



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.: KR22-SRF0012 Page (1) of (23)	
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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 : 2022-01-11
2. Use of Report : Class II Permissive change
3. Name of Product / Model : LTE module / L850-GL
4. Manufacturer / Country of Origin : Fibocom Wireless Inc. / China
5. Host Name of Product / Model : Notebook PC / XE345XDA
6. FCC ID : ZMOL850GLD
7. Date of Test : 2022-02-03 to 2022-02-06
8. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
 (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)
9. Test method used : FCC Part 2
 FCC Part 22 subpart H
 FCC Part 24 subpart E
 FCC Part 27 subpart C
10. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Kwonse Kim (Signature)	Technical Manager Name : Seungyong Kim (Signature)
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2022-02-10

KCTL Inc.

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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.: KR22-SRF0012 Page (2) of (23)	
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REPORT REVISION HISTORY

Date	Revision	Page No
2022-02-10	Originally issued	-

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General remarks for test reports

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

(may be required by the product standard or client)

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

Procedure number, issue date and title:

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

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

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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 : L850-GL
 Host name of Product : Notebook PC
 Host Model : XE345XDA
 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 7 : 2 500 MHz ~ 2 570 MHz
 LTE Band 12 : 699 MHz ~ 716 MHz
 LTE Band 13 : 777 MHz ~ 787 MHz
 LTE Band 38 : 2 570 MHz ~ 2 620 MHz
 LTE Band 66 : 1 710 MHz ~ 1 780 MHz
 WCDMA 850 : 824 MHz ~ 849 MHz
 WCDMA 1900 : 1 850 MHz ~ 1 910 MHz
 Software version : Chrome OS
 Hardware version : REV5
 Test device serial No. : 1JKN91ZR600022M, 1JKP91ZR600093W, 1JKN91ZR600017E

Note.

1. In this report is based on original report FCC ID: ZMOL850GLD additional simultaneous transmission measurement with intel module AX201D2W which is also integrated into this host was investigated in test report.

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 L850-GL, Unlicensed module AX201D2W) was selected for the test.

2.3. Frequency/channel operations

This device contains the following capabilities:

WCDMA 850, WCDMA 1900, LTE Band 2, LTE Band 4, LTE Band 5, LTE Band 7, LTE Band 12, LTE Band 13, LTE Band 38, LTE Band 66

WCDMA 850

Ch.	Frequency (MHz)
4132	826.4
4183	836.6
4233	846.6

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 7

Ch.	Frequency (MHz)
20775	2 502.5
21100	2 535.0
21425	2 567.5

Table 2.3.19. 5M BW

Ch.	Frequency (MHz)
20800	2 505.0
21100	2 535.0
21400	2 565.0

Table 2.3.20. 10M BW

Ch.	Frequency (MHz)
20825	2 507.5
21100	2 535.0
21375	2 562.5

Table 2.3.21. 15M BW

Ch.	Frequency (MHz)
20850	2 510.0
21100	2 535.0
21350	2 560.0

Table 2.3.22. 20M BW

LTE Band 12

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

Table 2.3.23. 1.4M BW

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

Table 2.3.24. 3M BW

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

Table 2.3.25. 5M BW

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

Table 2.3.26. 10M BW

LTE Band 13

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

Table 2.3.27 5M BW

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

Table 2.3.28. 10M BW

LTE Band 38

Ch.	Frequency (MHz)
37775	2 572.5
38000	2 595.0
38225	2 617.5

Table 2.3.29. 1.4M BW

Ch.	Frequency (MHz)
37800	2 575.0
38000	2 595.0
38200	2 615.0

Table 2.3.30. 3M BW

Ch.	Frequency (MHz)
37825	2 577.5
38000	2 595.0
38175	2 612.5

Table 2.3.31. 5M BW

Ch.	Frequency (MHz)
37850	2 580.0
38000	2 595.0
38150	2 610.0

Table 2.3.32. 10M BW

LTE Band 66

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

Table 2.3.33. 1.4M BW

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

Table 2.3.34. 3M BW

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

Table 2.3.35. 5M BW

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

Table 2.3.36. 10M BW

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

Table 2.3.37. 15M BW

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

Table 2.3.38. 20M 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(b)(c)(10)		< 3 Watts max. ERP		Pass
24.232(c) 27.50(h)(2)	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(f),(g),(h), (m)(4)	Radiated Spurious Emissions	< 43 + 10Log ₁₀ (P) dB for all out of band emissions, <-70 dBW/MHz EIRP- Wideband, <-80 dBW/MHz EIRP- Narrowband, Undesirable emissions must meet the limits detailed in 27.53(m).		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.

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.

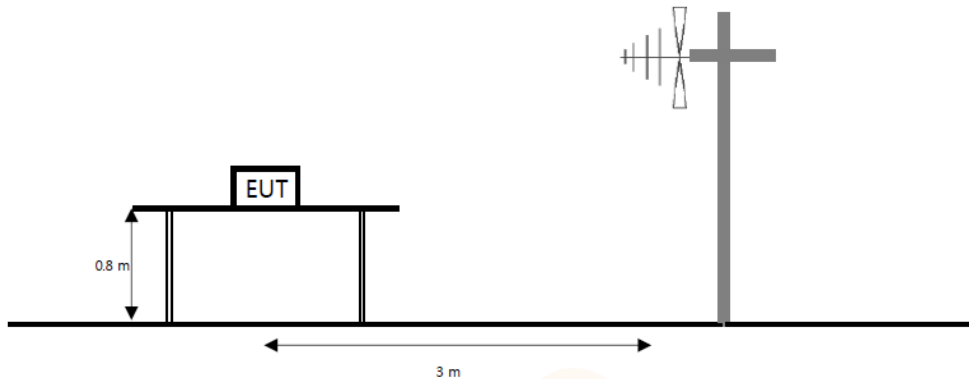
Parameter	Expanded uncertainty (±)	
Radiated spurious emissions	Below 1 000 MHz	4.3 dB
	1 000 MHz ~ 18 000 MHz	3.8 dB
	Above 18 000 MHz	5.8 dB

5. Test results

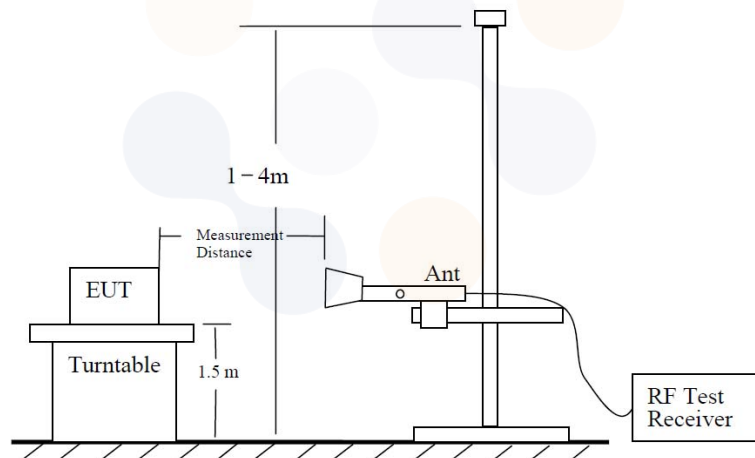
5.1. Radiated Power (ERP/EIRP)

Test setup

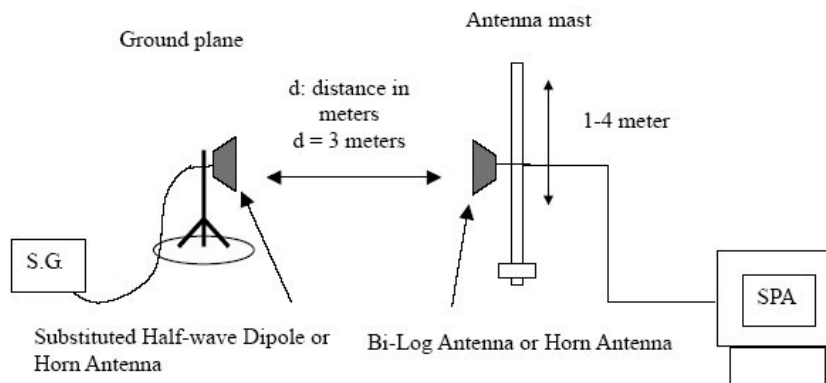
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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.



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 MHz, 776-768 MHz, and 776-768 MHz bands are limited to 3 watts ERP.

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.

According to §27.50(h)(2), the Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

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

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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 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 850

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
RMC	4132	836.40	V	-2.41	5.12	28.26	20.73	0.118

Test mode: WCDMA 1900

Mode	Channel	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
RMC	9538	1 907.60	H	5.32	7.84	25.45	22.93	0.196

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	1 860.00	H	5.44	7.70	25.41	23.15	0.207

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	1 720.00	H	5.77	7.40	22.47	20.84	0.121

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	844.00	V	-2.87	5.16	27.88	19.85	0.097

Test mode: LTE Band 7

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
15	QPSK	2 535.00	H	6.25	8.99	25.71	22.97	0.198

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	707.50	V	-2.55	4.60	25.70	18.55	0.072

Test mode: LTE Band 13

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
10	QPSK	782.00	V	-1.65	4.82	27.26	20.79	0.120

Note.

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

Test mode: LTE Band 38

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
20	QPSK	2 610.00	H	6.35	9.12	25.23	22.46	0.176

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	1 745.00	H	5.71	7.42	22.57	20.86	0.122

Note.

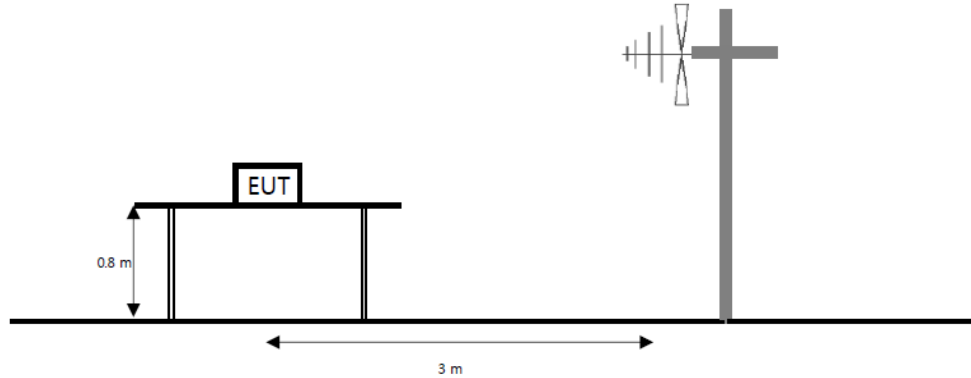
1. E.R.P & E.I.R.P(dBm) = Substitute Level(dB) + Antenna gain(dBd & dBi) - C.L(Cable loss) (dB)



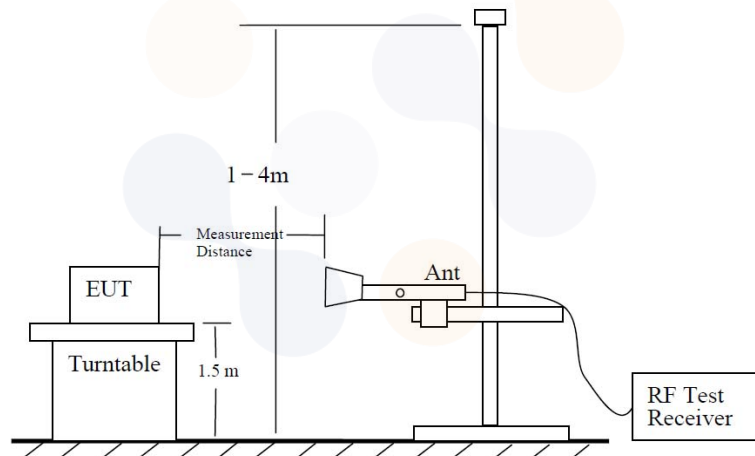
5.2. Radiated Spurious Emissions

Test setup

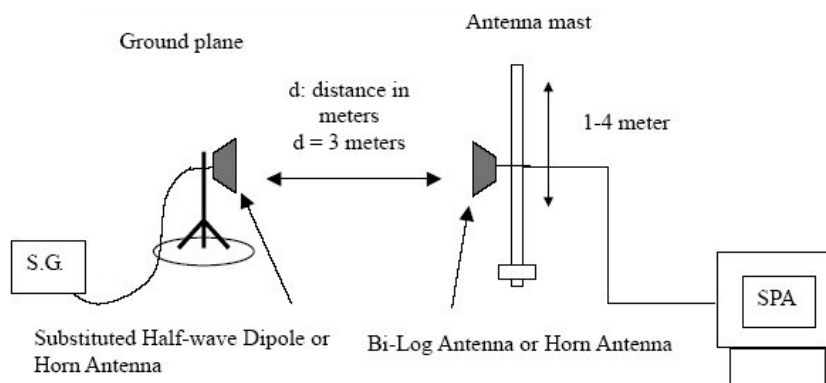
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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.



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(f), for operations in the 746-758 MHz, 775-788 MHz, and 805-806 MHz bands, emissions in the band 1559-1610 MHz shall be limited to -70 dBW/MHz equivalent isotropically radiated power(EIRP) for wideband signals, and -80 dBW EIRP for discrete emissions of less than 700 Hz bandwidth. For the purpose of equipment authorization, a transmitter shall be tested with an antenna that is representative of the type that will be used with the equipment in normal operation.

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

According to §27.53(m)(4), the minimum permissible attenuation level of any spurious emission is $55 + 10\log(P_{\text{[Watts]}})$ 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.

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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 850

Frequency(MHz) : 826.4

Channel : 4132

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	1 652.75	V	5.93	7.19	-58.94	-60.20	-30.00	30.20
	2 483.15	V	6.16	8.91	-53.35	-56.10	-30.00	26.10
	3 305.76	V	7.76	10.57	-51.69	-54.50	-30.00	24.50
	4 131.24	V	8.82	11.95	-49.47	-52.60	-30.00	22.60

Test mode : WCDMA 1900

Frequency(MHz) : 1 907.6

Channel : 9538

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
RMC	3 816.42	V	8.68	11.63	-53.05	-56.00	-13.00	43.00
	5 719.90	H	10.54	13.92	-51.42	-54.80	-13.00	41.80
	7 634.24	V	12.21	16.40	-47.81	-52.00	-13.00	39.00
	9 542.83	V	13.19	18.36	-46.53	-51.70	-13.00	38.70

Test mode : LTE Band 2

Frequency(MHz) : 1 900.0

Channel : 19100

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	3 777.48	H	8.63	11.28	-52.85	-55.50	-13.00	42.50
	4 999.87	V	10.10	13.14	-45.46	-48.50	-13.00	35.50
	5 673.31	V	10.53	13.89	-34.84	-38.20	-13.00	25.20
	7 564.66	H	12.15	16.23	-38.92	-43.00	-13.00	30.00

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) : 1 745.0

Channel : 20300

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	3 490.23	H	8.27	10.94	-46.53	-49.20	-13.00	36.20
	5 235.41	V	10.29	13.39	-35.10	-38.20	-13.00	25.20
	6 980.60	H	11.38	15.63	-28.85	-33.10	-13.00	20.10
	10 470.96	H	13.10	19.28	-31.42	-37.60	-13.00	24.60

Test mode : LTE Band 5

Frequency(MHz) : 836.5

Channel : 20525

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	1 681.88	V	5.86	7.27	-52.29	-53.70	-13.00	40.70
	2 522.54	H	6.23	8.96	-45.17	-47.90	-13.00	34.90
	3 365.25	V	7.92	10.69	-53.13	-55.90	-13.00	42.90
	4 984.61	H	10.05	13.12	-46.43	-49.50	-13.00	36.50

Test mode : LTE Band 7

Frequency(MHz) : 2 560.0

Channel : 21350

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	5 102.00	H	10.18	13.45	-48.53	-51.80	-25.00	26.80
	7 653.39	H	12.22	16.42	-45.60	-49.80	-25.00	24.80
	10 204.14	V	13.10	19.05	-41.35	-47.30	-25.00	22.30
	15 306.27	V	14.22	22.92	-26.20	-34.90	-25.00	9.90

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 12

Frequency(MHz) : 704.0

Channel : 23060

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	1 399.20	H	5.63	6.66	-55.57	-56.60	-13.00	43.60
	2 098.72	H	5.32	8.16	-53.86	-56.70	-13.00	43.70
	2 798.25	H	6.62	9.54	-53.48	-56.40	-13.00	43.40
	3 496.95	V	8.29	10.95	-53.34	-56.00	-13.00	43.00

Test mode : LTE Band 13

Frequency(MHz) : 782.0

Channel : 23230

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	1 572.75	V	6.13	7.01	-57.52	-58.40	-50.00	8.40
	2 360.07	V	5.89	8.67	-54.02	-56.80	-13.00	43.80
	3 148.21	V	7.31	10.25	-52.96	-55.90	-13.00	42.90
	3 935.54	V	8.82	11.62	-51.00	-53.80	-13.00	40.80

Test mode : LTE Band 13 (1 559 MHz – 1 610 MHz)

Frequency(MHz) : 782.0

Channel : 23230

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	1 574.02	H	6.12	7.01	-58.41	-59.30	-50.00	9.30

Note.

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

Limit Calculation of wide-band (dBm/MHz) = -70dBW/MHz (-40 dBm/MHz)

Limit Calculation of narrow-band (dBm) = -80dBW (-50dBm)

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

3. The narrowband limit is applied because any emissions are not detected within 1 559 MHz - 1 610 MHz.

Test mode : LTE Band 38

Frequency(MHz) : 2 610.0

Channel : 38150

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	5 202.22	H	10.26	13.34	-45.12	-48.20	-25.00	23.20
	7 803.40	V	12.34	16.67	-38.07	-42.40	-25.00	17.40
	10 398.82	V	13.10	19.09	-46.01	-52.00	-25.00	27.00
	12 998.72	H	13.50	21.44	-42.26	-50.20	-25.00	25.20

Test mode : LTE Band 66

Frequency(MHz) : 1 745.0

Channel : 132322

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	3 472.36	V	8.22	10.90	-45.62	-48.30	-13.00	35.30
	5 207.97	H	10.27	13.35	-43.92	-47.00	-13.00	34.00
	6 944.21	H	11.33	15.60	-29.93	-34.20	-13.00	21.20
	10 416.70	V	13.10	19.23	-26.97	-33.10	-13.00	20.10

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)

Spurious Emission for Simultaneous Condition

Case	WWAN	Bluetooth
Mode	LTE B38	EDR (2DH5)
Channel	38150	39
Frequency(MHz)	2 610	2 441
Bandwidth(MHz)	20	-

Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
1 961.69	V	5.19	7.91	-62.78	-65.50	-25.00	40.50
2 121.06	V	5.37	8.20	-48.37	-51.20	-25.00	26.20
2 281.19	V	5.72	8.50	-33.22	-36.00	-25.00	11.00
5 202.22	V	10.26	13.34	-51.02	-54.10	-25.00	29.10
7 803.40	H	12.34	16.67	-46.57	-50.90	-25.00	25.90

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.

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6. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	AGILENT	N9040B	MY57010132	22.12.31
Signal Generator	R&S	SMB100A	176206	23.01.19
Wideband Radio Communication Tester	R&S	CMW500	141780	22.04.01
Biconical VHF-UHF Broadband Antenna	SCHWARZBECK	VUBA9117	275	22.04.09
Bilog Antenna	ETS.LINDGREN	3143B	00228420	23.09.28
Horn Antenna	ETS.LINDGREN	3117	161225	22.05.11
Horn Antenna	ETS.LINDGREN	3117	00227509	22.09.27
Horn Antenna	ETS.lindgren	3116	00086632	23.01.25
Horn Antenna	ETS.lindgren	3116	00086635	22.05.17
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	22.08.20
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	22.08.20
Band Reject Filter	Wainwright Instruments GmbH	WRCTF2402/2480-2400/2483.5-35/12+9SS	43	23.01.19
Broadband Amplifier	SONOMA INSTRUMENT	315	300314	23.01.19
Amplifier	LTC MICROWAVE	LLA01185522Q-B	139	22.07.19
Amplifier	L-3 Narda-MITEQ	JS44-18004000-33-8P	2000997	22.07.29
Antenna Stand	innco systems GmbH	AS1500-EP-10kg	N/A	-
Antenna Stand	innco systems GmbH	AS1500-EP-10kg	N/A	-
Compact Table	innco systems GmbH	CT1000	N/A	-
Cable Assembly	Radiall	R286303620	1649.241	-
Cable Assembly	Radiall	TESTPRO 3	-	-

End of test report