# TEST REPORT

**KCTL Inc.**
65, Sinwon-ro, Yeongtong-gu,
Suwon-si, Gyeonggi-do, 16677, Korea
TEL: 82-31-285-0894 FAX: 82-505-299-8311
www.kctl.co.kr



**1. Client**

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2019-10-18

**2. Use of Report** : Class II Permissive change

**3. Name of Product and Model** : Smart Wearable / SM-R835F

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

**5. FCC ID** : A3LSMR835

**6. Date of Test** : 2019-10-30 to 2019-11-05

**7. Test Standards** : FCC Part 2
FCC Part 22 Subpart H

**8. Test Results** : Refer to the test result in the test report

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

2019-11-15

## KCTL Inc.

**Report revision history**

| Date | Revision | Page No |
|---|---|---|
| 2019-11-15 | Initial report | - |
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# 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 Co., Ltd. |
| Address | : | 94-1, Imsu-dong, Gumi-si, Gyengsangbuk-do, 730-722, Rep. of Korea |
| Factory | : | Samsung Electronics VIETNAM Co., Ltd. |
| Address | : | Yenphong 1 - I.P Yentrung Commune, Yenphong Dist., Bac Ninh Province, Vietnam |
| Laboratory | : | KCTL Inc. |
| 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 |
| | | Industry Canada Registration No. : 8035A |
| | | KOLAS No.: KT231 |

## 2. Device information

| | | |
|---|---|---|
| Equipment under test | : | Smart Wearable |
| Model | : | SM-R835F |
| Frequency range | : | Bluetooth(BDR/EDR/BLE)_2 402 ㎒ ~ 2 480 ㎒ |
| | | WIFI(802.11b/g/n20)_2 412 ㎒ ~ 2 472 ㎒ |
| | | LTE Band 5_824.7 ㎒ ~ 848.3 ㎒ |
| | | WCDMA 850_826.4 ㎒ ~ 846.6 ㎒ |
| Modulation technique | : | Bluetooth(BDR/EDR)_ GFSK, π/4DQPSK, 8DPSK |
| | | Bluetooth(BLE)_GFSK |
| | | WIFI(802.11b/g/n20)_DSSS, OFDM |
| | | LTE_QPSK, 16QAM |
| | | WCDMA_QPSK |
| Number of channels | : | Bluetooth(BDR/EDR)_79 ch |
| | | Bluetooth(BLE)_40 ch |
| | | WIFI(802.11b/g/n20)_13 ch |
| Power source | : | DC 3.85 V |
| Antenna specification | : | LTE/WCDMA_PIFA (Housing metal) Antenna |
| | | WIFI/Bluetooth(BDR/EDR/BLE)_LDS Antenna |
| Antenna gain | : | WIFI/Bluetooth(BDR/EDR/BLE) : -6.4 ㏈i |
| Software version | : | R835F.001 |
| Hardware version | : | REV1.0 |

Test device serial No. : Conducted(353343/11/000040/0)
Radiated(R3AM90016TK, R3AM90016QF, R3AM900174Y)

Operation temperature : -30 ℃ ~ 50 ℃

## 2.1. Accessory information

| Equipment | Manufacturer | Model | Serial No. | Power source | FCC ID |
|---|---|---|---|---|---|
| Wireless charger | Samsung Electronics Co., Ltd. | EP-OR825 | - | DC 5.0 V, 1.0 A | A3LEPOR825 |

## 2.2. Frequency/channel operations

his device contains the following capabilities:
Bluetooth(BDR/EDR/BLE), WIFI(802.11b/g/n20), LTE Band 5, WCDMA 850

**LTE Band 5**

| Ch. | Frequency (㎒) |
|---|---|
| 20407 | 824.7 |
| 20525 | 836.5 |
| 20643 | 848.3 |

Table 2.2.1. 1.4M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20415 | 825.5 |
| 20525 | 836.5 |
| 20635 | 847.5 |

Table 2.2.2. 3M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20425 | 826.5 |
| 20525 | 836.5 |
| 20625 | 846.5 |

Table 2.2.3. 5M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20450 | 829.0 |
| 20525 | 836.5 |
| 20600 | 844.0 |

Table 2.2.4. 10M BW

## 3. Summary of tests

| FCC Part section(s) | Parameter | Test results |
|---|---|---|
| 2.1046<br>22.913(a)(5) | Conducted Output Power | Pass |
| 2.1049 | Occupied Bandwidth & 26 dB Bandwidth | N/T(Note1) |
| 2.1051<br>22.917(a) | Band Edge Emissions at Antenna Terminal | N/T(Note1) |
| | Spurious Emissions at Antenna Terminal | N/T(Note1) |
| 2.1055<br>22.355 | Frequency stability | N/T(Note1) |
| 22.913(a)(5) | Effective Radiated Power &<br>Equivalent Isotropic Radiated Power | Pass |
| 2.1053<br>22.917(a) | Radiated Spurious Emissions | Pass |

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

1. These test item was performed. (FCC ID: A3LSMR835)
   Test Report No. KR19-SRF0097-B issued on 8, August, 2019 by KCTL Inc.)
2. C2PC model is electrically identical to the Original model.
   The Product Equality Declaration includes detailed information about the changes between the devices.
3. The data from that application has been verified through appropriate spot checks to demonstrate compliance for this device as shown in the test result of section 6.
4. Output power was verified to be within the expected tune up tolerances prior to performing the spot checks for radiated spurious emissions and band edge to confirm that the proposed changes to the digital circuitry had not adversely affected the previously reported values in the original filing.
5. The test procedure(s) in this report were performed in accordance as following.
   ANSI C63.26-2015
   ANSI/TIA-603-E-2016
   KDB 971168 D01 v03r01
6. The test scenario for spot check is based on the worst-case of original report results.

## 4. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.4-2014.

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 (±) | |
|---|---|---|
| Conducted RF power | 1.76 dB | |
| Conducted spurious emissions | 4.03 dB | |
| Radiated spurious emissions | 9 kHz ~ 30 MHz: | 2.28 dB |
| | 30 MHz ~ 1 GHz | 3.68 dB |
| | Above 1 GHz | 5.72 dB |

## 5. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.
With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

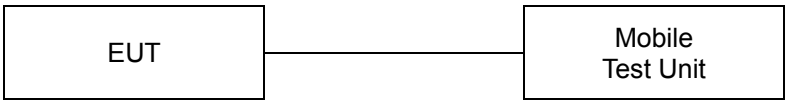
| Frequency (㎒) | Factor(㏈) | Frequency (㎒) | Factor(㏈) |
|---|---|---|---|
| 30 | 0.03 | 11 000 | 1.83 |
| 50 | 0.09 | 12 000 | 1.89 |
| 100 | 0.20 | 13 000 | 1.75 |
| 200 | 0.20 | 14 000 | 1.95 |
| 300 | 0.26 | 15 000 | 1.98 |
| 400 | 0.25 | 16 000 | 1.95 |
| 500 | 0.28 | 17 000 | 1.99 |
| 600 | 0.31 | 18 000 | 2.07 |
| 700 | 0.34 | 19 000 | 2.37 |
| 800 | 0.32 | 20 000 | 2.22 |
| 900 | 0.35 | 21 000 | 2.23 |
| 1 000 | 0.36 | 22 000 | 2.03 |
| 2 000 | 0.67 | 23 000 | 2.32 |
| 3 000 | 0.83 | 24 000 | 2.45 |
| 4 000 | 0.94 | 25 000 | 2.42 |
| 5 000 | 0.95 | 26 000 | 2.65 |
| 6 000 | 1.00 | 26 500 | 2.78 |
| 7 000 | 1.04 | 27 000 | 2.75 |
| 8 000 | 1.77 | 28 000 | 3.06 |
| 9 000 | 1.85 | 29 000 | 2.46 |
| 10 000 | 1.66 | 30 000 | 2.80 |

**Note.**
Offset(㏈) = RF cable loss(㏈)

# 6. Test results

## 6.1. Conducted output power

**Test setup**




**Test procedure**

971168 D01 v03r01 – Section 5.2
ANSI C63.26-2015 – Section 5.2.4.2
CFR 47, - Section §2.1046

**Test settings**

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ± 2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

**Notes:**

Offset(㏈) = RF cable loss(㏈)

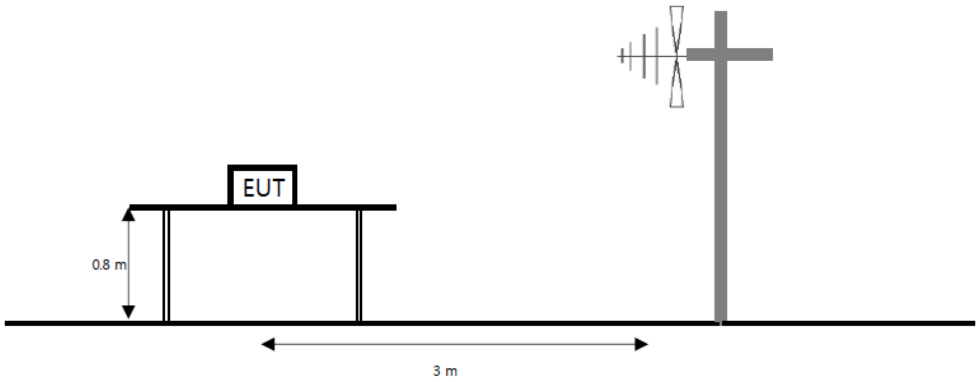
## Test results

| Test Band | Bandwidth (MHz) | Test mode | RB size | RB offset | Maximum power | | |
|---|---|---|---|---|---|---|---|
| | | | | | Frequency (MHz) | | |
| | | | | | Low | Middle | High |
| LTE Band 5 | 1.4 | QPSK | 1 | 0 | 23.18 | 23.24 | 23.13 |
| | | | 1 | 3 | 23.16 | 23.22 | 23.09 |
| | | | 1 | 5 | 23.24 | 23.23 | 23.10 |
| | | | 3 | 0 | 23.18 | 23.24 | 23.15 |
| | | | 3 | 1 | 23.18 | 23.21 | 23.16 |
| | | | 3 | 3 | 23.15 | 23.22 | 23.15 |
| | | | 6 | 0 | 21.94 | 22.10 | 22.03 |
| | | 16QAM | 1 | 0 | 21.96 | 21.84 | 21.96 |
| | | | 1 | 3 | 21.94 | 21.90 | 21.99 |
| | | | 1 | 5 | 21.93 | 21.84 | 21.97 |
| | | | 3 | 0 | 21.97 | 22.01 | 21.93 |
| | | | 3 | 1 | 22.01 | 22.03 | 21.93 |
| | | | 3 | 3 | 22.02 | 21.96 | 21.92 |
| | | | 6 | 0 | 20.98 | 21.11 | 21.06 |
| | 3 | QPSK | 1 | 0 | 23.20 | 23.18 | 23.23 |
| | | | 1 | 8 | 23.17 | 23.21 | 23.21 |
| | | | 1 | 14 | 23.17 | 23.21 | 23.22 |
| | | | 8 | 0 | 22.01 | 22.08 | 21.99 |
| | | | 8 | 4 | 21.97 | 22.07 | 21.97 |
| | | | 8 | 7 | 22.02 | 22.06 | 21.93 |
| | | | 15 | 0 | 21.99 | 22.07 | 22.00 |
| | | 16QAM | 1 | 0 | 21.88 | 21.91 | 22.21 |
| | | | 1 | 8 | 21.81 | 21.82 | 22.13 |
| | | | 1 | 14 | 21.77 | 21.91 | 22.20 |
| | | | 8 | 0 | 21.05 | 20.96 | 20.92 |
| | | | 8 | 4 | 21.02 | 20.94 | 20.91 |
| | | | 8 | 7 | 21.04 | 20.98 | 20.89 |
| | | | 15 | 0 | 21.06 | 21.09 | 20.95 |
| | 5 | QPSK | 1 | 0 | 23.05 | 23.19 | 23.23 |
| | | | 1 | 12 | 23.04 | 23.20 | 23.22 |
| | | | 1 | 24 | 23.10 | 23.15 | 23.17 |
| | | | 12 | 0 | 21.97 | 22.04 | 22.04 |
| | | | 12 | 7 | 21.99 | 22.04 | 22.07 |
| | | | 12 | 13 | 21.99 | 22.02 | 22.05 |
| | | | 25 | 0 | 22.00 | 22.05 | 22.01 |
| | | 16QAM | 1 | 0 | 21.53 | 22.05 | 22.00 |
| | | | 1 | 12 | 21.55 | 22.04 | 22.04 |
| | | | 1 | 24 | 21.83 | 22.04 | 21.91 |
| | | | 12 | 0 | 20.93 | 20.97 | 20.99 |
| | | | 12 | 7 | 20.92 | 21.03 | 21.04 |
| | | | 12 | 13 | 20.82 | 20.94 | 20.98 |
| | | | 25 | 0 | 21.01 | 21.02 | 21.08 |
| | 10 | QPSK | 1 | 0 | 23.24 | 23.25 | 23.15 |
| | | | 1 | 25 | 23.10 | 23.11 | 23.11 |
| | | | 1 | 49 | 23.09 | 23.15 | 23.08 |
| | | | 25 | 0 | 22.03 | 22.10 | 22.09 |
| | | | 25 | 12 | 22.03 | 22.03 | 22.06 |
| | | | 25 | 25 | 22.05 | 22.05 | 22.02 |
| | | | 50 | 0 | 21.95 | 22.08 | 22.05 |
| | | 16QAM | 1 | 0 | 21.69 | 21.88 | 22.16 |
| | | | 1 | 25 | 21.68 | 21.77 | 21.97 |
| | | | 1 | 49 | 21.59 | 21.79 | 21.90 |
| | | | 25 | 0 | 21.05 | 21.07 | 21.11 |
| | | | 25 | 12 | 20.98 | 21.08 | 21.10 |
| | | | 25 | 25 | 20.99 | 21.05 | 21.10 |
| | | | 50 | 0 | 21.08 | 21.03 | 21.05 |

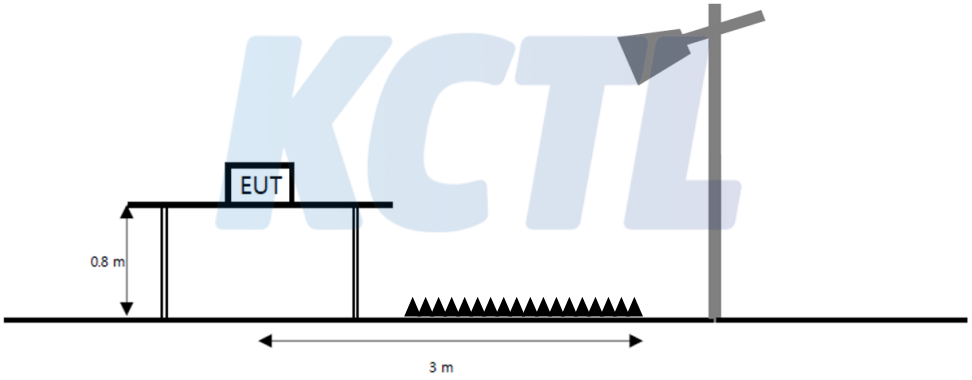
## 6.2. Radiated Power (ERP/EIRP)

**Test setup**

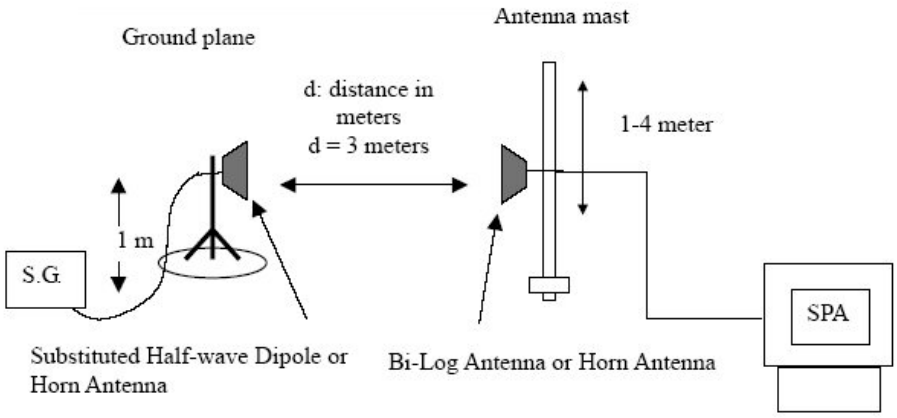
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




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.




The diagram below shows the test setup for substituted method.



**Limit**

According to §22.913(a)(5), the ERP of transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.

**Test procedure**

971168 D01 v03r01 - Section 5.2 and 5.8, 412172 D01 v01r01
ANSI 63.26-2015 – Section 5.2
ANSI/TIA-603-E-2016 - Section 2.2.17

**Test settings**

1) RBW = 1 % to 5 % of the OBW.
2) VBW ≥ 3 × RBW.
3) SPAN = 2 × to 3 × the OBW.
4) Number of measurement points in sweep ≥ 2 × span / RBW.
5) Sweep time :
   1) Auto couple, or
   2) ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6) Detector = RMS
7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full -power transmissions).
9) Trace mode = trace averaging (RMS) over 100 sweeps.
10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11) Allow trace to fully stabilize.

**Notes:**

1. On a test site, the EUT shall be placed at 80 cm height on a turn table, and in the position close To normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to Correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the Level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(㏈m) = Pg(㏈m) – Cable loss (㏈) + Antenna gain (㏈)
   Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

## Test results

### Test mode: LTE Band 5

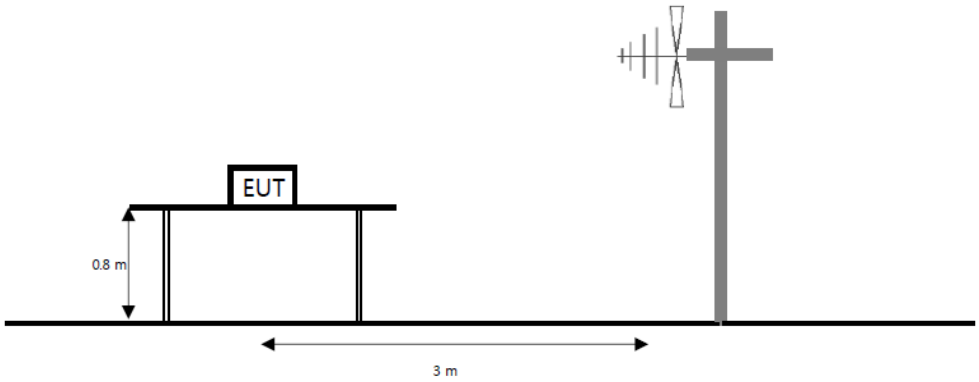
| Bandwidth | Mode | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | [㎒] | [V/H] | [dBi] | [dB] | [dB m] | [dB m] | [W] |
| | QPSK | 824.7 | H | -0.60 | 3.69 | 12.60 | 8.31 | 0.007 |
| | | 836.5 | H | -0.50 | 3.72 | 12.90 | 8.68 | 0.007 |
| | | 848.3 | H | -0.60 | 3.74 | 13.29 | 8.95 | 0.008 |

Note.
1. E.R.P (dBm) = Substitute Level(dB) + Antenna gain(dBi) - C.L(Cable loss) (dB)

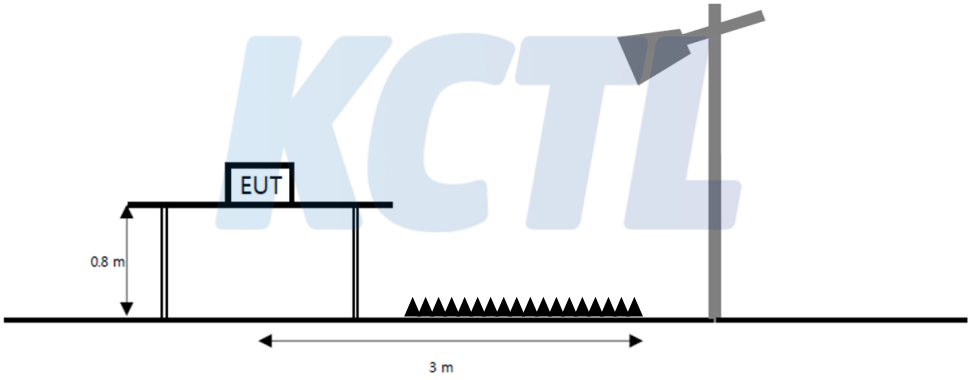
## 6.3. Radiated Spurious Emissions

**Test setup**

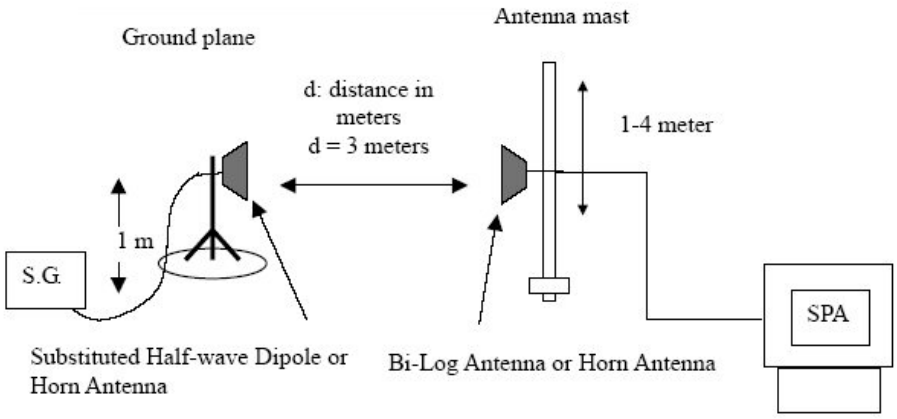
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




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.




The diagram below shows the test setup for substituted method.



**Limit**

According to §22.917(a), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43+10log(P) ㏈.

**Test procedure**

971168 D01 v03r01 - Section 6.2
ANSI 63.26-2015 – Section 5.5
ANSI/TIA-603-E-2016 - Section 2.2.12

**Test settings**

1) RBW = 100 ㎑ for below 1 ㎓ and 1 ㎒ for above 1 ㎓.
2) VBW ≥ 3 × RBW.
3) Detector = RMS
4) Trace mode = Max hold
5) Sweep time = Auto couple
6) Number of sweep points ≥ 2 × span / RBW
7) Allow trace to fully stabilize.

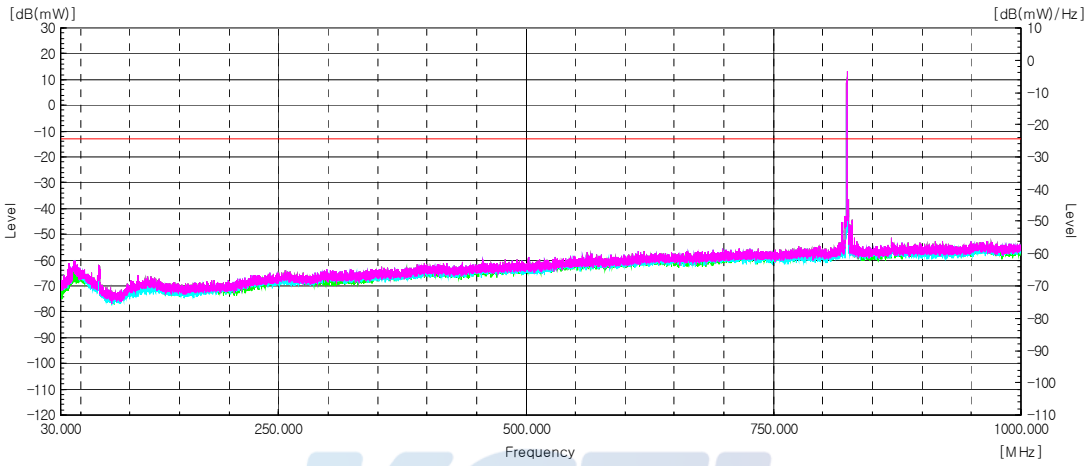
**Notes:**

1. On a test site, the EUT shall be placed at 80 ㎝ height on a turn table, and in the position close to normal use as declared by the applicant.
2. The test antenna shall be oriented initially for vertical polarization located 3 m from EUT to correspond to the fundamental frequency of the transmitter.
3. The turntable is rotated through 360°, and the receiving antenna scans in order to determine the level of the maximized emission.
4. The test antenna shall be raised and lowered again through the specified range of height until the maximum signal level is detected by the measuring receiver.
5. The maximum signal level detected by the measuring receiver shall be noted.
6. The EUT was replaced by half-wave dipole (1 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

## Test results (Below 1 000 ㎒)

| | | |
|---|---|---|
| Test mode | : | LTE Band 5 |
| Frequency (㎒) | : | 824.7 |
| Channel | : | 20407 |

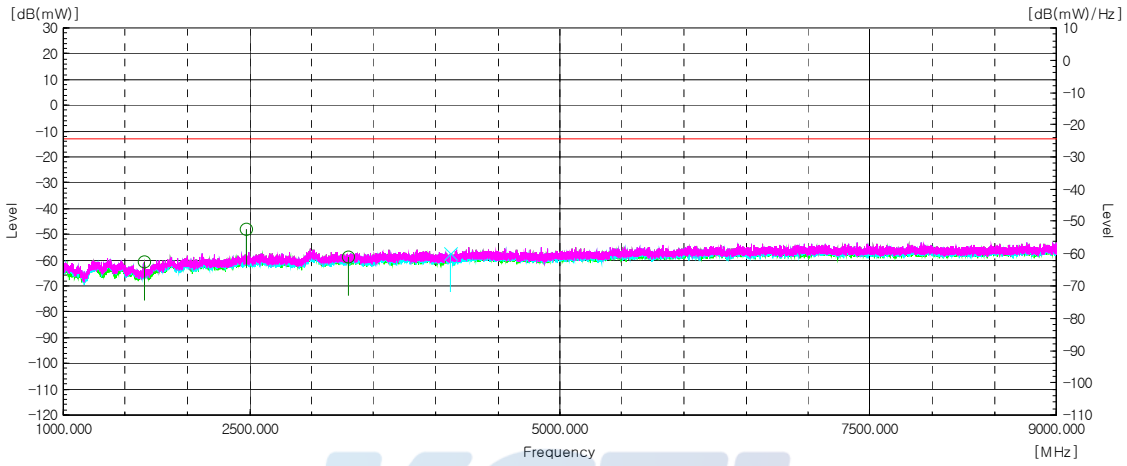
**Horizontal/Vertical**



## Test results (Above 1 000 ㎒)

Test mode : LTE Band 5
Frequency (㎒) : 824.7
Channel : 20407

**Horizontal/Vertical**

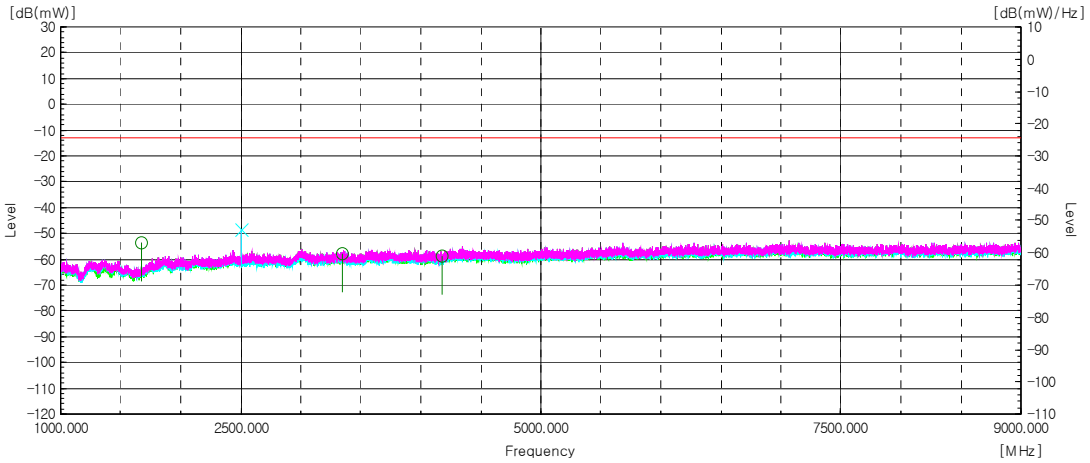



| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 648.54 | H | 6.42 | 5.36 | -61.66 | -60.60 | -13.00 | 47.60 |
| | 2 472.59 | H | 6.00 | 6.63 | -47.57 | -48.20 | -13.00 | 35.20 |
| | 3 296.14 | H | 7.35 | 7.66 | -58.49 | -58.80 | -13.00 | 45.80 |
| | 4 120.70 | V | 8.72 | 8.59 | -57.73 | -57.60 | -13.00 | 44.60 |

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)

Test mode : LTE Band 5
Frequency (㎒) : 836.5
Channel : 20525

**Horizontal/Vertical**

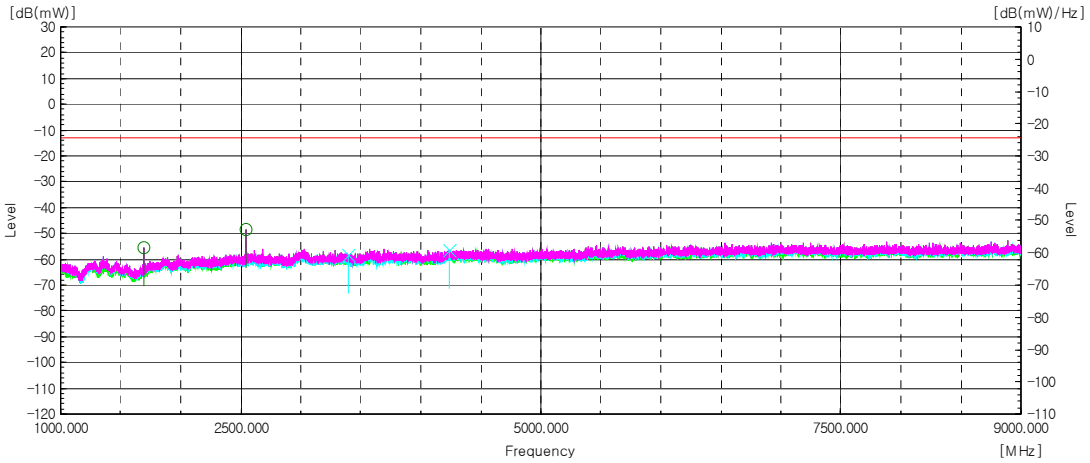



| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 672.04 | H | 6.39 | 5.40 | -54.69 | -53.70 | -13.00 | 40.70 |
| | 2 508.09 | V | 6.01 | 6.64 | -47.87 | -48.50 | -13.00 | 35.50 |
| | 3 342.65 | H | 7.45 | 7.72 | -57.53 | -57.80 | -13.00 | 44.80 |
| | 4 179.70 | H | 8.78 | 8.65 | -58.83 | -58.70 | -13.00 | 45.70 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log($P_{[Watts]}$)

Test mode : LTE Band 5
Frequency (㎒) : 848.3
Channel : 20643

**Horizontal/Vertical**




| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 696.04 | H | 6.36 | 5.44 | -56.62 | -55.70 | -13.00 | 42.70 |
| | 2 543.60 | H | 6.06 | 6.73 | -47.83 | -48.50 | -13.00 | 35.50 |
| | 3 391.65 | V | 7.56 | 7.78 | -58.28 | -58.50 | -13.00 | 45.50 |
| | 4 239.20 | V | 8.84 | 8.70 | -56.64 | -56.50 | -13.00 | 43.50 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log($P_{[Watts]}$)

## 7. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Next Cal. Date |
|---|---|---|---|---|
| Biconical VHF-UHF Broadband Antenna | SCHWARZBECK | VUBA9117 | 275 | 20.04.13 |
| Bilog Antenna | Teseq GmbH | CBL 6143A | 35039 | 21.05.21 |
| Horn Antenna | ETS.lindgren | 3117 | 161225 | 20.05.22 |
| High pass Filter | Wainwright Instruments GmbH | WHKX1.0/1.5S-10SS | 14 | 20.01.25 |
| Attenuator | Weinschel ENGINEERING | 10 | AJ1239 | 20.05.14 |
| Amplifier | SONOMA INSTRUMENT | 310N | 186402 | 20.01.04 |
| Amplifier | L-3 Narda-MITEQ | AMF-7D-01001800-22-10P | 2031196 | 20.02.21 |
| Spectrum Analyzer | AGILENT | N9040B | MY57010132 | 20.07.31 |
| Signal Generator | R&S | SMB100A | 176206 | 20.01.25 |
| Widebnad Radio Communication Tester | R&S | CMW500 | 141780 | 20.04.18 |
| Antenna Mast | MATURO | EAS 1.5 | 042/8941211 | N/A |
| Antenna Mast | MATURO | EAS 1.5 | 043/8941211 | N/A |
| Turn Table | MATURO | TT 0.8 PF | 041/8941211 | N/A |

**End of test report**