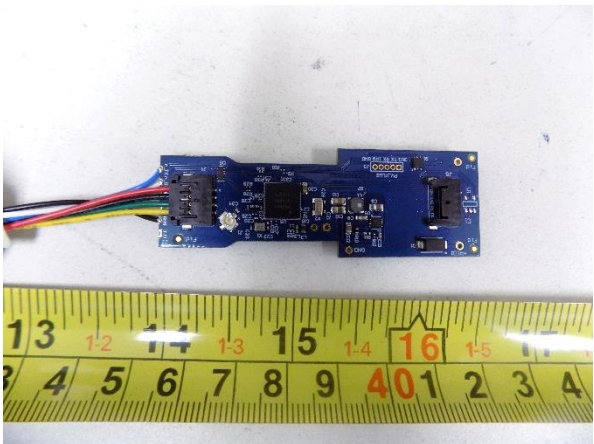


Test Report No.: <i>Prüfbericht-Nr.:</i>	US23I2KO.001 Rev1.0	Order No.: <i>Auftrags-Nr.:</i>	234202013 P00979800	Page 1 of 52 Seite 1 von 52
Client Reference No.: <i>Kunden-Referenz-Nr.:</i>	2218280	Order date: <i>Auftragsdatum:</i>	02/10/2023	
Client: <i>Auftraggeber:</i>	Hunter Douglas Window Fashions, Inc 1 Duette Way Broomfield, CO 80020 U.S.A.			
Test item: <i>Prüfgegenstand:</i>	Powerview Gen3 Motor Control Board			
Identification/ Type No.: <i>Bezeichnung / Typ-Nr.</i>	1016000015			
Order content: <i>Auftrags-Inhalt:</i>	Class 2 Permissive Change Report			
Test specification: <i>Prüfgrundlage:</i>	CFR 47 Part 15.247: 2023 and RSS 247: 2017 Emissions: ANSI C63.10-2013, KDB 558074 D01 DTS Measurement Guidance v05r02, KDB 662911 D01 Multiple Transmitter Output v02r01, FCC KDB 996369 D04 Module Integration Guide v02.			
Date of sample receipt: <i>Wareneingangsdatum:</i>	March 30th, 2023			
Test sample No: <i>Prüfmuster-Nr.:</i>	1016000016 RevA.1			
Testing period: <i>Prüfzeitraum:</i>	March 30th, 2023 - April 5th, 2023			
Place of testing: <i>Ort der Prüfung:</i>	5015 Brandin Ct. Fremont, CA 94538			
Testing laboratory: <i>Prüflaboratorium:</i>	TUV Rheinland of North America			
Test result*: <i>Prüfergebnis*:</i>	Pass			
tested by: Osvaldo Casorla <i>geprüft von:</i>	authorized by: Rachana Khanduri <i>genehmigt von:</i>			
Date: April 18, 2023 <i>Datum:</i>	Issue Date: April 18, 2023 <i>Ausstellungsdatum:</i>			
Position / Stellung: Expert	Position / Stellung: Expert			
Others / <i>Sonstiges:</i>				
Condition of the test item at delivery: <i>Zustand des Prüfgegenstandes bei Anlieferung:</i>	Test item complete and undamaged			
* Legend:	P(ass) = passed a.m. test specification(s)	F(ail) = failed a.m. test specification(s)	N/A = not applicable	N/T = not tested
* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
This test report only relates to the a. m. test sample. Without permission of the test center this test report is not permitted to be duplicated in extracts. This test report does not entitle to carry any test mark. Dieser Prüfbericht bezieht sich nur auf das o.g. Prüfmuster und darf ohne Genehmigung der Prüfstelle nicht auszugsweise vervielfältigt werden. Dieser Bericht berechtigt nicht zur Verwendung eines Prüfzeichens.				

Test report no.: US23I2KO.001 Rev1.0
Prüfbericht-Nr.:

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Remarks
Anmerkungen

1	The equipment used during the specified testing period was calibrated according to our test laboratory calibration program. The equipment fulfils the requirements included in the relevant standards. The traceability of the test equipment used is ensured by compliance with the regulations of our management system. Detailed information regarding test conditions, equipment and measurement uncertainty is available in the test laboratory and could be provided on request. <i>Alle eingesetzten Prüfmittel waren zum angegebenen Prüfzeitraum gemäß eines festgelegten Kalibrierungsprogramms unseres Prüfhauses kalibriert. Sie entsprechen den in den Prüfprogrammen hinterlegten Anforderungen. Die Rückverfolgbarkeit der eingesetzten Prüfmittel ist durch die Einhaltung der Regelungen unseres Managementsystems gegeben.</i> <i>Detaillierte Informationen bezüglich Prüfkonditionen, Prüfequipment und Messunsicherheiten sind im Prüflabor vorhanden und können auf Wunsch bereitgestellt werden.</i>
2	As contractually agreed, this document has been signed digitally only. TÜV Rheinland has not verified and unable to verify which legal or other pertaining requirements are applicable for this document. Such verification is within the responsibility of the user of this document. Upon request by its client, TÜV Rheinland can confirm the validity of the digital signature by a separate document. Such request shall be addressed to our Sales department. An environmental fee for such additional service will be charged. <i>Wie vertraglich vereinbart, wurde dieses Dokument nur digital unterzeichnet. Der TÜV Rheinland hat nicht überprüft, welche rechtlichen oder sonstigen diesbezüglichen Anforderungen für dieses Dokument gelten. Diese Überprüfung liegt in der Verantwortung des Benutzers dieses Dokuments. Auf Verlangen des Kunden kann der TÜV Rheinland die Gültigkeit der digitalen Signatur durch ein gesondertes Dokument bestätigen. Diese Anfrage ist an unseren Vertrieb zu richten. Eine Umweltgebühr für einen solchen zusätzlichen Service wird erhoben.</i>
3	Test clauses with remark of * are subcontracted to qualified subcontractors and described under the respective test clause in the report. Deviations of testing specification(s) or customer requirements are listed in specific test clause in the report. <i>Prüfklausel mit der Note * wurden an qualifizierte Unterauftragnehmer vergeben und sind unter der jeweiligen Prüfklausel des Berichts beschrieben.</i> <i>Abweichungen von Prüfspezifikation(en) oder Kundenanforderungen sind in der jeweiligen Prüfklausel im Bericht aufgeführt.</i>
4	Electromagnetic Compatibility Test Report. The above product was found to be Compliant to the above test standard(s).

Test report no.: US23I2KO.001 Rev1.0
Prüfbericht-Nr.:

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Remarks
Anmerkungen

1	Product details: <i>Produktdetails:</i>	BLE 1Mbps, 2Mbps
2	Dimensions / Weight: <i>Maße / Gewicht:</i>	5 cm x 5 cm x 1 cm / 1g
3	Operating elements: <i>Bedienelemente:</i>	3.3 VDC, 1.5 A
4	Equipment / Accessories: <i>Ausstattung / Zubehör:</i>	None
5	Used materials: <i>Verwendete Materialien:</i>	Two other PCBAs attached. These boards are not transmitters but should stay attached to represent worst-case-scenario.
6	Other: <i>Sonstiges:</i>	Test sample(s), as well sample information, description, product details and intended usage was provided by customer.
7	Test sample obtaining: <i>Prüfmusterbereitstellung:</i>	☒ Sending by customer ☐ Sampling by TÜV Rheinland Group ☐ others:

Revisions

Revision No.	Date MM/DD/YYYY	Reason for Change	Author
1.0	4/18/2023	Original Report	OC

Note: Latest revision report will replace all previous reports.

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1 Executive Summary

1.1 Scope

This report US23I2KO.001 Rev1.0 is intended to document the status of conformance with the requirements of the CFR 47 Part 15.247: 2023 and RSS 247: 2017 based on the results of testing performed on March 30th, 2023 - April 5th, 2023 on the Powerview Gen3 Motor Control Board Model 1016000015. Manufactured by Hunter Douglas Window Fashions, Inc. 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.

This is a Class 2 Permissive Change Report. For full testing, covered by Original Module test report number Document 32195339.001 Issued on May 27, 2021 with FCC ID: UXUMOTG3 and IC: 7316A-MOTG3.

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 for Bluetooth, Low Energy is covered in this document.

1.3 Summary of Test Results

Table 1: Summary of Test Results

Test	Test Method ANSI C 63.10 & C63.4	Worse Case (Measured)	Result
Maximum Output Power	CFR47 15.247 (b), RSS 247 Sect. 5.4 (d)	4.96 dBm @ 2402, 1Mbps	Complied
DTS Bandwidth (6dB)	CFR47 15.247 (a)(2), RSS 247 Sect. 5.2 (a)	730 kHz @ 2402, 1Mbps	Complied
Peak Power Spectral Density	CFR47 15.247 (e), RSS 247 Sect. 5.2 (b)	-	Note 3
Out of Band Emissions: Non-Restricted	CFR47 15.247 (d), RSS 247 Sect.5.5	-	Note 3
Out of Band Emissions: Restricted	CFR47 15.247 (d), RSS 247 Sect.5.5	9.62 dB margin @ 2483.5 MHz, Average	Complied
Transmitter Spurious Emissions	CFR47 15.247 (d), RSS 247 Sect.5.5	0.77 dB Margin @ 396.35 MHz, QP	Complied
AC Power Conducted Emission	CFR47 15.207, RSS-GEN Sect.8.8	33.07 dB Margin @ 0.42 MHz, Average	Complied

Note 1: This test report covers 2402 MHz to 2480 MHz band.

Note 2: Class B limits were applied where applicable.

Note 3: Covered by Original Module test report number Document 32195339.001 Issued on May 27, 2021 with FCC ID: UXUMOTG3 and IC: 7316A-MOTG3.

1.4 Special Accessories

The 2.4 GHz notch filter was used to protect the front end of the pre-amp.

1.5 Equipment Modifications

None

2 Laboratory Information

2.1 Accreditations & Endorsements

2.1.1 US Federal Communications Commission, US1131



TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, are 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 (Registration No. US1131). The laboratory Scopes of Accreditation include Title 47 CFR Parts 15, 18 and 90. The accreditations are updated every three years.

2.1.2 NIST / A2LA, Testing Cert #3331.02



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 17025:2017. The scope of laboratory accreditation includes emission and immunity testing. The accreditation is updated annually.

2.1.3 Canada – Industry Canada, 2932M



Industry
Canada Industrie
Canada

The Pleasanton 5-meter Semi-Anechoic Chamber, Registration No. 2932M-1, has been accepted by Industry Canada to perform testing to 3 and 5 meters based on the test procedures described in ANSI C63.4-2014. The Fremont 10-meter Semi-Anechoic Chamber, Registration No. 2932D-1, has been accepted by Industry Canada to perform testing to 3 and 10 meters based on the test procedures described in ANSI C63.4-2014.

2.1.4 Japan – VCCI



The Voluntary Control Council for Interference by Information Technology Equipment (VCCI) is a group that consists of Information Technology Equipment (ITE) manufacturers and EMC test laboratories. The purpose of the Council is to take voluntary control measures against electromagnetic interference from Information Technology Equipment, and thereby contribute to the development of a socially beneficial and responsible state of affairs in the realm of Information Technology Equipment in Japan. TUV Rheinland of North America EMC test facilities located at 1279 Quarry Lane, Ste. A, Pleasanton, CA, 94566, and 5015 Brandin Ct, Fremont, CA 94538, have been assessed and approved in accordance with the Regulations for Voluntary Control Measures.

VCCI Registration No. for Pleasanton: A-0399

VCCI Registration No. for Fremont: A-0398

2.1.5 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

Test facilities are located at 5015 Brandin Ct, Fremont, California, 94538, USA and 1279 Quarry Lane, Pleasanton, California 94566, USA (Fremont is the Pleasanton Annex).

2.2.1 Emission Test Facility

The Semi-Anechoic Chambers and AC Line Conducted measurement facilities used to collect radiated and conducted emissions data have been constructed in accordance with ANSI C63.7:1992. The Fremont 10 meter semi-anechoic chamber has been measured in accordance with and verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2014 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04), at test distances of 3 and 10 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02). The Pleasanton 5 meter semi-anechoic chamber has been verified to comply with the theoretical volumetric normalized site attenuation of ANSI C63.4:2009 and SVSWR requirements of CISPR 16-1-4 Consol. Ed. 3.0 (2010-04) at a test distance of 3 meters. This site has been described in reports dated November 1st, 2006, submitted to the FCC, and accepted by letter dated November 28, 2006. The site is listed with the FCC and accredited by A2LA (Testing Certificate #3331.02).

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.

The Expanded Uncertainty defines an interval about the result of a measurement that may be expected to encompass a large fraction of the distribution of values that could reasonably be attributed to the measurement and the fraction may be viewed as the coverage probability or level of confidence of the interval.

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:

$$\text{Field Strength (dB}\mu\text{V/m)} = \text{RAW} - \text{AMP} + \text{CBL} + \text{ACF}$$

Where: RAW = Measured level before correction (dB μ V)

AMP = Amplifier Gain (dB)

CBL = Cable Loss (dB)

ACF = Antenna Correction Factor (dB/m)

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

Sample radiated emissions calculation @ 30 MHz

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

$$25 \text{ dB}\mu\text{V/m} + 17.5 \text{ dB} - 20 \text{ dB} + 1.0 \text{ dB} = 23.5 \text{ dB}\mu\text{V/m}$$

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 17025:2017. Equipment calibration records are kept on file at the test facility.

3 Product Information

3.1 Product Description

The Model 1016000015 is a Powerview Gen3 Motor Control Board utilizing Bluetooth. The EUT 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. 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 and to place the EUT in the most susceptible state for immunity testing.

3.3 Operating Mode

A description of the operation mode is given in the Test Plan Section. In the case of an EUT that can operate in more than one state, preliminary testing was performed to determine the operating mode that produced maximum radiation.

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 Powerview Gen3 Motor Control Board has 1 dedicated Bluetooth antenna that has maximum gain of 1.58 dBi. Antenna not easily accessible to the end user.

Antenna Gain was derived from a manufacturer data sheet declared in document number 330-0149-R3.4.

4 Emissions

Testing was performed in accordance with CFR 47 Part 15.247: 2023 and RSS 247: 2017. 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.

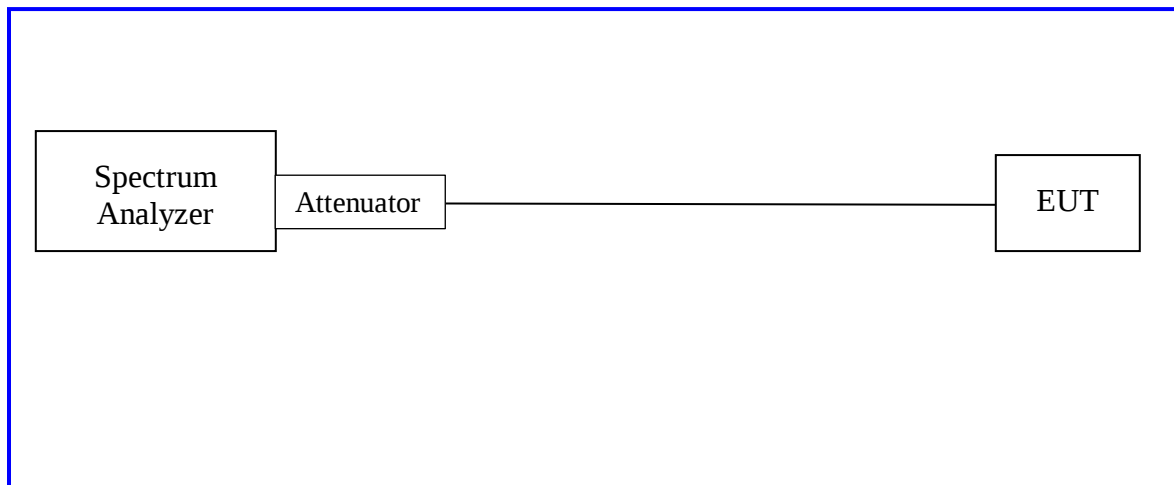
The maximum output power and harmonics shall not exceed CFR47 Part 15.247 (b) and RSS 247 5.4 (d).

The maximum transmitted power in the band 2400-2483.5 MHz: 1 W

4.1.1 Test Method

Conducted method was used to measure the channel power output according to ANSI C63.10:2013 Section 11.9.1.1. The worst findings were conducted on 3 channels in each operating range per CFR47 Part 15.247(b) and RSS 247 Sect. 5.4(d); 2400 MHz to 2483.5 MHz. The worst mode results indicated below.

Test Setup:



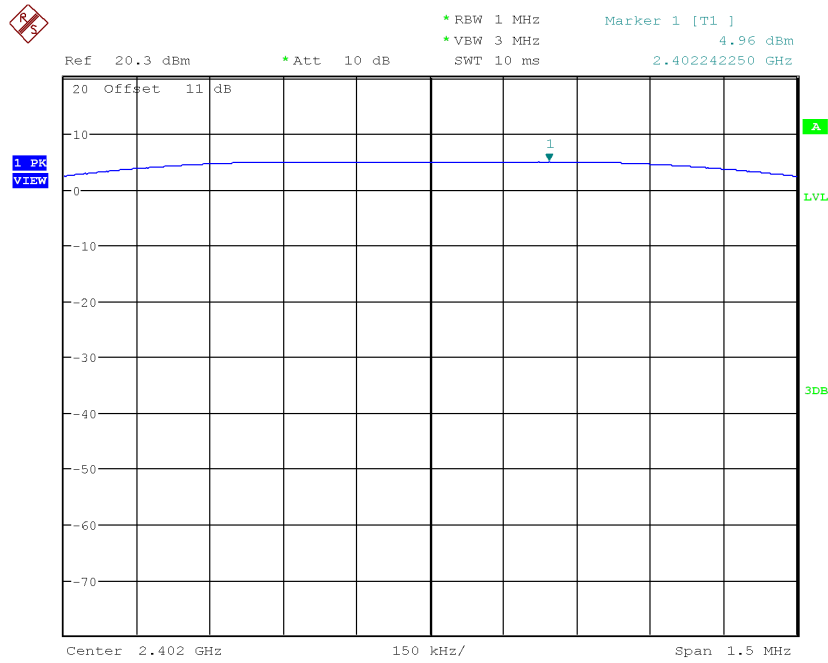
4.1.2 Results

As originally tested, the EUT was found to be compliant to the requirements of the test standard(s). Worse case data for each mode reported below. Plots of highest power included for low, medium, and high channels.

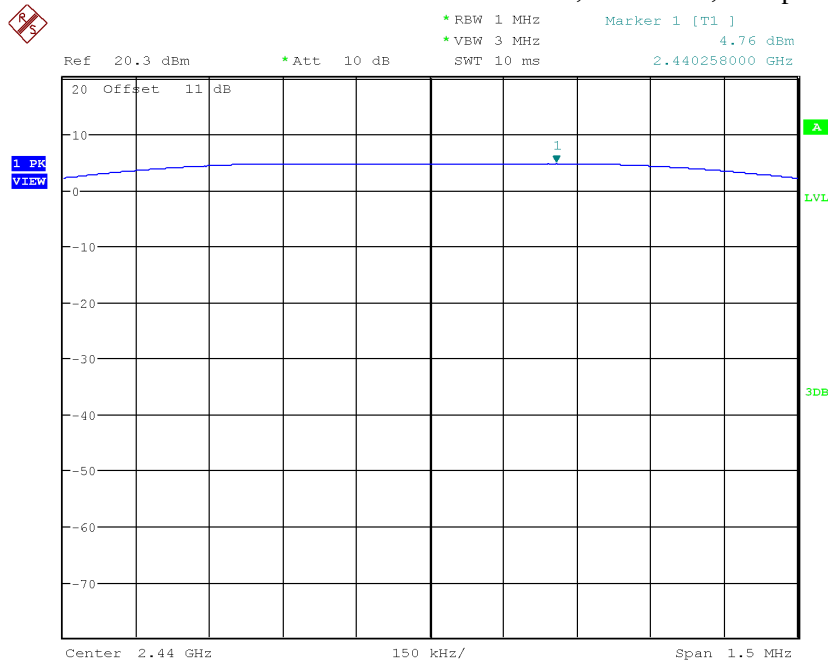
ANSI C63.10:2013 Section 11.9.1.1

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

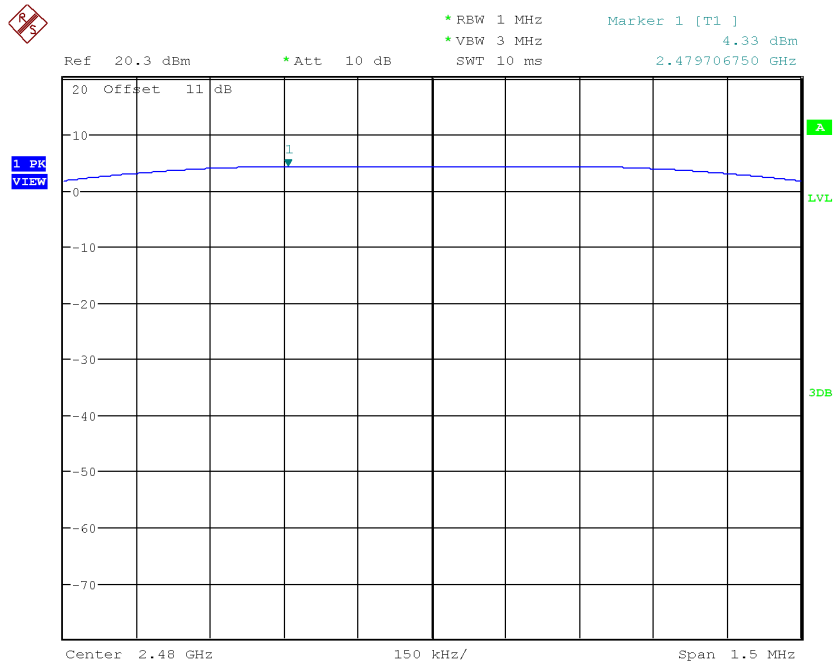
Test Conditions:	Conducted Measurement, Normal Temperature		Date	4/4/23
Antenna Type:	2.4ghz FlexPIFA, LSR 330-0149	Power Level:		See Table 9
Ambient Temperature:		22° C	Relative Humidity:	40% RH
Max. Antenna Gain:		1.58 dBi	Test Performed by:	Osvaldo Casorla
1Mbps				
Operating Channel (MHz)	Limit [dBm]	Total Power [dBm]	Margin [dB]	
2402.00	30.00	4.96	25.04	
2440.00	30.00	4.76	25.24	
2480.00	30.00	4.33	25.67	
2Mbps				
Operating Channel (MHz)	Limit [dBm]	Total Power [dBm]	Margin [dB]	
2402.00	30.00	4.88	25.12	
2440.00	30.00	4.67	25.33	
2480.00	30.00	4.37	25.63	



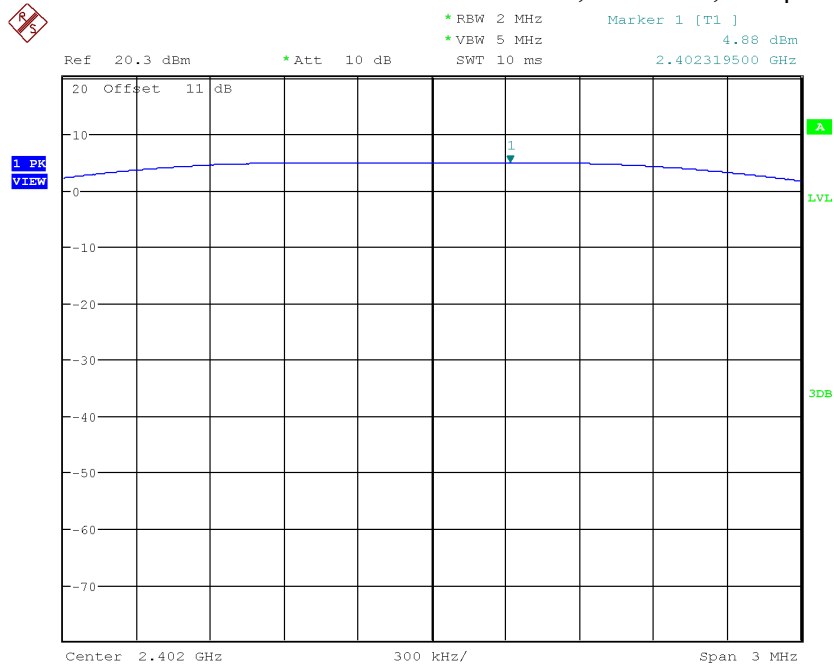
Plot 1. Maximum Conducted Power, 2402MHz, 1Mbps



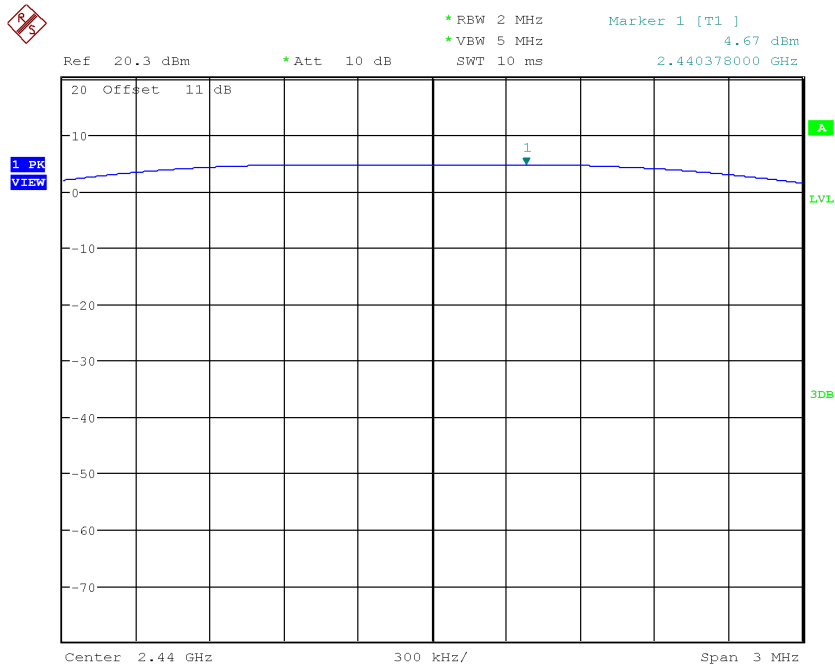
Plot 2. Maximum Conducted Power, 2440MHz, 1Mbps



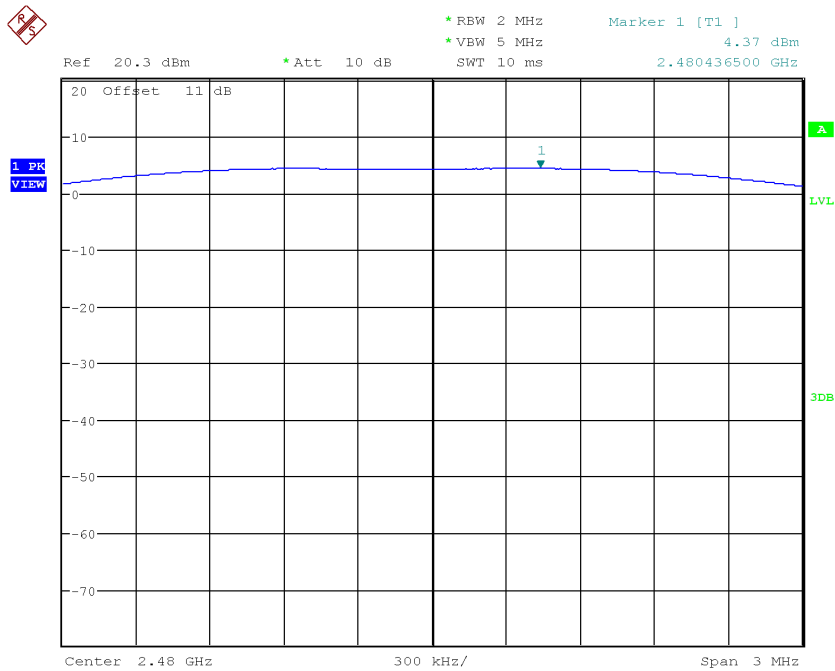
Plot 3. Maximum Conducted Power, 2480MHz, 1Mbps



Plot 4. Maximum Conducted Power, 2402MHz, 2Mbps



Plot 5. Maximum Conducted Power, 2440MHz, 2Mbps



Plot 6. Maximum Conducted Power, 2480MHz, 2Mbps

4.2 DTS Bandwidth (6dB) and 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.

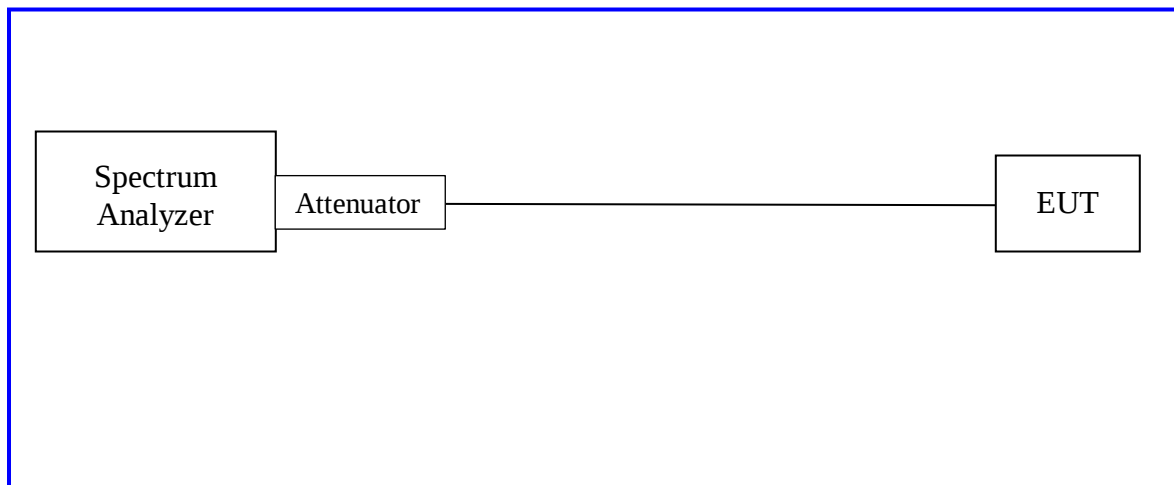
The 99% bandwidth is the bandwidth in which 99% of the transmitted power occupied.

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 according to ANSI C63.10:2013 Section 11.8. The measurement was performed with modulation per CFR47 15.247 (a) (2) and RSS Gen Sect. 6.6. Measurements were performed on the low, middle and high channels of the operating frequency range; 2400 MHz to 2483.5 MHz.

Test Setup:

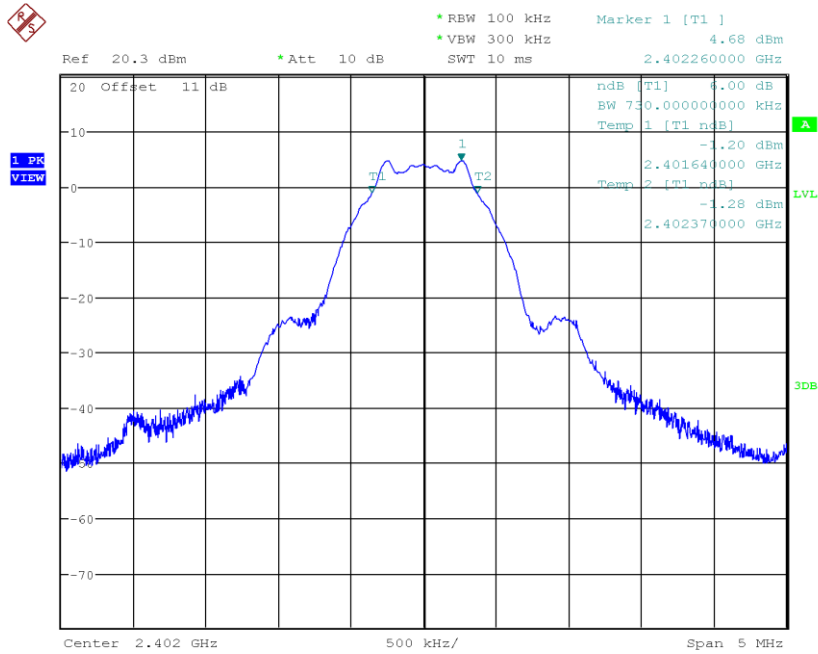


4.2.2 Results

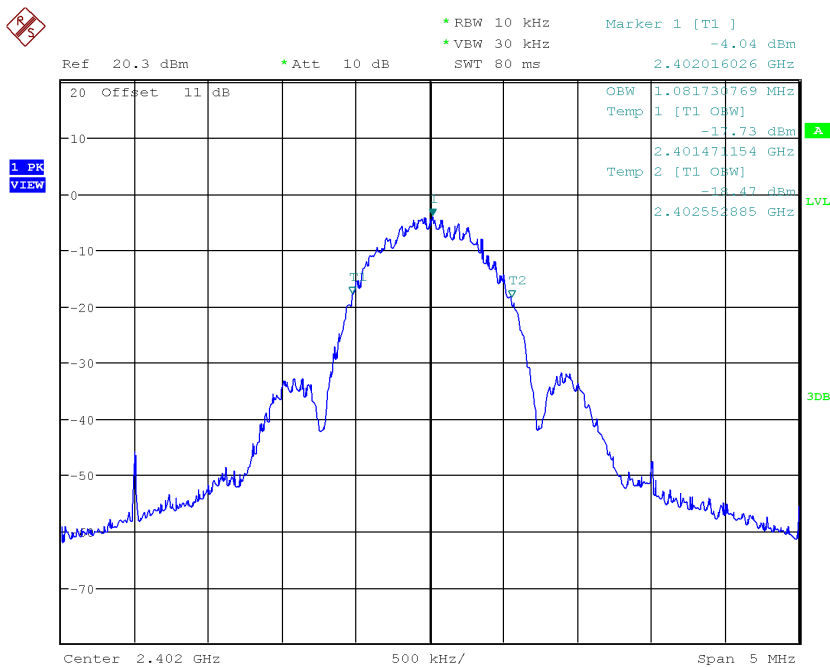
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 3: Occupied Bandwidth – Test Results

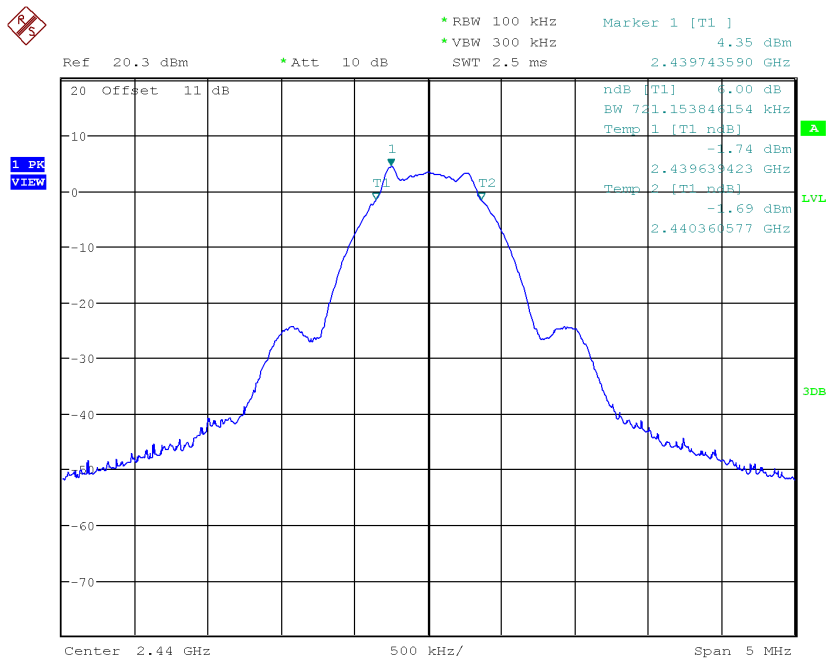
Test Conditions:	Conducted Measurement, Normal Temperature		Date	4/4/23
Antenna Type:	2.4ghz FlexPIFA, LSR 330-0149	Power Level:	See Table 9	
Ambient Temperature:	22° C	Relative Humidity:	40% RH	
Max. Antenna Gain:	1.58 dBi	Test Performed by:	Osvaldo Casorla	
Bandwidth				
1Mbps				
Freq. (MHz)	99% Bandwidth		6dB (DTS) Bandwidth	
	(MHz)		(MHz)	
2402	1.08		730.00	
2440	1.09		721.15	
2480	1.09		753.21	
2Mbps				
Freq. (MHz)	99% Bandwidth		6dB (DTS) Bandwidth	
	(MHz)		(MHz)	
2402	2.09		1.26	
2440	2.09		1.30	
2480	2.11		1.39	
Note: None				



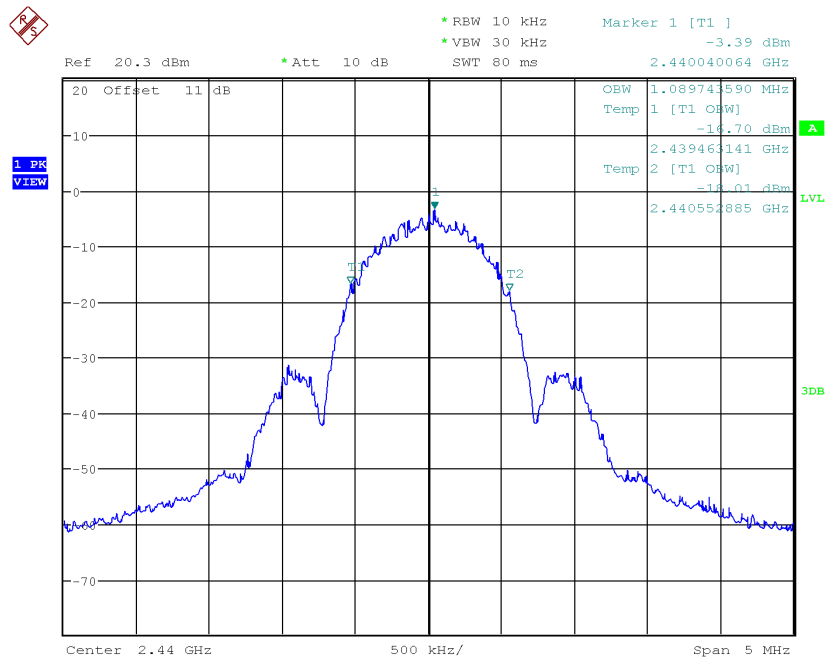
Plot 7. 2402MHz, 6dB Bandwidth, 1Mbps



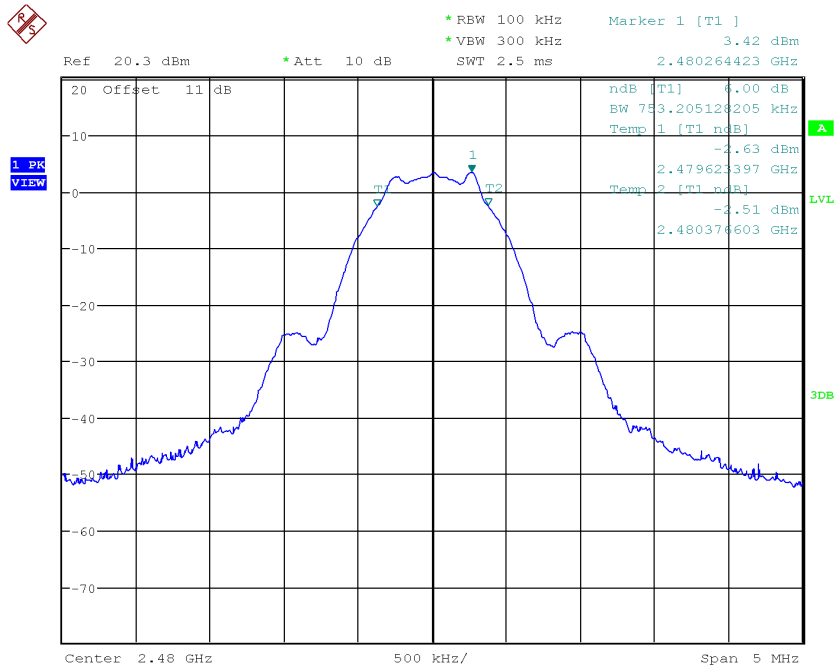
Plot 8. 2402MHz, 99% Bandwidth, 1Mbps



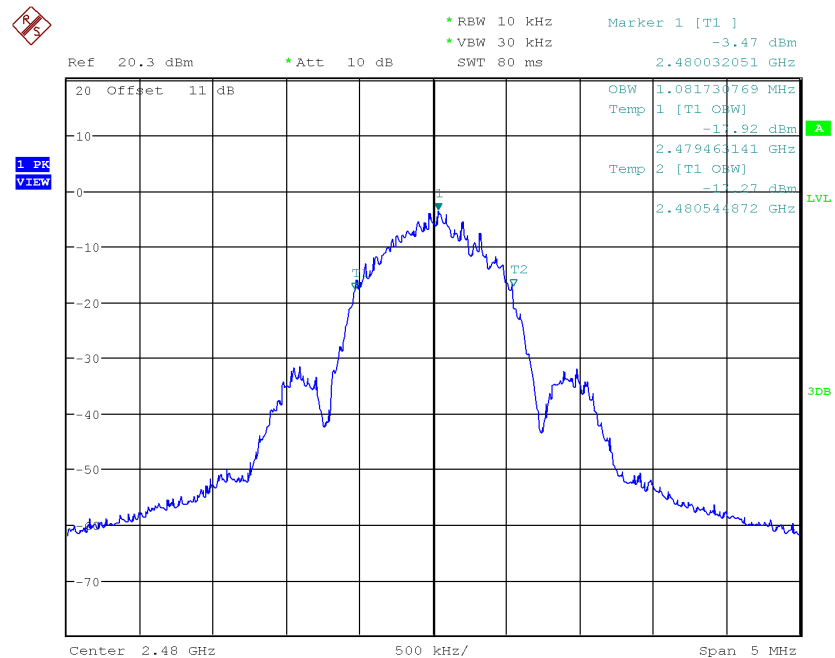
Plot 9. 2440MHz, 6dB Bandwidth, 1Mbps



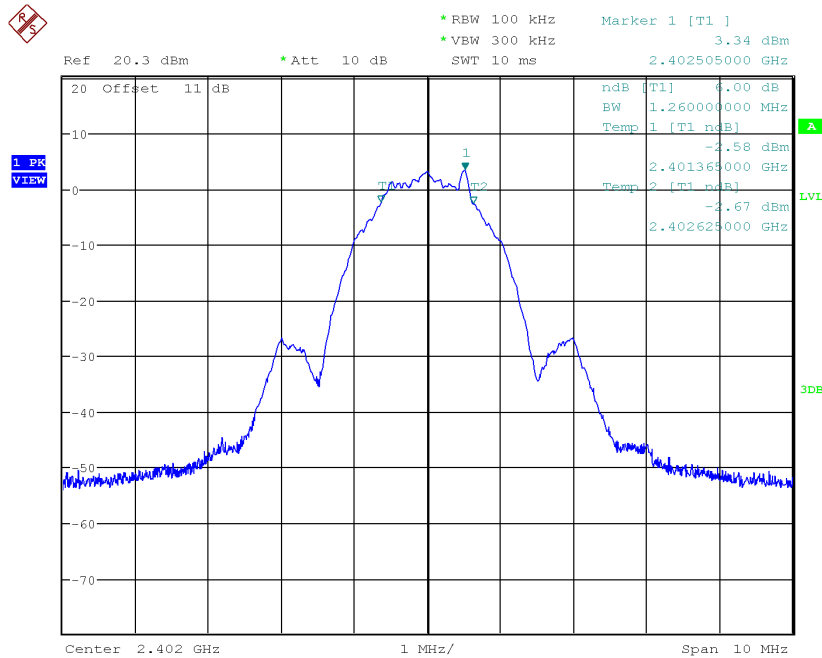
Plot 10. 2440MHz, 99% Bandwidth, 1Mbps



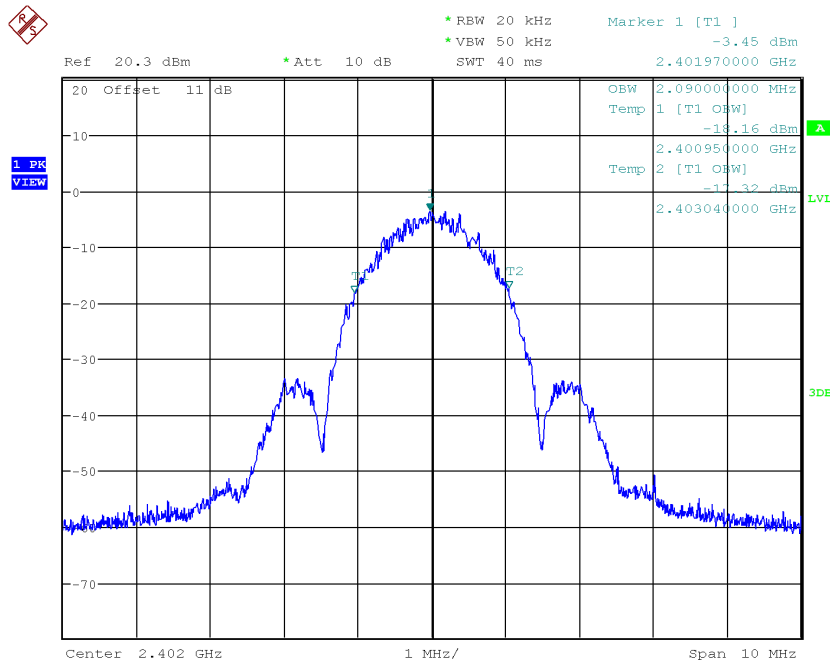
Plot 11. 2480MHz, 6dB Bandwidth, 1Mbps



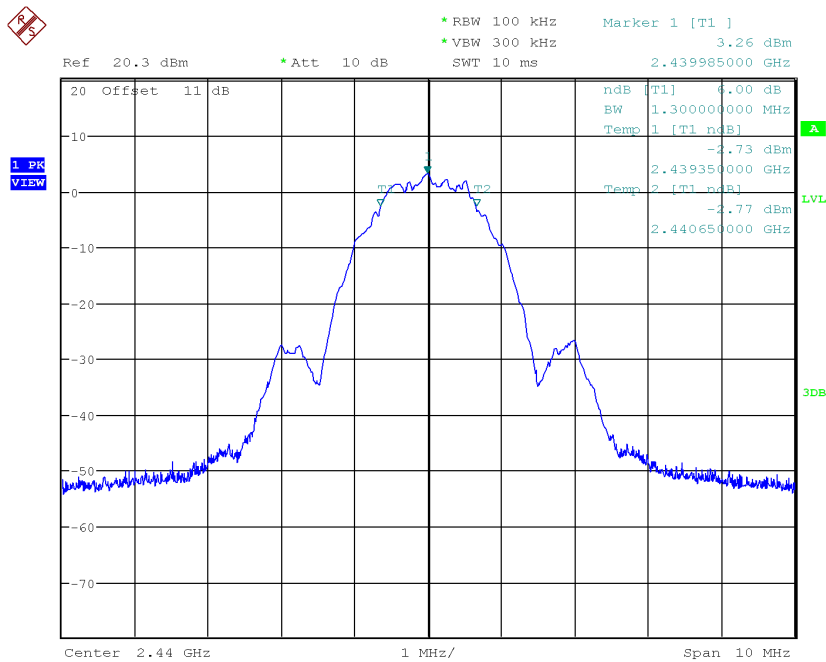
Plot 12. 2480MHz, 99% Bandwidth, 1Mbps



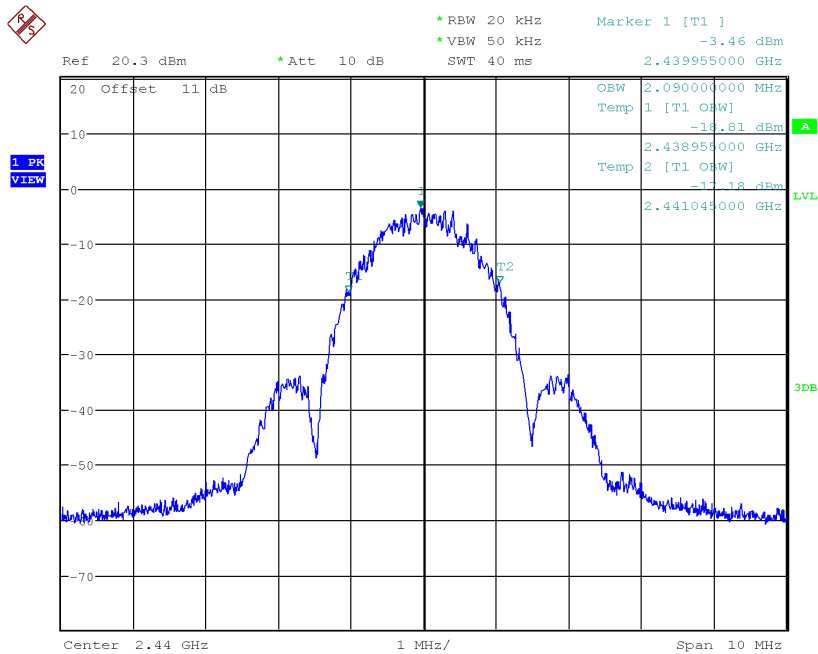
Plot 13. 2402MHz, 6dB Bandwidth, 2Mbps



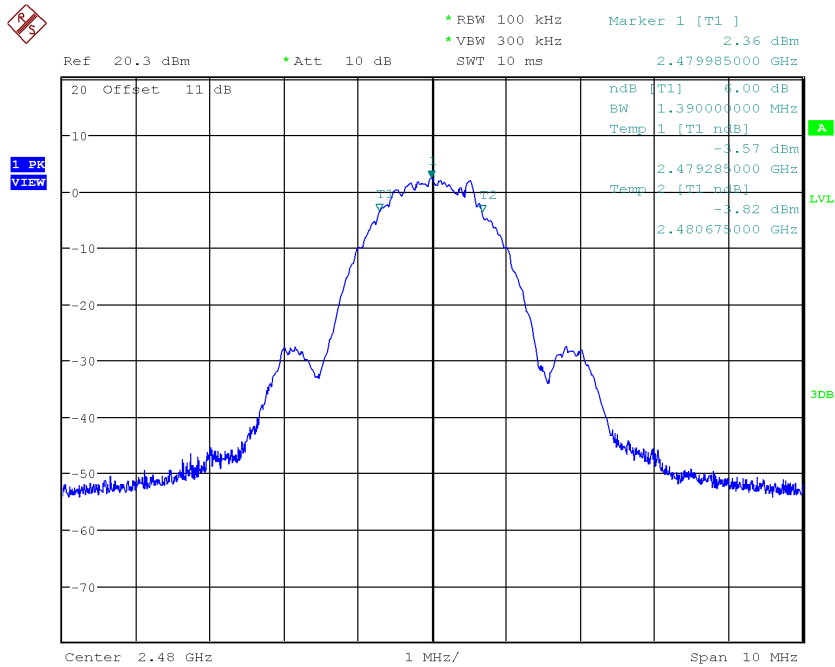
Plot 14. 2402MHz, 99% Bandwidth, 2Mbps



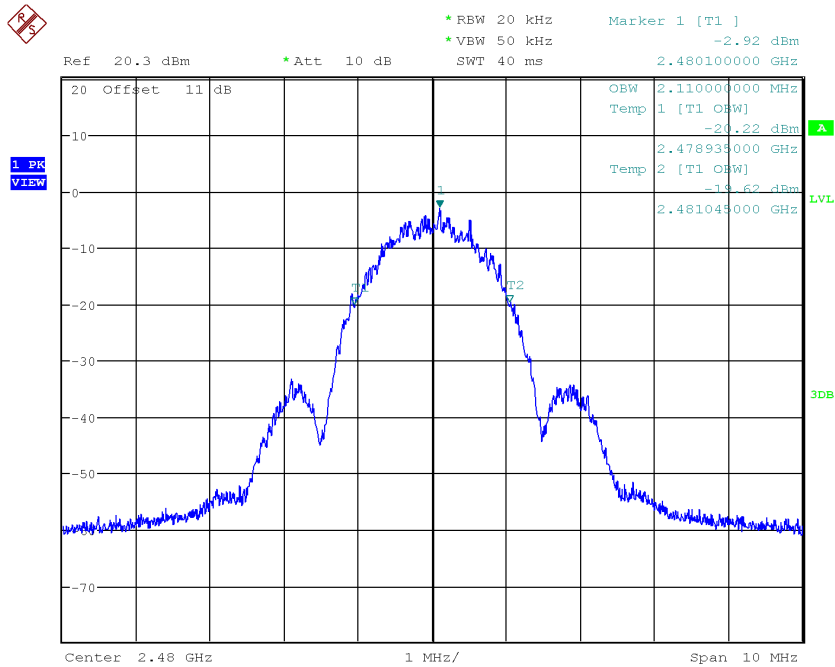
Plot 15. 2440MHz, 6dB Bandwidth, 2Mbps



Plot 16. 2440MHz, 99% Bandwidth, 2Mbps



Plot 17. 2480MHz, 6dB Bandwidth, 2Mbps



Plot 18. 2480MHz, 99% Bandwidth, 2Mbps

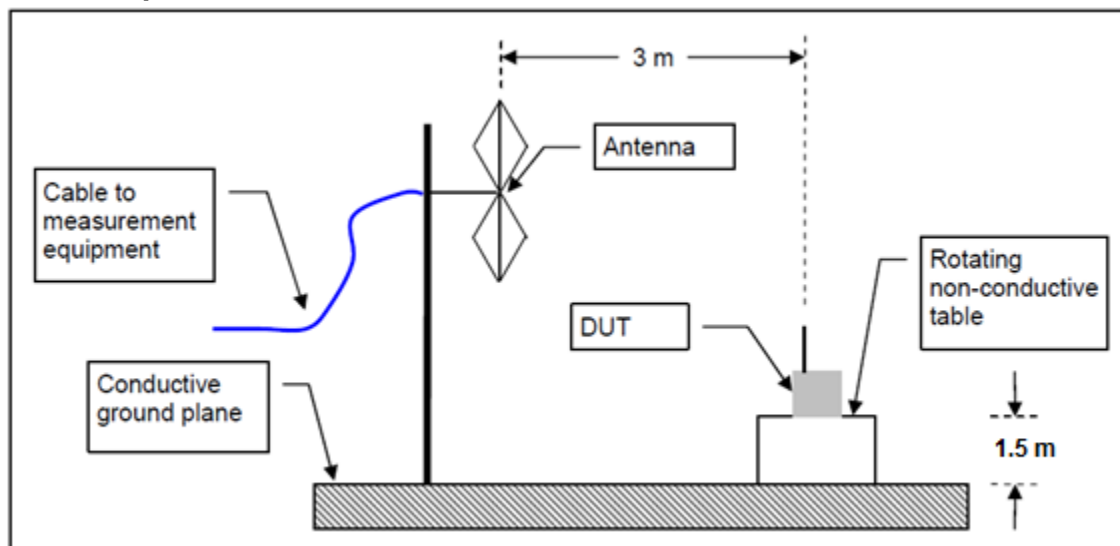
4.3 Out of Band Emissions: Restricted Band Edge

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), RSS-247 Sect. 5.5, RSS-GEN Sect. 8.9 and 8.10.

4.3.1 Test Method

Radiated measurements per ANSI C63.10-2013 Section 6.10.5 were used to measure the undesirable emission requirement in restricted bands. Peak points were found and Average was taken for each point found. The measurement was performed with modulation. This test was conducted on 3 channels in each mode on the EUT. The worst case measurement of each channel is recorded in this report. All channels were tested at highest power settings. RBW=1 MHz, VBW=3 MHz for Above 1GHz.

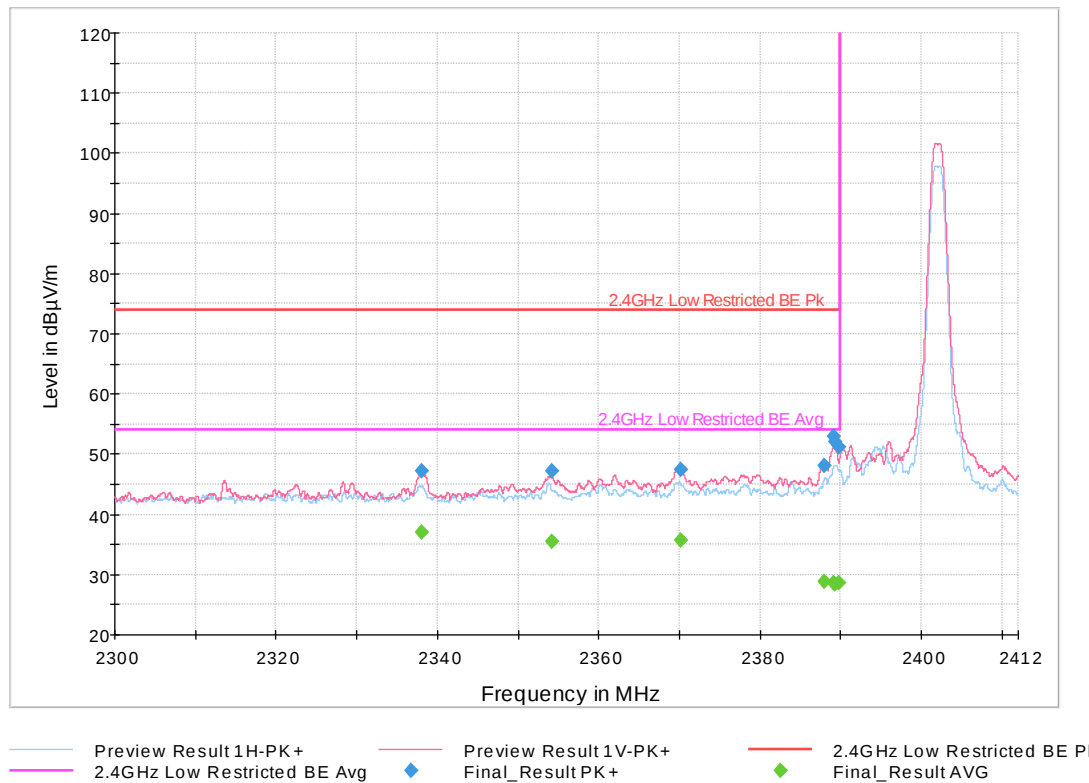
Test Setup



The DUT was stimulated by manufacturer provided test software that is not available to the end user.

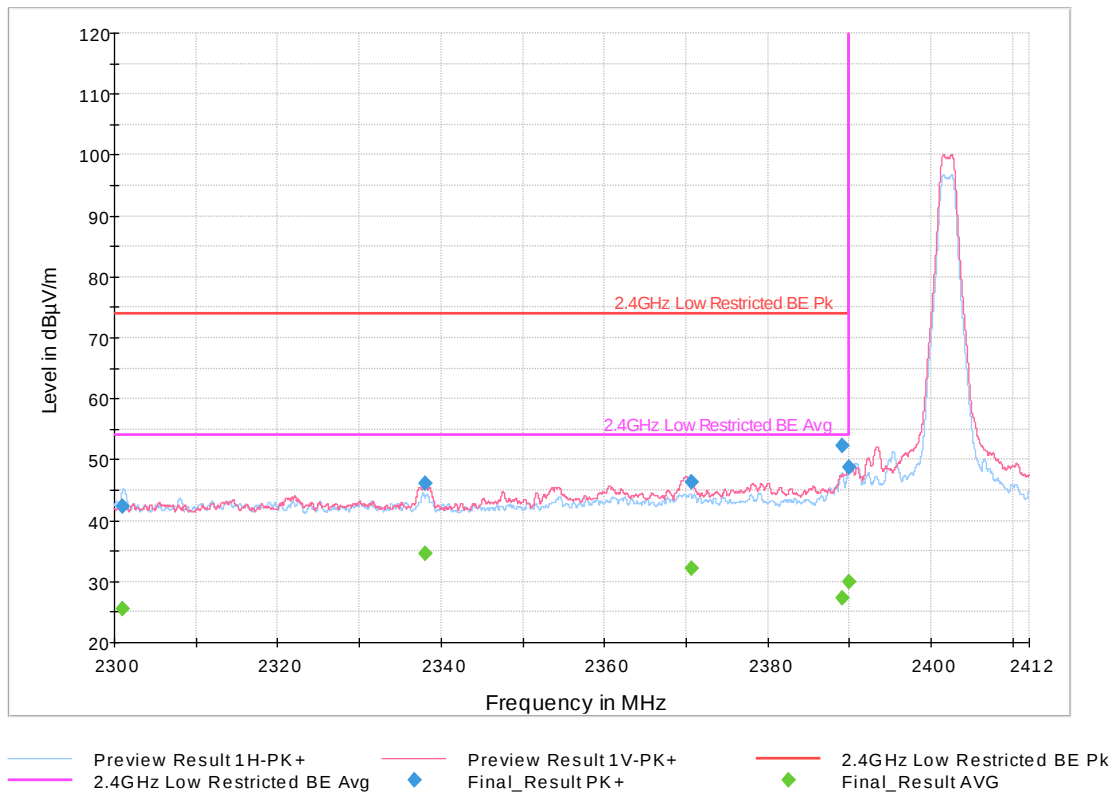
4.3.2 Test Results

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2338.01	47.17	---	74.00	26.83	1000.00	143.00	V	239.00	-3.60
2338.01	---	37.10	54.00	16.90	1000.00	143.00	V	239.00	-3.60
2354.16	47.25	---	74.00	26.75	1000.00	100.00	V	128.00	-3.60
2354.16	---	35.45	54.00	18.55	1000.00	100.00	V	128.00	-3.60
2370.24	---	35.61	54.00	18.39	1000.00	100.00	V	290.00	-3.50
2370.24	47.32	---	74.00	26.68	1000.00	100.00	V	290.00	-3.50
2387.98	---	28.75	54.00	25.25	1000.00	217.00	V	167.00	-3.50
2387.98	48.17	---	74.00	25.83	1000.00	217.00	V	167.00	-3.50
2389.16	52.96	---	74.00	21.04	1000.00	307.00	V	156.00	-3.50
2389.16	---	28.56	54.00	25.44	1000.00	307.00	V	156.00	-3.50
2389.22	52.17	---	74.00	21.83	1000.00	309.00	V	159.00	-3.50
2389.22	---	28.42	54.00	25.58	1000.00	309.00	V	159.00	-3.50
2389.80	---	28.59	54.00	25.41	1000.00	206.00	V	335.00	-3.50
2389.80	51.17	---	74.00	22.83	1000.00	206.00	V	335.00	-3.50



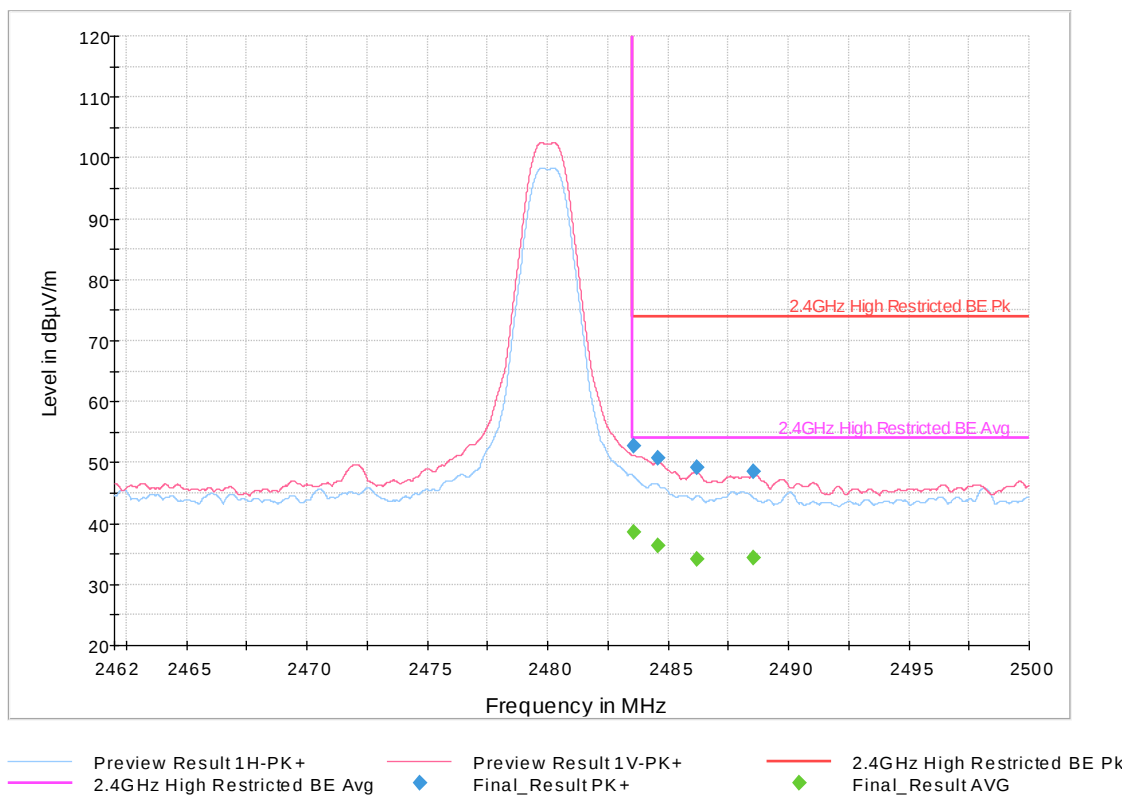
Plot 19. 2402 MHz, 1Mbps Lower Band Edge, Restricted

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2301.00	42.41	---	74.00	31.59	1000.00	333.00	H	300.00	-3.60
2301.00	---	25.49	54.00	28.51	1000.00	333.00	H	300.00	-3.60
2338.06	---	34.66	54.00	19.34	1000.00	100.00	V	98.00	-3.60
2338.06	46.06	---	74.00	27.94	1000.00	100.00	V	98.00	-3.60
2370.58	46.30	---	74.00	27.70	1000.00	118.00	V	244.00	-3.50
2370.58	---	32.19	54.00	21.81	1000.00	118.00	V	244.00	-3.50
2389.04	---	27.27	54.00	26.73	1000.00	350.00	H	121.00	-3.10
2389.04	52.36	---	74.00	21.64	1000.00	350.00	H	121.00	-3.10
2389.99	---	29.92	54.00	24.08	1000.00	250.00	V	335.00	-3.50
2389.99	48.67	---	74.00	25.33	1000.00	250.00	V	335.00	-3.50



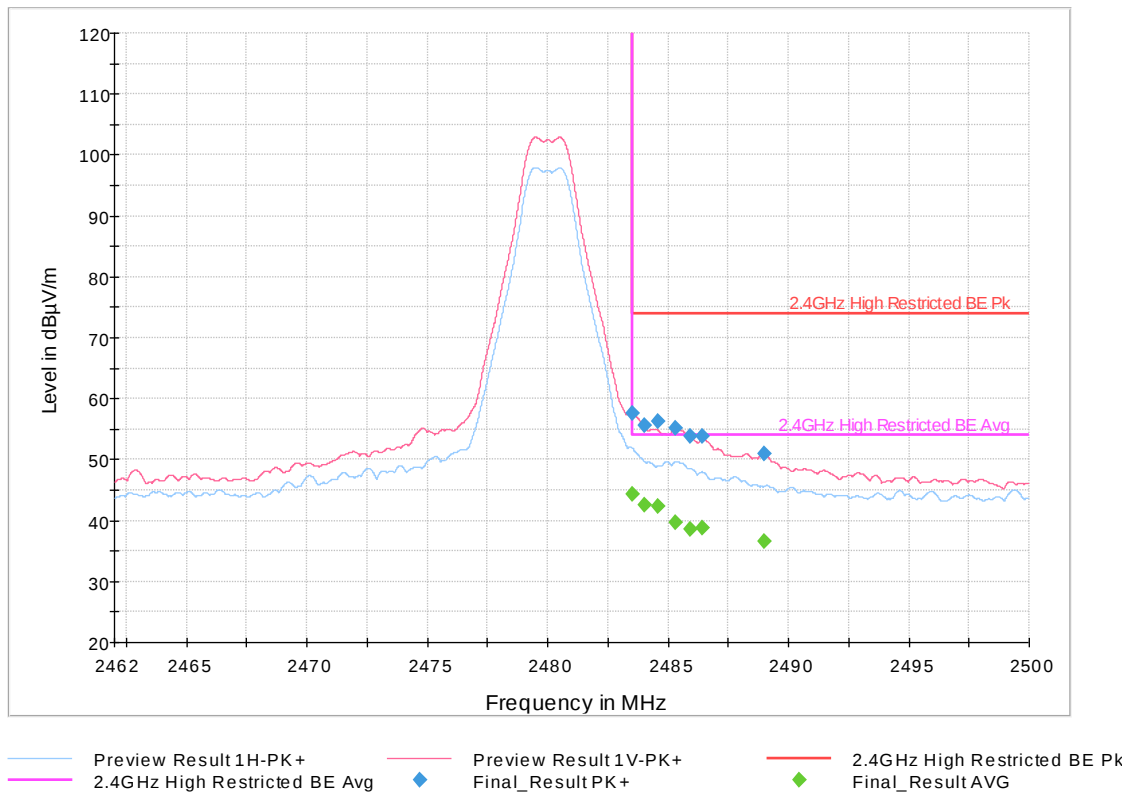
Plot 20. 2402 MHz, 2Mbps Lower Band Edge, Restricted

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.57	52.73	---	74.00	21.27	1000.00	196.00	V	267.00	-3.30
2483.57	---	38.63	54.00	15.37	1000.00	196.00	V	267.00	-3.30
2484.59	---	36.40	54.00	17.60	1000.00	143.00	V	260.00	-3.30
2484.59	50.66	---	74.00	23.34	1000.00	143.00	V	260.00	-3.30
2486.18	---	34.10	54.00	19.90	1000.00	150.00	V	255.00	-3.30
2486.18	49.11	---	74.00	24.89	1000.00	150.00	V	255.00	-3.30
2488.55	48.58	---	74.00	25.42	1000.00	144.00	V	213.00	-3.30
2488.55	---	34.39	54.00	19.61	1000.00	144.00	V	213.00	-3.30



Plot 21. 2480 MHz, 1Mbps, Upper Band Edge, Restricted

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2483.50	57.60	---	74.00	16.40	1000.00	150.00	V	258.00	-3.30
2483.50	---	44.38	54.00	9.62	1000.00	150.00	V	258.00	-3.30
2484.02	---	42.50	54.00	11.50	1000.00	100.00	V	109.00	-3.30
2484.02	55.72	---	74.00	18.28	1000.00	100.00	V	109.00	-3.30
2484.56	56.18	---	74.00	17.82	1000.00	100.00	V	261.00	-3.30
2484.56	---	42.38	54.00	11.62	1000.00	100.00	V	261.00	-3.30
2485.31	55.26	---	74.00	18.74	1000.00	192.00	V	181.00	-3.30
2485.31	---	39.79	54.00	14.21	1000.00	192.00	V	181.00	-3.30
2485.90	---	38.69	54.00	15.31	1000.00	194.00	V	331.00	-3.30
2485.90	53.80	---	74.00	20.20	1000.00	194.00	V	331.00	-3.30
2486.43	53.84	---	74.00	20.16	1000.00	104.00	V	236.00	-3.30
2486.43	---	38.86	54.00	15.14	1000.00	104.00	V	236.00	-3.30
2489.01	---	36.56	54.00	17.44	1000.00	105.00	V	266.00	-3.30
2489.01	50.87	---	74.00	23.13	1000.00	105.00	V	266.00	-3.30



Plot 22. 2480 MHz, 2Mbps, Upper Band Edge, Restricted

4.4 Transmitter 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), RSS 247 Sect.5.5, RSS-GEN Sect. 8.9 and 8.10.

4.4.1 Test Methodology

4.4.1.1 Preliminary Test

A test program that controls instrumentation and data logging was used to automate the preliminary RF emission test procedure. The frequency range of interest was divided into sub-ranges to yield a frequency resolution of approximately 120 kHz and provide a reading at each frequency for no more than 12° of turntable rotation. For each frequency sub-range the turntable was rotated 360° while peak emission data was recorded and plotted over the frequency range of interest in horizontal and vertical antenna polarization's.

Preliminary emission profile testing was performed inside the anechoic chamber. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the floor. The EUT was positioned as shown in the setup photographs. The receiving antenna was placed at a distance of 3m at a fixed height of 1m. Measurement equipment was located outside of the chamber. A video camera was placed inside the chamber to view the EUT.

Pre-scans were performed to determine the worst data rate / chains.

4.4.1.2 Final Test

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. The six highest emissions relative to the limit were measured unless such emissions were more than 20 dB below the limit. If less than six emissions are within 20 dB of the limit, than the noise level of the receiver is measured at frequencies where emissions are expected. Multiples of all oscillator and microprocessor frequencies were also checked.

Final testing was performed on an NSA compliant test site. The EUT was placed on a 1.0m x 1.5m non-conductive table 80cm (<1 GHz) and 150cm (>1 GHz) above the ground plane. The placement of EUT and cables were the same as for preliminary testing and is shown in the setup photographs. RBW is set to 200 Hz and VBW is set to 1 kHz for 9 kHz-150 kHz.
RBW is set to 9 kHz and VBW is set to 30 kHz for 150 kHz-30 MHz
RBW is set to 100 kHz, VBW is set to 300 kHz for 30 MHz-1 GHz.
RBW is set to 1 MHz, VBW is set to 3 MHz for above 1 GHz.

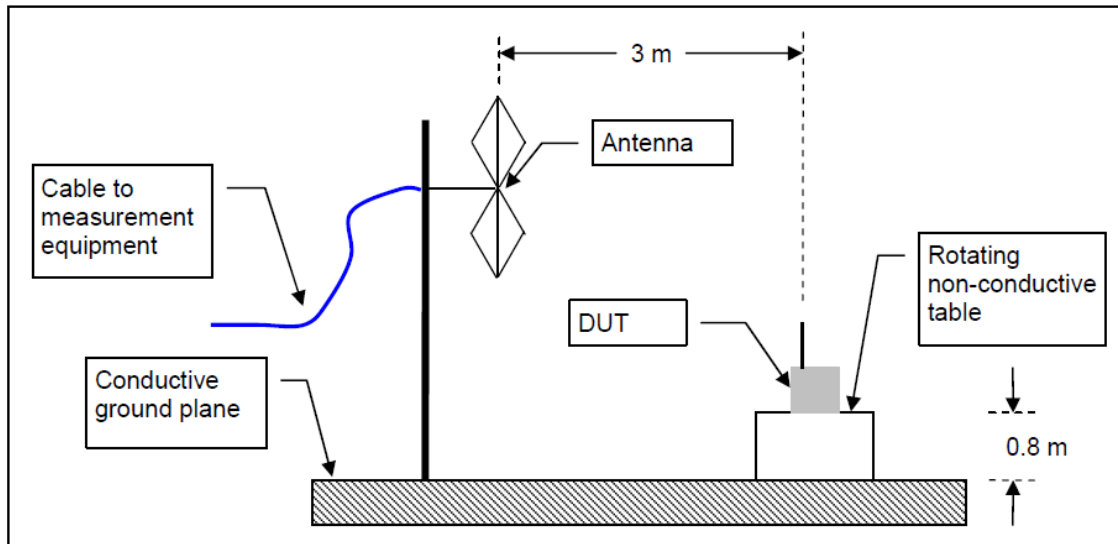
4.4.1.3 Deviations

None.

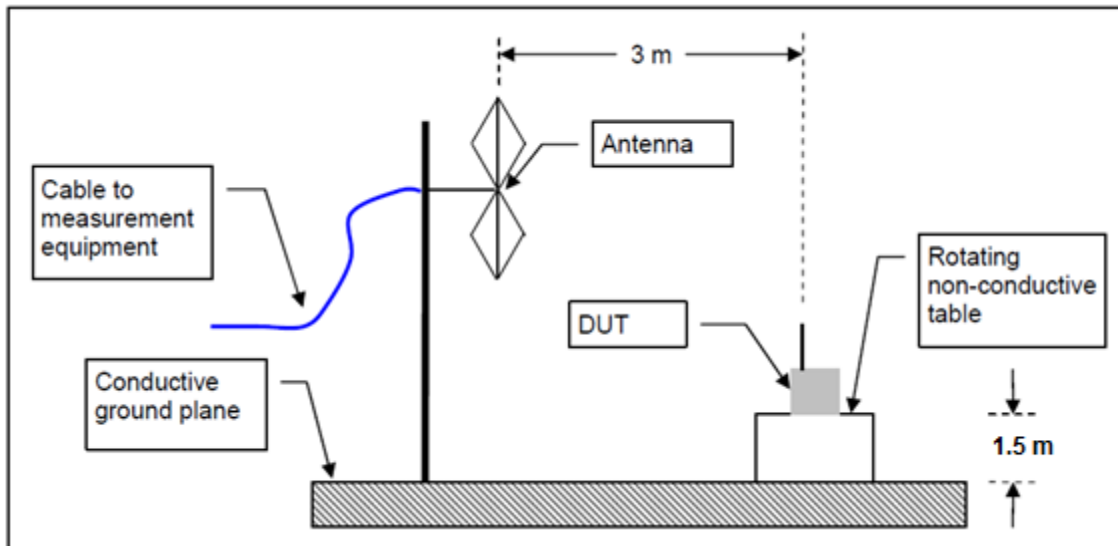
4.4.2 Test Setup:

All tests were conducted at full power on low, middle, and high channels. The DUT was stimulated by manufacturer provided test software that is not available to the end user.

30MHz-1GHz



1-26GHz



4.4.3 Transmitter Spurious Emission Limit

The spurious emissions of the transmitter shall not exceed the values in CFR47 Part 15.205, 15.209: 2023 and RSS Gen Sect. 8.9 and 8.10: 2018.

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

4.4.4 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.

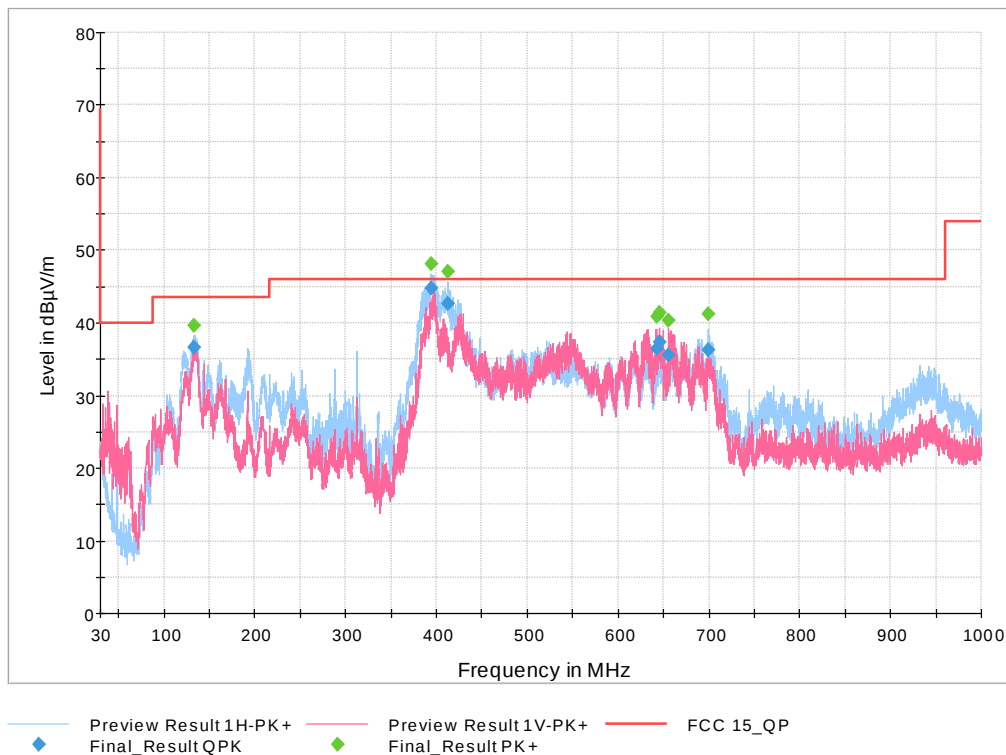
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Note: Below 30 MHz and above 18 GHz was investigated and no emissions was found above noise floor.

Note: The 2.4 GHz notch filter was used to protect the front end of the pre-amp.

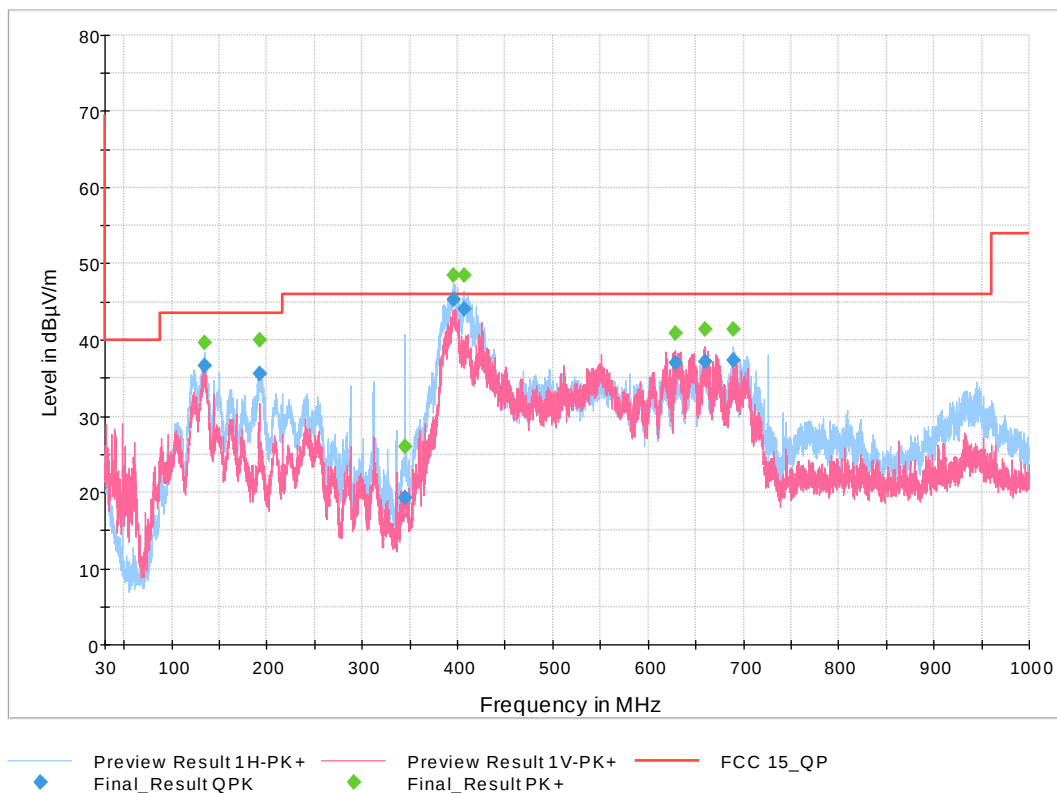
4.4.4.1 Results

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
133.11	36.68	---	43.52	6.84	1000.00	120.00	250.00	H	71.00	-11.70
133.11	---	39.67	---	---	1000.00	120.00	250.00	H	71.00	-11.70
394.84	44.82	---	46.00	1.18	1000.00	120.00	100.00	H	274.00	-9.40
394.84	---	48.14	---	---	1000.00	120.00	100.00	H	274.00	-9.40
412.47	42.73	---	46.00	3.27	1000.00	120.00	100.00	H	204.00	-8.70
412.47	---	47.12	---	---	1000.00	120.00	100.00	H	204.00	-8.70
642.25	36.37	---	46.00	9.63	1000.00	120.00	100.00	V	222.00	-5.50
642.25	---	40.90	---	---	1000.00	120.00	100.00	V	222.00	-5.50
645.72	---	41.39	---	---	1000.00	120.00	100.00	V	220.00	-5.40
645.72	37.38	---	46.00	8.62	1000.00	120.00	100.00	V	220.00	-5.40
655.36	---	40.42	---	---	1000.00	120.00	100.00	V	225.00	-5.10
655.36	35.60	---	46.00	10.40	1000.00	120.00	100.00	V	225.00	-5.10
699.49	---	41.21	---	---	1000.00	120.00	104.00	H	163.00	-3.50
699.49	36.23	---	46.00	9.77	1000.00	120.00	104.00	H	163.00	-3.50



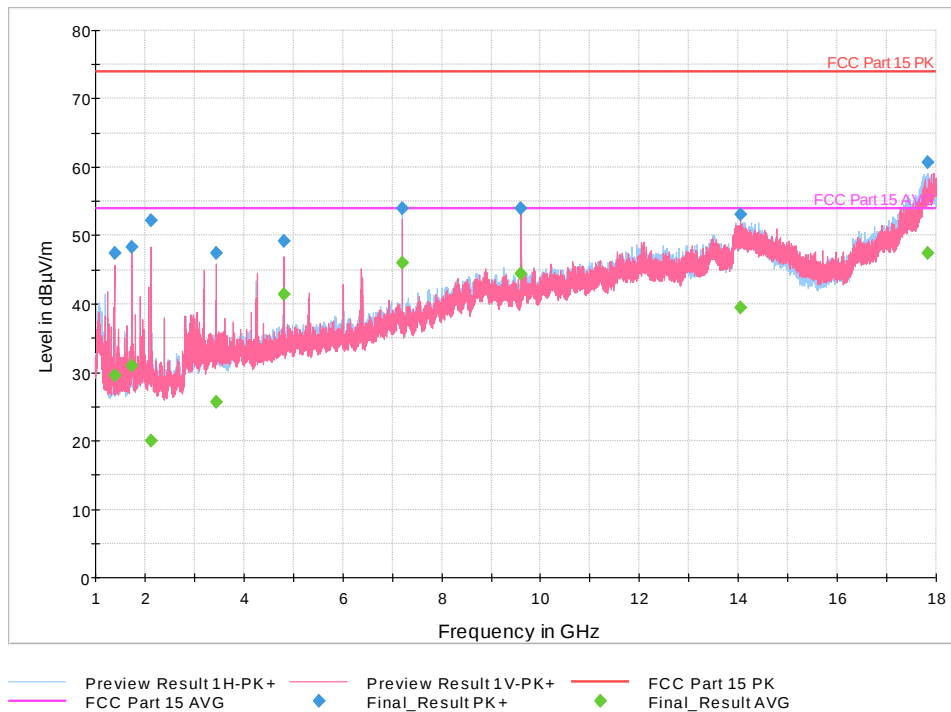
Plot 23. 30 MHz-1 GHz, 2402 MHz, 1Mbps

Frequency (MHz)	QuasiPeak (dBμV/m)	MaxPeak (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Meas. Time (ms)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
133.99	36.57	---	43.52	6.95	1000.00	120.00	231.00	H	93.00	-11.70
133.99	---	39.70	---	---	1000.00	120.00	231.00	H	93.00	-11.70
191.97	35.59	---	43.52	7.94	1000.00	120.00	103.00	H	104.00	-13.10
191.97	---	39.99	---	---	1000.00	120.00	103.00	H	104.00	-13.10
345.19	19.37	---	46.00	26.63	1000.00	120.00	103.00	H	145.00	-9.80
345.19	---	26.02	---	---	1000.00	120.00	103.00	H	145.00	-9.80
396.35	45.23	---	46.00	0.77	1000.00	120.00	100.00	H	276.00	-9.30
396.35	---	48.54	---	---	1000.00	120.00	100.00	H	276.00	-9.30
407.09	44.08	---	46.00	1.92	1000.00	120.00	100.00	H	207.00	-9.00
407.09	---	48.50	---	---	1000.00	120.00	100.00	H	207.00	-9.00
628.97	36.96	---	46.00	9.04	1000.00	120.00	100.00	V	221.00	-5.40
628.97	---	40.93	---	---	1000.00	120.00	100.00	V	221.00	-5.40
659.62	---	41.45	---	---	1000.00	120.00	100.00	V	224.00	-5.00
659.62	37.21	---	46.00	8.79	1000.00	120.00	100.00	V	224.00	-5.00
689.60	---	41.37	---	---	1000.00	120.00	106.00	H	164.00	-3.70
689.60	37.34	---	46.00	8.66	1000.00	120.00	106.00	H	164.00	-3.70



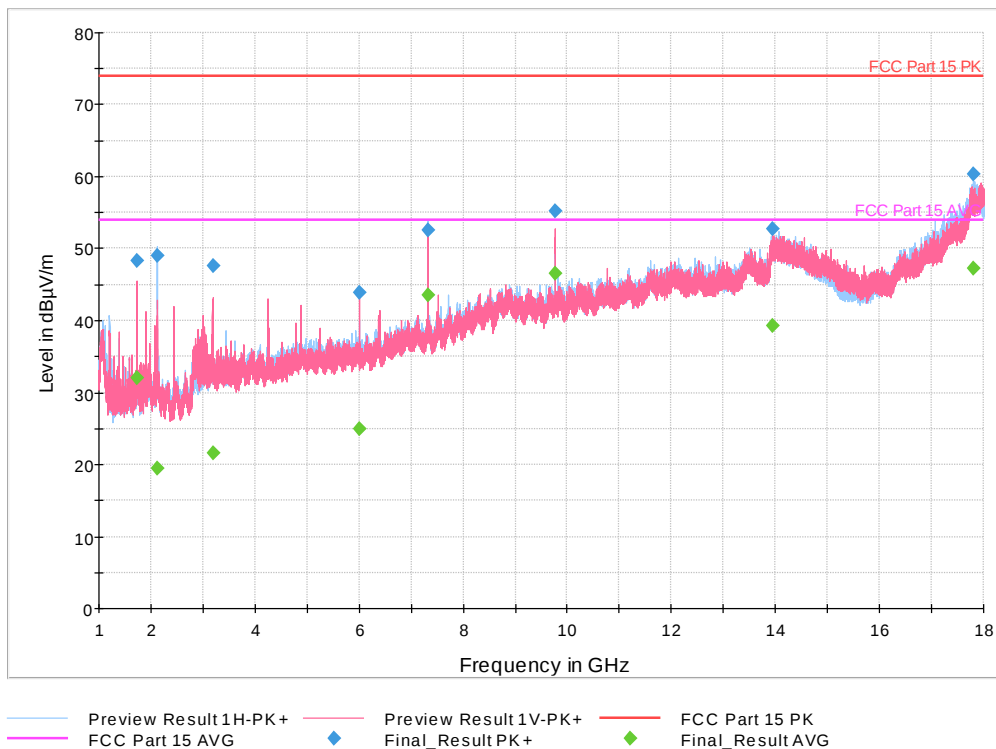
Plot 24. 30 MHz-1 GHz, 2402 MHz, 2Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1380.00	47.38	---	74.00	26.62	1000.00	354.00	V	171.00	-7.00
1380.00	---	29.63	54.00	24.37	1000.00	354.00	V	171.00	-7.00
1724.98	48.23	---	74.00	25.77	1000.00	250.00	V	225.00	-5.70
1724.98	---	31.06	54.00	22.94	1000.00	250.00	V	225.00	-5.70
2126.21	52.28	---	74.00	21.72	1000.00	103.00	V	242.00	-4.20
2126.21	---	19.97	54.00	34.03	1000.00	103.00	V	242.00	-4.20
3450.00	---	25.75	54.00	28.25	1000.00	250.00	V	220.00	0.20
3450.00	47.38	---	74.00	26.62	1000.00	250.00	V	220.00	0.20
4803.48	---	41.49	54.00	12.51	1000.00	103.00	V	186.00	3.10
4803.48	49.27	---	74.00	24.73	1000.00	103.00	V	186.00	3.10
7206.78	53.92	---	74.00	20.08	1000.00	154.00	H	214.00	8.40
7206.78	---	46.10	54.00	7.90	1000.00	154.00	H	214.00	8.40
9607.00	53.99	---	74.00	20.01	1000.00	355.00	V	219.00	11.90
9607.00	---	44.42	54.00	9.58	1000.00	355.00	V	219.00	11.90
14048.55	53.16	---	74.00	20.84	1000.00	350.00	V	249.00	19.10
14048.55	---	39.51	54.00	14.49	1000.00	350.00	V	249.00	19.10
17827.13	---	47.35	54.00	6.65	1000.00	150.00	H	343.00	26.70
17827.13	60.66	---	74.00	13.34	1000.00	150.00	H	343.00	26.70



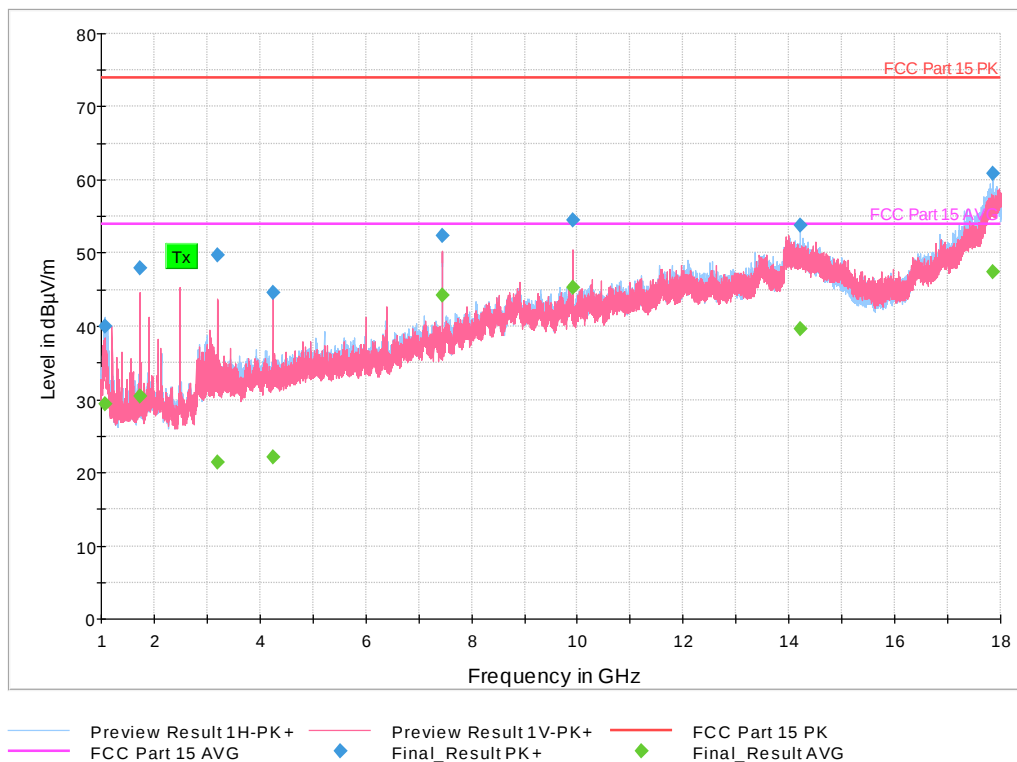
Plot 25. 1-18 GHz, 2402 MHz, 1Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1725.00	---	31.99	54.00	22.01	1000.00	155.00	V	229.00	-5.70
1725.00	48.35	---	74.00	25.65	1000.00	155.00	V	229.00	-5.70
2129.11	48.99	---	74.00	25.01	1000.00	255.00	H	277.00	-4.10
2129.11	---	19.54	54.00	34.46	1000.00	255.00	H	277.00	-4.10
3190.31	---	21.63	54.00	32.37	1000.00	355.00	V	198.00	-0.40
3190.31	47.65	---	74.00	26.35	1000.00	355.00	V	198.00	-0.40
6000.02	---	24.95	54.00	29.05	1000.00	154.00	V	84.00	4.80
6000.02	43.95	---	74.00	30.05	1000.00	154.00	V	84.00	4.80
7320.82	---	43.46	54.00	10.54	1000.00	155.00	H	155.00	8.50
7320.82	52.49	---	74.00	21.51	1000.00	155.00	H	155.00	8.50
9759.08	---	46.63	54.00	7.37	1000.00	109.00	V	280.00	12.10
9759.08	55.17	---	74.00	18.83	1000.00	109.00	V	280.00	12.10
13935.51	---	39.36	54.00	14.64	1000.00	234.00	V	49.00	18.80
13935.51	52.67	---	74.00	21.33	1000.00	234.00	V	49.00	18.80
17809.00	60.39	---	74.00	13.61	1000.00	153.00	H	159.00	26.60
17809.00	---	47.24	54.00	6.76	1000.00	153.00	H	159.00	26.60



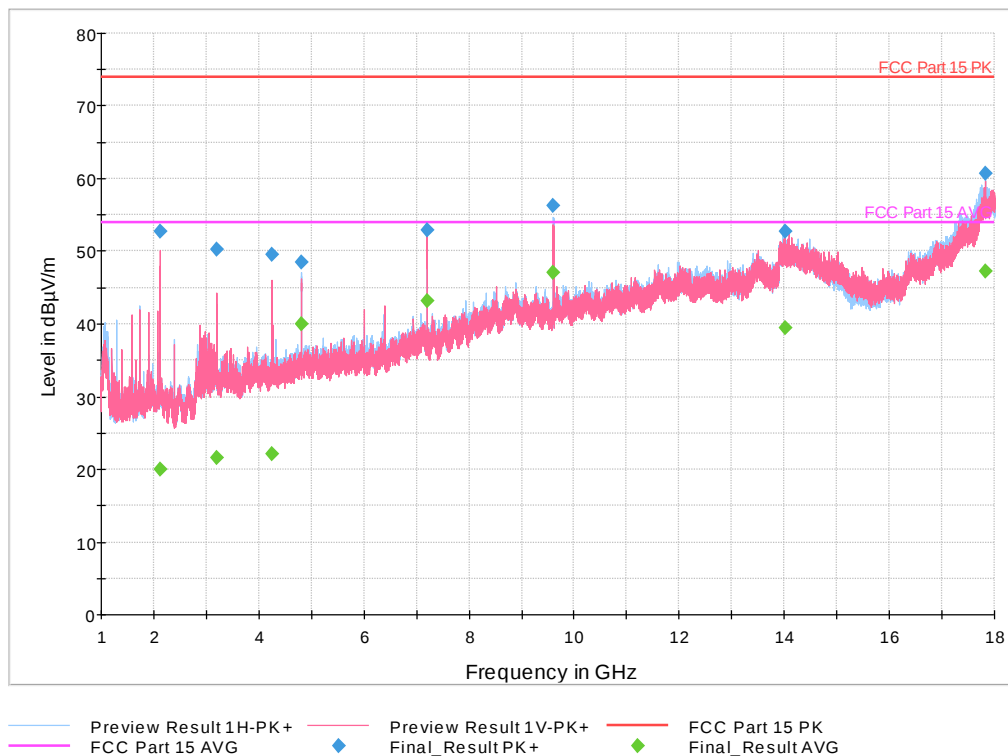
Plot 26. 1-18 GHz, 2440 MHz, 1Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1075.81	---	29.33	54.00	24.67	1000.00	155.00	H	233.00	-8.10
1075.81	39.91	---	74.00	34.09	1000.00	155.00	H	233.00	-8.10
1725.00	48.05	---	74.00	25.95	1000.00	153.00	V	234.00	-5.70
1725.00	---	30.52	54.00	23.48	1000.00	153.00	V	234.00	-5.70
3189.62	---	21.49	54.00	32.51	1000.00	105.00	V	198.00	-0.40
3189.62	49.71	---	74.00	24.29	1000.00	105.00	V	198.00	-0.40
4247.09	---	22.17	54.00	31.83	1000.00	334.00	V	142.00	1.60
4247.09	44.54	---	74.00	29.46	1000.00	334.00	V	142.00	1.60
7440.79	52.35	---	74.00	21.65	1000.00	100.00	V	180.00	8.40
7440.79	---	44.31	54.00	9.69	1000.00	100.00	V	180.00	8.40
9921.03	---	45.23	54.00	8.77	1000.00	100.00	V	267.00	12.40
9921.03	54.43	---	74.00	19.57	1000.00	100.00	V	267.00	12.40
14220.00	---	39.59	54.00	14.41	1000.00	355.00	H	93.00	19.60
14220.00	53.85	---	74.00	20.15	1000.00	355.00	H	93.00	19.60
17843.97	60.91	---	74.00	13.09	1000.00	100.00	H	220.00	26.90
17843.97	---	47.38	54.00	6.62	1000.00	100.00	H	220.00	26.90



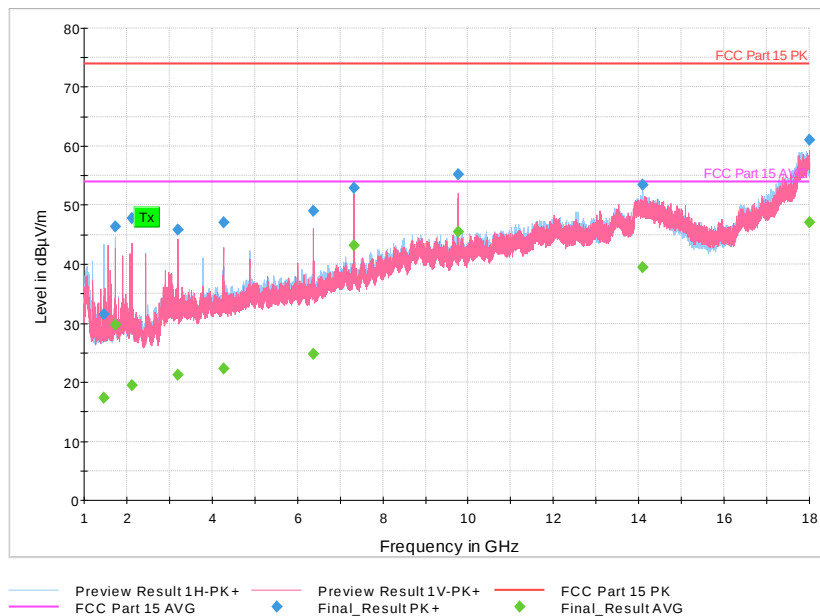
Plot 27. 1-18 GHz, 2480 MHz, 1Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
2128.50	---	20.04	54.00	33.96	1000.00	235.00	V	203.00	-4.20
2128.50	52.78	---	74.00	21.22	1000.00	235.00	V	203.00	-4.20
3193.86	50.27	---	74.00	23.73	1000.00	250.00	V	185.00	-0.40
3193.86	---	21.53	54.00	32.47	1000.00	250.00	V	185.00	-0.40
4250.00	49.62	---	74.00	24.38	1000.00	105.00	V	235.00	1.60
4250.00	---	22.04	54.00	31.96	1000.00	105.00	V	235.00	1.60
4804.98	---	39.94	54.00	14.06	1000.00	153.00	H	59.00	3.60
4804.98	48.58	---	74.00	25.42	1000.00	153.00	H	59.00	3.60
7204.50	52.98	---	74.00	21.02	1000.00	155.00	H	140.00	8.40
7204.50	---	43.24	54.00	10.76	1000.00	155.00	H	140.00	8.40
9609.88	---	47.00	54.00	7.00	1000.00	253.00	H	222.00	12.40
9609.88	56.35	---	74.00	17.65	1000.00	253.00	H	222.00	12.40
14015.30	---	39.46	54.00	14.54	1000.00	100.00	V	209.00	19.00
14015.30	52.73	---	74.00	21.27	1000.00	100.00	V	209.00	19.00
17838.12	60.71	---	74.00	13.29	1000.00	150.00	H	151.00	26.80
17838.12	---	47.22	54.00	6.78	1000.00	150.00	H	151.00	26.80



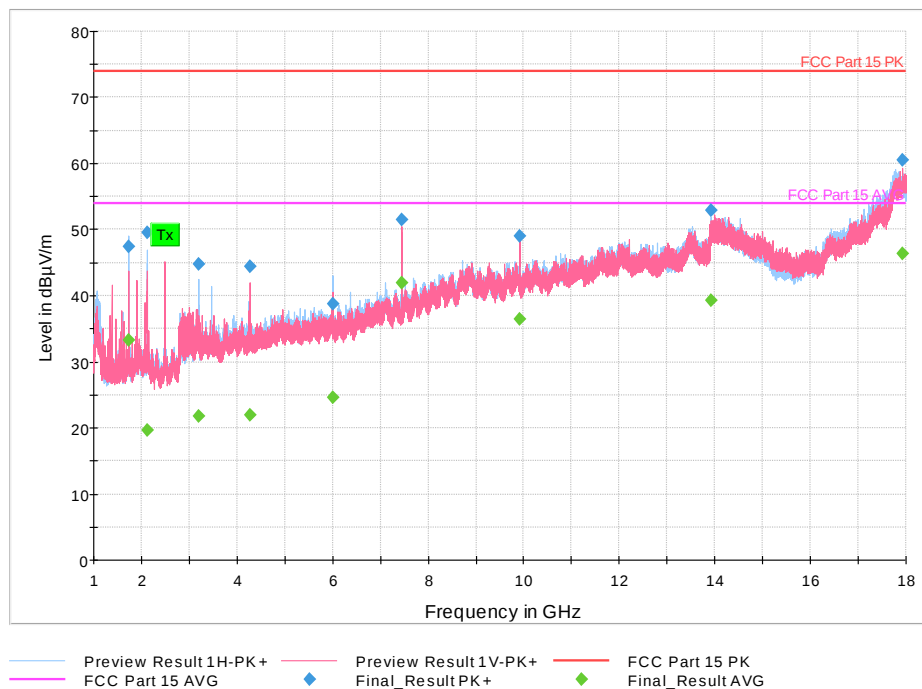
Plot 28. 1-18 GHz, 2402 MHz, 2Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1456.70	---	17.31	54.00	36.69	1000.00	250.00	H	13.00	-6.90
1456.70	31.50	---	74.00	42.50	1000.00	250.00	H	13.00	-6.90
1725.02	46.41	---	74.00	27.59	1000.00	336.00	H	246.00	-5.80
1725.02	---	29.78	54.00	24.22	1000.00	336.00	H	246.00	-5.80
2124.44	---	19.46	54.00	34.54	1000.00	250.00	V	329.00	-4.20
2124.44	47.82	---	74.00	26.18	1000.00	250.00	V	329.00	-4.20
3189.50	45.91	---	74.00	28.09	1000.00	100.00	V	69.00	-0.40
3189.50	---	21.27	54.00	32.73	1000.00	100.00	V	69.00	-0.40
4261.50	47.11	---	74.00	26.89	1000.00	355.00	V	238.00	1.60
4261.50	---	22.33	54.00	31.67	1000.00	355.00	V	238.00	1.60
6377.50	49.02	---	74.00	24.98	1000.00	100.00	V	284.00	5.70
6377.50	---	24.73	54.00	29.27	1000.00	100.00	V	284.00	5.70
7321.45	52.88	---	74.00	21.12	1000.00	154.00	H	156.00	8.50
7321.45	---	43.15	54.00	10.85	1000.00	154.00	H	156.00	8.50
9758.12	---	45.50	54.00	8.50	1000.00	100.00	V	268.00	12.10
9758.12	55.26	---	74.00	18.74	1000.00	100.00	V	268.00	12.10
14094.22	---	39.56	54.00	14.44	1000.00	354.00	H	28.00	19.20
14094.22	53.44	---	74.00	20.56	1000.00	354.00	H	28.00	19.20
17993.20	61.05	---	74.00	12.95	1000.00	100.00	V	291.00	26.30
17993.20	---	47.07	54.00	6.93	1000.00	100.00	V	291.00	26.30



Plot 29. 1-18 GHz, 2440 MHz, 2Mbps

Frequency (MHz)	MaxPeak (dBμV/m)	Average (dBμV/m)	Limit (dBμV/m)	Margin (dB)	Bandwidth (kHz)	Height (cm)	Pol	Azimuth (deg)	Corr. (dB/m)
1725.00	47.46	---	74.00	26.54	1000.00	153.00	H	258.00	-5.80
1725.00	---	33.21	54.00	20.79	1000.00	153.00	H	258.00	-5.80
2131.43	49.60	---	74.00	24.40	1000.00	336.00	H	268.00	-4.10
2131.43	---	19.72	54.00	34.28	1000.00	336.00	H	268.00	-4.10
3198.36	44.85	---	74.00	29.15	1000.00	350.00	H	254.00	0.00
3198.36	---	21.72	54.00	32.28	1000.00	350.00	H	254.00	0.00
4264.00	44.44	---	74.00	29.56	1000.00	100.00	V	20.00	1.60
4264.00	---	21.99	54.00	32.01	1000.00	100.00	V	20.00	1.60
6000.10	38.79	---	74.00	35.21	1000.00	158.00	H	72.00	5.40
6000.10	---	24.61	54.00	29.39	1000.00	158.00	H	72.00	5.40
7441.49	51.50	---	74.00	22.50	1000.00	100.00	V	179.00	8.40
7441.49	---	41.92	54.00	12.08	1000.00	100.00	V	179.00	8.40
9918.06	---	36.41	54.00	17.59	1000.00	354.00	V	241.00	12.40
9918.06	49.03	---	74.00	24.97	1000.00	354.00	V	241.00	12.40
13920.99	52.94	---	74.00	21.06	1000.00	350.00	H	233.00	18.90
13920.99	---	39.37	54.00	14.63	1000.00	350.00	H	233.00	18.90
17922.37	60.48	---	74.00	13.52	1000.00	354.00	V	195.00	26.00
17922.37	---	46.45	54.00	7.55	1000.00	354.00	V	195.00	26.00



Plot 30. 1-18 GHz, 2480 MHz, 2Mbps

4.5 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 the levels 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 and RSS-GEN. Sect. 8.8.

4.5.1 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 50 μ H / 50 Ω LISNs.

Testing is performed in Lab1. 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.

4.5.1.1 Deviations

There were no deviations from this test methodology.

4.5.2 Test Results

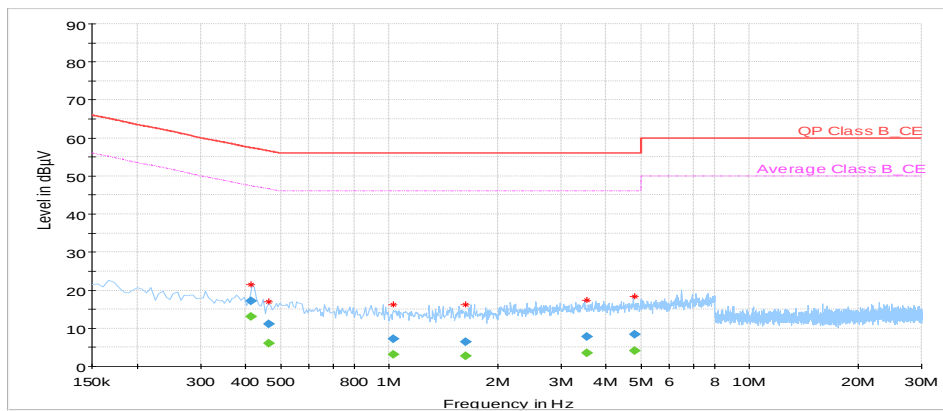
As originally tested, the EUT was found to be compliant to the requirements of the test standard(s).

Table 4: AC Conducted Emissions – Test Results

Test Conditions: Conducted Measurement at Normal Conditions only		
Antenna Type: 2.4ghz FlexPIFA, LSR 330-0149		Power Level: See Table 9
AC Power: 120 Vac/60 Hz		Configuration: Tabletop
Configuration	Frequency Range	Test Result
Line 1 (Live)	0.15 to 30 MHz	Pass
Line 2 (Neutral)	0.15 to 30 MHz	Pass

Live Line

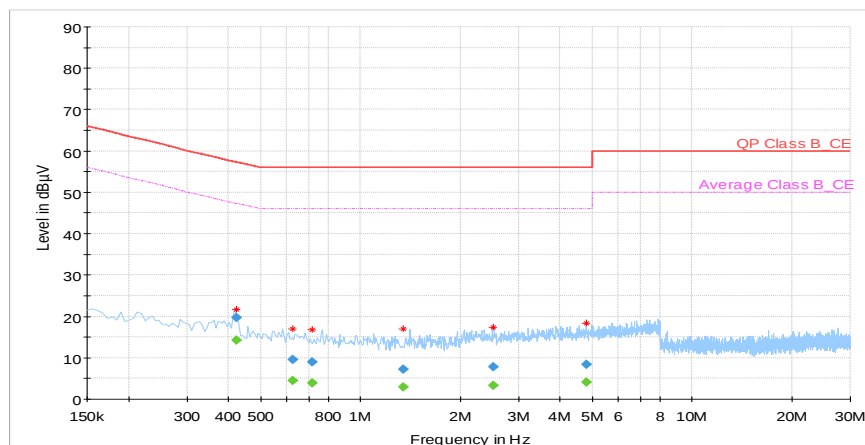
Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Line	PE	Corr. (dB)
0.42	---	13.07	47.44	34.37	10000.00	L1	GND	9.90
0.42	17.23	---	57.44	40.21	10000.00	L1	GND	9.90
0.46	---	6.10	46.61	40.51	10000.00	L1	GND	9.90
0.46	11.20	---	56.61	45.41	10000.00	L1	GND	9.90
1.03	---	3.15	46.00	42.85	10000.00	L1	GND	9.80
1.03	7.20	---	56.00	48.80	10000.00	L1	GND	9.80
1.63	---	2.69	46.00	43.31	10000.00	L1	GND	9.80
1.63	6.53	---	56.00	49.47	10000.00	L1	GND	9.80
3.54	---	3.53	46.00	42.47	10000.00	L1	GND	9.80
3.54	7.75	---	56.00	48.25	10000.00	L1	GND	9.80
4.80	---	4.01	46.00	41.99	10000.00	L1	GND	9.80
4.80	8.32	---	56.00	47.68	10000.00	L1	GND	9.80



Plot 31. 0.15 - 30 MHz, Live Line

Neutral Line

Frequency (MHz)	QuasiPeak (dBμV)	Average (dBμV)	Limit (dBμV)	Margin (dB)	Meas. Time (ms)	Line	PE	Corr. (dB)
0.42	---	14.27	47.33	33.07	10000.00	N	GND	10.00
0.42	19.69	---	57.33	37.64	10000.00	N	GND	10.00
0.63	---	4.56	46.00	41.44	10000.00	N	GND	10.00
0.63	9.50	---	56.00	46.50	10000.00	N	GND	10.00
0.72	---	3.96	46.00	42.04	10000.00	N	GND	9.90
0.72	8.99	---	56.00	47.01	10000.00	N	GND	9.90
1.35	---	2.92	46.00	43.08	10000.00	N	GND	9.90
1.35	7.25	---	56.00	48.75	10000.00	N	GND	9.90
2.52	---	3.40	46.00	42.60	10000.00	N	GND	9.90
2.52	7.81	---	56.00	48.19	10000.00	N	GND	9.90
4.80	---	4.09	46.00	41.91	10000.00	N	GND	9.90
4.80	8.39	---	56.00	47.61	10000.00	N	GND	9.90



Plot 32. 0.15 - 30 MHz, Neutral Line

5 Test Equipment List

5.1 Equipment List

Equipment used					
RE					
Equipment	Type	Inventory number	Manufacturer	Last calibration	Calibration due date
Antenna, Horn, 1 - 18 GHz	3115	9038283	EMCO	07/29/23	07/29/24
Preamplifier, 18 - 40 GHz	TS-PR1840	9018046	Rohde & Schwarz	04/04/23	04/04/24
Small Horn Antenna, 18 - 40 GHz	180-442-KF	9024554	ATM	06/20/22	06/20/24
Antenna, Bilog	JB3	G1700574	Sunol Sciences	06/07/22	06/07/24
Preamplifier, 30 MHz - 8 GHz	TS-PR8	9017639	Rohde & Schwarz	03/14/23	03/14/24
2.4GHz Band Pass Filter	Micro-Tronics	BRM50702	009	N/A (See Note)	
Note: Equipment is characterized before use.					
CE					
Receiver, EMI, 20 Hz - 40 GHz	ESIB40	G1700882	Rohde & Schwarz	02/22/2023	02/22/2024
Limiter, Transient, 9 kHz - 30 MHz	LIT-930	G1700144	Com-Power	02/22/2023	02/22/2024
LISN, 150 kHz - 30 MHz	FCC-LISN-50-200-4-02	G1700912	FCC	02/21/2023	02/21/2024
Conducted RF					
Spectrum Analyzer	FSU	9022595	Rohde & Schwarz	02/22/2023	02/22/2024

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 (information supplied by the customer and can affect the validity of results) so that the test laboratory may perform the requested testing.

6.2 Customer

Table 5: Customer Information

Client	Hunter Douglas Window Fashions, Inc
Address 1	1 Duette Way
Address 2	Broomfield, CO 80020
Contact Person	Mike Rockwood
Telephone	720-778-0205
Fax	n/a
E-mail	mike.rockwood@hunterdouglas.com

Table 6: Technical Contact Information

Contact Person	Mike Rockwood
Telephone	720-778-0205
E-mail	mike.rockwood@hunterdouglas.com

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 7: EUT Designation

Product Name	Powerview Gen3 Motor Control Board
Model Number	1016000015
Product Description	Image Computer Remote Cabinet/ External Storage Cabinet

6.4 Product Specifications

Table 8: EUT Specifications *

EUT Specifications	
AC/DC Input	3.3 VDC, 1.5 A
Environment (Indoor / Outdoor)	Indoor
Operating Temperature Range:	0C-70C
Multiple Feeds:	☐ Yes and how many ☒ No
Product Marketing Name (PMN)	Powerview Automation
Model No.	1016000015
Hardware Version Identification Number (HVIN)	1016000015
Firmware Version Identification Number (FVIN)	n/a
Operating Modes	BLE 1Mbps, 2Mbps
Transmitter Frequency Band	2400 – 2483.5 MHz
Power Settings	8dBm
Antenna Type	2.4ghz FlexPIFA, LSR 330-0149 (001-0014)
Antenna Gain (dBi)	1.58 dBi
Modulation Type	☒ GFSK ☐ DSSS ☐ OFDM ☐ Other describe:
Type of Equipment	☒ Table Top ☐ Wall-mount ☐ Floor standing cabinet ☐ Other:
*All EUT specifications are provided by the manufacturer or the TUV direct customer. Note: Information supplied by the customer and can affect the validity of results.	

Table 9: EUT Channel Power Specifications

Freq. (MHz)	BLE 1Mbps	BLE 2Mbps							
FCC/IC Power Setting									
2402	8	8							
2440	8	8							
2480	8	8							

Table 10: Wireless

☒	Yes	☐	No
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Table 11: General Product Information

Size	H	5cm	W	5cm	L	1cm
Weight	1 g		Fork-Lift Needed		no	
Notes						

Table 12: Electrical Power Type

☐	AC	☒	DC	☐	Batteries	☐	Host -
Note: AC/DC power supply used to supply DC.							

Table 13: Electrical Power Type

Name	Type	Voltage		Frequency	Current	Notes
		min	max			
AC/DC Power Supply	-	-	3.3V DC	-	1.5 A	See Note 1
Notes	1. Power Option: AC/DC power supply was used as the worst case scenario. 18V AC/DC Power Supply - Model: AMS165-1802000FU; P/N 7806000000 Input: 100-240VAC, 1.0A; Output: 18VDC, 2.0A					

Table 14: Electrical Support Equipment

Type	Manufacture	Model	Connected To
Laptop	HP	17-bs011dx	EUT

Table 15: Non- Electrical Support Equipment

Item	Notes
n/a	

Table 16: EUT Equipment / Cabling Information

EUT Port	Connected To	Location	Length	Shielded / Unshielded
Pins	Laptop	USB	< 3m	Unshielded

6.5 Test Specifications

Table 17: Test Specifications

Emissions	
Standard	Requirement
CFR 47 Part 15.247: 2023	Clause b, d, a2, 15.207
RSS 247 Issue 2, 2017	Clause 5.5

END OF REPORT