

EDCL1500-130

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

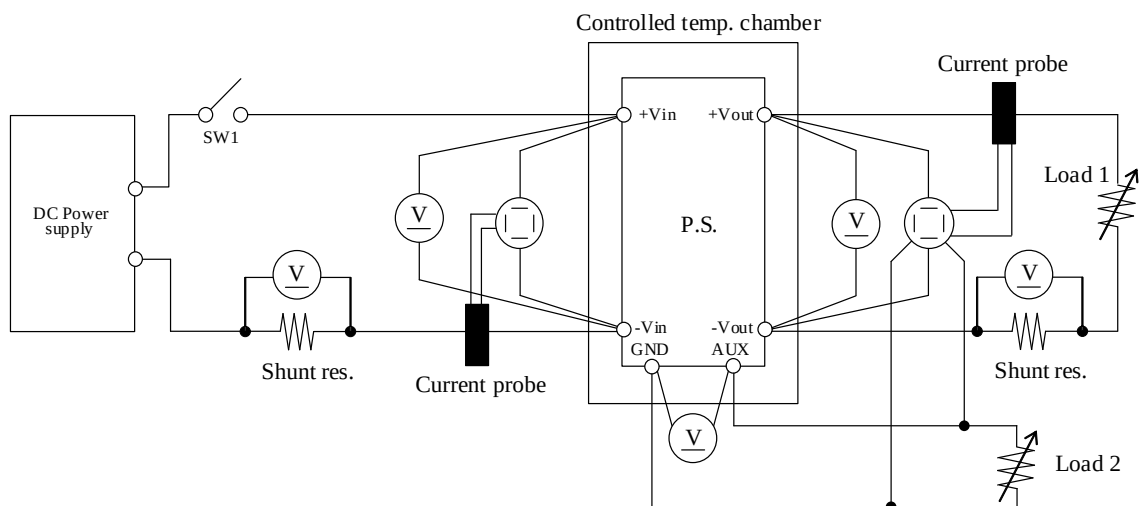
出力電流立ち上がり、立ち下がり特性 Output current rise/fall characteristics

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

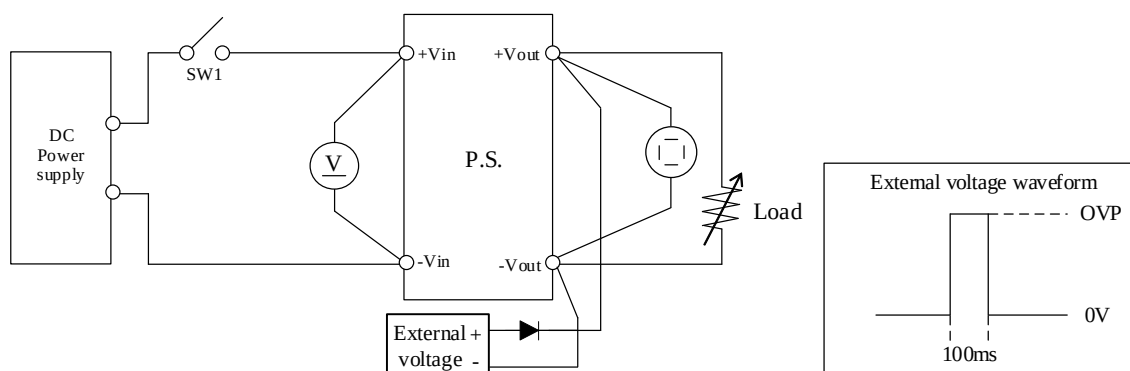
出力リップル、ノイズ電流波形 Output ripple and noise current waveform

入力電圧瞬停特性 Response to brown out characteristics



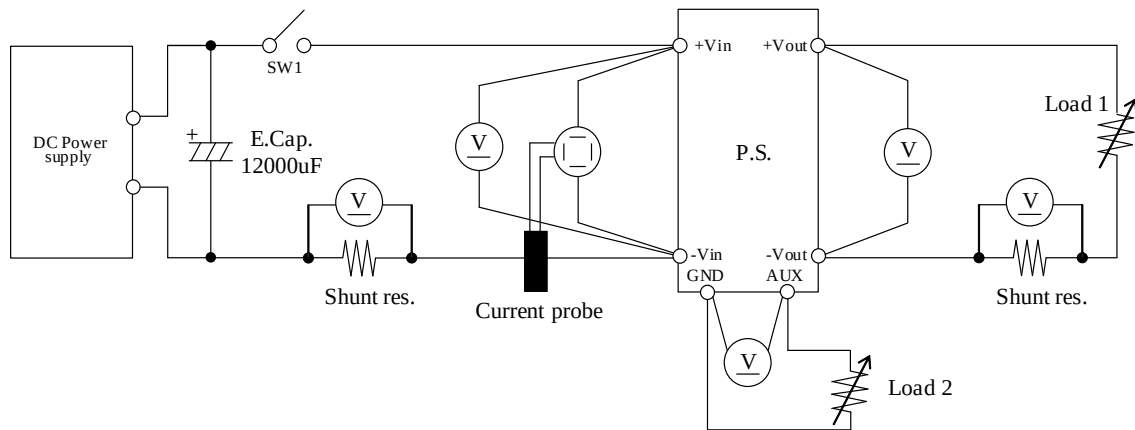
測定回路 2 Circuit 2 used for determination

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

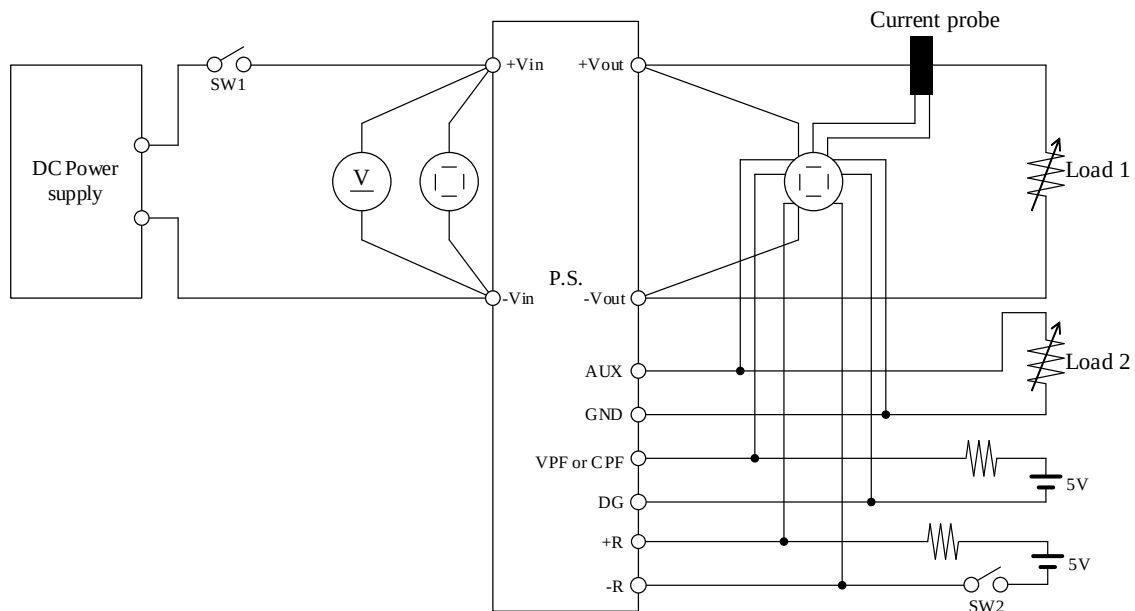
測定回路 4 Circuit 4 used for determination

ON/OFF コントロール時出力立ち上がり、立ち下がり特性

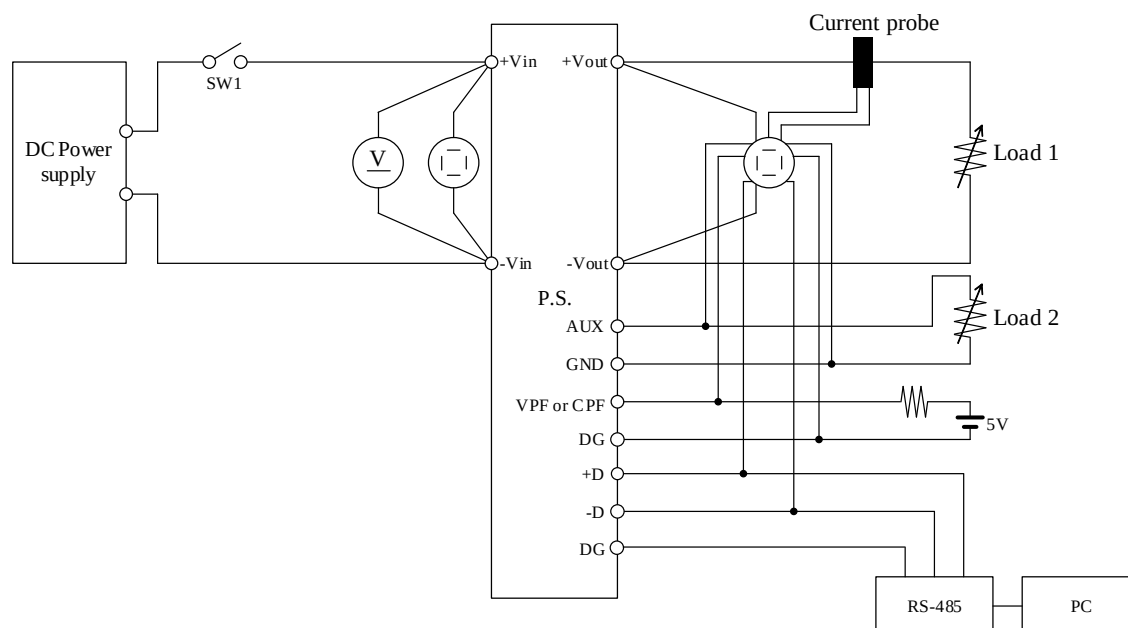
Output rise/fall characteristics with ON/OFF Control

(a) リモート ON/OFF コントロール端子による ON/OFF

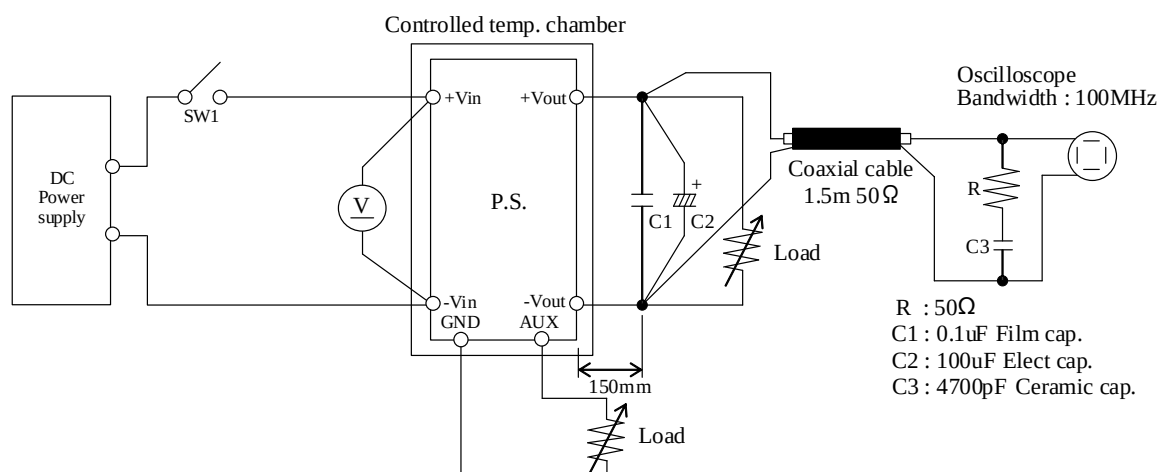
ON/OFF control by remote ON/OFF control terminal



(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

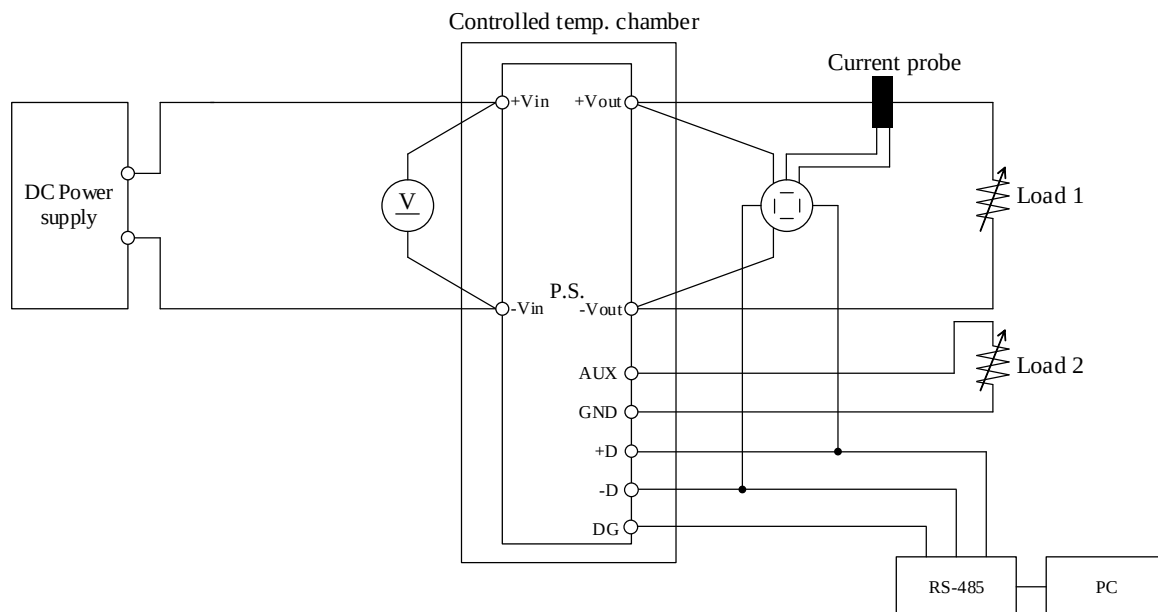
出力リップル、ノイズ電圧波形 Output ripple and noise voltage waveform



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

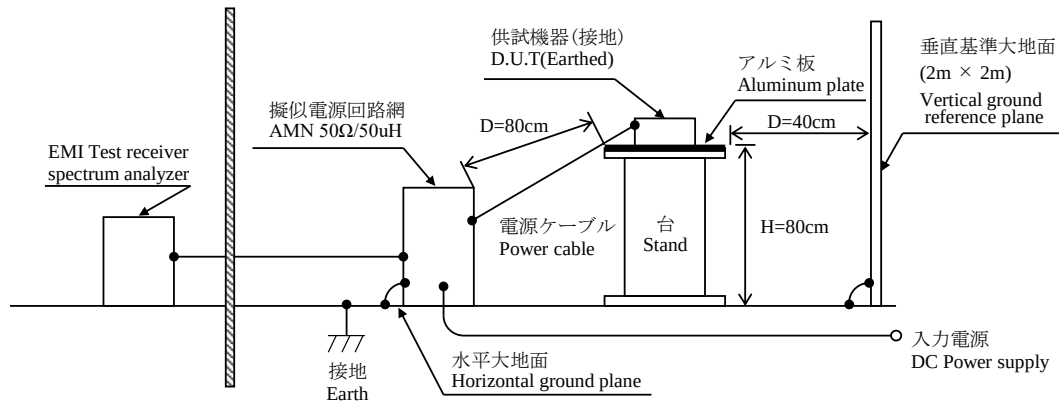
出力電流指令応答特性 Output current command response characteristics



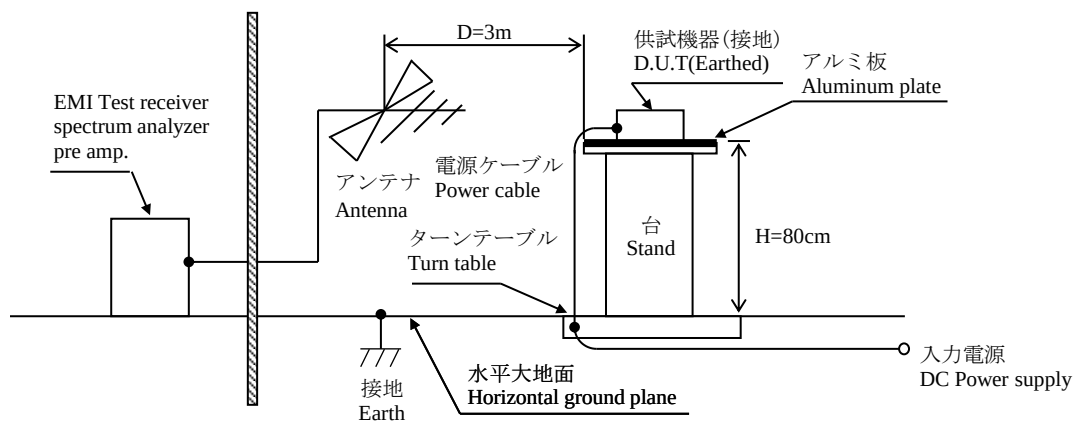
測定構成 Configuration used for determination

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	DYNAMIC DUMMY LOAD	KIKUSI	PLZ1004W
7	DYNAMIC DUMMY LOAD BOOSTER	KIKUSI	PLZ2004WB
8	DYNAMIC DUMMY LOAD	CHROMA	63220E-1200-800
9	DYNAMIC DUMMY LOAD	TDK-LAMBDA	SFL120-60-300
10	CVCC	KIKUSUI	PCR18000WEA2R
11	DIRECT CURRENT POWER SUPPLY	KEYSIGHT	N8934A
12	CONTROLLED TEMP. CHAMBER	ESPEC	PL-4J
13	EMI TEST RECEIVER / SPECTRUM ANALYZER	ROHDE & SCHWARZ	ESR3
14	PRE AMP.	SONOMA	310N
15	AMN	SCHWARZBECK	NNLK8121
16	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

Conditions Ta : 25 °C
 Iout (100%) : 15.4 A (Vin = 70VDC)
 19.2 A (Vin = 80VDC)
 23.2 A (Vin = 90 - 220VDC)

Iout \ Vin	70VDC	80VDC	90VDC	110VDC	220VDC	Line regulation	
0%	130.39V	130.38V	130.37V	130.39V	130.40V	26mV	0.020%
25%	129.98V	129.98V	129.95V	129.97V	129.97V	29mV	0.023%
50%	130.00V	130.01V	130.05V	130.04V	130.04V	51mV	0.039%
Load regulation	405mV 0.311%	406mV 0.312%	419mV 0.323%	418mV 0.322%	424mV 0.326%		

Iout \ Vin	70VDC	80VDC	90VDC	110VDC	220VDC	Line regulation	
0%	65.31V	65.30V	65.31V	65.30V	65.30V	15mV	0.011%
50%	65.04V	65.07V	65.10V	65.10V	65.10V	59mV	0.045%
100%	65.12V	65.14V	65.14V	65.14V	65.16V	39mV	0.030%
Load regulation	269mV 0.207%	230mV 0.177%	204mV 0.157%	203mV 0.156%	206mV 0.158%		

2. Temperature drift

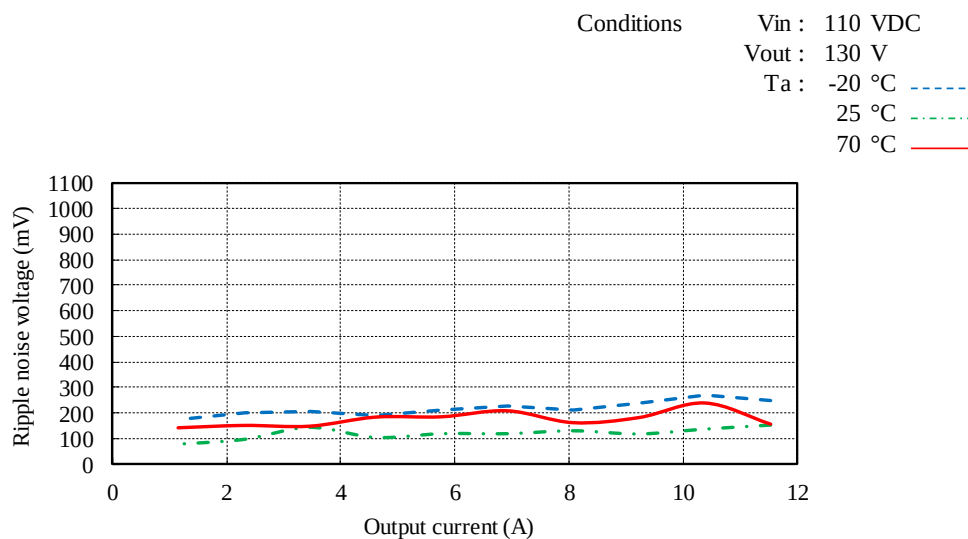
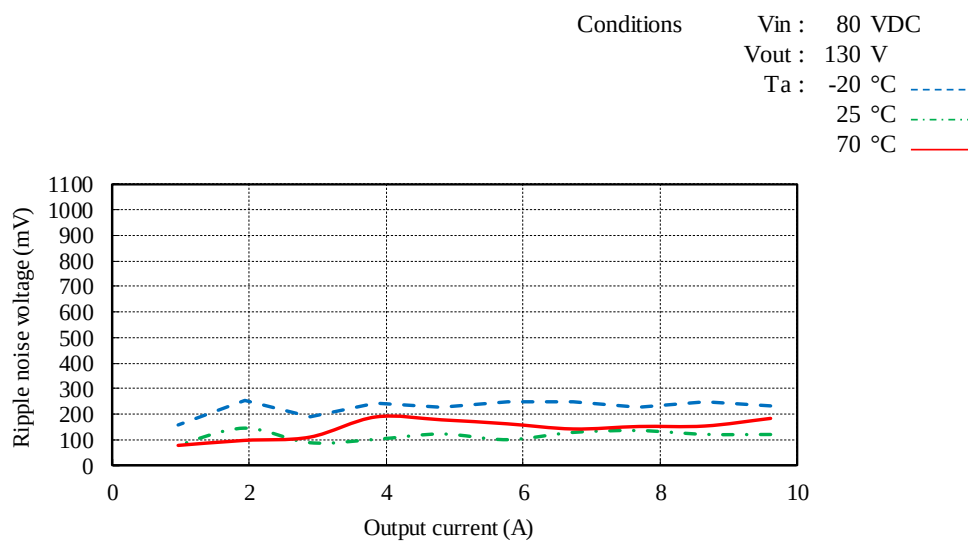
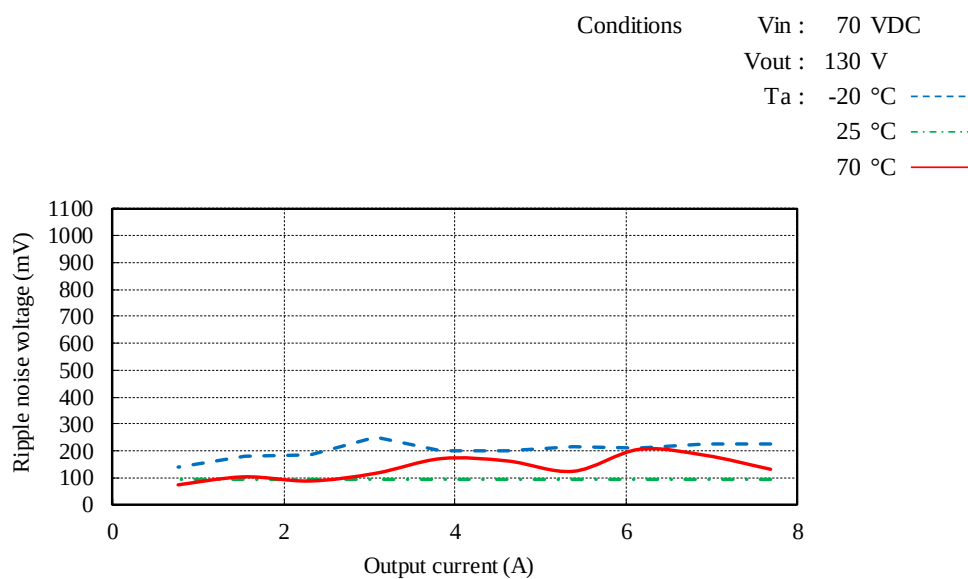
Conditions Vin : 110 VDC
 Iout : 11.6 A

Ta	-20°C	+25°C	+70°C	Temperature stability	
Vout	129.77V	130.04V	129.93V	269mV	0.207%

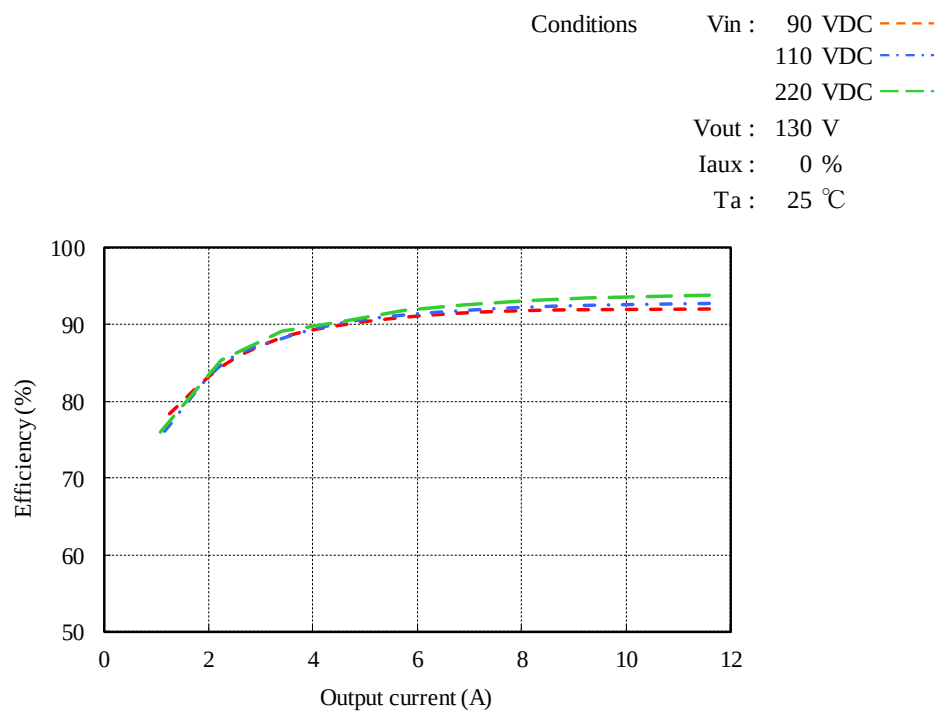
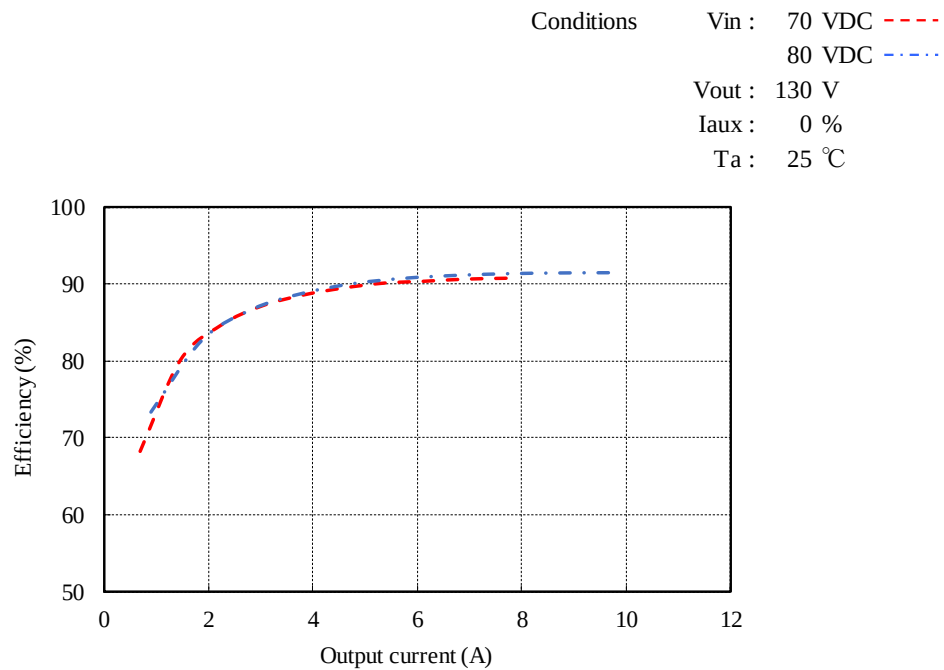
Iout : 23.2 A

Ta	-20°C	+25°C	+70°C	Temperature stability	
Vout	65.03V	65.14V	65.04V	110mV	0.085%

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

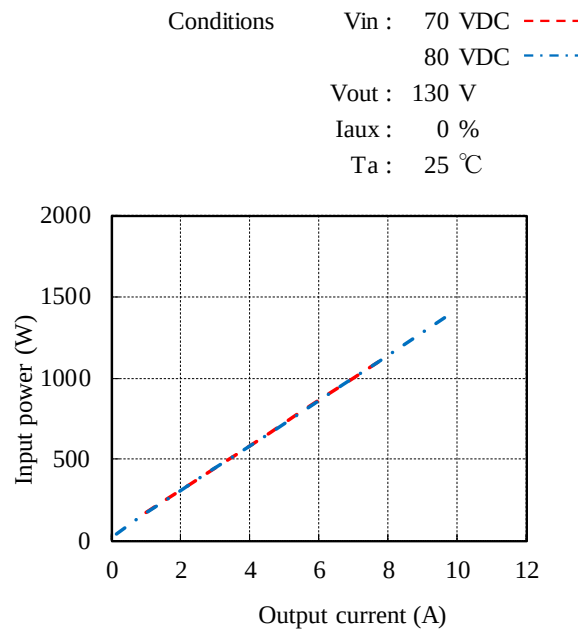


(3) 効率対出力電流 Efficiency vs. Output current

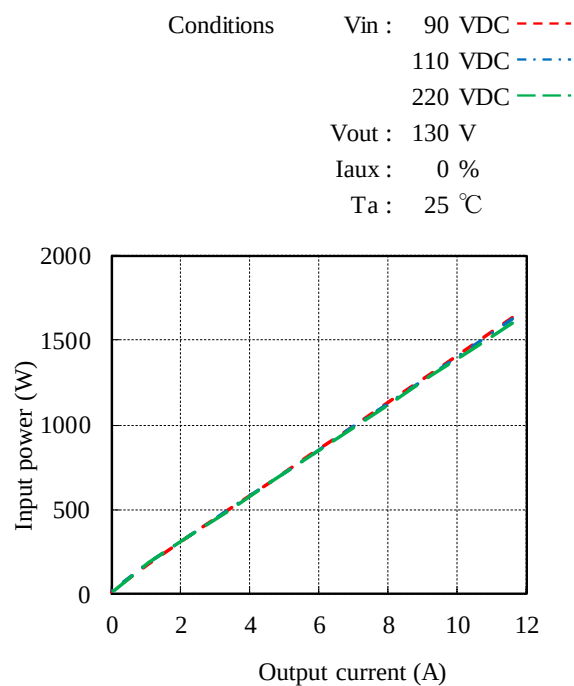


(4) 入力電力対出力電流 Input power vs. Output current

Vin	Input power	
	Iout : 0%	Control OFF
70VDC	15.0W	10.5W
80VDC	14.7W	11.5W

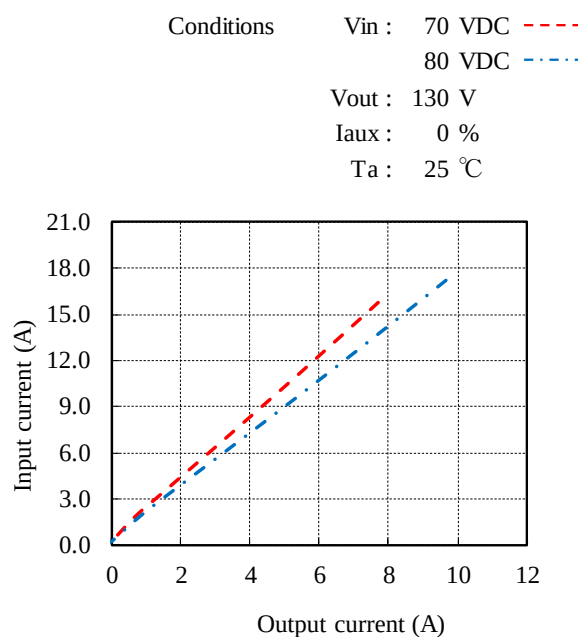


Vin	Input power	
	Iout : 0%	Control OFF
90VDC	12.0W	9.0W
110VDC	12.6W	8.7W
220VDC	8.3W	2.4W

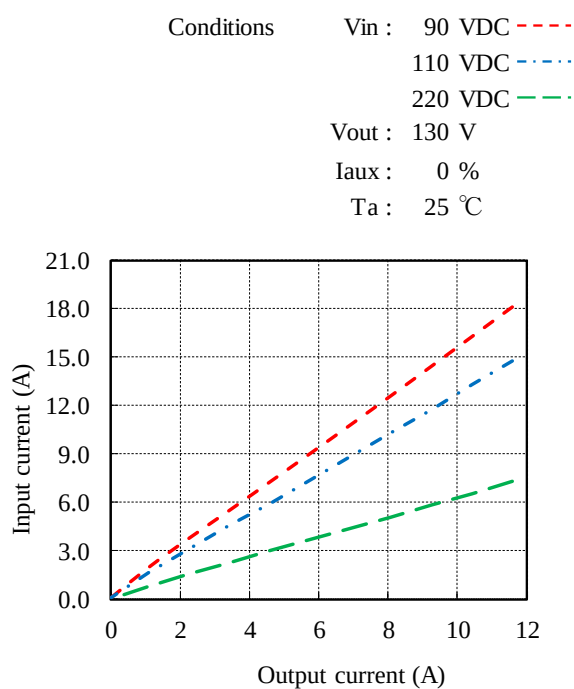


(5) 入力電流対出力電流 Input current vs. Output current

Vin	Input current	
	I _{out} : 0%	Control OFF
70VDC	0.21A	0.15A
80VDC	0.18A	0.14A

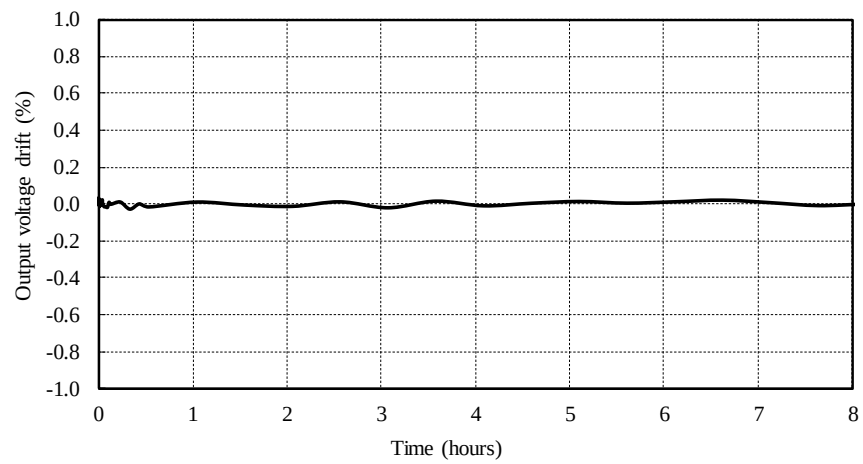


Vin	Input current	
	I _{out} : 0%	Control OFF
90VDC	0.13A	0.10A
110VDC	0.11A	0.08A
220VDC	0.04A	0.01A



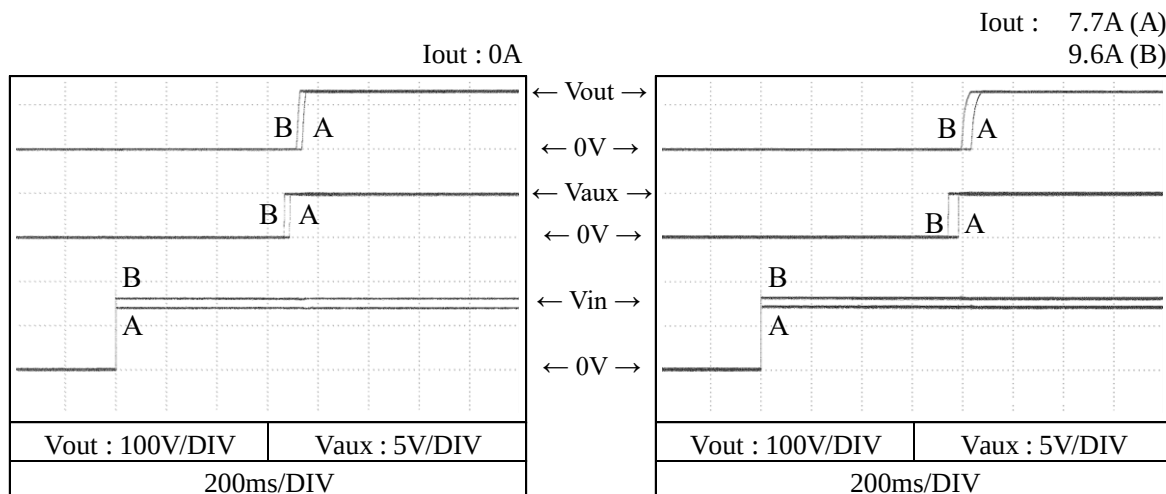
2-1-2. 通電ドリフト特性 Warm up voltage drift characteristics

Conditions V_{in} : 110 VDC
 V_{out} : 130 V
 I_{out} : 11.6 A
 T_a : 25 °C

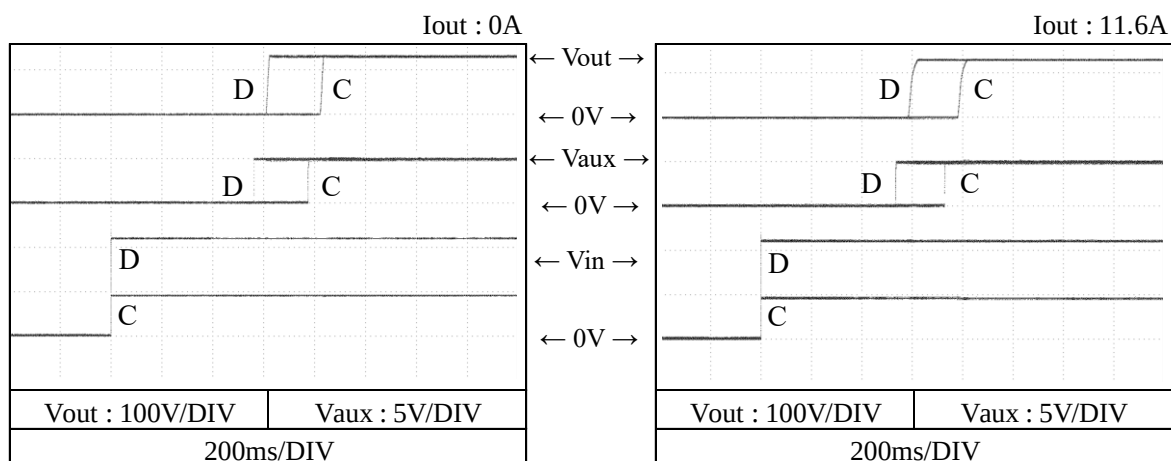


2-1-3. 出力電圧立ち上がり特性 Output voltage rise characteristics

Conditions Vin : 70 VDC (A)
 80 VDC (B)
 Iaux : 100 %
 Ta : 25 °C

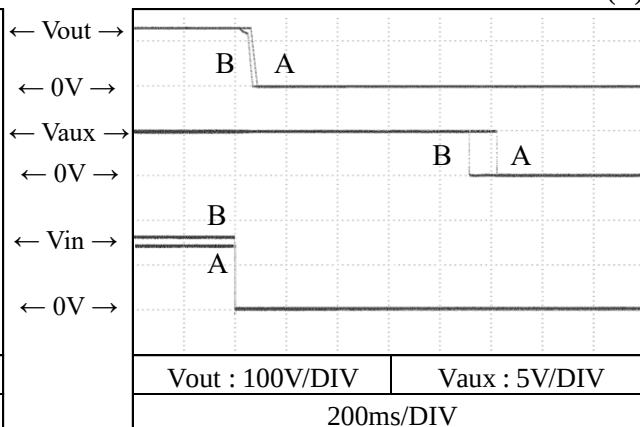
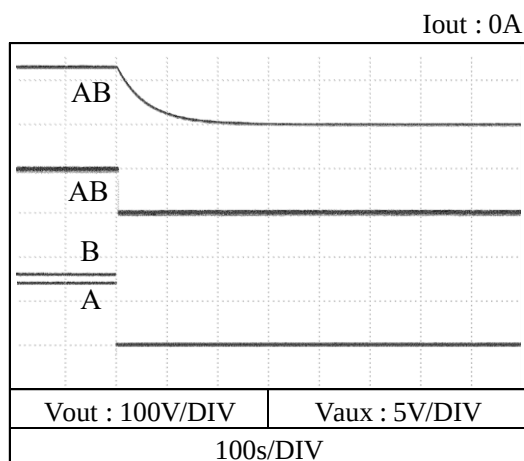


Conditions Vin : 90 VDC (C)
 220 VDC (D)
 Iaux : 100 %
 Ta : 25 °C

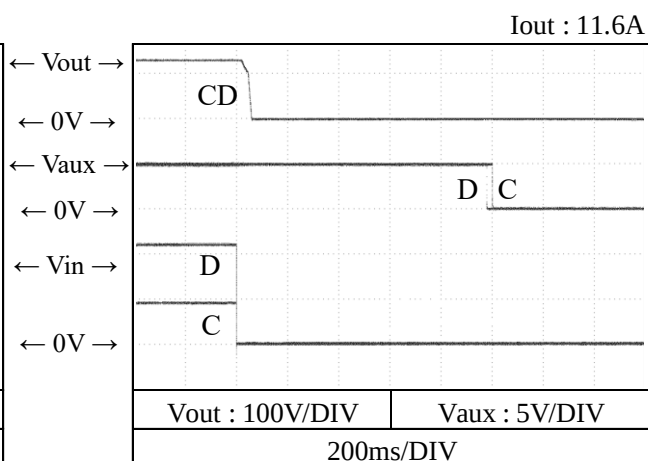
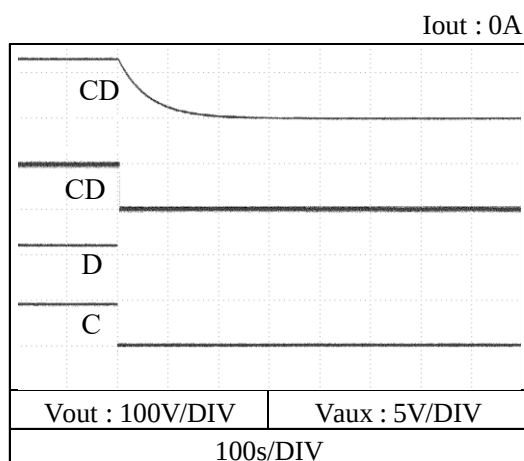


2-1-4. 出力電圧立ち下がり特性 Output voltage fall characteristics

Conditions Vin : 70 VDC (A)
 80 VDC (B)
 Iaux : 100 %
 Ta : 25 °C



Conditions Vin : 90 VDC (C)
 220 VDC (D)
 Iaux : 100 %
 Ta : 25 °C

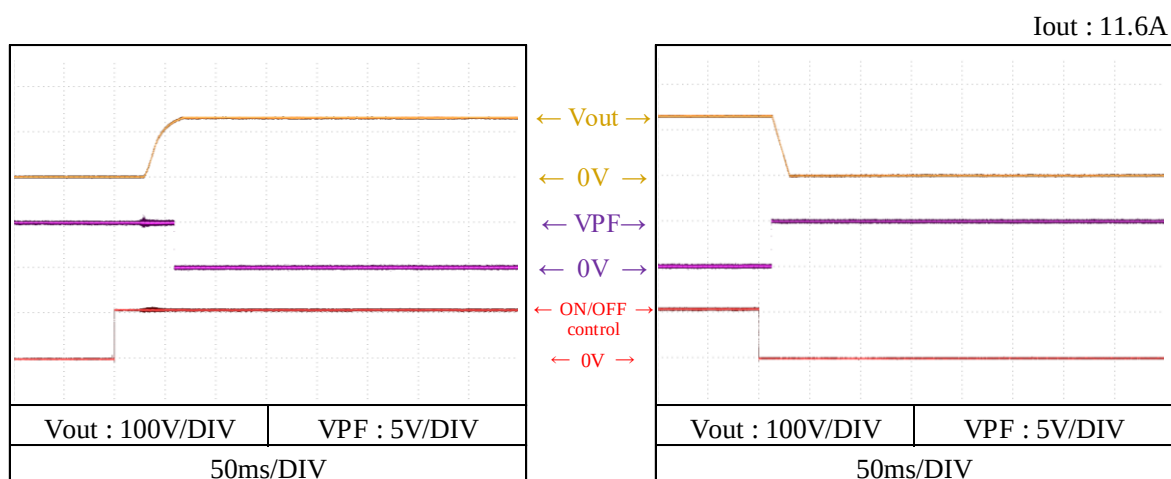
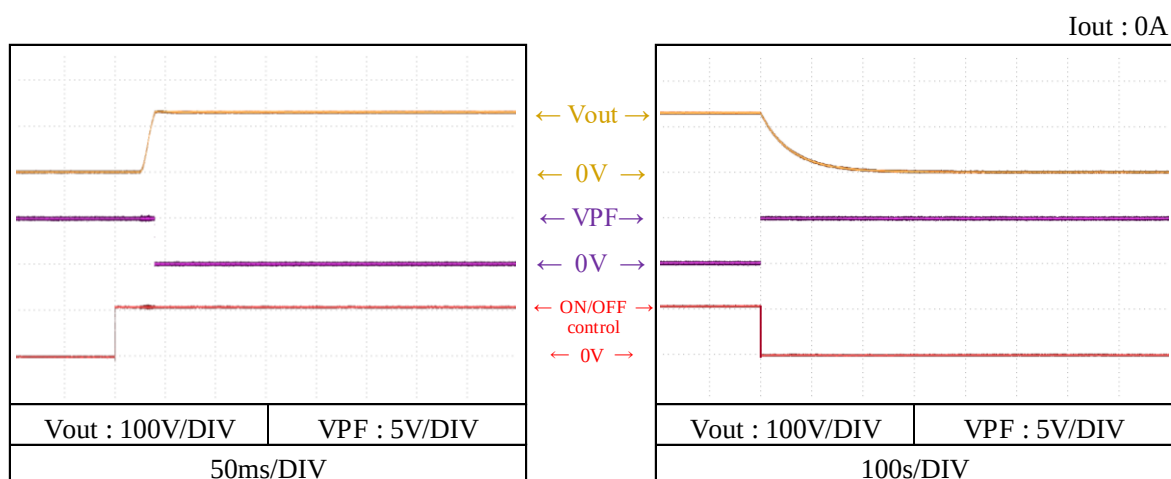


2-1-5. ON/OFF コントロール時出力立ち上がり、立ち下がり特性

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

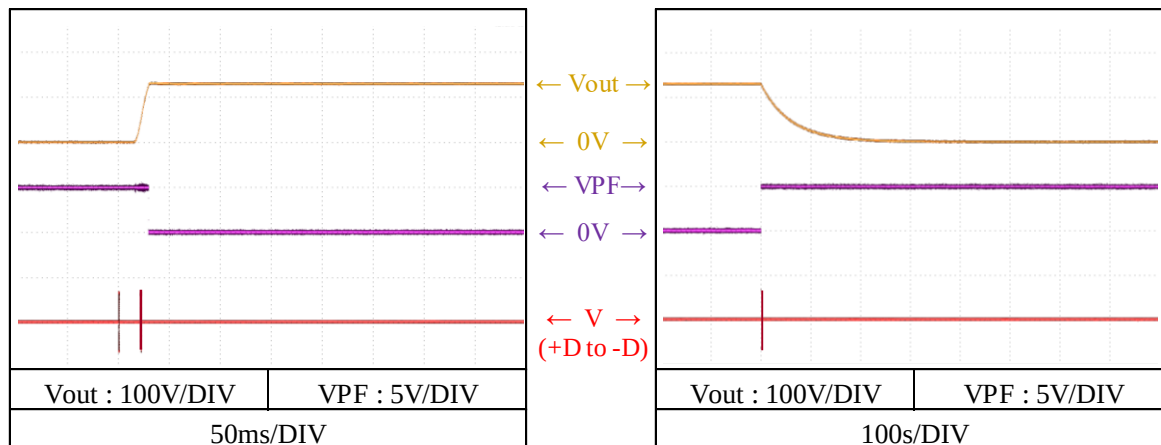
Conditions V_{in} : 110 VDC T_a : 25 °C

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

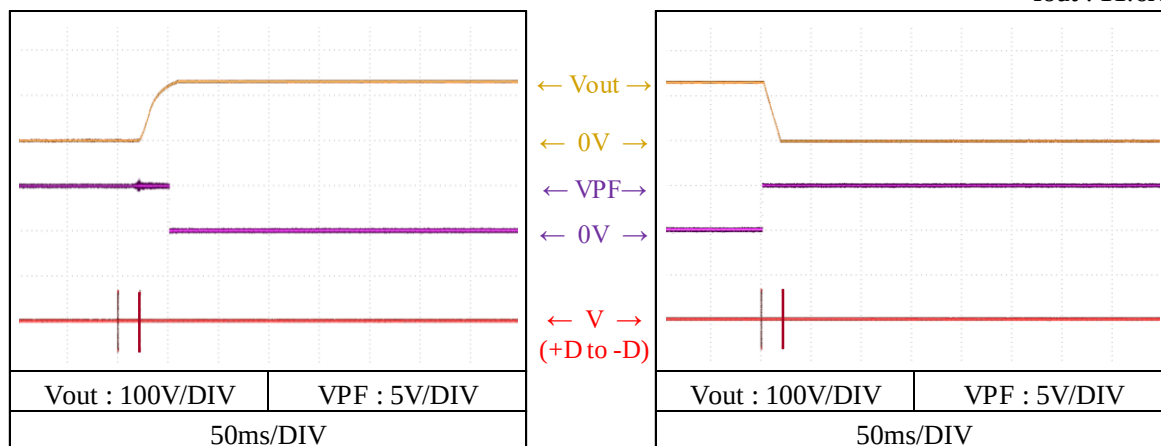
Conditions Vin : 110 VDC

Ta : 25 °C

Iout : 0A

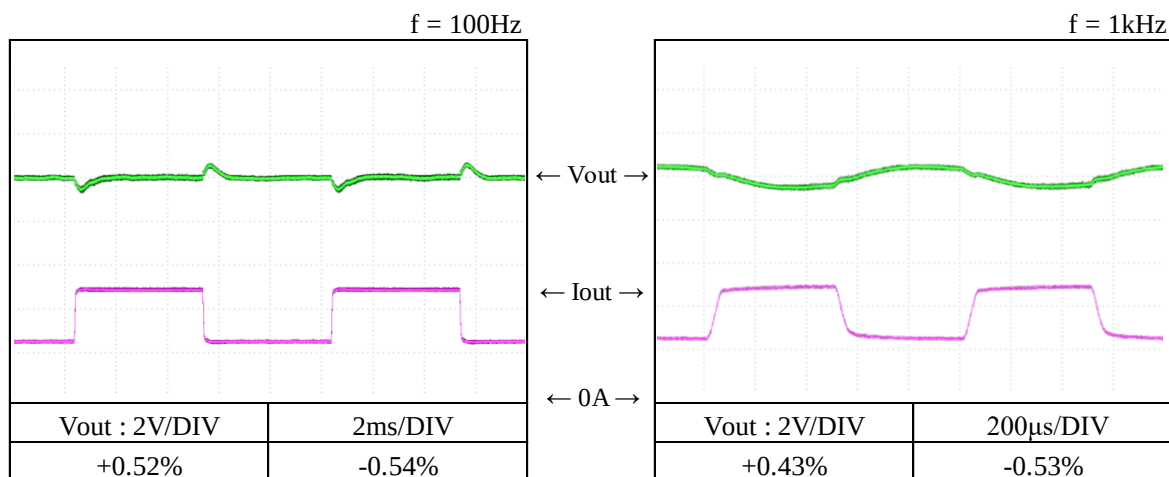


Iout : 11.6A



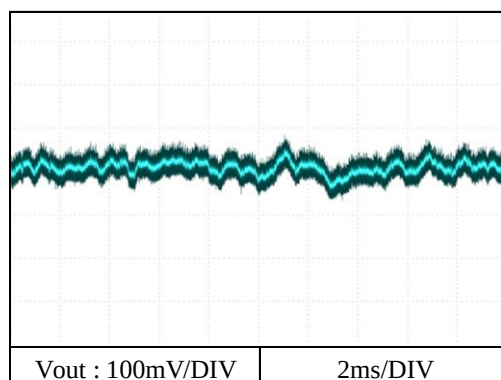
2-1-6. 過渡応答 (負荷急変) 特性 Dynamic load response characteristics

Conditions V_{in} : 110 VDC
 I_{out} : 5.8A $\leftrightarrow$ 11.6A
(tr = tf = 50 μ s)
 T_a : 25 $^{\circ}$ C



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

Conditions V_{in} : 110 VDC
 V_{out} : 130 V
 I_{out} : 11.6 A
 T_a : 25 $^{\circ}$ C



2-1-8.入力電圧瞬停特性 Response to brown out characteristics

瞬停時間 Interruption time

A:出力電圧の低下なし Output voltage does not drop.

B:出力電圧の低下が 0V までいかない Output voltage drop down not reaching 0V.

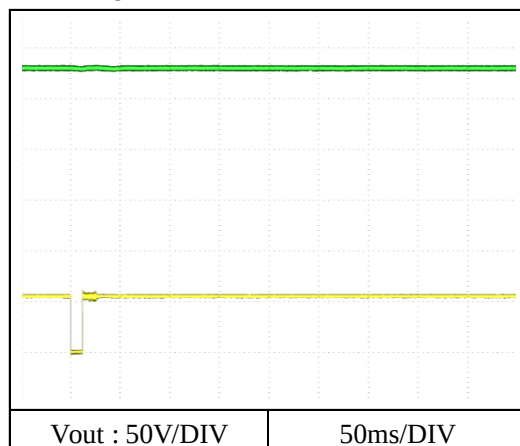
C:出力電圧が 0V まで低下 Output voltage drops until 0V.

Conditions V_{in} : 110 VDC

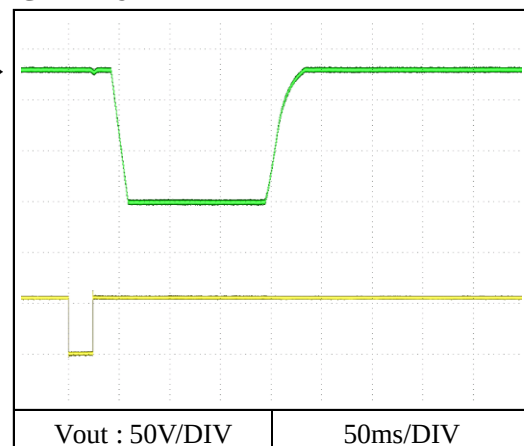
I_{out} : 11.6 A

T_a : 25 °C

A = 12ms



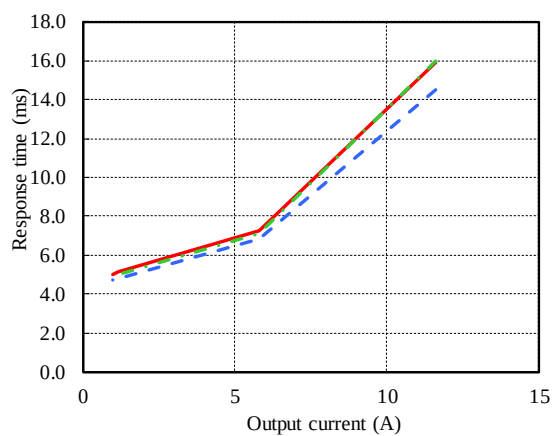
C = 24ms



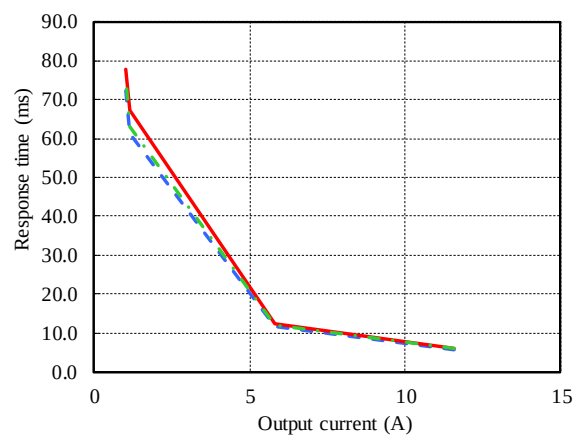
2-1-9. 出力電圧指令応答特性 Output voltage command response characteristics

Conditions V_{in} : 110 VDC
 T_a : -20 °C ---
 25 °C ---
 70 °C ---

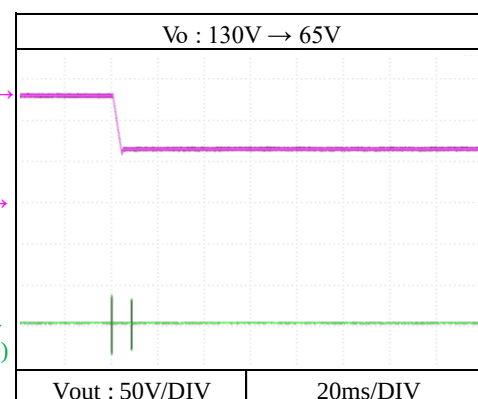
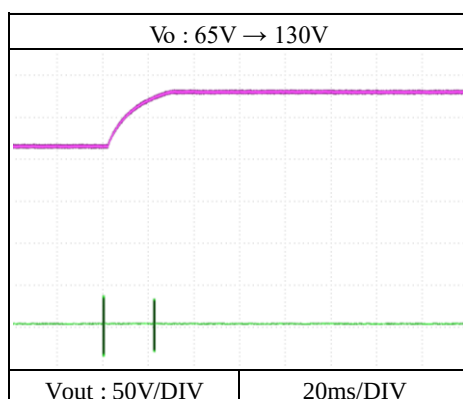
V_o : 65V → 130V



V_o : 130V → 65V



Conditions V_{in} : 110 VDC
 I_{out} : 11.6 A
 T_a : 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

Conditions

Ta : 25 °C
 Vout (100%) : 86 V (Vin = 70VDC)
 108 V (Vin = 80VDC)
 130 V (Vin = 90 - 220VDC)

Vout \ Vin	70VDC	80VDC	90VDC	110VDC	220VDC	Line regulation	
5%	23.23A	23.22A	23.23A	23.23A	23.23A	7mA	0.032%
25%	23.22A	23.21A	23.20A	23.20A	23.19A	24mA	0.102%
50%	23.19A	23.19A	23.19A	23.18A	23.19A	12mA	0.052%
Load	37mA	31mA	44mA	45mA	34mA		
regulation	0.162%	0.136%	0.191%	0.193%	0.149%		

Vout \ Vin	70VDC	80VDC	90VDC	110VDC	220VDC	Line regulation	
10%	11.62A	11.63A	11.62A	11.63A	11.63A	5mA	0.022%
50%	11.61A	11.60A	11.61A	11.61A	11.61A	8mA	0.034%
100%	11.61A	11.61A	11.60A	11.60A	11.60A	9mA	0.039%
Load	16mA	25mA	20mA	27mA	28mA		
regulation	0.069%	0.108%	0.086%	0.116%	0.121%		

2. Temperature drift

Conditions

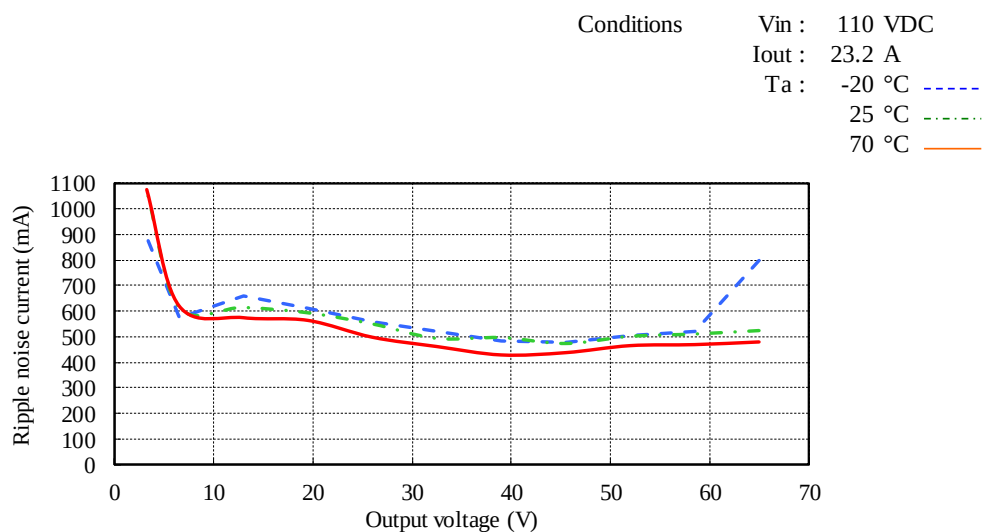
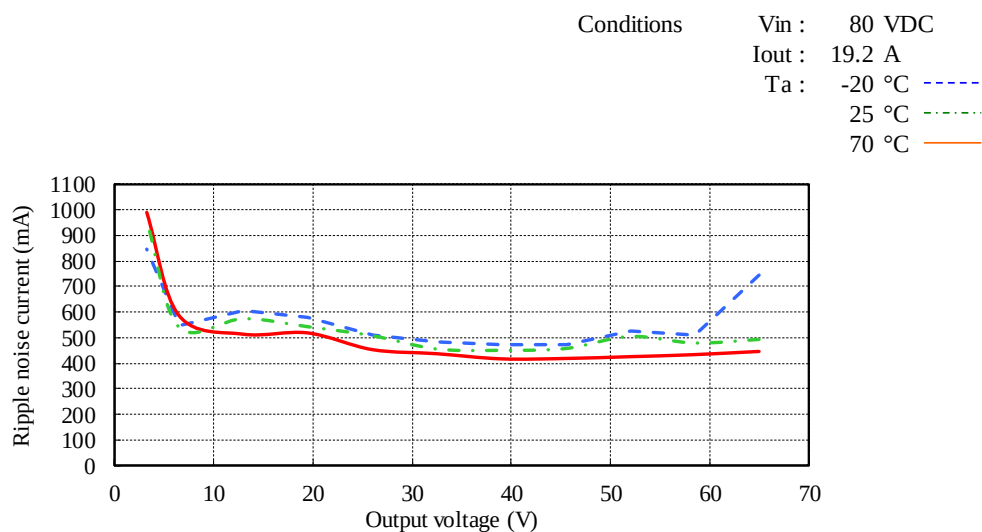
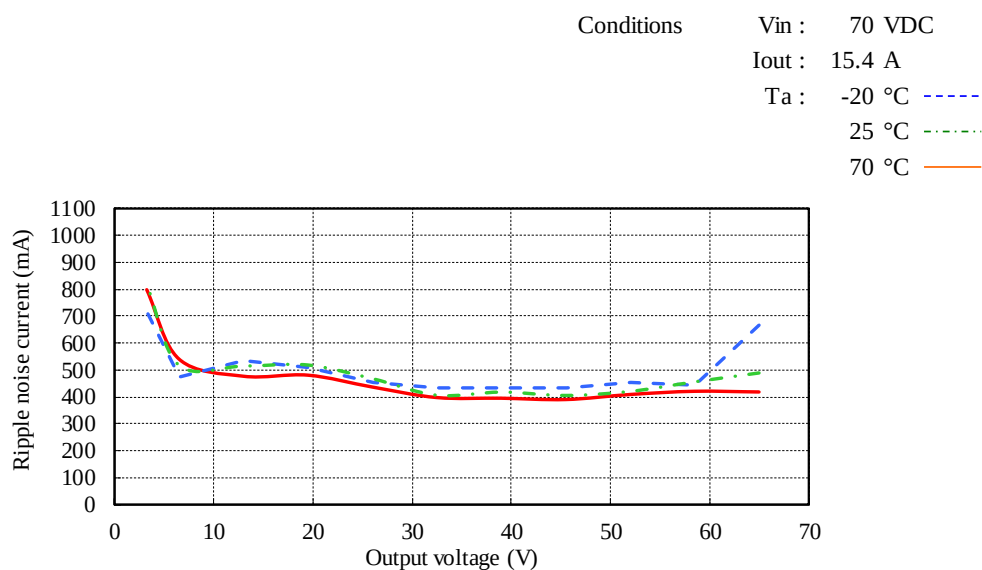
Vin : 110 VDC
 Vout : 65 V

Ta	-20°C	+25°C	+70°C	Temperature stability	
Iout	23.23A	23.18A	23.17A	58mA	0.251%

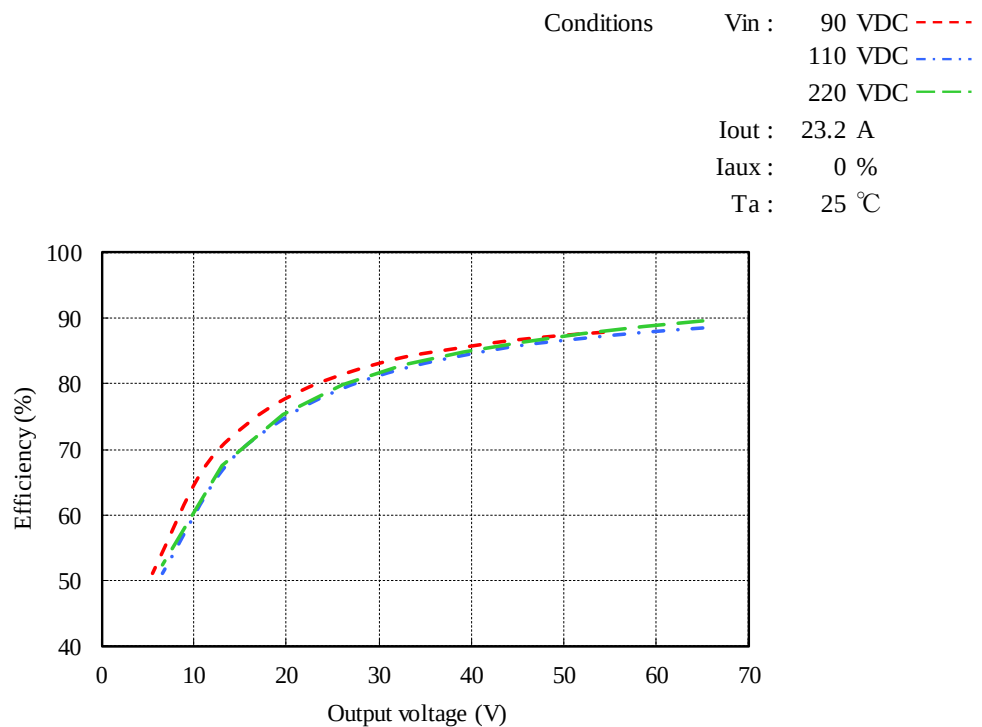
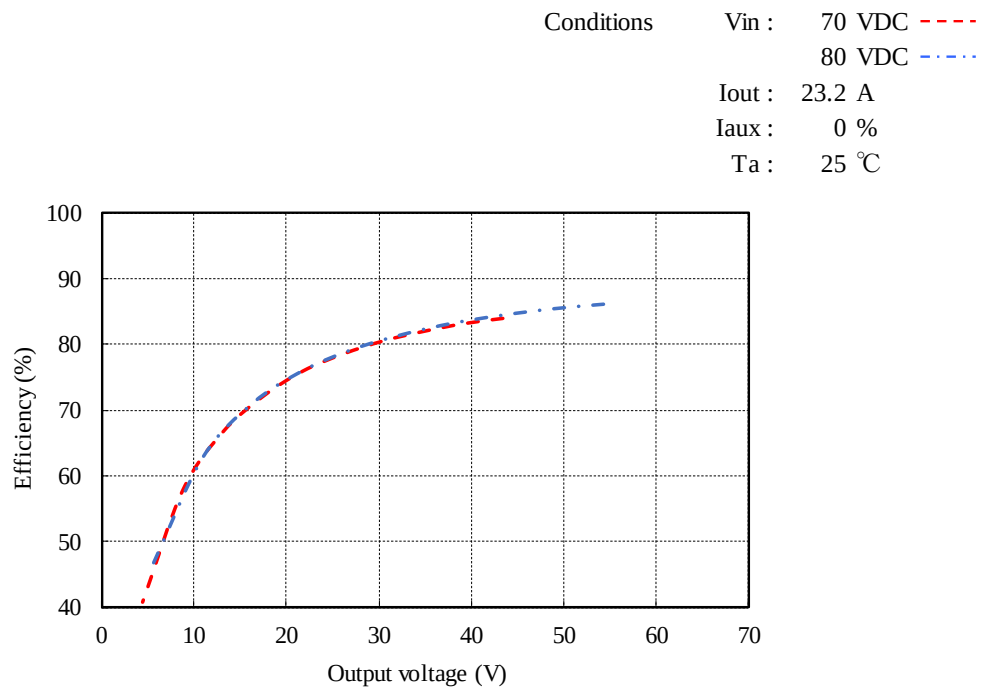
Vout : 130 V

Ta	-20°C	+25°C	+70°C	Temperature stability	
Iout	11.62A	11.60A	11.59A	32mA	0.138%

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

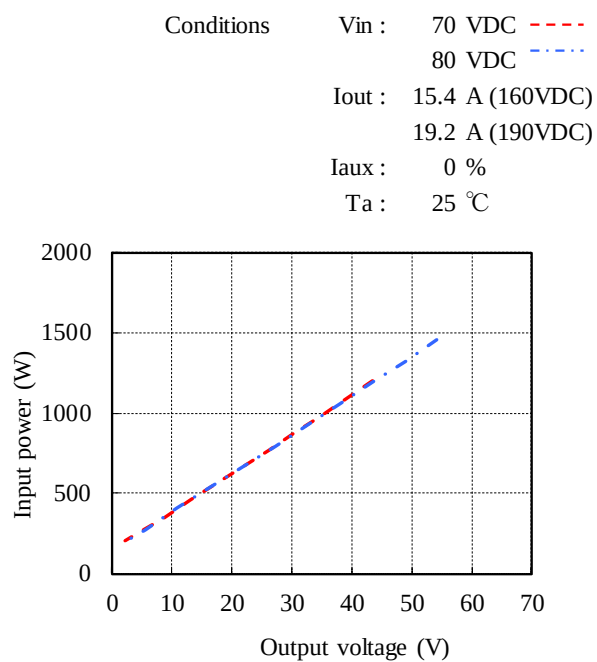


(3) 効率対出力電圧 Efficiency vs. Output voltage

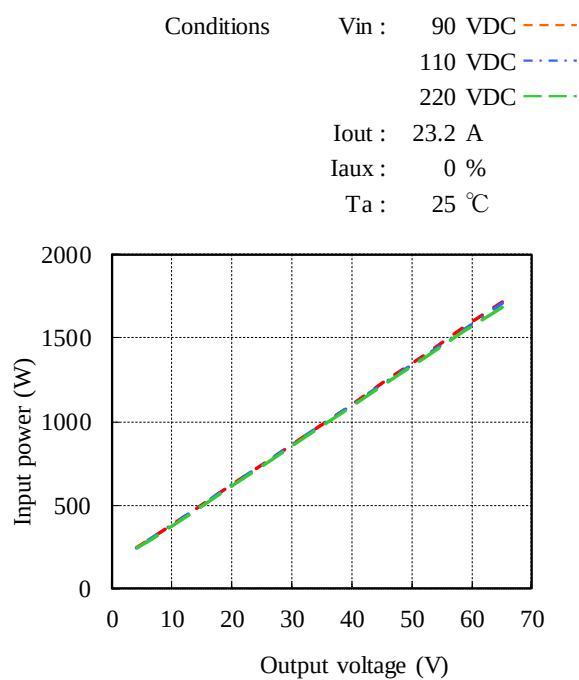


(4) 入力電力対出力電圧 Input power vs. Output voltage

Vin	Input power
	Control OFF
70VDC	10.5W
80VDC	11.5W



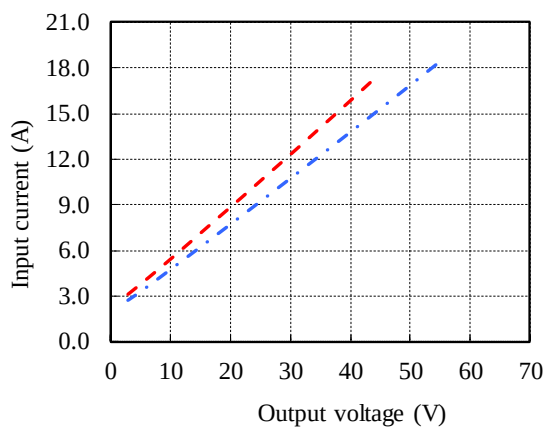
Vin	Input power
	Control OFF
90VDC	9.0W
110VDC	8.7W
220VDC	2.4W



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

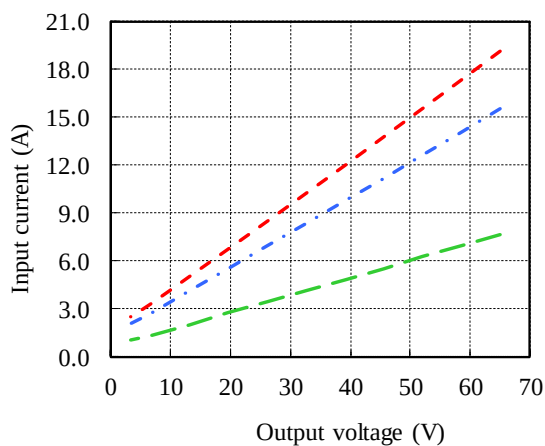
Vin	Input current
	Control OFF
70VDC	0.15A
80VDC	0.14A

Conditions Vin : 70 VDC ---
80 VDC -.-
Iout : 15.4 A (160VDC)
19.2 A (190VDC)
Iaux : 0 %
Ta : 25 °C



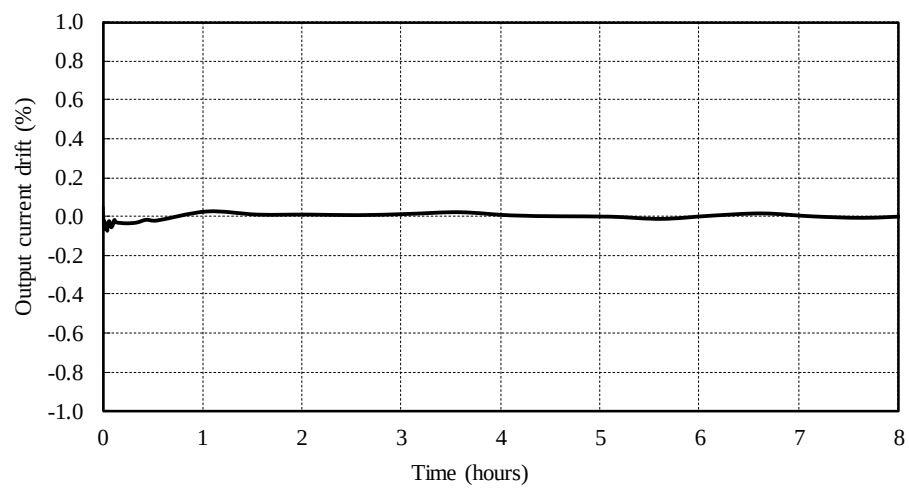
Vin	Input current
	Control OFF
90VDC	0.10A
110VDC	0.08A
220VDC	0.01A

Conditions Vin : 90 VDC ---
110 VDC -.-
220 VDC -.-
Iout : 23.2 A
Iaux : 0 %
Ta : 25 °C



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

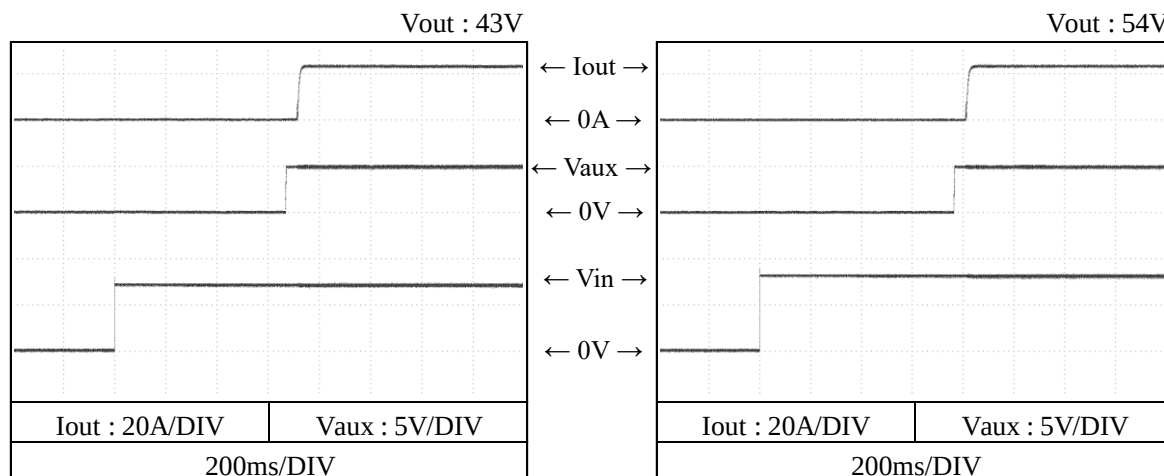
Conditions V_{in} : 110 VDC
 V_{out} : 65 V
 I_{out} : 23.2 A
 T_a : 25 °C



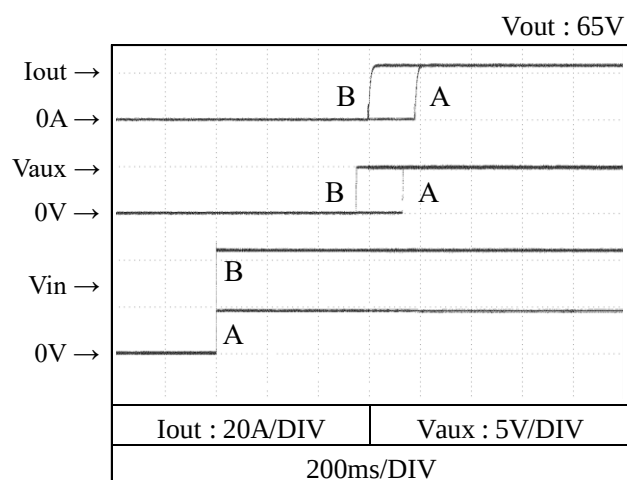
2-2-3. 出力電流立ち上がり特性 Output current rise characteristics

Conditions Vin : 70 VDC
 Iaux : 100 %
 Ta : 25 °C

Conditions Vin : 80 VDC
 Iaux : 100 %
 Ta : 25 °C



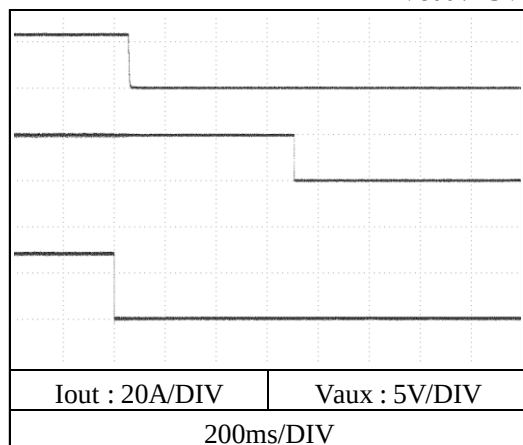
Conditions Vin : 90 VDC (A)
 220 VDC (B)
 Iaux : 100 %
 Ta : 25 °C



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

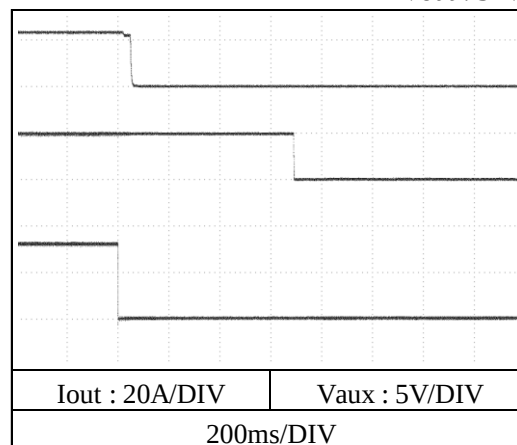
Conditions Vin : 70 VDC
 Iaux : 100 %
 Ta : 25 °C

Vout : 43V



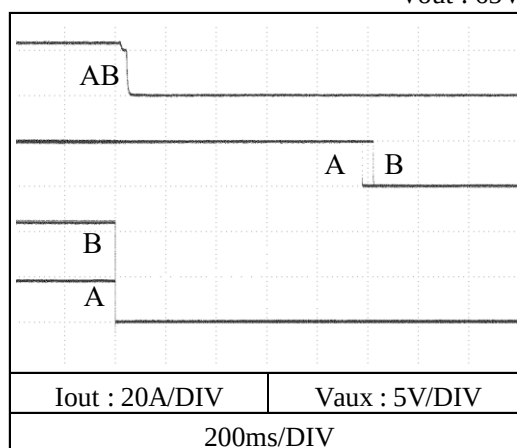
Conditions Vin : 80 VDC
 Iaux : 100 %
 Ta : 25 °C

Vout : 54V



Conditions Vin : 90 VDC (A)
 220 VDC (B)
 Iaux : 100 %
 Ta : 25 °C

Vout : 65V

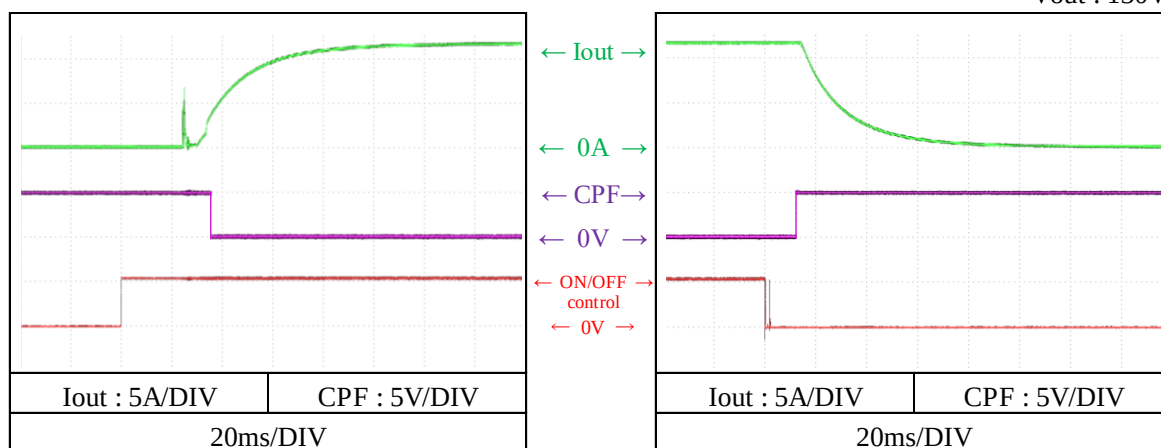


2-2-5.ON/OFF コントロール時出力立ち上がり、立ち下がり特性

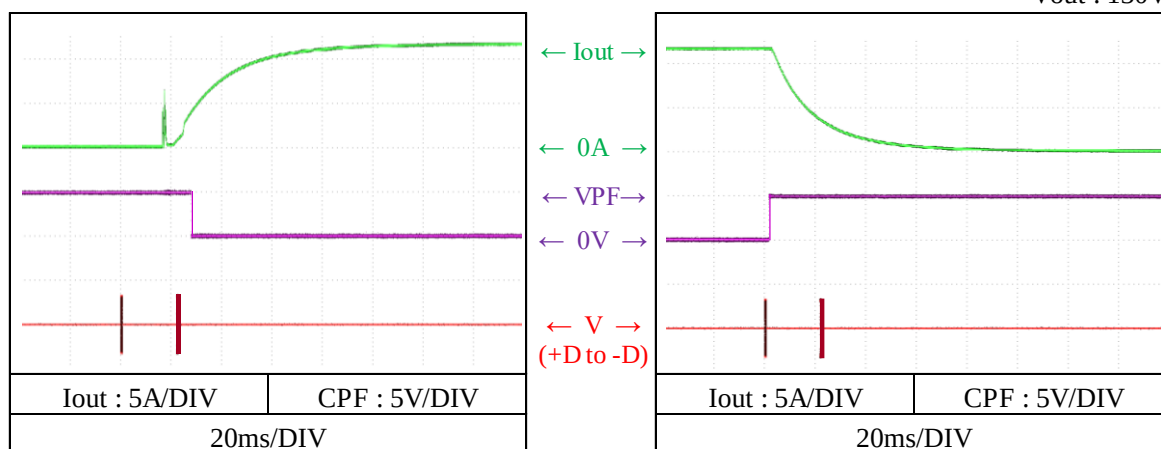
Output rise/fall characteristics with ON/OFF Control

(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

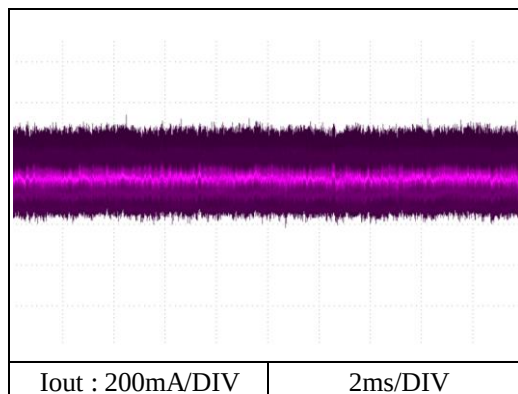
Conditions V_{in} : 110 VDC T_a : 25 °C V_{out} : 130V

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

Conditions V_{in} : 110 VDC T_a : 25 °C V_{out} : 130V

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

Conditions V_{in} : 110 VDC
 V_{out} : 65 V
 I_{out} : 23.2 A
 T_a : 25 °C



2-2-7.入力電圧瞬停特性 Response to brown out characteristics

瞬停時間 Interruption time

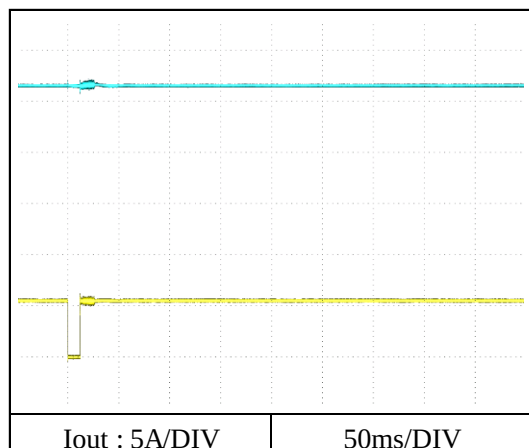
A:出力電流の低下なし Output current does not drop.

B:出力電流の低下が 0A までいかない Output current drop down not reaching 0A.

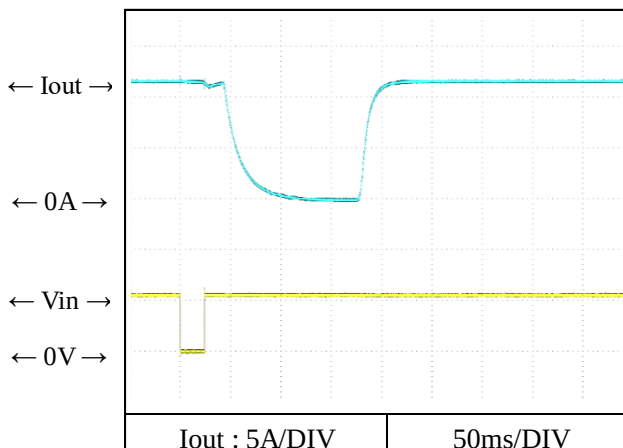
C:出力電流が 0A まで低下 Output current drops until 0A.

Conditions V_{in} : 110 VDC
 V_{out} : 130 V
 T_a : 25 °C

A = 12ms



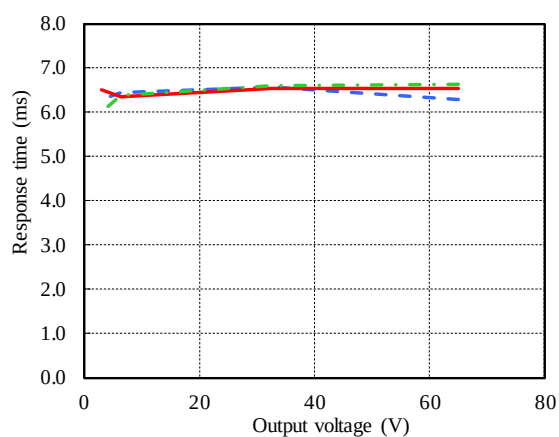
C = 24ms



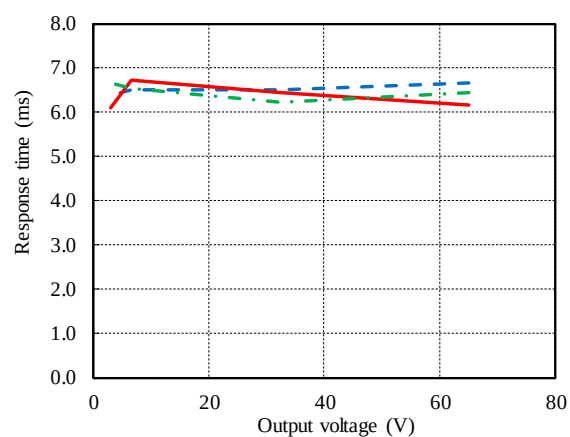
2-2-8. 定電流指令応答特性 Constant current command response characteristics

Conditions V_{in} : 110 VDC
 T_a : -20 °C ---
 25 °C ---
 70 °C ---

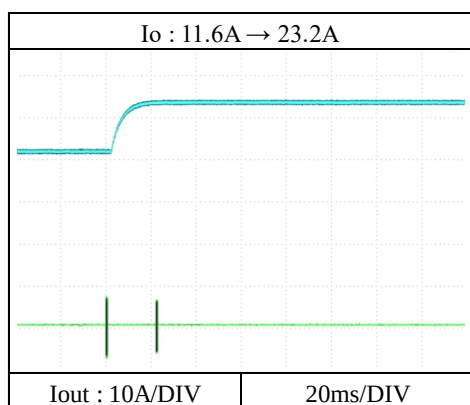
I_o : 11.6A $\rightarrow$ 23.2A



I_o : 23.2A $\rightarrow$ 11.6A



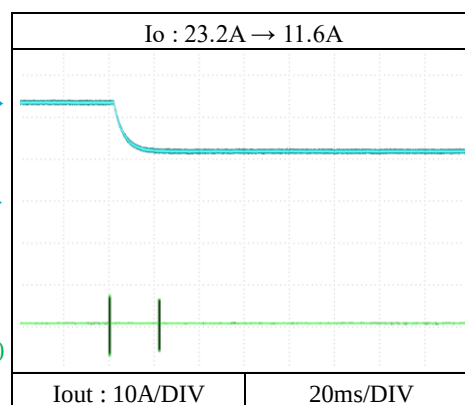
Conditions V_{in} : 110 VDC
 V_{out} : 65 V
 T_a : 25 °C



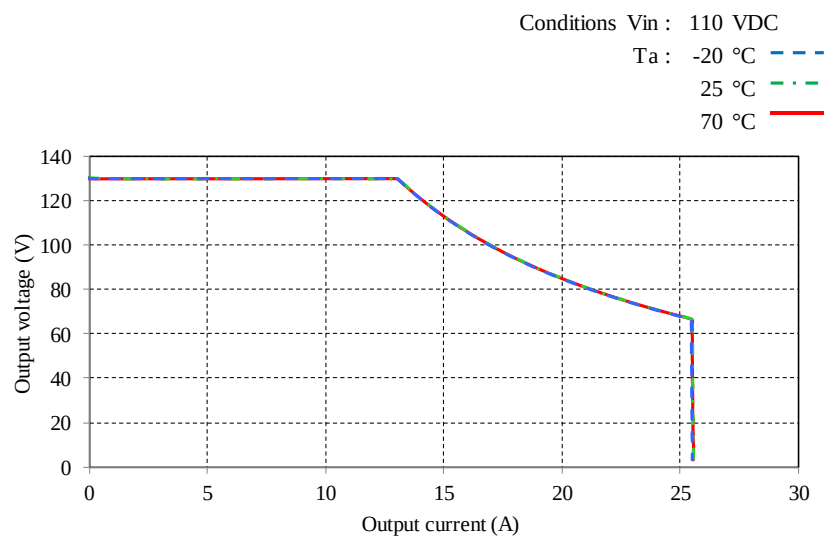
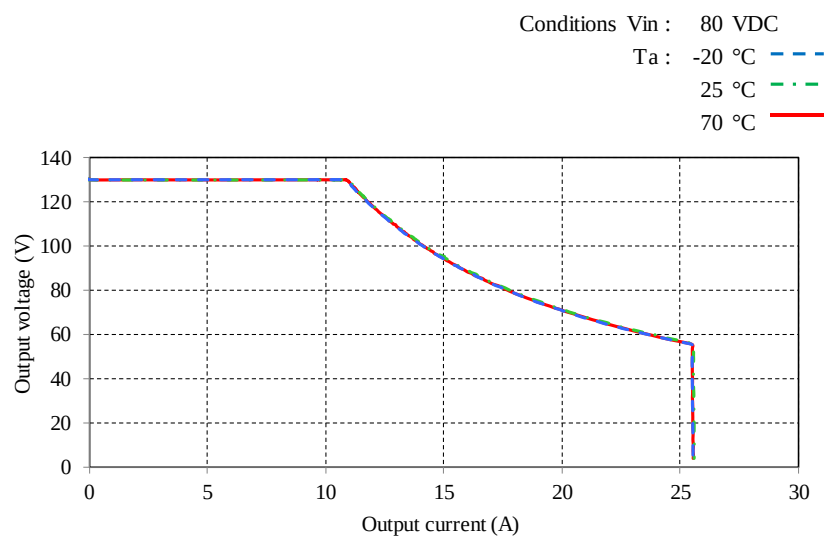
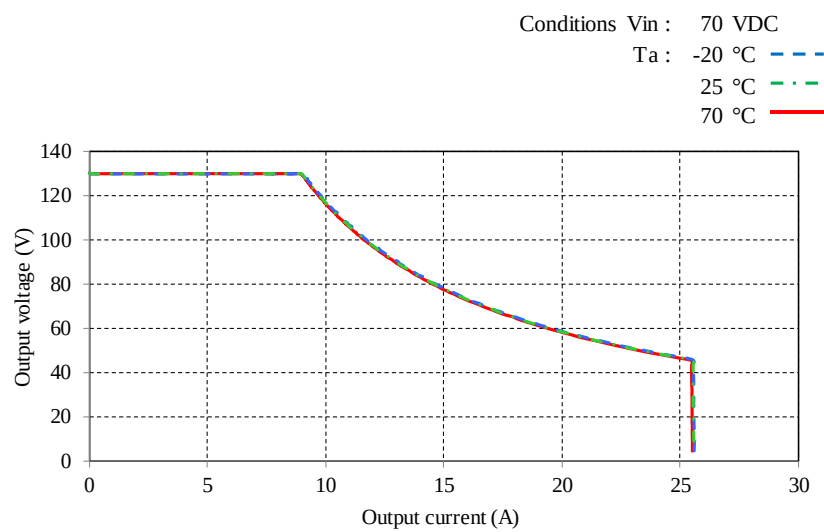
$\leftarrow I_{out} \rightarrow$

$\leftarrow 0A \rightarrow$

$\leftarrow V \rightarrow$
(+D to -D)

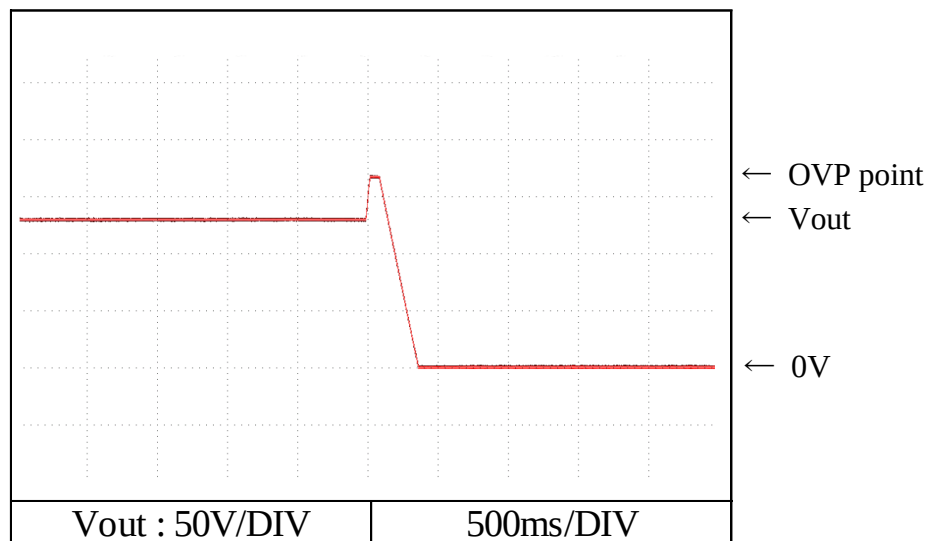


2-3. 過電流保護特性 Over current protection (OCP) characteristics

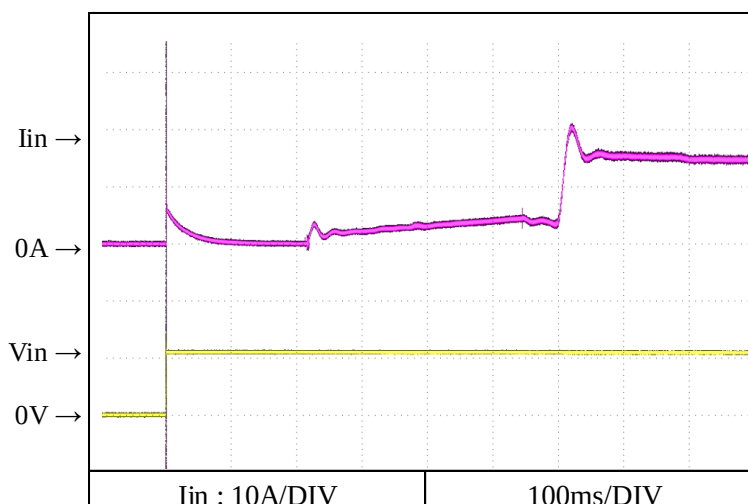


2-4. 過電圧保護特性 Over voltage protection (OVP) characteristics

Conditions V_{in} : 110 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} : 110 VDC
 V_{out} : 130 V
 I_{out} : 11.6 A
 T_a : 25 °C



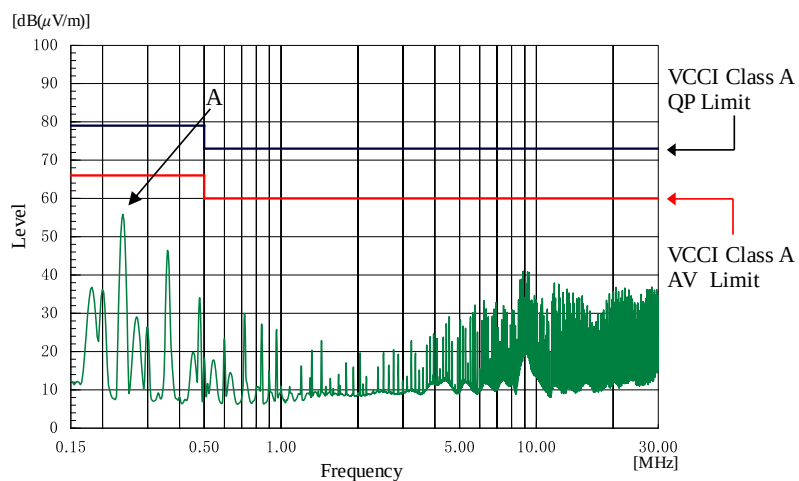
2-6. EMI 特性 Electro Magnetic Interference characteristics

雑音端子電圧
Conducted Emission

Conditions Vin : 110 VDC
Iout : 11.6 A
Iaux : 100 %
Ta : 25 °C

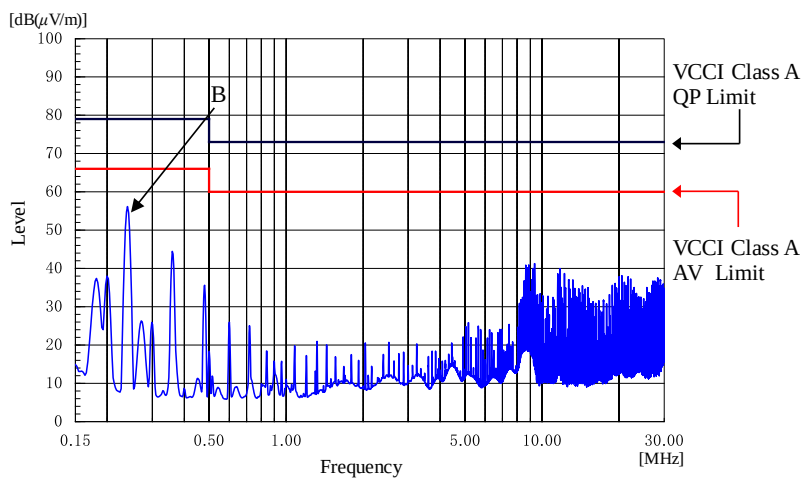
Phase : -Vin

Point A (0.24MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	79.0	55.8
AV	66.0	55.9



Phase : +Vin

Point B (0.24MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	79.0	59.8
AV	66.0	56.5



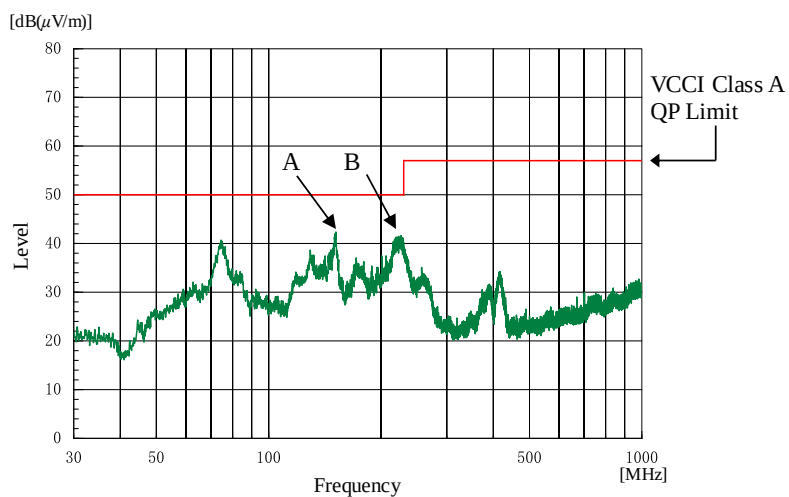
雑音電界強度
Radiated Emission

Conditions Vin : 110 VDC
Iout : 11.6 A
Iaux : 100 %
Ta : 25 °C

HORIZONTAL

Point A (151MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	37.0

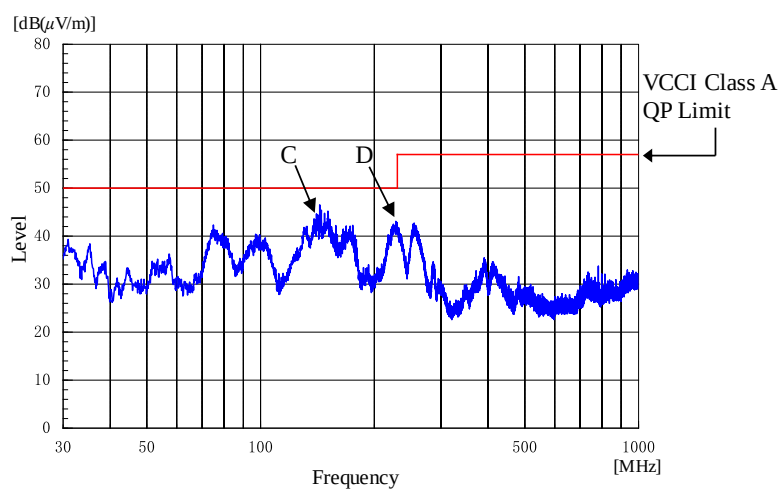
Point B (226MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	41.2



VERTICAL

Point C (144MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	40.8

Point D (226MHz)		
Ref.	Limit	Measure
Data	(dB)	(dB)
QP	50.0	39.2



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.