# CUT35

# EVALUATION DATA

# 型式データ

CA837-53-01

# INDEX

使用記号 Terminology used

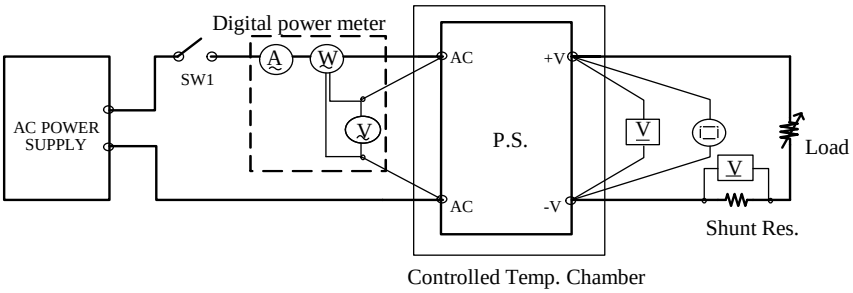
| | 定義 | Definition | |
|---|---|---|---|
| Vin | ..... | 入力電圧 | Input voltage |
| Vout | ..... | 出力電圧 | Output voltage |
| Iin | ..... | 入力電流 | Input current |
| Iout | ..... | 出力電流 | Output current |
| Ta | ..... | 周囲温度 | Ambient temperature |
| f | ..... | 周波数 | Frequency |

## 1. 測定方法　　Evaluation Method

1. 1　測定回路　　Circuit used for determination

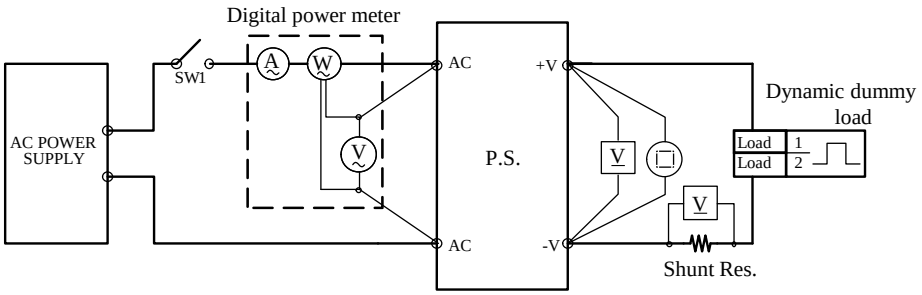
測定回路1 Circuit 1 used for determination

- 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
- 出力立ち上がり特性　　Output rise characteristics
- 出力立ち下がり特性　　Output fall characteristics
- 出力保持時間特性　　Hold up time characteristics

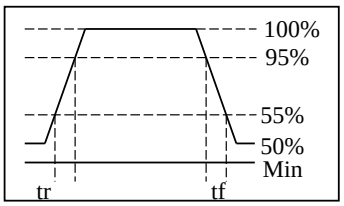



測定回路2 Circuit 2 used for determination

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

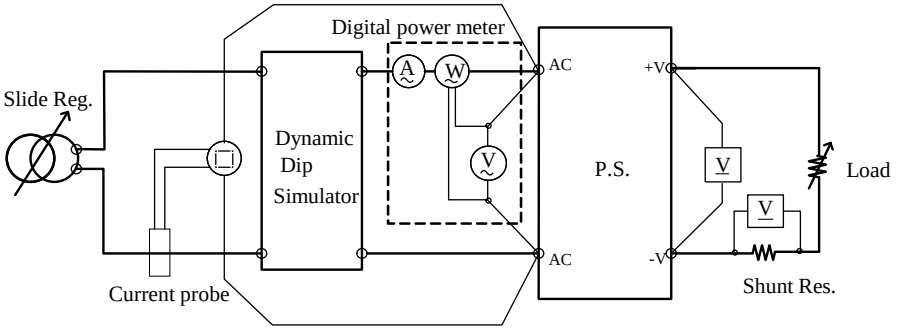



Output current waveform



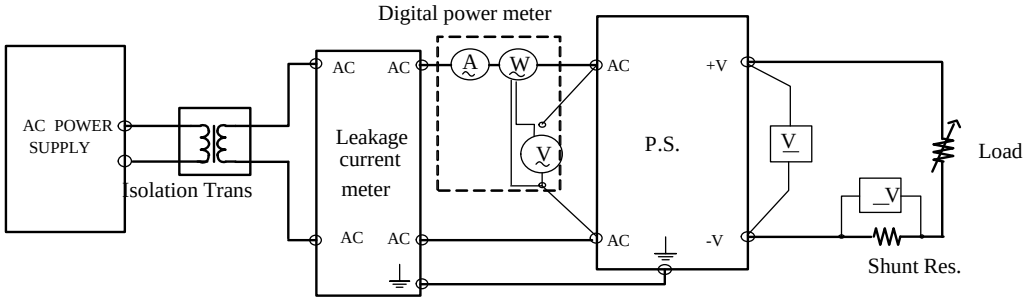

測定回路3 Circuit 3 used for determination

- 入力サージ電流(突入電流)波形　　Inrush current waveform



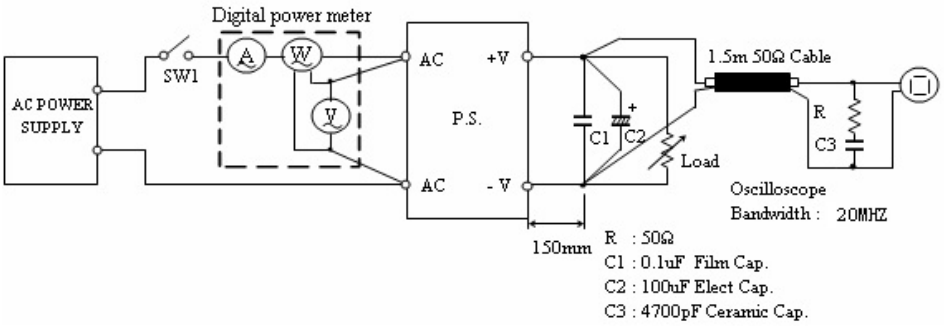
測定回路4 Circuit 4 used for determination

・リーク電流特性　　Leakage current characteristics




測定回路5 Circuit 5 used for determination

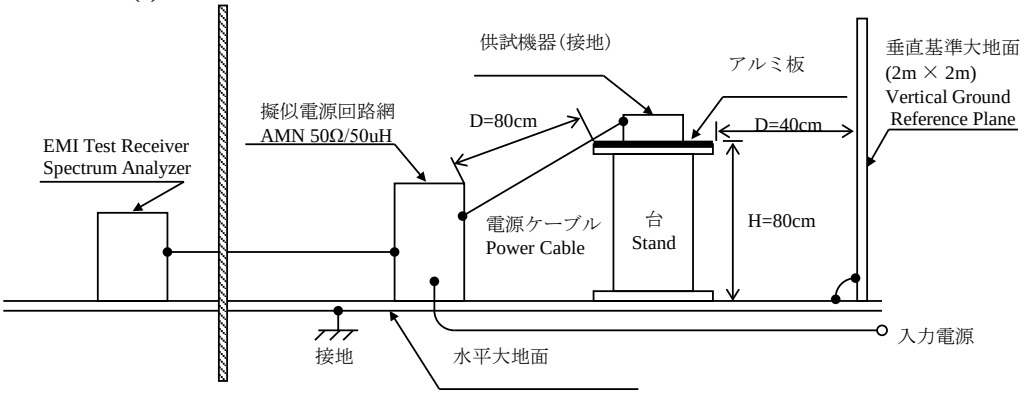
・出力リップル、ノイズ波形　　Output ripple and noise waveform



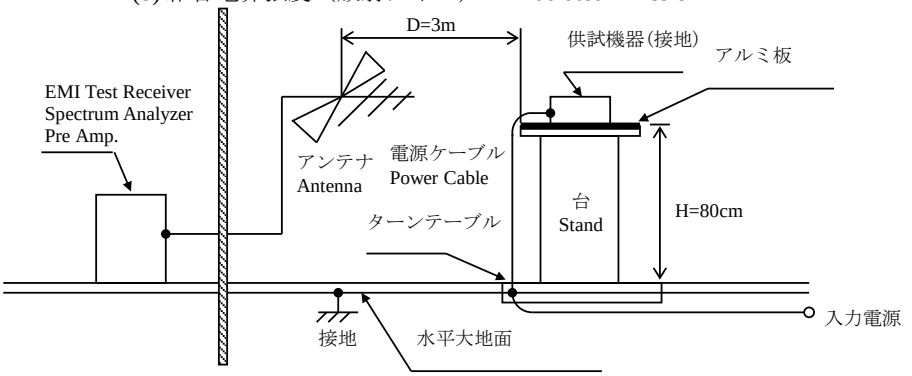

測定構成　Configuration used for determination

・ＥＭＩ特性　　Electro-Magnetic Interference characteristics

(a) 雑音端子電圧（帰還ノイズ）　　Conducted Emission




(b) 雑音電界強度（放射ノイズ）　　Radiated Emission



1.2 使用測定機器 List of equipment used

| | EQUIPMENT USED | MANUFACTURER | MODEL NO. |
|---|---|---|---|
| 1 | DIGITAL STORAGE OSCILLOSCOPE | TEKTRONIX | TDS7054 |
| 2 | DIGITAL STORAGE OSCILLOSCOPE | YOKOGAWA ELECT. | DLM2054 |
| 3 | DIGITAL MULTIMETER | FLUKE | 45 |
| 4 | DIGITAL POWER METER | YOKOGAWA ELECT. | WT210 |
| 5 | CURRENT PROBE | TEKTRONIX | 63202 |
| 6 | DC AMPERE METER | TEKTRONIX | P5100 |
| 7 | DYNAMIC DUMMY LOAD | CHROMA | 63030 |
| 8 | CVCF | KIKUSUI | PCR2000L |
| 9 | LEAKAGE CURRENT METER | SIMPSON | 3226 |
| 10 | CONTROLLED TEMP. CHAMBER | TABAI-ESPEC | 63203 |
| 11 | EMI TEST RECEIVER | ROHDE & SCHWARZ | ESCI-03 |
| 12 | LISN | ROHDE & SCHWARZ | ENV216 |
| 13 | BICONICAL ANTENNA | EMCO | 63208 |

## 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・遮断電圧

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

Model:CUT35-522

CH1:　5V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | 5.040V | 5.039V | 5.036V | 5.036V | 4mV | 0.080% |
| 50% | 5.038V | 5.038V | 5.038V | 5.038V | 0mV | 0.000% |
| 100% | 5.039V | 5.039V | 5.039V | 5.040V | 1mV | 0.020% |
| load | 2mV | 1mV | 3mV | 4mV | | |
| regulation | 0.040% | 0.020% | 0.060% | 0.080% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 5.004V | 5.039V | 5.039V | 35mV | 0.700% |

CH2:　12V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | 11.949V | 11.952V | 11.955V | 11.955V | 6mV | 0.050% |
| 50% | 11.869V | 11.868V | 11.867V | 11.867V | 2mV | 0.017% |
| 100% | 11.850V | 11.849V | 11.848V | 11.847V | 3mV | 0.025% |
| load | 99mV | 103mV | 107mV | 108mV | | |
| regulation | 0.825% | 0.858% | 0.892% | 0.900% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 11.857V | 11.849V | 11.846V | 11mV | 0.092% |

CH3:　-12V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | -11.961V | -11.964V | -11.969V | -11.970V | 9mV | 0.075% |
| 50% | -12.044V | -12.044V | -12.043V | -12.043V | 1mV | 0.008% |
| 100% | -12.043V | -12.042V | -12.040V | -12.039V | 4mV | 0.033% |
| load | 83mV | 80mV | 74mV | 73mV | | |
| regulation | -0.692% | -0.667% | -0.617% | -0.608% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | -12.055V | -12.042V | -12.044V | 13mV | 0.108% |

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

| | |
|---|---|
| Start up voltage (Vin) | 53VAC |
| Drop out voltage (Vin) | 50VAC |

## 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・遮断電圧

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

Model:CUT35-5FF

CH1:　5V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | 5.097V | 5.097V | 5.097V | 5.097V | 0mV | 0.000% |
| 50% | 5.095V | 5.095V | 5.096V | 5.096V | 1mV | 0.020% |
| 100% | 5.097V | 5.097V | 5.097V | 5.097V | 0mV | 0.000% |
| load | 2mV | 2mV | 1mV | 1mV | | |
| regulation | 0.040% | 0.040% | 0.020% | 0.020% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 5.073V | 5.097V | 5.097V | 24mV | 0.480% |

CH2:　15V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | 15.049V | 15.050V | 15.044V | 15.042V | 8mV | 0.053% |
| 50% | 14.929V | 14.928V | 14.924V | 14.923V | 6mV | 0.040% |
| 100% | 14.923V | 14.922V | 14.919V | 14.914V | 9mV | 0.060% |
| load | 126mV | 128mV | 125mV | 128mV | | |
| regulation | 0.840% | 0.853% | 0.833% | 0.853% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | 14.918V | 14.922V | 14.913V | 9mV | 0.060% |

CH3:　-15V　1. Regulation - line and load　　Condition　Ta :　25 ℃

| Iout \ Vin | 85VAC | 100VAC | 200VAC | 265VAC | line regulation | |
|---|---|---|---|---|---|---|
| 0% | -15.094V | -15.097V | -15.105V | -15.108V | 14mV | 0.093% |
| 50% | -15.220V | -15.220V | -15.224V | -15.224V | 4mV | 0.027% |
| 100% | -15.212V | -15.212V | -15.214V | -15.213V | 2mV | 0.013% |
| load | 126mV | 123mV | 119mV | 116mV | | |
| regulation | -0.840% | -0.820% | -0.793% | -0.773% | | |

2. Temperature drift　　Conditions　Vin : 100 VAC　Iout : 100 %

| Ta | -20℃ | +25℃ | +55℃ | temperature stability | |
|---|---|---|---|---|---|
| Vout | -15.203V | -15.212V | -15.210V | 9mV | 0.060% |

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

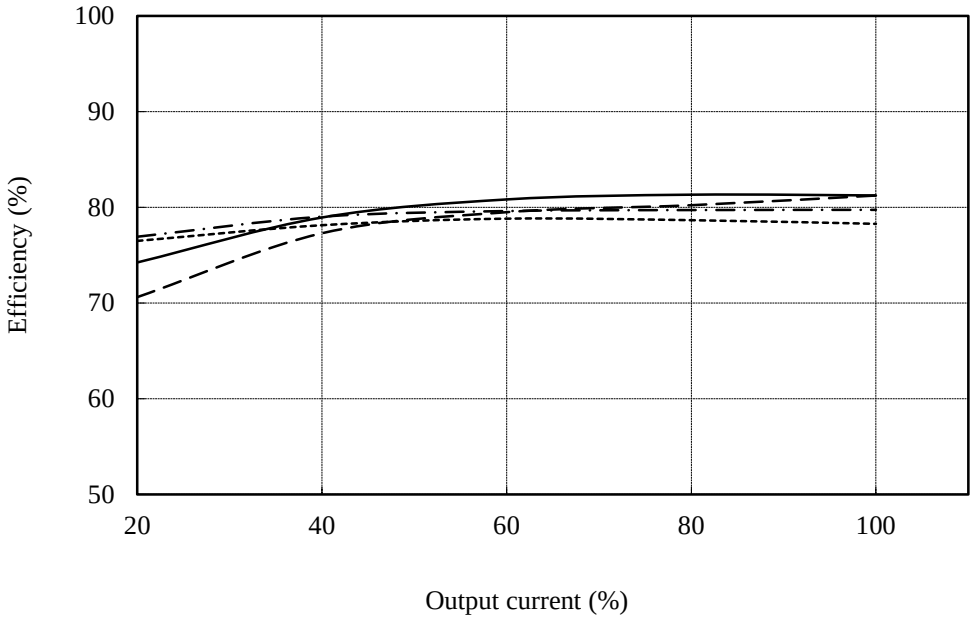
| | |
|---|---|
| Start up voltage (Vin) | 53VAC |
| Drop out voltage (Vin) | 49VAC |

(2) 効率対出力電流

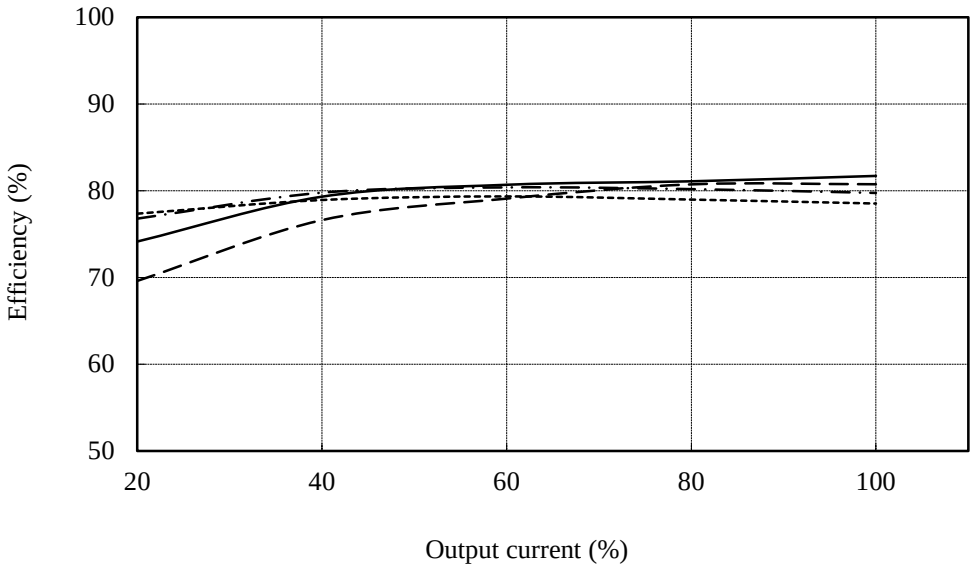
Efficiency vs. Output current

Model:CUT35-522

Conditions Vin : 85 VAC ------
: 100 VAC -·-·-
: 200 VAC ——
: 265 VAC – – – –
Ta : 25 ℃




Model:CUT35-5FF

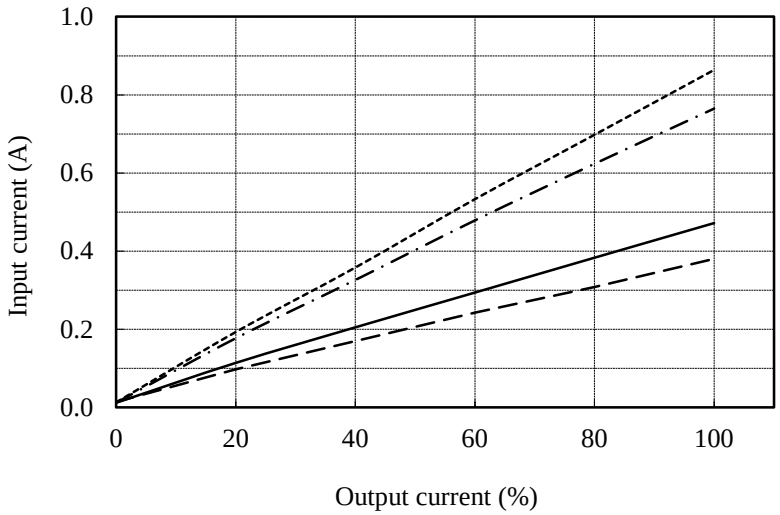


(3) 入力電流対出力電流

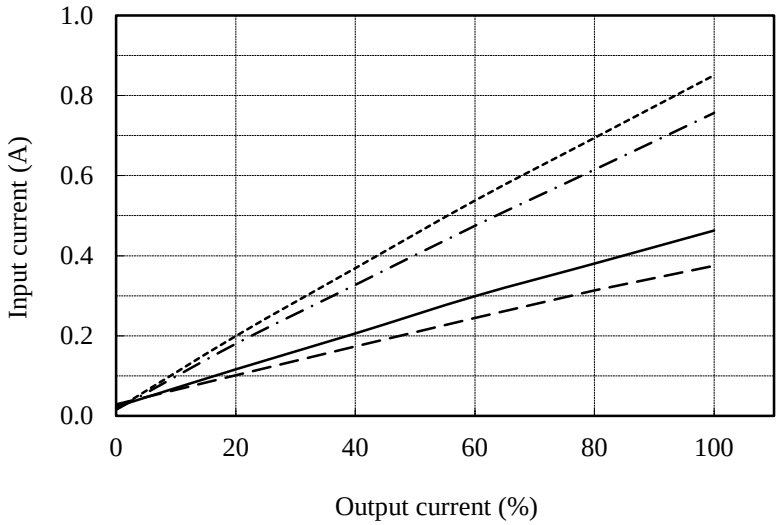
Input current vs. Output current

Model:CUT35-522

Conditions Vin : 85 VAC ------
: 100 VAC -·-·-
: 200 VAC ——
: 265 VAC – – – –
Ta : 25 ℃




Model:CUT35-5FF

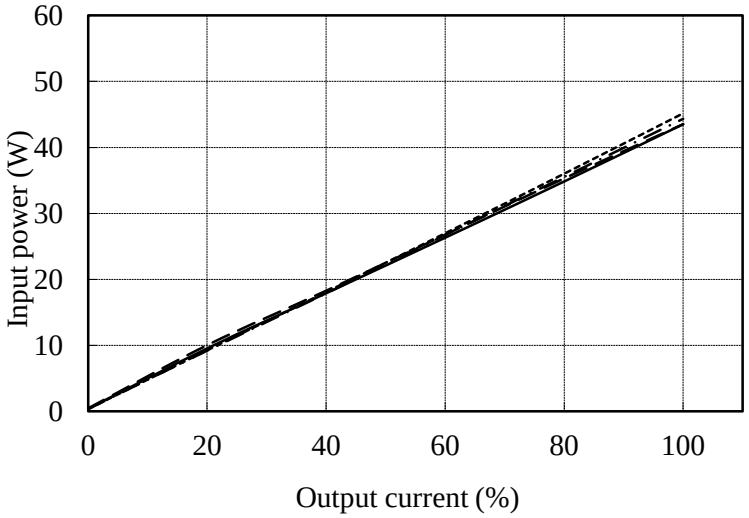


(4) 入力電力対出力電流

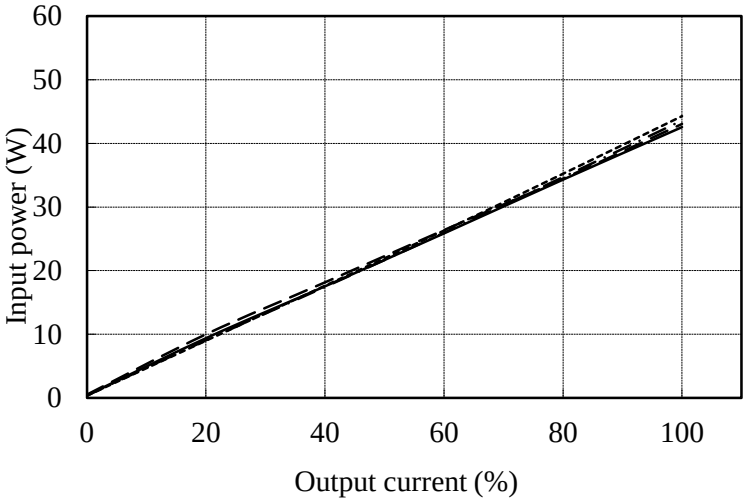
Input power vs. Output current

Model:CUT35-522

Conditions Vin : 85 VAC
: 100 VAC
: 200 VAC
: 265 VAC
Ta : 25 ℃




Model:CUT35-5FF



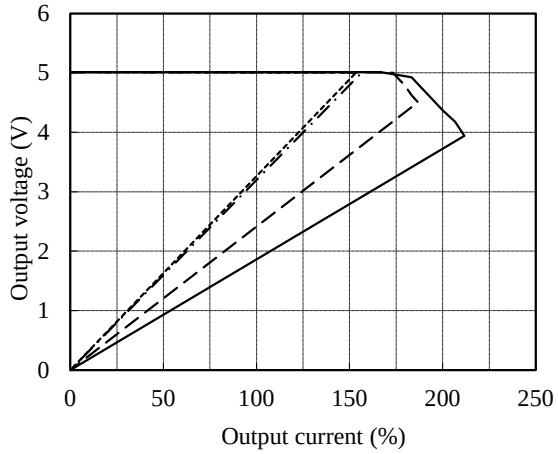
2.2 過電流保護特性

Over current protection (OCP) characteristics

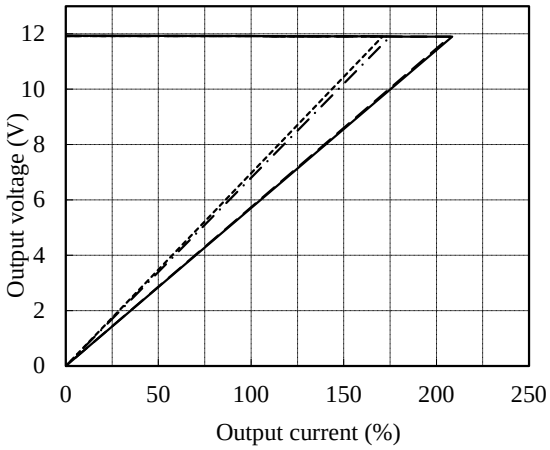
Model:CUT35-522

Conditions Vin : 85 VAC ------
100 VAC -·-·-·-
200 VAC – – – –
265 VAC ——
Ta : 25 ℃

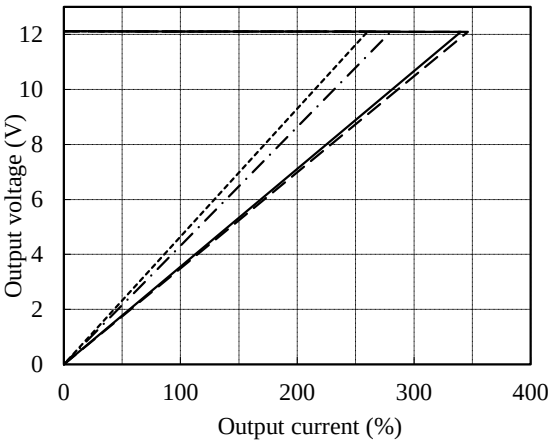
CH1:5V




CH2: +12V



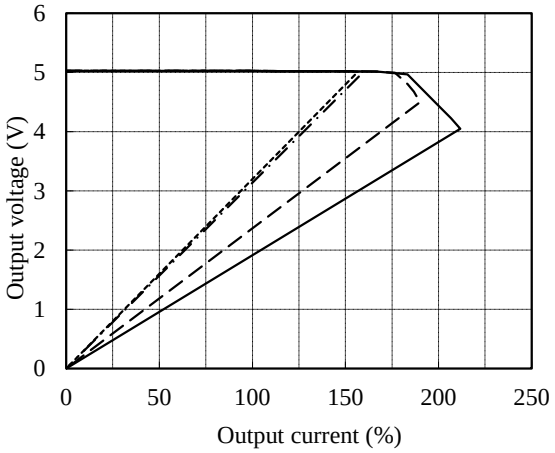

CH3: -12V



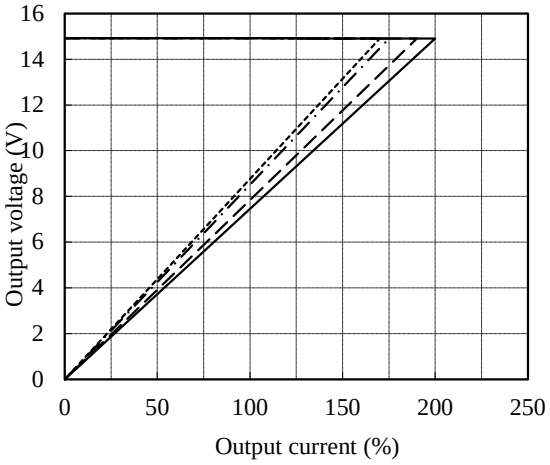

Model:CUT35-5FF

Conditions Vin : 85 VAC ------
100 VAC -·-·-·-
200 VAC – – – –
265 VAC ——
Ta : 25 ℃

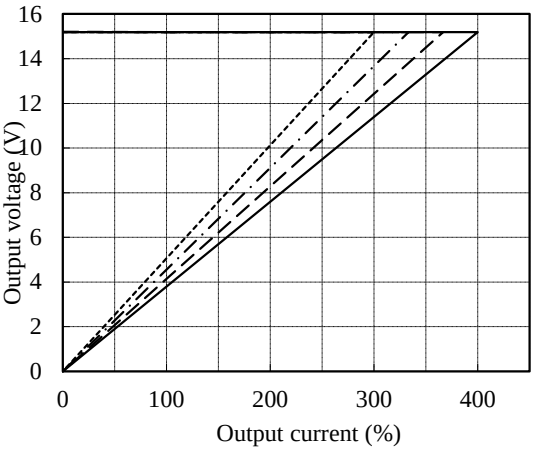
CH1:5V




CH2: +15V




CH3: -15V

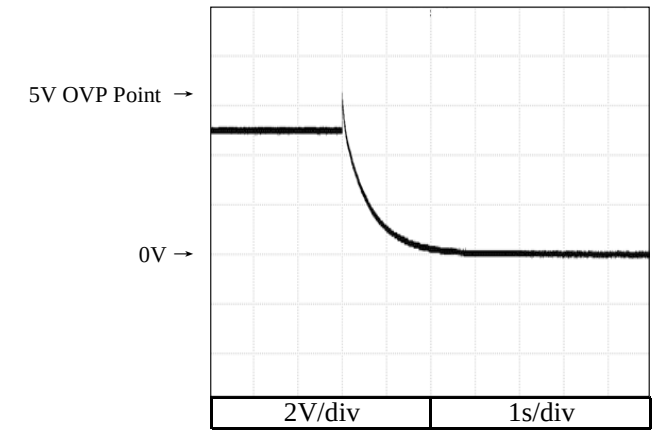


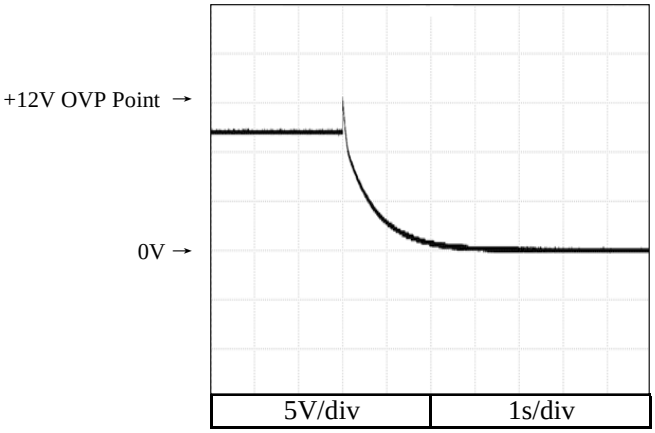
2.3 過電圧保護特性

Over voltage protection (OVP) characteristics

Model:CUT35-522

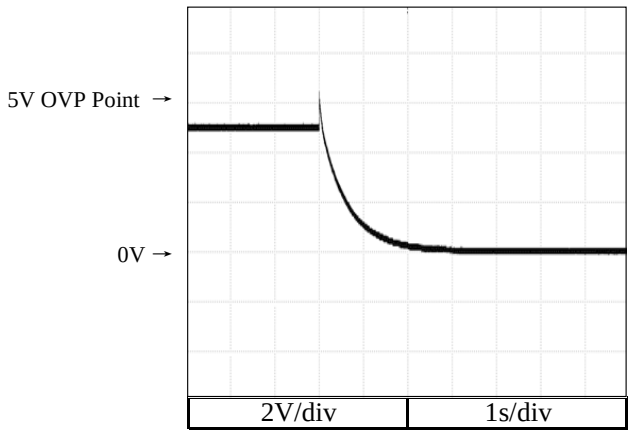
Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 ℃

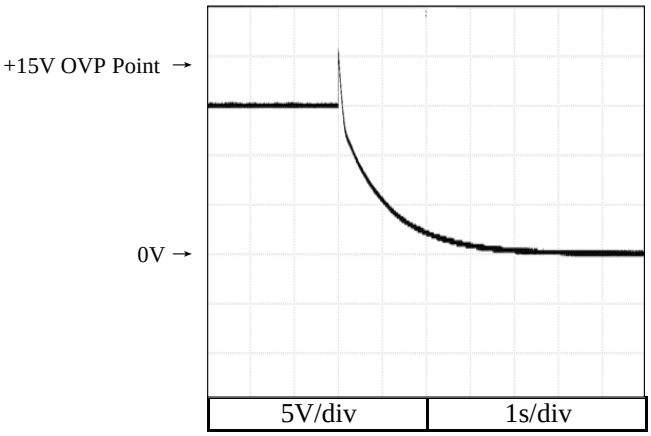



Model:CUT35-5FF

Conditions Vin : 100 VAC
Iout : 0 %
Ta : 25 ℃



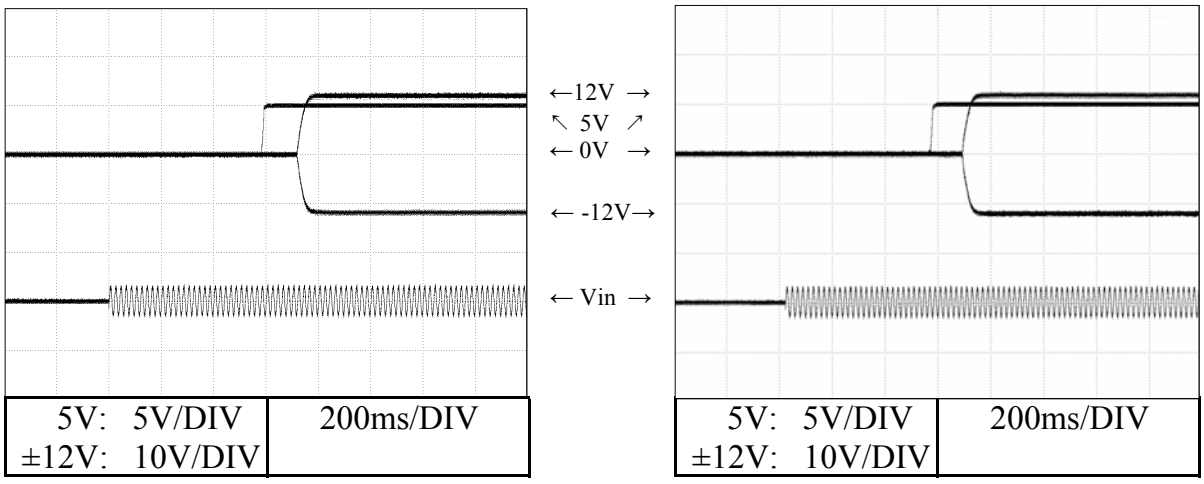
2.4 出力立ち上がり特性

Output rise characteristics

Model：CUT35-522

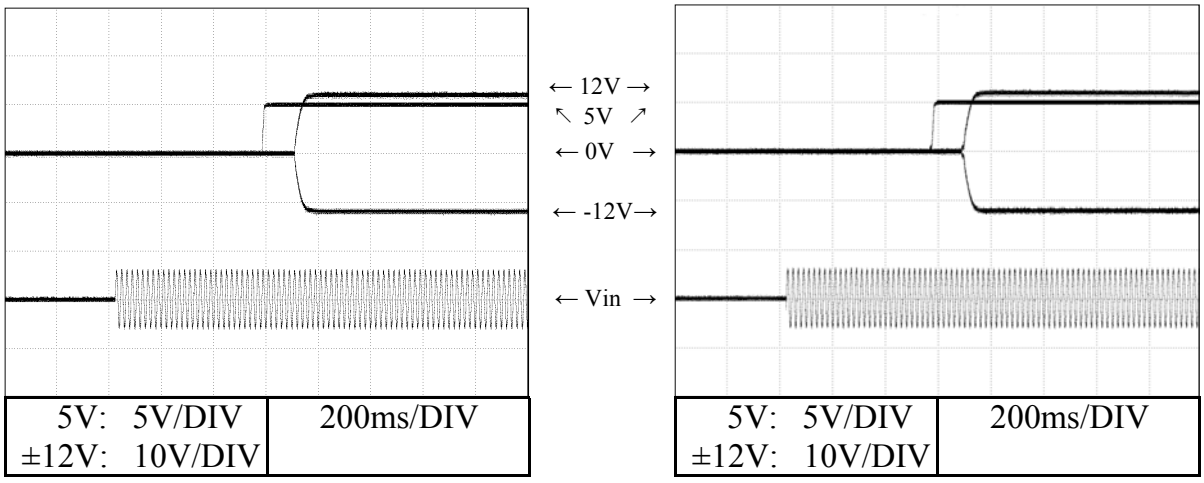
Conditions Ta : 25 ℃
Vin : 100 VAC
Iout : 100%

Iout : 0%




Vin : 200 VAC
Iout : 100%

Iout : 0%



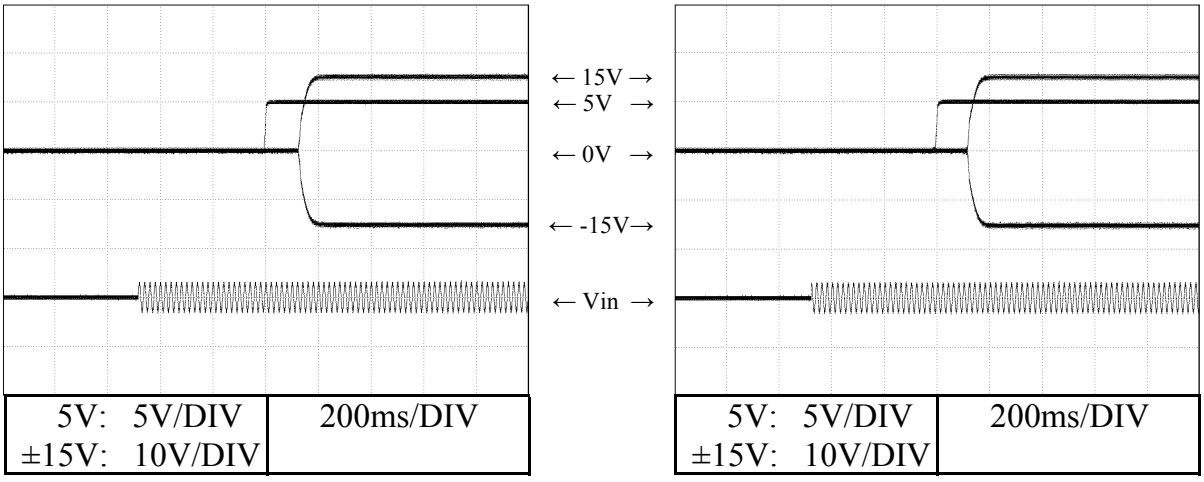
2.4 出力立ち上がり特性

Output rise characteristics

Model：CUT35-5FF

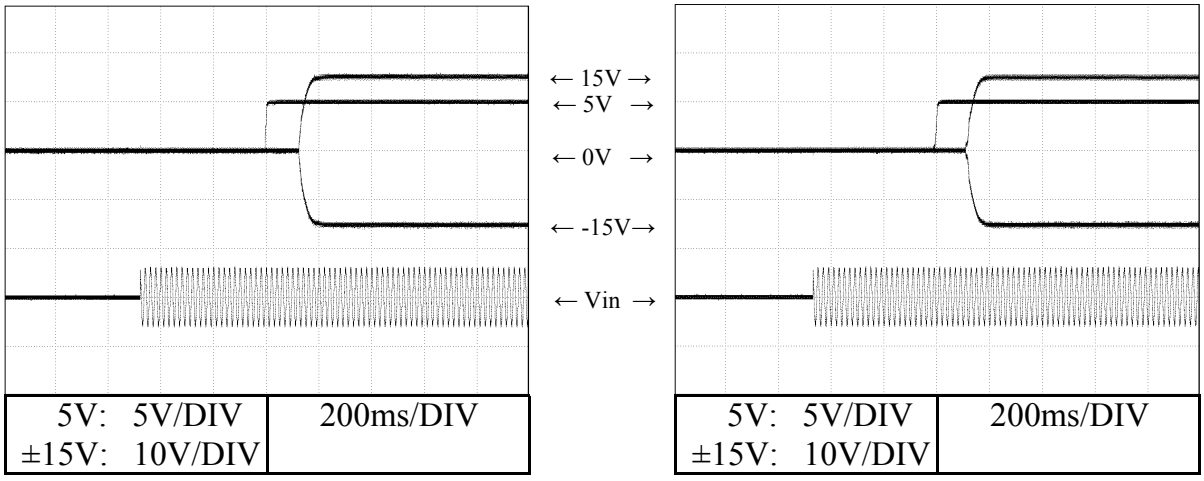
Conditions Ta : 25 ℃
Vin : 100 VAC
Iout : 100%

Iout : 0%




Vin : 200 VAC
Iout : 100%

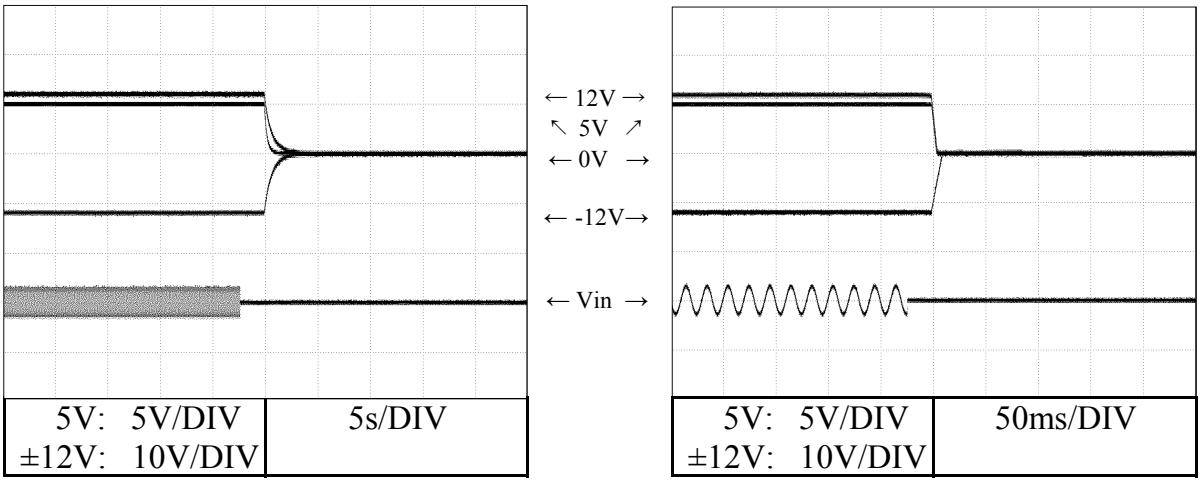
Iout : 0%



2.5 出力立ち下がり特性
Output fall characteristics
Model：CUT35-522

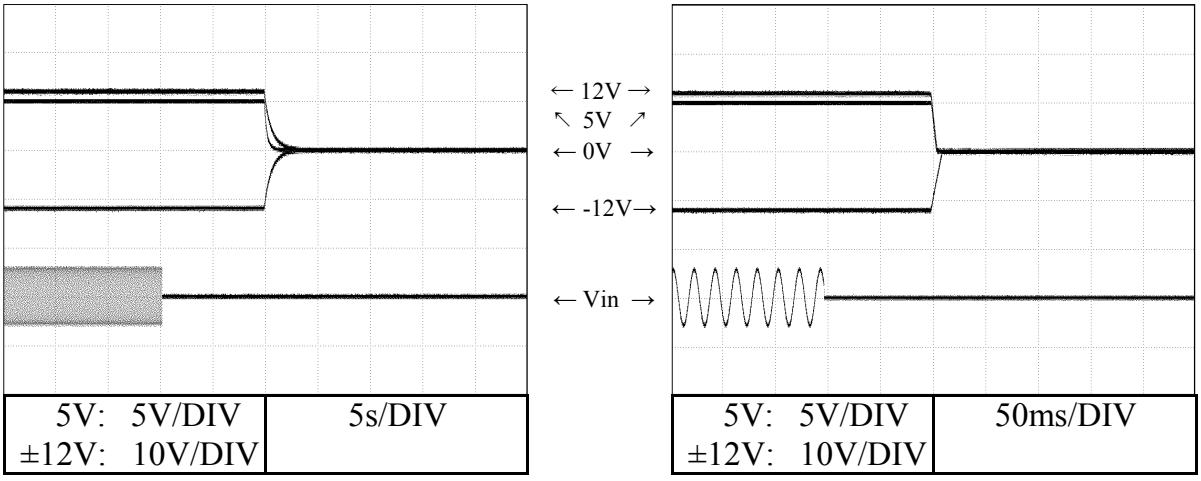
Conditions Ta : 25 ℃
Vin : 100 VAC
Iout : 100%

Iout : 0%




Vin : 200 VAC
Iout : 100%

Iout : 0%



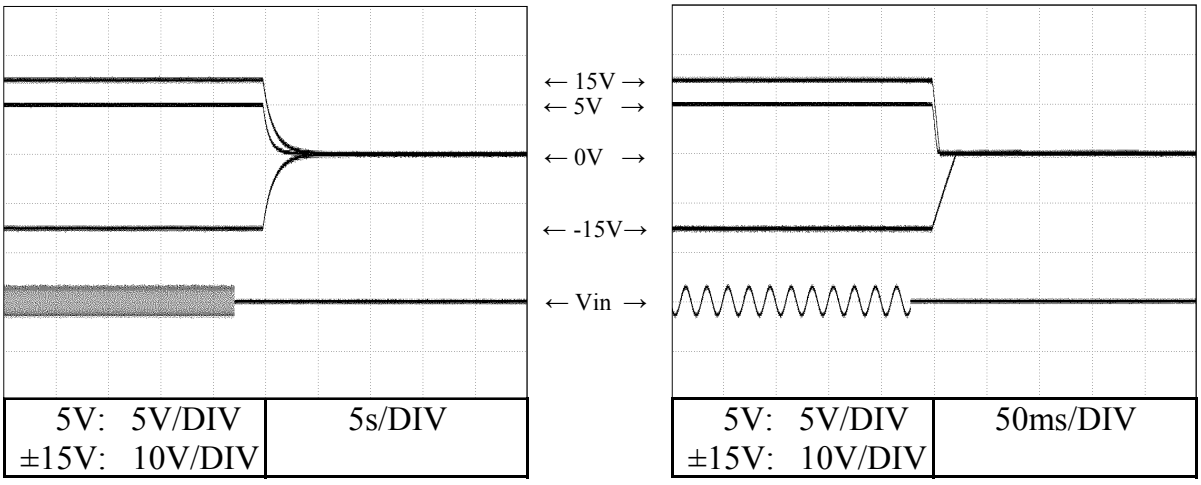
2.5 出力立ち下がり特性

Output fall characteristics

Model：CUT35-5FF

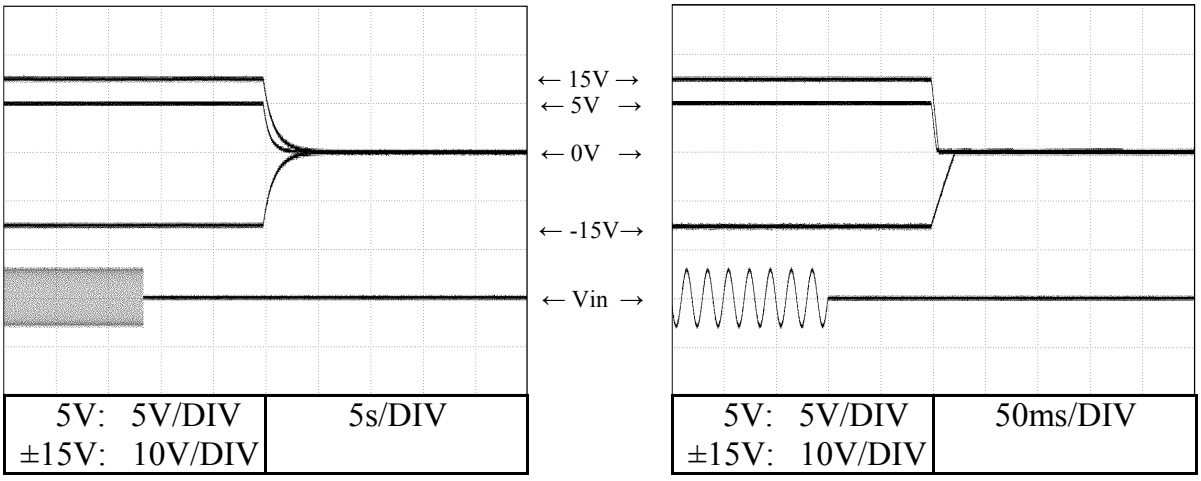
Conditions Ta : 25 ℃
Vin : 100 VAC
Iout : 100%

Iout : 0%




Vin : 200 VAC
Iout : 100%

Iout : 0%



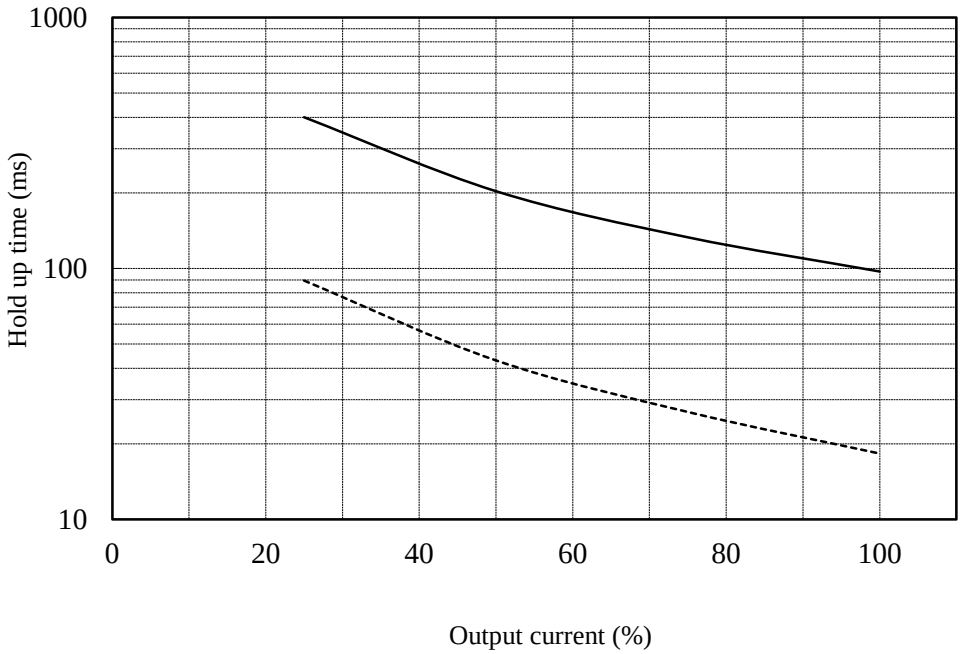
2.6 出力保持時間特性

Hold up time characteristics

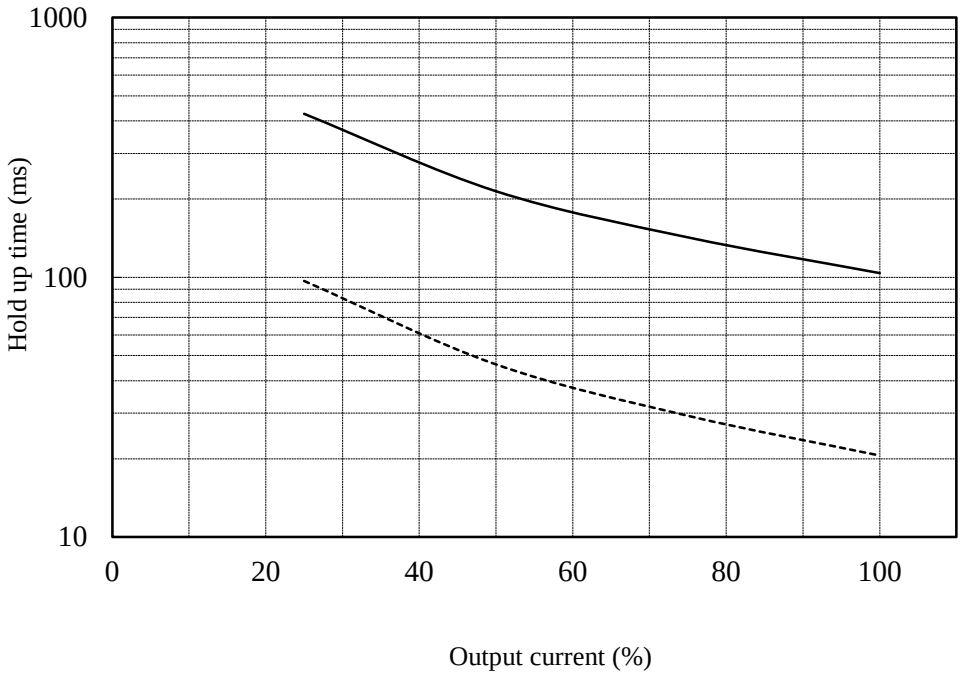
Conditions Vin : 100 VAC ------
200 VAC ——

Model:CUT35-522

Ta : 25 ℃




Model:CUT35-5FF



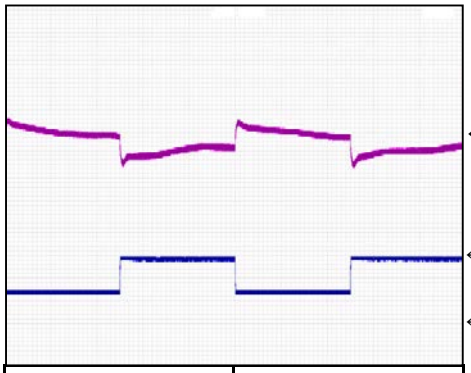
2.7 過渡応答（負荷急変）特性

Dynamic load response characteristics　　Conditions　Vin : 100VAC
Model:CUT35-522　　Ta : 25℃
(tr = tf = 75us)

5V

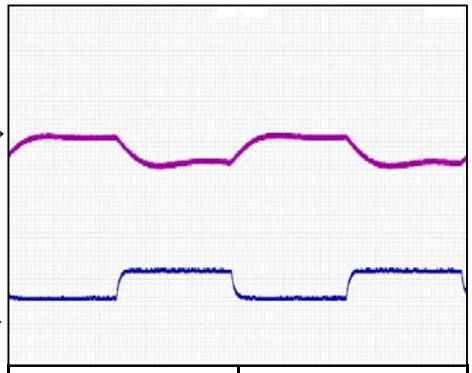
Iout : 5V:50%↔100%
±12V:100%

f = 100Hz




| 200mV/DIV | 2ms/DIV |
|---|---|
| +2.08% | -2.38% |

f = 1kHz

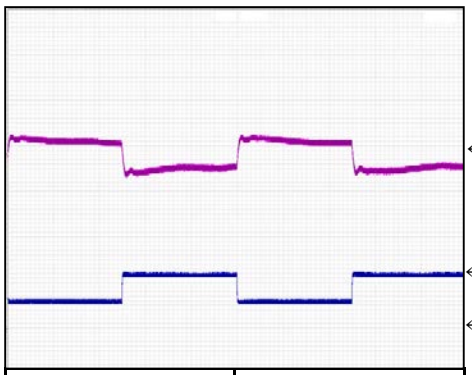


| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +1.60% | -1.60% |

+12V

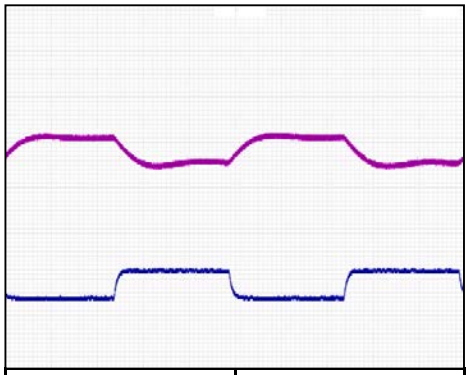
Iout : 12V:50%↔100%
5V,-12V:100%

f = 100Hz




| 200mV/DIV | 2ms/DIV |
|---|---|
| +0.75% | -0.86% |

f = 1kHz

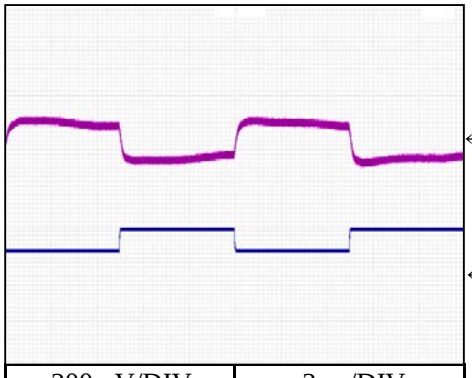


| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +0.67% | -0.67% |

-12V

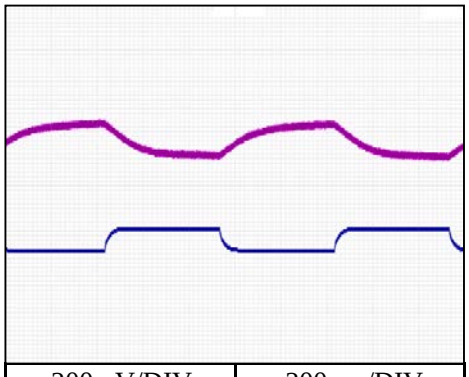
Iout : -12V:50%↔100%
5V,+12V:100%

f = 100Hz




| 200mV/DIV | 2ms/DIV |
|---|---|
| +0.47% | -0.50% |

f = 1kHz



| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +0.40% | -0.40% |

2.7 過渡応答（負荷急変）特性

Dynamic load response characteristics

Model:CUT35-5FF

Conditions Vin : 100VAC
Ta : 25℃
(tr = tf = 75us)

## 5V

Iout : 5V:50%↔100%
±15V:100%

f = 100Hz


| 200mV/DIV | 2ms/DIV |
|---|---|
| +2.08% | -2.22% |

f = 1kHz

| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +1.60% | -1.76% |

## +15V

Iout : 15V:50%↔100%
5V,-15V:100%

f = 100Hz


| 200mV/DIV | 2ms/DIV |
|---|---|
| +0.59% | -0.59% |

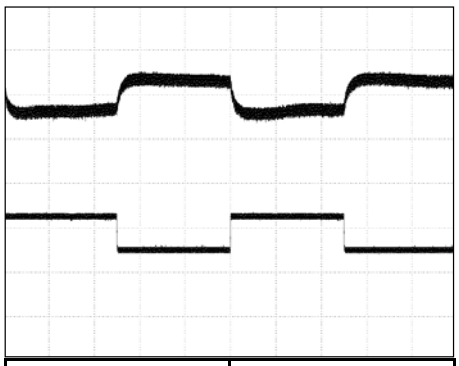
f = 1kHz

| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +0.53% | -0.59% |

## -15V

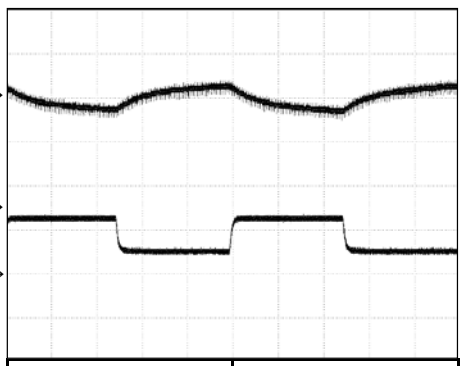
Iout : -15V:50%↔100%
5V,+15V:100%

f = 100Hz




| 200mV/DIV | 2ms/DIV |
|---|---|
| +0.35% | -0.43% |

f = 1kHz



| 200mV/DIV | 200 μ s/DIV |
|---|---|
| +0.27% | -0.35% |

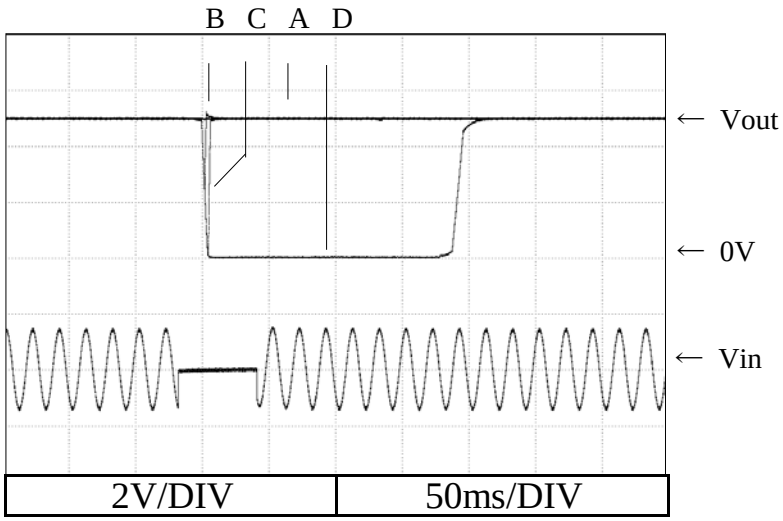
2.8 入力電圧瞬停特性

Response to brown out characteristics

Model:CUT35-522

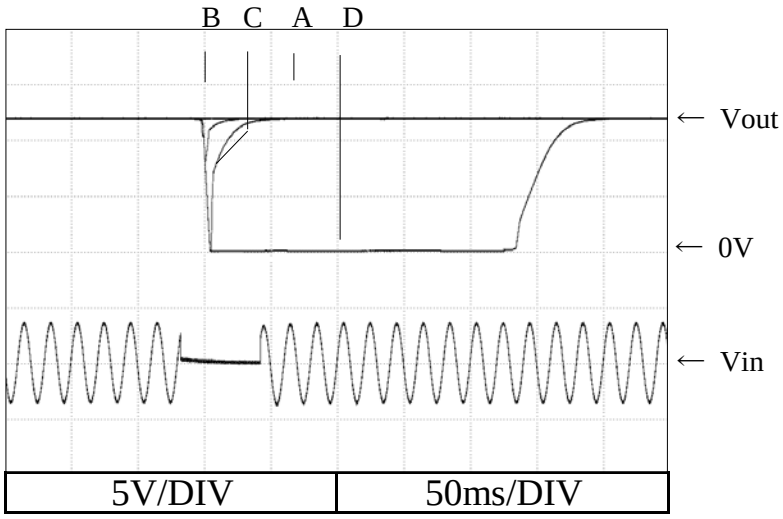
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

5V



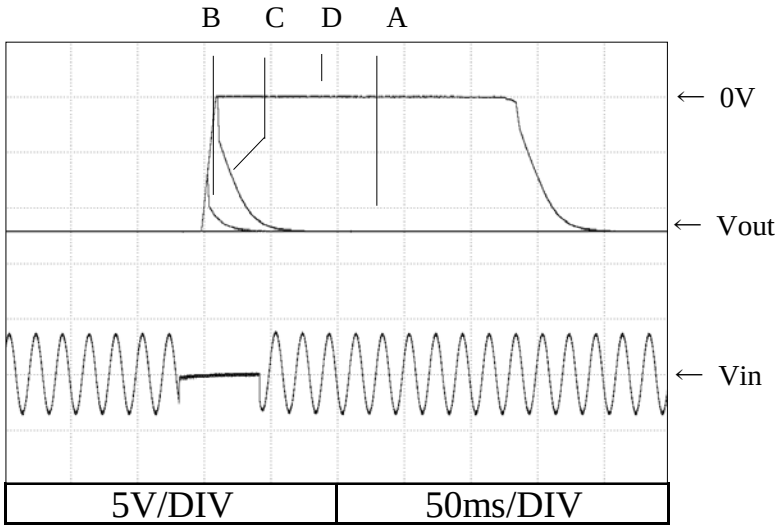

A = 18ms
B = 20ms
C = 25ms
D = 59ms

12V




A = 18ms
B = 20ms
C = 26ms
D = 60ms

-12V




A = 18ms
B = 20ms
C = 30ms
D = 60ms

2.8 入力電圧瞬停特性

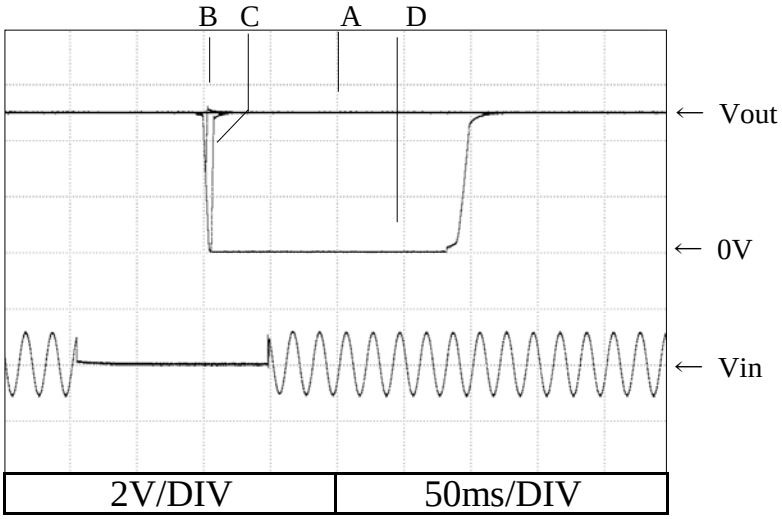
Response to brown out characteristics

Model:CUT35-522

Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

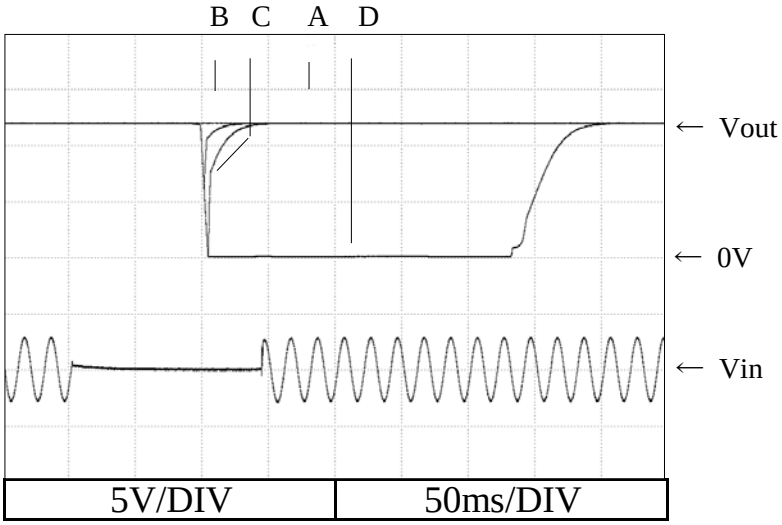
5V

A = 95ms
B = 102ms
C = 107ms
D = 143ms



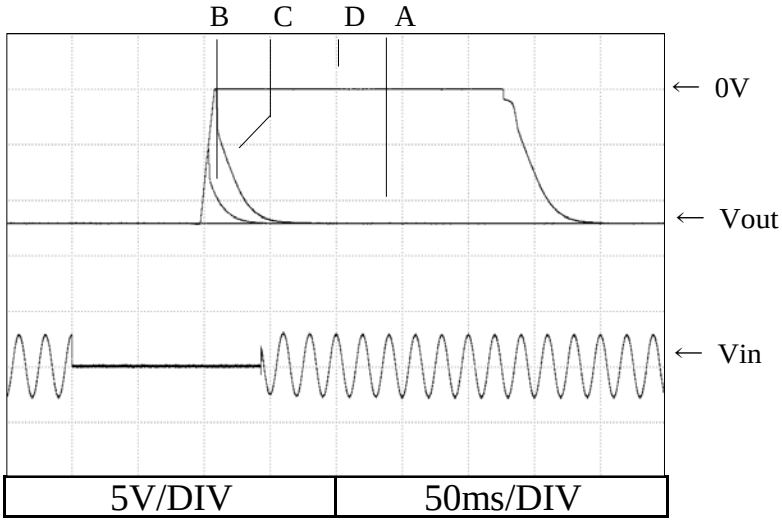

12V

A = 95ms
B = 102ms
C = 106ms
D = 142ms




-12V

A = 95ms
B = 105ms
C = 114ms
D = 143ms



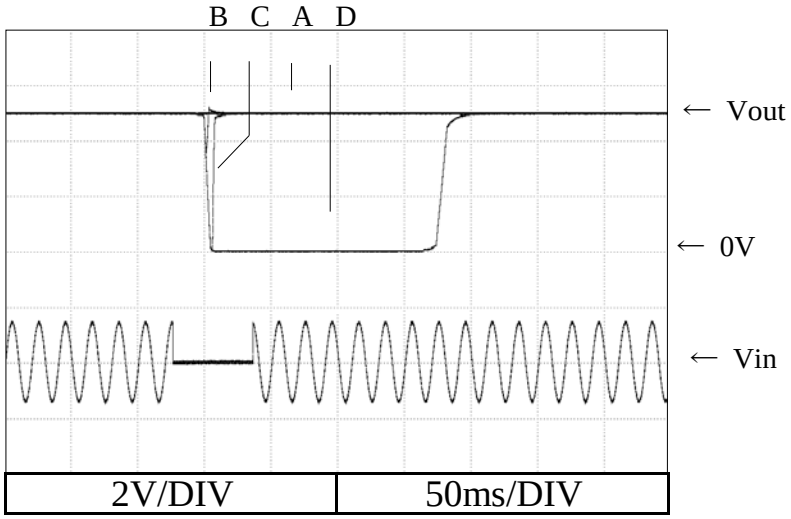
2.8 入力電圧瞬停特性

Response to brown out characteristics

Model:CUT35-5FF

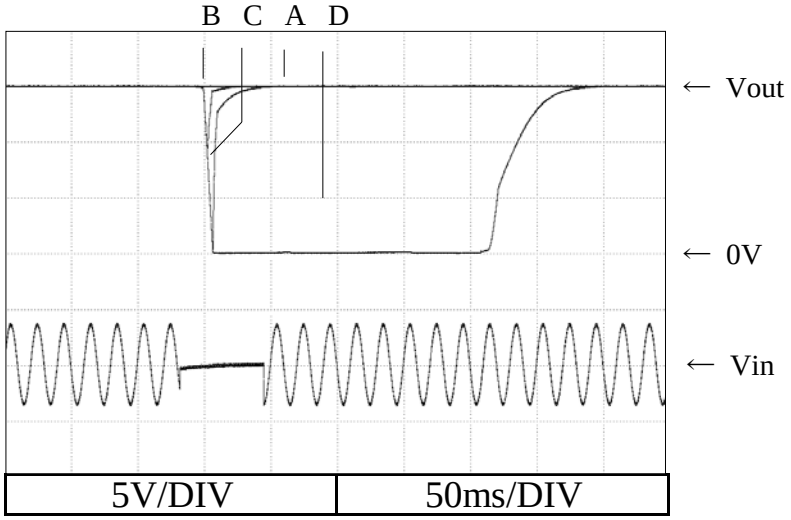
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

5V



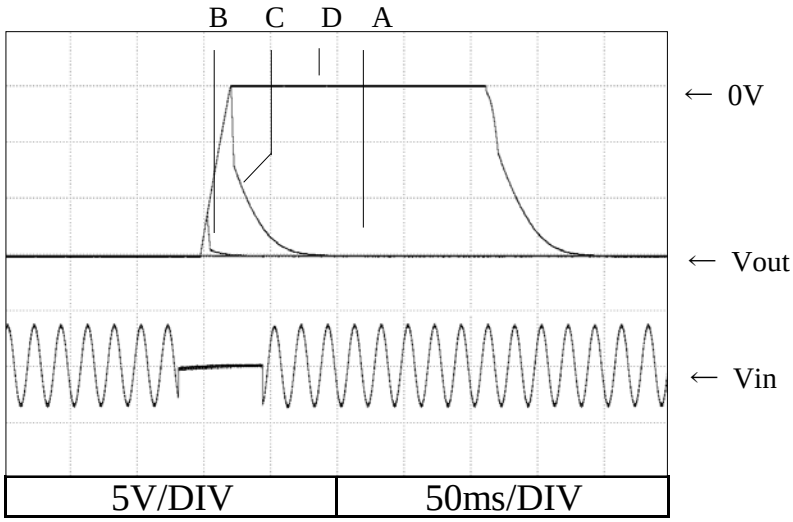

A = 15ms
B = 21ms
C = 26ms
D = 60ms

15V




A = 15ms
B = 22ms
C = 28ms
D = 63ms

-15V




A = 15ms
B = 22ms
C = 44ms
D = 63ms

2.8 入力電圧瞬停特性

Response to brown out characteristics

Model:CUT35-5FF

Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

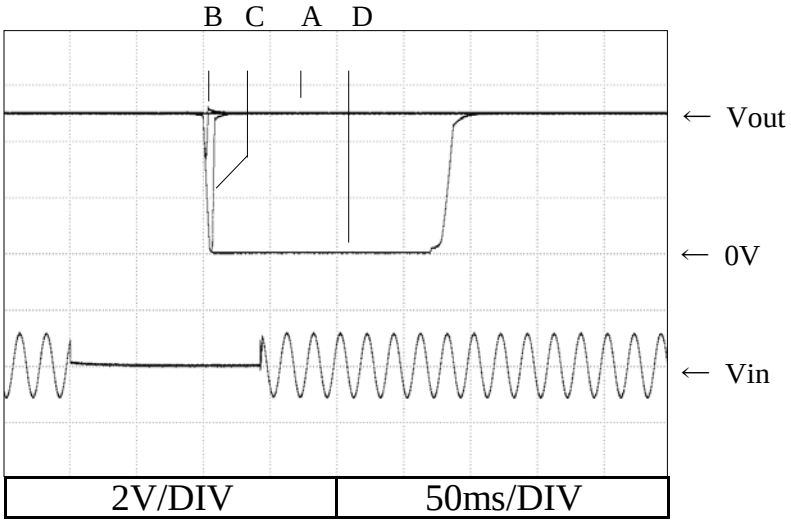
5V

A = 98ms

B = 103ms

C = 108ms

D = 142ms



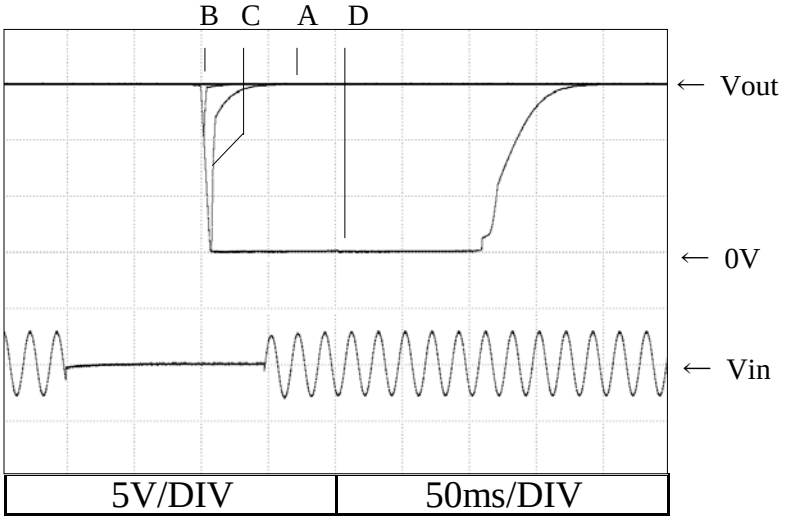

15V

A = 98ms

B = 106ms

C = 113ms

D = 148ms



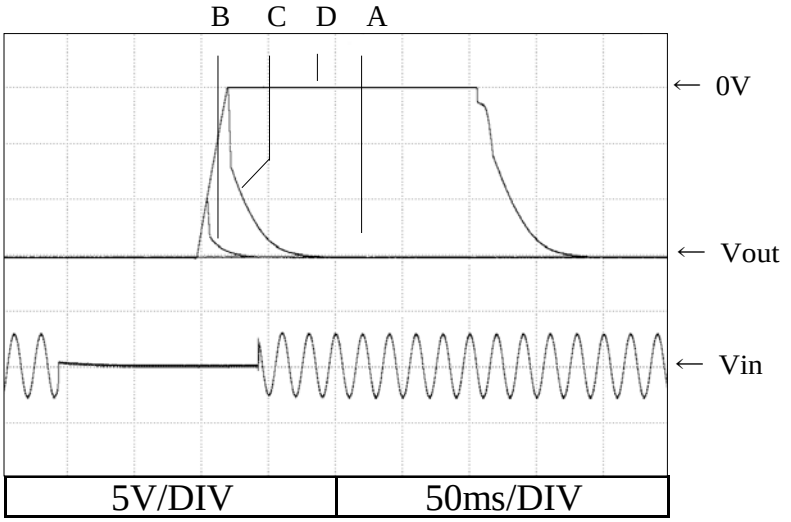

-15V

A = 100ms

B = 109ms

C = 128ms

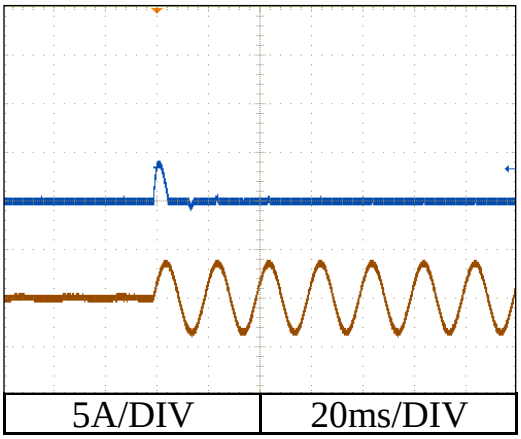
D = 149ms



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

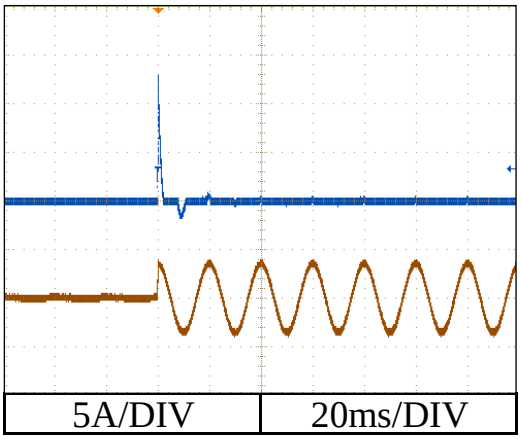
Conditions Vin : 100 VAC
Iout : 100 %
Ta : 25 ℃

Switch on phase angle of input AC voltage
$\phi$ = 0°



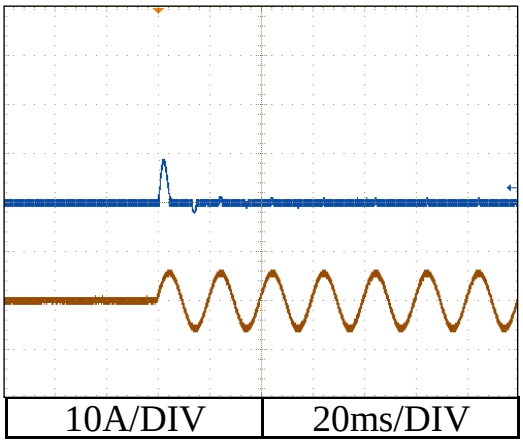

← Iin →
← Vin →

Switch on phase angle of input AC voltage
$\phi$ = 90°



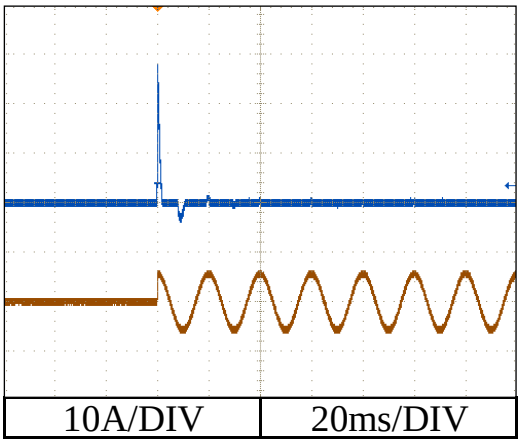

Conditions Vin : 200 VAC
Iout : 100 %
Ta : 25 ℃

Switch on phase angle of input AC voltage
$\phi$ = 0°




← Iin →
← Vin →

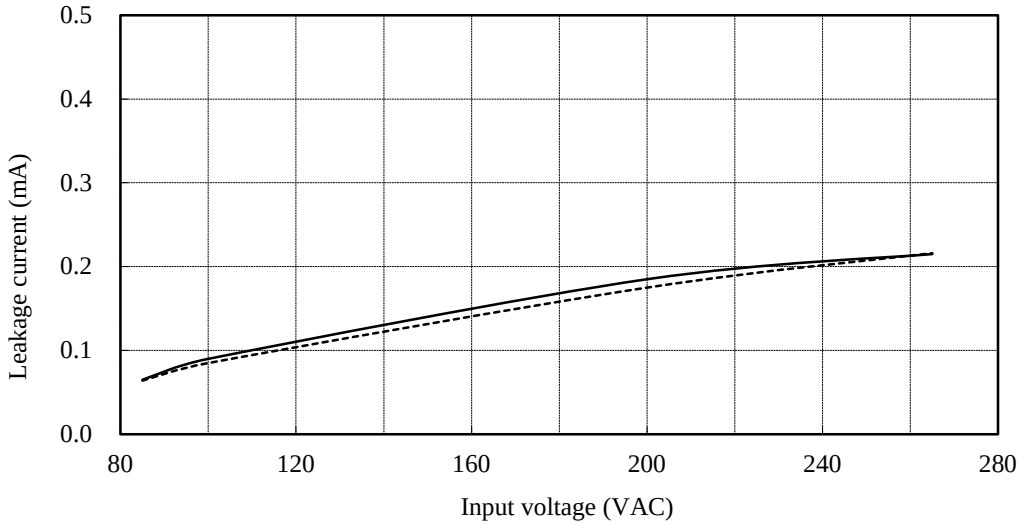
Switch on phase angle of input AC voltage
$\phi$ = 90°



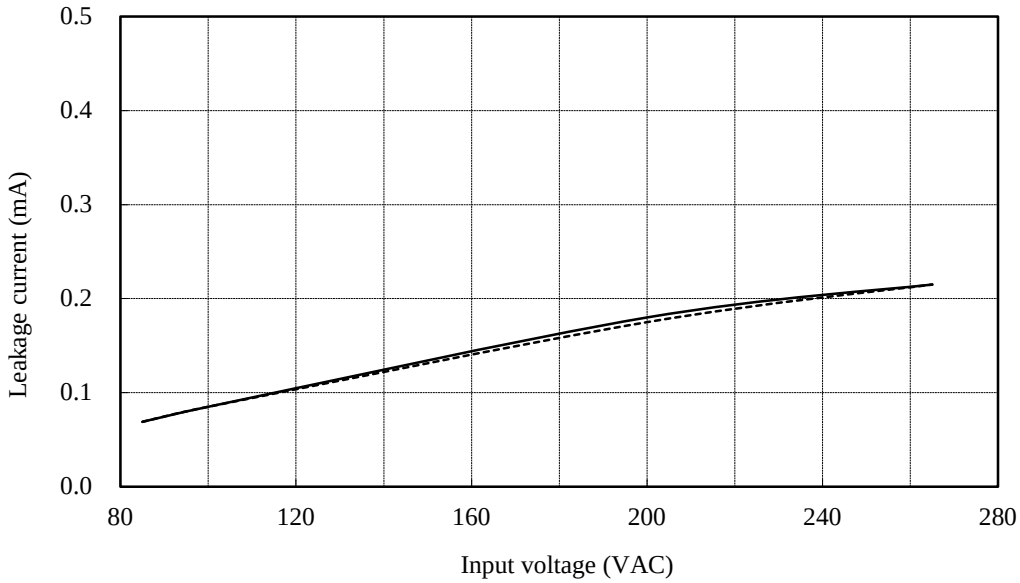
2.10 リーク電流特性
Leakage current characteristics

Conditions Iout : 0 % ------
100 % ——
Ta : 25 ℃
f : 50 Hz
Equipment used : 3226 (Simpson)

L




N



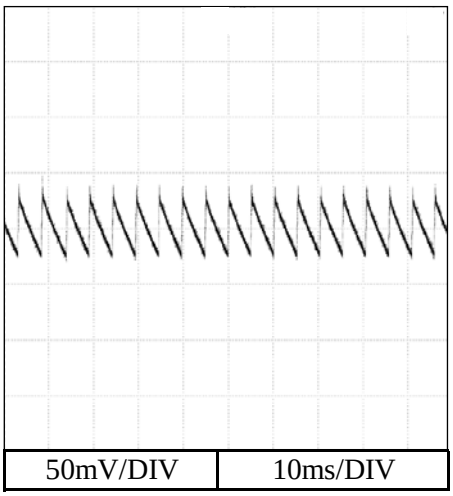
2. 11 出力リップル、ノイズ波形

Output ripple and noise waveform　　Conditions　Vin : 100VAC

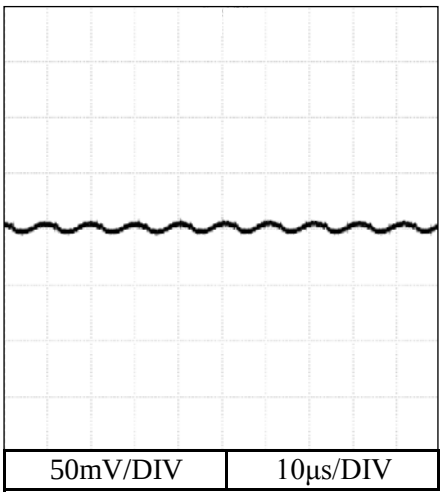
Model:CUT35-522　　Ta : 25℃

CH1:5V

Iout : 0%

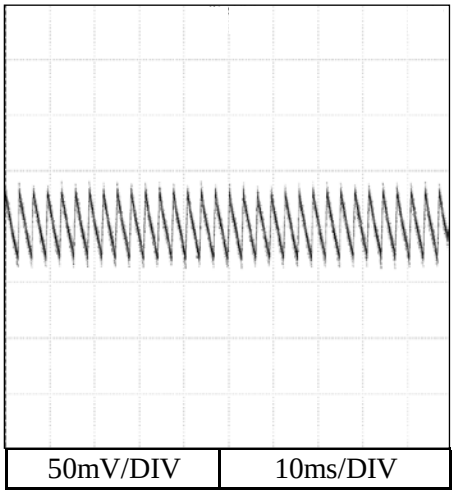



Iout : 100%

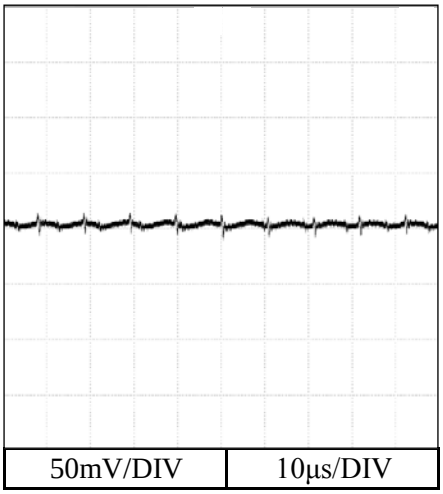



CH2:+12V

Iout : 0%

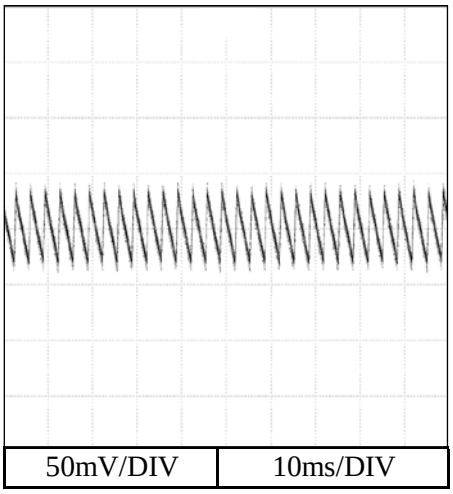



Iout : 100%

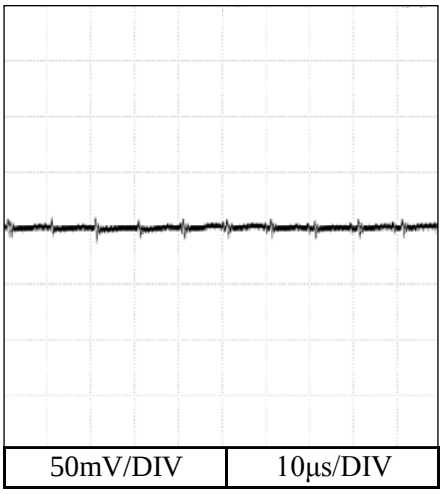



CH3:-12V

Iout : 0%




Iout : 100%



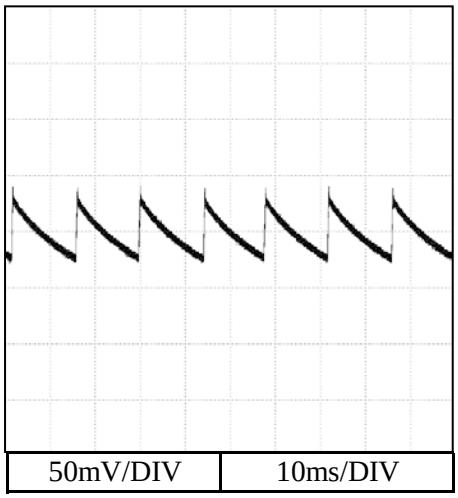
2. 11 出力リップル、ノイズ波形

Output ripple and noise waveform　　Conditions　　Vin : 100VAC

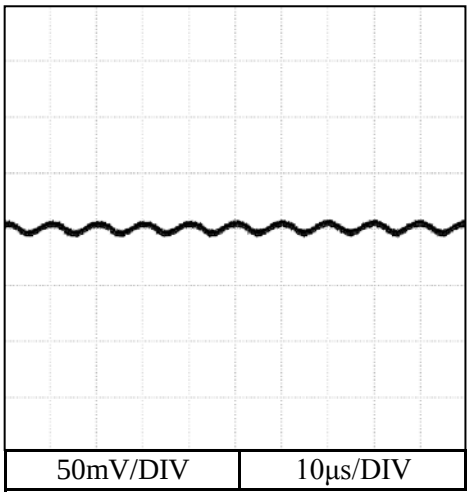
Model:CUT35-5FF　　Ta : 25℃

CH1:5V

Iout : 0%

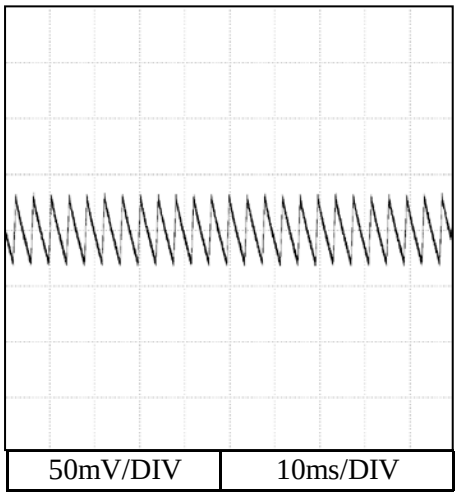



Iout : 100%

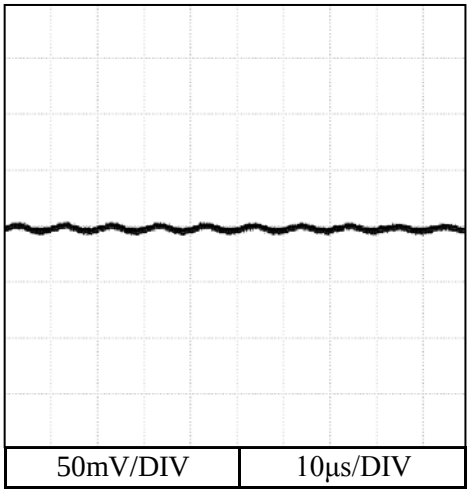



CH2:+15V

Iout : 0%

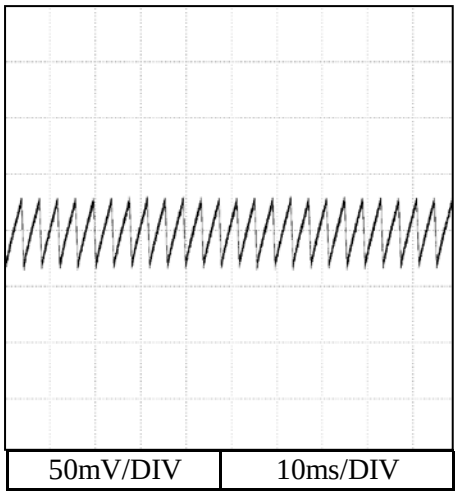



Iout : 100%

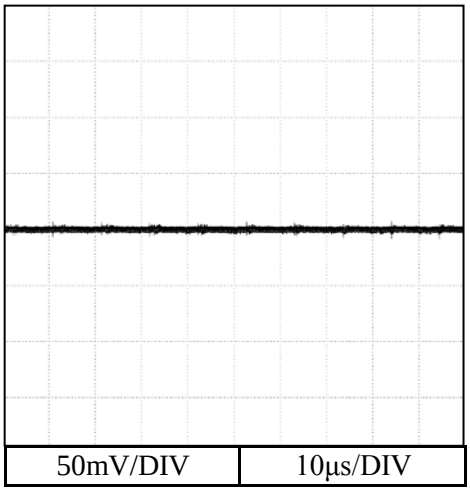



CH3:-15V

Iout : 0%




Iout : 100%



2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics

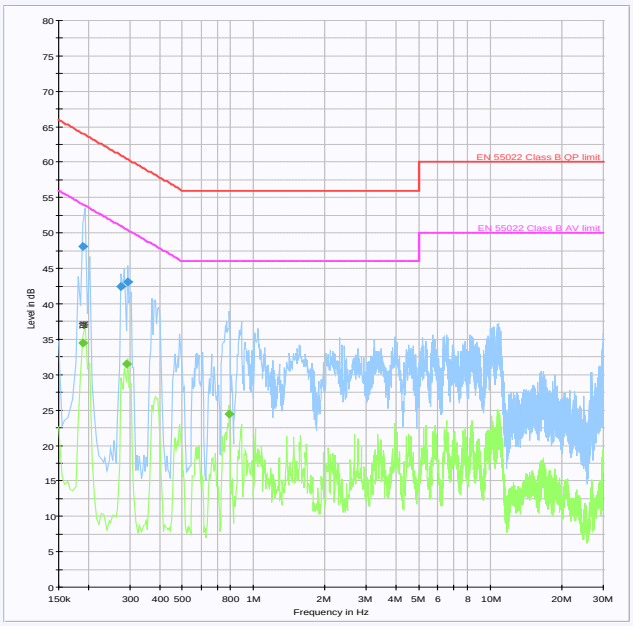
Model:CUT35-522

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧

Conducted Emission

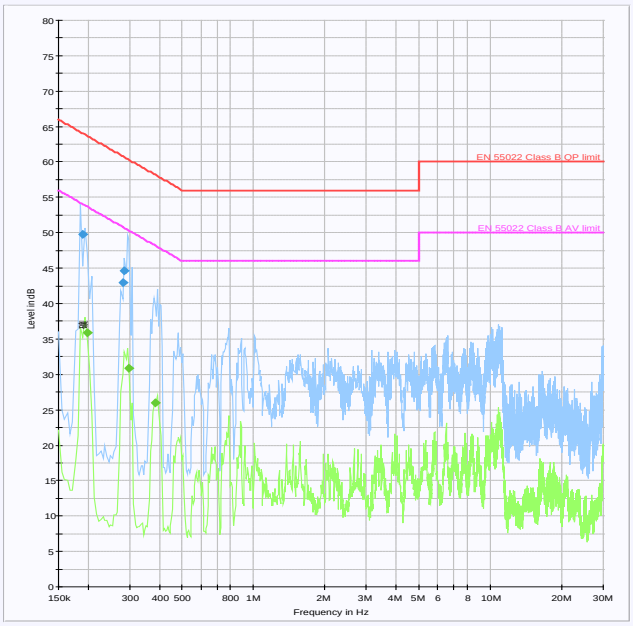
Phase : L




EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

Phase : N




EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

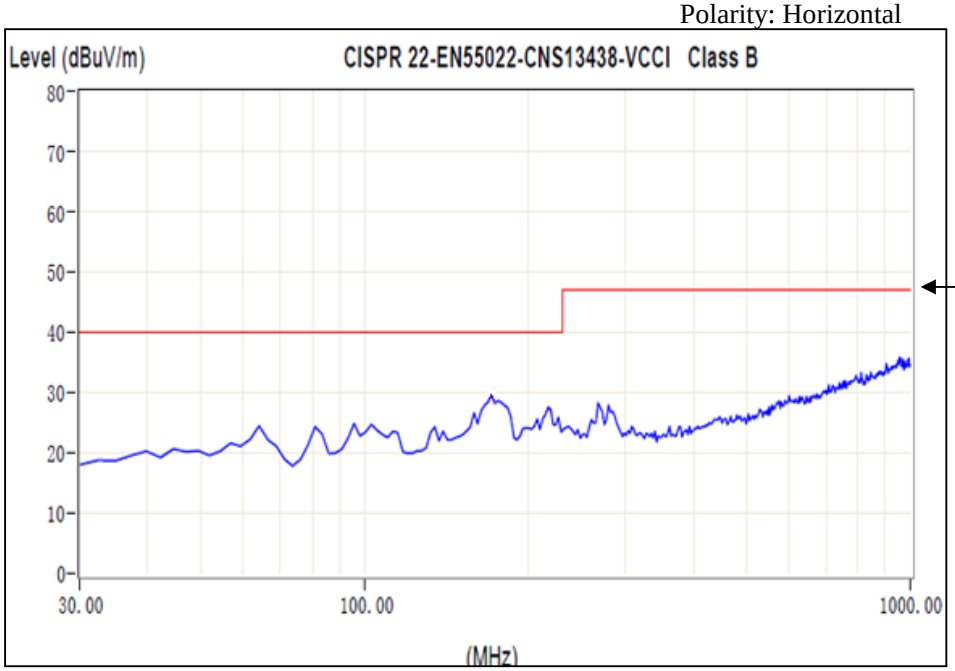
EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics　　Conditions　Vin: 230VAC
Model:CUT35-522　　Io: 100%
Ta: 25℃

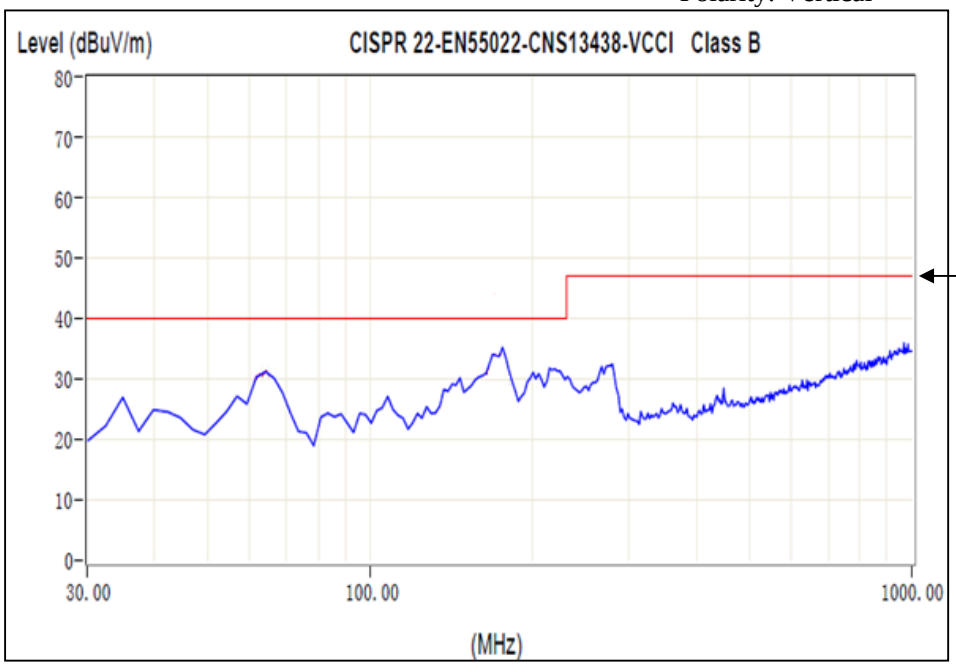
雑音電界強度
Radiated Emission

Polarity: Horizontal




EN55022 Class B
QP Limit

Polarity: Vertical




EN55022 Class B
QP Limit

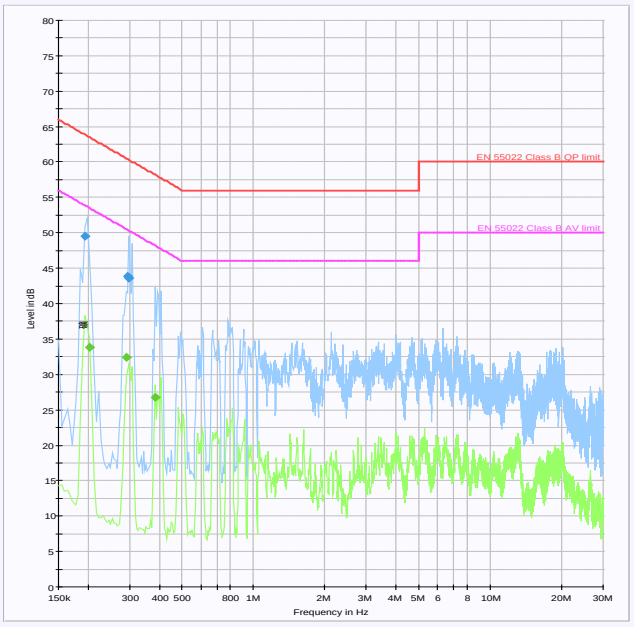
## 2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics
Model:CUT35-5FF

Conditions Vin : 230 VAC
Iout : 100 %
Ta : 25 ℃

雑音端子電圧
Conducted Emission

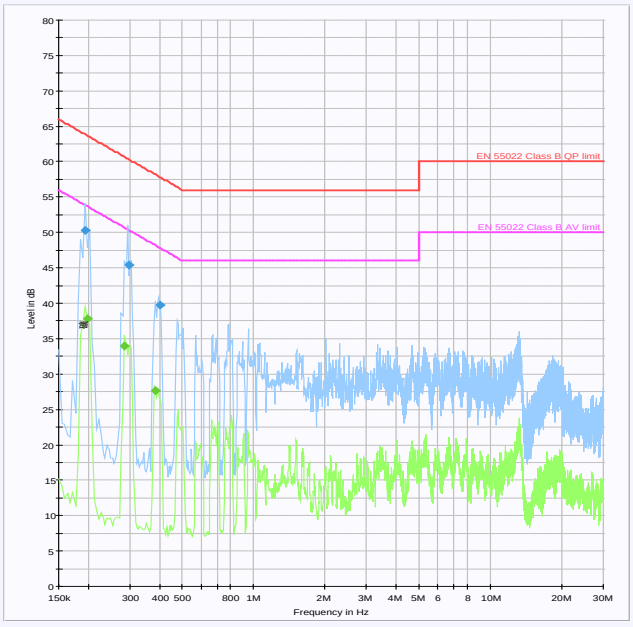
Phase : L




EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

Phase : N




EN 55022 Class B
QP Limit

EN 55022 Class B
AV Limit

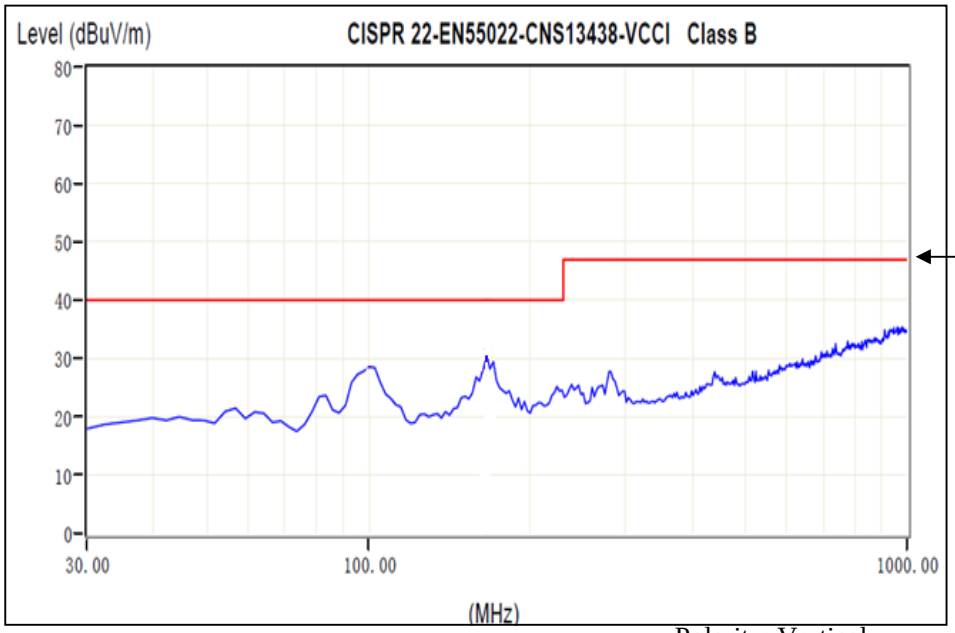
EN55011-B,VCCI-B,FCC-Bの限界値はEN55022 class Bの限界値と同じ
Limit of EN55011-B,VCCI-B,FCC-B are same as its EN55022 class B.

2. 12 ＥＭＩ特性

Electro-Magnetic Interference characteristics　　Conditions　Vin: 230VAC
Model:CUT35-5FF　　Io: 100%
Ta: 25℃

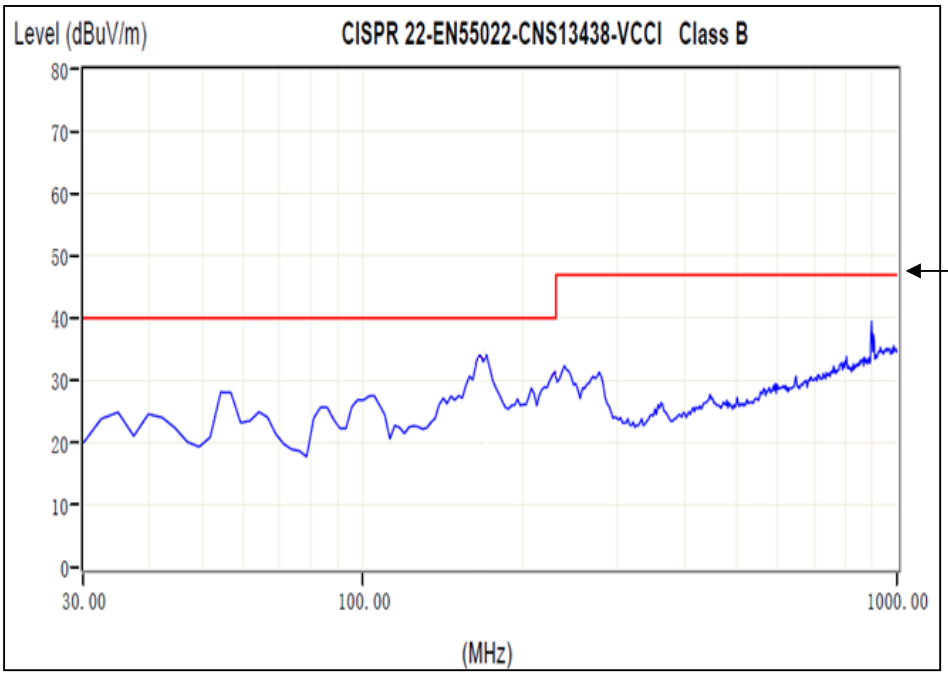
雑音電界強度
Radiated Emission

Polarity: Horizontal




EN55022 Class B
QP Limit

Polarity: Vertical




EN55022 Class B
QP Limit