CUS1600M

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
PG	.....	Power good signal
Vstb	.....	Output voltage of standby
Istb	.....	Output current of standby

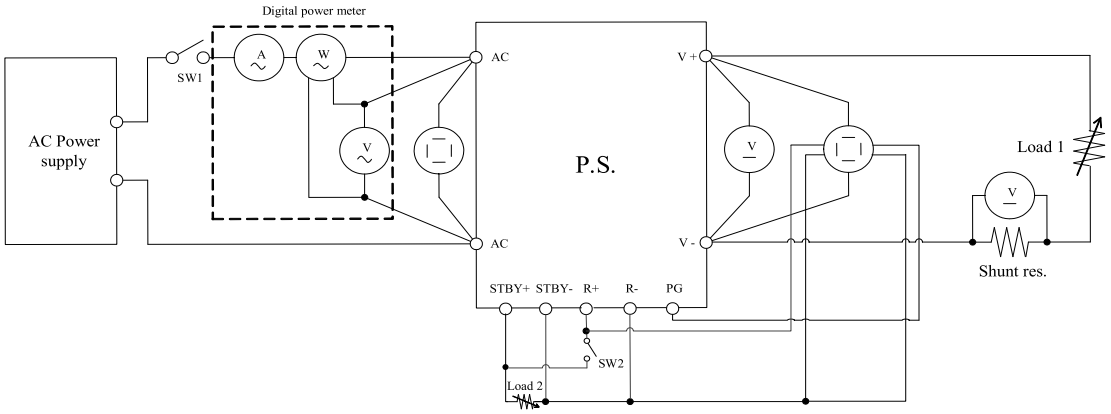
※ Test results are reference data based on our measurement condition.

1. Evaluation Method

1-1. Circuit used for determination

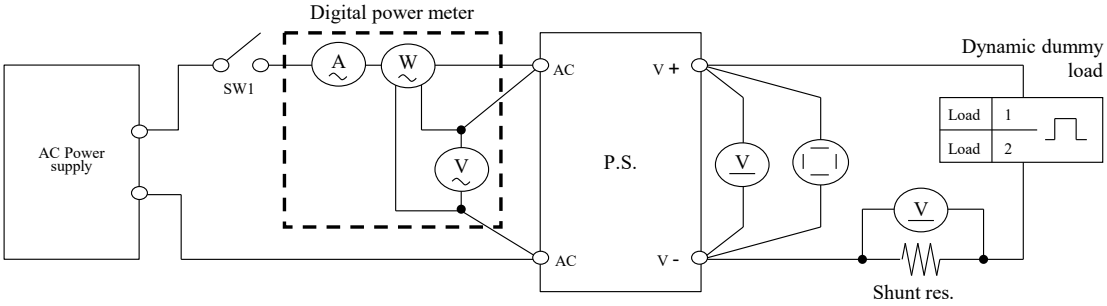
Circuit 1 used for determination

- Steady state data
- Warm up voltage drift characteristics
- Hold up time characteristics
- Output rise characteristics
- Output fall characteristics
- Over current protection (OCP) characteristics
- Over voltage protection (OVP) characteristics
- Response to brown out characteristics
- Various signal

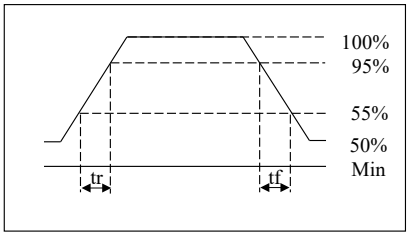


Circuit 2 used for determination

- Dynamic load response characteristics

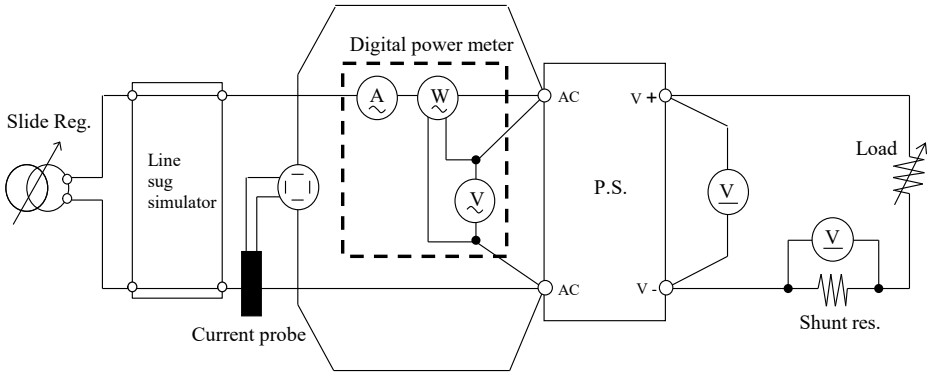


Output current waveform
Iout 50% <==> 100%



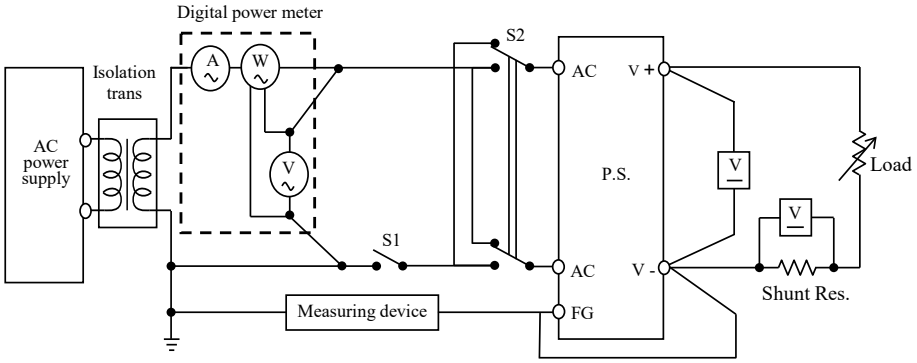
Circuit 3 used for determination

・Inrush current waveform



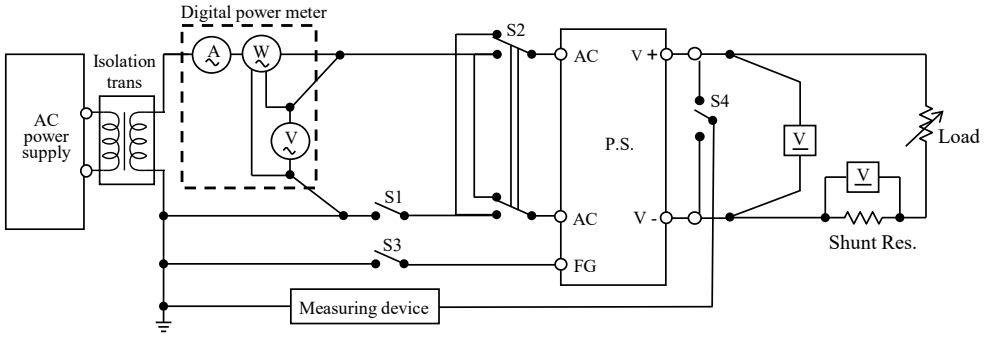
Circuit 4 used for determination

・Earth leakage current characteristics



Measure in all possible combination of position of S2 with :
S1 closed (normal condition), and S1 open (single fault condition)

・Patient leakage current



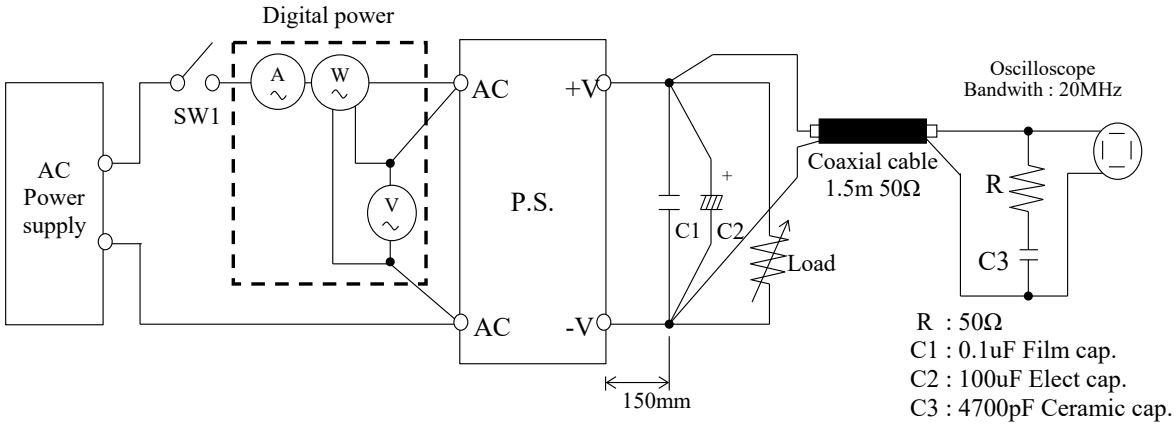
CLASS I equipment:

S1, S3 closed, measure under all possible position of S2 & S4.

Single fault condition: S1 open with S3 close or S1 close with S3 open.

Circuit 5 used for determination

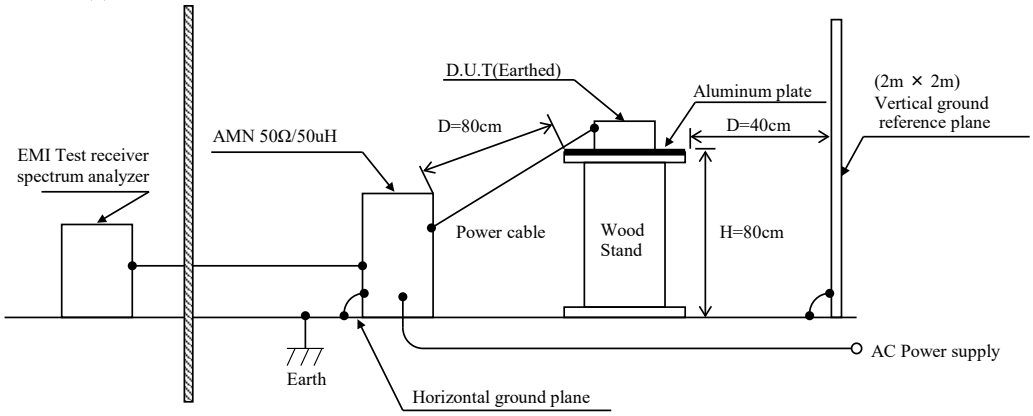
・Output ripple and noise waveform



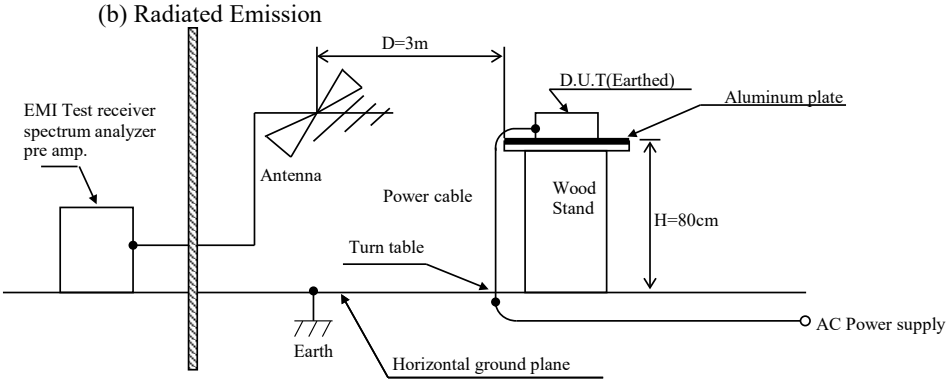
Configuration used for determination

・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 ELECT.	DLM3054
2	DIGITAL MULTIMETER	KEYSIGHT	34970A
3	DIGITAL POWER METER	YOKOGAWA ELECT.	WT310
4	CURRENT PROBE	YOKOGAWA ELECT.	701931
5	POWER SUPPLY	YOKOGAWA ELECT.	700938
6	DYNAMIC DUMMY LOAD	CHROMA	63030/63203A/63640
7	AC SOURCE	KIKUSUI	PCR4000LE/PCR6000WE2
8	EARTH LEAKAGE CURRENT METER	SIMPSON	228
9	PATIENT LEAKAGE CURRENT METER	SIQ	SIQ16042
10	CONTROLLED TEMP. CHAMBER	TABAI-ESPEC	SH-662
11	EMI TEST RECEIVER	ROHDE & SCHWARZ	ESR3
12	LISN	ROHDE & SCHWARZ	ENV216
13	BROADBAND ANTENNA	SCHWARZBECK	VULB9163
14	LINE SUG SIMULATOR	TAKAMISAWA	PSA-210
15	SOUND CALIBRATOR	BRUEL AND KJAER	TYPE 4231
16	AUDIO ANALYZER	BRUEL AND KJAER	TYPE 3560-C

1-3. Load conditions

Vin	Iout	12V	24V	36V	48V
85VAC	50%	50A	33.35A	22.25A	16.7A
90 - 100VAC	50%	50A	31.25A	20.85A	15.63A
100 - 265VAC	50%	50A	33.35A	22.25A	16.7A
85VAC	90%	90A	60A	40A	30A
90 - 100VAC	100%	100A	62.5A	41.7A	31.25A
100 - 265VAC	100%	100A	66.7A	44.5A	33.4A
85 - 265VAC	50%Peak	66.7A	33.35A	22.25A	16.7A
85 - 265VAC	Peak	133.4A	66.7A	44.5A	33.4A

*Vstb=5V, Istb=2A(100%)

2. Characteristics

2-1. Steady state data

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

12V

1. Regulation - line and load

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	Line regulation	
0%	12.023V	12.017V	12.022V	12.020V	6mV	0.050%
50%	12.008V	12.007V	12.006V	12.007V	2mV	0.017%
100%	-	11.995V	11.995V	11.995V	0mV	0.000%
Load regulation	15mV	22mV	27mV	25mV		
	0.125%	0.183%	0.225%	0.208%		

2. Temperature drift

Condition Vin : 115 VAC
Iout : 100 %
Istb : 0 %

Ta	-20°C	+25°C	+40°C	Temperature stability	
Vout	11.979V	11.995V	11.991V	16mV	0.133%

3. Start up voltage and Drop out voltage

Condition Ta : 25 °C
Iout : Peak
Istb : 0 %

Start up voltage (Vin)	78.2VAC
Drop out voltage (Vin)	75.0VAC

24V

1. Regulation - line and load

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	Line regulation	
0%	24.021V	24.026V	24.019V	24.025V	7mV	0.029%
50%	24.008V	24.007V	24.008V	24.008V	1mV	0.004%
100%	-	23.995V	23.996V	23.995V	1mV	0.004%
Load regulation	13mV	31mV	23mV	30mV		
	0.054%	0.129%	0.096%	0.125%		

2. Temperature drift

Condition Vin : 115 VAC
Iout : 100 %
Istb : 0 %

Ta	-20°C	+25°C	+40°C	Temperature stability	
Vout	23.977V	23.995V	23.985V	18mV	0.075%

3. Start up voltage and Drop out voltage

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Start up voltage (Vin)	78.1VAC
Drop out voltage (Vin)	74.1VAC

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

36V 1. Regulation - line and load

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	Line regulation	
0%	36.135V	36.132V	36.132V	36.137V	5mV	0.014%
50%	36.111V	36.111V	36.111V	36.110V	1mV	0.003%
100%	-	36.101V	36.100V	36.099V	2mV	0.006%
Load regulation	24mV	31mV	32mV	38mV		
	0.067%	0.086%	0.089%	0.106%		

2. Temperature drift

Condition Vin : 115 VAC
Iout : 100 %
Istb : 0 %

Ta	-20°C	+25°C	+40°C	Temperature stability	
Vout	36.061V	36.101V	36.098V	40mV	0.111%

3. Start up voltage and Drop out voltage

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Start up voltage (Vin)	78.3VAC
Drop out voltage (Vin)	75.2VAC

48V 1. Regulation - line and load

Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

Iout \ Vin	85VAC	115VAC	230VAC	265VAC	Line regulation	
0%	47.999V	48.004V	48.004V	48.008V	9mV	0.019%
50%	47.965V	47.963V	47.963V	47.964V	2mV	0.004%
100%	-	47.947V	47.941V	47.942V	6mV	0.013%
Load regulation	34mV	57mV	63mV	66mV		
	0.071%	0.119%	0.131%	0.138%		

2. Temperature drift

Condition Vin : 115 VAC
Iout : 100 %
Istb : 0 %

Ta	-20°C	+25°C	+40°C	Temperature stability	
Vout	47.949V	47.947V	47.928V	21mV	0.044%

3. Start up voltage and Drop out voltage

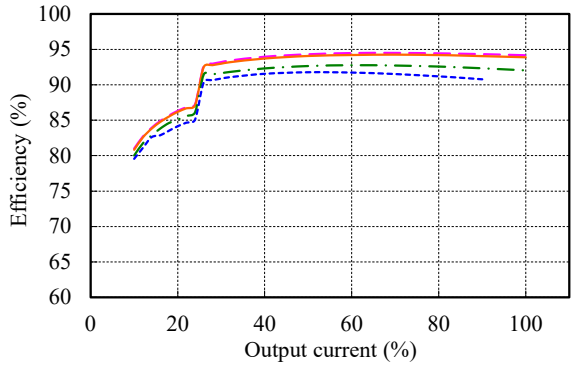
Condition Ta : 25 °C
Iout : 100 %
Istb : 0 %

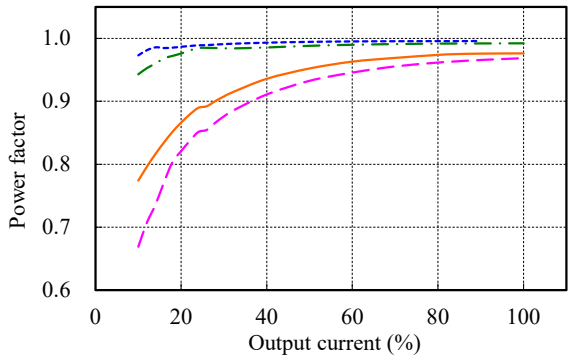
Start up voltage (Vin)	78.1VAC
Drop out voltage (Vin)	74.8VAC

(2) Efficiency and Power factor vs. Output current

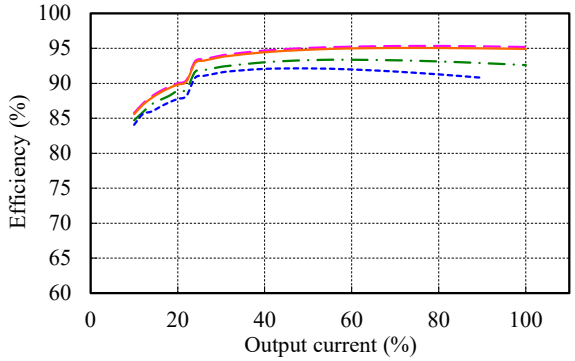
Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 °C
Istb : 0 %

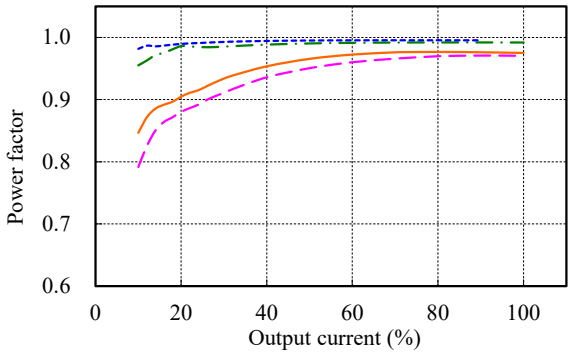
12V



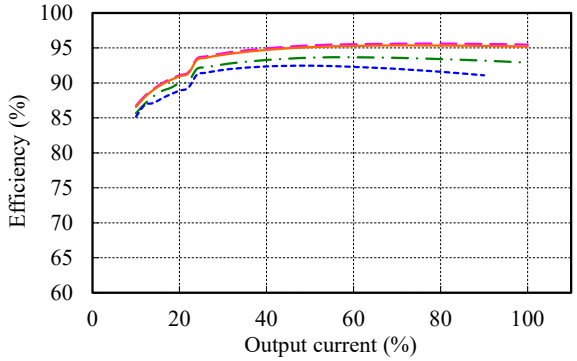


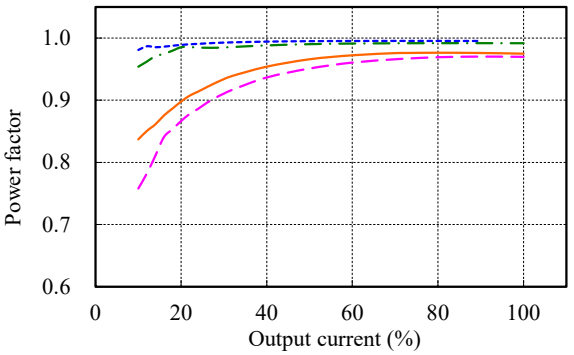
24V



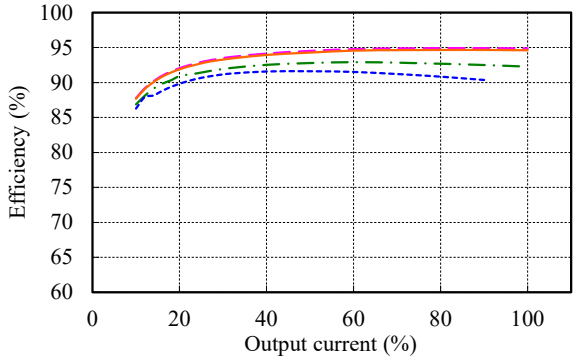


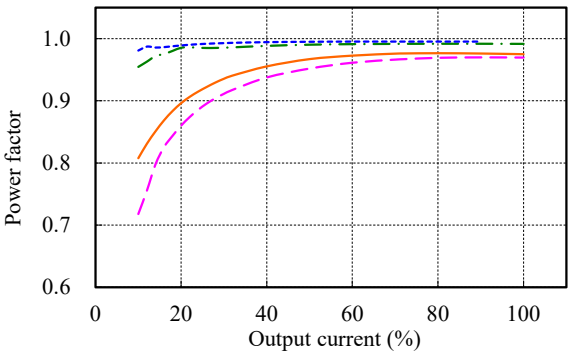
36V





48V



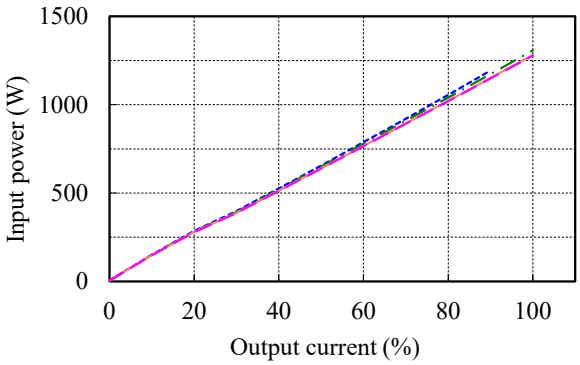


(3) Input power vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 °C
Istb : 0 %

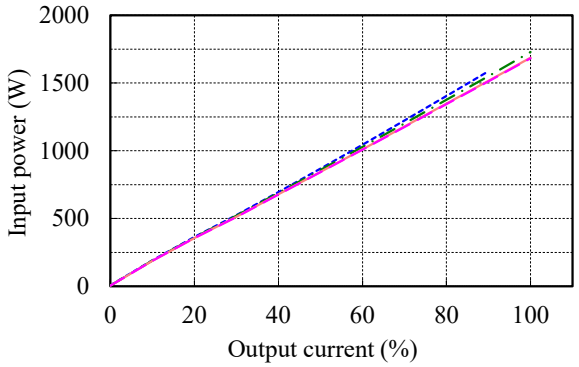
12V

Vin	Input power	
	Iout: 0%	Remote OFF
85VAC	6.3W	0.32W
115VAC	5.0W	0.38W
230VAC	4.3W	0.75W
265VAC	4.5W	0.91W



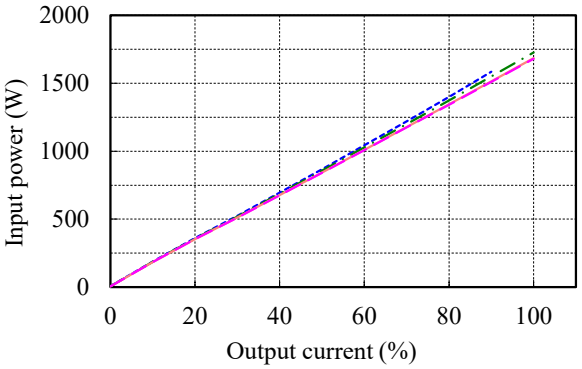
24V

Vin	Input power	
	Iout: 0%	Remote OFF
85VAC	7.0W	0.31W
115VAC	5.7W	0.38W
230VAC	4.7W	0.74W
265VAC	4.5W	0.91W



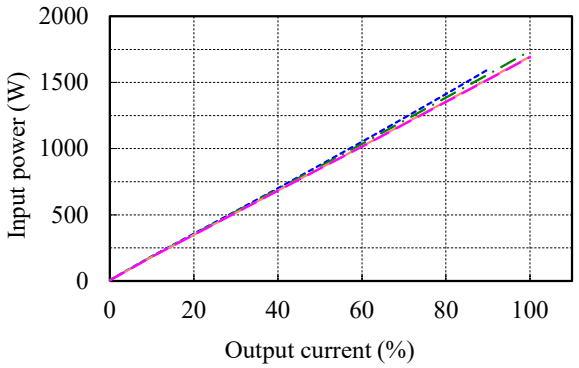
36V

Vin	Input power	
	Iout: 0%	Remote OFF
85VAC	7.2W	0.33W
115VAC	6.4W	0.38W
230VAC	5.2W	0.75W
265VAC	5.1W	0.91W



48V

Vin	Input power	
	Iout: 0%	Remote OFF
85VAC	7.4W	0.33W
115VAC	5.9W	0.39W
230VAC	5.0W	0.42W
265VAC	4.7W	0.93W

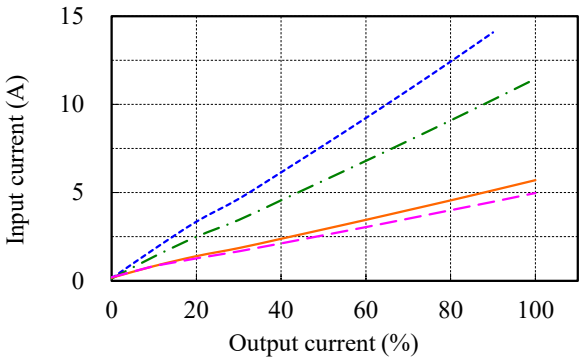


(4) Input current vs. Output current

Conditions Vin : 85 VAC
115 VAC
230 VAC
265 VAC
Ta : 25 °C
Istb : 0 %

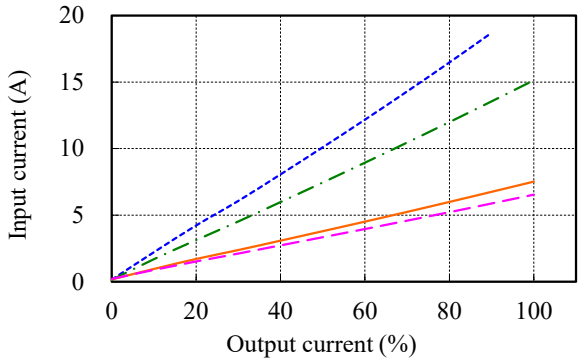
12V

Vin	Input current	
	Iout: 0%	Remote OFF
85VAC	0.14A	0.06A
115VAC	0.13A	0.08A
230VAC	0.17A	0.16A
265VAC	0.20A	0.18A



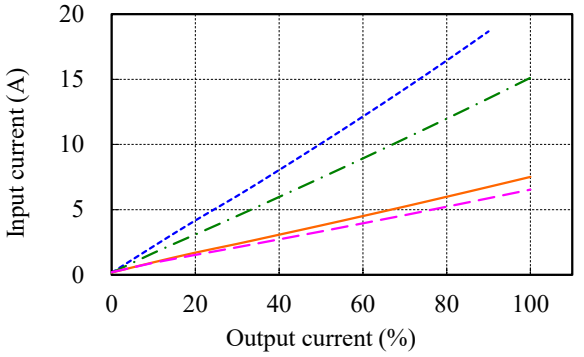
24V

Vin	Input current	
	Iout: 0%	Remote OFF
85VAC	0.15A	0.06A
115VAC	0.13A	0.08A
230VAC	0.18A	0.16A
265VAC	0.21A	0.18A



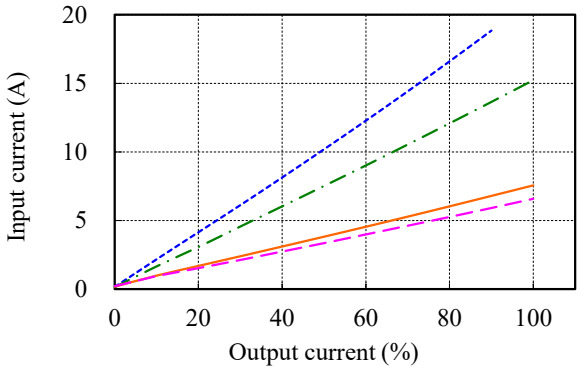
36V

Vin	Input current	
	Iout: 0%	Remote OFF
85VAC	0.15A	0.06A
115VAC	0.15A	0.08A
230VAC	0.18A	0.16A
265VAC	0.20A	0.18A



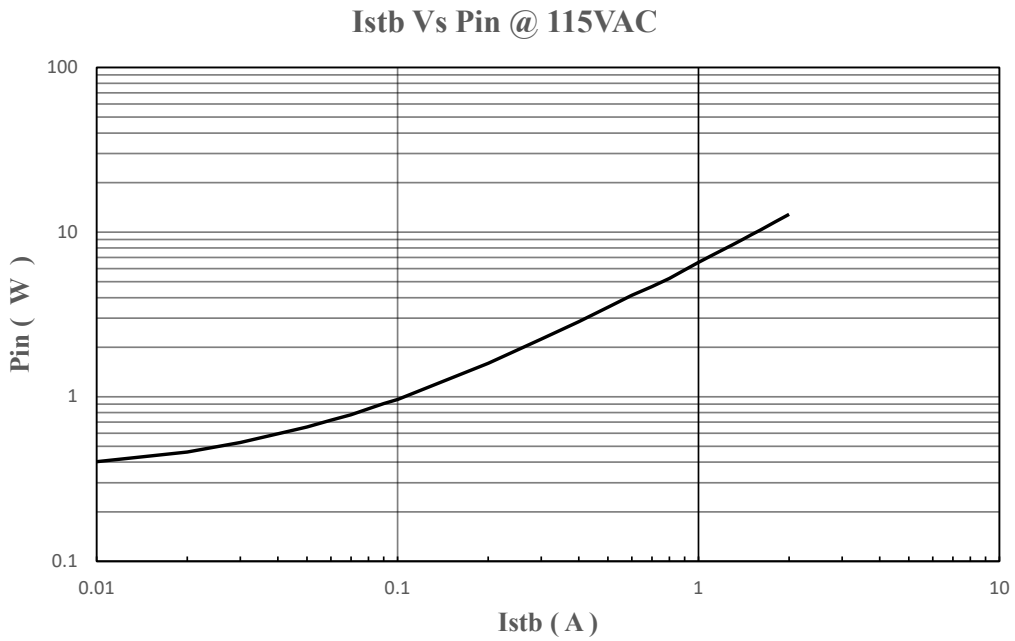
48V

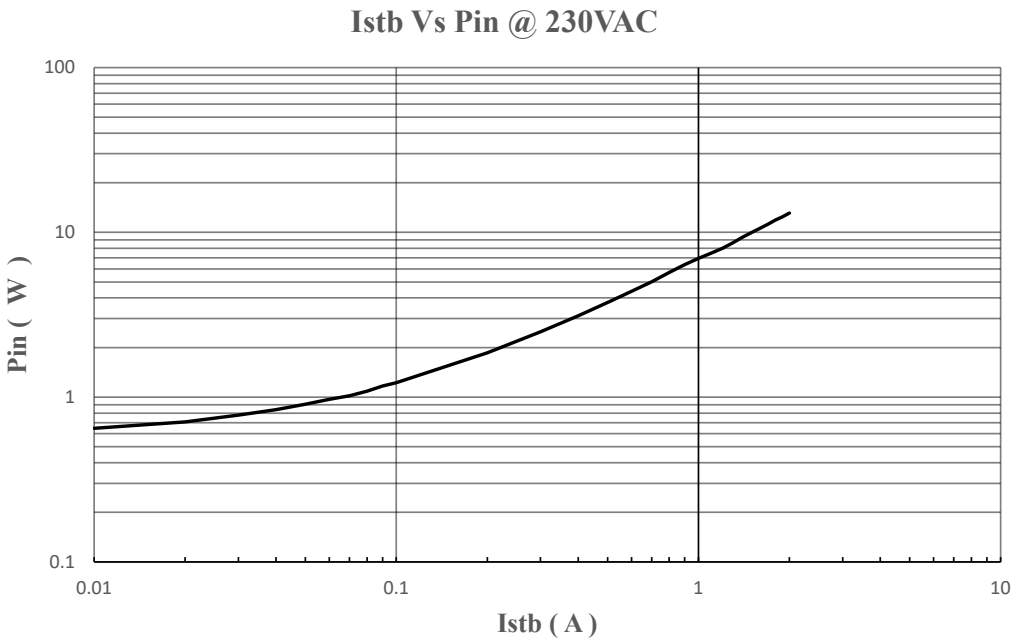
Vin	Input current	
	Iout: 0%	Remote OFF
85VAC	0.16A	0.06A
115VAC	0.14A	0.08A
230VAC	0.18A	0.16A
265VAC	0.21A	0.18A



(5) Input power vs. Output current @ Remote OFF

Condition Remote OFF

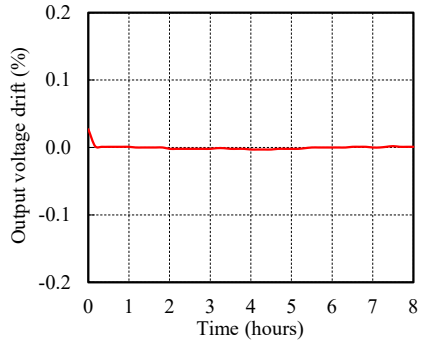




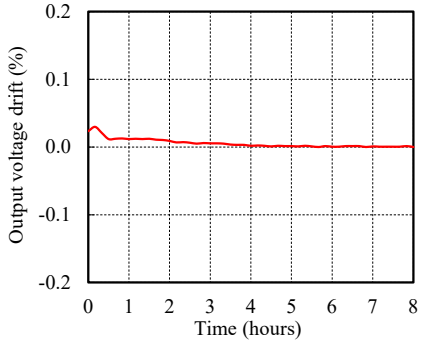
2-2. Warm up voltage drift characteristics

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

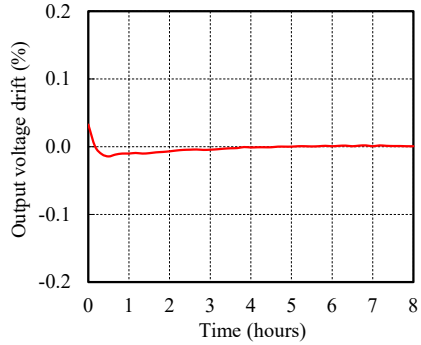
12V



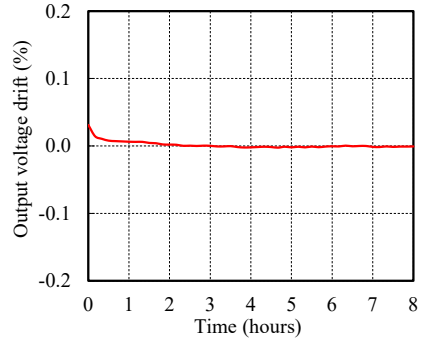
24V



36V

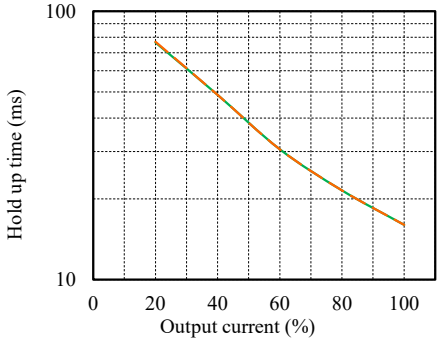


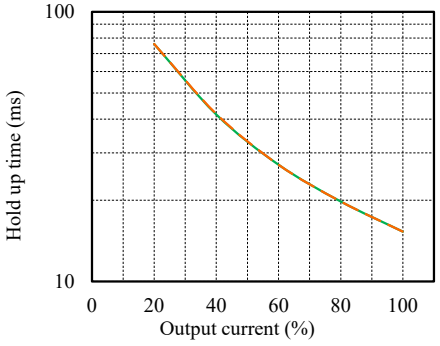
48V

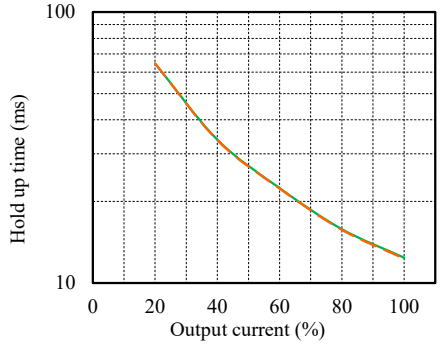


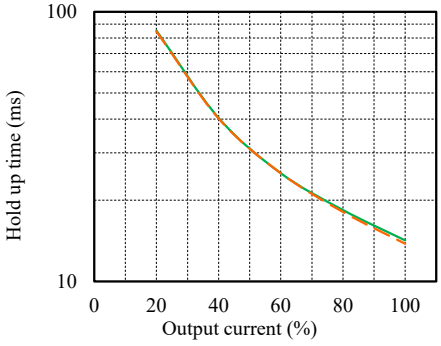
2-3. Hold up time characteristics

Conditions Vin : 115 VAC
230 VAC
Ta : 25 °C
Istb : 100%





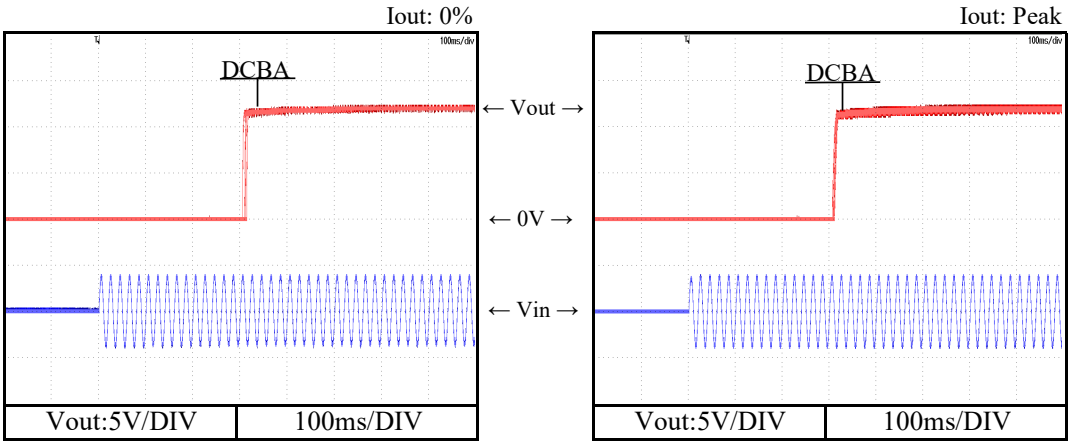




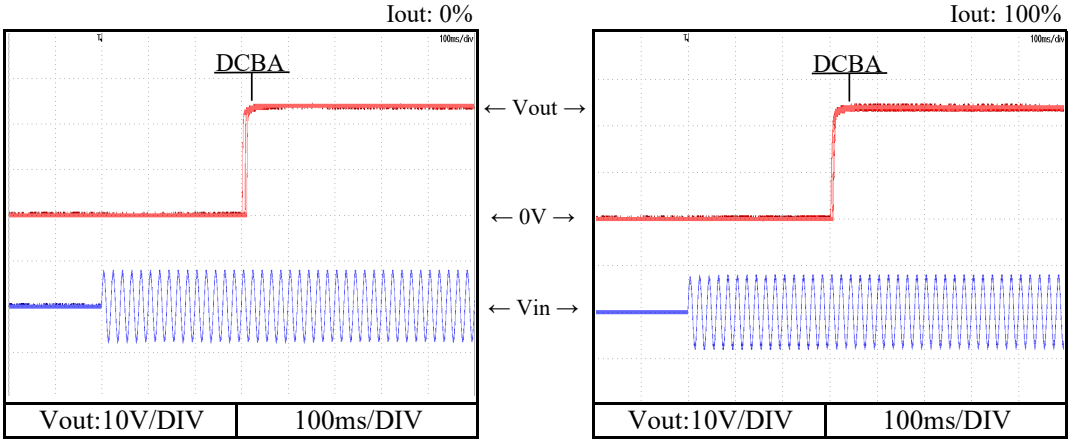
2-4. Output rise characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Istb : 100 %
Ta : 25 °C

12V



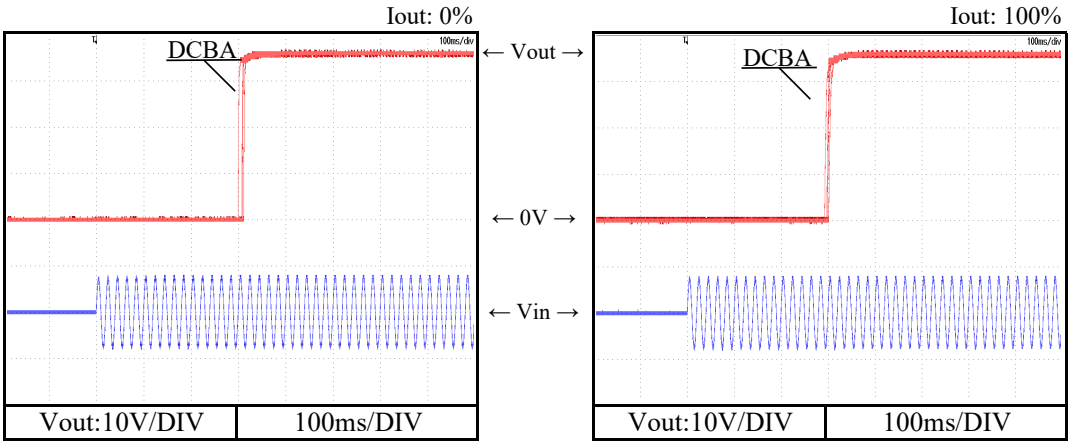
24V



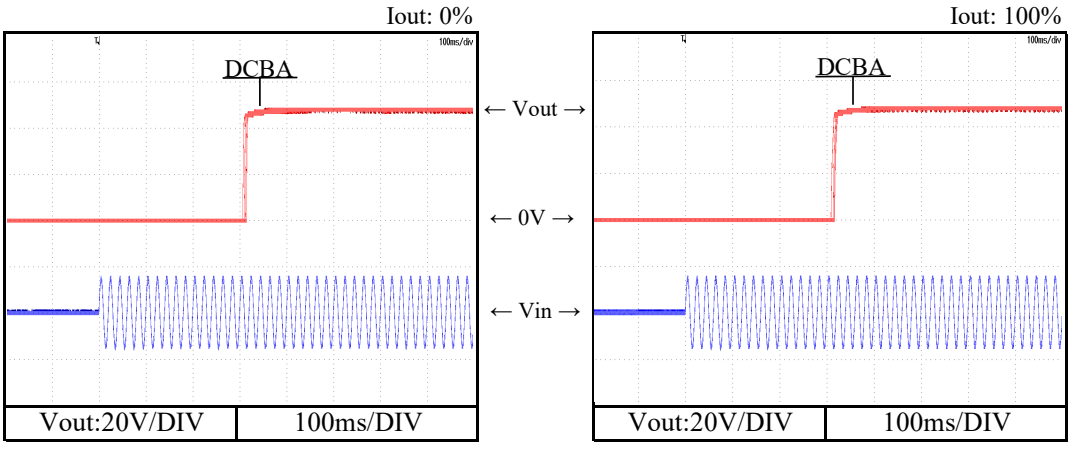
2-4. Output rise characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Istb : 100 %
Ta : 25 ℃

36V



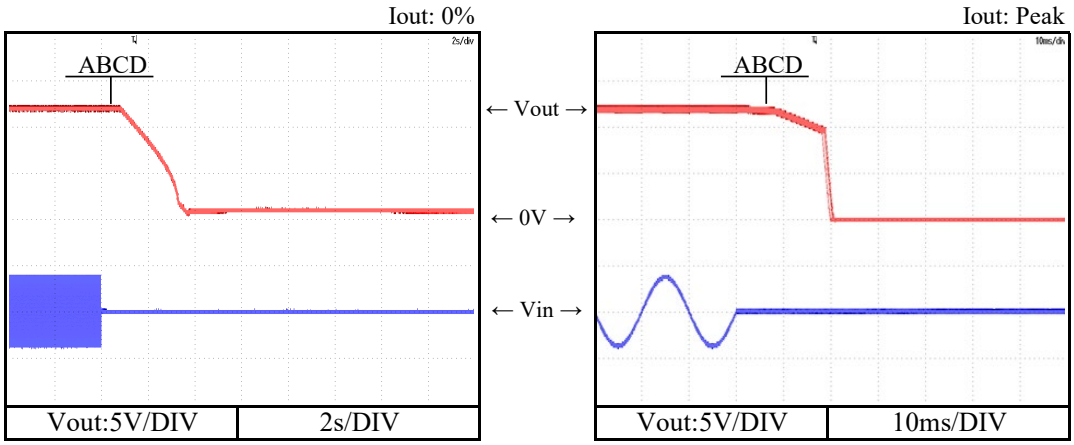
48V



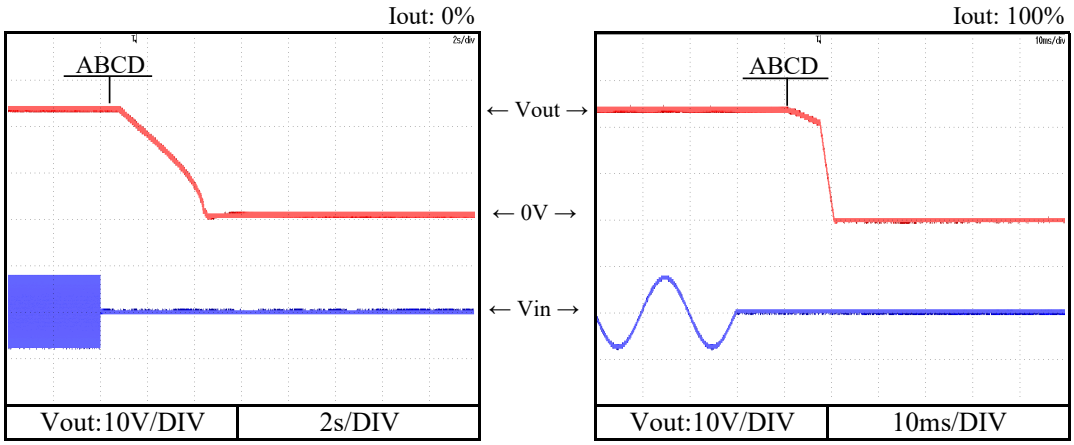
2-5. Output fall characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Istb : 100 %
Ta : 25 °C

12V



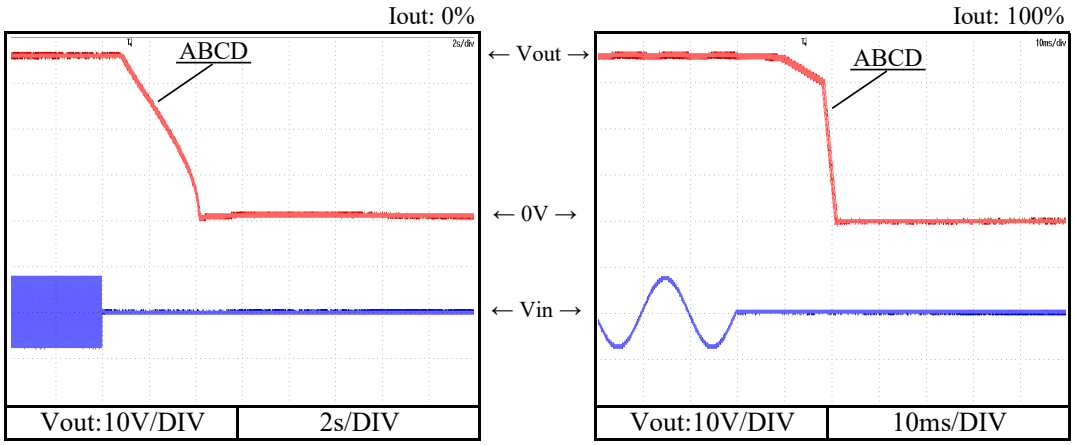
24V



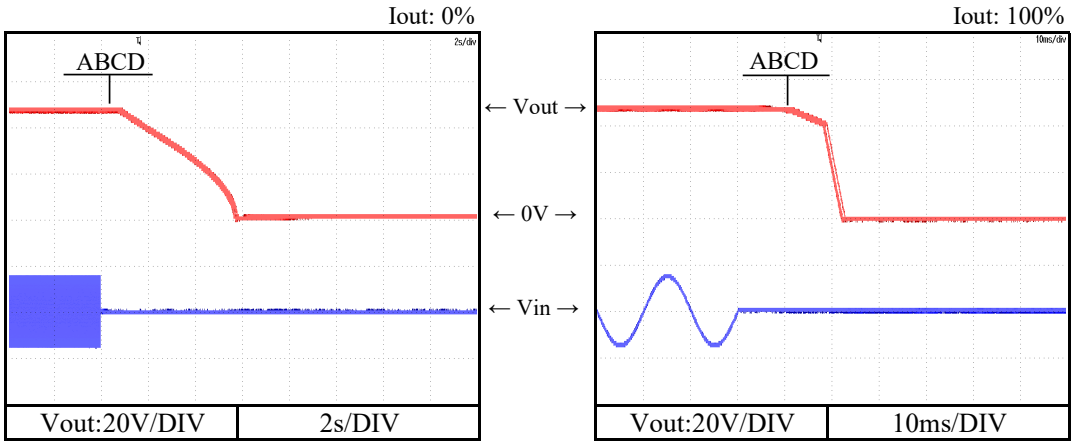
2-5. Output fall characteristics

Conditions Vin : 85 VAC (A)
115 VAC (B)
230 VAC (C)
265 VAC (D)
Istb : 100 %
Ta : 25 °C

36V



48V

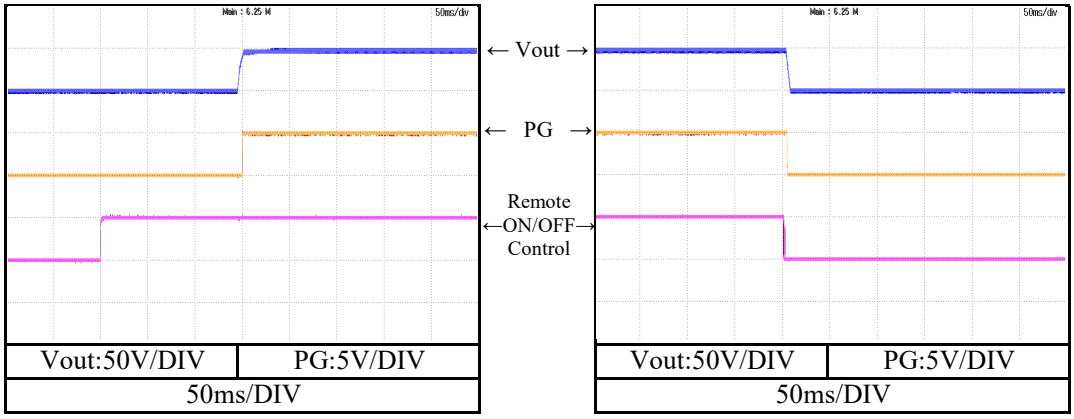


2-6. Various signal

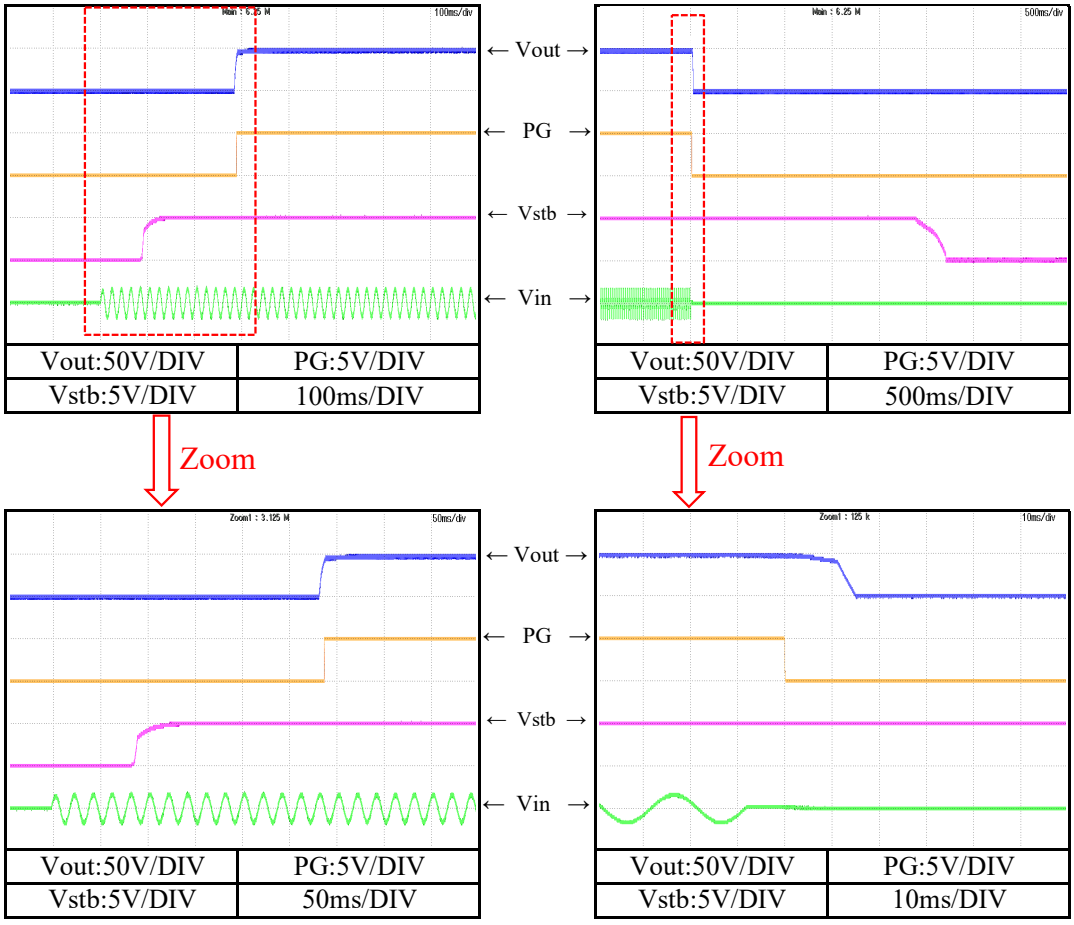
Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 °C

Output rise, fall characteristics with Remote ON/OFF Control

48V



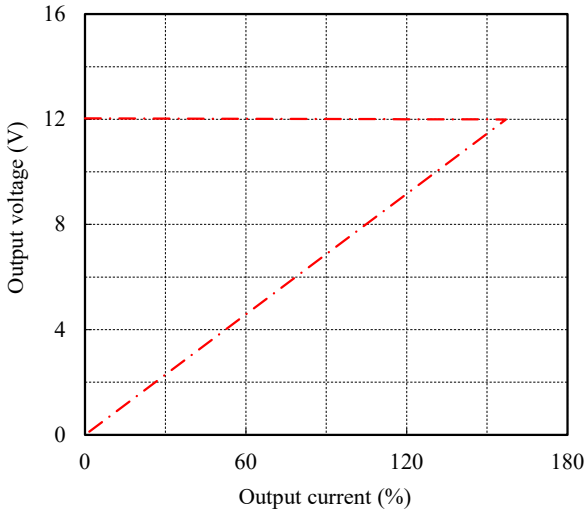
Output rise, fall characteristics with Input voltage ON/OFF



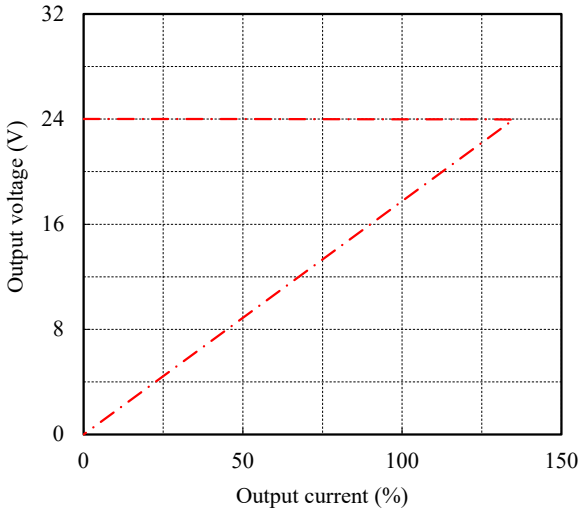
2-7. Over current protection (OCP) characteristics

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

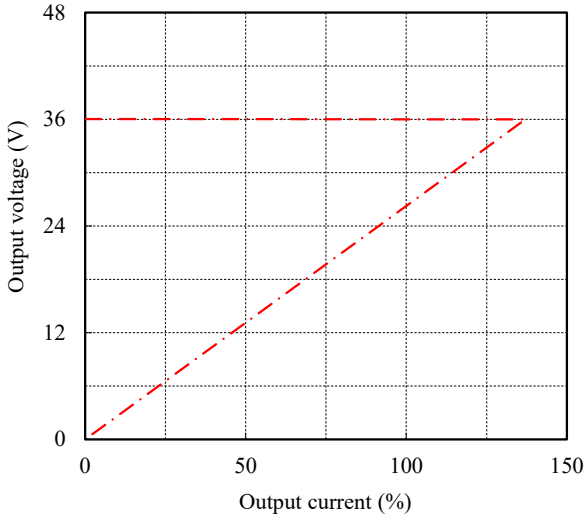
12V



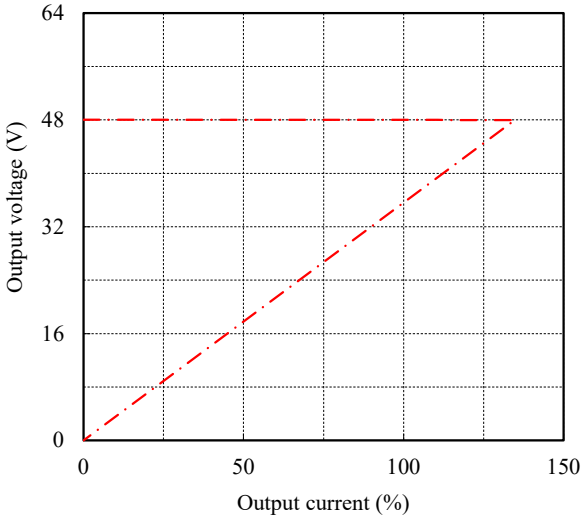
24V



36V



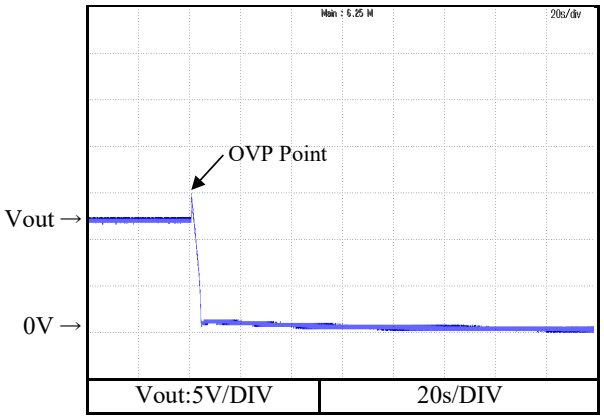
48V



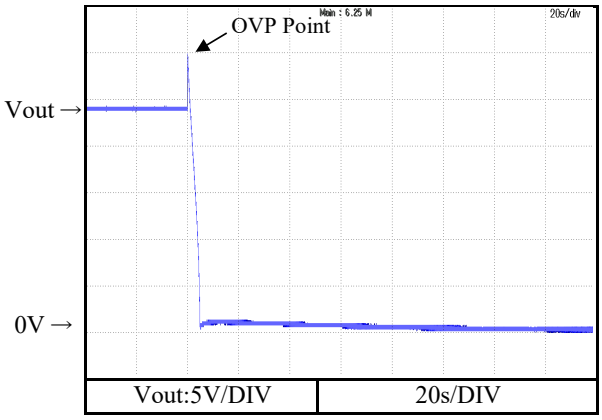
2-8. Over voltage protection (OVP) characteristics

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

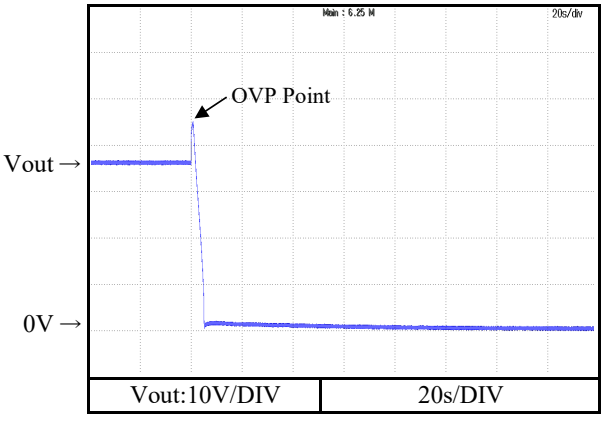
12V



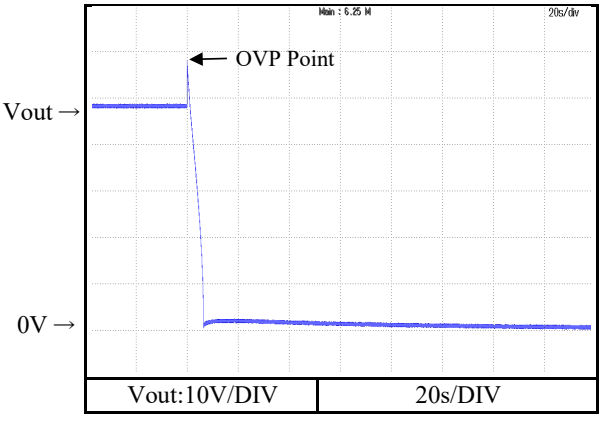
24V



36V



48V

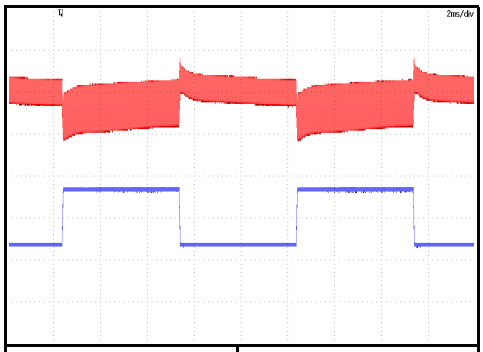


2-9. Dynamic load response characteristics

Conditions Vin : 115 VAC
Iout : 50 % ⇔ 100 % (Peak)
(tr = tf = 50us)
Istb : 100 %
Ta : 25 °C

12V

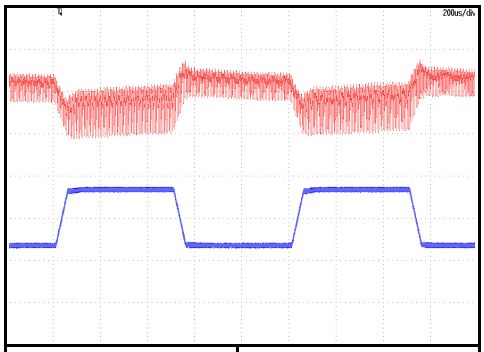
f = 100Hz



Vout: 200mV/DIV	Iout: 50A/DIV
2ms/DIV	
+1.33%	-1.96%

←Vout→
←Iout→
← 0A→

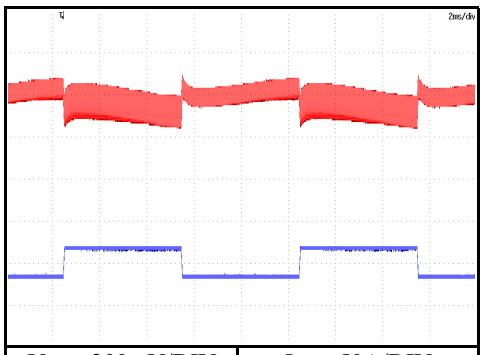
f = 1kHz



Vout: 200mV/DIV	Iout: 50A/DIV
200µs/DIV	
+1.28%	-1.88%

24V

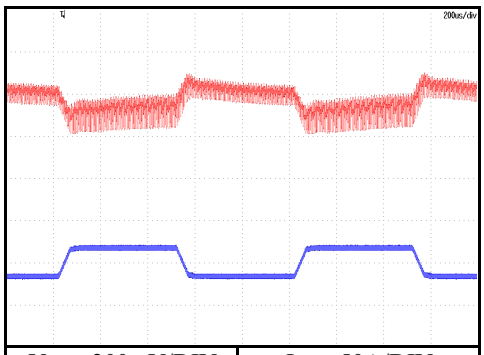
f = 100Hz



Vout: 200mV/DIV	Iout: 50A/DIV
2ms/DIV	
+0.40%	-0.67%

←Vout→
←Iout→
← 0A→

f = 1kHz



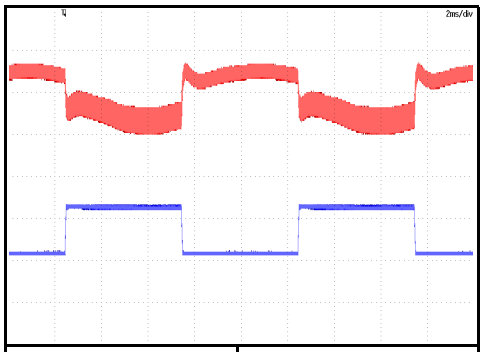
Vout: 200mV/DIV	Iout: 50A/DIV
200µs/DIV	
+0.43%	-0.78%

2-9. Dynamic load response characteristics

Conditions Vin : 115 VAC
Iout : 50 % ⇔ 100 % (Peak)
(tr = tf = 50us)
Istb : 100 %
Ta : 25 °C

36V

f = 100Hz



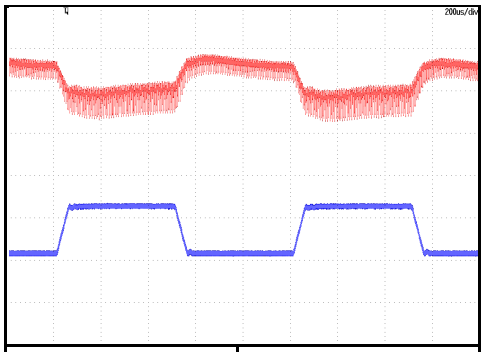
Vout: 200mV/DIV	Iout: 20A/DIV
2ms/DIV	
+0.40%	-0.56%

←Vout→

←Iout→

← 0A→

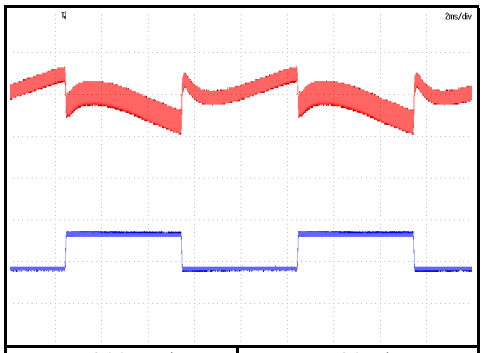
f = 1kHz



Vout: 200mV/DIV	Iout: 20A/DIV
200us/DIV	
+0.48%	-0.41%

48V

f = 100Hz



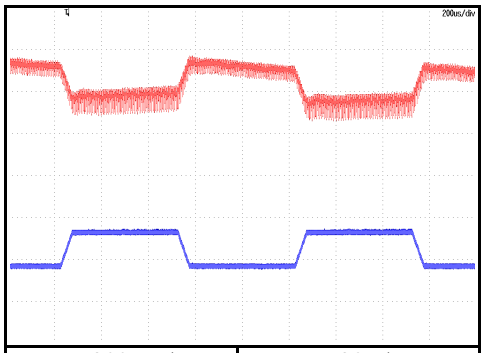
Vout: 200mV/DIV	Iout: 20A/DIV
2ms/DIV	
+0.28%	-0.40%

←Vout→

←Iout→

← 0A→

f = 1kHz



Vout: 200mV/DIV	Iout: 20A/DIV
200us/DIV	
+0.36%	-0.29%

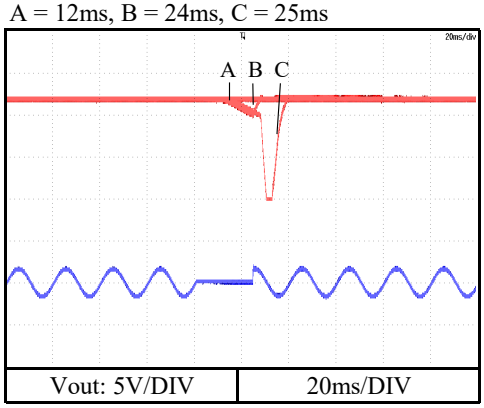
2-10. Response to brown out characteristics

Conditions Iout : 100 %
Istb : 100 %
Ta : 25 °C

Interruption time
A : Output voltage does not drop.
B : Output voltage drop down to 20~40% of the nominal output voltage.
C : Output voltage drops until 0V.

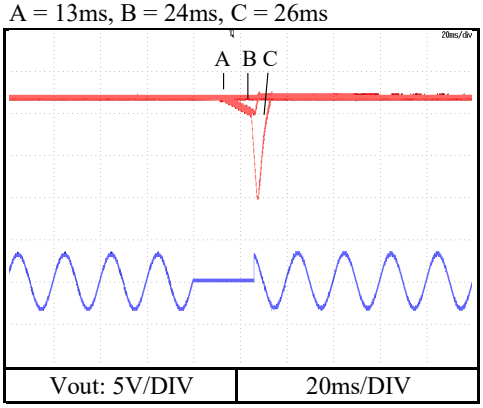
12V

Vin : 115VAC
A = 12ms, B = 24ms, C = 25ms



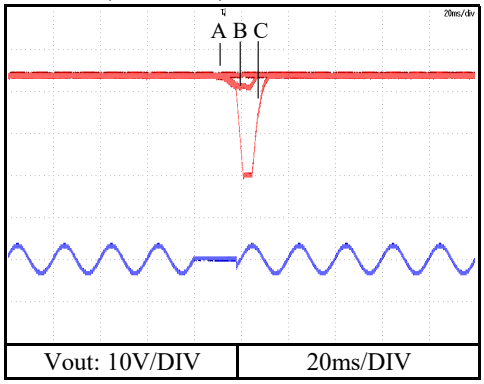
←Vout→
←0V→
←Vin→

Vin : 230VAC
A = 13ms, B = 24ms, C = 26ms



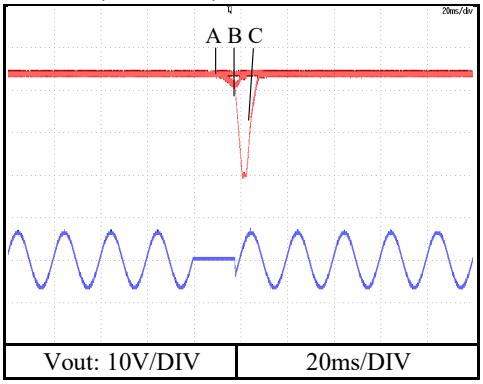
24V

Vin : 115VAC
A = 12ms, B = 17ms, C = 18ms



←Vout→
←0V→
←Vin→

Vin : 230VAC
A =12ms, B = 17ms, C = 18ms



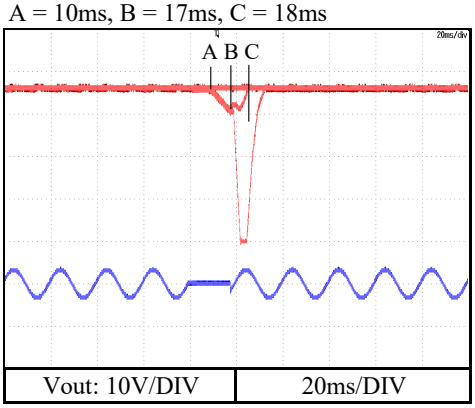
2-10. Response to brown out characteristics

Conditions Iout : 100 %
Istb : 100 %
Ta : 25 °C

Interruption time
A : Output voltage does not drop.
B : Output voltage drop down to 20~40% of the nominal output voltage.
C : Output voltage drops until 0V.

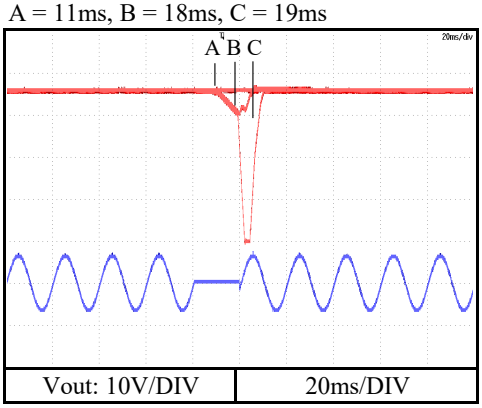
36V

Vin : 115VAC
A = 10ms, B = 17ms, C = 18ms



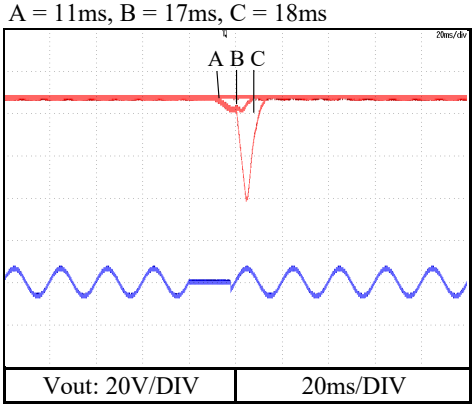
←Vout→
←0V→
←Vin→

Vin : 230VAC
A = 11ms, B = 18ms, C = 19ms



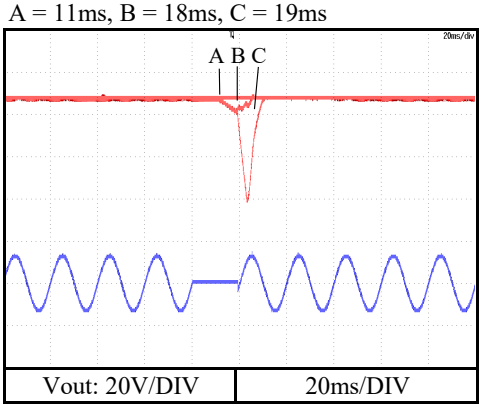
48V

Vin : 115VAC
A = 11ms, B = 17ms, C = 18ms



←Vout→
←0V→
←Vin→

Vin : 230VAC
A = 11ms, B = 18ms, C = 19ms

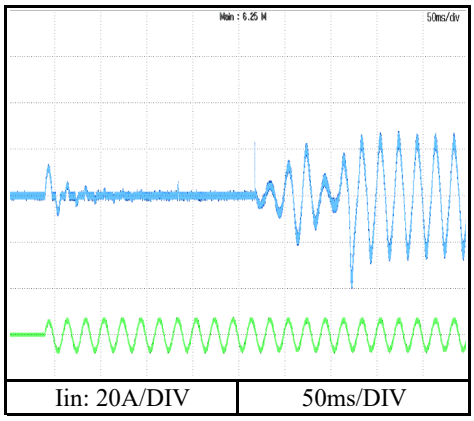


2-11. Inrush current waveform

Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

48V

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

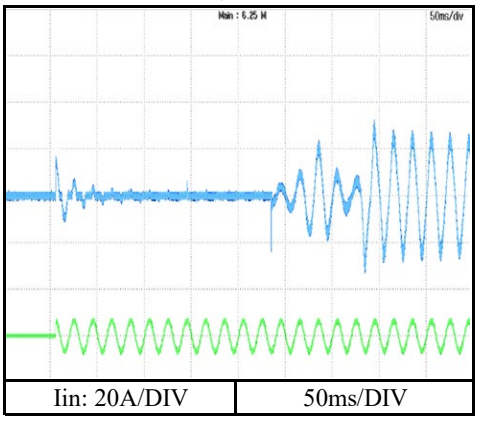


Iin: 20A/DIV	50ms/DIV

← Iin →

← Vin →

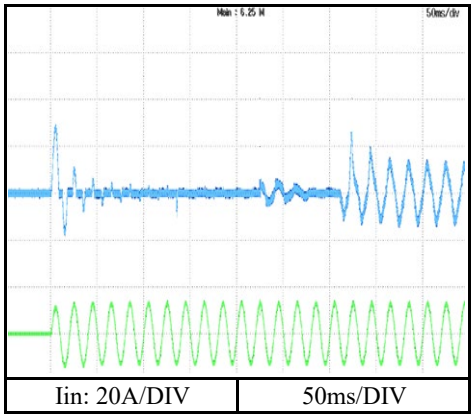
Switch on phase angle of input AC voltage
ϕ = 90°



Iin: 20A/DIV	50ms/DIV

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

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

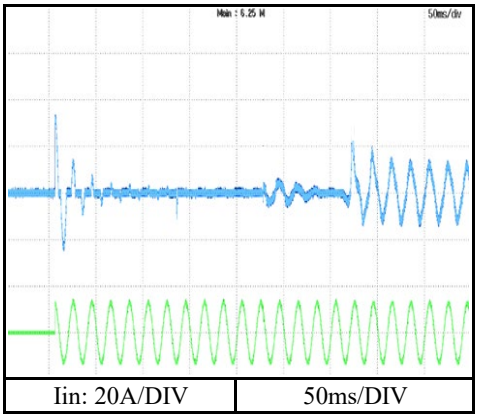


Iin: 20A/DIV	50ms/DIV

← Iin →

← Vin →

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

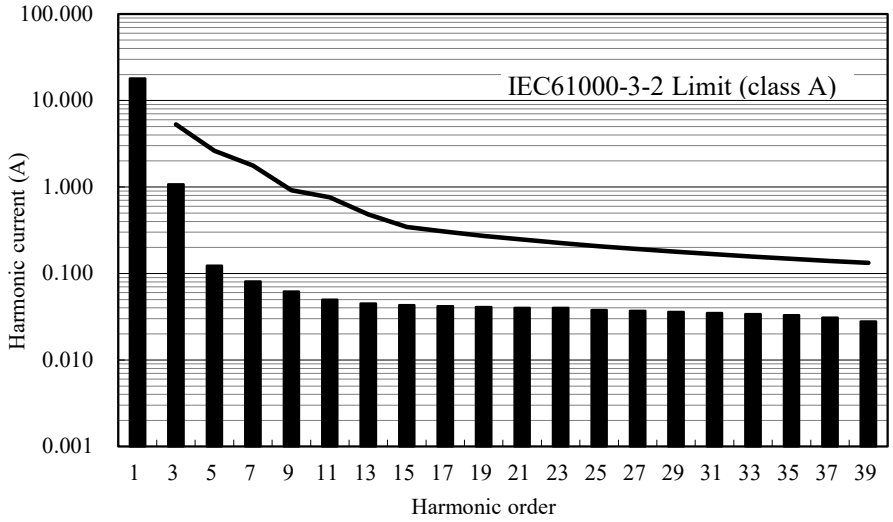


Iin: 20A/DIV	50ms/DIV

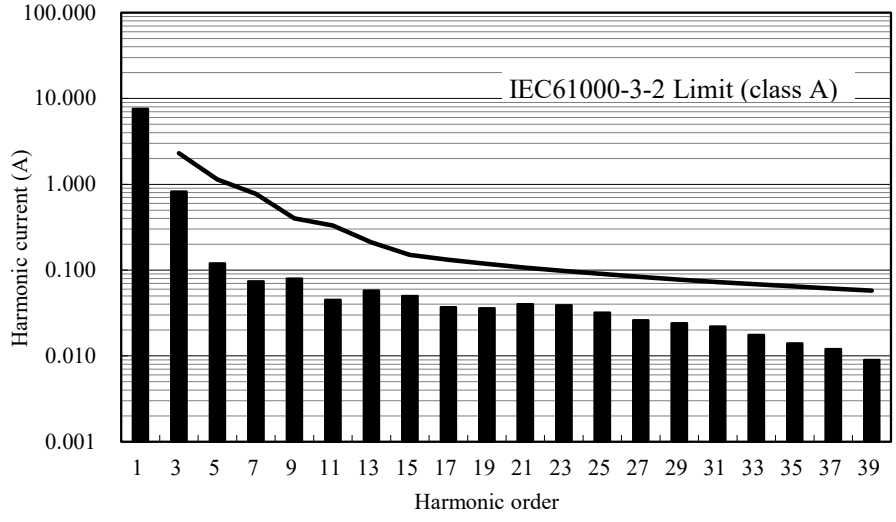
2-12. Input current harmonics

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

48V



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



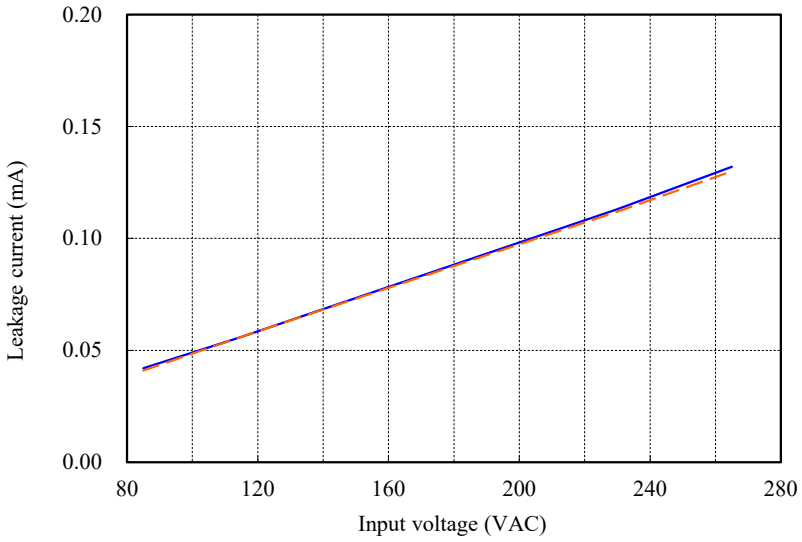
2-13. Leakage current characteristics

Earth leakage current of CLASS I equipment

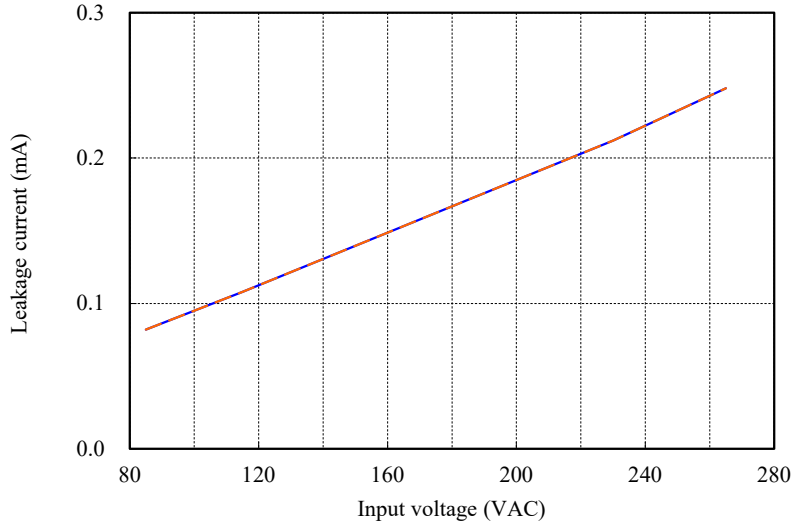
Conditions Iout : 0 % ——
100 % - - - - -
Ta : 25 °C
Istb : 100 %
f : 60 Hz

48V

Normal condition



Single fault condition (Open L or N)

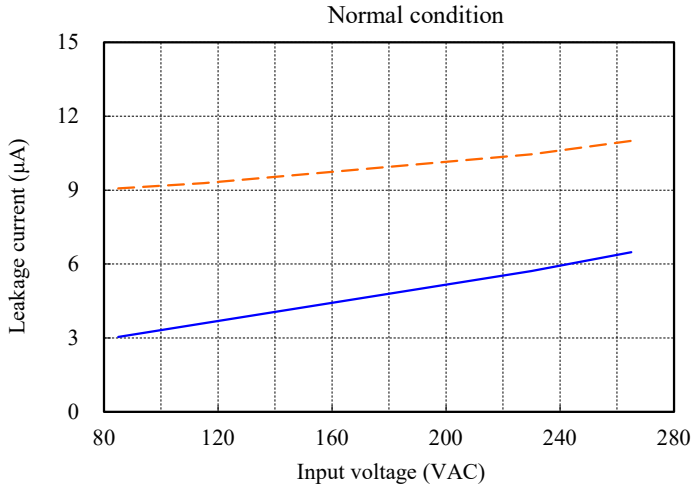


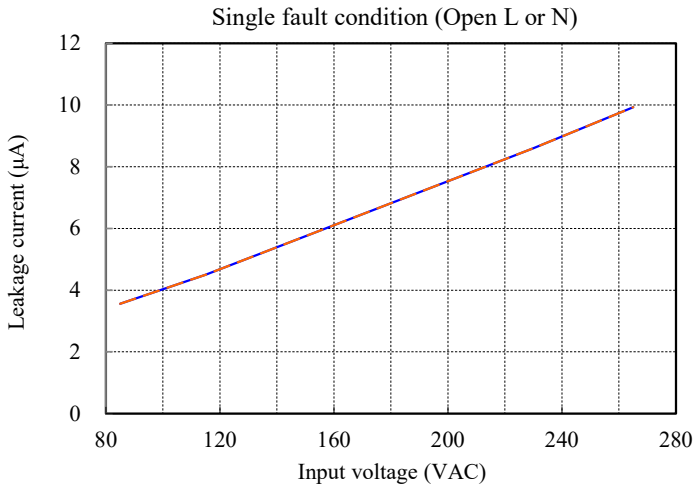
2-13. Leakage current characteristics

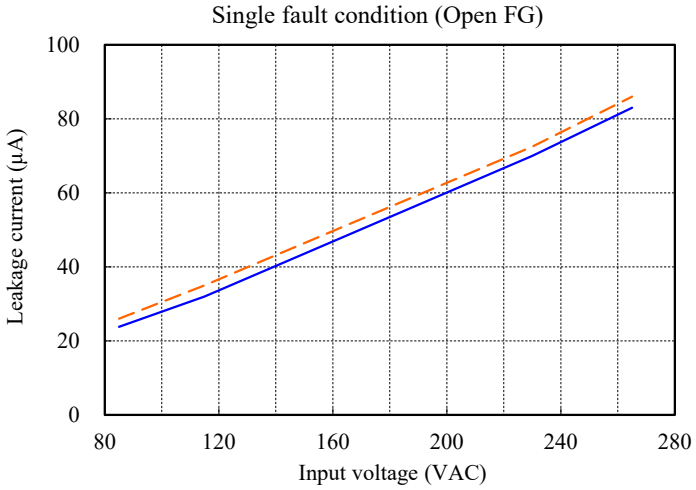
Patient leakage current of CLASS I equipment

Conditions Iout : 0 %
100 %
Ta : 25 °C
Istb : 100 %
f : 60 Hz

48V

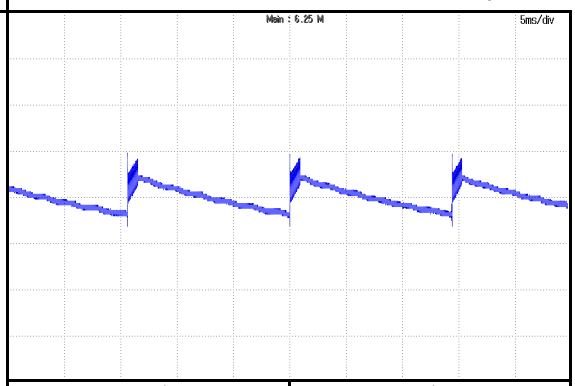
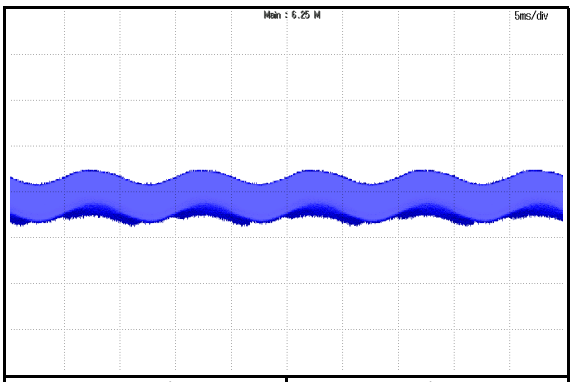
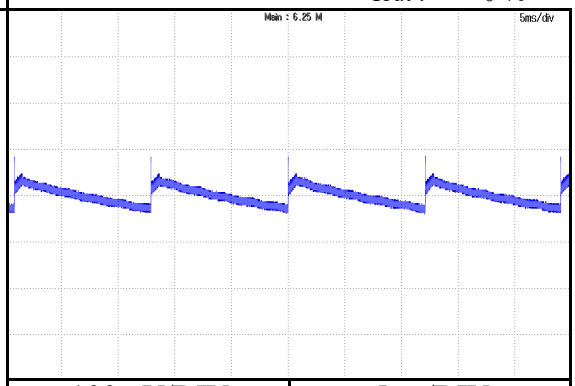
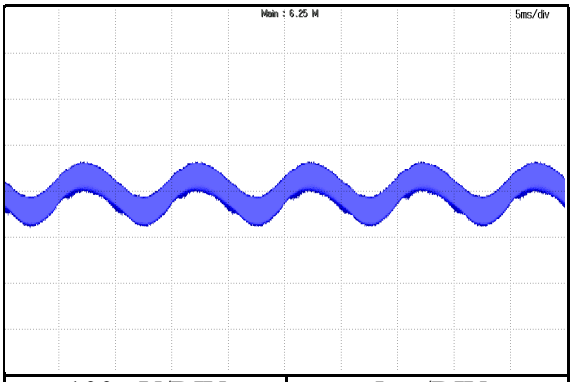
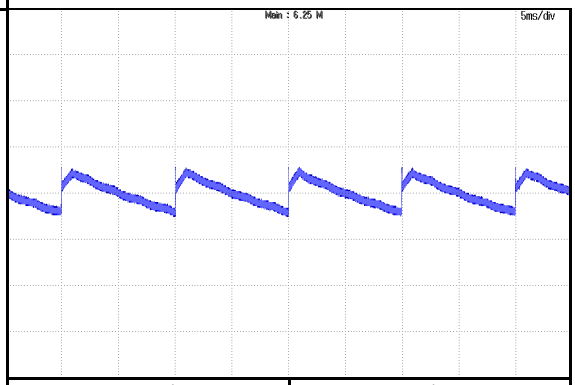
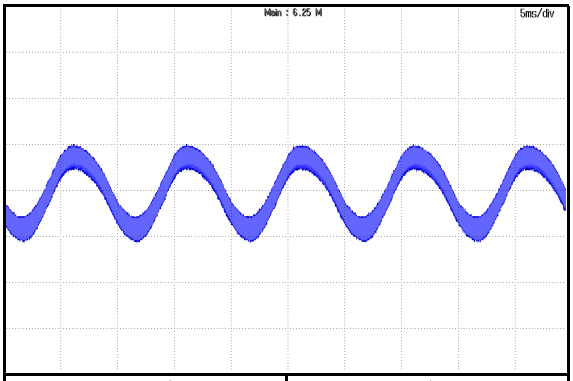
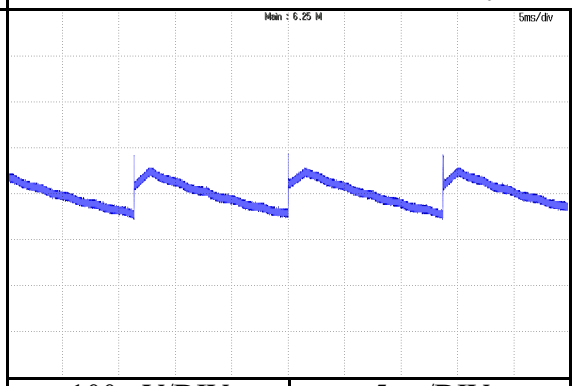
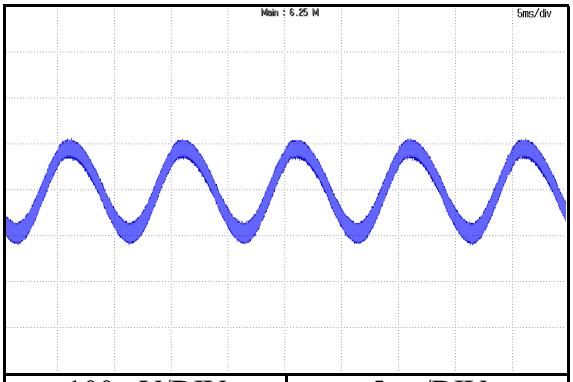






2-14. Output ripple and noise waveform

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

	Iout : 0 %		Iout : 100 %	
12V		50mV/DIV 5ms/DIV		100mV/DIV 5ms/DIV
24V		100mV/DIV 5ms/DIV		100mV/DIV 5ms/DIV
36V		100mV/DIV 5ms/DIV		100mV/DIV 5ms/DIV
48V		100mV/DIV 5ms/DIV		100mV/DIV 5ms/DIV

2-15. Electro-Magnetic Interference characteristics

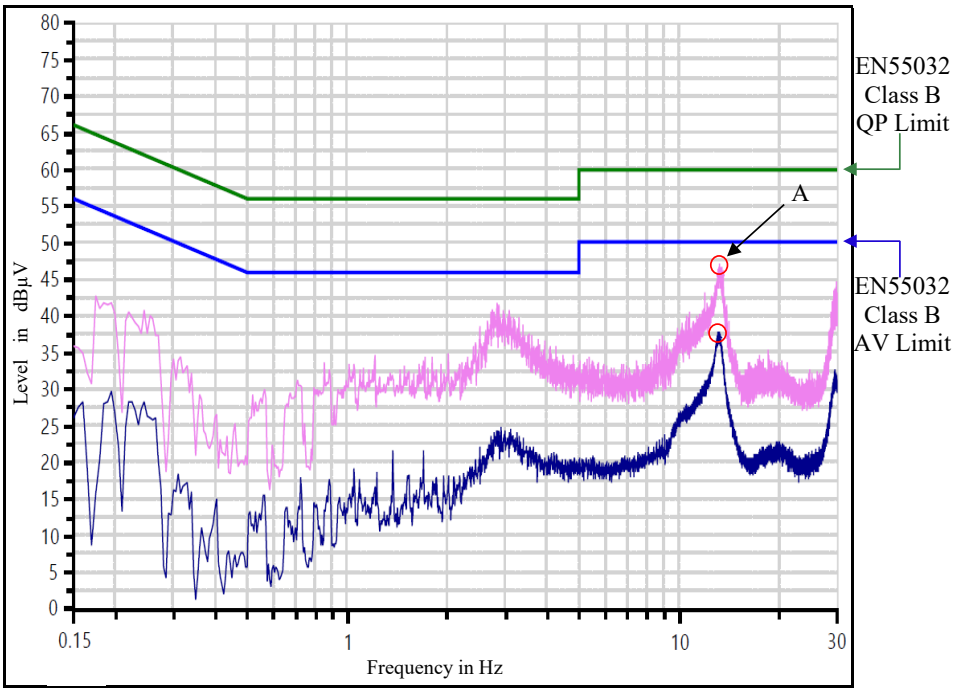
Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

12V

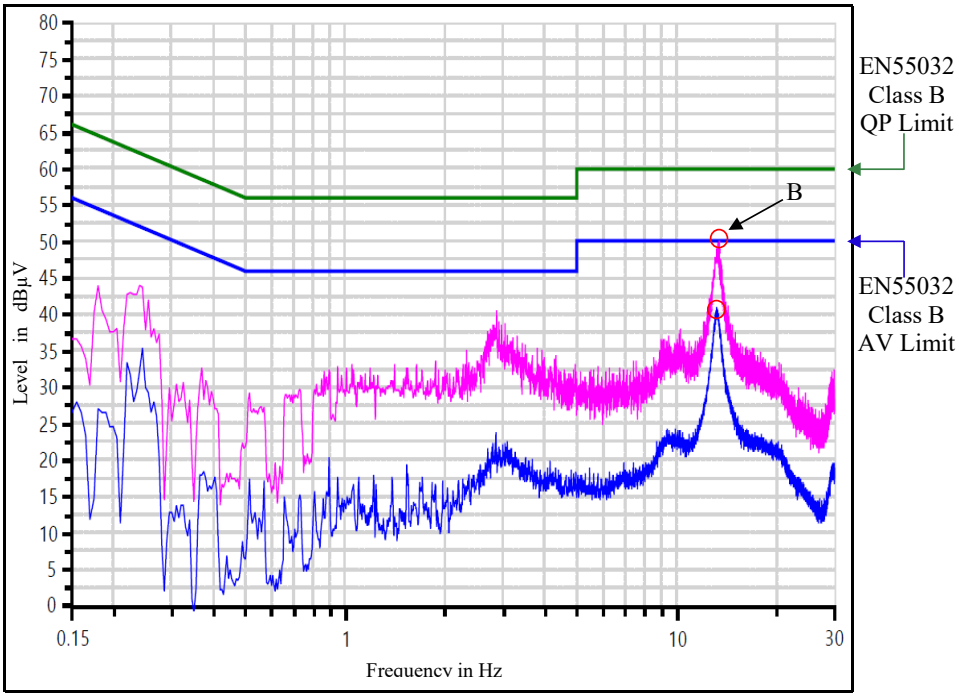
Phase : L

Ref. Data	Point A (13.3MHz) Limit (dB)	Measure (dB)
QP	60.0	47.1
AV	50.0	37.8



Phase : N

Ref. Data	Point B (13.5MHz) Limit (dB)	Measure (dB)
QP	60.0	50.2
AV	50.0	41.0



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

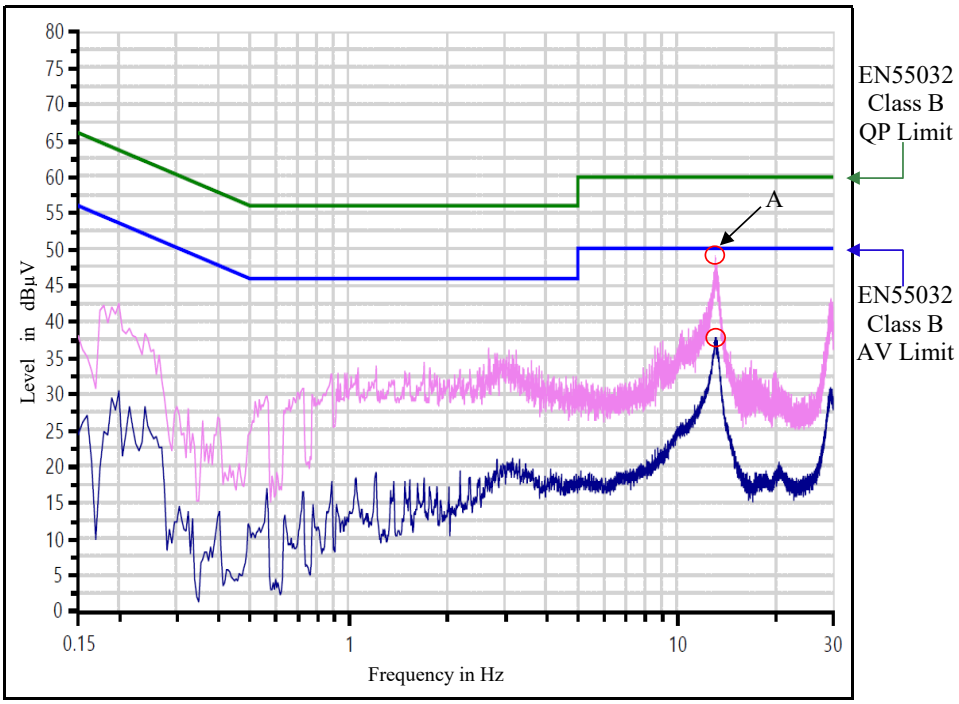
Conditions Vin : 230 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

12V

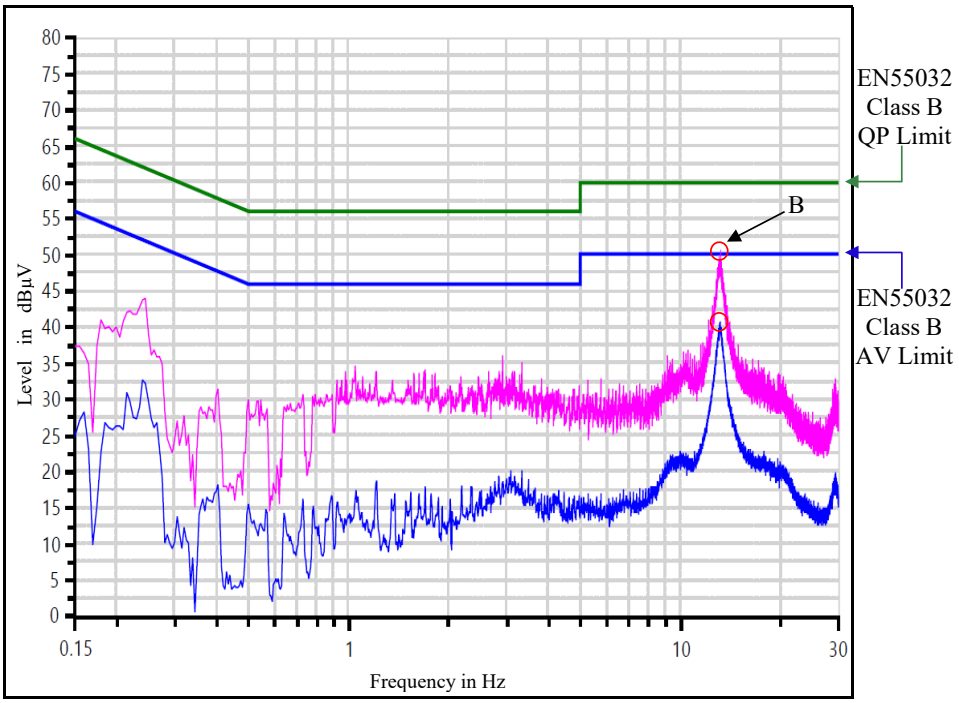
Phase : L

Ref. Data	Point A (13.1MHz) Limit (dB)	Measure (dB)
QP	60.0	48.7
AV	50.0	37.8



Phase : N

Ref. Data	Point B (13.3MHz) Limit (dB)	Measure (dB)
QP	60.0	50.8
AV	50.0	40.7



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

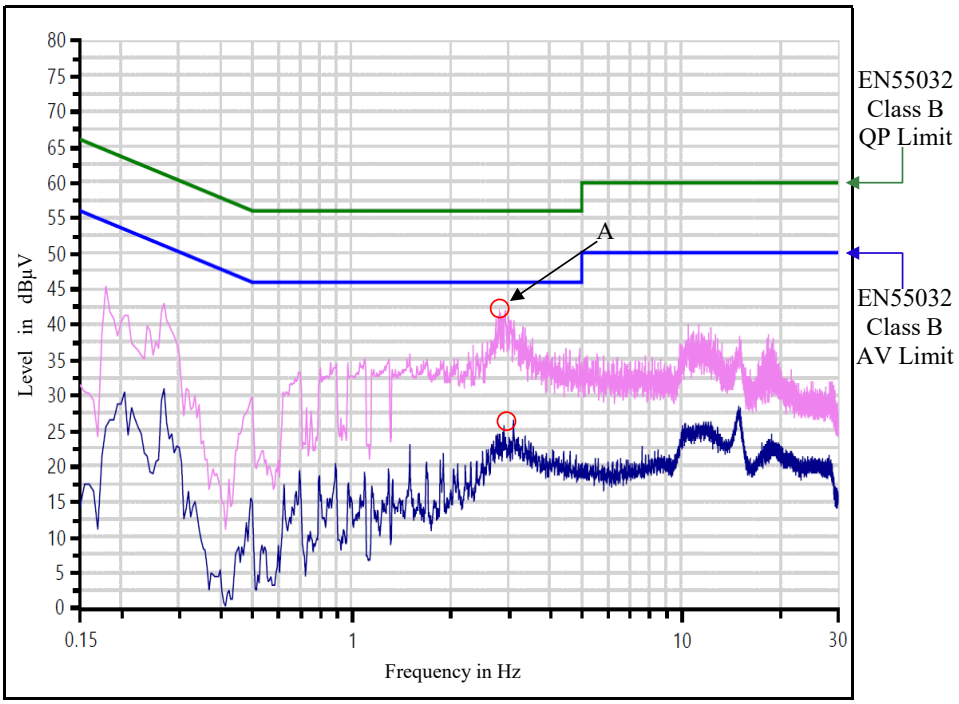
Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

24V

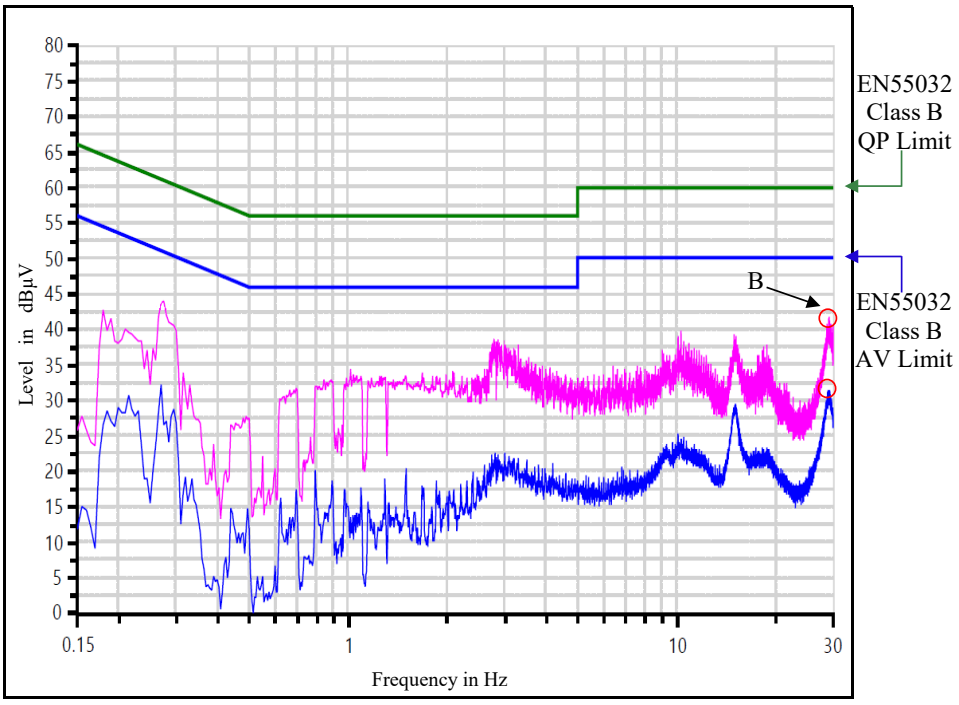
Phase : L

Ref. Data	Point A (3.1MHz) Limit (dB)	Measure (dB)
QP	56.0	42.2
AV	46.0	26.5



Phase : N

Ref. Data	Point B (29.0MHz) Limit (dB)	Measure (dB)
QP	60.0	41.8
AV	50.0	31.4



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

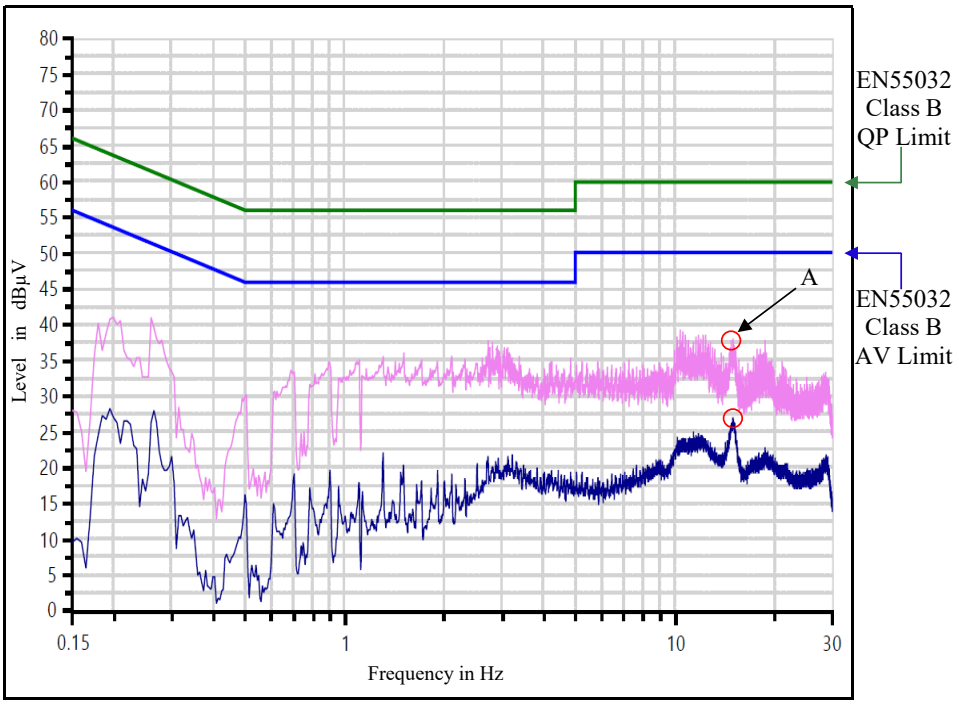
Conditions Vin : 230 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

24V

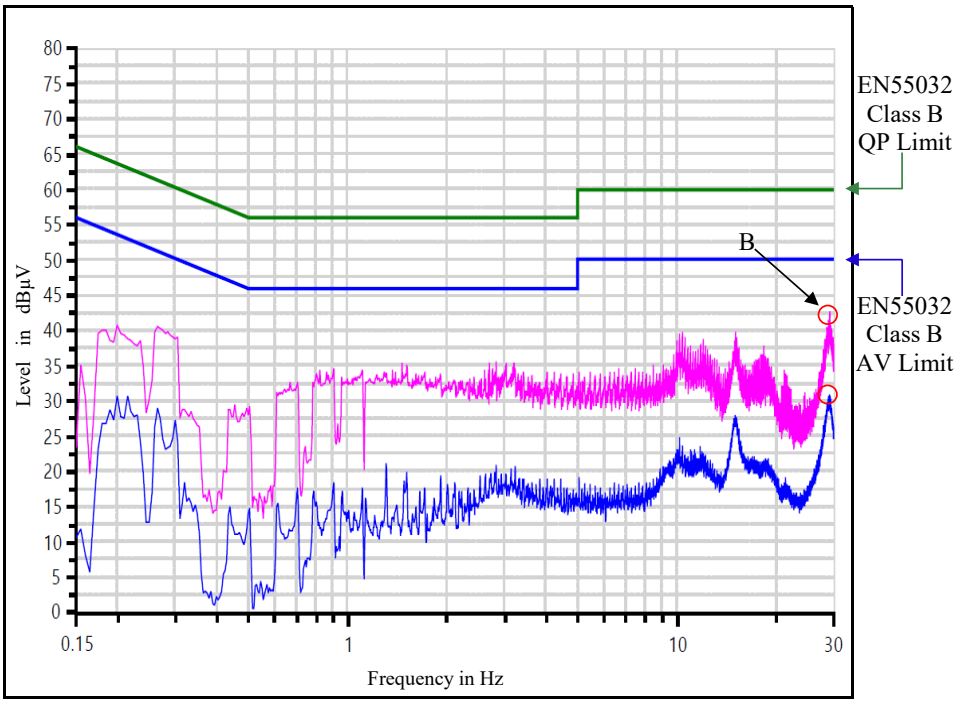
Phase : L

Ref. Data	Point A (15.0MHz) Limit (dB)	Measure (dB)
QP	60.0	38.3
AV	50.0	26.9



Phase : N

Ref. Data	Point B (29.2MHz) Limit (dB)	Measure (dB)
QP	60.0	42.6
AV	50.0	30.8



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

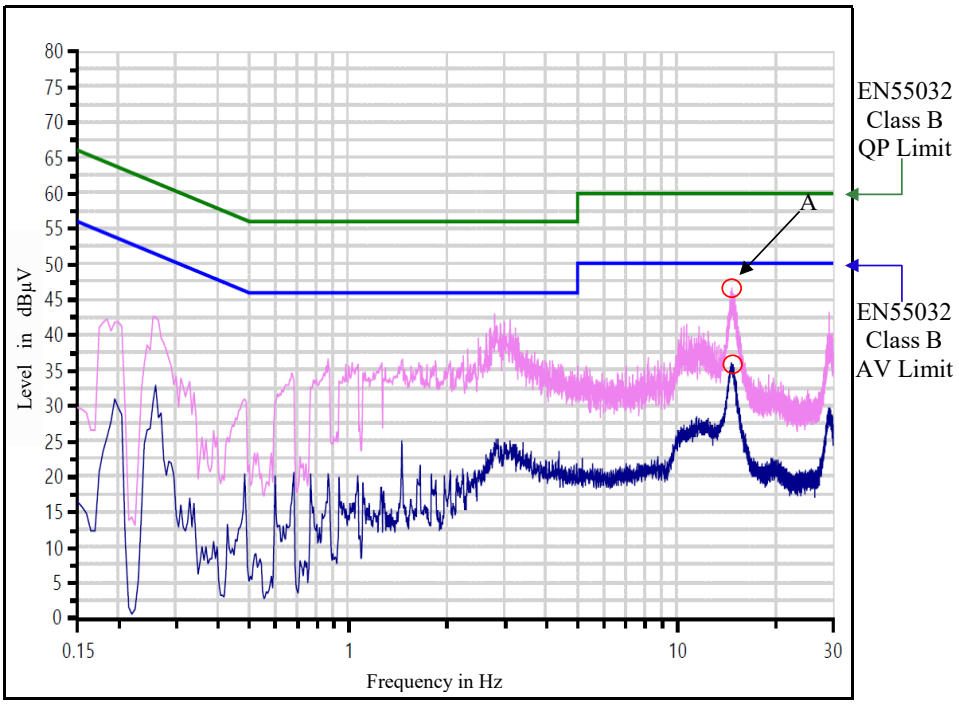
Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

36V

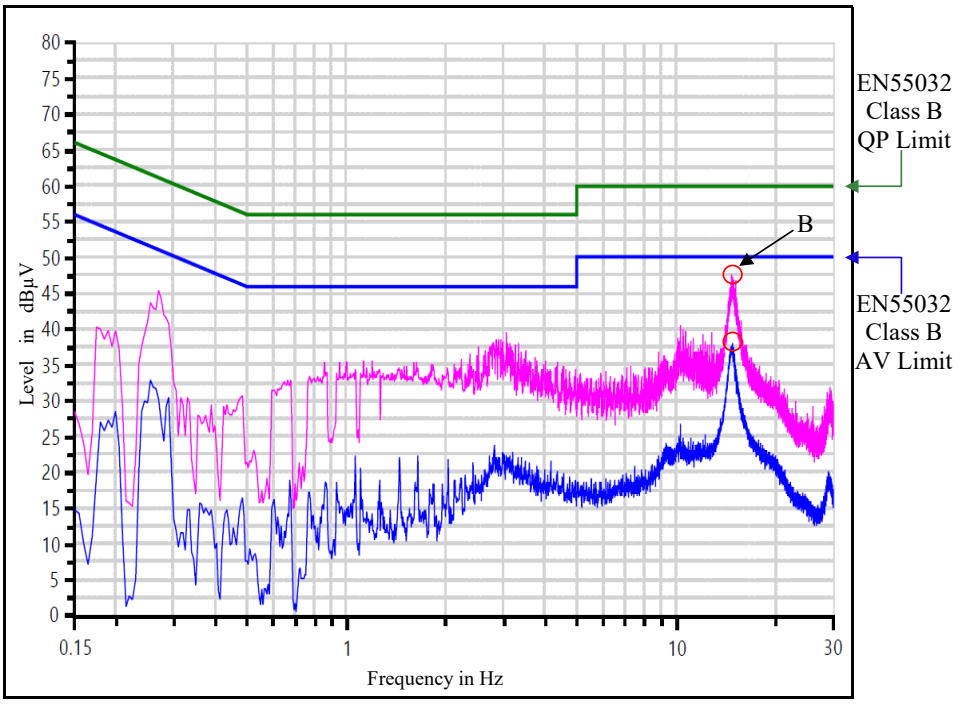
Phase : L

Ref. Data	Point A (14.6MHz) Limit (dB)	Measure (dB)
QP	60.0	46.7
AV	50.0	36.1



Phase : N

Ref. Data	Point B (14.9MHz) Limit (dB)	Measure (dB)
QP	60.0	48.0
AV	50.0	38.1



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

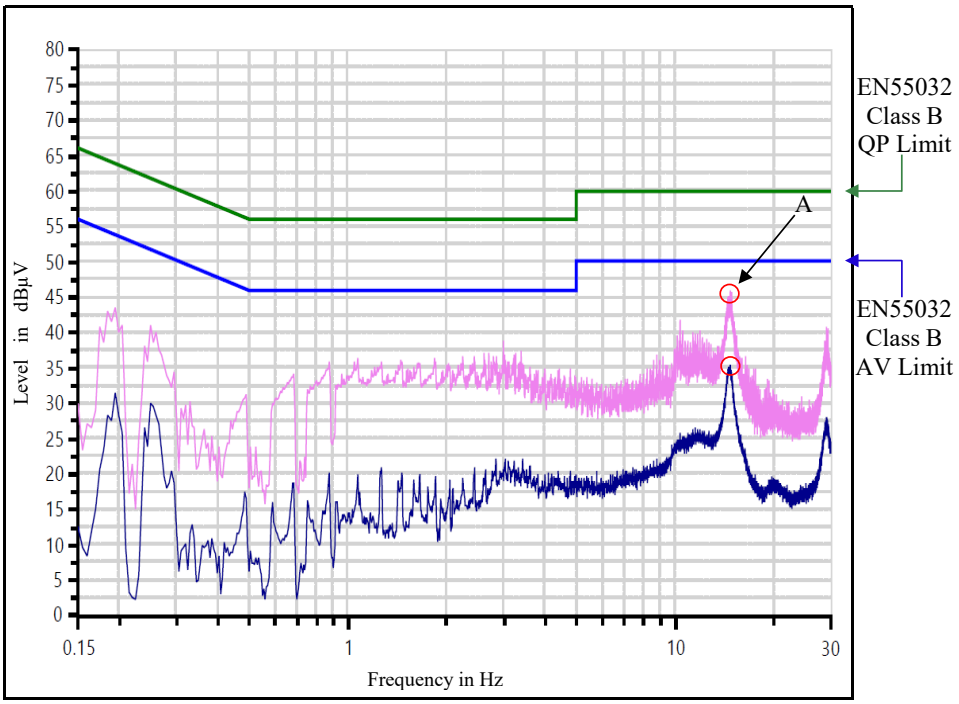
Conditions Vin : 230 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

36V

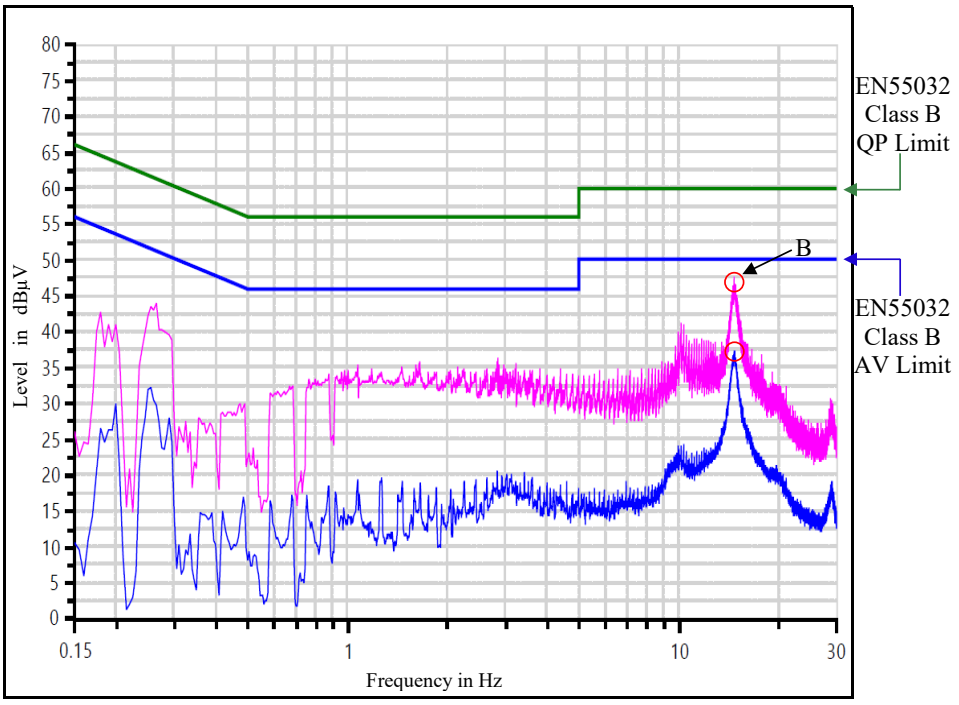
Phase : L

Ref. Data	Point A (14.7MHz) Limit (dB)	Measure (dB)
QP	60.0	45.6
AV	50.0	35.4



Phase : N

Ref. Data	Point B (14.7MHz) Limit (dB)	Measure (dB)
QP	60.0	47.3
AV	50.0	37.2



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

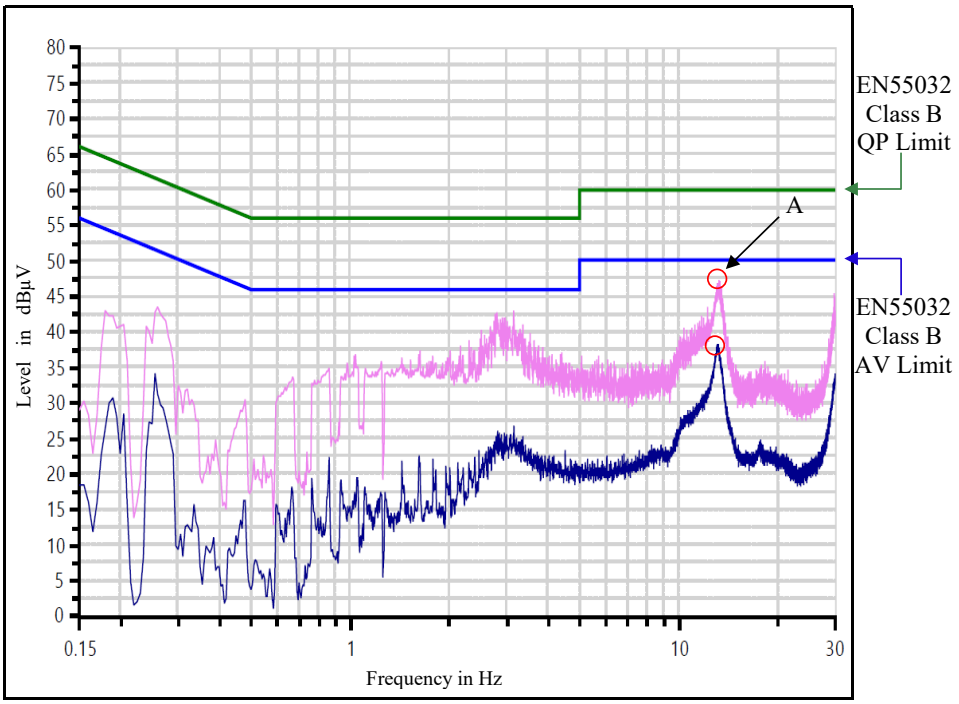
Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

48V

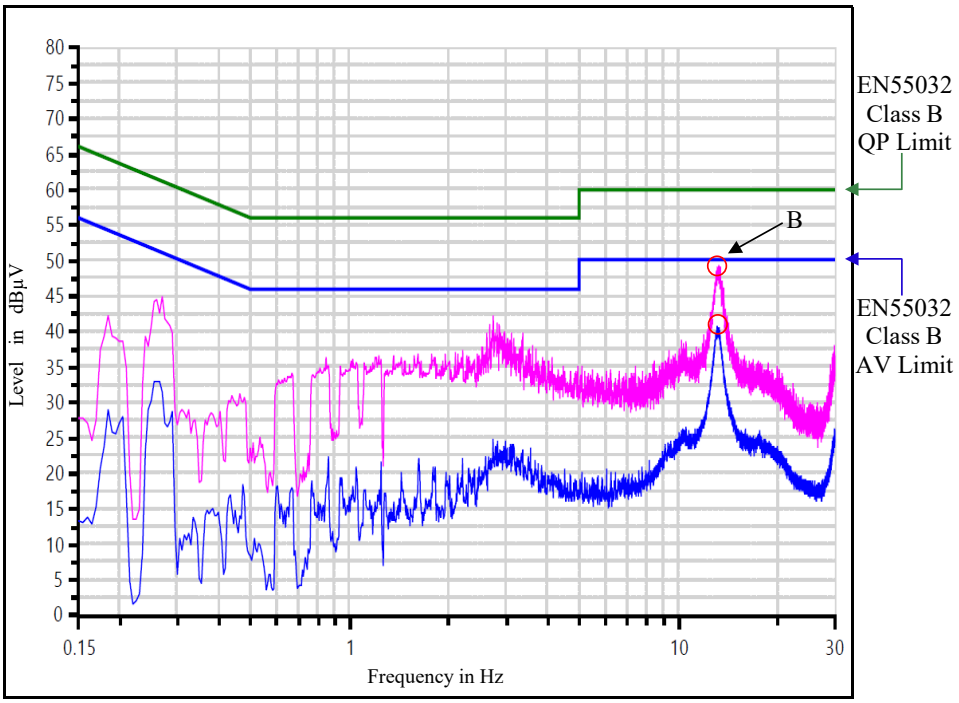
Ref. Data	Point A (13.2MHz) Limit (dB)	Measure (dB)
QP	60.0	47.3
AV	50.0	38.3

Phase : L



Ref. Data	Point B (13.2MHz) Limit (dB)	Measure (dB)
QP	60.0	48.8
AV	50.0	40.7

Phase : N



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

2-15. Electro-Magnetic Interference characteristics

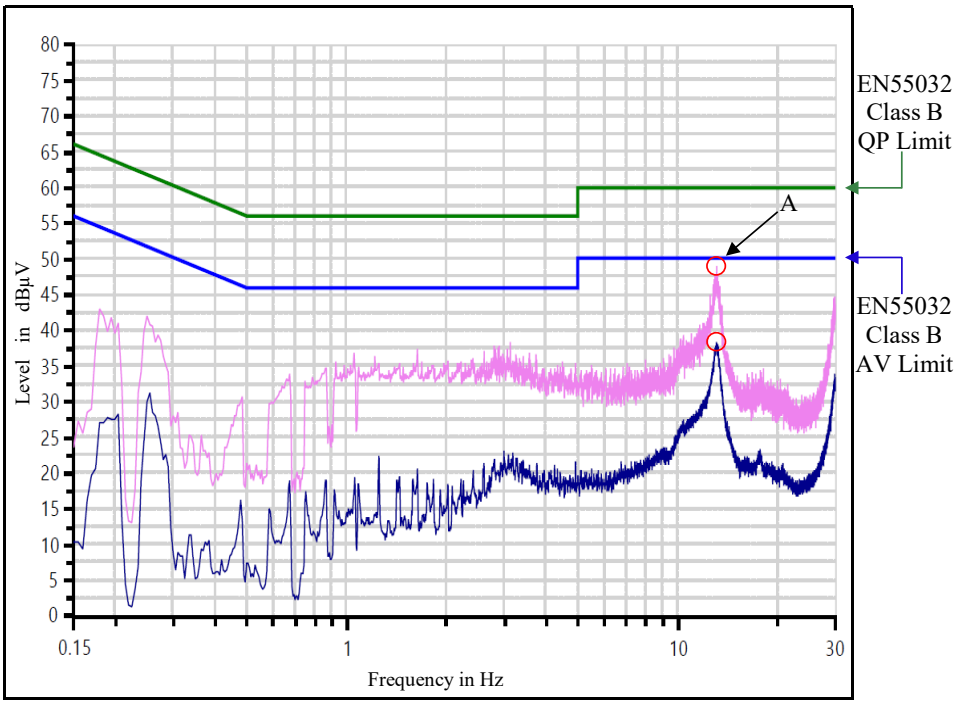
Conditions Vin : 230 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Conducted Emission

48V

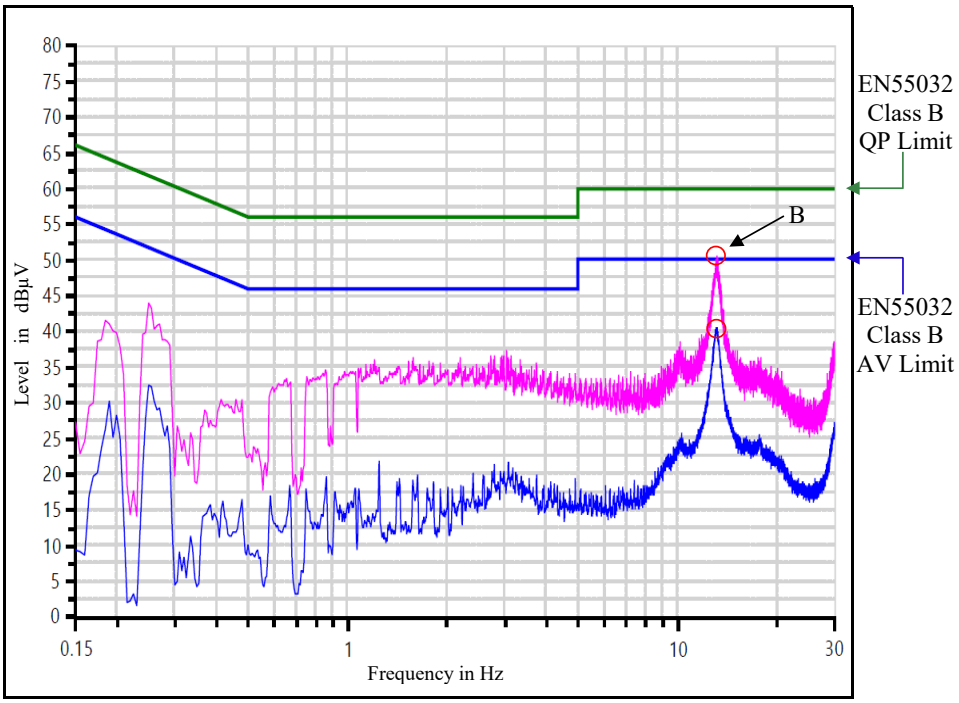
Ref. Data	Point A (13.1MHz) Limit (dB)	Measure (dB)
QP	60.0	48.9
AV	50.0	38.2

Phase : L



Ref. Data	Point B (13.2MHz) Limit (dB)	Measure (dB)
QP	60.0	50.5
AV	50.0	40.6

Phase : N



Limit of EN55011-B, FCC-Class B are same as EN55032-B.

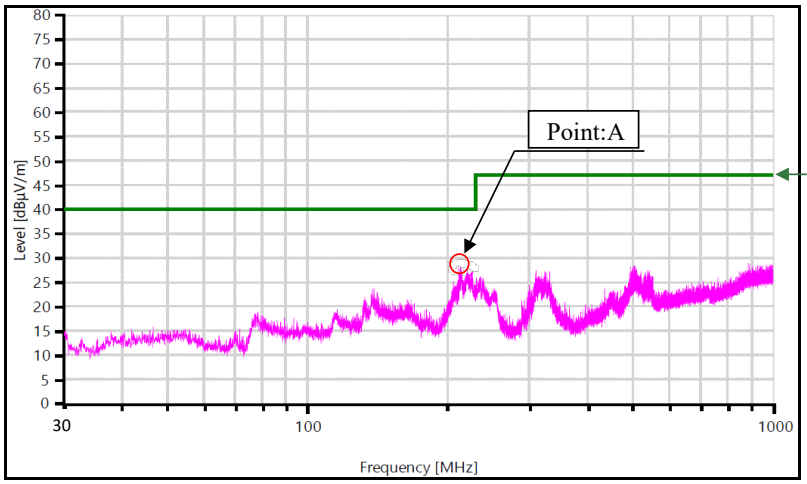
2-15. Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Radiated Emission

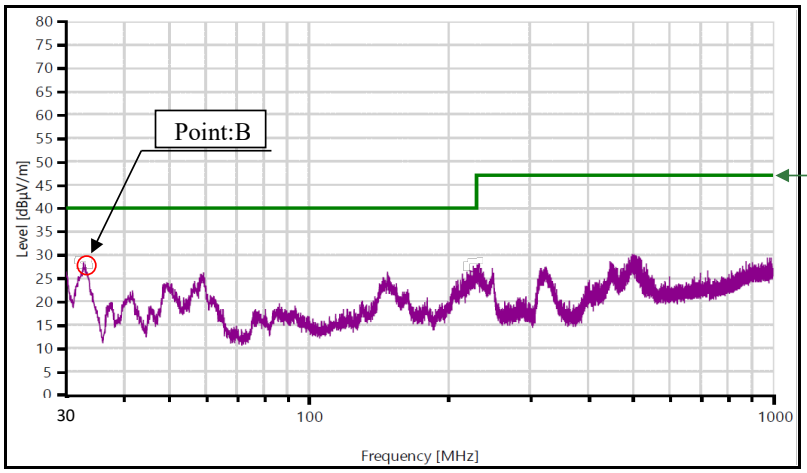
12V

HORIZONTAL



Ref. Data	Point A (212MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	27.8

VERTICAL



Ref. Data	Point B (32.7MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.4

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

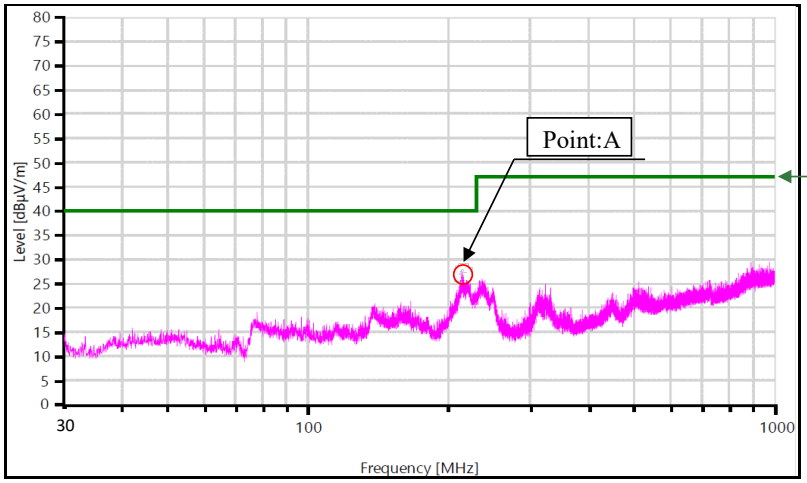
2-15. Electro-Magnetic Interference characteristics

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

Radiated Emission

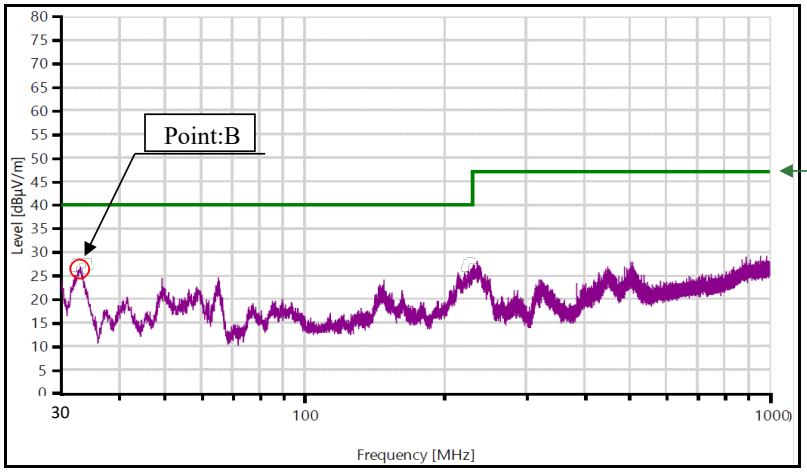
12V

HORIZONTAL



Ref. Data	Point A (214MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	27.4

VERTICAL



Ref. Data	Point B (32.9MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	26.9

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

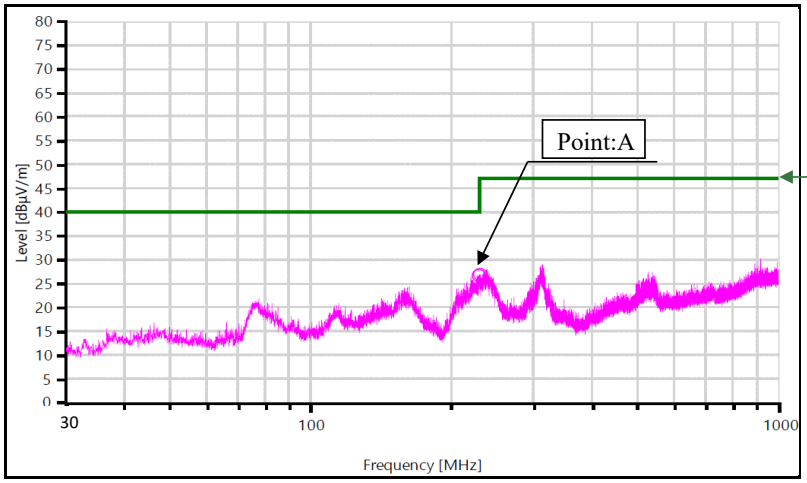
2-15. Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Radiated Emission

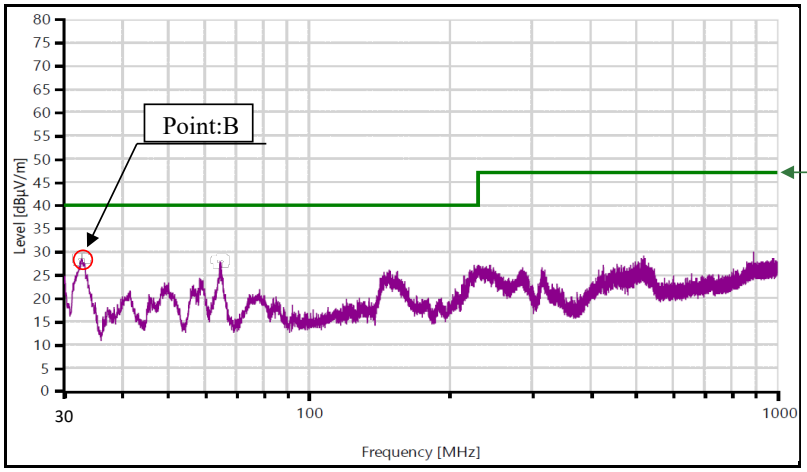
24V

HORIZONTAL



Ref. Data	Point A (230MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	27.0

VERTICAL



Ref. Data	Point B (32.8MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.7

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

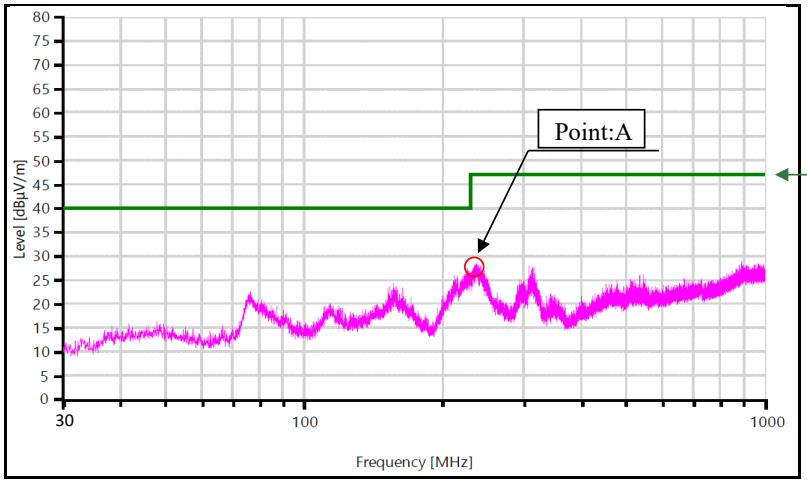
2-15. Electro-Magnetic Interference characteristics

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

Radiated Emission

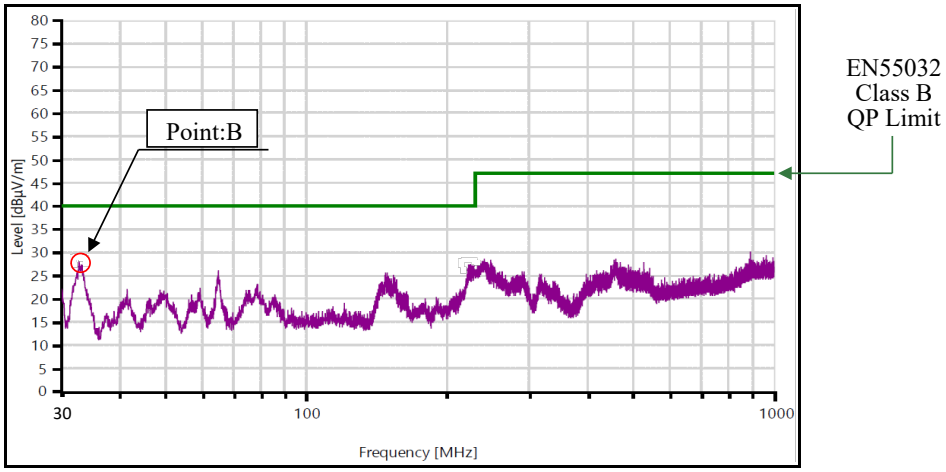
24V

HORIZONTAL



Ref. Data	Point A (226.1MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	27.3

VERTICAL



Ref. Data	Point B (32.7MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.1

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

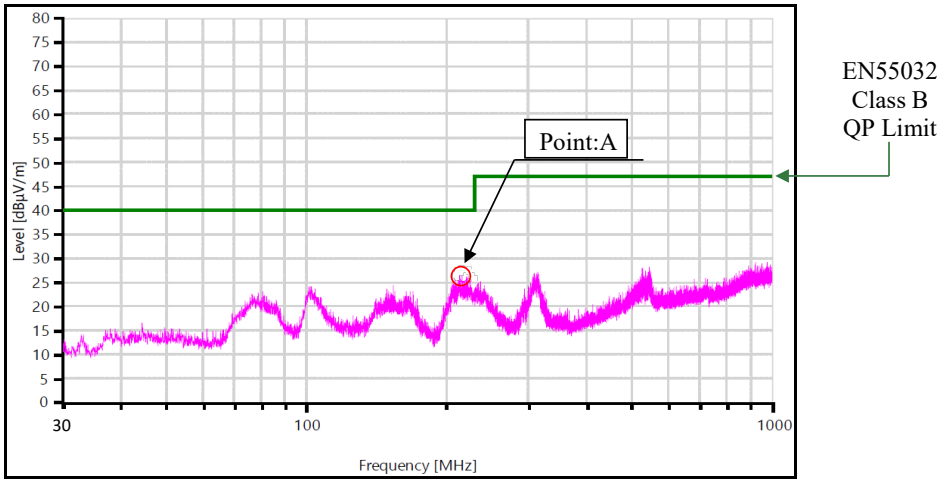
2-15. Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Radiated Emission

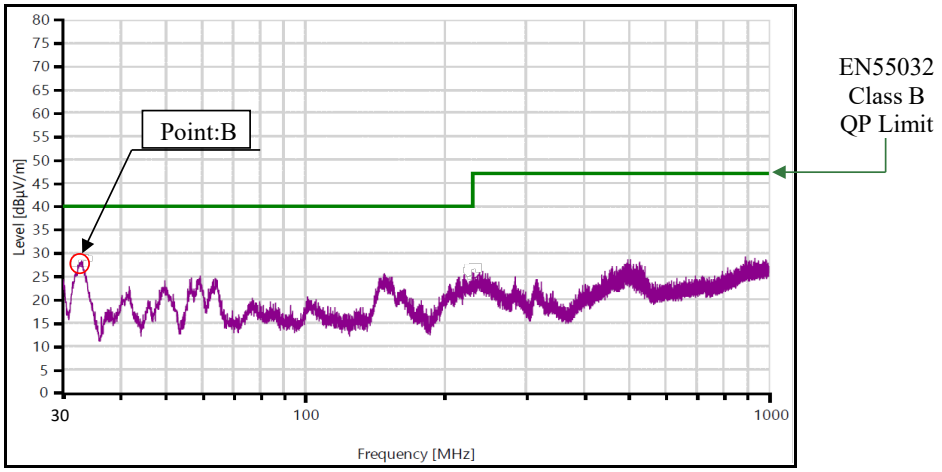
36V

HORIZONTAL



Ref. Data	Point A (216MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	26.4

VERTICAL



Ref. Data	Point B (32.9MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.5

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

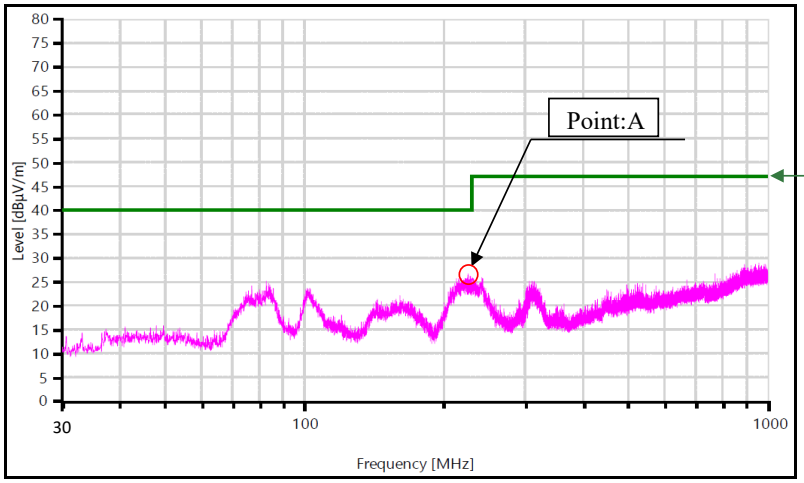
2-15. Electro-Magnetic Interference characteristics

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

Radiated Emission

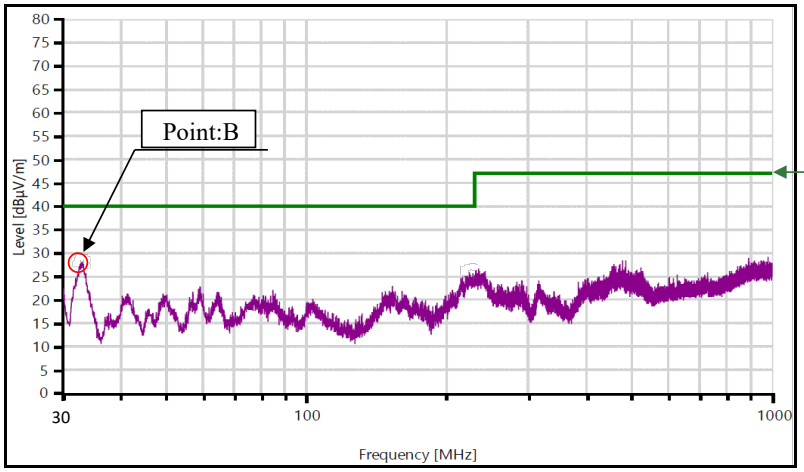
36V

HORIZONTAL



Ref. Data	Point A (225.6MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	26.6

VERTICAL



Ref. Data	Point B (33MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.1

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

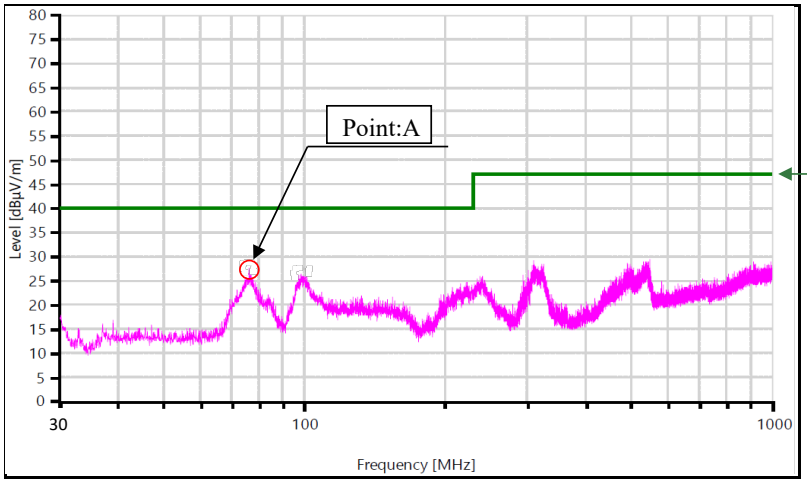
2-15. Electro-Magnetic Interference characteristics

Conditions Vin : 115 VAC
Iout : 100 %
Istb : 100 %
Ta : 25 ℃

Radiated Emission

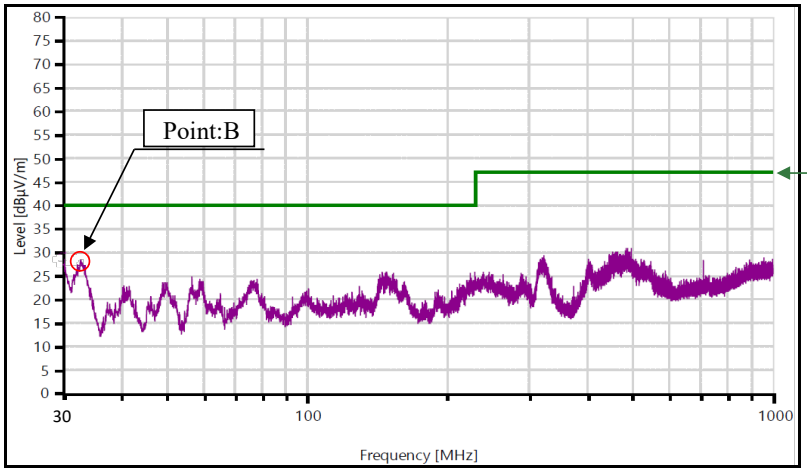
48V

HORIZONTAL



Ref. Data	Point A (76.2MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	27.7

VERTICAL



Ref. Data	Point B (32.6MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.5

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

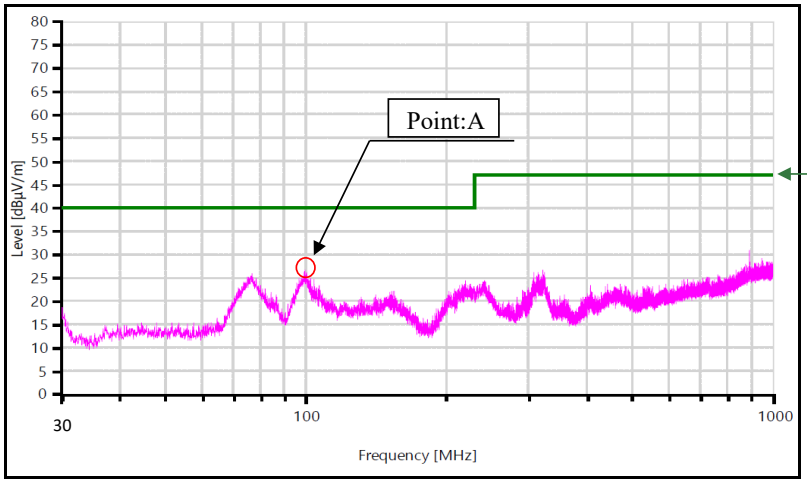
2-15. Electro-Magnetic Interference characteristics

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

Radiated Emission

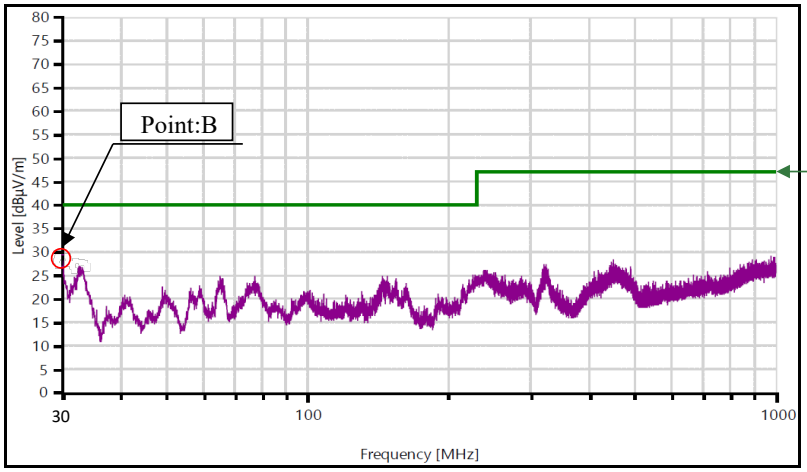
48V

HORIZONTAL



Ref. Data	Point A (99.6MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	26.6

VERTICAL



Ref. Data	Point B (30MHz) Limit (dBuV)	Measure (dBuV)
QP	40.0	28.1

Limit of EN55011-B, FCC-Class B are same as EN55032-B.

Indication are peak values.

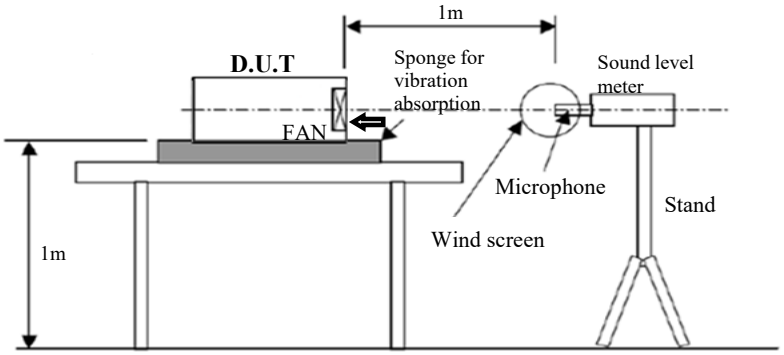
2-16.Audible Noise of FAN

Test condition: Background noise: 14 [dB(A)]
Test duration: 60 [s]
Vin: 100VAC @ 60Hz
230VAC @ 50Hz
Iout: 100% (66.7A)
Istb: 100% (2A)
Ta: 25℃

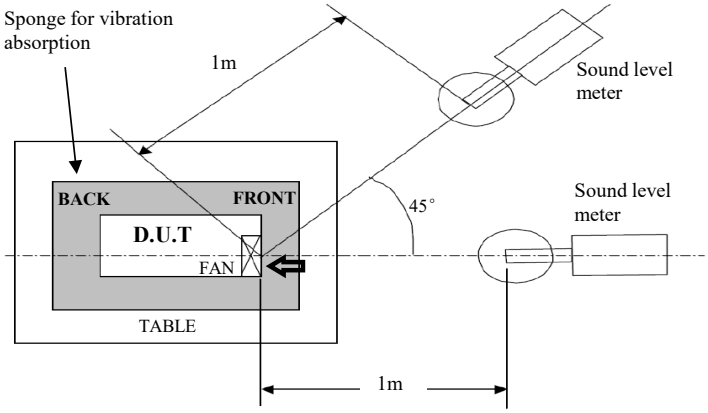
Test equipment :

Sound Calibrator: Type 4231 (B&K) Audio Analyzer: Type 3560-C (B&K)

Test Method :



Basic setting of sound measurements



Position of a sound meter intake surface (air inlet)

Audible Noise Curve of FAN: