verify No.027443653832

위변조방지/진위확인
cert.qnqkorea.com:8080

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-SRF0044 Page(1) of (47)	eurofins | KCTL

1. Client

- Name : Samsung Electronics Co., Ltd.
- Address : 129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
- Date of Receipt : 2024-03-28

2. Use of Report : Certification

3. Name of Product / Model : Smart Wearable / SM-L315U

4. Derivative Model : SM-L315F

5. Manufacturer / Country of Origin : Samsung Electronics Co., Ltd. / Vietnam

6. FCC ID : A3LSML315

7. Date of Test : 2024-04-01 to 2024-04-22

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 27 Subpart C

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

	Tested by	Technical Manager
Affirmation	Name : Kwonse Kim (Signature)	Name : Harim Lee (Signature)

2024-04-24

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
2024-04-24	Originally issued	-

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

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	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Manufacturer	:	Samsung Electronics Co., Ltd.
Address	:	129, Samsung-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Rep. of Korea
Factory 1	:	AG TECH CO.,LTD
Address 1	:	Lot G3, Que Vo Industrial Park(Expanded Area), Nam son Ward, Bac Ninh Province, Vietnam
Factory 2	:	ALMUS VINA
Address 2	:	Lot CN07A, Phu Ha Industrial Park, Ha Thach Commune, Phu Tho Town, Phu Tho Province, Vietnam
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	:	Smart Wearable		
Model	:	SM-L315U		
Derivative model	:	SM-L315F		
Modulation technique	:	LTE	:	QPSK, 16QAM
Power source	:	DC 3.88 V		
Antenna specification	:	PIFA + Metal Antenna		
Antenna gain	:	-13.1 dBi		
Frequency range	:	LTE B7	:	2 502.5 ㎒ ~ 2 567.5 ㎒
Bandwidth	:	LTE B7	:	5/10/15/20 ㎒
Software version	:	L315U.001		
Hardware version	:	REV1.0		
Test device serial No.	:	Conducted	:	R3AX400NZGL
		Radiated	:	R3AX400NYFN, R3AX400NX0P
Operation Temperature	:	0 ℃ ~ 35 ℃		

Note.
1. The product equality letter includes detailed information about the differences between SM-L315U and SM-L315F model.

2.1. Accessory information

Equipment	Manufacturer	Model	Serial No.	Power source	FCC ID & IC
Wireless charger	RF TECH	EP-OL300	-	5.0 V, 3.0 A	FCC ID : A3LEPOL300 IC : 649E-EPOL300

2.2. Frequency/channel operations

This device contains the following capabilities:
LTE B7

LTE B7

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

Table 2.2-1. 5M BW

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

Table 2.2-2. 10M BW

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

Table 2.2-3. 15M BW

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

Table 2.2-4. 20M BW

3. Maximum ERP/EIRP power

LTE B7

Mode	Tx frequency (㎒)	Emission designator	EIRP	
			Max. power (㏈m)	Max. power (W)
LTE B7	2 502.5 ~ 2 567.5	4M55G7D	17.85	0.061
		4M55W7D	16.76	0.047
	2 505.0 ~ 2 565.0	9M04G7D	18.17	0.066
		9M04W7D	17.37	0.055
	2 507.5 ~ 2 562.5	13M6G7D	18.26	0.067
		13M6W7D	17.35	0.054
	2 510.0 ~ 2 560.0	18M1G7D	17.66	0.058
		18M1W7D	16.94	0.049

4. Summary of tests

FCC Part section(s)	Parameter	Test Limit	Test Condition	Test results
2.1046	Conducted Output Power	N/A	Conducted	Pass
2.1049	Occupied Bandwidth & 26 dB Bandwidth	N/A		Pass
2.1051 27.53(m)(4)	Band Edge Emissions at Antenna Terminal	Refer to Section 7.3 and 7.4		Pass
	Spurious Emissions at Antenna Terminal			Pass
27.50(d)	Peak to Average Power Ratio	<13 dB		Pass
2.1055 27.54	Frequency stability	Emission must remain in band		Pass
27.53(h)(2)	Equivalent Isotropic Radiated Power	<2 Watts max. EIRP	Radiated	Pass
2.1053 27.53(m)(4)	Radiated Spurious Emissions	<55 + 10Log$_{10}$(P) dB for all out of band emissions		Pass

Notes:

1. 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. In the case of radiated spurious emissions, only the worst case bandwidth results were reported.
3. Output power measurements were measured on all of modulation. All tests except output power was performed with below modulation with highest power.
   1) LTE: QPSK, 16QAM
4. However, the PAPR was evaluated for all wave forms and modulations during pre-test, then all bandwidth was performed for the modulations with the highest result.
   1) LTE: QPSK, 16QAM
5. All configurations have been performed (Stand-alone, Stand-alone with TA and Strap).
6. The fundamental of the EUT was investigated in three orthogonal orientations X, Y and Z and all of the radiated tests have been performed with the accessories as below. It was determined that below orientation was worst case orientation for each band.

Band	Strap	With charger	Without charger		
		X-axis	X-axis	Y-axis	Z-axis
LTE B7	With strap	-	-	O	-
	Without strap	-	-	-	-

7. Test Condition

- The measurement was performed with various configurations then worst results are reported.

1) Radiated measurement

Test Description	Mode	Condition		Test Channel
Effective Isotropic power	LTE	QPSK, 16QAM	RB Size: 1	Low, Middle, High
Radiated Spurious Emissions	LTE	QPSK	RB Size: 1	Low, Middle, High

Band	Bandwidth (㎒)	RB size	RB offset
LTE B7	5, 10, 15, 20	1	Low, Middle, High

2) Conducted measurement

Test Description	Mode	Condition		Test Channel
OBW & 26 ㏈ BW	LTE	QPSK, 16QAM	RB Size: Full	Low, Middle, High
PAPR	LTE	QPSK, 16QAM	RB Size: Full	Middle
Band Edge	LTE	QPSK	RB Size: 1, Full	Low, High
Spurious Emissions	LTE	QPSK	RB Size: 1	Low, Middle, High

Band	Bandwidth (㎒)	RB size	RB offset
LTE B7	5, 10, 15, 20	1	0, 24, 49, 74, 99
		Full	0

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	1.9 dB	
Radiated spurious emissions	Below 1 000 ㎒	2.5 dB
	1 000 ㎒ ~ 18 000 ㎒	2.5 dB
	Above 1 8000 ㎒	2.6 dB

6. Measurement results explanation example

Frequency (㎒)	Factor(㏈)	Frequency (㎒)	Factor(㏈)
30	5.82	16 000	9.29
50	6.09	17 000	9.50
100	6.15	18 000	9.55
200	6.09	19 000	9.31
300	6.28	20 000	8.51
400	6.51	21 000	9.00
500	6.57	22 000	9.52
600	6.62	23 000	9.53
700	6.67	24 000	9.95
800	6.70	25 000	10.82
900	6.74	26 000	10.60
1 000	6.76	26 500	10.73
2 000	7.06	27 000	10.59
3 000	7.25	28 000	11.48
4 000	7.39	29 000	10.38
5 000	7.54	30 000	10.69
6 000	7.94	31 000	11.57
7 000	8.10	32 000	11.70
8 000	8.21	33 000	12.00
9 000	8.26	34 000	11.88
10 000	7.36	35 000	11.65
11 000	8.35	36 000	11.80
12 000	8.40	37 000	11.51
13 000	8.62	38 000	10.82
14 000	8.71	39 000	11.00
15 000	9.02	40 000	11.30

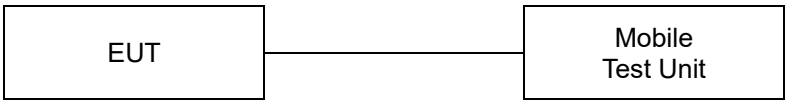
Note.

1. Offset(㏈) = RF cable loss(㏈) + Divider (㏈)

7. Test results

7.1. Conducted output power

Test setup



Test procedure

971168 D01 v03r01 – Section 5.2
ANSI C63.26-2015 – Section 5.2.4.2
CFR 47 - Section §2.1046

Test settings

When an average power meter is used to perform RF output power measurements, the fundamental condition that measurement be performed only over durations of active transmissions at maximum output power level applies. Thus, an average power meter can always be used to perform the measurement when the EUT can be configured to transmit continuously.

If the EUT cannot be configured to transmit continuously (i.e., burst duty cycle < 98%), then the following options can be implemented to facilitate measurement of the average power with an average power meter:

a) A gated average power meter can be used to perform the measurement if the gating parameters can be adjusted such that the power is measured only during active transmission bursts at maximum output power levels.
b) A conventional average power meter with no signal gating capability can also be used if the measured burst duty cycle is constant (i.e., duty cycle variations are less than or equal to ± 2%) by performing the measurement over the on/off burst cycles and then correcting (increasing) the measured level by a factor equal to [10log (1/duty cycle)]. See 5.2.4.3.4 for guidance with respect to measuring the transmitter duty cycle.

See item r) of 4.1 for more information regarding power meter functional requirements and limitations, and consult the instrumentation-specific application literature for proper set-up and use.

Note:

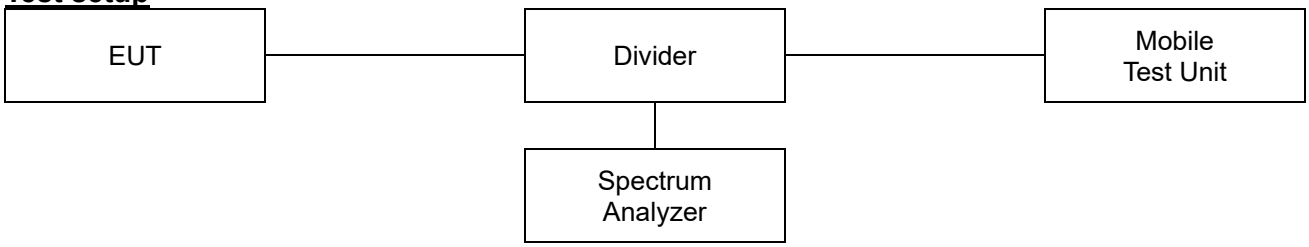
1. Offset(㏈) = RF cable loss(㏈)

Test results

Test Band	Bandwidth (㎒)	Test mode	RB size	RB offset	Maximum Average Power (dBm)		
					Channel		
					Low	Middle	High
LTE B7	5	QPSK	1	0	22.18	22.31	22.54
			1	12	22.11	22.25	22.47
			1	24	22.09	22.15	22.45
			12	0	21.25	21.40	21.67
			12	7	21.20	21.36	21.62
			12	13	21.16	21.28	21.59
			25	0	21.22	21.35	21.59
		16QAM	1	0	21.15	21.28	21.52
			1	12	21.01	21.15	21.43
			1	24	21.10	21.12	21.45
			12	0	20.27	20.34	20.68
			12	7	20.25	20.27	20.58
			12	13	20.21	20.21	20.57
			25	0	20.18	20.26	20.65
	10	QPSK	1	0	22.40	22.48	22.71
			1	25	22.19	22.30	22.54
			1	49	22.12	22.20	22.49
			25	0	21.36	21.45	21.72
			25	12	21.26	21.36	21.65
			25	25	21.24	21.30	21.59
			50	0	21.24	21.39	21.64
		16QAM	1	0	21.53	21.53	21.76
			1	25	21.44	21.20	21.43
			1	49	21.10	20.99	21.57
			25	0	20.30	20.45	20.73
			25	12	20.23	20.38	20.66
			25	25	20.14	20.29	20.59
			50	0	20.23	20.39	20.64
	15	QPSK	1	0	22.63	22.62	22.73
			1	36	22.30	22.34	22.45
			1	74	22.22	22.26	22.33
			36	0	21.52	21.53	21.71
			36	18	21.36	21.38	21.57
			36	37	21.31	21.31	21.50
			75	0	21.37	21.45	21.59
		16QAM	1	0	21.88	21.56	21.96
			1	36	21.63	21.23	21.61
			1	74	21.41	21.15	21.56
			36	0	20.46	20.56	20.66
			36	18	20.34	20.39	20.51
			36	37	20.26	20.30	20.44
			75	0	20.36	20.40	20.54
	20	QPSK	1	0	22.71	22.74	22.85
			1	49	22.04	22.24	22.34
			1	99	22.03	22.20	22.24
			50	0	21.43	21.55	21.69
			50	24	21.25	21.37	21.47
			50	50	21.14	21.28	21.37
			100	0	21.30	21.41	21.56
		16QAM	1	0	21.66	21.80	21.97
			1	49	21.19	21.40	21.46
			1	99	21.12	21.19	21.49
			50	0	20.39	20.53	20.61
			50	24	20.20	20.32	20.43
			50	50	20.16	20.26	20.35
			100	0	20.26	20.40	20.52

7.2. 99% Occupied Bandwidth & 26dB Bandwidth

Test setup



Limit

According to §2.1049,

The occupied bandwidth, that is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers radiated are each equal to 0.5 percent of the total mean power radiated by a given emission shall be measured.

Test procedure

971168 D01 v03r01 – Section 4.2 and 4.3
ANSI C63.26-2015 – Section 5.4.3 and 5.4.4

Test settings

◆ **26dB Bandwidth**

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The span range for the spectrum analyzer shall be wide enough to see sufficient roll off of the signal to make the measurement.

b) The nominal RBW shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation.
See guidance provided in 4.2.3.

d) The dynamic range of the spectrum analyzer at the selected RBW shall be more than 10 dB below the target "−X dB" requirement, i.e., if the requirement calls for measuring the −26 dB OBW, the spectrum analyzer noise floor at the selected RBW shall be at least 36 dB below the reference level.

e) Set spectrum analyzer detection mode to peak, and the trace mode to max hold.

f) Determine the reference value by either of the following:
   1) Set the EUT to transmit a modulated signal. Allow the trace to stabilize. Set the spectrum analyzer marker to the highest level of the displayed trace (this is the reference value).
   2) Set the EUT to transmit an unmodulated carrier. Set the spectrum analyzer marker to the level of the carrier.

g) Determine the "−X dB amplitude" as equal to (Reference Value − X). Alternatively, this calculation can be performed on the spectrum analyzer using the delta-marker measurement function.

h) If the reference value was determined using an unmodulated carrier, turn the EUT modulation on, then either clear the existing trace or start a new trace on the spectrum analyzer and allow the new trace to stabilize. Otherwise the trace from step f) shall be used for step i).

i) Place two markers, one at the lowest and the other at the highest frequency of the envelope of the spectral display such that each marker is at or slightly below the "−X dB amplitude" determined in step f). If a marker is below this "−X dB amplitude" value it should be as close as possible to this value. The OBW is the positive frequency difference between the two markers.

j) The spectral envelope can cross the "−X dB amplitude" at multiple points. The lowest or highest frequency shall be selected as the frequencies that are the farthest away from the center frequency at which the spectral envelope crosses the "−X dB amplitude."

k) The OBW shall be reported by providing plot(s) of the measuring instrument display, to include markers depicting the relevant frequency and amplitude information (e.g., marker table). The frequency and amplitude axis and scale shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

◆ 99% Occupied Bandwidth

a) The spectrum analyzer center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be set wide enough to capture all modulation products including the emission skirts (typically a span of 1.5 × OBW is sufficient).

b) The nominal IF filter 3 dB bandwidth (RBW) shall be in the range of 1% to 5% of the anticipated OBW, and the VBW shall be set ≥ 3 × RBW.

c) Set the reference level of the instrument as required to prevent the signal amplitude from exceeding the maximum spectrum analyzer input mixer level for linear operation. See guidance provided in 4.2.3.

d) Set the detection mode to peak, and the trace mode to max-hold.

e) If the instrument does not have a 99% OBW function, recover the trace data points and sum directly in linear power terms. Place the recovered amplitude data points, beginning at the lowest frequency, in a running sum until 0.5% of the total is reached. Record that frequency as the lower OBW frequency. Repeat the process until 99.5% of the total is reached and record that frequency as the upper OBW frequency. The 99% power OBW can be determined by computing the difference these two frequencies.

f) The OBW shall be reported and plot(s) of the measuring instrument display shall be provided with the test report. The frequency and amplitude axis and scale shall be clearly labeled. Tabular data can be reported in addition to the plot(s).

Notes:

1. The EUT was setup to maximum output power with all bandwidth and modulation.

Test results

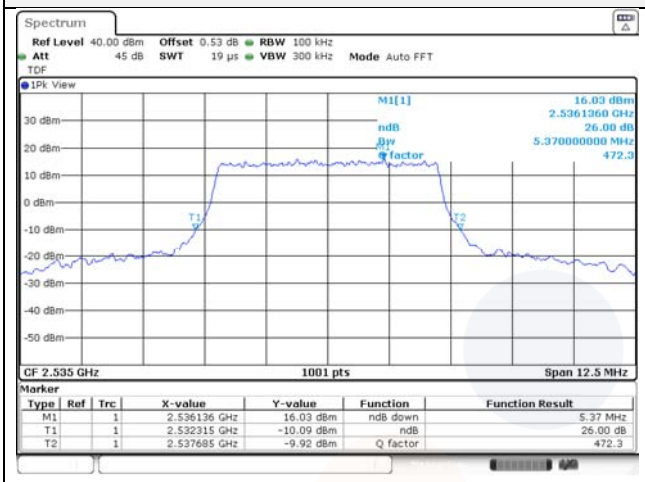
Test Band	Bandwidth (㎒)	Channel	Test mode	26㏈ Bandwidth (㎒)	99 % Bandwidth (㎒)
LTE B7	5	Low	QPSK	5.33	4.55
			16QAM	5.28	4.52
		Middle	QPSK	5.37	4.53
			16QAM	5.31	4.55
		High	QPSK	5.45	4.51
			16QAM	5.41	4.53
	10	Low	QPSK	10.34	9.02
			16QAM	10.39	9.04
		Middle	QPSK	10.22	9.04
			16QAM	10.39	9.04
		High	QPSK	10.22	9.02
			16QAM	10.27	9.02
	15	Low	QPSK	15.21	13.56
			16QAM	15.29	13.52
		Middle	QPSK	15.32	13.49
			16QAM	15.44	13.56
		High	QPSK	15.47	13.49
			16QAM	15.17	13.56
	20	Low	QPSK	19.88	18.08
			16QAM	19.83	17.98
		Middle	QPSK	20.28	18.03
			16QAM	19.83	18.08
		High	QPSK	20.23	17.93
			16QAM	19.98	18.08

In order to simplify the report, only Middle channel test plots are attached

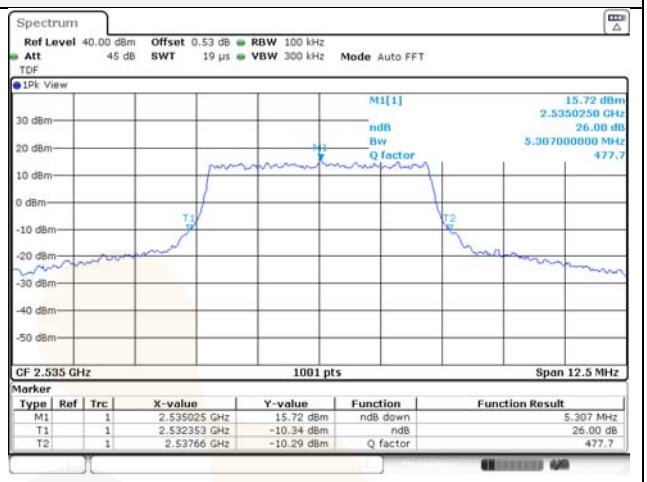
26dB Bandwidth

Test mode: LTE B7

5M BW QPSK Middle channel

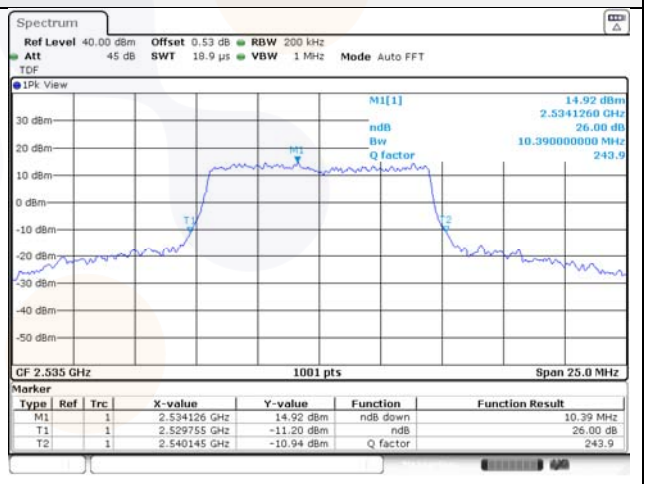


5M BW 16QAM Middle channel

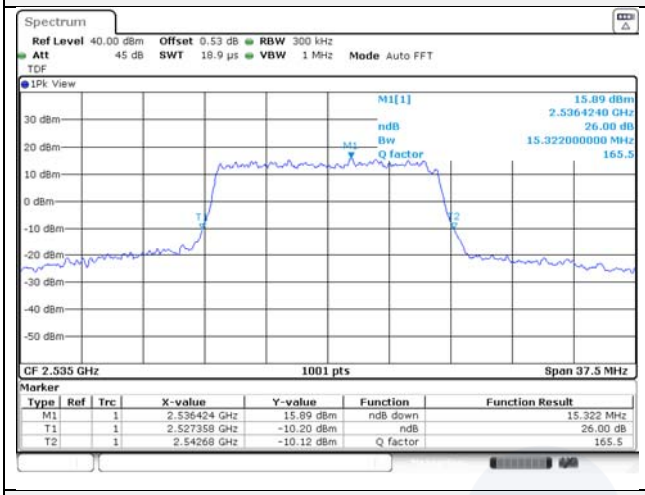


10M BW QPSK Middle channel

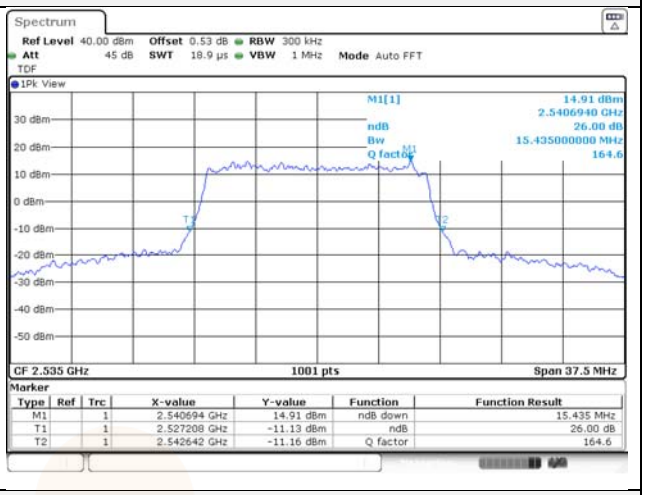
10M BW 16QAM Middle channel



15M BW QPSK Middle channel

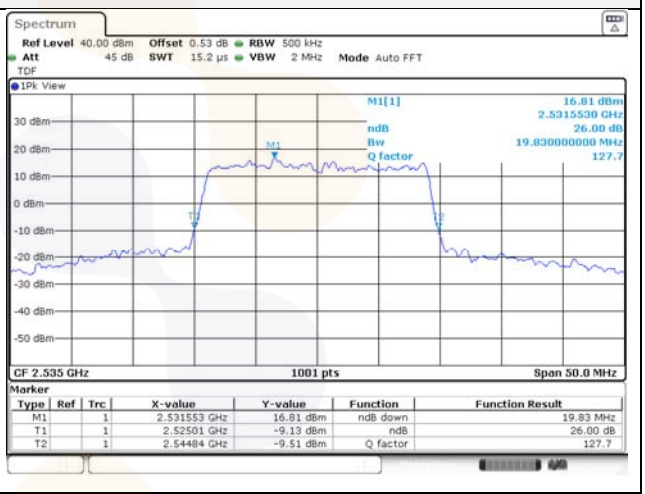


15M BW 16QAM Middle channel



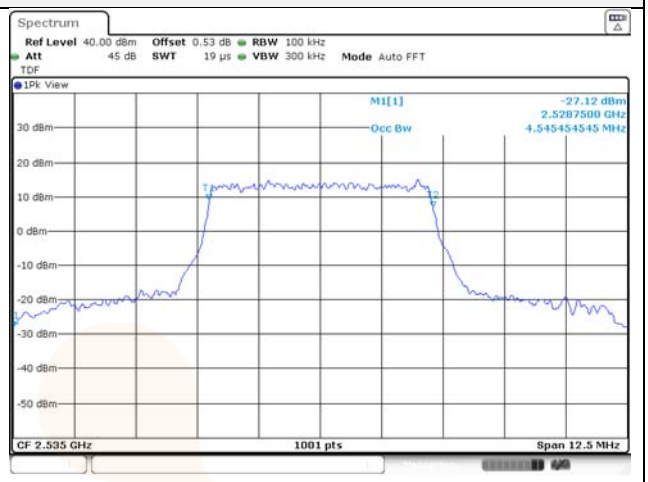
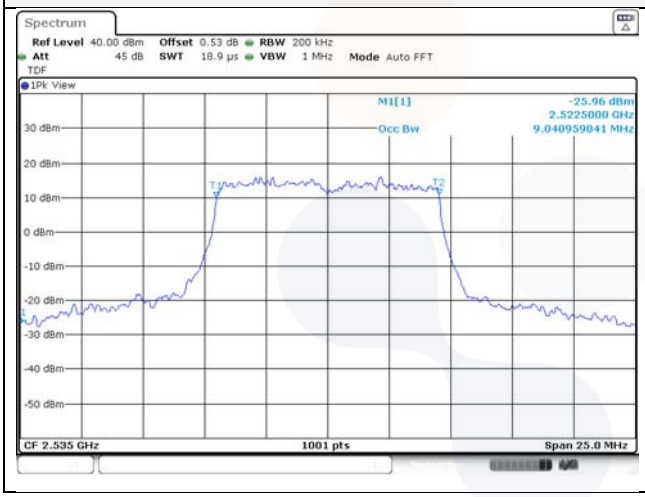
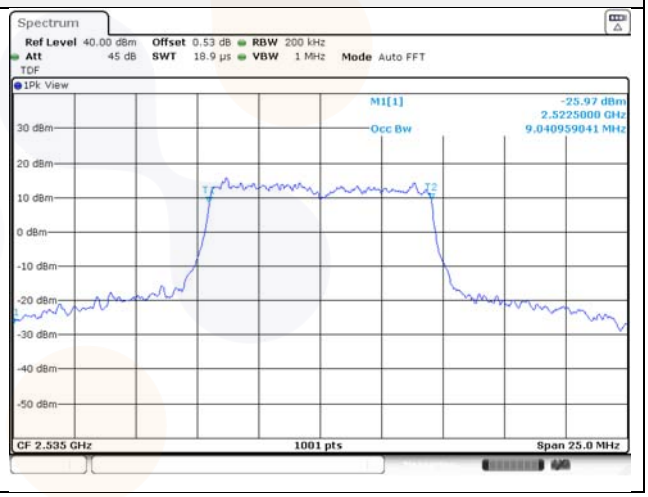
20M BW QPSK Middle channel

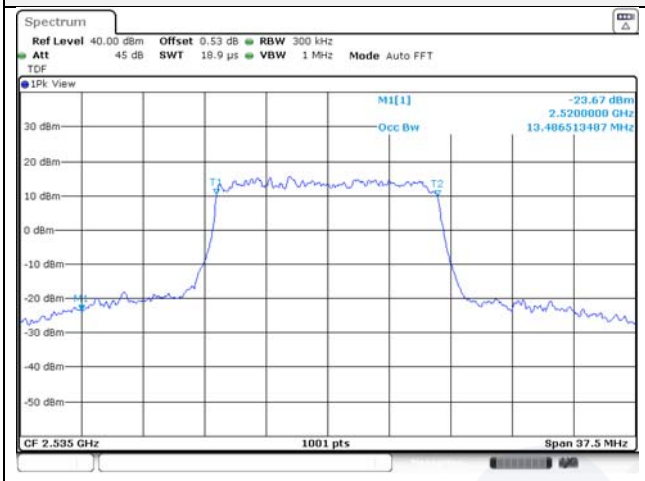
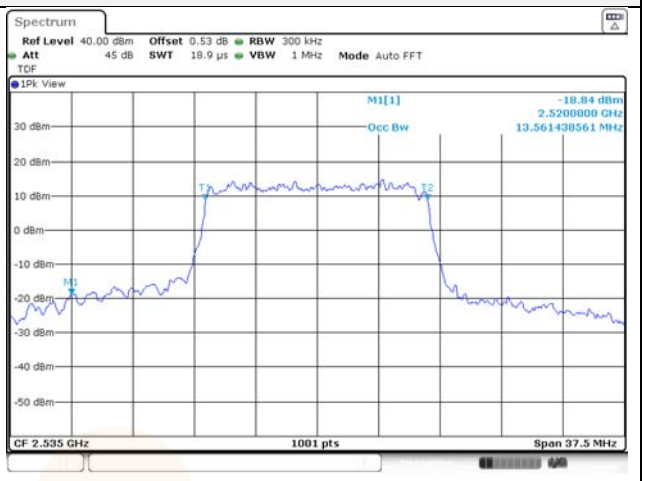
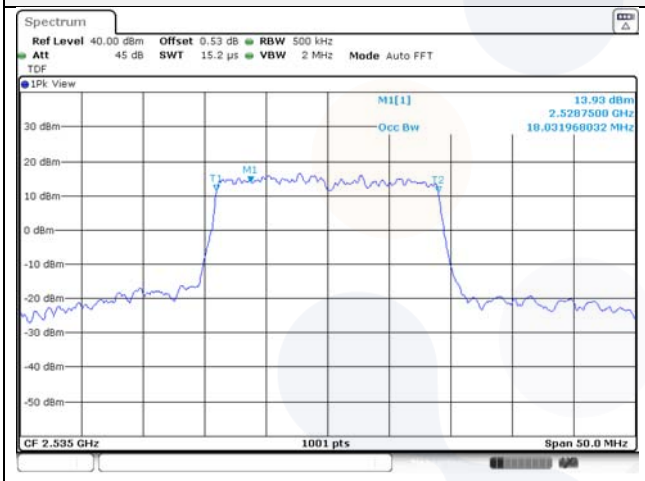
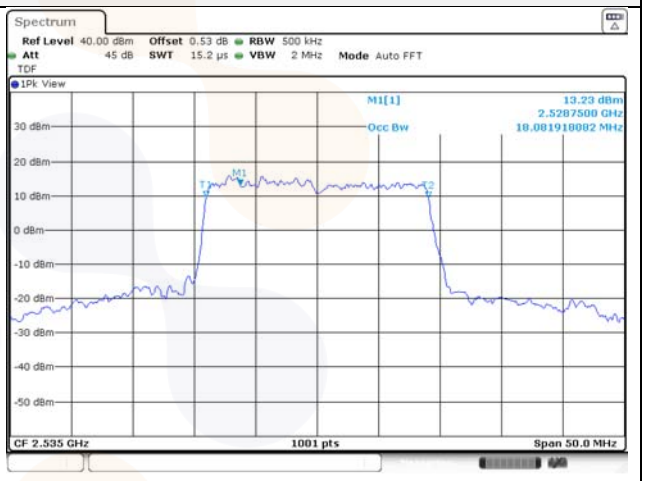
20M BW 16QAM Middle channel



99% Occupied Bandwidth

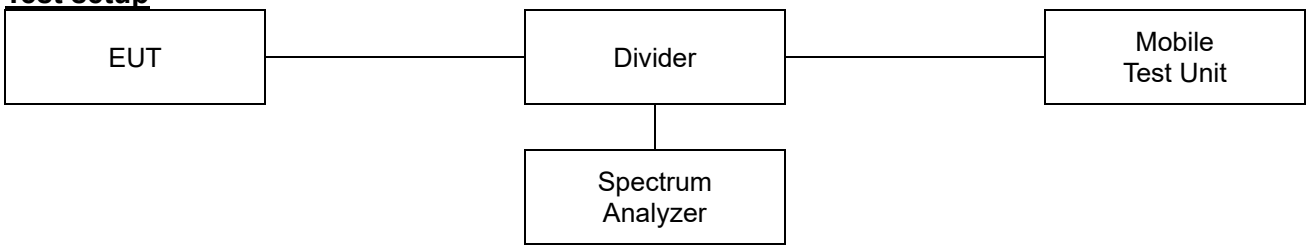
Test mode: LTE B7

5M BW QPSK Middle channel	5M BW 16QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 16QAM Middle channel**
	

15M BW QPSK Middle channel	15M BW 16QAM Middle channel
	
20M BW QPSK Middle channel	**20M BW 16QAM Middle channel**
	

7.3. Band Edge Emissions at Antenna Terminal

Test setup



Limit

According to §27.53(m)(4),

The attenuation factor shall be not less than 40 + 10log(P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10log(P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10log(P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10log(P) ㏈ on all frequencies between 2490.5 ㎒ and 2496 ㎒ and 55 + 10log(P) ㏈ at or below 2490.5 ㎒.

Test procedure

971168 D01 v03r01 - Section 6
ANSI C63.26-2015 – Section 5.7

Test settings

1) Start and stop frequency were set such that the band edge would be placed in the center of the plot
2) Span was set large enough so as to capture all out of band emissions near the band edge.
3) Set the RBW > 1% of the emission bandwidth.
4) Set the VBW ≥ 3 x RBW.
5) Set the number of sweep points ≥ 2 x Span/RBW
6) Detector = RMS
7) Trace mode = trace average
8) Sweep time should be auto for peak detection. For RMS detection the sweep time should be set as follows:
   a) If the device can be configured to transmit continuously (duty cycle ≥ 98%), set the (sweep time) > (number of points in sweep) x (symbol period) (e.g., by a factor of 10 x symbol period x number of points) Increasing the sweep time (i.e., slowing the sweep speed) will allow for averaging over multiple symbols.
   b) If the device cannot transmit continuously (duty cycle < 98%), a gated sweep shall be used when possible (i.e., gate triggered such that the analyzer only sweeps when the device is transmitting at full power), set the sweep time > (number of points in sweep) x (symbol period) but the sweep time shall always be maintained at a value that is less than or equal to the minimum transmission time
   c) If the device cannot be configured to transmit continuously (duty cycle > 98%), and a free-running sweep must be used, set the sweep time so that the averaging is performed over multiple on/off cycles by setting the sweep time

> (number of points in sweep) × (transmitter period) (i.e., the transmit on-time + the off-time). The spectrum analyzer readings shall subsequently be corrected by [10 log (1/duty cycle)]. This assumes that the transmission period and duty cycle is relatively constant (duty cycle variation ≤ ±2%).

d) If the device cannot be configured to transmit continuously and a free-running sweep must be used, and if the transmissions exhibit a non-constant duty cycle (duty cycle variations > ±2%), set the sweep time so that the averaging is performed over the on-period by setting the sweep time > (symbol period) × (number of points), while also maintaining the sweep time < (transmitter on-time). The trace mode shall be set to max hold, since not every display point will be averaged only over just the on-time. Thus, multiple sweeps (e.g., 100) in maximum hold art necessary to ensure that the maximum power is measured.

9) Allow trace to fully stabilize.

Notes:

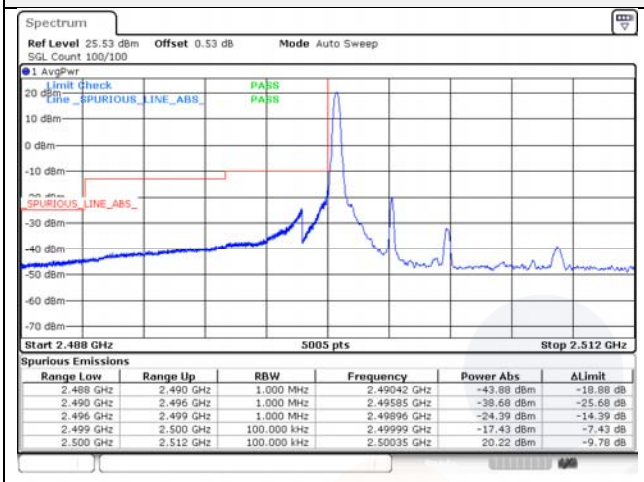
1. Per 27.53(m)(6), in the 1 megahertz bands immediately outside and adjacent to the frequency block a resolution bandwidth of at least two percent may be employed, except when the 1 megahertz band is 2495-2496 ㎒, in which case a resolution bandwidth of at least one percent may be employed. A narrower resolution bandwidth is permitted in all cases to improve measurement accuracy provided the measured power is integrated over the full required measurement bandwidth (i.e. 1 megahertz or 1 percent of emission bandwidth, as specified; or 1 megahertz or 2 percent for mobile digital stations, except in the band 2495-2496 ㎒).
2. The EUT was setup to maximum output power as its lowest and highest channel with all bandwidth, modulation and RB configurations.

Test results

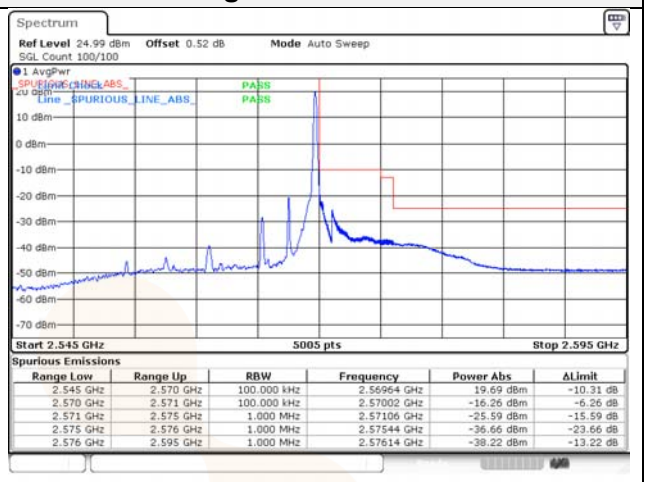
Test mode: LTE B7

5M BW QPSK

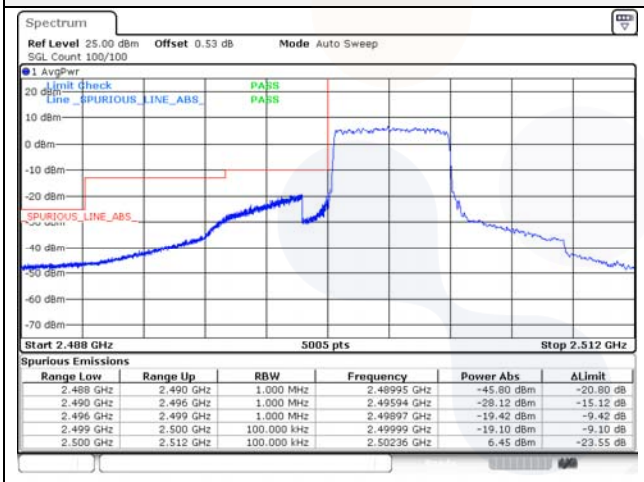
Low channel 1RB



High channel 1RB



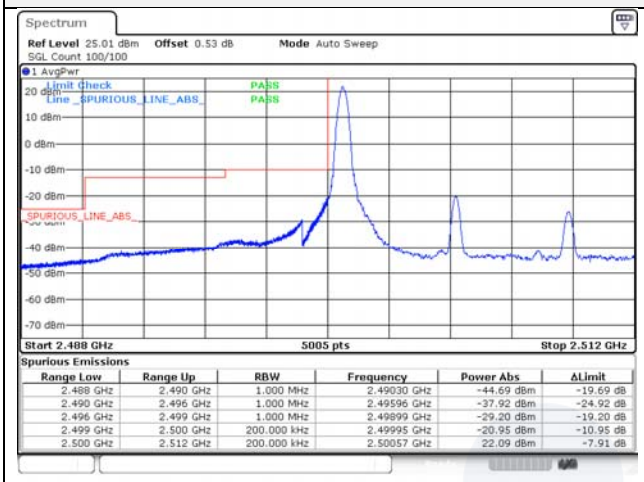
Low channel FRB



High channel FRB

10M BW QPSK

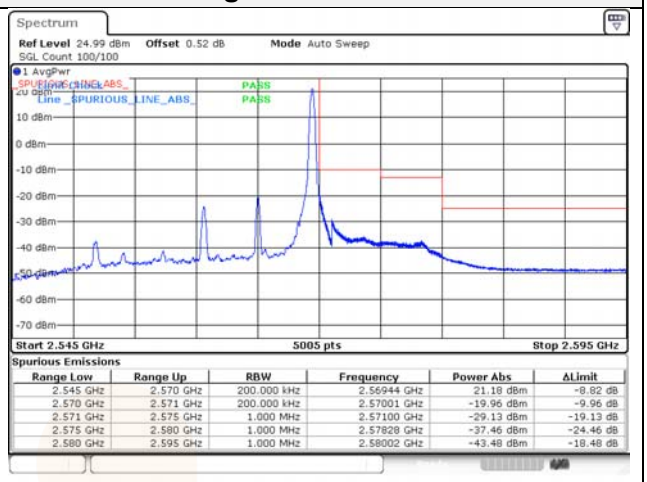
Low channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49030 GHz	-44.69 dBm	-19.69 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49596 GHz	-37.92 dBm	-24.92 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49899 GHz	-29.20 dBm	-19.20 dB
2.499 GHz	2.500 GHz	200.000 kHz	2.49995 GHz	-20.95 dBm	-10.95 dB
2.500 GHz	2.512 GHz	200.000 kHz	2.50057 GHz	22.09 dBm	-7.91 dB

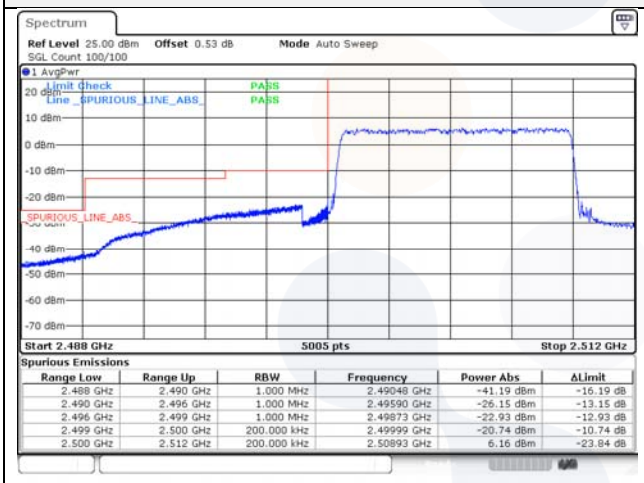
High channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	200.000 kHz	2.56944 GHz	21.18 dBm	-8.82 dB
2.570 GHz	2.571 GHz	200.000 kHz	2.57001 GHz	-19.96 dBm	-9.96 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57100 GHz	-29.13 dBm	-19.13 dB
2.575 GHz	2.580 GHz	1.000 MHz	2.57828 GHz	-37.46 dBm	-24.46 dB
2.580 GHz	2.595 GHz	1.000 MHz	2.58002 GHz	-43.48 dBm	-18.48 dB

Low channel FRB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49048 GHz	-41.19 dBm	-16.19 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49590 GHz	-26.15 dBm	-13.15 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49873 GHz	-22.93 dBm	-12.93 dB
2.499 GHz	2.500 GHz	200.000 kHz	2.49999 GHz	-20.74 dBm	-10.74 dB
2.500 GHz	2.512 GHz	200.000 kHz	2.50893 GHz	6.16 dBm	-23.84 dB

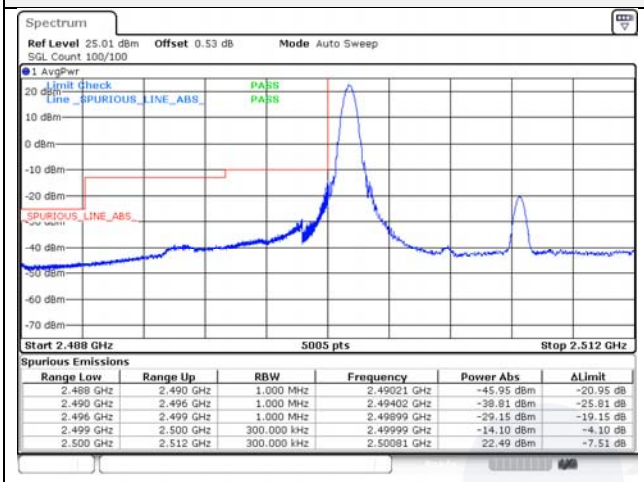
High channel FRB

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	200.000 kHz	2.56469 GHz	6.24 dBm	-23.76 dB
2.570 GHz	2.571 GHz	200.000 kHz	2.57001 GHz	-22.80 dBm	-12.80 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57139 GHz	-23.57 dBm	-13.57 dB
2.575 GHz	2.580 GHz	1.000 MHz	2.57509 GHz	-27.63 dBm	-14.63 dB
2.580 GHz	2.595 GHz	1.000 MHz	2.58004 GHz	-41.88 dBm	-16.88 dB

15M BW QPSK

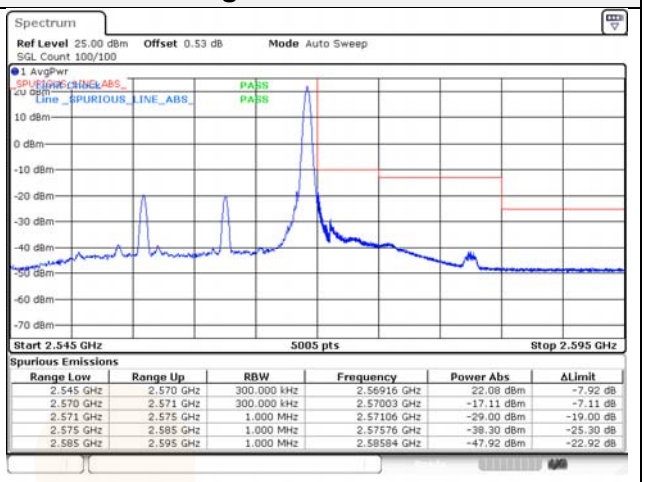
Low channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49021 GHz	-45.95 dBm	-20.95 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49402 GHz	-38.81 dBm	-25.81 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49899 GHz	-29.15 dBm	-19.15 dB
2.499 GHz	2.500 GHz	300.000 kHz	2.49999 GHz	-14.10 dBm	-4.10 dB
2.500 GHz	2.512 GHz	300.000 kHz	2.50081 GHz	22.49 dBm	-7.51 dB

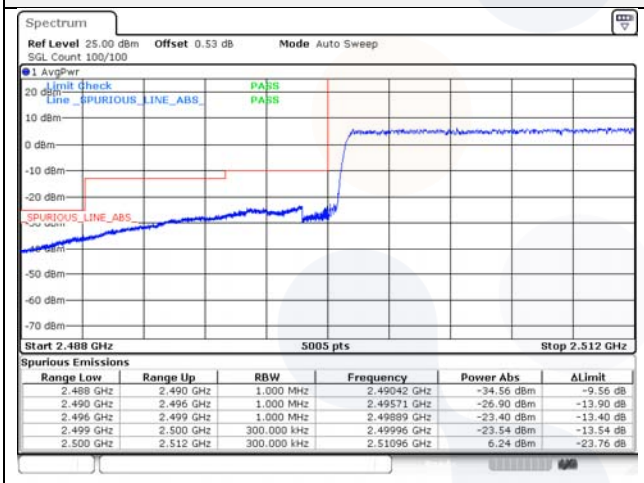
High channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	300.000 kHz	2.56916 GHz	22.08 dBm	-7.92 dB
2.570 GHz	2.571 GHz	300.000 kHz	2.57003 GHz	-17.11 dBm	-7.11 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57106 GHz	-29.00 dBm	-19.00 dB
2.575 GHz	2.585 GHz	1.000 MHz	2.57576 GHz	-38.30 dBm	-25.30 dB
2.585 GHz	2.595 GHz	1.000 MHz	2.58584 GHz	-47.92 dBm	-22.92 dB

Low channel FRB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49042 GHz	-34.56 dBm	-9.56 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49571 GHz	-26.90 dBm	-13.90 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49889 GHz	-23.40 dBm	-13.40 dB
2.499 GHz	2.500 GHz	300.000 kHz	2.49996 GHz	-23.54 dBm	-13.54 dB
2.500 GHz	2.512 GHz	300.000 kHz	2.51096 GHz	6.24 dBm	-23.76 dB

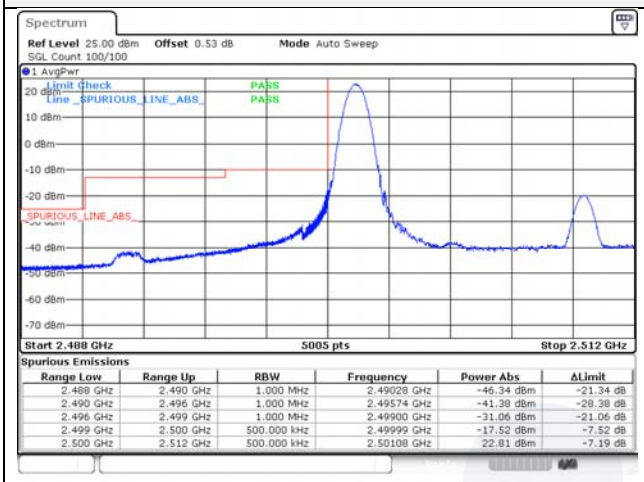
High channel FRB

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	300.000 kHz	2.56307 GHz	6.00 dBm	-24.00 dB
2.570 GHz	2.571 GHz	300.000 kHz	2.57009 GHz	-24.60 dBm	-14.60 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57109 GHz	-24.88 dBm	-14.88 dB
2.575 GHz	2.585 GHz	1.000 MHz	2.57549 GHz	-28.06 dBm	-15.06 dB
2.585 GHz	2.595 GHz	1.000 MHz	2.58507 GHz	-46.66 dBm	-21.66 dB

20M BW QPSK

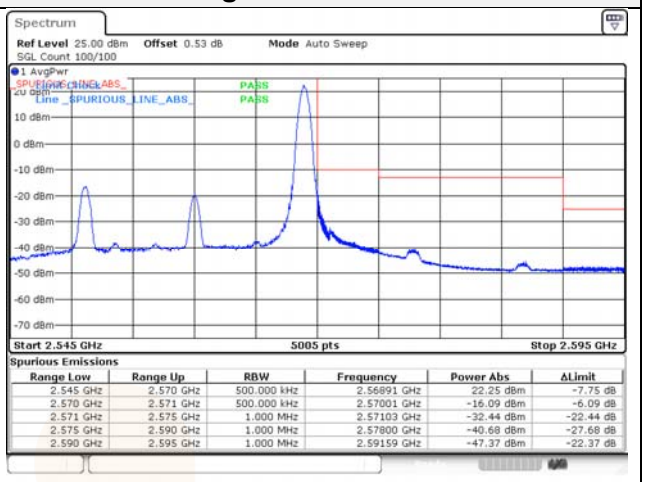
Low channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49028 GHz	-46.34 dBm	-21.34 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49574 GHz	-41.38 dBm	-28.38 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49900 GHz	-31.06 dBm	-21.06 dB
2.499 GHz	2.500 GHz	500.000 kHz	2.49999 GHz	-17.52 dBm	-7.52 dB
2.500 GHz	2.512 GHz	500.000 kHz	2.50108 GHz	22.81 dBm	-7.19 dB

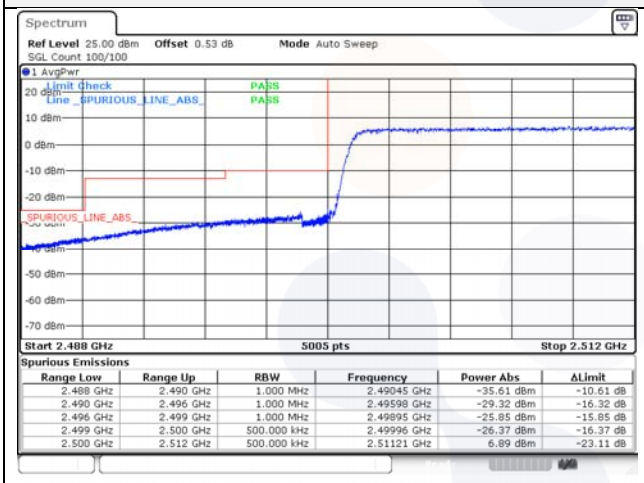
High channel 1RB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	500.000 kHz	2.56891 GHz	22.25 dBm	-7.75 dB
2.570 GHz	2.571 GHz	500.000 kHz	2.57001 GHz	-16.09 dBm	-6.09 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57103 GHz	-32.44 dBm	-22.44 dB
2.575 GHz	2.590 GHz	1.000 MHz	2.57800 GHz	-40.68 dBm	-27.68 dB
2.590 GHz	2.595 GHz	1.000 MHz	2.59159 GHz	-47.37 dBm	-22.37 dB

Low channel FRB



Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.488 GHz	2.490 GHz	1.000 MHz	2.49045 GHz	-35.61 dBm	-10.61 dB
2.490 GHz	2.496 GHz	1.000 MHz	2.49598 GHz	-29.32 dBm	-16.32 dB
2.496 GHz	2.499 GHz	1.000 MHz	2.49895 GHz	-25.85 dBm	-15.85 dB
2.499 GHz	2.500 GHz	500.000 kHz	2.49996 GHz	-26.37 dBm	-16.37 dB
2.500 GHz	2.512 GHz	500.000 kHz	2.51121 GHz	6.89 dBm	-23.11 dB

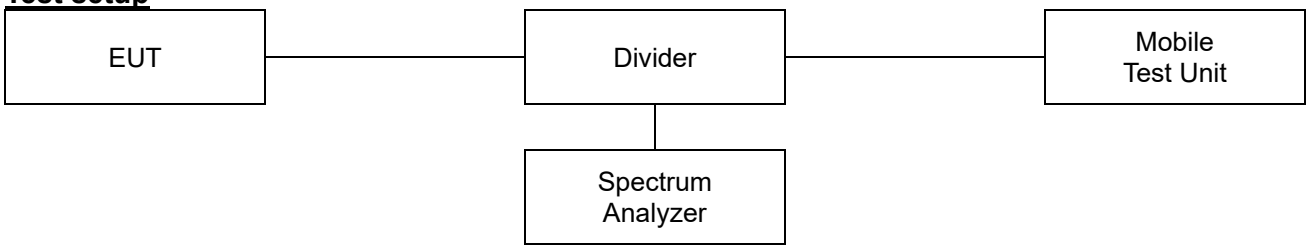
High channel FRB

Spurious Emissions

Range Low	Range Up	RBW	Frequency	Power Abs	ΔLimit
2.545 GHz	2.570 GHz	500.000 kHz	2.55845 GHz	7.09 dBm	-22.91 dB
2.570 GHz	2.571 GHz	500.000 kHz	2.57006 GHz	-25.28 dBm	-15.28 dB
2.571 GHz	2.575 GHz	1.000 MHz	2.57147 GHz	-27.88 dBm	-17.88 dB
2.575 GHz	2.590 GHz	1.000 MHz	2.57552 GHz	-30.40 dBm	-17.40 dB
2.590 GHz	2.595 GHz	1.000 MHz	2.59197 GHz	-47.40 dBm	-22.40 dB

7.4. Spurious Emissions at Antenna Terminal

Test setup



Limit

According to §27.53(m)(4),

The attenuation factor shall be not less than 40 + 10log(P) ㏈ on all frequencies between the channel edge and 5 megahertz from the channel edge, 43 + 10log(P) ㏈ on all frequencies between 5 megahertz and X megahertz from the channel edge, and 55 + 10log(P) ㏈ on all frequencies more than X megahertz from the channel edge, where X is the greater of 6 megahertz or the actual emission bandwidth as defined in paragraph (m)(6) of this section. In addition, the attenuation factor shall not be less that 43 + 10log(P) ㏈ on all frequencies between 2490.5 ㎒ and 2496 ㎒ and 55 + 10log(P) ㏈ at or below 2490.5 ㎒.

Test procedure

971168 D01 v03r01 - Section 6
ANSI 63.26-2015 – Section 5.7

Test settings

1) Start frequency was set to 30 ㎒ and stop frequency was set to at least 10th the fundamental frequency.
2) Detector = RMS
3) Sweep time = auto couple.
4) Trace mode = trace average
5) Allow trace to fully stabilize.
6) Please see test notes below RBW and VBW settings.

Notes:

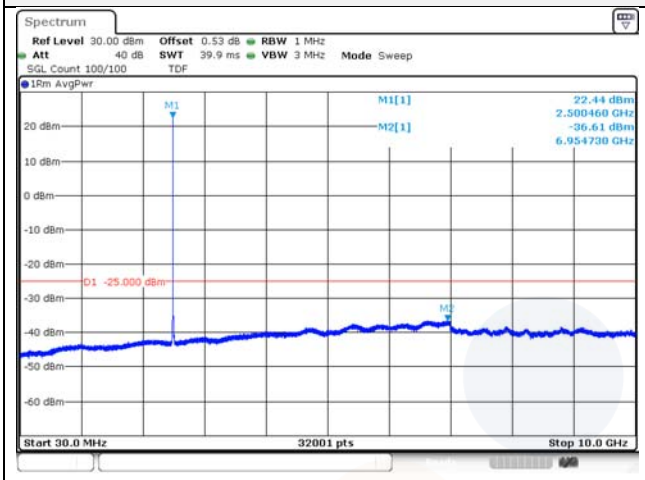
1. Per 27.53(m)(6), compliance with these provisions is based on the use of measurement instrumentation employing a resolution bandwidth of 100 ㎑ or greater for frequencies less than 1 ㎓ and 1 ㎒ or greater for frequencies greater than 1 ㎓.
   The emission bandwidth is defined as the width of the signal between two points, one below the carrier center frequency and one above the carrier center frequency, outside of which all emissions are attenuated at least 26 ㏈ below the transmitter power.
2. All modes of operation were investigated and the worst-case configuration results are reported.

Test results

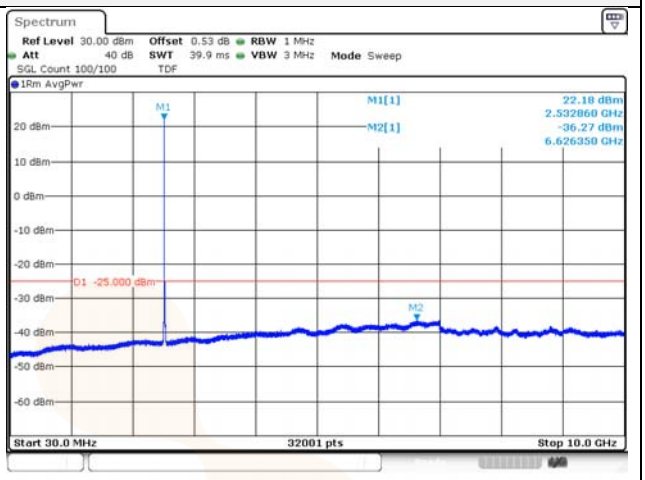
Test mode: LTE B7

5M BW QPSK

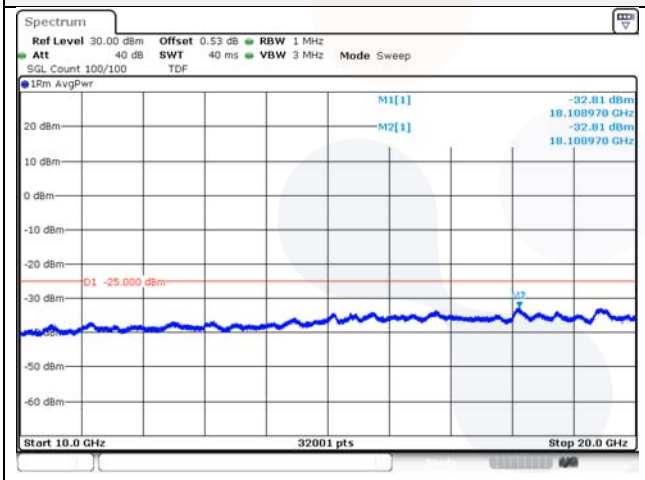
Low channel (30 ㎒ ~ 10 ㎓)



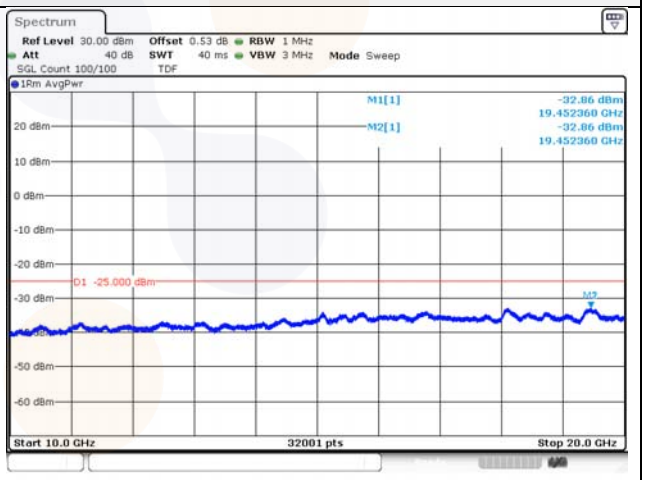
Middle channel (30 ㎒ ~ 10 ㎓)



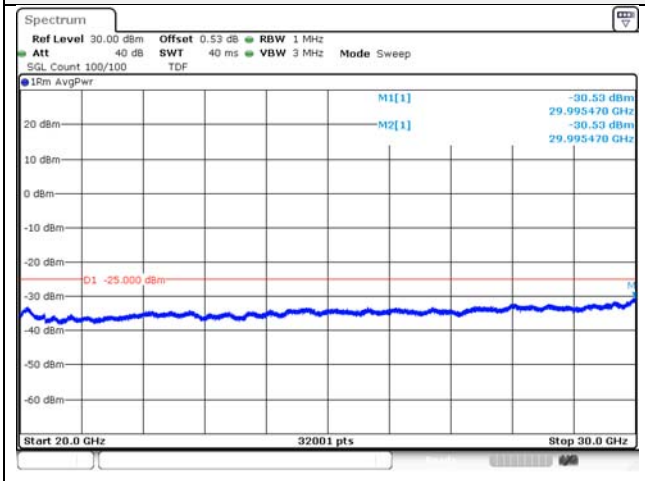
Low channel (10 ㎓ ~ 20 ㎓)



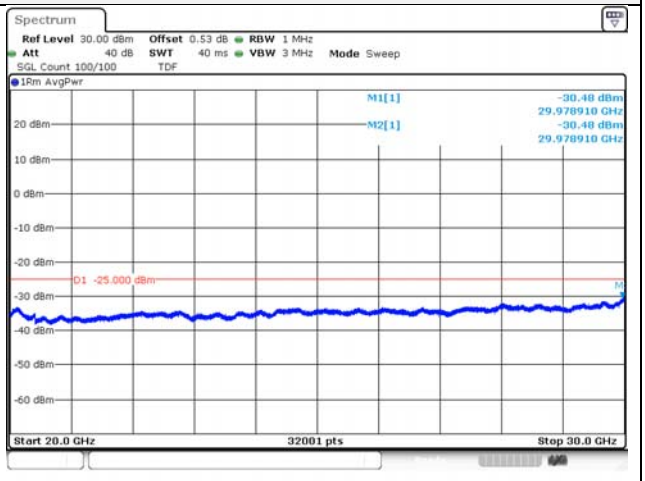
Middle channel (10 ㎓ ~ 20 ㎓)

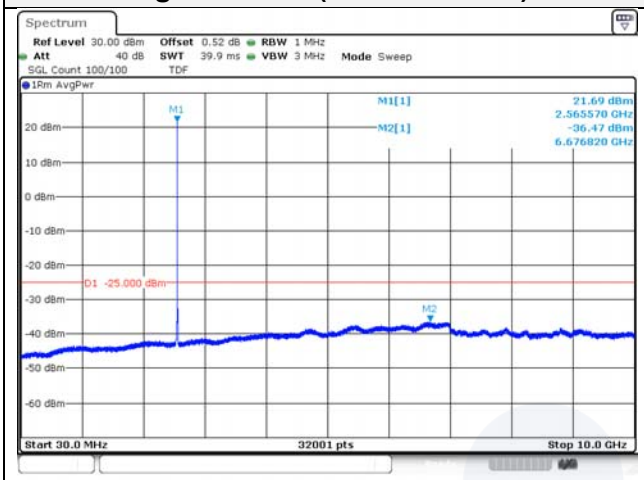
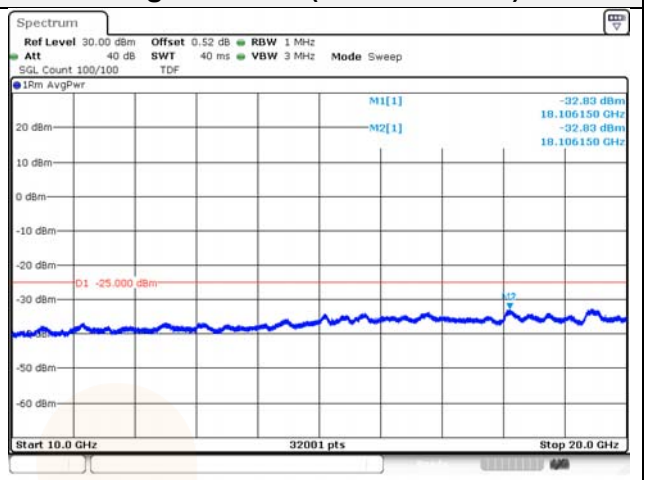
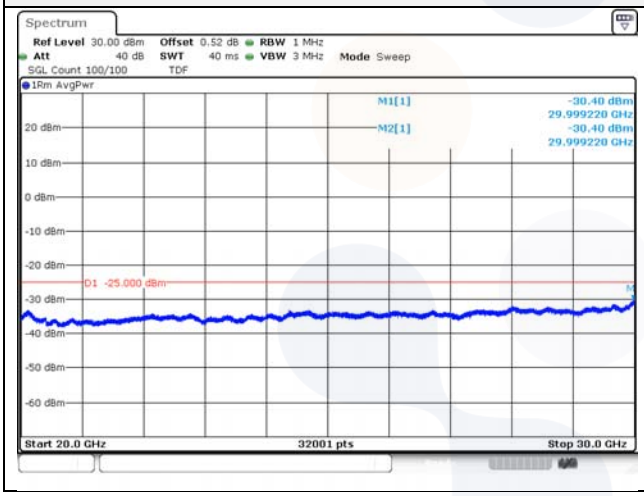


Low channel (20 ㎓ ~ 30 ㎓)



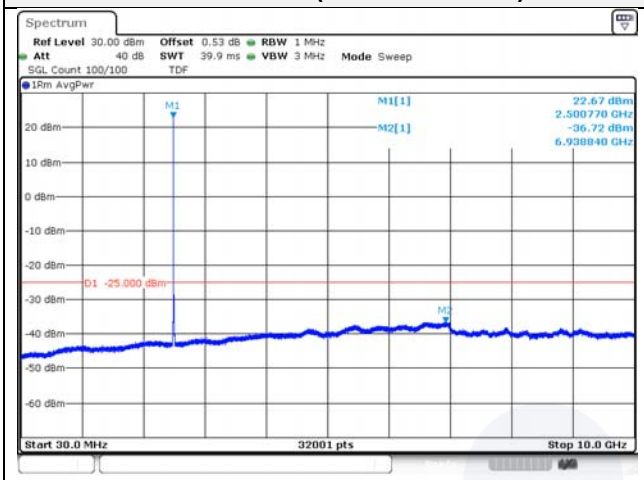
Middle channel (20 ㎓ ~ 30 ㎓)



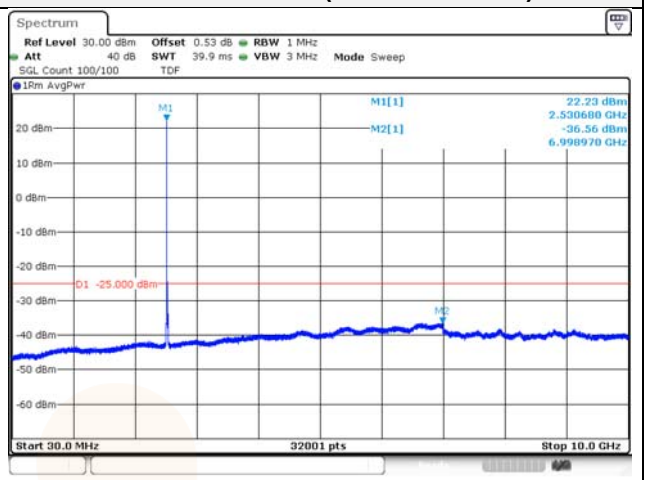
5M BW QPSK	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (10 ㎓ ~ 20 ㎓)**
	
High channel (20 ㎓ ~ 30 ㎓)	**-**
	Blank

10M BW QPSK

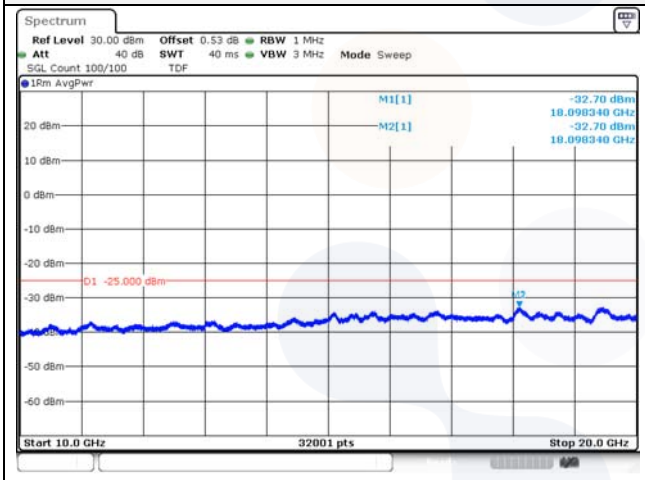
Low channel (30 ㎒ ~ 10 ㎓)



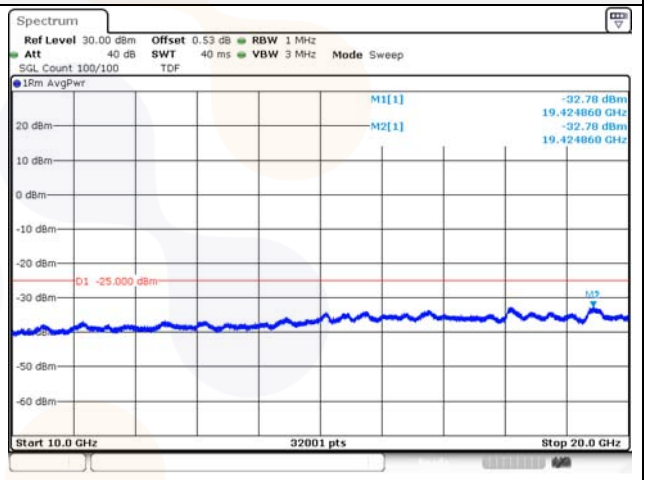
Middle channel (30 ㎒ ~ 10 ㎓)



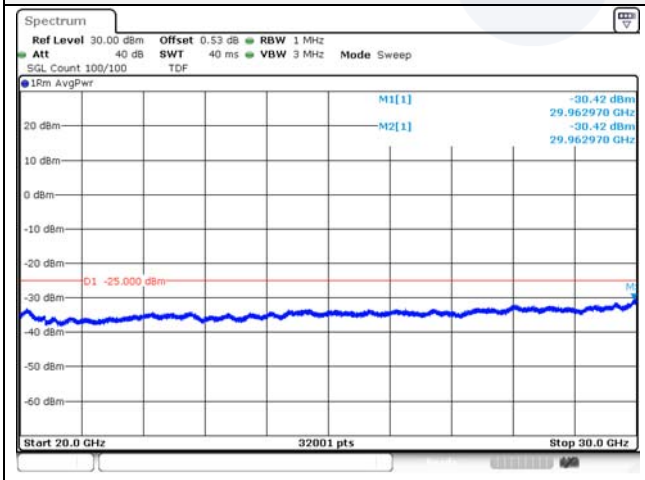
Low channel (10 ㎓ ~ 20 ㎓)



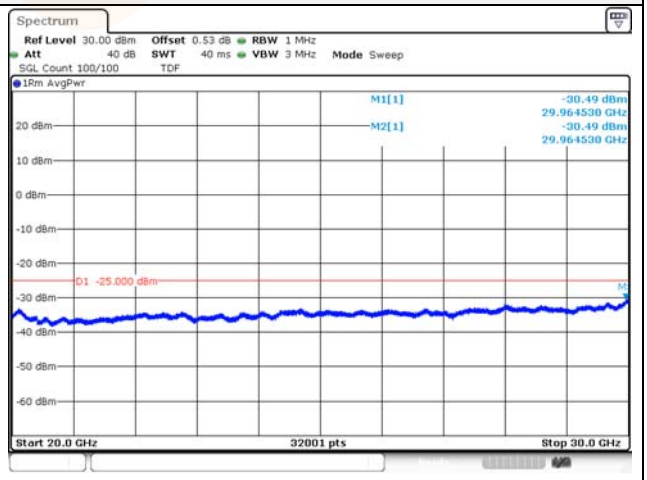
Middle channel (10 ㎓ ~ 20 ㎓)

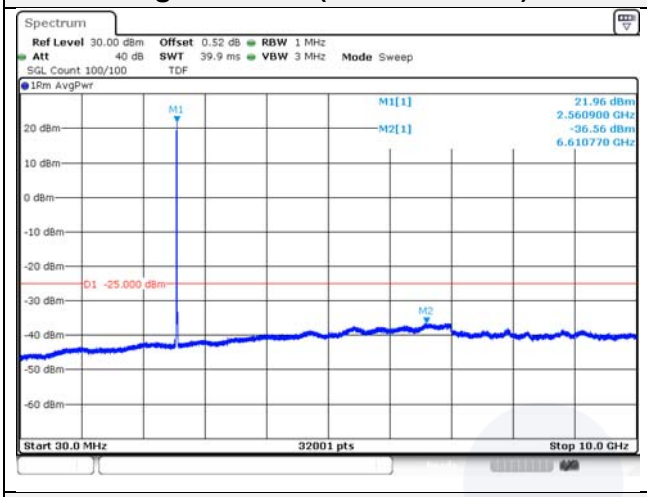
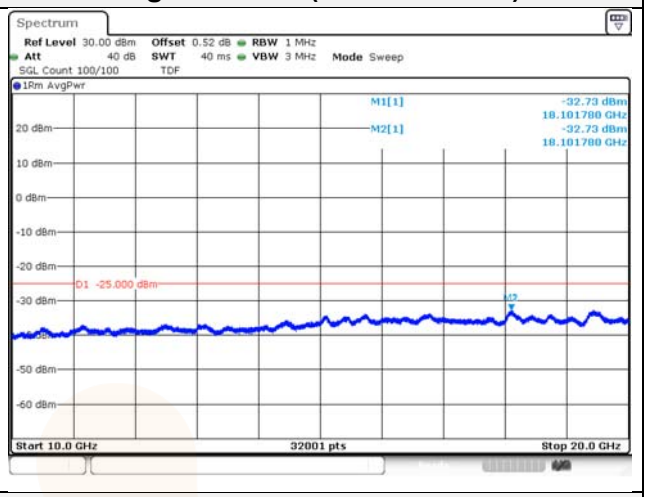
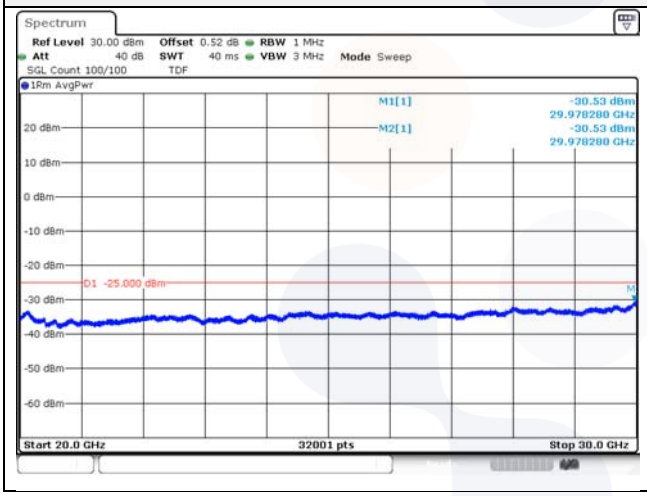


Low channel (20 ㎓ ~ 30 ㎓)



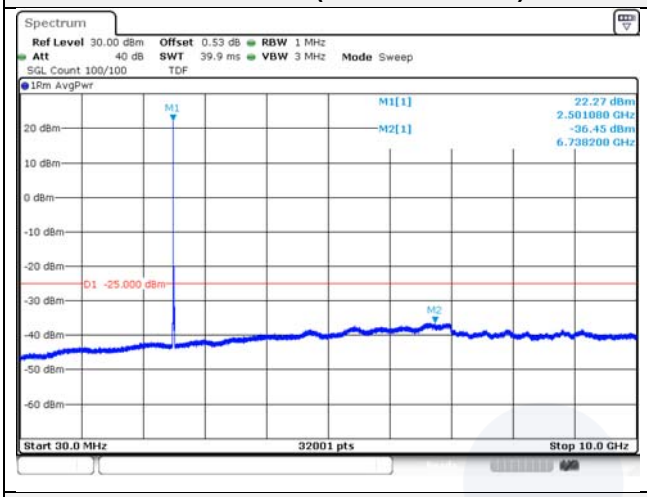
Middle channel (20 ㎓ ~ 30 ㎓)



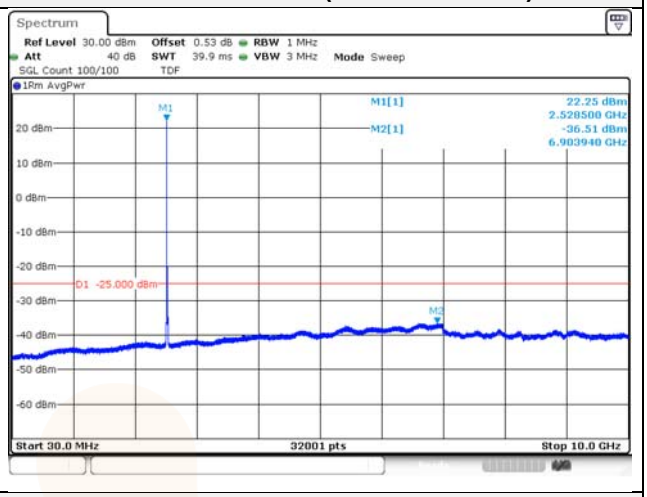
10M BW QPSK	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (10 ㎓ ~ 20 ㎓)**
	
High channel (20 ㎓ ~ 30 ㎓)	**-**
	Blank

15M BW QPSK

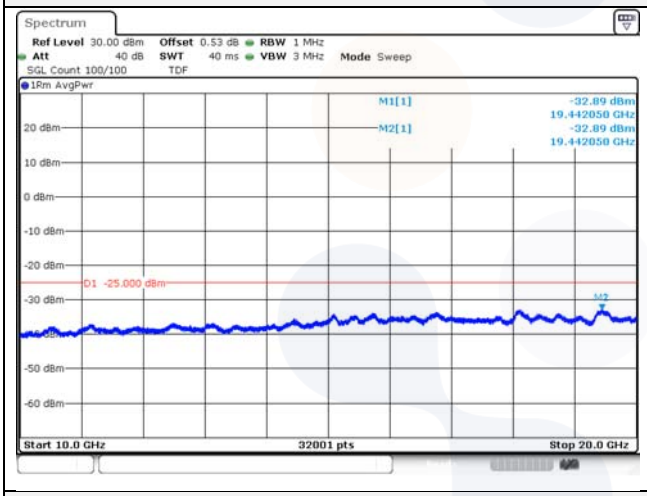
Low channel (30 ㎒ ~ 10 ㎓)



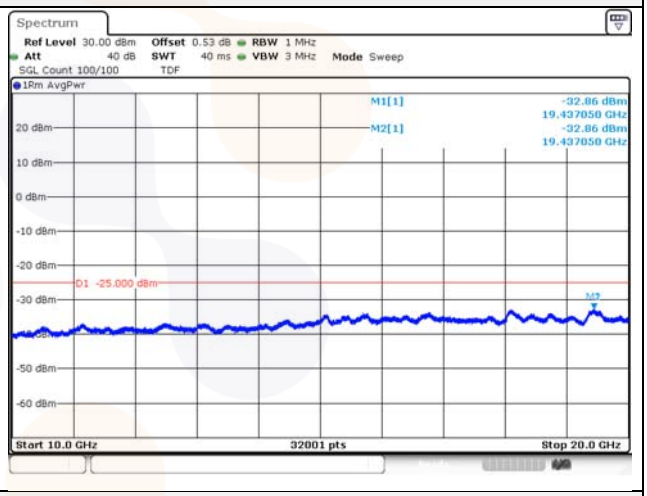
Middle channel (30 ㎒ ~ 10 ㎓)



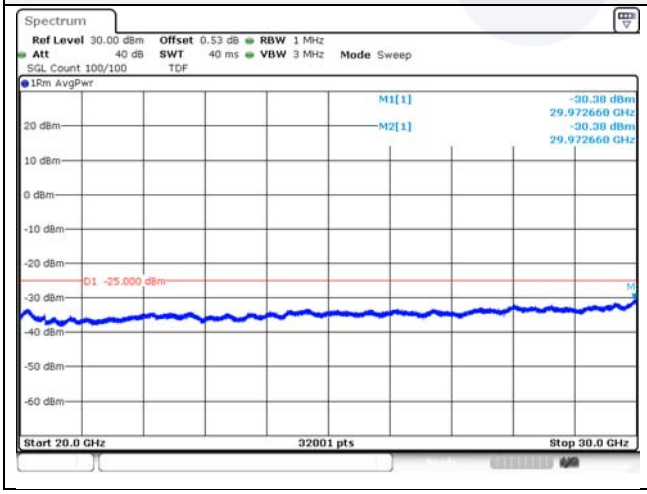
Low channel (10 ㎓ ~ 20 ㎓)



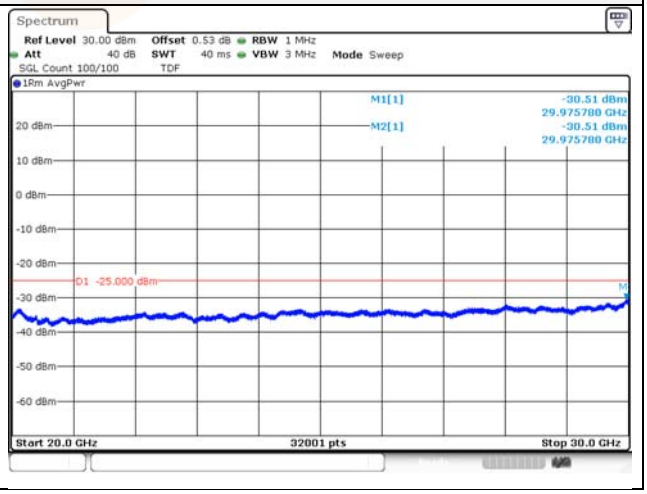
Middle channel (10 ㎓ ~ 20 ㎓)

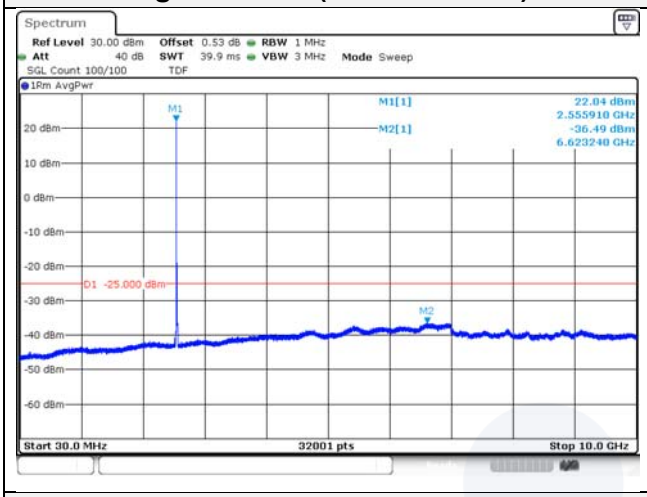
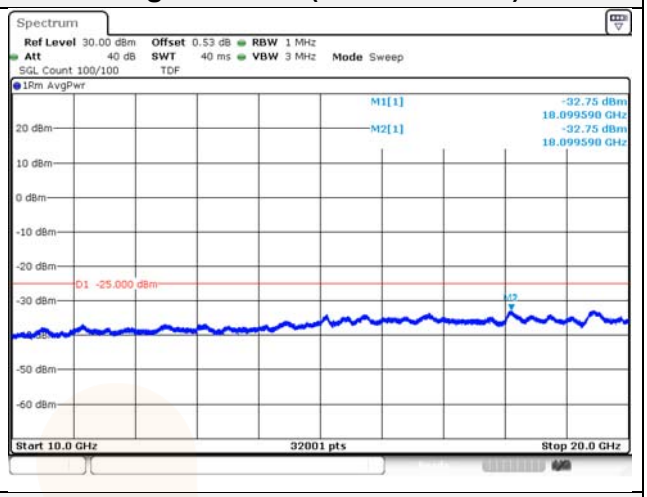
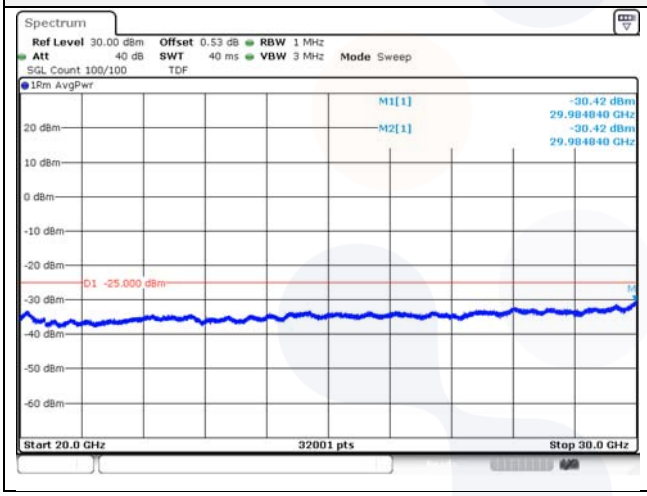


Low channel (20 ㎓ ~ 30 ㎓)



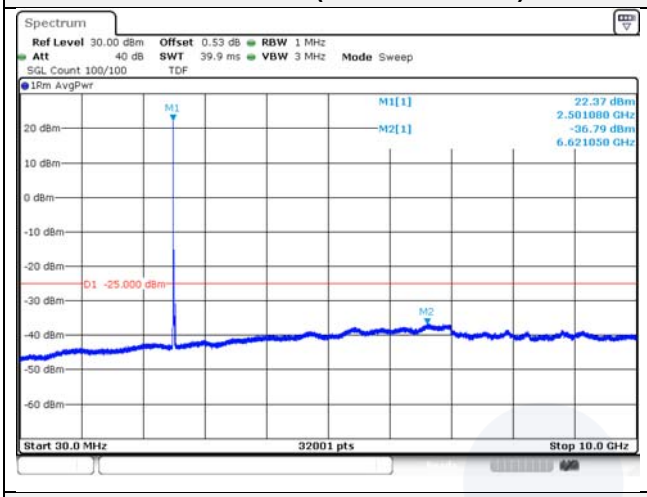
Middle channel (20 ㎓ ~ 30 ㎓)



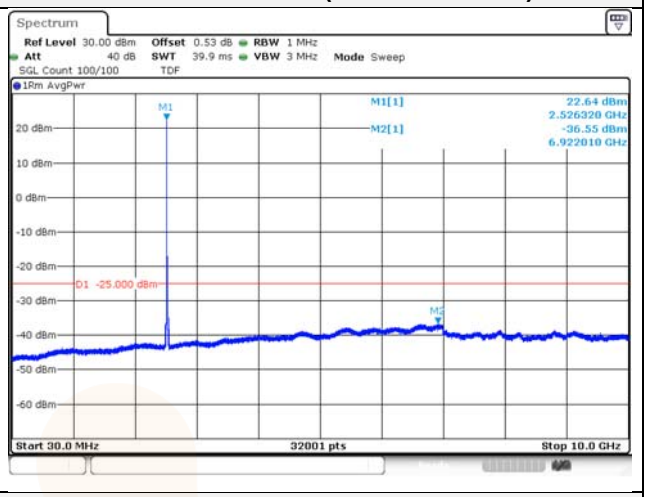
15M BW QPSK	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (10 ㎓ ~ 20 ㎓)**
	
High channel (20 ㎓ ~ 30 ㎓)	**-**
	Blank

20M BW QPSK

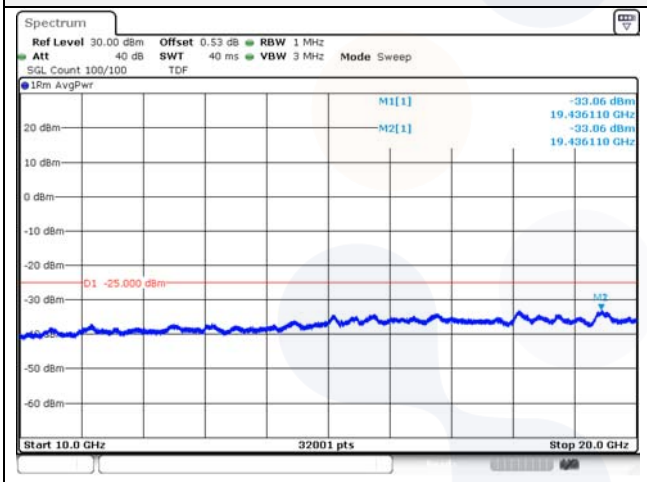
Low channel (30 ㎒ ~ 10 ㎓)



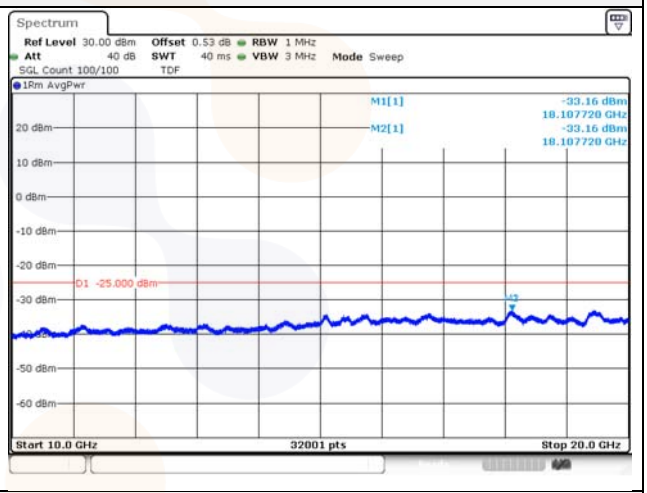
Middle channel (30 ㎒ ~ 10 ㎓)



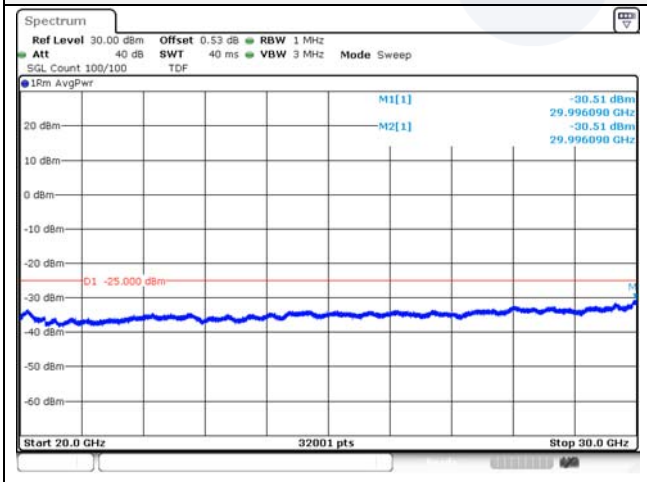
Low channel (10 ㎓ ~ 20 ㎓)



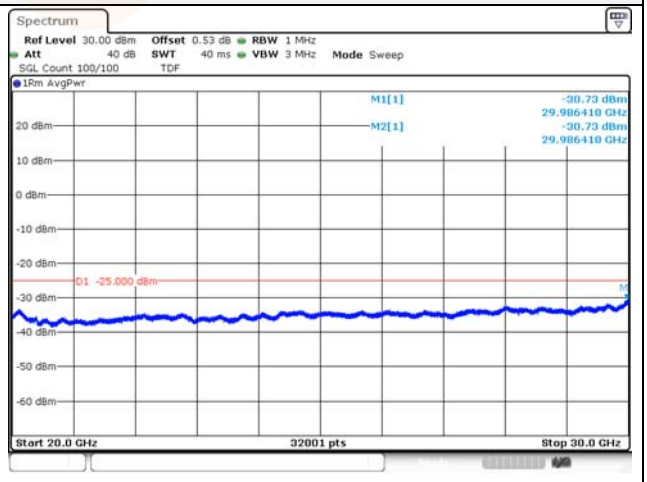
Middle channel (10 ㎓ ~ 20 ㎓)

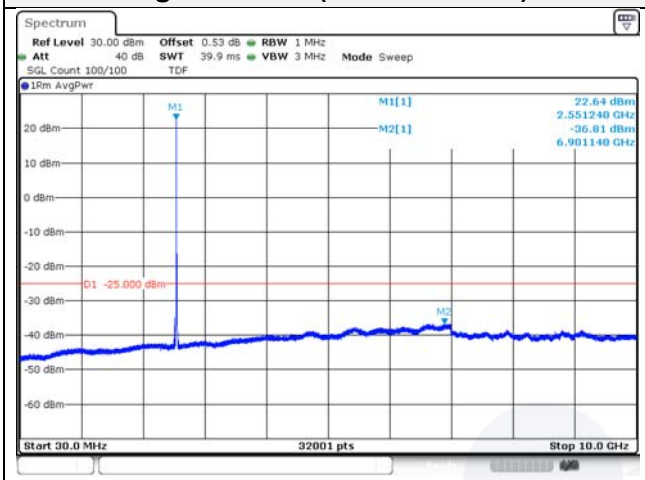
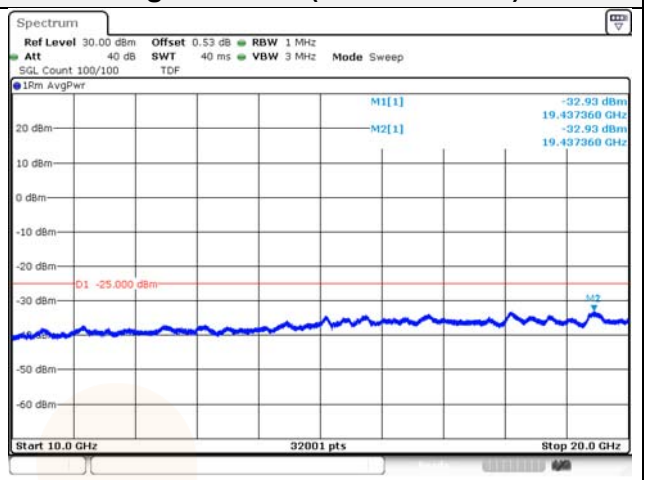
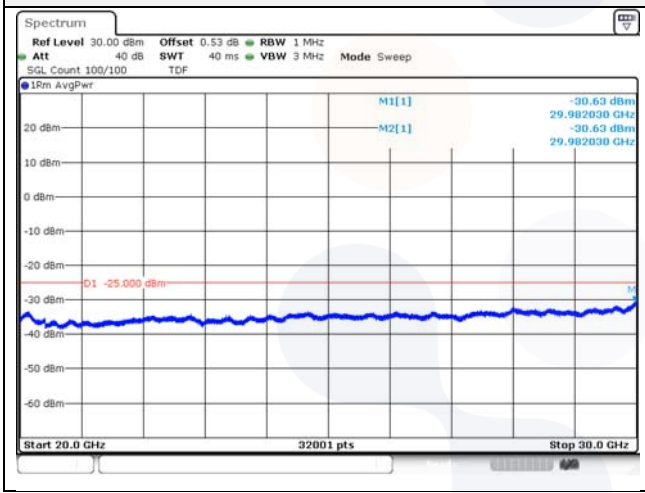


Low channel (20 ㎓ ~ 30 ㎓)



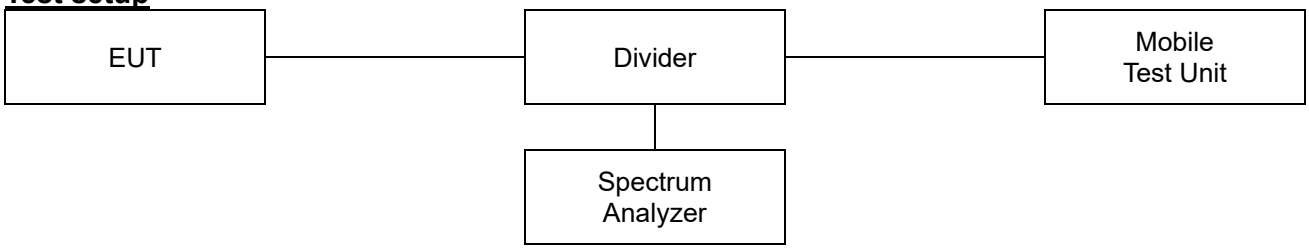
Middle channel (20 ㎓ ~ 30 ㎓)



20M BW QPSK	
High channel (30 ㎒ ~ 10 ㎓)	**High channel (10 ㎓ ~ 20 ㎓)**
	
High channel (20 ㎓ ~ 30 ㎓)	**-**
	Blank

7.5. Peak to Average Power Ratio (PAPR)

Test setup



Limit

According to §27.50(d),

The peak-to-average ratio(PAR) of the transmission must not exceed 13 dB.

Test procedure

971168 D01 v03r01 - Section 5.7.2 or 5.7.3
ANSI 63.26-2015 – Section 5.2.3.4 or 5.2.6

Test settings

5.2.3.4 Measurement of peak power in a broadband noise-like signal using CCDF

1) Set resolution/measurement bandwidth ≥ OBW or specified reference bandwidth
2) Set the number of counts to a value that stabilizes the measured CCDF curve.
3) Set the measurement interval as follows:
   a) For continuous transmissions, set to the greater of [10 x (number of points in sweep) x (transmission symbol period)] or 1 ms.
   b) For burst transmissions, employ an external trigger that is synchronized with the EUT burst timing sequence, or use the internal burst trigger with a trigger level that allows the burst to stabilize. Set the measurement internal to a time that is less than or equal to the burst duration.
   c) If there are several carriers in a single antenna port, the peak power shall be determined for each individual carrier (by disabling the other carriers while measuring the required carrier) and the total peak power calculated from the sum of the individual carrier peak powers.
4) Record the maximum PAPR level associated with a probability of 0.1%

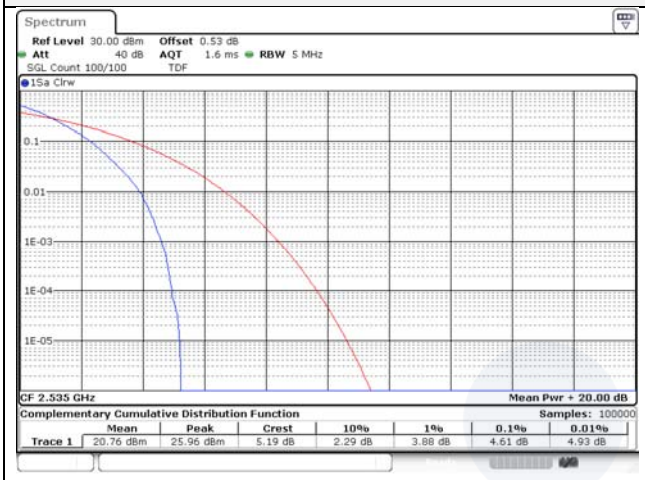
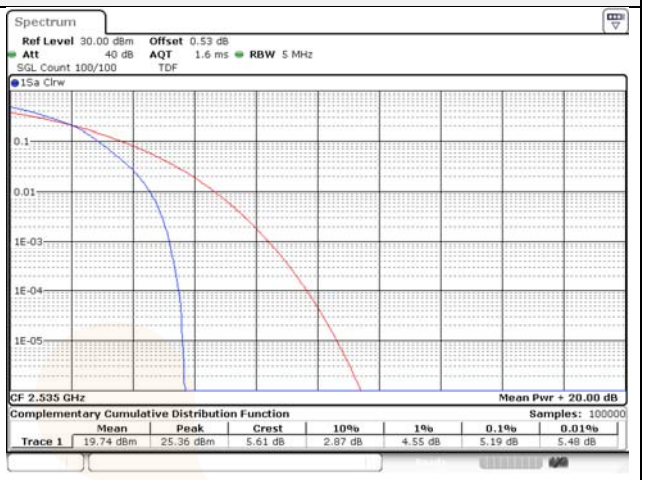
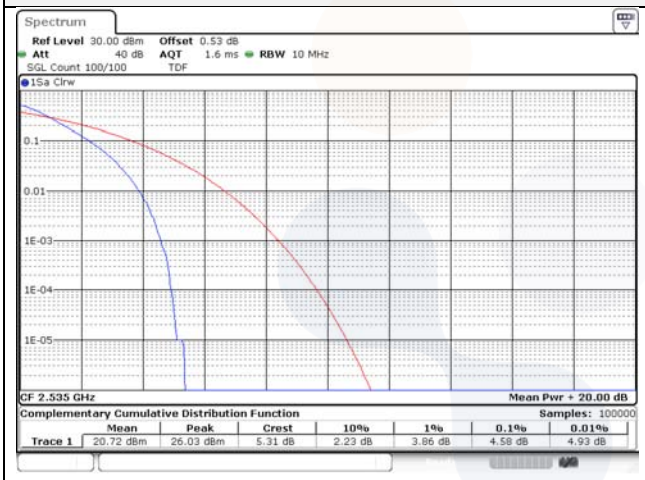
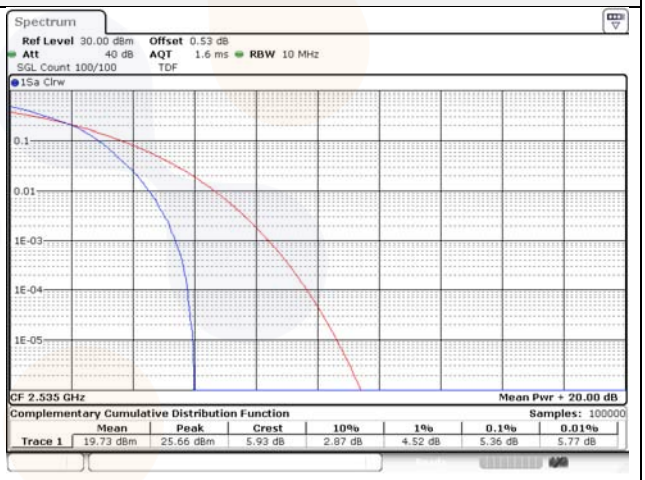
5.2.6 Peak-to-average power ratio

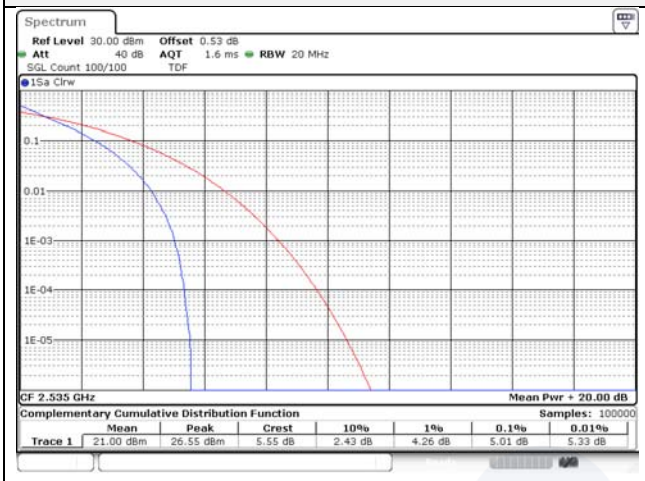
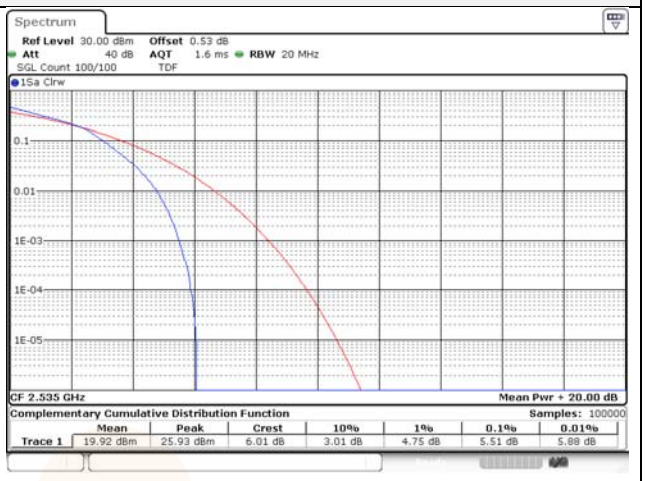
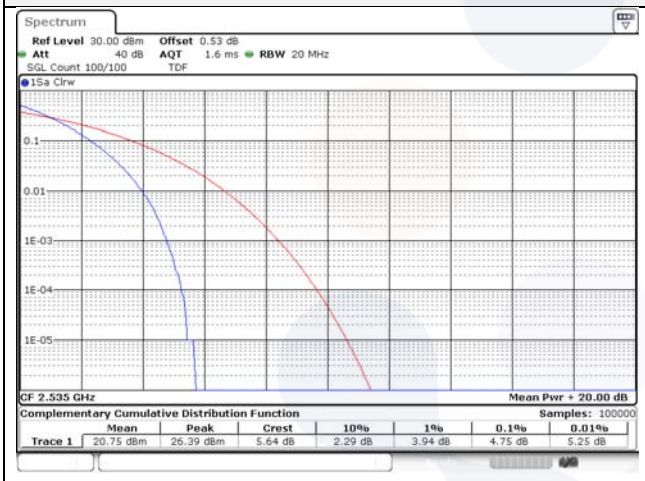
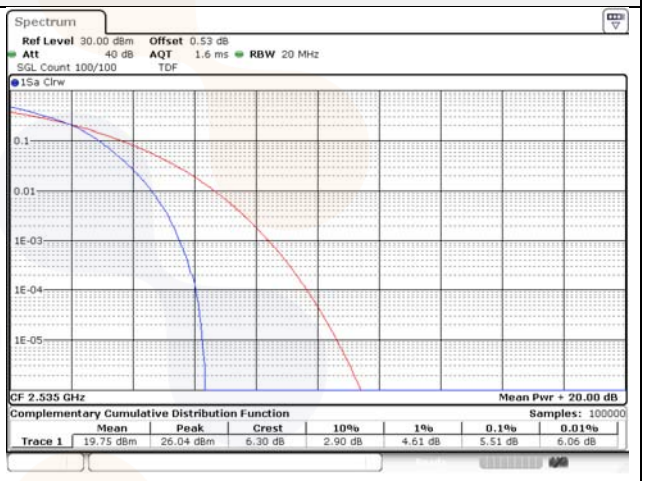
Use one of the procedures presented in 5.2(ANSI C63.26-2015) to measure the total peak power and record as P_{PK}.
Use one of the applicable procedure presented 5.2(ANSI C63.26-2015) to measure the total average power and record as P_{AG}. Determine the P.A.P.R from:

$$PAPR(dB) = P_{PK}(dBm \text{ or } dBW) - P_{AG}(dBm \text{ or } dBW)$$

Test results

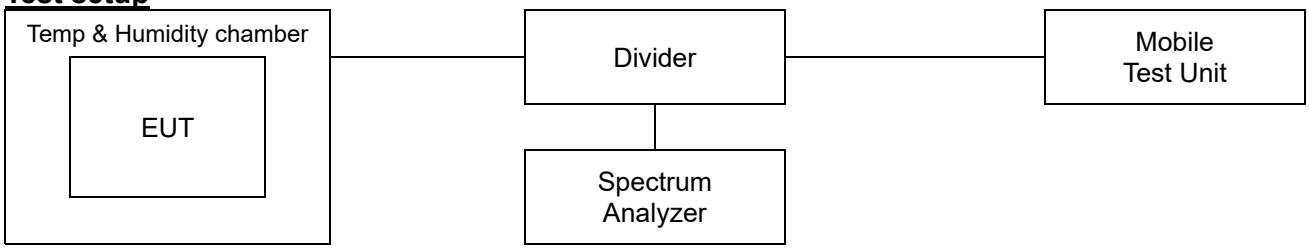
Test mode: LTE B7

5M BW QPSK Middle channel	5M BW 16QAM Middle channel
	
10M BW QPSK Middle channel	**10M BW 16QAM Middle channel**
	

15M BW QPSK Middle channel	15M BW 16QAM Middle channel
	
20M BW QPSK Middle channel	**20M BW 16QAM Middle channel**
	

7.6. Frequency stability

Test setup



Limit

According to §2.1055(a),

The frequency stability shall be measured with variation of ambient temperature as follows:

1) From -30° to + 50° centigrade for all equipment except that specified in paragraphs (a) (2) and (3) of this section.
2) From -20° to + 50° centigrade for equipment to be licensed for use in the maritime services under part 80 of this chapter, except for class A, B, and S emergency position indicating radiobeacons (EPIRBS), and equipment to be licensed for use above 952 ㎒ at operational fixed stations in all services, stations in the local television transmission service and point-to-point microwave radio service under part 21 of this chapter, equipment licensed for use aboard aircraft in the aviation services under part 87 of this chapter, and equipment authorized for use in the family radio service under part 95 of this chapter.
3) From 0° to + 50° centigrade for equipment to be licensed for use in the radio broadcast Services under part 73 of this chapter.

According to §2.1055(d),

The frequency stability shall be measured with variation of primary supply Voltage as follows:

1) Vary primary supply voltage from 85 to 115 percent of the nominal value for other than hand carried battery equipment.
2) For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating and point which shall be specified by the manufacturer.
3) The supply voltage shall be measured at the input to the cable normally provided with the equipment, or at the power supply terminals if cables are not normally provided. Effects on frequency of transmitter keying (except for broadcast transmitters) and any heating element cycling at the nominal supply voltage and at each extreme also shall be shown.

According to §27.54,

The frequency stability shall be sufficient to ensure that the fundamental emission stays within the authorized bands of operation.

Test procedure

ANSI 63.26-2015 – Section 5.6

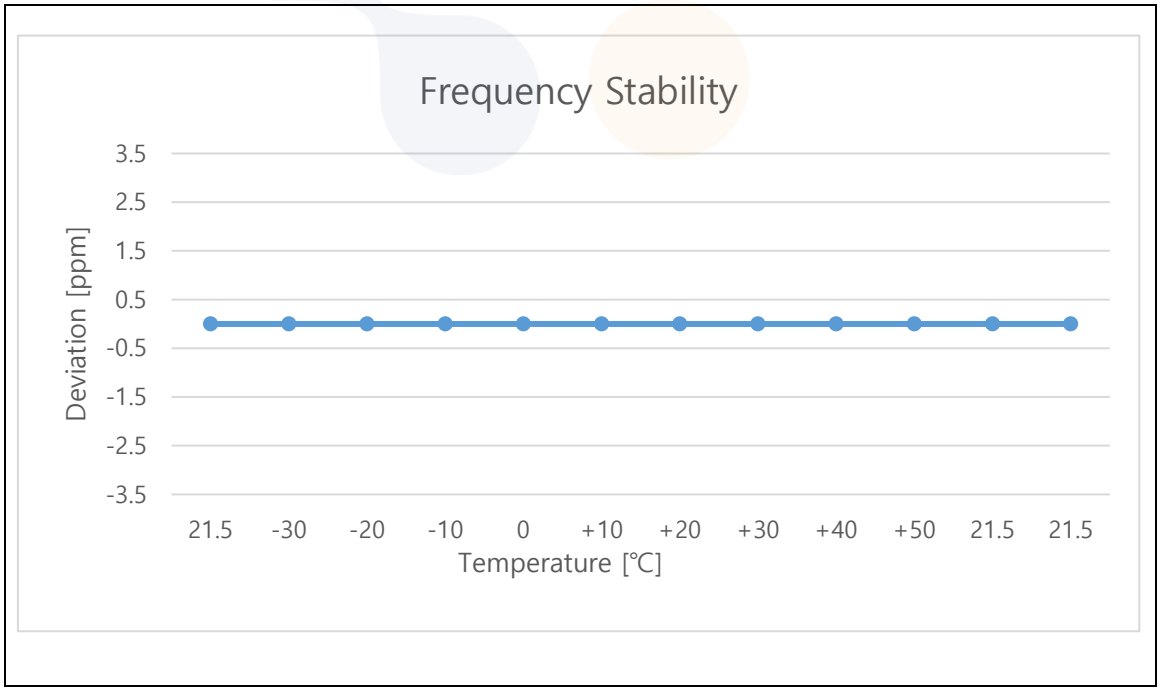
Test settings

1) The carrier frequency of the transmitter is measured at room temperature. (20°C to provide a reference)
2) The equipment is turned on in a “standby” condition for one minute before applying power to the transmitter. Measurement of the carrier frequency of the transmitter is made within one minute after applying power to the transmitter.
3) Frequency measurements are made at 10°C intervals ranging from -30°C to +50°C. A period of at least one half-hour is provided to allow stabilization of the equipment at each Temperature level.

Test results

Test mode : LTE B7
Frequency (㎐) : 2 535 000 000
Channel : 21100
Deviation limit : The frequency stability shall be sufficient to ensure that the fundamental emissions stay within the authorized bands of operation.

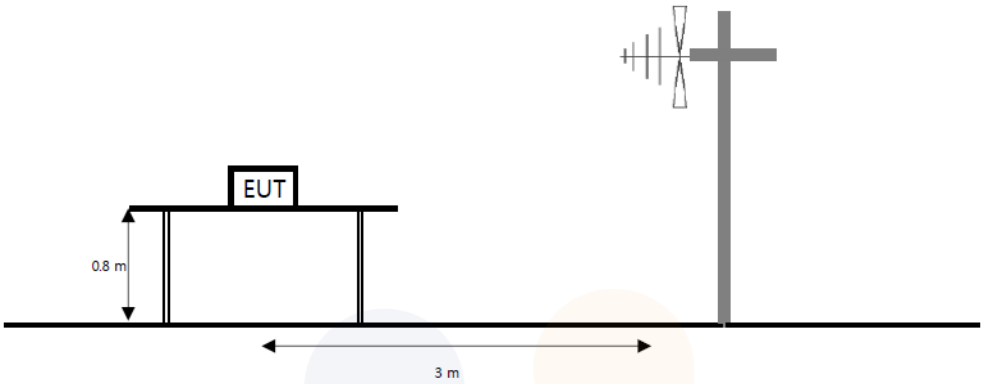
Voltage (%)	Power (V)	Temp. (°C)	Frequency (㎐)	Frequency error (㎐)	Deviation	
					(ppm)	(%)
100%	3.88	+21.5(Ref)	2,534,999,999	-0.96	0.0	0.000 000
		-30	2,534,999,999	-0.64	0.0	0.000 000
		-20	2,535,000,003	2.56	0.0	0.000 000
		-10	2,535,000,002	2.19	0.0	0.000 000
		0	2,535,000,003	3.48	0.0	0.000 000
		+10	2,535,000,000	0.03	0.0	0.000 000
		+20	2,535,000,002	1.76	0.0	0.000 000
		+30	2,535,000,003	2.92	0.0	0.000 000
		+40	2,534,999,999	-0.79	0.0	0.000 000
		+50	2,535,000,003	3.42	0.0	0.000 000
115%	4.46	+21.5(Ref)	2,535,000,000	-0.37	0.0	0.000 000
End point	3.40	+21.5(Ref)	2,535,000,002	1.86	0.0	0.000 000



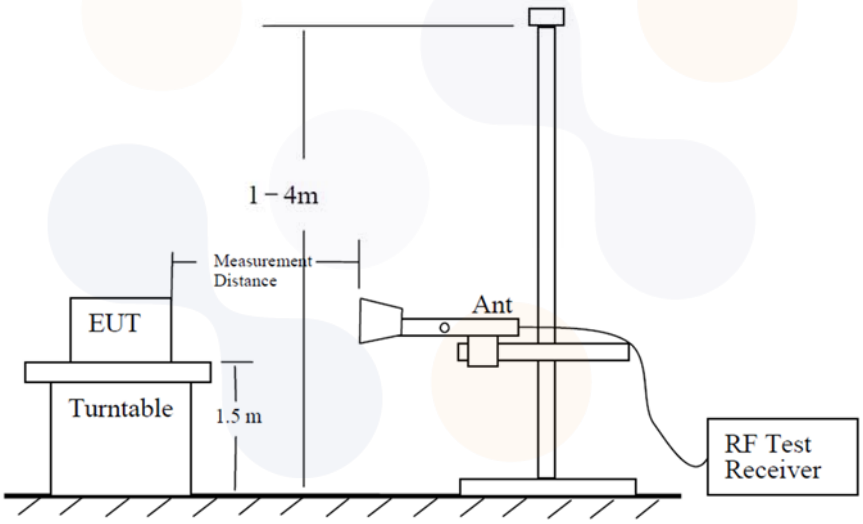
7.7. Radiated Power (EIRP)

Test setup

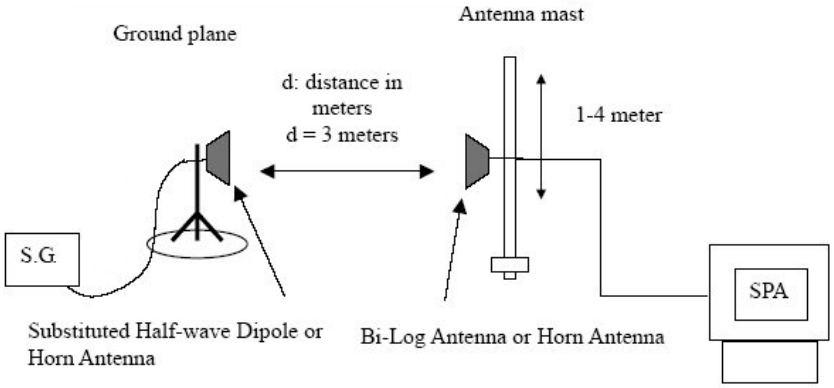
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §27.50(h),

Mobile stations are limited to 2.0 watts EIRP. All user stations are limited to 2.0 watts transmitter output power.

Test procedure

412172 D01 v01r01
971168 D01 v03r01 - Section 5.2 and 5.8
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.
   The test antenna shall be raised and lowered through the specified range of height to ensure that
7. The maximum signal is received.
   The input signal to the substitution antenna shall be adjusted to the level that produces a level
8. 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 B7

Bandwidth [㎒]	Modulation	Channel	Pol.	Antenna Gain	C.L	Substitute Level	EIRP	
			[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[W]
5	QPSK	Low	V	6.01	10.77	22.61	17.85	0.061
		Middle	V	6.09	10.78	21.98	17.29	0.054
		High	V	6.18	10.81	19.54	14.90	0.031
	16QAM	Low	V	6.01	10.77	21.52	16.76	0.047
		Middle	V	6.09	10.78	20.92	16.23	0.042
		High	V	6.18	10.81	18.71	14.07	0.026
10	QPSK	Low	V	6.01	10.74	22.90	18.17	0.066
		Middle	V	6.09	10.78	21.66	16.97	0.050
		High	V	6.17	10.81	20.04	15.39	0.035
	16QAM	Low	V	6.01	10.74	22.10	17.37	0.055
		Middle	V	6.09	10.78	20.58	15.89	0.039
		High	V	6.17	10.81	18.68	14.04	0.025
15	QPSK	Low	V	6.02	10.74	22.98	18.26	0.067
		Middle	V	6.09	10.78	21.47	16.78	0.048
		High	V	6.16	10.82	19.78	15.12	0.033
	16QAM	Low	V	6.02	10.74	22.07	17.35	0.054
		Middle	V	6.09	10.78	20.50	15.81	0.038
		High	V	6.16	10.82	18.78	14.12	0.026
20	QPSK	Low	V	6.03	10.75	22.39	17.66	0.058
		Middle	V	6.09	10.78	21.80	17.11	0.051
		High	V	6.16	10.81	20.34	15.68	0.037
	16QAM	Low	V	6.03	10.75	21.66	16.94	0.049
		Middle	V	6.09	10.78	20.88	16.19	0.042
		High	V	6.16	10.81	19.43	14.77	0.030

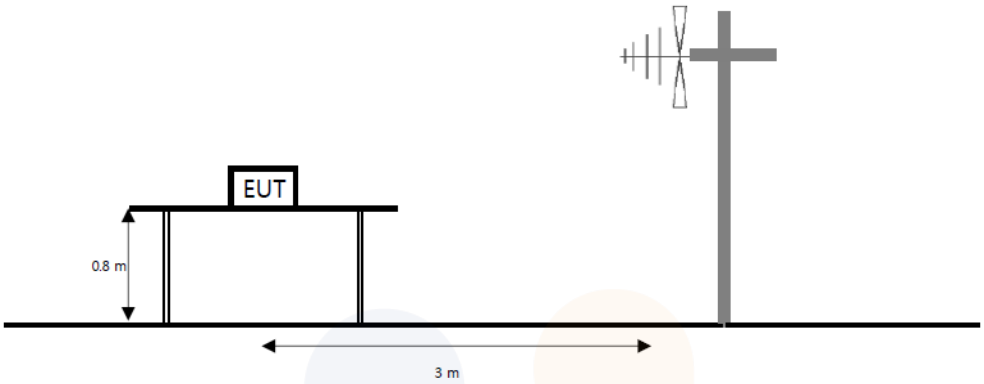
Note.

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

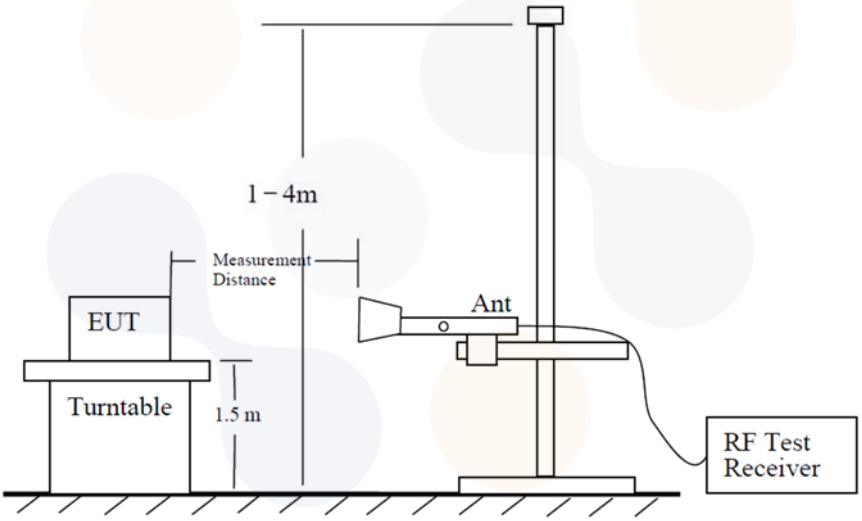
7.8. Radiated Spurious Emissions

Test setup

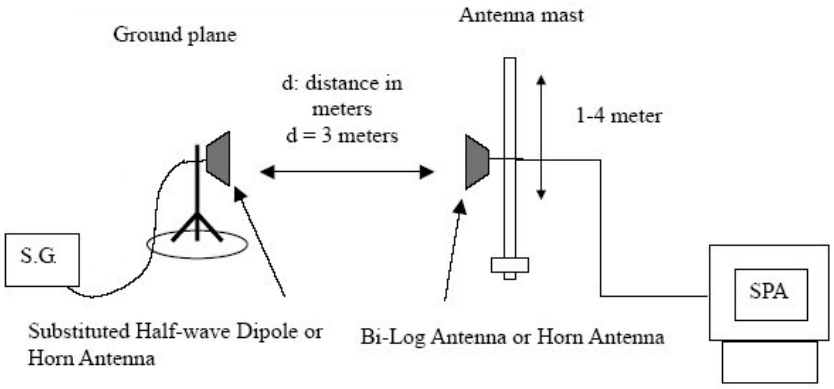
The diagram below shows the test setup that is utilized to make the measurements for emission from 30 ㎒ to 1 ㎓ emissions.



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 §27.53(m)(4),

The minimum permissible attenuation level of any spurious emission is 55 + 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.

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 B7
Frequency(㎒) : 2 507.5
Channel : 20825
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 001.15	H	10.30	15.65	-47.55	-52.90	-25.00	27.90
	7 500.83	V	12.10	19.28	-43.32	-50.50	-25.00	25.50
	10 001.15	V	13.10	22.28	-34.82	-44.00	-25.00	19.00
	12 501.47	V	13.20	25.50	-30.30	-42.60	-25.00	17.60

Test mode : LTE B7
Frequency(㎒) : 2 535
Channel : 21100
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 068.17	H	10.34	15.74	-45.60	-51.00	-25.00	26.00
	7 606.79	V	12.19	19.54	-41.25	-48.60	-25.00	23.60
	10 139.03	H	13.13	22.78	-34.85	-44.50	-25.00	19.50
	12 674.45	V	13.27	25.51	-31.06	-43.30	-25.00	18.30

Test mode : LTE B7
Frequency(㎒) : 2 562.5
Channel : 21375
Bandwidth(㎒) : 15

Mode	Frequency	Pol.	Antenna Gain	Cable loss	Substitute Level	Level	Limit	Margin
	[㎒]	[V/H]	[dBi]	[dB]	[dBm]	[dBm]	[dBm]	[dB]
QPSK	5 109.66	V	10.37	16.69	-47.18	-53.50	-25.00	28.50
	7 666.16	H	12.23	19.59	-40.24	-47.60	-25.00	22.60
	10 221.37	V	13.14	22.83	-36.61	-46.30	-25.00	21.30
	12 775.31	H	13.31	25.97	-29.14	-41.80	-25.00	16.80

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

8. Measurement equipment

Equipment Name	Manufacturer	Model No.	Serial No.	Next Cal. Date
Spectrum Analyzer	R&S	FSV40-N	101462	24.10.12
Signal Generator	R&S	SMB100A	176206	25.01.18
DC Power Supply	AGILENT	E3632A	KR75304571	24.04.27
Divider	Marki Microwave, Inc.	PD-0040	D0006	24.07.04
Wideband Radio Communication Tester	R&S	CMW500	132120	24.04.25
Temp & Humid Chamber	Myeongseong R&P	CTHC-50P-DT	20150824-2	25.01.18
Spectrum Analyzer	AGILENT	N9040B	US55230151	24.07.03
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	24.07.12
Horn Antenna	ETS-LINDGREN	3116	00086635	25.01.25
Horn Antenna	ETS-LINDGREN	3116C	00251516	25.02.01
Amplifier	SONOMA INSTRUMENT	310N	421822	24.10.12
Amplifier	C&K Technologies, Inc.	BZR-00504000-551028-252525	27736	24.07.04
Amplifier	C&K Technologies, Inc.	BZRT-00504000-481055-382525	26299-27735	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX10-900-1000-15000-40SS	11	24.07.04
High Pass Filter	Wainwright Instruments GmbH	WHKX12-2805-3000-18000-40SS	32	24.07.04

End of test report