



# TEST REPORT

|                                                                                                                                                                                                         |                                                        |                                                                   |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------|
| <b>Eurofins KCTL Co.,Ltd.</b><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><a href="http://www.kctl.co.kr">www.kctl.co.kr</a> | Report No.:<br><b>KR23-SRF0164</b><br>Page (1) of (23) | <div style="float: right; text-align: right;"> <b>KCTL</b> </div> |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------|-------------------------------------------------------------------|

**1. Client**

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2023-03-23

**2. Use of Report** : Certification

**3. Name of Product / Model** : Smart wearable / SM-R960

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

**5. FCC ID** : A3LSMR960

**6. IC Certificate No.** : 649E-SMR960

**7. Date of Test** : 2023-04-11 to 2023-05-17

**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

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

2023-05-22

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|                                                                                                                                                                                                         |                                                        |                                                                                     |
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## REPORT REVISION HISTORY

| Date       | Revision          | Page No |
|------------|-------------------|---------|
| 2023-05-22 | Originally issued | -       |
|            |                   |         |
|            |                   |         |
|            |                   |         |
|            |                   |         |

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## 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

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## 2.1. Accessory information

| Equipment        | Manufacturer                  | Model    | Serial No. | Power source | FCC ID & IC                                    |
|------------------|-------------------------------|----------|------------|--------------|------------------------------------------------|
| Wireless charger | Samsung Electronics Co., Ltd. | EP-OR900 | -          | 5.0 V, 2.0 A | FCC ID :<br>A3LEPOR900<br>IC :<br>649E-EPOR900 |

## 2.2. Frequency/channel operations

This device contains the following capabilities:  
WLAN (11a/b/g/n), Bluetooth (BDR/EDR/BLE)

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

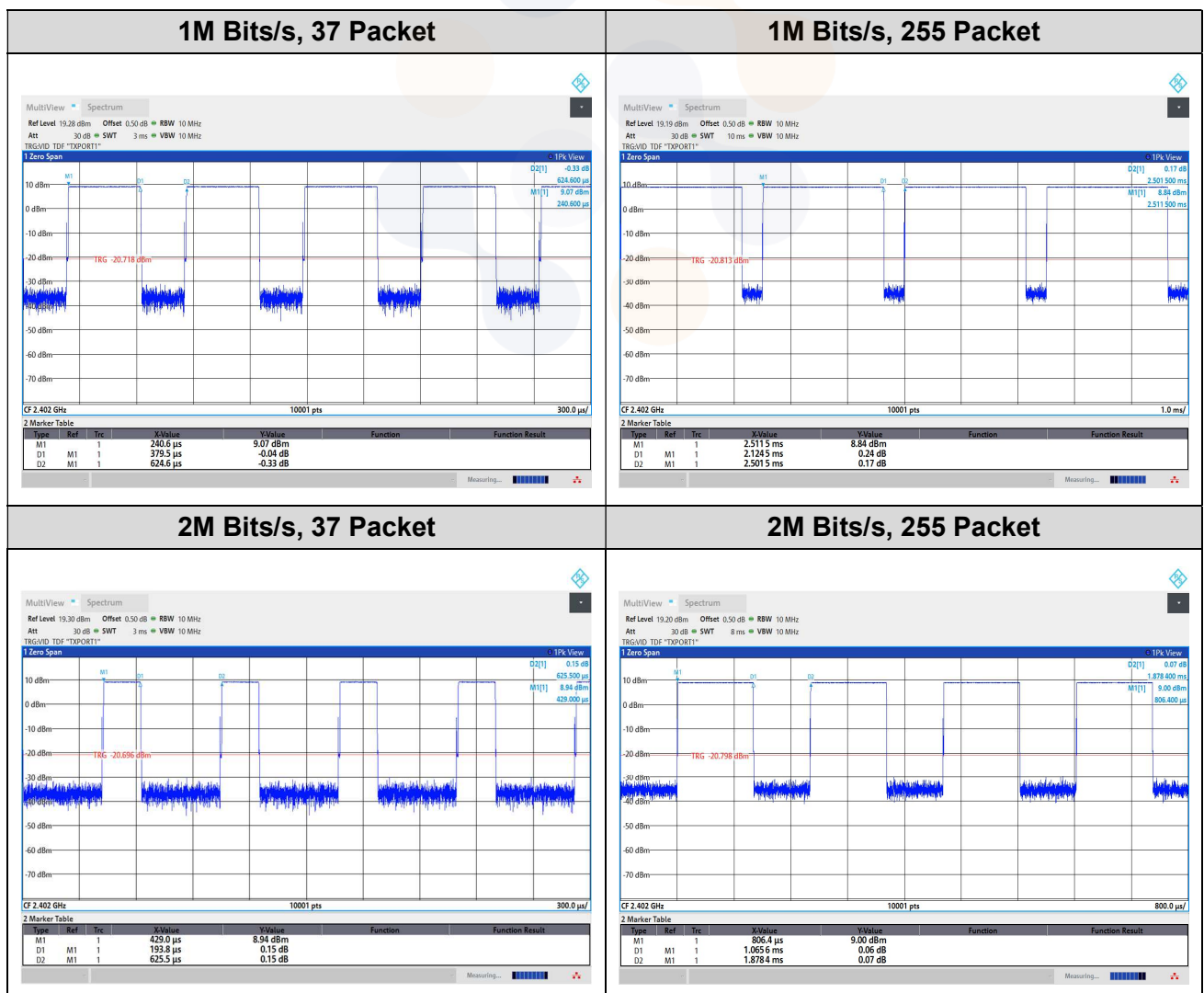
Table 2.2.1. Bluetooth Low Energy

## 2.3. Duty Cycle Factor

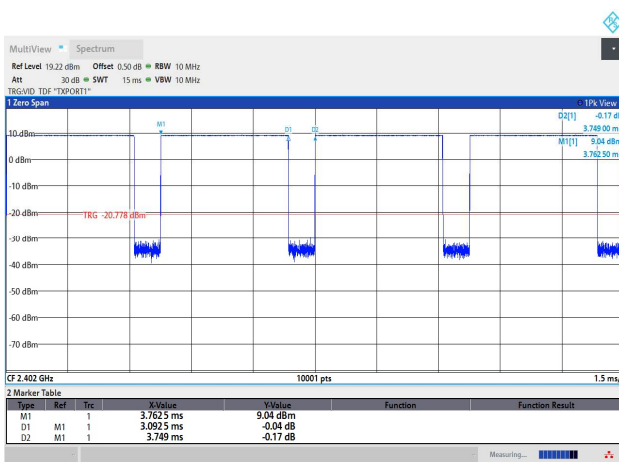
| Test mode               | Period (ms) | On time (ms) | Duty cycle |       | Duty Cycle Factor (dB) |
|-------------------------|-------------|--------------|------------|-------|------------------------|
|                         |             |              | (Linear)   | (%)   |                        |
| 1M Bits/s, 37 Packet    | 0.625       | 0.380        | 0.608 0    | 60.80 | 2.16                   |
| 1M Bits/s, 255 Packet   | 2.502       | 2.125        | 0.849 3    | 84.93 | 0.71                   |
| 2M Bits/s, 37 Packet    | 0.626       | 0.194        | 0.309 9    | 30.99 | 5.09                   |
| 2M Bits/s, 255 Packet   | 1.878       | 1.066        | 0.567 6    | 56.76 | 2.46                   |
| 125k Bits/s, 37 Packet  | 3.749       | 3.093        | 0.825 0    | 82.50 | 0.84                   |
| 125k Bits/s, 255 Packet | 17.511      | 17.056       | 0.974 0    | 97.40 | 0.11                   |
| 500k Bits/s, 37 Packet  | 1.876       | 1.058        | 0.564 0    | 56.40 | 2.49                   |
| 500k Bits/s, 255 Packet | 5.001       | 4.545        | 0.908 8    | 90.88 | 0.42                   |

### Notes.

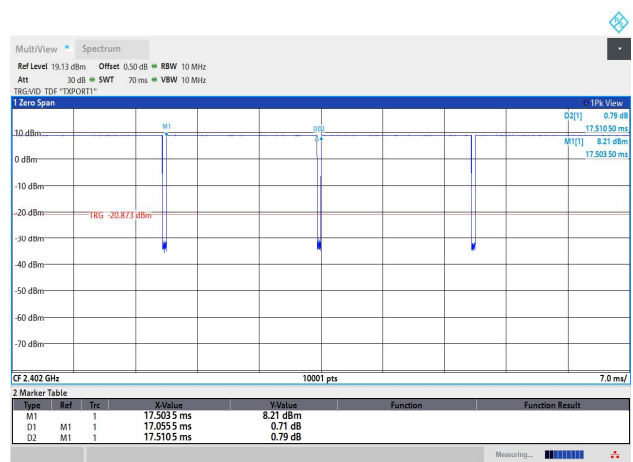
1. Duty cycle (Linear) = Ton time / Period
2. DCF(Duty cycle factor) =  $10\log(1/\text{duty cycle})$
3. DCF is not compensated to average result if the duty cycle is more than 98%



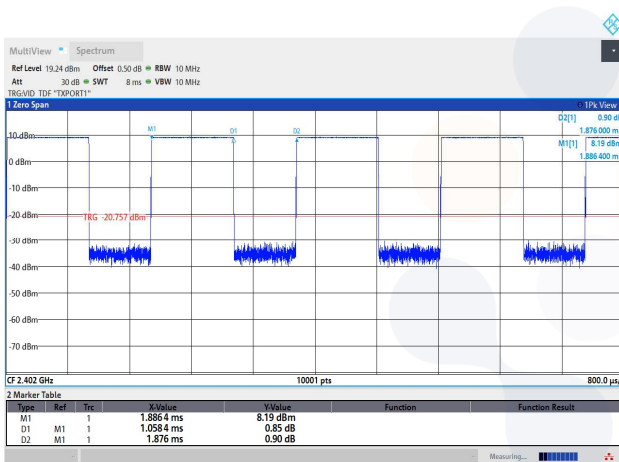
### 125k Bits/s, 37 Packet



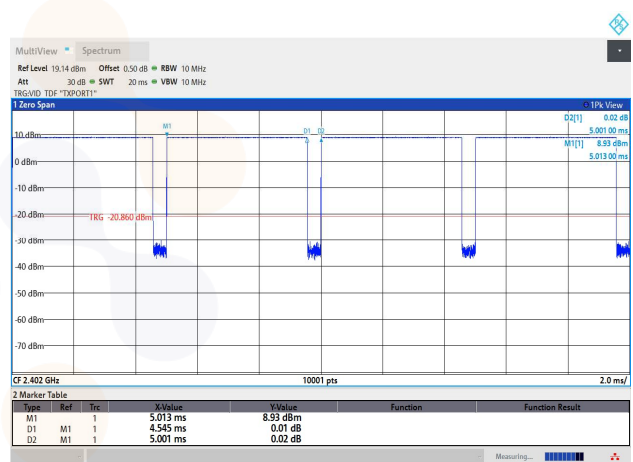
### 125k Bits/s, 255 Packet



### 500k Bits/s, 37 Packet



### 500k Bits/s, 255 Packet



|                                                                                                                                                                                                         |                                                 |                                                                                                                                                                         |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
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### 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 LDS Antenna (Internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247.

## 4. Introduction

This report referenced from the FCC ID : A3LSMR965 and IC : 649E-SMR965.

Based on their similarity, the FCC Part 15C and RSS-247 (equipment class: DTS) 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 and IC.

### 4.1 Difference

The FCC ID : A3LSMR960 and IC : 649E-SMR960 share the same enclosure and circuit board as FCC ID : A3LSMR965 and IC : 649E-SMR965. The WIFI/BT/BLE 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 : A3LSMR965 and IC : 649E-SMR965 shall remain representative of FCC ID : A3LSMR960 and IC : 649E-SMR960.

**Note.** The difference between the parent and variant is that the RF circuit for WCDMA/LTE bands in the parent model SM-R965U is removed from the variant model SM-R960.

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

| Test band | Test item | Test mode       | Channel | Measured frequency (MHz) | SM-R965U (dBμV) |       | SM-R960 (dBμV) |       | Deviation (dB) |       |
|-----------|-----------|-----------------|---------|--------------------------|-----------------|-------|----------------|-------|----------------|-------|
|           |           |                 |         |                          | Avg.            | Peak  | Avg.           | Peak  | Avg.           | Peak  |
| BLE       | Band edge | 1Mbps Packet 37 | 39      | 2 483.5 ~ 2 500          | -               | 50.25 | -              | 43.43 | -              | -6.82 |
|           | RSE       |                 | 0       | 7 281.12                 | -               | 48.10 | -              | 44.45 | -              | -3.65 |
|           | Band edge | 2Mbps Packet 37 | 39      | 2 483.5 ~ 2 500          | 43.23           | 53.35 | 38.80          | 44.84 | -4.43          | -8.51 |
|           | RSE       |                 | 19      | 7 266.62                 | -               | 47.78 | -              | 43.96 | -              | -3.82 |

#### Notes:

1. FCC ID : A3LSMR960 and IC : 649E-SMR960 have been verified the performance as for Bluetooth LE identical with the FCC ID : A3LSMR965 and IC : 649E-SMR965.
2. Comparison of two models, the variant model emissions are less than 3 dB higher than the parent model, and all test results are under FCC/ISED 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 & IC    | Application Type | Reference Test report Number   | Exhibit Type | Variant Test Report Number | Data Re-used |
|-----------------|--------------------------|------------------|--------------------------------|--------------|----------------------------|--------------|
| DTS             | A3LSMR965<br>649E-SMR965 | Original         | KR23-SRF0157<br>(802.11b/g/n)  | Test report  | KR23-SRF0165               | All          |
|                 |                          |                  | KR23-SRF0156<br>(Bluetooth LE) | Test report  | KR23-SRF0164               | All          |
| DSS             | A3LSMR965<br>649E-SMR965 | Original         | KR23-SRF0155<br>(Bluetooth)    | Test report  | KR23-SRF0163               | All          |
| NII             | A3LSMR965<br>649E-SMR965 | Original         | KR23-SRF0158<br>(802.11a/n)    | Test report  | KR23-SRF0166               | All          |



## 5. Summary of tests

| FCC Part section(s)     | IC Rule Reference           | Parameter                  | Test Condition | Test results |
|-------------------------|-----------------------------|----------------------------|----------------|--------------|
| 15.205(a),<br>15.209(a) | RSS-Gen<br>(8.9),<br>(8.10) | Spurious emission          | Radiated       | Pass         |
|                         |                             | Band-edge, restricted band |                | Pass         |

### Notes:

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. 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.
- The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z and all of the radiated tests have been performed with the accessories as below. It was determined that below orientation was worst case orientation for each band.

| Band         | Strap         | With charger | Without charger |        |        |
|--------------|---------------|--------------|-----------------|--------|--------|
|              |               | X-axis       | X-axis          | Y-axis | Z-axis |
| Bluetooth LE | With strap    | -            | -               | -      | O      |
|              | Without strap | -            | -               | -      | -      |

- The worst-case data rate were : 1M Bits/s, Packet length 37 Bytes  
2M Bits/s, Packet length 37 Bytes
- The test procedure(s) in this report were performed in accordance as following.
  - ANSI C63.10-2013
  - KDB 558074 D01 v05r02

## 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 or exceeds the  $U_{\text{CISPR}}$  measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

| Parameter                   | Expanded uncertainty ( $\pm$ ) |        |
|-----------------------------|--------------------------------|--------|
| Radiated spurious emissions | 9 kHz ~ 30 MHz:                | 2.3 dB |
|                             | 30 MHz ~ 1 000 MHz             | 2.5 dB |
|                             | 1 000 MHz ~ 18 000 MHz         | 4.7 dB |
|                             | Above 18 000 MHz               | 4.8 dB |

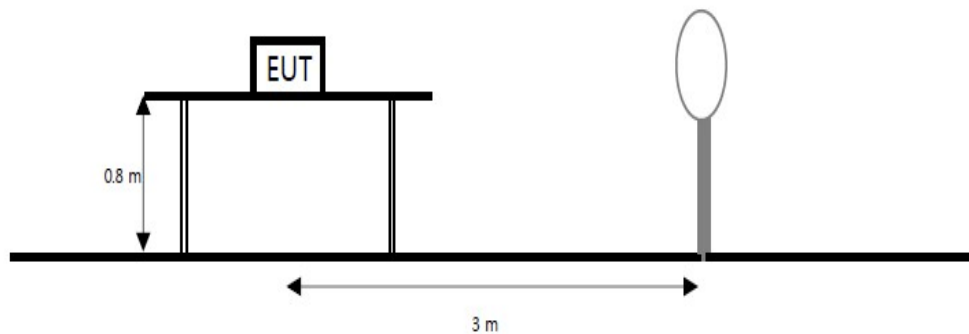


## 7. Test results

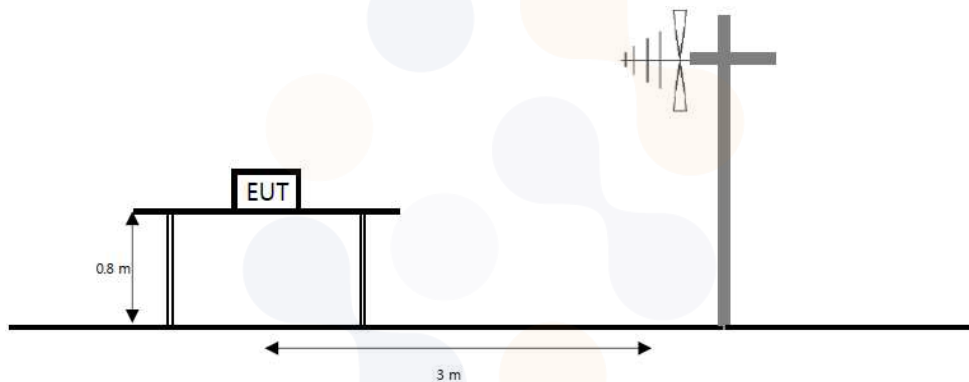
### 7.1. Spurious Emission, Band Edge and Restricted bands

#### Test setup

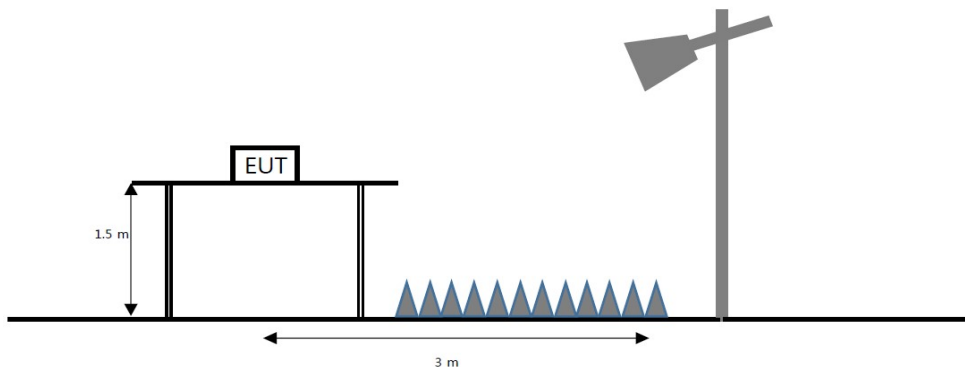
The diagram below shows the test setup that is utilized to make the measurements for emission from 9 kHz to 30 MHz Emissions



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



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 GHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz 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 (MHz) | Field strength ( $\mu V/m$ ) | Measurement distance (m) |
|-----------------|------------------------------|--------------------------|
| 0.009 - 0.490   | 2 400/F(kHz)                 | 300                      |
| 0.490 - 1.705   | 24 000/F(kHz)                | 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 MHz, 76–88 MHz, 174–216 MHz or 470–806 MHz. However, operation within these frequency bands is permitted under other sections of this part, e.g., Section 15.231 and 15.241.

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

| MHz                   | MHz                   | MHz               | GHz           |
|-----------------------|-----------------------|-------------------|---------------|
| 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  | 2 483.5 - 2 500   | 17.7 - 21.4   |
| 8.376 25 - 8.386 75   | 25                    | 2 690 - 2 900     | 22.01 - 23.12 |
| 8.414 25 - 8.414 75   | 156.7 - 156.9         | 3 260 - 3 267     | 23.6 - 24.0   |
| 12.29 - 12.293        | 162.012 5 - 167.17    | 3 332 - 3 339     | 31.2 - 31.8   |
| 12.519 75 - 12.520 25 | 167.72 - 173.2        | 3 345.8 - 3 358   | 36.43 - 36.5  |
| 12.576 75 - 12.577 25 | 240 - 285             | 3 600 - 4 400     | Above 38.6    |
| 13.36 - 13.41         | 322 - 335.4           |                   |               |

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 MHz, compliance with the limits in section 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1 000 MHz, 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 kHz 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 dB below that in the 100 kHz 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 dB instead of 20 dB. 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 MHz**

| Frequency(MHz) | Field strength<br>( $\mu\text{V/m}$ 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 MHz**

| Frequency                 | Magnetic field strength (H-Field)<br>( $\mu\text{A/m}$ ) | Measurement<br>distance(m) |
|---------------------------|----------------------------------------------------------|----------------------------|
| 9 – 490 kHz <sup>1)</sup> | $6.37/F$ (F in kHz)                                      | 300                        |
| 490 – 1705 kHz            | $63.7/F$ (F in kHz)                                      | 30                         |
| 1.705 - 30 MHz            | 0.08                                                     | 30                         |

**Note 1:** The emission limits for the ranges 9-90 kHz and 110-490 kHz 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:

- 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).
- Unwanted emissions that fall into restricted frequency bands listed in table 7 shall comply with the limits specified in table 5 and table 6.
- 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  $\geq$  (3 $\times$ 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 kHz to 150 kHz    | 200 Hz to 300 Hz   |
| 0.15 MHz to 30 MHz  | 9 kHz to 10 kHz    |
| 30 MHz to 1 000 MHz | 100 kHz to 120 kHz |
| > 1 000 MHz         | 1 MHz              |

### Average field strength measurements

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

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

1. RBW = 1 MHz (unless otherwise specified).
2. VBW  $\geq$  (3 $\times$ RBW).
3. Detector = RMS (power averaging), if  $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$ . 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 dB 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 ( $D \geq 98\%$ ) cannot be achieved and the duty cycle is constant (duty cycle variations are less than  $\pm 2\%$ ), 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 MHz (unless otherwise specified).
4. VBW  $\geq [3 \times \text{RBW}]$ .
5. Detector = RMS (power averaging), if  $[\text{span} / (\# \text{ of points in sweep})] \leq (\text{RBW} / 2)$ . 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):

|                                                                                                                                                                                                                        |                                                             |                                                                                     |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------|
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|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------------------------------|

- 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 ( $D \geq 98\%$ ) rather than turning ON and OFF with the transmit cycle, then no duty cycle correction is required for that emission.

#### **Notes:**

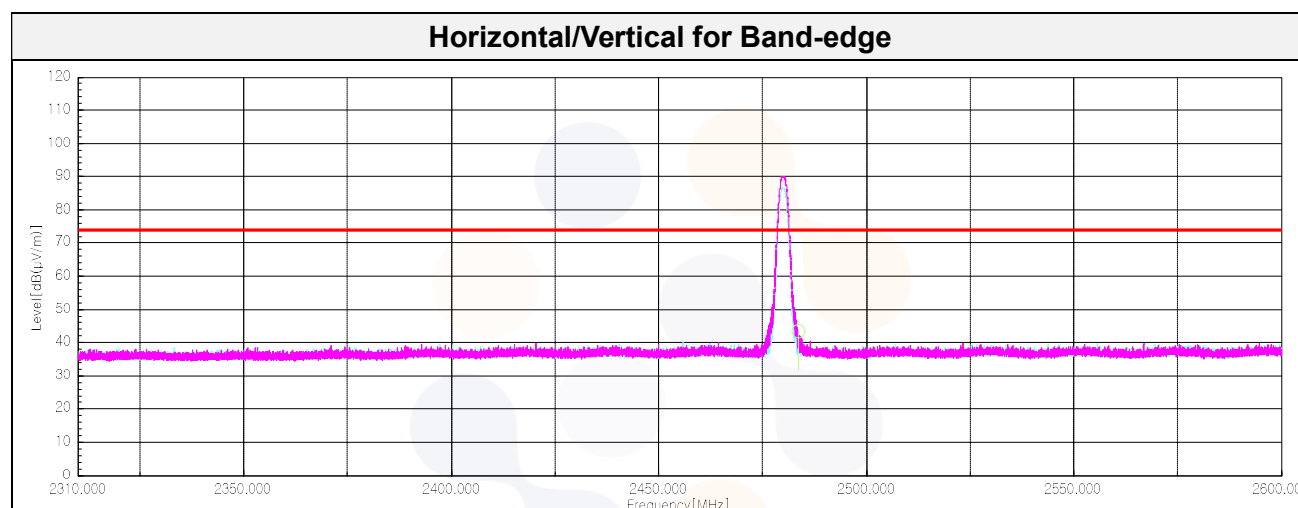
1.  $f < 30$  MHz, extrapolation factor of 40 dB/decade of distance.  $F_d = 40 \log(D_m/D_s)$   
 $f \geq 30$  MHz, extrapolation factor of 20 dB/decade of distance.  $F_d = 20 \log(D_m/D_s)$   
Where:  
 $F_d$  = Distance factor in dB  
 $D_m$  = Measurement distance in meters  
 $D_s$  = Specification 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. <sup>1)</sup> means restricted band.
6. Below 30 MHz frequency range, In order to search for the worst result, all orientations about parallel, perpendicular, and ground-parallel were investigated then reported. when the emission level was higher than 20 dB of the limit, then the following statement shall be made: "No spurious emissions were detected within 20 dB of the limit."
7. 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 kHz resulted in a level of Y dBμV/m, which is equivalent to  $Y - 51.5 = Z$  dBμA/m, which has the same margin, W dB, to the corresponding RSS-GEN Table 6 limit as it has to be 15.209(a) limit.

## Spot-check Test results

### 1 Mbits/s(37 Bytes) / Band-edge

#### Highest Channel

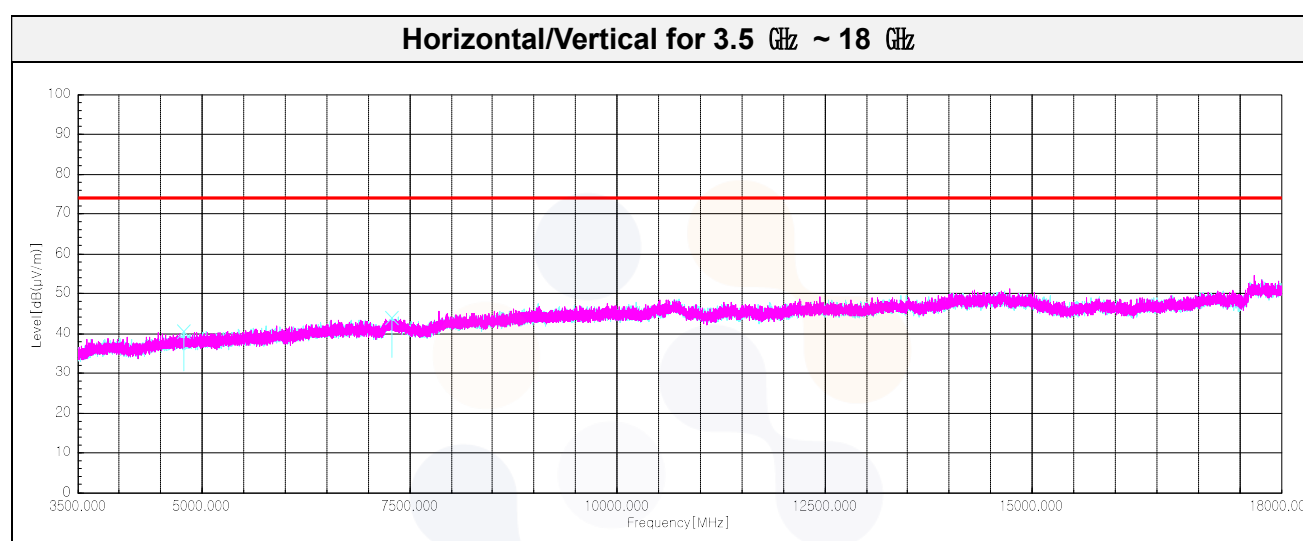
| Frequency                                                      | Pol.  | Reading  | Antenna Factor | Amp. + Cable | DCF  | Result     | Limit      | Margin |
|----------------------------------------------------------------|-------|----------|----------------|--------------|------|------------|------------|--------|
| [MHz]                                                          | [V/H] | [dB(μV)] | [dB]           | [dB]         | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB]   |
| <b>Peak data</b>                                               |       |          |                |              |      |            |            |        |
| 2 483.70 <sup>1)</sup>                                         | H     | 47.90    | 27.80          | -32.27       | -    | 43.43      | 74.00      | 30.57  |
| <b>Average Data</b>                                            |       |          |                |              |      |            |            |        |
| No spurious emissions were detected within 20 dB of the limit. |       |          |                |              |      |            |            |        |



## 1 Mbits/s(37 Bytes) / Harmonic

### Lowest Channel

| Frequency                                                      | Pol.  | Reading  | Antenna Factor | Amp. + Cable | DCF  | Result     | Limit      | Margin |
|----------------------------------------------------------------|-------|----------|----------------|--------------|------|------------|------------|--------|
| [MHz]                                                          | [V/H] | [dB(μV)] | [dB]           | [dB]         | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB]   |
| <b>Peak data</b>                                               |       |          |                |              |      |            |            |        |
| 7 255.50 <sup>1)</sup>                                         | V     | 53.80    | 37.01          | -46.36       | -    | 44.45      | 74.00      | 29.55  |
| <b>Average Data</b>                                            |       |          |                |              |      |            |            |        |
| No spurious emissions were detected within 20 dB of the limit. |       |          |                |              |      |            |            |        |

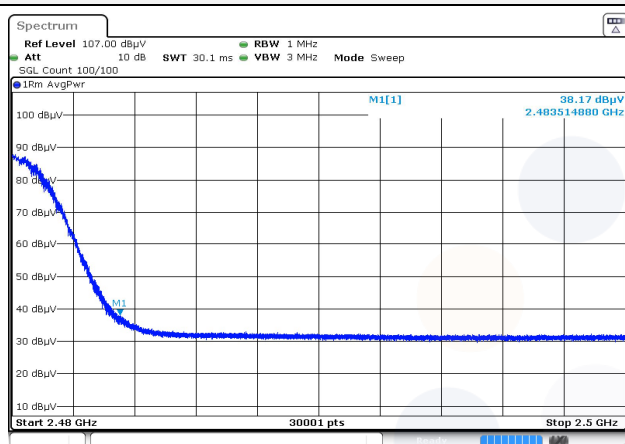


## 2 Mbits/s(37 Bytes) / Band-edge

### Highest Channel

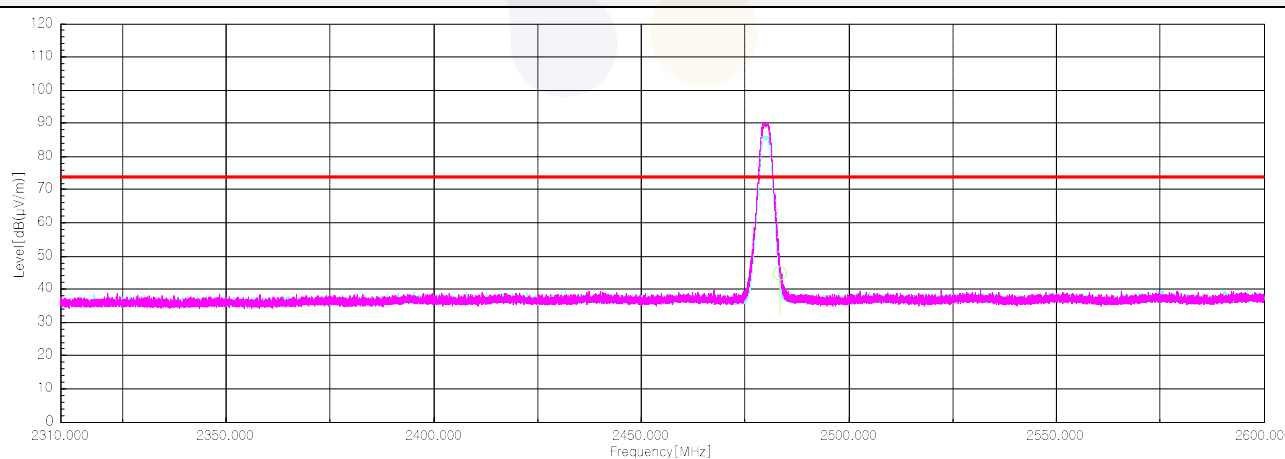
| Frequency              | Pol.  | Reading  | Antenna Factor | Amp. + Cable | DCF  | Result     | Limit      | Margin |
|------------------------|-------|----------|----------------|--------------|------|------------|------------|--------|
| [MHz]                  | [V/H] | [dB(μV)] | [dB]           | [dB]         | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB]   |
| Peak data              |       |          |                |              |      |            |            |        |
| 2 483.51 <sup>1)</sup> | H     | 49.30    | 27.80          | -32.26       | -    | 44.84      | 74.00      | 29.16  |
| 2 483.51 <sup>1)</sup> | H     | 38.17    | 27.80          | -32.26       | 5.09 | 38.80      | 54.00      | 15.20  |

### Average data



Blank

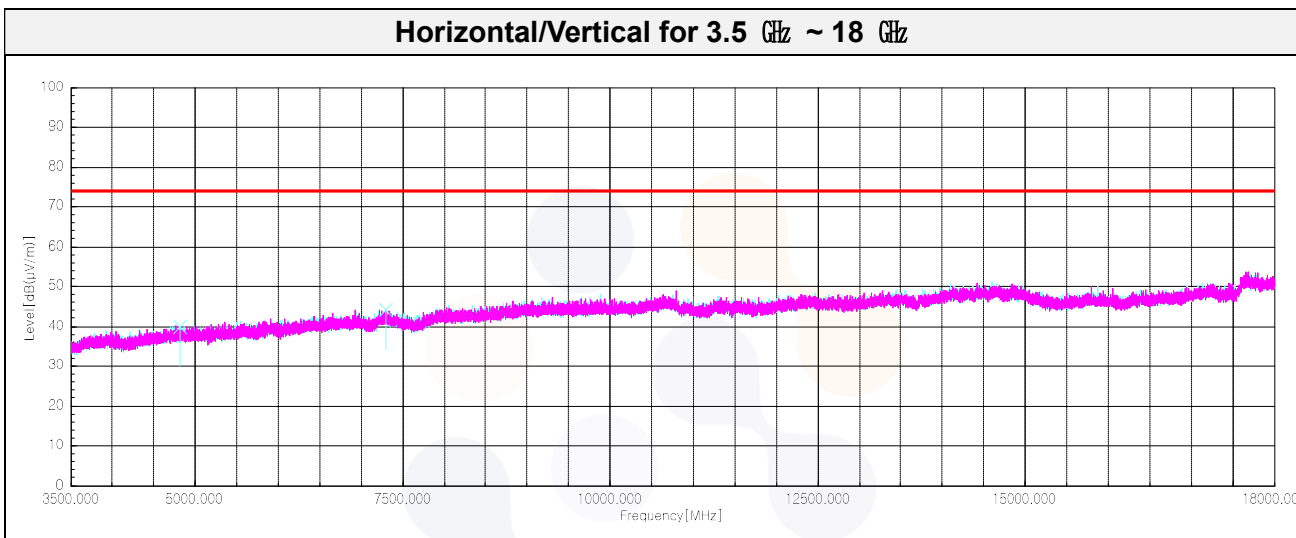
### Horizontal/Vertical for Band-edge



## 2 MBits/s(37 Bytes) / Harmonic

### Middle Channel

| Frequency                                                      | Pol.  | Reading  | Antenna Factor | Amp. + Cable | DCF  | Result     | Limit      | Margin |
|----------------------------------------------------------------|-------|----------|----------------|--------------|------|------------|------------|--------|
| [MHz]                                                          | [V/H] | [dB(μV)] | [dB]           | [dB]         | [dB] | [dB(μV/m)] | [dB(μV/m)] | [dB]   |
| <b>Peak data</b>                                               |       |          |                |              |      |            |            |        |
| 7 303.83 <sup>1)</sup>                                         | V     | 53.50    | 36.89          | -46.43       | -    | 43.96      | 74.00      | 30.04  |
| <b>Average Data</b>                                            |       |          |                |              |      |            |            |        |
| No spurious emissions were detected within 20 dB of the limit. |       |          |                |              |      |            |            |        |



|                                                                                                                                                                                                         |                                                  |                                                                                     |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------|
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|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|-------------------------------------------------------------------------------------|

## 8. Measurement equipment

| Equipment Name          | Manufacturer                | Model No.                   | Serial No. | Next Cal. Date |
|-------------------------|-----------------------------|-----------------------------|------------|----------------|
| Spectrum Analyzer       | R&S                         | FSV3044                     | 101427     | 24.03.28       |
| Attenuator              | HUBER+SUHNER                | 6610_SK-50-1/199_NE         | ATT10      | 24.04.10       |
| DC Power Supply         | AGILENT                     | E3632A                      | MY40000265 | 24.04.27*      |
| Spectrum Analyzer       | R&S                         | FSV40                       | 100988     | 23.07.11       |
| PSA Spectrum Analyzer   | Agilent                     | E4440A                      | MY46186407 | 24.03.22       |
| Broadband Pre Amplifier | SCHWARZBECK                 | BBV9718D                    | 53         | 24.03.17       |
| Low Noise Amplifier     | TESTEK                      | TK-PA18H                    | 220123-L   | 23.12.02       |
| Low Noise Amplifier     | TESTEK                      | TK-PA1840H                  | 220133-L   | 23.12.02       |
| Horn Antenna            | SCHWARZBECK                 | BBHA9120D                   | 2764       | 23.12.06       |
| Horn Antenna            | SCHWARZBECK                 | BBHA9170                    | 1267       | 23.12.05       |
| High Pass Filter        | Wainwright Instruments GmbH | WHKX12-2805-3000-18000-40SS | SN59       | 23.12.14       |
| Signal Generator        | R&S                         | SMB100A                     | 176206     | 24.01.19       |

\* Tests related to this equipment were progressed after the calibration was completed.

**End of test report**