

LS200

EVALUATION DATA

DWG.No PA607-53-01		
APPD	CHK	DWG
<i>Jeg8</i> 21/Jan/10	<i>Ramothu</i> 21/Jan/10	<i>Yehia</i>

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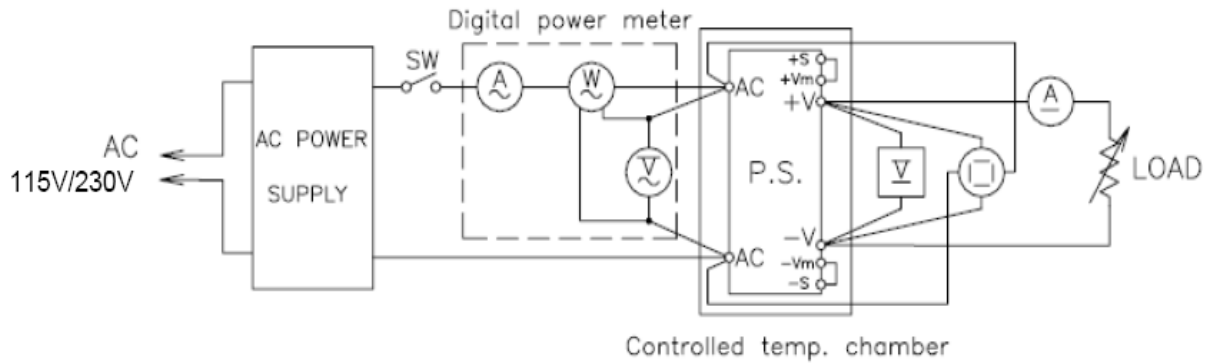
Terminology Used

	Definition
V _{in}	Input Voltage
V _{out}	Output Voltage
I _{in}	Input Current
I _{out}	Output Current
T _a	Ambient Temperature

1. Evaluation Method

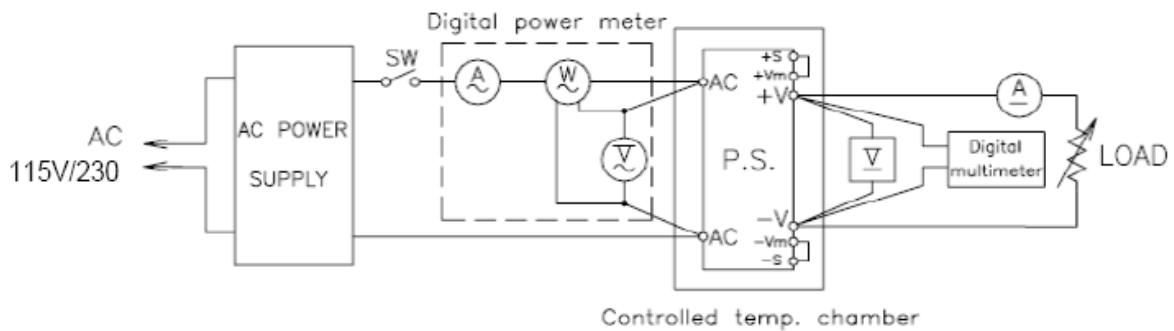
1.1 Circuit used for determination

- (1) Steady state data



- (2) Warm up voltage drift characteristics
Same as Steady state data

- (3) Over current protection (OCP) characteristics

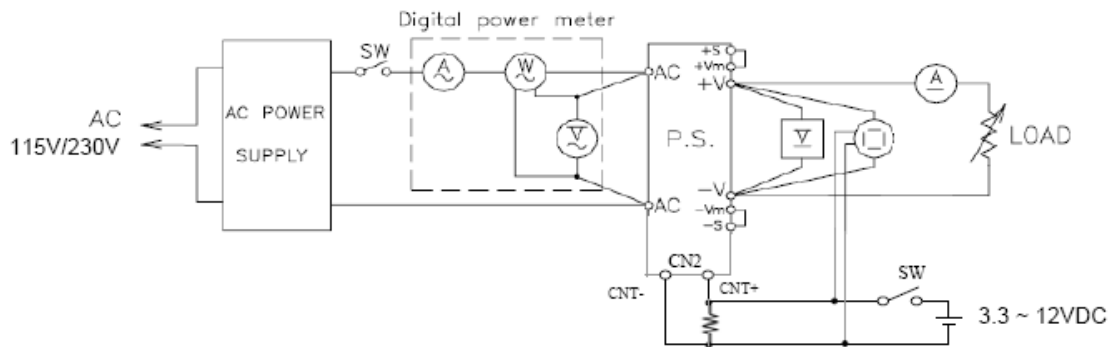


- (4) Over voltage protection (OVP) characteristics
Same as Steady state data

- (5) Output rise characteristics
Same as Steady state data

- (6) Output fall characteristics
Same as Steady state data

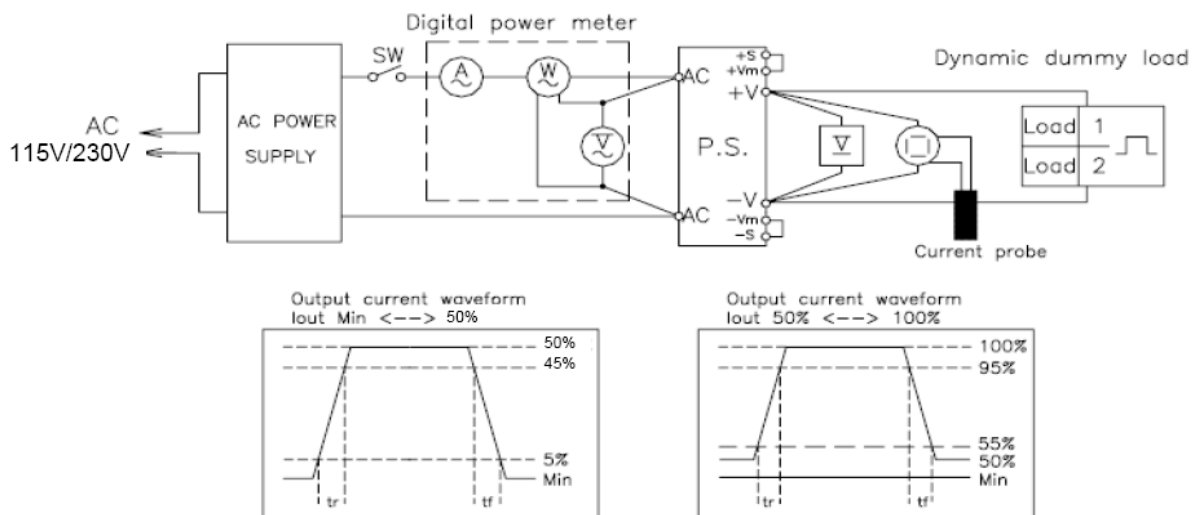
(7) Output rise characteristics with ON/OFF CONTROL



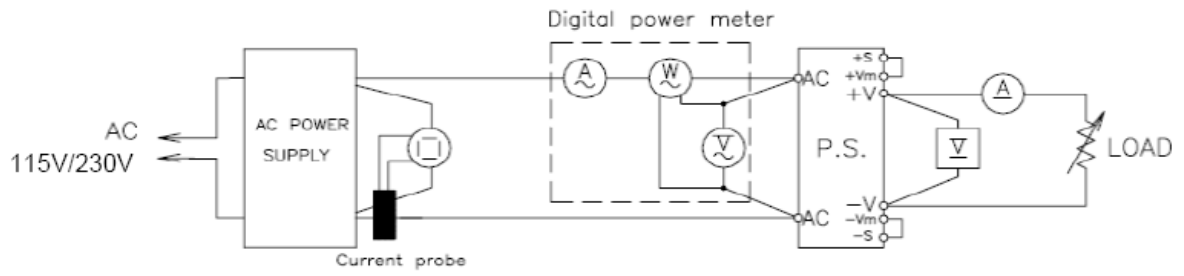
(8) Output fall characteristics with ON/OFF CONTROL
Same as Output rise characteristics with ON/OFF CONTROL

(9) Dynamic line response characteristics
Same as Steady state data

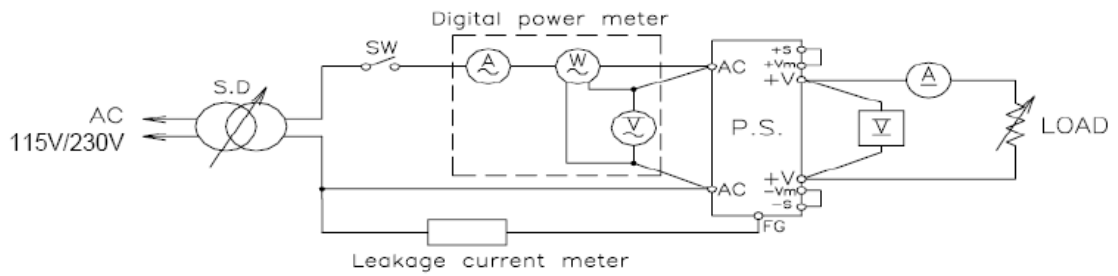
(10) Dynamic load response characteristics



(11) Inrush current characteristics



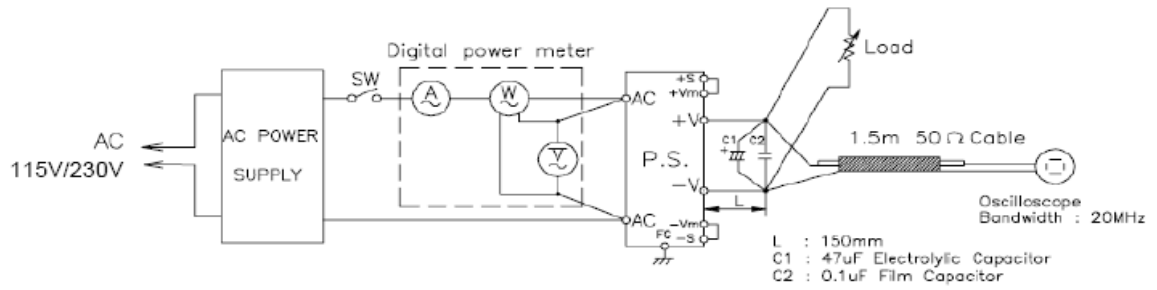
(12) Leakage current characteristics



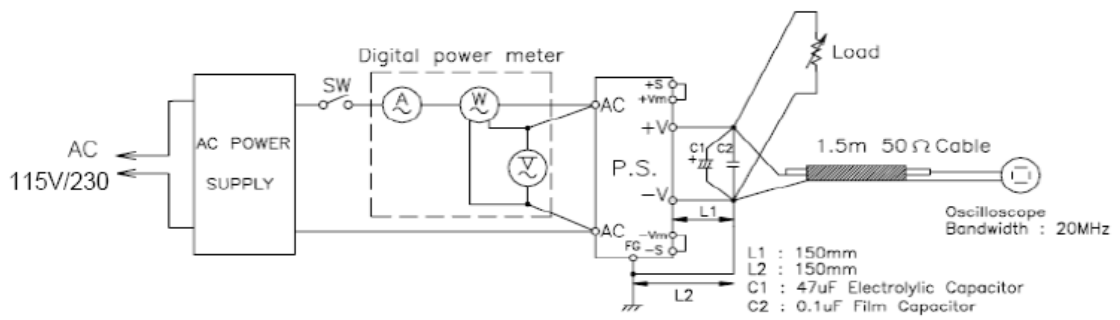
Range used ---AC (For SIMPSON TYPE 228)

(13) Output ripple and noise waveform

(a) Normal Mode (using a 150mm twisted pair terminated with 0.1uF and 47uF capacitor at 20MHz)



(b) Normal + Common Mode

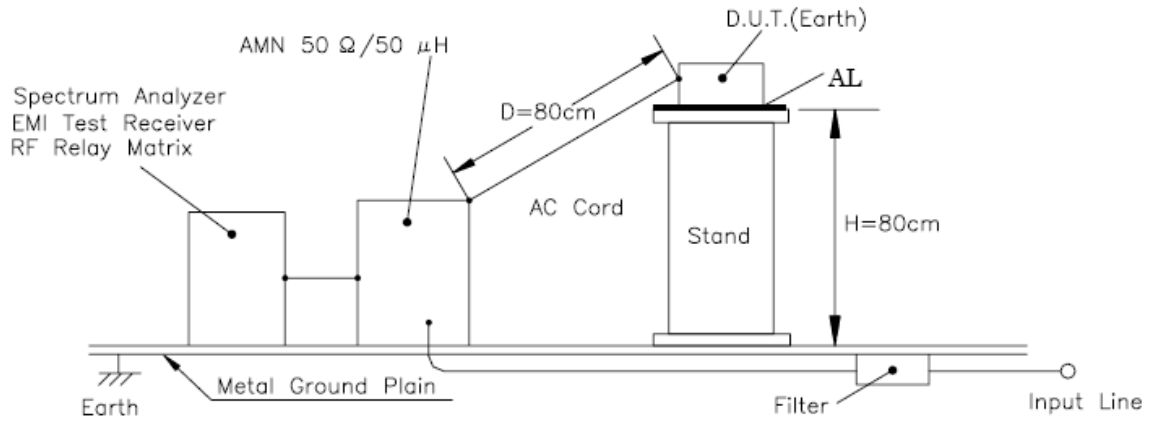


(14) Standby current

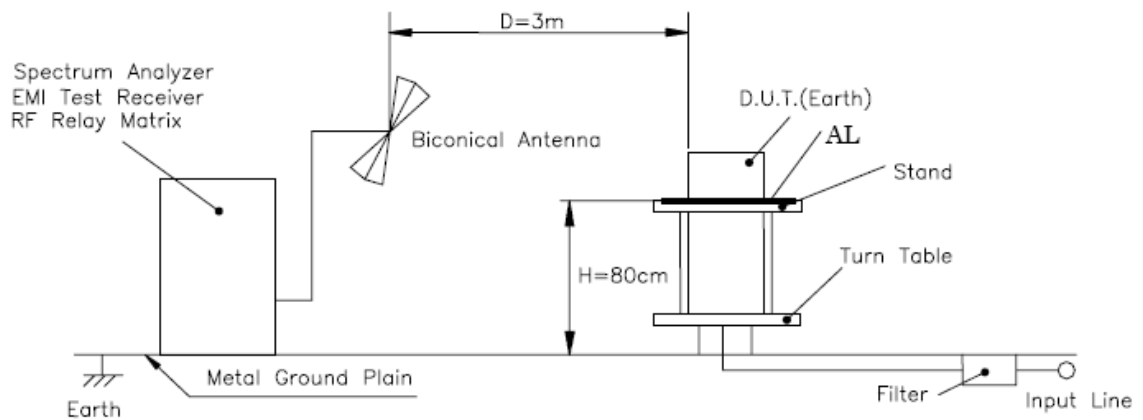
Same as Steady state data

(15) Electro-Magnetic Interference characteristics

(a) Conducted Emission Noise



(b) Radiated Emission Noise



1-2 List of Equipment Used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA	DL1740/DL1740E
2	DIGITAL MULTIMETER	FLUKE	89 VI
3	DIGITAL POWER METER	YOKOGAWA	WT210
4	CURRENT PROBE/AMPLIFIER	TEKTRONIX	TCP404XL/TCPA400
5	DYNAMIC DUMMY LOAD	CHROMA	63030/63201
6	DYNAMIC DUMMY LOAD	KIKUSUI	PLZ1004W
7	CONTROLLED TEMP. CHAMBER	ESPEC	SU-241
8	LEAKAGE CURRENT METER	SIMPSON	228
9	AC SOURCE	KIKUSUI	PCR-2000L
10	AC SOURCE	CHROMA	61503/61505
11	POWER ANALYZER	CHROMA	6630
12	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESCI
13	EMI TEST RECEIVER	ROHDE&SCHWARZ	ESI26
14	LISN	ROHDE&SCHWARZ	ENV216
15	ANTENNA	ROHDE&SCHWARZ	HL562

2. Characteristics

2.1 Steady State Data

(1) Regulation - Line and Load, Temperature Drift

5V

1. Regulation-Line and Load Condition Ta : 25°C

Iout \ Vin	85VAC	115VAC	230VAC	264VAC	Line Regulation	
0%	5.038	5.038	5.038	5.038	0.000V	0.000%
50%	5.025	5.025	5.025	5.025	0.000V	0.000%
100%	5.014	5.014	5.014	5.014	0.000V	0.000%
Load	0.024V	0.024V	0.024V	0.024V		
Regulation	0.480%	0.480%	0.480%	0.480%		

2. Temperature drift Conditions; Vin = 115VAC
Iout = 100%

Ta	-25°C	25°C	50°C	Temperature Stability	
Vout	4.975	5.014	5.012	0.039V	0.78%

12V

1. Regulation-Line and Load Condition Ta : 25°C

Iout \ Vin	85VAC	115VAC	230VAC	264VAC	Line Regulation	
0%	12.036	12.038	12.037	12.036	0.002V	0.017%
50%	12.025	12.024	12.025	12.025	0.001V	0.008%
100%	12.010	12.010	12.011	12.011	0.001V	0.008%
Load	0.026V	0.028V	0.026V	0.025V		
Regulation	0.217%	0.233%	0.217%	0.208%		

2. Temperature drift Conditions; Vin = 115VAC
Iout = 100%

Ta	-25°C	25°C	50°C	Temperature Stability	
Vout	11.960	12.010	11.992	0.050V	0.417%

24V

1. Regulation-Line and Load Condition Ta : 25°C

Iout \ Vin	85VAC	115VAC	230VAC	264VAC	Line Regulation	
0%	24.023	24.024	24.022	24.024	0.002V	0.008%
50%	24.010	24.010	24.011	24.010	0.001V	0.004%
100%	24.006	24.008	24.007	24.007	0.002V	0.008%
Load	0.017V	0.016V	0.015V	0.017V		
Regulation	0.071%	0.067%	0.062%	0.071%		

2. Temperature drift Conditions; Vin = 115VAC
Iout = 100%

Ta	-25°C	25°C	50°C	Temperature Stability	
Vout	23.902	24.008	23.962	0.106V	0.44%

2-1 Steady State Data

(2) Output Voltage And Ripple Voltage Vs Input Voltage

Condition : Iout = 100%

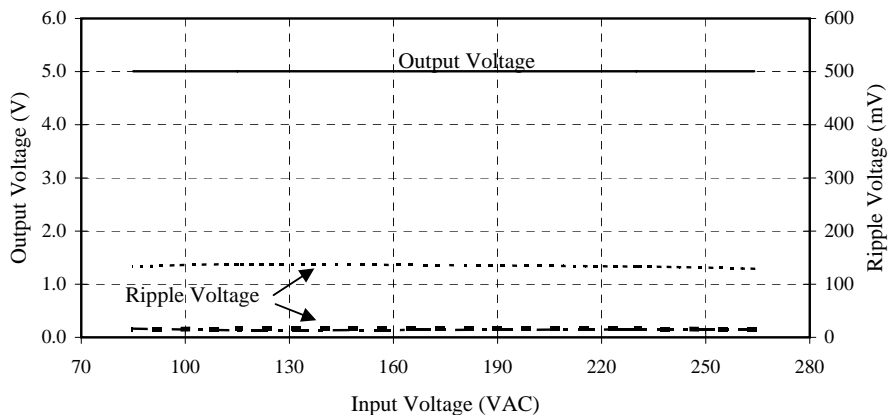
Ta = -25°C

= 25°C

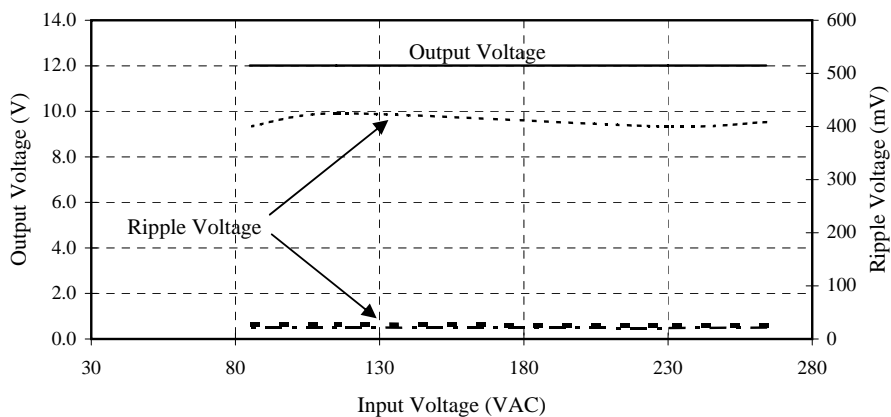
= 50°C



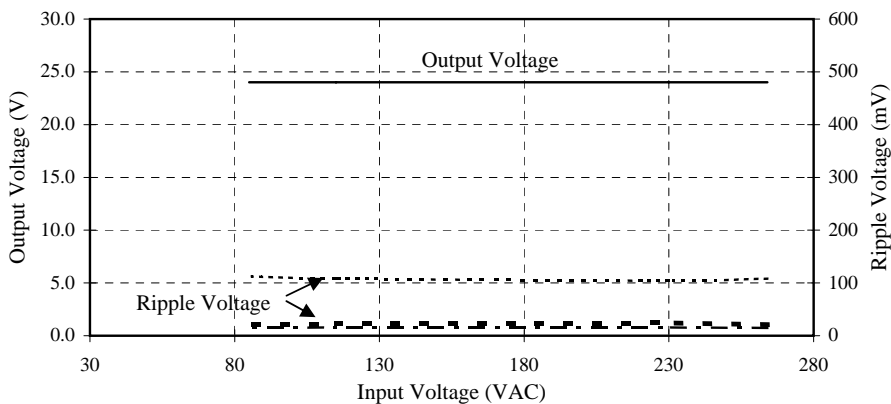
5V



12V



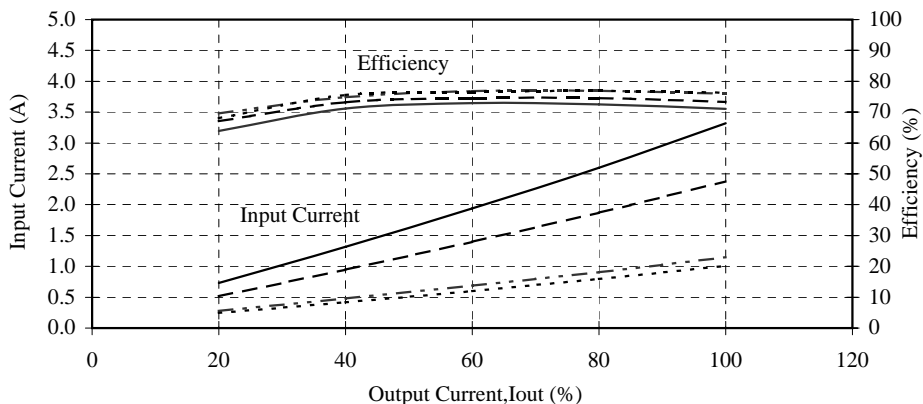
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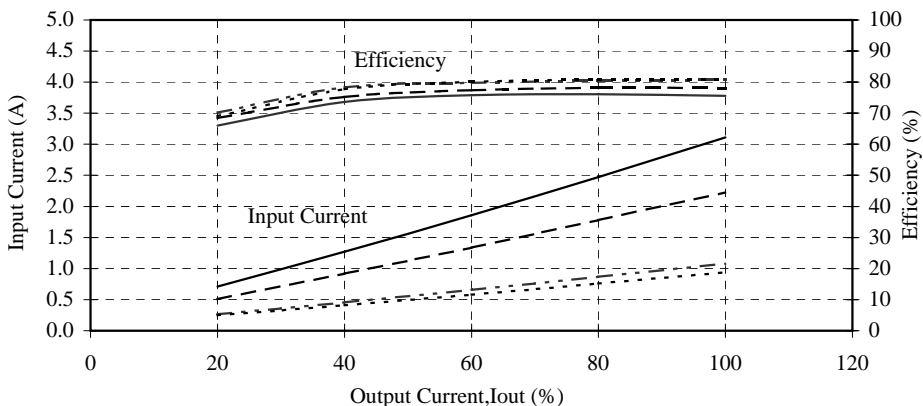
2-1 Steady State Data
 (3) Efficiency And Input Current Vs Output Current

Conditions: Ta= 25°C
 Vin= 85VAC
 115VAC
 230VAC
 264VAC

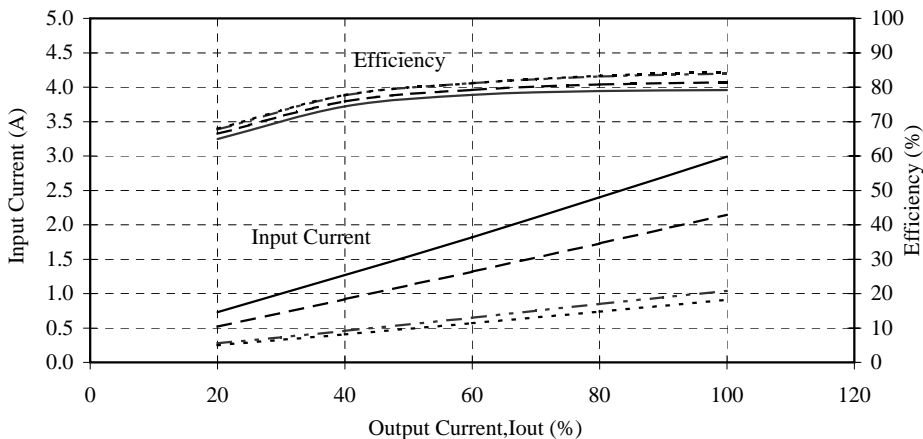
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12V



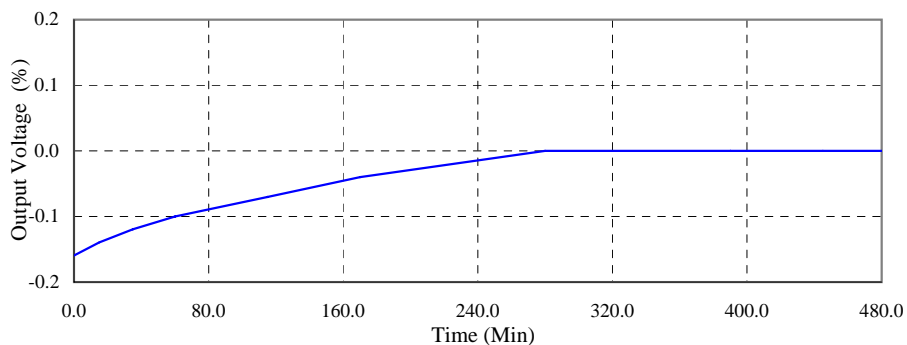
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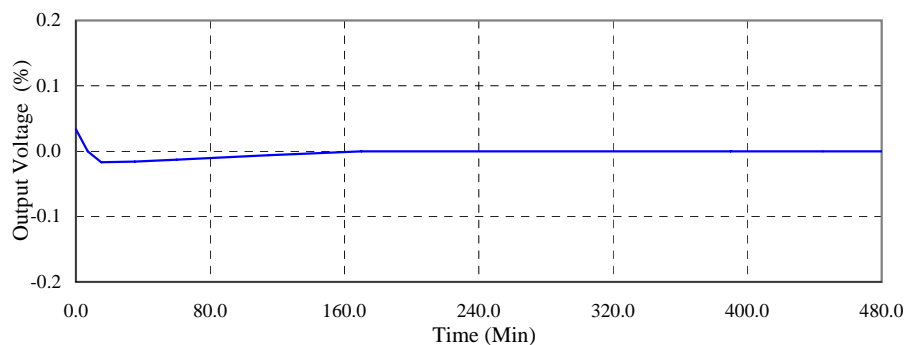
2-2 Warm Up Voltage Drift Characteristics

Conditions : Ta = 25°C
Vin = 230VAC
Iout = 100%

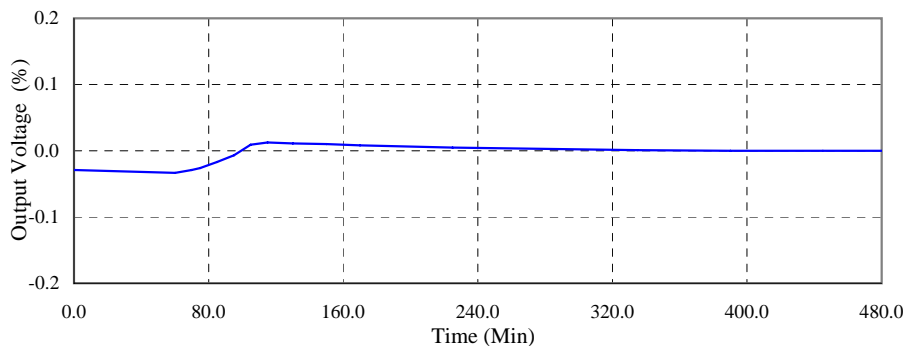
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12V



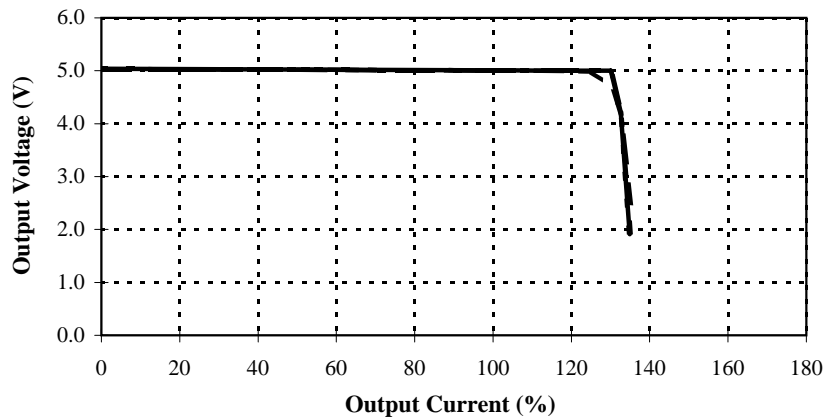
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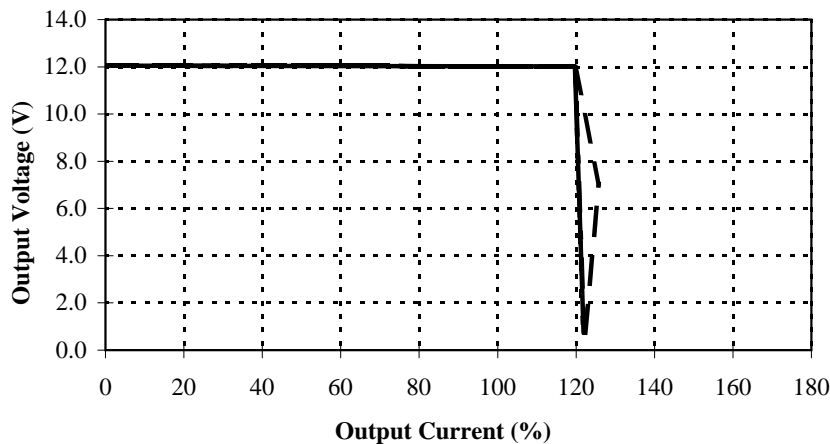
2-3 Over Current Protection (OCP) Characteristics

Conditions: Vin : 85 VAC -----
 115 VAC -.-.-.-.-
 230 VAC —————
 264 VAC -.-.-.-.-
 Ta : 25°C

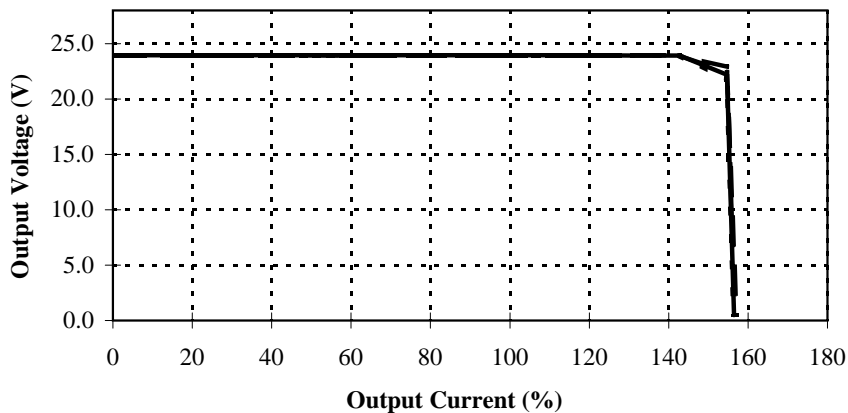
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12V



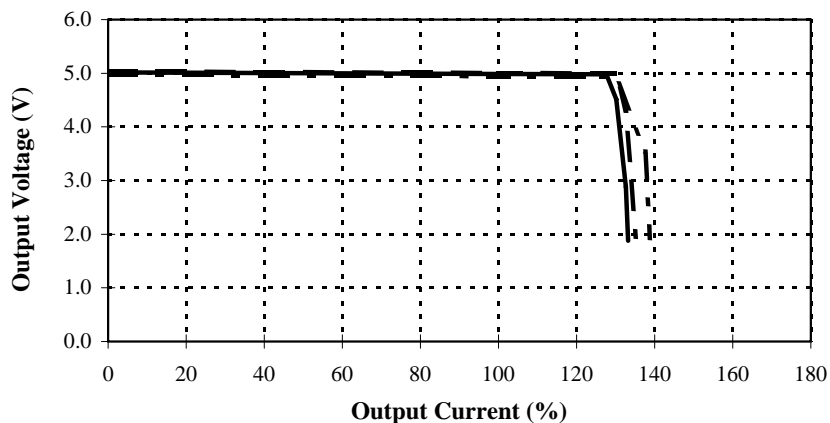
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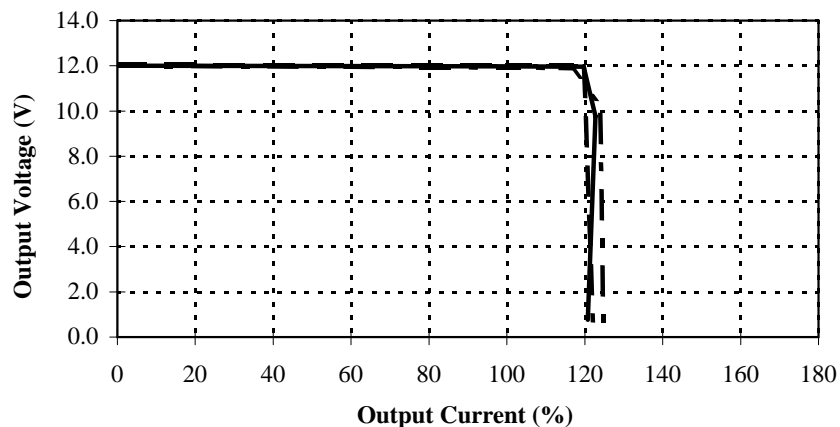
2-3 Over Current Protection (OCP) Characteristics

Conditions: Vin: 115VAC
 Ta : -25°C -----
 25°C - - - - -
 50°C _____

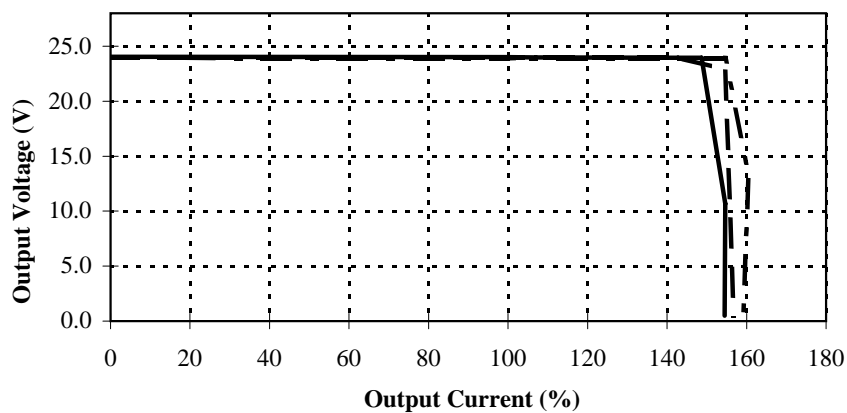
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12V



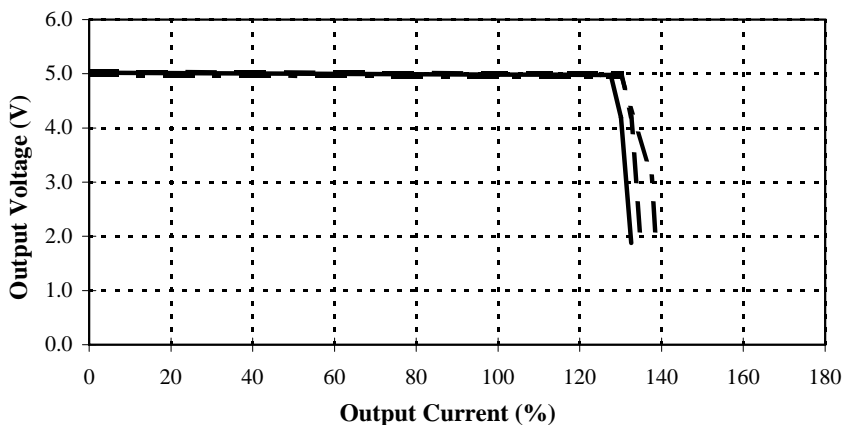
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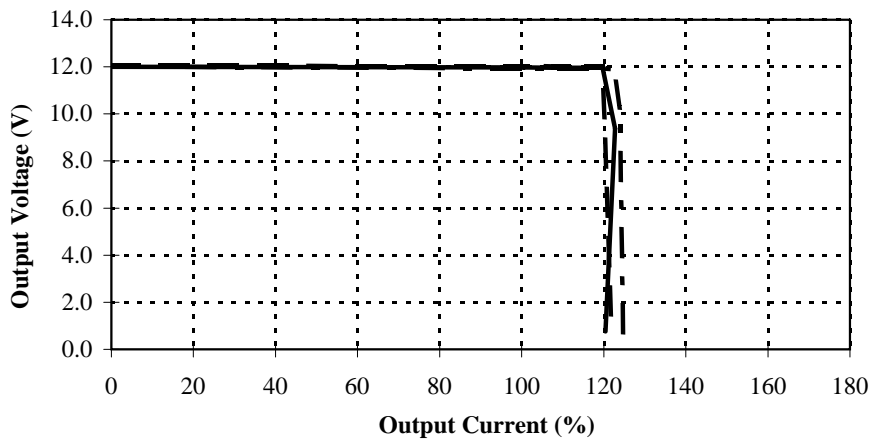
2-3 Over Current Protection (OCP) Characteristics

Conditions: Vin: 230VAC
 Ta : -25°C -----
 25°C -.-.-.-
 50°C _____

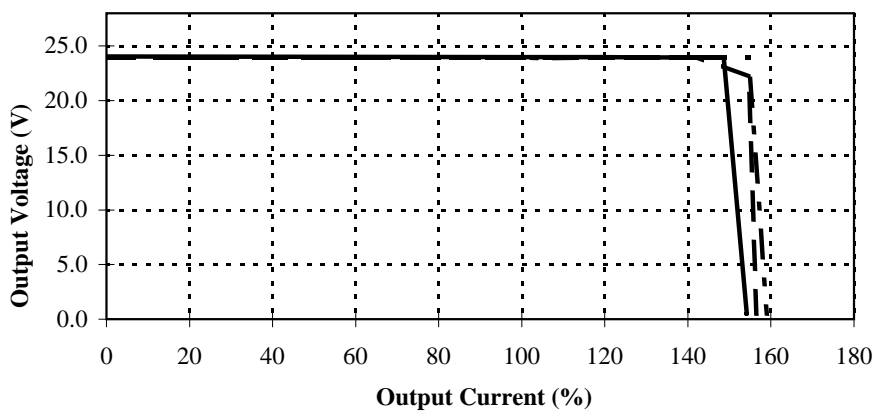
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12V



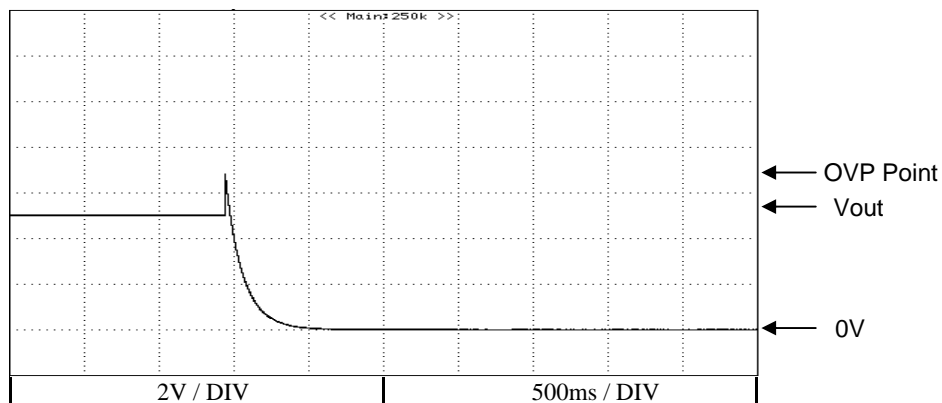
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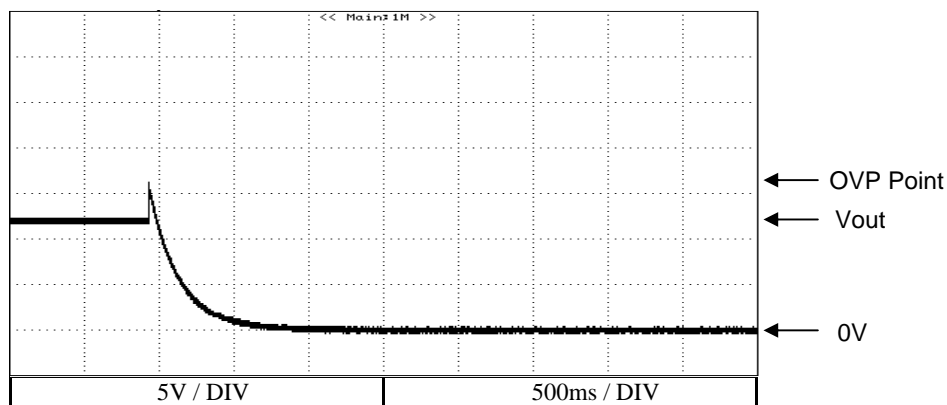
2-4 Over Voltage Protection (OVP) Characteristics

Conditions : Ta = 25°C
Vin = 230VAC
Iout = 0%

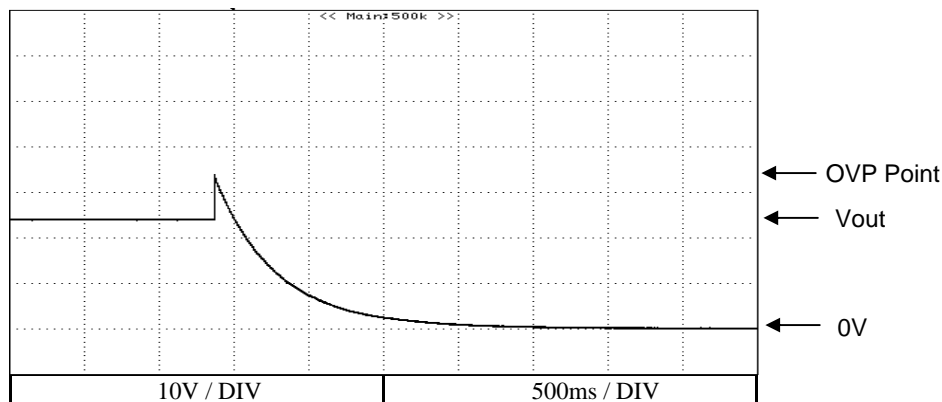
5V



12V



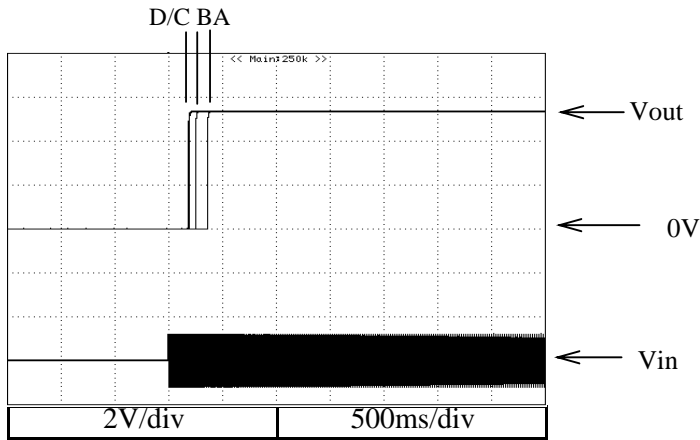
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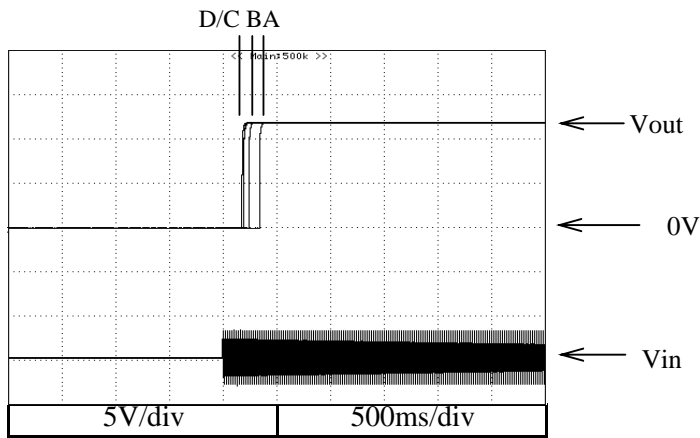
2-5 Output Rise Characteristics

Conditions; Vin : 85VAC (A)
 : 115VAC (B)
 : 230VAC (C)
 : 264VAC (D)
 Iout : 0%
 Ta : 25°C

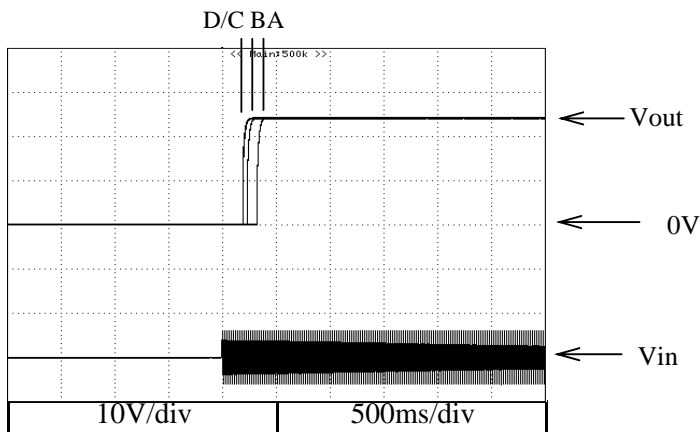
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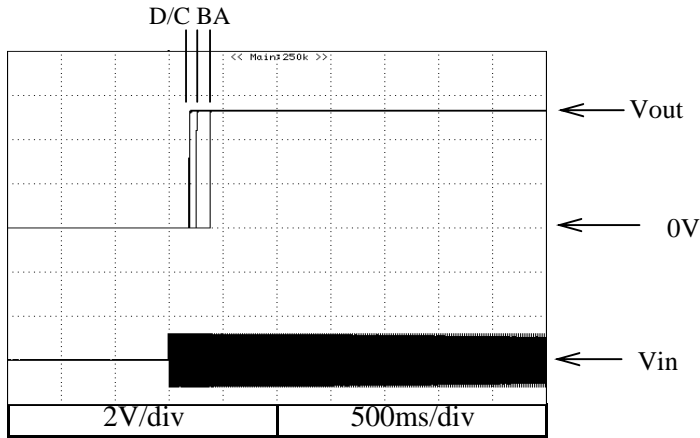
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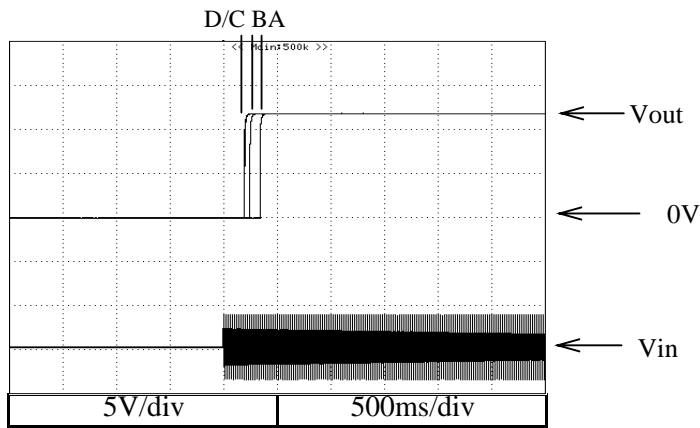
2-5 Output Rise Characteristics

Conditions; Vin : 85VAC (A)
 : 115VAC (B)
 : 230VAC (C)
 : 264VAC (D)
 Iout : 100%
 Ta : 25°C

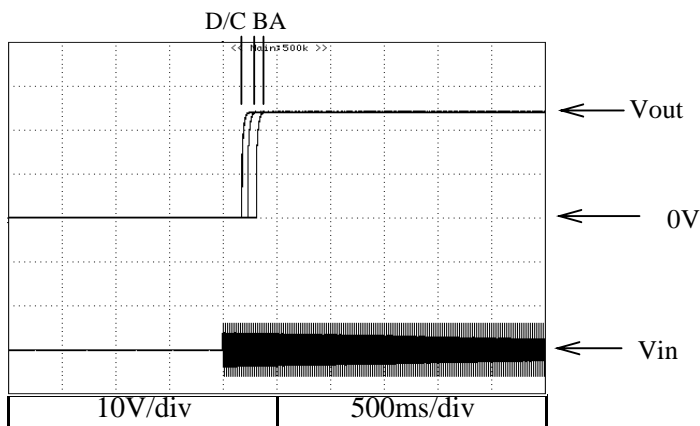
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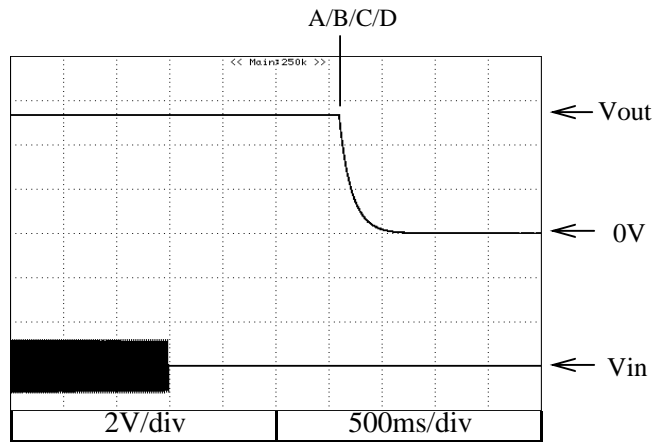
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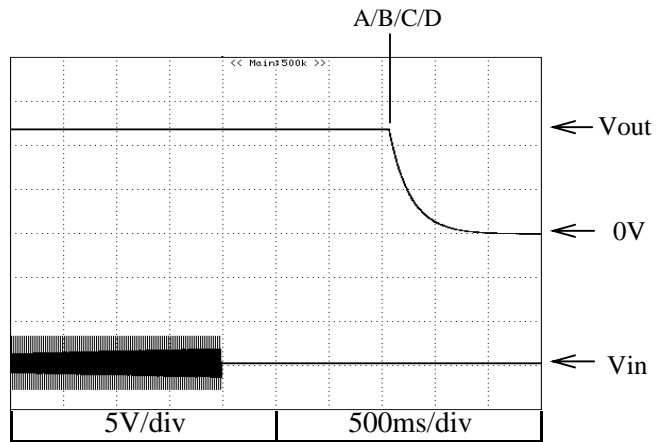
2-6 Output Fall Characteristics

Conditions; Vin : 85VAC (A)
 : 115VAC (B)
 : 230VAC (C)
 : 264VAC (D)
 Iout : 0%
 Ta : 25°C

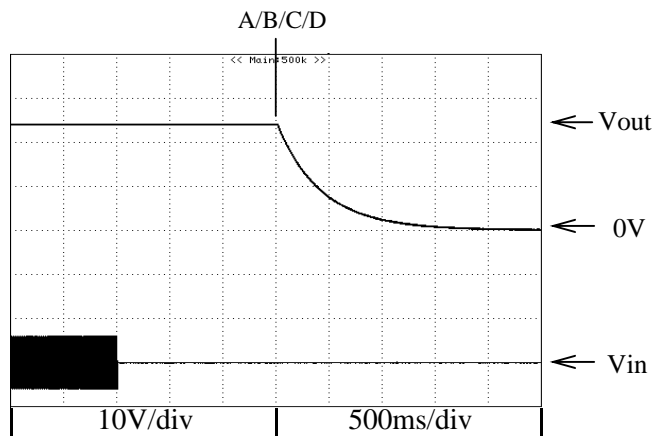
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12V



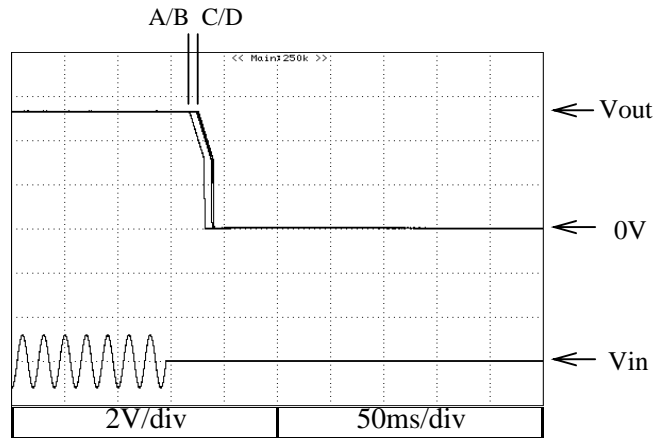
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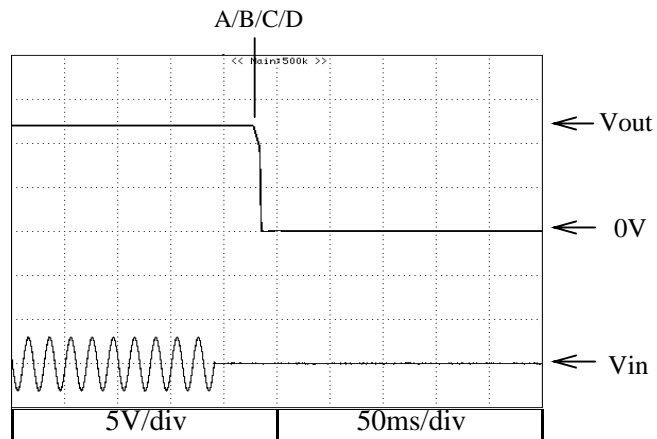
2-6 Output Fall Characteristics

Conditions; Vin : 85VAC (A)
 : 115VAC (B)
 : 230VAC (C)
 : 264VAC (D)
 Iout : 100%
 Ta : 25°C

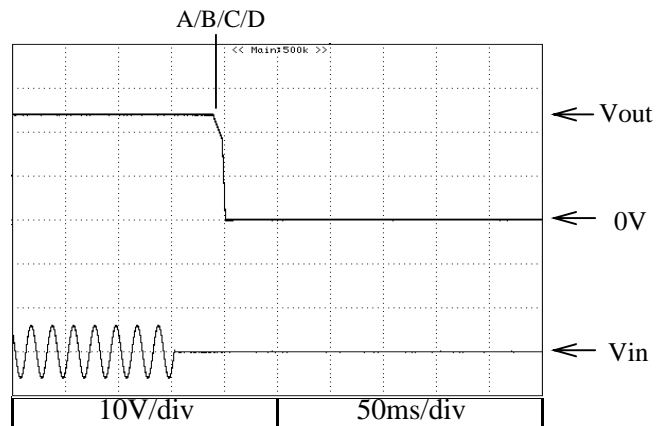
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12V



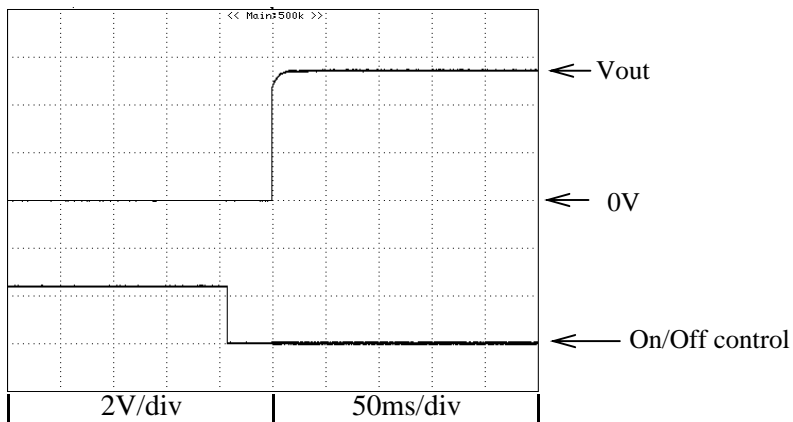
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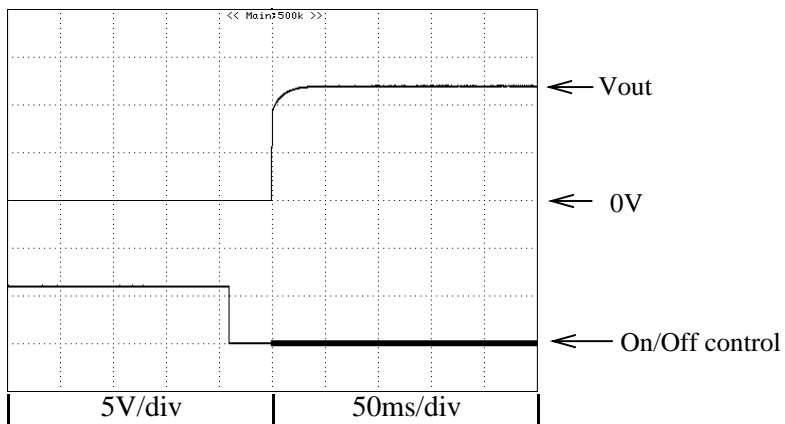
2.7 Output Rise Characteristics With On/Off Control

Conditions: V_{in} : 115VAC
 I_{out} : 100%
 T_a : 25°C

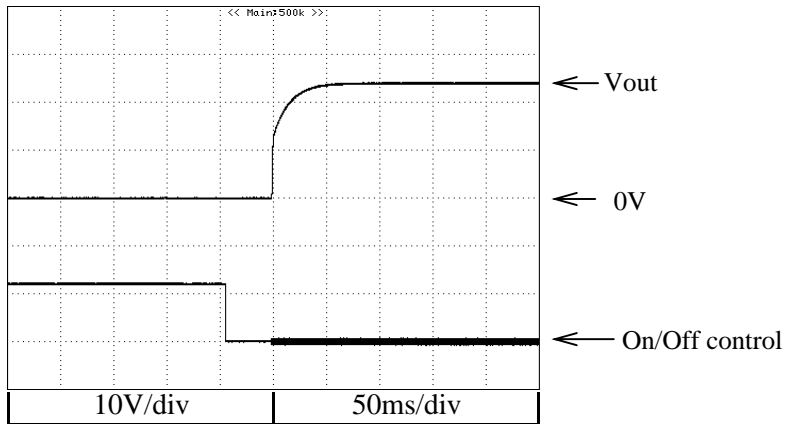
5V



12V



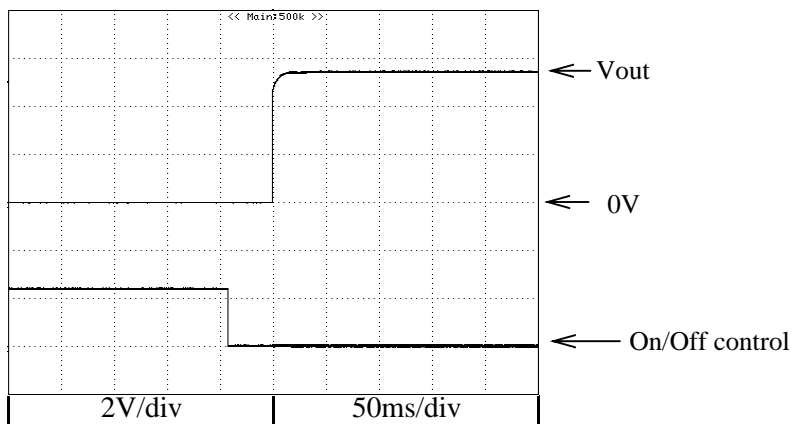
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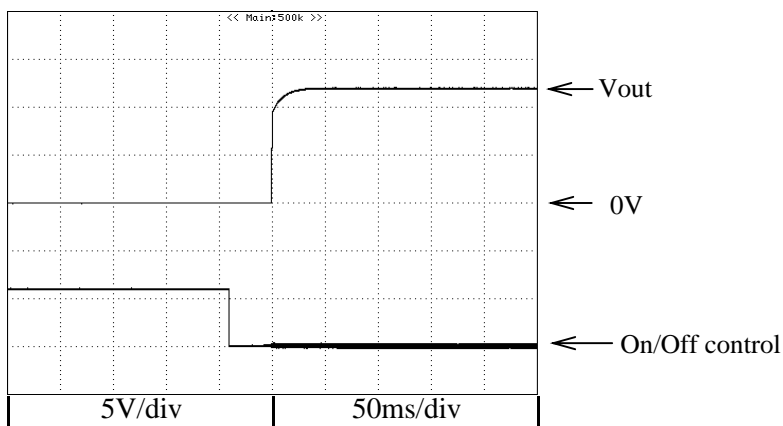
2.7 Output Rise Characteristics With On/Off Control

Conditions: V_{in} : 230VAC
 I_{out} : 100%
 T_a : 25°C

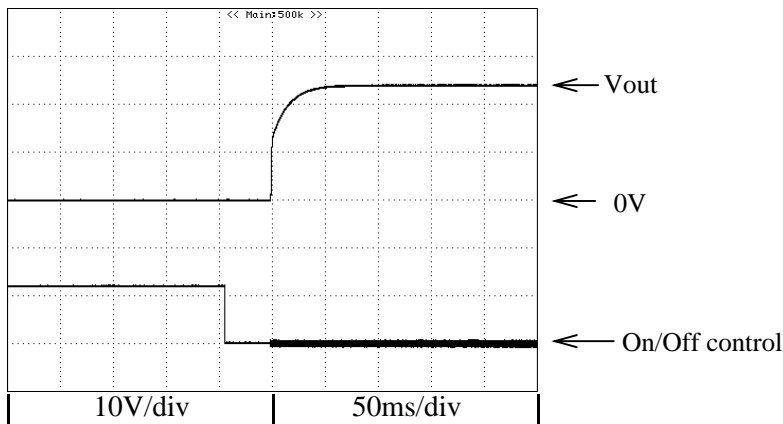
5V



12V



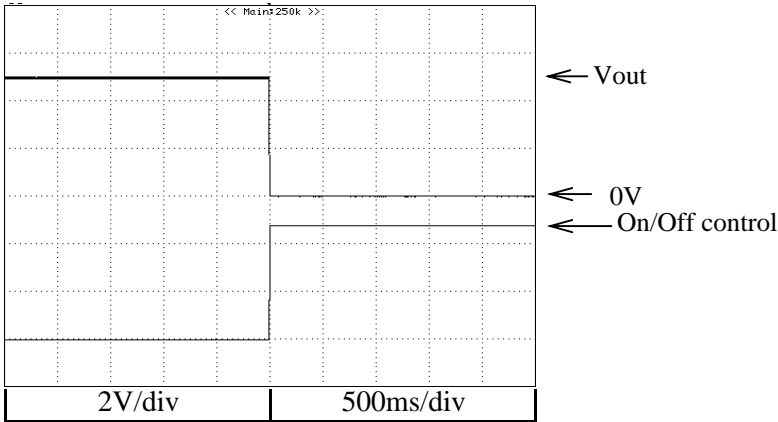
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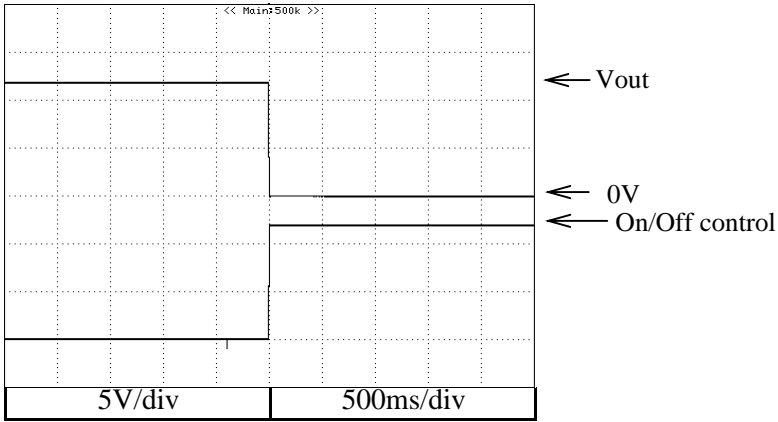
2.8 Output Fall Characteristics With On/Off Control

Conditions: V_{in} : 115VAC
 I_{out} : 100%
 T_a : 25°C

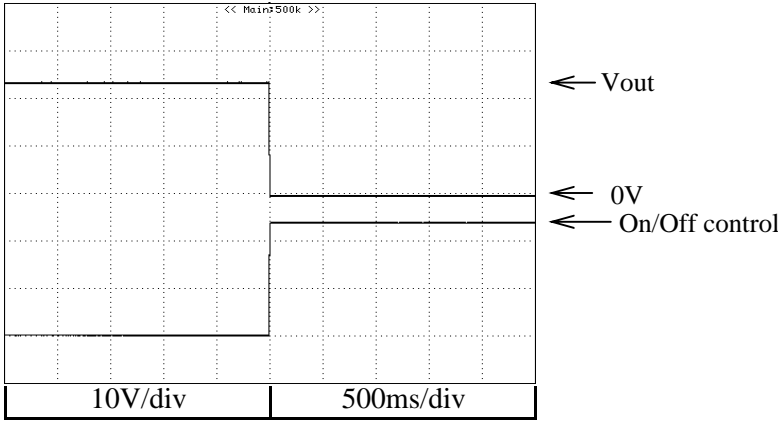
5V



12V



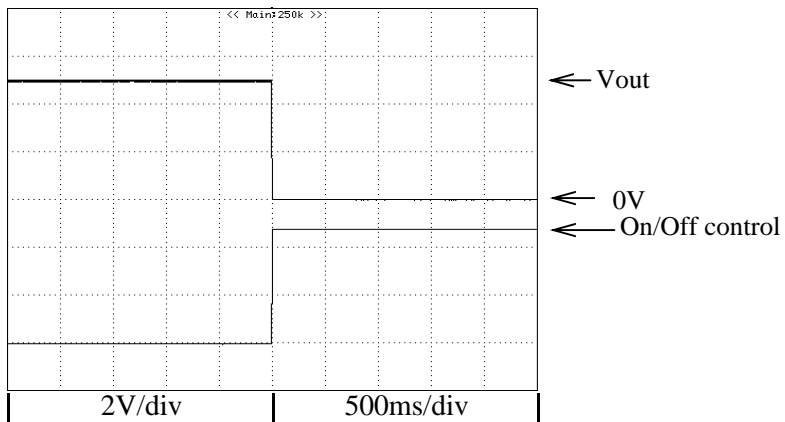
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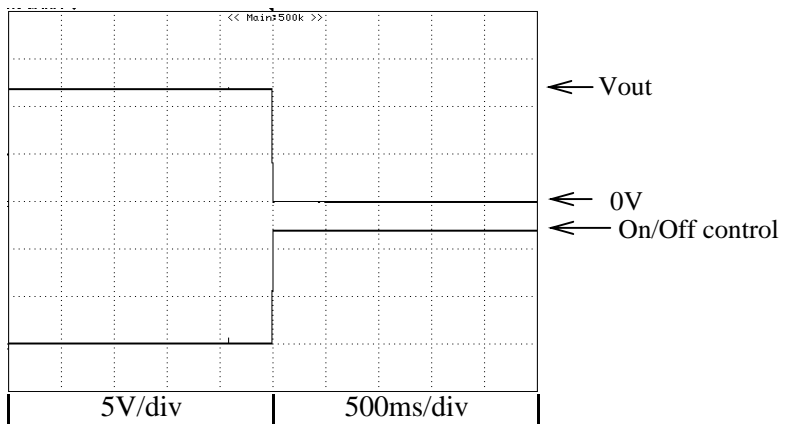
2.8 Output Fall Characteristics With On/Off Control

Conditions: V_{in} : 230VAC
 I_{out} : 100%
 T_a : 25°C

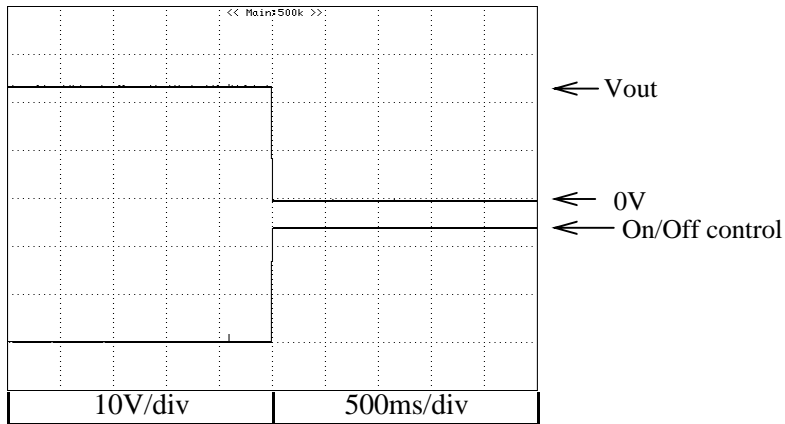
5V



12V



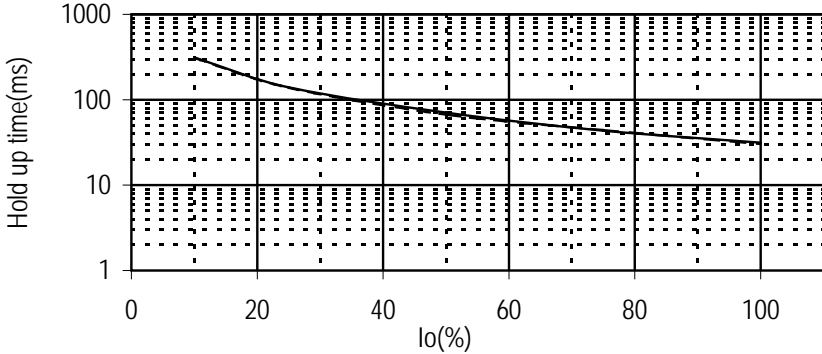
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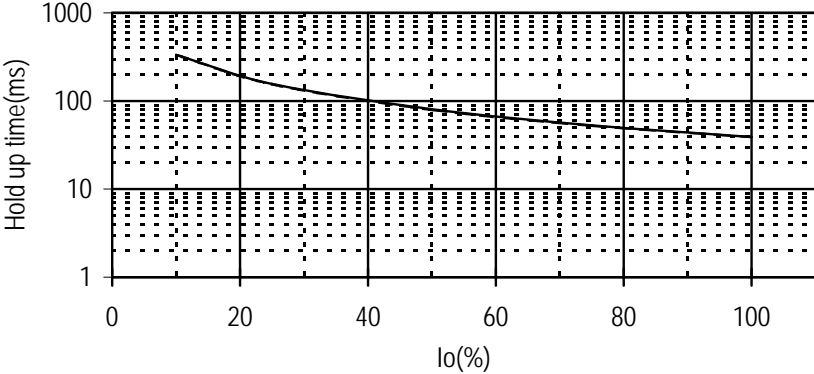
2-9 Hold Up Time Characteristics

Conditions Vin: 115VAC -----
230VAC -----
Ta: 25°C

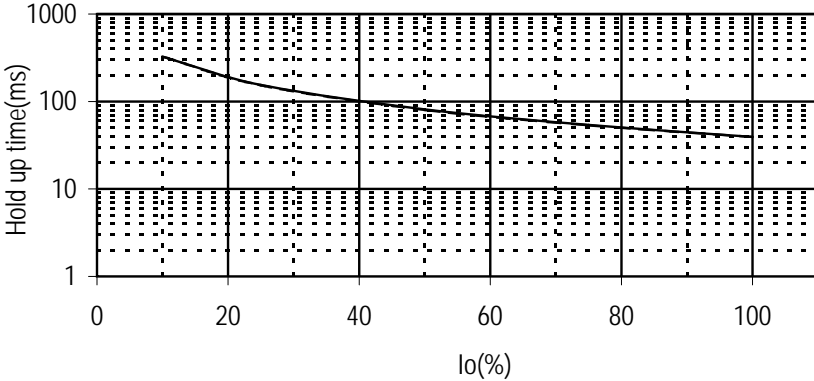
5V



12V



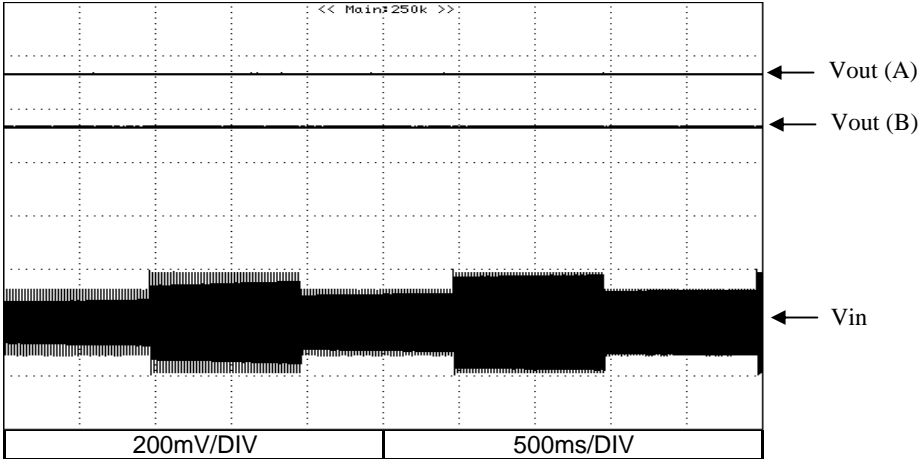
24V



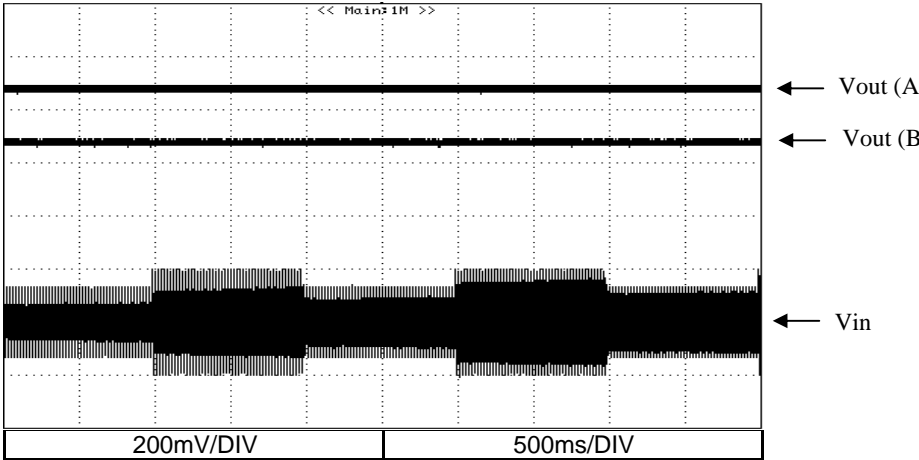
2-10 Dynamic Line Response Characteristics

Conditions : Vin = 85<=>132 VAC (A)
 = 170<=>264 VAC (B)
Iout = 100%
Ta = 25°C

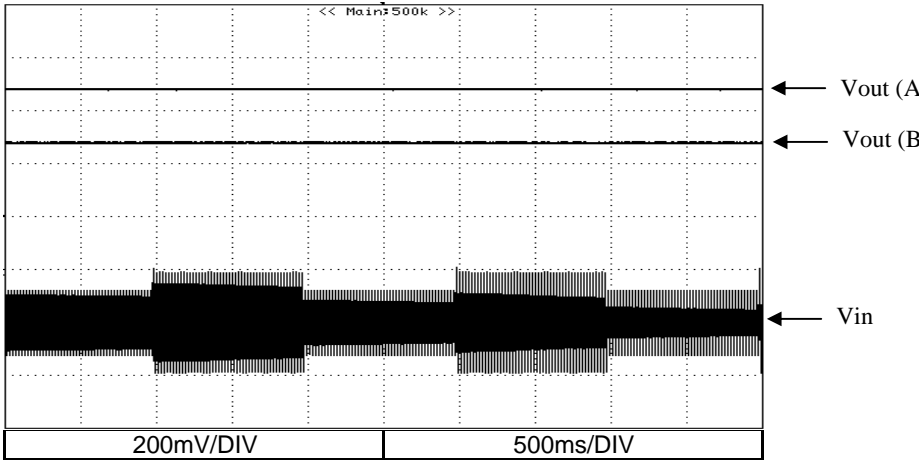
5V



12V



24V

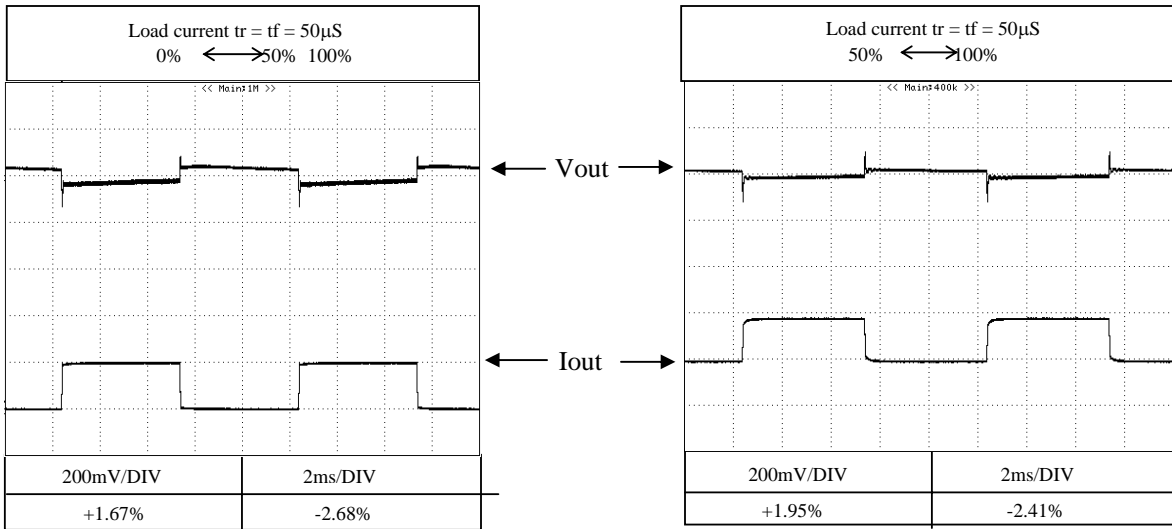


2-11 Dynamic Load Response Characteristics

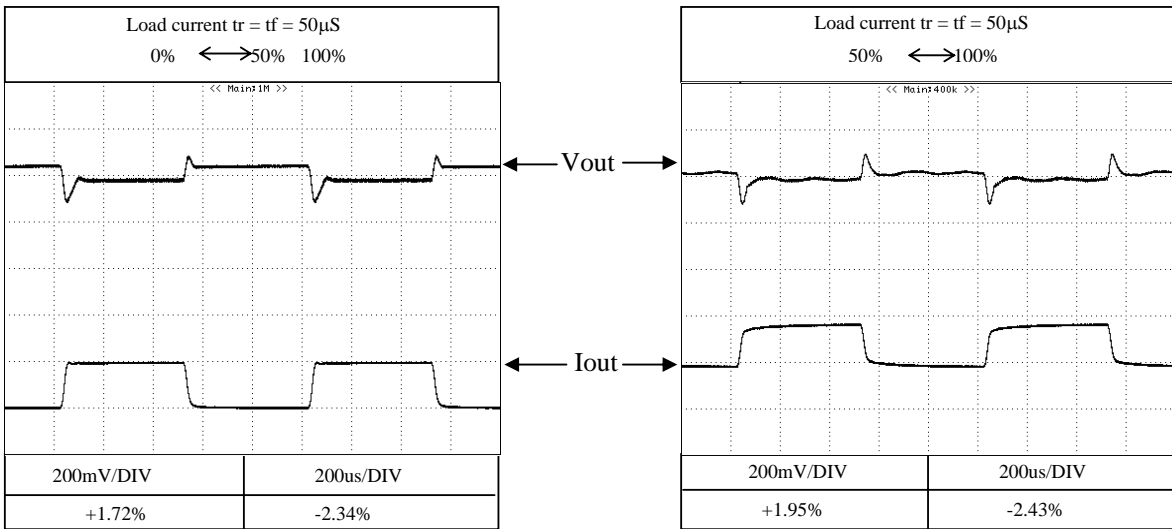
Conditions : Vin = 115VAC
Ta = 25°C

5V

f=100Hz



f=1KHz

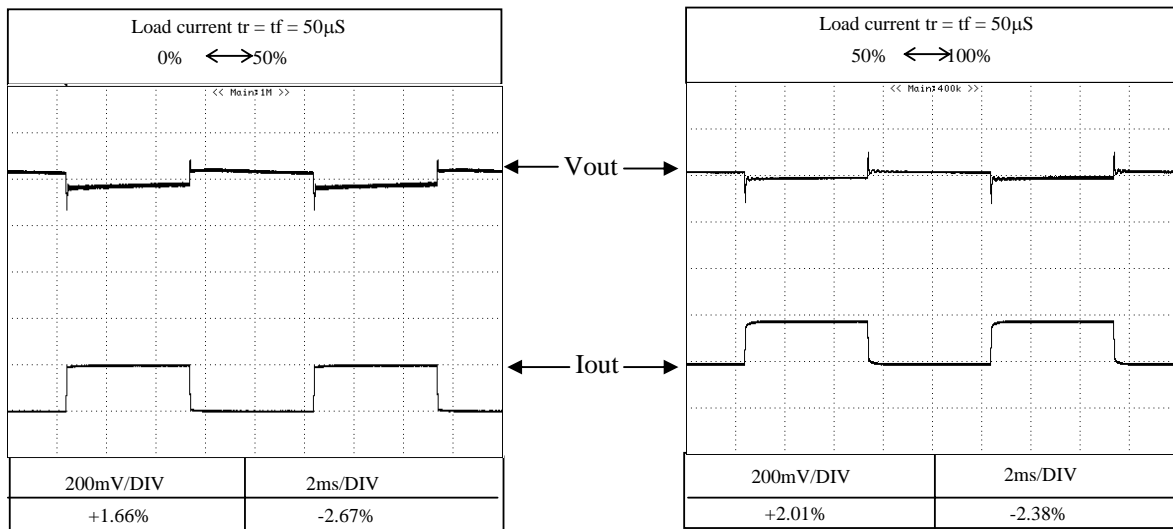


2-11 Dynamic Load Response Characteristics

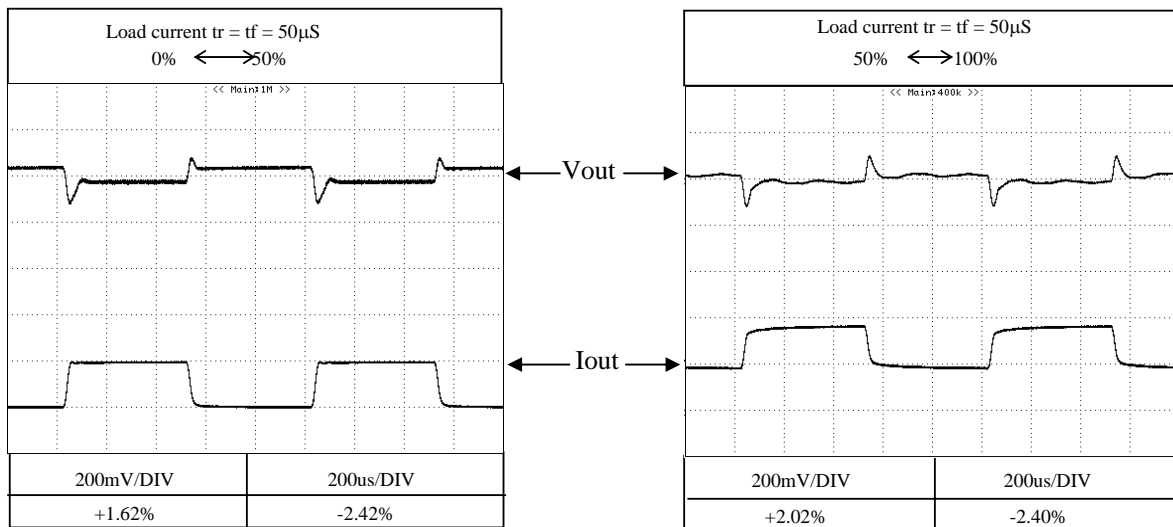
Conditions : $V_{in} = 230VAC$
 $T_a = 25^{\circ}C$

5V

f=100Hz



f=1KHz

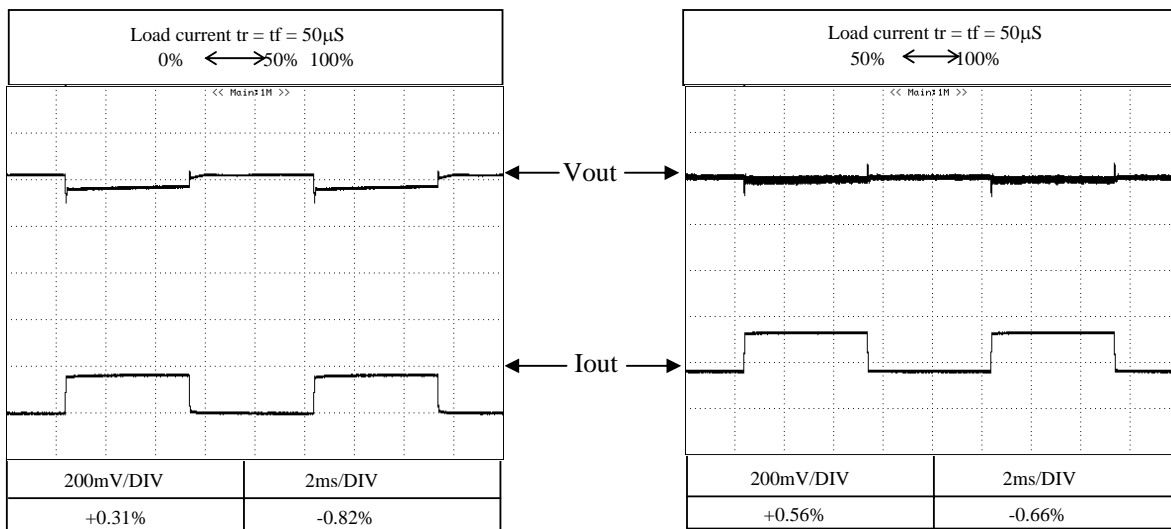


2-11 Dynamic Load Response Characteristics

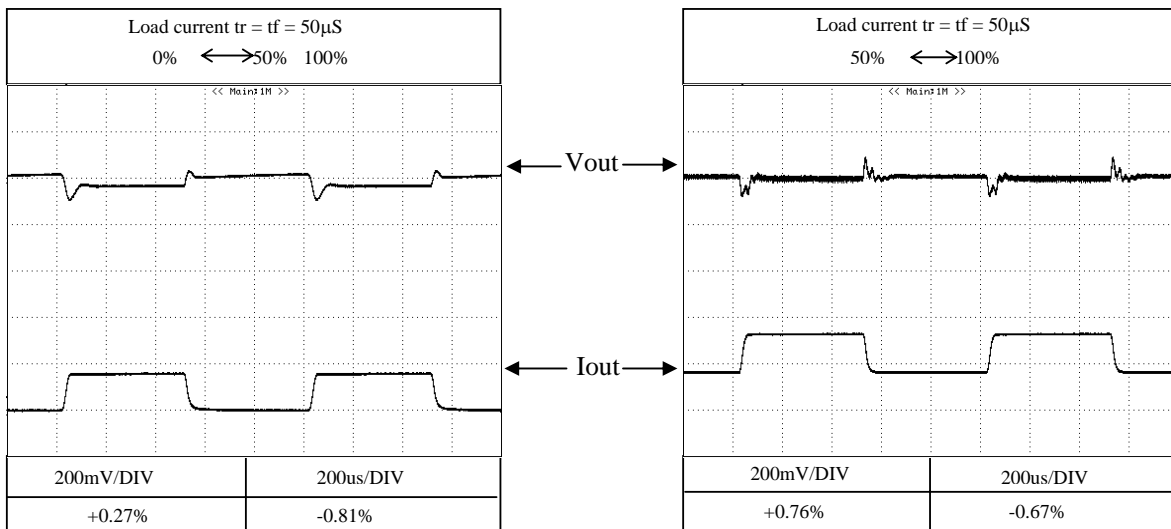
Conditions : Vin = 115VAC
Ta = 25°C

12V

f=100Hz



f=1KHz

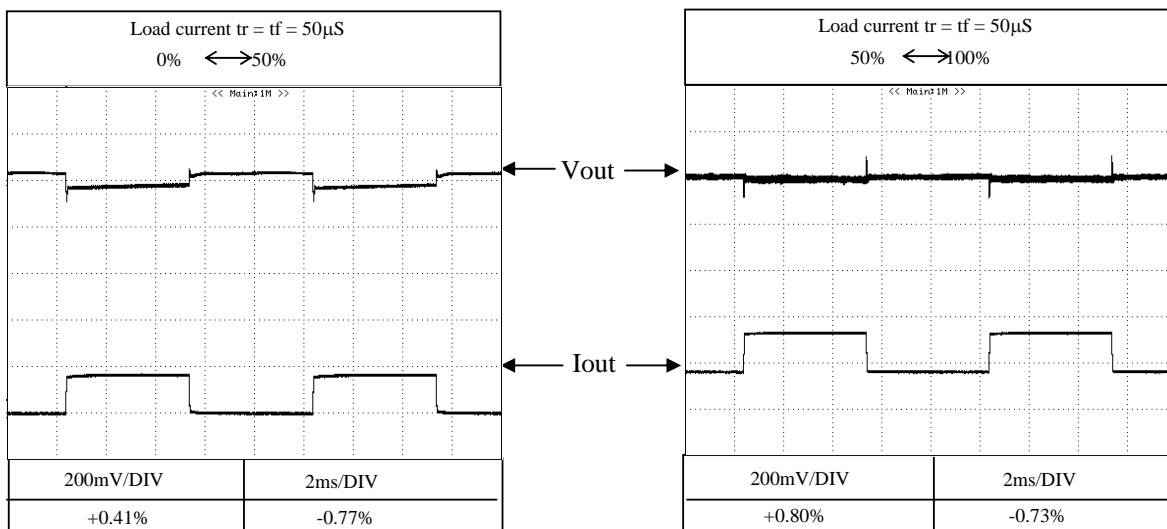


2-11 Dynamic Load Response Characteristics

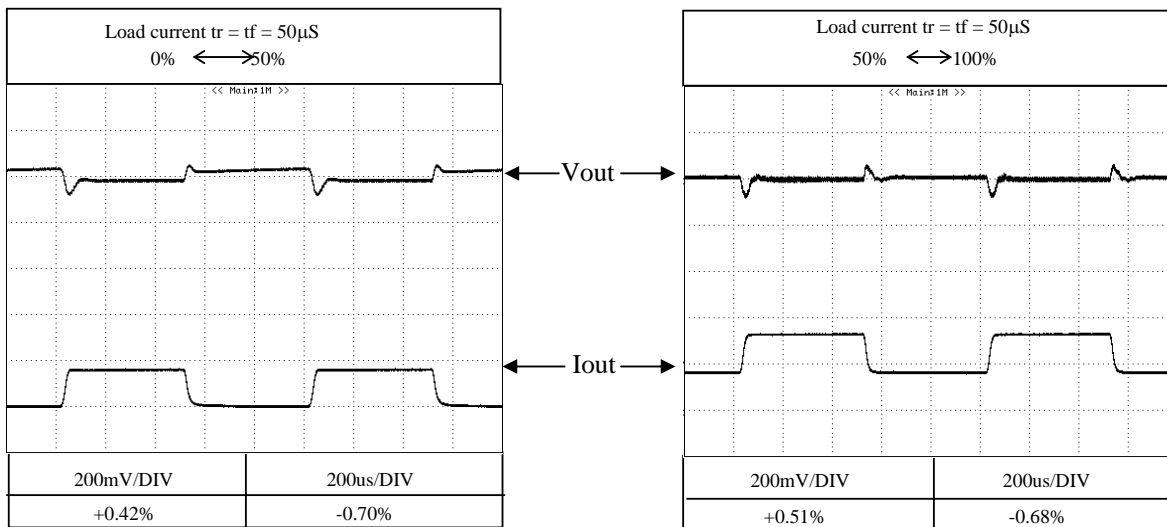
Conditions : $V_{in} = 230VAC$
 $T_a = 25^{\circ}C$

12V

$f=100Hz$



$f=1KHz$

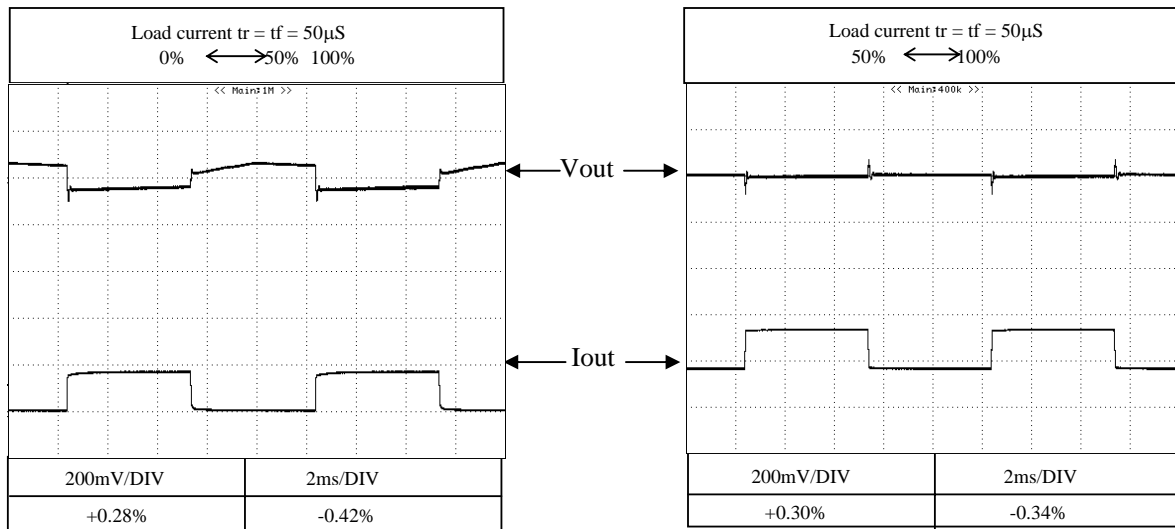


2-11 Dynamic Load Response Characteristics

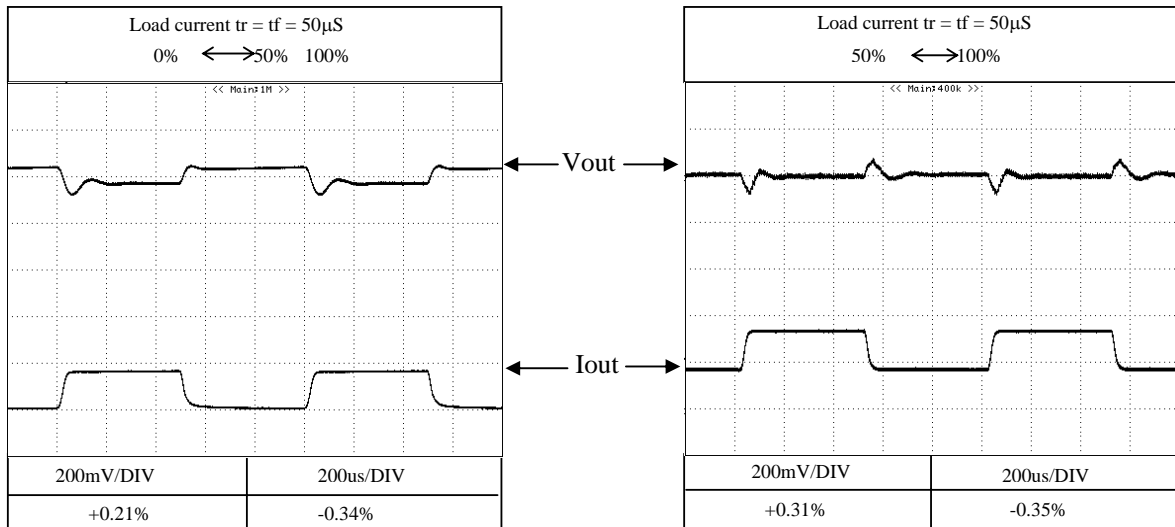
Conditions : $V_{in} = 115VAC$
 $T_a = 25^{\circ}C$

24V

$f=100Hz$



$f=1KHz$

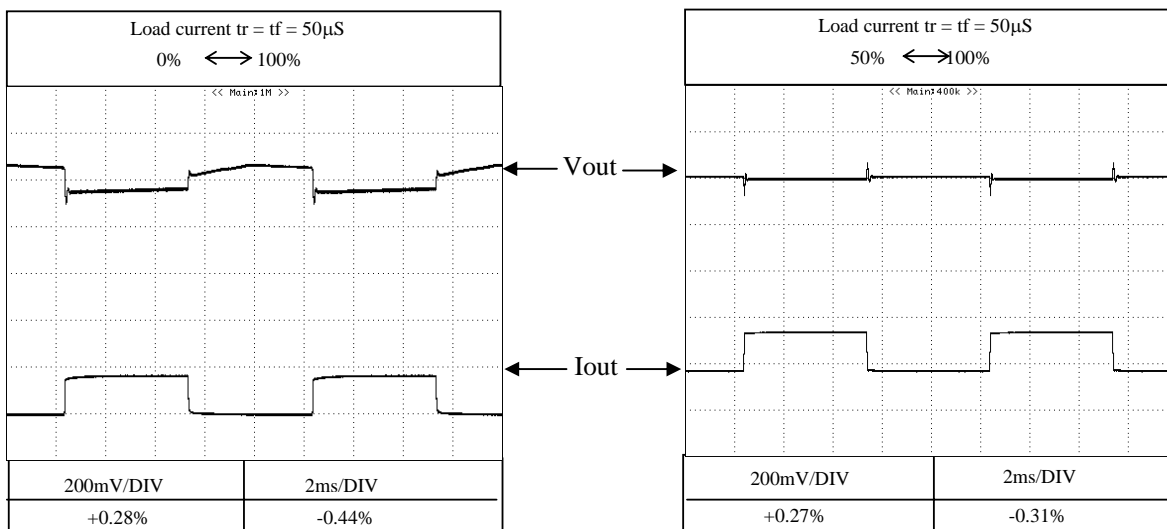


2-11 Dynamic Load Response Characteristics

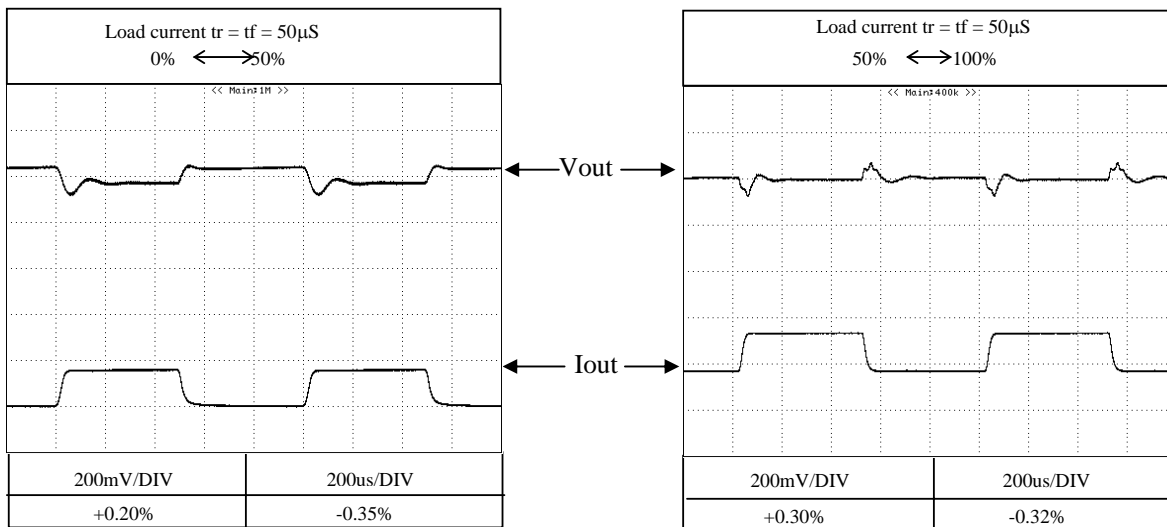
Conditions : $V_{in} = 230VAC$
 $T_a = 25^{\circ}C$

24V

$f=100Hz$



$f=1KHz$

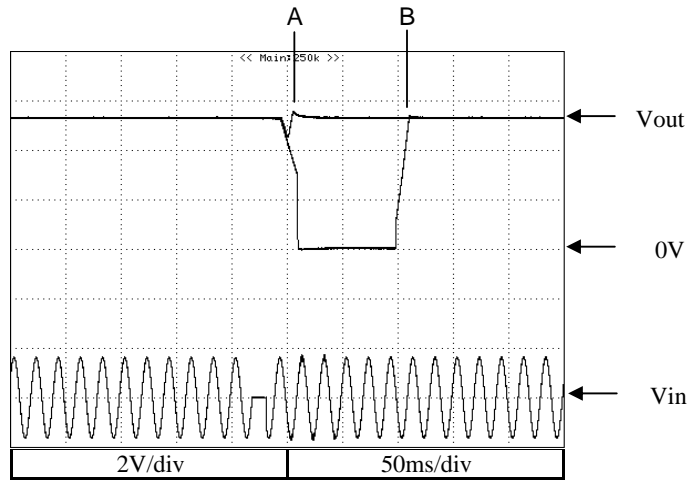


2-12 Response to Brown Out Characteristics

Conditions: Vin : 115VAC
Iout : 100%
Ta : 25°C

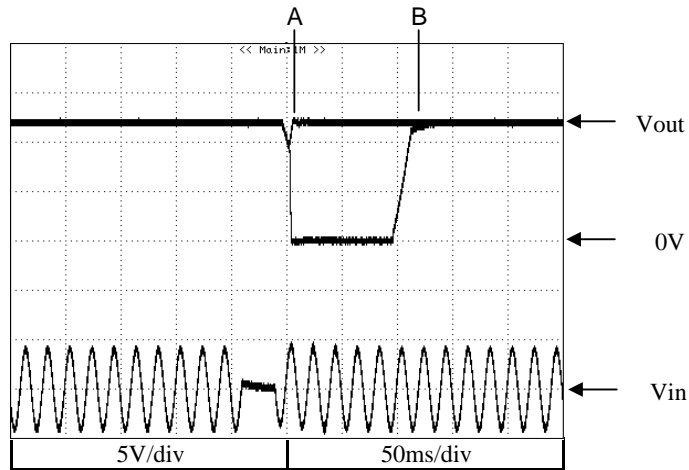
5V

A = 13ms
B = 19ms



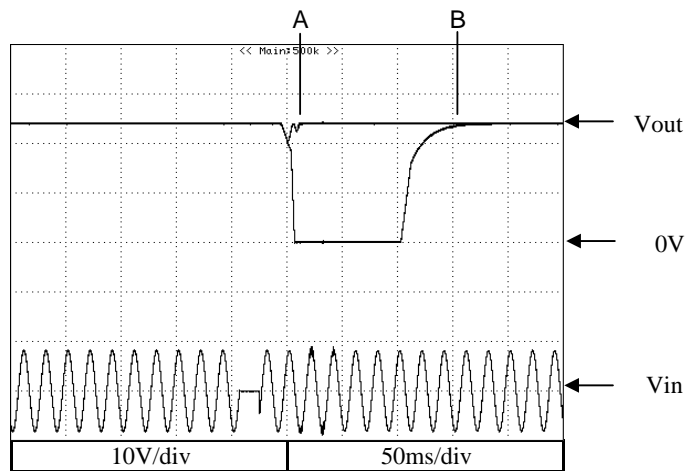
12V

A = 57ms
B = 73ms



24V

A = 36ms
B = 55ms

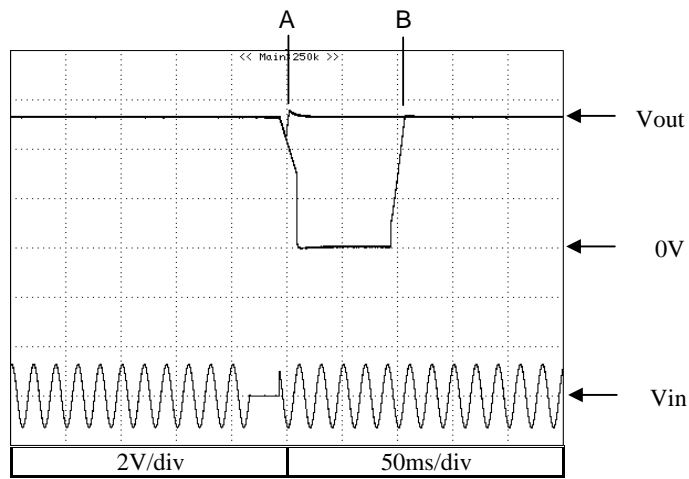


2-12 Response to Brown Out Characteristics

Conditions: Vin : 230VAC
Iout : 100%
Ta : 25°C

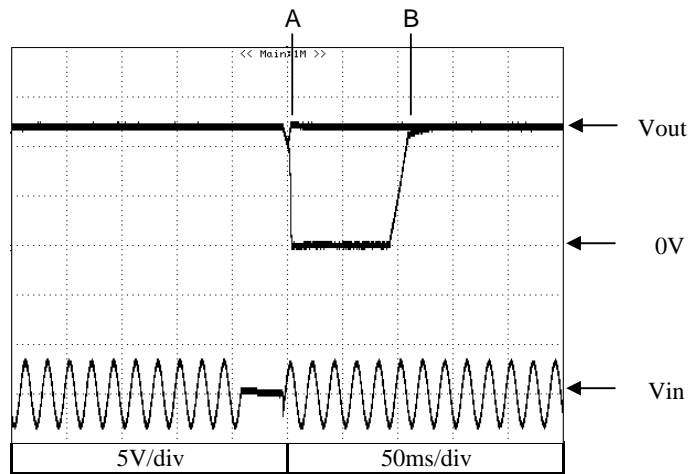
5V

A = 27ms
B = 38ms



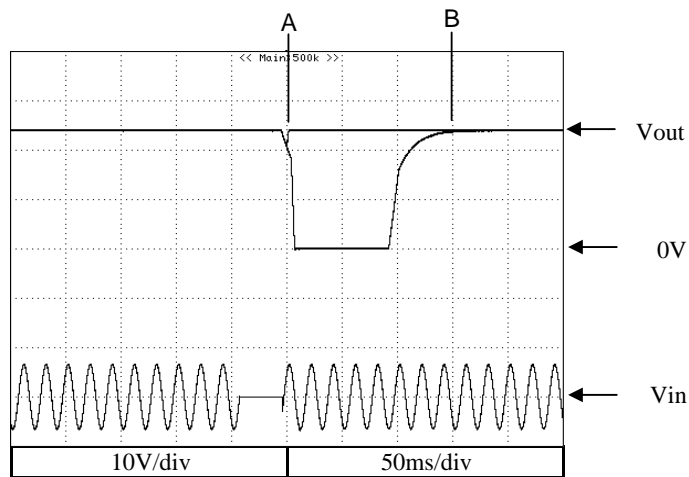
12V

A = 75ms
B = 89ms



24V

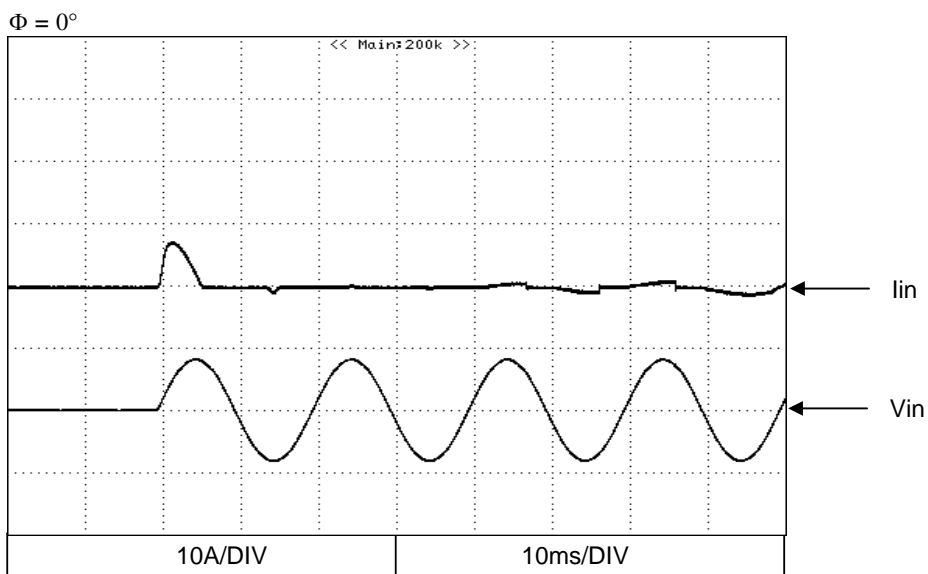
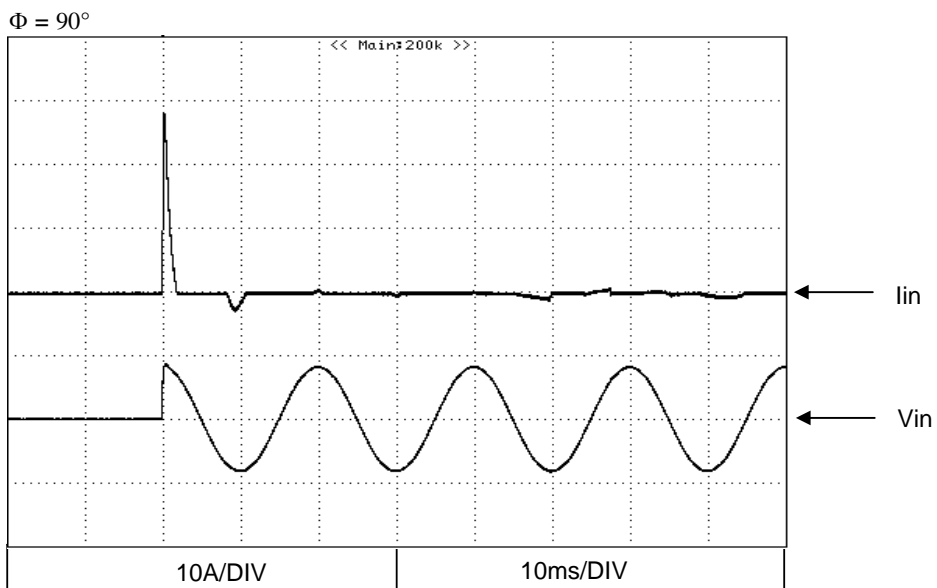
A = 77ms
B = 94ms



2-13 Inrush Current

Conditions : $V_{in} = 115VAC$
 $I_{out} = 100\%$
 $T_a = 25^{\circ}C$

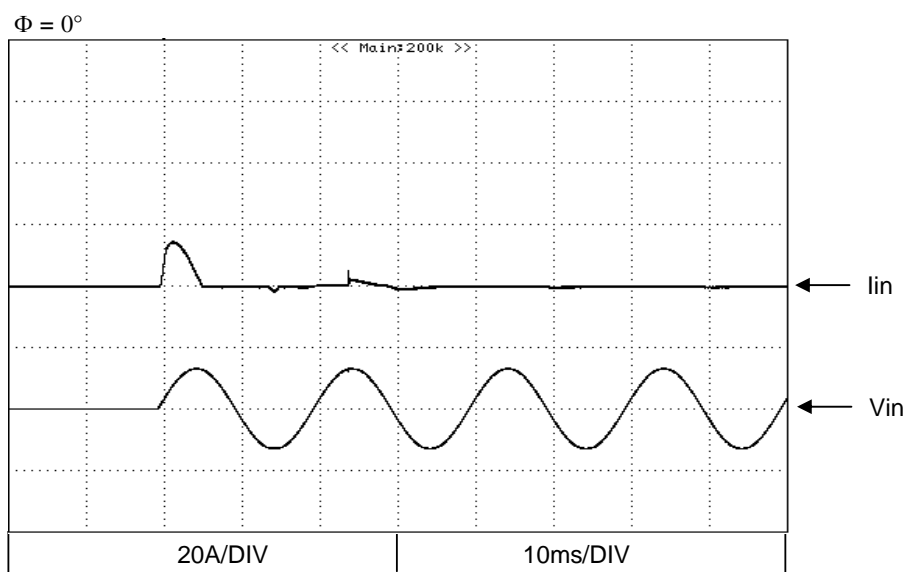
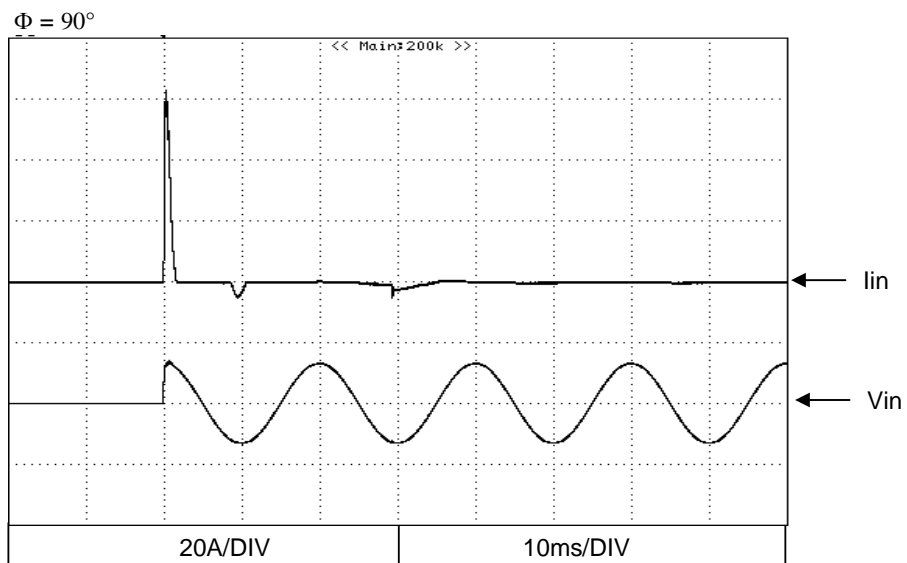
5V



2-13 Inrush Current

Conditions : $V_{in} = 230VAC$
 $I_{out} = 100\%$
 $T_a = 25^{\circ}C$

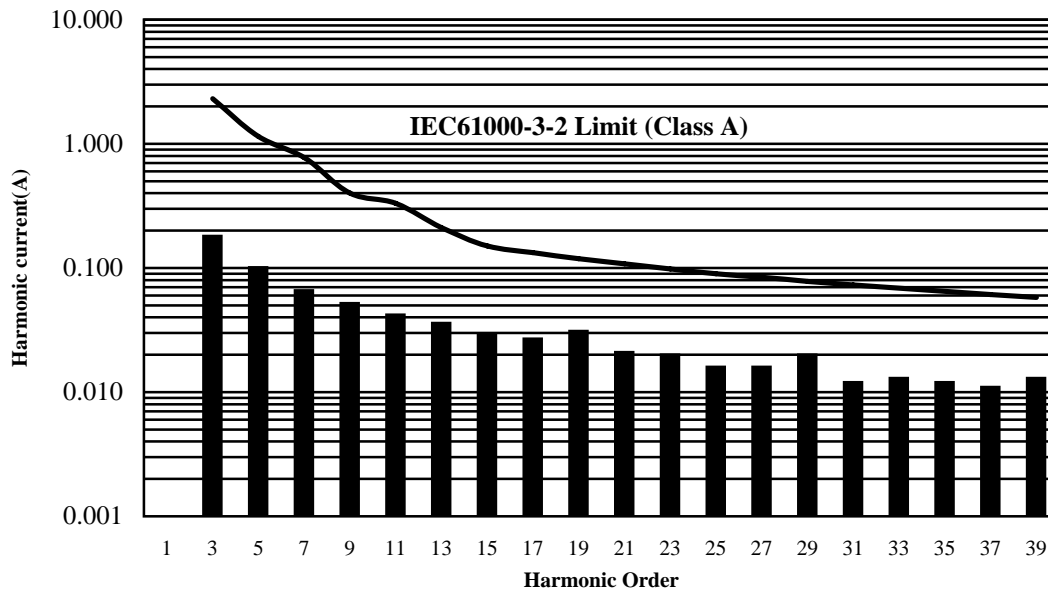
5V



2-14 Input Current Harmonics

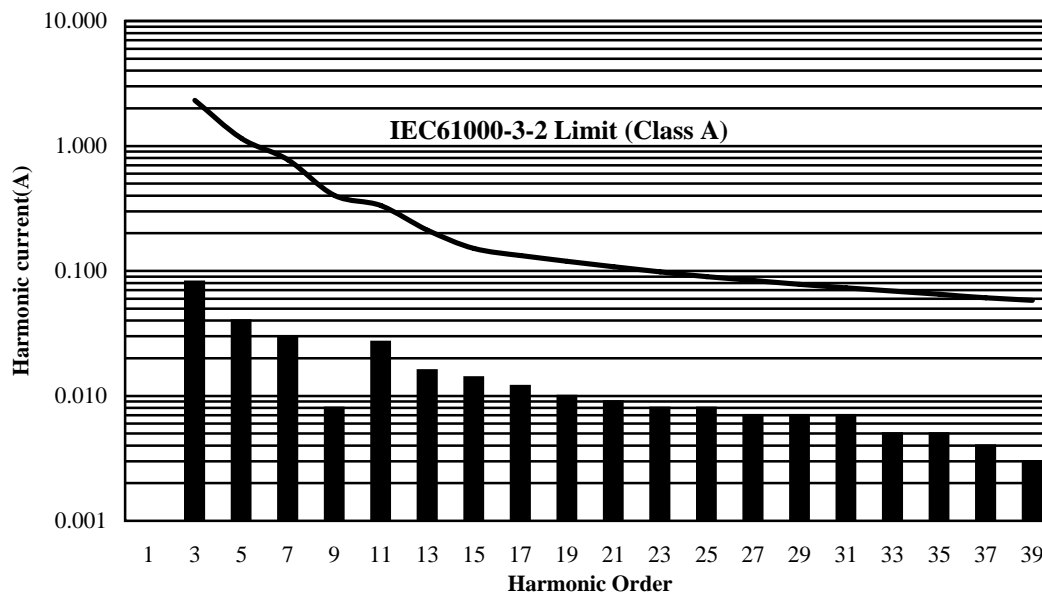
Conditions : Vin = 115 VAC
 Iout = 100%
 Ta = 25°C

5V



Conditions : Vin = 230 VAC
 Iout = 100%
 Ta = 25°C

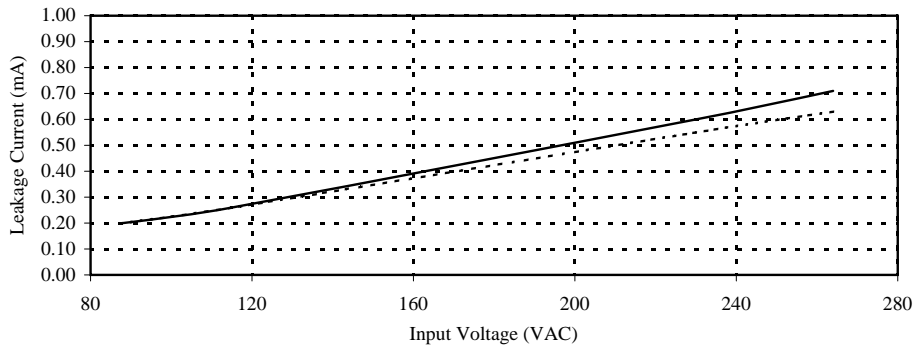
5V



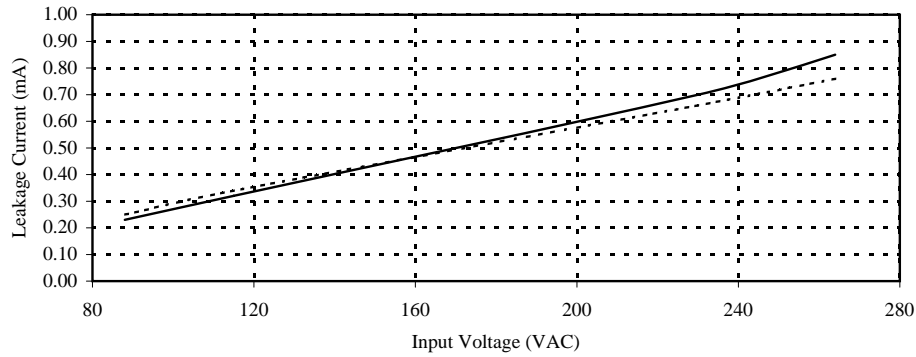
2-15 Leakage Current Characteristics

Conditions : $I_{out} = 0\%$ ———
 $= 100\%$ - - - - -
 $T_a = 25^\circ\text{C}$
 $f = 50\text{Hz}$

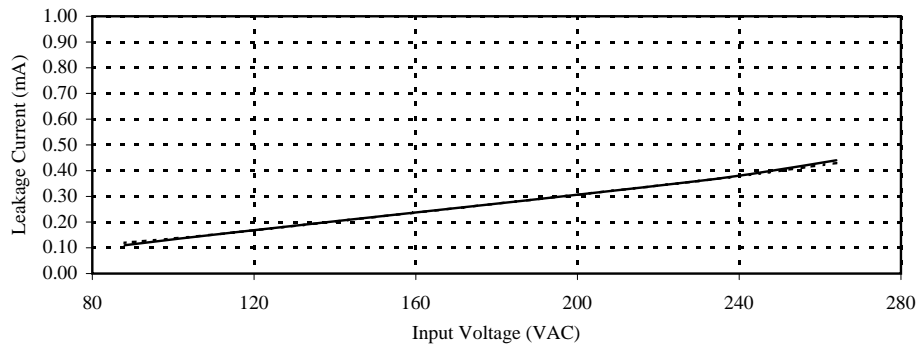
5V



12V



24V

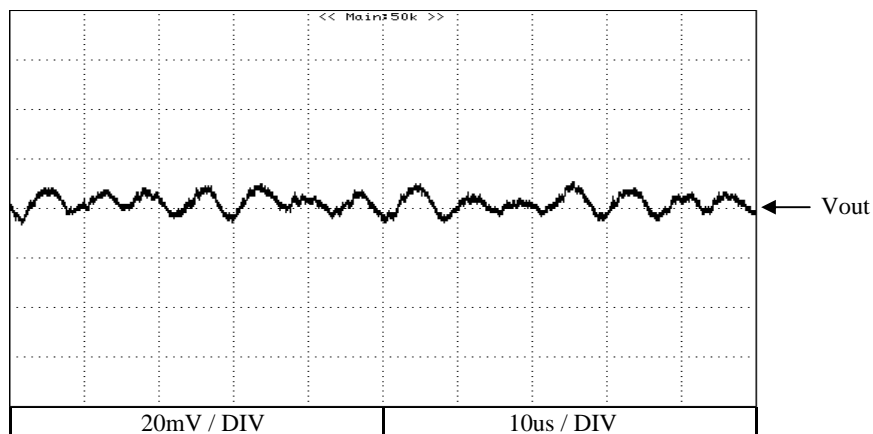


2-16 Output Ripple And Noise Waveform

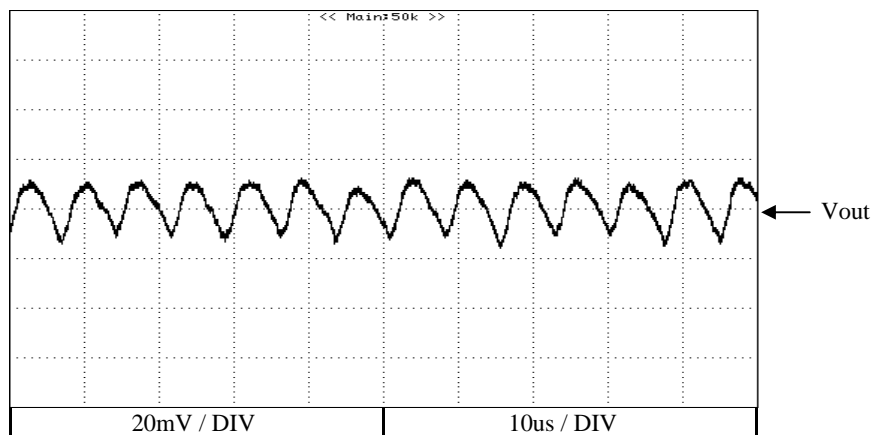
Conditions : Vin = 230VAC
Iout = 100%
Ta = 25°C

NORMAL MODE

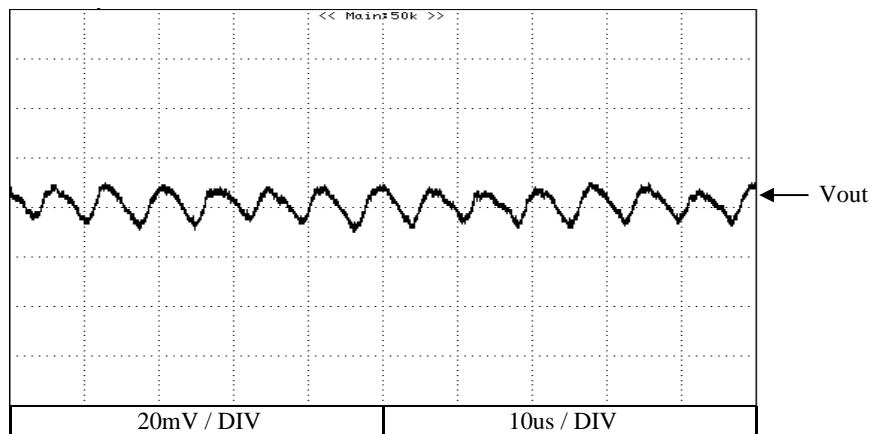
5V



12V



24V

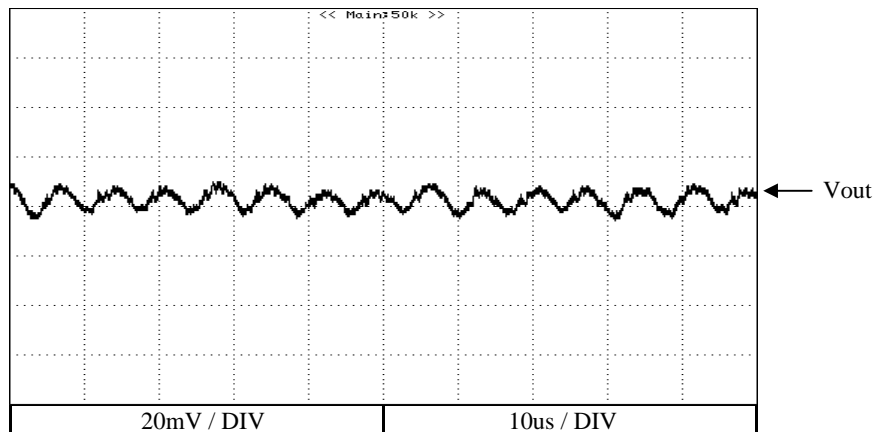


2-16 Output Ripple And Noise Waveform

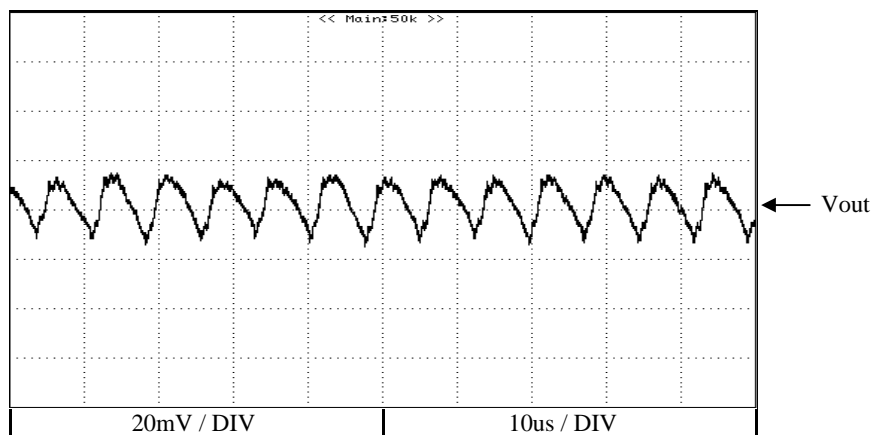
Conditions : Vin = 230VAC
Iout = 100%
Ta = 25°C

NORMAL + COMMON MODE

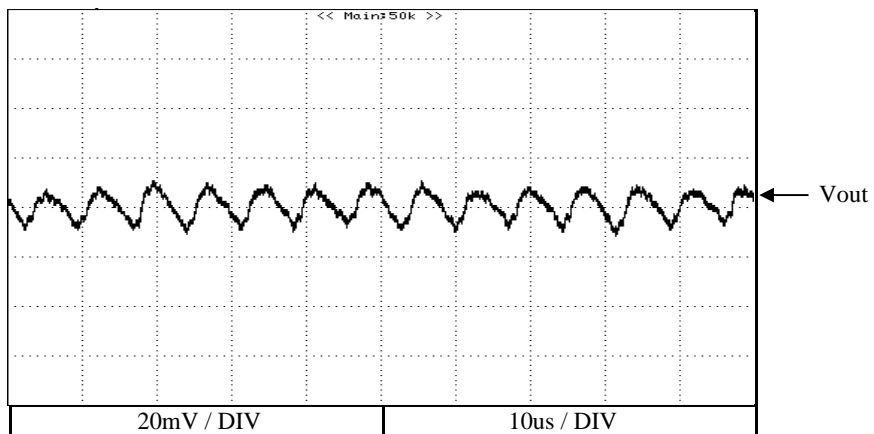
5V



12V



24V



2-17 Electro-Magnetic Interference Characteristics

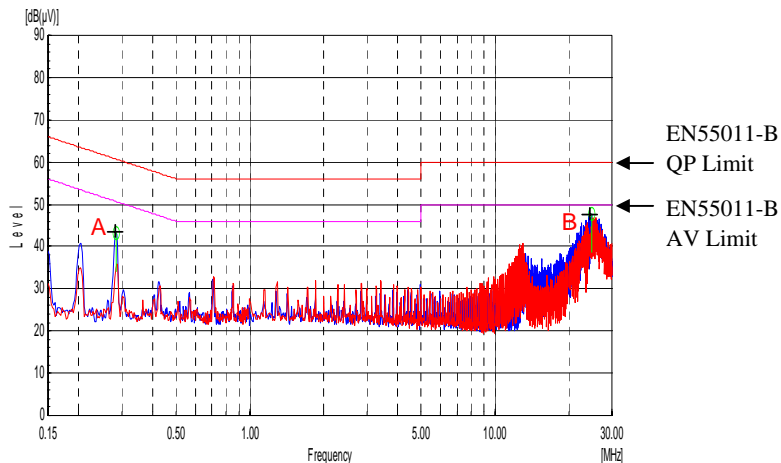
Conditions: Vin : 115VAC
Iout : 100%

Conducted Emission

5V

Phase : N		
Point A (0.286MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60.6	43
AV	50.6	42.6

Phase : N		
Point B (24.752MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60	44.5
AV	50	34.2

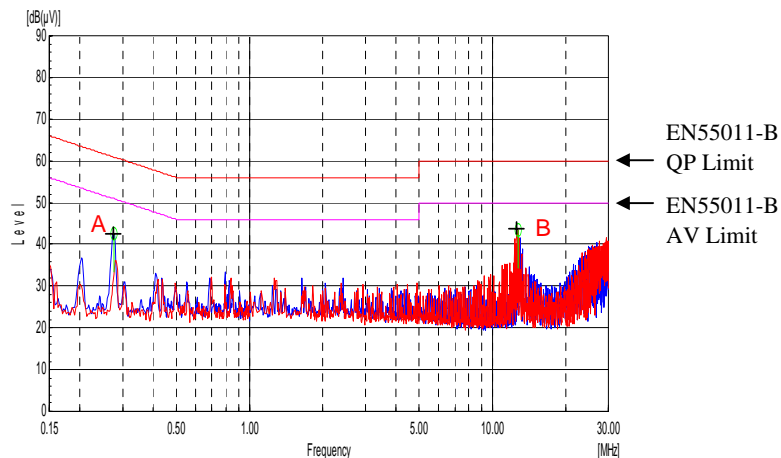


5V

Conditions: Vin : 230VAC
Iout : 100%

Phase : N		
Point A (0.280MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60.8	37.5
AV	50.8	37

Phase : L		
Point B (12.823MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60	25.6
AV	50	18.6



2-17 Electro-Magnetic Interference Characteristics

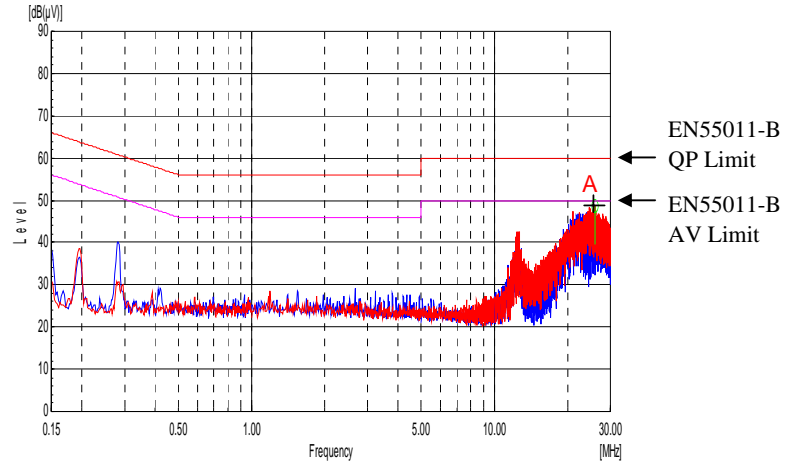
Conditions: Vin : 115VAC
Iout : 100%

Conducted Emission

12V

Phase : L

Ref.	Point A (25.854MHz)	
	DATA	Measured (dBuV)
QP	60	39.3
AV	50	39

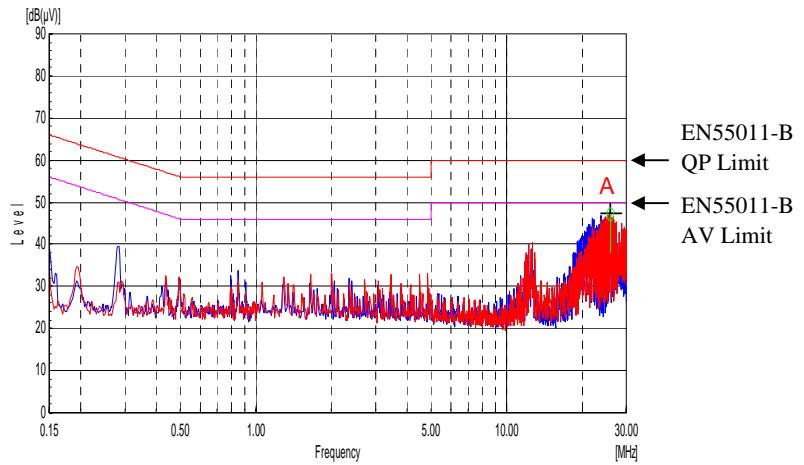


12V

Phase : L

Ref.	Point A (25.857MHz)	
	DATA	Measured (dBuV)
QP	60	45
AV	50	43.3

Conditions: Vin : 230VAC
Iout : 100%



2-17 Electro-Magnetic Interference Characteristics

Conditions:

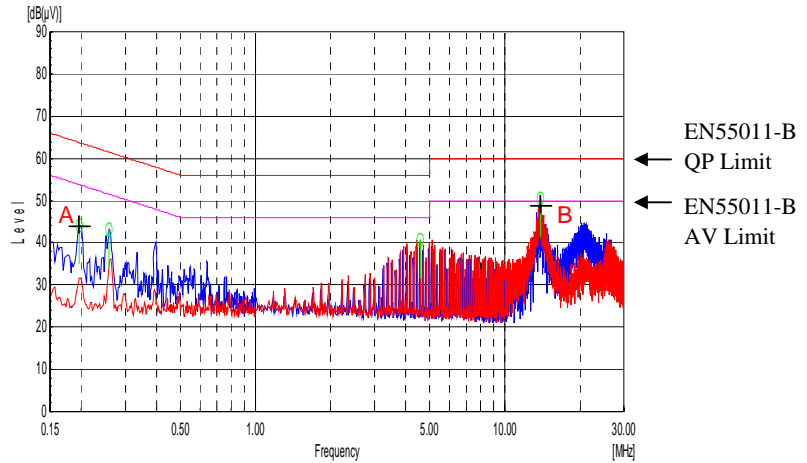
Vin : 115VAC
Iout : 100%

Conducted Emission

24V

Phase : N		
Point A (0.198MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	63.7	43.7
AV	53.7	38.1

Phase : L		
Point B (13.938MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60	30.5
AV	50	31.4



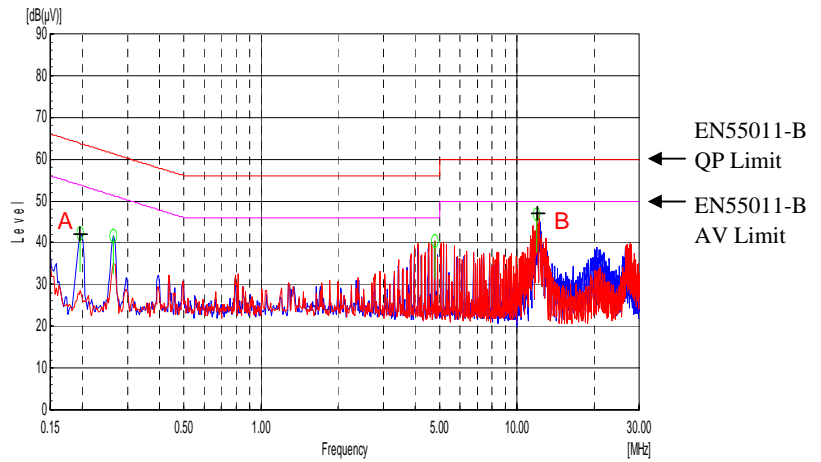
24V

Conditions:

Vin : 230VAC
Iout : 100%

Phase : N		
Point A (0.196MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	63.8	42.3
AV	53.8	36.7

Phase : L		
Point B (11.94MHz)		
Ref. DATA	Limit (dBuV)	Measured (dBuV)
QP	60	45.4
AV	50	42.7

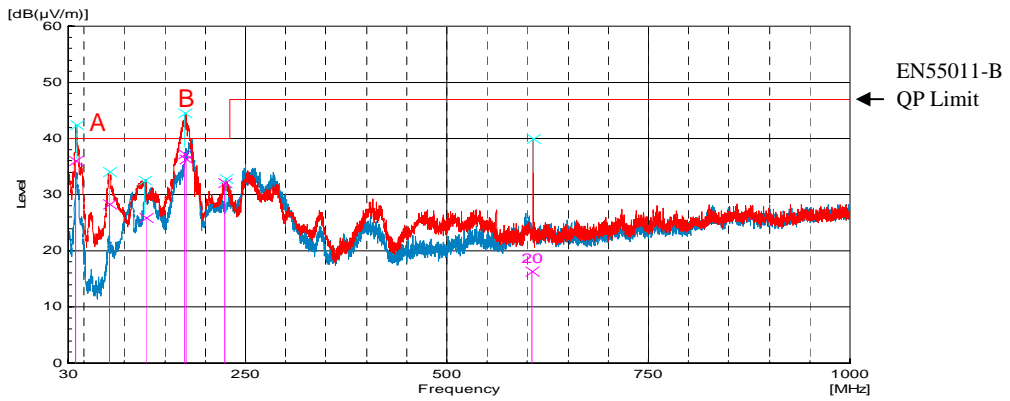


2-17 Electro-Magnetic Interference Characteristics

Conditions: Vin : 115VAC
Iout : 100%

Radiated Emission

5V

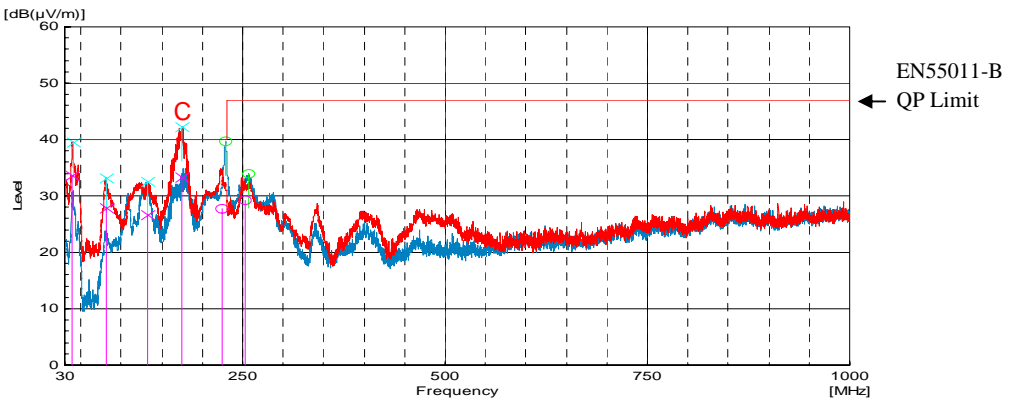


Point A (39.46MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	36	V

Point B (175.2MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	37.2	V

Conditions: Vin : 230VAC
Iout : 100%

5V



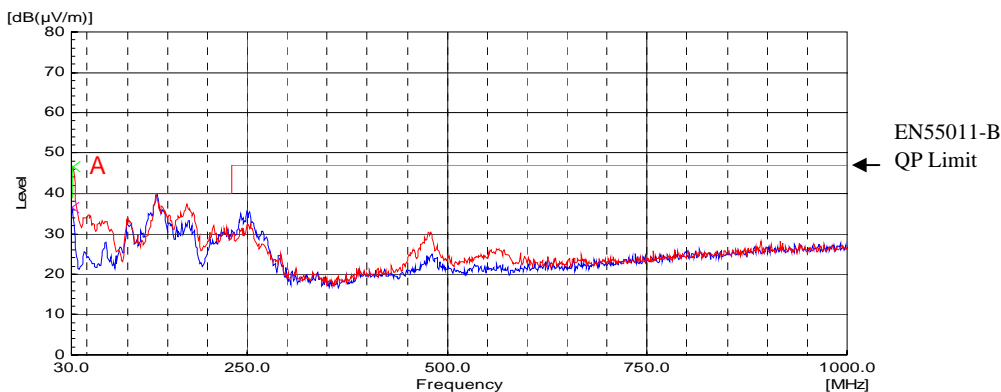
Point C (174.97MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	33.4	V

2-17 Electro-Magnetic Interference Characteristics

Conditions: Vin : 115VAC
Iout : 100%

Radiated Emission

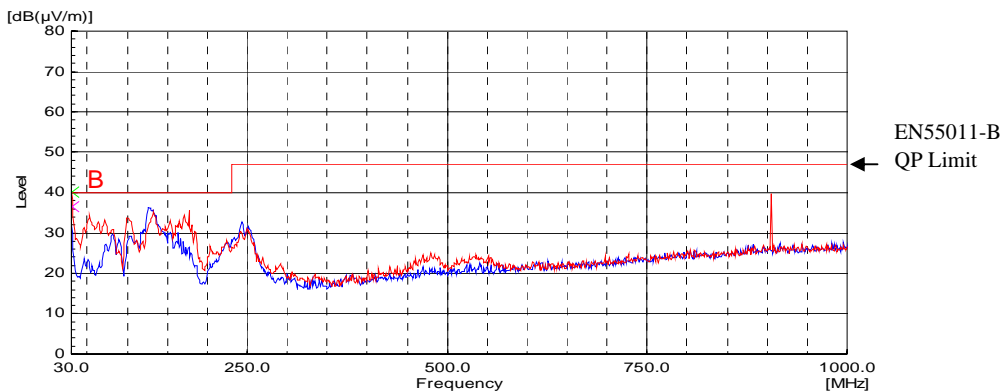
12V



Point A (30.189MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	36.5	V

Conditions: Vin : 230VAC
Iout : 100%

12V



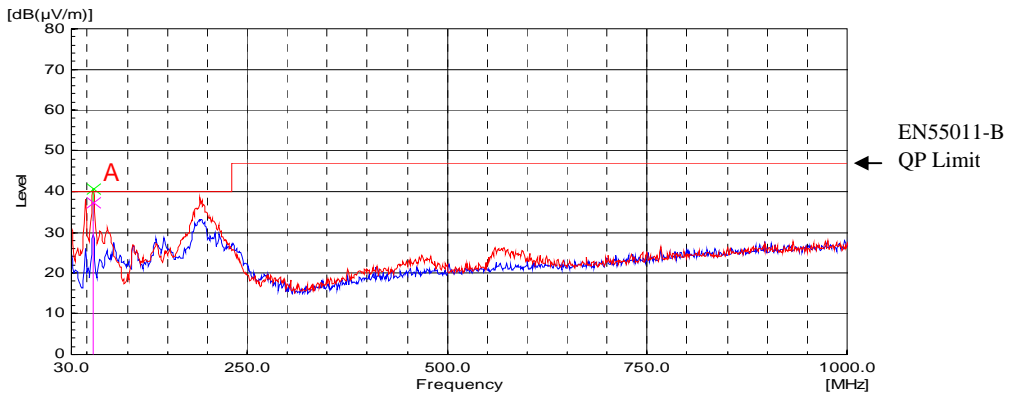
Point B (30.35MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	36.5	V

2-17 Electro-Magnetic Interference Characteristics

Conditions: Vin : 115VAC
Iout : 100%

Radiated Emission

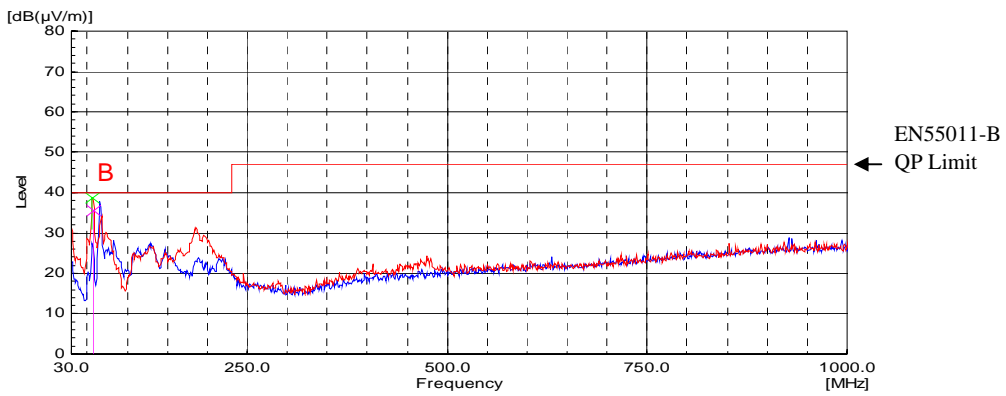
24V



Point A (57.385MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	37.3	V

Conditions: Vin : 230VAC
Iout : 100%

24V



Point B (56.654MHz)		
Limit (dBuV/m)	Measured (dBuV/m)	(P)
40	35.6	V