TEST REPORT

Eurofins KCTL Co.,Ltd. 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.: KR23-SRF0051-A Page (1) of (32)	eurofins | KCTL

1. Client

- Name : TYMICT
- Address : 222-12, Sangseo-ri, Useong-myon, Gongju-si, Chungcheongnam-do, Republic of Korea
- Date of Receipt : 2022-12-05

2. Use of Report : Certification

3. Name of Product / Model : TBOX / TBX2

4. Manufacturer / Country of Origin : TYMICT / Korea

5. FCC ID : 2A9Q6-TBX2

6. IC Certificate No. : 29802-TBX2

7. Date of Test : 2022-12-26 to 2022-12-28

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 3
FCC Part 24 subpart E / RSS-133 Issue 6
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)

2023-02-10

Eurofins KCTL Co.,Ltd.

REPORT REVISION HISTORY

Date	Revision	Page No
2023-01-26	Originally issued	-
2023-02-10	Updated	4, 9, 20

Note. The report No. KR23-SRF0051 is superseded by the report No. KR23-SRF0051-A.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 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	:	TBX2
Modulation technique	:	LTE_QPSK, 16QAM
Power source	:	DC 12.00 V
Antenna specification	:	LTE_Chip Antenna
Frequency range	:	LTE Band 2_1 850.7 ㎒ ~ 1 909.3 ㎒
		LTE Band 4_1 710.7 ㎒ ~ 1 754.3 ㎒
		LTE Band 5_824.7 ㎒ ~ 848.3 ㎒
		LTE Band 12_699.7 ㎒ ~ 715.3 ㎒
		LTE Band 13_779.5 ㎒ ~ 784.5 ㎒
		LTE Band 14_790.5 ㎒ ~ 800.5 ㎒
		LTE Band 66_1 710.7 ㎒ ~ 1 779.3 ㎒
		LTE Band 71_665.5 ㎒ ~ 695.5 ㎒
Software version	:	V109
Hardware version	:	V106
Operation temperature	:	-10 ℃ ~ 50 ℃
Test device serial No.	:	T101224800020002

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 (㎒)
18607	1 850.7
18900	1 880.0
19193	1 909.3

Table 2.1.1. 1.4M BW

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

Table 2.1.2. 3M BW

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

Table 2.1.3. 5M BW

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

Table 2.1.4. 10M BW

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

Table 2.1.5. 15M BW

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

Table 2.1.6. 20M BW

LTE Band 4

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

Table 2.1.7. 1.4M BW

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

Table 2.1.8. 3M BW

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

Table 2.1.9. 5M BW

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

Table 2.1.10. 10M BW

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

Table 2.1.11. 15M BW

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

Table 2.1.12. 20M BW

LTE Band 5

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

Table 2.1.13. 1.4M BW

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

Table 2.1.14. 3M BW

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

Table 2.1.15. 5M BW

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

Table 2.1.16. 10M BW

LTE Band 12

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

Table 2.1.17. 1.4M BW

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

Table 2.1.18. 3M BW

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

Table 2.1.19. 5M BW

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

Table 2.1.20. 10M BW

LTE Band 13

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

Table 2.1.21. 5M BW

Ch.	Frequency (㎒)
-	-
23230	782.0
-	-

Table 2.1.22. 10M BW

LTE Band 66

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

Table 2.1.22. 1.4M BW

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

Table 2.1.23. 3M BW

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

Table 2.1.24. 5M BW

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

Table 2.1.25. 10M BW

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

Table 2.1.26. 15M BW

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

Table 2.1.27. 20M BW

LTE Band 71

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

Table 2.1.28. 5M BW

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

Table 2.1.29. 10M BW

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

Table 2.1.30. 15M BW

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

Table 2.1.31. 20M BW

Notes:

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

3. Maximum ERP/EIRP power

LTE Band 2

Mode	Tx frequency (㎒)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 2	1 850.7 ~ 1 909.3	1M14G7D	25.19	0.330
		1M13W7D	24.40	0.275
	1 851.5 ~ 1 908.5	2M75G7D	25.15	0.327
		2M77W7D	24.28	0.268
	1 852.5 ~ 1 907.5	4M53G7D	25.25	0.335
		4M54W7D	24.43	0.277
	1 855.0 ~ 1 905.0	9M05G7D	**25.36**	**0.344**
		9M04W7D	24.58	0.287
	1 857.5 ~ 1 902.5	13M5G7D	25.09	0.323
		13M5W7D	24.14	0.259
	1 860.0 ~ 1 900.0	17M9G7D	25.30	0.339
		17M9W7D	24.39	0.275

LTE Band 5

Mode	Tx frequency (㎒)	Emission designator	ERP (FCC)		EIRP (IC)	
			Max. power (dBm)	Max. power (W)	Max. power (dBm)	Max. power (W)
LTE Band 5	824.7 ~ 848.3	1M14G7D	**25.58**	**0.361**	**27.73**	**0.593**
		1M13W7D	24.48	0.281	26.63	0.460
	825.5 ~ 847.5	2M75G7D	24.98	0.315	27.13	0.516
		2M76W7D	24.07	0.255	26.22	0.419
	826.5 ~ 846.5	4M53G7D	24.73	0.297	26.88	0.488
		4M53W7D	23.98	0.250	26.13	0.410
	829.0 ~ 844.0	9M04G7D	23.98	0.250	26.13	0.410
		9M04W7D	23.12	0.205	25.27	0.337

LTE Band 12

Mode	Tx frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 12	699.7 ~ 715.3	1M14G7D	**22.89**	**0.195**
		1M13W7D	22.07	0.161
	700.5 ~ 714.5	2M75G7D	22.70	0.186
		2M76W7D	21.95	0.157
	701.5 ~ 713.5	4M53G7D	22.76	0.189
		4M54W7D	22.08	0.161
	704.0 ~ 711.0	9M05G7D	22.83	0.192
		9M04W7D	22.11	0.163

LTE Band 13

Mode	Tx frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 13	779.5 ~ 784.5	4M50G7D	23.96	0.249
		4M54W7D	23.58	0.228
	782.0	9M03G7D	**24.21**	**0.264**
		9M03W7D	23.18	0.208

LTE Band 4

Mode	Tx frequency (㎒)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 4	1 710.7 ~ 1 754.3	1M14G7D	**25.88**	**0.387**
		1M13W7D	25.20	0.331
	1 711.5 ~ 1 753.5	2M75G7D	25.81	0.381
		2M76W7D	24.59	0.288
	1 712.5 ~ 1 752.5	4M53G7D	25.49	0.354
		4M54W7D	24.23	0.265
	1 715.0 ~ 1 750.0	9M04G7D	25.39	0.346
		9M04W7D	24.51	0.282
	1 717.5 ~ 1 747.5	13M5G7D	25.50	0.355
		13M5W7D	24.51	0.282
	1 720.0 ~ 1 745.0	17M9G7D	25.23	0.333
		17M9W7D	24.55	0.285

LTE Band 66

Mode	Tx frequency (㎒)	Emission designator	EIRP	
			Max. power (dBm)	Max. power (W)
LTE Band 66	1 710.7 ~ 1 779.3	1M14G7D	**27.29**	**0.536**
		1M13W7D	25.90	0.389
	1 711.5 ~ 1 778.5	2M75G7D	26.50	0.447
		2M77W7D	25.44	0.35
	1 712.5 ~ 1 777.5	4M53G7D	25.95	0.394
		4M54W7D	24.91	0.31
	1 715.0 ~ 1 775.0	9M04G7D	26.30	0.427
		9M04W7D	25.32	0.34
	1 717.5 ~ 1 772.5	13M5G7D	26.37	0.434
		13M5W7D	25.52	0.356
	1 720.0 ~ 1 770.0	17M9G7D	26.03	0.401
		17M9W7D	25.25	0.335

LTE Band 71

Mode	Tx frequency (㎒)	Emission designator	ERP	
			Max. power (dBm)	Max. power (W)
LTE Band 71	665.5 ~ 695.5	4M52G7D	22.75	0.188
		4M53W7D	22.11	0.163
	668.0 ~ 693.0	9M03G7D	23.19	0.208
		9M04W7D	22.34	0.171
	670.5 ~ 690.5	13M5G7D	23.09	0.204
		13M5W7D	22.40	0.174
	673.0 ~ 688.0	17M9G7D	**23.20**	**0.209**
		17M9W7D	22.05	0.16

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 + 10Log10(P) dB for all out of band emissions, <65 + 10Log10(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 (FCC) <11.5 Watts max. EIRP (IC)	Radiated	Pass
27.50(b)(10) 27.50(c)(10)	RSS-130(4.6)		< 3 Watts max. ERP		Pass
24.232(c)	RSS-133(6.4)	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(6.5) RSS-139(5.6)	Radiated Spurious Emissions	<43 + 10Log10(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)

1. 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.)

2. 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 (㎒)	RB size	RB offset
Radiated	B2	QPSK	10	1	0, 25, 49
	B5		1.4	1	0, 3, 5
	B12		1.4	1	0, 3, 5
	B13		10	1	0, 25, 49
	B4		1.4	1	0, 3, 5
	B66		1.4	1	0, 3, 5
	B71		20	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 of exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

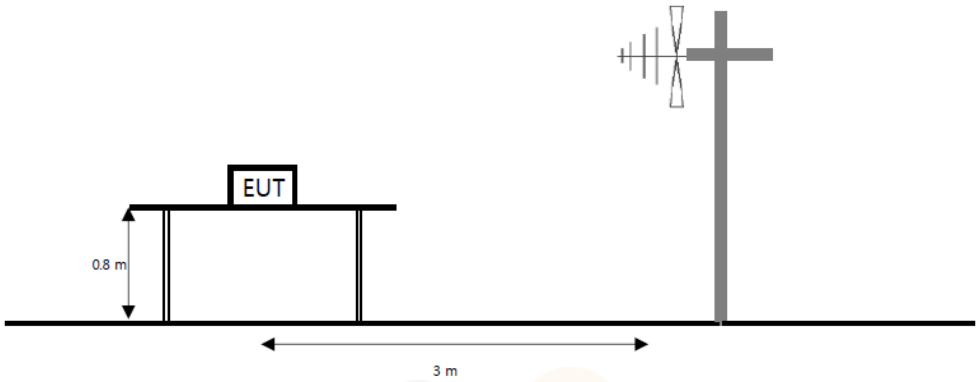
Parameter	Expanded uncertainty (±)	
Conducted RF power	0.9 dB	
Conducted spurious emissions	1.1 dB	
Radiated spurious emissions	Below 1 000 ㎒	4.3 dB
	1 000 ㎒ ~ 18 000 ㎒	3.8 dB
	Above 1 8000 ㎒	5.9 dB

6. Test results

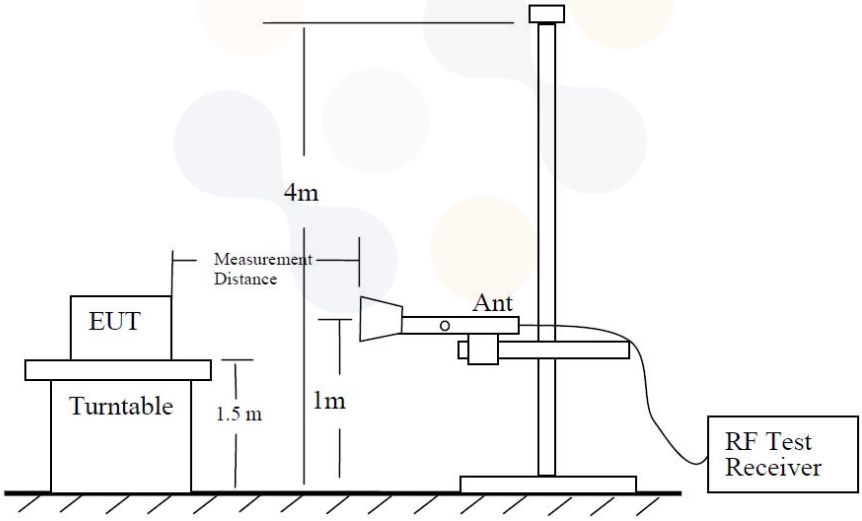
6.1. Radiated Power (ERP/EIRP)

Test setup

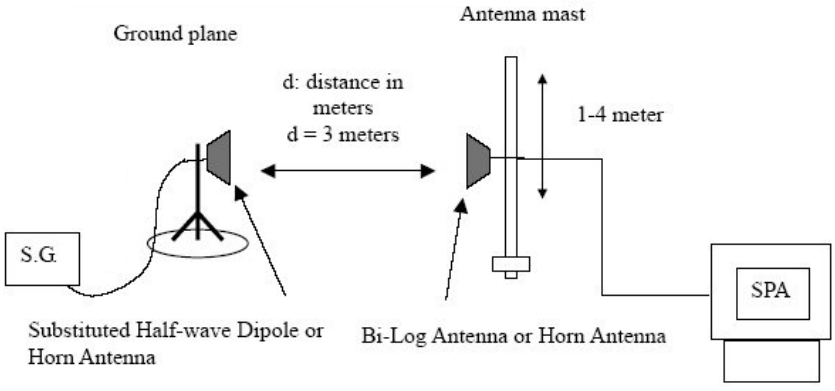
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.913(a)(5), the ERP of transmitters in the cellular radiotelephone service must not exceed the limits in this section. The ERP of mobile transmitters and auxiliary test transmitters must not exceed 7 watts.
According to RSS-132(5.4), the equivalent isotropically radiated power (e.i.r.p) for mobile equipment shall not exceed 11.5 watts. Refer to SRSP-503 for base stations e.i.r.p limits.

According to §24.232(c) and RSS-133(6.4), 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 ㎒, 746-757 ㎒, 776-788 ㎒, and 805-806 ㎒ 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 ㎒ and 1755-1780 ㎒ 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 ≥ 3 × RBW.
3) SPAN = 2 × to 3 × the OBW.
4) Number of measurement points in sweep ≥ 2 × span / RBW.
5) Sweep time :
   1) Auto couple, or
   2) ≥ [10 × (number of points in sweep) × (transmission period)] for single sweep (automation-compatible) measurement. Transmission period is the on and off time of the transmitter.
6) Detector = RMS
7) If the EUT can be configured to transmit continuously, then set the trigger to free run.
8) If the EUT cannot be configured to transmit continuously, then use a sweep trigger with the level set to enable triggering only on full power bursts and configure the EUT to transmit at full power for the entire duration of each sweep. Verify that the sweep time is less than or equal to the transmission burst duration. Time gating can also be used under similar constraints (i.e., configured such that measurement data is collected only during active full -power transmissions).
9) Trace mode = trace averaging (RMS) over 100 sweeps.
10) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band or channel power measurement function, with the band/channel limits set equal to the OBW band edges. If the instrument does not have a band or channel power function, then sum the spectrum levels (in linear power units) at intervals equal to the RBW extending across the entire OBW of the spectrum.
11) Allow trace to fully stabilize.

Notes:

1. On a test site, the EUT shall be placed at 80 cm 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 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
   The power is calculated by the following formula;
   Pd(㏈m) = Pg(㏈m) – Cable loss (㏈) + Antenna gain (㏈)
   Note. Pd is the dipole equivalent power and Pg is the generator output power into the substitution antenna.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that The maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level Detected by the measuring corrected for the change of input attenuator setting of the measuring Receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for Any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna Orientated for horizontal polarization.

Test results

Test mode: LTE Band 2

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 850.7	H	5.02	7.14	27.31	25.19	0.330
		1 880.0	H	4.94	7.21	26.96	24.69	0.294
		1 909.3	H	4.85	7.31	26.86	24.40	0.275
	16QAM	1 850.7	H	5.02	7.14	26.52	24.40	0.275
		1 880.0	H	4.94	7.21	26.24	23.97	0.249
		1 909.3	H	4.85	7.31	25.72	23.26	0.212
3 M	QPSK	1 851.5	H	5.02	7.14	27.22	25.10	0.324
		1 880.0	H	4.94	7.21	26.85	24.58	0.287
		1 908.5	H	4.86	7.31	27.60	25.15	0.327
	16QAM	1 851.5	H	5.02	7.14	26.11	23.99	0.251
		1 880.0	H	4.94	7.21	25.82	23.55	0.226
		1 908.5	H	4.86	7.31	26.73	24.28	0.268
5 M	QPSK	1 852.5	H	5.01	7.14	26.86	24.73	0.297
		1 880.0	H	4.94	7.21	27.52	25.25	0.335
		1 907.5	H	4.86	7.31	27.34	24.89	0.308
	16QAM	1 852.5	H	5.01	7.14	25.58	23.45	0.221
		1 880.0	H	4.94	7.21	26.70	24.43	0.277
		1 907.5	H	4.86	7.31	26.51	24.06	0.255
10 M	QPSK	1 855.0	H	5.01	7.15	27.50	25.36	0.344
		1 880.0	H	4.94	7.21	27.53	25.26	0.336
		1 905.0	H	4.87	7.32	27.37	24.92	0.310
	16QAM	1 855.0	H	5.01	7.15	26.59	24.45	0.279
		1 880.0	H	4.94	7.21	26.85	24.58	0.287
		1 905.0	H	4.87	7.32	26.69	24.24	0.265
15 M	QPSK	1 857.5	H	5.00	7.17	27.26	25.09	0.323
		1 880.0	H	4.94	7.21	27.26	24.99	0.316
		1 902.5	H	4.87	7.31	27.34	24.90	0.309
	16QAM	1 857.5	H	5.00	7.17	26.00	23.83	0.242
		1 880.0	H	4.94	7.21	26.41	24.14	0.259
		1 902.5	H	4.87	7.31	26.29	23.85	0.243
20 M	QPSK	1 860.0	H	4.99	7.19	27.50	25.30	0.339
		1 880.0	H	4.94	7.21	27.43	25.16	0.328
		1 900.0	H	4.88	7.32	27.26	24.82	0.303
	16QAM	1 860.0	H	4.99	7.19	26.59	24.39	0.275
		1 880.0	H	4.94	7.21	26.37	24.10	0.257
		1 900.0	H	4.88	7.32	26.83	24.39	0.275

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

Test mode: LTE Band 5

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP		EIRP Note.1	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]	[dBm]	[W]
1.4 M	QPSK	824.7	V	0.09	4.88	30.37	25.58	0.361	27.73	0.593
		836.5	V	-0.32	4.97	29.98	24.69	0.294	26.84	0.483
		848.3	V	-0.77	5.03	29.73	23.93	0.247	26.08	0.406
	16QAM	824.7	V	0.09	4.88	29.27	24.48	0.281	26.63	0.460
		836.5	V	-0.32	4.97	29.22	23.93	0.247	26.08	0.406
		848.3	V	-0.77	5.03	28.74	22.94	0.197	25.09	0.323
3 M	QPSK	825.5	V	0.11	4.88	29.75	24.98	0.315	27.13	0.516
		836.5	V	-0.32	4.97	30.10	24.81	0.303	26.96	0.497
		847.5	V	-0.75	5.03	29.63	23.85	0.243	26.00	0.398
	16QAM	825.5	V	0.11	4.88	28.70	23.93	0.247	26.08	0.406
		836.5	V	-0.32	4.97	29.36	24.07	0.255	26.22	0.419
		847.5	V	-0.75	5.03	28.42	22.64	0.184	24.79	0.301
5 M	QPSK	826.5	V	0.13	4.89	29.49	24.73	0.297	26.88	0.488
		836.5	V	-0.32	4.97	29.97	24.68	0.294	26.83	0.482
		846.5	V	-0.73	5.03	29.48	23.72	0.236	25.87	0.386
	16QAM	826.5	V	0.13	4.89	28.38	23.62	0.230	25.77	0.378
		836.5	V	-0.32	4.97	29.27	23.98	0.250	26.13	0.410
		846.5	V	-0.73	5.03	28.35	22.59	0.182	24.74	0.298
10 M	QPSK	829.0	V	0.18	4.91	28.71	23.98	0.250	26.13	0.410
		836.5	V	-0.32	4.97	29.04	23.75	0.237	25.90	0.389
		844.0	V	-0.68	5.03	29.11	23.40	0.219	25.55	0.359
	16QAM	829.0	V	0.18	4.91	27.58	22.85	0.193	25.00	0.316
		836.5	V	0.09	4.97	28.00	23.12	0.205	25.27	0.337
		844.0	V	-0.32	5.03	28.00	22.65	0.184	24.80	0.302

Note.
1. The E.I.R.P conversion formula for IC : E.I.R.P result (dBm)
   = E.R.P result (dBm) + 2.15 (dB)
2. 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	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	699.7	V	-0.50	4.44	27.63	22.69	0.186
		707.5	V	-0.35	4.48	27.72	22.89	0.195
		715.3	V	-0.56	4.51	27.55	22.47	0.177
	16QAM	699.7	V	-0.50	4.44	26.94	22.00	0.158
		707.5	V	-0.35	4.48	26.90	22.07	0.161
		715.3	V	-0.56	4.51	26.57	21.49	0.141
3 M	QPSK	700.5	V	-0.49	4.44	27.63	22.70	0.186
		707.5	V	-0.35	4.48	27.38	22.55	0.180
		714.5	V	-0.53	4.51	27.58	22.54	0.179
	16QAM	700.5	V	-0.49	4.44	26.38	21.45	0.140
		707.5	V	-0.35	4.48	26.78	21.95	0.157
		714.5	V	-0.53	4.51	26.55	21.51	0.142
5 M	QPSK	701.5	V	-0.47	4.44	27.67	22.76	0.189
		707.5	V	-0.35	4.48	27.56	22.73	0.187
		713.5	V	-0.48	4.50	27.47	22.49	0.177
	16QAM	701.5	V	-0.47	4.44	26.99	22.08	0.161
		707.5	V	-0.35	4.48	26.20	21.37	0.137
		713.5	V	-0.48	4.50	26.73	21.75	0.150
10 M	QPSK	704.0	V	-0.42	4.46	27.64	22.76	0.189
		707.5	V	-0.35	4.48	27.58	22.75	0.188
		711.0	V	-0.35	4.49	27.67	22.83	0.192
	16QAM	704.0	V	-0.42	4.46	26.98	22.10	0.162
		707.5	V	-0.50	4.48	27.09	22.11	0.163
		711.0	V	-0.35	4.49	26.59	21.75	0.150

Test mode: LTE Band 13

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	779.5	V	0.60	4.68	27.83	23.75	0.237
		782.0	V	0.56	4.70	27.88	23.74	0.237
		784.5	V	0.51	4.71	28.16	23.96	0.249
	16QAM	779.5	V	0.60	4.68	26.77	22.69	0.186
		782.0	V	0.56	4.70	27.27	23.13	0.206
		784.5	V	0.51	4.71	27.78	23.58	0.228
10 M	QPSK	782.0	V	0.56	4.70	28.35	24.21	0.264
	16QAM	782.0	V	0.56	4.70	27.32	23.18	0.208

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

Test mode: LTE Band 4

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	H	5.41	6.88	27.35	25.88	0.387
		1 732.5	H	5.35	6.90	26.04	24.49	0.281
		1 754.3	H	5.29	6.94	26.58	24.93	0.311
	16QAM	1 710.7	H	5.41	6.88	26.67	25.20	0.331
		1 732.5	H	5.35	6.90	24.74	23.19	0.208
		1 754.3	H	5.29	6.94	25.73	24.08	0.256
3 M	QPSK	1 711.5	H	5.41	6.88	27.28	25.81	0.381
		1 732.5	H	5.35	6.90	25.81	24.26	0.267
		1 753.5	H	5.29	6.94	26.11	24.46	0.279
	16QAM	1 711.5	H	5.41	6.88	26.06	24.59	0.288
		1 732.5	H	5.35	6.90	24.94	23.39	0.218
		1 753.5	H	5.29	6.94	25.32	23.67	0.233
5 M	QPSK	1 712.5	H	5.41	6.88	26.97	25.49	0.354
		1 732.5	H	5.35	6.90	25.72	24.17	0.261
		1 752.5	H	5.29	6.95	25.86	24.20	0.263
	16QAM	1 712.5	H	5.41	6.88	25.71	24.23	0.265
		1 732.5	H	5.35	6.90	24.91	23.36	0.217
		1 752.5	H	5.29	6.95	24.87	23.21	0.209
10 M	QPSK	1 715.0	H	5.40	6.87	26.86	25.39	0.346
		1 732.5	H	5.35	6.90	25.65	24.10	0.257
		1 750.0	H	5.30	6.94	23.92	22.28	0.169
	16QAM	1 715.0	H	5.40	6.87	25.98	24.51	0.282
		1 732.5	H	5.35	6.90	25.05	23.50	0.224
		1 750.0	H	5.30	6.94	23.44	21.80	0.151
15 M	QPSK	1 717.5	H	5.39	6.89	27.00	25.50	0.355
		1 732.5	H	5.35	6.90	25.48	23.93	0.247
		1 747.5	H	5.31	6.93	23.16	21.54	0.143
	16QAM	1 717.5	H	5.39	6.89	26.01	24.51	0.282
		1 732.5	H	5.35	6.90	24.98	23.43	0.220
		1 747.5	H	5.31	6.93	22.32	20.70	0.117
20 M	QPSK	1 720.0	H	5.38	6.89	26.74	25.23	0.333
		1 732.5	H	5.35	6.90	25.54	23.99	0.251
		1 745.0	H	5.31	6.93	22.85	21.23	0.133
	16QAM	1 720.0	H	5.38	6.89	26.06	24.55	0.285
		1 732.5	H	5.35	6.90	24.26	22.71	0.187
		1 745.0	H	5.31	6.93	22.27	20.65	0.116

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

Test mode: LTE Band 66

Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
		[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
1.4 M	QPSK	1 710.7	H	5.41	6.88	28.76	27.29	0.536
		1 745.0	H	5.31	6.93	24.18	22.56	0.180
		1 779.3	H	5.22	7.02	26.84	25.04	0.319
	16QAM	1 710.7	H	5.41	6.88	27.37	25.90	0.389
		1 745.0	H	5.31	6.93	22.83	21.21	0.132
		1 779.3	H	5.22	7.02	26.09	24.29	0.269
3 M	QPSK	1 711.5	H	5.41	6.88	27.97	26.50	0.447
		1 745.0	H	5.31	6.93	23.61	21.99	0.158
		1 778.5	H	5.22	7.02	26.13	24.33	0.271
	16QAM	1 711.5	H	5.41	6.88	26.91	25.44	0.350
		1 745.0	H	5.31	6.93	22.98	21.36	0.137
		1 778.5	H	5.22	7.02	25.47	23.67	0.233
5 M	QPSK	1 712.5	H	5.41	6.88	27.43	25.95	0.394
		1 745.0	H	5.31	6.93	23.53	21.91	0.155
		1 777.5	H	5.22	7.02	26.66	24.86	0.306
	16QAM	1 712.5	H	5.41	6.88	26.39	24.91	0.310
		1 745.0	H	5.31	6.93	22.99	21.37	0.137
		1 777.5	H	5.22	7.02	25.61	23.81	0.240
10 M	QPSK	1 715.0	H	5.40	6.87	27.77	26.30	0.427
		1 745.0	H	5.31	6.93	23.51	21.89	0.155
		1 775.0	H	5.23	7.00	26.36	24.59	0.288
	16QAM	1 715.0	H	5.40	6.87	26.79	25.32	0.340
		1 745.0	H	5.31	6.93	22.86	21.24	0.133
		1 775.0	H	5.23	7.00	25.56	23.79	0.239
15 M	QPSK	1 717.5	H	5.39	6.89	27.87	26.37	0.434
		1 745.0	H	5.31	6.93	23.39	21.77	0.150
		1 772.5	H	5.24	7.00	26.03	24.27	0.267
	16QAM	1 717.5	H	5.39	6.89	27.02	25.52	0.356
		1 745.0	H	5.31	6.93	22.81	21.19	0.132
		1 772.5	H	5.24	7.00	25.05	23.29	0.213
20 M	QPSK	1 720.0	H	5.38	6.89	27.54	26.03	0.401
		1 745.0	H	5.31	6.93	23.75	22.13	0.163
		1 770.0	H	5.24	7.00	26.79	25.03	0.318
	16QAM	1 720.0	H	5.38	6.89	26.76	25.25	0.335
		1 745.0	H	5.31	6.93	22.50	20.88	0.122
		1 770.0	H	5.24	7.00	26.22	24.46	0.279

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

Test mode: LTE Band 71

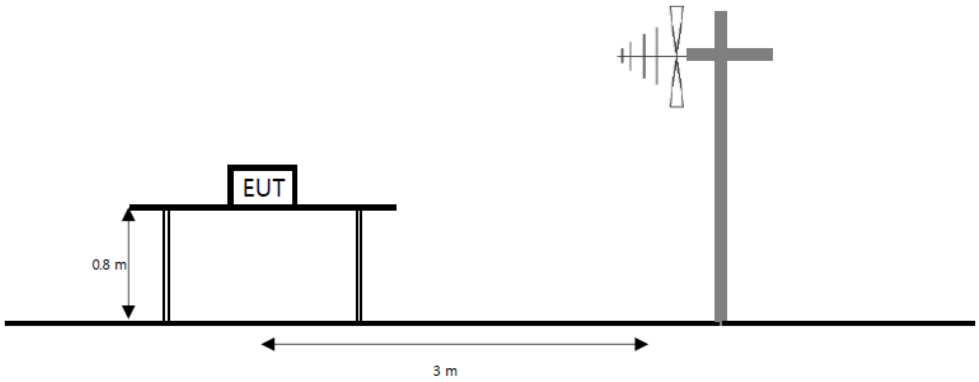
Bandwidth	Modulation	Frequency	Pol.	Antenna Gain	C.L	Substitute Level	ERP	
		[㎒]	[V/H]	[dBd]	[dB]	[dBm]	[dBm]	[W]
5 M	QPSK	665.50	V	-0.93	4.36	26.11	20.82	0.121
		680.50	V	-0.70	4.37	27.55	22.48	0.177
		695.50	V	-0.55	4.42	27.72	22.75	0.188
	16QAM	665.50	V	-0.93	4.36	24.73	19.44	0.088
		680.50	V	-0.70	4.37	26.34	21.27	0.134
		695.50	V	-0.55	4.42	27.08	22.11	0.163
10 M	QPSK	668.00	V	-1.08	4.36	26.55	21.11	0.129
		680.50	V	-0.70	4.37	27.73	22.66	0.185
		693.00	V	-0.57	4.43	28.19	23.19	0.208
	16QAM	668.00	V	-1.08	4.36	25.02	19.58	0.091
		680.50	V	-0.70	4.37	27.12	22.05	0.160
		693.00	V	-0.57	4.43	27.34	22.34	0.171
15 M	QPSK	670.50	V	-1.18	4.37	26.69	21.14	0.130
		680.50	V	-0.70	4.37	27.73	22.66	0.185
		690.50	V	-0.60	4.42	28.11	23.09	0.204
	16QAM	670.50	V	-1.18	4.37	25.53	19.98	0.100
		680.50	V	-0.70	4.37	26.97	21.90	0.155
		690.50	V	-0.60	4.42	27.42	22.40	0.174
20 M	QPSK	673.00	V	-1.05	4.37	27.40	21.98	0.158
		680.50	V	-0.70	4.37	27.75	22.68	0.185
		688.00	V	-0.62	4.40	28.22	23.20	0.209
	16QAM	673.00	V	-1.05	4.37	26.45	21.03	0.127
		680.50	V	-0.93	4.37	27.35	22.05	0.160
		688.00	V	-0.70	4.40	27.01	21.91	0.155

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

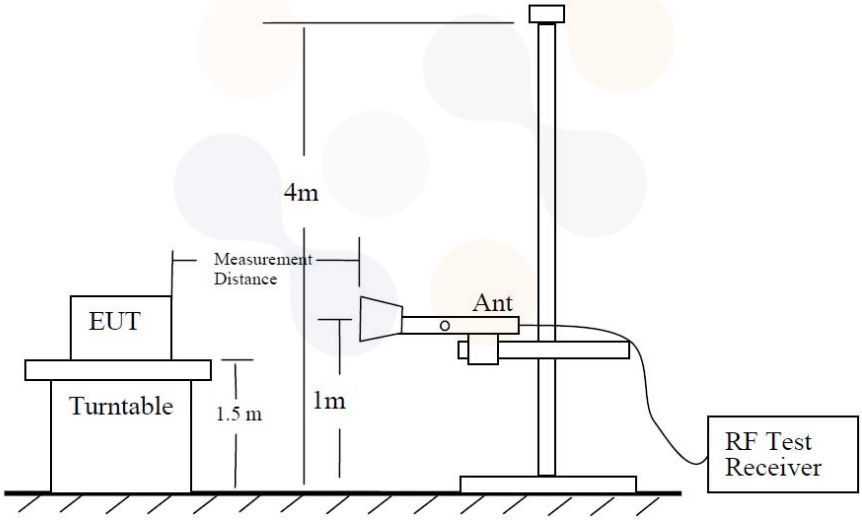
6.2. Radiated Spurious Emissions

Test setup

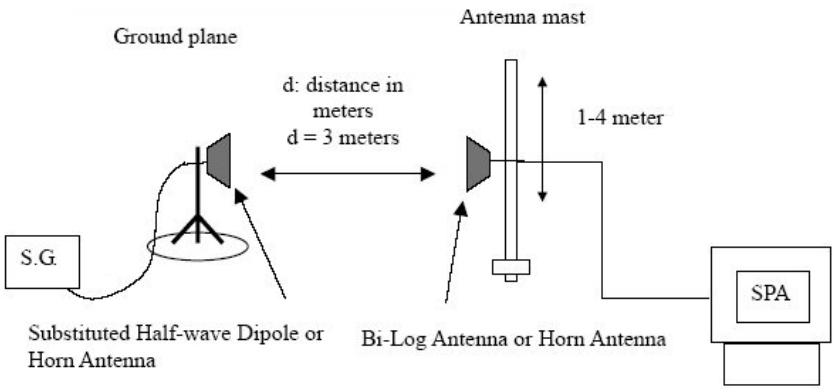
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



The diagram below shows the test setup that is utilized to make the measurements for emission from 1 ㎓ to the tenth harmonic of the highest fundamental frequency or to 40 ㎓ emissions, whichever is lower.



The diagram below shows the test setup for substituted method.



Limit

According to §22.917(a), §24.238(a) and RSS-132(5.5), RSS-133(6.5), the power of any emission outside of the authorized operating frequency ranges must be attenuated below the transmitting power (P) by a factor of at least 43 + 10log($P_{[Watts]}$) ㏈.

According to §27.53(c)(2) and RSS-130(4.7), on any frequency outside the 776-788 ㎒ band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10log($P_{[Watts]}$) ㏈.
According to §27.53(f), for operations in the 746-758 ㎒, 775-788 ㎒, and 805-806 ㎒ bands, emissions in the band 1559-1610 ㎒ shall be limited to -70 ㏈W/㎒ equivalent isotropically radiated power (EIRP) for wideband signals, and -80 ㏈W EIRP for discrete emissions of less than 700 ㎐ 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 ㎒ band and the 698-746 ㎒ 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 + 10log($P_{[Watts]}$) ㏈.

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 + 10log($P_{[Watts]}$) ㏈.

Test procedure

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

Test settings

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

For the narrowband spurious settings:

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

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 ㎓ below) or horn antenna (1 ㎓ above) connected to a signal generator.
7. The test antenna shall be raised and lowered through the specified range of height to ensure that the maximum signal is received.
8. The input signal to the substitution antenna shall be adjusted to the level that produces a level detected by the measuring corrected for the change of input attenuator setting of the measuring receiver.
9. The input level to the substitution antenna shall be recorded as power level in ㏈m, corrected for any change of input attenuator setting of the measuring receiver.
10. The measurement shall be repeated with the test antenna and the substitution antenna orientated for horizontal polarization.

Test results (Above 1 000 ㎒)

Test mode : LTE Band 2
Frequency(㎒) : 1 855.0
Channel : 18675
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 709.50	H	8.44	11.02	-48.82	-51.40	-13.00	38.40
	5 565.00	H	10.33	13.54	-54.29	-57.50	-13.00	44.50
	7 419.00	V	11.68	15.77	-52.91	-57.00	-13.00	44.00
	9 275.25	H	12.96	17.47	-49.99	-54.50	-13.00	41.50

Test mode : LTE Band 2
Frequency(㎒) : 1 880.0
Channel : 18900
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 759.75	H	8.52	10.85	-50.27	-52.60	-13.00	39.60
	5 640.00	H	10.36	13.53	-54.73	-57.90	-13.00	44.90
	7 521.75	H	11.73	15.83	-52.40	-56.50	-13.00	43.50
	9 399.75	H	12.98	17.82	-48.36	-53.20	-13.00	40.20

Test mode : LTE Band 2
Frequency(㎒) : 1 905
Channel : 19150
Bandwidth(㎒) : 10

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 809.25	H	8.59	11.33	-53.86	-56.60	-13.00	43.60
	5 715.00	H	10.39	13.41	-48.88	-51.90	-13.00	38.90
	7 620.75	V	11.89	16.10	-51.69	-55.90	-13.00	42.90
	9 525.75	V	12.99	17.83	-48.66	-53.50	-13.00	40.50

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

Test mode : LTE Band 5
Frequency(㎒) : 824.7
Channel : 20407
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 649.60	V	5.58	6.76	-45.92	-47.10	-13.00	34.10
	2 474.40	V	6.02	8.34	-46.78	-49.10	-13.00	36.10
	3 298.40	V	7.70	10.12	-53.78	-56.20	-13.00	43.20
	4 123.20	V	8.97	11.61	-54.66	-57.30	-13.00	44.30

Test mode : LTE Band 5
Frequency(㎒) : 836.5
Channel : 20525
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 673.20	V	5.52	6.73	-44.09	-45.30	-13.00	32.30
	2 509.60	H	6.12	8.37	-48.95	-51.20	-13.00	38.20
	3 346.40	V	7.79	10.22	-47.47	-49.90	-13.00	36.90
	4 182.40	V	9.01	11.43	-55.28	-57.70	-13.00	44.70

Test mode : LTE Band 5
Frequency(㎒) : 848.3
Channel : 20643
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 696.80	V	5.45	6.80	-43.85	-45.20	-13.00	32.20
	2 545.60	H	6.19	8.47	-48.92	-51.20	-13.00	38.20
	3 393.60	V	7.89	10.33	-47.16	-49.60	-13.00	36.60
	4 241.60	H	9.04	11.63	-57.01	-59.60	-13.00	46.60

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

Test mode : LTE Band 12
Frequency(㎒) : 699.7
Channel : 23017
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 399.60	V	5.36	6.17	-52.59	-53.40	-13.00	40.40
	2 099.60	H	4.90	7.65	-57.15	-59.90	-13.00	46.90
	2 799.20	H	6.70	9.01	-46.79	-49.10	-13.00	36.10
	3 498.80	V	8.10	10.56	-46.34	-48.80	-13.00	35.80

Test mode : LTE Band 12
Frequency(㎒) : 707.5
Channel : 23095
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 415.20	V	5.46	6.20	-55.56	-56.30	-13.00	43.30
	2 124.40	V	4.97	7.70	-58.17	-60.90	-13.00	47.90
	2 830.00	H	6.76	9.08	-50.98	-53.30	-13.00	40.30
	3 538.00	V	8.16	10.65	-52.51	-55.00	-13.00	42.00

Test mode : LTE Band 12
Frequency(㎒) : 715.3
Channel : 23173
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 431.20	V	5.56	6.24	-57.82	-58.50	-13.00	45.50
	2 143.60	V	5.03	7.73	-56.50	-59.20	-13.00	46.20
	2 861.60	H	6.82	9.15	-45.87	-48.20	-13.00	35.20
	3 576.80	V	8.22	10.19	-49.43	-51.40	-13.00	38.40

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

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 555.20	V	5.85	6.46	-58.09	-58.70	-13.00	45.70
	2 332.80	V	5.60	8.03	-47.97	-50.40	-13.00	37.40
	3 109.20	V	7.32	9.70	-55.42	-57.80	-13.00	44.80
	3 885.20	V	8.72	11.09	-56.43	-58.80	-13.00	45.80

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

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 576.85	H	5.78	6.52	-58.76	-59.50	-40.00	19.50

Note.
1. Limit Calculation(dBm)= 43 + 10log($P_{[Watts]}$)
   Limit Calculation of wide-band (dBm/㎒) = -70dBW/㎒ (-40 dBm/㎒)
   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 66/4
Frequency(㎒) : 1 710.7
Channel : 131979
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 421.50	H	7.94	10.39	-37.65	-40.10	-13.00	27.10
	5 132.25	H	9.93	13.10	-53.93	-57.10	-13.00	44.10
	6 843.00	H	11.44	15.26	-50.28	-54.10	-13.00	41.10
	8 553.75	V	12.90	16.90	-49.50	-53.50	-13.00	40.50

Test mode : LTE Band 66/4
Frequency(㎒) : 1 745.0
Channel : 132322
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 489.75	H	8.08	10.54	-38.24	-40.70	-13.00	27.70
	5 235.75	H	10.04	13.05	-55.49	-58.50	-13.00	45.50
	6 980.25	V	11.58	15.34	-51.44	-55.20	-13.00	42.20
	8 724.75	V	12.90	17.31	-49.39	-53.80	-13.00	40.80

Test mode : LTE Band 66/4
Frequency(㎒) : 1 779.3
Channel : 132665
Bandwidth(㎒) : 1.4

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	3 558.00	H	8.19	10.12	-42.17	-44.10	-13.00	31.10
	5 337.75	H	10.14	13.26	-53.48	-56.60	-13.00	43.60
	7 116.75	V	11.62	15.34	-49.28	-53.00	-13.00	40.00
	8 896.50	V	12.90	17.05	-45.95	-50.10	-13.00	37.10

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

Test mode : LTE Band 71
Frequency(㎒) : 673.0
Channel : 133222
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 346.40	H	5.02	6.01	-55.71	-56.70	-13.00	43.70
	2 019.20	H	4.66	7.51	-52.95	-55.80	-13.00	42.80
	2 690.80	V	6.48	8.77	-57.71	-60.00	-13.00	47.00
	3 365.60	H	7.83	10.27	-56.46	-58.90	-13.00	45.90

Test mode : LTE Band 71
Frequency(㎒) : 680.5
Channel : 133297
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 361.20	H	5.11	6.09	-55.52	-56.50	-13.00	43.50
	2 042.00	V	4.73	7.55	-53.78	-56.60	-13.00	43.60
	2 722.80	V	6.55	8.84	-58.21	-60.50	-13.00	47.50
	3 403.20	V	7.91	10.35	-57.36	-59.80	-13.00	46.80

Test mode : LTE Band 71
Frequency(㎒) : 688.0
Channel : 133372
Bandwidth(㎒) : 20

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	1 376.40	V	5.21	6.12	-51.19	-52.10	-13.00	39.10
	2 064.40	V	4.79	7.59	-54.90	-57.70	-13.00	44.70
	2 752.40	H	6.60	8.90	-59.10	-61.40	-13.00	48.40
	3 438.80	V	7.98	10.43	-57.25	-59.70	-13.00	46.70

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

7. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Bilog Antenna	Teseq GmbH	CBL 6143A	35039	23.05.12
Bilog Antenna	ETS.LINDGREN	'3143B	00228420	23.09.28
Horn Antenna	ETS.LINDGREN	3117	161225	23.05.04
Horn Antenna	ETS.LINDGREN	3117	00227509	23.09.20
Horn Antenna	ETS.lindgren	3116	00086632	23.01.25
Horn Antenna	Steatite Antennas	QMS-00225	17790	23.07.14
Horn Antenna	Steatite Antennas	QMS-00238	17791	23.07.14
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	23.08.10
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	23.08.10
Broadband Amplifier	SONOMA INSTRUMENT	315	300314	23.01.19
Low Noise Amplifier	TESTEK	TK-PA18H	220123-L	23.12.02
DC Power Supply	AGILENT	E3632A	MY40006352	23.05.02
Signal Generator	R&S	SMB100A	176206	23.01.19
Spectrum Analyzer	AGILENT	N9040B	MY57010132	23.10.14
Widebnad Radio Communication Tester	R & S	CMW500	141780	23.03.28
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