DRB120-24-1

EVALUATION DATA

INDEX

2. Characteristics

Terminology used

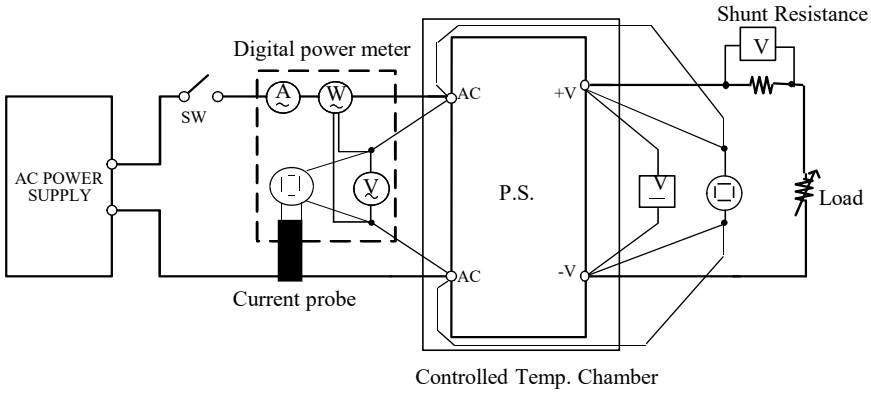
	Definition	
Vin	.....	Input voltage
Vout	.....	Output voltage
Iin	.....	Input current
Iout	.....	Output current
Ta	.....	Ambient temperature
f	.....	Frequency

1. Evaluation Method

1.1 Circuit used for determination

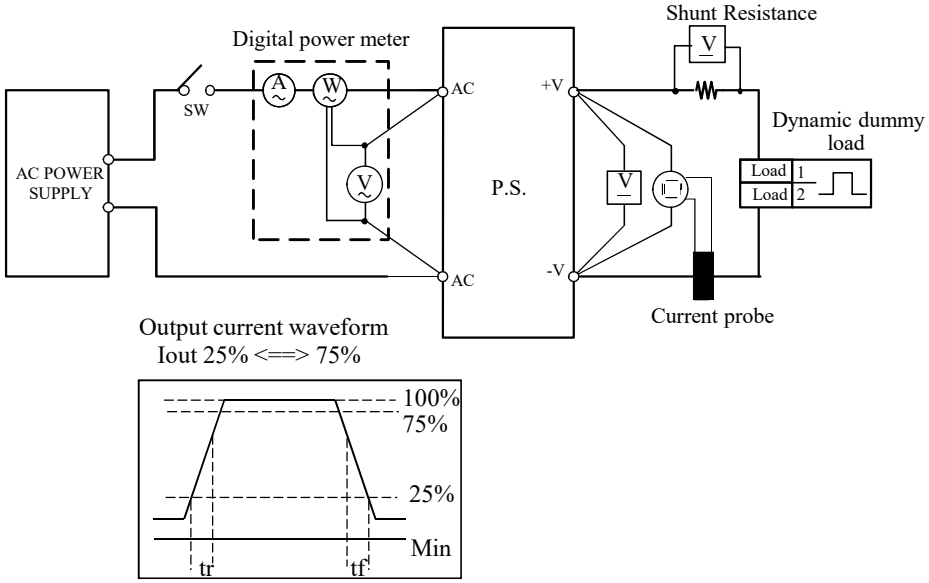
Circuit 1 used for determination

- Steady state data
- Over current protection (OCP) characteristics
- Over voltage protection (OVP) characteristics
- Output rise characteristics
- Output fall characteristics
- Hold up time characteristics
- Response to brown out characteristics
- Input current harmonics
- Input current waveform



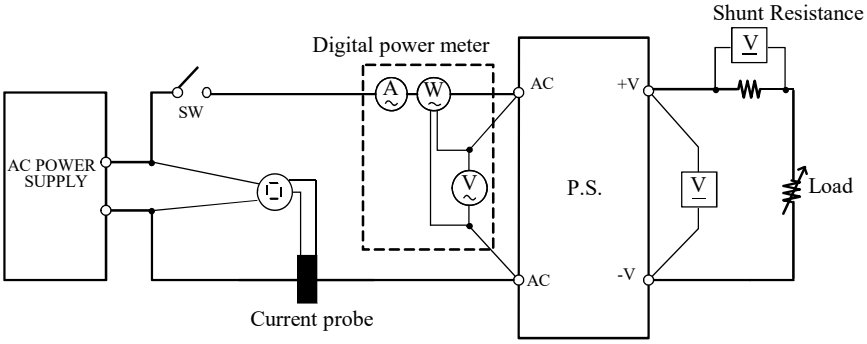
Circuit 2 used for determination

- Dynamic load response characteristics



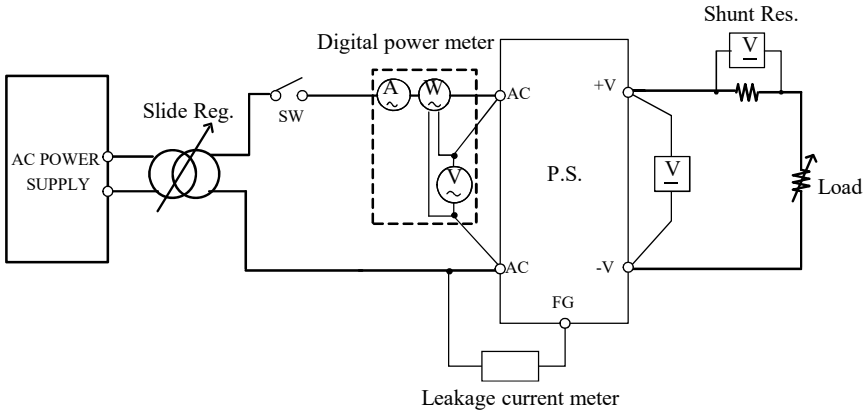
Circuit 3 used for determination

・Inrush current waveform



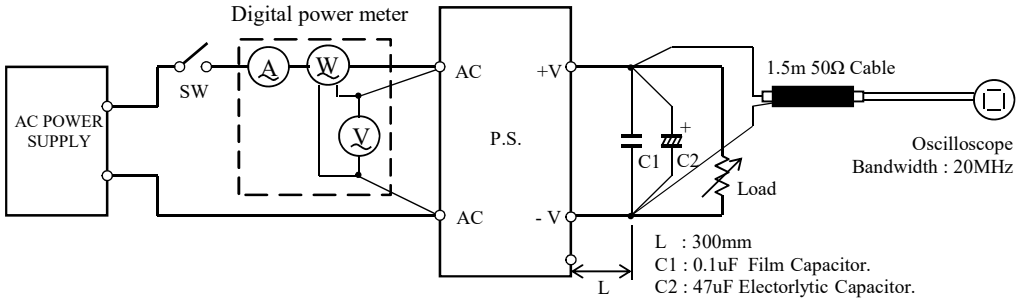
Circuit 4 used for determination

・Leakage current characteristics



Circuit 5 used for determination

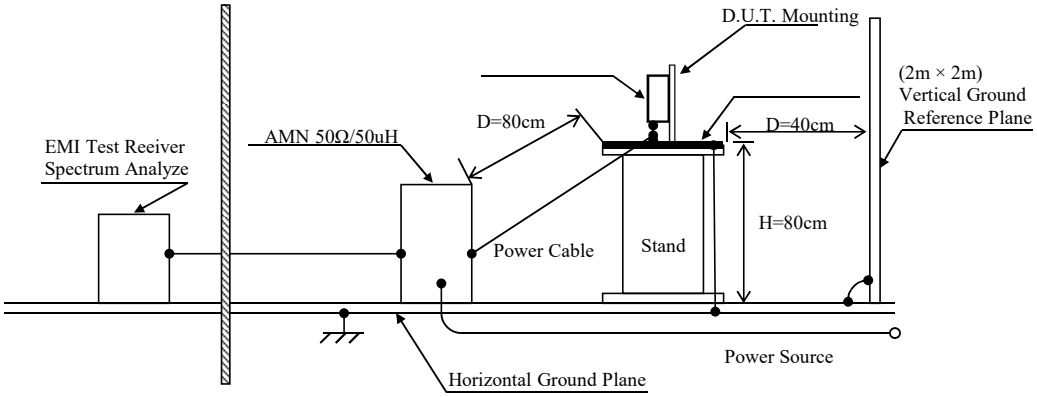
・Output ripple and noise waveform



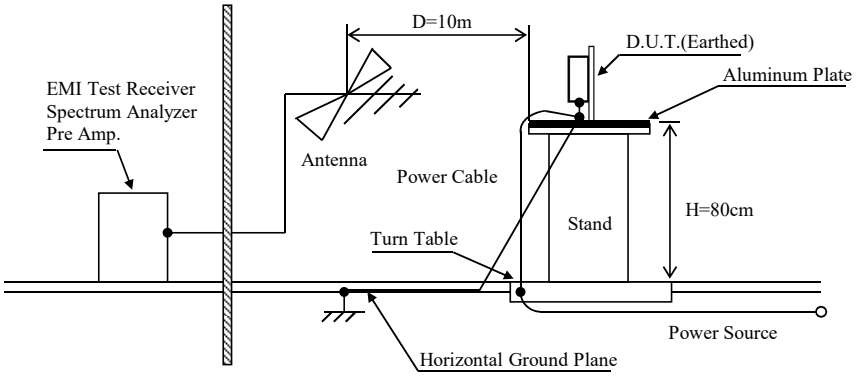
Configuration used for determination

・Electro-Magnetic Interference characteristics

(a) Conducted Emission



(b) Radiated Emission



1.2 List of equipment used

	EQUIPMENT USED	MANUFACTURER	MODEL NO.
1	DIGITAL STORAGE OSCILLOSCOPE	YOKOGAWA	DL1740/DL1740E
2	DIGITAL MULTIMETER	AGILENT	34970A
3	DIGITAL POWER METER	HIOKI	3333
4	CURRENT PROBE/AMPLIFIER	YOKOGAWA	701931
5	DATA ACQUISITION UNIT	AGILENT	34970A
6	ELECTRONIC LOAD	CHROMA	63112A
7	CONTROLLED TEMP. CHAMBER	ESPEC	SH-641
8	LEAKAGE CURRENT METER	SIMPSON	228
9	AC SOURCE	CHROMA	61505
10	AC SOURCE (CE-UL Lab)	KEYSIGHT TECHNOLOGIES	6813B
11	EMI TEST RECEIVER (CE-UL Lab)	ROHDE & SCHWARZ	ES17
12	LISN (CE-UL Lab)	SCHAFFNER LISN	NNB 41
13	LISN (CE-UL Lab)	EMCO LISN (AE)	3825/2
14	EMI TEST RECEIVER (RE-UL Lab)	ROHDE & SCHWARZ 100Hz-26.5Ghz	ESU26
15	ANTENNA (BILOG) (RE-UL Lab)	TESEQ	CBL6112B
16	ANTENNA (HORN) (RE-UL Lab)	EMCO	3115
17	PRE AMP (RE-UL Lab)	HP	8447D
18	PRE AMP (RE-UL Lab)	TOYO	TPA0108-40

2 Characteristics

2.1 Steady state data

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

24V

1. Regulation - line and load

Condition Ta : 25°C

Iout \ Vin	85VAC	115VAC	230VAC	264VAC	line regulation	
0%	24.097	24.098	24.098	24.097	1mV	0.004%
50%	24.05	24.049	24.049	24.049	1mV	0.004%
100%	24.003	24.003	24.003	24.003	0mV	0.000%
load	94mV	95mV	95mV	94mV		
regulation	0.392%	0.396%	0.396%	0.392%		

2. Temperature drift

Condition Vin : 115VAC
Iout : 100%

Ta	-25°C	25°C	55°C	temperature stability	
Vout	23.981	24.003	24.126	145mV	0.604%

3. Start up voltage and Drop out voltage

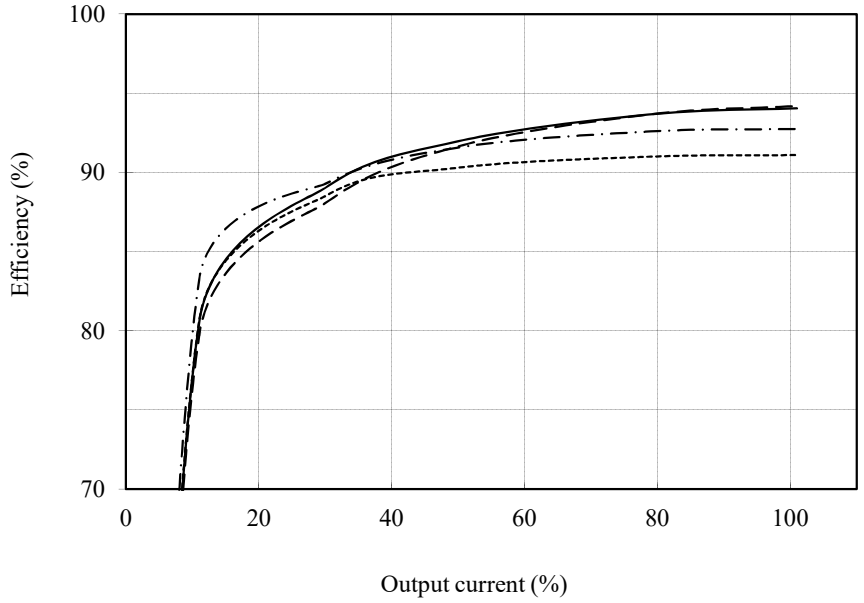
Condition Ta : 25°C
Iout : 100%

Start up voltage (Vin)	70VAC
Drop out voltage (Vin)	58VAC

(2) Efficiency vs. Output current

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

24V

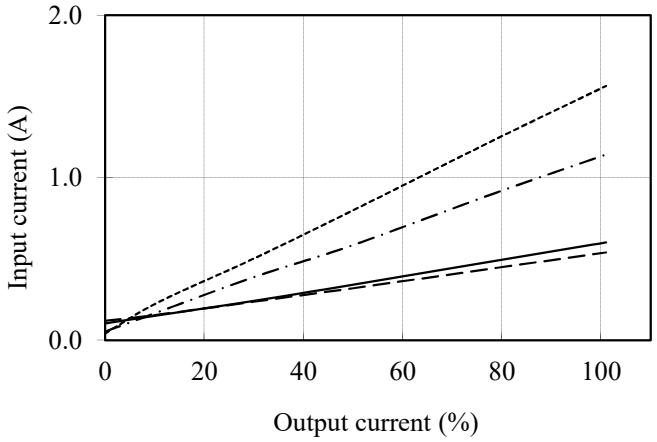


(3) Input current vs. Output current

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

24V

Vin	Input current
	Iout : 0%
85VAC	0.043A
115VAC	0.054A
230VAC	0.104A
264VAC	0.120A

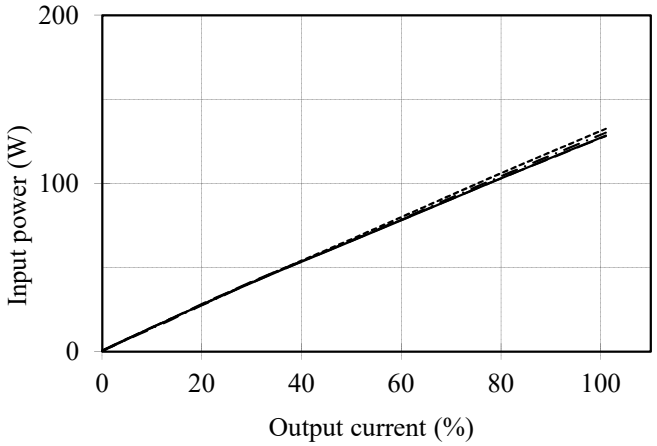


(4) Input power vs. Output current

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

24V

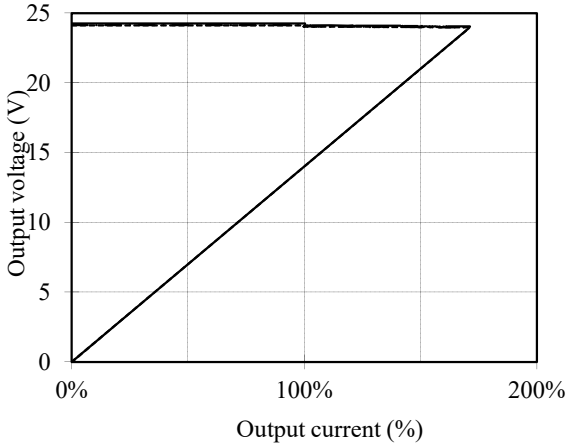
Vin	Input power
	Iout : 0%
85VAC	0.39W
115VAC	0.41W
230VAC	0.59W
264VAC	0.66W



2.2 Over current protection (OCP) characteristics

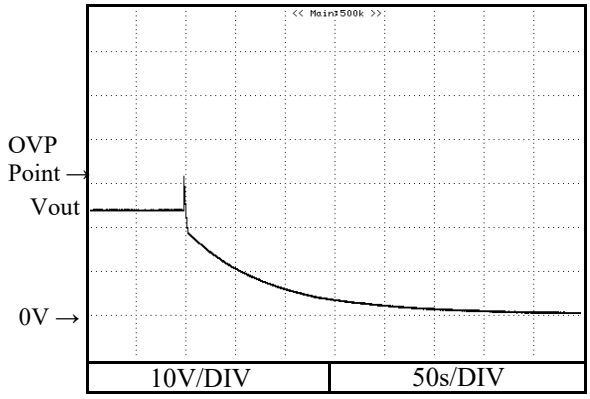
Conditions Vin : 115VAC
Ta : -25°C
25°C
55°C

24V



2.3 Over voltage protection (OVP) characteristics

Conditions Vin : 115VAC
Iout : 0%
Ta : 25°C

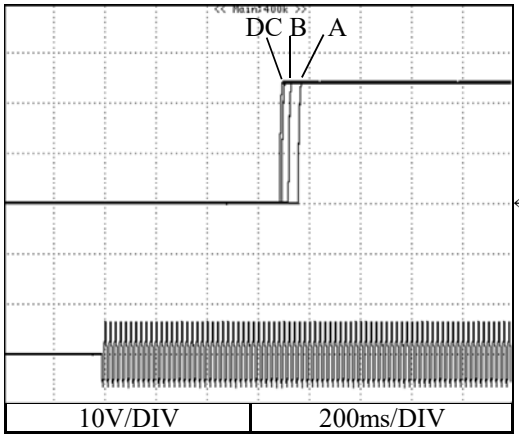


2.4 Output rise characteristics

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

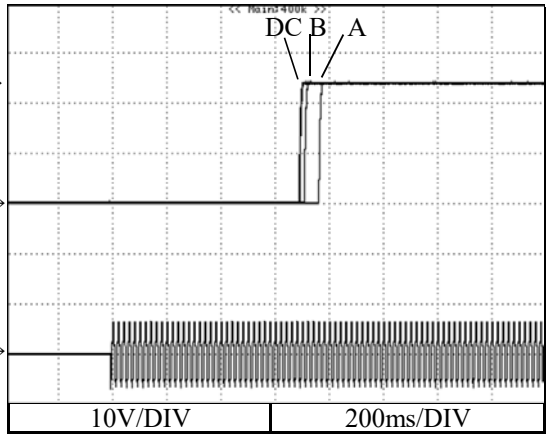
24V

Iout : 0%



← Vout →
← 0V →
← Vin →

Iout : 100%

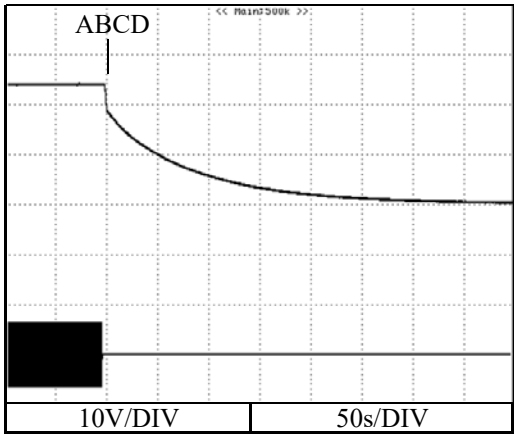


2.5 Output fall characteristics

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

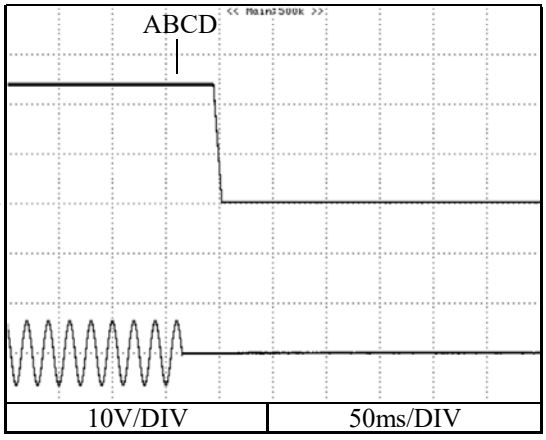
24V

Iout : 0%



← Vout →
← 0V →
← Vin →

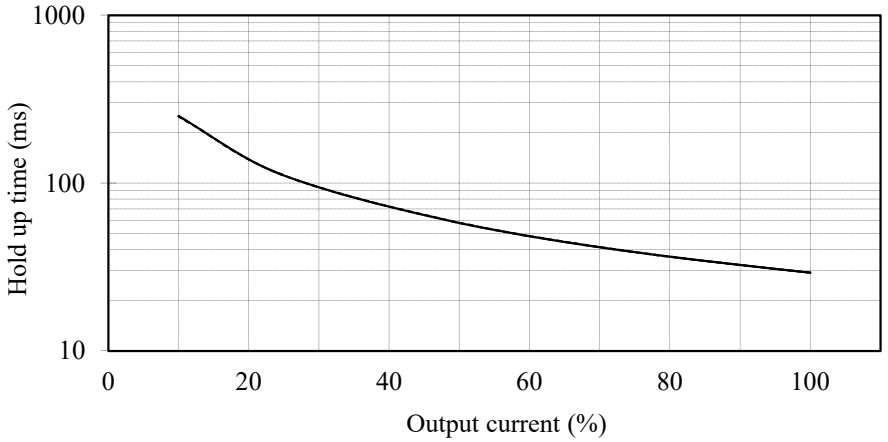
Iout : 100%



2.6 Hold up time characteristics

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

24V

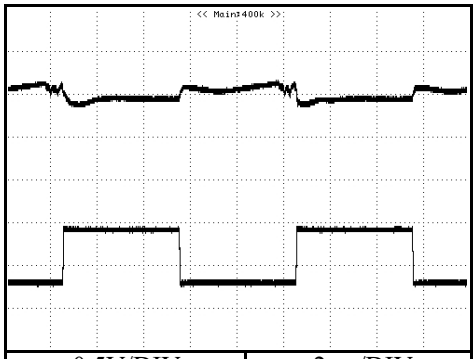


2.7 Dynamic load response characteristics

Conditions Vin : 115VAC
Iout : 25%⇔ 75%
(tr = tf = 50us)
Ta : 25°C

24V

f = 100Hz



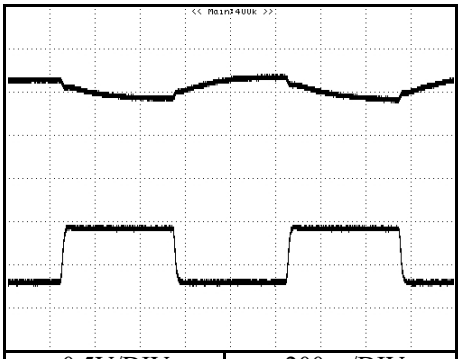
0.5V/DIV	2ms/DIV
+0.69%	-0.61%

← Vout →

← Iout →

← Iout:0% →

f = 1kHz



0.5V/DIV	200µs/DIV
+0.87%	-0.52%

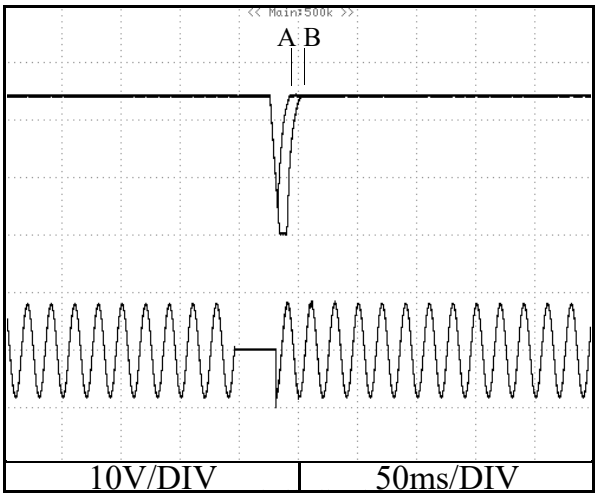
2.8 Response to brown out characteristics

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

24V

A = 28ms

B = 29ms



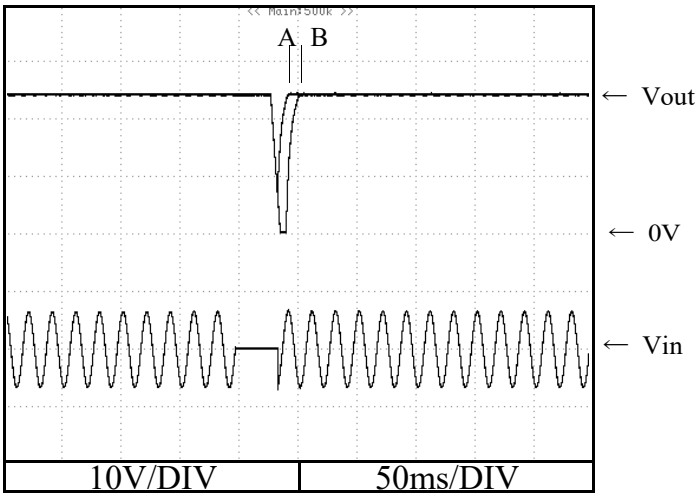
2.8 Response to brown out characteristics

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

24V

A = 29ms

B = 36ms

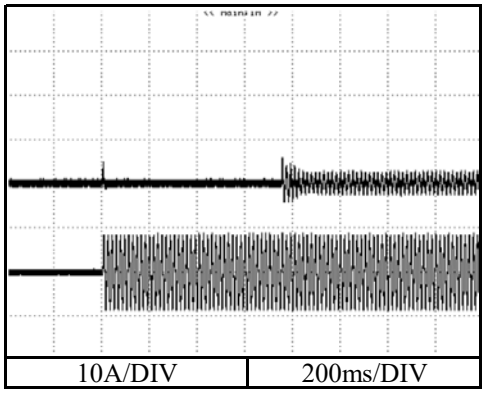


2.9 Inrush current waveform

24V

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

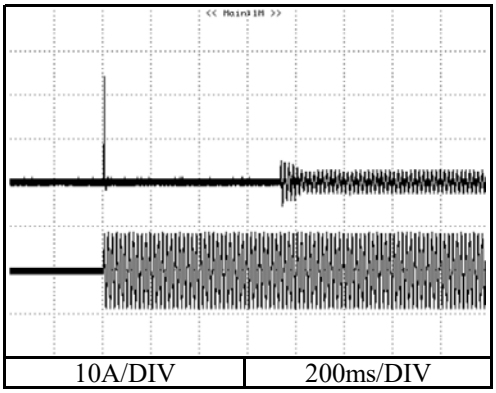
Switch on phase angle of input AC voltage
φ = 0°



← Iin →

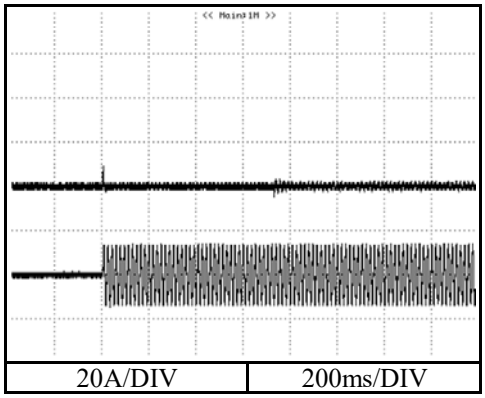
← Vin →

Switch on phase angle of input AC voltage
φ = 90°



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

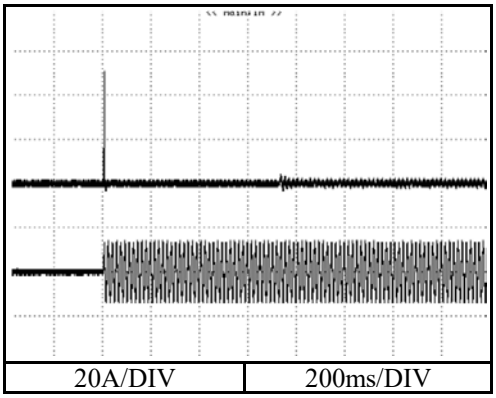
Switch on phase angle of input AC voltage
φ = 0°



← Iin →

← Vin →

Switch on phase angle of input AC voltage
φ = 90°

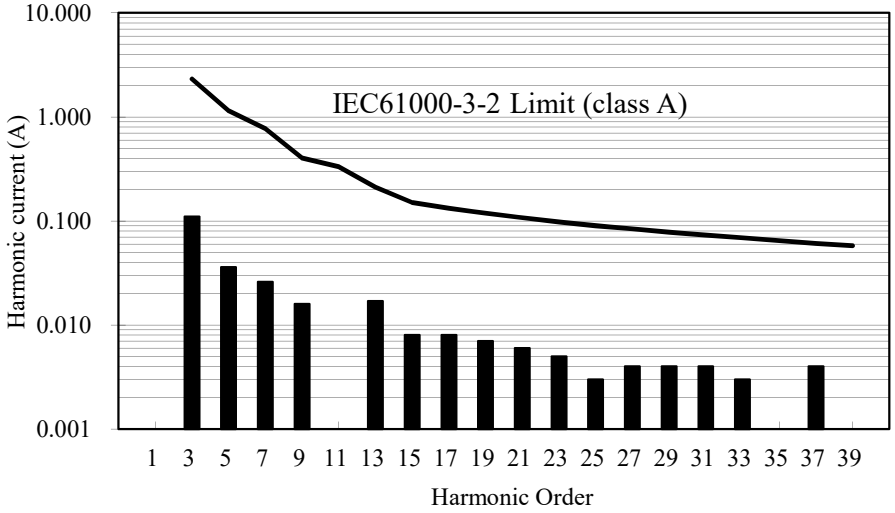


2.10 Input current harmonics

Conditions Iout : 100%
Ta : 25°C

24V

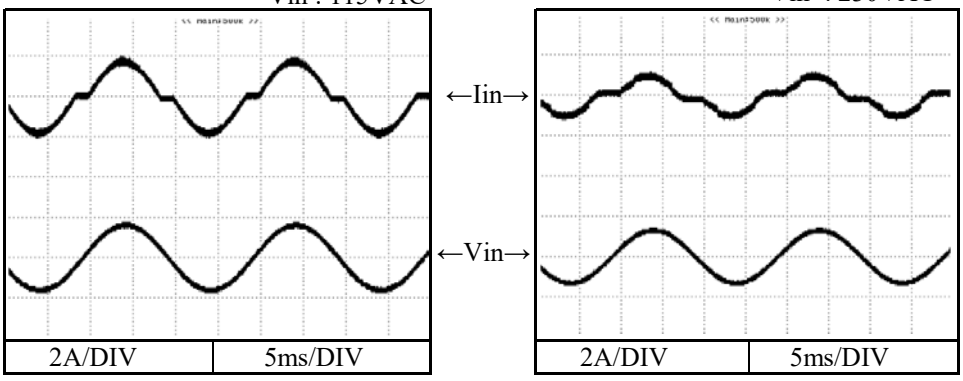
Vin : 115VAC



2.11 Input current waveform

Conditions Iout : 100%
Ta : 25°C

Vin : 115VAC



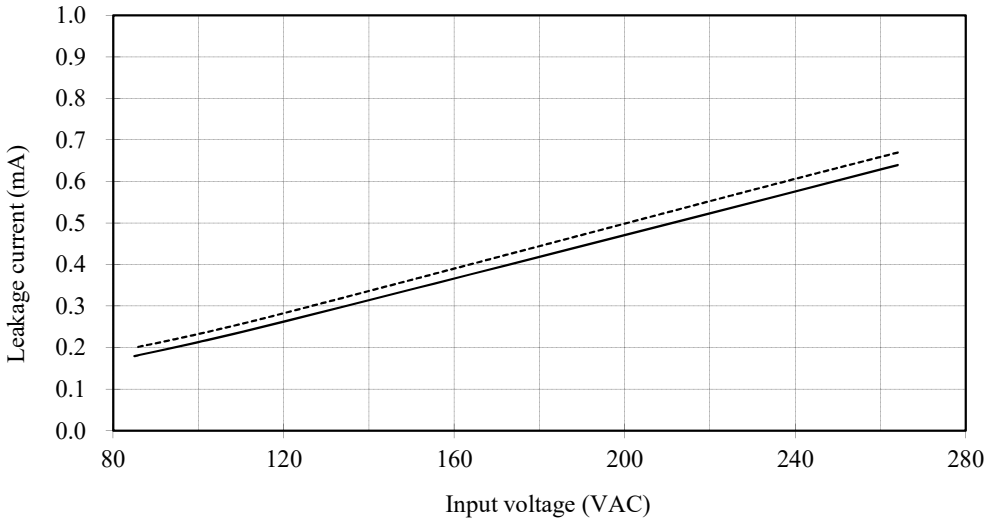
Vin : 230VAC

2.12 Leakage current characteristics

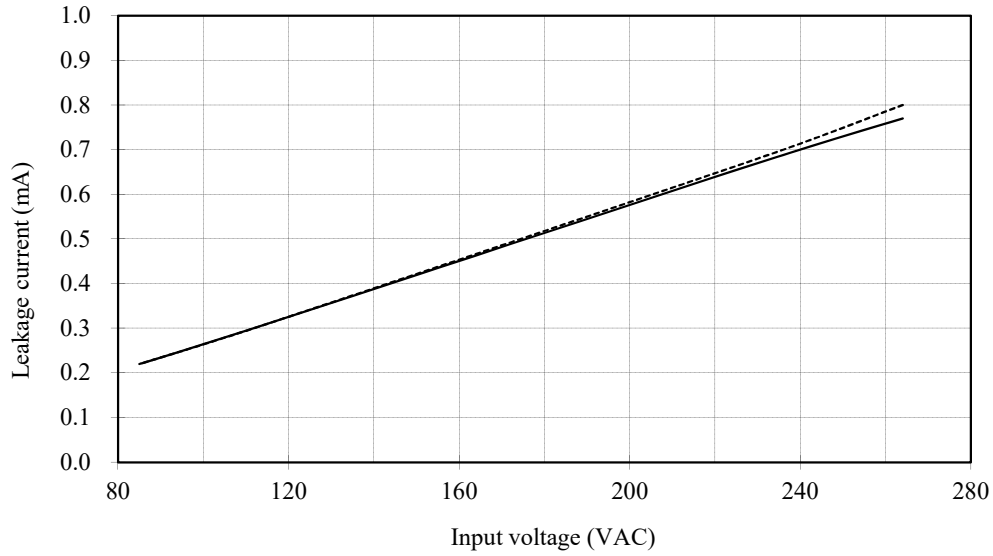
Conditions Iout : 0% --------
100% ——
Ta : 25°C

24V

f : 50Hz



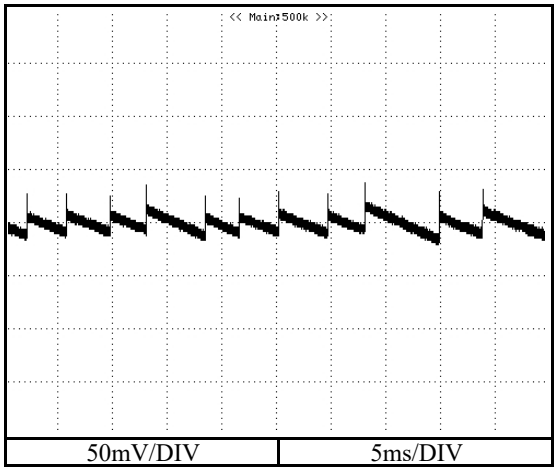
f : 60Hz



2.13 Output ripple and noise waveform

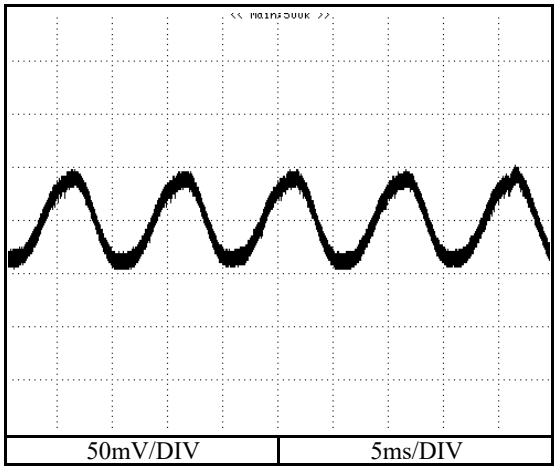
Conditions Vin : 115VAC
Iout : 0%
Ta : 25°C

24V



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

24V



2.14 Electro-Magnetic Interference characteristics

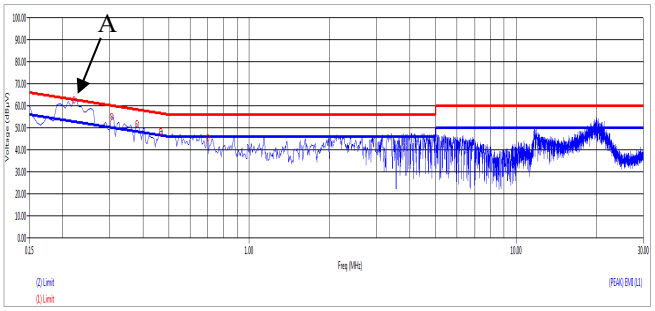
Conditions Vin : 230VAC
Iout : 100%
Ta : 25°C
QP Limit : --------
AVE Limit : --------

Conducted Emission

24V

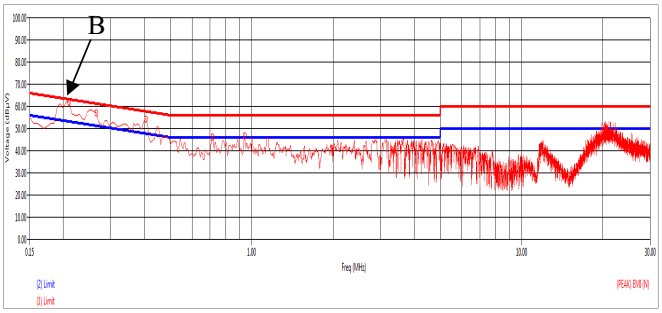
LIVE

Ref. Data	Point A (0.22MHz) Limit (dBuV)	Measure (dBuV)
QP	62.82	58.95
AV	52.82	39.33



NEUTRAL

Ref. Data	Point B (0.21MHz) Limit (dBuV)	Measure (dBuV)
QP	63.22	58.35
AV	53.22	35.79

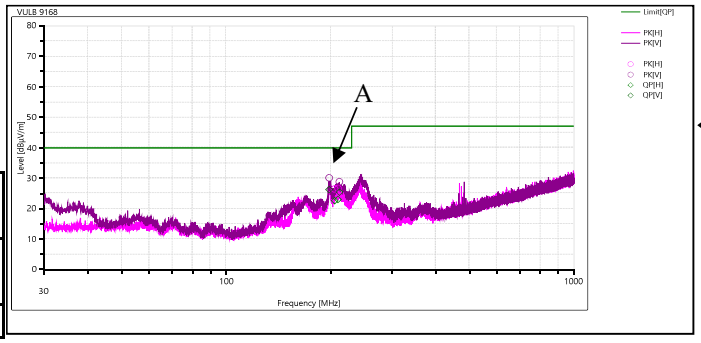


2.15 Electro-Magnetic Interference characteristics

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

Radiated Emission Horizontal : ——
Vertical : ——

24V



EN55032-B
QP Limit

	Point A (197.96156MHz)	
Ref. Data	Limit (dBuV)	Measure (dBuV)
QP	40.0	26.19