MODEL	RFS50A-5

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB
Limit(AV): ——— VCCI ClassB

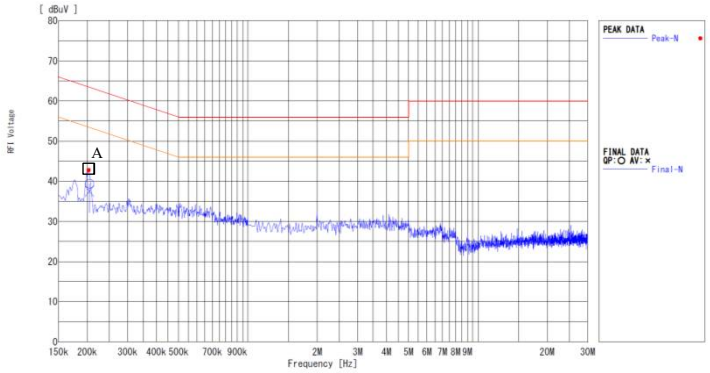
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	204.9k	63.4	24.0
B	202.5k	63.5	23.4

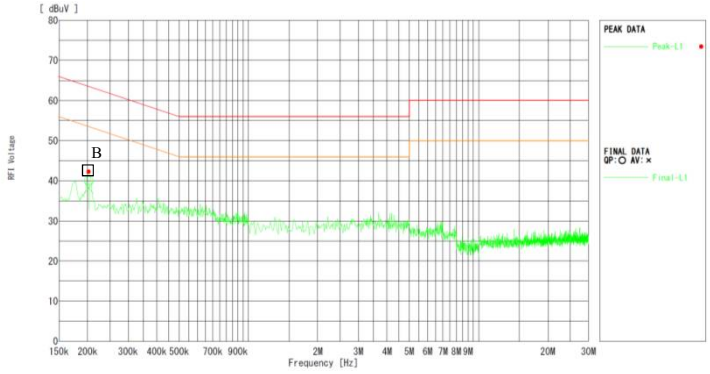
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	204.9k	53.4	15.9
B	202.5k	53.5	15.3

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB
Limit(AV): ——— EN55032 ClassB

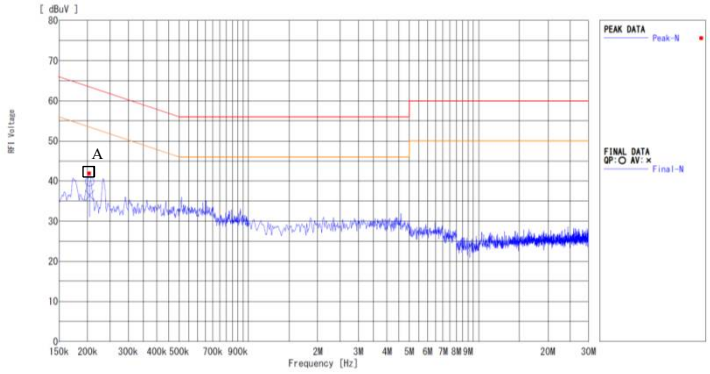
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	204.0k	63.4	23.5
B	175.8k	64.7	27.2
C	204.2k	63.4	23.3

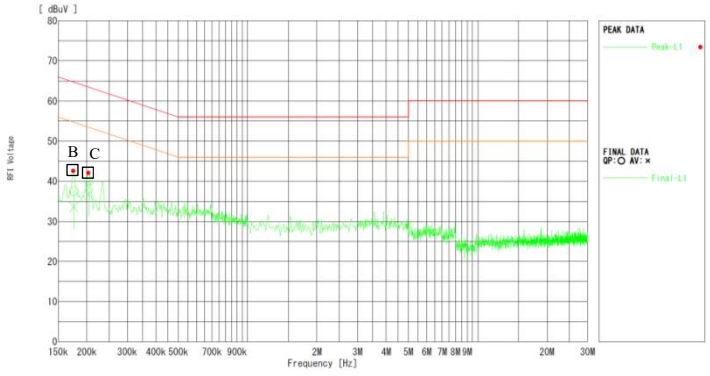
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	204.0k	53.4	17.0
B	175.8k	54.7	21.2
C	204.2k	53.4	16.7

■ Phase: N



■ Phase: L



MODEL	RFS50A-12

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB
Limit(AV): ——— VCCI ClassB

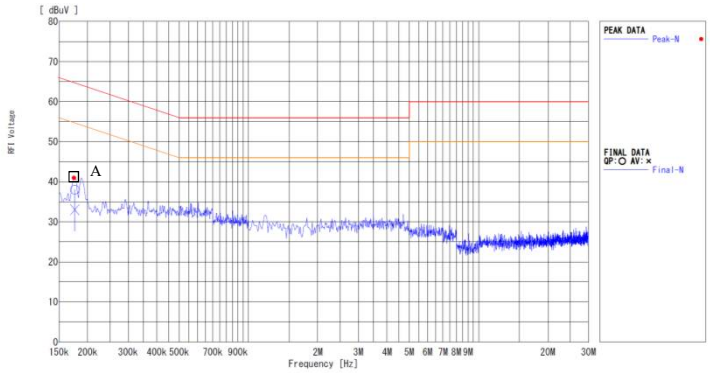
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	175.9k	64.7	26.7
B	191.1k	64.0	27.0

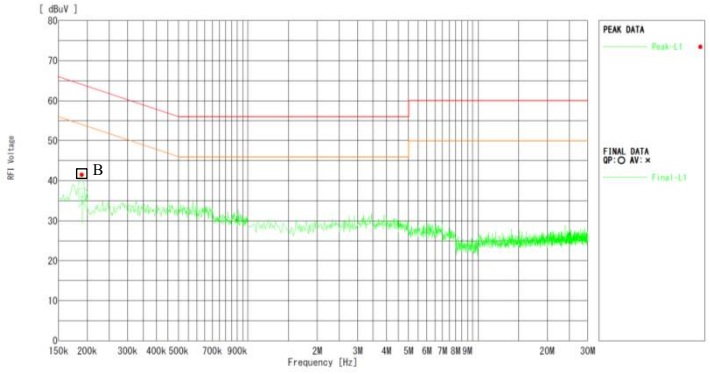
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	175.9k	54.7	21.7
B	191.1k	54.0	19.4

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB
Limit(AV): ——— EN55032 ClassB

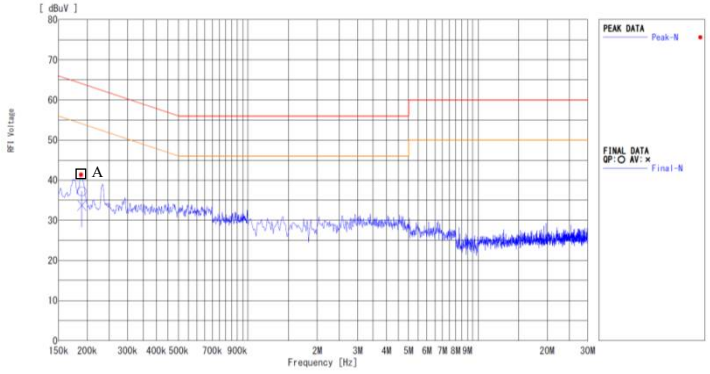
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	189.6k	64.1	26.9
B	188.0k	64.1	27.8

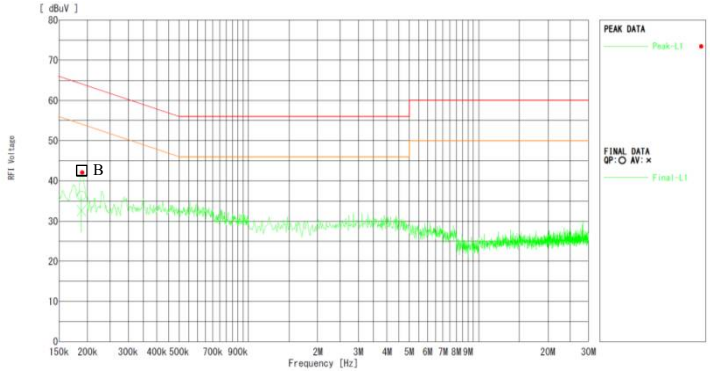
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	189.6k	54.1	20.4
B	188.0k	54.1	21.5

■ Phase: N



■ Phase: L



MODEL	RFS50A-15

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): VCCI ClassB
Limit(AV): VCCI ClassB

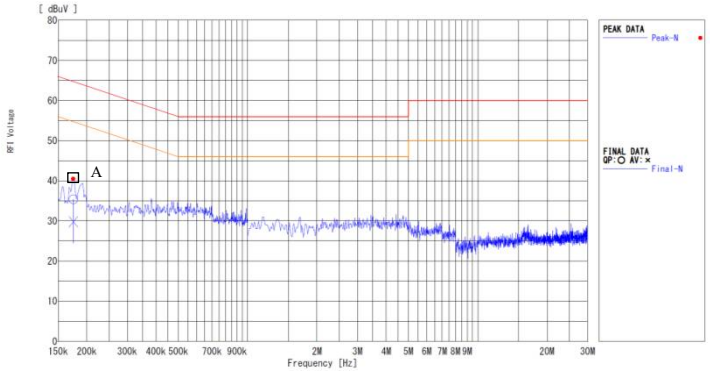
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	174.8k	64.7	29.3

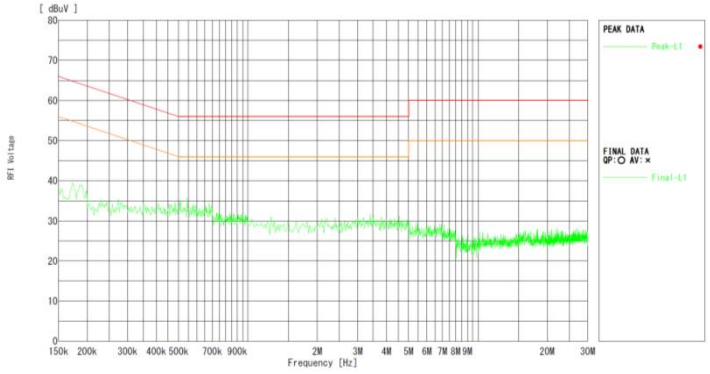
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	174.8k	54.7	24.9

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): EN55032 ClassB
Limit(AV): EN55032 ClassB

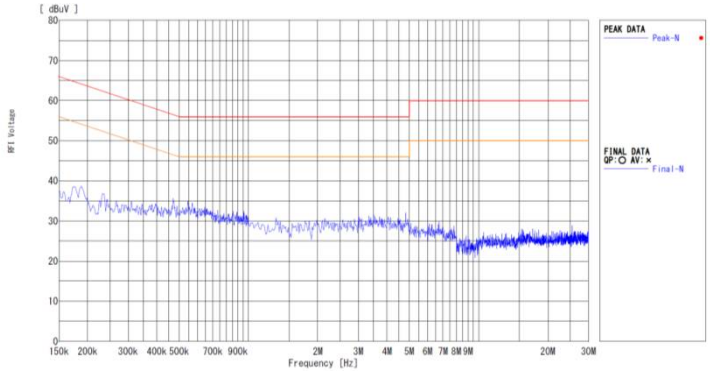
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	187.6k	64.1	30.1

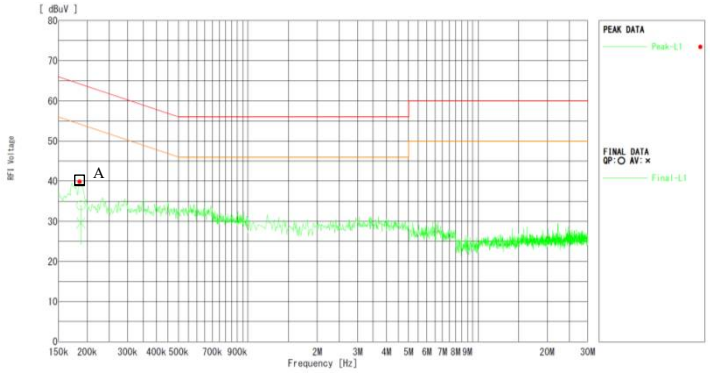
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	187.6k	54.1	24.5

■ Phase: N



■ Phase: L



MODEL	RFS50A-24

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB
Limit(AV): ——— VCCI ClassB

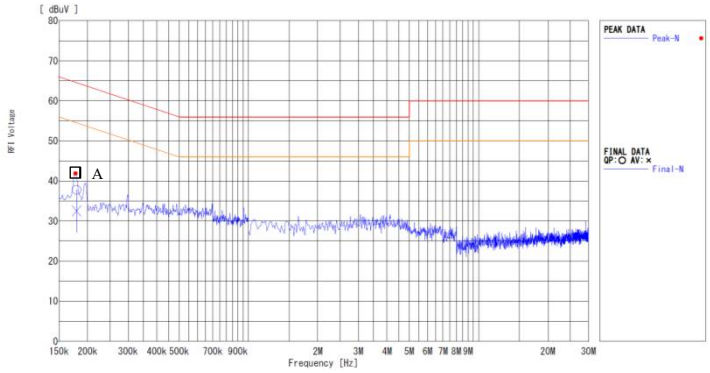
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	179.2k	64.5	26.7
B	177.9k	64.6	27.5

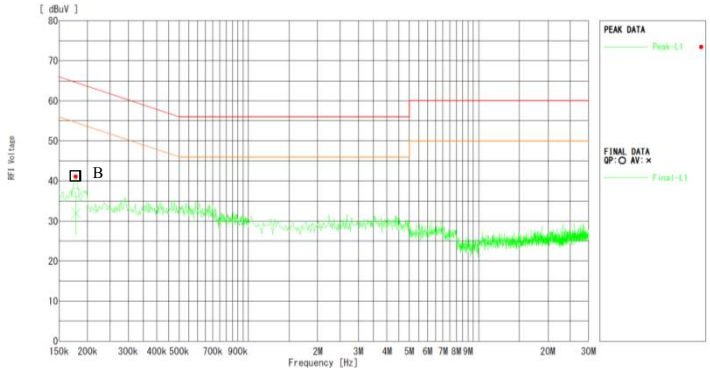
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	179.2k	54.5	22.0
B	177.9k	54.6	22.7

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB
Limit(AV): ——— EN55032 ClassB

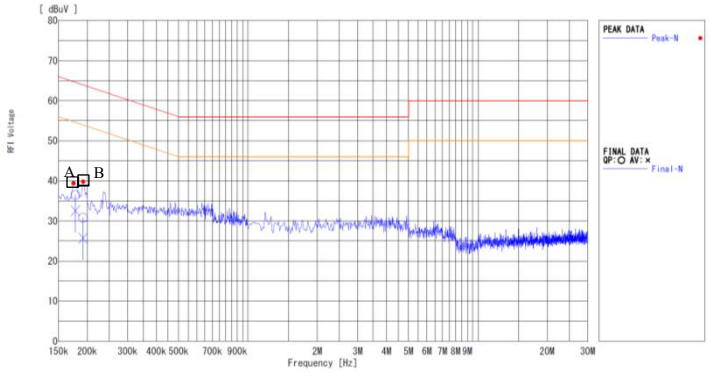
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	177.7k	64.6	28.1
B	191.9k	64.0	33.2
C	177.0k	64.6	29.3

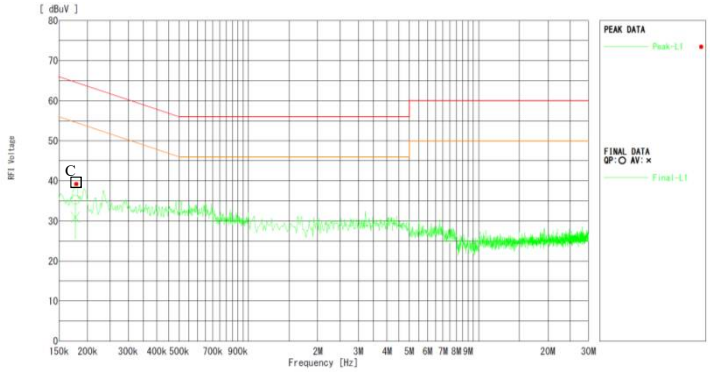
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	177.7k	54.6	22.1
B	191.9k	54.0	28.3
C	177.0k	54.6	23.7

■ Phase: N



■ Phase: L



MODEL	RFS50A-30

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB
Limit(AV): ——— VCCI ClassB

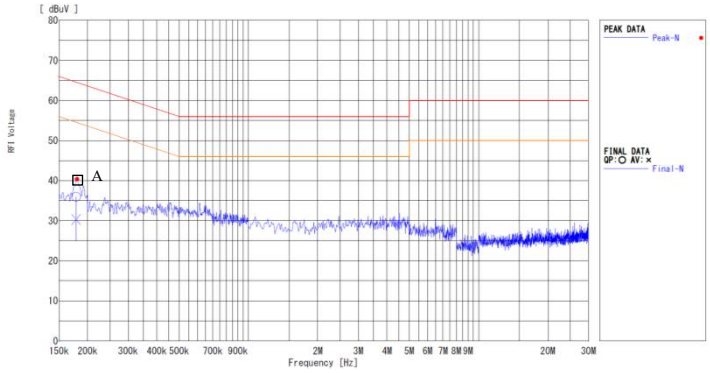
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	178.2k	64.6	28.6
B	180.6k	64.5	30.3

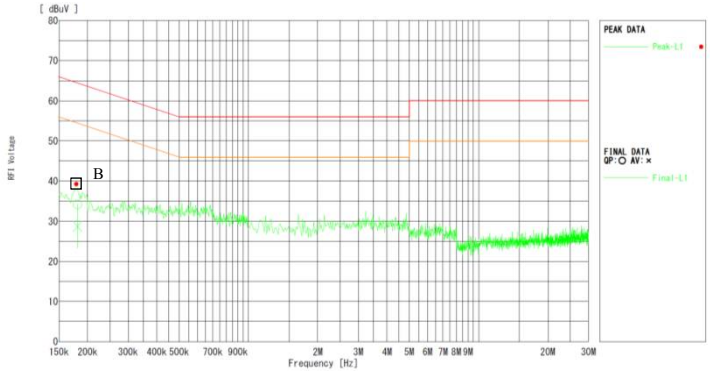
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	178.2k	54.6	24.3
B	180.6k	54.5	25.8

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB
Limit(AV): ——— EN55032 ClassB

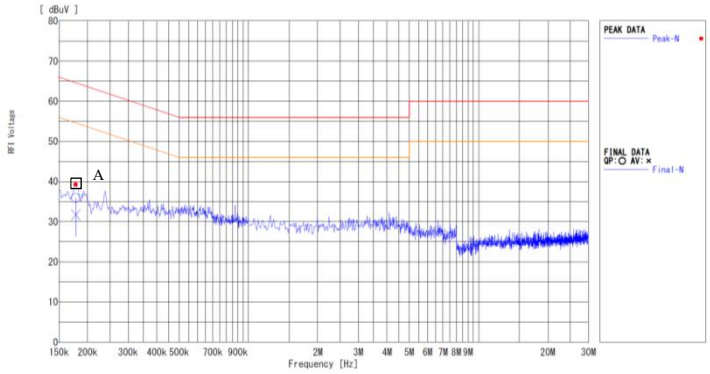
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	177.6k	64.6	28.7
B	176.5k	64.6	30.4

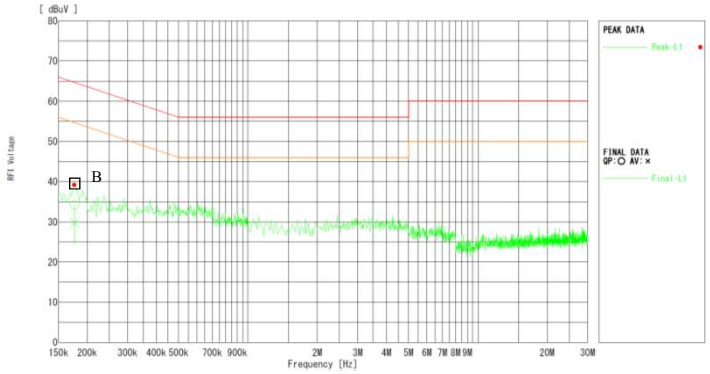
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	177.6k	54.6	22.9
B	176.5k	54.6	24.9

■ Phase: N



■ Phase: L



MODEL	RFS50A-48

雑音端子電圧
Conducted Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB
Limit(AV): ——— VCCI ClassB

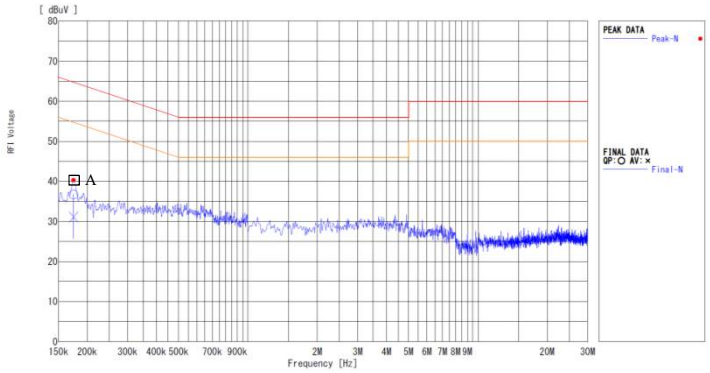
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	174.6k	64.7	28.0
B	173.7k	64.8	29.8

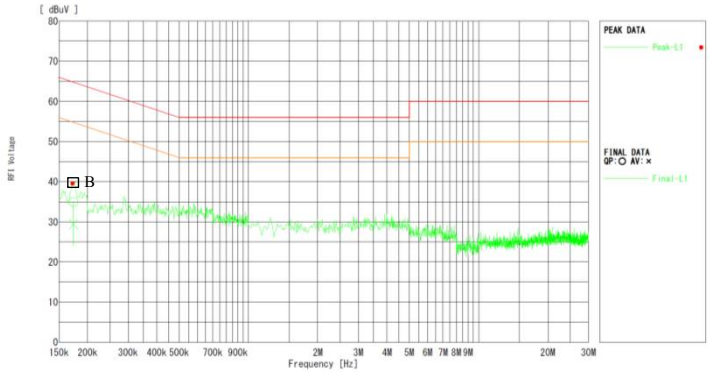
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	174.6k	54.7	23.6
B	173.7k	54.8	25.4

■ Phase: N



■ Phase: L



Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB
Limit(AV): ——— EN55032 ClassB

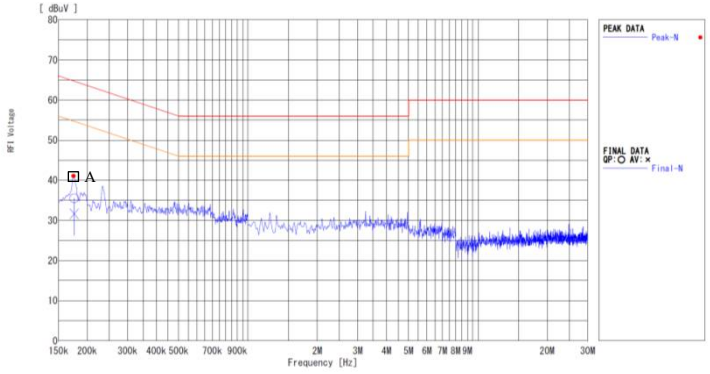
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	175.7k	64.7	29.2

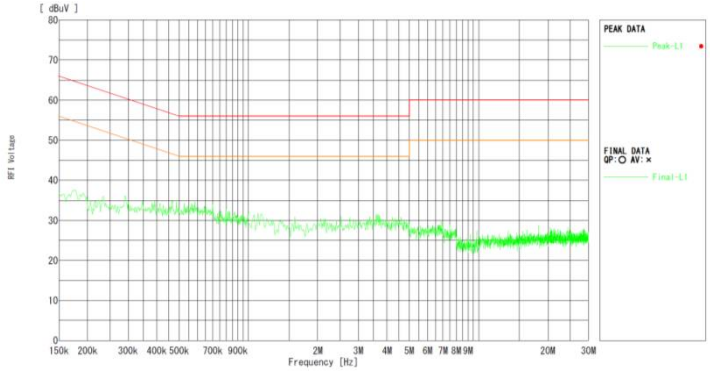
AV Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	175.7k	54.7	23.1

■ Phase: N



■ Phase: L



MODEL	RFS50A-5

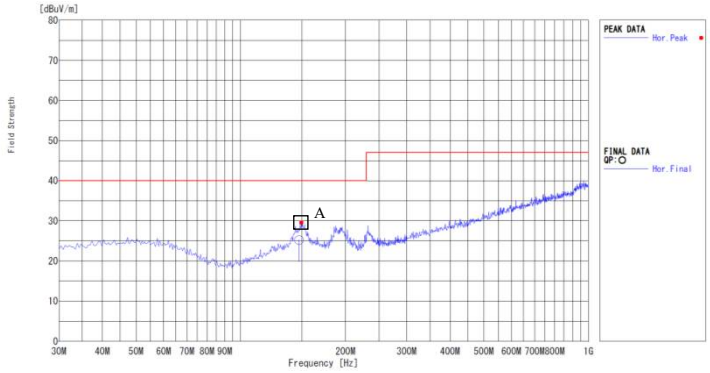
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

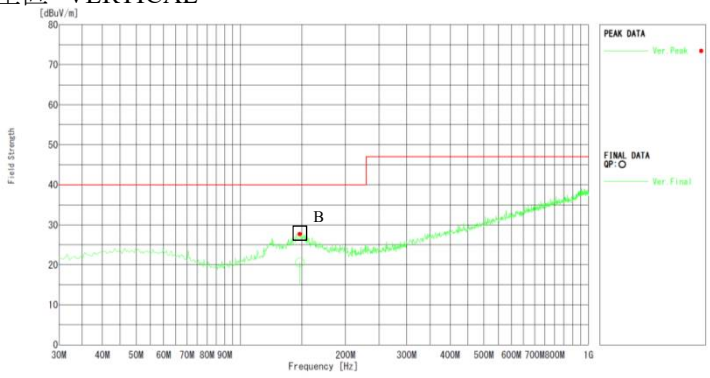
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	147.1M	40.0	14.8
B	148.0M	40.0	19.4

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

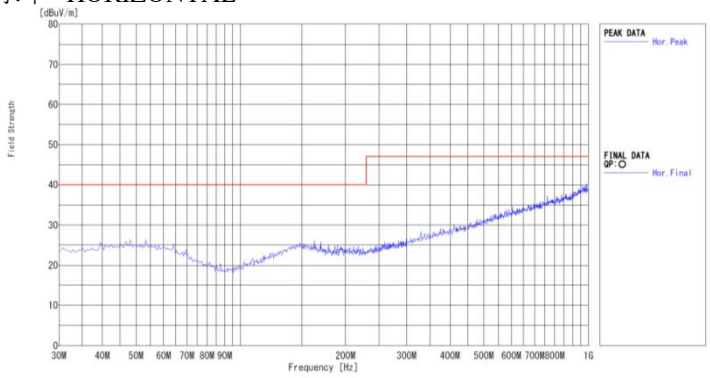


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

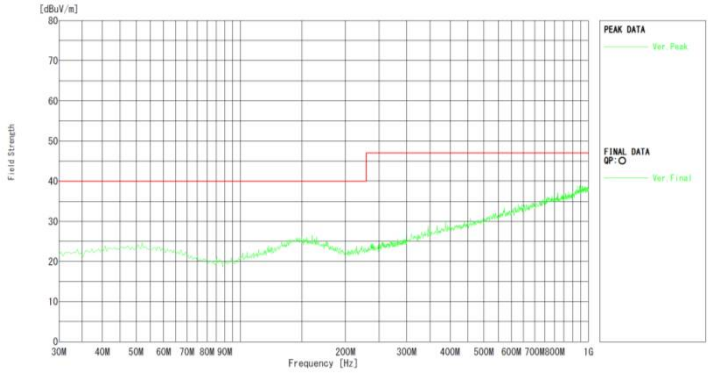
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



MODEL	RFS50A-12

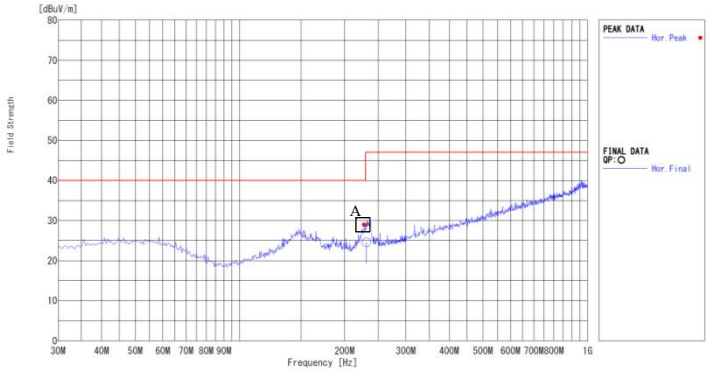
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

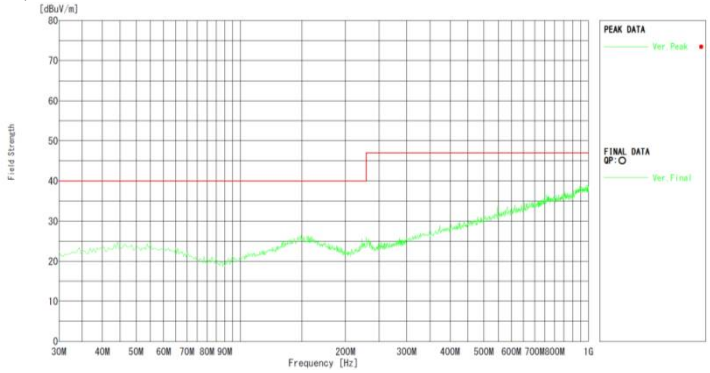
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	231.3M	47.0	22.4

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

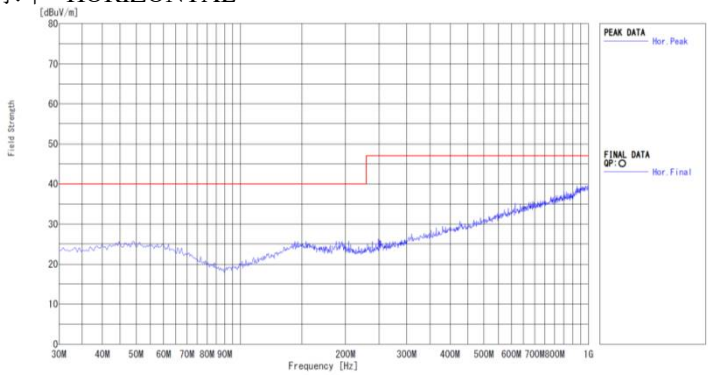


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

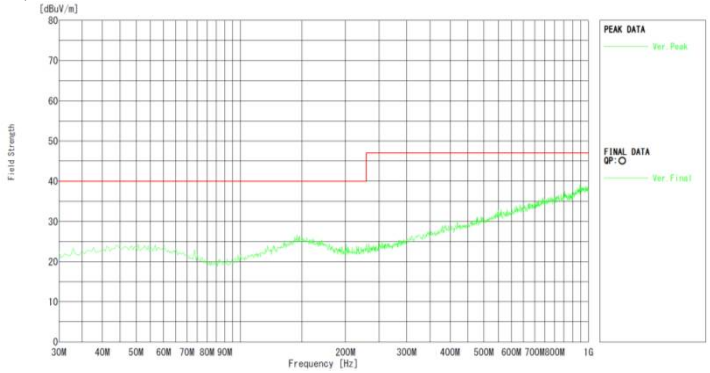
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



MODEL	RFS50A-15

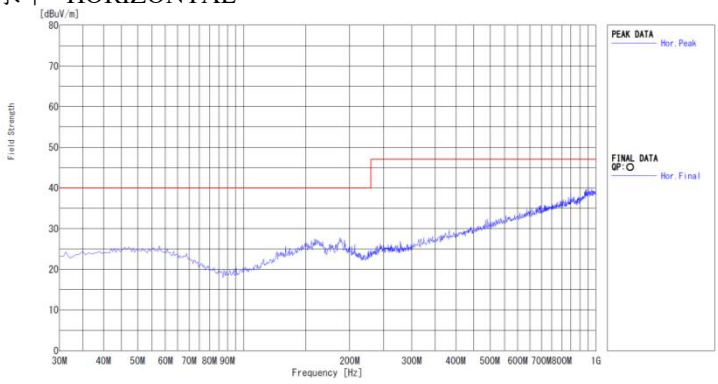
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

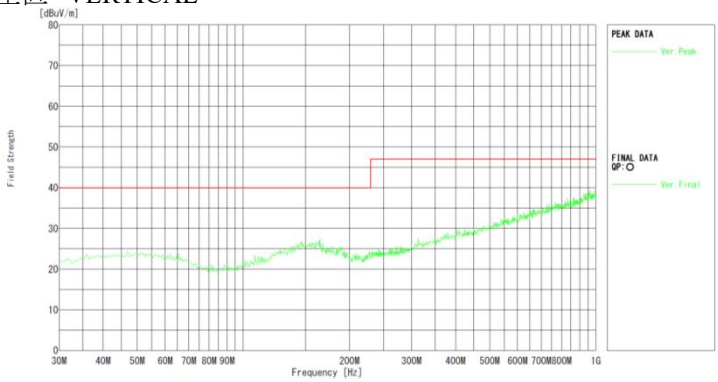
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

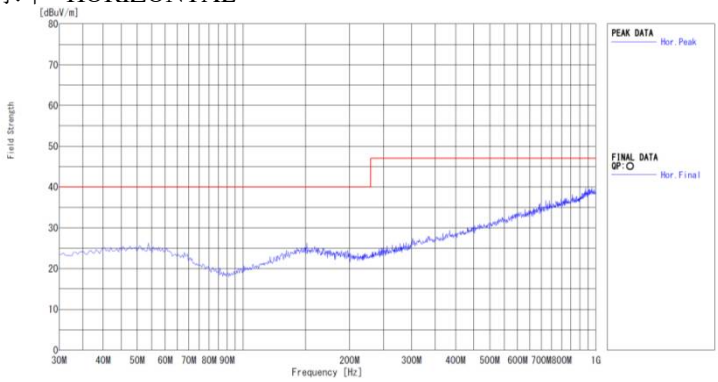


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

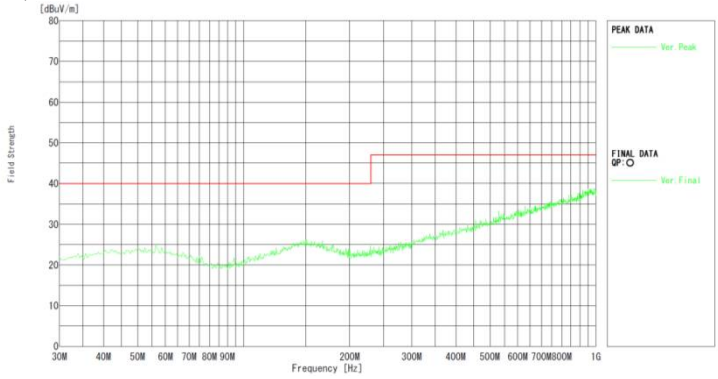
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



MODEL	RFS50A-24

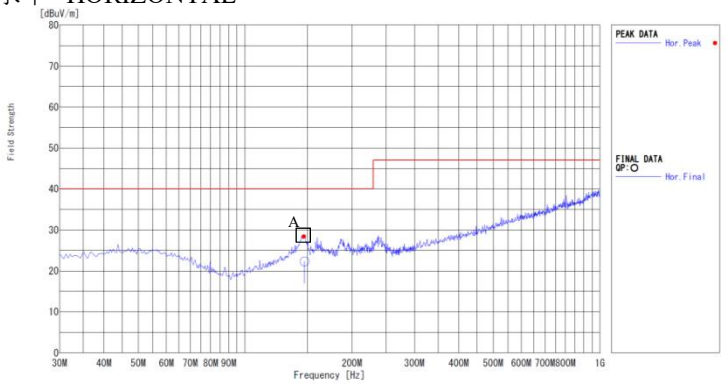
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

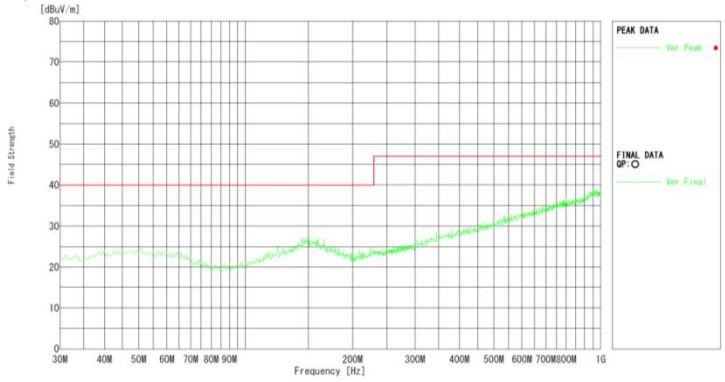
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	147.1M	40.0	17.7

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

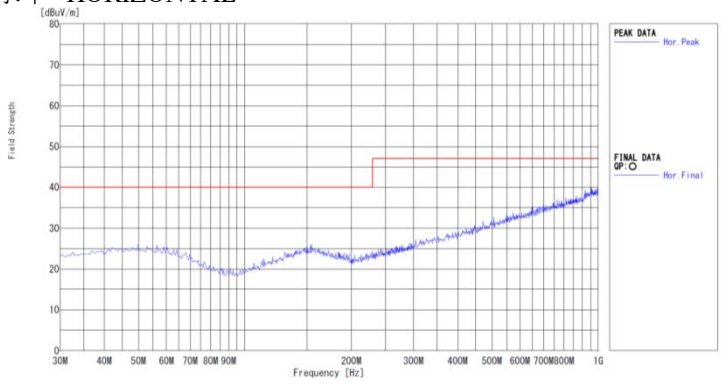


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

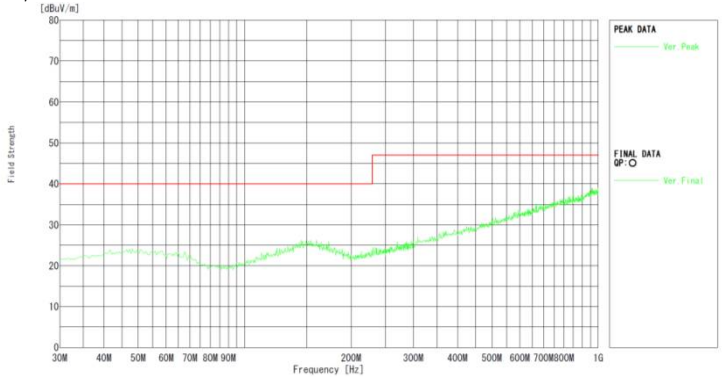
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



MODEL	RFS50A-30

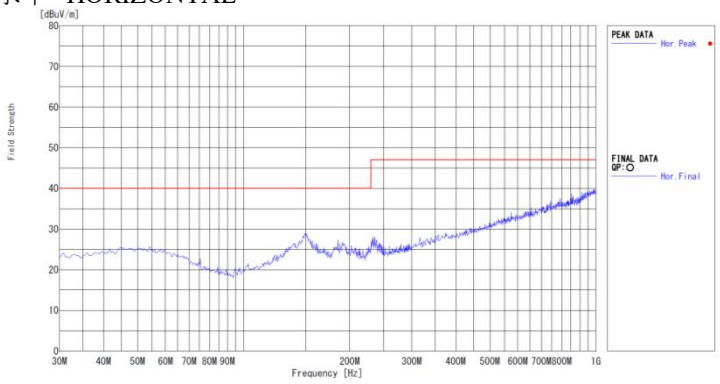
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

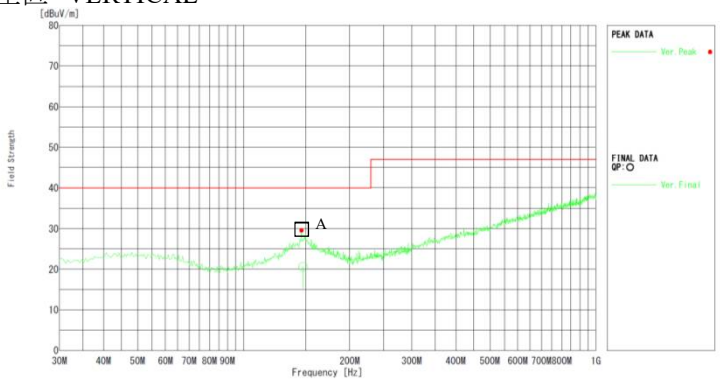
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]
A	147.4M	40.0	19.4

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

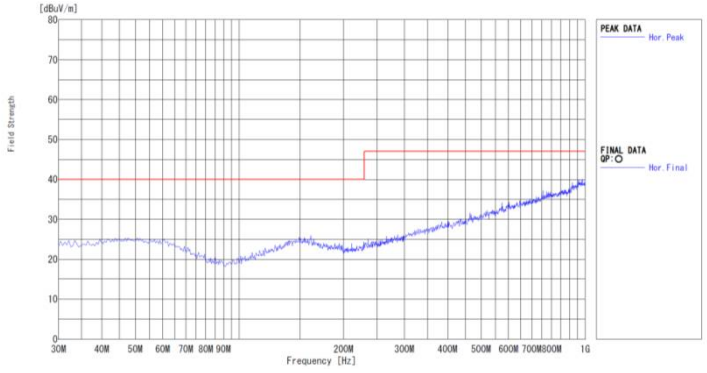


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

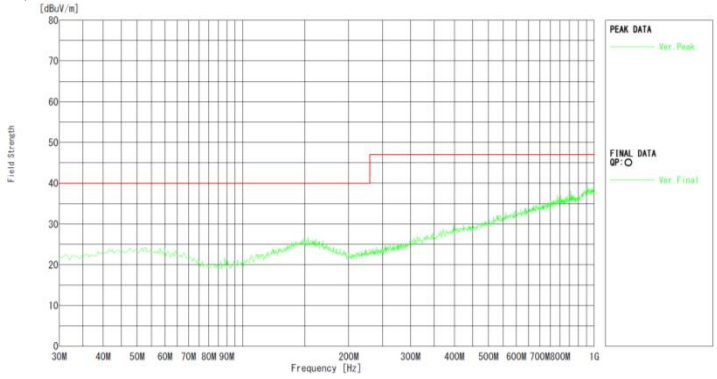
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



MODEL	RFS50A-48

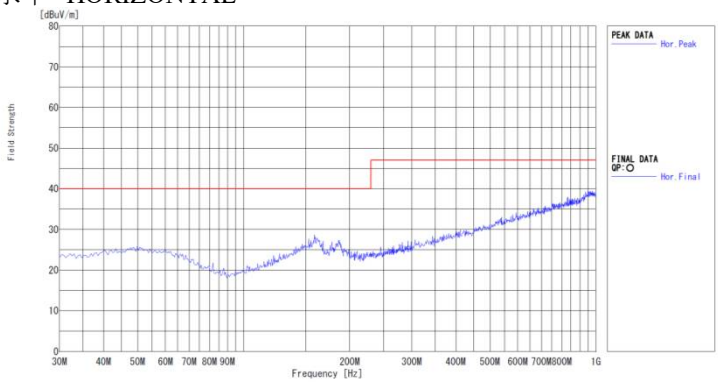
雑音電界強度
Radiated Emission

Conditions
Vin: 100VAC / 50Hz
Iout: 100%
Limit(QP): ——— VCCI ClassB

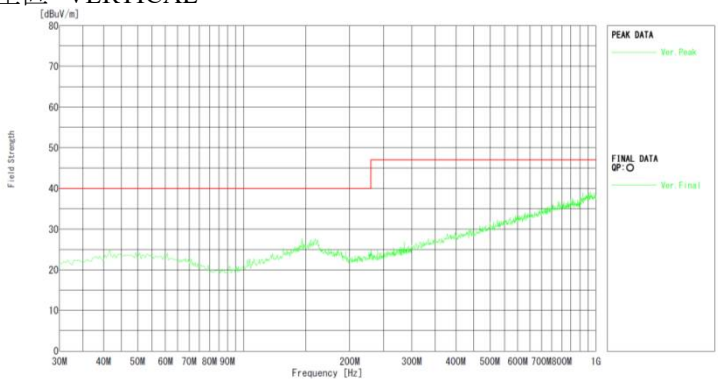
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL

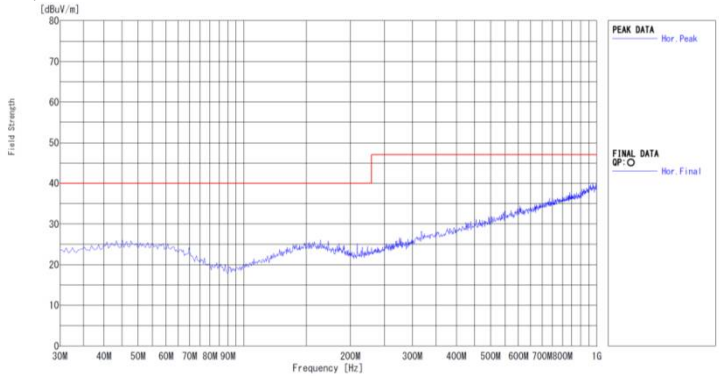


Conditions
Vin: 230VAC / 50Hz
Iout: 100%
Limit(QP): ——— EN55032 ClassB

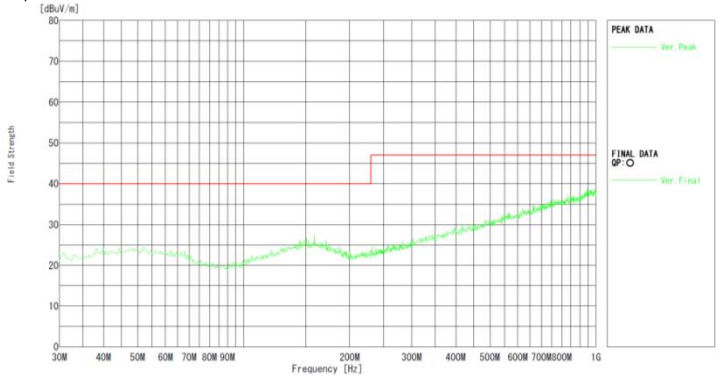
QP Data List

Point	Freq. [Hz]	Limit [dBuV/m]	Margin [dB]

■ 水平 HORIZONTAL



■ 垂直 VERTICAL



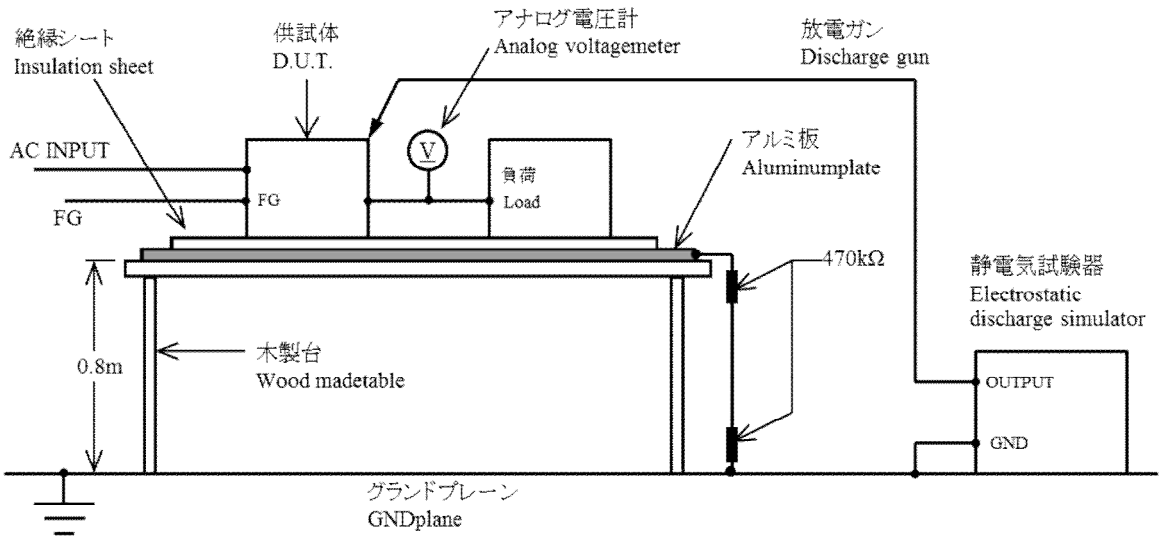
MODEL	RFS50A

静電気放電イミュニティ試験
Electrostatic Discharge Immunity Test(EN61000-4-2)

1.使用試験装置 Equipment used
- ・静電気試験器 Electrostatic discharge simulator
- ・放電ガン Discharge gun
- ・静電容量 Capacity : 150pF ・放電抵抗 Discharge Resistance : 330Ω

2.試験条件 Test conditions
- ・カバー付き with Cover
- ・周囲温度 Ambient temperature : 25 ℃
- ・入力電圧 Input voltage : 100 , 230 VAC
- ・出力電圧 Output voltage : 定格 Rated
- ・出力電流 Output current : 100 %
- ・試験回数 Number of tests : 10回 10 times
- ・極性 Polarity : ＋ , －
- ・放電間隔 Discharge interval : ＞ 1 s

3.試験方法及び印加箇所 Test method and Device test points
- ・接触放電 Contact discharge : シャーシ , カバー , ネジ取り付け部
- ・気中放電 Air discharge : シャーシ , カバー



4.判定条件 Acceptable conditions
- ・試験中の出力電圧変動は、初期値（試験前）の±5%を超えないこと。
  Output voltage regulation must not exceed ±5% of initial (before test) value during test.
- ・試験後の出力電圧は、初期値（試験前）から仕様範囲内の変動であること。
  Output voltage after test shall be stable at the initial (before test) value (within specification range).
- ・試験中、発煙／発火及び出力低下が無いこと。
  No discharge of fire or smoke, as well as no output failure during test.

5.試験結果 Test result

・接触放電 Contact discharge

LEVEL	Contact discharge (kV)	Result
1	2	OK
2	4	OK
3	6	OK
4	8	OK

・気中放電 Air discharge

LEVEL	Airt discharge (kV)	Result
1	2	OK
2	4	OK
3	8	OK
4	15	OK

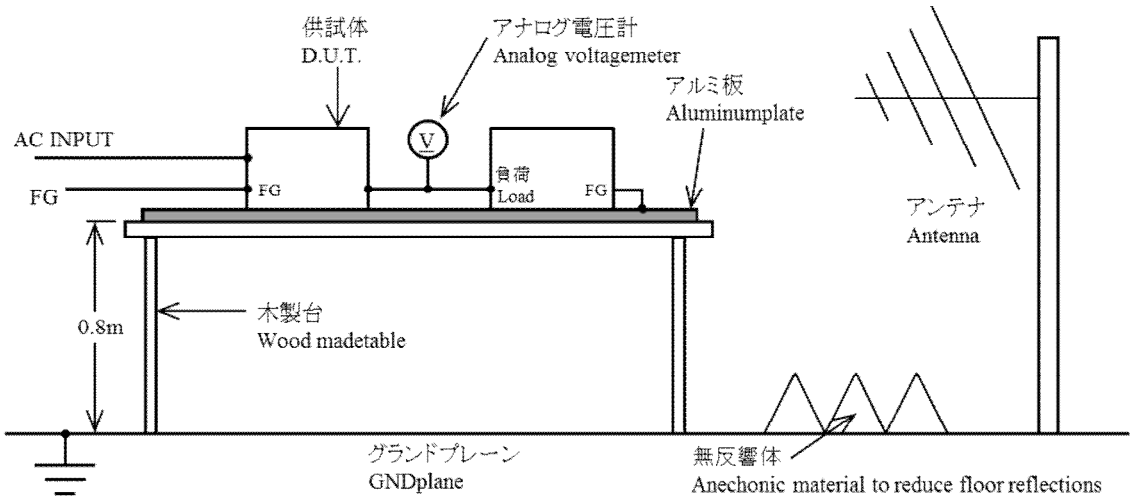
MODEL	RFS50A

放射無線周波数電磁界イミュニティ試験
Radiated Radio-Frequency Electromagnetic Field Immunity Test(EN61000-4-3)

1.使用試験装置 Equipment used
- ・放射イミュニティ測定システム Radiation immunity measurement system
- ・アンテナ Antenna
  - バイログアンテナ Bilog antenna
  - スタックド・ダブルログペリアンテナ Stacked Microwave Log.-Per. Antenna

2.試験条件 Test conditions
- ・カバー付き with Cover
- ・周囲温度 Ambient temperature : 25 ℃
- ・入力電圧 Input voltage : 100 , 230 VAC
- ・出力電圧 Output voltage : 定格 Rated
- ・出力電流 Output current : 100 %
- ・距離 Distance : 2.1 m
- ・スイープ・コンディション Sweep condition : 1.0 %ステップ, 1.0 秒保持 1.0 %step up, 1.0 s hold
- ・試験方向 Test angle : 上下 , 左右 , 前後 Top/Bottom , Both Sides , Front/Back
- ・電磁界周波数 Electromagnetic frequency : 80 MHz～2.7 GHz
- ・振幅変調 Amplitude modulated : 80 % , 1 kHz
- ・偏波 Wave angle : 水平 , 垂直 Horizontal , Vertical

3.試験方法 Test method



4.判定条件 Acceptable conditions
- ・試験中の出力電圧変動は、初期値（試験前）の±5%を超えないこと。
  Output voltage regulation must not exceed ±5% of initial (before test) value during test.
- ・試験後の出力電圧は、初期値（試験前）から仕様範囲内の変動であること。
  Output voltage after test shall be stable at the initial (before test) value (within specification range).
- ・試験中、発煙／発火及び出力低下が無いこと。
  No discharge of fire or smoke, as well as no output failure during test.

5.試験結果 Test result

LEVEL	Radiation Field Strength(V/m)	Result
1	1	OK
2	3	OK

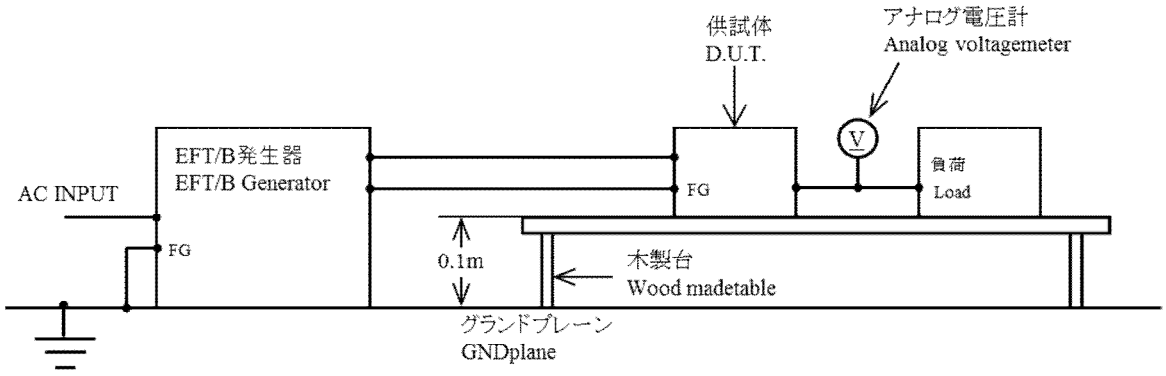
MODEL	RFS50A

電気的ファーストトランジェントバーストイミュニティ試験
Electrical Fast Transient / Burst Immunity Test(EN61000-4-4)

1.使用試験装置　Equipment used
・EFT/B発生器　EFT/B generator

2.試験条件　Test conditions
・カバー付き　with Cover
・周囲温度　Ambient temperature　: 25 ℃
・入力電圧　Input voltage　: 100 , 230 VAC
・出力電圧　Output voltage　: 定格　Rated
・出力電流　Output current　: 100 %
・パルス周波数 Pulse Frequency　: 5kHz , 100kHz
・バースト期間 Burst Time　: 15ms , 0.75ms
・バースト周期 Burst Cycle　: 300ms
・極性　Polarity　: ＋ , －
・試験時間　Test time　: 1 min.
・試験回数　Number of tests　: 3 回　3 times

3.試験方法及び印加箇所　Test method and Device test points
全線(L , N , FG)に印加
Apply to All lines(L , N , FG).



4.判定条件　Acceptable conditions
・試験中の出力電圧変動は、初期値（試験前）の±5%を超えないこと。
Output voltage regulation must not exceed ±5% of initial (before test) value during test.
・試験後の出力電圧は、初期値（試験前）から仕様範囲内の変動であること。
Output voltage after test shall be stable at the initial (before test) value (within specification range).
・試験中、発煙／発火及び出力低下が無いこと。
No discharge of fire or smoke, as well as no output failure during test.

5.試験結果　Test result

LEVEL	Test Voltage (kV)	Result
1	0.5	OK
2	1.0	OK
3	2.0	OK
4	4.0	OK

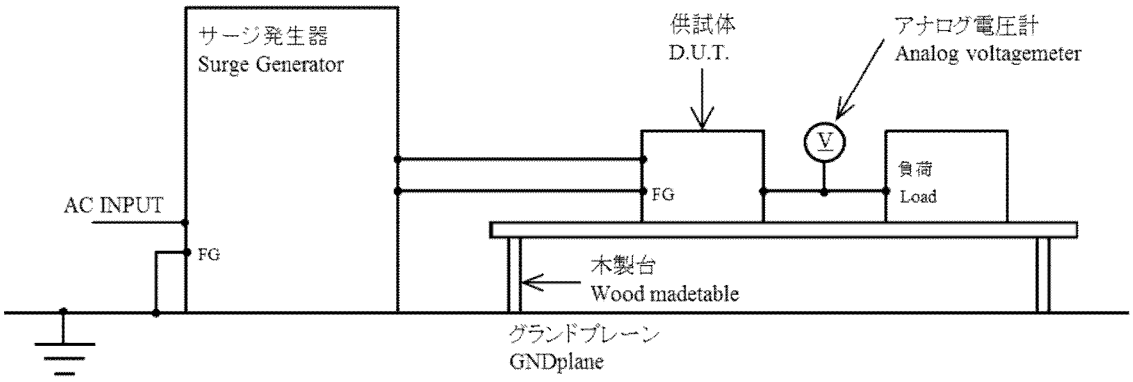
MODEL	RFS50A

サージイミュニティー試験
Surge Immunity Test(EN61000-4-5)

1.使用試験装置　Equipment used
・サージ発生器　Surge generator

2.試験条件　Test conditions
・カバー付き　with Cover
・周囲温度　Ambient temperature　: 25 ℃
・入力電圧　Input voltage　: 100 , 230 VAC
・出力電圧　Output voltage　: 定格　Rated
・出力電流　Output current　: 100 %
・試験回数　Number of tests　: 5 times
・極性　Polarity　: ＋ , －
・位相　Phase　: 0 , 90 , 270 deg
・モード　Mode　: コモン , ノーマル (Common , Normal)

3.試験方法及び印加箇所　Test method and Device test points
コモンモード(L-FG , N-FG)及びノーマルモード(L-N)に印加
Apply to Common mode(L-FG , N-FG) and Normal mode(L-N).



4.判定条件　Acceptable conditions
・試験中の出力電圧変動は、初期値（試験前）の±5%を超えないこと。
Output voltage regulation must not exceed ±5% of initial (before test) value during test.
・試験後の出力電圧は、初期値（試験前）から仕様範囲内の変動であること。
Output voltage after test shall be stable at the initial (before test) value (within specification range).
・試験中、発煙／発火及び出力低下が無いこと。
No discharge of fire or smoke, as well as no output failure during test.

5.試験結果　Test result

LEVEL	Test Voltage (kV)	Result		
		L-FG	N-FG	L-N
1	0.5	OK	OK	OK
2	1.0	OK	OK	OK
3	2.0	OK	OK	

MODEL	RFS50A

伝導性無線周波数電磁界イミュニティ試験

Immunity to conducted disturbances,induced by radio-frequency fields　(EN61000-4-6)

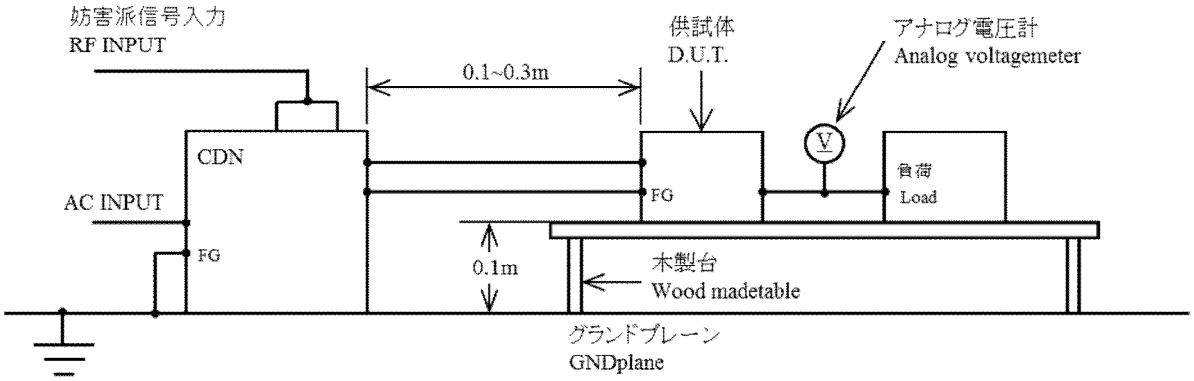
1.使用試験装置　Equipment used

・RFパワーアンプ　RF POWER AMPLIFIER
・シグナルジェネレータ　SIGNAL GENERATOR
・結合／減結合ネットワーク(CDN)　COUPLING DE-COUPLING NETWORK(CDN)

2.試験条件　Test conditions

・カバー付き　with Cover
・周囲温度　Ambient temperature　: 25 ℃
・入力電圧　Input voltage　: 100 , 230 VAC
・出力電圧　Output voltage　: 定格　Rated
・出力電流　Output current　: 100 %
・スイープ・コンディション　: 1.0 %ステップ, 1.0 秒保持
　Sweep condition　1.0 %step up, 1.0 s hold
・電磁界周波数　: 150 kHz～80 MHz
　Electromagnetic frequency

3.試験方法　Test method



4.判定条件　Acceptable conditions

・試験中の出力電圧変動は、初期値（試験前）の±5%を超えないこと。
　Output voltage regulation must not exceed ±5% of initial (before test) value during test.
・試験後の出力電圧は、初期値（試験前）から仕様範囲内の変動であること。
　Output voltage after test shall be stable at the initial (before test) value (within specification range).
・試験中、発煙／発火及び出力低下が無いこと。
　No discharge of fire or smoke, as well as no output failure during test.

5.試験結果　Test result

LEVEL	Voltage Level (V)	Result
1	1	OK
2	3	OK
3	10	OK

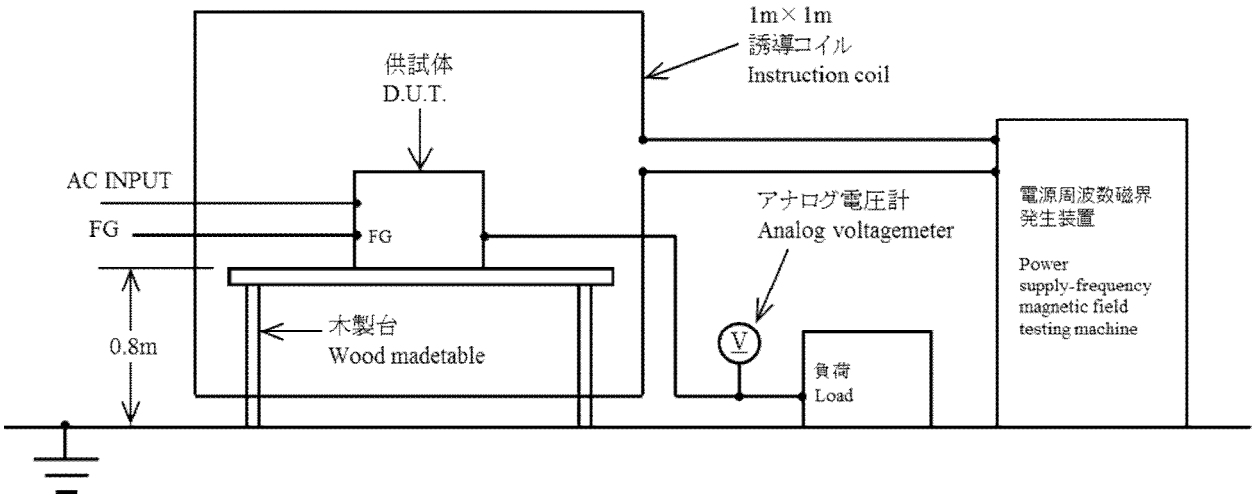
MODEL	RFS50A

電力周波数磁界イミュニティ試験
Power Supply-Frequency Magnetic Field Immunity Test (EN61000-4-8)

1.使用試験装置 Equipment used
・電源周波数磁界試験装置 Power supply-frequency magnetic field testing machine

2.試験条件 Test conditions
・カバー付き with Cover
・周囲温度 Ambient temperature : 25 ℃
・入力電圧 Input voltage : 100 , 230 VAC
・出力電圧 Output voltage : 定格 Rated
・出力電流 Output current : 100 %
・印加方向 Direction : X , Y , Z
・印加磁界周波数 : 50 , 60 Hz
Input magnetic frequency
・試験時間 Test time : 1 min(各方向/Each direction)

3.試験方法 Test method



4.判定条件 Acceptable conditions
・試験中の出力電圧変動は、初期値(試験前)の±5%を超えないこと。
Output voltage regulation must not exceed ±5% of initial (before test) value during test.
・試験後の出力電圧は、初期値(試験前)から仕様範囲内の変動であること。
Output voltage after test shall be stable at the initial (before test) value (within specification range).
・試験中、発煙／発火及び出力低下が無いこと。
No discharge of fire or smoke, as well as no output failure during test.

5.試験結果 Test result

LEVEL	Magnetic Field Strength (A/m)	Result
1	1	OK
2	3	OK
3	10	OK
4	30	OK

MODEL	RFS50A-15

振動試験
Vibration Test

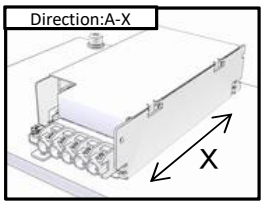
1.使用試験装置　Equipment used

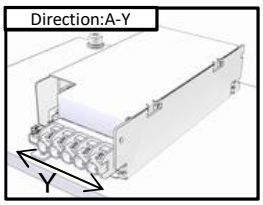
・振動試験装置　Vibration testing machine

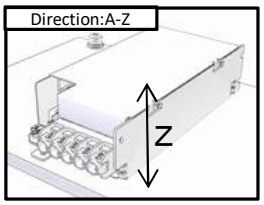
2.試験条件　Test conditions

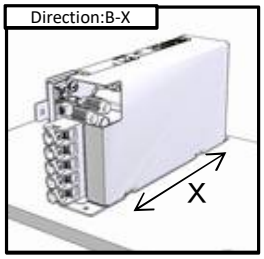
・非動作　No operating.
・周囲温度　Ambient temperature　：　25℃
・周波数範囲　Sweep frequency　：　10-55Hz
・掃印時間　Sweep time　：　1分間　1min.
・振動方向　Direction　：　X , Y , Z
・試験時間　Test time　：　各方向60分間　60 min. each
・加速度　Acceleration　：　19.6m/s^2　一定

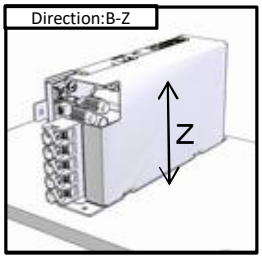
3.試験方法　Test method

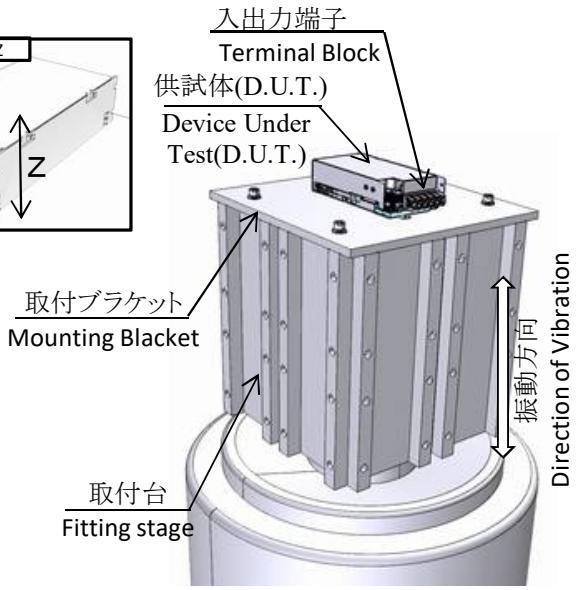












4.試験結果　Test result

・確認条件　Check condition　：　周囲温度　Ambient temperature　22 ℃
：　入力電圧　Input voltage　100 VAC
：　出力電流　Output current　100 %

確認項目 Check item	出力電圧 Output voltage	出力リップルノイズ Output ripple noise	外観状態 State of appearance
試験前　Before test	15.07 V	2.4 mVp-p	異常無し　OK
試験後　After test	15.07 V	2.1 mVp-p	異常無し　OK

MODEL	RFS50A-15

衝撃試験
Inpact Test

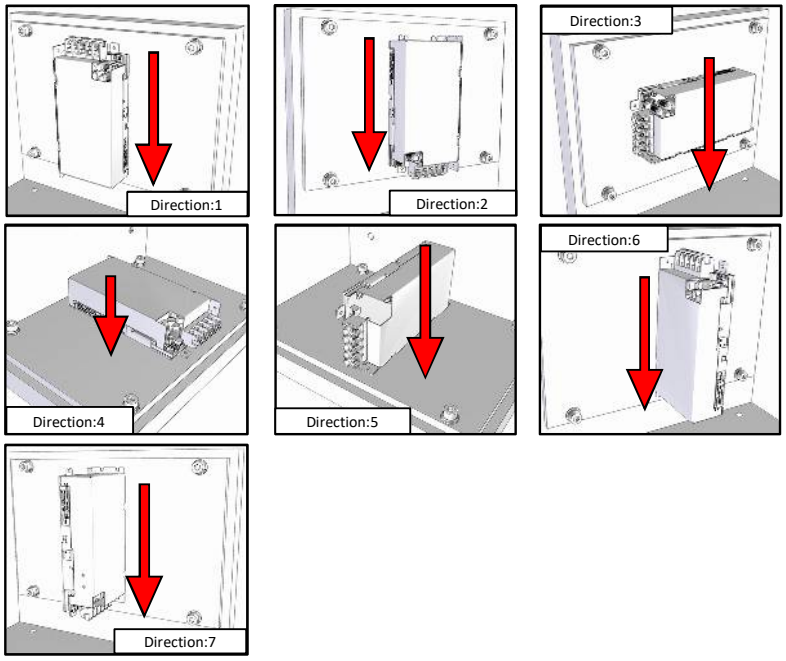
1.使用試験装置　Equipment used

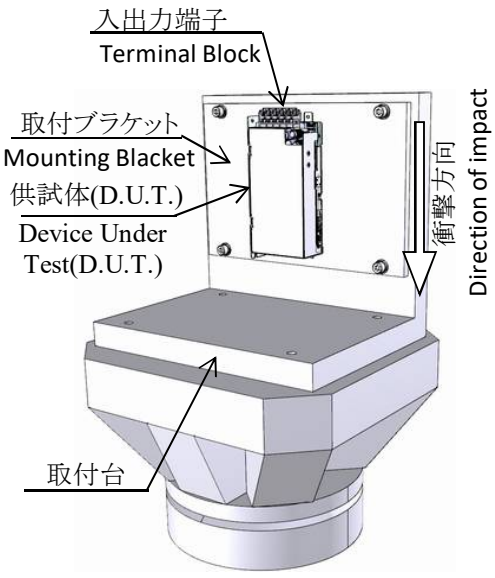
・振動試験装置　Vibration testing machine

2.試験条件　Test conditions

・カバー付き　with Cover
・非動作　No operating.
・周囲温度　Ambient temperature　：　25 ℃
・パルス波形　Pulse waveform　：　正弦半波　Half-sine waveform
・ピーク加速度　Peak acceleration　：　300 m/s2
・衝撃方向　Direction　：　X , Y , Z
・試験時間　：　11 ms　X , Y , Z方向　各1回
Test time　11 ms, once each X , Y and Z axis　1times

3.試験方法　Test method





衝撃試験装置
Impact testing machine

4.試験結果　Test result

・確認条件　Check condition　：　周囲温度　Ambient temperature　22 ℃
：　入力電圧　Input voltage　100 VAC
：　出力電流　Output current　100 %

確認項目 Check item	出力電圧 Output voltage	出力リップルノイズ Output ripple noise	外観状態 State of appearance
試験前　Before test	15.05 V	2.3 mVp-p	異常無し　OK
試験後　After test	15.06 V	1.8 mVp-p	異常無し　OK

MODEL	RFS50A-12

Calculated values of MTBF

JEITA RCR-9102B

1. 算出方法　Part count reliability projection
MIL-HDBK-217F　NOTICE 2の部品点数信頼度予測法により算出されています。
Calculated based on part count reliability projection of MIL-HDBK-217F NOTICE 2.

＜算出式＞

$$\lambda\ equip\ = \sum_{i=1}^{i=n} N_i(\lambda_g \pi_q)_i$$　式を簡単にする為に品質ファクタ π q = 1とする。

$$MTBF = \frac{1}{\lambda_{equip}} \times 10^6 = \frac{1}{\sum_{i=1}^{i=n} N_i(\lambda_g)_i} \times 10^6 \ [時間]\ [hour]$$

λ_{equi} : 全機器故障率 （故障率／10^6時間）
Total Equipment Failure Rate.(Failure/10^6 hour)

λ_g : i番目の同属部品に対する故障率 （故障率／10^6時間）
Generic Failure Rate for The ith Generic Part.

π_q : i番目の同属部品に対する品質ファクタ
Generic Quality Factor for The ith Generic Part.

Ni : i番目の同属部品個数
Quantity of ith Generic Part.

n : 異なった同属部品のカテゴリの数
Number of Different Generic Part Categories.

2. MTBF 値

G_F : 地上・固定 (Ground, Fixed)

MTBF = 1×10^6／ 7.365 = 135,787 時間 (hour)　15.5 年 (year)