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Emissions
Test Report

EUT Name: Norton Core Secure WiFi Router

Model No.: 518

CFR 47 Part 15.247: 2018 and RSS 247: 2017

Prepared for:

Symantec Corporation
350 Ellis Street
Mountain View, CA 94043

Prepared by:

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Report/Issue Date: 8/9/2018
Job # 0000153870
Report Number: 31852093.001

Revisions

Revision No.	Date	Reason for Change	Author
0	7/19/2018	Original Document	DA
1	8/9/2018	Updated BT LE Output Power, Test Software Tool Settings	DA

Note: Latest revision report will replace all previous reports.

Statement of Compliance

Manufacturer:	Symantec Corporation 350 Ellis Street Mountain View, CA 94043
Requester / Applicant:	Symantec Corporation
Name of Equipment:	Norton Core Secure WiFi Router
Model No.	518
Type of Equipment:	Intentional Radiator
Application of Regulations:	CFR 47 Part 15.247: 2018 and RSS 247: 2017
Test Dates:	26 Dec 2017 to 15 June 2018

Guidance Documents:

Emissions: ANSI C63.10-2013

Test Methods:

Emissions: ANSI C63.10-2013

The electromagnetic compatibility test and documented data described in this report has been performed and recorded by TUV Rheinland, in accordance with the standards and procedures listed herein. As the responsible authorized agent of the EMC laboratory, I hereby declare that the equipment described above has been shown to be compliant with the EMC requirements of the stated regulations and standards based on these results. If any special accessories and/or modifications were required for compliance, they are listed in the Executive Summary of this report.

This report must not be used to claim product endorsement by A2LA or any agency of the U.S. Government. This report shall not be reproduced except in full, without the written authorization of TUV Rheinland of North America.

Douglas Antioco		Josie Sabado	
Test Engineer	Date August 9, 2018	A2LA Signatory	Date August 9, 2018

Testing Cert #3331.02 **US1131** **2932M-1**

1 Executive Summary

1.1 Scope

This report is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247: 2018 and RSS 247: 2017 based on the results of testing performed on 26 Dec 2017 to 15 June 2018 on the Norton Core Secure WiFi Router Model 518 manufactured by Symantec Corporation. This report only applies to the specific samples tested under the stated test conditions. It is the responsibility of the manufacturer to assure that additional production units of this model are manufactured with identical or EMI equivalent electrical and mechanical components. This report is further intended to document changes and modifications to the EUT throughout its life cycle. All documentation will be included as a supplement.

1.2 Purpose

Testing was performed to evaluate the EMC performance of the EUT in accordance with the applicable requirements, procedures, and criteria defined in the application of regulations and application of standards listed in this report. The 2400 MHz to 2483.5 MHz frequency band is covered in this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C63.4	Worse Case (Measured)	Result
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8	12.1 dB Margin @ 16.3 MHz (Average)	**Complied**
DTS Bandwidth (6dB)	CFR47 15.247 (a)(2), RSS 247 Sect. 5.2(a)	693 KHz	**Complied**
Maximum Output Power	CFR47 15.247 (b), RSS 247 Sect. 5.4 (d)	6.1 dBm RMS	**Complied**
Peak Power Spectral Density	CFR47 15.247 (e), RSS 247 Sect. 5.2	-12.4 dBm/3KHz	**Complied**
Out of Band Emissions	CFR47 15.247 (d), RSS 247 Sect.5.5	Non-Restricted: -41.8 dBc Restricted: 48 dBuV/m (Average)	**Complied**
Transmit Radiated Spurious Emissions	CFR47 15.247 (d), RSS 247 Sect.5.5	0.9 dB Margin @ 4879.8 MHz (Average)	**Complied**

1.4 Special Accessories

No special accessories were necessary in order to achieve compliance.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission

TUV Rheinland of North America at 1279 Quarry Ln, Pleasanton, CA 94566 is recognized by the commission for performing testing services for the general public on a fee basis. These laboratory test facilities have been fully described in reports submitted to and accepted by the FCC (US1131). The laboratory scope of accreditation includes: Title 47 CFR Parts 15, 18, and 90. The accreditation is updated every 3 years.

2.1.2 NIST / A2LA

TUV Rheinland of North America is accredited by the National Voluntary Laboratory Accreditation Program, which is administered under the auspices of the National Institute of Standards and Technology. The laboratory has been assessed and accredited in accordance with ISO Guide 17025:1999 and ISO 9002 (Lab Code Testing Cert #3331.02). The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Acceptance by Mutual Recognition Arrangement

The United States has an established agreement with specific countries under the Asia Pacific Laboratory Accreditation Corporation (APLAC) Mutual Recognition Arrangement. Under this agreement, all TUV Rheinland at 1279 Quarry Ln, Pleasanton, CA 94566 test results and test reports within the scope of the laboratory NIST / A2LA accreditation will be accepted by each member country.

2.2 Test Facilities

All of the test facilities are located at 1279 Quarry Lane, Pleasanton, California 94566, USA. The 2305 Mission College, Santa Clara, 95054, USA location is considered a Pleasanton annex.

2.2.1 Emission Test Facility

The Semi-Anechoic chamber and AC Line Conducted measurement facility used to collect the radiated and conducted data has been constructed in accordance with ANSI C63.7:1992. The site has been measured in accordance with and verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 and 5 meters. The site is listed with the FCC and accredited by A2LA (Lab Code Testing Cert #3331.02). The 3/5-meter semi-anechoic chamber used to collect the radiated data has been verified to comply with the theoretical normalized site attenuation requirements of ANSI C63.4-2014, at a test distance of 3 meter and 5 meters. A report detailing this site can be obtained from TUV Rheinland of North America.

2.3 Measurement Uncertainty

Two types of measurement uncertainty are expressed in this report, per *ISO Guide To The Expression Of Uncertainty In Measurement*, 1st Edition, 1995.

The Combined Standard Uncertainty is the standard uncertainty of the result of a measurement when that result is obtained from the values of a number of other quantities; it is equal to the positive square root of the sum of the variances or co-variances of these other quantities, weighted according to how the measurement result varies with changes in these quantities. The term *standard uncertainty* is the result of a measurement expressed as a standard deviation.

2.3.1 Sample Calculation – radiated & conducted emissions

The field strength is calculated by subtracting the Amplifier Gain and adding the Cable Loss and Antenna Correction Factor to the measured reading. The basic equation is as follows:

Field Strength (dBµV/m) = RAW - AMP + CBL + ACF

Where: RAW = Measured level before correction (dBµV)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

$$\mu V/m = 10^{\frac{dB\mu V/m}{20}}$$

Sample radiated emissions calculation @ 30 MHz

Measurement +Antenna Factor–Amplifier Gain+Cable loss=Radiated Emissions (dBuV/m)

25 dBuV/m + 17.5 dB – 20 dB + 1.0 dB = 23.5 dBuV/m

2.3.2 Measurement Uncertainty

Per CISPR 16-4-2	**U_{lab}**	**U_{cispr}**
Radiated Disturbance @ 10 meters		
30 – 1,000 MHz	2.25 dB	4.51 dB
Radiated Disturbance @ 3 meters		
30 – 1,000 MHz	2.26 dB	4.52 dB
1 – 6 GHz	2.12 dB	4.25 dB
6 – 18 GHz	2.47 dB	4.93 dB

Conducted Disturbance @ Mains Terminals		
150 kHz – 30 MHz	1.09 dB	2.18 dB
Disturbance Power		
30 MHz – 300 MHz	3.92 dB	4.3 dB

2.4 Calibration Traceability

All measurement instrumentation is traceable to the National Institute of Standards and Technology (NIST). Measurement method complies with ANSI/NCSL Z540-1-1994 and ISO Standard 17025:2005. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

Norton Core is a 4x4 secure wireless router that protects your connected home network, while delivering the highest level of security and performance. It is intended to work as a dual band (2.4GHz and 5GHz) wireless router. The router will be in compliance with regulatory standards of regions it will be operating in.

3.2 Equipment Configuration

A description of the equipment configuration is given in the Test Plan Section (Section 6). The EUT was tested as called for in the test standard and was configured and operated in a manner consistent with its intended use. The EUT was connected to rated power and allowed to reach intended operating conditions. The placement of the EUT system components was guided by the test standard and selected to represent typical installation conditions.

In the case of an EUT that can operate in more than one configuration, preliminary testing was performed to determine the configuration that produced maximum radiation.

The final configuration was selected to produce the worst case radiation for emissions testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section (Section 6).

The final operating mode was selected to produce the worst case radiation for emissions testing.

3.4 Unique Antenna Connector

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this Section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of CFR47 Parts 15.211, 15.213, 15.217, 15.219, or 15.221.

3.4.1 Results

The Norton Core Secure WiFi Router employs a single integral PIFA antenna inaccessible to the end user. The antenna has a declared maximum gain of 3.4 dBi.

Refer to Table 9 for additional antenna information.

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247. These test methods are listed under the laboratory's A2LA Scope of Accreditation. This test measures the levels emanating from the EUT, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices. Procedures described in section 8 of the standard were used.

4.1 Output Power Requirements

The maximum output power requirement is the maximum equivalent isotropic radiated power delivering at the transmitting antenna under specified conditions of measurements in the presence of modulation.

The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b)

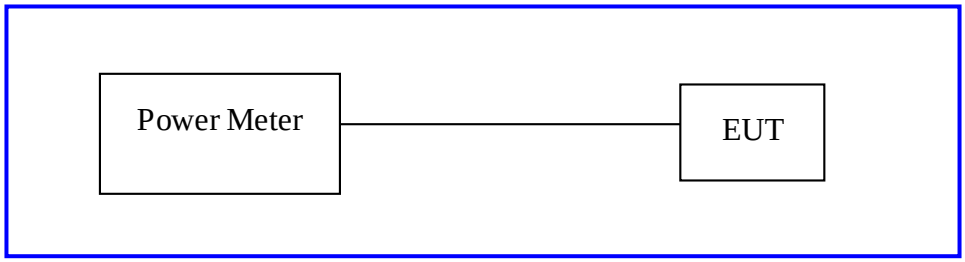
The maximum transmitted powers are:

Band 2400-2483.5 MHz: 1 W

4.1.1 Test Method

The ANSI C63.10-2013 11.9.2.3.1 Method AVGPM conducted was used to measure the channel power output. The measurements were conducted on the low, medium and high channels per CFR47 Part 15.247(b); 2400 MHz to 2483.5 MHz.

Test Setup:



4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 2: RF Output Power at the Antenna Port – Test Results – BLE 4.0

Test Conditions: Conducted Measurement, Normal Temperature				
Antenna Type: PIFA		**Power Setting:** See test plan		
Max. Directional Gain: 3.4 dBi				
Signal State: Modulated				
Ambient Temp.: 24° C		**Relative Humidity:** 39%		
RF Output Power – BT LE 4.0				
Voltage	**Operating Channel (MHz)**	**Measured RMS Power [dBm]**	**Limit [dBm]**	**Margin [dB]**
Nominal	2402	-0.7	30.0	30.7
	2440	1.6	30.0	28.4
	2480	3.3	30.0	26.7
Note: All insertion loss corrections are accounted for in the measurement plots.				

4.2 DTS Bandwidth (6dB) and 99% Occupied Bandwidth

The occupied bandwidth is measured at an amplitude level reduced from the reference level by a specified ratio. The reference level is the level of the highest amplitude signal observed from the transmitter at the fundamental frequency.

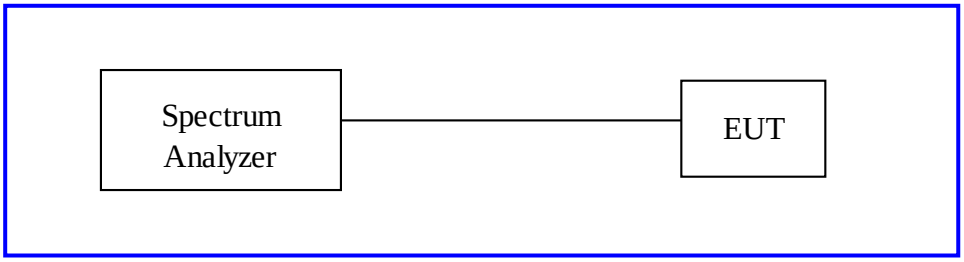
The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

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

4.2.1 Test Method

The conducted method was used to measure the occupied bandwidth and 6 dB bandwidth according to ANSI C63.10:2013 Section 6.9.3 and 11.8.1, respectively. The measurement was performed with modulation per CFR47 15.247(a) (2). Measurements were performed on 3 channels in each operating frequency range; 2400 MHz to 2483.5 MHz.

Test Setup:



4.2.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

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Table 3: Occupied Bandwidth – Test Results – BLE 4.0

Test Conditions: Conducted Measurement, Normal Temperature		
Antenna Type: Custom Integrated		**Power Setting:** See test plan
Signal State: Modulated		
Ambient Temp.: 24° C		**Relative Humidity:** 39%
Bandwidth for BLE 4.0		
Freq. (MHz)	**6dB Bandwidth (MHz)**	**99% Bandwidth (MHz)**
2402	0.699	1.04
2442	0.693	1.04
2480	0.701	1.04

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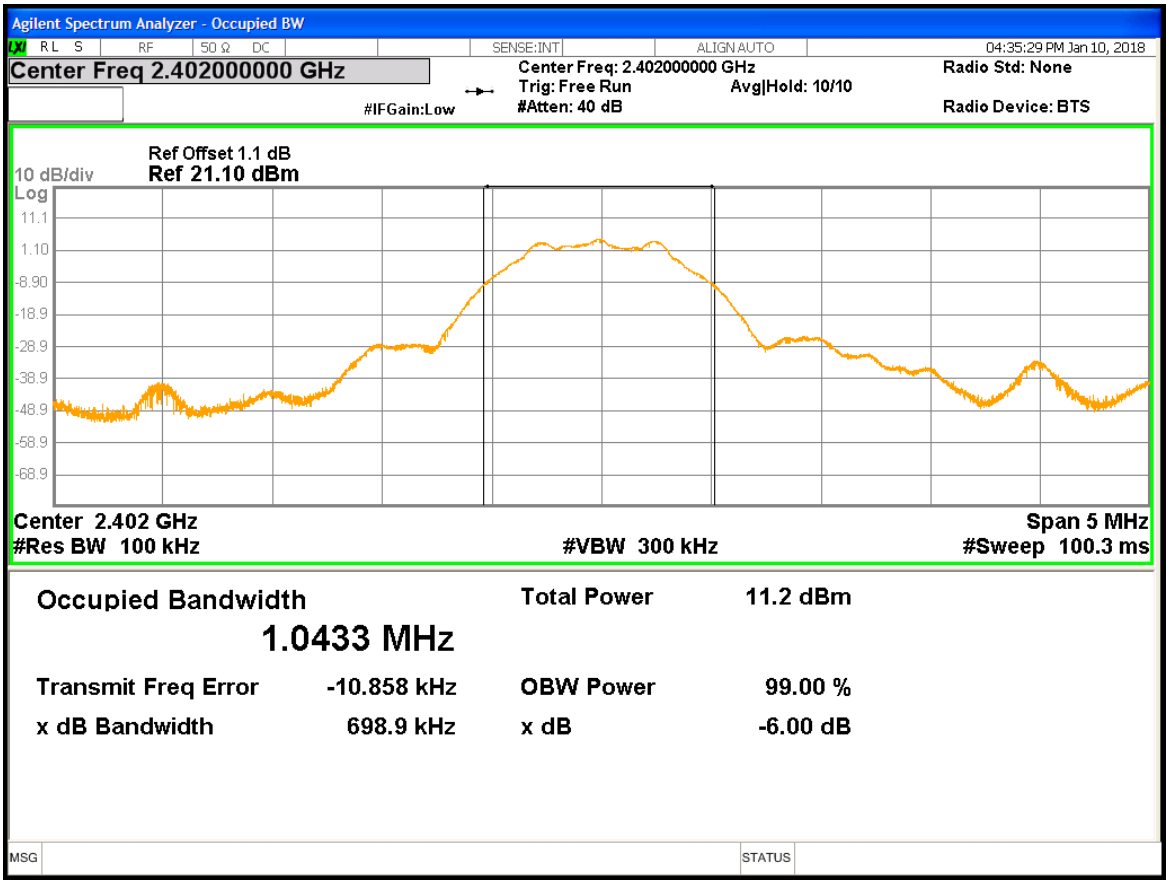

Figure 1 : 6dB & 99% Bandwidth – BLE – 2402MHz

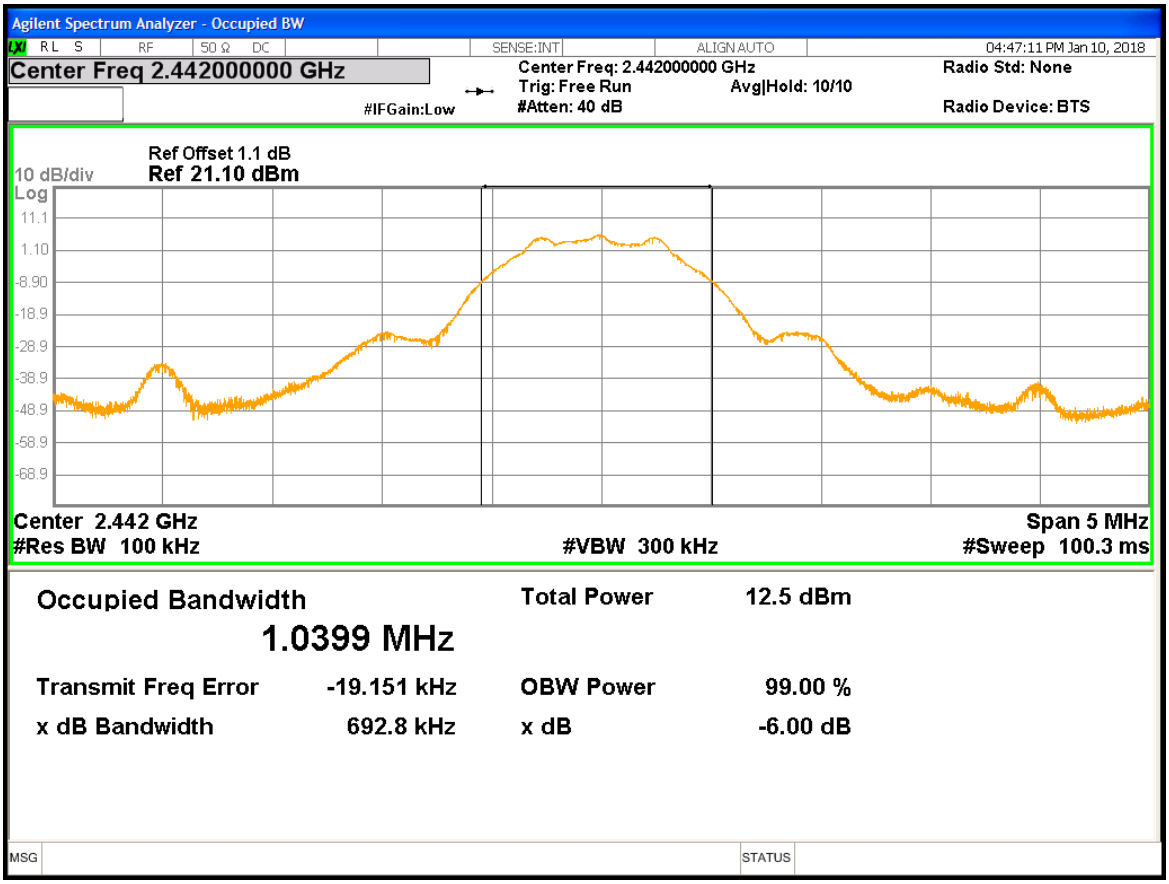

Figure 2 : 6dB & 99% Bandwidth – BLE – 2440MHz

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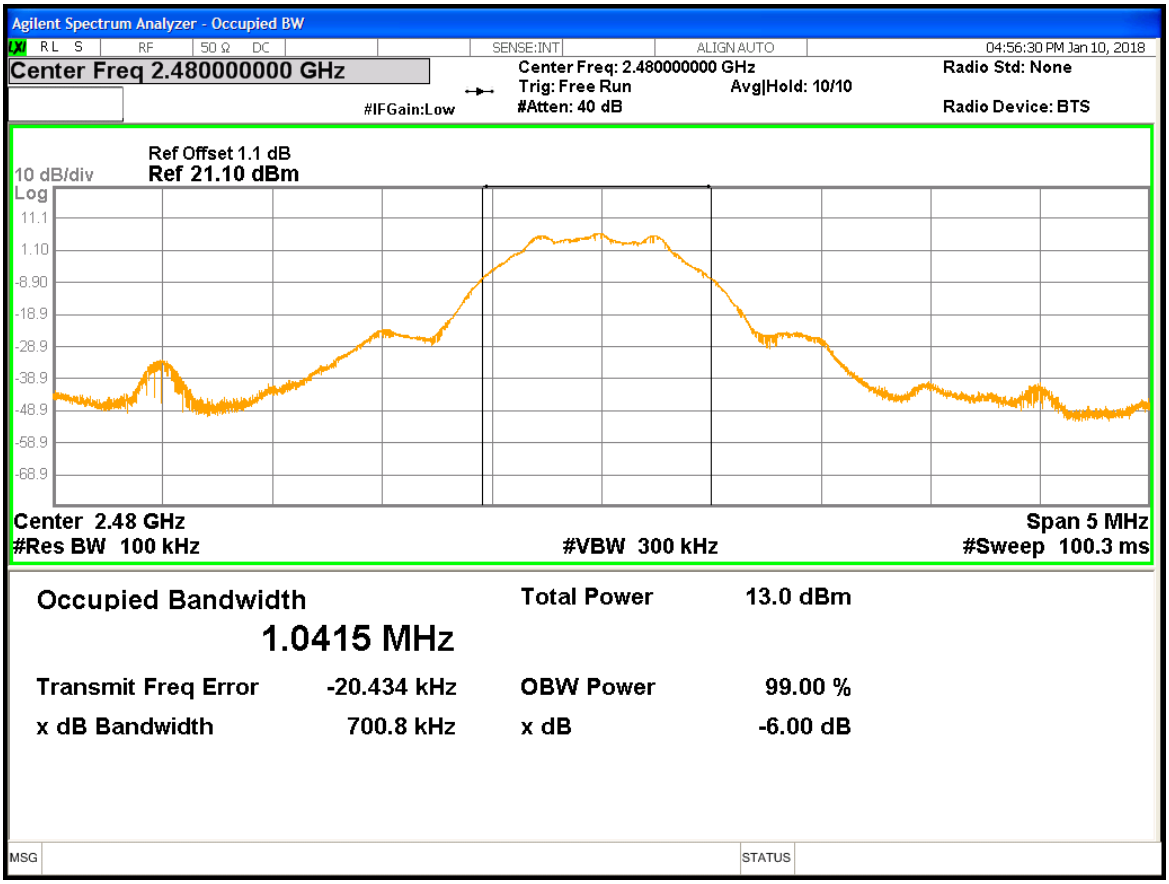


Figure 3 : 6dB & 99% Bandwidth – BLE – 2480MHz

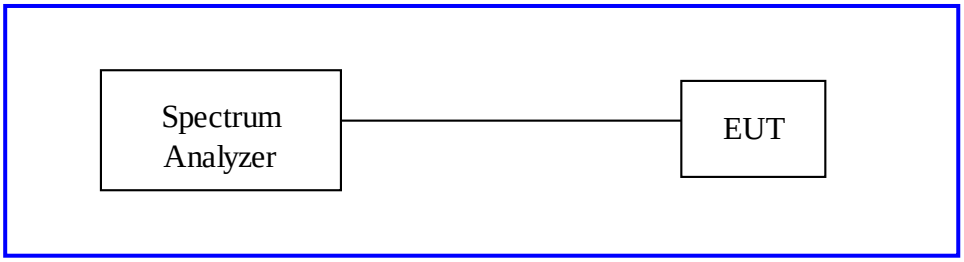
4.3 Peak Power Spectral Density

According to the CFR47 Part 15.247 (e) and RSS 247 Sect.5.2.2, 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.

4.3.1 Test Method

The conducted method was used to measure the channel power output per ANSI C63.10-2013 Section 11.10.2. The measurement was performed with modulation per CFR47 Part 15.247 (e) and RSS 247 Sect.5.2.2.

Test Setup:



4.3.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 4: Peak Power Spectral Density – Test Results – BLE 4.0

Test Conditions: Conducted Measurement, Normal Temperature			
Antenna Type: Custom Integrated		**Power Setting:** See test plan	
Signal State: Modulated			
Ambient Temp.: 24° C		**Relative Humidity:** 39%	
Peak Power Spectral Density – BLE 4.0			
Freq. (MHz)	**Measured PSD [dBm/3kHz]**	**Limit [dBm/3kHz]**	**Margin [dB]**
2402	-14.3	8	22.3
2440	-12.9	8	20.9
2480	-12.4	8	20.4
Note: All insertion loss corrections are accounted for in the measurement plots.			

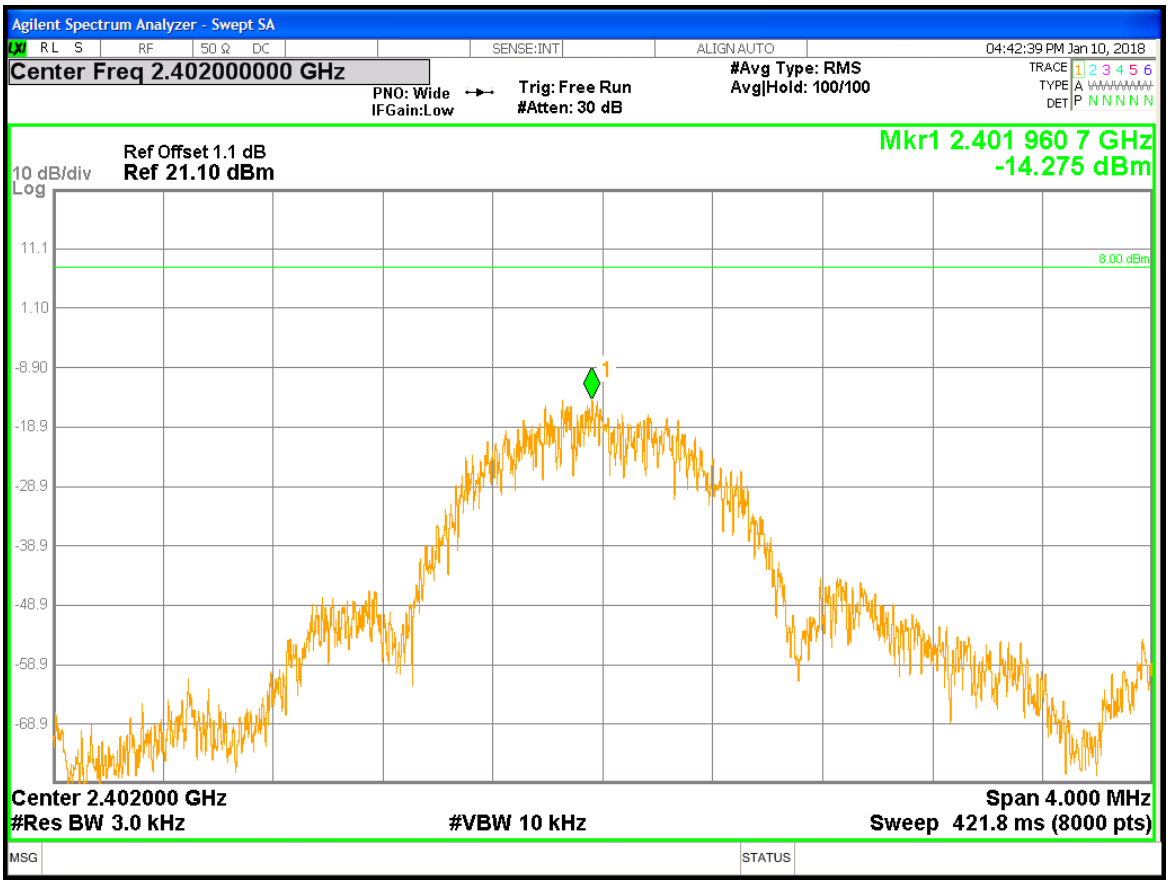


Figure 4: Power Spectral Density – BLE – 2402 MHz

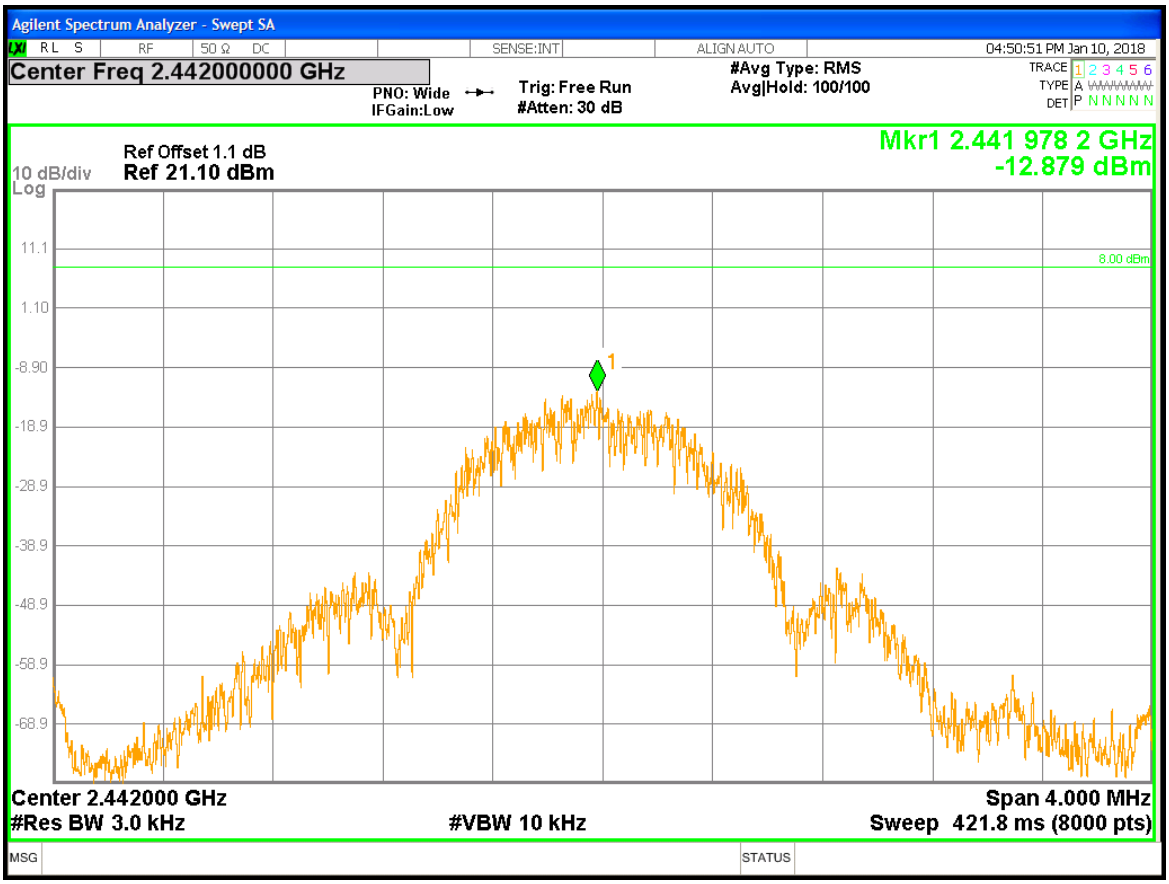


Figure 5: Power Spectral Density – BLE – 2440 MHz

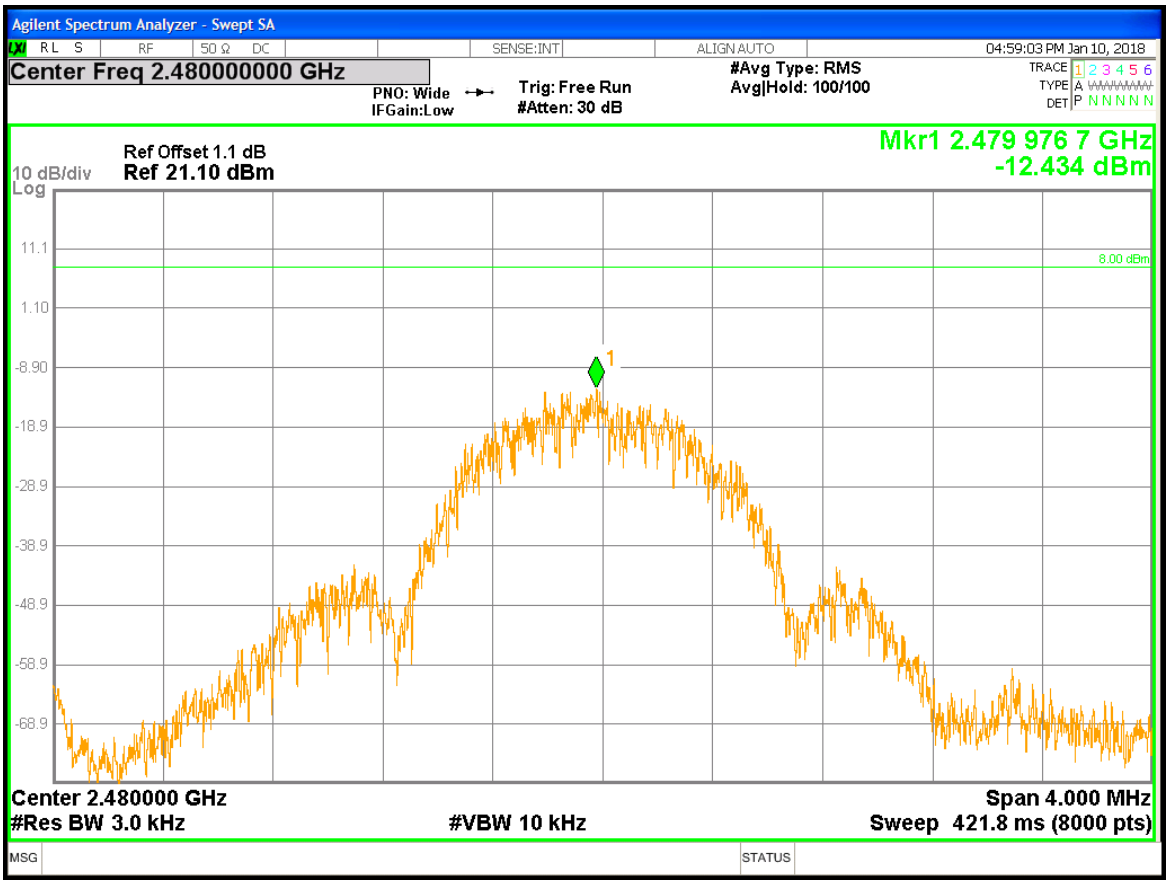


Figure 6: Power Spectral Density – BLE – 2480 MHz

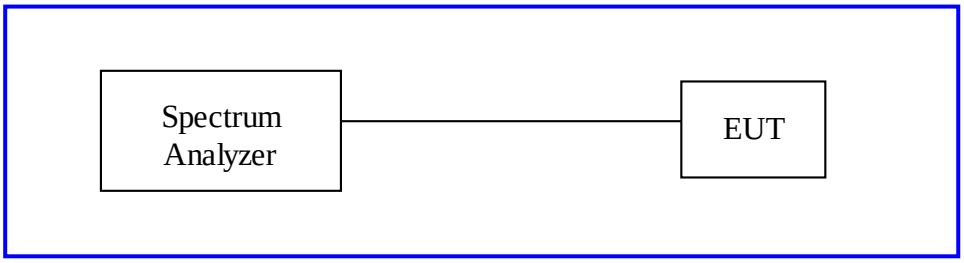
4.4 Out of Band Emissions- Non-Restricted and Restricted Bands

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmitting mode; per requirement of CFR47 15.205, 15.209, 15.247(d).

4.4.1 Test Method

The conducted method was used to measure the undesirable emission requirement for non-restricted bands. The radiated method was used to measure the undesirable emission requirement for non-restricted bands. The measurement was performed with modulation. Duty Cycle Measurements were performed according to ANSI 63.10 Section 11.6. Measurements for emissions in nonrestricted frequency bands were performed according to ANSI 63.10-2013 sections 6.10.4 and 11.11. Measurements for emissions in nonrestricted frequency bands were performed according to ANSI 63.10-2013 sections 6.10.5, 11.12.2.4 and 11.12.2.5.2.

4.4.2 Test Setup:



4.4.3 Duty Cycle

The duty cycle of the EUT while operating in each supported mode was measured. Applicable corrections have been applied to emissions measured while operating in modes with a duty cycle less than 98%. Application of the appropriate corrections are in accordance with ANSI 63.10 Section 11.

Mode	Continuous (>98%)	DC Constant?	On Time per period (ms)	Period (ms)	Duty Cycle	Duty Cycle Correction Factor (dB)
BT LE	No	Yes	392	648	60.5%	2.2

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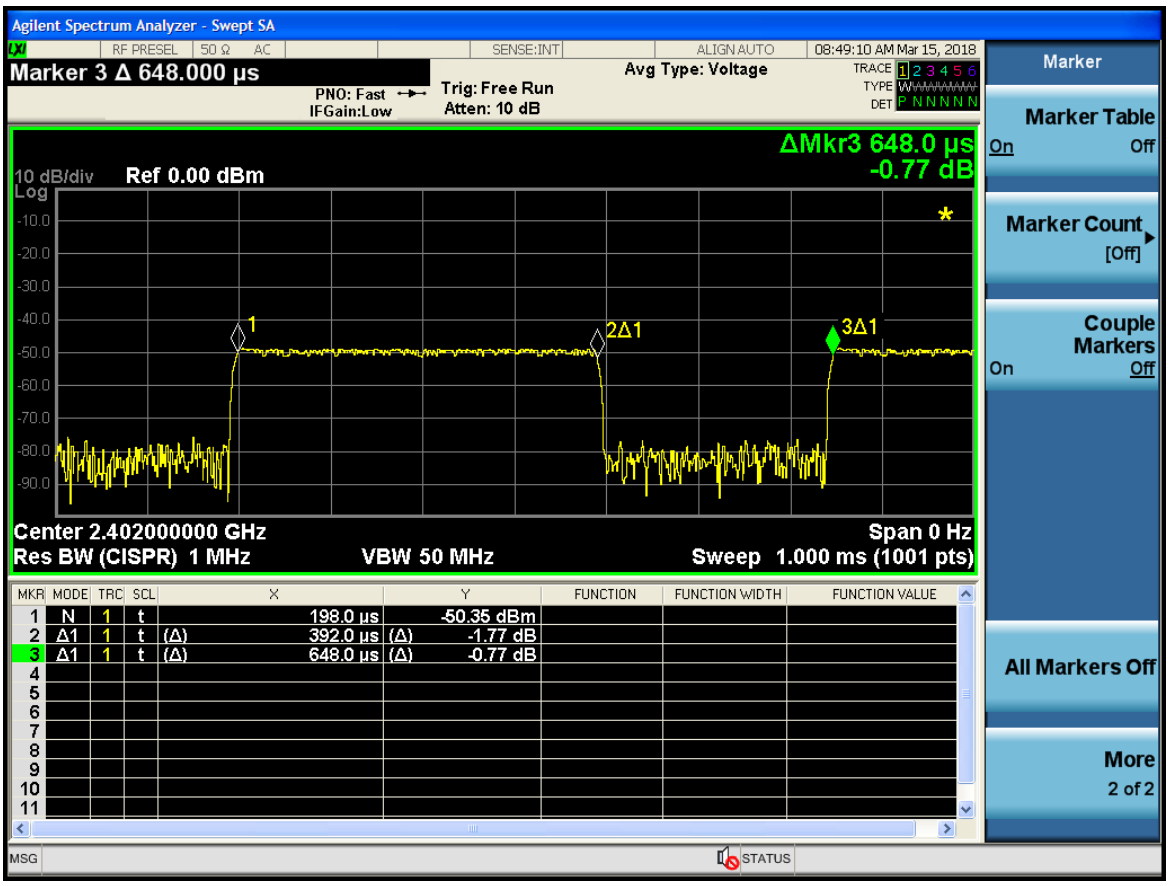

4.4.4 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 5: Out of Band Emissions including the Band-Edge – Test Results – BT LE

Test Conditions: Conducted Measurement, Normal Temperature					
Antenna Type: PIFA		**Power Setting:** See test plan			
Max. Directional Gain: 3.4 dBi		**Low Channel Maximum Level in 100kHz BW:** 4.7dBm			
Signal State: Modulated					
Ambient Temp.: 24° C		**Relative Humidity:** 39%			
Non-Restricted Frequency Band Emissions – BT LE 4.0					
Operating Freq. (MHz)	**Measured Freq. (MHz)**	**Measured (dBm)**	**Limit (dBm)**	**Margin (dB)**	**Result**
2402	2400	-41.8	-25.3	16.5	Pass
Note: 1. The stated limits are 30dBc relative to the max output measured in a 100kHz bandwidth					

Table 6: Out of Band Emissions including the Band-Edge – Test Results – BT LE

Test Conditions: Radiated Measurement, Normal Temperature					
Antenna Type: PIFA		**Power Setting:** See test plan			
Max. Directional Gain: 3.4 dBi		**Signal State:** Modulated			
Ambient Temp.: 24° C		**Relative Humidity:** 39%			
Restricted Frequency Band Emissions – BLE 4.0					
Operating Freq. (MHz)	**Measured Freq. (MHz)**	**Measured (dBuV/m)**	**Limit (dBuV/m)**	**Margin (dB)**	**Result**
2402	2384.3	61.8	74	12.2	Pass
2402	2387.1	43.6	54	10.4	Pass
2480	2489.4	65.0	74	9.0	Pass
2480	2483.5	48.0	54	6.0	Pass
Note: Unless otherwise specified, corrections for insertion losses are included in the plot					

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4.4.5 Measurement Plots

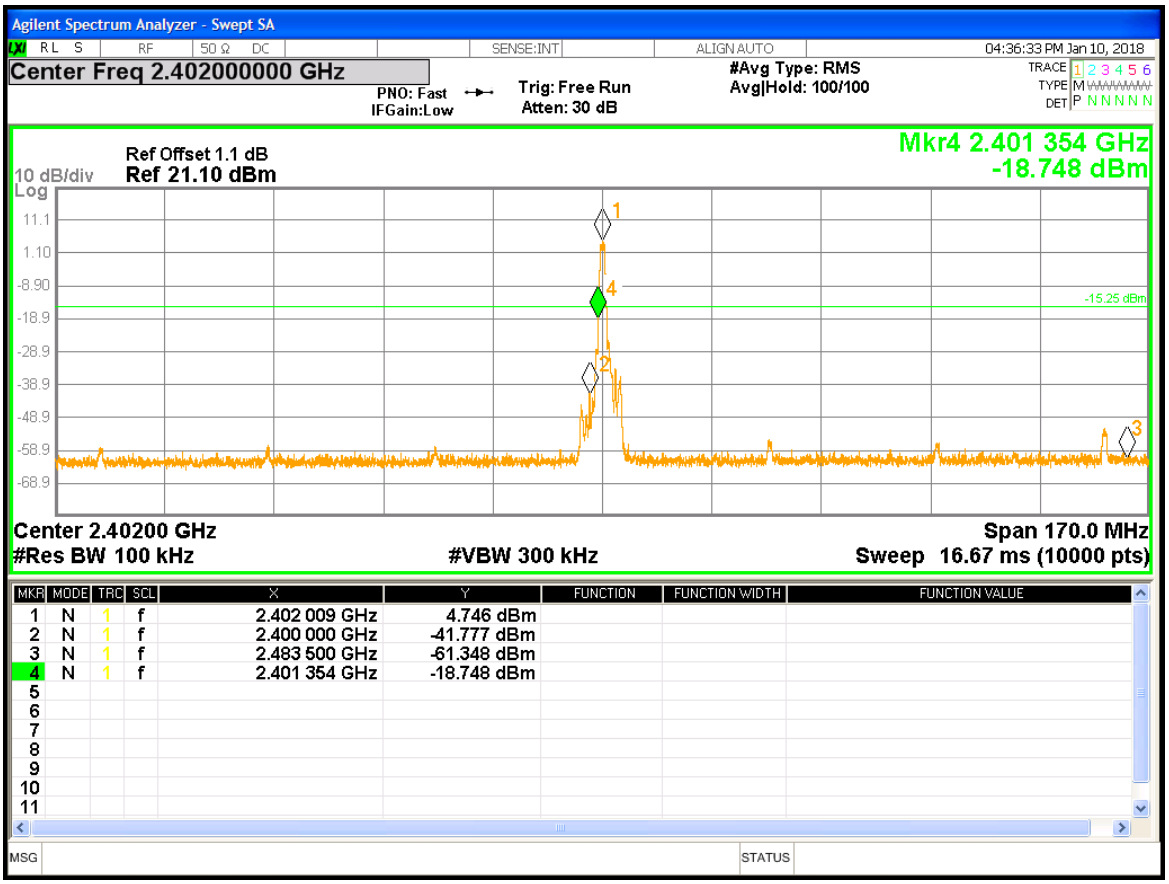


Figure 7: Low Channel Non-Restricted Band Edge– BT LE

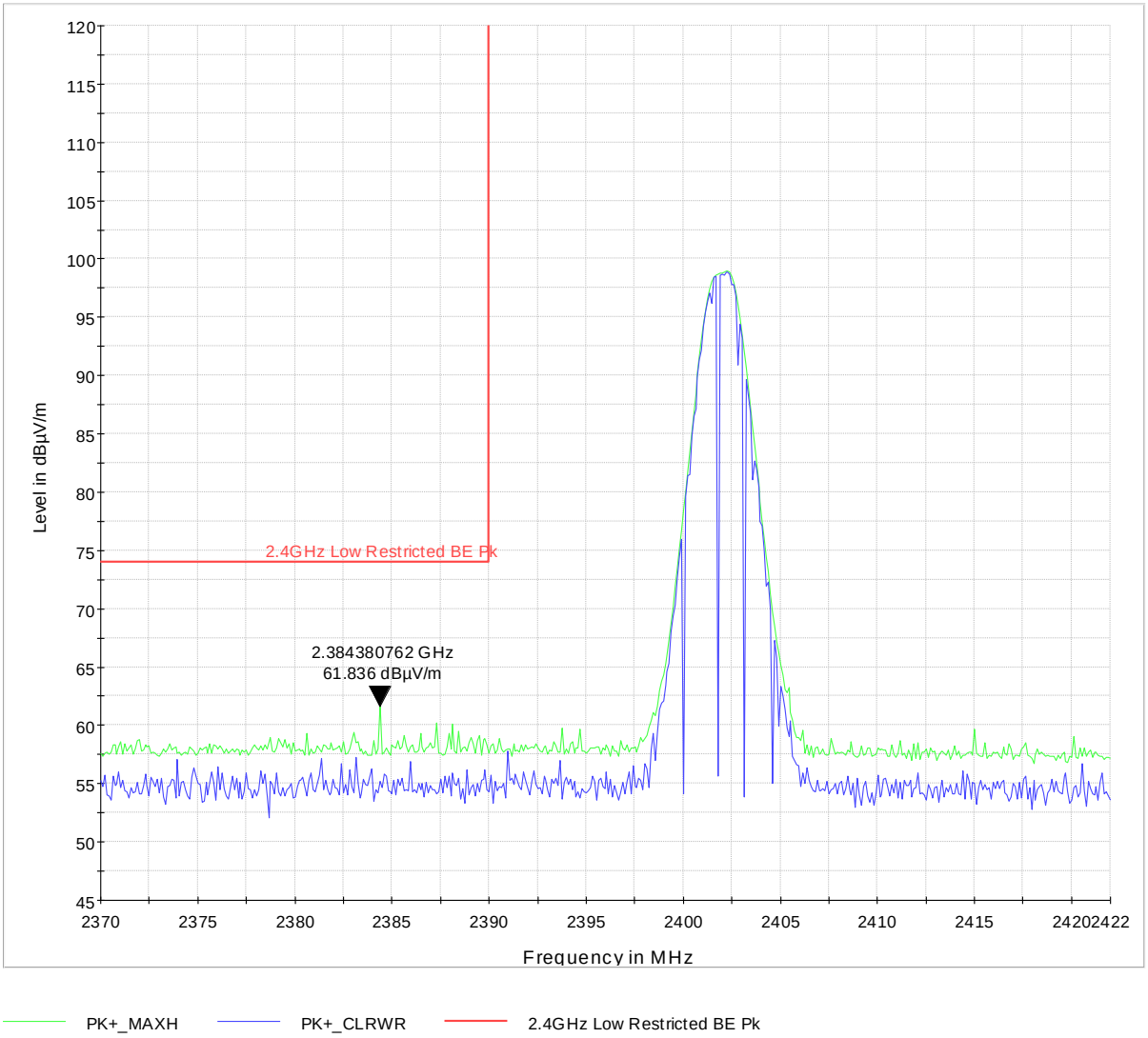


Figure 8: Low Channel Restricted Band Edge Peak Detector– BT LE

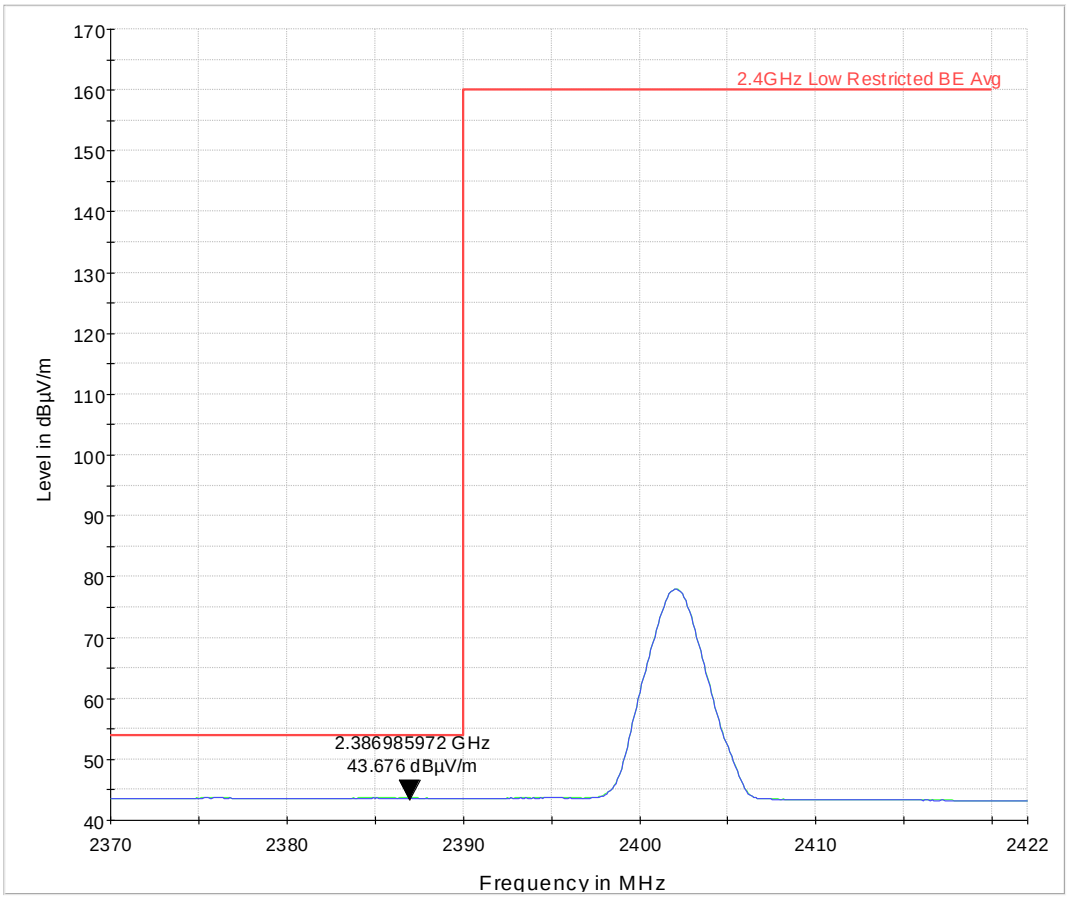


Figure 9: Low Channel Restricted Band Edge RMS Detector– BT LE

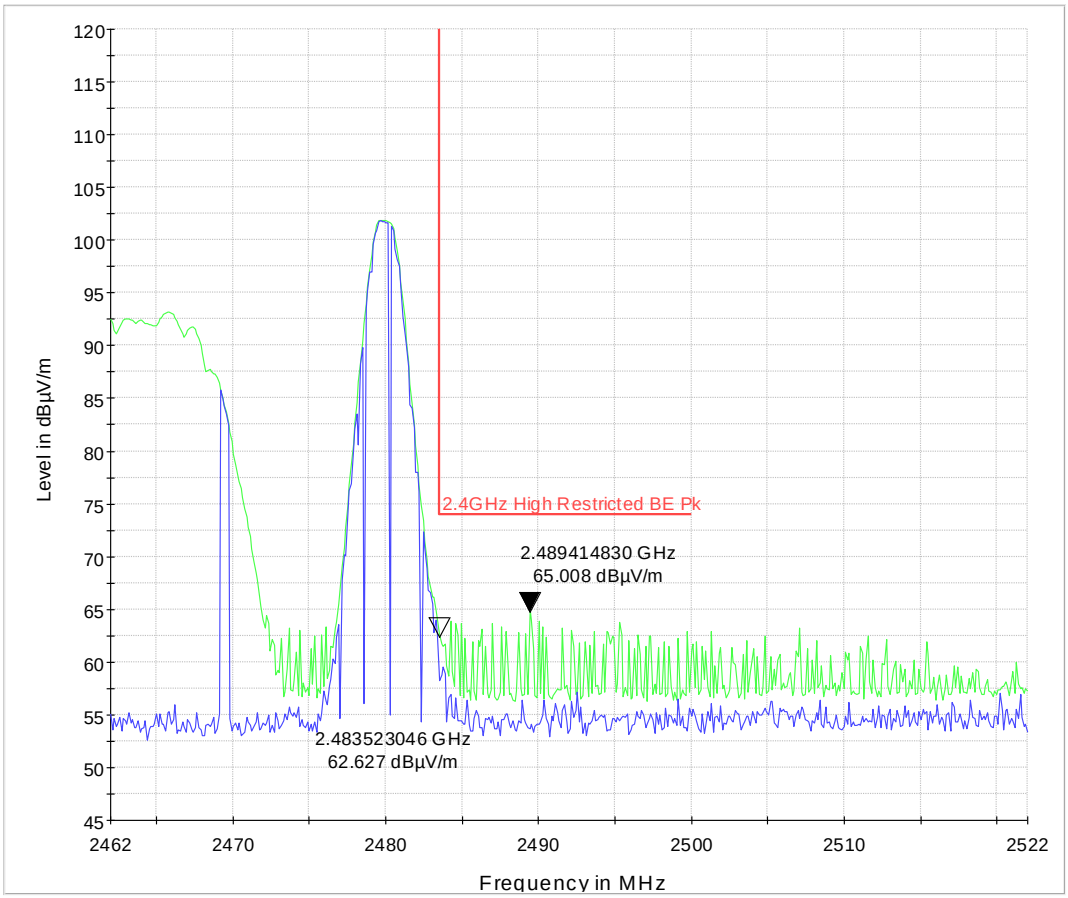


Figure 10: High Channel Restricted Band Edge Peak Detector– BT LE

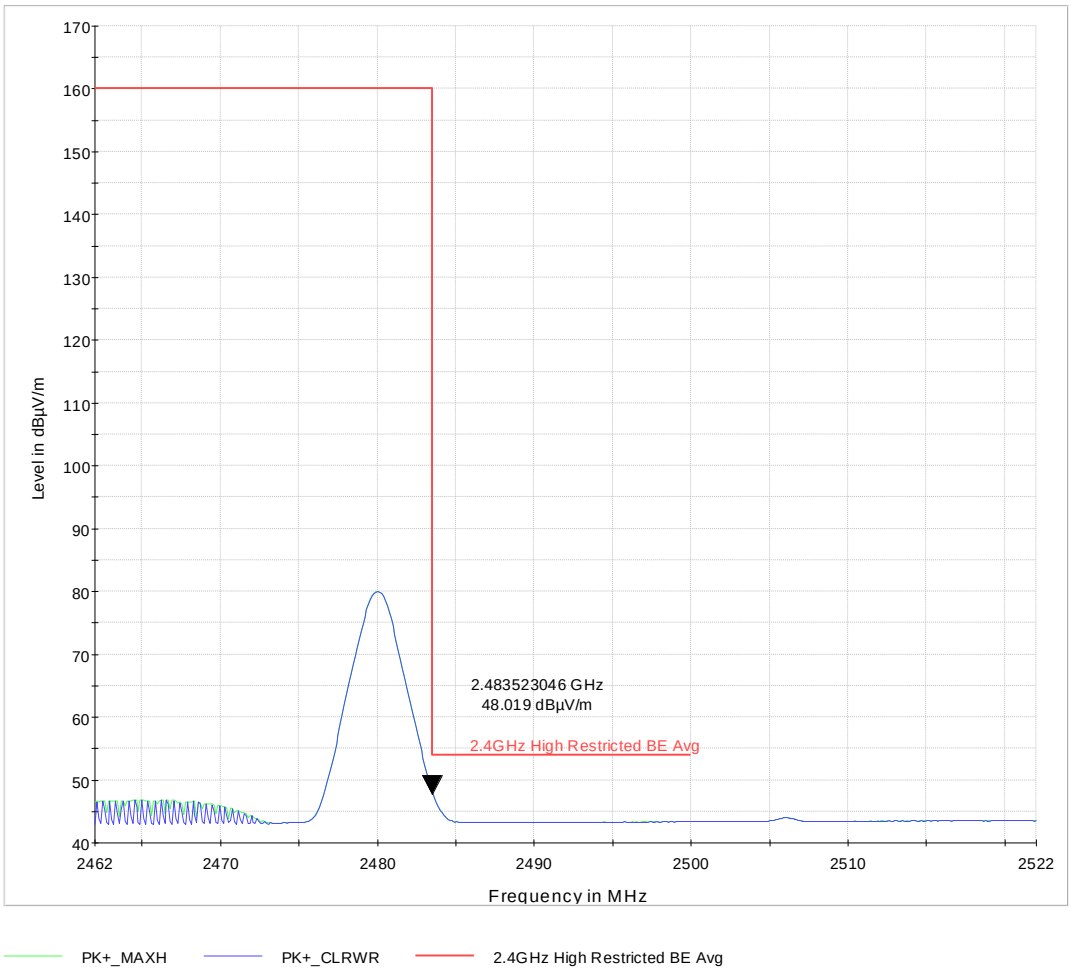


Figure 11: High Channel Restricted Band Edge RMS Detector– BT LE

4.5 Transmit Radiated Spurious Emissions

Transmitter spurious emissions are emissions outside the frequency range of the equipment when the equipment is in transmit mode; per requirement of CFR47 15.205, 15.209, 15.247(d).

4.5.1 Test Methodology

4.5.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emissions test procedure. The frequency range of interest was divided into sub-ranges. For each sub-range peak emission data was recorded and plotted while the turntable was rotated 360° in 90° steps and the measurement antenna was rotated in horizontal and vertical antenna polarization.

Preliminary emission profile testing was performed inside a semi-anechoic chamber. The EUT was placed on a non-conductive table 80 cm above the floor for emissions less than 1 GHz and 150cm above the floor for emissions greater than 1 GHz. The EUT was positioned as shown in the setup photographs. The measurement antenna was placed at a distance of 3m.

4.5.1.2 Final Test

Final testing was performed on an NSA compliant test site.

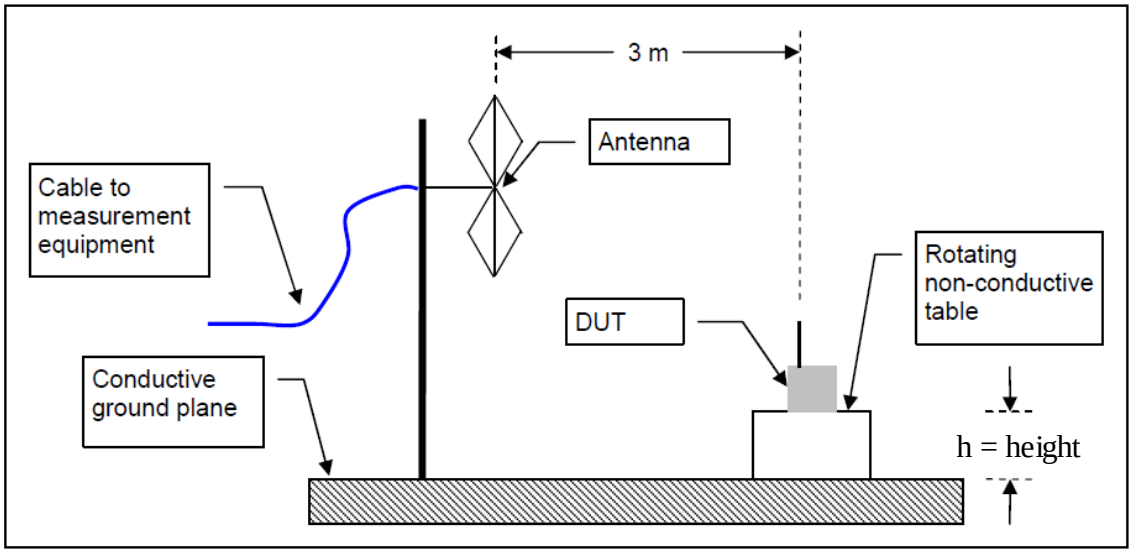
For each frequency measured, the peak emission was maximized by manipulating the receiving antenna from 1 to 4 meters above the ground plane and placing it at the position that produced the maximum signal strength reading. The turntable was then rotated through 360° while observing the peak signal and placing the EUT at the position that produced maximum radiation. Preliminary emissions within 10 dB of the limit were measured.

The final scans were performed on the worst EUT axis for three operating channels in the operating mode with the highest power.

4.5.1.3 Deviations

None.

Test Setup:



Where h = 80cm for <1GHz and 150cm for >1GHz

4.5.2 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209.

Frequency (MHz)	Field strength (microvolts/meter)	Measurement distance (meters)
0.009-0.490.....	2400/F(kHz)	300
0.490-1.705.....	24000/F(kHz)	30
1.705-30.0.....	30	30
30-88.....	100 **	3
88-216.....	150 **	3
216-960.....	200 **	3
Above 960.....	500	3

All harmonics and spurious emission which are outside of the restricted band shall be 20dB below the in-band emission.

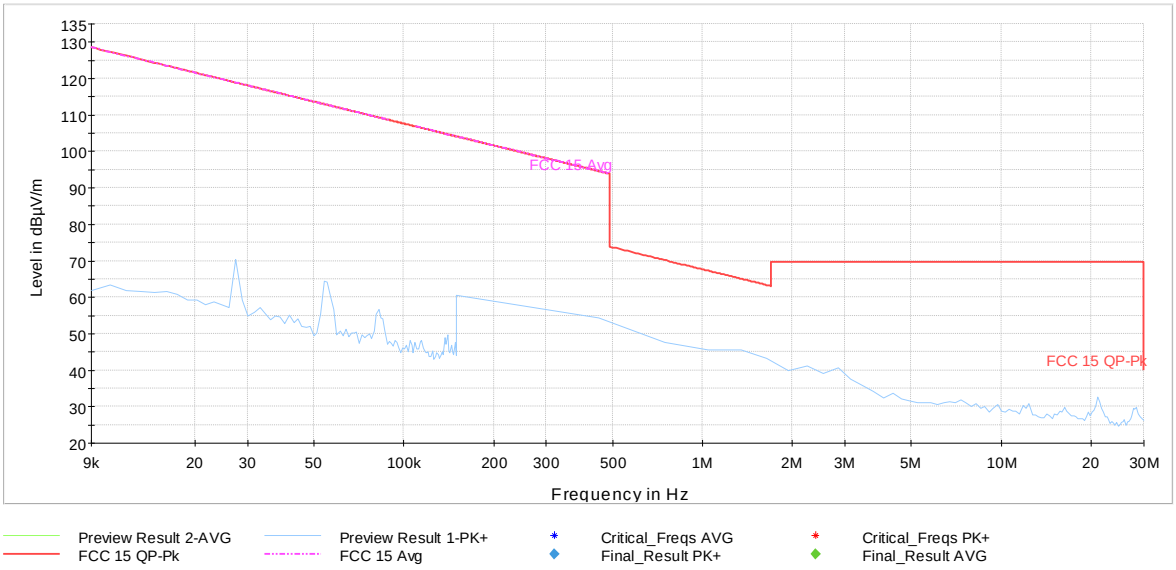
4.5.3 Test Results

The final measurement data was taken under the worst case operating modes, configurations, and/or cable positions. It also reflects the results including any modifications and/or special accessories listed in Sections 1.4 and test plan.

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	24° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2402MHz – BT LE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / 6502	**Performed by**	Douglas Antioco

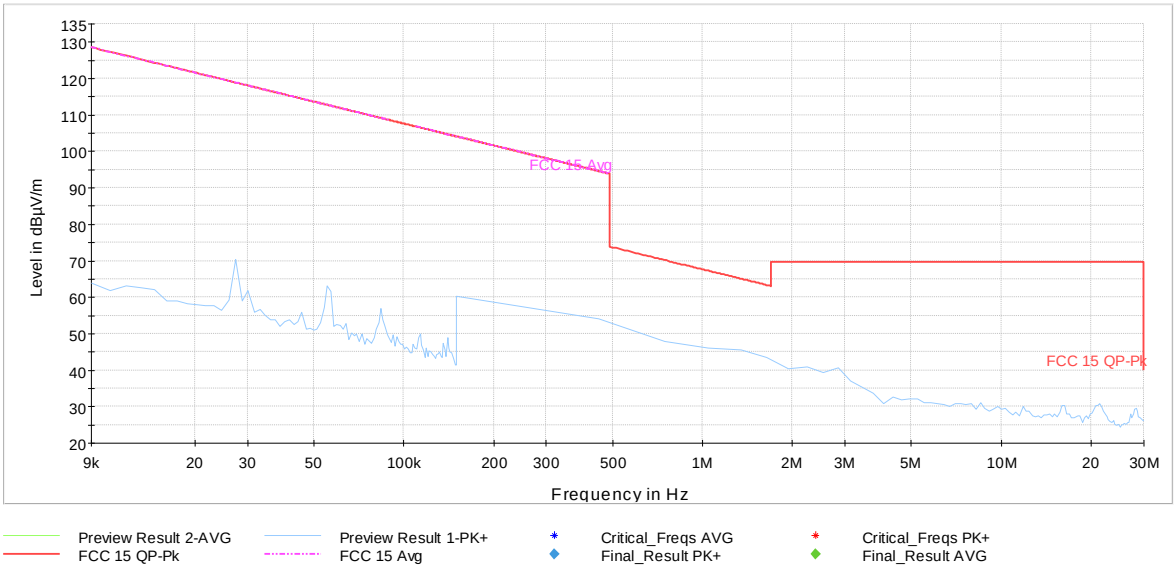
9KHz-30MHz Transmit at 2402 MHz (Low Channel)



Note:

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	24° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2440MHz – BT LE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	120 kHz/ 300 kHz
Dist/Ant Used	3m / 6502	**Performed by**	Douglas Antioco

9KHz-30MHz Transmit at 2440 MHz (Mid Channel)



Note:

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	24° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz – BT LE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	9KHz-150KHz :200Hz/ kHz/ 300 kHz
Dist/Ant Used	3m / 6502	**Performed by**	Douglas Antioco

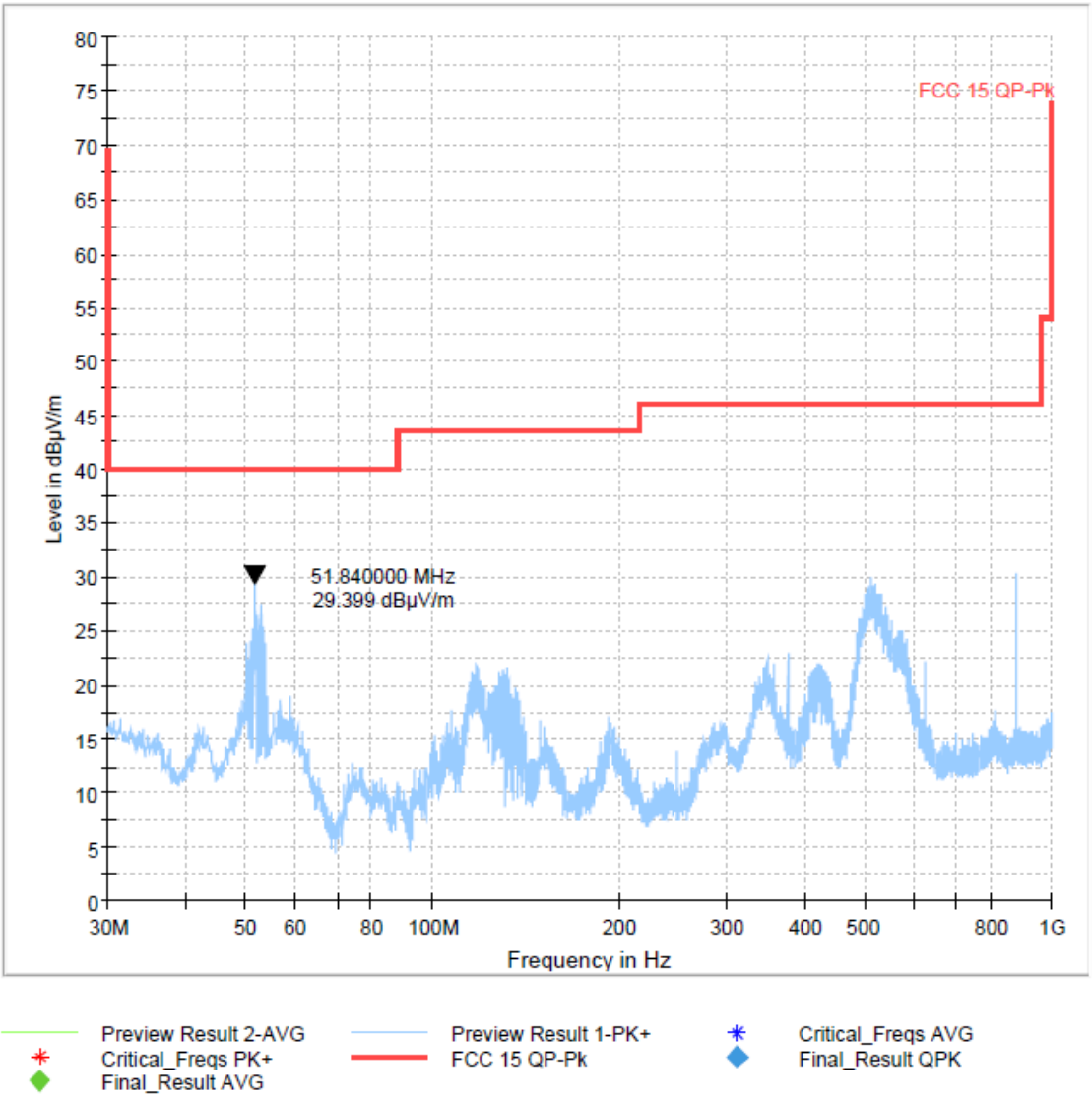
9KHz-30MHz Transmit at 2480 MHz (High Channel)

Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2402MHz - BLE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	100KHz/ 300KHz
Dist/Ant Used	3m/ JB3	**Performed by**	Douglas Antioco

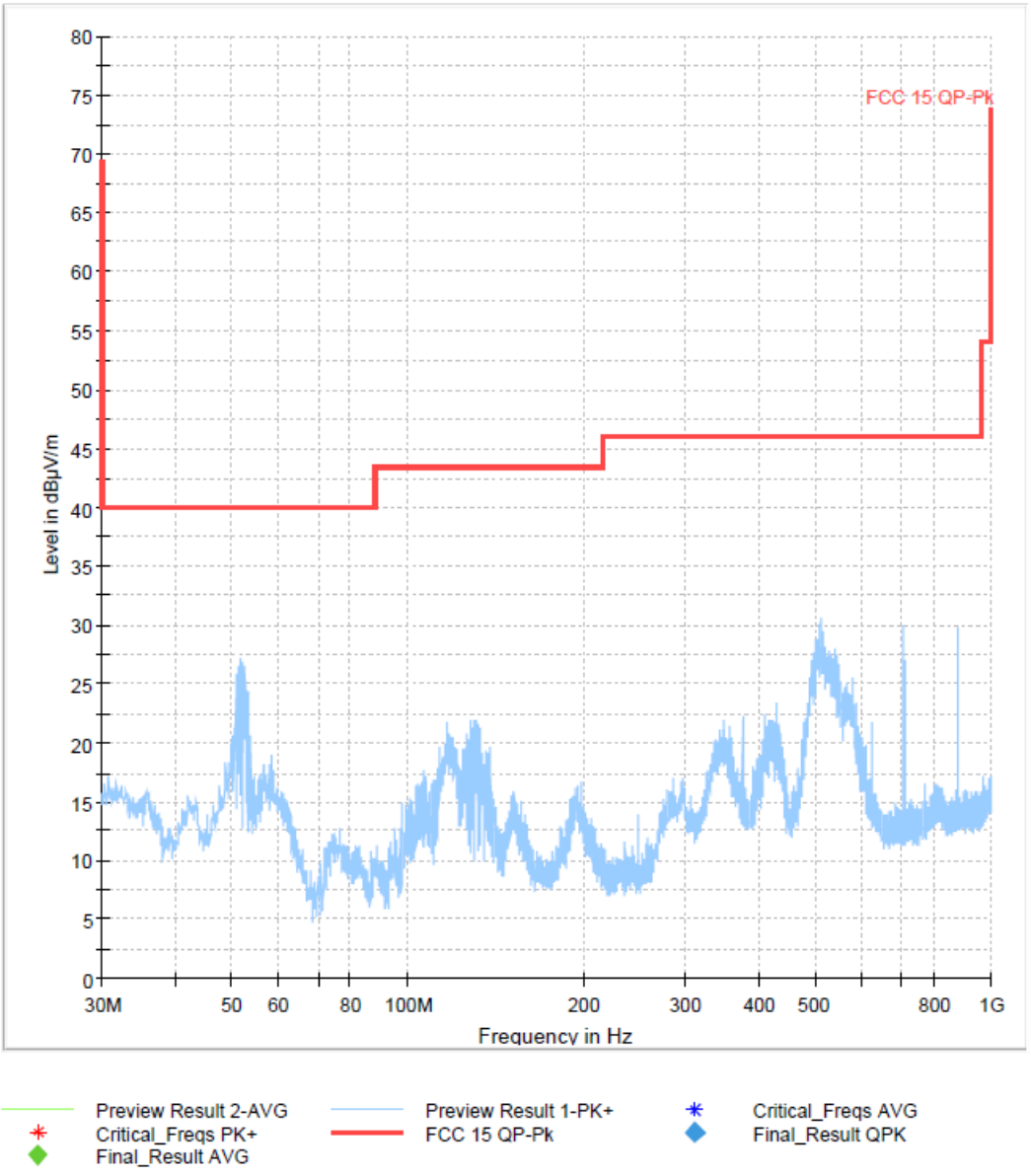
30MHz– 1 GHz Transmit at 2402 MHz (Low Channel)



Note:

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2440MHz - BLE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	100KHz/ 300KHz
Dist/Ant Used	3m/ JB3	**Performed by**	Douglas Antioco

30MHz-1GHz Transmit at 2440 MHz (Mid Channel)

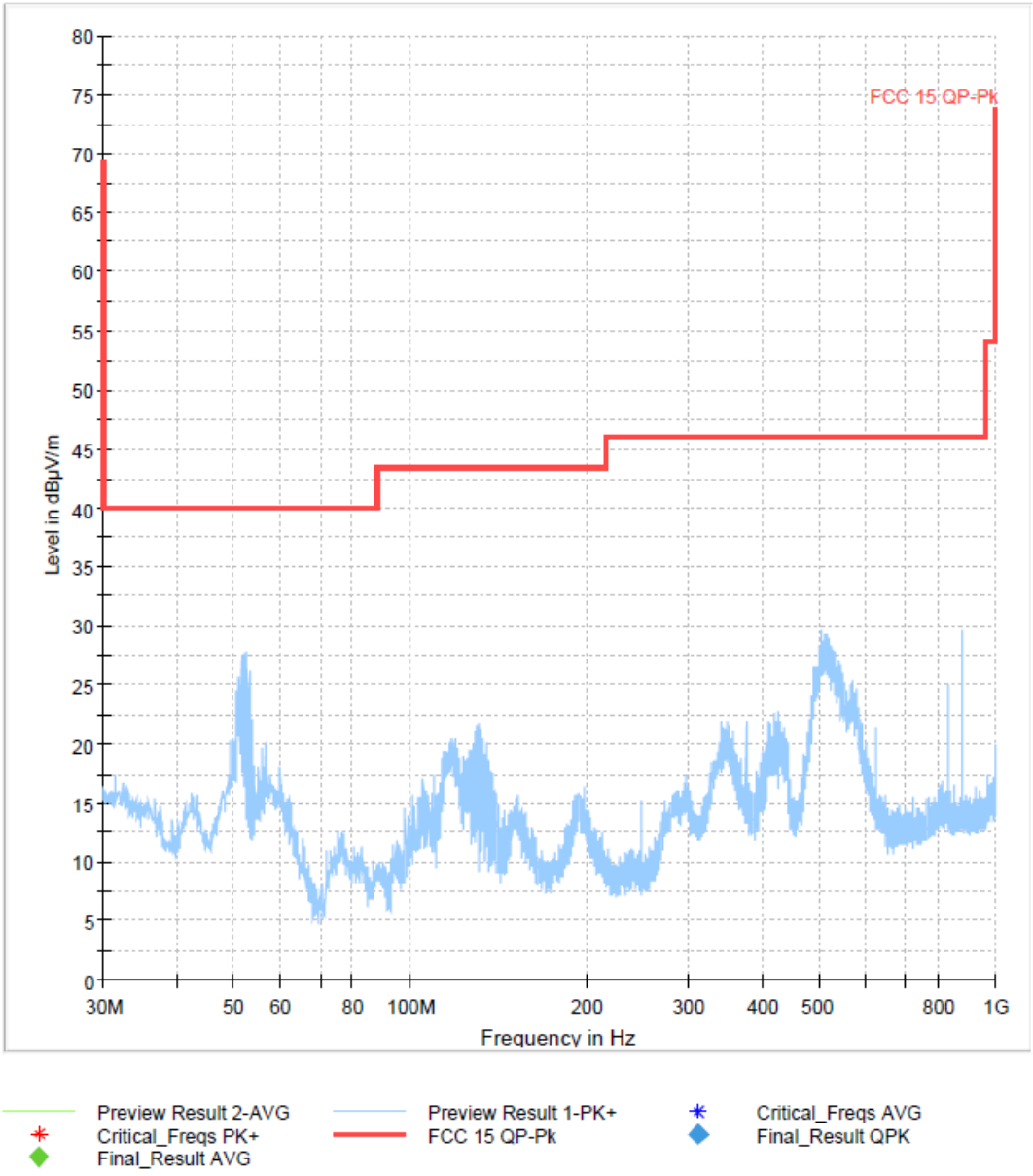


Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz - BLE	**Line AC / Freq**	120 VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	100KHz/ 300KHz
Dist/Ant Used	3m/ JB3	**Performed by**	Douglas Antioco

30MHz-1GHz Transmit at 2480 MHz (High Channel)



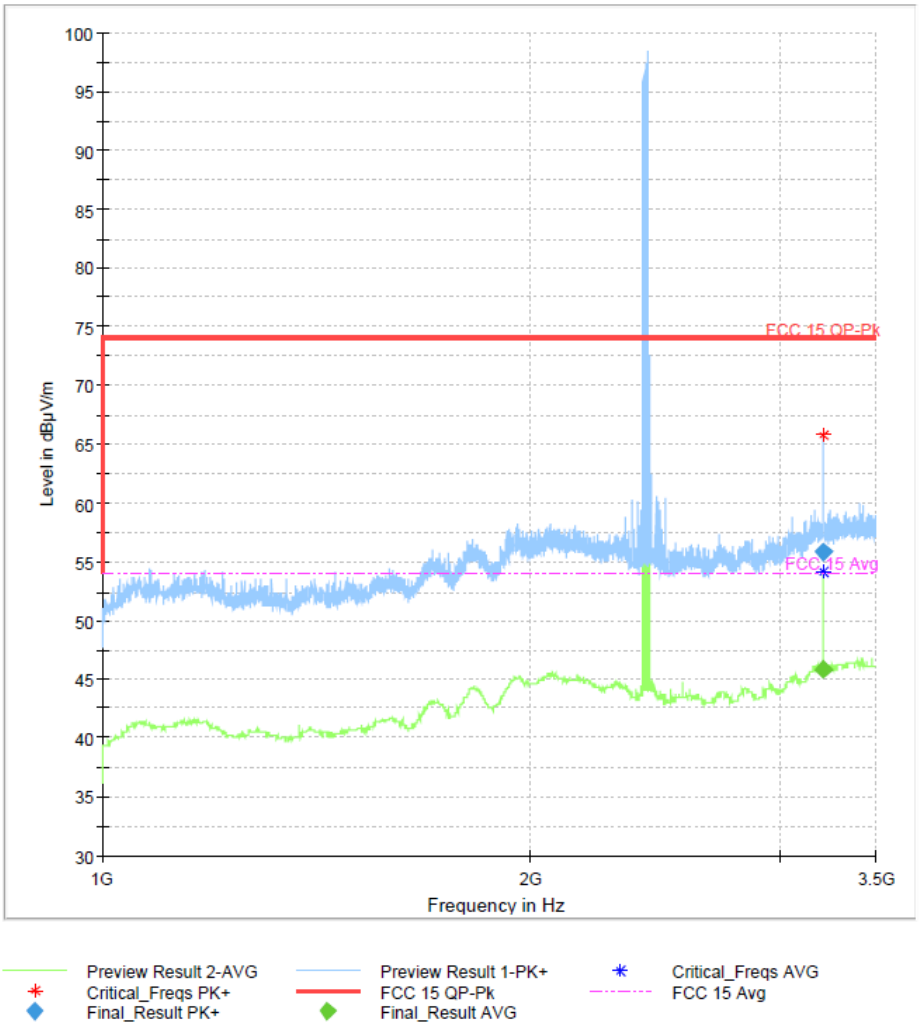
Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	20° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2402MHz - BLE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

1 – 3.5 GHz Transmit at 2402 MHz (Low Channel)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3211.800000	55.84	---	74.00	18.16	2.0	1000.000	200.6	V	187.0	33.8
3215.000000	---	45.86	54.00	8.14	2.0	1000.000	160.7	V	286.0	33.8



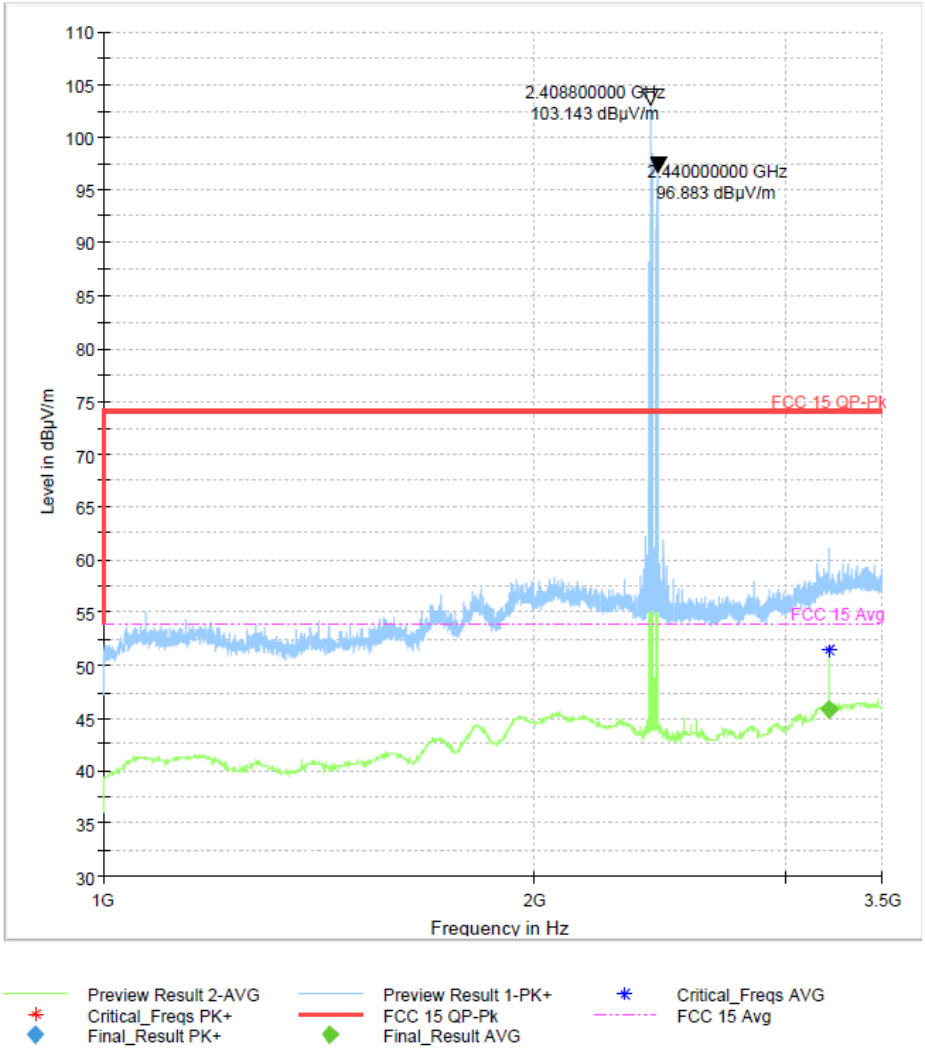
Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	20° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2440MHz - BLE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

1-3.5 GHz Transmit at 2440 MHz (Mid Channel)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3215.000000	---	45.86	54.00	8.14	2.0	1000.000	324.3	H	176.0	33.8



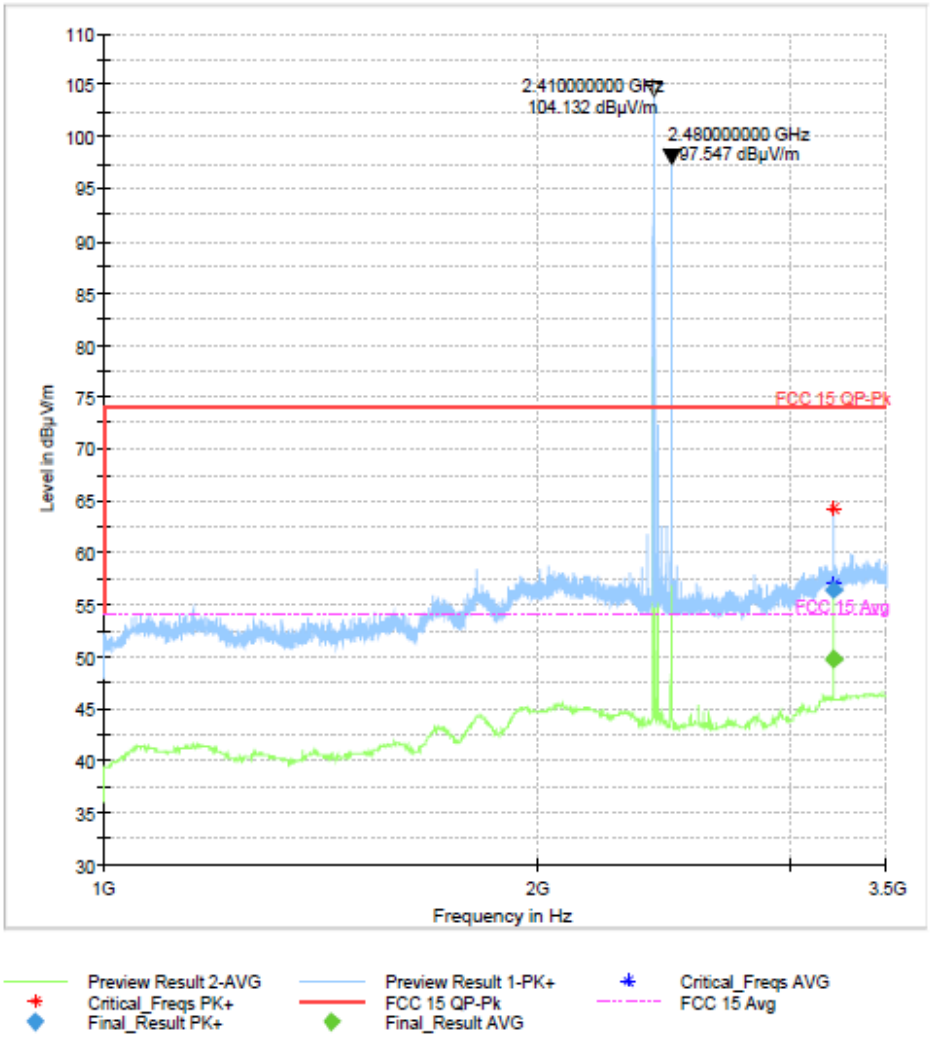
Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	20° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz - BLE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

1-3.5 GHz Transmit at 2480 MHz (High Channel)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB)
3215.000000	56.36	---	74.00	17.64	2.0	1000.000	254.5	V	232.0	33.8
3216.200000	---	49.74	54.00	4.26	2.0	1000.000	146.9	V	322.0	33.8



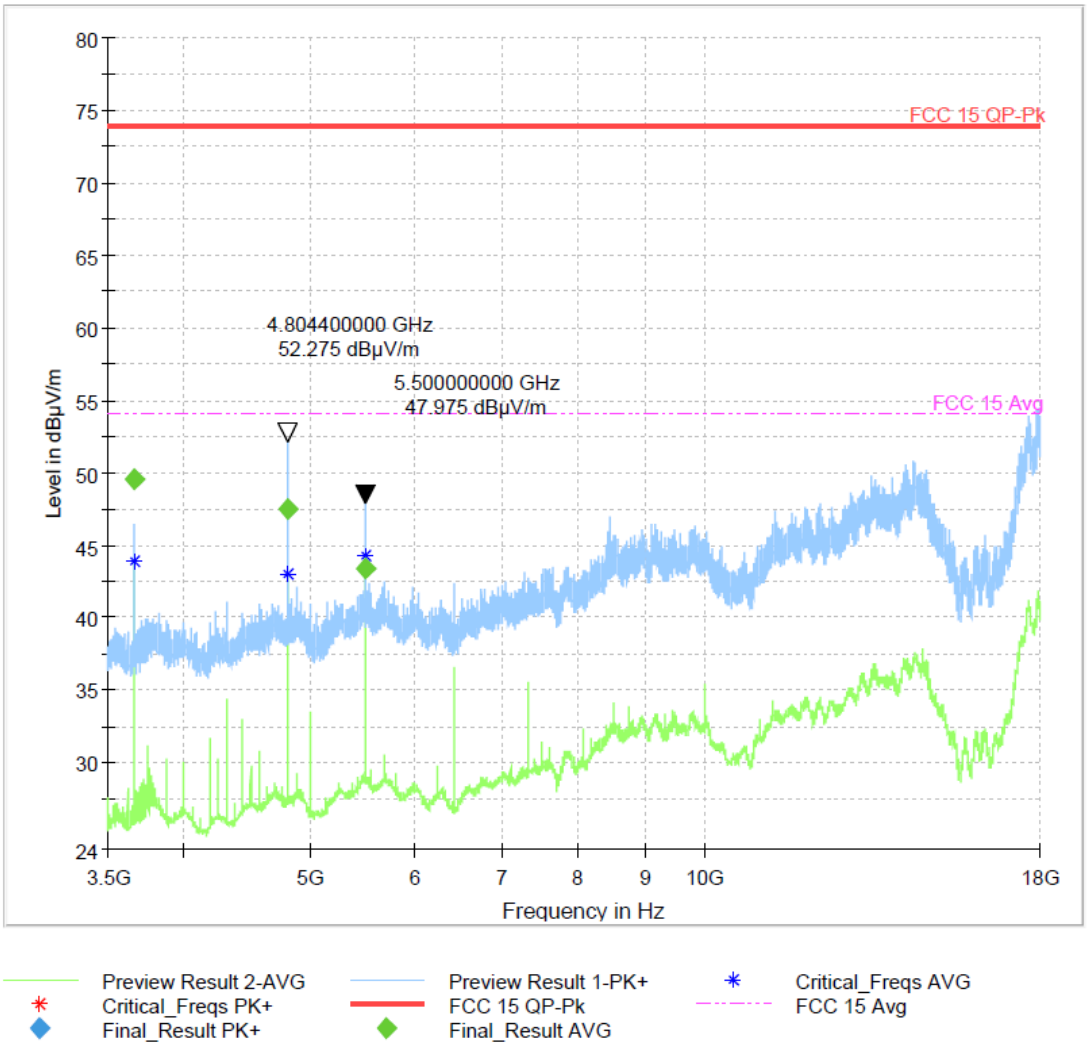
Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	24° C / 34%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2402MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

3.5 – 18 GHz Transmit at 2402MHz

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
3666.600000	---	49.61	54.00	4.39	2.0	1000.000	331.0	H	140.0
4803.800000	---	47.48	54.00	6.52	2.0	1000.000	174.3	H	110.0
5499.800000	---	43.35	54.00	10.65	2.0	1000.000	187.9	V	92.0



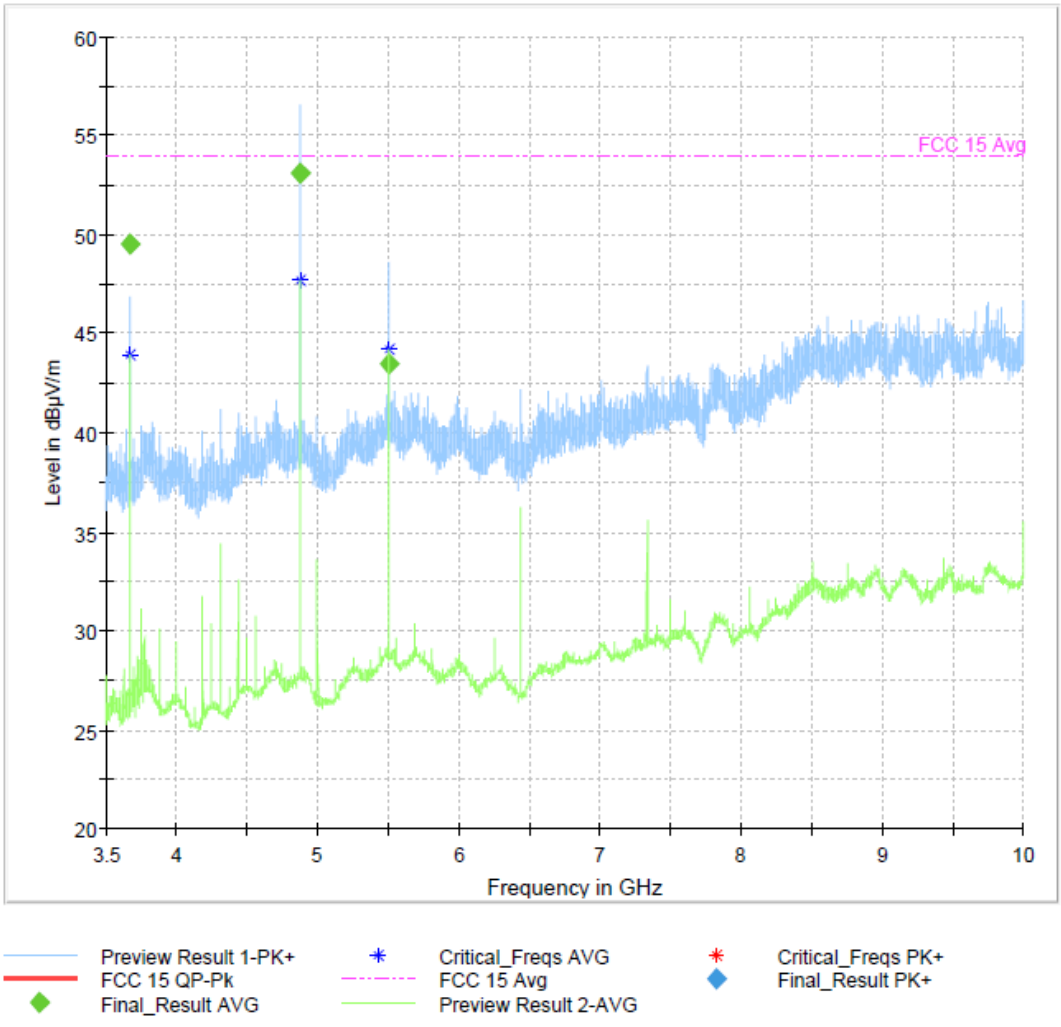
Note: 1.

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2440MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

3.5 - 18 GHz Transmit at 2440 MHz (Mid Channel)

Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
3666.600000	---	49.52	54.00	4.48	2.0	1000.000	250.0	H	140.0
4879.800000	---	53.10	54.00	0.90	2.0	1000.000	200.3	V	69.0
5499.800000	---	43.45	54.00	10.55	2.0	1000.000	185.7	V	92.0



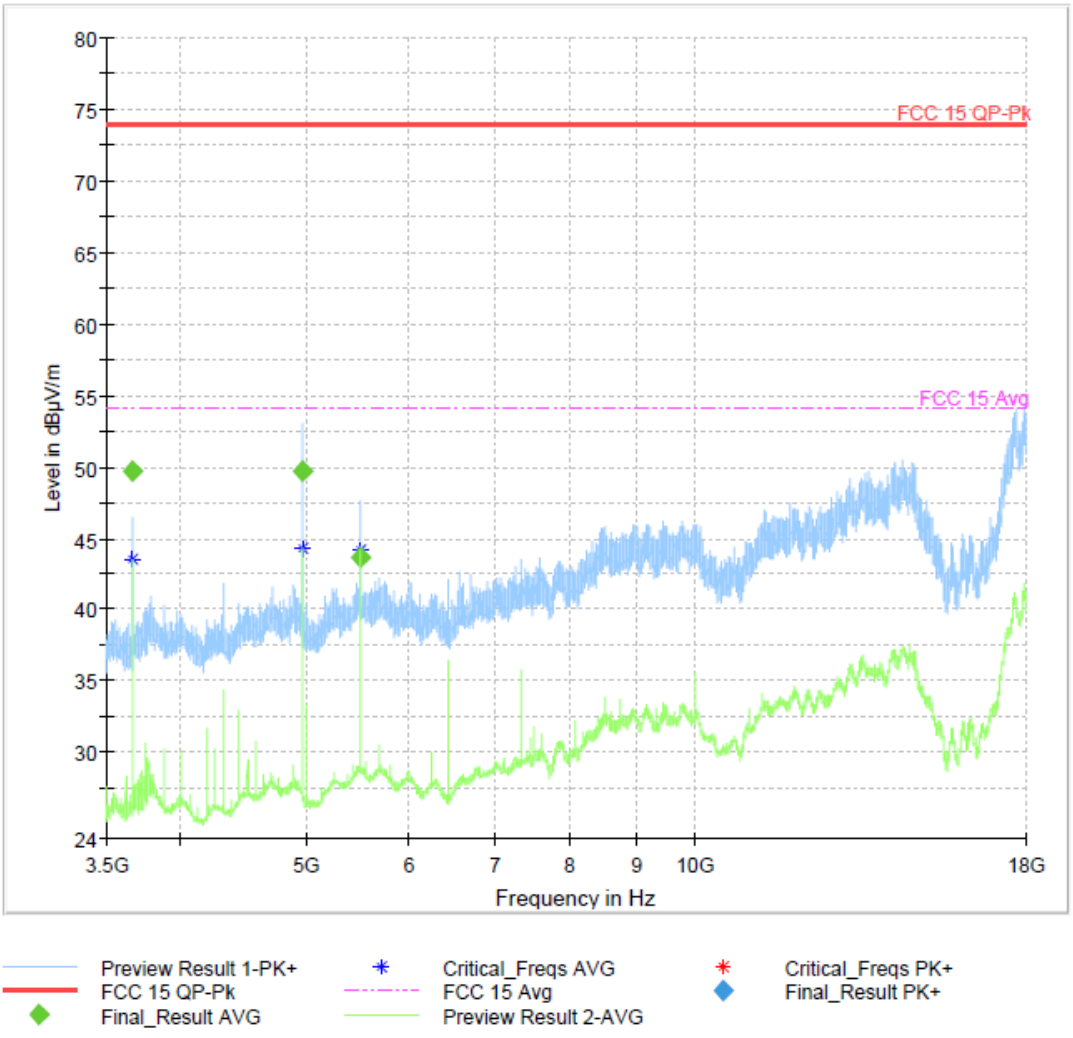
Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	3m/EMCO3115	**Performed by**	Douglas Antioco

3.5 – 18 GHz Transmit at 2480 MHz (High Channel)

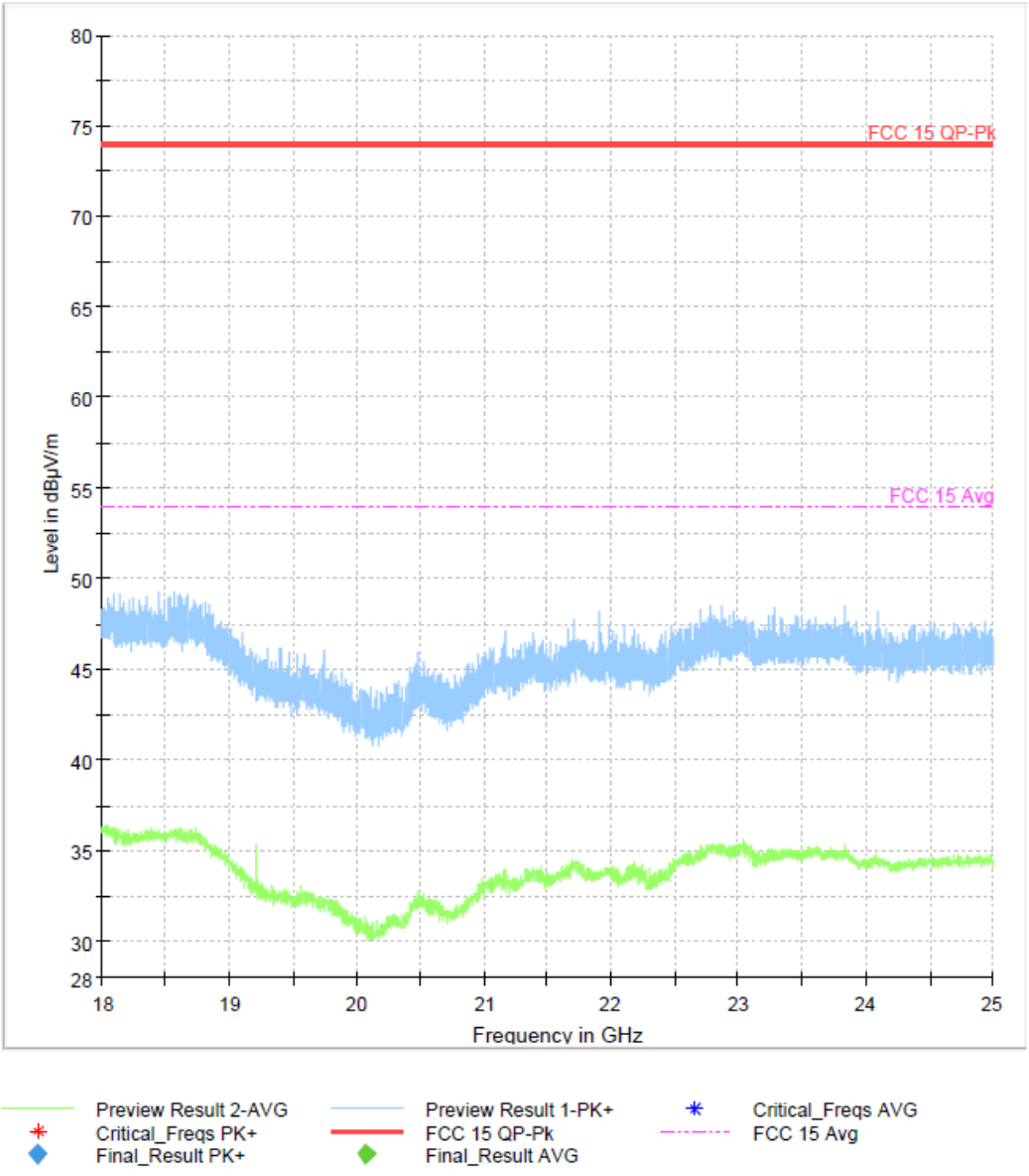
Frequency (MHz)	MaxPeak (dBµV/m)	Average (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)
3666.600000	---	49.69	54.00	4.31	2.0	1000.000	330.6	H	138.0
4959.800000	---	49.70	54.00	4.30	2.0	1000.000	228.2	V	70.0
5499.800000	---	43.60	54.00	10.40	2.0	1000.000	188.0	V	91.0



Note:

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2402MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	1m – AHA-840	**Performed by**	Douglas Antioco

18-25 GHz Transmit at 2402 MHz (Low Channel)

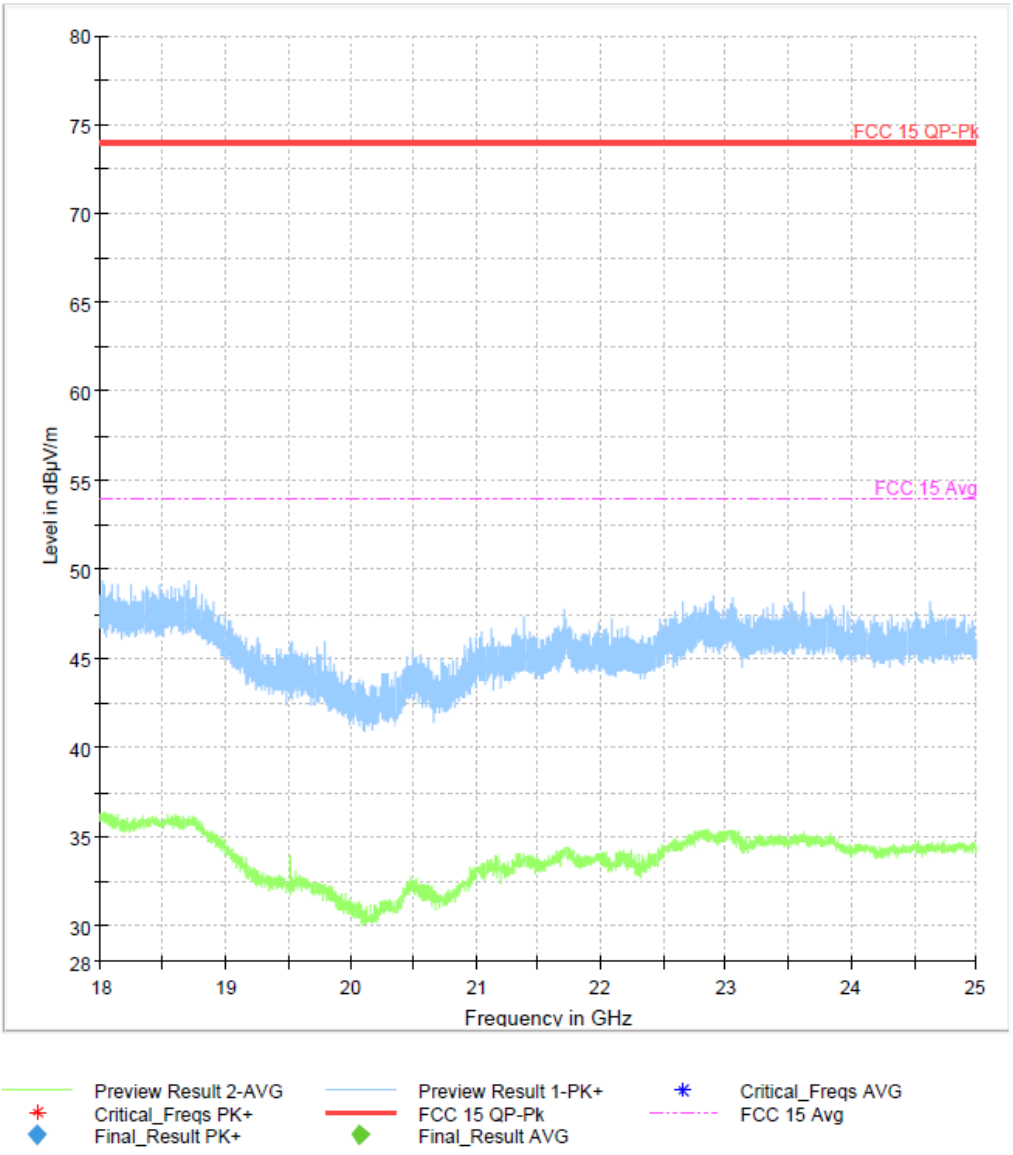


Note:

SOP 1 Radiated Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	1m – AHA-840	**Performed by**	Douglas Antioco

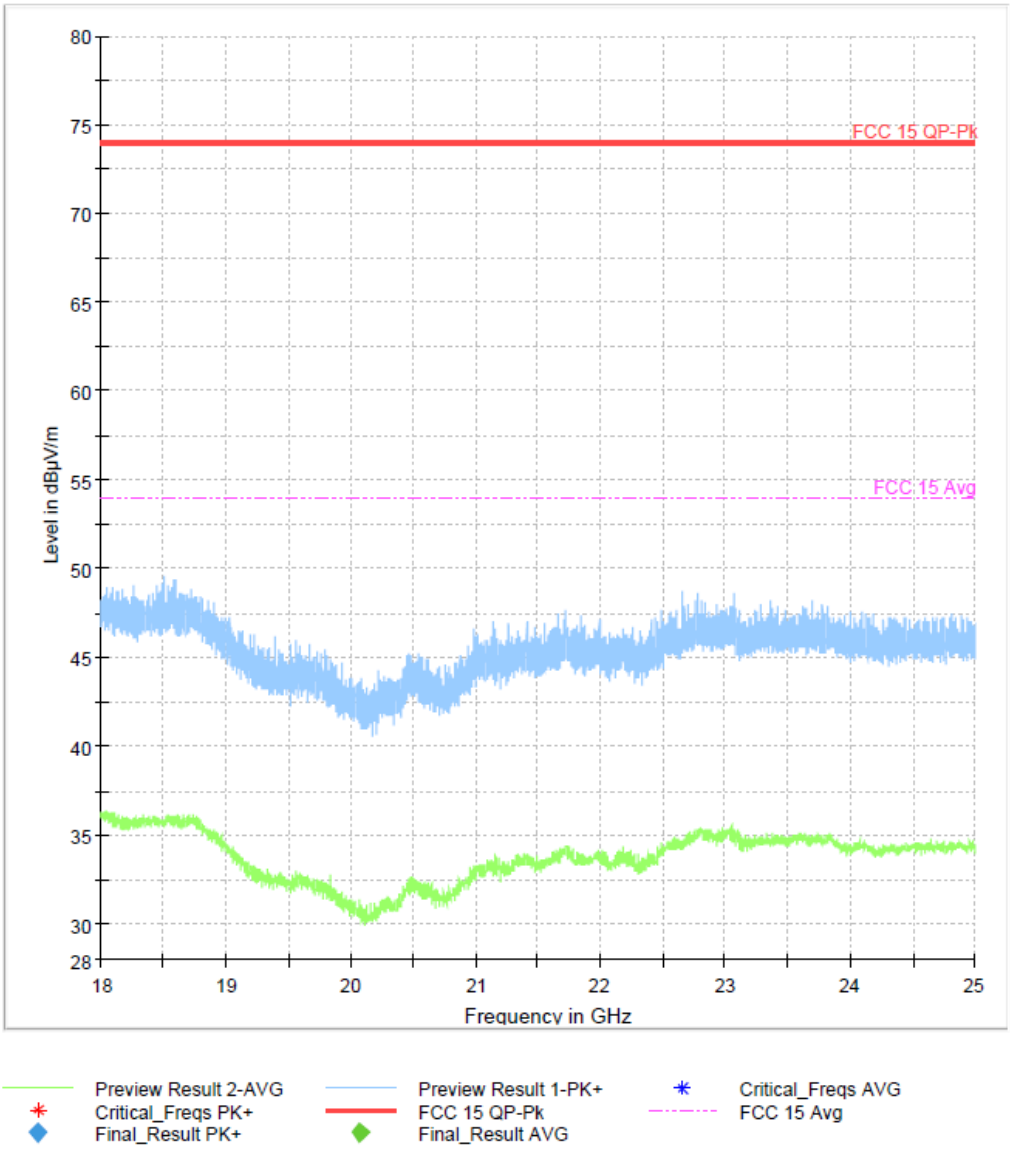
18-25 GHz Transmit at 2440 MHz (Mid Channel)



Note:

SOP 1 Radiated Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	21° C / 37%rh
EUT Serial	10041P625119C	**Temp / Hum out**	N/A
EUT Config.	2480MHz – BT LE	**Line AC / Freq**	120VAC
Standard	CFR47 Part 15 Subpart C	**RBW / VBW**	1 MHz/ 3 MHz
Dist/Ant Used	1m – AHA-840	**Performed by**	Douglas Antioco

18-25 GHz Transmit at 2480 MHz (High Channel)



Note:

4.6 AC Conducted Emissions

Testing was performed in accordance with ANSI C63.4: 2014. These test methods are listed under the laboratory's A2LA Scope of Accreditation.

This test measures RF emissions emanating from the EUT's AC input port, thus evaluating the potential for the EUT to cause radio frequency interference to other electronic devices.

The AC conducted emissions of equipment under test shall not exceed the values in CFR47 Part 15.207.

4.6.1 Test Methodology

A test program that controls instrumentation and data logging was used to automate the AC Power Line Conducted emission test procedure. The frequency range of interest was divided into sub-ranges such as to yield a frequency resolution of 9 kHz. Each phase and neutral of the AC power line were measured with respect to ground. Measurements were performed using a set of 50µH / 50Ω LISNs.

Testing is performed in Lab 5. The setup photographs clearly identify which site was used. The vertical ground plane used in the semi-anechoic chamber is a 2m x 2m solid aluminum frame and panel, and it is bonded to the horizontal ground plane.

In the case of tabletop equipment, the EUT is placed on a 1.0m x 1.5m non-conductive table 80cm above the ground plane and 40cm from a vertical ground reference plane. The rear of the EUT was positioned flush with the backside of the table and directly over the LISNs. The power and I/O cables were routed over the edge of the table and bundled approximately 40cm from the ground plane. Support equipment was powered from a separate LISN.

4.6.1.1 Deviations

There were no deviations from this test methodology.

4.6.2 Test Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 7: AC Conducted Emissions – Test Results

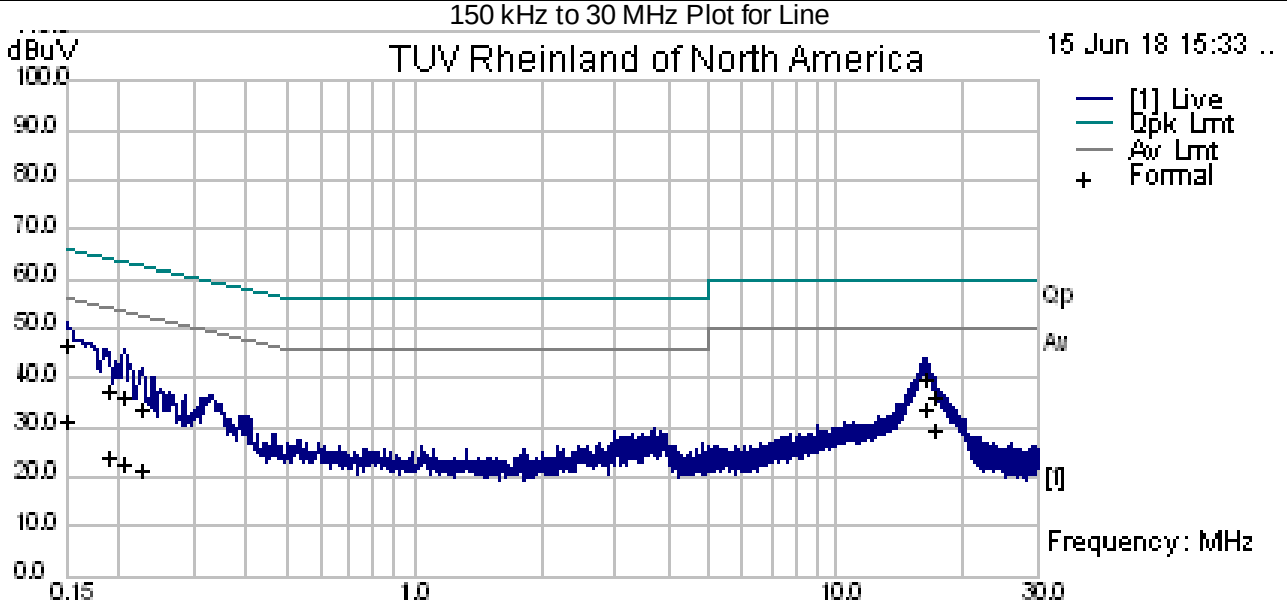
SOP 2 Conducted Emissions			
EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	22° C / 40% rh
EUT Serial	10041P231551	**Temp / Hum out**	N/A
EUT Config.	Continuous Tx Mid Channel (19)	**Line AC / Freq**	120Vac / 60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power	**Performed by**	Benjamin Atsu

Neutral									
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
16.28265	34.49	10.03	-0.02	44.5	QP	Neutral	60	-15.5	Pass
0.164578	36.47	9.82	0.05	46.34	QP	Neutral	65.23	-18.89	Pass
16.93459	32.07	10.04	-0.02	42.09	QP	Neutral	60	-17.91	Pass
17.84038	28.45	10.04	-0.03	38.47	QP	Neutral	60	-21.53	Pass
0.330186	28.11	9.83	0.03	37.98	QP	Neutral	59.45	-21.47	Pass
0.238052	25.01	9.83	0.04	34.88	QP	Neutral	62.16	-27.28	Pass
16.28265	27.9	10.03	-0.02	37.92	Average	Neutral	50	-12.08	Pass
0.164578	25.02	9.82	0.05	34.89	Average	Neutral	55.23	-20.34	Pass
16.93459	25.73	10.04	-0.02	35.75	Average	Neutral	50	-14.26	Pass
17.84038	22.22	10.04	-0.03	32.23	Average	Neutral	50	-17.77	Pass
0.330186	19.82	9.83	0.03	29.69	Average	Neutral	49.45	-19.76	Pass
0.238052	15.09	9.83	0.04	24.96	Average	Neutral	52.16	-27.2	Pass
Line									
Frequency	Raw	Limiter	Ins. Loss	Level	Detector	Line	Limit	Margin	Result
MHz	dBuV	dB	dB	dBuV		Line	dBuV	dB	
0.15	37	9.82	0.06	46.88	QP	Live	66	-19.13	Pass
16.2879	29.84	10.03	-0.02	39.85	QP	Live	60	-20.15	Pass
0.206563	26.54	9.83	0.04	36.41	QP	Live	63.34	-26.93	Pass
0.18732	27.82	9.82	0.04	37.68	QP	Live	64.15	-26.47	Pass
17.15594	26.03	10.04	-0.02	36.04	QP	Live	60	-23.96	Pass
0.227556	24.12	9.83	0.04	33.99	QP	Live	62.54	-28.55	Pass
0.15	21.39	9.82	0.06	31.27	Average	Live	56	-24.73	Pass
16.2879	23.68	10.03	-0.02	33.7	Average	Live	50	-16.31	Pass
0.206563	12.87	9.83	0.04	22.74	Average	Live	53.34	-30.6	Pass
0.18732	14.16	9.82	0.04	24.03	Average	Live	54.15	-30.13	Pass
17.15594	19.58	10.04	-0.02	29.6	Average	Live	50	-20.41	Pass
0.227556	11.36	9.83	0.04	21.23	Average	Live	52.54	-31.31	Pass
Spec Margin = QP./Ave. - Limit, ± Uncertainty									
Combined Standard Uncertainty $u_c(y) = \pm 1.2$ dB Expanded Uncertainty $U = ku_c(y)$ $k = 2$ for 95% confidence									
Notes:									

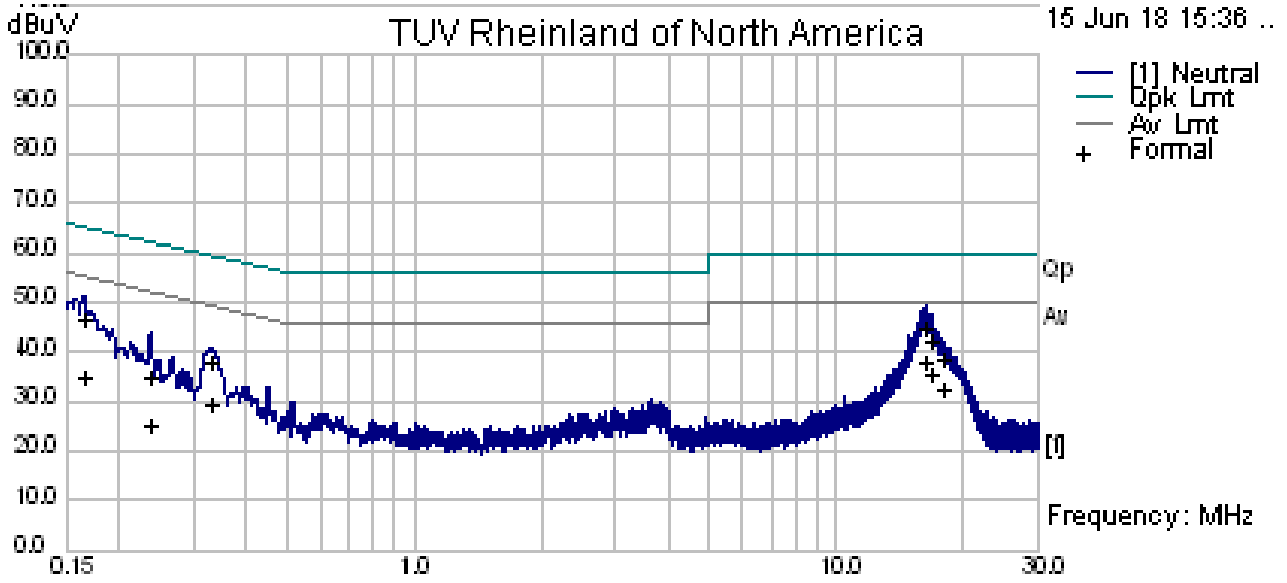
SOP 2 Conducted Emissions

EUT Name	Norton Core Secure WiFi Router		
EUT Model	518	**Temp / Hum in**	22° C / 40% rh
EUT Serial	10041P231551	**Temp / Hum out**	N/A
EUT Config.	Continuous Tx Mid Channel (19)	**Line AC**	120Vac / 60Hz
Standard	CFR47 Part 15.207	**RBW / VBW**	9 kHz / 30 kHz
Lab/LISN	Lab #5 /Com-Power, Line 1	**Performed by**	Douglas Antioco

150 kHz to 30 MHz Plot for Line



150 kHz to 30 MHz Plot for Neutral



5 Test Equipment List

5.1 Equipment List

Equipment	Manufacturer	Model #	Serial/Inst #	Last Cal mm/dd/yyyy	Next Cal mm/dd/yyyy
Bilog Antenna	Sunol Sciences	JB3	A102606	06/15/2016	06/15/2018
Horn Antenna	EMCO	3115	9211-3969	05/16/2017	05/16/2019
Active Horn Antenna	Com-Power	AHA-840	105005	05/26/2017	05/26/2019
Active Loop Antenna	EMCO	6502	00062531	05/17/2017	05/17/2019
LISN	Com-Power	LI-215	12100	01/24/2018	01/24/2019
Spectrum Analyzer	Agilent	N9038A	MY51210195	01/24/2018	01/24/2019
Spectrum Analyzer	Rohde & Schwarz	FSL6	100169	01/13/2018	01/13/2019
EMI Receiver	Rohde & Schwarz	ESIB40	832427/002	01/22/2018	01/22/2019
Thermometer	VWR	61161-378	160702310	08/15/2015	08/15/2018
Vector Signal Generator	Rohde & Schwarz	SMBV100A	257744	9/16/2016	9/16/2019
Thermo Chamber	Espec	BTZ-133	0613436	05/31/2018	05/31/2019
Power Sensors	Rohde & Schwarz	OSP-B157	26160467	01/18/2018	01/18/2019
Amplifier	Sonoma	310N	185516	N/A (See Note)	
Amplifier	Miteq	TTA1800-30-HG	1842452	N/A (See Note)	
Test Software	Rohde & Schwarz	EMC32 v.10.20.01	N/A	N/A	
1.6 GHz Low Pass Filter	K&L Microwave	8L120-X1600-0/09135-0249	UA691-35	N/A (See Note)	
3.5 GHz High Pass Filter	Hewlett Packard	84300-80038	820004	N/A (See Note)	

Note: Equipment is characterized before use.

6 EMC Test Plan

6.1 Introduction

This section provides a description of the Equipment Under Test (EUT), configurations, operating conditions, and performance acceptance criteria. It is an overview of information provided by the manufacturer so that the test laboratory may perform the requested testing.

6.2 Customer

Table 8: Customer Information

Company Name	Symantec Corporation
Address	350 Ellis Street
City, State, Zip	Mountain View, CA 94043
Country	USA

6.3 Equipment Under Test (EUT)

The information provided in the following table should be listed as it should appear in the final report. For those products that have only a model name, list the model number as *non-applicable* and vice-versa.

Table 9 – EUT Designation

Product Name	Norton Core
Model Number	518
System Name	NA
Product Description	Norton Core is a 4x4 secure wireless router that protects your connected home network, while delivering the highest level of security and performance. It is intended to work as a dual band (2.4GHz and 5GHz) wireless router. The router will be in compliance with regulatory standards of regions it will be operating in.

6.4 Product Specifications

Table 10: EUT Specifications

EUT Specification	
AC Input	100-240V AC, 50 – 60 Hz
Number of Antenna Feeds:	Transmit: 1 Receive: 1
Product Marketing Name (PMN)	Norton Core
Hardware Version Identification Number (HVIN)	518
Firmware Version Identification Number (FVIN)	QSDK 5.3
RF Test Software Version	QCAQMSL – QLIV V6.1.291.QPHONEMS
Radio Evaluated	Bluetooth Low Energy (LE)
Transmit Frequency Band	2400-2483.5MHz
Max. Power Output for Technology	3.3 dBm RMS (Measured, Conducted)
Antenna Gain	3.4 dBi
Antenna Type	Internal
Modulation Type	GFSK
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other:

Table 11: Antenna Information

Number	Antenna Type	Description	Max Gain (dBi)
1	Internal	PIFA	3.4

Table 12: Interface Specifications

Interface Type	Cabled with what type of cable?	Is the cable shielded?	Maximum potential length of the cable?	Metallic (M), Coax (C), Fiber (F), or Not Applicable?
Ethernet	Ethernet	No	Not specified	Not Applicable
Note: Ethernet cable was used to connect EUT with a control laptop to toggle channels/modes.				

Table 13: Support Equipment

Equipment	Manufacturer	Model	Serial	Used for
Laptop	Lenovo	Thinkpad	N/A	Setup EUT operating channels via terminal emulator with Ethernet connection to EUT
Note: None.				

Table 14: Description of Sample used for Testing

Device	Serial	RF Connection	Comment
Norton Core	10041P492283	RF connector	Conducted Unit
Norton Core	10041P625119C	Integrated Antenna	Radiated Unit

Table 15: Accessory Equipment

Equipment	Manufacturer	Model	Serial	Comment
AC/DC Converter	Delta	21369161 REV2	IFSD79V020C	Power supply that ships with EUT

6.5 Testing Notes:

The EUT's BT LE radio was stimulated for continuous transmission on all applicable channels via software tool supplied by the chipset manufacturer which is not available to the end user. The test software has a power setting of 7, which is what the manufacturer implements for the EUT.

END OF REPORT