

**PAF700F48-\***

**EVALUATION DATA**

**型式データ**

DWG.No. C173-53-01

**DENSEI-LAMBDA**

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      VCCI class A 対応アプリケーションシステム

          VCCI class A application system ..... T-30~32

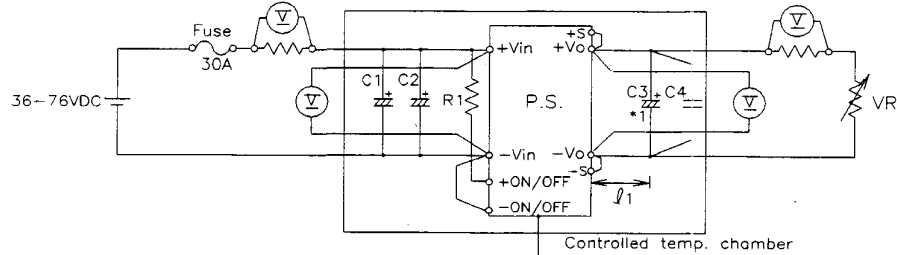
使用記号    Terminology used

	Definition	
Vin	..... 入力電圧	Input Voltage
Vout	..... 出力電圧	Output Voltage
Von/off	..... ON/OFF電圧	ON/OFF Voltage
Iin	..... 入力電流	Input Current
Iout	..... 出力電流	Output Current
Tp	..... ベースプレート温度	Base-Plate Temperature

1. 測定方法 Evaluation Method

1.1 測定回路 Circuits used for determination

(1) 静特性 Steady state data

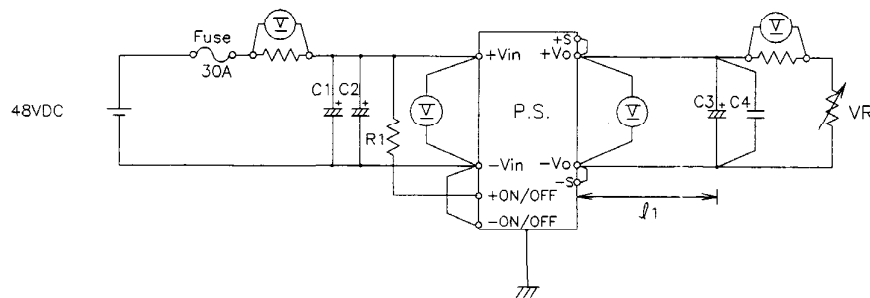


C1,C2: 220uF Electrolytic Capacitor  
 C3: 12V-470uF Electrolytic Capacitor  
 28V-220uF Electrolytic Capacitor  
 C4: 10uF Ceramic Capacitor  
 R1: 30kΩ  
 I1: 50mm

==NOTE==

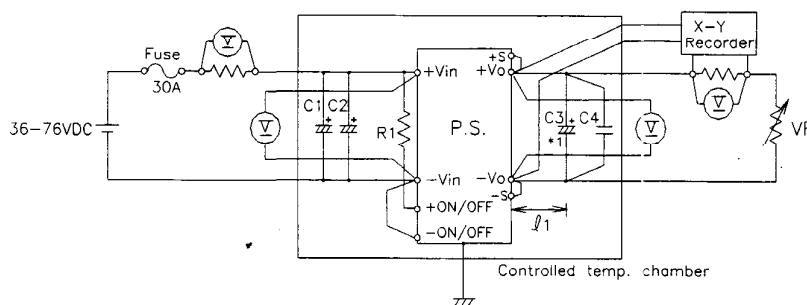
\*1. If the ambient temperature is less than -20°C,  
 use 4 PCS of the recommended capacitor above.

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



C1,C2: 220uF Electrolytic Capacitor  
 C3: 12V-470uF Electrolytic Capacitor  
 28V-220uF Electrolytic Capacitor  
 C5: 10uF Ceramic Capacitor  
 R1: 30kΩ  
 I1: 50mm

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

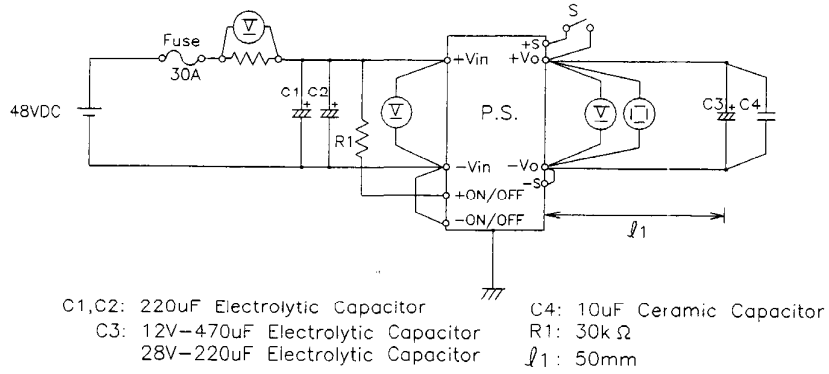


C1,C2: 220uF Electrolytic Capacitor  
 C3: 12V-470uF Electrolytic Capacitor  
 28V-220uF Electrolytic Capacitor  
 C4: 10uF Ceramic Capacitor  
 R1: 30kΩ  
 I1: 50mm

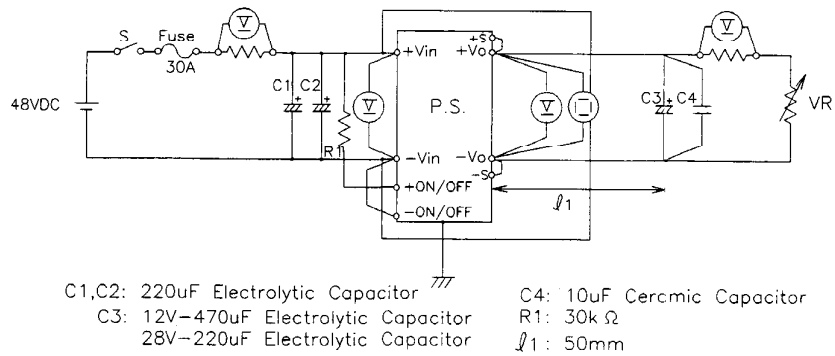
==NOTE==

\*1. If the ambient temperature is less than -20°C,  
 use 4 PCS of the recommended capacitor above.

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



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



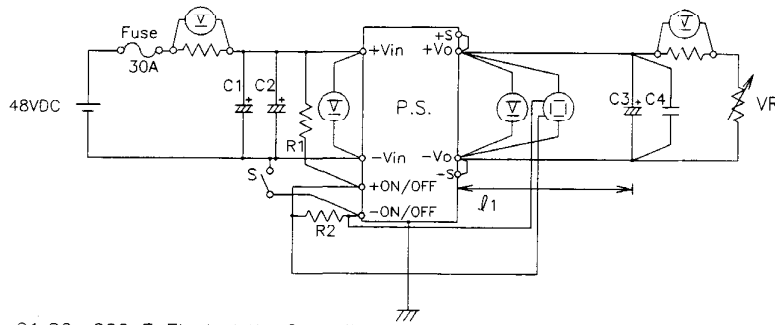
(6) 出力立ち下がり Output fall characteristics

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,C2: 220uF Electrolytic Capacitor  
 C3: 12V-470uF Electrolytic Capacitor  
 C4: 10uF Ceramic Capacitor  
 R1: 30kΩ  
 R2: 1MΩ  
 I1: 50mm

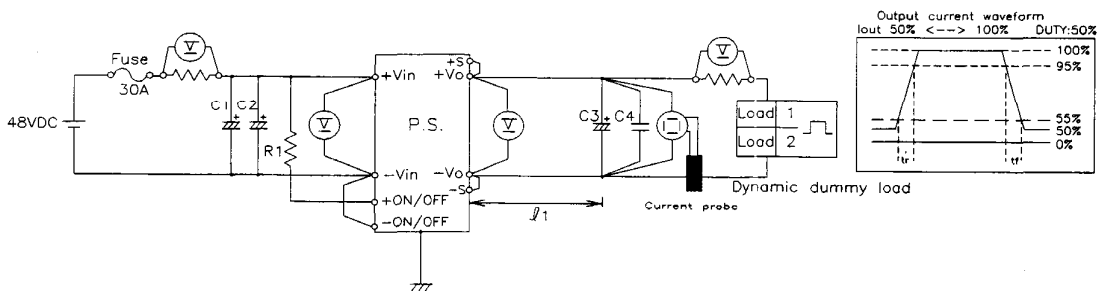
(8) 出力立ち下がり特性 (ON/OFFコントロール時)

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

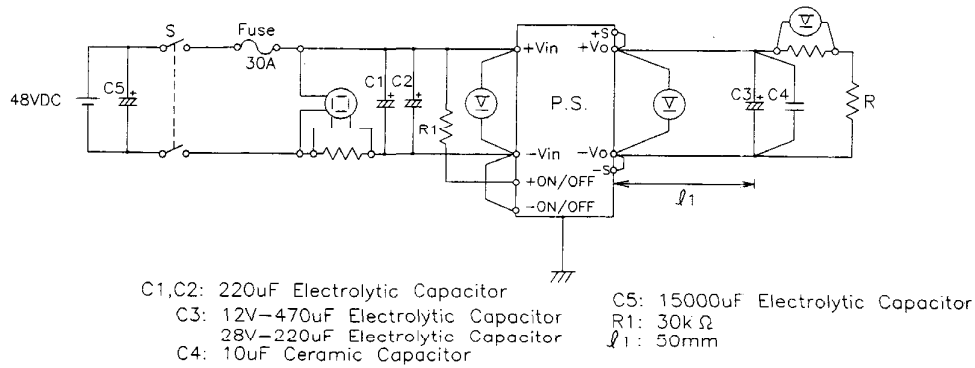
Same as output rise characteristics with ON/OFF CONTROL

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



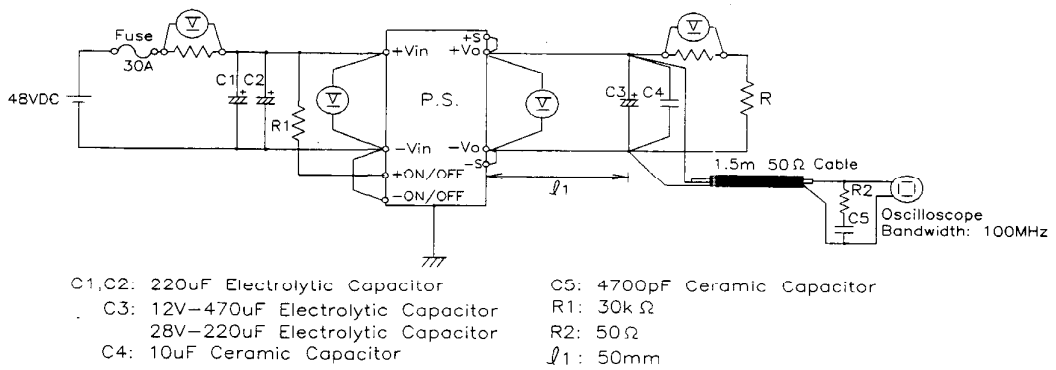
- C1,C2: 220uF Electrolytic Capacitor  
 C3: 12V-470uF Electrolytic Capacitor  
 C4: 10uF Ceramic Capacitor  
 R1: 30kΩ  
 I1: 50mm

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

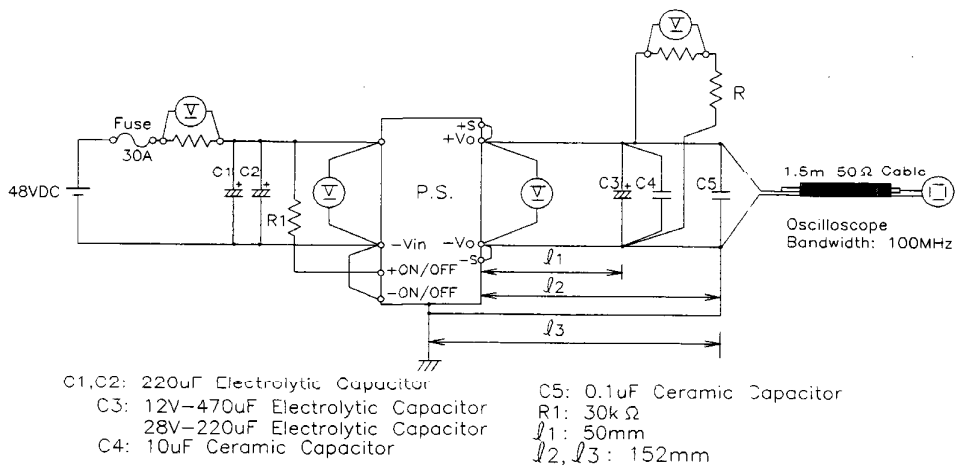


(11) 出力リップル、ノイズ波形 Output ripple and noise waveform

(a) Normal Mode



(b) Normal + Common Mode

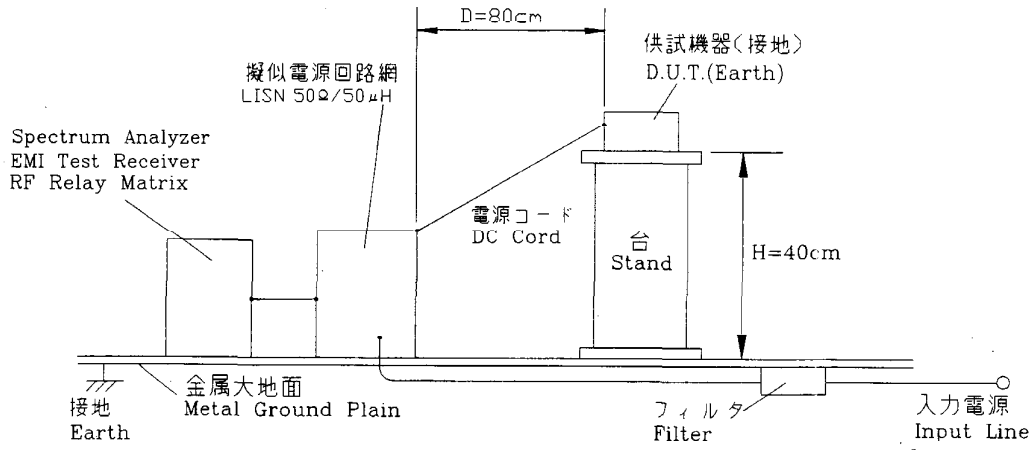


(12) EMI 特性

Electro-Magnetic Interference characteristics

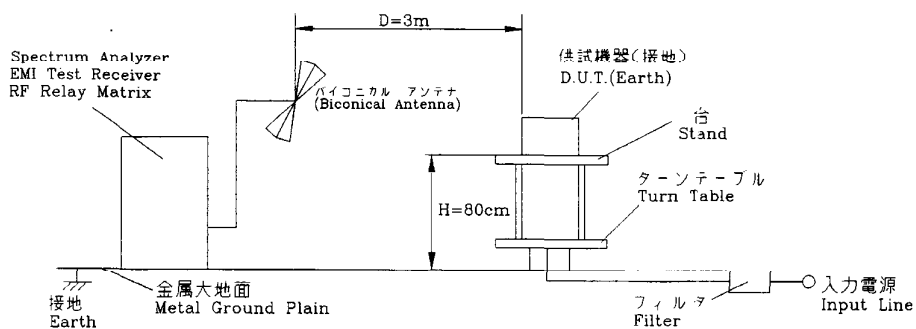
(a) 雑音端子電圧 (帰還ノイズ)

Conducted Emission Noise



(b) 雑音電界強度 (輻射ノイズ)

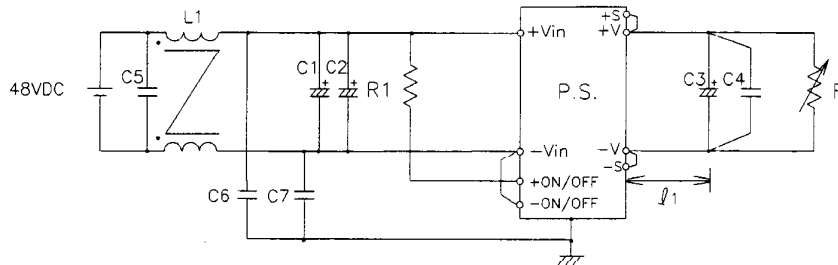
Radiated Emission Noise





(1) VCCI class A 対応アプリケーションシステム

VCCI class A application system



- |                                       |                                  |
|---------------------------------------|----------------------------------|
| L1 : 1mH                              | C5 : 2.2uF Ceramic Capacitor     |
| C1,C2 : 220uF Electrolytic Capacitor  | C6,C7 : 0.15uF Ceramic Capacitor |
| C3 : 12V-470uF Electrolytic Capacitor | R1 : 30k $\Omega$                |
| C4 : 28V-220uF Electrolytic Capacitor | l1 : 50mm                        |
| C4 : 10uF Ceramic Capacitor           |                                  |

## 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	TDS540B
3	DIGITAL STORAGE OSCILLOSCOPE	IWATSU	LT364L
4	DIGITAL MULTIMETER	YOKOGAWA ELECT.	7544
5	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110
6	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303/AM503
7	DYNAMIC DUMMY LOAD	TAKASAGO	FK-1000L
8	DC POWER SUPPLY	TAKASAGO	EX-1500H
9	X-Y RECORDER	GRAPHTEC	WX4309
10	CONTROLLED TEMP. CHAMBER	TABAI ESPEC	SH-240
11	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSA
12	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
13	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
14	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
15	AMN	KYORITSU DENSHI	KNW-242
16	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	BBA9106

## 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

12V

## 1. Regulation - line and load

condition  $T_p : 25^{\circ}\text{C}$ 

$I_{out} \setminus V_{in}$	36VDC	48VDC	76VDC	line regulation	
0%	11.974V	11.974V	11.975V	1mV	0.008%
50%	11.973V	11.973V	11.974V	1mV	0.008%
100%	11.969V	11.971V	11.972V	3mV	0.025%
load regulation	5mV	3mV	3mV		
	0.042%	0.025%	0.025%		

## 2. Temperature drift

conditions  $V_{in} : 48\text{VDC}$  $I_{out} : 100\%$ 

$T_p$	$-40^{\circ}\text{C}$	$25^{\circ}\text{C}$	$85^{\circ}\text{C}$	temperature stability	
$V_{out}$	11.963V	11.973V	11.898V	75mV	0.625%

28V

## 1. Regulation - line and load

condition  $T_p : 25^{\circ}\text{C}$ 

$I_{out} \setminus V_{in}$	36VDC	48VDC	76VDC	line regulation	
0%	27.964V	27.965V	27.964V	1mV	0.004%
50%	27.962V	27.963V	27.963V	1mV	0.004%
100%	27.962V	27.962V	27.962V	0mV	0.000%
load regulation	2mV	3mV	2mV		
	0.007%	0.011%	0.007%		

## 2. Temperature drift

conditions  $V_{in} : 48\text{VDC}$  $I_{out} : 100\%$ 

$T_p$	$-40^{\circ}\text{C}$	$25^{\circ}\text{C}$	$85^{\circ}\text{C}$	temperature stability	
$V_{out}$	27.929V	27.962V	27.899V	63mV	0.225%

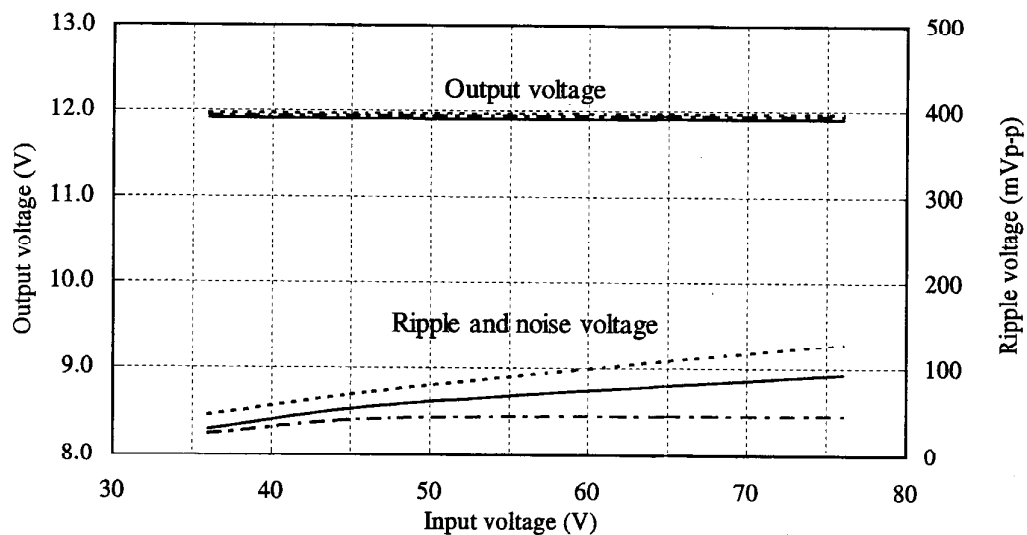
2.1 (2) 出力電圧、リップル電圧対入力電圧

Output voltage and ripple voltage vs input voltage

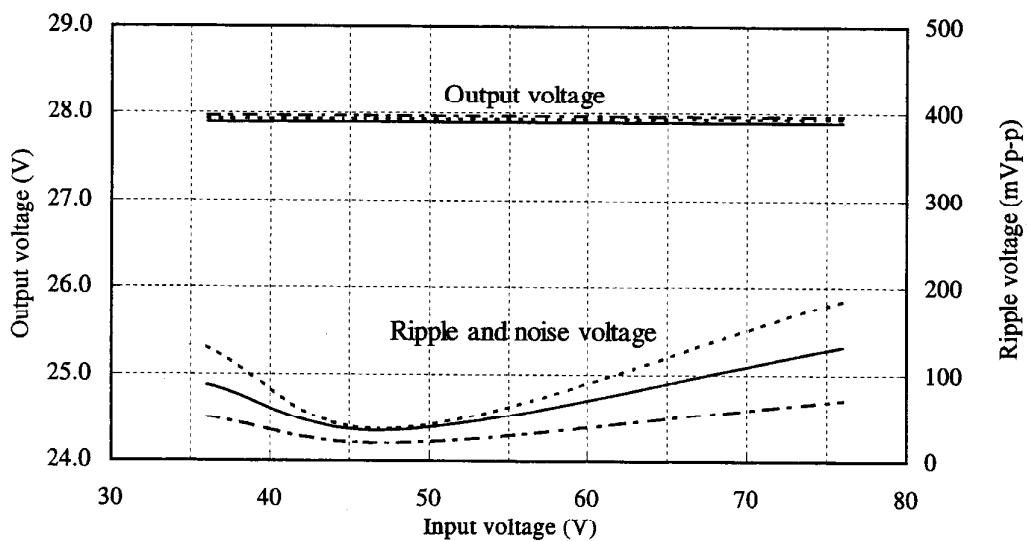
Conditions Iout : 100 %

Tp : -40 °C -----  
 : 25 °C - - - - -  
 : 85 °C \_\_\_\_\_

12V



28V

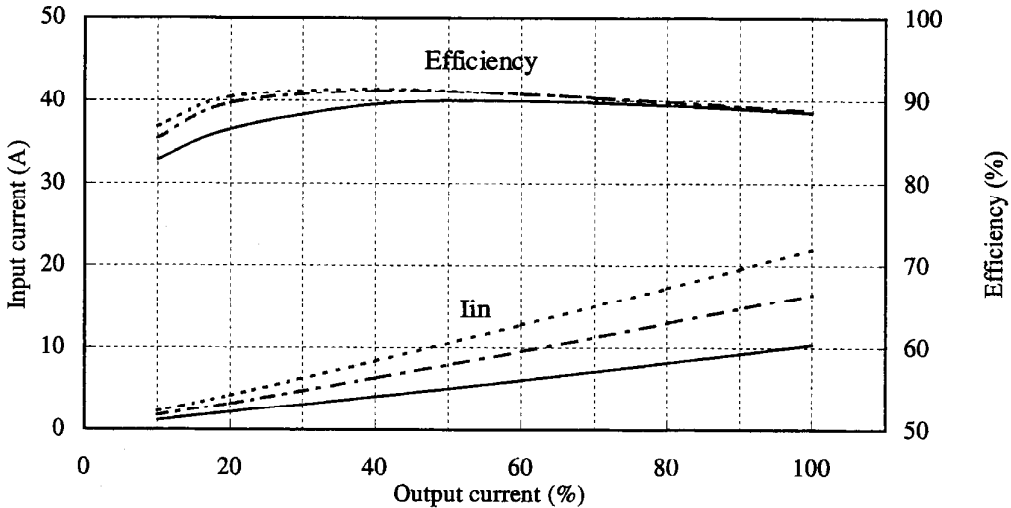


2.1 (3) 効率、入力電流対出力電流

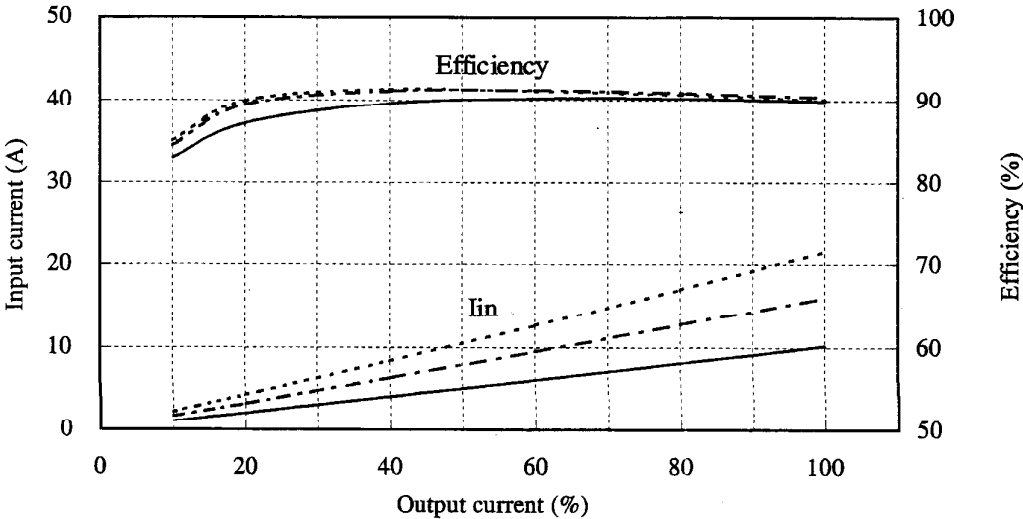
Efficiency and input current vs output current

Conditions Vin : 36 VDC -----  
 : 48 VDC - - - - -  
 : 76 VDC ————  
 Tp : 25 °C

12V



28V



2.1 (4) 効率対入力電圧

Efficiency vs input voltage

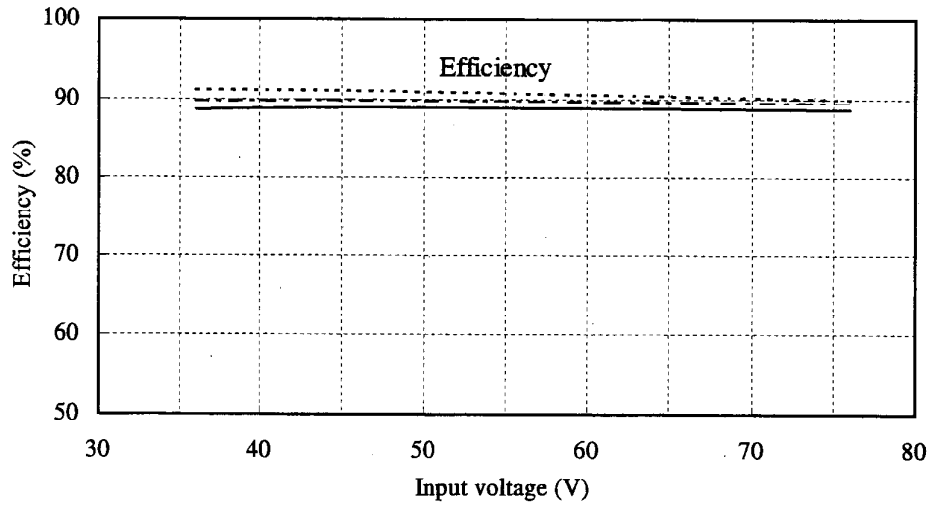
Conditions  $T_p$  : 25 °C

$I_{out}$  : 50 % -----

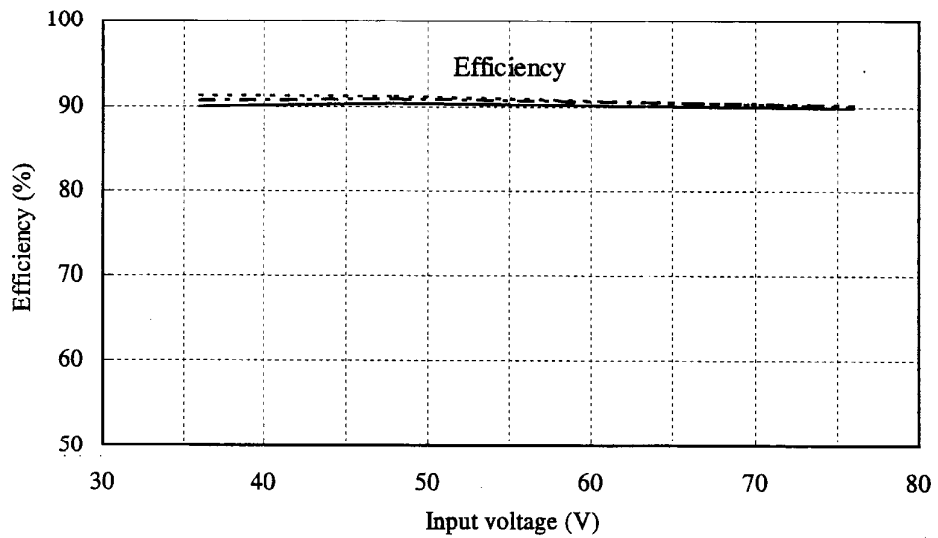
80 % -.-.-.-

100 % \_\_\_\_\_

12V



28V



2.1 (5) 効率対ベースプレート温度  
Efficiency vs base-plate temperature

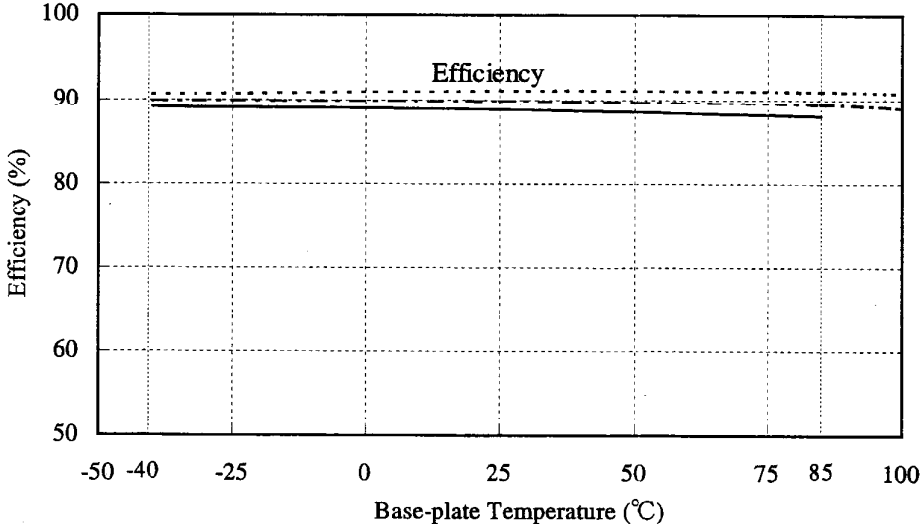
Conditions Vin : 48 VDC

Iout : 50 % -----

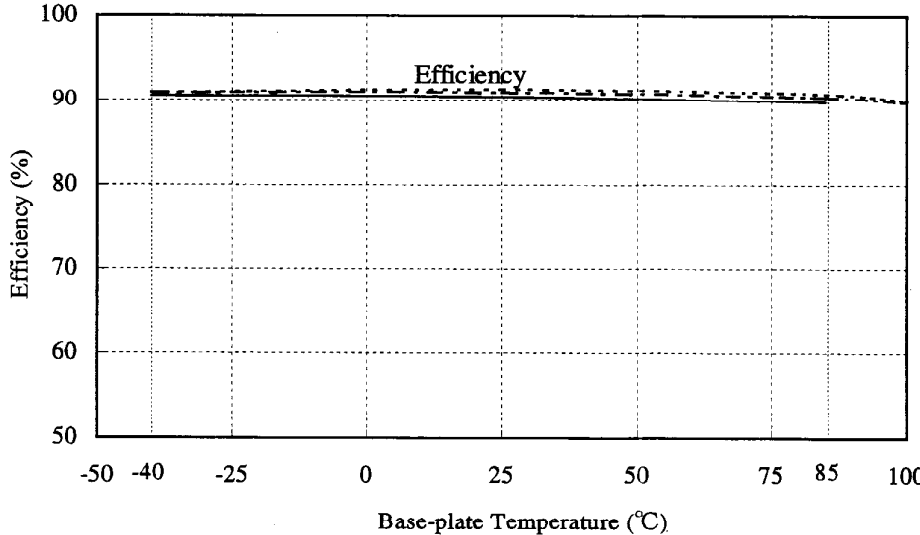
80 % - - - - -

100 % ———

12V



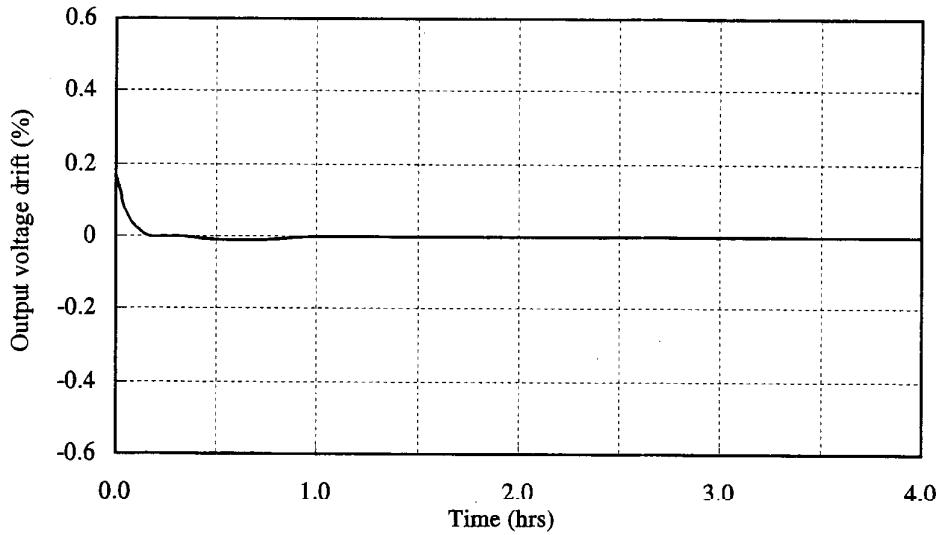
28V



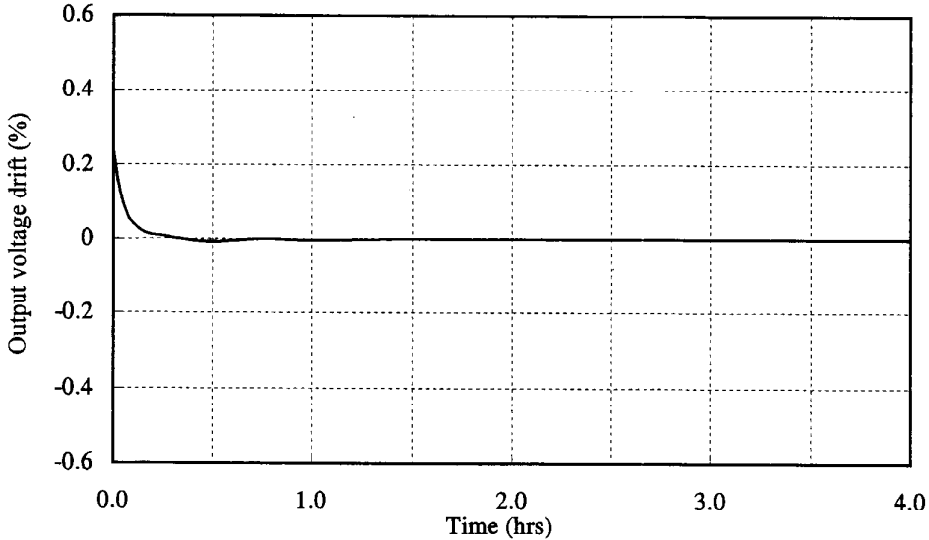
2.2 通電ドリフト特性  
Warm-up voltage drift characteristics

Conditions  $V_{in}$  : 48 VDC  
 $I_{out}$  : 100 %  
 $T_p$  : 25 °C

12V



28V



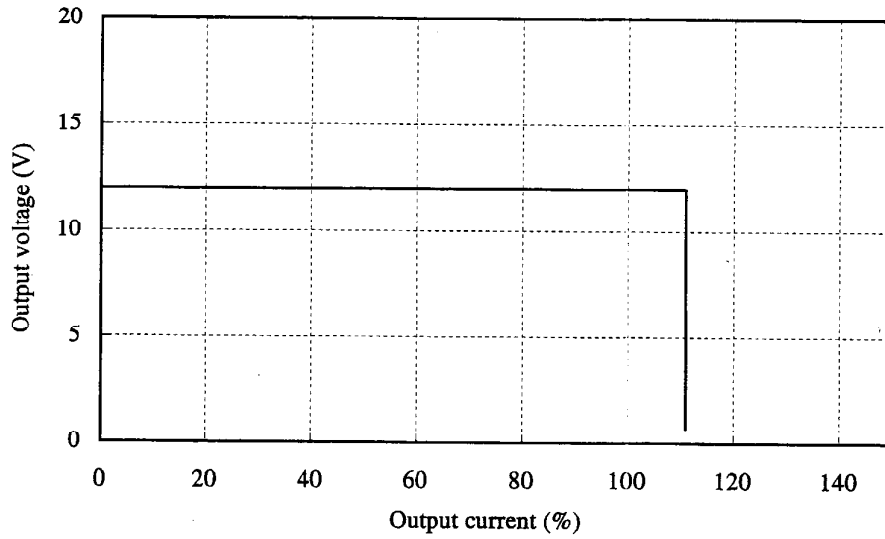


2.3 過電流保護特性

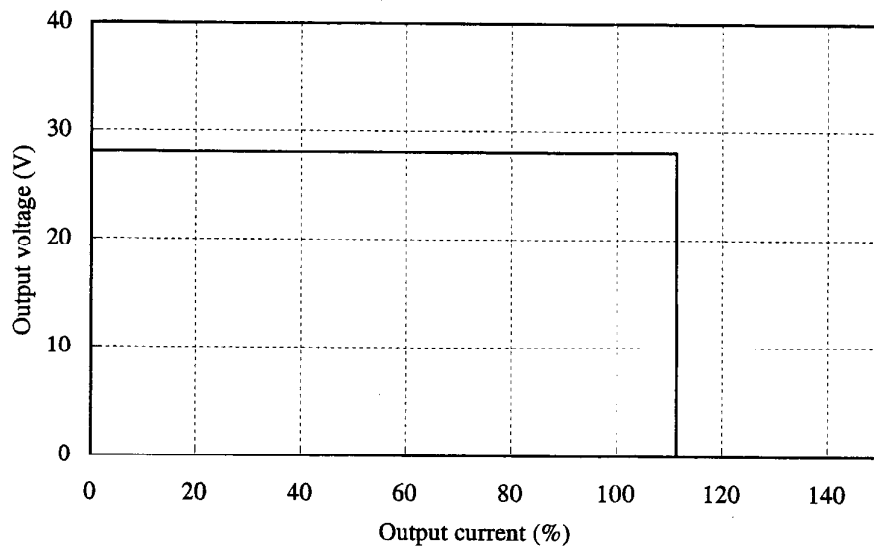
Over current protection (OCP) characteristics

Conditions Vin : 36 VDC -----  
 : 48 VDC -----  
 : 76 VDC -----  
 Tp : 25 °C

12V



28V



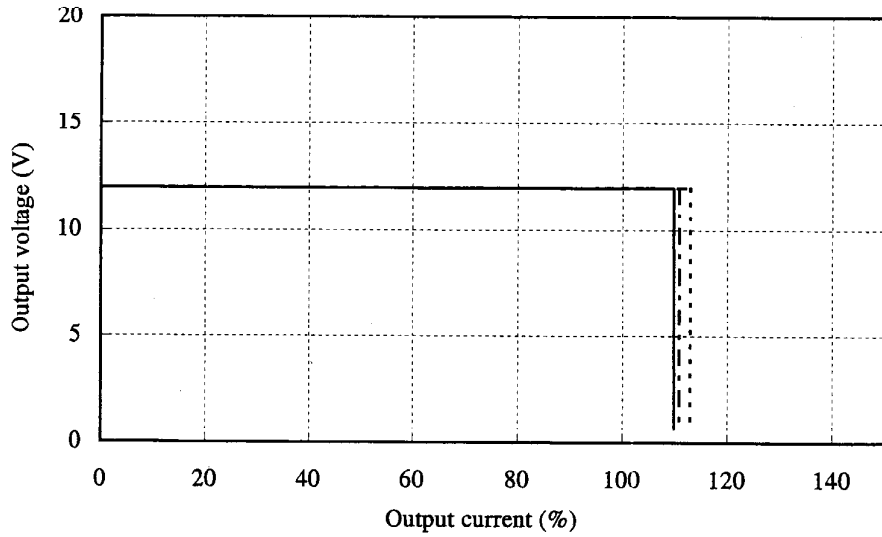
2.3 過電流保護特性

Over current protection (OCP) characteristics

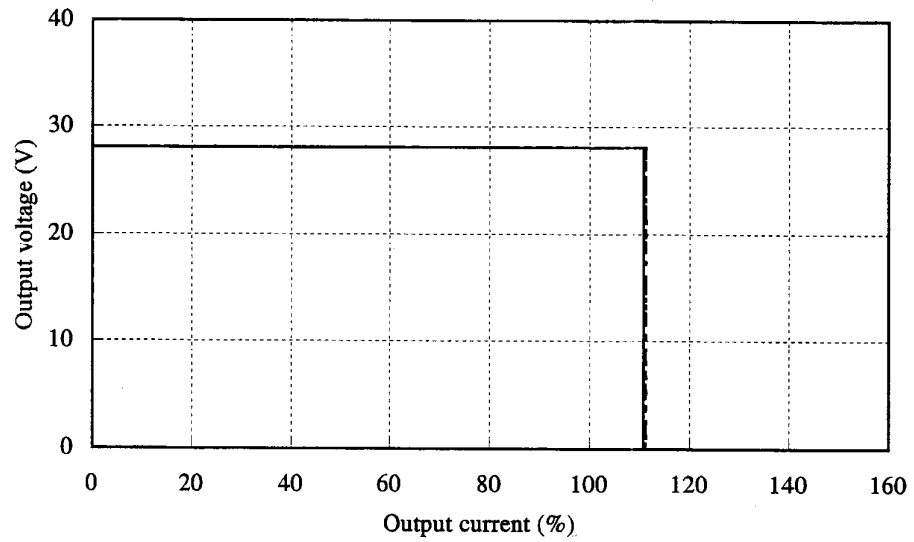
Conditions Vin : 48 VDC

Tp : -40 °C -----  
 : 25 °C - - - - -  
 : 85 °C \_\_\_\_\_

12V



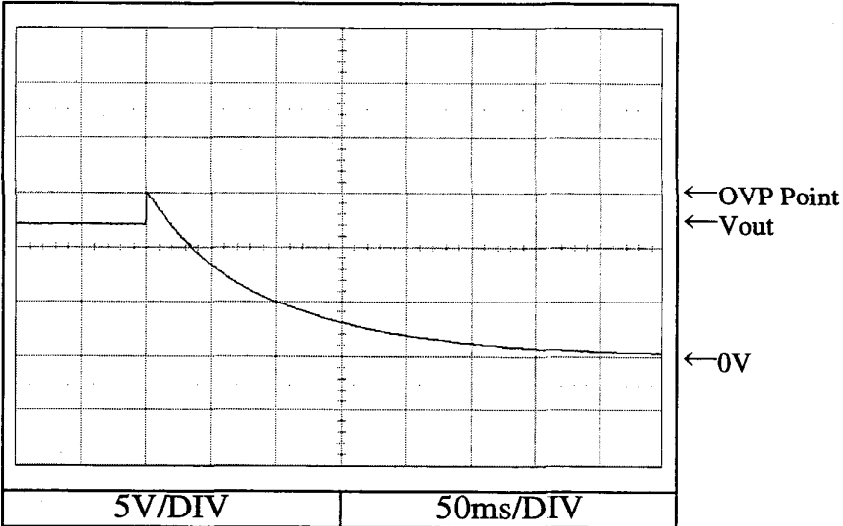
28V



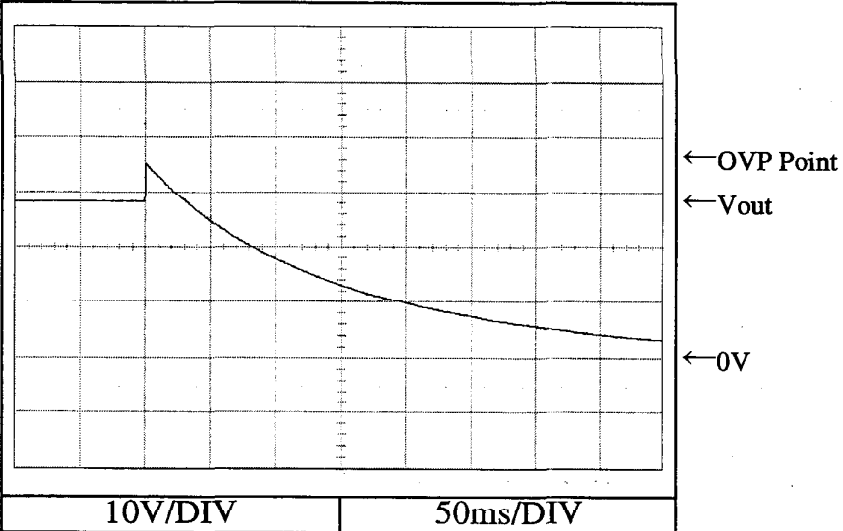
2.4 過電圧保護特性  
Over voltage protection (OVP) characteristics

Conditions Vin : 48 VDC  
Iout : 0 %  
Tp : 25 °C

12V



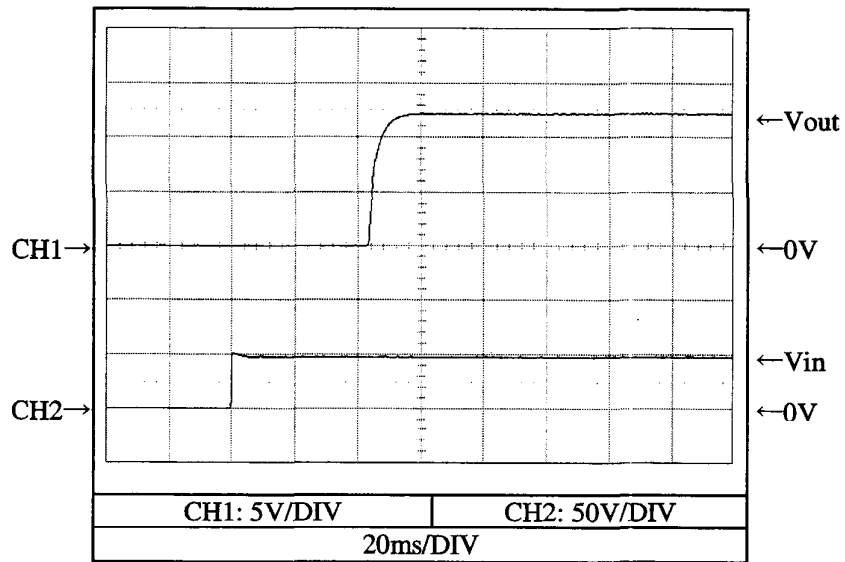
28V



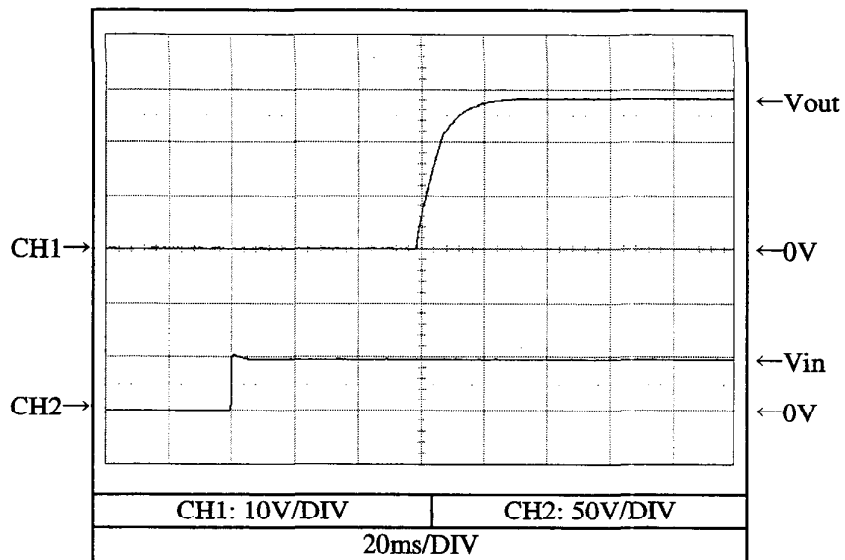
2.5 出力立ち上がり特性  
Output rise characteristics

Conditions Vin : 48 VDC  
Iout : 0 %  
Tp : 25 °C

12V



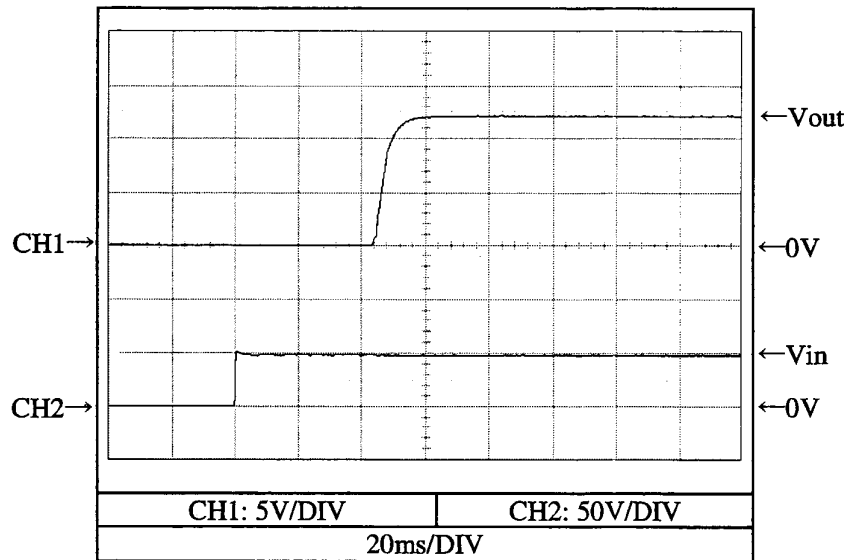
28V



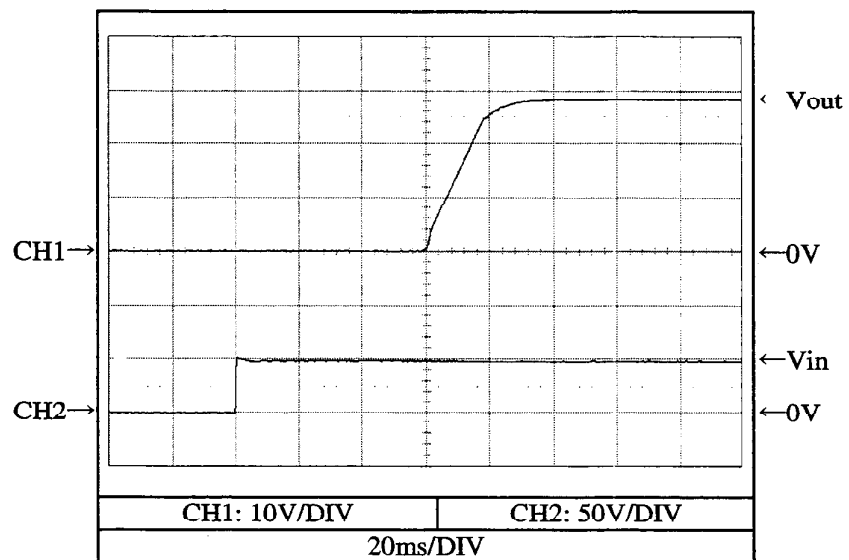
2.5 出力立ち上がり特性  
Output rise characteristics

Conditions Vin : 48 VDC  
Iout : 100 %  
Tp : 25 °C

12V



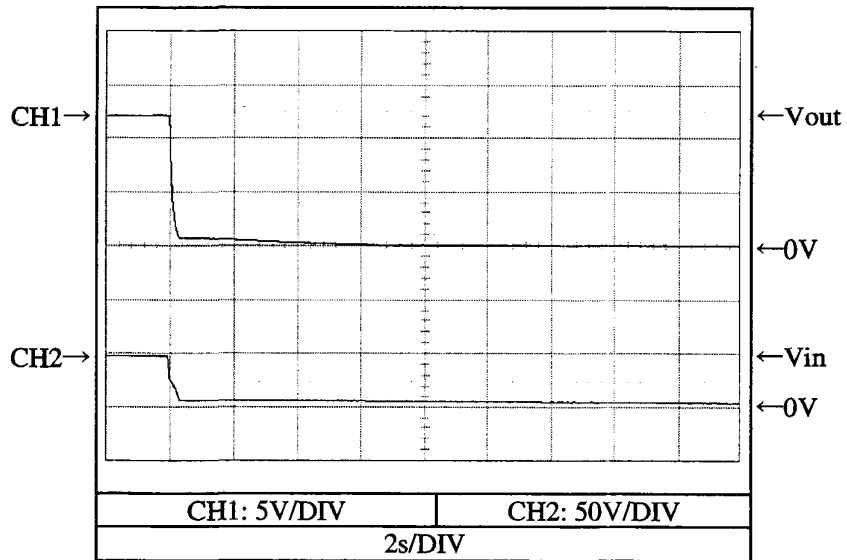
28V



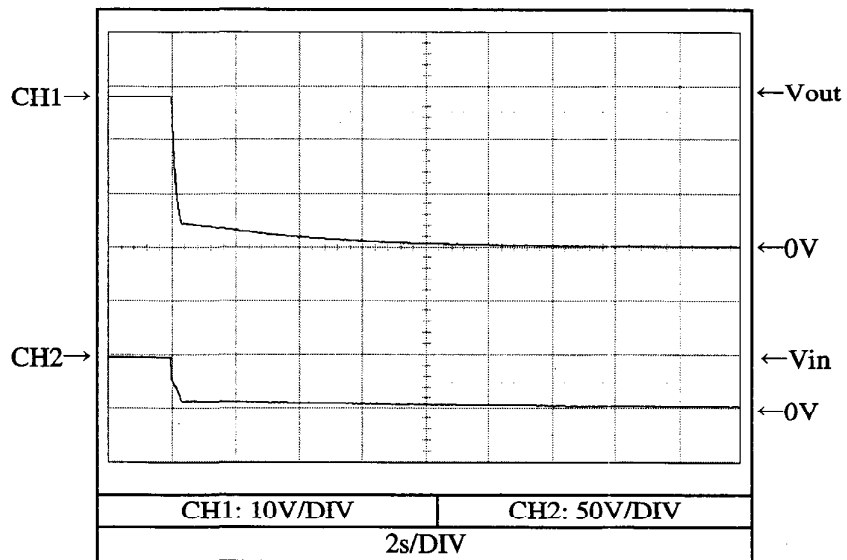
2.6 出力立ち下がり特性  
Output fall characteristics

Conditions Vin : 48 VDC  
Iout : 0 %  
Tp : 25 °C

12V



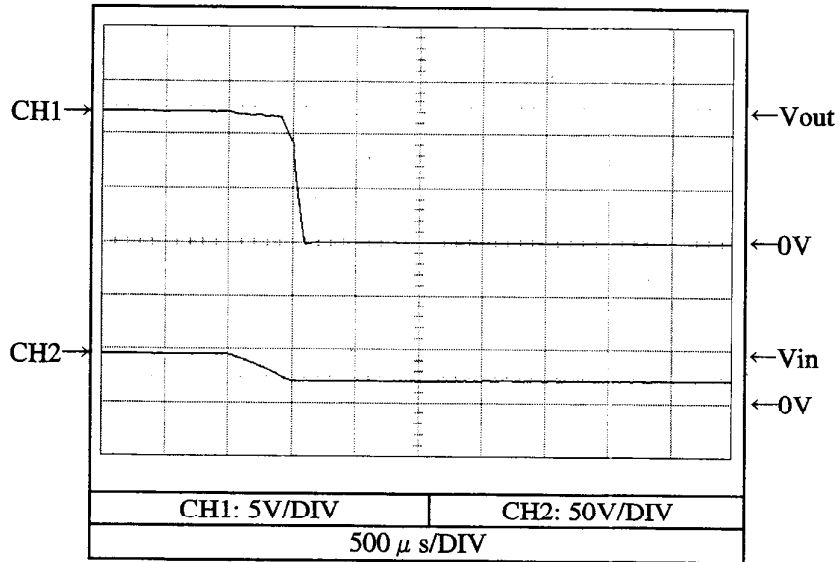
28V



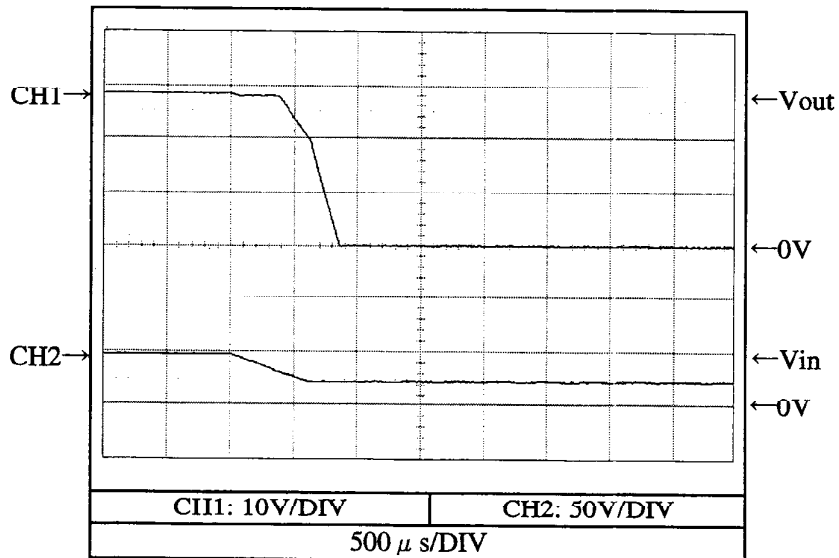
2.6 出力立ち下がり特性  
Output fall characteristics

Conditions Vin : 48 VDC  
Iout : 100 %  
Tp : 25 °C

12V



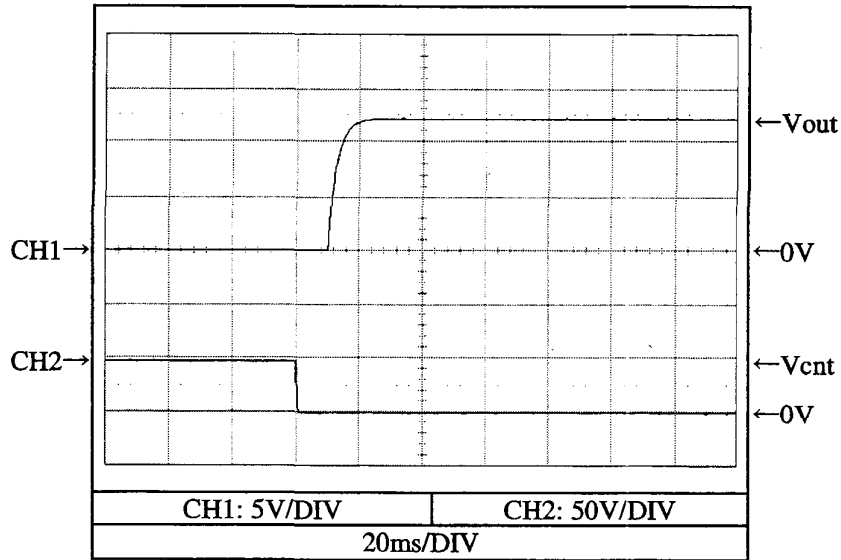
28V



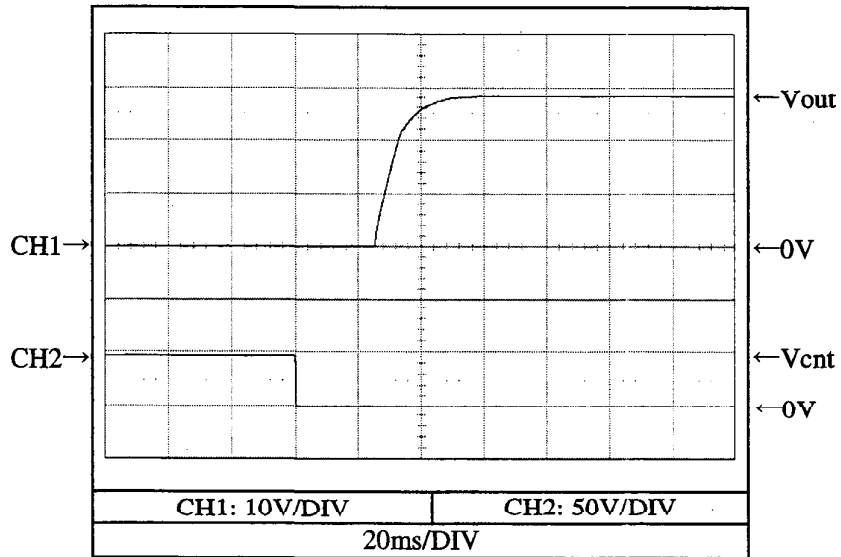
2.7 出力立ち上がり特性 (ON/OFFコントロール時)  
Output rise characteristics with ON/OFF CONTROL

Conditions Vin : 48 VDC  
Iout : 0 %  
Tp : 25 °C

12V



28V

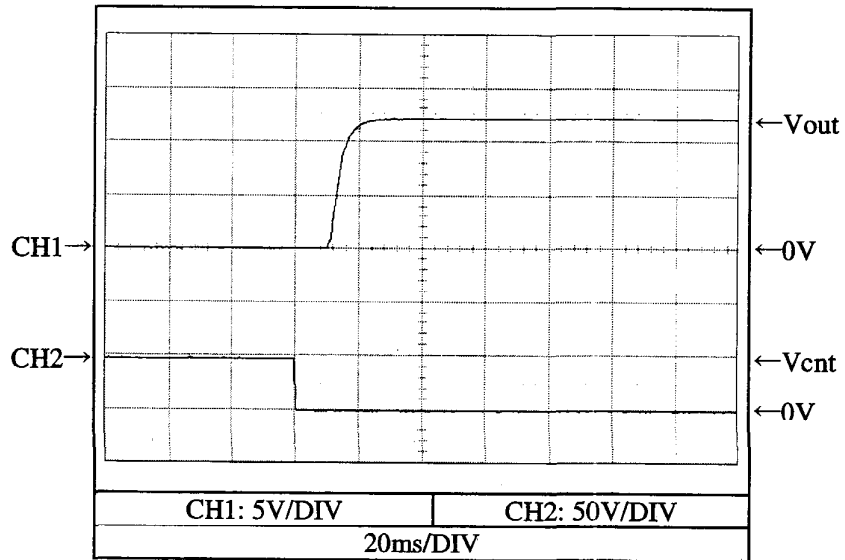




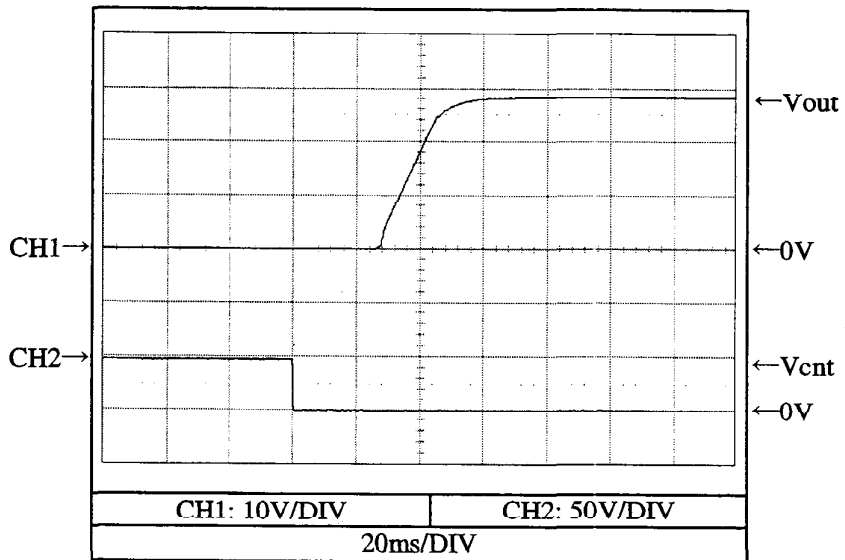
2.7 出力立ち上がり特性 (ON/OFFコントロール時)  
Output rise characteristics with ON/OFF CONTROL

Conditions Vin : 48 VDC  
Iout : 100 %  
Tp : 25 °C

12V



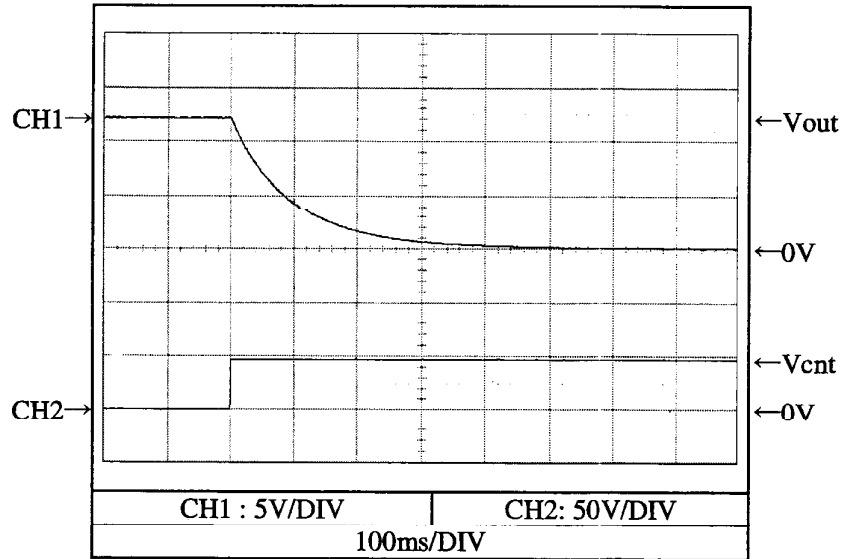
28V



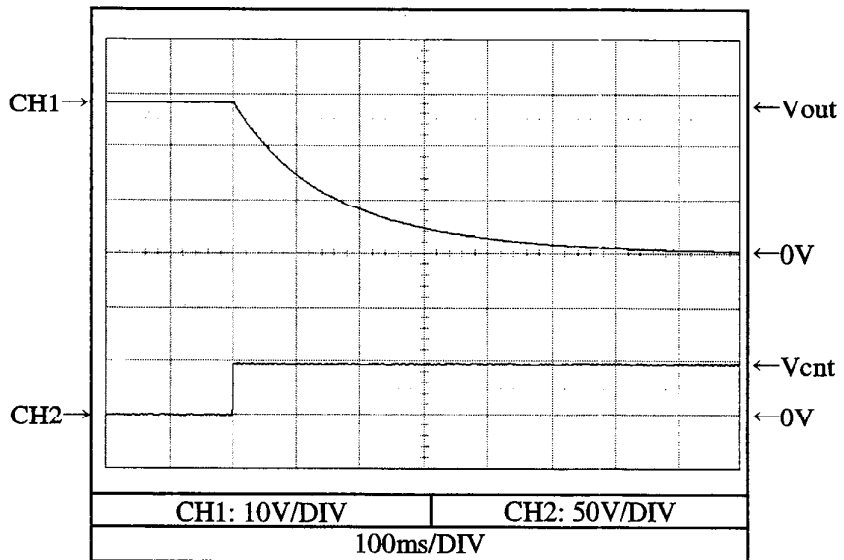
2.8 出力立ち下がり特性 (ON/OFFコントロール時)  
Output fall characteristics with ON/OFF CONTROL

Conditions Vin : 48 VDC  
Iout : 0 %  
Tp : 25 °C

12V



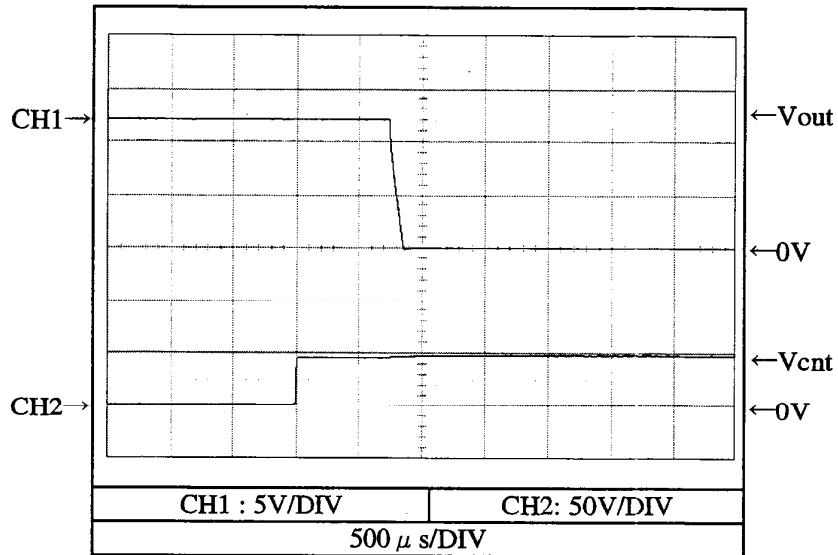
28V



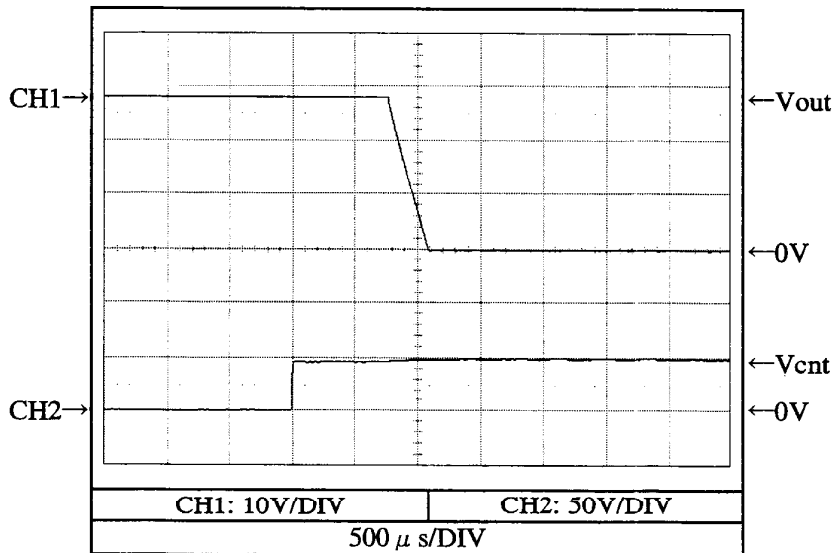
2.8 出力立ち下がり特性 (ON/OFFコントロール時)  
Output fall characteristics with ON/OFF CONTROL

Conditions Vin : 48 VDC  
Iout : 100 %  
Tp : 25 °C

12V



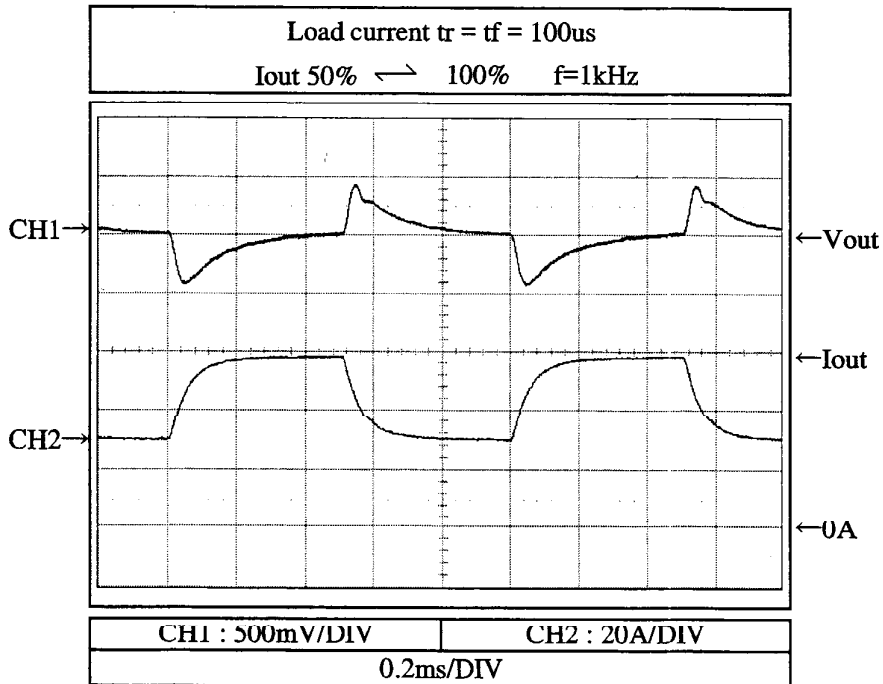
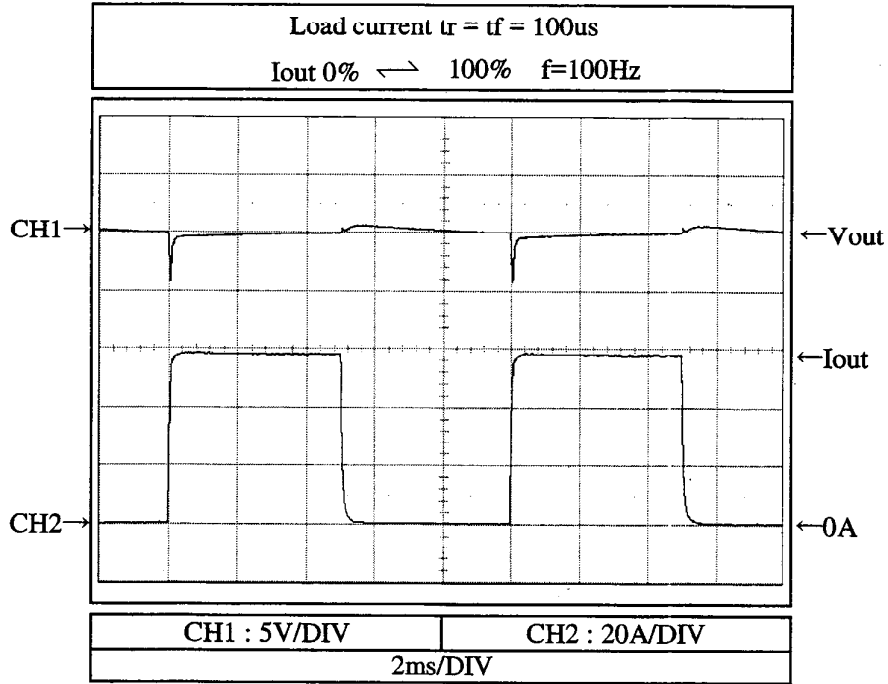
28V



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

Conditions Vin : 48 VDC  
Tp : 25 °C

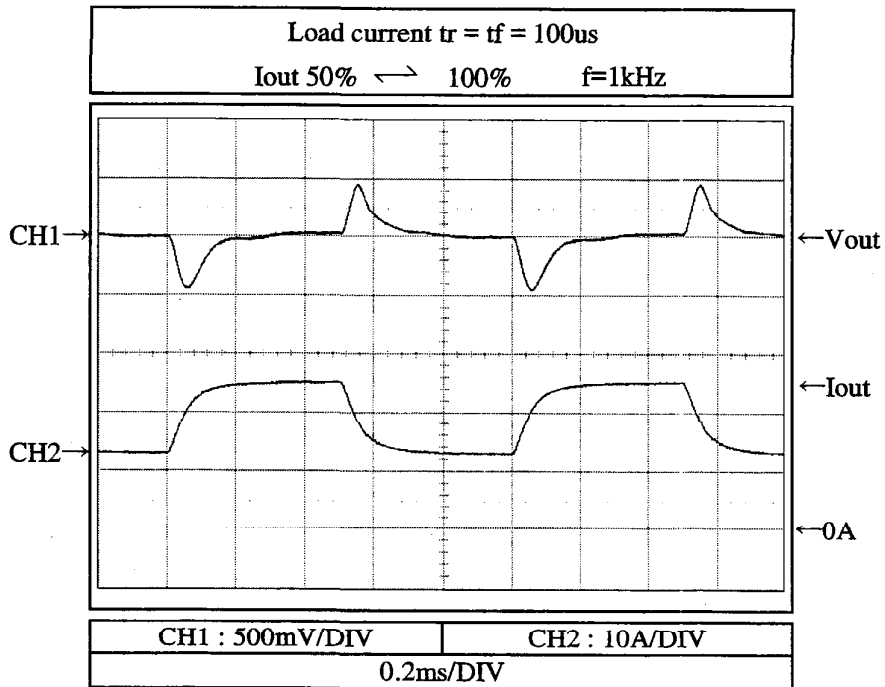
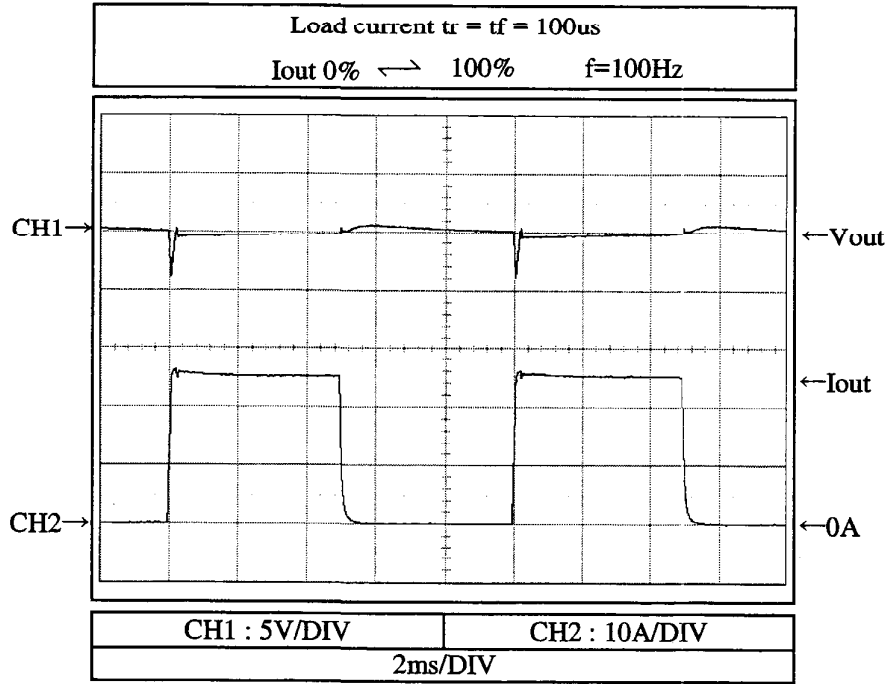
12V



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

Conditions Vin : 48 VDC  
Tp : 25 °C

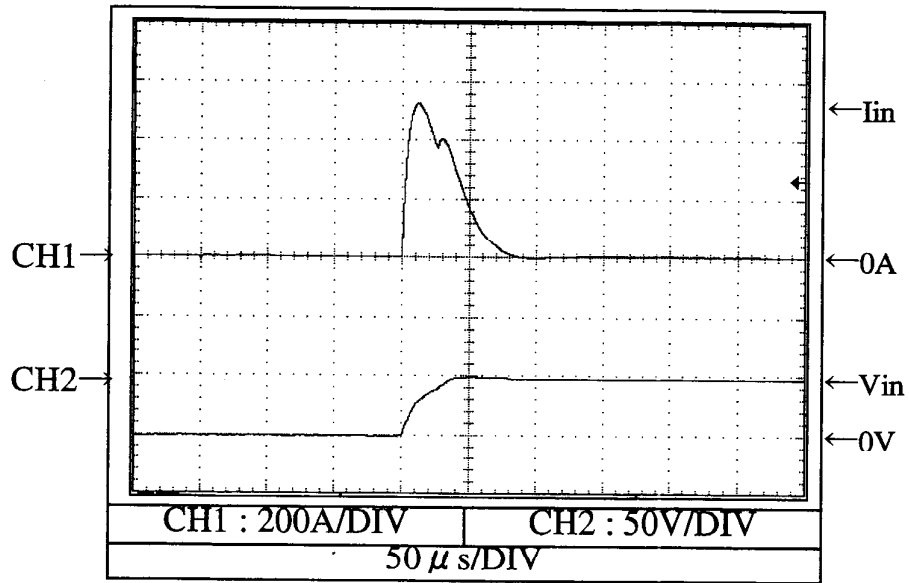
28V



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

Conditions  $V_{in}$  : 48 VDC  
 $I_{out}$  : 100 %  
 $T_p$  : 25 °C

28V

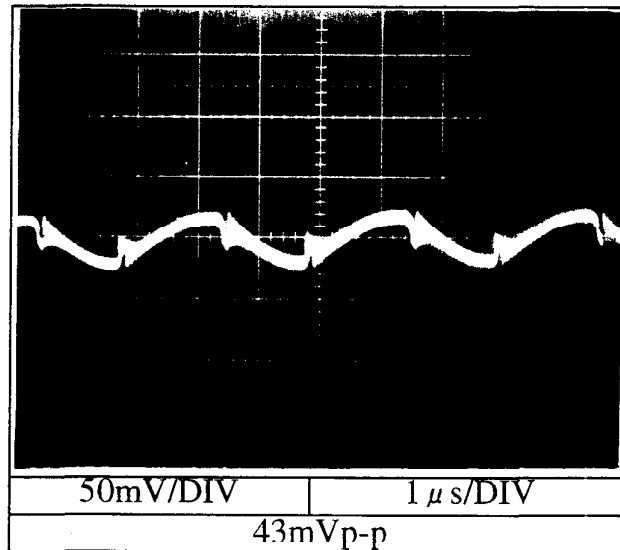


2.11 出力リップル、ノイズ波形  
Output ripple and noise waveform

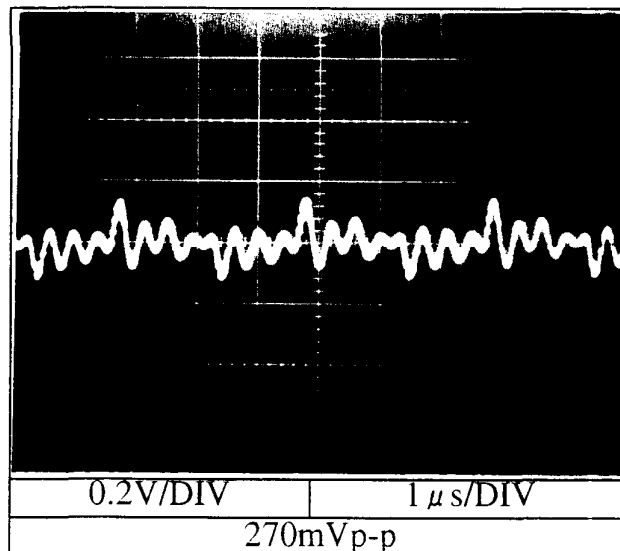
Conditions Vin : 48 VDC  
Iout : 100 %  
Ta : 25 °C

12V

Normal mode



Normal + common mode

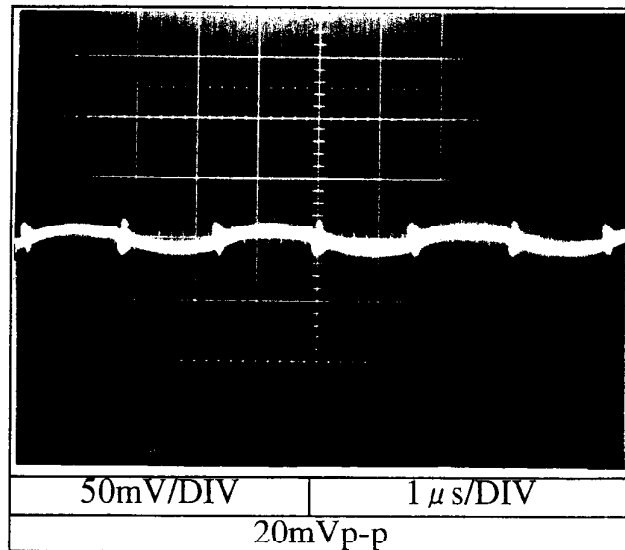


2.11 出カリップル、ノイズ波形  
Output ripple and noise waveform

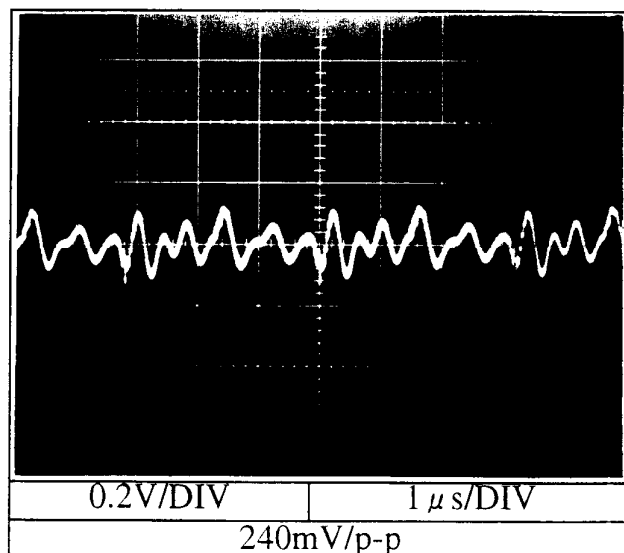
Conditions Vin : 48 VDC  
Iout : 100 %  
Ta : 25 °C

28V

Normal mode



Normal + common mode





2.12 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

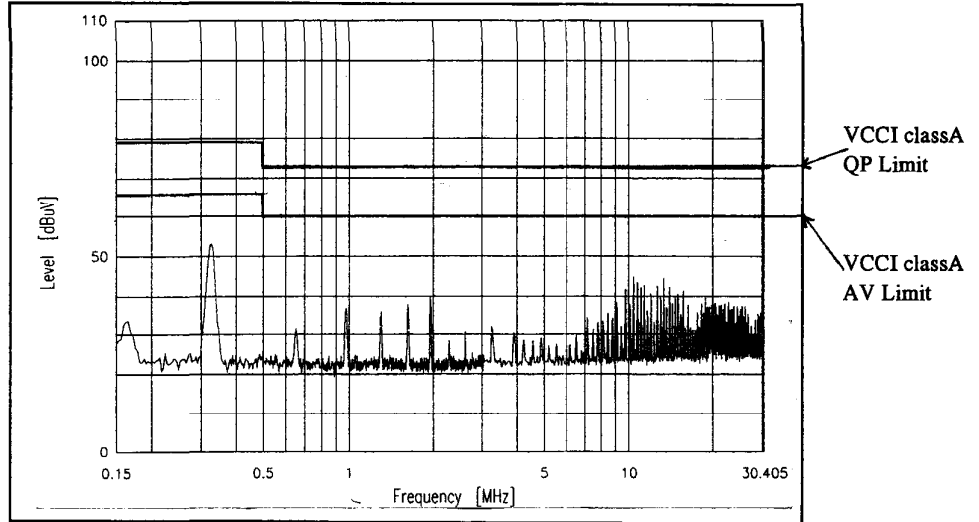
Iout : 100 %

(1) VCCI class A 対応アプリケーションシステム

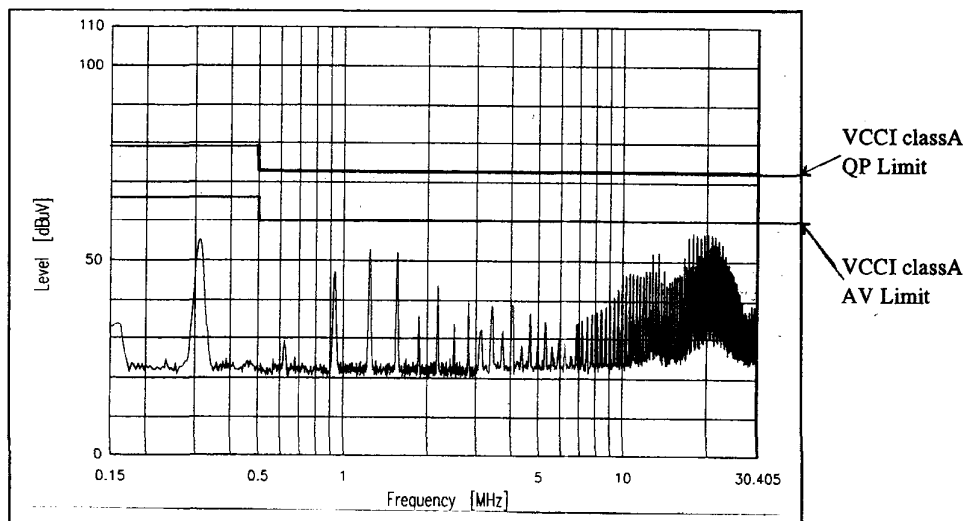
Tp : 25 °C

VCCI class A application system

12V



28V



2.12 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

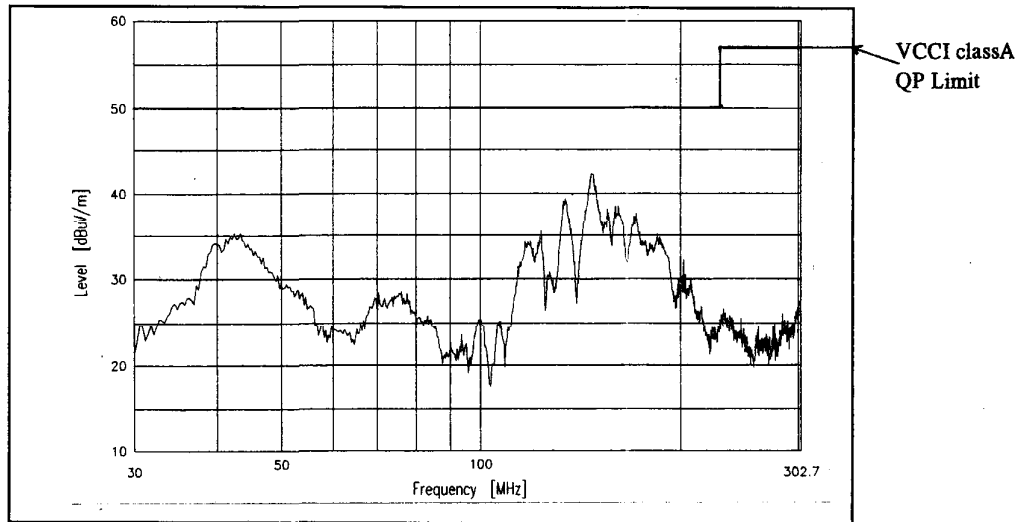
Conditions Vin : 48 VDC

Iout : 100 %

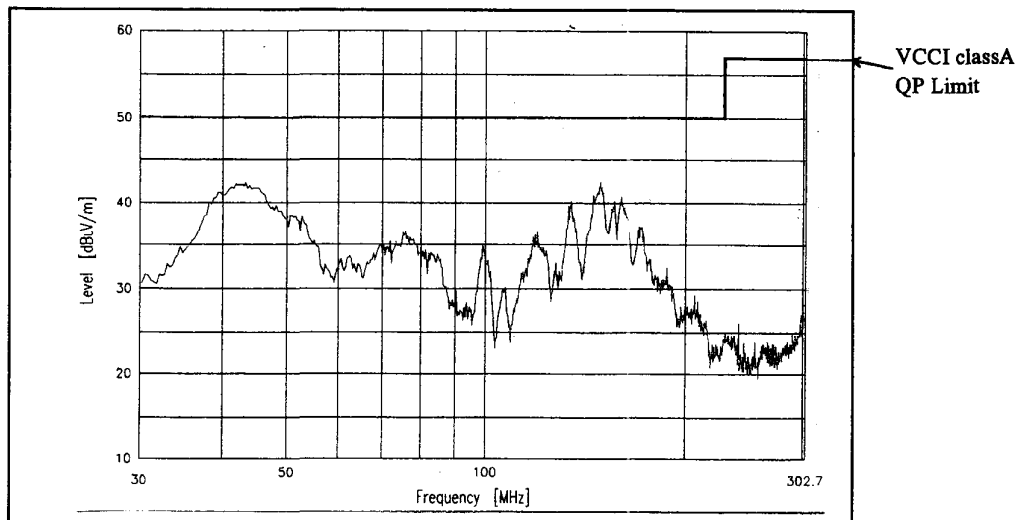
Tp : 25 °C

12V

HORIZONTAL:



VERTICAL:



2.12 EMI特性

Electro-Magnetic Interference characteristics

(b) 雑音電界強度 (輻射ノイズ)

Conditions Vin : 48 VDC

Radiated Emission

Iout : 100 %

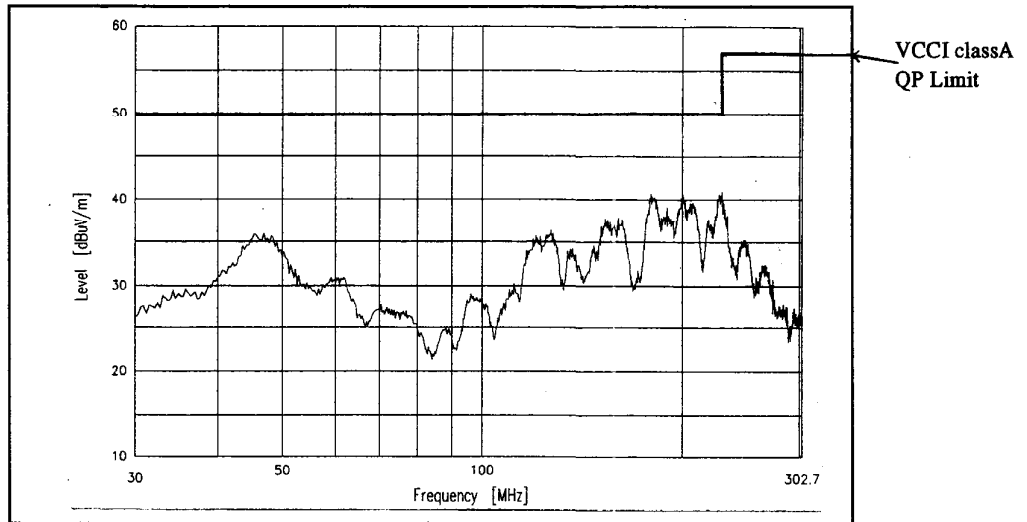
(1) VCCI class A 対応アプリケーションシステム

Tp : 25 °C

VCCI class A application system

28V

HORIZONTAL:



VERTICAL:

