VS75E

EVALUATION DATA

型式データ

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

TDK-Lambda

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
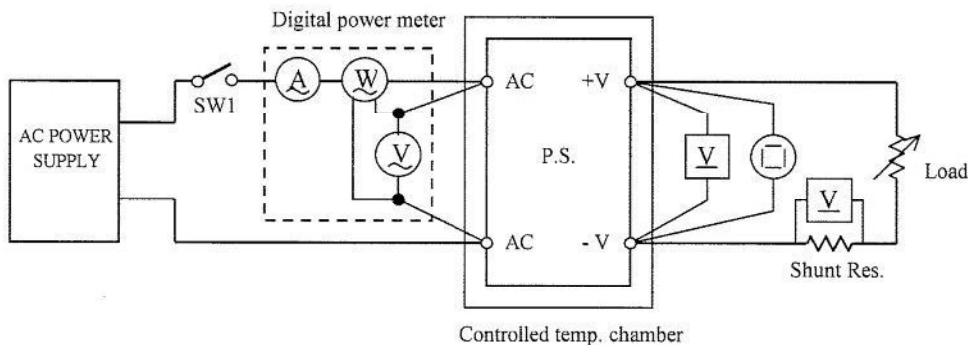
測定回路2　Circuit 2

・過渡応答（負荷急変）特性　　Dynamic load response characteristics
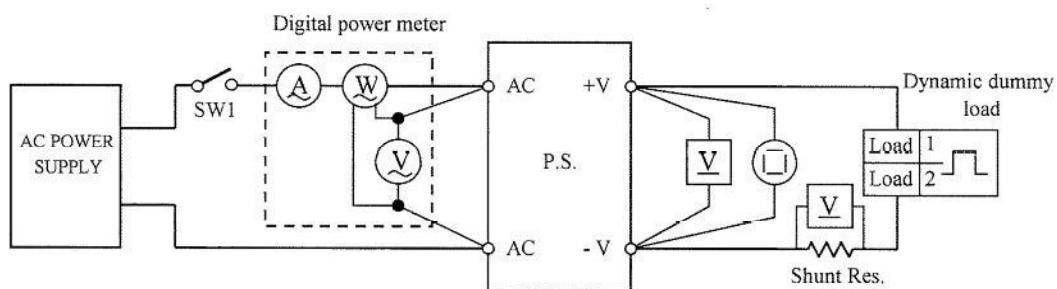
Output current waveform
Iout 50% <==> 100%

測定回路3　Circuit 3

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

TDK-Lambda
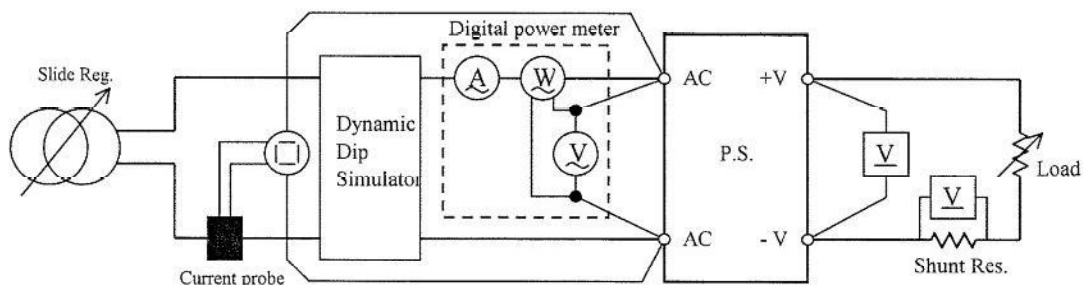
測定回路4 Circuit 4

・リーク電流特性　　　　　Leakage current characteristics

Digital power meter

Slide Reg.

Isolation Trans

AC　AC

Leakage
current
meter

AC　AC

A　W

V

AC　　+V

P.S.

AC　　- V

V

V

Load

Shunt Res.

NOTE : Leakage current meter HIOKI 3156
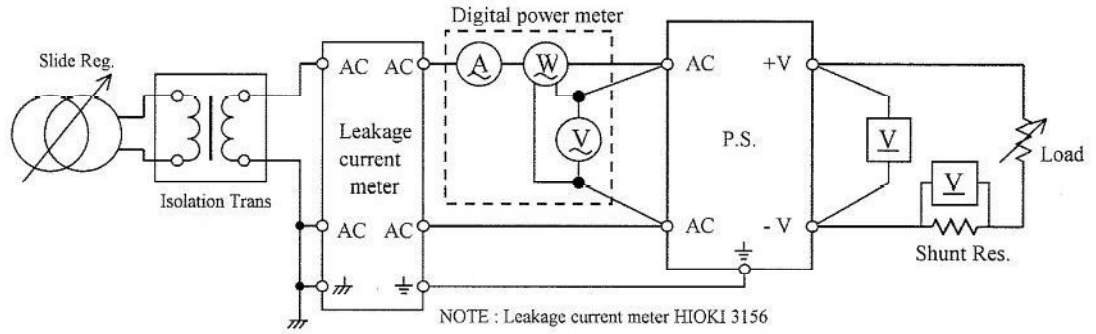
測定回路5 Circuit 5

・出力リップル、ノイズ特性　　　Output ripple and noise waveform
　　　　Normal Mode (JEITA Standard RC-9131A)

Digital power meter

AC POWER
SUPPLY

SW1

A　W

V

AC　　+V

P.S

AC　　- V

C1　C2

Load

150mm

1.5m 50Ω Cable

R
C3

Osilloscope
Bandwidth : 100MHz

R　: 50Ω
C1 : 0.1uF Film Cap.
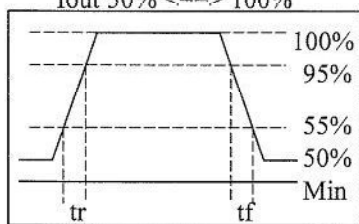C2 : 100uF Elec Cap.
C3 : 4700pF Film Cap.
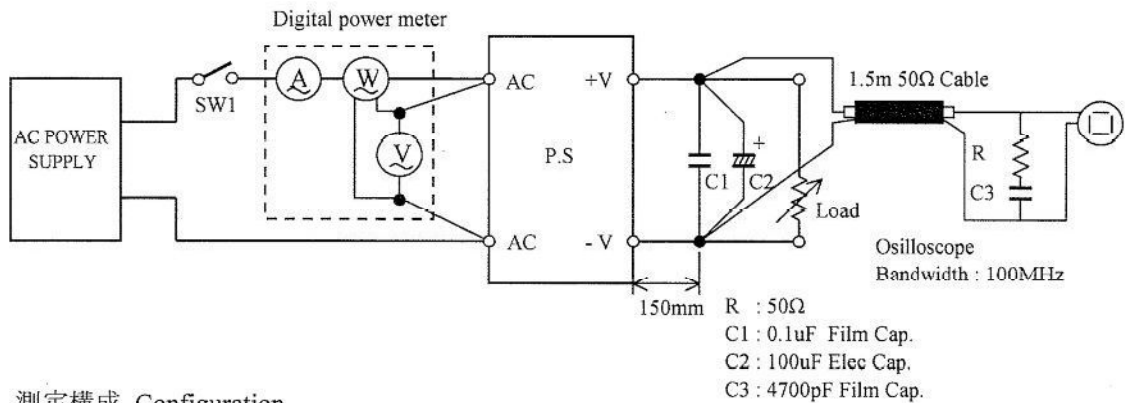
測定構成 Configuration

・ＥＭＩ特性　　　　　　　Electro-Magnetic Interference characteristics
　雑音端子電圧（帰還ノイズ）　Conducted Emission Noise

供試機器(接地)
D.U.T.(Earthed)

アルミ板
Aluminum Plate

D=80cm

Spectrum Analyzer
EMI Test Receiver
RF Relay matrix

擬似電源回路網
AMN 50Ω/50uH

電源コード
AC Cord

台
Stand

H=80cm

接地
Earth

金属大地面
Metal Ground Plate

フィルタ
Filter

入力電源
Input
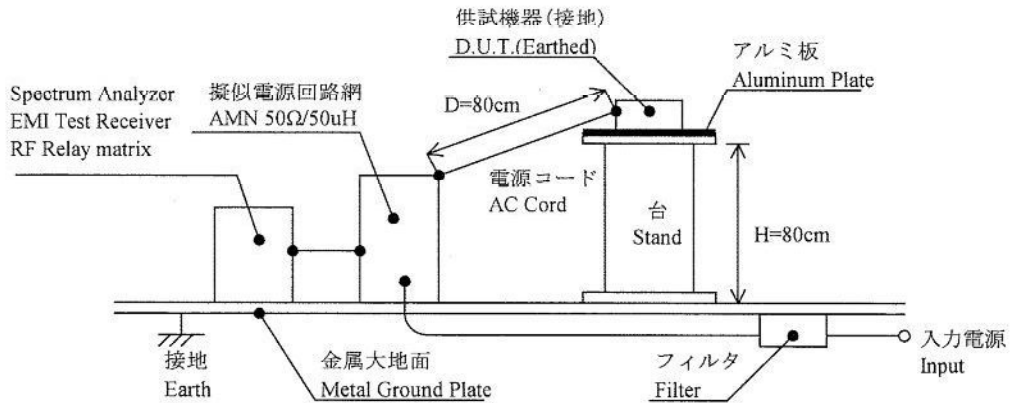
雑音電界強度（輻射ノイズ）　　　Radiated Emission Noise

D=3m

供試機器(接地)
D.U.T.(Earthed) アルミ板
Aluminum Plate

Spectrum Analyzer
EMI Test Receiver
RF Relay matrix

バイコニカル　アンテナ
Biconical Antenna

ターンテーブル
Turn Table

台
Stand

H=80cm

接地
Earth

金属大地面
Metal Ground Plate

フィルタ
Filter

入力電源
Input

TDK-Lambda
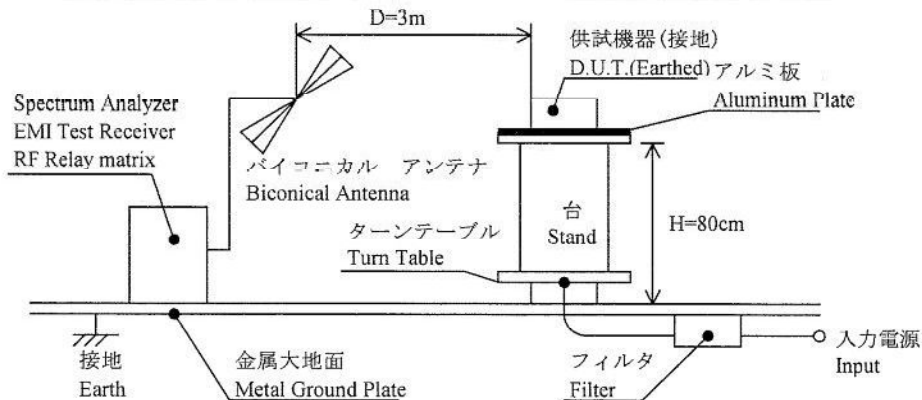
1.2 使用測定機器　　List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	TEKTRONIX	TDS3012
2	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA ELECT.	DL1740EL/DL9040L
3	DIGITAL MULTIMETER	AGILENT	34970A
4	DIGITAL POWER METER	YOKOGAWA ELECT.	WT210
5	CURRENT PROBE/AMPLIFIER	YOKOGAWA ELECT.	701930
6	DYNAMIC DUMMY LOAD	TAKASAGO	FK-200L
7	SLIDE REGULATOR	MATSUNAGA	SD-2650
8	CVCF	TAKASAGO	AA2000XG
9	LEAKAGE CURRENT METER	HIOKI	3156
10	DYNAMIC DIP SIMULATOR	CYBERNETICS	PSA-210
11	CONTROLLED TEMP. CHAMBER	ESPEC	SU-261
12	SPECTRUM ANALYZER	ROHDE & SCHWARZ	FSA
13	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESHS10
14	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESVS10
15	RF RELAY MATRIX	ROHDE & SCHWARZ	PSU
16	AMN	KYORITU DENSHI	KNW-242
17	ANTENA(BICONICAL ANTENA)	SCHWARZBECK	BBA9106
18	POWER HITESTER	HIOKI	3193
19	POWER HITESTER	HIOKI	9600
20	IMPEDANCE NETWORK 20A	NF	4150
21	SING PHASE MASTER	NF	4420
22	BOOSTER	NF	4421

TDK-Lambda

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	85VAC	100VAC	132VAC	line regulation	
0%	5.003V	5.003V	5.004V	1mV	0.020%
50%	5.002V	5.002V	5.002V	0mV	0.000%
100%	5.001V	5.001V	5.001V	0mV	0.000%
load	2mV	2mV	3mV		
regulation	0.040%	0.040%	0.060%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	5.005V	5.001V	4.994V	11mV	0.220%

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

Start up voltage (Vin)	66VAC
Drop out voltage (Vin)	67VAC

12V

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

Iout \ Vin	85VAC	100VAC	132VAC	line regulation	
0%	12.005V	12.005V	12.006V	1mV	0.008%
50%	12.002V	12.002V	12.002V	0mV	0.000%
100%	12.001V	12.001V	12.001V	0mV	0.000%
load	4mV	4mV	5mV		
regulation	0.033%	0.033%	0.042%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	12.016V	12.001V	11.979V	37mV	0.308%

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

Start up voltage (Vin)	66VAC
Drop out voltage (Vin)	65VAC

24V

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

Iout \ Vin	85VAC	100VAC	132VAC	line regulation	
0%	23.936V	23.936V	23.936V	0mV	0.000%
50%	23.932V	23.932V	23.931V	1mV	0.004%
100%	23.931V	23.931V	23.930V	1mV	0.004%
load	5mV	5mV	6mV		
regulation	0.021%	0.021%	0.025%		

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

Ta	-10℃	+25℃	+50℃	temperature stability	
Vout	23.976V	23.931V	23.878V	98mV	0.408%

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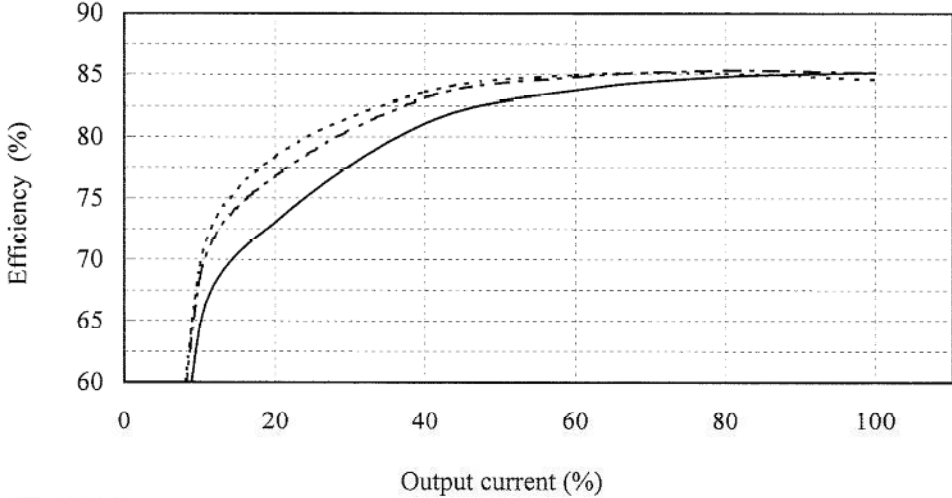　　　　　　　　　　　　　　　　　　　　　　　　　　Iout : 100 %

Start up voltage (Vin)	66VAC
Drop out voltage (Vin)	69VAC

TDK-Lambda

(2) 効率対出力電流
Efficiency vs. Output current

Conditions　Vin :　85 VAC　------
:　100 VAC　-·-·-
:　132 VAC　------
Ta :　25 ℃

5V

Efficiency (%) vs Output current (%)

12V

Efficiency (%) vs Output current (%)

24V

Efficiency (%) vs Output current (%)

TDK-Lambda

T-5
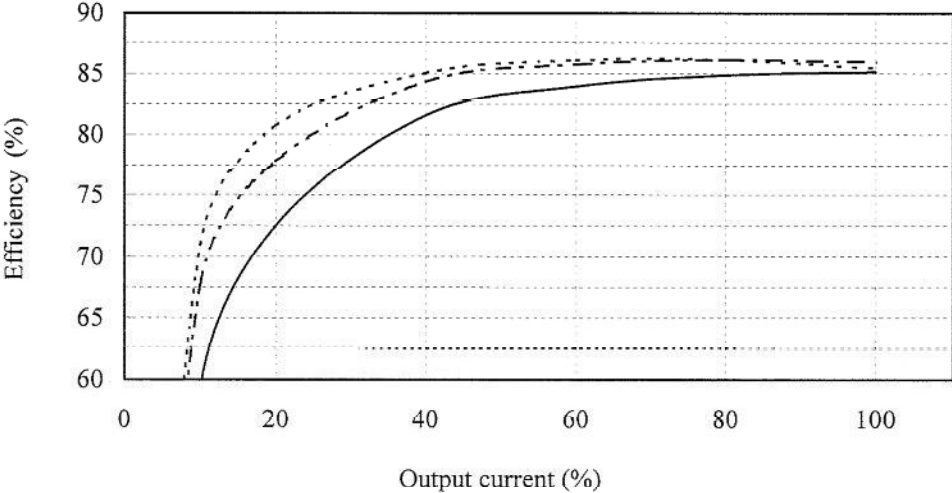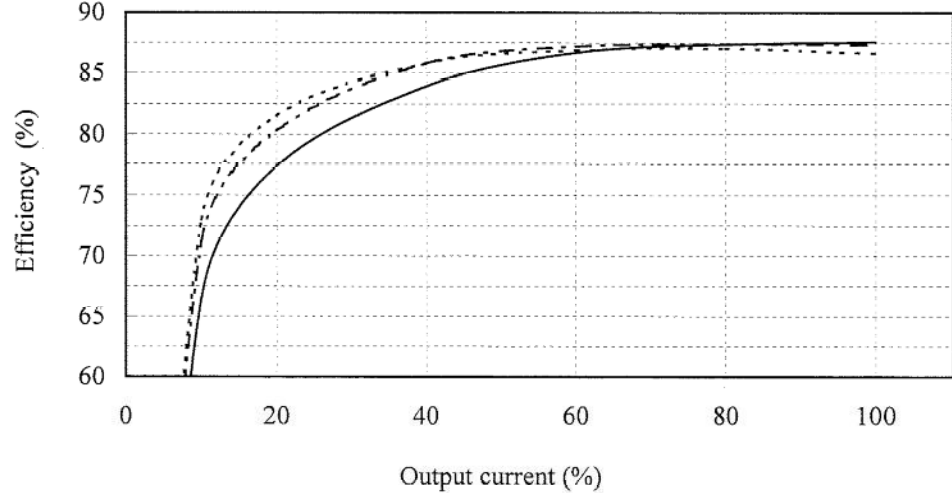
(3) 入力電流対出力電流
Input current vs. Output current

Conditions　Vin :　85 VAC ------
　　　　　　　　: 100 VAC —·—·—
　　　　　　　　: 132 VAC ———
　　　　　Ta :　25 ℃

5V

Input current (A) vs. Output current (%)

2.5
2.0
1.5
1.0
0.5
0.0
0　　20　　40　　60　　80　　100
Output current (%)

12V

Input current (A) vs. Output current (%)

2.5
2.0
1.5
1.0
0.5
0.0
0　　20　　40　　60　　80　　100
Output current (%)

24V

Input current (A) vs. Output current (%)

2.5
2.0
1.5
1.0
0.5
0.0
0　　20　　40　　60　　80　　100
Output current (%)

TDK-Lambda
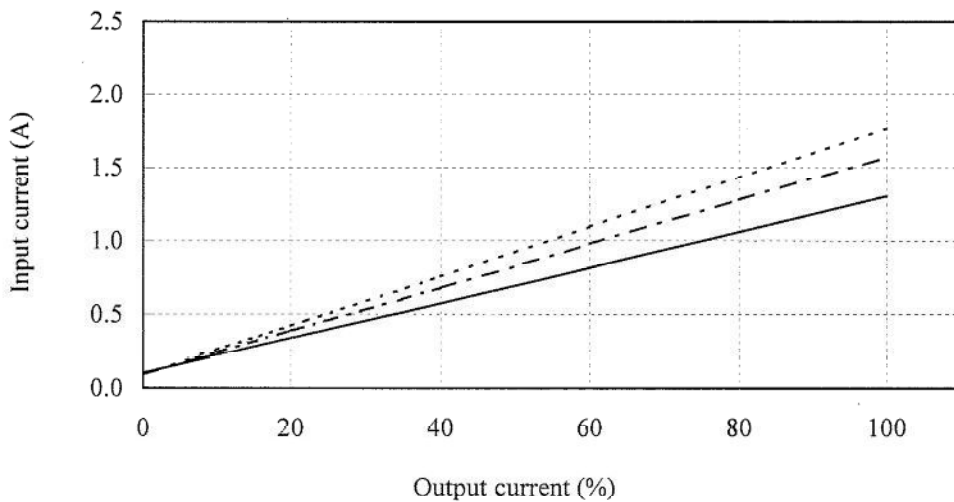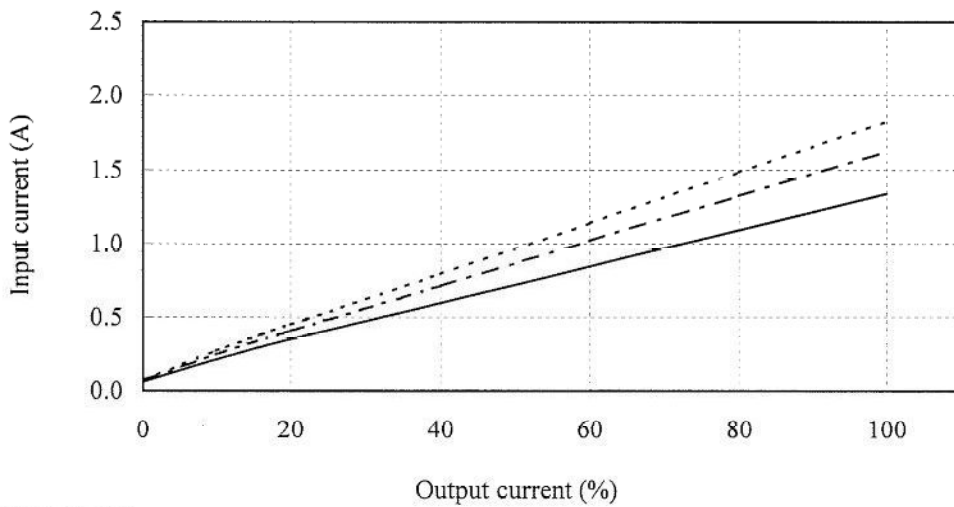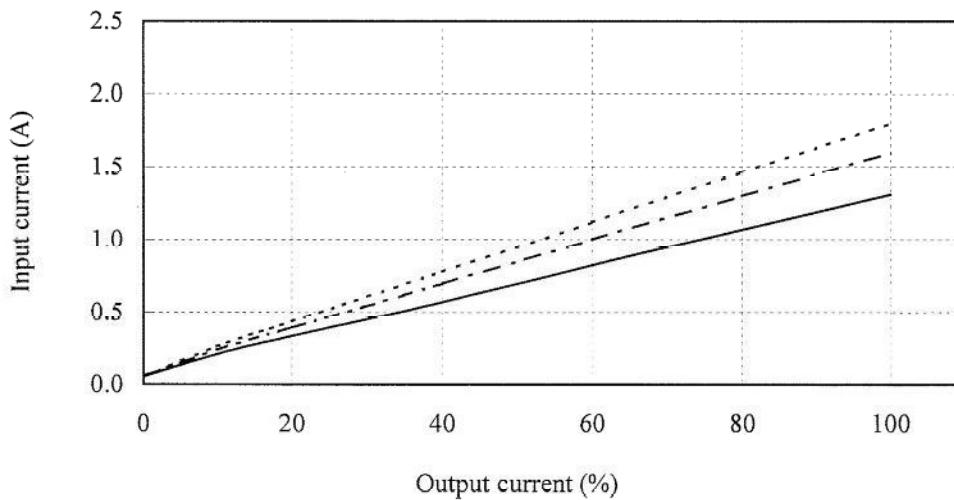
(4) 入力電力対出力電流
Low load input power vs. Output current

Conditions　Vin :　　85 VAC　‑‑‑‑‑
　　　　　　　 :　　100 VAC　‑‑‑‑‑
　　　　　　　 :　　132 VAC　———
　　　　Ta :　　25 ℃

5V

Conditions	Iout : 0%
Vin	Input power
85VAC	3.2W
100VAC	3.7W
132VAC	5.3W
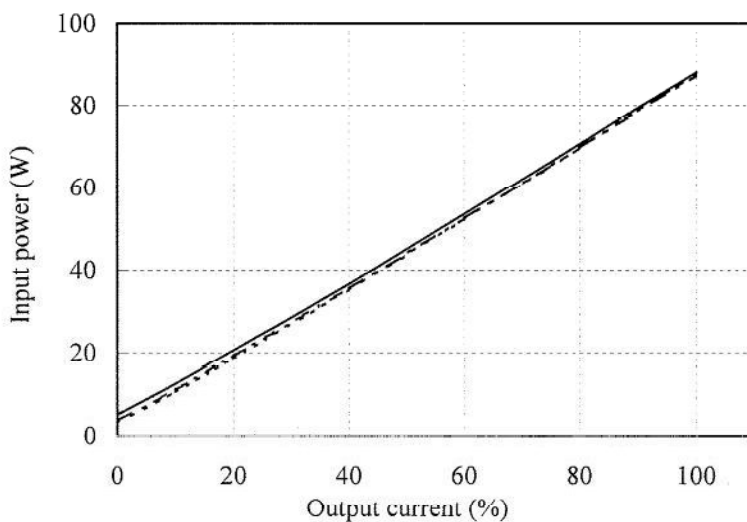
12V

Conditions	Iout : 0%
Vin	Input power
85VAC	2.2W
100VAC	2.5W
132VAC	2.2W
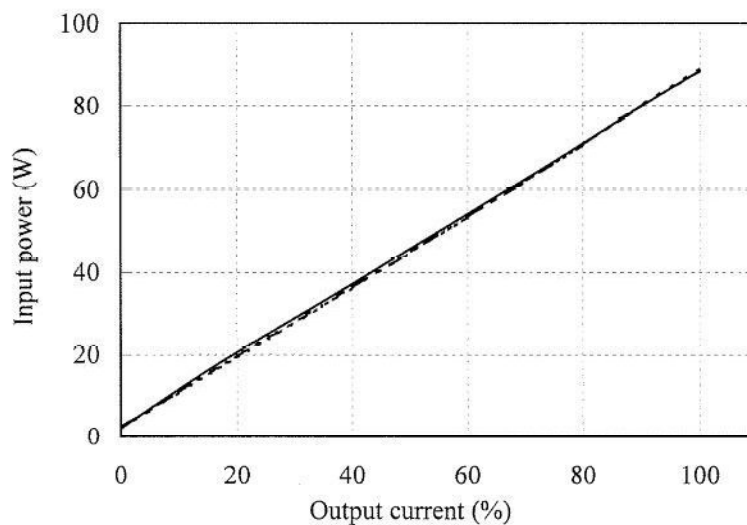
24V

Conditions	Iout : 0%
Vin	Input power
85VAC	1.4W
100VAC	1.8W
132VAC	1.7W

TDK-Lambda
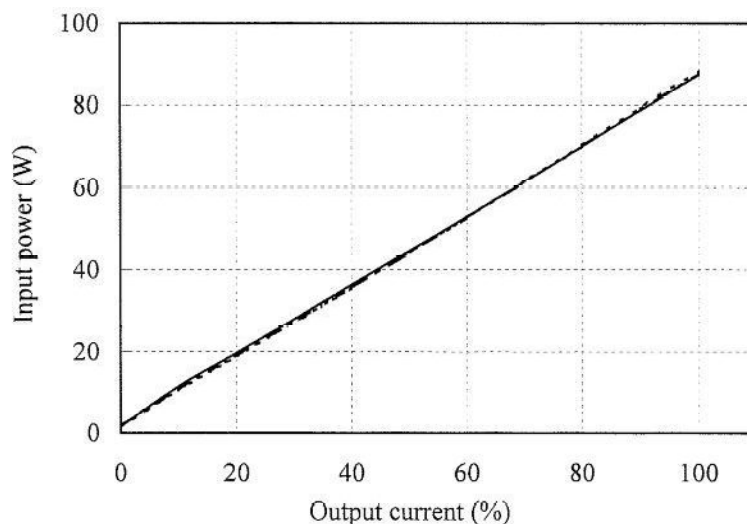
2.2 過電流保護特性
Over current protection (OCP) characteristics
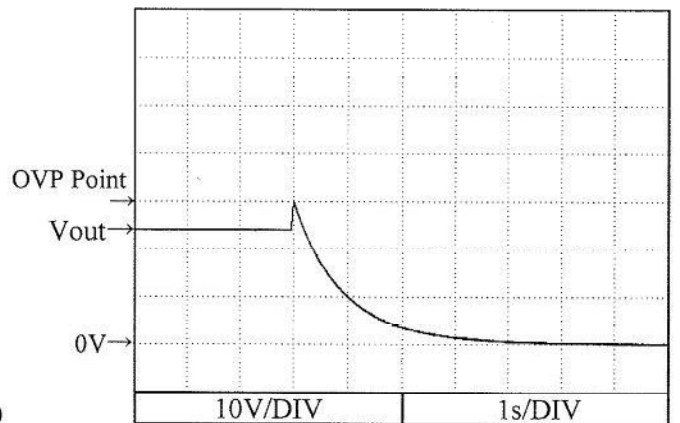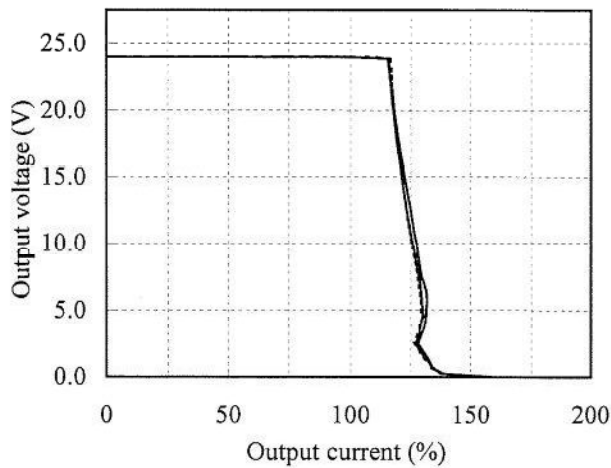
2.3 過電圧保護特性
Over voltage protection (OVP) characteristics

Conditions Vin : 85 VAC ------
  100 VAC —·—·—
  132 VAC ———
Ta : 25 ℃

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

5V

12V

24V

2V/DIV 1s/DIV

5V/DIV 1s/DIV

10V/DIV 1s/DIV

OVP Point
Vout
0V

TDK-Lambda
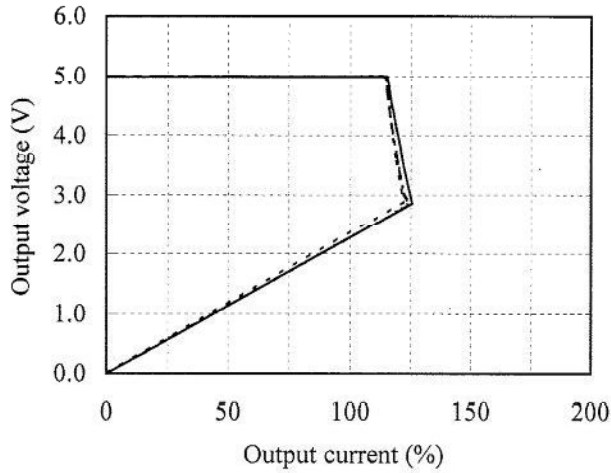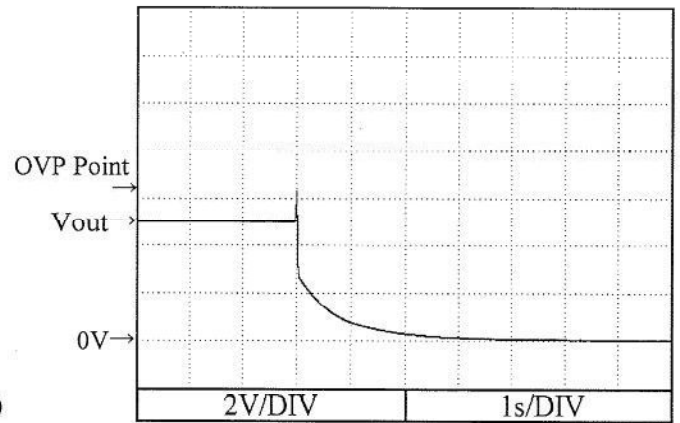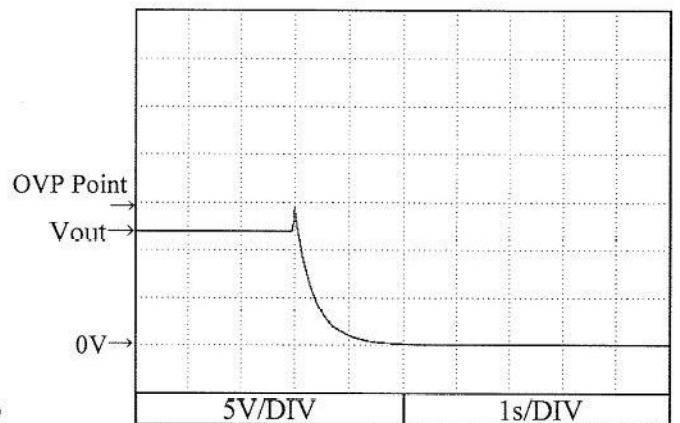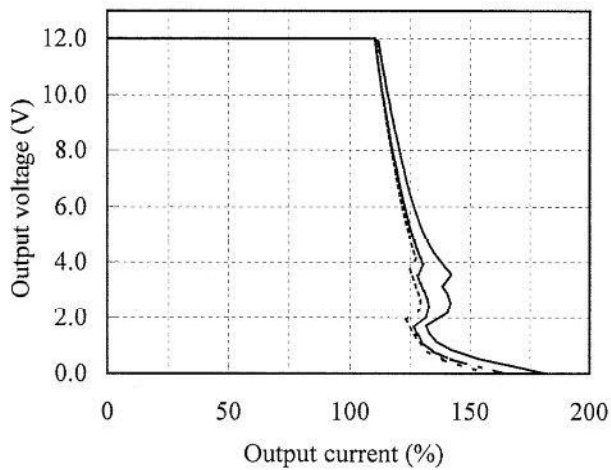
2.4 出力立ち上がり特性、出力立ち下がり特性
Output rise characteristics, Output fall characteristics

Conditions　Vin :　85 VAC (A)
　　　　　　　　　　100 VAC (B)
　　　　　　　　　　132 VAC (C)
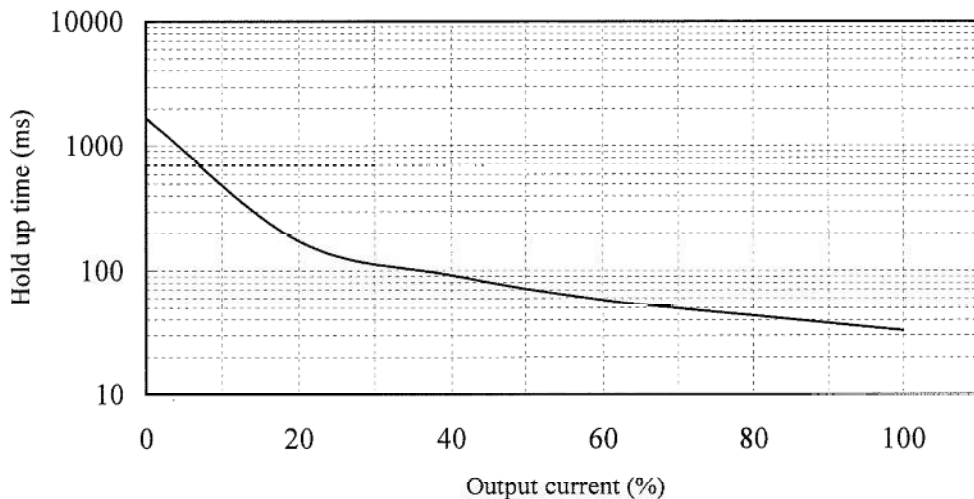　　　　　　Iout :　100 %
　　　　　　Ta :　25 ℃

5V

C B A
←Vont

←0V→

←Vin→

2V/DIV	50ms/DIV

A B　　　C
←Vont

←0V→

←Vin→

2V/DIV	20ms/DIV

12V

C B A
←Vont

←0V→

←Vin→

5V/DIV	50ms/DIV

A B　　　C
←Vont

←0V→

←Vin→

5V/DIV	20ms/DIV

24V

C B A
←Vont

←0V→

←Vin→

10V/DIV	50ms/DIV

A B　　　C
←Vont

←0V→

←Vin→

10V/DIV	20ms/DIV

TDK-Lambda
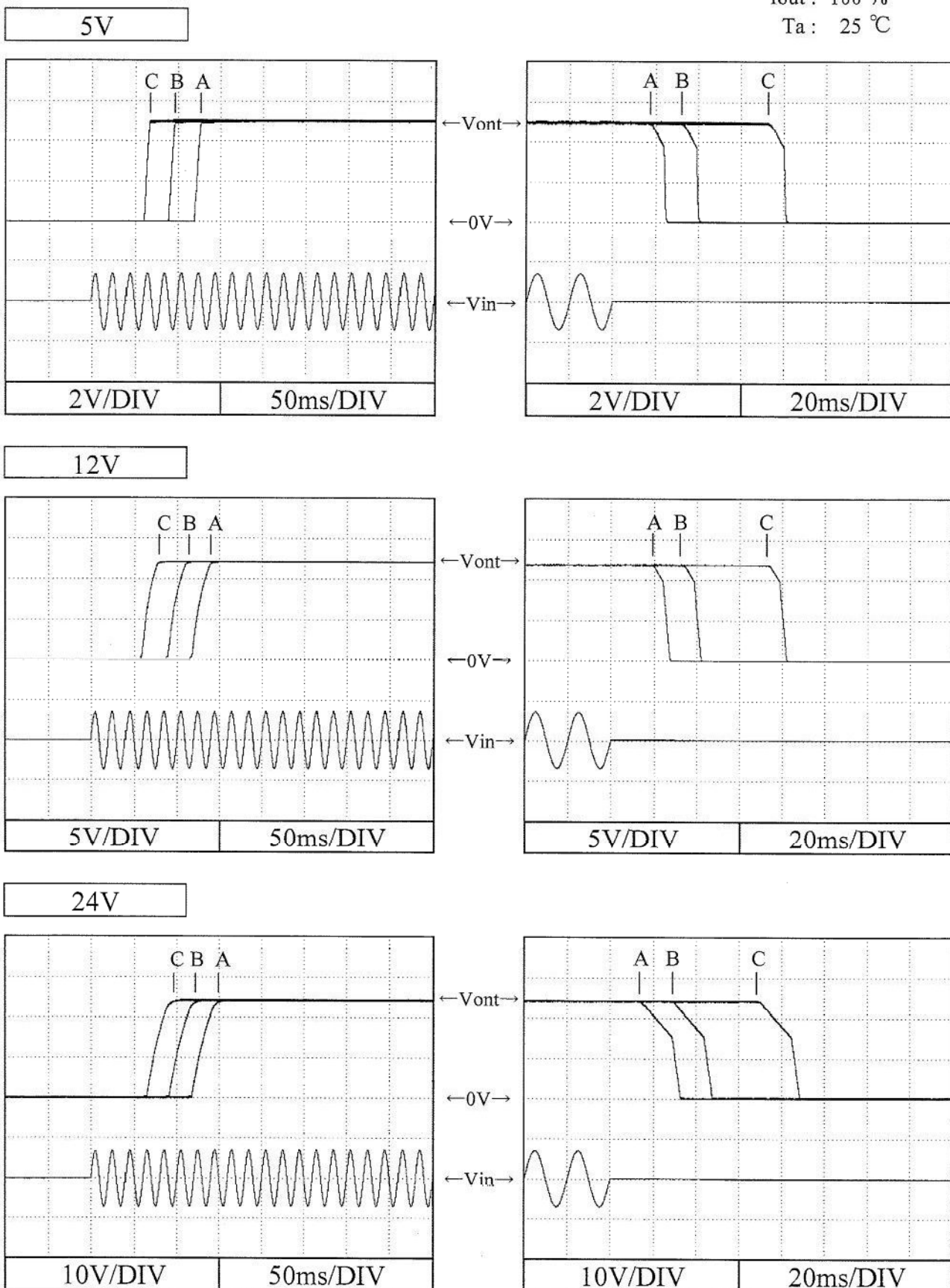
2.5 出力保持時間特性
　　　Hold up time characteristics

Conditions　Vin : 100 VAC
Ta :　25 ℃

5V

Hold up time (ms) vs Output current (%)

Hold up time (ms)

Output current (%)

12V

Hold up time (ms)

Output current (%)
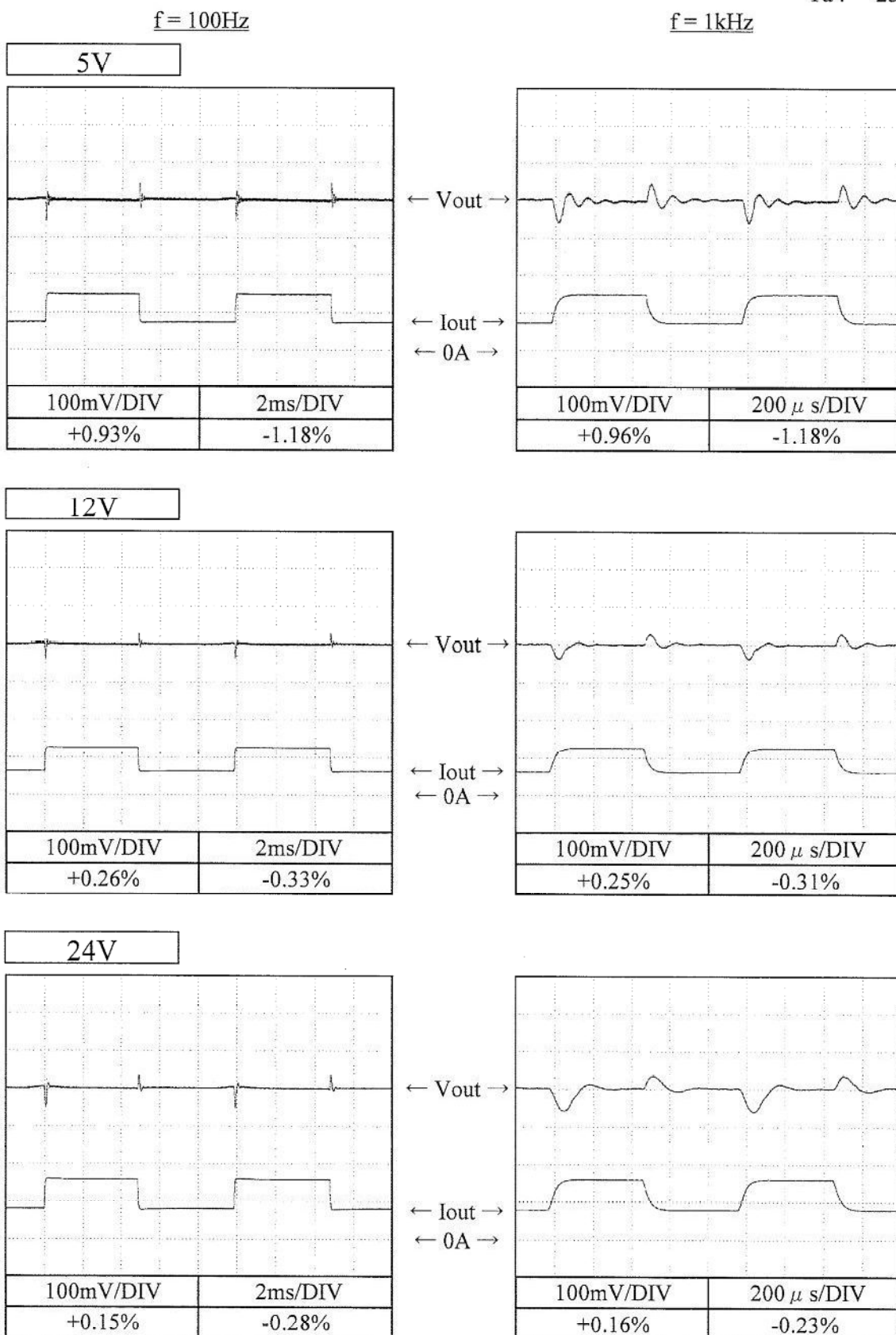
24V

Hold up time (ms)

Output current (%)

TDK-Lambda

T-10
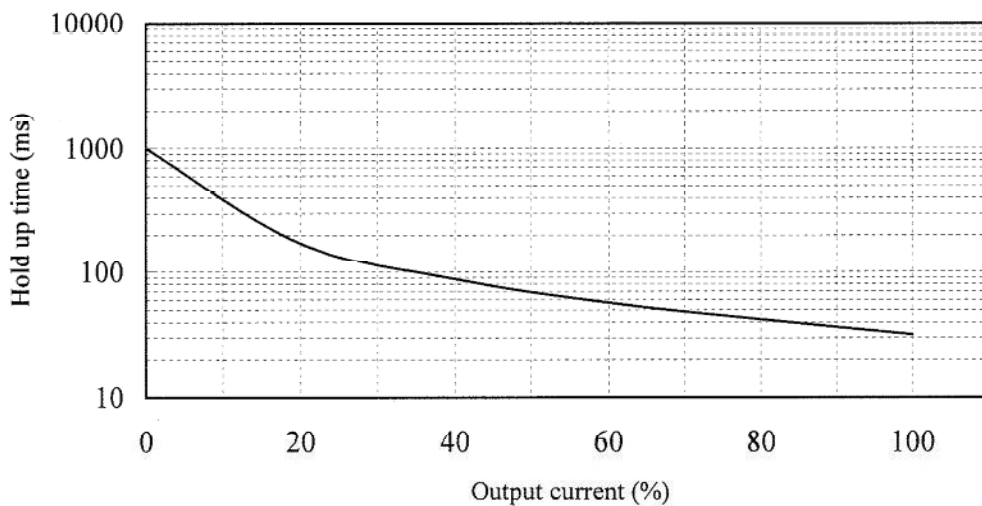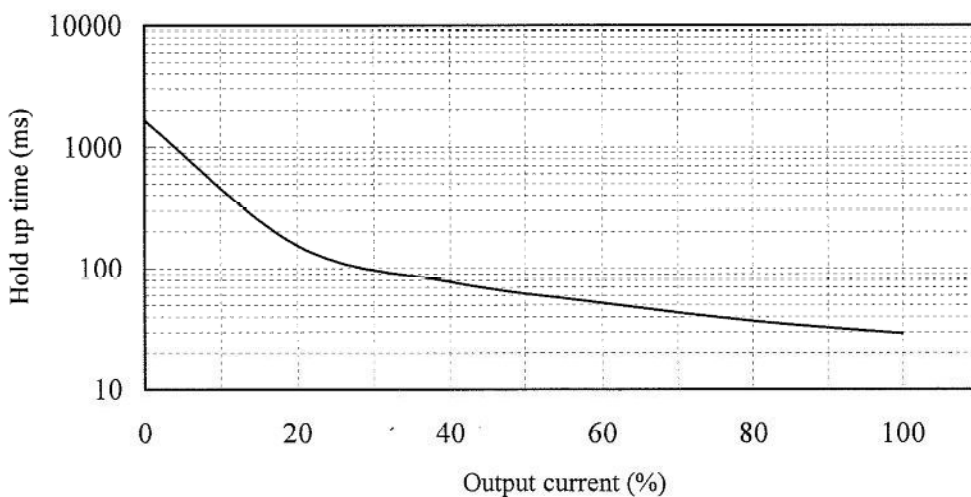
2.6 過渡応答（負荷急変）特性
Dynamic load response characteristics

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

f = 100Hz

5V	

← Vout →

← Iout →
← 0A →

100mV/DIV	2ms/DIV
+0.93%	-1.18%

f = 1kHz

← Vout →

← Iout →
← 0A →

100mV/DIV	200 μ s/DIV
+0.96%	-1.18%

12V	

← Vout →

← Iout →
← 0A →

100mV/DIV	2ms/DIV
+0.26%	-0.33%

← Vout →

← Iout →
← 0A →

100mV/DIV	200 μ s/DIV
+0.25%	-0.31%

24V	

← Vout →

← Iout →
← 0A →

100mV/DIV	2ms/DIV
+0.15%	-0.28%

← Vout →

← Iout →
← 0A →

100mV/DIV	200 μ s/DIV
+0.16%	-0.23%

TDK-Lambda

2.7 入力電圧瞬停特性
　　　Response to brown out characteristics

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

5V

B A C
← Vout

A = 31ms

B = 37ms

C = 38ms

← 0V

← Vin

| 2V/DIV | 50ms/DIV |

12V

B A C
← Vout

A = 33ms

B = 37ms

C = 38ms

← 0V

← Vin

| 5V/DIV | 50ms/DIV |

24V

B A C
← Vout

A = 28ms

B = 44ms

C = 45ms

← 0V

← Vin

| 10V/DIV | 50ms/DIV |

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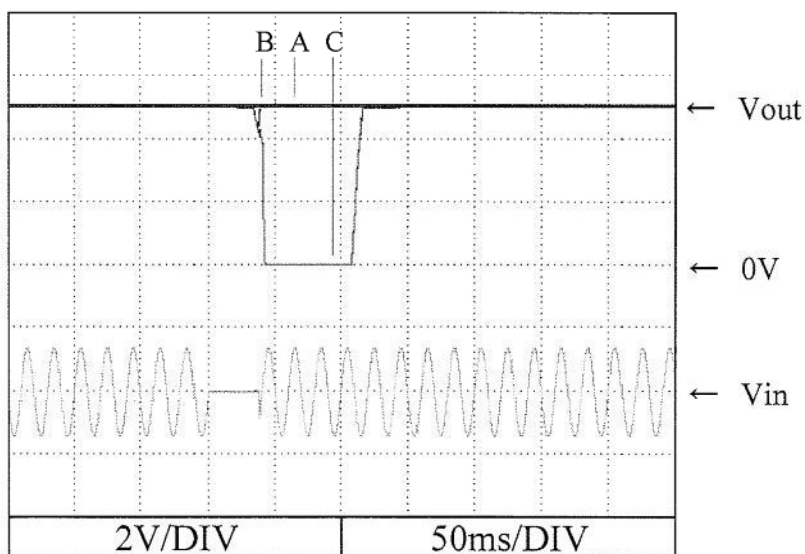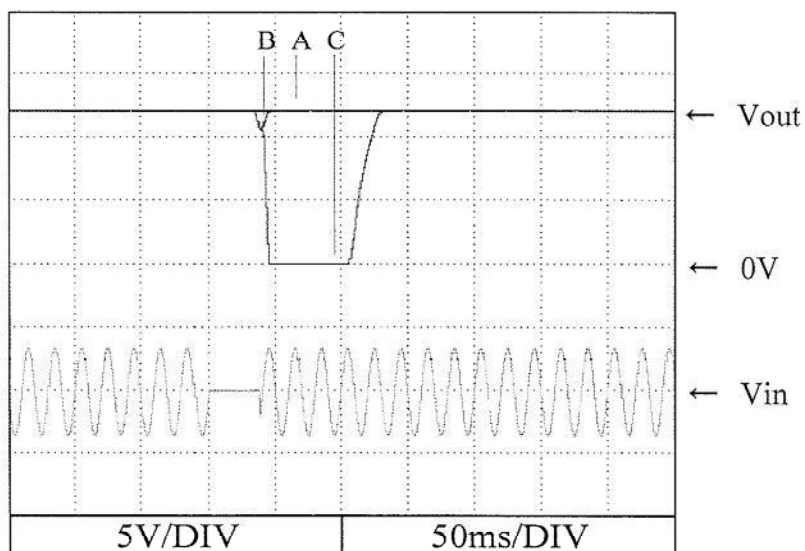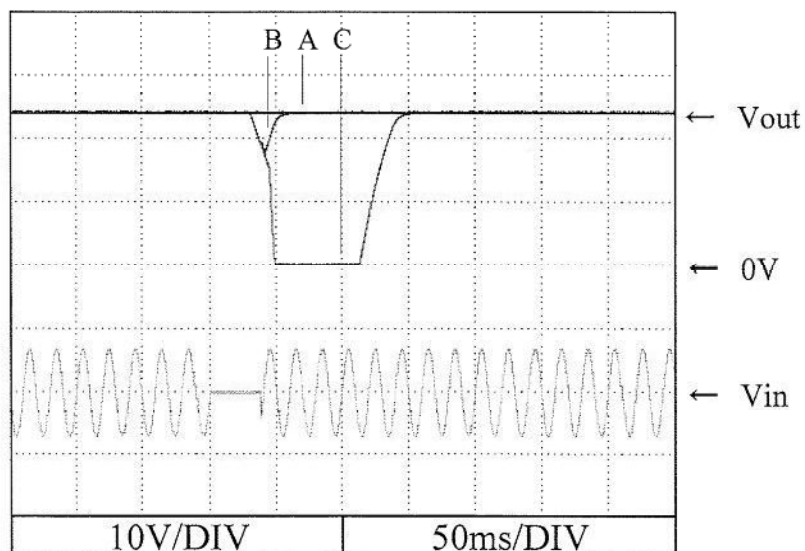
2.8 入力サージ電流（突入電流）特性
Inrush current waveform

5V

Switch on phase angle of input AC voltage
$\phi = 0°$
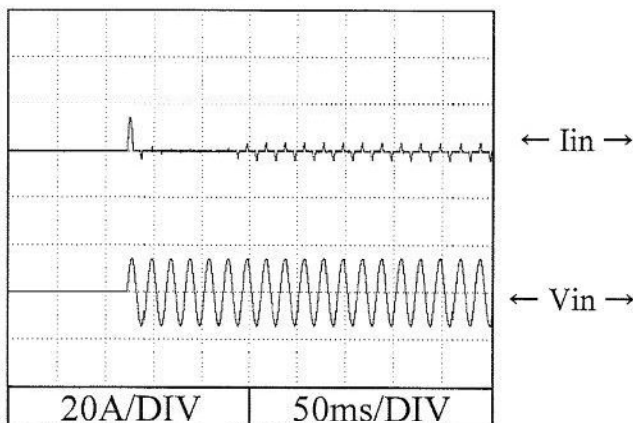
Switch on phase angle of input AC voltage
$\phi = 90°$
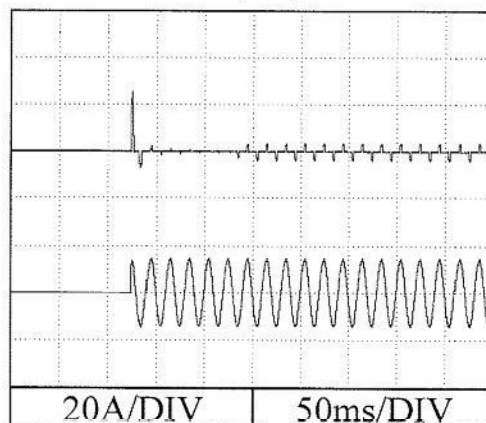
← Iin →

← Vin →

20A/DIV	50ms/DIV

20A/DIV	50ms/DIV

2.9 リーク電流特性
Leakage current characteristics

5V

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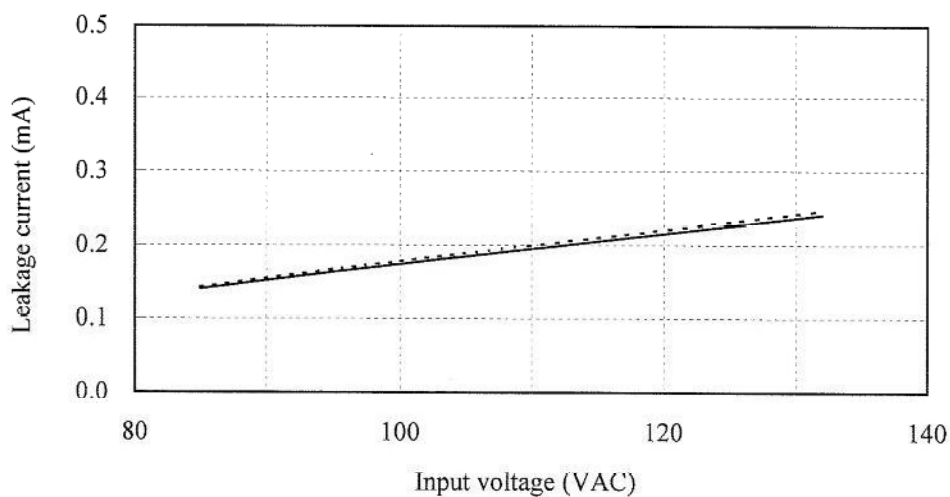
2.10 出力リップル、ノイズ波形
Output ripple and noise waveform

NORMAL MODE

5V

20mV/DIV   2μs/DIV

12V

10mV/DIV   2μs/DIV

24V

10mV/DIV   2μs/DIV

TDK-Lambda
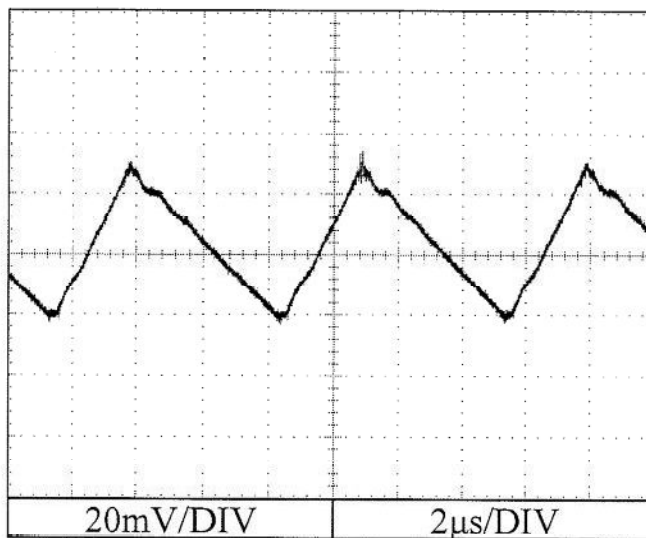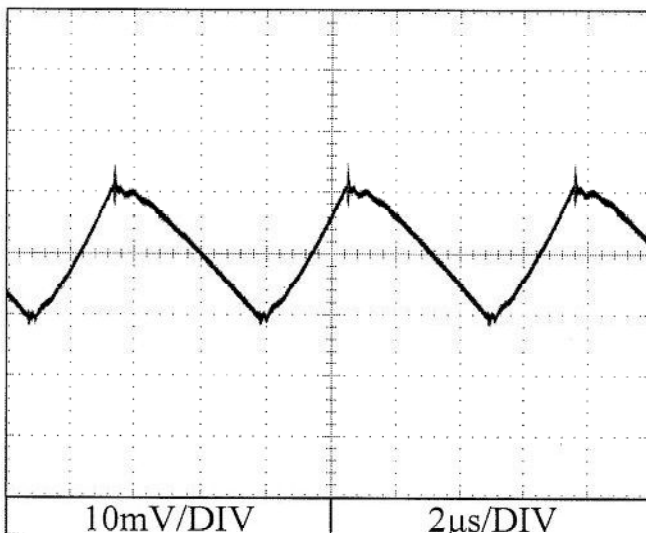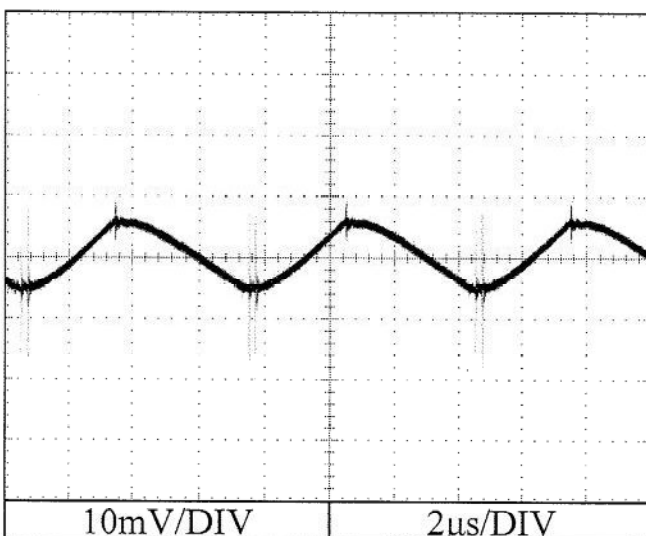
2.11 ＥＭＩ特性
    Electro-Magnetic Interference characteristics

雑音端子電圧   Conditions   Vin :   100 VAC
  Conducted Emission   Io :   100 %

Phase : N   Phase : L

5V
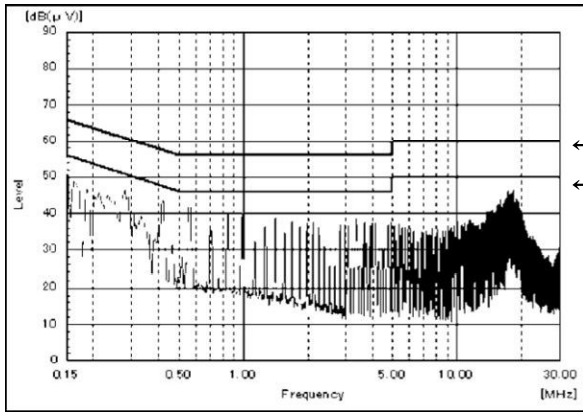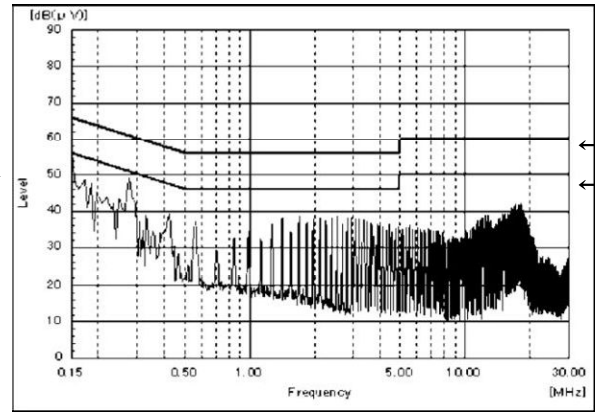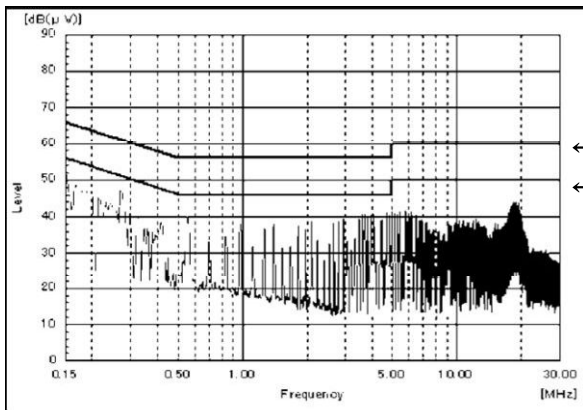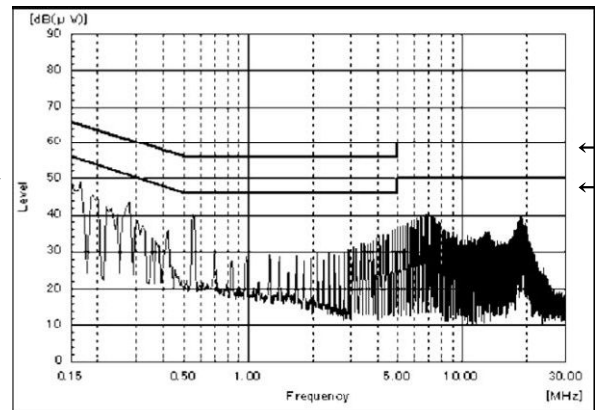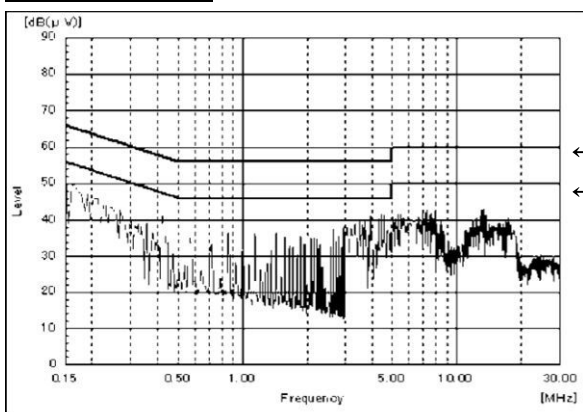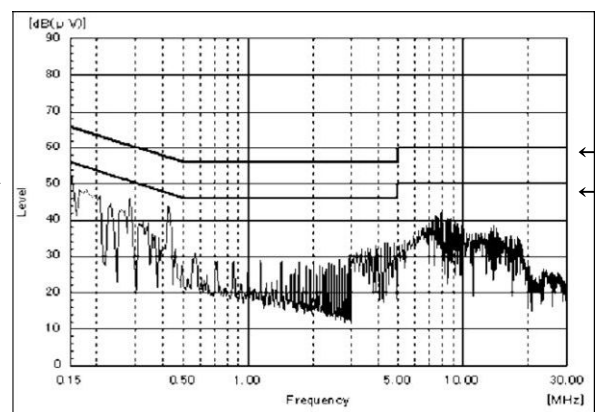
12V

24V

EN55011-B,EN55032-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B are same as its VCCI class B.

表示はピーク値です。
Indication is peak values.

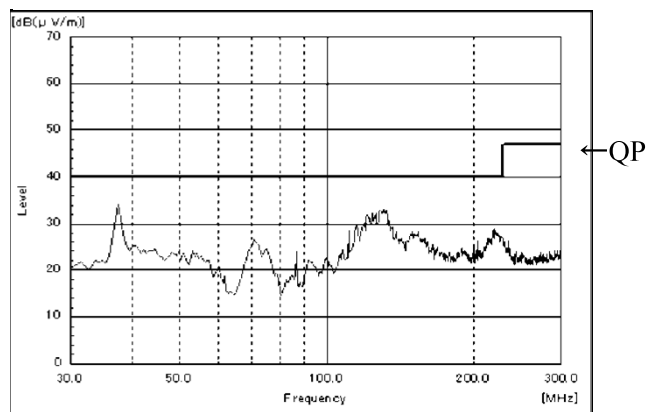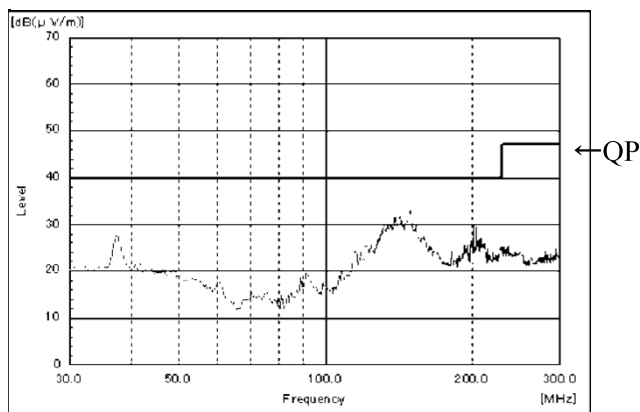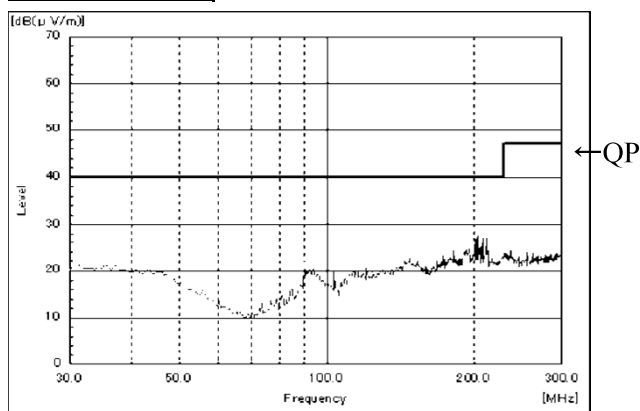**TDK-Lambda**

雑音電界強度   Conditions   Vin :   100 VAC

Radiated Emission   Io :   100 %
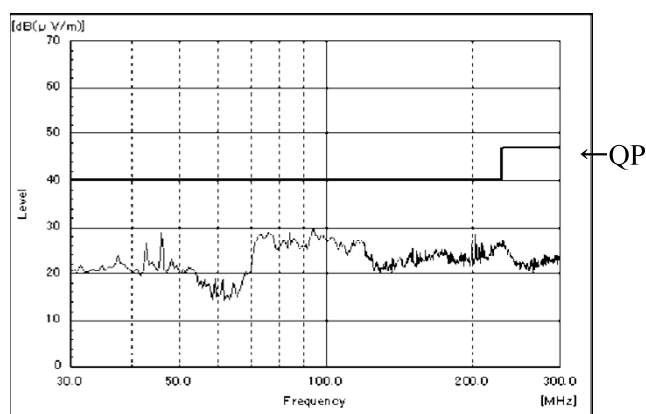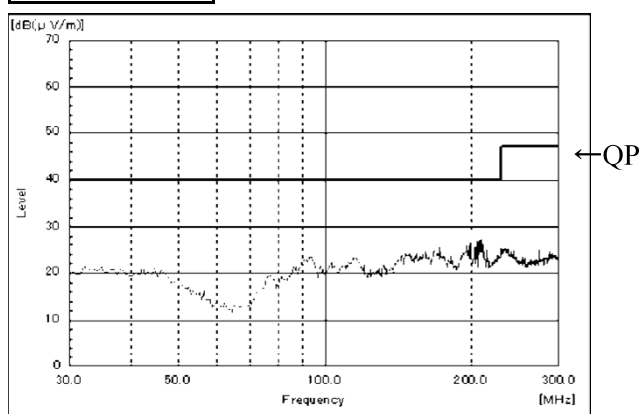
HORIZONTAL   VERTICAL

5V

12V

24V

EN55011-B,EN55032-Bの限界値はVCCI class Bの限界値と同じ
Limit of EN55011-B,EN55032-B are same as its VCCI class B.

表示はピーク値です。
Indication is peak values.

TDK-Lambda   T-16