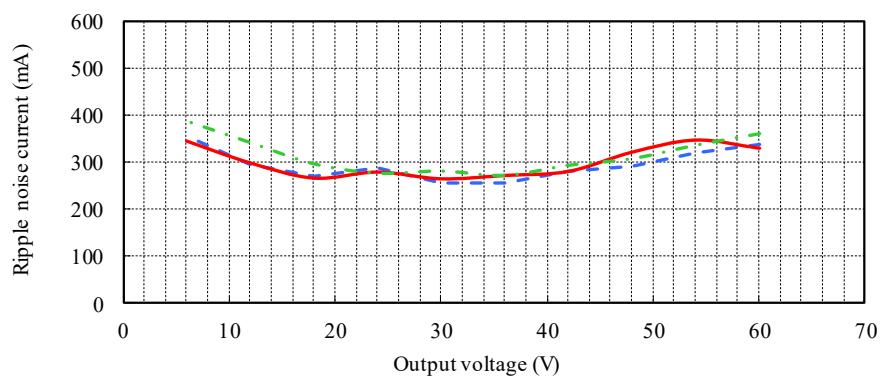
Ta	-20°C	+25°C	+50°C	Temperature stability	
Iout	49.97A	49.87A	49.84A	124mA	0.249%

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

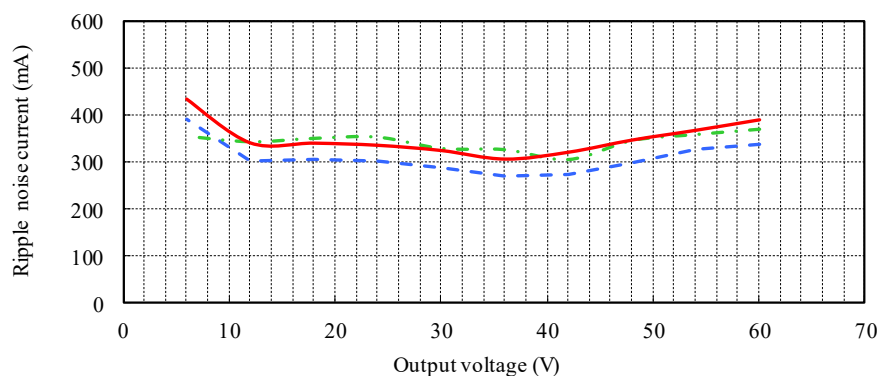
Conditions
 V_{in} : 160 VDC
 I_{out} : 20 A
 T_a : -20 °C ---
 25 °C ---
 50 °C ---



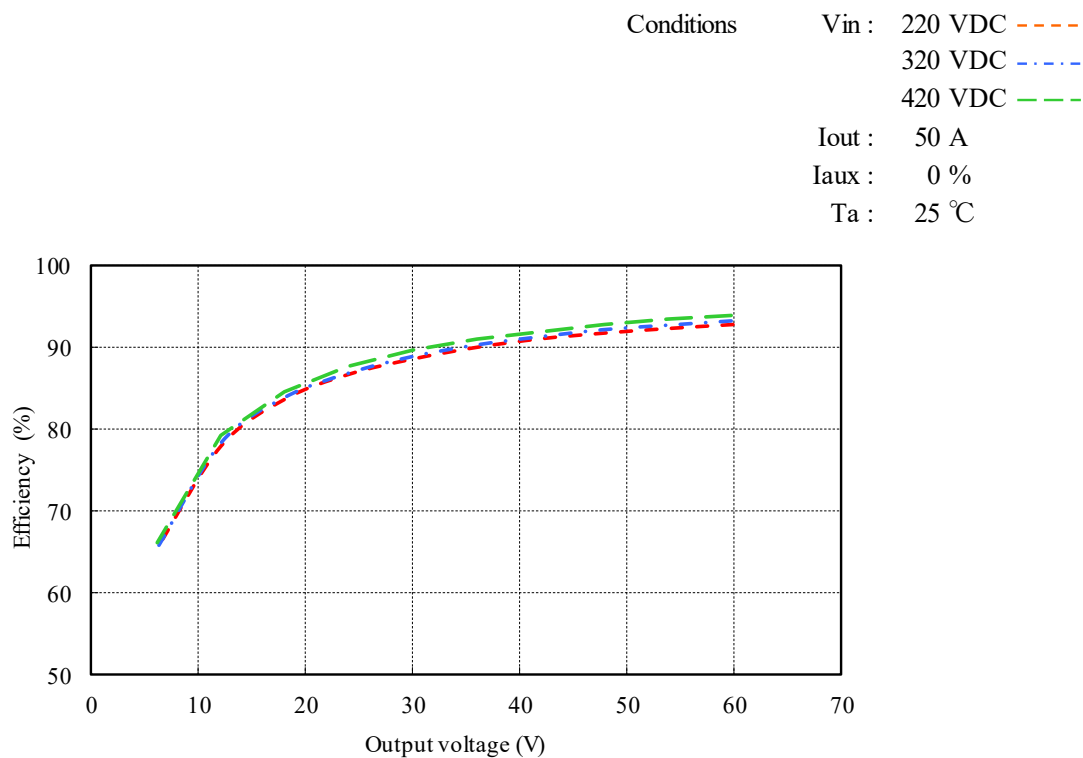
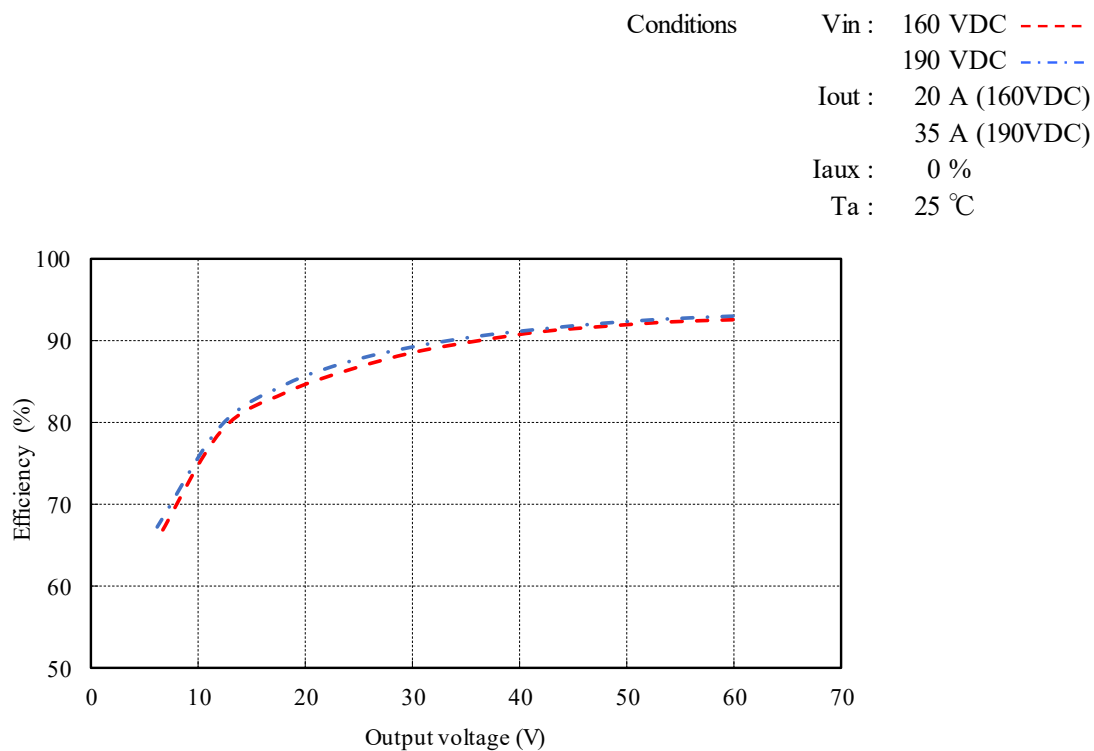
Conditions
 V_{in} : 190 VDC
 I_{out} : 35 A
 T_a : -20 °C ---
 25 °C ---
 50 °C ---



Conditions
 V_{in} : 320 VDC
 I_{out} : 50 A
 T_a : -20 °C ---
 25 °C ---
 50 °C ---

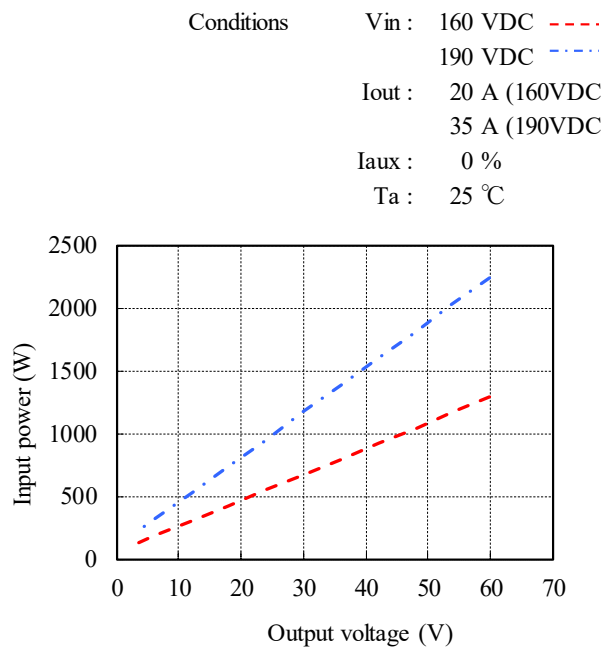


(3) 効率対出力電圧 Efficiency vs. Output voltage

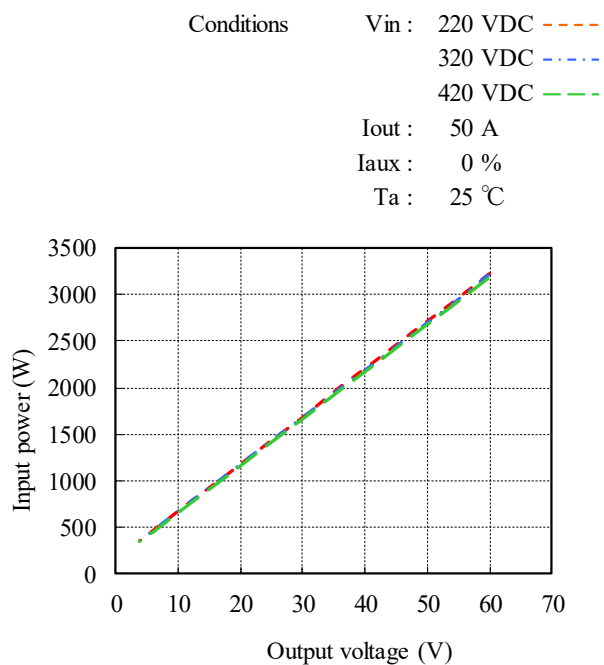


(4) 入力電力対出力電圧 Input power vs. Output voltage

V _{in}	Input power
	Control OFF
160VDC	7.8W
190VDC	7.7W



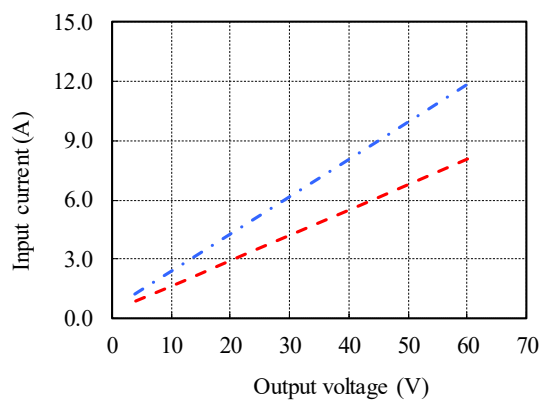
V _{in}	Input power
	Control OFF
220VDC	7.5W
320VDC	5.9W
420VDC	6.8W



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

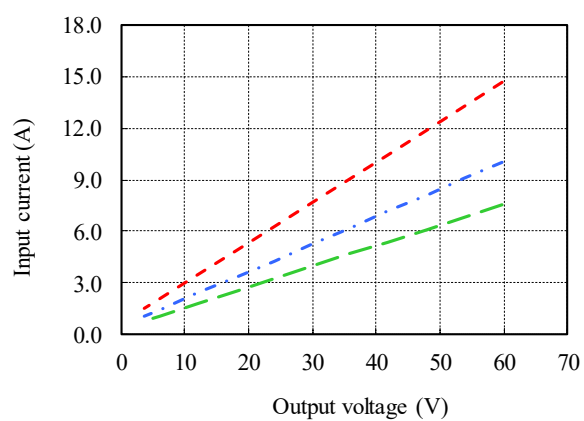
Vin	Input current
	Control OFF
160VDC	0.05A
190VDC	0.04A

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



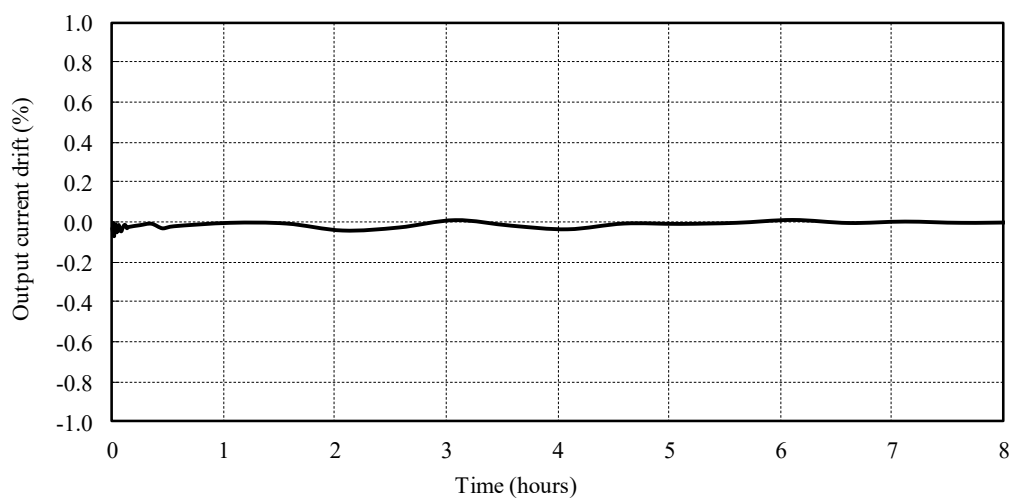
Vin	Input current
	Control OFF
220VDC	0.03A
320VDC	0.02A
420VDC	0.02A

Conditions Vin : 220 VDC ---
 320 VDC - - -
 420 VDC ---
 Iout : 50 A
 Iaux : 0 %
 Ta : 25 °C



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

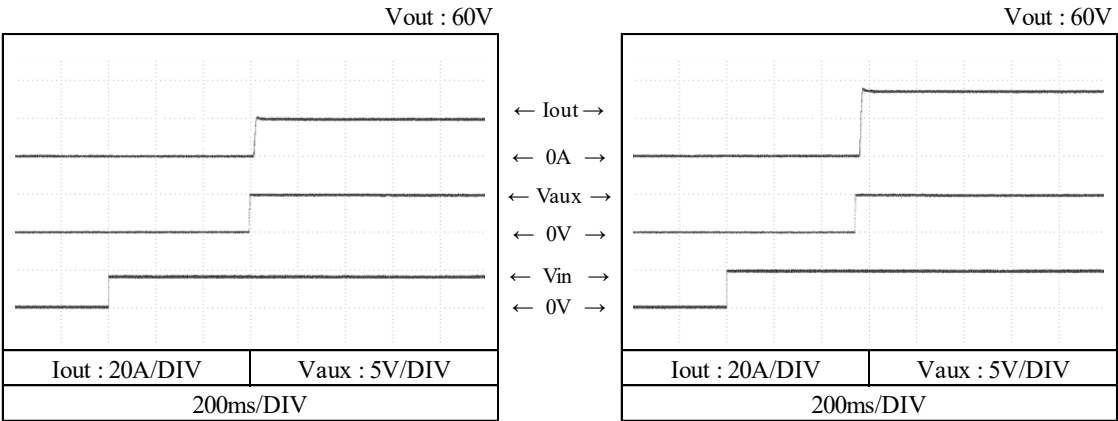
Conditions V_{in} : 320 VDC
 V_{out} : 60 V
 I_{out} : 50 A
 T_a : 25 °C



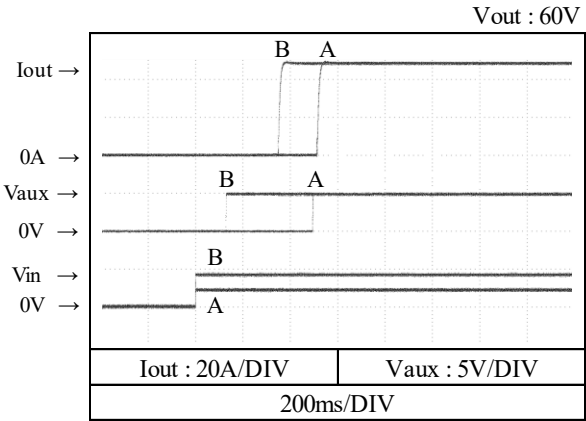
2-2-3. 出力電流立ち上がり特性 Output current rise characteristics

Conditions Vin : 160 VDC
 Iaux : 100 %
 Ta : 25 °C

Conditions Vin : 190 VDC
 Iaux : 100 %
 Ta : 25 °C



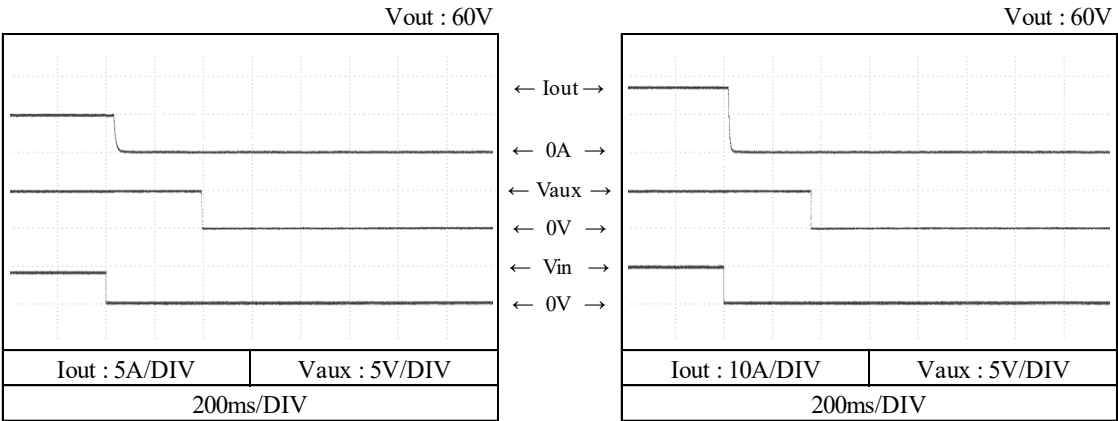
Conditions Vin : 220 VDC (A)
 420 VDC (B)
 Iaux : 100 %
 Ta : 25 °C



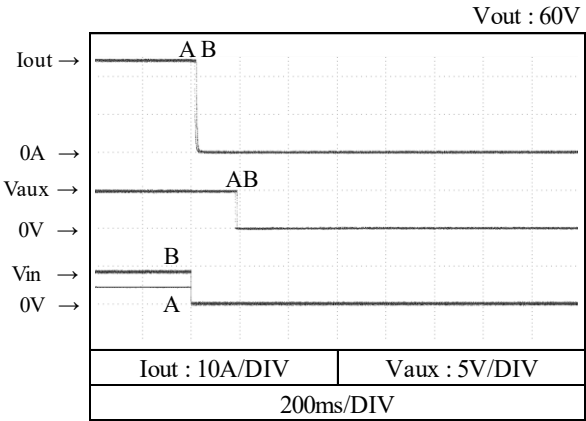
2-2-4. 出力電流立ち下がり特性 Output current fall characteristics

Conditions Vin : 160 VDC
 Iaux : 100 %
 Ta : 25 °C

Conditions Vin : 190 VDC
 Iaux : 100 %
 Ta : 25 °C



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

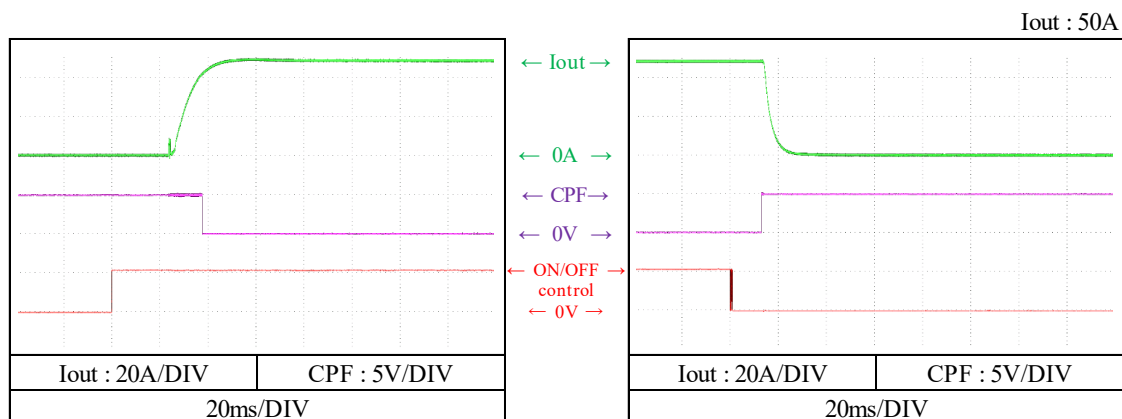


2-2-5. ON/OFF コントロール時出力立ち上がり、立ち下がり特性

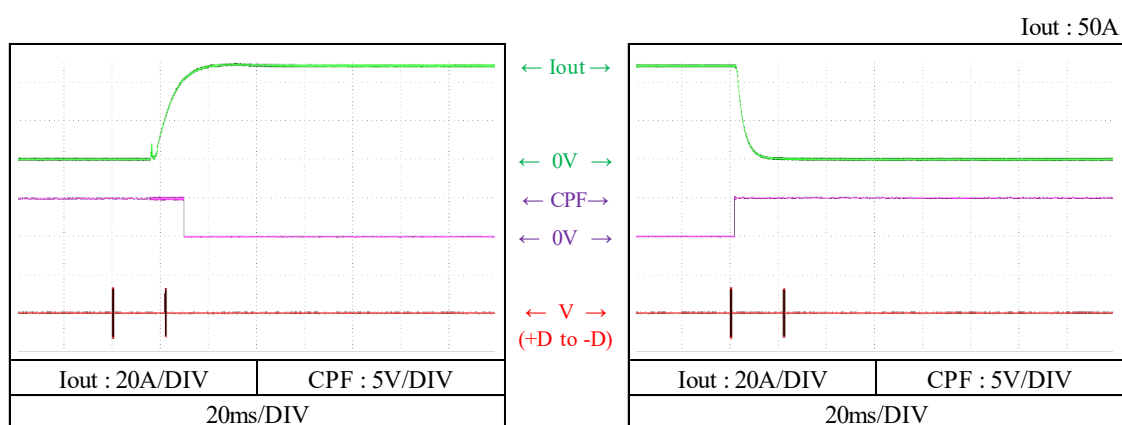
Output rise, fall characteristics with ON/OFF Control

(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

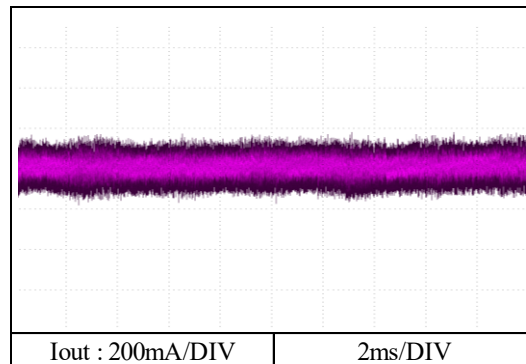
Conditions V_{in} : 320 VDC T_a : 25 °C

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

Conditions V_{in} : 320 VDC T_a : 25 °C

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

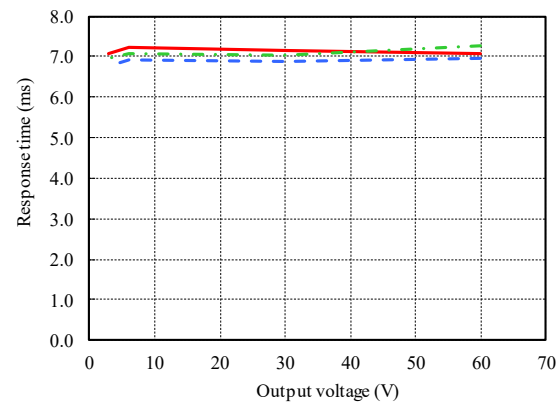
Conditions	V _{in} :	320 VDC
	V _{out} :	60 V
	I _{out} :	50 A
	T _a :	25 °C



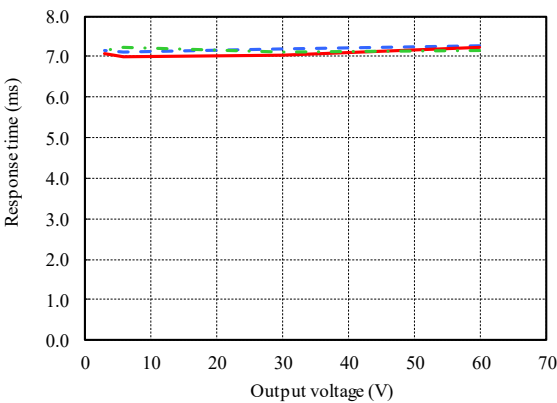
2-2-7. 定電流指令応答特性 Constant current command response characteristics

Conditions V_{in} : 320 VDC
 T_a : -20 °C ---
 25 °C - · -
 50 °C —

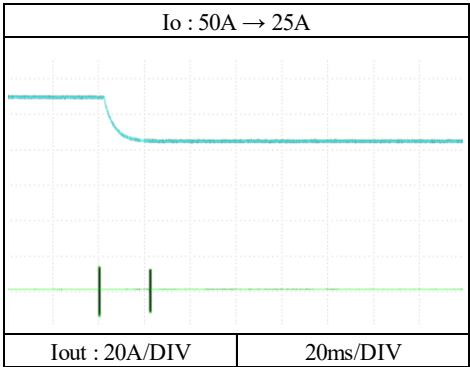
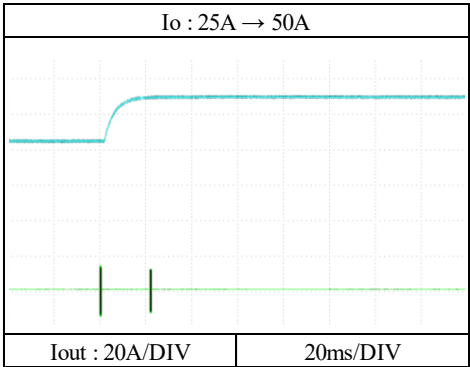
I_o : 25A → 50A



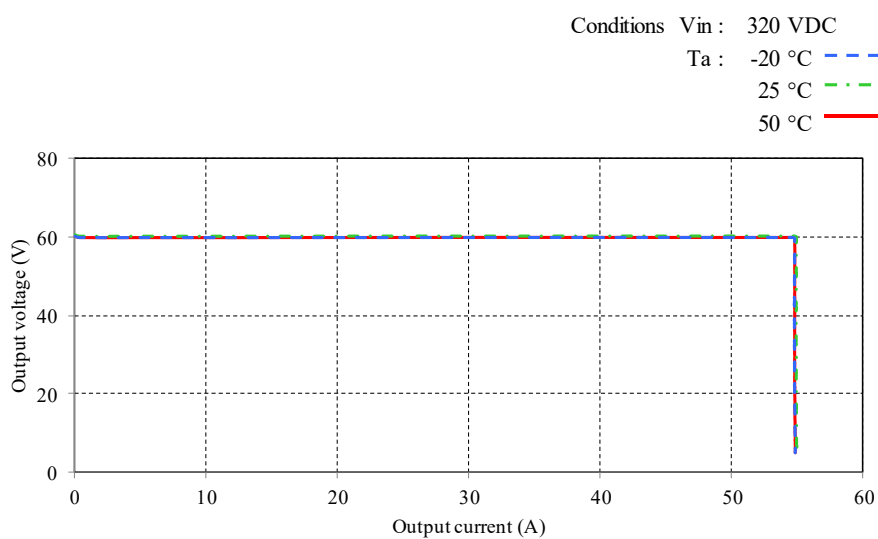
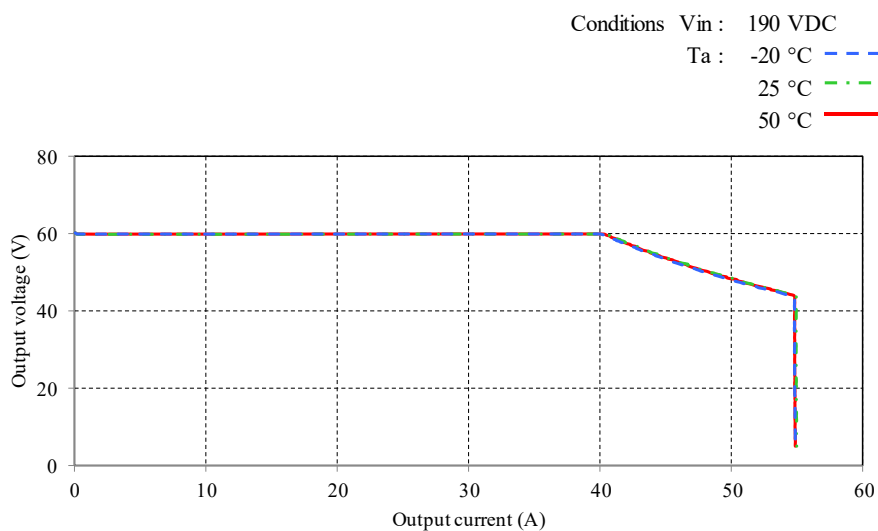
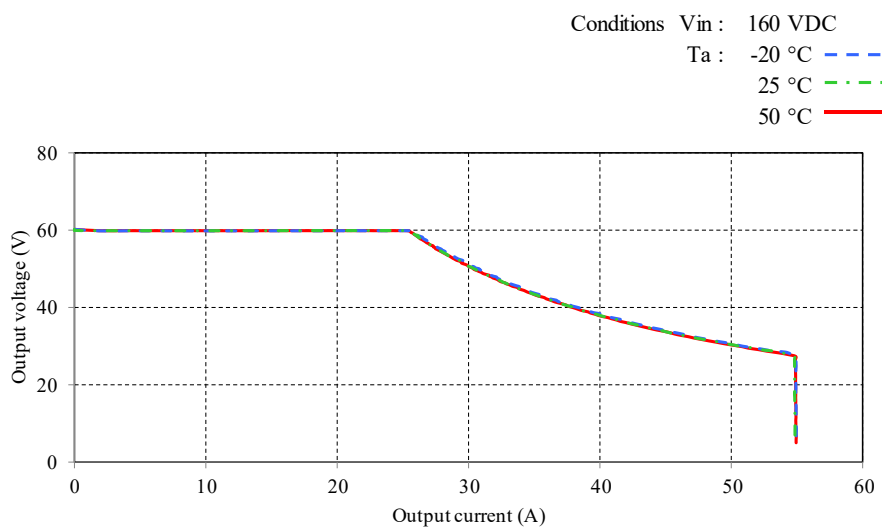
I_o : 50A → 25A



Conditions V_{in} : 320 VDC
 V_{out} : 60 V
 T_a : 25 °C

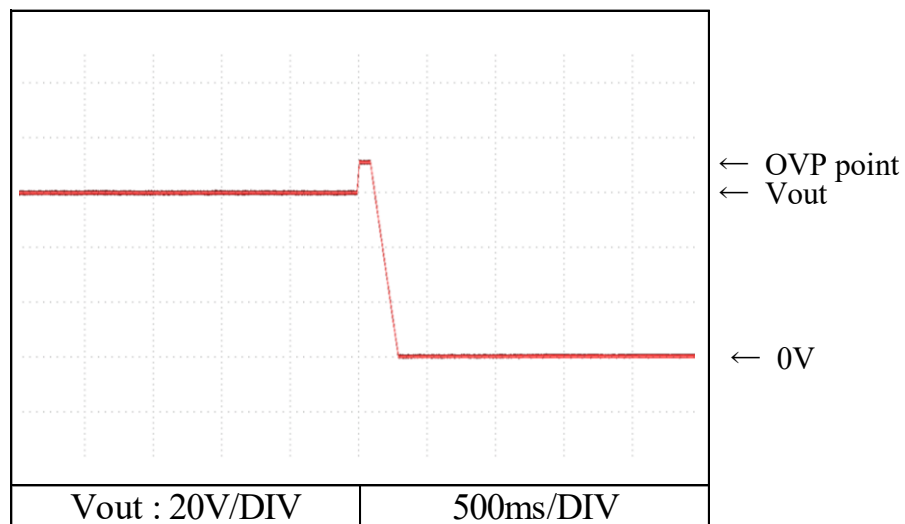


2-3. 過電流保護特性 Over current protection (OCP) characteristics

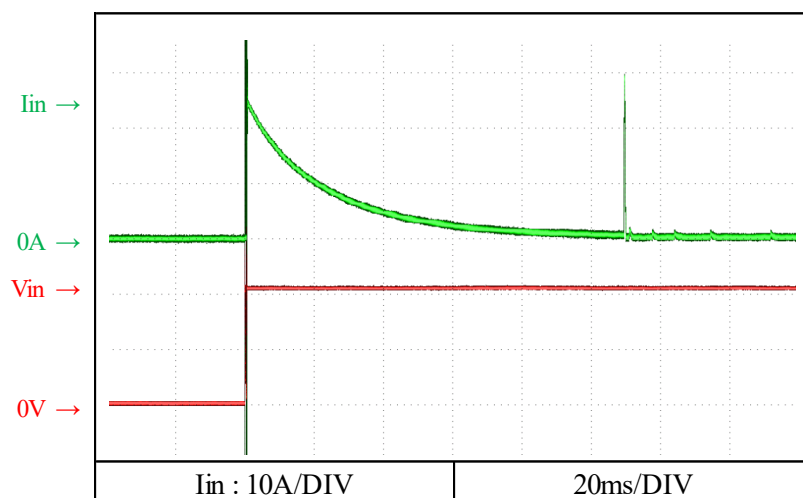


2-4. 過電圧保護特性 Over voltage protection (OVP) characteristics

Conditions V_{in} : 320 VDC
 I_{out} : 1 A
 T_a : 25 °C



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

Conditions V_{in} : 420 VDC V_{out} : 60 V I_{out} : 50 A T_a : 25 °C

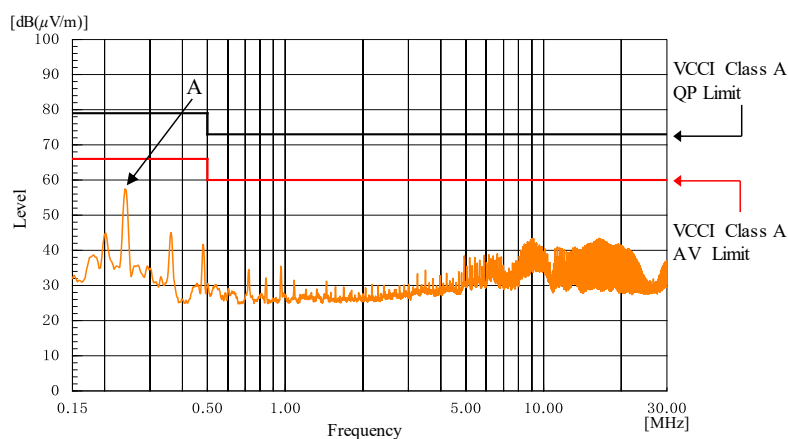
2-6. EMI 特性 Electro Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions V_{in} : 320 VDC
 I_{out} : 50 A
 I_{aux} : 100 %
 T_a : 25 °C

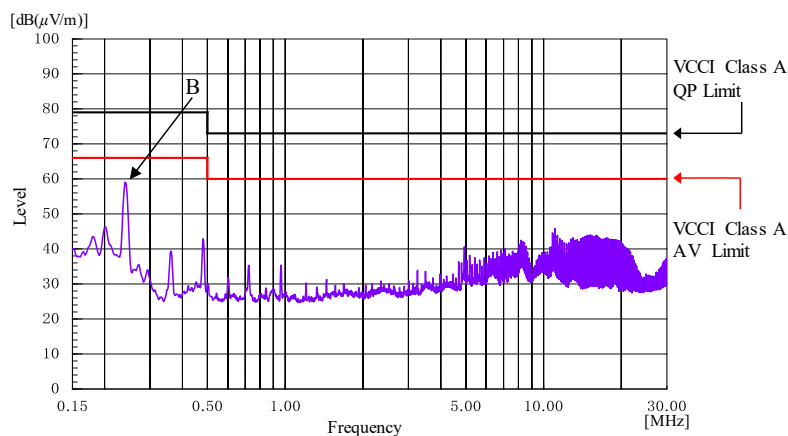
Phase : - V_{in}

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



Phase : + V_{in}

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



雑音電界強度
Radiated Emission

Conditions V_{in} : 320 VDC

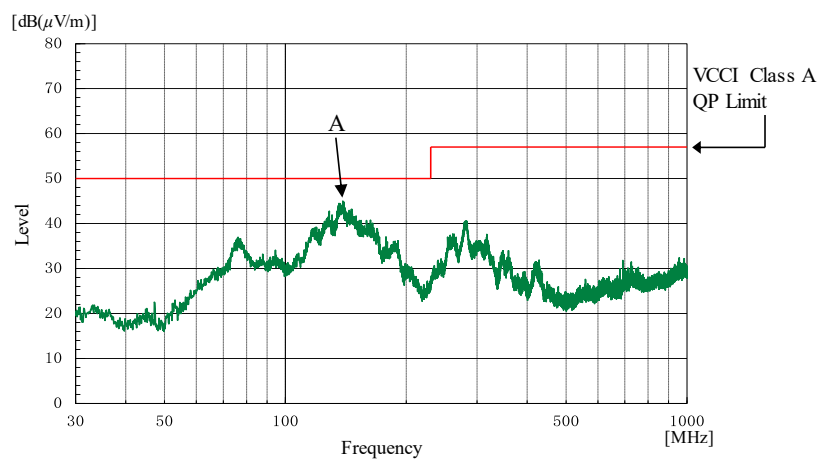
I_{out} : 50 A

I_{aux} : 100 %

T_a : 25 °C

HORIZONTAL

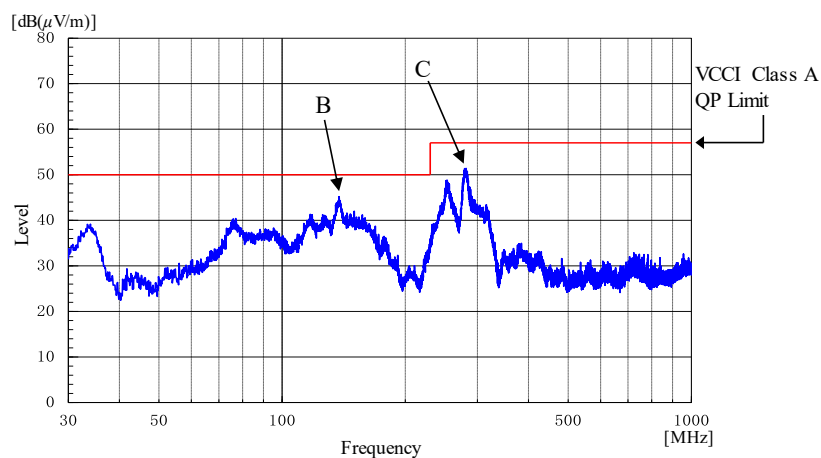
Point A (138MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	41.8



VERTICAL

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

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