# RDS60-24

# EVALUATION DATA

# 型式データ

| DWG No. B028-53-01 | | |
|---|---|---|
| APPD | CHK | DWG |
| Kurosawa<br>9. Mar. '10 | Ryuman<br>9, Mar, '10 | Shimamura<br>9, Mar, '10 |

# INDEX



使用記号　Terminology used

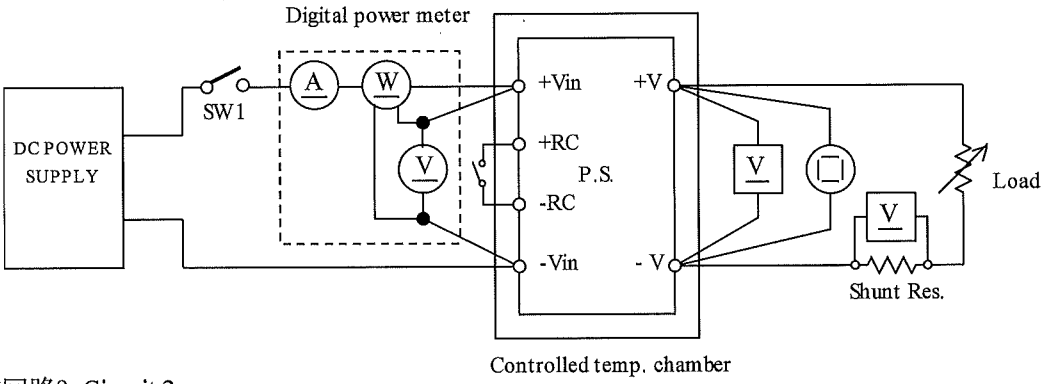
| | Definition | |
|---|---|---|
| Vin | ..... | 入力電圧　Input voltage |
| Vout | ..... | 出力電圧　Output voltage |
| Iin | ..... | 入力電流　Input current |
| Iout | ..... | 出力電流　Output current |
| Ta | ..... | 周囲温度　Ambient temperature |
| f | ..... | 周波数　Frequency |
| CNT (RC) | ..... | ＯＮ／ＯＦＦコントロール　ON/OFF control |

1. 測定方法 **Evaluation Method**

1.1 測定回路 Circuit used for determination

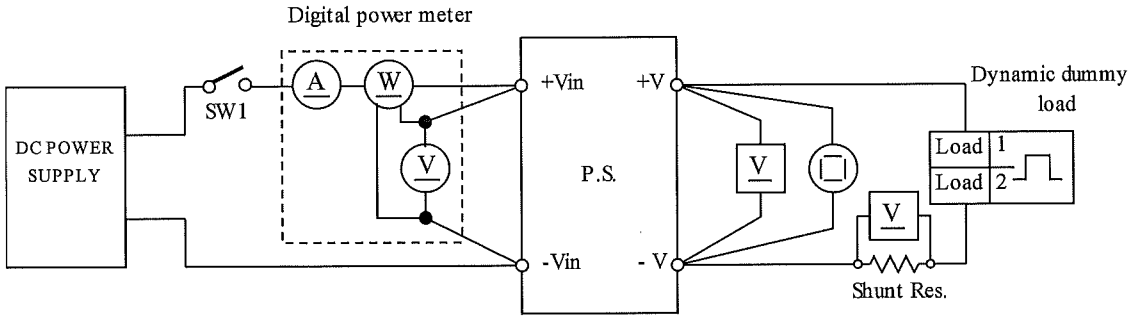
測定回路1 Circuit 1

- 静特性 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



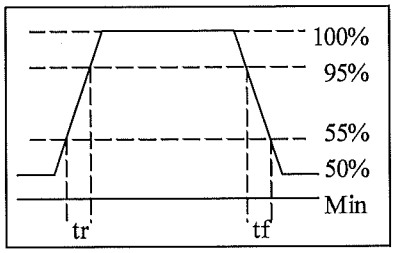

測定回路2 Circuit 2

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



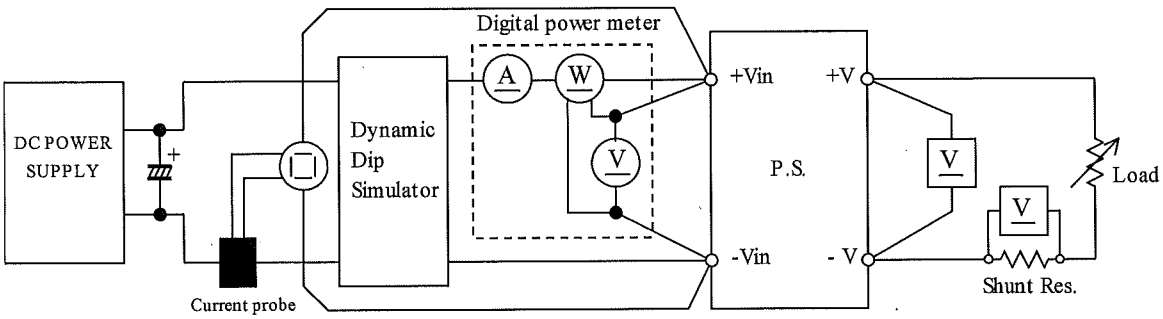

Output current waveform

Iout 50% <==> 100%




測定回路3 Circuit 3

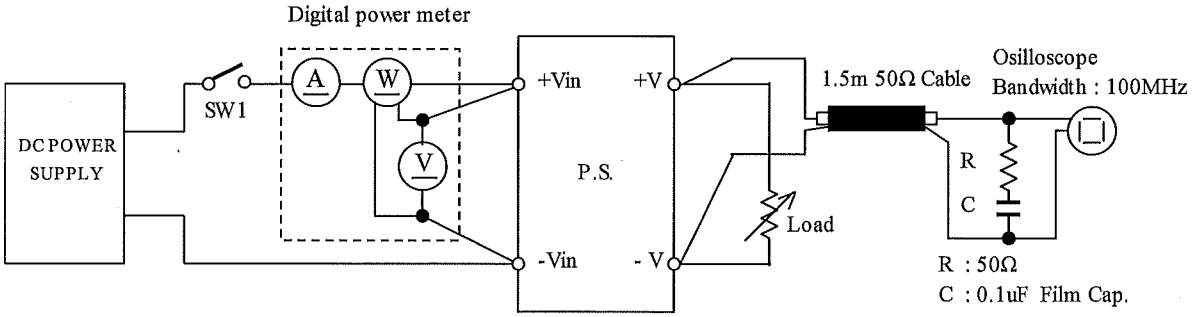
- 入力サージ電流（突入電流）特性 Inrush current characteristics



測定回路4 Circuit 4

・出力リップル、ノイズ特性　　Output ripple and noise waveform

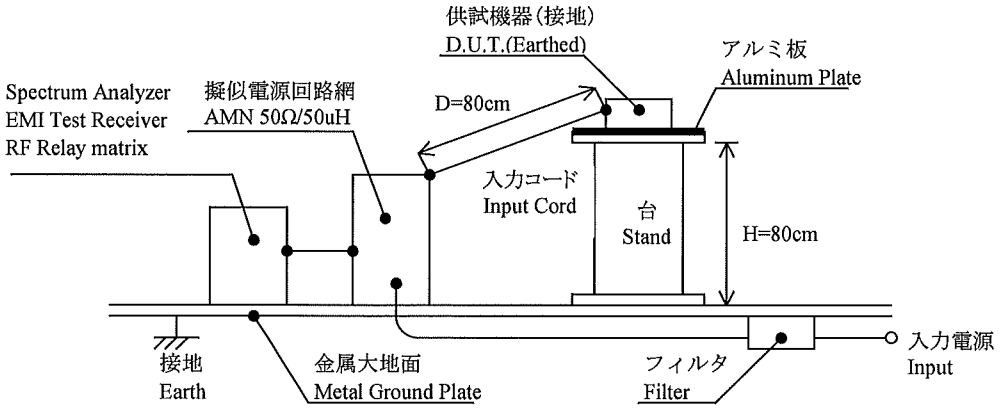
Normal Mode (JEITA Standard RC-9131A)



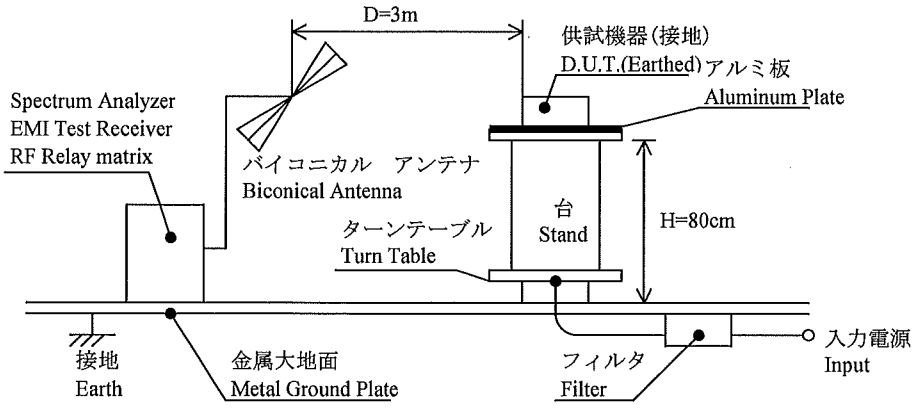

測定構成 Configuration

・ＥＭＩ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

| | EQUIPMENT USED | MANUFACTURER | MODEL NO. |
|---|---|---|---|
| 1 | DIGITAL STORAGE OSCILLOSCOPE | TEKTRONIX | TDS3012 |
| 2 | DIGITAL STORAGE OSCILLOSCOPE | YOKOGAWA ELECT. | DL1740EL |
| 3 | DIGITAL MULTIMETER | AGILENT | 34970A |
| 4 | DIGITAL POWER METER | YOKOGAWA ELECT. | WT110 |
| 5 | CURRENT PROBE/AMPLIFIER | YOKOGAWA ELECT. | 701930 |
| 6 | DYNAMIC DUMMY LOAD | TAKASAGO | FK-400L |
| 7 | CVCF | TAKASAGO | AA2000XG |
| 8 | DYNAMIC DIP SIMULATOR | CYBERNETICS | PSA-210 |
| 9 | CONTROLLED TEMP. CHAMBER | ESPEC | SU-641 |
| 10 | SPECTRUM ANALYZER<br>EMI TEST RECEIVER | ROHDE & SCHWARZ | ESCI |
| 11 | RF SELECTOR | TOYO, CORP | NS4900 |
| 12 | AMN | SCHWARZBECK | NNLK8121 |
| 13 | 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 :　25 ℃

| Iout \ Vin | 18VDC | 24VDC | 32VDC | line regulation | |
|---|---|---|---|---|---|
| 0% | 5.072V | 5.067V | 5.066V | 6mV | 0.120% |
| 50% | 5.039V | 5.035V | 5.034V | 5mV | 0.100% |
| 100% | 5.004V | 5.000V | 4.999V | 5mV | 0.100% |
| load | 68mV | 67mV | 67mV | | |
| regulation | 1.360% | 1.340% | 1.340% | | |

2. Temperature drift　Conditions　Vin :　24 VDC
Iout :　100 %

| Ta | -20℃ | +25℃ | +50℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 5.022V | 5.000V | 5.015V | 22mV | 0.440% |

3. Start up voltage and Drop out voltage　Conditions　Ta :　25 ℃
Iout :　100 %

| | |
|---|---|
| Start up voltage (Vin) | 16.3VDC |
| Drop out voltage (Vin) | 16.4VDC |

## 12V

1. Regulation - line and load　Condition　Ta :　25 ℃

| Iout \ Vin | 18VDC | 24VDC | 32VDC | line regulation | |
|---|---|---|---|---|---|
| 0% | 12.047V | 12.046V | 12.046V | 1mV | 0.008% |
| 50% | 12.035V | 12.032V | 12.031V | 4mV | 0.033% |
| 100% | 12.019V | 12.015V | 12.013V | 6mV | 0.050% |
| load | 28mV | 31mV | 33mV | | |
| regulation | 0.233% | 0.258% | 0.275% | | |

## 24V

1. Regulation - line and load　Condition　Ta :　25 ℃

| Iout \ Vin | 18VDC | 24VDC | 32VDC | line regulation | |
|---|---|---|---|---|---|
| 0% | 24.096V | 24.190V | 24.236V | 140mV | 0.583% |
| 50% | 24.086V | 24.085V | 24.111V | 26mV | 0.108% |
| 100% | 24.076V | 24.074V | 24.084V | 10mV | 0.042% |
| load | 20mV | 116mV | 152mV | | |
| regulation | 0.083% | 0.483% | 0.633% | | |

2. Temperature drift　Conditions　Vin :　24 VDC
Iout :　100 %

| Ta | -20℃ | +25℃ | +50℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 24.074V | 23.999V | 23.966V | 108mV | 0.450% |

3. Start up voltage and Drop out voltage　Conditions　Ta :　25 ℃
Iout :　100 %

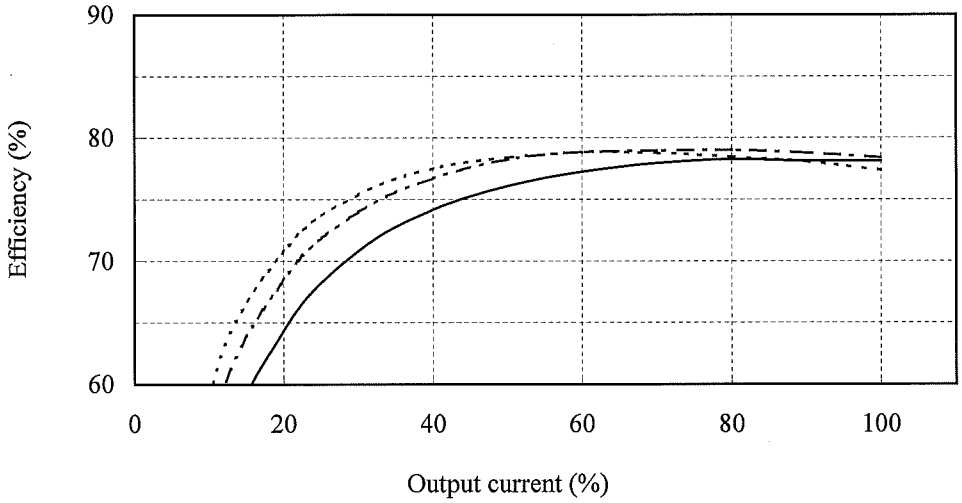
| | |
|---|---|
| Start up voltage (Vin) | 15.8VDC |
| Drop out voltage (Vin) | 14.0VDC |

(2) 効率対出力電流

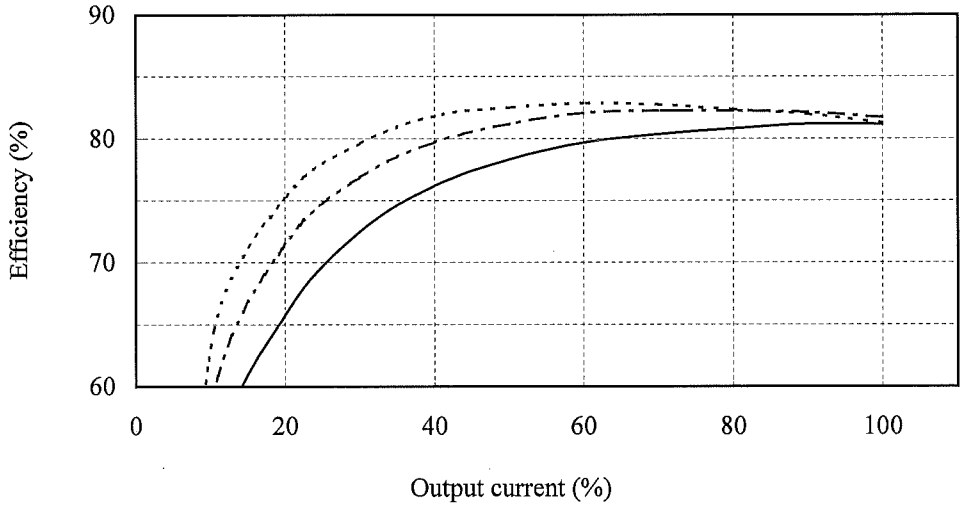
Efficiency vs. Output current

Conditions Vin : 18 VDC ------
24 VDC -·-·-·-
32 VDC ——
Ta : 25 ℃

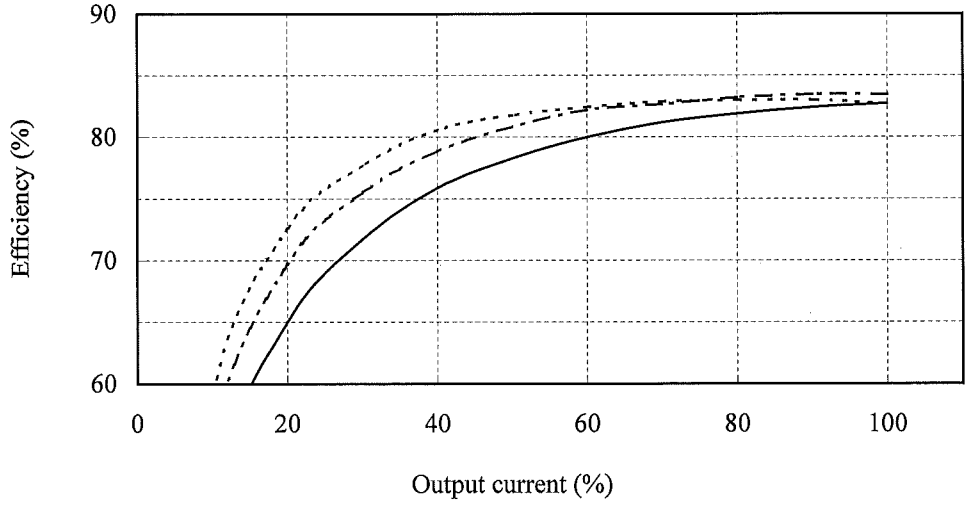
5V




12V



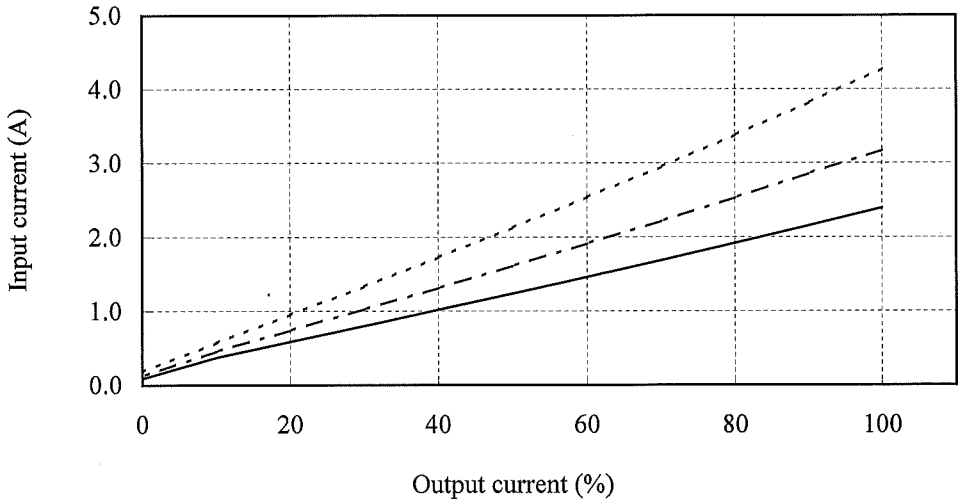

24V



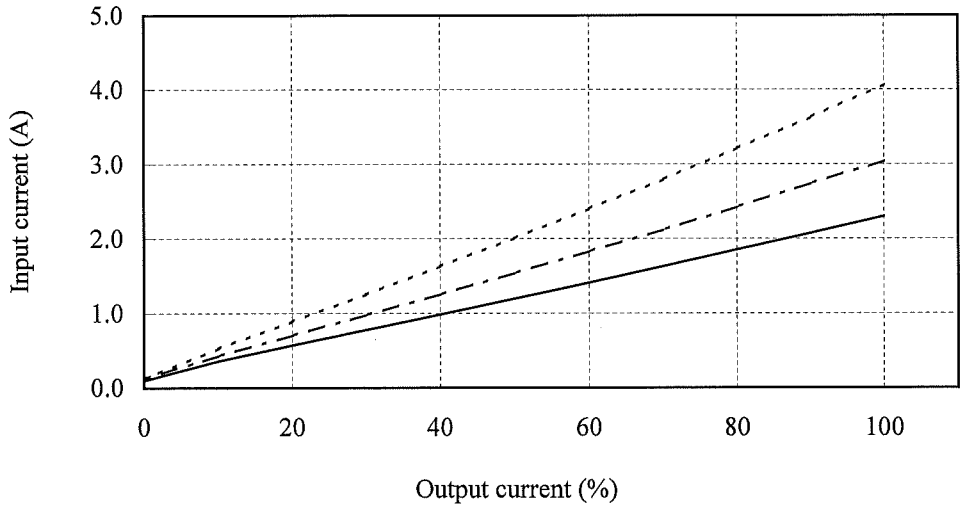
(3) 入力電流対出力電流
Input current vs. Output current

Conditions Vin : 18 VDC ------
24 VDC -·-·-·-
32 VDC ——
Ta : 25 ℃

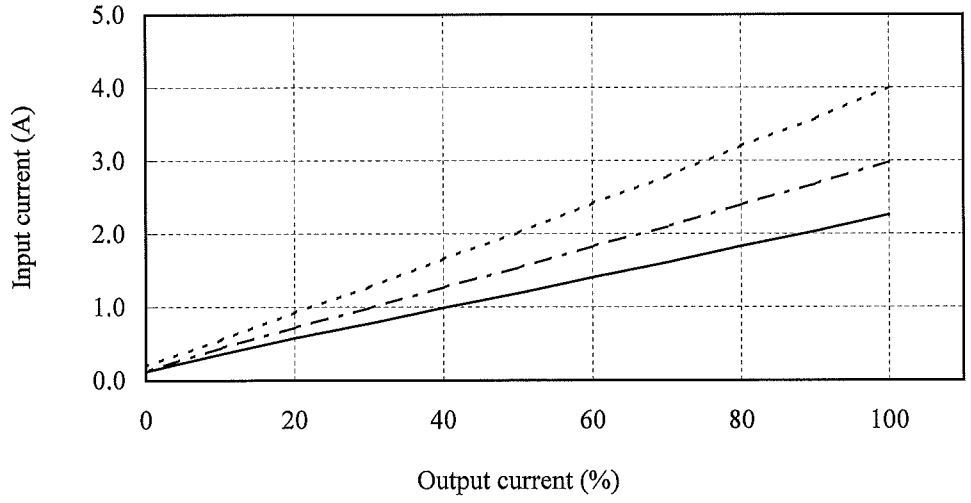
5V




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 ℃

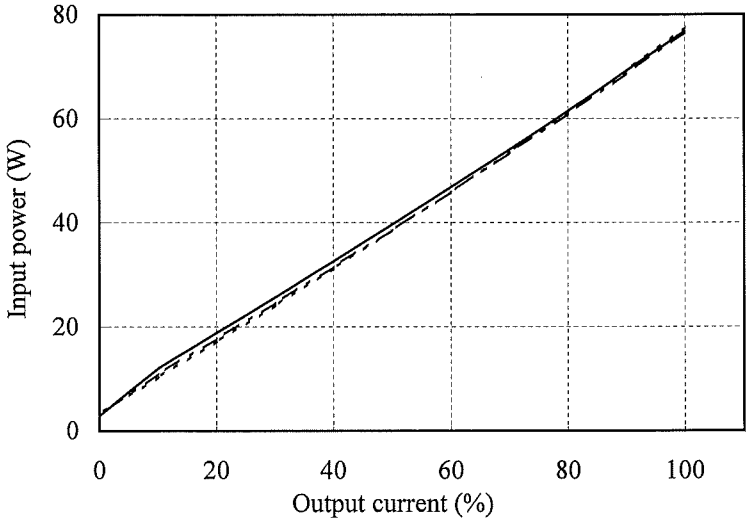
## 5V

Conditions Iout : 0%

| Vin | Input power |
|---|---|
| 18VDC | 3.3W |
| 24VDC | 2.9W |
| 32VDC | 3.0W |

Conditions CNT (RC) : OFF

| Vin | Input power |
|---|---|
| 18VDC | 0.2W |
| 24VDC | 0.4W |
| 32VDC | 0.8W |



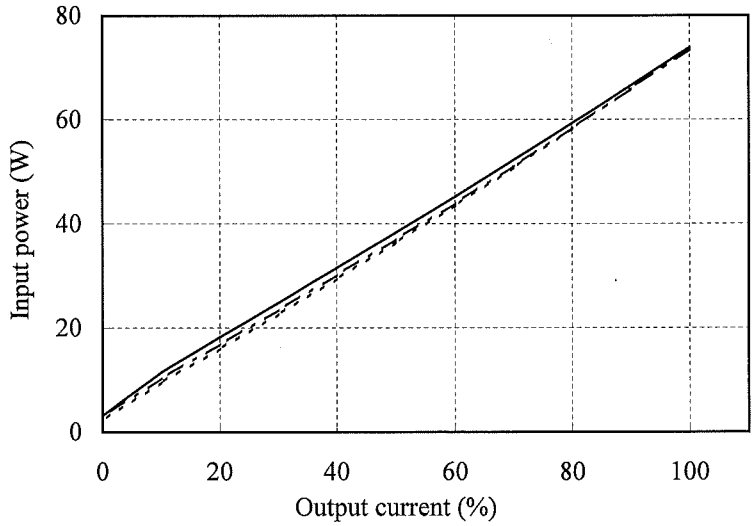

## 12V

Conditions Iout : 0%

| Vin | Input power |
|---|---|
| 18VDC | 2.3W |
| 24VDC | 3.0W |
| 32VDC | 3.2W |

Conditions CNT (RC) : OFF

| Vin | Input power |
|---|---|
| 18VDC | 0.2W |
| 24VDC | 0.4W |
| 32VDC | 0.9W |



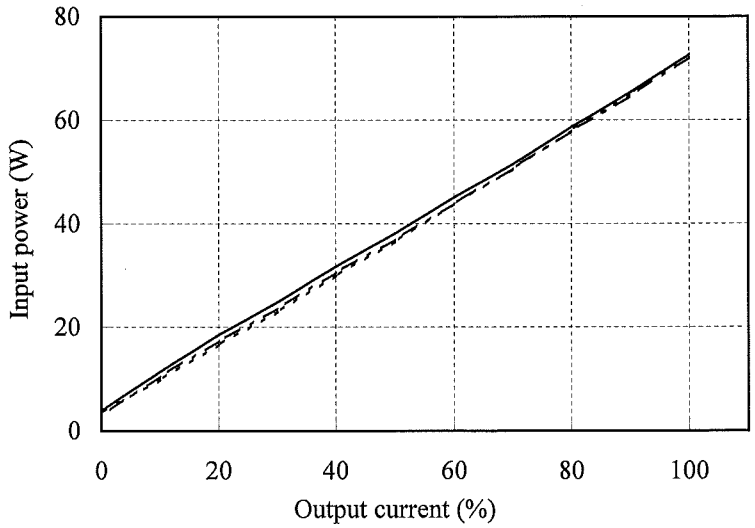

## 24V

Conditions Iout : 0%

| Vin | Input power |
|---|---|
| 18VDC | 3.5W |
| 24VDC | 3.1W |
| 32VDC | 4.0W |

Conditions CNT (RC) : OFF

| Vin | Input power |
|---|---|
| 18VDC | 0.2W |
| 24VDC | 0.4W |
| 32VDC | 0.8W |



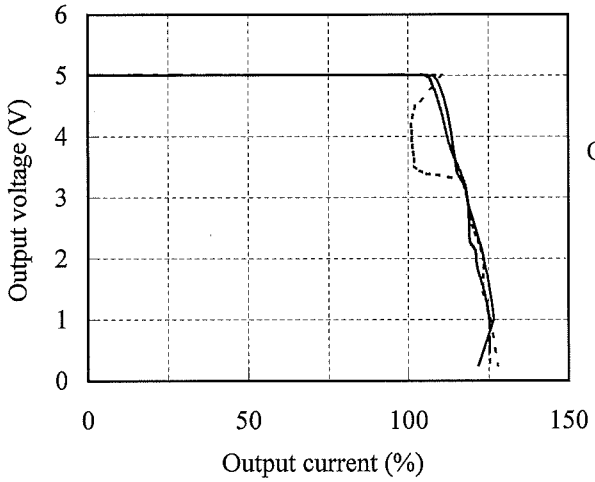
2.2 過電流保護特性
Over current protection (OCP) characteristics

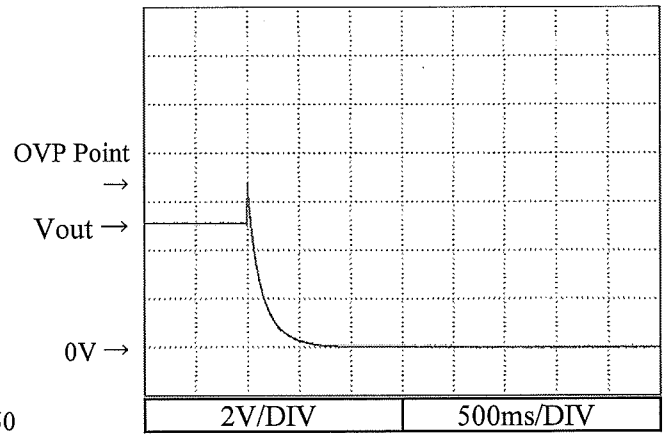
Conditions Vin : 18 VDC ------
24 VDC -·-·-·-
32 VDC ——
Ta : 25 ℃

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

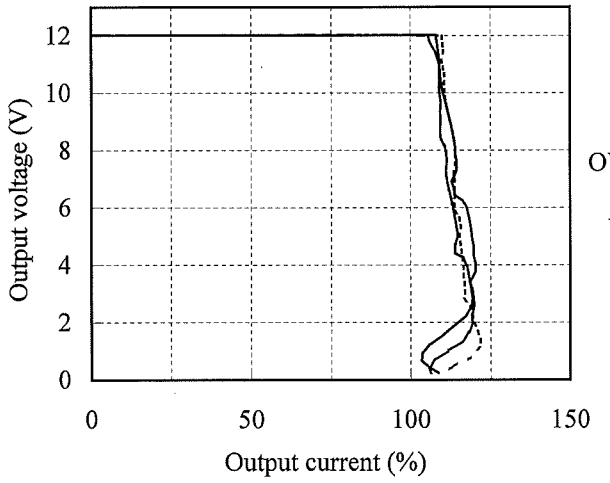
Conditions Vin : 24 VDC
Iout : 0 %
Ta : 25 ℃

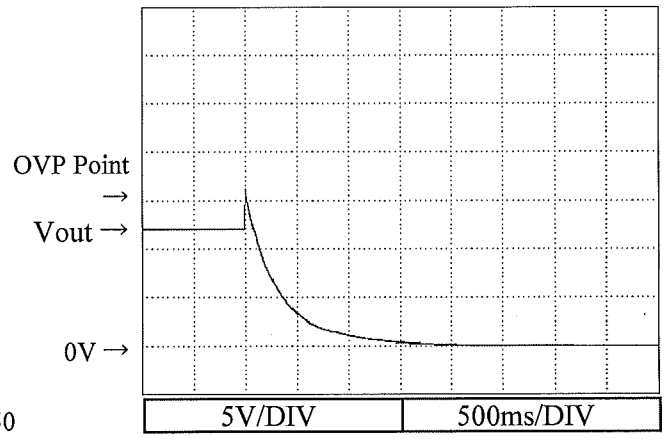
5V



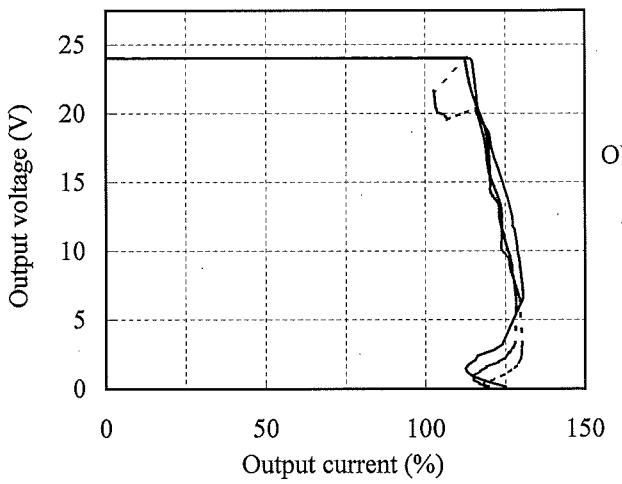



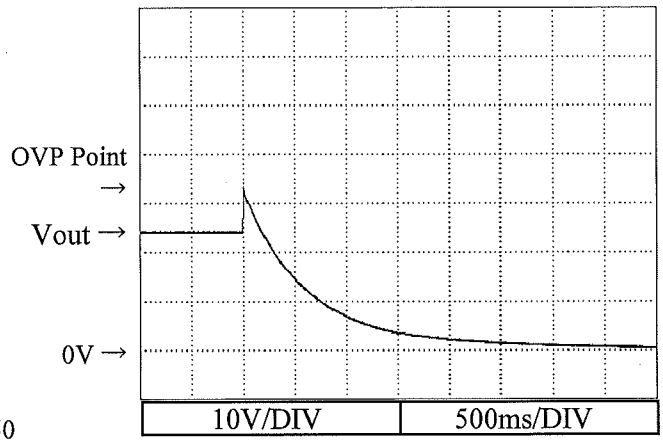

12V




24V

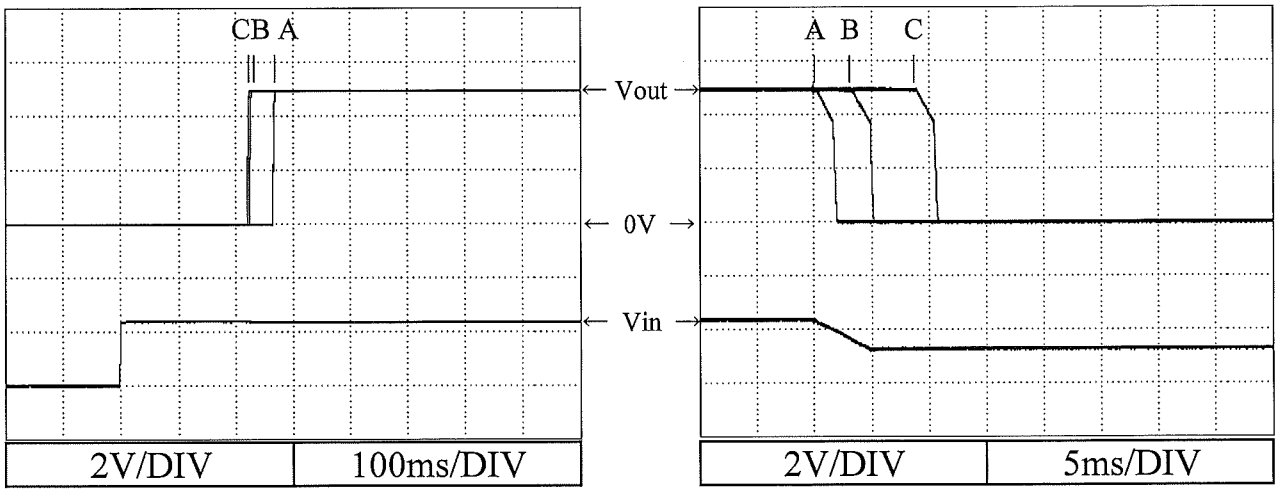


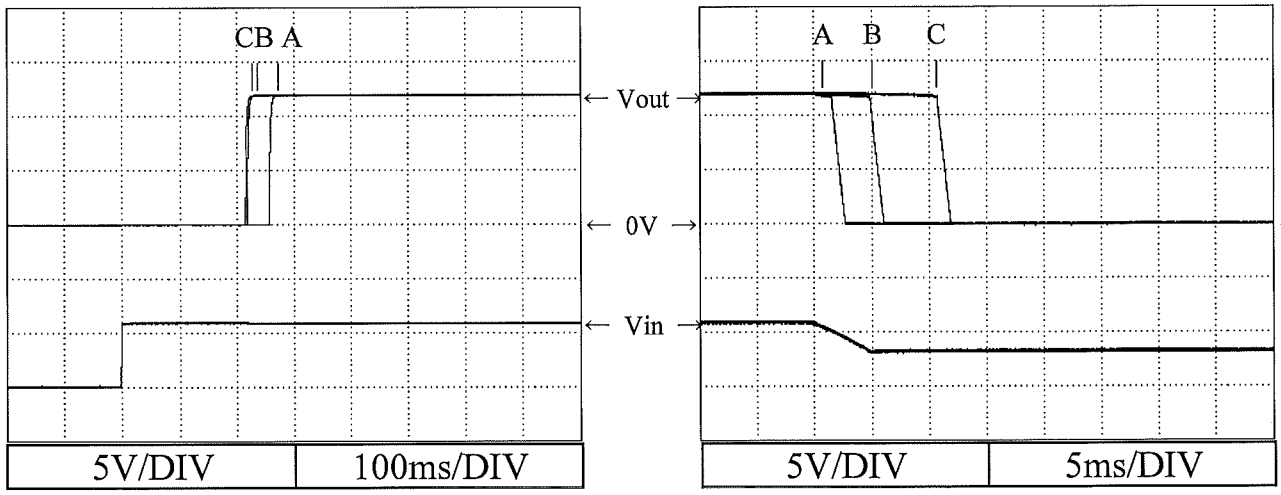
2.4 出力立ち上がり・立ち下がり特性
Output rise/fall characteristics

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

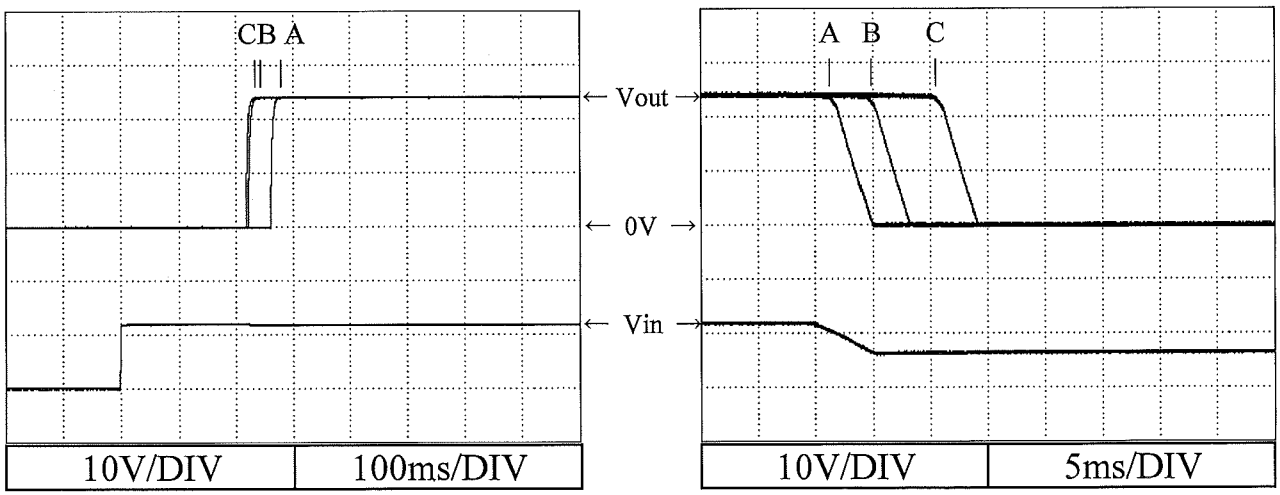
5V




12V



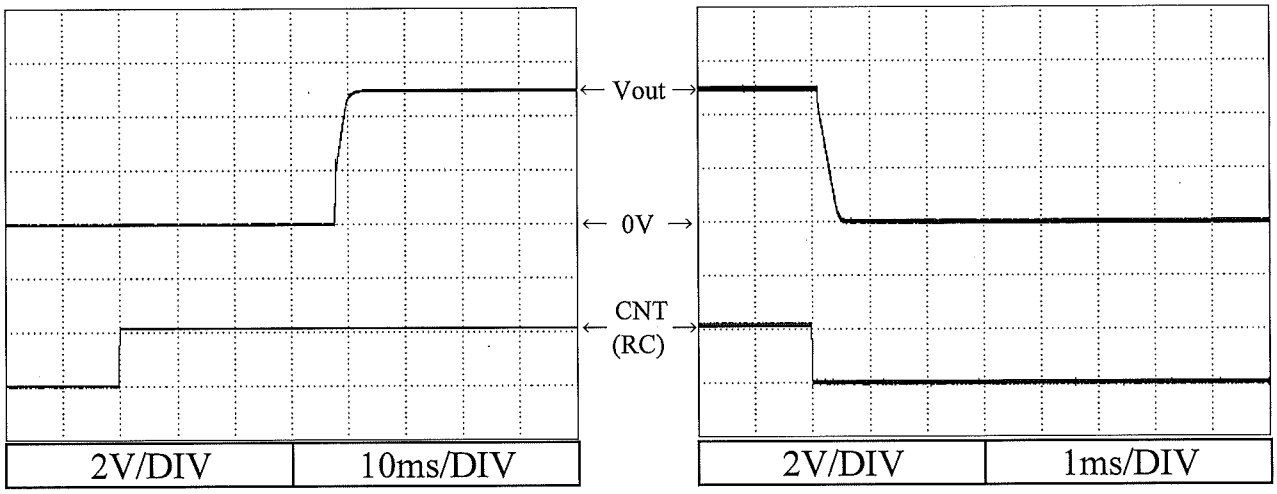

24V



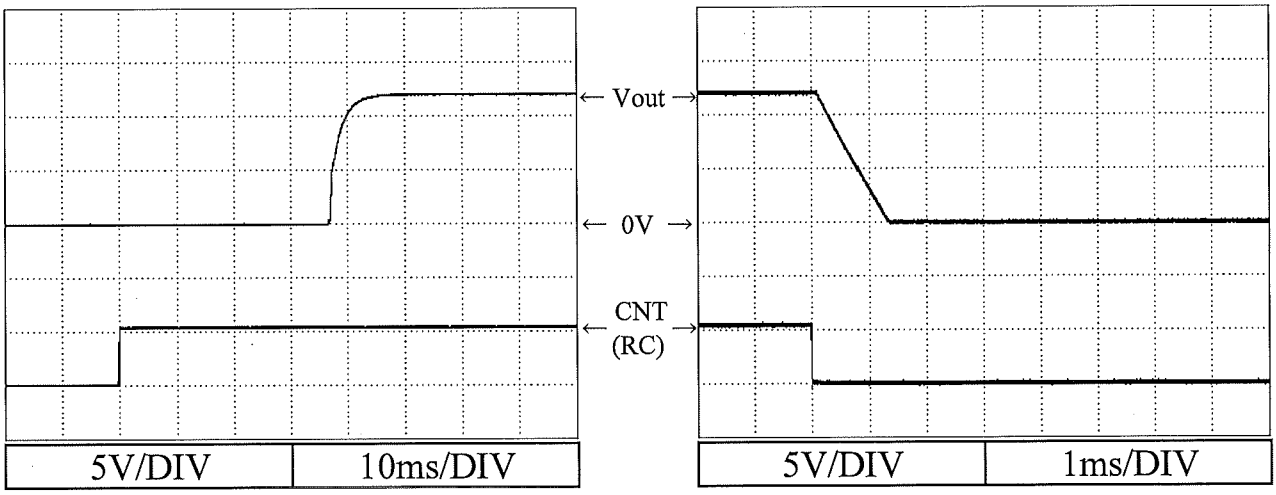
2.5 ＯＮ／ＯＦＦコントロール時出力立ち上がり・立ち下がり特性
Output rise/fall characteristics with ON/OFF control

Conditions Vin : 24 VDC
Iout : 100 %
Ta : 25 ℃

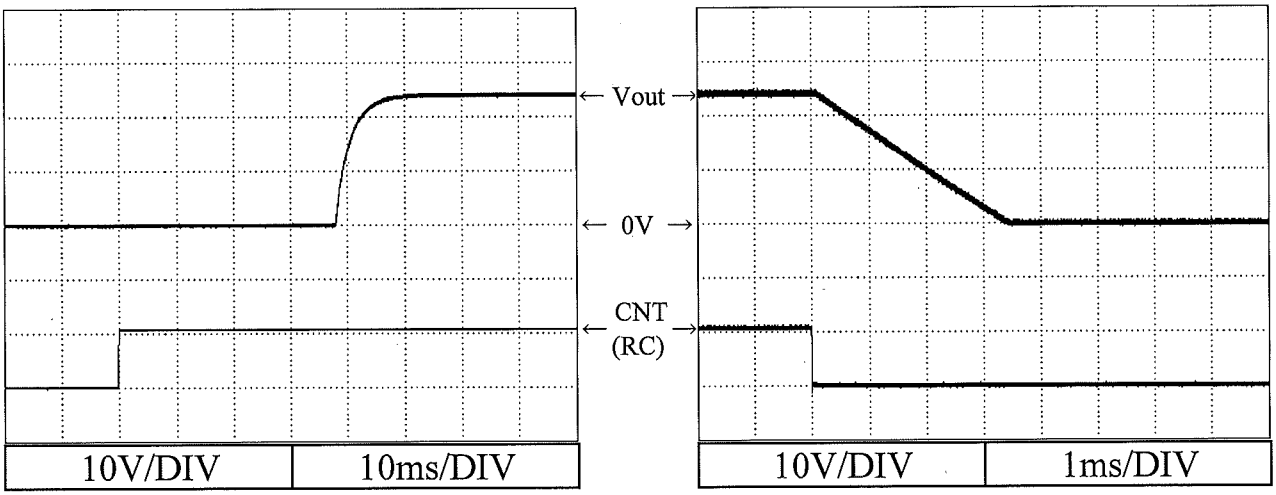
5V




12V



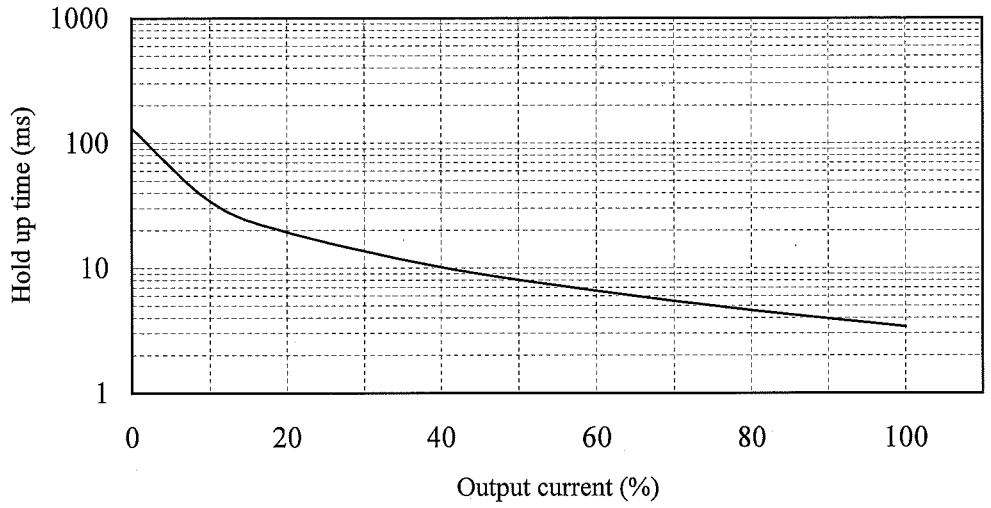

24V



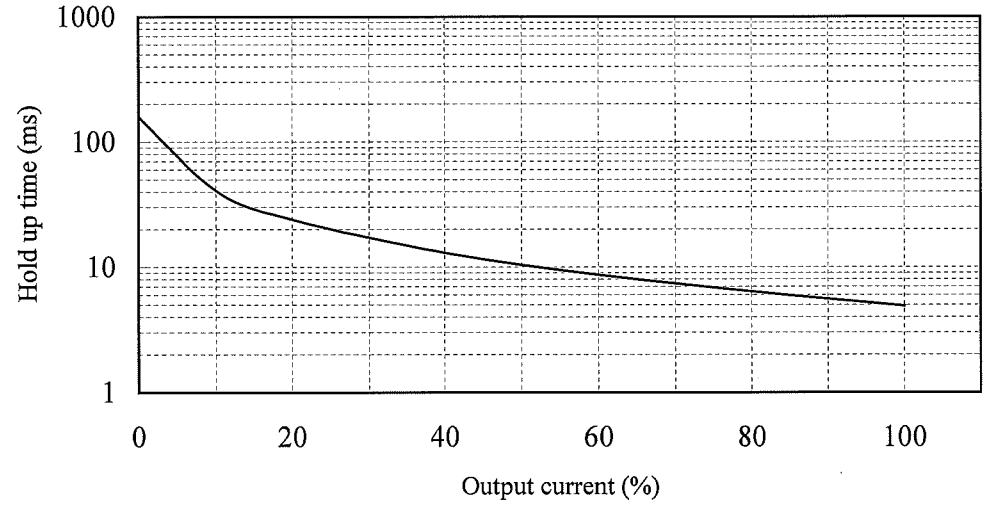
2.6 出力保持時間特性
Hold up time characteristics

Conditions Vin : 24 VDC
Ta : 25 ℃

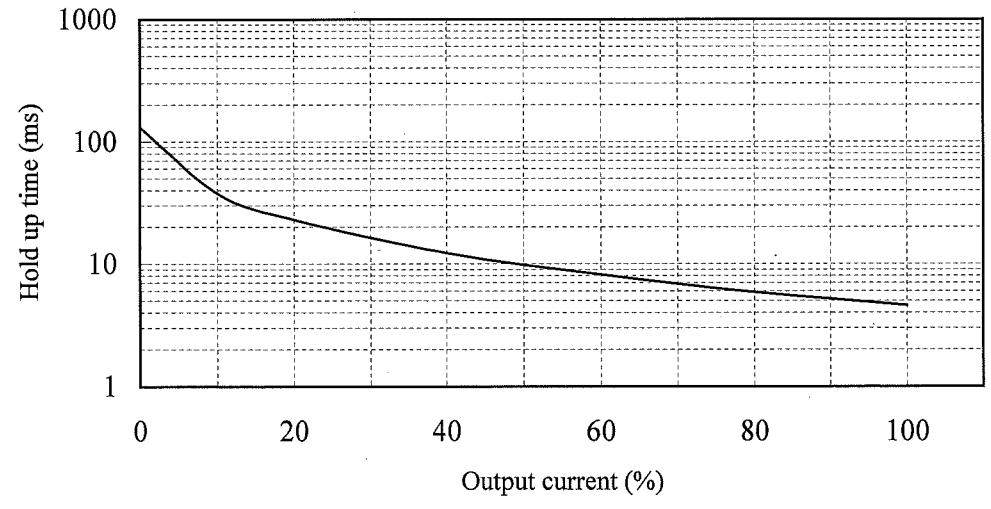
5V




12V




24V

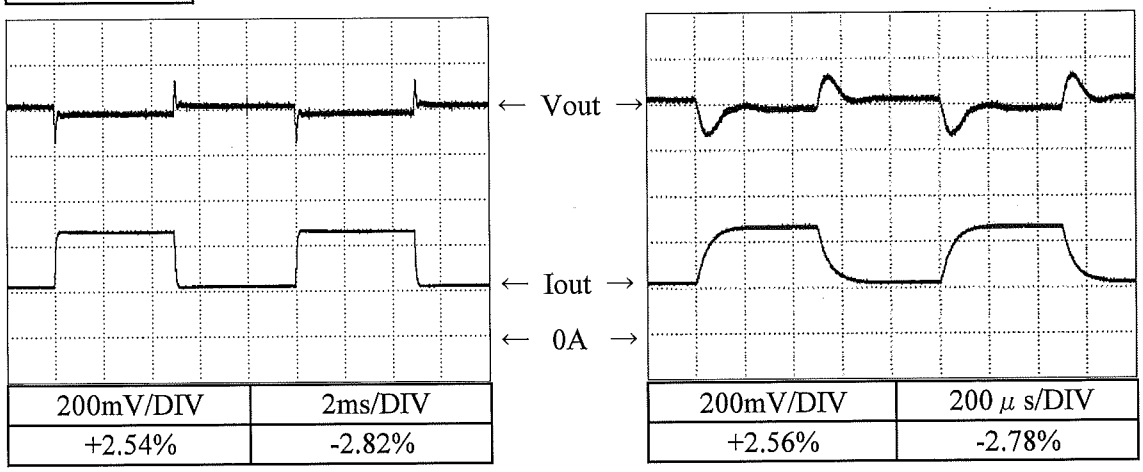


2.7 過渡応答（負荷急変）特性
Dynamic load response characteristics

Conditions Vin : 24 VDC
Io : 50 % ⟷ 100 %
(tr = tf = 100us)
Ta : 25 ℃

f = 100Hz　　f = 1kHz

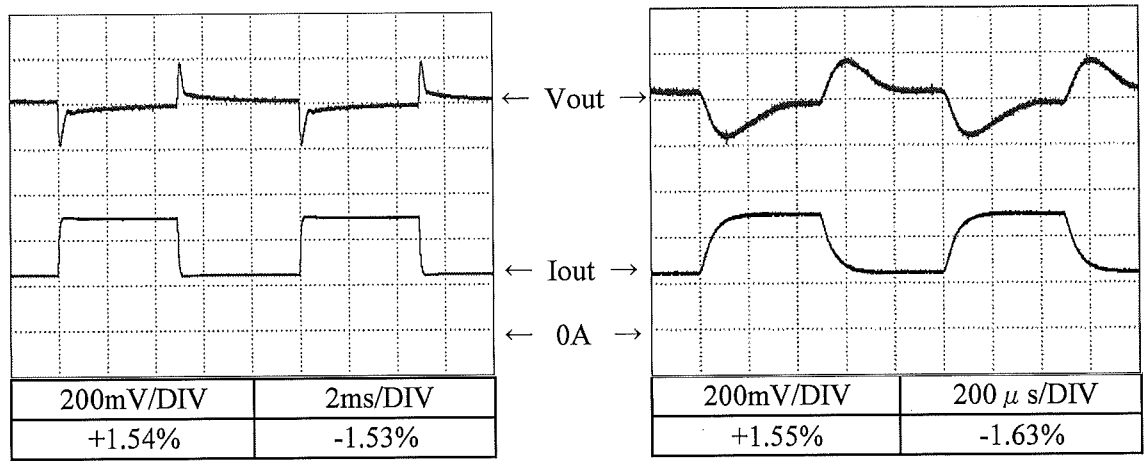
5V




| 200mV/DIV | 2ms/DIV |
|---|---|
| +2.54% | -2.82% |

| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +2.56% | -2.78% |

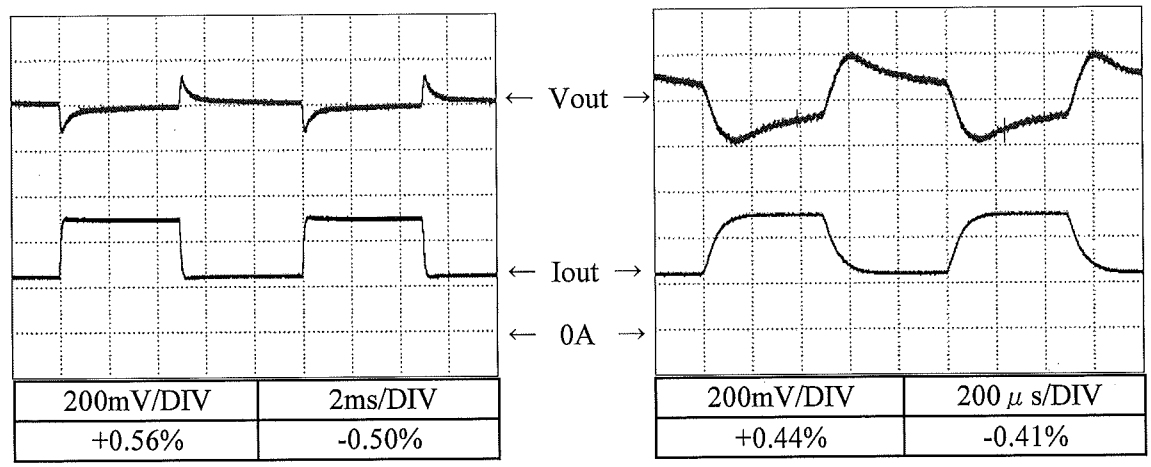
12V




| 200mV/DIV | 2ms/DIV |
|---|---|
| +1.54% | -1.53% |

| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +1.55% | -1.63% |

24V



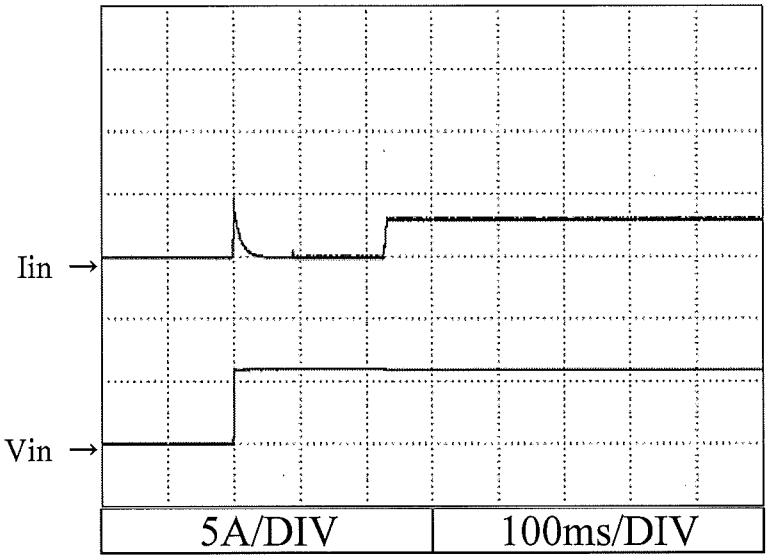

| 200mV/DIV | 2ms/DIV |
|---|---|
| +0.56% | -0.50% |

| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +0.44% | -0.41% |

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

Conditions Vin : 24 VDC
Iout : 100 %
Ta : 25 ℃

5V

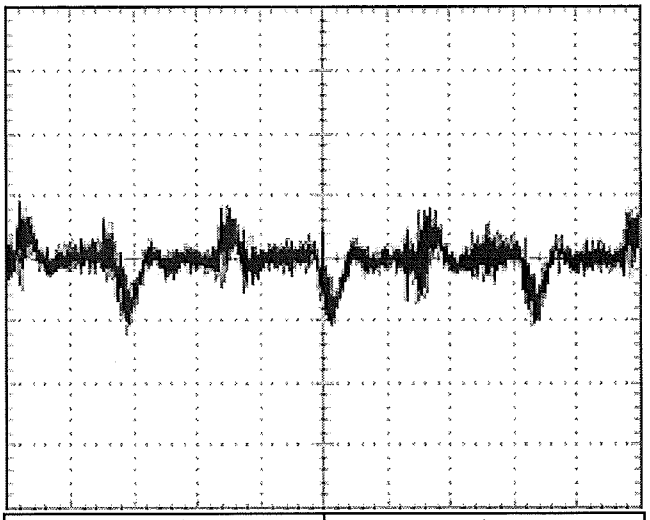


2.9 出力リップル、ノイズ波形
Output ripple and noise waveform

Conditions Vin : 24 VDC
Iout : 100 %
Ta : 25 ℃

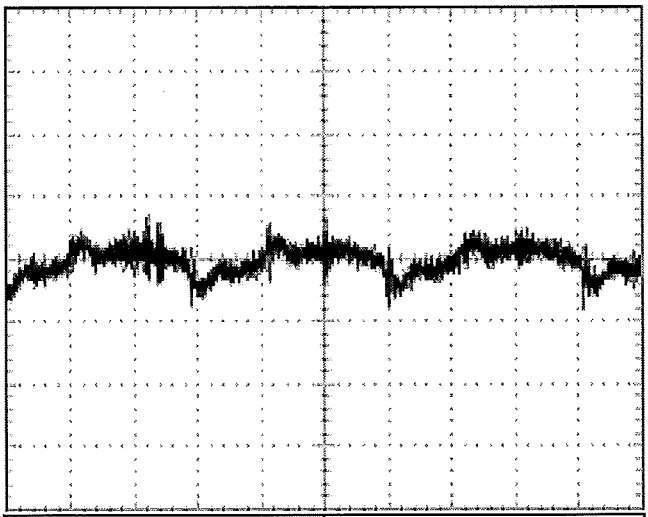
NORMAL MODE

5V



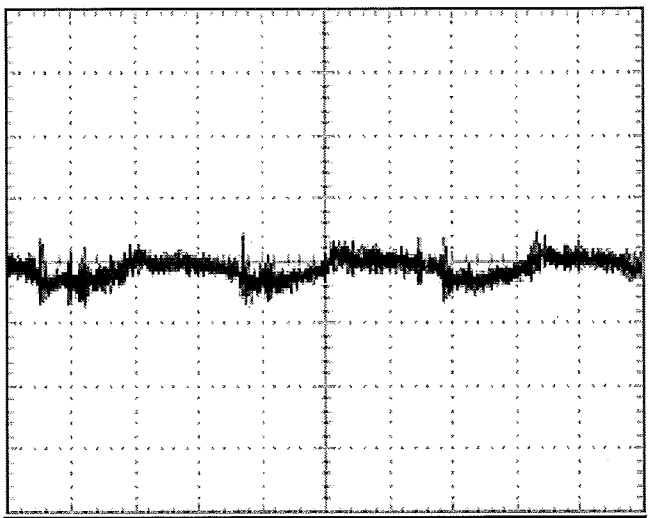
10mV/DIV | 1μs/DIV

12V



10mV/DIV | 1μs/DIV

24V



10mV/DIV | 1μs/DIV

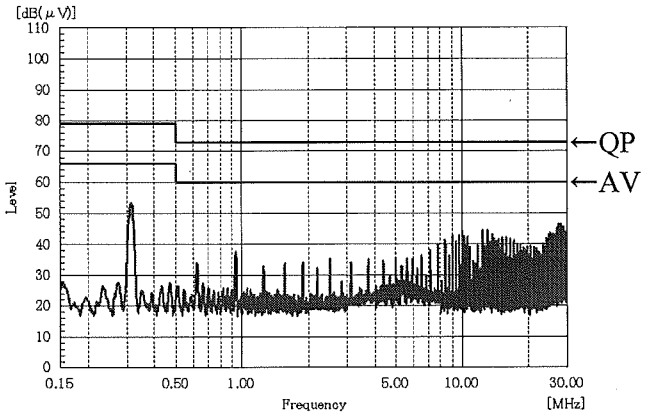
## 2. 10 ＥＭＩ特性
Electro-Magnetic Interference characteristics

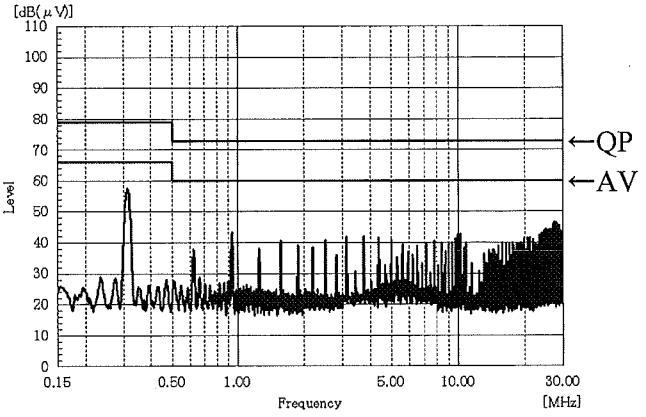
雑音端子電圧
Conducted Emission

Conditions　Vin :　24 VDC
Iout :　100 %

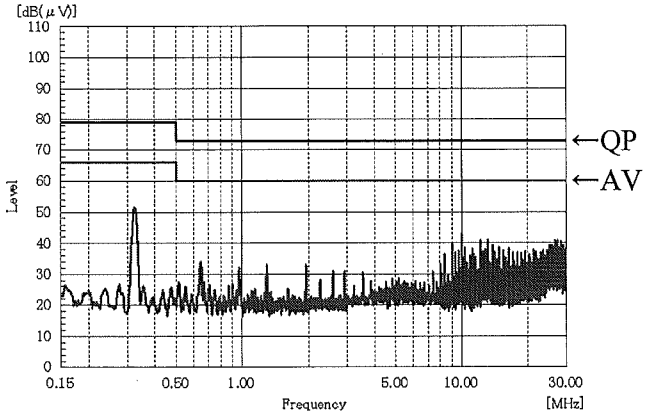
Phase : N (-Vin side)　　Phase : L (+Vin side)

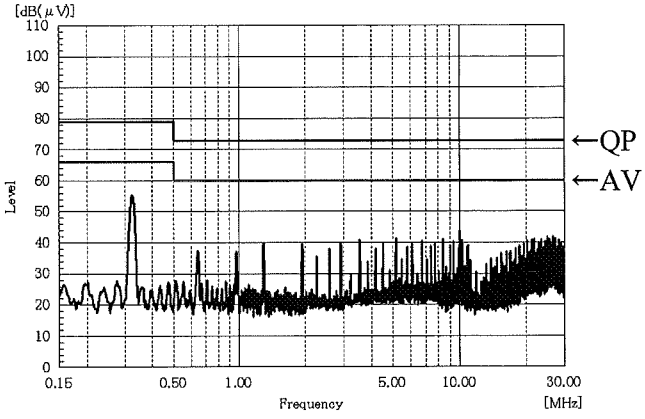
5V



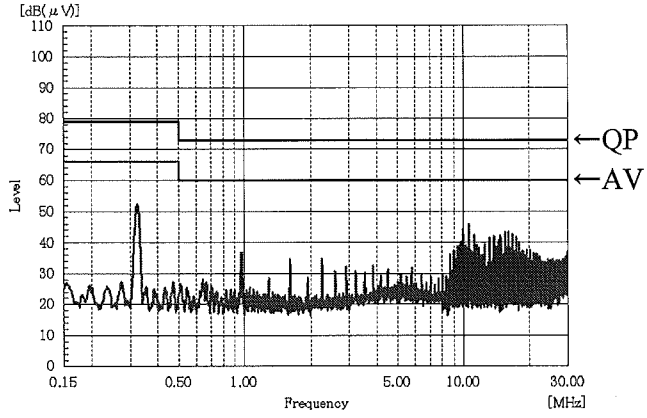



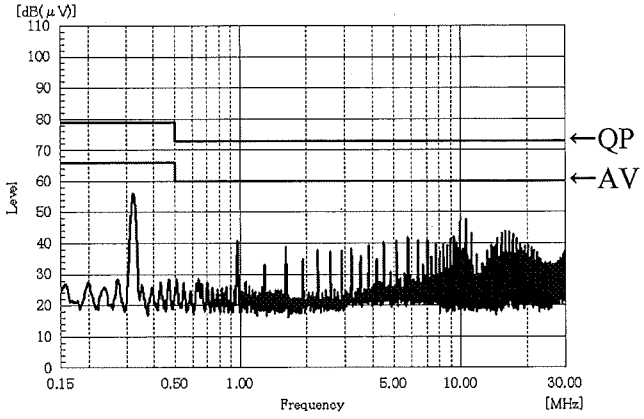

12V




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.

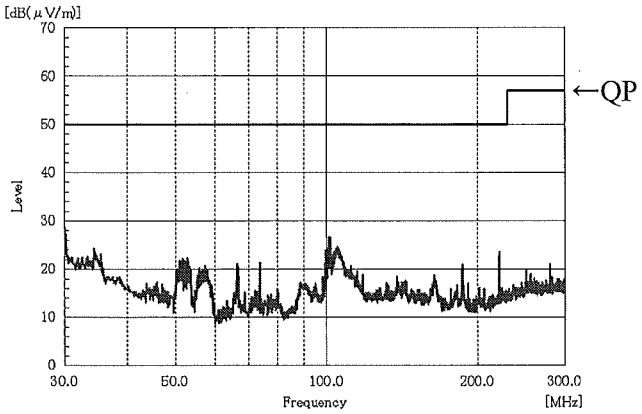
雑音電界強度
Radiated Emission

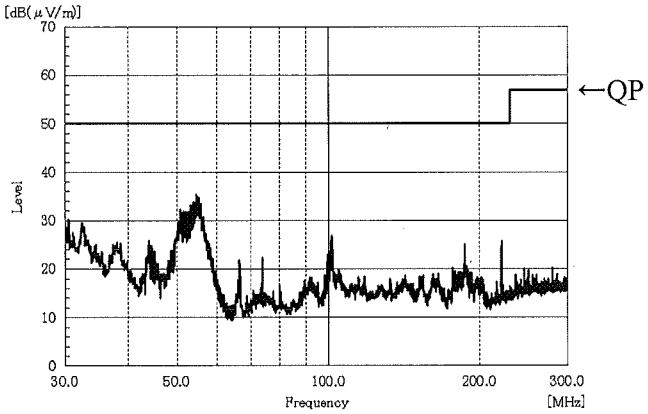
Conditions Vin : 24 VDC
Iout : 100 %

HORIZONTAL

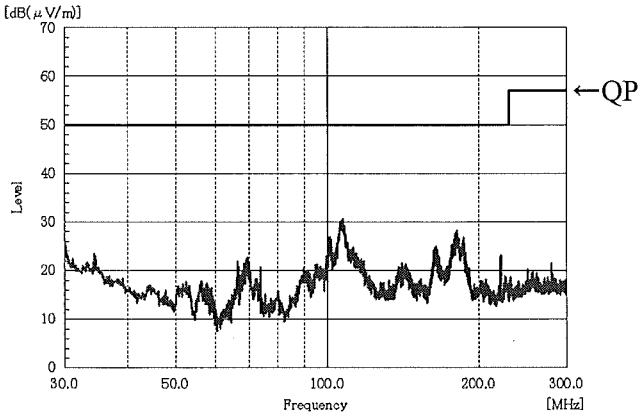
VERTICAL

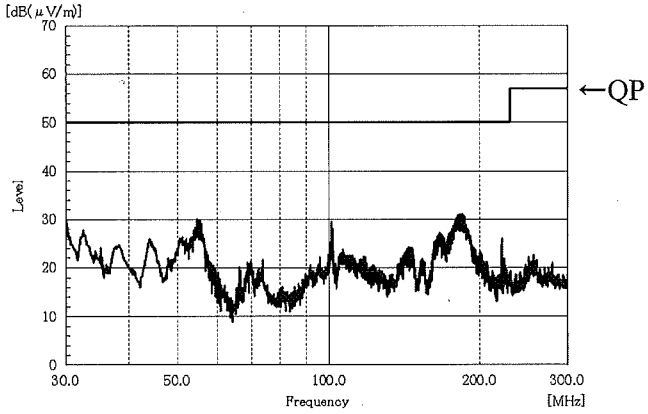
5V



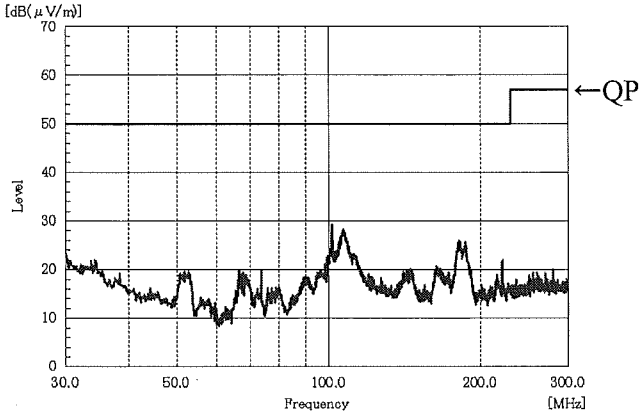



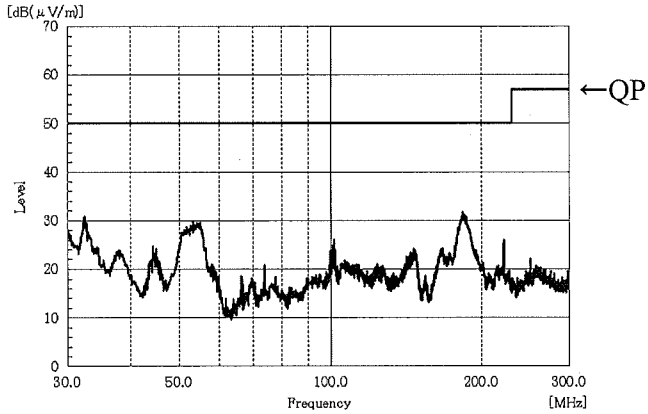

12V




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.