

# RDS180-24

## EVALUATION DATA

### 型式データ

DWG No. B030-53-01A		
APPD	CHK	DWG
<i>N. Uemura</i>	<i>M. Kurosawa</i>	<i>M. Inagata</i>
28. Sep. '12	28. Sep. '12	27. Sep. '12

## INDEX

1. 測定方法	Evaluation Method	PAGE
1.1 測定回路	Circuit used for determination	
測定回路 1	Circuit 1 used for determination .....	T-1
	静特性	Steady state data
	過電流保護特性	Over current protection (OCP) characteristics
	過電圧保護特性	Over voltage protection (OVP) characteristics
	出力立ち上がり・立ち下がり特性	Output rise/fall characteristics
	出力保持時間特性	Hold up time characteristics
測定回路 2	Circuit 2 used for determination .....	T-1
	過渡応答 (負荷急変) 特性	Dynamic load response characteristics
測定回路 3	Circuit 3 used for determination .....	T-1
	入力サージ電流 (突入電流) 特性	Inrush current characteristics
測定回路 4	Circuit 4 used for determination .....	T-2
	出力リップル、ノイズ波形	Output ripple and noise waveform
測定構成	Configuration used for determination .....	T-2
	E M I 特性	Electro-Magnetic Interference characteristics
	雑音端子電圧 (帰還ノイズ)	Conducted Emission Noise
	雑音電界強度 (輻射ノイズ)	Radiated Emission Noise
1.2 使用測定機器	List of equipment used .....	T-3
2. 特性データ	Characteristics	
2.1 静特性	Steady state data	
(1) 入力・負荷・温度変動/出力起動・低下電圧	Regulation - line and load, Temperature drift / Start up voltage and Drop out voltage ...	T-4
(2) 効率対出力電流	Efficiency vs. Output current.....	T-5
(3) 入力電流対出力電流	Input current vs. Output current.....	T-6
(4) 入力電力対出力電流	Input power vs. Output current.....	T-7
2.2 過電流保護特性	Over current protection (OCP) characteristics .....	T-8
2.3 過電圧保護特性	Over voltage protection (OVP) characteristics .....	T-8
2.4 出力立ち上がり・立ち下がり特性	Output rise/fall characteristics .....	T-9
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 ...	T-10
2.6 出力保持時間特性	Hold up time characteristics .....	T-11
2.7 過渡応答 (負荷急変) 特性	Dynamic load response characteristics .....	T-12
2.8 入力電圧瞬停特性	Response to Brown out characteristics .....	T-13
2.9 入力サージ電流 (突入電流) 特性	Inrush current waveform .....	T-14
2.1 出力リップル、ノイズ波形	Output ripple and noise waveform .....	T-15
2.11 E M I 特性	Electro-Magnetic Interference characteristics .....	T-16~17
使用記号	Terminology used	
	Definition	
$V_{in}$	..... 入力電圧	Input voltage
$V_{out}$	..... 出力電圧	Output voltage
$I_{in}$	..... 入力電流	Input current
$I_{out}$	..... 出力電流	Output current
$T_a$	..... 周囲温度	Ambient temperature
$f$	..... 周波数	Frequency
CNT (RC)	..... ON/OFF コントロール	ON/OFF control

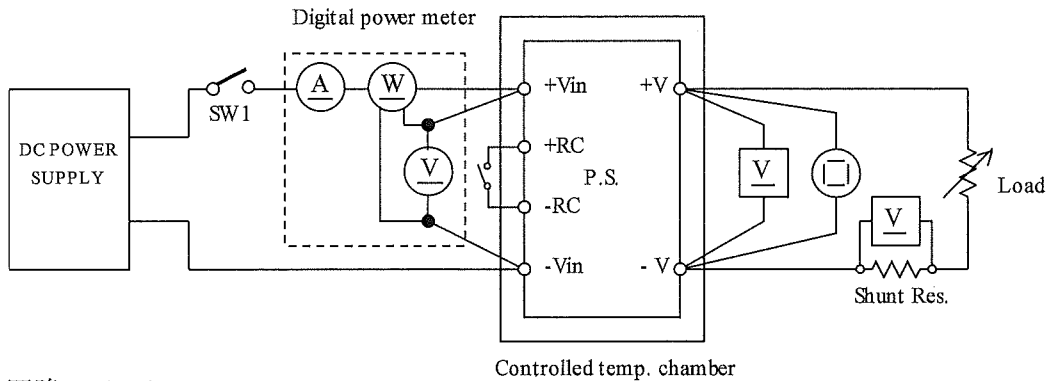
1. 測定方法 Evaluation Method

1.1 測定回路 Circuit used for determination

測定回路1 Circuit 1

- ・ 静特性
- ・ 過電流保護特性
- ・ 過電圧保護特性
- ・ 出力立ち上がり・立ち下がり特性
- ・ 出力保持時間特性

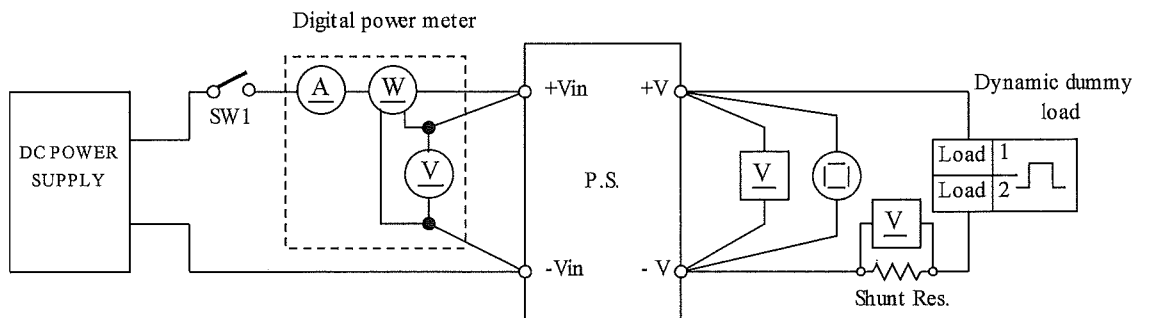
- Steady state data
- Over current protection (OCP) characteristics
- Over voltage protection (OVP) characteristics
- Output rise/fall characteristics
- Hold up time characteristics



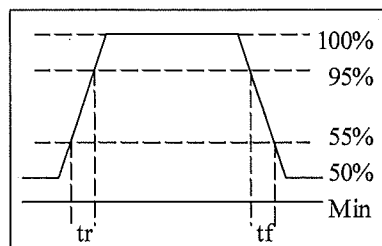
測定回路2 Circuit 2

- ・ 過渡応答 (負荷急変) 特性

- Dynamic load response characteristics



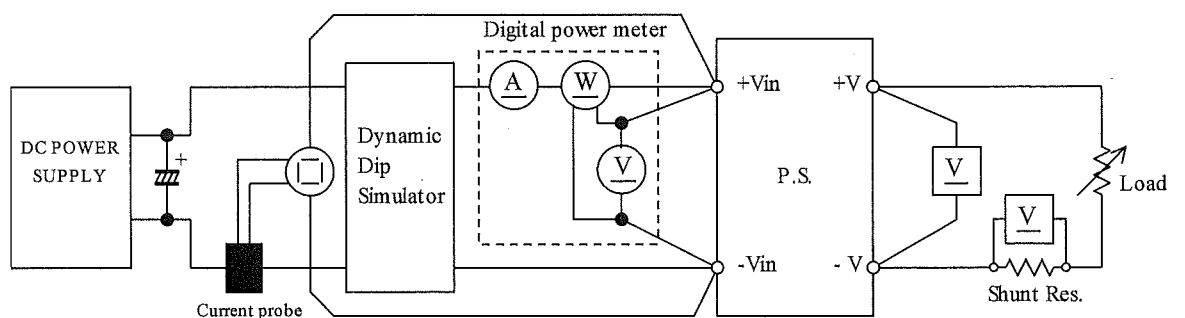
Output current waveform  
Iout 50%  $\leftrightarrow$  100%



測定回路3 Circuit 3

- ・ 入力サージ電流 (突入電流) 特性

- Inrush current characteristics

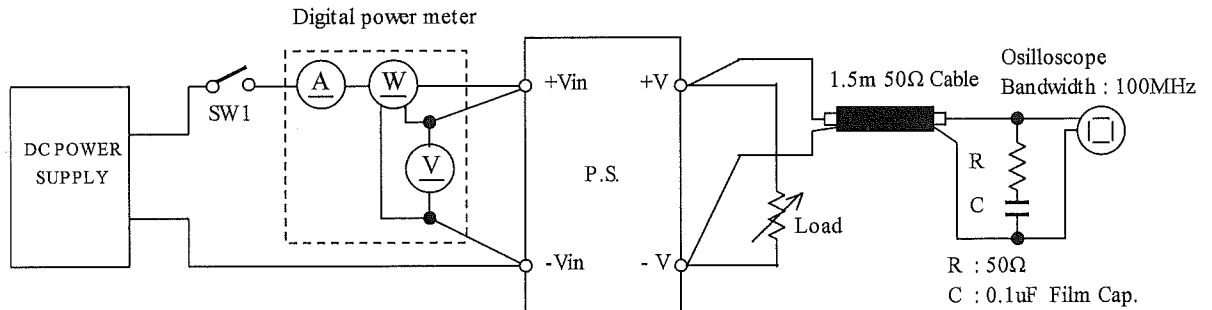


測定回路4 Circuit 4

- 出力リップル、ノイズ特性

Output ripple and noise waveform

Normal Mode (JEITA Standard RC-9131A)

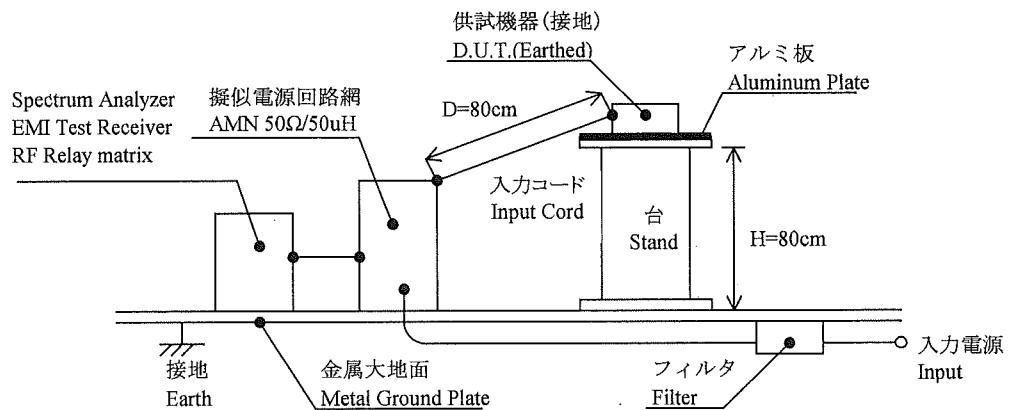


測定構成 Configuration

- E M I 特性
- 雑音端子電圧 (帰還ノイズ)

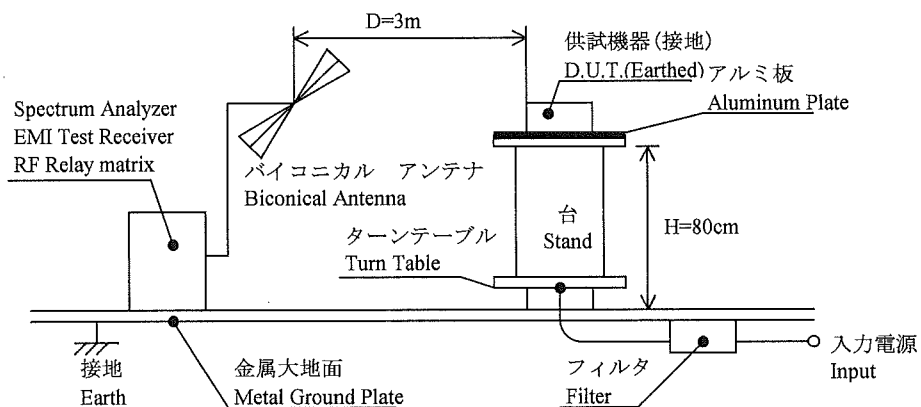
Electro-Magnetic Interference characteristics

Conducted Emission Noise



雑音電界強度 (輻射ノイズ)

Radiated Emission Noise



## 1.2 使用測定機器 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT110
5	CURRENT PROBE/AMPLIFIER	TEKTRONIX	A6303
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-400L
7	CVCF	TAKASAGO	AA2000XG
8	CVCF	KIKUSUI	PCR4000L
9	DYNAMIC DIP SIMULATOR	CYBERNETICS	PSA-210
10	CONTROLLED TEMP. CHAMBER	ESPEC	SU-641
11	SPECTRUM ANALYZER EMI TEST RECEIVER	ROHDE & SCHWARZ	ESCI
12	RF SELECTOR	TOYO, CORP	NS4900
13	AMN	SCHWARZBECK	NNLK8121
14	ANTENNA (BICONICAL ANTENNA)	TESEQ	CBL6111D

## 2.1 静特性 Steady state data

(1) 入力・負荷・温度変動／出力起動・低下電圧

Regulation - line and load, Temperature drift / Start up voltage and Drop out voltage

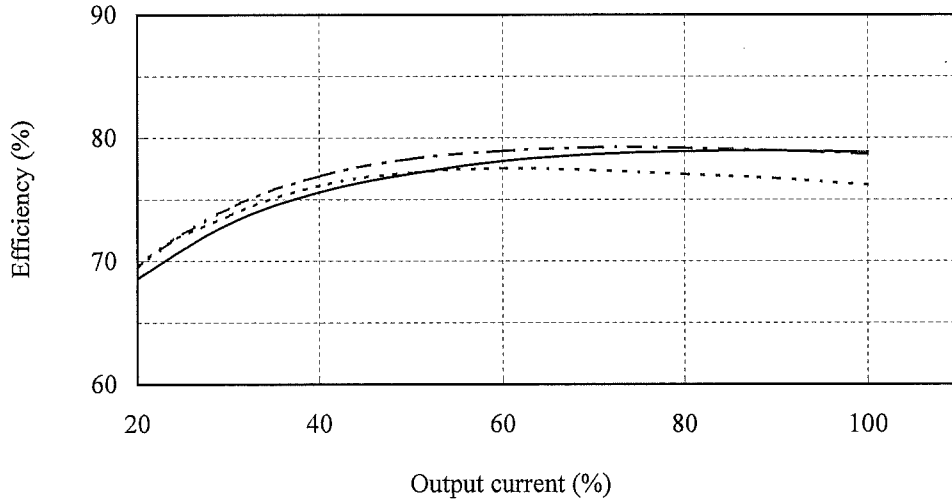
5V		1. Regulation - line and load			Condition		Ta :	
Iout \ Vin	18VDC	24VDC	32VDC	line regulation			25 °C	
0%	5.005V	5.005V	5.005V	0mV	0.000%			
50%	5.013V	5.012V	5.013V	1mV	0.020%			
100%	5.003V	5.004V	5.004V	1mV	0.020%			
load regulation	10mV	8mV	9mV					
	0.200%	0.160%	0.180%					
		2. Temperature drift			Conditions		Vin :	24 VDC
							Iout :	100 %
Ta	-20°C	+25°C	+50°C	temperature stability				
Vout	4.991V	5.004V	5.014V	23mV	0.460%			
		3. Start up voltage and Drop out voltage			Conditions		Ta :	25 °C
							Iout :	100 %
Start up voltage (Vin)		16.2VDC						
Drop out voltage (Vin)		11.8VDC						
12V		1. Regulation - line and load			Condition		Ta :	
Iout \ Vin	18VDC	24VDC	32VDC	line regulation			25 °C	
0%	12.023V	12.023V	12.023V	0mV	0.000%			
50%	12.023V	12.023V	12.024V	1mV	0.008%			
100%	12.021V	12.020V	12.021V	1mV	0.008%			
load regulation	2mV	3mV	3mV					
	0.017%	0.025%	0.025%					
24V		1. Regulation - line and load			Condition		Ta :	
Iout \ Vin	18VDC	24VDC	32VDC	line regulation			25 °C	
0%	24.019V	24.019V	24.020V	1mV	0.004%			
50%	24.019V	24.019V	24.020V	1mV	0.004%			
100%	24.019V	24.019V	24.018V	1mV	0.004%			
load regulation	0mV	0mV	2mV					
	0.000%	0.000%	0.008%					
		2. Temperature drift			Conditions		Vin :	24 VDC
							Iout :	100 %
Ta	-20°C	+25°C	+50°C	temperature stability				
Vout	24.055V	24.019V	24.008V	47mV	0.196%			
		3. Start up voltage and Drop out voltage			Conditions		Ta :	25 °C
							Iout :	100 %
Start up voltage (Vin)		14.9VDC						
Drop out voltage (Vin)		12.3VDC						

(2) 効率が出力電流

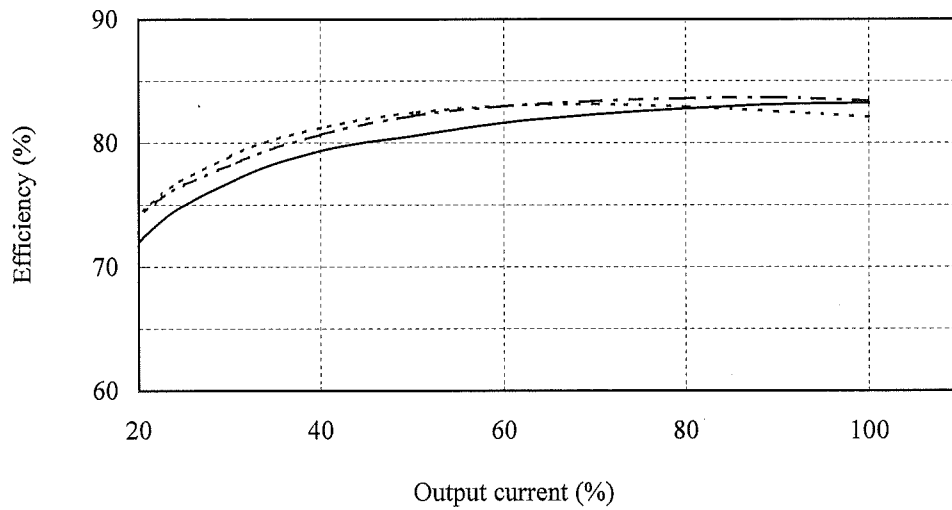
Efficiency vs. Output current

Conditions Vin : 18 VDC -----  
 24 VDC - - - - -  
 32 VDC ————  
 Ta : 25 °C

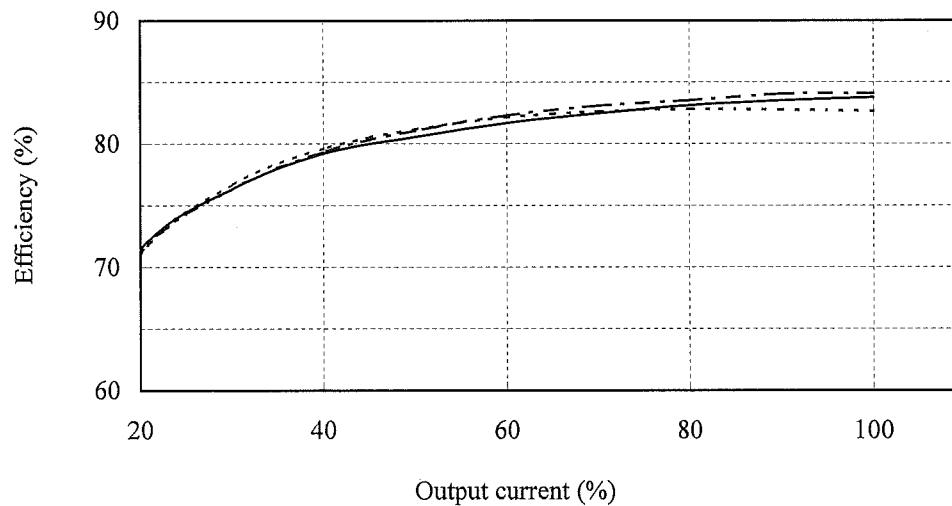
5V



12V



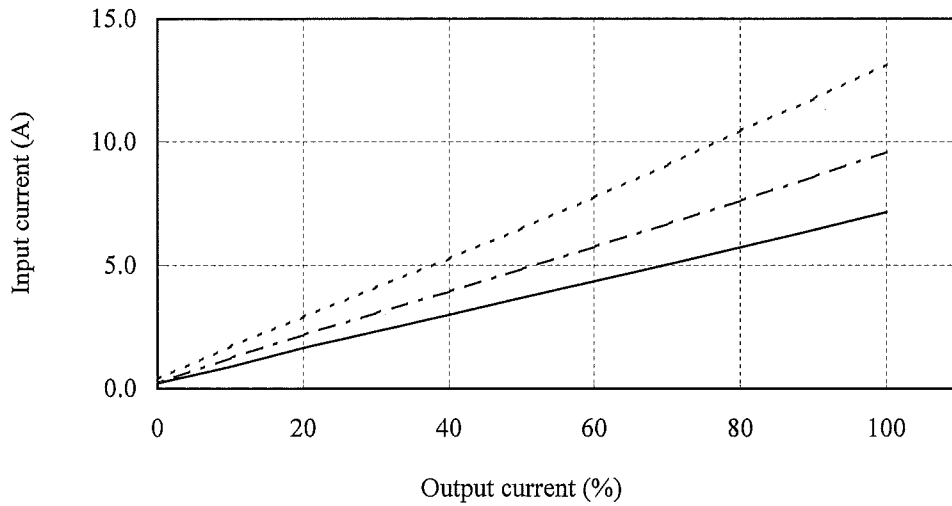
24V



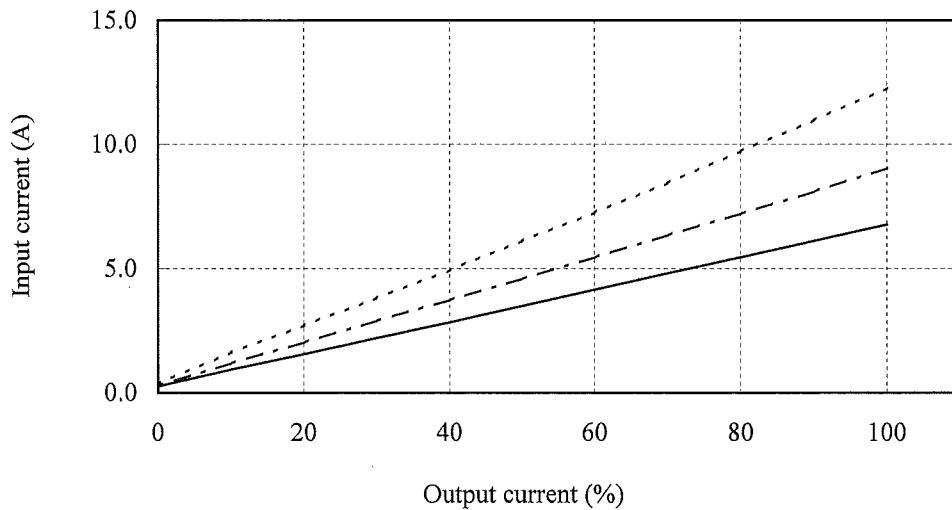
(3) 入力電流対出力電流  
Input current vs. Output current

Conditions Vin : 18 VDC -----  
 24 VDC - - - - -  
 32 VDC ————  
 Ta : 25 °C

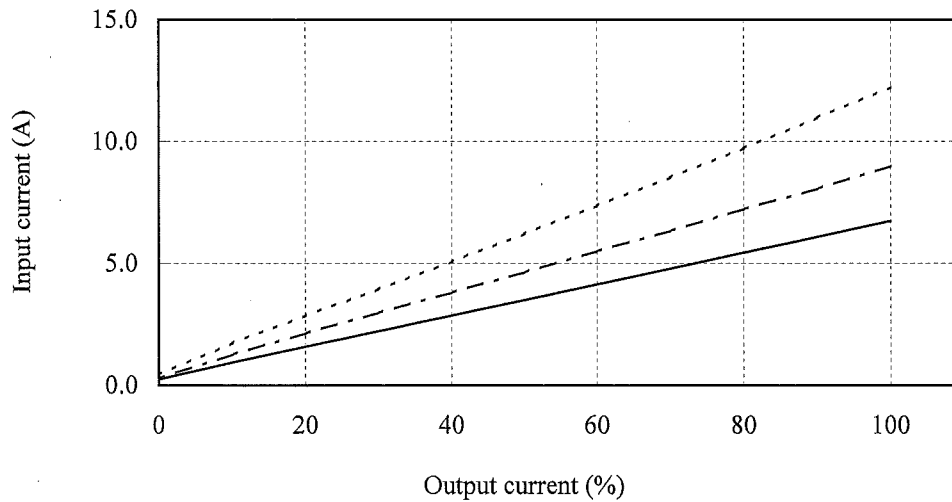
5V



12V



24V





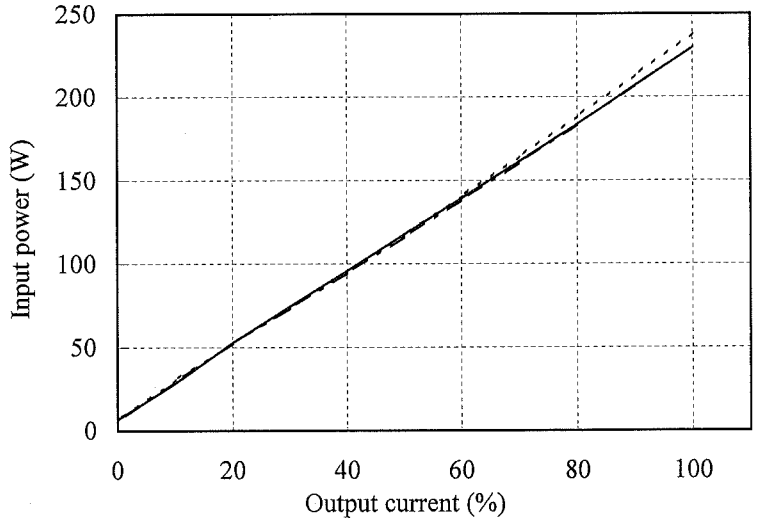
(4) 入力電力対出力電流  
Input power vs. Output current

Conditions Vin : 18 VDC -----  
24 VDC - - - - -  
32 VDC ————  
Ta : 25 °C

5V

Conditions Iout : 0%	
Vin	Input power
18VDC	6.8W
24VDC	5.3W
32VDC	6.9W

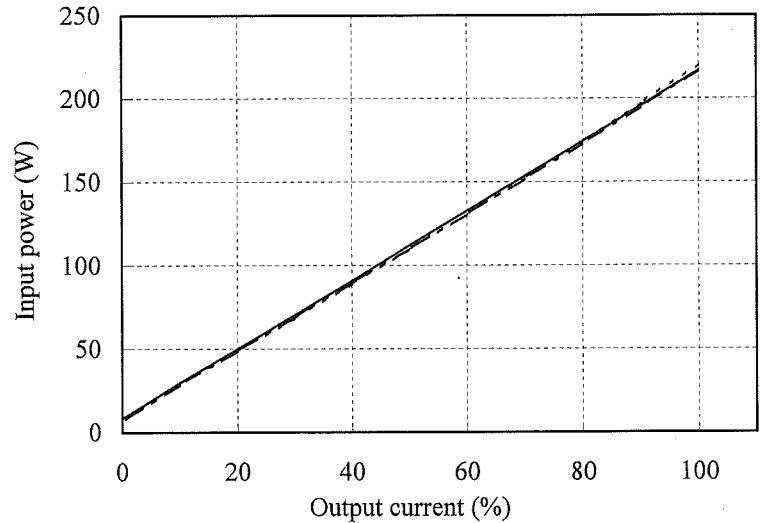
Conditions CNT (RC) : OFF	
Vin	Input power
18VDC	1.6W
24VDC	2.0W
32VDC	2.5W



12V

Conditions Iout : 0%	
Vin	Input power
18VDC	6.4W
24VDC	6.8W
32VDC	8.4W

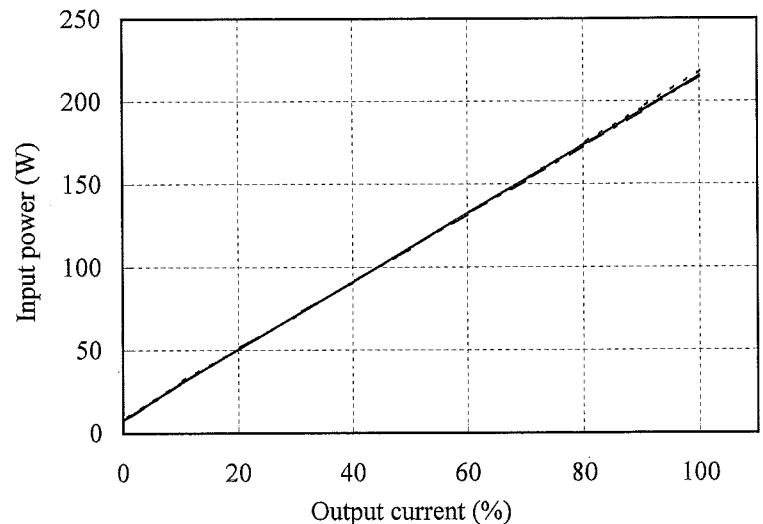
Conditions CNT (RC) : OFF	
Vin	Input power
18VDC	1.6W
24VDC	2.0W
32VDC	2.5W



24V

Conditions Iout : 0%	
Vin	Input power
18VDC	7.9W
24VDC	6.7W
32VDC	8.0W

Conditions CNT (RC) : OFF	
Vin	Input power
18VDC	1.7W
24VDC	2.0W
32VDC	2.6W

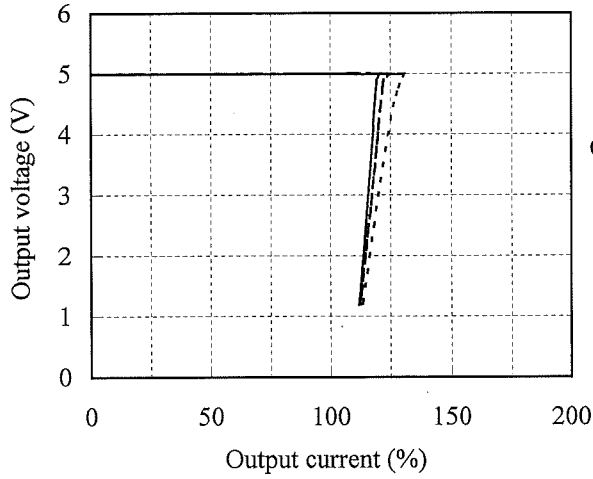


## 2.2 過電流保護特性

Over current protection (OCP) characteristics

Conditions Vin : 18 VDC -----  
 24 VDC - - - - -  
 32 VDC \_\_\_\_\_  
 Ta : 25 °C

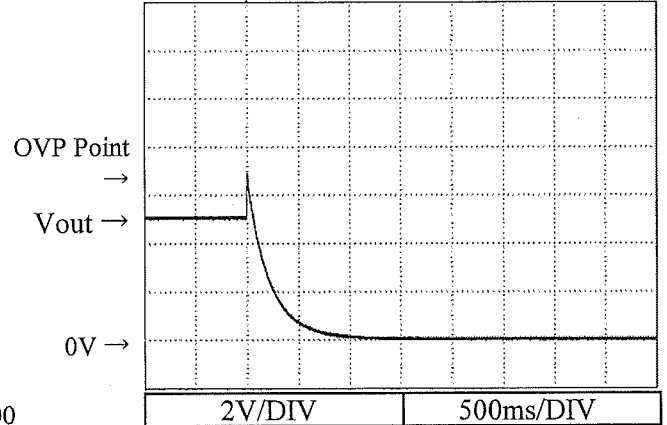
5V



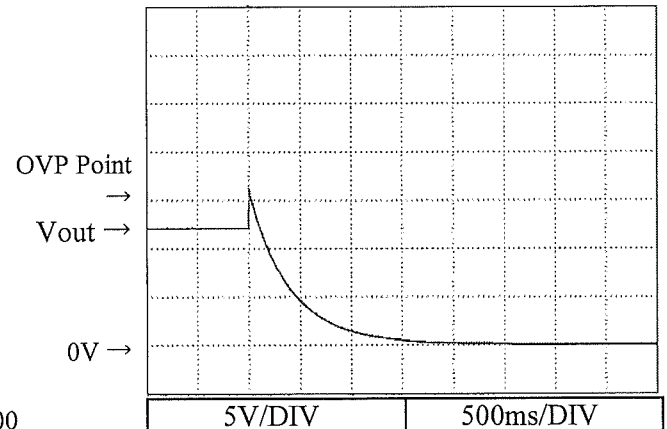
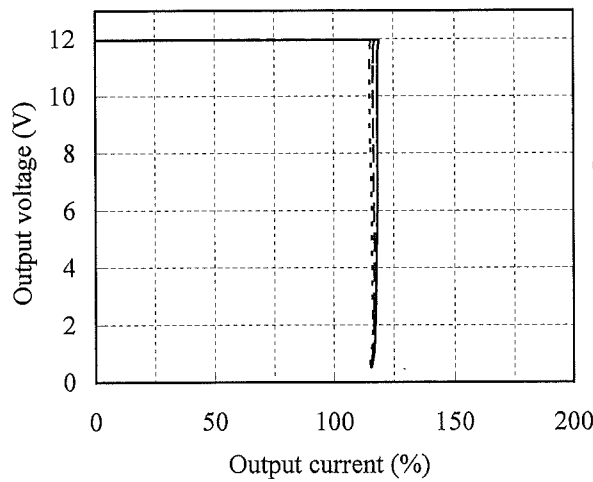
## 2.3 過電圧保護特性

Over voltage protection (OVP) characteristics

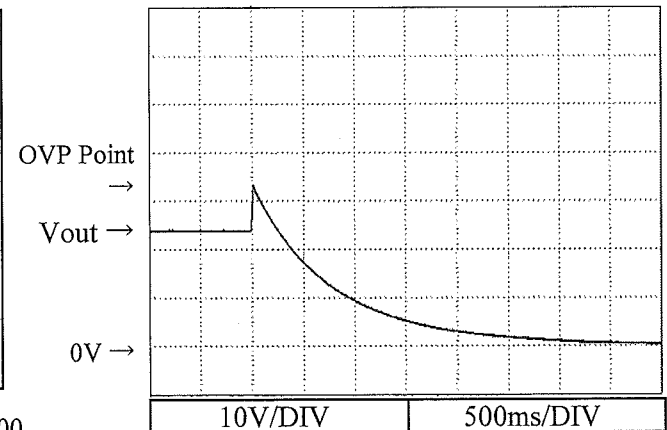
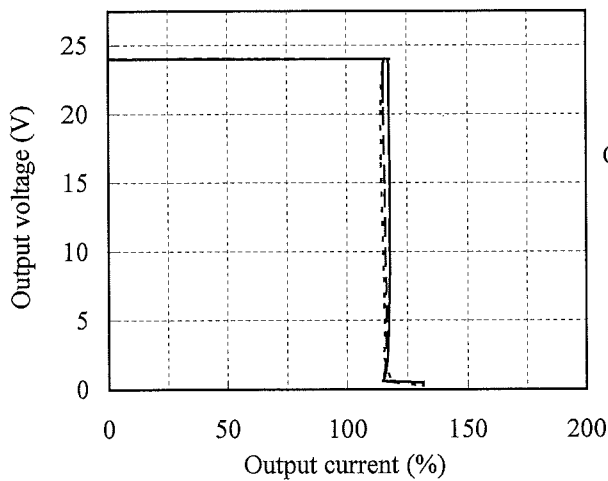
Conditions Vin : 24 VDC  
 Iout : 0 %  
 Ta : 25 °C



12V

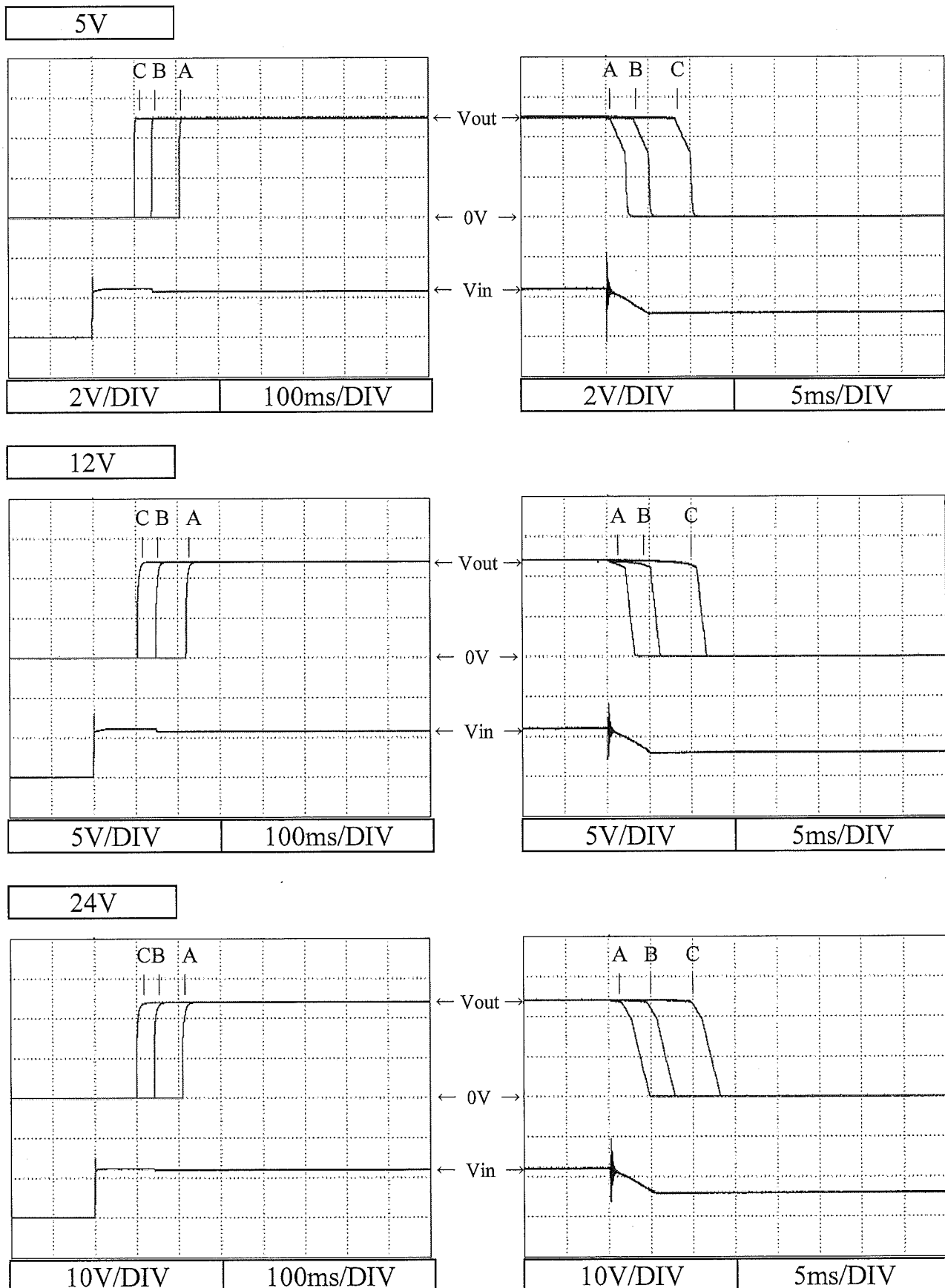


24V



## 2.4 出力立ち上がり・立ち下がり特性 Output rise/fall characteristics

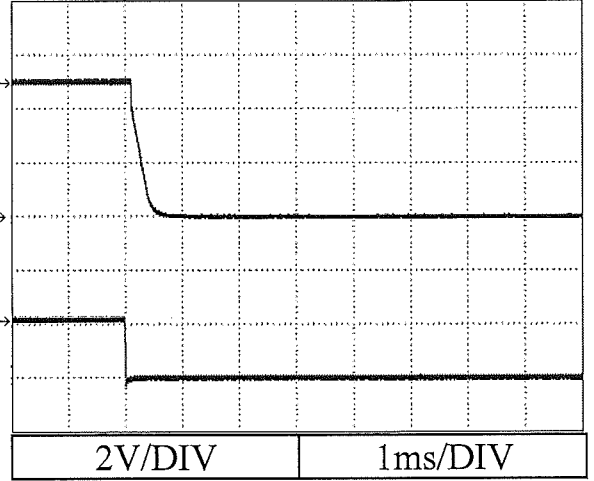
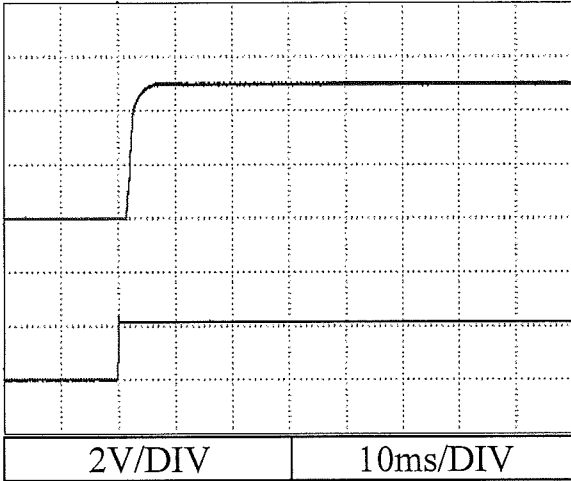
Conditions Vin : 18 VDC (A)  
24 VDC (B)  
32 VDC (C)  
Iout : 100 %  
Ta : 25 °C



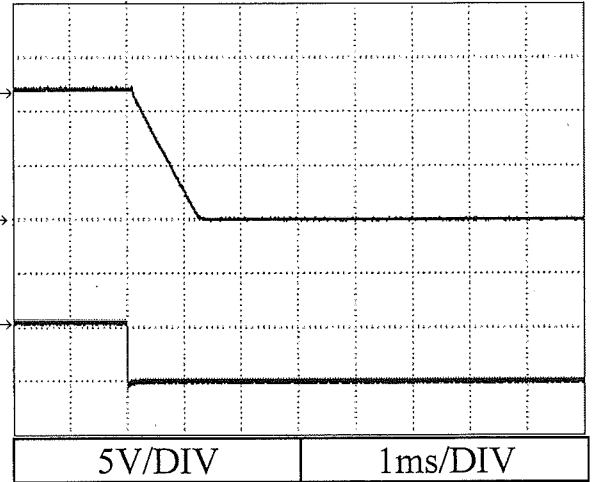
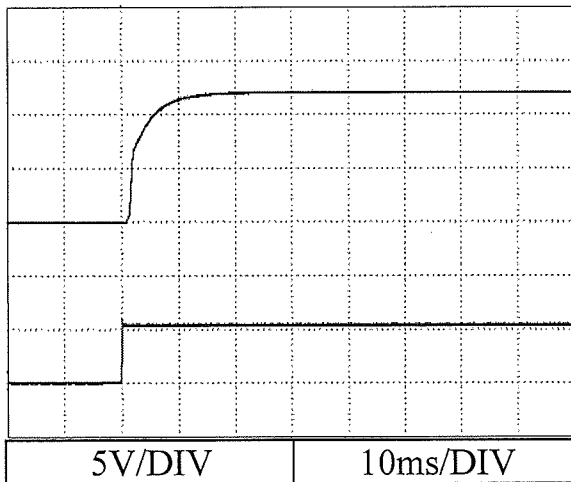
2.5 ON/OFFコントロール時出力立ち上がり・立ち下がり特性  
Output rise/fall characteristics with ON/OFF control

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

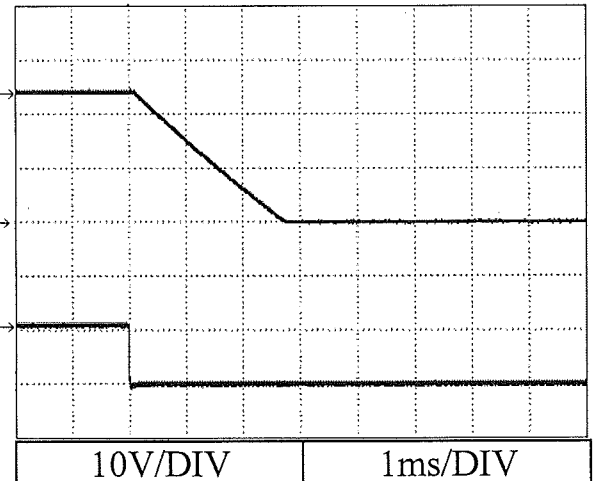
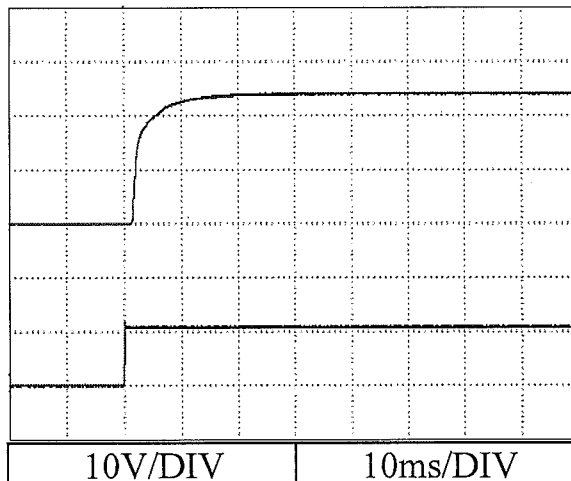
5V



12V



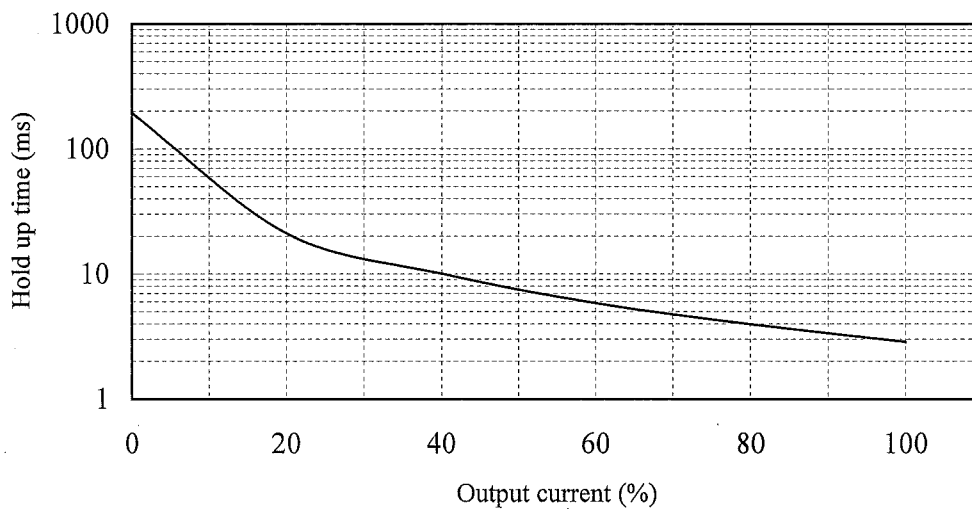
24V



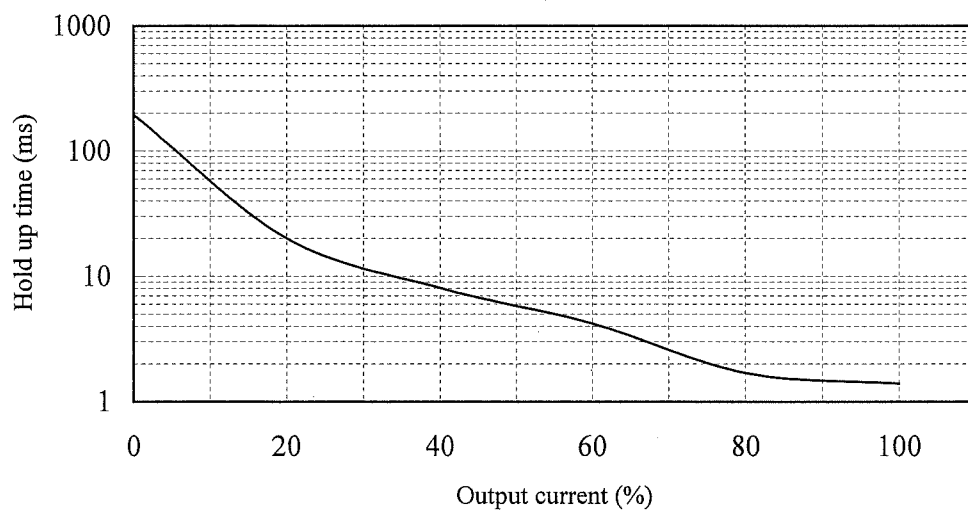
2.6 出力保持時間特性  
Hold up time characteristics

Conditions Vin : 24 VDC  
Ta : 25 °C

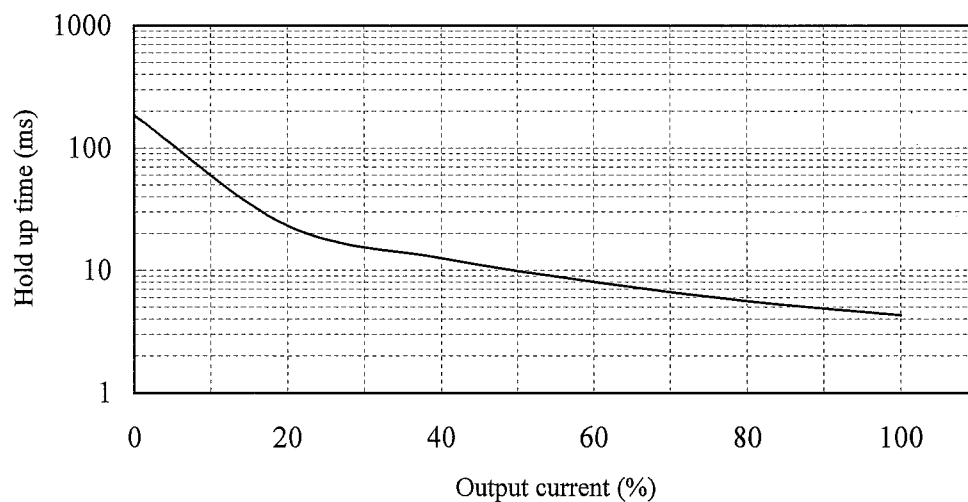
5V



12V



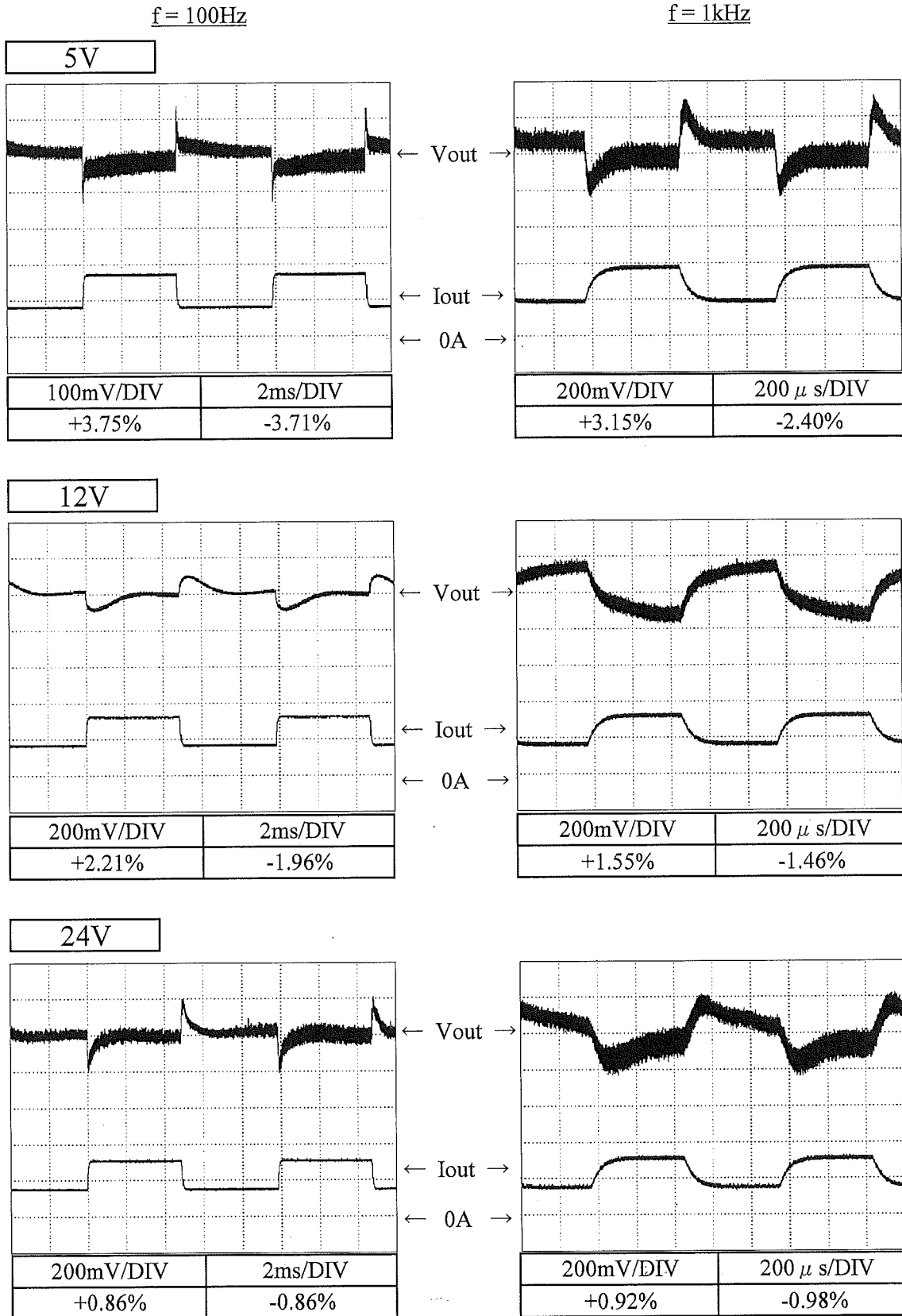
24V



## 2.7 過渡応答（負荷急変）特性

Dynamic load response characteristics

Conditions Vin : 24 VDC  
 Io : 50 % ↔ 100 %  
 (tr = tf = 100us)  
 Ta : 25 °C



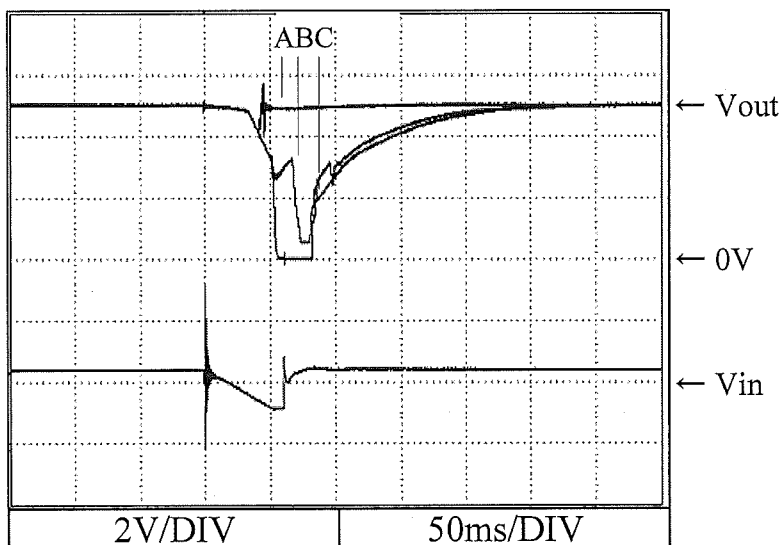
2.8 入力電圧瞬停特性

Response to brown out characteristics

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

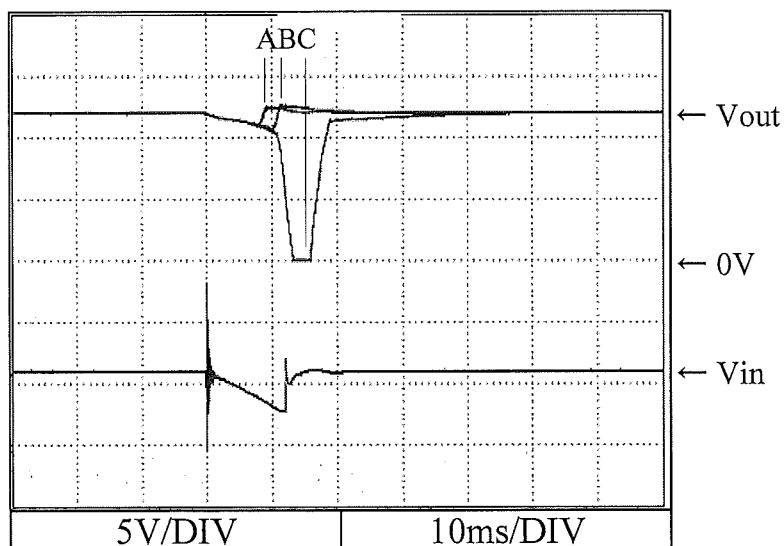
5V

A = 3ms  
B = 4ms  
C = 5ms



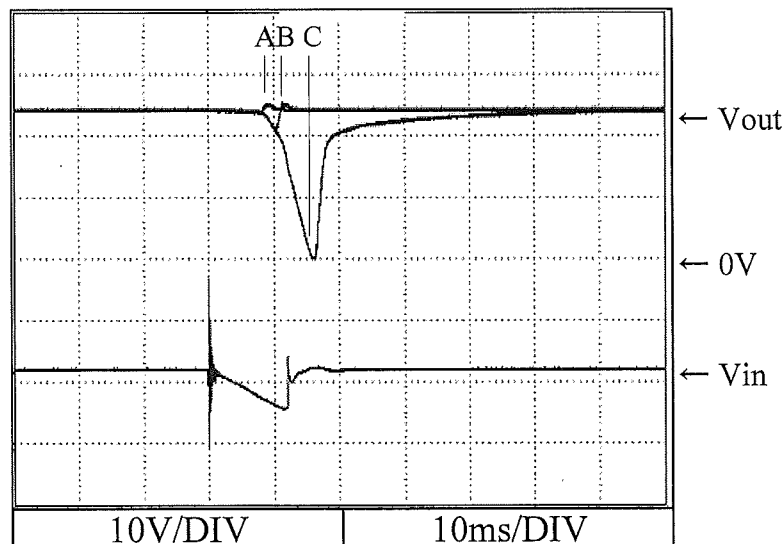
12V

A = 4ms  
B = 5ms  
C = 6ms



24V

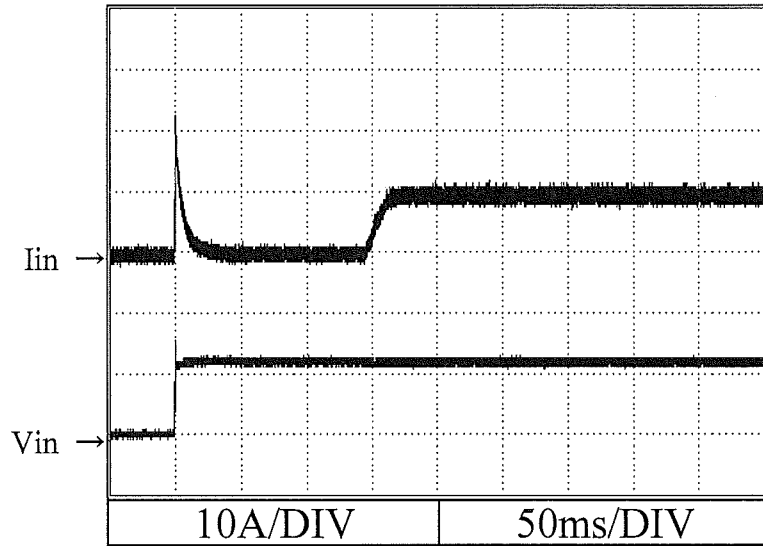
A = 4ms  
B = 5ms  
C = 9ms



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

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

5V



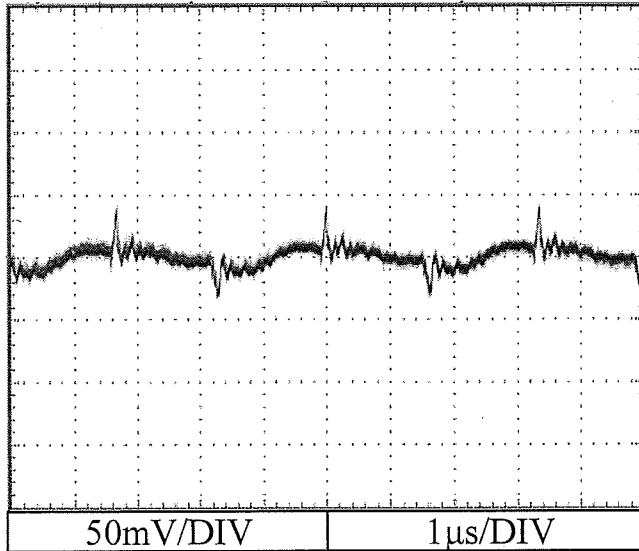


2.10 出力リップル、ノイズ波形  
Output ripple and noise waveform

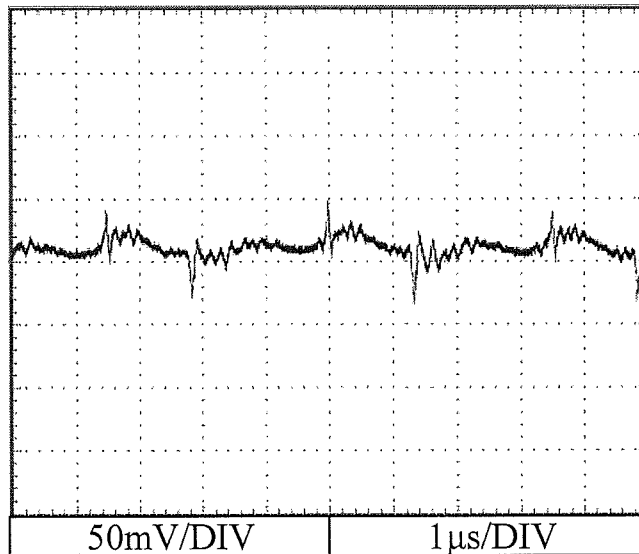
Conditions Vin : 24 VDC  
Iout : 100 %  
Ta : 25 °C

NORMAL MODE

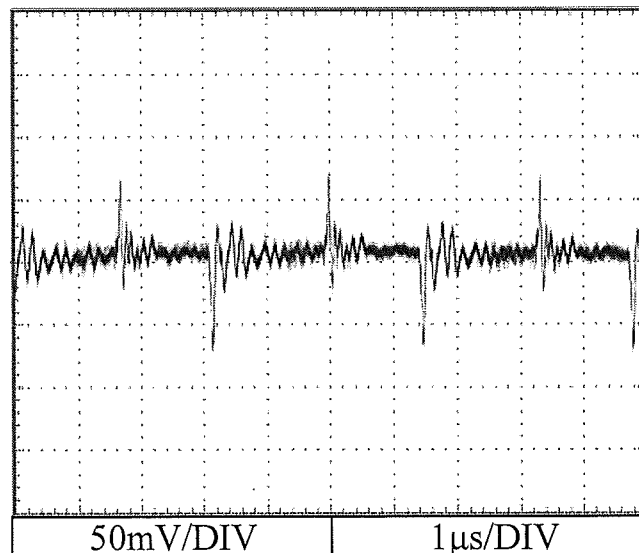
5V



12V



24V



2.11 EMI 特性

Electro-Magnetic Interference characteristics

雑音端子電圧

Conducted Emission

Conditions

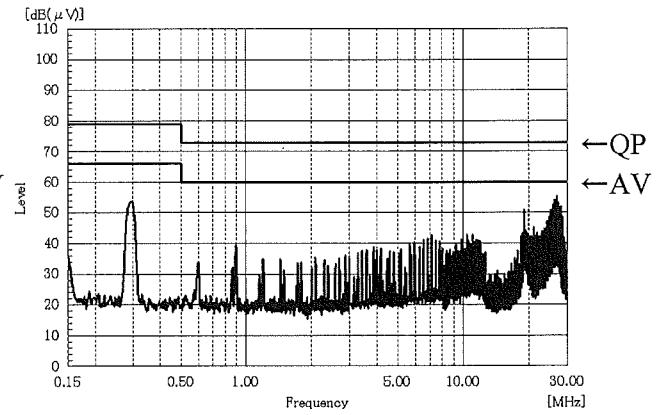
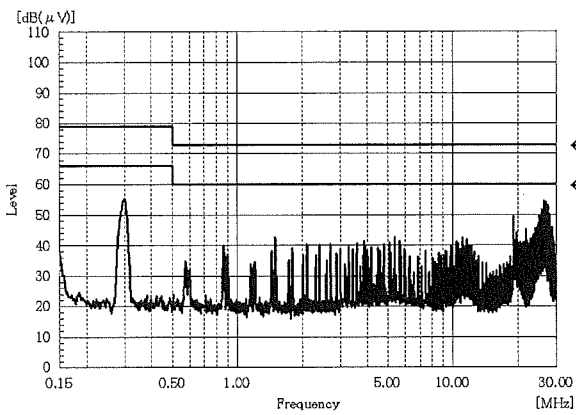
Vin : 24 VDC

Iout : 100 %

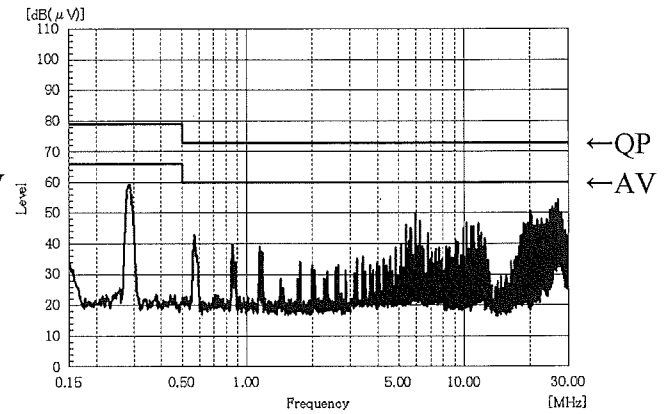
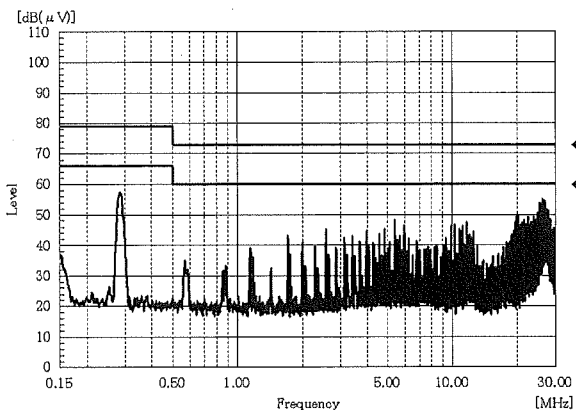
Phase : N (-Vin side)

Phase : L (+Vin side)

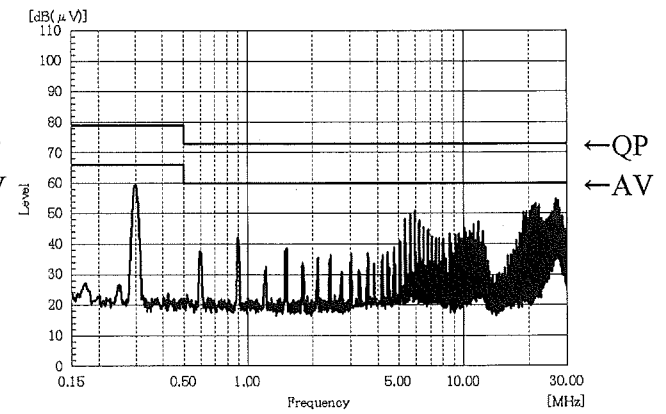
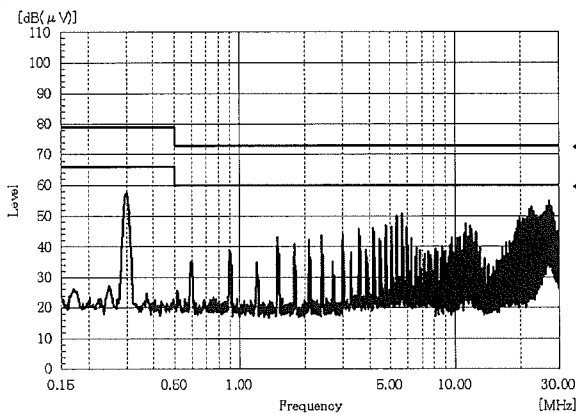
5V



12V



24V



EN55011-A,EN55022-Aの限界値はVCCI class Aの限界値と同じです。  
Limit of EN55011-A,EN55022-A are same as its VCCI class A.

表示はピーク値です。  
Indication is peak values.

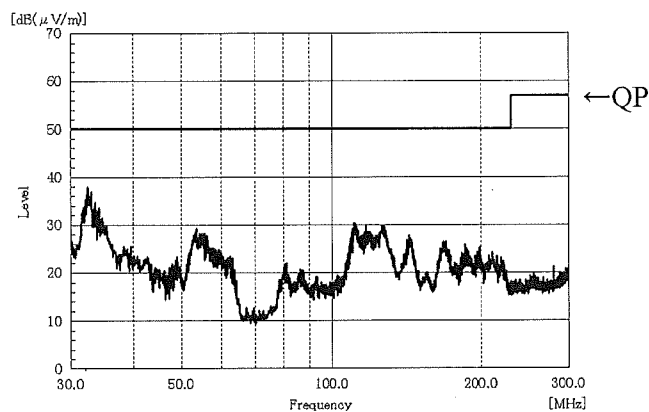
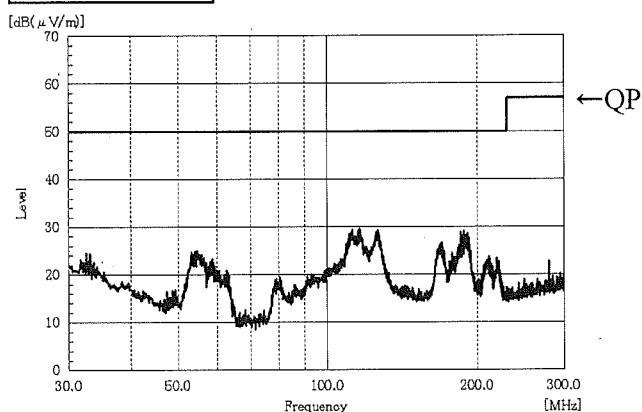
雑音電界強度  
Radiated Emission

Conditions Vin : 24 VDC  
Iout : 100 %

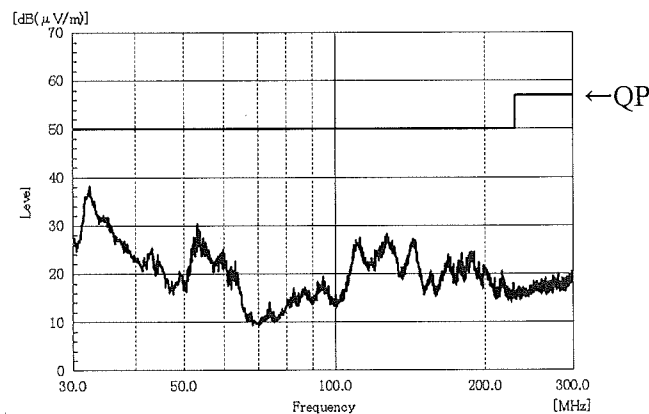
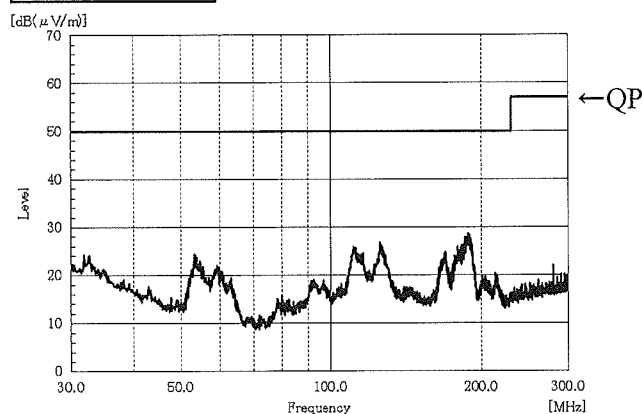
HORIZONTAL

VERTICAL

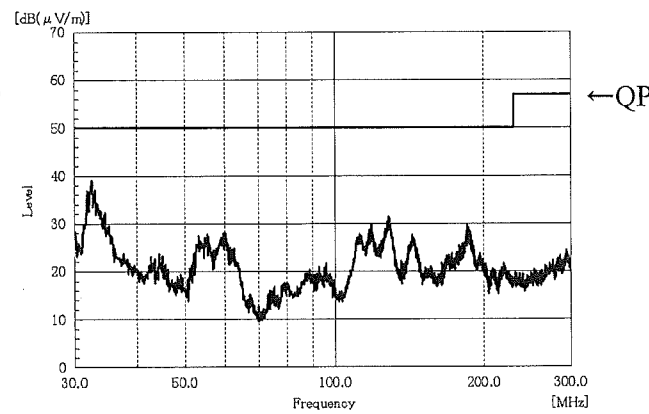
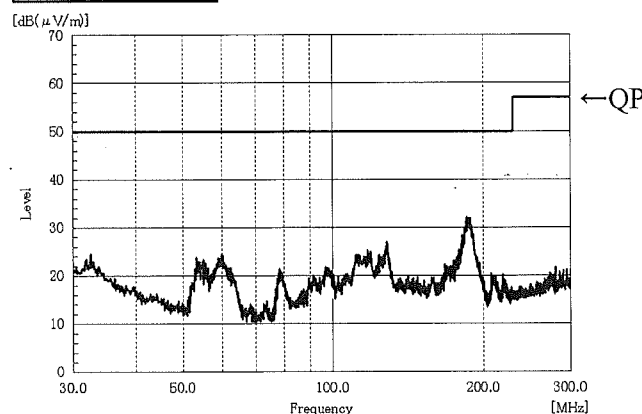
5V



12V



24V



EN55011-A,EN55022-Aの限界値はVCCI class Aの限界値と同じです。  
Limit of EN55011-A,EN55022-A are same as its VCCI class A.

表示はピーク値です。  
Indication is peak values.