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www.intertek.com

TEST REPORT

Report Number: 18121244HKG-001

Application for Original Grant of 47 CFR Part 15 Certification

New Family of RSS-247 Issue 2 Equipment

FCC ID: RNL-CS1

IC: 4970A-CS1

PREPARED AND CHECKED BY:	APPROVED BY:
Signed On File Wong Cheuk Ho, Herbert Lead Engineer	Digitally signed by Kenneth Wong Location: Intertek Testing Services Hong Kong Ltd. Wong Kwok Yeung, Kenneth Senior Lead Engineer Date: April 26, 2019

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TEST REPORT

GENERAL INFORMATION

Applicant Name:	Johnson Controls Inc.
Applicant Address:	4747 South Broad Street Building 101, Suite 330 Philadelphia, PA 19112 USA.
FCC Specification Standard:	FCC Part 15, October 1, 2017 Edition
FCC ID:	RNL-CS1
FCC Model(s):	CS1-WH1-B04, PS2100-WH1-B04
IC Specification Standard:	RSS-247 Issue 2, February 2017 RSS-Gen Issue 5, April 2018
IC:	4970A-CS1
PMN:	CS1 WiFi Thermostat, PS2100 WiFi Thermostat
HVIN:	CS1-WH1-B04, PS2100-WH1-B04
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	WiFi connected Low-Voltage Room Thermostat
Serial Number:	N/A
Sample Receipt Date:	December 28, 2018
Date of Test:	March 09, 2019 to April 08, 2019
Report Date:	April 26, 2019
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

TEST REPORT

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TEST REPORT

EXHIBIT 1 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.0 TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE

1.1 Summary of Test Results

TEST ITEMS	FCC PART 15 SECTION	RSS-247/ RSS-GEN# SECTION	RESULTS	DETAILS SEE SECTION
Antenna Requirement	15.203	7.1.2#	Pass	2.1
Max. Conducted Output Power (Peak)	15.247(b)(3)&(4)	5.4(4)	Pass	4.1
Min. 6dB RF Bandwidth	15.247(a)(2)	5.2(1)	Pass	4.2
Max. Power Density	15.247(e)	5.2(2)	Pass	4.3
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d), 15.209 & 15.109	5.5	Pass	4.6
AC Power Line Conducted Emission	15.207 & 15.107	7.2.4#	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, 2017 Edition
RSS-247 Issue 2, February 2017
RSS-Gen Issue 5 + Amendment 1, March 2019

TEST REPORT

EXHIBIT 2 GENERAL DESCRIPTION

2.0 GENERAL DESCRIPTION

2.1 Product Description

The Equipment Under Test (EUT) is a WiFi Thermostat, equipped with a WLAN module. After connecting the EUT to the WLAN network, user can control the home heater/cooler system via smartphone. The EUT is powered by 24VAC.

The tested model is CS1-WH1-B04.

The Equipment Under Test (EUT) operates at frequency range of 2412MHz to 2462MHz with 11 channels.

For 802.11b mode, it operates at frequency range of 2412MHz to 2462MHz 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 2412MHz to 2462MHz 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 2412MHz to 2462MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

The antenna(s) used in the EUT is internal, integral.

For FCC, the Model(s): PS2100-WH1-B04 is the same as the Model: CS1-WH1-B04 in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are cover color to be sold for marketing purpose.

For IC, the Model(s): PS2100-WH1-B04 is the same as the Model: CS1-WH1-B04 in electronics/electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The only differences between these models are cover color to be sold for marketing purpose.

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

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 No.558074 D01 v05r01 (11-February-2019). All other measurements were made in accordance with the procedures in 47 CFR Part 2 and RSS-Gen Issue 5 (2018).

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. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada No.: 2042H.

2.4 Related Submittal(s) Grants

This is a single application for certification of a transceiver.

TEST REPORT

EXHIBIT 3 SYSTEM TEST CONFIGURATION

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 EUT was powered by a 24VAC.

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 configuration mode and setting of data rate for 802.11b/g/n(HT20) of WiFi mode had been considered, and worst case test data are shown on this test report.

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:

An AC transformer was used to power the device. Their description are listed below.

(1) 24V AC transformer (Input: 120V, Output: 24V) (Provided by Intertek)

Description of Accessories:

(1) N/A

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. 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

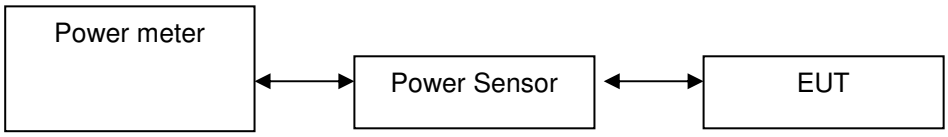
EXHIBIT 4 TEST RESULTS

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 9.1.3 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) Antenna Gain = 3.3 dBi

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	16.8	47.9
Middle Channel:	2437	17.2	52.5
High Channel:	2462	17.4	55.0

IEEE 802.11g (OFDM, 6 Mbps) Antenna Gain = 3.3 dBi

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	21.6	144.5
Middle Channel:	2437	21.8	151.4
High Channel:	2462	16.8	47.9

IEEE 802.11n (20MHz) (OFDM, MCS0) Antenna Gain = 3.3 dBi

Frequency (MHz)		Output in dBm	Output in mWatt
Low Channel:	2412	20.2	104.7
Middle Channel:	2437	20.6	114.8
High Channel:	2462	16.2	41.7

TEST REPORT

4.1 Maximum Conducted Output Power at Antenna Terminals – Cont'd

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 = 17.4 dBm

IEEE 802.11g (OFDM, 9 Mbps)
max. conducted (peak) output level = 21.8 dBm

IEEE 802.11n (20MHz) (OFDM, MCS0)
max. conducted (peak) output level = 20.6 dBm

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

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

The plots of conducted output power are saved as below.

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	10.24
Middle Channel:	2437	10.20
High Channel:	2462	10.24

IEEE 802.11g (OFDM, 6 Mbps)

	Frequency (MHz)	6dB Bandwidth (MHz)
Low Channel:	2412	16.56
Middle Channel:	2437	16.44
High Channel:	2462	16.56

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

	Frequency (MHz)	6dB Bandwidth (MHz)
Low Channel:	2412	17.76
Middle Channel:	2437	17.80
High Channel:	2462	17.76

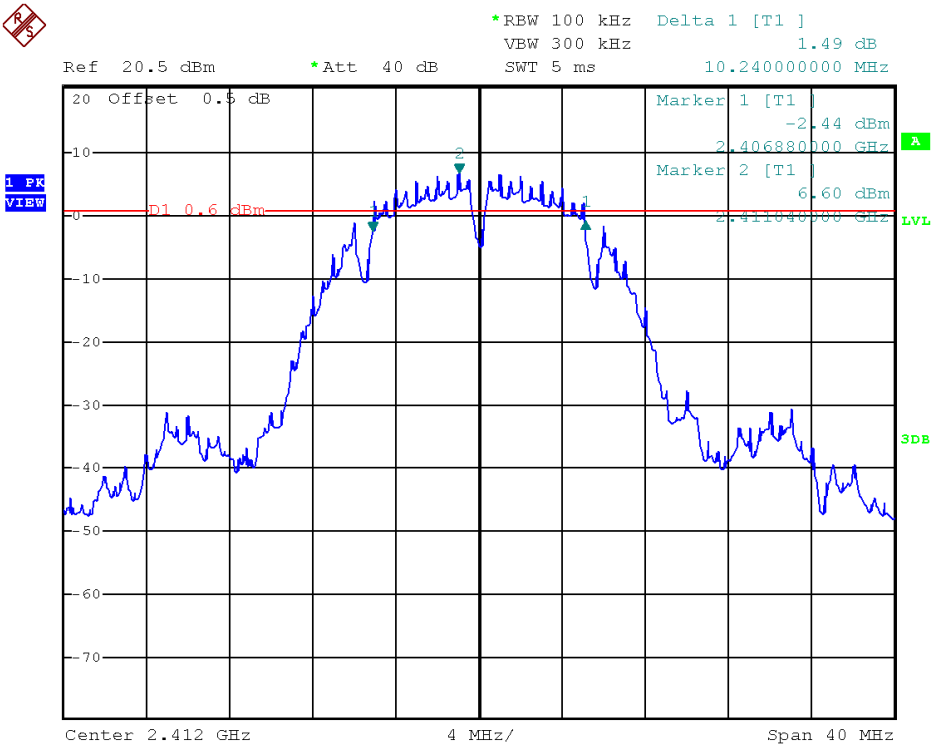
Limits
6 dB bandwidth shall be at least 500kHz

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

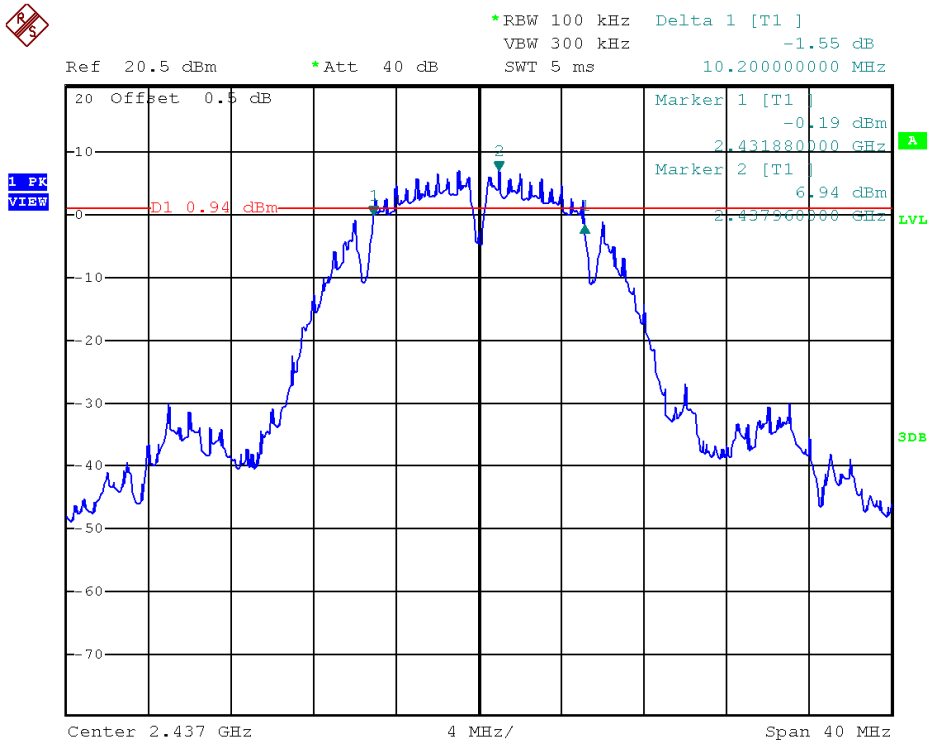
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

802.11b, Lowest Channel



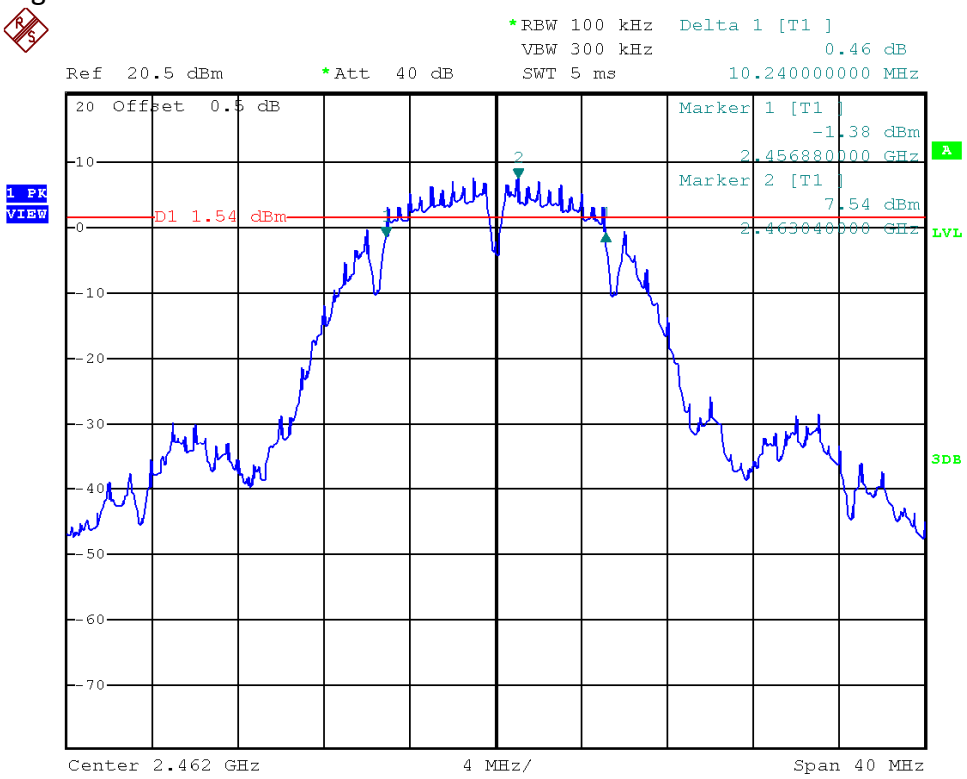
802.11b, Middle Channel



TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

802.11b, Highest Channel



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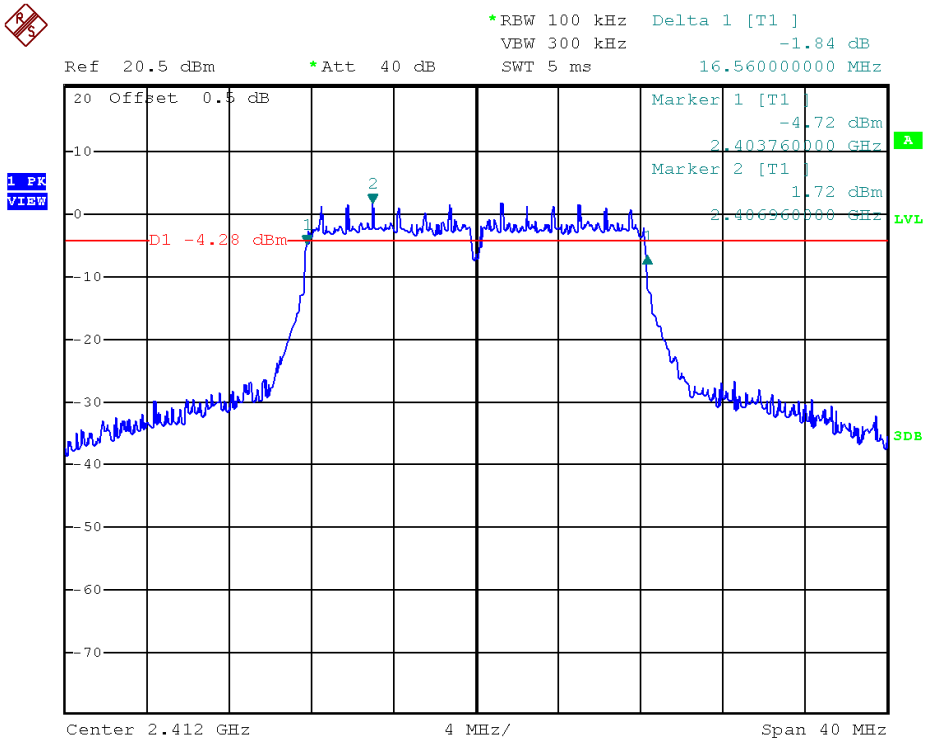
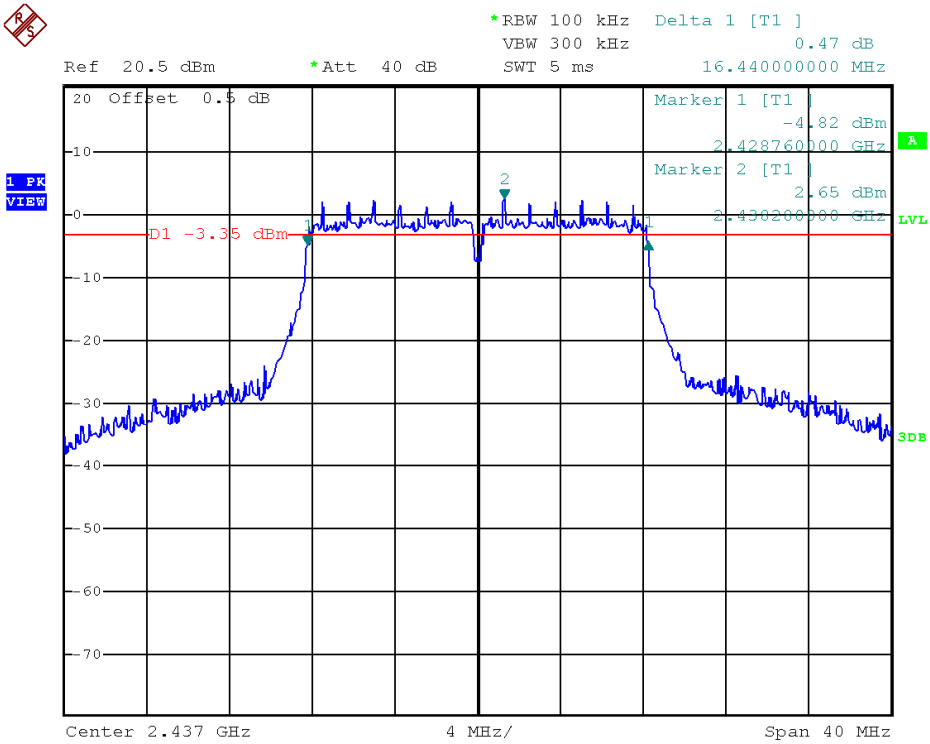
PLOTS OF 6dB RF BANDWIDTH

802.11g, Lowest Channel



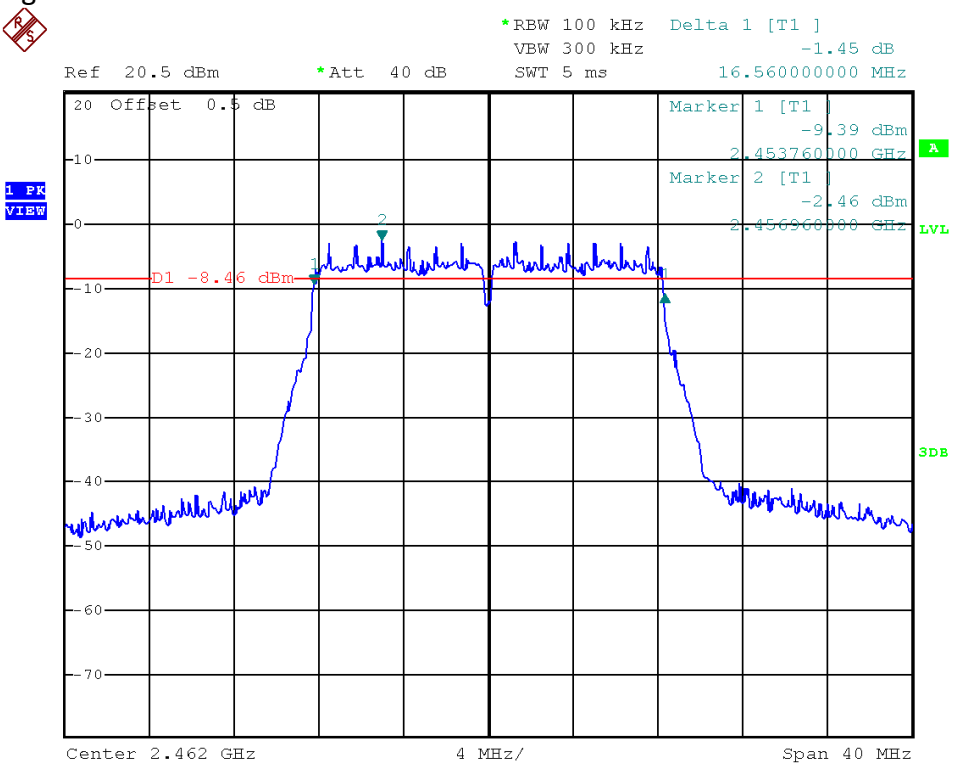
802.11g, Middle Channel



TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

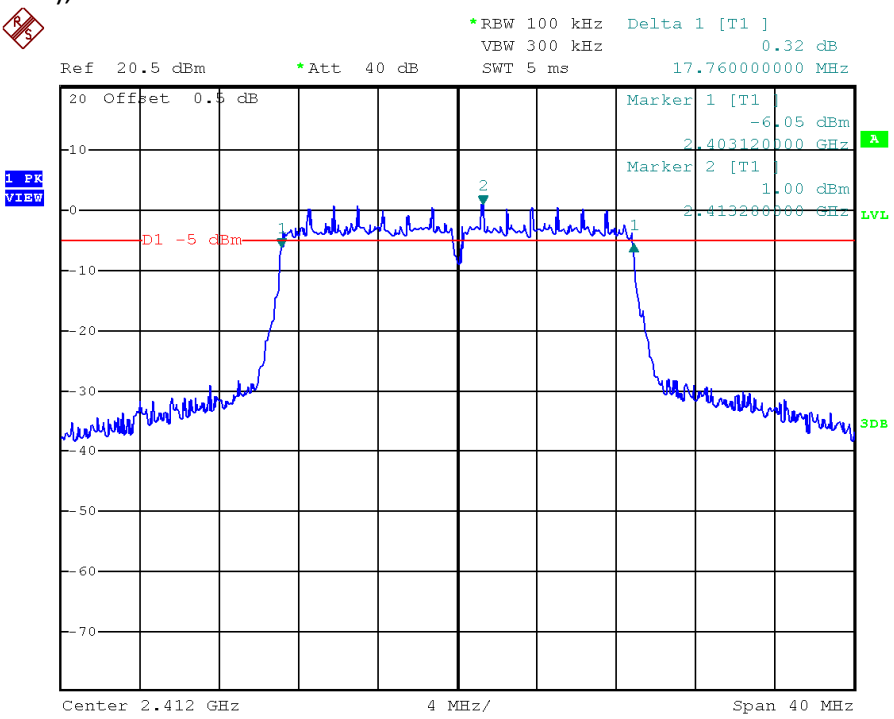
802.11g, Highest Channel



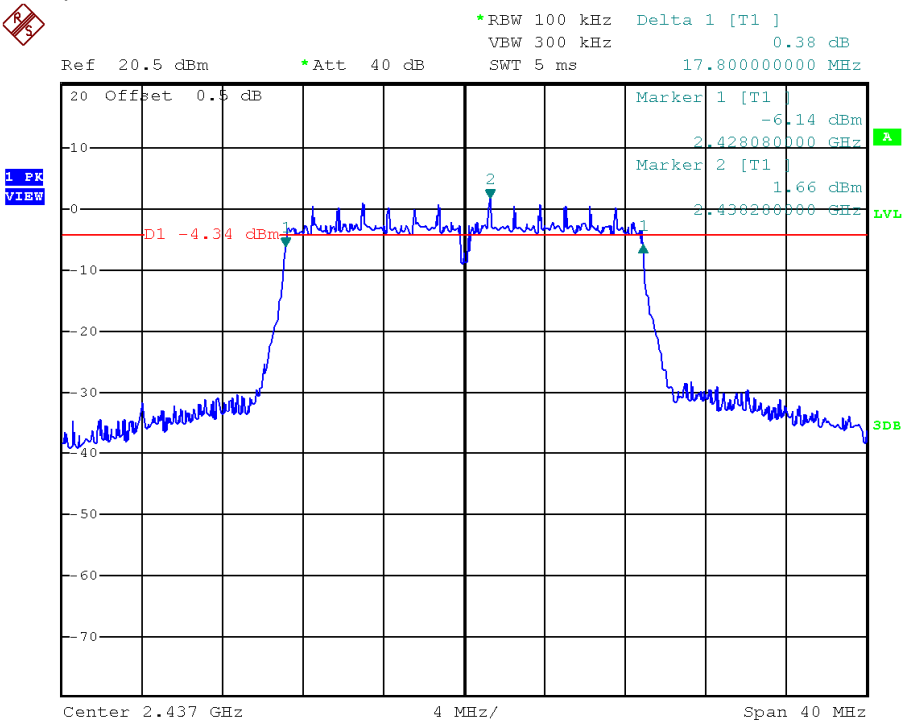
TEST REPORT

PLOTS OF 6dB RF BANDWIDTH

802.11n (20MHz), Lowest Channel



802.11n (20MHz), Middle Channel



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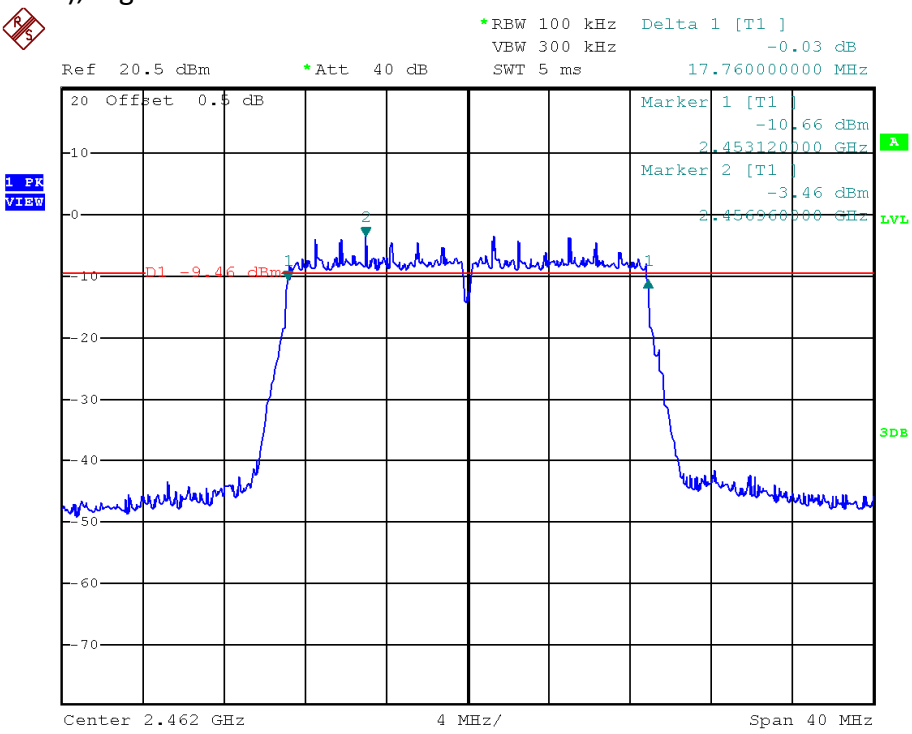
PLOTS OF 6dB RF BANDWIDTH

802.11n (20MHz), Highest Channel



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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	6.44
Middle Channel:	2437	6.96
High Channel:	2462	7.46

IEEE 802.11g (OFDM, 6 Mbps)

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2412	2.04
Middle Channel:	2437	2.78
High Channel:	2462	-2.38

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

Frequency (MHz)		PSD in 100kHz (dBm)
Low Channel:	2412	0.82
Middle Channel:	2437	1.00
High Channel:	2462	-3.45

Cable Loss: 0.5 dB

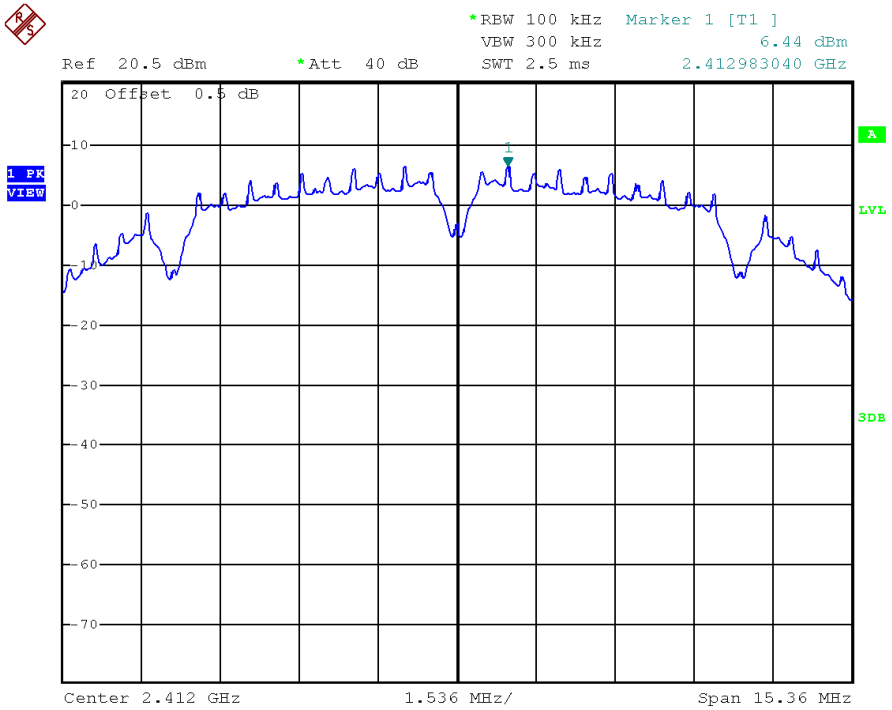
Limit:
8dBm

The plots of power spectral density are as below.

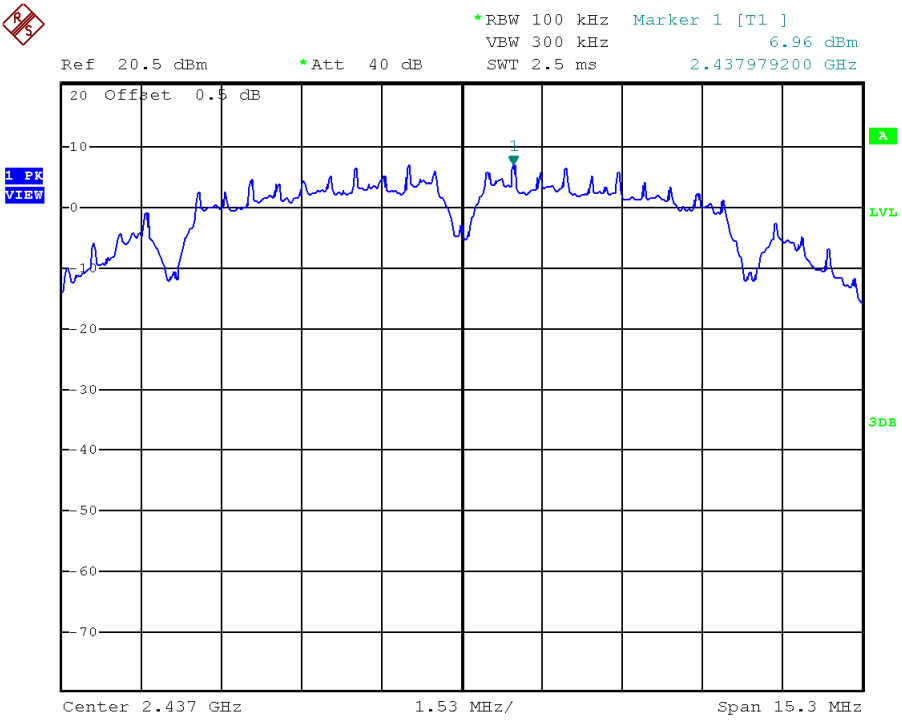
TEST REPORT

PLOTS OF POWER SPECTRAL DENSITY

802.11b, Lowest channel



802.11b, Middle channel



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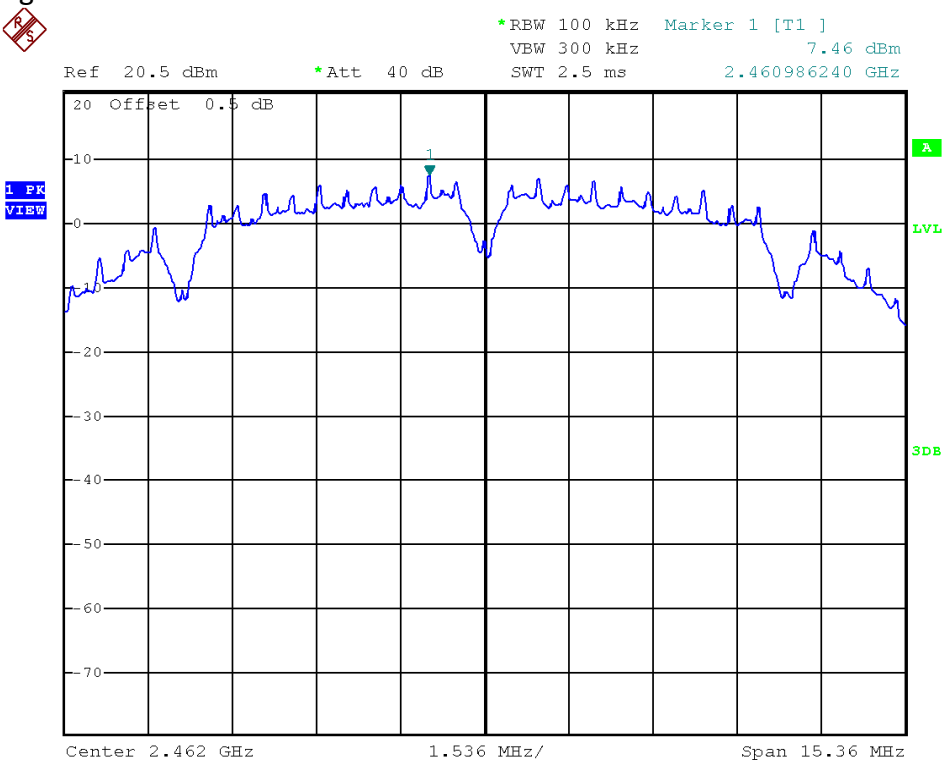
PLOTS OF POWER SPECTRAL DENSITY

802.11b, Highest channel



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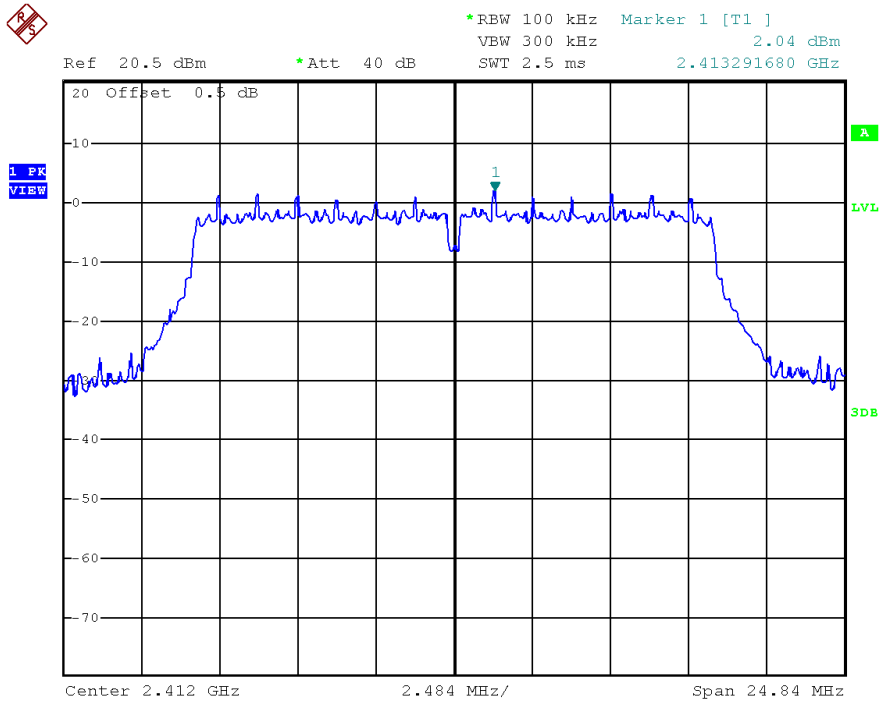
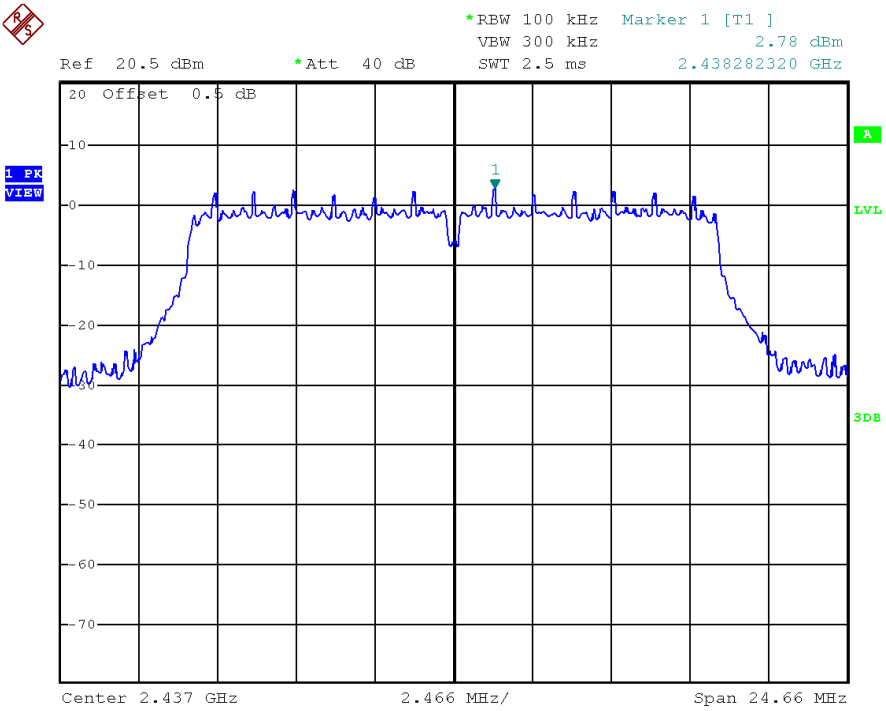
PLOTS OF POWER SPECTRAL DENSITY

802.11g, Lowest channel



802.11g, Middle channel



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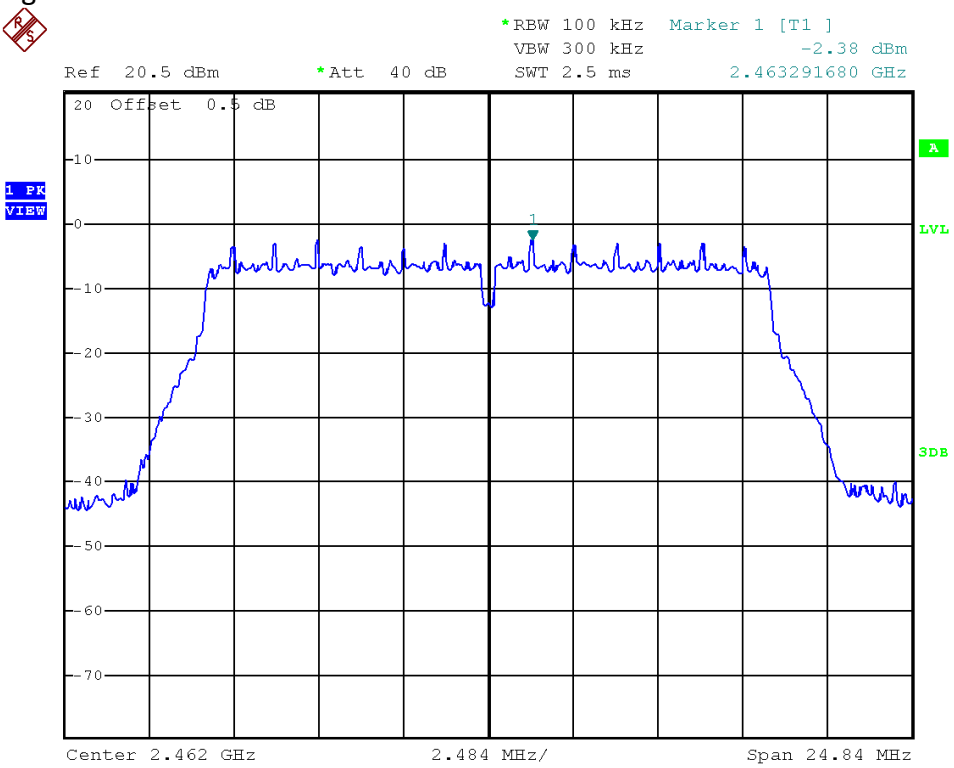
PLOTS OF POWER SPECTRAL DENSITY

802.11g, Highest channel



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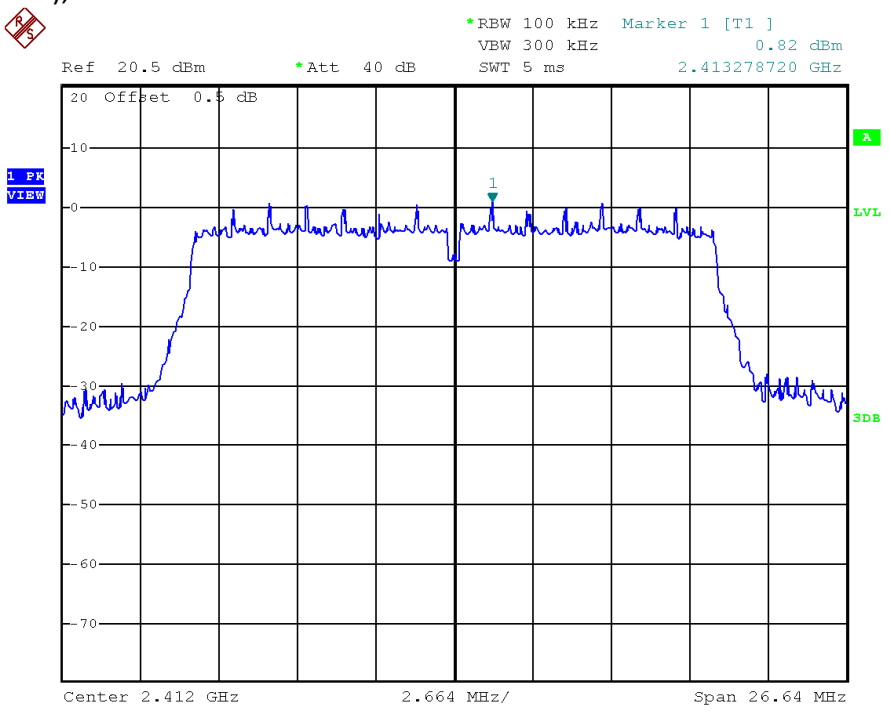
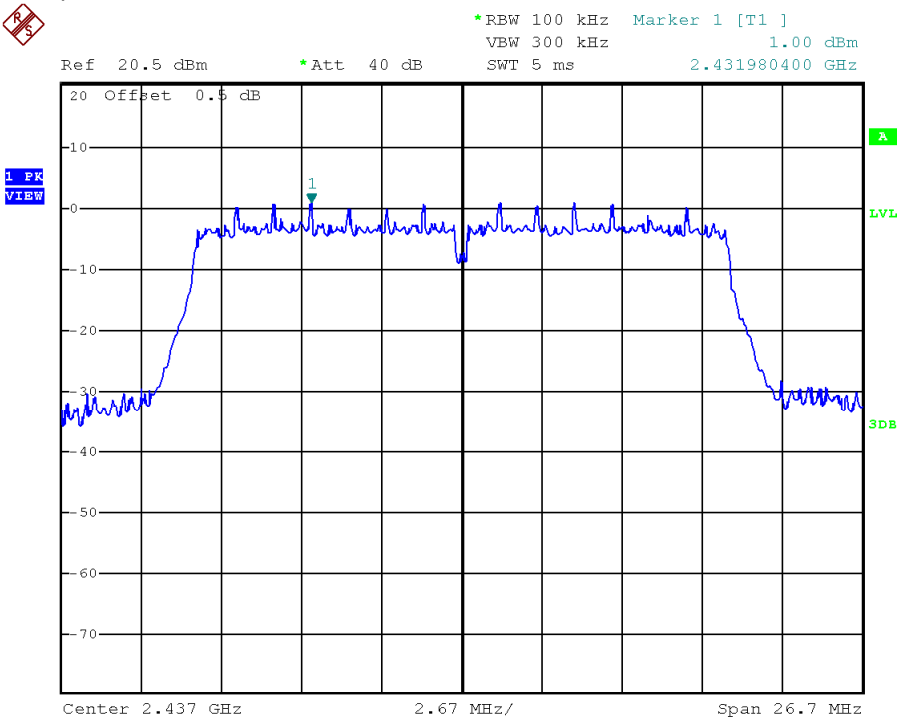
PLOTS OF POWER SPECTRAL DENSITY

802.11n (20MHz), Lowest channel



802.11n (20MHz), Middle channel



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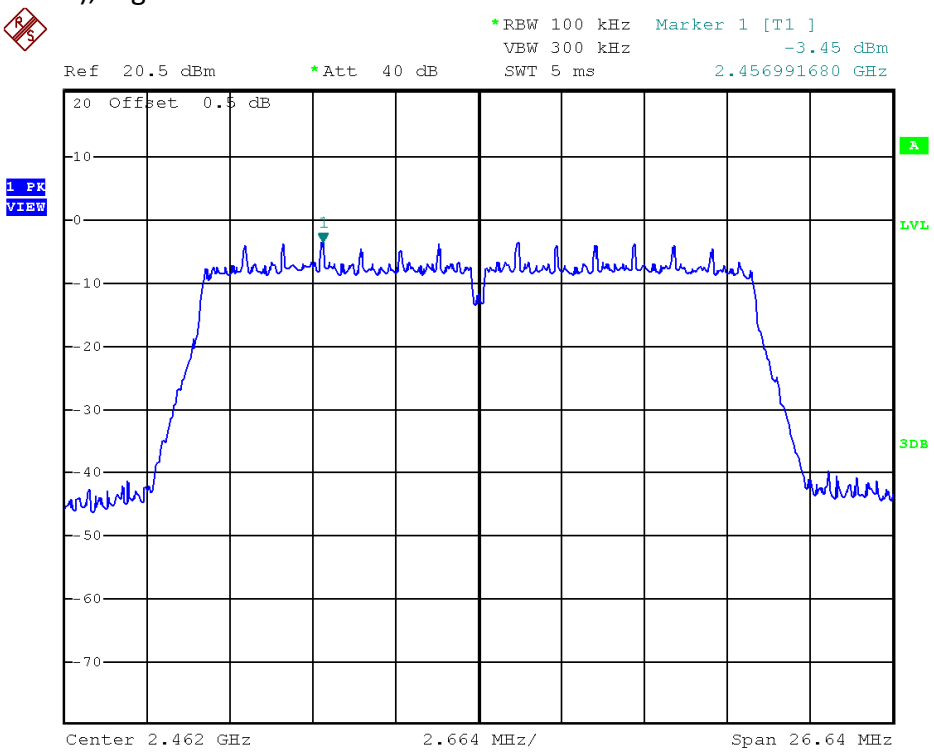
PLOTS OF POWER SPECTRAL DENSITY

802.11n (20MHz), Highest channel



4.4 Out of Band Conducted Emissions

For 802.11b/g/n20MHz, 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.

The measurement procedures under sections 11 of KDB558074 D01 v05r01 (11-February-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 for 802.11b/g/n(HT20MHz) below the maximum measured in-band peak PSD level.

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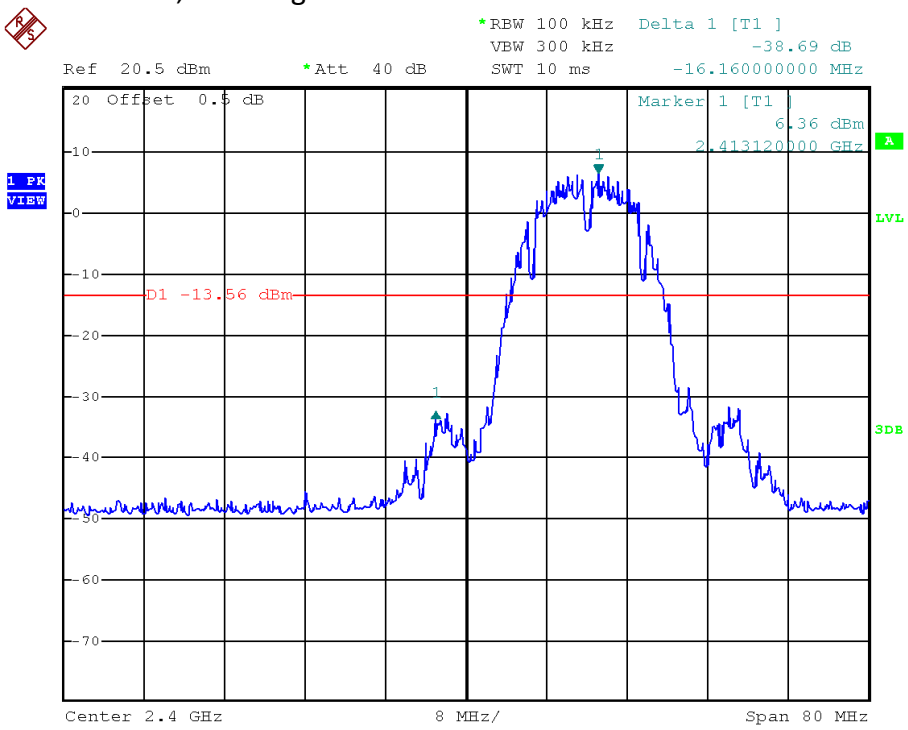
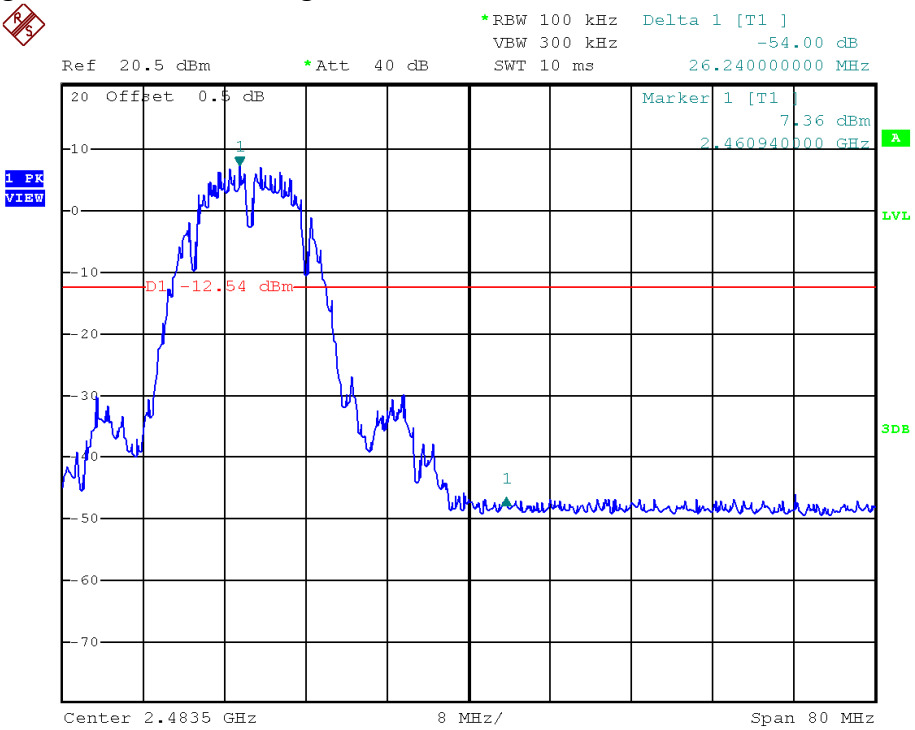
PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Bandedge



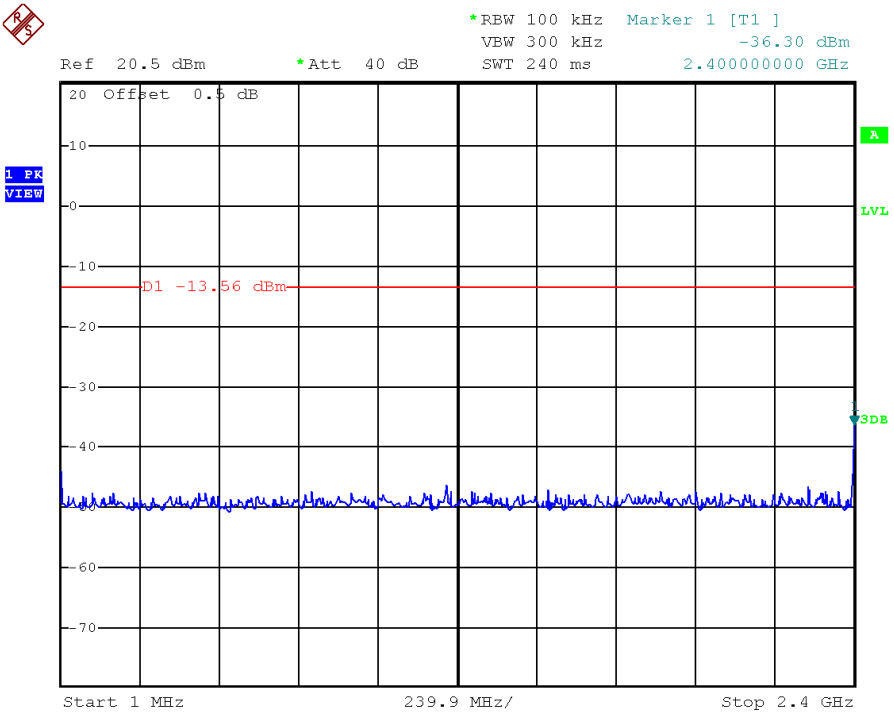
802.11b, Highest Channel, Bandedge



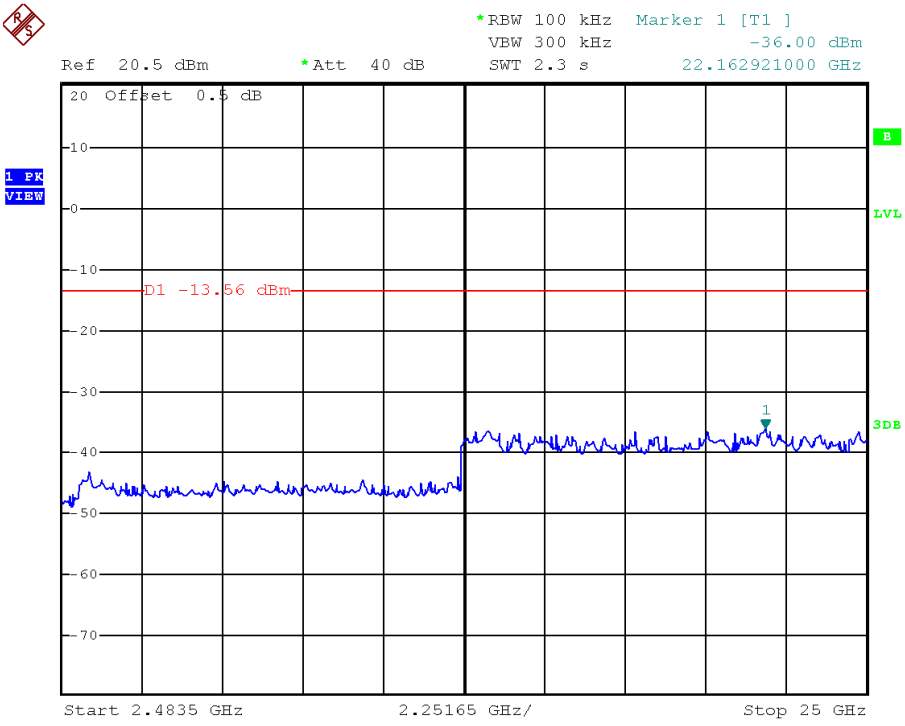
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Plot A



802.11b, Lowest Channel, Plot B



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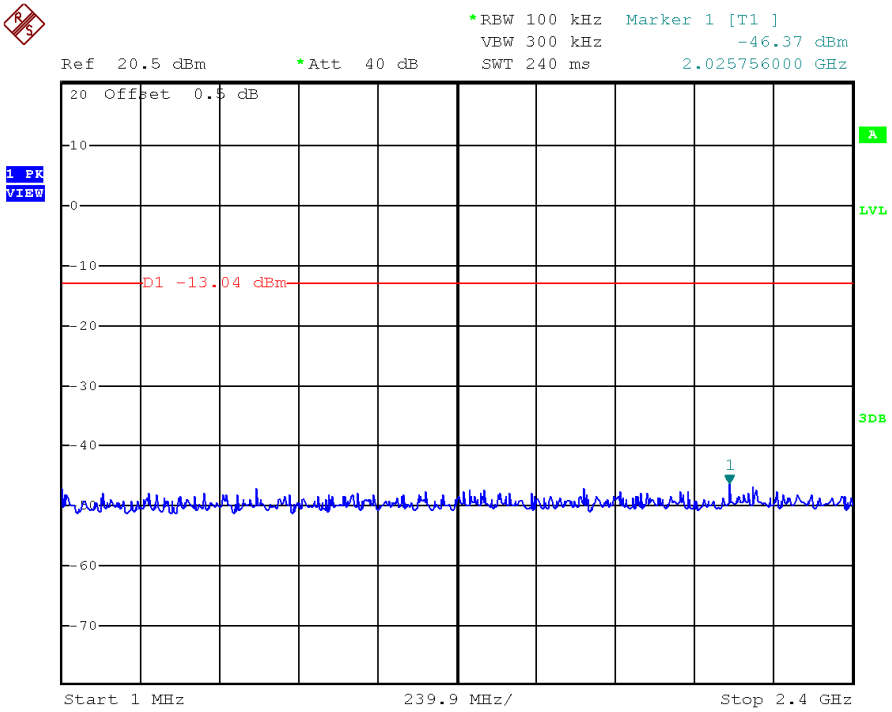
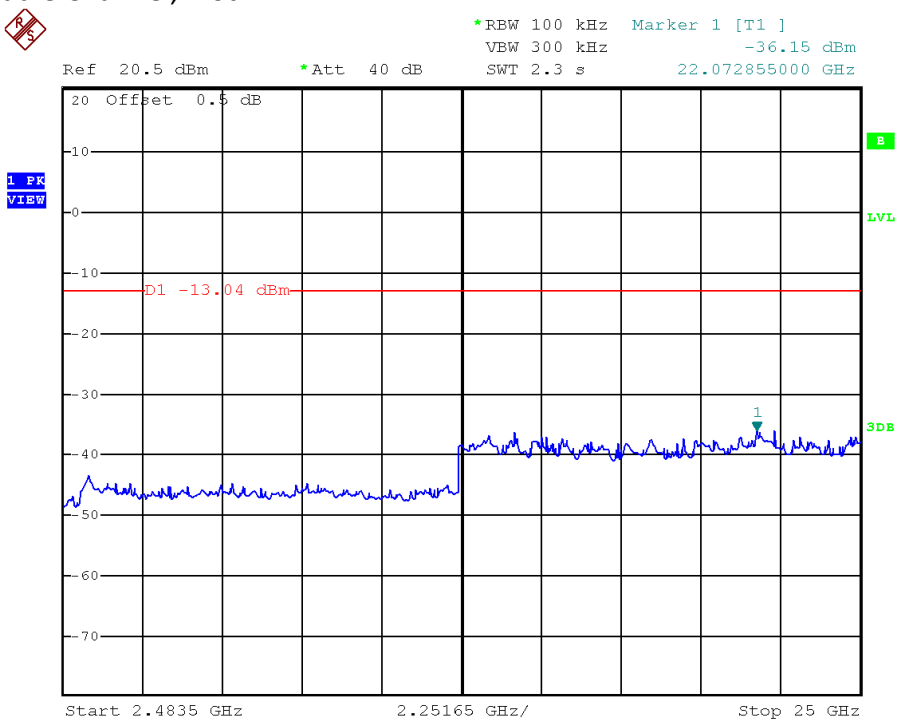
PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Middle Channel, Plot A



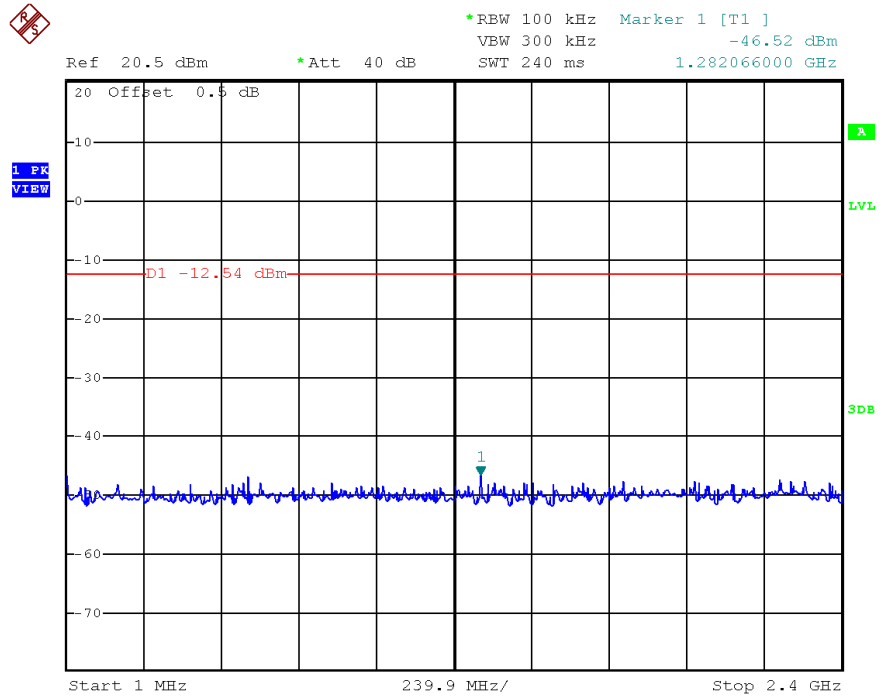
802.11b, Middle Channel, Plot B



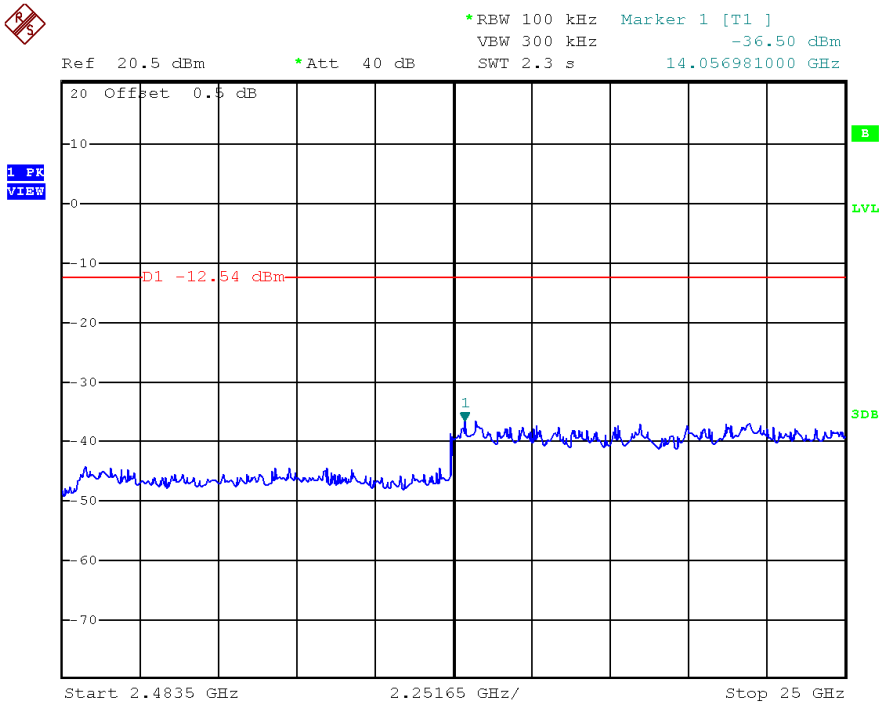
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Highest Channel, Plot A



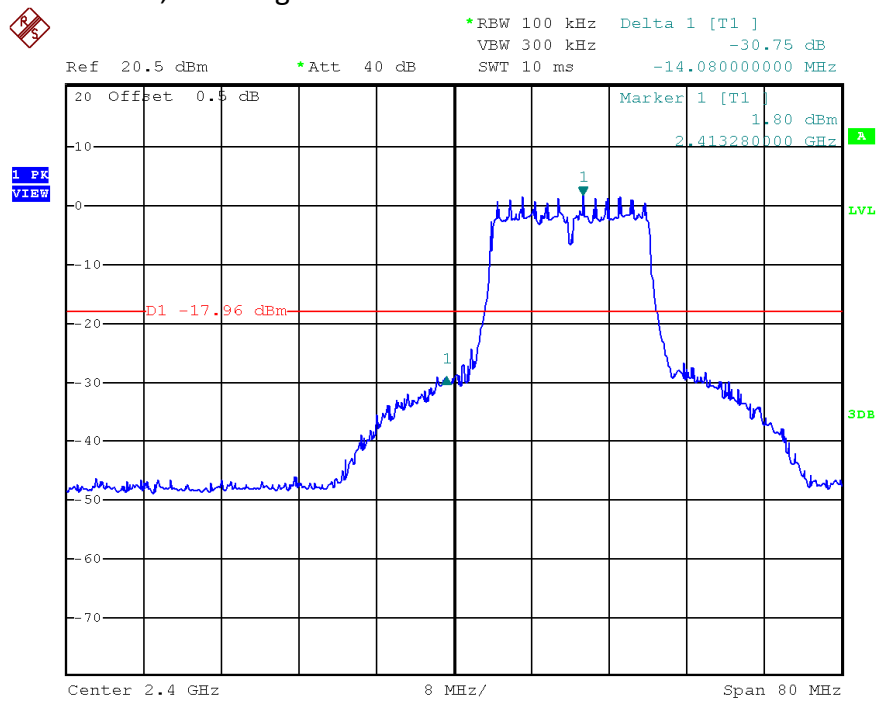
802.11b, Highest Channel, Plot B



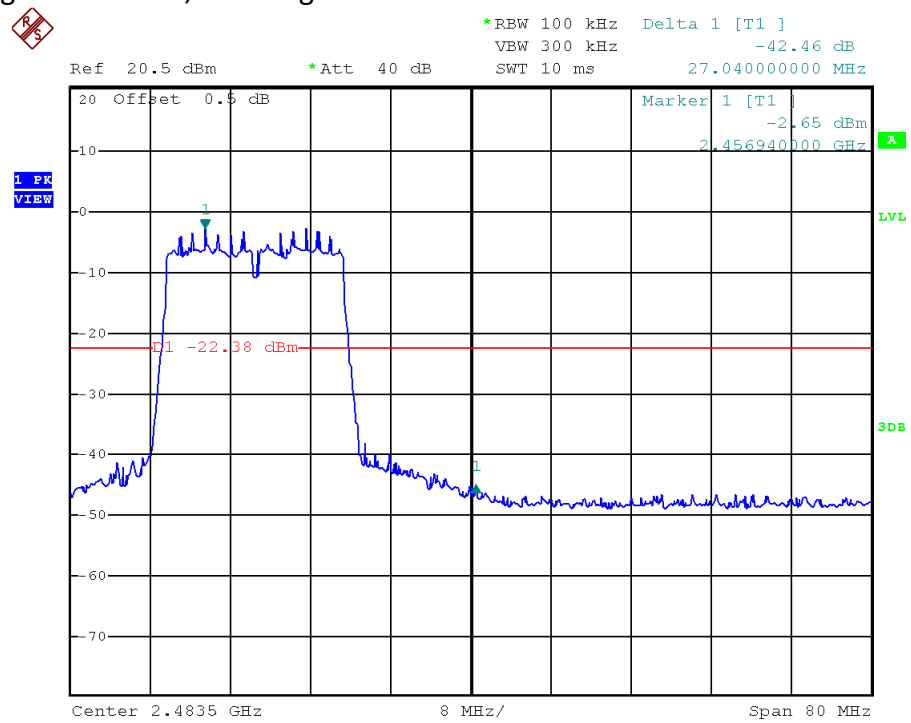
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Lowest Channel, Bandedge



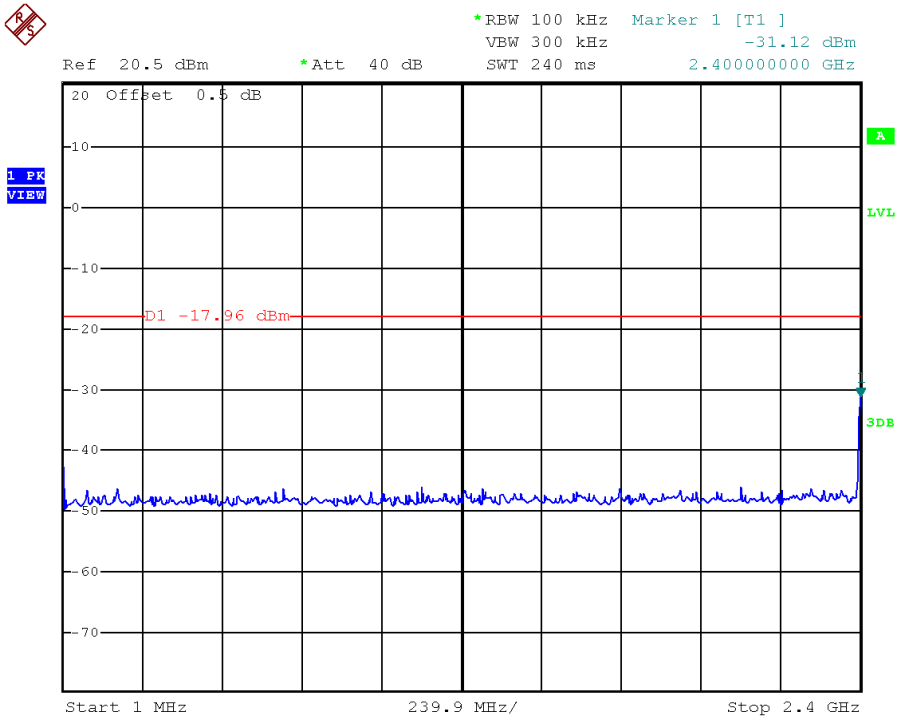
802.11g, Highest Channel, Bandedge



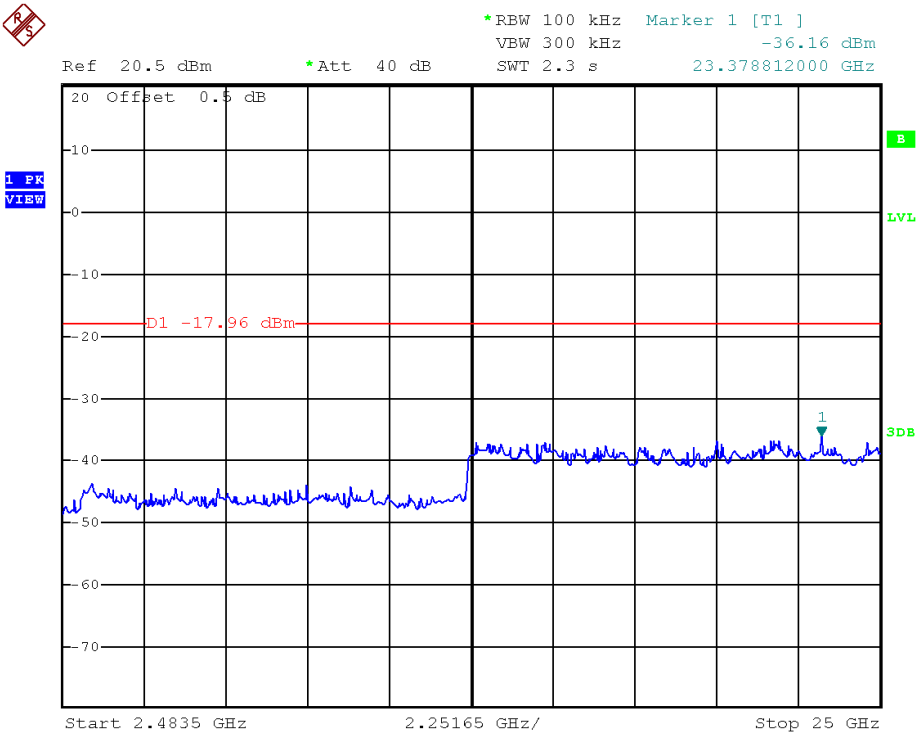
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Lowest Channel, Plot A



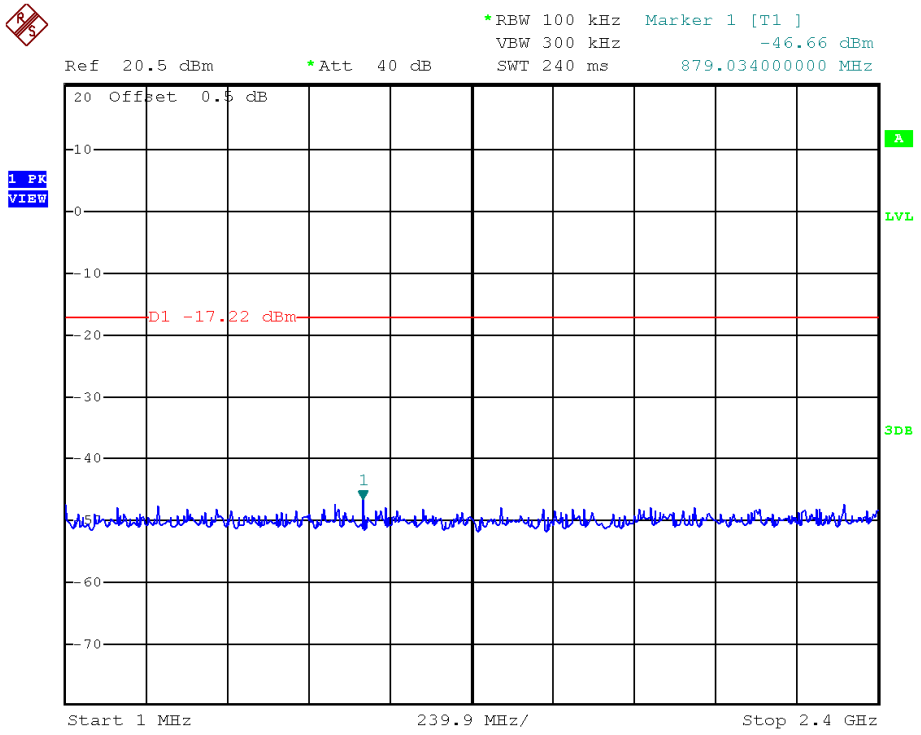
802.11g, Lowest Channel, Plot B



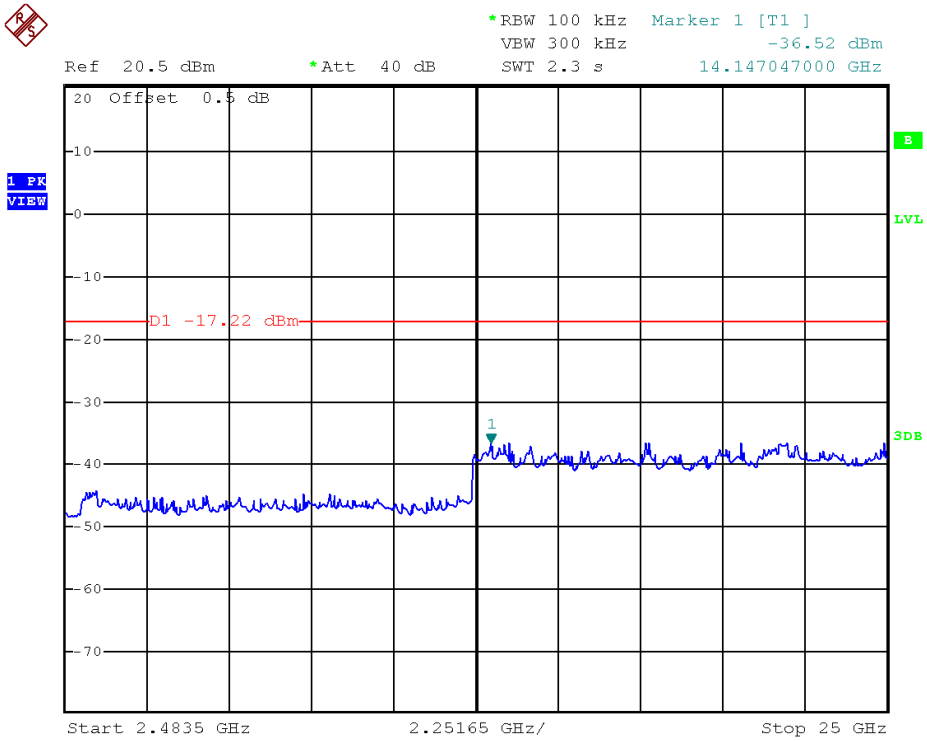
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Middle Channel, Plot A



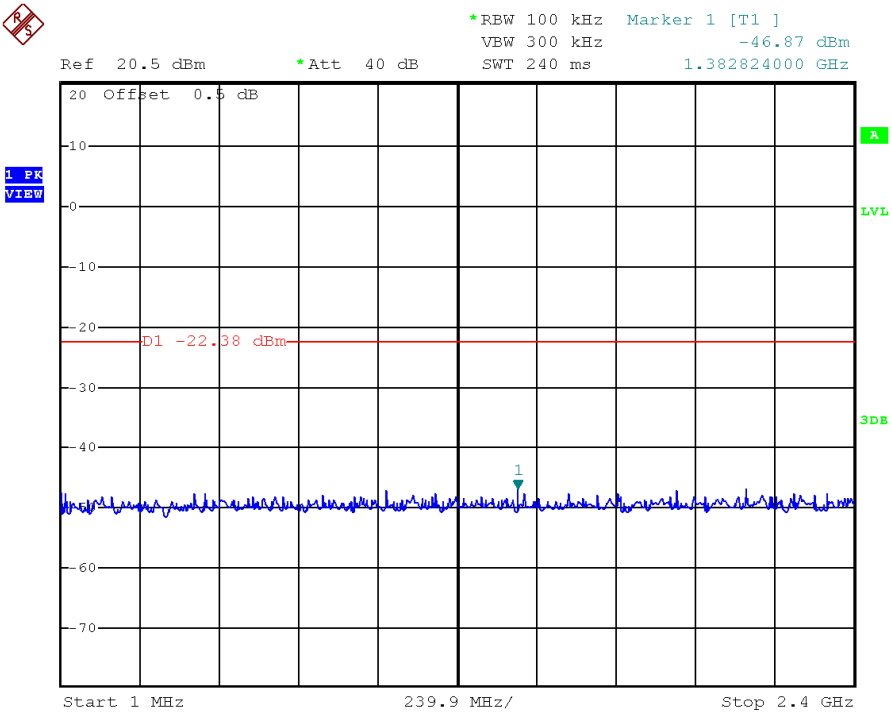
802.11g, Middle Channel, Plot B



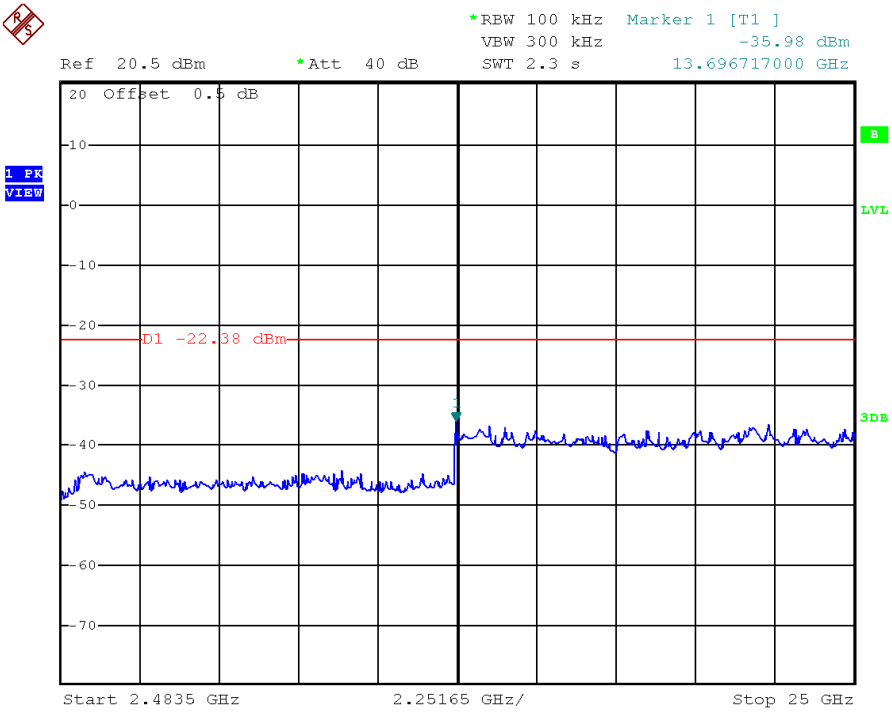
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Highest Channel, Plot A



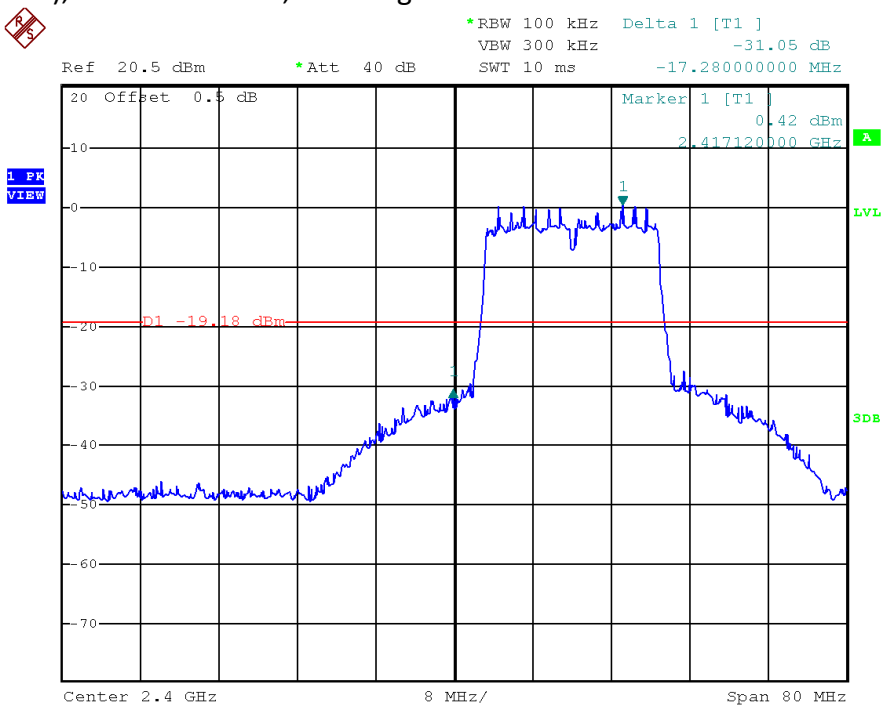
802.11g, Highest Channel, Plot B



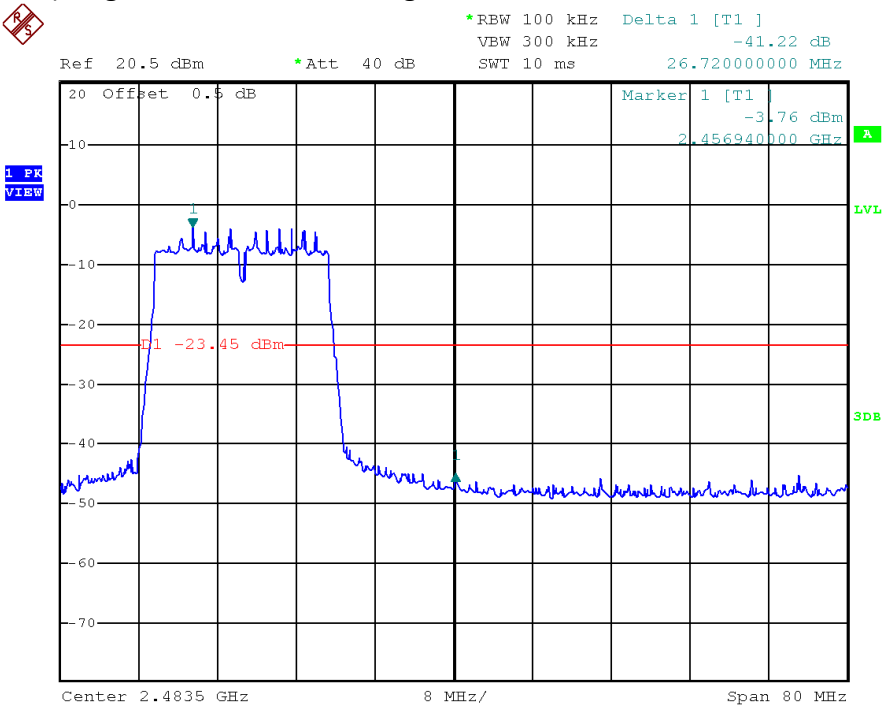
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11n (20MHz), Lowest Channel, Bandedge



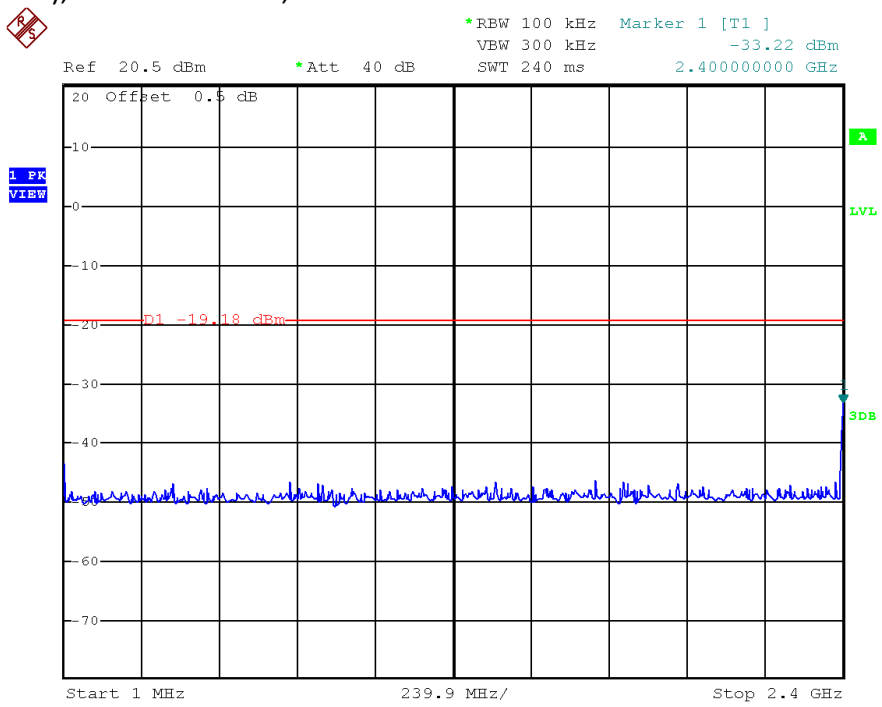
802.11n (20MHz), Highest Channel, Bandedge



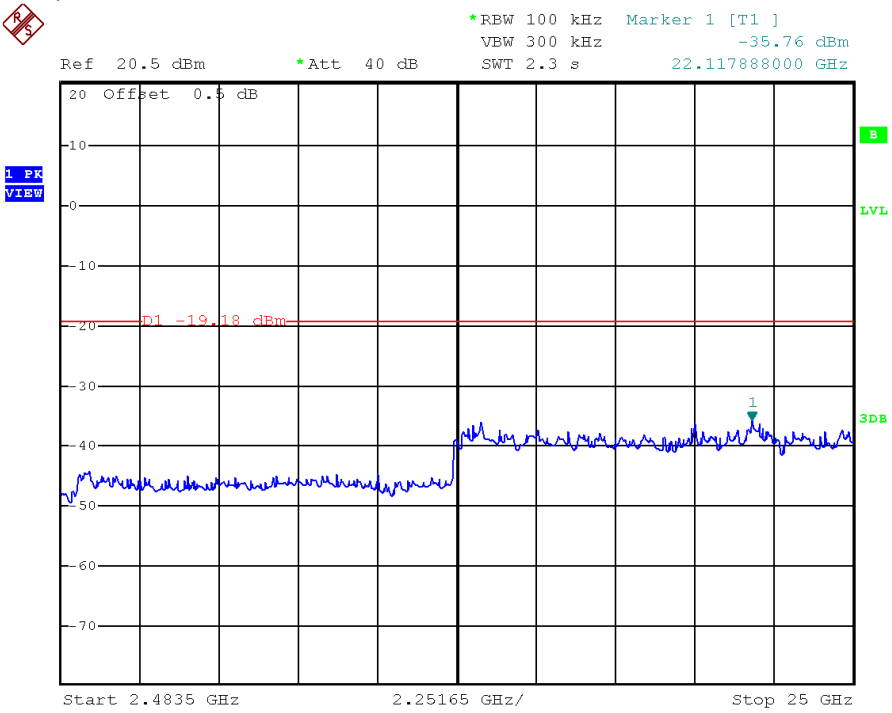
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



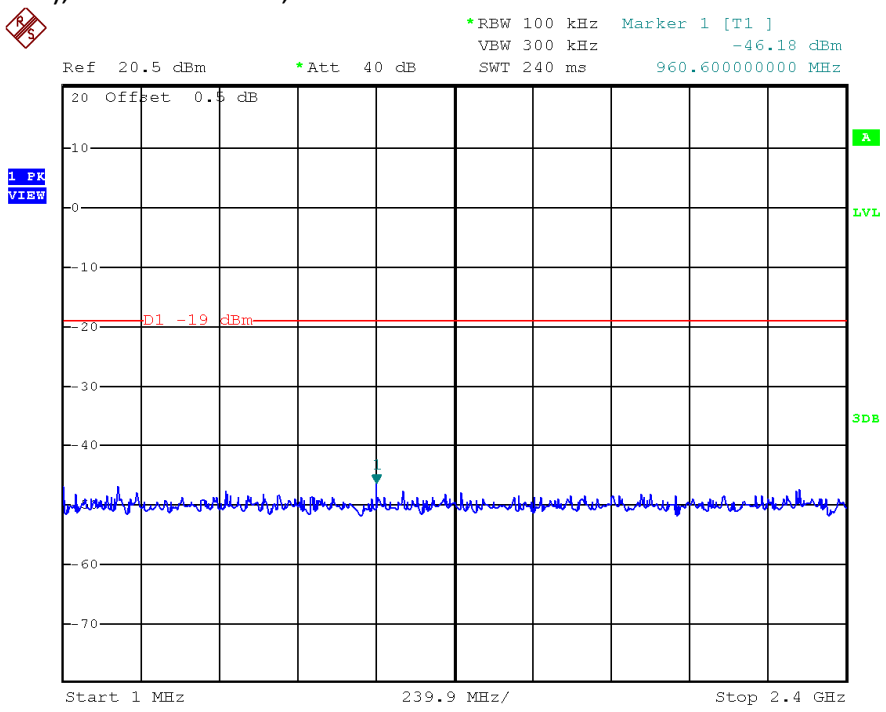
802.11n (20MHz), Lowest Channel, Plot B



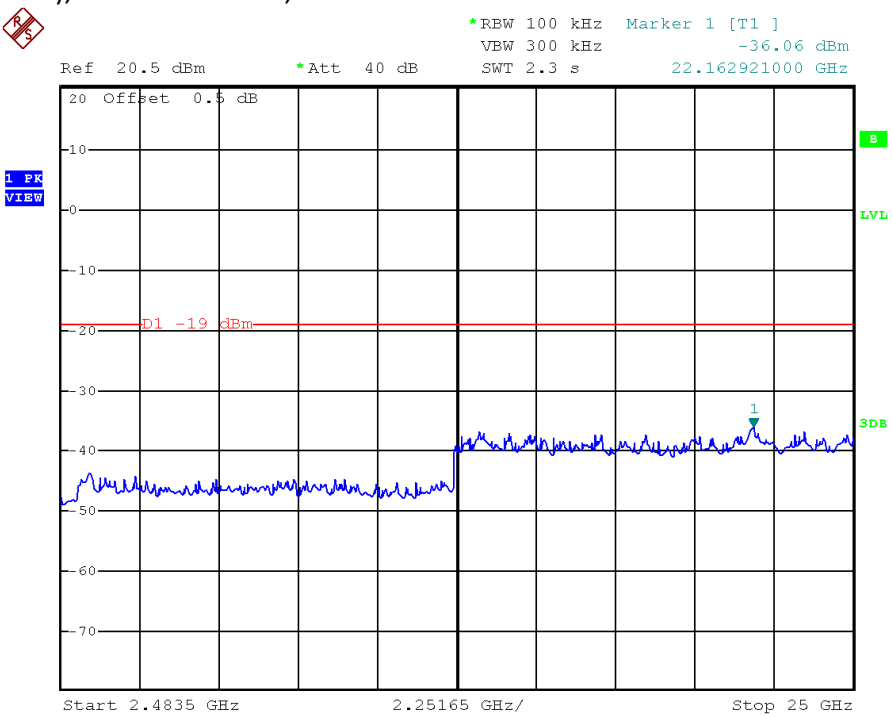
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



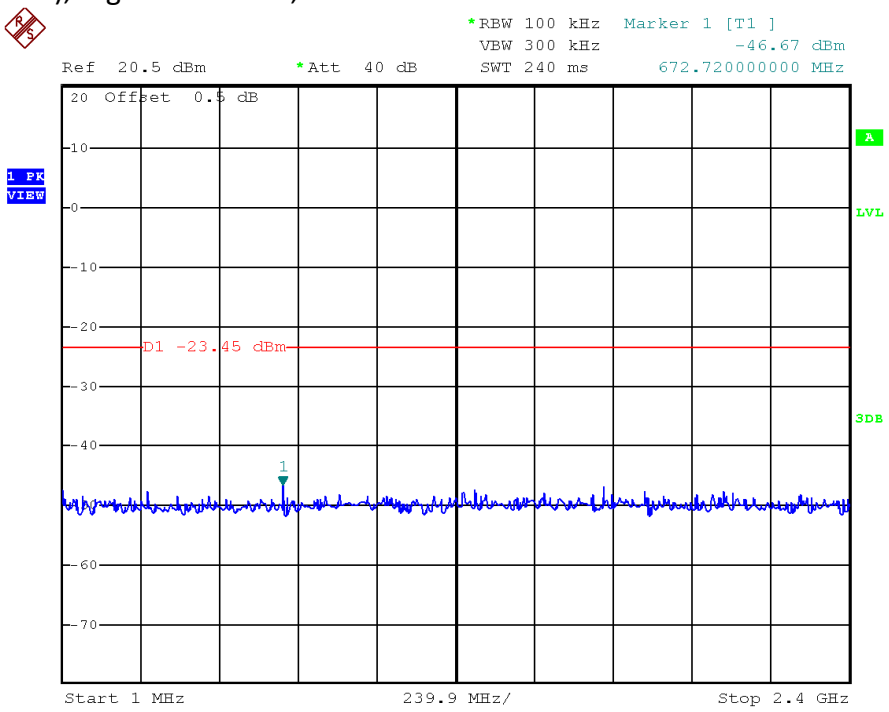
802.11n (20MHz), Middle Channel, Plot B



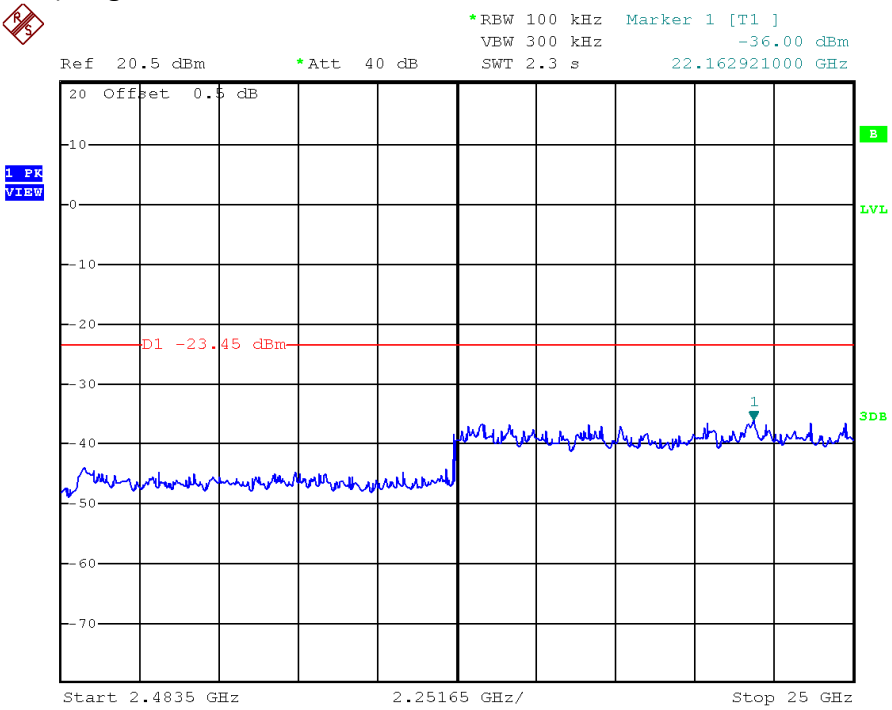
TEST REPORT

PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



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



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

92.230 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 1-10 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 0.5 dB margin

TEST REPORT

RADIATED EMISSION DATA

Model: CS1-WH1-B04
Mode: TX-Channel 01
Date of Test: March 12, 2019

Table 1
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2390.000***	***46.5***	***33***	***29.4***	***42.9***	***54.0***	***-11.1***
H	***4824.000***	***40.9***	***33***	***34.9***	***42.8***	***54.0***	***-11.2***
V	***12060.000***	***31.7***	***33***	***40.5***	***39.2***	***54.0***	***-14.8***

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	***2390.000***	***62.1***	***33***	***29.4***	***58.5***	***74.0***	***-15.5***
H	***4824.000***	***51.6***	***33***	***34.9***	***53.5***	***74.0***	***-20.5***
V	***12060.000***	***42.9***	***33***	***40.5***	***50.4***	***74.0***	***-23.6***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 06
Date of Test: March 12, 2019

Table 2
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***4874.000***	***42.0***	***33***	***34.9***	***43.9***	***54.0***	***-10.1***
H	***7311.000***	***39.6***	***33***	***37.9***	***44.5***	***54.0***	***-9.5***
V	***12185.000***	***31.6***	***33***	***40.5***	***39.1***	***54.0***	***-14.9***

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)
H	***4874.000***	***52.9***	***33***	***34.9***	***54.8***	***74.0***	***-19.2***
H	***7311.000***	***48.4***	***33***	***37.9***	***53.3***	***74.0***	***-20.7***
V	***12185.000***	***42.8***	***33***	***40.5***	***50.3***	***74.0***	***-23.7***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 11
Date of Test: March 12, 2019

Table 3
IEEE 802.11b (DSSS, 1 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2483.500***	***52.1***	***33***	***29.4***	***48.5***	***54.0***	***-5.5***
H	***4924.000***	***43.5***	***33***	***34.9***	***45.4***	***54.0***	***-8.6***
H	***7386.000***	***40.3***	***33***	***37.9***	***45.2***	***54.0***	***-8.8***
V	***12310.000***	***31.5***	***33***	***40.5***	***39.0***	***54.0***	***-15.0***

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	***2483.500***	***68.7***	***33***	***29.4***	***65.1***	***74.0***	***-8.9***
H	***4924.000***	***53.9***	***33***	***34.9***	***55.8***	***74.0***	***-18.2***
H	***7386.000***	***51.2***	***33***	***37.9***	***56.1***	***74.0***	***-17.9***
V	***12310.000***	***42.8***	***33***	***40.5***	***50.3***	***74.0***	***-23.7***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 01
Date of Test: March 12, 2019

Table 4
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2390.000***	***48.9***	***33***	***29.4***	***45.3***	***54.0***	***-8.7***
H	***4824.000***	***29.5***	***33***	***34.9***	***31.4***	***54.0***	***-22.6***
V	***12060.000***	***31.4***	***33***	***40.5***	***38.9***	***54.0***	***-15.1***

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	***2390.000***	***68.8***	***33***	***29.4***	***65.2***	***74.0***	***-8.8***
H	***4824.000***	***43.3***	***33***	***34.9***	***45.2***	***74.0***	***-28.8***
V	***12060.000***	***42.8***	***33***	***40.5***	***50.3***	***74.0***	***-23.7***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 06
Date of Test: March 12, 2019

Table 5
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***4874.000***	***29.6***	***33***	***34.9***	***31.5***	***54.0***	***-22.5***
H	***7311.000***	***29.3***	***33***	***37.9***	***34.2***	***54.0***	***-19.8***
V	***12185.000***	***31.6***	***33***	***40.5***	***39.1***	***54.0***	***-14.9***

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)
H	***4874.000***	***43.5***	***33***	***34.9***	***45.4***	***74.0***	***-28.6***
H	***7311.000***	***42.4***	***33***	***37.9***	***47.3***	***74.0***	***-26.7***
V	***12185.000***	***43.0***	***33***	***40.5***	***50.5***	***74.0***	***-23.5***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 11
Date of Test: March 12, 2019

Table 6
IEEE 802.11g (OFDM, 6 Mbps)

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2483.500***	***49.9***	***33***	***29.4***	***46.3***	***54.0***	***-7.7***
H	***4924.000***	***28.9***	***33***	***34.9***	***30.8***	***54.0***	***-23.2***
H	***7386.000***	***28.8***	***33***	***37.9***	***33.7***	***54.0***	***-20.3***
V	***12310.000***	***31.0***	***33***	***40.5***	***38.5***	***54.0***	***-15.5***

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***	***69.7***	***33***	***29.4***	***66.1***	***74.0***	***-7.9***
H	***4924.000***	***41.3***	***33***	***34.9***	***43.2***	***74.0***	***-30.8***
H	***7386.000***	***40.2***	***33***	***37.9***	***45.1***	***74.0***	***-28.9***
V	***12310.000***	***42.6***	***33***	***40.5***	***50.1***	***74.0***	***-23.9***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 01
Date of Test: March 12, 2019

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

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2390.000***	***49.7***	***33***	***29.4***	***46.1***	***54.0***	***-7.9***
H	***4824.000***	***29.3***	***33***	***34.9***	***31.2***	***54.0***	***-22.8***
V	***12060.000***	***31.3***	***33***	***40.5***	***38.8***	***54.0***	***-15.2***

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	***2390.000***	***69.6***	***33***	***29.4***	***66.0***	***74.0***	***-8.0***
H	***4824.000***	***42.5***	***33***	***34.9***	***44.4***	***74.0***	***-29.6***
V	***12060.000***	***42.9***	***33***	***40.5***	***50.4***	***74.0***	***-23.6***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 06
Date of Test: March 12, 2019

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

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***4874.000***	***29.5***	***33***	***34.9***	***31.4***	***54.0***	***-22.6***
H	***7311.000***	***28.3***	***33***	***37.9***	***33.2***	***54.0***	***-20.8***
V	***12185.000***	***31.4***	***33***	***40.5***	***38.9***	***54.0***	***-15.1***

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	***4874.000***	***42.7***	***33***	***34.9***	***44.6***	***74.0***	***-29.4***
H	***7311.000***	***39.6***	***33***	***37.9***	***44.5***	***74.0***	***-29.5***
V	***12185.000***	***42.9***	***33***	***40.5***	***50.4***	***74.0***	***-23.6***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: TX-Channel 11
Date of Test: March 12, 2019

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

Polari-zation	Frequency (MHz)	Reading (dBµV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Average Limit at 3m (dBµV/m)	Margin (dB)
H	***2483.500***	***51.0***	***33***	***29.4***	***47.4***	***54.0***	***-6.6***
H	***4924.000***	***28.8***	***33***	***34.9***	***30.7***	***54.0***	***-23.3***
H	***7386.000***	***28.2***	***33***	***37.9***	***33.1***	***54.0***	***-20.9***
V	***12310.000***	***31.4***	***33***	***40.5***	***38.9***	***54.0***	***-15.1***

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***	***71.2***	***33***	***29.4***	***67.6***	***74.0***	***-6.4***
H	***4924.000***	***41.1***	***33***	***34.9***	***43.0***	***74.0***	***-31.0***
H	***7386.000***	***39.6***	***33***	***37.9***	***44.5***	***74.0***	***-29.5***
V	***12310.000***	***43.0***	***33***	***40.5***	***50.5***	***74.0***	***-23.5***

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. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.
7. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
8. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

TEST REPORT

Model: CS1-WH1-B04
Mode: WiFi Operating
Date of Test: March 12, 2019

Table 10

Polarization	Frequency (MHz)	Reading (dBµV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBµV/m)	Limit at 3m (dBµV/m)	Margin (dB)
V	87.798	44.5	16	9.0	37.5	40.0	-2.5
V	90.989	47.1	16	11.0	42.1	43.5	-1.4
V	***91.610***	***47.3***	***16***	***11.0***	***42.3***	***43.5***	***-1.2***
V	92.230	48.0	16	11.0	43.0	43.5	-0.5
V	92.851	47.7	16	11.0	42.7	43.5	-0.8
V	93.515	46.6	16	11.0	41.6	43.5	-1.9
V	***94.092***	***46.0***	***16***	***11.0***	***41.0***	***43.5***	***-2.5***
V	165.577	41.3	16	17.0	42.3	43.5	-1.2
V	166.242	40.8	16	17.0	41.8	43.5	-1.7
V	***166.862***	***41.2***	***16***	***17.0***	***42.2***	***43.5***	***-1.3***
V	170.009	40.8	16	18.0	42.8	43.5	-0.7
V	176.878	39.4	16	19.0	42.4	43.5	-1.1
V	177.498	38.5	16	19.0	41.5	43.5	-2.0

NOTES:
1. Quasi-Peak detector is used for the emission measurement.

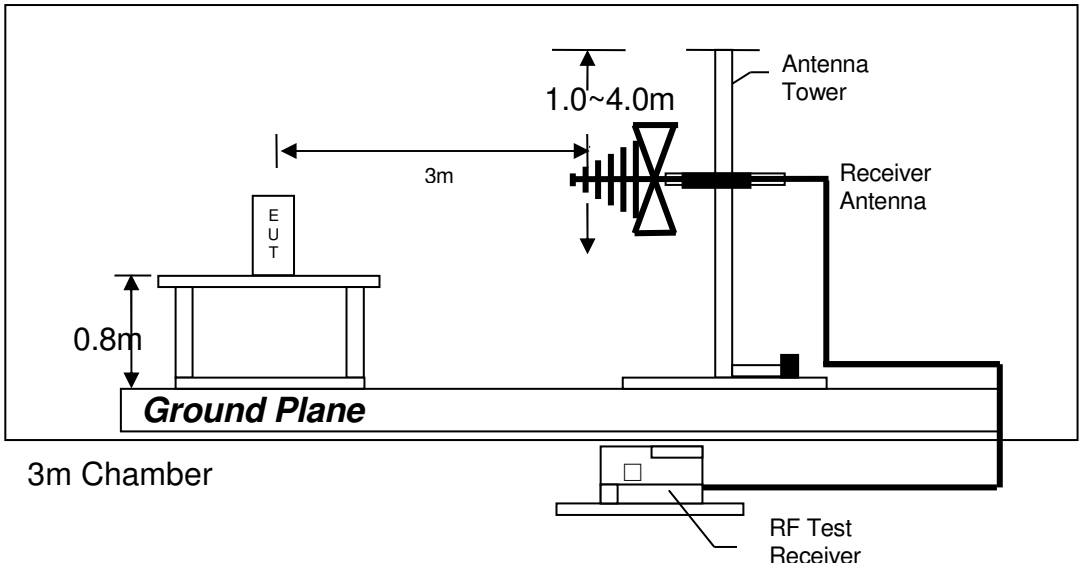
2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.

3. Negative value in the margin column shows emission below limit.

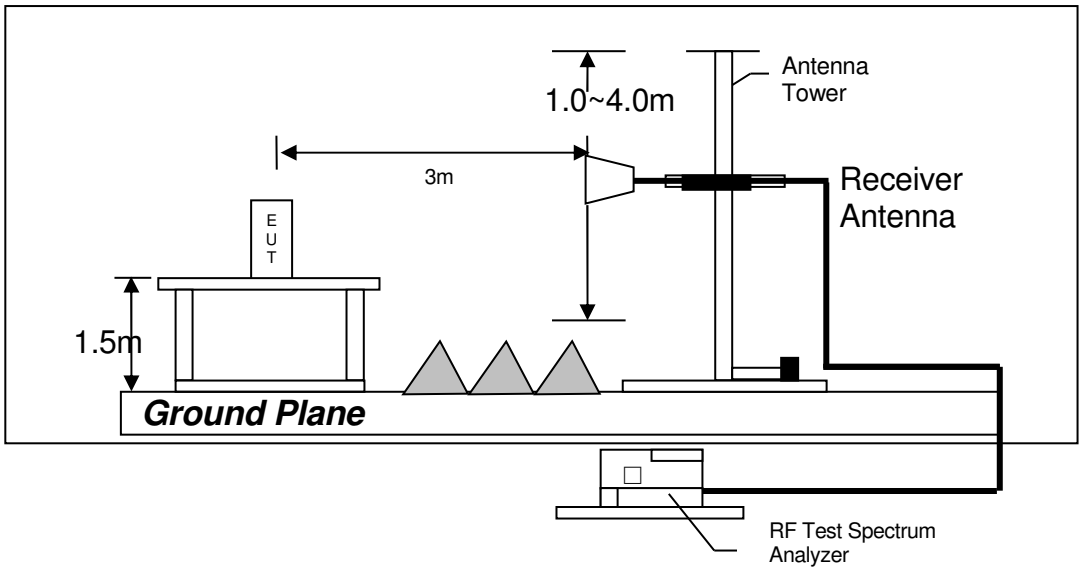
4. Emission (the row indicated by ***bold italic***) within the restricted band meets the requirement of FCC Part 15 Section 15.205 / RSS-Gen Section 8.10.

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

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

1.883 MHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.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 11.1 dB margin compare with Quasi-peak limit

TEST REPORT

AC POWER LINE CONDUCTED EMISSION

Model: CS1-WH1-B04

Worst Case: WiFi Operating

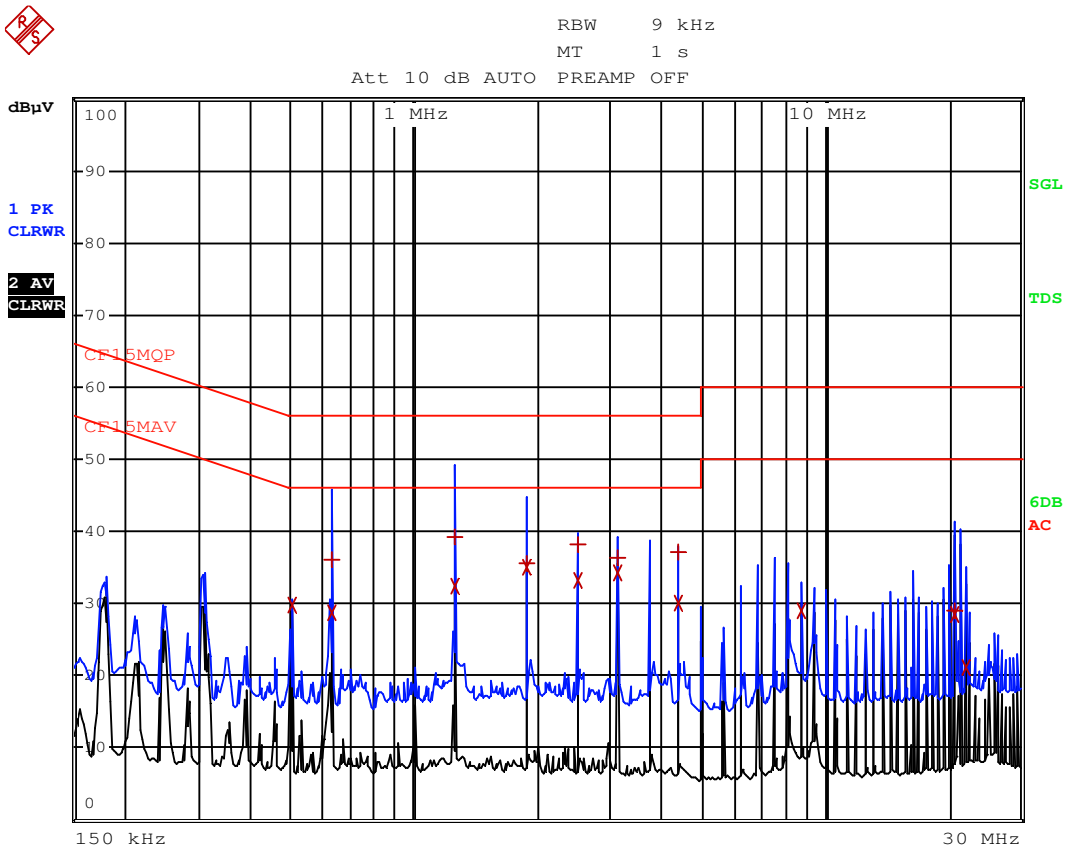
EDIT PEAK LIST (Final Measurement Results)

Trace1:	CF15MQP
Trace2:	CF15MAV
Trace3:	---

	TRACE	FREQUENCY	LEVEL dBµV		DELTA LIMIT dB
2	CISPR Average	501 kHz	29.83	L1	-16.16
1	Quasi Peak	627 kHz	36.11	L1	-19.88
2	CISPR Average	627 kHz	28.67	L1	-17.32
1	Quasi Peak	1.257 MHz	39.14	N	-16.85
2	CISPR Average	1.257 MHz	32.35	N	-13.64
2	CISPR Average	1.8825 MHz	34.93	N	-11.06
1	Quasi Peak	1.887 MHz	35.51	L1	-20.48
1	Quasi Peak	2.5125 MHz	38.25	L1	-17.74
2	CISPR Average	2.5125 MHz	33.28	L1	-12.71
1	Quasi Peak	3.138 MHz	36.28	N	-19.71
2	CISPR Average	3.138 MHz	34.30	N	-11.69
1	Quasi Peak	4.3935 MHz	37.04	L1	-18.95
2	CISPR Average	4.3935 MHz	30.15	N	-15.84
2	CISPR Average	8.7855 MHz	29.00	L1	-20.99
1	Quasi Peak	20.7105 MHz	29.04	L1	-30.95
2	CISPR Average	20.7105 MHz	28.58	L1	-21.41
2	CISPR Average	21.9705 MHz	21.17	N	-28.82

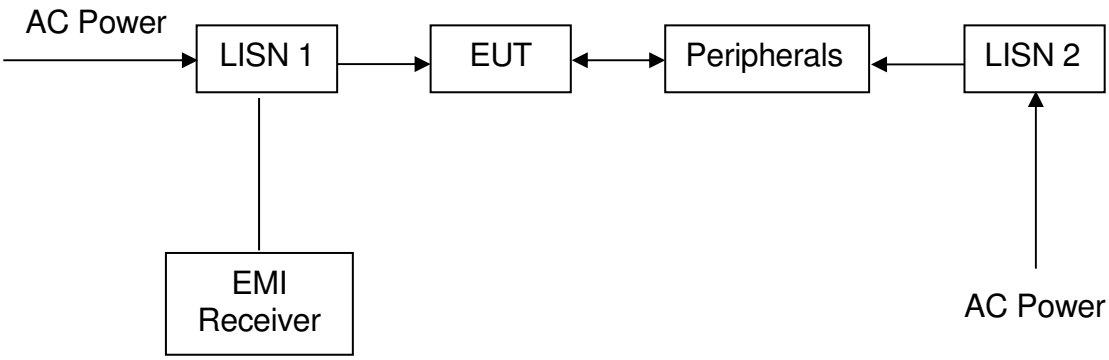
TEST REPORT

Model: CS1-WH1-B04
Worst Case: WiFi Operating



TEST REPORT

4.7.3 Conducted Emission Test Setup

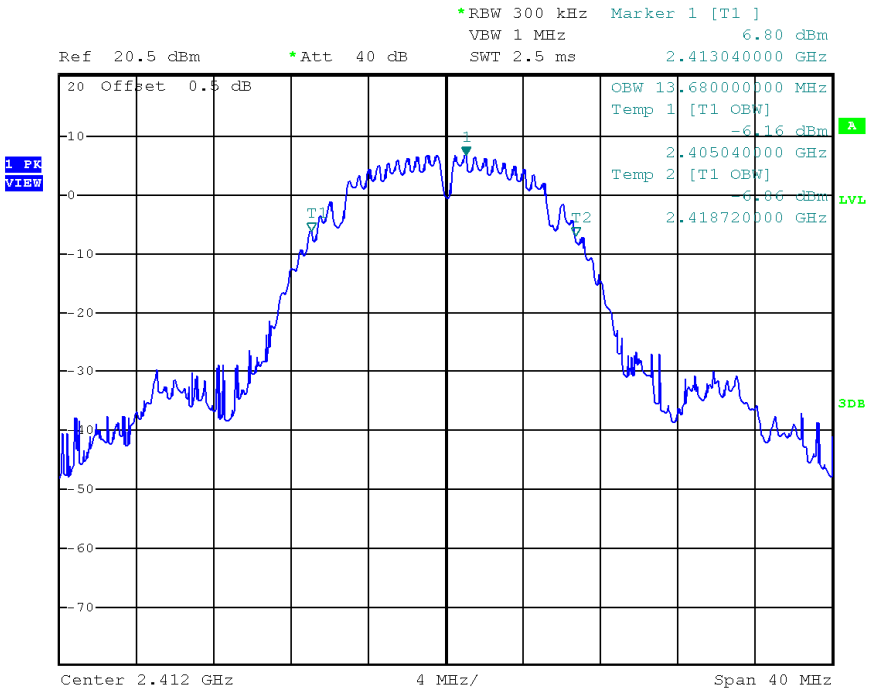


TEST REPORT

Occupied Bandwidth Results: B mode

B mode	Occupied Bandwidth (MHz)
Low Channel: 2412MHz	13.68
Middle Channel: 2437MHz	13.60
High Channel: 2462MHz	13.60

The worst case is shown as below

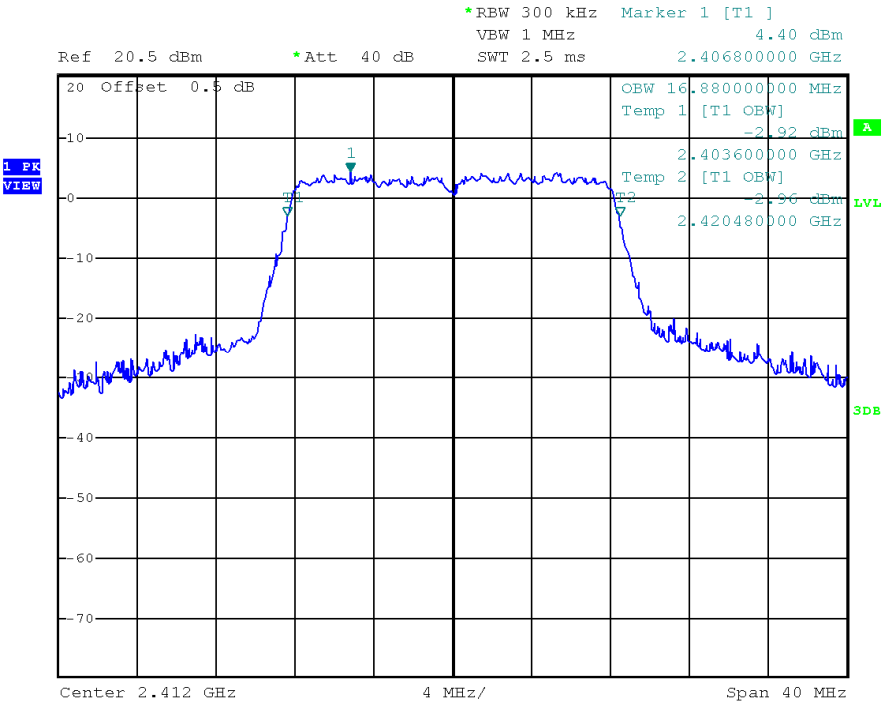


Occupied Bandwidth Results: N20 mode

TEST REPORT

G mode	Occupied Bandwidth (MHz)
Low Channel: 2412MHz	16.88
Middle Channel: 2437MHz	16.88
High Channel: 2462MHz	16.88

The worst case is shown as below

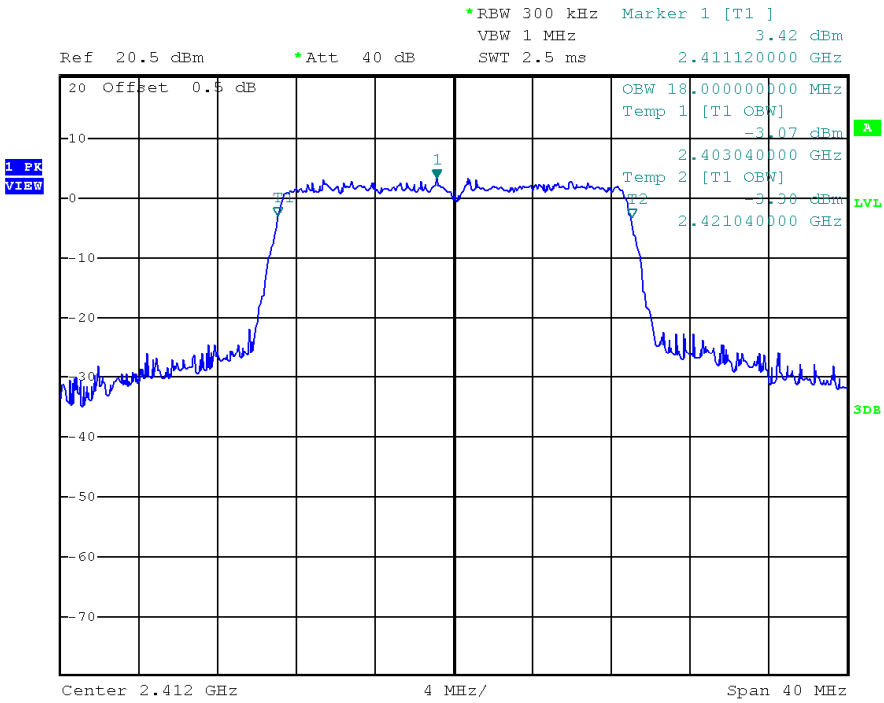


TEST REPORT

Occupied Bandwidth Results: N20 mode

N20 mode	Occupied Bandwidth (MHz)
Low Channel: 2412MHz	18.00
Middle Channel: 2437MHz	18.00
High Channel: 2462MHz	18.00

The worst case is shown as below



TEST REPORT

EXHIBIT 5 EQUIPMENT LIST

5.0 EQUIPMENT LIST

1) Radiated Emissions Test

Equipment	EMI Test Receiver	Spectrum Analyzer	Biconical Antenna
Registration No.	EW-2666	EW-2249	EW-0571
Manufacturer	R&S	R&S	EMCO
Model No.	ESCI7	FSP30	3104C
Calibration Date	August 28, 2018	May 17, 2018	February 27, 2018
Calibration Due Date	August 28, 2019	May 17, 2019	August 27, 2019

Equipment	Log Periodic Antenna	Double Ridged Guide Antenna	14m Double Shield RF Cable (20MHz to 6GHz)
Registration No.	EW-0447	EW-1015	EW-2505
Manufacturer	EMCO	EMCO	RADIALL
Model No.	3148	3115	nm / br5d / sma 14m
Calibration Date	January 17, 2018	November 17, 2017	October 27, 2018
Calibration Due Date	July 17, 2019	May 17, 2019	October 27, 2019

Equipment	RF Cable 14m (1GHz to 26.5GHz)	RF Pre-amplifier 3 pcs (9kHz to 40GHz)	High Pass Filter 3GHz to 12GHz (2 Pieces)
Registration No.	EW-2781	EW-3006	EW-1835
Manufacturer	GREATBILLION	SCHWARZBECK	KLMICROWAVE
Model No.	SMA m/SHF5MPU /SMA m ra14m,26G	BBV 9718 BBV9744 BBV 9721	11SH10-3000/T12000-0/OP
Calibration Date	October 27, 2018	April 26, 2018	May 11, 2018
Calibration Due Date	October 27, 2019	April 26, 2019	May 11, 2019

Equipment	Active Loop H-field (9kHz to 30MHz)	Notch Filter (cutoff frequency 2.4GHz to 2.5GHz)
Registration No.	EW-2313	EW-2213
Manufacturer	ELECTROMETRI	MICROTRONICS
Model No.	EM-6876	BRM50701-02
Calibration Date	March 08, 2018	May 24, 2018
Calibration Due Date	September 08, 2019	May 24, 2019

2) Conducted Emissions Test

Equipment	RF Cable 80cm (RG142) (9kHz to 30MHz)	Artificial Mains Network	EMI Test Receiver
Registration No.	EW-2451	EW-3360	EW-2666
Manufacturer	RADIALL	ROHDESCHWARZ	R&S
Model No.	bnc m st / 142 / bnc m st 80cm	ENV-216	ESCI7
Calibration Date	November 03, 2018	May 09, 2018	August 28, 2018
Calibration Due Date	November 03, 2019	May 09, 2019	August 28, 2019

3) Conductive Measurement Test

Equipment	Spectrum Analyzer	RF Cable (up to 40GHz) 1.5m length	RF Power Meter with Power Sensor (N1921A)
Registration No.	EW-2249	EW-3104	EW-2270
Manufacturer	R&S	N/A	AGILENTTECH
Model No.	FSP30	SMA-M to SMA-M	N1911A
Calibration Date	May 17, 2018	July 03, 2018	Mar. 09, 2019
Calibration Due Date	May 17, 2019	July 03, 2019	Mar. 09, 2020

4) Bandedge/Bandwidth Measurement

Equipment	**RF Cable (up to 40GHz) 1.5m length**	**Spectrum Analyzer**
Registration No.	EW-3104	EW-2249
Manufacturer	N/A	R&S
Model No.	SMA-M to SMA-M	FSP30
Calibration Date	July 03, 2018	May 17, 2018
Calibration Due Date	July 03, 2019	May 17, 2019

- End of Report -