# TEST REPORT

**Testing Laboratory:**
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**Test Report Number: SKT-RFC-190003**
**Date of issue: June 14, 2019**

| | |
|---|---|
| **Applicant:** | **KYUNGWOO SYSTECH INC.**<br>#401, Daeryung Post Tower 5, 68, Digital-ro 9, Geumcheon-gu, Seoul, South Korea |
| **Manufacturer:** | **KYUNGWOO SYSTECH INC.**<br>#401, Daeryung Post Tower 5, 68, Digital-ro 9, Geumcheon-gu, Seoul, South Korea |
| **Product:** | SMK FOB |
| **Model:** | **SMK-DWS-01** |
| **FCC ID:** | ZE8-SMK-DWS-01 |
| **Project number:** | SKTEU18-1196 |
| **EUT received:** | December 4, 2018 |

| | |
|---|---|
| **Applied standards:** | ANSI C63.10-2013 and ANSI C63.4-2014 |
| **Rule parts:** | FCC Part 15 Subpart C - Intentional radiators |
| **Equipment Class:** | **DSC - Part 15 Security/Remote Control Transmitter** |

| | |
|---|---|
| **Remarks to the standards:** | None |

The above equipment has been tested by SK Tech Co., Ltd., and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product or system, which was tested.

Wonsik Ham / **Testing Engineer**

Jongsoo Yoon / **Technical Manager**

# Revision History of Test Report

| Rev. | Revisions | Effect page | Approved by | Date |
|---|---|---|---|---|
| - | Initial issue | All | Jongsoo Yoon | Jun. 14, 2019 |

# TABLE OF CONTENTS

# 1 Summary of test results

| Requirement | CFR 47 Section | Result |
|---|---|---|
| Antenna Requirement | 15.203 | Meets the requirements |
| 20dB Emission Bandwidth | 15.231(c) | Meets the requirements |
| Transmission Time | 15.231(a) | Meets the requirements |
| Spurious Emission, Band Edge, and Restricted bands | 15.231(b), 15.205(a), 15.209(a) | Meets the requirements |
| AC power line Conducted emissions | 15.207(a) | N/A |

***Note:*** *The EUT uses a lithium battery with DC 3 V, and therefore the test suites related to AC Mains port were not applicable.*

## 2 Description of equipment under test (EUT)

| | |
|---|---|
| Product: | SMK FOB |
| Model: | SMK-DWS-01 |
| Serial number: | None (prototype) |

**Model differences:**

| Model name | Difference | Tested (checked) |
|---|---|---|
| SMK-DWS-01 | fully tested model that was provided by the applicant | ☒ |

**Technical data:**

| | | |
|---|---|---|
| Power source | DC 3.0 V lithium battery (type CR2032) | |
| Local Oscillator or X-Tal | 32.768 kHz, 26 MHz | |
| Operating Frequency | 433.92 MHz | 133 kHz |
| Antenna Type | Integral chip antenna | Resonance coil |
| Type of Modulation | GFSK | ASK |
| RF Output power | 75.3 dBμV/m (peak)<br>(measured at 3 m distance) | n.a (receive only) |

| I/O port | Type | Q'ty | Remark |
|---|---|---|---|
| - | - | - | |

**Modification of EUT during the compliance testing:**

The two test samples were provided for the tests; SAMPLE #1, which modified by the firmware for the periodic operation and for reducing the RF power setting, was used for all the tests, except for the measurements of Transmission Time for which SAMPLE #2 was used considering the normal operation.

The firmware of the EUTs was modified as below:

(a) In the normal operation, the product shortly transmitted RF signals. Therefore the SAMPLE #1 was modified for the tests in order to repeatedly transmit the RF signals as described on the page 16. The SAMPE #1 was operated in the test mode by pressing the buttons (Lock button for transmitting of modulated RF signals, Unlock button for transmitting of un-modulated RF signals, and Search button for stand-by operation).

(b) The SAMPLE #1 was modified again, in order to meet the electric filed strength limit at the fundamental frequency. The applicant changed the value for RF power setting to reduce the emission level during the radiated emission measurements. The version of the new firmware was v1.0.0 as the production of the products.

# 3 Test and measurement conditions

## 3.1. Test configuration (arrangement of EUT)

The EUT was tested as a stand-alone equipment. The EUT was powered from the new battery during the radiated emission measurements. The measurements were taken when the EUT (SAMPLE #1) transmitted the RF signals repeatedly with the maximum duty cycle provided by the applicant. In order to transmit RF signals, the LOCK button on the EUT (SAMPLE #1) was pressed once.

NOTE: the Transmission Time was measured in the normal operation for the EUT (SAMPLE #2; without the firmware modification used for the periodic operation of SAMPLE #1). The RF signals manually transmitted when releasing the button of the EUT; or automatically transmitted when being activated during pairing with SMK CONTROLLER UNIT (FCC ID: ZE8-SMK-DWS-00, model SMK-DWS-00) in order for the EUT to be registered to SMK CONTROLLER UNIT or verify the ID code.

## 3.2. Description of support units (accessory equipment)

The following support units or accessories were used to form a representative test configuration during the tests.

| # | Equipment | Manufacturer | Model No. | Serial No. |
|---|---|---|---|---|
| 1 | - | - | - | - |

## 3.3. Interconnection and I/O cables

The following support units or accessories were used to form a representative test configuration during the tests.

| # | Start | | End | | Cable | |
|---|---|---|---|---|---|---|
| | Name | I/O port | Name | I/O port | length (m) | shielded (Y/N) |
| | - | - | - | - | - | - |

## 3.4. Measurement Uncertainty (*U*)

| Measurement Item | Combined Standard Uncertainty *Uc* | Expanded Uncertainty $U = k \times Uc$ ($k = 2$) |
|---|---|---|
| Conducted RF power | ±1.49 dB | ±2.98 dB |
| Conducted emissions | ±1.42 dB | ±2.84 dB |
| Radiated emissions (9 kHz to 30 MHz) | ±2.30 dB | ±4.60 dB |
| Radiated emissions (30 MHz to 1000 MHz) | ±2.53 dB | ±5.06 dB |
| Radiated emissions (1 GHz to 6 GHz) | ±2.62 dB | ±5.24 dB |

## 3.5. Test date

| | |
|---|---|
| Date Tested | January 8, 2019 – April 11, 2019 |

# 4 Facilities and accreditations

## 4.1. Facilities

All of the measurements described in this report were performed at SK Tech Co., Ltd
Site I: 88, Geulgaeul-ro 81beon-gil, Wabu-eup, Namyangju-si, Gyeonggi-do, Korea
Site II: 124-8, Geulgaeul-ro, Wabu-eup, Namyangju-si, Gyeonggi-do, Korea

The sites are constructed in conformance with the requirements of ANSI C63.4 and CISPR 16-1-4. The sites comply with the Normalized Site Attenuation requirements given in ANSI C63.4, and site VSWR requirements specified in CISPR 16-1-4. The measuring apparatus and ancillary equipment conform to CISPR 16-1 series.

## 4.2. Accreditations

The laboratory has been also notified to FCC by RRA as a Conformity Assessment Body, and designated to perform compliance testing on equipment subject to Supplier's Declaration of Conformity (SDoC) and Certification under Parts 15 and 18 of the FCC Rules.

| Designation No. | KR0007 |
|---|---|

## 4.3. List of test and measurement instruments

| No | Description | Model | Manufacturer | Serial No. | Cal. due | Use |
|---|---|---|---|---|---|---|
| 1 | Spectrum Analyzer | E4405B | Agilent | US40520856 | 2020.02.25 | ☒ |
| 2 | Spectrum Analyzer | E4440A | Agilent | MY46186322 | 2019.06.18 | ☒ |
| 3 | EMI Test Receiver | ESR26 | Rohde&Schwarz | 101441 | 2019.08.29 | ☒ |
| 4 | EMI Test Receiver | ESIB40 | Rohde&Schwarz | 100277 | 2020.02.26 | ☒ |
| 5 | EMI Test Receiver | PMM9010F | Narda | 020WW40105 | 2020.06.10 | |
| 6 | Pulse limiter | ESH3-Z2 | Rohde&Schwarz | 100604 | 2020.06.10 | |
| 7 | AMN (LISN) | ENV 216 | Rohde&Schwarz | 102047 | 2020.02.25 | |
| 8 | AMN (LISN) | FCC-LISN-50-32-2-01-480V | FCC | 141455 | 2020.06.10 | |
| 9 | Pre-amplifier (30 MHz - 1 GHz) | MLA-10K01-B01-27 | TSJ | 2005350 | 2020.06.11 | ☒ |
| 10 | Pre-amplifier (30 MHz - 1 GHz) | 8447D | HP | 2944A07994 | 2020.06.10 | |
| 11 | Pre-amplifier (1 GHz - 18 GHz) | MLA-100M18-B02-38 | TSJ | 1539546 | 2020.02.25 | ☒ |
| 16 | Attenuator (10dB) | 8491B | HP | 38072 | 2020.06.10 | |
| 17 | Attenuator (6dB) | 18N5W | API Technology | - | 2020.06.10 | ☒ |
| 18 | High Pass Filter | WHKE3-500.2-610-4000-40SS | Wainwright | 1 | 2019.06.20 | ☒ |
| 19 | VHF Precision Dipole Antenna (TX/RX) | VHAP | Schwarzbeck | 1014 / 1015 | 2020.06.11 | |
| 20 | UHF Precision Dipole Antenna (TX/RX) | UHAP | Schwarzbeck | 989 / 990 | 2020.09.17 | |
| 21 | Loop Antenna | HFH2-Z2 | Schwarzbeck | 863048/019 | 2020.12.18 | ☒ |
| 22 | BILOG Broadband Antenna | VULB9168 | Schwarzbeck | 9168-230 | 2019.07.20 | ☒ |
| 23 | Horn Antenna (1 GHz - 18 GHz) | BBHA 9120D | Schwarzbeck | 9120D-816 | 2021.06.10 | ☒ |
| 24 | Horn Antenna (15 GHz - 40 GHz) | BBHA9170 | Schwarzbeck | BBHA9170318 | 2020.07.23 | |
| 25 | Vector Signal Generator | E4438C | Agilent | MY42080359 | 2020.02.26 | |
| 26 | PSG analog signal generator | E8257D | Agilent | MY45141255 | 2020.06.10 | |
| 27 | DC Power Supply | 6633A | HP | 2838A-01000 | 2020.06.10 | ☒ |
| 28 | DC Power Supply | 6633A | HP | 3325A04972 | 2020.06.10 | |
| 29 | Digital Thermo-Hygrometer | 608-H1 | Testo | - | 2019.06.21 | ☒ |
| 30 | Temperature/Humidity Chamber | DJ-THC02 | DAE JIN ENG | 06071 | 2020.02.27 | |

# 5 Test and measurements

## 5.1. Antenna requirement

### 5.1.1 Regulation

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 manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, 15.213, 15.217, 15.219, 15.221, or §15.236. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

### 5.1.2 Result: PASS

The EUT has an internal chip antenna and meets the requirements of this section.

## 5.2. 20 dB Emission Bandwidth

### 5.2.1 Regulation

According to §15.231(c), The bandwidth of the emission shall be no wider than 0.25% of the center frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

### 5.2.2 Test Procedure

The EUT (SAMPLE #1) repeatedly transmitted RF signals and the small antenna, to which the Spectrum Analyzer was connected, placed in the vicinity of the EUT. The Occupied Bandwidth (99 %) and 20 dB emission bandwidth were measured with the following setting according to ANSI C63.10, 12.4.

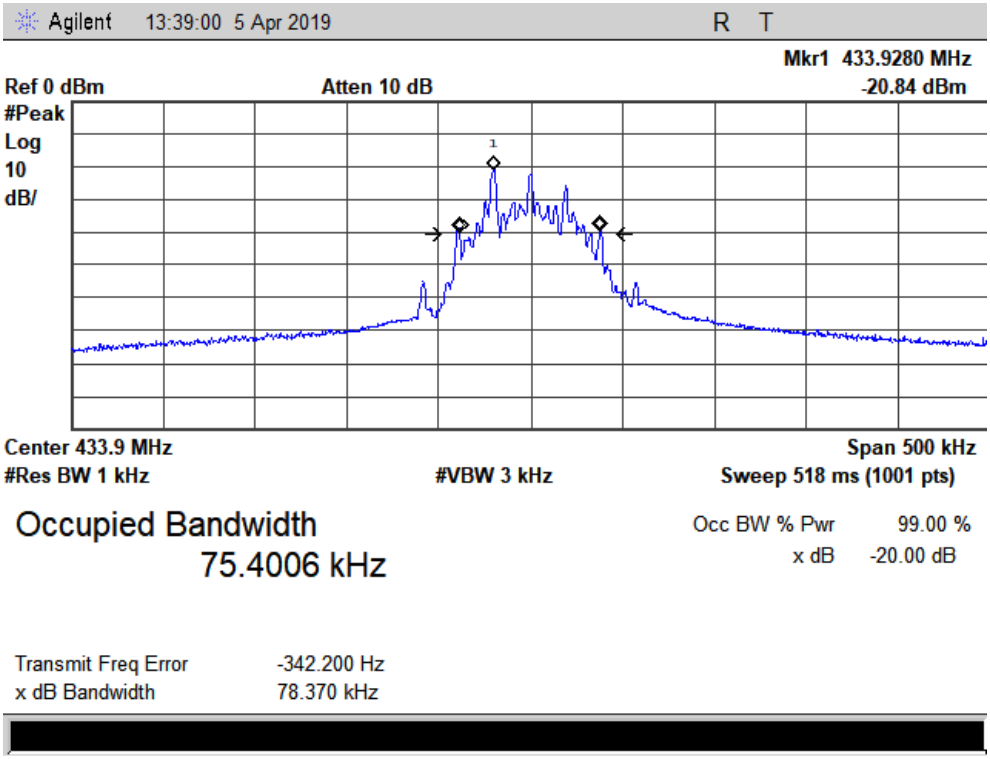
(a) Set RBW = approximately 1 % of the emission bandwidth
(b) Set the VBW > RBW
(c) Detector = peak
(d) Trace mode = max hold

### 5.2.3 Test Results: PASS

**Table 1: Measured values of the 20 dB Emission Bandwidth**

| Operating frequency | Occupied Bandwidth (99 %) | 20dB Emission Bandwidth | Limit |
|---|---|---|---|
| 433.92 MHz | 75.4 kHz | 78.4 kHz | < 1084.8 kHz |

**Figure 1. Plot of the 20dB Emission Bandwidth & Occupied Bandwidth**



## 5.3. Transmission Time

### 5.3.1 Regulation

(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.
(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.
(3) Periodic transmissions at regular predetermined intervals are not permitted. However, polling or supervision transmissions, including data, to determine system integrity of transmitters used in security or safety applications are allowed if the total duration of transmissions does not exceed more than two seconds per hour for each transmitter. There is no limit on the number of individual transmissions, provided the total transmission time does not exceed two seconds per hour.

### 5.3.2 Test Procedure

The EUT (SAMPLE #2) transmitted RF signals and the small antenna, to which the Spectrum Analyzer was connected, placed in the vicinity of the EUT. The Transmission Time was measured in the following operation conditions.
(a) Manual transmission when releasing a button
(b) Automatic transmission when being activated during pairing with SMK CONTROLLER UNIT. The EUT was activated when receiving the commands from SMK CONTROLLER UNIT, and sent RF signals twice.

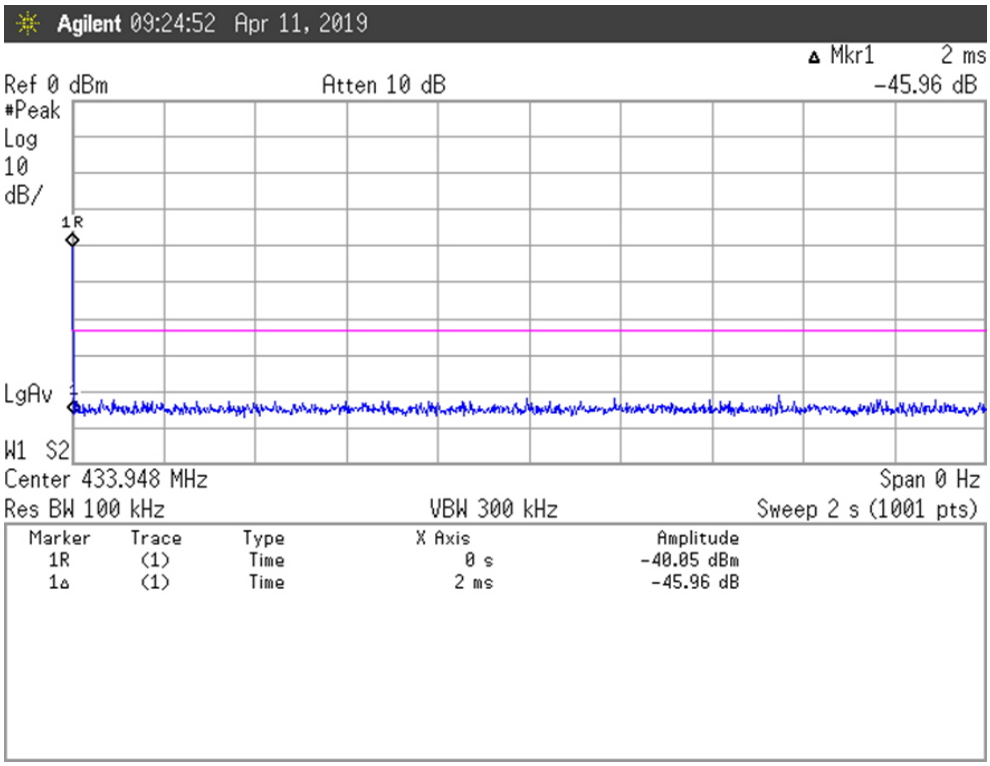
The Spectrum Analyzer was set as below:
(a) Set the center frequency to the operating frequency
(b) Set RBW > 20 dB Emission Bandwidth (or Occupied Bandwidth)
(c) Set Trigger level to start the measurement when the EUT transmitted RF signals
(d) Set Sweep time to capture the pulse trains and/or to capture the burst ON time

### 5.3.3 Test Results: PASS

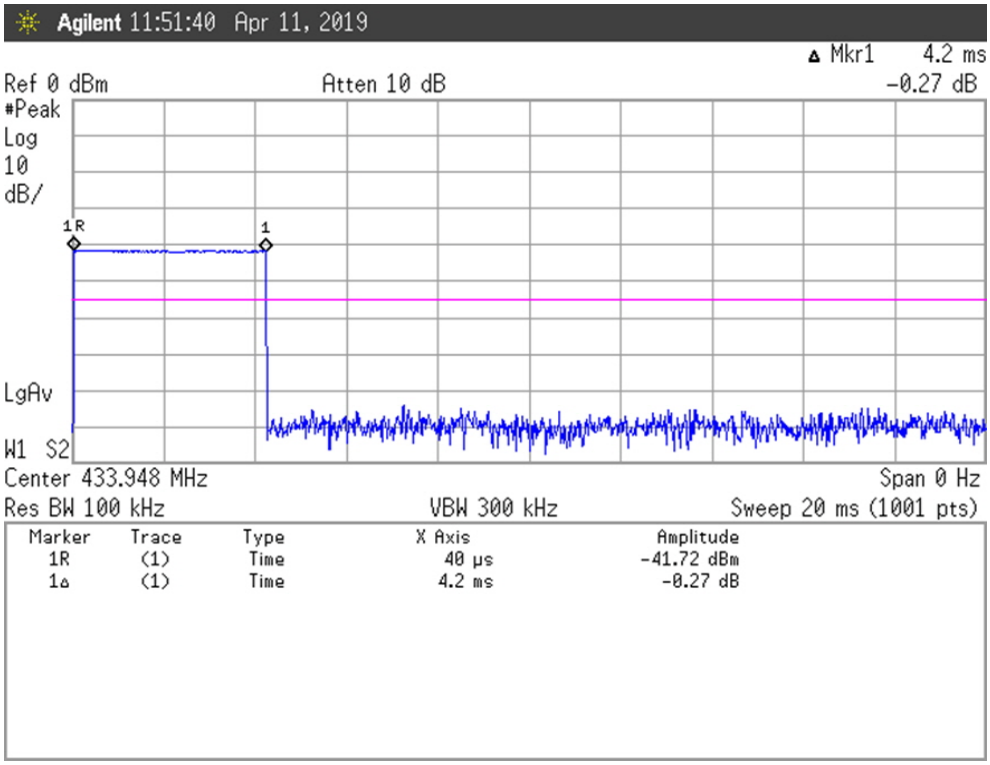
**Table 2: Measured values of the Transmission Time**

| Operating frequency | Transmission Type | Transmission Time | Limit |
|---|---|---|---|
| | | [ms] | [s] |
| 433.92 MHz | Manually | 4.2 | 5 |
| 433.92 MHz | Automatically | 154 | 5 |

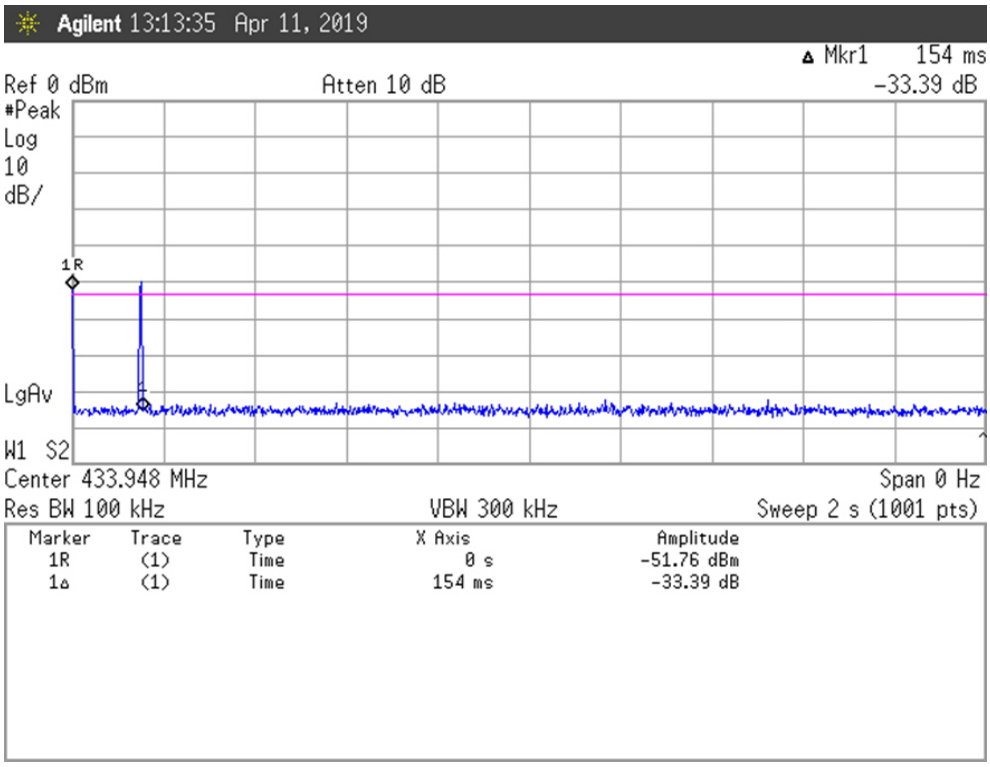
**Figure 2. Plot of the Transmission Time**



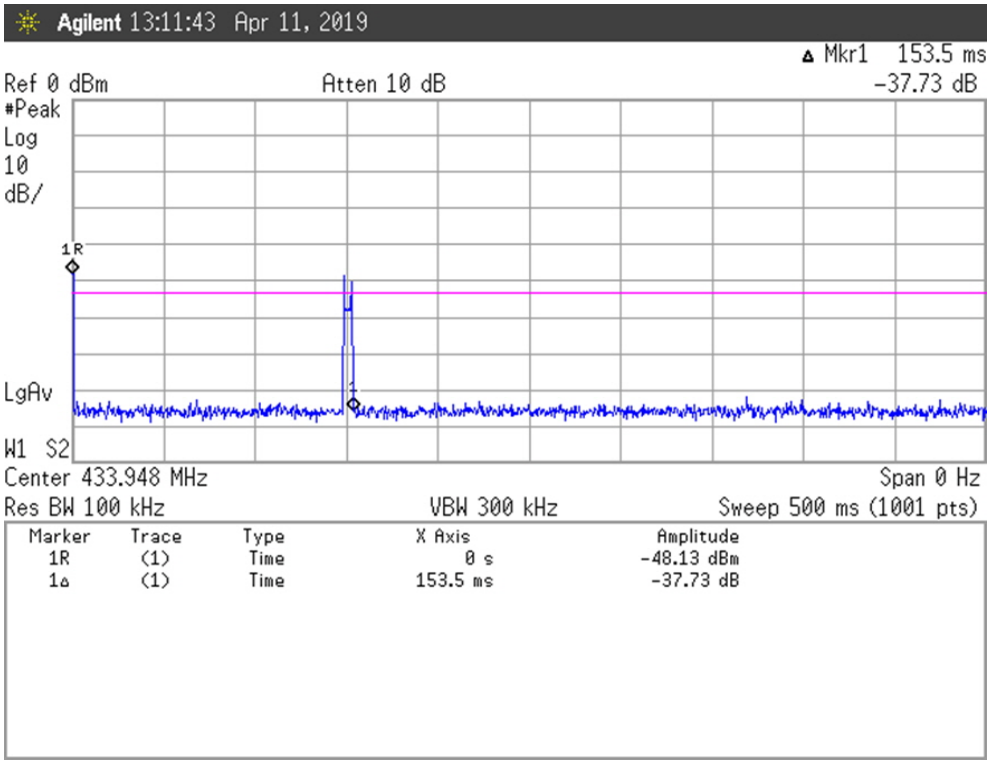

Manual transmission when releasing a button (one time)




Transmission time (duration) for manual operation




Automatic transmission when being activated during pairing with SMK CONTROLLER UNIT




Transmission time (duration) for automatic transmission (two burst signals were transmitted)

## 5.4. Radiated emissions

### 5.4.1 Regulation

**FCC 47CFR15 – 15.231**

According to §15.231(b), the field strength of emissions from intentional radiators operated under this section shall not exceed the following:

| Fundamental frequency (MHz) | Field strength of fundamental (μV/m) @ 3 m | Field strength of spurious emissions (μV/m) @ 3 m |
|---|---|---|
| 40.66 – 40.70 | 2,250 | 225 |
| 70 – 130 | 1,250 | 125 |
| 130 – 174 | 1,250 to 3,750** | 125 to 375** |
| 174 – 260 | 3,750 | 375 |
| 260 – 470 | 3,750 to 12,500** | 375 to 1,250** |
| Above 470 | 12,500 | 1,250 |

** linear interpolations

The limits on the field strength of the spurious emissions in the above table are based on the fundamental frequency of the intentional radiator. Spurious emissions shall be attenuated to the average (or, alternatively, CISPR quasi-peak) limits shown in this table or to the general limits shown in §15.209, whichever limit permits a higher field strength.

**FCC 47CFR15 – 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 limit (μV/m) | Field strength limit (dBμV/m) | Measurement Distance (m) |
|---|---|---|---|
| 0.009 – 0.490 | 2400/F (kHz) = 266.7 – 4.9 | 48.5 – 13.8 | 300 |
| 0.490 – 1.705 | 24000/F (kHz) = 49.0 – 14.1 | 33.8 – 23.0 | 30 |
| 1.705 – 30.0 | 30 | 29.5 | 30 |
| 30 – 88 | 100 | 40.0 | 3 |
| 88 – 216 | 150 | 43.5 | 3 |
| 216 – 960 | 200 | 46.0 | 3 |
| Above 960 | 500 | 54.0 | 3 |

The emission limit in this paragraph is based on measurement instrumentation employing an average detector. The provisions in §15.35 for limiting peak emissions apply. Spurious Radiated Emissions measurements starting below or at the lowest crystal frequency.

Compliance with the provisions of §15.205 shall be demonstrated using the measurement instrumentation specified in that section.

### 5.4.2 Measurement Procedure

The EUT (SAMPLE #1) repeatedly transmitted RF signals and the following measurement procedure specified in ANSI C63.10-2013 was used.

**Radiated Emissions Test, 9 kHz to 30 MHz (Magnetic Field Test)**

(a) The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions at a distance of 3 meters according to Section 15.31(f)(2).
(b) The EUT was placed on the top of the 0.8-meter height, 1 × 1.5 meter non-metallic table.
(c) Emissions from the EUT are maximized by adjusting the orientation of the Loop antenna and rotating the EUT on the turntable. Manipulating the system cables also maximizes EUT emissions if applicable.
(d) To obtain the final measurement data, each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
(e) The EUT was situated in three orthogonal planes (if appropriate).

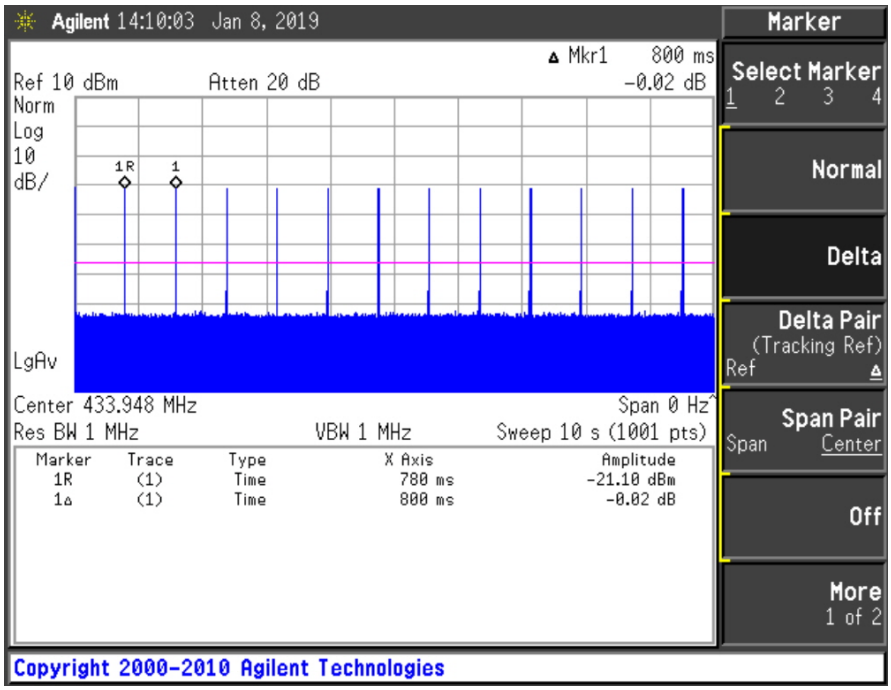
**Radiated Emissions Test, above 30 MHz**

(a) The preliminary radiated measurements were performed to determine the frequency producing the maximum emissions in an anechoic chamber at a distance of 3 meters.
(b) The EUT was placed on the top of the 0.8-meter height (or 1.5 meter height for above 1 GHz), 1 × 1.5 meter non-metallic table. To find the maximum emission levels, the height of a measuring antenna was changed and the turntable was rotated 360˚.
(c) The antenna polarization was also changed from vertical to horizontal. The spectrum was scanned from 30 to 1000 MHz using the Bilog broadband antenna, and from 1 GHz to tenth harmonic of the highest fundamental frequency using the horn antenna.
(d) Each frequency found during preliminary measurements was re-examined and investigated. The test-receiver system was set up to average, peak, and quasi-peak detector function with specified bandwidth.
(e) The EUT was situated in three orthogonal planes (if appropriate).

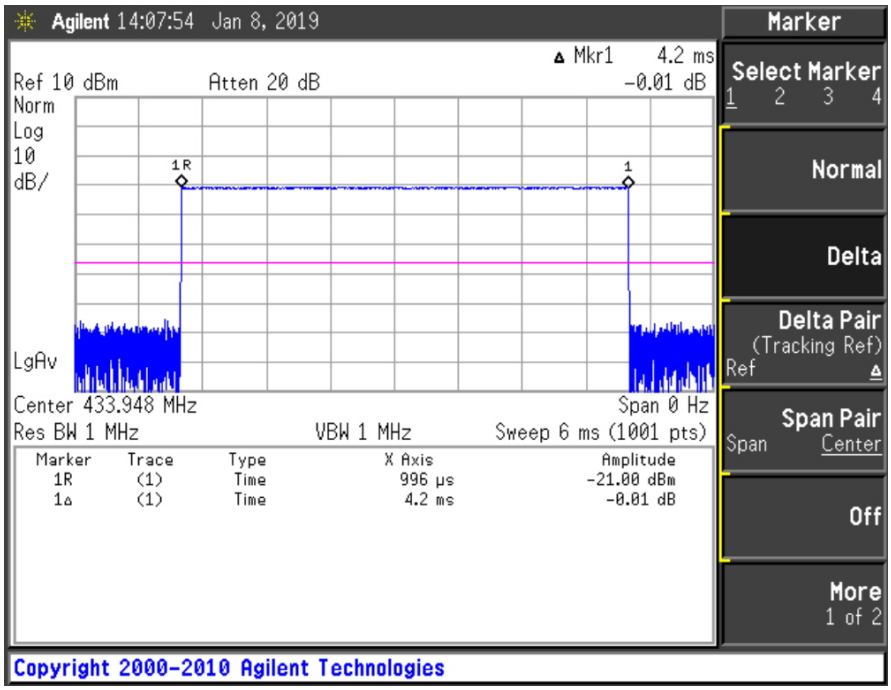
Measurement software: TEPTO-DV/RE_Version: 3.1.0044

**Figure 3. RF signals during the measurements achieved by the modification of firmware**

In the normal operation, the EUT transmitted one burst signal when releasing the button, and two burst signals during the pairing as the section 5.3 of this test report. The firmware of the EUT (SAMPLE #1) was modified in order to repeatedly transmit the RF signals with the duration 4.2 ms and period 800 ms. According to FCC Part 15.35(b), the measurement of the field strength was performed by averaging over one complete pulse train (4.2 ms) becuase the pulse train did not exceed 0.1 seconds. [remark: Figure 3 were taken before the change of the value for RF power setting to reduce the emission level, and the final measurements of the field strength were performed for SAMPLE #1 with lower RF power setting value after checking the same periodic operation of the RF signals]




Periodic operation for the radiated emission measurements




Duration of the burst signals

### 5.4.3 Test Results: PASS

**Table 3: Measured values of the Field strength**

For the measurements under below 30 MHz

| Freq. (kHz) | RBW (kHz) | Reading (dBμV) | | | AF (dB/m) | Cable Loss (dB) | Actual (dBμV/m) | | | Limit (at 3m) (dBμV/m) | | | Margin (dB) | | | Remark |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | PK | AV | QP | | | PK | AV | QP | PK | AV | QP | PK | AV | QP | |
| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |
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| | | | | | | | | | | | | | | | | |
| | | | | | | | | | | | | | | | | |

***No Radiated Spurious Emissions Found***

Actual (dBμV/m) = Reading + AF + Cable Loss

Margin (dB) = Limit – Actual

Note: These test results were measured at the 3 m distance.

For the measurements from 30 MHz to 1 GHz (for X-axis)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 433.928 | H | 1.00 | 50.1 | 49.0 | 0.0 | 22.4 | 2.8 | 75.3 | 74.2 | 100.8 | 80.8 | 25.5 | 6.6 |
| 433.928 | V | 1.00 | 38.7 | 36.9 | 0.0 | 22.4 | 2.8 | 63.9 | 62.1 | 100.8 | 80.8 | 36.9 | 18.7 |
| | | | | | | | | | | | | | |

For the measurements from 30 MHz to 1 GHz (for Y-axis)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 433.928 | H | 1.00 | 47.6 | 46.3 | 0.0 | 22.4 | 2.8 | 72.8 | 71.5 | 100.8 | 80.8 | 28.0 | 9.3 |
| 433.928 | V | 1.65 | 43.8 | 42.4 | 0.0 | 22.4 | 2.8 | 69.0 | 67.6 | 100.8 | 80.8 | 31.8 | 13.2 |
| | | | | | | | | | | | | | |

For the measurements from 30 MHz to 1 GHz (for Z-axis)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 433.928 | H | 1.00 | 46.6 | 45.4 | 0.0 | 22.4 | 2.8 | 71.8 | 70.6 | 100.8 | 80.8 | 29.0 | 10.2 |
| 433.928 | V | 1.45 | 46.1 | 44.9 | 0.0 | 22.4 | 2.8 | 71.3 | 70.1 | 100.8 | 80.8 | 29.5 | 10.7 |
| | | | | | | | | | | | | | |

V/H: Vertical / Horizontal polarization
AMP, AF and CL: pre-amplifier gain, antenna factor and cable loss including an attenuator/filter if used
Actual = Reading - AMP + AF + CL
Margin = Limit - Actual

For the measurements from 30 MHz to 1 GHz (for Z-axis) with CISPR quasi-peak detector (emissions in the restricted bands specified in 15.205)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Remark |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |
| | | | | | | | | | | |

***No Radiated Spurious Emissions Found***

V/H: Vertical / Horizontal polarization
AMP, AF and CL: pre-amplifier gain, antenna factor and cable loss including an attenuator/filter if used
Actual = Reading - AMP + AF + CL
Margin = Limit - Actual

For the measurements above 1 GHz (for X-axis)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 1301.646 | H | 2.72 | 46.4 | 29.7 | 39.5 | 24.8 | 5.8 | 37.5 | 20.8 | 74.0 | 54.0 | 36.5 | 33.2 |
| 2169.335 | H | 3.14 | 47.4 | 29.9 | 39.6 | 26.5 | 8.1 | 42.4 | 24.9 | 80.8 | 60.8 | 38.4 | 35.9 |
| 2169.360 | V | 3.42 | 43.1 | 29.4 | 39.6 | 26.5 | 8.1 | 38.1 | 24.4 | 80.8 | 60.8 | 42.7 | 36.4 |
| 3037.468 | V | 1.55 | 47.1 | 29.1 | 39.3 | 28.6 | 9.7 | 46.1 | 28.1 | 80.8 | 60.8 | 34.7 | 32.7 |
| 3037.508 | H | 3.34 | 46.6 | 29.2 | 39.3 | 28.6 | 9.7 | 45.6 | 28.2 | 80.8 | 60.8 | 35.2 | 32.6 |
| | | | | | | | | | | | | | |

For the measurements above 1 GHz (for Y-axis)

| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 1301.765 | H | 2.93 | 48.7 | 30.0 | 39.5 | 24.8 | 5.8 | 39.8 | 21.1 | 74.0 | 54.0 | 34.2 | 32.9 |
| 2169.710 | H | 2.77 | 44.9 | 29.4 | 39.6 | 26.5 | 8.1 | 39.9 | 24.4 | 80.8 | 60.8 | 40.9 | 36.4 |
| 2169.728 | V | 3.78 | 44.9 | 29.1 | 39.6 | 26.5 | 8.1 | 39.9 | 24.1 | 80.8 | 60.8 | 40.9 | 36.7 |
| 3037.591 | V | 1.15 | 56.6 | 30.7 | 39.3 | 28.6 | 9.7 | 55.6 | 29.7 | 80.8 | 60.8 | 25.2 | 31.1 |
| 3037.691 | H | 2.80 | 46.2 | 28.9 | 39.3 | 28.6 | 9.7 | 45.2 | 27.9 | 80.8 | 60.8 | 35.6 | 32.9 |
| | | | | | | | | | | | | | |

For the measurements above 1 GHz (for Z-axis)

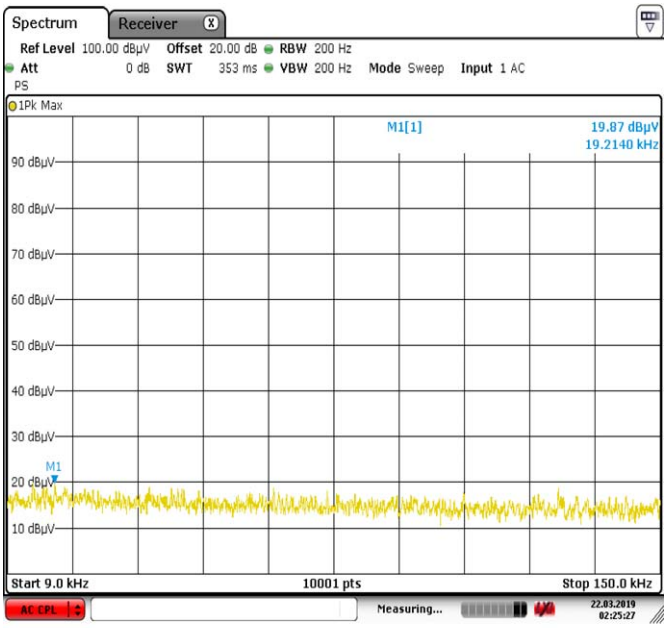
| Frequency (MHz) | Pol. (V/H) | Height (m) | Reading (dBμV) | | AMP (dB) | AF (dB/m) | CL (dB) | Actual (dBμV/m) | | Limit (dBμV/m) | | Margin (dB) | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | PK | AV | | | | PK | AV | PK | AV | PK | AV |
| 1301.815 | V | 2.78 | 50.3 | 30.0 | 39.5 | 24.8 | 5.8 | 41.4 | 21.1 | 74.0 | 54.0 | 32.6 | 32.9 |
| 2169.551 | H | 1.45 | 48.0 | 29.4 | 39.6 | 26.5 | 8.1 | 43.0 | 24.4 | 80.8 | 60.8 | 37.8 | 36.4 |
| 2169.598 | V | 3.88 | 46.0 | 29.2 | 39.6 | 26.5 | 8.1 | 41.0 | 24.2 | 80.8 | 60.8 | 39.8 | 36.6 |
| 3037.628 | V | 2.65 | 51.0 | 29.2 | 39.3 | 28.6 | 9.7 | 50.0 | 28.2 | 80.8 | 60.8 | 30.8 | 32.6 |
| 3040.514 | H | 2.38 | 41.0 | 28.1 | 39.3 | 28.6 | 9.7 | 40.0 | 27.1 | 80.8 | 60.8 | 40.8 | 33.7 |
| | | | | | | | | | | | | | |

V/H: Vertical / Horizontal polarization
AMP, AF and CL: pre-amplifier gain, antenna factor and cable loss including an attenuator/filter if used
Actual = Reading - AMP + AF + CL
Margin = Limit - Actual

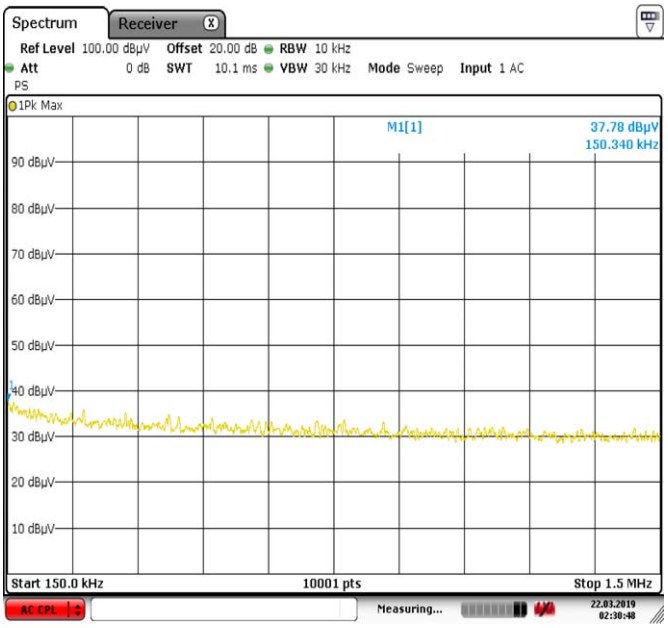
**Figure 4. Emission plot for the preliminary radiated measurements**

The worst-case plots were attached.

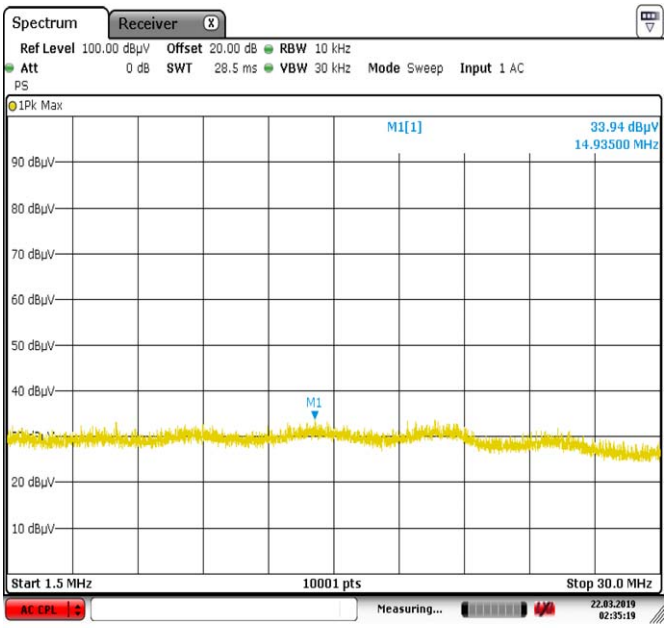
Frequency Range: 9 kHz ~ 150 kHz




Frequency range: 150 kHz ~ 1.5 MHz



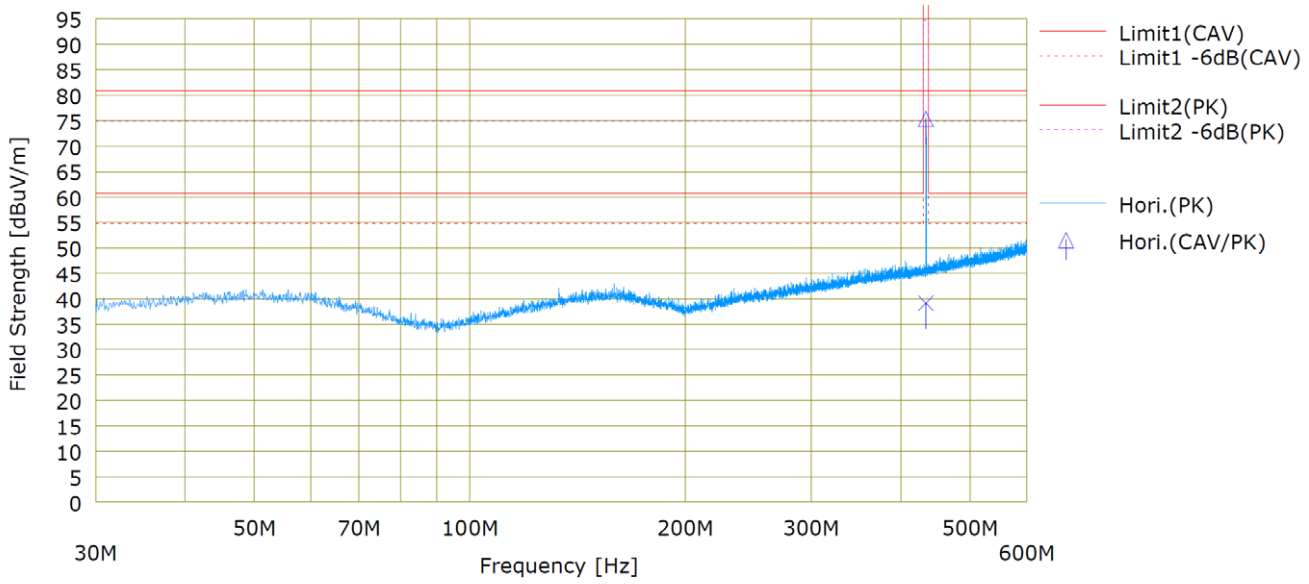

Frequency Range: 1.5 MHz ~ 30 MHz

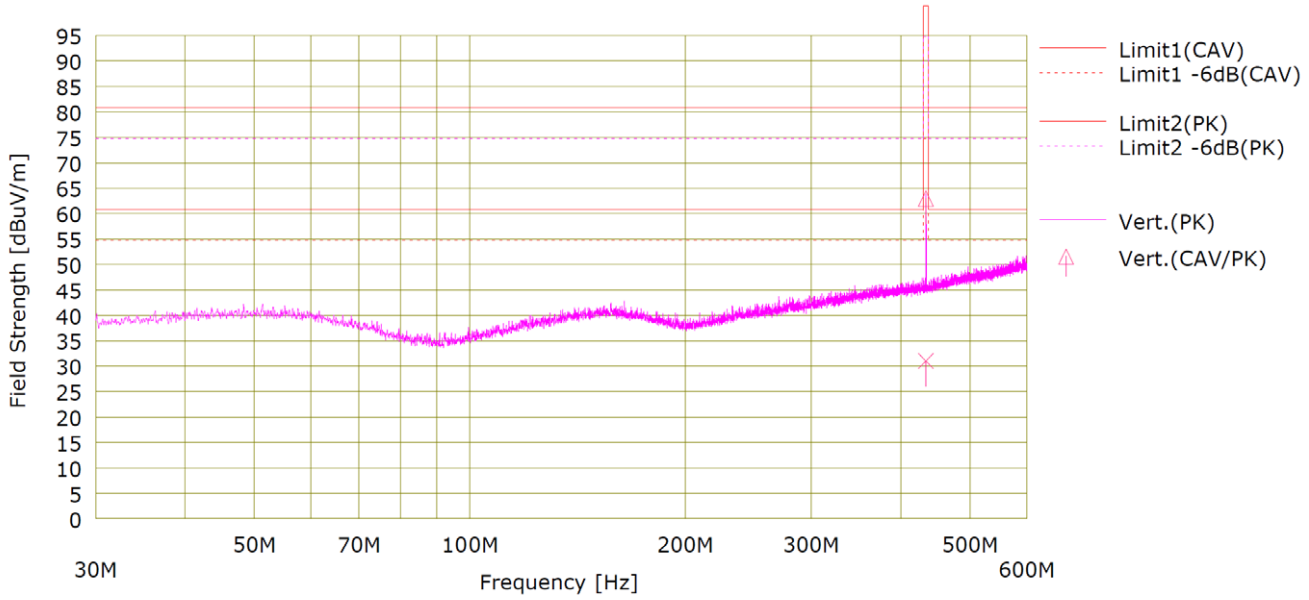



Remark: during the measurements, the correction factor (antenna factor and cable loss) was compensated as Offset 20 dB. Therefore the plots represented the measured results of the field strength in spite of the unit dBµV.

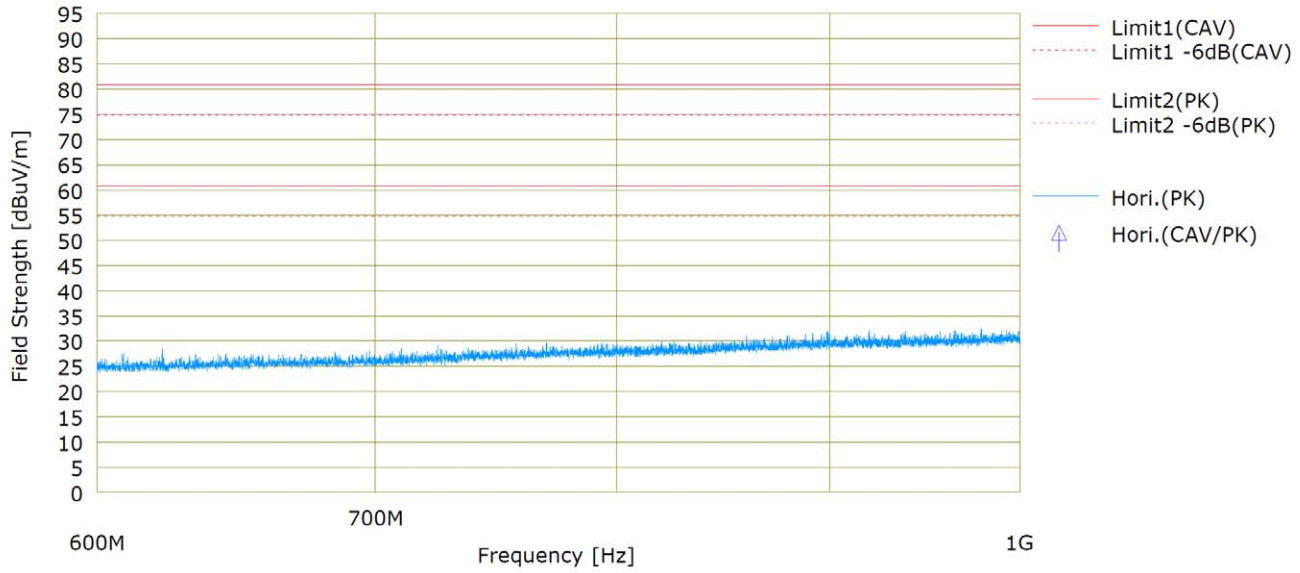
**Emission plot for the preliminary radiated measurements *(continued)***

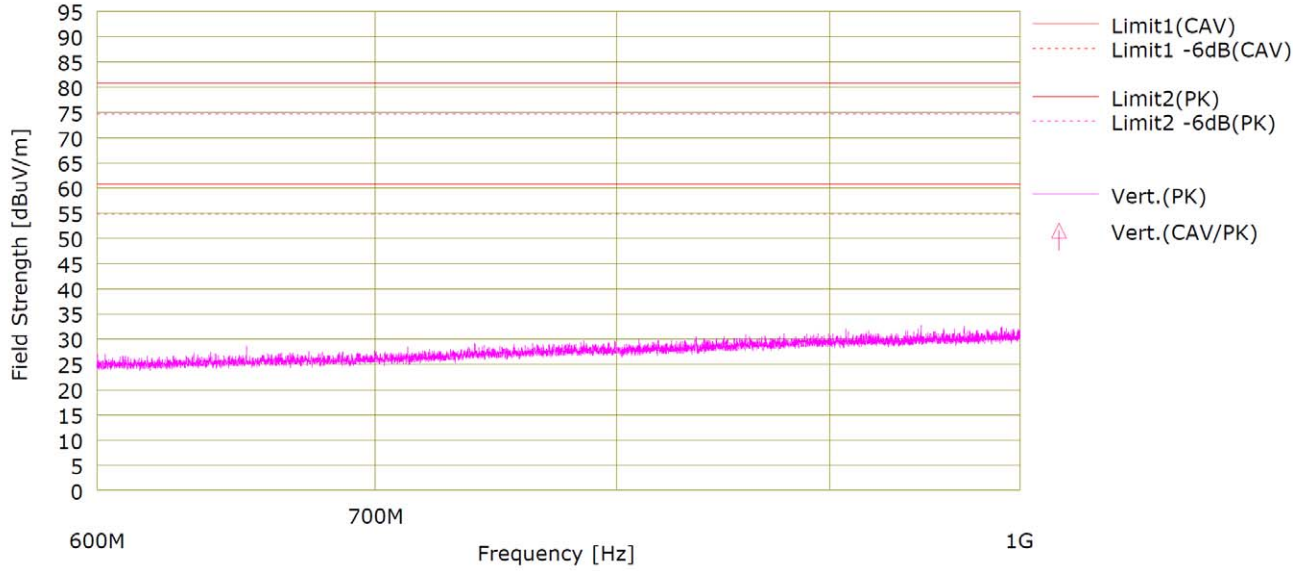
Frequency Range: 30 MHz ~ 600 MHz



Frequency Range: 600 MHz ~ 1 GHz



Frequency Range: 1 GHz ~ 5 GHz