



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	Report No.: KR21-SRF0166-A Page (1) of (19)	
---	--	--

1. Client

- Name : Fibocom Wireless Inc.
- Address : 1101, Tower A, Building 6, Shenzhen International Innovation Valley,
Dashu 1st Rd, Nanshan, Shenzhen, China
- Date of Receipt : 2021-06-03

2. Use of Report : Class II Permissive change

3. Name of Product / Model : LTE module / NL668-AM-00

4. Manufacturer / Country of Origin : Fibocom Wireless Inc. / China

5. Host Name of Product / Model : Notebook PC / XE345XDA

6. Host Series Model : XE345XDA-MA1TM

7. FCC ID : ZMONL668AM00

8. Date of Test : 2021-07-30 to 2021-08-03

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

10. Test method used : FCC Part 2
 FCC Part 22 subpart H
 FCC Part 24 subpart E
 FCC Part 27 subpart C


11. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Kwonse Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)
-------------	--	---

2021-08-12

KCTL Inc.

As a test result of the sample which was submitted from the client, this report does not guarantee the whole product quality. This test report should not be used and copied without a written agreement by KCTL Inc.

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	Report No.: KR21-SRF0166-A Page (2) of (19)	
---	--	---

REPORT REVISION HISTORY

Date	Revision	Page No
2021-08-09	Originally issued	-
2021-08-12	Updated	1, 4, 12

This report shall not be reproduced except in full, without the written approval of KCTL Inc. This document may be altered or revised by KCTL Inc. personnel only, and shall be noted in the revision section of the document. Any alteration of this document not carried out by KCTL Inc. will constitute fraud and shall nullify the document. This test report is a general report that does not use the KOLAS accreditation mark and is not related to KS Q ISO/IEC 17025 and KOLAS accreditation.

Note. The report No. KR21-SRF0166 is superseded by the report No. KR21-SRF0166-A.

General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

CONTENTS

1. General information4

2. Device information4

 2.1. Additional WLAN/Bluetooth Module information5

 2.2. Simultaneous Transmission Configurations5

 2.3. Frequency/channel operations.....6

3. Summary of tests8

4. Measurement uncertainty8

5. Test results9

 5.1. Radiated Power (ERP/EIRP)9

 5.2. Radiated Spurious Emissions13

6. Measurement equipment19

1. General information

Client : Fibocom Wireless Inc.
 Address : 1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China
 Manufacturer : Fibocom Wireless Inc.
 Address : 1101, Tower A, Building 6, Shenzhen International Innovation Valley, Dashi 1st Rd, Nanshan, Shenzhen, China
 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
 CAB Identifier: KR0040
 ISED Number: 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : LTE Module
 Model : NL668-AM-00
 Host name of Product : Notebook PC
 Host Model : XE345XDA
 Host Series Model : XE345XDA-MA1TM
 Modulation technique : LTE_QPSK, 16QAM
 WCDMA_QPSK
 Power source : DC 7.72 V
 Antenna specification : LTE/WCDMA_FPCB Antenna
 Frequency range : LTE Band 2_1 850 MHz ~ 1 910 MHz
 LTE Band 4_1 710 MHz ~ 1 755 MHz
 LTE Band 5_824 MHz ~ 849 MHz
 LTE Band 12_699 MHz ~ 716 MHz
 LTE Band 66_1 710 MHz ~ 1 780 MHz
 LTE Band 71_663 MHz ~ 698 MHz
 WCDMA 1700_1 710 MHz ~ 1 755 MHz
 WCDMA 1900_1 850 MHz ~ 1 910 MHz
 Software version : Chrome OS
 Hardware version : REV5
 Test device serial No. : 1JKP91ZR600080W
 Operation temperature : 10 °C ~ 35 °C

Note.

1. In this report is based on original report FCC ID: ZMONL668AM00, additional simultaneous transmission measurement with intel module AX201D2W which is also integrated into this host was investigated in test report.

2. Host series model: the SKU model name is a 5-digit identification number that is added after the basic model name (8 digits), and serves as a memo to indicate detailed specifications/businesses.

2.1. Additional WLAN/Bluetooth Module information

Manufacturer	:	Intel Mobile Communications	
Model	:	AX201D2W	
FCC ID	:	PD9AX201D2	
Modulation technique	:	DSSS, OFDM, OFDMA	
Frequency range	:	802.11b/g/n/ax	2.4 GHz Band (2 400.0 – 2 483.5 MHz)
		802.11a/n/ac/ax	5.15 GHz Band (5 150.0 – 5 250.0 MHz)
			5.25 GHz Band (5 250.0 – 5 350.0 MHz)
			5.47 GHz Band (5 470.0 – 5 725.0 MHz)
			5.725 GHz Band (5 725.0 – 5 850.0 MHz)
		Bluetooth/Low Energy	2.4 GHz Band (2 400.0 – 2 483.5 MHz)
Antenna Information	:	Chain A (Aux): WLAN 2.4 GHz & 5 GHz and Bluetooth	
		Chain B (Main): WLAN 2.4 GHz & 5 GHz	

2.2. Simultaneous Transmission Configurations

No	Scenario
1	Bluetooth (Aux) + WWAN

Note.

- WWAN does not work simultaneously with WIFI.
- For the simultaneous mode the lowest margin condition among the channels and modes of each module (Cellular module NL668-AM-00, Unlicensed module AX201D2W) was selected for the test.

2.3. Frequency/channel operations

This device contains the following capabilities:

WCDMA 1700, WCDMA 1900, LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 12, LTE Band 66,
LTE Band 71**WCDMA 1700**

Ch.	Frequency (MHz)
1312	1712.4
1412	1732.4
1513	1752.6

Table 2.3.1.
RMC/HSDPA/HSUPA**WCDMA 1900**

Ch.	Frequency (MHz)
9262	1 852.4
9400	1 880.0
9538	1 907.6

Table 2.3.2.
RMC/HSDPA/HSUPA**LTE Band 2**

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

Table 2.3.3. 1.4M BW

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

Table 2.3.4. 3M BW

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

Table 2.3.5. 5M BW

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

Table 2.3.6. 10M BW

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

Table 2.3.7. 15M BW

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

Table 2.3.8. 20M BW

LTE Band 4

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

Table 2.3.9. 1.4M BW

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

Table 2.3.10. 3M BW

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

Table 2.3.11. 5M BW

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

Table 2.3.12. 10M BW

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

Table 2.3.13. 15M BW

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

Table 2.3.14. 20M BW

LTE Band 5

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

Table 2.3.15. 1.4M BW

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

Table 2.3.16. 3M BW

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

Table 2.3.17. 5M BW

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

Table 2.3.18. 10M BW

LTE Band 12

Ch.	Frequency (MHz)
23017	699.7
23095	707.5
23173	715.3

Table 2.3.19. 1.4M BW

Ch.	Frequency (MHz)
23025	700.5
23095	707.5
23165	714.5

Table 2.3.20. 3M BW

Ch.	Frequency (MHz)
23035	701.5
23095	707.5
23155	713.5

Table 2.3.21. 5M BW

Ch.	Frequency (MHz)
23060	704.0
23095	707.5
23130	711.0

Table 2.3.22. 10M BW

LTE Band 66

Ch.	Frequency (MHz)
131979	1 710.7
132322	1 745.0
132665	1 779.3

Table 2.3.23. 1.4M BW

Ch.	Frequency (MHz)
131987	1 711.5
132322	1 745.0
132657	1 778.5

Table 2.3.24. 3M BW

Ch.	Frequency (MHz)
131997	1 712.5
132322	1 745.0
132647	1 777.5

Table 2.3.25. 5M BW

Ch.	Frequency (MHz)
132022	1 715.0
132322	1 745.0
132622	1 775.0

Table 2.3.26. 10M BW

Ch.	Frequency (MHz)
132047	1 717.5
132322	1 745.0
132597	1 772.5

Table 2.3.27. 15M BW

Ch.	Frequency (MHz)
132072	1 720.0
132322	1 745.0
132572	1 770.0

Table 2.3.28. 20M BW

LTE Band 71

Ch.	Frequency (MHz)
133147	665.5
133297	680.5
133447	695.5

Table 2.3.29. 1.4M BW

Ch.	Frequency (MHz)
133172	668.0
133297	680.5
133422	693.0

Table 2.3.30. 3M BW

Ch.	Frequency (MHz)
133197	670.5
133297	680.5
133397	690.5

Table 2.3.31. 5M BW

Ch.	Frequency (MHz)
133222	673.0
133297	680.5
133372	688.0

Table 2.3.32. 10M BW

3. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
22.913(a)(5)	Effective Radiated Power	< 7 Watts max. ERP	Radiated	Pass
27.50(c)(10)		< 3 Watts max. ERP		Pass
24.232(c)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		Pass
27.50(d)(4)		< 1 Watts max. EIRP		Pass
2.1053 22.917(a) 24.238(a) 27.53(g)(h)	Radiated Spurious Emissions	< 43 + 10Log ₁₀ (P) dB for all out of band emissions		Pass

Notes:

- 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
- This is the C2PC test report to add host (Notebook PC), XE345XDA as documented in the C2PC letter. Because the change does not affect RF characteristics, therefore, only radiated spurious emission test was done against the worst case from the original module.
- Conducted power has been checked and it is same as original filing.

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 or 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.

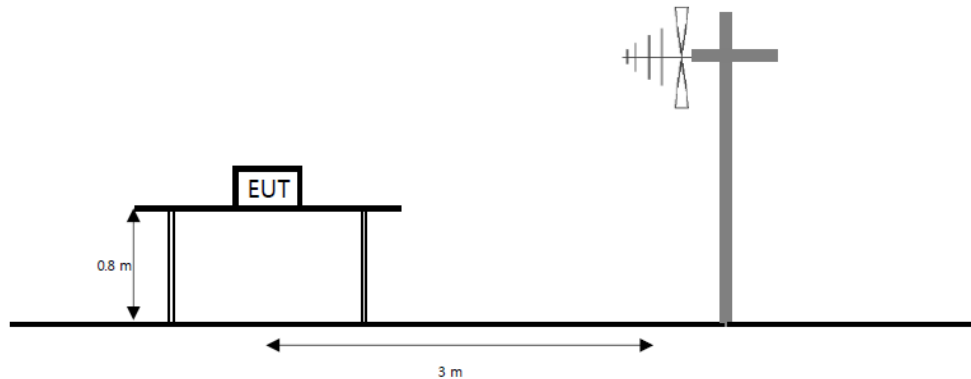
Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	Below 1 000 MHz	4.3 dB
	1 000 MHz ~ 18 000 MHz	3.8 dB
	Above 18 000 MHz	3.8 dB

5. Test results

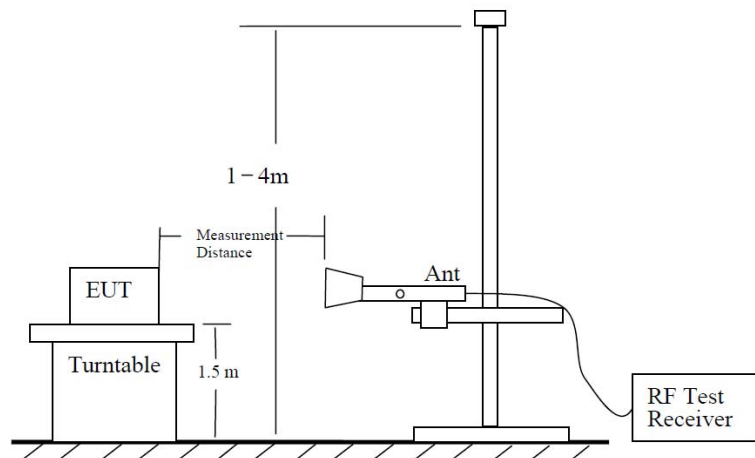
5.1. Radiated Power (ERP/EIRP)

Test setup

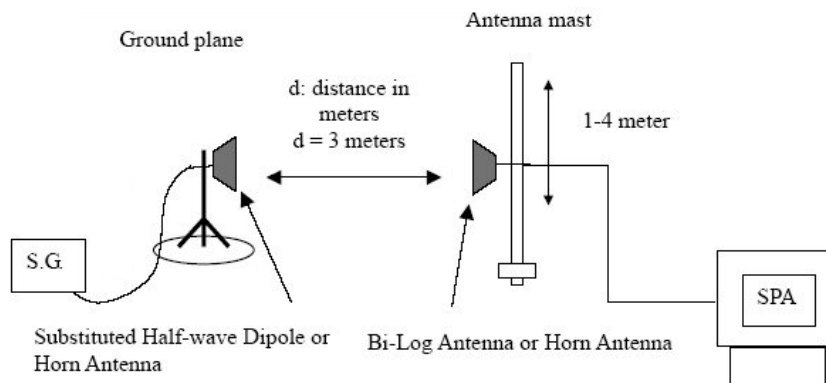
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.




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.



The diagram below shows the test setup for substituted method.



<p style="text-align: center;">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</p>	<p style="text-align: center;">Report No.: KR21-SRF0166-A Page (10) of (19)</p>	
--	---	---

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(c)(10), Portable stations (hand-held devices) in the 600 MHz uplink band and the 698-746 MHz band, and fixed and mobile stations in the 600 MHz uplink band are limited to 3 watts ERP.

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

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 $\geq 3 \times$ RBW.
- 3) SPAN = 2 \times to 3 \times the OBW.
- 4) Number of measurement points in sweep $\geq 2 \times$ span / RBW.
- 5) Sweep time :
 - 1) Auto couple, or
 - 2) $\geq [10 \times (\text{number of points in sweep}) \times (\text{transmission period})]$ 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.

<p align="center">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</p>	<p align="center">Report No.: KR21-SRF0166-A Page (11) of (19)</p>	
---	--	---

Notes:

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m 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 GHz below) or horn antenna (1 GHz above) connected to a signal generator.
The power is calculated by the following formula;

$$Pd(dBm) = Pg(dBm) - \text{Cable loss (dB)} + \text{Antenna gain (dB)}$$
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 dBm, 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: WCDMA 1900

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
RMC	9262	1 852.4	H	5.45	7.91	27.25	24.79	0.301

Test mode: WCDMA 1700

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
RMC	1312	1 712.4	H	5.79	7.61	25.36	23.54	0.226

Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
20	QPSK	1 880.0	H	5.39	7.96	26.01	23.44	0.221

Test mode: LTE Band 4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
20	QPSK	1 732.5	H	5.74	7.64	24.28	22.38	0.173

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
10	QPSK	836.5	V	-2.42	5.40	24.12	16.30	0.043

Test mode: LTE Band 12

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
10	QPSK	707.5	H	-2.54	4.89	23.56	16.13	0.041

Test mode: LTE Band 66

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
20	QPSK	1 770.0	H	5.65	7.76	26.01	23.90	0.245

Test mode: LTE Band 71

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
20	QPSK	680.5	H	-3.03	4.81	25.17	17.33	0.054

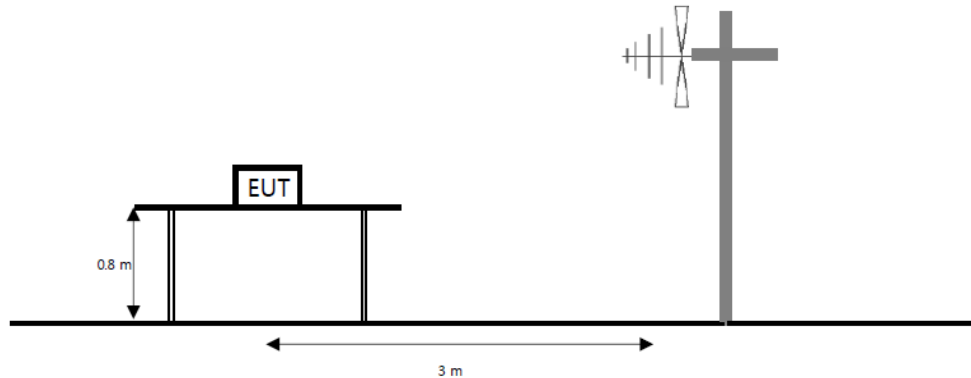
Note.

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

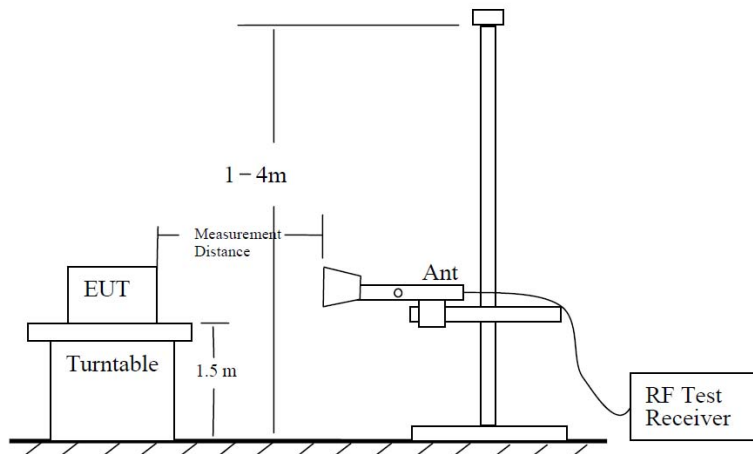
5.2. Radiated Spurious Emissions

Test setup

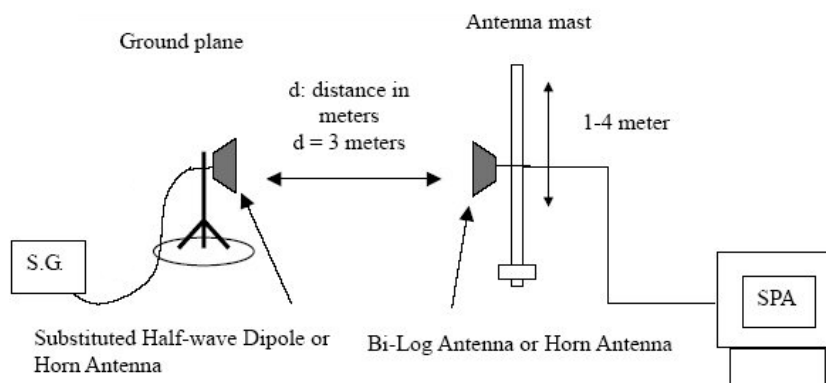
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.




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.



The diagram below shows the test setup for substituted method.



<p align="center">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</p>	<p align="center">Report No.: KR21-SRF0166-A Page (14) of (19)</p>	
---	--	---

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 $43 + 10\log(P_{\text{Watts}})$ dB.

According to §27.53(g), for operations in the 600 MHz band and the 698-746 MHz band, the power of any emission outside a licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, by at least $43 + 10 \log (P)$ dB.

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 $43 + 10\log(P_{\text{Watts}})$ dB.

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

For the narrowband spurious settings:

- 1) RBW = 1 kHz
- 2) VBW = 3 kHz
- 3) Detector = RMS
- 4) Trace mode = Max hold
- 5) Sweep speed slow enough to maintain measurement calibration.

<p>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</p>	<p>Report No.: KR21-SRF0166-A Page (15) of (19)</p>	
--	---	---

Notes:

1. On a test site, the EUT shall be placed at 80 cm or 1.5 m 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 GHz below) or horn antenna (1 GHz 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 dBm, 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 MHz)

Test mode : WCDMA 1900

Frequency(MHz) : 1 880.0

Channel : 9400

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 757.73	H	8.61	11.51	-50.90	-53.80	-13.00	40.80
	5 637.83	H	10.53	14.43	-47.40	-51.30	-13.00	38.30
	7 522.54	V	12.12	16.82	-47.00	-51.70	-13.00	38.70
	9 400.33	H	13.20	18.93	-42.57	-48.30	-13.00	35.30

Test mode : WCDMA 1700

Frequency(MHz) : 1 732.4

Channel : 1412

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 462.33	H	8.19	11.15	-48.84	-51.80	-13.00	38.80
	5 195.50	V	10.26	14.11	-49.15	-53.00	-13.00	40.00
	6 924.05	H	11.31	16.12	-46.49	-51.30	-13.00	38.30
	8 667.21	H	13.07	18.01	-45.06	-50.00	-13.00	37.00

Test mode : LTE Band 2

Frequency(MHz) : 1 880.0

Channel : 18900

Bandwidth(MHz) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 756.19	H	8.61	11.51	-49.30	-52.20	-13.00	39.20
	5 638.60	H	10.53	14.44	-42.29	-46.20	-13.00	33.20
	7 519.46	H	12.12	16.81	-43.71	-48.40	-13.00	35.40
	9 395.71	H	13.20	18.93	-41.57	-47.30	-13.00	34.30

Note.

1. E.R.P & E.I.R.P(dB m) = Substitute Level(dB) + Antenna gain(dB i&dB d) - C.L(Cable loss) (dB)

Test mode : LTE Band 4

Frequency(MHz) : 1 732.5

Channel : 20175

Bandwidth(MHz) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 482.33	H	8.25	11.19	-46.26	-49.20	-13.00	36.20
	5 223.96	V	10.28	13.94	-45.04	-48.70	-13.00	35.70
	6 968.67	H	11.36	16.16	-44.80	-49.60	-13.00	36.60
	8 717.22	V	13.09	18.24	-42.15	-47.30	-13.00	34.30

Test mode : LTE Band 5

Frequency(MHz) : 836.5

Channel : 20525

Bandwidth(MHz) : 5

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 668.34	H	5.90	7.50	-54.80	-56.40	-13.00	43.40
	2 499.15	V	6.20	9.21	-50.09	-53.10	-13.00	40.10
	3 336.53	H	7.84	10.90	-49.34	-52.40	-13.00	39.40
	4 165.29	V	8.80	12.16	-47.64	-51.00	-13.00	38.00

Test mode : LTE Band 12

Frequency(MHz) : 707.5

Channel : 23095

Bandwidth(MHz) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 410.69	V	5.71	6.93	-54.98	-56.20	-13.00	43.20
	2 122.52	H	5.37	8.44	-43.93	-47.00	-13.00	34.00
	2 829.84	H	6.66	9.88	-49.98	-53.20	-13.00	40.20
	3 535.93	H	8.34	11.30	-49.34	-52.30	-13.00	39.30

Note.

1. E.R.P & E.I.R.P(dB m) = Substitute Level(dB) + Antenna gain(dB i&dB d) - C.L(Cable loss) (dB)

Test mode : LTE Band 66

Frequency(MHz) : 1 745.0

Channel : 132322

Bandwidth(MHz) : 3

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 492.33	H	8.28	11.21	-45.47	-48.40	-13.00	35.40
	5 238.58	V	10.29	13.96	-45.53	-49.20	-13.00	36.20
	6 985.59	V	11.38	16.18	-45.40	-50.20	-13.00	37.20
	8 729.52	H	13.09	18.25	-41.64	-46.80	-13.00	33.80

Test mode : LTE Band 71

Frequency(MHz) : 680.5

Channel : 133297

Bandwidth(MHz) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 375.40	H	5.48	6.84	-54.04	-55.40	-13.00	42.40
	2 060.98	H	5.23	8.31	-50.52	-53.60	-13.00	40.60
	2 754.76	V	6.56	9.73	-50.73	-53.90	-13.00	40.90
	3 436.64	V	8.12	11.10	-49.22	-52.20	-13.00	39.20


Spurious Emission for Simultaneous Condition

Case	WWAN	Bluetooth
Mode	LTE Band 71	EDR (2DH5)
Channel	133297	39
Frequency(MHz)	680.5	2441
Bandwidth(MHz)	15	-

Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
4 041.59	H	8.88	11.93	-49.35	-52.40	-13.00	39.40
4 883.17	V	9.75	13.77	-47.78	-51.80	-13.00	38.80

Note.

1. E.R.P & E.I.R.P(dB m) = Substitute Level(dB) + Antenna gain(dB i&dB d) - C.L(Cable loss) (dB)
2. For the simultaneous mode the lowest margin condition among the channels and modes were selected for the test.

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	Report No.: KR21-SRF0166-A Page (19) of (19)	
---	---	---

6. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	KEYSIGHT	N9040B	US56050101	22.07.28
Vector Signal Generator	R&S	SMBV100A	257566	22.07.09
Signal Generator	R&S	SMB100A	176206	22.01.20
Wideband Radio Communication Tester	R&S	CMW500	141780	22.04.01
Amplifier	L-3 Narda-MITEQ	AFS5-00101800-25-S-5	2054570	22.05.10
Broadband Amplifier	SONOMA INSTRUMENT	310N	186280	22.04.01
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	22.04.09
Bilog Antenna	ETS.LINDGREN	3143B	00228420	21.09.30
Horn Antenna	ETS.lindgren	3117	161225	22.05.11
Horn Antenna	ETS.LINDGREN	3117	00227509	21.09.23
High pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	21.08.20
High pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	21.08.20
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
Cable Assembly	Radiall	R286303620	1649.241	N/A
Cable Assembly	Radiall	TESTPRO 3	N/A	N/A

End of test report