



TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-5008-1021 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR24-SRF0129-A Page (1) of (33)	KCTL
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1. Client

- Name : TYMICT
- Address : 222-12, Sangseo-ri, Useong-myon, Gongju-si, Chungcheongnam-do, Republic of Korea
- Date of Receipt : 2024-08-23

2. Use of Report : Certification

3. Name of Product / Model : TBOX / TBX4

4. Manufacturer / Country of Origin : TYMICT / Korea

5. FCC ID : 2A9Q6-TBX4

6. IC Certificate No. : 29802-TBX4

7. Date of Test : 2024-09-09 to 2024-09-13

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 / RSS-Gen Issue 5
 FCC Part 22 subpart H / RSS-132 Issue 4
 FCC Part 24 subpart E / RSS-133 Issue 7
 FCC Part 27 subpart C / RSS-130 Issue 2, RSS-139 Issue 4

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

Affirmation	Tested by Name : Hosung Lee (Signature)	Technical Manager Name : Heesu Ahn (Signature)
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2024-10-14

Eurofins KCTL Co.,Ltd.

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 Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2024-09-30	Originally issued	-
2024-10-14	Updated	9, 19

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Note. The report No. KR24-SRF0129 is superseded by the report No. KR24-SRF0129-A.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

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1. General information

Client : TYMICT
 Address : 222-12, Sangseo-ri, Useong-myon, Gongju-si, Chungcheongnam-do, Republic of Korea
 Manufacturer : TYMICT
 Address : 222-12, Sangseo-ri, Useong-myon, Gongju-si, Chungcheongnam-do, Republic of Korea
 Laboratory : Eurofins KCTL Co.,Ltd.
 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 : TBOX
 Model : TBX4
 Modulation technique : LTE_QPSK, 16QAM
 Power source : DC 12 V
 Antenna specification : LTE_Chip Antenna
 Frequency range : LTE Band 2_1 850.7 MHz ~ 1 909.3 MHz
 LTE Band 4_1 710.7 MHz ~ 1 754.3 MHz
 LTE Band 5_824.7 MHz ~ 848.3 MHz
 LTE Band 12_699.7 MHz ~ 715.3 MHz
 LTE Band 13_779.5 MHz ~ 784.5 MHz
 LTE Band 14_790.5 MHz ~ 800.5 MHz
 LTE Band 66_1 710.7 MHz ~ 1 779.3 MHz
 LTE Band 71_665.5 MHz ~ 695.5 MHz
 Software version : V201
 Hardware version : V303
 Operation temperature : -30 °C ~ 85 °C
 Test device serial No. : T202243500040004

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
-	-	-	-	-	-

2.2. Frequency/channel operations

This device contains the following capabilities:
 LTE Band (2/4/5/12/13/14/66/71)

LTE Band 2

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

Table 2.2.1. 1.4M BW

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

Table 2.2.2. 3M BW

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

Table 2.2.3. 5M BW

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

Table 2.2.4. 10M BW

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

Table 2.2.5. 15M BW

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

Table 2.2.6. 20M BW

LTE Band 4

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

Table 2.2.7. 1.4M BW

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

Table 2.2.8. 3M BW

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

Table 2.2.9. 5M BW

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

Table 2.2.10. 10M BW

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

Table 2.2.11. 15M BW

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

Table 2.2.12. 20M BW

LTE Band 5

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

Table 2.2.13. 1.4M BW

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

Table 2.2.14. 3M BW

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

Table 2.2.15. 5M BW

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

Table 2.2.16. 10M BW

LTE Band 12

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

Table 2.2.17. 1.4M BW

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

Table 2.2.18. 3M BW

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

Table 2.2.19. 5M BW

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

Table 2.2.20. 10M BW

LTE Band 13

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

Table 2.2.21. 5M BW

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

Table 2.2.22. 10M BW

LTE Band 66

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

Table 2.2.25. 1.4M BW

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

Table 2.2.26. 3M BW

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

Table 2.2.27. 5M BW

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

Table 2.2.28. 10M BW

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

Table 2.2.29. 15M BW

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

Table 2.2.30. 20M BW

LTE Band 71

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

Table 2.2.31. 5M BW

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

Table 2.2.32. 10M BW

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

Table 2.2.33. 15M BW

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

Table 2.2.34. 20M BW

Notes:

1. The LTE band 71 are not supported in Canada.

2.3. RF power setting in TEST SW

Mode	Frequency [MHz]	RF Power setting value	Test Software
Band 2	1 850.7	Default	-
	1 880.0		
	1 909.3		
Band 4	1 710.7		
	1 732.5		
	1 754.3		
Band 5	824.7		
	836.5		
	848.3		
	699.7		
Band 12	707.5		
	715.3		
Band 13	779.5		
	782.0		
	784.5		
Band 66	1 710.7		
	1 745.0		
	1 779.3		
Band 71	665.5		
	680.5		
	695.5		

3. Maximum ERP/EIRP power

LTE Band 2

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 2	1 850.7 ~ 1 909.3	1M14G7D	25.20	0.331
		1M13W7D	24.29	0.268
	1 851.5 ~ 1 908.5	2M75G7D	25.15	0.327
		2M77W7D	24.17	0.261
	1 852.5 ~ 1 907.5	4M53G7D	25.35	0.343
		4M54W7D	24.13	0.259
	1 855.0 ~ 1 905.0	9M05G7D	25.13	0.326
		9M04W7D	24.27	0.267
	1 857.5 ~ 1 902.5	13M5G7D	24.54	0.285
		13M5W7D	23.41	0.219
	1 860.0 ~ 1 900.0	17M9G7D	24.85	0.305
		17M9W7D	23.57	0.227

LTE Band 4

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 4	1 710.7 ~ 1 754.3	1M14G7D	25.56	0.360
		1M13W7D	24.00	0.251
	1 711.5 ~ 1 753.5	2M75G7D	25.11	0.324
		2M76W7D	24.14	0.259
	1 712.5 ~ 1 752.5	4M53G7D	24.95	0.313
		4M54W7D	24.17	0.261
	1 715.0 ~ 1 750.0	9M04G7D	25.21	0.332
		9M04W7D	24.10	0.257
	1 717.5 ~ 1 747.5	13M5G7D	25.36	0.343
		13M5W7D	23.93	0.247
	1 720.0 ~ 1 745.0	17M9G7D	24.89	0.308
		17M9W7D	24.04	0.253

LTE Band 5

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 5	824.7 ~ 848.3	1M14G7D	24.30	0.269
		1M13W7D	23.24	0.211
	825.5 ~ 847.5	2M75G7D	24.15	0.260
		2M76W7D	23.15	0.207
	826.5 ~ 846.5	4M53G7D	23.95	0.249
		4M53W7D	23.02	0.200
	829.0 ~ 844.0	9M04G7D	24.42	0.277
		9M04W7D	23.45	0.221

LTE Band 12

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 12	699.7 ~ 715.3	1M14G7D	22.49	0.178
		1M13W7D	21.25	0.133
	700.5 ~ 714.5	2M75G7D	22.41	0.174
		2M76W7D	21.39	0.138
	701.5 ~ 713.5	4M53G7D	22.25	0.168
		4M54W7D	21.19	0.132
	704.0 ~ 711.0	9M05G7D	22.24	0.167
		9M04W7D	21.26	0.134

LTE Band 13

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 13	779.5 ~ 784.5	4M53G7D	24.04	0.254
		4M54W7D	23.54	0.226
	782.0	9M03G7D	24.11	0.257
		9M04W7D	22.98	0.199

LTE Band 66

Mode	Tx frequency (MHz)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 66	1 710.7 ~ 1 779.3	1M14G7D	26.27	0.423
		1M13W7D	25.01	0.317
	1 711.5 ~ 1 778.5	2M75G7D	26.09	0.406
		2M77W7D	24.92	0.310
	1 712.5 ~ 1 777.5	4M53G7D	26.11	0.409
		4M54W7D	25.14	0.327
	1 715.0 ~ 1 775.0	9M04G7D	26.10	0.407
		9M04W7D	24.97	0.314
	1 717.5 ~ 1 772.5	13M5G7D	26.10	0.407
		13M5W7D	24.94	0.312
	1 720.0 ~ 1 770.0	17M9G7D	26.42	0.438
		17M9W7D	25.97	0.395

LTE Band 71

Mode	Tx frequency (MHz)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 71	665.5 ~ 695.5	4M52G7D	22.77	0.189
		4M53W7D	22.40	0.174
	668.0 ~ 693.0	9M03G7D	22.25	0.168
		9M04W7D	21.24	0.133
	670.5 ~ 690.5	13M5G7D	22.38	0.173
		13M5W7D	21.39	0.138
	673.0 ~ 688.0	17M9G7D	21.84	0.153
		17M9W7D	21.05	0.127

4. Summary of tests

FCC Part section(s)	RSS Section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046	RSS-130(4.6) RSS-132(5.4) RSS-133(4.1) RSS-139(5.5)	Conducted Output Power	N/A	Conducted	N/T ¹⁾
2.1049	RSS-Gen(6.7) RSS-132(2.3)	Occupied Bandwidth & 26 dB Bandwidth	N/A		N/T ¹⁾
2.1051 22.917(a) 24.238(a) 27.53(c),(f),(g),(h)	RSS-130(4.7) RSS-132(5.5) RSS-133(6.5) RSS-139(5.6)	Band Edge Emissions at Antenna Terminal	<43 + 10Log ₁₀ (P) dB for all out of band emissions, <65 + 10Log ₁₀ (P) dB		N/T ¹⁾
		Spurious Emissions at Antenna Terminal			N/T ¹⁾
24.232(d) 27.50(d)(5)	RSS-133(6.4) RSS-139(5.5)	Peak to Average Power Ratio	< 13 dB		N/T ¹⁾
2.1055 22.355	RSS-132(5.3) RSS-133(6.3)	Frequency stability	< 2.5 ppm		N/T ¹⁾
24.235	RSS-130(4.5)		Emission must remain in band		
27.54	RSS-139(5.4)				
22.913(a)(5)	RSS-132(5.4)	Effective Radiated Power	< 7 Watts max. ERP (IC : Mobile < 7 Watts / Portable < 3 Watts)	Radiated	Pass
27.50(b)(10) 27.50(c)(10)	RSS-130(4.6)		< 3 Watts max. ERP		Pass
24.232(c)	RSS-133(5.5)	Equivalent Isotropic Radiated Power	< 2 Watts max. EIRP		Pass
27.50(d)(4)	RSS-139(5.5)		< 1 Watts max. EIRP		Pass
2.1053 22.917(a) 24.238(a) 27.53(c),(f),(g),(h)	RSS-130(4.7) RSS-132(5.5) RSS-133(5.6) RSS-139(5.6)	Radiated Spurious Emissions	<43 + 10Log ₁₀ (P) dB for all out of band emissions, <-70 dBW/MHz EIRP - Wideband <-80 dBW/MHz EIRP- Narrowband		Pass

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

- These test items were performed by the certified module.
 (FCC ID: XMR201808EC25AF, IC: 10224A-2018EC25AF)
 (Part 22H)Test Report No. R1806A0301-R1V1 issued on July 31, 2018 by TA Technology (Shanghai) Co., Ltd.)
 (Part 24E)Test Report No. R1806A0301-R2V1 issued on July 31, 2018 by TA Technology (Shanghai) Co., Ltd.)
 (Part 27C)Test Report No. R1806A0301-R3V1 issued on July 31, 2018 by TA Technology (Shanghai) Co., Ltd.)
- 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

4.1. Worst case orientation

1. All modes of operation were investigated and the worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations in the test data.
2. All final radiated testing was performed with the EUT in worst case orientation.
3. For LTE Band 2, 4, 66 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. For LTE Band 5, 12, 13 and 71 The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z. It was determined that **Y** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **Y** orientation.

Test condition	LTE Band	Modulation	Bandwidth (MHz)	RB size	RB offset
Radiated	B2	QPSK	5	1	0, 25, 49
	B4		1.4	1	0, 3, 5
	B5		10	1	0, 3, 5
	B12		1.4	1	0, 3, 5
	B13		10	1	0, 25, 49
	B66		20	1	0, 3, 5
	B71		5	1	0, 50, 99

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 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.

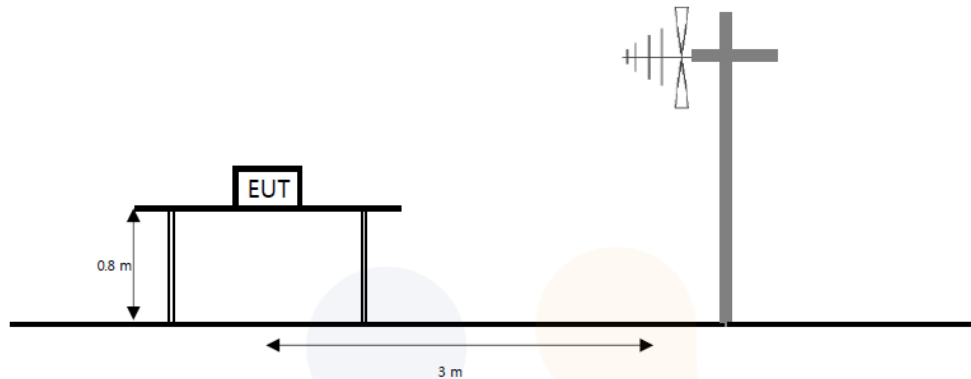
Parameter	Expanded uncertainty ($\pm$)	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.9 dB	
Radiated spurious emissions	Below 1 000 MHz	2.5 dB
	1 000 MHz ~ 18 000 MHz	2.5 dB
	Above 1 8000 MHz	2.6 dB

6. Test results

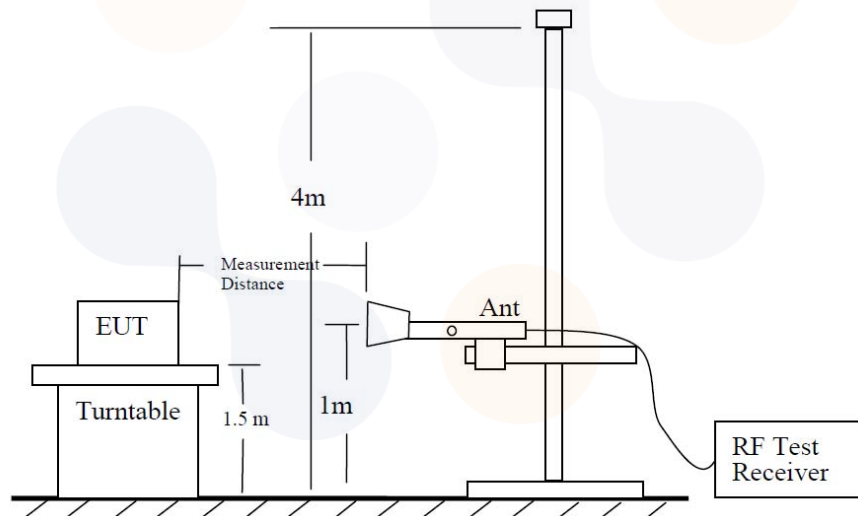
6.1. Radiated Power (ERP/EIRP)

Test setup

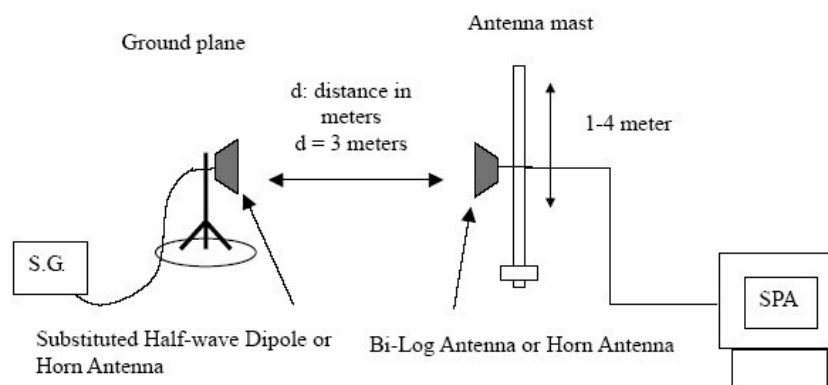
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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 RSS-132(5.4), The equivalent radiated power (e.r.p.) shall not exceed 7 watts for mobile equipment and 3 watts for portable equipment. Refer to SRSP-503 for base stations e.i.r.p limits.

According to §24.232(c) and RSS-133(5.5), 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), 27.50(c)(10) and RSS-130(4.6), Portable stations (hand-held devices) in the 698 -746 MHz, 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited 3 watts ERP.

According to §27.50(d)(4) and RSS-139(5.5), Fixed, mobile and portable (hand-held) stations operating in the 1710-1755 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.

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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.
The power is calculated by the following formula;

$$Pd(\text{dBm}) = Pg(\text{dBm}) - \text{Cable loss (dB)} + \text{Antenna gain (dB)}$$
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: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	5.15	9.13	26.75	22.77	0.189
		1 880.0	H	5.06	9.22	29.36	25.20	0.331
		1 909.3	H	4.97	9.28	27.89	23.58	0.228
	16QAM	1 850.7	H	5.15	9.13	25.75	21.76	0.150
		1 880.0	H	5.06	9.22	28.45	24.29	0.268
		1 909.3	H	4.97	9.28	26.64	22.33	0.171
3 M	QPSK	1 851.5	H	5.15	9.12	26.55	22.58	0.181
		1 880.0	H	5.06	9.22	29.31	25.15	0.327
		1 908.5	H	4.97	9.29	27.85	23.54	0.226
	16QAM	1 851.5	H	5.15	9.12	25.52	21.55	0.143
		1 880.0	H	5.06	9.22	28.33	24.17	0.261
		1 908.5	H	4.97	9.29	26.89	22.57	0.181
5 M	QPSK	1 852.5	H	5.14	9.13	26.39	22.41	0.174
		1 880.0	H	5.06	9.22	29.51	25.35	0.343
		1 907.5	H	4.98	9.30	27.58	23.25	0.212
	16QAM	1 852.5	H	5.14	9.13	25.32	21.33	0.136
		1 880.0	H	5.06	9.22	28.29	24.13	0.259
		1 907.5	H	4.98	9.30	26.69	22.37	0.173
10 M	QPSK	1 855.0	H	5.14	9.16	27.40	23.38	0.218
		1 880.0	H	5.06	9.22	29.29	25.13	0.326
		1 905.0	H	4.99	9.27	27.84	23.55	0.227
	16QAM	1 855.0	H	5.14	9.16	26.24	22.21	0.166
		1 880.0	H	5.06	9.22	28.43	24.27	0.267
		1 905.0	H	4.99	9.27	26.83	22.55	0.180
15 M	QPSK	1 857.5	H	5.13	9.17	27.39	23.35	0.216
		1 880.0	H	5.06	9.22	28.70	24.54	0.285
		1 902.5	H	4.99	9.24	27.57	23.32	0.215
	16QAM	1 857.5	H	5.13	9.17	25.88	21.84	0.153
		1 880.0	H	5.06	9.22	27.57	23.41	0.219
		1 902.5	H	4.99	9.24	26.56	22.32	0.170
20 M	QPSK	1 860.0	H	5.12	9.18	27.84	23.78	0.239
		1 880.0	H	5.06	9.22	29.01	24.85	0.305
		1 900.0	H	5.00	9.24	27.22	22.98	0.199
	16QAM	1 860.0	H	5.12	9.18	26.69	22.63	0.183
		1 880.0	H	5.06	9.22	27.73	23.57	0.227
		1 900.0	H	5.00	9.24	26.08	21.84	0.153

Note.

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

Test mode: LTE Band 4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	H	5.57	8.80	28.22	24.99	0.315
		1 732.5	H	5.50	8.83	27.62	24.30	0.269
		1 754.3	H	5.44	8.93	29.05	25.56	0.360
	16QAM	1 710.7	H	5.57	8.80	27.20	23.97	0.250
		1 732.5	H	5.50	8.83	26.33	23.00	0.200
		1 754.3	H	5.44	8.93	27.50	24.00	0.251
3 M	QPSK	1 711.5	H	5.57	8.81	28.08	24.84	0.305
		1 732.5	H	5.50	8.83	27.50	24.17	0.261
		1 753.5	H	5.44	8.92	28.59	25.11	0.324
	16QAM	1 711.5	H	5.57	8.81	26.92	23.67	0.233
		1 732.5	H	5.50	8.83	26.34	23.01	0.200
		1 753.5	H	5.44	8.92	27.62	24.14	0.259
5 M	QPSK	1 712.5	H	5.56	8.81	27.97	24.73	0.297
		1 732.5	H	5.50	8.83	27.38	24.06	0.254
		1 752.5	H	5.44	8.92	28.43	24.95	0.313
	16QAM	1 712.5	H	5.56	8.81	27.20	23.95	0.248
		1 732.5	H	5.50	8.83	26.75	23.43	0.220
		1 752.5	H	5.44	8.92	27.65	24.17	0.261
10 M	QPSK	1 715.0	H	5.56	8.80	28.46	25.21	0.332
		1 732.5	H	5.50	8.83	27.47	24.14	0.259
		1 750.0	H	5.45	8.92	28.53	25.06	0.321
	16QAM	1 715.0	H	5.56	8.80	27.20	23.96	0.249
		1 732.5	H	5.50	8.83	26.33	23.00	0.199
		1 750.0	H	5.45	8.92	27.57	24.10	0.257
15 M	QPSK	1 717.5	H	5.55	8.81	28.62	25.36	0.343
		1 732.5	H	5.50	8.83	27.19	23.86	0.243
		1 747.5	H	5.46	8.91	27.12	23.67	0.233
	16QAM	1 717.5	H	5.55	8.81	27.19	23.93	0.247
		1 732.5	H	5.50	8.83	26.17	22.84	0.192
		1 747.5	H	5.46	8.91	26.16	22.71	0.186
20 M	QPSK	1 720.0	H	5.54	8.82	28.17	24.89	0.308
		1 732.5	H	5.50	8.83	27.33	24.00	0.251
		1 745.0	H	5.47	8.89	26.80	23.38	0.218
	16QAM	1 720.0	H	5.54	8.82	27.32	24.04	0.253
		1 732.5	H	5.50	8.83	26.20	22.87	0.194
		1 745.0	H	5.47	8.89	25.94	22.52	0.179

Note.

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

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	824.7	H	3.40	6.08	26.34	23.66	0.232
		836.5	H	3.45	6.21	27.06	24.30	0.269
		848.3	H	3.20	6.26	26.99	23.93	0.247
	16QAM	824.7	H	3.40	6.08	25.21	22.52	0.179
		836.5	H	3.45	6.21	25.97	23.21	0.210
		848.3	H	3.20	6.26	26.30	23.24	0.211
3 M	QPSK	825.5	H	3.41	6.09	26.44	23.75	0.237
		836.5	H	3.45	6.21	26.86	24.10	0.257
		847.5	H	3.23	6.26	27.18	24.15	0.260
	16QAM	825.5	H	3.41	6.09	25.35	22.67	0.185
		836.5	H	3.45	6.21	25.80	23.04	0.201
		847.5	H	3.23	6.26	26.19	23.15	0.207
5 M	QPSK	826.5	H	3.42	6.11	26.36	23.67	0.233
		836.5	H	3.45	6.21	26.71	23.95	0.249
		846.5	H	3.26	6.26	27.26	24.26	0.267
	16QAM	826.5	H	3.42	6.11	25.33	22.64	0.183
		836.5	H	3.45	6.21	25.76	23.00	0.199
		846.5	H	3.26	6.26	26.03	23.02	0.200
10 M	QPSK	829.0	H	3.44	6.11	26.41	23.74	0.237
		836.5	H	3.45	6.21	26.72	23.96	0.249
		844.0	H	3.33	6.21	27.30	24.42	0.277
	16QAM	829.0	H	3.44	6.11	25.29	22.62	0.183
		836.5	H	3.45	6.21	25.94	23.18	0.208
		844.0	H	3.33	6.21	26.33	23.45	0.221

Note.

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

Test mode: LTE Band 12

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	699.7	H	2.55	5.61	24.24	21.18	0.131
		707.5	H	2.63	5.60	24.80	21.82	0.152
		715.3	H	2.60	5.63	25.53	22.49	0.178
	16QAM	699.7	H	2.55	5.61	23.35	20.29	0.107
		707.5	H	2.63	5.60	23.82	20.85	0.121
		715.3	H	2.60	5.63	24.29	21.25	0.133
3 M	QPSK	700.5	H	2.56	5.62	24.42	21.35	0.137
		707.5	H	2.63	5.60	24.69	21.72	0.149
		714.5	H	2.61	5.63	25.43	22.41	0.174
	16QAM	700.5	H	2.56	5.62	23.31	20.24	0.106
		707.5	H	2.63	5.60	23.66	20.68	0.117
		714.5	H	2.61	5.63	24.42	21.39	0.138
5 M	QPSK	701.5	H	2.57	5.62	24.28	21.22	0.133
		707.5	H	2.63	5.60	24.71	21.74	0.149
		713.5	H	2.62	5.63	25.26	22.25	0.168
	16QAM	701.5	H	2.57	5.62	23.42	20.37	0.109
		707.5	H	2.63	5.60	23.91	20.94	0.124
		713.5	H	2.62	5.63	24.21	21.19	0.132
10 M	QPSK	704.0	H	2.59	5.59	24.59	21.59	0.144
		707.5	H	2.63	5.60	24.49	21.51	0.142
		711.0	H	2.64	5.63	25.23	22.24	0.167
	16QAM	704.0	H	2.59	5.59	23.59	20.59	0.115
		707.5	H	2.63	5.60	23.62	20.64	0.116
		711.0	H	2.64	5.63	24.25	21.26	0.134

Test mode: LTE Band 13

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	779.5	H	3.35	5.85	26.54	24.04	0.254
		782.0	H	3.31	5.87	26.48	23.92	0.246
		784.5	H	3.26	5.87	26.21	23.60	0.229
	16QAM	779.5	H	3.35	5.85	26.04	23.54	0.226
		782.0	H	3.31	5.87	25.68	23.12	0.205
		784.5	H	3.26	5.87	25.43	22.82	0.191
10 M	QPSK	782.0	H	3.31	5.87	26.67	24.11	0.257
	16QAM	782.0	H	3.31	5.87	25.54	22.98	0.199

Note.

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

Test mode: LTE Band 66

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[MHz]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	H	5.57	8.80	28.87	25.64	0.366
		1 745.0	H	5.47	8.89	29.69	26.27	0.423
		1 779.3	H	5.36	9.01	27.21	23.56	0.227
	16QAM	1 710.7	H	5.57	8.80	27.57	24.34	0.272
		1 745.0	H	5.47	8.89	28.44	25.01	0.317
		1 779.3	H	5.36	9.01	26.38	22.73	0.188
3 M	QPSK	1 711.5	H	5.57	8.81	28.79	25.54	0.358
		1 745.0	H	5.47	8.89	29.52	26.09	0.406
		1 778.5	H	5.36	9.02	27.48	23.83	0.241
	16QAM	1 711.5	H	5.57	8.81	27.62	24.38	0.274
		1 745.0	H	5.47	8.89	28.35	24.92	0.310
		1 778.5	H	5.36	9.02	26.45	22.80	0.190
5 M	QPSK	1 712.5	H	5.56	8.81	28.83	25.58	0.362
		1 745.0	H	5.47	8.89	29.54	26.11	0.409
		1 777.5	H	5.37	9.00	27.33	23.70	0.234
	16QAM	1 712.5	H	5.56	8.81	27.86	24.62	0.289
		1 745.0	H	5.47	8.89	28.57	25.14	0.327
		1 777.5	H	5.37	9.00	26.50	22.86	0.193
10 M	QPSK	1 715.0	H	5.56	8.80	29.02	25.77	0.378
		1 745.0	H	5.47	8.89	29.52	26.10	0.407
		1 775.0	H	5.38	9.02	27.29	23.64	0.231
	16QAM	1 715.0	H	5.56	8.80	27.88	24.63	0.291
		1 745.0	H	5.47	8.89	28.39	24.97	0.314
		1 775.0	H	5.38	9.02	26.43	22.79	0.190
15 M	QPSK	1 717.5	H	5.55	8.81	29.27	26.01	0.399
		1 745.0	H	5.47	8.89	29.53	26.10	0.407
		1 772.5	H	5.38	9.02	27.18	23.54	0.226
	16QAM	1 717.5	H	5.55	8.81	28.12	24.86	0.306
		1 745.0	H	5.47	8.89	28.37	24.94	0.312
		1 772.5	H	5.38	9.02	26.36	22.73	0.187
20 M	QPSK	1 720.0	H	5.54	8.82	29.70	26.42	0.438
		1 745.0	H	5.47	8.89	29.51	26.08	0.406
		1 770.0	H	5.39	9.01	28.43	24.81	0.303
	16QAM	1 720.0	H	5.54	8.82	29.25	25.97	0.395
		1 745.0	H	5.47	8.89	28.13	24.71	0.296
		1 770.0	H	5.39	9.01	27.49	23.87	0.244

Note.

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

Test mode: LTE Band 71

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[MHz]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	665.50	H	3.14	5.45	25.08	22.77	0.189
		680.50	H	2.84	5.49	24.31	21.66	0.146
		695.50	H	2.55	5.54	25.00	22.01	0.159
	16QAM	665.50	H	3.14	5.45	24.71	22.40	0.174
		680.50	H	2.84	5.49	23.29	20.64	0.116
		695.50	H	2.55	5.54	23.85	20.86	0.122
10 M	QPSK	668.00	H	3.09	5.49	24.65	22.25	0.168
		680.50	H	2.84	5.49	24.85	22.19	0.166
		693.00	H	2.55	5.54	24.85	21.86	0.154
	16QAM	668.00	H	3.09	5.49	23.64	21.24	0.133
		680.50	H	2.84	5.49	23.71	21.05	0.127
		693.00	H	2.55	5.54	23.90	20.91	0.123
15 M	QPSK	670.50	H	3.04	5.50	24.68	22.22	0.167
		680.50	H	2.84	5.49	25.04	22.38	0.173
		690.50	H	2.55	5.54	24.18	21.19	0.132
	16QAM	670.50	H	3.04	5.50	23.75	21.29	0.135
		680.50	H	2.84	5.49	24.05	21.39	0.138
		690.50	H	2.55	5.54	23.35	20.36	0.109
20 M	QPSK	673.00	H	2.99	5.47	23.83	21.35	0.136
		680.50	H	2.84	5.49	24.49	21.84	0.153
		688.00	H	2.61	5.55	23.68	20.74	0.118
	16QAM	673.00	H	2.99	5.47	22.88	20.40	0.110
		680.50	H	2.84	5.49	23.70	21.05	0.127
		688.00	H	2.61	5.55	22.88	19.94	0.099

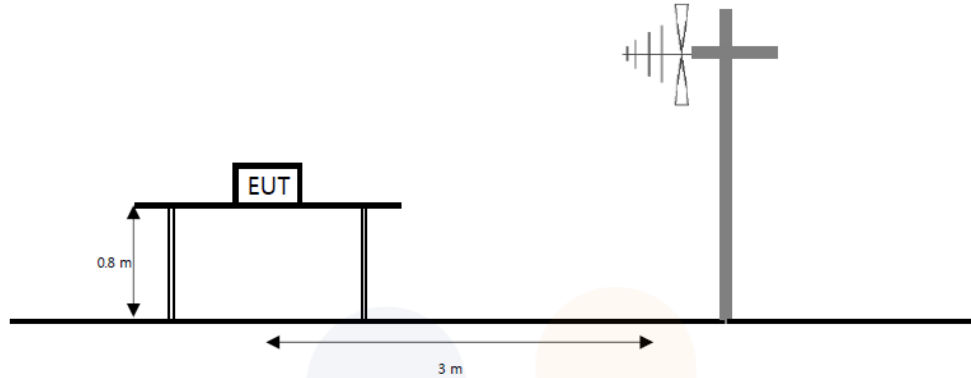
Note.

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

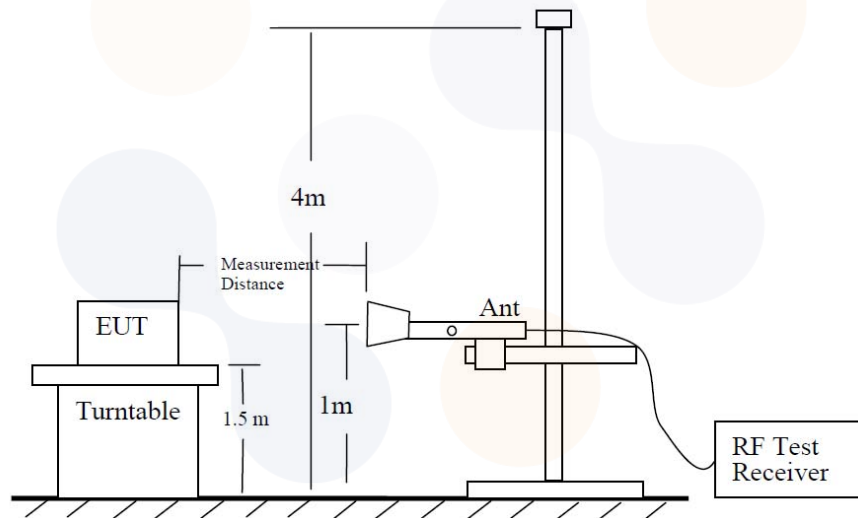
6.2. Radiated Spurious Emissions

Test setup

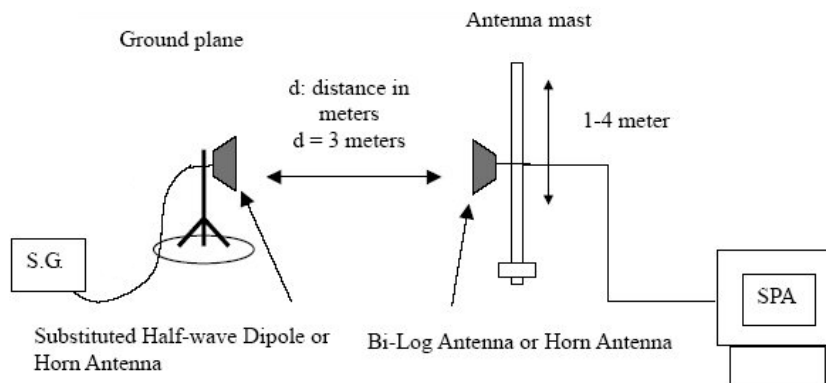
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 MHz to 1 GHz emissions.



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) and RSS-132(5.5), RSS-133(5.6), 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(c)(2) and RSS-130(4.7), on any frequency outside the 776-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by 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) and RSS-130(4.7), 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) and RSS-139(5.6), 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.

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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 : LTE Band 2

Frequency(MHz) : 1 852.5

Channel : 18625

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	3 701.52	V	8.66	13.35	-45.81	-50.50	-13.00	37.50
	5 552.02	V	10.61	16.57	-41.84	-47.80	-13.00	34.80
	7 399.97	H	11.96	19.20	-38.56	-45.80	-13.00	32.80
	9 251.12	V	13.20	21.59	-34.51	-42.90	-13.00	29.90

Test mode : LTE Band 2

Frequency(MHz) : 1 880.0

Channel : 18900

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	3 754.50	H	8.76	13.50	-45.66	-50.40	-13.00	37.40
	5 631.81	H	10.63	16.56	-43.67	-49.60	-13.00	36.60
	7 511.68	H	12.11	19.30	-37.41	-44.60	-13.00	31.60
	9 383.89	H	13.20	21.90	-34.30	-43.00	-13.00	30.00

Test mode : LTE Band 2

Frequency(MHz) : 1 907.5

Channel : 19175

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	3 817.06	H	8.87	13.44	-46.83	-51.40	-13.00	38.40
	5 729.48	H	10.65	16.72	-42.73	-48.80	-13.00	35.80
	7 639.35	H	12.21	19.57	-39.34	-46.70	-13.00	33.70
	9 551.77	H	13.19	21.85	-34.04	-42.70	-13.00	29.70

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) : 1 710.7

Channel : 19957

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	3 420.02	H	8.14	12.74	-44.30	-48.90	-13.00	35.90
	5 128.18	V	10.38	16.70	-44.08	-50.40	-13.00	37.40
	6 841.44	H	11.27	18.51	-39.76	-47.00	-13.00	34.00
	8 549.60	H	13.02	20.67	-35.95	-43.60	-13.00	30.60

Test mode : LTE Band 4

Frequency(MHz) : 1 732.5

Channel : 20175

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	3 464.06	H	8.23	12.84	-46.19	-50.80	-13.00	37.80
	5 195.84	V	10.42	16.76	-42.76	-49.10	-13.00	36.10
	6 927.61	H	11.34	18.57	-38.97	-46.20	-13.00	33.20
	8 658.75	H	13.06	20.58	-36.08	-43.60	-13.00	30.60

Test mode : LTE Band 4

Frequency(MHz) : 1 754.3

Channel : 20393

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	3 508.75	H	8.32	12.93	-43.99	-48.60	-13.00	35.60
	5 262.22	V	10.46	16.03	-42.53	-48.10	-13.00	35.10
	7 016.98	V	11.42	18.72	-36.40	-43.70	-13.00	30.70
	8 773.01	V	13.11	20.65	-35.96	-43.50	-13.00	30.50

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 5

Frequency(MHz) : 829

Channel : 20450

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	1 666.70	H	5.70	8.65	-47.15	-50.10	-13.00	37.10
	2 500.80	H	6.00	10.75	-36.45	-41.20	-13.00	28.20
	3 336.53	V	7.97	12.56	-38.81	-43.40	-13.00	30.40
	4 174.32	H	9.34	13.97	-35.37	-40.00	-13.00	27.00

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	1 673.27	H	5.68	8.66	-49.12	-52.10	-13.00	39.10
	2 509.82	H	6.03	10.74	-37.89	-42.60	-13.00	29.60
	3 346.79	V	7.99	12.58	-39.31	-43.90	-13.00	30.90
	4 181.29	V	9.35	13.98	-36.27	-40.90	-13.00	27.90

Test mode : LTE Band 5

Frequency(MHz) : 844

Channel : 20600

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	1 679.83	V	5.66	8.68	-49.58	-52.60	-13.00	39.60
	2 517.62	V	6.05	10.77	-41.08	-45.80	-13.00	32.80
	3 358.28	H	8.02	12.60	-39.02	-43.60	-13.00	30.60
	4 193.60	V	9.35	14.01	-36.24	-40.90	-13.00	27.90

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) : 699.7

Channel : 23017

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	1 399.61	V	5.50	7.96	-48.24	-50.70	-13.00	37.70
	2 099.13	V	4.96	9.76	-35.80	-40.60	-13.00	27.60
	2 797.84	V	6.77	11.38	-40.49	-45.10	-13.00	32.10
	3 497.77	H	8.30	12.91	-37.99	-42.60	-13.00	29.60

Test mode : LTE Band 12

Frequency(MHz) : 707.5

Channel : 23095

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	1 415.61	V	5.61	8.01	-52.40	-54.80	-13.00	41.80
	2 122.93	V	5.02	9.82	-34.90	-39.70	-13.00	26.70
	2 829.84	V	6.86	11.45	-42.41	-47.00	-13.00	34.00
	3 537.57	H	8.37	13.00	-37.87	-42.50	-13.00	29.50

Test mode : LTE Band 12

Frequency(MHz) : 715.3

Channel : 23173

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	1 430.38	V	5.71	8.05	-49.56	-51.90	-13.00	38.90
	2 146.32	V	5.08	9.87	-37.41	-42.20	-13.00	29.20
	2 860.61	H	6.94	11.52	-41.32	-45.90	-13.00	32.90
	3 574.90	V	8.43	12.78	-38.85	-43.20	-13.00	30.20

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 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	1 551.41	V	6.05	8.35	-51.50	-53.80	-13.00	40.80
	2 332.99	H	5.57	10.40	-38.57	-43.40	-13.00	30.40
	3 107.19	H	7.51	12.06	-38.75	-43.30	-13.00	30.30
	3 886.30	H	9.00	13.61	-36.89	-41.50	-13.00	28.50

Test mode : LTE Band 13

Frequency(MHz) : 782.0 (1 559 – 1 610 MHz)

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	1 607.35	V	5.88	8.57	-54.31	-57.00	-40.00	17.00

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 i&dB d) - C.L(Cable loss) (dB)

Test mode : LTE Band 66

Frequency(MHz) : 1 720.0

Channel : 132072

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	3 421.93	V	8.14	12.74	-43.90	-48.50	-13.00	35.50
	5 130.09	V	10.38	16.71	-43.27	-49.60	-13.00	36.60
	6 841.44	H	11.27	18.51	-39.76	-47.00	-13.00	34.00
	8 550.24	V	13.02	20.67	-37.45	-45.10	-13.00	32.10

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	8.24	12.85	-46.49	-51.10	-13.00	38.10
	5 204.78	H	10.42	15.94	-43.38	-48.90	-13.00	35.90
	6 940.38	V	11.35	18.59	-40.16	-47.40	-13.00	34.40
	8 675.35	H	13.07	20.60	-34.87	-42.40	-13.00	29.40

Test mode : LTE Band 66

Frequency(MHz) : 1 770

Channel : 132572

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	3 540.02	H	8.37	13.00	-43.37	-48.00	-13.00	35.00
	5 310.74	V	10.49	16.29	-43.80	-49.60	-13.00	36.60
	7 080.17	H	11.51	18.79	-36.52	-43.80	-13.00	30.80
	8 852.16	V	13.14	20.75	-35.09	-42.70	-13.00	29.70

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 71

Frequency(MHz) : 665.5

Channel : 133147

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	1 327.81	H	4.99	7.78	-50.61	-53.40	-13.00	40.40
	1 989.59	H	4.73	9.48	-44.85	-49.60	-13.00	36.60
	2 651.37	H	6.39	11.11	-40.58	-45.30	-13.00	32.30
	3 315.61	V	7.93	12.51	-38.72	-43.30	-13.00	30.30

Test mode : LTE Band 71

Frequency(MHz) : 680.5

Channel : 133297

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	1 366.38	H	5.26	7.86	-50.70	-53.30	-13.00	40.30
	2 051.13	H	4.83	9.65	-42.98	-47.80	-13.00	34.80
	2 733.42	V	6.61	11.24	-40.07	-44.70	-13.00	31.70
	3 409.56	V	8.12	12.72	-38.40	-43.00	-13.00	30.00

Test mode : LTE Band 71

Frequency(MHz) : 695.5

Channel : 133447

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	1 386.89	H	5.41	7.92	-48.39	-50.90	-13.00	37.90
	2 082.31	V	4.91	9.72	-43.69	-48.50	-13.00	35.50
	2 772.40	H	6.71	11.33	-41.98	-46.60	-13.00	33.60
	3 465.36	H	8.23	12.84	-39.39	-44.00	-13.00	31.00

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)

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	Agilent	N9040B	US55230151	25.07.01
Wideband Radio Communication Tester	R&S	CMW500	141780	25.01.18
Bilog Antenna	Teseq GmbH	CBL 6112D	62027	24.11.17
Bilog Antenna	ETS-LINDGREN	3143B	00228420	25.07.20
Horn Antenna	ETS-LINDGREN	3117	00251528	25.01.26
Horn Antenna	ETS-LINDGREN	3117	00227509	25.06.28
Horn Antenna	ETS-LINDGREN	3116C	00251516	25.02.01
Horn Antenna	ETS-LINDGREN	3116	00086635	25.01.25
Amplifier	SONOMA INSTRUMENT	310N	421822	24.10.12
Amplifier	B&Z Technologies	BZRT-00504000-481055-382525	26299-27735	25.06.24
Amplifier	B&Z Technologies	BZR-0050400-551028-252525	27736	25.06.24
High pass Filter	Wainwright Instruments GmbH	WHKX3.0/18G-12SS	44	25.01.18
Signal Generator	R&S	SMB100A	176206	25.01.18
High pass Filter	Wainwright Instruments GmbH	WHKX1.0/15G-10SS	14	25.01.18

End of test report