Prüfbericht - Produkte
Test Report - Products

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Prüfbericht-Nr.: *Test Report No.:*	**JP2290QR 001**	**Auftrags-Nr.:** *Order No.:*	**150246456**	**Seite 1 von 167** *Page 1 of 167*
Kunden-Referenz-Nr.: *Client Reference No.:*	N/A	**Auftragsdatum:** *Order Date:*	2021-08-31	
Auftraggeber: *Client:*	Panasonic Corporation 4261 Ikonobe-cho, Tsuzuki-ku, Yokohama-shi, Kanagawa-ken 224-8520, Japan			
Prüfgegenstand: *Test Item:*	Car Navigation			
Bezeichnung / Typ-Nr.: *Identification / Type No.:*	AT2201	**Serien-Nr.:** *Serial No.:*	No. 002	
Auftrags-Inhalt: *Order Content:*	Radio Testing			
Prüfgrundlage: *Test Specification:*	**FCC 47 CFR Part 15, Subpart C, Section 15.247** **RSS-Gen (Issue 5): 2018+A1:2019** **RSS-247 (Issue 2): 2017** ANSI C63.10-2013 KDB Publication No. 558074 D01 (v05r02): Guidance for Compliance Measurement on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operation under Section 15.247 of the FCC Rules			
Wareneingangsdatum: *Date of Receipt:*	2021-09-06			
Prüfmuster-Nr.: *Test Sample No.:*	A003125761, A003125757			
Prüfzeitraum: *Testing Period:*	2021-09-07 - 2021-11-09			
Ort der Prüfung: *Place of Testing:*	Yokohama EMC Laboratory			
Prüflaboratorium: *Testing Laboratory:*	TÜV Rheinland Japan Ltd.			
Prüfergebnis*: *Test Result*:*	Pass			

Überprüft von: *Reviewed by:*		**Genehmigt von:** *Authorized by:*	
Datum: 2022-02-18 *Date:*	Daisuke Watanuki	**Datum:** 2022-02-18 *Date:*	Pin Zhang
***Stellung** / Position:*	Inspector	***Stellung** / Position:*	Reviewer

Sonstiges / *Other:*

Zustand des Prüfgegenstandes bei Anlieferung: *Condition of the Test Item at Delivery:*	Prüfmuster vollständig und unbeschädigt *Test item complete and undamaged*

* Legende:	P(ass) = entspricht o.g. Prüfgrundlage(n)	F(ail) = entspricht nicht o.g. Prüfgrundlage(n)	N/A = nicht anwendbar	N/T = nicht getestet
** 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*

REVISIONS

Report No.	Issue date	Changes / Remarks
JP2290QR 001	2022-02-18	Original document for WLAN 2.4GHz and Bluetooth Low Energy

Contents

1. General Remarks

1.1 Test Specifications

Table 1: Test Summary

Test	Specifications	Result
Radio: FCC 47 CFR Part 15, Subpart C, Section 15.247 RSS-Gen (Issue 5): 2018+A1:2019 RSS-247 (Issue 2): 2017 ANSI C63.10-2013 KDB Publication No. 558074 D01 (v05r02): Guidance for Compliance Measurement on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid System Devices Operation under Section 15.247 of the FCC Rules		
Conducted Output Power	FCC 15.247(b)(3) RSS-247 Section 5.4	Pass
6dB Bandwidth	FCC 15.215(c), 15.247(a)(2) RSS-247 Section 5.2	Pass
99% Bandwidth	For reference	Performed
Conducted Spurious Emissions	FCC 15.247(d) RSS-247 Section 5.5	Pass
Peak Power Spectral Density	FCC 15.247(e) RSS-247 Section 5.2	Pass
Duty Cycle	For reference	Performed
Radiated Spurious Emissions of Transmitter	FCC 15.205, FCC 15.209, FCC 15.247(d) RSS-Gen Section 8.10, 8.9, RSS-247 Section 5.5	Pass
Conducted Emission on AC Power Ports	FCC 15.207 RSS-Gen Section 8.8 Not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.	N/A

1.2 Test Report Purpose

The purpose of this test report is to show compliance of the EUT (Equipment Under Test) with the requirements of the FCC rules and ISED standards listed in section 1.1.

This test report covers WLAN (2.4GHz) and Bluetooth Low Energy parts of the product, that has multiple wireless connectivity: Bluetooth (Classic and Low Energy), WLAN (2.4GHz and 5GHz).

1.3 Complementary Materials

There is no attachment to this test report.

2. Test Sites

2.1 Test Facilities

TÜV Rheinland Japan Ltd. – Global Technology Assessment Center
4-25-2 Kita-Yamata, Tsuzuki-ku, Yokohama 224-0021, Japan

The test facility is accredited by VLAC (member of ILAC) under number VLAC-017-1 according to ISO/IEC 17025:2017.

The test facility is recognized by the Federal Communications Commission (FCC) as a Conformity Assessment Body under designation number JP0017 and test firm registration number 386498.

The test site is registered by Innovation, Science and Economic Development Canada (ISED) under OATS filing number 3466B-1.

2.2 List of Test and Measurement Instruments

Table 2: List of Test and Measurement Equipment

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equip. ID	Cal. Interval	Cal. Date	Next Cal.
For Antenna Port Conducted Emission							
EMI Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	1 year	2021-08-25	2022-08-25
EMI Receiver	Rohde & Schwarz	ESW 26	101316	RF-0812	1 year	2021-05-21	2022-05-21
EMI Receiver	Rohde & Schwarz	ESW 44	101751	RF-0809	1 year	2021-09-27	2022-09-27
10dB Attenuator	Huber + Suhner	6610_SMA -50- 1/199_NE	-	RF-0762	1 year	2021-03-17	2022-03-17
For Radiated Emission (RE)							
Radiated Emission Measurement Soft-ware (above 30MHz)	Toyo Corporation	EP7/RE	VER. 8.0.90	RF-0026	1 year	2021-02-16	2022-02-16
EMI Receiver	Rohde & Schwarz	ESU 8	100025	RF-0020	1 year	2021-03-12	2022-03-12
EMI Receiver	Rohde & Schwarz	ESU 40	100029	RF-0021	1 year	2021-08-25	2022-08-25
RF Selector (10m Chamber)	Toyo Corporation	NS4900	0703-182	RF-0029	1 year	2021-02-16	2022-02-16
Loop Antenna with Amplifier, 9kHz-30MHz	Rohde & Schwarz	HFH2-Z2	100139	RF-0048	1 year	2021-04-27	2022-04-27

Kind of Equipment	Manufacturer	Model Name	Serial Number	Equip. ID	Cal. Interval	Cal. Date	Next Cal.
Trilog Antenna No. 2, 30-1000MHz	Schwarzbeck	VULB 9168	9168-475	RF-0462	1 year	2021-05-18	2022-05-18
5dB Attenuator	Pasternack	PE7047-5	-	RF-0731	1 year	2021-05-18	2022-05-18
Low Noise Preamplifier, 9kHz-1GHz	TSJ	MLA-10K01-B01-35	1370750	RF-0253	1 year	2021-01-06	2022-01-06
Low Pass Filter, DC-1GHz	R&K	LP1000CH3	12104001	RF-0515	1 year	2021-01-06	2022-01-06
Horn Antenna, 1-8GHz	Schwarzbeck	BBHA 9120 D	1059	RF-0553	1 year	2021-04-03	2022-04-03
Microwave Preamplifier, 1-8GHz	Toyo Corporation	TPA0108-40	0634	RF-0052	1 year	2021-01-06	2022-01-06
Band Reject Filter, 1-8GHz	Nitsuki	NF-49BT	027	RF-0131	1 year	2021-01-06	2022-01-06
Horn Antenna with Preamplifier, 8-18GHz (RX)	Toyo Corporation	HAP06-18W	00000025	RF-0065	1 year	2021-04-03	2022-04-03
High Pass Filter, 8-18GHz	Micro-Tronics	HPM50107	006	RF-0334	1 year	2021-04-03	2022-04-03
Horn Antenna with Preamplifier, 18-26.5GHz (RX)	Toyo Corporation	HAP18-26N	00000010	RF-0070	1 year	2021-04-03	2022-04-03
Horn Antenna with Preamplifier, 26.5 -40GHz (RX)	Toyo Corporation	HAP26-40N	00000007	RF-0069	1 year	2021-04-03	2022-04-03
20dB Attenuator	Weinschel Associates	WA54-20-12	-	RF-0560	1 year	2021-07-15	2022-07-15
Band Reject filter	MICRO-TRONICS	BRM50702	G488	RF-0933	1 year	2021-09-14	2022-09-14
Band Reject filter	MICRO-TRONICS	BRC50703	027	RF-0408	1 year	2021-07-16	2022-07-16
Constant Voltage Constant Frequency Stabilizers and Power Accessories							
CVCF (10m Chamber)	NF Corporation	ES2000U	9067307	RF-0212	1 year	2021-03-12	2022-03-12
CVCF Booster (10m Chamber)	NF Corporation	ES2000B	9074408	RF-0213	1 year	2021-03-12	2022-03-12
DC Power Supply	Kikusui	PWR800L	NA003235	PV-0039	N/A	N/A	N/A
True RMS Multimeter	Fluke	87V	97680445	RF-0281	1 year	2020-12-15	2021-12-15
True RMS Multimeter	Fluke	87V	97680450	RF-0282	1 year	2021-03-23	2022-03-23
True RMS Multimeter	Fluke	87V	16110176	RF-0414	1 year	2021-06-10	2022-06-10
AC,DC Power Source	NF Corporation	EC1000SA	9364678	RF-0940	1 year	2021-09-21	2022-09-21

Conformance of the used measurement and test equipment with the requirements of ISO/IEC 17025 has been confirmed before testing.

2.3 Measurement Uncertainty

Table 3: Emission Measurement Uncertainty

Measurement Type	Frequency	Uncertainty
AC Power Line Conducted Emission	150kHz - 30MHz	±2.0dB
Antenna Port Conducted Emission	20Hz - 40GHz	±1.5dB
Radiated Emission	150kHz - 30MHz	±4.7dB
	30MHz - 1GHz	±3.8dB at 3m ±5.0dB at 10m
	> 1GHz	±4.5dB

Note:

The measurement instrumentation uncertainty (MIU) was determined according to CISPR 16-4-2 and ETSI TR 100-028. All MIU values mentioned in the above table are smaller than the uncertainty budgets specified by CISPR 16-4-2 and ETSI TR 100-028, therefore compliance for all emission measurements is deemed to occur if no measured disturbance level exceeds the disturbance limit.

3. General Product Information

3.1 Product Function and Intended Use

The **EUT** (**E**quipment **U**nder **T**est) is a car navigation to be installed in vehicles with wireless connectivity of Bluetooth, WLAN (2.4GHz and 5GHz) and GNSS.

3.2 Ratings and System Details

1) WLAN (2.4GHz)

Radio standard:	IEEE 802.11b, IEEE 802.11g, IEEE 802.11n (20HT)
Frequency range:	2412 - 2462MHz
Antenna gain:	+0.07dBi (RF0)
Antenna type:	Inverted F Type Antenna
Antenna mounting type:	Internal
Modulation type:	IEEE 802.11b (DSSS): BPSK, QPSK, CCK IEEE 802.11g (OFDM): BPSK, QPSK, 16 QAM, 64QAM IEEE 802.11n (20HT): (OFDM): BPSK, QPSK, 16 QAM, 64QAM
Signal spreading:	DSSS and OFDM (coupled with modulation type above)
Transmit speed:	IEEE 802.11b: 11 / 5.5 / 2 / 1 Mbps IEEE 802.11g: 54 / 48 / 36 / 24 / 18 / 12 / 9 / 6 Mbps IEEE 802.11n (20HT): 65 / 58.5 / 52 / 39 / 26 / 19.5 / 13 / 6.5 Mbps
Number of channels:	11
Channel spacing:	5MHz
FCC classification:	DTS
ISED classification:	WLAN, Vehicle Device, RSS-247 Non-DFS
Emission designator:	G1D (DSSS) and D1D (OFDM)

2) Bluetooth Low Energy

Radio standard:	Bluetooth Low Energy (1M-PHY, 2M-PHY)
Frequency range:	2402 - 2480MHz
Antenna gain:	+1.01dBi (RF1)
Antenna type:	Inverted F Type Antenna
Antenna mounting type:	Internal
Modulation type:	GFSK
Transmit speed:	1M-PHY, 2M-PHY
Number of channels:	40
Channel spacing:	2MHz

FCC classification:	DTS
ISED classification:	Bluetooth Device, Vehicle Device, RSS-247 Non-DFS
Emission designator:	F1D
Simultaneous transmission:	CDD, MIMO for WLAN 5GHz WLAN 5GHz, WLAN 2.4GHz and Bluetooth can simultaneously transmit.
Rated temperature:	-30 to +65°C
Rated voltage:	DC 12V
Rated input Current:	13.11A (Max.)
Protection class:	III
Test voltage:	DC 13.2V for radio testing

3.3 Noise Generating and Noise Suppressing Parts

The highest frequency generated or used by the EUT is 5825MHz as intentional radiator portion.

3.4 Submitted Documents and Information

Following documents have been submitted by the client:

Block Diagram, BOM, Label and location.

Following information provided in this test report has been submitted by the client:

- client name and address;
- EUT identification, ratings, system details, and description of product function and intended use;
- information related to noise generating and noise suppressing parts (if any).

4. Test Setup and Operation Modes

4.1 Test Methodology

The test methodology used is based on the requirements of 47 CFR Part 15, Sections 15.31, 15.33, 15.35, 15.205, 15.207, 15.209, 15.247, RSS-247, RSS-Gen.

The test methods, which have been used, are based on ANSI C63.10 and KDB 558074 D01.

For details, see under each test item.

4.2 Operation Modes

The basic operation modes used for testing are:

A. EUT transmits a continuous modulated signal at the lowest channel
B. EUT transmits a continuous modulated signal at the middle channel
C. EUT transmits a continuous modulated signal at the highest channel

Configurations:

IEEE 802.11b:	1 Mbps, PN9 **(*)**
IEEE 802.11g:	54 Mbps, PN9 **(*)**
IEEE 802.11n (20HT) SISO:	MCS 7, PN9 **(*)**
BLE 1M-PHY:	Maximum Packet Size, PRBS9
BLE 2M-PHY:	Maximum Packet Size, PRBS9

Power setting:

IEEE 802.11b:	+13dBm
IEEE 802.11g:	+11dBm (2412MHz and 2462MHz)
	+13dBm (2417MHz to 2457MHz)
IEEE 802.11n (20HT):	+10dBm (2412MHz and 2462MHz)
	+12dBm (2417MHz to 2457dBm)
BLE 1M-PHY:	Fixed
BLE 2M-PHY:	Fixed

Note: **(*)** The worst condition was determined based on the test result of Maximum Peak Output Power.

4.3 Physical Configuration for Testing

The test system was configured in a typical fashion (as a customer would normally use it).

The justification and manipulation of cables and equipment in order to simulate a worst-case behavior of the test setup has been carried out as prescribed in ANSI C63.10.

Figure 1: Block Diagram

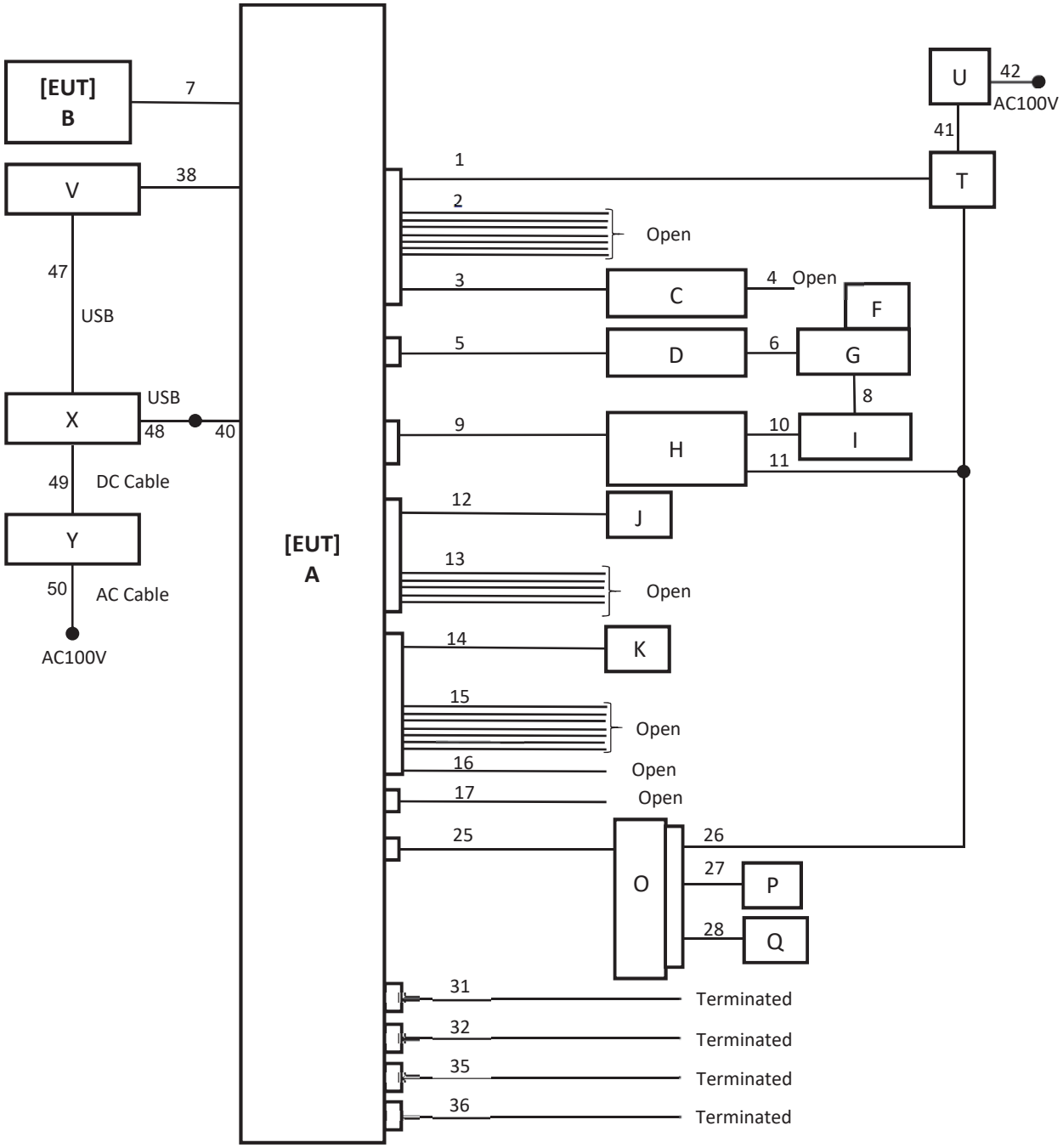

Table 4: The System consists of the Following Units

No.	Item	Model No.	Serial Number	Manufacturer	Remark
A	Car Navigation	AT2201	No. 002	Panasonic Corporation	EUT
B	GNSS Antenna	3498778-10	06D30023	Panasonic Corporation	EUT
C	Steering Switch	-/-	1143	Panasonic Corporation	-/-
D	IF Box	DEP32-10078	035	Panasonic Corporation	-/-
F	USB memory	RUF3-KS	-/-	Buffalo Inc.	-/-
G	USB Hub	U3H-A422BX	0600235	ELECOM	-/-
H	JIG Board	GVIF2HDJIG	15	Panasonic Corporation	-/-
I	Separate Display	ON-LAP 11021	-/-	TEKWIND	-/-
J	Mic	GP-SDA3510A	0DC062856	Panasonic Corporation	-/-
K	Mic	GP-SDA3510A	0DC062519	Panasonic Corporation	-/-
O	MOST AMP	CL-DL47X2AJ Rev.A	513263	Panasonic Corporation	-/-
P	Speaker	TS-X180	-/-	Pioneer	-/-
Q	Dummy load	-/-	Unspecified	Panasonic Corporation	-/-
T	Terminal Block	-/-	-/-	-/-	-/-
U *1)	Power Supply (DC) CVCF+Booster	ES2000U, ES2000B	9067307, 9074408	NF Corporation, NF Corporation	-/-
U *2)	Power Supply (DC)	PWR800L	NA003235	Kikusui	-/-
V	Jig board	WR12-3224	-/-	WESTEK	-/-

X	Laptop PC	20U2S5M60Q	PF2YP1PV	Lenovo	-/-
Y	AC adapter for Laptop PC	ADLX65YDC2 D	8SSA10R16918D1S G 16B0 1H7	Lenovo	-/-

*1) Used for Radiated Emission test
*2) Used for Conducted test

Note: For more details, refer to section: Photographs of the Test Set-Up.

Table 5: Interfaces present on the EUT

No.	Name	Length(m)	Shield		Remarks
			Cable	Connector	
1	DC cable	2.0m	Unshielded	Unshielded	-
2	Signal cable	2.0m	Unshielded	Unshielded	-
3	Signal cable	2.0+0.1m	Unshielded	Unshielded	-
4	IF Box Power	0.3m	Unshielded	Unshielded	-
5	Signal cable	1.0m	Shielded	Shielded	-
6	USB cable	0.07m	Shielded	Shielded	-
7	GPS cable	3.7m	Shielded	Shielded	-
8	USB cable	1.2m	Shielded	Shielded	-
9	GBIF (Separate Display)	1.9m	Shielded	Shielded	-
10	HDMI cable	1.2m	Shielded	Shielded	-
11	DC cable	2.0+0.5m	Unshielded	Unshielded	-
12	Mic	2.0m	Unshielded	Unshielded	-
13	Signal cable	2.0m	Unshielded	Unshielded	-
14	Mic	2.0m	Unshielded	Unshielded	-
15	Signal cable	2.0m	Unshielded	Unshielded	-
16	Signal cable	2.0m	Unshielded	Unshielded	-
17	RSE	2.0m	Shielded	Shielded	-
25	MOST AMP	2.5m	Unshielded	Unshielded	-
26	DC cable	1.0m	Unshielded	Unshielded	-
27	Speaker cable	1.0+4.8m	Unshielded	Unshielded	-
28	Speaker cable	1.0m	Unshielded	Unshielded	-
31	A2B	3.0m	Unshielded	Unshielded	-
32	DCM	3.0m	Unshielded	Unshielded	-
35	FM	2.0m	Shielded	Shielded	-
36	FM	2.0m	Shielded	Shielded	-
38	Signal cable	0.1m	Unshielded	Unshielded	*3)
40	UART	0.3m	Unshielded	Unshielded	*3)
47	USB	1.1m	Shielded	Shielded	*3)
48	UART-USB	1.8m	Shielded	Shielded	*3)
49	DC cable of AC adapter	1.8m	Shielded	Shielded	*3)
50	AC cable of AC adapter	1.0m	Unshielded	Unshielded	*3)

*3) This cable is for testing and is not included with products.

For more details, refer to section: Photographs of the Test Setup.

4.4 Test Software

The EUT was provided by the manufacturer with suitable software to allow operation in all the required modes.

Software used for testing:

Tera term version 4.106 (SVN# 9298) by TeraTerm Project
CCD_WiFi_TxPower_3dB_UP_Procedure manual_00.xlsx by Panasonic
BT_BLE_Procedure manual version.xls by Panasonic

These software were running on external PC. It was used to enable the operation modes listed in section 4.2 as appropriate.

4.5 Special Accessories and Auxiliary Equipment

The product has been tested together with the following additional accessories:

1. Product: Laptop PC
   Manufacturer: Lenovo
   Model: 20U2S5M60Q
   Rated Voltage: DC 20V
   Input Current: 2.25A
   Protection Class: III
   Serial Number: PF2YP1PV

2. Product: AC adapter for Laptop PC
   Manufacturer: Lenovo
   Model: ADLX65YDC2D
   Rated Voltage: AC 100-240V
   Input Current: 1.8A
   Frequency: 50-60Hz
   Protection Class: II
   Serial Number: 8SSA10R16918D1SG 16B0 1H7

3. Product: Steering Switch
   Manufacturer: Panasonic Corporation
   Protection Class: III
   Serial Number: 1143

Note: See section 6 for more details of this Steering Switch as test jig.

4. Product: IF Box
   Manufacturer: Panasonic Corporation
   Model: DEP32-10078
   Protection Class: III
   Serial Number: 035

5. Product: USB Memory
   Manufacturer: Buffalo Inc.
   Model: RUF3-KS
   Protection Class: III

6. Product: USB Hub
   Manufacturer: ELECOM
   Model: U3H-A422BX
   Protection Class: III
   Serial Number: 0600235

7. Product: JIG Board
   Manufacturer: Panasonic Corporation
   Model: GVIF2HDJIG
   Protection Class: III
   Serial Number: 15

8. Product: Separate Display
   Manufacturer: TEKWIND
   Model: ON-LAP 11021
   Rated Voltage: DC 5V
   Input Current: 1.7A
   Protection Class: III

9. Product: Mic
   Manufacturer: Panasonic Corporation
   Model: GP-SDA3510A
   Protection Class: III
   Serial Number: 0DC062856

10. Product: Mic
    Manufacturer: Panasonic Corporation
    Model: GP-SDA3510A
    Protection Class: III
    Serial Number: 0DC062519

11. Product: MOST AMP
    Manufacturer: Panasonic Corporation
    Model: CL-DL47X2AJ Rev.A
    Protection Class: III
    Serial Number: 513263

12. Product: Speaker
    Manufacturer: Pioneer
    Model: TS-X180
    Protection Class: III

4.6 Countermeasures to achieve Compliance

No additional measures were employed to achieve compliance.

5. Test Results RADIO

5.1 Technical Requirements

5.1.1 Supply Voltage Requirements

RESULT: **PASS**

Requirements:

FCC 15.31(e)

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

Verdict:

The EUT has an internal voltage regulator to supply the RF circuit. Hence it complies with the supply voltage requirements.

5.1.2 Antenna Requirements

RESULT: **PASS**

Requirements:

FCC 15.203

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.

Verdict:

The EUT has an internal antenna which is not user accessible. Hence it complies with the antenna requirements.

5.1.3 Restricted Bands of Operation

RESULT: **PASS**

Requirements:

FCC 15.205 and RSS-Gen 8.10

Only spurious emissions are permitted in any of the restricted frequency bands, unless otherwise specified.

Verdict:

The EUT operation frequency range is 2400-2483.5MHz. Therefore only spurious emissions may be found in the restricted bands of operation and the EUT complies with the restricted frequency band requirement.

5.2 Conducted Measurements at Antenna Port

5.2.1 Maximum Peak Output Power

RESULT: **PASS**

Date of testing:	2021-09-27, 2021-09-28
Ambient temperature:	22, 24°C
Relative humidity:	58, 51%
Atmospheric pressure:	1016, 1015hPa

Requirements:

FCC 15.247(b)(3) and RSS-247 Clause 5.4

For systems using digital modulation in the 2400-2483.5MHz band, the maximum peak output power is 1W (30dBm). The e.i.r.p. shall not exceed 4 W.

If transmitting antennas of directional gain greater than 6dBi are used, the conducted output power from the intentional radiator shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6dBi.

Test procedure:

ANSI C63.10:2013 §11.9, KDB 558074 D01.

The maximum peak output power was measured at the antenna port with a spectrum analyzer using a peak detector. The resolution bandwidth and the video bandwidth were set to 20MHz.

The readings of the measurements take into account the loss generated by all the involved cables.

The measurement was performed at all the available modulations (data rates) in order to identify the one producing the highest output power for each of the 802.11b, 802.11g and 801.11n-20 radios. Therefore, all the other measurements for the evaluation of the radio properties of the EUT have been performed using this data rates.

Maximum average output power was measured for reference (i.e. RF Exposure Evaluation). Method AVGSA-2 according to the clause 11.9.2.2.4 of ANSI C63.10:2013 was applied.

Table 6: Maximum Peak Output Power, 802.11b, 1Mbps

Freq. [MHz]	Peak Output Power [dBm]	Peak Output Power Limit [dBm]	Peak Output Power Margin [dB]	Antenna Gain [dBi]	e.i.r.p. [dBm]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	13.87	30	16.13	0.07	13.94	36	22.06
2437	14.75	30	15.25	0.07	14.82	36	21.18
2462	15.93	30	14.07	0.07	16.00	36	20.00

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power
e.i.r.p. [dBm] = Peak Output Power [dBm] + Antenna Gain [dBi]

Table 7: Maximum Peak Output Power, 802.11b, Mode B (2437MHz), all Data Rates

Data Rate [Mbps]	Peak Output Power [dBm]	Remark
1	14.75	Worst
2	14.69	
5.5	14.69	
11	14.71	

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Table 8: Maximum Peak Output Power, 802.11g, 54Mbps

Freq. [MHz]	Peak Output Power [dBm]	Peak Output Power Limit [dBm]	Peak Output Power Margin [dB]	Antenna Gain [dBi]	e.i.r.p. [dBm]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	20.44	30	9.56	0.07	20.51	36	15.49
2437	21.93	30	8.07	0.07	22.00	36	14.00
2462	21.91	30	8.09	0.07	21.98	36	14.02

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power
e.i.r.p. [dBm] = Peak Output Power [dBm] + Antenna Gain [dBi]

Table 9: Maximum Peak Output Power, 802.11g, Mode B (2437MHz), all Data Rates

Data Rate [Mbps]	Peak Output Power [dBm]	Remark
6	21.87	
9	21.83	
12	21.84	
18	21.87	
24	21.80	
36	21.79	
48	21.82	
54	21.93	Worst

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Table 10: Maximum Peak Output Power, 802.11n-20, MCS7

Freq. [MHz]	Peak Output Power [dBm]	Peak Output Power Limit [dBm]	Peak Output Power Margin [dB]	Antenna Gain [dBi]	e.i.r.p. [dBm]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2412	19.88	30	10.12	0.07	19.95	36	16.05
2437	21.76	30	8.24	0.07	21.83	36	14.17
2462	21.83	30	8.17	0.07	21.90	36	14.10

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power
e.i.r.p. [dBm] = Peak Output Power [dBm] + Antenna Gain [dBi]

Table 11: Maximum Peak Output Power, 802.11n-20, Mode B (2437MHz), all Data Rates

Data Rate [MCS]	Peak Output Power [dBm]	Remark
0	21.76	
1	21.67	
2	21.70	
3	21.64	
4	21.66	
5	21.70	
6	21.68	
7	21.76	Worst

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Table 12: Maximum Peak Output Power, BLE 1M-PHY

Freq. [MHz]	Peak Output Power [dBm]	Peak Output Power Limit [dBm]	Peak Output Power Margin [dB]	Antenna Gain [dBi]	e.i.r.p. [dBm]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2402	2.53	30	27.47	1.01	3.54	36	32.46
2440	3.01	30	26.99	1.01	4.02	36	31.98
2480	3.02	30	26.98	1.01	4.03	36	31.97

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power
e.i.r.p. [dBm] = Peak Output Power [dBm] + Antenna Gain [dBi]

Table 13: Maximum Peak Output Power, BLE 2M-PHY

Freq. [MHz]	Peak Output Power [dBm]	Peak Output Power Limit [dBm]	Peak Output Power Margin [dB]	Antenna Gain [dBi]	e.i.r.p. [dBm]	e.i.r.p. Limit [dBm]	e.i.r.p. Margin [dB]
2402	2.76	30	27.24	1.01	3.77	36	32.23
2440	3.23	30	26.77	1.01	4.24	36	31.76
2480	3.27	30	26.73	1.01	4.28	36	31.72

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power
e.i.r.p. [dBm] = Peak Output Power [dBm] + Antenna Gain [dBi]

Table 14: Maximum Average Output Power, 802.11b, 5.5Mbps (For Reference)

Freq. [MHz]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]
2412	11.02	0.07	11.09
2437	11.71	0.07	11.78
2462	11.43	0.07	11.50

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

Table 15: Maximum Average Output Power, 802.11b, Mode B (2437MHz), all Data Rates

Freq. [MHz]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]	Remark
1	11.09	0.01	11.10	
2	11.11	0.03	11.14	
5.5	11.71	0.07	11.78	Worst
11	11.41	0.13	11.54	

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

Table 16: Maximum Average Output Power, 802.11g, 12Mbps (For Reference)

Freq. [MHz]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]
2412	7.66	0.15	7.81
2437	10.50	0.21	10.71
2462	8.15	0.15	8.30

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

Table 17: Maximum Average Output Power, 802.11g, Mode B (2437MHz), all Data Rates

Freq. [MHz]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]	Remark
6	10.37	0.08	10.45	
9	10.53	0.11	10.64	
12	10.50	0.21	10.71	Worst
18	10.13	0.21	10.34	
24	10.02	0.29	10.31	
36	9.82	0.04	9.86	
48	9.84	0.53	10.37	
54	9.84	0.58	10.42	

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

Table 18: Maximum Average Output Power, 802.11n-20, MCS1 (For Reference)

Freq. [MHz]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]
2412	7.01	0.14	7.15
2437	9.64	0.14	9.78
2462	7.19	0.14	7.33

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

Table 19: Maximum Average Output Power, 802.11n-20, Mode B (2437MHz), all Data Rates

Data Rate [MCS]	Conducted Reading [dBm]	Duty Cycle Factor [dB]	Maximum Average Output Power [dBm]	Remark
0	9.64	0.07	9.71	
1	9.64	0.14	9.78	Worst
2	9.30	0.21	9.51	
3	9.35	0.26	9.61	
4	9.28	0.37	9.65	
5	8.97	0.47	9.44	
6	8.98	0.50	9.48	
7	8.98	0.55	9.53	

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Conducted Reading
Duty cycle factor = 10 x log (1/duty cycle)
Maximum Average Output Power [dBm] = Conducted Reading [dBm] + Duty Cycle Factor [dB]

5.2.2 6dB Bandwidth

RESULT: **PASS**

Date of testing: 2021-10-22, 2021-10-24

Ambient temperature: 23, 22°C
Relative humidity: 47, 48%
Atmospheric pressure: 1012, 1024hPa

Requirements:

FCC 15.215(c), 15.247(a)(2) and RSS-247 5.2 (a)

For systems using digital modulation in the 2400-2483.5MHz band, the 6dB bandwidth shall be at least 500kHz. Additionally, for FCC, the 6dB bandwidth shall be contained within the frequency band designated in the rule section under which the equipment is operated.

Test procedure:

ANSI C63.10:2013 §11.8

KDB 558074 D01.

The 6dB bandwidth was measured at the antenna port with a spectrum analyzer using a peak detector. The resolution bandwidth was set to 100kHz and the video bandwidth to 300kHz. Markers placed at the lowest and highest intersections of the trace with a 6dBc line were used to calculate the emission bandwidth.

Table 20: 6dB Bandwidth, 802.11b

Operating Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
2412	10.228	>0.5
2437	10.167	>0.5
2462	10.173	>0.5

Figure 2: 6dB Bandwidth, 802.11b, Mode A (2412MHz)

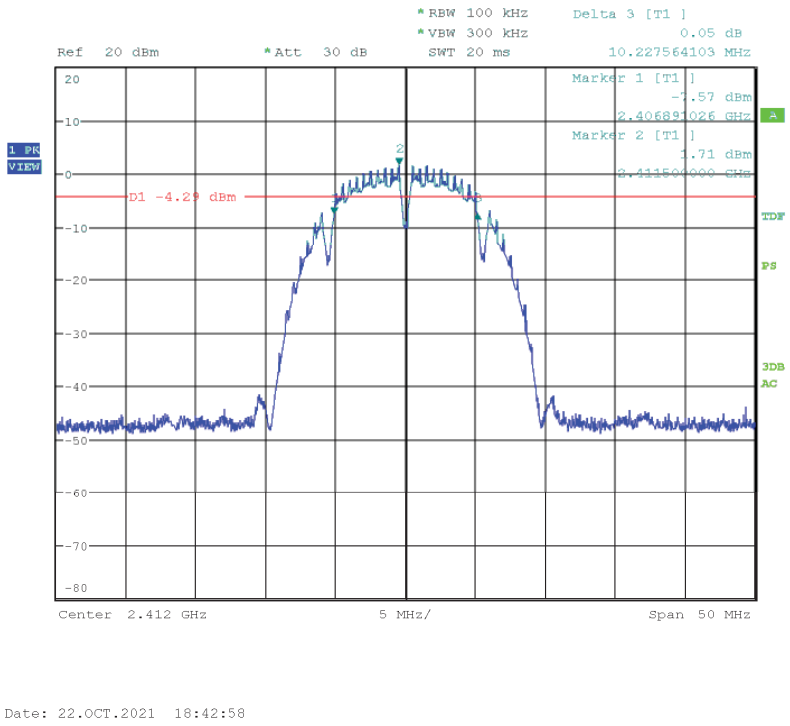

Figure 3: 6dB Bandwidth, 802.11b, Mode B (2437MHz)

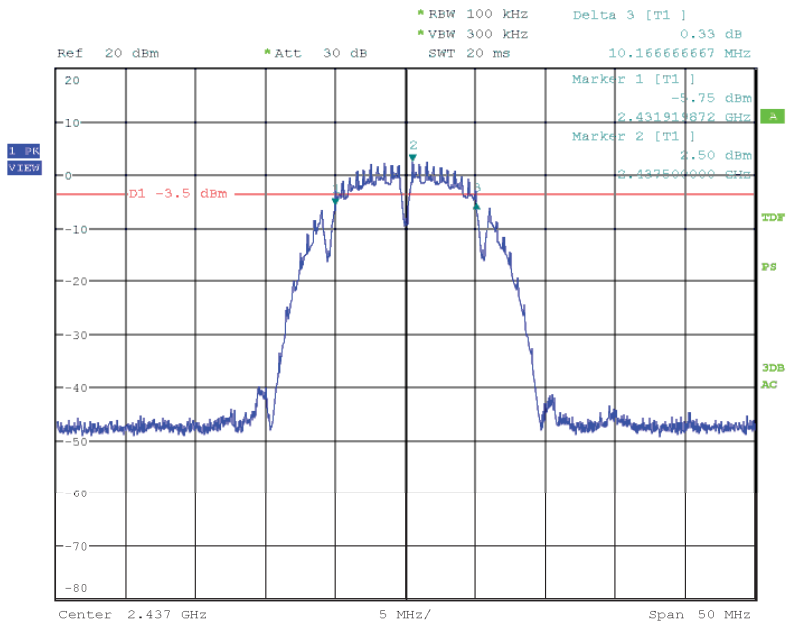

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Figure 4: 6dB Bandwidth, 802.11b, Mode C (2462MHz)

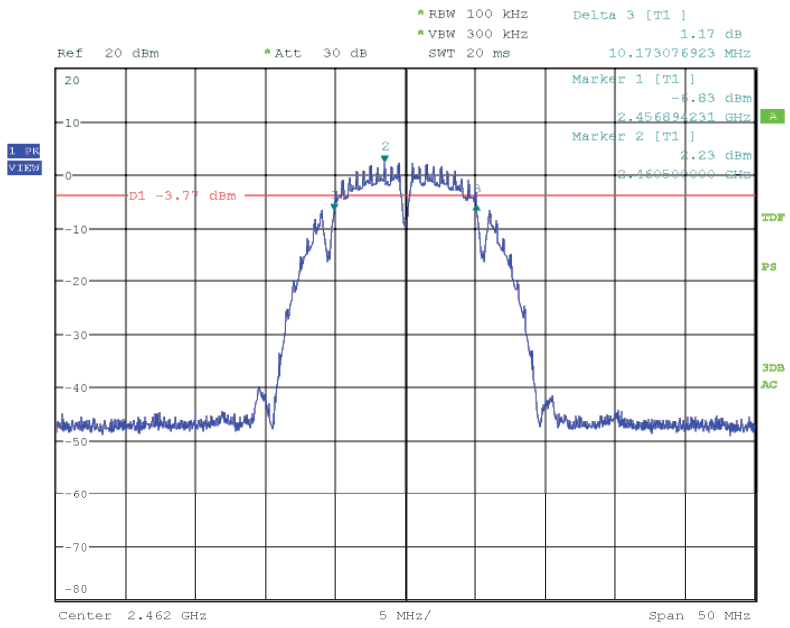

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Table 21: 6dB Bandwidth, 802.11g

Operating Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
2412	16.587	>0.5
2437	16.635	>0.5
2462	16.587	>0.5

Figure 5: 6dB Bandwidth, 802.11g, Mode A (2412MHz)

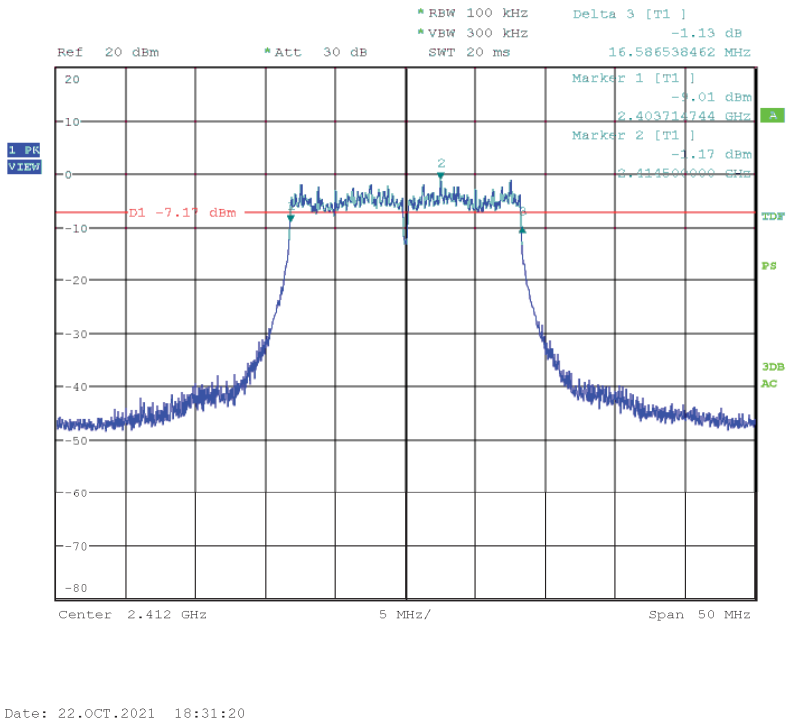

Figure 6: 6dB Bandwidth, 802.11g, Mode B (2437MHz)

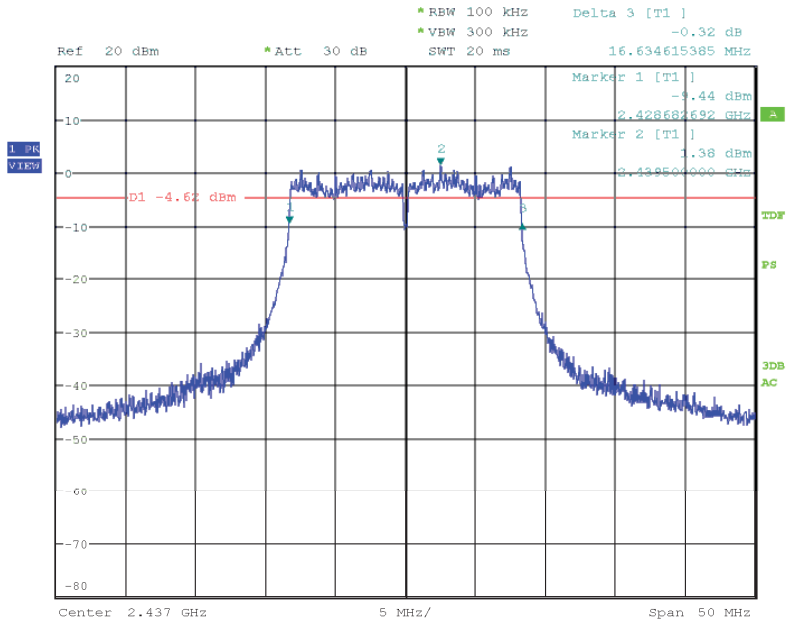

Figure 7: 6dB Bandwidth, 802.11g, Mode C (2462MHz)

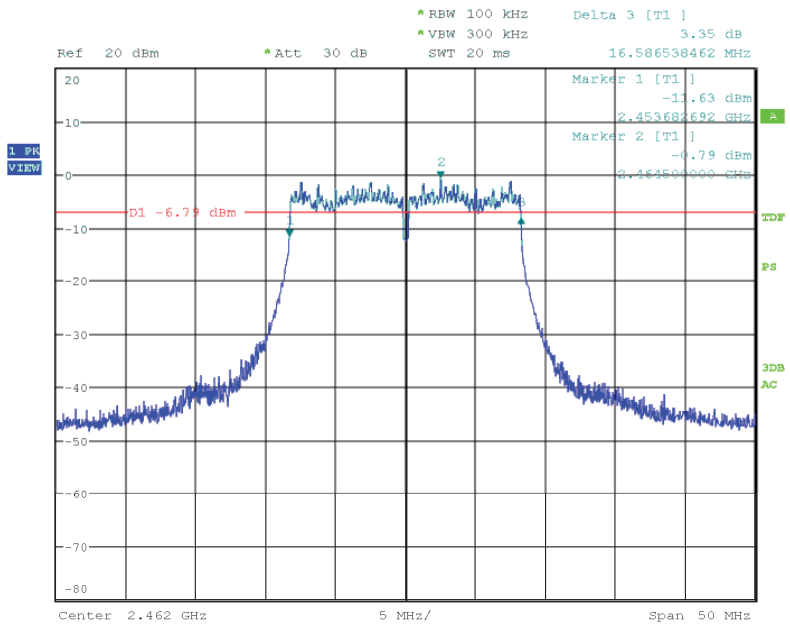

Table 22: 6dB Bandwidth, 802.11n-20

Operating Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
2412	17.788	>0.5
2437	17.788	>0.5
2462	17.708	>0.5

Figure 8: 6dB Bandwidth, 802.11n-20, Mode A (2412MHz)

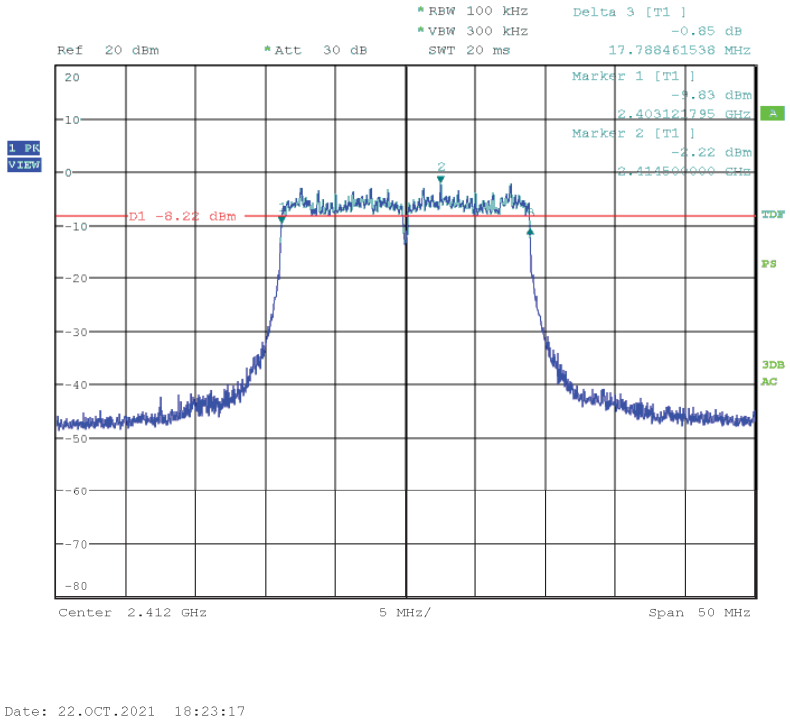

Figure 9: 6dB Bandwidth, 802.11n-20, Mode B (2437MHz)

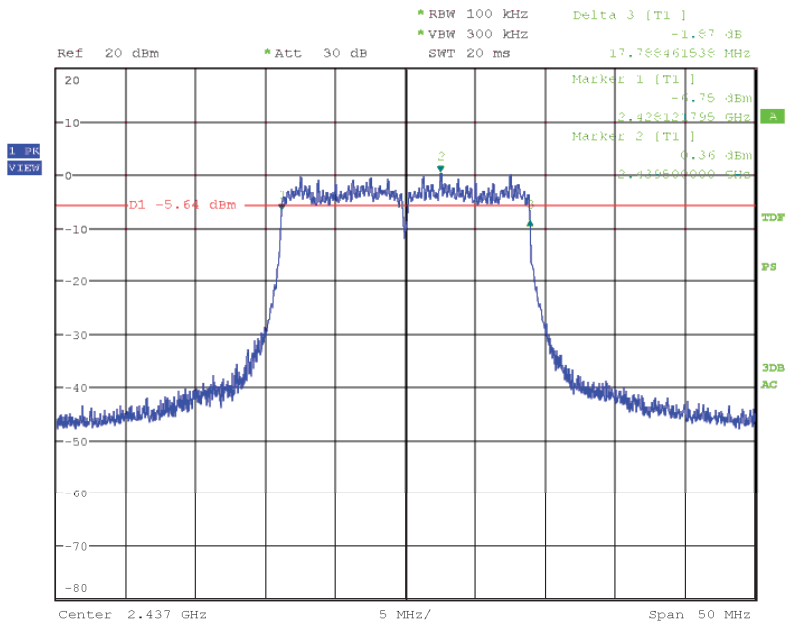

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Figure 10: 6dB Bandwidth, 802.11n-20, Mode C (2462MHz)

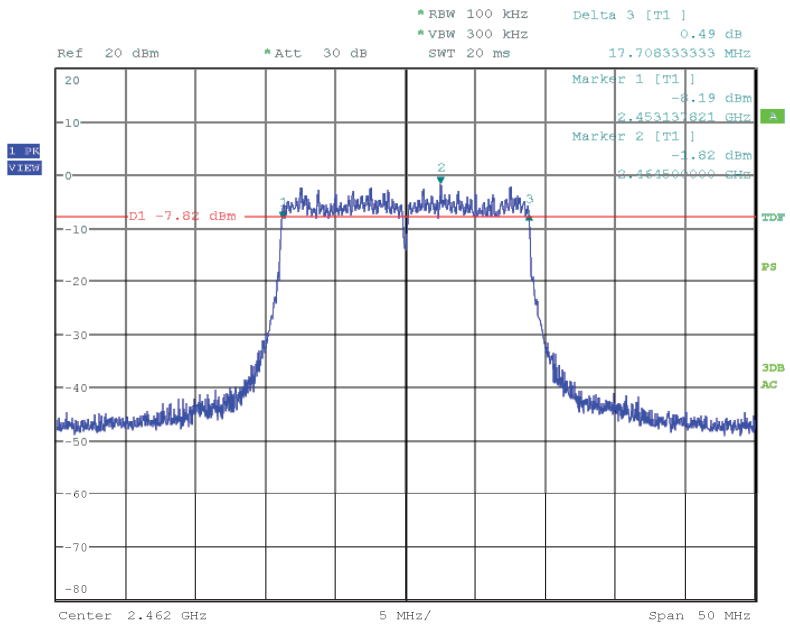

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Table 23: 6dB Bandwidth, BLE 1M-PHY

Operating Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
2402	0.721	>0.5
2440	0.737	>0.5
2480	0.705	>0.5

Figure 11: 6dB Bandwidth, BLE 1M-PHY, Mode A (2402MHz)

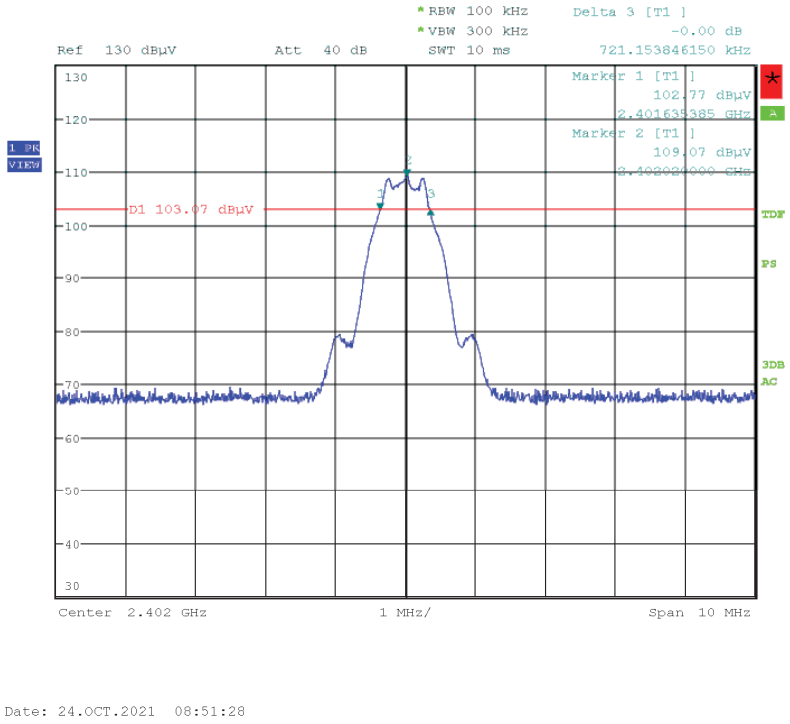

Figure 12: 6dB Bandwidth, BLE 1M-PHY, Mode B (2440MHz)

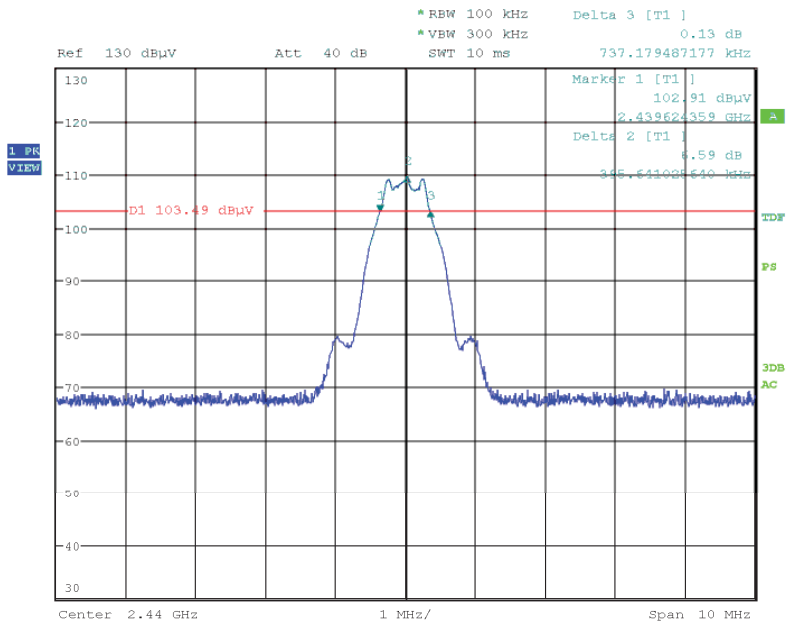

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Figure 13: 6dB Bandwidth, BLE 1M-PHY, Mode C (2480MHz)

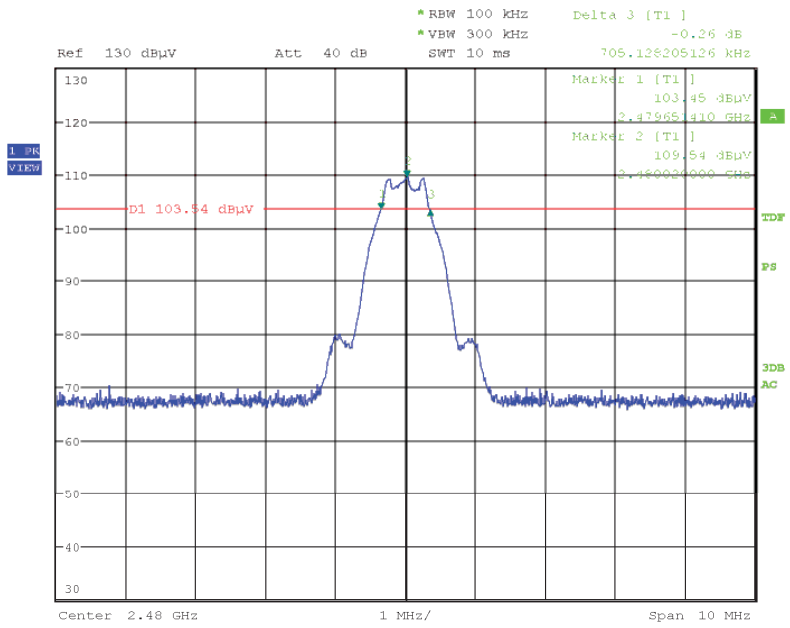

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Table 24: 6dB Bandwidth, BLE 2M-PHY

Operating Frequency [MHz]	6dB Bandwidth [MHz]	Limit [MHz]
2402	1.240	>0.5
2440	1.240	>0.5
2480	1.250	>0.5

Figure 14: 6dB Bandwidth, BLE 2M-PHY, Mode A (2402MHz)

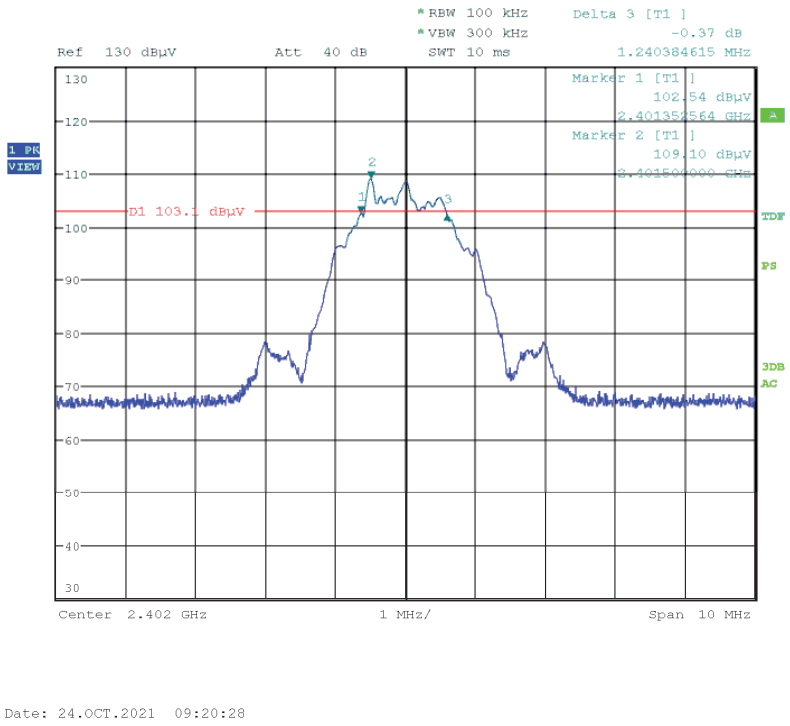

Figure 15: 6dB Bandwidth, BLE 2M-PHY, Mode B (2440MHz)

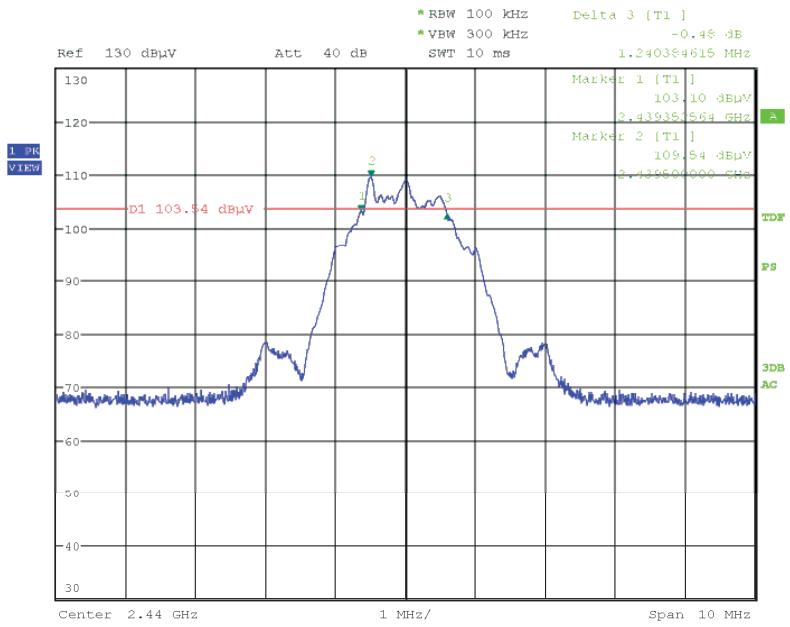

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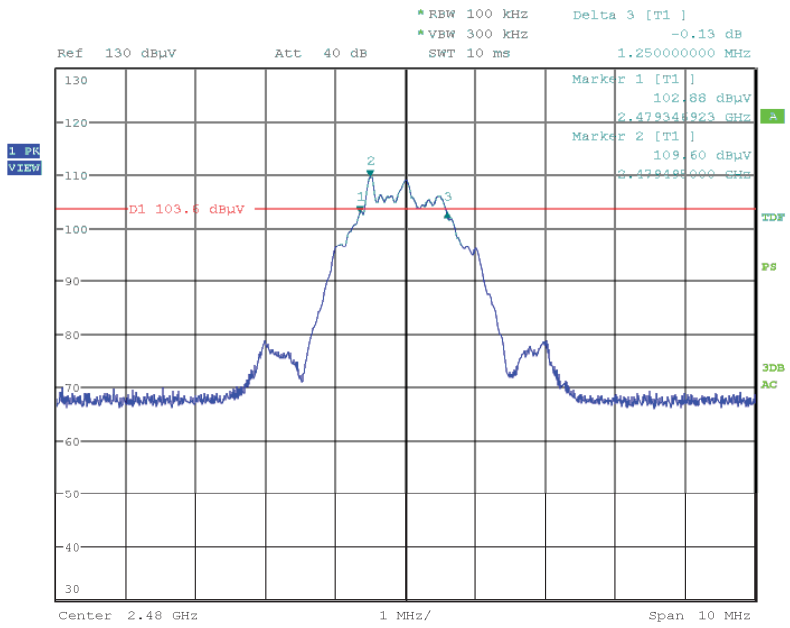
Figure 16: 6dB Bandwidth, BLE 2M-PHY, Mode C (2480MHz)



Date: 24.OCT.2021 09:09:05

5.2.3 99% Bandwidth

RESULT: **PERFORMED**

Date of testing:	2021-10-22, 2021-11-08
Ambient temperature:	23, 22°C
Relative humidity:	47, 51%
Atmospheric pressure:	1012, 1016hPa

Test procedure:

ANSI C63.10 §6.9.3

The 99% bandwidth was measured at the antenna port with a spectrum analyzer using a peak detector instead of sample detector. The value of the emission bandwidth was obtained by using the OBW function of the analyzer with a 99% coverage setting.

Table 25: 99% Bandwidth, 802.11b

Operating Frequency [MHz]	99% Bandwidth [MHz]	Remarks
2412	13.425	Widest OBW, 13M4G1D
2437	13.375	
2462	13.375	

Figure 17: 99% Bandwidth, 802.11b, Mode A (2412MHz)

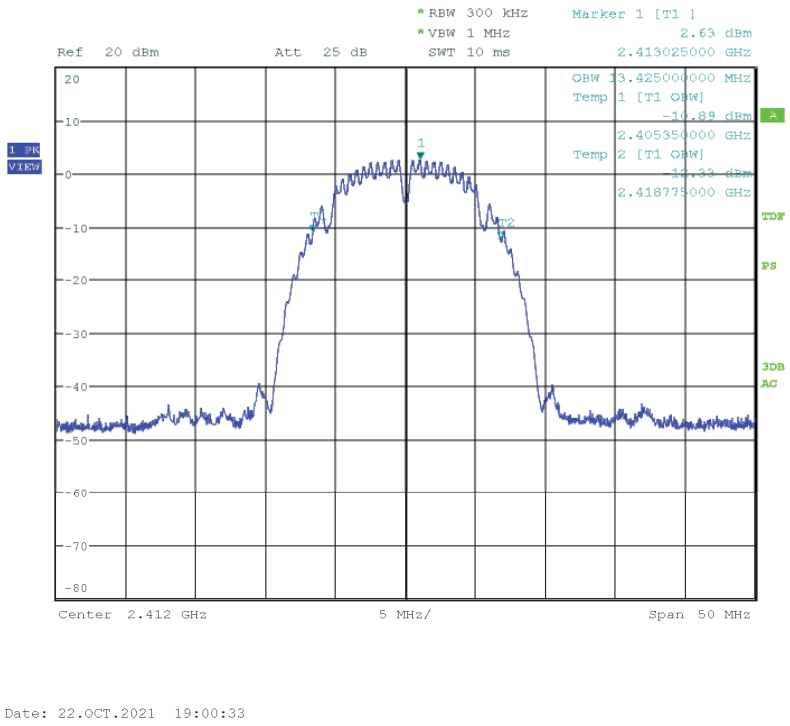


Figure 18: 99% Bandwidth, 802.11b, Mode B (2437MHz)

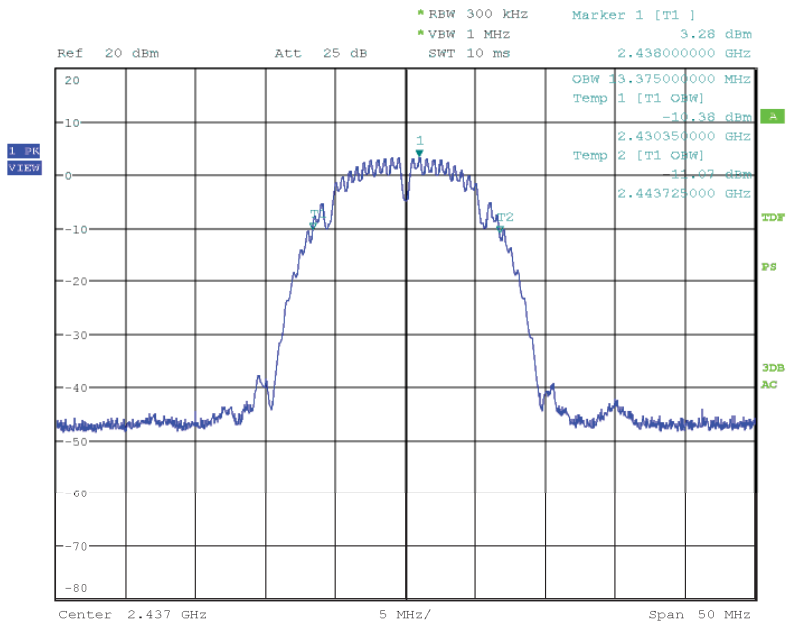


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Figure 19: 99% Bandwidth, 802.11b, Mode C (2462MHz)

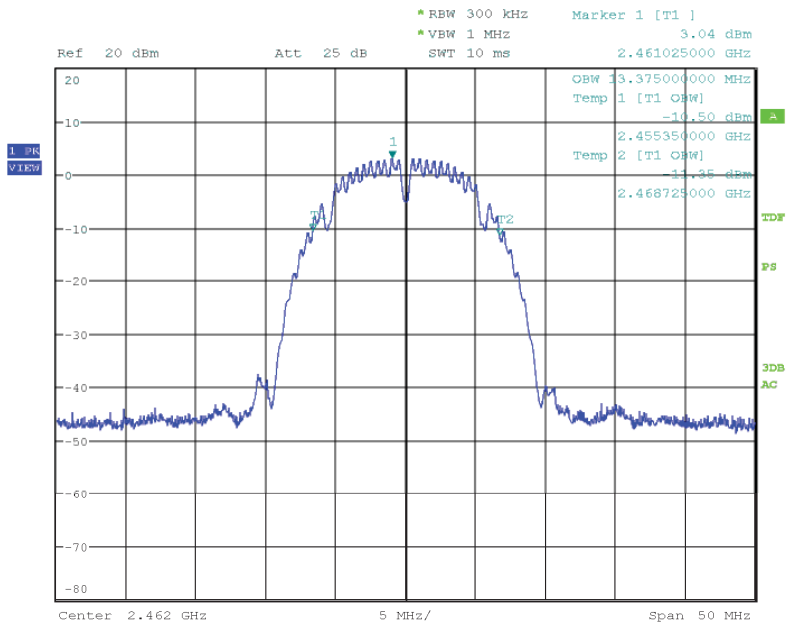

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Table 26: 99% Bandwidth, 802.11g

Operating Frequency [MHz]	99% Bandwidth [MHz]
2412	16.775
2437	16.775
2462	16.775

Figure 20: 99% Bandwidth, 802.11g, Mode A (2412MHz)

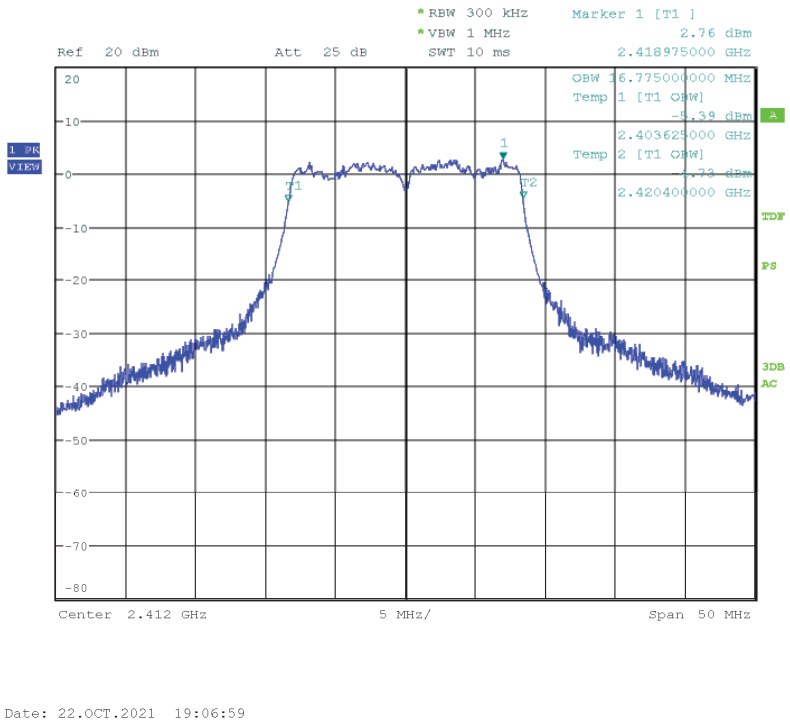

Figure 21: 99% Bandwidth, 802.11g, Mode B (2437MHz)

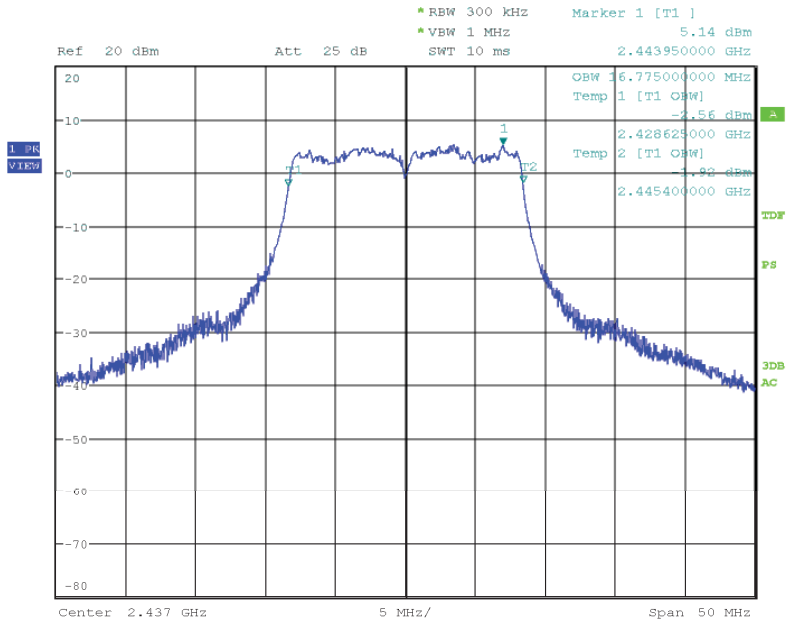

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Figure 22: 99% Bandwidth, 802.11g, Mode C (2462MHz)

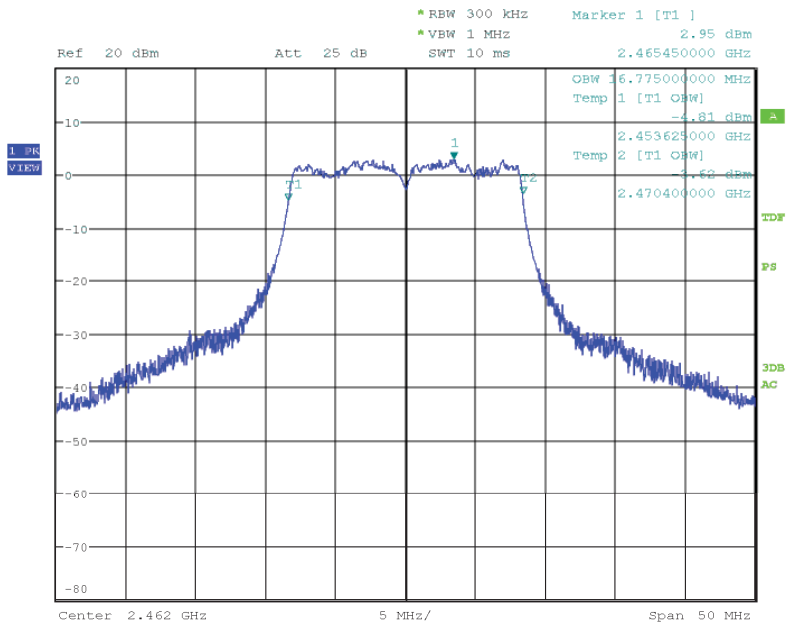

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Table 27: 99% Bandwidth, 802.11n-20

Operating Frequency [MHz]	99% Bandwidth [MHz]	Remarks
2412	17.800	
2437	17.800	
2462	17.825	Widest OBW, 17M8D1D

Figure 23: 99% Bandwidth, 802.11n-20, Mode A (2412MHz)

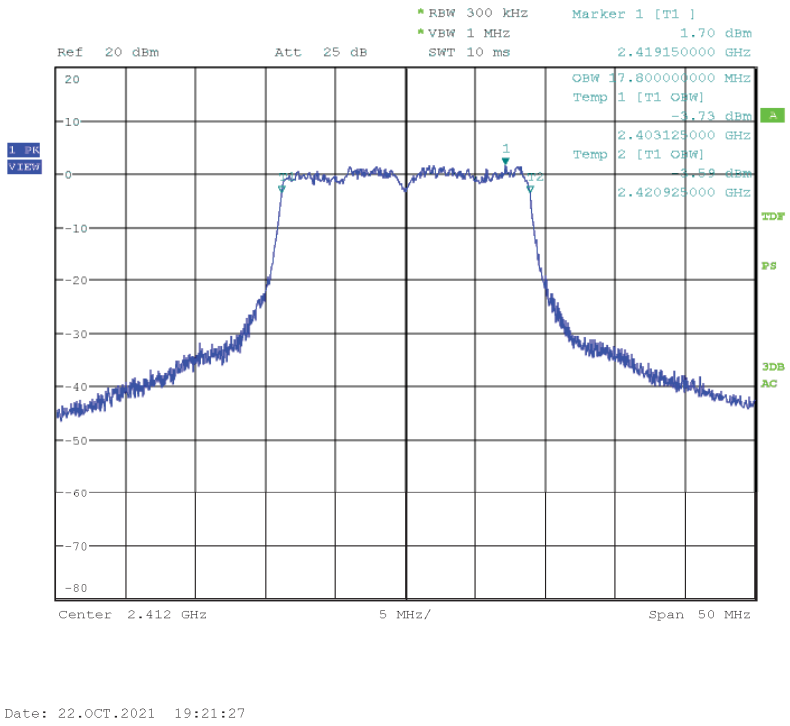

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Figure 24: 99% Bandwidth, 802.11n-20, Mode B (2437MHz)

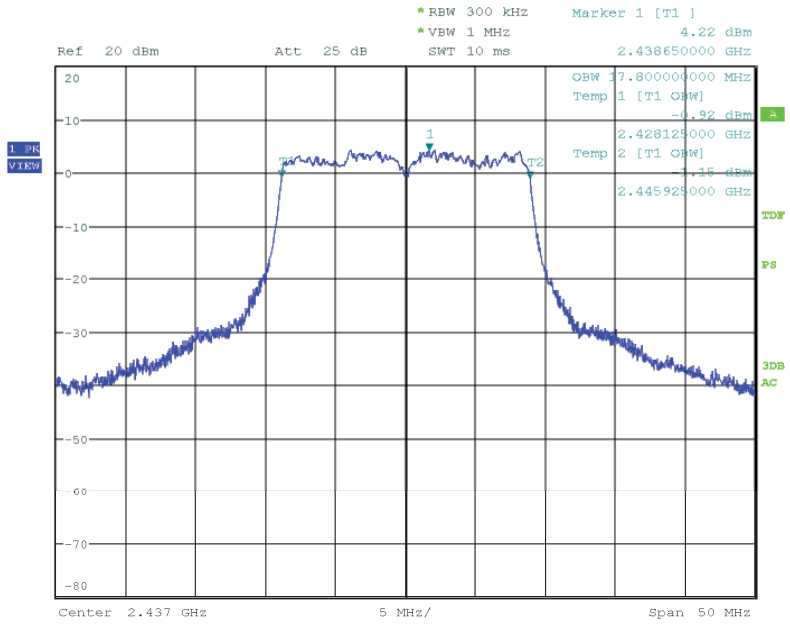

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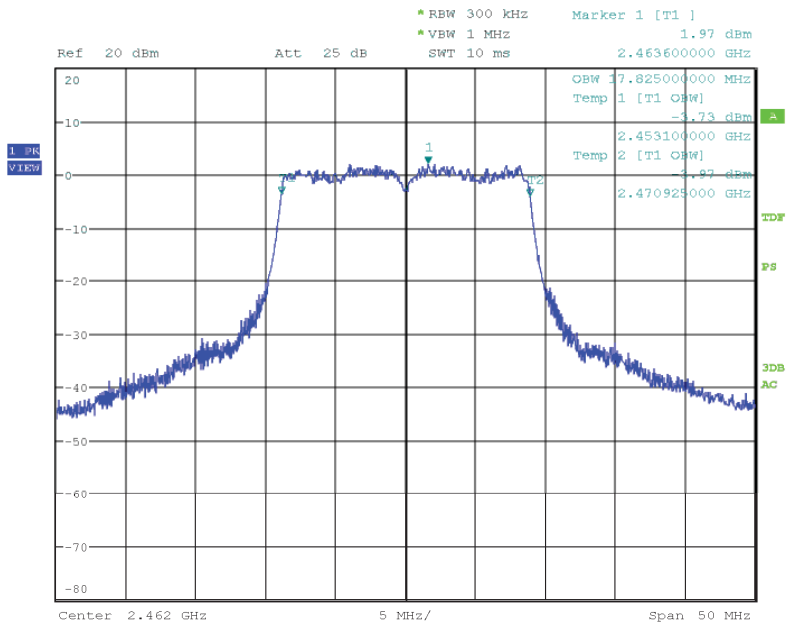
Figure 25: 99% Bandwidth, 802.11n-20, Mode C (2462MHz)



Date: 22.OCT.2021 19:18:20

Table 28: 99% Bandwidth, BLE 1M-PHY

Operating Frequency [MHz]	99% Bandwidth [MHz]	Remarks
2402	1.02971	
2440	1.02894	
2480	1.03014	Widest OBW, 1M03F1D

Figure 26: 99% Bandwidth, BLE 1M-PHY, Mode A (2402MHz)

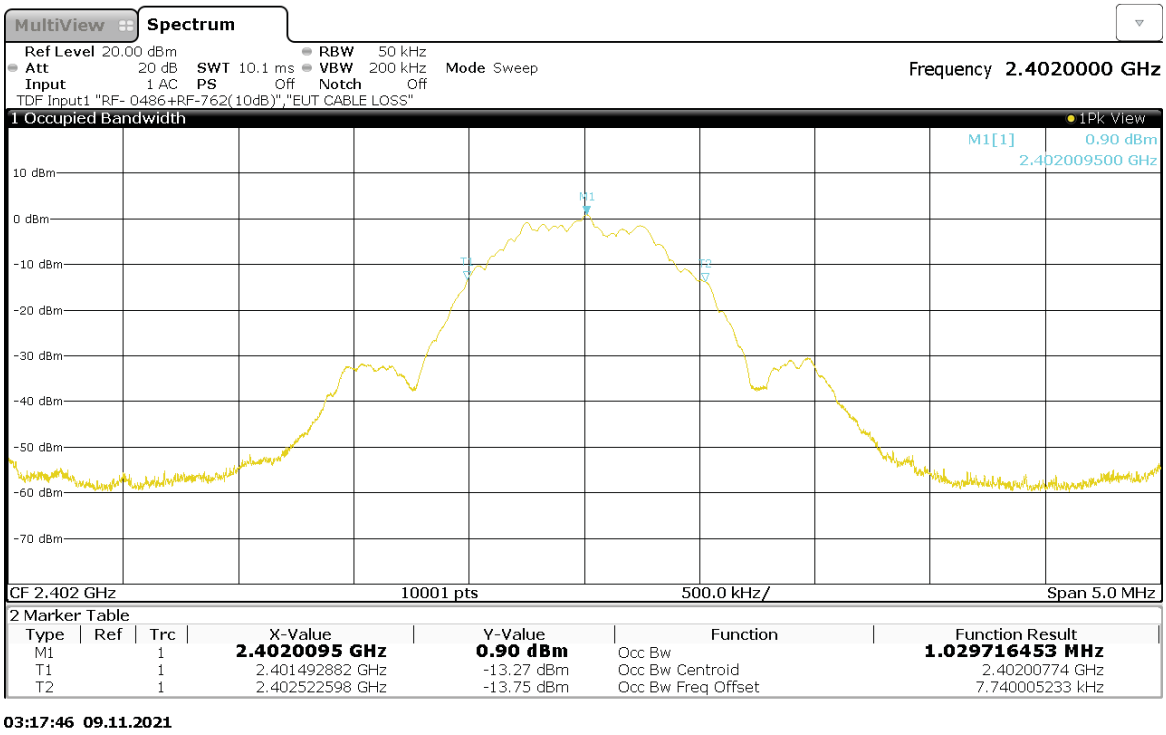


Figure 27: 99% Bandwidth, BLE 1M-PHY, Mode B (2440MHz)

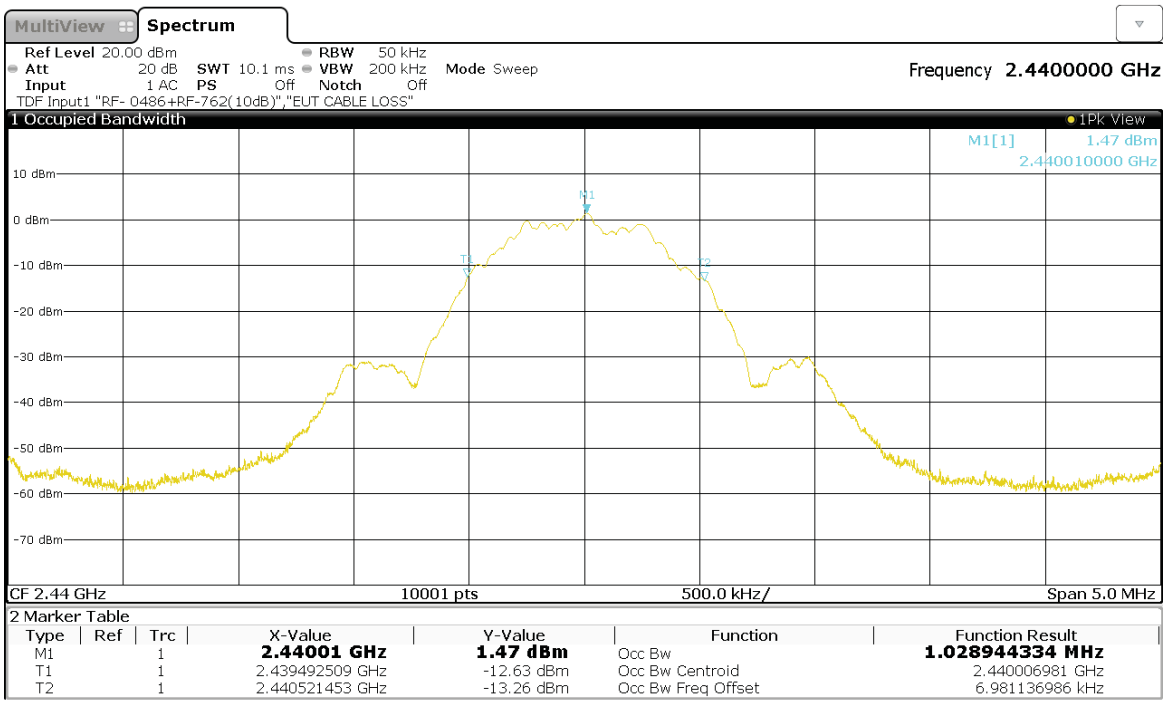


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Figure 28: 99% Bandwidth, BLE 1M-PHY, Mode C (2480MHz)

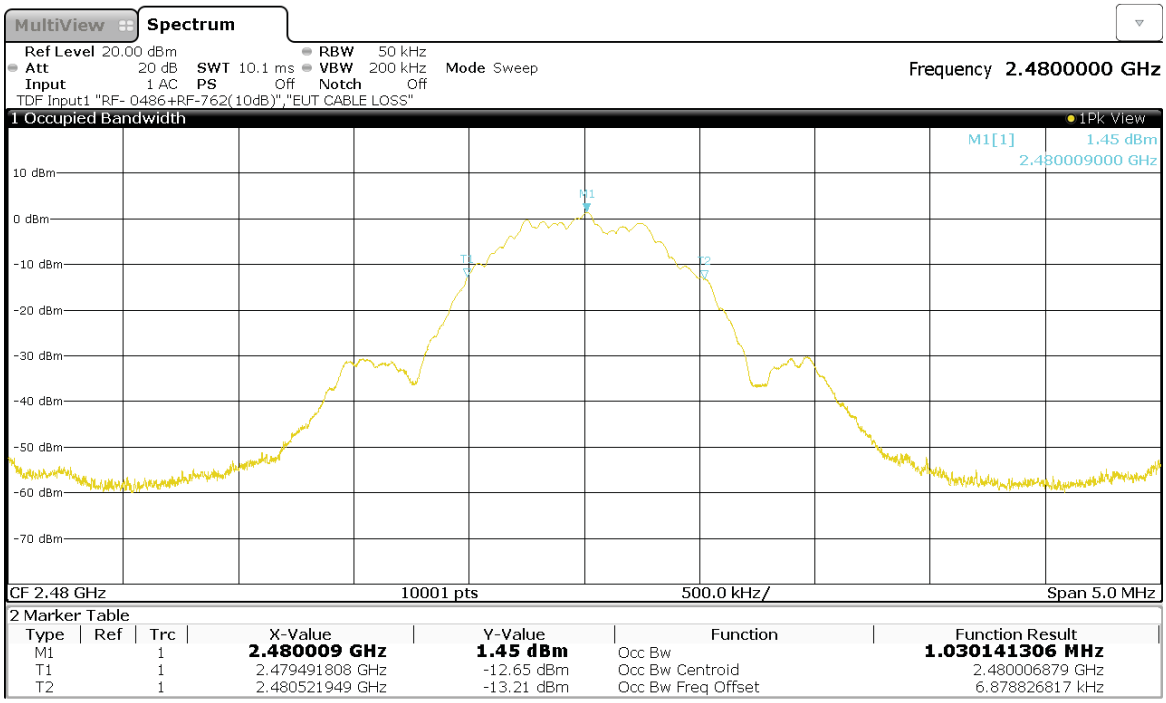

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Table 29: 99% Bandwidth, BLE 2M-PHY

Operating Frequency [MHz]	99% Bandwidth [MHz]	Remarks
2402	2.04541	
2440	2.04307	
2480	2.04460	Widest OBW, 2M04F1D

Figure 29: 99% Bandwidth, BLE 2M-PHY, Mode A (2402MHz)

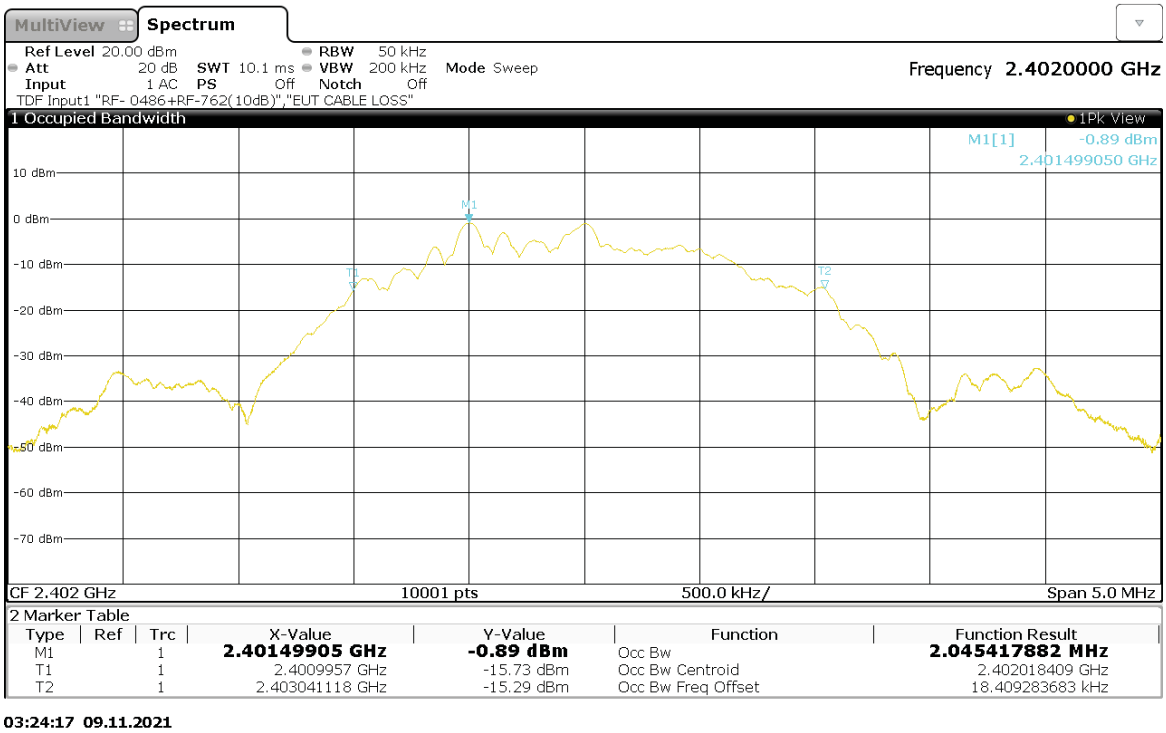

Figure 30: 99% Bandwidth, BLE 2M-PHY, Mode B (2440MHz)

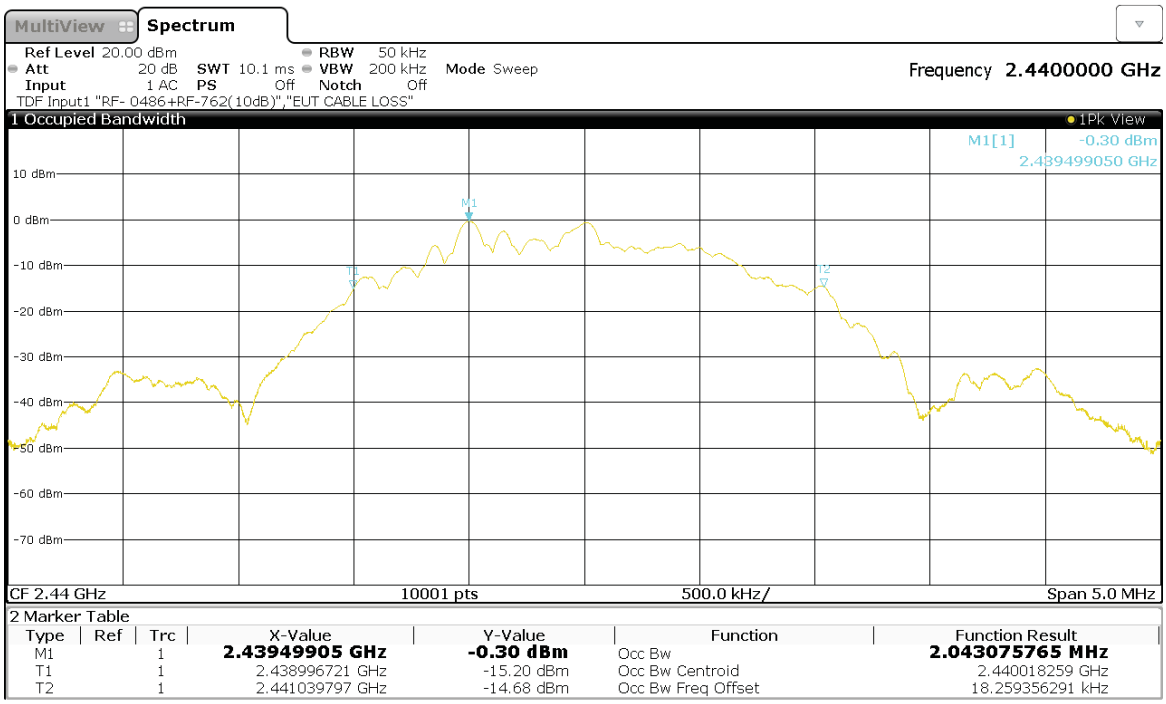

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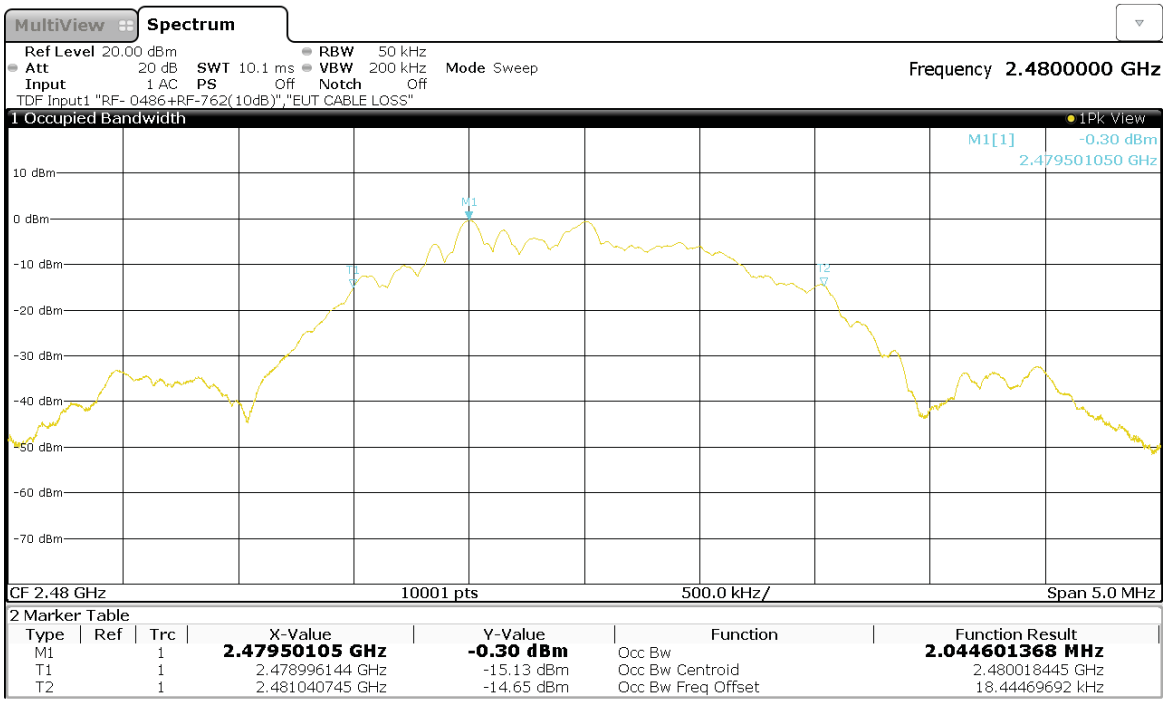
Figure 31: 99% Bandwidth, BLE 2M-PHY, Mode C (2480MHz)



03:29:06 09.11.2021

5.2.4 Conducted Spurious Emissions

RESULT: **PASS**

Date of testing: 2021-10-22

Ambient temperature: 23°C
Relative humidity: 47%
Atmospheric pressure: 1012hPa

Requirements:

FCC 15.247(d) and RSS-247 5.5

In any 100kHz bandwidth outside the frequency band in which the intentional radiator is operating, the RF power shall be at least 20dB below that of the maximum in-band 100kHz emission.

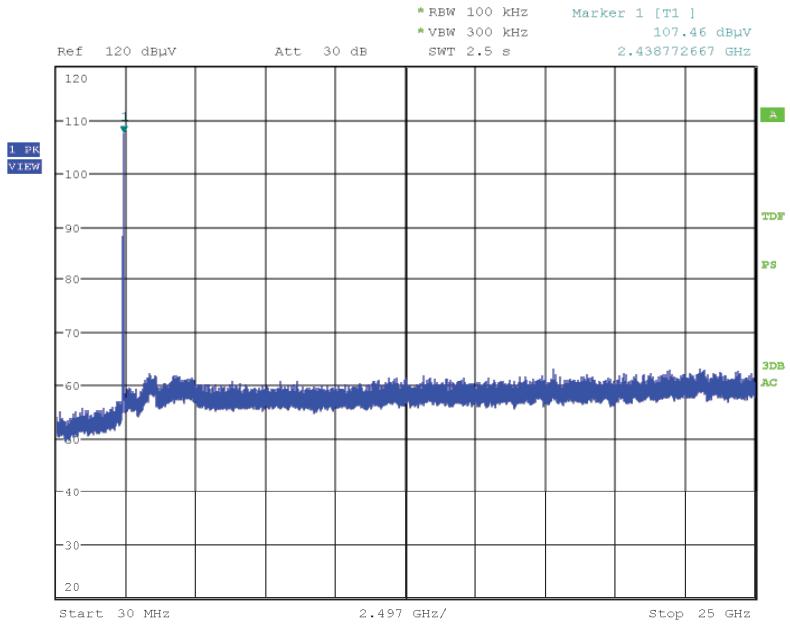
Test procedure:

KDB 558074 D01.

The conducted spurious emissions were measured at the antenna port with a spectrum analyzer using a peak detector. The resolution bandwidth was set to 100kHz and the video bandwidth to 300kHz. Measurements were performed from 30MHz to 25GHz (10^{th} harmonics).

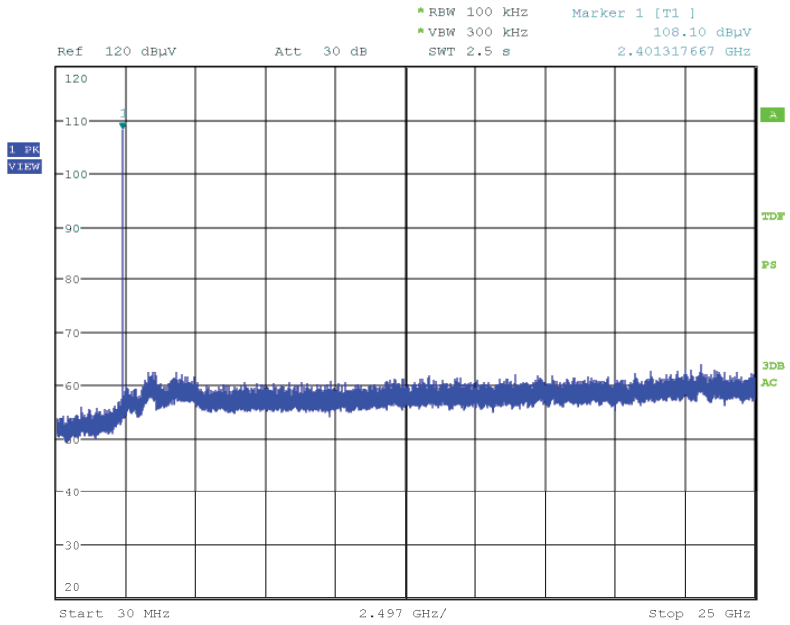
The readings of the measurements take into account the loss generated by all the involved cables.

Figure 32: Conducted Spurious Emissions, 30MHz - 25GHz, 802.11b, Mode B (2437MHz)



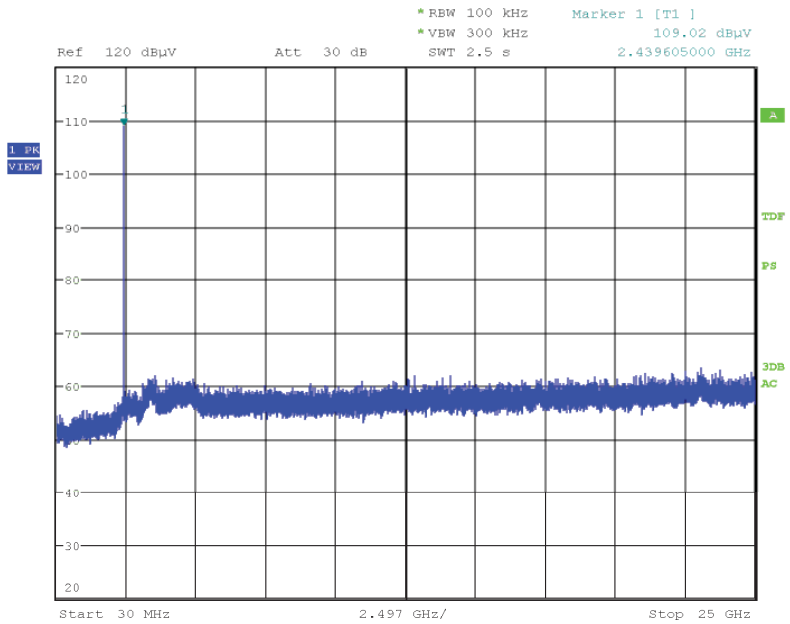
Date: 22.OCT.2021 16:33:12

Figure 33: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 1M-PHY, Mode A (2402MHz)



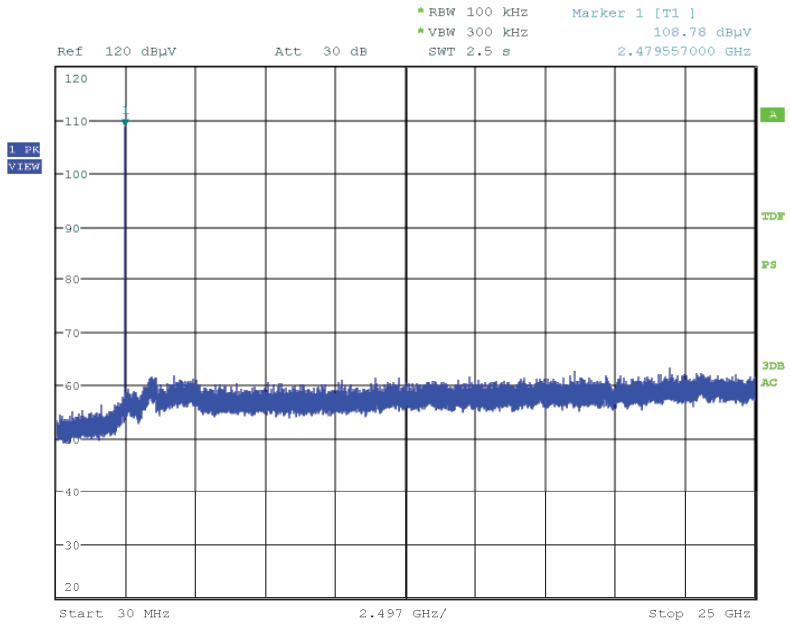
Date: 22.OCT.2021 14:17:06

Figure 34: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 1M-PHY, Mode B (2440MHz)



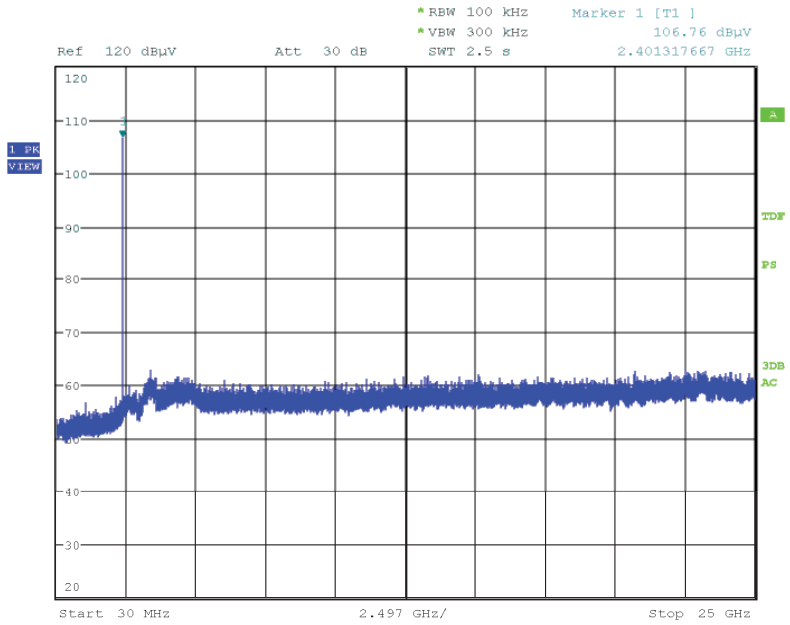
Date: 22.OCT.2021 14:55:02

Figure 35: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 1M-PHY, Mode C (2480MHz)



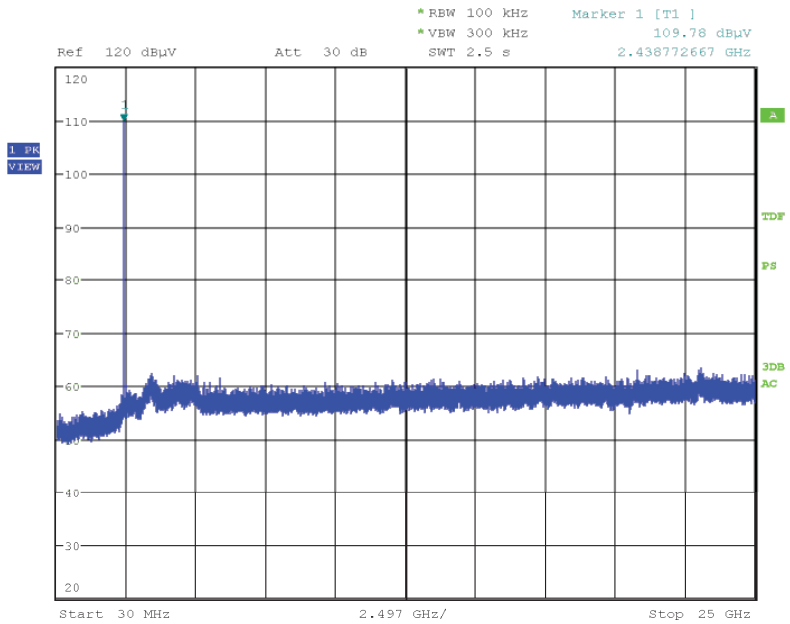
Date: 22.OCT.2021 15:18:11

Figure 36: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 2M-PHY, Mode A (2402MHz)



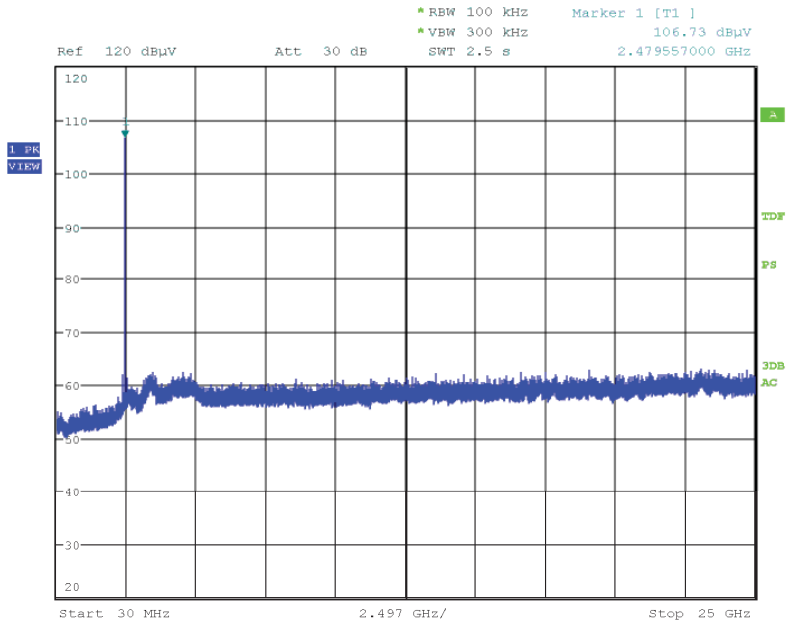
Date: 22.OCT.2021 15:21:30

Figure 37: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 2M-PHY, Mode B (2440MHz)



Date: 22.OCT.2021 15:59:01

Figure 38: Conducted Spurious Emissions, 30MHz - 25GHz, BLE 2M-PHY, Mode C (2480MHz)



5.2.5 Peak Power Spectral Density

RESULT: **PASS**

Date of testing:	2021-10-22, 2021-11-08
Ambient temperature:	23 22°C
Relative humidity:	47 51%
Atmospheric pressure:	1012, 1016hPa

Requirements:

FCC 15.247(e) and RSS-247 5.2(b)

For digitally modulated systems, the power spectral density (PSD) conducted from the intentional radiator to the antenna shall not be greater than 8dBm in any 3kHz band during any time interval of continuous transmission.

Test procedure:

ANSI C63.10:2013 §11.10, KDB 558074 D01.

The peak power spectral density was measured at the antenna port with a spectrum analyzer using a peak detector with a resolution bandwidth of 3kHz and a video bandwidth of 10kHz.

The readings of the measurements take into account the loss generated by all the involved cables.

Table 30: Peak Power Spectral Density, 802.11b

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
2412	-7.58	8	15.58
2437	-6.76	8	14.76
2462	-6.99	8	14.99

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Figure 39: Power Spectral Density, 802.11b, Mode A (2412MHz)

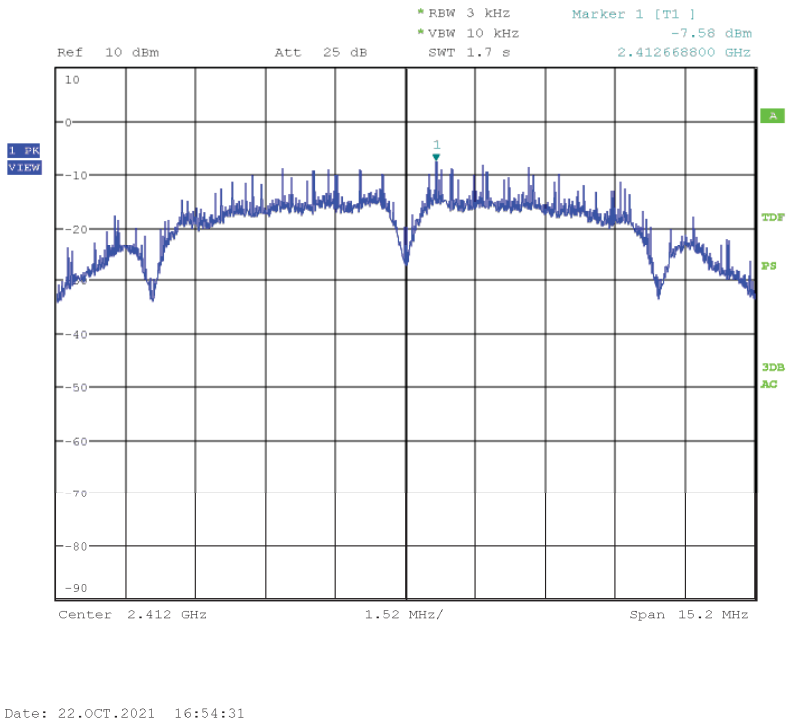
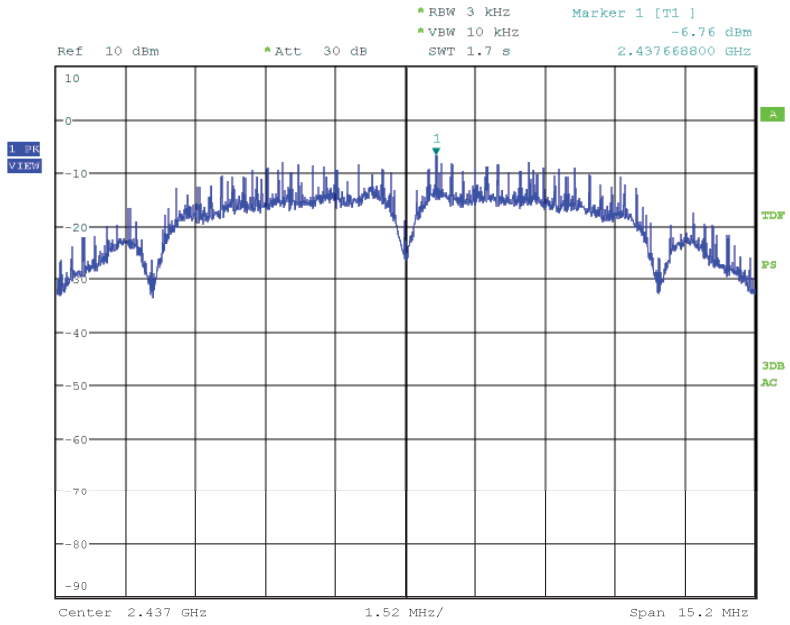
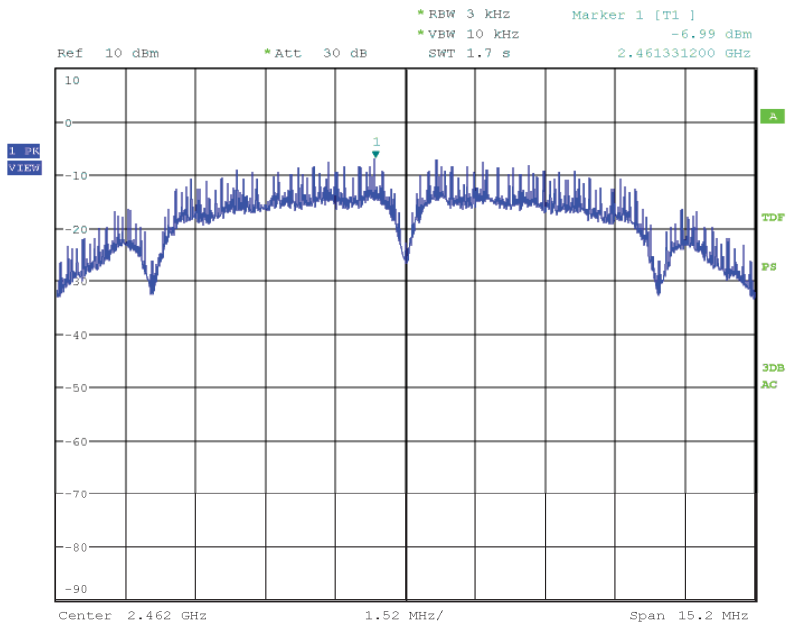


Figure 40: Power Spectral Density, 802.11b, Mode B (2437MHz)



Date: 22.OCT.2021 17:12:05

Figure 41: Power Spectral Density, 802.11b, Mode C (2462MHz)



Date: 22.OCT.2021 17:21:29

Table 31: Peak Power Spectral Density, 802.11g

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
2412	-15.02	8	23.02
2437	-11.31	8	19.31
2462	-14.35	8	22.35

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Figure 42: Power Spectral Density, 802.11g, Mode A (2412MHz)

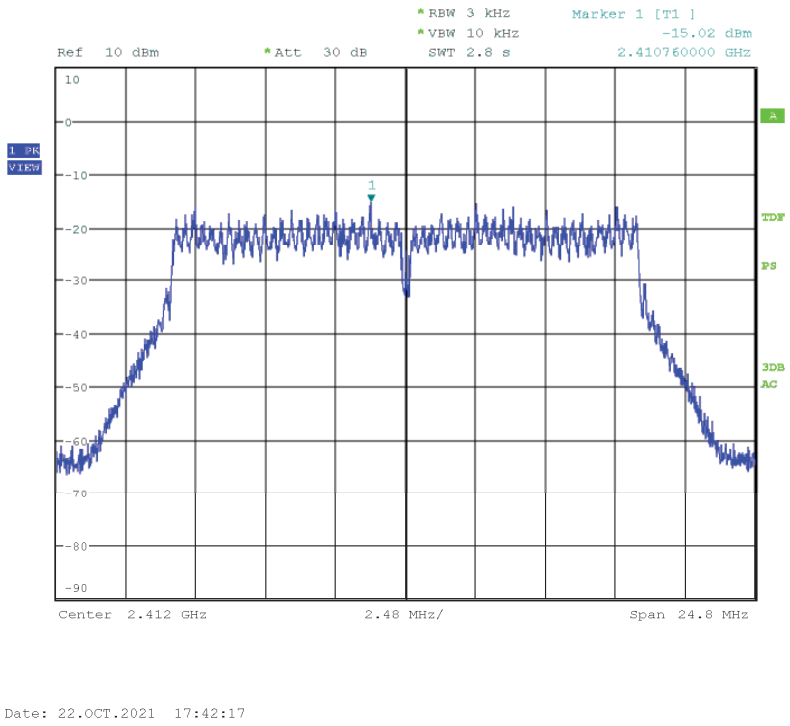


Figure 43: Power Spectral Density, 802.11g, Mode B (2437MHz)

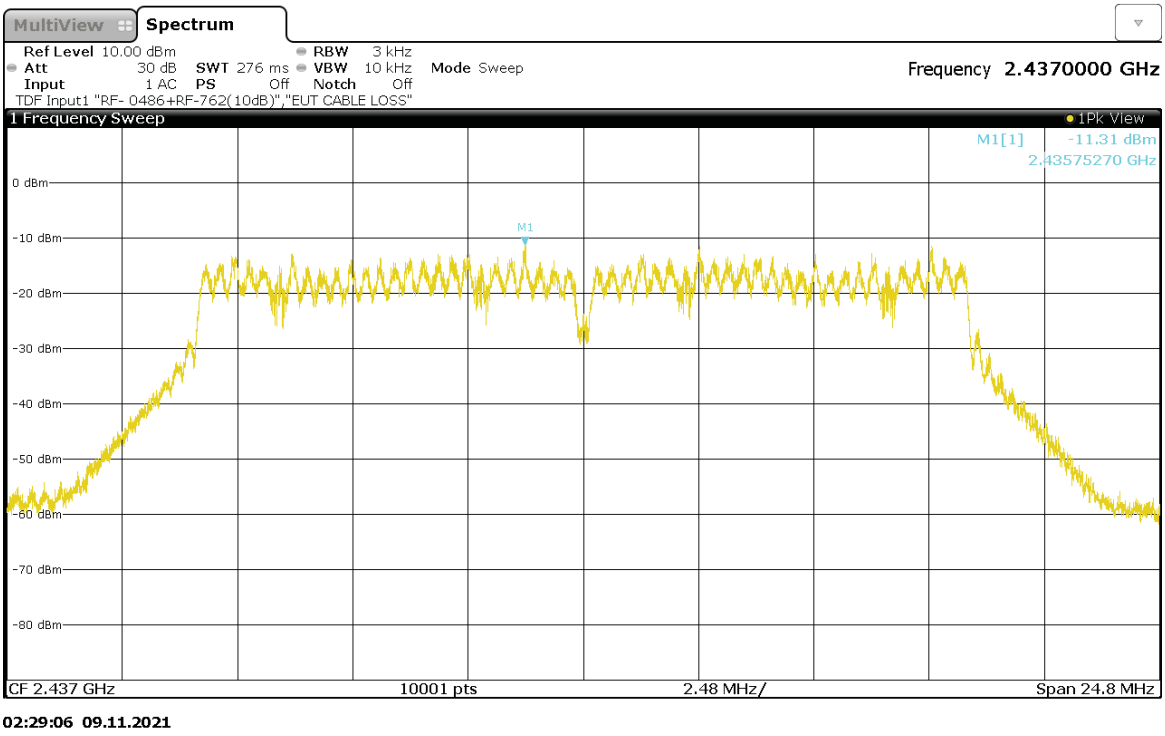


Figure 44: Power Spectral Density, 802.11g, Mode C (2462MHz)

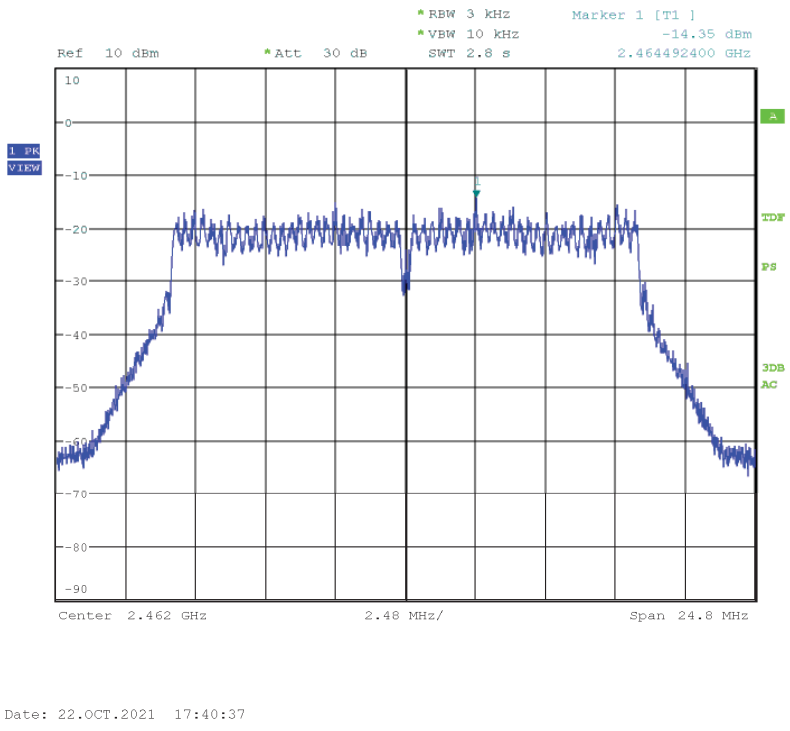


Table 32: Peak Power Spectral Density, 802.11n-20

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
2412	-15.98	8	23.98
2437	-13.09	8	21.09
2462	-15.89	8	23.89

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Figure 45: Power Spectral Density, 802.11n-20, Mode A (2412MHz)

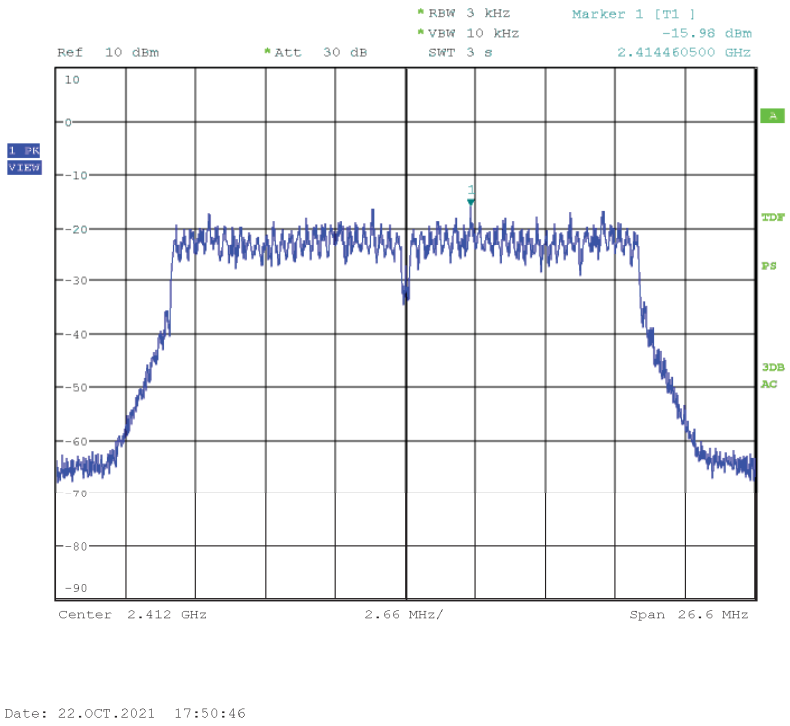


Figure 46: Power Spectral Density, 802.11n-20, Mode B (2437MHz)

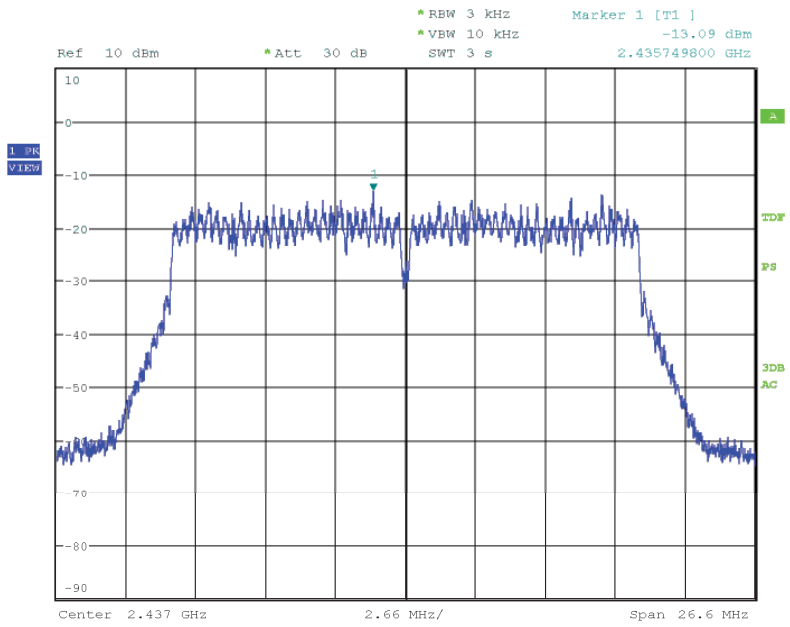


Figure 47: Power Spectral Density, 802.11n-20, Mode C (2462MHz)

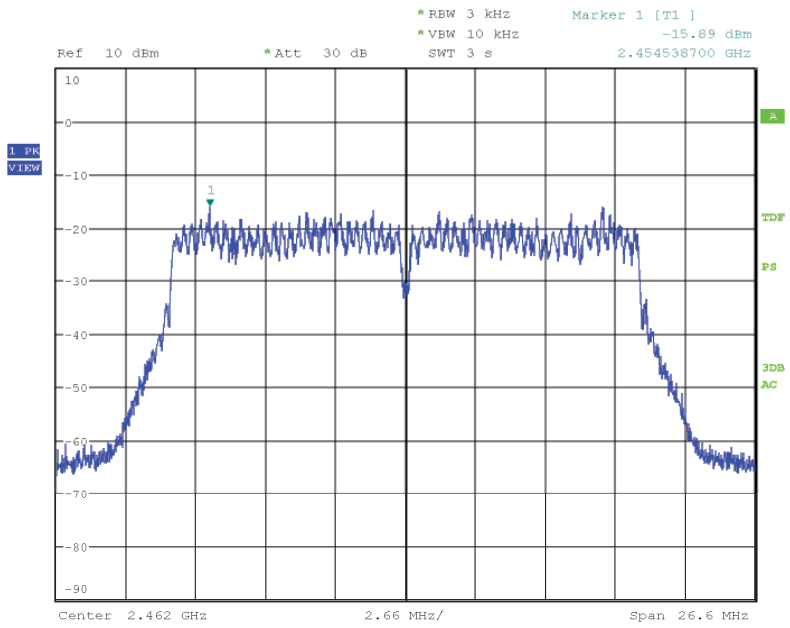


Table 33: Peak Power Spectral Density, BLE 1M-PHY

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
2402	-12.89	8	20.89
2440	-12.33	8	20.33
2480	-12.38	8	20.38

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Figure 48: Power Spectral Density, BLE 1M-PHY, Mode A (2402MHz)

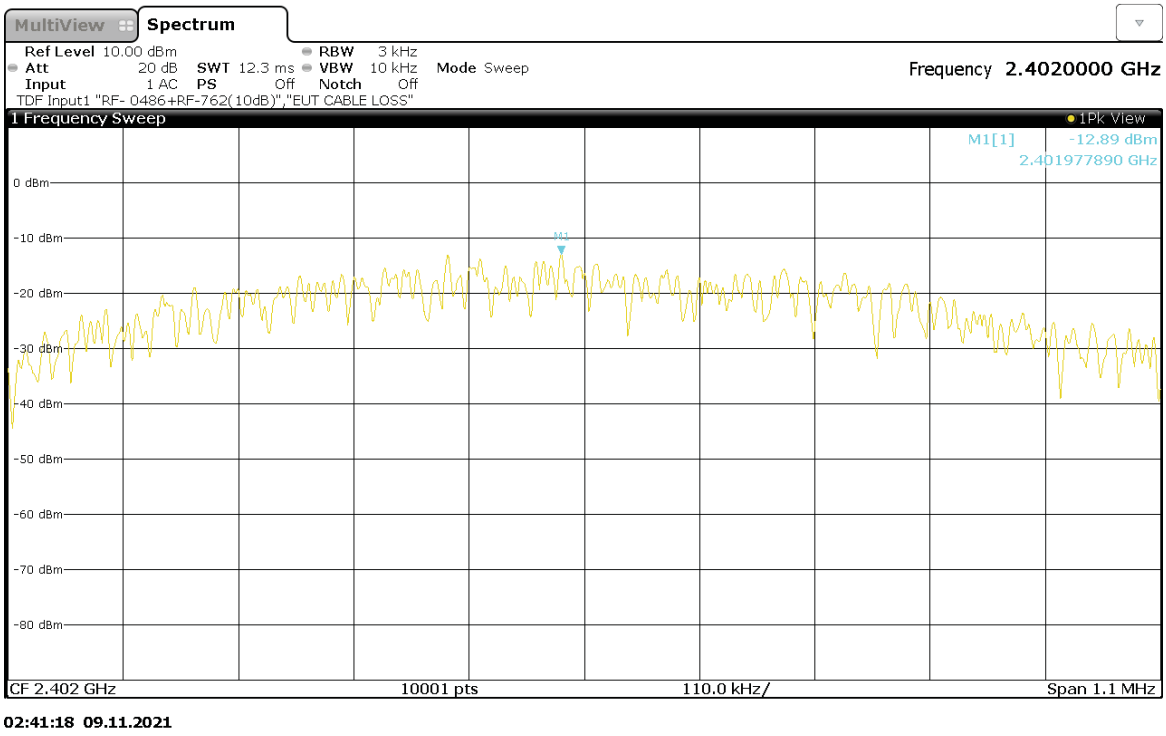


Figure 49: Power Spectral Density, BLE 1M-PHY, Mode B (2440MHz)

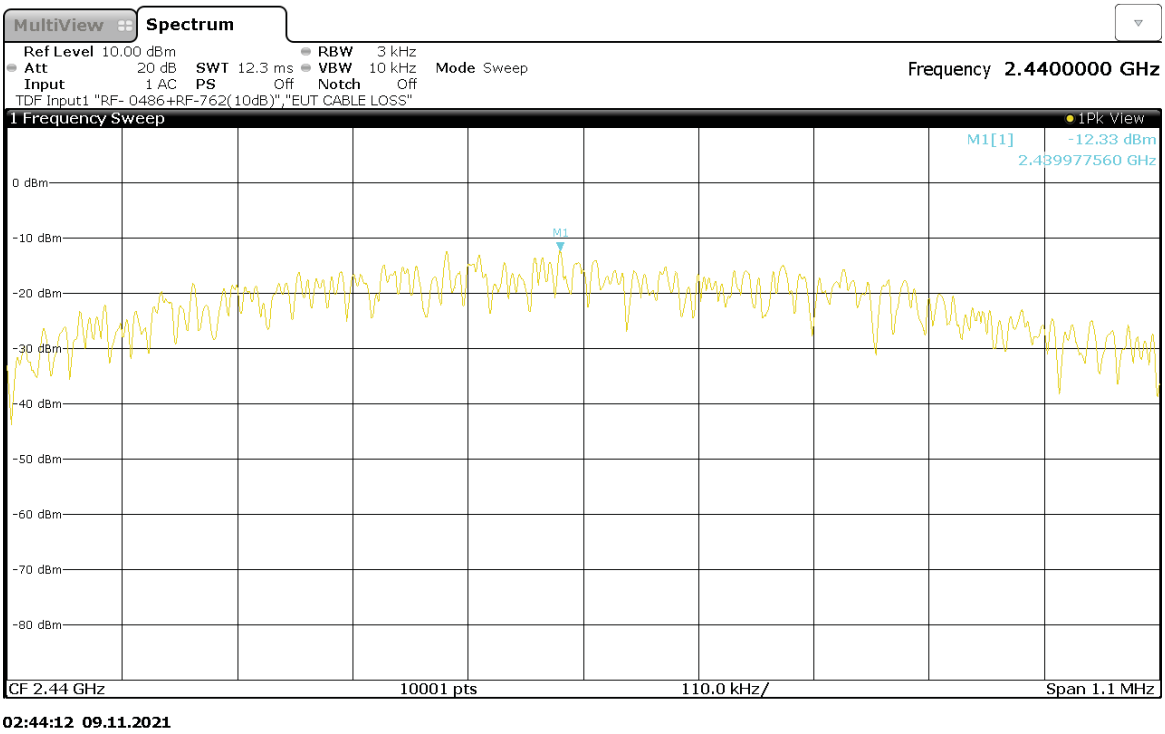


Figure 50: Power Spectral Density, BLE 1M-PHY, Mode C (2480MHz)

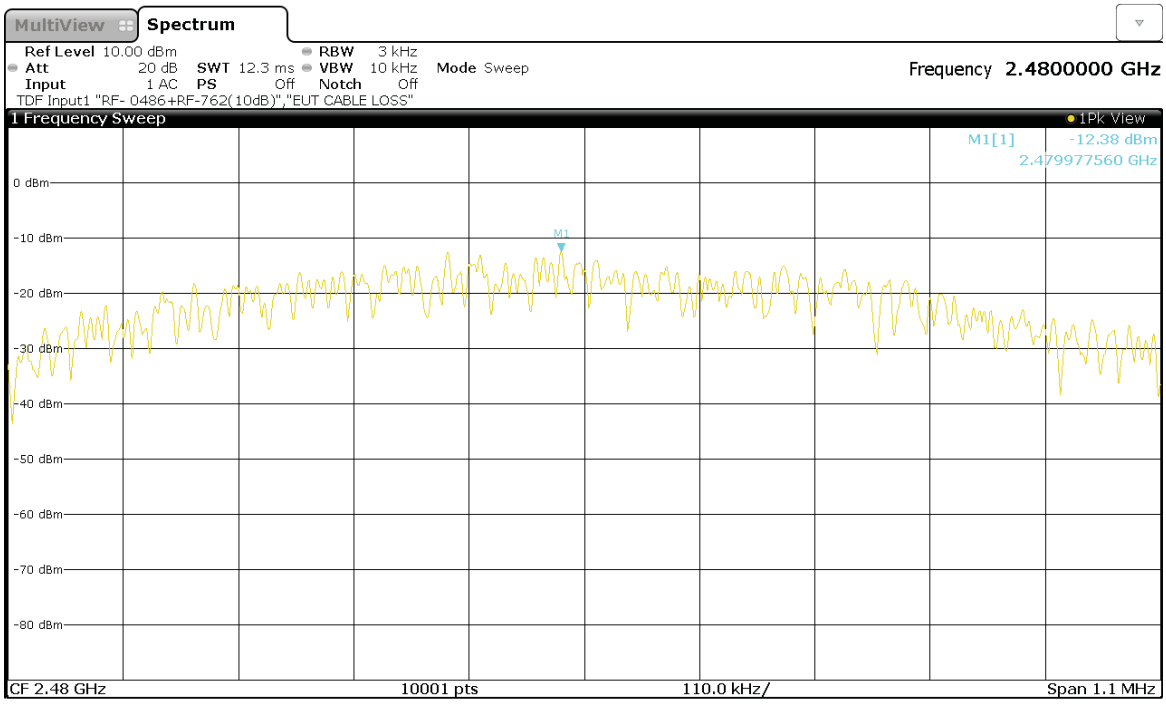
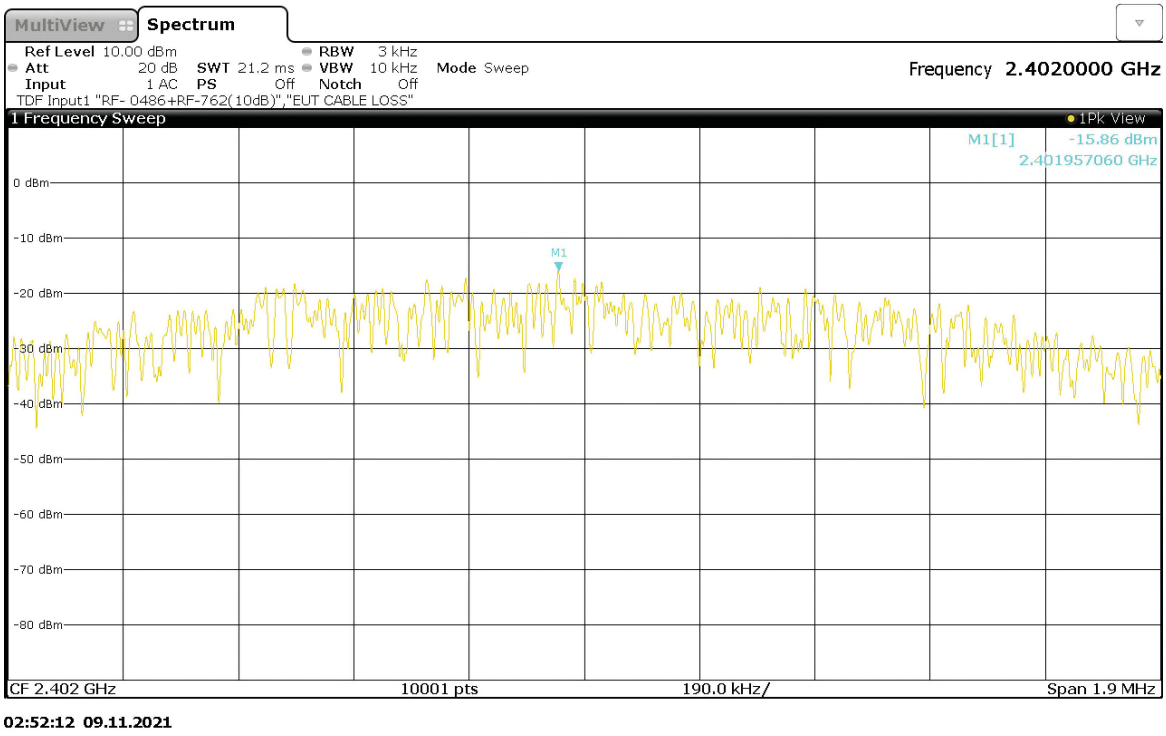


Table 34: Peak Power Spectral Density, BLE 2M-PHY

Operating Frequency [MHz]	Max PSD [dBm]	Limit [dBm]	Margin [dB]
2402	-15.86	8	23.85
2440	-15.33	8	23.33
2480	-15.40	8	23.40

Note:
Cable (including temporary RF cable) and attenuator loss has been compensated for Peak Output Power

Figure 51: Power Spectral Density, BLE 2M-PHY, Mode A (2402MHz)



02:52:12 09.11.2021

Figure 52: Power Spectral Density, BLE 2M-PHY, Mode B (2440MHz)

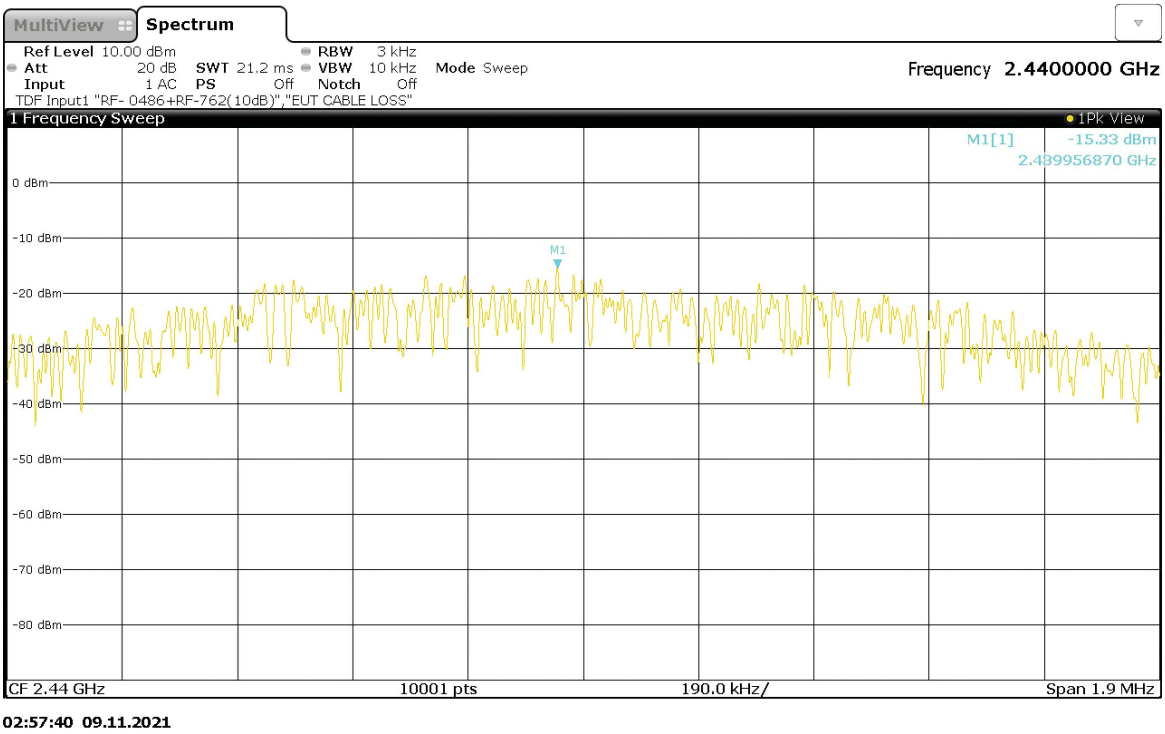
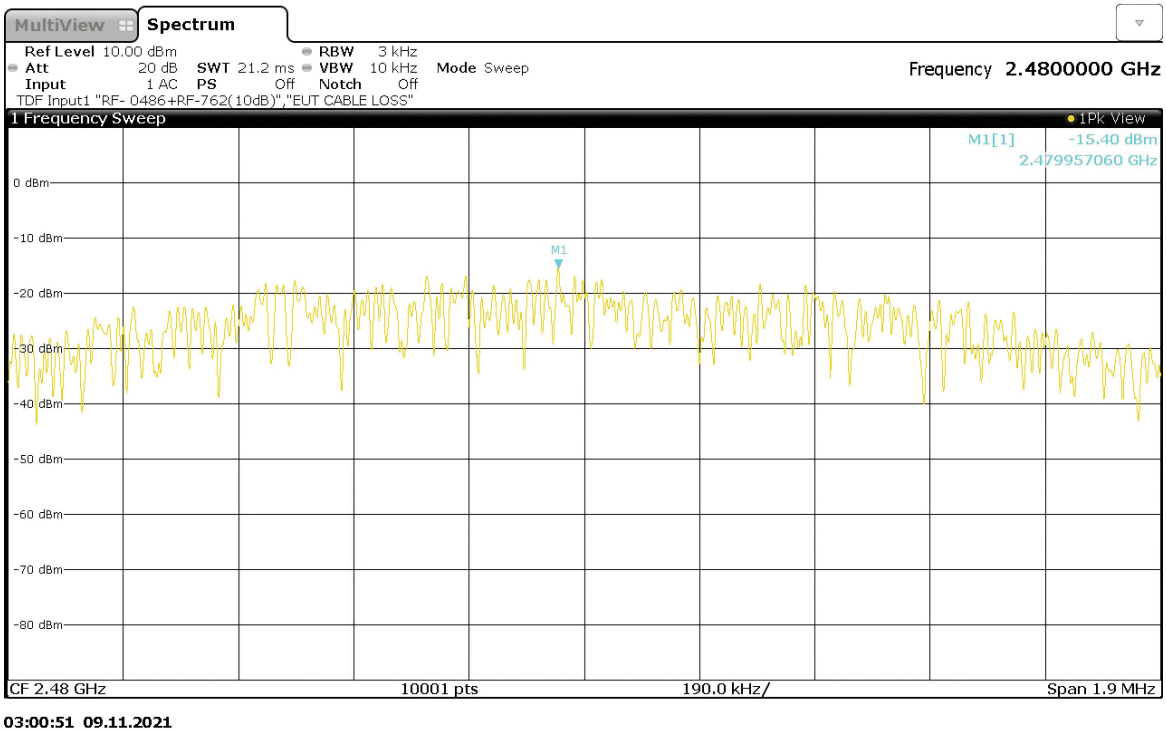


Figure 53: Power Spectral Density, BLE 2M-PHY, Mode C (2480MHz)



5.2.6 Duty Cycle

RESULT: **PERFORMED**

Date of testing:	2021-09-27, 2021-10-24, 2021-10-28
Ambient temperature:	22, 22, 22°C
Relative humidity:	58, 48, 58%
Atmospheric pressure:	1016, 1024, 1018hPa

Requirements:

N/A, this test item was performed as reference.

Test procedure:

ANSI C63.10-2013 §7.5
KDB 558074 D01, Especially. Section 11 Question 3 **(*)**

Note:
For WLAN, average results are compensated by **D**uty **C**ycle **F**actor (CDF) when a duty cycle was less than 98 % during testing.

CDF is calculated by the following formula;

$$CDF = 20 \times \text{Log}_{10} (1/\text{Duty Cycle})$$, where Duty Cycle is in dimensionless.

(*) For BLE, average results are calculated with peak results and are compensated by DCCF at radiated emission measurement.

As per the section 4.1.4.2.4 of ANSI C63.10-2013, **D**uty **C**ycle **C**orrection **F**actor (**DCCF)** is calculated by the following formula;

$$DCCF = 20 \times \text{Log}_{10} (\text{Duty Cycle})$$, where Duty Cycle is in dimensionless.

Table 35: Duty Cycle, 802.11

Radio	Data Rate	On-Time [ms]	Period [ms]	Duty Cycle	Duty Cycle Factor (CDF) [dB]
802.11b	1Mbps	7.458	7.480	99.71%	(Duty Cycle > 98%)
802.11g	54Mbps	0.155	0.178	87.08%	1.2
802.11n-20	MCS7	0.164	0.186	88.17%	1.1

Note:
Duty Cycle Factor = 20 x log (1/duty cycle)

Figure 54: Duty Cycle, 802.11b, Mode B (2437MHz)

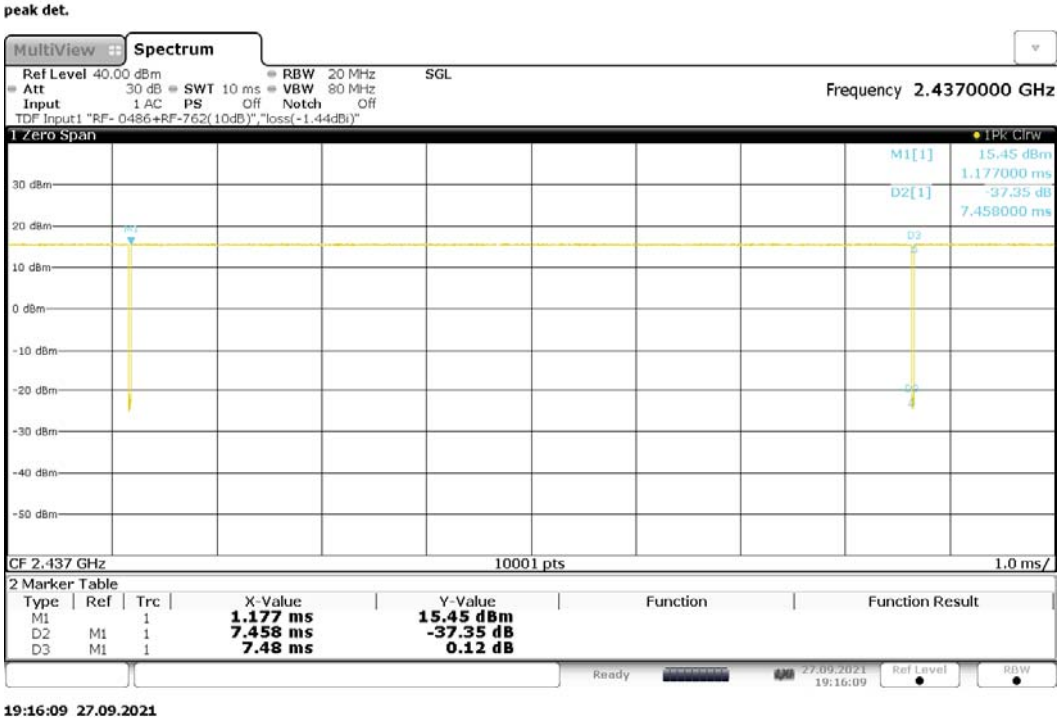


Figure 55: Duty Cycle, 802.11g, Mode B (2437MHz)

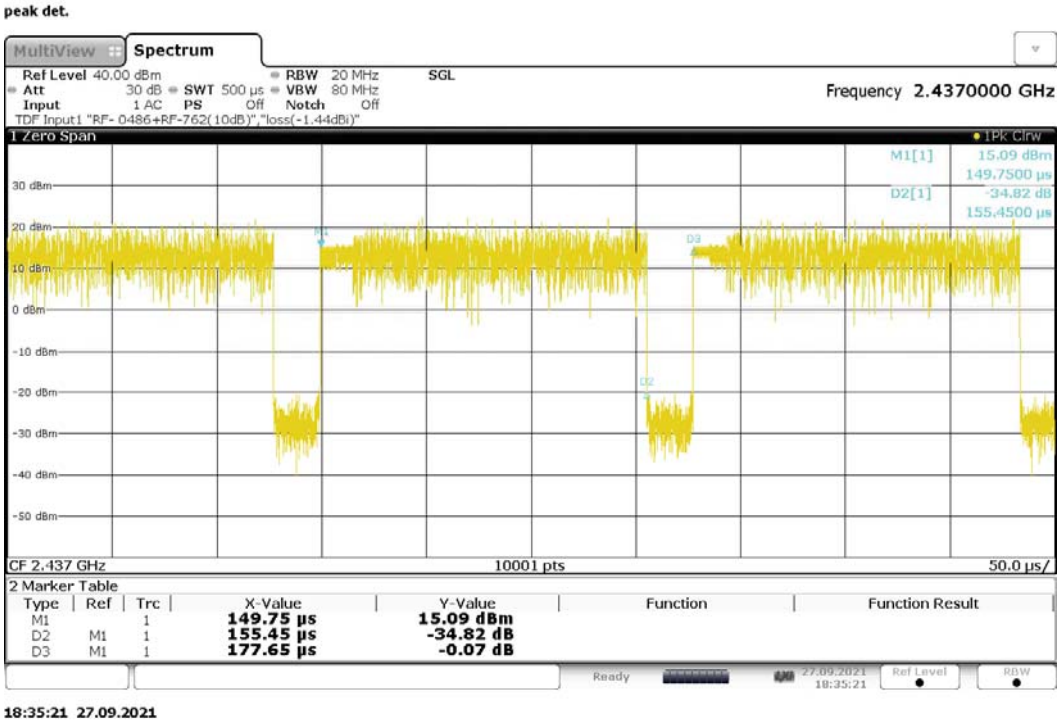


Figure 56: Duty Cycle, 802.11n-20, Mode B (2437MHz)

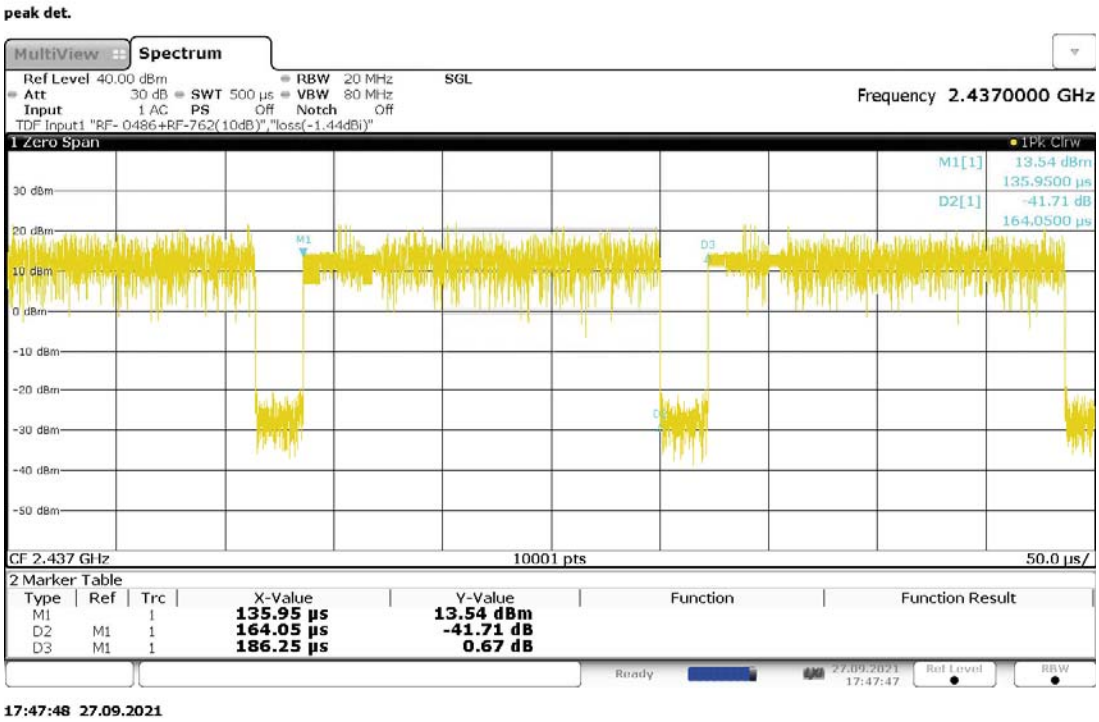


Table 36: Duty Cycle, BLE

Radio	Data Rate	On-Time [ms]	Period [ms]	Duty Cycle [%]
BLE	1M-PHY	0.388	0.627	61.88
BLE	2M-PHY	0.205	0.626	32.75

Figure 57: Duty Cycle, BLE 1M-PHY, Mode B (2440MHz)

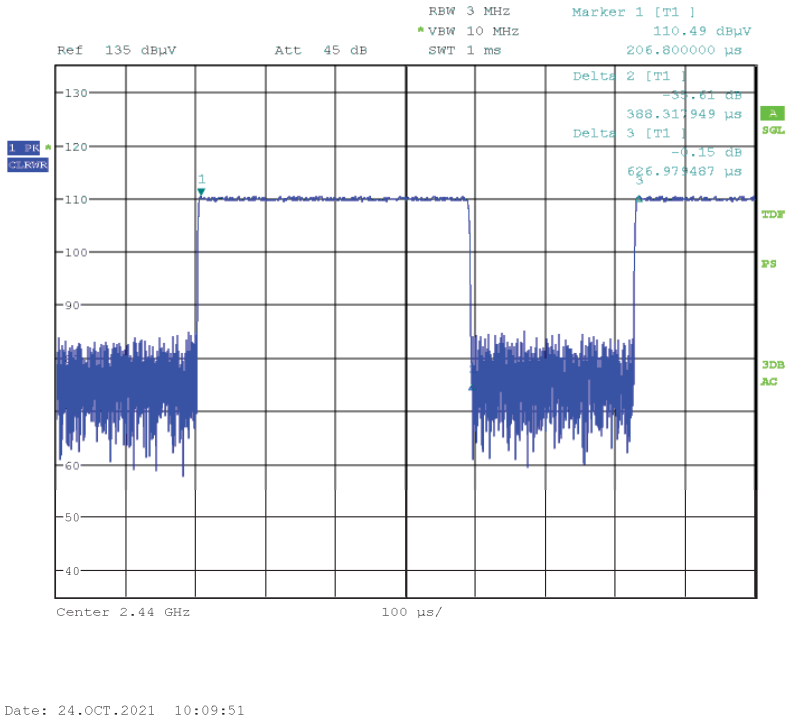
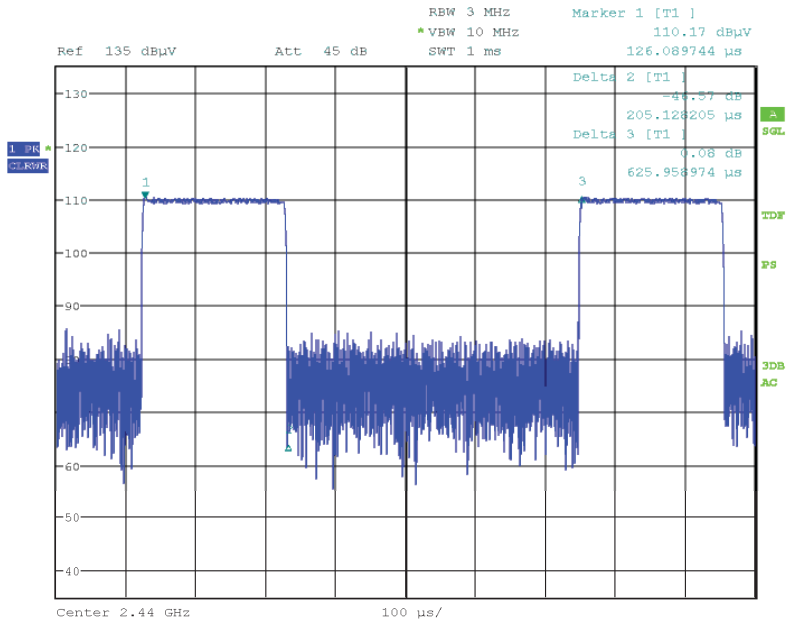


Figure 58: Duty Cycle, BLE 2M-PHY, Mode B (2440MHz)



Date: 24.OCT.2021 10:04:45

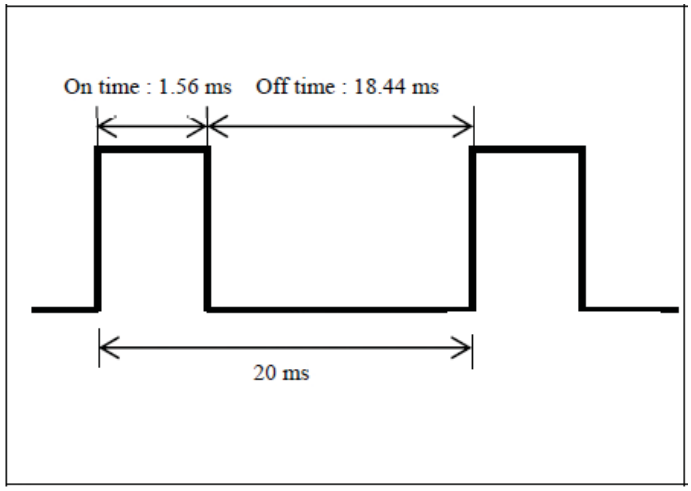
Table 37: Duty Cycle Correction Factor (DCCF), BLE (Information Provided by the Client)

Radio	Data Rate	On-Time [ms]	Period [ms]	Duty Cycle [%]	DCCF [dB]
BLE	1M-PHY	1.56	20	7.8	-22.2
BLE	2M-PHY	0.78	20	3.9	-28.2

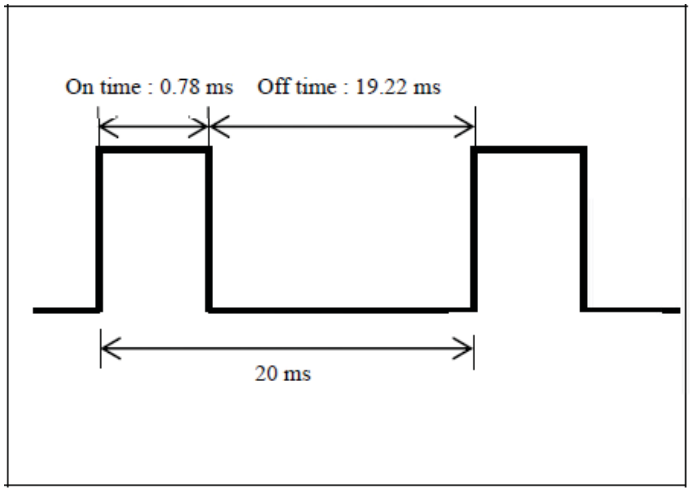
Note:
DCCF is used as compensation factor during Radiated Spurious Emission of Transmitter.
DCCF [dB] = 20 x log (On-Time [ms] / Period [ms])
The Worst Duty Cycle condition for BLE is Advertising mode.

Figure 59: Duty Cycle Correction Factor (Information Provided by the Client)

BLE 1M-PHY, Advertising Mode



BLE 2M-PHY, Advertising Mode



5.3 Radiated Measurements

5.3.1 Radiated Spurious Emissions of Transmitter

RESULT: **PASS**

Date of testing:	2021-09-07, 2021-09-08, 2021-09-15, 2021-09-16, 2021-09-17, 2021-09-21, 2021-09-30, 2021-10-03, 2021-10-04 2021-11-09
Ambient temperature:	22, 23, 20, 23, 22, 21, 22, 23, 22, 22°C
Relative humidity:	50, 52, 59, 62, 58, 58, 56, 59, 52, 58%
Atmospheric pressure:	1013, 1011, 1009, 1013, 1013, 1013,1007, 1018, 1022, 1000hPa
Frequency range:	9kHz - 25GHz
Measurement distance:	3m
Kind of test site:	Semi Anechoic Chamber

Requirements:

FCC 15.205, FCC 15.209, FCC 15.247(d) and RSS-247 5.5, RSS-Gen 8.9, 8.10.

Radiated emissions which fall in the restricted bands, as defined in FCC 15.205(a) must comply with the radiated emission limits specified in FCC 15.209(a).

Radiated emissions which fall outside the operation frequency band and outside restricted bands shall either meet the limit specified in FCC 15.209(a) or be attenuated at least 20dB below the power level in the 100kHz bandwidth within the band that contains the highest level of the desired power (the less severe limit applies).

Test procedure:

ANSI C63.10 §6.3, 6.4, 6.5, 6.6, 6.10

KDB 558074 D01

The EUT was placed on a nonconductive turntable. The table height was 0.8m for measurements below 1GHz and 1.5m for measurements above 1GHz. Before final measurements of radiated emissions were performed, the EUT was scanned to determine its emission spectrum profile. The physical arrangement of the test system, the associated cabling were varied in order to ensure that maximum emission amplitudes were attained.

The spectrum was examined from 9kHz to the 10th harmonic of the highest fundamental transmitter frequency (25GHz). Final radiated emission measurements were made at 3m distance.

At each frequency where a spurious emission was found, the EUT was rotated 360° in order to determine the emission's maximum level. For frequencies above 30MHz, the antenna was raised and lowered from 1 to 4m and measurements were taken using both horizontal and vertical antenna polarizations.

For emissions between 30MHz and 1GHz, measurements were performed with a test receiver operating in the CISPR quasi-peak detection mode with a 6dB bandwidth set to 120kHz.

For emissions above 1GHz, measurements were performed with a spectrum analyzer using Peak and Average detector.

For WLAN, average results are measured with Average detector and compensated by adding Duty Cycle Factor (CDF).

For BLE, average results are calculated with peak results and are compensated by adding DCCF. For frequencies not related to the fundamental or its harmonics, average results were measured with RBW = 1MHz & VBW = 10Hz.

Absorbers have been placed on the floor between the EUT and the measuring antenna for testing above 1GHz.

The highest emission amplitudes relative to the appropriate limit were recorded in this report. Emissions other than those mentioned are small or not detectable.

Table 38: Radiated Emissions, Quasi Peak Data, 9kHz - 30MHz, 802.11n-20, 2437MHz, with 802.11ac-80, CDD, 5210MHz and Bluetooth Hopping on DH5

Freq. [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
0.01371	H	29.6	19.8	49.4	125.0	75.6	100.0	186
0.38338	H	26.7	19.6	46.3	96.0	49.7	100.0	252
1.51601	H	17.2	19.8	37.0	64.0	27.0	100.0	4
1.93180	H	15.6	19.8	35.4	69.5	34.1	100.0	30
2.57502	H	16.0	19.8	35.8	69.5	33.7	100.0	7
28.17876	H	16.2	21.0	37.2	69.5	32.3	100.0	29
0.01069	V	27.5	20.0	47.5	127.1	79.6	100.0	192
0.01365	V	34.0	19.8	53.8	125.0	71.2	100.0	190
0.38501	V	26.4	19.6	46.0	95.9	49.9	100.0	196
0.66808	V	7.3	19.7	27.0	71.1	44.1	100.0	225
2.57573	V	12.2	19.8	32.0	69.5	37.5	100.0	270
27.79529	V	16.4	20.9	37.3	69.5	32.2	100.0	52

Note: Level QP = Reading QP + Factor

Table 39: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
148.344	H	57.8	-21.0	36.8	43.5	6.7	222	342
353.198	V	46.3	-17.8	28.5	46.0	17.5	138	80
353.200	H	50.8	-17.8	33.0	46.0	13.0	100	25

Note: Level QP = Reading QP + Factor

Table 40: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
1038.406	V	65.6	-18.7	46.9	74.0	27.1	124	179
3708.660	H	57.6	-10.8	46.8	74.0	27.2	120	230
3708.670	V	60.1	-10.8	49.4	74.0	24.6	109	307
4825.664	V	53.3	-7.6	45.7	74.0	28.3	202	162
7245.749	H	52.9	-0.1	52.8	74.0	21.2	130	121
9648.096	V	51.5	-7.8	43.7	74.0	30.3	107	28
12065.665	H	52.6	-4.9	47.7	74.0	26.3	131	236
21708.000	H	50.5	-10.7	39.8	74.0	34.2	199	182
21708.000	V	50.4	-10.7	39.7	74.0	34.3	199	356

Note: Level PK = Reading PK + Factor

Table 41: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
1038.406	V	56.8	-18.7	38.1	54.0	15.9	124	179
3708.660	H	42.5	-10.8	31.7	54.0	22.3	120	230
3708.670	V	42.7	-10.8	31.9	54.0	22.1	109	307
4825.664	V	39.2	-7.6	31.6	54.0	22.4	202	162
7245.749	H	39.3	-0.1	39.2	54.0	14.8	130	121
9648.096	V	37.5	-7.8	29.7	54.0	24.3	107	28
12065.665	H	37.8	-4.9	32.9	54.0	21.1	131	236
21708.000	H	37.1	-10.7	26.4	54.0	27.6	199	182
21708.000	V	37.1	-10.7	26.4	54.0	27.6	199	356

Note: Level AV = Reading AV + Factor

Table 42: Band Edge, 802.11b, 2412MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	95.43	75.43	2400	44.00	31.43
2412	V	86.11	66.11	2400	43.50	22.61

Notes: All correction factors are included in the measurement values.

Figure 60: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11b, 2412MHz, Horizontal Antenna Orientation

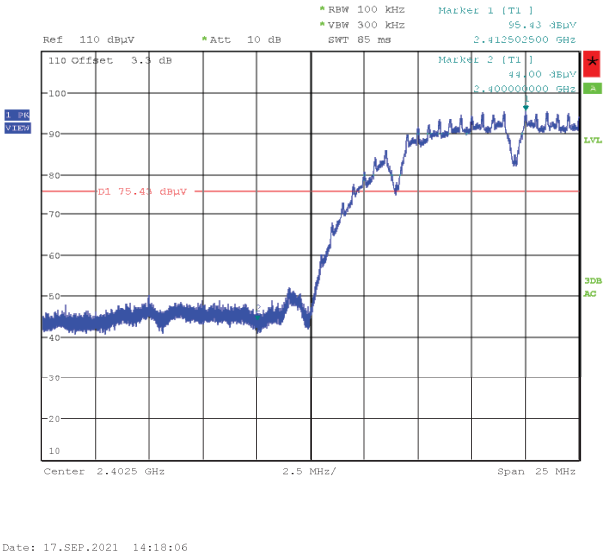


Figure 61: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11b, 2412MHz, Vertical Antenna Orientation

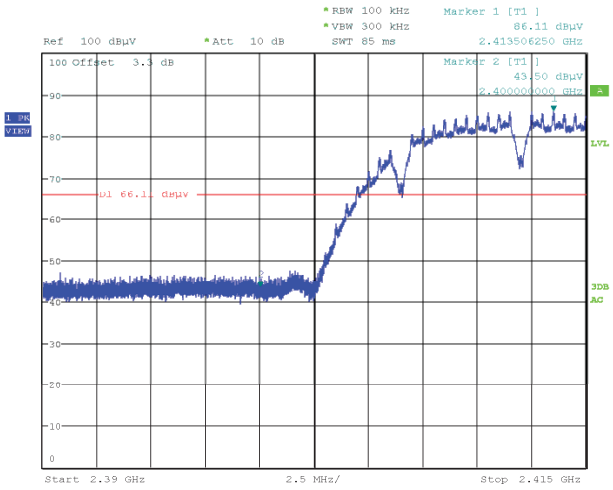


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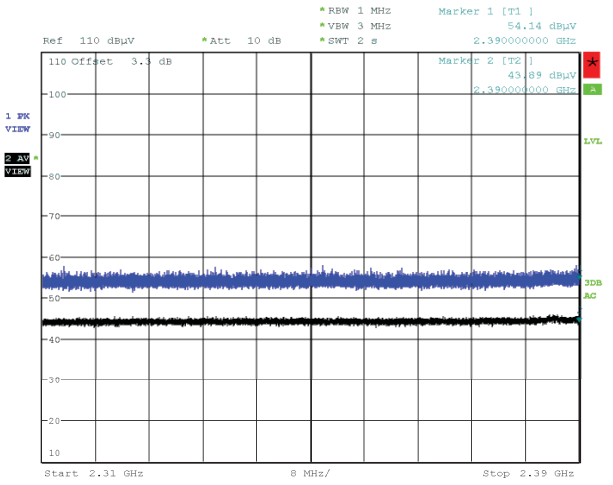
Figure 62: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2412MHz, Horizontal Antenna Orientation



Date: 17.SEP.2021 14:21:19

Figure 63: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2412MHz, Vertical Antenna Orientation

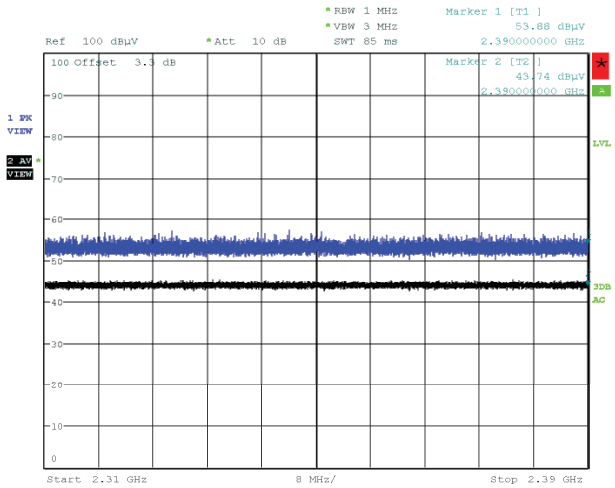


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Table 43: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.700	V	56.7	-10.8	46.0	74.0	28.0	187	305
4920.092	V	53.1	-7.8	45.3	74.0	28.7	165	257
7364.006	V	52.9	-0.1	52.8	74.0	21.2	147	1
9744.635	H	50.9	-7.1	43.8	74.0	30.2	136	119
12183.836	V	51.5	-5.2	46.3	74.0	27.7	193	9
21933.000	V	50.9	-10.6	40.3	74.0	33.7	200	1
21933.000	H	50.3	-10.6	39.7	74.0	34.3	193	356

Note: Level PK = Reading PK + Factor

Table 44: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.700	V	40.7	-10.8	29.9	54.0	24.1	187	305
4920.092	V	39.1	-7.8	31.3	54.0	22.7	165	257
7364.006	V	39.0	-0.1	38.9	54.0	15.1	147	1
9744.635	H	36.8	-7.1	29.7	54.0	24.3	136	119
12183.836	V	37.2	-5.2	32.0	54.0	22.0	193	9
21933.000	V	37.1	-10.6	26.5	54.0	27.5	200	1
21933.000	H	37.1	-10.6	26.5	54.0	27.5	193	356

Note: Level AV = Reading AV + Factor

Table 45: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.686	V	58.9	-10.8	48.2	74.0	25.8	131	270
4909.019	V	53.8	-7.8	46.0	74.0	28.0	114	23
7250.199	V	53.2	-0.1	53.1	74.0	20.9	198	118
9847.623	H	50.7	-7.0	43.7	74.0	30.3	136	110
12320.710	V	52.4	-6.5	45.9	74.0	28.1	177	114
22158.000	H	50.9	-10.7	40.2	74.0	33.8	131	14
22158.000	V	51.1	-10.7	40.4	74.0	33.6	199	334

Note: Level PK = Reading PK + Factor

Table 46: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.686	V	42.1	-10.8	31.3	54.0	22.7	131	270
4909.019	V	39.1	-7.8	31.3	54.0	22.7	114	23
7250.199	V	39.2	-0.1	39.1	54.0	14.9	198	118
9847.623	H	36.7	-7.0	29.7	54.0	24.3	136	110
12320.710	V	37.3	-6.5	30.8	54.0	23.2	177	114
22158.000	H	37.2	-10.7	26.5	54.0	27.5	131	14
22158.000	V	37.2	-10.7	26.5	54.0	27.5	199	334

Note: Level AV = Reading AV + Factor

Figure 64: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2462MHz, Horizontal Antenna Orientation

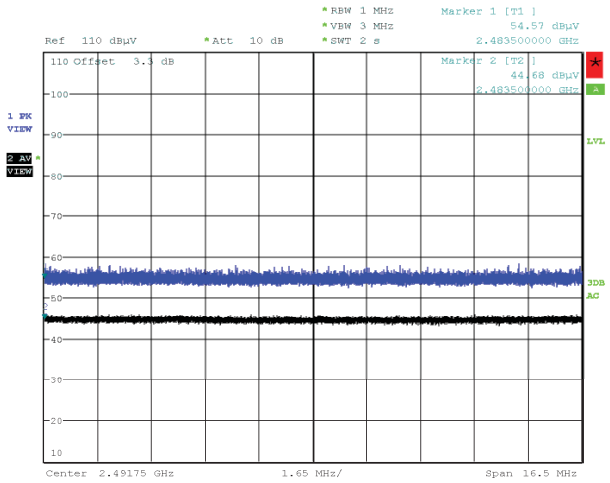

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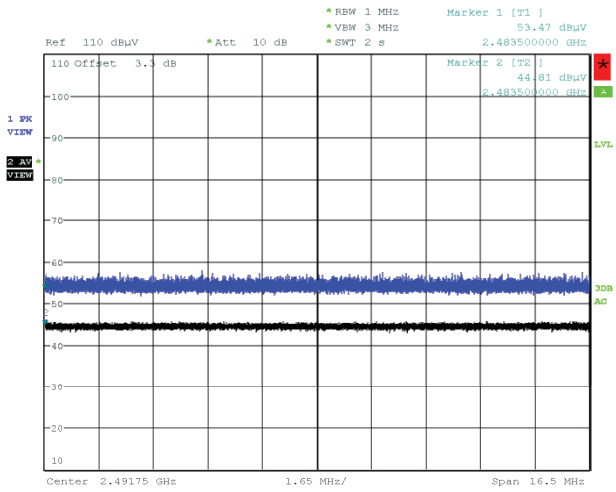
Figure 65: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2462MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 11:41:58

Table 47: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
2225.362	V	60.3	-13.4	46.9	74.0	27.1	132	178
3708.742	H	58.1	-10.8	47.3	74.0	26.7	188	232
4829.199	H	53.2	-7.6	45.6	74.0	28.4	178	220
7240.255	H	53.1	-0.2	52.9	74.0	21.1	129	64
9654.944	V	51.7	-7.7	44.0	74.0	30.0	153	220
12058.164	H	51.4	-4.9	46.5	74.0	27.5	164	63
21708.000	H	50.5	-10.7	39.8	74.0	34.2	153	8
21708.000	V	50.4	-10.7	39.7	74.0	34.3	197	355

Note: Level PK = Reading PK + Factor

Table 48: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
2225.362	V	45.4	-13.4	1.2	33.2	54.0	20.8	132	178
3708.742	H	41.6	-10.8	1.2	32.0	54.0	22.0	188	232
4829.199	H	39.1	-7.6	1.2	32.7	54.0	21.3	178	220
7240.255	H	39.2	-0.2	1.2	40.2	54.0	13.8	129	64
9654.944	V	37.6	-7.7	1.2	31.1	54.0	22.9	153	220
12058.164	H	37.4	-4.9	1.2	33.7	54.0	20.3	164	63
21708.000	H	37.0	-10.7	1.2	27.5	54.0	26.5	153	8
21708.000	V	37.0	-10.7	1.2	27.5	54.0	26.5	197	355
2225.362	V	45.4	-13.4	1.2	33.2	54.0	20.8	132	178

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 49: Band Edge, 802.11g, 2412MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	91.61	71.61	2400	51.11	20.50
2412	V	86.73	66.73	2400	45.35	21.38

Notes: All correction factors are included in the measurement values.

Figure 66: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2412MHz, Horizontal Antenna Orientation

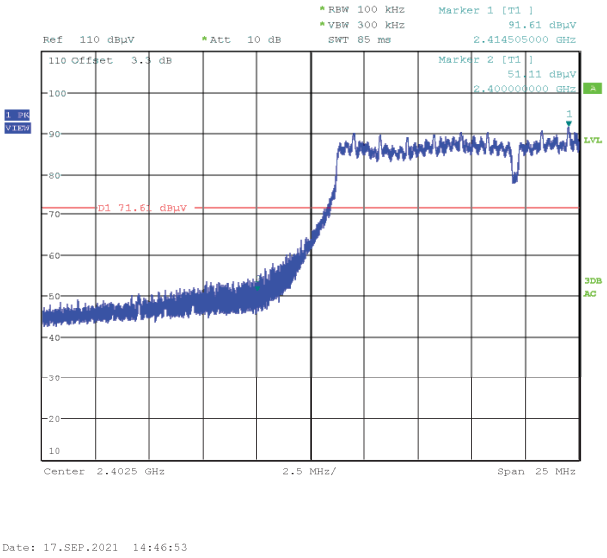


Figure 67: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2412MHz, Vertical Antenna Orientation

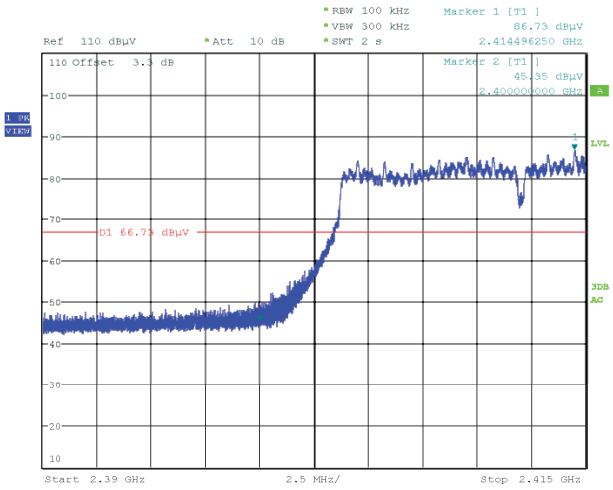


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Figure 68: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2412MHz, Horizontal Antenna Orientation

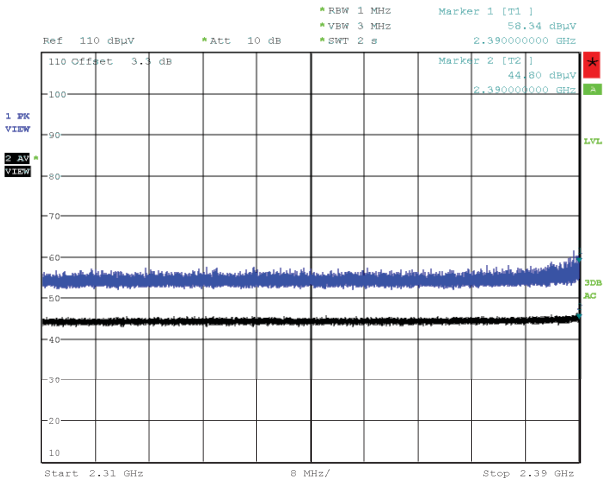

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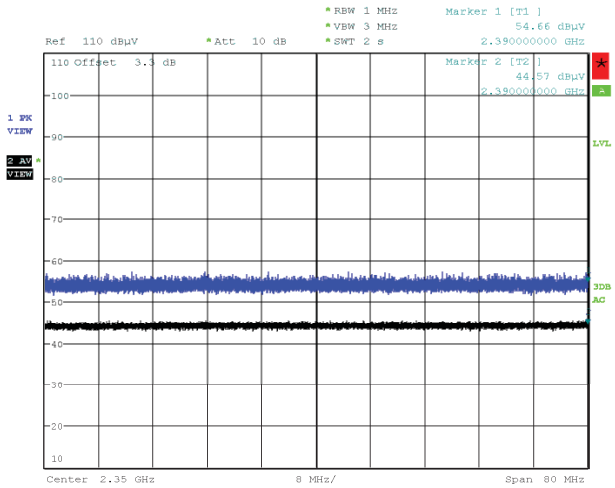
Figure 69: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2412MHz, Vertical Antenna Orientation



Date: 17.SEP.2021 14:55:53

Table 50: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2417MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.819	V	59.9	-10.8	49.1	74.0	24.9	156	313
4829.208	V	53.3	-7.6	45.7	74.0	28.3	190	301
7275.833	V	53.8	-0.1	53.8	74.0	20.2	190	233

Note: Level PK = Reading PK + Factor

Table 51: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2417MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.819	V	42.4	-10.8	1.2	32.8	54.0	21.2	156	313
4829.208	V	39.2	-7.6	1.2	32.8	54.0	21.2	190	301
7275.833	V	39.3	-0.1	1.2	40.4	54.0	13.6	190	233

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 52: Band Edge, 802.11g, 2417MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2417	H	93.97	73.97	2400	51.06	22.91
2417	V	87.20	67.20	2400	44.51	22.69

Notes: All correction factors are included in the measurement values.

Figure 70: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2417MHz, Horizontal Antenna Orientation

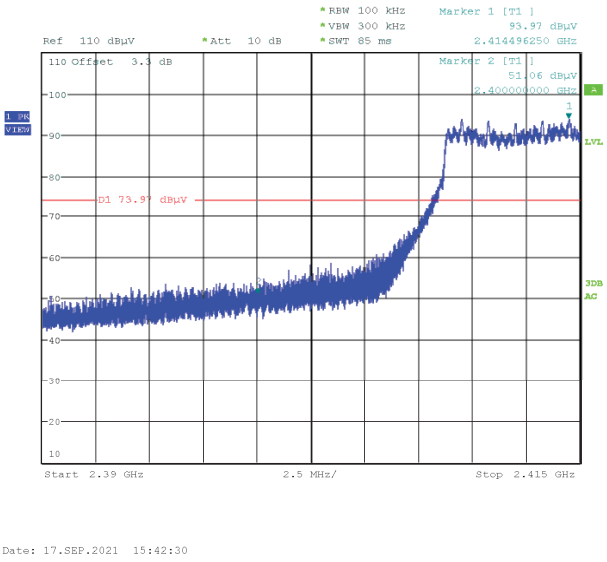


Figure 71: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2417MHz, Vertical Antenna Orientation

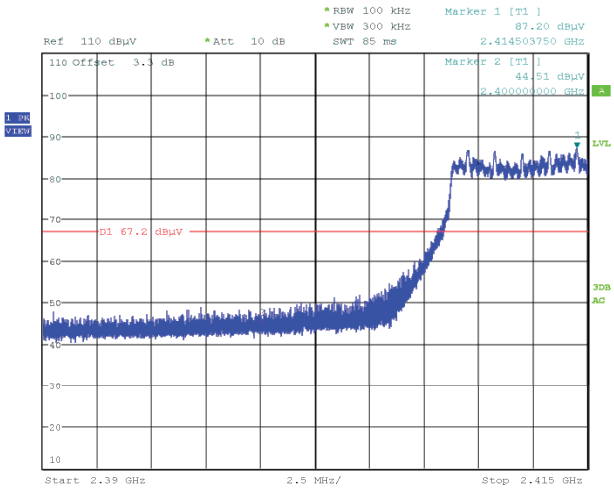


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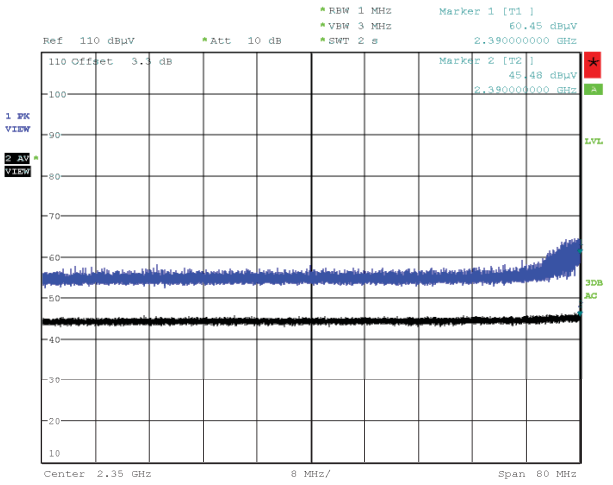
Figure 72: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2417MHz, Horizontal Antenna Orientation



Date: 17.SEP.2021 15:39:19

Figure 73: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2417MHz, Vertical Antenna Orientation

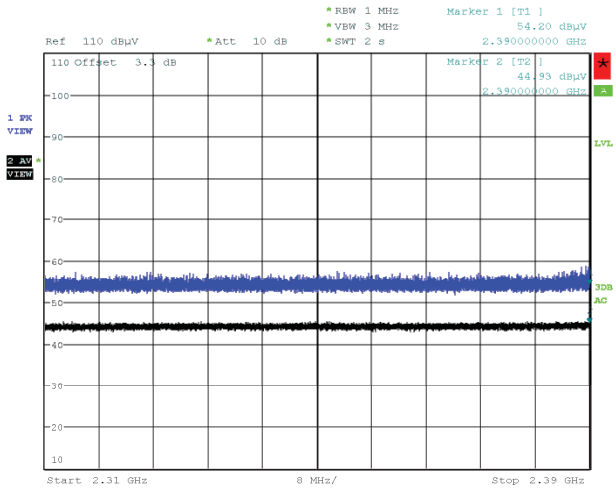


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Table 53: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.571	V	59.9	-10.8	49.1	74.0	24.9	100	259
4892.062	V	52.8	-7.8	45.0	74.0	29.0	191	133
7350.358	V	53.1	-0.1	53.0	74.0	21.0	105	30
9740.298	H	51.4	-7.1	44.3	74.0	29.7	152	218
12187.815	V	51.7	-5.2	46.5	74.0	27.5	147	156
21933.000	H	50.4	-10.6	39.8	74.0	34.2	113	281
21933.000	V	50.2	-10.6	39.6	74.0	34.4	196	7

Note: Level PK = Reading PK + Factor

Table 54: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.571	V	42.7	-10.8	1.2	33.1	54.0	20.9	100	259
4892.062	V	39.0	-7.8	1.2	32.4	54.0	21.6	191	133
7350.358	V	39.2	-0.1	1.2	40.3	54.0	13.7	105	30
9740.298	H	37.2	-7.1	1.2	31.3	54.0	22.7	152	218
12187.815	V	36.9	-5.2	1.2	32.9	54.0	21.1	147	156
21933.000	H	36.7	-10.6	1.2	27.3	54.0	26.7	113	281
21933.000	V	36.6	-10.6	1.2	27.2	54.0	26.8	196	7
3708.571	V	42.7	-10.8	1.2	33.1	54.0	20.9	100	259
4892.062	V	39.0	-7.8	1.2	32.4	54.0	21.6	191	133

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 55: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2457MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.364	V	58.6	-10.8	47.8	74.0	26.2	156	271
4934.296	V	52.9	-7.7	45.2	74.0	28.8	138	309
7380.296	V	52.8	-0.2	52.7	74.0	21.3	199	7

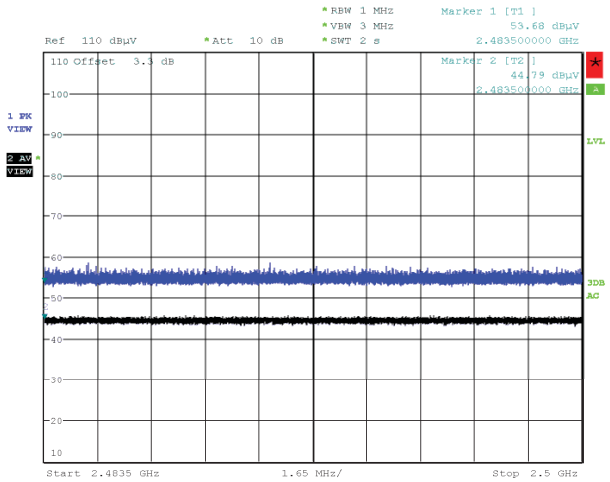
Note: Level PK = Reading PK + Factor

Table 56: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2457MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.364	V	42.1	-10.8	1.2	32.5	54.0	21.5	156	271
4934.296	V	38.9	-7.7	1.2	32.4	54.0	21.6	138	309
7380.296	V	38.9	-0.2	1.2	39.9	54.0	14.1	199	7

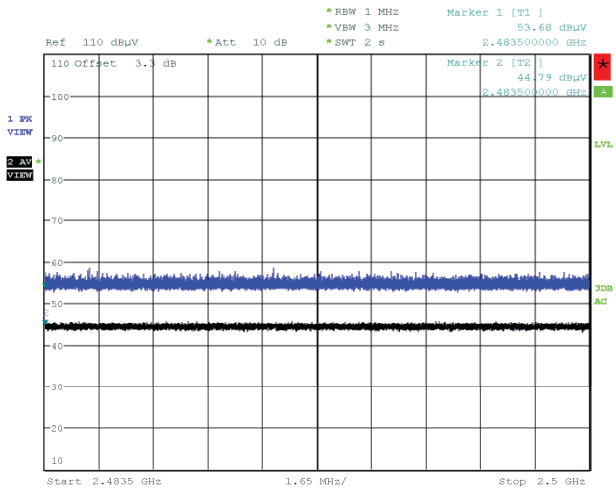
Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 74: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2457MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 10:39:31

Figure 75: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2457MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 10:39:31

Table 57: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.691	V	57.4	-10.8	46.7	74.0	27.3	197	309
4920.262	V	52.9	-7.8	45.1	74.0	28.9	164	112
7428.078	V	53.9	-0.3	53.7	74.0	20.3	200	181
9848.022	V	51.6	-7.0	44.6	74.0	29.4	200	355
12316.239	H	51.2	-6.5	44.7	74.0	29.3	139	299
22158.000	H	50.8	-10.7	40.1	74.0	33.9	144	300
22158.000	V	50.7	-10.7	40.0	74.0	34.0	118	327

Note: Level PK = Reading PK + Factor

Table 58: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.691	V	41.2	-10.8	1.2	31.6	54.0	22.4	197	309
4920.262	V	39.1	-7.8	1.2	32.5	54.0	21.5	164	112
7428.078	V	39.1	-0.3	1.2	40.0	54.0	14.0	200	181
9848.022	V	40.2	-7.0	1.2	34.4	54.0	19.6	200	355
12316.239	H	37.2	-6.5	1.2	31.9	54.0	22.1	139	299
22158.000	H	37.2	-10.7	1.2	27.7	54.0	26.3	144	300
22158.000	V	37.2	-10.7	1.2	27.7	54.0	26.3	118	327

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 76: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2462MHz, Horizontal Antenna Orientation

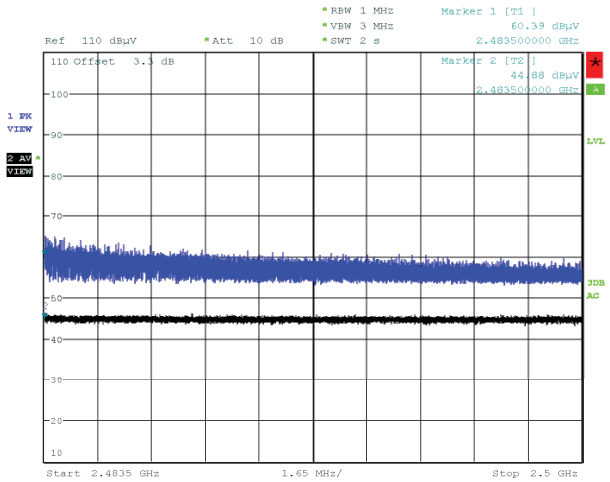


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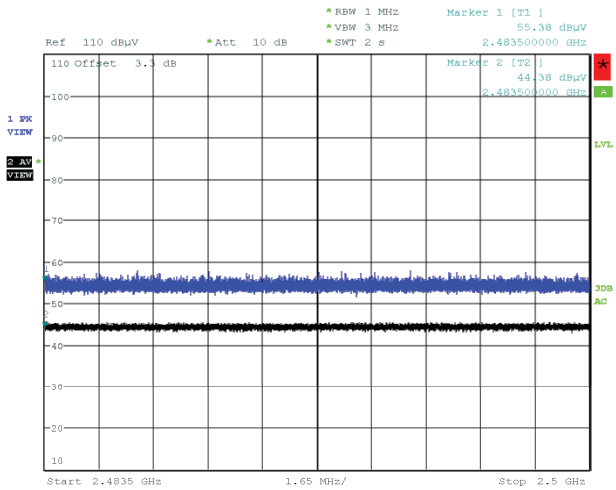
Figure 77: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2462MHz, Vertical Antenna Orientation



Date: 17.SEP.2021 18:50:13

Table 59: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3709.296	V	58.6	-10.7	47.9	74.0	26.1	182	312
4818.440	V	52.9	-7.6	45.3	74.0	28.7	177	330
7256.727	V	53.1	-0.1	53.0	74.0	21.0	160	230
9650.779	H	51.7	-7.8	43.9	74.0	30.1	127	186
12050.470	V	51.6	-5.0	46.7	74.0	27.3	197	289
21708.000	H	52.3	-10.7	41.6	74.0	32.4	124	29

Note: Level PK = Reading PK + Factor

Table 60: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2412MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3709.296	V	41.4	-10.7	1.1	31.8	54.0	22.2	182	312
4818.440	V	39.1	-7.6	1.1	32.6	54.0	21.4	177	330
7256.727	V	39.3	-0.1	1.1	40.3	54.0	13.7	160	230
9650.779	H	37.6	-7.8	1.1	30.9	54.0	23.1	127	186
12050.470	V	37.5	-5.0	1.1	33.6	54.0	20.4	197	289
21708.000	H	38.3	-10.7	1.1	28.7	54.0	25.3	124	29

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 61: Band Edge, 802.11n-20, 2412MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	91.57	71.57	2400	49.39	22.18
2412	V	82.76	62.76	2400	44.74	18.02

Notes: All correction factors are included in the measurement values.

Figure 78: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2412MHz, Horizontal Antenna Orientation

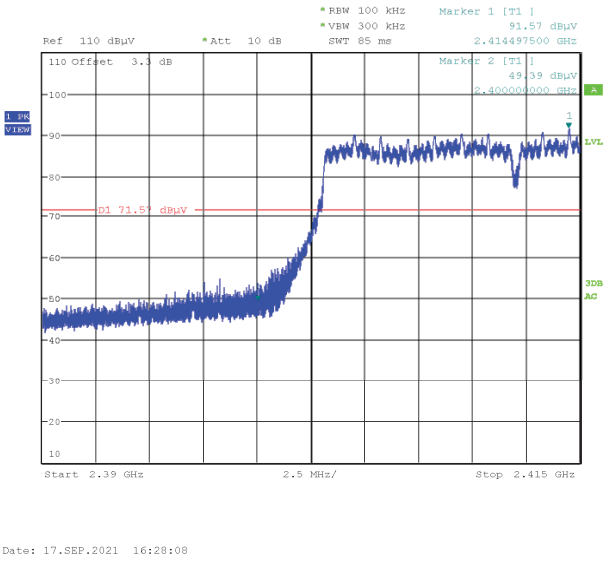


Figure 79: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2412MHz, Vertical Antenna Orientation

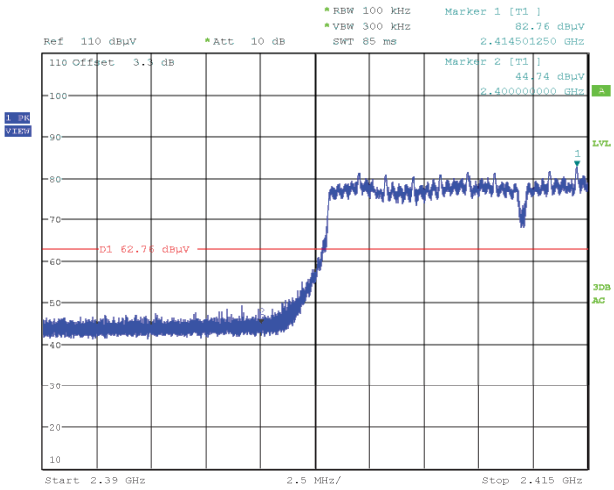


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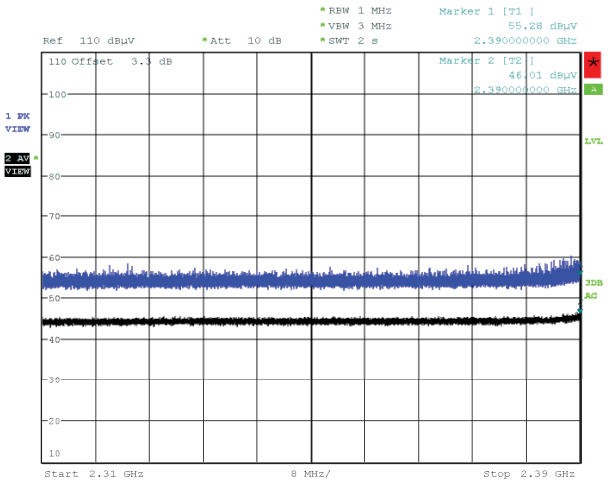
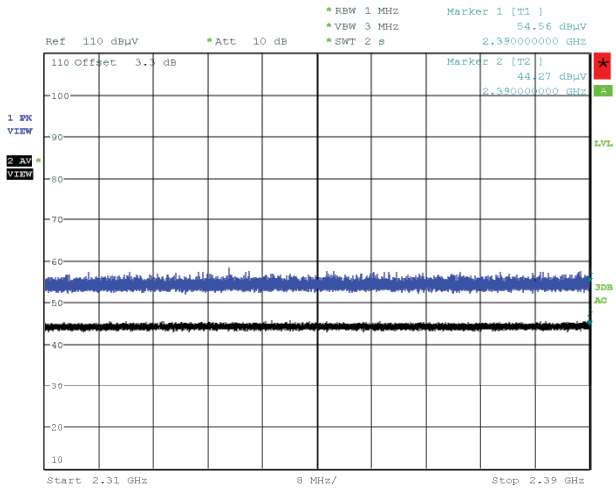
Figure 80: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2412MHz, Horizontal Antenna Orientation



Date: 17.SEP.2021 16:25:17

Figure 81: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2412MHz, Vertical Antenna Orientation



Date: 17.SEP.2021 16:10:05

Table 62: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2417MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.659	V	59.7	-10.8	49.0	74.0	25.0	114	258
4858.558	V	52.7	-7.7	45.0	74.0	29.0	100	0
7252.383	V	53.2	-0.1	53.1	74.0	20.9	130	301

Note: Level PK = Reading PK + Factor

Table 63: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2417MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.659	V	43.1	-10.8	1.1	33.4	54.0	20.6	114	258
4858.558	V	38.8	-7.7	1.1	32.2	54.0	21.8	100	0
7252.383	V	39.3	-0.1	1.1	40.3	54.0	13.7	130	301

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 64: Band Edge, 802.11n-20, 2417MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2417	H	92.46	72.46	2400	47.17	25.29
2417	V	83.86	63.86	2400	42.94	20.92

Notes: All correction factors are included in the measurement values.

Figure 82: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2417MHz, Horizontal Antenna Orientation

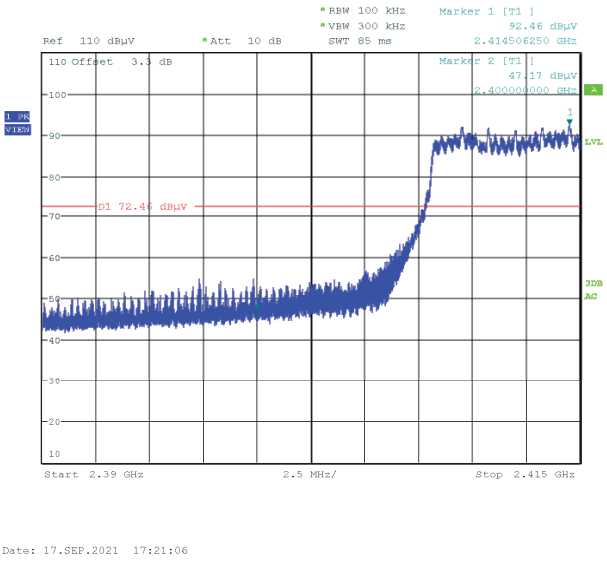


Figure 83: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2417MHz, Vertical Antenna Orientation

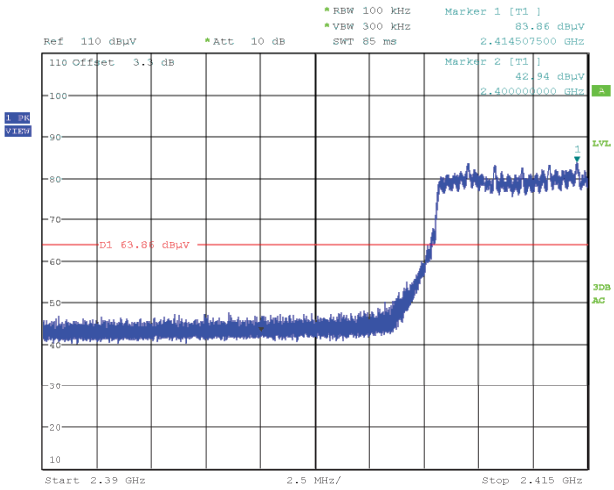


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Figure 84: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2417MHz, Horizontal Antenna Orientation

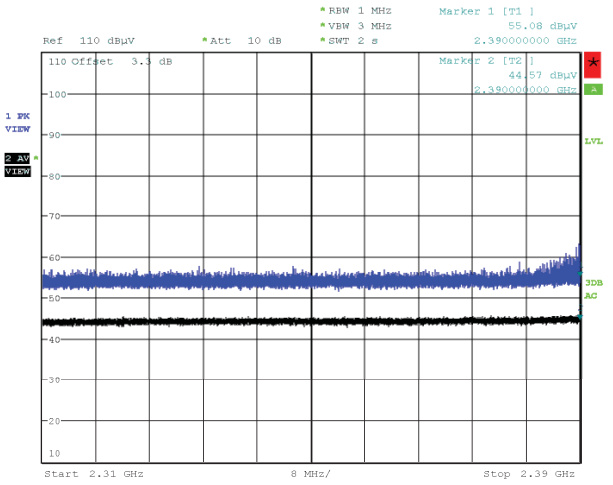

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Figure 85: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2417MHz, Vertical Antenna Orientation

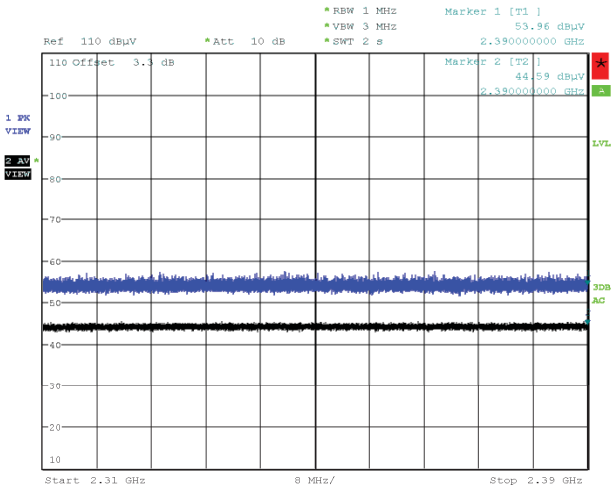

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Table 65: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.461	V	57.5	-10.8	46.8	74.0	27.2	100	304
4876.477	V	52.5	-7.8	44.7	74.0	29.3	147	349
7305.487	V	53.7	0.0	53.7	74.0	20.3	100	117
9736.571	H	51.1	-7.2	44.0	74.0	30.0	190	257
12187.841	V	51.2	-5.2	45.9	74.0	28.1	189	80
21933.000	V	52.2	-10.6	41.6	74.0	32.4	152	215

Note: Level PK = Reading PK + Factor

Table 66: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.461	V	41.7	-10.8	1.1	32.0	54.0	22.0	100	304
4876.477	V	38.8	-7.8	1.1	32.1	54.0	21.9	147	349
7305.487	V	38.9	0.0	1.1	40.0	54.0	14.0	100	117
9736.571	H	37.2	-7.2	1.1	31.1	54.0	22.9	190	257
12187.841	V	37.1	-5.2	1.1	33.0	54.0	21.0	189	80
21933.000	V	38.4	-10.6	1.1	28.9	54.0	25.1	152	215

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 67: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2457MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.706	V	61.7	-10.8	51.0	74.0	23.0	124	262
4893.313	V	53.1	-7.8	45.3	74.0	28.7	154	254
7380.175	V	53.2	-0.2	53.0	74.0	21.0	153	154

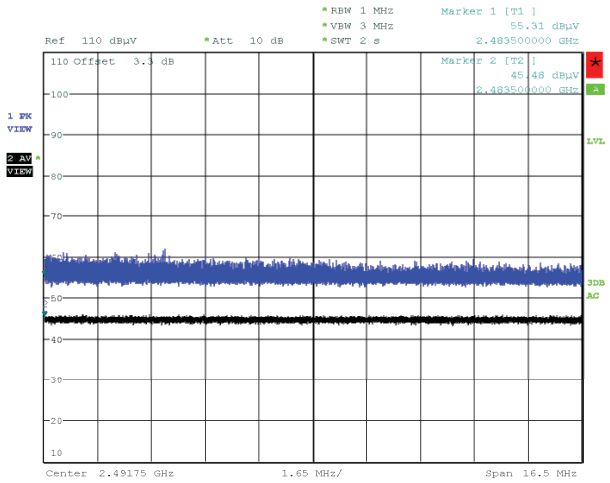
Note: Level PK = Reading PK + Factor

Table 68: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2457MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.706	V	43.7	-10.8	1.1	34.0	54.0	20.0	124	262
4893.313	V	39.0	-7.8	1.1	32.3	54.0	21.7	154	254
7380.175	V	38.9	-0.2	1.1	39.8	54.0	14.2	153	154

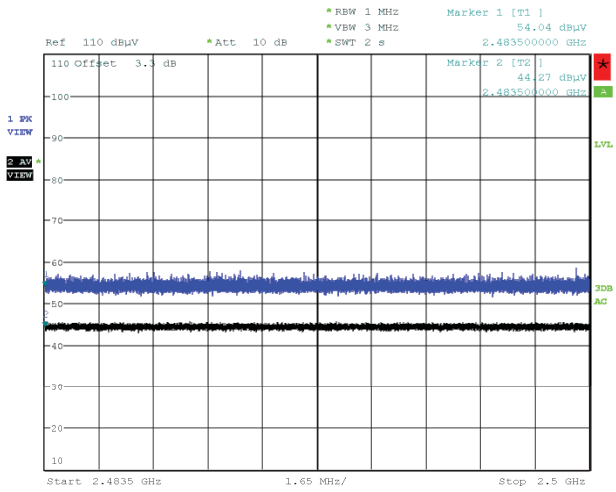
Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 86: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2457MHz, Horizontal Antenna Orientation



Date: 17.SEP.2021 17:56:28

Figure 87: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2457MHz, Vertical Antenna Orientation



Date: 17.SEP.2021 17:53:08

Table 69: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.570	V	58.5	-10.8	47.7	74.0	26.3	149	251
4919.861	V	52.6	-7.8	44.8	74.0	29.2	100	168
7380.042	V	53.0	-0.2	52.8	74.0	21.2	167	188
9854.954	H	50.9	-7.0	43.9	74.0	30.1	148	110
12321.170	V	51.3	-6.5	44.8	74.0	29.2	195	47
22158.000	H	52.6	-10.7	41.9	74.0	32.1	111	141

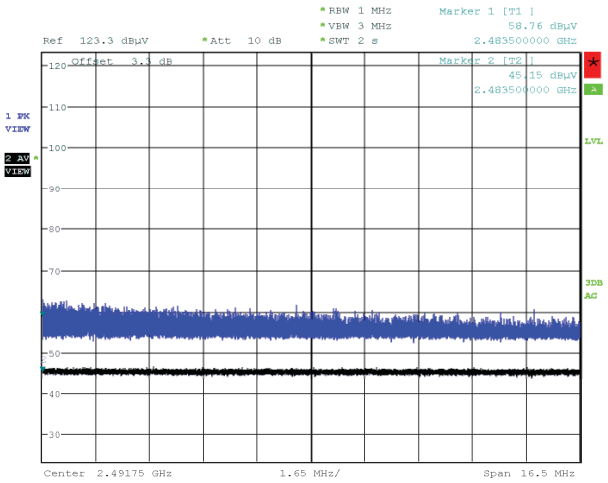
Note: Level PK = Reading PK + Factor

Table 70: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2462MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.570	V	42.2	-10.8	1.1	32.5	54.0	21.5	149	251
4919.861	V	39.1	-7.8	1.1	32.4	54.0	21.6	100	168
7380.042	V	38.9	-0.2	1.1	39.8	54.0	14.2	167	188
9854.954	H	36.7	-7.0	1.1	30.8	54.0	23.2	148	110
12321.170	V	37.4	-6.5	1.1	32.0	54.0	22.0	195	47
22158.000	H	38.6	-10.7	1.1	29.0	54.0	25.0	111	141

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 88: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2462MHz, Horizontal Antenna Orientation



Date: 17.SEP.2021 18:26:48

Figure 89: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2462MHz, Vertical Antenna Orientation

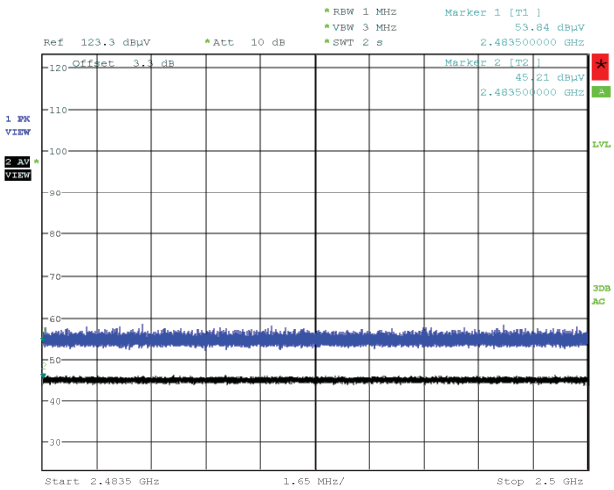


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Table 71: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
148.346	H	57.7	-21.0	36.7	43.5	6.8	206	343
343.655	H	54.0	-18.1	35.9	46.0	10.1	100	21
353.200	V	51.3	-17.8	33.5	46.0	12.5	221	84
353.201	H	53.4	-17.8	35.6	46.0	10.4	100	6

Note: Level QP = Reading QP + Factor

Table 72: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4812.000	H	53.3	-6.6	46.7	74.0	27.3	200	45
4812.000	V	53.8	-6.6	47.2	74.0	26.8	136	57
7254.120	H	53.6	0.8	54.4	74.0	19.6	186	172
7264.929	V	53.6	0.8	54.4	74.0	19.6	121	327

Note: Level PK = Reading PK + Factor

Table 73: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4812.000	H	41.2	-6.6	34.6	54.0	19.4	200	45
4812.000	V	40.1	-6.6	33.5	54.0	20.5	136	57
7254.120	H	40.4	0.8	41.2	54.0	12.8	186	172
7264.929	V	40.4	0.8	41.2	54.0	12.8	121	327

Note: Level AV = Reading AV + Factor

Table 74: Band Edge, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	94.91	74.91	2400	44.12	30.79
2412	V	86.21	66.21	2400	44.08	22.13

Notes: All correction factors are included in the measurement values.

Figure 90: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

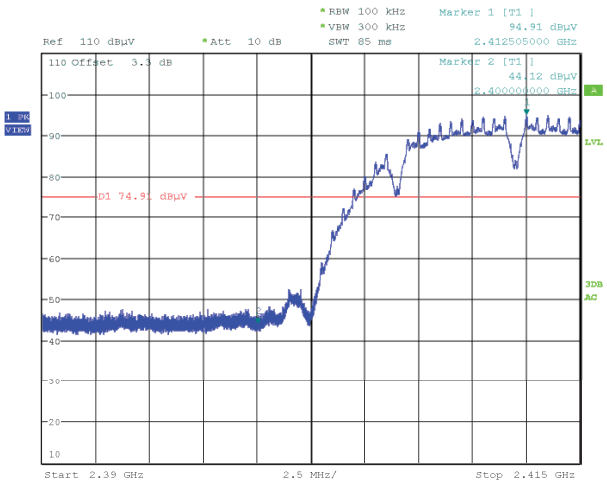
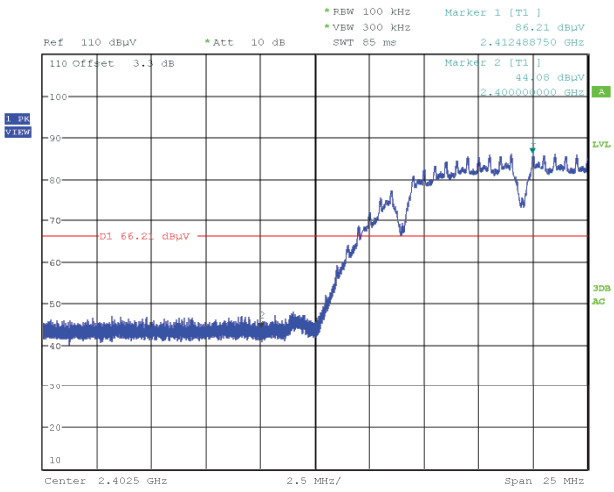
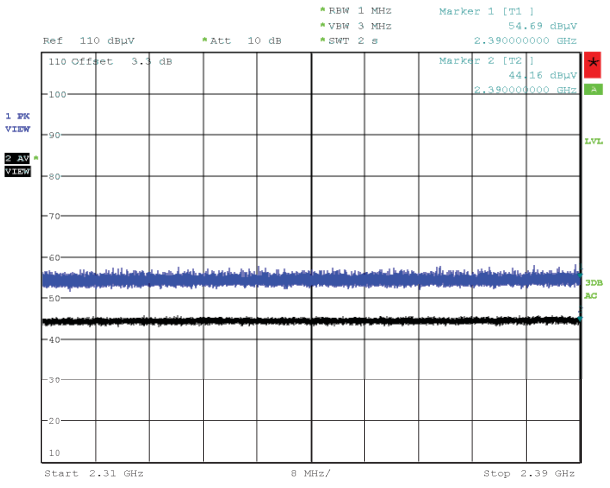


Figure 91: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



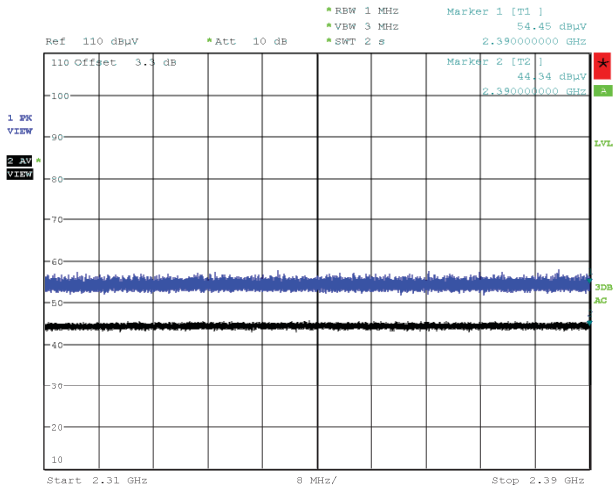
Date: 21.SEP.2021 12:48:16

Figure 92: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 12:40:11

Figure 93: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 12:51:20

Table 75: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4914.679	H	53.6	-6.7	46.8	74.0	27.2	128	312
4918.427	V	53.4	-6.7	46.7	74.0	27.3	180	23
7364.781	H	53.3	0.8	54.1	74.0	19.9	159	324
7390.459	V	53.4	0.8	54.2	74.0	19.8	136	123

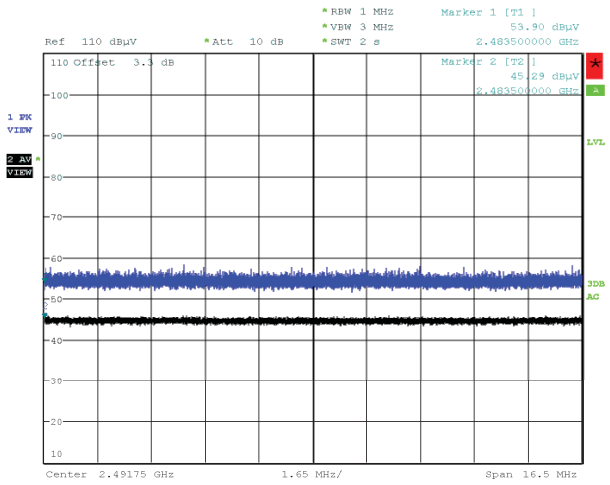
Note: Level PK = Reading PK + Factor

Table 76: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11b, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4914.679	H	40.3	-6.7	33.6	54.0	20.4	128	312
4918.427	V	40.2	-6.7	33.5	54.0	20.5	180	23
7364.781	H	40.2	0.8	41.0	54.0	13.0	159	324
7390.459	V	40.0	0.8	40.8	54.0	13.2	136	123

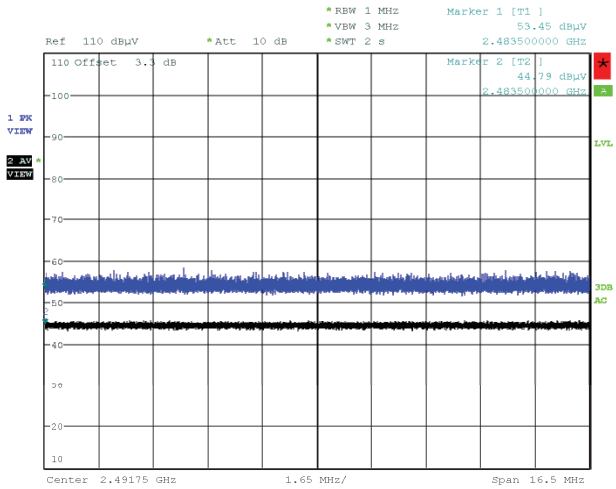
Note: Level AV = Reading AV + Factor

Figure 94: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 11:50:18

Figure 95: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11b, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 11:53:12

Table 77: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4816.713	H	53.6	-6.6	47.0	74.0	27.0	181	300
4823.959	V	53.1	-6.7	46.4	74.0	27.6	152	259
7251.388	V	53.8	0.8	54.6	74.0	19.4	112	95
7254.039	H	53.6	0.8	54.4	74.0	19.6	178	14

Note: Level PK = Reading PK + Factor

Table 78: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4816.713	H	40.3	-6.6	1.2	34.9	54.0	19.1	181	300
4823.959	V	40.3	-6.7	1.2	34.8	54.0	19.2	152	259
7251.388	V	40.4	0.8	1.2	42.4	54.0	11.6	112	95
7254.039	H	40.4	0.8	1.2	42.4	54.0	11.6	178	14

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 79: Band Edge, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	90.69	70.69	2400	47.78	22.91
2412	V	86.33	66.33	2400	44.62	21.71

Notes: All correction factors are included in the measurement values.

Figure 96: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

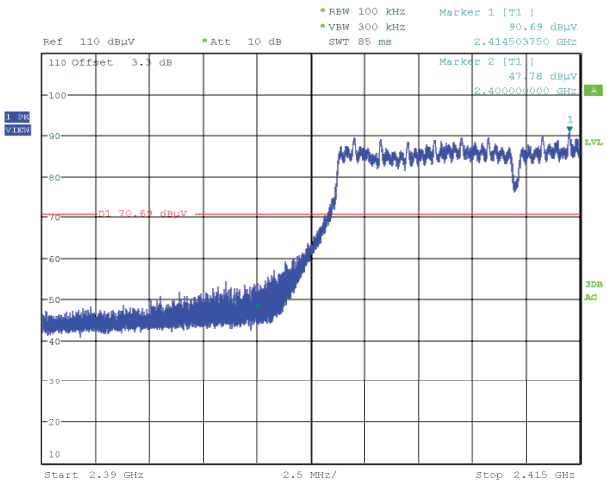
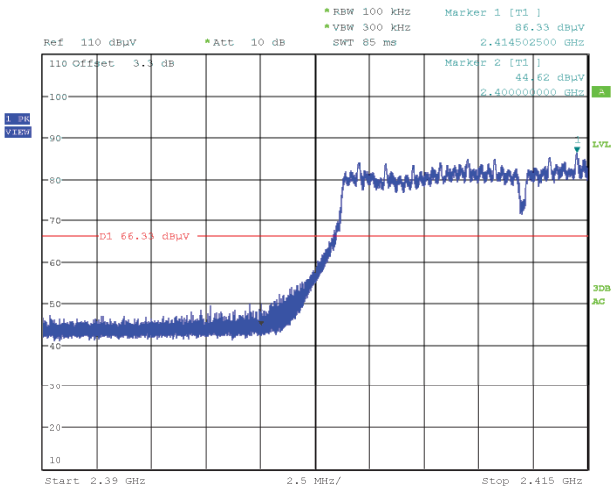
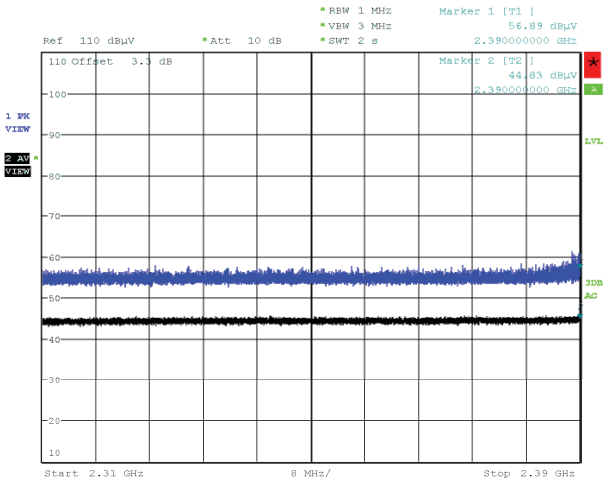


Figure 97: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



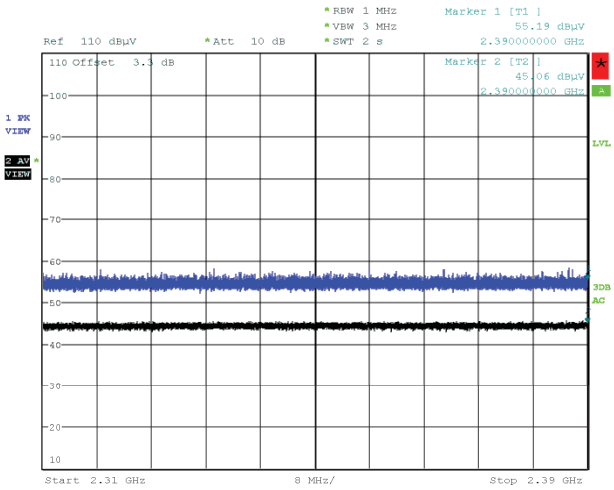
Date: 21.SEP.2021 13:01:39

Figure 98: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 13:10:07

Figure 99: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 14:01:20

Table 80: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4816.786	V	53.6	-6.6	47.0	74.0	27.0	200	350
4834.898	H	53.7	-6.7	47.0	74.0	27.0	161	0
7257.563	H	54.2	0.8	55.0	74.0	19.0	172	213
7265.104	V	53.9	0.8	54.7	74.0	19.3	100	53

Note: Level PK = Reading PK + Factor

Table 81: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4816.786	V	40.3	-6.6	1.2	34.9	54.0	19.1	200	350
4834.898	H	40.7	-6.7	1.2	35.2	54.0	18.8	161	0
7257.563	H	40.4	0.8	1.2	42.4	54.0	11.6	172	213
7265.104	V	40.4	0.8	1.2	42.4	54.0	11.6	100	53

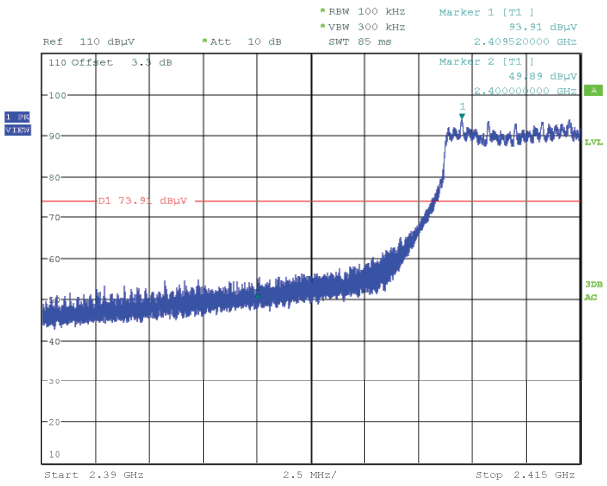
Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 82: Band Edge, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2417	H	93.91	73.91	2400	49.89	24.02
2417	V	87.16	67.16	2400	45.68	21.48

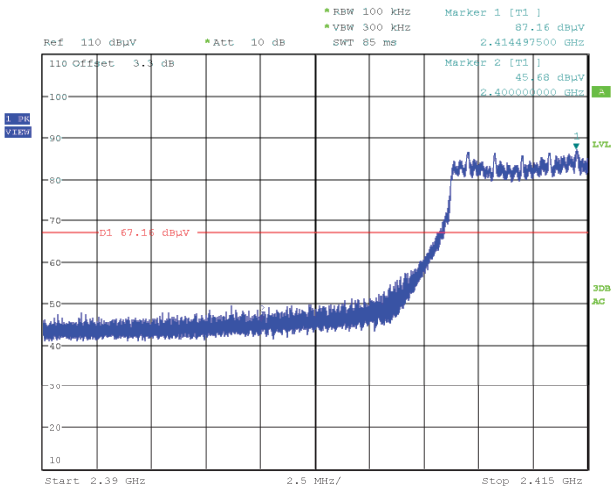
Notes: All correction factors are included in the measurement values.

Figure 100: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



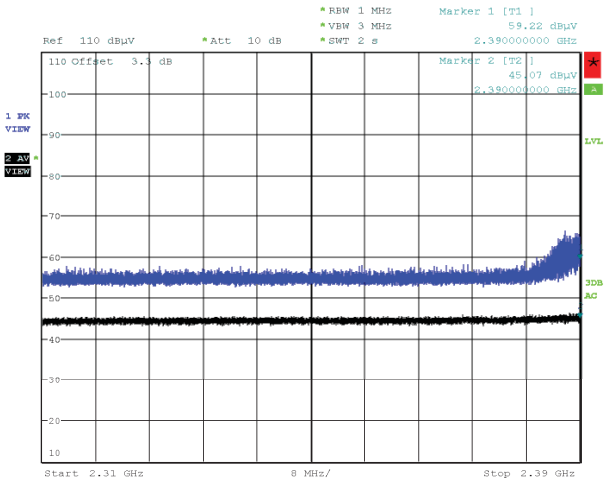
Date: 21.SEP.2021 13:38:53

Figure 101: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



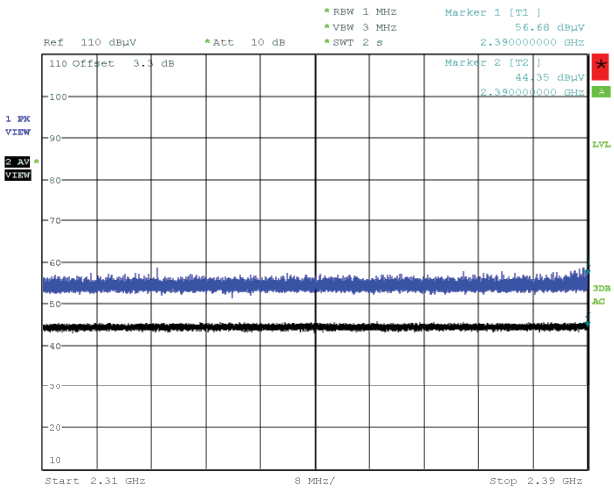
Date: 21.SEP.2021 13:42:43

Figure 102: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 13:33:52

Figure 103: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 13:45:12

Table 83: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2457MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4896.155	V	53.2	-6.8	46.4	74.0	27.6	146	183
4936.899	H	53.0	-6.5	46.5	74.0	27.5	166	201
7338.903	H	52.9	0.9	53.8	74.0	20.2	178	207
7365.012	V	53.9	0.8	54.7	74.0	19.3	166	73

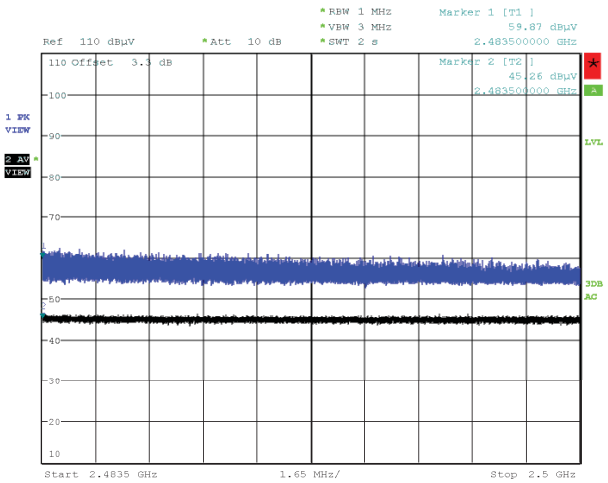
Note: Level PK = Reading PK + Factor

Table 84: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2457MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4896.155	V	40.1	-6.8	1.2	34.5	54.0	19.5	146	183
4936.899	H	40.0	-6.5	1.2	34.7	54.0	19.3	166	201
7338.903	H	40.2	0.9	1.2	42.3	54.0	11.7	178	207
7365.012	V	40.2	0.8	1.2	42.2	54.0	11.8	166	73

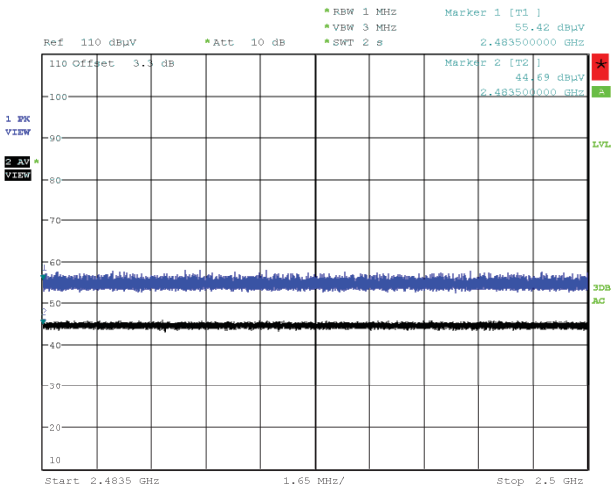
Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 104: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2457MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 14:20:38

Figure 105: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2457MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 14:16:56

Table 85: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4895.444	V	53.2	-6.8	46.4	74.0	27.6	171	88
4944.296	H	53.4	-6.5	47.0	74.0	27.0	198	177
7350.355	H	53.4	0.8	54.2	74.0	19.8	120	11
7353.551	V	53.3	0.8	54.1	74.0	19.9	161	44

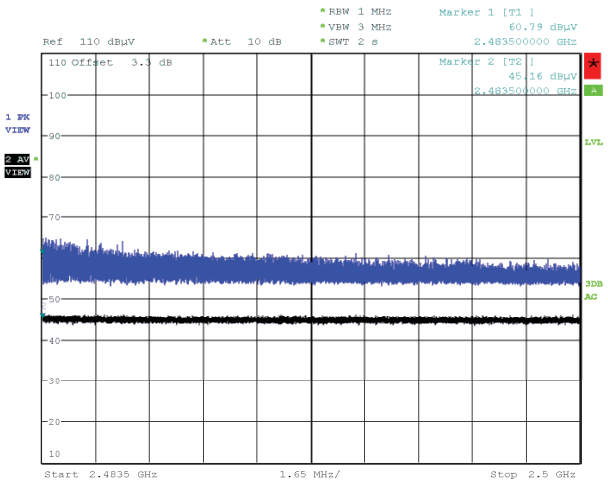
Note: Level PK = Reading PK + Factor

Table 86: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11g, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4895.444	V	40.1	-6.8	1.2	34.5	54.0	19.5	171	88
4944.296	H	39.9	-6.5	1.2	34.6	54.0	19.4	198	177
7350.355	H	40.2	0.8	1.2	42.2	54.0	11.8	120	11
7353.551	V	40.2	0.8	1.2	42.2	54.0	11.8	161	44

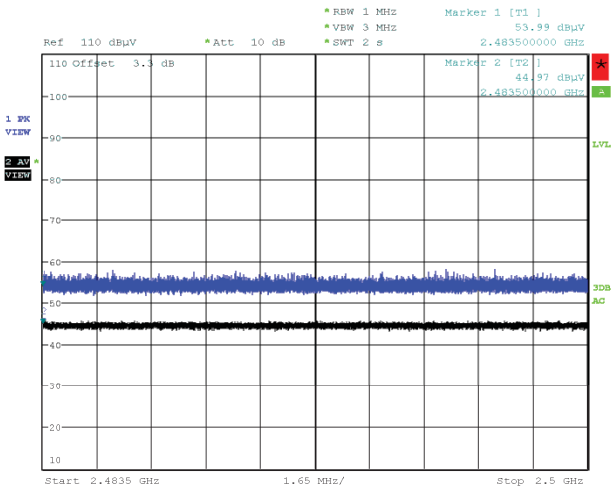
Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 106: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 14:26:01

Figure 107: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11g, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 14:28:15

Table 87: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4820.241	V	53.2	-6.7	46.6	74.0	27.4	184	203
4823.973	H	53.7	-6.7	47.1	74.0	26.9	198	330
7240.819	H	54.2	0.7	54.9	74.0	19.1	100	298
7255.393	V	53.4	0.8	54.2	74.0	19.8	200	22

Note: Level PK = Reading PK + Factor

Table 88: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4820.241	V	40.3	-6.7	1.1	34.7	54.0	19.3	184	203
4823.973	H	40.6	-6.7	1.1	35.0	54.0	19.0	198	330
7240.819	H	40.3	0.7	1.1	42.1	54.0	11.9	100	298
7255.393	V	40.4	0.8	1.1	42.3	54.0	11.7	200	22

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 89: Band Edge, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2412	H	91.01	71.01	2400	47.18	23.83
2412	V	82.08	62.08	2400	43.59	18.49

Notes: All correction factors are included in the measurement values.

Figure 108: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

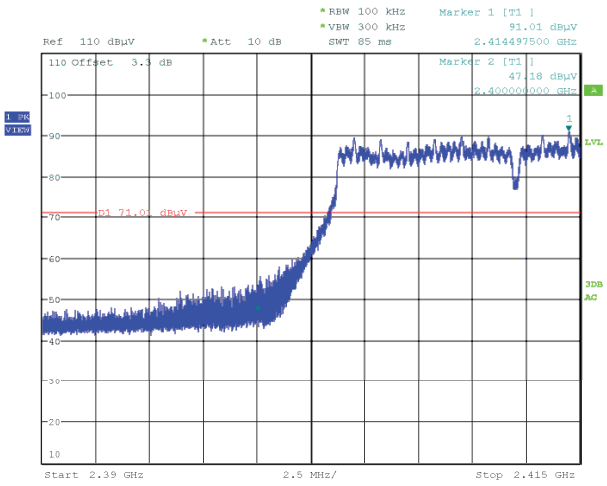
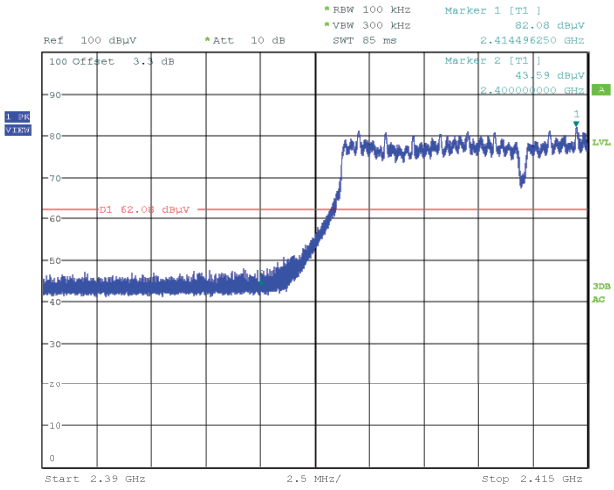
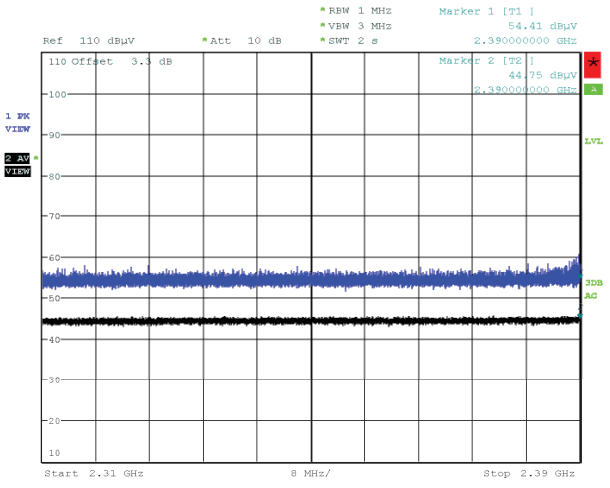


Figure 109: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 21.SEP.2021 14:55:31

Figure 110: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 14:47:40

Figure 111: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2412MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation

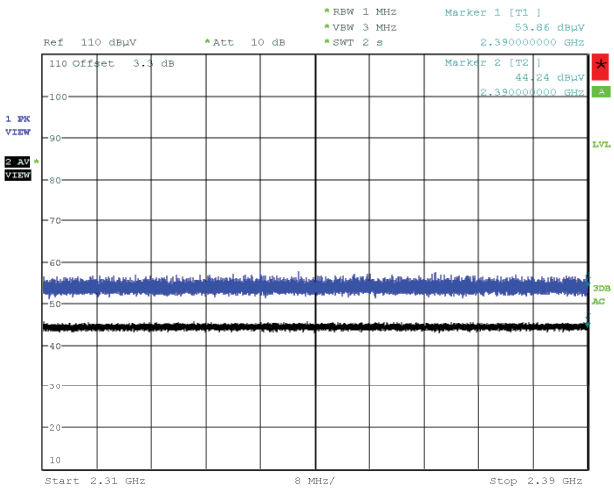


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Table 90: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4835.133	H	53.6	-6.7	46.9	74.0	27.1	193	339
4838.444	V	53.2	-6.7	46.5	74.0	27.5	183	99
7253.868	V	53.3	0.8	54.1	74.0	19.9	146	354
7254.314	H	53.5	0.8	54.3	74.0	19.7	153	263

Note: Level PK = Reading PK + Factor

Table 91: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4835.133	H	40.8	-6.7	1.1	35.2	54.0	18.8	193	339
4838.444	V	40.2	-6.7	1.1	34.6	54.0	19.4	183	99
7253.868	V	40.4	0.8	1.1	42.3	54.0	11.7	146	354
7254.314	H	40.4	0.8	1.1	42.3	54.0	11.7	153	263

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 92: Band Edge, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2417	H	91.61	71.61	2400	45.94	25.67
2417	V	82.94	62.94	2400	44.15	18.79

Notes: All correction factors are included in the measurement values.

Figure 112: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

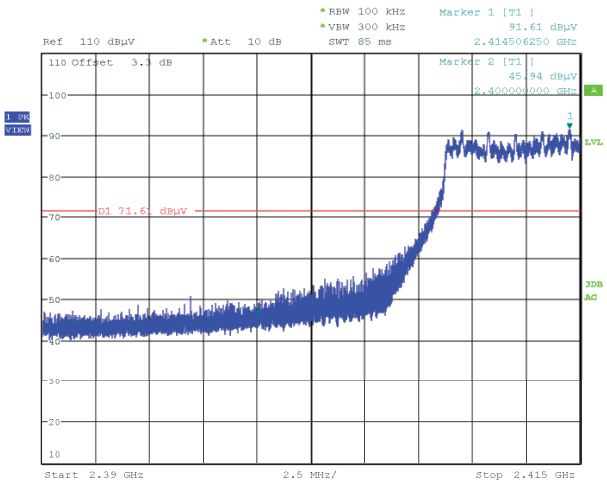
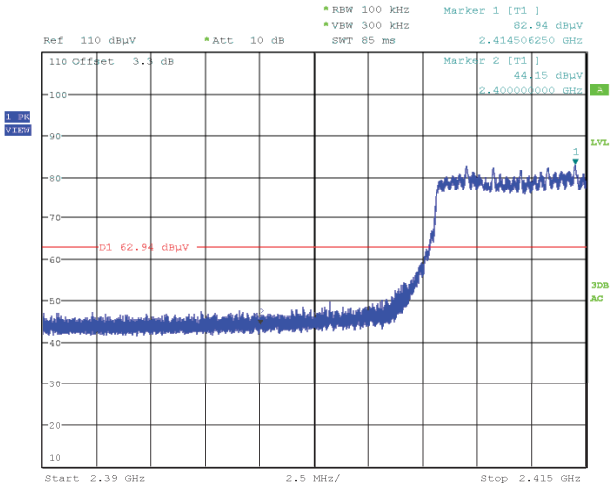
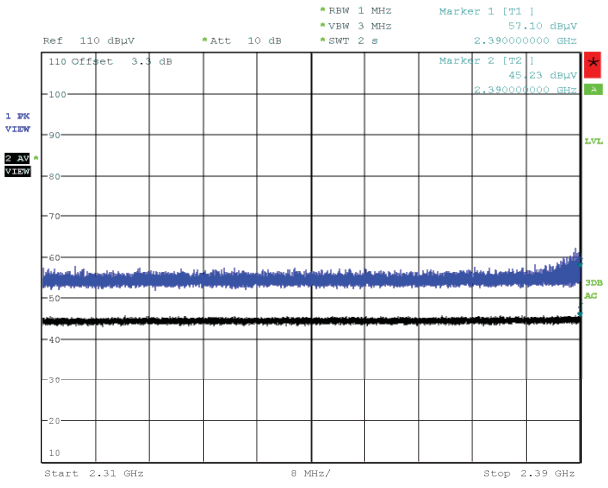


Figure 113: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation



Date: 9.OCT.2021 15:50:36

Figure 114: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation



Date: 21.SEP.2021 15:03:50

Figure 115: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2417MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation

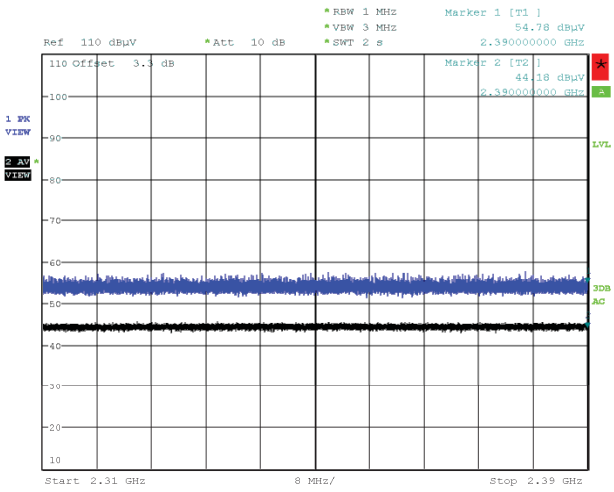


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Table 93: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4831.107	V	53.5	-6.7	46.8	74.0	27.2	145	218
4891.106	H	53.7	-6.8	46.9	74.0	27.1	201	46
7310.925	H	53.8	0.9	54.7	74.0	19.3	138	196
7323.386	V	53.9	0.9	54.8	74.0	19.2	172	65
9748.000	H	50.7	-7.1	43.6	74.0	30.4	101	327
9748.000	V	51.3	-7.1	44.2	74.0	29.8	166	347
10480.000	H	50.9	-6.9	44.0	74.0	30.0	184	163
10480.000	V	51.6	-6.9	44.7	74.0	29.3	100	46
12185.000	H	51.0	-5.2	45.8	74.0	28.2	198	338
12185.000	V	51.2	-5.2	46.0	74.0	28.0	130	130
15720.000	H	51.7	-4.9	46.8	74.0	27.2	151	320
15720.000	V	52.3	-4.9	47.4	74.0	26.6	183	270
21933.182	H	52.5	-10.6	41.9	74.0	32.1	115	112

Note: Level PK = Reading PK + Factor

Table 94: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2437MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4831.107	V	40.3	-6.7	1.1	34.7	54.0	19.3	145	218
4891.106	H	40.0	-6.8	1.1	34.3	54.0	19.7	201	46
7310.925	H	40.1	0.9	1.1	42.1	54.0	11.9	138	196
7323.386	V	40.2	0.9	1.1	42.2	54.0	11.8	172	65
9748.000	H	36.8	-7.1	1.1	30.8	54.0	23.2	101	327
9748.000	V	37.9	-7.1	1.1	31.9	54.0	22.1	166	347
10480.000	H	36.9	-6.9	1.1	31.1	54.0	22.9	184	163
10480.000	V	37.0	-6.9	1.1	31.2	54.0	22.8	100	46
12185.000	H	37.0	-5.2	1.1	32.9	54.0	21.1	198	338
12185.000	V	37.0	-5.2	1.1	32.9	54.0	21.1	130	130
15720.000	H	37.7	-4.9	1.1	33.9	54.0	20.1	151	320
15720.000	V	37.7	-4.9	1.1	33.9	54.0	20.1	183	270
21933.182	H	38.3	-10.6	1.1	28.8	54.0	25.2	115	112

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Table 95: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2457MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4892.606	V	53.6	-6.8	46.8	74.0	27.2	129	107
4922.119	H	53.5	-6.7	46.8	74.0	27.2	172	6
7364.532	V	53.8	0.8	54.6	74.0	19.4	184	128
7372.563	H	53.8	0.8	54.6	74.0	19.4	197	150

Note: Level PK = Reading PK + Factor

Table 96: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2457MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4892.606	V	40.0	-6.8	1.1	34.3	54.0	19.7	129	107
4922.119	H	40.2	-6.7	1.1	34.6	54.0	19.4	172	6
7364.532	V	40.2	0.8	1.1	42.1	54.0	11.9	184	128
7372.563	H	40.1	0.8	1.1	42.0	54.0	12.0	197	150

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 116: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2457MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

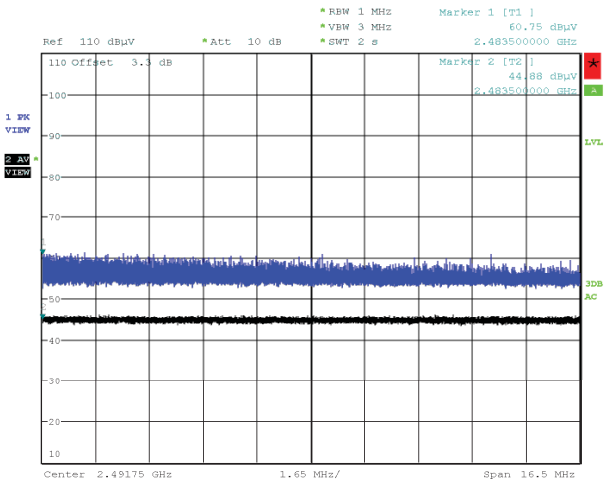

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Figure 117: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2457MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation

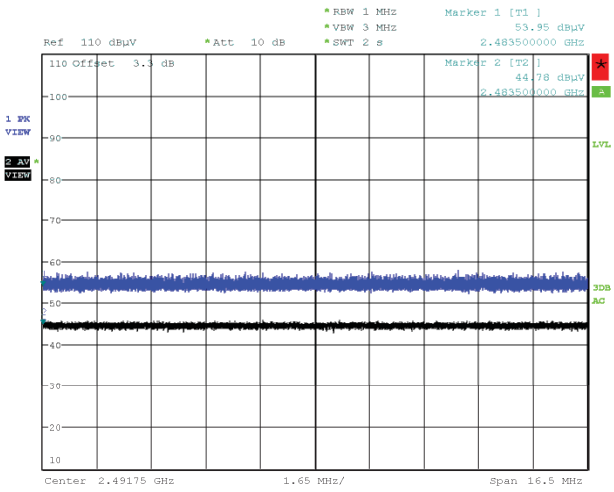

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Table 97: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
4903.364	V	53.5	-6.8	46.7	74.0	27.3	184	186
4914.560	H	54.3	-6.8	47.6	74.0	26.4	174	17
7350.376	V	53.4	0.8	54.2	74.0	19.8	197	96
7394.541	H	53.2	0.8	54.0	74.0	20.0	136	292

Note: Level PK = Reading PK + Factor

Table 98: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, 802.11n-20, 2462MHz, with 802.11ac-20, CDD, 5240MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	CDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4903.364	V	40.2	-6.8	1.1	34.5	54.0	19.5	184	186
4914.560	H	40.2	-6.8	1.1	34.5	54.0	19.5	174	17
7350.376	V	40.2	0.8	1.1	42.1	54.0	11.9	197	96
7394.541	H	40.0	0.8	1.1	41.9	54.0	12.1	136	292

Note: Level AV = Reading AV + Factor + CDF (Duty Cycle Factor)

Figure 118: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Horizontal Antenna Orientation

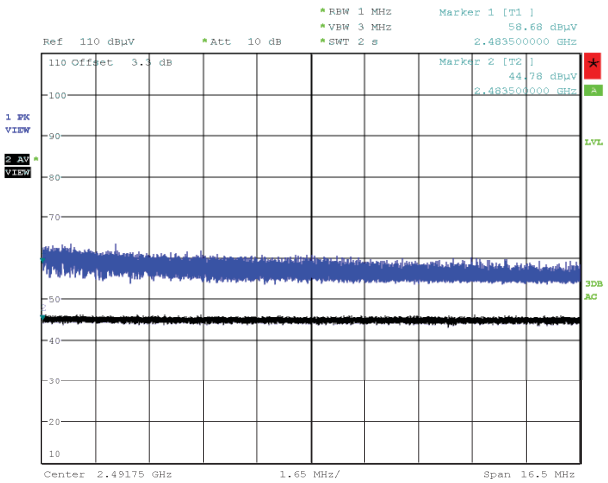

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Figure 119: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, 802.11n-20, 2462MHz, with 802.11ac-20, CDD, 5240MHz, Vertical Antenna Orientation

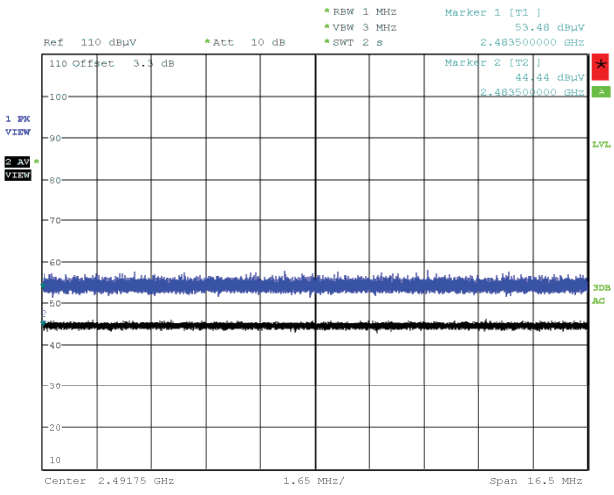

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Table 99: Radiated Emissions, Quasi Peak Data, 30MHz - 1GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading QP [dBµV]	Factor [dB(1/m)]	Level QP [dBµV/m]	Limit [dBµV/m]	Margin QP [dB]	Height [cm]	Angle [°]
148.346	H	57.9	-21.0	36.9	43.5	6.6	221	345

Note: Level QP = Reading QP + Factor

Table 100: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.700	V	59.3	-10.8	48.6	74.0	25.4	100	307
4825.565	V	52.8	-7.6	45.2	74.0	28.8	167	34
7205.890	V	60.2	-0.3	59.9	74.0	14.1	100	41
9607.999	H	52.3	-8.0	44.3	74.0	29.7	194	322
9607.999	V	54.5	-8.0	46.5	74.0	27.5	190	1
12010.000	V	51.4	-5.2	46.2	74.0	27.8	191	354
14412.000	H	52.6	-6.6	46.0	74.0	28.0	200	6
16814.000	V	51.7	-5.2	46.5	74.0	27.5	200	292
23968.808	H	54.1	-11.7	42.4	74.0	31.6	115	43

Note: Level PK = Reading PK + Factor

Table 101: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.700	V	42.5	-10.8	31.7	54.0	22.3	100	307
23968.808	H	40.3	-11.7	28.6	54.0	25.4	115	43

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 102: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4825.565	V	52.8	-7.6	-22.2	23.0	54.0	31.0	167	34
7205.890	V	60.2	-0.3	-22.2	37.7	54.0	16.3	100	41
9607.999	H	52.3	-8.0	-22.2	22.1	54.0	31.9	194	322
9607.999	V	54.5	-8.0	-22.2	24.3	54.0	29.7	190	1
12010.000	V	51.4	-5.2	-22.2	24.0	54.0	30.0	191	354
14412.000	H	52.6	-6.6	-22.2	23.8	54.0	30.2	200	6
16814.000	V	51.7	-5.2	-22.2	24.3	54.0	29.7	200	292

Note: Level AV = Reading PK + Factor + CDDF

Table 103: Band Edge, BLE 1M-PHY, 2402MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2402	H	86.73	66.73	2400	30.26	36.47
2402	V	87.04	67.04	2400	31.15	35.89

Notes: All correction factors are included in the measurement values.

Figure 120: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, BLE 1M-PHY, 2402MHz, Horizontal Antenna Orientation

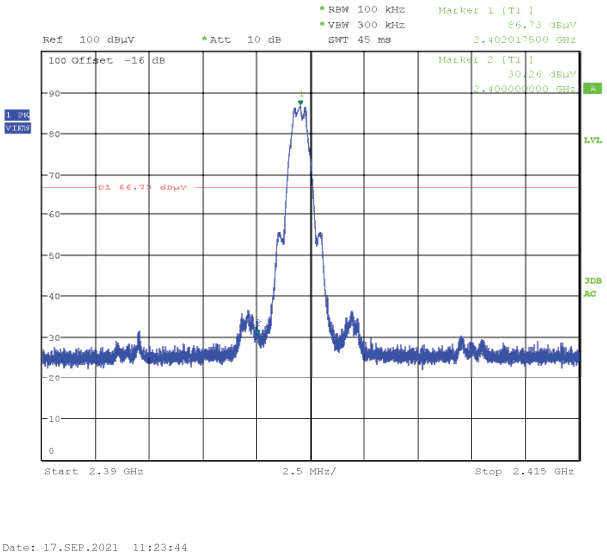

Figure 121: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, BLE 1M-PHY, 2402MHz, Vertical Antenna Orientation

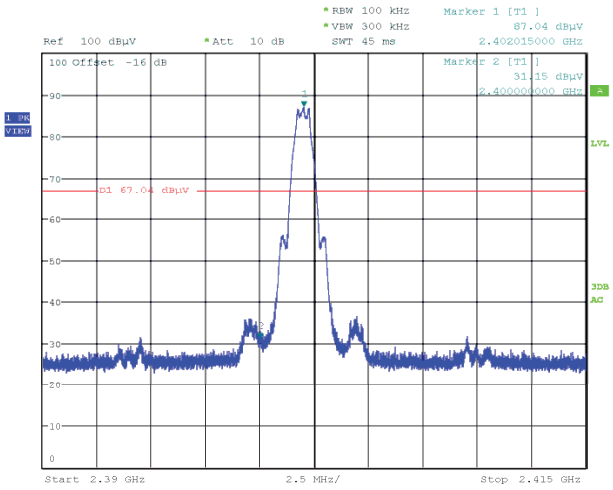

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Figure 122: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 1M-PHY, 2402MHz, Horizontal Antenna Orientation

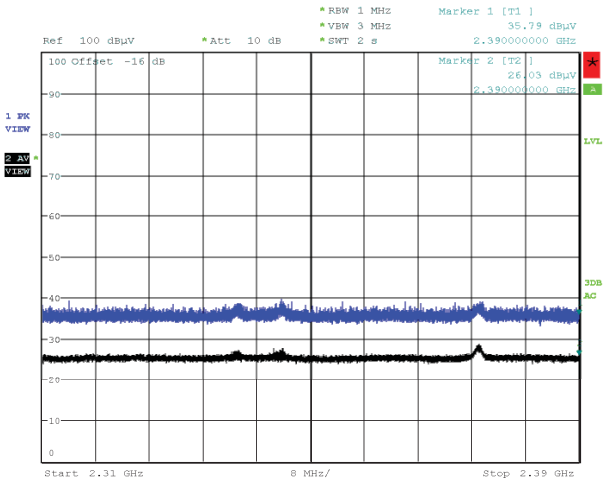

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Figure 123: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 1M-PHY, 2402MHz, Vertical Antenna Orientation

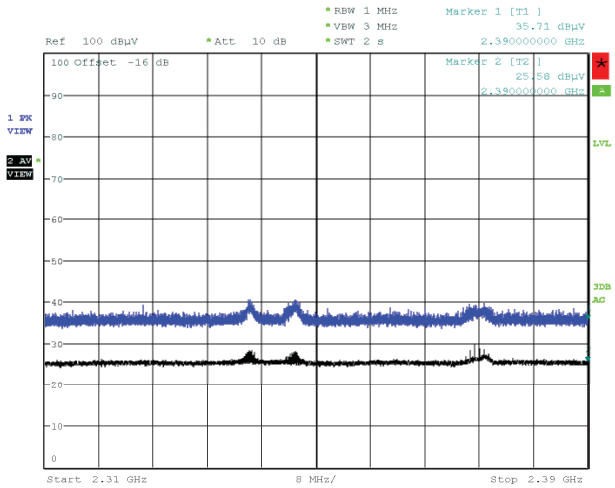

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Table 104: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.641	H	58.5	-10.8	47.7	74.0	26.3	141	95
4851.916	V	53.0	-7.7	45.3	74.0	28.7	190	17
7277.916	V	58.6	0.0	58.6	74.0	15.4	100	23
9704.000	H	53.7	-7.4	46.3	74.0	27.7	200	35
9704.000	V	55.3	-7.4	47.9	74.0	26.1	184	355
12130.000	V	51.5	-4.9	46.6	74.0	27.4	194	355
14556.000	H	51.4	-6.7	44.7	74.0	29.3	132	6
16982.000	H	52.4	-5.0	47.4	74.0	26.6	200	352

Note: Level PK = Reading PK + Factor

Table 105: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.641	H	41.7	-10.8	30.9	54.0	23.1	141	95

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 106: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4851.916	V	53.0	-7.7	-22.2	23.1	54.0	30.9	190	17
7277.916	V	58.6	0.0	-22.2	36.4	54.0	17.6	100	23
9704.000	H	53.7	-7.4	-22.2	24.1	54.0	29.9	200	35
9704.000	V	55.3	-7.4	-22.2	25.7	54.0	28.3	184	355
12130.000	V	51.5	-4.9	-22.2	24.4	54.0	29.6	194	355
14556.000	H	51.4	-6.7	-22.2	22.5	54.0	31.5	132	6
16982.000	H	52.4	-5.0	-22.2	25.2	54.0	28.8	200	352

Note: Level AV = Reading PK + Factor + CDDF

Table 107: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2480MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.762	V	56.4	-10.8	45.6	74.0	28.4	106	305
4938.468	H	52.6	-7.7	44.9	74.0	29.1	196	353
7439.912	V	58.0	-0.3	57.7	74.0	16.3	100	30
9920.000	H	51.7	-7.1	44.6	74.0	29.4	108	32
9920.000	V	54.0	-7.1	46.9	74.0	27.1	200	354
12400.000	V	54.2	-6.8	47.4	74.0	26.6	200	354
14880.000	H	51.6	-6.1	45.5	74.0	28.5	200	354
17360.000	V	51.2	-5.1	46.1	74.0	27.9	100	342

Note: Level PK = Reading PK + Factor

Table 108: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2840MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.762	V	41.0	-10.8	30.2	54.0	23.8	106	305

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 109: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 1M-PHY, 2480MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4938.468	H	52.6	-7.7	-22.2	22.7	54.0	31.3	196	353
7439.912	V	58.0	-0.3	-22.2	35.5	54.0	18.5	100	30
9920.000	H	51.7	-7.1	-22.2	22.4	54.0	31.6	108	32
9920.000	V	54.0	-7.1	-22.2	24.7	54.0	29.3	200	354
12400.000	V	54.2	-6.8	-22.2	25.2	54.0	28.8	200	354
14880.000	H	51.6	-6.1	-22.2	23.3	54.0	30.7	200	354
17360.000	V	51.2	-5.1	-22.2	23.9	54.0	30.1	100	342

Note: Level AV = Reading PK + Factor + CDDF

Figure 124: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 1M-PHY, 2480MHz, Horizontal Antenna Orientation

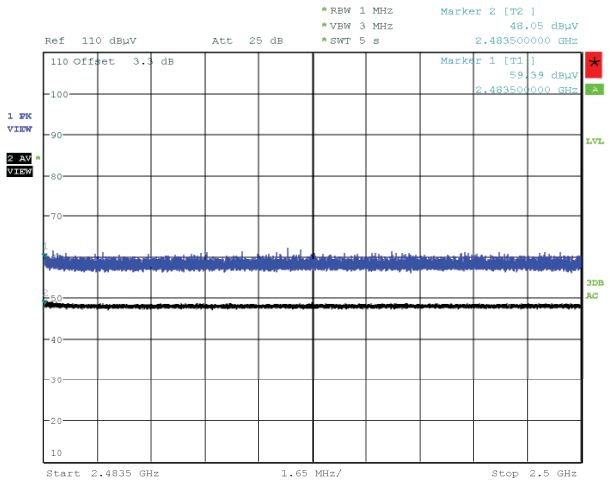

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Figure 125: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 1M-PHY, 2480MHz, Vertical Antenna Orientation

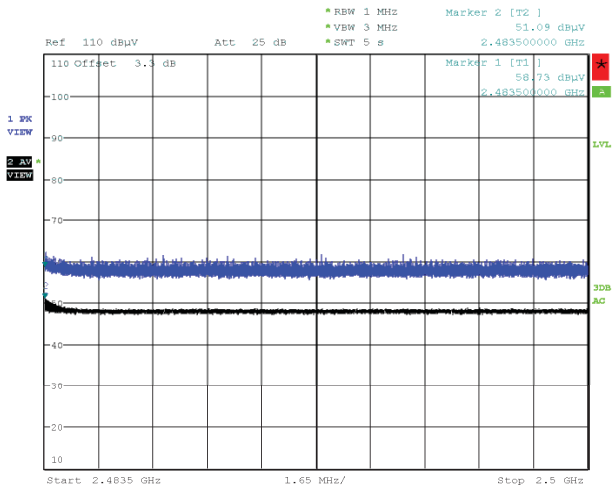

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Table 110: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.561	V	60.4	-10.8	49.7	74.0	24.3	112	257
4829.206	H	52.8	-7.6	45.2	74.0	28.8	198	35
7204.779	V	59.6	-0.3	59.3	74.0	14.7	105	50
9608.000	H	52.3	-8.0	44.3	74.0	29.7	200	324
9608.000	V	54.5	-8.0	46.5	74.0	27.5	163	321
12010.000	H	50.4	-5.2	45.2	74.0	28.8	127	66
12010.000	V	51.0	-5.2	45.8	74.0	28.2	198	354

Note: Level PK = Reading PK + Factor

Table 111: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.561	V	42.7	-10.8	31.9	54.0	22.1	112	257

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 112: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2402MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4829.206	H	52.8	-7.6	-28.2	17.0	54.0	37.0	198	35
7204.779	V	59.6	-0.3	-28.2	31.1	54.0	22.9	105	50
9608.000	H	52.3	-8.0	-28.2	16.1	54.0	37.9	200	324
9608.000	V	54.5	-8.0	-28.2	18.3	54.0	35.7	163	321
12010.000	H	50.4	-5.2	-28.2	17.0	54.0	37.0	127	66
12010.000	V	51.0	-5.2	-28.2	17.6	54.0	36.4	198	354

Note: Level AV = Reading PK + Factor + CDDF

Table 113: Band Edge, BLE 2M-PHY, 2402MHz

Operating Frequency [MHz]	Antenna Orientation	Fundamental Level [dBµV]	Band Edge Limit [dBµV]	Band Edge Frequency [MHz]	Band Edge Level [dBµV]	Margin [dB]
2402	H	84.95	64.95	2400	52.95	12.00
2402	V	85.70	65.70	2400	52.84	12.86

Notes: All correction factors are included in the measurement values.

Figure 126: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, BLE 2M-PHY, 2402MHz, Horizontal Antenna Orientation

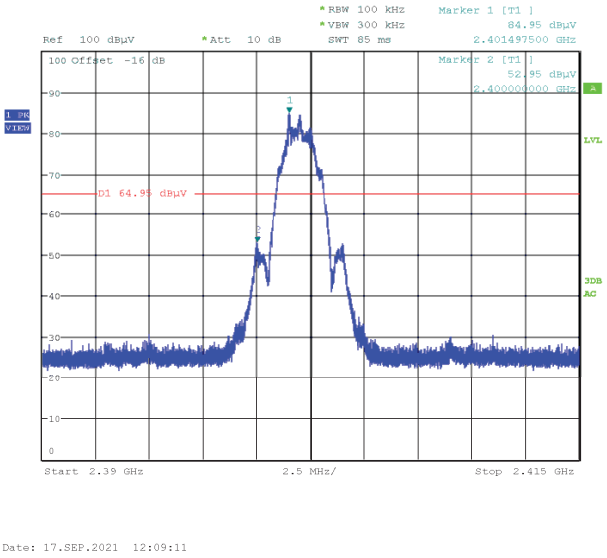

Figure 127: Radiated Emissions at Band Edge (Authorized Band), Spectral Diagram, BLE 2M-PHY, 2402MHz, Vertical Antenna Orientation

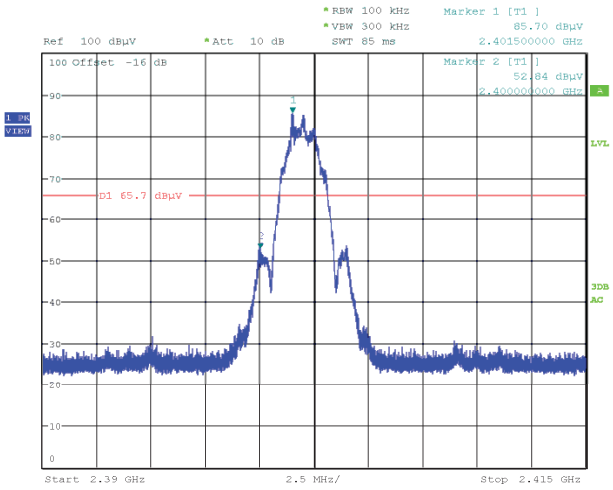

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Figure 128: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 2M-PHY, 2402MHz, Horizontal Antenna Orientation

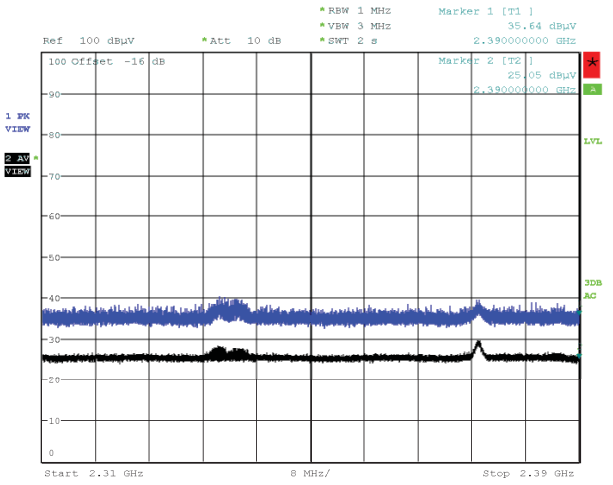

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Figure 129: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 2M-PHY, 2402MHz, Vertical Antenna Orientation

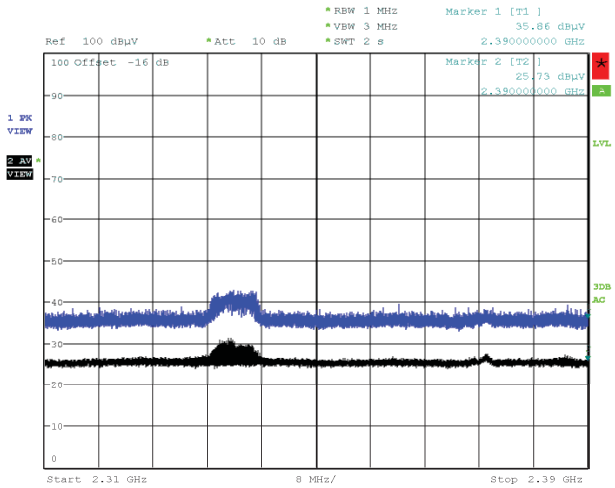

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Table 114: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.680	V	59.1	-10.8	48.3	74.0	25.7	100	257
4909.117	H	53.2	-7.8	45.4	74.0	28.6	192	117
7276.747	V	59.0	0.0	59.0	74.0	15.0	100	50
9704.000	H	51.8	-7.4	44.4	74.0	29.6	176	15
9704.000	V	54.6	-7.4	47.2	74.0	26.8	197	1
12130.000	H	51.0	-4.9	46.1	74.0	27.9	100	63
12130.000	V	51.1	-4.9	46.2	74.0	27.8	198	352

Note: Level PK = Reading PK + Factor

Table 115: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.680	V	41.8	-10.8	31.0	54.0	23.0	100	257

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 116: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2440MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4909.117	H	53.2	-7.8	-28.2	17.2	54.0	36.8	192	117
7276.747	V	59.0	0.0	-28.2	30.8	54.0	23.2	100	50
9704.000	H	51.8	-7.4	-28.2	16.2	54.0	37.8	176	15
9704.000	V	54.6	-7.4	-28.2	19.0	54.0	35.0	197	1
12130.000	H	51.0	-4.9	-28.2	17.9	54.0	36.1	100	63
12130.000	V	51.1	-4.9	-28.2	18.0	54.0	36.0	198	352

Note: Level AV = Reading PK + Factor + CDDF

Table 117: Radiated Emissions, Peak Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2480MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	Level PK [dBµV/m]	Limit [dBµV/m]	Margin PK [dB]	Height [cm]	Angle [°]
3708.622	V	60.8	-10.8	50.0	74.0	24.0	100	308
4934.624	V	52.8	-7.7	45.1	74.0	28.9	199	321
7438.808	V	56.8	-0.3	56.5	74.0	17.5	103	318
9920.000	H	51.3	-7.1	44.2	74.0	29.8	198	15
9920.000	V	54.0	-7.1	46.9	74.0	27.1	200	355
12400.000	H	52.5	-6.8	45.7	74.0	28.3	127	302
12400.000	V	54.1	-6.8	47.3	74.0	26.7	169	352

Note: Level PK = Reading PK + Factor

Table 118: Radiated Emissions, Average Data, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2840MHz

Freq. [MHz]	Antenna Orientation	Reading AV [dBµV]	Factor [dB(1/m)]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
3708.622	V	42.9	-10.8	32.1	54.0	21.9	100	308

Note: Level AV = Reading AV + Factor

Average results are measured with 10Hz of VBR

Table 119: Radiated Emissions, Average Data Compensated with CDDF, 1 - 25GHz, Horizontal and Vertical Antenna Orientations, BLE 2M-PHY, 2480MHz

Freq. [MHz]	Antenna Orientation	Reading PK [dBµV]	Factor [dB(1/m)]	CDDF [dB]	Level AV [dBµV/m]	Limit [dBµV/m]	Margin AV [dB]	Height [cm]	Angle [°]
4934.624	V	52.8	-7.7	-28.2	16.9	54.0	37.1	199	321
7438.808	V	56.8	-0.3	-28.2	28.3	54.0	25.7	103	318
9920.000	H	51.3	-7.1	-28.2	16.0	54.0	38.0	198	15
9920.000	V	54.0	-7.1	-28.2	18.7	54.0	35.3	200	355
12400.000	H	52.5	-6.8	-28.2	17.5	54.0	36.5	127	302
12400.000	V	54.1	-6.8	-28.2	19.1	54.0	34.9	169	352

Note: Level AV = Reading PK + Factor + CDDF

Figure 130: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 2M-PHY, 2480MHz, Horizontal Antenna Orientation

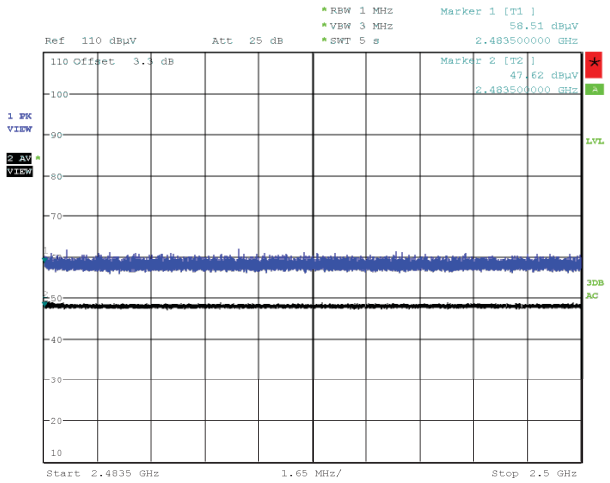

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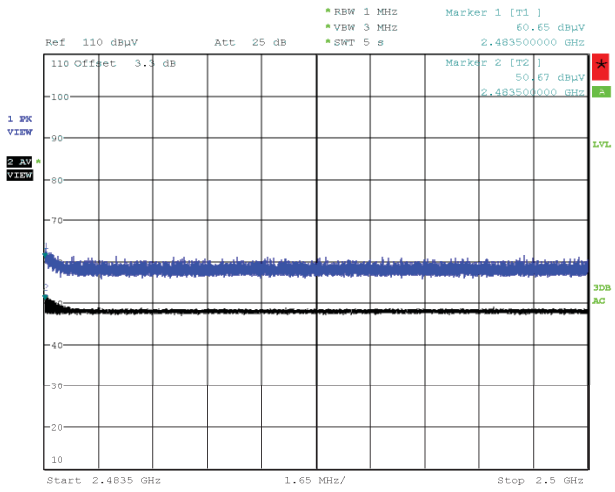
Figure 131: Radiated Emissions at Band Edge (Restricted Band), Spectral Diagram, BLE 2M-PHY, 2480MHz, Vertical Antenna Orientation



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5.4 AC Power Line Conducted Measurements

5.4.1 AC Power Line Conducted Emission of Transmitter

RESULT: **N/A**

Requirements:

FCC 15.207 and RSS-Gen 8.8

The AC power line conducted emission on any frequency within the band 150kHz to 30MHz shall not exceed the limits specified in FCC 15.207 and RSS-Gen 8.8.

Test procedure:

ANSI C63.10 §6.2

Note:

Not applicable since the EUT is not the device that is designed to be connected to the public utility (AC) power line.

7. List of Tables

8. List of Figures

9. List of Photographs

– End of test report –