PAE50S48- *

EVALUATION DATA

型式データ

DWG.No. C178-53-02/50-A		
承認	査閲	担当
Kurosawa 1.Aug.'08	Y. Kihara 1.Aug.'08	H. Shimizu 1.Aug.'08

DENSEI-LAMBDA

INDEX

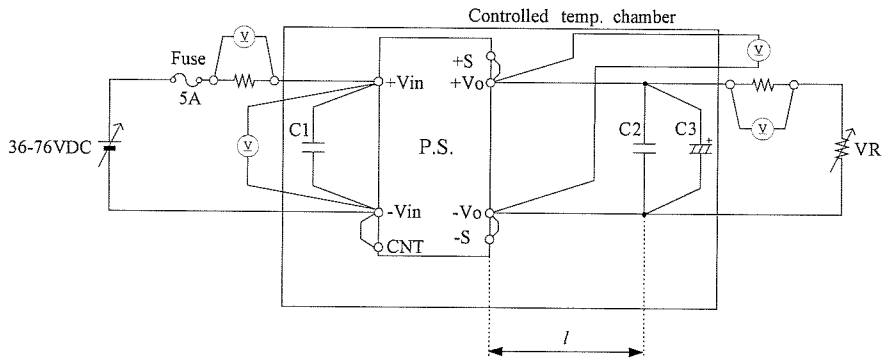
使用記号 Terminology used

	Definition	
Vin	..... 入力電圧	Input Voltage
Vout	..... 出力電圧	Output Voltage
VCNT	..... CNT電圧	CNT Voltage
Iin	..... 入力電流	Input Current
Iout	..... 出力電流	Output Current
Ta	..... 周囲温度	Ambient Temperature

1. 測定方法　　Evaluation Method

1.1 測定回路　　Circuits used for determination

(1) 静特性　Steady state characteristics



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

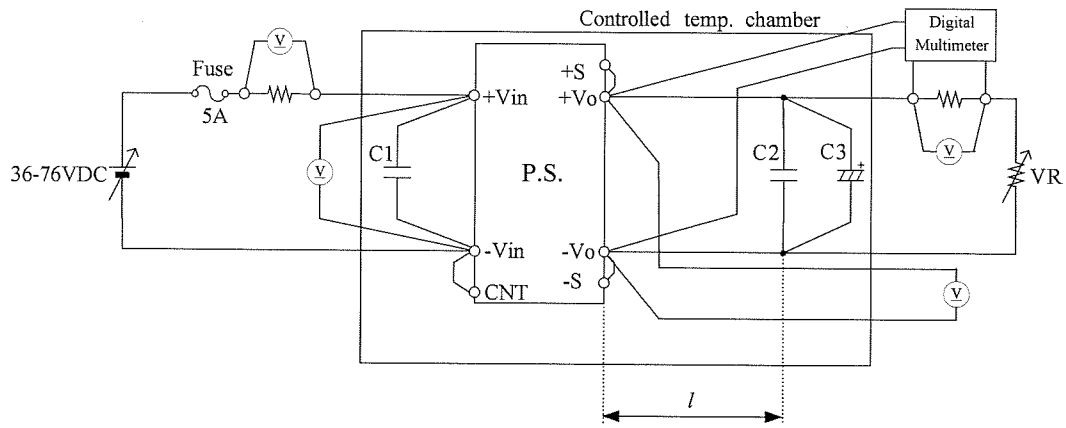
l : 50mm

(2) 通電ドリフト　Warm up voltage drift characteristics

静特性と同じ

Same as Steady state data

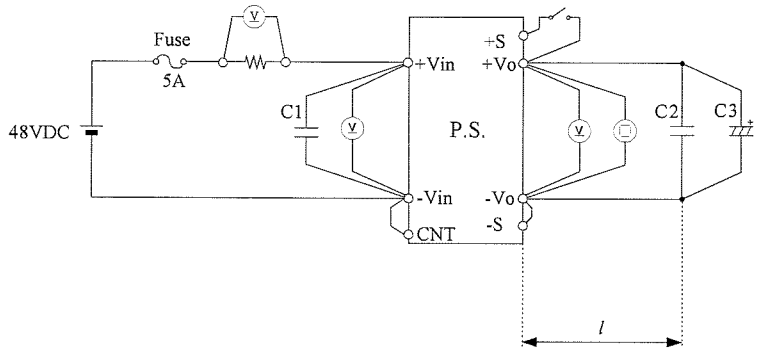
(3) 過電流保護特性　Over current protection (OCP) characteristics



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

l: 50mm

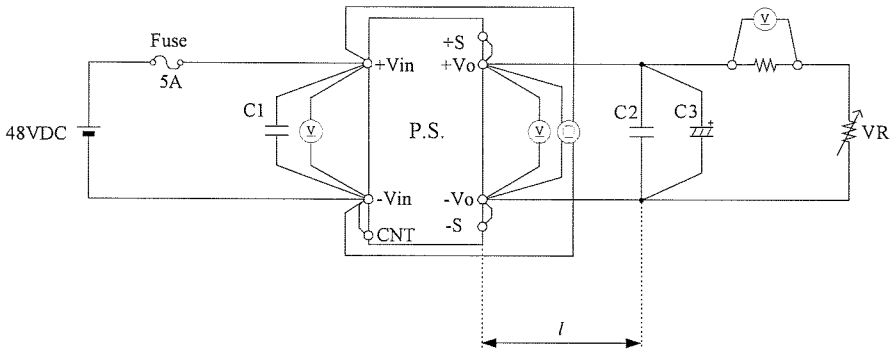
(4) 過電圧保護特性　Over voltage protection (OVP) characteristics



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

l: 50mm

(5) 出力立ち上がり特性　Output rise characteristics



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

l: 50mm

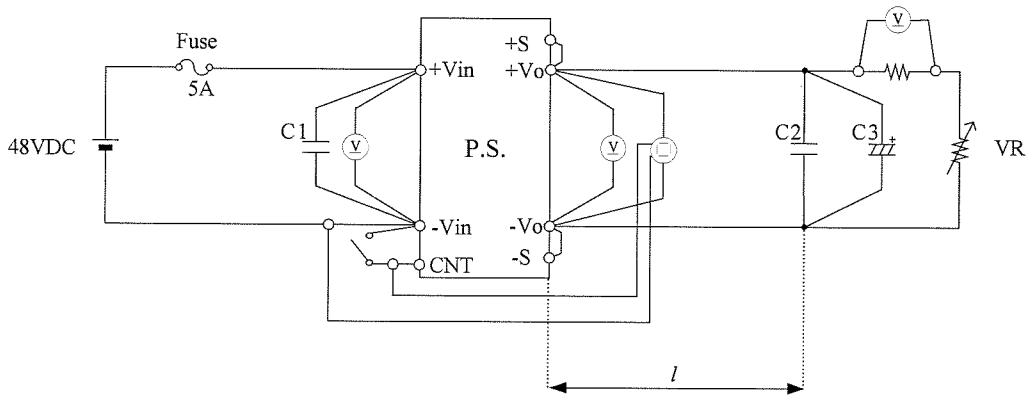
(6) 出力立ち下がり　Output fall characteristics

出力立ち上がり特性と同じ

Same as output rise characteristics

(7) 出力立ち上がり特性　（ ＯＮ/ＯＦＦコントロール時)

Output rise characteristics with ON/OFF CONTROL



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

l: 50mm

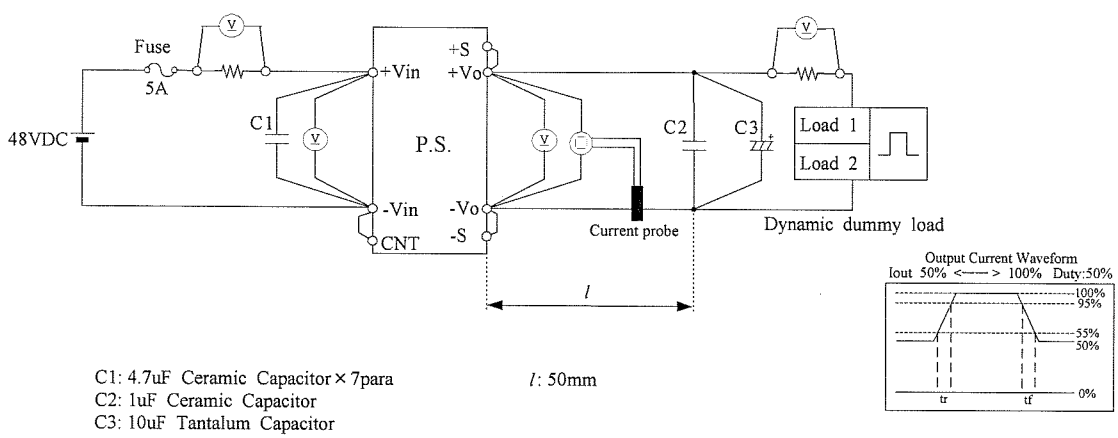
(8) 出力立ち下がり特性　（ ＯＮ/ＯＦＦコントロール時)

Output fall characteristics with ON/OFF CONTROL

出力立ち上がり特性（ ＯＮ/ＯＦＦコントロール時）と同じ

Same as output rise characteristics with ON/OFF CONTROL

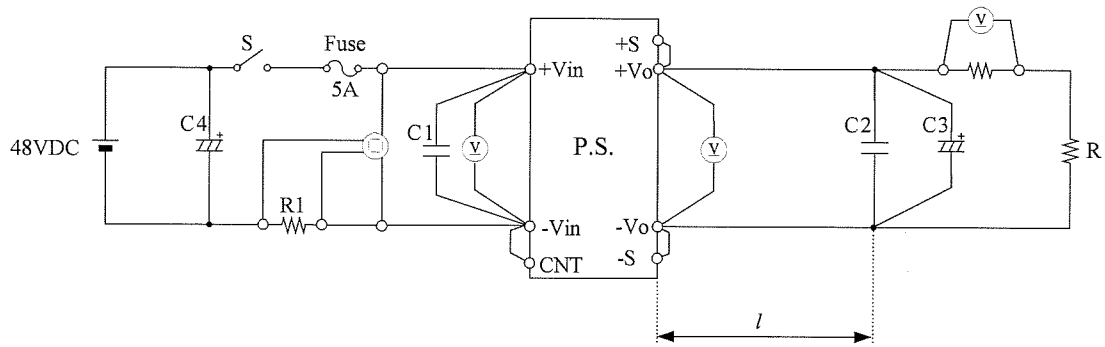
(9) 過渡応答(負荷急変)特性　Dynamic load response characteristics



C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor

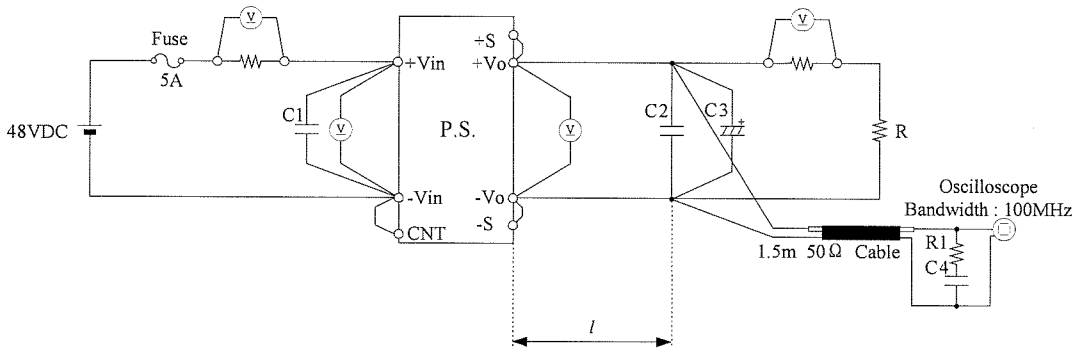
l: 50mm

(10) 入力サージ電流（突入電流）特性　Inrush current characteristics



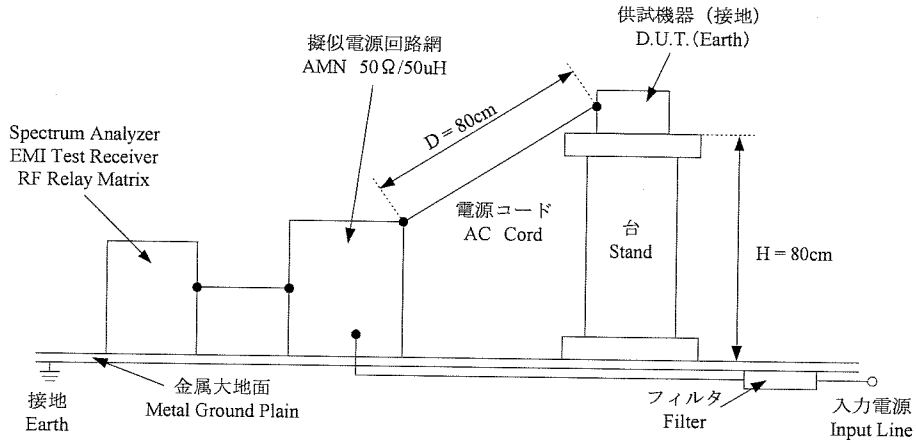
C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor
C4: 15000uF Electrolytic Capacitor
R1: 0.01Ω
l : 50mm

(11) 出力リップル、ノイズ波形　Output ripple and noise waveform

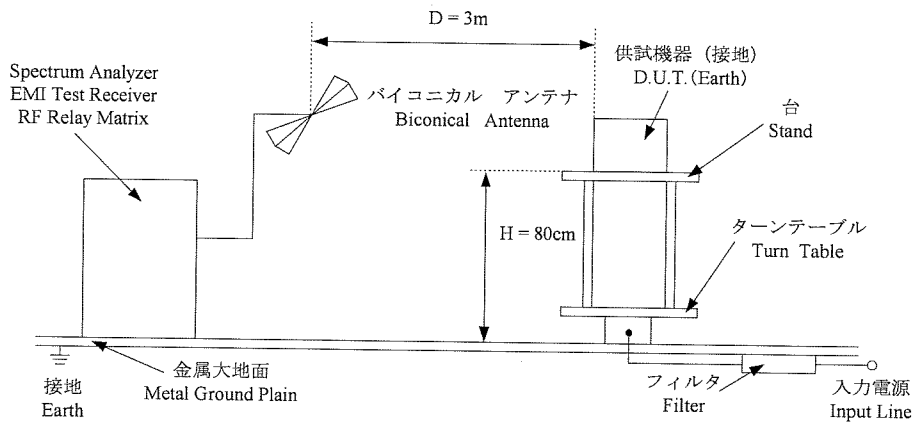


C1: 4.7uF Ceramic Capacitor × 7para
C2: 1uF Ceramic Capacitor
C3: 10uF Tantalum Capacitor
C4: 4700pF Ceramic Capacitor
R1 : 50Ω
l : 50mm

(12) ＥＭＩ特性　Electro-Magnetic Interference characteristics



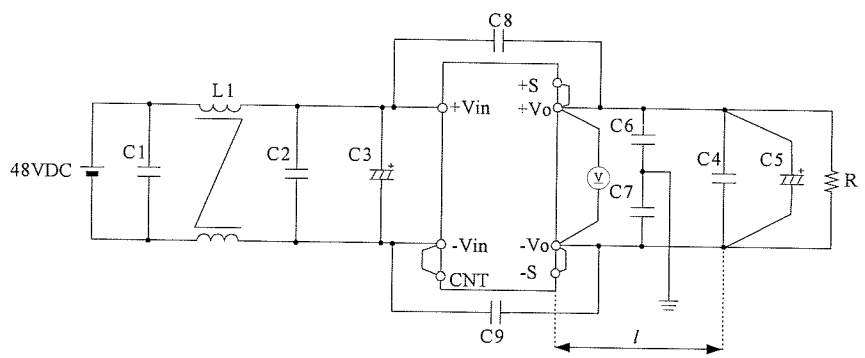
(a) 雑音端子電圧（帰還ノイズ） Conducted Emission Noise



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

(1) VCC class A 対応アプリケーションシステム

VCCI class A application system



L1: 680uH
C1,C2: 1uF Ceramic Capacitor
C3: 470uF Electrolytic Capacitor × 2para
C4: 1uF Ceramic Capacitor
C5: 10uF Tantalum Capacitor
C6,C7: 0.1uF Ceramic Capacitor
C8,C9: 0.047uF Ceramic Capacitor
l : 50mm

1.2 使用測定機器　　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	OSCILLO SCOPE	HITACHI DENSHI	V-1100A
2	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS540
3	DIGITAL MULTIMETER	AGILENT	34970A
4	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503
5	SHUNT RESISTOR	YOKOGAWA ELECT.	2215
6	CARBON PLATE RHEOSTATS	YAMABISHI ELECT.	RC-3
7	CONTROLLED TEMP. CHANBER	TABAI ESPEC	SH-240
8	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSA
9	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
10	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
11	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
12	AMN	KYORITSU	KNW-242
13	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	BBA9106
14	DYNAMIC DUMMY LOAD	TAKASAGO	FK-400L
15	AC POWER SUPPLY	TAKASAGO	AA2000XG

2. 特性データ
2. 1 静特性　　Steady state data
(1) 入力、負荷、温度変動　Regulation - line and load, temperature drift

1.8V

1. Regulation - line and load　　condition Ta : 25℃
Air Velocity: 2m/s

Iout \ Vin	36VDC	48VDC	76VDC	line regulation	
0%	1.7991V	1.7992V	1.7994V	0.3mV	0.017%
50%	1.7992V	1.7994V	1.7995V	0.3mV	0.017%
100%	1.7995V	1.7996V	1.7996V	0.1mV	0.006%
load	0.4mV	0.4mV	0.2mV		
regulation	0.022%	0.022%	0.011%		

2. Temperature drift　　conditions Vin : 48VDC
Iout : 100%
Air Velocity: 2m/s

Ta	-40℃	25℃	85℃	temperature stability	
Vout	1.7880V	1.7996V	1.8086V	20.6mV	1.144%

3.3V

1. Regulation - line and load　　condition Ta : 25℃
Air Velocity: 2m/s

Iout \ Vin	36VDC	48VDC	76VDC	line regulation	
0%	3.2920V	3.2918V	3.2917V	0.3mV	0.009%
50%	3.2920V	3.2919V	3.2919V	0.1mV	0.003%
100%	3.2923V	3.2921V	3.2905V	1.8mV	0.055%
load	0.3mV	0.3mV	1.4mV		
regulation	0.009%	0.009%	0.042%		

2. Temperature drift　　conditions Vin : 48VDC
Iout : 100%
Air Velocity: 2m/s

Ta	-40℃	25℃	85℃	temperature stability	
Vout	3.2736V	3.2921V	3.3147V	41.1mV	1.245%

2. 特性データ
2. 1 静特性　　Steady state data
(1) 入力、負荷、温度変動　Regulation - line and load, temperature drift

5V

1. Regulation - line and load　　condition Ta : 25℃
Air Velocity: 2m/s

Iout \ Vin	36VDC	48VDC	76VDC	line regulation	
0%	5.0177V	5.0176V	5.0180V	0.4mV	0.008%
50%	5.0178V	5.0176V	5.0181V	0.4mV	0.009%
100%	5.0181V	5.0180V	5.0185V	0.5mV	0.011%
load	0.4mV	0.4mV	0.5mV		
regulation	0.008%	0.008%	0.014%		

2. Temperature drift　　conditions Vin : 48VDC
Iout : 100%
Air Velocity: 2m/s

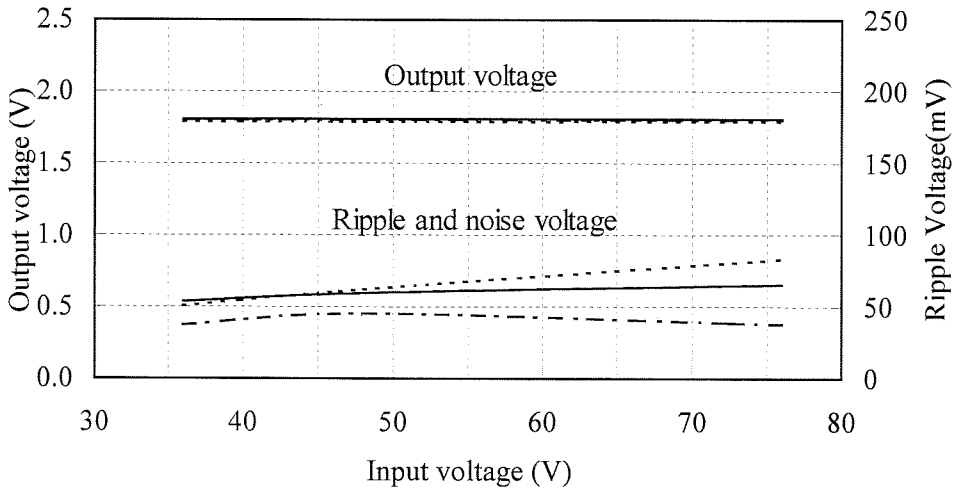
Ta	-40℃	25℃	85℃	temperature stability	
Vout	4.9856V	5.0180V	5.0412V	55.6mV	1.111%

2.1 (2) 出力電圧、リップル電圧対入力電圧

Output voltage and ripple voltage vs input voltage

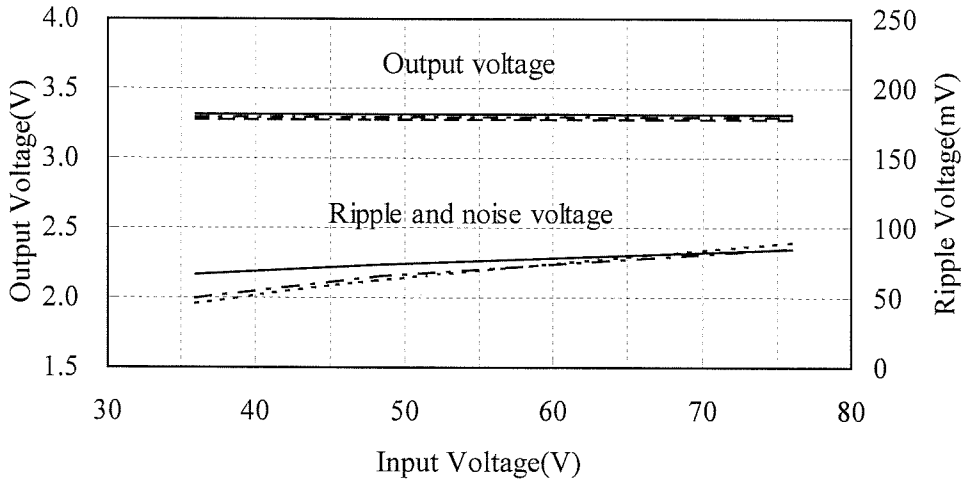
Conditions Iout : 100 %
Ta : -40 ℃
25 ℃
85 ℃
Air Velocity : 2m/s

1.8V



Ta : -40 ℃
25 ℃
85 ℃
Air Velocity : 2m/s

3.3V



2.1 (2) 出力電圧、リップル電圧対入力電圧

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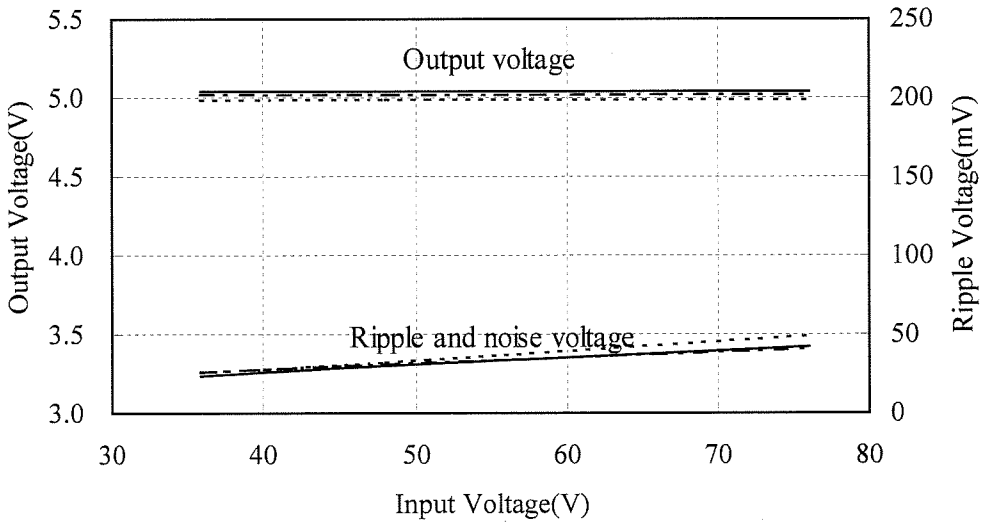
5V

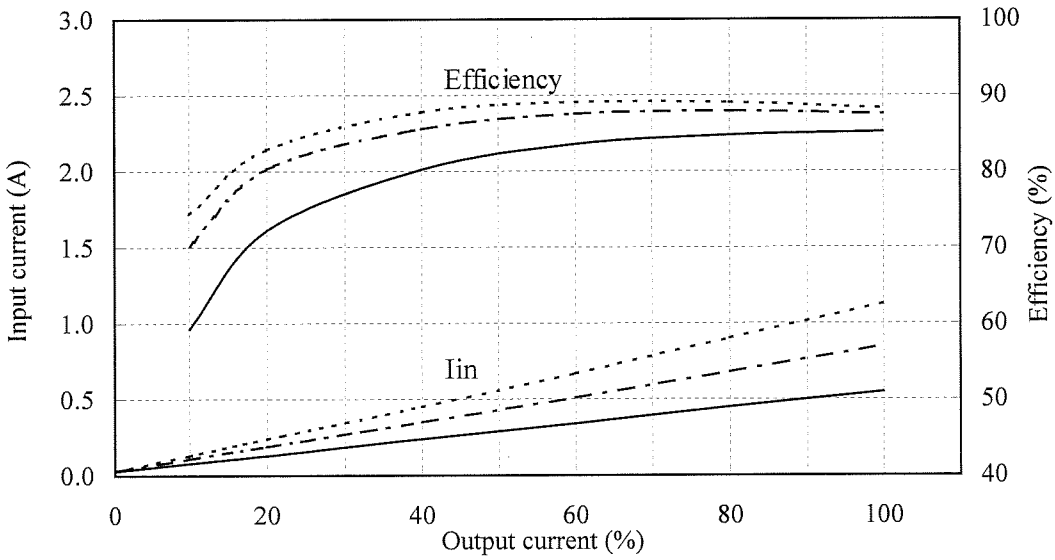


2.1 (3) 効率、入力電流対出力電流

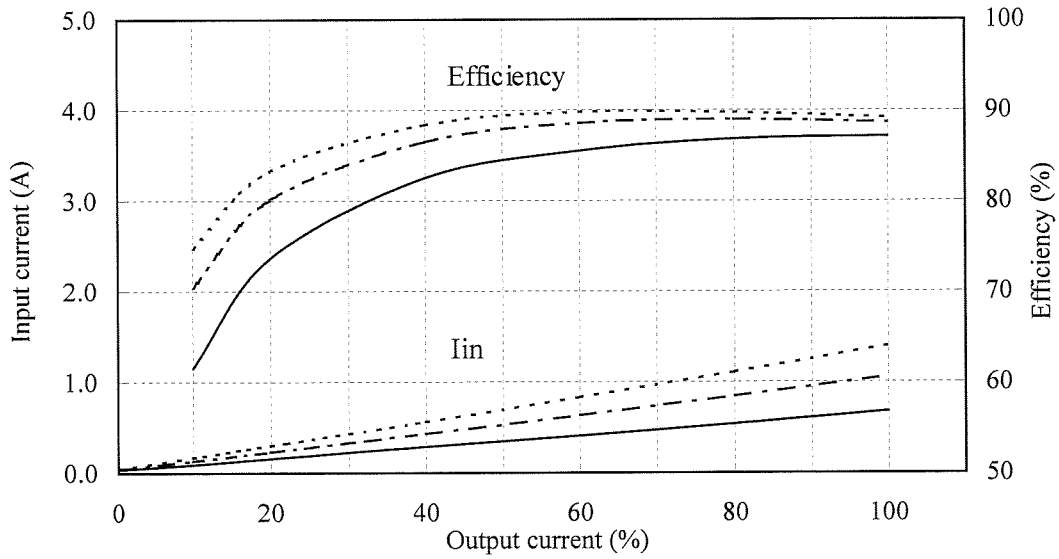
Efficiency and input current vs output current

Conditions Vin : 36 VDC -------
: 48 VDC -·-·-·-
: 76 VDC ———
Ta : 25 ℃
Air Velocity : 2m/s

1.8V



2.5V

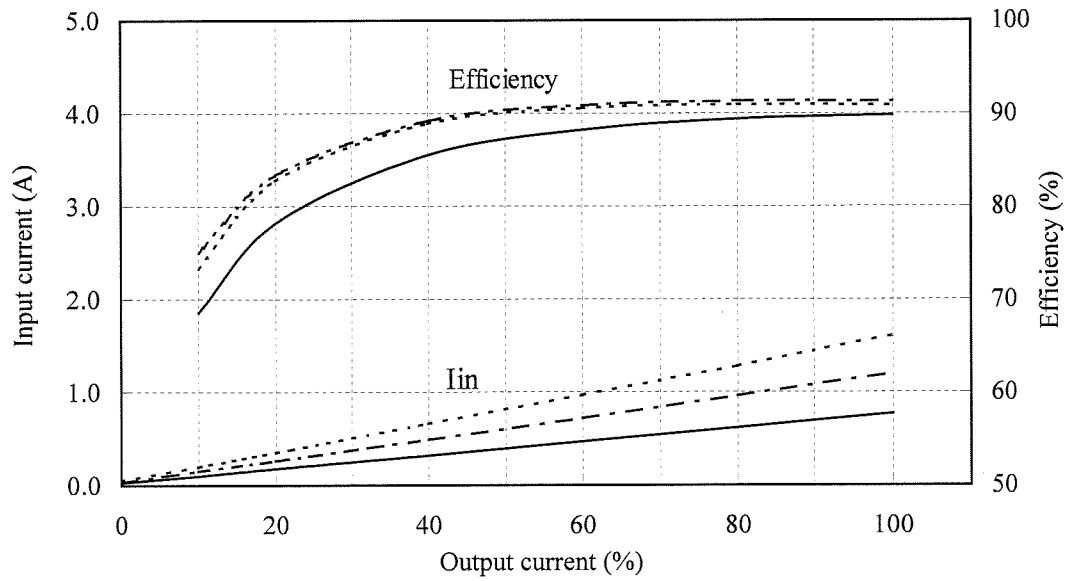


2.1 (3) 効率、入力電流対出力電流

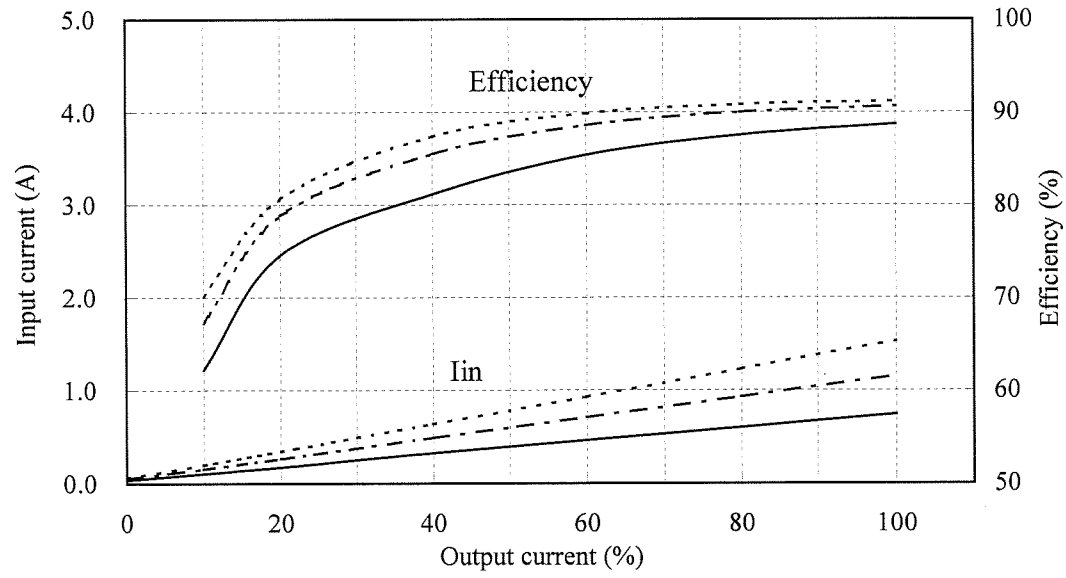
Efficiency and input current vs output current

Conditions Vin : 36 VDC -------
: 48 VDC -·-·-·-
: 76 VDC ———
Ta : 25 ℃
Air Velocity : 2m/s

3.3V



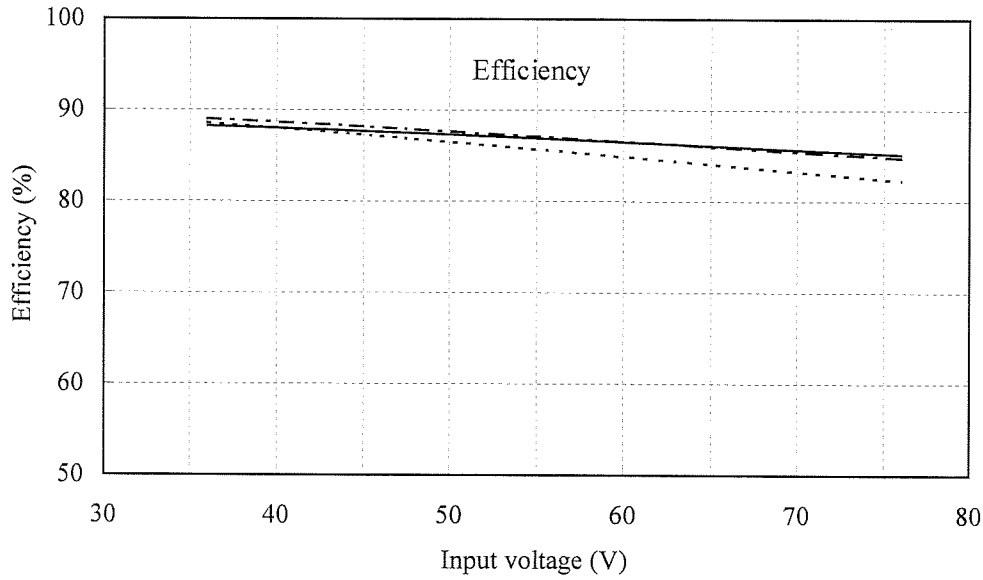
5V



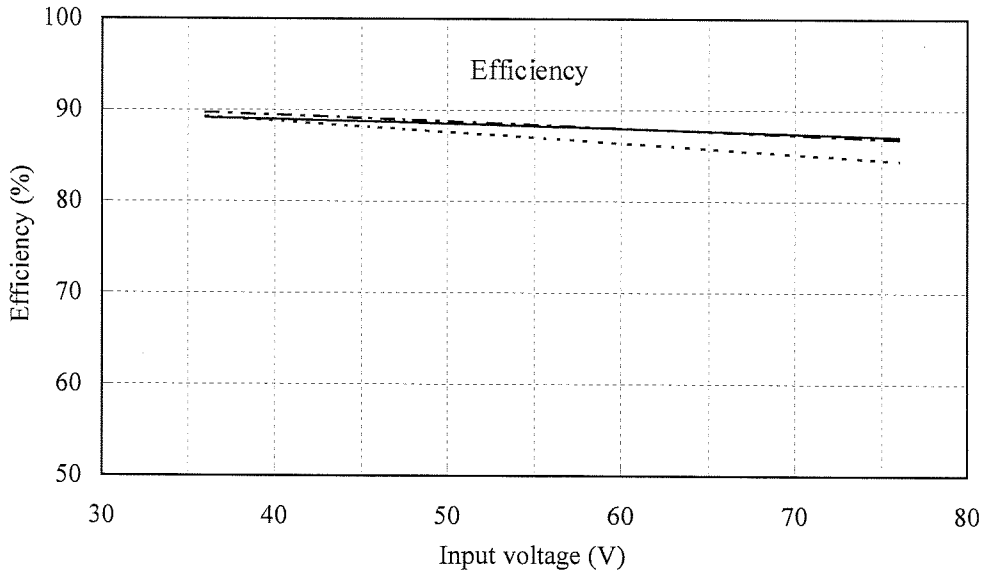
2.1 (4) 効率対入力電圧
Efficiency vs input voltage

Conditions Ta : 25 ℃
Iout : 50 % -------
80 % -·-·-·-
100 % ———
Air Velocity : 2m/s

1.8V



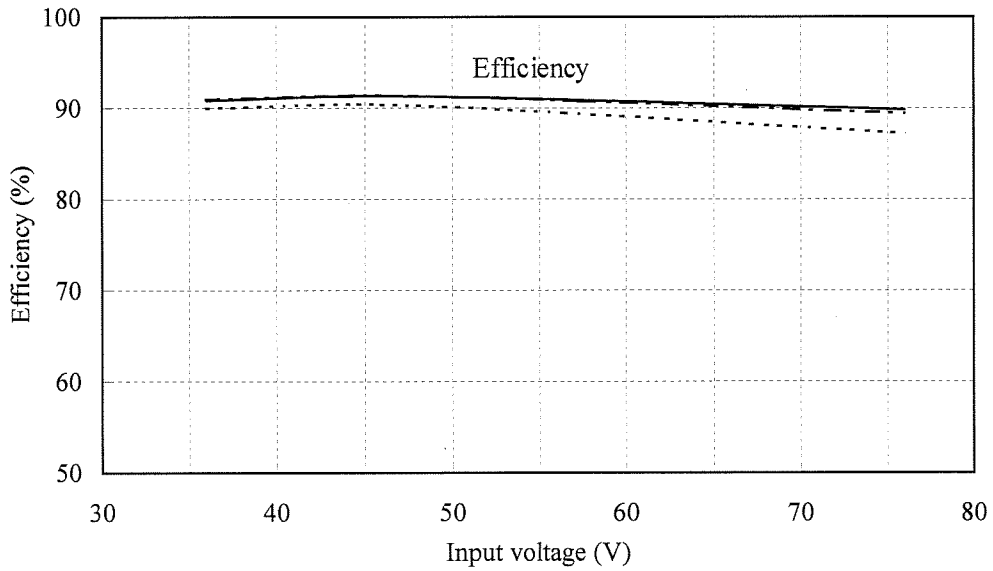
2.5V



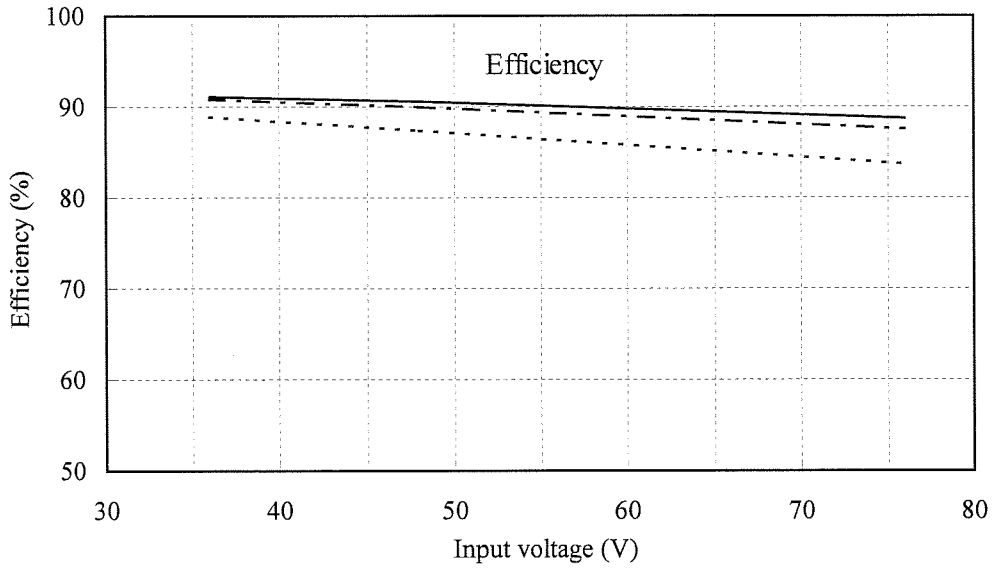
2.1 (4) 効率対入力電圧
Efficiency vs input voltage

Conditions Ta : 25 ℃
Iout : 50 %
80 %
100 %
Air Velocity : 2m/s

3.3V



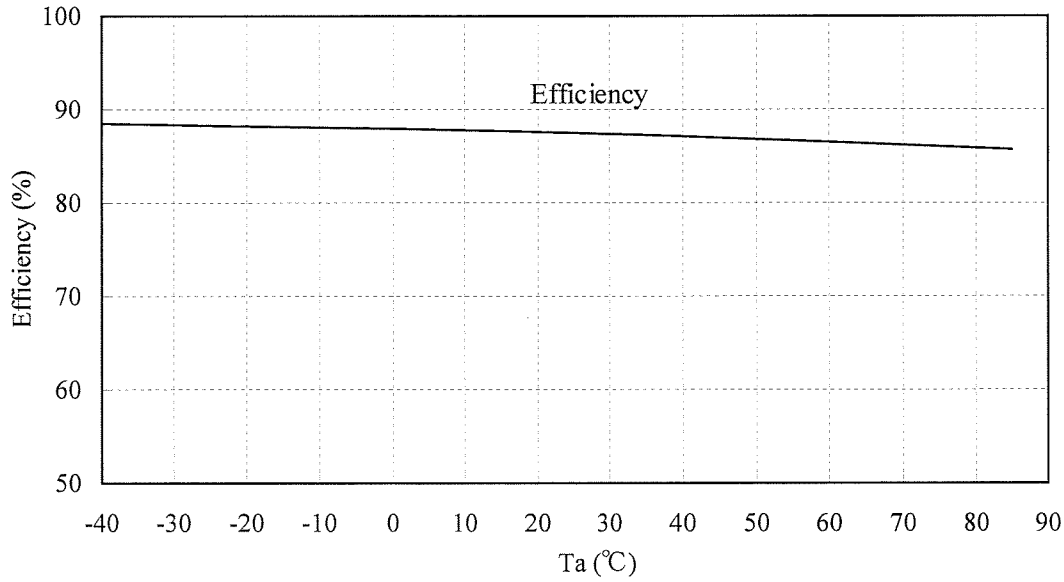
5V



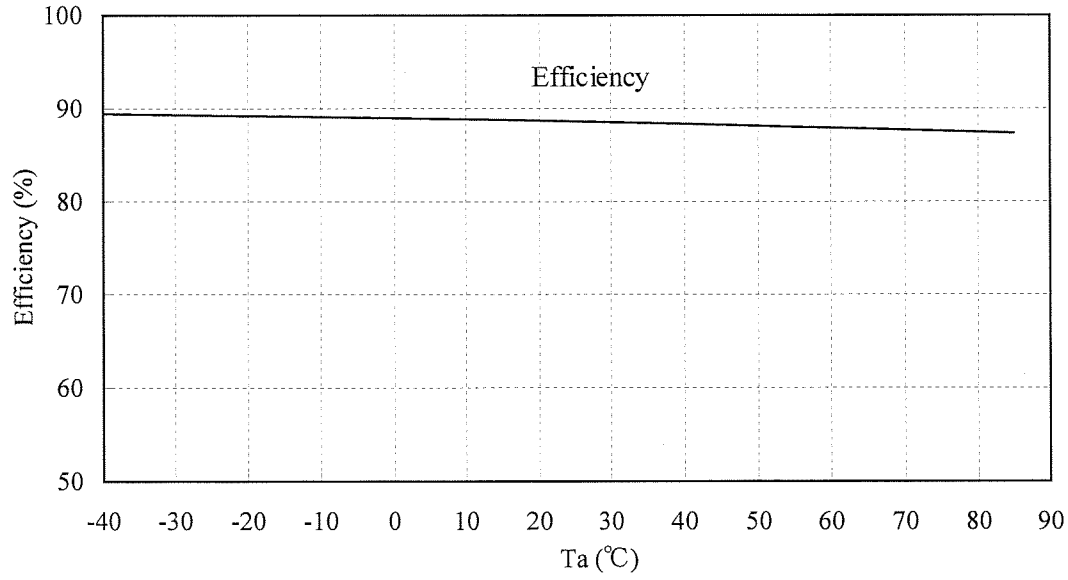
2.1 (5) 効率対周囲温度
Efficiency vs ambient temperature

Conditions Vin : 48 VDC
Iout : 100 %
Air Velocity : 2m/s

1.8V



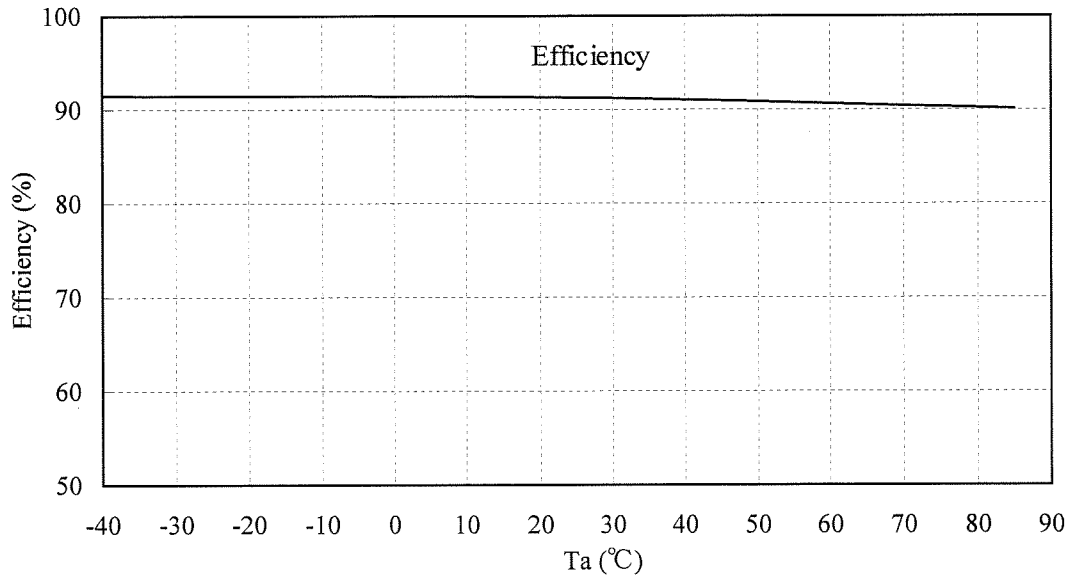
2.5V



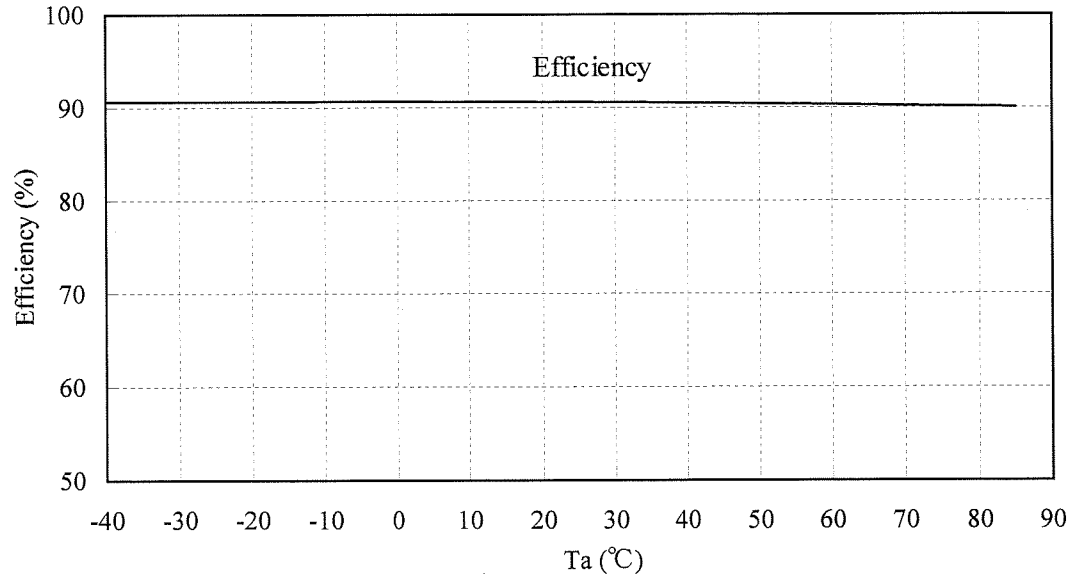
2.1 (5) 効率対周囲温度
Efficiency vs ambient temperature

Conditions Vin : 48 VDC
Iout : 100 %
Air Velocity : 2m/s

3.3V



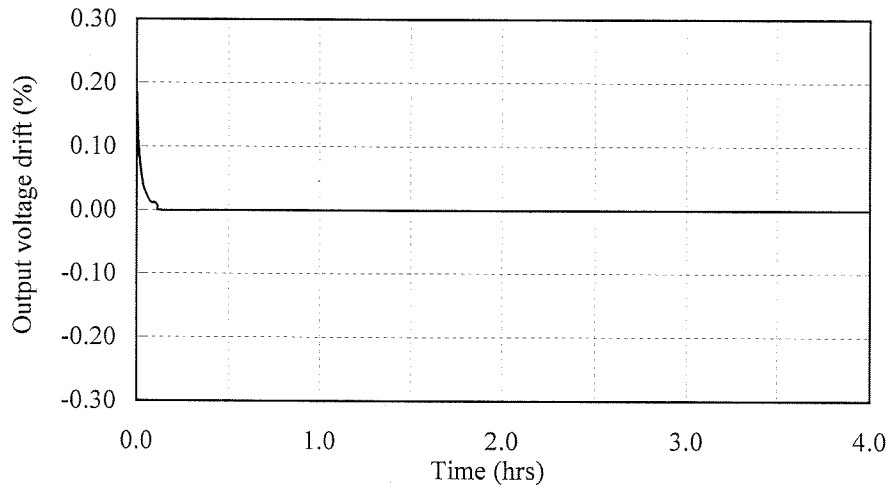
5V



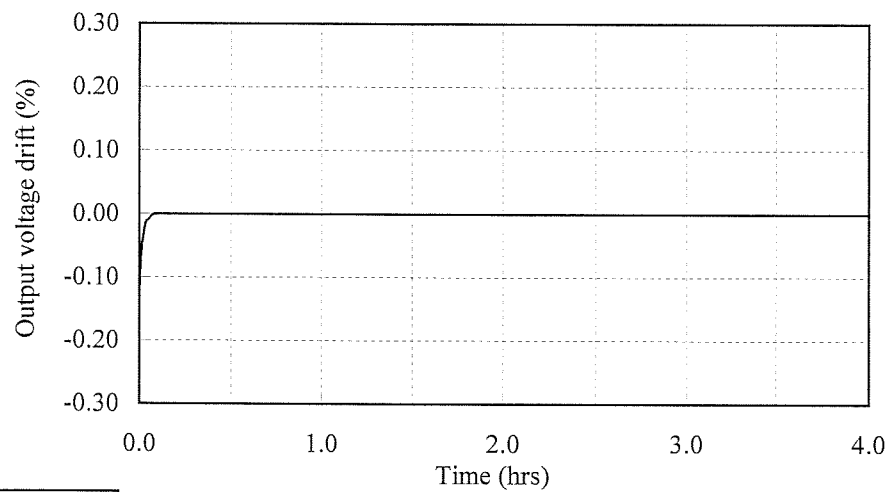
2.2 通電ドリフト特性
Warm up voltage drift characteristics

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃
Air Velocity : 2 m/s

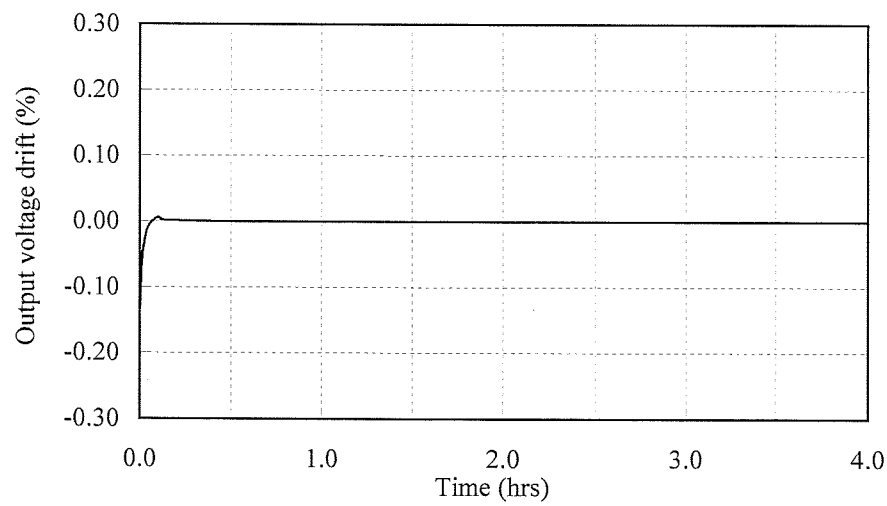
1.8V



3.3V



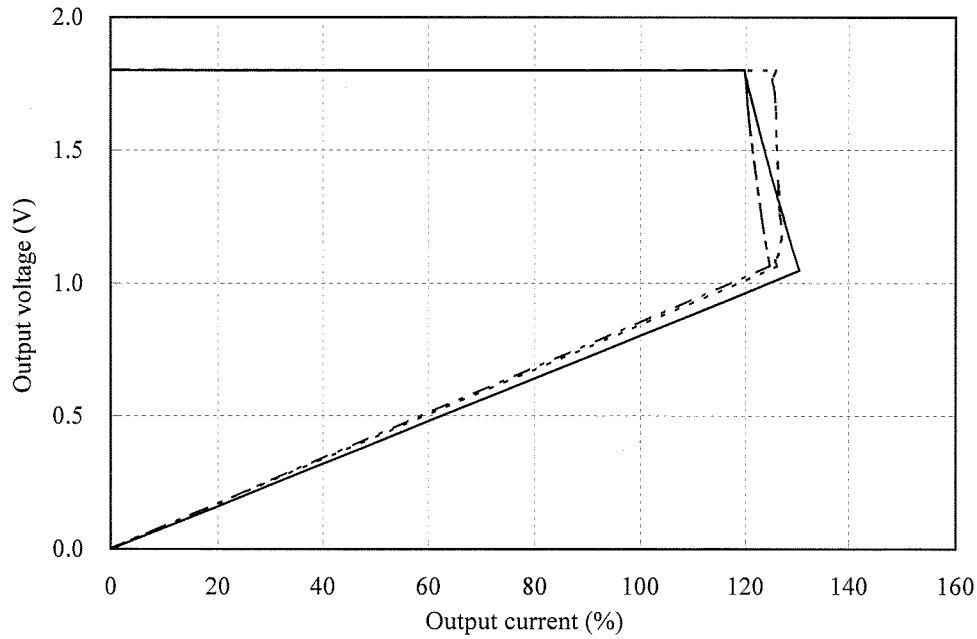
5V



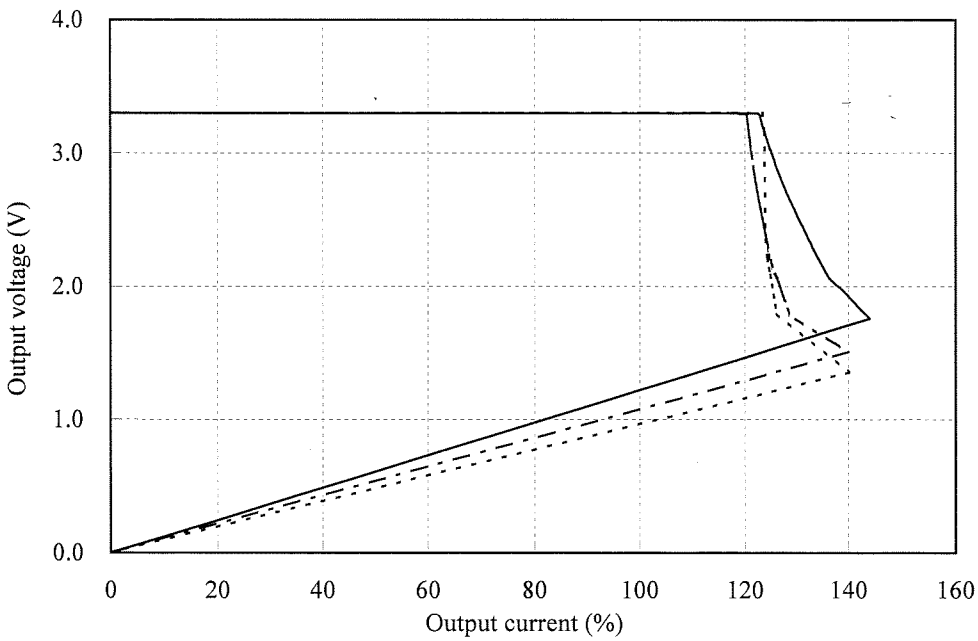
2. 3 過電流保護特性
Over current protection (OCP) characteristics

Conditions Vin : 36 VDC -------
: 48 VDC -·-·-·-
: 76 VDC ———
Ta : 25 ℃

1.8V



3.3V

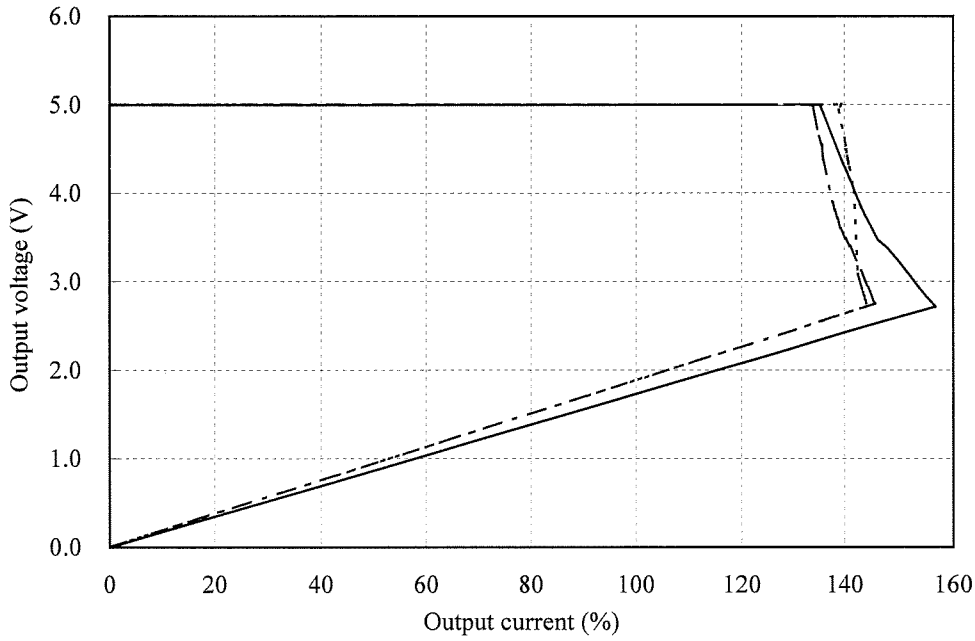


＊ OCP状態になり、出力電圧がLVPレベルより低下するとラッチ遮断します。
(/Vタイプを除きます。)
When left in OCP condition,output voltage drops below LVP level
and output will shutdown with latch.(Except /V type)

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

Conditions Vin : 36 VDC
: 48 VDC
: 76 VDC
Ta : 25 ℃

5V



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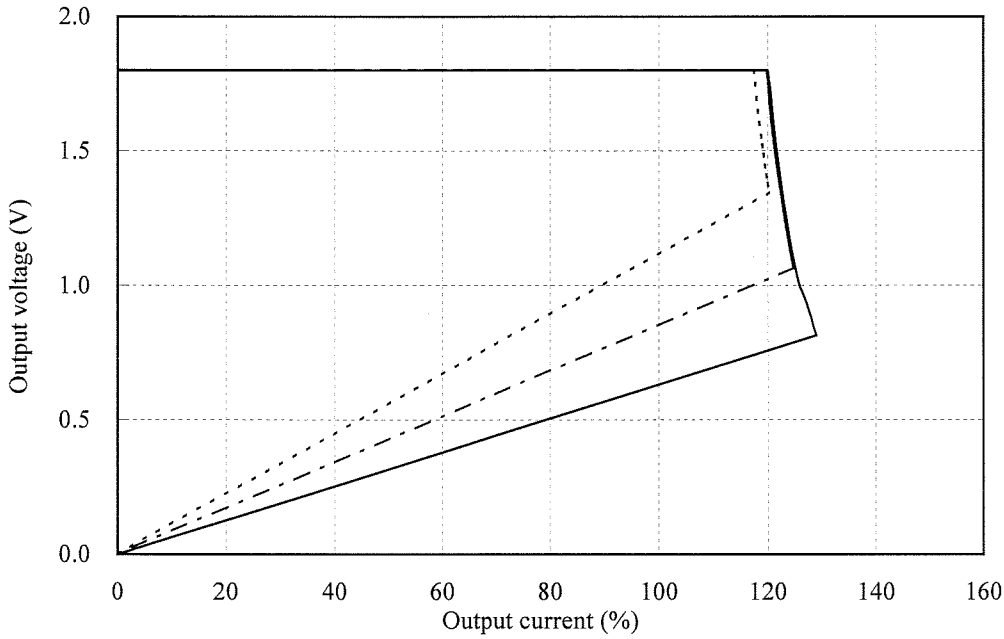
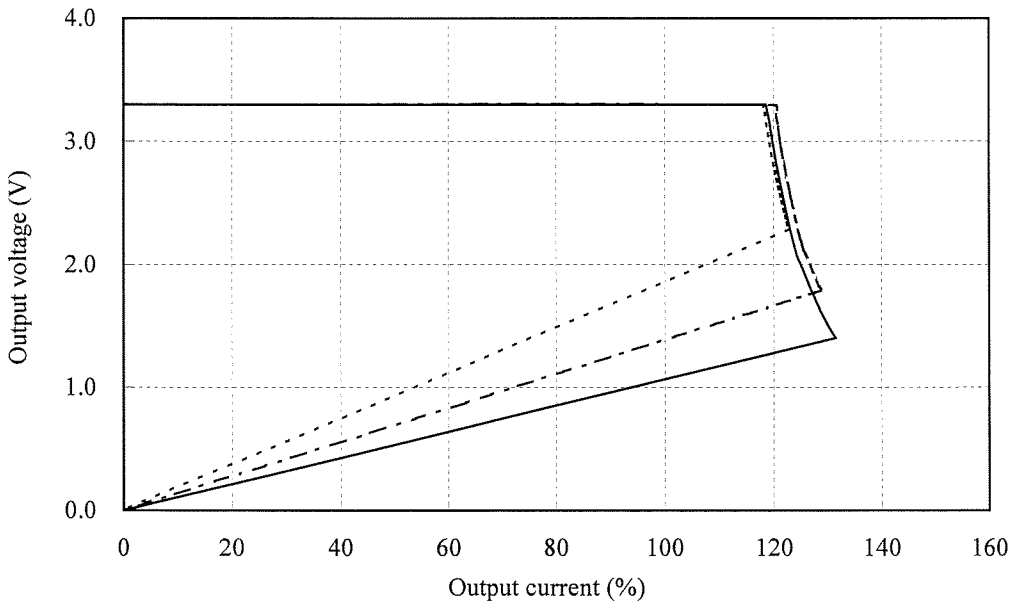
2. 3 過電流保護特性
Over current protection (OCP) characteristics

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

1.8V



3.3V



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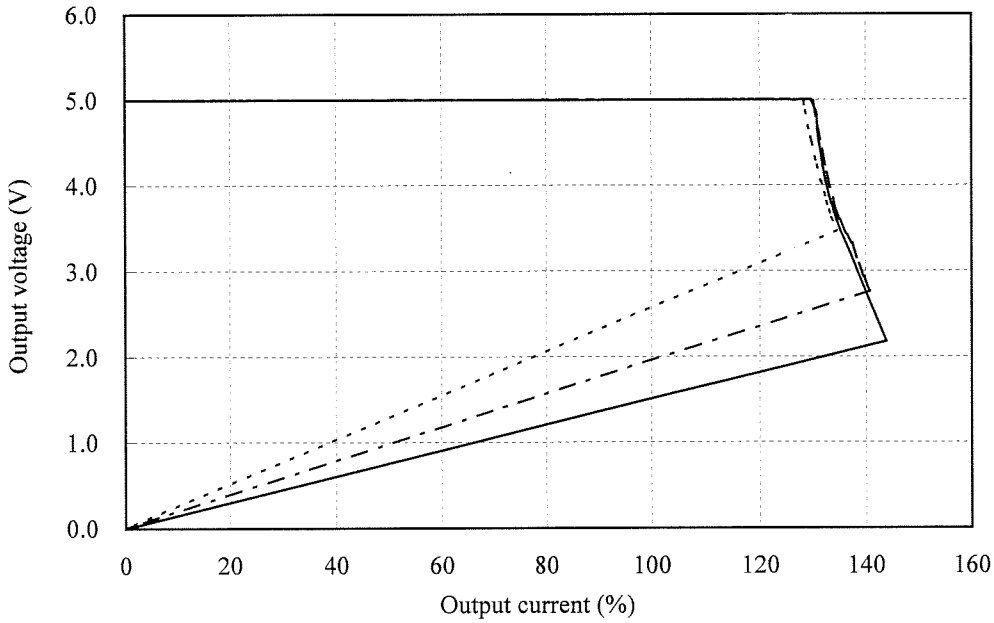
2. 3 過電流保護特性
Over current protection (OCP) characteristics

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

5V

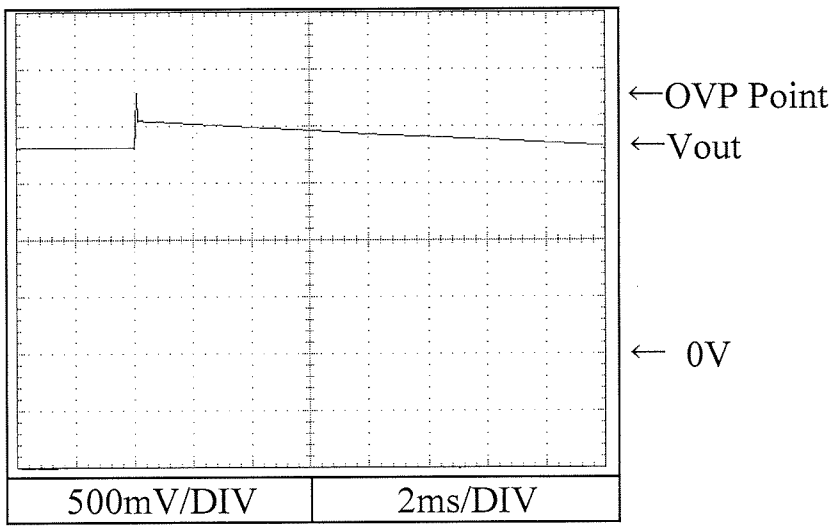


＊ OCP状態になり、出力電圧がLVPレベルより低下するとラッチ遮断します。
(/Vタイプを除きます。)
When left in OCP condition,output voltage drops below LVP level
and output will shutdown with latch.(Except /V type)

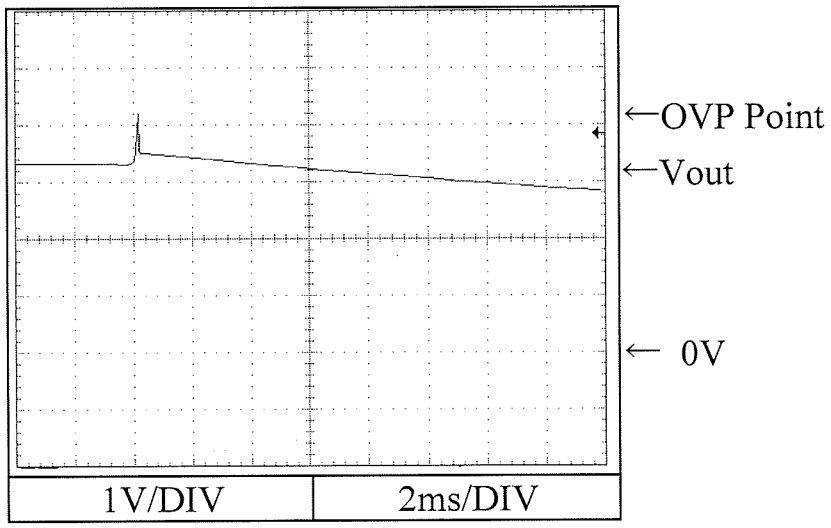
2.4 過電圧保護特性
Over voltage protection (OVP) characteristics

Conditions Vin : 48 VDC
Iout : 0 %
Ta : 25 ℃

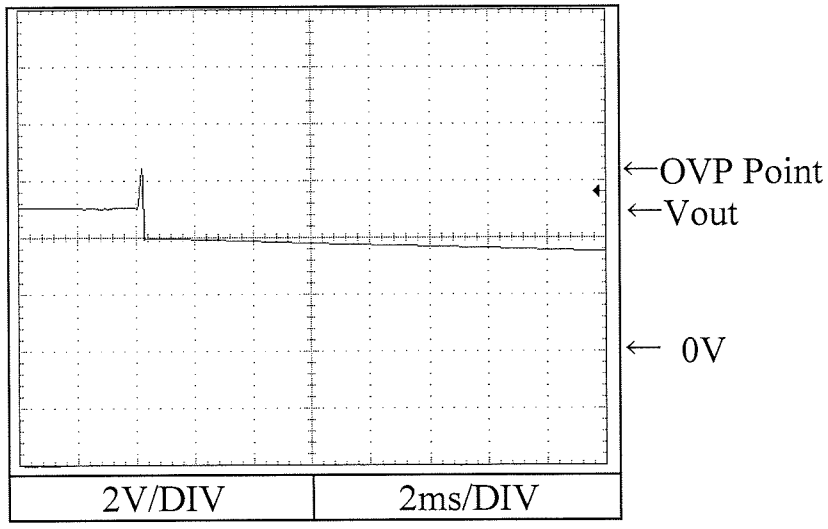
1.8V



3.3V

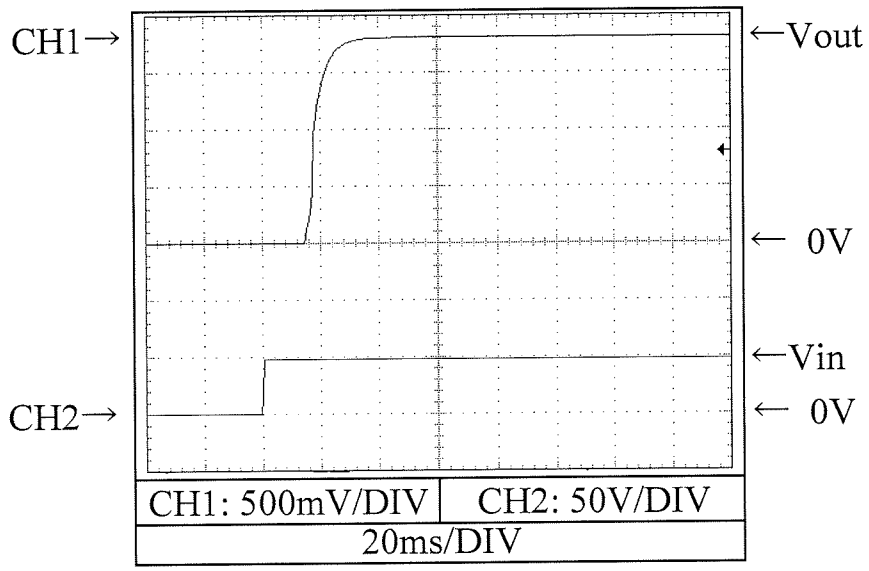


5V

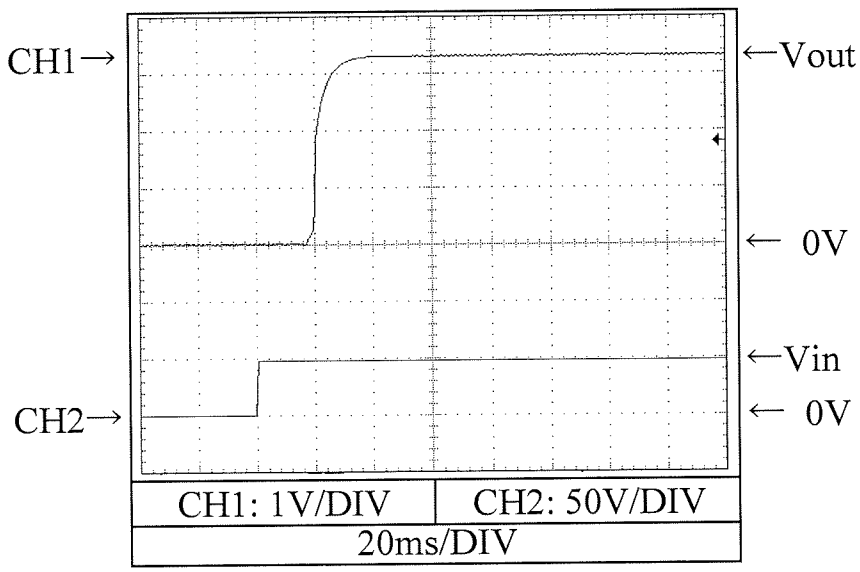


Conditions Vin : 48 VDC
Iout : 0 %
Ta : 25 ℃

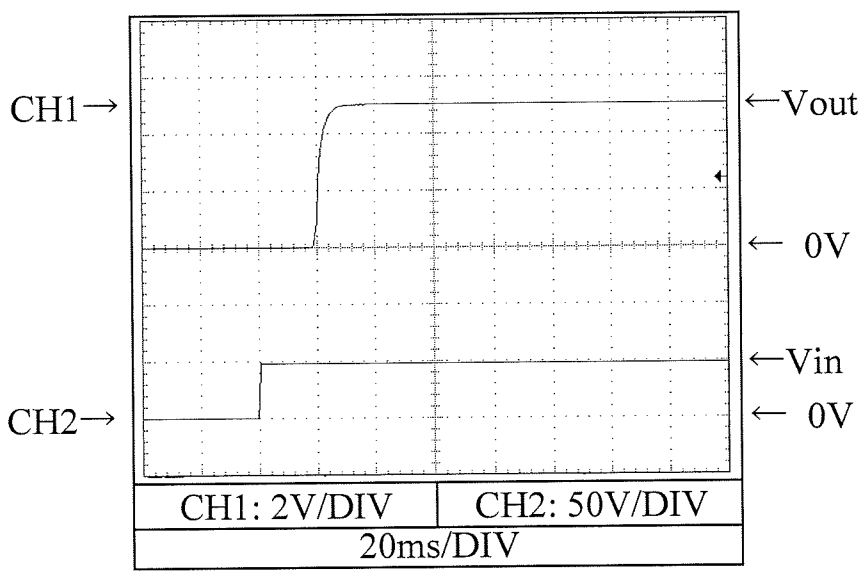
1.8V



3.3V



5V

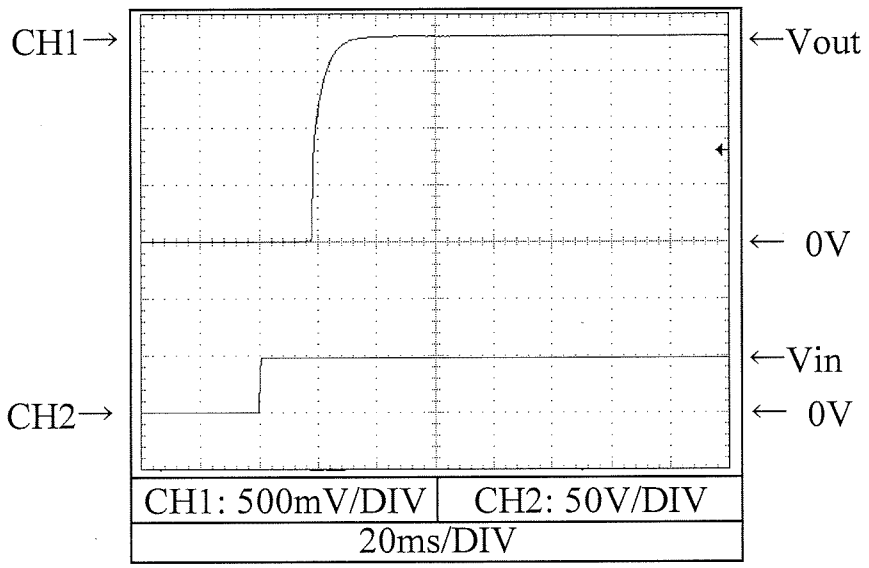


出力立ち上がり特性
Output rise characteristics

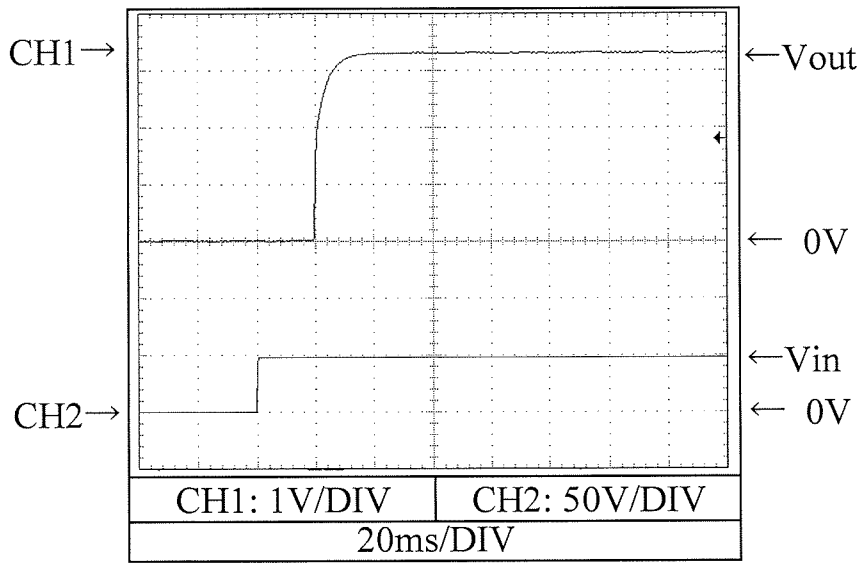
PAE50S48-*

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

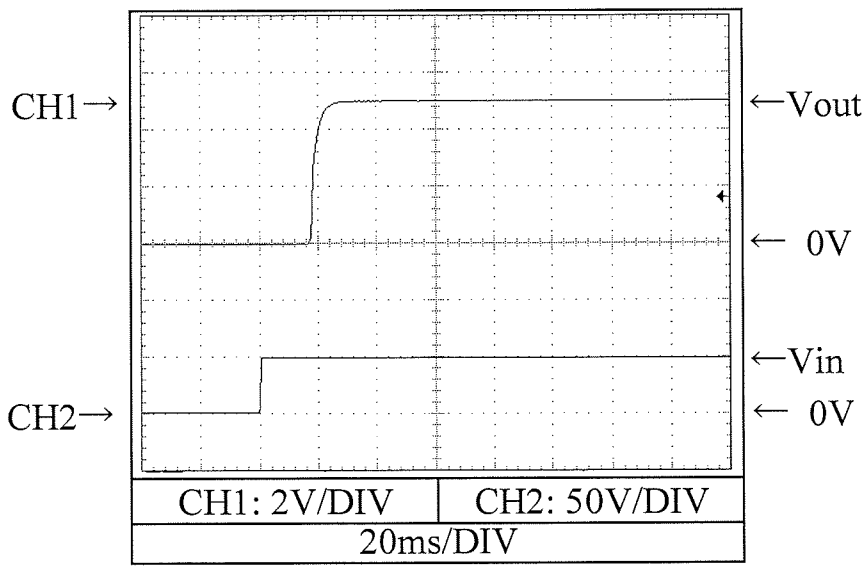
1.8V



3.3V

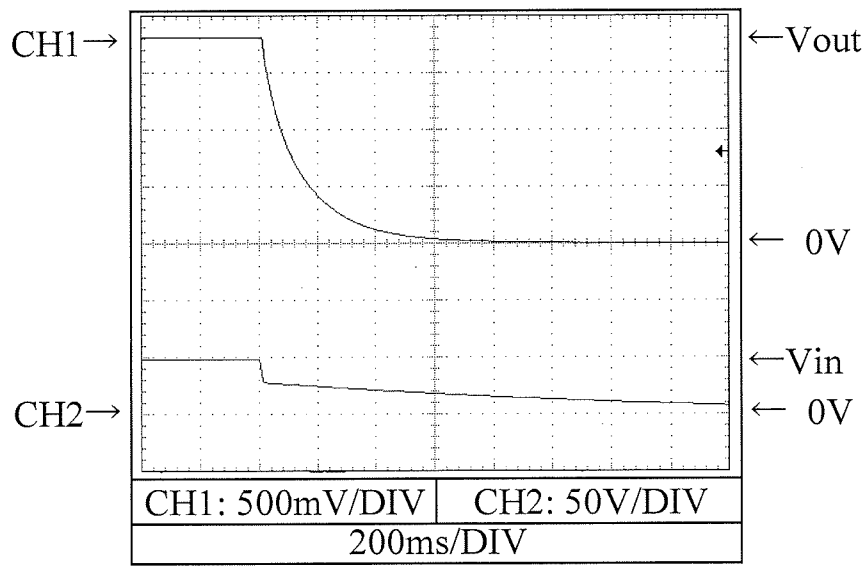


5V

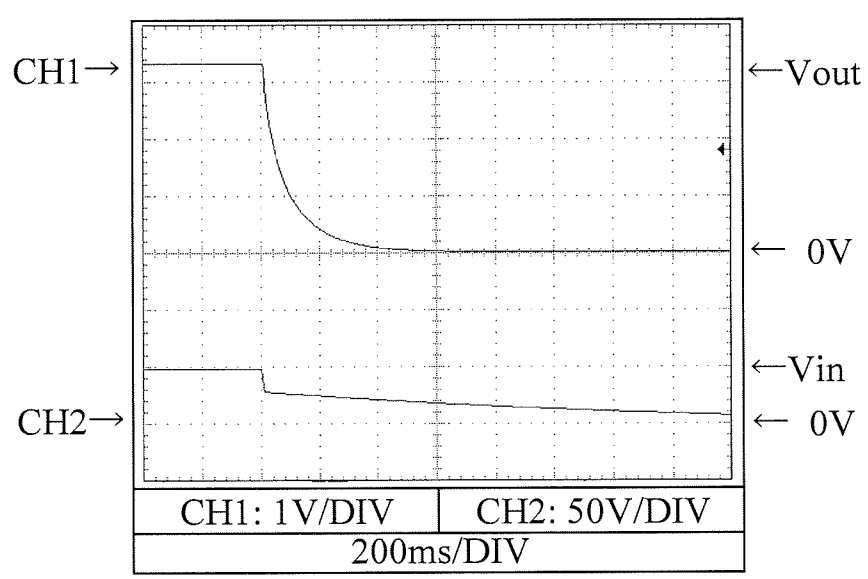


Conditions Vin : 48 VDC
Iout : 0 %
Ta : 25 ℃

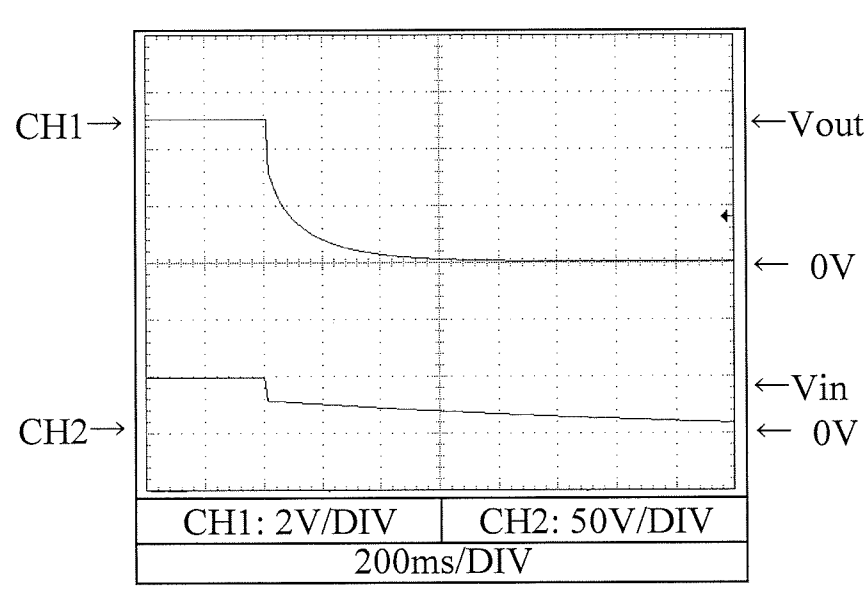
1.8V



3.3V



5V

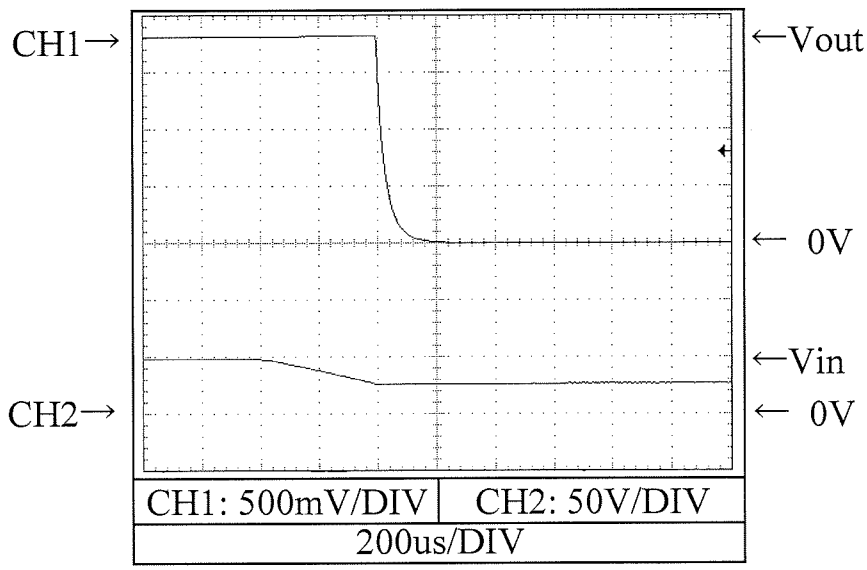


出力立ち下がり特性
Output rise characteristics

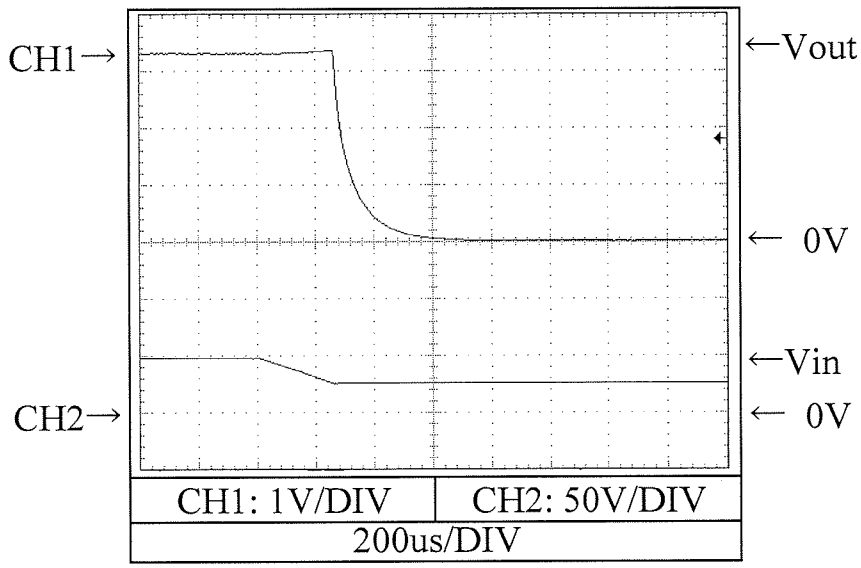
PAE50S48-*

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

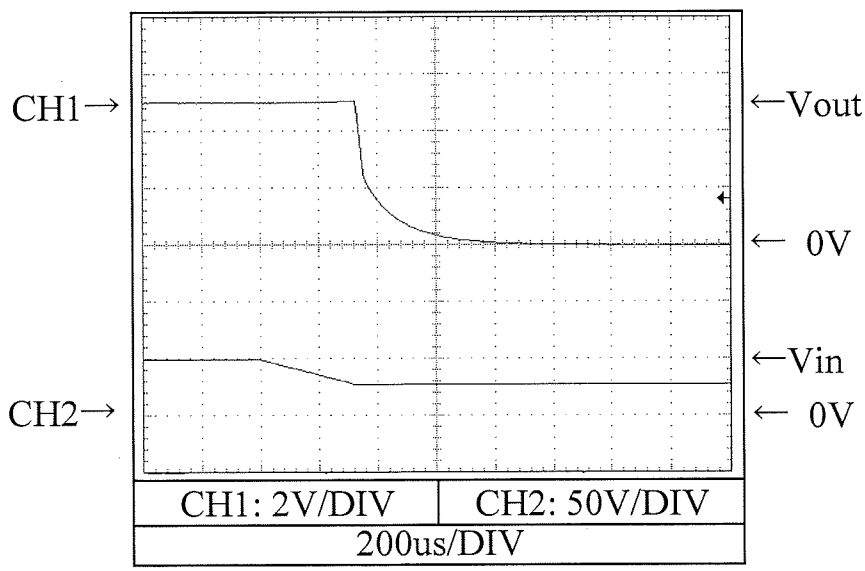
1.8V



3.3V

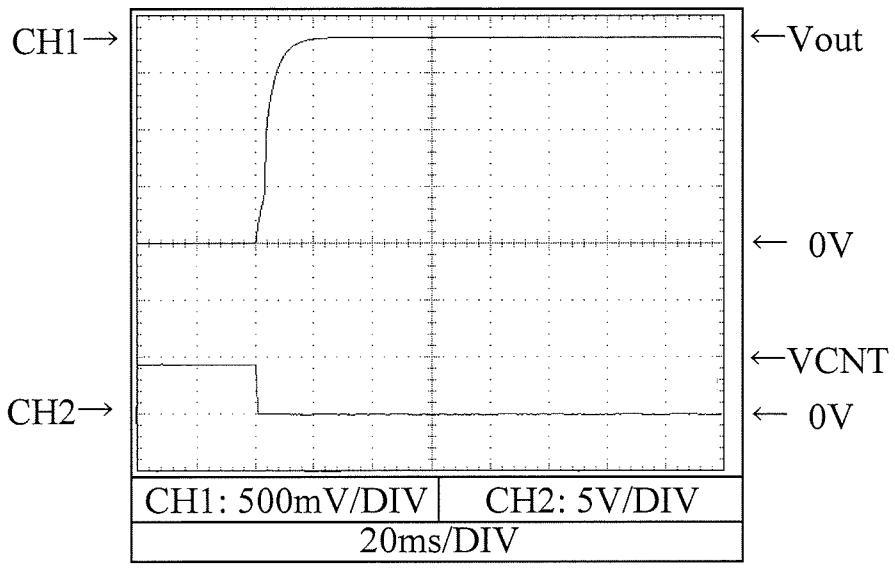


5V

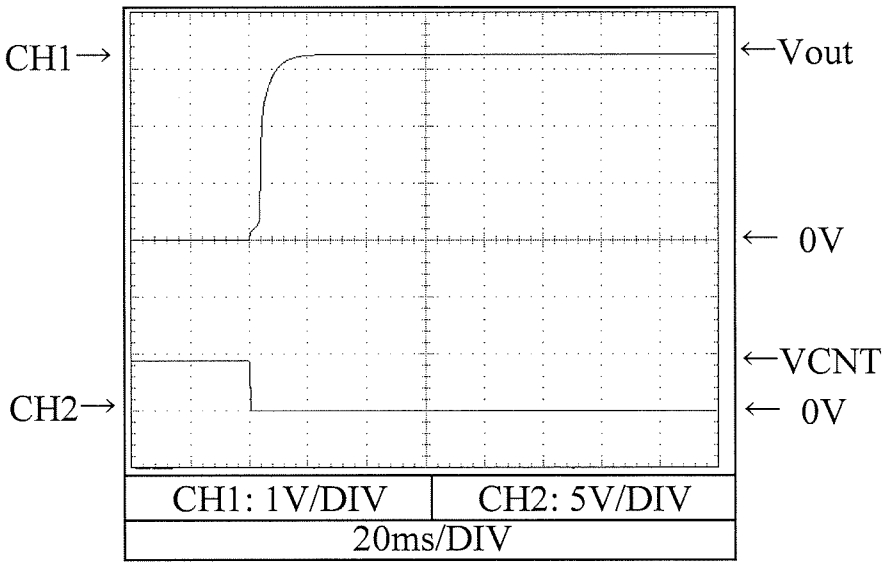


Conditions Vin : 48 VDC
Iout : 0 %
Ta : 25 ℃

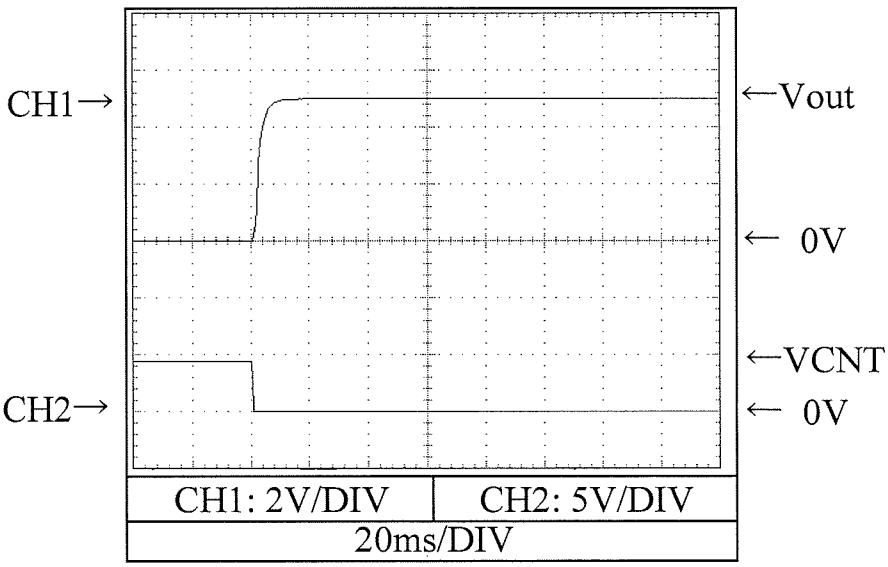
1.8V



3.3V

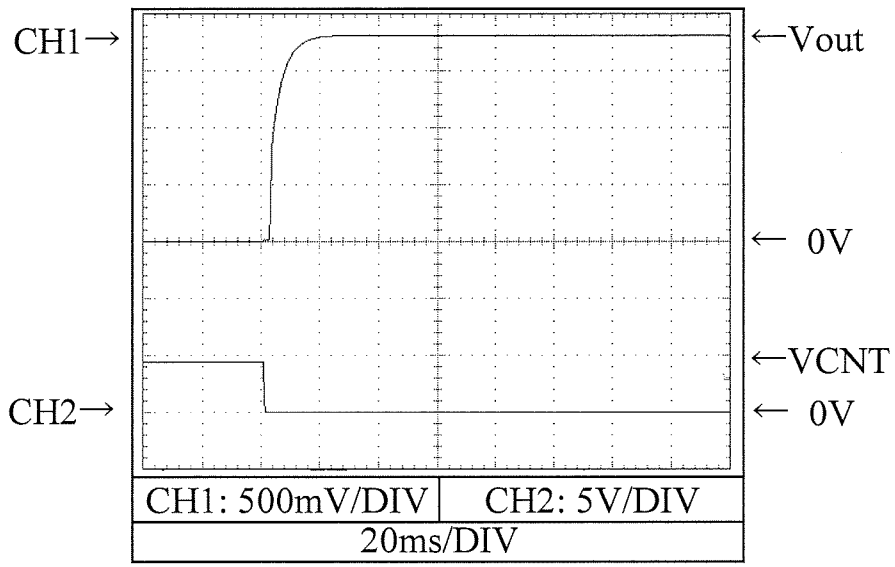


5V

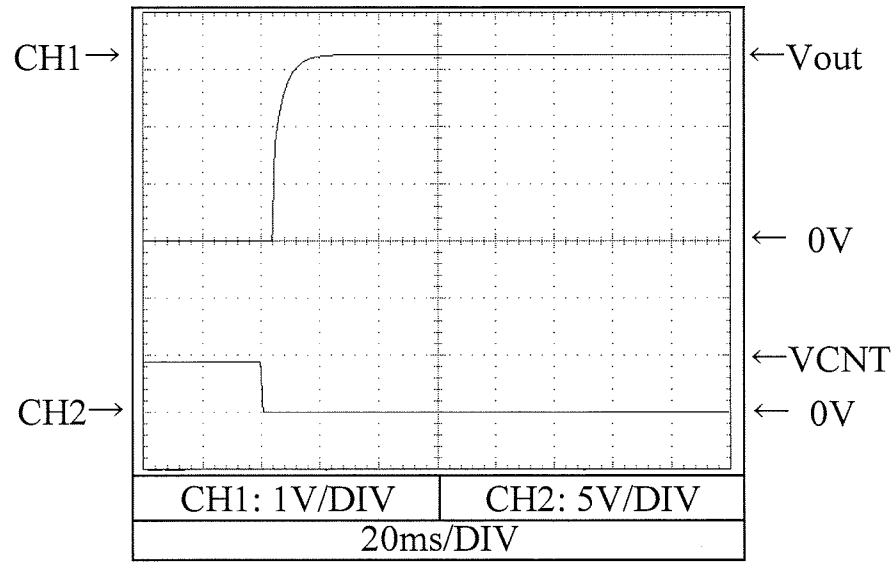


Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

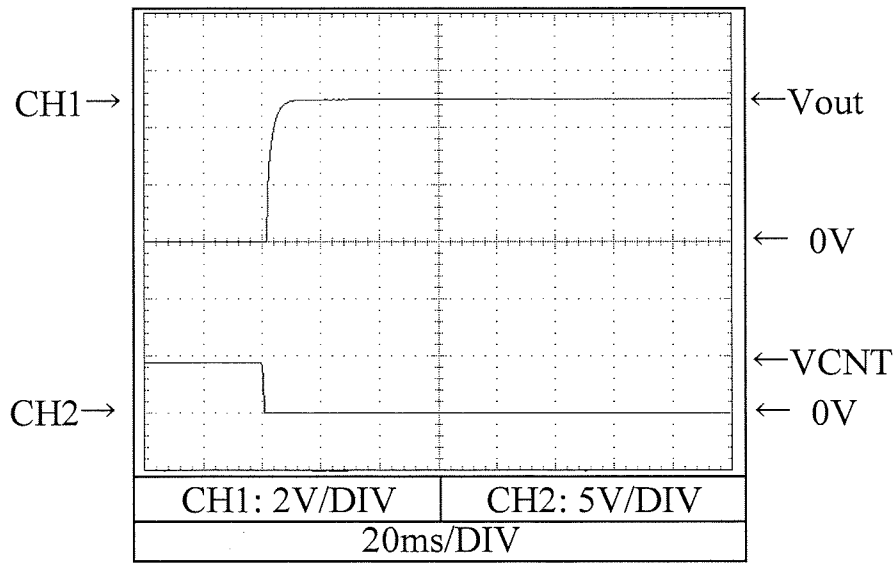
1.8V



3.3V

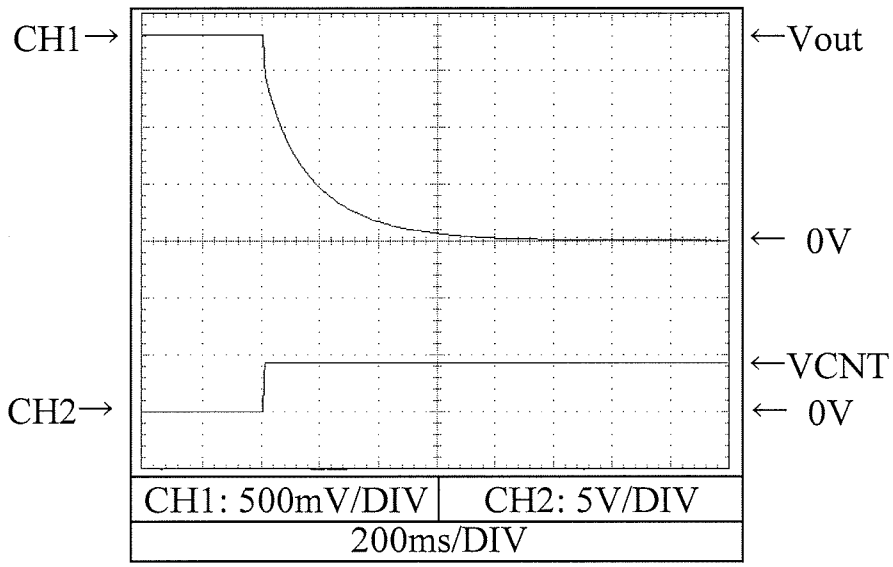


5V

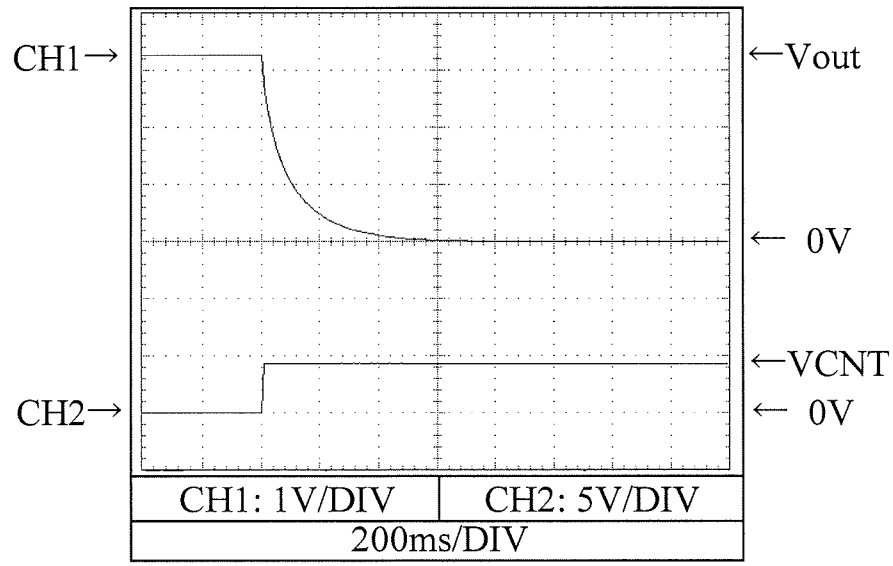


Conditions Vin : 48 VDC
Iout : 0 %
Ta : 25 ℃

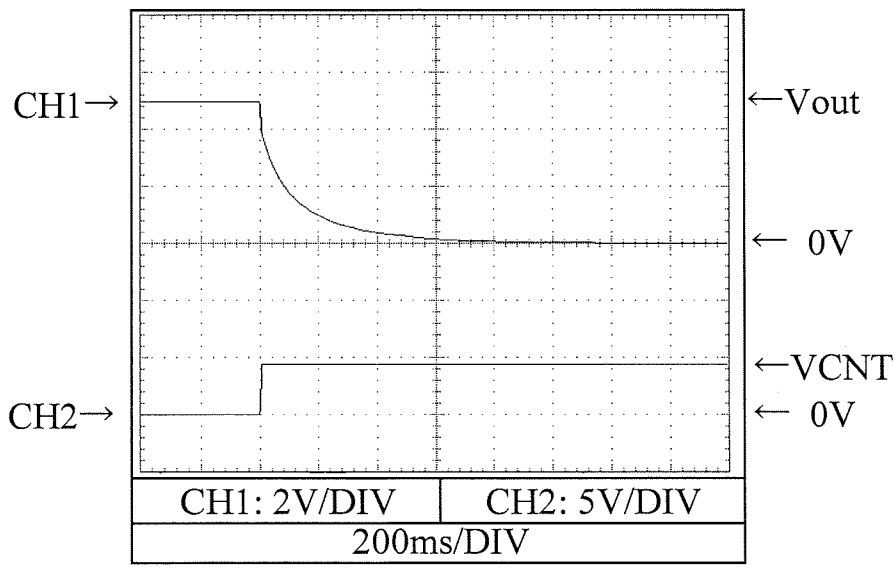
1.8V



3.3V



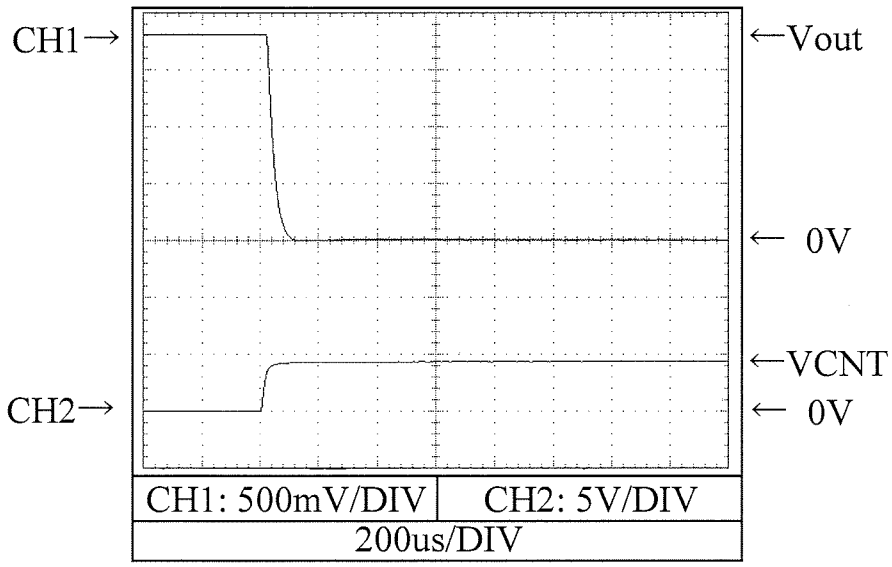
5V



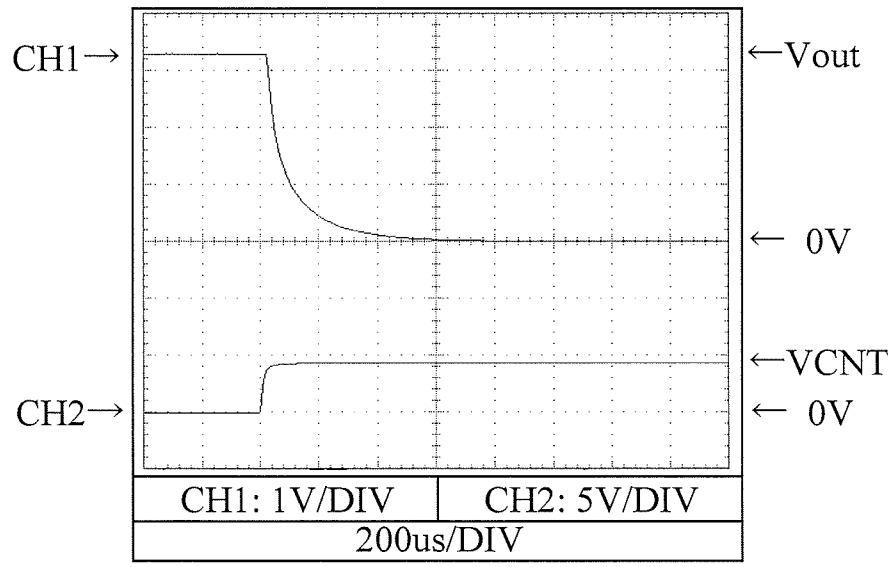
出力立ち下がり特性　（ＯＮ／ＯＦＦコントロール時）
Output fall characteristics with ON/OFF CONTROL

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

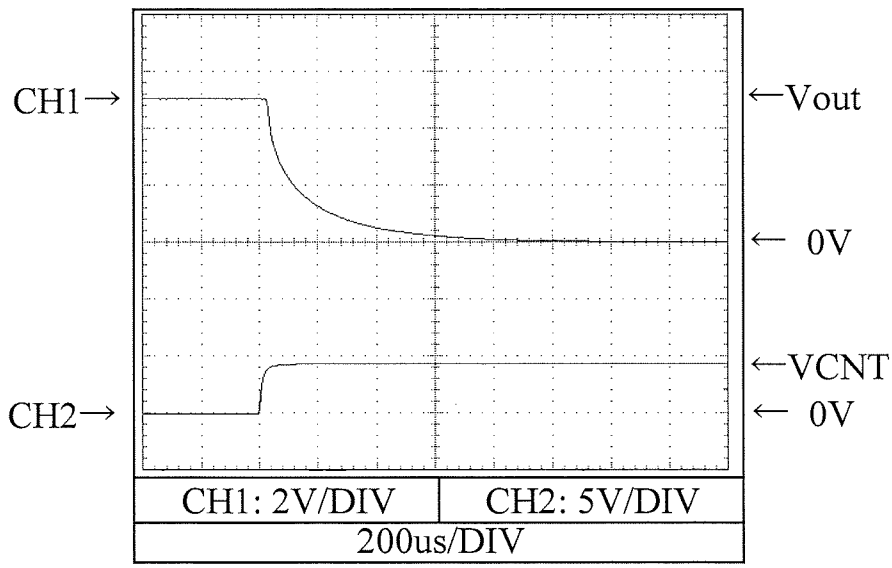
1.8V



3.3V



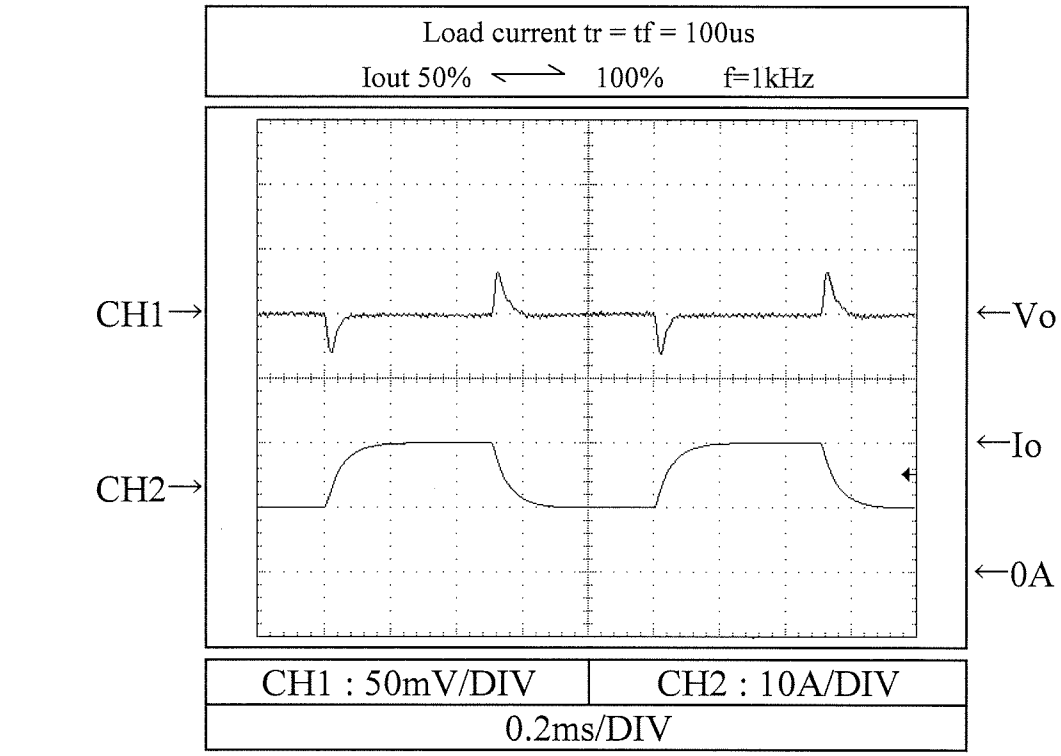
5V



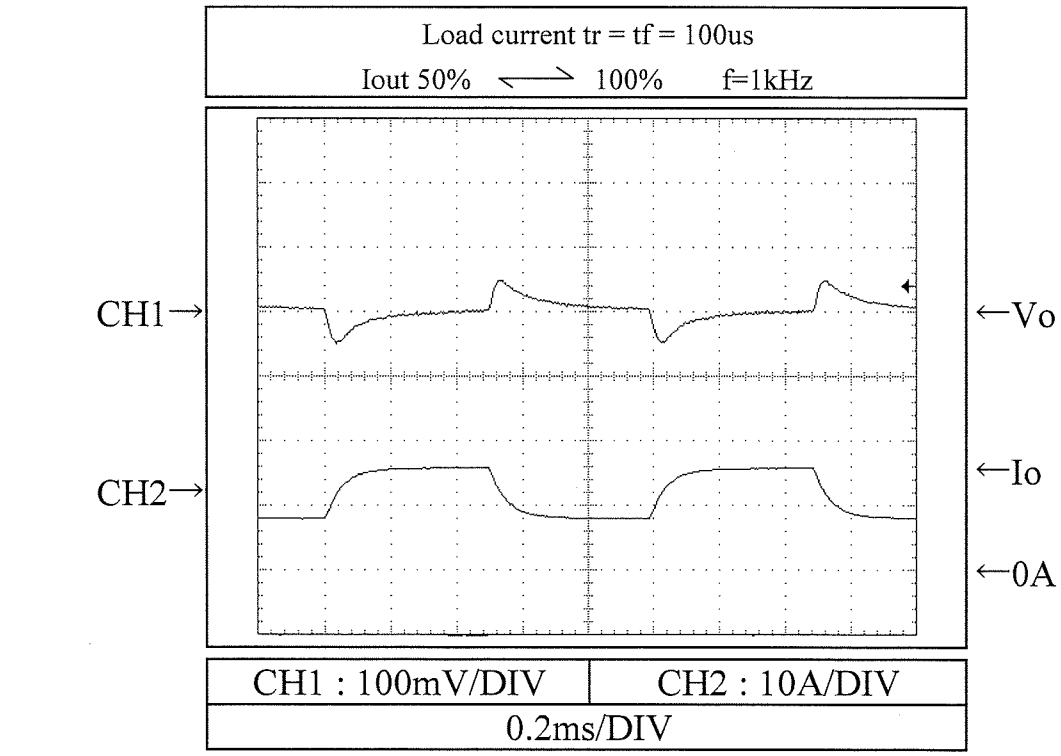
2.9 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 48 VDC
Ta : 25 ℃

1.8V



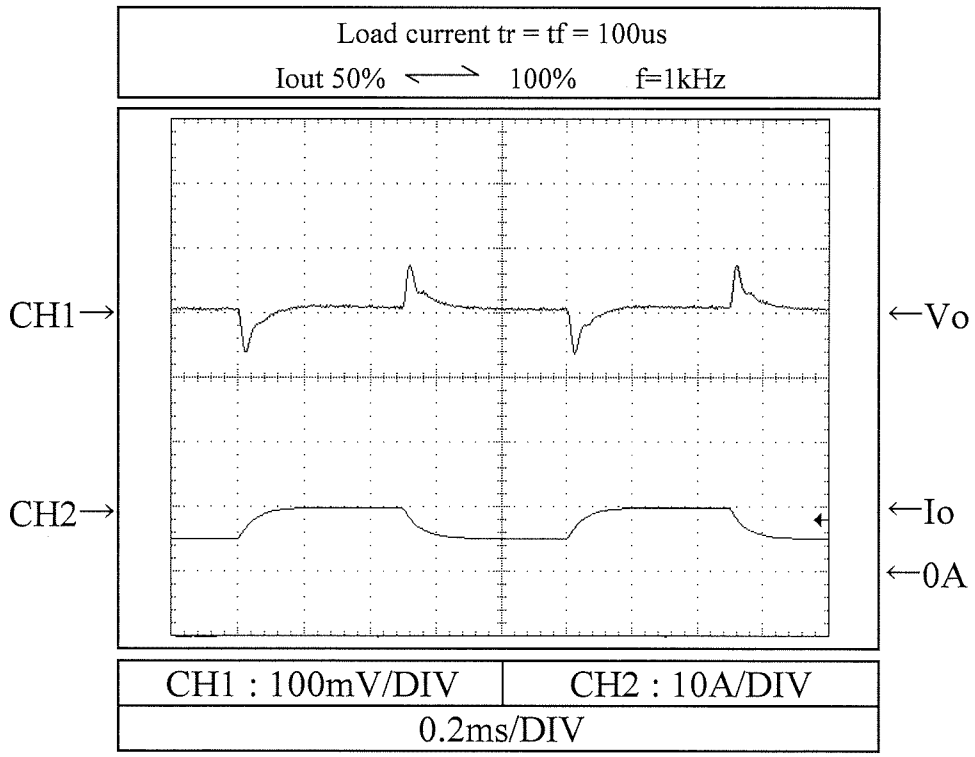
3.3V



2.9 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 48 VDC
Ta : 25 ℃

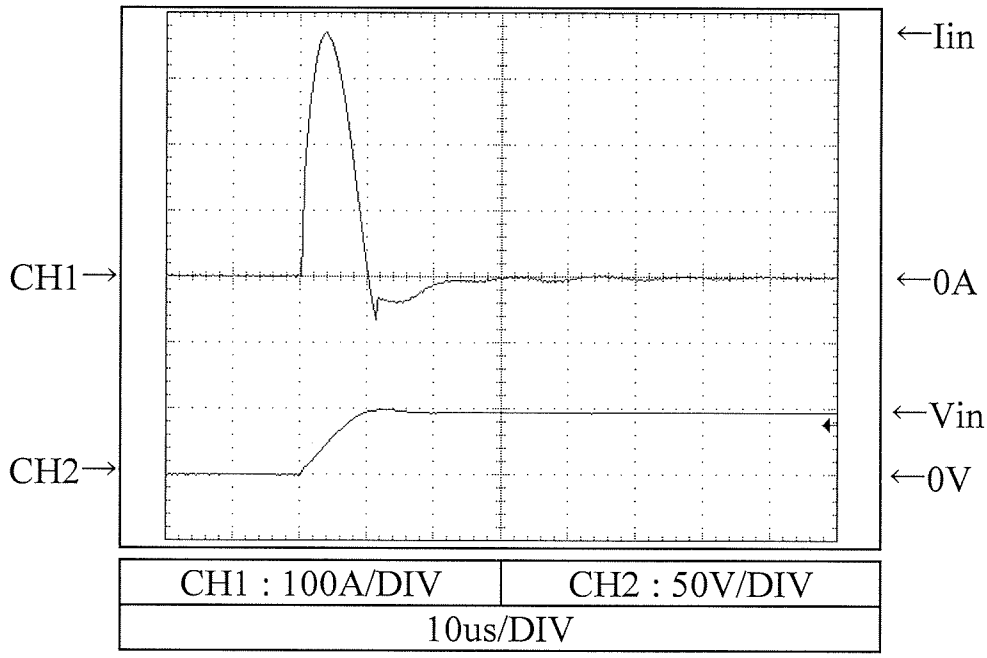
5V



2. 10 入力サージ電流（突入電流）特性
Inrush current waveform

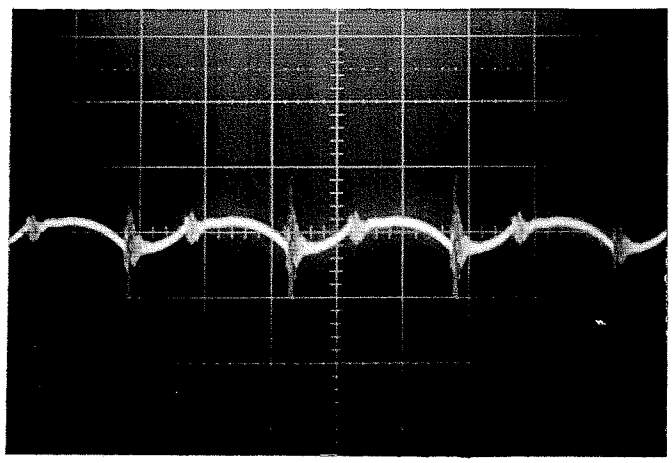
Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

5V



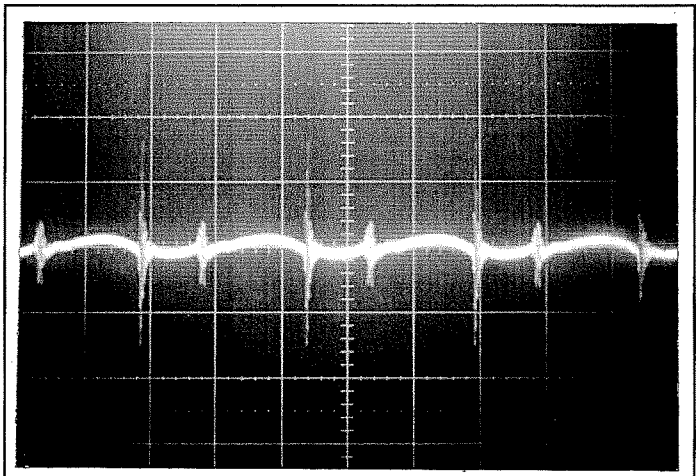
Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

1.8V



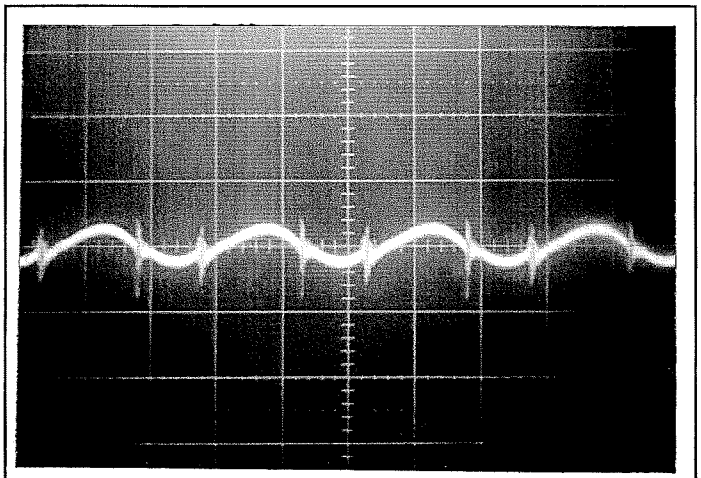
20mV/DIV	1 μ s/DIV
45mV	

3.3V



20mV/DIV	1 μ s/DIV
65mV	

5V



20mV/DIV	1 μ s/DIV
24mV	

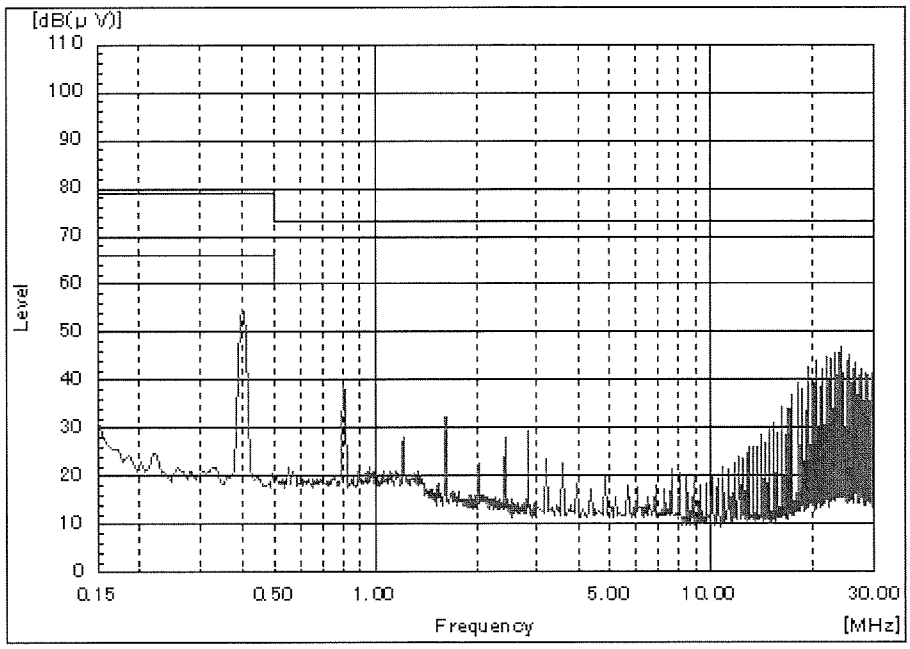
2.12 EMI特性
Electro-Magnetic Interference characteristics

(a) 雑音端子電圧（帰還ノイズ）
Conducted Emission

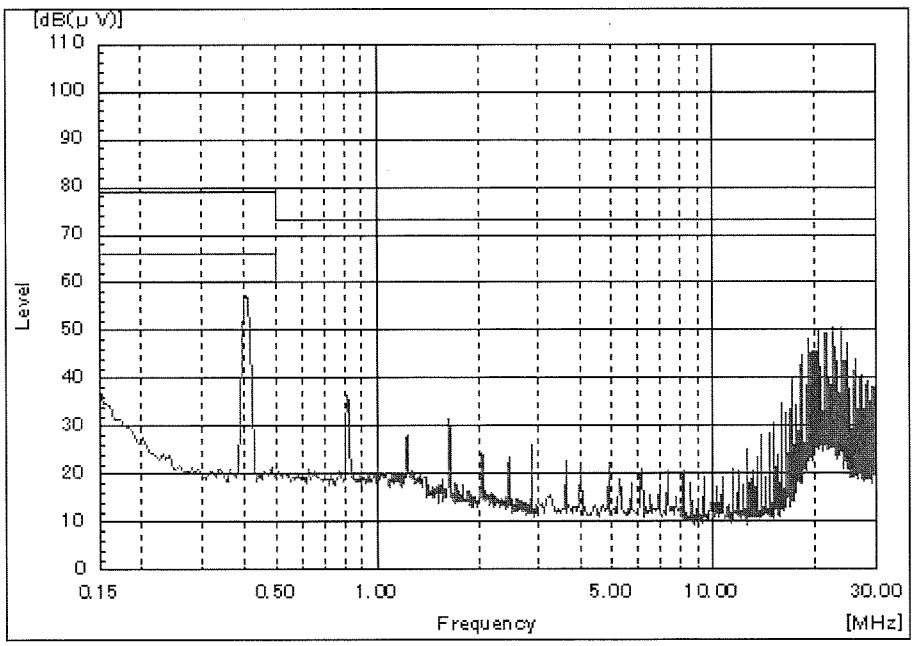
(1) VCCI class A 対応アプリケーションシステム
VCCI class A application system

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

1.8V



3.3V



EMI特性

Electro-Magnetic Interference characteristics

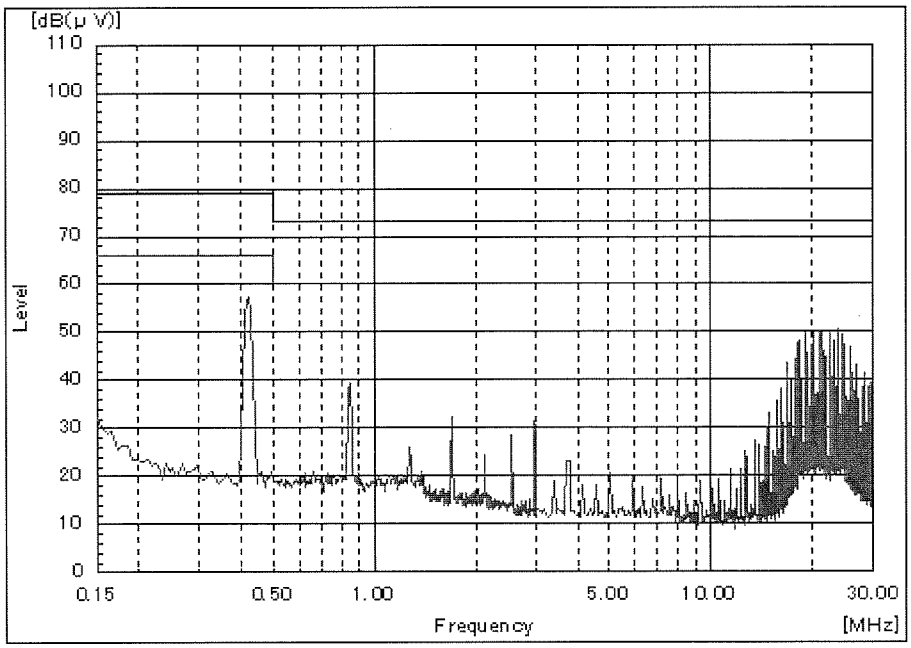
(a) 雑音端子電圧（帰還ノイズ）　　Conditions　Vin : 48 VDC

Conducted Emission　　Iout : 100 %

(1) VCCI class A 対応アプリケーションシステム　　Ta : 25 ℃

VCCI class A application system

5V



EMI特性

Electro-Magnetic Interference characteristics

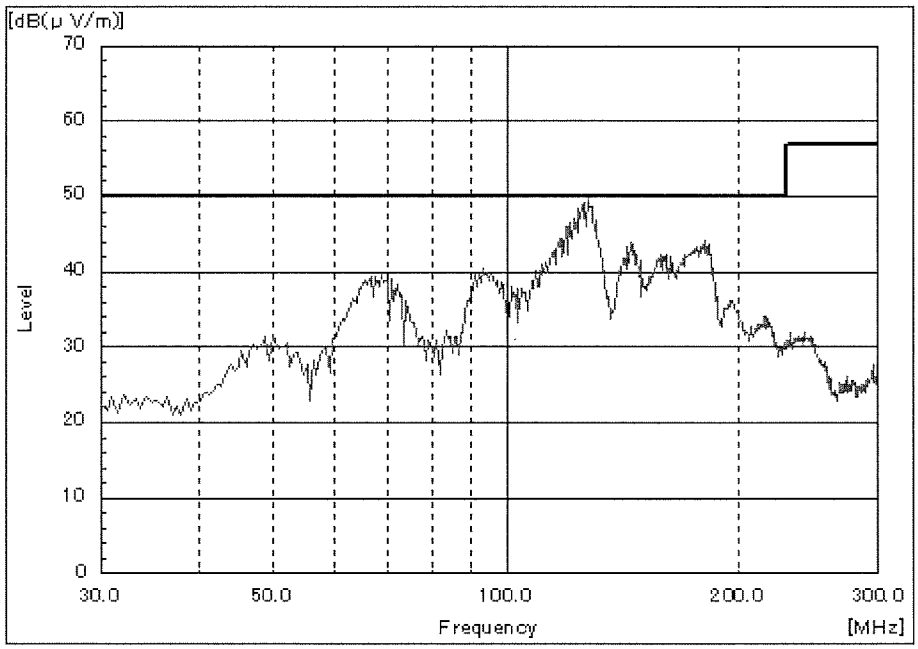
(b) 雑音電界強度（輻射ノイズ）
Radiated Emission

(1) VCCI class A 対応アプリケーションシステム
VCCI class A application system

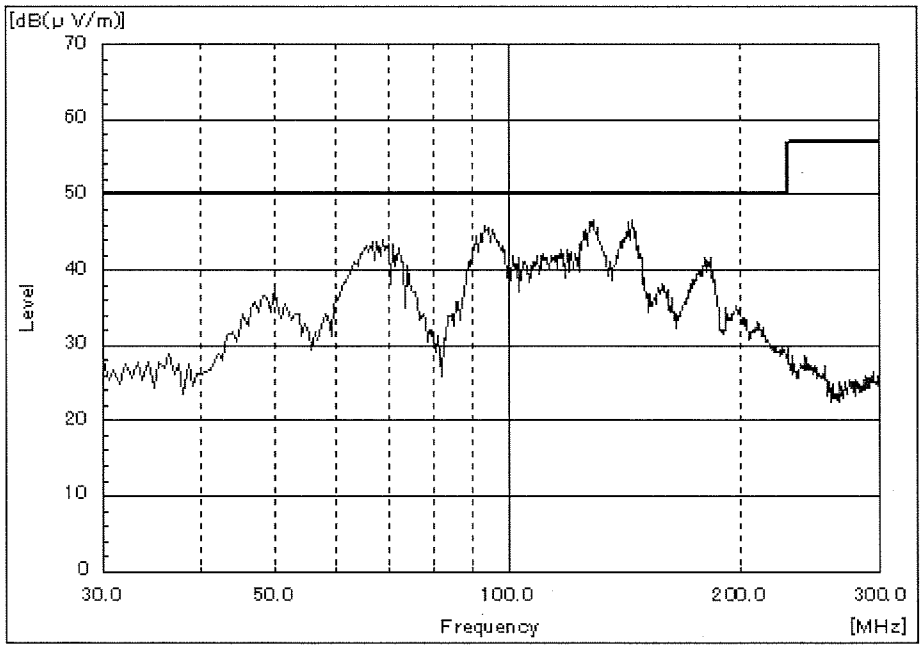
Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

1.8V

HORIZONTAL:



VERTICAL:



EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度（輻射ノイズ）

Radiated Emission

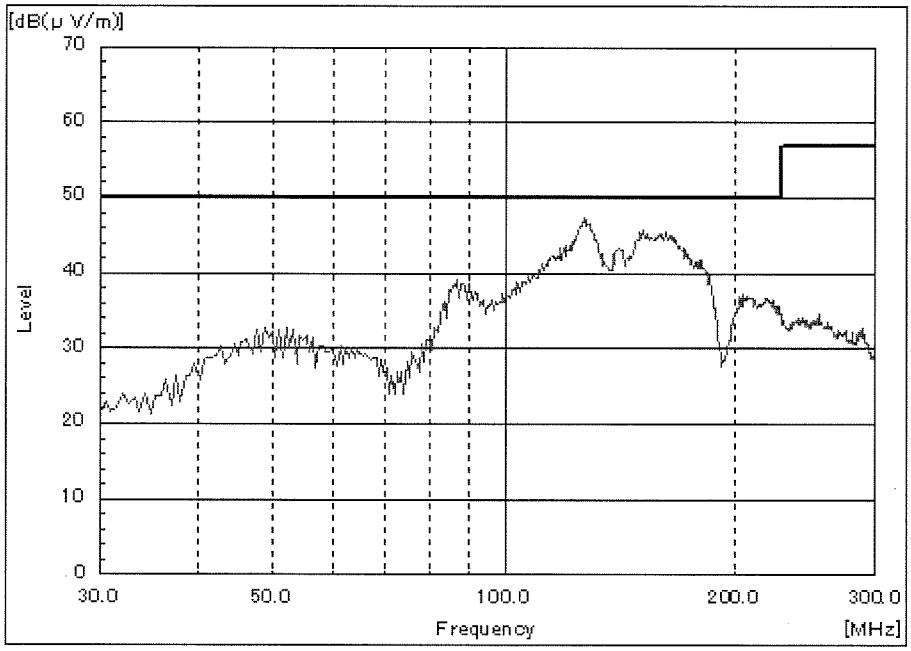
(1) VCCI class A 対応アプリケーションシステム

VCCI class A application system

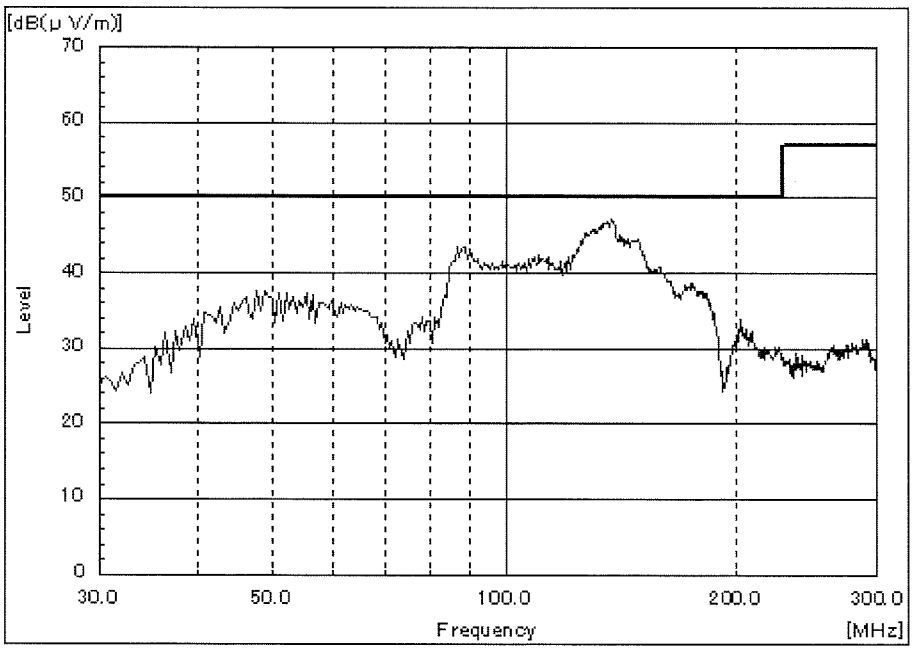
Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

3.3V

HORIZONTAL:



VERTICAL:



EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度（輻射ノイズ）

Radiated Emission

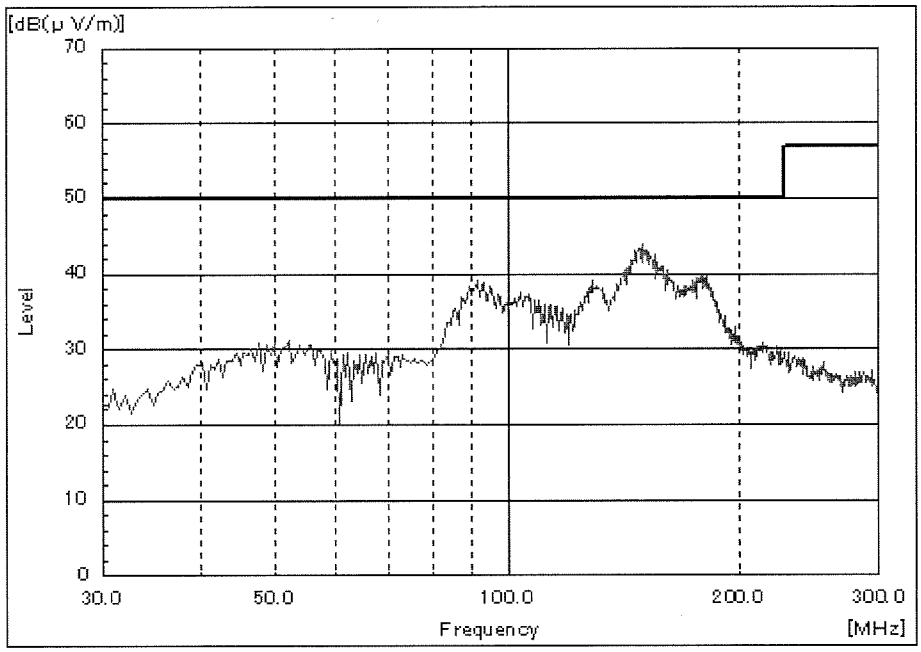
(1) VCCI class A 対応アプリケーションシステム

VCCI class A application system

Conditions Vin : 48 VDC
Iout : 100 %
Ta : 25 ℃

5V

HORIZONTAL:



VERTICAL: