2/F., Garment Centre,
576 Castle Peak Road, Kowloon,
Hong Kong SAR, China.

Telephone: (852) 2173 8888
Facsimile: (852) 2785 5487
www.intertek.com

# TEST REPORT

**Report Number: 22041027HKG-001**

Permissive Change Class Two Application of 47 CFR Part 15 Equipment

**FCC ID: 2AW6I-4801**

| **Prepared and Checked by:** | **Approved by:** |
|---|---|
| Signed On File<br>Wong Cheuk Ho, Herbert<br>Lead Engineer | Digitally signed by Kenneth Wong<br>Location: Intertek Testing Services Hong Kong Limited<br>Wong Kwok Yeung, Kenneth<br>Assistant Supervisor<br>Date: April 28, 2022 |

# TEST REPORT

## GENERAL INFORMATION

| | |
|---|---|
| **Applicant Name:** | HALO Innovations, Inc. |
| **Applicant Address:** | 213 West 35th Street,<br>Suite 2E, New York,<br>NY 10001 |
| **FCC Specification Standard:** | FCC Part 15, October 1, 2020 Edition |
| **FCC ID:** | 2AW6I-4801 |
| **FCC Model(s):** | 4669 |
| **Type of EUT:** | Spread Spectrum Transmitter |
| **Description of EUT:** | SleepSure Base Station |
| **Serial Number:** | N/A |
| **Sample Receipt Date:** | April 18, 2022 |
| **Date of Test:** | April 18, 2022 to April 28, 2022 |
| **Report Date:** | April 28, 2022 |
| **Environmental Conditions:** | Temperature: +10 to 40°C<br>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

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# 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 4669 is a SleepSure Base Station incorporating a wifi transceiver and a Bluetooth BLE transceiver.

For Bluetooth BLE mode, it operates at frequency range of 2402MHz to 2480MHz with 39 channels.

For wifi mode, it operates at frequency range of 2412MHz to 2462MHz with 11 channels.

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.

The EUT is power by a AC Adaptor adaptor.
AC/DC adaptor (Base Unit: AC Input 100-240VAC 50/60Hz 0.3A; Output 5VDC 1A)
Model: HX075B-0501000-CU

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

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

# 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 No.558074 D01 v05r01 (11-February-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

Purpose of Change is saved with filename: “purpose of change.pdf”

# 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 EUT was powered by 120VAC

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 Limits.

## 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 / data rates were tested under normal mode. Only the worst-case data is shown in the report for DSSS and OFDM

For simultaneous transmission, both WiFi and Bluetooth BLE 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:*

An AC adaptor (provided with the unit) was used to power the device. Their description are listed below.

(1) AC/DC adaptor (Base Unit: AC Input 100-240VAC 50/60Hz 0.3A; Output 5VDC 1A)
Model: HX075B-0501000-CU
(Provided by Client)

*Description of Accessories:*

(1) USB Cable (1.4m long)
(Provided by Client)

There are no accessories for compliance of this product.

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.

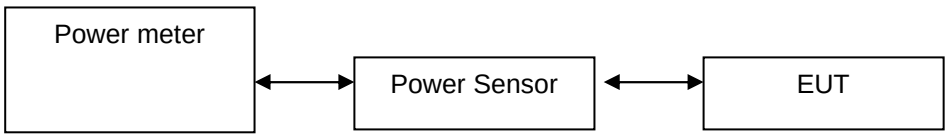
# TEST REPORT

## 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) Antenna Gain = 2 dBi

| Frequency (MHz) | | Output in dBm | Output in mWatt |
|---|---|---|---|
| Low Channel: | 2412 | 23.5 | 223.9 |
| Middle Channel: | 2437 | 24.6 | 288.4 |
| High Channel: | 2462 | 25.8 | 380.2 |

IEEE 802.11g (OFDM, 6 Mbps) Antenna Gain = 2 dBi

| Frequency (MHz) | | Output in dBm | Output in mWatt |
|---|---|---|---|
| Low Channel: | 2412 | 23.8 | 239.9 |
| Middle Channel: | 2437 | 24.8 | 302.0 |
| High Channel: | 2462 | 26.4 | 436.5 |

IEEE 802.11n (20MHz) (OFDM, MCS0) Antenna Gain = 2 dBi

| Frequency (MHz) | | Output in dBm | Output in mWatt |
|---|---|---|---|
| Low Channel: | 2412 | 23.2 | 208.9 |
| Middle Channel: | 2437 | 23.4 | 218.8 |
| High Channel: | 2462 | 25.2 | 331.1 |

## TEST REPORT

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

Bluetooth 4.0 Antenna Gain = 2 dBi

| Frequency (MHz) | | Output in dBm | Output in mWatt |
|---|---|---|---|
| Low Channel: | 2402 | 1.0 | 1.3 |
| Middle Channel: | 2440 | 0.8 | 1.2 |
| High Channel: | 2480 | 0.5 | 1.1 |

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 = 25.8 dBm

IEEE 802.11g (OFDM, 9 Mbps)
max. conducted (peak) output level = 26.4 dBm

IEEE 802.11n (20MHz) (OFDM, MCS0)
max. conducted (peak) output level = 25.2 dBm

Bluetooth 4.0
max. conducted (peak) output level = 1.0 dBm

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

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

## 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 | 10.24 |
| Middle Channel: | 2437 | 10.24 |
| High Channel: | 2462 | 10.20 |

IEEE 802.11g (OFDM, 6 Mbps)

| | Frequency (MHz) | 6dB Bandwidth (MHz) |
|---|---|---|
| Low Channel: | 2412 | 16.48 |
| Middle Channel: | 2437 | 16.48 |
| High Channel: | 2462 | 16.44 |

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

| | Frequency (MHz) | 6dB Bandwidth (MHz) |
|---|---|---|
| Low Channel: | 2412 | 16.96 |
| Middle Channel: | 2437 | 16.92 |
| High Channel: | 2462 | 16.96 |

Bluetooth 4.0

| | Frequency (MHz) | 6dB Bandwidth (MHz) |
|---|---|---|
| Low Channel: | 2402 | 0.750 |
| Middle Channel: | 2440 | 0.756 |
| High Channel: | 2480 | 0.762 |

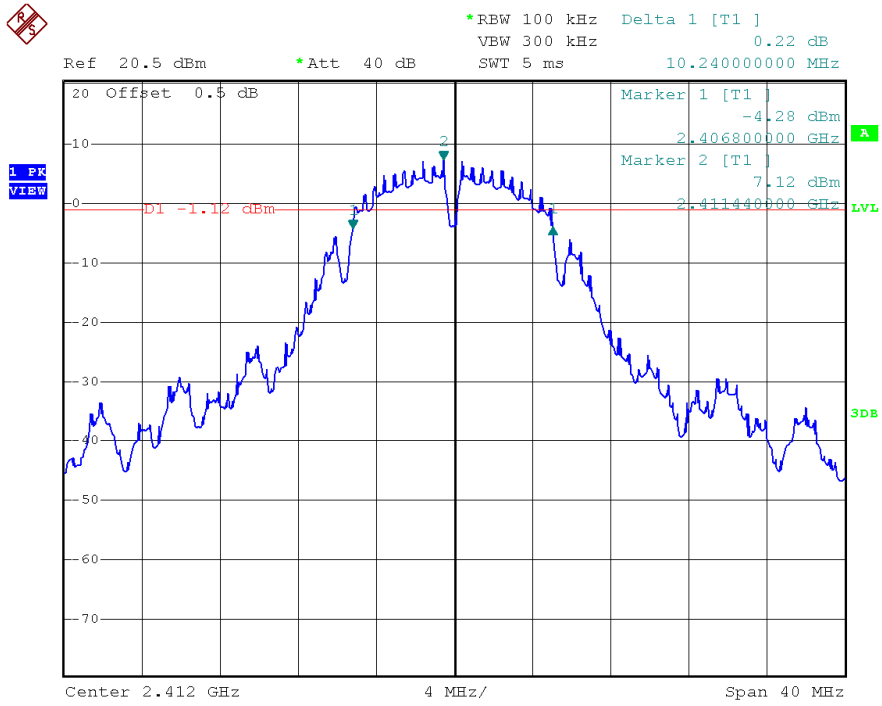
Limits
6 dB bandwidth shall be at least 500kHz

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

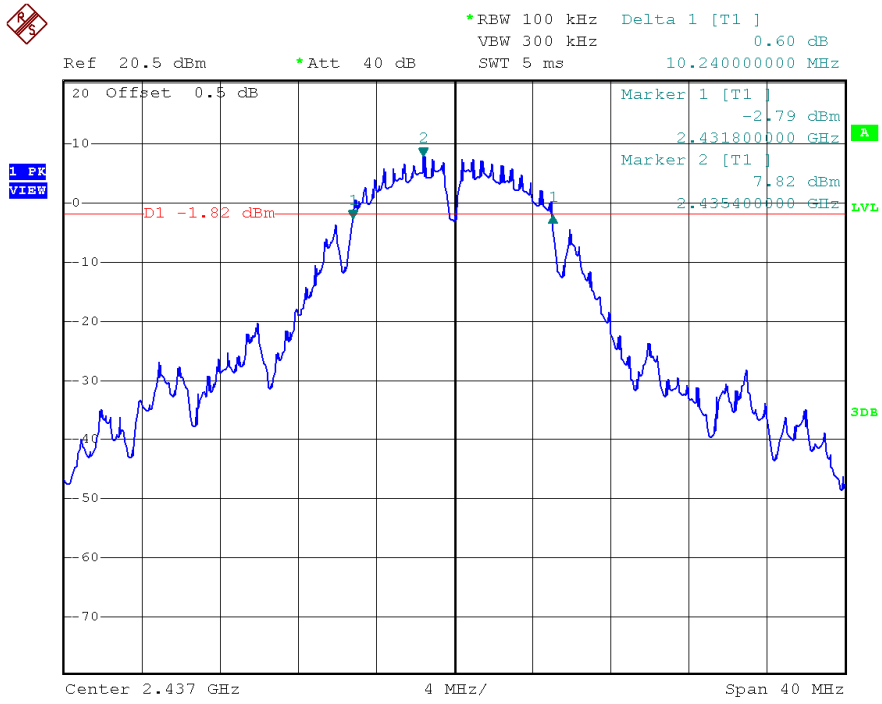
# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

802.11b, Lowest Channel



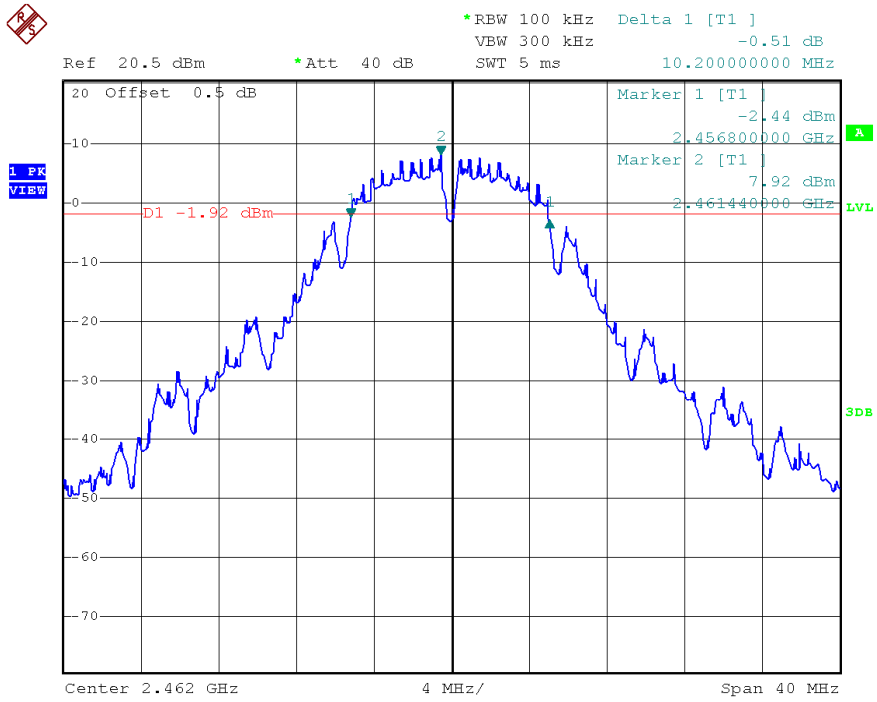

802.11b, Middle Channel



# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

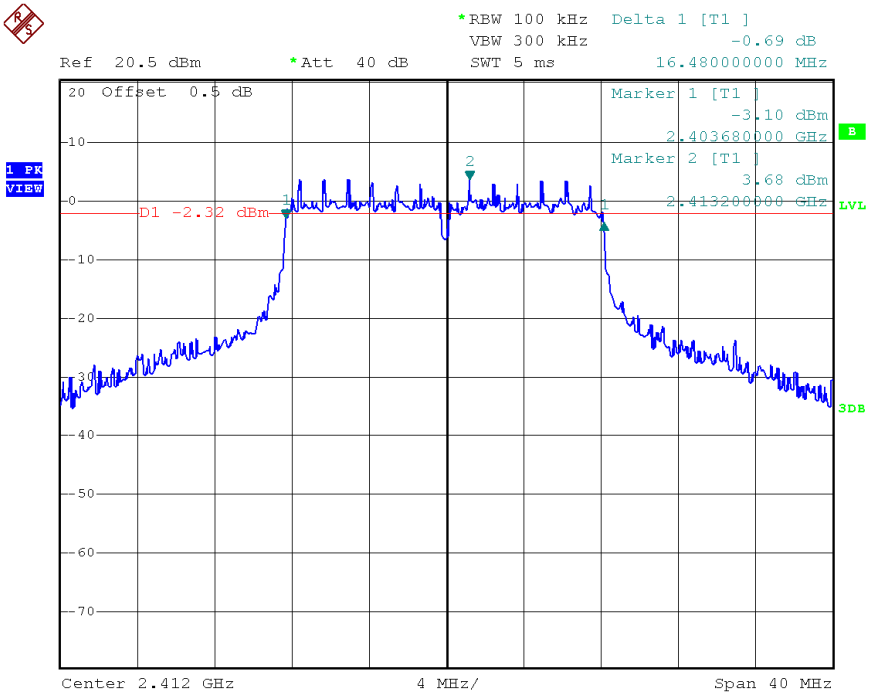
802.11b, Highest Channel



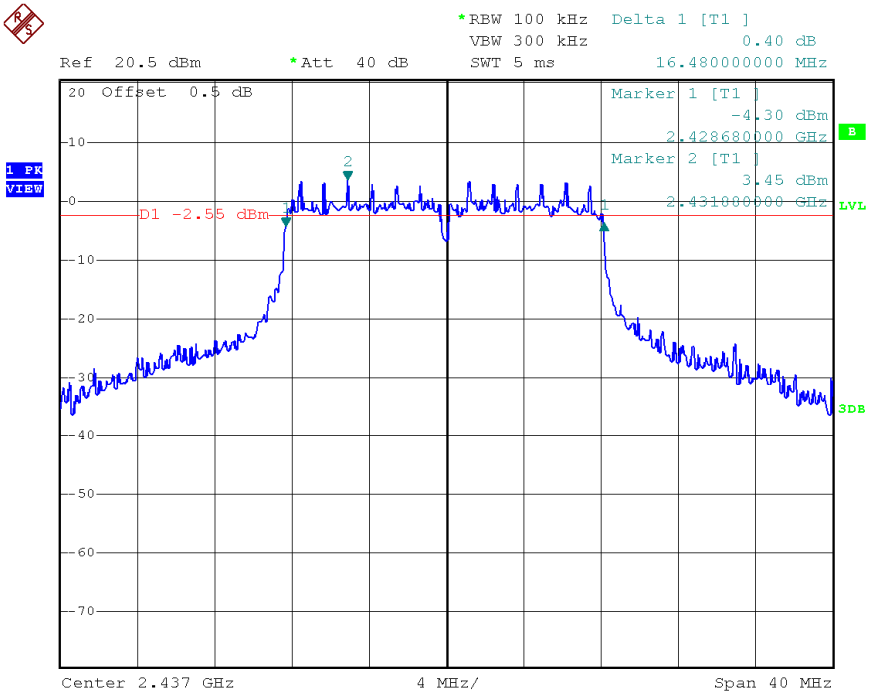
# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

802.11g, Lowest Channel



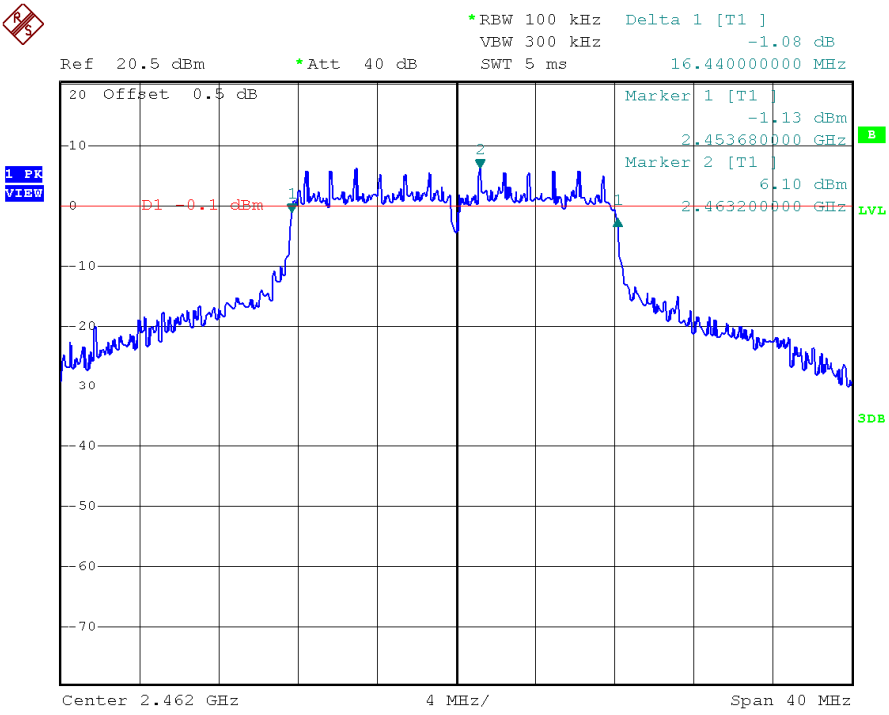

802.11g, Middle Channel



# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

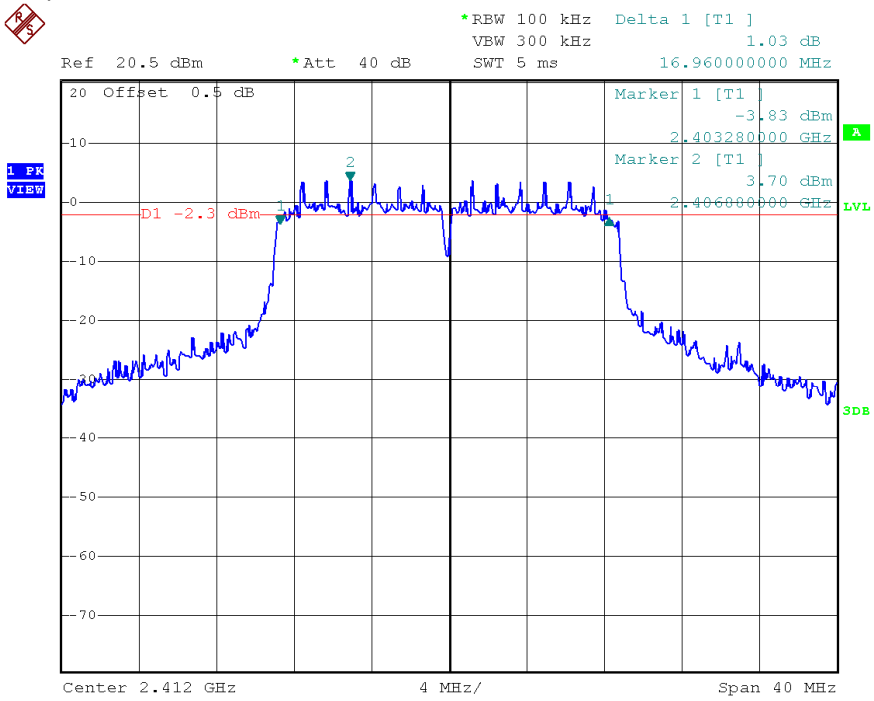
802.11g, Highest Channel



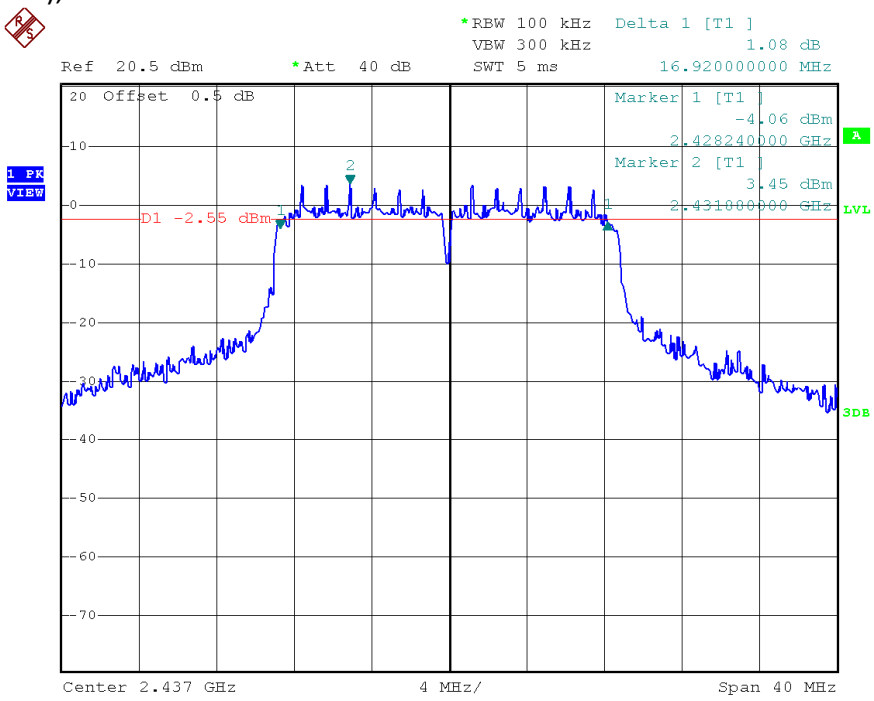
# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

802.11n (20MHz), Lowest Channel



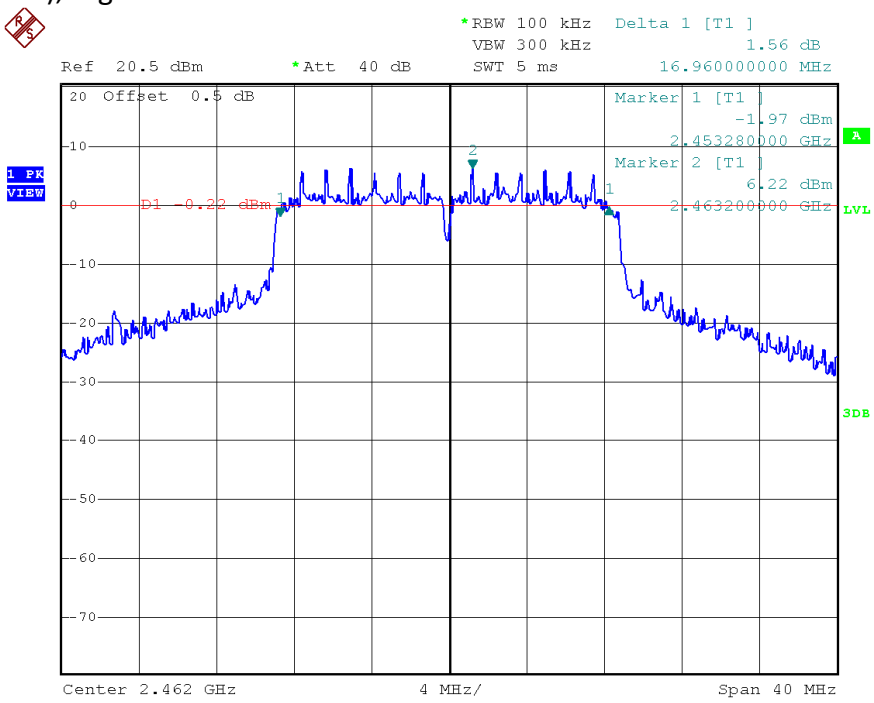

802.11n (20MHz), Middle Channel



# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

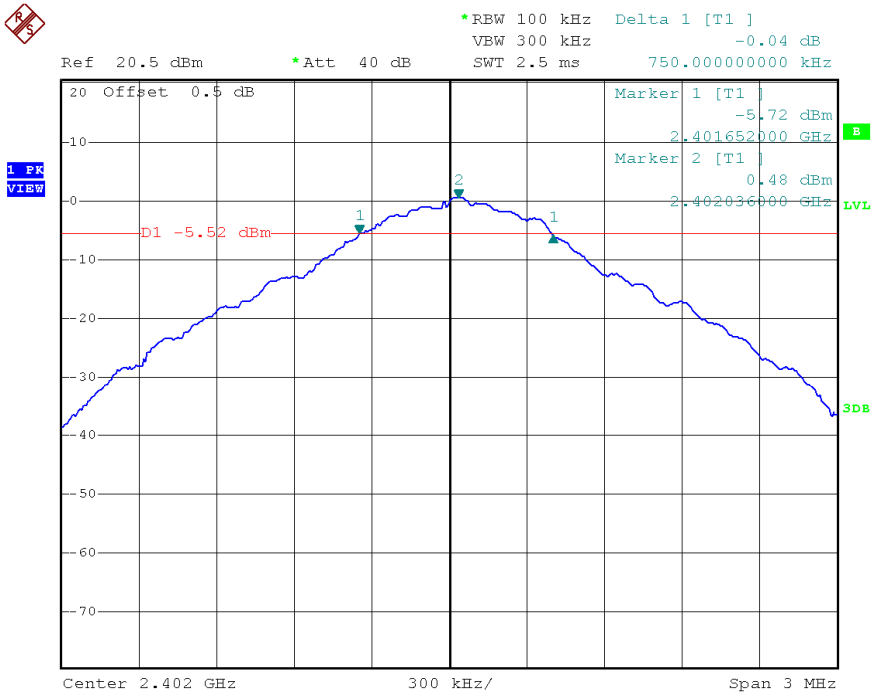
802.11n (20MHz), Highest Channel



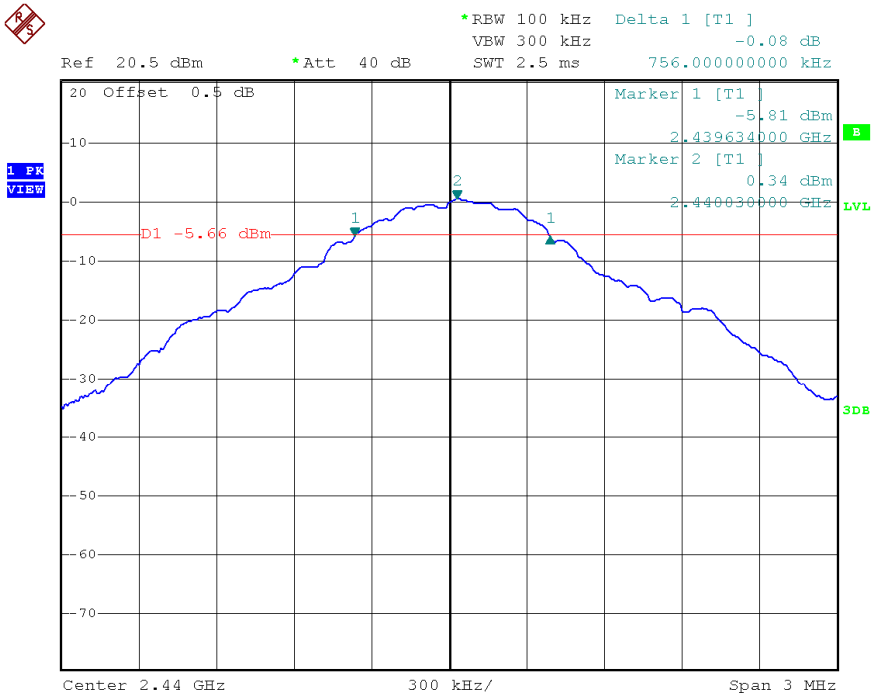
# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

Bluetooth 4.0, Lowest Channel



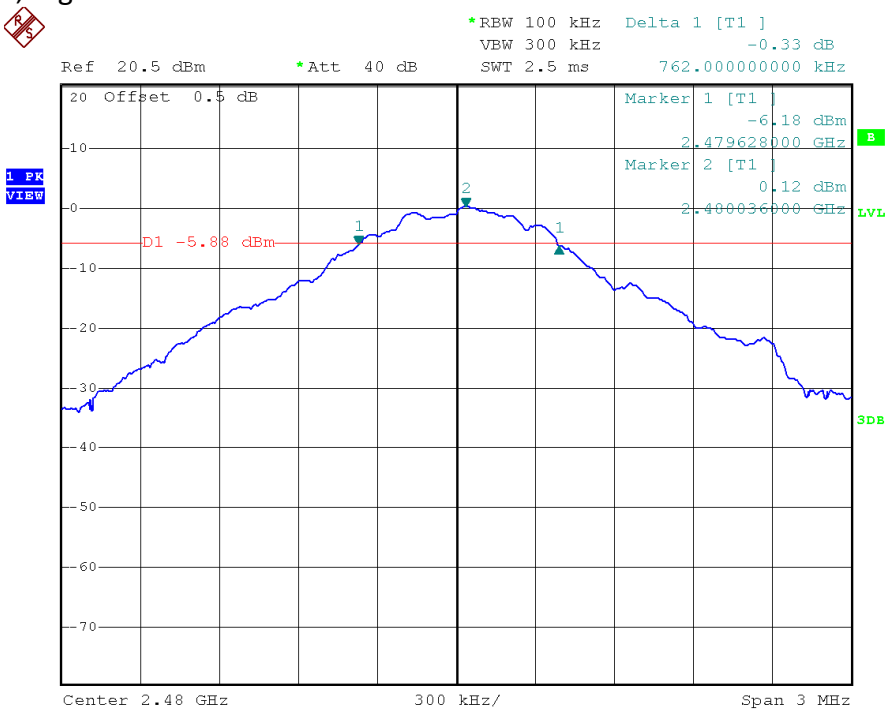

Bluetooth 4.0, Middle Channel



# TEST REPORT

## PLOTS OF 6dB RF BANDWIDTH

Bluetooth 4.0, 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 | 6.54 |
| Middle Channel: | 2437 | 7.82 |
| High Channel: | 2462 | 7.90 |

IEEE 802.11g (OFDM, 6 Mbps)

| Frequency (MHz) | | PSD in 100kHz (dBm) |
|---|---|---|
| Low Channel: | 2412 | 3.80 |
| Middle Channel: | 2437 | 3.58 |
| High Channel: | 2462 | 5.96 |

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

| Frequency (MHz) | | PSD in 100kHz (dBm) |
|---|---|---|
| Low Channel: | 2412 | 3.74 |
| Middle Channel: | 2437 | 3.45 |
| High Channel: | 2462 | 6.28 |

Bluetooth 4.0

| Frequency (MHz) | | PSD in 100kHz (dBm) |
|---|---|---|
| Low Channel: | 2402 | 0.44 |
| Middle Channel: | 2440 | 0.32 |
| High Channel: | 2480 | 0.15 |

Cable Loss: 0.5 dB

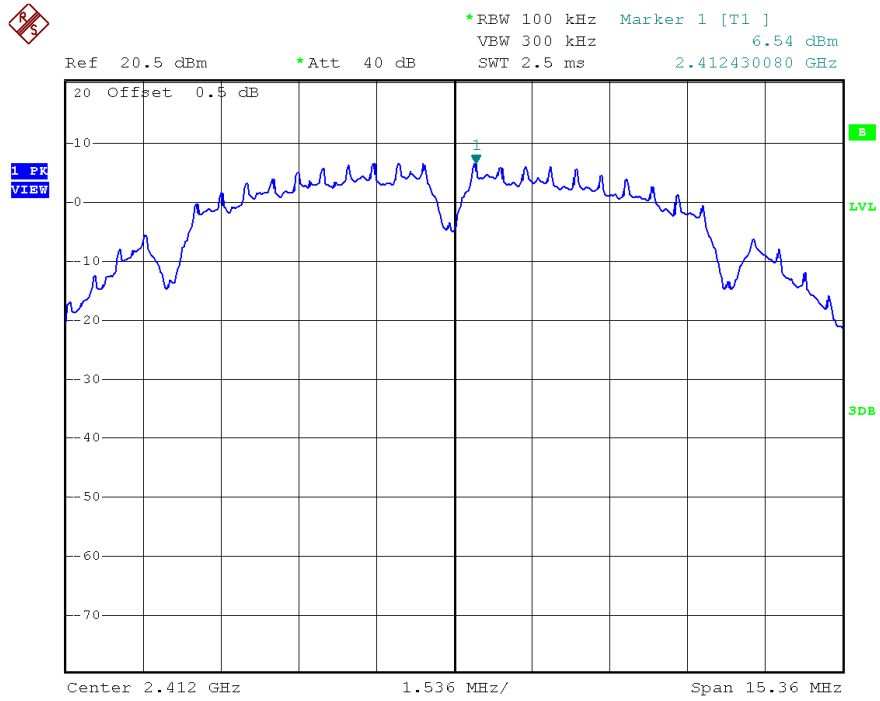
Limit:
8dBm

The plots of power spectral density are as below.

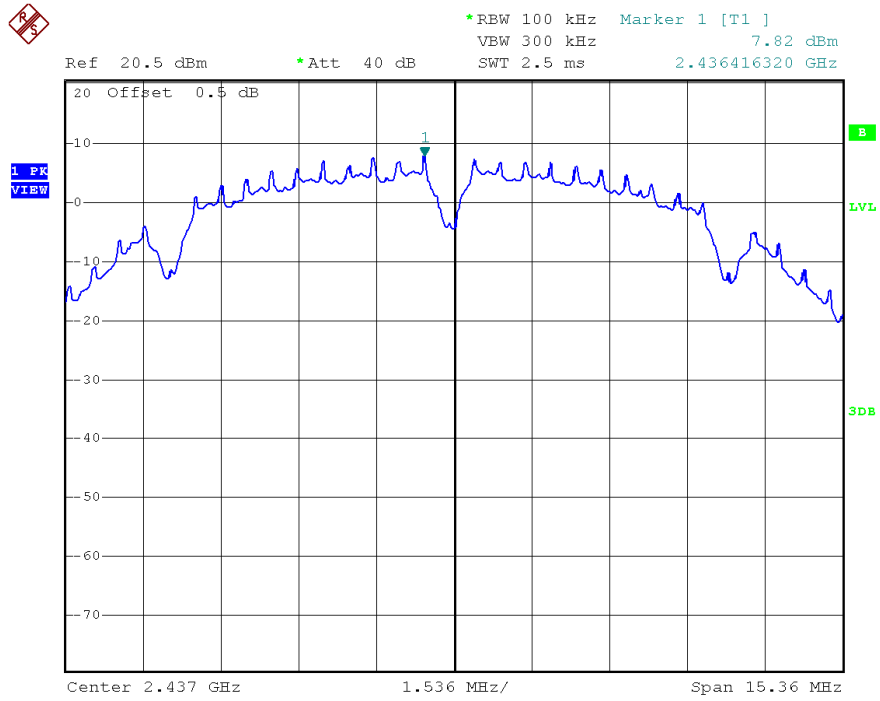
# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

802.11b, Lowest channel



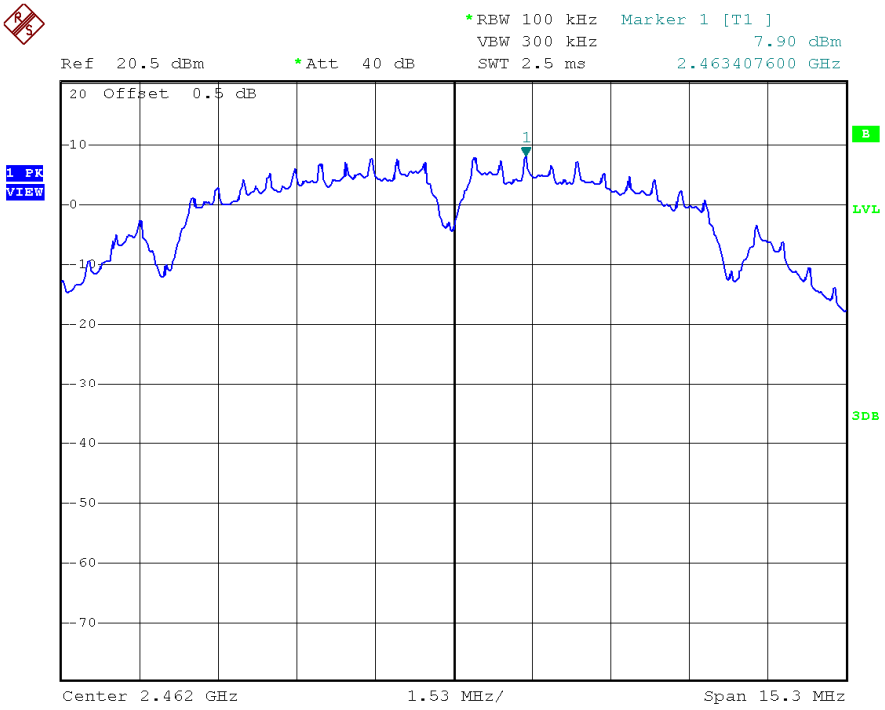

802.11b, Middle channel



# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

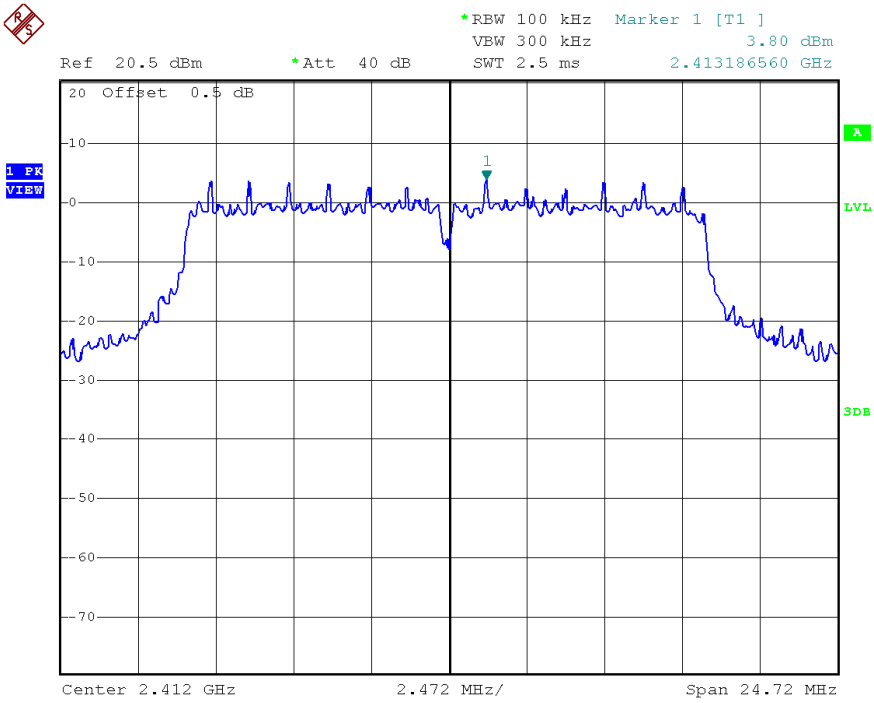
802.11b, Highest channel



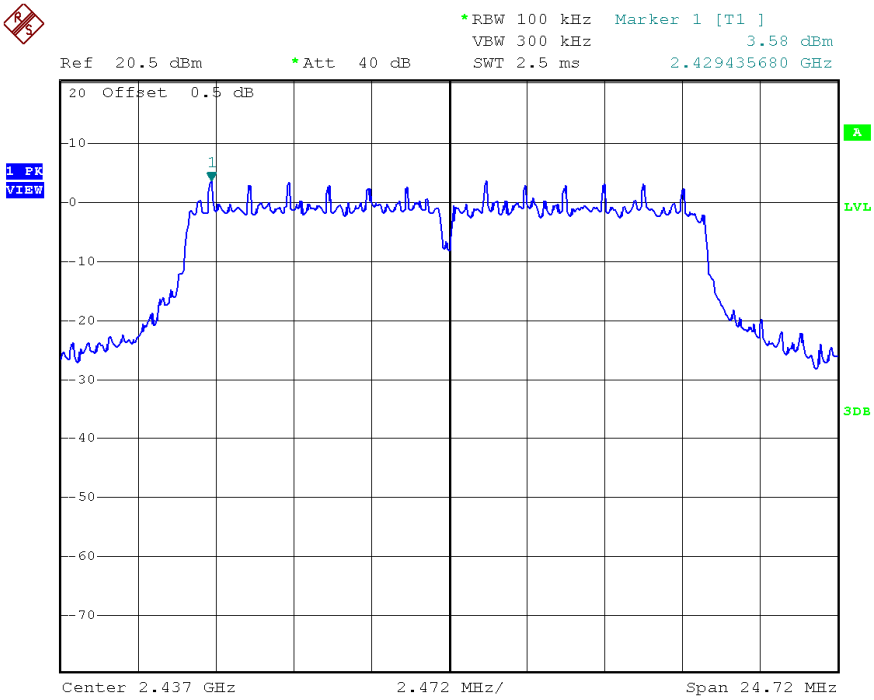
# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

802.11g, Lowest channel



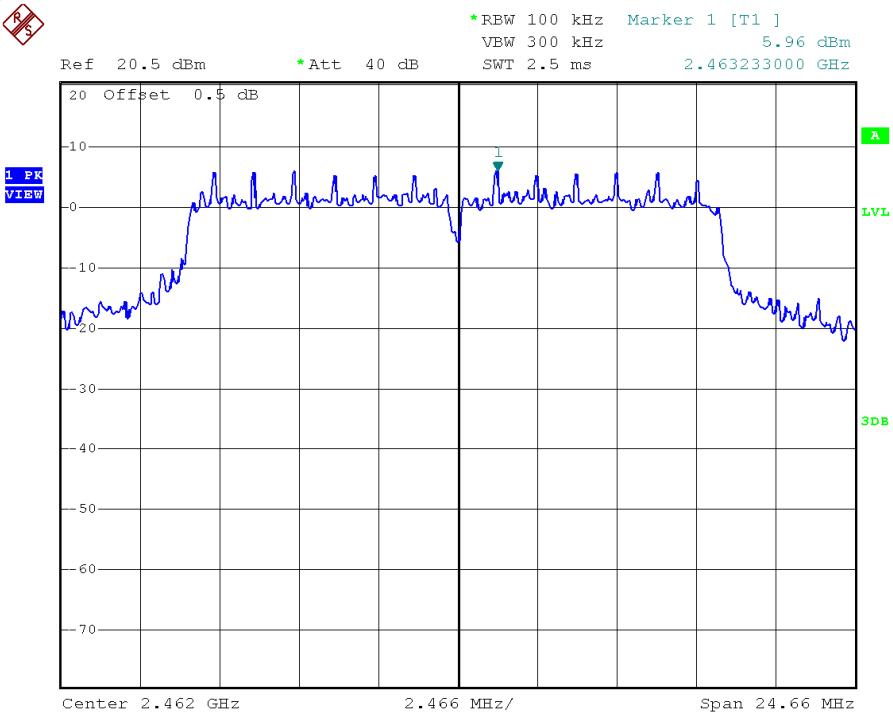

802.11g, Middle channel



# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

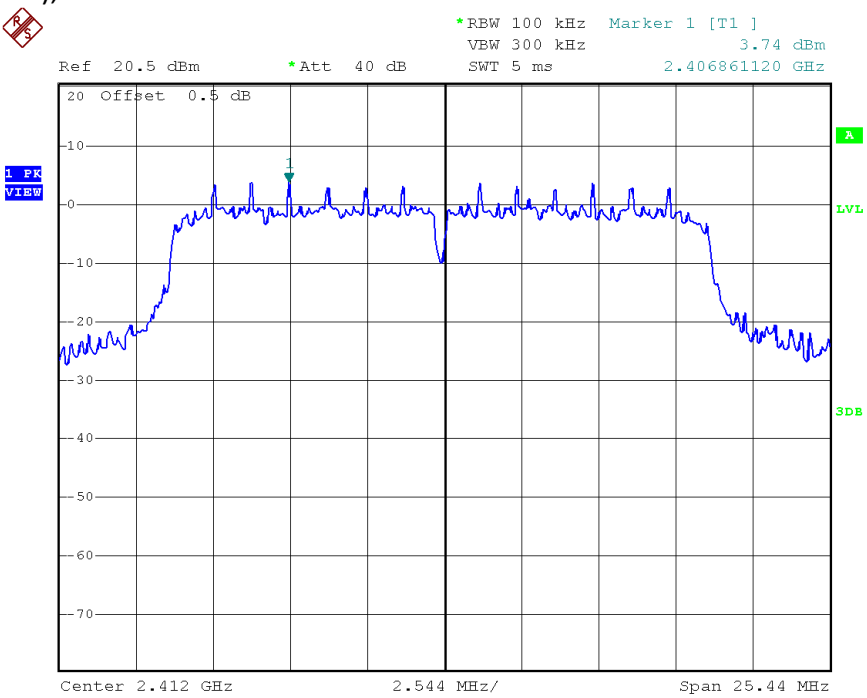
802.11g, Highest channel



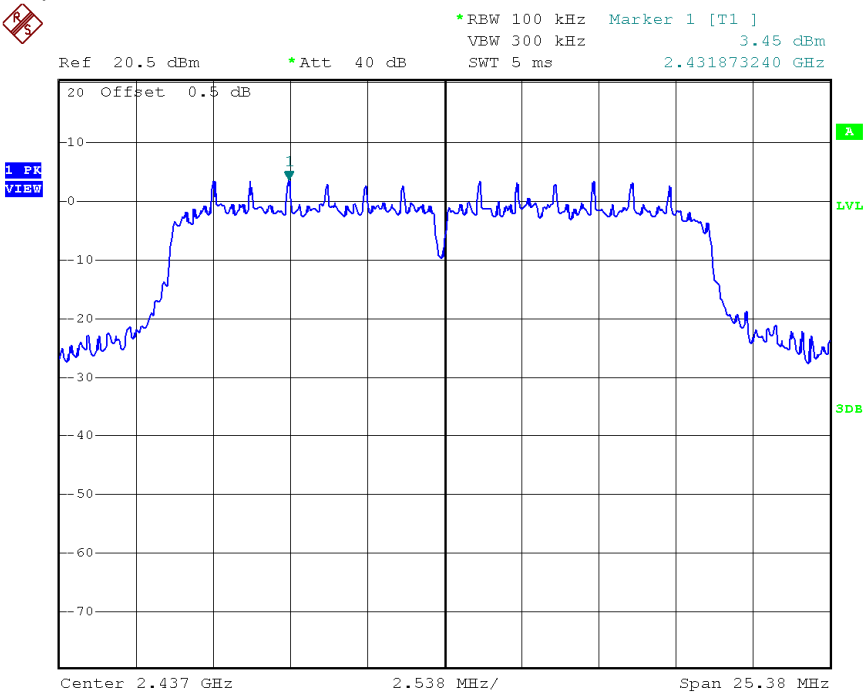
# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

802.11n (20MHz), Lowest channel



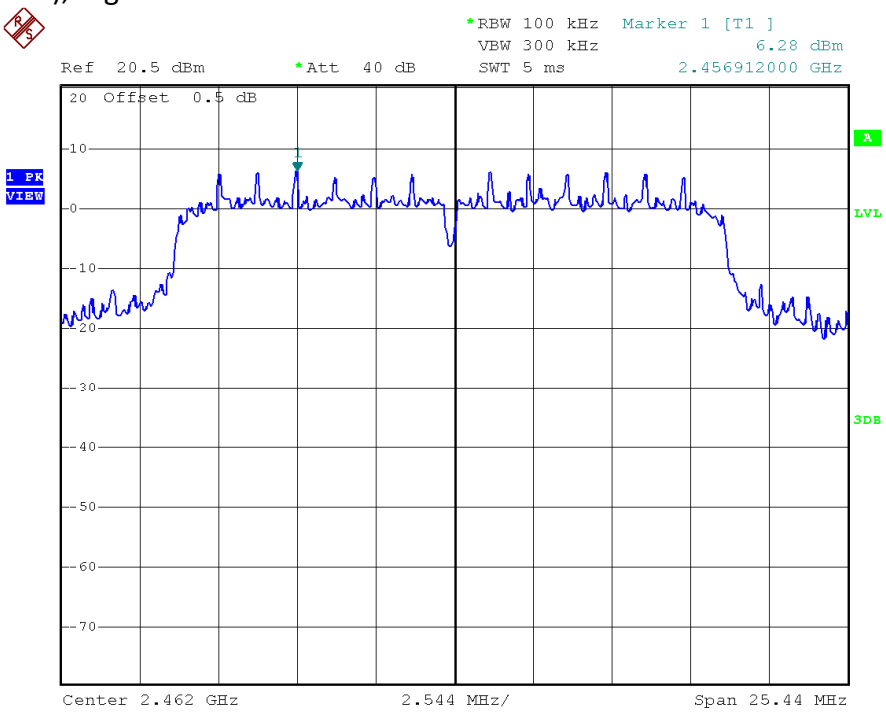

802.11n (20MHz), Middle channel



# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

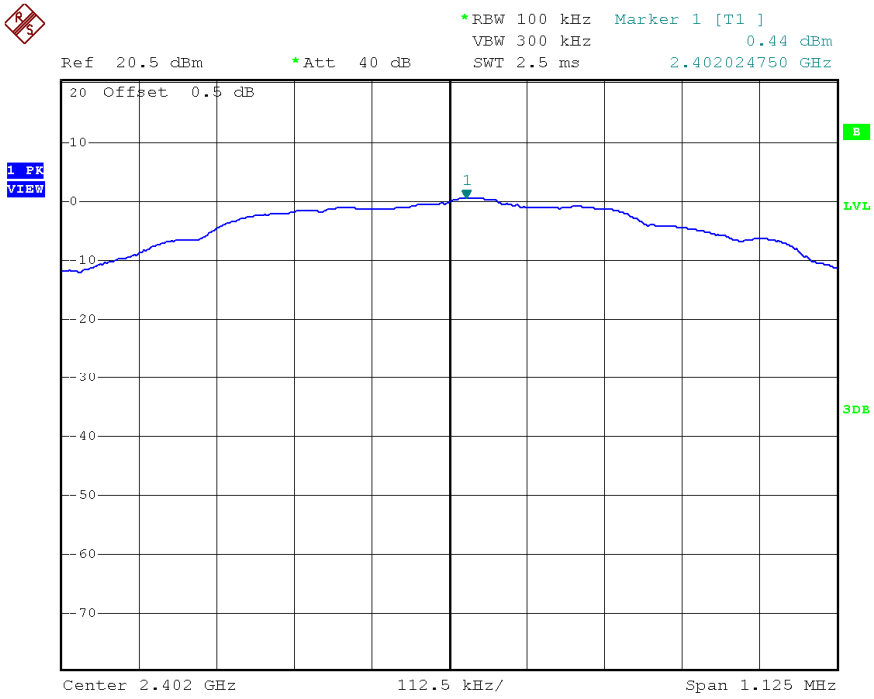
802.11n (20MHz), Highest channel



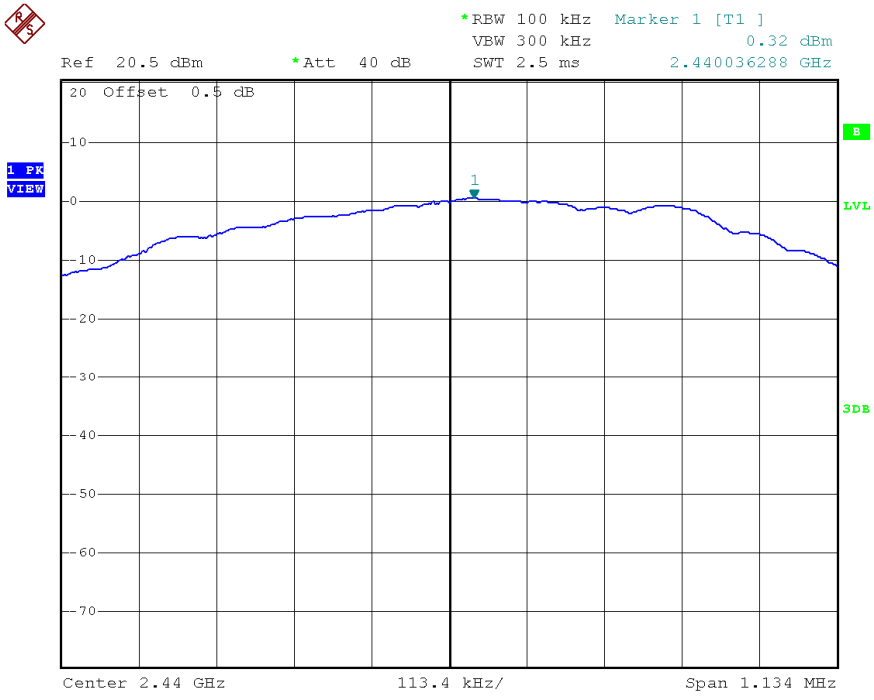
# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

Bluetooth 4.0, Lowest channel



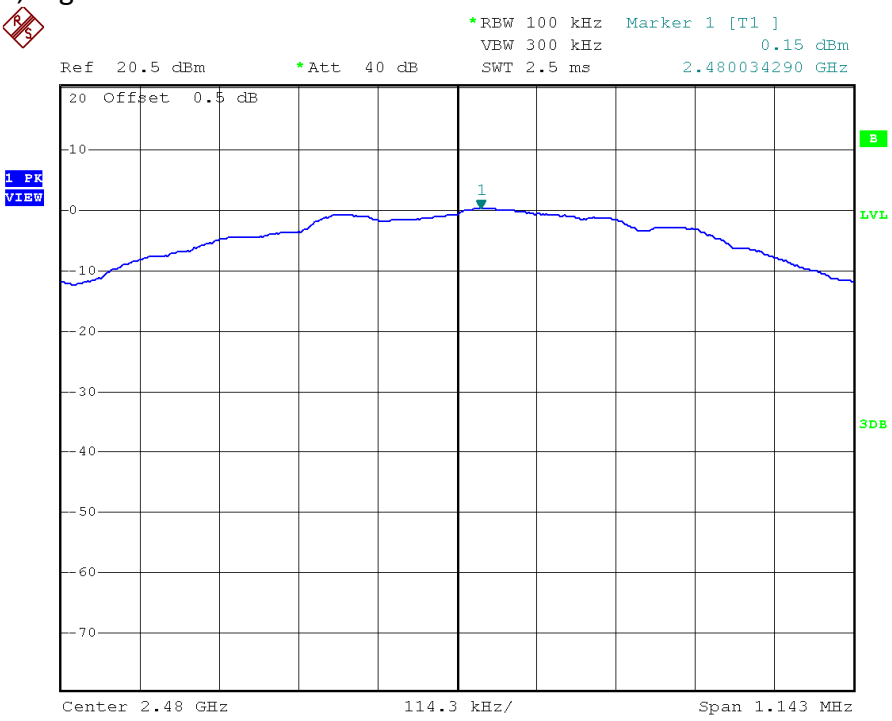

Bluetooth 4.0, Middle channel



# TEST REPORT

## PLOTS OF POWER SPECTRAL DENSITY

Bluetooth 4.0, Highest channel



## TEST REPORT

### 4.4 Out of Band Conducted Emissions

For 802.11b/g/n20MHz & Bluetooth 4.0, 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 4.0.

The measurement procedures under sections 11 of KDB No.558074 D01 v05r01 (11-February-2019) were used.

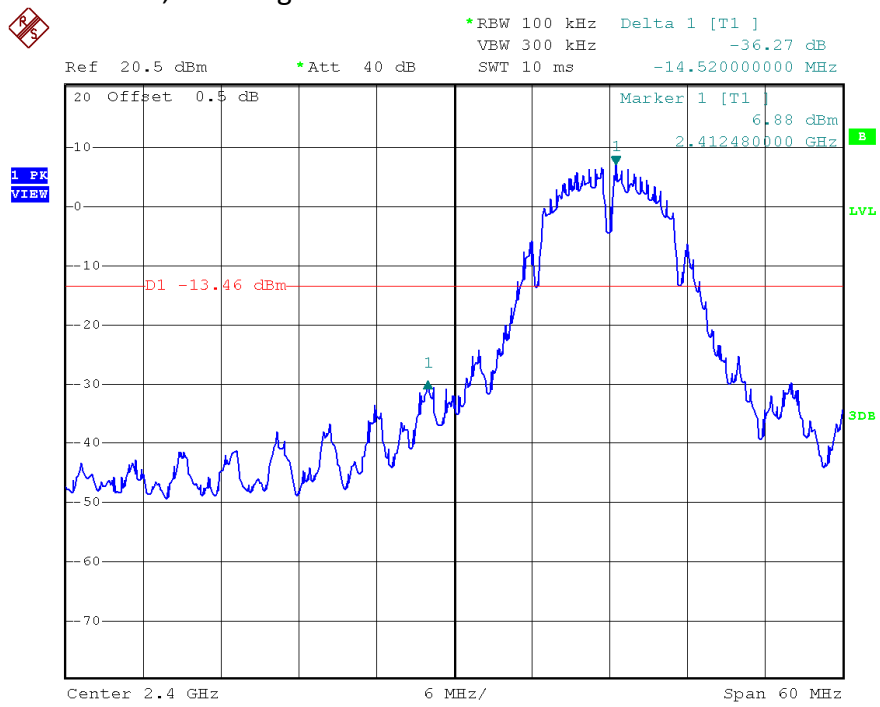
Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

Limits:
All spurious emission and up to the tenth harmonic was measured and they were found to be at least 20dB below the maximum measured in-band peak PSD level.

# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Bandedge

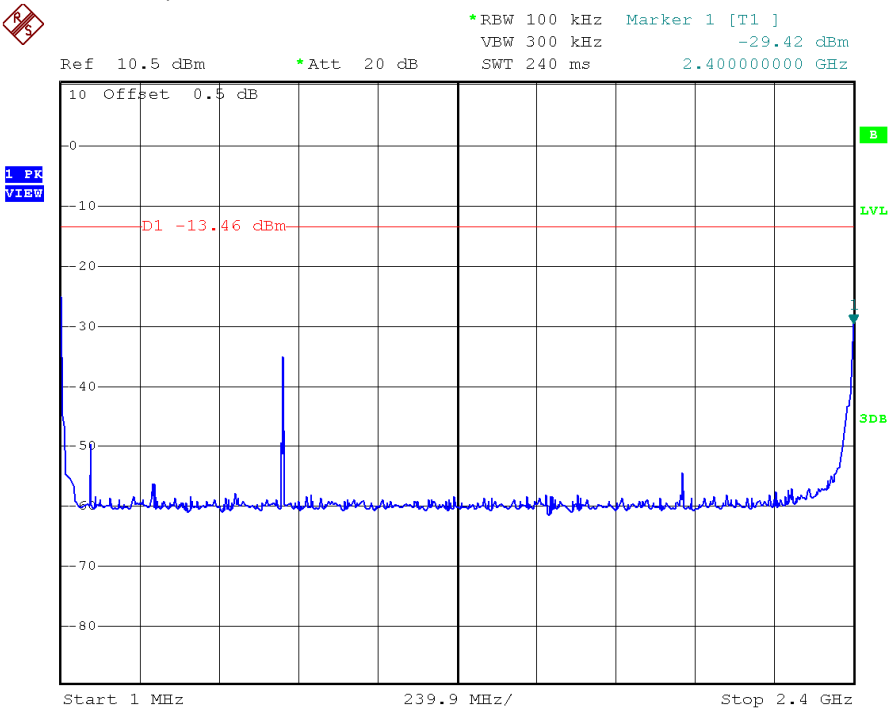



802.11b, Highest Channel, Bandedge

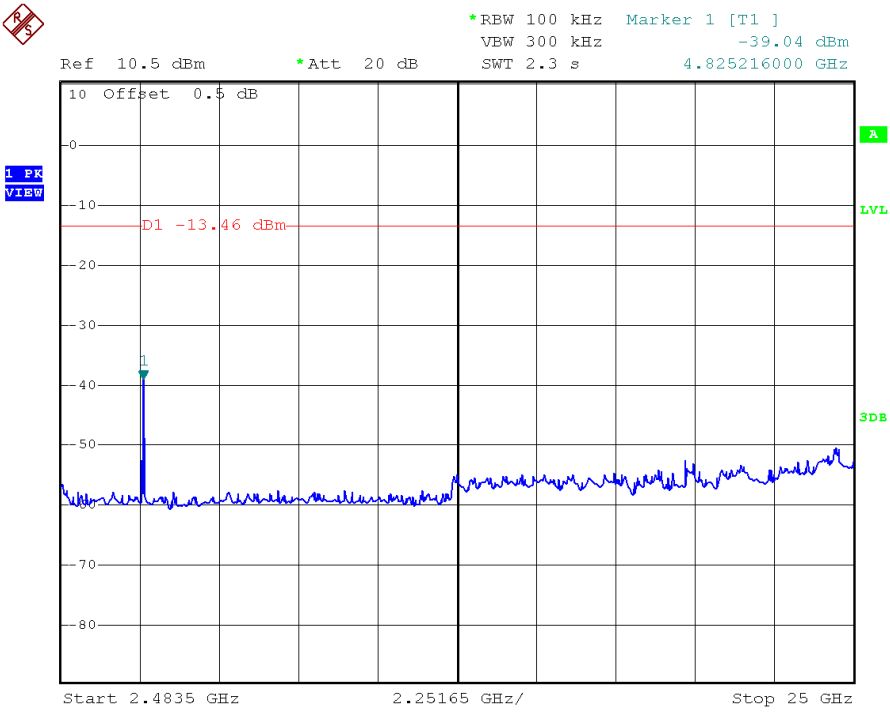
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Lowest Channel, Plot A



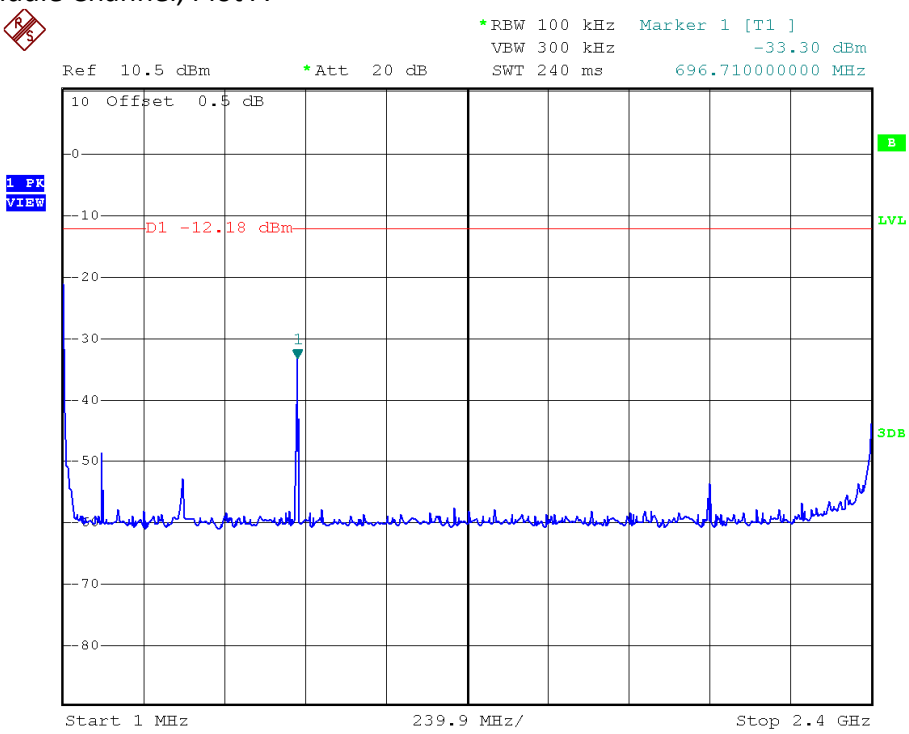

802.11b, Lowest Channel, Plot B



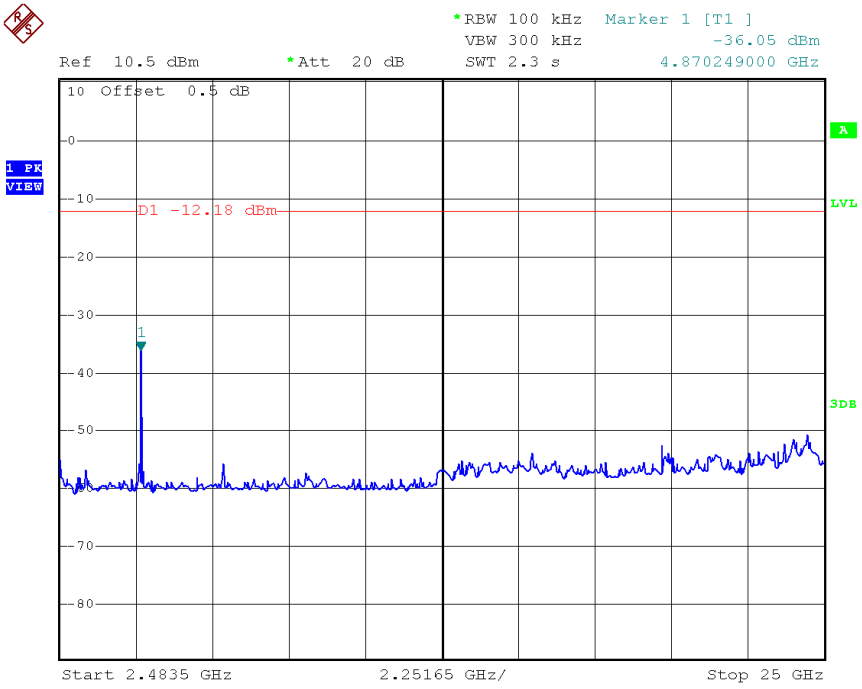
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Middle Channel, Plot A



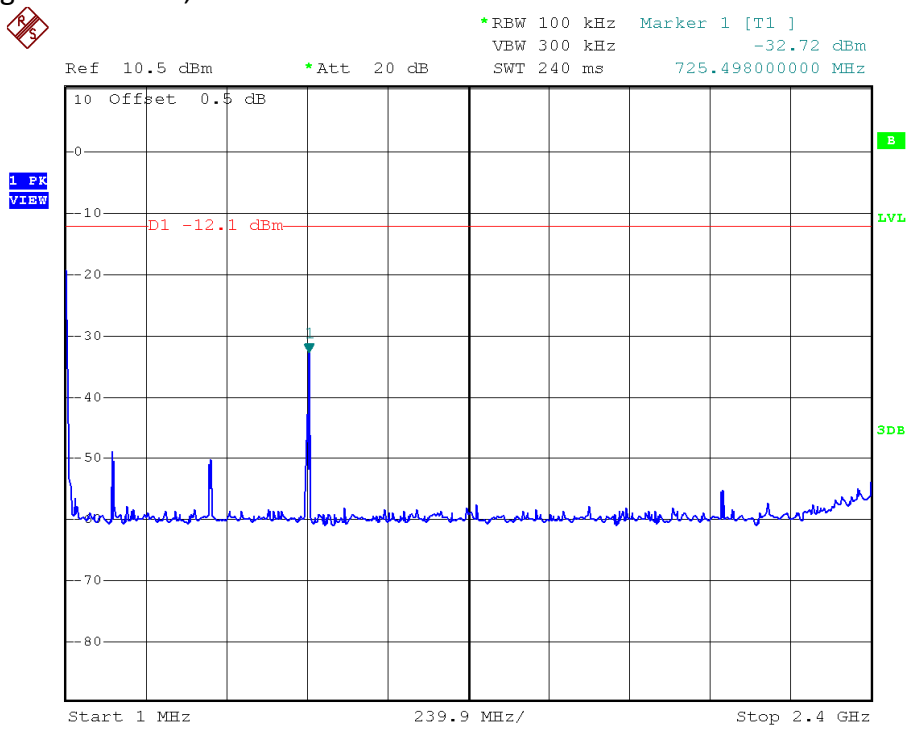

802.11b, Middle Channel, Plot B



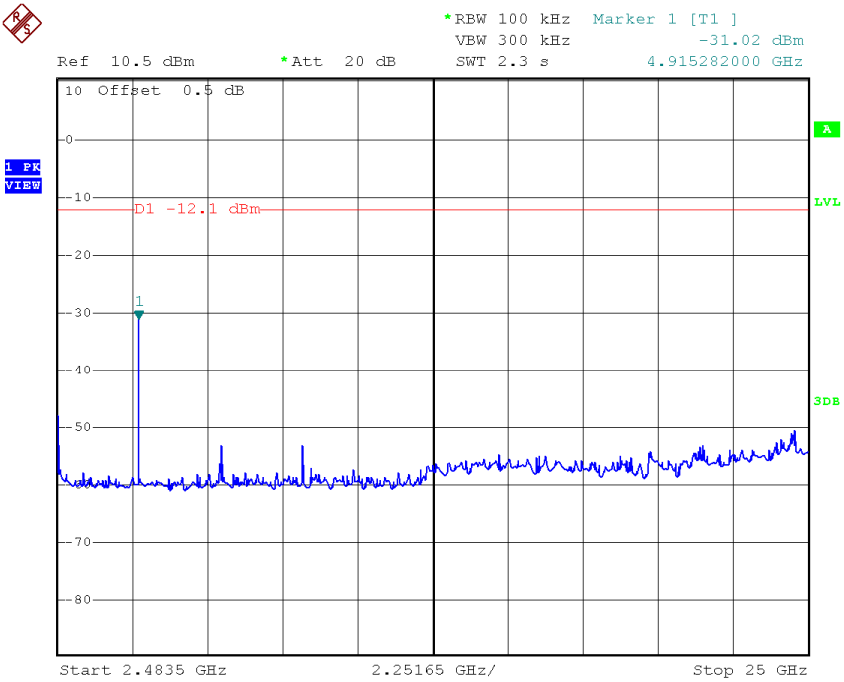
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11b, Highest Channel, Plot A



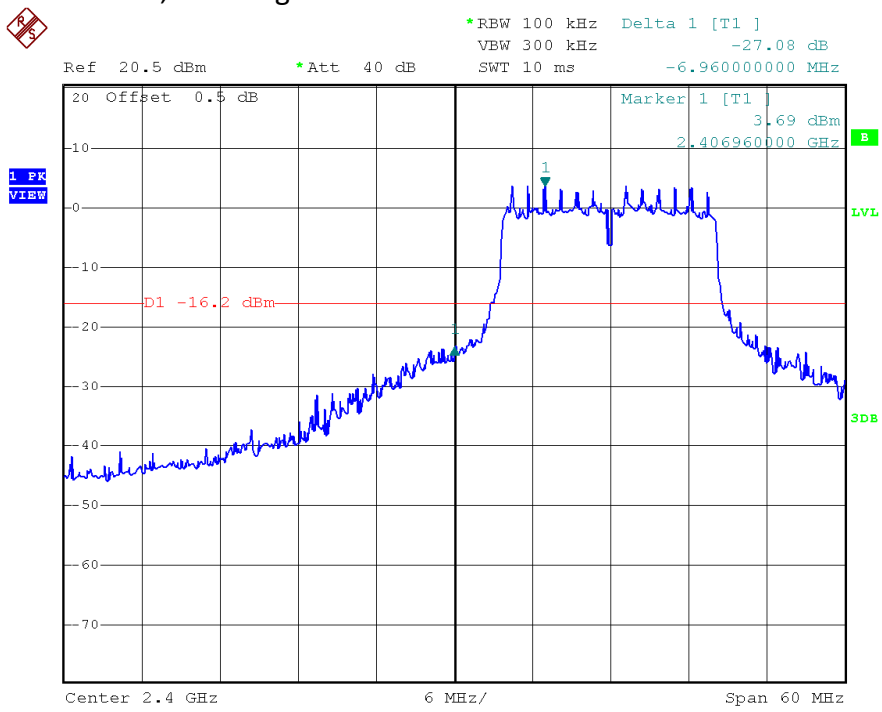

802.11b, Highest Channel, Plot B



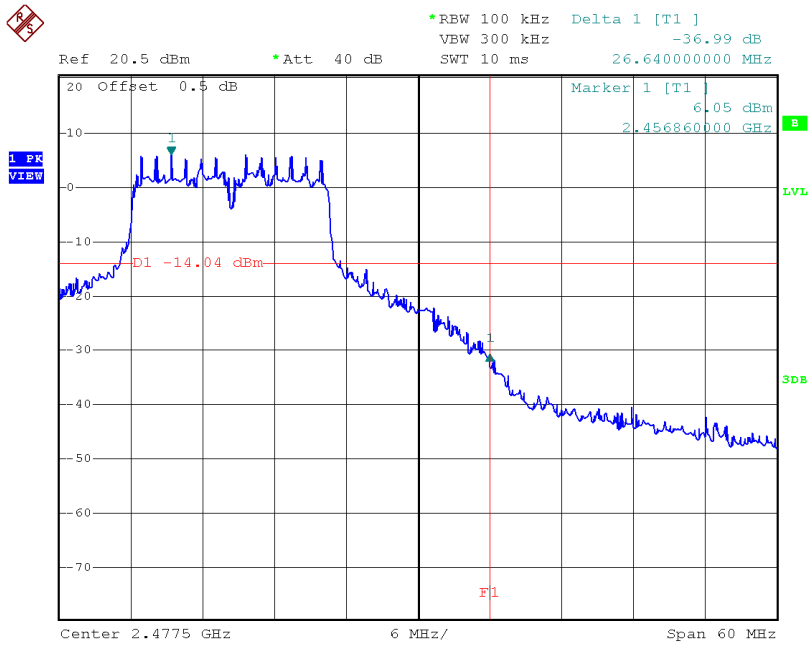
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Lowest Channel, Bandedge



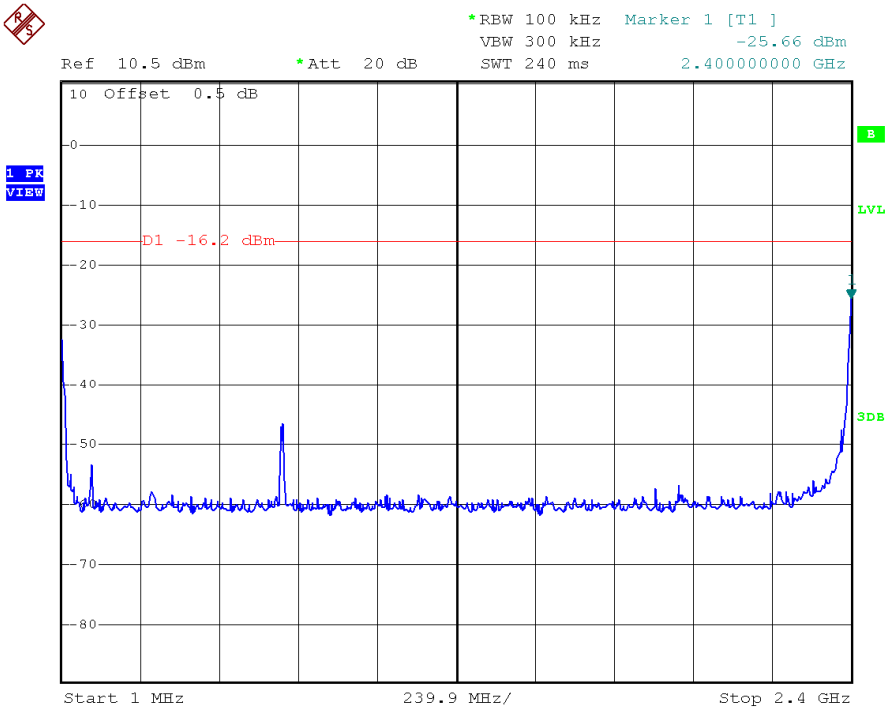

802.11g, Highest Channel, Bandedge



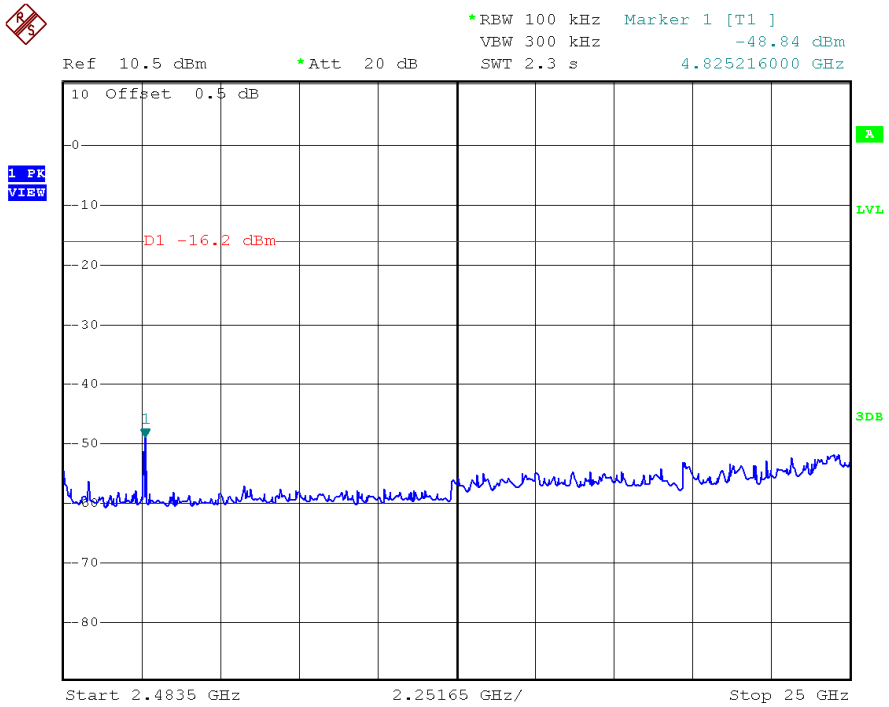
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Lowest Channel, Plot A



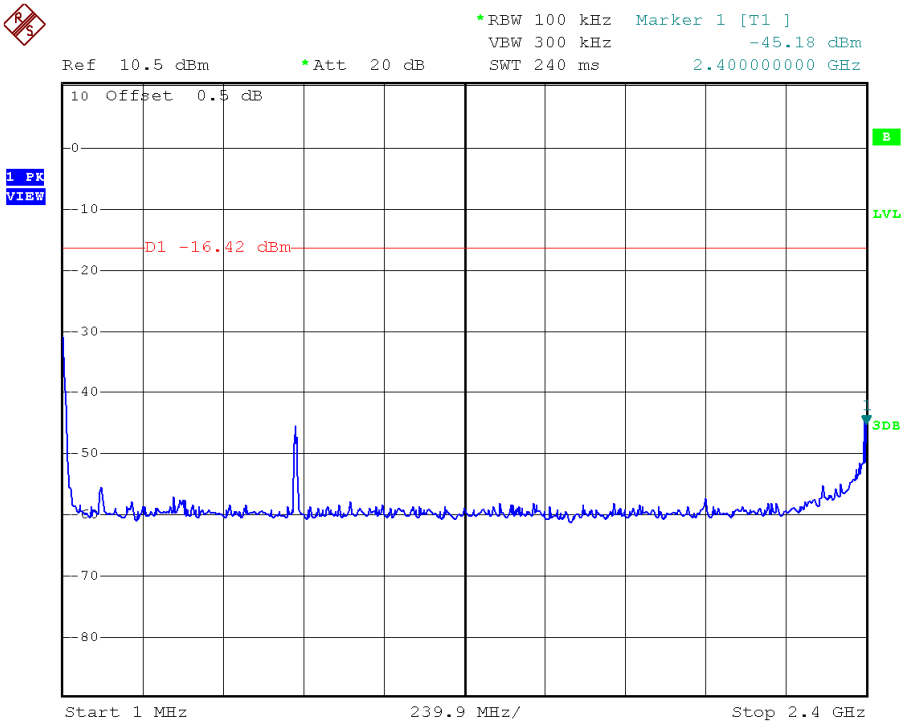

802.11g, Lowest Channel, Plot B



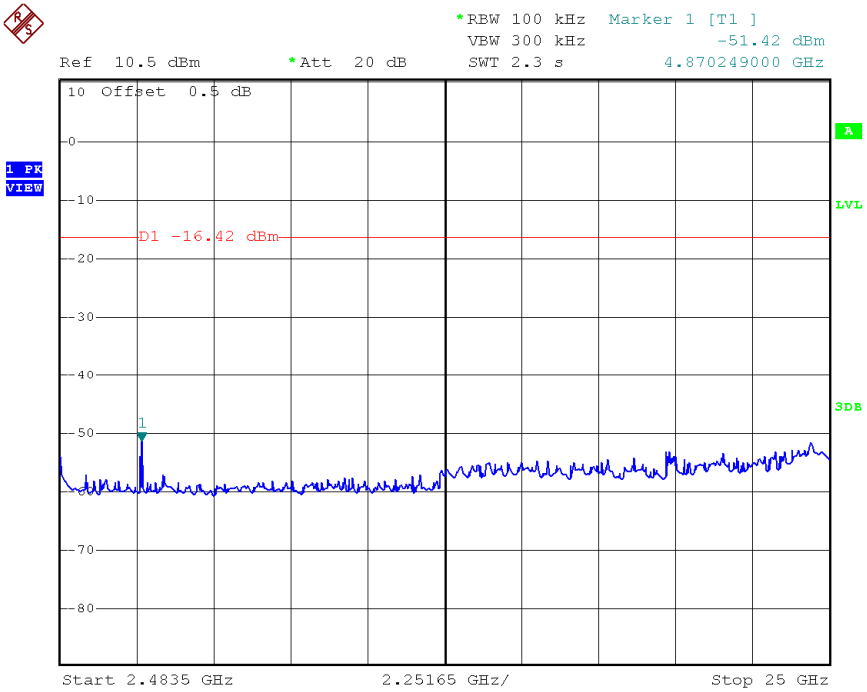
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Middle Channel, Plot A



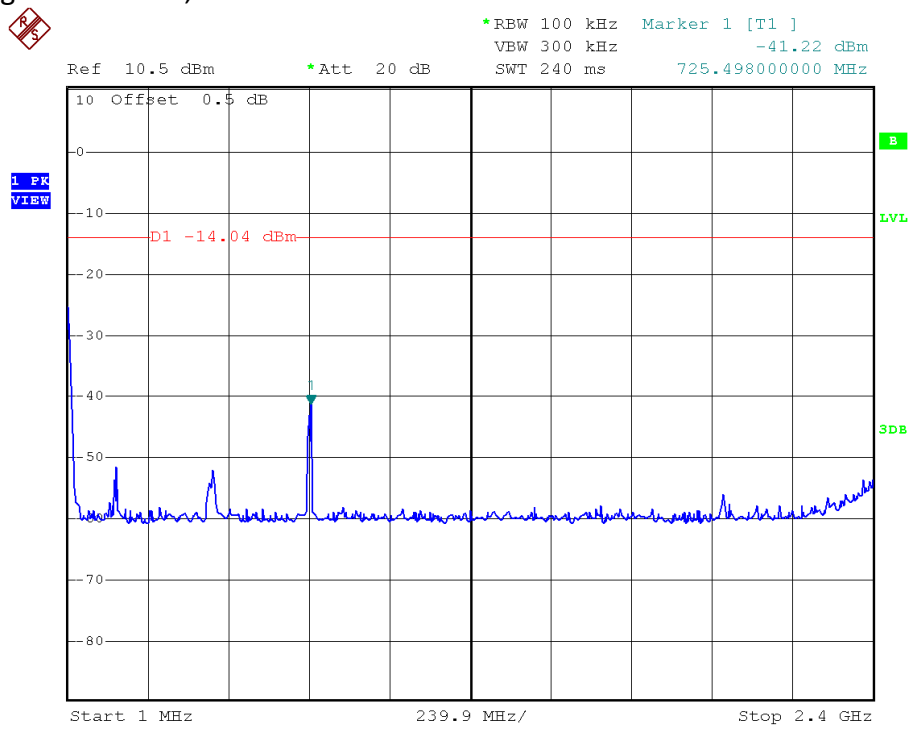

802.11g, Middle Channel, Plot B



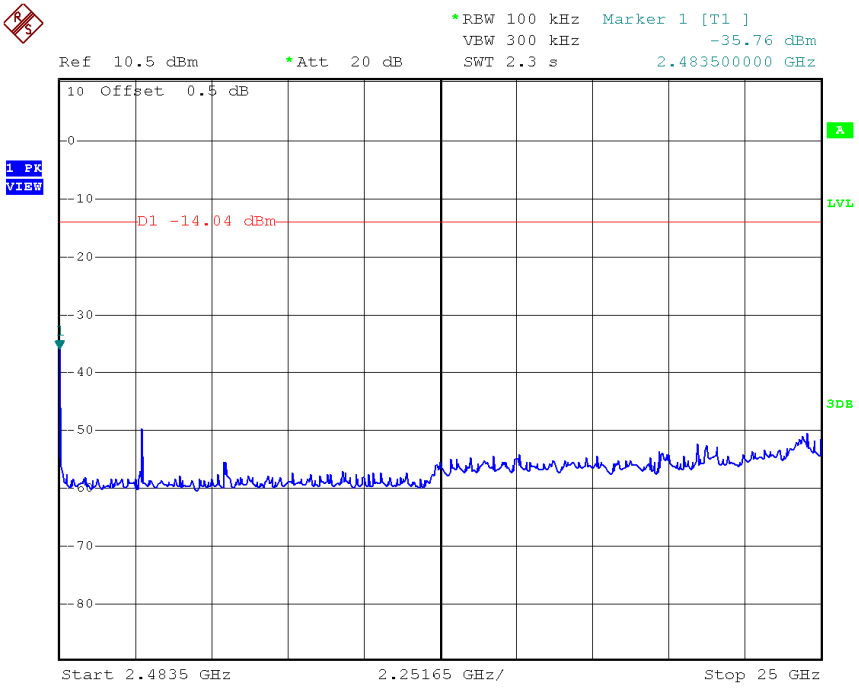
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802.11g, Highest Channel, Plot A



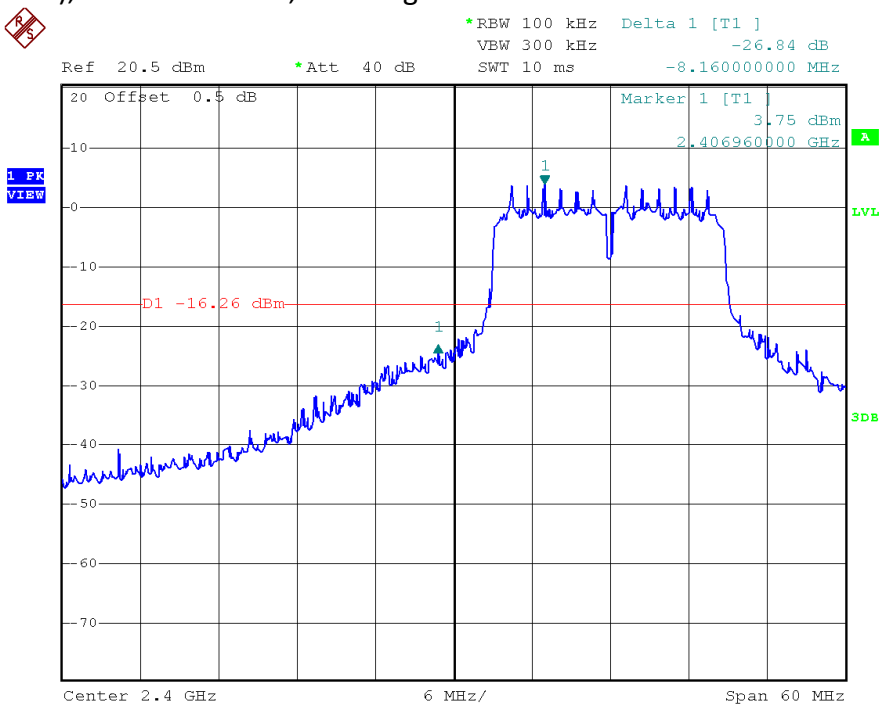

802.11g, Highest Channel, Plot B



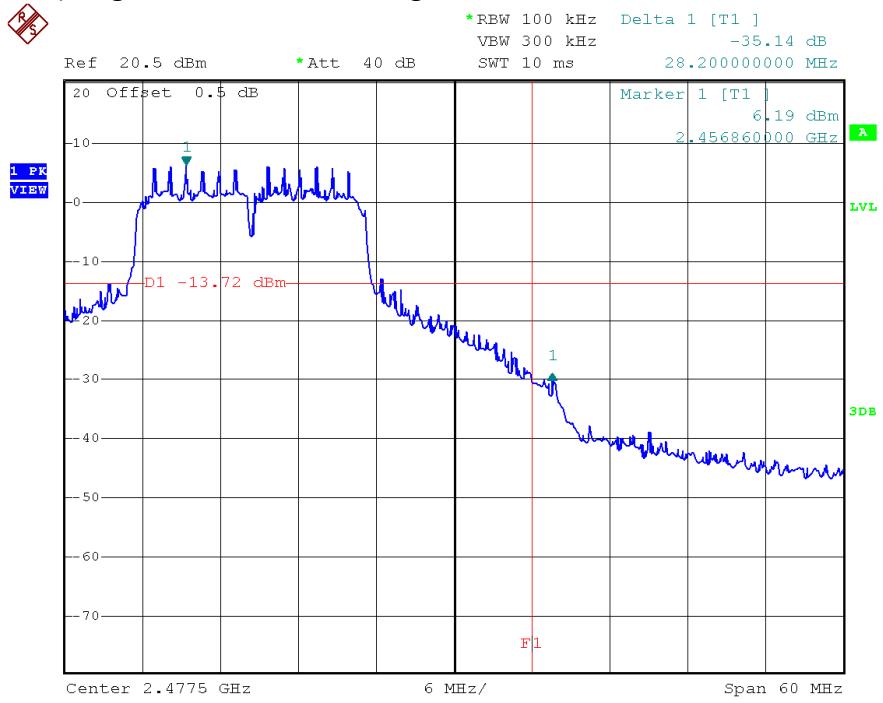
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

802. 11n (20MHz), Lowest Channel, Bandedge



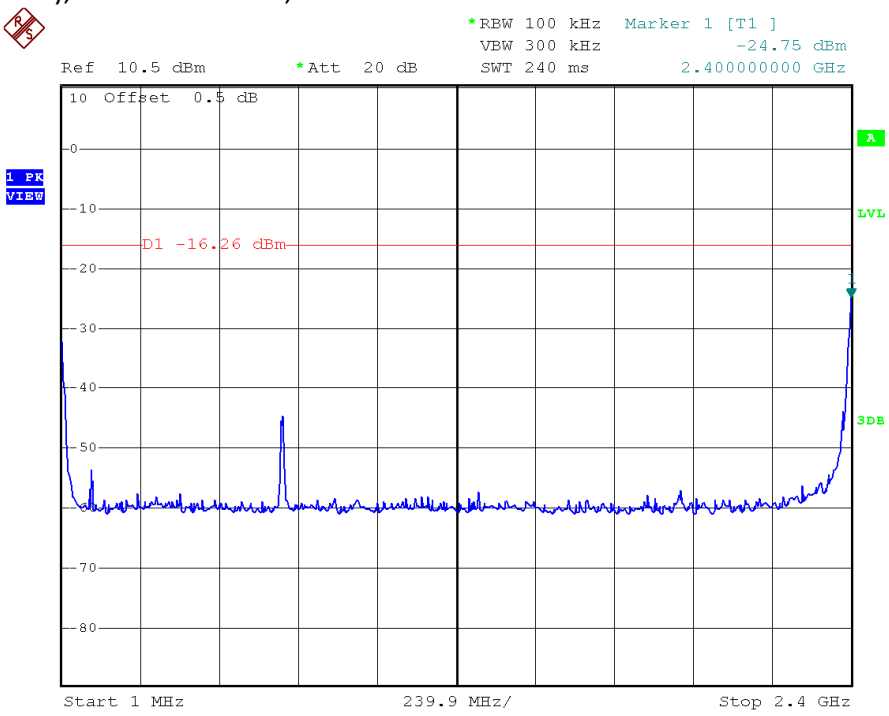

802. 11n (20MHz), Highest Channel, Bandedge



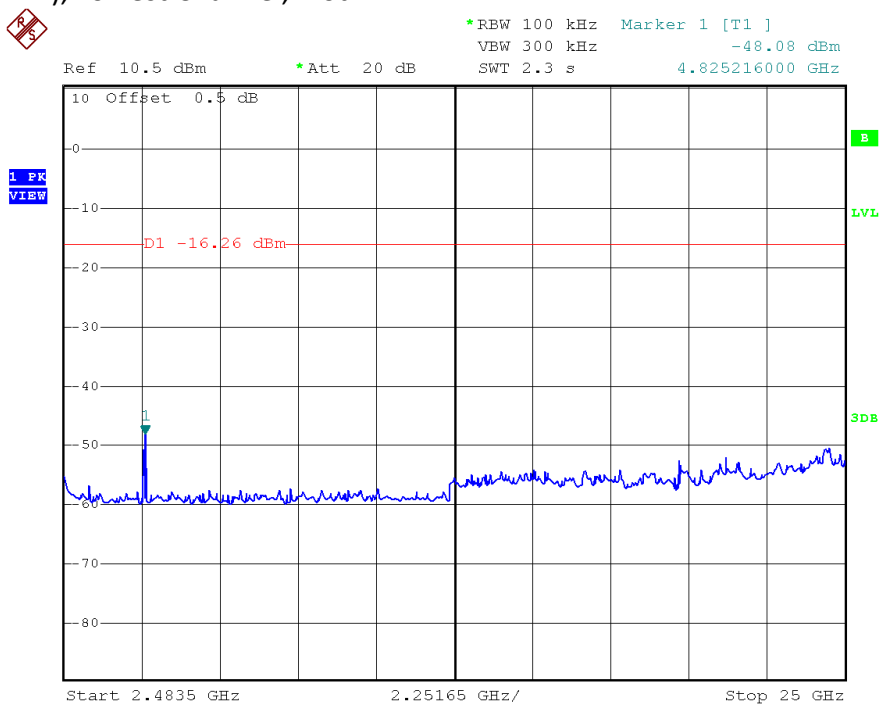
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



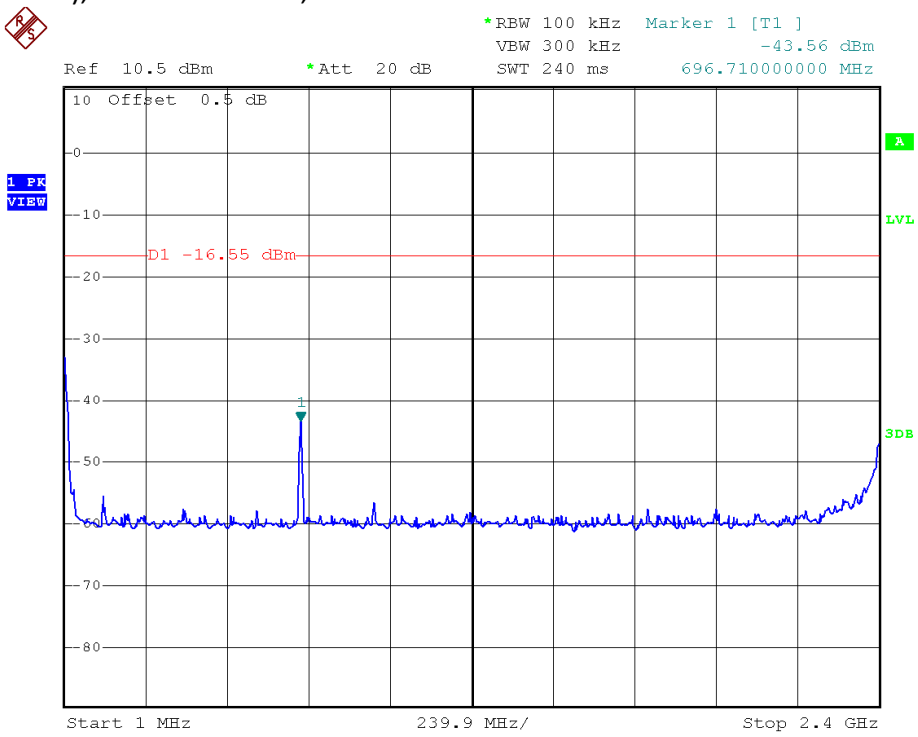

802.11n (20MHz), Lowest Channel, Plot B



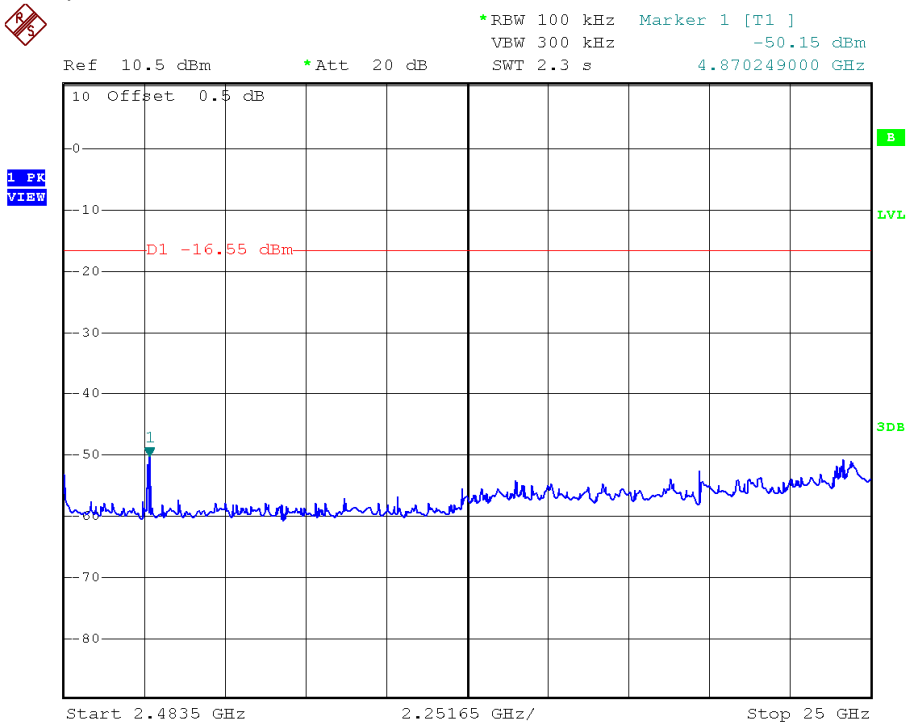
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



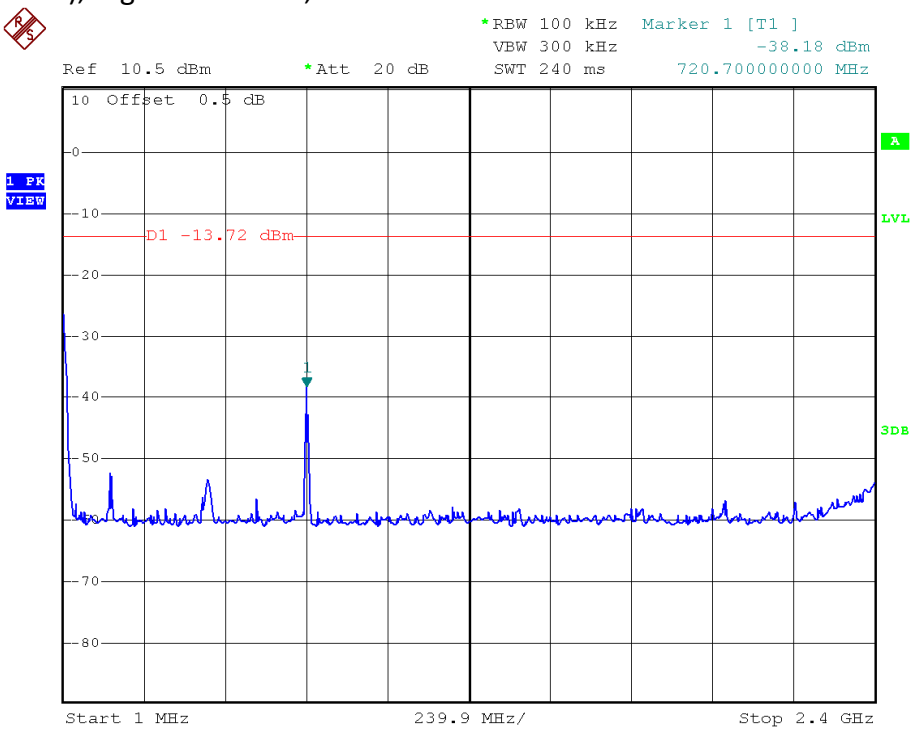

802.11n (20MHz), Middle Channel, Plot B



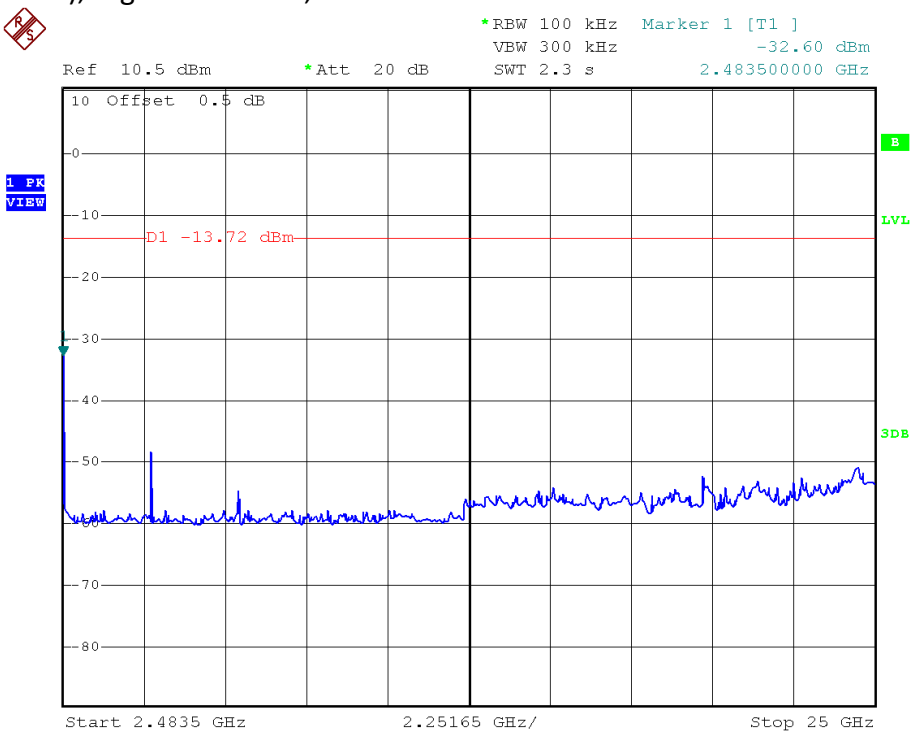
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

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



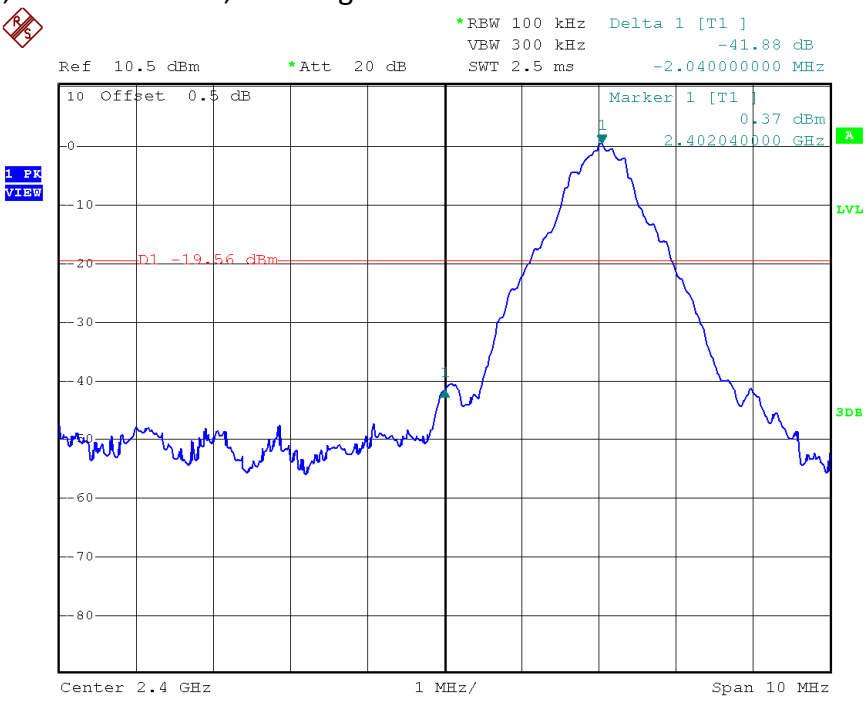

802.11n (20MHz), Highest Channel, Plot B



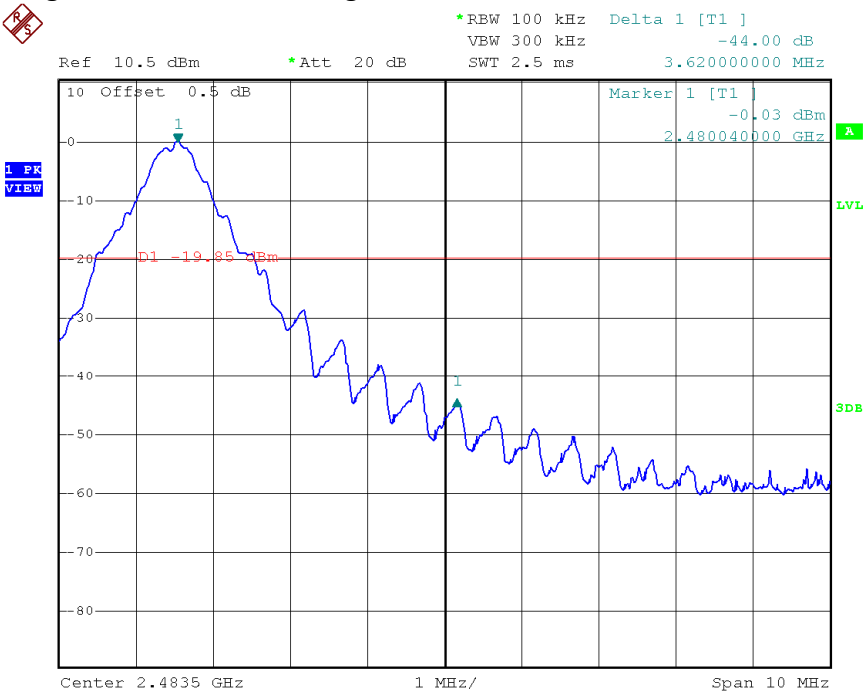
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Bandedge



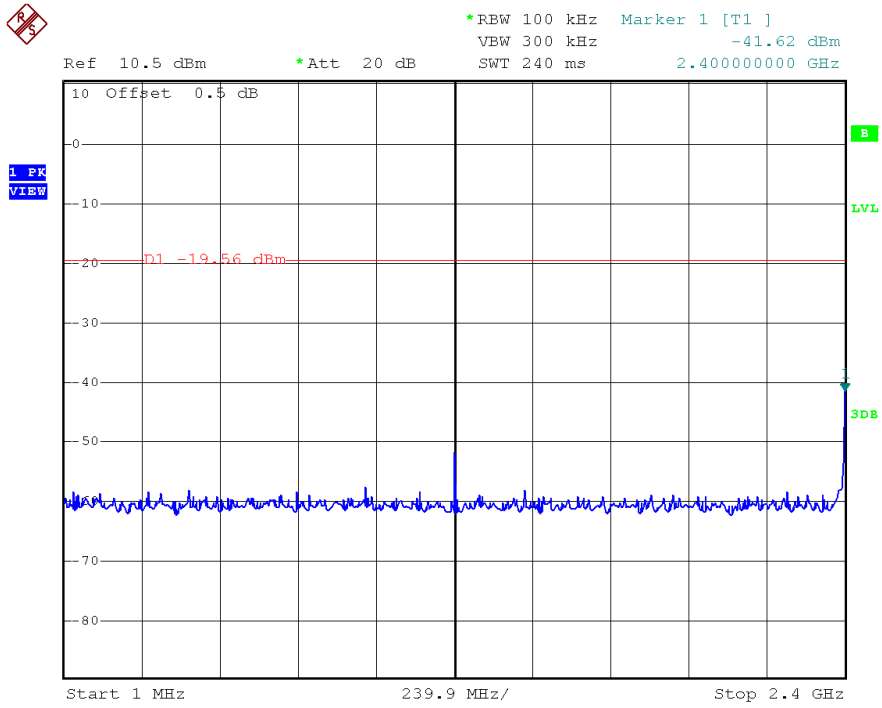

Bluetooth 4.0, Highest Channel, Bandedge



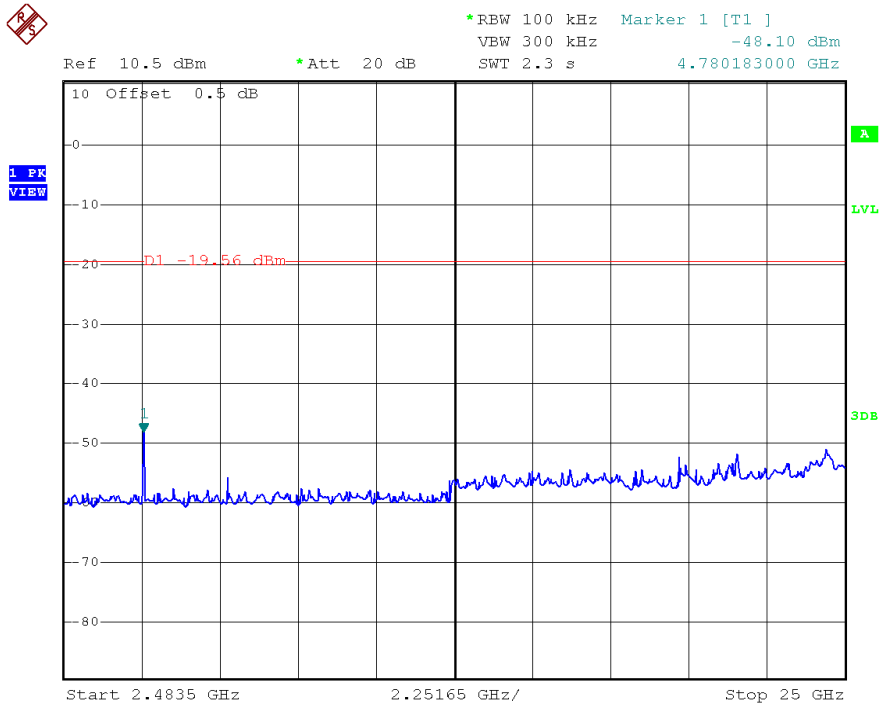
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Lowest Channel, Plot A



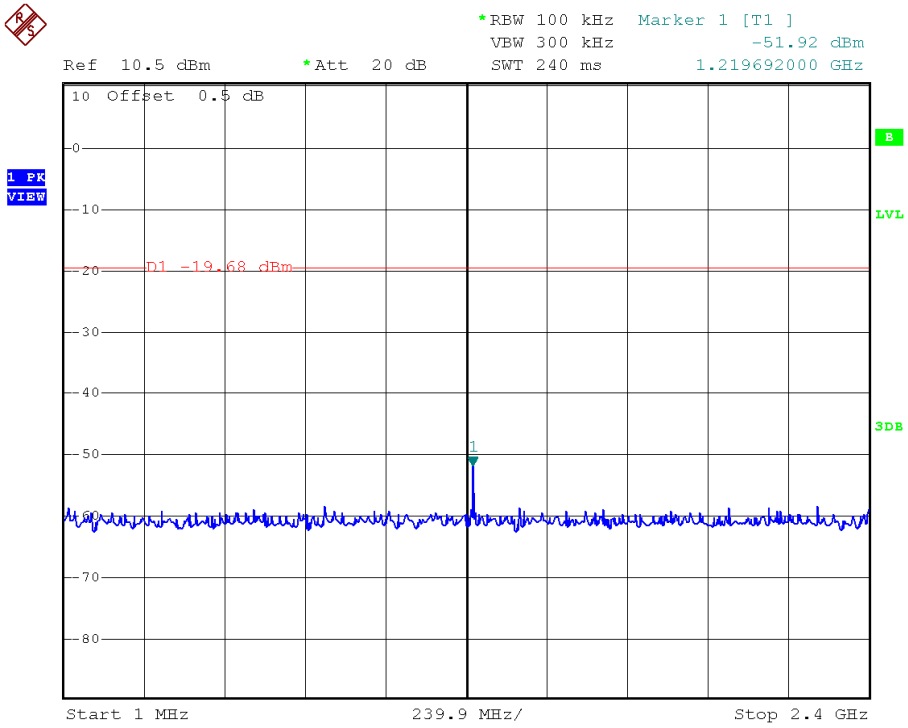

Bluetooth 4.0, Lowest Channel, Plot B



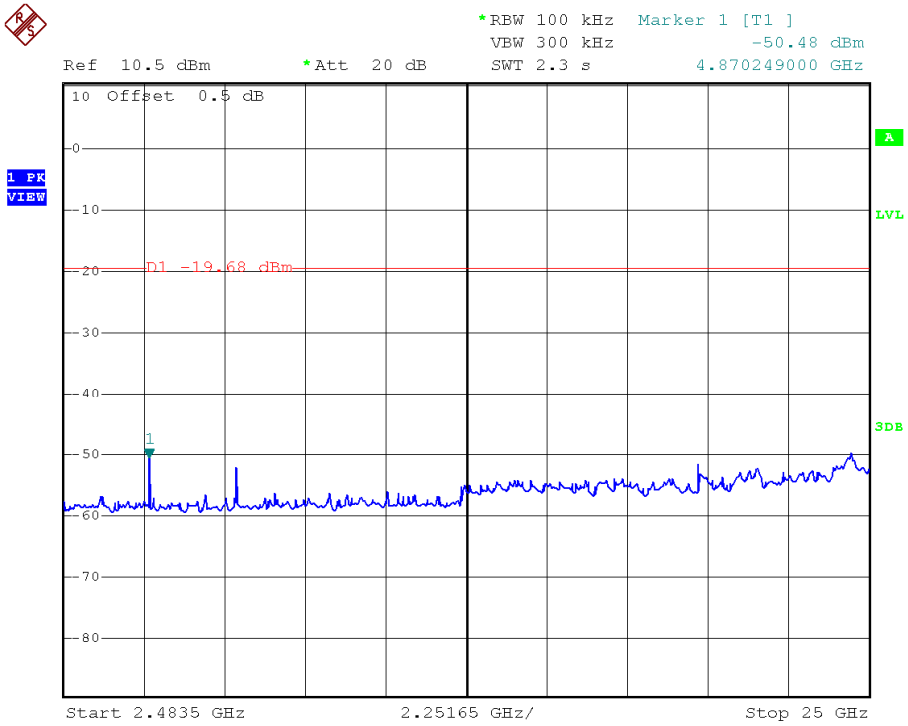
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Middle Channel, Plot A



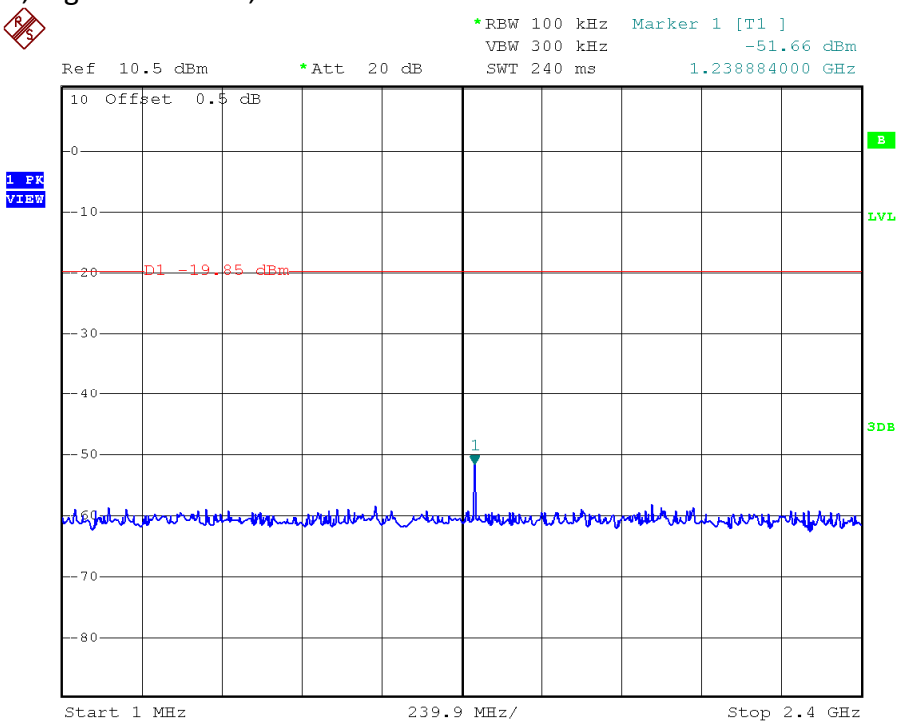

Bluetooth 4.0, Middle Channel, Plot B



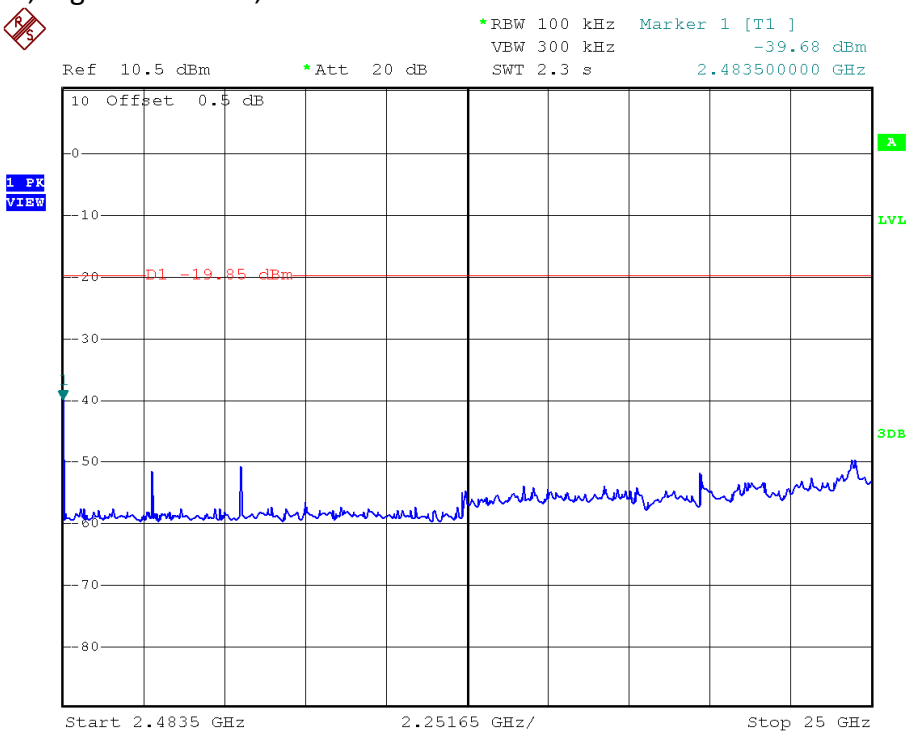
# TEST REPORT

## PLOTS OF OUT OF BAND CONDUCTED EMISSIONS

Bluetooth 4.0, Highest Channel, Plot A




Bluetooth 4.0, Highest Channel, Plot B

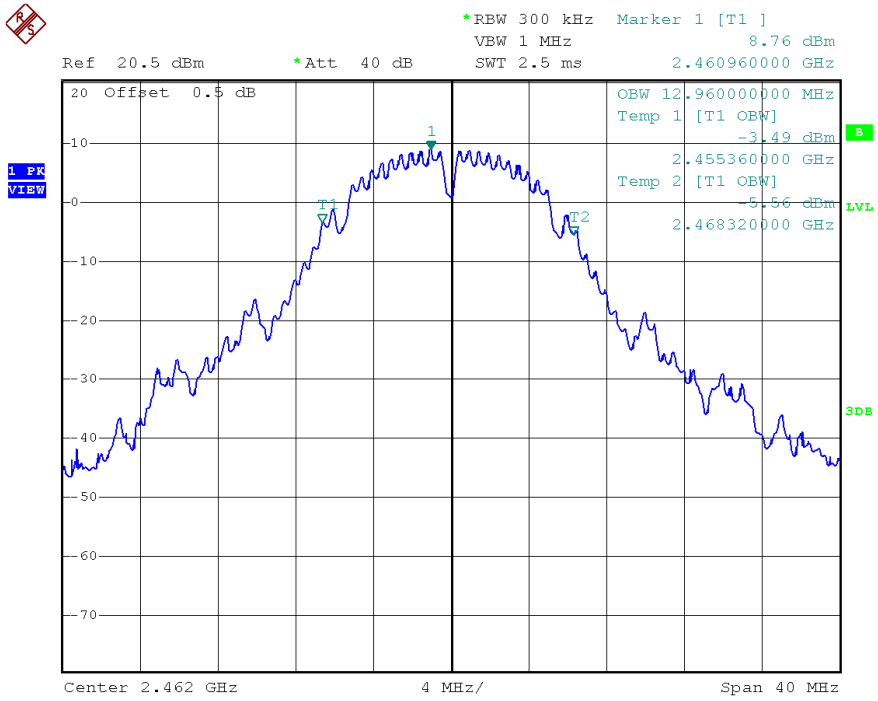


## TEST REPORT

Occupied Bandwidth Results: (802.11b)

| (802.11b) | Occupied Bandwidth (MHz) |
|---|---|
| Low Channel: 2412 | 12.32 |
| Middle Channel: 2437 | 12.64 |
| High Channel: 2462 | 12.96 |

The worst case is shown as below

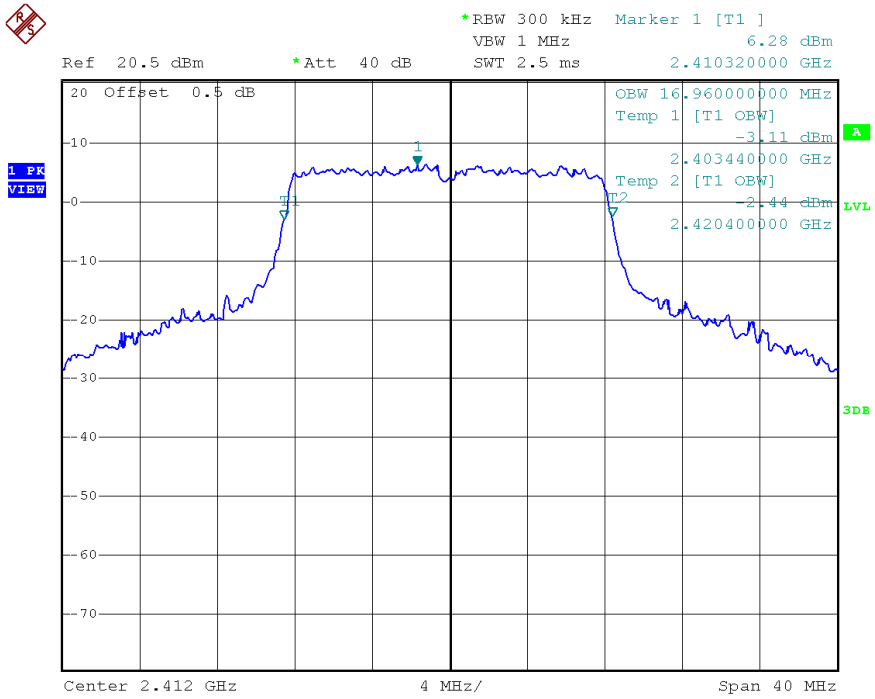


## TEST REPORT

Occupied Bandwidth Results: (802.11g)

| (802.11g) | Occupied Bandwidth (MHz) |
|---|---|
| Low Channel: 2412 | 16.96 |
| Middle Channel: 2437 | 16.96 |
| High Channel: 2462 | 16.52 |

The worst case is shown as below

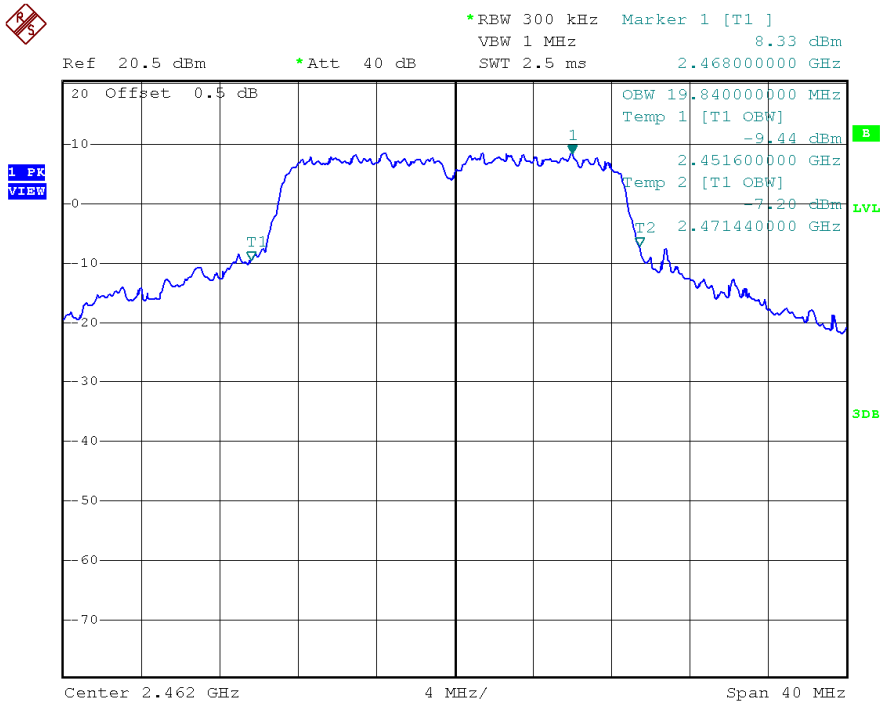


## TEST REPORT

Occupied Bandwidth Results: (802.11n HT20)

| (802.11n HT20) | Occupied Bandwidth (MHz) |
|---|---|
| Low Channel: 2412 | 17.92 |
| Middle Channel: 2437 | 17.92 |
| High Channel: 2462 | 19.84 |

The worst case is shown as below

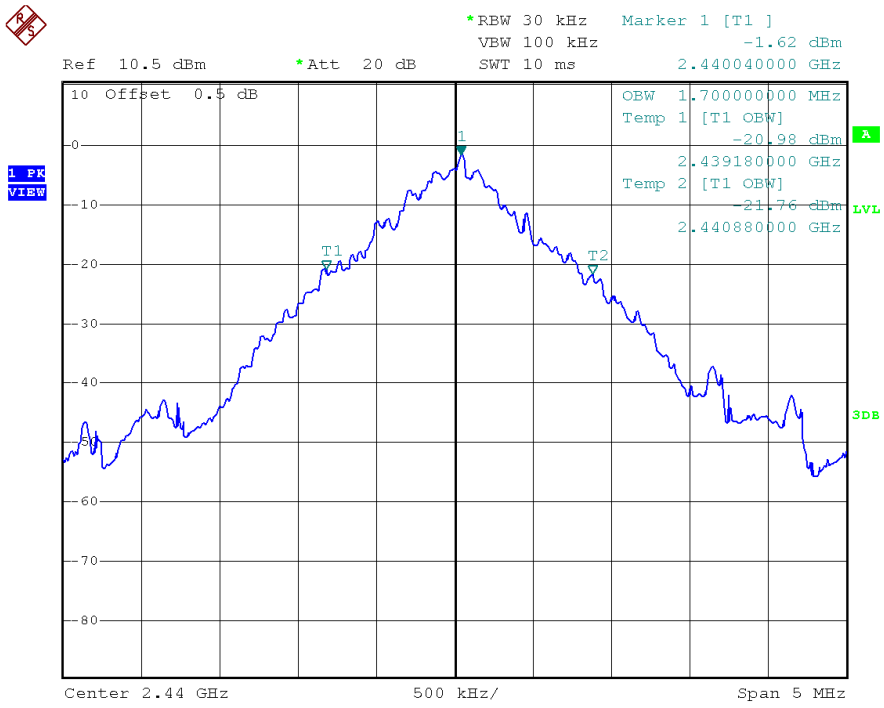


## TEST REPORT

Occupied Bandwidth Results: Bluetooth

| (Bluetooth 4.0) | Occupied Bandwidth (MHz) |
|---|---|
| Low Channel: 2402 | 1.61 |
| Middle Channel: 2440 | 1.70 |
| High Channel: 2480 | 1.68 |

The worst case is shown as below



# 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

4824.000 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 1-14 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

Passed by 0.2 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2390.000 | 43.8 | 33 | 29.4 | 40.2 | 54.0 | -13.8 |
| V | 4824.000 | 51.9 | 33 | 34.9 | 53.8 | 54.0 | -0.2 |
| H | 12060.000 | 24.7 | 33 | 40.5 | 32.2 | 54.0 | -21.8 |

| 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 | 57.1 | 33 | 29.4 | 53.5 | 74.0 | -20.5 |
| V | 4824.000 | 71.7 | 33 | 34.9 | 73.6 | 74.0 | -0.4 |
| H | 12060.000 | 31.0 | 33 | 40.5 | 38.5 | 74.0 | -35.5 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 51.5 | 33 | 34.9 | 53.4 | 54.0 | -0.6 |
| V | 7311.000 | 33.3 | 33 | 37.9 | 38.2 | 54.0 | -15.8 |
| H | 12185.000 | 24.0 | 33 | 40.5 | 31.5 | 54.0 | -22.5 |

| 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) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 71.6 | 33 | 34.9 | 73.5 | 74.0 | -0.5 |
| V | 7311.000 | 45.3 | 33 | 37.9 | 50.2 | 74.0 | -23.8 |
| H | 12185.000 | 32.9 | 33 | 40.5 | 40.4 | 74.0 | -33.6 |

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.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2483.500 | 45.1 | 33 | 29.4 | 41.5 | 54.0 | -12.5 |
| V | 4924.000 | 50.9 | 33 | 34.9 | 52.8 | 54.0 | -1.2 |
| V | 7386.000 | 33.3 | 33 | 37.9 | 38.2 | 54.0 | -15.8 |
| H | 12310.000 | 22.9 | 33 | 40.5 | 30.4 | 54.0 | -23.6 |

| 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) |
|---|---|---|---|---|---|---|---|
| H | 2483.500 | 57.1 | 33 | 29.4 | 53.5 | 74.0 | -20.5 |
| V | 4924.000 | 69.9 | 33 | 34.9 | 71.8 | 74.0 | -2.2 |
| V | 7386.000 | 43.9 | 33 | 37.9 | 48.8 | 74.0 | -25.2 |
| H | 12310.000 | 31.0 | 33 | 40.5 | 38.5 | 74.0 | -35.5 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2390.000 | 45.4 | 33 | 29.4 | 41.8 | 54.0 | -12.2 |
| V | 4824.000 | 49.7 | 33 | 34.9 | 51.6 | 54.0 | -2.4 |
| H | 12060.000 | 32.9 | 33 | 40.5 | 40.4 | 54.0 | -13.6 |

| 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) |
|---|---|---|---|---|---|---|---|
| H | 2390.000 | 60.1 | 33 | 29.4 | 56.5 | 74.0 | -17.5 |
| V | 4824.000 | 71.3 | 33 | 34.9 | 73.2 | 74.0 | -0.8 |
| H | 12060.000 | 33.7 | 33 | 40.5 | 41.2 | 74.0 | -32.8 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 51.6 | 33 | 34.9 | 53.5 | 54.0 | -0.5 |
| V | 7311.000 | 27.6 | 33 | 37.9 | 32.5 | 54.0 | -21.5 |
| H | 12185.000 | 23.3 | 33 | 40.5 | 30.8 | 54.0 | -23.2 |

| 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) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 71.6 | 33 | 34.9 | 73.5 | 74.0 | -0.5 |
| V | 7311.000 | 35.6 | 33 | 37.9 | 40.5 | 74.0 | -33.5 |
| H | 12185.000 | 28.9 | 33 | 40.5 | 36.4 | 74.0 | -37.6 |

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.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2483.500 | 44.1 | 33 | 29.4 | 40.5 | 54.0 | -13.5 |
| V | 4924.000 | 46.3 | 33 | 34.9 | 48.2 | 54.0 | -5.8 |
| V | 7386.000 | 26.6 | 33 | 37.9 | 31.5 | 54.0 | -22.5 |
| H | 12310.000 | 22.8 | 33 | 40.5 | 30.3 | 54.0 | -23.7 |

| 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 | 61.8 | 33 | 29.4 | 58.2 | 74.0 | -15.8 |
| V | 4924.000 | 66.9 | 33 | 34.9 | 68.8 | 74.0 | -5.2 |
| V | 7386.000 | 31.9 | 33 | 37.9 | 36.8 | 74.0 | -37.2 |
| H | 12310.000 | 33.0 | 33 | 40.5 | 40.5 | 74.0 | -33.5 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2390.000 | 46.4 | 33 | 29.4 | 42.8 | 54.0 | -11.2 |
| V | 4824.000 | 33.7 | 33 | 34.9 | 35.6 | 54.0 | -18.4 |
| H | 12060.000 | 31.1 | 33 | 40.5 | 38.6 | 54.0 | -15.4 |

| 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 | 63.8 | 33 | 29.4 | 60.2 | 74.0 | -13.8 |
| V | 4824.000 | 65.9 | 33 | 34.9 | 67.8 | 74.0 | -6.2 |
| H | 12060.000 | 34.1 | 33 | 40.5 | 41.6 | 74.0 | -32.4 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 38.4 | 33 | 34.9 | 40.3 | 54.0 | -13.7 |
| V | 7311.000 | 29.3 | 33 | 37.9 | 34.2 | 54.0 | -19.8 |
| H | 12185.000 | 26.0 | 33 | 40.5 | 33.5 | 54.0 | -20.5 |

| 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) |
|---|---|---|---|---|---|---|---|
| V | 4874.000 | 71.1 | 33 | 34.9 | 73.0 | 74.0 | -1.0 |
| V | 7311.000 | 45.2 | 33 | 37.9 | 50.1 | 74.0 | -23.9 |
| H | 12185.000 | 29.0 | 33 | 40.5 | 36.5 | 74.0 | -37.5 |

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. Emission 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 3m Average (dBµV/m) | Average Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| H | 2483.500 | 45.2 | 33 | 29.4 | 41.6 | 54.0 | -12.4 |
| V | 4924.000 | 47.0 | 33 | 34.9 | 48.9 | 54.0 | -5.1 |
| V | 7386.000 | 25.4 | 33 | 37.9 | 30.3 | 54.0 | -23.7 |
| H | 12310.000 | 23.0 | 33 | 40.5 | 30.5 | 54.0 | -23.5 |

| 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 | 64.1 | 33 | 29.4 | 60.5 | 74.0 | -13.5 |
| V | 4924.000 | 63.7 | 33 | 34.9 | 65.6 | 74.0 | -8.4 |
| V | 7386.000 | 35.3 | 33 | 37.9 | 40.2 | 74.0 | -33.8 |
| H | 12310.000 | 33.3 | 33 | 40.5 | 40.8 | 74.0 | -33.2 |

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. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

## TEST REPORT

Mode: TX-Channel 01

Table 10
Bluetooth 4.0

| 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 | 2390.000 | 41.4 | 33 | 29.4 | 37.8 | 54.0 | -16.2 |
| V | 4804.000 | 48.6 | 33 | 34.9 | 50.5 | 54.0 | -3.5 |
| H | 12010.000 | 26.0 | 33 | 40.5 | 33.5 | 54.0 | -20.5 |

| 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 | 2390.000 | 54.1 | 33 | 29.4 | 50.5 | 74.0 | -23.5 |
| V | 4804.000 | 50.9 | 33 | 34.9 | 52.8 | 74.0 | -21.2 |
| H | 12010.000 | 39.7 | 33 | 40.5 | 47.2 | 74.0 | -26.8 |

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. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

## TEST REPORT

Mode: TX-Channel 19

Table 11
Bluetooth 4.0

| 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 | 48.9 | 33 | 34.9 | 50.8 | 54.0 | -3.2 |
| V | 7320.000 | 45.7 | 33 | 37.9 | 50.6 | 54.0 | -3.4 |
| H | 12200.000 | 26.1 | 33 | 40.5 | 33.6 | 54.0 | -20.4 |

| 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 | 54.9 | 33 | 34.9 | 56.8 | 74.0 | -17.2 |
| V | 7320.000 | 50.5 | 33 | 37.9 | 55.4 | 74.0 | -18.6 |
| H | 12200.000 | 39.1 | 33 | 40.5 | 46.6 | 74.0 | -27.4 |

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. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

## TEST REPORT

Mode: TX-Channel 39

Table 12
Bluetooth 4.0

| 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 | 43.1 | 33 | 29.4 | 39.5 | 54.0 | -14.5 |
| V | 4960.000 | 46.9 | 33 | 34.9 | 48.8 | 54.0 | -5.2 |
| V | 7440.000 | 42.3 | 33 | 37.9 | 47.2 | 54.0 | -6.8 |
| H | 12400.000 | 27.9 | 33 | 40.5 | 35.4 | 54.0 | -18.6 |

| 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) |
|---|---|---|---|---|---|---|---|
| H | 2483.500 | 73.2 | 33 | 29.4 | 69.6 | 74.0 | -4.4 |
| V | 4960.000 | 57.9 | 33 | 34.9 | 59.8 | 74.0 | -14.2 |
| V | 7440.000 | 51.7 | 33 | 37.9 | 56.6 | 74.0 | -17.4 |
| H | 12400.000 | 41.9 | 33 | 40.5 | 49.4 | 74.0 | -24.6 |

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.
4. Negative value in the margin column shows emission below limit.
5. Horn antenna is used for the emission over 1000MHz.
6. Emission within the restricted band meets the requirement of FCC Part 15 Section 15.205.

## TEST REPORT

Mode: Base Station wifi and Bluetooth BLE Operating

Table 13

| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-amp (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 44.008 | 34.4 | 16 | 10.0 | 28.4 | 40.0 | -11.6 |
| V | 57.406 | 33.6 | 16 | 11.0 | 28.6 | 40.0 | -11.4 |
| H | 81.128 | 34.4 | 16 | 7.0 | 25.4 | 40.0 | -14.6 |
| H | 168.032 | 22.4 | 16 | 18.0 | 24.4 | 43.5 | -19.1 |
| V | 198.485 | 24.8 | 16 | 16.0 | 24.8 | 43.5 | -18.7 |
| V | 568.128 | 24.1 | 16 | 28.0 | 36.1 | 46.0 | -9.9 |

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative 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

Mode: Base Station wifi and Bluetooth BLE Operating with Charging Sensor

Table 14

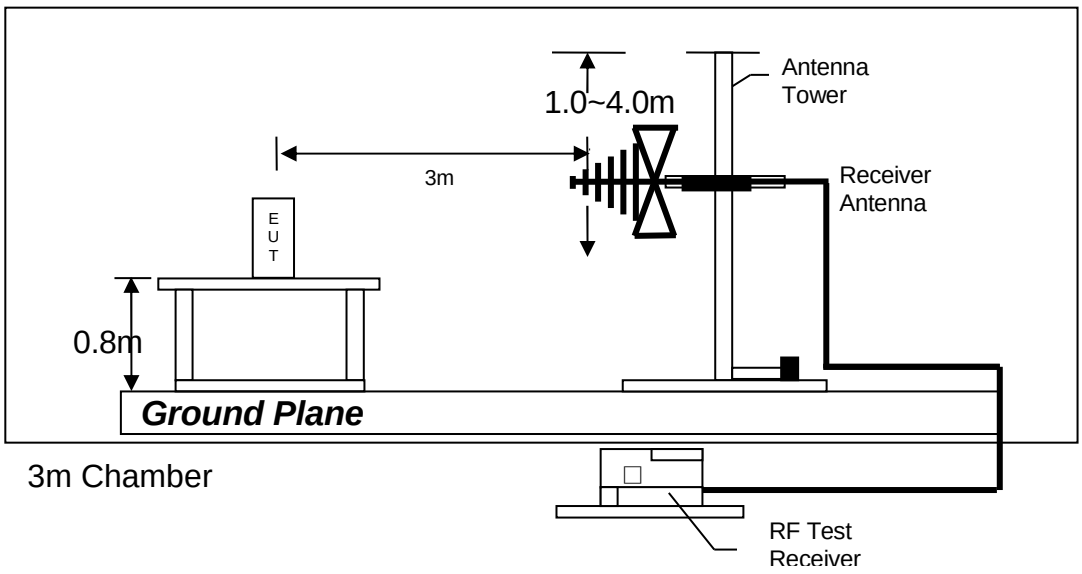
| Polarization | Frequency (MHz) | Reading (dBµV) | Pre-amp (dB) | Antenna Factor (dB) | Net at 3m (dBµV/m) | Limit at 3m (dBµV/m) | Margin (dB) |
|---|---|---|---|---|---|---|---|
| V | 48.012 | 33.5 | 16 | 11.0 | 28.5 | 40.0 | -11.5 |
| V | 56.998 | 33.8 | 16 | 11.0 | 28.8 | 40.0 | -11.2 |
| V | 82.582 | 33.2 | 16 | 7.0 | 24.2 | 40.0 | -15.8 |
| V | 112.962 | 24.4 | 16 | 14.0 | 22.4 | 43.5 | -21.1 |
| V | 148.968 | 26.5 | 16 | 14.0 | 24.5 | 43.5 | -19.0 |
| H | 560.032 | 24.4 | 16 | 28.0 | 36.4 | 46.0 | -9.6 |

NOTES:
1. Quasi-Peak detector is used for the emission measurement.
2. All measurements were made at 3 meters.
3. Negative 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.

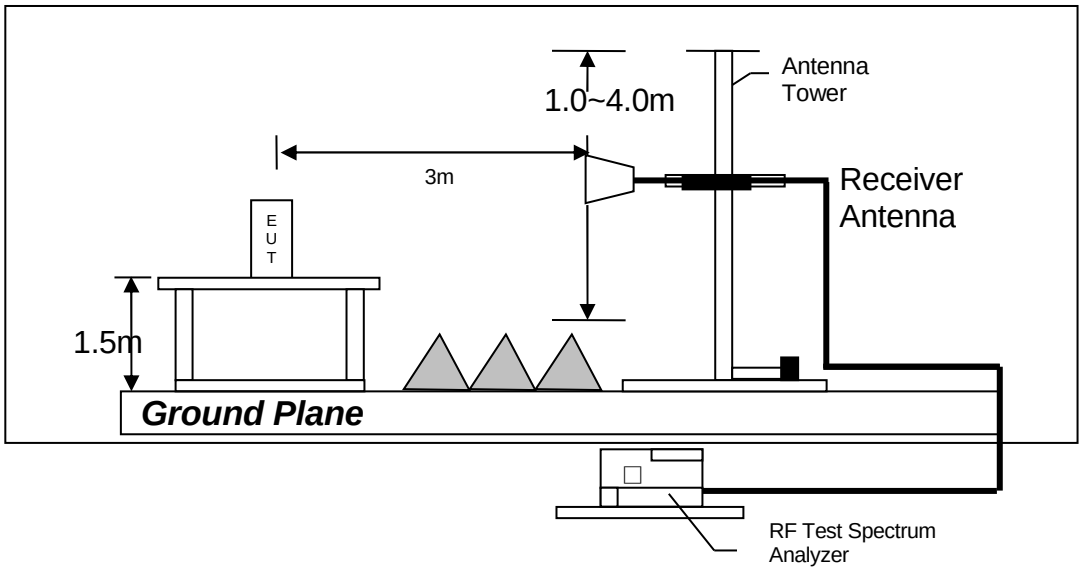
## TEST REPORT

### 4.6.3 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

0.420 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 11.6 dB margin

# TEST REPORT

## AC POWER LINE CONDUCTED EMISSION

Worst Case: Base Station wifi and Bluetooth BLE Operating

EDIT PEAK LIST (Final Measurement Results)

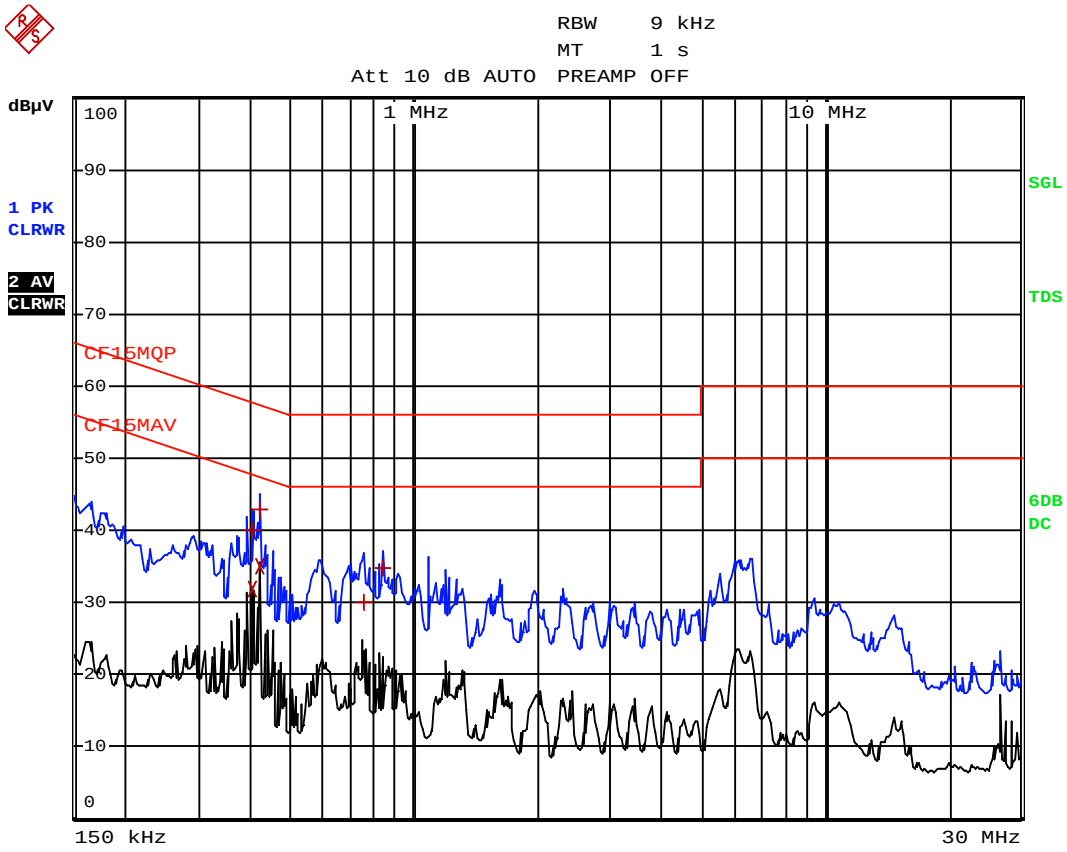
Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

| | TRACE | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 1 | Quasi Peak | 402 kHz | 40.14 | L1 | -17.67 |
| 2 | CISPR Average | 402 kHz | 31.80 | N | -16.01 |
| 1 | Quasi Peak | 420 kHz | 42.81 | L1 | -14.63 |
| 2 | CISPR Average | 420 kHz | 34.92 | N | -12.52 |
| 1 | Quasi Peak | 757.5 kHz | 30.03 | L1 | -25.96 |
| 1 | Quasi Peak | 838.5 kHz | 34.89 | L1 | -21.10 |

Date: 26.APR.2022 16:23:55

# TEST REPORT

Worst Case: Base Station wifi and Bluetooth BLE Operating




Date: 26.APR.2022 16:24:11

# TEST REPORT

Worst Case: Base Station wifi and Bluetooth BLE Operating with Charging Sensor

EDIT PEAK LIST (Final Measurement Results)

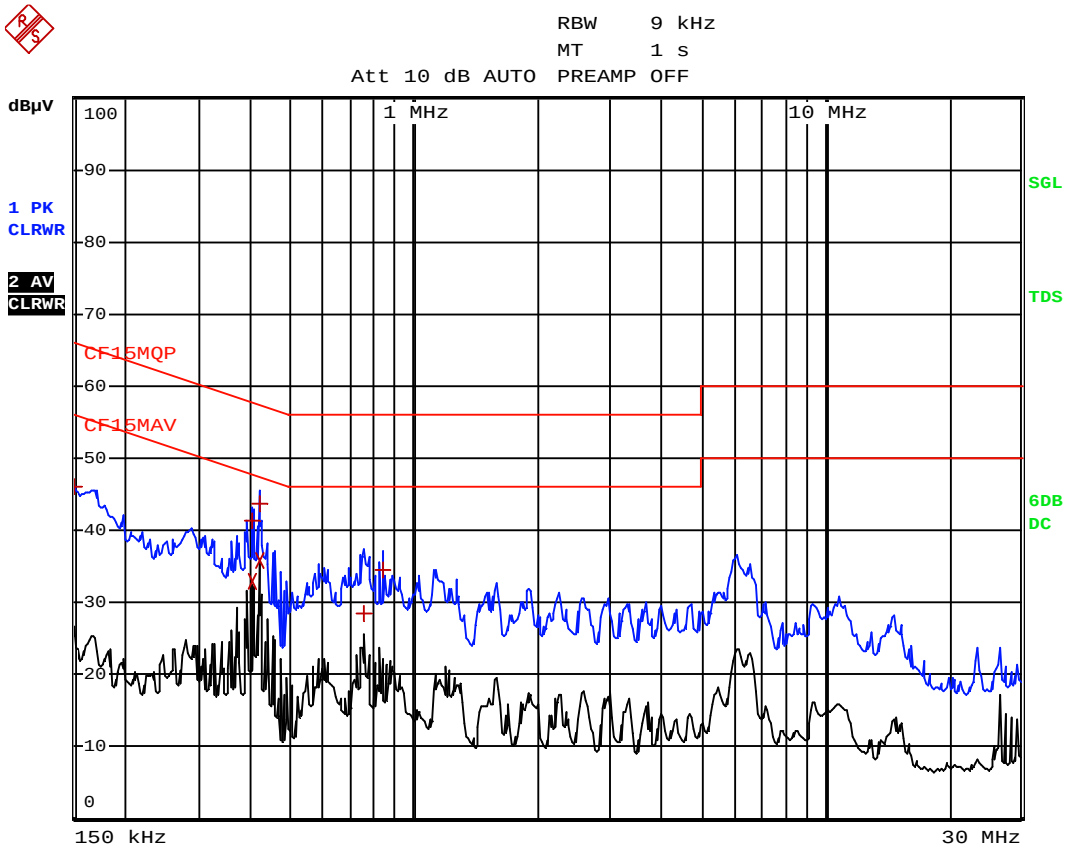
Trace1: CF15MQP
Trace2: CF15MAV
Trace3: ---

| | TRACE | FREQUENCY | LEVEL dBµV | | DELTA LIMIT dB |
|---|---|---|---|---|---|
| 1 | Quasi Peak | 150 kHz | 46.18 | N | -19.81 |
| 1 | Quasi Peak | 402 kHz | 41.24 | L1 | -16.56 |
| 2 | CISPR Average | 402 kHz | 32.92 | N | -14.88 |
| 1 | Quasi Peak | 420 kHz | 43.69 | L1 | -13.75 |
| 2 | CISPR Average | 420 kHz | 35.88 | N | -11.56 |
| 1 | Quasi Peak | 757.5 kHz | 28.40 | L1 | -27.59 |
| 1 | Quasi Peak | 838.5 kHz | 34.54 | L1 | -21.45 |

Date: 26.APR.2022 16:15:56

# TEST REPORT

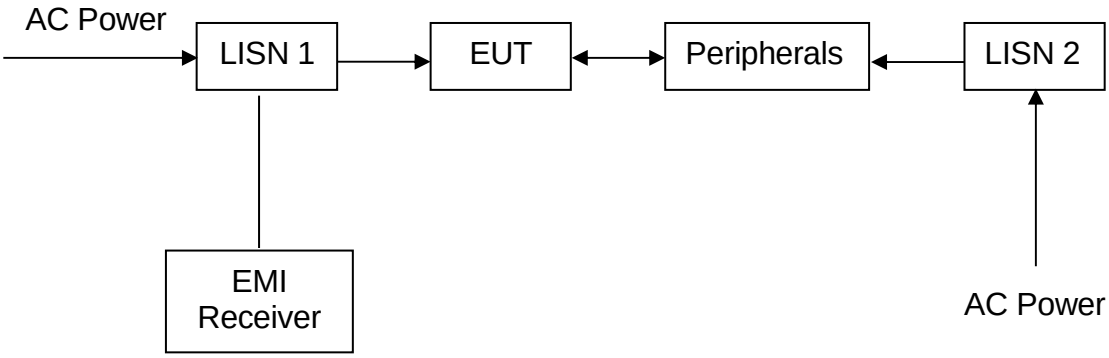
Worst Case: Base Station wifi and Bluetooth BLE Operating with Charging Sensor




Date: 26.APR.2022 16:16:17

**TEST REPORT**

4.7.3 Conducted Emission Test Setup



# TEST REPORT

## 5.0 EQUIPMENT LIST

1) Radiated Emissions Test

| Equipment | EMI Test Receiver | Spectrum Analyzer | Biconical Antenna (20MHz to 200MHz) |
|---|---|---|---|
| Registration No. | EW-3481 | EW-2466 | EW-2512 |
| Manufacturer | ROHDESCHWARZ | ROHDESCHWARZ | EMCO |
| Model No. | ESR7 | FSP30 | 3104C |
| Calibration Date | December 21, 2021 | November 18, 2019 | June 03, 2020 |
| Calibration Due Date | December 21, 2022 | August 18, 2022 | December 03, 2022 |

| Equipment | Log Periodic Antenna | Double Ridged Guide Antenna | RF Cable 14m (1GHz to 26.5GHz) |
|---|---|---|---|
| Registration No. | EW-3243 | EW-1133 | EW-2781 |
| Manufacturer | EMCO | EMCO | GREATBILLION |
| Model No. | 3148B | 3115 | SMA m/SHF5MPU /SMA m ra14m,26G |
| Calibration Date | June 30, 2021 | June 03, 2021 | November 24, 2020 |
| Calibration Due Date | December 30, 2022 | June 03, 2022 | November 24, 2022 |

| 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 | Pyramidal Horn Antenna | Active Loop H-field (9kHz to 30MHz) |
|---|---|---|
| Registration No. | EW-0905 | EW-3302 |
| Manufacturer | EMCO | EMCO |
| Model No. | 3160-09 | 6502 |
| Calibration Date | July 23, 2019 | December 13, 2021 |
| Calibration Due Date | June 23, 2022 | June 13, 2023 |

## 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-3481 |
| Manufacturer | RADIALL | ROHDESCHWARZ | ROHDESCHWARZ |
| Model No. | Bnc m st / 142 / bnc mra 240cm | ENV-216 | ESR7 |
| Calibration Date | November 10, 2020 | September 11, 2021 | December 21, 2021 |
| Calibration Due Date | May 10, 2022 | September 11, 2022 | December 21, 2022 |

3) Conductive Measurement Test

| Equipment | 5m RF Cable (40GHz) | Wideband power sensor 2 pcs 50MHz to 18GHz | Spectrum Analyzer |
|---|---|---|---|
| Registration No. | EW-2701 | EW-3309 | EW-2466 |
| Manufacturer | RADIALL | ROHDESCHWARZ | ROHDESCHWARZ |
| Model No. | Sma m-m 5m 40G | NRP-Z81 | FSP30 |
| Calibration Date | November 24, 2020 | December 01, 2021 | November 18, 2019 |
| Calibration Due Date | November 24, 2022 | December 01, 2022 | August 18, 2022 |

4) Bandedge & Bandwidth Measurement

| Equipment | Spectrum Analyzer | 5m RF Cable (40GHz) |
|---|---|---|
| Registration No. | EW-2466 | EW-2701 |
| Manufacturer | ROHDESCHWARZ | RADIALL |
| Model No. | FSP30 | Sma m-m 5m 40G |
| Calibration Date | November 18, 2019 | November 24, 2020 |
| Calibration Due Date | August 18, 2022 | November 24, 2022 |

5) Control Software for Radiated Emission

| Software Information | |
|---|---|
| Software Name | EMC32 |
| Manufacturer | ROHDESCHWARZ |
| Software version | 10.50.40 |

**END OF TEST REPORT**