MEASUREMENT REPORT

FCC PART 15.407

FCC ID:	2AD8UFW2RN01
Application:	Nokia Solutions and Networks, OY
Application Type:	Certification
Product:	Flexi Zone Unlicensed LTE
Model No.:	FW2RN
Brand Name:	Nokia
FCC Classification:	Unlicensed National Information Infrastructure (NII)
FCC Rule Part(s):	Part15 Subpart E (Section 15.407)
Test Procedure(s):	ANSI C63.10-2013, KDB 789033 D02v02r01, KDB 662911 D01v02r01
Test Date:	June 27 ~ July 29, 2019

Reviewed By: Paddy Chen
(Paddy Chen)

Approved By: Chenz Ker
(Chenz Ker)

Testing Laboratory
3261

The test results relate only to the samples tested.

This equipment has been shown to be capable of compliance with the applicable technical standards as indicated in the measurement report and was tested in accordance with the measurement procedures specified in ANSI C63.10-2013. Test results reported herein relate only to the item(s) tested.

The test report shall not be reproduced except in full without the written approval of MRT Technology (Taiwan) Co., Ltd.

Revision History

Report No.	Version	Description	Issue Date	Note
1907TW0105-U1	Rev. 01	Initial Report	07-29-2019	Valid

CONTENTS

Description Page

§2.1033General Information

Applicant:	Nokia Solutions and Networks, OY
Applicant Address:	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
Manufacturer:	Nokia Solutions and Networks, OY
Manufacturer Address:	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
Test Site:	MRT Technology (Taiwan) Co., Ltd
Test Site Address:	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)
Test Device Serial No.:	N/A ☐ Production ☒ Pre-Production ☐ Engineering

Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- **MRT facility is a FCC registered (Reg. No. 153292 and 291082) test facility with the site description report on file and is designated by the FCC as an Accredited Test Firm.**
- **MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.**
- **MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.**

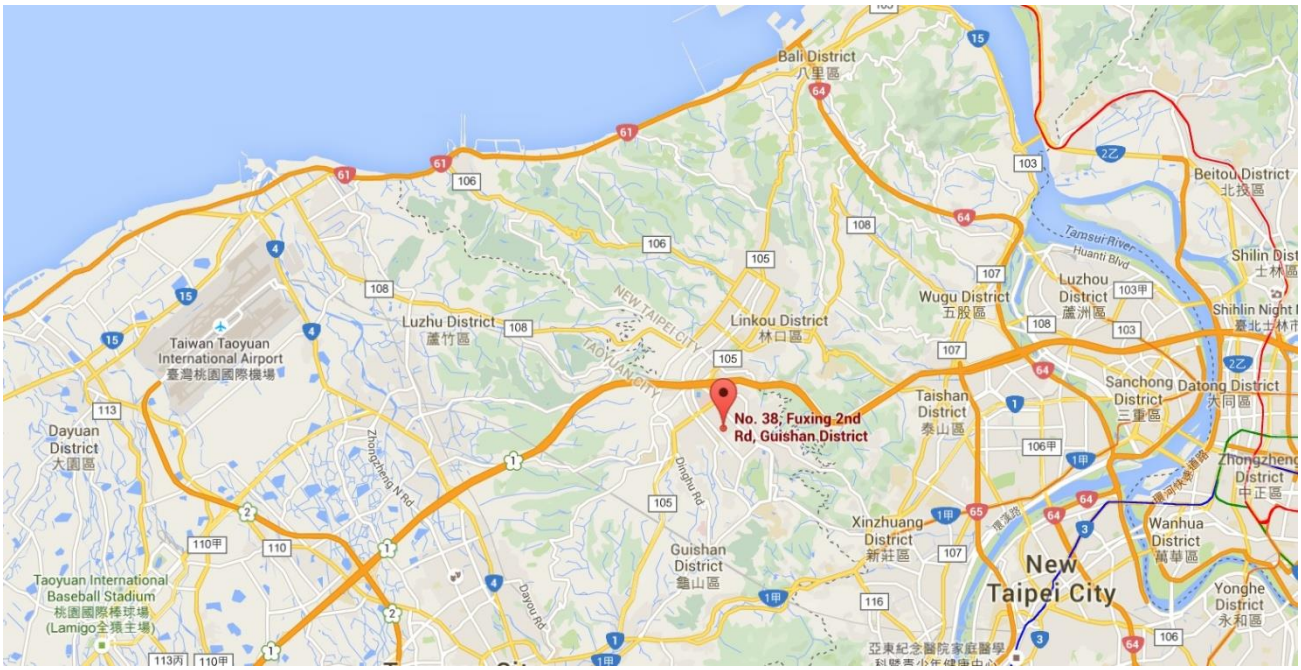
1. INTRODUCTION

1.1. Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices includingintentional and/or unintentional radiators for compliance with the technical rules and regulations of the FederalCommunications Commission and the Industry Canada Certification and Engineering Bureau.

1.2. MRT Test Location

The map below shows the location of the MRT LABORATORY, its proximity to the Taoyuan City. These measurement tests were conducted at the MRT Technology (Taiwan) Co., Ltd. Facility located at No.38, Fuxing 2nd Rd., Guishan Dist., Taoyuan City 33377, Taiwan (R.O.C).



2. PRODUCT INFORMATION

2.1. Equipment Description

Product Name:	Flexi Zone Unlicensed LTE
Model No.:	FW2RN
Brand Name:	Nokia
Test Device Serial No.:	EB191390028
Hardware Version:	475254A.x22
Software Version:	TLF00
LTE Operating Band (s):	LTE Band 46d
Type of Modulation:	QPSK, 16QAM, 64QAM, 256QAM
Carrier Bandwidth:	20MHz
T_X Frequency Range:	5745 ~ 5825.1 MHz
R_X Frequency Range:	5745 ~ 5825.1 MHz
Antenna Specification:	Refer to Section 2.3
Cable Specification:	Nokia Part Number: 475312A, Cable Loss: 0.8dB

2.2. Working Frequencies for this report

Channel	Frequency	Channel	Frequency	Channel	Frequency
149	5745.0 MHz	153	5765.1 MHz	157	5784.9 MHz
161	5805.0 MHz	165	5825.1 MHz	--	--

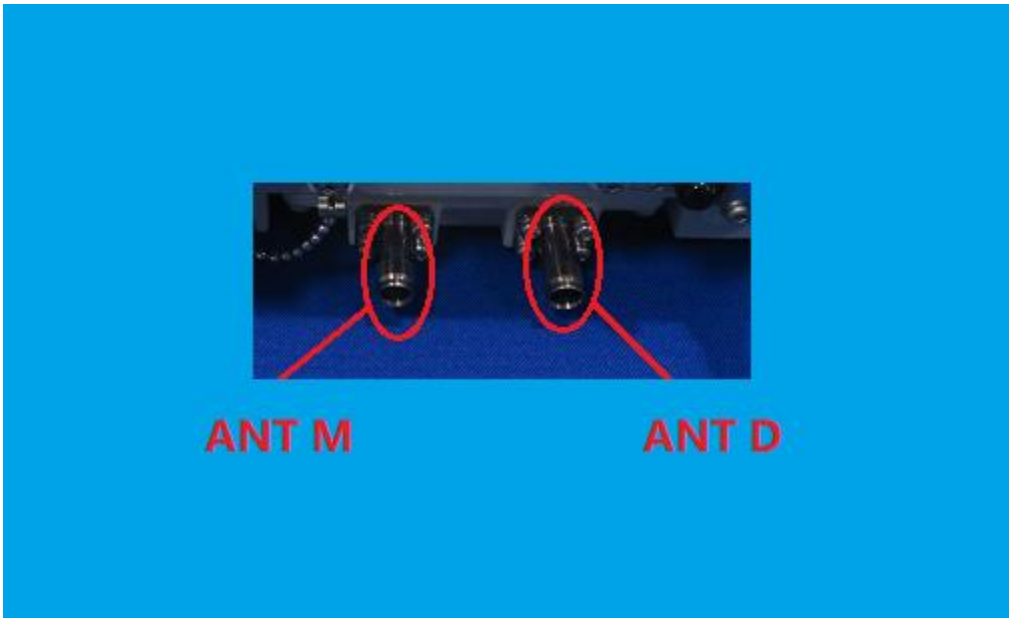
2.3. Description of Available Antennas

Antenna Type	Nokia Part Number	Frequency Band (MHz)	T_X Paths	Max Antenna Gain (dBi)	Directional Gain (dBi)
Directional Antenna	FA2RE (475214A)	5735 ~ 5835	2	6.00	9.01
Omini Antenna	FA2RA (473121A)	5735 ~ 5835	2	7.50	10.51

Note: The directional gain = G_{ANT} + 10 log(N_{ANT}/N_{SS}) dBi, where NSS = the number of independent spatial streams of data and GANT is the antenna gain in dBi. So, the directional gain = 6 or 7.5dBi + 3.01 = 9.01 or 10.51dBi.

2.4. Description of Antenna RF Port

Antenna RF Port		
Software Control Port	ANT M	ANT D



2.5. Test Mode

Test Mode	Mode 1: Transmit at LTE band via QPSK modulation; Mode 2: Transmit at LTE band via 16QAM modulation; Mode 3: Transmit at LTE band via 64QAM modulation; Mode 4: Transmit at LTE band via 256QAM modulation;

2.6. Description of Test Software

The test utility software used during testing was “BTS Site Manager”, and the version was “0000_000434_000011”.

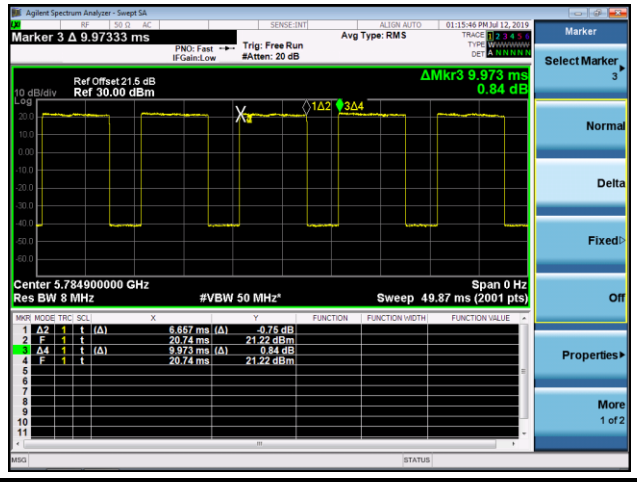
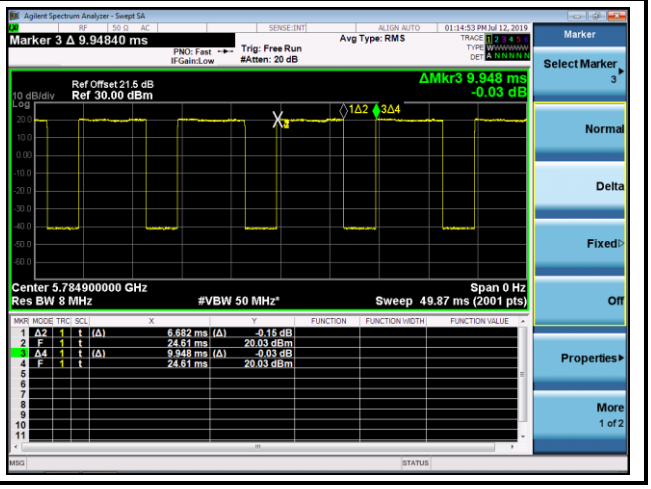
2.7. Device Capabilities

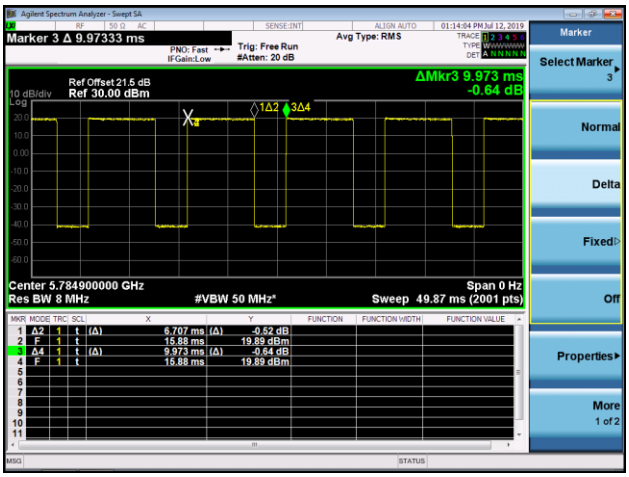
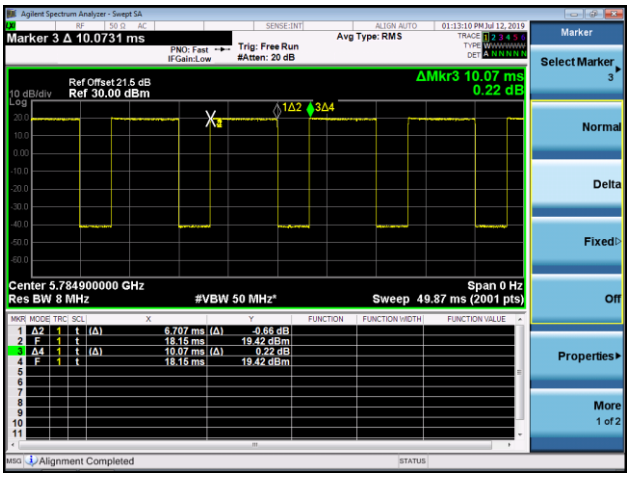
This device contains the following capabilities:

LTE Base Station (NII-3).

Note: unit operation is possible in 20MHz channel bandwidths. The maximum achievable duty cycles for all modes were determined based on measurements performed on a spectrum analyzer in zero-span mode with RBW = 8MHz, VBW = 50MHz per the guidance of Section B)2)b) of ANSI C63.10-2013. The RBW and VBW were both greater than 50/T, where T is the minimum transmission duration, and the number of sweep points across T was greater than 100. The duty cycles are as follows:

Frequency (MHz)	Modulation Type	Duty Cycle
5784.9	QPSK	66.75%
	16QAM	67.17%
	64QAM	67.25%
	256QAM	66.60%

Duty Cycle (T = Transmission Duration)	
Channel 157 (5784.9MHz) - QPSK	Channel 157 (5784.9MHz) - 16QAM
	

Channel 157 (5784.9MHz) - 64QAM	Channel 157 (5784.9MHz) - 256QAM
	

2.8. Test Configuration

The unit was tested per the guidance of ANSI C63.10-2013 was used to reference the appropriate EUT setup for radiated spurious emissions testingand AC line conducted testing.

2.9. EMI Suppression Device(s)/Modifications

No EMI suppression device(s) were added and/or no modifications were made during testing.

2.10. Labeling Requirements

Per 2.1074 & 15.19; Docket 95-19

The label shall be permanently affixed at a conspicuous location on the device; instruction manual or pamphletsupplied to the user and be readily visible to the purchaser at the time of purchase. However, when the deviceis so small wherein placement of the label with specified statement is not practical, only the FCC ID must be displayed on the device per Section 15.19(a)(5). Please see attachment for FCC ID label andlabel location.

3. DESCRIPTION OF TEST

3.1. Evaluation Procedure

The measurement procedures described in the American National Standard for Testing Unlicensed WirelessDevices (ANSI C63.10-2013) was used in themeasurement.

Deviation from measurement procedure…….....None

3.2. AC Line Conducted Emissions

The line-conducted facility is located inside an8'x4'x4' shielded enclosure. A 1m x 2m wooden table 80cm high is placed 40cm away from the vertical wall and 80cm away from the sidewall of the shielded room. Two 10kHz-30MHz, 50Ω/50uH Line-Impedance Stabilization Networks (LISNs) are bonded to the shielded room floor. Power to the LISNs is filtered by external high-current high-insertion loss power line filters. These filters attenuate ambient signal noise from entering the measurement lines. These filters are also bonded to the shielded enclosure.

The EUT is powered from one LISN and the support equipment is powered from the second LISN. All interconnecting cables more than 1 meter were shortened to a 1 meter length by non-inductive bundling (serpentine fashion) and draped over the back edge of the test table. All cables were at least 40cm above the horizontal reference ground-plane. Power cables for support equipment were routed down to the second LISN while ensuring that that cables were not draped over the second LISN.

Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The RF output of the LISN was connected to the receiver and exploratory measurements were made to determine the frequencies producing the maximum emission from the EUT. The receiver was scanned from 150kHz to 30MHz. The detector function was set to peak mode for exploratory measurements while the bandwidth of the analyzer was set to 9kHz. The EUT, support equipment, and interconnecting cables were arranged and manipulated to maximize each emission. Each emission was also maximized by varying, power lines, the mode of operation or data exchange speed, or support equipment whichever determined the worst-case emission. Once the worst-case emissions have been identified, the one EUT cable configuration/arrangement and mode of operation that produced these emissions are used for final measurements on the same test site. The analyzer is set to CISPR quasi-peak and average detectors with a 9kHz resolution bandwidth for final measurements.

An extension cord was used to connect to a single LISN which powered by EUT. The extension cord was calibrated with LISN, the impedance and insertion loss are compliance with the requirements as stated in ANSI C63.10-2013.

3.3. Radiated Emissions

The radiated test facilities consisted of an indoor 3 meter semi-anechoic chamber used for final measurements and exploratory measurements, when necessary. The measurement area is contained within the semi-anechoic chamber which is shielded from any ambient interference. For measurements above 1GHz absorbers are arranged on the floor between the turn table and the antenna mast in such a way so as to maximize the reduction of reflections. For measurements below 1GHz, the absorbers are removed. A MF Model 210SS turntable is used for radiated measurement. It is a continuously rotatable, remotecontrolled, metallic turntable and 2 meters (6.56 ft.) in diameter. The turn table is flush with the raised floor of the chamber in order to maintain its function as a ground plane. An80cm high PVC support structure is placed on top of the turntable.

For all measurements, the spectrum was scanned through all EUT azimuths and from 1 to 4 meter receive antenna height using a broadband antenna from 30MHz up to the upper frequency shown in 15.33(b)(1) depending on the highest frequency generated or used in the device or on which the device operates or tunes. For frequencies above 1GHz, linearly polarized double ridge horn antennas were used. For frequencies below 30MHz, a calibrated loop antenna was used. When exploratory measurements were necessary, they were performed at 1 meter test distance inside the semi-anechoic chamber using broadband antennas, broadband amplifiers, and spectrum analyzers to determine the frequencies and modes producing the maximum emissions. Sufficient time for the EUT, support equipment, and test equipment was allowed in order for them to warm up to their normal operating condition. The test set-up for frequencies below 1GHz was placed on top of the 0.8 meter high, 1 x 1.5 meter table; and test set-up for frequencies 1-40GHz was placed on top of the 1.5 meter high, 1 x 1.5 meter table. The EUT, support equipment, and interconnecting cables were arranged and manipulated tomaximize each emission. Appropriate precaution was taken to ensure that all emissions from the EUT were maximized and investigated. The system configuration, clock speed, mode of operation or video resolution, if applicable, turntable azimuth, and receive antenna height was noted for each frequency found.

Final measurements were made in the semi-anechoic chamber using calibrated, linearly polarized broadband and horn antennas. The test setup was configured to the setup that produced the worst-case emissions. The spectrum analyzer was set to investigate all frequencies required for testing to compare the highest radiated disturbances with respect to the specified limits. The turntable containing the EUT was rotated through 360 degrees and the height of the receive antenna was varied 1 to 4 meters and stopped at the azimuth and height producing the maximum emission. Each emission was maximized by changing the orientation of the EUT through three orthogonal planes and changing the polarity of the receive antenna, whichever produced the worst-case emissions.

According to 3dB Beam-Width of horn antenna, the horn antenna should be always directed to the EUT when rising height.

4. ANTENNA REQUIREMENTS

Excerpt from §15.203 of the FCC Rules/Regulations:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by theresponsible party can be used with the device. The use of a permanently attached antenna or of an antennathat uses a unique coupling to the intentional radiator shall be considered sufficient to comply with theprovisions of this section.”

- There are provisions special connectors (straight NEX10 female connectors) for antenna.

Conclusion:

The unit complies with the requirement of §15.203.

5. TEST EQUIPMENT CALIBRATION DATE

Conducted Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Two-Line V-Network	R&S	ENV 216	MRTTWA00019	1 year	2020/03/25
Two-Line V-Network	R&S	ENV 216	MRTTWA00020	1 year	2020/04/25
8-Wire ISN (T8)	R&S	ENY81	MRTTWA00018	1 year	2020/04/23
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2020/03/25
Thermohygrometer	TFA	35.1078.10.IT	MRTTWA00033	1 year	2020/05/20

Radiated Emissions

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
Acitve Loop Antenna	SCHWARZBECK	FMZB 1519B	MRTTWA00002	1 year	2020/04/29
Broadband TRILOG Antenna	SCHWARZBECK	VULB 9162	MRTTWA00001	1 year	2020/05/22
Broadband Hornantenna	SCHWARZBECK	BBHA 9120D	MRTTWA00003	1 year	2020/04/22
Breitband Hornantenna	SCHWARZBECK	BBHA 9170	MRTTWA00004	1 year	2020/04/23
Broadband Preamplifier	SCHWARZBECK	BBV 9718	MRTTWA00005	1 year	2020/04/24
Broadband Amplifier	SCHWARZBECK	BBV 9721	MRTTWA00006	1 year	2020/04/24
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2020/03/26
EMI Test Receiver	R&S	ESR3	MRTTWA00009	1 year	2020/03/25
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/07/30
Antenna Cable	HUBERSUHNER	SF106	MRTTWE00010	1 year	2020/06/17
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00032	1 year	2020/05/20

Conducted Test Equipment

Instrument	Manufacturer	Type No.	Asset No.	Cali. Interval	Cali. Due Date
X-Series USB Peak and Average Power Sensor	KEYSIGHT	U2021XA	MRTTWA00014	1 year	2020/04/22
Wideband Radio Communication Taster	R&S	CMW 500	MRTTWA00041	1 year	2020/01/28
EXA Signal Analyzer	KEYSIGHT	N9010A	MRTTWA00012	1 year	2019/07/30
EXA Signal Analyzer	KEYSIGHT	N9010B	MRTSUE06457	1 year	2020/07/11
Signal Analyzer	R&S	FSV40	MRTTWA00007	1 year	2020/03/26
Programmable AC Power Source	N4L	N4A3	MRTTWA00068	1 year	2020/02/12
Temperature/Humidity Meter	TFA	35.1078.10.IT	MRTTWA00033	1 year	2020/05/20

Software	Version	Function
EMI Software	V3	EMI Test Software

6. MEASUREMENT UNCERTAINTY

Where relevant, the following test uncertainty levels have been estimated for tests performed on the EUT as specified in CISPR 16-4-2. This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k = 2.

AC Conducted Emission Measurement - SR2
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 150kHz~30MHz: 2.53dB
Radiated Emission Measurement - AC1
Measuring Uncertainty for a Level of Confidence of 95% (U=2Uc(y)): 9kHz ~ 1GHz: 4.25dB 1GHz ~ 25GHz: 4.45dB

7. TEST RESULT

7.1. Summary

FCC Section(s)	Test Description	Test Limit	Test Condition	Test Result	Reference
15.407(a)	26dB Bandwidth	N/A	Conducted	Pass	Section 7.2
15.407(e)	6dB Bandwidth	≥ 500kHz		Pass	Section 7.3
15.407(a)(3)	Maximum Conducted Output Power	Refer to section 7.4		Pass	Section 7.4
15.407(h)(1)	Transmit Power Control	≤ 24 dBm		N/A	Section 7.5
15.407(a)(3), (5)	Peak Power Spectral Density	Refer to section 7.6		Pass	Section 7.6
15.407(g)	Frequency Stability	N/A		Pass	Section 7.7
15.407(b)(4)(i)	Undesirable Emissions	Refer to Section 7.8	Radiated	Pass	Section 7.8 & 7.9
15.205, 15.209 15.407(b)(5), (6), (7)	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	Emissions in restrictedbands must meet theradiated limits detailed in15.209		Pass	
15.207	AC Conducted Emissions 150kHz - 30MHz	< FCC 15.207 limits	Line Conducted	Pass	Section 7.10

Notes:

1) The analyzer plots shown in this section were all taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables and attenuators used as part ofthe system to connect the EUT to the analyzer at all frequencies of interest.
2) All modes of operation and data rates were investigated. For radiated emission test, every axis (X, Y, Z) was also verified. The test results shown in the following sections represent the worst-case emissions.
3) Test Items “26dB Bandwidth” & “6dB Bandwidth” have been assessed MIMO transmission, and showed the worst test data in this report.
4) “N/A” means that the test item is not applicable, and the details information refer to relevant section.

7.2. 26dB Bandwidth Measurement

7.2.1.Test Limit

N/A

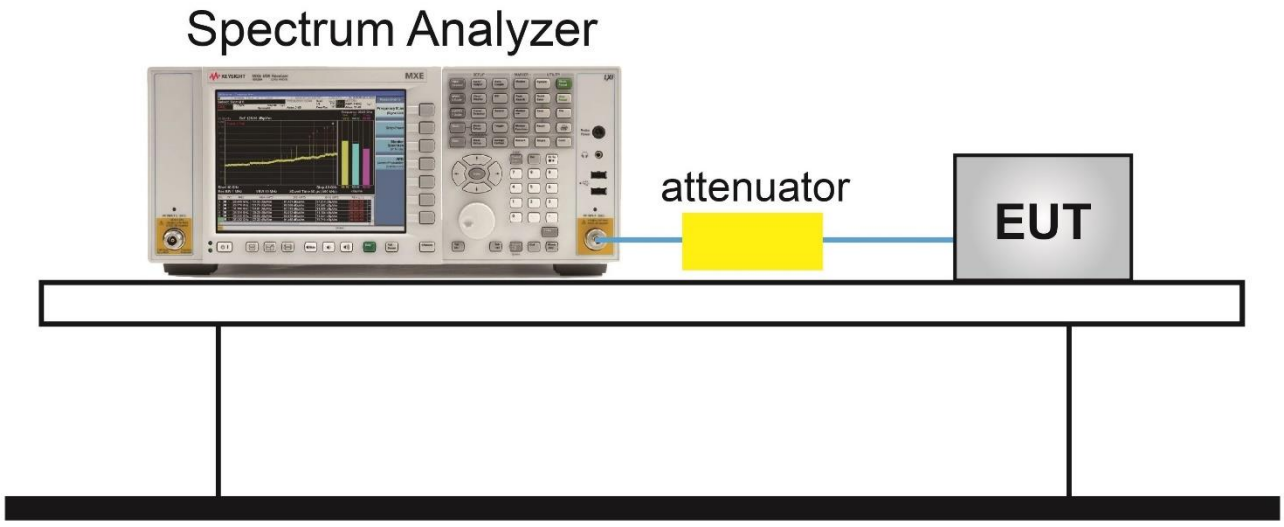
7.2.2.Test Procedure used

ANSI C63-2013 - Section 12.4.1

7.2.3.Test Setting

1. The analyzers' automatic bandwidth measurement capability was used to perform the 26dB bandwidth measurement. The "X" dB bandwidth parameter was set to X = 26. The automatic bandwidth measurement function also has the capability of simultaneously measuring the 99% occupied bandwidth. The bandwidth measurement was not influenced by any intermediated power nulls in the fundamental emission.
2. RBW = approximately 1% of the emission bandwidth.
3. VBW ≥ 3×RBW.
4. Detector = Peak.
5. Trace mode = max hold.

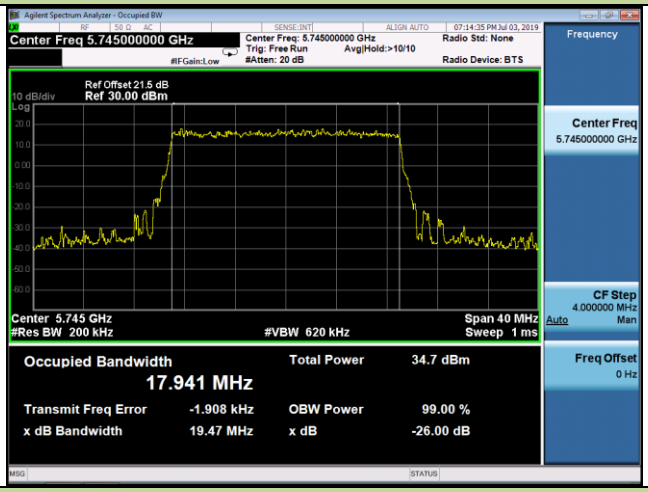
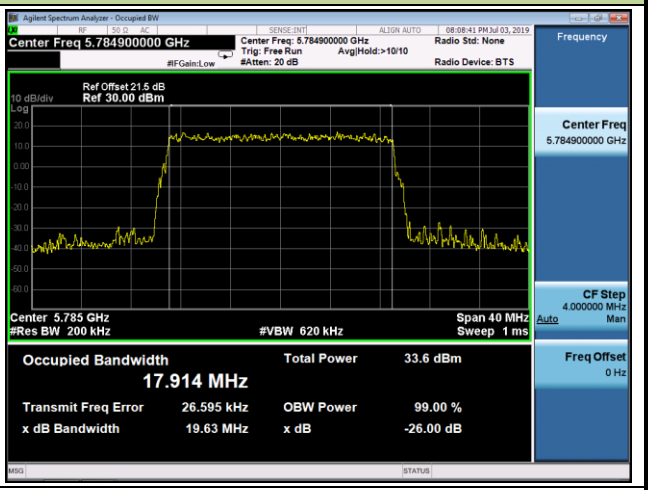
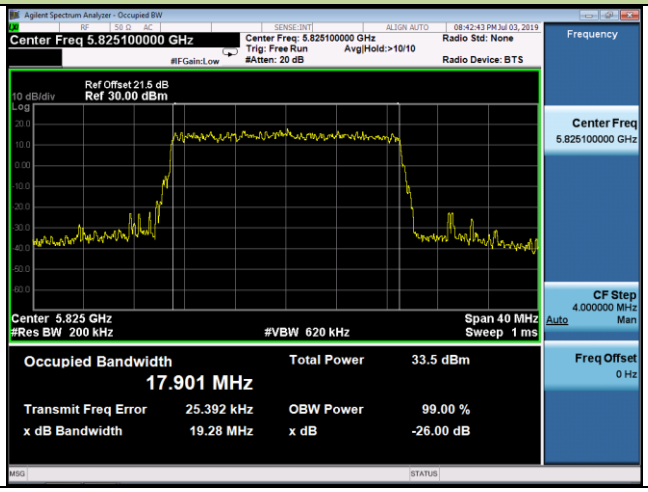
7.2.4.Test Setup

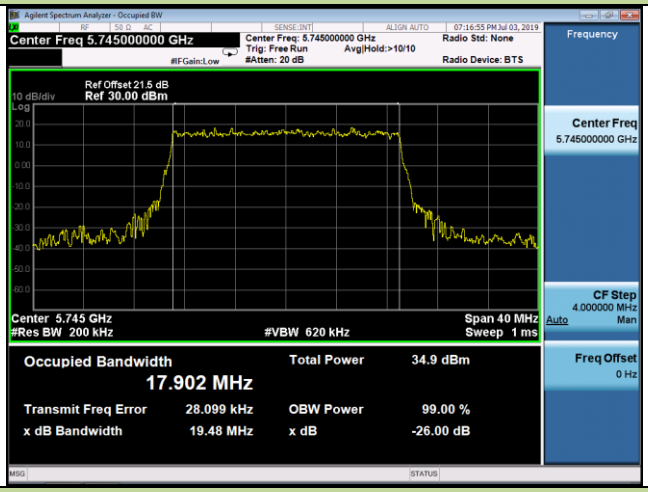
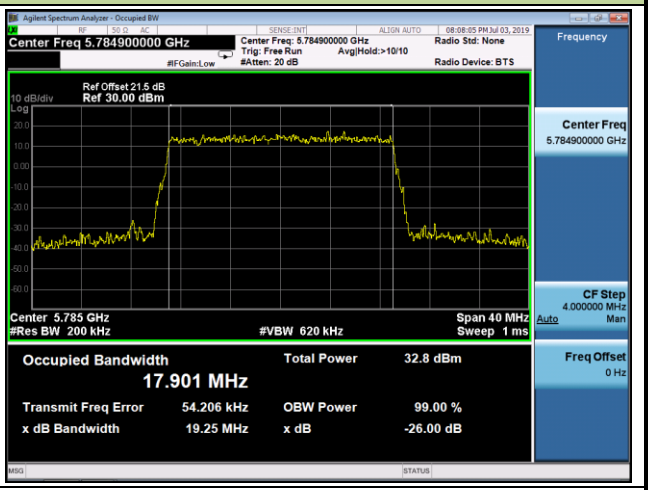
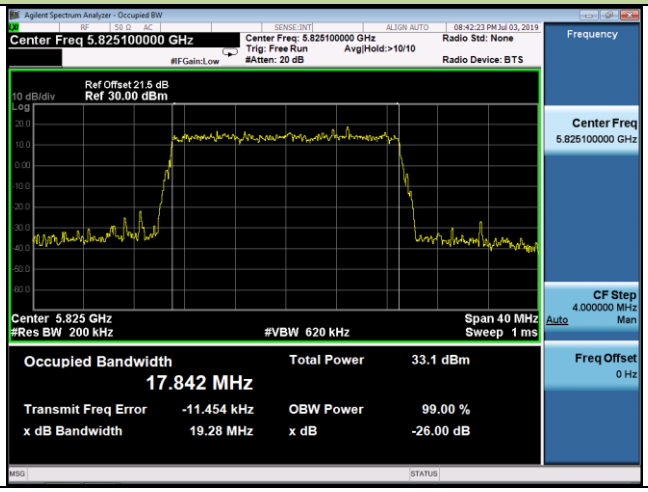


7.2.5.Test Result

Product	Flexi Zone Unlicensed LTE	Temperature	24°C
Test Engineer	Peter Xu	Relative Humidity	59%
Test Site	SR2	Test Date	2019/07/03

Test Mode	Channel No.	Frequency (MHz)	26dB Bandwidth (MHz)	99% Bandwidth (MHz)
ANT M / ANT M + D				
QPSK	149	5745.0	19.47	17.94
	157	5784.9	19.63	17.91
	165	5825.1	19.28	17.90
16QAM	149	5745.0	19.48	17.90
	157	5784.9	19.25	17.90
	165	5825.1	19.28	17.84
64QAM	149	5745.0	19.48	17.88
	157	5784.9	19.51	17.89
	165	5825.1	19.29	17.89
256QAM	149	5745.0	19.57	17.89
	157	5784.9	19.51	17.88
	165	5825.1	19.51	17.89

26dB Bandwidth & 99% Bandwidth - ANT M / ANT M + D (QPSK)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

26dB Bandwidth & 99% Bandwidth - ANT M / ANT M + D (16QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

26dB Bandwidth & 99% Bandwidth - ANT M / ANT M + D (64QAM)	
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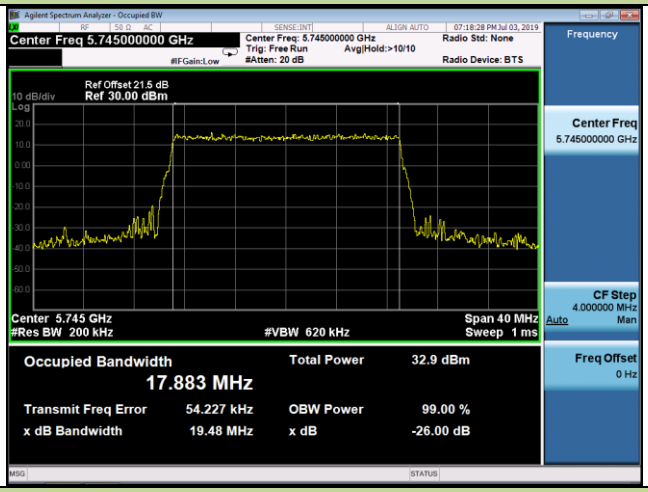
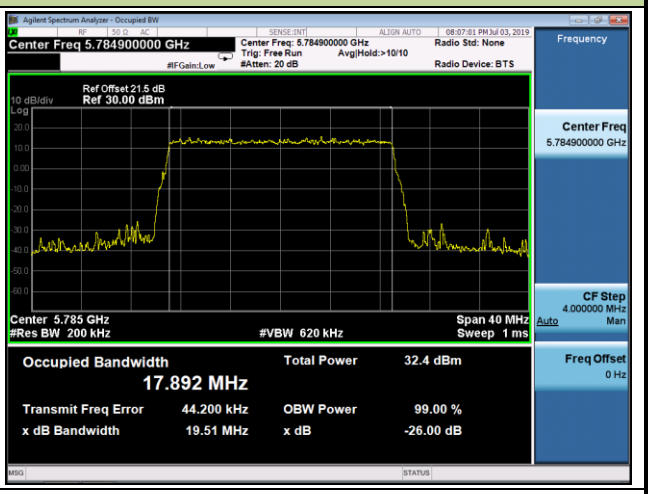
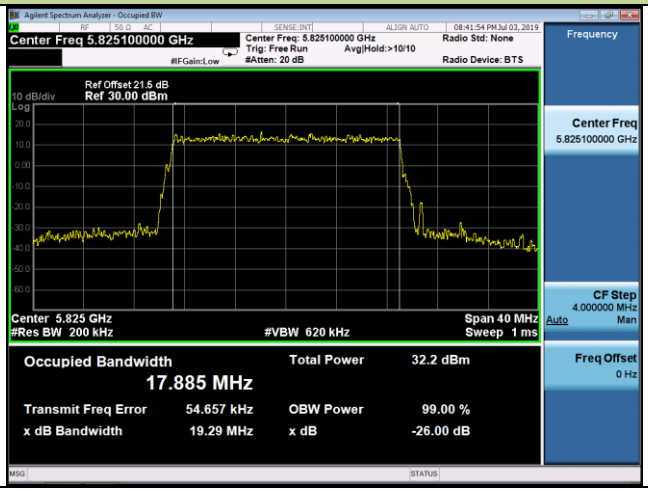
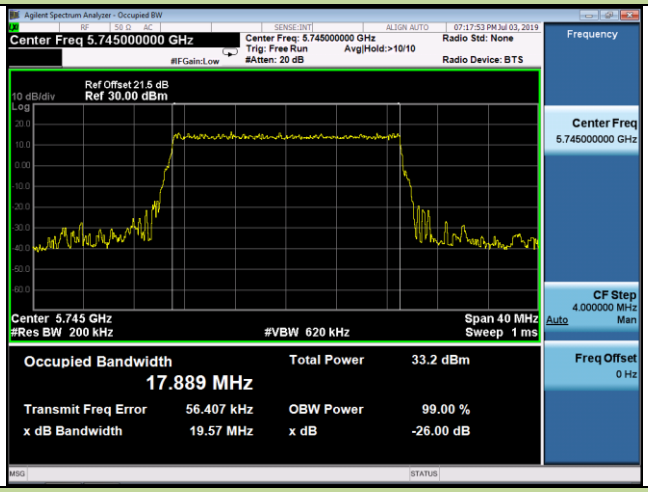
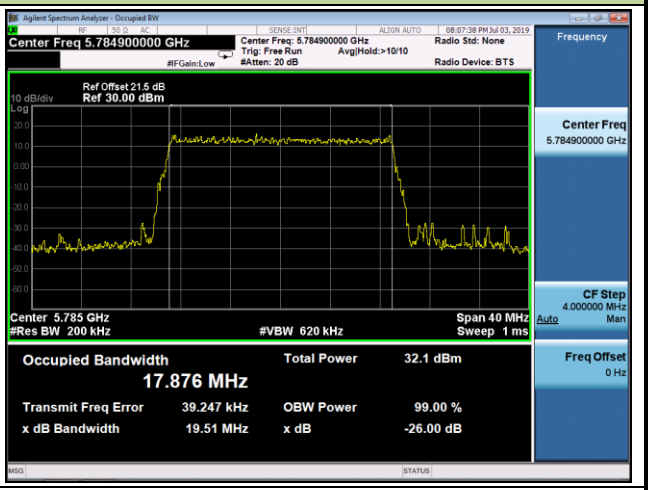
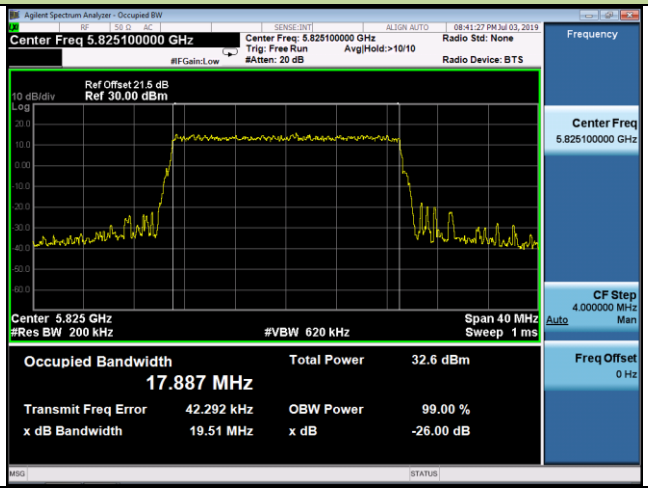
	
Channel 165 (5825.1MHz)	
	

26dB Bandwidth & 99% Bandwidth - ANT M / ANT M + D (256QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

7.3. 6dB Bandwidth Measurement

7.3.1.Test Limit

The minimum 6dB bandwidth shall be at least 500 kHz.

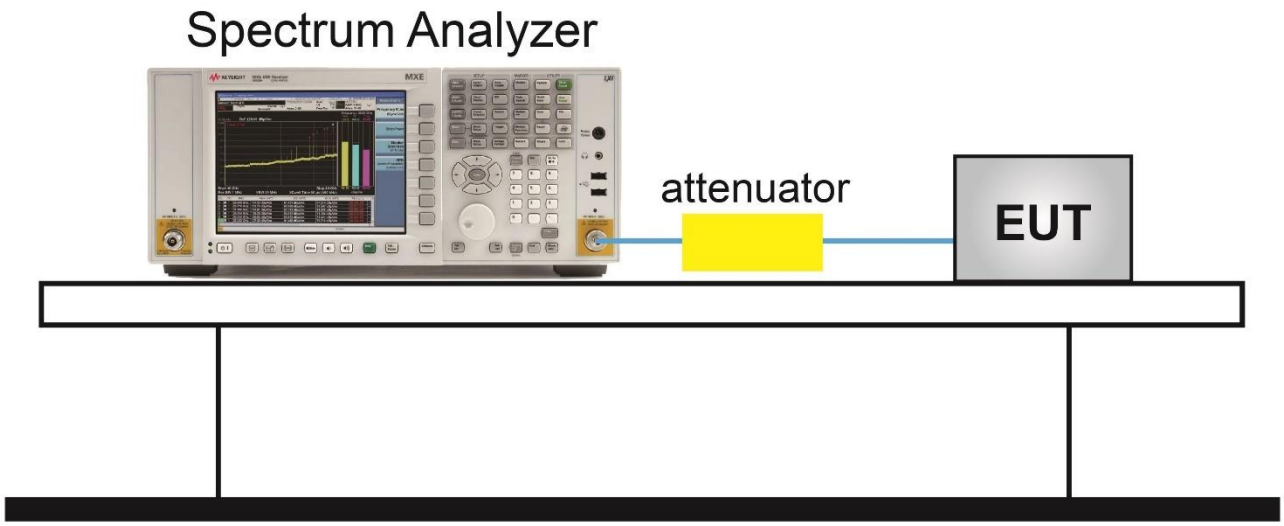
7.3.2.Test Procedure used

ANSI C63-2013 - Section 12.4.2

7.3.3.Test Setting

1. Set center frequency to the nominal EUT channel center frequency.
2. RBW = 100 kHz.
3. VBW ≧ 3 × RBW.
4. Detector = Peak.
5. Trace mode = max hold.
6. Sweep = auto couple.
7. Allow the trace to stabilize.
8. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

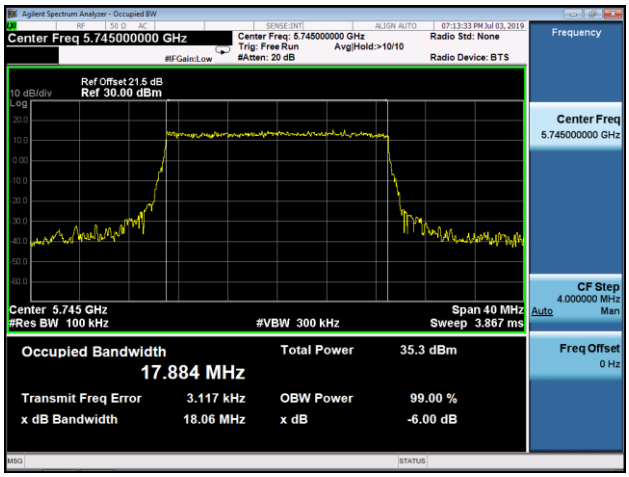
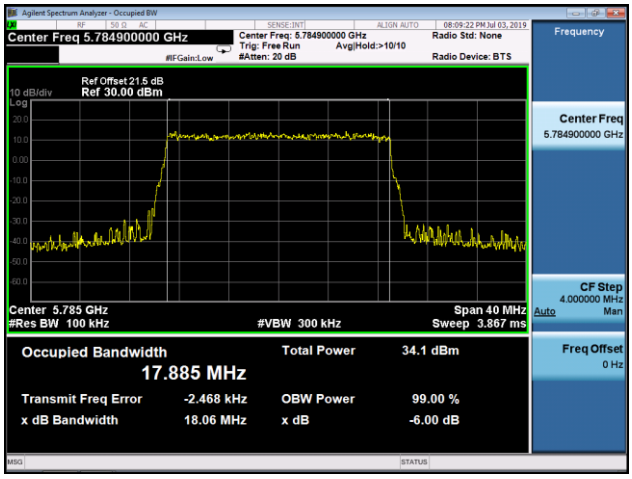
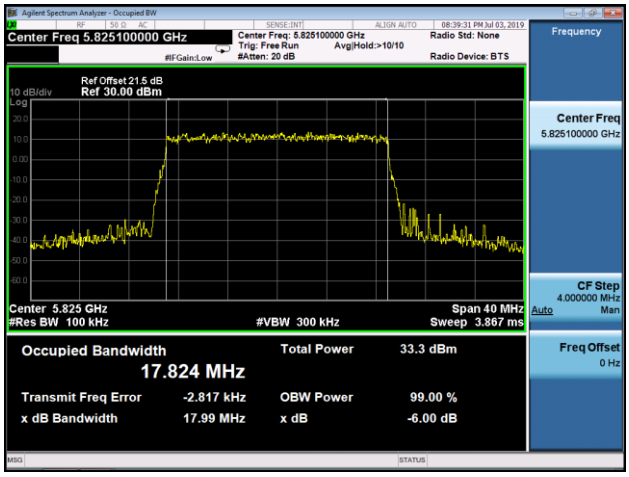
7.3.4.Test Setup

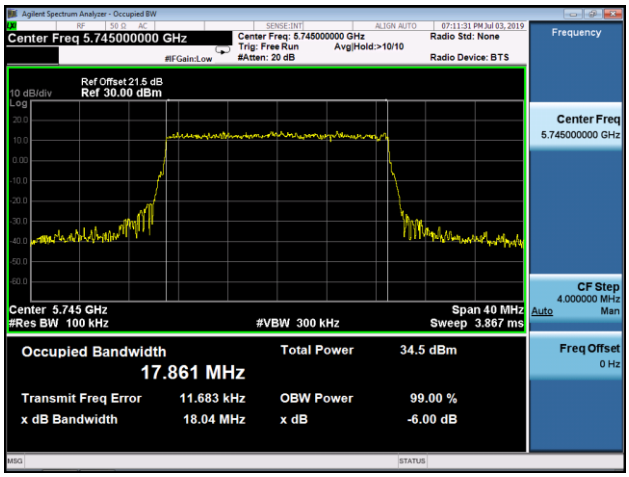
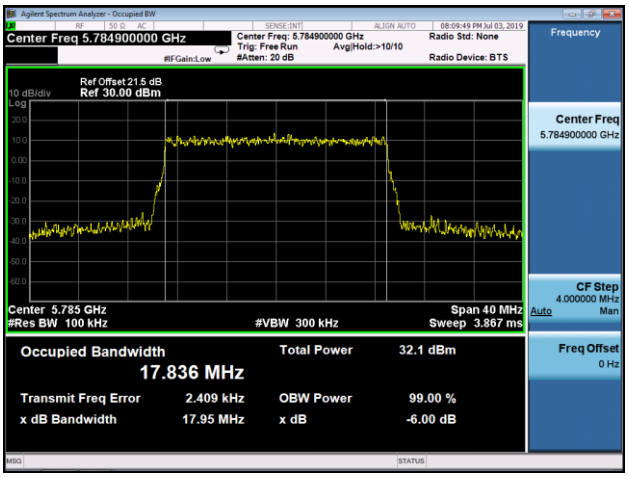
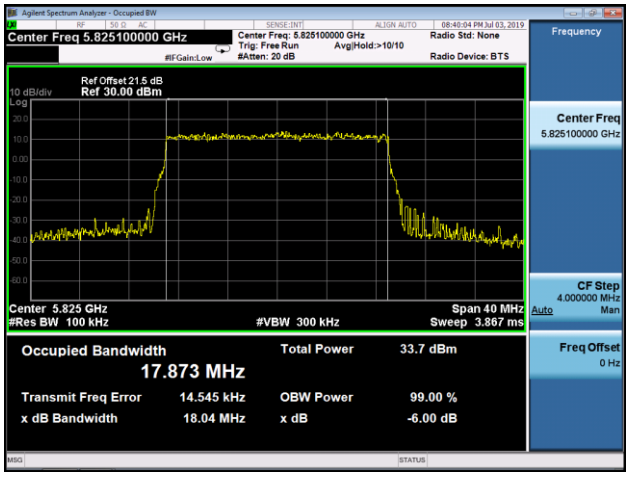


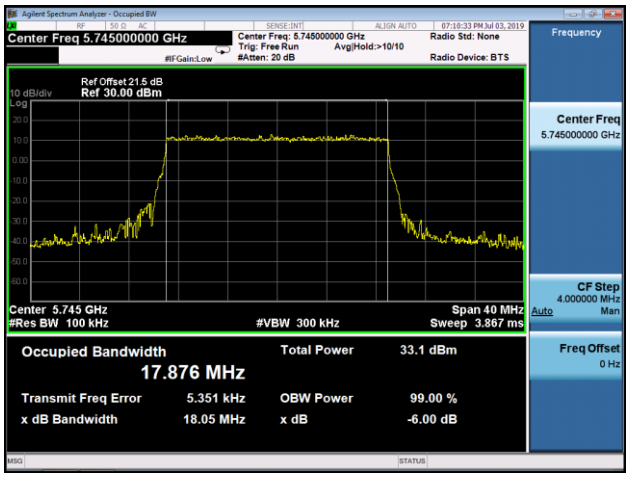
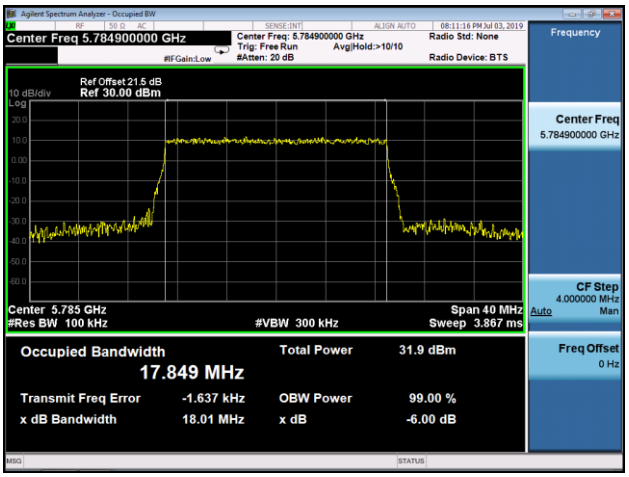
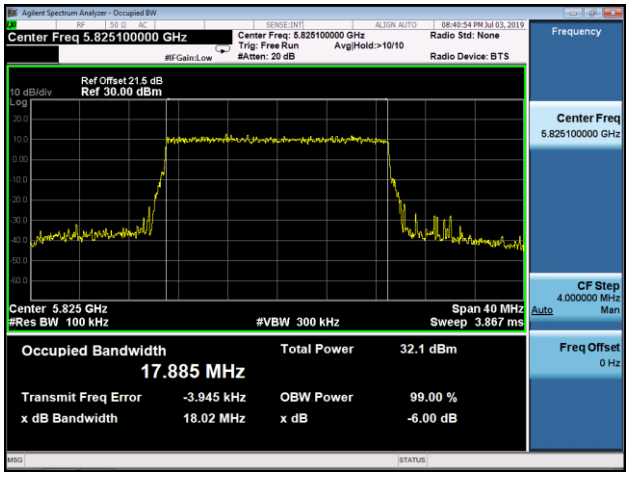
7.3.5.Test Result

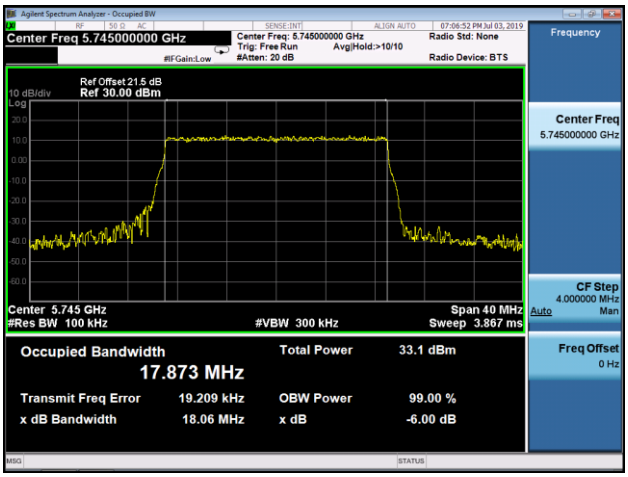
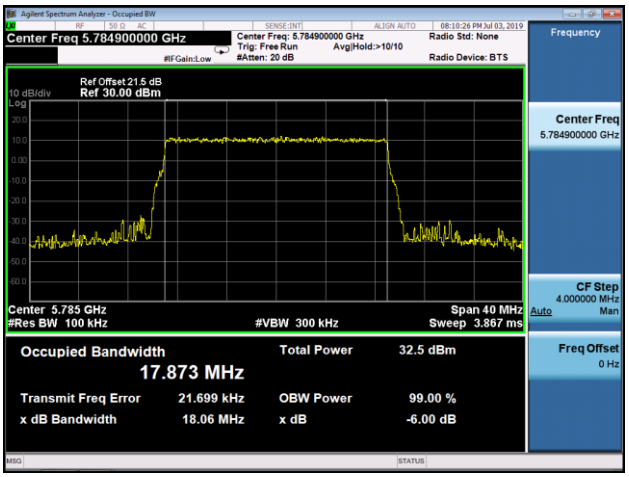
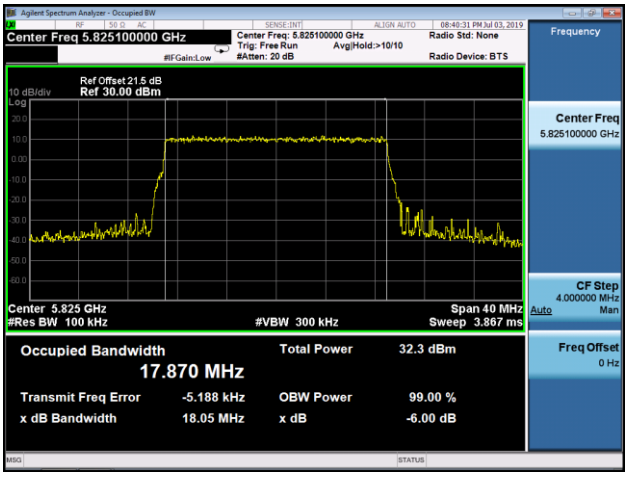
Product	Flexi Zone Unlicensed LTE	Temperature	24°C
Test Engineer	Peter Xu	Relative Humidity	59%
Test Site	SR2	Test Date	2019/07/03

Test Mode	Channel No.	Frequency (MHz)	6dB Bandwidth (MHz)	Limit (MHz)	Result
ANT M / ANT M + D					
QPSK	149	5745.0	18.06	≥ 0.5	Pass
	157	5784.9	18.06	≥ 0.5	Pass
	165	5825.1	17.99	≥ 0.5	Pass
16QAM	149	5745.0	18.04	≥ 0.5	Pass
	157	5784.9	17.95	≥ 0.5	Pass
	165	5825.1	18.04	≥ 0.5	Pass
64QAM	149	5745.0	18.05	≥ 0.5	Pass
	157	5784.9	18.01	≥ 0.5	Pass
	165	5825.1	18.02	≥ 0.5	Pass
256QAM	149	5745.0	18.06	≥ 0.5	Pass
	157	5784.9	18.06	≥ 0.5	Pass
	165	5825.1	18.05	≥ 0.5	Pass

6dB Bandwidth - ANT M / ANT M + D (QPSK)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

6dB Bandwidth - ANT M / ANT M + D (16QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

6dB Bandwidth - ANT M / ANT M + D (64QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

6dB Bandwidth - ANT M / ANT M + D (256QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

7.4. Output Power Measurement

7.4.1.Test Limit

For the band 5.725 - 5.85 GHz, the maximum conducted output power over the frequency band of operation shall not exceed 1 W (30dBm).

If transmitting antennas of directional gain greater than 6dBi are used, the maximumconducted output power shall be reduced by the amount in dB that the directional gain of theantenna exceeds 6dBi.

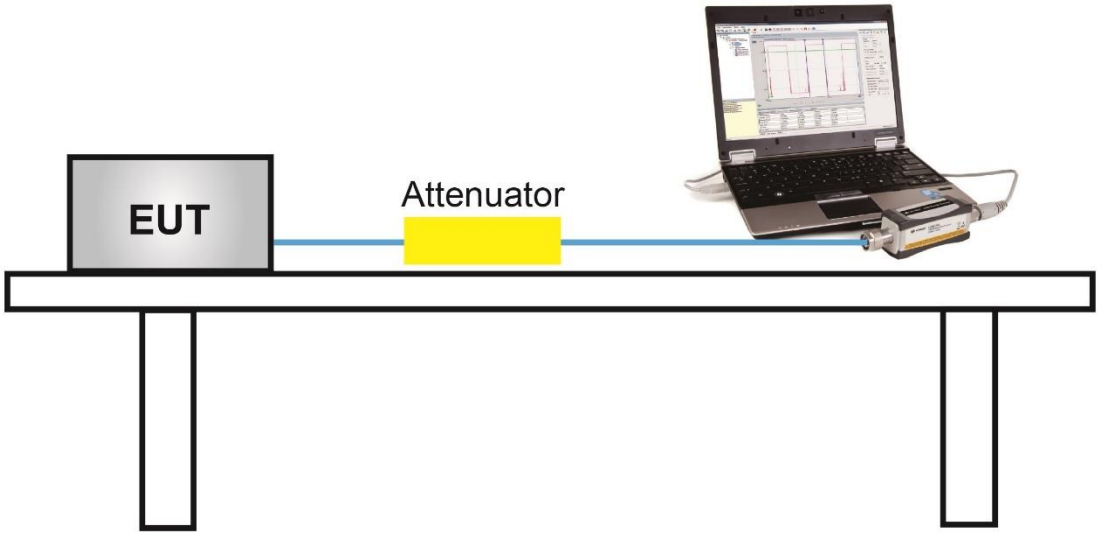
7.4.2.Test Procedure Used

ANSI C63-2013 - Section 12.3

7.4.3.Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter.

7.4.4.Test Setup



7.4.5.Test Result

Product	Flexi Zone Unlicensed LTE	Temperature	25°C
Test Engineer	Peter Xu	Relative Humidity	56%
Test Site	SR2	Test Date	2019/07/03
Antenna Type	Directional Antenna		

Modulation Type	Channel No.	Freq. (MHz)	ANT M Average Power (dBm)	ANT D Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Result
QPSK	149	5745.0	23.79	23.93	26.87	≤ 26.99	Pass
	157	5784.9	23.78	23.99	26.90	≤ 26.99	Pass
	165	5825.1	23.72	23.88	26.81	≤ 26.99	Pass
16QAM	149	5745.0	23.63	23.74	26.70	≤ 26.99	Pass
	157	5784.9	23.63	23.87	26.76	≤ 26.99	Pass
	165	5825.1	23.65	23.91	26.79	≤ 26.99	Pass
64QAM	149	5745.0	23.41	23.85	26.65	≤ 26.99	Pass
	157	5784.9	23.64	23.84	26.75	≤ 26.99	Pass
	165	5825.1	24.10	23.71	26.92	≤ 26.99	Pass
256QAM	149	5745.0	24.14	23.60	26.89	≤ 26.99	Pass
	157	5784.9	24.08	23.57	26.84	≤ 26.99	Pass
	165	5825.1	24.13	23.61	26.89	≤ 26.99	Pass

Note 1: Total Average Power (dBm) = 10*log*{$10^{[\text{ANT M Average Power (dBm) / 10}]}$ + $10^{[\text{ANT D Average Power (dBm) / 10}]}$ } (dBm).

Note 2: Average Power Limit (dBm) = 30dBm - (6dBi + 3.01dB - 6dB) = 26.99dBm

Product	Flexi Zone Unlicensed LTE	Temperature	25°C
Test Engineer	Peter Xu	Relative Humidity	56%
Test Site	SR2	Test Date	2019/07/25
Antenna Type	Omni Antenna		

Modulation Type	Channel No.	Freq. (MHz)	ANT M Average Power (dBm)	ANT D Average Power (dBm)	Total Average Power (dBm)	Average Power Limit (dBm)	Result
QPSK	149	5745.0	22.13	22.05	25.10	≤ 25.49	Pass
	157	5784.9	21.51	21.89	24.71	≤ 25.49	Pass
	165	5825.1	22.11	21.92	25.03	≤ 25.49	Pass
16QAM	149	5745.0	22.29	21.96	25.14	≤ 25.49	Pass
	157	5784.9	21.52	21.84	24.69	≤ 25.49	Pass
	165	5825.1	22.09	21.86	24.99	≤ 25.49	Pass
64QAM	149	5745.0	22.08	21.89	25.00	≤ 25.49	Pass
	157	5784.9	21.44	21.74	24.60	≤ 25.49	Pass
	165	5825.1	21.84	21.78	24.82	≤ 25.49	Pass
256QAM	149	5745.0	22.14	21.95	25.06	≤ 25.49	Pass
	157	5784.9	21.43	21.72	24.59	≤ 25.49	Pass
	165	5825.1	21.71	21.64	24.69	≤ 25.49	Pass

Note 1: Total Average Power (dBm) = 10*log*{$10^{[\text{ANT M Average Power (dBm) / 10}]}$ + $10^{[\text{ANT D Average Power (dBm) / 10}]}$ } (dBm).

Note 2: Average Power Limit (dBm) = 30dBm - (7.50dBi + 3.01dB - 6dB) = 25.49dBm

7.5. Transmit Power Control

7.5.1.Test Limit

The U-NII device is required to have the capability to operate at least 6 dB below the mean EIRP value of 30 dBm.

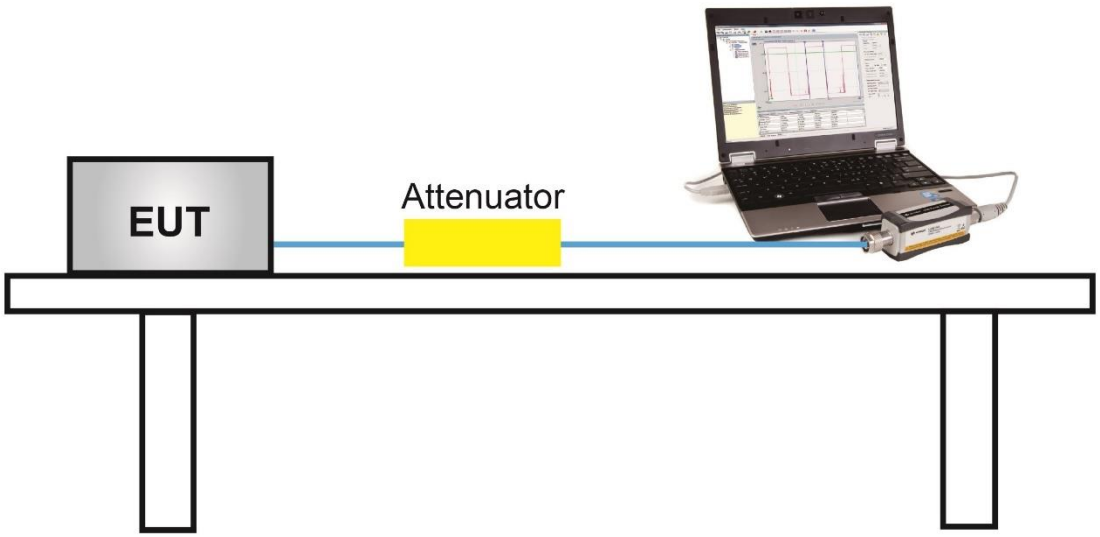
7.5.2.Test Procedure Used

ANSI C63-2013 - Section 12.3

7.5.3.Test Setting

Average power measurements were performed only when the EUT was transmitting at its maximum power control level using a broadband power meter with a pulse sensor. The power meter implemented triggering and gating capabilities which were set up such that power measurements were recorded only during the ON time of the transmitter. The trace was averaged over 100 traces to obtain the final measured average power.

7.5.4.Test Setup



7.5.5.Test Result

The TPC requirement is not applicable to the operating band at 5745-5825.1MHz.

7.6. Power Spectral Density Measurement

7.6.1.Test Limit

For the band 5.725-5.85 GHz, the maximum power spectral density shall not exceed 30 dBm in any 500-kHz band.

If transmitting antennas of directional gain greater than 6dBi are used, the peak power spectral density shall be reduced by the amount in dB that the directional gain of theantenna exceeds 6dBi.

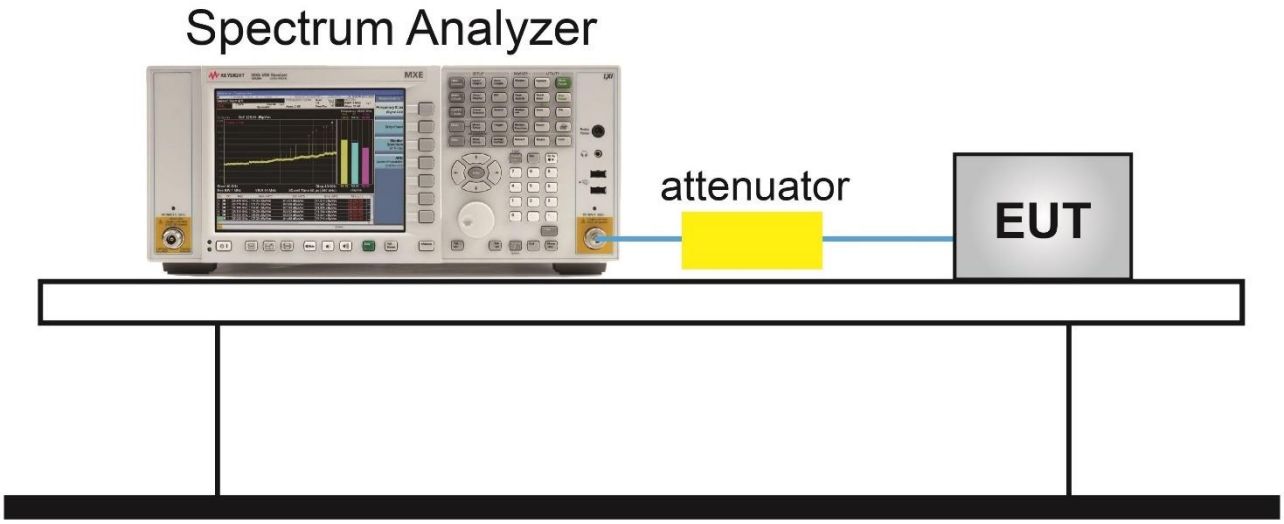
7.6.2.Test Procedure Used

ANSI C63-2013 - Section 12.6

7.6.3.Test Setting

1. Analyzer was set to the center frequency of the UNII channel under investigation
2. Span was set to encompass the entire 26dB EBW of the signal.
3. RBW = 1MHz, if measurement bandwidth of Maximum PSD is specified in 500 kHz, RBW = 100 kHz
4. VBW = 3MHz
5. Number of sweep points ≥ 2 × (span / RBW)
6. Detector = power averaging (Average)
7. Sweep time = auto
8. Trigger = free run
9. Use the peak search function on the instrument to find the peak of the spectrum and record its value.
10. Add 10*log(1/x), where x is the duty cycle, to the measured power in order to compute the average power during the actual transmission times (because the measurement represents an average over both the on and off times of the transmission). For example, add 10*log*(1/0.25) = 6 dB if the duty cycle is 25 percent.
11. When the measurement bandwidth of Maximum PSD is specified in 500 kHz, add a constant factor 10*log(500kHz/100kHz) = 6.99 dB to the measured result.

7.6.4.Test Setup



7.6.5.Test Result

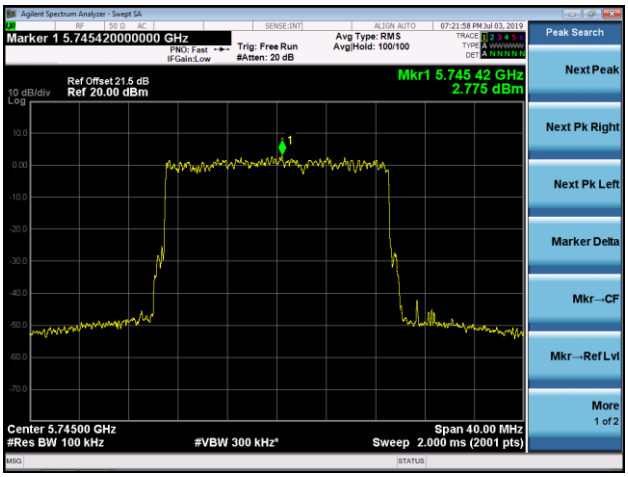
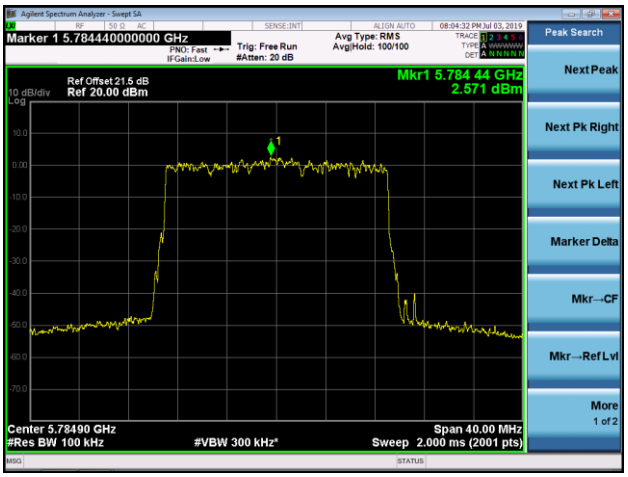
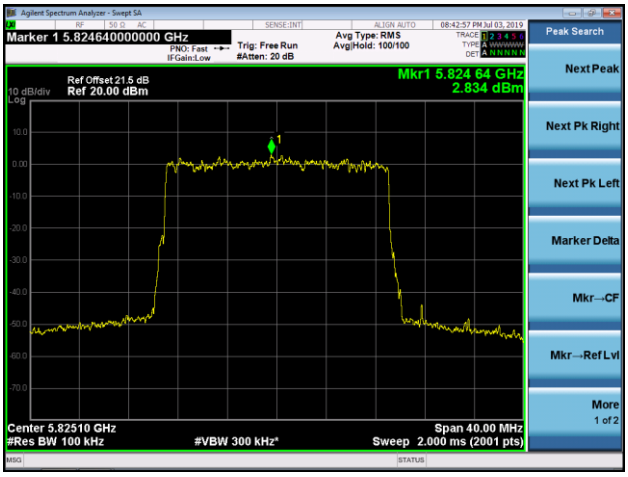
Product	Flexi Zone Unlicensed LTE	Temperature	24°C
Test Engineer	Peter Xu	Relative Humidity	59%
Test Site	SR2	Test Date	2019/07/03
Antenna Type	Directional Antenna		

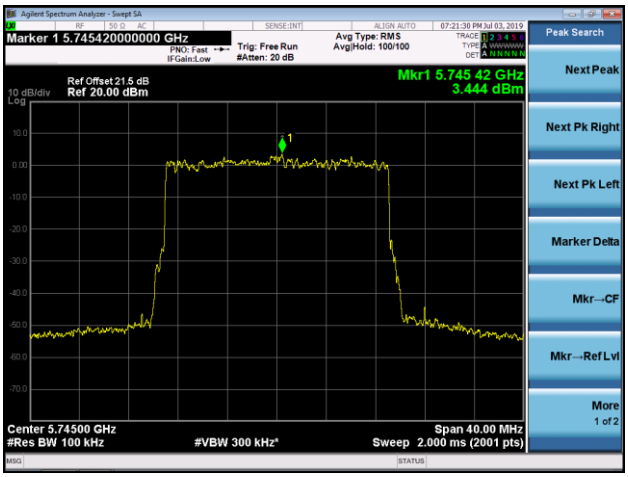
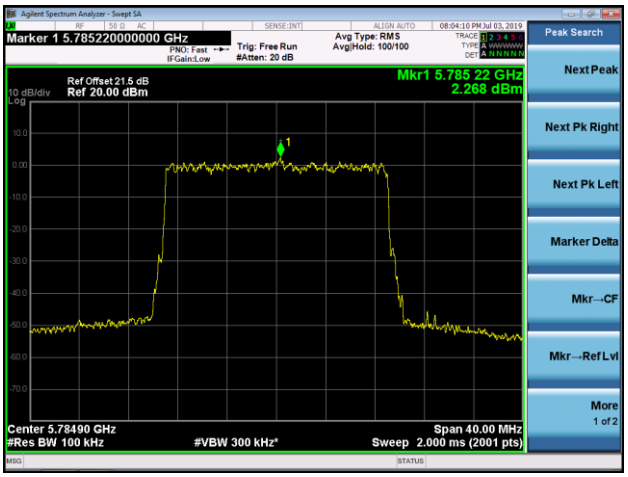
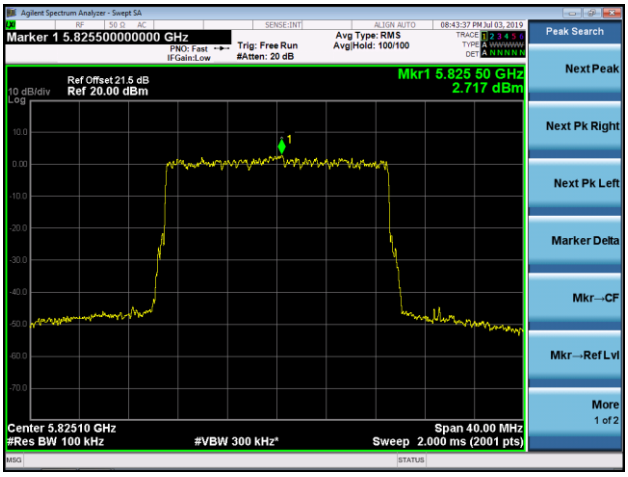
Modulation Type	Channel No.	Freq. (MHz)	ANT M PSD (dBm/ 100kHz)	ANT D PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor (dB)	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
QPSK	149	5745.0	2.78	2.25	66.75	6.99	14.28	≤ 26.99	Pass
	157	5784.9	2.57	2.05	66.75	6.99	14.07	≤ 26.99	Pass
	165	5825.1	2.83	2.22	66.75	6.99	14.29	≤ 26.99	Pass
16QAM	149	5745.0	3.44	2.42	67.17	6.99	14.69	≤ 26.99	Pass
	157	5784.9	2.27	2.74	67.17	6.99	14.24	≤ 26.99	Pass
	165	5825.1	2.72	2.26	67.17	6.99	14.22	≤ 26.99	Pass
64QAM	149	5745.0	2.10	1.86	67.25	6.99	13.71	≤ 26.99	Pass
	157	5784.9	1.16	1.07	67.25	6.99	12.84	≤ 26.99	Pass
	165	5825.1	1.90	1.75	67.25	6.99	13.55	≤ 26.99	Pass
256QAM	149	5745.0	1.83	1.29	66.60	6.99	13.33	≤ 26.99	Pass
	157	5784.9	1.44	1.19	66.60	6.99	13.08	≤ 26.99	Pass
	165	5825.1	1.88	1.29	66.60	6.99	13.36	≤ 26.99	Pass

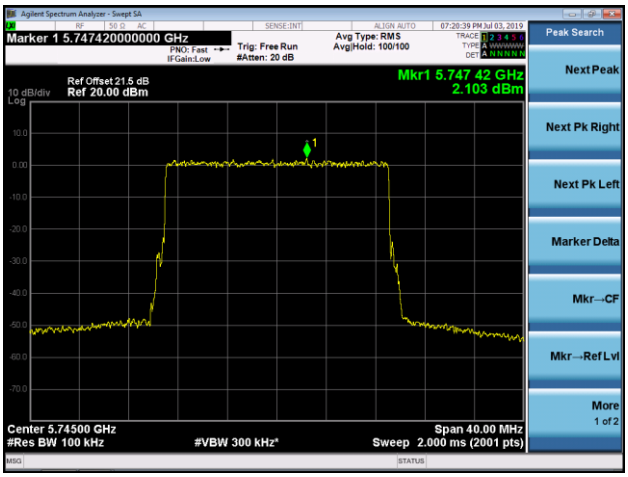
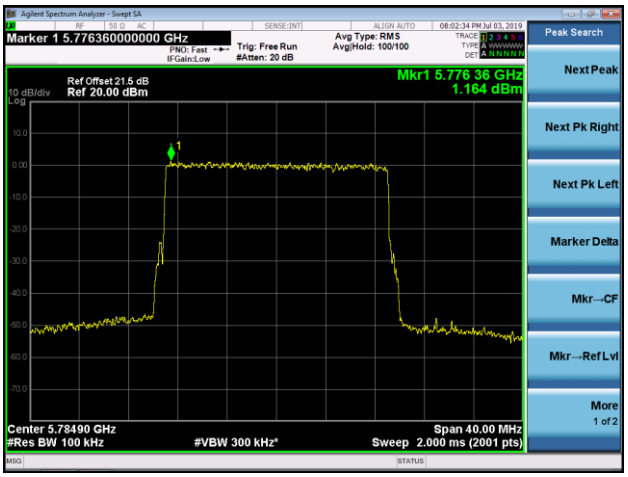
Note 1:

When EUT duty cycle < 98%, the total PSD (dBm/500kHz) = 10*log {$10^{\wedge[\text{ANT M PSD (dBm/ MHz)}/10]} + 10^{\wedge[\text{ANT D PSD (dBm/ MHz)}/10]}$} (dBm/100kHz) + Constant Factor (dB) + 10*log (1/Duty Cycle).

Note 2: PSD Limit (dBm/500kHz) = 30 - (6dBi + 3.01dBi - 6dB) = 26.99dBm/500kHz.

Power Spectral Density - ANT M / ANT M + D(QPSK)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT M / ANT M + D(16QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT M / ANT M + D(64QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
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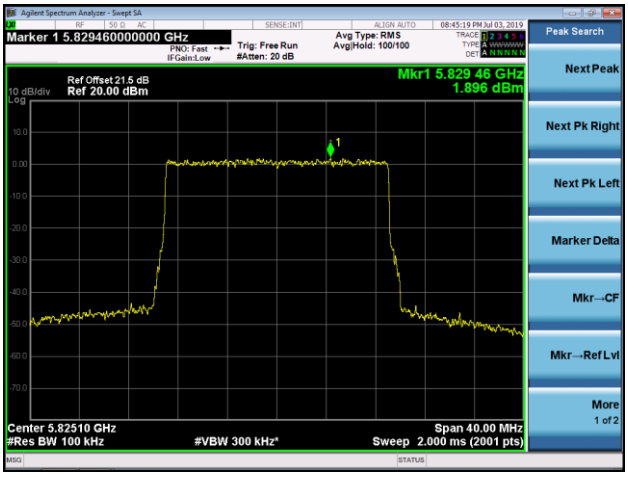
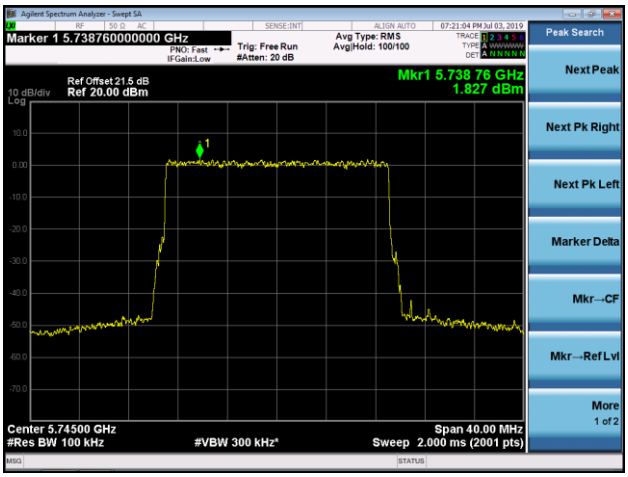
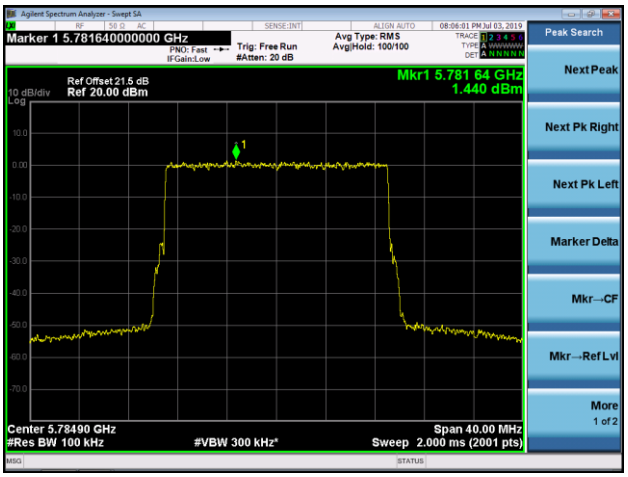
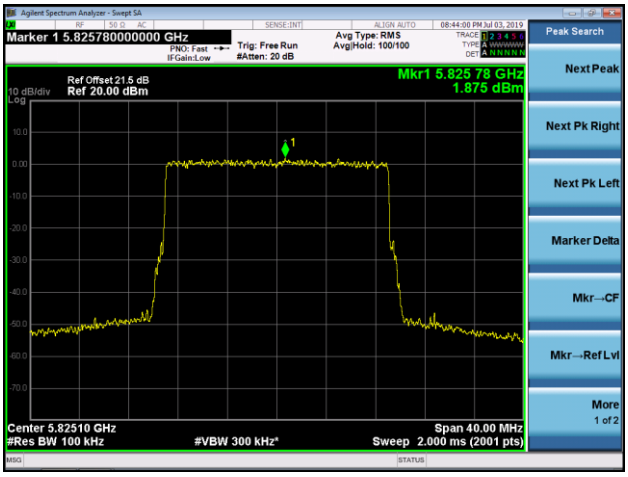
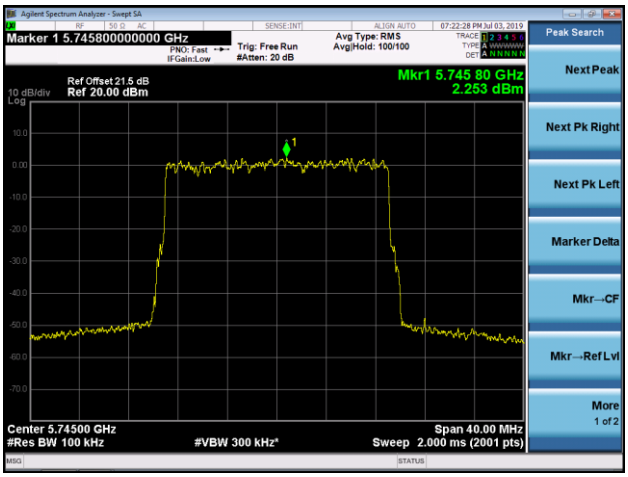
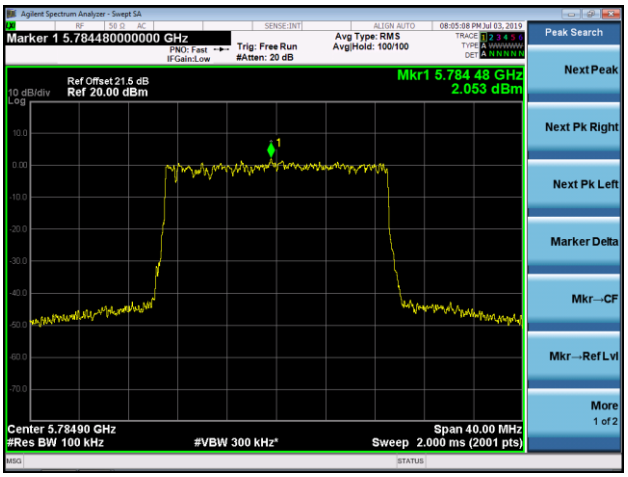
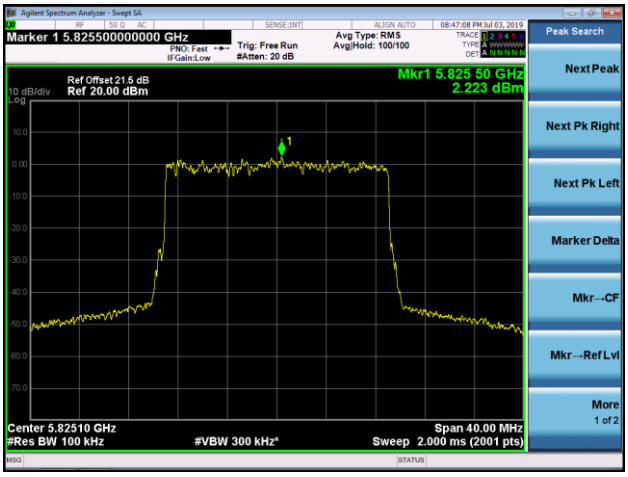
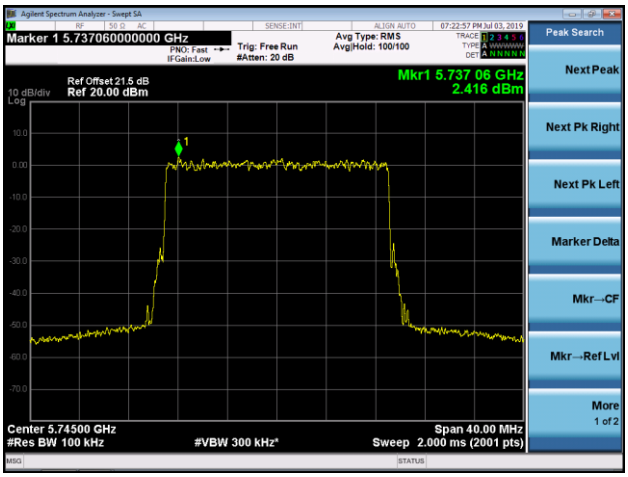
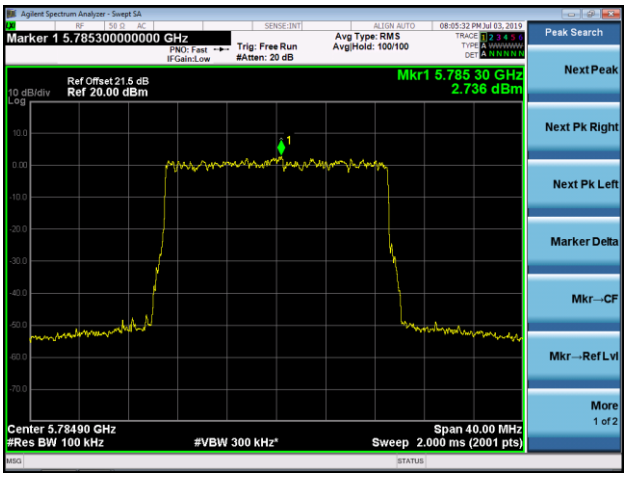
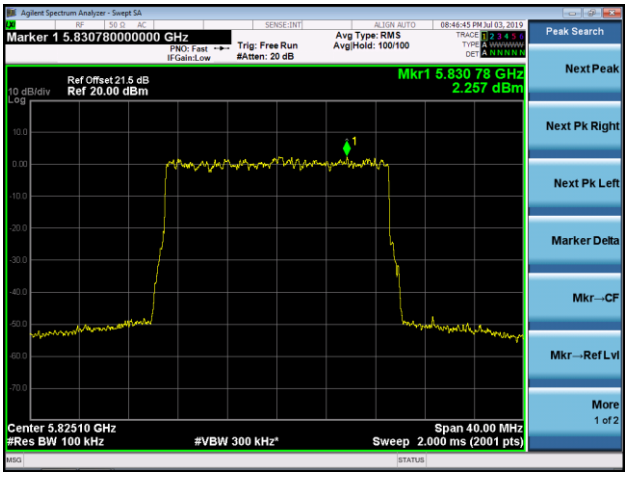
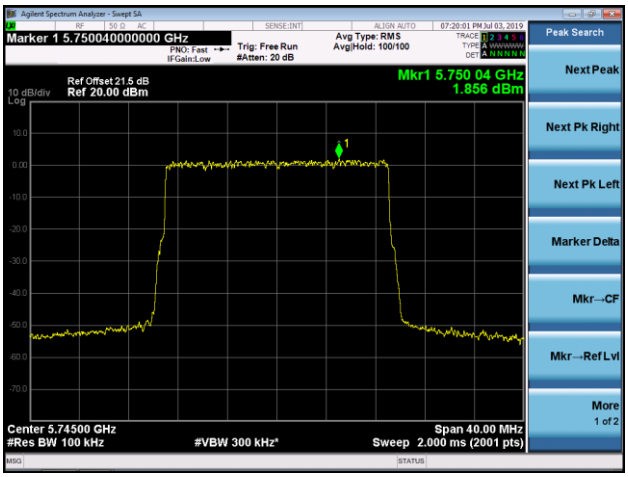
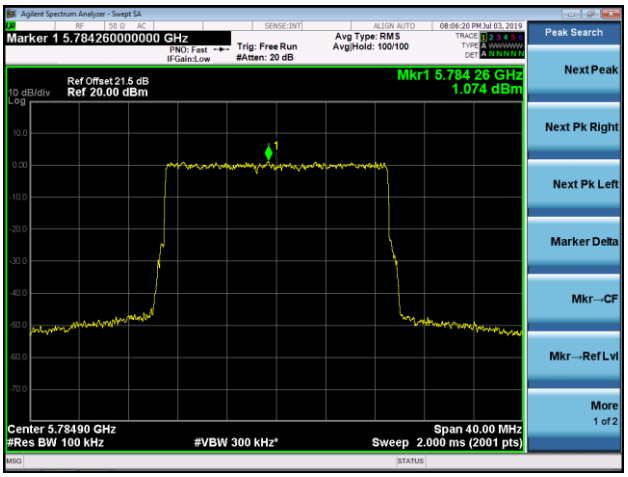
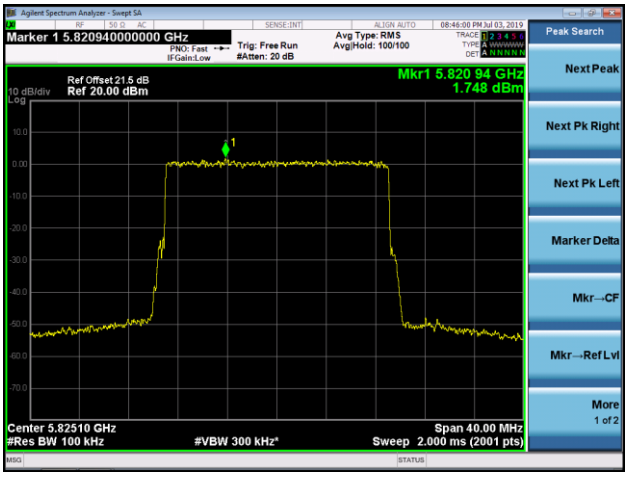
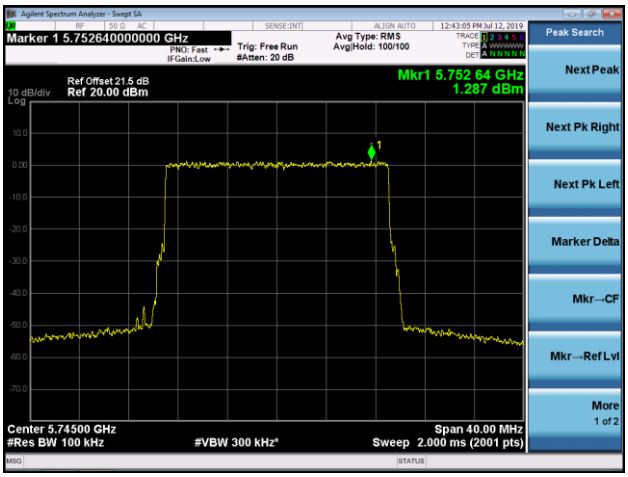
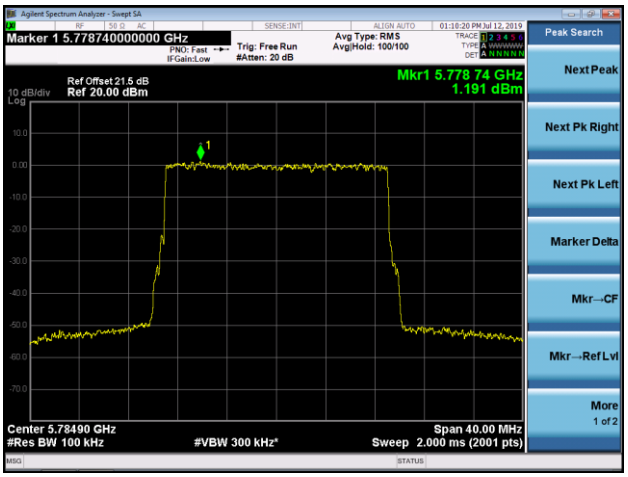
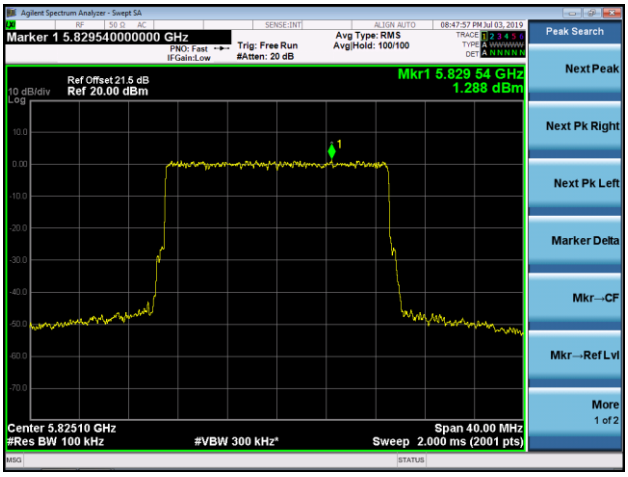
	

Power Spectral Density - ANT M / ANT M + D(256QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT D / ANT M + D(QPSK)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT D / ANT M + D(16QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT D / ANT M + D(64QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT D / ANT M + D(256QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

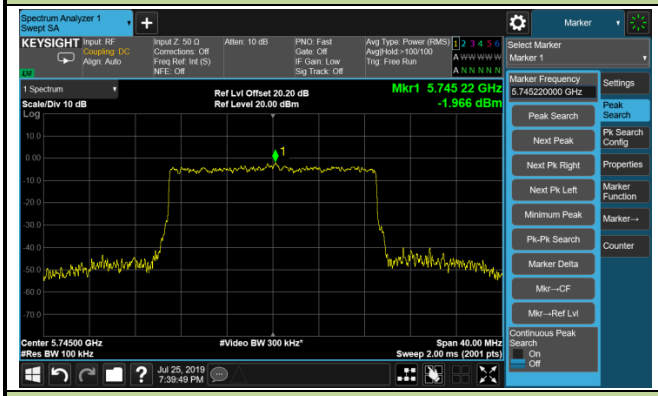
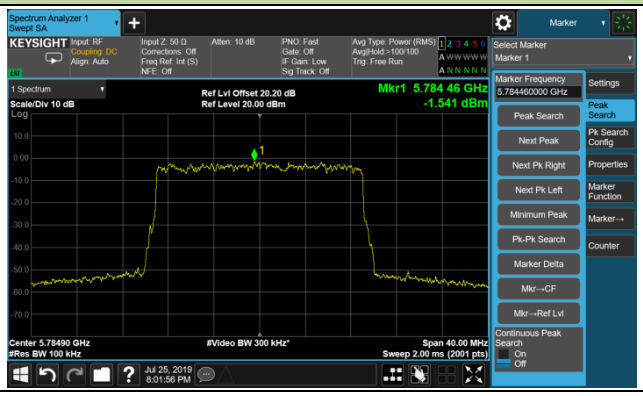
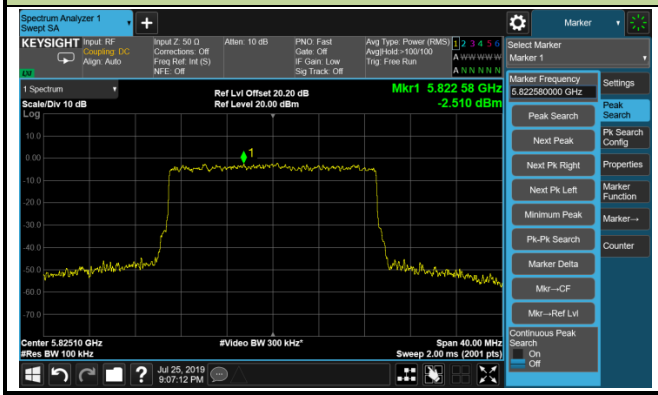
Product	Flexi Zone Unlicensed LTE	Temperature	25°C
Test Engineer	Peter Xu	Relative Humidity	56%
Test Site	SR2	Test Date	2019/07/25
Antenna Type	Omni Antenna		

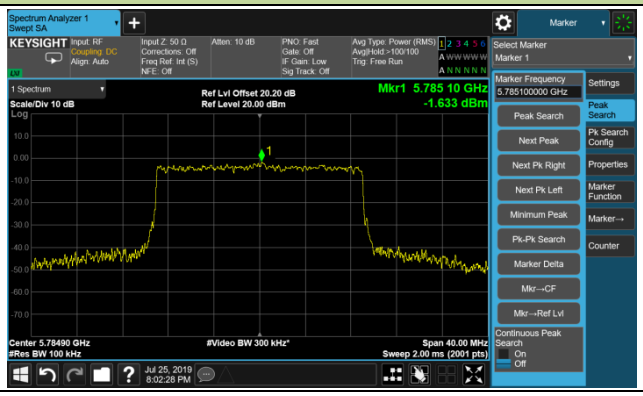
Modulation Type	Channel No.	Freq. (MHz)	ANT M PSD (dBm/ 100kHz)	ANT D PSD (dBm/ 100kHz)	Duty Cycle (%)	Constant Factor (dB)	Total PSD (dBm/ 500kHz)	Limit (dBm/ 500kHz)	Result
QPSK	149	5745.0	-1.97	-2.92	66.75	6.99	9.34	≤ 25.49	Pass
	157	5784.9	-1.54	-1.65	66.75	6.99	10.16	≤ 25.49	Pass
	165	5825.1	-2.51	-2.54	66.75	6.99	9.23	≤ 25.49	Pass
16QAM	149	5745.0	-2.05	-3.33	67.17	6.99	9.09	≤ 25.49	Pass
	157	5784.9	-1.63	-2.44	67.17	6.99	9.71	≤ 25.49	Pass
	165	5825.1	-3.08	-2.69	67.17	6.99	8.85	≤ 25.49	Pass
64QAM	149	5745.0	-2.82	-3.35	67.25	6.99	8.65	≤ 25.49	Pass
	157	5784.9	-2.86	-3.21	67.25	6.99	8.69	≤ 25.49	Pass
	165	5825.1	-2.73	-3.28	67.25	6.99	8.73	≤ 25.49	Pass
256QAM	149	5745.0	-3.38	-3.00	66.60	6.99	8.58	≤ 25.49	Pass
	157	5784.9	-3.06	-2.84	66.60	6.99	8.82	≤ 25.49	Pass
	165	5825.1	-2.64	-3.78	66.60	6.99	8.59	≤ 25.49	Pass

Note 1:

When EUT duty cycle < 98%, the total PSD (dBm/500kHz) = 10*log {$10^{\wedge[\text{ANT M PSD (dBm/ MHz)}/10]} + 10^{\wedge[\text{ANT D PSD (dBm/ MHz)}/10]}$} (dBm/100kHz) + Constant Factor (dB) + 10*log (1/Duty Cycle).

Note 2: PSD Limit (dBm/500kHz) = 30 - (7.50dBi + 3.01dBi - 6dB) = 25.49dBm/500kHz.

Power Spectral Density - ANT M / ANT M + D(QPSK)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)	
	

Power Spectral Density - ANT M / ANT M + D(16QAM)	
Channel 149 (5745.0MHz)	Channel 157 (5784.9MHz)
	
Channel 165 (5825.1MHz)