# TEST REPORT

| Eurofins KCTL Co.,Ltd.<br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 16677, Korea<br>TEL: 82-70-5008-1021 FAX: 82-505-299-8311<br>www.kctl.co.kr | Report No.:<br>KR23-SRF0184<br>Page (1) of (25) | eurofins \| KCTL |
|---|---|---|

**1. Client**

- Name : SUPREMA INC
- Address : 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of)
- Date of Receipt : 2023-05-01

**2. Use of Report** : FCC Class II permissive change

**3. Name of Product / Model** : BioStation3 / BS3-DB

**4. Manufacturer / Country of Origin** : SUPREMA INC / Korea

**5. FCC ID** : TKWBS3-DB

**6. IC Certificate No.** : 23080-BS3DB

**7. Date of Test** : 2023-06-07 to 2023-06-27

**8. Location of Test** : ■ Permanent Testing Lab ☐ On Site Testing
(Address:65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

**9. Test method used** : FCC Part 15 Subpart C, 15.247
RSS-247 Issue 2 February 2017
RSS-Gen Issue 5 February 2021

**10. Test Result** : Refer to the test result in the test report

| | Tested by | Technical Manager |
|---|---|---|
| Affirmation | Name : Minki Kim (Signature) | Name : Heesu Ahn (Signature) |

2023-07-13

**Eurofins KCTL Co.,Ltd.**

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2023-07-13 | Originally issued | - |
| | | |
| | | |
| | | |
| | | |



## General remarks for test reports

**Statement concerning the uncertainty of the measurement systems used for the tests**

(may be required by the product standard or client)

☐ **Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:**

**Procedure number, issue date and title:**

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ **Statement not required by the standard or client used for type testing**

# CONTENTS

## 1. General information

| | | |
|---|---|---|
| Client | : | SUPREMA INC |
| Address | : | 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of) |
| Manufacturer | : | SUPREMA INC |
| Address | : | 17F-5, Parkview officetower,, 248, Jeongjail-ro, Bundang-gu, Seongnam-si, Gyeonggi-do 13554 Korea (Republic Of) |
| Laboratory | : | Eurofins KCTL Co.,Ltd. |
| Address | : | 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea |
| Accreditations | : | FCC Site Designation No: KR0040, FCC Site Registration No: 687132 |
| | | VCCI Registration No. : R-20080, G-20078, C-20059, T-20056 |
| | | CAB Identifier: KR0040, ISED Number: 8035A |
| | | KOLAS No.: KT231 |

## 2. Device information

| | | |
|---|---|---|
| Equipment under test | : | BioStation3 |
| Model | : | BS3-DB |
| Frequency range | : | 13.56 ㎒(NFC) |
| | | 125 ㎑(RFID) |
| | | 2 402 ㎒ ~ 2 480 ㎒(Bluetooth Low Energy) |
| Modulation technique | : | ASK(NFC,RFID), GFSK(Bluetooth Low Energy) |
| Number of channels | : | 40 ch(Bluetooth Low Energy), 1 ch(NFC, RFID) |
| Power source | : | DC 12 V, DC 24 V |
| Antenna specification | : | PCB Loop antenna(NFC) |
| | | Coil antenna(RFID) |
| | | PCB antenna(Bluetooth Low Energy) |
| Antenna gain | : | -2.42 ㏈i(Bluetooth Low Energy) |
| Software version | : | 1.0.0 |
| Hardware version | : | 1.0.0 |
| Operation temperature | : | - 20 ℃ ~ 50 ℃ |
| Test device serial No. | : | Conducted : 538204715 |
| | | Radiated : 538204712 |

## 2.1. Accessory information

| Equipment | Manufacturer | Model | Serial No. | Power source |
|---|---|---|---|---|
| N/A | - | - | - | - |

## 2.2. Frequency/channel operations

This device contains the following capabilities:
NFC, RFID(125 ㎑), Bluetooth Low Energy

| Ch. | Frequency (㎒) |
|---|---|
| 00 | 2 402 |
| . | . |
| 19 | 2 440 |
| . | . |
| 39 | 2 480 |

Table 2.2.1. Bluetooth Low Energy

## 2.3. RF power setting in TEST SW

| Test Condition | Test Program | Frequency (㎒) | Power Setting |
|---|---|---|---|
| Bluetooth Low Energy | nRF Connect v3.7.0 | 2 402 | 0 |
| | | 2 440 | |
| | | 2 480 | |

# 3. Antenna requirement

**Requirement of FCC part section 15.203:**

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

**Requirement of RSS-Gen Section 6.8:**

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached PCB antenna (internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247.

## 4. Summary of tests

| FCC Part Section(s) | IC Rule Reference | Parameter | Test Condition | Test Results |
|---|---|---|---|---|
| 15.247(b)(3) | RSS-247 (5.4)(d) | Maximum Peak Output Power | Conducted | N/T[1)] |
| 15.247(e) | RSS-247 (5.2)(b) | Peak Power Spectral Density | | N/T[1)] |
| 15.247(a)(2) | RSS-247 (5.2)(a) | 6 dB Channel Bandwidth | | N/T[1)] |
| - | RSS-Gen (6.7) | Occupied Bandwidth | | N/T[1)] |
| 15.207(a) | RSS-Gen (8.8) | AC Conducted Emissions | | Pass |
| 15.247(d), 15.205(a), 15.209(a) | RSS-Gen (8.9), (8.10) RSS-247(5.5) | Spurious emission | Radiated | Pass |
| | | Band-edge, restricted band | | Pass |

**Notes:** (N/T: Not Tested, N/A: Not Applicable)

1. This is a FCC/IC Class II Permissive Change report.
   These test items were performed. (FCC ID: TKWBS3-DB, IC: 23080-BS3DB
   Test Report No. KR22-SRF0162 issued on 19, October, 2022 by Eurofins KCTL Co.,Ltd.)
2. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
3. According to exploratory test no any obvious emission were detected from 9 ㎑ to 30 ㎒. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
4. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Y** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Y** orientation
5. All the radiated tests have been performed two modes (with charger and without charger) and the with charger is the worst case mode.
6. The worst-case data rate were: 1M Bits/s, 37 Packet
7. The test procedure(s) in this report were performed in accordance as following.
   - ANSI C63.10-2013
   - KDB 558074 D01 v05r02
8. All tests were performed on the power type (DC 12 V, DC 24 V).
   Since the output deviation is not large, only the worst-case power mode(DC 24 V) due to the client's request was reported.

## 5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2013.

All measurement uncertainty values are shown with a coverage factor of $k$=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

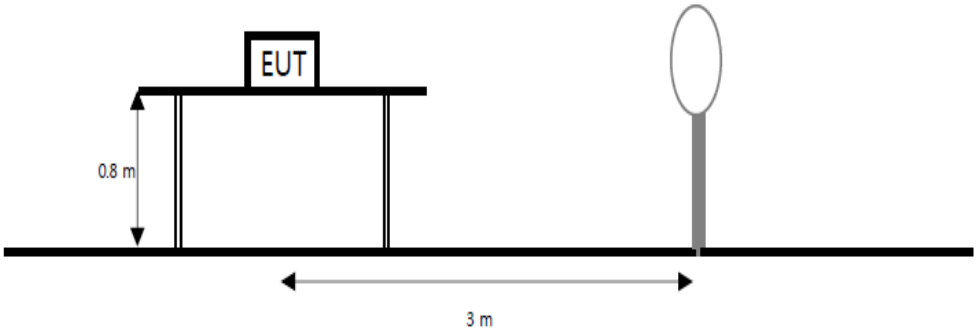
| Parameter | Expanded Uncertainty (±) | |
|---|---|---|
| Radiated Emissions | Below 30 ㎒ | 2.3 ㏈ |
| | 30 ㎒ to 1 000 ㎒ | 2.5 ㏈ |
| | 1 000 ㎒ to 18 000 ㎒ | 4.7 ㏈ |
| | Above 18 000 ㎒ | 4.8 ㏈ |
| Conducted Emissions | 150 ㎑ to 30 ㎒ | 2.7 ㏈ |

# 7. Test results

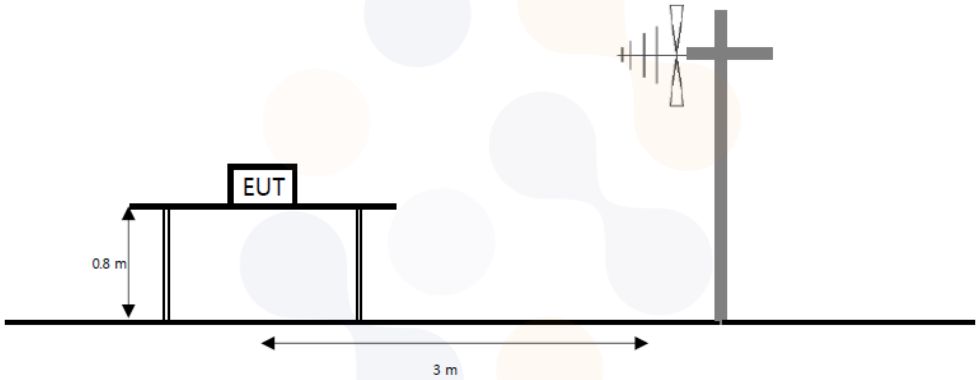
## 7.1. Spurious Emission, Band Edge and Restricted bands

**Test setup**

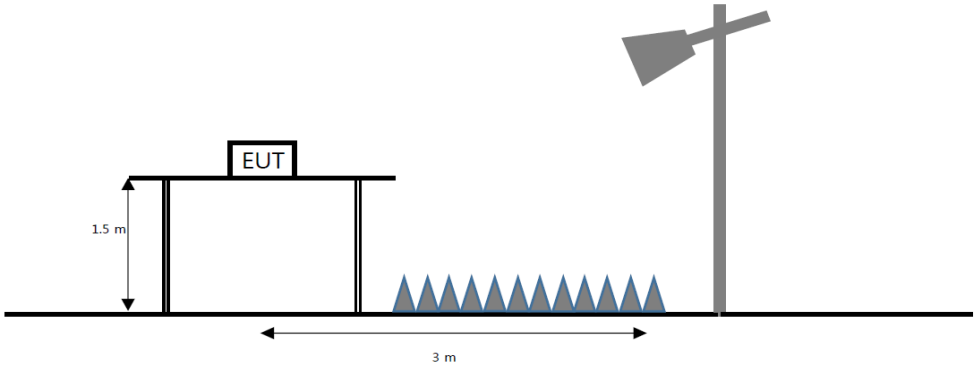
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 ㎑ to 30 ㎒ Emissions




The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



## Limit

### FCC

According to section 15.209(a), except as provided elsewhere in this subpart, the emissions from an intentional radiator shall not exceed the field strength levels specified in the following table:

| Frequency (㎒) | Field strength (㎶/m) | Measurement distance (m) |
|---|---|---|
| 0.009 - 0.490 | 2 400/F(㎑) | 300 |
| 0.490 - 1.705 | 24 000/F(㎑) | 30 |
| 1.705 - 30 | 30 | 30 |
| 30 - 88 | 100** | 3 |
| 88 - 216 | 150** | 3 |
| 216 - 960 | 200** | 3 |
| Above 960 | 500 | 3 |

**Except as provided in paragraph (g), fundamental emissions from intentional radiators operating under this section shall not be located in the frequency bands 54–72 ㎒, 76–88 ㎒, 174–216 ㎒ or 470–806 ㎒. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section15.231 and 15.241.

According to section 15.205(a) and (b), only spurious emissions are permitted in any of the frequency bands listed below:

| ㎒ | ㎒ | ㎒ | ㎓ |
|---|---|---|---|
| 0.009 - 0.110 | 16.42 - 16.423 | 399.9 - 410 | 4.5 - 5.15 |
| 0.495 - 0.505 | 16.694 75 - 16.695 25 | 608 - 614 | 5.35 - 5.46 |
| 2.173 5 - 2.190 5 | 16.804 25 - 16.804 75 | 960 – 1 240 | 7.25 - 7.75 |
| 4.125 - 4.128 | 25.5 - 25.67 | 1 300 – 1 427 | 8.025 - 8.5 |
| 4.177 25 - 4.177 75 | 37.5 - 38.25 | 1 435 – 1 626.5 | 9.0 - 9.2 |
| 4.207 25 - 4.207 75 | 73 - 74.6 | 1 645.5 – 1 646.5 | 9.3 - 9.5 |
| 6.215 - 6.218 | 74.8 - 75.2 | 1 660 – 1 710 | 10.6 - 12.7 |
| 6.267 75 - 6.268 25 | 108 - 121.94 | 1 718.8 – 1 722.2 | 13.25 - 13.4 |
| 6.311 75 - 6.312 25 | 123 - 138 | 2 200 – 2 300 | 14.47 - 14.5 |
| 8.291 - 8.294 | 149.9 - 150.05 | 2 310 – 2 390 | 15.35 - 16.2 |
| 8.362 - 8.366 | 156.524 75 - 156.525 25 | 2 483.5 – 2 500 | 17.7 - 21.4 |
| 8.376 25 - 8.386 75 | 156.7 - 156.9 | 2 690 – 2 900 | 22.01 - 23.12 |
| 8.414 25 - 8.414 75 | 162.012 5 - 167.17 | 3 260 – 3 267 | 23.6 - 24.0 |
| 12.29 - 12.293 | 167.72 - 173.2 | 3 332 – 3 339 | 31.2 - 31.8 |
| 12.519 75 - 12.520 25 | 240 - 285 | 3 345.8 – 3 358 | 36.43 - 36.5 |
| 12.576 75 - 12.577 25 | 322 - 335.4 | 3 600 – 4 400 | Above 38.6 |
| 13.36 - 13.41 | | | |

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in section 15.209. At frequencies equal to or less than 1 000 ㎒, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 ㎒, compliance with the emission limits in section 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in section 15.35 apply to these measurements.

**IC**

According to RSS-247(5.5), In any 100 ㎑ bandwidth outside the frequency band in which the spread spectrum or digitally modulated device is operating, the RF power that is produced shall be at least 20 ㏈ below that in the 100 ㎑ bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided that the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of root-mean-square averaging over a time interval, as permitted under section 5.4(d), the attenuation required shall be 30 ㏈ instead of 20 ㏈. Attenuation below the general field strength limits specified in RSS-Gen is not required.

According to RSS-Gen(8.9), Except where otherwise indicated in the applicable RSS, radiated emissions shall comply with the field strength limits shown in table 5 and table 6. Additionally, the level of any transmitter unwanted emission shall not exceed the level of the transmitter's fundamental emission.

**Table 5- General field strength limits at frequencies above 30 ㎒**

| Frequency(㎒) | Field strength (㎶/m at 3 m) |
|---|---|
| 30 to 88 | 100 |
| 88 to 216 | 150 |
| 216 to 960 | 200 |
| Above 960 | 500 |

**Table 6- General field strength limits at frequencies below 30 ㎒**

| Frequency | Magnetic field strength (H-Field) (㎂/m) | Measurement distance(m) |
|---|---|---|
| 9 – 490 ㎑ 1) | 6.37/F (F in ㎑) | 300 |
| 490 – 1705 ㎑ | 63.7/F (F in ㎑) | 30 |
| 1.705 - 30 ㎒ | 0.08 | 30 |

**Note 1:** The emission limits for the ranges 9-90 ㎑ and 110-490 ㎑ are based on measurements employing a linear average detector.

According to RSS-Gen(8.10), Restricted frequency bands, identified in table 7, are designated primarily for safety-of-life services (distress calling and certain aeronautical activities), certain satellite downlinks, radio astronomy and some government uses. Except where otherwise indicated, the following conditions related to the restricted frequency bands apply:

(a) The transmit frequency, including fundamental components of modulation, of licence-exempt radio apparatus shall not fall within the restricted frequency bands listed in table 7 except for apparatus compliant with RSS-287, Emergency Position Indicating Radio Beacons (EPIRB), Emergency Locator Transmitters (ELT), Personal Locator Beacons (PLB), and Maritime Survivor Locator Devices (MSLD).
(b) Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
(c) Unwanted emissions that do not fall within the restricted frequency bands listed in table 7 shall comply either with the limits specified in the applicable RSS or with those specified in table 5 and table 6.

**Table 7- Restricted frequency bands***

| MHz | MHz | GHz |
|---|---|---|
| 0.090 - 0.110 | 149.9 - 150.05 | 9.0 - 9.2 |
| 0.495 - 0.505 | 156.52475 - 156.52525 | 9.3 - 9.5 |
| 2.1735 - 2.1905 | 156.7 - 156.9 | 10.6 - 12.7 |
| 3.020 - 3.026 | 162.0125 - 167.17 | 13.25 - 13.4 |
| 4.125 - 4.128 | 167.72 - 173.2 | 14.47 - 14.5 |
| 4.17725 - 4.17775 | 240 - 285 | 15.35 - 16.2 |
| 4.20725 - 4.20775 | 322 - 335.4 | 17.7 - 21.4 |
| 5.677 - 5.683 | 399.9 - 410 | 22.01 - 23.12 |
| 6.215 - 6.218 | 608 - 614 | 23.6 - 24.0 |
| 6.26775 - 6.26825 | 960 - 1427 | 31.2 - 31.8 |
| 6.31175 - 6.31225 | 1435 - 1626.5 | 36.43 - 36.5 |
| 8.291 - 8.294 | 1645.5 - 1646.5 | Above 38.6 |
| 8.362 - 8.366 | 1660 - 1710 | |
| 8.37625 - 8.38675 | 1718.8 - 1722.2 | |
| 8.41425 - 8.41475 | 2200 - 2300 | |
| 12.29 - 12.293 | 2310 - 2390 | |
| 12.51975 - 12.52025 | 2483.5 - 2500 | |
| 12.57675 - 12.57725 | 2655 - 2900 | |
| 13.36 - 13.41 | 3260 - 3267 | |
| 16.42 - 16.423 | 3332 - 3339 | |
| 16.69475 - 16.69525 | 3345.8 - 3358 | |
| 16.80425 - 16.80475 | 3500 - 4400 | |
| 25.5 - 25.67 | 4500 - 5150 | |
| 37.5 - 38.25 | 5350 - 5460 | |
| 73 - 74.6 | 7250 - 7750 | |
| 74.8 - 75.2 | 8025 - 8500 | |
| 108 - 138 | -- | |

* Certain frequency bands listed in table 7 and in bands above 38.6 GHz are designated for licence-exempt applications. These frequency bands and the requirements that apply to related devices are set out in the 200 and 300 series of RSSs.

**Test procedure**
ANSI C63.10-2013

**Test settings**
**Peak field strength measurements**

1. Analyzer center frequency was set to the frequency of the radiated spurious emission of interest
2. RBW = as specified in table
3. VBW ≥ (3×RBW)
4. Detector = peak
5. Sweep time = auto
6. Trace mode = max hold
7. Allow sweeps to continue until the trace stabilizes

**Table. RBW as a function of frequency**

| Frequency | RBW |
|---|---|
| 9 ㎑ to 150 ㎑ | 200 ㎐ to 300 ㎐ |
| 0.15 ㎒ to 30 ㎒ | 9 ㎑ to 10 ㎑ |
| 30 ㎒ to 1 000 ㎒ | 100 ㎑ to 120 ㎑ |
| > 1 000 ㎒ | 1 ㎒ |

**Average field strength measurements**

**Trace averaging with continuous EUT transmission at full power**

If the EUT can be configured or modified to transmit continuously (D ≥ 98%), then the average emission levels shall be measured using the following method (with EUT transmitting continuously):

1. RBW = 1 ㎒ (unless otherwise specified).
2. VBW ≥ (3×RBW).
3. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
4. Averaging type = power (i.e., rms):
   1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
   2) Some instruments require linear display mode to use linear voltage averaging. Log or ㏈ averaging shall not be used.
5. Sweep time = auto.
6. Perform a trace average of at least 100 traces.

**Trace averaging across ON and OFF times of the EUT transmissions followed by duty cycle correction**

If continuous transmission of the EUT (D ≥ 98%) cannot be achieved and the duty cycle is constant (duty cycle variations are less than ±2%), then the following procedure shall be used:

1. The EUT shall be configured to operate at the maximum achievable duty cycle.
2. Measure the duty cycle D of the transmitter output signal as described in 11.6.
3. RBW = 1 ㎒ (unless otherwise specified).
4. VBW ≥ [3 × RBW].
5. Detector = RMS (power averaging), if [span / (# of points in sweep)] ≤ (RBW / 2). Satisfying this condition may require increasing the number of points in the sweep or reducing the span. If this condition cannot be satisfied, then the detector mode shall be set to peak.
6. Averaging type = power (i.e., rms):

1) As an alternative, the detector and averaging type may be set for linear voltage averaging.
2) Some instruments require linear display mode to use linear voltage averaging. Log or dB averaging shall not be used.

7. Sweep time = auto.
8. Perform a trace average of at least 100 traces.
9. A correction factor shall be added to the measurement results prior to comparing with the emission limit to compute the emission level that would have been measured had the test been performed at 100% duty cycle. The correction factor is computed as follows:
   1) If power averaging (rms) mode was used in step f), then the applicable correction factor is [10 log (1 / D)], where D is the duty cycle.
   2) If linear voltage averaging mode was used in step f), then the applicable correction factor is [20 log (1 / D)], where D is the duty cycle.
   3) If a specific emission is demonstrated to be continuous (D ≥ 98%) rather than turning ON and OFF with with the transmit cycle, then no duty cycle correction is required for that emission.

**Notes:**

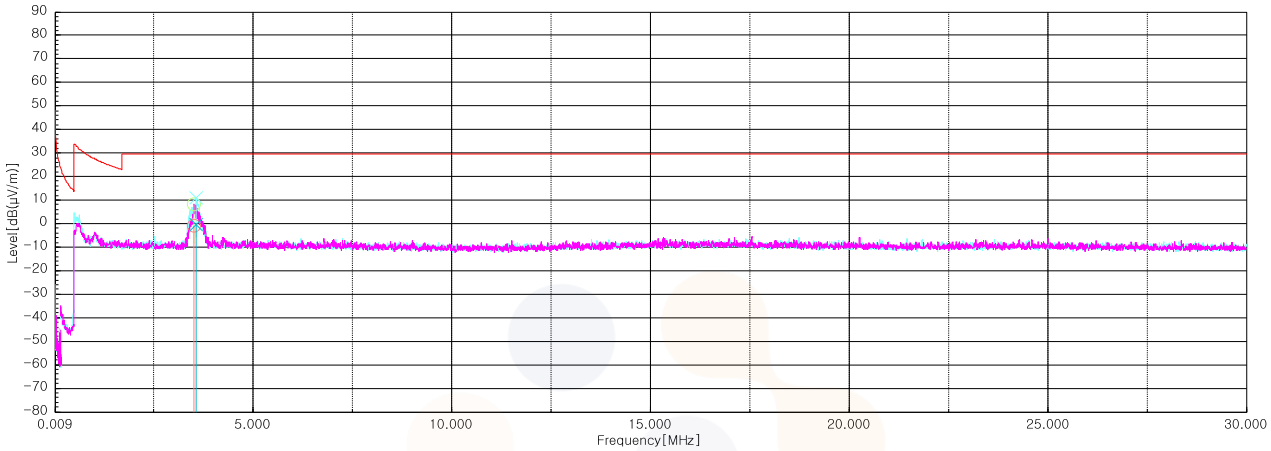
1. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/D_s)$
   *f* ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/D_s)$
   Where:
   $F_d$= Distance factor in dB
   $D_m$= Measurement distance in meters
   $D_s$= Specification distance in meters
2. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) - or $F_d$(dB)
3. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
4. Average test would be performed if the peak result were greater than the average limit.
5. 1) means restricted band.
6. All tests were performed on the power type (DC 12 V, DC 24 V).
   Since the output deviation is not large, only the worst-case power mode(DC 24 V) due to the client's request was reported.

**[DC 24 V]**

**Test results (Below 30 ㎒) –Worst case: 1 MBits/s(37 Bytes)_2 402 ㎒**

| Frequency | Pol. | Reading | Cable Loss | Amp Gain | Antenna Factor | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| No spurious emissions were detected within 20 ㏈ of the limit. | | | | | | | | | |

**Horizontal/Vertical**

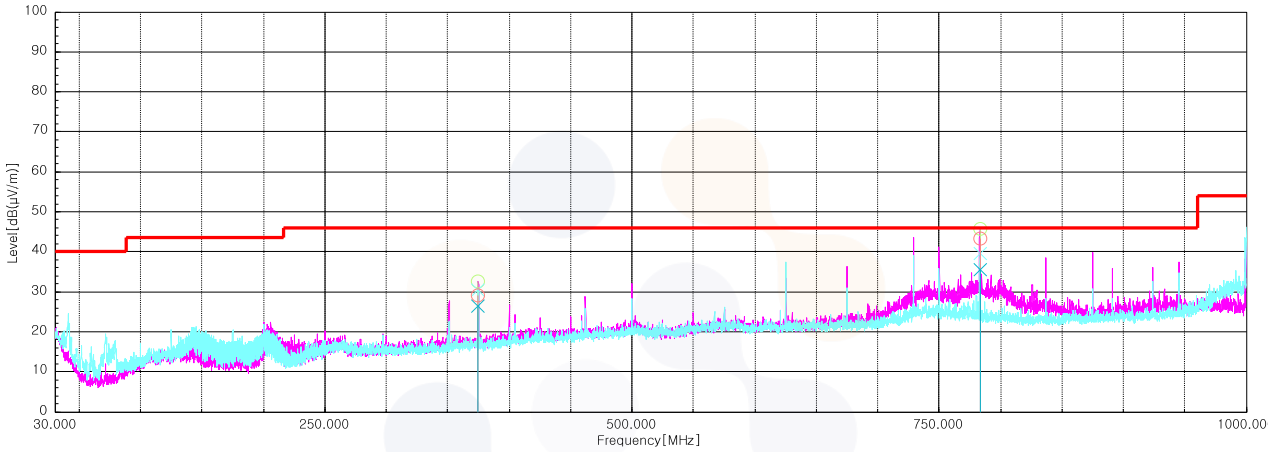



Note. The limits in CFR 47, Part 15, Subpart C, paragraph 15.209 (a), are identical to those in RSS-GEN Section 8.9, Table 6, since the measurements are performed in terms of magnetic field strength and converted to electric field strength levels (as reported in the table) using the free space impedance of 377Ω. For example, the measurement frequency X ㎑ resulted in a level of Y ㏈㎶/m, which is equivalent to Y-51.5 = Z ㏈㎂/m, which has the same margin, W ㏈, to the corresponding RSS-GEN Table 6 limit as it has to the 15.209(a) limit.

**Test results (Below 1 000 ㎒) –Worst case: 1 MBits/s(37 Bytes)_2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| 374.96 | H | 39.50 | 20.70 | -31.09 | - | 29.11 | 46.00 | 16.89 |
| 374.96 | V | 36.90 | 20.70 | -31.09 | - | 26.51 | 46.00 | 19.49 |
| 783.08 | H | 47.50 | 25.70 | -29.99 | - | 43.21 | 46.00 | 2.79 |
| 783.08 | V | 39.90 | 25.70 | -29.99 | - | 35.61 | 46.00 | 10.39 |

**Horizontal/Vertical**

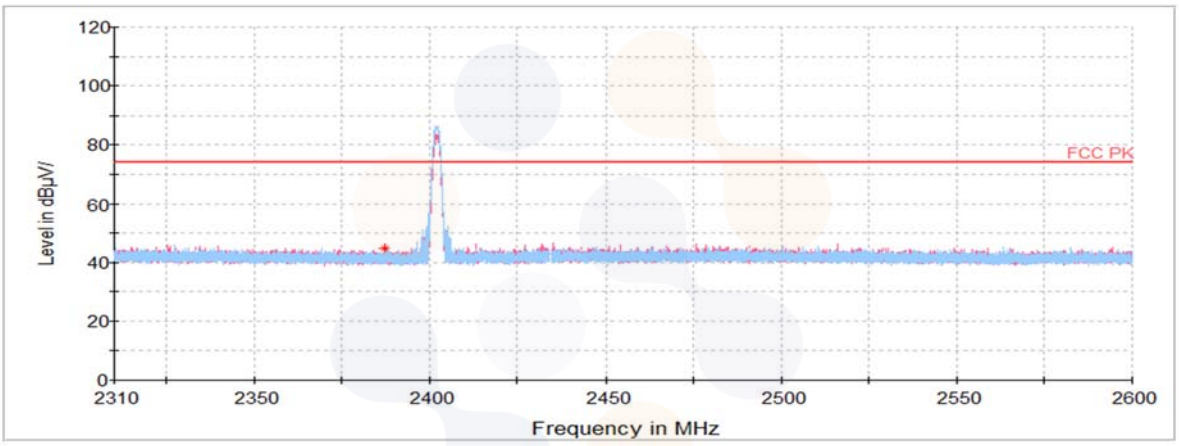


**Test results (Above 1 000 ㎒)_1 MBits/s(37 Bytes)**

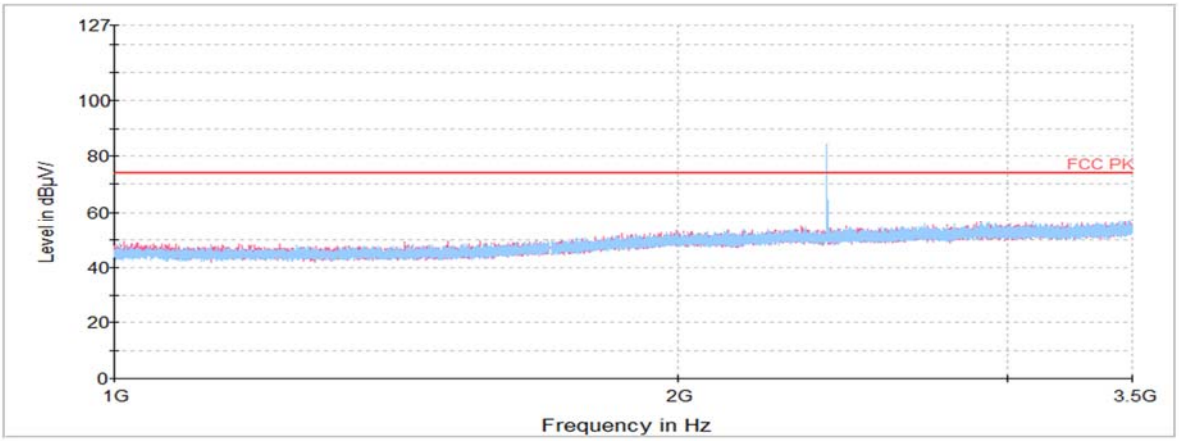
**2 402 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(μV)] | [dB] | [dB] | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 387.18[1)] | H | 31.01 | 32.07 | -18.43 | - | 44.65 | 74.00 | 29.35 |
| 4 804.55[1)] | V | 70.85 | 33.40 | -55.94 | - | 48.31 | 74.00 | 25.69 |
| 7 206.56 | V | 66.94 | 35.20 | -51.96 | - | 50.18 | 74.00 | 23.82 |
| **Average Data** | | | | | | | | |
| No spurious emissions were detected within 20 ㏈ of the limit. | | | | | | | | |

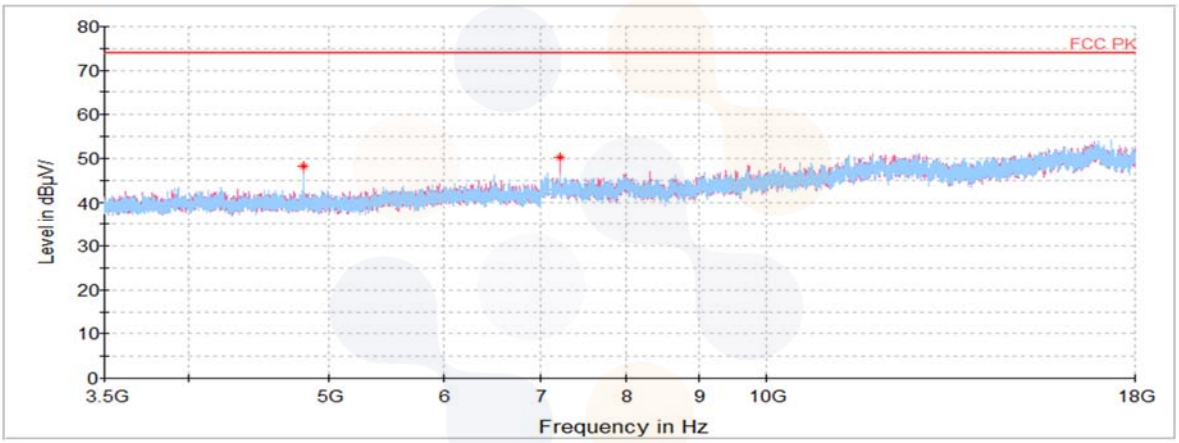
**Horizontal/Vertical for Band-edge**



**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**



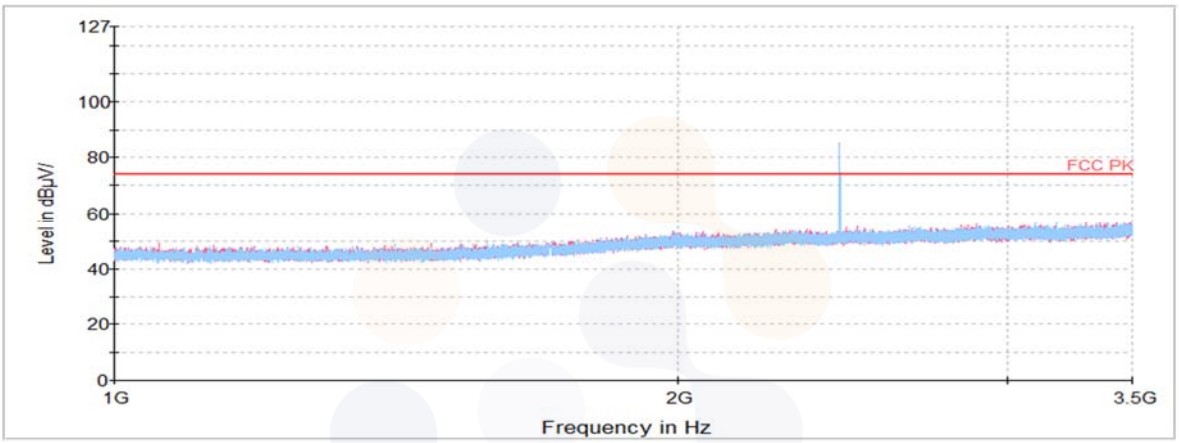

**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



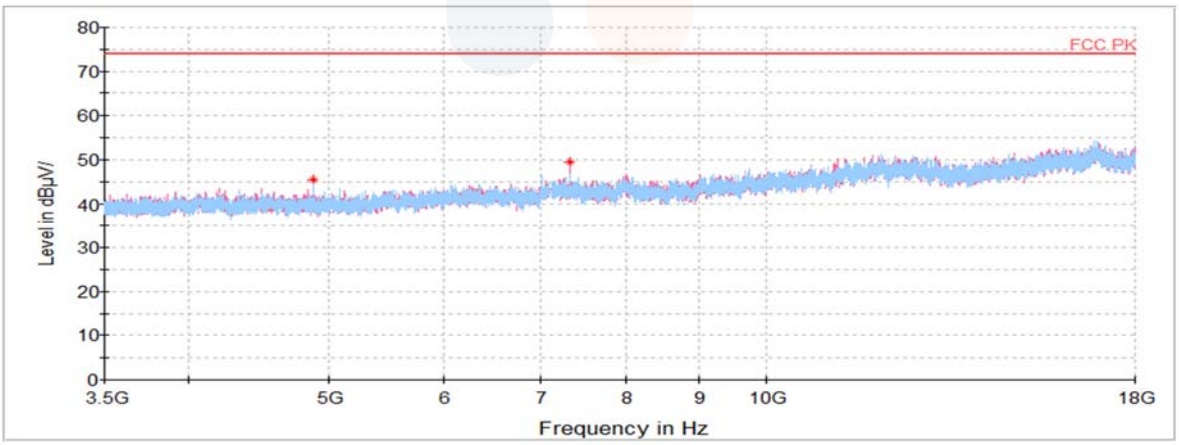
**2 440 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 4 880.22[1)] | V | 67.74 | 33.40 | -55.76 | - | 45.38 | 74.00 | 28.62 |
| 7 320.30[1)] | V | 66.25 | 35.20 | -51.96 | - | 49.49 | 74.00 | 24.51 |
| **Average Data** | | | | | | | | |
| No spurious emissions were detected within 20 ㏈ of the limit. | | | | | | | | |

**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**



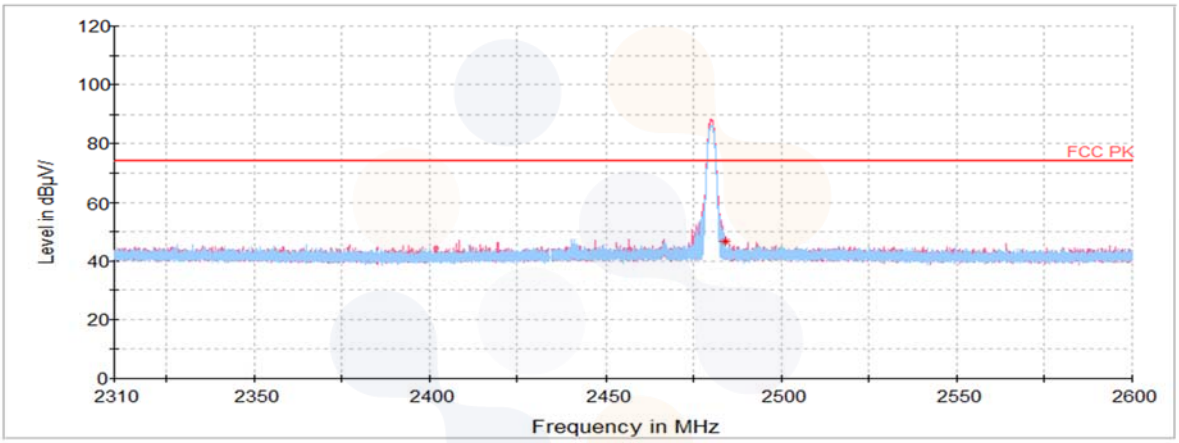

**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



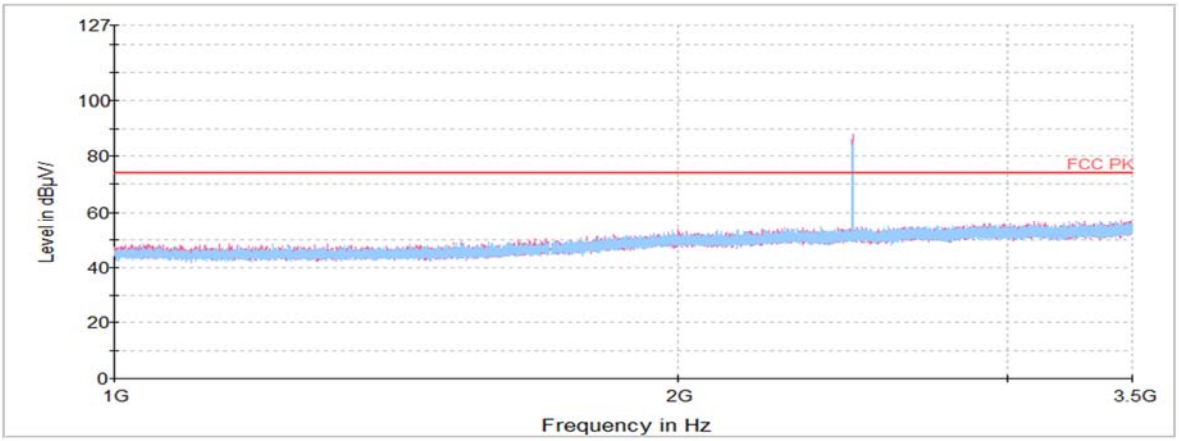
**2 480 ㎒**

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | DCF | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| [㎒] | [V/H] | [dB(㎶)] | [dB] | [dB] | [dB] | [dB(㎶/m)] | [dB(㎶/m)] | [dB] |
| **Peak data** | | | | | | | | |
| 2 483.94[1)] | H | 32.38 | 32.27 | -18.11 | - | 46.54 | 74.00 | 27.46 |
| 4 959.06[1)] | V | 66.79 | 33.40 | -55.59 | - | 44.60 | 74.00 | 29.40 |
| 5 454.78[1)] | H | 65.51 | 34.04 | -55.04 | - | 44.51 | 74.00 | 29.49 |
| 7 440.38[1)] | V | 65.54 | 35.20 | -51.95 | - | 48.79 | 74.00 | 25.21 |
| **Average Data** | | | | | | | | |
| No spurious emissions were detected within 20 ㏈ of the limit. | | | | | | | | |

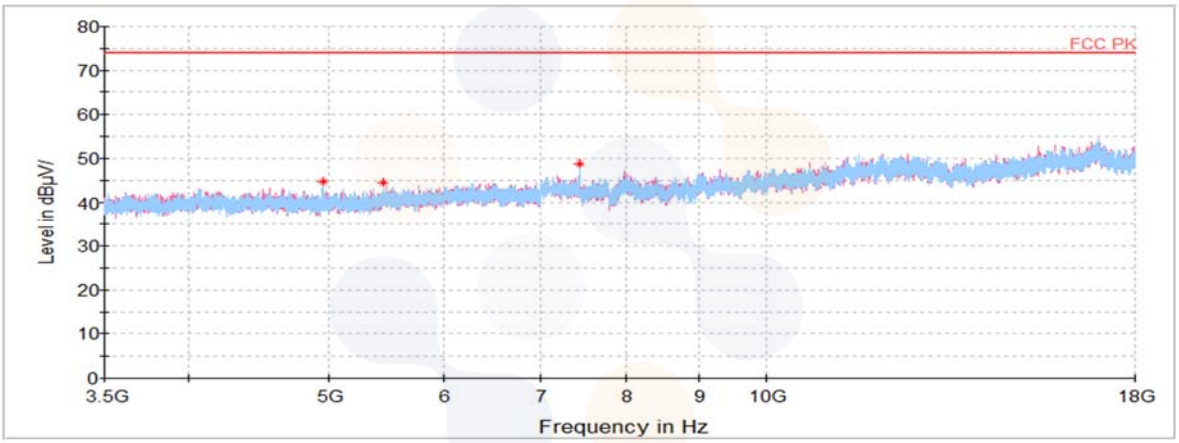
**Horizontal/Vertical for Band-edge**



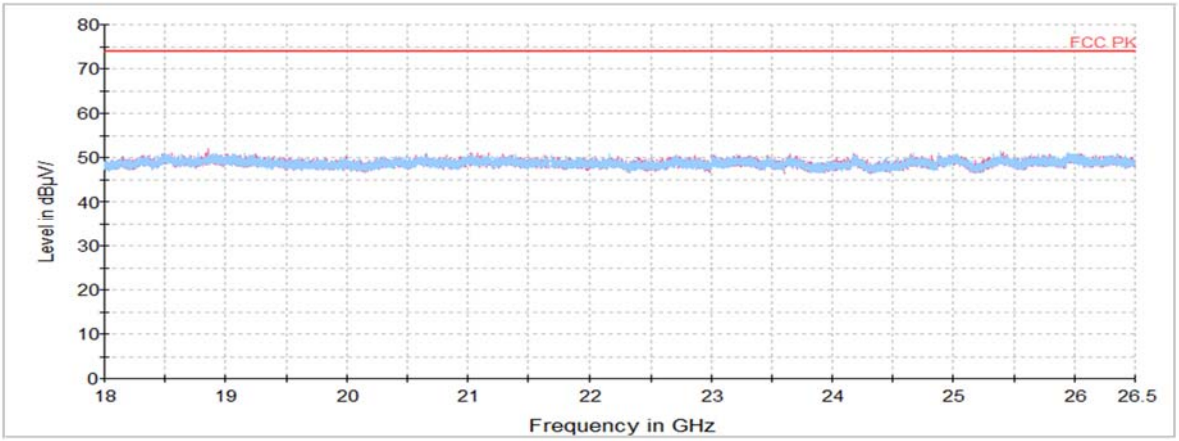
**Horizontal/Vertical for 1 ㎓ ~ 3.5 ㎓**




**Horizontal/Vertical for 3.5 ㎓ ~ 18 ㎓**



**Test results (Above 18 ㎓) – Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒_DC 24 V**

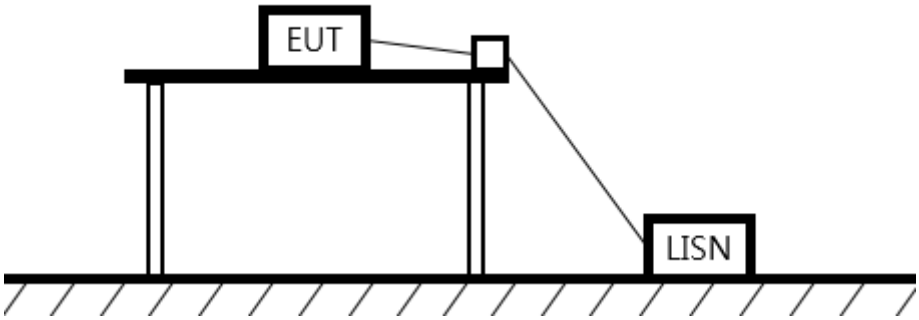
| Horizontal/Vertical for 18 ㎓ ~ 26.5 ㎓ |
|---|
|  |



**Note:** The worst case was based on the lowest margin condition considering harmonic and spurious emission.

## 7.2. AC Conducted emission

**Test setup**




**Limit**

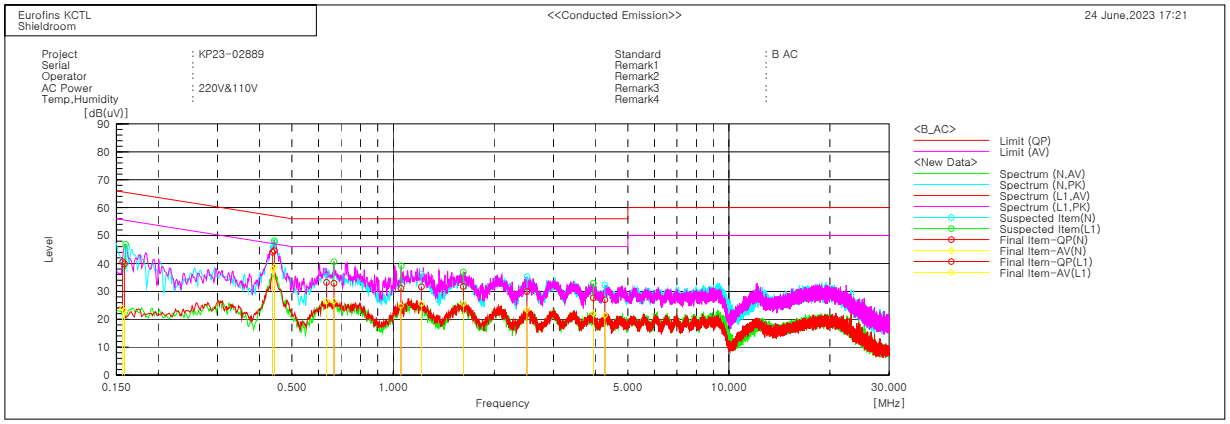
According to 15.207(a) and RSS-Gen(8.8), for an intentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies, within the band 150 ㎑ to 30 ㎒, shall not exceed the limits in the following table, as measured using a 50uH/50 ohm line impedance stabilization network (LISN). Compliance with the provision of this paragraph shall on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower applies at the boundary between the frequencies ranges.

| Frequency of Emission (㎒) | Conducted limit (dB㎶/m) | |
|---|---|---|
| | Quasi-peak | Average |
| 0.15 – 0.50 | 66 - 56* | 56 - 46* |
| 0.50 – 5.00 | 56 | 46 |
| 5.00 – 30.0 | 60 | 50 |

**Measurement procedure**

1. The EUT was placed on a wooden table of size, 1 m by 1.5 m, raised 80 ㎝ in which is located 40 ㎝ away from the vertical wall and 1.5m away from the side wall of the shielded room.
2. Each current-carrying conductor of the EUT power cord was individually connected through a 50Ω/50μH LISN, which is an input transducer to a spectrum analyzer or an EMI/Field Intensity Meter, to the input power source.
3. Exploratory measurements were made to identify the frequency of the emission that had the highest amplitude relative to the limit by operating the EUT in a range of typical modes of operation, cable position, and with a typical system equipment configuration and arrangement. Based on the exploratory tests of the EUT, the one EUT cable configuration and arrangement and mode of operation that had produced the emission with the highest amplitude relative to the limit was selected for the final measurement.
4. The final test on all current-carrying conductors of all of the power cords to the equipment that comprises the EUT (but not the cords associated with other non-EUT equipment is the system) was then performed over the frequency range of 0.15 ㎒ to 30 ㎒.
5. The measurements were made with the detector set to peak amplitude within a bandwidth of 10 ㎑ or to quasi-peak and average within a bandwidth of 9 ㎑. The EUT was in transmitting mode during the measurements.

## Test results-Worst case: 1 MBits/s(37 Bytes) 2 402 ㎒_DC 24 V




Final Result

--- N Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15651 | 30.8 | 14.2 | 9.8 | 40.6 | 24.0 | 65.6 | 55.6 | 25.0 | 31.6 |
| 2 | 0.44304 | 34.7 | 28.9 | 9.8 | 44.5 | 38.7 | 57.0 | 47.0 | 12.5 | 8.3 |
| 3 | 0.63386 | 23.4 | 16.7 | 9.8 | 33.2 | 26.5 | 56.0 | 46.0 | 22.8 | 19.5 |
| 4 | 1.21373 | 21.9 | 15.8 | 9.7 | 31.6 | 25.5 | 56.0 | 46.0 | 24.4 | 20.5 |
| 5 | 2.50464 | 20.2 | 13.7 | 9.7 | 29.9 | 23.4 | 56.0 | 46.0 | 26.1 | 22.6 |
| 6 | 4.27558 | 17.3 | 11.7 | 9.7 | 27.0 | 21.4 | 56.0 | 46.0 | 29.0 | 24.6 |

--- L1 Phase ---

| No. | Frequency [MHz] | Reading QP [dB(uV)] | Reading CAV [dB(uV)] | c.f [dB] | Result QP [dB(uV)] | Result CAV [dB(uV)] | Limit QP [dB(uV)] | Limit AV [dB(uV)] | Margin QP [dB] | Margin CAV [dB] |
|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.15857 | 29.9 | 13.1 | 9.9 | 39.8 | 23.0 | 65.5 | 55.5 | 25.7 | 32.5 |
| 2 | 0.43836 | 34.2 | 28.2 | 9.8 | 44.0 | 38.0 | 57.1 | 47.1 | 13.1 | 9.1 |
| 3 | 0.66711 | 23.1 | 16.7 | 9.8 | 32.9 | 26.5 | 56.0 | 46.0 | 23.1 | 19.5 |
| 4 | 1.05538 | 21.4 | 15.0 | 9.7 | 31.1 | 24.7 | 56.0 | 46.0 | 24.9 | 21.3 |
| 5 | 1.61935 | 22.1 | 15.8 | 9.7 | 31.8 | 25.5 | 56.0 | 46.0 | 24.2 | 20.5 |
| 6 | 3.949 | 18.0 | 12.4 | 9.7 | 27.7 | 22.1 | 56.0 | 46.0 | 28.3 | 23.9 |

## 8. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|
| Spectrum Analyzer | R&S | FSV40 | 100989 | 23.10.14 |
| DC Power Supply | TOYOTECH | TL305TP | 20100121 | 24.07.03 |
| Horn antenna | ETS.lindgren | 3117 | 251528 | 24.02.02 |
| Horn antenna | ETS.lindgren | 3116 | 86632 | 24.01.25 |
| Attenuator | API Inmet | 40AH2W-10 | 12 | 24.05.03 |
| AMPLIFIER | B&Z Technologies | BZRT-00504000-481055-382525 | 26299-27735 | 24.07.04 |
| AMPLIFIER | B&Z Technologies | BZR-0050400-551028-252525 | 27736 | 24.07.04 |
| High pass Filter | Qotana | DBHF058004000A | 20070100016 | 24.07.04 |
| High pass Filter | WT | WT-A1698-HS | WT160411001 | 24.04.25 |
| Signal Generator | R&S | SMB100A | 176206 | 24.01.19 |
| Vector Signal Generator | R&S | SMBV100A | 257566 | 24.07.04 |
| Spectrum Analyzer | R&S | FSVA40 | 101575 | 24.06.19 |
| PSA Spectrum Analyzer | Agilent | E4440A | MY46186407 | 24.03.22 |
| Amplifier | SONOMA INSTRUMENT | 310N | 421821 | 23.12.14 |
| Bilog Antenna | Teseq GmbH | CBL 6112D | 63756 | 24.11.17 |
| Loop Antenna | R&S | HFH2-Z2 | 100355 | 24.08.10 |
| TWO-LINE V - NETWORK | R&S | ENV216 | 101358 | 23.09.29 |
| EMI TEST RECEIVER | R&S | ESCI3 | 100001 | 23.08.18 |
| Antenna Mast | Innco Systems | MA4640-XP-ET | - | - |
| Controller | Innco Systems | CO3000 | 1175/45850319/P | - |
| Controller | INNCO SYSTEMS | CO3000 | 1441/54370322/P | - |
| Antenna Mast | INNCO SYSTEMS | MA4640-XP-ET | - | - |
| Turn Device | INNCO SYSTEMS | DS1200-S-1t | - | - |

## End of test report