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MEASUREMENT REPORT
LTE Band 8

Applicant Name:
Council Rock Enterprises LLC
11 Centre Park
Rochester, NY 14614
United States

Date of Testing:
04/2 – 08/10/2021
Test Site/Location:
PCTEST Lab. Columbia, MD, USA
Test Report Serial No.:
1M2108110091-01.2AL52

FCC ID:	**2AL52E15008A**
Applicant:	**Council Rock Enterprises LLC**

Application Type:	Class II Permissive Change
Model:	TELiG E1500-8NW
Additional Model(s):	TELiG E1500-8W
EUT Type:	Cellular Module
FCC Classification:	PCS Licensed Transmitter (PCB)
FCC Rule Part(s):	Part 27 Subpart P
Test Procedure(s):	ANSI C63.26-2015, KDB 971168 D01 v03r01, ANSI C63.10-2013
Class II Permissive Change:	Integrating and co-locating module into host TELiG E1500 product
Original Grant Date:	04/28/2021

This equipment has been evaluated against the requirements in the technical service rules presented in Part 27 Subpart P. Test results reported herein relate only to the item(s) tested.

I attest to the accuracy of data. All measurements reported herein were performed by me or were made under my supervision and are correct to the best of my knowledge and belief. I assume full responsibility for the completeness of these measurements and vouch for the qualifications of all persons taking them.

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1.0 INTRODUCTION

1.1 Scope

Measurement and determination of electromagnetic emissions (EMC) of radio frequency devices including intentional and/or unintentional radiators for compliance with the technical rules and regulations of the Federal Communications Commission and the Innovation, Science and Economic Development Canada.

1.2 PCTEST Test Location

These measurement tests were conducted at the PCTEST Engineering Laboratory, facility located at 7185 Oakland Mills Road, Columbia, MD 21046. The measurement facility is compliant with the test site requirements specified in ANSI C63.4-2014.

1.3 Test Facility / Accreditations

Measurements were performed at PCTEST Engineering Lab located in Columbia, MD 21046, U.S.A.

- PCTEST is an ISO 17025-2017 accredited test facility under the American Association for Laboratory Accreditation (A2LA) with Certificate number 2041.01 for Specific Absorption Rate (SAR), Hearing Aid Compatibility (HAC) testing, where applicable, and Electromagnetic Compatibility (EMC) testing for FCC and Innovation, Science, and Economic Development Canada rules.

- PCTEST TCB is a Telecommunication Certification Body (TCB) accredited to ISO/IEC 17065-2012 by A2LA (Certificate number 2041.03) in all scopes of FCC Rules and ISED Standards (RSS).

- PCTEST facility is a registered (2451B) test laboratory with the site description on file with ISED.

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2.0 PRODUCT INFORMATION

2.1 Equipment Description

The Equipment Under Test (EUT) is the **Council Rock Enterprises LLC LTE Cellular Module FCC ID: 2AL52E15008A**.This host device includes modules integrated and co-located as shown below in the table. The device operates under the provisions of Part 27, WLAN (DTS), and UNII transmitter.

Model	Module 1	Module 2	Module 3
TELiG E1500-8NW	TK4WLE900VX	2AL52E1500N	2AL52E15008A
TELiG E1500-8W		TK4WLE900VX	2AL52E15008A

Test Device Serial No.: 812012

2.2 Device Capabilities

This device contains the following capabilities:

Multi-band LTE Band and CAT-M1, 802.11b WLAN, 802.11a UNII(5GHz)

2.3 Test Configuration

The EUT was tested per the guidance of ANSI C63.26-2015 and KDB 971168 D01 v03r01. See Section 3.0 of this test report for a description of the radiated and antenna port conducted emissions tests.

The EUT was tested with 2 modules being radiated transmitting and 1 module conducted transmitting. Module 1 (WLE900VX) is always radiated transmitting either at 2.4GHz or 5GHz. Band 8 on module 2 (SARA) and module 3 (EM7455) of the test cases are radiated transmitting unless in cases where both Band 8 needs to be transmitting, which one of the Band 8 will be conducted. The combinations of test cases were tested with Band 8 with low, mid, and high bands (from either module 2 or 3 where applicable), and WIFI transmissions (2.4GHz or 5GHz) were tested for compliance.

2.4 EMI Suppression Device(s)/Modifications

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

2.5 Software and Firmware

The test was conducted with software/firmware version L0.0.00.00.05.08 installed on the EUT.

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3.0 DESCRIPTION OF TESTS

3.1 Evaluation Procedure

This device was evaluated for compliance to the radiated spurious emissions requirements in the various FCC rule parts governing operation of the supported transmitters and in KDB 996369 for module integrations.

3.2 Radiated Spurious 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. The test site inside the chamber is a 6m x 5.2m elliptical, obstruction-free area in accordance with Figure 5.7 of Clause 5 in ANSI C63.4-2014. 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 above 1GHz. For measurements below 1GHz, the absorbers are removed. A raised turntable is used for radiated measurement. The turn table is a continuously rotatable, remote-controlled, 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. An 80cm tall test table made of Styrodur is placed on top of the turn table. A Styrodur pedestal is placed on top of the test table to bring the total table height to 1.5m.

The equipment under test was transmitting while connected to an external DC power adapter and is placed on a turntable 3 meters from the receive antenna. The receive antenna height is adjusted between 1 and 4 meter height, the turntable is rotated through 360 degrees, and the EUT is manipulated through all orthogonal planes representative of its typical use to achieve the highest reading on the receive spectrum analyzer.

For radiated spurious emissions measurements, field strength method is used per the guidance of ANSI C63.26-2015. Radiated emissions were measured from the EUT and the field strength was calculated to the ERP or EIRP value with their corresponding limits. At least six of the highest data points were measured and reported.

For radiated spurious emissions measurements and calculations, conversion method is used per the formulas in KDB 971168 Section 5.8.4. Field Strength (EIRP) is calculated using the following formulas:

$$E_{[dB\mu V/m]} = \text{Measured amplitude level}_{[dBm]} + 107 + \text{Cable Loss}_{[dB]} + \text{Antenna Factor}_{[dB/m]}$$

And

$$EIRP_{[dBm]} = E_{[dB\mu V/m]} + 20\log D - 104.8;$$ where D is the measurement distance in meters.

All radiated measurements are performed in a chamber that meets the site requirements per ANSI C63.4-2014. Additionally, radiated emissions below 30MHz are also validated on an Open Area Test Site to assert correlation with the chamber measurements per the requirements of KDB 414788 D01.

Radiated spurious emission levels are investigated with the receive antenna horizontally and vertically polarized per ANSI C63.26-2015.

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4.0 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 indicate a 95% level of confidence. The measurement uncertainty shown below meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and, thus, can be compared directly to specified limits to determine compliance.

Contribution	Expanded Uncertainty (±dB)
Conducted Bench Top Measurements	1.13
Radiated Disturbance (<1GHz)	4.98
Radiated Disturbance (>1GHz)	5.07
Radiated Disturbance (>18GHz)	5.09

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5.0 TEST EQUIPMENT CALIBRATION DATA

Test Equipment Calibration is traceable to the National Institute of Standards and Technology (NIST). Measurements antennas used during testing were calibrated in accordance to the requirements of ANSI C63.5-2017.

Manufacturer	Model	Description	Cal Date	Cal Interval	Cal Due	Serial Number
-	AP2	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	AP2
-	ETS	EMC Cable and Switch System	3/4/2021	Annual	3/4/2022	ETS
-	LTx2	Licensed Transmitter Cable Set	3/12/2021	Annual	3/12/2022	LTx2
Agilent	N9030A	50GHz PXA Signal Analyzer	1/20/2021	Annual	1/20/2022	US51350301
Anritsu	MT8821C	Radio Communication Analyzer	4/30/2021	Annual	4/30/2022	6201524620
Emco	3115	Horn Antenna (1-18GHz)	6/18/2020	Biennial	6/18/2022	9704-5182
Rohde & Schwarz	CMW500	Radio Communication Tester	11/5/2020	Annual	11/5/2021	112347
Rohde & Schwarz	ESU40	EMI Test Receiver (40GHz)	9/9/2020	Annual	9/9/2021	100348
Rohde & Schwarz	ESW44	EMI Test Receiver 2Hz to 44 GHz	1/21/2021	Annual	1/21/2022	101716

Table 5-1. Summary of Test Results

Notes:

1. For equipment listed above that has a calibration date or calibration due date that falls within the test date range, care was taken to ensure that this equipment was used after the calibration date and before the calibration due date.

2. Equipment with a calibration date of "N/A" shown in this list was not used to make direct calibrated measurements.

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6.0 SAMPLE CALCULATIONS

Emission Designator

QPSK Modulation

Emission Designator = 8M62G7D

LTE BW = 8.62 MHz
G = Phase Modulation
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

QAM Modulation

Emission Designator = 8M45W7D

LTE BW = 8.45 MHz
W = Amplitude/Angle Modulated
7 = Quantized/Digital Info
D = Data transmission, telemetry, telecommand

Spurious Radiated Emission – LTE Band

Example: Middle Channel LTE Mode 2nd Harmonic (1564 MHz)

The average spectrum analyzer reading at 3 meters with the EUT on the turntable was –81.0 dBm. The gain of the substituted antenna is 8.1 dBi. The signal generator connected to the substituted antenna terminals is adjusted to produce a reading of –81.0 dBm on the spectrum analzyer. The loss of the cable between the signal generator and the terminals of the substituted antenna is 2.0 dB at 1564 MHz. So 6.1 dB is added to the signal generator reading of –30.9 dBm yielding –24.80 dBm. The fundamental EIRP was 25.501 dBm so this harmonic was 25.501 dBm – (-24.80).

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7.0 TEST RESULTS

7.1 Summary

Company Name: Council Rock Enterprises LLC

FCC ID: 2AL52E15008A

Mode(s): Multi-band LTE, CAT-M1, 2.4GHz/5GHz WiFi

Test Condition	Test Description	FCC Part Section(s)	Test Limit	Test Result	Report Reference
CONDUCTED (Licensed)	Transmitter Conducted Output Power	2.1046	N/A	PASS	Section 7.2
CONDUCTED (DTS)	Transmitter Output Power	15.247(B)(3)	< 1 Watt	PASS	Section 7.2
CONDUCTED (UNII)	Maximum Conducted Output Power	15.407 (a.1.iv), (a.2), (a.3)	Maximum conducted powers must meet the limits detailed in 15.407 (a)	PASS	Section 7.2
Radiated	Radiated Spurious Emissions	2.1051, 27.1509(a)	Attenuation > 43 + 10 $\log_{10}$ (P[Watts]) for all out-of-band emissions	PASS	Section 7.3

Table 7-1. Summary of Test Results

Notes:

1) All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
2) The analyzer plots shown in Section 7.0 were taken with a correction table loaded into the analyzer. The correction table was used to account for the losses of the cables, directional couplers, and attenuators used as part of the system to maintain a link between the call box and the EUT at all frequencies of interest.
3) All antenna port conducted emissions testing was performed on a test bench with the antenna port of the EUT connected to the spectrum analyzer through calibrated cables, attenuators, and couplers.
4) All conducted emissions measurements are performed with automated test software to capture the corresponding plots necessary to show compliance. The measurement software utilized is LTE Automation Version 5.3
5) All harmonics are evaluated to the limits that govern their operation while intermods products are assessed to the least stringent limit per FCC guidance

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7.2 Transmitter Conducted Output Power

Test Overview

The transmitter conducted output power is a measure of the total average power contained within 1.4MHz and 3MHz channels as defined in §27.1506. All modes of operation were investigated and the worst-case configuration results are reported in this section.

Test Procedure Used

ANSI C63.26-2015 – Section 5.2.4.2

Test Settings

All conducted powers were measured using the R&S CMW500's Channel Measurement function.

Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

Figure 7-1. Test Instrument & Measurement Setup

Test Notes

None

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LTE Band 8 3MHz Bandwidth			
Modulation	Number of RB	RB Offset	Mid Channel 21640 (899.0 MHz) Conducted Power [dBm]
QPSK	1	0	23.03
	1	3	23.30
	1	5	**24.04**
	6	0	20.93
16 QAM	1	0	21.39
	1	3	22.83
	1	5	23.07
	6	0	19.96

Table 7-2. Transmitter Conducted Output Power Measurements of SARA-R410M-02B module (3 MHz)

LTE Band 8 3MHz Bandwidth			
Modulation	Number of RB	RB Offset	Mid Channel 21640 (899.0 MHz) Conducted Power [dBm]
QPSK	1	0	23.49
	1	8	**23.64**
	1	14	23.31
	15	0	22.31
16-QAM	1	0	22.60
	1	8	22.67
	1	14	22.53
	15	0	21.22

Table 7-4. Transmitter Conducted Output Power Measurements of EM7455 module (3 MHz)

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2.4GHz	2.4GHz Conducted Power [dBm]			
	Freq [MHz]	Channel	IEEE Transmission Mode	
			802.11b	
			Average	Target
	2437	6	21.46	22.1

Table 7-4. Transmitter Conducted Output Power Measurements of WLE900VX (DTS) – CH0

2.4GHz	2.4GHz Conducted Power [dBm]			
	Freq [MHz]	Channel	IEEE Transmission Mode	
			802.11b	
			Average	Target
	2437	6	21.21	21.8

Table 7-4. Transmitter Conducted Output Power Measurements of WLE900VX (DTS) – CH1

5GHz (20MHz Bandwidth)	5GHz (20MHz) Conducted Power [dBm]			
	Freq [MHz]	Channel	IEEE Transmission Mode	
			802.11a	
			Average	Target
	5240	48	18.32	20.4

Table 7-4. Transmitter Conducted Output Power Measurements of WLE900VX (UNII) – CH0

5GHz (20MHz Bandwidth)	5GHz (20MHz) Conducted Power [dBm]			
	Freq [MHz]	Channel	IEEE Transmission Mode	
			802.11a	
			Average	Target
	5240	48	18.55	20.8

Table 7-4. Transmitter Conducted Output Power Measurements of WLE900VX (UNII) – CH1

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7.3 Radiated Spurious Emissions Measurements

Test Overview

Radiated spurious emissions measurements are performed using the direct field strength conversion method described in ANSI C63.26-2015 with the EUT connected to their corresponding antenna ports. Module 1 was connected with Linx antenna for radiated transmission. Modules 2 and 3 were connected with SMA cables for conducted transmissions and shark fins antennas for radiated transmissions. The combinations of test cases were tested with Band 8 with low, mid, and high bands (from either module 2 or 3 where applicable), and WIFI transmissions (2.4GHz or 5GHz) were tested for compliance. Measurements on signals operating below 1GHz are performed using horizontally and vertically polarized tuned dipole antennas. Measurements on signals operating above 1GHz are performed using vertically and horizontally polarized broadband horn antennas. All measurements are performed as peak measurements while the EUT is operating at maximum power, and at the appropriate frequencies.

Test Procedures Used

KDB 971168 D01 v03r01 – Section 7

ANSI C63.26-2015 – Section 5.5.4

Test Settings

1. RBW = 100kHz for emissions below 1GHz and 1MHz for emissions above 1GHz
2. VBW ≥ 3 x RBW
3. Span = 1.5 times the OBW
4. No. of sweep points ≥ 2 x span / RBW
5. Detector = RMS
6. Trace mode = Average (Max Hold for pulsed emissions)
7. The trace was allowed to stabilize

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Test Setup

The EUT and measurement equipment were set up as shown in the diagram below.

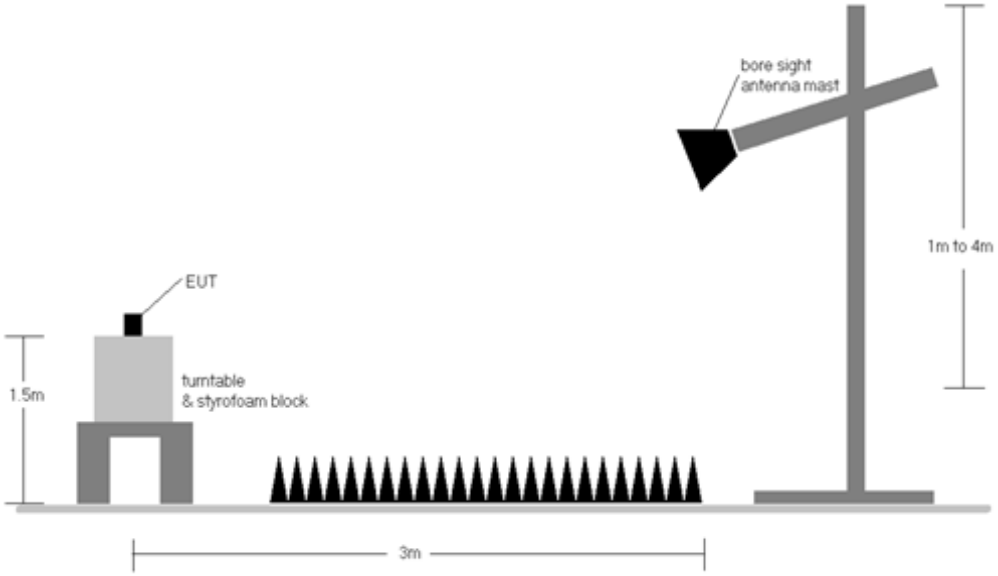

Figure 7-2. Test Instrument & Measurement Setup

Test Notes

1) Field strengths are calculated using the Measurement quantity conversions in KDB 971168 Section 5.8.4.
   b) E(dBµV/m) = Measured amplitude level (dBm) + 107 + Cable Loss (dB) + Antenna Factor (dB/m)
   d) EIRP (dBm) = E(dBµV/m) + 20logD – 104.8; where D is the measurement distance in meters.

2) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case emissions are reported with the EUT positioning, modulations, RB sizes and offsets, and channel bandwidth configurations shown in the tables below.

3) The EUT was tested in three orthogonal planes and in all possible test configurations and positioning. The worst case setup is reported in the tables below.

4) The spectrum is measured from 9kHz to the 10th harmonic of the fundamental frequency of the transmitter. The worst-case emissions are reported.

5) Emissions below 18GHz were measured at a 3 meter test distance while emissions above 18GHz were measured at a 1 meter test distance with the application of a distance correction factor.

6) The "-" shown in the following RSE tables are used to denote a noise floor measurement.

Sample Calculation

Field Strength Limit [dBµV/m] to EIRP Spurious Emission Level Limit [dBm]

- Field Strength Level [dBµV/m] +(20*log (3m (test distance))-104.8) = EIRP Spurious Emission Level Limit [dBm]

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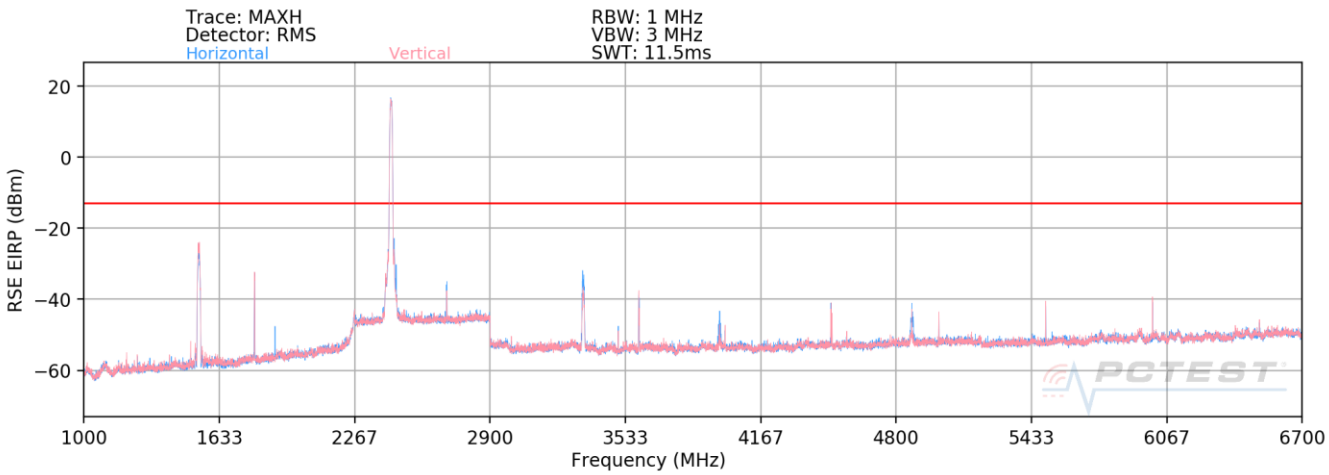
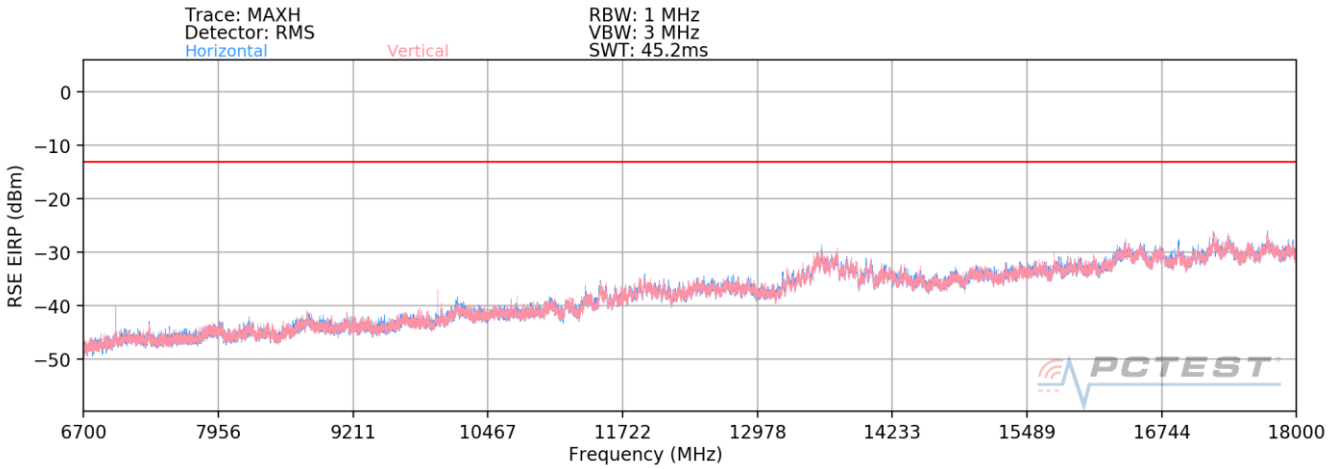


Plot 7-1. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 2.4GHz)



Plot 7-2. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 2.4GHz)

Case:	B8 (rad) _ B8 (cond) _ 2.4GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	899/899/2437
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1538.0	H	204	98	-30.01	0.21	77.20	-18.06	-13.00	-5.06
1798.0	H	145	200	-49.65	3.24	60.59	-34.67	-13.00	-21.67
2697.0	H	145	246	-62.76	14.65	58.89	-36.37	-13.00	-23.37
3336.0	H	125	104	-60.37	8.22	54.85	-40.41	-13.00	-27.41
3596.0	H	226	257	-53.96	7.74	60.78	-34.47	-13.00	-21.47
5999.8	V	162	265	-67.63	11.46	50.83	-44.43	-13.00	-31.43

Table 7-6. Radiated Spurious Data (LTE Band 8 / LTE Band 8 / 2.4GHz)

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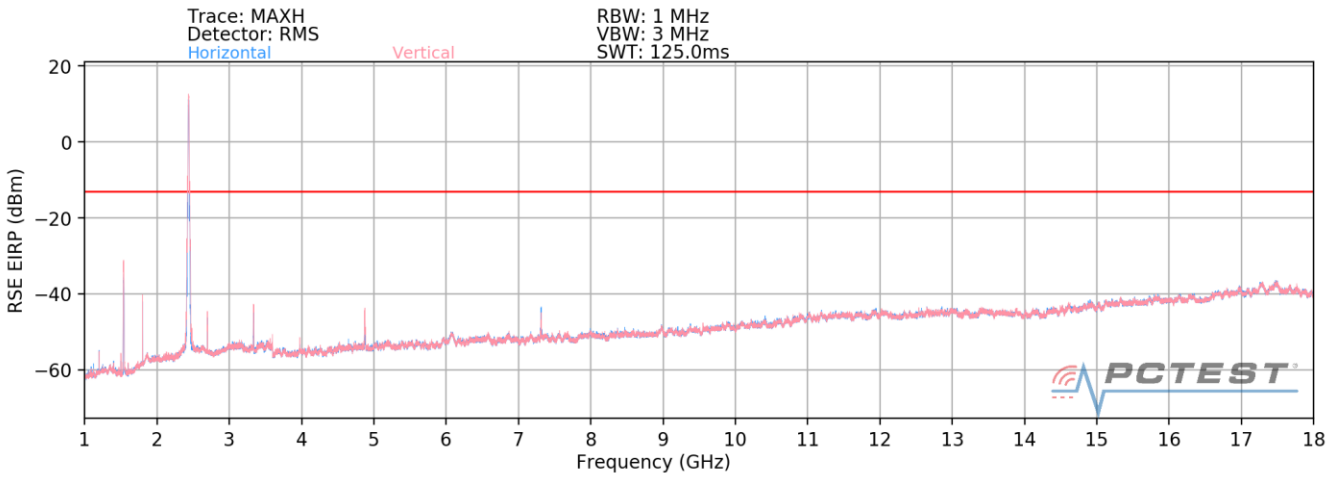

Plot 7-3. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 2.4GHz)

Case:	B8 (cond) _ B8 (rad) _ 2.4GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	899/899/2437
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1200.0	V	199	165	-63.60	-2.78	40.62	-54.64	-13.00	-41.64
1538.0	V	159	237	-40.11	-2.44	64.45	-30.80	-13.00	-17.80
1798.0	V	168	194	-51.45	-0.46	55.09	-40.17	-13.00	-27.17
2697.0	V	234	1	-59.66	2.21	49.55	-45.71	-13.00	-32.71
3336.0	V	143	23	-52.21	2.69	57.48	-37.78	-13.00	-24.78
3975.0	V	142	211	-65.08	4.15	46.07	-49.19	-13.00	-36.19
*4874	V	135	200	-65.28	4.88	46.60	-48.66	-41.28	-7.38
**4874	V	135	200	-56.43	4.88	55.45	-39.81	-21.28	-18.53
7311.0	H	187	279	-60.47	7.71	54.24	-41.02	-13.00	-28.02

Table 7-7. Radiated Spurious Data (LTE Band 8 / LTE Band 8 / 2.4GHz)

*Measured with Detector/Trace Mode of Average/RMS following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

** Measured with Detector/Trace Mode of Max Hold/Peak following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

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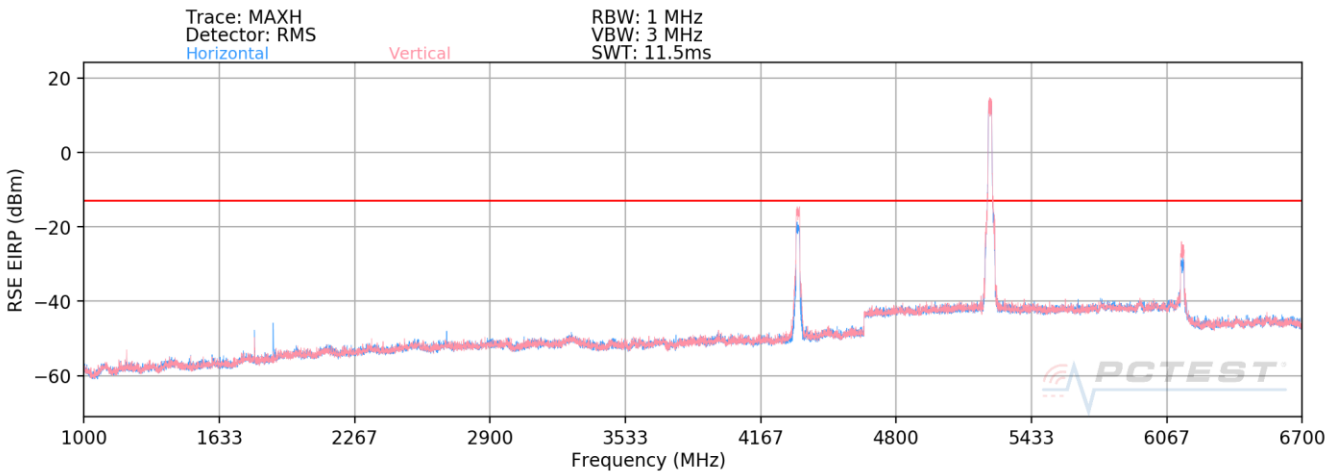
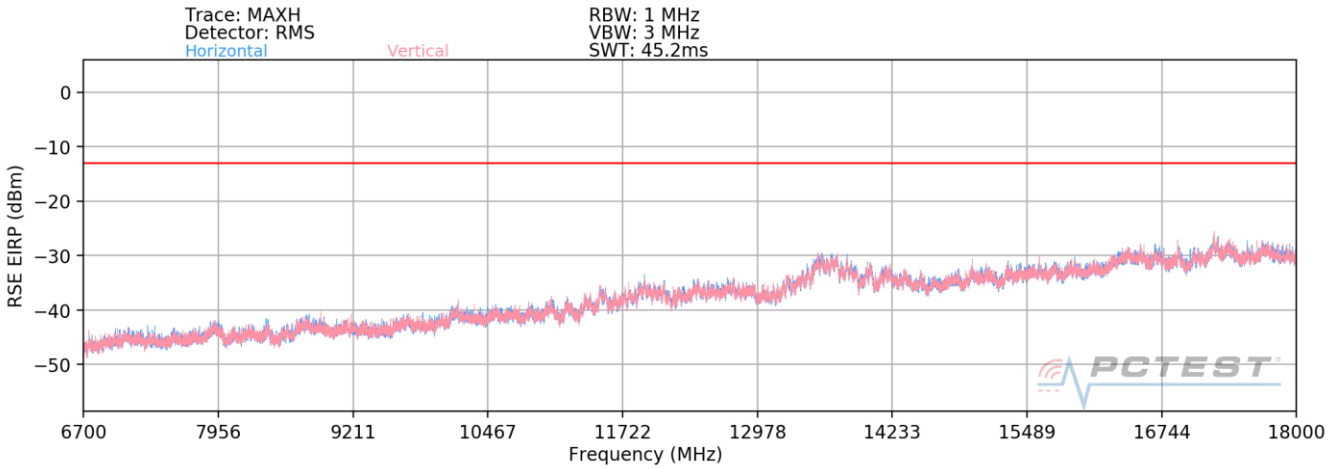
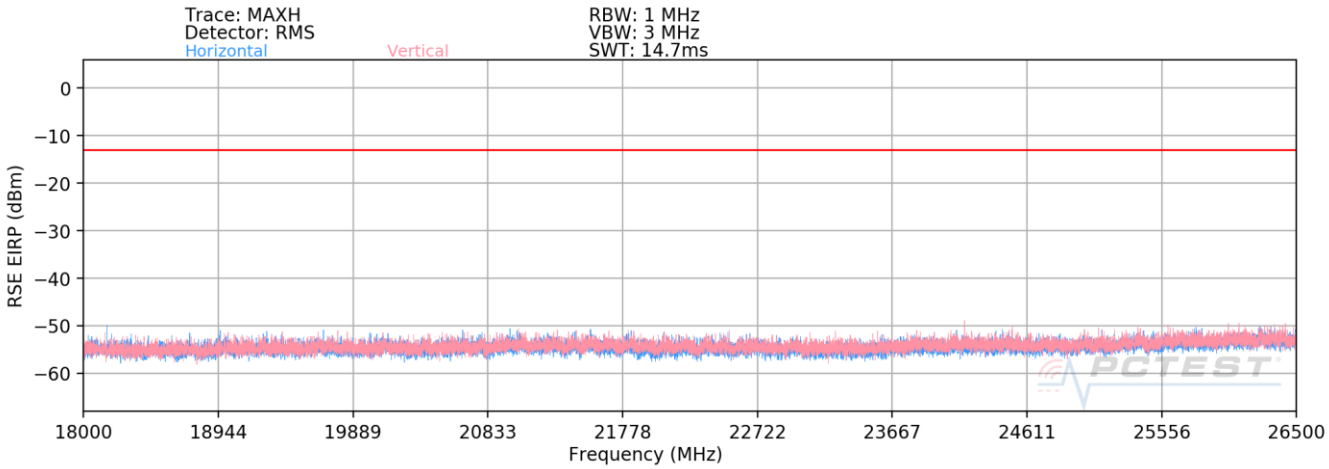


Plot 7-4. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)



Plot 7-5. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)



Plot 7-6. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)

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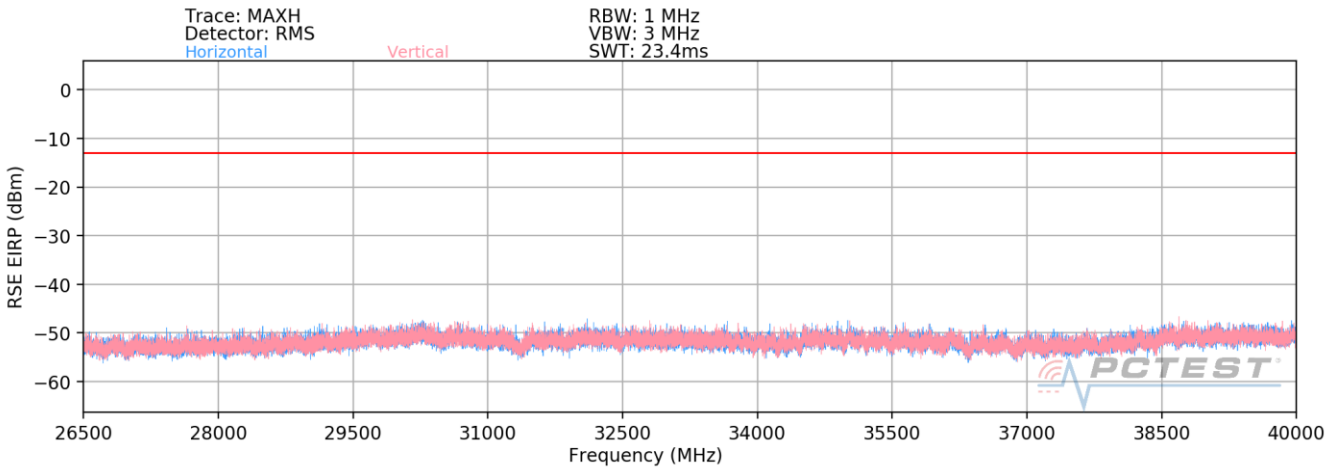

Plot 7-7. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)

Case:	B8 (rad) _ B8 (cond) _ 5GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	899/899/5240
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1199.7	H	152	174	-64.57	-0.40	42.03	-53.23	-13.00	-40.23
1798.0	H	350	269	-61.88	2.85	47.97	-47.29	-13.00	-34.29
1885.2	H	117	14	-65.89	2.76	43.87	-51.39	-13.00	-38.39
2697.0	H	120	342	-65.50	6.34	47.84	-47.42	-13.00	-34.42
4337.0	V	230	177	-36.96	8.96	79.00	-16.26	-13.00	-3.26
6147.3	H	188	285	-52.29	16.72	71.43	-23.83	-13.00	-10.83
24173.5	V	150	308	-57.42	6.28	55.86	-39.40	-13.00	-26.40

Table 7-8. Radiated Spurious Data (LTE Band 8 / LTE Band 8 / 5GHz)

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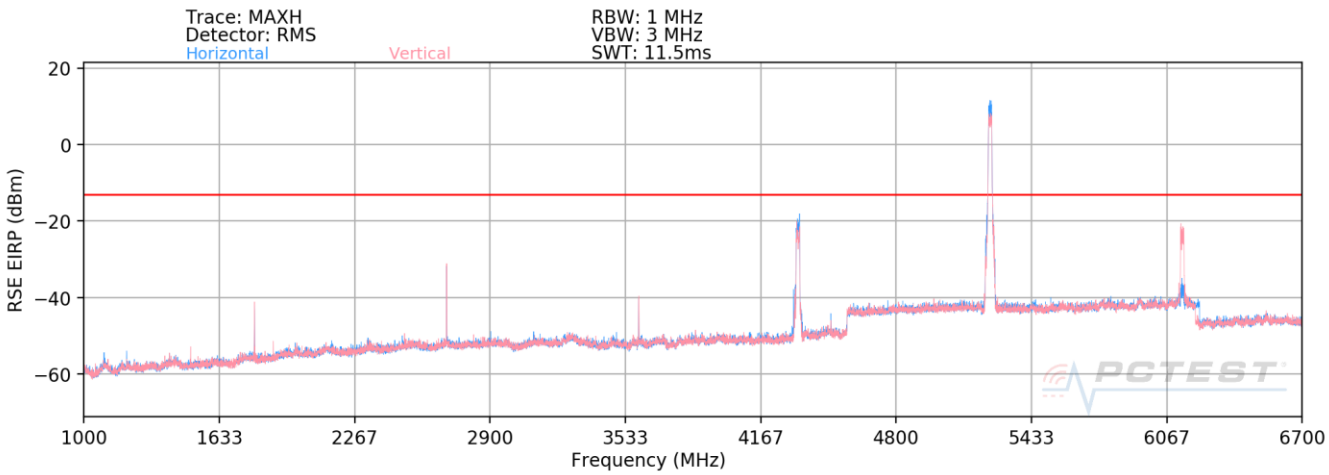
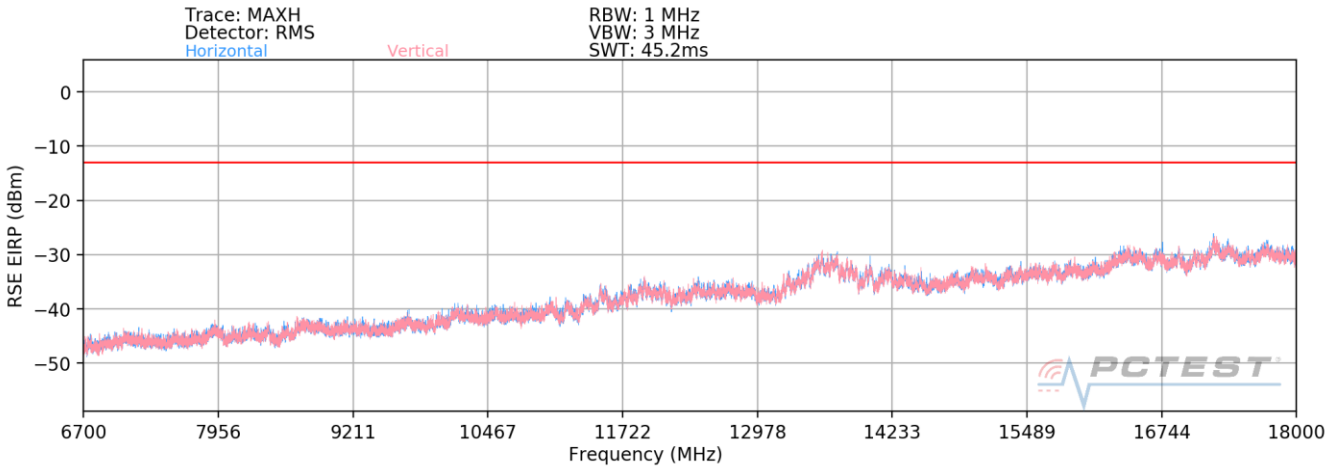


Plot 7-8. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)



Plot 7-9. Radiated Spurious Plot (LTE Band 8 / LTE Band 8 / 5GHz)

Case:	B8 (cond) _ B8 (rad) _ 5GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	899/899/5240
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1798.0	V	149	202	-55.00	2.84	54.84	-40.42	-13.00	-27.42
1886.2	V	399	333	-67.73	2.79	42.06	-53.19	-13.00	-40.19
2697.0	V	124	185	-53.76	6.34	59.58	-35.68	-13.00	-22.68
3596.0	V	119	209	-54.31	7.60	60.29	-34.97	-13.00	-21.97
4341.0	V	116	219	-38.50	9.18	77.68	-17.58	-13.00	-4.58
6131.8	V	398	117	-60.04	21.68	68.64	-26.62	-13.00	-13.62

Table 7-9. Radiated Spurious Data (LTE Band 8 / LTE Band 8 / 5GHz)

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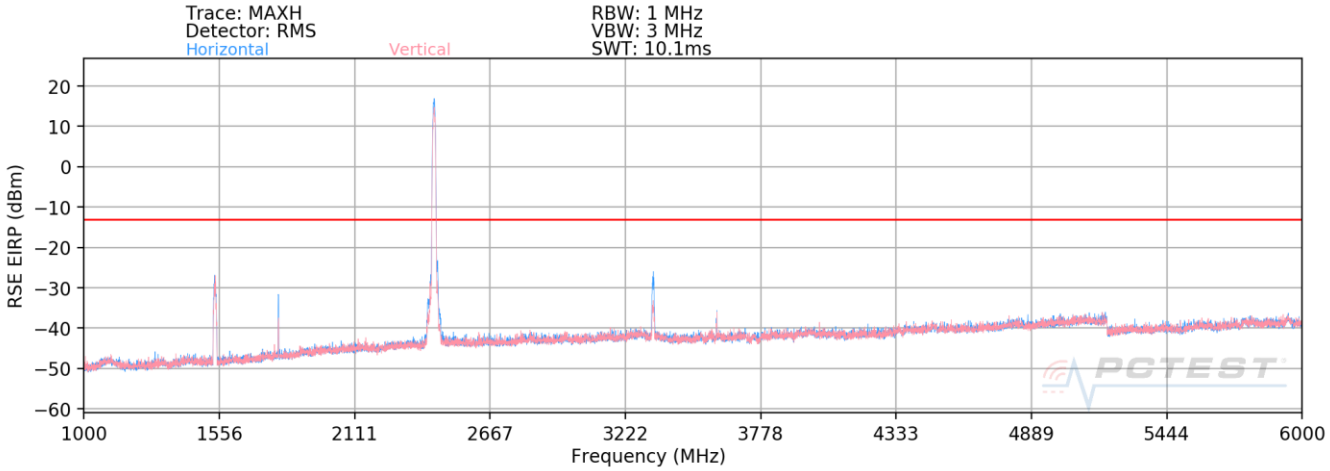
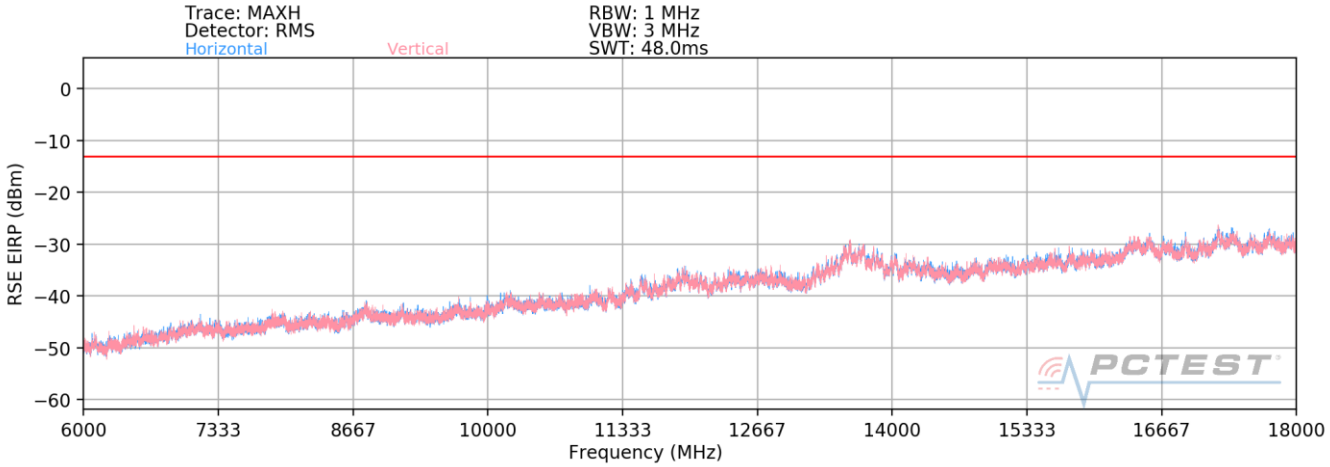


Plot 7-10. Radiated Spurious Plot (LTE Band 8 / LTE Band 13 / 2.4GHz)



Plot 7-11. Radiated Spurious Plot (LTE Band 8 / LTE Band 13 / 2.4GHz)

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Case:	B8 _ B13 _ 2.4GHz
Bandwidth (MHz):	1.4/10/20
Frequency (MHz):	899/782/2437
RB / Offset:	2/2 & 2/24
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1538.0	H	212	230	-33.58	0.21	73.63	-21.63	-13.00	-8.63
1798.0	H	157	222	-45.94	3.24	64.30	-30.96	-13.00	-17.96
3336.0	H	248	303	-44.95	8.22	70.27	-24.99	-13.00	-11.99
3596.0	H	112	117	-54.28	7.74	60.46	-34.79	-13.00	-21.79
4495.0	H	-	-	-61.29	8.61	54.32	-40.94	-13.00	-27.94
*4874	H	251	175	-58.22	4.88	53.66	-41.60	-41.28	-0.32
**4874	H	251	175	-57.45	4.88	54.43	-40.83	-21.28	-19.55

Table 7-10. Radiated Spurious Data (LTE Band 8 (rad) / LTE Band 13 (cond) / 2.4GHz)

*Measured with Detector/Trace Mode of Average/RMS following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

** Measured with Detector/Trace Mode of Max Hold/Peak following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

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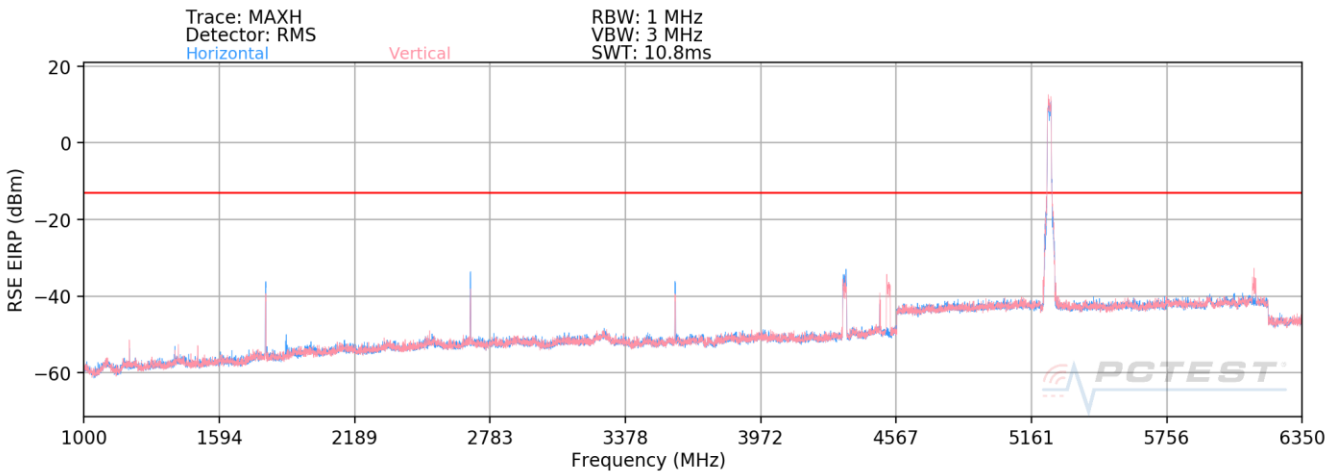
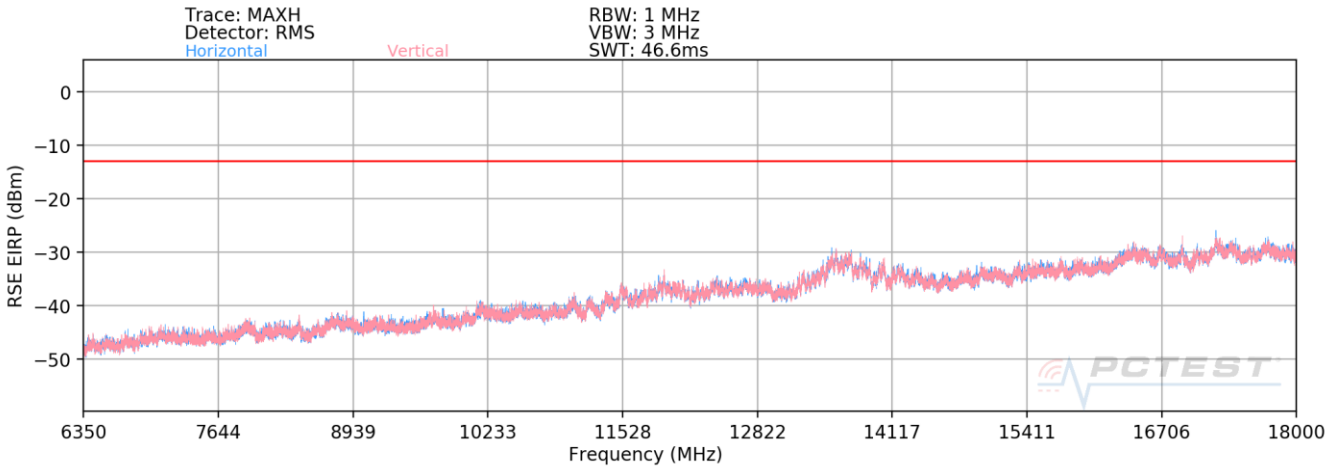


Plot 7-12. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 12 (cond) / 5GHz)



Plot 7-13. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 12 (cond) / 5GHz)

Case:	B8 _ B12 _ 5GHz
Bandwidth (MHz):	1.4/10/20
Frequency (MHz):	899/707.5/5240
RB / Offset:	2/2 & 2/24
Mode:	Multi-Band LTE and WIFI RSE

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1798.0	H	115	328	-50.83	2.85	59.02	-36.24	-13.00	-23.24
2697.0	H	130	325	-49.95	6.34	63.39	-31.87	-13.00	-18.87
3596.0	H	126	284	-52.21	7.60	62.39	-32.87	-13.00	-19.87
4341.0	H	223	95	-51.07	9.18	65.11	-30.15	-13.00	-17.15
4496.9	V	201	269	-63.21	9.16	52.95	-42.31	-13.00	-29.31
6131.8	V	129	190	-65.28	21.68	63.40	-31.86	-13.00	-18.86

Table 7-13. Radiated Spurious Data (LTE Band 8 (rad) / LTE Band 12 (cond) / 5GHz)

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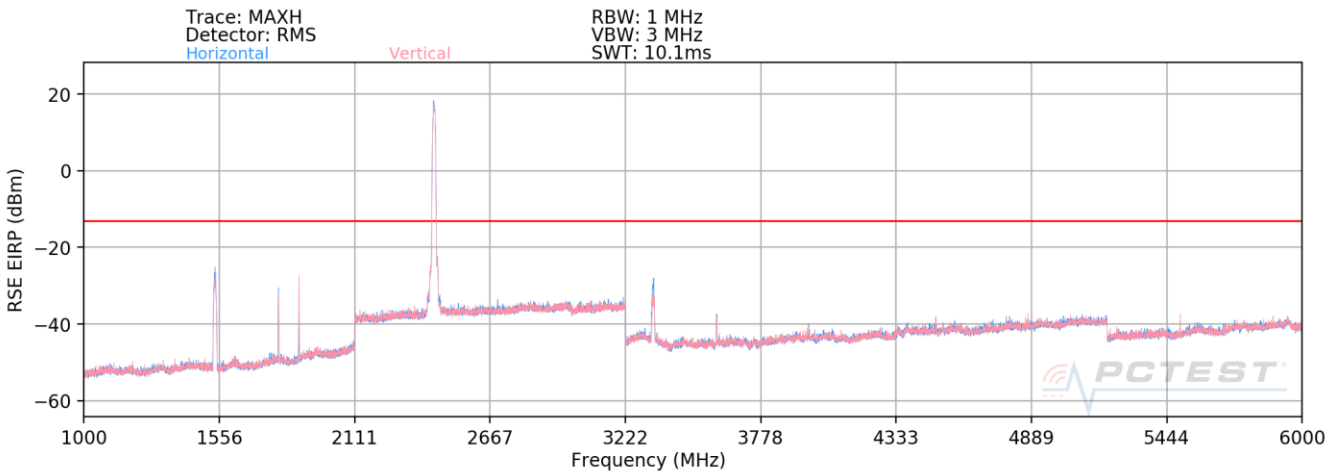
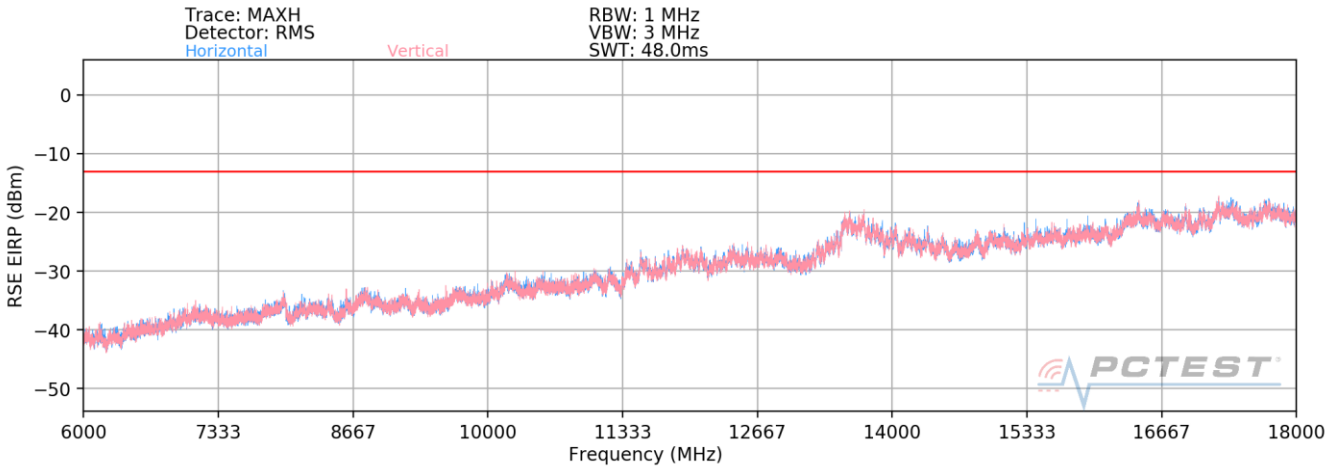


Plot 7-14. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 25 (cond) / 2.4GHz)



Plot 7-15. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 25 (cond) / 2.4GHz)

Case:	B8 _ B25 _ 2.4GHz
Bandwidth (MHz):	1.4/20/20
Frequency (MHz):	899/1882.5/2437
RB / Offset:	2/2 & 2/49
Mode:	Multi-Band LTE, CAT-M1, and and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1538.0	H	165	70	-40.84	0.21	66.37	-28.89	-13.00	-15.89
1798.0	H	278	297	-48.81	3.24	61.43	-33.83	-13.00	-20.83
2697.0	H	109	90	-59.16	14.65	62.49	-32.77	-13.00	-19.77
3336.0	H	272	211	-52.16	8.22	63.06	-32.20	-13.00	-19.20
3596.0	H	135	129	-56.13	7.74	58.61	-36.64	-13.00	-23.64
4495.0	H	117	120	-57.55	8.61	58.06	-37.20	-13.00	-24.20

Plot 7-11. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 25 (cond) / 2.4GHz)

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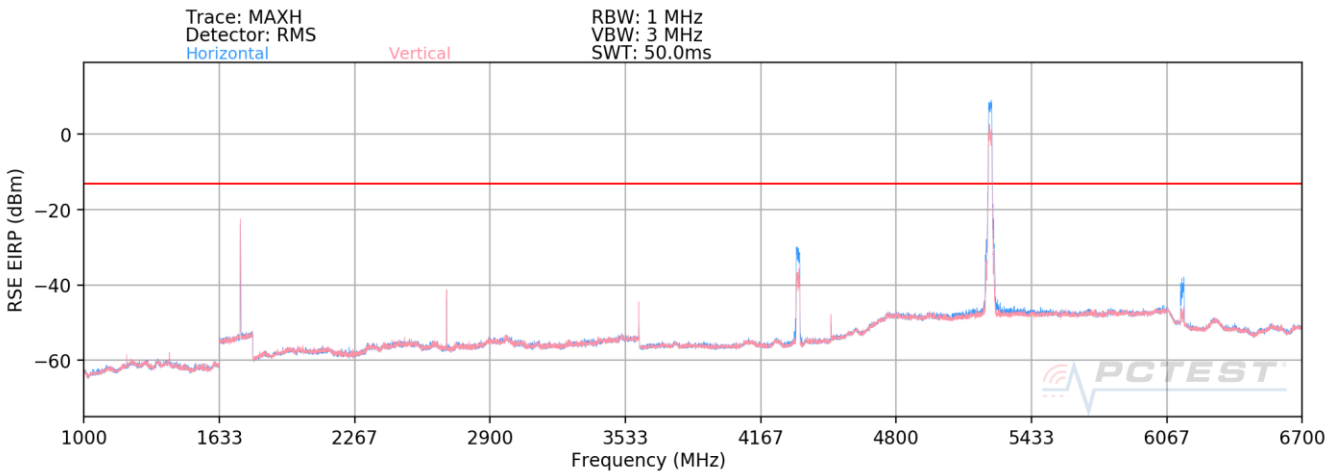
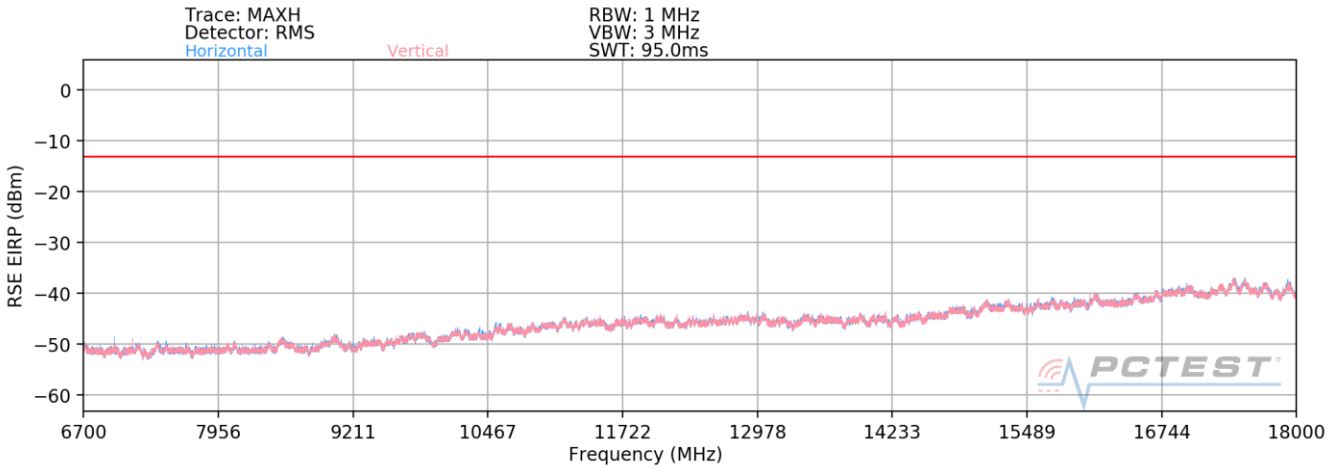


Plot 7-16. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 4 (cond) / 5GHz)



Plot 7-17. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 4 (cond) / 5GHz)

Case:	B8_B4_5GHz
Bandwidth (MHz):	1.4/20/20
Frequency (MHz):	899/1732.5/5240
RB / Offset:	2/2 & 2/49
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1200.0	H	149	255	-67.71	-2.50	36.79	-58.47	-13.00	-45.47
2697.0	H	119	340	-48.53	1.22	59.69	-35.57	-13.00	-22.57
3596.5	H	263	309	-57.38	2.83	52.45	-42.81	-13.00	-29.81
4341.0	H	154	70	-41.86	3.54	68.68	-26.57	-13.00	-13.57
4712.5	H	260	177	-74.39	9.61	42.22	-53.03	-13.00	-40.03
6131.8	H	248	266	-54.18	9.68	62.50	-32.76	-13.00	-19.76

Table 7-14. Radiated Spurious Data (LTE Band 8 (rad) / LTE Band 4(cond) / 5GHz)

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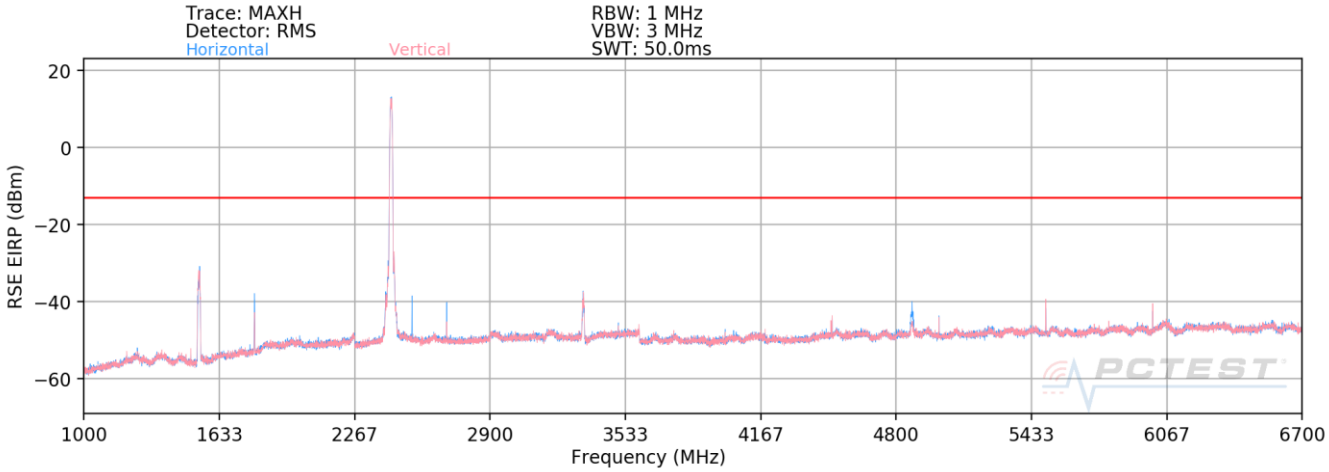
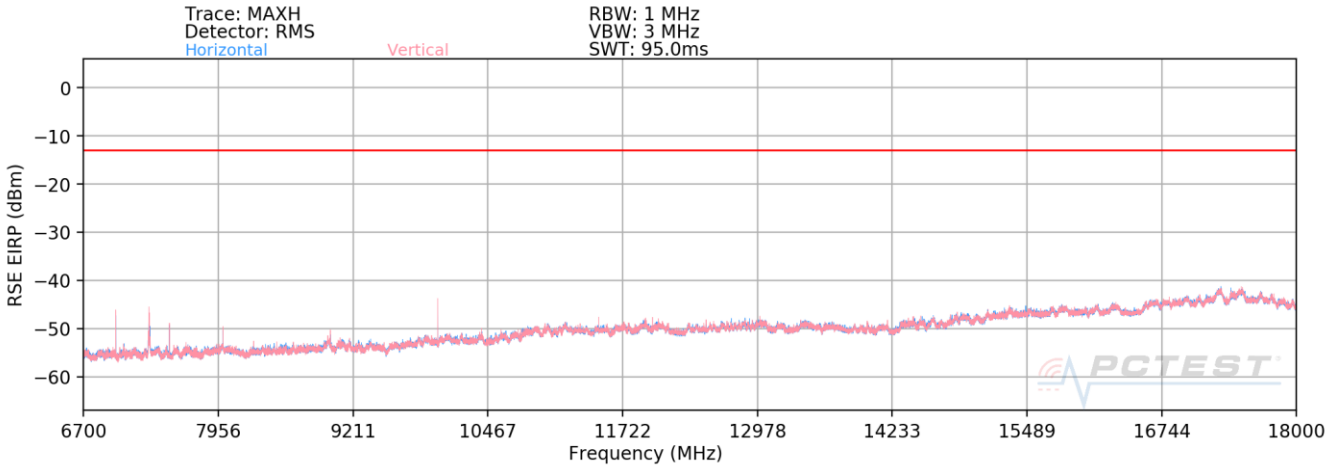


Plot 7-18. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 7 (cond) / 2.4GHz)



Plot 7-19. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 7 (cond) / 2.4GHz)

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Case:	B8 _ B7 _ 2.4GHz
Bandwidth (MHz):	1.4/20/20
Frequency (MHz):	899/2535/2437
RB / Offset:	2/2 & 2/49
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1538.0	H	161	255	-38.20	-3.15	65.65	-29.61	-13.00	-16.61
1798.0	H	145	19	-46.37	-0.63	60.00	-35.26	-13.00	-22.26
2697.0	H	113	24	-61.23	10.91	56.68	-38.58	-13.00	-25.58
3336.0	H	356	271	-48.82	2.67	60.85	-34.41	-13.00	-21.41
*4874	H	330	294	-60.01	4.88	51.87	-43.39	-41.28	-2.11
**4874	H	330	294	-53.80	4.88	58.08	-37.18	-21.28	-15.90
5500.5	V	162	31	-57.09	5.38	55.29	-39.96	-13.00	-26.96

Table 7-12. Radiated Spurious Data (LTE Band 8 (rad) / LTE Band 7 (cond) / 2.4GHz)

*Measured with Detector/Trace Mode of Average/RMS following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

** Measured with Detector/Trace Mode of Max Hold/Peak following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

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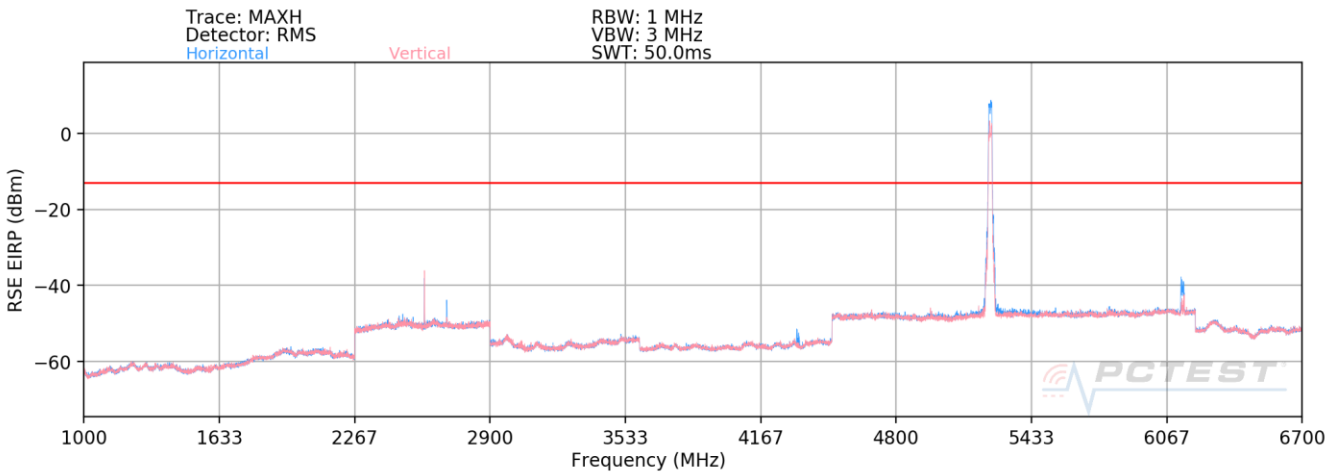
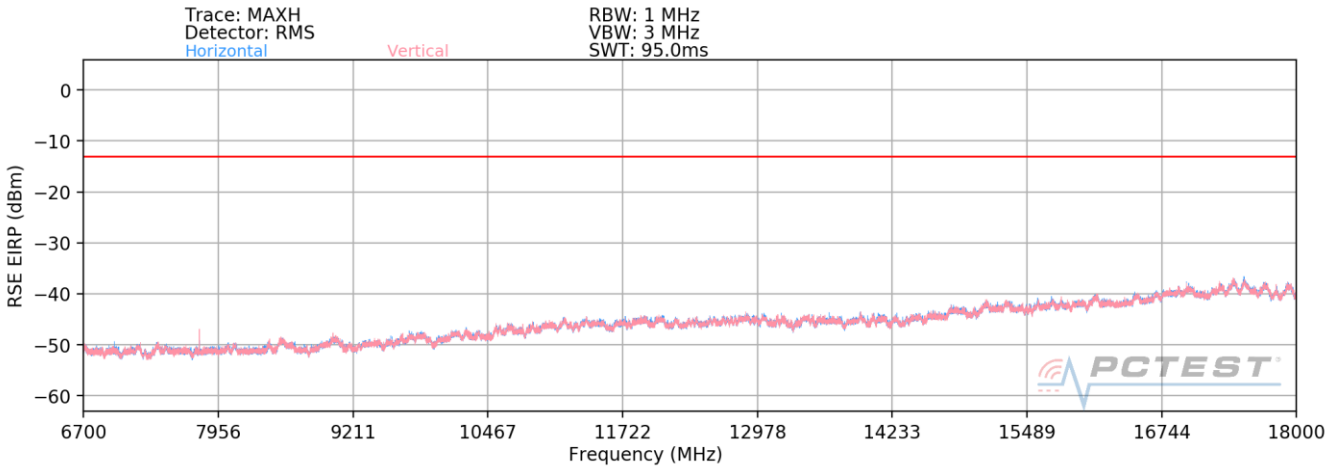


Plot 7-20. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 41 (cond) / 5GHz)



Plot 7-21. Radiated Spurious Plot (LTE Band 8 (rad) / LTE Band 41 (cond) / 5GHz)

Case:	B8 _ B41 _ 5GHz
Bandwidth (MHz):	1.4/20/20
Frequency (MHz):	899/2593/5240
RB / Offset:	2/2 & 2/49
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1798.0	H	141	322	-67.60	-0.63	38.77	-56.49	-13.00	-43.49
2697.0	H	114	344	-57.37	10.91	60.54	-34.72	-13.00	-21.72
3596.5	H	165	100	-71.18	2.83	38.65	-56.61	-13.00	-43.61
4341.0	H	159	350	-70.30	3.54	40.24	-55.01	-13.00	-42.01
6131.8	H	156	332	-62.10	16.09	60.99	-34.27	-13.00	-21.27
7779.0	V	362	119	-65.17	8.64	50.47	-44.79	-13.00	-31.79

Table 7-15. Radiated Spurious Data (LTE Band 8 (rad) / LTE Band 41 (cond) / 5GHz)

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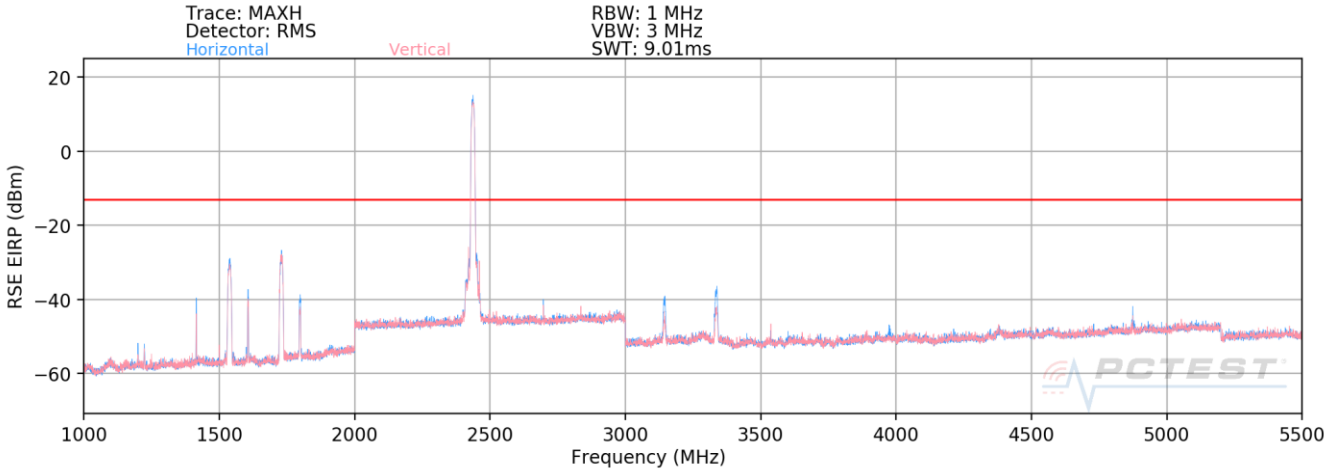
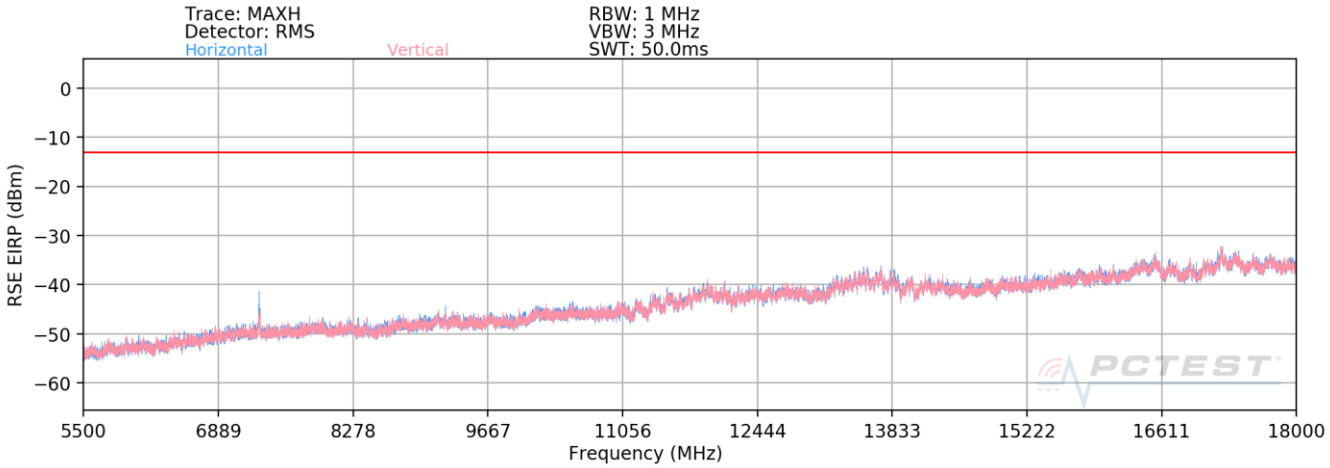


Plot 7-22. Radiated Spurious Plot (LTE Band 12 (cond) / LTE Band 8 (rad) / 2.4GHz)



Plot 7-23. Radiated Spurious Plot (LTE Band 12 (cond) / LTE Band 8 (rad) / 2.4GHz)

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Case:	B12 _ B8 _ 2.4GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	707.5/899/2437
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1415.0	H	102	146	-58.01	0.36	49.35	-45.91	-13.00	-32.91
1538.0	H	159	190	-38.86	0.21	68.35	-26.91	-13.00	-13.91
1606.5	H	105	280	-51.57	1.81	57.24	-38.02	-13.00	-25.02
1729.5	H	299	63	-37.44	2.03	71.59	-23.67	-13.00	-10.67
1798.0	H	158	317	-52.29	3.24	57.95	-37.31	-13.00	-24.31
3144.5	H	297	73	-55.15	7.32	59.17	-36.09	-13.00	-23.09
3336.0	H	218	305	-56.00	8.22	59.22	-36.04	-13.00	-23.04
*4874	H	175	5	-63.57	9.06	52.49	-42.77	-41.28	-1.49
**4874	H	175	5	-56.25	4.88	55.63	-39.63	-21.28	-18.35

Table 7-16. Radiated Spurious Data (LTE Band 12 (cond) / LTE Band 8 (rad) / 2.4GHz)

*Measured with Detector/Trace Mode of Average/RMS following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

** Measured with Detector/Trace Mode of Max Hold/Peak following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

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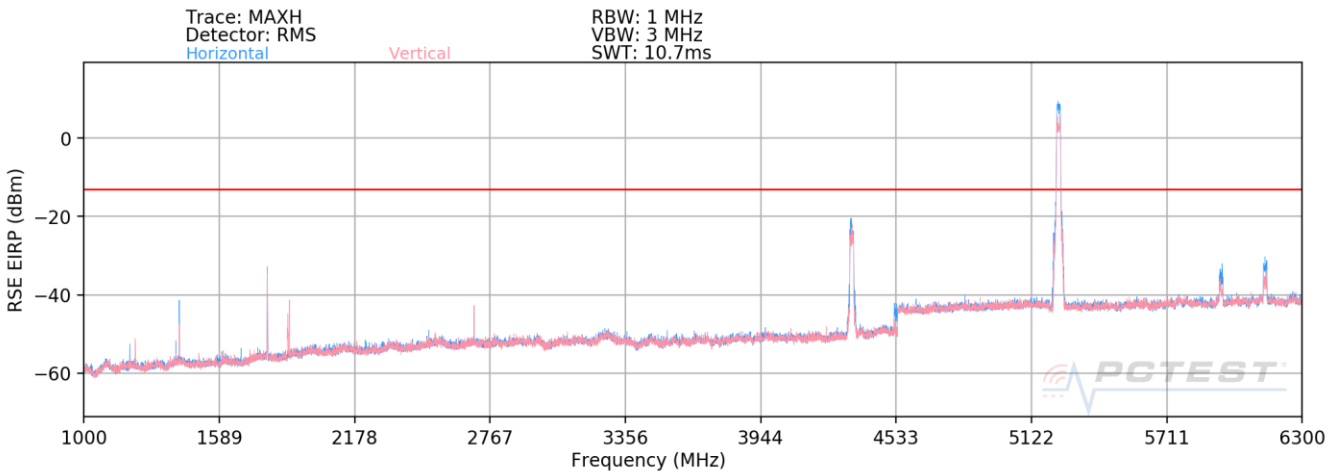
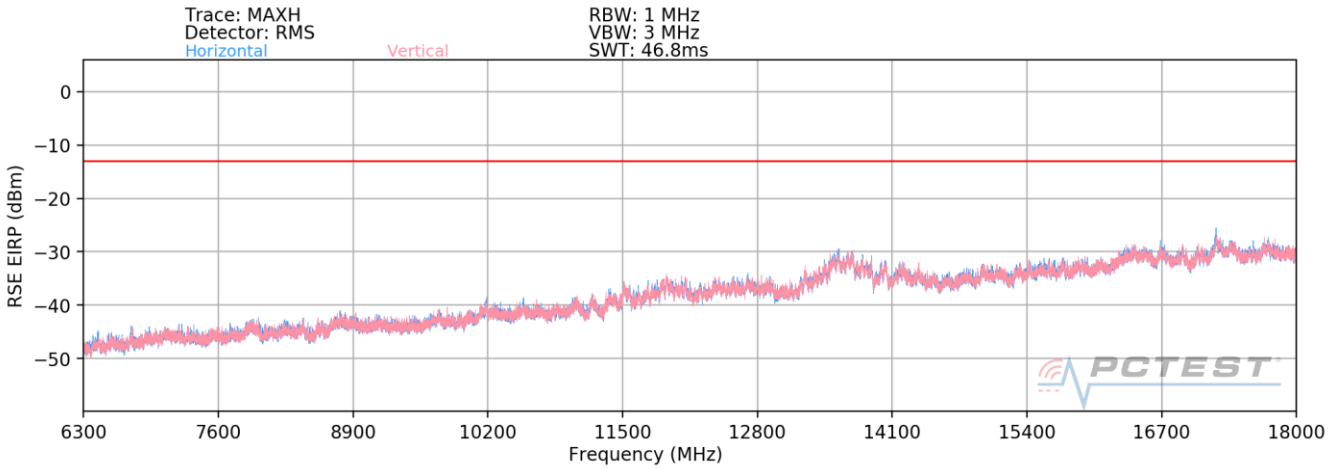


Plot 7-24. Radiated Spurious Plot (LTE Band 12 (cond) / LTE Band 8 (rad) / 5GHz)



Plot 7-25. Radiated Spurious Plot (LTE Band 12 (cond) / LTE Band 8 (rad) / 5GHz)

Case:	B12 _ B8 _ 5GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	707.5/899/5240
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1, and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1415.0	H	100	253	-51.52	0.74	56.22	-39.04	-13.00	-26.04
1798.0	H	281	331	-48.25	2.85	61.60	-33.66	-13.00	-20.66
2697.0	H	151	87	-59.27	6.34	54.07	-41.19	-13.00	-28.19
4345.0	H	256	298	-40.83	9.12	75.29	-19.96	-13.00	-6.96
5950.3	H	183	294	-63.36	21.51	65.15	-30.11	-13.00	-17.11
6131.8	H	237	300	-60.75	21.68	67.93	-27.33	-13.00	-14.33

Table 7-18. Radiated Spurious Data (LTE Band 12 (cond) / LTE Band 8 (rad) / 5GHz)

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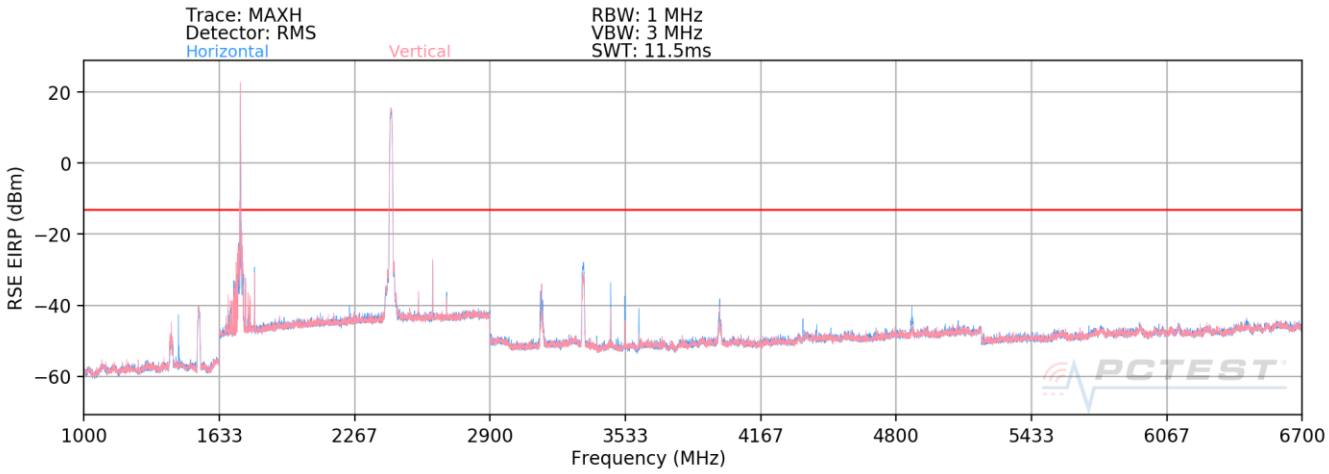
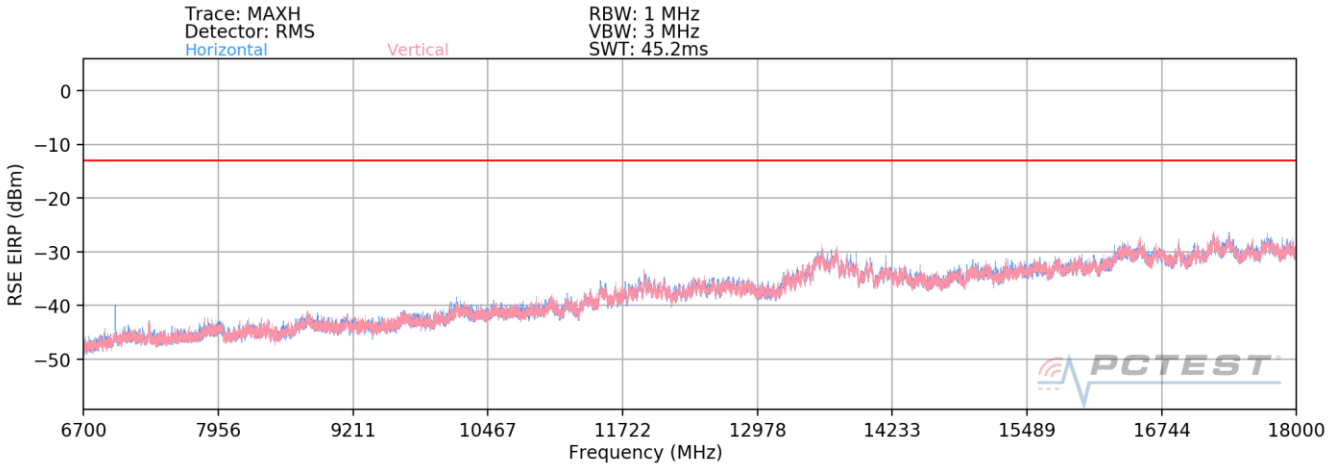


Plot 7-26. Radiated Spurious Plot (LTE Band 4 (cond) / LTE Band 8 (rad) / 2.4GHz)



Plot 7-27. Radiated Spurious Plot (LTE Band 4 (cond) / LTE Band 8 (rad) / 2.4GHz)

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Case:	B4_B8_2.4GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	1732.5/899/2437
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1 and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
1538.0	H	246	279	-47.64	0.21	59.57	-35.69	-13.00	-22.69
1798.2	H	360	120	-50.02	11.29	68.27	-26.99	-13.00	-13.99
2631.6	H	145	217	-55.34	14.54	66.20	-29.06	-13.00	-16.06
3141.5	H	134	180	-57.85	7.29	56.44	-38.82	-13.00	-25.82
3336.0	H	151	288	-46.64	8.22	68.58	-26.68	-13.00	-13.68
3465.0	H	370	249	-52.36	7.90	62.54	-32.72	-13.00	-19.72
3530.5	H	359	88	-58.11	7.69	56.58	-38.68	-13.00	-25.68
*4874	H	330	292	-66.75	9.06	49.31	-45.95	-41.28	-4.67
**4874	H	330	292	-53.05	4.88	58.83	-36.43	-21.28	-15.15

Table 7-17. Radiated Spurious Data (LTE Band 4 (cond) / LTE Band 8 (rad) / 2.4GHz)

*Measured with Detector/Trace Mode of Average/RMS following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

** Measured with Detector/Trace Mode of Max Hold/Peak following the provisions of WLAN (DTS) of FCC Rule Part 15 Subpart C (15.247)

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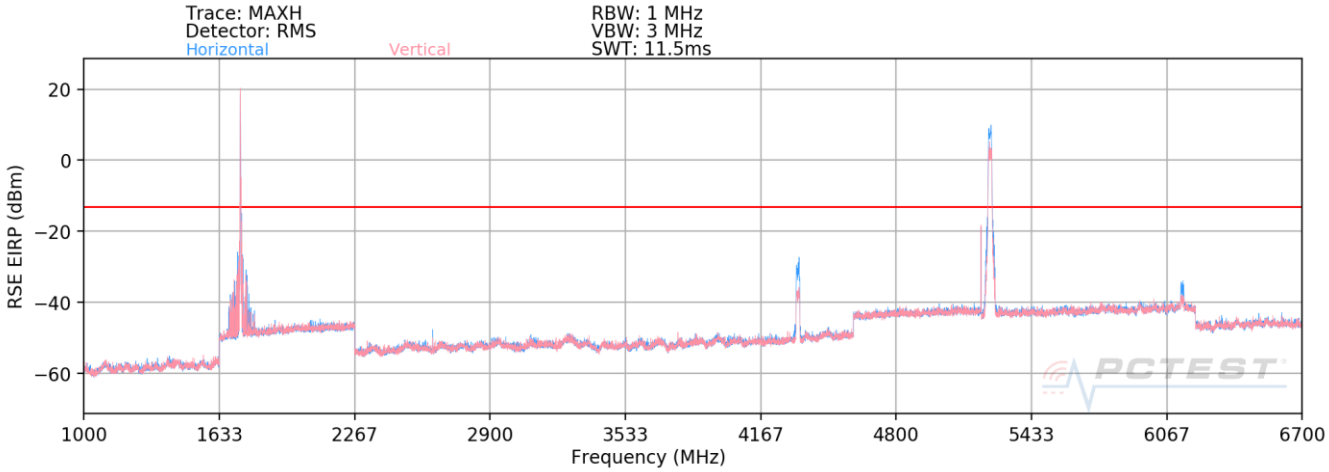
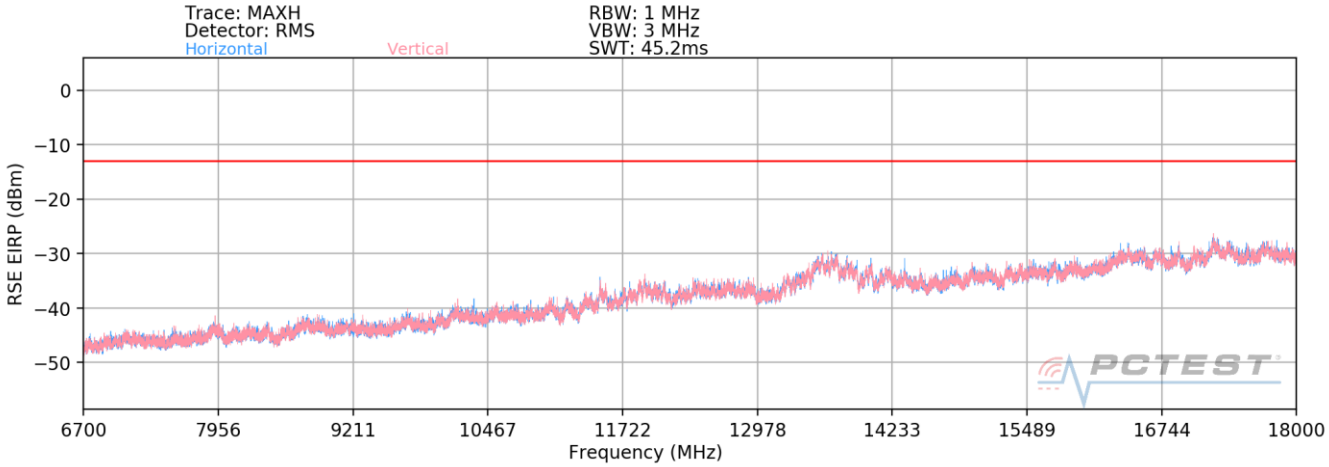


Plot 7-28. Radiated Spurious Plot (LTE Band 4 (cond) / LTE Band 8 (rad) / 5GHz)



Plot 7-29. Radiated Spurious Plot (LTE Band 4 (cond) / LTE Band 8 (rad) / 5GHz)

Case:	B4_B8_5GHz
Bandwidth (MHz):	1.4/3/20
Frequency (MHz):	1732.5/899/5240
RB / Offset:	2/2 & 2/7
Mode:	Multi-Band LTE, CAT-M1 and WIFI RSE
Detector / Trace Mode:	RMS / Max Hold
RBW / VBW:	1MHz / 3MHz

Frequency [MHz]	Ant. Pol. [H/V]	Antenna Height [cm]	Turntable Azimuth [degree]	Analyzer Level [dBm]	AFCL [dB/m]	Field Strength [dBµV/m]	EIRP Spurious Emission Level [dBm]	Limit [dBm]	Margin [dB]
2631.5	H	120	216	-57.66	5.08	54.42	-40.84	-13.00	-27.84
4345.0	H	253	296	-44.05	9.12	72.07	-23.18	-13.00	-10.18
6131.8	H	354	321	-65.11	21.68	63.57	-31.69	-13.00	-18.69
11652.5	H	-	-	-68.48	23.62	62.14	-33.12	-13.00	-20.12
13814.9	H	-	-	-67.50	28.79	68.29	-26.96	-13.00	-13.96
14350.4	H	-	-	-69.04	28.03	65.99	-29.26	-13.00	-16.26

Table 7-19. Radiated Spurious Data (LTE Band 4 (cond) / LTE Band 8 (rad) / 5GHz)

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8.0 CONCLUSION

The data collected relate only to the item(s) tested and show that the **Council Rock Enterprises LLC LTE Cellular Module FCC ID: 2AL52E15008A** complies with all requirements specified in FCC Part 27 of the FCC Rules for LTE CAT-M1 and LTE Operation.

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