

# PAH300S24-\*

## EVALUATION DATA

### 型式データ

DWG.NO. C175-53-01			
承認	承認	査閲	担当
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<i>10.OCT.'03</i>	<i>10.OCT.'03</i>	<i>10,Oct,'03</i>	<i>9.Oct,'03</i>

DENSEI-LAMBDA

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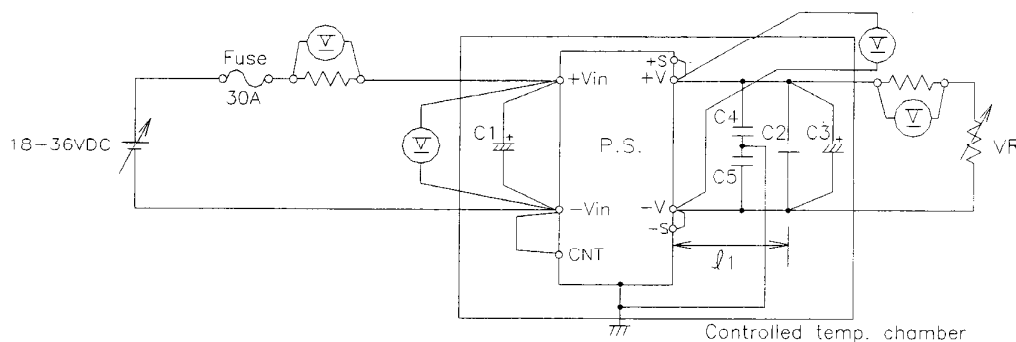
使用記号 Terminology used

	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
Tbp	..... ベースプレート温度	Baseplate Temperature

1. 測定方法 Evaluation Method

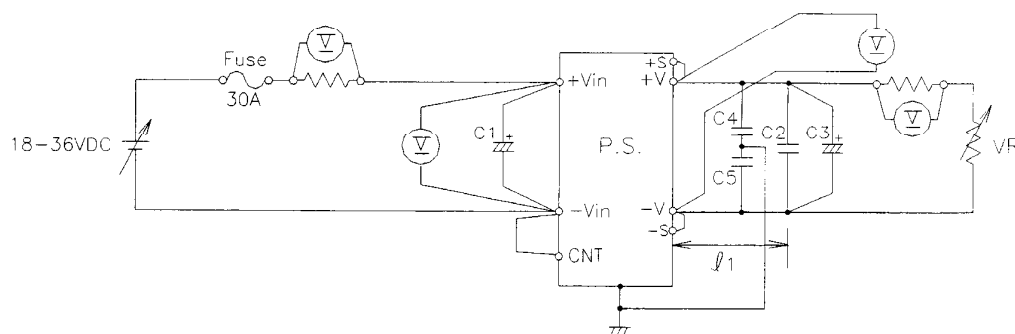
1.1 測定回路 Circuits used for determination

(1) 静特性 Steady state data



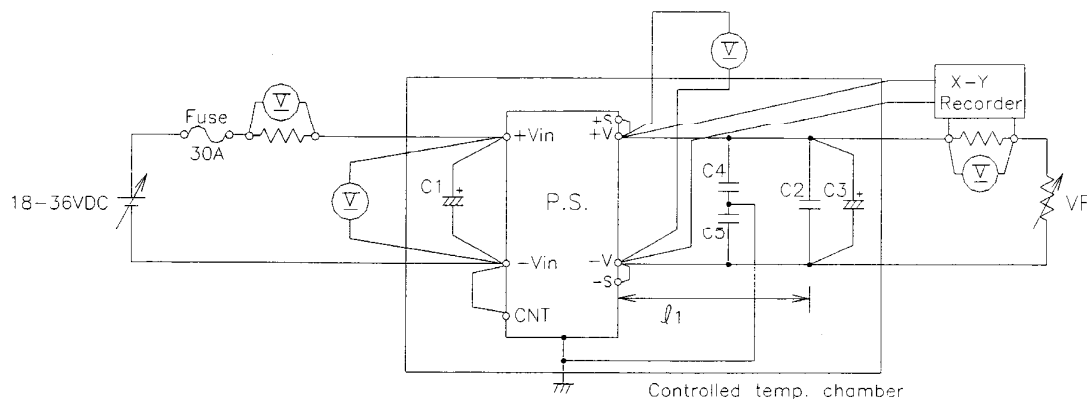
C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor  $l_1$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

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



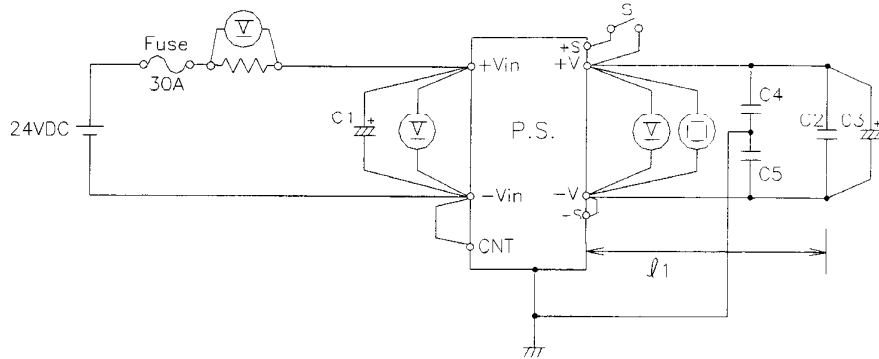
C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor  $l_1$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

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



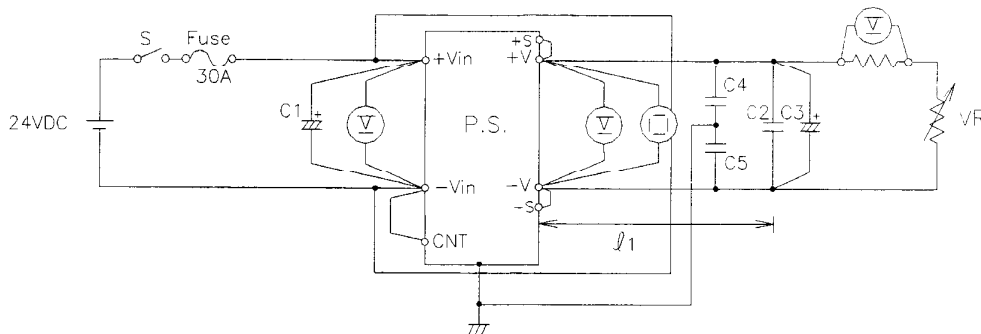
C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor  $l_1$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

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



C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor  $l_1$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

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



C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor  $l_1$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

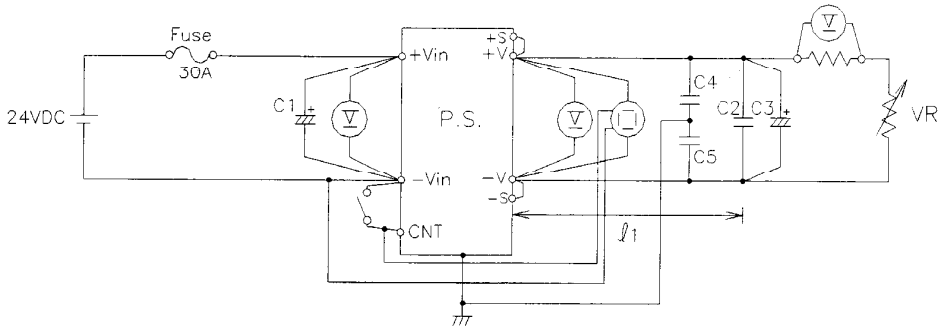
(6) 出力立ち下がり Output fall characteristics

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



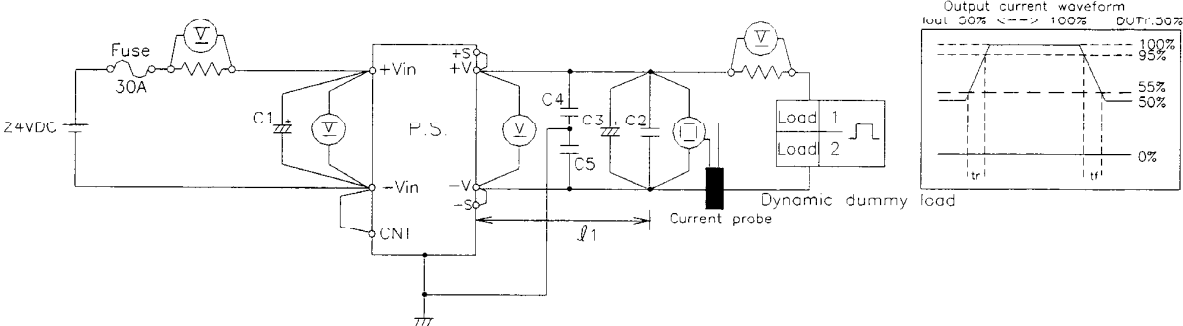
C1: 220uF Electrolytic Capacitor x 2para    C3: 12V-470uF Electrolytic Capacitor    I<sub>1</sub>: 50mm  
 C2: 0.1uF Ceramic Capacitor                                28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

(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

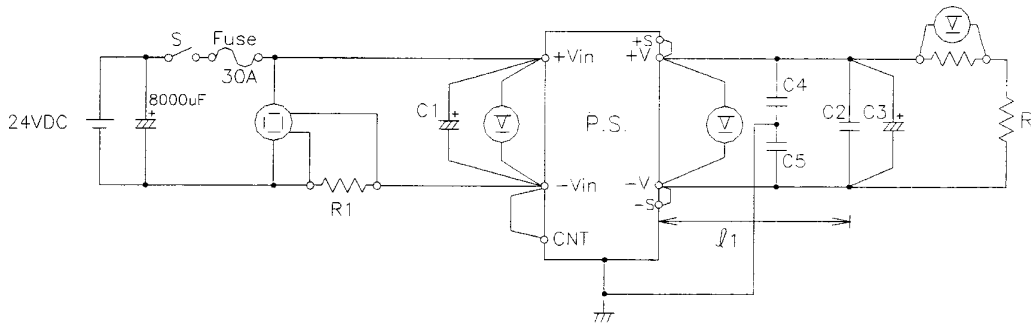
出力立ち上がり特性 (ON/OFFコントロール時) と同じ  
 Same as output rise characteristics with ON/OFF CONTROL

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



C1: 220uF Electrolytic Capacitor x 2para    C3: 12V-470uF Electrolytic Capacitor    I<sub>1</sub>: 50mm  
 C2: 0.1uF Ceramic Capacitor                                28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

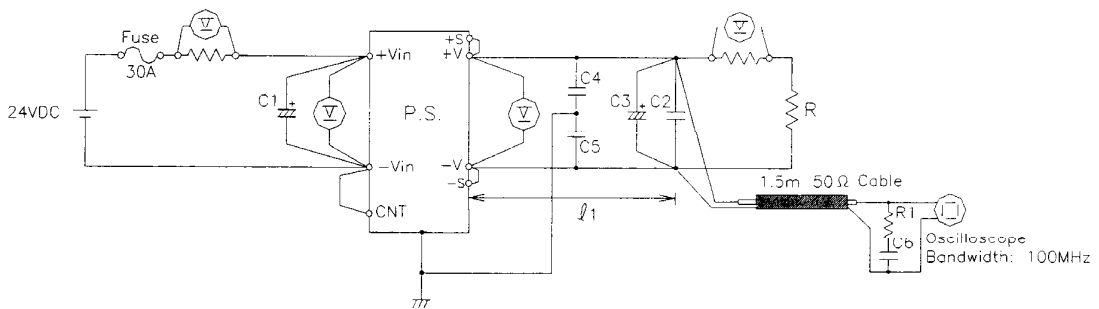
(10) 入力サージ電流 (突入電流) 特性 Inrush current characteristics



C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor R1: 0.01Ω  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  $l_1$ : 50mm  
 C4,C5: 0.022uF Film Capacitor

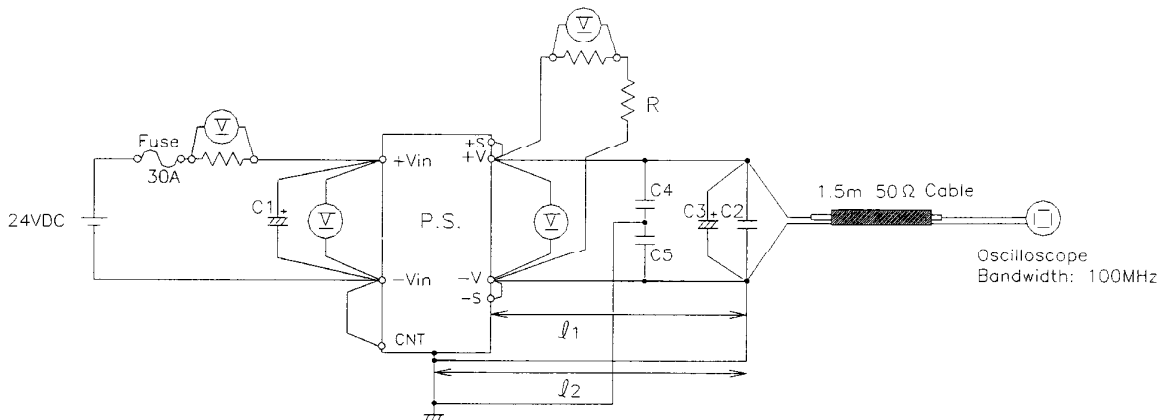
(11) 出力リップル、ノイズ波形 Output ripple and noise waveform

(a) Normal Mode



C1: 220uF Electrolytic Capacitor x 2para C3: 12V-470uF Electrolytic Capacitor C6: 4700pF Ceramic Capacitor  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor R1: 50 Ω  
 C4,C5: 0.022uF Film Capacitor  $l_1$ : 50mm

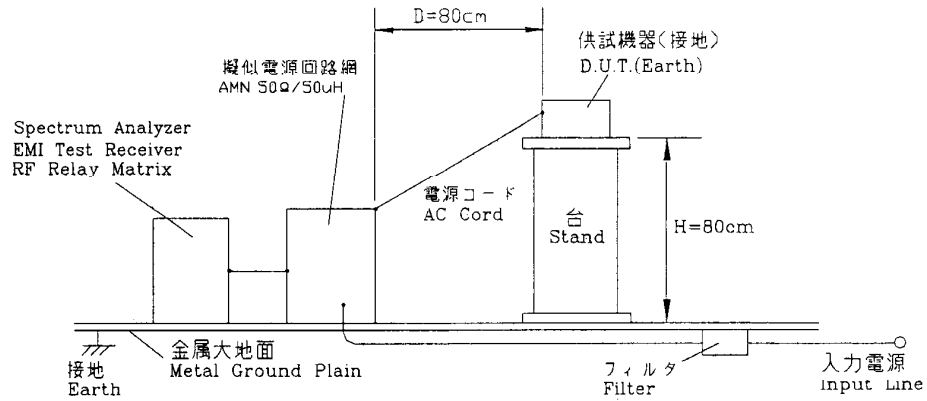
(b) Normal + Common Mode



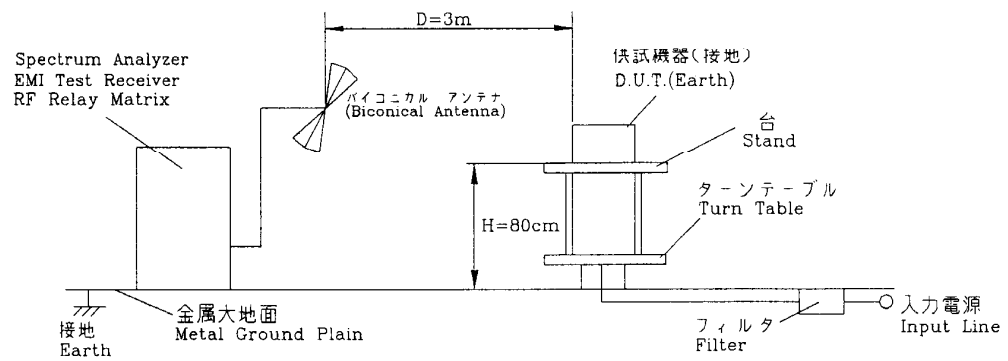
C1: 220uF Electrolytic Capacitor x 2para C3: 12V 470uF Electrolytic Capacitor  $l_1, l_2$ : 50mm  
 C2: 0.1uF Ceramic Capacitor 28V-220uF Electrolytic Capacitor  
 C4,C5: 0.022uF Film Capacitor

(12) EMI 特性 Electro-Magnetic Interference characteristics

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

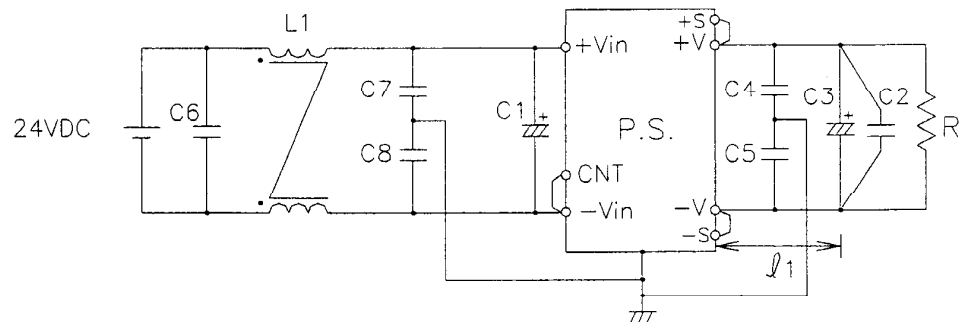


(b) 雑音電界強度 (輻射ノイズ) Radiated Emission Noise



(1) VCC class A 対応対応アプリケーションシステム

VCCI class A application system



- |   |                                   |
|---|-----------------------------------|
| C1 : 680uF Electrolytic Capacitor x 3para | C4,C5 : 0.022uF Ceramic Capacitor |
| C2 : 0.1uF Ceramic Capacitor              | C6 : 10uF Ceramic Capacitor       |
| C3 : 12V-470uF Electrolytic Capacitor     | C7,C8 : 0.4/uF Film Capacitor     |
| 28V-220uF Electrolytic Capacitor          | L1 : 1mH                          |
|   | l1 : 50mm                         |



## 1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	OSCILLOSCOPE	HITACHI DENSHI	V-1100A
2	DIGITAL STORAGE OSCILLOSCOPE	IWATSU-LECROY	LT364L
3	DIGITAL MULTIMETER	ADVANTEST	R6441B
4	DATA ACQUISITION / SWITCH UNIT	AGILENT	34970A
5	CURRENT PROBE	LECROY	AP015
6	SHUNT RESISTER	YOKOGAWA ELECT.	2215
7	X-Y RECORDER	GRAPHTEC	WX3000
8	CONTROLLED TEMP. CHAMBER	TABAI ESPEC	SH-240
9	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSA
10	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
11	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
12	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
13	AMN	KYORITU DENSHI	KNW-408
14	ANTENNA(BICONICAL ANTENNA)	SCHWARZBECK	BBA9106
15	DYNAMIC DUMMY LOAD	TAKASAGO	FK-400L
16	DC POWER SUPPLY	TAKASAGO	EX-1500L

## 2. 特性データ Characteristics

## 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 Tbp : 25°C

Iout \ Vin	18VDC	24VDC	36VDC	line regulation	
0%	12.009V	12.008V	12.009V	1mV	0.008%
50%	12.010V	12.010V	12.010V	0mV	0.000%
100%	12.011V	12.010V	12.011V	1mV	0.008%
load regulation	2mV	2mV	2mV		
	0.017%	0.017%	0.017%		

## 2. Temperature drift

conditions Vin : 24VDC

Iout : 100%

Tbp	-40°C	25°C	100°C	temperature stability	
Vout	12.047V	12.010V	11.942V	105mV	0.875%

28V

## 1. Regulation - line and load

condition Tbp : 25°C

Iout \ Vin	18VDC	24VDC	36VDC	line regulation	
0%	27.927V	27.929V	27.928V	2mV	0.007%
50%	27.927V	27.928V	27.928V	1mV	0.004%
100%	27.927V	27.929V	27.929V	2mV	0.007%
load regulation	0mV	1mV	1mV		
	0.000%	0.004%	0.004%		

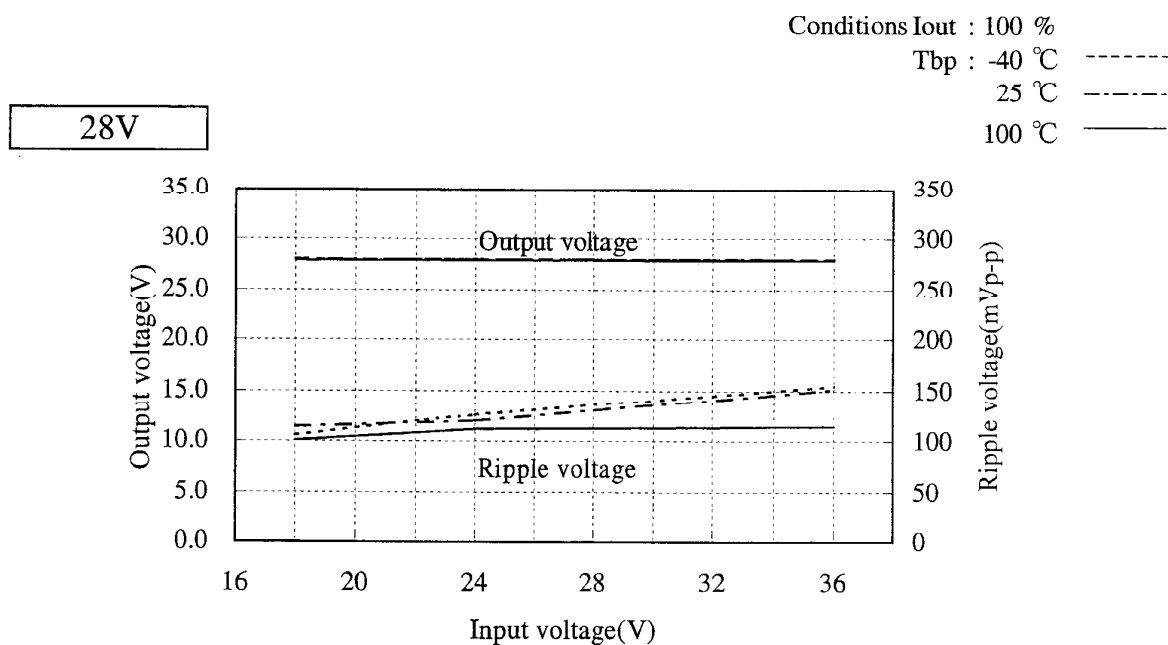
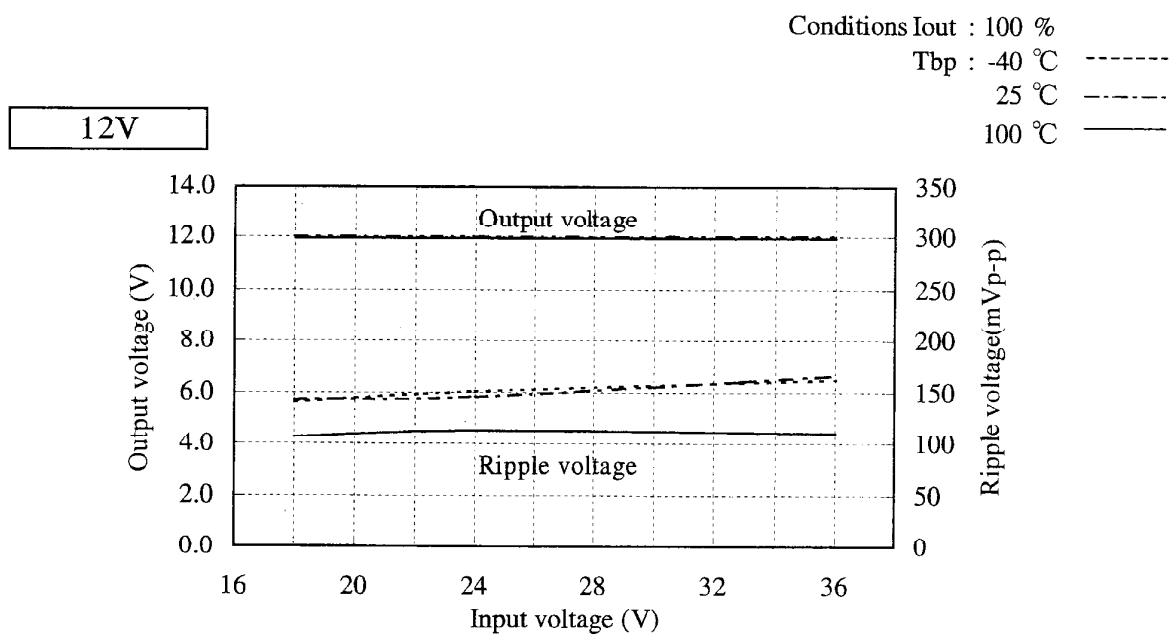
## 2. Temperature drift

conditions Vin : 24VDC

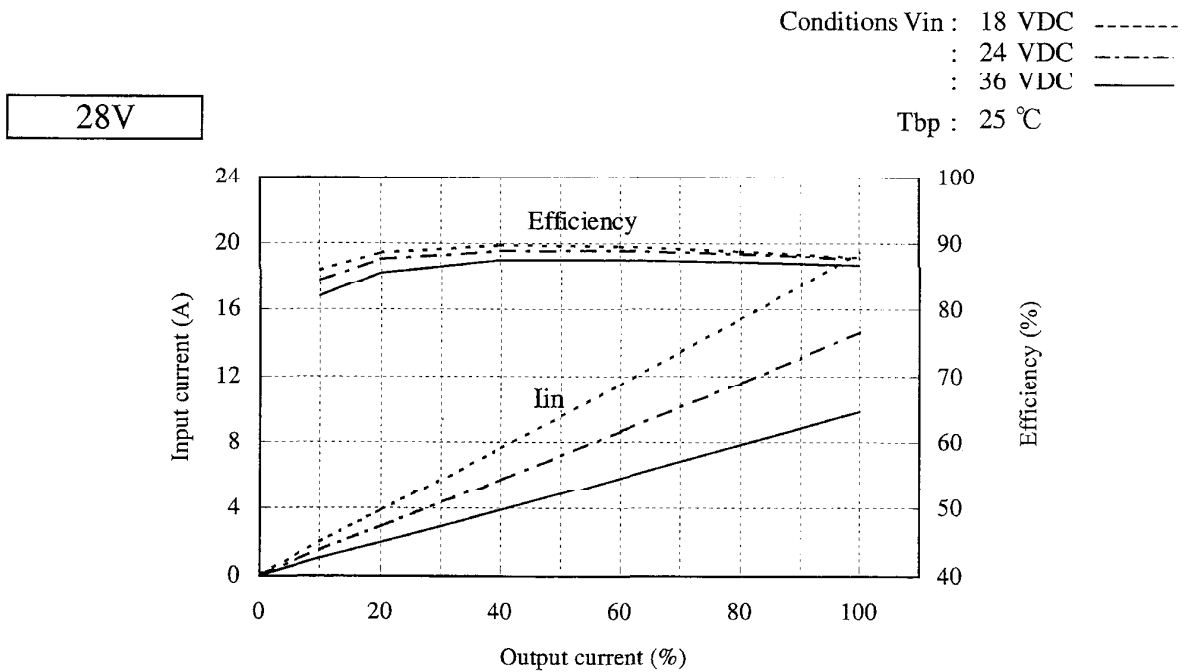
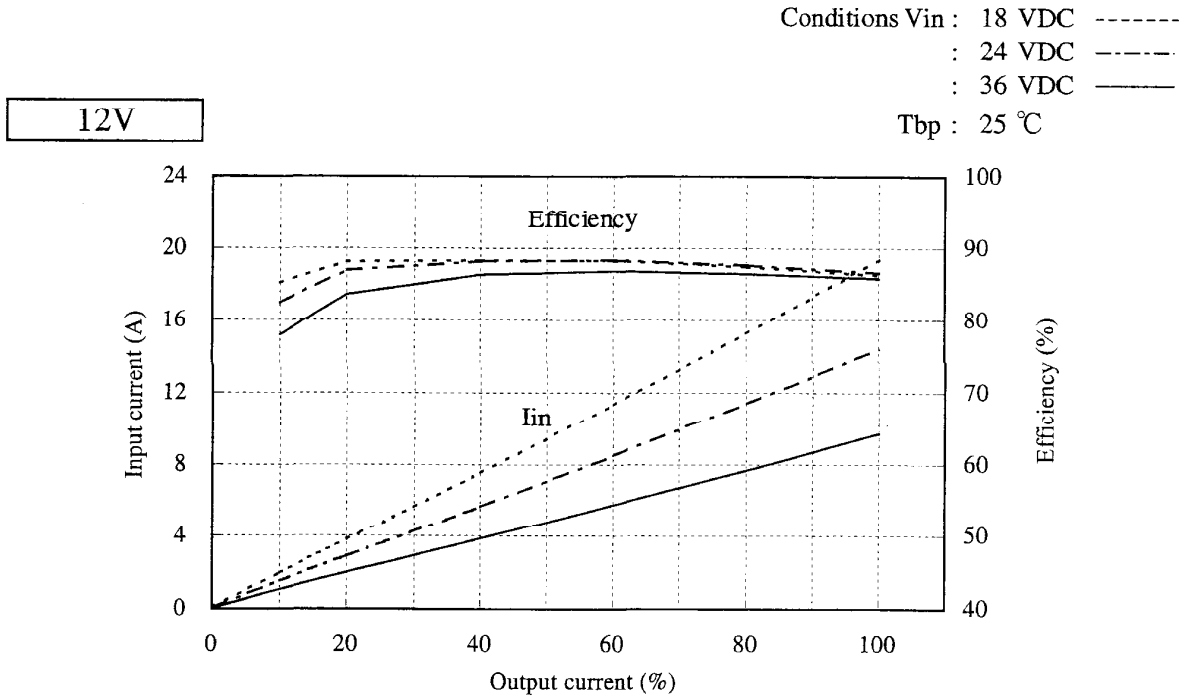
Iout : 100%

Tbp	-40°C	25°C	100°C	temperature stability	
Vout	27.966V	27.929V	27.898V	68mV	0.243%

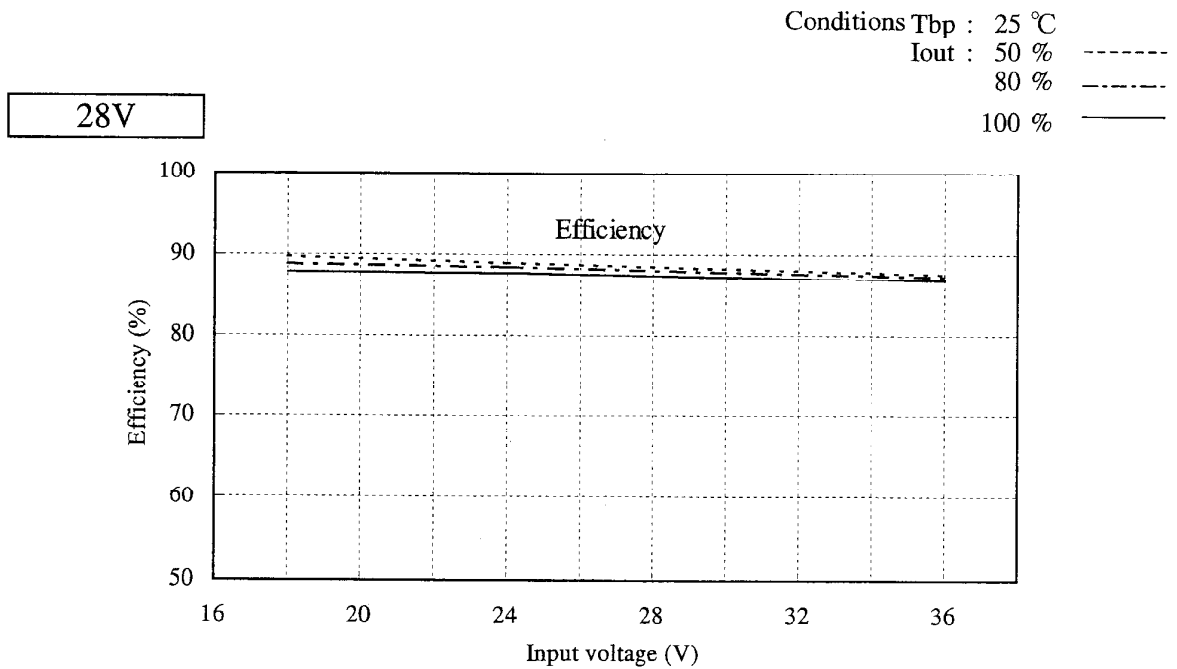
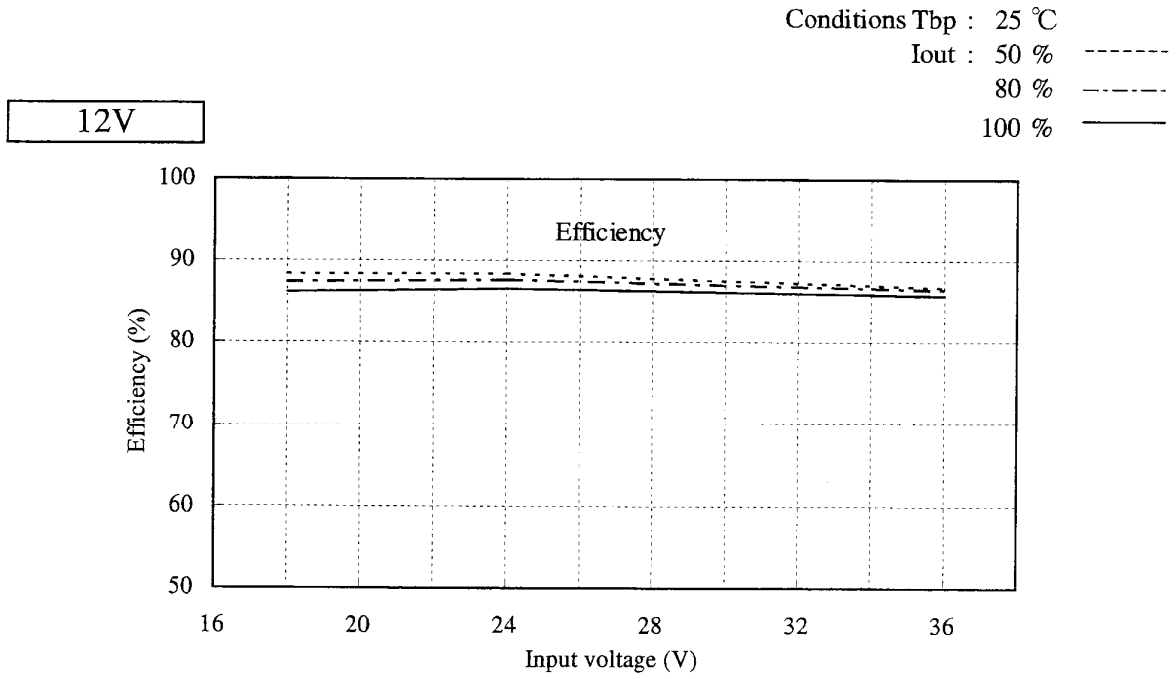
2.1 (2) 出力電圧・リップル電圧対入力電圧  
Output voltage and ripple voltage v.s. input voltage



2.1 (3) 効率・入力電流対出力電流  
 Efficiency and input current v.s. output current



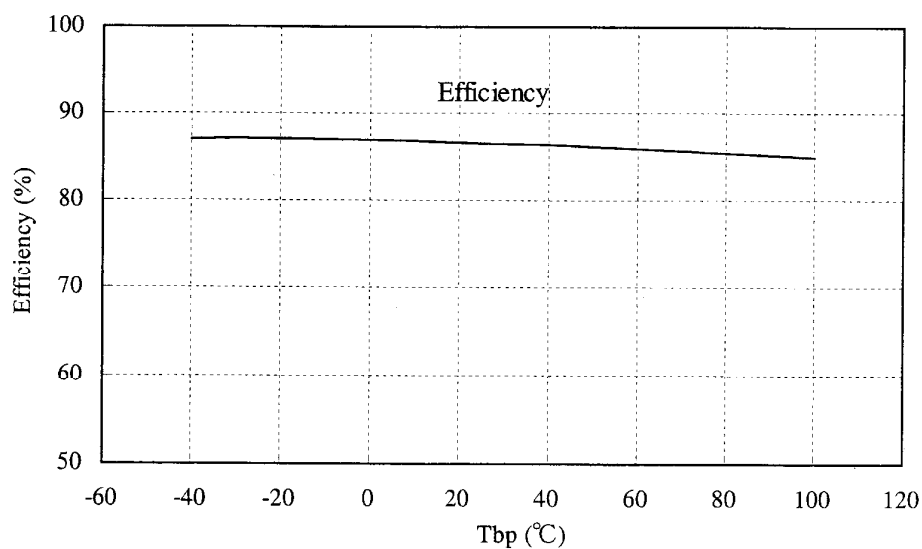
2.1 (4) 効률对入力電圧  
Efficiency v.s. input voltage



2.1 (5) 効率対ベースプレート温度  
Efficiency v.s. Baseplate temperature

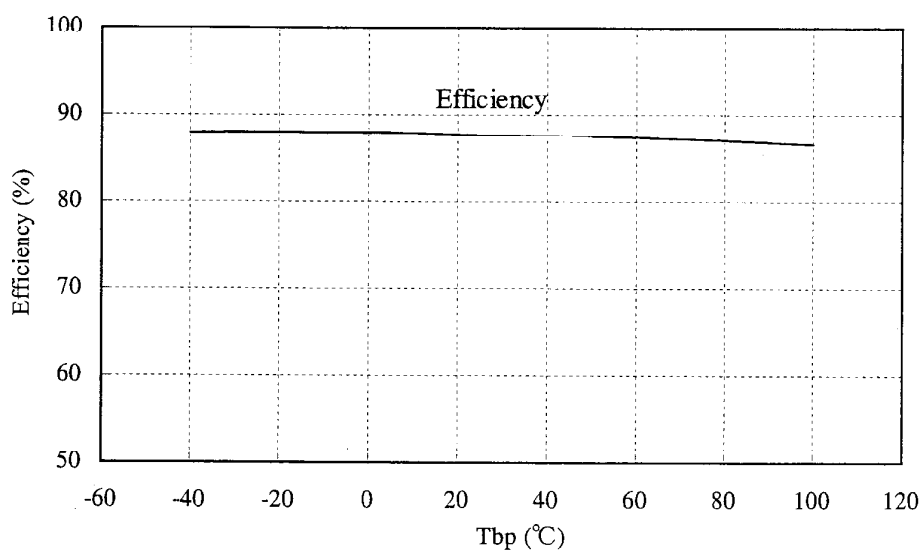
Conditions Vin : 24 VDC  
Iout : 100 %

12V



28V

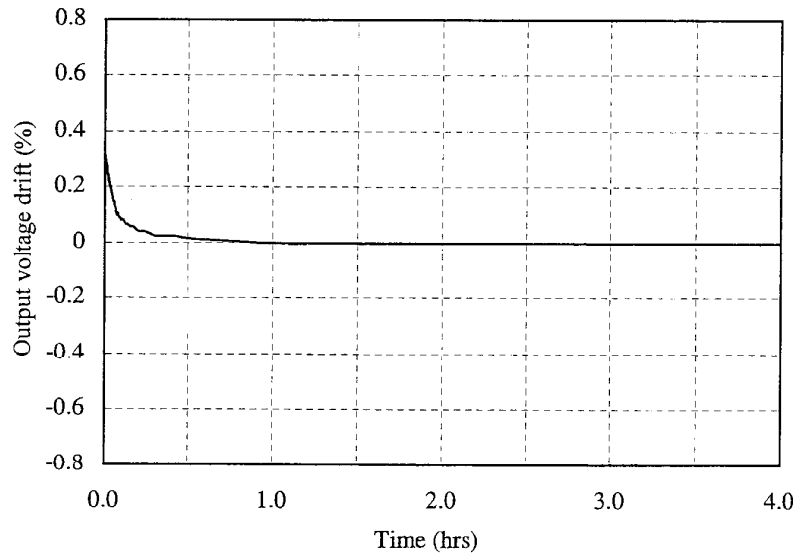
Conditions Vin : 24 VDC  
Iout : 100 %



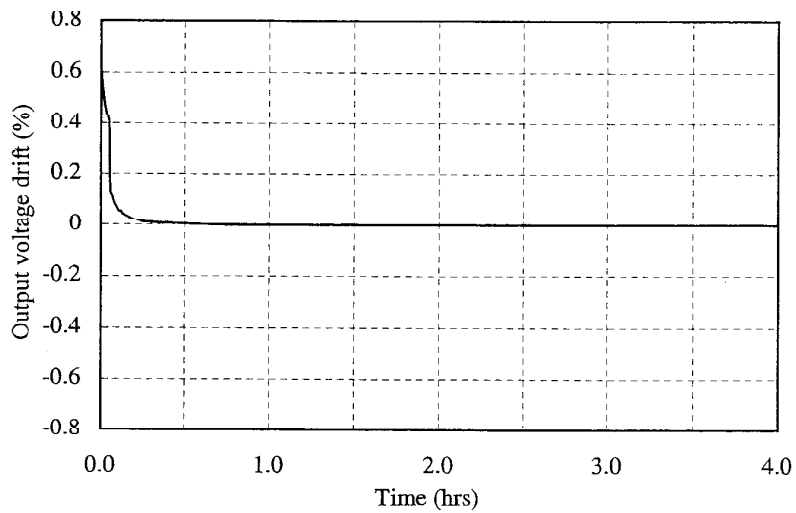
2.2 通電ドリフト特性  
Warm up voltage drift characteristics

Conditions Vin : 24 VDC  
Iout : 100 %  
Ta : 25 °C

12V



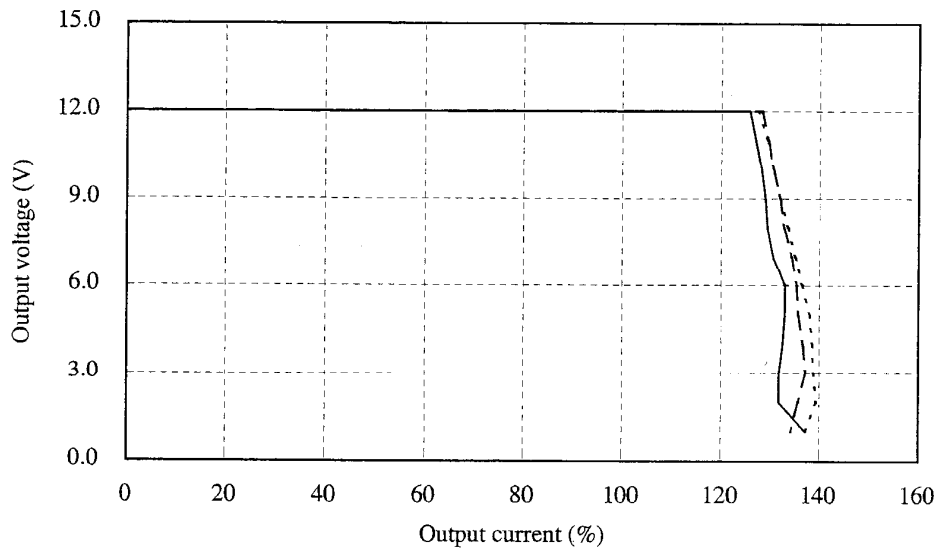
28V



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

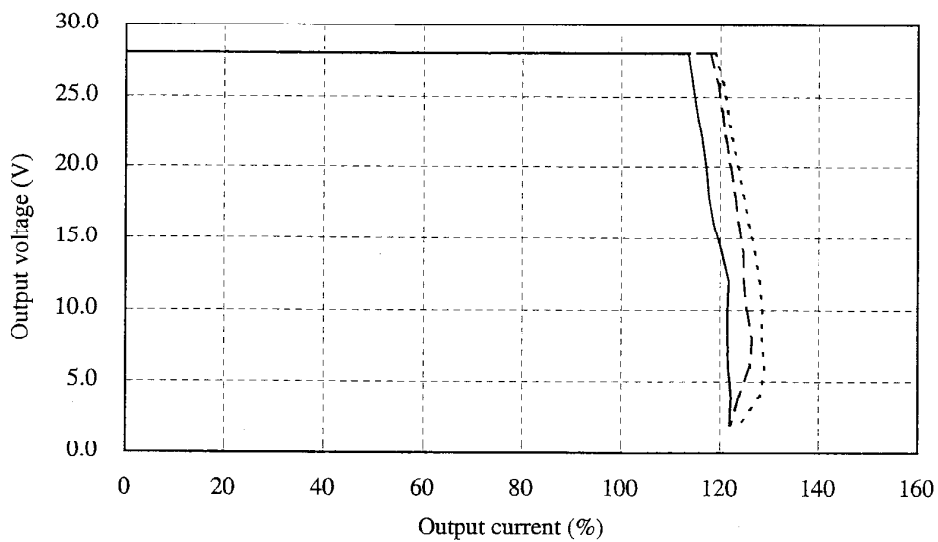
Conditions Vin : 18 VDC -----  
 : 24 VDC -----  
 : 36 VDC -----  
 Tbp : 25 °C

12V



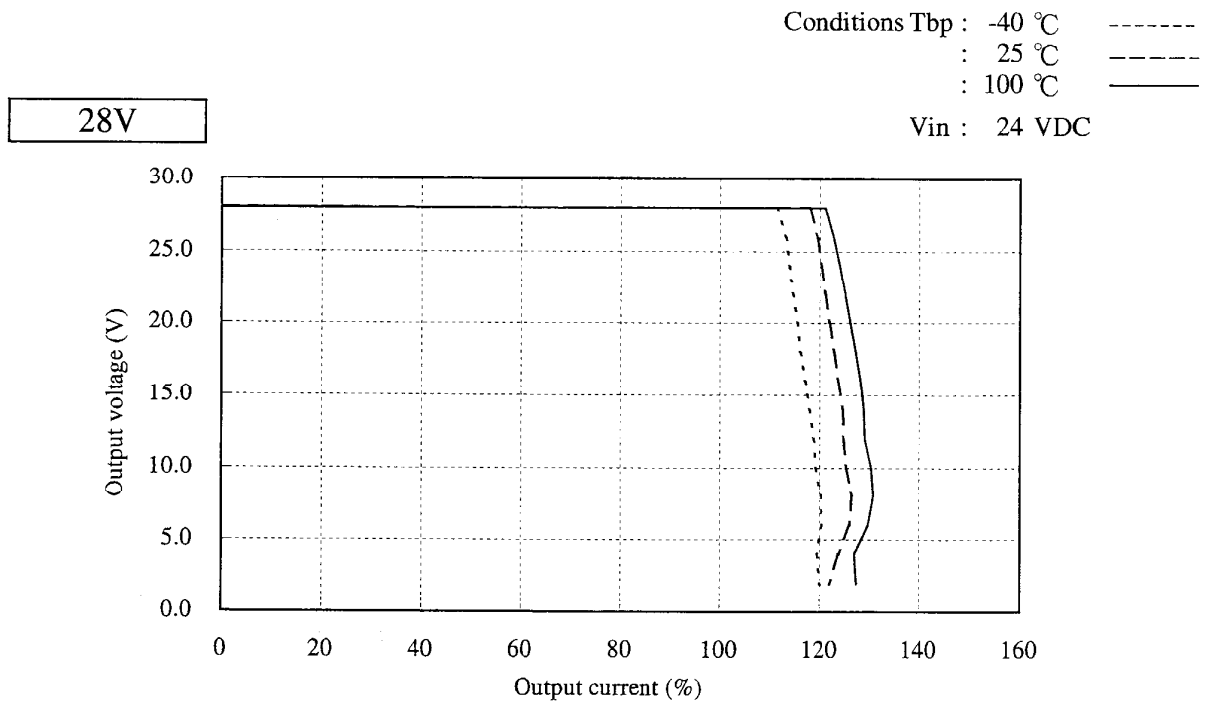
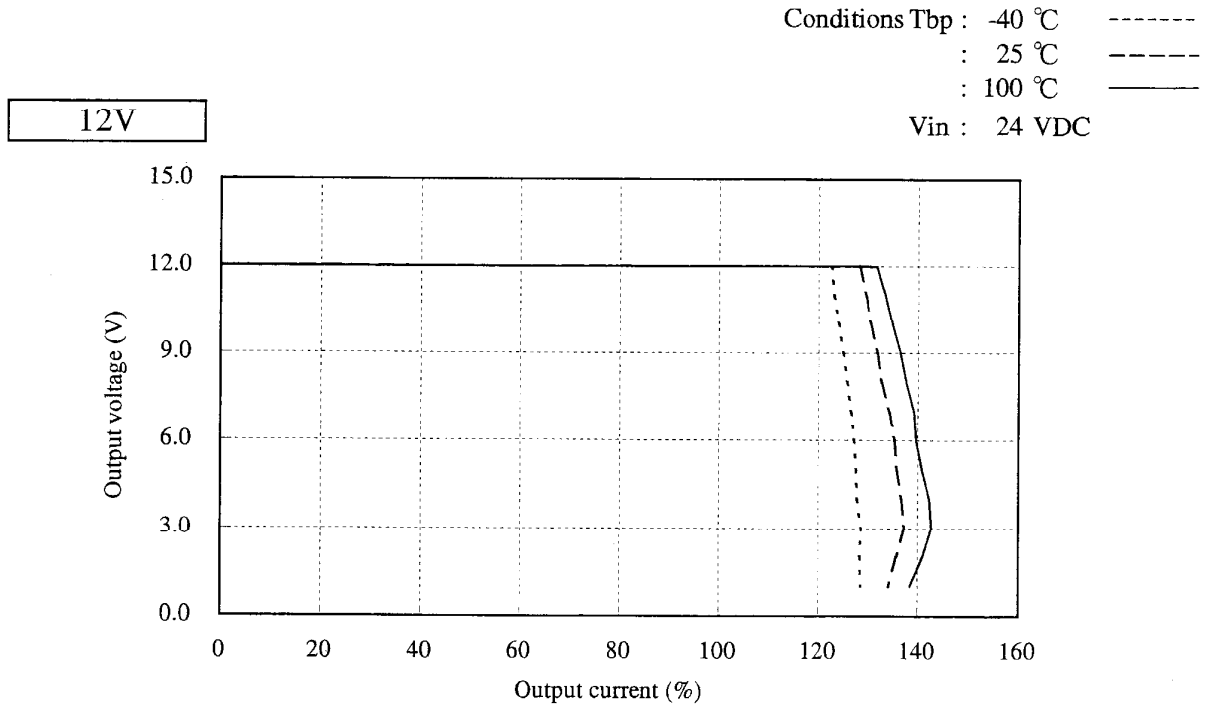
Conditions Vin : 18 VDC -----  
 : 24 VDC -----  
 : 36 VDC -----  
 Tbp : 25 °C

28V





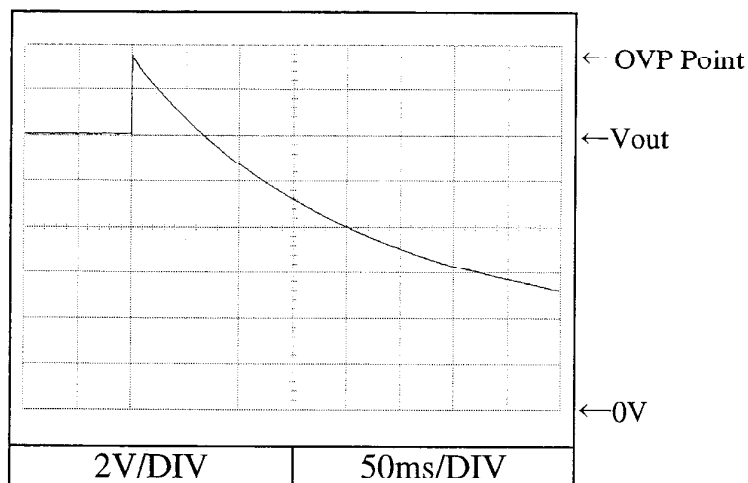
2.3 過電流保護特性  
Over current protection (OCP) characteristics



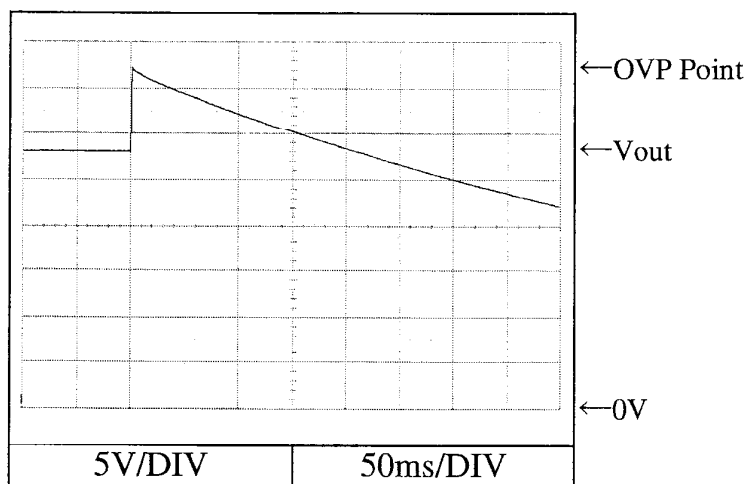
2.4 過電圧保護特性  
Over voltage protection (OVP) characteristics

Conditions Vin : 24 VDC  
Iout : 0 %  
Tbp : 25 °C

12V



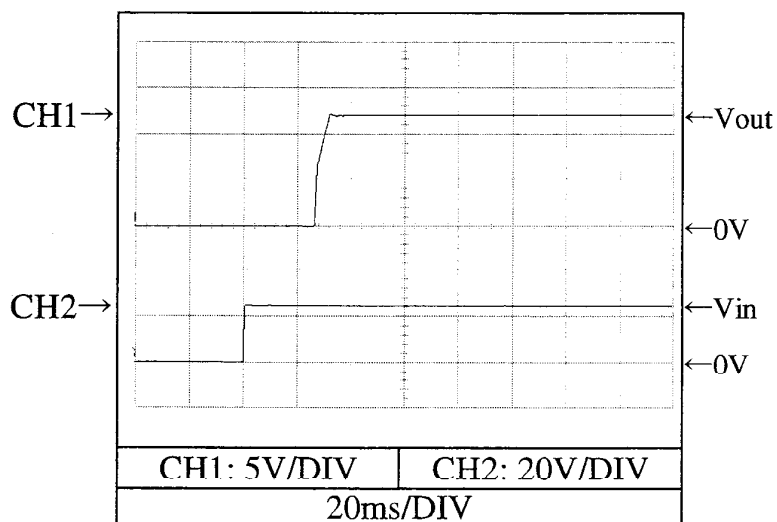
28V



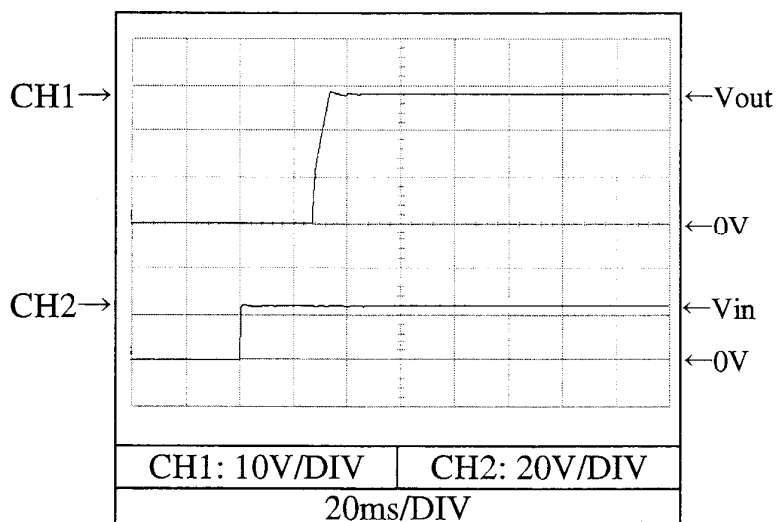
2.5 出力立ち上がり特性  
Output rise characteristics

Conditions Vin : 24 VDC  
Iout : 0 %  
Tbp : 25 °C

12V



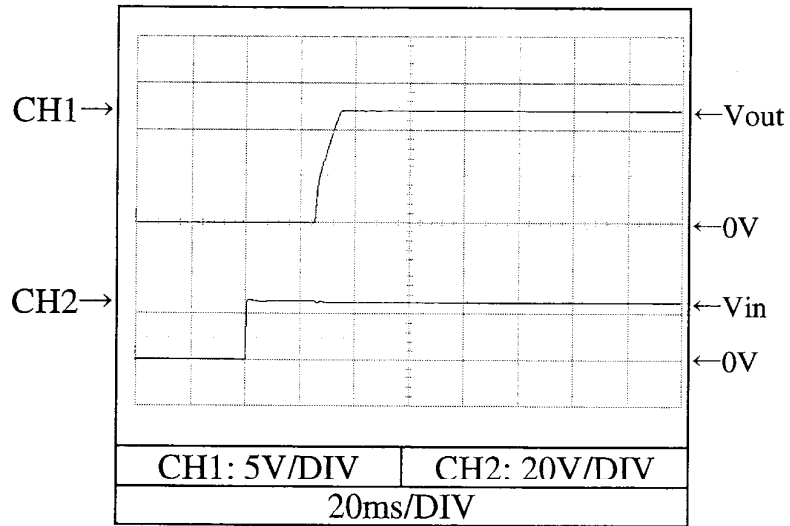
28V



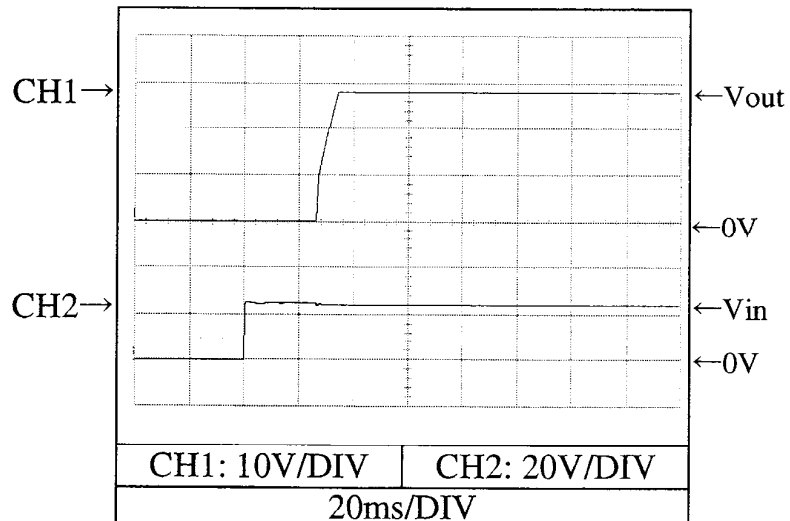
2.5 出力立ち上がり特性  
Output rise characteristics

Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

12V



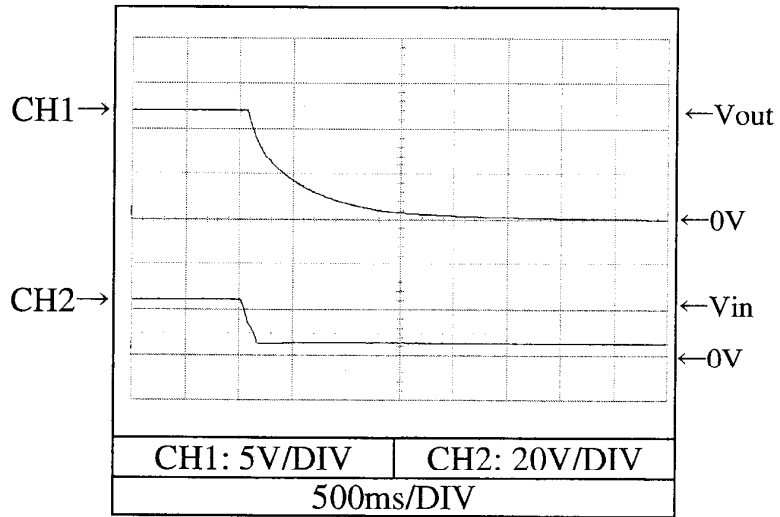
28V



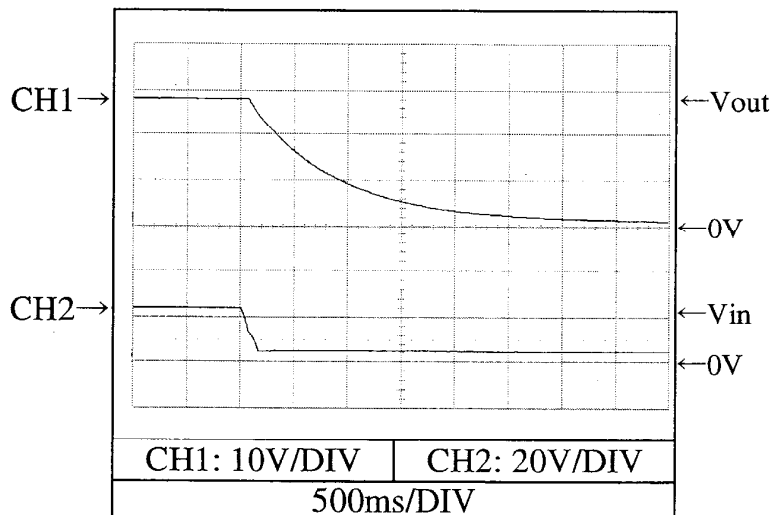
2.6 出力立ち下がり特性  
Output fall characteristics

Conditions Vin : 24 VDC  
Iout : 0 %  
Tbp : 25 °C

12V



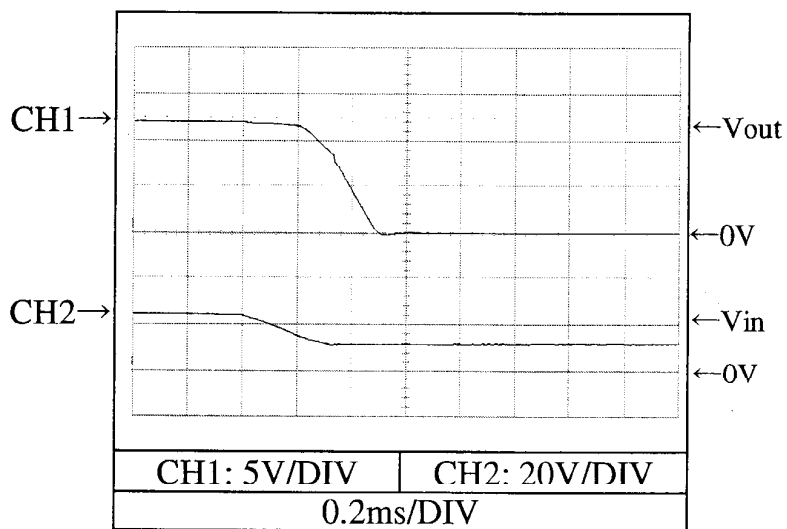
28V



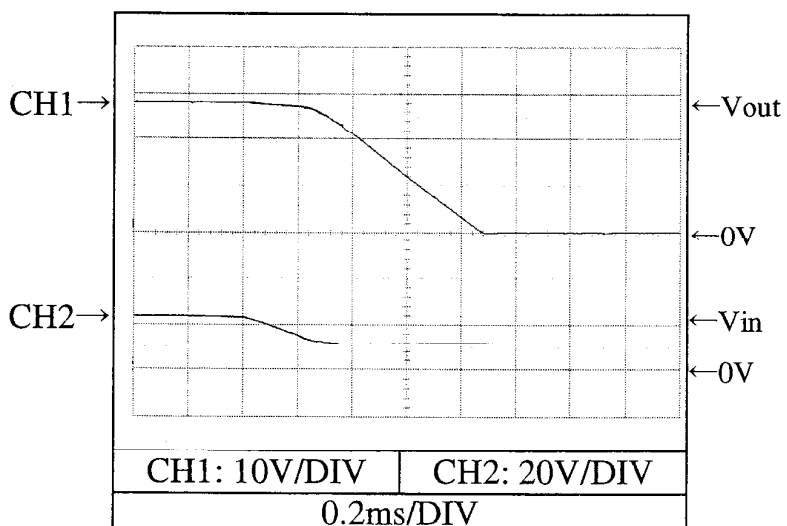
2.6 出力立ち下がり特性  
Output fall characteristics

Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

12V



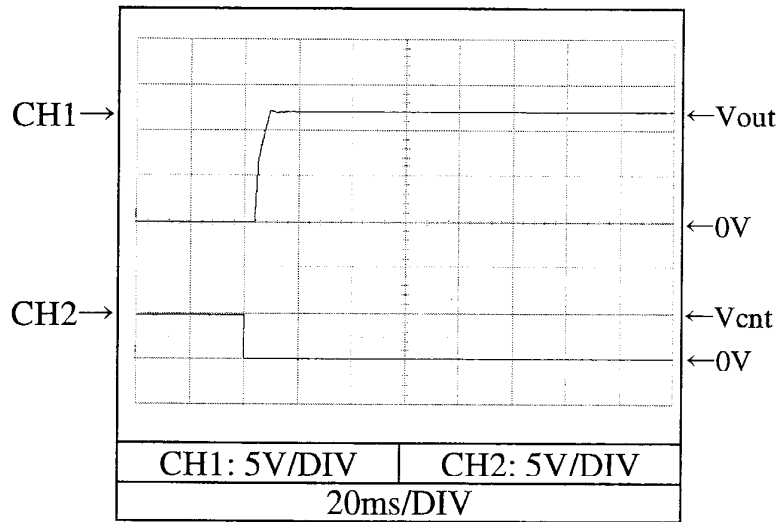
28V



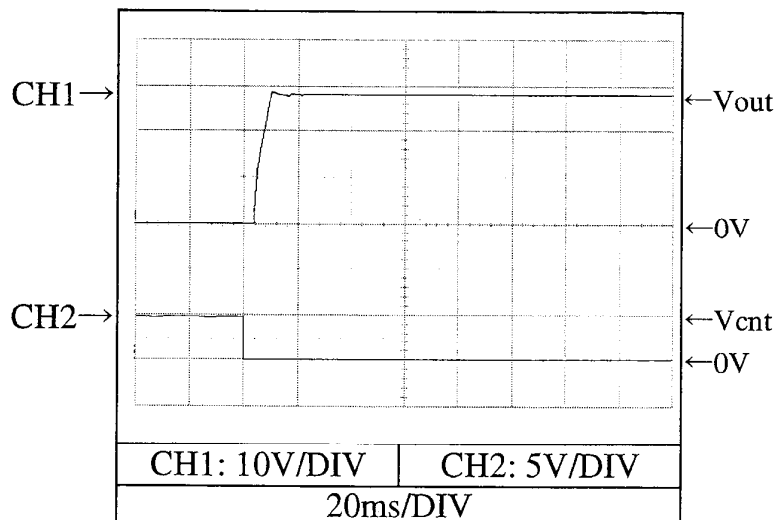
2.7 出力立ち上がり特性 (ON/OFFコントロール時)  
Output rise characteristics with ON/OFF CONTROL

Conditions Vin : 24 VDC  
Iout : 0 %  
Tbp : 25 °C

12V



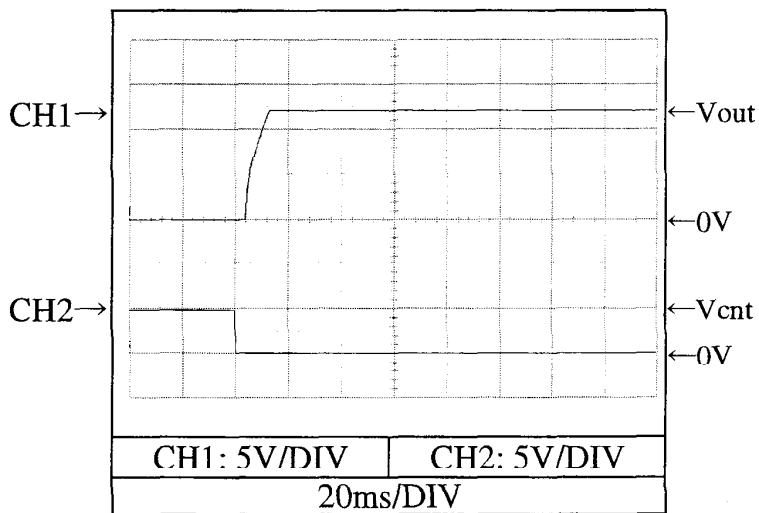
28V



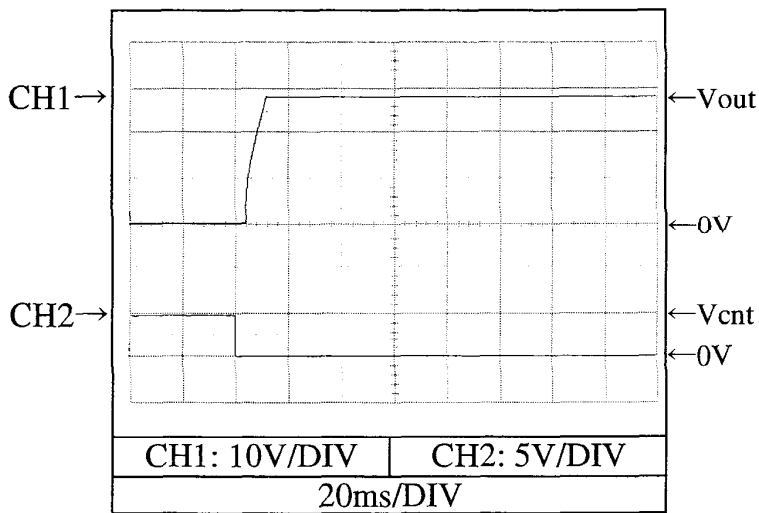
2.7 出力立ち上がり特性 (ON/OFFコントロール時)  
Output rise characteristics with ON/OFF CONTROL

Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

12V



28V

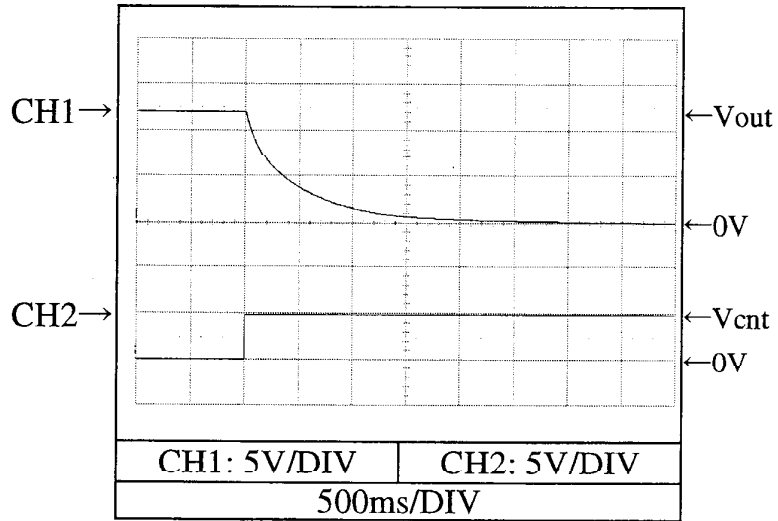




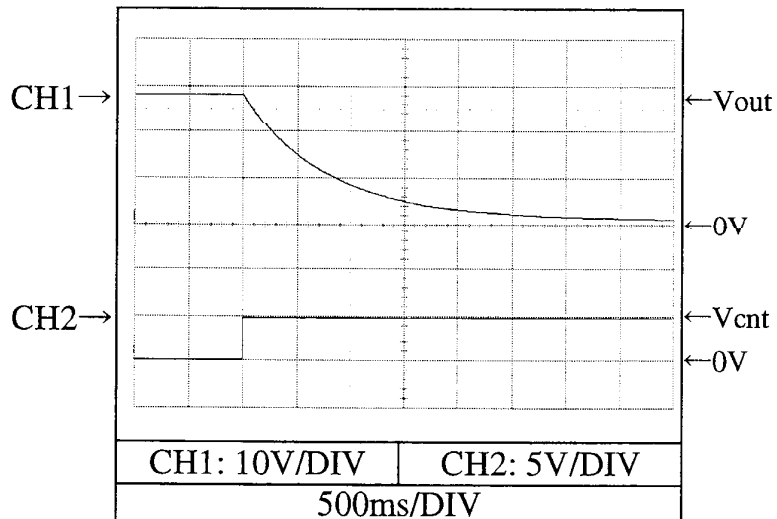
2.8 出力立ち下がり特性 (ON/OFFコントロール時)  
Output fall characteristics with ON/OFF CONTROL

Conditions Vin : 24 VDC  
Iout : 0 %  
Tbp : 25 °C

12V



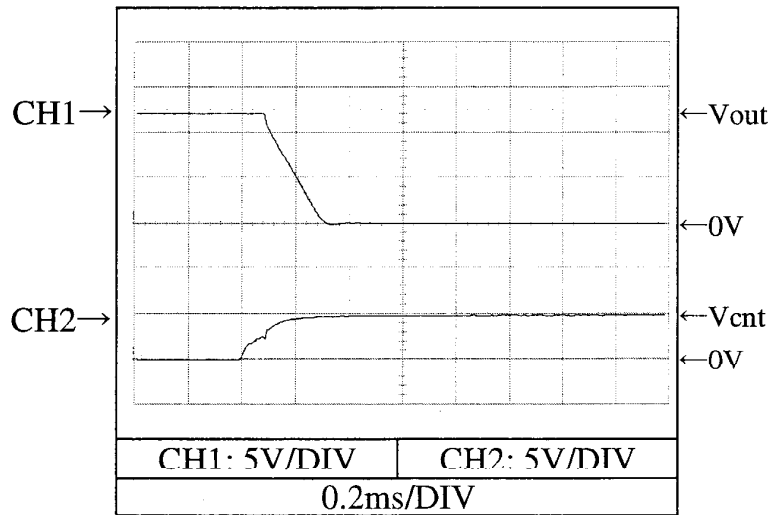
28V



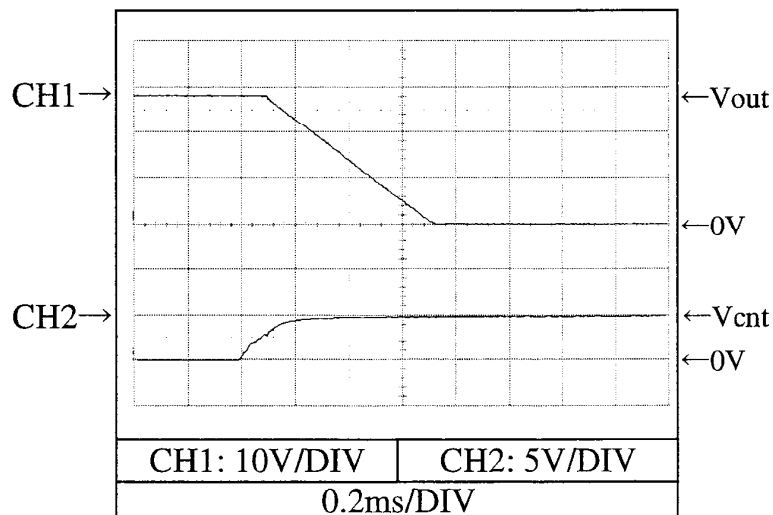
2.8 出力立ち下がり特性 (ON/OFFコントロール時)  
Output fall characteristics with ON/OFF CONTROL

Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

12V



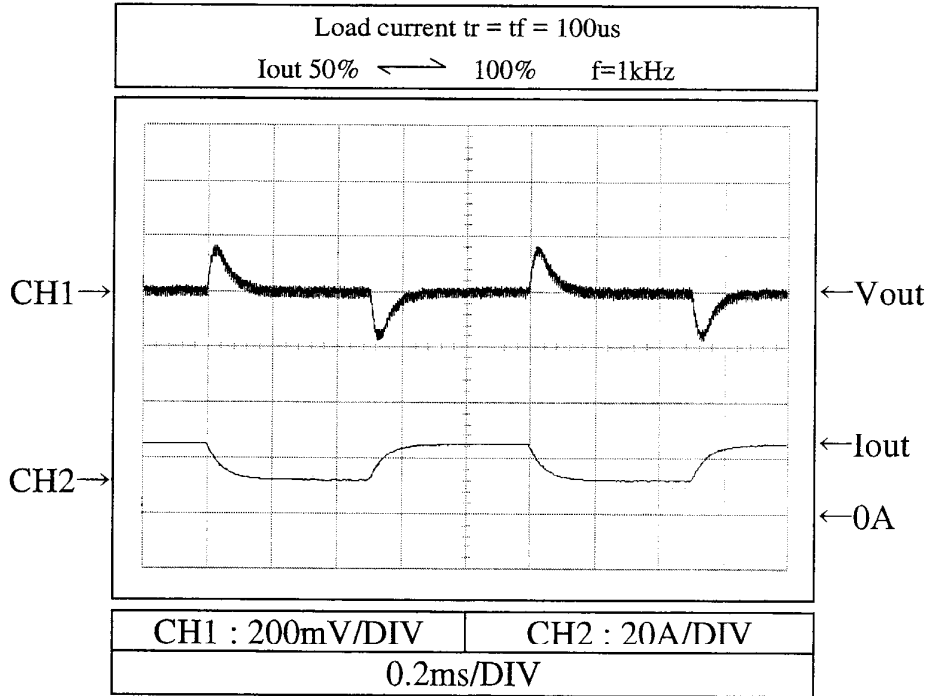
28V



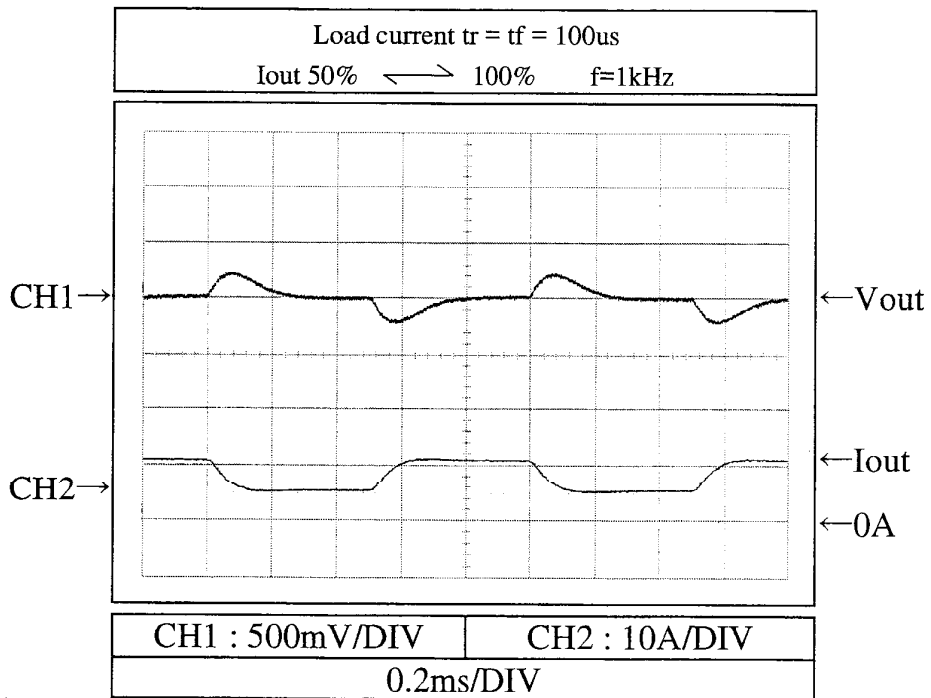
2.9 過渡応答（負荷急変）特性  
Dynamic load response characteristics

Conditions Vin : 24 VDC  
Tbp : 25 °C

12V



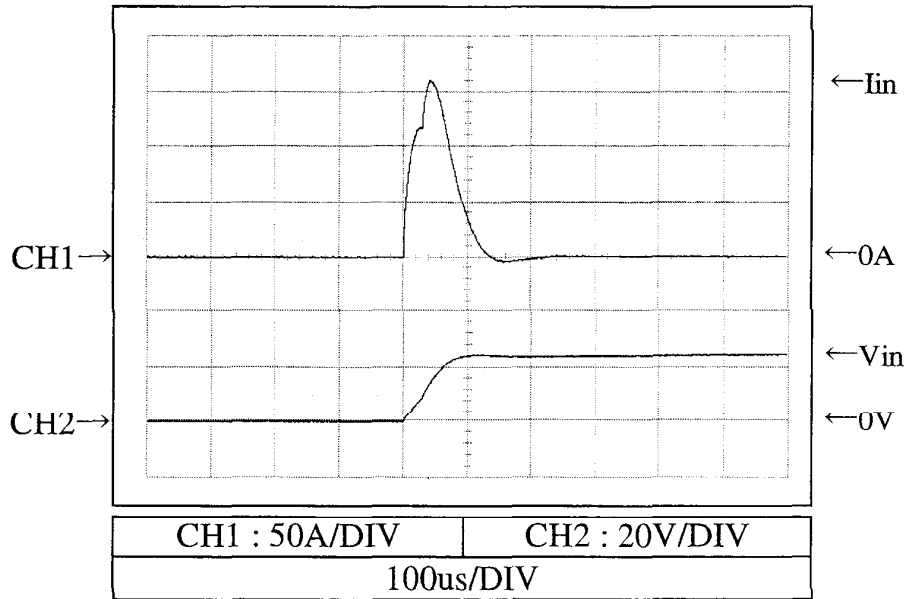
28V



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

Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

28V

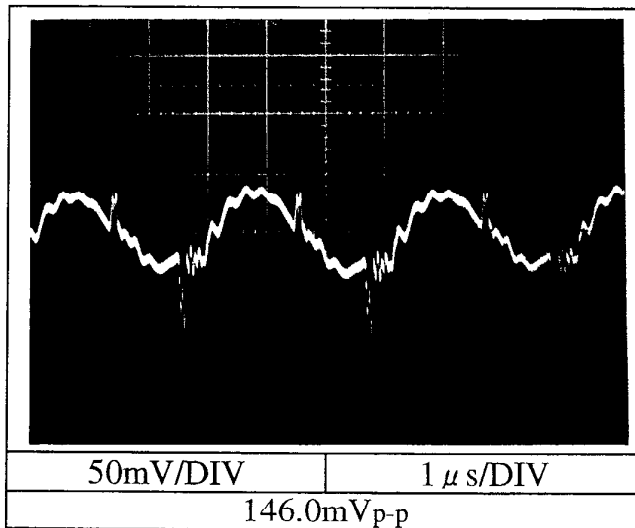


2.11 出力リップル、ノイズ波形  
Output ripple and noise waveform

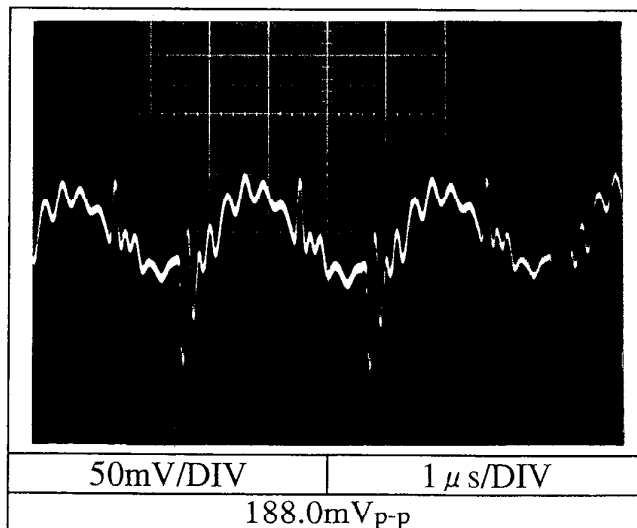
Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

12V

Normal mode



Normal + common mode

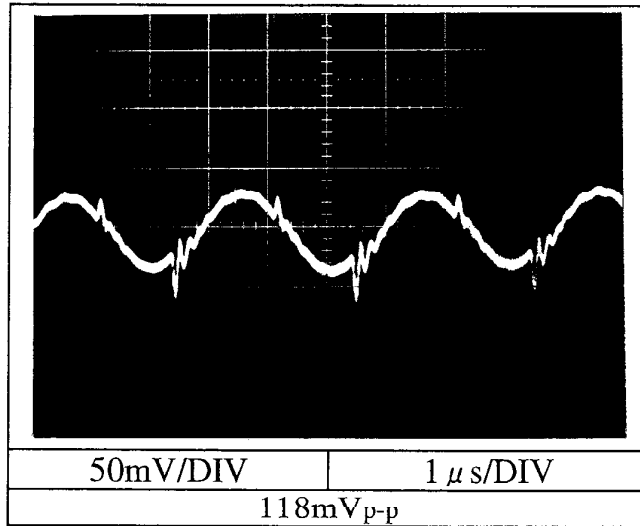


2.11 出力リップル、ノイズ波形  
Output ripple and noise waveform

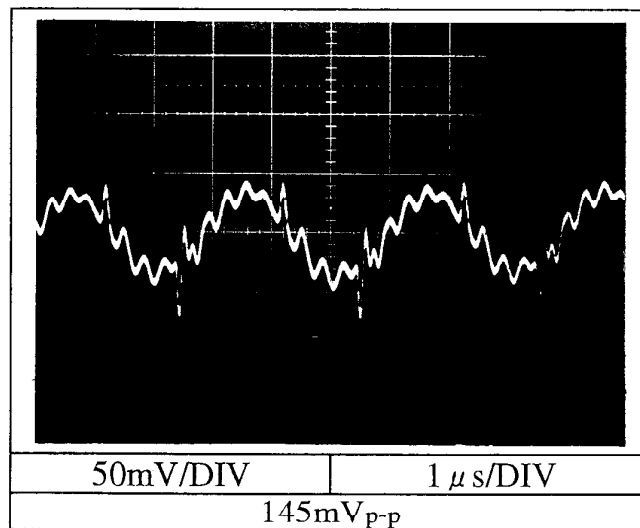
Conditions Vin : 24 VDC  
Iout : 100 %  
Tbp : 25 °C

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)

Conducted Emission

(1) VCCI class A 対応アプリケーションシステム

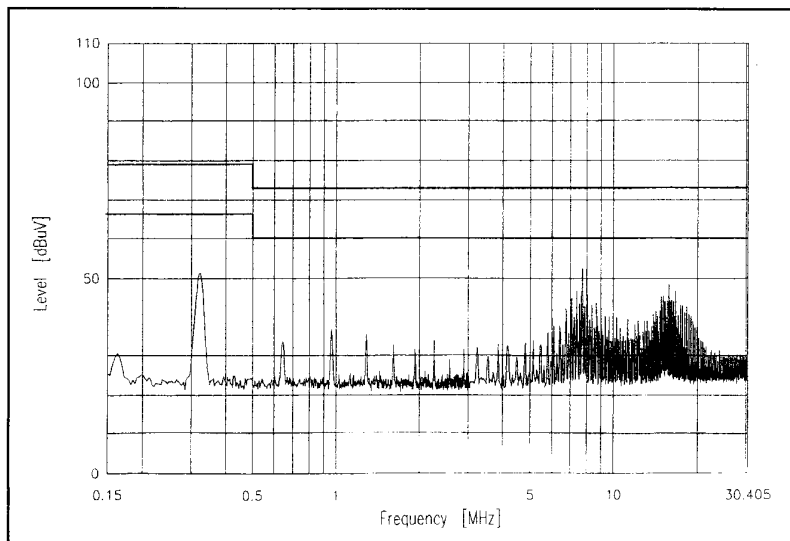
VCCI class A application system

Conditions Vin : 24 VDC

Iout : 100 %

Tbp : 25 °C

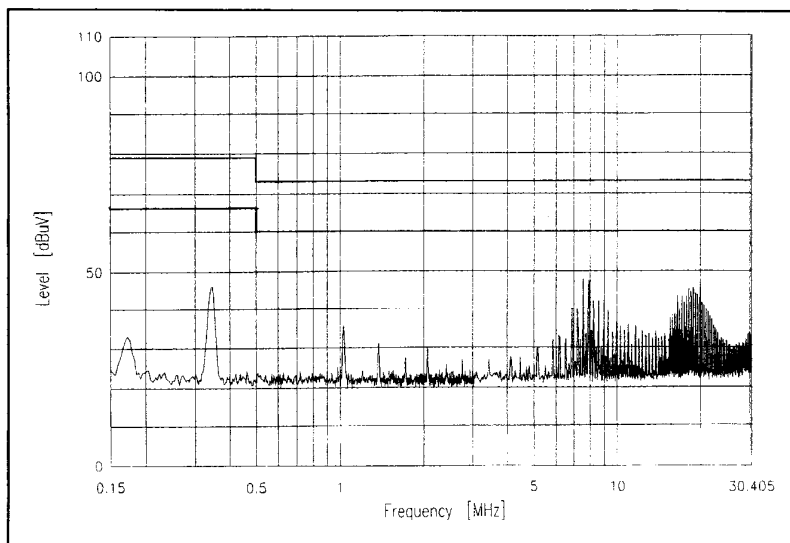
12V



VCCI classA  
QP Limit

VCCI classA  
AV Limit

28V



VCCI classA  
QP Limit

VCCI classA  
AV Limit

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

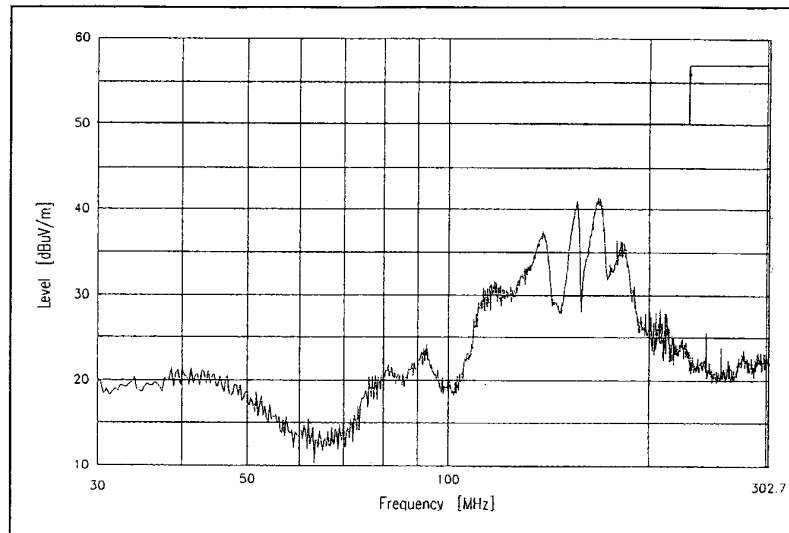
Conditions Vin : 24 VDC

Iout : 100 %

Tbp : 25 °C

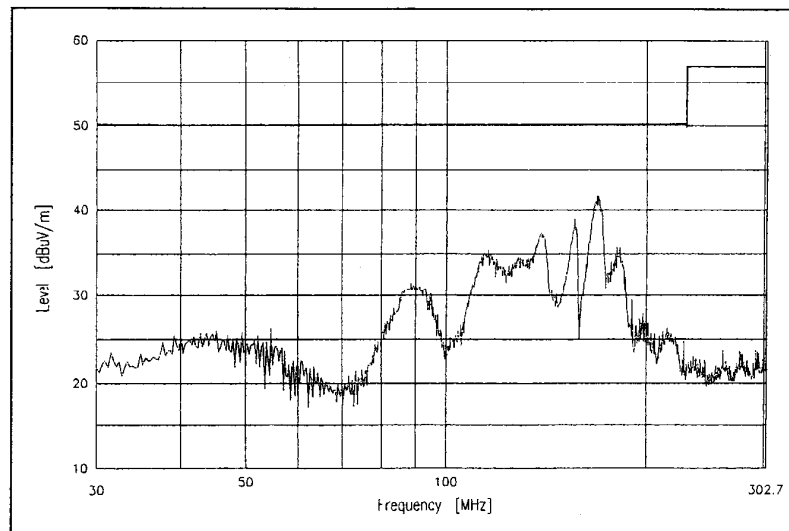
12V

HORIZONTAL:



VCCI classA  
QP Limit

VERTICAL:



VCCI classA  
QP Limit



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

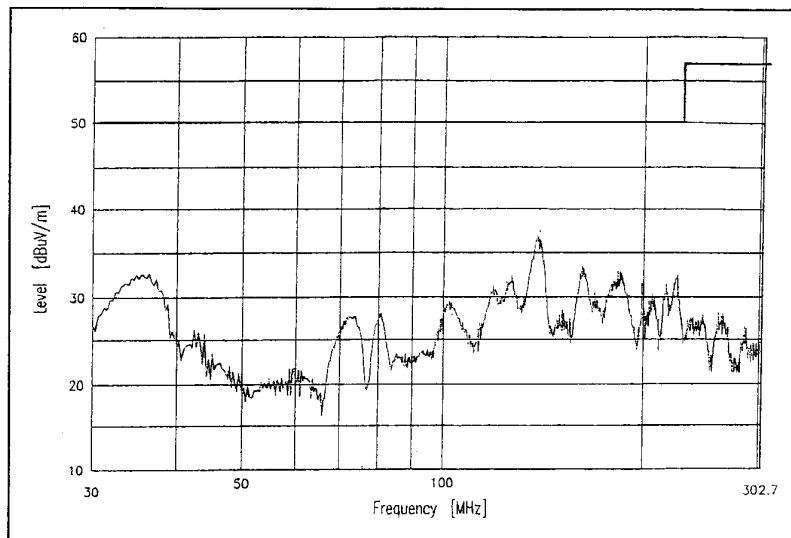
Conditions Vin : 24 VDC

Iout : 100 %

Tbp : 25 °C

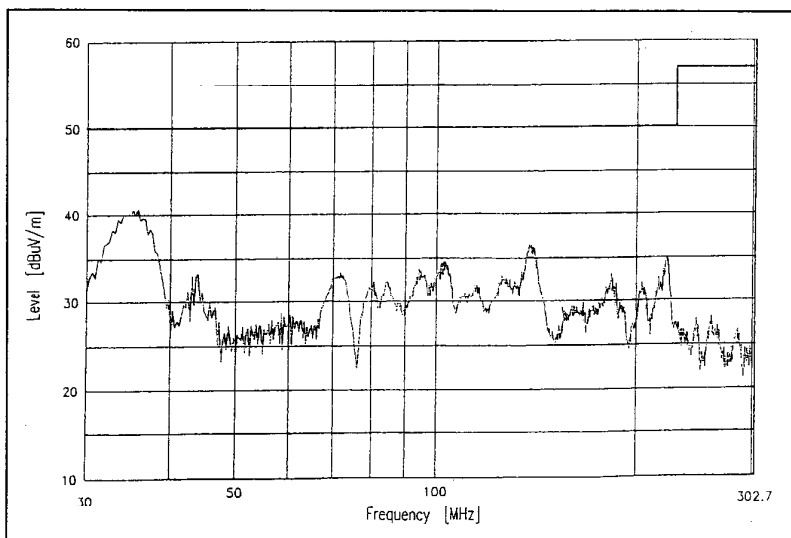
28V

HORIZONTAL:



VCCI classA  
QP Limit

VERTICAL:



VCCI classA  
QP Limit