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TEST REPORT

Report Number: 21100134HKG-002

Application for Original Grant of 47 CFR Part 15 Certification

FCC ID: 2ANJG-KS400

This report contains the data of Bluetooth BLE 5.2 and 2.4GHz WiFi portions only.

Prepared and Checked by:	**Approved by:**
Signed On File Chan Hin Man, Oscar Assistant Engineer	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Limited Wong Kwok Yeung, Kenneth Assistant Supervisor Date: June 20, 2022

TEST REPORT

GENERAL INFORMATION

Applicant Name:	Thomas & Darden Inc.
Applicant Address:	9101 Burning Tree Rd, Bethesda, MD 20817
Specification Standard:	FCC Part 15, October 1, 2020 Edition
FCC ID:	2ANJG-KS400
Model:	KS400B
Additional Model:	KS400W
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	Wi-Fi, Bluetooth, Aux-in Speaker
Serial Number:	N/A
Sample Receipt Date:	October 06, 2021
Date of Test:	March 25, 2022 to June 16, 2022
Report Date:	June 20, 2022
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%
Conclusion:	Test was conducted by client submitted sample. The submitted sample as received complied with the 47 CFR Part 15 Certification.

TEST REPORT

TABLE OF CONTENTS

TEST REPORT

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	Results	Details See Section
Antenna Requirement	15.203	Pass	2.1
Max. Conducted Output Power (Peak)	15.247(b)(3)&(4)	Pass	4.1
Min. 6dB RF Bandwidth	15.247(a)(2)	Pass	4.2
Max. Power Density (average)	15.247(e)	Pass	4.3
Out of Band Antenna Conducted Emission	15.247(d)	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d), 15.209 & 15.109	Pass	4.6
AC Power Line Conducted Emission	15.207 & 15.107	Pass	4.7

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standard:

FCC Part 15, October 1, 2020 Edition

TEST REPORT

2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment Under Test (EUT) that is a WiFi, Bluetooth Speaker. The EUT is powered by 100-240VAC, 50-60Hz and equipped with internal rechargeable battery. The EUT can support Bluetooth (FHSS) mode, Bluetooth 5.2 BLE mode, 2.4GHz WiFi mode and 5.8GHz WiFi mode.

For Bluetooth 5.2 (BLE), it operates at frequency range of 2402.000MHz to 2480.000MHz with 40 channels. It transmits via Gaussian frequency Shift Keying Shift Keying (GFSK) modulation. Maximum bit rate can be up to 1Mbps.

For 802.11b mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Direct-sequence spread spectrum (DSSS) modulation. Maximum bit rate can be up to 11Mbps.
For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps.
For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

This report contains the data of Bluetooth BLE 5.2 and 2.4GHz WiFi portions only.

The antenna(s) used in the EUT is integral, and the test sample is a prototype.

The Model: KS400W is the same as the Model: KS400B in hardware aspect as declared by client. The difference in model number serves as marketing strategy as declared by client. The models are different in color only as declared by client.

The circuit description is saved with filename: descri.pdf.

Antenna Information:

- PCB Antenna
- WLAN 802.11 a/b/g/n/ac and Bluetooth BLE
- For operating frequency of 2.4GHz, antenna has maximum gain of 2.55 dBi
- For operating frequency of 5GHz, antenna has maximum gain of 2.82 dBi

TEST REPORT

2.2 Test Methodology

Both AC power line-conducted and radiated emission measurements were performed according to the procedures in ANSI C63.10 (2013). Preliminary radiated scans and all radiated measurements were performed in radiated emission test sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "**Justification Section**" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013) and KDB Publication KDB558074 D01 v05r01 (11-Feb-2019). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong SAR, China. This test facility and site measurement data have been fully placed on file with the FCC.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver (Bluetooth BLE and WiFi portions)

TEST REPORT

3.0 SYSTEM TEST CONFIGURATION

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The device was powered by 120VAC during test.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109.

TEST REPORT

3.1 Justification – Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.8.3.

Determination of pulse desensitization was made according to *Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF.* The effective period (Teff) was referred to Exhibit 4.8.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

For AC line conducted emission test, the EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50ohm coupling impedance for measuring instrument. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

All relevant operation modes have been tested, and the worst-case data is included in this report.

All data rates were tested under normal mode of Bluetooth / WiFi. Only the worst-case data is shown in the report for QPSK, DSSS and OFDM

For simultaneous transmission, both WiFi and Bluetooth portions are also switched on when taking radiated emission for determining worst-case spurious emission.

3.2 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

TEST REPORT

3.3 Details of EUT and Description of Accessories

Details of EUT:

The EUT is powered by 120VAC

Support Equipment List and Description

1. 1 X Power cord of 2m in length
2. 1 X USB cable of 0.5m in length with resistive load termination

3.4 Measurement Uncertainty

Decision Rule for compliance: For FCC/IC standard, the measured value must be within the limits of applicable standard without accounting for the measurement uncertainty. For EN/IEC/HKTA/HKTC standard, conformity rules will be used as per standard directly excepted EN/IEC 61000-3-2, EN/IEC 61000-3-3, HKTA1004, HKCA1008, HKTA1019, HKTA1020, HKTA1041 and HKTA1044. For these excepted or not mentioned standards, Cl 4.2.2 of ILAC-G8:09/2019 decision rules will be reference and guard band will be equal to our measurement uncertainty with 95% confidence level (k=2). In case, the measured value is within guard band region, undetermined decision will be used. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are ± 5.3dB and ±0.99dB respectively. The value of the Measurement uncertainty for conducted emission test is ±4.2dB.

Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

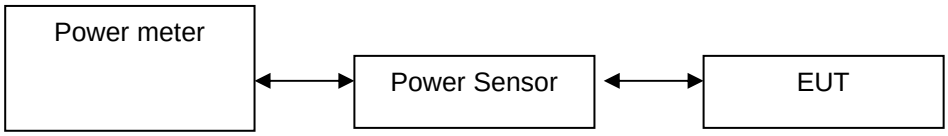
TEST REPORT

4.0 TEST RESULTS

4.1 Maximum Conducted (peak) Output Power at Antenna Terminals

RF Conduct Measurement Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



The antenna port of the EUT was connected to the input of a spectrum analyzer.

☒ The antenna power of the EUT was connected to the input of a power meter. Power was read directly and cable loss correction was added to the reading to the obtain power at the EUT antenna terminals. The measurement procedure 9.1.2 was used.

☐ The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVG1 was used.

IEEE 802.11b (DSSS, 1 Mbps)

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	13.7	23.4
Middle Channel:	2437	13.7	23.4
High Channel:	2462	12.4	17.4

IEEE 802.11g (OFDM, 6 Mbps)

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	10.9	12.3
Middle Channel:	2437	10.8	12.0
High Channel:	2462	9.1	8.1

IEEE 802.11n (20MHz) (OFDM, MCS0)

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	10.8	12.0
Middle Channel:	2437	10.8	12.0
High Channel:	2462	9.3	8.5

BLE 5.2 (1Mbps) (QPSK)

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2402	1.9	1.5
Middle Channel:	2440	2.5	1.8
High Channel:	2480	1.2	1.3

TEST REPORT

Peak Antenna Gain = 2.55 dBi

Cable loss: 0.5 dB External Attenuation: 0 dB

Cable loss, external attenuation: ☒ included in OFFSET function
☐ added to SA raw reading

IEEE 802.11b (DSSS, 1 Mbps)
max. conducted (peak) output level = 13.7 dBm

IEEE 802.11g (OFDM, 9 Mbps)
max. conducted (peak) output level = 10.9 dBm

IEEE 802.11n (20MHz) (OFDM, MCS0)
max. conducted (peak) output level = 10.8 dBm

BLE 5.2 (1Mbps) (QPSK)
max. conducted (peak) output level = 2.5 dBm

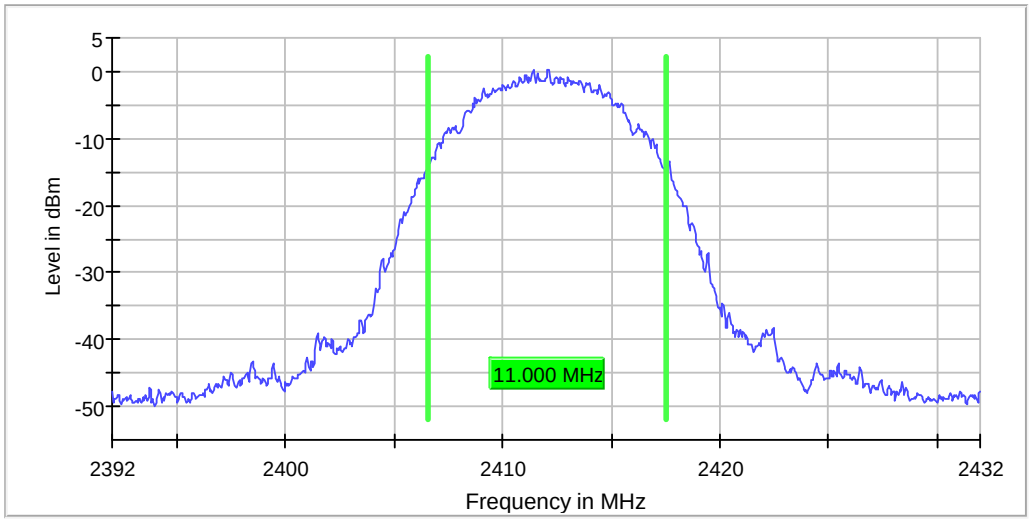
Limits:
☒ 1W (30dBm) for antennas with gains of 6dBi or less

☐ ___W (___dBm) for antennas with gains more than 6dBi

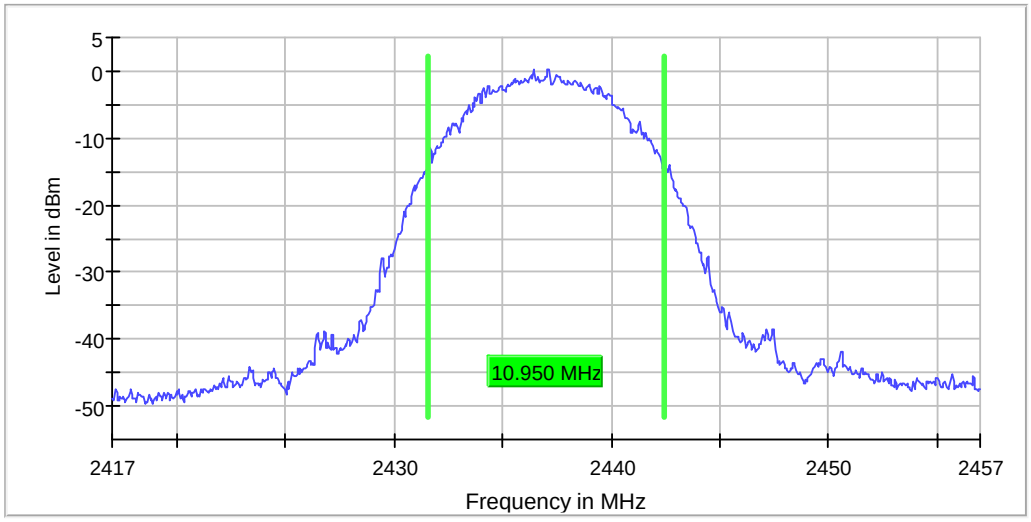
TEST REPORT

PLOTS OF OCCUPIED BANDWIDTH

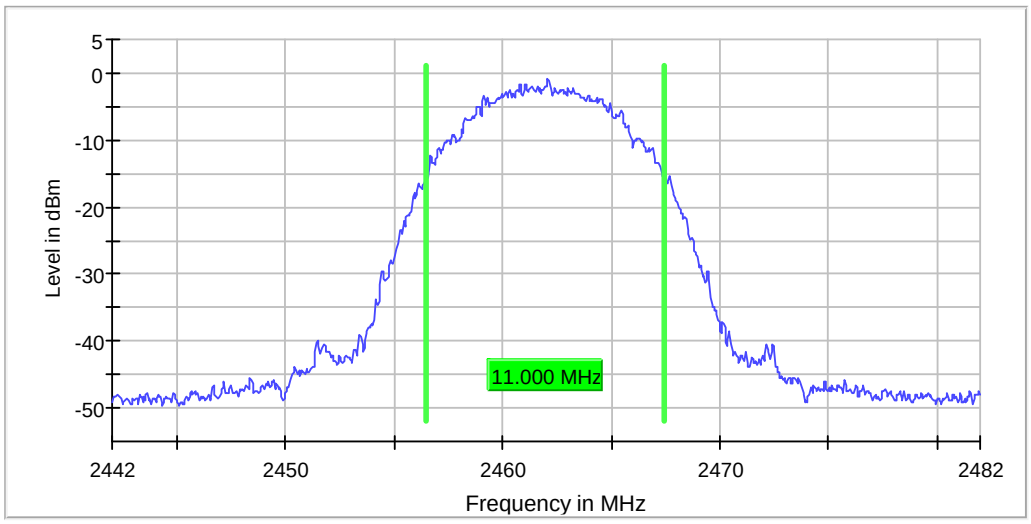
802.11b, Lowest Channel



802.11b, Middle Channel



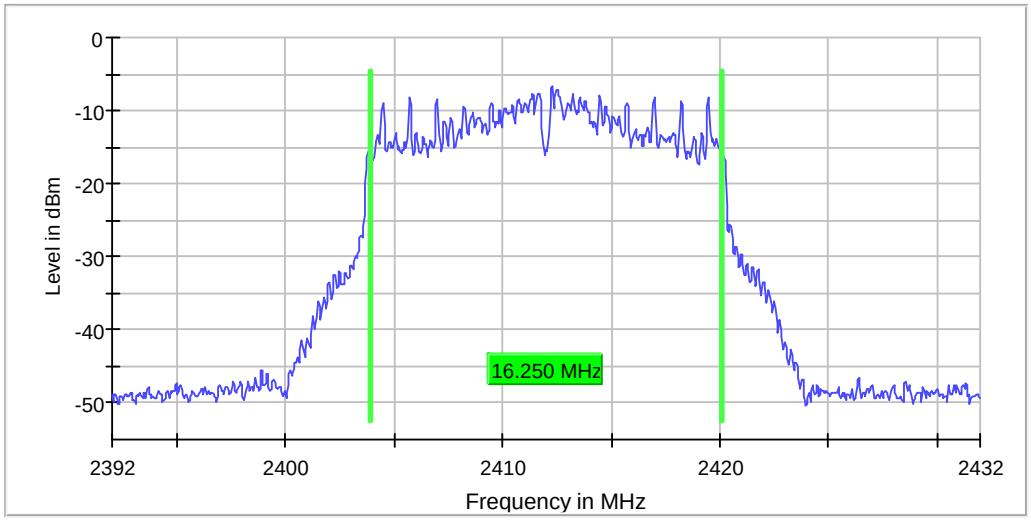
802.11b, Highest Channel



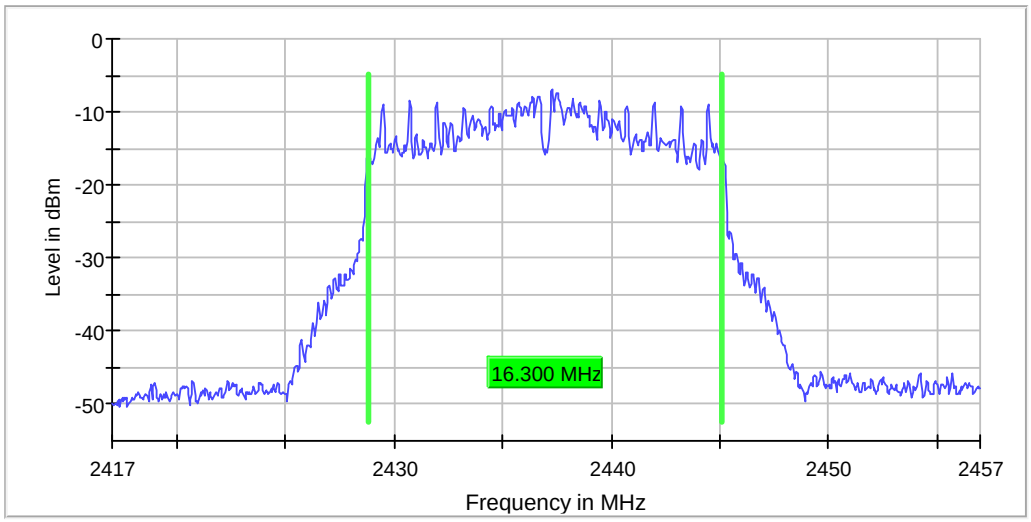
TEST REPORT

PLOTS OF OCCUPIED BANDWIDTH

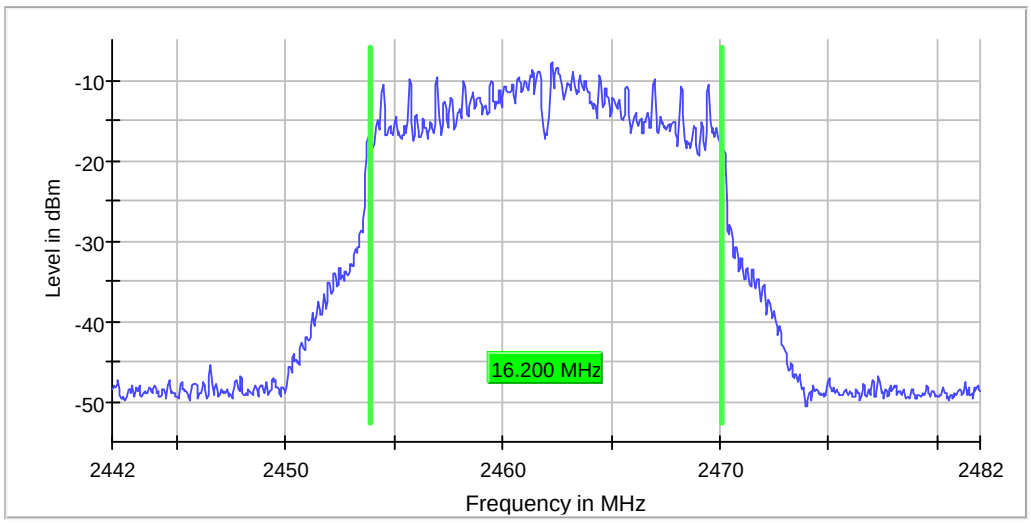
802.11g, Lowest Channel



802.11g, Middle Channel



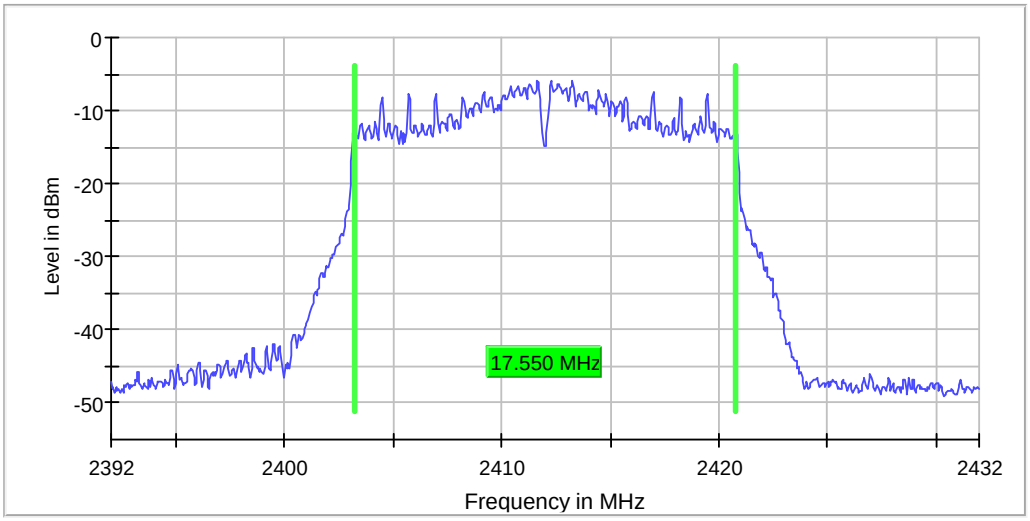
802.11g, Highest Channel



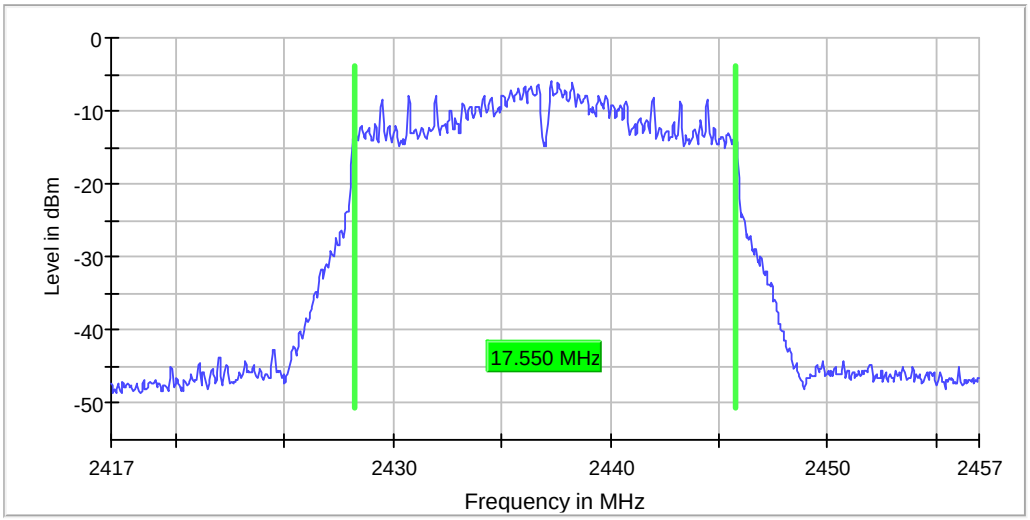
TEST REPORT

PLOTS OF OCCUPIED BANDWIDTH

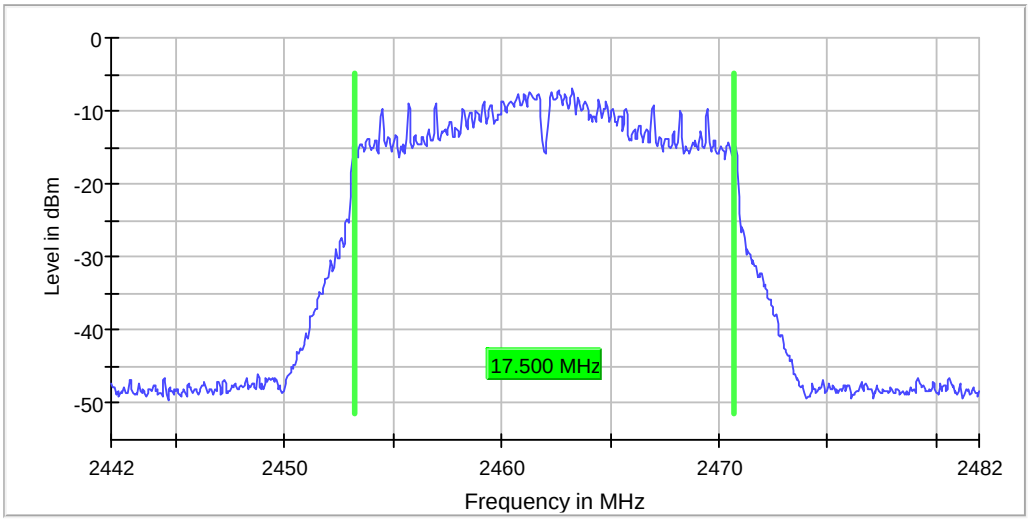
802.11n (20MHz), Lowest Channel



802.11n (20MHz), Middle Channel

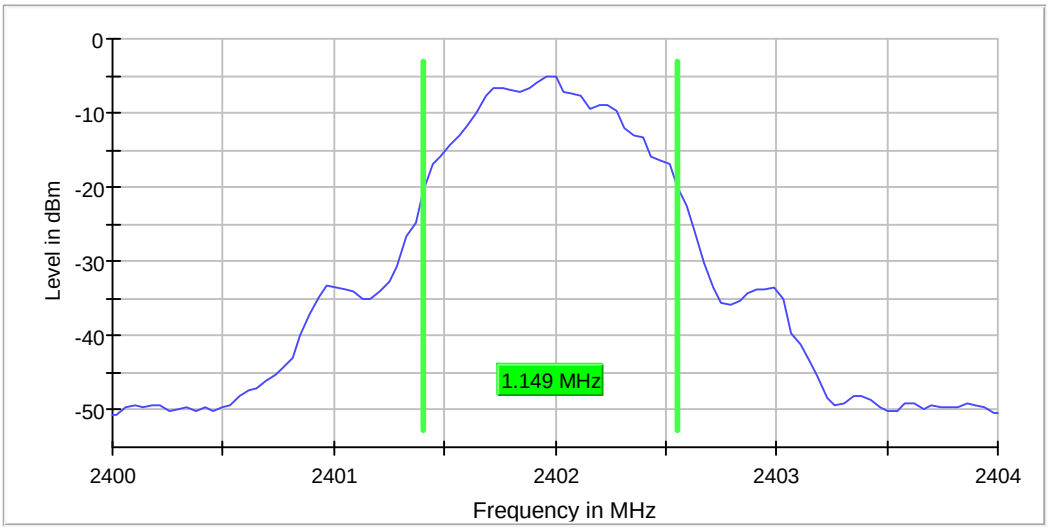


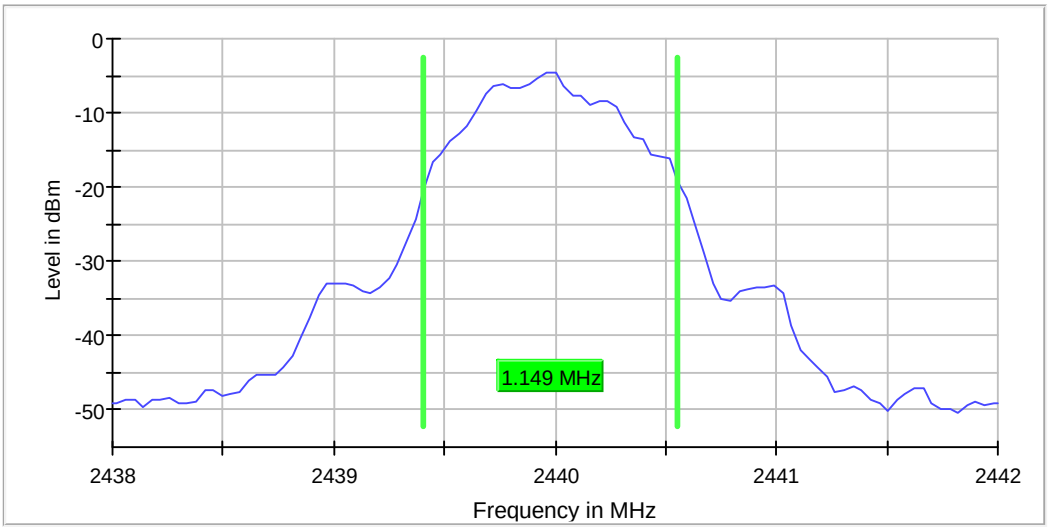
802.11n (20MHz), Highest Channel

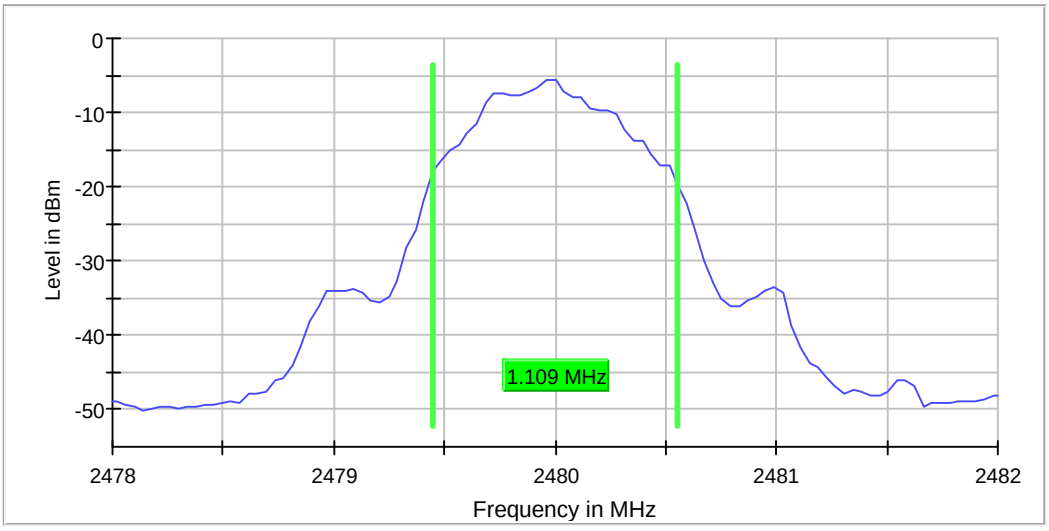


TEST REPORT

PEAK MEASUREMENT (Bluetooth 5.2 BLE)







TEST REPORT

4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

IEEE 802.11b (DSSS, 1 Mbps)

Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	7.2
Middle Channel:	2437	7.3
High Channel:	2462	7.1

IEEE 802.11g (OFDM, 6 Mbps)

Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	15.3
Middle Channel:	2437	15.3
High Channel:	2462	15.3

IEEE 802.11n (20MHz) (OFDM, MCS0)

Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	15.3
Middle Channel:	2437	15.3
High Channel:	2462	15.3

BLE 5.2 (1Mbps) (GFSK)

Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2402	0.713
Middle Channel:	2440	0.713
High Channel:	2480	0.713

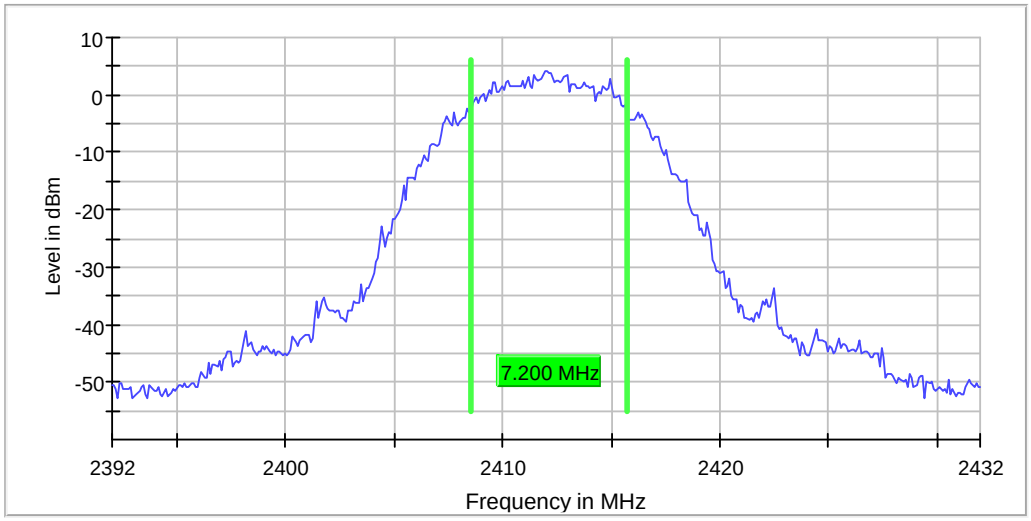
Limits
6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth are saved as below.

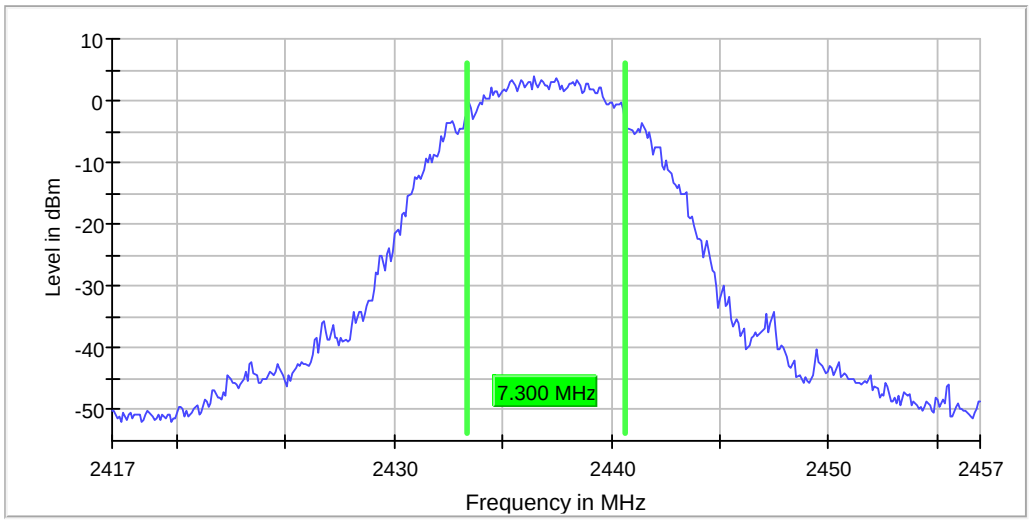
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

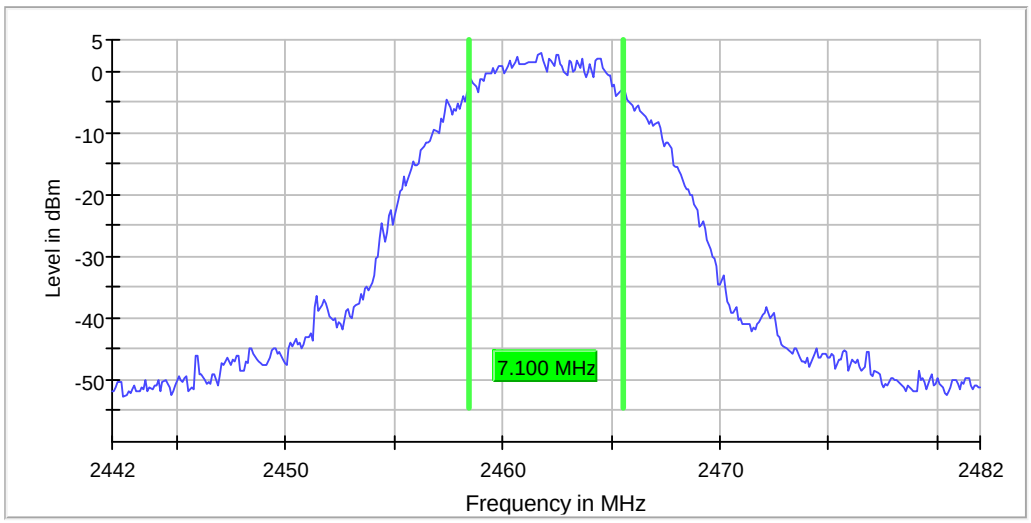
802.11b, Lowest Channel



802.11b, Middle Channel



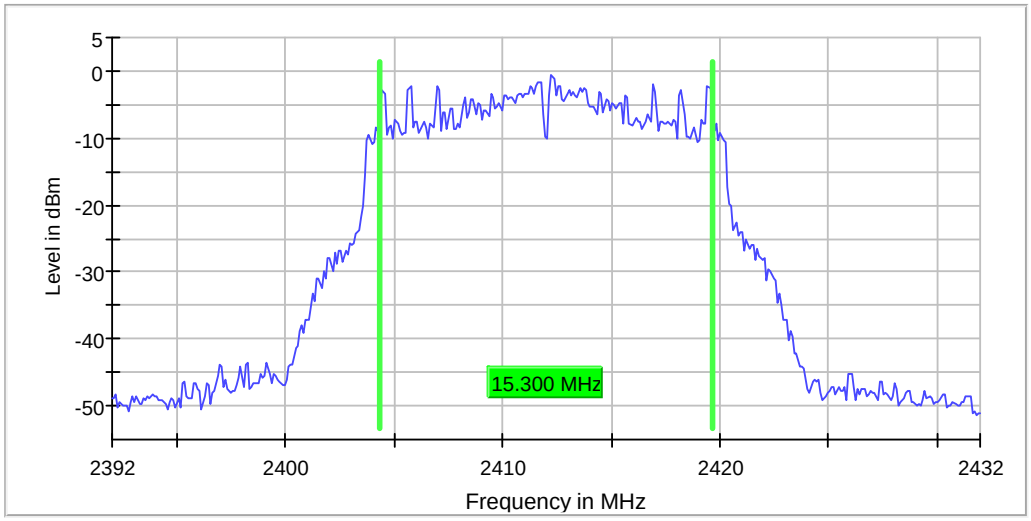
802.11b, Highest Channel



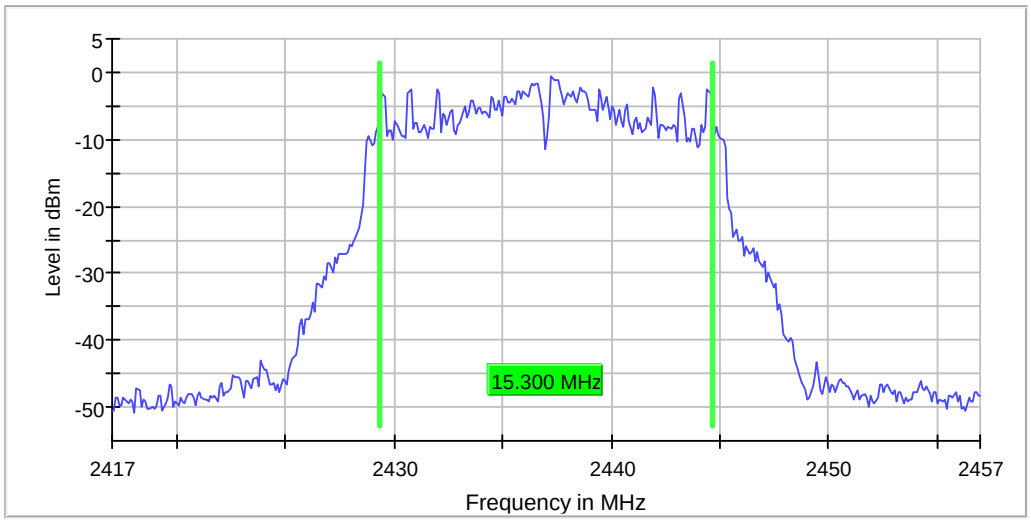
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

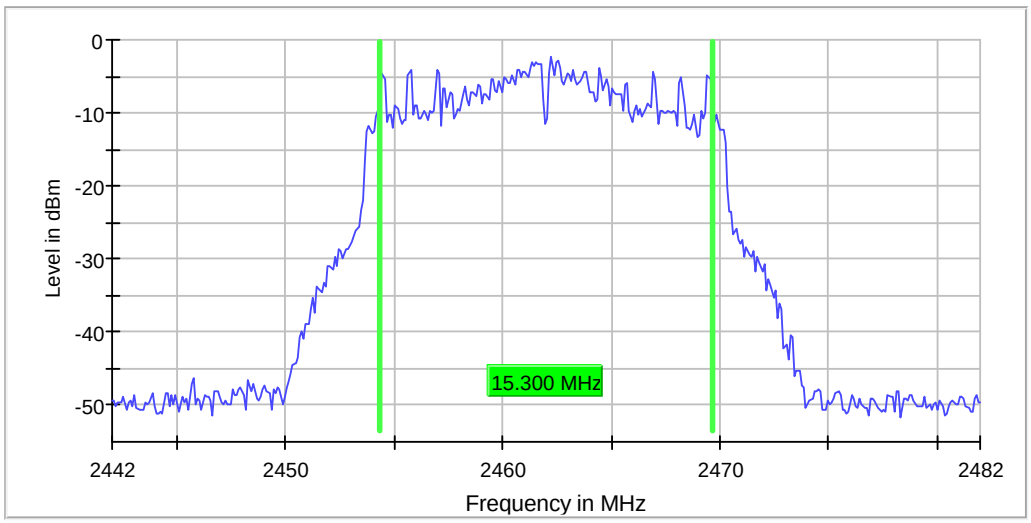
802.11g, Lowest Channel



802.11g, Middle Channel



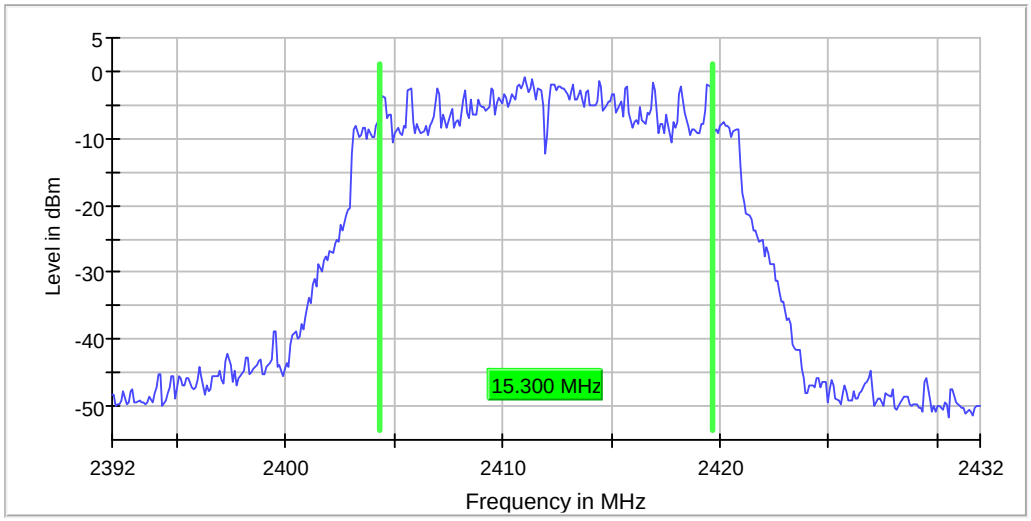
802.11g, Highest Channel



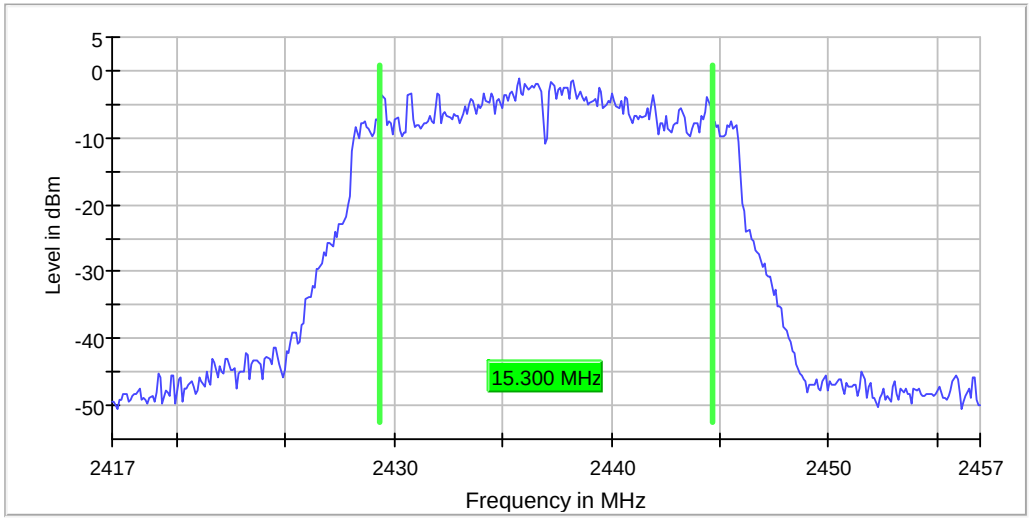
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

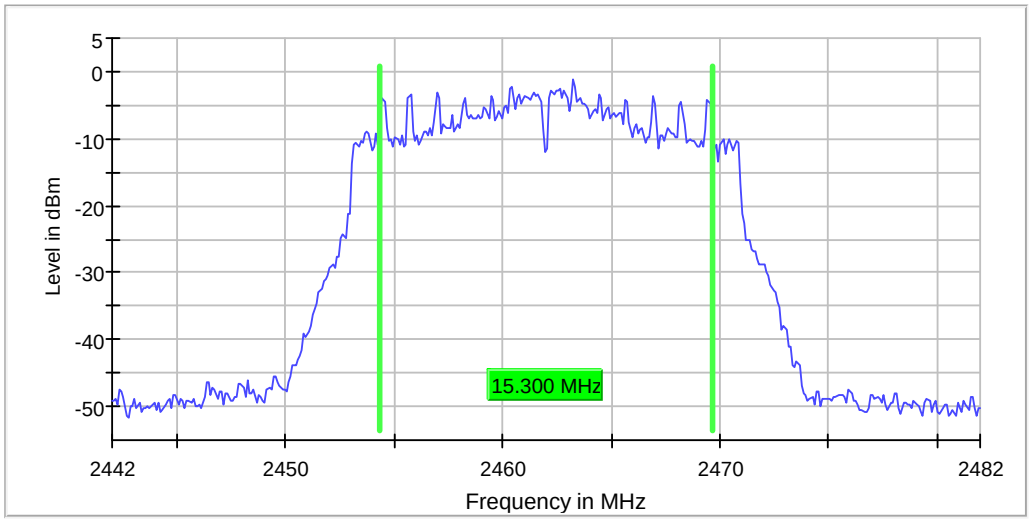
802.11n (20MHz), Lowest Channel



802.11n (20MHz), Middle Channel



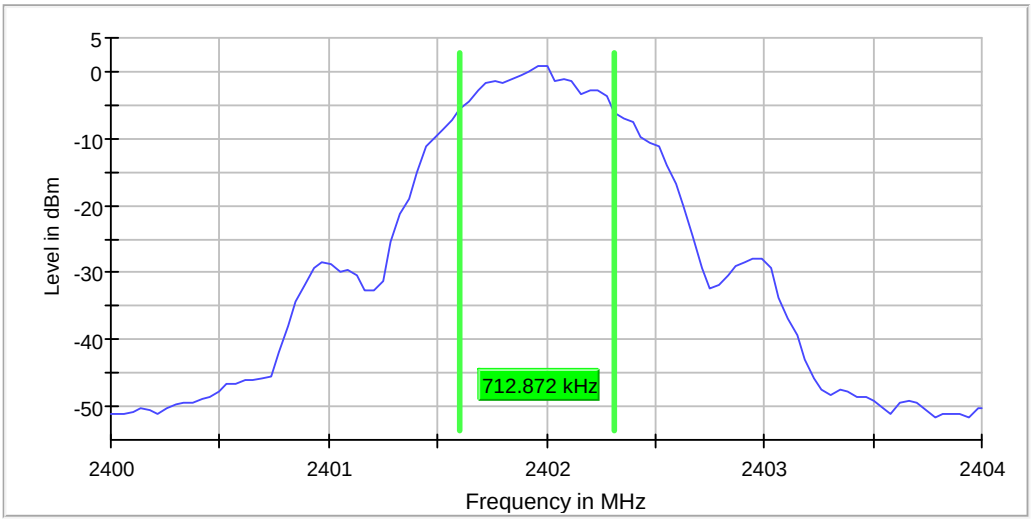
802.11n (20MHz), Highest Channel



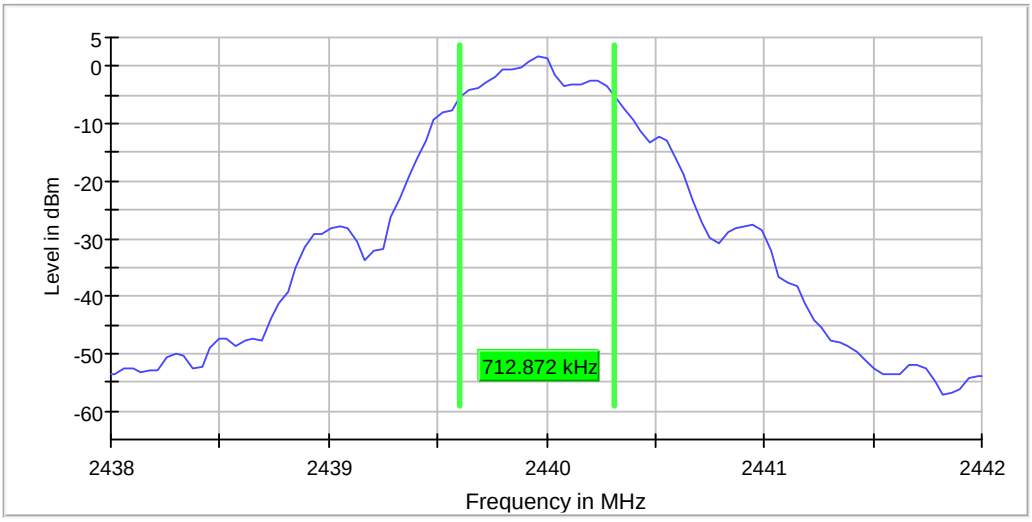
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

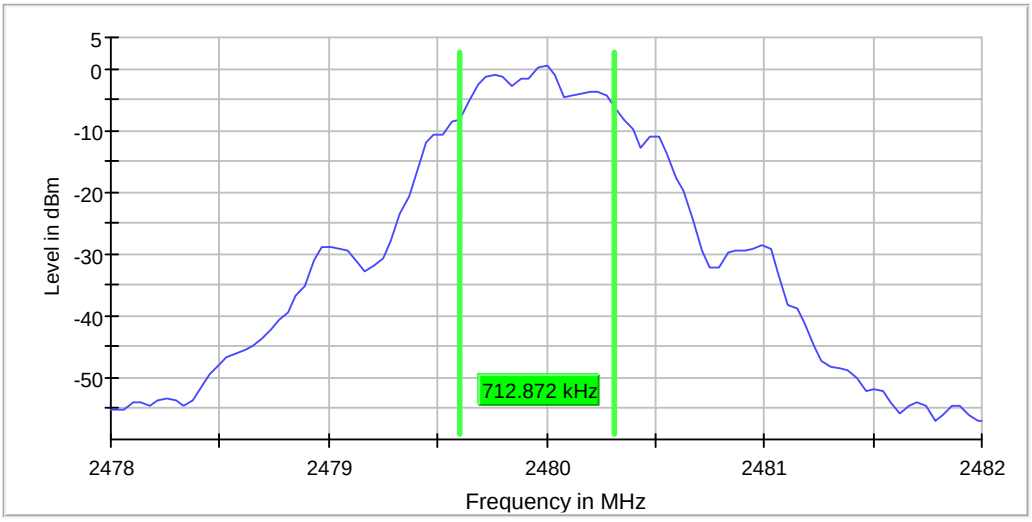
BLE 5.2, Lowest Channel



BLE 5.2, Middle Channel



BLE 5.2, Highest Channel



TEST REPORT

4.3 Maximum Power Spectral Density

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.2 PKPSD was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

IEEE 802.11b (DSSS, 1 Mbps)

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2412	5.589
Middle Channel:	2437	5.597
High Channel:	2462	2.337

IEEE 802.11g (OFDM, 6 Mbps)

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2412	-0.595
Middle Channel:	2437	-0.740
High Channel:	2462	-2.349

IEEE 802.11n (20MHz) (OFDM, MCS0)

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2412	-1.425
Middle Channel:	2437	-1.406
High Channel:	2462	-2.599

BLE 5.2 (GFSK, 1 Mbps)

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2402	-4.717
Middle Channel:	2440	-4.015
High Channel:	2480	-5.203

Cable Loss: 0.5 dB

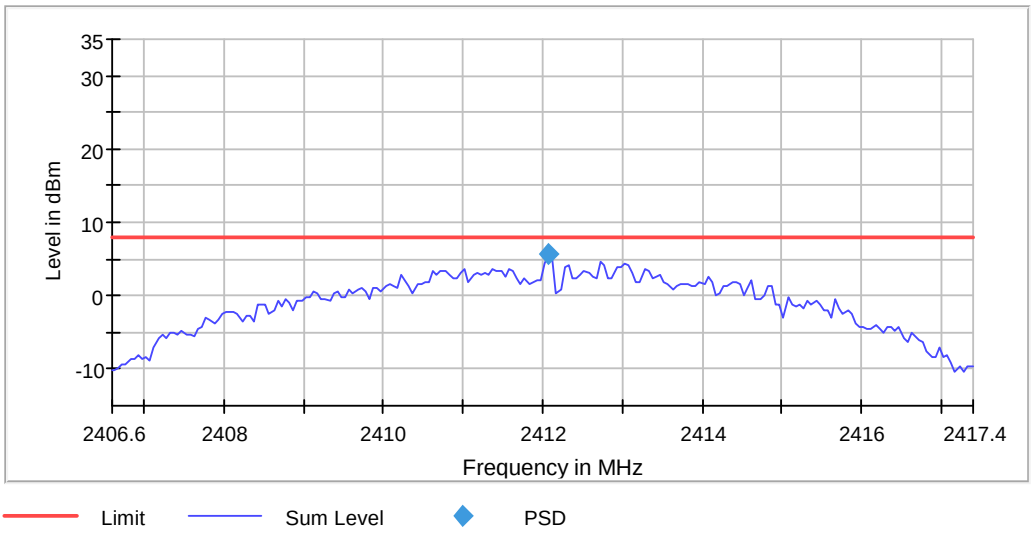
Limit:
8dBm

The plots of power spectral density are as below.

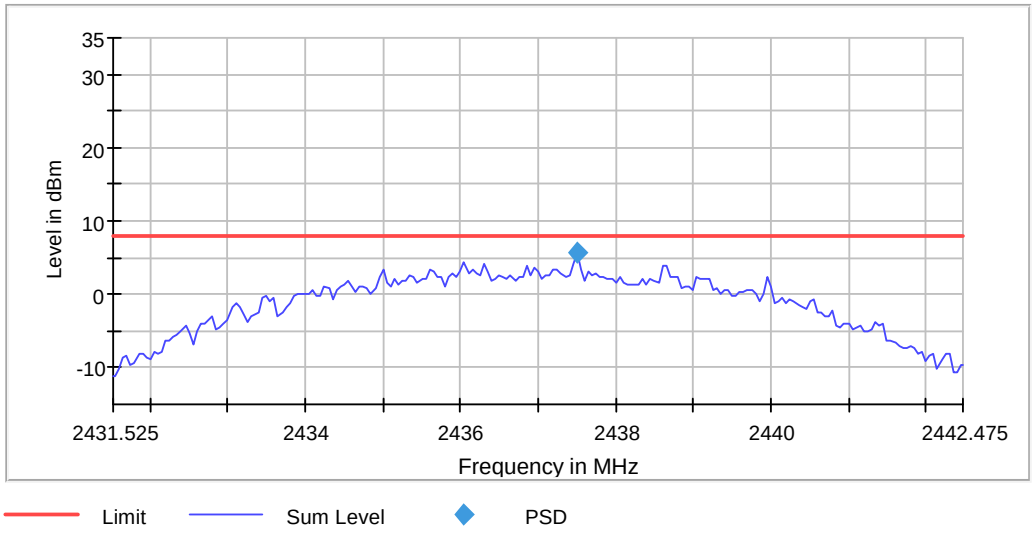
TEST REPORT

PLOTS OF POWER SPECTRAL DENSITY

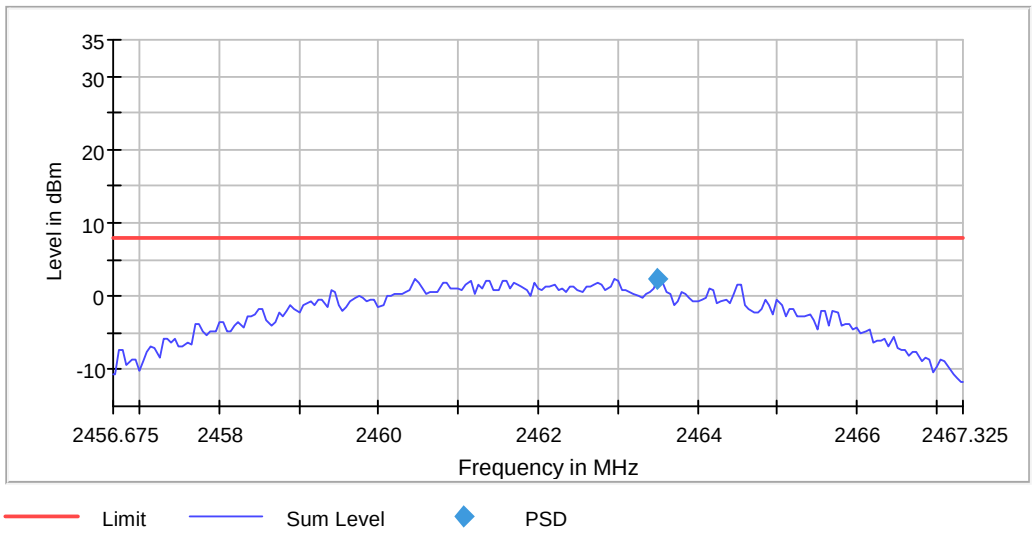
802.11b, Lowest channel



802.11b, Middle channel



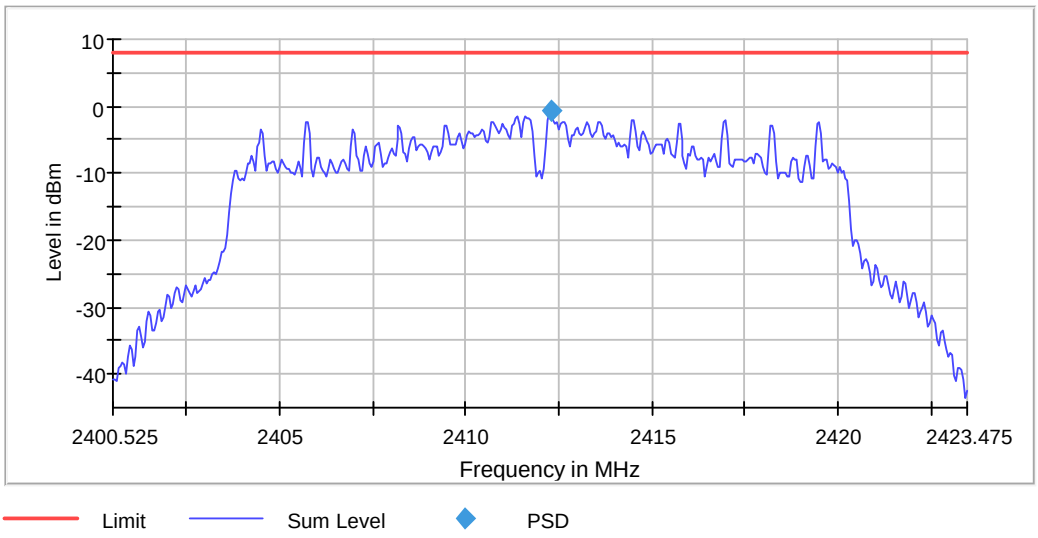
802.11b, Highest channel



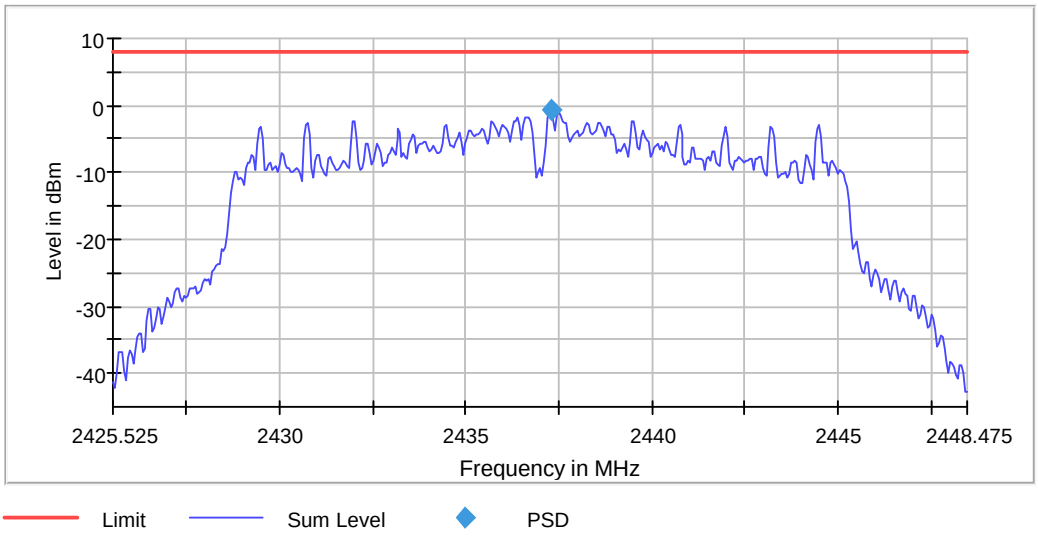
TEST REPORT

PLOTS OF POWER SPECTRAL DENSITY

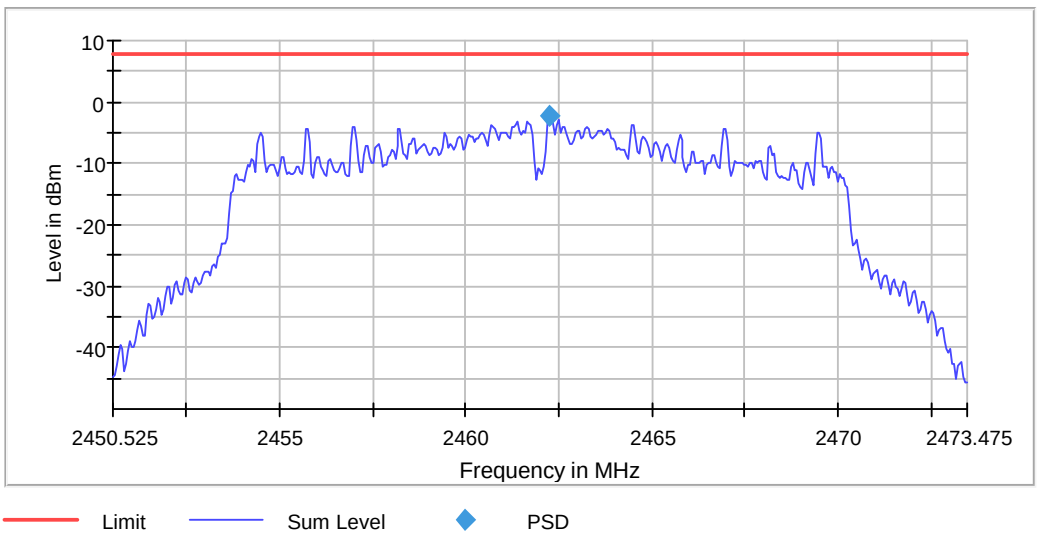
802.11g, Lowest channel



802.11g, Middle channel



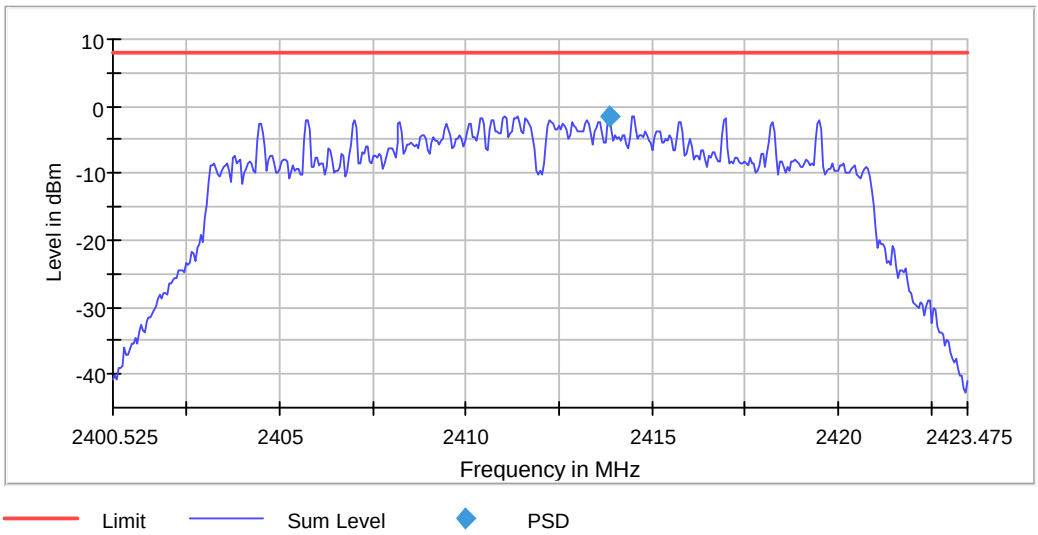
802.11g, Highest channel



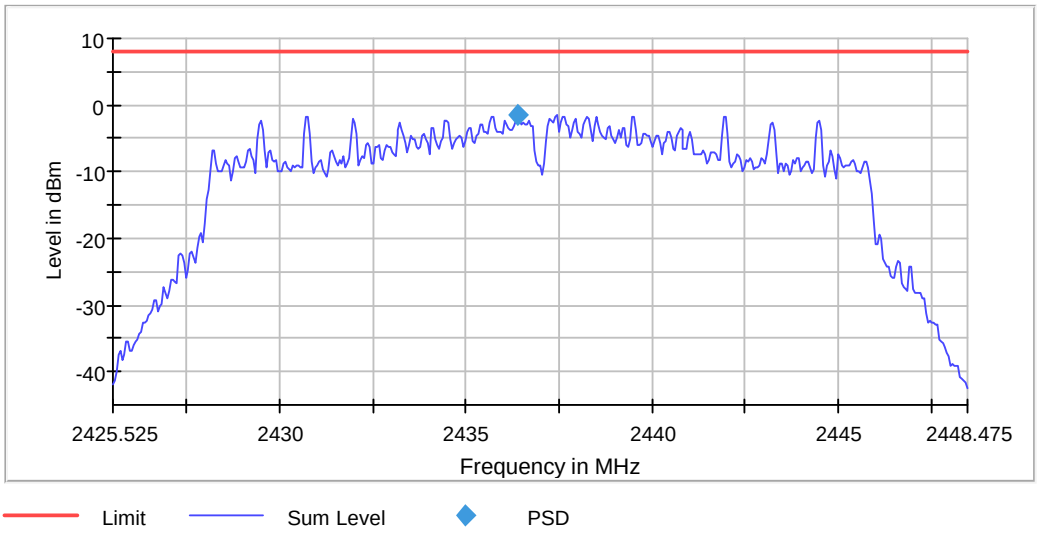
TEST REPORT

PLOTS OF POWER SPECTRAL DENSITY

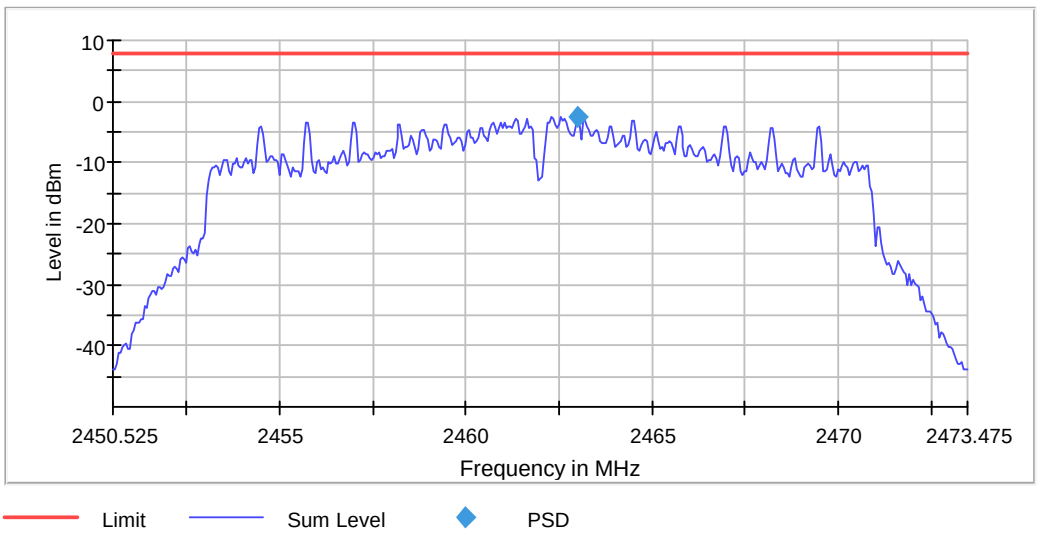
802.11n (20MHz), Lowest channel



802.11n (20MHz), Middle channel



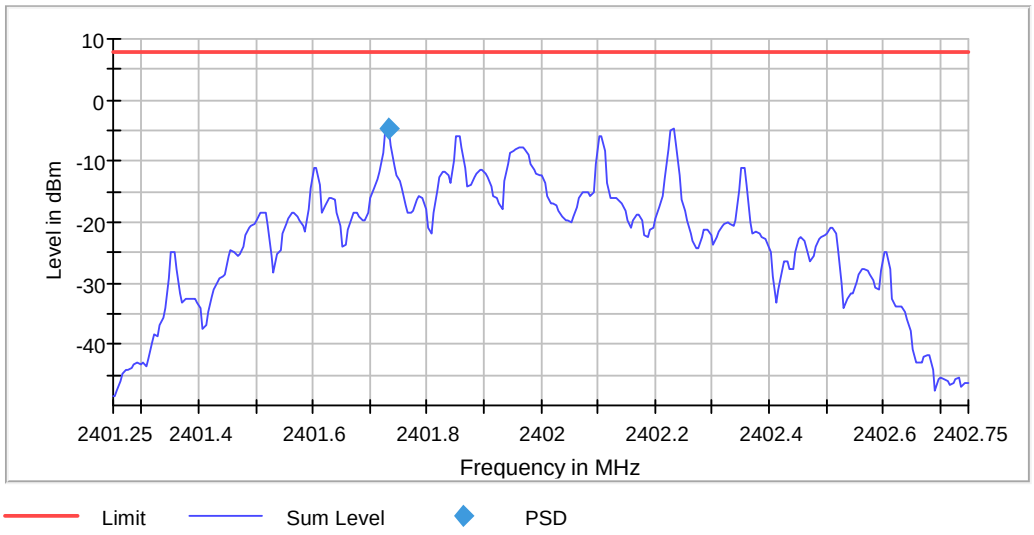
802.11n (20MHz), Highest channel



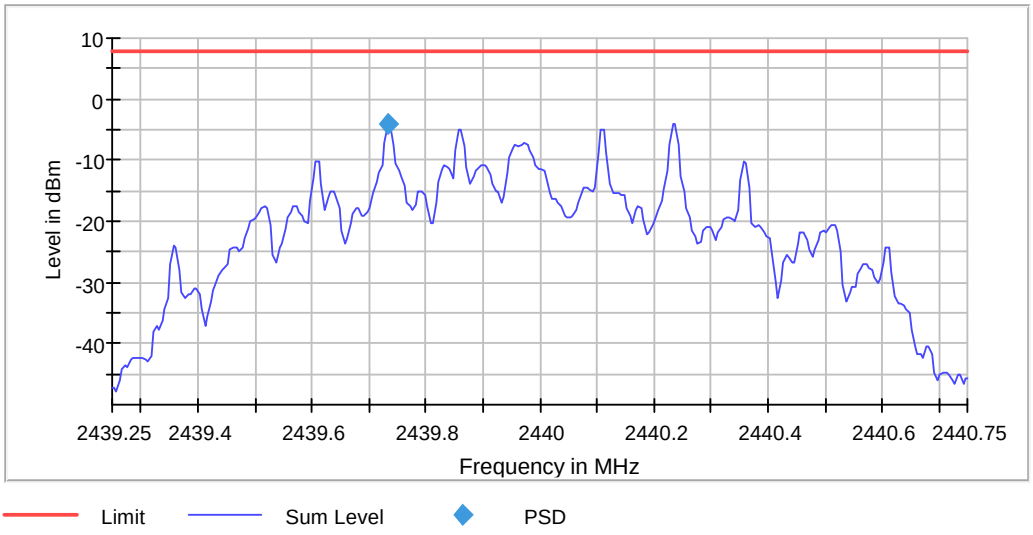
TEST REPORT

PLOTS OF POWER SPECTRAL DENSITY

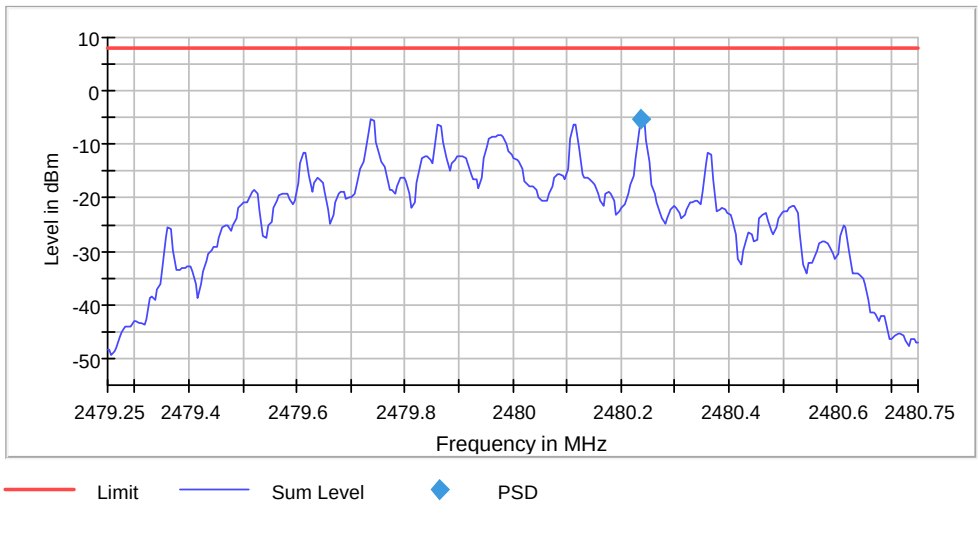
BLE 5.2, Lowest channel



BLE 5.2, Middle channel



BLE 5.2, Highest channel



TEST REPORT

4.4 Out of Band Conducted Emissions

For 802.11b,g,n20MHz, Bluetooth BLE, the maximum conducted (peak) output power was used to demonstrate compliance as described in 9.1. Then the display line (in red) shown in the following plots denotes the limit at 20dB below maximum measured in-band peak PSD level in 100 KHz bandwidth for 802.11b,g,n20MHz, Bluetooth BLE.

The measurement procedures under sections 11 of KDB558074 D01 v05r01 (11-Feb-2019) were used.

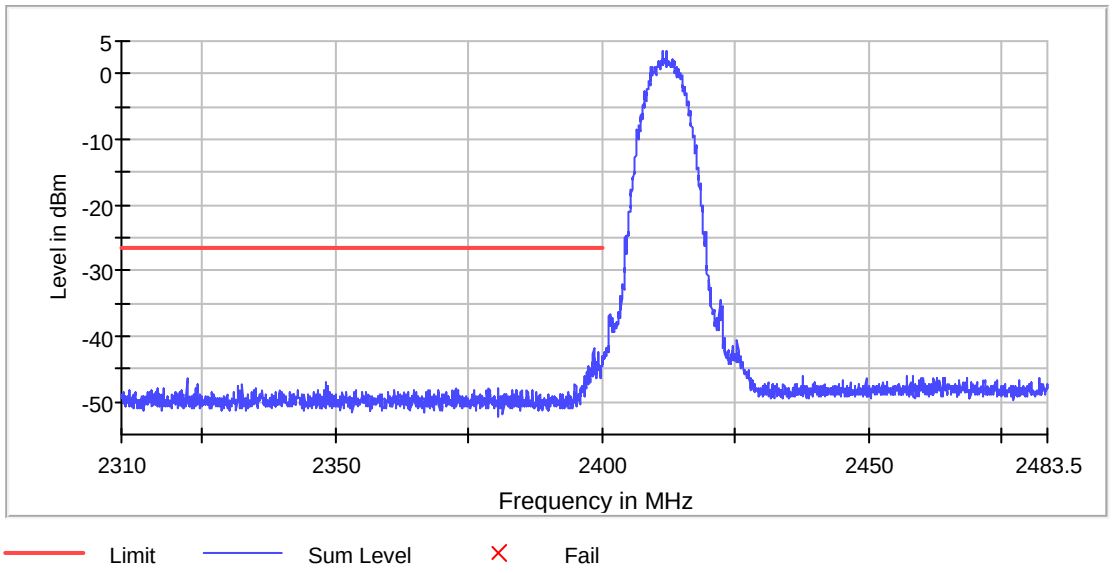
Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the maximum measured in-band peak PSD level for 802.11b,g,n20MHz, Bluetooth BLE.

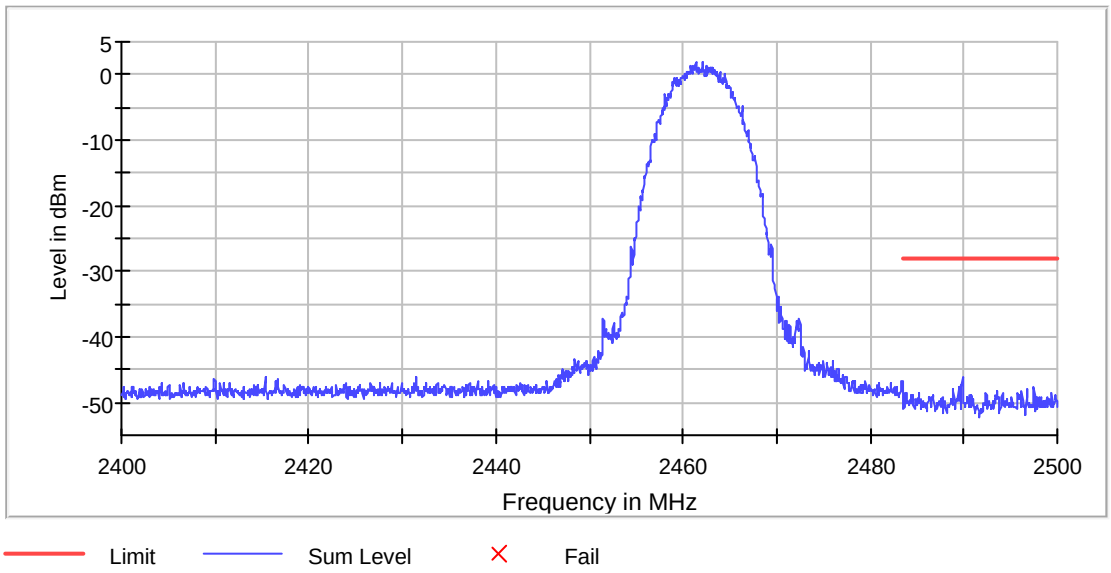
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Bandedge



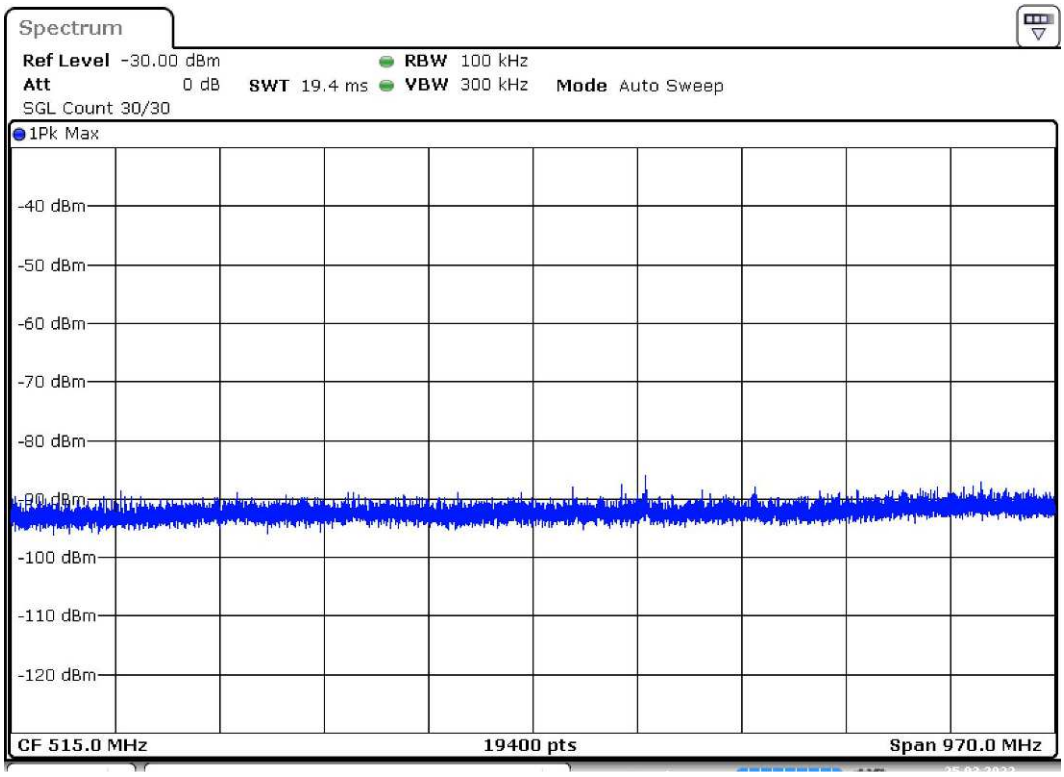
802.11b, Highest Channel, Bandedge

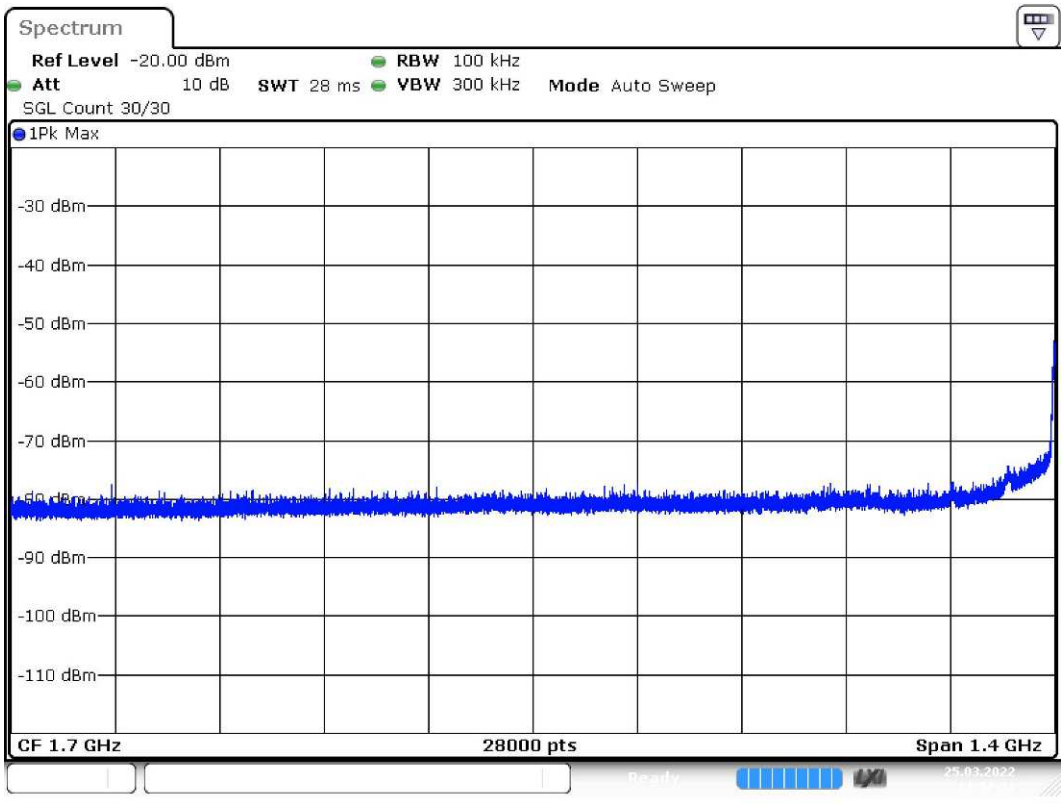


TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Plot A

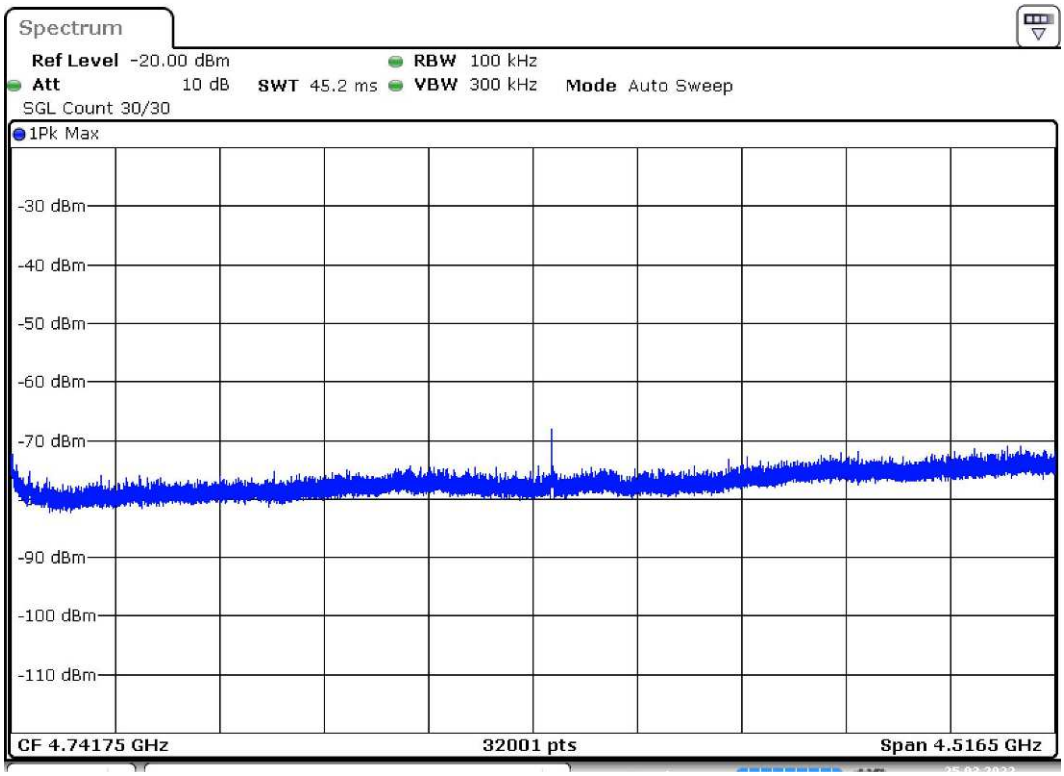


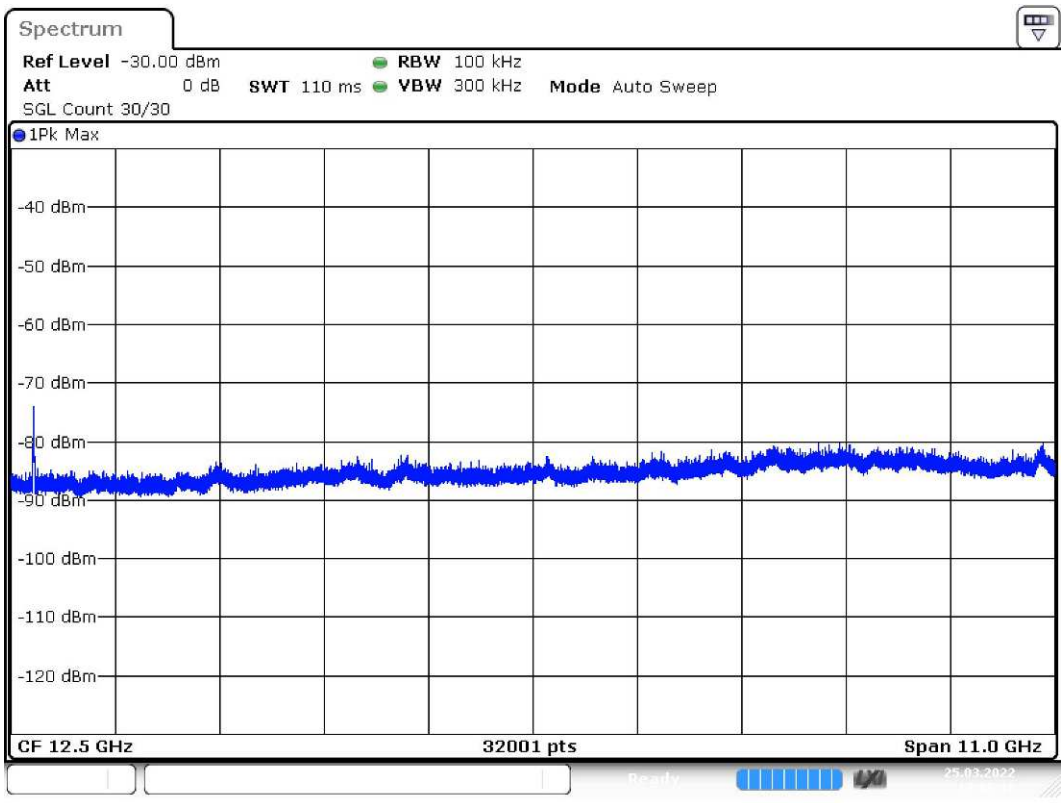


Date: 25.MAR.2022 11:52:51

TEST REPORT

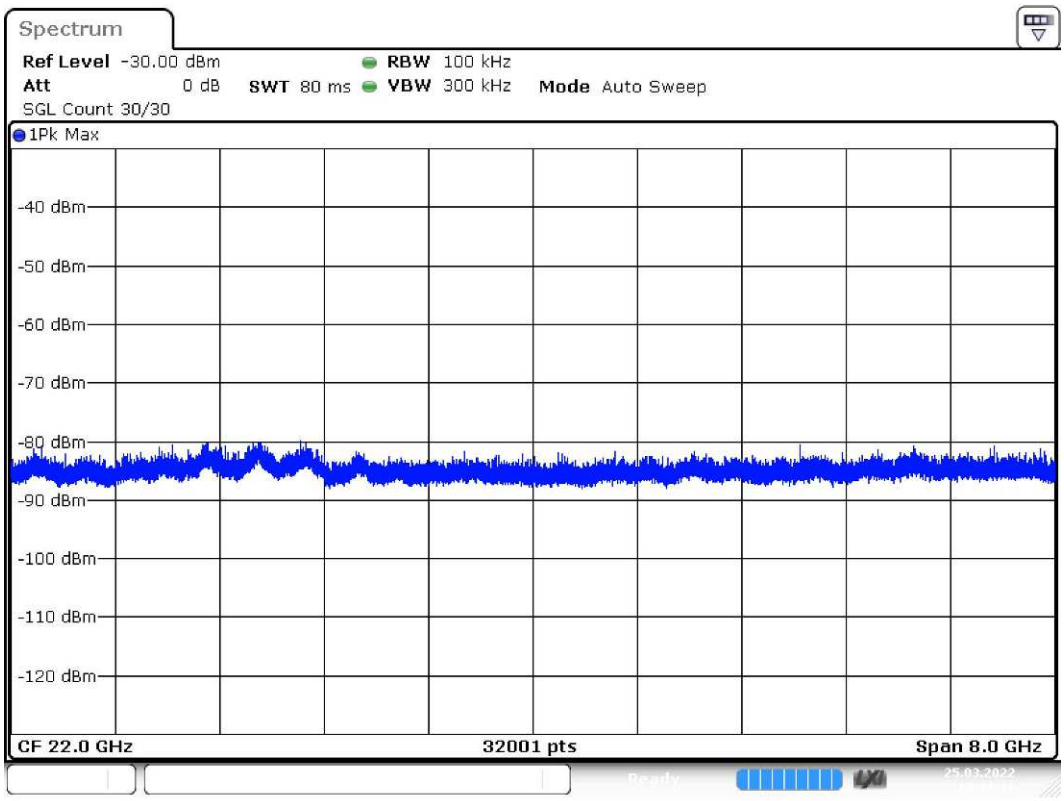
802.11b, Lowest Channel, Plot B





Date: 25.MAR.2022 12:00:18

TEST REPORT

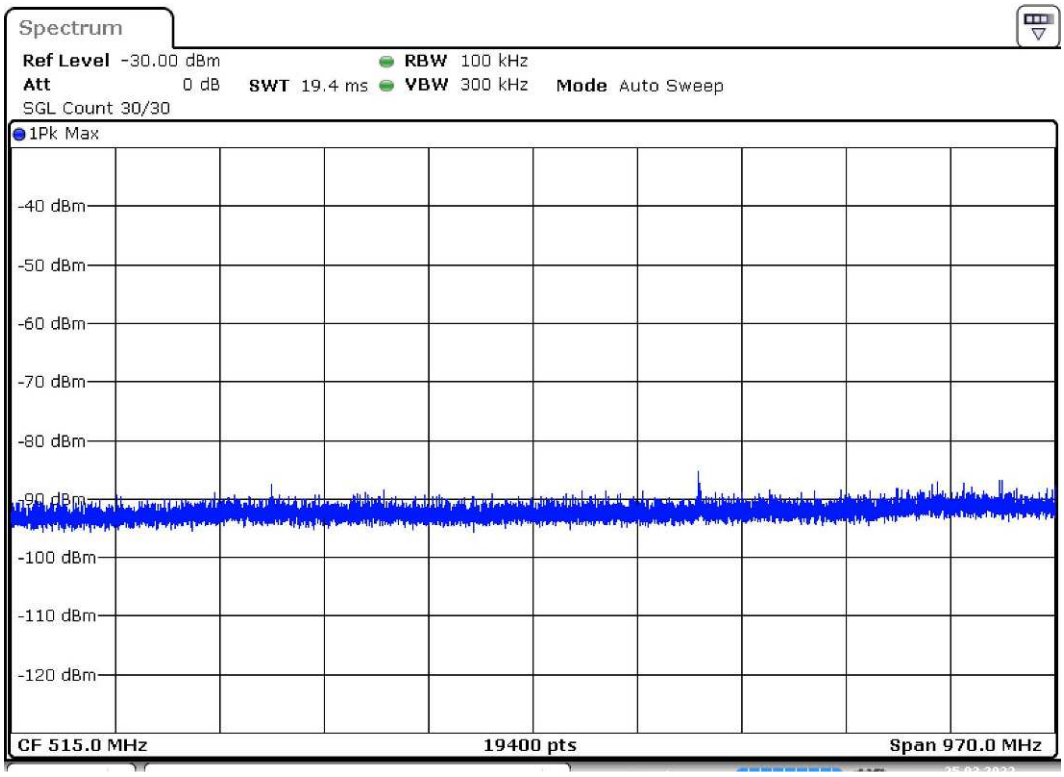


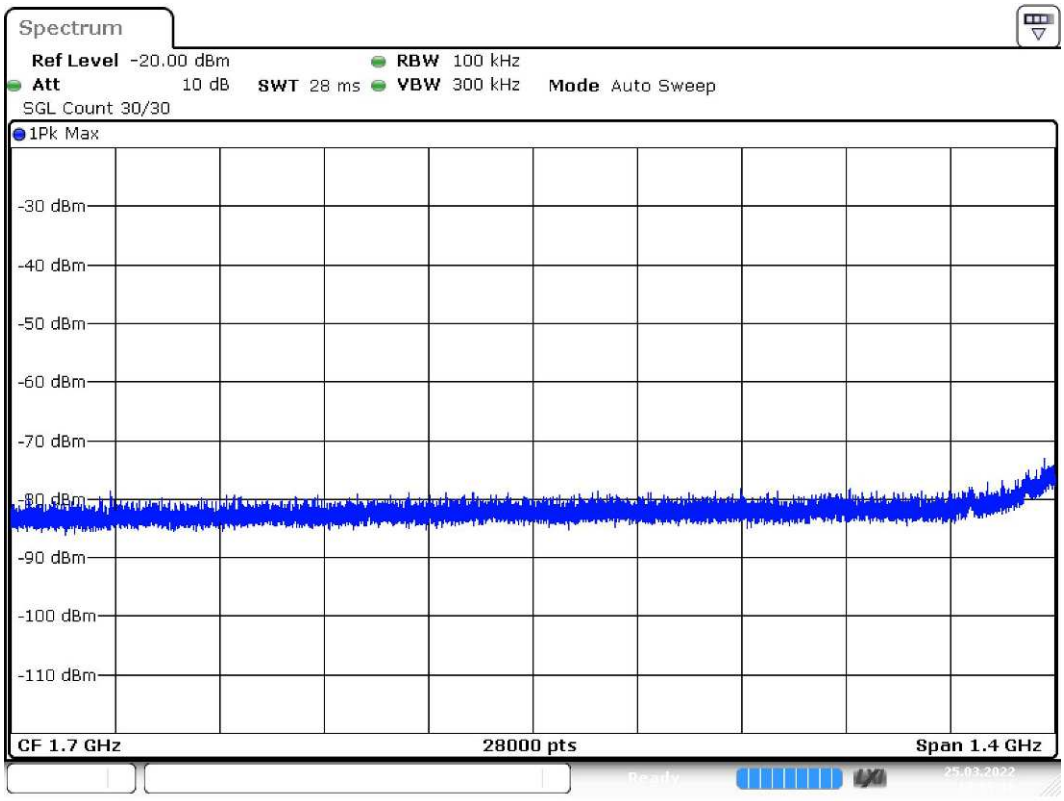
Date: 25.MAR.2022 12:01:17

TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Middle Channel, Plot A

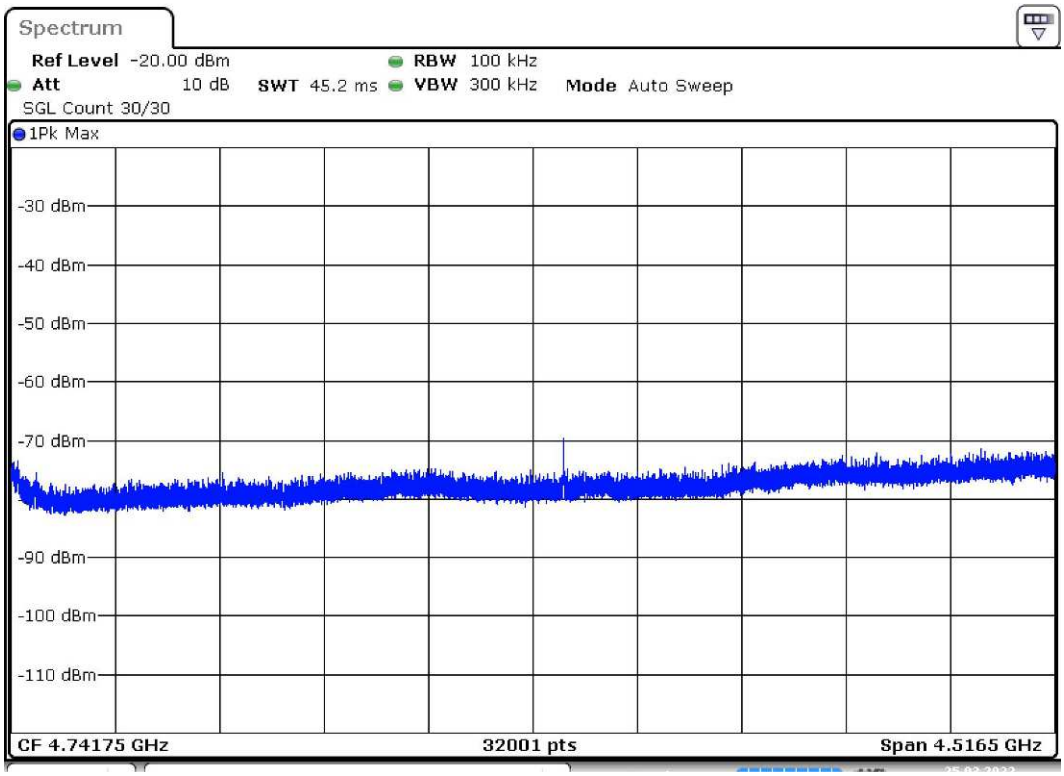


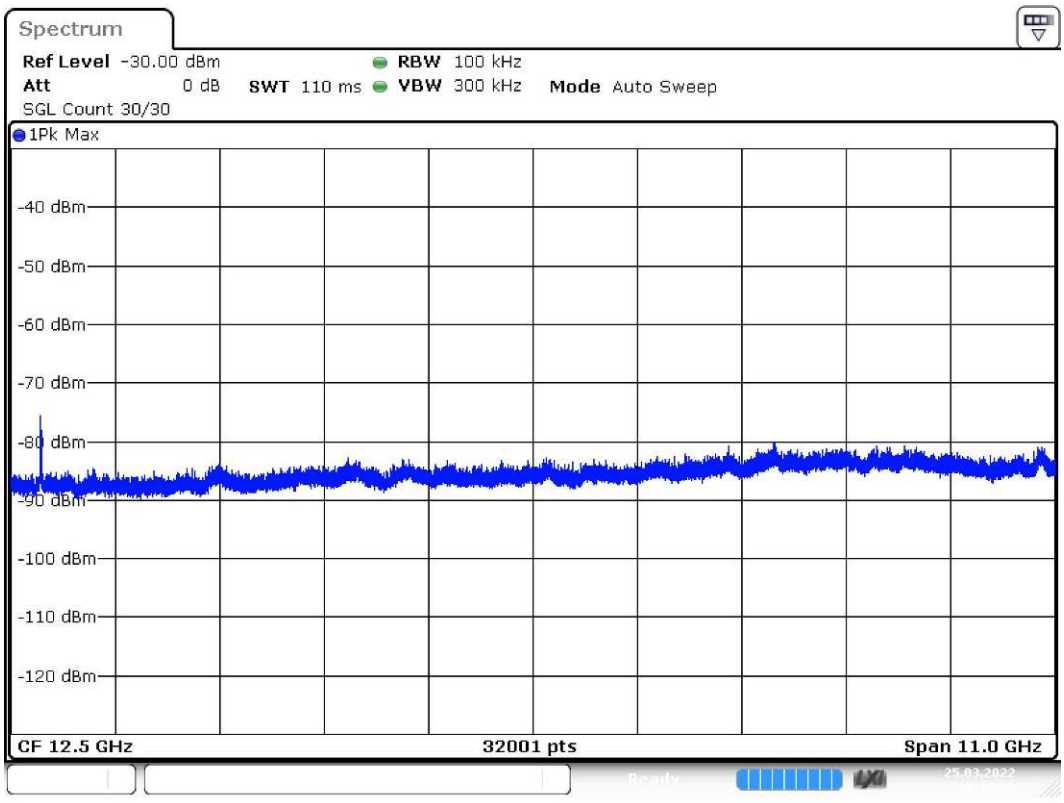


Date: 25.MAR.2022 12:09:17

TEST REPORT

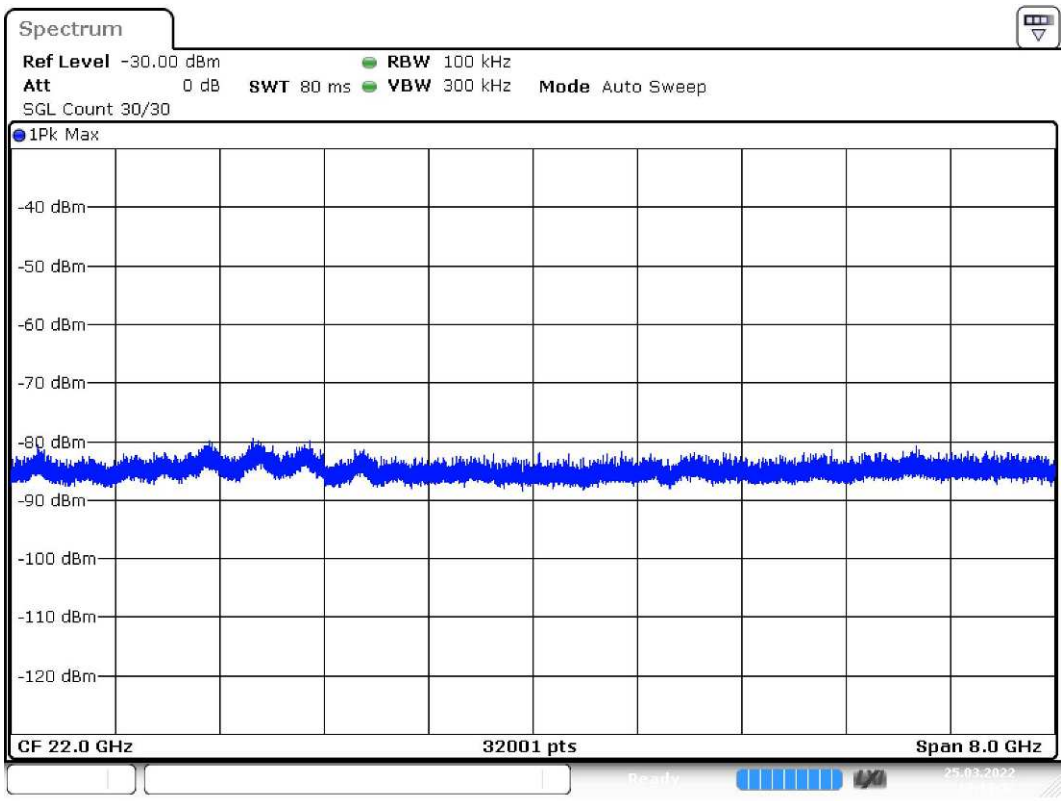
802.11b, Middle Channel, Plot B





Date: 25.MAR.2022 12:13:59

TEST REPORT

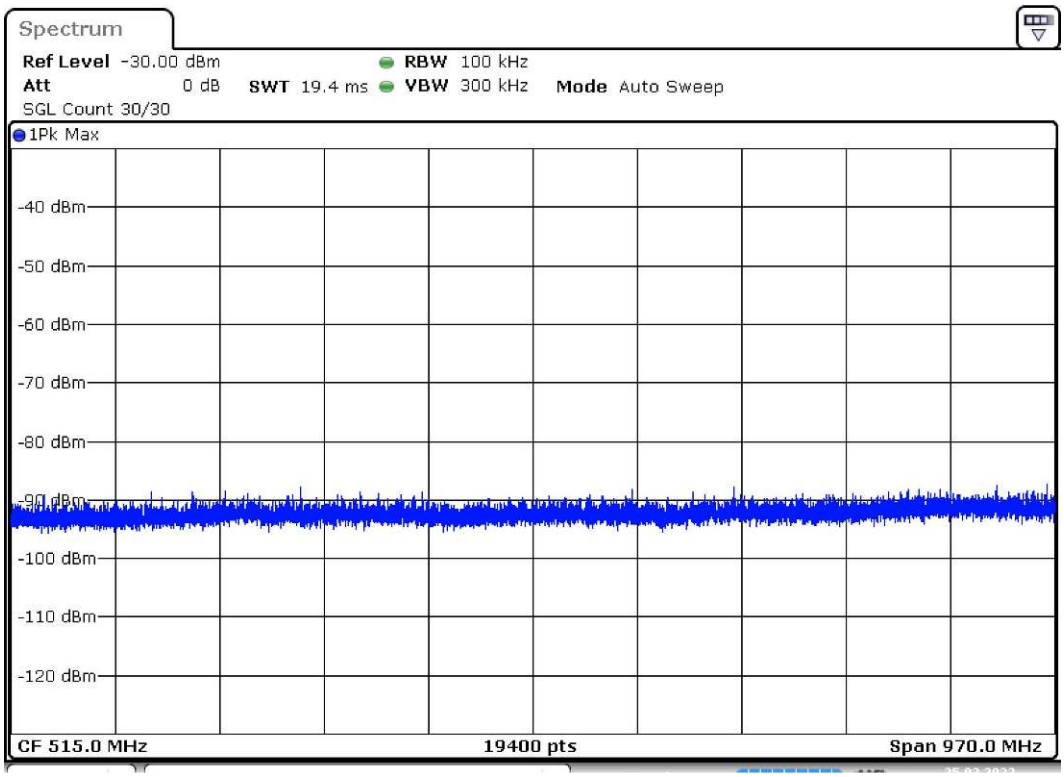


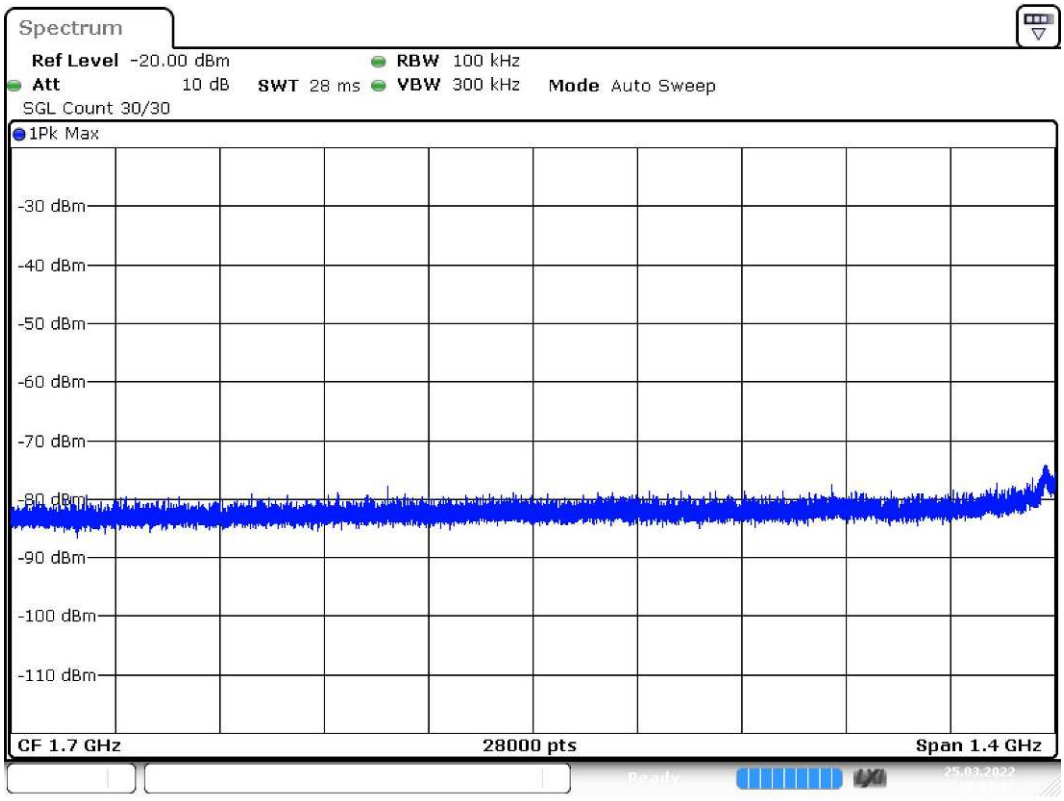
Date: 25.MAR.2022 12:14:52

TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Highest Channel, Plot A

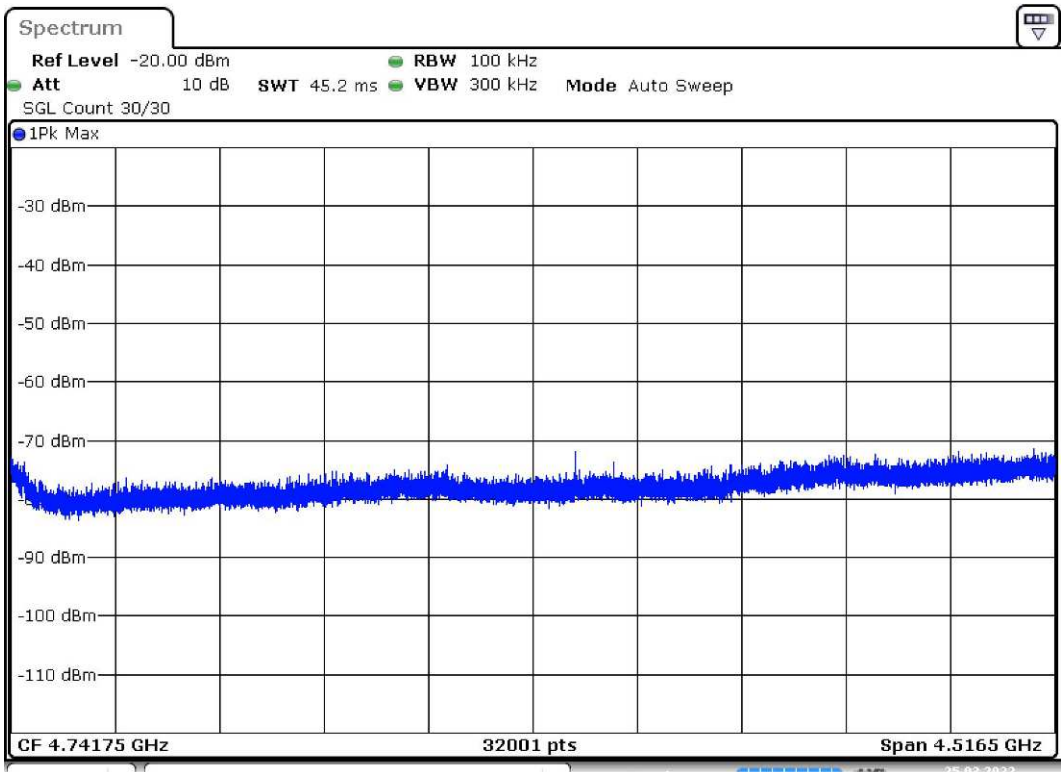


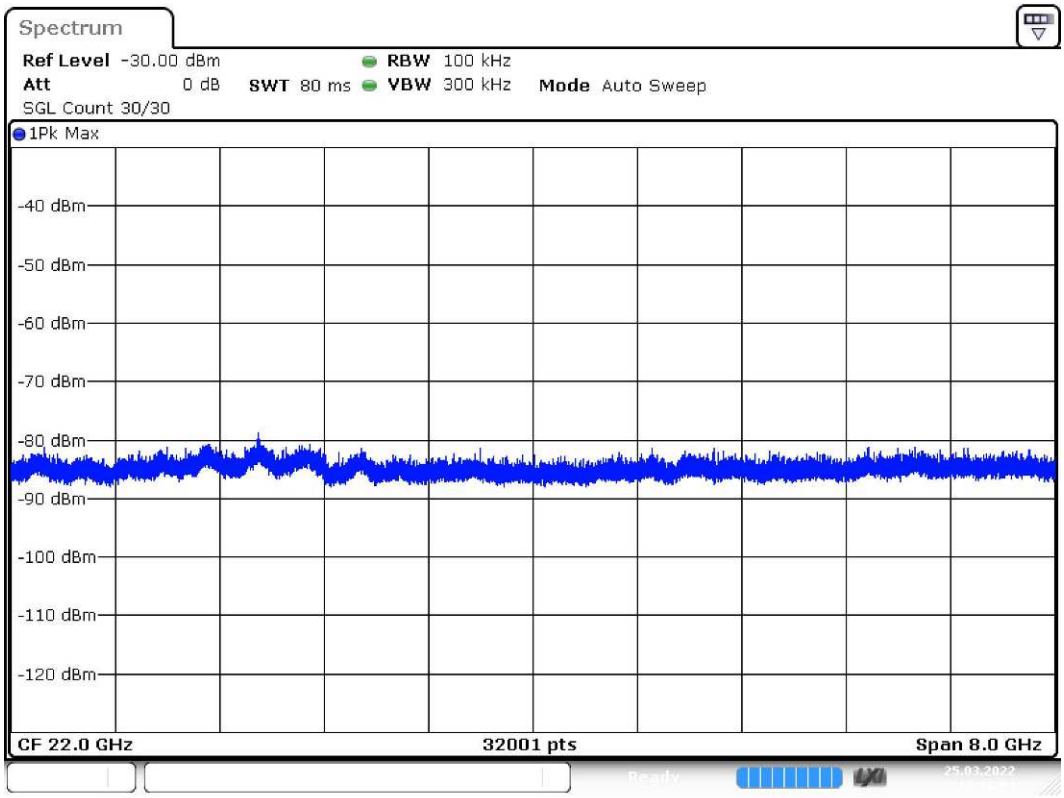


Date: 25.MAR.2022 12:34:13

TEST REPORT

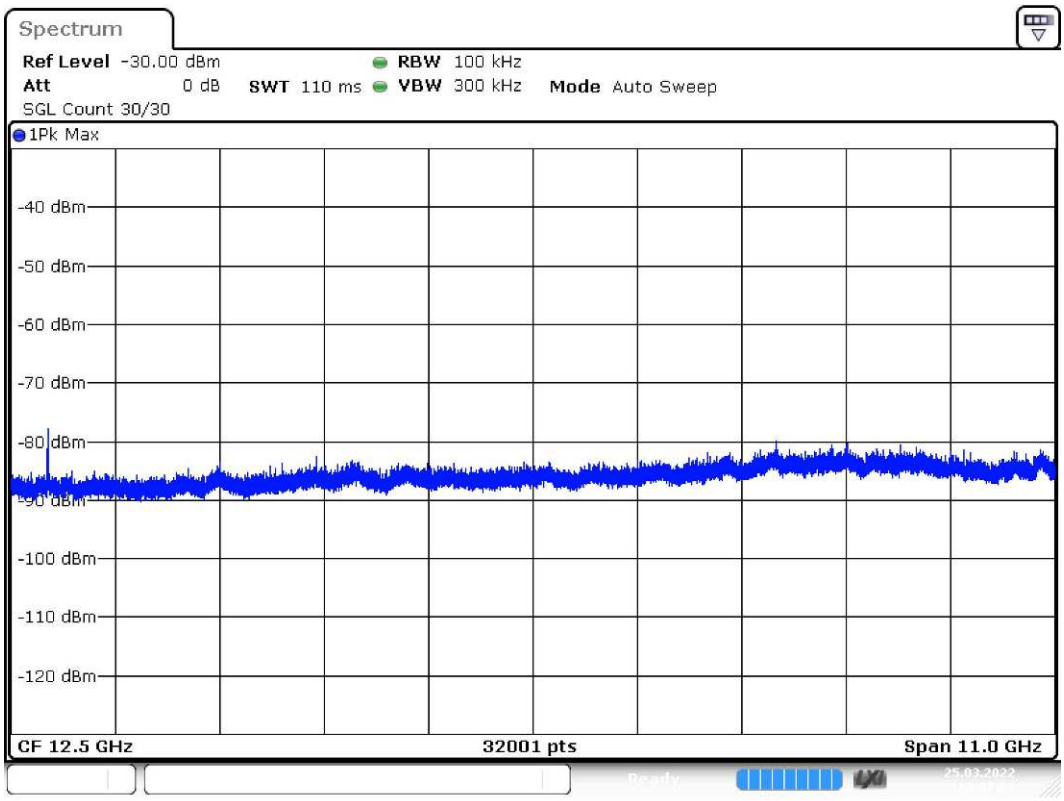
802.11b, Highest Channel, Plot B





Date: 25.MAR.2022 12:38:04

TEST REPORT

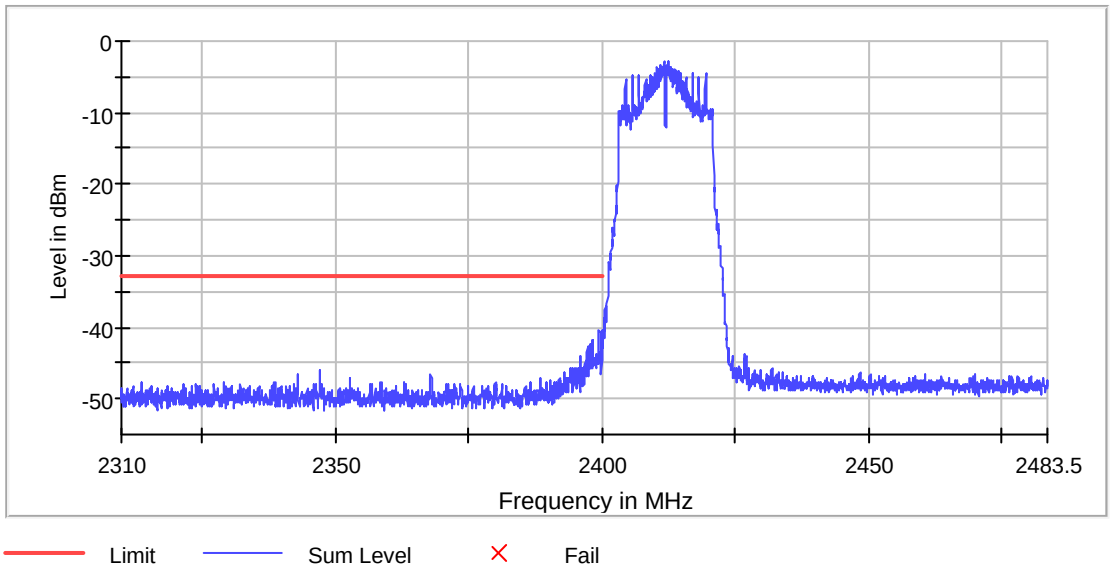


Date: 25.MAR.2022 12:37:10

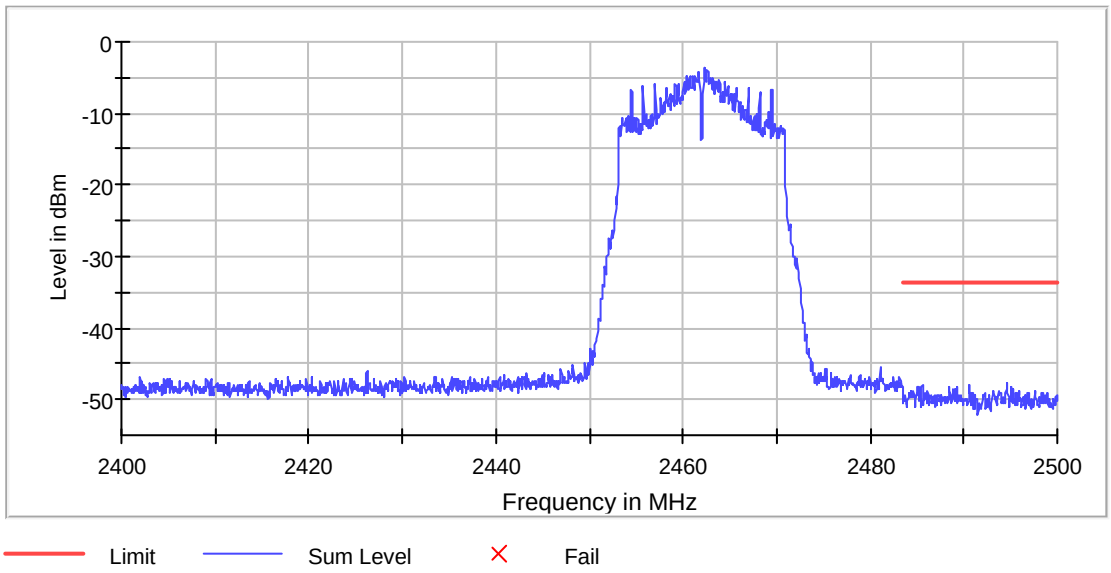
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Lowest Channel, Bandedge



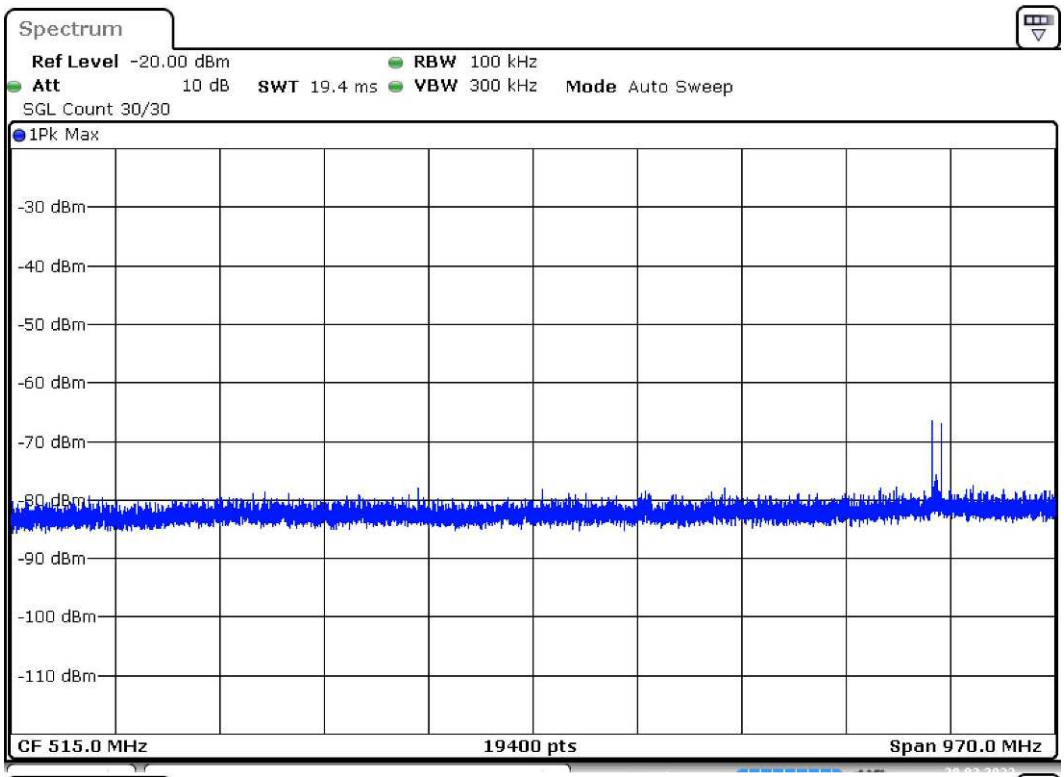
802.11g, Highest Channel, Bandedge

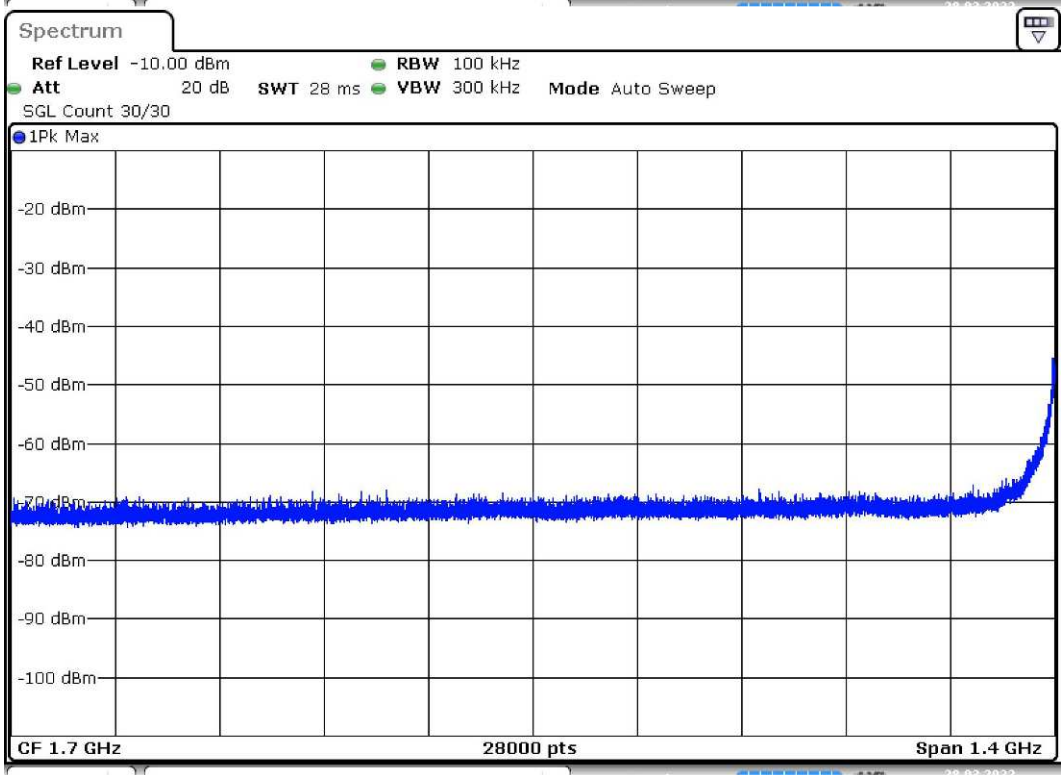


TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

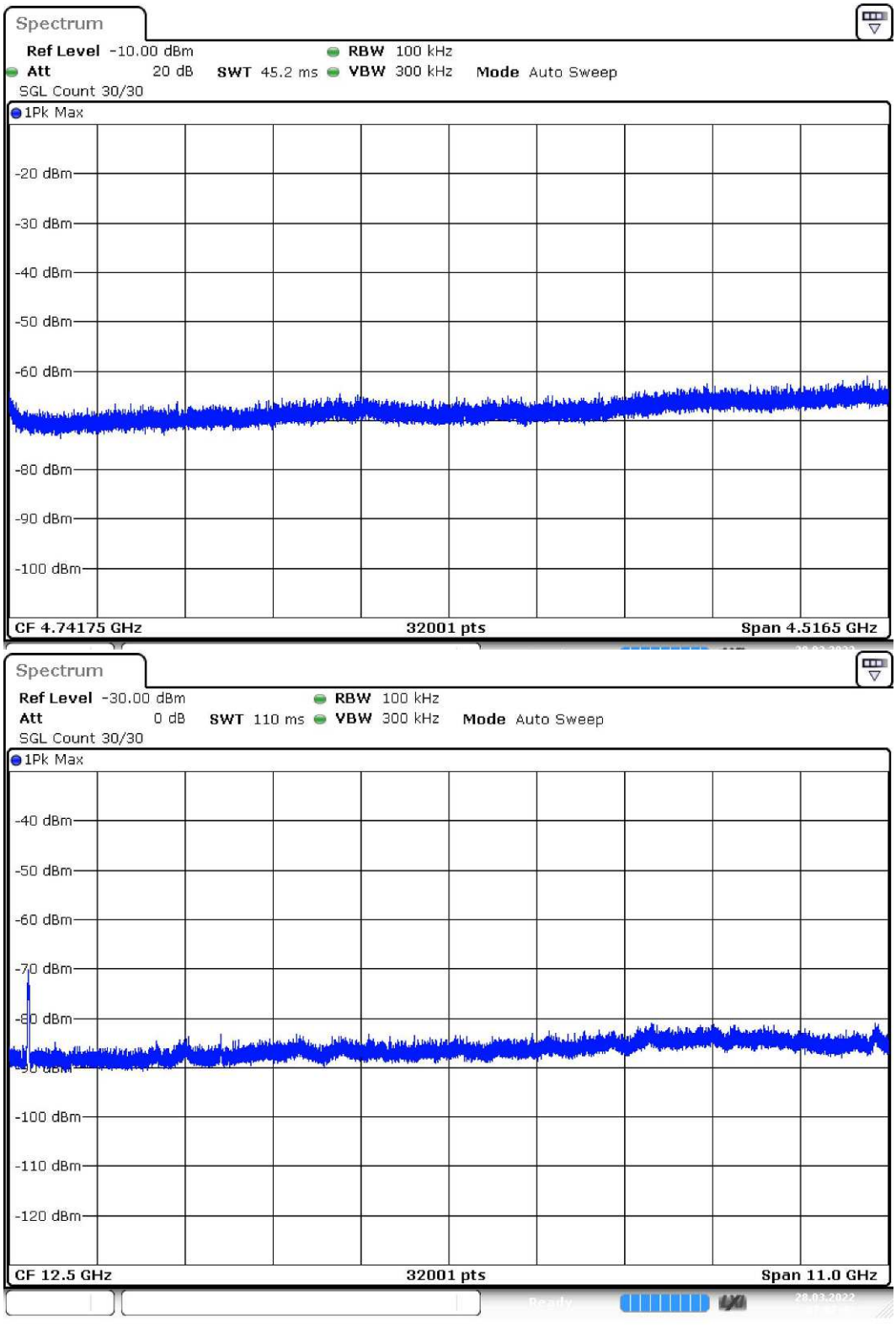
802.11g, Lowest Channel, Plot A



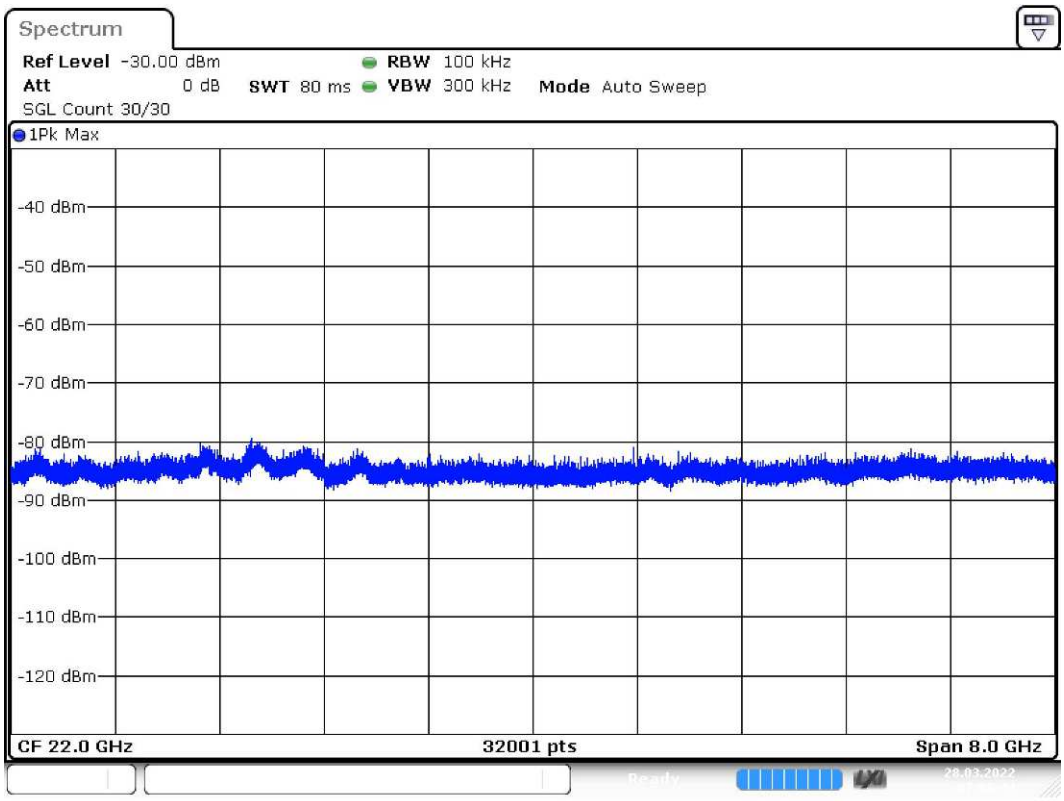


TEST REPORT

802.11g, Lowest Channel, Plot B



TEST REPORT

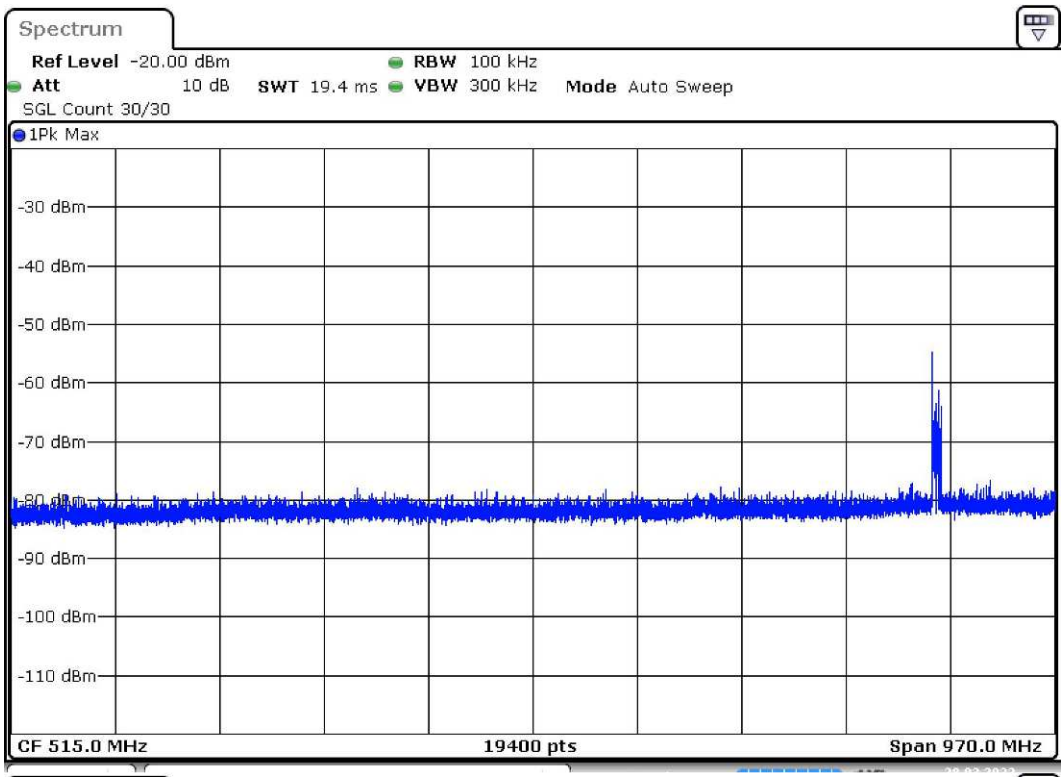


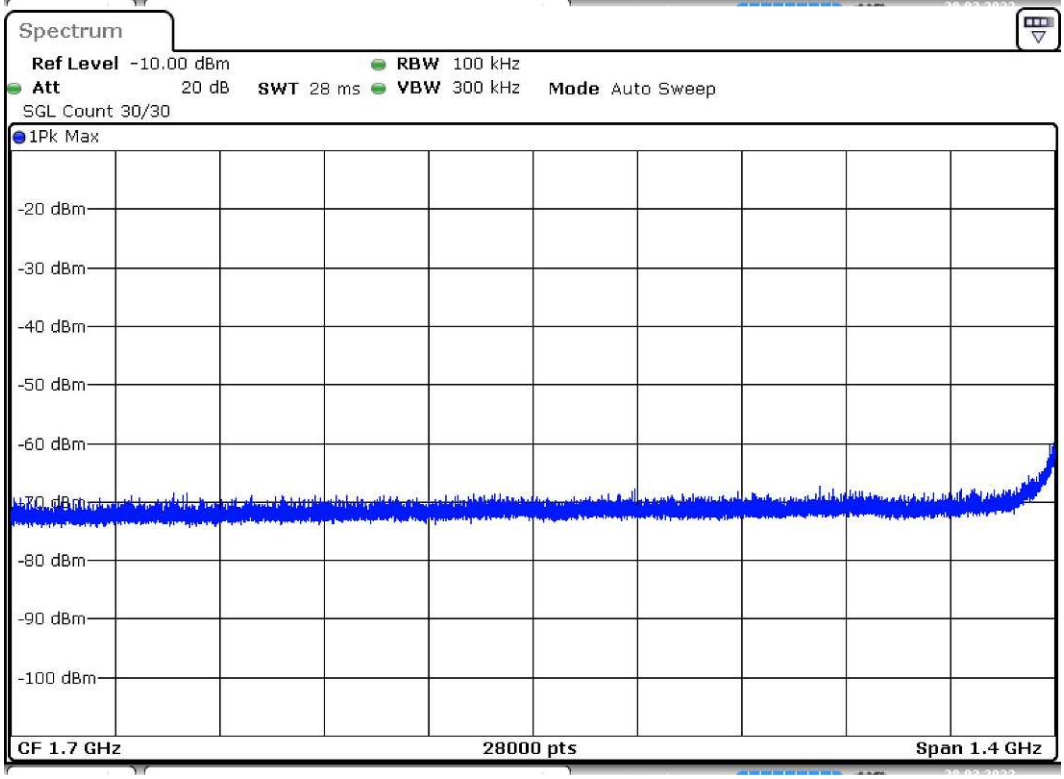
Date: 28.MAR.2022 07:08:45

TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

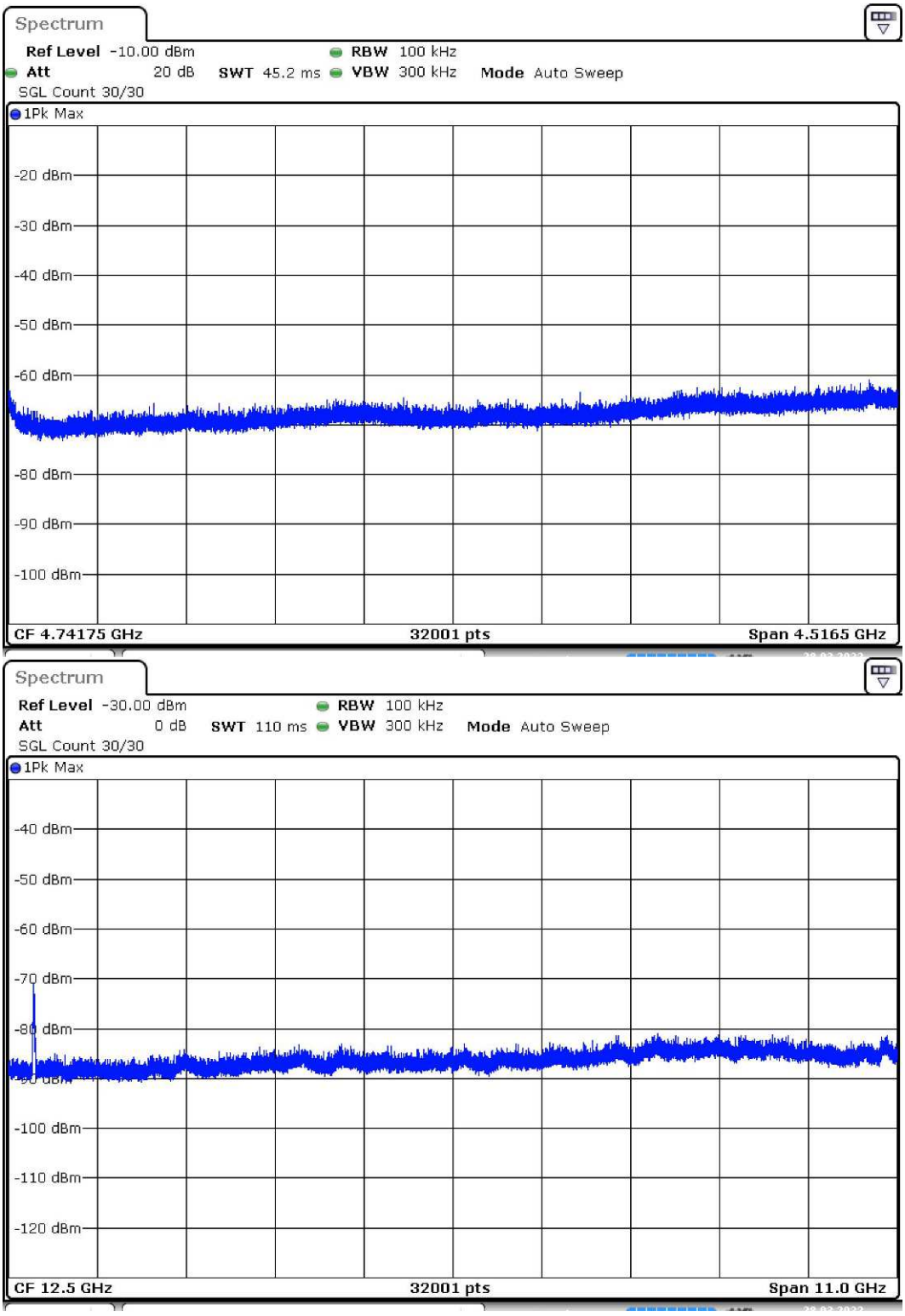
802.11g, Middle Channel, Plot A



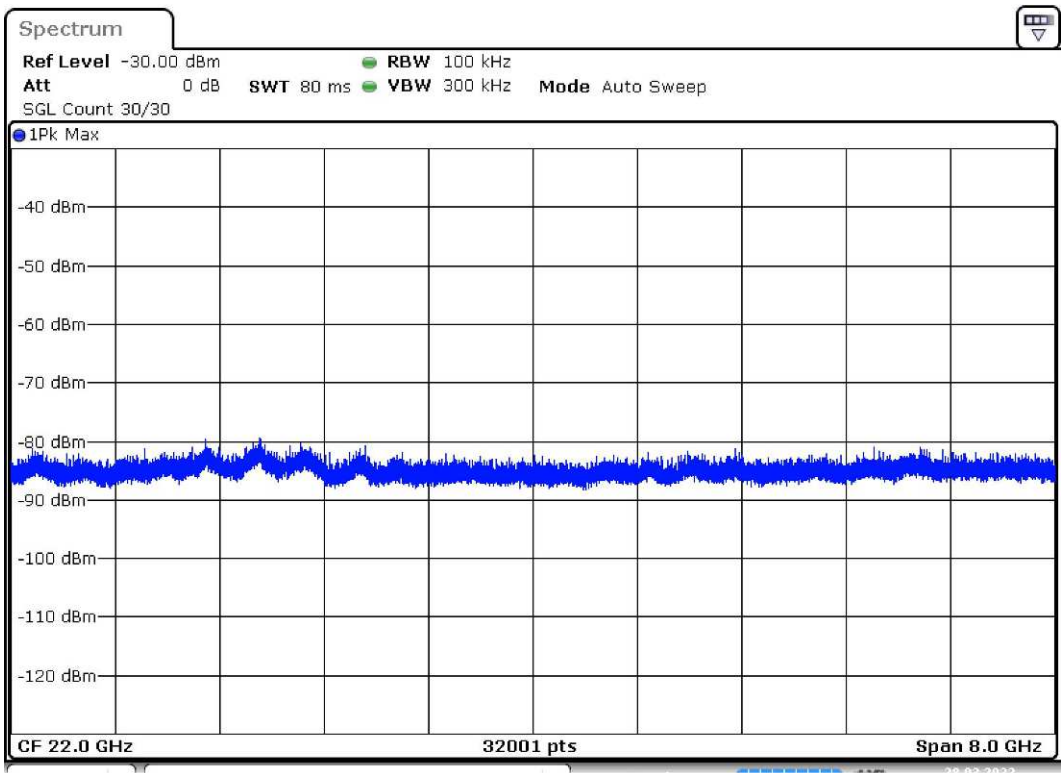


TEST REPORT

802.11g, Middle Channel, Plot B



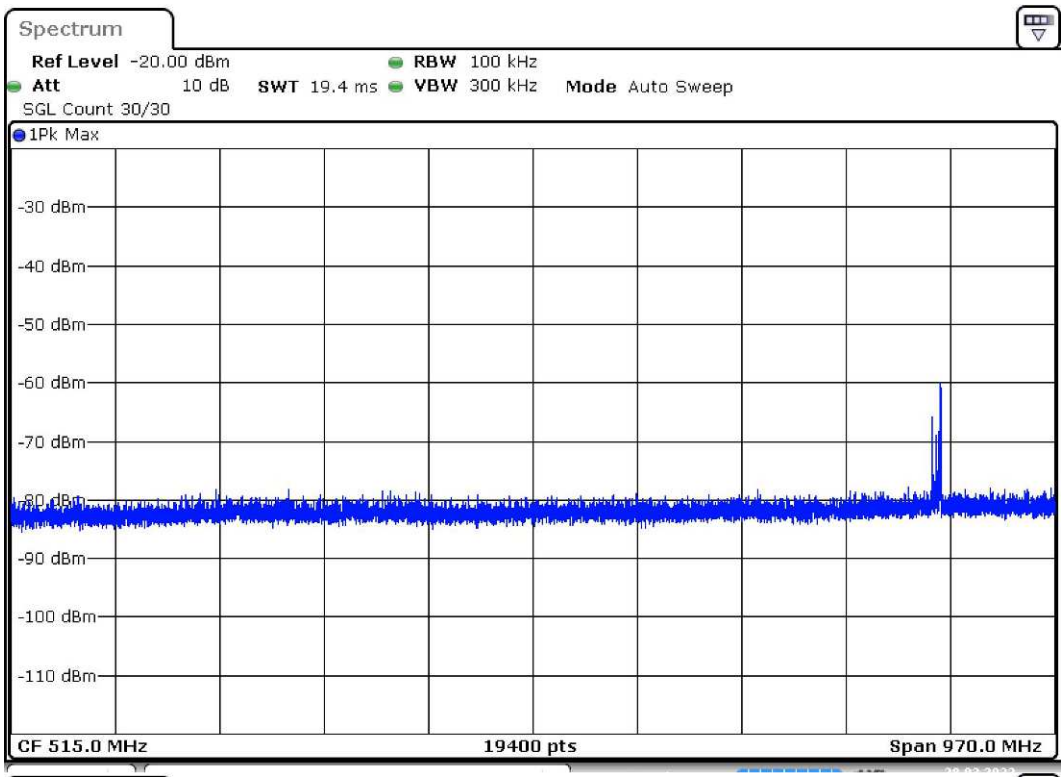
TEST REPORT

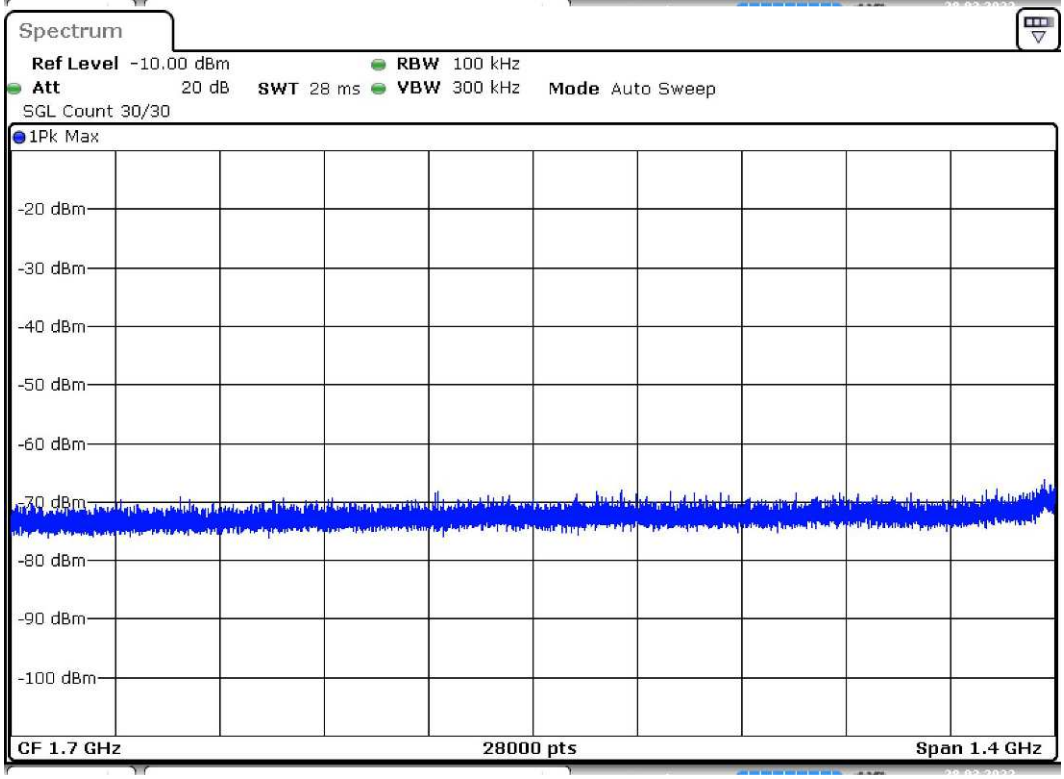

Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
Att 0 dB
SWT 80 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 22.0 GHz
32001 pts
Span 8.0 GHz

TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

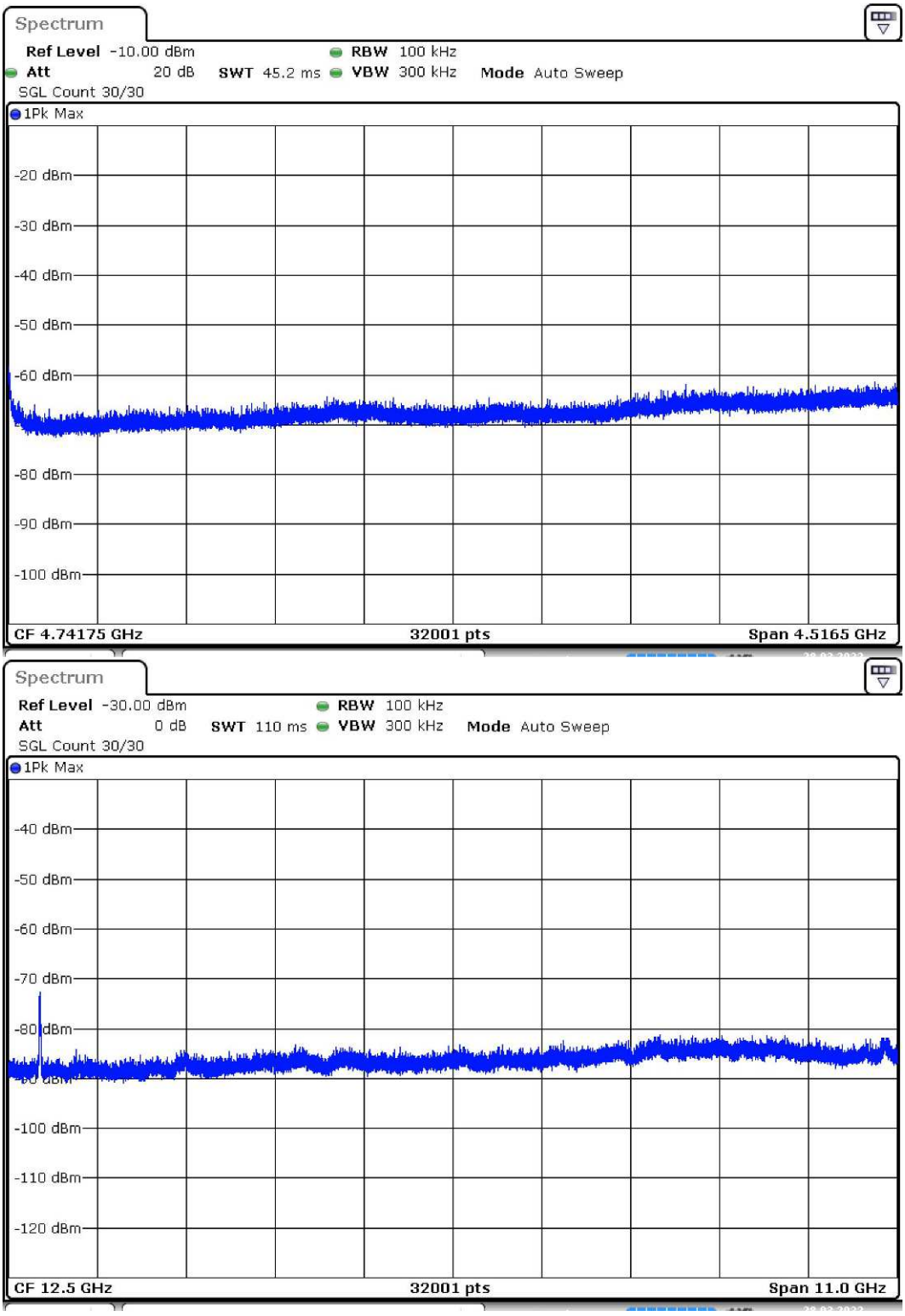
802.11g, Highest Channel, Plot A



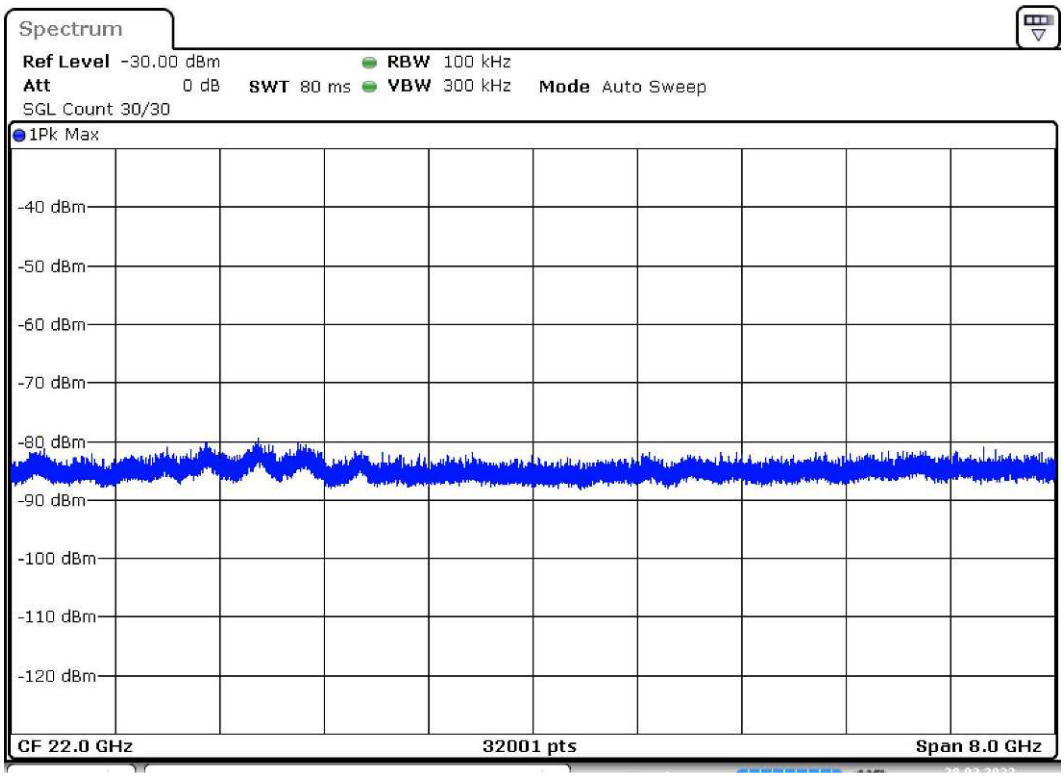


TEST REPORT

802.11g, Highest Channel, Plot B



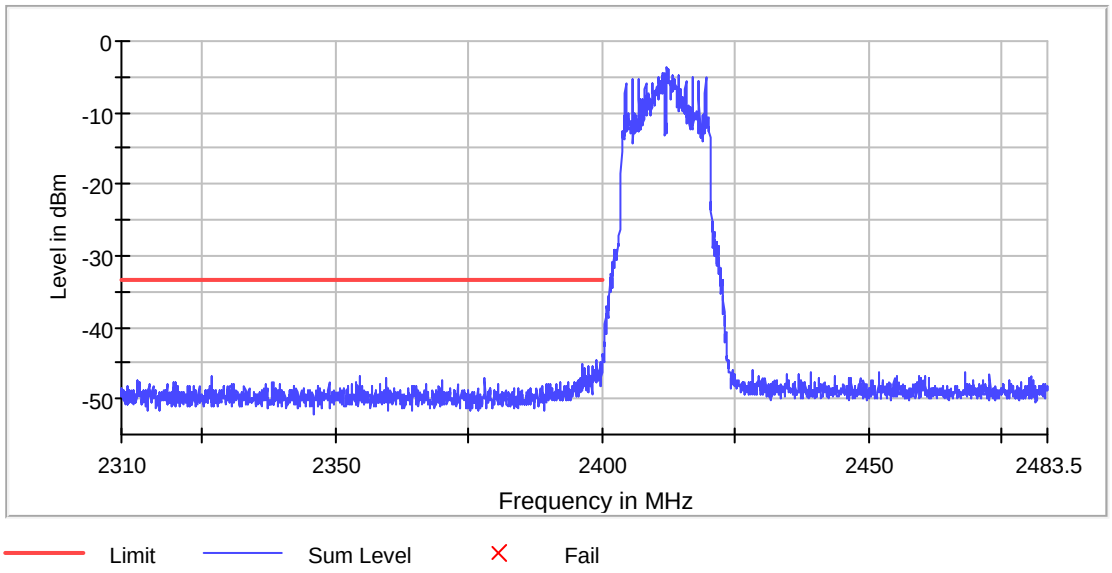
TEST REPORT


Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
Att 0 dB
SWT 80 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 22.0 GHz
32001 pts
Span 8.0 GHz

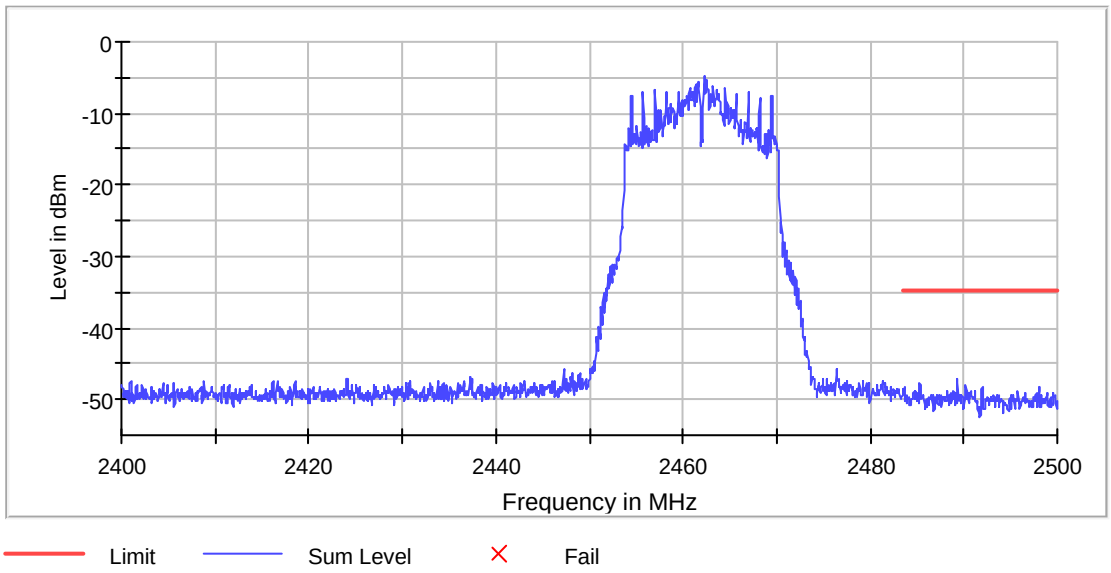
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11n (20MHz), Lowest Channel, Bandedge



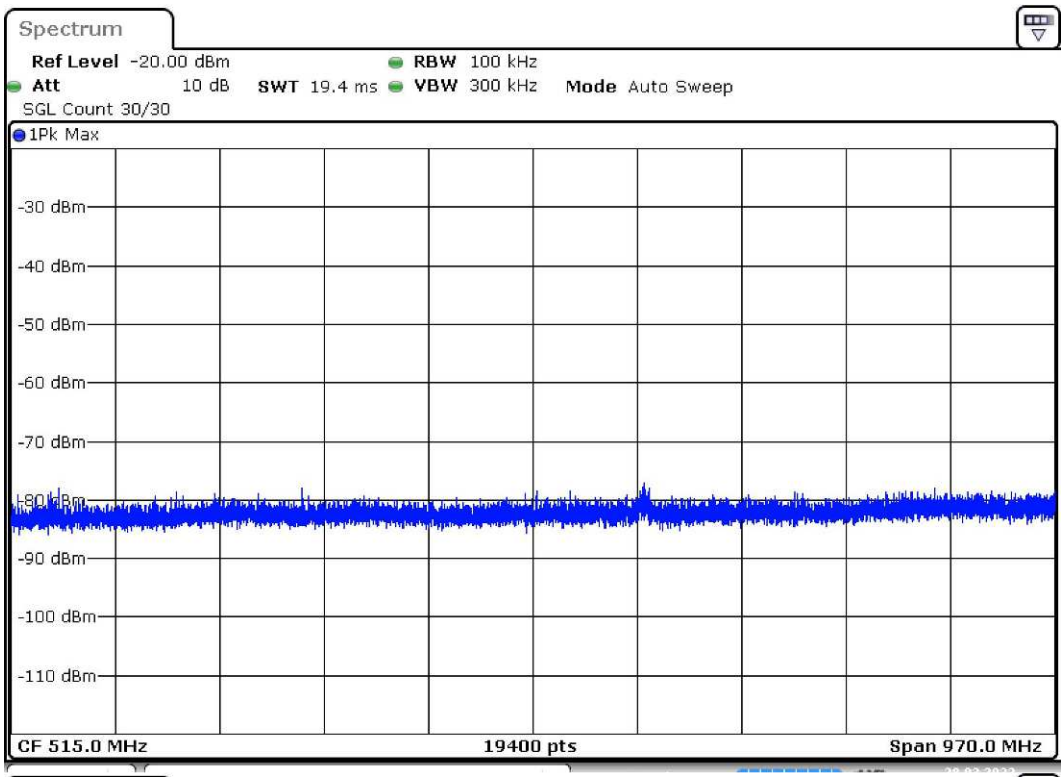
802.11n (20MHz), Highest Channel, Bandedge

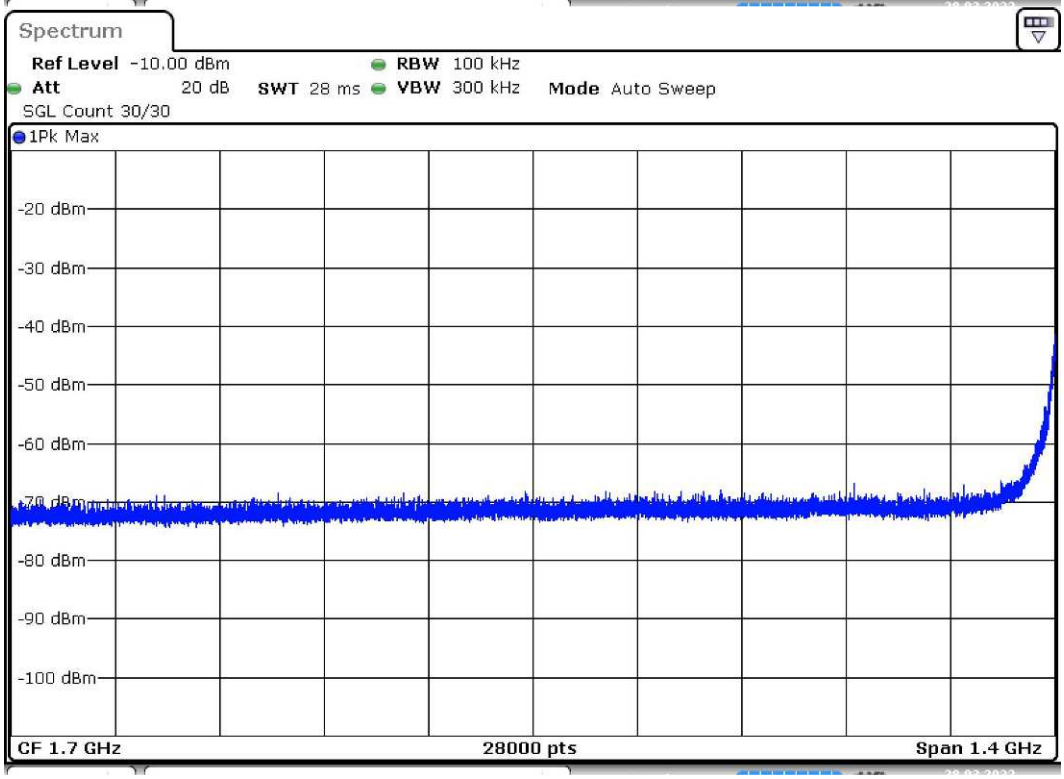


TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

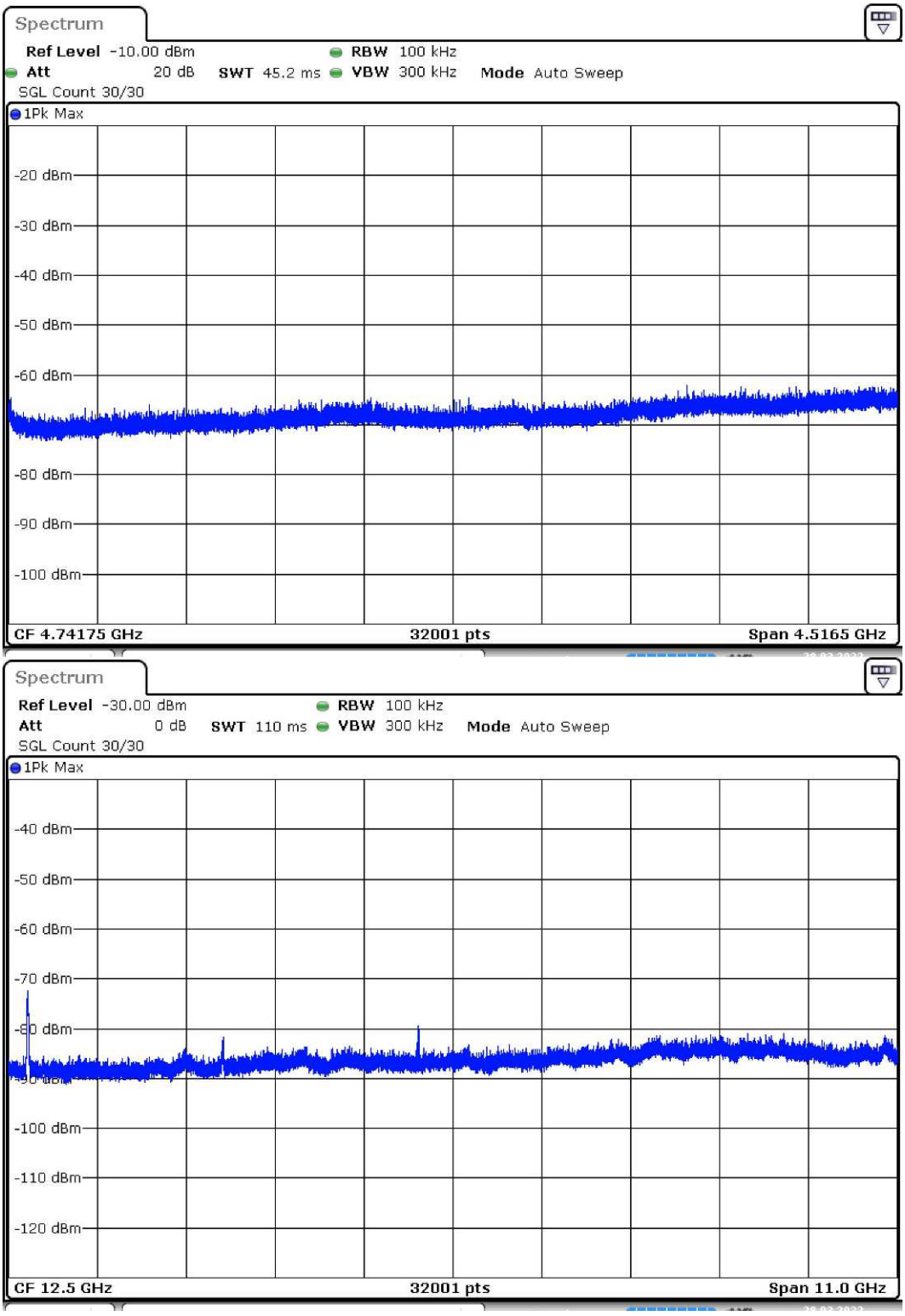
802.11n (20MHz), Lowest Channel, Plot A



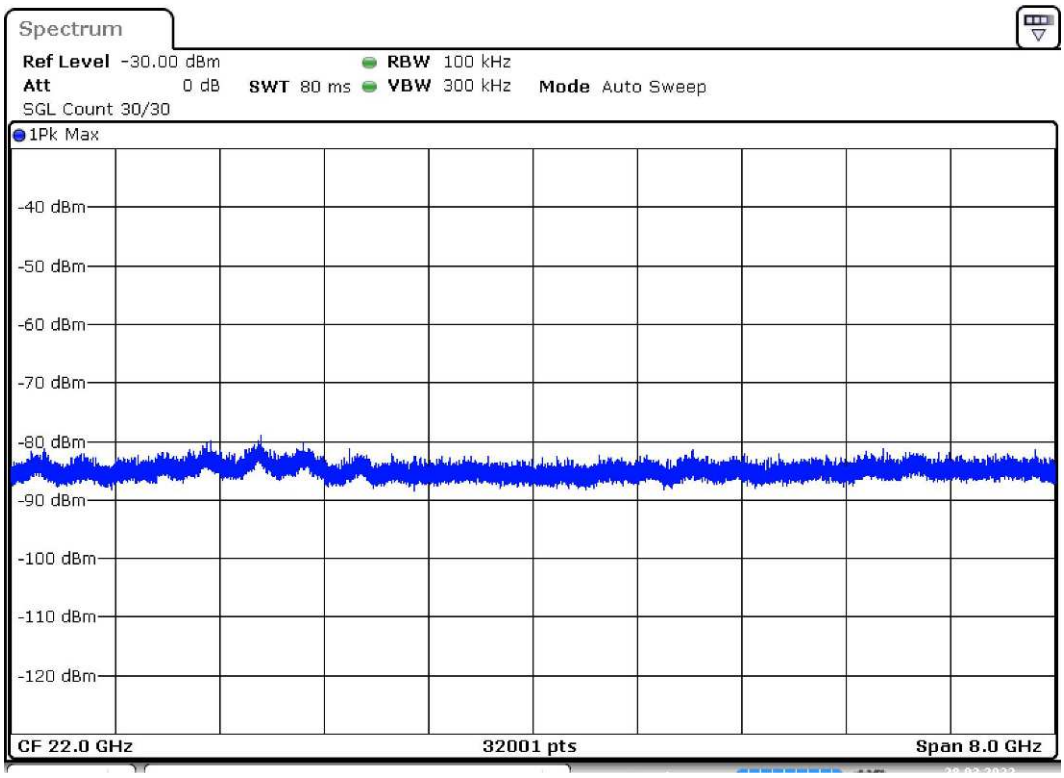


TEST REPORT

802.11n (20MHz), Lowest Channel, Plot B



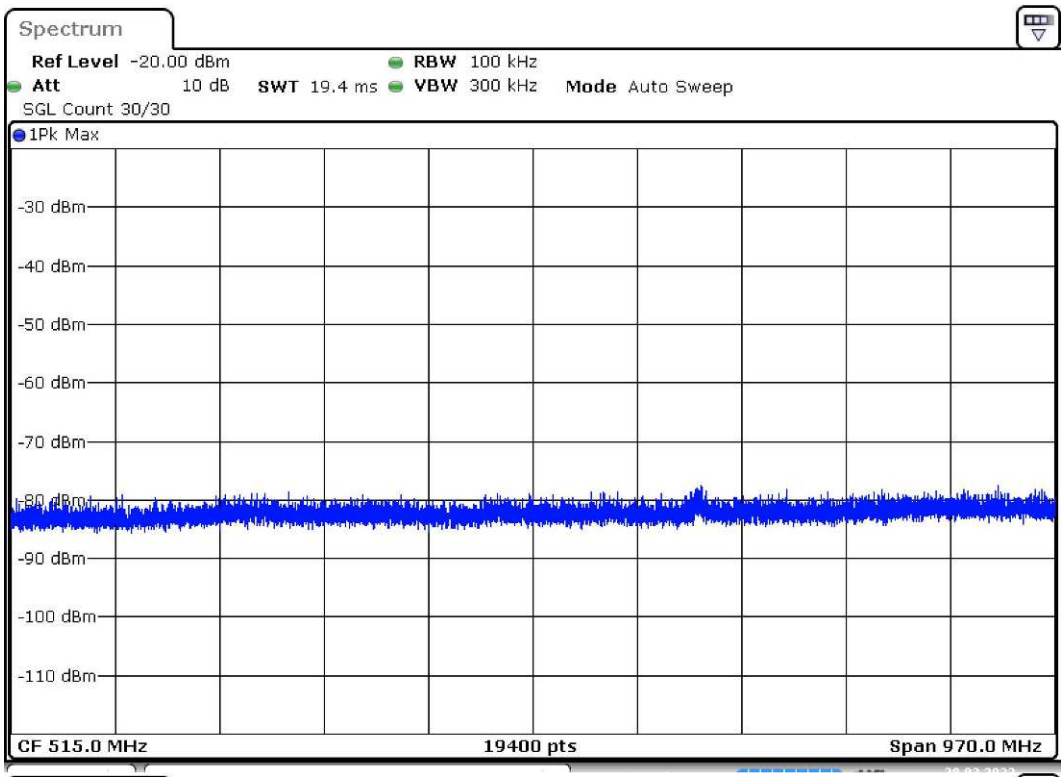
TEST REPORT

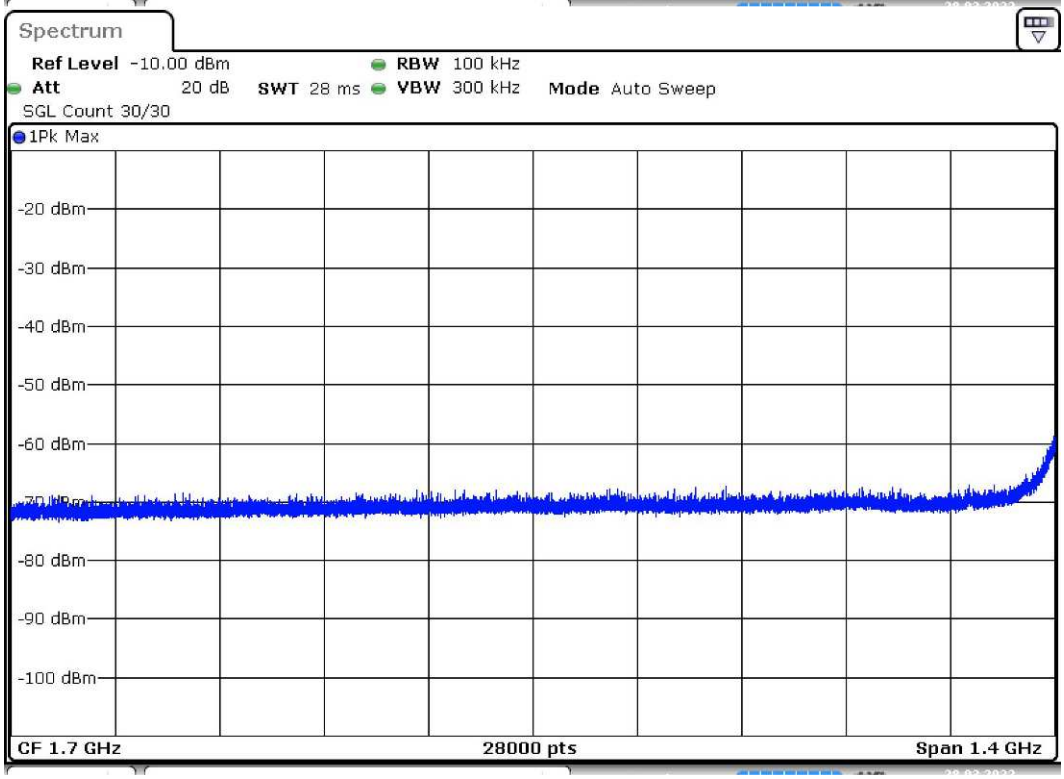

Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
Att 0 dB
SWT 80 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 22.0 GHz
32001 pts
Span 8.0 GHz

TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

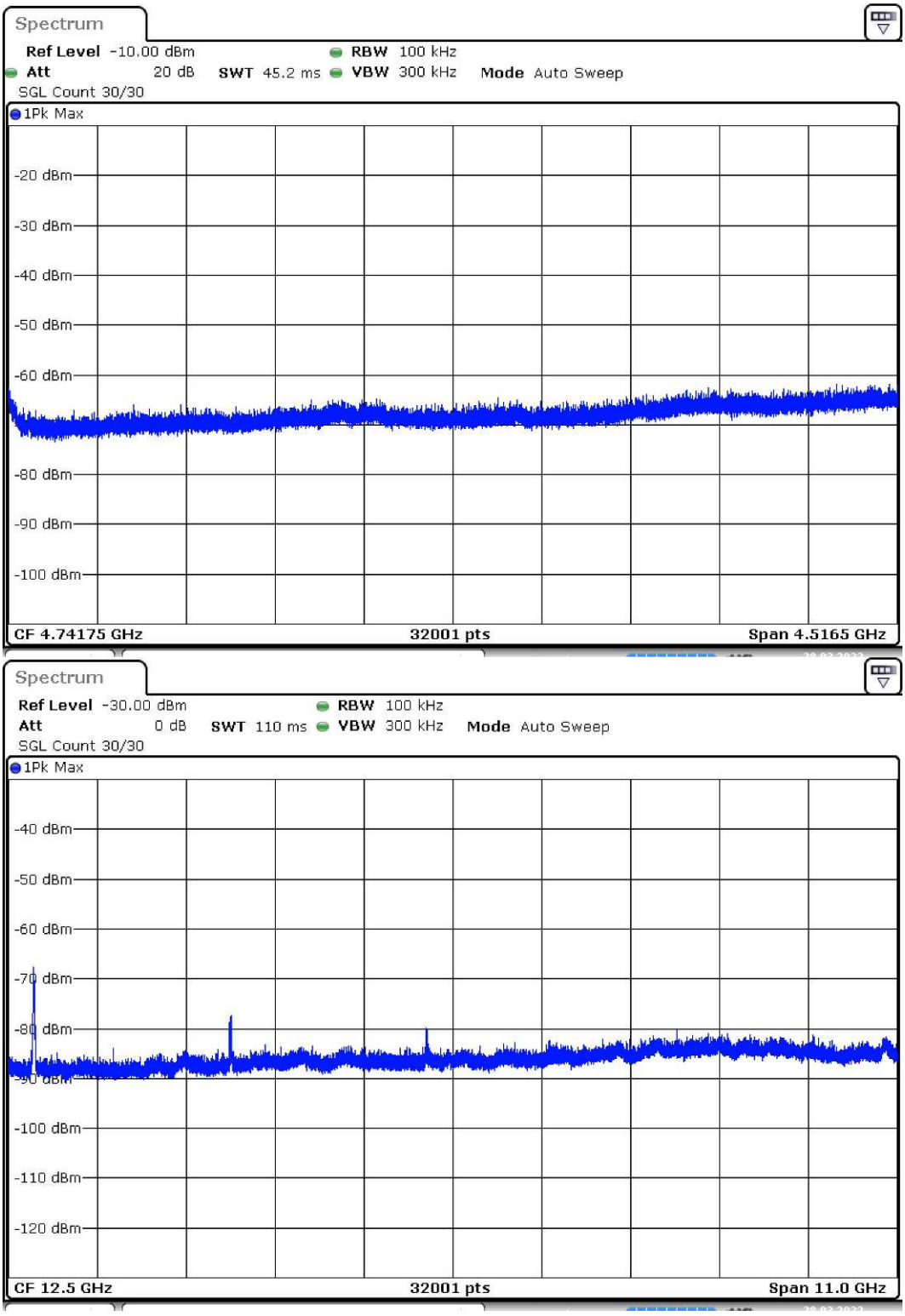
802.11n (20MHz), Middle Channel, Plot A



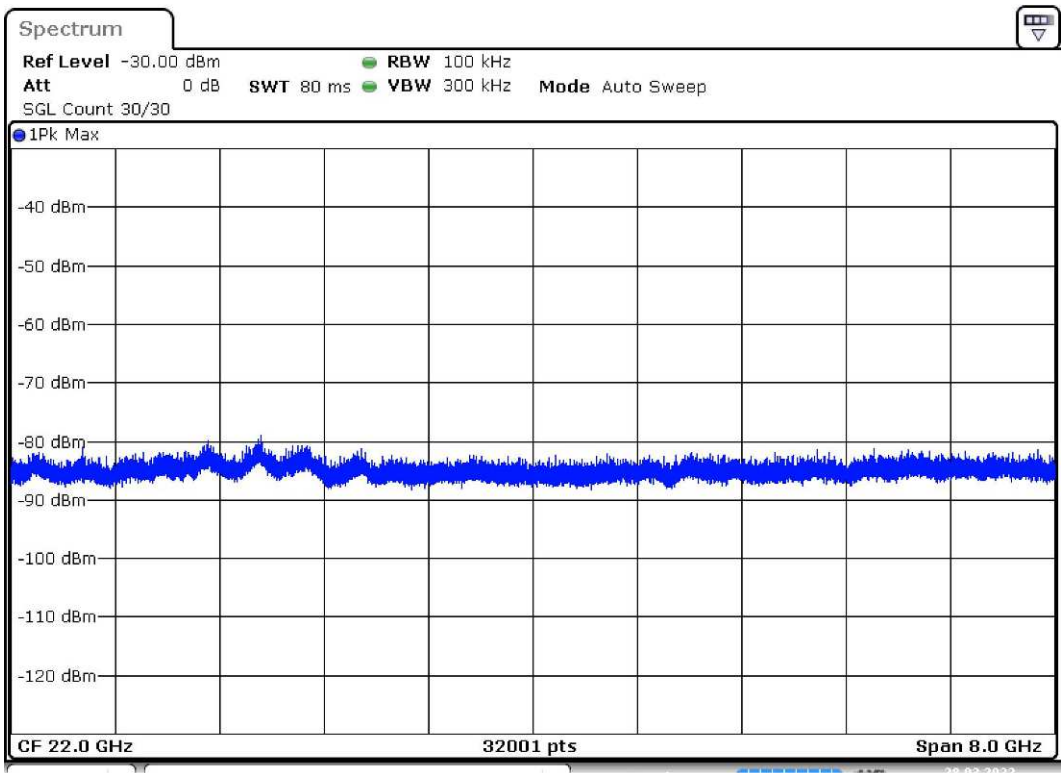


TEST REPORT

802.11n (20MHz), Middle Channel, Plot B



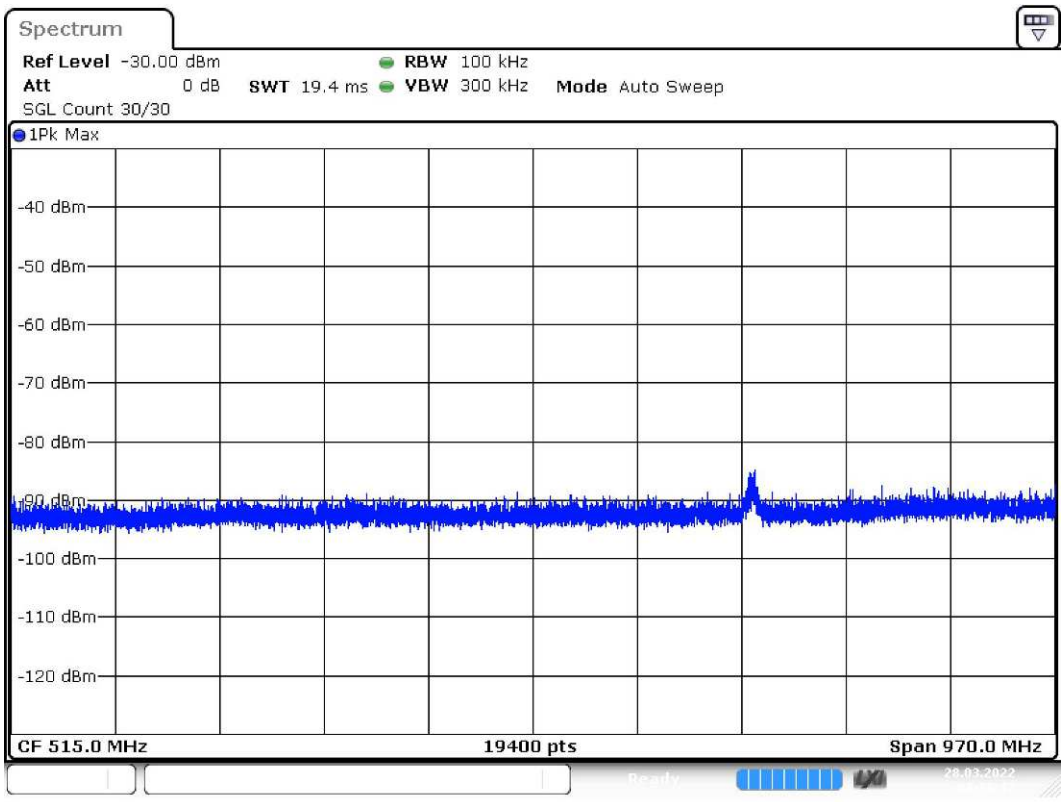
TEST REPORT


Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
Att 0 dB
SWT 80 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 22.0 GHz
32001 pts
Span 8.0 GHz

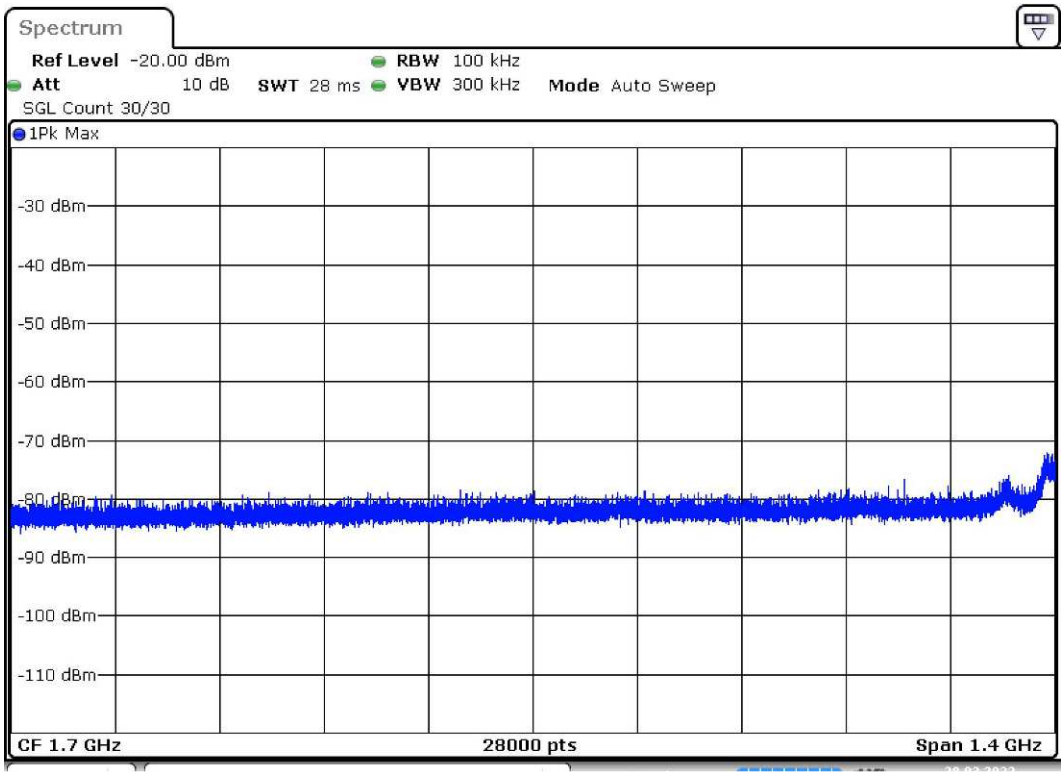
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11n (20MHz), Highest Channel, Plot A

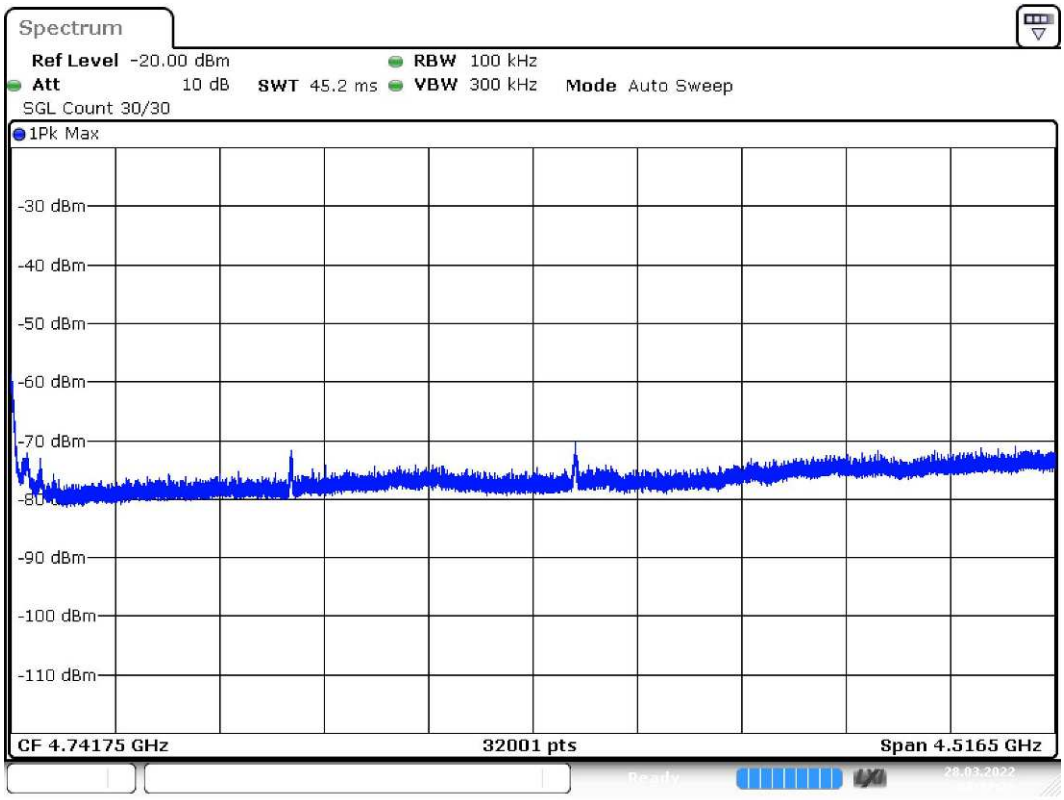


Date: 28.MAR.2022 08:28:17

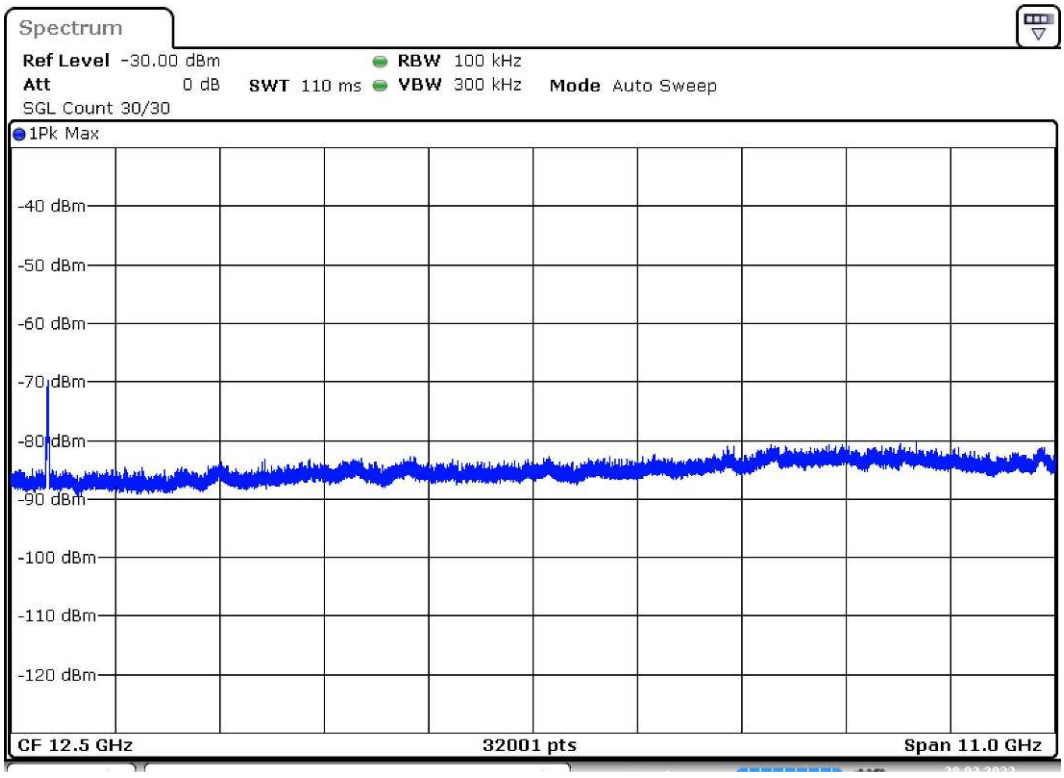


TEST REPORT

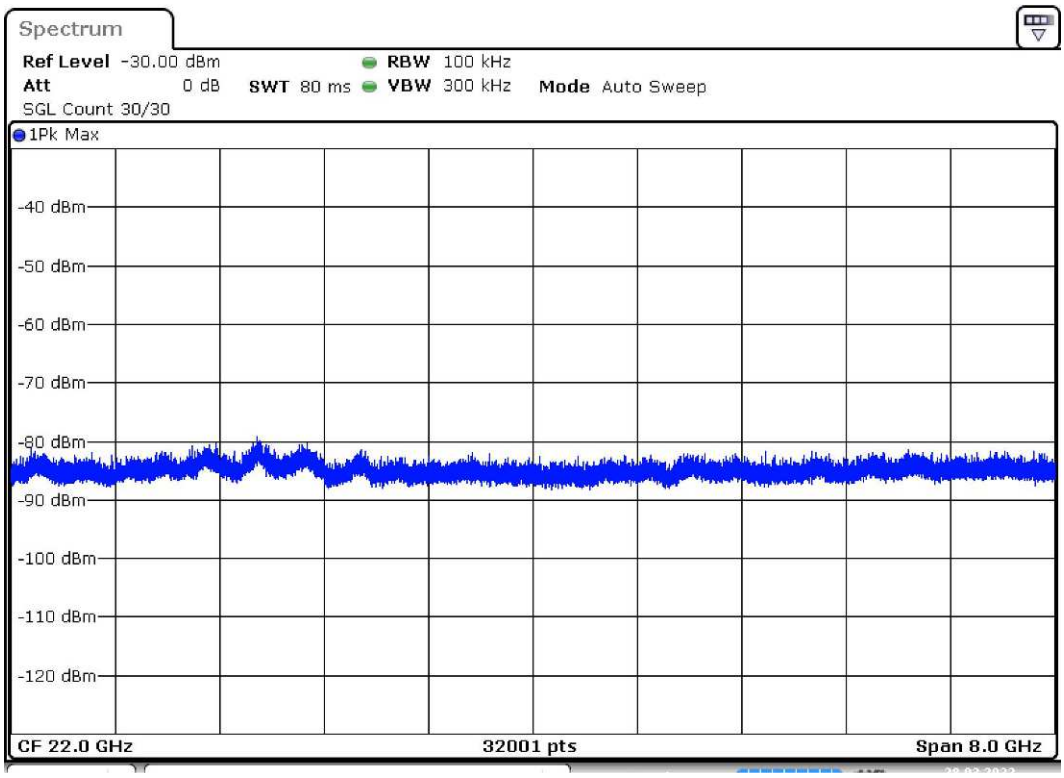
802.11n (20MHz), Highest Channel, Plot B



Date: 28.MAR.2022 08:32:27



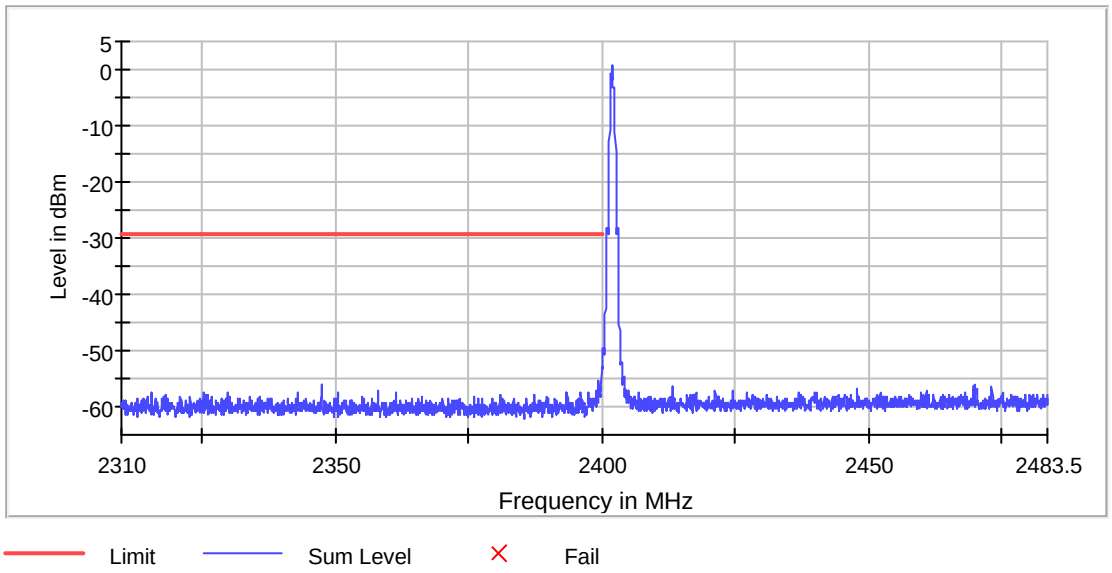
TEST REPORT


Spectrum
Ref Level -30.00 dBm
RBW 100 kHz
Att 0 dB
SWT 80 ms
VBW 300 kHz
Mode Auto Sweep
SGL Count 30/30
1Pk Max
-40 dBm
-50 dBm
-60 dBm
-70 dBm
-80 dBm
-90 dBm
-100 dBm
-110 dBm
-120 dBm
CF 22.0 GHz
32001 pts
Span 8.0 GHz

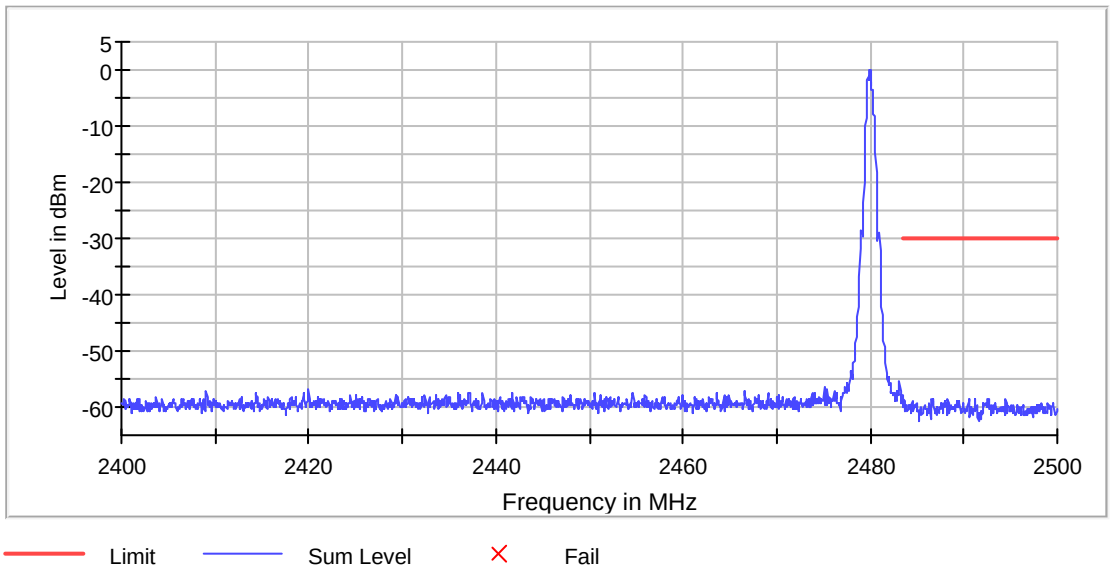
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

BLE 5.2, Lowest Channel, Bandedge



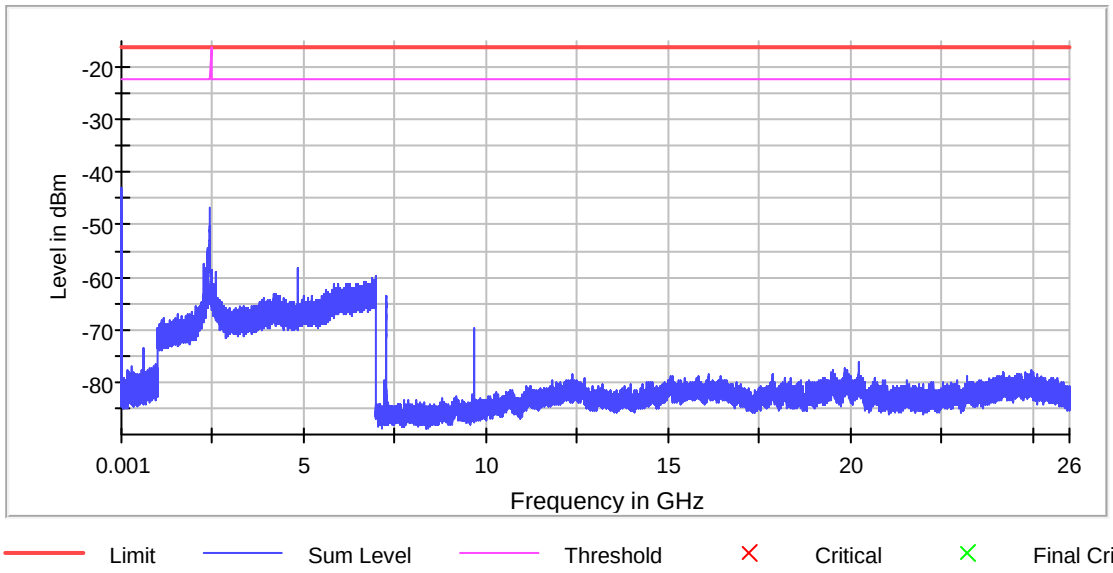
BLE 5.2, Highest Channel, Bandedge



TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

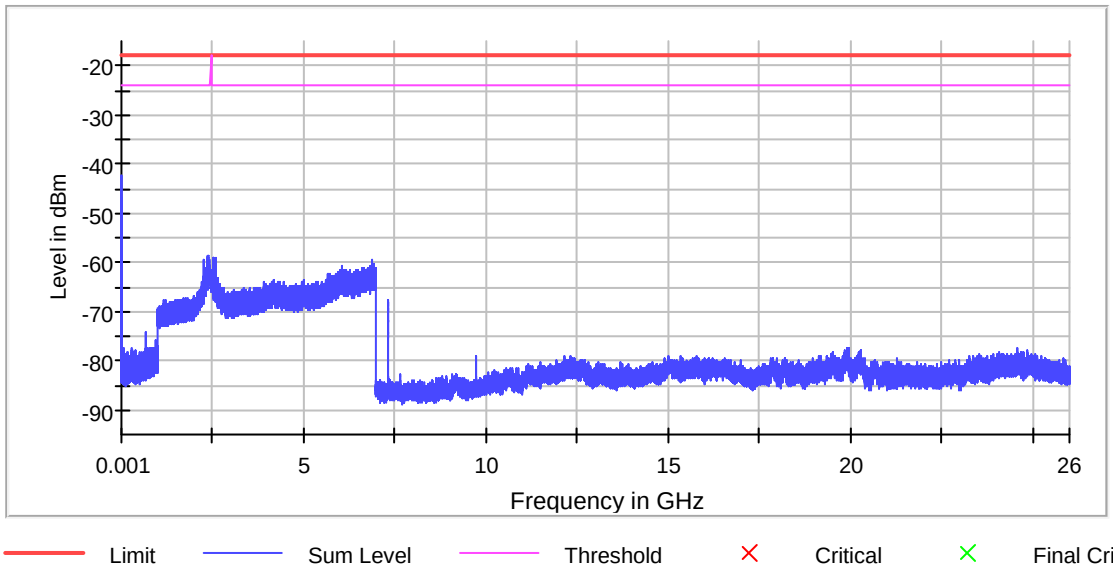
BLE 5.2, Lowest Channel



TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

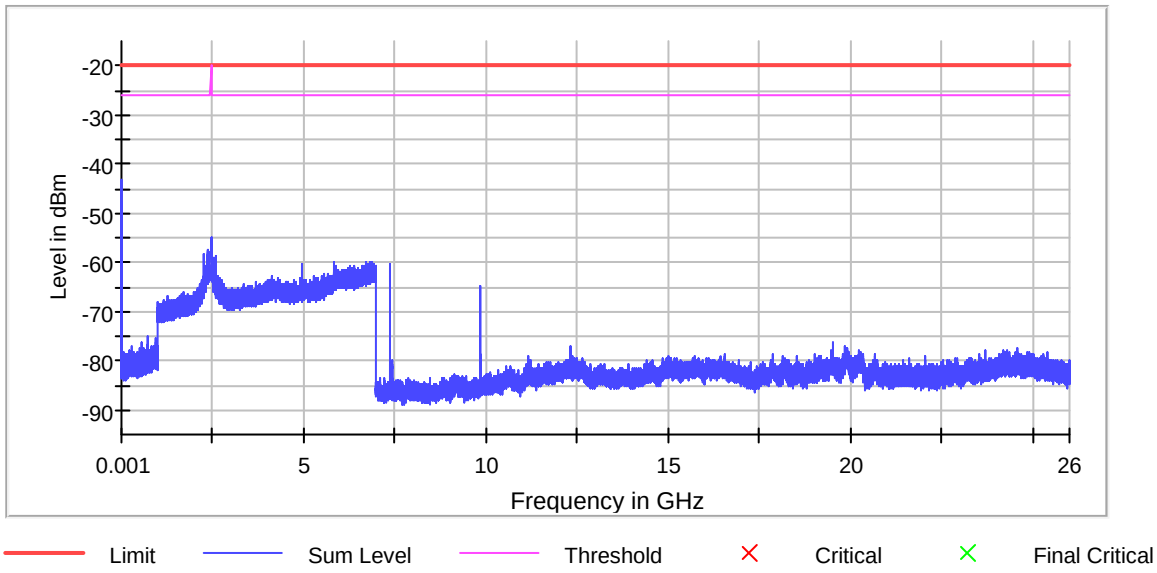
BLE 5.2, Middle Channel



TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

BLE 5.2, Highest Channel



TEST REPORT

4.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

FS = RA + AF + CF - AG + PD + AV

Where FS = Field Strength in dBµV/m
RA = Receiver Amplitude (including preamplifier) in dBµV
CF = Cable Attenuation Factor in dB
AF = Antenna Factor in dB
AG = Amplifier Gain in dB
PD = Pulse Desensitization in dB
AV = Average Factor in -dB

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

FS = RA + AF + CF - AG + PD + AV

Example
Assume a receiver reading of 62.0 dBµV is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 dBµV/m. This value in dBµV/m is converted to its corresponding level in µV/m.

RA = 62.0 dBµV
AF = 7.4 dB
CF = 1.6 dB
AG = 29.0 dB
PD = 0.0 dB
AV = -10 dB

FS = 62.0 + 7.4 + 1.6 – 29.0 + 0.0 + (-10.0) = 32.0 dBµV/m

Level in µV/m = Common Antilogarithm [(32.0 dBµV/m)/20] = 39.8 µV/m

TEST REPORT

4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst-case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

750.025 MHz

The worst case radiated emission configuration photographs are saved with filename: config photos.pdf

4.6.2 Radiated Emission Data

The data in tables 1-12 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 1.8 dB margin

TEST REPORT

RADIATED EMISSION DATA

Mode: TX-Channel 01

Table 1
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	42.4	33	29.4	38.8	54.0	-15.3
V	4824.000	41.6	33	34.9	43.5	54.0	-10.5
V	7236.000	29.7	33	37.9	34.6	54.0	-19.4
V	9648.000	25.9	33	40.4	33.3	54.0	-20.7
V	12060.000	28.4	33	40.5	35.9	54.0	-18.1
V	14472.000	29.0	33	40.0	36.0	54.0	-18.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	57.2	33	29.4	53.6	74.0	-20.4
V	4824.000	51.4	33	34.9	53.3	74.0	-20.7
V	7236.000	43.9	33	37.9	48.8	74.0	-25.2
V	9648.000	42.0	33	40.4	49.4	74.0	-24.6
V	12060.000	37.2	33	40.5	44.7	74.0	-29.3
V	14472.000	39.5	33	40.0	46.5	74.0	-27.5

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement.
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 06

Table 2
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	41.7	33	34.9	43.6	54.0	-10.4
V	7311.000	30.4	33	37.9	35.3	54.0	-18.7
V	9748.000	26.4	33	40.4	33.8	54.0	-20.2
V	12185.000	27.6	33	40.5	35.1	54.0	-18.9
V	14622.000	33.0	33	38.4	38.4	54.0	-15.6

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	51.5	33	34.9	53.4	74.0	-20.6
V	7311.000	43.0	33	37.9	47.9	74.0	-26.1
V	9748.000	44.8	33	40.4	52.2	74.0	-21.8
V	12185.000	37.5	33	40.5	45.0	74.0	-29.0
V	14622.000	39.7	33	38.4	45.1	74.0	-28.9

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 11

Table 3
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	42.8	33	29.4	39.2	54.0	-14.8
V	4924.000	39.3	33	34.9	41.2	54.0	-12.8
V	7386.000	26.1	33	37.9	31.0	54.0	-23.0
V	9848.000	26.9	33	40.4	34.3	54.0	-19.7
V	12310.000	27.6	33	40.5	35.1	54.0	-18.9
V	14772.000	32.9	33	38.4	38.3	54.0	-15.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	58.0	33	29.4	54.4	74.0	-19.7
V	4924.000	51.9	33	34.9	53.8	74.0	-20.2
V	7386.000	43.4	33	37.9	48.3	74.0	-25.7
V	9848.000	41.2	33	40.4	48.6	74.0	-25.4
V	12310.000	36.5	33	40.5	44.0	74.0	-30.0
V	14772.000	39.5	33	38.4	44.9	74.0	-29.1

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 01

Table 4
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	50.0	33	29.4	46.4	54.0	-7.6
V	4824.000	41.6	33	34.9	43.5	54.0	-10.5
V	7236.000	29.7	33	37.9	34.6	54.0	-19.4
V	9648.000	25.9	33	40.4	33.3	54.0	-20.7
V	12060.000	28.4	33	40.5	35.9	54.0	-18.1
V	14472.000	29.0	33	40.0	36.0	54.0	-18.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	63.1	33	29.4	59.5	74.0	-14.5
V	4824.000	51.4	33	34.9	53.3	74.0	-20.7
V	7236.000	43.9	33	37.9	48.8	74.0	-25.2
V	9648.000	42.0	33	40.4	49.4	74.0	-24.6
V	12060.000	37.2	33	40.5	44.7	74.0	-29.3
V	14472.000	39.5	33	40.0	46.5	74.0	-27.5

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 06

Table 5
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	41.7	33	34.9	43.6	54.0	-10.4
V	7311.000	30.4	33	37.9	35.3	54.0	-18.7
V	9748.000	26.4	33	40.4	33.8	54.0	-20.2
V	12185.000	27.6	33	40.5	35.1	54.0	-18.9
V	14622.000	33.0	33	38.4	38.4	54.0	-15.6

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	51.5	33	34.9	53.4	74.0	-20.6
V	7311.000	43.0	33	37.9	47.9	74.0	-26.1
V	9748.000	44.8	33	40.4	52.2	74.0	-21.8
V	12185.000	37.5	33	40.5	45.0	74.0	-29.0
V	14622.000	39.7	33	38.4	45.1	74.0	-28.9

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 11

Table 6
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	50.9	33	29.4	47.3	54.0	-6.7
V	4924.000	39.3	33	34.9	41.2	54.0	-12.8
V	7386.000	26.1	33	37.9	31.0	54.0	-23.0
V	9848.000	26.9	33	40.4	34.3	54.0	-19.7
V	12310.000	27.6	33	40.5	35.1	54.0	-18.9
V	14772.000	32.9	33	38.4	38.3	54.0	-15.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	63.9	33	29.4	60.3	74.0	-13.7
V	4924.000	51.9	33	34.9	53.8	74.0	-20.2
V	7386.000	43.4	33	37.9	48.3	74.0	-25.7
V	9848.000	41.2	33	40.4	48.6	74.0	-25.4
V	12310.000	36.5	33	40.5	44.0	74.0	-30.0
V	14772.000	39.5	33	38.4	44.9	74.0	-29.1

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 01

Table 7
IEEE 802.11n (20MHz) (OFDM, MCS0)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	50.0	33	29.4	46.4	54.0	-7.6
V	4824.000	41.6	33	34.9	43.5	54.0	-10.5
V	7236.000	29.7	33	37.9	34.6	54.0	-19.4
V	9648.000	25.9	33	40.4	33.3	54.0	-20.7
V	12060.000	28.4	33	40.5	35.9	54.0	-18.1
V	14472.000	29.0	33	40.0	36.0	54.0	-18.0

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2389.313	63.1	33	29.4	59.5	74.0	-14.5
V	4824.000	51.4	33	34.9	53.3	74.0	-20.7
V	7236.000	43.9	33	37.9	48.8	74.0	-25.2
V	9648.000	42.0	33	40.4	49.4	74.0	-24.6
V	12060.000	37.2	33	40.5	44.7	74.0	-29.3
V	14472.000	39.5	33	40.0	46.5	74.0	-27.5

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 06

Table 8
IEEE 802.11n (20MHz) (OFDM, MCS0)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	41.7	33	34.9	43.6	54.0	-10.4
V	7311.000	30.4	33	37.9	35.3	54.0	-18.7
V	9748.000	26.4	33	40.4	33.8	54.0	-20.2
V	12185.000	27.6	33	40.5	35.1	54.0	-18.9
V	14622.000	33.0	33	38.4	38.4	54.0	-15.6

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	4874.000	51.5	33	34.9	53.4	74.0	-20.6
V	7311.000	43.0	33	37.9	47.9	74.0	-26.1
V	9748.000	44.8	33	40.4	52.2	74.0	-21.8
V	12185.000	37.5	33	40.5	45.0	74.0	-29.0
V	14622.000	39.7	33	38.4	45.1	74.0	-28.9

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 11

Table 9
IEEE 802.11n (20MHz) (OFDM, MCS0)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at Average 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	50.9	33	29.4	47.3	54.0	-6.7
V	4924.000	39.3	33	34.9	41.2	54.0	-12.8
V	7386.000	26.1	33	37.9	31.0	54.0	-23.0
V	9848.000	26.9	33	40.4	34.3	54.0	-19.7
V	12310.000	27.6	33	40.5	35.1	54.0	-18.9
V	14772.000	32.9	33	38.4	38.3	54.0	-15.7

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	64.5	33	29.4	60.9	74.0	-13.1
V	4924.000	51.9	33	34.9	53.8	74.0	-20.2
V	7386.000	43.4	33	37.9	48.3	74.0	-25.7
V	9848.000	41.2	33	40.4	48.6	74.0	-25.4
V	12310.000	36.5	33	40.5	44.0	74.0	-30.0
V	14772.000	39.5	33	38.4	44.9	74.0	-29.1

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 2402MHz

Table 10
(Bluetooth 5.2 BLE)

Lowest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2389.993	40.5	33	29.4	36.9	54.0	-17.1
V	4804.000	38.8	33	34.9	40.7	54.0	-13.3
V	7206.000	33.2	33	37.9	38.1	54.0	-15.9
V	9608.000	36.2	33	40.4	43.6	54.0	-10.4
V	12010.000	32.7	33	40.5	40.2	54.0	-13.8
V	14412.000	32.7	33	40.0	39.7	54.0	-14.3

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2389.993	55.2	33	29.4	51.6	74.0	-22.4
V	4804.000	57.5	33	34.9	59.4	74.0	-14.6
V	7206.000	42.8	33	37.9	47.7	74.0	-26.3
V	9608.000	41.0	33	40.4	48.4	74.0	-25.6
V	12010.000	35.1	33	40.5	42.6	74.0	-31.4
V	14412.000	35.7	33	40.0	42.7	74.0	-31.3

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 2440MHz

Table 11
(Bluetooth 5.2 BLE)

Middle Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
V	4880.000	37.5	33	34.9	39.4	54.0	-14.6
V	7320.000	34.1	33	37.9	39.0	54.0	-15.0
V	9760.000	31.0	33	40.4	38.4	54.0	-15.6
V	12200.000	34.3	33	40.5	41.8	54.0	-12.2
V	14640.000	34.7	33	38.4	40.1	54.0	-13.9

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
V	4880.000	57.1	33	34.9	59.0	74.0	-15.0
V	7320.000	43.5	33	37.9	48.4	74.0	-25.6
V	9760.000	42.1	33	40.4	49.5	74.0	-24.5
V	12200.000	37.3	33	40.5	44.8	74.0	-29.2
V	14640.000	38.5	33	38.4	43.9	74.0	-30.1

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: TX-Channel 2480MHz

Table 12
(Bluetooth 5.2 BLE)

Highest Channel

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	41.4	33	29.4	37.8	54.0	-16.2
V	4960.000	38.2	33	34.9	40.1	54.0	-13.9
V	7440.000	35.5	33	37.9	40.4	54.0	-13.6
V	9920.000	31.3	33	40.4	38.7	54.0	-15.3
V	12400.000	34.4	33	40.5	41.9	54.0	-12.1
V	14880.000	34.1	33	38.4	39.5	54.0	-14.5

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBµV/m)	Peak Limit at 3m (dBµV/m)	Margin (dB)
H	2483.500	55.1	33	29.4	51.5	74.0	-22.5
V	4960.000	58.4	33	34.9	60.3	74.0	-13.7
V	7440.000	43.9	33	37.9	48.8	74.0	-25.2
V	9920.000	42.0	33	40.4	49.4	74.0	-24.6
V	12400.000	37.2	33	40.5	44.7	74.0	-29.3
V	14880.000	38.1	33	38.4	43.5	74.0	-30.5

NOTES:
1. Peak detector is used for the emission measurement.
2. Average detector is used for the average data of emission measurement
3. All measurements were made at 3 meters.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emissions within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

Mode: Transmitting + Charging Internal Battery + USB Charging Out

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	49.128	27.8	16	11.0	22.8	40.0	-17.2
V	106.045	37.5	16	13.0	34.5	43.5	-9.0
H	246.312	34.6	16	20.0	38.6	46.0	-7.4
V	626.788	25.8	16	29.0	38.8	46.0	-7.2
V	724.956	29.5	16	30.0	43.5	46.0	-2.5
V	750.025	30.2	16	30.0	44.2	46.0	-1.8
V	774.224	25.8	16	31.0	40.8	46.0	-5.2
V	792.265	27.8	16	31.0	42.8	46.0	-3.2

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Value in the margin column shows emission below limit.
4. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

TEST REPORT

4.0 EQUIPMENT PHOTOGRAPHS

For electronic filing, the photographs are saved with filename: external photos.pdf and internal photos.pdf.

5.0 PRODUCT LABELLING

For electronics filing, the FCC ID label artwork and the label location are saved with filename: label.pdf.

6.0 TECHNICAL SPECIFICATIONS

For electronic filing, the block diagram and schematic of the tested EUT are saved with filename: block.pdf and circuit.pdf respectively.

7.0 INSTRUCTION MANUAL

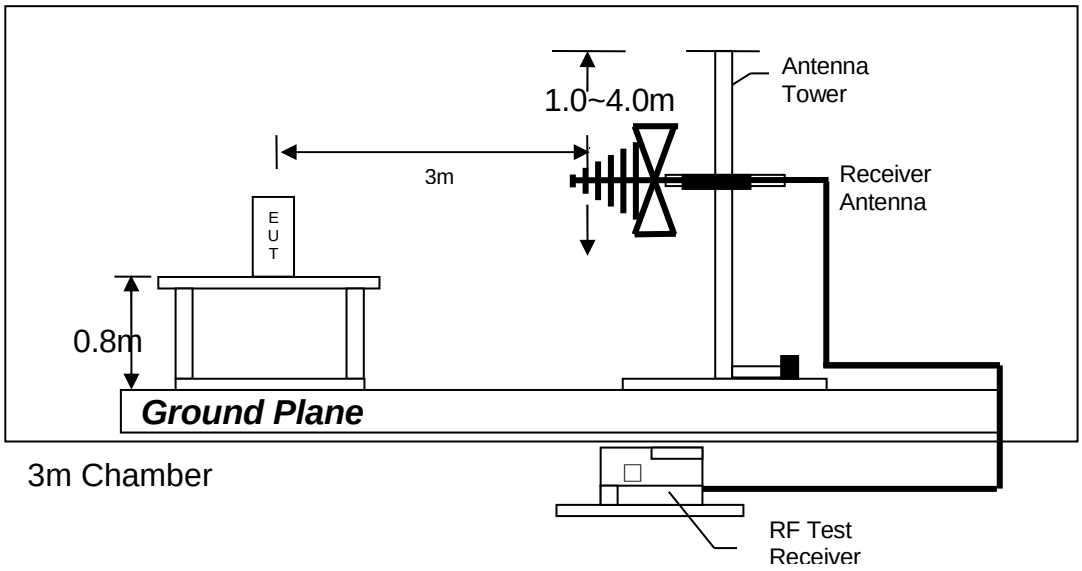
For electronic filing, a preliminary copy of the Instruction Manual is saved with filename: manual.pdf.

This manual will be provided to the end-user with each unit sold/leased in the United States.

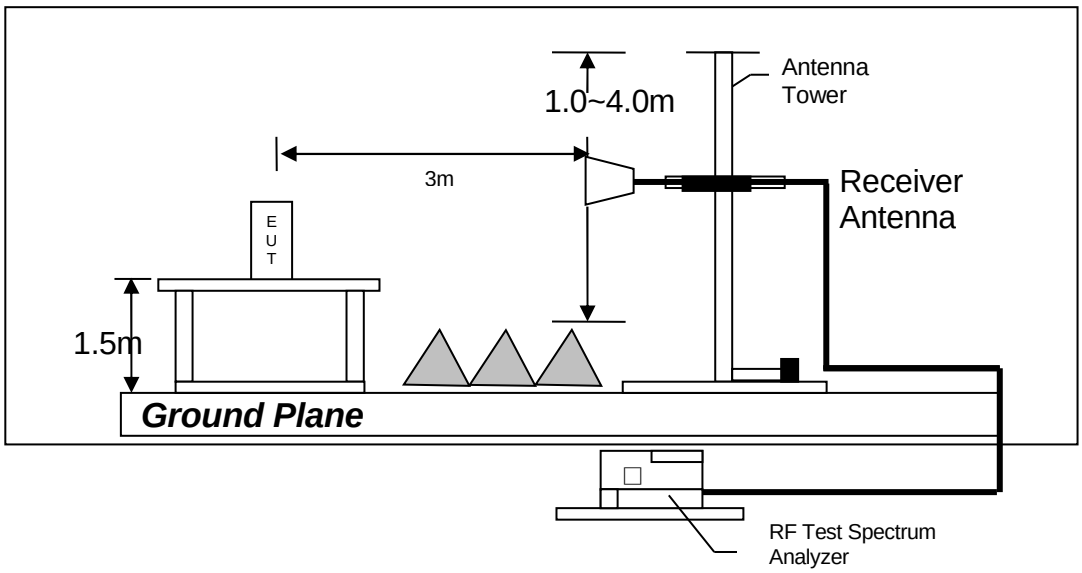
TEST REPORT

4.6.3 Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions up to 1GHz



Test setup of radiated emissions above 1GHz

TEST REPORT

4.6.4 Transmitter Duty Cycle Calculation

Not applicable – No average factor is required.

TEST REPORT

4.7 AC Power Line Conducted Emission

☐ Not applicable – EUT is only powered by battery for operation.

☒ EUT connects to AC power line. Emission Data is listed in following pages.

☐ Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

1.208 MHz

The worst-case line conducted configuration photographs are attached in the Appendix and saved with filename: Conduct Photo.pdf

4.7.2 AC Power Line Conducted Emission Data

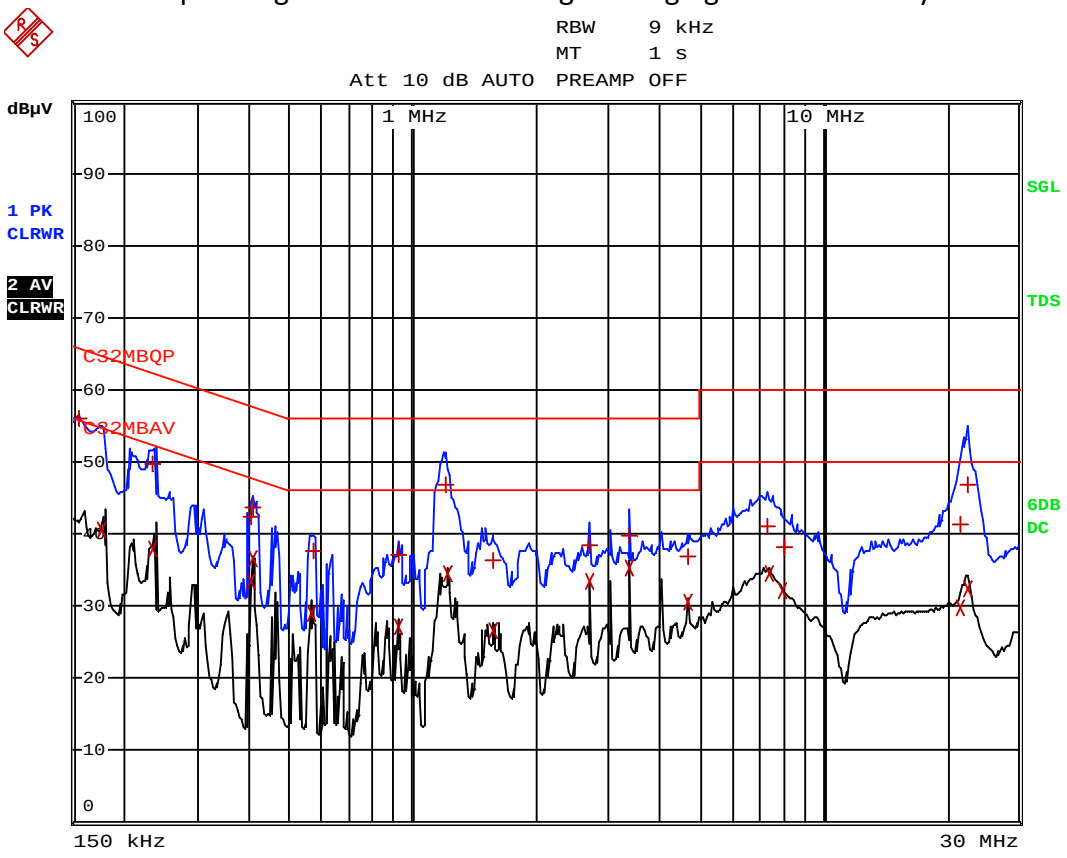
The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance.

Passed by 9.2dB margin

TEST REPORT

CONDUCTED EMISSION

Model No.: KS400B
Date of Test: June 15,2022
Worst Case Operating Mode: Transmitting + Charging Internal Battery + USB Charging Out



TEST REPORT

CONDUCTED EMISSION

Model No.: KS400B
Date of Test: June 15,2022
Worst Case Operating Mode: Transmitting + Charging Internal Battery + USB Charging Out

EDIT PEAK LIST (Final Measurement Results)

Trace1: C32MBQP
Trace2: C32MBAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
1	Quasi Peak	154.5 kHz	55.96	L1	-9.79
2	CISPR Average	177 kHz	40.66	L1	-13.96
1	Quasi Peak	235.5 kHz	49.76	L1	-12.49
2	CISPR Average	235.5 kHz	37.86	L1	-14.39
2	CISPR Average	402 kHz	33.35	L1	-14.45
1	Quasi Peak	402 kHz	42.34	L1	-15.46
2	CISPR Average	406.5 kHz	36.56	L1	-11.15
1	Quasi Peak	406.5 kHz	43.70	L1	-14.01
2	CISPR Average	568.5 kHz	29.03	L1	-16.96
1	Quasi Peak	573 kHz	37.64	L1	-18.35
2	CISPR Average	919.5 kHz	27.24	N	-18.75
1	Quasi Peak	928.5 kHz	37.03	N	-18.97
1	Quasi Peak	1.2075 MHz	46.82	L1	-9.17
2	CISPR Average	1.2165 MHz	34.42	L1	-11.57
2	CISPR Average	1.5675 MHz	26.69	L1	-19.30
1	Quasi Peak	1.572 MHz	36.29	L1	-19.70
2	CISPR Average	2.6925 MHz	33.46	L1	-12.53
1	Quasi Peak	2.6925 MHz	38.54	L1	-17.45
2	CISPR Average	3.3675 MHz	35.31	L1	-10.68
1	Quasi Peak	3.3675 MHz	39.82	L1	-16.17

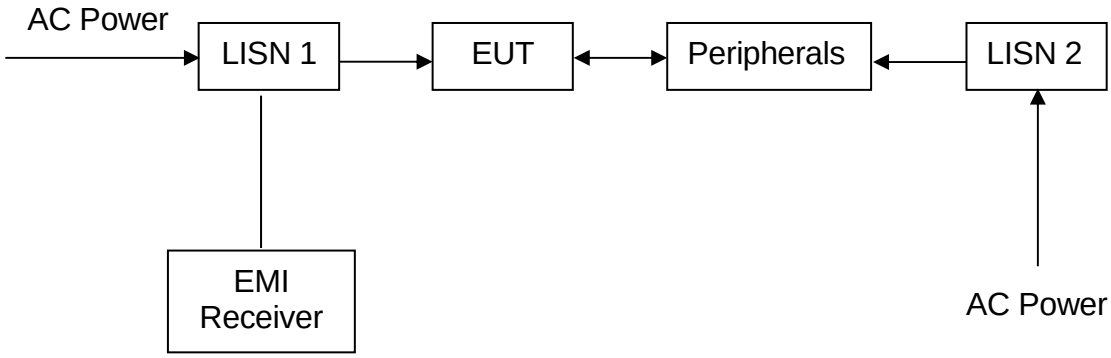
EDIT PEAK LIST (Final Measurement Results)

Trace1: C32MBQP
Trace2: C32MBAV
Trace3: ---

TRACE		FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	4.713 MHz	30.65	L1	-15.34
1	Quasi Peak	4.713 MHz	36.97	N	-19.02
1	Quasi Peak	7.3455 MHz	41.02	N	-18.97
2	CISPR Average	7.413 MHz	34.49	N	-15.50
2	CISPR Average	8.007 MHz	32.08	N	-17.91
1	Quasi Peak	8.043 MHz	38.31	N	-21.68
1	Quasi Peak	21.489 MHz	41.35	L1	-18.65
2	CISPR Average	21.498 MHz	29.87	N	-20.12
2	CISPR Average	22.4385 MHz	32.43	N	-17.57
1	Quasi Peak	22.5555 MHz	46.97	N	-13.02

TEST REPORT

4.7.3 Conducted Emission Test Setup



TEST REPORT

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	Signal and Spectrum Analyzer (10Hz to 40GHz)	Biconical Antenna (20MHz to 200MHz)	EMI Test Receiver 7GHz
Registration No.	EW-3016	EW-3061	EW-3481
Manufacturer	ROHDESCHWARZ	EMCO	ROHDESCHWARZ
Model No.	FSV40	3142E	ESR7
Calibration Date	October 29, 2021	February 02, 2021	December 21, 2021
Calibration Due Date	October 29, 2022	August 02, 2022	December 21, 2022

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	Active Loop H-field (9kHz to 30MHz)
Registration No.	EW-3243	EW-1133	EW-3302
Manufacturer	EMCO	EMCO	EMCO
Model No.	3148B	3115	6502
Calibration Date	June 03, 2021	May 26, 2021	December 13, 2021
Calibration Due Date	December 30, 2022	November 26, 2022	June 13, 2023

Equipment	RF Preamplifier (9kHz to 6000MHz)	2.4GHz Notch Filter	14m Double Shield RF Cable (20MHz to 6GHz)
Registration No.	EW-3006b	EW-3435	EW-2074
Manufacturer	SCHWARZBECK	MICROWAVE	RADIALL
Model No.	BBV9718	N0324413	N(m)-RG142-BNC(m) L=14M
Calibration Date	November 25, 2019	November 16, 2019	November 14, 2019
Calibration Due Date	June 25, 2022	June 16, 2022	August 14, 2022

Equipment	RF Cable 14m (1GHz to 26.5GHz)	Pyramidal Horn Antenna
Registration No.	EW-2781	EW-0905
Manufacturer	GREATBILLION	EMCO
Model No.	SMA m/SHF5MPU /SMA m ra14m,26G	3160-09
Calibration Date	November 24, 2020	July 23, 2019
Calibration Due Date	November 24, 2022	June 23, 2022

TEST REPORT

2) Conducted Emissions Test

Equipment	RF Cable 240cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver
Registration No.	EW-2454	EW-2501	EW-3156
Manufacturer	RADIALL	ROHDESCHWARZ	R&S
Model No.	bnc m st / 142 /bnc m ra 240cm	ENV-216	ESCI7
Calibration Date	January 26, 2022	November 09, 2021	December 21, 2021
Calibration Due Date	January 26, 2023	November 09, 2022	December 21, 2022

3) Conductive Measurement Test

Equipment	5m RF Cable (40GHz)	RF Power Meter	Spectrum Analyzer
Registration No.	EW-2701	EW-3279	EW-3016
Manufacturer	RADIALL	YOKOGAWA	R&S
Model No.	sma m-m 5m 40G	WT310E	FSP40
Calibration Date	November 24, 2020	March 04, 2022	October 29, 2021
Calibration Due Date	November 24, 2022	October 11, 2023	October 29, 2022

4) Bandedge & Bandwidth Measurement

Equipment	Spectrum Analyzer	5m RF Cable (40GHz)
Registration No.	EW-2466	EW-2107
Manufacturer	ROHDESCHWARZ	N/A
Model No.	FSP30	SMA-M to SMA-M
Calibration Date	November 18, 2019	December 11, 2021
Calibration Due Date	August 18, 2022	December 11, 2022

5) Control Software for Radiated Emission

Software Information	
Software Name	EMC32
Manufacturer	ROHDESCHWARZ
Software version	10.50.40

END OF TEST REPORT