# TEST REPORT

| | | |
|---|---|---|
| **Eurofins KCTL Co.,Ltd.**<br>65, Sinwon-ro, Yeongtong-gu,<br>Suwon-si, Gyeonggi-do, 16677, Korea<br>TEL: 82-31-285-0894 FAX: 82-505-299-8311<br>www.kctl.co.kr | Report No.:<br>KR23-SRF0033-A<br>Page (1) of (16) | eurofins \| KCTL |

**1. Client**

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2022-10-17

**2. Use of Report** : Certification

**3. Name of Product / Model** : Mobile phone / SM-A346B/DSN

**4. Manufacturer / Country of Origin** : Samsung Electronics Co., Ltd. / Vietnam

**5. FCC ID** : A3LSMA346B

**6. Date of Test** : 2022-11-09 to 2023-01-04

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

**8. Test method used** : FCC Part 15 Subpart C, 15.225

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

| | | |
|---|---|---|
| Affirmation | Tested by<br>Name : Sunghyun Yoon (Signature) | Technical Manager<br>Name : Seungyong Kim (Signature) |

2023-01-20

**Eurofins KCTL Co.,Ltd.**

## REPORT REVISION HISTORY

| Date | Revision | Page No |
|---|---|---|
| 2023-01-17 | Originally issued | - |
| 2023-01-20 | Updated to TCB comment | 6 ~ 7 |
| | | |
| | | |
| | | |



Note. The report No. KR23-SRF0033 is superseded by the report No. KR23-SRF0033-A.

## 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 | : | Samsung Electronics Co., Ltd. |
| Address | : | 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea |
| Manufacturer | : | Samsung Electronics Co., Ltd. |
| Address | : | 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea |
| Factory | : | Samsung Electronics Vietnam Thai Nguyen Co., Ltd |
| Address | : | Yen Binh Industrial Park, Dong Tien Ward, Pho Yen Town, Thai Nguyen Province, Vietnam |
| 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<br>VCCI Registration No. : R-20080, G-20078, C-20059, T-20056<br>CAB Identifier: KR0040<br>ISED Number: 8035A<br>KOLAS No.: KT231 |

# 2. Device information

| | | |
|---|---|---|
| Equipment under test | : | Mobile phone |
| Model | : | SM-A346B/DSN |
| Modulation technique | : | ASK (NFC) |
| Number of channels | : | 1 ch |
| Power source | : | DC 3.88 V |
| Antenna specification | : | LDS Antenna |
| Software version | : | A346B.001 |
| Hardware version | : | REV1.0 |
| Test device serial No. | : | Radiated : R3CTA0N84EX |
| Operation temperature | : | -20 ℃ ~ 60 ℃ |

## 2.1. Frequency/channel operations

This device contains the following capabilities:
WLAN (11a/b/g/n/ac), Bluetooth (BDR/EDR/BLE), LTE B2/4/5/12/17/26/41/66, GSM 850/1900, WCDMA 850/1700/1900, NFC

| Ch. | Frequency (㎒) |
|---|---|
| 01 | 13.56 |

Table 2.1-1. NFC

## 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.

- The transmitter has permanently attached LDS Antenna (Internal antenna) on board.

# 4. Introduction

This report referenced from the FCC ID: A3LSMA346M
Based on their similarity, the FCC Part 15C (equipment class: DXX) reuse the original model's result and do spot-check, following the FCC KDB 484596 D01 v01.
And the applicant takes full responsibility that the test data as referenced in this report represent compliance for this FCC ID.

## 4.1 Difference

The FCC ID: A3LSMA346B shares the same enclosure and circuit board as FCC ID: A3LSMA346M. The WIFI/BT/BLE/NFC/WCDMA/GSM/LTE antenna and surrounding circuitry and layout are identical between these two units.
As for all bands, they have been verified and the parent model test results under FCC ID: A3LSMA346M shall remain representative of FCC ID: A3LSMA346B.

**Note.** The difference between the parent and variant is that the RF circuit for NR/LTE Bands (13/n5/n66), ULCA Band 4 and EN-DC for Band 2/66 in the parent model A3LSMA346M is removed from the variant model A3LSMA346B.

## 4.2 Spot check verification data (Band-edge & Spurious emission)

| Test mode | Test item | Test mode | Measured frequency (㎒) | SM-A346M/DSN (dB㎶) | SM-A346B/DSN (dB㎶) | Deviation (dB) |
|---|---|---|---|---|---|---|
| | | | | QP | QP | |
| NFC | Fundamental | Without Tag | 13.56 | 12.28 | 10.78 | -1.5 |
| | Emission | Without Tag | 25.81 | -15.37 | -14.77 | 0.6 |

**Notes:**
1. FCC ID: A3LSMA346B have been verified the performance as for NFC identical with the FCC ID: A3LSMA346M.
2. Comparison of two models, the variant model emissions are less than 3 ㏈ higher than the parent model, and all test results are under FCC technical limits.
3. The test procedure(s) in this report were performed in accordance as following.
   - KDB 484596 D01 v01

## 4.3 Reference Detail

Reference application that contains the reused reference data in the individual test reports.

| Equipment Class | Reference FCC ID | Application Type | Reference Test report Number | Exhibit Type | Variant Test Report Number | Date Re-used |
|---|---|---|---|---|---|---|
| DTS | A3LSMA346M | Original | KR23-SRF0005 (802.11b/g/n) | Test report | KR23-SRF0027 | All |
| | | | KR23-SRF0004 (Bluetooth LE) | Test report | KR23-SRF0026 | All |
| DSS | A3LSMA346M | Original | KR23-SRF0003 (Bluetooth) | Test report | KR23-SRF0025 | All |
| NII | A3LSMA346M | Original | KP23-SRF0006 (802.11a/n/ac) | Test report | KR23-SRF0028 | All |
| DXX | A3LSMA346M | Original | KP23-SRF0012 (NFC) | Test report | KR23-SRF0033 | All |
| PCE | A3LSMA346M | Original | KR23-SRF0008 (2G, 3G) | Test report | KR23-SRF0030 | All |
| | | | KR23-SRF0009 (LTE) | Test report | KR23-SRF0031 | Partial[1),2)] |
| | | | KR23-SRF0010 (LTE Part90) | Test report | KR23-SRF0032 | All |

**Notes:**

1. This device does not support the LTE Band 13.
2. This device does not support sub antenna for usage of ULCA (LTE B4) and EN-DC (LTE B2/66).
3. This device does not support the 5GNR Bands of n5/n66.

## 5. Summary of tests

| FCC Part section(s) | Parameter | Test Condition | Test results |
|---|---|---|---|
| 15.225(a) | In-band Fundamental Emission | Radiated | Pass |
| 15.225(b) | In-band Spurious Emission | | Pass |
| 15.225(c) | In-band Spurious Emission | | Pass |
| 15.225(d)<br>15.209 | Out-of–band Spurious Emission | | Pass |

**Notes:**

1. All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2. 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.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Z** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Z** orientation
4. The test procedure(s) in this report were performed in accordance as following.
   ◆ ANSI C63.10-2013
5. All the radiated tests have been performed several case. (Stand-alone, with accessories (DLC Cable etc.))
   - Worst case: stand-alone
6. Radiated(fundamental level and spurious emissions) tests were performed both without reading a passive tag condition[test mode] and with reading a passive tag condition
   - Worst case : Without passive tag

## 6. Measurement uncertainty

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

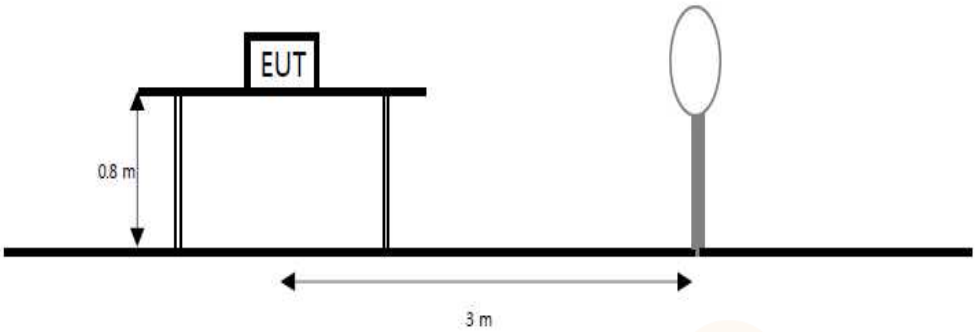
All measurement uncertainty values are shown with a coverage factor of $k$=2 to indicated a 95 % level of confidence. The measurement data shown herein meets of exceeds the $U_{CISPR}$ measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine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

| Parameter | Expanded uncertainty (±) | |
|---|---|---|
| Radiated spurious emissions | 9 ㎑ ~ 30 ㎒: | 2.4 dB |
| | 30 ㎒ ~ 1 000 ㎒ | 2.3 dB |
| Conducted emissions | 9 ㎑ ~ 150 ㎑ | 1.6 dB |
| | 150 ㎑ ~ 30 ㎒ | 1.7 dB |

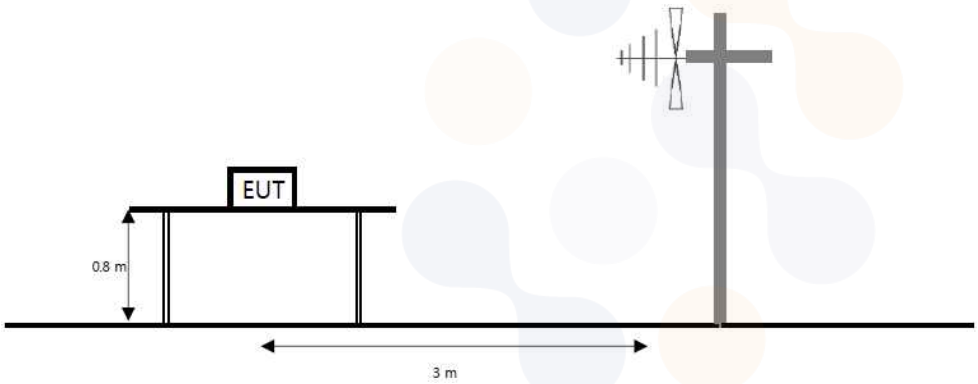
# 7. Test results
## 7.1. Radiated spurious emissions

**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.




**Limit**

15.225 (a) The field strength of any emission within the band 13.553-13.567 ㎒ shall not exceed 15, 848 microvolts/meter at 30 meters.

15.225 (b) With in the bands 13.410-13.553 ㎒ and 13.567-13.710 ㎒, the field strength of any emissions shall not exceed 334 microvolts/meter at 30 meters.

15.225 (c) With in the bands 13.110-13.410 ㎒ and 13.710-14.010 ㎒, the field strength of any emissions shall not exceed 106 microvolts/meter at 30 meters.

15.225 (d) The Field Strength of any emissions appearing outside of the 13.110-14.010 ㎒ band shall not exceed the general radiated emission limits in 15.209.

| Frequency (㎒) | Field Strength (㎶/m) | Measurement distance (meters) |
|---|---|---|
| 0.009-0.490 | 2400/F(㎑) | 300 |
| 0.490-1.705 | 24000/F(㎑) | 30 |
| 1.705-30.0 | 30(29.54 dB㎶/m) | 30 |
| 30.0-88.0 | 100(40 dB㎶/m) | 3 |
| 88-216 | 150(43.5 dB㎶/m) | 3 |
| 216-960 | 200 (46 dB㎶/m) | 3 |
| Above 960 | 500 (53.98 dB㎶/m) | 3 |

**Test procedure**

ANSI C63.10-2013 - Section 6.4, 6.5

**Test settings**

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 x RBW
4. Detector = peak
5. Sweep time = auto couple
6. Trace mode = max hold
7. Trace was allowed to stabilize

**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 ㎒ |

**Notes:**

1. *f* <30 ㎒, extrapolation factor of 40 dB/decade of distance. $F_d = 40\log(D_m/Ds)$
   *f* ≥30 ㎒, extrapolation factor of 20 dB/decade of distance. $F_d = 20\log(D_m/Ds)$
   Where:
   $F_d$= Distance factor in dB
   $D_m$= Measurement distance in meters
   $D_s$= Specification distance in meters
2. Measurements were performed at 3m and the data was extrapolated to the specified measurement distance of 30m using the square of an inverse linear distance extrapolation factor (40 dB/decade) as specified in § 15.31(f)(2). Extrapolation Factor = 40 log10(30/3) = 40 dB.
3. Factors(dB) = Antenna factor(dB/m) + Cable loss(dB) + or Amp. gain(dB) + or $F_d$(dB)
4. Result = Reading + Cable loss + Amp gain + Ant. factor - Distance factor
5. The worst-case emissions are reported however emissions whose levels were not within 20 dB of respective limits were not reported.
6. All measurements were recorded using a spectrum analyzer employing a quasi-peak detector.
7. Below 30 ㎒ frequency range, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported and the worse orientations of Face-on and Face-off were set for final test.
8. Face-on = Parallel, Face-off = Perpendicular
9. [1] means restricted band

## Test results for fundamental

### 15.225 (a) 13.553-13.567 ㎒

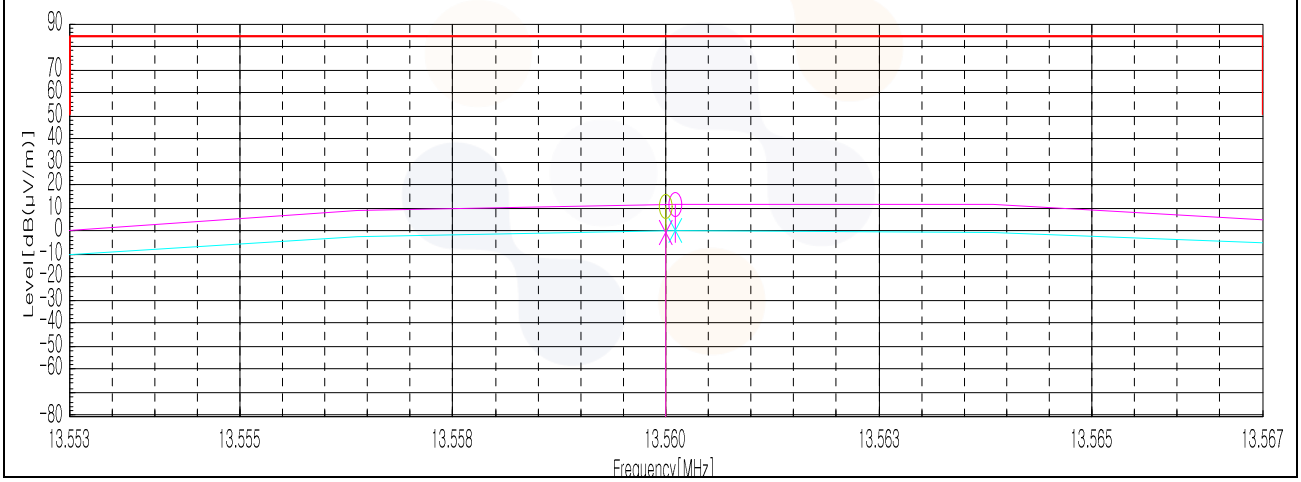
[Face-on]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 13.56 | 61.60 | 20.31 | -31.13 | 40.00 | 10.78 | 84.00 | 73.22 |

[Face-off]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 13.56 | 49.80 | 20.31 | -31.13 | 40.00 | -1.02 | 84.00 | 85.02 |

**Face-on/Face-off**



## Test results for in-band & out-band (9 ㎑ to 30 ㎒)

### 15.225 (b,c) 13.110-14.010 ㎒

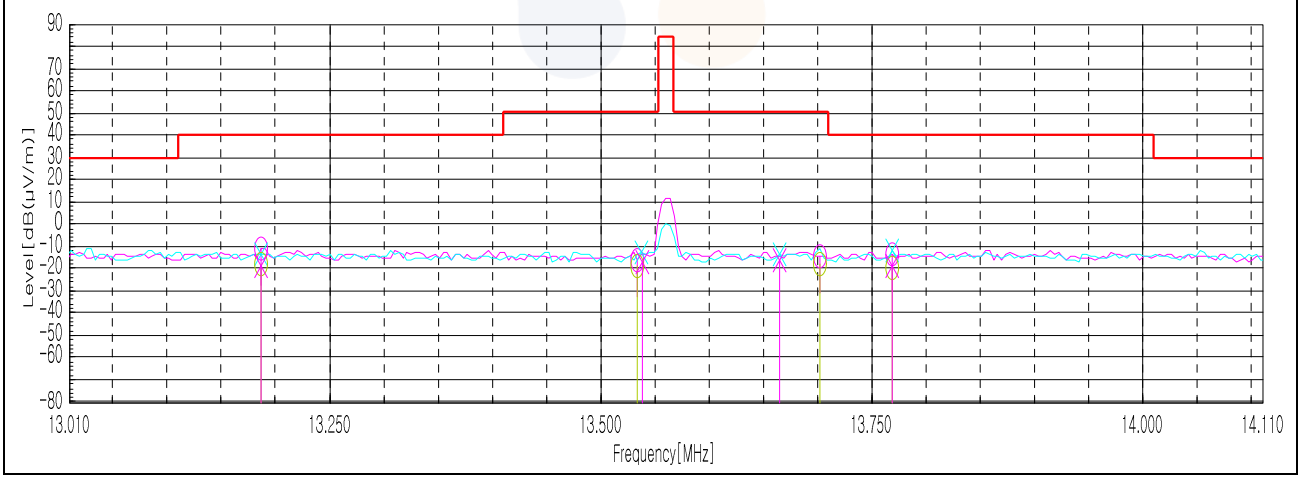
[Face-on]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 13.19 | 32.70 | 20.29 | -31.16 | 40.00 | -18.17 | 29.50 | 47.67 |
| 13.53 | 31.70 | 20.31 | -31.13 | 40.00 | -19.12 | 29.50 | 48.62 |
| 13.70 | 32.80 | 20.32 | -31.13 | 40.00 | -18.01 | 50.50 | 68.51 |
| 13.77 | 31.40 | 20.33 | -31.14 | 40.00 | -19.41 | 40.50 | 59.91 |

[Face-off]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 13.19 | 31.90 | 20.29 | -31.16 | 40.00 | -18.97 | 29.50 | 48.47 |
| 13.54 | 33.20 | 20.31 | -31.13 | 40.00 | -17.62 | 29.50 | 47.12 |
| 13.67 | 34.20 | 20.32 | -31.13 | 40.00 | -16.61 | 50.50 | 67.11 |
| 13.77 | 32.20 | 20.33 | -31.14 | 40.00 | -18.61 | 40.50 | 59.11 |

**Face-on/Face-off**



## Test results (9 ㎑ to 30 ㎒)

### 15.225 (d) 0.009-30 ㎒

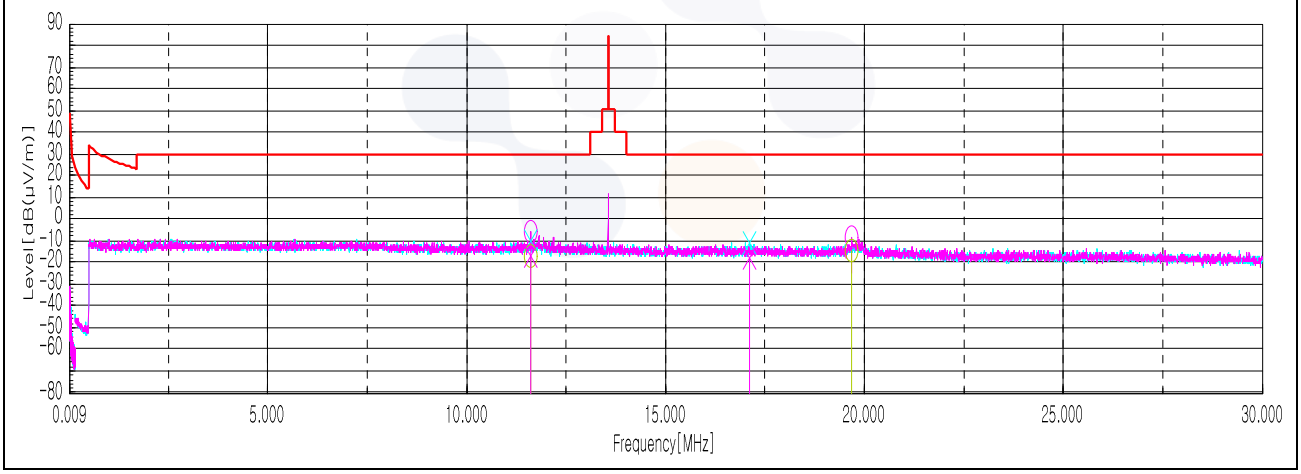
[Face-on]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 11.61 | 33.40 | 20.20 | -31.23 | 40.00 | -17.63 | 29.50 | 47.13 |
| 19.68 | 35.40 | 20.68 | -30.85 | 40.00 | -14.77 | 29.50 | 44.27 |

[Face-off]

| Frequency | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|
| (㎒) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | |
| 11.61 | 33.70 | 20.20 | -31.23 | 40.00 | -17.33 | 29.50 | 46.83 |
| 17.12 | 32.80 | 20.53 | -30.98 | 40.00 | -17.65 | 29.50 | 47.15 |

**Face-on/Face-off**

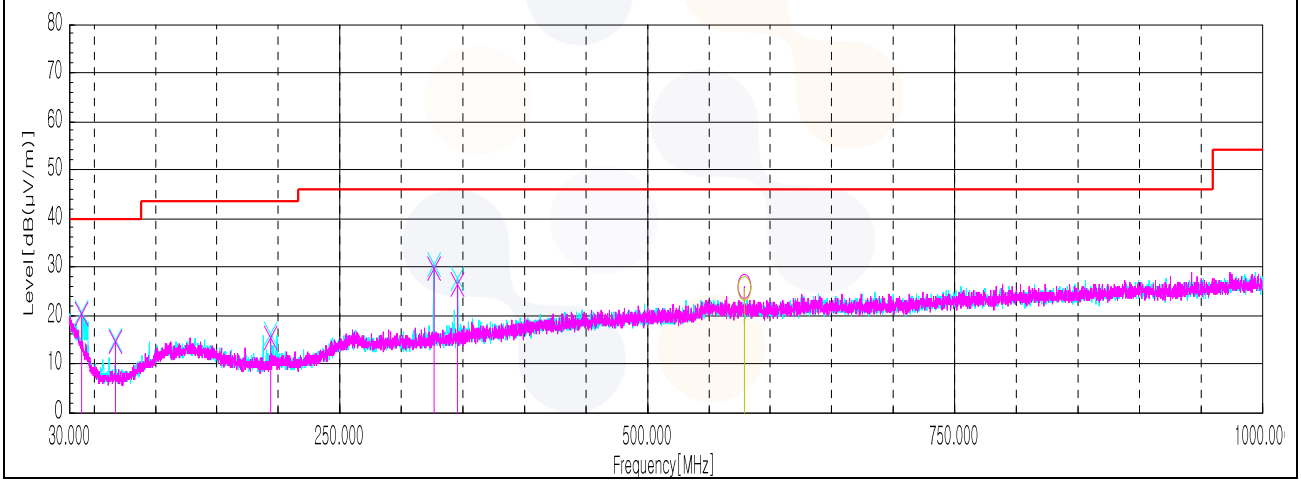


## Test results (Below 1 000 ㎒)

### 15.225 (d) 30-1000 ㎒

| Frequency | Pol. | Reading | Antenna Factor | Amp. + Cable | Distance Factor | Result | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| (㎒) | (V/H) | (dB(㎶)) | (dB) | (dB) | (dB) | (dB(㎶/m)) | (dB(㎶/m)) | (dB) |
| **Quasi peak data** | | | | | | | | |
| 39.94 | V | 30.90 | 19.24 | -29.81 | - | 20.33 | 40.00 | 19.67 |
| 67.83 | V | 31.30 | 12.12 | -29.07 | - | 14.35 | 40.00 | 25.65 |
| 193.81 | V | 27.70 | 15.08 | -27.26 | - | 15.52 | 43.50 | 27.98 |
| 326.34[1)] | V | 35.80 | 19.63 | -25.82 | - | 29.61 | 46.00 | 16.39 |
| 346.10 | V | 31.90 | 19.94 | -25.62 | - | 26.22 | 46.00 | 19.78 |
| 579.14 | H | 24.30 | 24.40 | -23.33 | - | 25.37 | 46.00 | 20.63 |

**Horizontal/Vertical**



## 8. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|
| EMI TEST RECEIVER | R&S | ESCI7 | 100732 | 23.01.19 |
| Bi-Log Antenna | TESEQ | CBL 6112D | 62438 | 24.08.24 |
| Amplifier | SONOMA INSTRUMENT | 310N | 284608 | 23.08.18 |
| ATTENUATOR | KEYSIGHT | 8491B-6dB | MY39271060 | 24.04.27 |
| LOOP Antenna | R&S | HFH2-Z2 | 100355 | 24.08.10 |
| Antenna Mast | Innco Systems | MA4640-XP-ET | - | - |
| Turn Table | Innco Systems | CO3000 | 1175/45850319/P | - |
| Vector Signal Generator | R&S | SMBV100A | 257566 | 23.07.04 |

**End of test report**