EXHIBIT 8 – EMC TEST REPORT

Test Report Serial Number:	45461449R2.0
Test Report Date:	4 September 2018
Project Number:	1415

EMC Test Report - New Filing

Applicant:

SENDUM

Sendum Wireless Corporation
4500 Beedie St.
Burnaby, BC
V5J 5L2
Canada

FCC ID:	IC Registration Number
TS5-WP76-OM500	6234A-WP76OM500
Product Model Number / HVIN	**Product Name / PMN**
OM500	Omnilink OM500

In Accordance With:

CFR Title 47, Part 15 Subpart C (§15.247), Part 27
Digital Transmission System (DTS), Miscellaneous Wireless Communications Services

RSS-Gen, RSS-247 Issue 2, RSS-130 Issue 1, RSS-139 Issue 3
Digital Transmission Systems (DTSs)
Mobile Broadband Services (MBS) Equipment, Advanced Wireless Services (AWS) Equipment

Approved By:

Ben Hewson, President
Celltech Labs Inc.
21-364 Lougheed Rd.
Kelowna, BC, V1X 7R8
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ilac-MRA ACCREDITED

Industry Canada

Test Lab Certificate: 2470.01 **IC Registration 3874A-1** **FCC Registration: CA3874**

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1.0 DOCUMENT CONTROL

Revision History					
Samples Tested By:	Art Voss, P.Eng.		**Date(s) of Evaluation:**	2 August - 13 August, 2018	
Report Prepared By:	Art Voss, P.Eng.		**Report Reviewed By:**	Ben Hewson	
Report Revision	**Description of Revision**		**Revised Section**	**Revised By**	**Revision Date**
1.0	Initial Release		n/a	Art Voss	13 August 2018
2.0	Revised per TCB Response		n/a	Art Voss	4 September 2018

2.0 CLIENT AND DUT INFORMATION

Client Information		
Applicant Name	**Sendum Wireless Corporation**	
Applicant Address	4500 Beedie St.	
	Burnaby, BC, V5J 5L2	
	Canada	
DUT Information		
Device Identifier(s):	**FCC ID:**	**TS5-WP76-OM500**
	ISED ID:	**6234A-WP76-OM500**
Type of Equipment:	Portable Digital Offender Monitor Anklet Transceiver	
Device Model(s) / HVIN:	OM500	
Device Marketing Name / PMN:	Omnilink OM500	
Firmware Version ID Number / FVIN:	-	
Host Marketing Name / HMN:	Omnilink OM500	
Test Sample Serial No.:	T/A Sample - Identical Prototype	
Transmit Frequency Range:	WiFi: 2412 - 2462MHz	
	LTE Band 4: 1710 - 1755MHz	
	LTE Band 13: 777 - 787MHz	
Number of Channels:	WiFi: 1 - 11, LTE Band 4 and 13: Per EARFCN	
Manuf. Max. Rated Output Power:	WiFi: 0.0469W (16.7dBm) Conducted	
	LTE Band 4: 0.216W (23.3dBm) Conducted	
	LTE Band 13: 0.242W (23.8dBm) Conducted	
Manuf. Max. Rated BW/Data Rate:	WiFi: 20MHz, 54Mbps	
	LTE Band 4: 1.4, 3, 5, 10, 15, 20 MHz	
	LTE Band 13: 5, 10MHz	
Antenna Type and Gain:	Flex Foil: -2.15dBi LTE B4, 0.6dBi LTE B13, -2.65 DTS	
Modulation:	QPSK, 16QAM, 64QAM	
Mode:	n/a	
DUT Power Source:	3.7VDC, 3400mAh, Li-Ion Battery	
DUT Dimensions [HxWxD] (mm)	H x W x D: 100mm x 65mm x 35mm	
Deviation(s) from standard/procedure:	None	
Modification of DUT:	None	

3.0 SCOPE

This Certification Report was prepared on behalf of:

Sendum Wireless Corporation

,(the '*Applicant*"), in accordance with the applicable Federal Communications Commission (FCC) CFR 47 and Innovation, Scientific and Economic Development (ISED) Canada rules parts and regulations (the '*Rules*'). The scope of this investigation was limited to only the equipment, devices and accessories (the '*Equipment*') supplied by the *Applicant*. The tests and measurements performed on this *Equipment* were only those set forth in the applicable *Rules* and/or the Test and Measurement Standards they reference. The *Rules* applied and the Test and Measurement Standards used during this evaluation appear in the Normative References section of this report. The limits set forth in the technical requirements of the applicable *Rules* were applied to the measurement results obtained during this evaluation and ,unless otherwise noted, these limits were used as the Pass/Fail criteria. The Pass/Fail statements made in this report apply to only the tests and measurements performed on only the *Equipment* tested during this evaluation. Where applicable and permissible, information including test and measurement data and/or results from previous evaluations of same or similar equipment, devices and/or accessories may be cited in this report.

As per FCC CFR 47 Part §2.1091 and §2.1093 and Health Canada Safety Code 6, an RF Exposure evaluation report is required for this *Equipment* and the results of the RF Exposure evaluation appear in a separate exhibit from this report.

Application:

This application is for a new certification of a composite host consisting of two previously certified modules with no other transmitters. Application is being sought as per FCC KDB 996369 D01v02 (IX), FCC KDB 996369 D02v01 (1)(a) and RSP-100. As such, the original test reports for these modules are included in this report in their entirety as indicated below:

FCC ID: N7NWP76A
IC ID: 2417C-WP76A
Manufacturer: Sierra Wireless Inc.
Model/HVIN: WP7601
Test Report Number (FCC): B17W00380-FCC-RF
Test Report Number (ISED): B17W00380-FCC-RF

FCC ID: XF6-RS9113SB
IC ID: 8407A-RS9113SB
Manufacturer: Redpine Signals Inc.
Model/HVIN: RS9113SB
Test Report Number (FCC): 19660127 001
Test Report Number (ISED): 19660137 001

Scope of Evaluation:

The scope of this investigation is to perform conducted and radiated measurements on certain channels, bandwidths and modulations to ensure the test results from the original filings for each module are representative and applicable to this filing. Additionally, as conditions exists whereby both transmitters can simultaneously transmit, measurements are made to ensure that any additional conducted or radiated spurious emissions are non-existent or are below the applicable limits. RF Exposure evaluations will appear in an additional separate exhibit with this filing.

Although there are different model variants of the modules cited above, and the emissions of these different variants are indicated on their respective grants, ONLY the emissions from the variants integrated into the OM500 will be considered and reported. It is important to note that since the certification of the above modules, certain standards or procedures have changed. Where applicable, references to outdated or obsolete standards or procedures will be re-referenced to current standards or procedures for the purposes of this filing.

4.0 TEST SUMMARY

Table 4.1 – Excerpt - Test Summary of RS9113SB - FCC

FCC §15.247 TEST SUMMARY ***							
FCC ID: XF6-RS9113SB				Test Report ID: 19660127 001			
Page	Description of Test	Cited Procedure Reference	Cited Rule Part(s)	Applicable Procedure Reference	Applicable Rule Part(s)	Note	Result
8	Maximum Average Conducted Output Power	KDB 558074 D01v03r02	§15.247(b)(3)	KDB 558074 D01v04	§15.247(b)(3)	1	Pass
26	Maximum Power Spectral Density	KDB 558074 D01v03r02	§15.247(e)	KDB 558074 D01v04	§15.247(a)(2)	2	Pass
44	6dB Bandwidth	KDB 558074 D01v03r02	§15.247(a)(2)	KDB 558074 D01v04	§15.247(e)	3	Pass
76	Band-Edge Compliance	KDB 558074 D01v03r02	§15.247(d)	KDB 558074 D01v04	§15.247(d)	4	Pass
106	Spurious Radiated Emissions and Restricted Bands of Operation	ANSI C63.4-2009	§15.209 §15.205	ANSI C63.4-2014	§15.209 §15.205	5	Pass
114	Conducted Emissions Test on AC Power Line	ANSI C63.4-2009	§15.207	ANSI C63.4-2014	§15.207	6	Pass

*** The above information is an excerpt from the original test report indicated for FCC ID: XF6-RS9113SB. Some of the cited procedures and rule parts have been superceded by applicable procedures and rule parts. The comparison of those procedures and rule parts are explained in the Notes below. Appendix D for complete report.

Notes	
1	The measurement method AVGSA-1 was used during the original evaluation. The method AVGSA-1 described in KDB 558074 D01v03r02 9.2.2.2 is identical to the method AVGSA-1 described in KDB 558074 D01v04 9.2.2.2. The requirements of §15.247(b)(3) has remained unchanged since the original evaluation.
2	The measurement method AVGPSD-1 was used during the original evaluation. The method AVGPSD-1 described in KDB 558074 D01v03r02 10.3 is identical to the method AVGPSD-1 described in KDB 558074 D01v04 10.3. The requirements of §15.247(e) has remained unchanged since the original evaluation.
3	The measurement method DTS Bandwidth Option1 was used during the original evaluation. The method DTS Bandwidth Option1 described in KDB 558074 D01v03r02 8.1 is identical to the method DTS Bandwidth Option1 described in KDB 558074 D01v04 8.1. The requirements of §15.247(a)(2) has remained unchanged since the original evaluation.
4	The requirements of §15.247(d) has remained unchanged since the original evaluation.
5	The test facility requirments and test methods described in ANSI C63.4-2009 are the same as those described in ANSI C63.4-2014 with regards to this measurement. The requirements of §15.205 and §15.205 have remained unchanged since the original evaluation.
6	The test facility requirments and test methods described in ANSI C63.4-2009 are the same as those described in ANSI C63.4-2014 with regards to this measurement. The requirements of §15.207 has remained unchanged since the original evaluation.

Table 4.2 – Excerpt - Test Summary of RS9113SB - ISED

ISED RSS-247 TEST SUMMARY ***							
IC ID: 8407A-RS9113SB				Test Report ID: 19660137 001			
Page	Description of Test	Cited Procedure Reference	Cited Rule Part(s)	Applicable Procedure Reference	Applicable Rule Part(s)	Note	Result
8	Maximum Average Conducted Output Power	KDB 558074 D01v03r02	RSS-210 Iss 8 A8.4 (4)	KDB 558074 D01v04	RSS-247 Iss 2 5.4(d)	1	Pass
26	Maximum Power Spectral Density	KDB 558074 D01v03r02	RSS-210 Iss 8 A8.2 (b)	KDB 558074 D01v04	RSS-247 Iss 2 5.2(d)	2	Pass
44	6dB Bandwidth	KDB 558074 D01v03r02	RSS-210 Iss 8 A8.2 (a)	KDB 558074 D01v04	RSS-247 Iss 2 5.2(a)	3	Pass
76	Band-Edge Compliance	KDB 558074 D01v03r02	RSS-210 Iss 8 A8.5	KDB 558074 D01v04	RSS-247 Iss 2 5.5	4	Pass
106	Spurious Radiated Emissions and Restricted Bands of Operation	ANSI C63.4-2009	RSS-Gen Iss 4 8.9 & 8.10	ANSI C63.4-2014	RSS-Gen Iss 5 8.9 & 8.10	5	Pass
114	Conducted Emissions Test on AC Power Line	ANSI C63.4-2009	RSS-Gen Iss 4 8.8	ANSI C63.4-2014	RSS-Gen Iss 5 8.8	6	Pass

*** The above information is an excerpt from the original test report indicated for IC ID: 8407A-RS9113SB. Some of the cited procedures and rule parts have been superceded by applicable procedures and rule parts. The comparison of those procedures and rule parts are explained in the Notes below. Appendix E for complete report.

Notes	
1	The measurement method AVGSA-1 was used during the original evaluation. The method AVGSA-1 described in KDB 558074 D01v03r02 9.2.2.2 is identical to the method AVGSA-1 described in KDB 558074 D01v04 9.2.2.2. The requirements of RSS-210 A8.4(4) are the same as RSS-247 5.4(d).
2	The measurement method AVGPSD-1 was used during the original evaluation. The method AVGPSD-1 described in KDB 558074 D01v03r02 10.3 is identical to the method AVGPSD-1 described in KDB 558074 D01v04 10.3. The requirements of RSS-210 A8.2(b) are the same as RSS-247 5.2(b) with respect to this measurement between 2400 and 2483.5MHz.
3	The measurement method DTS Bandwidth Option1 was used during the original evaluation. The method DTS Bandwidth Option1 described in KDB 558074 D01v03r02 8.1 is identical to the method DTS Bandwidth Option1 described in KDB 558074 D01v04 8.1. The requirements of RSS-210 A8.2(a) are the same as RSS-247 5.2(a) with respect to this measurement between 2400 and 2483.5MHz.
4	The requirements of RSS-210 A8.5 are the same as RSS-247 5.5
5	The test facility requirments and test methods described in ANSI C63.4-2009 are the same as those described in ANSI C63.4-2014 with regards to this measurement. The requirements of RSS-Gen Iss 4 8.9 and 8.10 are the same as RSS-Gen Iss 5 8.9 and 8.10.
6	The test facility requirments and test methods described in ANSI C63.4-2009 are the same as those described in ANSI C63.4-2014 with regards to this measurement. The requirements of RSS-Gen Iss 4 8.8 are the same as RSS-Gen Iss 5 8.8.

Table 4.3 – Excerpt - Test Summary of WP76A - FCC

FCC §27 Subpart C TEST SUMMARY ***							
FCC ID: N7NWP76A			Test Report ID: B17W00380-FCC-RF				
Page	Description of Test	Cited Procedure Reference	Cited Rule Part(s)	Applicable Procedure Reference	Applicable Rule Part(s)	Note	Result
11	Conducted RF Power Output		§2.1046 §27.50(b)		§2.1046 §27.50(b)		Pass
21	Occupied Bandwidth		§2.1049		§2.1049		*Note1
31	Conducted Spurious Emissions		§2.1051 §27.53		§2.1051 §27.53		Pass
45	Radiated Spurious Emissions	ANSI/TIA-603-D 2.2.13	§2.1053 §27.53	ANSI/TIA-603-E 2.2.13	§2.1053 §27.53	1	Pass
56	Band Edge	ANSI/TIA-603-D 2.2.12	§2.1051 §27.53	ANSI/TIA-603-E 2.2.12	§2.1051 §27.53	2	Pass
98	Frequency Stability of Temperature Variation		§2.1055 §27.54		§2.1055 §27.54		Pass
99	Frequency Stability of Voltage Variation		§2.1055 §27.54		§2.1055 §27.54		Pass
100	Peak to Average Ratio		§27.50		§27.50		Pass
*Note1	No Applicable performance criteria						

*** The above information is an excerpt from the original test report indicated for FCC ID: N7NWP76A. Some of the cited procedures and rule parts have been superceded by applicable procedures and rule parts. The comparison of those procedures and rule parts are explained in the Notes below. See Appendix F for complete report.

Notes	
1	The measurement method for Radiated Spurious Emissions described in ANSI/TIA-603-D 2.2.13 is identical to the measurement method for Radiated Spurious Emissions described in ANSI/TIA-603-E 2.2.13
2	The measurement method for Conducted Spurious Emissions described in ANSI/TIA-603-D 2.2.12 is identical to the measurement method for Conducted Spurious Emissions described in ANSI/TIA-603-E 2.2.12

Table 4.4 – Excerpt - Test Summary of WP76A - ISED

ISED RSS-130, RSS-139 TEST SUMMARY ***							
IC ID: 2147C-WP76A				Test Report ID: B17W00380-FCC-RF			
Page	Description of Test	Cited Procedure Reference	Cited Rule Part(s)	Applicable Procedure Reference	Applicable Rule Part(s)	Note	Result
11	Conducted RF Power Output		RSS-130 4.4 RSS-139 6.5		RSS-130 4.4 RSS-139 6.5		Pass
21	Occupied Bandwidth		RSS-Gen 6.6		RSS-Gen	1	*Note1
31	Conducted Spurious Emissions		RSS-130 4.4 RSS-139 6.5		RSS-130 4.4 RSS-139 6.5		Pass
45	Radiated Spurious Emissions	ANSI/TIA-603-D 2.2.13	RSS-130 4.4 RSS-139 6.5	ANSI/TIA-603-E 2.2.13	RSS-130 4.4 RSS-139 6.5	2	Pass
56	Band Edge	ANSI/TIA-603-D 2.2.12	RSS-130 4.4 RSS-139 6.5	ANSI/TIA-603-E 2.2.12	RSS-130 4.4 RSS-139 6.5	3	Pass
98	Frequency Stability of Temperature Variation		RSS-130 4.4 RSS-139 6.5		RSS-130 4.4 RSS-139 6.5		Pass
99	Frequency Stability of Voltage Variation		RSS-130 4.4 RSS-139 6.5		RSS-130 4.4 RSS-139 6.5		Pass
100	Peak to Average Ratio		RSS-130 4.4		RSS-130 4.4		Pass
*Note1	No Applicable performance criteria						

*** The above information is an excerpt from the original test report indicated for IC ID: 2147C-WP76A. Some of the cited procedures and rule parts have been superceded by applicable procedures and rule parts. The comparison of those procedures and rule parts are explained in the Notes below. See Appendix J for complete report.

Notes	
1	The requirements of RSS-Gen Iss 4 6.6 are the same as RSS-Gen Iss 5 6.7.
2	The measurement method for Radiated Spurious Emissions described in ANSI/TIA-603-D 2.2.13 is identical to the measurement method for Radiated Spurious Emissions described in ANSI/TIA-603-E 2.2.13

Table 4.5 –Test Summary of OM500 - DTS

FCC §15.247, RSS-247 VERIFICATION SUMMARY ***						
FCC ID: TS5-WP76-OM500				IC ID: 6123A-WP76OM500		
Section	Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Test Date	Result
7.0	Conducted Power (Fundemental)	ANSI C63.10-2013 KDB 558074 D01v04	§2.1046 §15.247(b)(3)	RSS-Gen RSS-247 (5.4)(d)	2 Aug 2018	Pass
8.0	6dB Bandwidth	ANSI C63.10-2013 KDB 558074 D01v04	§2.1049 §15.247(a)(2)	RSS-Gen RSS-247 (5.2)(a)	2 Aug 2018	Pass
9.0	Occupied Bandwidth	ANSI C63.10-2013 KDB 558074 D01v04	§2.1049 §15.247(a)(2)	RSS-Gen RSS-247 (5.2)(a)	2 Aug 2018	Pass
10.0	Power Spectral Density	ANSI C63.10-2013 KDB 558074 D01v04	§15.247(e)	RSS-247 (5.2)(b)	2 Aug 2018	Pass
13.0	Conducted TX Spurious Emissions Simultaneous Transmission	ANSI/TIA-603-E	§15.31(k) §2.947(f)	RSS-Gen RSP-100	9 Aug 2018	Pass
14.0	Radiated TX Spurious Emissions Simultaneous Transmission	ANSI C63.4-2014	§15.31(k) §2.947(f)	RSS-Gen RSP-100	9 Aug 2018	Pass

*** The above summary represents measurements of the OM500 Host Device during the course of THIS evaluation. This data is used for the comparison of the measurement data indicated on the original reports filed for each module. Only certain tests and measurements were made on certain test channels, bandwidths and modulations for the purposes of this comparison. Where possible, the the channels and configurations which produced the highest output or worst case results from the original evaluation were evaluated. A "Pass" shown in the Results column demostrates that the measuremenet results accurately represent those of the original filings. Additionally, sample measurements were taken during simultaneous transmission configurations for the purposes of demostrating compliance to simultaneous transmission conditions of a composite system.

Table 4.6 –Test Summary of OM500 - LTE

FCC §27, RSS-130, RSS-139 VERIFICATION SUMMARY ***						
FCC ID: TS5-WP76-OM500				IC ID: 6123A-WP76OM500		
Section	**Description of Test**	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Applicable Rule Part(s) ISED**	**Test Date**	**Result**
11.0	Conducted Pow er (Fundemental)	ANSI/TIA-603-E	§2.1046 §27.50(b)	RSS-130 4.4 RSS-139 6.5	9 Aug 2018	Pass
12.0	Occupied Bandw idth	ANSI/TIA-603-E	§2.1049	RSS-Gen RSS-247 (5.2)(a)	9 Aug 2018	Pass
13.0	Conducted TX Spurious Emissions Simultaneous Transmission	ANSI/TIA-603-E	§15.31(k) §2.947(f)	RSS-Gen RSP-100	9 Aug 2018	Pass
14.0	Radiated TX Spurious Emissions Simultaneous Transmission	ANSI C63.4-2014	§15.31(k) §2.947(f)	RSS-Gen RSP-100	9 Aug 2018	Pass

*** The above summary represents measurements of the OM500 Host Device during the course of THIS evaluation. This data is used for the comparison of the measurement data indicated on the original reports filed for each module. Only certain tests and measurements were made on certain test channels, bandwidths and modulations for the purposes of this comparison. Where possible, the the channels and configurations which produced the highest output or worst case results from the original evaluation were evaluated. A "Pass" shown in the Results column demostrates that the measuremenet results accurately represent those of the original filings. Additionally, sample measurements were taken during simultaneous transmission configurations for the purposes of demostrating compliance to simultaneous transmission conditions of a composite system.

Table 4.7 –Composite Test Summary of OM500 - DTS

FCC §15.247, RSS-247 COMPOSITE TEST SUMMARY ***				
FCC ID: TS5-WP76-OM500		IC ID: 6123A-WP76OM500		
Description of Test	Procedure Reference	Applicable Rule Part(s) FCC	Applicable Rule Part(s) ISED	Result
Maximum Average Conducted Output Power	KDB 558074 D01v04	§15.247(b)(3)	RSS-247 Iss 2 5.4(d)	Pass
Maximum Power Spectral Density	KDB 558074 D01v04	§15.247(a)(2)	RSS-247 Iss 2 5.2(d)	Pass
6dB Bandwidth	KDB 558074 D01v04	§15.247(e)	RSS-247 Iss 2 5.2(a)	Pass
Band-Edge Compliance	KDB 558074 D01v04	§15.247(d)	RSS-247 Iss 2 5.5	Pass
Spurious Radiated Emissions and Restricted Bands of Operation	ANSI C63.4-2014	§15.209 §15.205	RSS-Gen Iss 5 8.9 & 8.10	Pass
Conducted Emissions Test on AC Power Line	ANSI C63.4-2014	§15.207	RSS-Gen Iss 5 8.8	Pass
Conducted TX Spurious Emissions Simultaneous Transmission	ANSI/TIA-603-E	§15.31(k) §2.947(f)	RSS-Gen RSP-100	Pass
Radiated TX Spurious Emissions Simultaneous Transmission	ANSI C63.4-2014	§15.31(k) §2.947(f)	RSS-Gen RSP-100	Pass

*** From the Verification Data, when compared to the data of the original test report data of the module, it is deemed that the test result data from the original module filing is representative of the OM500 Composite Host and therefore the OM500 meets all of the requirements of the standards cited therein.

Table 4.8 –Composite Test Summary of OM500 - LTE

FCC §27, RSS-130, RSS-139 COMPOSITE TEST SUMMARY ***				
FCC ID: TS5-WP76-OM500		IC ID: 6123A-WP76OM500		
Description of Test	**Procedure Reference**	**Applicable Rule Part(s) FCC**	**Applicable Rule Part(s) ISED**	**Result**
Conducted RF Power Output		§2.1046 §27.50(b)	RSS-130 4.4 RSS-139 6.5	Pass
Occupied Bandwidth		§2.1049	RSS-Gen	Pass
Conducted Spurious Emissions		§2.1051 §27.53	RSS-130 4.4 RSS-139 6.5	Pass
Radiated Spurious Emissions	ANSI/TIA-603-E 2.2.13	§2.1053 §27.53	RSS-130 4.4 RSS-139 6.5	Pass
Band Edge	ANSI/TIA-603-E 2.2.12	§2.1051 §27.53	RSS-130 4.4 RSS-139 6.5	Pass
Frequency Stability of Temperature Variation		§2.1055 §27.54	RSS-130 4.4 RSS-139 6.5	Pass
Frequency Stability of Voltage Variation		§2.1055 §27.54	RSS-130 4.4 RSS-139 6.5	Pass
Peak to Average Ratio		§27.50	RSS-130 4.4	Pass
Conducted TX Spurious Emissions Simultaneous Transmission	ANSI/TIA-603-E	§15.31(k) §2.947(f)	RSS-Gen RSP-100	Pass
Radiated TX Spurious Emissions Simultaneous Transmission	ANSI C63.4-2014	§15.31(k) §2.947(f)	RSS-Gen RSP-100	Pass

*** From the Verification Data, when compared to the data of the original test report data of the module, it is deemed that the test result data from the original module filing is representative of the OM500 Composite Host and therefore the OM500 meets all of the requirements of the standards cited therein.

I attest that the data reported herein is true and accurate within the tolerance of the Measurement Instrument Uncertainty; that all tests and measurements were performed in accordance with accepted practices or procedures; and that all tests and measurements were performed by me or by trained personnel under my direct supervision. The results of this investigation are based solely on the test sample(s) provided by the client which were not adjusted, modified or altered in any manner whatsoever, except as required to carry out specific tests or measurements. This test report has been completed in accordance with ISO/IEC 17025.

Art Voss, P.Eng.
Technical Manager
Celltech Labs Inc.

13 August 2018
Date

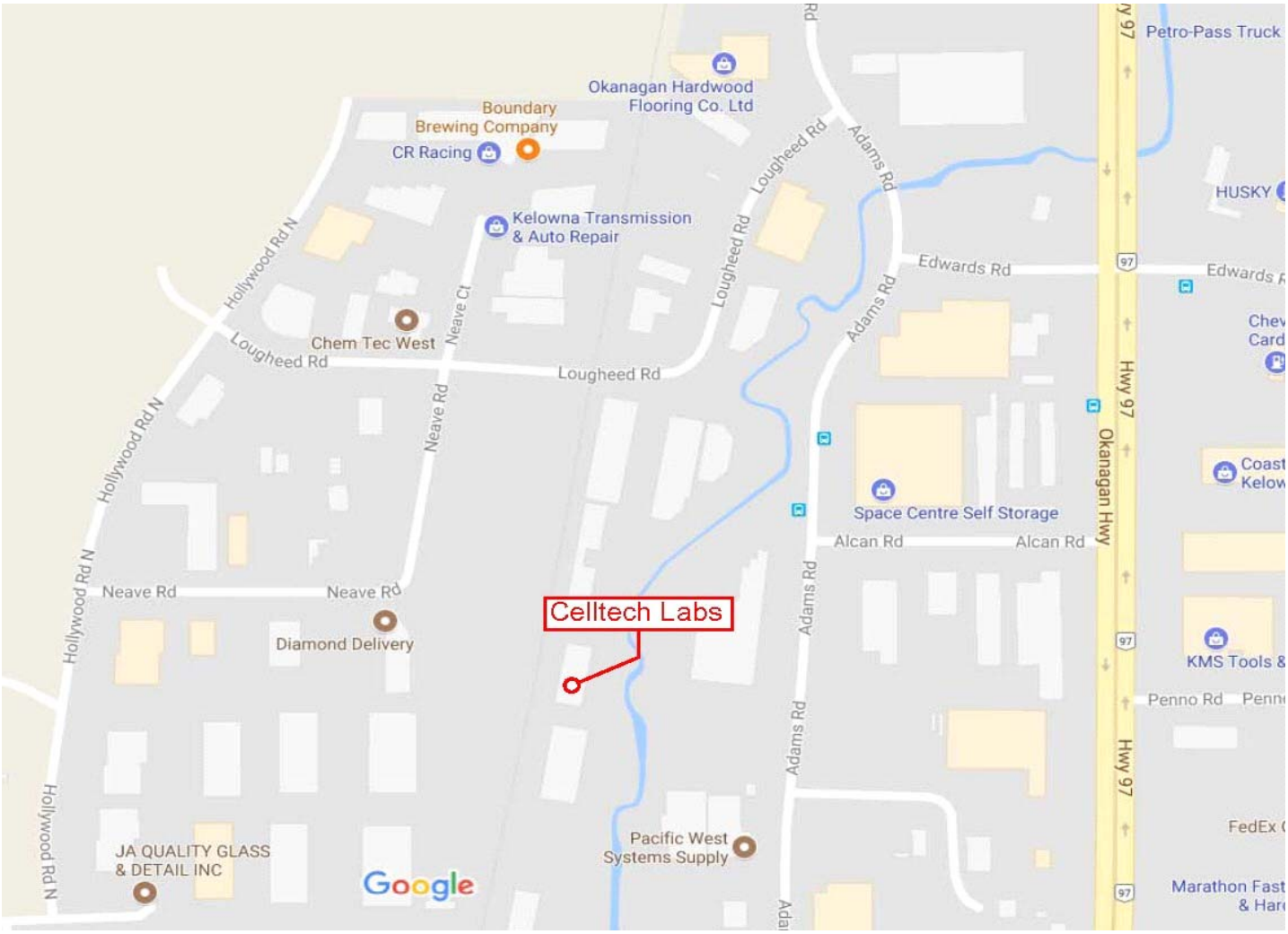
5.0 NORMATIVE REFERENCES

Normative References	
ISO/IEC 17025:2017	General requirements for the competence of testing and calibration laboratories
ANSI C63.10-2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices
ANSI C63.4-2014	American National Standard of Procedures for Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electric and Electronic Equipment in the Range of 9kHz to 40GHz
ANSI/TIA-603-E	Land Mobile FM or PM Communications Equipment Measurement and Performance Standards (Revision of TIA-603-D)
CFR Title 47: Part 2:	Code of Federal Regulations Telecommunication Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
CFR Title 47: Part 15: Sub Part C (15.247)	Code of Federal Regulations Telecommunication Radio Frequency Devices Intentional Radiators
CFR Title 47: Part 15: Subpart A:	Code of Federal Regulations Telecommunication Radio Frequency Devices General
CFR Title 47: Part 27: Sub Part C:	Code of Federal Regulations Telecommunication Miscellaneous Wireless Communications Services Technical Standards
ISED RSS-Gen Issue 5:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification General Requirements and Information for the Certification of Radiocommunication Equipment
ISED RSS-247 Issue 2:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licensed-Exempt Local Area Network (LE_LAN) Devices
ISED RSS-130 Issue 1:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz
ISED RSS-139 Issue 3:	Innovation, Science and Economic Development Canada Spectrum Management and Telecommunications Radio Standards Specification Advanced Wireless Services (AWS) Equipment Operating in the Bands 1710-1780 MHz and 2110-2180 MHz
FCC KDB 558074 D01v04	OET Major Guidance Publications, Knowledge Data Base Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under Section 15.247

6.0 FACILITIES AND ACCREDITATIONS

Facility and Accreditation:

The facilities used to evaluate this device outlined in this report are located at 21-364 Lougheed Road, Kelowna, British Columbia, Canada V1X 7R8. The radiated emissions site (OATS) conforms to the requirements set forth in ANSI C63.4 and is filed and listed with the FCC under Test Firm Registration Number CA3874 and Innovation, Science and Economic Development Canada under Test Site File Number ISED 3874A-1. Celltech is accredited to ISO 17025, through accrediting body A2LA and with certificate 2470.01.



7.0 CONDUCTED POWER - WLAN

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d),
	KDB 558074 (9.2.2.2), ANSI C63.10 (11.9.2.2.2)

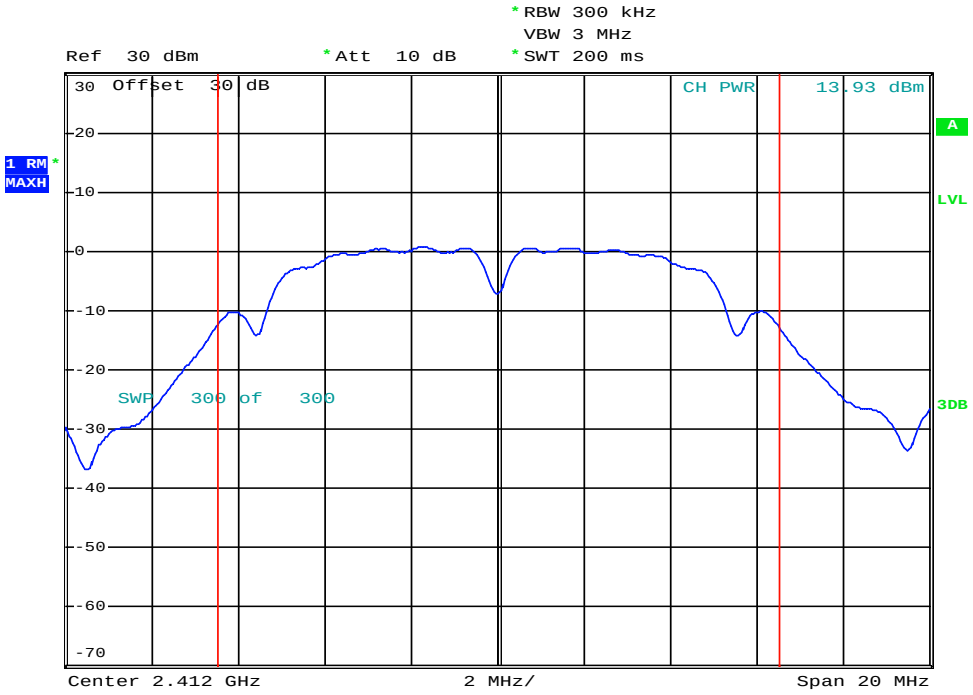
Limits	
47 CFR §15.247(b)(3)	(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following: (3) For systems using digital modulation in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power.
RSS-247 (5.4)(d)	5.4 Transmitter output power and equivalent isotropically radiated power (e.i.r.p.) requirements Devices shall comply with the following requirements, where applicable: d) For DTSs employing digital modulation techniques operating in the bands 902-928 MHz and 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1W. The e.i.r.p. shall not exceed 4 W, except as provided in section 5.4(e). As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.
KDB 558074 (9.2.1)	9.2.1 General Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.
KDB 558074 (9.2.2.6) C63.10 (11.9.2.2.6)	**Method AVGSA-3** (RMS detection across on- and off-times of the EUT with max hold) a) Set span to at least 1.5 X OBW. b) Set sweep trigger to “free run”. c) Set RBW = 1 % to 5 % of the OBW, not to exceed 1 MHz. d) Set VBW ≥ 3 X RBW e) Number of points in sweep ≥ 2 X span / RBW. f) Sweep time ≤ (number of points in sweep) X T, g) Detector = RMS. h) Trace mode = max hold. i) Allow max hold to run for at least 60 s, or longer as needed to allow the trace to stabilize. h) Compute power by integrating the spectrum across the OBW of the signal using the instrument’s band power measurement function with band limits set equal to the OBW band edges. If the instrument does not have a band power function, sum the spectrum levels (in power units) at intervals equal to the RBW extending across the entire OBW.
Test Setup	**Appendix A Figure A.1**

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT’s antenna port. The SA was configured as described above. Number of Sweep Points ≥ 2 X Span / RBW = 2 X (20MHz / 300kHz) = 133, the SA was configured for 1001 Points. The output power of the DUT was set to the manufacturer’s highest output power setting. The Channel Power measurement instrument function was set to measure the channel power with the Channel Bandwidth set to the measured 99% Occupied Bandwidth (See Section 9.0). The Band Channel Power was measured and recorded.

Plot 7.1 – Conducted Power WLAN Channel 1

Conducted Power (RMS)

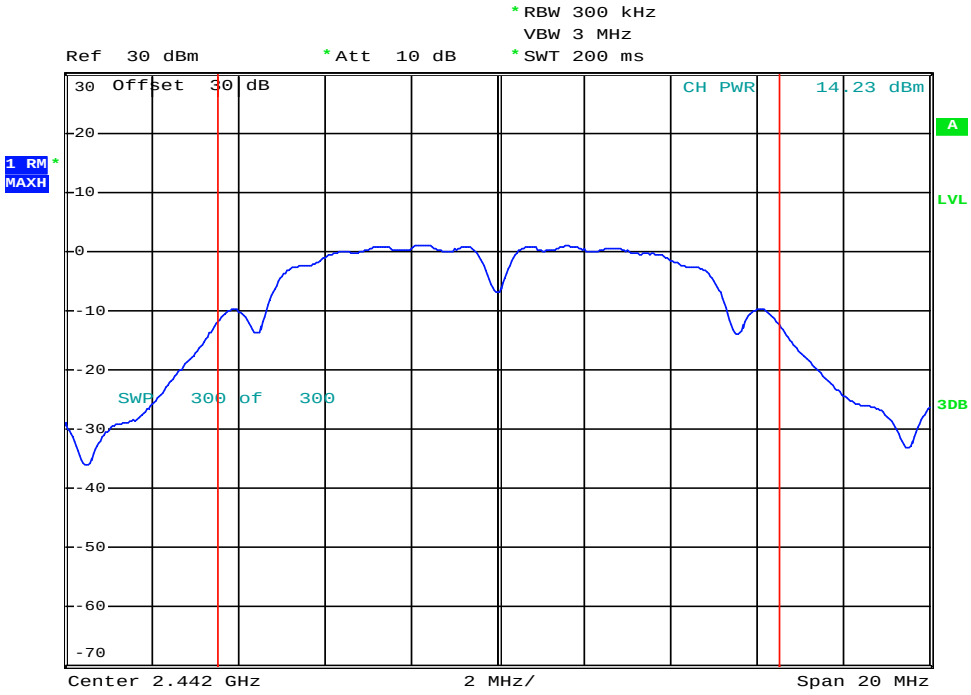


Date: 2.AUG.2018 15:09:11

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2412.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
802.11b	**Max** dBm	**13.93** dBm

Plot 7.2 – Conducted Power WLAN Channel 7

Conducted Power (RMS)

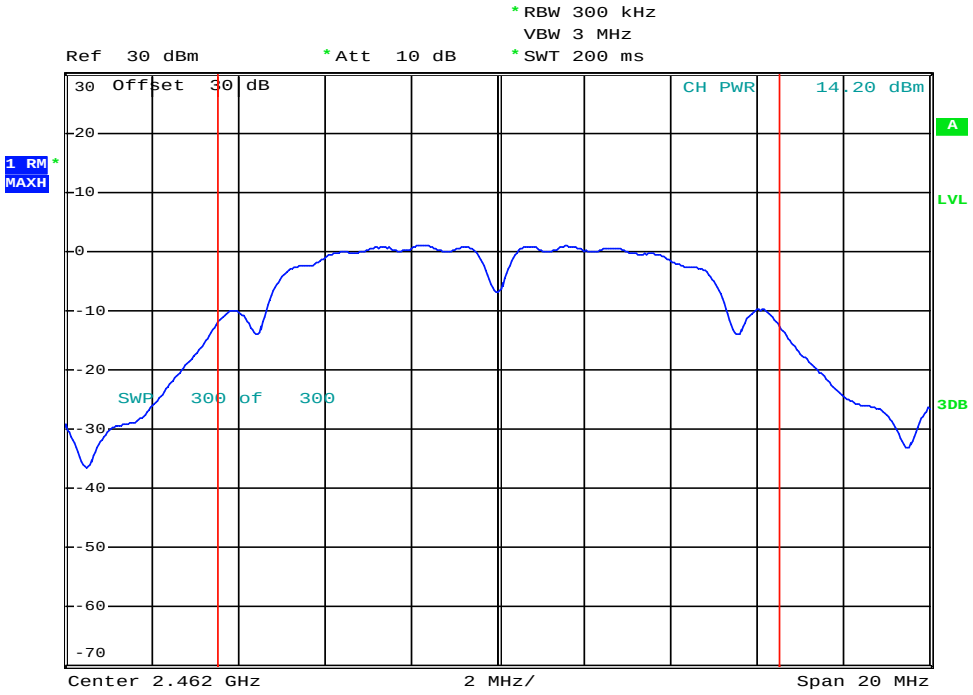


Date: 2.AUG.2018 15:11:16

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2442.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
802.11b	**Max** dBm	**14.23** dBm

Plot 7.3 – Conducted Power WLAN Channel 11

Conducted Power (RMS)



Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2462.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured Channel Power:**
802.11b	**Max** dBm	**14.20** dBm

Table 7.1 – Summary of Conducted Power Measurements

§15.247(b)(3), RSS-247 (5.4)(d) Channel Output Power (RMS)									
Frequency (MHz)	BW (MHz)	Modulation	Power Setting (dBm)	Measured Power (dBm)	Measured Power (W)	Original[1] Power (dBm)	Original[1] Power [E_{Meas}] (W)	Limit (W)	Margin (dB)
2412.0	12.5	802.11b	Max	13.93	0.025	12.05	0.016	1.0	**18.0**
2442.0				14.23	0.026	16.62	0.046		**13.4**
2462.0				14.20	0.026	12.25	0.017		**17.8**
								Results:	**Complies**

(1) As reported in the original module report
Margin = 10*Log(Limit / E_{meas})

8.0 DTS BANDWIDTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1049, §15.247(a)(2), RSS-Gen (6.7), RSS-247 (5.2)(a), KDB 558074 (8.2), ANSI C63.10 (11.8.2)

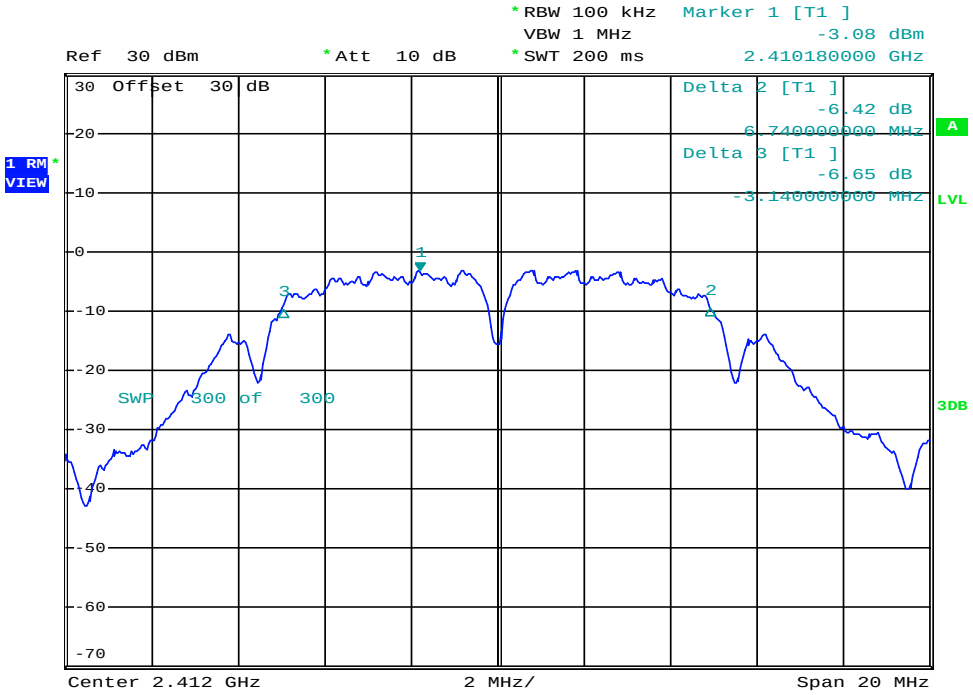
Limits	
47 CFR §15.247(a)(2)	(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions: (2) Systems using digital modulation techniques may operate in the 902-928 MHz, 2400-2483.5 MHz, and 5725-5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.
RSS-247 (5.2)(a)	5.2 Digital transmission systems DTSs include systems that employ digital modulation techniques resulting in spectral characteristics similar to direct sequence systems. The following applies to the bands 902-928 MHz and 2400 - 2483.5 MHz: a) The minimum 6 dB bandwidth shall be 500 kHz.
KDB 558074 (8.2) C63.10 (11.8.2)	**8.2 Option 2** The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described above (i.e., RBW = 100 kHz, VBW ≥ 3 X RBW, peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.
Test Setup	**Appendix A Figure A.1**

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as above using the Automatic 6dB Cursor Bandwidth measurement. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device.

Plot 8.1 – 6dB DTS Bandwidth 2412MHz

6dB *DTS* Bandwidth

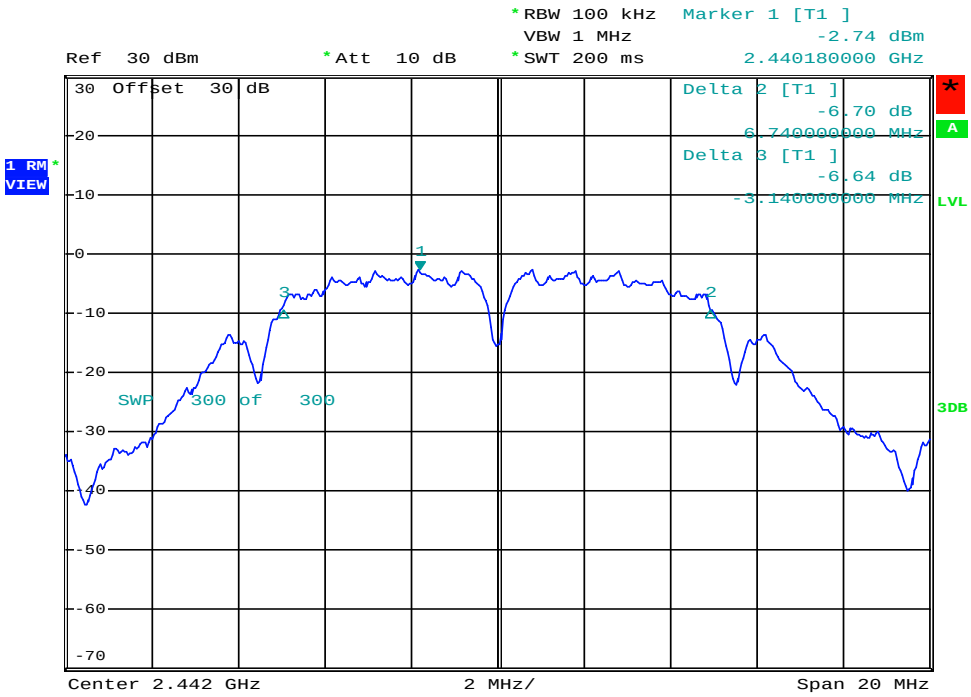


Date: 2.AUG.2018 15:59:00

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2412.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured 6dB Bandwidth:**
802.11b	**Max** dBm	**9.88** MHz

Plot 8.2 – 6dB DTS Bandwidth 2442MHz

6dB *DTS* Bandwidth

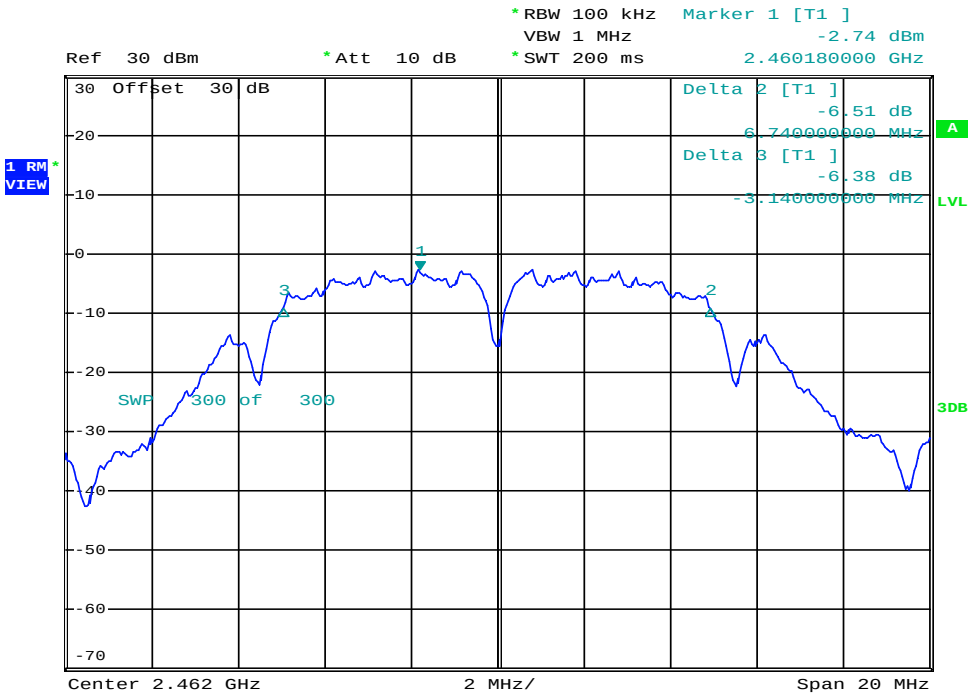


Date: 2.AUG.2018 15:55:59

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2442.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured 6dB Bandwidth:**
802.11b	**Max** dBm	**9.88** MHz

Plot 8.3 – 6dB DTS Bandwidth 2462MHz

6dB *DTS* Bandwidth



Date: 2.AUG.2018 15:52:40

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2462.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured 6dB Bandwidth:**
802.11b	**Max** dBm	**9.88** MHz

Table 8.1 – Summary of 6dB DTS Bandwidth Measurements

6dB *DTS* Bandwidth Measurement Results						
Freqency (MHz)	Bandwidth Setting (MHz)	Modulation	Measured 6dB BW (MHz)	Original[1] 6dB BW [BW] (MHz)	Minimum 6dB BW [MBW] (MHz)	Margin (MHz)
2412.00	12.5	802.11b	9.88	10.76	0.5	**10.26**
2442.00			9.88	10.76		**10.26**
2462.00			9.88	10.76		**10.26**
					Result:	**Complies**

(1) As reported in the original module report

Margin = BW - MBW

9.0 OCCUPIED BANDWIDTH

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §15.247(b)(3), RSS-Gen (6.1.2), RSS-247 (5.4)(d),
	KDB 558074 (9.2.1), ANSI C63.10 (6.9.3)

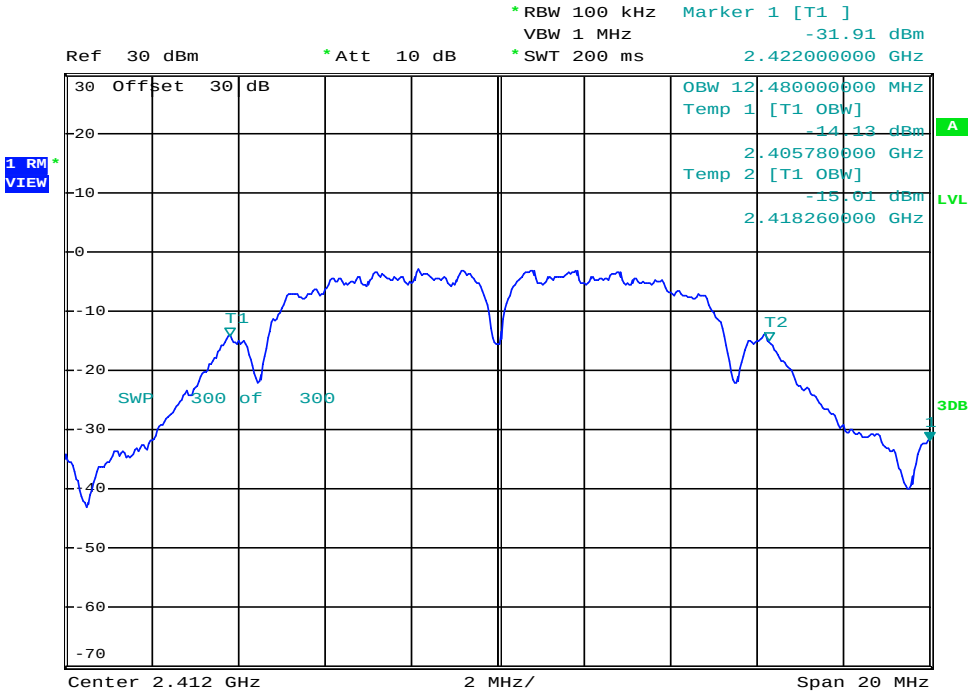
Limits	
KDB 558074 (9.2.1)	9.2.1 General Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.
C63.10 (6.9.3)	6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels. The 99% Occupied Bandwidth was measured and recorded and used for the basis for measuring the Conducted Output Power (See Section 7.0) and Power Spectral Density (See Section 10.0).

Plot 9.1 – Occupied Bandwidth 2412MHz

Occupied Bandwidth

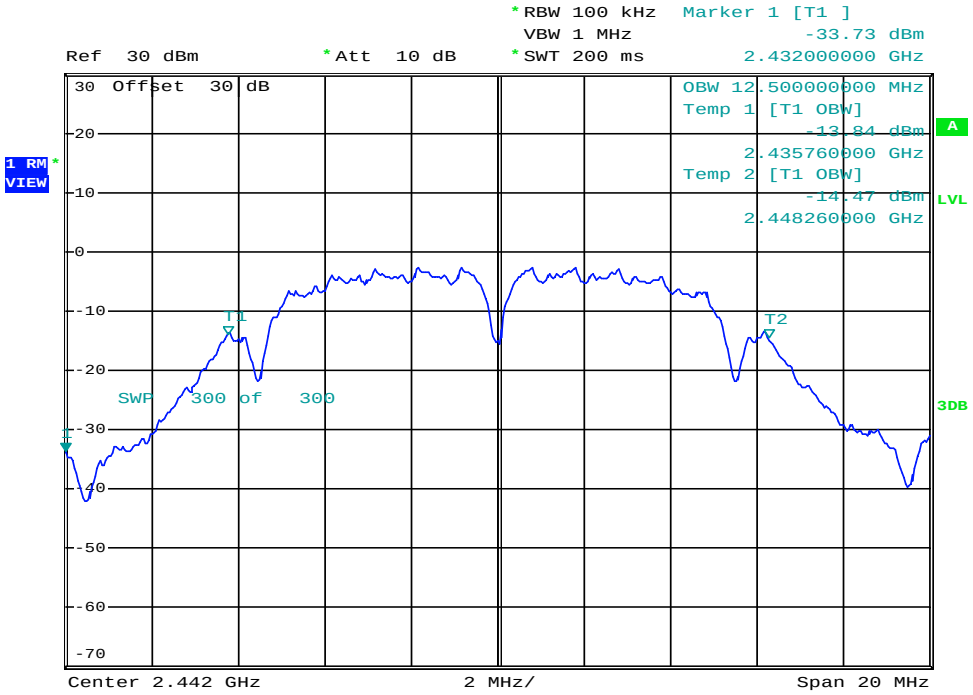


Date: 2.AUG.2018 15:26:44

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2412.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
802.11b	**Max** dBm	**12.48** MHz

Plot 9.2 – Occupied Bandwidth 2442MHz

Occupied Bandwidth

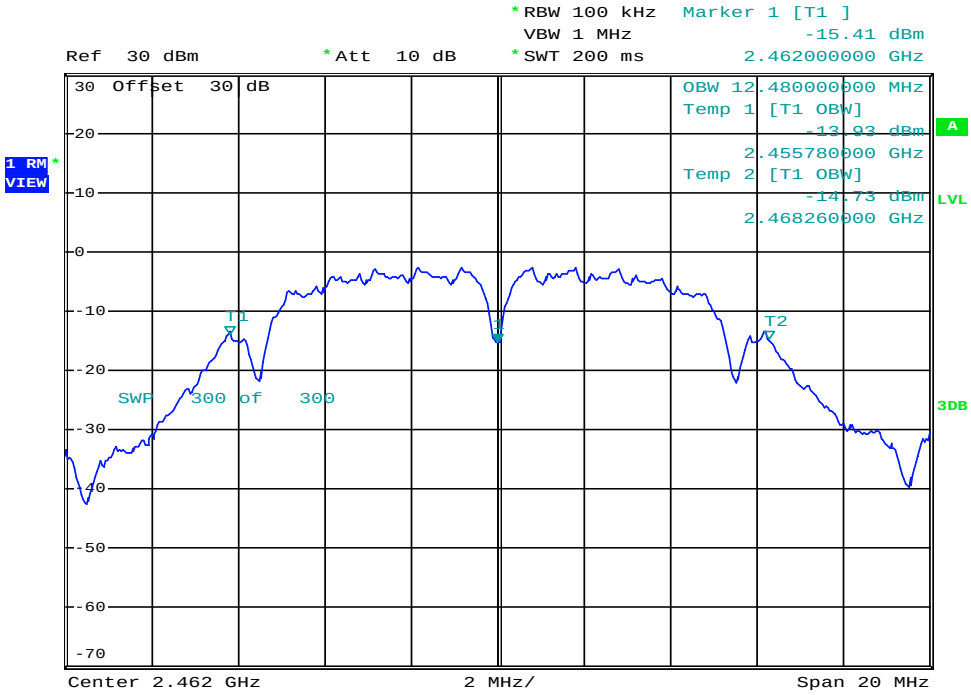


Date: 2.AUG.2018 15:28:28

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2442.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
802.11b	**Max** dBm	**12.50** MHz

Plot 9.3 – Occupied Bandwidth 2462MHz

Occupied Bandwidth



Date: 2.AUG.2018 15:30:23

Channel Frequency:	Channel Bandwidth Setting:	Transmit Duty Cycle:
2462.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured OBW:**
802.11b	**Max** dBm	**12.48** MHz

Table 9.1 – Summary of Occupied Bandwidth Measurements

Summary of Occupied Bandwidth Measurement				
Frequency (MHz)	Bandwidth Setting (MHz)	Modulation	Measured Occupied BW (MHz)	Original(1) Occupied [BW] (MHz)
2412.00	12.5	802.11b	12.48	12.03
2442.00			12.50	12.22
2462.00			12.48	12.03
			Result:	Complies

(1) As reported in the original module report

Margin = BW - MBW

10.0 POWER SPECTRAL DENSITY

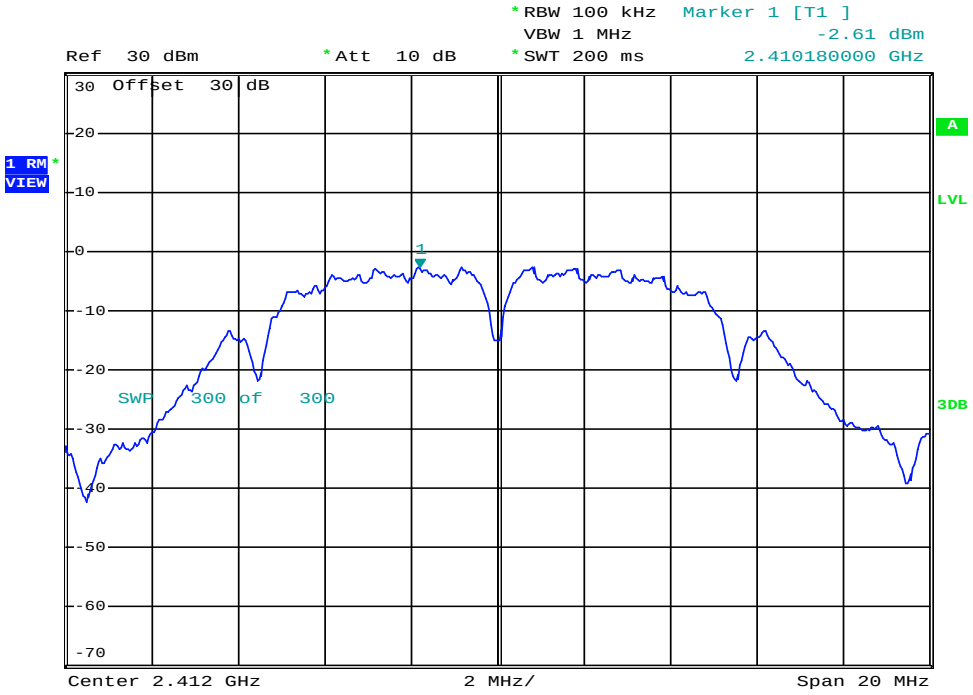
Test Procedure	
Normative Reference	FCC 47 CFR §15.247(e), RSS-247 (5.2)(b),
	KDB 558074 (10.3), ANSI C63.10 (11.10.3)

Limits	
47 CFR §15.247(e)	(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.
RSS-247 (5.2)(b)	b) The transmitter power spectral density conducted from the transmitter to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of section 5.4(d), (i.e. the power spectral density shall be determined using the same method as is used to determine the conducted output power).
KDB 558074 (10.7) C63.10 (11.10.7)	**Method AVGPSD-3** (trace averaging with EUT transmitting at full power throughout each sweep) This procedure is applicable when the EUT cannot be configured to transmit continuously (i.e., duty cycle < 98 %), and when sweep triggering/signal gating cannot be used to measure only when the EUT is transmitting at its maximum power control level and when the transmission duty cycle is not constant (i.e., duty cycle variations exceed ± 2 %): a) Set the instrument span to a minimum of 1.5 X OBW. b) Set sweep trigger to "free run". c) Set RBW to: 3 kHz ≤ RBW ≤ 100 kHz. . d) Set VBW ≥ 3 X RBW. e) Number of points in sweep ≥ 2 Span / RBW. f) Sweep time ≤ (number of points in sweep) X T g) Detector = RMS. h) Trace mode = max hold. i) Allow max hold to run for at least 60 s, or longer as needed to allow the trace to stabilize. j) Use the peak marker function to determine the maximum PSD level. k) If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat (note that this may require zooming in on the emission of interest and reducing the span in order to meet the minimum measurement point requirement as the RBW is reduced).
Test Setup	**Appendix A Figure A.1**

Measurement Procedure
The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above. Number of Sweep Points ≥ 2 X Span / RBW = 2 X (20MHz / 300kHz) = 133, the SA was configured for 1001 Points. The output power of the DUT was set to the manufacturer's highest output power setting at the Low, Mid and High frequency channels as permitted by the device. The Power Spectral Density was measured and recorded.

Plot 10.1 – Power Spectral Density 2412MHz

Power Spectral Density

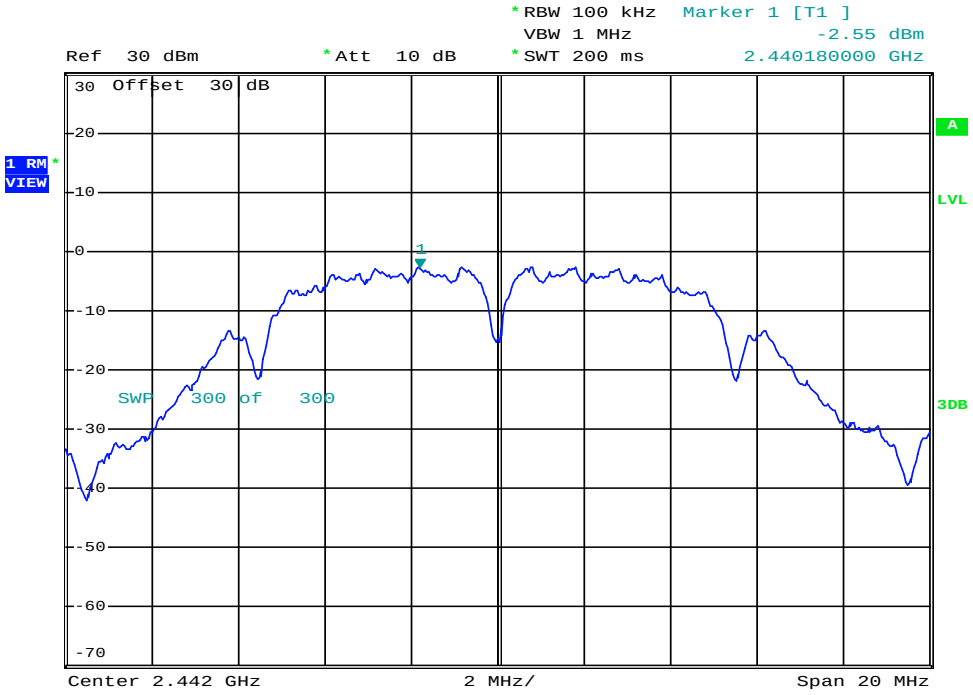


Date: 2.AUG.2018 16:10:10

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2412.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
802.11b	**Max** dBm	**-2.61** dBm

Plot 10.2 – Power Spectral Density 2442MHz

Power Spectral Density

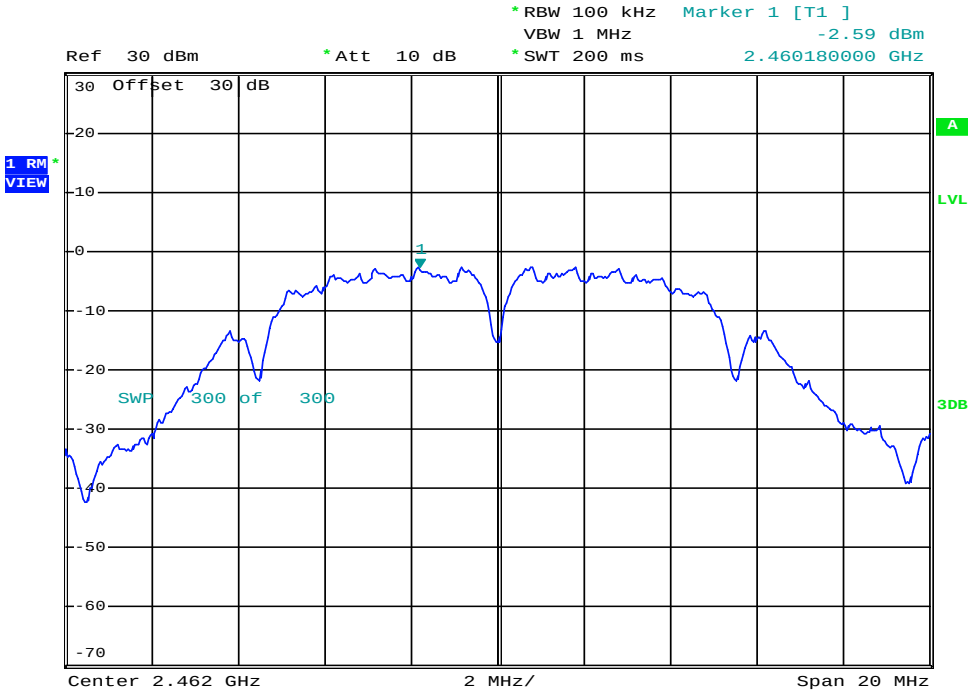


Date: 2.AUG.2018 16:12:33

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2442.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
802.11b	**Max** dBm	**-2.55** dBm

Plot 10.3 – Power Spectral Density 2462MHz

Power Spectral Density



Date: 2.AUG.2018 16:14:56

Channel Frequency:	Channel Bandwidth:	Transmit Duty Cycle:
2462.00 MHz	**12.50** MHz	**50** %
Modulation Setting:	**Channel Power Setting:**	**Measured PSD:**
802.11b	**Max** dBm	**-2.59** dBm

Table 10.1 – Summary of Power Spectral Density Measurements

Power Spectral Density Measurement Results								
Frequency (MHz)	BW (MHz)	Modulation	Power Setting (dBm)	Transmit Duty Cycle (%)	Measured PSD (dBm)	Original(1) PSD [PSD_{Meas}] (dBm)	Limit (dBm)	Margin (dB)
2412.0	12.5	802.11b	Max	50	-2.61	-5.51	8.0	**13.5**
2442.0					-2.55	-1.53		**9.5**
2462.0					-2.59	-5.92		**13.9**
						Results:		**Complies**

(1) As reported in the original module report

Margin = Limit - PSD_{meas}

11.0 CONDUCTED POWER - LTE

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §27.50(b)(10), §27.50(d)(4), KDB 971168 D01v02r02
	RSS-130 4.4, RS139 6.5

Limits	
47 CFR §27.50(b)(10)	**§ 27.50 Power limits and duty cycle.** (b) The following power and antenna height limits apply to transmitters operating in the 746–763 MHz, 775–793 MHz and 805–806 MHz bands: (10)Portable stations (hand-held devices) transmitting in the 746-757 MHz, 776-788 MHz, and 805-806 MHz bands are limited to 3 watts ERP
47 CFR §27.50(d)(4)	**§ 27.50 Power limits and duty cycle.** (d) The following power and antenna height requirements apply to stations transmitting in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz and 2180-2200 MHz bands: (4) Fixed, mobile, and portable (hand-held) stations operating in the 1710-1755 MHz band and mobile and portable stations operating in the 1695-1710 MHz and 1755-1780 MHz bands are limited to 1 watt EIRP
RSS-130 4.4	**4.4 Transmitter Output Power and Equivalent Isotropic Radiated Power (e.i.r.p.)** The e.i.r.p. shall not exceed 50 watts for mobile equipment or for outdoor fixed subscriber equipment, nor shall it exceed 5 watts for portable equipment or for indoor fixed subscriber equipment.
RSS-139 6.5	**6.5 Transmitter Output Power** The equivalent isotropically radiated power (e.i.r.p.) for mobile and portable transmitters shall not exceed one watt. The e.i.r.p. for fixed and base stations in the band 1710-1780 MHz shall not exceed one watt.
KDB 971168 5.2.1	**5.2 Average power measurements** The EUT is considered to transmit continuously if it can be configured to transmit at a burst duty cycle of greater than or equal to 98% throughout the duration of the measurement. If this condition can be achieved, then the following procedure can be used to measure the average output power of the EUT. a) Set the instrument span to a minimum of 1.5 X OBW. b) Set RBW = 1-5% of the OBW, not to exceed 1 MHz. c) Set VBW ≥ 3 X RBW. d) Set number of points in sweep ≥ 2 X span / RBW. e) Sweep time = auto-couple. f) Sweep time ≤ (number of points in sweep) X T g) Detector = RMS (power averaging). h) Trace mode = max hold. i) Compute the power by integrating the spectrum across the OBW of the signal using the instrument's band power measurement function, with the band limits set equal to the OBW band edges.

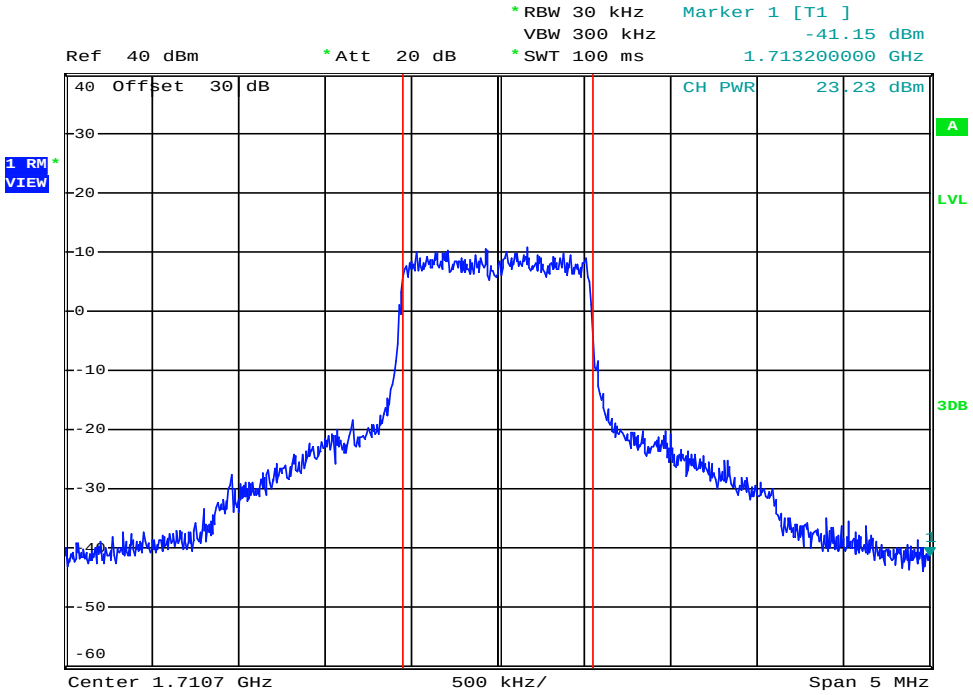
Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, §27.50(b)(10), §27.50(d)(4), KDB 971168 D01v02r02
	RSS-130 4.4, RS139 6.5
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA Detector was set to Max Peak with the RBW set to ≥ the OBW of the DUT. The output power of the DUT was set to the manufacturer's highest rated setting for each modulation type and to the center frequency of each transmission band.

Plot 11.1 – Conducted Power B4- Channel 19957 - QPSK

Conducted Power (RMS)

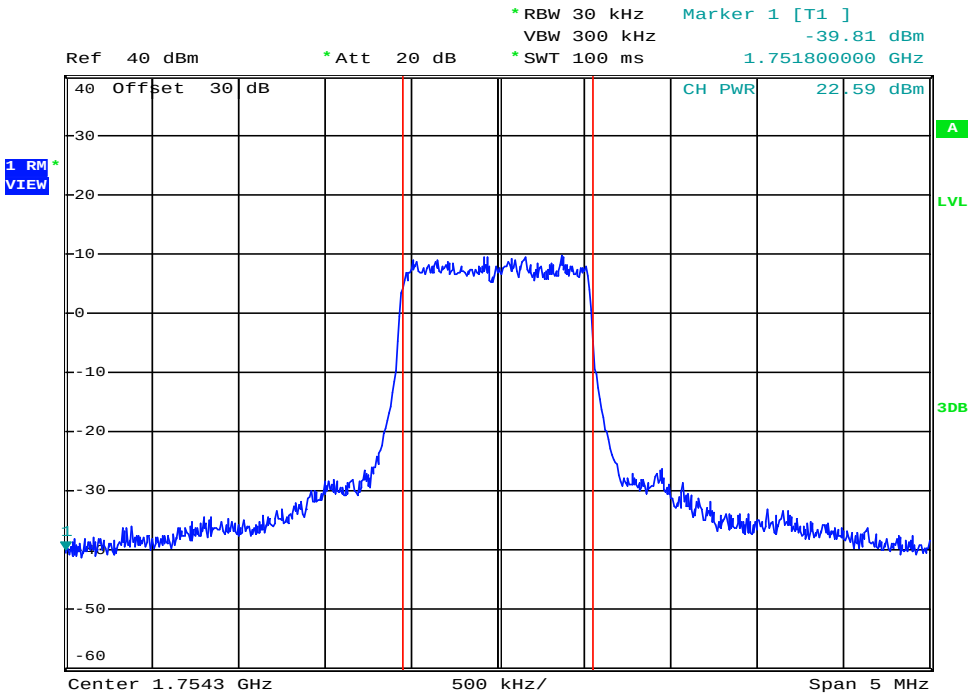


Date: 9.AUG.2018 11:08:56

Channel Setting:	Channel Frequency:	Modulation Setting:
19957	**1710.7** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**2**	**1.4** MHz
	LTE Band:	Measured Channel Power:
	B4	**23.23** dBm

Plot 11.2 – Conducted Power B4- Channel 20393 – 16QAM

Conducted Power (RMS)

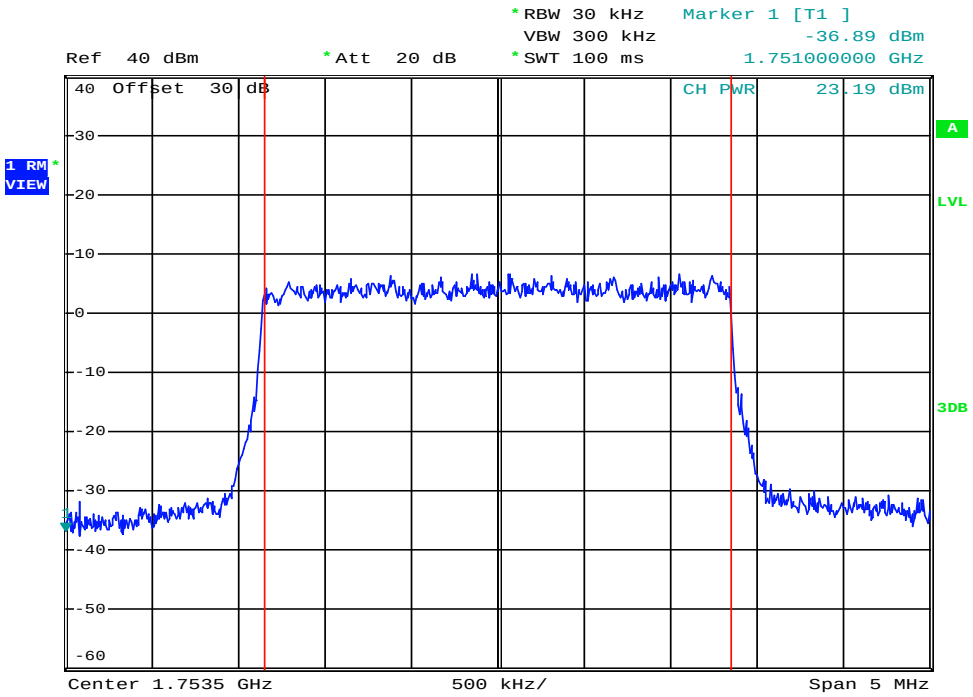


Date: 9.AUG.2018 11:11:02

Channel Setting: **20393**	Channel Frequency: **1754.3** MHz	Modulation Setting: **16 QAM**
Number of RBs: **1**	Start RB: **2**	Bandwidth Setting: **1.4** MHz
	LTE Band: **B4**	Measured Channel Power: **22.59** dBm

Plot 11.3 – Conducted Power B4- Channel 20385 - QPSK

Conducted Power (RMS)

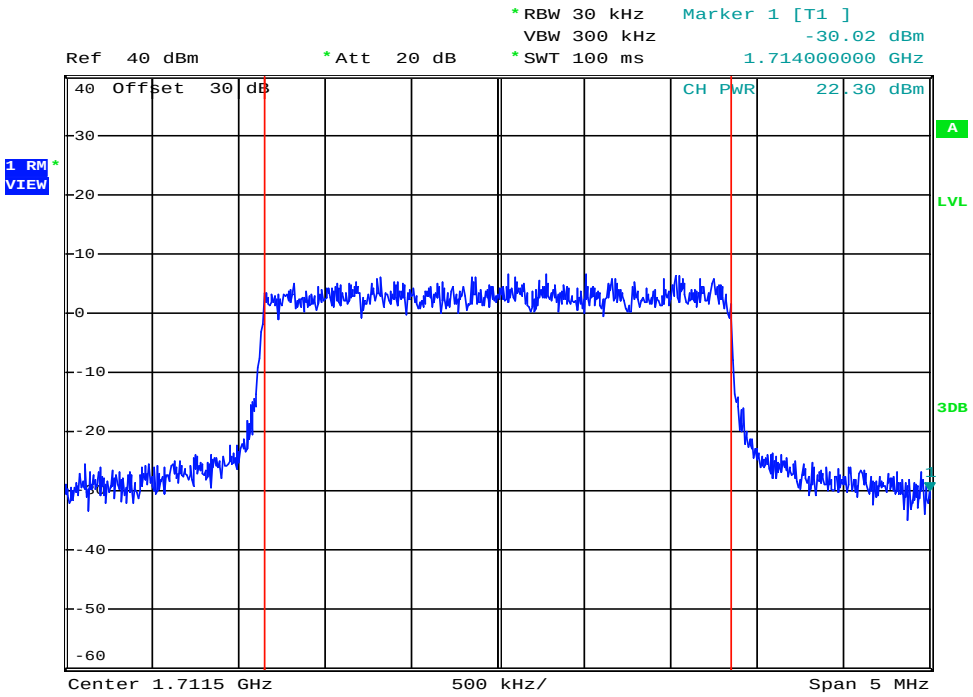


Date: 9.AUG.2018 11:31:20

Channel Setting:	Channel Frequency:	Modulation Setting:
20385	**1753.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**15**	**3.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**23.19** dBm

Plot 11.4 – Conducted Power B4- Channel 19965 – 16QAM

Conducted Power (RMS)

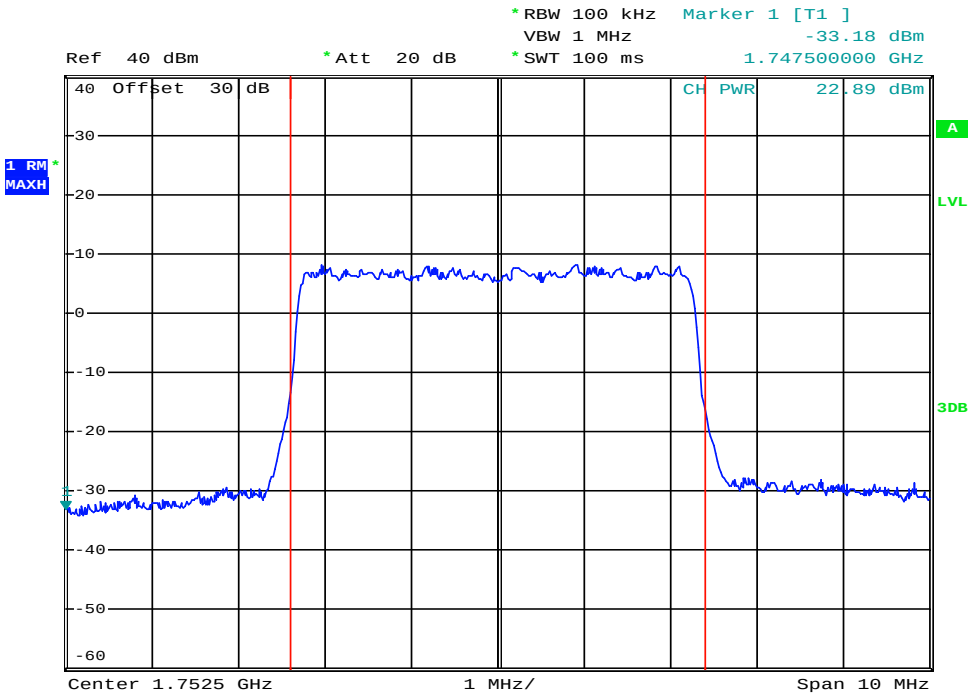


Date: 9.AUG.2018 11:53:15

Channel Setting:	Channel Frequency:	Modulation Setting:
19965	**1711.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**15**	**3.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**22.30** dBm

Plot 11.5 – Conducted Power B4- Channel 20375 - QPSK

Conducted Power (RMS)

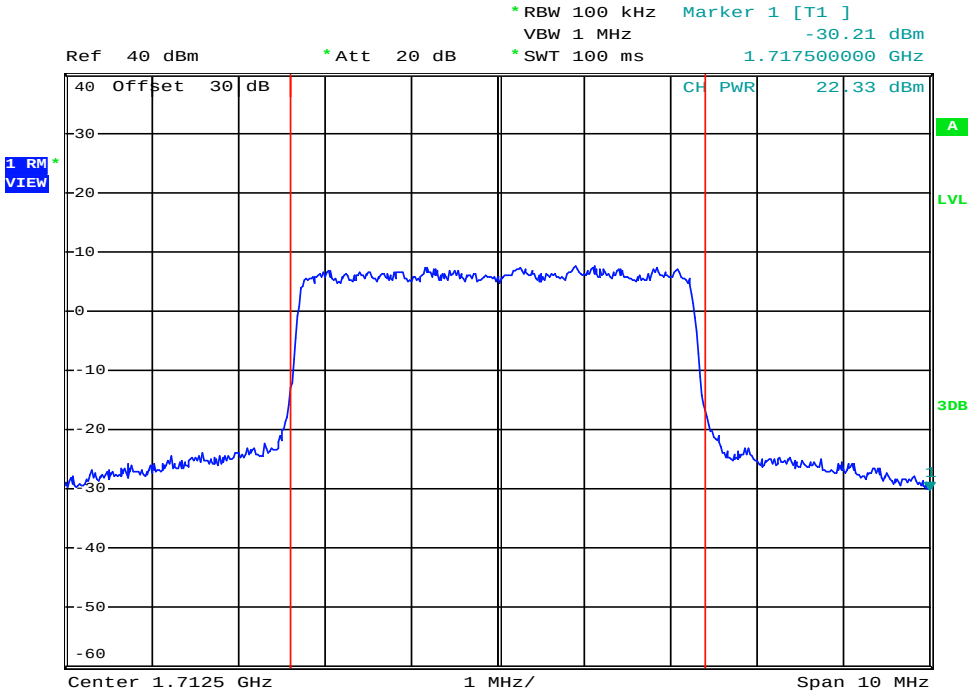


Date: 9.AUG.2018 12:10:21

Channel Setting:	Channel Frequency:	Modulation Setting:
20375	**1725.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**24**	**5.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**22.89** dBm

Plot 11.6 – Conducted Power B4- Channel 19975 – 16QAM

Conducted Power (RMS)

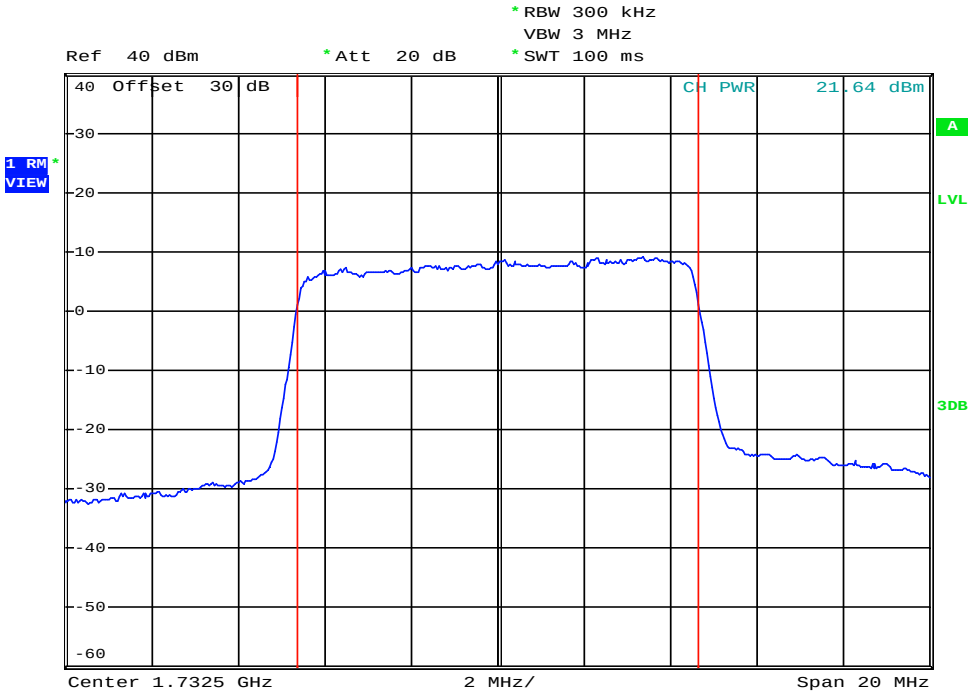


Date: 9.AUG.2018 12:14:47

Channel Setting:	Channel Frequency:	Modulation Setting:
19975	**1712.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**22.33** dBm

Plot 11.7 – Conducted Power B4- Channel 20175 - QPSK

Conducted Power (RMS)

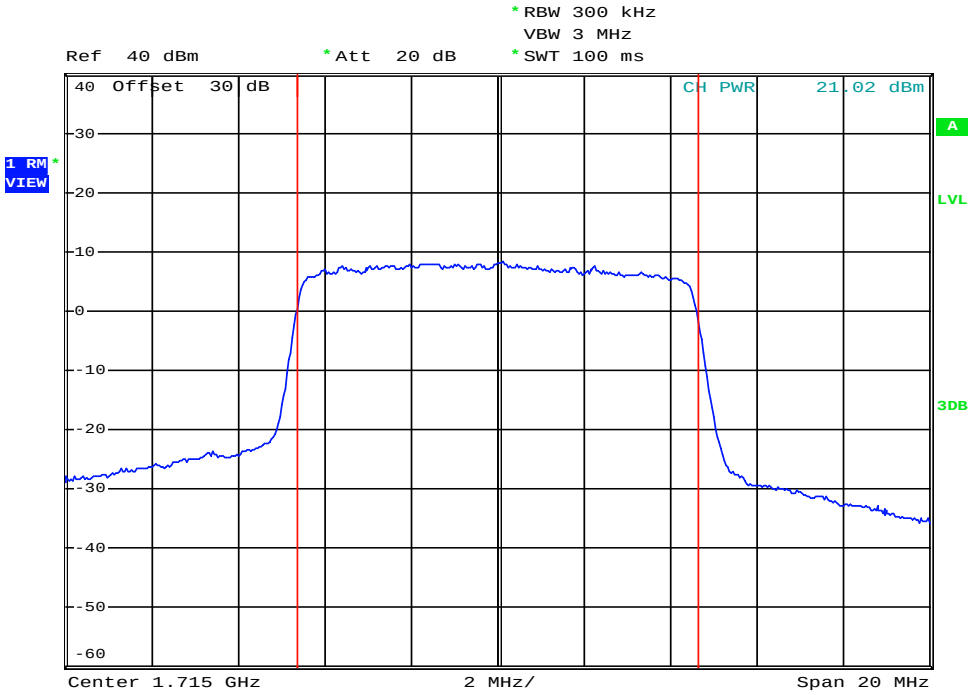


Date: 9.AUG.2018 12:43:40

Channel Setting:	Channel Frequency:	Modulation Setting:
20175	**1732.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**21.64** dBm

Plot 11.8 – Conducted Power B4- Channel 20000 – 16QAM

Conducted Power (RMS)

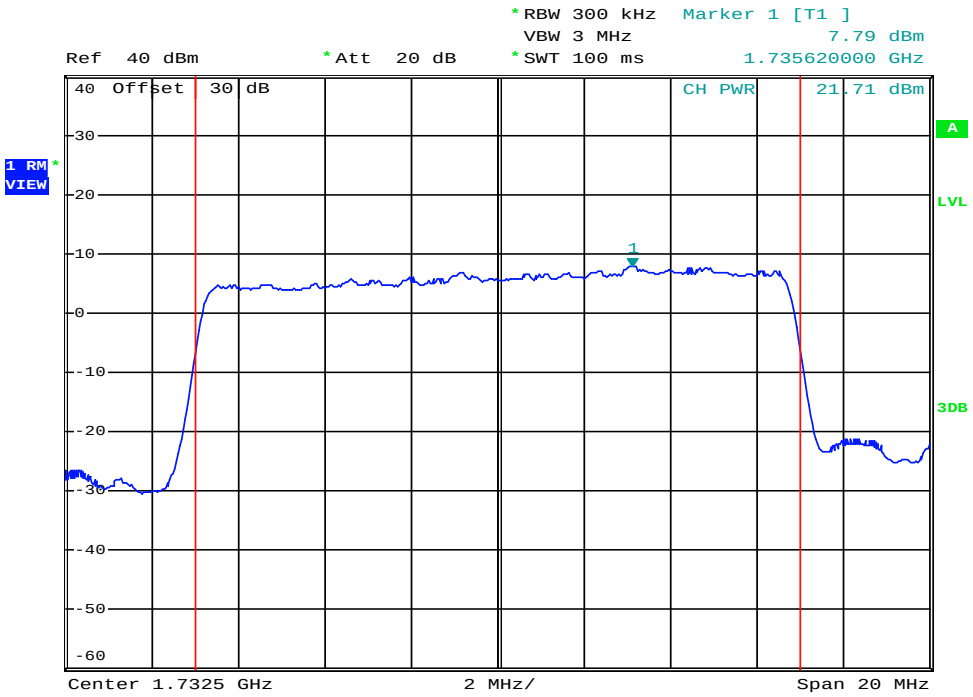


Date: 9.AUG.2018 12:45:44

Channel Setting:	Channel Frequency:	Modulation Setting:
20000	**1715.0** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**49**	**10.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**21.02** dBm

Plot 11.9 – Conducted Power B4- Channel 20325 - QPSK

Conducted Power (RMS)

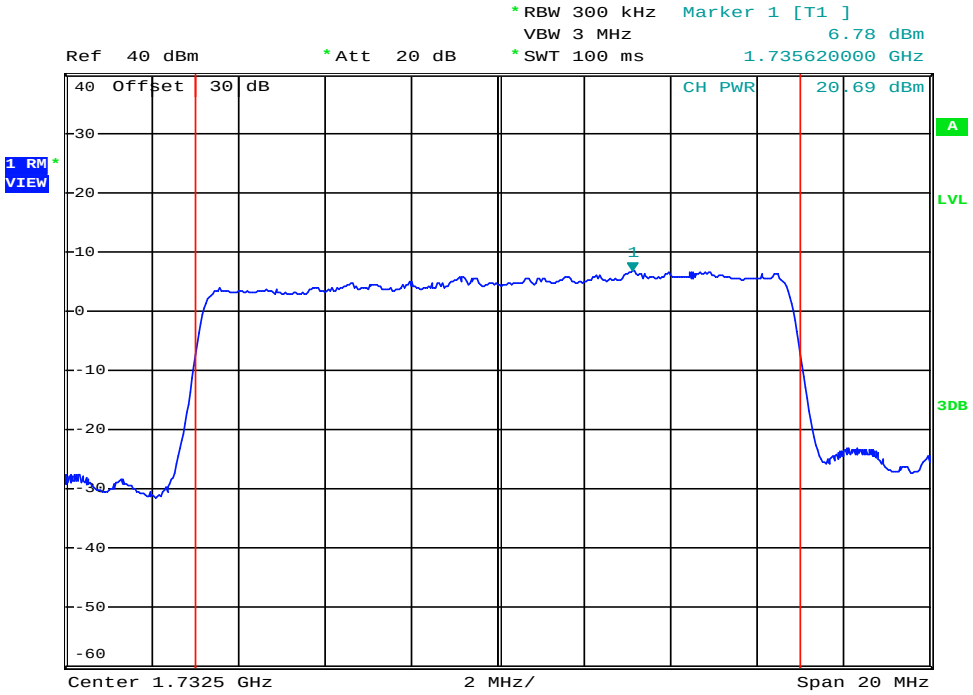


Date: 9.AUG.2018 12:53:39

Channel Setting:	Channel Frequency:	Modulation Setting:
20325	**1747.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**74**	**15.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**21.71** dBm

Plot 11.10 – Conducted Power B4- Channel 20325 – 16QAM

Conducted Power (RMS)

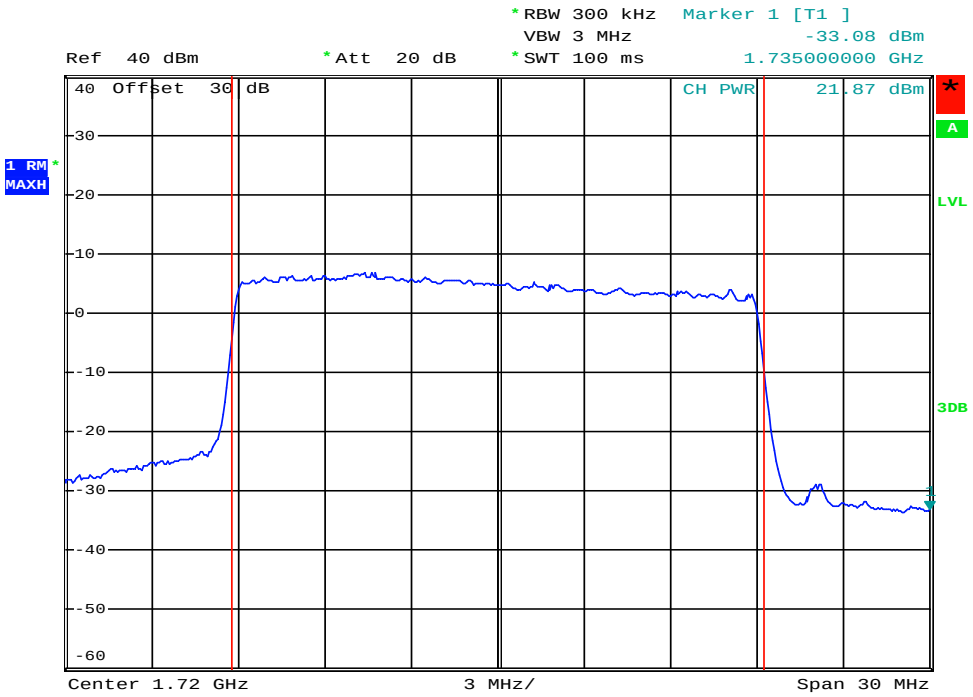


Date: 9.AUG.2018 12:58:28

Channel Setting:	Channel Frequency:	Modulation Setting:
20325	**1747.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**0**	**15.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**20.69** dBm

Plot 11.11 – Conducted Power B4- Channel 20050 - QPSK

Conducted Power (RMS)

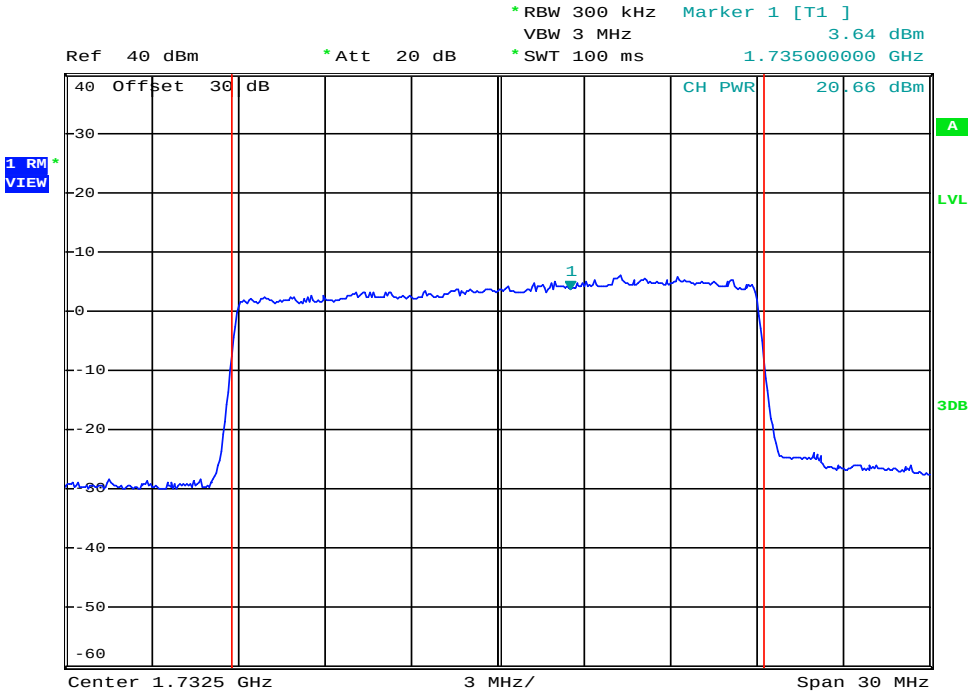


Date: 9.AUG.2018 13:10:15

Channel Setting:	Channel Frequency:	Modulation Setting:
20050	**1720.0** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**0**	**20.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**21.87** dBm

Plot 11.12 – Conducted Power B4- Channel 20175 – 16QAM

Conducted Power (RMS)

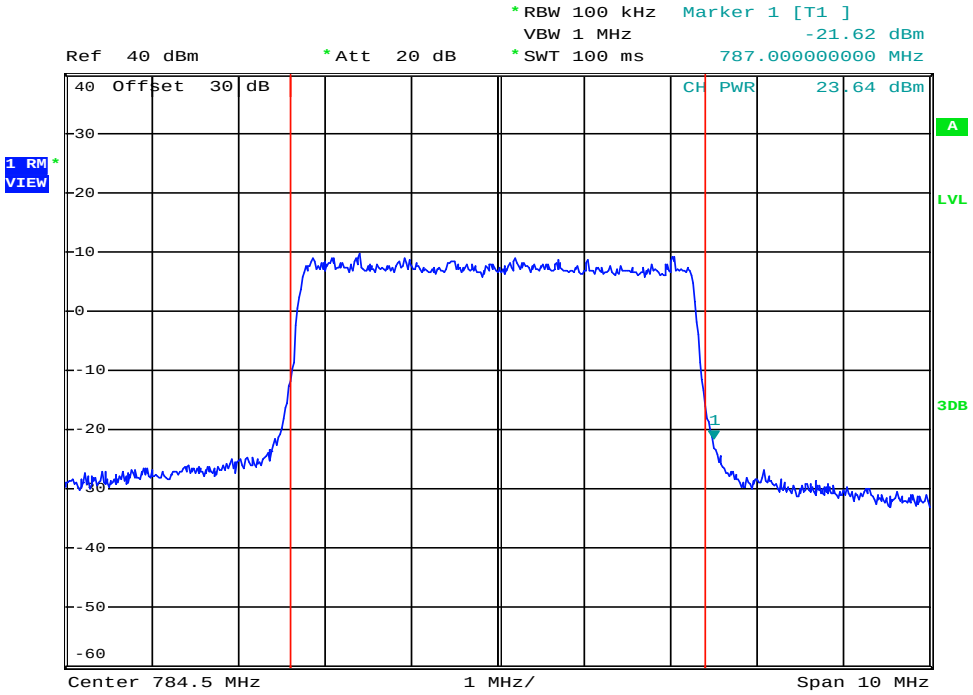


Date: 9.AUG.2018 13:14:04

Channel Setting:	Channel Frequency:	Modulation Setting:
20175	**1732.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**50**	**20.0** MHz
	LTE Band:	Measured Channel Power:
	B4	**20.66** dBm

Plot 11.13 – Conducted Power B13- Channel 23255 – QPSK

Conducted Power (RMS)

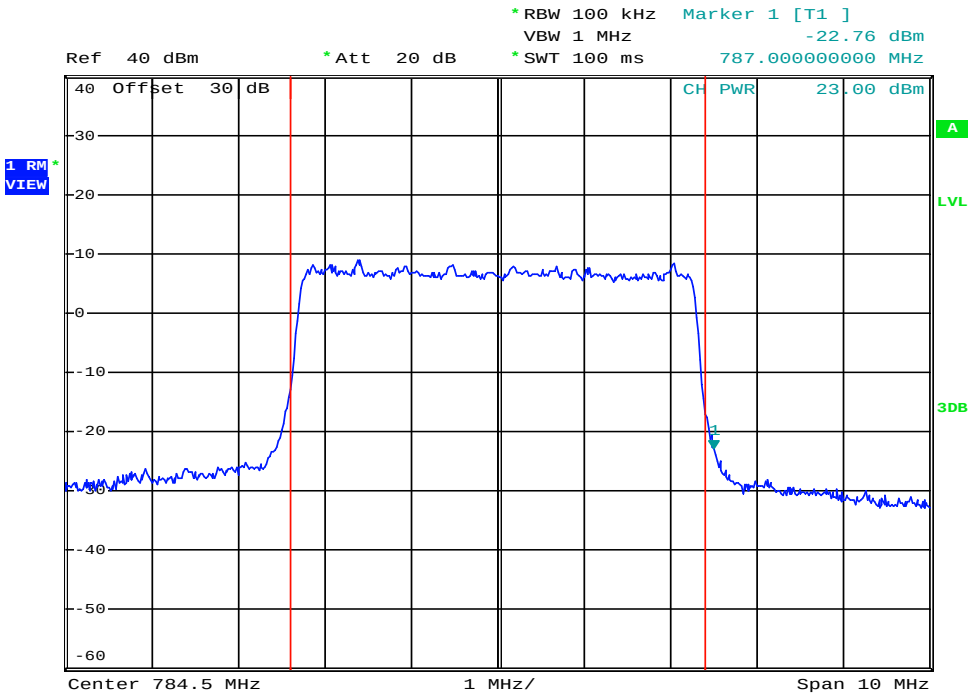


Date: 9.AUG.2018 13:27:37

Channel Setting:	Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Channel Power:
	B13	**23.64** dBm

Plot 11.14 – Conducted Power B13- Channel 23255 – 16QAM

Conducted Power (RMS)

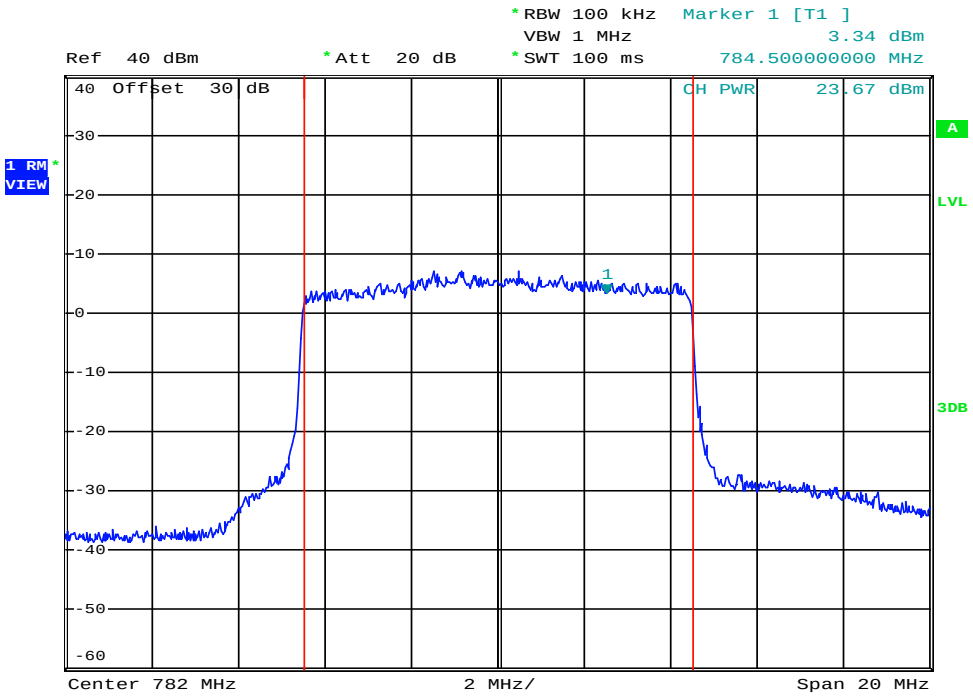


Date: 9.AUG.2018 13:30:10

Channel Setting:	Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Channel Power:
	B13	**23.00** dBm

Plot 11.15 – Conducted Power B13- Channel 23230 – QPSK

Conducted Power (RMS)

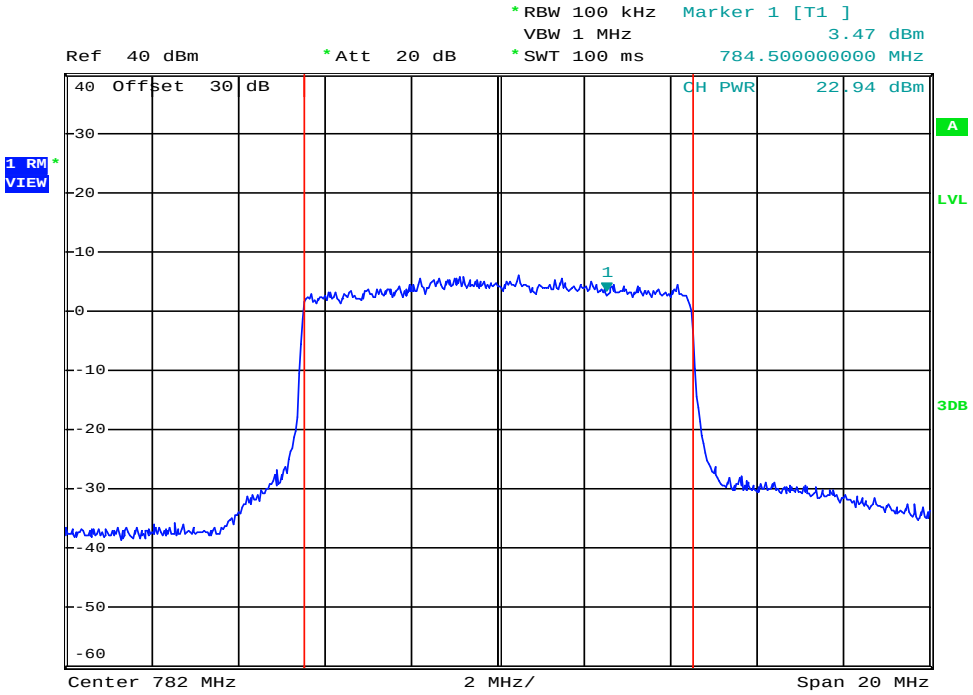


Date: 9.AUG.2018 13:36:32

Channel Setting:	Channel Frequency:	Modulation Setting:
23230	**782.0** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Channel Power:
	B13	**23.67** dBm

Plot 11.16 – Conducted Power B13- Channel 23230 – 16QAM

Conducted Power (RMS)



Date: 9.AUG.2018 13:38:30

Channel Setting:	Channel Frequency:	Modulation Setting:
23230	**782.0** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Channel Power:
	B13	**22.94** dBm

Table 11.1 – Summary of Conducted Power Measurements - LTE

§27.50(b), RSS-130 4.4, RSS-139 6.5 Channel Output Power (RMS)																		
Channel Number	Frequency (MHz)	LTE Band	BW (MHz)	Modulation	Power Setting (dBm)	Number of Resource Blocks	Resource Block Start	Measured Power (dBm)	Measured Power (W)	Original[(1)] Power [E_{Meas}] (dBm)	Original[(1)] Power (W)	Antenna Gain* [G_T] (dBi)	ERP (W)	EIRP (W)	Limit (W) FCC ERP	Limit (W) ISED EIRP	Margin (dB) FCC	Margin (dB) ISED
19957	1710.7	B4	1.4	QPSK	Max	1	2	23.23	0.210	23.28	0.213	-2.2		0.130	1.0		**8.9**	**8.9**
20393	17534.3			16 QAM		1	2	22.59	0.182	22.63	0.183			0.112			**9.5**	**9.5**
20385	1753.5		3	QPSK		1	15	23.19	0.208	23.11	0.205			0.125			**9.0**	**9.0**
19965	1711.5			16 QAM		1	15	22.30	0.170	22.44	0.175			0.107			**9.7**	**9.7**
20375	1752.5		5	QPSK		1	24	22.89	0.195	23.20	0.209			0.127			**9.0**	**9.0**
19975	1712.5			16 QAM		1	13	22.33	0.171	22.56	0.180			0.110			**9.6**	**9.6**
20175	1732.5		10	QPSK		1	25	21.64	0.146	23.32	0.215			0.131			**8.8**	**8.8**
20000	1715.0			16 QAM		1	49	21.02	0.126	22.54	0.179			0.109			**9.6**	**9.6**
20325	1747.5		15	QPSK		1	74	23.28	0.213	23.28	0.213			0.130			**8.9**	**8.9**
20325	1747.5			16 QAM		1	0	20.69	0.117	22.58	0.181			0.110			**9.6**	**9.6**
20050	1720.0		20	QPSK		1	0	21.87	0.154	23.34	0.216			0.132			**8.8**	**8.8**
20175	1732.5			16 QAM		1	50	20.66	0.116	23.11	0.205			0.125			**9.0**	**9.0**
23255	784.5	B13	5	QPSK		1	13	23.64	0.231	23.83	0.242	0.6	0.169	0.277	3.0	5.0	**12.5**	**12.6**
23255	784.5			16 QAM		1	13	23.00	0.200	23.03	0.201		0.141	0.231			**13.3**	**13.4**
23230	782.0		10	QPSK		1	25	23.67	0.233	23.71	0.235		0.164	0.270			**12.6**	**12.7**
23230	782.0			16 QAM		1	25	22.94	0.197	23.03	0.201		0.141	0.231			**13.3**	**13.4**
														Results:	**Complies**			

(1) As reported in the original module report

Margin = 10*Log(Limit / E_{meas})

* Maximum Gain in Each Band

EIRP = E_{Meas} + G_T(dBi) Converted to Watts, F > 1GHz

ERP = E_{Meas} + G_T(dBi) - 2.15dB Converted to Watts, F < 1GHz

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12.0 OCCUPIED BANDWIDTH - LTE

Test Procedure	
Normative Reference	FCC 47 CFR §2.1046, RSS-Gen (6.1.2)
	KDB 558074 (9.2.1), ANSI C63.10 (6.9.3)

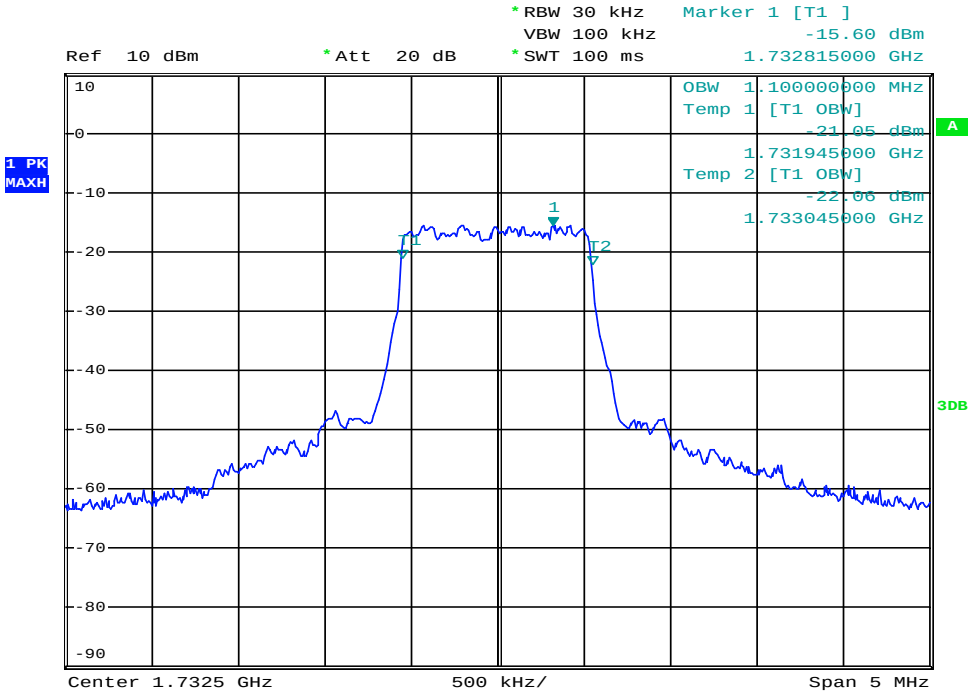
Limits	
KDB 558074 (9.2.1)	9.2.1 General Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth.
C63.10 (6.9.3)	6.9.3 Occupied bandwidth—power bandwidth (99%) measurement procedure The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission. The following procedure shall be used for measuring 99% power bandwidth: a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW. b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be approximately three times the RBW, unless otherwise specified by the applicable requirement. c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than [10 log (OBW/RBW)] below the reference level. Specific guidance is given in 4.1.5.2. d) Step a) through step c) might require iteration to adjust within the specified range. e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max hold mode (until the trace stabilizes) shall be used. f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
Test Setup	Appendix A Figure A.1

Measurement Procedure

The DUT was connected to a Spectrum Analyzer (SA) via a 30dB attenuator connected to the DUT's antenna port. The SA was configured as described above using the 99% Occupied Bandwidth function. The output power of the DUT was set to the manufacturer's highest output power setting. The 99% Occupied Bandwidth was measured and recorded on each channel, channel bandwidth and modulation used for measuring the Conducted Output Power (See Section 11.0).

Plot 12.1 – Occupied Bandwidth – LTE B4 – Channel 19957 – QPSK – 1.4MHz BW

Occupied Bandwidth

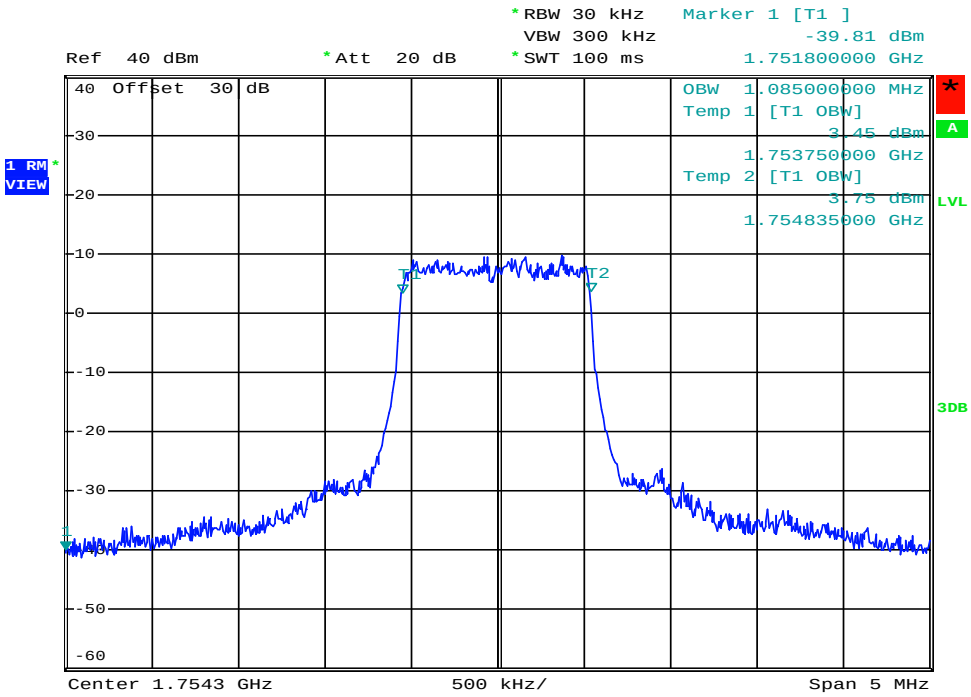


Date: 8.AUG.2018 16:51:49

Channel Setting:	Channel Frequency:	Modulation Setting:
19957	**1710.7** MHz	**QPSK**
Number of RBs:	**Start RB:**	**Bandwidth Setting:**
1	**2**	**1.4** MHz
	LTE Band:	**Measured Occupied Bandwidth:**
	B4	**1.10** MHz

Plot 12.2 – Occupied Bandwidth – LTE B4 – Channel 20393 -16QAM – 1.4MHz BW

Occupied Bandwidth

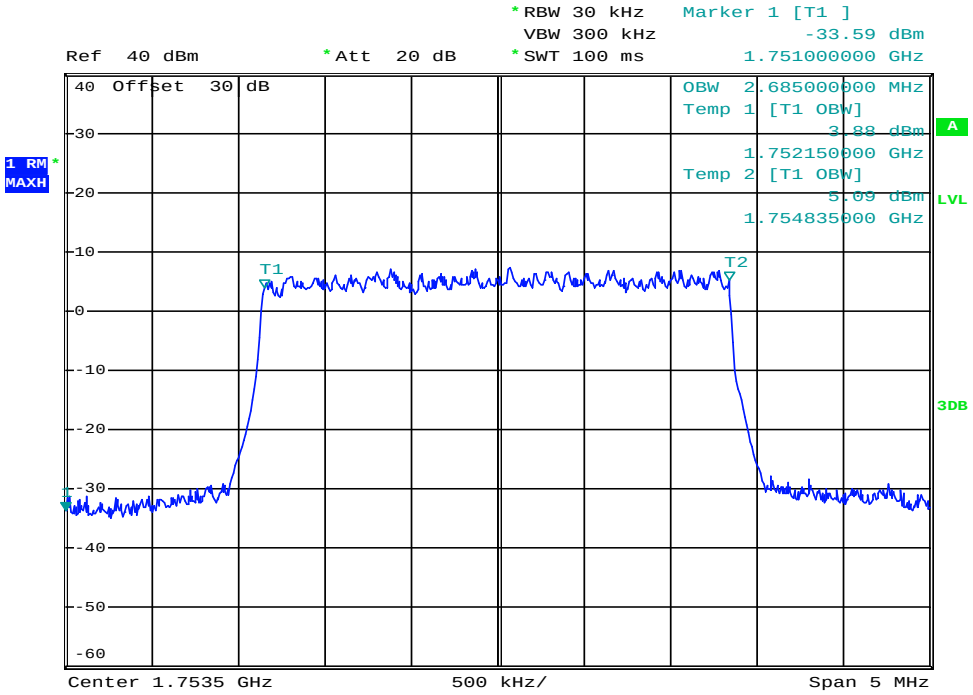


Date: 9.AUG.2018 11:15:13

Channel Setting:	Channel Frequency:	Modulation Setting:
20393	**1754.3** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**2**	**1.4** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**1.09** MHz

Plot 12.3 – Occupied Bandwidth – LTE B4 – Channel 20385 – QPSK – 3MHz BW

Occupied Bandwidth

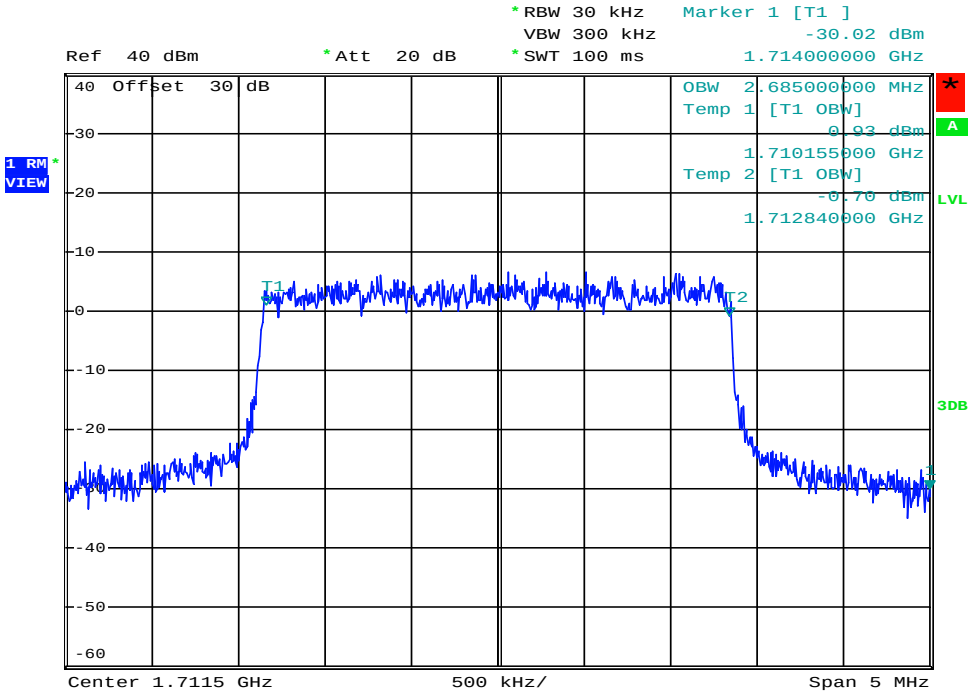


Date: 9.AUG.2018 11:30:09

Channel Setting:	Channel Frequency:	Modulation Setting:
20385	**1753.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**15**	**3.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**2.69** MHz

Plot 12.4 – Occupied Bandwidth – LTE B4 – Channel 19965 – 16QAM – 3MHz BW

Occupied Bandwidth

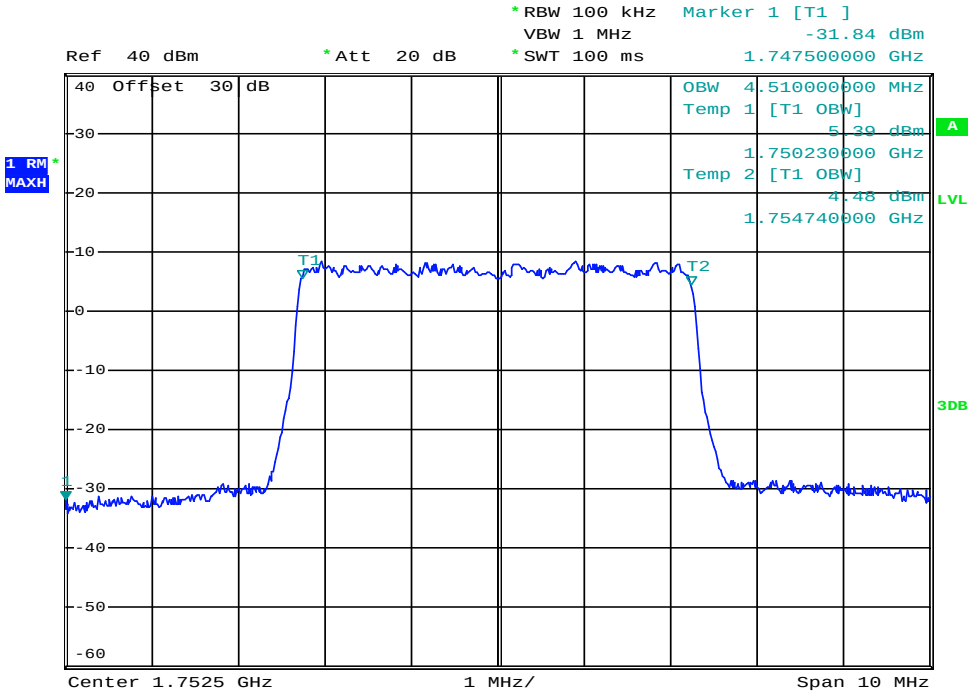


Date: 9.AUG.2018 11:53:44

Channel Setting:	Channel Frequency:	Modulation Setting:
19965	**1711.5** MHz	**16 QAM**
Number of RBs:	**Start RB:**	**Bandwidth Setting:**
1	**15**	**3.0** MHz
	LTE Band:	**Measured Occupied Bandwidth:**
	B4	**2.69** MHz

Plot 12.5 – Occupied Bandwidth – LTE B4 – Channel 20375 – QPSK – 5MHz BW

Occupied Bandwidth

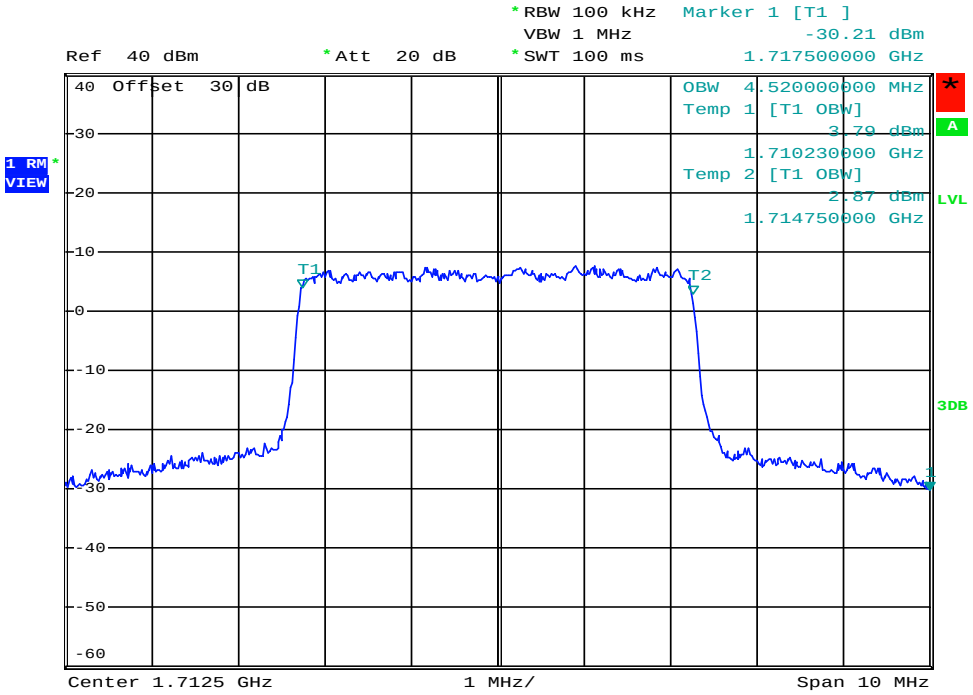


Date: 9.AUG.2018 12:08:28

Channel Setting:	Channel Frequency:	Modulation Setting:
20375	**1725.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**24**	**5.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**4.51** MHz

Plot 12.6 – Occupied Bandwidth – LTE B4 – Channel 19975 – 16QAM – 5MHz BW

Occupied Bandwidth

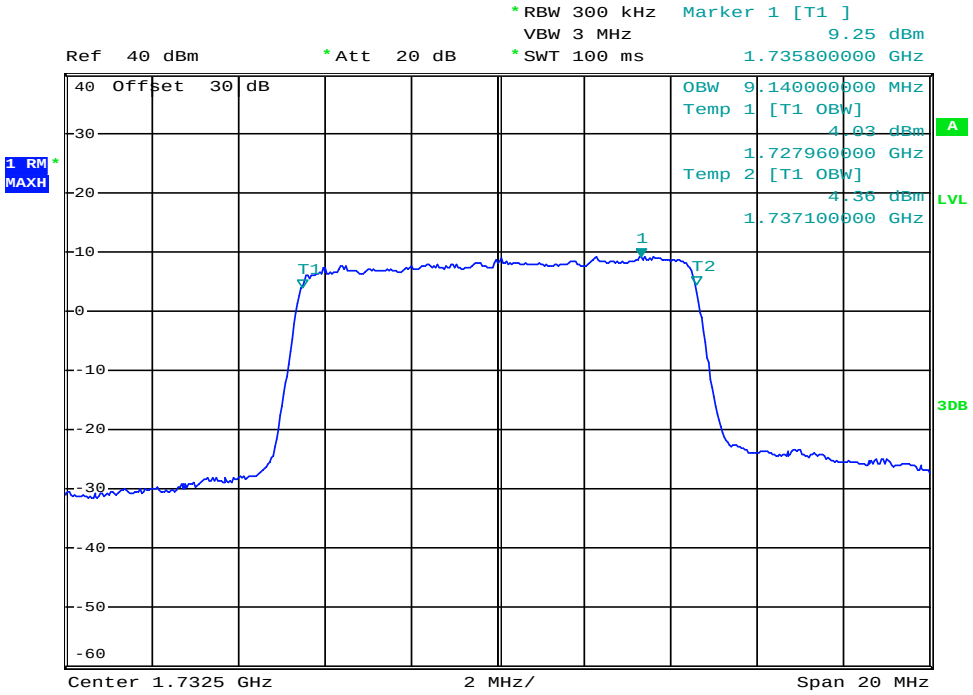


Date: 9.AUG.2018 12:15:09

Channel Setting:	Channel Frequency:	Modulation Setting:
19975	**1712.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**4.52** MHz

Plot 12.7 – Occupied Bandwidth – LTE B4 – Channel 20175 – QPSK – 10MHz BW

Occupied Bandwidth

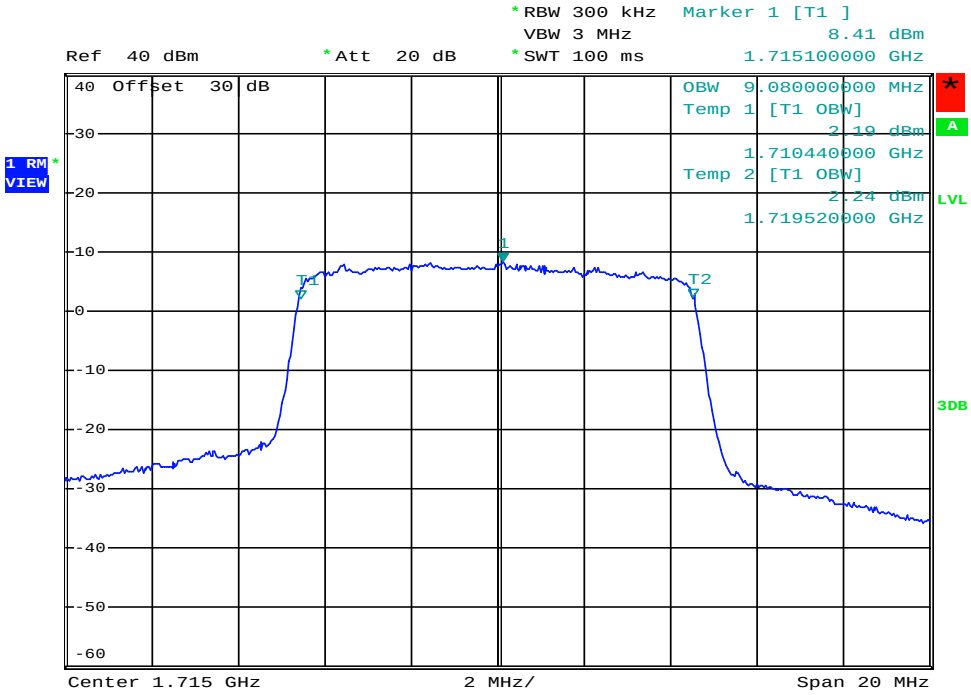


Date: 9.AUG.2018 12:41:21

Channel Setting:	Channel Frequency:	Modulation Setting:
20175	**1732.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**9.14** MHz

Plot 12.8 – Occupied Bandwidth – LTE B4 – Channel 20000 – 16QAM – 10MHz BW

Occupied Bandwidth

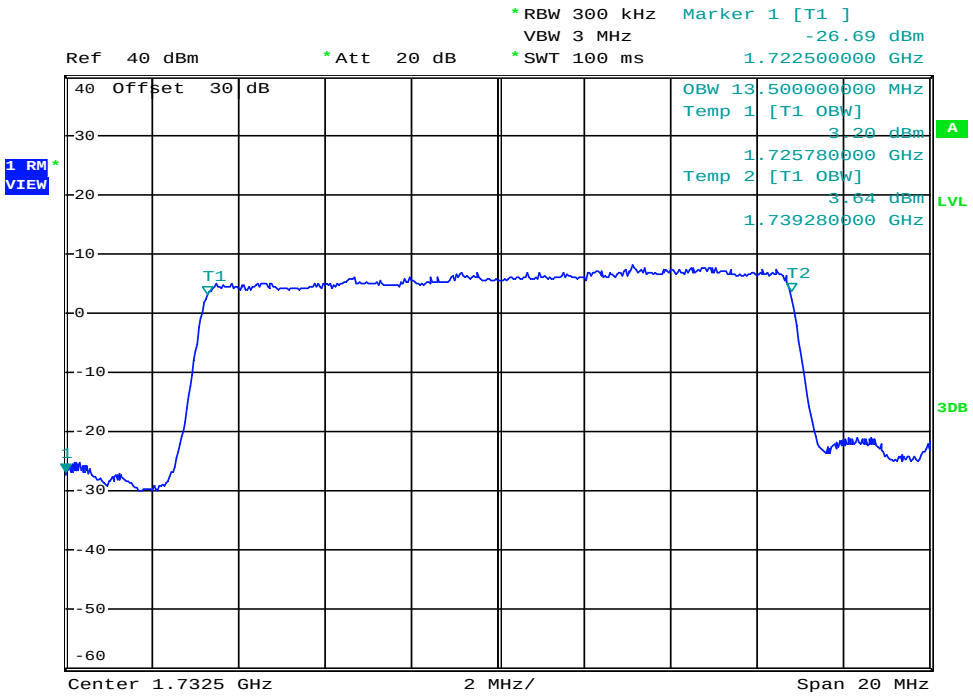


Date: 9.AUG.2018 12:46:22

Channel Setting:	Channel Frequency:	Modulation Setting:
20000	**1715.0** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**49**	**10.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**9.08** MHz

Plot 12.9 – Occupied Bandwidth – LTE B4 – Channel 20325 – QPSK – 15MHz BW

Occupied Bandwidth

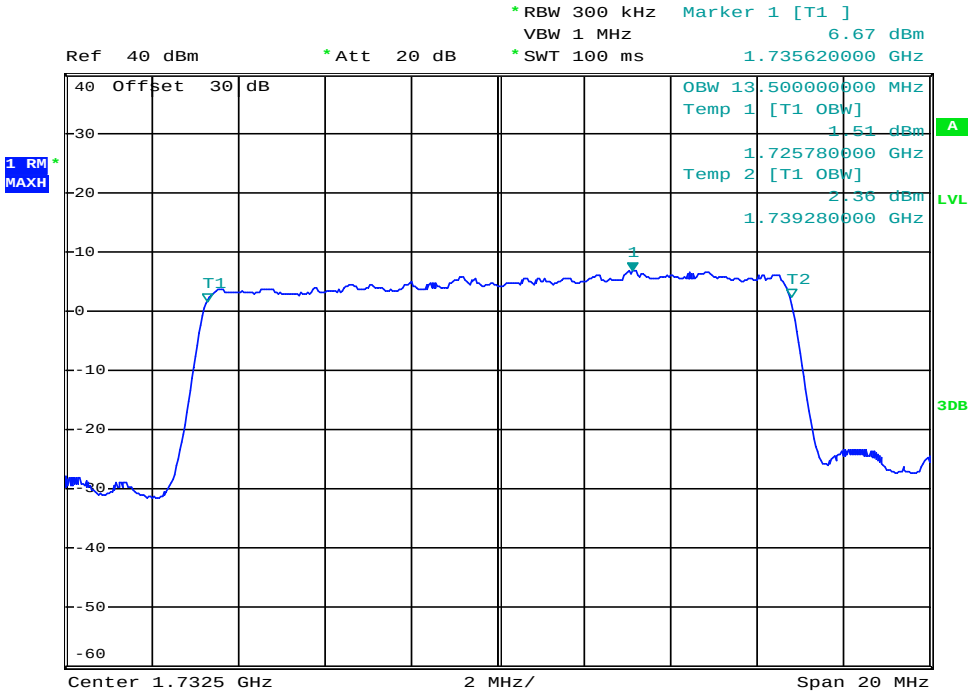


Date: 9.AUG.2018 12:52:23

Channel Setting:	Channel Frequency:	Modulation Setting:
20325	**1747.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**74**	**15.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**13.50** MHz

Plot 12.10 – Occupied Bandwidth – LTE B4 – Channel 20325 – 16QAM – 15MHz BW

Occupied Bandwidth

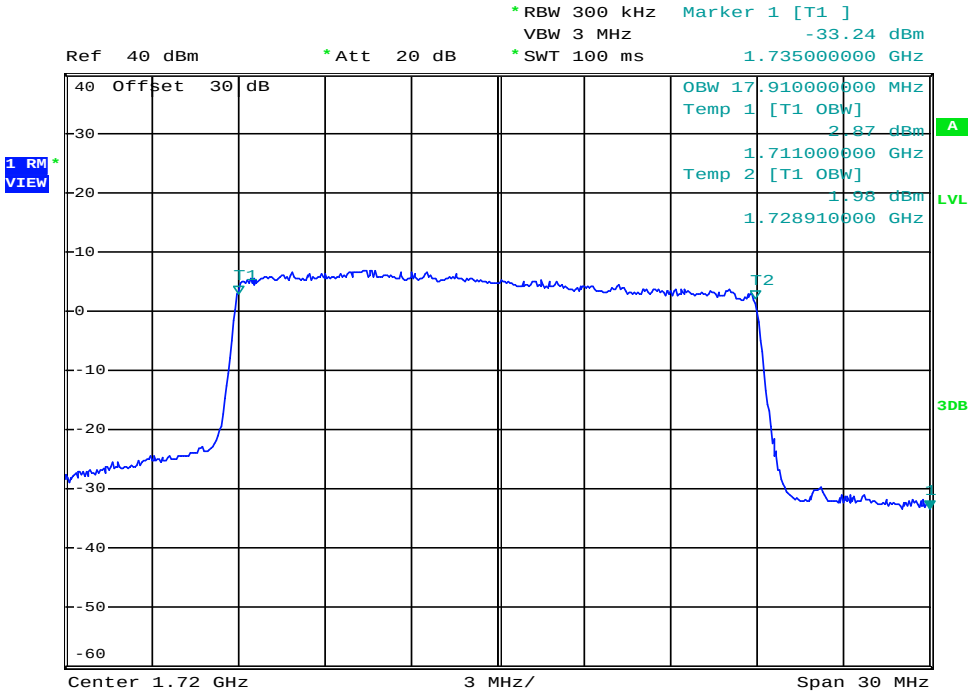


Date: 9.AUG.2018 13:00:23

Channel Setting:	Channel Frequency:	Modulation Setting:
20325	**1747.5** MHz	**16 QAM**
Number of RBs:	**Start RB:**	**Bandwidth Setting:**
1	**0**	**15.0** MHz
	LTE Band:	**Measured Occupied Bandwidth:**
	B4	**13.50** MHz

Plot 12.11 – Occupied Bandwidth – LTE B4 – Channel 20050 – QPSK – 20MHz BW

Occupied Bandwidth

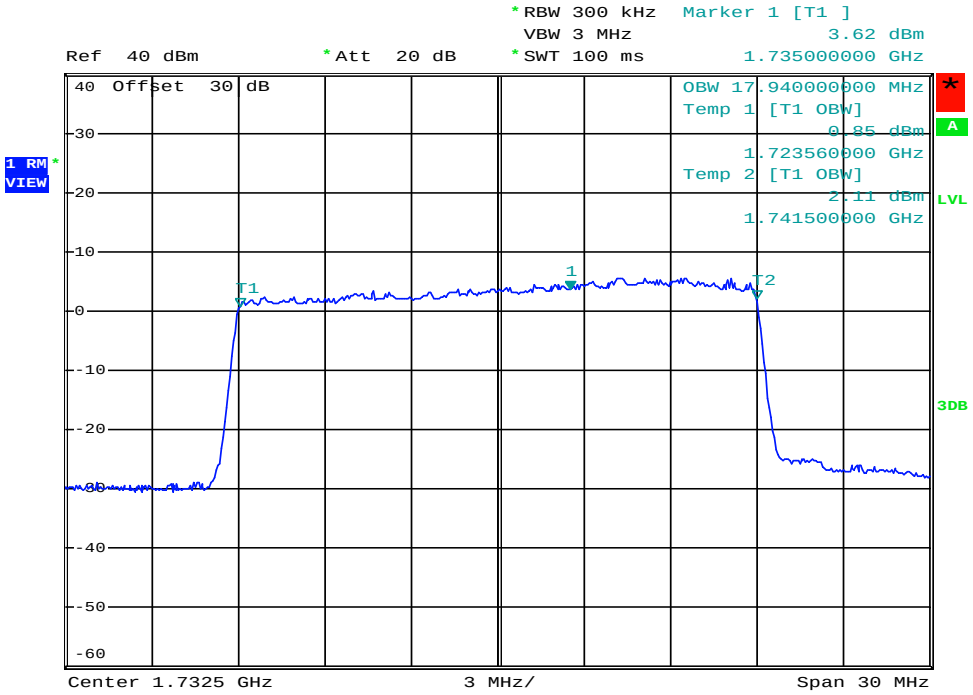


Date: 9.AUG.2018 13:08:43

Channel Setting:	Channel Frequency:	Modulation Setting:
20050	**1720.0** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**0**	**20.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**17.91** MHz

Plot 12.12 – Occupied Bandwidth – LTE B4 – Channel 20175 – 16QAM – 20MHz BW

Occupied Bandwidth

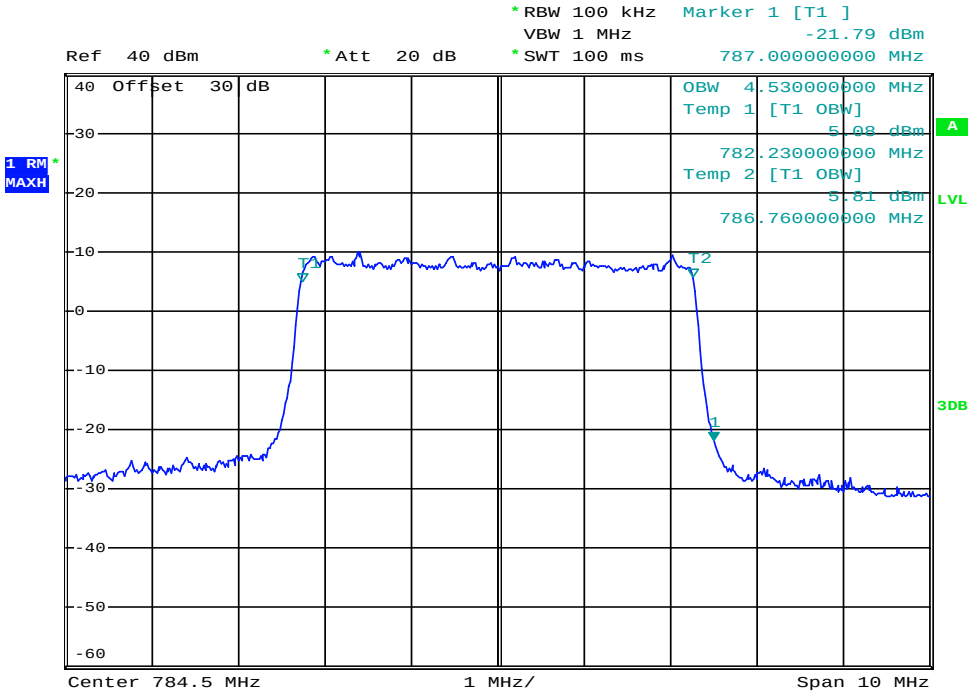


Date: 9.AUG.2018 13:14:30

Channel Setting:	Channel Frequency:	Modulation Setting:
20175	**1732.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**50**	**20.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B4	**17.94** MHz

Plot 12.13 – Occupied Bandwidth – LTE B13 – Channel 23255 – QPSK – 5MHz BW

Occupied Bandwidth

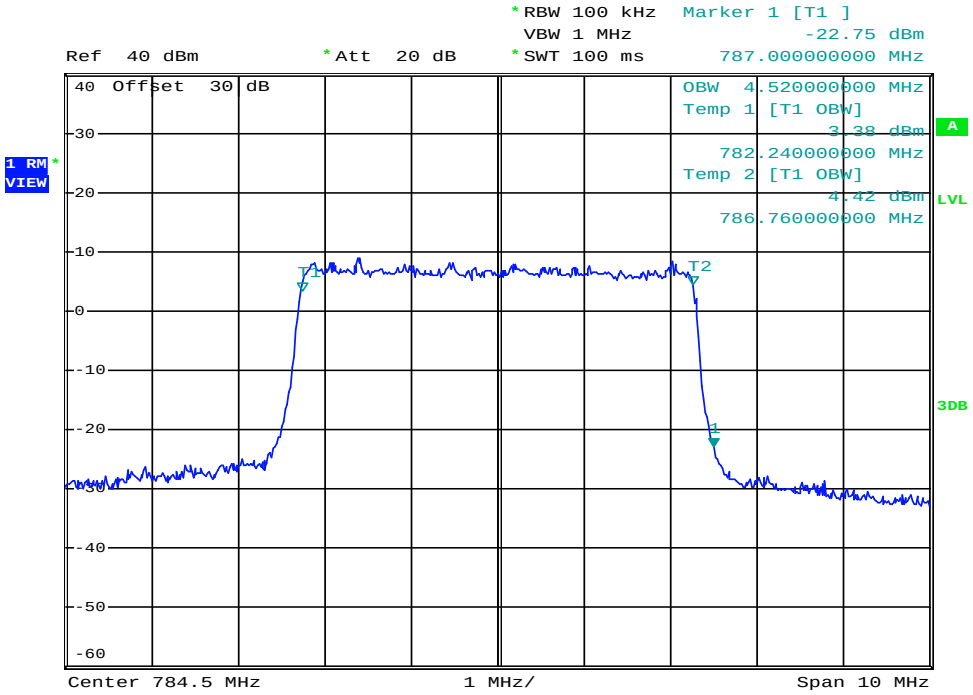


Date: 9.AUG.2018 13:26:21

Channel Setting:	Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B13	**4.53** MHz

Plot 12.14 – Occupied Bandwidth – LTE B13 – Channel 23255 – 16QAM – 5MHz BW

Occupied Bandwidth

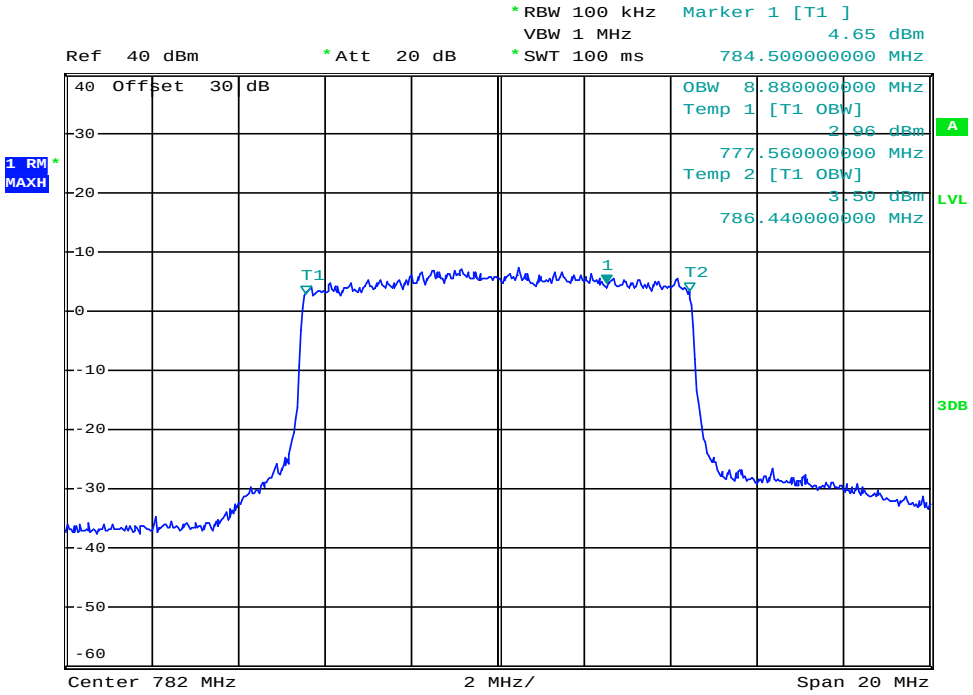


Date: 9.AUG.2018 13:30:37

Channel Setting:	Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B13	**4.52** MHz

Plot 12.15 – Occupied Bandwidth – LTE B13 – Channel 23230 – QPSK – 10MHz BW

Occupied Bandwidth

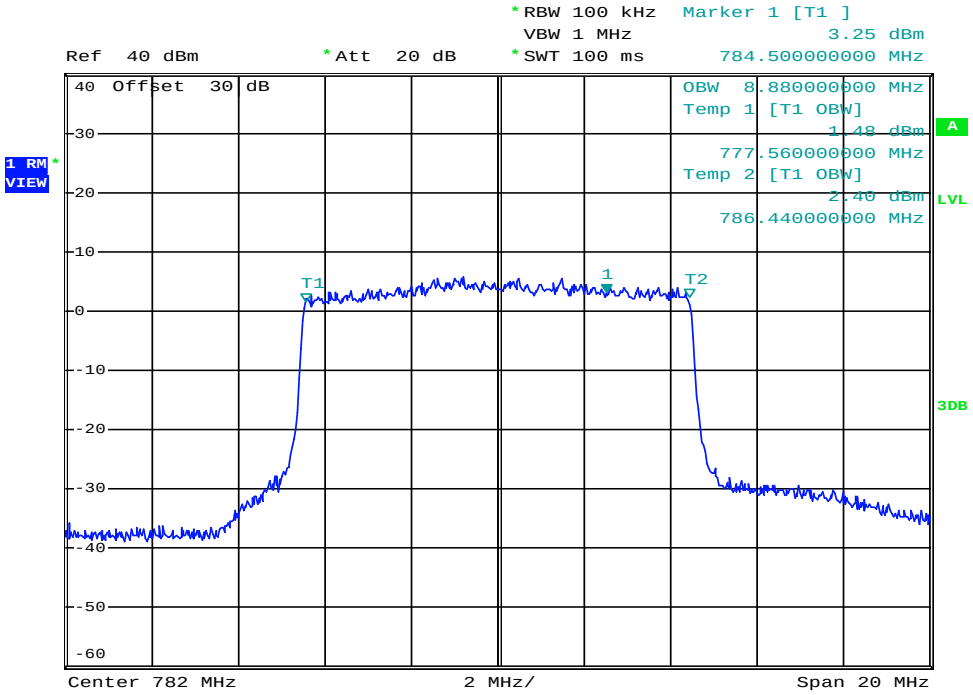


Date: 9.AUG.2018 13:35:41

Channel Setting:	Channel Frequency:	Modulation Setting:
23230	**782.0** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B13	**8.88** MHz

Plot 12.16 – Occupied Bandwidth – LTE B13 – Channel 23230 – 16QAM – 10MHz BW

Occupied Bandwidth



Date: 9.AUG.2018 13:38:56

Channel Setting:	Channel Frequency:	Modulation Setting:
23230	**782.0** MHz	**16 QAM**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**25**	**10.0** MHz
	LTE Band:	Measured Occupied Bandwidth:
	B13	**8.88** MHz

Table 12.1 – Summary of Occupied Bandwidth - LTE

99% Occupied Bandwidth								
Channel Number	Frequency (MHz)	LTE Band	BW (MHz)	Modulation	Power Setting (dBm)	Number of Resource Blocks	Resource Block Start	Measured Occupied BW (MHz)
19957	1710.7	B4	1.4	QPSK	Max	1	2	1.10
20393	17534.3			16 QAM		1	2	1.09
20385	1753.5		3	QPSK		1	15	2.69
19965	1711.5			16 QAM		1	15	2.69
20375	1752.5		5	QPSK		1	24	4.51
19975	1712.5			16 QAM		1	13	4.52
20175	1732.5		10	QPSK		1	25	9.14
20000	1715.0			16 QAM		1	49	9.08
20325	1747.5		15	QPSK		1	74	13.50
20325	1747.5			16 QAM		1	0	13.50
20050	1720.0		20	QPSK		1	0	17.91
20175	1732.5			16 QAM		1	50	17.94
23255	784.5	B13	5	QPSK		1	13	4.53
23255	784.5			16 QAM		1	13	4.52
23230	782.0		10	QPSK		1	25	8.88
23230	782.0			16 QAM		1	25	8.88
					Results:	**Complies**		

(1) As reported in the original module report

Margin = 10*Log(Limit / E_{meas})

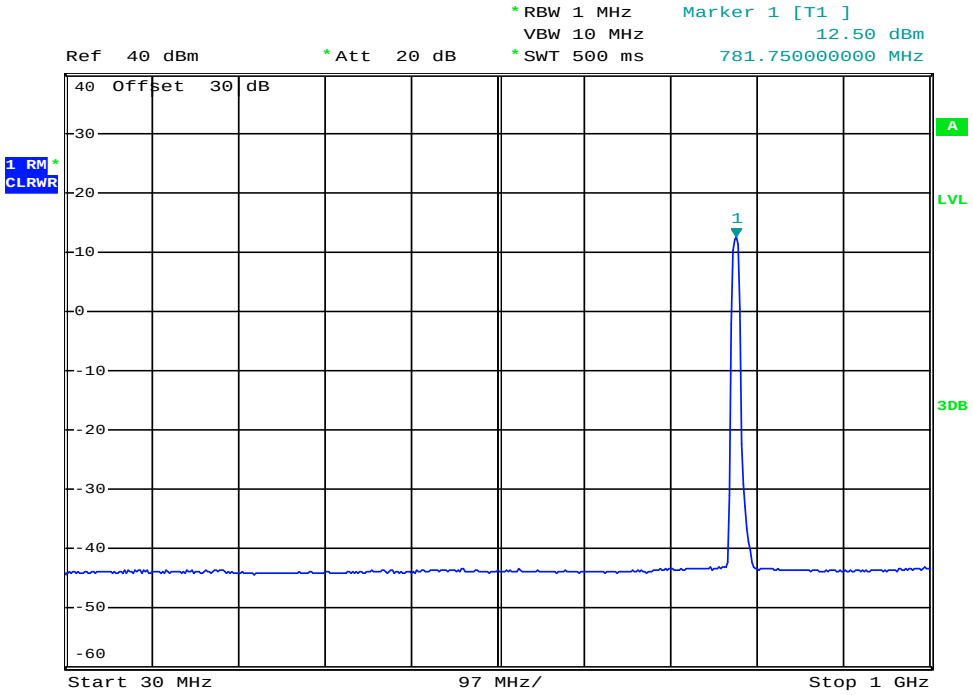
13.0 SIMULTANEOUS TRANSMISSION CONDUCTED SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	FCC 47 CFR §2.1046, §27.53(c), §27.53(h), §15.31(k), §2.947(f), KDB 971168 D01v03r01
Normative Reference	RSS-130 4.6, RSS-139 6.6, RSS-Gen 8.10

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
47 CFR §27.53(h)	**§ 27.53(h) AWS Emission limits** (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.
RSS-130 4.6	**4.6 Transmitter Unwanted Emissions** 4.6.1 The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed. 4.6.2 In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions: (a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least: (i) 76 + 10 log10 p(watts), dB, for base and fixed equipment, and (ii) 65 + 10 log10 p(watts), dB, for mobile and portable equipment.
RSS-139 6.6	**6.6 Transmitter Unwanted Emissions** (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. (ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

Plot 13.1 – Simultaneous Transmission Conducted Spurious Emissions – 30 to 1000MHz

Simultaneous Transmission Conducted Spurious Emissions 30MHz - 1000MHz



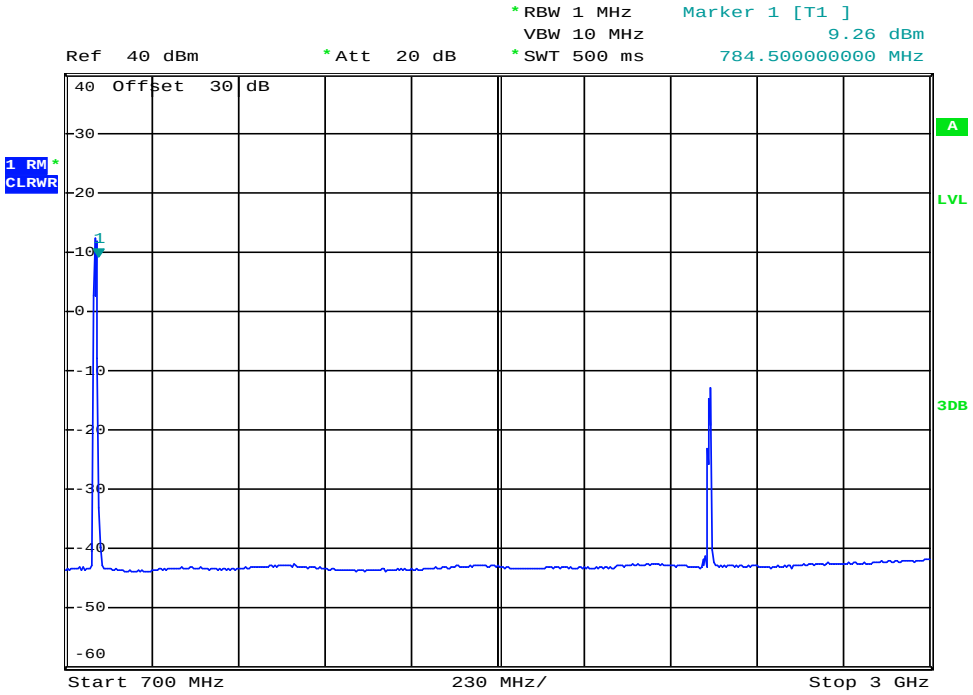
Date: 9.AUG.2018 14:17:20

Emissions shown is the fundamental LTE emissions.

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Plot 13.2 – Simultaneous Transmission Conducted Spurious Emissions – 700 to 3000MHz

Simultaneous Transmission Conducted Spurious Emissions 700MHz - 3000MHz



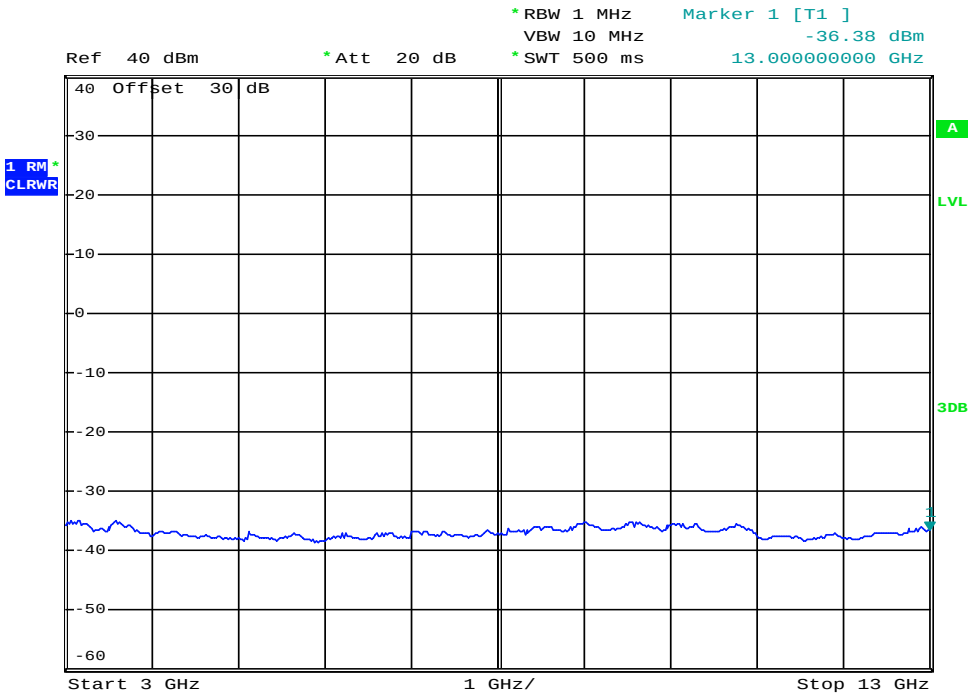
Date: 9.AUG.2018 13:43:01

Emissions shown are the fundamental emissions.

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Plot 13.3 – Simultaneous Transmission Conducted Spurious Emissions – 3 to 13GHz

Simultaneous Transmission Conducted Spurious Emissions 3GHz - 13GHz



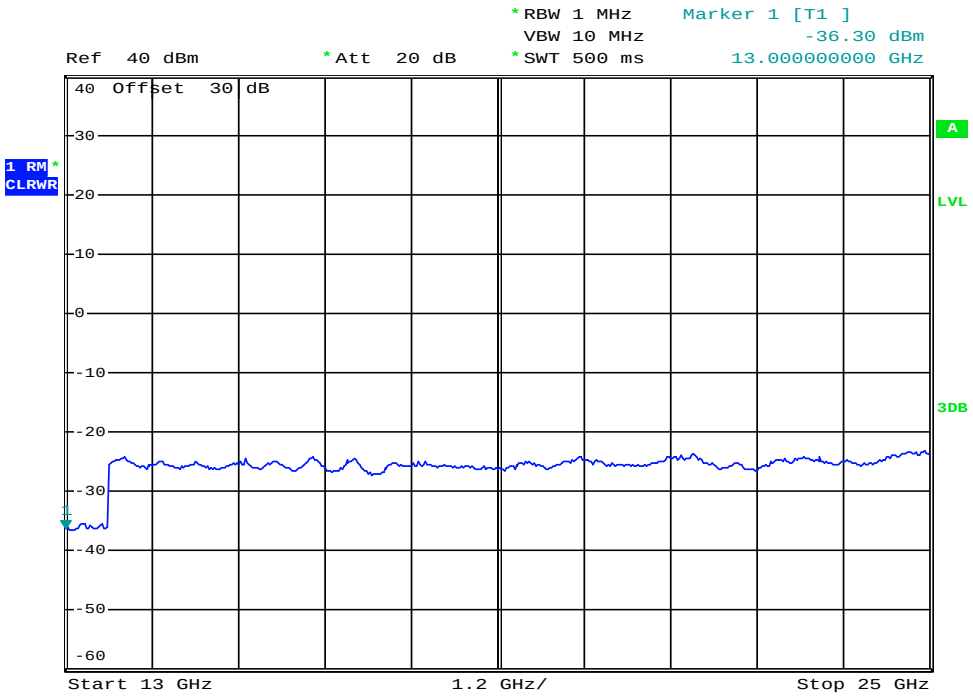
Date: 9.AUG.2018 13:43:58

No Spurious Emissions Detected

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Plot 13.4 – Simultaneous Transmission Conducted Spurious Emissions – 13 to 25GHz

Simultaneous Transmission Conducted Spurious Emissions 13GHz - 25GHz



Date: 9.AUG.2018 13:44:46

No Spurious Emissions Detected

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Table 13.1 – Summary of Simultaneous Transmission Conducted Spurious Emissions

§2.947(f) Simultaneous Transmission Conducted Spurious Emissions									
Channel Frequency (MHz)	Frequency Range (MHz)	Frequency of Emission (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting [P_{chan}] (dBm)	Spurious Emission [P_{Spur}] (dBc)	Attenuation [A] (dB)	Limit (dBm)	Margin (dB)
There were no spurious emissions observed as a result of simultaneous transmission.									
Attenuation [A] = [P_{chan}] - [P_{Spur}]									
Margin = Attenuation [A] - Limit									
							Result:	Complies	

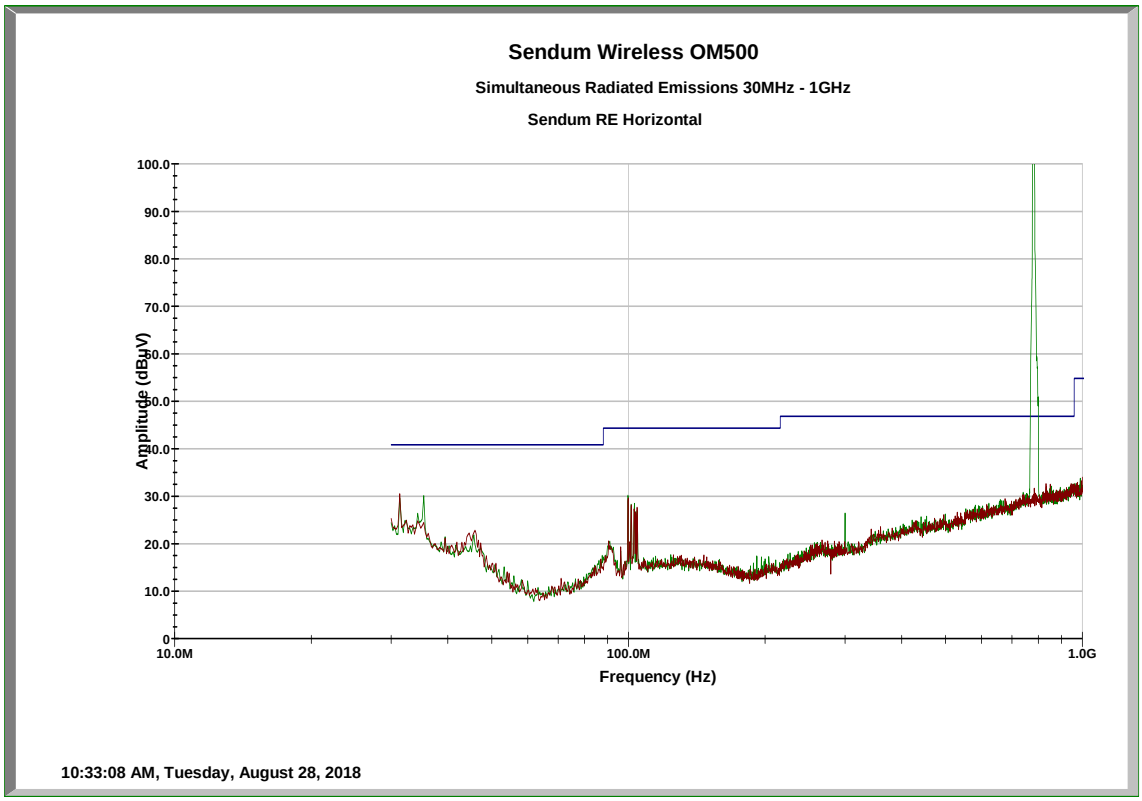
14.0 SIMULTANEOUS TRANSMISSION RADIATED SPURIOUS EMISSIONS

Test Conditions	
Normative Reference	FCC 47 CFR §2.1046, §27.53(c), §27.53(h), §15.31(k), §2.947(f), KDB 971168 D01v03r01
Normative Reference	RSS-130 4.6, RSS-139 6.6, RSS-Gen 8.10

Limits	
47 CFR §27.53(c)	**§ 27.53 Emission limits** (c) For operations in the 746–758 MHz band and the 776–788 MHz band, the power of any emission outside the licensee's frequency band(s) of operation shall be attenuated below the transmitter power (P) within the licensed band(s) of operation, measured in watts, in accordance with the following: (1) On any frequency outside the 746–758 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (2) On any frequency outside the 779-788 MHz band, the power of any emission shall be attenuated outside the band below the transmitter power (P) by at least 43 + 10 log (P) dB; (5) Compliance with the provisions of paragraphs (c)(1) and (c)(2) of this section is based on the use of measurement instrumentation employing a resolution bandwidth of 100 kHz or greater. However, in the 100 kHz bands immediately outside and adjacent to the frequency block, a resolution bandwidth of at least 30 kHz may be employed;
47 CFR §27.53(h)	**§ 27.53(h) AWS Emission limits** (1) General protection levels. Except as otherwise specified below, for operations in the 1695-1710 MHz, 1710-1755 MHz, 1755-1780 MHz, 1915-1920 MHz, 1995-2000 MHz, 2000-2020 MHz, 2110-2155 MHz, 2155-2180 MHz, and 2180-2200 bands, the power of any emission outside a licensee's frequency block shall be attenuated below the transmitter power (P) in watts by at least 43 + 10 log10 (P) dB.
RSS-130 4.6	**4.6 Transmitter Unwanted Emissions** 4.6.1 The power of any unwanted emissions in any 100 kHz bandwidth on any frequency outside the frequency range(s) within which the equipment is designed to operate shall be attenuated below the transmitter power, P (dBW), by at least 43 + 10 log10 p (watts), dB. However, in the 100 kHz band immediately outside the equipment's operating frequency range, a resolution bandwidth of 30 kHz may be employed. 4.6.2 In addition to the limit outlined in Section 4.6.1 above, equipment operating in the frequency bands 746-756 MHz and 777-787 MHz shall also comply with the following restrictions: (a) The power of any unwanted emissions in any 6.25 kHz bandwidth for all frequencies between 763-775 MHz and 793-806 MHz shall be attenuated below the transmitter power, P (dBW), by at least: (i) 76 + 10 log10 p(watts), dB, for base and fixed equipment, and (ii) 65 + 10 log10 p(watts), dB, for mobile and portable equipment.
RSS-139 6.6	**6.6 Transmitter Unwanted Emissions** (i) In the first 1.0 MHz bands immediately outside and adjacent to the equipment's smallest operating frequency block,2 which can contain the equipment's occupied bandwidth, the emission power per any 1% of the emission bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB. (ii) After the first 1.0 MHz outside the equipment's smallest operating frequency block, which can contain the equipment's occupied bandwidth, the emission power in any 1 MHz bandwidth shall be attenuated below the transmitter output power P (in dBW) by at least 43 + 10 log10 p (watts) dB.

Plot 14.1 – Simultaneous Transmission Radiated Spurious Emissions – 30 - 1000MHz – Horizontal

Simultaneous Transmission Radiated Spurious Emissions 30 - 1000MHz

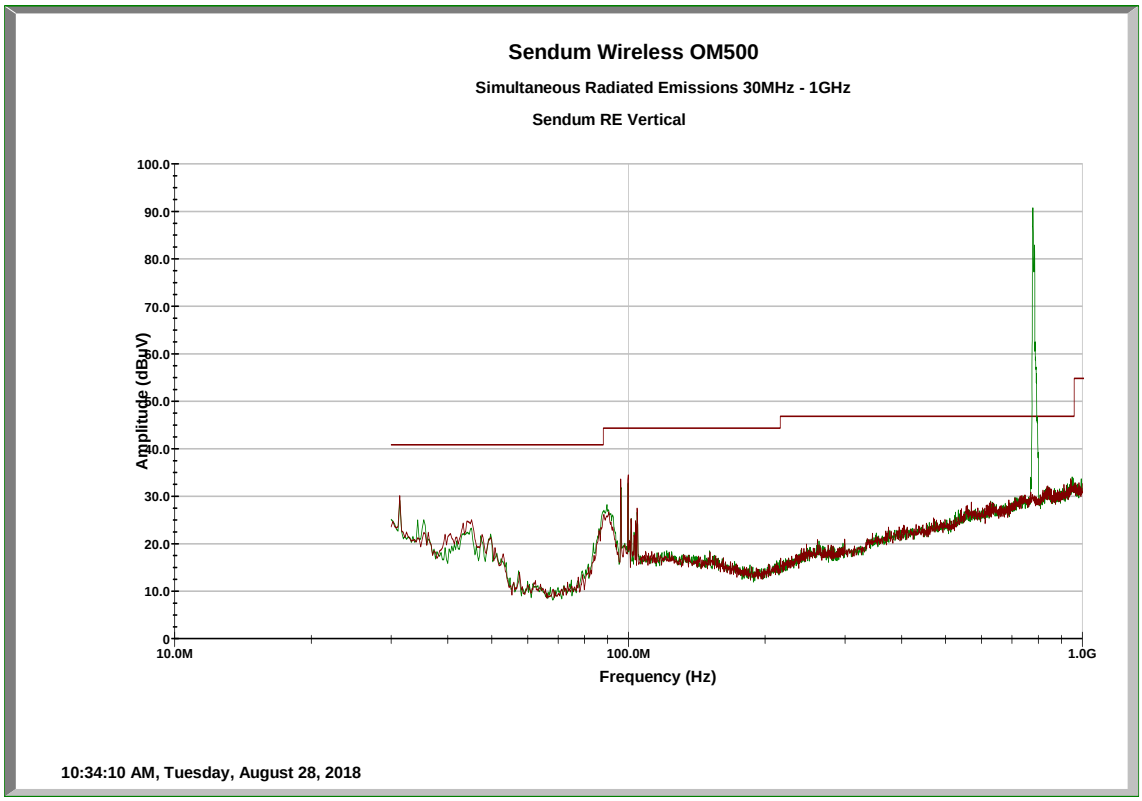


Red Trace: Ambient, Green Trance: DUT w/ Fundamental — Horizontal

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.2 – Simultaneous Transmission Radiated Spurious Emissions – 30 - 1000MHz – Vertical

Simultaneous Transmission Radiated Spurious Emissions 30 - 1000MHz

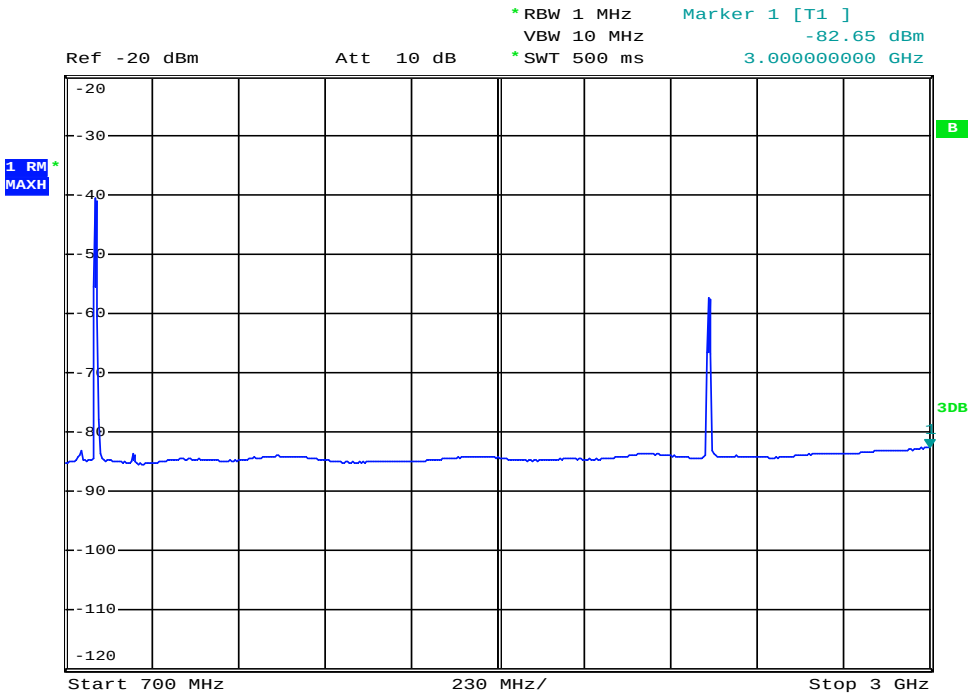


Red Trace: Ambient, Green Trance: DUT w/ Fundamental Vertical

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.3 – Simultaneous Transmission Radiated Spurious Emissions – 700 to 3000MHz - Horizontal

Simultaneous Transmission Radiated Spurious Emissions 700MHz - 3000MHz



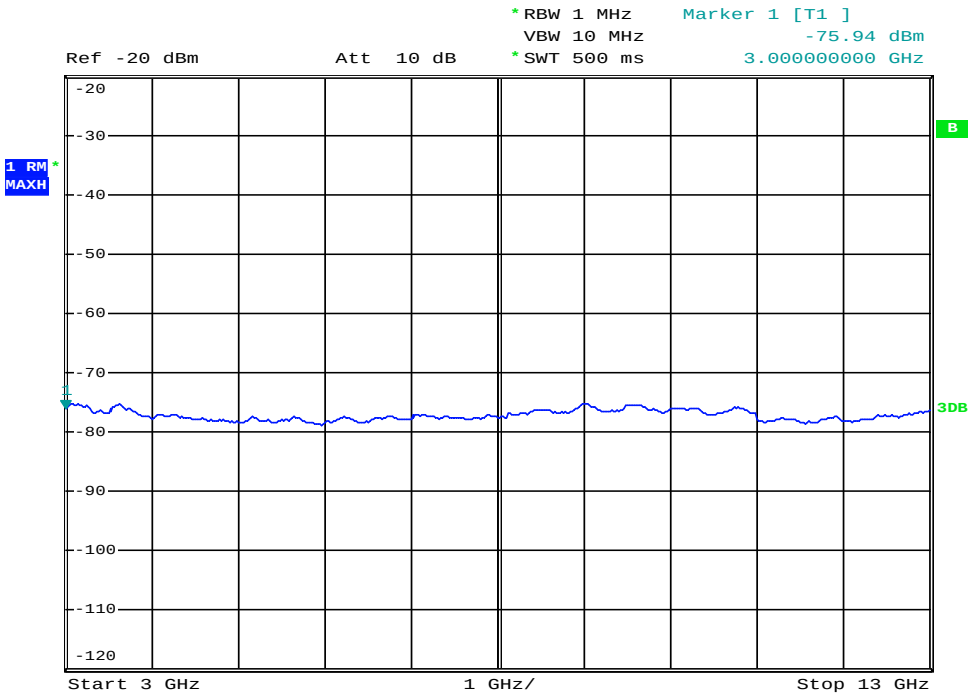
Date: 9.AUG.2018 16:24:32

Emissions shown are the fundamental emissions. Horizontal

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.4 – Simultaneous Transmission Radiated Spurious Emissions – 3 to 13GHz - Horizontal

Simultaneous Transmission Radiated Spurious Emissions 3 - 13GHz



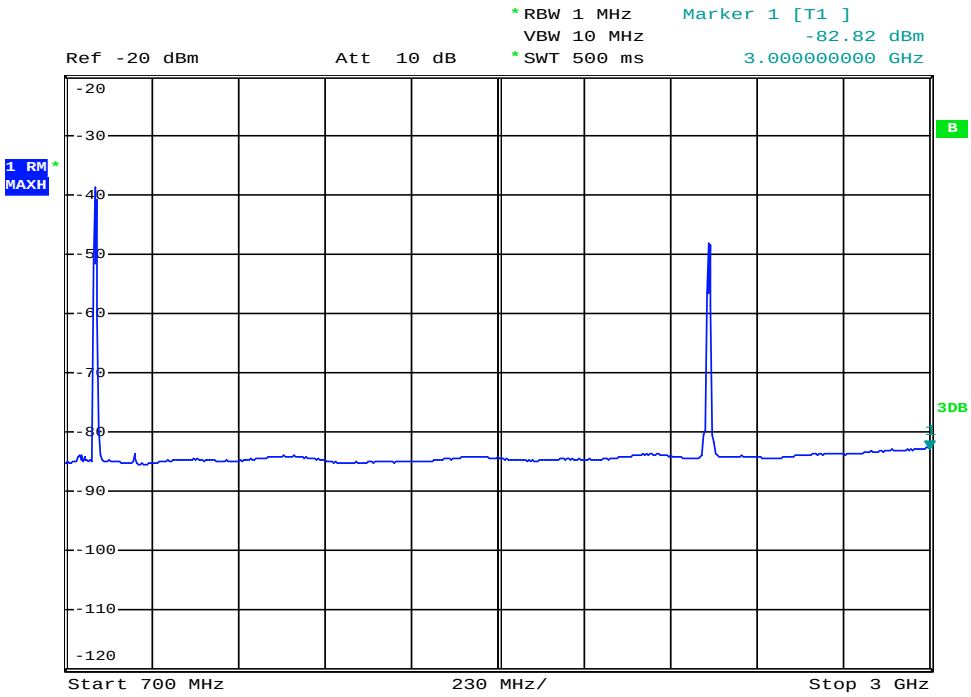
Date: 9.AUG.2018 16:22:56

No Emissions Detected | Horizontal

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.5 – Simultaneous Transmission Radiated Spurious Emissions – 700 to 3000MHz - Vertical

Simultaneous Transmission Radiated Spurious Emissions 700MHz - 3000MHz



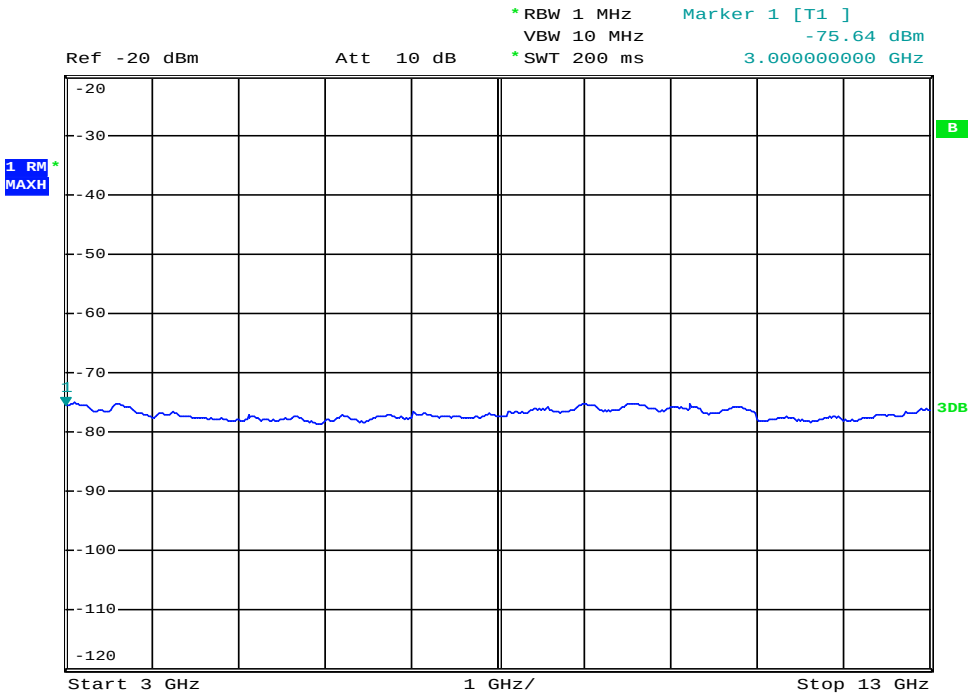
Date: 9.AUG.2018 16:25:07

Emissions shown are the fundamental emissions. Vertical

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Plot 14.6 – Simultaneous Transmission Radiated Spurious Emissions – 3 to 13GHz - Vertical

Simultaneous Transmission Radiated Spurious Emissions 3 - 13GHz



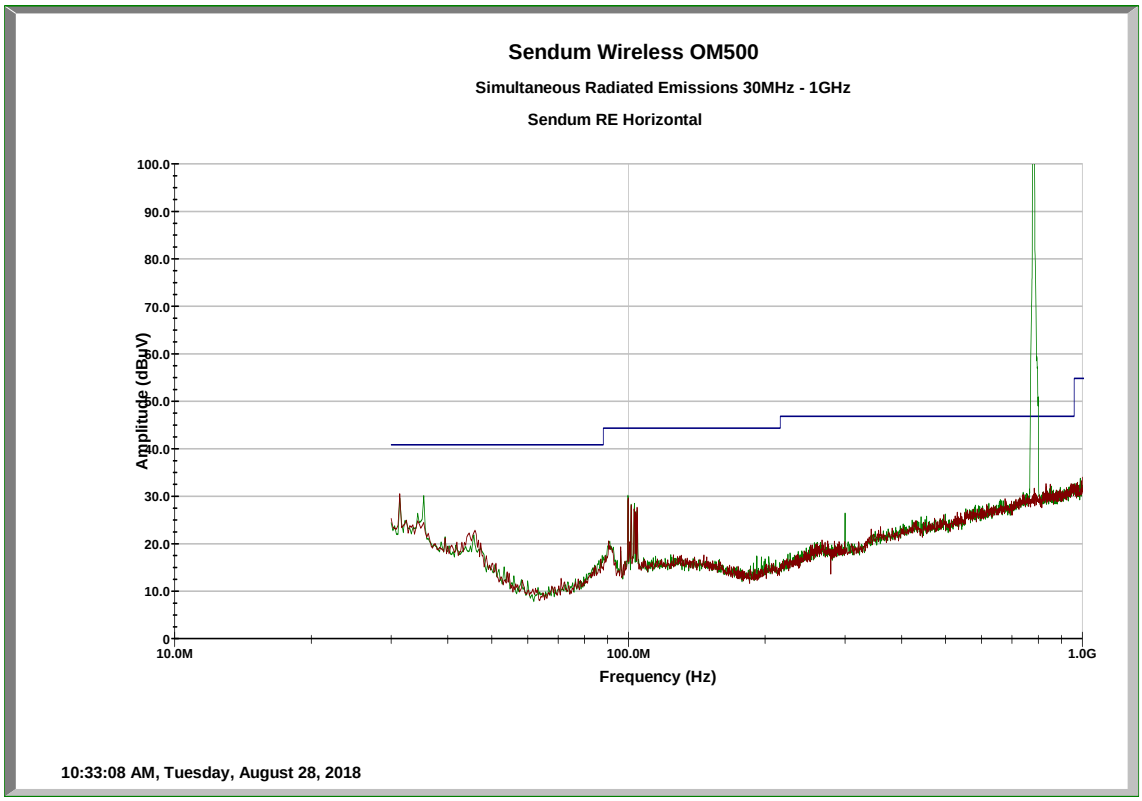
Date: 9.AUG.2018 16:21:01

No Emissions Detected | Vertical

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.7 – Simultaneous Transmission Radiated Spurious Emissions – 30 – 1000MHz - Horizontal

Simultaneous Transmission Radiated Spurious Emissions 30 - 1000MHz

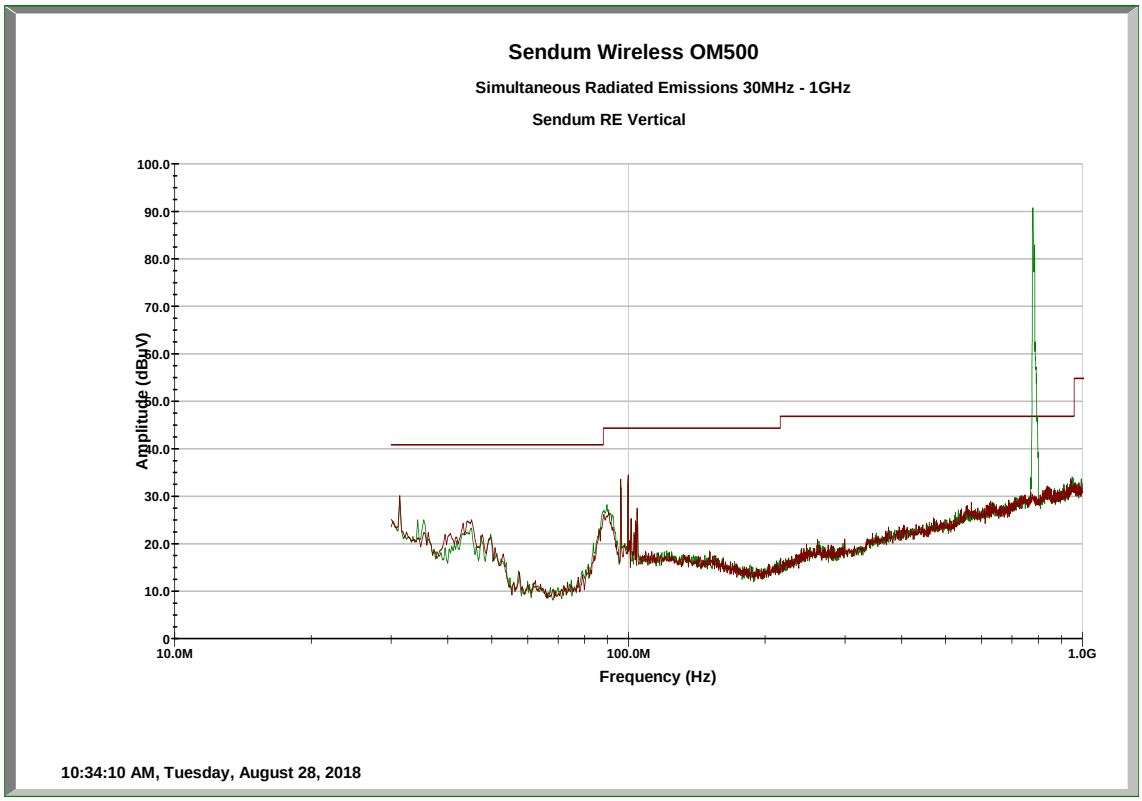


Red Trace: Ambient, Green Trance: DUT w/ Fundamental — Horizontal

LTE Channel Setting: **23255**	LTE Channel Frequency: **784.5** MHz	Modulation Setting: **QPSK**
Number of RBs: **1**	Start RB: **13**	Bandwidth Setting: **5.0** MHz
LTE Band: **B13**	WiFi Channel: **1**	WiFi Frequency: **2462.00** MHz

Plot 14.8 – Simultaneous Transmission Radiated Spurious Emissions – 30 – 1000MHz - Vertical

Simultaneous Transmission Radiated Spurious Emissions 30 - 1000MHz



Red Trace: Ambient, Green Trance: DUT w/ Fundamental — Vertical

LTE Channel Setting:	LTE Channel Frequency:	Modulation Setting:
23255	**784.5** MHz	**QPSK**
Number of RBs:	Start RB:	Bandwidth Setting:
1	**13**	**5.0** MHz
LTE Band:	WiFi Channel:	WiFi Frequency:
B13	**1**	**2462.00** MHz

Table 14.1 – Summary of Simultaneous Transmission Radiated Spurious Emissions

§2.947(f) Simultaneous Transmission Radiated Spurious Emissions									
Channel Frequency (MHz)	Frequency Range (MHz)	Frequency of Emission (MHz)	Bandwidth Setting (kHz)	Modulation	Tx Power Setting [P_{chan}] (dBm)	Spurious Emission [P_{Spur}] (dBc)	Attenuation [A] (dB)	Limit (dBm)	Margin (dB)
There were no spurious emissions observed within 20dB of the limit as a result of simultaneous transmission.									
Attenuation [A] = [P_{chan}] - [P_{Spur}]									
Margin = Attenuation [A] - Limit									
							Result:	**Complies**	

APPENDIX A – TEST SETUP DRAWINGS AND CONDITIONS

Table A.1 – Conducted Measurement Setup and Environmental

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List			
Asset Number	Manufacturer	Model Number	Description
00241	R&S	FSU40	Spectrum Analyzer

Figure A.1 – Test Setup – Conducted Measurements

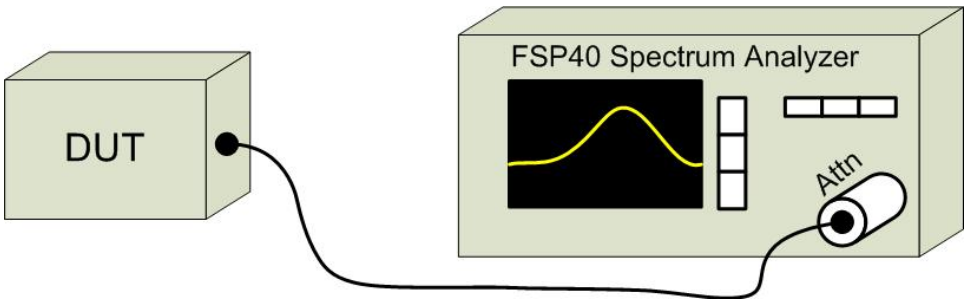


Table A.2 – Radiated Emissions Measurement Equipment and Environmental

Environmental Conditions (Typical)	
Temperature	25°C
Humidity	<60%
Barometric Pressure	101 +/- 3kPa

Equipment List

Asset Number	Manufacturer	Model Number	Description
00051	HP	8566B	Spectrum Analyzer
00049	HP	85650A	Quasi-peak Adapter
00047	HP	85685A	RF Preselector
00072	EMCO	2075	Mini-mast
00073	EMCO	2080	Turn Table
00071	EMCO	2090	Multi-Device Controller
00265	Miteq	JS32-00104000-58-5P	Microwave L/N Amplifier
00241	R&S	FSU40	Spectrum Analyzer
00050	Chase	CBL-6111A	Bilog Antenna
00275	Coaxis	LMR400	25m Cable
00276	Coaxis	LMR400	4m Cable
00278	TILE	34G3	TILE Test Software
00034	ETS	3115	Double Ridged Guide Horn
00085	EMCO	6502	Loop Antenna

Figure A.2 – Test Setup Radiated Measurements 30MHz – 1GHz

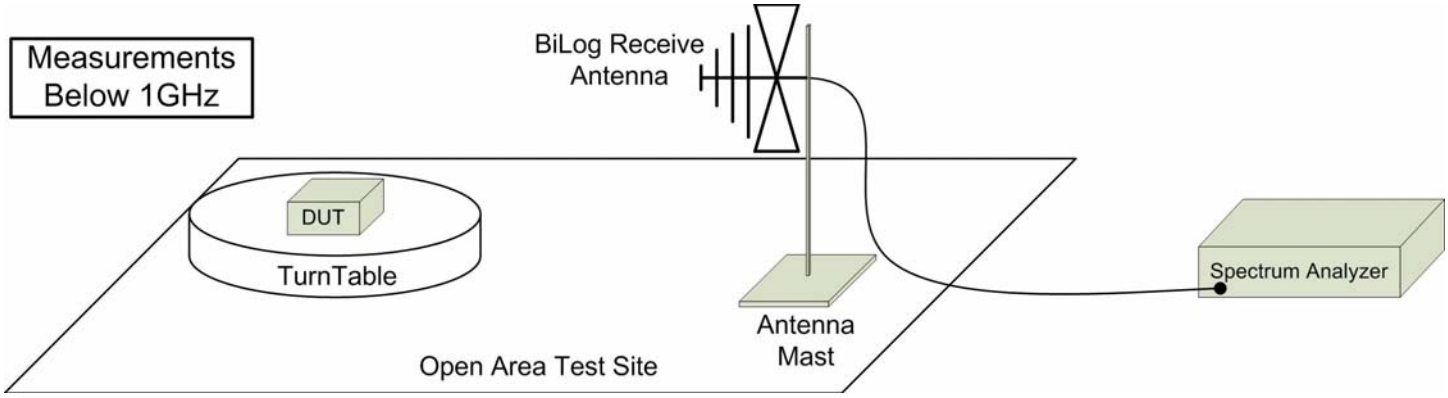
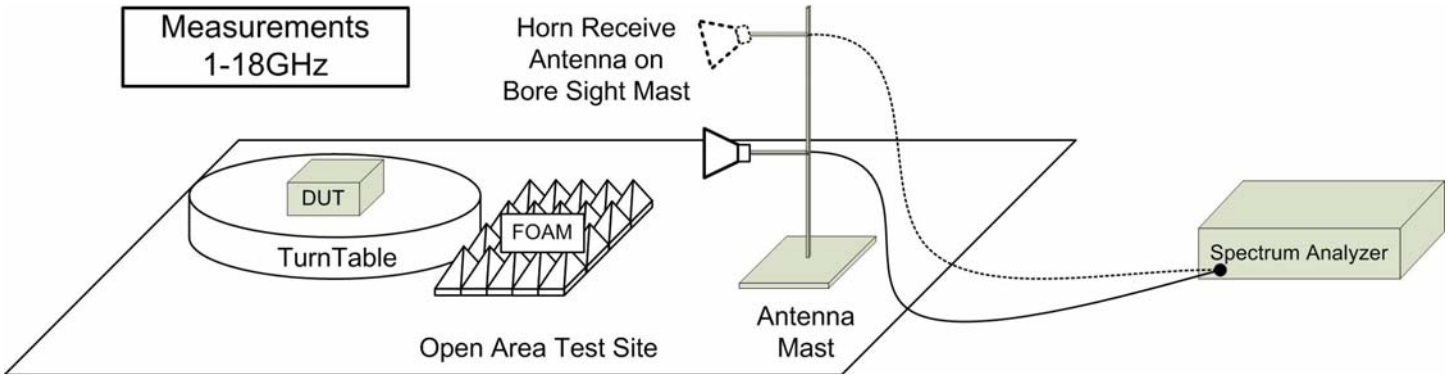


Figure A.3 – Test Setup Radiated Measurements 1 - 18GHz



APPENDIX B – EQUIPMENT LIST AND CALIBRATION

Equipment List							
(*)	Asset Number	Manufacturer	Model Number	Serial Number	Description	Last Calibrated	Calibration Interval
*	00050	Chase	CBL-6111A	1607	Bilog Antenna	23 Jun 2017	Triennial
*	00034	ETS	3115	6267	Double Ridged Guide Horn	02 Dec 2015	Triennial
	00035	ETS	3115	6276	Double Ridged Guide Horn	02 Dec 2015	Triennial
*	00085	EMCO	6502	9203-2724	Loop Antenna	8 Jun 2016	Triennial
*	00047	HP	85685A	2837A00826	RF Preselector	23 Jun 2017	Triennial
*	00049	HP	85650A	2043A00162	Quasi-peak Adapter	23 Jun 2017	Triennial
*	00051	HP	8566B	2747A05510	Spectrum Analyzer	23 Jun 2017	Triennial
	00223	HP	8901A	3749A07154	Modulation Analyzer	27 Dec 2017	Triennial
	00224	HP	8903B	3729A18691	Audio Analyzer	28 Dec 2017	Triennial
*	00241	R&S	FSU40	100500	Spectrum Analyzer	15 May 2018	Triennial
*	00005	HP	8648D	3847A00611	Signal Generator	21 Jun 2017	Triennial
	00006	R&S	SMR20	100104	Signal Generator	29 May 2017	Triennial
	00243	Rigol	DS1102E	DS1ET150502164	Oscilloscope	7 Nov 2017	Triennial
	00254	LeCroy	WM8600A	532	Oscilloscope	NCR	n/a
	00110	Gigatronics	8652A	1875801	Power Meter	29 Feb 2016	Triennial
	00237	Gigatronics	80334A	1837001	Power Sensor	23 Jun 2014	Triennial
	00232	ETS Lindgren	HI-6005	91440	Isotropic E-Field Probe	18 Dec 2017	Triennial
	00003	HP	53181A	3736A05175	Frequency Counter	21 Jun 2017	Triennial
	00257	Com-Power	LI-215A	191934	LISN	5 Jan 2018	Triennial
	00041	AR	10W1000C	27887	Power Amplifier	NCR	n/a
	00106	AR	5SIG4	26235	Power Amplifier	NCR	n/a
	00280	AR	25A250AM6	22702	Power Amplifier	NCR	n/a
	00265	Miteq	JS32-00104000-58-5P	1939850	Microwave L/N Amplifier	COU	n/a
	00071	EMCO	2090	9912-1484	Multi-Device Controller	n/a	n/a
*	00072	EMCO	2075	0001-2277	Mini-mast	n/a	n/a
*	00073	EMCO	2080	0002-1002	Turn Table	n/a	n/a
	00081	ESPEC	ECT-2	0510154-B	Environmental Chamber	CNR	n/a
	00234	VWR	61161-378	140320430	Temp/Humidity Meter	New	Triennial
	00236	Nokia	-	236	ESD Table	NCR	n/a
	00255	Expert ESD	A4001	A4001-155	ESD Target	COU	n/a
	00064	NARDA	3020A	n/a	Bi-Directional Coupler	COU	n/a
	00263	Koaxis	KP10-1.00M-TD	263	1m Armoured Cable	COU	n/a
*	00263B	Koaxis	KP10-1.00M-TD	263B	1m Armoured Cable	COU	n/a
*	00264	Koaxis	KP10-7.00M-TD	264	7m Armoured Cable	COU	n/a
*	00275	TMS	LMR400	n/a	25m Cable	COU	n/a
	00276	TMS	LMR400	n/a	4m Cable	COU	n/a
	00277	TMS	LMR400	n/a	4m Cable	COU	n/a
*	00278	TILE	34G3	n/a	TILE Test Software	NCR	n/a
Rented Equipment							

* Used during the course of this investigation
CNR: Calibration Not Required
COU: Calibrate On Use

APPENDIX C – MEASUREMENT INSTRUMENT UNCERTAINTY

CISPR 16-4 Measurement Uncertainty (U_{LAB})	
This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence interval using a coverage factor of k=2	
30MHz - 200MHz	
U_{LAB} = 5.14dB U_{CISPR} = 6.3dB	
200MHz - 1000MHz	
U_{LAB} = 5.90dB U_{CISPR} = 6.3dB	
1GHz - 6GHz	
U_{LAB} = 4.80dB U_{CISPR} = 5.2dB	
6GHz - 18GHz	
U_{LAB} = 5.1dB U_{CISPR} = 5.5dB	
If the calculated uncertainty **U_{lab}** is **less** than **U_{CISPR}** then:	
1	Compliance is deemed to occur if **NO** measured disturbance exceeds the disturbance limit
2	Non-Compliance is deemed to occur if **ANY** measured disturbance **EXCEEDS** the disturbance limit
If the calculated uncertainty **U_{lab}** is **greater** than **U_{CISPR}** then:	
3	Compliance is deemed to occur if **NO** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), exceeds the disturbance limit
4	Non-Compliance is deemed to occur if **ANY** measured disturbance, increased by (**U_{lab} - U_{CISPR}**), **EXCEEDS** the disturbance limit

