# TEST REPORT

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**1. Client**

- Name : HYUNDAI MOBIS CO., LTD.
- Address : 203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea
- Date of Receipt : 2019-09-20

**2. Use of Report** : Certification

**3. Name of Product and Model** : WIDE AVN / ATBA0HYAN

**4. Manufacturer and Country of Origin** : Hyundai Mobis Co., Ltd. / Korea

**5. FCC ID** : TQ8-ATBA0HYAN

**6. Date of Test** : 2019-10-16 to 2020-02-20

**7. Test Standards** : FCC Part 2
FCC Part 22 subpart H
FCC Part 24 subpart E
FCC Part 27 subpart C

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

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

2020-02-21

## KCTL Inc.

**Report revision history**

| Date | Revision | Page No |
|---|---|---|
| 2020-02-09 | Initial report | - |
| 2020-02-21 | Updated | 3,9,25,26,27,28 |
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*Note. The report No. KR20-SRF0041 is superseded by the report No. KR20-SRF0041-A.*

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## 1. General information

| | | |
|---|---|---|
| Client | : | HYUNDAI MOBIS CO., LTD. |
| Address | : | 203, Teheran-ro, Gangnam-gu, Seoul, 06141, Korea |
| Manufacturer | : | Hyundai Mobis Co., Ltd. |
| Address | : | 95, Sayang 2-Gil, Munbaek-Myeon, Jincheon-Gun, Chungcheongbuk-Do 27862 Korea |
| 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<br>VCCI Registration No. : R-20080, G-20078, C-20059, T-20056<br>Industry Canada Registration No. : 8035A<br>KOLAS No.: KT231 |

## 2. Device information

| | | |
|---|---|---|
| Equipment under test | : | WIDE AVN |
| Model | : | ATBA0HYAN |
| Derivative model | : | ATBA0HCAN, ATBA3HCAN |
| Frequency range | : | 779.5 ㎒ ~ 784.5 ㎒ (LTE Band 13)<br>824.7 ㎒ ~ 848.3 ㎒ (LTE Band 5)<br>1 710.7 ㎒ ~ 1 754.3 ㎒ (LTE Band 4)<br>1 850.7 ㎒ ~ 1 909.3 ㎒ (LTE Band 2)<br>824.7 ㎒ ~ 848.31 ㎒ (CDMA BC0)<br>1 851.25 ㎒ ~ 1 908.75 ㎒ (CDMA BC1) |
| Modulation technique | : | QPSK, 16-QAM (LTE)<br>QPSK (CDMA) |
| Power source | : | DC 14.4 V |
| Antenna specification | : | C-PAD Antenna(LTE), Shark Antenna(CDMA) |
| Software version | : | MQ4.USA.0000.V028.001.190821 |
| Hardware version | : | MQ4.USA.STD_AVN_G5_WIDE.004.001 |
| Test device serial No. | : | N/A |
| Operation temperature | : | -20 ℃ ~ 70 ℃ |

## 2.1. Information about derivative model

The difference between basic model and derivative models is:

The derivative models have a different product identification number.

ATBA0HCAN(96560 P4700), ATBA3HCAN(96560 P4900)

## 2.2. Frequency/channel operations

This device contains the following capabilities:
LTE Band 13, LTE Band 5, LTE Band 4, LTE Band 2, CDMA 850/1900(BC0, BC1)

### LTE Band 13

| Ch. | Frequency (㎒) |
|---|---|
| 23205 | 779.5 |
| 23230 | 782.0 |
| 23255 | 784.5 |

Table 2.2.1. 5M BW

| Ch. | Frequency (㎒) |
|---|---|
| - | - |
| 23230 | 782.0 |
| - | - |

Table 2.2.2. 10M BW

### LTE Band 5

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

Table 2.2.3. 1.4M BW

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

Table 2.2.4. 3M BW

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

Table 2.2.5. 5M BW

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

Table 2.2.6. 10M BW

### LTE Band 4

| Ch. | Frequency (㎒) |
|---|---|
| 19957 | 1 710.7 |
| 20175 | 1 732.5 |
| 20393 | 1 754.3 |

Table 2.2.7 1.4M BW

| Ch. | Frequency (㎒) |
|---|---|
| 19965 | 1 711.5 |
| 20175 | 1 732.5 |
| 20385 | 1 753.5 |

Table 2.2.8 3M BW

| Ch. | Frequency (㎒) |
|---|---|
| 19975 | 1 712.5 |
| 20175 | 1 732.5 |
| 20375 | 1 752.5 |

Table 2.2.9. 5M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20000 | 1 715.0 |
| 20175 | 1 732.5 |
| 20350 | 1 750.0 |

Table 2.2.10. 10M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20025 | 1 717.5 |
| 20175 | 1 732.5 |
| 20325 | 1 747.5 |

Table 2.2.11. 15M BW

| Ch. | Frequency (㎒) |
|---|---|
| 20050 | 1 720.0 |
| 20175 | 1 732.5 |
| 20300 | 1 745.0 |

Table 2.2.12. 20M BW

**LTE Band 2**

| Ch. | Frequency (㎒) |
|---|---|
| 18607 | 1 850.7 |
| 18900 | 1 880.0 |
| 19193 | 1 909.3 |

Table 2.2.13 1.4M BW

| Ch. | Frequency (㎒) |
|---|---|
| 18615 | 1 851.5 |
| 18900 | 1 880.0 |
| 19185 | 1 908.5 |

Table 2.2.14 3M BW

| Ch. | Frequency (㎒) |
|---|---|
| 18625 | 1 852.5 |
| 18900 | 1 880.0 |
| 19175 | 1 907.5 |

Table 2.2.15. 5M BW

| Ch. | Frequency (㎒) |
|---|---|
| 18650 | 1 855.0 |
| 18900 | 1 880.0 |
| 19150 | 1 905.0 |

Table 2.2.16 10M BW

| Ch. | Frequency (㎒) |
|---|---|
| 18675 | 1 857.5 |
| 18900 | 1 880.0 |
| 19125 | 1 902.5 |

Table 2.2.17 15M BW

| Ch. | Frequency (㎒) |
|---|---|
| 18700 | 1 860.0 |
| 18900 | 1 880.0 |
| 19100 | 1 900.0 |

Table 2.2.18 20M BW

## 3. Maximum ERP/EIRP power

**LTE Band 13**

| Mode | Tx frequency (㎒) | Emission designator | ERP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE Band 13 | 779.5 ~ 718.4 | 4M53G7D | 18.88 | 0.077 |
| | | 4M53W7D | 18.01 | 0.063 |
| | 782.0 | 8M92G7D | **18.98** | **0.079** |
| | | 8M94W7D | 17.55 | 0.057 |

**LTE Band 5**

| Mode | Tx frequency (㎒) | Emission designator | ERP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE Band 5 | 824.7 ~ 848.3 | 1M10G7D | 20.14 | 0.103 |
| | | 1M10W7D | 19.29 | 0.085 |
| | 825.5 ~ 847.5 | 2M71G7D | 20.25 | 0.106 |
| | | 2M71W7D | 19.13 | 0.082 |
| | 826.5 ~ 846.5 | 4M53G7D | 20.08 | 0.102 |
| | | 4M53W7D | 19.46 | 0.088 |
| | 829.0 ~ 844.0 | 8M94G7D | **20.38** | **0.109** |
| | | 8M94W7D | 19.35 | 0.086 |

**LTE Band 4**

| Mode | Tx frequency (㎒) | Emission designator | EIRP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE Band 4 | 1 710.7 ~ 1 754.3 | 1M10G7D | 21.21 | 0.132 |
| | | 1M10W7D | 20.20 | 0.105 |
| | 1 711.5 ~ 1 753.5 | 2M71G7D | 20.90 | 0.123 |
| | | 2M71W7D | 19.99 | 0.100 |
| | 1 712.5 ~ 1 752.5 | 4M53G7D | 21.17 | 0.131 |
| | | 4M53W7D | 20.08 | 0.102 |
| | 1 715.0 ~ 1 750.0 | 8M97G7D | 21.20 | 0.132 |
| | | 8M94W7D | 20.49 | 0.112 |
| | 1 717.5 ~ 1 747.5 | 13M5G7D | 21.00 | 0.126 |
| | | 13M5W7D | 20.16 | 0.104 |
| | 1 720.0 ~ 1 745.0 | 17M9G7D | **21.35** | **0.136** |
| | | 17M9W7D | 20.37 | 0.109 |

**LTE Band 2**

| Mode | Tx frequency (㎒) | Emission designator | EIRP | |
|---|---|---|---|---|
| | | | Max. power (dBm) | Max. power (W) |
| LTE Band 2 | 1 850.7 ~ 1 909.3 | 1M10G7D | 21.93 | 0.156 |
| | | 1M10W7D | 20.76 | 0.119 |
| | 1 851.5 ~ 1 908.5 | 2M71G7D | **21.39** | **0.138** |
| | | 2M72W7D | 20.25 | 0.106 |
| | 1 852.5 ~ 1 907.5 | 4M52G7D | 21.30 | 0.135 |
| | | 4M54W7D | 20.17 | 0.104 |
| | 1 855.0 ~ 1 905.0 | 8M94G7D | 20.66 | 0.116 |
| | | 8M94W7D | 20.74 | 0.119 |
| | 1 857.5 ~ 1 902.5 | 13M5G7D | 21.16 | 0.131 |
| | | 13M5W7D | 20.48 | 0.112 |
| | 1 860.0 ~ 1 900.0 | 17M9G7D | 21.22 | 0.132 |
| | | 17M9W7D | 20.73 | 0.118 |

## 4. Summary of tests

| FCC Part Section(s) | Parameter | Test results |
|---|---|---|
| 2.1046<br>22.913(a)(5)<br>24.232(c)<br>27.50(c),(d)<br>,(h)(2) | Conducted Output Power | N/T(note1) |
| 2.1049 | Occupied Bandwidth & 26 dB Bandwidth | N/T(note1) |
| 2.1051<br>22.917(a)<br>24.238(a)<br>27.53(c)(2)<br>,(h)(1) | Band Edge Emissions at Antenna Terminal | N/T(note1) |
| | Spurious Emissions at Antenna Terminal | N/T(note1) |
| 22.913(d)<br>24.232(d)<br>27.50(d)(5) | Peak to Average Power Ratio | N/T(note1) |
| 2.1055<br>22.355<br>24.235<br>27.54 | Frequency stability | N/T(note1) |
| 22.913(a)(5)<br>24.232(c)<br>27.50(b)(10)<br>,(d)(4) | Effective Radiated Power &<br>Equivalent Isotropic Radiated Power | Pass |
| 22.917(a)<br>24.238(a)<br>27.53(c)(2),<br>,(h)(1) | Radiated Spurious Emissions | Pass |

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

1. This test item was not performed by the request of manufacturer. Please refer to original test report no. F690501/RF-RTL011907-1 issued on Nov. 09, 2017 by SGS Korea Co., Ltd. (Gunpo Laboratory)
2. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations and paging service configurations in the test data.
3. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that X orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in X orientation.
4. 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

## 5. 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.

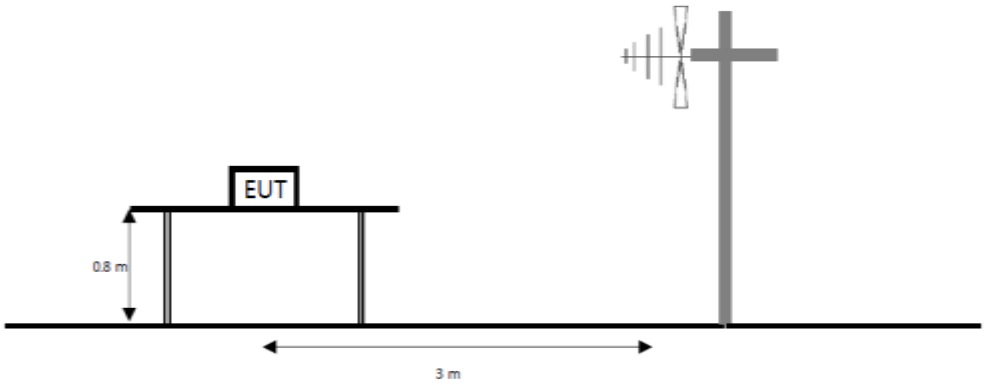
| Parameter | Expanded uncertainty(±) | |
|---|---|---|
| Radiated spurious emissions | 9 ㎑ ~ 30 ㎒ | 2.28 ㏈ |
| | 30 ㎒ ~ 1 ㎓ | 3.68 ㏈ |
| | Above 1 ㎓ | 5.72 ㏈ |

# 6. Test results

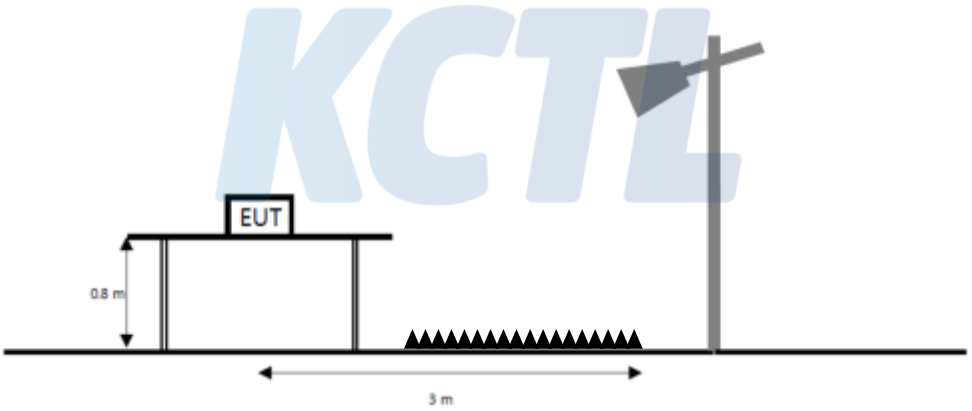
## 6.1. Radiated Power (ERP/EIRP)

**Test setup**

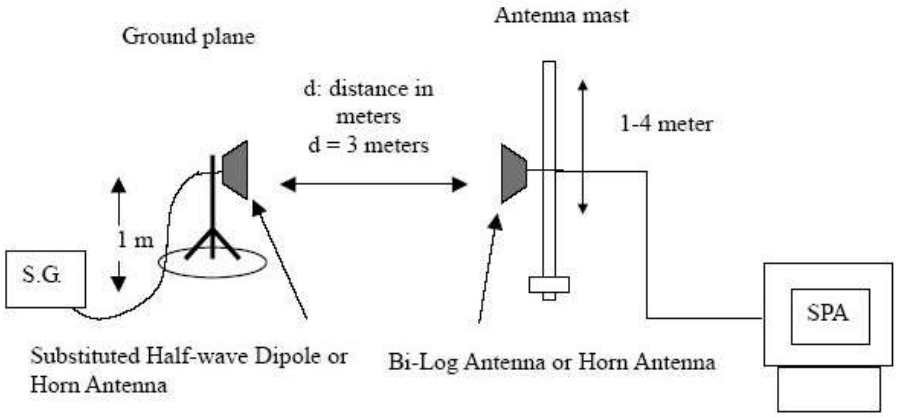
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




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.

According to §24.232(c) mobile and portable stations are limited to 2 watts EIRP and the equipment must employ a means for limiting power to the minimum necessary for successful communications.

According to §27.50(b)(10) Portable stations (hand-held devices) transmitting in the 746-757 ㎒, 776-788 ㎒, and 805-806 ㎒ bands are limited to 3 watts ERP.

According to §27.50(d)(4) fixed, mobile, and portable (hand-held) stations operating in the 1710~1755 ㎒ band and mobile and portable stations operating in the 1695~1710 ㎒ and 1755~1780 ㎒ bands are 1 watt EIRP.

**Test procedure**

971168 D01 v03r01 - Section 5.2.2
ANSI 63.26-2015 – Section 5.2.4.4.1
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 13

| Bandwidth | Modulation | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| 5 M | QPSK | 779.5 | H | 0.00 | 3.59 | 22.47 | 18.88 | 0.077 |
| | | 782.0 | H | 0.10 | 3.62 | 22.32 | 18.80 | 0.076 |
| | | 784.5 | H | 0.10 | 3.62 | 21.85 | 18.33 | 0.068 |
| | 16QAM | 779.5 | H | 0.00 | 3.59 | 21.60 | 18.01 | 0.063 |
| | | 782.0 | H | 0.10 | 3.62 | 21.39 | 17.87 | 0.061 |
| | | 784.5 | H | 0.10 | 6.62 | 23.93 | 17.41 | 0.055 |
| 10 M | QPSK | 782.0 | H | 0.10 | 3.62 | 22.50 | 18.98 | 0.079 |
| | 16QAM | 782.0 | H | 0.10 | 3.62 | 21.07 | 17.55 | 0.057 |

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

**Test mode: LTE Band 15**

| Bandwidth | Modulation | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | ERP | |
|---|---|---|---|---|---|---|---|---|
| | | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| 1.4 M | QPSK | 824.70 | H | -0.60 | 3.69 | 24.40 | 20.11 | 0.103 |
| | | 836.50 | H | -0.50 | 3.72 | 24.36 | 20.14 | 0.103 |
| | | 848.30 | H | -0.50 | 3.74 | 24.34 | 20.10 | 0.102 |
| | 16QAM | 824.70 | H | -0.60 | 3.69 | 23.52 | 19.23 | 0.084 |
| | | 836.50 | H | -0.50 | 3.72 | 23.51 | 19.29 | 0.085 |
| | | 848.30 | H | -0.50 | 3.74 | 23.87 | 19.63 | 0.092 |
| 3 M | QPSK | 825.50 | H | -0.60 | 3.70 | 24.38 | 20.08 | 0.102 |
| | | 836.50 | H | -0.50 | 3.72 | 24.43 | 20.21 | 0.105 |
| | | 847.50 | H | -0.50 | 3.74 | 24.49 | 20.25 | 0.106 |
| | 16QAM | 825.50 | H | -0.60 | 3.70 | 23.07 | 18.77 | 0.075 |
| | | 836.50 | H | -0.50 | 3.72 | 23.35 | 19.13 | 0.082 |
| | | 847.50 | H | -0.50 | 3.74 | 22.91 | 18.67 | 0.074 |
| 5 M | QPSK | 826.50 | H | -0.60 | 3.71 | 24.37 | 20.06 | 0.101 |
| | | 836.50 | H | -0.50 | 3.72 | 24.30 | 20.08 | 0.102 |
| | | 846.50 | H | -0.50 | 3.73 | 24.26 | 20.03 | 0.101 |
| | 16QAM | 826.50 | H | -0.60 | 3.71 | 23.27 | 18.96 | 0.079 |
| | | 836.50 | H | -0.50 | 3.72 | 23.29 | 19.07 | 0.081 |
| | | 846.50 | H | -0.50 | 3.73 | 23.69 | 19.46 | 0.088 |
| 10 M | QPSK | 829.00 | H | -0.60 | 3.71 | 24.44 | 20.13 | 0.103 |
| | | 836.50 | H | -0.50 | 3.72 | 24.39 | 20.17 | 0.104 |
| | | 844.00 | H | -0.50 | 3.73 | 24.61 | 20.38 | 0.109 |
| | 16QAM | 829.00 | H | -0.60 | 3.71 | 23.66 | 19.35 | 0.086 |
| | | 836.50 | H | -0.50 | 3.72 | 23.48 | 19.26 | 0.084 |
| | | 844.00 | H | -0.50 | 3.73 | 23.42 | 19.19 | 0.083 |

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

**Test mode: LTE Band 4**

| Bandwidth | Modulation | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | EIRP | |
|---|---|---|---|---|---|---|---|---|
| | | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| 1.4 M | QPSK | 1 710.7 | V | 6.35 | 5.48 | 20.34 | 21.21 | 0.132 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.29 | 21.09 | 0.129 |
| | | 1 754.3 | V | 6.29 | 5.56 | 20.25 | 20.98 | 0.125 |
| | 16QAM | 1 710.7 | V | 6.35 | 5.48 | 18.73 | 19.60 | 0.091 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.40 | 20.20 | 0.105 |
| | | 1 754.3 | V | 6.29 | 5.56 | 19.32 | 20.05 | 0.101 |
| 3 M | QPSK | 1 711.5 | V | 6.35 | 5.48 | 18.94 | 19.81 | 0.096 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.10 | 20.90 | 0.123 |
| | | 1 753.5 | V | 6.30 | 5.56 | 20.05 | 20.79 | 0.120 |
| | 16QAM | 1 711.5 | V | 6.35 | 5.48 | 18.82 | 19.69 | 0.093 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.19 | 19.99 | 0.100 |
| | | 1 753.5 | V | 6.30 | 5.56 | 19.13 | 19.87 | 0.097 |
| 5 M | QPSK | 1 712.5 | V | 6.35 | 5.49 | 20.05 | 20.90 | 0.123 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.37 | 21.17 | 0.131 |
| | | 1 752.5 | V | 6.30 | 5.55 | 20.12 | 20.87 | 0.122 |
| | 16QAM | 1 712.5 | V | 6.35 | 5.49 | 19.10 | 19.95 | 0.099 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.28 | 20.08 | 0.102 |
| | | 1 752.5 | V | 6.30 | 5.55 | 18.84 | 19.59 | 0.091 |
| 10 M | QPSK | 1 715.0 | V | 6.34 | 5.50 | 20.19 | 21.03 | 0.127 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.40 | 21.20 | 0.132 |
| | | 1 750.0 | V | 6.30 | 5.54 | 19.74 | 20.50 | 0.112 |
| | 16QAM | 1 715.0 | V | 6.34 | 5.50 | 19.65 | 20.49 | 0.112 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.25 | 20.05 | 0.101 |
| | | 1 750.0 | V | 6.30 | 5.54 | 18.72 | 19.48 | 0.089 |
| 15 M | QPSK | 1 717.5 | V | 6.34 | 5.49 | 20.14 | 20.99 | 0.126 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.20 | 21.00 | 0.126 |
| | | 1 747.5 | V | 6.30 | 5.54 | 20.06 | 20.82 | 0.121 |
| | 16QAM | 1 717.5 | V | 6.34 | 5.49 | 19.31 | 20.16 | 0.104 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.25 | 20.05 | 0.101 |
| | | 1 747.5 | V | 6.30 | 5.54 | 19.24 | 20.00 | 0.100 |
| 20 M | QPSK | 1 720.0 | V | 6.34 | 5.50 | 20.51 | 21.35 | 0.136 |
| | | 1 732.5 | V | 6.32 | 5.52 | 20.28 | 21.08 | 0.128 |
| | | 1 745.0 | V | 6.31 | 5.56 | 19.80 | 20.55 | 0.114 |
| | 16QAM | 1 720.0 | V | 6.34 | 5.50 | 19.07 | 19.91 | 0.098 |
| | | 1 732.5 | V | 6.32 | 5.52 | 19.57 | 20.37 | 0.109 |
| | | 1 745.0 | V | 6.31 | 5.56 | 19.36 | 20.11 | 0.103 |

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

**Test mode: LTE Band 2**

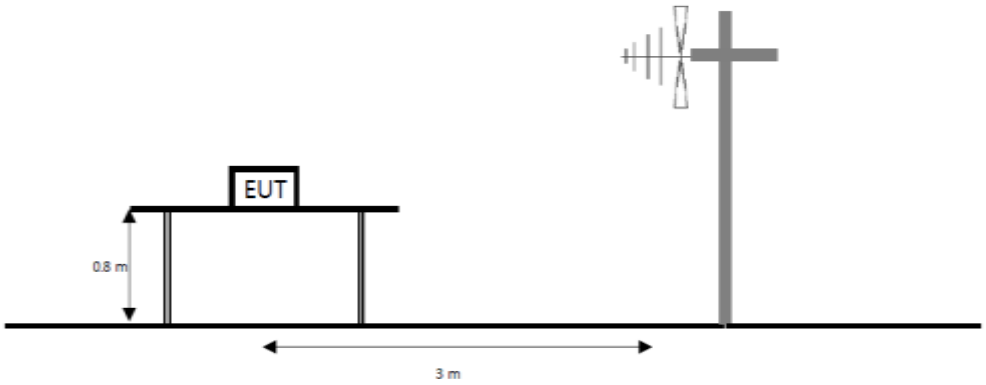
| Bandwidth | Modulation | Frequency | Pol. | Antenna Gain | C.L | Substitute Level | EIRP | |
|---|---|---|---|---|---|---|---|---|
| | | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [W] |
| 1.4 M | QPSK | 1 850.7 | V | 6.18 | 5.74 | 20.36 | 20.80 | 0.120 |
| | | 1 880.0 | V | 6.14 | 5.78 | 19.87 | 20.23 | 0.105 |
| | | 1 909.3 | V | 6.11 | 5.81 | 21.63 | 21.93 | 0.156 |
| | 16QAM | 1 850.7 | V | 6.18 | 5.74 | 19.55 | 19.99 | 0.100 |
| | | 1 880.0 | V | 6.14 | 5.78 | 18.29 | 18.65 | 0.073 |
| | | 1 909.3 | V | 6.11 | 5.81 | 20.46 | 20.76 | 0.119 |
| 3 M | QPSK | 1 851.5 | V | 6.18 | 5.74 | 20.68 | 21.12 | 0.129 |
| | | 1 880.0 | V | 6.14 | 5.78 | 20.01 | 20.37 | 0.109 |
| | | 1 908.5 | V | 6.11 | 5.81 | 21.09 | 21.39 | 0.138 |
| | 16QAM | 1 851.5 | V | 6.18 | 5.74 | 19.81 | 20.25 | 0.106 |
| | | 1 880.0 | V | 6.14 | 5.78 | 18.71 | 19.07 | 0.081 |
| | | 1 908.5 | V | 6.11 | 5.81 | 19.81 | 20.11 | 0.103 |
| 5 M | QPSK | 1 852.5 | V | 6.18 | 5.74 | 20.46 | 20.90 | 0.123 |
| | | 1 880.0 | V | 6.14 | 5.78 | 20.04 | 20.40 | 0.110 |
| | | 1 907.5 | V | 6.11 | 5.80 | 20.99 | 21.30 | 0.135 |
| | 16QAM | 1 852.5 | V | 6.18 | 5.74 | 19.54 | 19.98 | 0.100 |
| | | 1 880.0 | V | 6.14 | 5.78 | 18.74 | 19.10 | 0.081 |
| | | 1 907.5 | V | 6.11 | 5.80 | 19.86 | 20.17 | 0.104 |
| 10 M | QPSK | 1 855.0 | V | 6.17 | 5.75 | 20.85 | 21.27 | 0.134 |
| | | 1 880.0 | V | 6.14 | 5.78 | 19.95 | 20.31 | 0.107 |
| | | 1 905.0 | V | 6.11 | 5.79 | 20.34 | 20.66 | 0.116 |
| | 16QAM | 1 855.0 | V | 6.17 | 5.75 | 20.32 | 20.74 | 0.119 |
| | | 1 880.0 | V | 6.14 | 5.78 | 18.94 | 19.30 | 0.085 |
| | | 1 905.0 | V | 6.11 | 5.79 | 19.55 | 19.87 | 0.097 |
| 15 M | QPSK | 1 857.5 | V | 6.17 | 5.75 | 20.66 | 21.08 | 0.128 |
| | | 1 880.0 | V | 6.14 | 5.78 | 20.28 | 20.64 | 0.116 |
| | | 1 902.5 | V | 6.12 | 5.79 | 20.83 | 21.16 | 0.131 |
| | 16QAM | 1 857.5 | V | 6.17 | 5.75 | 20.06 | 20.48 | 0.112 |
| | | 1 880.0 | V | 6.14 | 5.78 | 19.10 | 19.46 | 0.088 |
| | | 1 902.5 | V | 6.12 | 5.79 | 19.46 | 19.79 | 0.095 |
| 20 M | QPSK | 1 860.0 | V | 6.17 | 5.75 | 20.80 | 21.22 | 0.132 |
| | | 1 880.0 | V | 6.14 | 5.78 | 20.70 | 21.06 | 0.128 |
| | | 1 900.0 | V | 6.12 | 5.79 | 20.74 | 21.07 | 0.128 |
| | 16QAM | 1 860.0 | V | 6.17 | 5.75 | 19.32 | 19.74 | 0.094 |
| | | 1 880.0 | V | 6.14 | 5.78 | 20.07 | 20.43 | 0.110 |
| | | 1 900.0 | V | 6.12 | 5.79 | 20.40 | 20.73 | 0.118 |

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

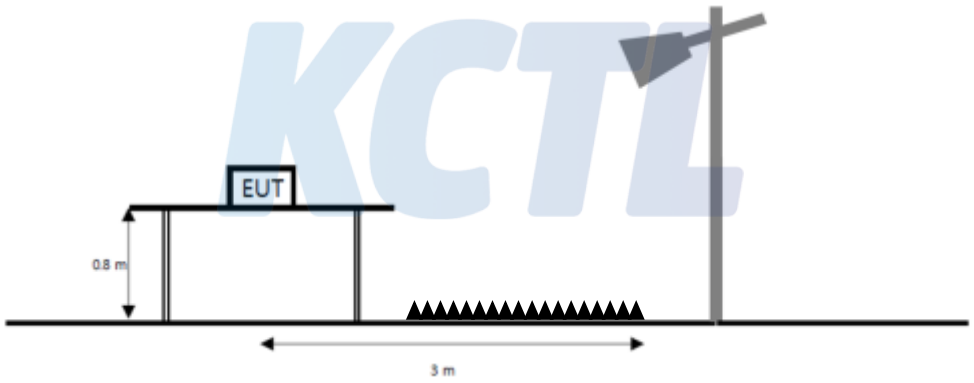
## 6.2. Radiated Spurious Emissions

**Test setup**

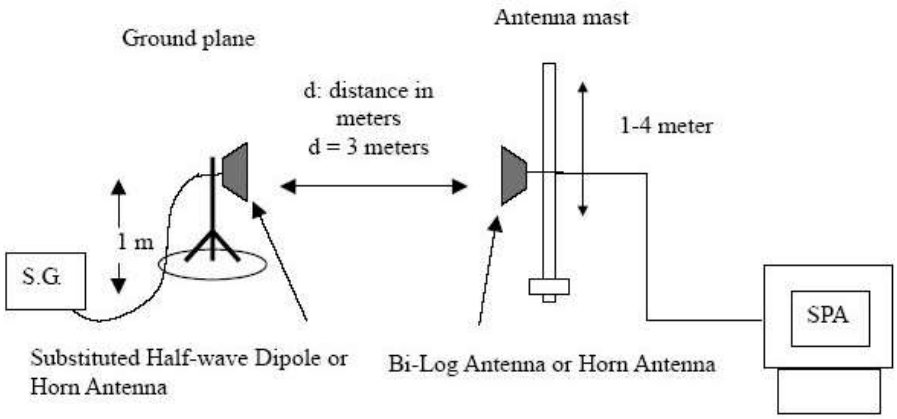
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.




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), §24.238(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($P_{[Watts]}$) ㏈.

According to §27.53(g) on any frequency outside the 776-788 ㎒ band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) ㏈

According to §27.53(h) the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10log($P_{[Watts]}$) ㏈.

**Test procedure**

971168 D01 v03r01 - Section 5.8
ANSI 63.26-2015 – Section 5.5
ANSI/TIA-603-E-2016 - Section 2.2.12

**Test settings**

1) RBW = 1 ㎑ 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 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.
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 (Above 1 000 ㎒)**

Test mode : LTE Band 13
Frequency(㎒) : 782.0
Channel : 23230
Bandwidth(㎒) 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 564.04 | V | 6.52 | 5.22 | -52.50 | -51.20 | -13.00 | 38.20 |
| | 2 346.08 | V | 6.00 | 6.46 | -46.24 | -46.70 | -13.00 | 33.70 |
| | 2 385.09 | V | 6.00 | 6.51 | -50.79 | -51.30 | -13.00 | 38.30 |
| | 3 128.63 | V | 6.98 | 7.46 | -58.22 | -58.70 | -13.00 | 45.70 |
| | 3 406.65 | V | 7.59 | 7.79 | -54.30 | -54.50 | -13.00 | 41.50 |

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

Test mode : LTE Band 13
Frequency(㎒) : 782.0
(1 559 ~ 1 610 ㎒)
Channel : 23230
Bandwidth(㎒) 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 564.19 | V | 6.52 | 5.22 | -78.00 | -76.70 | -50.00 | 26.70 |
| | 1 606.10 | V | 6.47 | 5.28 | -87.89 | -86.70 | -50.00 | 36.70 |

Note.
1. Limit Calculation of wide-band (dBm/㎒) = -70 dBW/㎒ (-40 dBm/㎒)
2. Limit Calculation of narrow-band (dBm) = -80 dBW (-50 dBm)

Test mode : LTE Band 5
Frequency(㎒) : 829.0
Channel : 20450
Bandwidth(㎒) 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 658.54 | V | 6.41 | 5.37 | -57.74 | -56.70 | -13.00 | 43.70 |
| | 2 384.59 | V | 6.00 | 6.51 | -52.29 | -52.80 | -13.00 | 39.80 |
| | 2 487.09 | V | 6.00 | 6.65 | -43.75 | -44.40 | -13.00 | 31.40 |
| | 3 317.15 | V | 7.40 | 7.68 | -57.92 | -58.20 | -13.00 | 45.20 |
| | 3 412.15 | V | 7.61 | 7.80 | -54.31 | -54.50 | -13.00 | 41.50 |

Test mode : LTE Band 5
Frequency(㎒) : 836.5
Channel : 20525
Bandwidth(㎒) 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 682.04 | V | 6.38 | 5.42 | -58.16 | -57.20 | -13.00 | 44.20 |
| | 2 385.09 | V | 6.00 | 6.51 | -50.89 | -51.40 | -13.00 | 38.40 |
| | 2 522.60 | V | 6.03 | 6.69 | -48.94 | -49.60 | -13.00 | 36.60 |
| | 3 366.15 | H | 7.51 | 7.74 | -58.37 | -58.60 | -13.00 | 45.60 |
| | 3 407.15 | V | 7.60 | 7.79 | -54.11 | -54.30 | -13.00 | 41.30 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

Test mode : LTE Band 5
Frequency(㎒) : 844.0
Channel : 20600
Bandwidth(㎒) 10

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 1 679.04 | V | 6.39 | 5.41 | -57.98 | -57.00 | -13.00 | 44.00 |
| | 2 385.09 | V | 6.00 | 6.51 | -50.99 | -51.50 | -13.00 | 38.50 |
| | 2 518.60 | V | 6.03 | 6.68 | -49.25 | -49.90 | -13.00 | 36.90 |
| | 3 355.65 | V | 7.48 | 7.73 | -58.65 | -58.90 | -13.00 | 45.90 |
| | 3 401.65 | V | 7.58 | 7.79 | -53.99 | -54.20 | -13.00 | 41.20 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

Test mode : LTE Band 4
Frequency(㎒) : 1 720.0
Channel : 20050
Bandwidth(㎒) 20

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 422.50 | V | 7.63 | 7.81 | -37.32 | -37.50 | -13.00 | 24.50 |
| | 5 133.00 | V | 10.09 | 9.67 | -45.32 | -44.90 | -13.00 | 31.90 |
| | 6 844.00 | V | 11.04 | 11.28 | -53.36 | -53.60 | -13.00 | 40.60 |
| | 8 555.00 | V | 12.98 | 12.61 | -49.17 | -48.80 | -13.00 | 35.80 |

Test mode : LTE Band 4
Frequency(㎒) : 1 732.5
Channel : 20175
Bandwidth(㎒) 20

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 465.00 | V | 7.72 | 7.86 | -28.96 | -29.10 | -13.00 | 16.10 |
| | 5 198.00 | V | 10.18 | 9.73 | -36.65 | -36.20 | -13.00 | 23.20 |
| | 6 930.00 | V | 11.07 | 11.40 | -41.77 | -42.10 | -13.00 | 29.10 |
| | 8 663.00 | V | 12.93 | 12.79 | -51.34 | -51.20 | -13.00 | 38.20 |

Test mode : LTE Band 4
Frequency(㎒) : 1 745.0
Channel : 20350
Bandwidth(㎒) 20

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 472.00 | V | 7.74 | 7.87 | -27.07 | -27.20 | -13.00 | 14.20 |
| | 5 208.50 | V | 10.19 | 9.63 | -31.16 | -30.60 | -13.00 | 17.60 |
| | 6 944.50 | V | 11.08 | 11.41 | -46.27 | -46.60 | -13.00 | 33.60 |
| | 8 680.50 | H | 12.93 | 12.80 | -50.33 | -50.20 | -13.00 | 37.20 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

Test mode : LTE Band 2
Frequency(㎒) : 1 850.7
Channel : 18607
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 700.50 | V | 8.12 | 8.15 | -31.37 | -31.40 | -13.00 | 18.40 |
| | 5 551.00 | V | 10.60 | 10.05 | -47.75 | -47.20 | -13.00 | 34.20 |
| | 7 400.50 | H | 11.82 | 11.62 | -47.40 | -47.20 | -13.00 | 34.20 |
| | 11 101.50 | V | 12.90 | 14.42 | -44.78 | -46.30 | -13.00 | 33.30 |

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 761.00 | V | 8.22 | 8.24 | -32.38 | -32.40 | -13.00 | 19.40 |
| | 5 641.50 | V | 10.60 | 10.18 | -47.72 | -47.30 | -13.00 | 34.30 |
| | 7 521.50 | V | 12.02 | 11.83 | -49.79 | -49.60 | -13.00 | 36.60 |
| | 11 282.50 | H | 12.90 | 14.49 | -44.31 | -45.90 | -13.00 | 32.90 |

Test mode : LTE Band 2
Frequency(㎒) : 1 909.3
Channel : 19193
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK | 3 818.50 | V | 8.31 | 8.21 | -36.30 | -36.20 | -13.00 | 23.20 |
| | 5 728.00 | V | 10.60 | 10.45 | -42.05 | -41.90 | -13.00 | 28.90 |
| | 7 637.50 | V | 12.14 | 11.92 | -49.22 | -49.00 | -13.00 | 36.00 |
| | 11 456.00 | H | 12.90 | 14.58 | -47.72 | -49.40 | -13.00 | 36.40 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

Test mode : Simultaneously
LTE Band 2
+ 2.4G WIFI 802.11g
Frequency(㎒) : 1 880.0 + 2 412
Channel : 18900, 1
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + OFDM | 1 348.09 | V | 5.14 | 4.84 | -18.51 | -18.20 | -13.00 | 5.20 |
| | 2 944.49 | V | 6.62 | 7.23 | -24.49 | -25.10 | -13.00 | 12.10 |
| | 3 759.00 | V | 8.21 | 8.24 | -35.88 | -35.90 | -13.00 | 22.90 |
| | 4 824.50 | V | 9.62 | 9.30 | -57.62 | -57.30 | -13.00 | 44.30 |
| | 5 638.50 | H | 10.60 | 10.18 | -50.12 | -49.70 | -13.00 | 36.70 |
| | 7 237.00 | V | 11.53 | 11.53 | -50.10 | -50.10 | -13.00 | 37.10 |

Test mode : Simultaneously
LTE Band 2
+ 5G WIFI 802.11a
Frequency(㎒) : 1 880.0 + 5 320
Channel : 18900, 64
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + OFDM | 1 562.55 | V | 6.52 | 5.21 | -18.71 | -17.40 | -13.00 | 4.40 |
| | 2 196.61 | V | 6.00 | 6.21 | -22.29 | -22.50 | -13.00 | 9.50 |
| | 3 759.00 | V | 8.21 | 8.24 | -34.07 | -34.10 | -13.00 | 21.10 |
| | 5 638.50 | V | 10.60 | 10.18 | -47.42 | -47.00 | -13.00 | 34.00 |
| | 10 640.46 | V | 12.90 | 14.19 | -52.81 | -54.10 | -13.00 | 41.10 |
| | 15 959.44 | V | 13.36 | 17.44 | -46.81 | -50.90 | -13.00 | 37.90 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

Test mode : Simultaneously
LTE Band 2 + BT
Frequency(㎒) : 1 880.0 + 2 480
Channel : 18900, 78
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK | 1 279.07 | V | 4.48 | 4.73 | -15.25 | -15.50 | -13.00 | 2.50 |
| | 3 759.00 | V | 8.21 | 8.24 | -33.88 | -33.90 | -13.00 | 20.90 |
| | 4 960.00 | H | 9.84 | 9.48 | -57.86 | -57.50 | -13.00 | 44.50 |
| | 5 639.00 | V | 10.60 | 10.18 | -49.52 | -49.10 | -13.00 | 36.10 |
| | 7 439.50 | V | 11.89 | 11.66 | -55.03 | -54.80 | -13.00 | 41.80 |

Test mode : Simultaneously
LTE Band 2 + BT
+ 2.4G WIFI 802.11g
Frequency(㎒) : 1 880.0 + 2 480
+ 2 412
Channel : 18900, 78, 1
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK + OFDM | 1 279.07 | H | 4.48 | 4.73 | -24.85 | -25.10 | -13.00 | 12.10 |
| | 1 347.59 | V | 5.14 | 4.83 | -18.20 | -17.90 | -13.00 | 4.90 |
| | 2 948.99 | V | 6.63 | 7.24 | -27.89 | -28.50 | -13.00 | 15.50 |
| | 3 759.00 | V | 8.21 | 8.24 | -35.68 | -35.70 | -13.00 | 22.70 |
| | 4 824.00 | V | 9.62 | 9.30 | -57.32 | -57.00 | -13.00 | 44.00 |
| | 4 959.50 | H | 9.84 | 9.48 | -57.36 | -57.00 | -13.00 | 44.00 |
| | 5 638.50 | V | 10.60 | 10.18 | -47.22 | -46.80 | -13.00 | 33.80 |
| | 7 236.50 | H | 11.53 | 11.53 | -52.80 | -52.80 | -13.00 | 39.80 |
| | 7 440.50 | V | 11.89 | 11.66 | -54.44 | -54.20 | -13.00 | 41.20 |

Note.
1. Limit Calculation(dBm)= 43 + 10log(P[Watts])

Test mode : Simultaneously
LTE Band 2 + BT
+ 5G WIFI 802.11a
Frequency(㎒) : 1 880.0 + 2 441
+ 5 320
Channel : 18900, 78, 64
Bandwidth(㎒) 1.4

| Mode | Frequency | Pol. | Antenna Gain | Cable loss | Substitute Level | Level | Limit | Margin |
|---|---|---|---|---|---|---|---|---|
| | [㎒] | [V/H] | [dBi] | [dB] | [dBm] | [dBm] | [dBm] | [dB] |
| QPSK + GFSK + OFDM | 1 279.03 | V | 4.48 | 4.73 | -19.45 | -19.70 | -13.00 | 6.70 |
| | 1 565.05 | V | 6.52 | 5.22 | -20.00 | -18.70 | -13.00 | 5.70 |
| | 2 199.11 | V | 6.00 | 6.22 | -22.08 | -22.30 | -13.00 | 9.30 |
| | 3 759.00 | V | 8.21 | 8.24 | -36.47 | -36.50 | -13.00 | 23.50 |
| | 4 960.50 | V | 9.84 | 9.48 | -54.96 | -54.60 | -13.00 | 41.60 |
| | 5 638.50 | H | 10.60 | 10.18 | -49.32 | -48.90 | -13.00 | 35.90 |
| | 10 640.46 | V | 12.90 | 14.19 | -53.21 | -54.50 | -13.00 | 41.50 |
| | 15 960.82 | V | 13.35 | 17.44 | -45.21 | -49.30 | -13.00 | 36.30 |

Note.
1. Limit Calculation(㏈m)= 43 + 10log(P[Watts])

## 7. Measurement equipment

| Equipment Name | Manufacturer | Model No. | Serial No. | Cal. Date | Next Cal. Date |
|---|---|---|---|---|---|
| Biconical VHF-UHF Broadband Antenna | SCHWARZBECK | VUBA9117 | 275 | 19.04.13 | 20.04.13 |
| Bilog Antenna | Teseq GmbH | CBL 6143A | 35039 | 19.05.21 | 21.05.21 |
| Horn Antenna | ETS.lindgren | 3117 | 00161083 | 19.09.18 | 20.09.18 |
| Horn Antenna | ETS.lindgren | 3117 | 161225 | 19.05.22 | 20.05.22 |
| Horn Antenna | Steatite Antennas | QMS-00225 | 17790 | 19.08.12 | 20.08.12 |
| Horn Antenna | ETS.lindgren | 3116 | 00086635 | 19.05.09 | 20.05.09 |
| High pass Filter | Wainwright Instruments GmbH | WHKX3.0/18G-12SS | 44 | 20.01.21 | 21.01.21 |
| High pass Filter | Wainwright Instruments GmbH | WHKX1.0/1.5S-10SS | 14 | 20.01.21 | 21.01.21 |
| Attenuator | Weinschel ENGINEERING | 10 | AJ1239 | 19.05.14 | 20.05.14 |
| Attenuator | API Inmet | 40AH2W-10 | 12 | 19.05.15 | 20.05.15 |
| Amplifier | SONOMA INSTRUMENT | 310N | 185799 | 20.01.21 | 21.01.21 |
| Amplifier | L-3 Narda-MITEQ | AMF-7D-01001800-22-10P | 2031196 | 20.02.12 | 21.02.12 |
| Amplifier | L-3 Narda-MITEQ | JS44-18004000-33-8P | 2000997 | 19.08.01 | 20.08.01 |
| Spectrum Analyzer | AGILENT | N9040B | MY57010132 | 19.07.31 | 20.07.31 |
| Signal Generator | R&S | SMB100A | 176206 | 20.01.21 | 21.01.21 |
| Widebnad Radio Communication Tester | R & S | CMW500 | 141780 | 19.04.18 | 20.04.18 |
| Antenna Mast | MATURO | EAS 1.5 | 042/8941211 | N/A | N/A |
| Antenna Mast | MATURO | EAS 1.5 | 043/8941211 | N/A | N/A |
| Turn Table | MATURO | TT 0.8 PF | 041/8941211 | N/A | N/A |
| Cable Assembly | Radiall | R286303620 | 1649.241 | N/A | N/A |
| Cable Assembly | Radiall | TESTPRO 3 | - | N/A | N/A |

**End of test report**