

# FCC Measurement/Technical Report on

## WLAN and Bluetooth module

### JODY-W164-07A

FCC ID: XPYJODYW164-07A  
IC: 8595A-JODYW16407A

Test Report Reference: MDE\_UBLOX\_1701\_FCCd

Test Laboratory:  
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**Note:**

The following test results relate only to the devices specified in this document. This report shall not be reproduced in parts without the written approval of the test laboratory.

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## 1 APPLIED STANDARDS AND TEST SUMMARY

### 1.1 APPLIED STANDARDS

#### Type of Authorization

Certification for an Intentional Radiator.

#### Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 and 15 (10-1-15 Edition). The following subparts are applicable to the results in this test report.

Part 2, Subpart J - Equipment Authorization Procedures, Certification

Part 15, Subpart C – Intentional Radiators

§ 15.201 Equipment authorization requirement

§ 15.207 Conducted limits

§ 15.209 Radiated emission limits; general requirements

§ 15.247 Operation within the bands 902-928 MHz, 2400-2483.5 MHz

#### Note 1: (DTS Equipment)

The tests were selected and performed with reference to the FCC Public Notice "Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247, 558074 D01 DTS Meas Guidance v04, 2017-04-05". ANSI C63.10–2013 is applied.

#### Note 2:

Not all possible operating modes were tested. Worst case operating modes were determined at the beginning of the test period.

#### Note 3:

Bluetooth LE mode like Bluetooth BDR uses GFSK modulation while Bluetooth BDR uses a higher output power. Therefore Bluetooth BDR mode worst case for "Transmitter spurious radiated emissions" and "Band Edge Compliance Radiated" and covers also Bluetooth LE mode.

## Summary Test Results:

The EUT complied with all performed tests as listed in chapter 1.3 Measurement Summary / Signatures.

## 1.2 FCC-IC CORRELATION TABLE

### Correlation of measurement requirements for DTS (e.g. WLAN 2.4 GHz, BT LE) equipment from FCC and IC

#### DTS equipment

| Measurement                                 | FCC reference                 | IC reference                                              |
|---------------------------------------------|-------------------------------|-----------------------------------------------------------|
| Conducted emissions on AC Mains             | § 15.207                      | RSS-Gen Issue 4: 8.8                                      |
| Occupied bandwidth                          | § 15.247 (a) (2)              | RSS-247 Issue 2: 5.2 (a)                                  |
| Peak conducted output power                 | § 15.247 (b) (3), (4)         | RSS-247 Issue 2: 5.4 (d)                                  |
| Transmitter spurious RF conducted emissions | § 15.247 (d)                  | RSS-Gen Issue 4: 6.13 / 8.9/8.10;<br>RSS-247 Issue 2: 5.5 |
| Transmitter spurious radiated emissions     | § 15.247 (d);<br>§ 15.209 (a) | RSS-Gen Issue 4: 6.13 / 8.9/8.10;<br>RSS-247 Issue 2: 5.5 |
| Band edge compliance                        | § 15.247 (d)                  | RSS-247 Issue 2: 5.5                                      |
| Power density                               | § 15.247 (e)                  | RSS-247 Issue 2: 5.2 (b)                                  |
| Antenna requirement                         | § 15.203 / 15.204             | RSS-Gen Issue 4: 8.3                                      |
| Receiver spurious emissions                 | –                             | –                                                         |

### 1.3 MEASUREMENT SUMMARY / SIGNATURES

47 CFR CHAPTER I FCC PART 15 Subpart C § 15.207  
§15.247

Conducted Emissions at AC Mains

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode        | Setup      | FCC    | IC     |
|----------------|------------|--------|--------|
| Operating mode |            |        |        |
| worst case     | S03_7_AB01 | Passed | Passed |

47 CFR CHAPTER I FCC PART 15 Subpart C § 15.247 (a) (2)  
§15.247

Occupied Bandwidth (6 dB)

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                               | Setup      | FCC    | IC     |
|---------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency |            |        |        |
| Bluetooth BDR, high                   | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, low                    | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid                    | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high                 | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, low                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, mid                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, high                 | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, low                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, mid                  | S01_7_AB01 | Passed | Passed |
| Bluetooth LE, high                    | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, low                     | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, mid                     | S01_7_AA01 | Passed | Passed |
| WLAN b, high                          | S01_7_AA01 | Passed | Passed |
| WLAN b, low                           | S01_7_AA01 | Passed | Passed |
| WLAN b, mid                           | S01_7_AA01 | Passed | Passed |
| WLAN g, high                          | S01_7_AA01 | Passed | Passed |
| WLAN g, low                           | S01_7_AA01 | Passed | Passed |
| WLAN g, mid                           | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, high                   | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, low                    | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, mid                    | S01_7_AA01 | Passed | Passed |

47 CFR CHAPTER I FCC PART 15 Subpart C IC RSS-Gen & IC TRC; Ch. 6.6 & Ch. 8  
§15.247

Occupied Bandwidth (99%)

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                               | Setup      | FCC | IC        |
|---------------------------------------|------------|-----|-----------|
| Radio Technology, Operating Frequency |            |     |           |
| Bluetooth BDR, high                   | S01_7_AB01 | N/A | Performed |
| Bluetooth BDR, low                    | S01_7_AB01 | N/A | Performed |
| Bluetooth BDR, mid                    | S01_7_AB01 | N/A | Performed |

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IC RSS-Gen & IC TRC; Ch. 6.6 &  
Ch. 8

Occupied Bandwidth (99%)

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                               | Setup      | FCC | IC        |
|---------------------------------------|------------|-----|-----------|
| Radio Technology, Operating Frequency |            |     |           |
| Bluetooth EDR 2, high                 | S01_7_AB01 | N/A | Performed |
| Bluetooth EDR 2, low                  | S01_7_AB01 | N/A | Performed |
| Bluetooth EDR 2, mid                  | S01_7_AB01 | N/A | Performed |
| Bluetooth EDR 3, high                 | S01_7_AB01 | N/A | Performed |
| Bluetooth EDR 3, low                  | S01_7_AB01 | N/A | Performed |
| Bluetooth EDR 3, mid                  | S01_7_AB01 | N/A | Performed |
| Bluetooth LE, high                    | S01_7_AA01 | N/A | Performed |
| Bluetooth LE, low                     | S01_7_AA01 | N/A | Performed |
| Bluetooth LE, mid                     | S01_7_AA01 | N/A | Performed |
| WLAN b, high                          | S01_7_AA01 | N/A | Performed |
| WLAN b, low                           | S01_7_AA01 | N/A | Performed |
| WLAN b, mid                           | S01_7_AA01 | N/A | Performed |
| WLAN g, high                          | S01_7_AA01 | N/A | Performed |
| WLAN g, low                           | S01_7_AA01 | N/A | Performed |
| WLAN g, mid                           | S01_7_AA01 | N/A | Performed |
| WLAN n 20 MHz, high                   | S01_7_AA01 | N/A | Performed |
| WLAN n 20 MHz, low                    | S01_7_AA01 | N/A | Performed |
| WLAN n 20 MHz, mid                    | S01_7_AA01 | N/A | Performed |

47 CFR CHAPTER I FCC PART 15 Subpart C  
§15.247

§ 15.247 (b) (3)

Peak Power Output

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                                   | Setup      | FCC    | IC     |
|-----------------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Measurement method |            |        |        |
| Bluetooth BDR, high, conducted                            | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, low, conducted                             | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid, conducted                             | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high, conducted                          | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, low, conducted                           | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, mid, conducted                           | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, high, conducted                          | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, low, conducted                           | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, mid, conducted                           | S01_7_AB01 | Passed | Passed |
| Bluetooth LE, high, conducted                             | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, low, conducted                              | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, mid, conducted                              | S01_7_AA01 | Passed | Passed |
| WLAN b, high, conducted                                   | S01_7_AA01 | Passed | Passed |
| WLAN b, low, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN b, mid, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN g, high, conducted                                   | S01_7_AA01 | Passed | Passed |

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§ 15.247 (b) (3)

Peak Power Output

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                                   | Setup      | FCC    | IC     |
|-----------------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Measurement method |            |        |        |
| WLAN g, low, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN g, mid, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, high, conducted                            | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, low, conducted                             | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, mid, conducted                             | S01_7_AA01 | Passed | Passed |

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§15.247

§ 15.247 (d)

Spurious RF Conducted Emissions and Conducted Emissions in  
Restricted Bands

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                                   | Setup      | FCC    | IC     |
|-----------------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Measurement method |            |        |        |
| Bluetooth BDR, high, conducted                            | S01_7_AA01 | Passed | Passed |
| Bluetooth BDR, low, conducted                             | S01_7_AA01 | Passed | Passed |
| Bluetooth BDR, mid, conducted                             | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 2, high, conducted                          | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 2, low, conducted                           | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 2, mid, conducted                           | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 3, high, conducted                          | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 3, low, conducted                           | S01_7_AA01 | Passed | Passed |
| Bluetooth EDR 3, mid, conducted                           | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, high, conducted                             | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, low, conducted                              | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, mid, conducted                              | S01_7_AA01 | Passed | Passed |
| WLAN b, high, conducted                                   | S01_7_AA01 | Passed | Passed |
| WLAN b, low, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN b, mid, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN g, high, conducted                                   | S01_7_AA01 | Passed | Passed |
| WLAN g, low, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN g, mid, conducted                                    | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, high, conducted                            | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, low, conducted                             | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, mid, conducted                             | S01_7_AA01 | Passed | Passed |



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§15.247

§ 15.247 (d)

Transmitter Spurious Radiated Emissions

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                                  | Setup      | FCC    | IC     |
|----------------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Measurement range |            |        |        |
| Bluetooth BDR, high, 1 GHz - 26 GHz                      | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, high, 30 MHz - 1 GHz                      | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, low, 1 GHz - 26 GHz                       | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, low, 30 MHz - 1 GHz                       | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid, 1 GHz - 26 GHz                       | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid, 30 MHz - 1 GHz                       | S02_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid, 9 kHz - 30 MHz                       | S02_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high, 1 GHz - 26 GHz                    | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |
| Bluetooth EDR 2, low, 1 GHz - 26 GHz                     | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |
| Bluetooth EDR 2, mid, 1 GHz - 26 GHz                     | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |
| WLAN b, high, 1 GHz - 26 GHz                             | S02_7_AB01 | Passed | Passed |
| WLAN b, high, 30 MHz - 1 GHz                             | S02_7_AB01 | Passed | Passed |
| WLAN b, low, 1 GHz - 26 GHz                              | S02_7_AB01 | Passed | Passed |
| WLAN b, low, 30 MHz - 1 GHz                              | S02_7_AB01 | Passed | Passed |
| WLAN b, mid, 1 GHz - 26 GHz                              | S02_7_AB01 | Passed | Passed |
| WLAN b, mid, 30 MHz - 1 GHz                              | S02_7_AB01 | Passed | Passed |
| WLAN b, mid, 9 kHz - 30 MHz                              | S02_7_AB01 | Passed | Passed |
| WLAN g, high, 1 GHz - 26 GHz                             | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |
| WLAN g, low, 1 GHz - 26 GHz                              | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |
| WLAN g, mid, 1 GHz - 26 GHz                              | S02_7_AB01 | Passed | Passed |
| Remark: only 1-8GHz                                      |            |        |        |

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§ 15.247 (d)

Band Edge Compliance Conducted

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                          | Setup      | FCC    | IC     |
|--------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Band Edge |            |        |        |
| Bluetooth BDR, high, high                        | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, low, low                          | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high, high                      | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, low, low                        | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, high, high                      | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, low, low                        | S01_7_AB01 | Passed | Passed |
| Bluetooth LE, high, high                         | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, low, low                           | S01_7_AA01 | Passed | Passed |
| WLAN b, high, high                               | S01_7_AA01 | Passed | Passed |
| WLAN b, low, low                                 | S01_7_AA01 | Passed | Passed |

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§ 15.247 (d)

Band Edge Compliance Conducted

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                          | Setup      | FCC    | IC     |
|--------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Band Edge |            |        |        |
| WLAN g, high, high                               | S01_7_AA01 | Passed | Passed |
| WLAN g, low, low                                 | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, high, high                        | S01_7_AA01 | Passed | Passed |
| WLAN n 20 MHz, low, low                          | S01_7_AA01 | Passed | Passed |

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§ 15.247 (d)

Band Edge Compliance Radiated

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                                          | Setup      | FCC    | IC     |
|--------------------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency, Band Edge |            |        |        |
| Bluetooth BDR, high, high                        | S02_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high, high                      | S02_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, high, high                      | S02_7_AB01 | Passed | Passed |
| WLAN b, high, high                               | S02_7_AB01 | Passed | Passed |
| WLAN g, high, high                               | S02_7_AB01 | Passed | Passed |
| WLAN n 20 MHz, high, high                        | S02_7_AB01 | Passed | Passed |

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§ 15.247 (e)

Power Density

The measurement was performed according to ANSI C63.10

Final Result

| OP-Mode                               | Setup      | FCC    | IC     |
|---------------------------------------|------------|--------|--------|
| Radio Technology, Operating Frequency |            |        |        |
| Bluetooth BDR, high                   | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, low                    | S01_7_AB01 | Passed | Passed |
| Bluetooth BDR, mid                    | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, high                 | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, low                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 2, mid                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, high                 | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, low                  | S01_7_AB01 | Passed | Passed |
| Bluetooth EDR 3, mid                  | S01_7_AB01 | Passed | Passed |
| Bluetooth LE, high                    | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, low                     | S01_7_AA01 | Passed | Passed |
| Bluetooth LE, mid                     | S01_7_AA01 | Passed | Passed |
| WLAN b, high                          | S01_7_AA01 | Passed | Passed |
| WLAN b, low                           | S01_7_AA01 | Passed | Passed |
| WLAN b, mid                           | S01_7_AA01 | Passed | Passed |
| WLAN g, high                          | S01_7_AA01 | Passed | Passed |
| WLAN g, low                           | S01_7_AA01 | Passed | Passed |

**47 CFR CHAPTER I FCC PART 15 Subpart C**  
**§15.247**

**§ 15.247 (e)**

Power Density

The measurement was performed according to ANSI C63.10

**Final Result**

**OP-Mode**

Radio Technology, Operating Frequency

WLAN g, mid

WLAN n 20 MHz, high

WLAN n 20 MHz, low

WLAN n 20 MHz, mid

**Setup**

**FCC**

**IC**

S01\_7\_AA01

Passed

Passed

S01\_7\_AA01

Passed

Passed

S01\_7\_AA01

Passed

Passed

S01\_7\_AA01

Passed

Passed

N/A: Not applicable

N/P: Not performed



(responsible for accreditation scope)  
Dipl.-Ing. Marco Kullik



(responsible for testing and report)  
Dipl.-Ing. Daniel Gall



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## 2 ADMINISTRATIVE DATA

### 2.1 TESTING LABORATORY

Company Name: 7layers GmbH  
Address: Borsigstr. 11  
40880 Ratingen  
Germany

This facility has been fully described in a report submitted to the ISED and accepted under the registration number: Site# 3699A-1.

The test facility is also accredited by the following accreditation organisation:

Laboratory accreditation no: DAKKS D-PL-12140-01-00  
FCC Designation Number: DE0015  
FCC Test Firm Registration: 929146  
Responsible for accreditation scope: Dipl.-Ing. Marco Kullik  
Report Template Version: 2017-07-14

### 2.2 PROJECT DATA

Responsible for testing and report: Dipl.-Ing. Daniel Gall  
Employees who performed the tests: documented internally at 7Layers  
Date of Report: 2018-05-18  
Testing Period: 2017-11-07 to 2018-01-22

### 2.3 APPLICANT DATA

Company Name: u-blox AG  
Address: Zürcherstrasse 68  
8800 Thalwil  
Switzerland  
Contact Person: Mr. Filip Kruzela

### 2.4 MANUFACTURER DATA

Company Name: Please see applicant data

### 3 TEST OBJECT DATA

#### 3.1 GENERAL EUT DESCRIPTION

|                                          |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
|------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Kind of Device product description       | The EUT is a module supporting WLAN in the 2.4 GHz and 5 GHz bands as well as Bluetooth (BT) 4.2 including Bluetooth Low Energy (BT LE)                                                                                                                                                                                                                                                                                                                                                                                                               |
| Product name                             | JODY-W164-07A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Type                                     | JODY-W164-07A                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                         |
| Declared EUT data by the supplier        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |
| Voltage Type                             | DC                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                    |
| Voltage Level                            | 3.3 V                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |
| Tested Modulation Types and Data Rates   | BT: GFSK Modulation, DHx packets (Bluetooth and Bluetooth Low Energy), 1 Mbps<br>$\pi/4$ DQPSK Modulation, 2-DHx packets, 2 Mbps<br>8-DPSK Modulation, 3-DHx packets, 3 Mbps<br>WLAN: Mode b: DSSS Modulation, 1Mbps<br>Mode g/n: OFDM Modulation, 6Mbps / MCS 0 (20 MHz only)                                                                                                                                                                                                                                                                        |
| Specific product description for the EUT | The JODY-W1 is a compact automotive grade module that provides Wi-Fi, Bluetooth, and Bluetooth low energy communication.<br>The JODY-W164-07A module can be operated in the following modes:<br>Wi-Fi (SISO) 802.11ac in 2.4 / 5 GHz real simultaneous dual band<br>Dual-mode Bluetooth v4.2, can be operated fully simultaneous with both Wi-Fi modes<br>It is equipped with two antenna pins connected to two SMA antenna connectors on the evaluation board.<br>Maximum supported band width in 2.4 GHz WLAN mode: 20 MHz, 5 GHz WLAN mode: 80 MHz |
| The EUT provides the following ports:    | DC Power Supply<br>Antenna ports<br>Signal ports                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| Special software used for testing        | The test modes were set using scripts that were run on a board computer with Linux operating system provided by the applicant.                                                                                                                                                                                                                                                                                                                                                                                                                        |

The main components of the EUT are listed and described in chapter 3.2 EUT Main components.

### 3.2 EUT MAIN COMPONENTS

| Sample Name      | Sample Code                                                                                                         | Description                |
|------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------|
| EUT 7A           | DE1015082aa01                                                                                                       | Module on evaluation board |
| Sample Parameter | Value                                                                                                               |                            |
| Integral Antenna | None, two external 50 Ohm connectors on evaluation board.<br>Antenna gain used for evaluation of test results: 2dBi |                            |
| Serial No.       | 001                                                                                                                 |                            |
| HW Version       | 00                                                                                                                  |                            |
| SW Version       | P8.1                                                                                                                |                            |
| Comment          |                                                                                                                     |                            |

| Sample Name      | Sample Code                                                                                                         | Description                |
|------------------|---------------------------------------------------------------------------------------------------------------------|----------------------------|
| EUT 7B           | DE1015082ab01                                                                                                       | Module on evaluation board |
| Sample Parameter | Value                                                                                                               |                            |
| Integral Antenna | None, two external 50 Ohm connectors on evaluation board.<br>Antenna gain used for evaluation of test results: 2dBi |                            |
| Serial No.       | 002                                                                                                                 |                            |
| HW Version       | 00                                                                                                                  |                            |
| SW Version       | P8.1                                                                                                                |                            |
| Comment          |                                                                                                                     |                            |

NOTE: The short description is used to simplify the identification of the EUT in this test report.

### 3.3 ANCILLARY EQUIPMENT

For the purposes of this test report, ancillary equipment is defined as equipment which is used in conjunction with the EUT to provide operational and control features to the EUT. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Ancillary Equipment can influence the test results.

| Device           | Details<br>(Manufacturer, Type Model, OUT Code) | Description                                                                                 |
|------------------|-------------------------------------------------|---------------------------------------------------------------------------------------------|
| Evaluation Board | UBLOX, REV. B, - , -                            | Board the EUT is mounted to, providing ports to the EUT (DC, Antennas, wired communication) |

### 3.4 AUXILIARY EQUIPMENT

For the purposes of this test report, auxiliary equipment is defined as equipment which is used temporarily to enable operational and control features especially used for the tests of the EUT which is not used during normal operation or equipment that is used during the tests in combination with the EUT but is not subject of this test report. It is necessary to configure the system in a typical fashion, as a customer would normally use it. But nevertheless Auxiliary Equipment can influence the test results.

| Device                              | Details<br>(Manufacturer, HW, SW, S/N) | Description                              |
|-------------------------------------|----------------------------------------|------------------------------------------|
| Board Computer                      | Toradex, Ixora, - , - , -              | Computer used for setting the test modes |
| AC/DC power supply<br>(115 V 60 Hz) | PeakTech, - , - , 081062045            | PeakTech 6005D                           |

### 3.5 EUT SETUPS

This chapter describes the combination of EUTs and equipment used for testing. The rationale for selecting the EUTs, ancillary and auxiliary equipment and interconnecting cables, is to test a representative configuration meeting the requirements of the referenced standards.

| Setup      | Combination of EUTs                                        | Description and Rationale                        |
|------------|------------------------------------------------------------|--------------------------------------------------|
| S01_7_AA01 | EUT 7A, Evaluation Board, Board Computer                   | Representative setup conducted tests             |
| S01_7_AB01 | EUT 7B, Evaluation Board, Board Computer                   | Representative setup conducted tests             |
| S02_7_AB01 | EUT 7B, Evaluation Board                                   | Representative setup radiated tests              |
| S03_7_AB01 | EUT 7B, Evaluation Board, AC/DC power supply (115 V 60 Hz) | Representative setup AC conducted emissions test |

### 3.6 OPERATING MODES

This chapter describes the operating modes of the EUTs used for testing.

#### 3.6.1 TEST CHANNELS

|                                                              |                                  |      |      |                    |      |
|--------------------------------------------------------------|----------------------------------|------|------|--------------------|------|
| WLAN<br>20 MHz Test Channels:<br>Channel:<br>Frequency [MHz] | 2.4 GHz ISM<br>2400 - 2483.5 MHz |      |      |                    |      |
|                                                              | Low <sup>1)</sup>                |      | mid  | High <sup>1)</sup> |      |
|                                                              | 1                                | 2    | 6    | 10                 | 11   |
|                                                              | 2412                             | 2417 | 2437 | 2457               | 2462 |

|                                                  |                                  |      |      |
|--------------------------------------------------|----------------------------------|------|------|
| BT Test Channels:<br>Channel:<br>Frequency [MHz] | 2.4 GHz ISM<br>2400 - 2483.5 MHz |      |      |
|                                                  | low                              | mid  | high |
|                                                  | 0                                | 39   | 78   |
|                                                  | 2402                             | 2441 | 2480 |

|                                                     |                                  |      |      |
|-----------------------------------------------------|----------------------------------|------|------|
| BT LE Test Channels:<br>Channel:<br>Frequency [MHz] | 2.4 GHz ISM<br>2400 - 2483.5 MHz |      |      |
|                                                     | low                              | mid  | high |
|                                                     | 0                                | 19   | 39   |
|                                                     | 2402                             | 2440 | 2480 |

1) Since in WLAN mode g and n the lowest and highest channels have lower output power than the other channels, additional testing was performed for the second lowest and highest channels in those modes.

Output power per channel and mode to be set in EUT WLAN script acc. to customer declaration:

| Channel No.         | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10   | 11   |
|---------------------|------|------|------|------|------|------|------|------|------|------|------|
| Channel freq. [MHz] | 2412 | 2417 | 2422 | 2427 | 2432 | 2437 | 2442 | 2447 | 2452 | 2457 | 2462 |
| WLAN mode b         | 18   | 18   | 18   | 18   | 18   | 18   | 18   | 18   | 18   | 18   | 18   |
| WLAN mode g         | 13   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 13   |
| WLAN mode n         | 13   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 15   | 13   |

### 3.7 PRODUCT LABELLING

#### 3.7.1 FCC ID LABEL

Please refer to the documentation of the applicant.

#### 3.7.2 LOCATION OF THE LABEL ON THE EUT

Please refer to the documentation of the applicant.



## 4 TEST RESULTS

### 4.1 CONDUCTED EMISSIONS AT AC MAINS

Standard      FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

#### 4.1.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C 63.10  
The Equipment Under Test (EUT) was setup in a shielded room to perform the conducted emissions measurements in a typical installation configuration. The EUT was powered from 50 $\mu$ H || 50 Ohm Line Impedance Stabilization Network (LISN). The LISN's unused connections were terminated with 50 Ohm loads.

The measurement procedure consists of two steps. It is implemented into the EMI test software EMC-32 from R&S.

##### Step 1: Preliminary scan

Intention of this step is, to determine the conducted EMI-profile of the EUT.

EMI receiver settings:

- Detector: Peak – Maxhold & Average
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 2.5 kHz
- IF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)
- Measurement on phase + neutral lines of the power cords

On basis of this preliminary scan the highest amplitudes and the corresponding frequencies relative to the limit are identified. Emissions above the limit and emissions which are in the 10 dB range below the limit are considered.

##### Step 2: Final measurement

Intention of this step is, to determine the highest emissions with the settings defined in the test specification for the frequencies identified in step 1.

EMI receiver settings:

- Detector: Quasi-Peak
- IF Bandwidth: 9 kHz
- Measuring time: 1 s / frequency

At each frequency determined in step 1, four measurements are performed in the following combinations:

- 1) Neutral lead - reference ground (PE grounded)
- 2) Phase lead - reference ground (PE grounded)
- 3) Neutral lead - reference ground (PE floating)
- 4) Phase lead - reference ground (PE floating)

The highest value is reported.

#### 4.1.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.207

| Frequency Range (MHz) | QP Limit (dBμV) | AV Limit (dBμV) |
|-----------------------|-----------------|-----------------|
| 0.15 – 0.5            | 66 to 56        | 56 to 46        |
| 0.5 – 5               | 56              | 46              |
| 5 – 30                | 60              | 50              |

Used conversion factor: Limit (dBμV) = 20 log (Limit (μV)/1μV).

#### 4.1.3 TEST PROTOCOL

Temperature: 24 °C  
Air Pressure: 986 hPa  
Humidity: 37 %

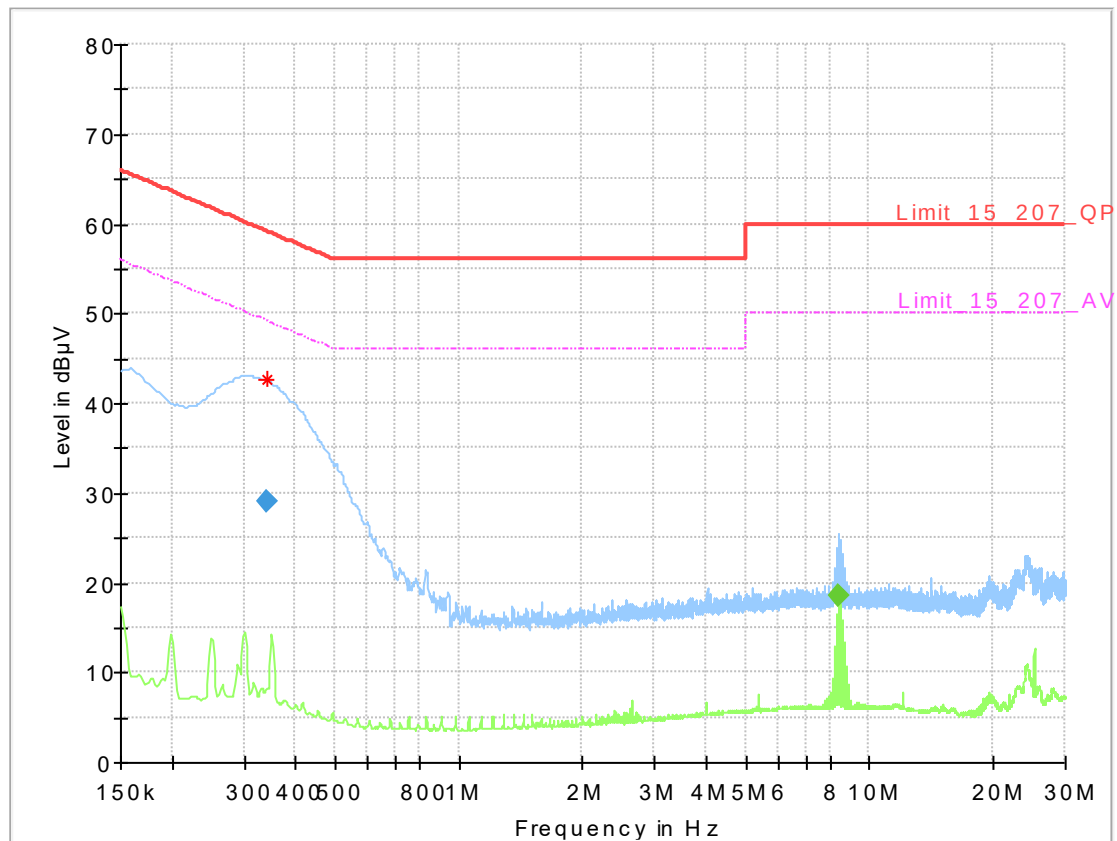
| Power line | Frequency [MHz] | Measured value QP [dBμV] | Measured value AV [dBμV] | QP Limit [dBμV] | AV Limit [dBμV] | Margin QP [dB] | Margin AV [dB] |
|------------|-----------------|--------------------------|--------------------------|-----------------|-----------------|----------------|----------------|
| N          | -               | -                        | -                        | -               | -               | > 20           | > 20           |
| L          | -               | -                        | -                        | -               | -               | > 20           | > 20           |

Remark: Measured at 120 V 60 Hz input of lab power supply, WLAN 2.4 GHz, CH 6, set EUT target power: 18 dBm

#### 4.1.4 MEASUREMENT PLOT

##### Common Information

|                             |                                                                                                                              |
|-----------------------------|------------------------------------------------------------------------------------------------------------------------------|
| Test Description:           | Conducted Emissions                                                                                                          |
| Test Standard:              | FCC §15.207                                                                                                                  |
| EUT / Setup Code:           | DE1015082ab01                                                                                                                |
| Operating Conditions:       | 120 V 60 Hz, BT TX on 2441 MHz                                                                                               |
| Operator Name:              | Gal                                                                                                                          |
| Comment:                    |                                                                                                                              |
| Legend:                     | Trace: blue = PK, green = CISPR AV; Star: red or blue = critical frequency; Rhombus: blue = final QP, green = final CISPR AV |
| Tested Port / used LISN:    | AC mains => ESH3-Z5                                                                                                          |
| Termination of other ports: | N/A                                                                                                                          |



##### Final Result

| Frequency (MHz) | QuasiPeak (dBµV) | CAverage (dBµV) | Limit (dBµV) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Line | PE  | Corr. (dB) |
|-----------------|------------------|-----------------|--------------|-------------|-----------------|-----------------|------|-----|------------|
| 0.341250        | 28.99            | ---             | 59.17        | 30.18       | 1000.0          | 9.000           | L1   | GND | 10.1       |
| 8.425500        | ---              | 18.65           | 50.00        | 31.35       | 1000.0          | 9.000           | N    | FLO | 10.5       |

#### 4.1.5 TEST EQUIPMENT USED

Conducted Emissions

## 4.2 OCCUPIED BANDWIDTH (6 DB)

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

### 4.2.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The results recorded were measured with the modulation which produce the worst-case (smallest) emission bandwidth.

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

See worst case analyser plots.

### 4.2.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (a) (2)

Systems using digital modulation techniques may operate in the 902-928 MHz and 2400-2483.5 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

#### 4.2.3 TEST PROTOCOL

Ambient temperature: 25 °C  
 Air Pressure: 1000 hPa  
 Humidity: 38 %

##### BT GFSK (1-DH1)

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 0           | 2402            | 0.51                 | 0.5         | 0.01                  |
|             | 39          | 2441            | 0.51                 | 0.5         | 0.01                  |
|             | 78          | 2480            | 0.51                 | 0.5         | 0.01                  |

##### BT n/4 DQPSK (2-DH1)

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.10                 | 0.5         | 0.60                  |
|             | 39          | 2441            | 1.10                 | 0.5         | 0.60                  |
|             | 78          | 2480            | 1.10                 | 0.5         | 0.60                  |

##### BT 8-DPSK (3-DH1)

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.11                 | 0.5         | 0.61                  |
|             | 39          | 2441            | 1.10                 | 0.5         | 0.60                  |
|             | 78          | 2480            | 1.10                 | 0.5         | 0.60                  |

##### BT LE GFSK

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 0           | 2402            | 0.75                 | 0.5         | 0.25                  |
|             | 19          | 2440            | 0.75                 | 0.5         | 0.25                  |
|             | 39          | 2480            | 0.75                 | 0.5         | 0.25                  |

##### WLAN b-Mode; 20 MHz; 1 Mbit/s

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 1           | 2412            | 8.0                  | 0.5         | 7.5                   |
|             | 6           | 2437            | 8.0                  | 0.5         | 7.5                   |
|             | 11          | 2462            | 8.0                  | 0.5         | 7.5                   |

##### WLAN g-Mode; 20 MHz; 6 Mbit/s

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 1           | 2412            | 16.2                 | 0.5         | 15.7                  |
|             | 2           | 2417            | 16.0                 | 0.5         | 15.5                  |
|             | 6           | 2437            | 16.4                 | 0.5         | 15.9                  |
|             | 10          | 2457            | 16.0                 | 0.5         | 15.5                  |
|             | 11          | 2462            | 16.3                 | 0.5         | 15.8                  |

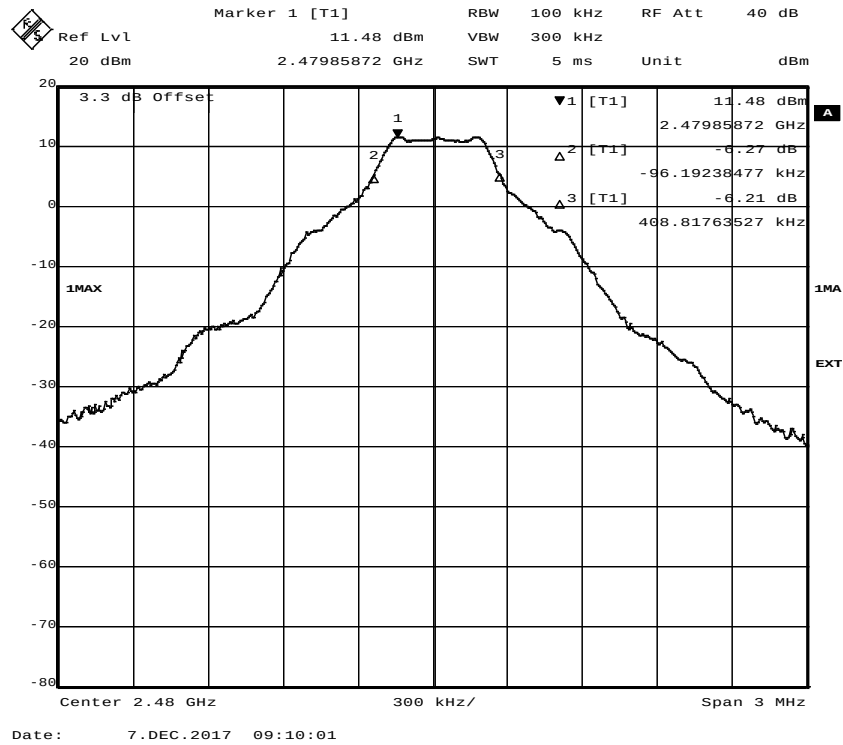
##### WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Band        | Channel No. | Frequency [MHz] | 6 dB Bandwidth [MHz] | Limit [MHz] | Margin to Limit [MHz] |
|-------------|-------------|-----------------|----------------------|-------------|-----------------------|
| 2.4 GHz ISM | 1           | 2412            | 17.3                 | 0.5         | 16.8                  |
|             | 2           | 2417            | 16.5                 | 0.5         | 16.0                  |
|             | 6           | 2437            | 17.6                 | 0.5         | 17.1                  |
|             | 10          | 2457            | 16.7                 | 0.5         | 16.2                  |
|             | 11          | 2462            | 17.1                 | 0.5         | 16.6                  |

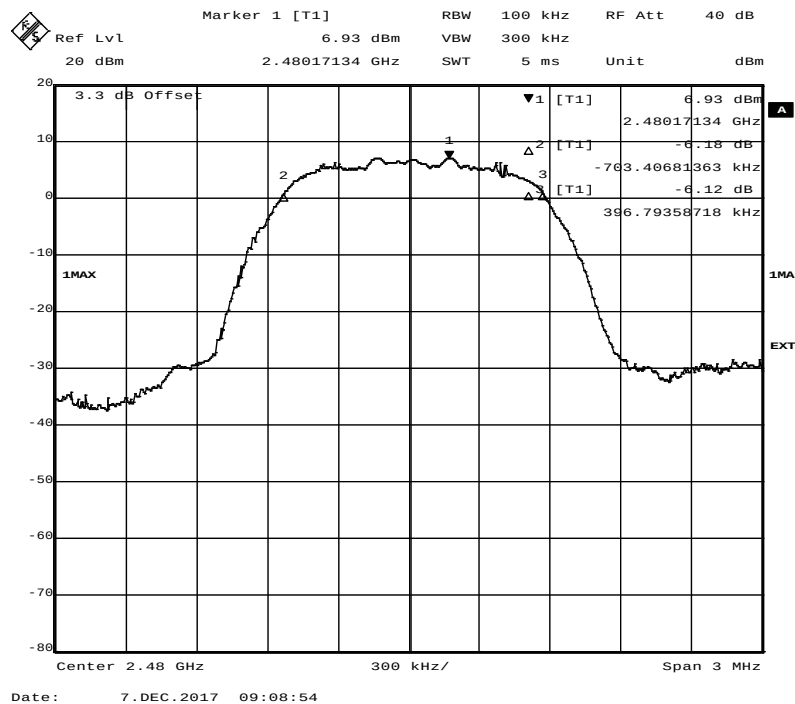
Remark: Please see next sub-clause for the measurement plot.

#### 4.2.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

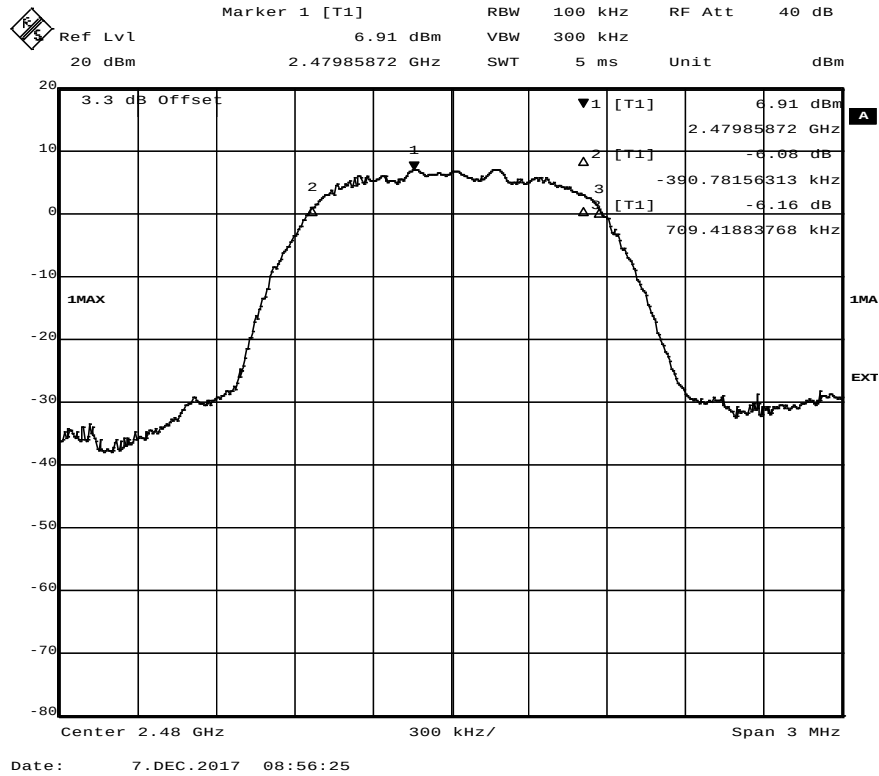
Radio Technology = BT GFSK (1-DH1), Operating Frequency = high  
(S01\_7\_AB01)



Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = high  
(S01\_7\_AB01)



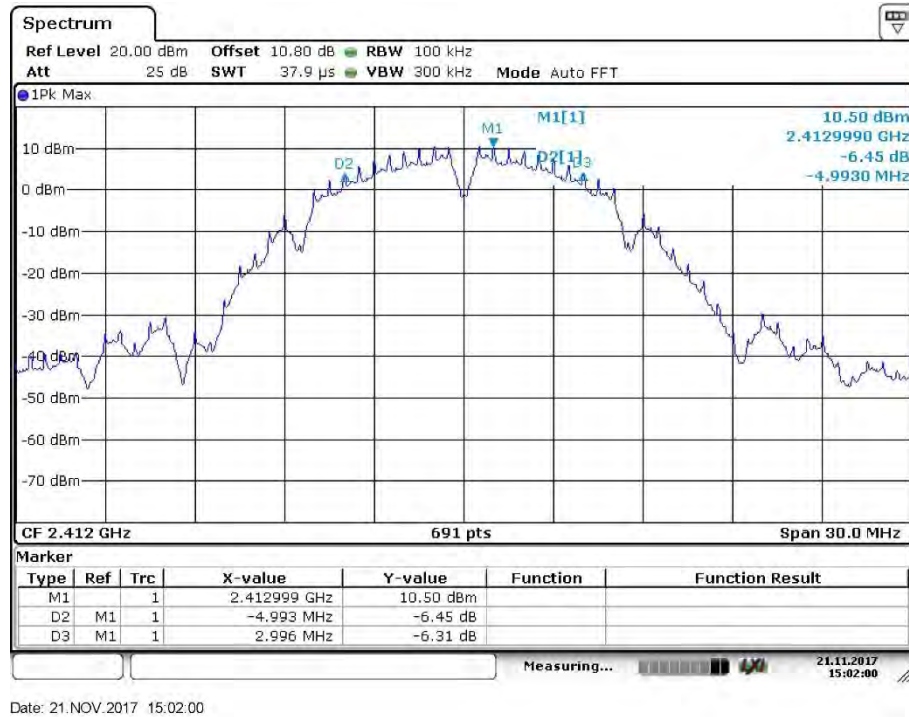
Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = high  
(S01\_7\_AB01)



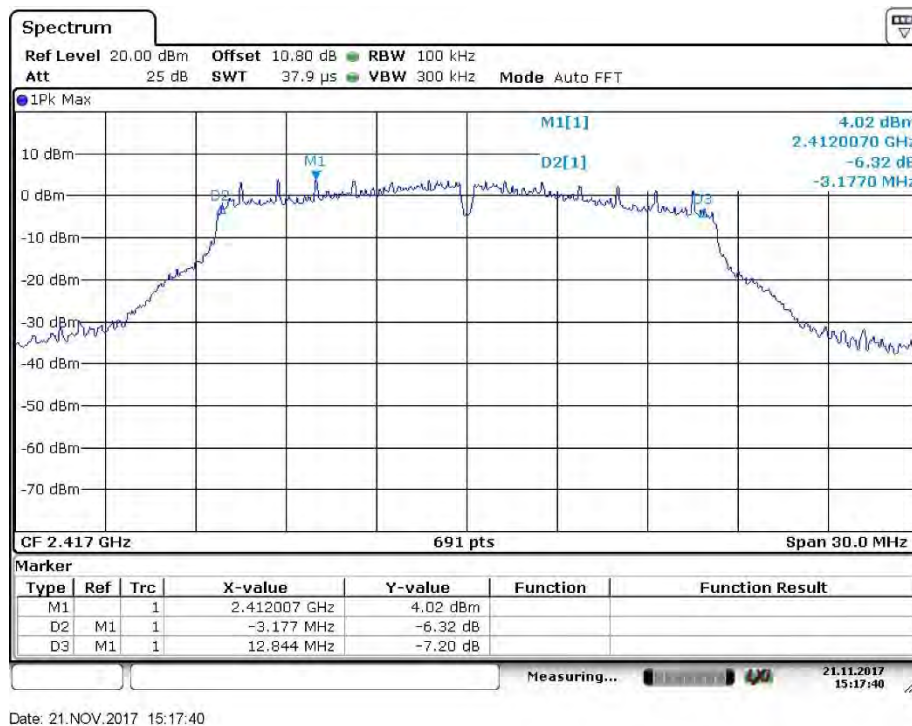
Radio Technology = Bluetooth LE, Operating Frequency = high  
(S01\_7\_AA01)



Radio Technology = WLAN b, Operating Frequency = low  
(S01\_7\_AA01)

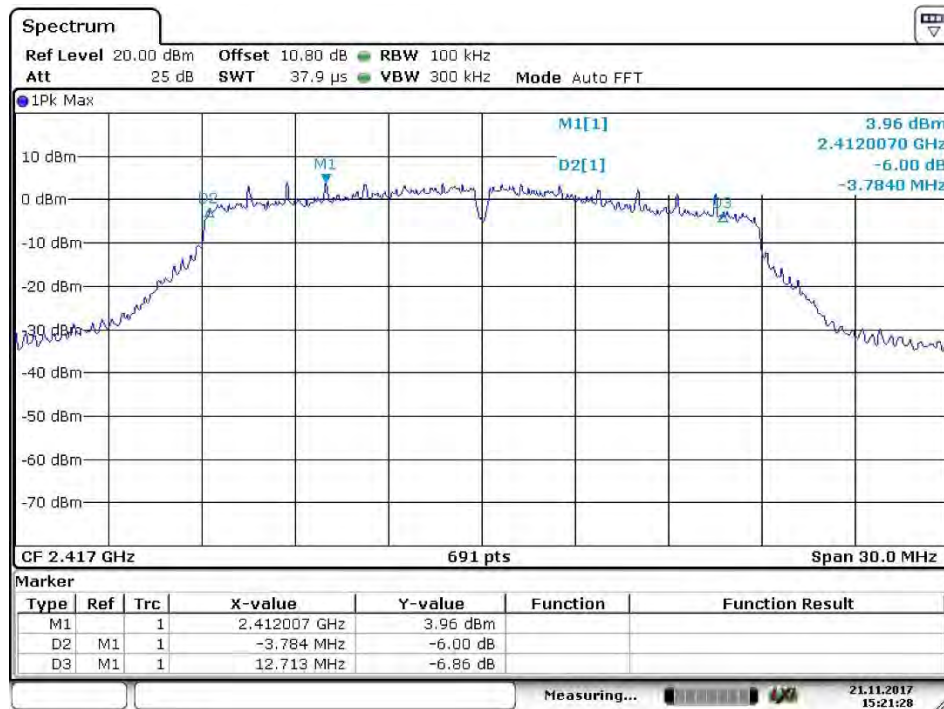


Radio Technology = WLAN g, Operating Frequency = low  
(S01\_7\_AA01)





Radio Technology = WLAN n 20 MHz, Operating Frequency = low  
(S01\_7\_AA01)



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#### 4.2.5 TEST EQUIPMENT USED

- R&S TS8997
- Regulatory Bluetooth RF Test Solution

#### 4.3 OCCUPIED BANDWIDTH (99%)

Standard      FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

##### 4.3.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the occupied bandwidth measurements.

The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical.

The EUT was connected to spectrum analyzer via a short coax cable with a known loss.  
Analyzer settings:

See measurement plots.

The 99 % measurement function of the spectrum analyser function was used to determine the 99 % bandwidth.

##### 4.3.2 TEST REQUIREMENTS / LIMITS

No applicable limit.

### 4.3.3 TEST PROTOCOL

Ambient temperature: 25 °C  
 Air Pressure: 1000 hPa  
 Humidity: 38 %

#### BT GFSK (1-DH1)

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.00                 |
|             | 39          | 2441            | 0.99                 |
|             | 78          | 2480            | 1.00                 |

#### BT n/4 DQPSK (2-DH1)

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.09                 |
|             | 39          | 2441            | 1.09                 |
|             | 78          | 2480            | 1.09                 |

#### BT 8-DPSK (3-DH1)

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.15                 |
|             | 39          | 2441            | 1.16                 |
|             | 78          | 2480            | 1.15                 |

#### BT LE GFSK

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.05                 |
|             | 19          | 2440            | 1.05                 |
|             | 39          | 2480            | 1.06                 |

#### WLAN b-Mode; 20 MHz; 1 Mbit/s

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | 10.6                 |
|             | 6           | 2437            | 10.4                 |
|             | 11          | 2462            | 10.4                 |

#### WLAN g-Mode; 20 MHz; 6 Mbit/s

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | 17.0                 |
|             | 2           | 2417            | 17.1                 |
|             | 6           | 2437            | 17.7                 |
|             | 10          | 2457            | 17.3                 |
|             | 11          | 2462            | 17.1                 |

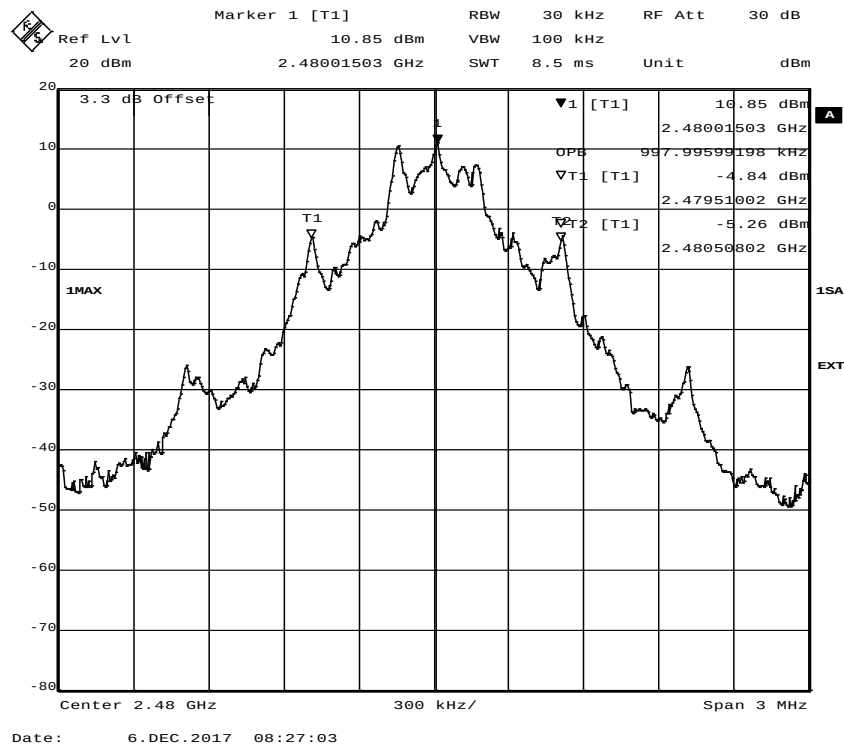
#### WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Band        | Channel No. | Frequency [MHz] | 99 % Bandwidth [MHz] |
|-------------|-------------|-----------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | 18.1                 |
|             | 2           | 2417            | 18.2                 |
|             | 6           | 2437            | 18.6                 |
|             | 10          | 2457            | 18.3                 |
|             | 11          | 2462            | 18.2                 |

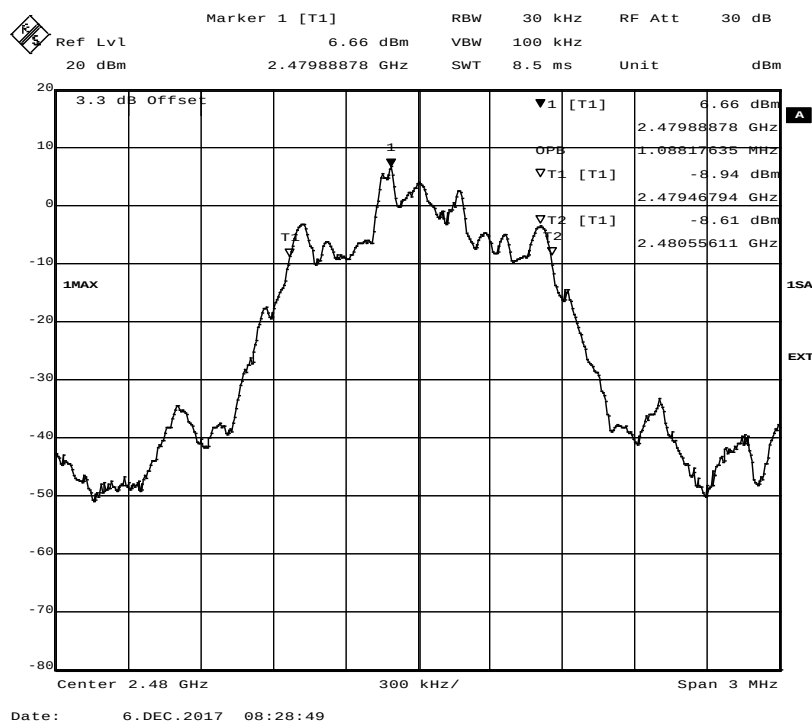
Remark: Please see next sub-clause for the measurement plot.

#### 4.3.4 MEASUREMENT PLOTS (HIGHEST VALUE PER MODE)

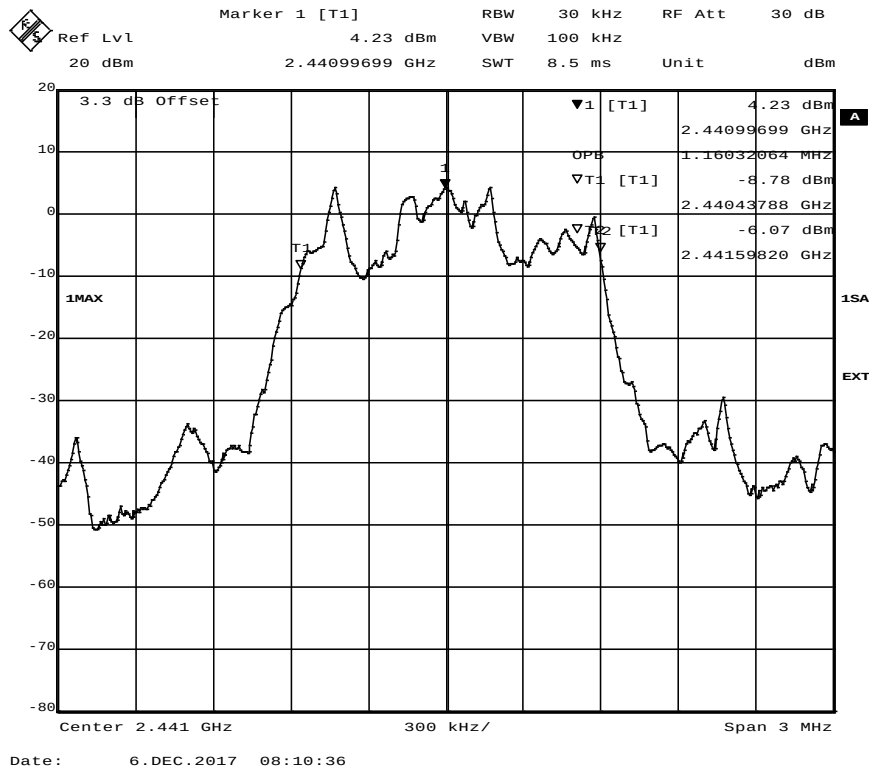
Radio Technology = BT GFSK (1-DH1), Operating Frequency = high  
(S01\_7\_AB01)



Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = high  
(S01\_7\_AB01)



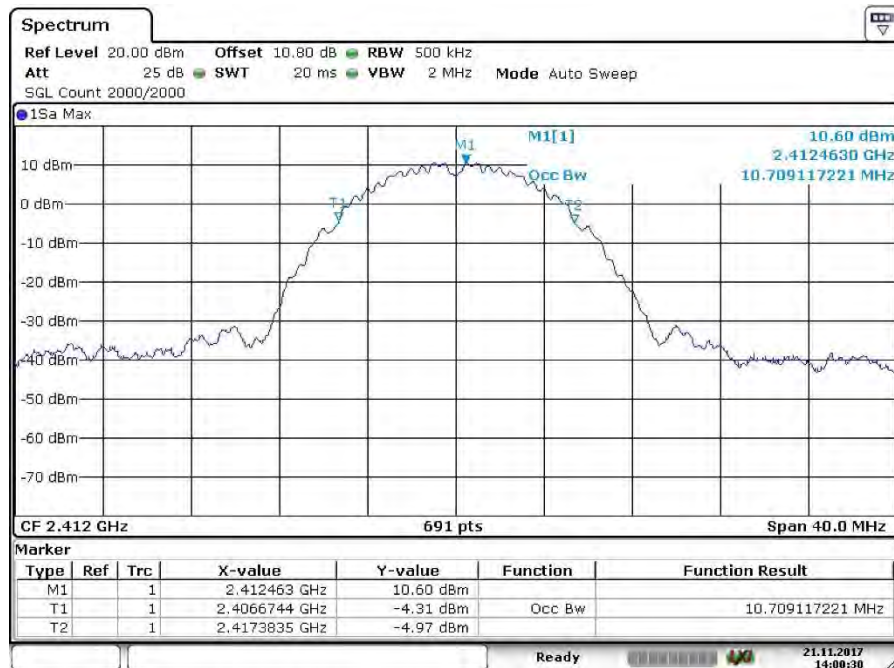
Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = mid  
(S01\_7\_AB01)



Radio Technology = Bluetooth LE, Operating Frequency = high  
(S01\_7\_AA01)



Radio Technology = WLAN b, Operating Frequency = low  
(S01\_7\_AA01)



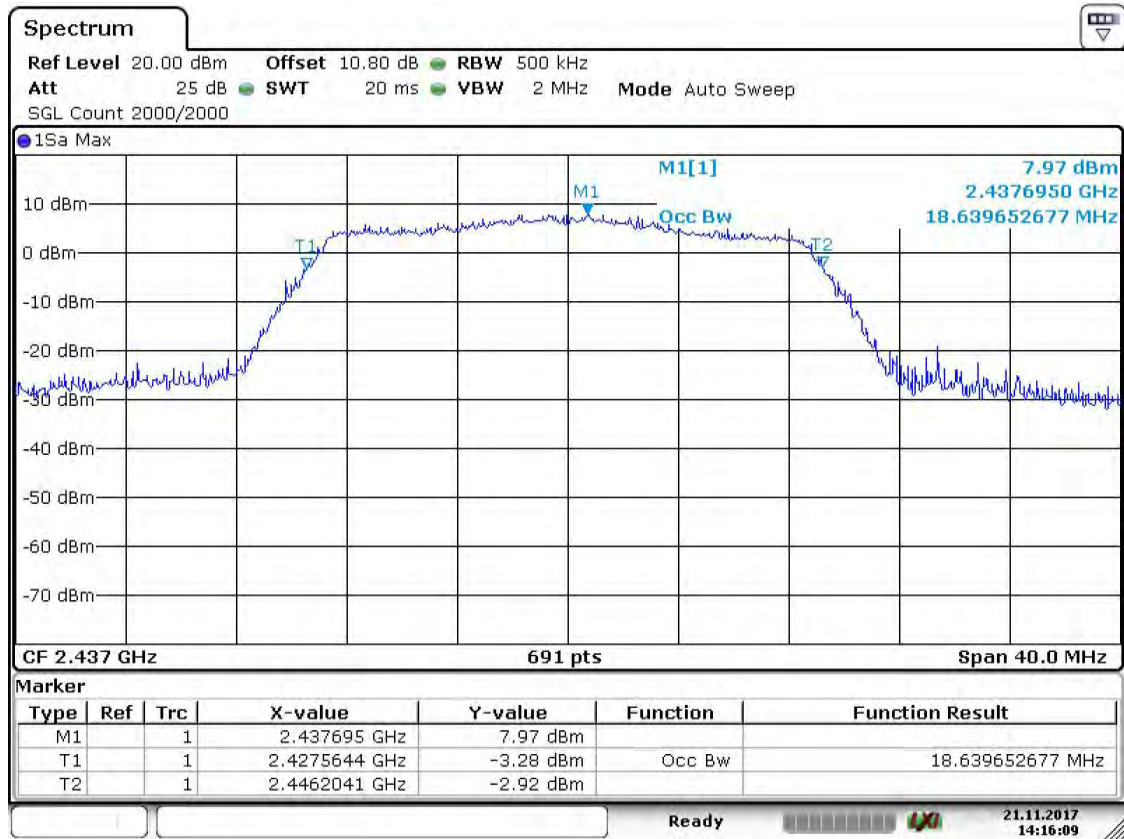
Date: 21.NOV.2017 14:00:31

Radio Technology = WLAN g, Operating Frequency = mid  
(S01\_7\_AA01)



Date: 21.NOV.2017 14:12:24

Radio Technology = WLAN n 20 MHz, Operating Frequency = mid  
(S01\_7\_AA01)



Date: 21.NOV.2017 14:16:10

WLAN n Ch. 1

#### 4.3.5 TEST EQUIPMENT USED

- R&S TS8997
- Regulatory Bluetooth RF Test Solution



#### 4.4 PEAK POWER OUTPUT

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

##### 4.4.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the output power measurements. The results recorded were measured with the modulation which produces the worst-case (highest) output power. The reference level of the spectrum analyzer was set higher than the output power of the EUT.

Peak conducted power:

The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- See analyser plots for BT and BT LE

Conducted power:

The EUT was connected to a power meter via a short coax cable with a known loss.

##### 4.4.2 TEST REQUIREMENTS / LIMITS

DTS devices:

FCC Part 15, Subpart C, §15.247 (b) (3)

For systems using digital modulation techniques in the 902-928 MHz, 2400-2483.5 MHz and 5725-5850 MHz bands: 1 watt.

= > Maximum conducted peak output power: 30 dBm (excluding antenna gain, if antennas with directional gains that do not exceed 6 dBi are used).

Frequency Hopping Systems:

FCC Part 15, Subpart C, §15.247 (b) (1)

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 non-overlapping hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt. For all other frequency hopping systems in the 2400-2483.5 MHz band: 0.125 watts.

FCC Part 15, Subpart C, §15.247 (b) (2)

For frequency hopping systems operating in the 902-928 MHz band: 1 watt for systems employing at least 50 hopping channels; and, 0.25 watts for systems employing less than 50 hopping channels, but at least 25 hopping channels, as permitted under paragraph (a)(1)(i) of this section.

Used conversion factor:  $\text{Limit (dBm)} = 10 \log (\text{Limit (W)}/1\text{mW})$



#### 4.4.3 TEST PROTOCOL

Ambient temperature: 25 °C  
Air Pressure: 1000 hPa  
Humidity: 38 %

##### BT GFSK (1-DH1)

| Band        | Channel No. | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|------------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 0           | 2402            | 11.5             | 30.0        | 18.5                 | 13.5          |
|             | 19          | 2440            | 11.7             | 30.0        | 18.3                 | 13.7          |
|             | 39          | 2480            | 11.7             | 30.0        | 18.3                 | 13.7          |

##### BT n/4 DQPSK (2-DH1)

| Band        | Channel No. | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|------------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 0           | 2402            | 9.6              | 30.0        | 20.4                 | 11.6          |
|             | 19          | 2440            | 9.8              | 30.0        | 20.2                 | 11.8          |
|             | 39          | 2480            | 9.4              | 30.0        | 20.6                 | 11.4          |

##### BT 8-DPSK (3-DH1)

| Band        | Channel No. | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|------------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 0           | 2402            | 9.6              | 30.0        | 20.4                 | 11.6          |
|             | 19          | 2440            | 9.7              | 30.0        | 20.3                 | 11.7          |
|             | 39          | 2480            | 9.4              | 30.0        | 20.6                 | 11.4          |

##### BT LE

| Band        | Channel No. | Frequency [MHz] | Peak Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|------------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 0           | 2402            | 7.8              | 30.0        | 22.2                 | 9.8           |
|             | 19          | 2440            | 7.9              | 30.0        | 22.1                 | 9.9           |
|             | 39          | 2480            | 7.6              | 30.0        | 22.4                 | 9.6           |

##### WLAN b-Mode; 20 MHz; 1 Mbit/s

| Band        | Channel No. | Frequency [MHz] | RMS Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|-----------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 1           | 2412            | 18.1            | 30.0        | 11.9                 | 20.1          |
|             | 6           | 2437            | 16.4            | 30.0        | 13.6                 | 18.4          |
|             | 11          | 2462            | 17.9            | 30.0        | 12.1                 | 19.9          |

##### WLAN g-Mode; 20 MHz; 6 Mbit/s

| Band        | Channel No. | Frequency [MHz] | RMS Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|-----------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 1           | 2412            | 13.2            | 30.0        | 16.8                 | 15.2          |
|             | 2           | 2417            | 15.7            | 30.0        | 14.3                 | 17.7          |
|             | 6           | 2437            | 13.8            | 30.0        | 16.2                 | 15.8          |
|             | 10          | 2457            | 14.4            | 30.0        | 15.6                 | 16.4          |
|             | 11          | 2462            | 13.4            | 30.0        | 16.6                 | 15.4          |

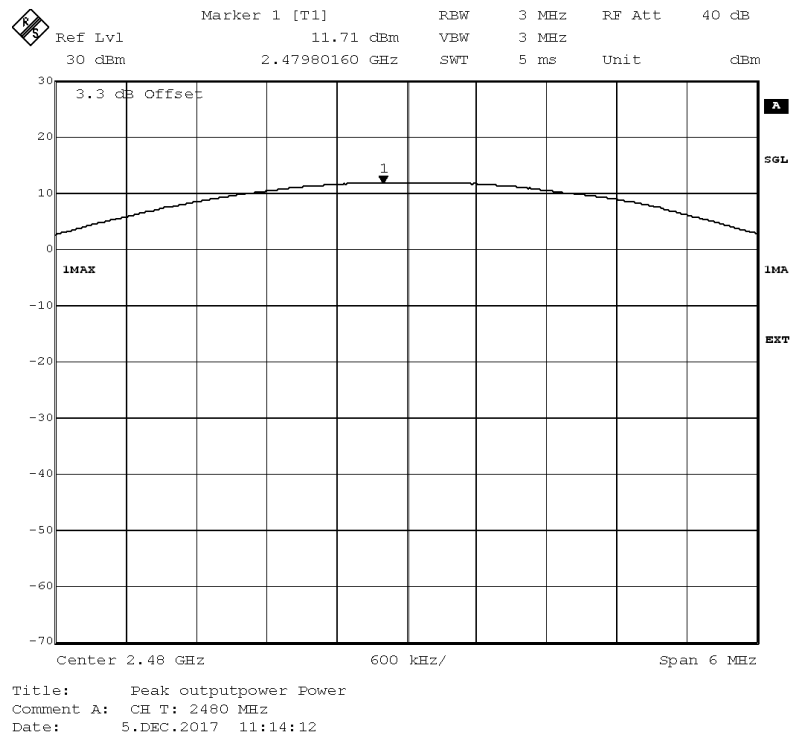
##### WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Band        | Channel No. | Frequency [MHz] | RMS Power [dBm] | Limit [dBm] | Margin to Limit [dB] | E.I.R.P [dBm] |
|-------------|-------------|-----------------|-----------------|-------------|----------------------|---------------|
| 2.4 GHz ISM | 1           | 2412            | 13.2            | 30.0        | 16.8                 | 15.2          |
|             | 2           | 2417            | 15.6            | 30.0        | 14.4                 | 17.6          |
|             | 6           | 2437            | 13.7            | 30.0        | 16.3                 | 15.7          |
|             | 10          | 2457            | 14.3            | 30.0        | 15.7                 | 16.3          |
|             | 11          | 2462            | 13.2            | 30.0        | 16.8                 | 15.2          |

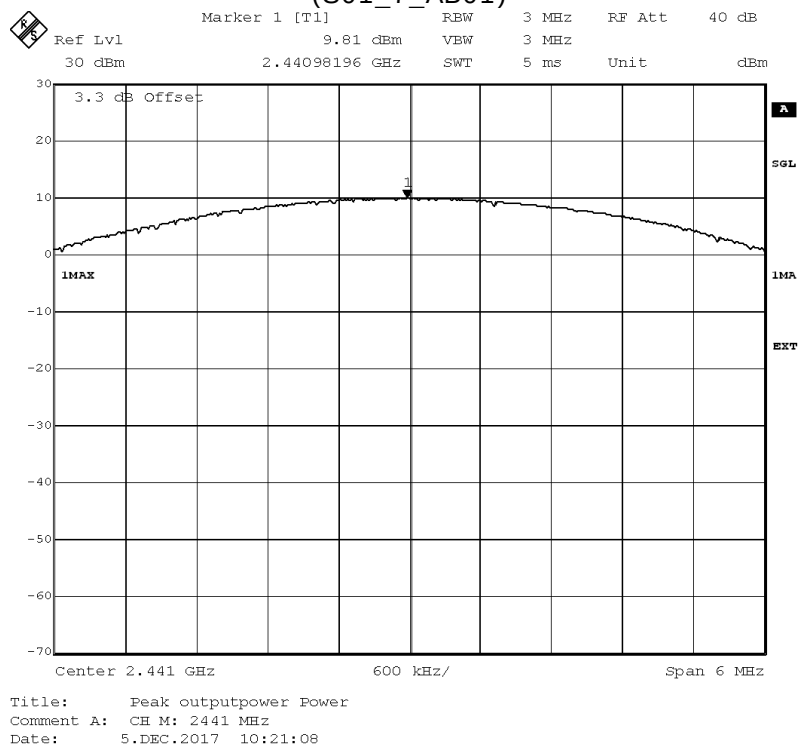
Remark: Please see next sub-clause for the measurement plot.

#### 4.4.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

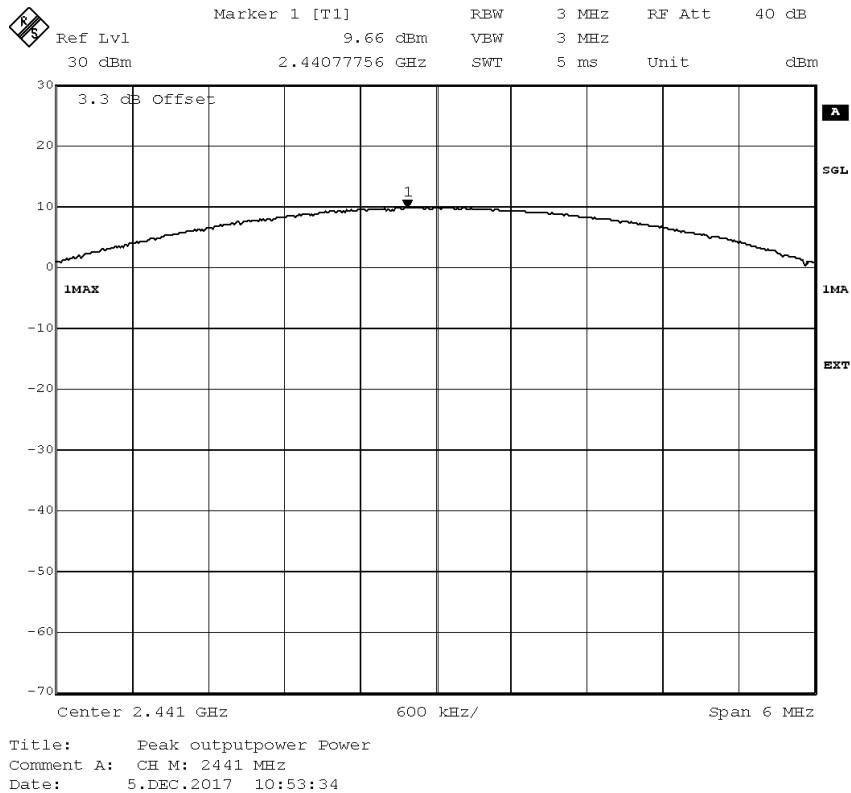
Radio Technology = BT GFSK (1-DH1), Operating Frequency = high  
(S01\_7\_AB01)



Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = mid  
(S01\_7\_AB01)



Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = mid  
(S01\_7\_AB01)



Radio Technology = Bluetooth LE, Operating Frequency = mid, Measurement method =  
conducted  
(S01\_7\_AA01)



#### 4.4.5 TEST EQUIPMENT USED

- R&S TS8997
- Regulatory Bluetooth RF Test Solution

#### 4.5 SPURIOUS RF CONDUCTED EMISSIONS AND CONDUCTED EMISSIONS IN RESTRICTED BANDS

Standard      FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

##### 4.5.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up to perform the spurious emissions measurements. The EUT was connected to spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- Frequency range: 9 – 150 kHz
- Resolution Bandwidth (RBW): 300 Hz
- Video Bandwidth (VBW): 1 kHz
- Trace: Maxhold
- Sweeps: 100
- Sweep Time: coupled
- Detector: Peak
  
- Frequency range: 0.15 – 30 MHz
- Resolution Bandwidth (RBW): 10 kHz
- Video Bandwidth (VBW): 30 kHz
- Trace: Maxhold
- Sweeps: 100
- Sweep Time: coupled
- Detector: Peak
  
- Frequency range: 30 – 1000 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Trace: Maxhold
- Sweeps: till stable, at least 120
- Sweep Time: coupled
- Detector: Peak
  
- Frequency range: 1000 – 25000 MHz
- Resolution Bandwidth (RBW): 1000 kHz
- Video Bandwidth (VBW): 3000 kHz
- Trace: Maxhold
- Sweeps: till stable, at least 120
- Sweep Time: coupled
- Detector: Peak

The reference value for the measurement of the spurious RF conducted emissions is determined during the test "band edge compliance conducted". This value is used to calculate the 20 dBc limit.

For automated Final Measurement the following settings were used:

- Center frequency: Peak frequency
- Span: Zero Span
- Resolution Bandwidth (RBW): 1000 kHz
- Video Bandwidth (VBW): 3000 kHz
- Trace: single sweep
- Sweep Time: 1s
- Detector: RMS

For manual final measurement settings see plot.

For the conducted emissions in restricted bands the Value is measured in dBm and then converted to dB $\mu$ V/m as given in KDB 558074:

1. Measure the conducted output power in dBm.
2. Add the maximum antenna gain in dBi
3. Add the appropriate ground reflection factor  
6 dB for frequencies  $\leq 30$  MHz;  
4.7 dB for frequencies between 30 MHz and 1000 MHz, inclusive; and  
0 dB for frequencies  $> 1000$  MHz).
4. Convert the resultant EIRP level to an equivalent electric field strength level using the following relationship:

$$E = \text{EIRP} - 20 \log D + 104.8$$

Where E is the electric field strength in dB $\mu$ V/m,

EIRP is the equivalent isotropically radiated power in dBm

D is the specified measurement distance in m

Value [dB $\mu$ V/m] = Measured value [dBm] + Maximum Antenna Gain [dBi] + Ground reflection factor - 20 log D + 104.8

#### 4.5.2 TEST REQUIREMENTS / LIMITS

##### FCC Part 15, Subpart C, §15.247 (c)

In any 100 kHz bandwidth outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB.

##### FCC Part 15, Subpart C, §15.247 (d)

... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

##### FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

| Frequency in MHz | Limit (μV/m)     | Measurement distance (m) | Limits (dBμV/m)    |
|------------------|------------------|--------------------------|--------------------|
| 0.009 – 0.49     | 2400/F(kHz)@300m | 3                        | (48.5 – 13.8)@300m |
| 0.49 – 1.705     | 24000/F(kHz)@30m | 3                        | (33.8 – 23.0)@30m  |
| 1.705 – 30       | 30@30m           | 3                        | 29.5@30m           |

| Frequency in MHz | Limit (μV/m) | Measurement distance (m) | Limits (dBμV/m) |
|------------------|--------------|--------------------------|-----------------|
| 30 – 88          | 100@3m       | 3                        | 40.0@3m         |
| 88 – 216         | 150@3m       | 3                        | 43.5@3m         |
| 216 – 960        | 200@3m       | 3                        | 46.0@3m         |
| 960 – 26000      | 500@3m       | 3                        | 54.0@3m         |
| 26000 – 40000    | 500@3m       | 1                        | 54.0@3m         |

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor:  $\text{Limit (dB}\mu\text{V/m)} = 20 \log (\text{Limit } (\mu\text{V/m})/1\mu\text{V/m})$

#### 4.5.3 TEST PROTOCOL

Ambient temperature: 23 °C  
 Air Pressure: 1012 hPa  
 Humidity: 41 %

20/30dBc:

| BT GFSK (1-DH1) |                            |                      |                      |          |           |                         |             |                      |
|-----------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No      | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 20 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 0               | 2402                       | -                    | -                    | PEAK     | 100       | 11.5                    | -8.5        | >20                  |
| 39              | 2441                       | -                    | -                    | PEAK     | 100       | 11.6                    | -8.4        | >20                  |
| 78              | 2480                       | -                    | -                    | PEAK     | 100       | 11.6                    | -8.4        | >20                  |

| BT n/4 DQPSK (2-DH1) |                            |                      |                      |          |           |                         |             |                      |
|----------------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No           | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 20 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 0                    | 2402                       | -                    | -                    | PEAK     | 100       | 7.5                     | -12.5       | >20                  |
| 39                   | 2441                       | -                    | -                    | PEAK     | 100       | 7.6                     | -12.4       | >20                  |
| 78                   | 2480                       | -                    | -                    | PEAK     | 100       | 7.3                     | -12.7       | >20                  |

| BT 8-DPSK (3-DH1) |                            |                      |                      |          |           |                         |             |                      |
|-------------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No        | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 20 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 0                 | 2402                       | -                    | -                    | PEAK     | 100       | 7.2                     | -12.8       | >20                  |
| 39                | 2441                       | -                    | -                    | PEAK     | 100       | 7.2                     | -12.8       | >20                  |
| 78                | 2480                       | -                    | -                    | PEAK     | 100       | 7.0                     | -13.0       | >20                  |

| BT LE GFSK |                            |                      |                      |          |           |                         |             |                      |
|------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 20 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 0          | 2402                       | -                    | -                    | PEAK     | 100       | 7.1                     | -12.9       | >20                  |
| 19         | 2440                       | -                    | -                    | PEAK     | 100       | 7.3                     | -12.7       | >20                  |
| 39         | 2480                       | -                    | -                    | PEAK     | 100       | 7.0                     | -13.0       | >20                  |

| WLAN b-Mode; 20 MHz; 1 Mbit/s |                            |                      |                      |          |           |                         |             |                      |
|-------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No                    | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 30 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 1                             | 2412                       | -                    | -                    | PEAK     | 100       | 10.3                    | -19.7       | >10                  |
| 6                             | 2437                       | -                    | -                    | PEAK     | 100       | 8.6                     | -21.4       | >10                  |
| 11                            | 2462                       | -                    | -                    | PEAK     | 100       | 10.5                    | -19.5       | >10                  |



| WLAN g-Mode; 20 MHz; 6 Mbit/s |                            |                      |                      |          |           |                         |             |                      |
|-------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No                    | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 30 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 1                             | 2412                       | -                    | -                    | PEAK     | 100       | 1.6                     | -28.4       | >10                  |
| 2                             | 2417                       | -                    | -                    | PEAK     | 100       | 3.8                     | -26.2       | >10                  |
| 6                             | 2437                       | -                    | -                    | PEAK     | 100       | 1.8                     | -28.2       | >10                  |
| 10                            | 2457                       | -                    | -                    | PEAK     | 100       | 2.6                     | -27.4       | >10                  |
| 11                            | 2462                       | -                    | -                    | PEAK     | 100       | 1.3                     | -28.7       | >10                  |

| WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0 |                            |                      |                      |          |           |                         |             |                      |
|--------------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-------------------------|-------------|----------------------|
| Channel No                           | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level 30 dBc [dBm] | Limit [dBm] | Margin to Limit [dB] |
| 1                                    | 2412                       | -                    | -                    | PEAK     | 100       | 1.7                     | -28.3       | >10                  |
| 2                                    | 2417                       | -                    | -                    | PEAK     | 100       | 3.6                     | -26.4       | >10                  |
| 6                                    | 2437                       | -                    | -                    | PEAK     | 100       | 1.9                     | -28.1       | >10                  |
| 10                                   | 2457                       | -                    | -                    | PEAK     | 100       | 2.9                     | -27.1       | >10                  |
| 11                                   | 2462                       | -                    | -                    | PEAK     | 100       | 1.3                     | -28.7       | >10                  |

In Restricted Bands, except for band edge and noise floor values:

| BT GFSK (1-DH1) |                            |                      |                      |          |           |                                   |                  |                      |
|-----------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No      | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 0               | 2402                       | 2882.8               | -51.0                | PEAK     | 1000      | 46.2                              | 54 <sup>1)</sup> | 7.8                  |
| 0               | 2402                       | 4804.3               | -44.3                | PEAK     | 1000      | 52.9                              | 54 <sup>1)</sup> | 1.1                  |
| 39              | 2441                       | 4882.8               | -44.9                | PEAK     | 1000      | 52.3                              | 54 <sup>1)</sup> | 1.7                  |
| 78              | 2480                       | 6543.2               | -45.2                | PEAK     | 1000      | 52.0                              | 54 <sup>1)</sup> | 2.0                  |

| BT π/4 DQPSK (2-DH1) |                            |                      |                      |          |           |                                   |                  |                      |
|----------------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No           | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 0                    | 2402                       | 4804.3               | -50.3                | PEAK     | 1000      | 46.9                              | 54 <sup>1)</sup> | 7.1                  |
| 39                   | 2441                       | 4881.8               | -53.3                | PEAK     | 1000      | 43.9                              | 54 <sup>1)</sup> | 10.1                 |
| 78                   | 2480                       | 4960.3               | -54.9                | PEAK     | 1000      | 42.3                              | 54 <sup>1)</sup> | 11.7                 |

| BT 8-DPSK (3-DH1) |                            |                      |                      |          |           |                                   |                  |                      |
|-------------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No        | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 0                 | 2402                       | 4803.8               | -51.0                | PEAK     | 1000      | 46.2                              | 54 <sup>1)</sup> | 7.8                  |
| 39                | 2441                       | 4882.3               | -53.0                | PEAK     | 1000      | 44.2                              | 54 <sup>1)</sup> | 9.8                  |
| 78                | 2480                       | 4960.3               | -54.4                | PEAK     | 1000      | 42.8                              | 54 <sup>1)</sup> | 11.2                 |

| BT LE GFSK |                            |                      |                      |          |           |                                   |                  |                      |
|------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 0          | 2402                       | 4803.8               | -51.5                | PEAK     | 1000      | 45.7                              | 54 <sup>1)</sup> | 8.3                  |
| 19         | 2440                       | 4880.8               | -51.5                | PEAK     | 1000      | 45.7                              | 54 <sup>1)</sup> | 8.3                  |
| 39         | 2480                       | 4960.8               | -51.4                | PEAK     | 1000      | 45.8                              | 54 <sup>1)</sup> | 8.2                  |

| WLAN b-Mode; 20 MHz; 1 Mbit/s |                            |                      |                      |          |           |                                   |                  |                      |
|-------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No                    | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 1                             | 2412                       | 4824.3               | -36.1                | PEAK     | 1000      | 61.1                              | 74               | 12.9                 |
| 1                             | 2412                       | 4824.3               | -46.0                | RMS      | 1000      | 51.2                              | 54               | 2.8                  |
| 6                             | 2437                       | 4874.3               | -45.8                | PEAK     | 1000      | 51.4                              | 54 <sup>1)</sup> | 2.6                  |
| 11                            | 2462                       | 4924.3               | -43.5                | PEAK     | 1000      | 53.7                              | 54 <sup>1)</sup> | 0.3                  |

| WLAN g-Mode; 20 MHz; 6 Mbit/s |                            |                      |                      |          |           |                                   |                  |                      |
|-------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No                    | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 1                             | 2412                       | 4825.3               | -47.4                | PEAK     | 1000      | 48.9                              | 54 <sup>1)</sup> | 5.1                  |
| 2                             | 2417                       | 4829.3               | -45.4                | PEAK     | 1000      | 51.8                              | 54 <sup>1)</sup> | 2.2                  |
| 6                             | 2437                       | 4869.8               | -46.7                | PEAK     | 1000      | 50.5                              | 54 <sup>1)</sup> | 3.5                  |
| 10                            | 2457                       | 4913.3               | -45.6                | PEAK     | 1000      | 51.6                              | 54 <sup>1)</sup> | 2.4                  |
| 11                            | 2462                       | 4926.8               | -47.3                | PEAK     | 1000      | 49.9                              | 54 <sup>1)</sup> | 4.1                  |

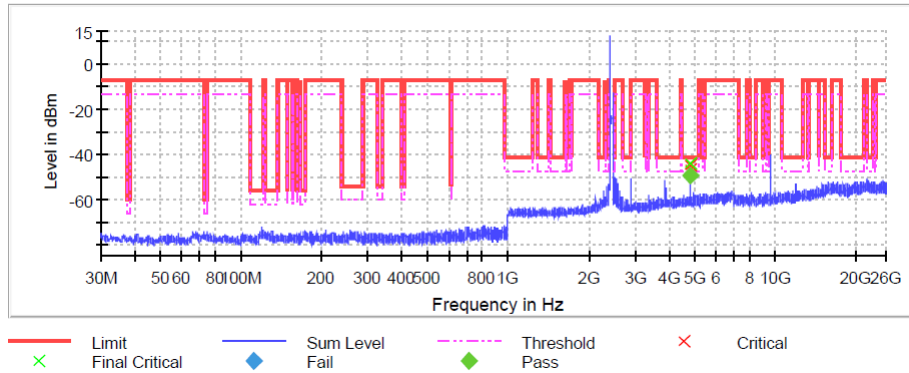
| WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0 |                            |                      |                      |          |           |                                   |                  |                      |
|--------------------------------------|----------------------------|----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| Channel No                           | Channel Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
| 1                                    | 2412                       | 4815.3               | -48.6                | PEAK     | 1000      | 48.6                              | 54 <sup>1)</sup> | 5.4                  |
| 2                                    | 2417                       | 4837.8               | -45.5                | PEAK     | 1000      | 51.7                              | 54 <sup>1)</sup> | 2.3                  |
| 6                                    | 2437                       | 4877.8               | -46.7                | PEAK     | 1000      | 50.5                              | 54 <sup>1)</sup> | 3.5                  |
| 10                                   | 2457                       | 4911.8               | -46.6                | PEAK     | 1000      | 50.6                              | 54 <sup>1)</sup> | 3.4                  |
| 11                                   | 2462                       | 4924.8               | -47.9                | PEAK     | 1000      | 49.3                              | 54 <sup>1)</sup> | 4.7                  |

1) Peak value below Average limit -> no average measurement performed / given.

Remark: Range 9 kHz – 30 MHz tested for BT BDR and WLAN b mode only.  
Please see next sub-clause for the measurement plots.

#### 4.5.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

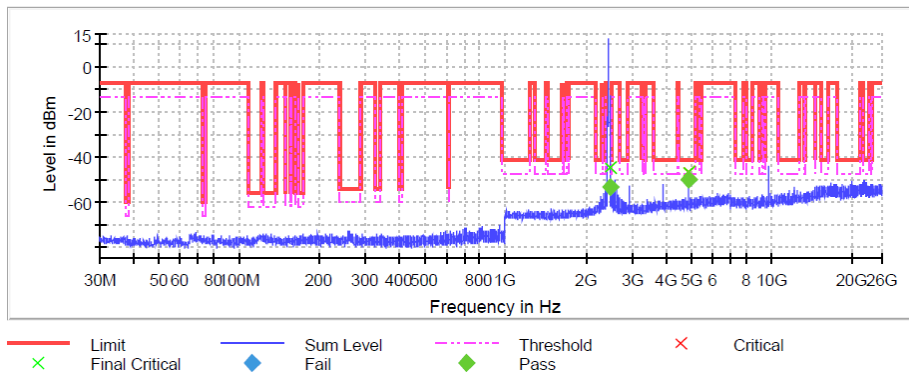
Radio Technology = BT GFSK (1-DH1), Operating Frequency = low  
(S01\_7\_AA01)



Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4804.250000     | -44.3       | 3.1         | -41.2       |
| 4804.750000     | -44.5       | 3.3         | -41.2       |
| 4803.750000     | -44.5       | 3.3         | -41.2       |
| 4805.250000     | -47.0       | 5.8         | -41.2       |
| 4803.250000     | -47.4       | 6.2         | -41.2       |
| 2487.750000     | -49.1       | 7.9         | -41.2       |
| 2488.250000     | -50.1       | 8.9         | -41.2       |
| 2489.250000     | -50.3       | 9.1         | -41.2       |
| 22108.750000    | -51.0       | 9.8         | -41.2       |
| 2882.750000     | -51.0       | 9.8         | -41.2       |
| 3843.750000     | -51.2       | 10.0        | -41.2       |
| 3843.250000     | -51.2       | 10.0        | -41.2       |
| 22086.250000    | -51.2       | 10.0        | -41.2       |
| 2882.250000     | -51.5       | 10.3        | -41.2       |
| 22155.250000    | -51.6       | 10.4        | -41.2       |

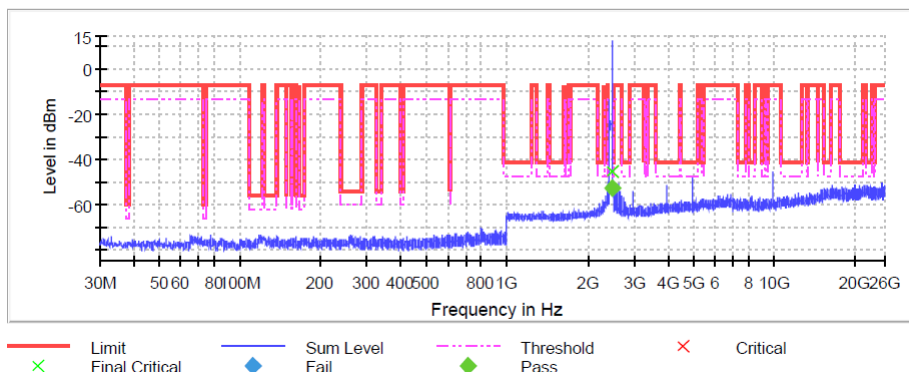
Radio Technology = BT GFSK (1-DH1), Operating Frequency = mid  
(S01\_7\_AA01)



Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2485.750000     | -44.5       | 3.3         | -41.2       |
| 4882.250000     | -46.5       | 5.3         | -41.2       |
| 4881.750000     | -46.6       | 5.4         | -41.2       |
| 4882.750000     | -46.8       | 5.6         | -41.2       |
| 2487.250000     | -48.4       | 7.2         | -41.2       |
| 4881.250000     | -48.8       | 7.6         | -41.2       |
| 4883.250000     | -48.8       | 7.6         | -41.2       |
| 2488.750000     | -49.5       | 8.3         | -41.2       |
| 19854.250000    | -50.9       | 9.7         | -41.2       |
| 22188.250000    | -51.0       | 9.8         | -41.2       |
| 22755.750000    | -51.1       | 9.9         | -41.2       |
| 22522.250000    | -51.4       | 10.2        | -41.2       |
| 2489.250000     | -51.4       | 10.2        | -41.2       |
| 22271.250000    | -51.8       | 10.6        | -41.2       |
| 18516.750000    | -51.8       | 10.6        | -41.2       |

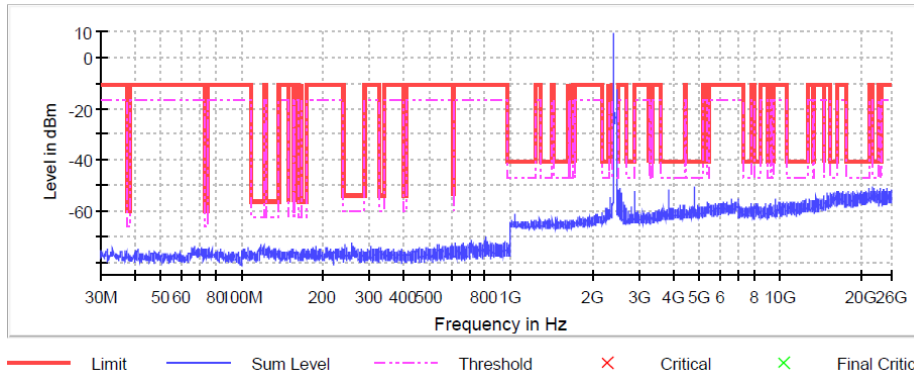
Radio Technology = BT GFSK (1-DH1), Operating Frequency = high  
(S01\_7\_AA01)



Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2488.750000     | -45.7       | 4.5         | -41.2       |
| 2486.750000     | -47.4       | 6.2         | -41.2       |
| 2484.250000     | -48.0       | 6.8         | -41.2       |
| 2483.750000     | -48.1       | 6.9         | -41.2       |
| 2485.250000     | -48.1       | 6.9         | -41.2       |
| 4960.250000     | -48.4       | 7.2         | -41.2       |
| 4960.750000     | -48.6       | 7.4         | -41.2       |
| 4959.750000     | -48.8       | 7.6         | -41.2       |
| 2489.750000     | -48.9       | 7.7         | -41.2       |
| 2484.750000     | -49.8       | 8.6         | -41.2       |
| 4961.250000     | -50.8       | 9.6         | -41.2       |
| 4959.250000     | -51.0       | 9.8         | -41.2       |
| 22192.250000    | -51.4       | 10.2        | -41.2       |
| 22040.250000    | -51.6       | 10.4        | -41.2       |
| 20085.750000    | -51.7       | 10.5        | -41.2       |

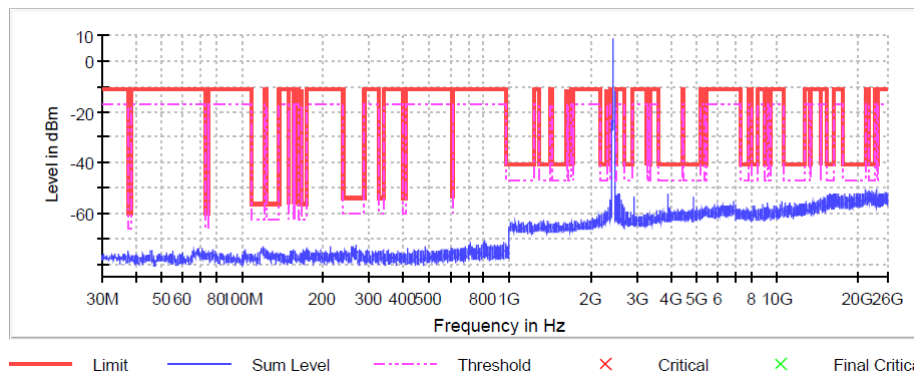
Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = low  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4804.750000     | -50.3       | 9.1         | -41.2       |
| 4804.250000     | -50.7       | 9.5         | -41.2       |
| 22225.250000    | -50.9       | 9.7         | -41.2       |
| 23604.750000    | -51.1       | 9.9         | -41.2       |
| 21395.250000    | -51.2       | 10.0        | -41.2       |
| 21394.750000    | -51.2       | 10.0        | -41.2       |
| 22017.250000    | -51.4       | 10.2        | -41.2       |
| 3843.250000     | -51.5       | 10.3        | -41.2       |
| 3843.750000     | -51.5       | 10.3        | -41.2       |
| 22194.750000    | -51.6       | 10.4        | -41.2       |
| 22221.750000    | -51.6       | 10.4        | -41.2       |
| 22210.250000    | -51.7       | 10.5        | -41.2       |
| 22089.750000    | -51.8       | 10.6        | -41.2       |
| 22238.250000    | -51.9       | 10.7        | -41.2       |
| 22261.750000    | -51.9       | 10.7        | -41.2       |

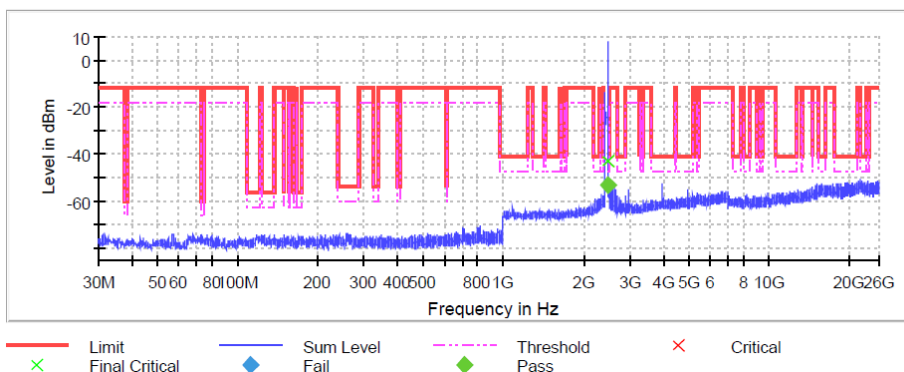
Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = mid  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2484.750000     | -49.9       | 8.7         | -41.2       |
| 21395.250000    | -50.8       | 9.6         | -41.2       |
| 22029.750000    | -51.2       | 10.0        | -41.2       |
| 22149.250000    | -51.3       | 10.1        | -41.2       |
| 22756.750000    | -51.4       | 10.2        | -41.2       |
| 22204.750000    | -51.8       | 10.6        | -41.2       |
| 22917.250000    | -51.8       | 10.6        | -41.2       |
| 22294.750000    | -51.8       | 10.6        | -41.2       |
| 22295.250000    | -51.8       | 10.6        | -41.2       |
| 22936.250000    | -51.8       | 10.6        | -41.2       |
| 22105.750000    | -51.9       | 10.7        | -41.2       |
| 22031.250000    | -51.9       | 10.7        | -41.2       |
| 21351.250000    | -52.0       | 10.8        | -41.2       |
| 22199.250000    | -52.0       | 10.8        | -41.2       |
| 22274.750000    | -52.0       | 10.8        | -41.2       |

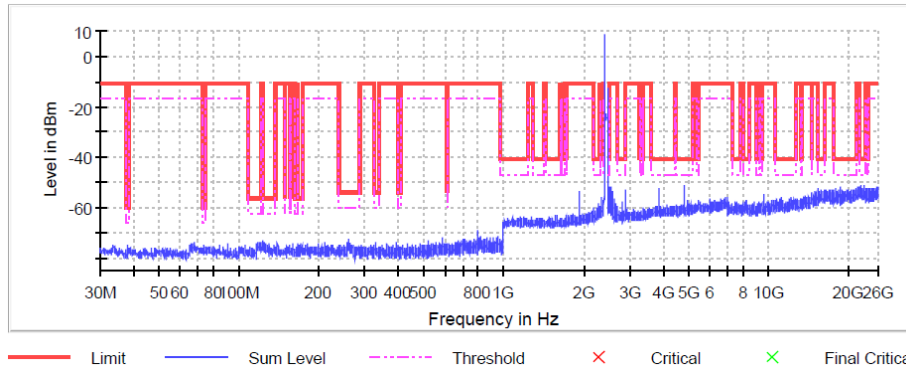
Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = high  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2484.750000     | -42.8       | 1.6         | -41.2       |
| 2483.750000     | -49.1       | 7.9         | -41.2       |
| 22139.750000    | -50.4       | 9.2         | -41.2       |
| 22353.250000    | -51.1       | 9.9         | -41.2       |
| 22353.750000    | -51.2       | 10.0        | -41.2       |
| 22214.250000    | -51.3       | 10.1        | -41.2       |
| 23606.250000    | -51.4       | 10.2        | -41.2       |
| 22032.250000    | -51.5       | 10.3        | -41.2       |
| 2485.250000     | -51.5       | 10.3        | -41.2       |
| 22065.250000    | -51.7       | 10.5        | -41.2       |
| 2484.250000     | -51.8       | 10.6        | -41.2       |
| 23605.750000    | -51.9       | 10.7        | -41.2       |
| 22012.250000    | -51.9       | 10.7        | -41.2       |
| 19839.250000    | -52.0       | 10.8        | -41.2       |
| 21318.250000    | -52.0       | 10.8        | -41.2       |

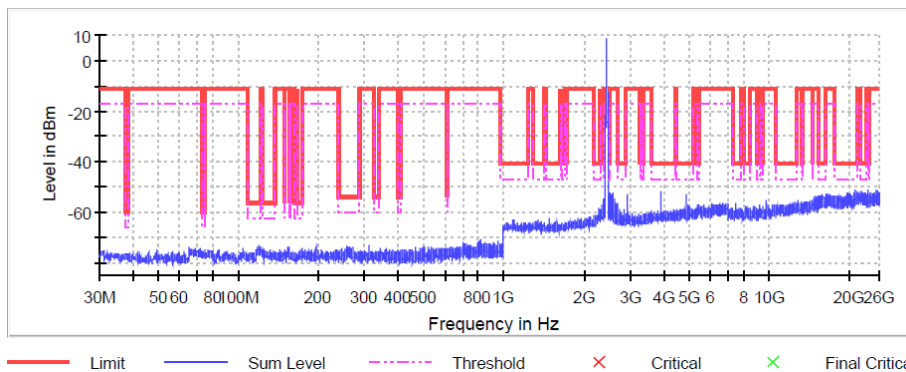
Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = low  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 4803.750000     | -51.0       | 9.8         | -41.2       |
| 22209.750000    | -51.2       | 10.0        | -41.2       |
| 22192.250000    | -51.2       | 10.0        | -41.2       |
| 23104.250000    | -51.3       | 10.1        | -41.2       |
| 22856.250000    | -51.5       | 10.3        | -41.2       |
| 22167.750000    | -51.6       | 10.4        | -41.2       |
| 4804.250000     | -51.6       | 10.4        | -41.2       |
| 22126.750000    | -51.7       | 10.5        | -41.2       |
| 22362.750000    | -51.8       | 10.6        | -41.2       |
| 18584.750000    | -51.8       | 10.6        | -41.2       |
| 22213.250000    | -51.8       | 10.6        | -41.2       |
| 22062.250000    | -51.9       | 10.7        | -41.2       |
| 22919.250000    | -51.9       | 10.7        | -41.2       |
| 22285.750000    | -52.0       | 10.8        | -41.2       |
| 22010.250000    | -52.0       | 10.8        | -41.2       |

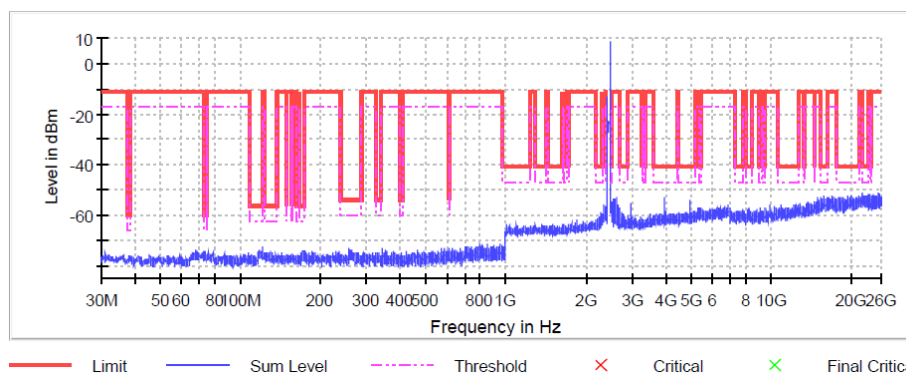
Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = mid  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 21059.250000    | -51.4       | 10.2        | -41.2       |
| 21390.750000    | -51.6       | 10.4        | -41.2       |
| 21388.250000    | -51.7       | 10.5        | -41.2       |
| 22425.250000    | -51.8       | 10.6        | -41.2       |
| 3905.750000     | -51.8       | 10.6        | -41.2       |
| 22078.750000    | -51.9       | 10.7        | -41.2       |
| 3906.250000     | -52.0       | 10.8        | -41.2       |
| 22097.750000    | -52.0       | 10.8        | -41.2       |
| 19768.750000    | -52.1       | 10.9        | -41.2       |
| 22066.750000    | -52.2       | 11.0        | -41.2       |
| 22064.750000    | -52.2       | 11.0        | -41.2       |
| 22091.750000    | -52.2       | 11.0        | -41.2       |
| 22519.250000    | -52.2       | 11.0        | -41.2       |
| 20897.750000    | -52.3       | 11.1        | -41.2       |
| 20898.250000    | -52.3       | 11.1        | -41.2       |

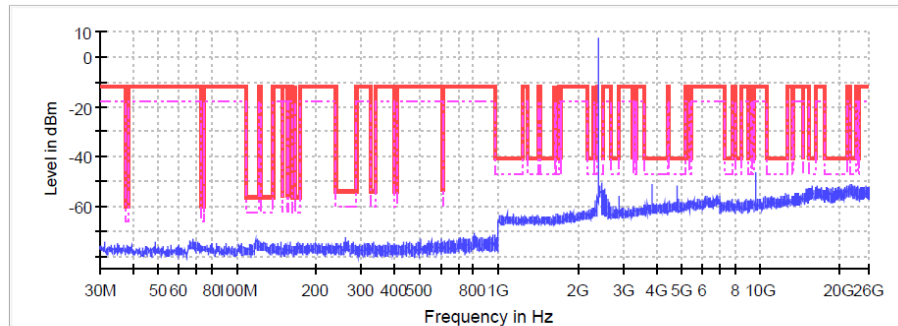
Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = high  
(S01\_7\_AA01)



#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2483.750000     | -50.1       | 8.9         | -41.2       |
| 2484.250000     | -51.1       | 9.9         | -41.2       |
| 22115.750000    | -51.2       | 10.0        | -41.2       |
| 2484.750000     | -51.8       | 10.6        | -41.2       |
| 22026.750000    | -51.8       | 10.6        | -41.2       |
| 23617.250000    | -52.0       | 10.8        | -41.2       |
| 21390.750000    | -52.1       | 10.9        | -41.2       |
| 22040.250000    | -52.1       | 10.9        | -41.2       |
| 15849.750000    | -52.2       | 11.0        | -41.2       |
| 19952.750000    | -52.2       | 11.0        | -41.2       |
| 22545.750000    | -52.2       | 11.0        | -41.2       |
| 15849.250000    | -52.2       | 11.0        | -41.2       |
| 22032.250000    | -52.2       | 11.0        | -41.2       |
| 22131.250000    | -52.2       | 11.0        | -41.2       |
| 22052.750000    | -52.3       | 11.1        | -41.2       |

Radio Technology = Bluetooth LE, Operating Frequency = low  
(S01\_7\_AA01)

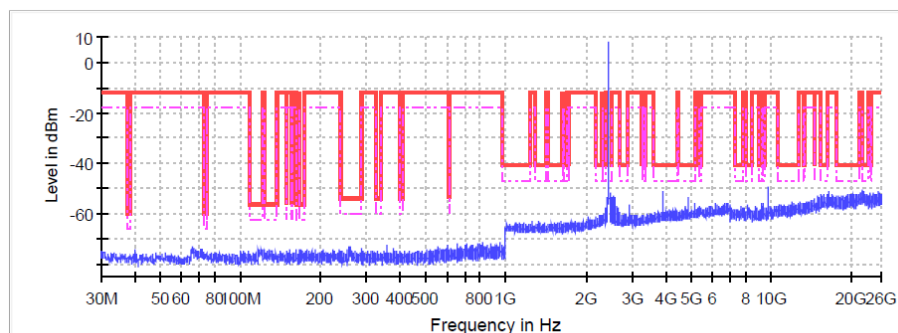


— Limit — Sum Level - - - Threshold × Critical × Final Critical

#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 22298.250000    | -51.0       | 9.8         | -41.2       |
| 3843.250000     | -51.0       | 9.8         | -41.2       |
| 3843.750000     | -51.1       | 9.9         | -41.2       |
| 3842.750000     | -51.3       | 10.1        | -41.2       |
| 22330.250000    | -51.3       | 10.1        | -41.2       |
| 22330.750000    | -51.3       | 10.1        | -41.2       |
| 22233.750000    | -51.5       | 10.3        | -41.2       |
| 22401.250000    | -51.6       | 10.4        | -41.2       |
| 15837.750000    | -51.6       | 10.4        | -41.2       |
| 22265.250000    | -51.7       | 10.5        | -41.2       |
| 23609.750000    | -51.7       | 10.5        | -41.2       |
| 22227.750000    | -51.8       | 10.6        | -41.2       |
| 22122.750000    | -51.9       | 10.7        | -41.2       |
| 22621.250000    | -51.9       | 10.7        | -41.2       |
| 22112.250000    | -52.0       | 10.8        | -41.2       |

Radio Technology = Bluetooth LE, Operating Frequency = mid  
(S01\_7\_AA01)

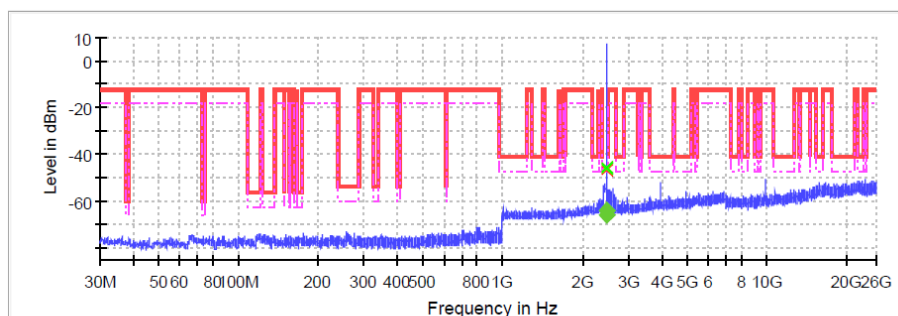


— Limit — Sum Level - - - Threshold × Critical × Final Critical

#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 22058.250000    | -50.7       | 9.5         | -41.2       |
| 22146.750000    | -51.3       | 10.1        | -41.2       |
| 3904.250000     | -51.3       | 10.1        | -41.2       |
| 22451.750000    | -51.5       | 10.3        | -41.2       |
| 3904.750000     | -51.6       | 10.4        | -41.2       |
| 22111.250000    | -51.7       | 10.5        | -41.2       |
| 22170.250000    | -51.7       | 10.5        | -41.2       |
| 22018.750000    | -52.0       | 10.8        | -41.2       |
| 3905.250000     | -52.0       | 10.8        | -41.2       |
| 22909.250000    | -52.1       | 10.9        | -41.2       |
| 22514.250000    | -52.1       | 10.9        | -41.2       |
| 22494.750000    | -52.1       | 10.9        | -41.2       |
| 22254.750000    | -52.1       | 10.9        | -41.2       |
| 22197.250000    | -52.1       | 10.9        | -41.2       |
| 22074.250000    | -52.1       | 10.9        | -41.2       |

Radio Technology = Bluetooth LE, Operating Frequency = high  
(S01\_7\_AA01)



× Final Critical ◆ Sum Level Fail - - - Threshold × Critical

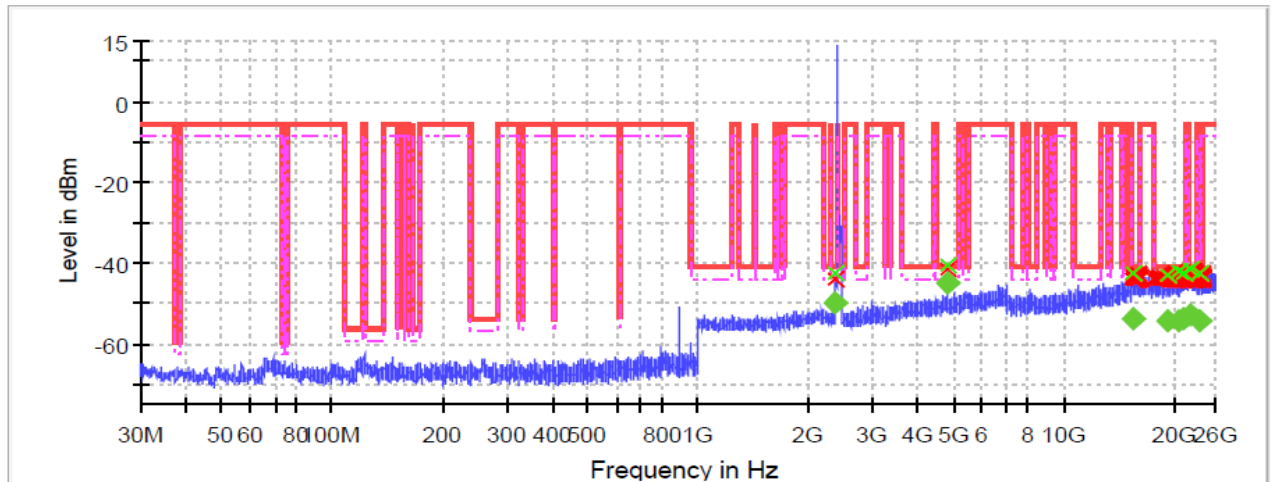
#### Pre Measurements

| Frequency (MHz) | Level (dBm) | Margin (dB) | Limit (dBm) |
|-----------------|-------------|-------------|-------------|
| 2486.750000     | -45.7       | 4.5         | -41.2       |
| 2485.250000     | -46.4       | 5.2         | -41.2       |
| 2484.750000     | -47.0       | 5.8         | -41.2       |
| 2487.750000     | -48.8       | 7.6         | -41.2       |
| 2488.250000     | -49.3       | 8.1         | -41.2       |
| 2484.250000     | -51.1       | 9.9         | -41.2       |
| 22055.750000    | -51.1       | 9.9         | -41.2       |
| 22110.750000    | -51.2       | 10.0        | -41.2       |
| 22906.750000    | -51.4       | 10.2        | -41.2       |
| 2483.750000     | -51.5       | 10.3        | -41.2       |
| 22463.250000    | -51.5       | 10.3        | -41.2       |
| 22068.750000    | -51.5       | 10.3        | -41.2       |
| 22195.750000    | -51.8       | 10.6        | -41.2       |
| 21336.250000    | -51.8       | 10.6        | -41.2       |
| 22090.250000    | -51.8       | 10.6        | -41.2       |



Radio Technology = WLAN b-Mode, Operating Frequency = low  
(S01\_7\_AA01)

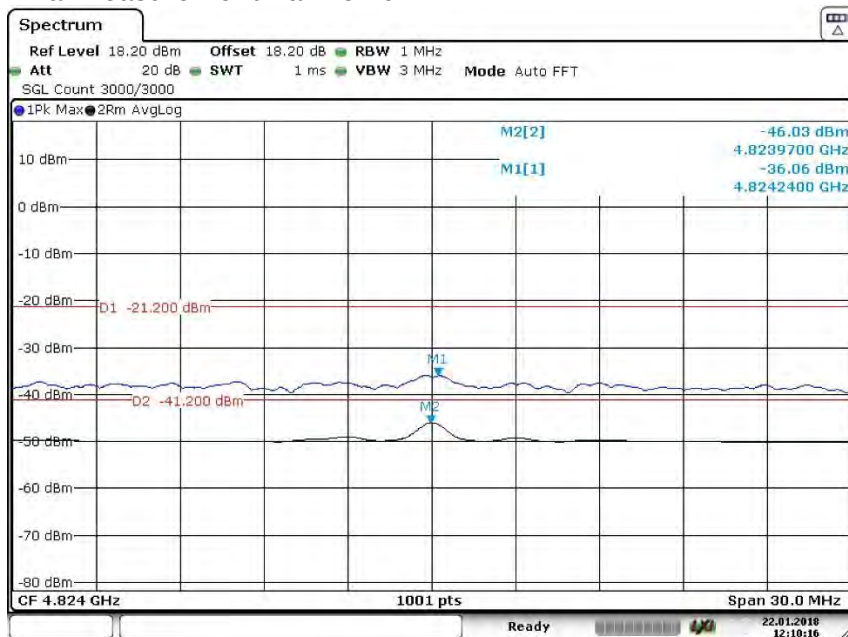
Pre Measurement incl. final of noise floor:



### Final measurements

| Frequency<br>(MHz) | Level Pre<br>Measurement<br>(dBm) | level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-----------------------------------|----------------|----------------|----------------|
| 15449.75           | -42.3                             | -53.8          | -41.2          | 12.6           |
| 19322.25           | -43                               | -54.4          | -41.2          | 13.2           |
| 20496.25           | -42.2                             | -54.4          | -41.2          | 13.2           |
| 21246.75           | -42.4                             | -54            | -41.2          | 12.8           |
| 22147.25           | -41.4                             | -52.9          | -41.2          | 11.7           |
| 23670.25           | -42.4                             | -54.2          | -41.2          | 13             |

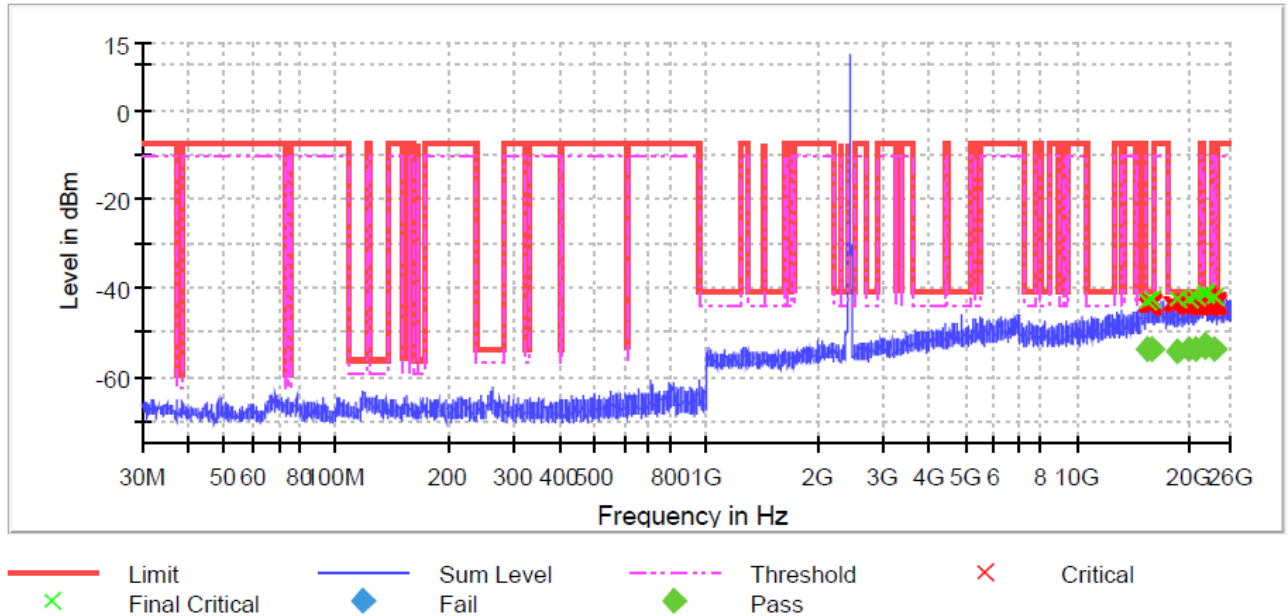
Final Measurement harmonic:



Date: 22 JAN 2018 12:10:16

Radio Technology = WLAN b-Mode, Operating Frequency = mid  
(S01\_7\_AA01)

Pre Measurement incl. final of noise floor:



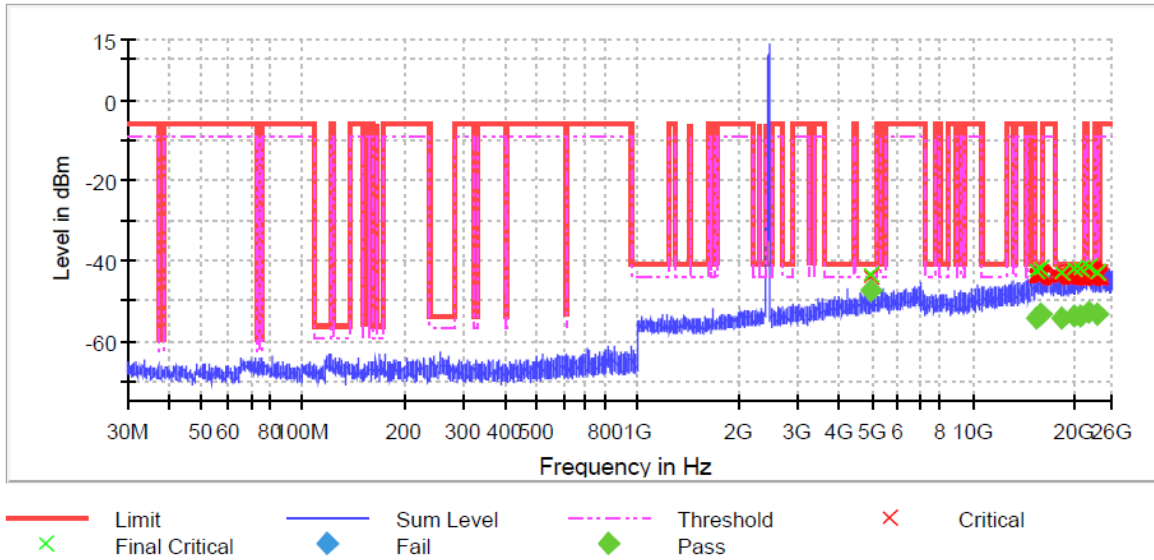
## Final measurements

| Frequency (MHz) | Level Pre Measurement (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------------------|-------------|-------------|-------------|
| 15563.250000    | -43.2                       | -54.0       | -41.2       | 12.8        |
| 15830.750000    | -42.4                       | -53.6       | -41.2       | 12.4        |
| 18560.250000    | -42.5                       | -54.4       | -41.2       | 13.2        |
| 20083.250000    | -42.7                       | -53.9       | -41.2       | 12.7        |
| 21088.750000    | -42.1                       | -54.0       | -41.2       | 12.8        |
| 22095.250000    | -41.7                       | -53.1       | -41.2       | 11.9        |
| 22134.250000    | -41.2                       | -52.9       | -41.2       | 11.7        |
| 23611.250000    | -42.1                       | -53.7       | -41.2       | 12.5        |



Radio Technology = WLAN b-Mode, Operating Frequency = high  
(S01\_7\_AA01)

Pre Measurement incl. final of noise floor:



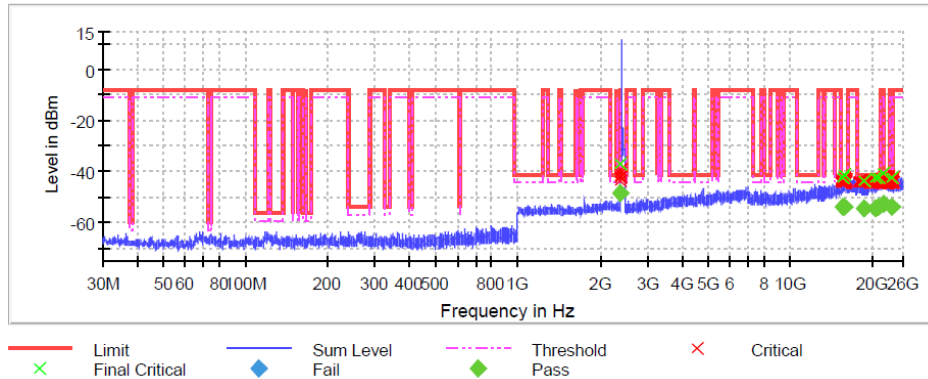
### Final measurements

| Frequency<br>(MHz) | Level Pre<br>Measurement<br>(dBm) | level<br>(dBm) | Limit<br>(dBm) | Margin<br>(dB) |
|--------------------|-----------------------------------|----------------|----------------|----------------|
| 15397.25           | -42.5                             | -54.5          | -41.2          | 13.3           |
| 15858.25           | -41.8                             | -53.3          | -41.2          | 12.1           |
| 18524.75           | -42.9                             | -54.5          | -41.2          | 13.3           |
| 20169.75           | -42                               | -54.1          | -41.2          | 12.9           |
| 20922.25           | -42.1                             | -53.7          | -41.2          | 12.5           |
| 22206.25           | -41.6                             | -52.8          | -41.2          | 11.6           |
| 23605.25           | -42.8                             | -53.5          | -41.2          | 12.3           |

Final Measurement harmonic:

Radio Technology = WLAN g-Mode, Operating Frequency = low  
(S01\_7\_AA01)

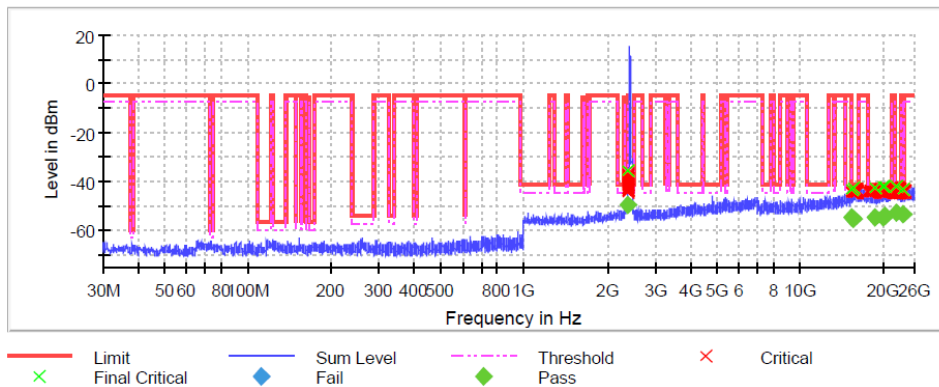
Pre Measurement incl. final of noise floor Ch. 1:



**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15451.25        | -43.2           | -53.9       | -41.2       | 12.7        |
| 15767.25        | -42.3           | -54.4       | -41.2       | 13.2        |
| 18161.75        | -43.3           | -54.8       | -41.2       | 13.6        |
| 19277.75        | -43.1           | -54.9       | -41.2       | 13.7        |
| 19819.75        | -42.9           | -53.7       | -41.2       | 12.5        |
| 21346.75        | -41.9           | -53.6       | -41.2       | 12.4        |
| 22271.75        | -41.1           | -52.7       | -41.2       | 11.5        |
| 23612.25        | -43.1           | -53.7       | -41.2       | 12.5        |

Pre Measurement incl. final of noise floor Ch. 2:

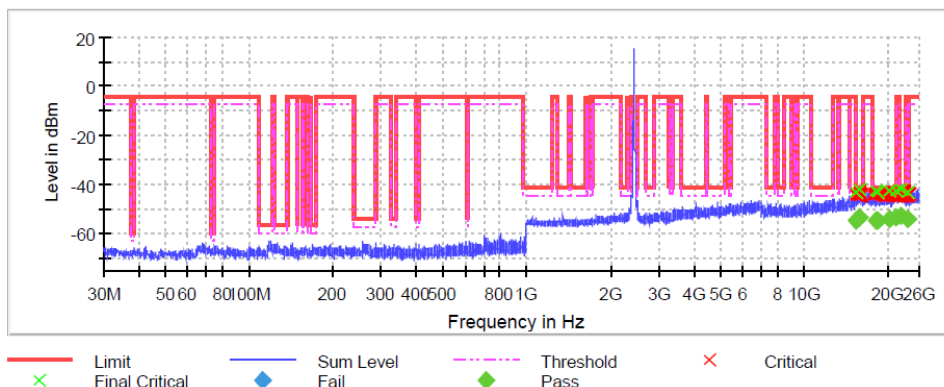


**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15395.75        | -43.1           | -54.5       | -41.2       | 13.3        |
| 15638.25        | -42.8           | -55         | -41.2       | 13.8        |
| 18588.75        | -42.5           | -54.7       | -41.2       | 13.5        |
| 19944.75        | -41.9           | -54.5       | -41.2       | 13.3        |
| 20187.25        | -41.8           | -54         | -41.2       | 12.8        |
| 22265.25        | -41.7           | -52.8       | -41.2       | 11.6        |
| 23607.25        | -43.3           | -53.2       | -41.2       | 12          |

Radio Technology = WLAN g-Mode, Operating Frequency = mid  
(S01\_7\_AA01)

Pre Measurement incl. final of noise floor Ch. 6:

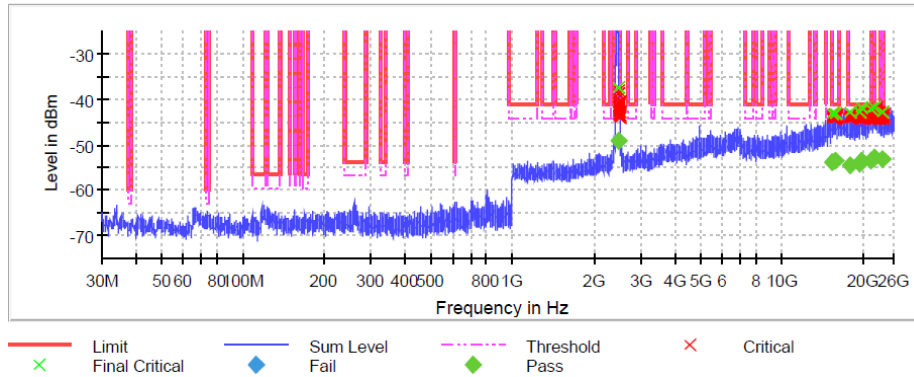


**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15407.25        | -42.9           | -54.3       | -41.2       | 13.1        |
| 15838.75        | -41.7           | -53.5       | -41.2       | 12.3        |
| 18164.75        | -42.6           | -54.9       | -41.2       | 13.7        |
| 18463.25        | -42.8           | -54.9       | -41.2       | 13.7        |
| 20192.25        | -42.5           | -54         | -41.2       | 12.8        |
| 21394.75        | -42.3           | -53.4       | -41.2       | 12.2        |
| 22261.75        | -41.6           | -52.6       | -41.2       | 11.4        |
| 23653.25        | -43.1           | -54.1       | -41.2       | 12.9        |

Radio Technology = WLAN g-Mode, Operating Frequency = high  
(S01\_7\_AA01)

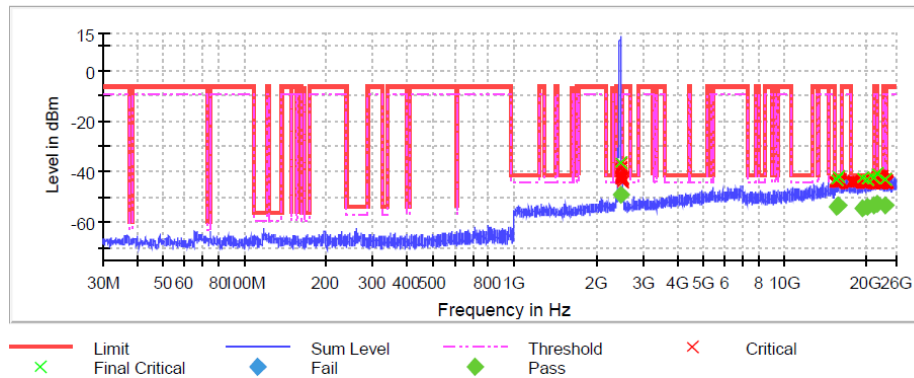
Pre Measurement incl. final of noise floor Ch. 10:



Final measurements

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15441.25        | -43.2           | -53.9       | -41.2       | 12.7        |
| 15879.25        | -43             | -53.7       | -41.2       | 12.5        |
| 18018.25        | -42.7           | -54.4       | -41.2       | 13.2        |
| 19334.75        | -42.7           | -54.3       | -41.2       | 13.1        |
| 19841.25        | -41.7           | -53.5       | -41.2       | 12.3        |
| 21397.25        | -42.3           | -53.4       | -41.2       | 12.2        |
| 22144.75        | -41.9           | -52.9       | -41.2       | 11.7        |
| 23605.75        | -42.8           | -53.1       | -41.2       | 11.9        |

Pre Measurement incl. final of noise floor Ch. 11:

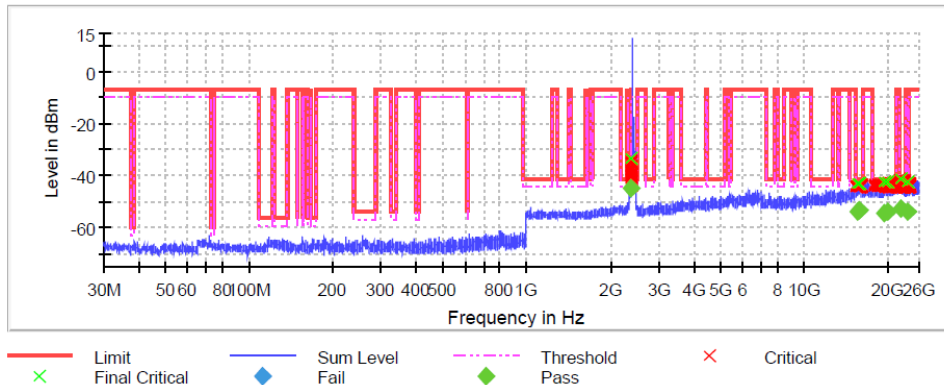


Final measurements

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15567.75        | -43             | -54.1       | -41.2       | 12.9        |
| 15871.75        | -42             | -53.5       | -41.2       | 12.3        |
| 19345.75        | -42.6           | -54.4       | -41.2       | 13.2        |
| 20147.25        | -42.9           | -54.1       | -41.2       | 12.9        |
| 21393.25        | -42.3           | -53.4       | -41.2       | 12.2        |
| 22146.75        | -40.8           | -52.8       | -41.2       | 11.6        |
| 23608.75        | -42.8           | -53.2       | -41.2       | 12          |

Radio Technology = WLAN n-Mode, Operating Frequency = low  
(S01\_7\_AA01)

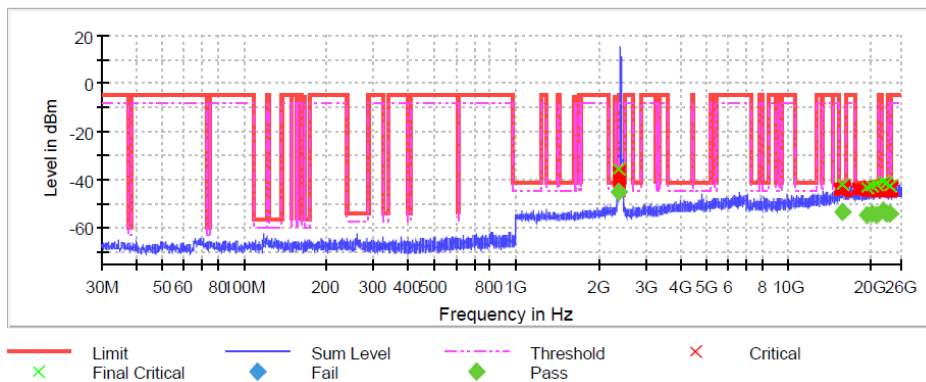
Pre Measurement incl. final of noise floor Ch. 1:



**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15551.75        | -43             | -54         | -41.2       | 12.8        |
| 15857.25        | -42.7           | -53.3       | -41.2       | 12.1        |
| 19345.25        | -42.5           | -54.3       | -41.2       | 13.1        |
| 20128.75        | -42.4           | -54.1       | -41.2       | 12.9        |
| 22207.75        | -40.9           | -52.8       | -41.2       | 11.6        |
| 23638.75        | -42.7           | -53.9       | -41.2       | 12.7        |

Pre Measurement incl. final of noise floor Ch. 2:

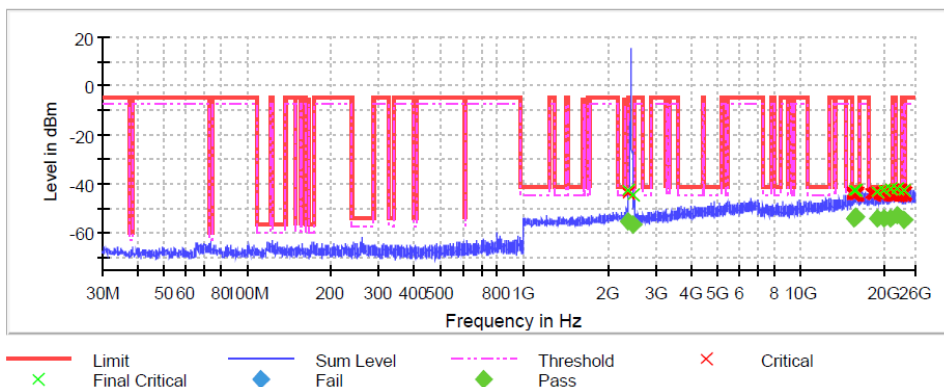


**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15875.25        | -42.1           | -53.6       | -41.2       | 12.4        |
| 19401.75        | -43             | -54.9       | -41.2       | 13.7        |
| 20241.25        | -42.3           | -54.2       | -41.2       | 13          |
| 21003.75        | -42             | -54.4       | -41.2       | 13.2        |
| 22282.75        | -40.5           | -52.9       | -41.2       | 11.7        |
| 22961.75        | -41.3           | -53.9       | -41.2       | 12.7        |
| 23646.25        | -42.3           | -54         | -41.2       | 12.8        |

Radio Technology = WLAN n-Mode, Operating Frequency = mid  
(S01\_7\_AA01)

Pre Measurement incl. final of noise floor Ch. 6:

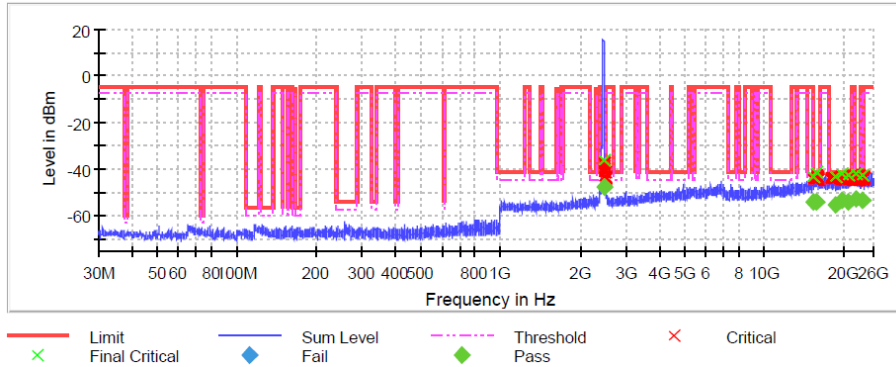


**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15563.75        | -42.6           | -54.1       | -41.2       | 12.9        |
| 15865.75        | -42.4           | -53.4       | -41.2       | 12.2        |
| 19015.75        | -43.1           | -53.9       | -41.2       | 12.7        |
| 19893.75        | -42.5           | -53.9       | -41.2       | 12.7        |
| 21033.75        | -41.6           | -54         | -41.2       | 12.8        |
| 22215.25        | -41.6           | -52.8       | -41.2       | 11.6        |
| 23681.25        | -42.4           | -54.4       | -41.2       | 13.2        |

Radio Technology = WLAN n-Mode, Operating Frequency = high  
(S01\_7\_AA01)

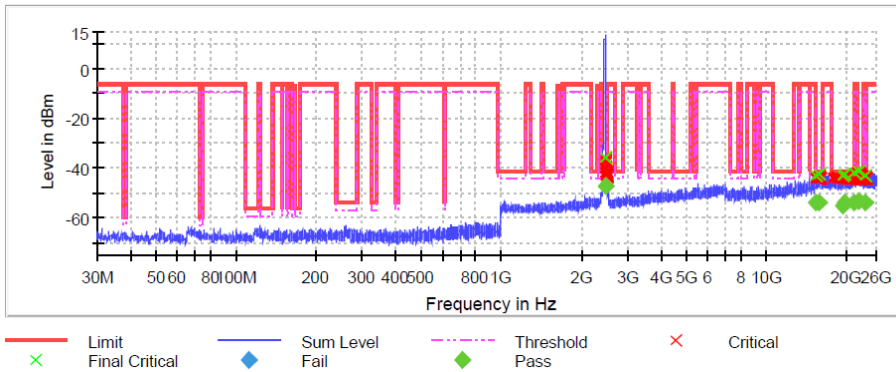
Pre Measurement incl. final of noise floor Ch. 10:



**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15434.75        | -43             | -53.9       | -41.2       | 12.7        |
| 15824.75        | -41.3           | -53.7       | -41.2       | 12.5        |
| 18604.75        | -43.2           | -55         | -41.2       | 13.8        |
| 19842.75        | -42.1           | -53.5       | -41.2       | 12.3        |
| 20878.25        | -42.2           | -54.1       | -41.2       | 12.9        |
| 22215.25        | -41.9           | -52.8       | -41.2       | 11.6        |
| 23601.75        | -42.2           | -53.2       | -41.2       | 12          |

Pre Measurement incl. final of noise floor Ch. 11:



**Final measurements**

| Frequency (MHz) | Level Pre (dBm) | level (dBm) | Limit (dBm) | Margin (dB) |
|-----------------|-----------------|-------------|-------------|-------------|
| 15457.25        | -43.2           | -53.9       | -41.2       | 12.7        |
| 15877.75        | -42.6           | -53.6       | -41.2       | 12.4        |
| 19402.25        | -43             | -54.8       | -41.2       | 13.6        |
| 19816.25        | -42.3           | -53.8       | -41.2       | 12.6        |
| 21330.25        | -41.9           | -53.6       | -41.2       | 12.4        |
| 22320.25        | -41             | -53.1       | -41.2       | 11.9        |
| 23638.75        | -42.9           | -53.9       | -41.2       | 12.7        |

#### 4.5.5 TEST EQUIPMENT USED

- R&S TS8997

## 4.6 TRANSMITTER SPURIOUS RADIATED EMISSIONS

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

### 4.6.1 TEST DESCRIPTION

The test set-up was made in accordance to the general provisions of ANSI C63.10 in a typical installation configuration. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m<sup>2</sup> in the semi-anechoic chamber. The influence of the EUT support table that is used between 30–1000 MHz was evaluated.

The measurement procedure is implemented into the EMI test software EMC32 from R&S. Exploratory tests are performed at 3 orthogonal axes to determine the worst-case orientation of a body-worn or handheld EUT. The final test on all kind of EUTs is also performed at 3 axes. A pre-check is performed while the EUT is powered from a DC power source.

#### 1. Measurement up to 30 MHz

The Loop antenna HFH2-Z2 is used.

##### Step 1: pre measurement

- Anechoic chamber
- Antenna distance: 3 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 MHz and 0.15 – 30 MHz
- Frequency steps: 0.05 kHz and 2.25 kHz
- IF-Bandwidth: 0.2 kHz and 9 kHz
- Measuring time / Frequency step: 100 ms (FFT-based)

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

##### Step 2: final measurement

For the relevant emissions determined in step 1, an additional measurement with the following settings will be performed. Intention of this step is to find the maximum emission level.

- Open area test side
- Antenna distance: according to the Standard
- Detector: Quasi-Peak
- Frequency range: 0.009 – 30 MHz
- Frequency steps: measurement at frequencies detected in step 1
- IF-Bandwidth: 0.2 - 10 kHz
- Measuring time / Frequency step: 1 s

#### 2. Measurement above 30 MHz and up to 1 GHz

##### Step 1: Preliminary scan

This is a preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Antenna distance: 3 m
- Detector: Peak-Maxhold / Quasipeak (FFT-based)

- Frequency range: 30 – 1000 MHz
- Frequency steps: 30 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 ms
- Turntable angle range:  $-180^{\circ}$  to  $90^{\circ}$
- Turntable step size:  $90^{\circ}$
- Height variation range: 1 – 3 m
- Height variation step size: 2 m
- Polarisation: Horizontal + Vertical

Intention of this step is, to determine the radiated EMI-profile of the EUT. Afterwards the relevant emissions for the final measurement are identified.

#### Step 2: Adjustment measurement

In this step the accuracy of the turntable azimuth and antenna height will be improved. This is necessary to find out the maximum value of every frequency.

For each frequency, which was determined the turntable azimuth and antenna height will be adjusted. The turntable azimuth will slowly vary by  $\pm 45^{\circ}$  around this value. During this action, the value of emission is continuously measured. The turntable azimuth at the highest emission will be recorded and adjusted. In this position, the antenna height will also slowly vary by  $\pm 100$  cm around the antenna height determined. During this action, the value of emission is also continuously measured. The antenna height of the highest emission will also be recorded and adjusted.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range:  $\pm 45^{\circ}$  around the determined value
- Height variation range:  $\pm 100$  cm around the determined value
- Antenna Polarisation: max. value determined in step 1

#### Step 3: Final measurement with QP detector

With the settings determined in step 3, the final measurement will be performed:

EMI receiver settings for step 4:

- Detector: Quasi-Peak ( $< 1$  GHz)
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 1 s

After the measurement a plot will be generated which contains a diagram with the results of the preliminary scan and a chart with the frequencies and values of the results of the final measurement.

### 3. Measurement above 1 GHz

The following modifications apply to the measurement procedure for the frequency range above 1 GHz:

#### Step 1:

The Equipment Under Test (EUT) was set up on a non-conductive support (tilt device) at 1.5 m height in the fully-anechoic chamber.

All steps were performed with one height (1.5 m) of the receiving antenna only.

The EUT is turned during the preliminary measurement across the elevation axis, with a step size of  $90^{\circ}$ .

The turn table step size (azimuth angle) for the preliminary measurement is  $45^{\circ}$ .

#### Step 2:



Due to the fact, that in this frequency range the test is performed in a fully anechoic room, the height scan of the receiving antenna in step 2 is omitted. Instead of this, a maximum search with a step size  $\pm 45^\circ$  for the elevation axis is performed.

The turn table azimuth will slowly vary by  $\pm 22.5^\circ$ .

The elevation angle will slowly vary by  $\pm 45^\circ$

EMI receiver settings (for all steps):

- Detector: Peak, Average
- IF Bandwidth = 1 MHz

Step 3:

Spectrum analyser settings for step 3:

- Detector: Peak / Average
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 1 MHz
- Measuring time: 1 s

#### 4.6.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (d)

... In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

| Frequency in MHz | Limit ( $\mu\text{V}/\text{m}$ ) | Measurement distance (m) | Limits ( $\text{dB}\mu\text{V}/\text{m}$ ) |
|------------------|----------------------------------|--------------------------|--------------------------------------------|
| 0.009 – 0.49     | 2400/F(kHz)@300m                 | 3                        | (48.5 – 13.8)@300m                         |
| 0.49 – 1.705     | 24000/F(kHz)@30m                 | 3                        | (33.8 – 23.0)@30m                          |
| 1.705 – 30       | 30@30m                           | 3                        | 29.5@30m                                   |

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

| Frequency in MHz | Limit ( $\mu\text{V}/\text{m}$ ) | Measurement distance (m) | Limits ( $\text{dB}\mu\text{V}/\text{m}$ ) |
|------------------|----------------------------------|--------------------------|--------------------------------------------|
| 30 – 88          | 100@3m                           | 3                        | 40.0@3m                                    |
| 88 – 216         | 150@3m                           | 3                        | 43.5@3m                                    |
| 216 – 960        | 200@3m                           | 3                        | 46.0@3m                                    |
| 960 – 26000      | 500@3m                           | 3                        | 54.0@3m                                    |
| 26000 – 40000    | 500@3m                           | 1                        | 54.0@3m                                    |

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor:  $\text{Limit (dB}\mu\text{V}/\text{m)} = 20 \log (\text{Limit (}\mu\text{V}/\text{m)})/1\mu\text{V}/\text{m}$



#### 4.6.3 TEST PROTOCOL

Ambient temperature: 22 °C  
Air Pressure: 1012 hPa  
Humidity: 37 %

| BT GFSK (1-DH1)                          |                        |                      |                         |          |           |                |                      |            |
|------------------------------------------|------------------------|----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| Applied duty cycle correction (AV): 0 dB |                        |                      |                         |          |           |                |                      |            |
| Ch. No.                                  | Ch. Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
| 0                                        | 2402                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 39                                       | 2441                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 78                                       | 2480                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |

| BT π/4 DQPSK (2-DH1)                     |                        |                      |                         |          |           |                |                      |            |
|------------------------------------------|------------------------|----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| Applied duty cycle correction (AV): 0 dB |                        |                      |                         |          |           |                |                      |            |
| Ch. No.                                  | Ch. Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
| 0                                        | 2402                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 39                                       | 2441                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 78                                       | 2480                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |

| BT 8-DPSK (3-DH1)                        |                        |                      |                         |          |           |                |                      |            |
|------------------------------------------|------------------------|----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| Applied duty cycle correction (AV): 0 dB |                        |                      |                         |          |           |                |                      |            |
| Ch. No.                                  | Ch. Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
| 0                                        | 2402                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 39                                       | 2441                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 78                                       | 2480                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |

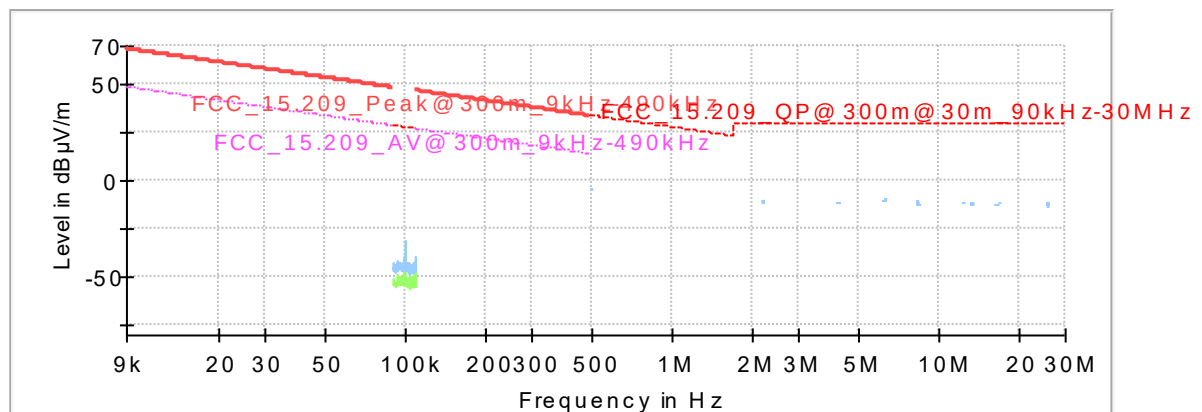
| WLAN b-Mode; 20 MHz; 1 Mbit/s            |                        |                      |                         |          |           |                |                      |            |
|------------------------------------------|------------------------|----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| Applied duty cycle correction (AV): 0 dB |                        |                      |                         |          |           |                |                      |            |
| Ch. No.                                  | Ch. Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
| 1                                        | 2412                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 6                                        | 2437                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 11                                       | 2462                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |

| WLAN g-Mode; 20 MHz; 6 Mbit/s            |                        |                      |                         |          |           |                |                      |            |
|------------------------------------------|------------------------|----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| Applied duty cycle correction (AV): 0 dB |                        |                      |                         |          |           |                |                      |            |
| Ch. No.                                  | Ch. Center Freq. [MHz] | Spurious Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
| 1                                        | 2412                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 6                                        | 2437                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |
| 11                                       | 2462                   | ---                  | ---                     | ---      | ---       | ---            | ---                  | RB         |

Remark: Antenna port of EUT terminated with 50 Ohm.  
Please see next sub-clause for the measurement plot.

#### 4.6.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

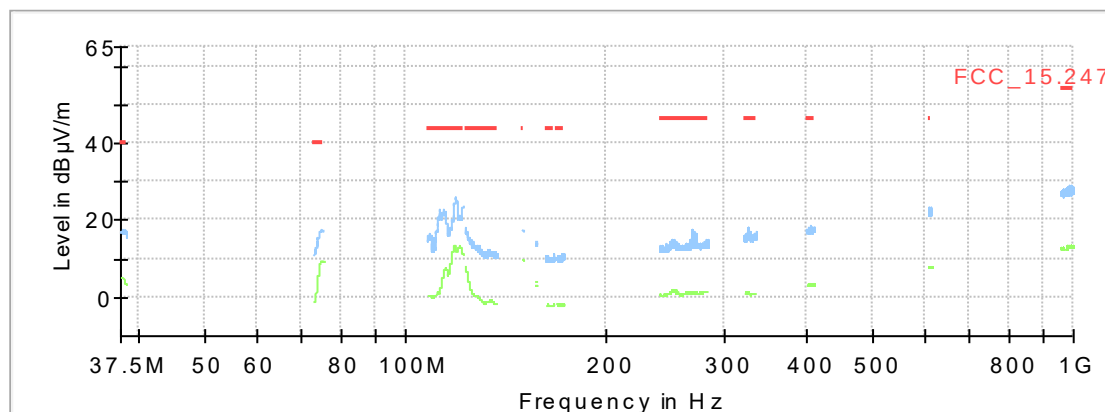
Radio Technology = Bluetooth BDR, Operating Frequency = mid, Measurement range = 9 kHz - 30 MHz  
(S02\_7\_AB01)



#### Final Result

| Frequency (MHz) | MaxPeak (dBµV/m) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|------------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|---------|
| ---             | ---              | ---                | ---            | ---         | ---             | ---             | ---         | --- | ---           | ---        | ---     |

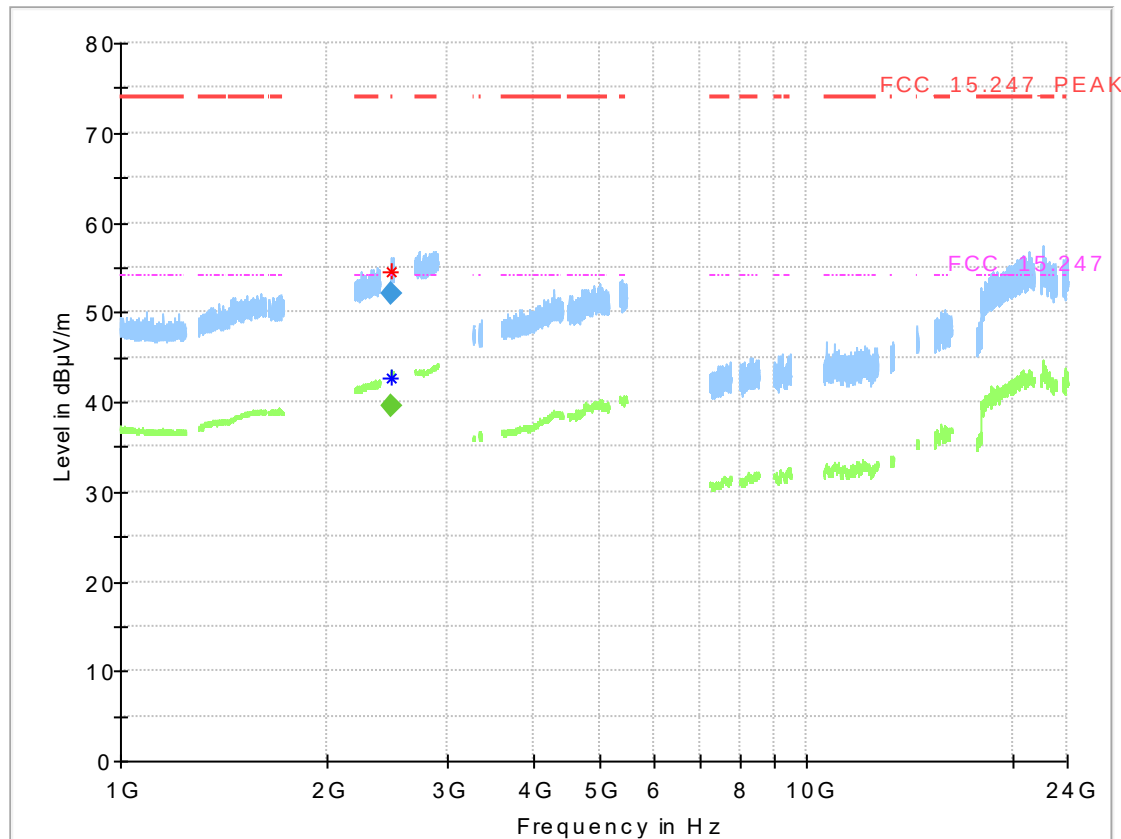
Radio Technology = Bluetooth BDR, Operating Frequency = high, Measurement range = 30 MHz - 1 GHz  
(S02\_7\_AB01)



#### Final Result

| Frequency (MHz) | QuasiPeak (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|--------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|---------|
| ---             | ---                | ---            | ---         | ---             | ---             | ---         | --- | ---           | ---        | ---     |

Radio Technology = Bluetooth BDR, Operating Frequency = high, Measurement range = 1 GHz  
- 26 GHz  
(S02\_7\_AB01)



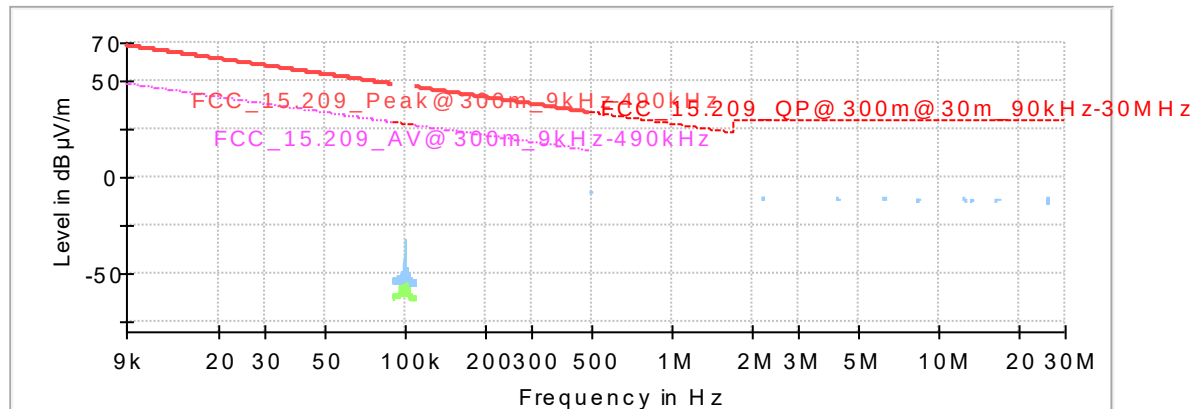
### Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.655000     | 54.61            | ---              | 74.00          | 19.39       | ---             | ---             | 150.0       | V   | -130.0        | 14.7            |
| 2484.655000     | ---              | 42.79            | 54.00          | 11.21       | ---             | ---             | 150.0       | H   | 151.0         | 14.8            |

### Final Result

| Frequency (MHz) | MaxPeak (dBµV/m) | CAverage (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|-------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.655000     | ---              | 39.47             | 54.00          | 14.53       | 1000.0          | 1000.000        | 150.0       | H   | 151.0         | 14.8            |
| 2484.655000     | 52.13            | ---               | 74.00          | 21.87       | 1000.0          | 1000.000        | 150.0       | V   | -130.0        | 14.7            |

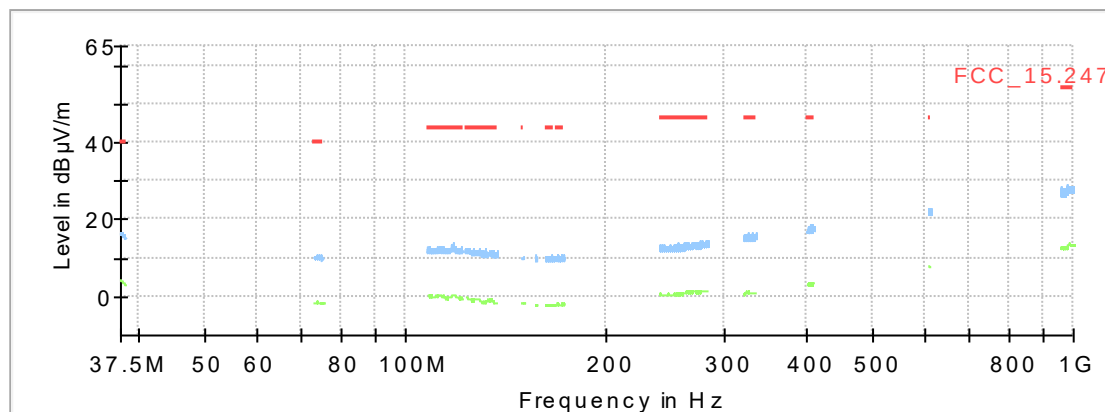
Radio Technology = WLAN b, Operating Frequency = mid, Measurement range = 9 kHz - 30 MHz  
(S02\_7\_AB01)



### Final\_Result

| Frequency (MHz) | MaxPeak (dB $\mu$ V/m) | QuasiPeak (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|------------------------|--------------------------|----------------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|---------|
| ---             | ---                    | ---                      | ---                  | ---         | ---             | ---             | ---         |     | ---           | ---        |         |

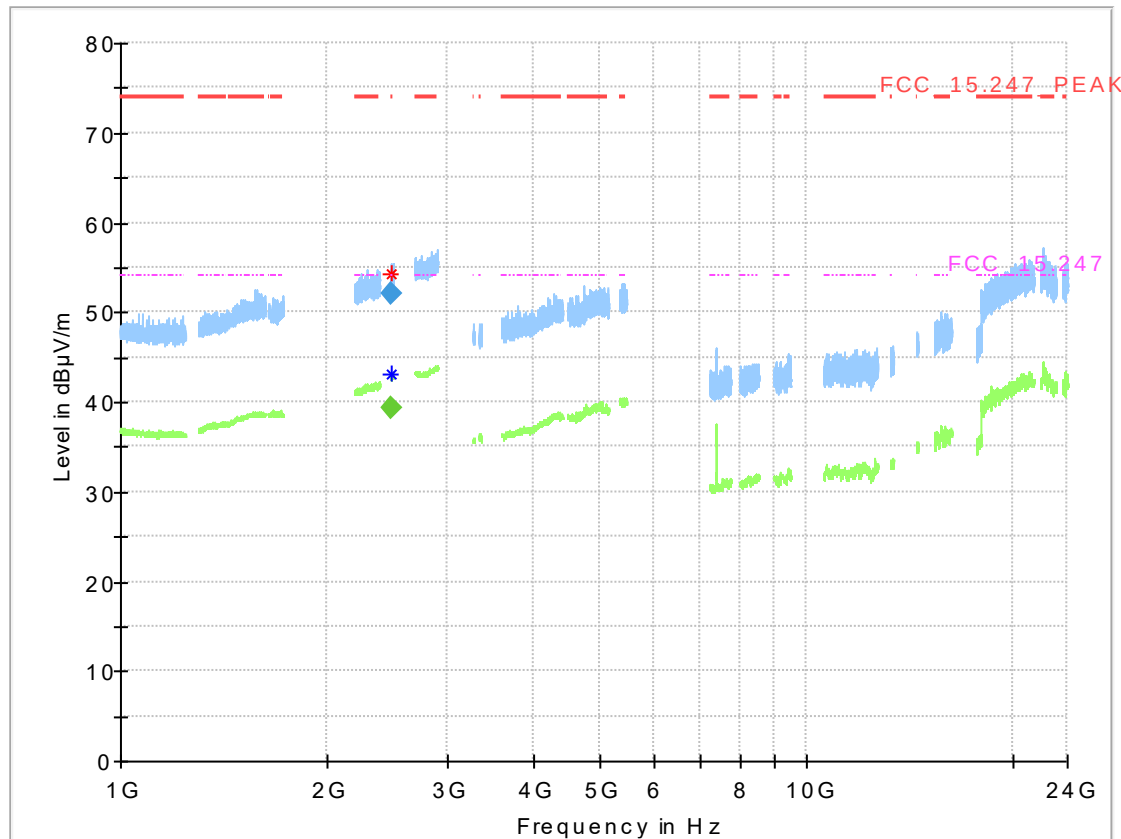
Radio Technology = WLAN b, Operating Frequency = high, Measurement range = 30 MHz - 1 GHz  
(S02\_7\_AB01)



### Final\_Result

| Frequency (MHz) | QuasiPeak (dB $\mu$ V/m) | Limit (dB $\mu$ V/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Corr. (dB) | Comment |
|-----------------|--------------------------|----------------------|-------------|-----------------|-----------------|-------------|-----|---------------|------------|---------|
| ---             | ---                      | ---                  | ---         | ---             | ---             | ---         |     | ---           | ---        |         |

Radio Technology = WLAN b, Operating Frequency = high, Measurement range = 1 GHz - 26 GHz  
(S02\_7\_AB01)



### Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2483.665000     | 54.23            | ---              | 74.00          | 19.77       | ---             | ---             | 150.0       | H   | 20.0          | -15.2           |
| 2484.077500     | ---              | 43.05            | 54.00          | 10.95       | ---             | ---             | 150.0       | V   | 79.0          | 15.2            |

### Final Result

| Frequency (MHz) | MaxPeak (dBµV/m) | CAverage (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|-------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2483.665000     | 52.02            | ---               | 74.00          | 21.98       | 1000.0          | 1000.000        | 150.0       | H   | 20.0          | -15.2           |
| 2484.077500     | ---              | 39.23             | 54.00          | 14.77       | 1000.0          | 1000.000        | 150.0       | V   | 79.0          | 15.2            |

### 4.6.5 TEST EQUIPMENT USED

- Radiated Emissions

## 4.7 BAND EDGE COMPLIANCE CONDUCTED

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

### 4.7.1 TEST DESCRIPTION

For the conducted measurement, the Equipment Under Test (EUT) is placed in a shielded room. The reference power was measured in the test case "Spurious RF Conducted Emissions". The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

20/30 dBc:

Analyzer settings:

- Lower Band Edge:  
Minimum frequency: 2397.0 MHz  
Upper Band Edge  
Maximum frequency: 2485.0 MHz
- Span:  
Bluetooth: 6 MHz  
WLAN: 25 / 45 / 85 MHz [depending on channel bandwidth]
- Detector: Peak
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Sweptime: 5 ms
- Sweeps: 2000
- Trace: Maxhold

Band Edge at restricted bands:

See Test Case Spurious RF Conducted Emissions and Conducted Emissions in Restricted Bands.

### 4.7.2 TEST REQUIREMENTS / LIMITS

FCC Part 15.247 (d)

"In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. ...

If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c))."

For the conducted measurement the RF power at the band edge shall be "at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power..."

#### 4.7.3 TEST PROTOCOL

Ambient temperature: 23 °C  
Air Pressure: 1012 hPa  
Humidity: 41 %

20/30dBc:

##### BT GFSK (1-DH1)

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 0           | 2402                           | 2400.0                | -43.7                | PEAK     | 100       | 11.5             | -8.5        | 35.1                 |
| 78          | 2480                           | 2483.5                | -44.1                | PEAK     | 100       | 11.6             | -8.4        | 35.7                 |

##### BT n/4 DQPSK (2-DH1)

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 0           | 2402                           | 2400.0                | -44.5                | PEAK     | 100       | 7.5              | -12.5       | 31.9                 |
| 78          | 2480                           | 2483.5                | -43.2                | PEAK     | 100       | 7.3              | -12.7       | 30.5                 |

##### BT 8-DPSK (3-DH1)

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 0           | 2402                           | 2400.0                | -44.1                | PEAK     | 100       | 7.2              | -12.8       | 31.2                 |
| 78          | 2480                           | 2483.5                | -44.7                | PEAK     | 100       | 7.0              | -13.0       | 31.7                 |

##### BT LE GFSK

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 0           | 2402                           | 2400.0                | -50.1                | PEAK     | 100       | 7.1              | -12.9       | 37.2                 |
| 78          | 2480                           | 2483.5                | -53.2                | PEAK     | 100       | 7.0              | -13.0       | 40.2                 |

##### WLAN b-Mode; 20 MHz; 1 Mbit/s

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 1           | 2412                           | 2400.0                | -37.7                | PEAK     | 100       | 10.3             | -19.7       | 18.0                 |
| 11          | 2462                           | 2483.5                | -49.4                | PEAK     | 100       | 10.5             | -19.5       | 29.9                 |

##### WLAN g-Mode; 20 MHz; 6 Mbit/s

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 1           | 2412                           | 2400.0                | -38.2                | PEAK     | 100       | 1.6              | -28.4       | 9.8                  |
| 11          | 2462                           | 2483.5                | -47.8                | PEAK     | 100       | 1.3              | -28.7       | 19.1                 |

WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Channel No. | Channel Center Frequency [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Ref. Level [dBm] | Limit [dBm] | Margin to Limit [dB] |
|-------------|--------------------------------|-----------------------|----------------------|----------|-----------|------------------|-------------|----------------------|
| 1           | 2412                           | 2400.0                | -37.7                | PEAK     | 100       | 1.7              | -28.3       | 9.4                  |
| 11          | 2462                           | 2483.5                | -47.6                | PEAK     | 100       | 1.3              | -28.7       | 18.9                 |

Remark: Please see next sub-clause for the measurement plot.

In Restricted Bands:

BT GFSK (1-DH1)

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| 2402                           | 2389.8               | 2390.0                | -54.2                | PEAK     | 1000      | 43.0                              | 54 <sup>1)</sup> | 11.0                 |
| 2480                           | 2484.8               | 2483.5                | -45.7                | PEAK     | 1000      | 51.5                              | 54 <sup>1)</sup> | 2.5                  |

BT π/4 DQPSK (2-DH1)

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| 2402                           | 2389.3               | 2390.0                | -58.4                | PEAK     | 1000      | 38.8                              | 54 <sup>1)</sup> | 15.2                 |
| 2480                           | 2483.8               | 2483.5                | -42.8                | PEAK     | 1000      | 54.4                              | 74               | 19.6                 |
| 2480                           | 2483.8               | 2483.5                | -52.9                | RMS      | 1000      | 44.3                              | 54               | 9.7                  |

BT 8-DPSK (3-DH1)

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| 2402                           | 2388.3               | 2390.0                | -54.4                | PEAK     | 1000      | 42.8                              | 54 <sup>1)</sup> | 11.2                 |
| 2480                           | 2484.8               | 2483.5                | -50.1                | PEAK     | 1000      | 47.1                              | 54 <sup>1)</sup> | 6.9                  |

BT LE GFSK

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm]      | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|------------------|----------------------|
| 2402                           | 2381.8               | 2390.0                | -57.8                | PEAK     | 1000      | 39.4                              | 54 <sup>1)</sup> | 14.6                 |
| 2480                           | 2484.8               | 2483.5                | -45.7                | PEAK     | 1000      | 51.5                              | 54 <sup>1)</sup> | 2.5                  |

WLAN b-Mode; 20 MHz; 1 Mbit/s

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm] | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|-------------|----------------------|
| 2412                           | 2387.9               | 2390.0                | -39.9                | PEAK     | 1000      | 57.3                              | 74          | 16.7                 |
| 2412                           | 2387.4               | 2390.0                | -47.6                | RMS      | 1000      | 49.6                              | 54          | 4.4                  |
| 2462                           | 2487.8               | 2483.5                | -41.1                | PEAK     | 1000      | 56.1                              | 74          | 17.9                 |
| 2462                           | 2488.7               | 2483.5                | -50.3                | RMS      | 1000      | 46.9                              | 54          | 7.1                  |



WLAN g-Mode; 20 MHz; 6 Mbit/s

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm] | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|-------------|----------------------|
| 2412                           | 2390.0               | 2390.0                | -35.2                | PEAK     | 1000      | 62.0                              | 74          | 12                   |
| 2412                           | 2390.0               | 2390.0                | -47.0                | RMS      | 1000      | 50.2                              | 54          | 3.8                  |
| 2417                           | 2388.1               | 2390.0                | -35.0                | PEAK     | 1000      | 62.2                              | 74          | 11.8                 |
| 2417                           | 2390.0               | 2390.0                | -46.7                | RMS      | 1000      | 50.5                              | 54          | 3.5                  |
| 2457                           | 2484.9               | 2483.5                | -36.4                | PEAK     | 1000      | 60.8                              | 74          | 13.2                 |
| 2457                           | 2483.5               | 2483.5                | -48.4                | RMS      | 1000      | 48.8                              | 54          | 5.2                  |
| 2462                           | 2483.5               | 2483.5                | -35.7                | PEAK     | 1000      | 61.5                              | 74          | 12.5                 |
| 2462                           | 2483.5               | 2483.5                | -47.8                | RMS      | 1000      | 49.4                              | 54          | 4.6                  |

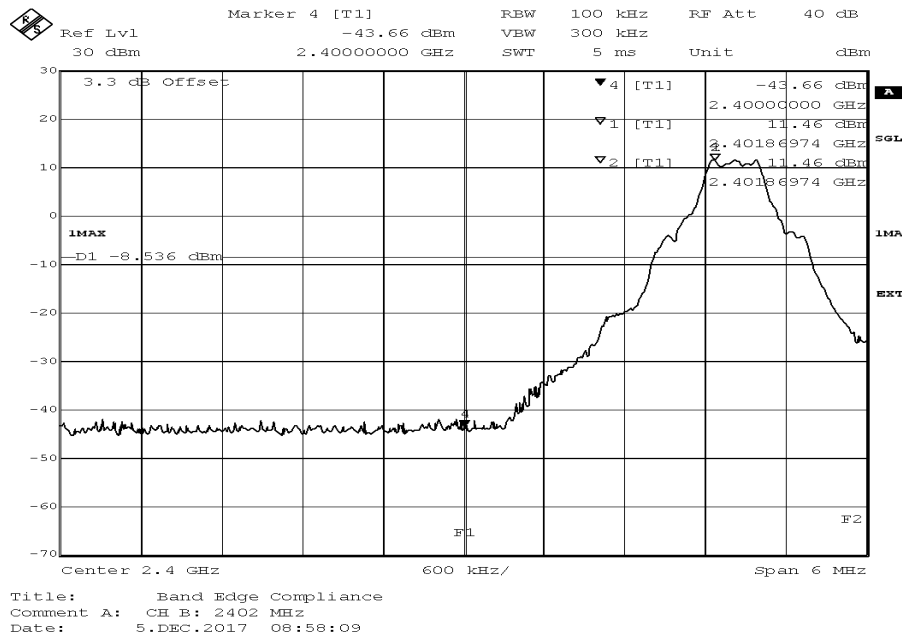
WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Channel Center Frequency [MHz] | Measured freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBm] | Detector | RBW [kHz] | Spurious Level converted [dBμV/m] | Limit [dBm] | Margin to Limit [dB] |
|--------------------------------|----------------------|-----------------------|----------------------|----------|-----------|-----------------------------------|-------------|----------------------|
| 2412                           | 2390.0               | 2390.0                | -36.7                | PEAK     | 1000      | 60.5                              | 74          | 13.5                 |
| 2412                           | 2390.0               | 2390.0                | -46.7                | RMS      | 1000      | 50.5                              | 54          | 3.5                  |
| 2417                           | 2389.4               | 2390.0                | -35.6                | PEAK     | 1000      | 61.6                              | 74          | 12.4                 |
| 2417                           | 2390.0               | 2390.0                | -46.0                | RMS      | 1000      | 51.2                              | 54          | 2.8                  |
| 2457                           | 2484.2               | 2483.5                | -34.6                | PEAK     | 1000      | 62.6                              | 74          | 11.4                 |
| 2457                           | 2483.5               | 2483.5                | -47.8                | RMS      | 1000      | 49.4                              | 54          | 4.6                  |
| 2462                           | 2483.7               | 2483.5                | -36.4                | PEAK     | 1000      | 60.8                              | 74          | 13.2                 |
| 2462                           | 2483.5               | 2483.5                | -47.1                | RMS      | 1000      | 50.1                              | 54          | 3.9                  |

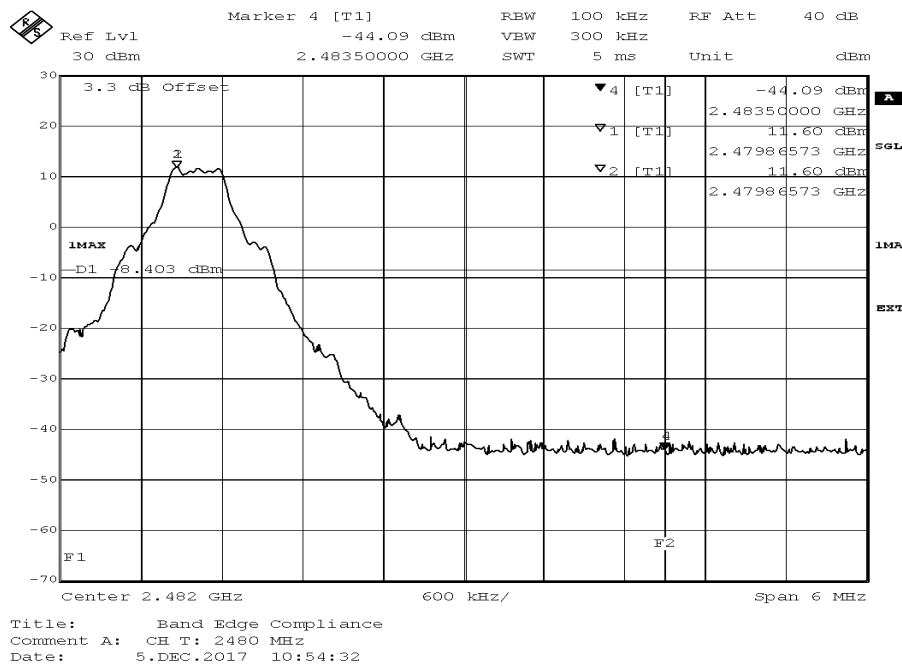
#### 4.7.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

20/30dBc:

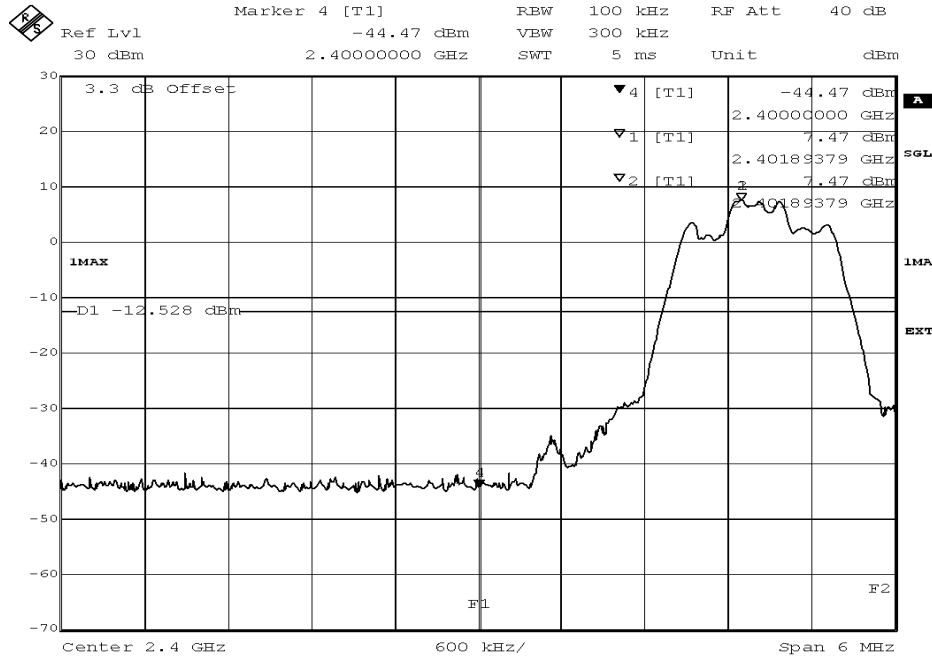
Radio Technology = Bluetooth BDR, Operating Frequency = low, Band Edge = low  
(S01\_7\_AB01)



Radio Technology = Bluetooth BDR, Operating Frequency = high, Band Edge = high  
(S01\_7\_AB01)

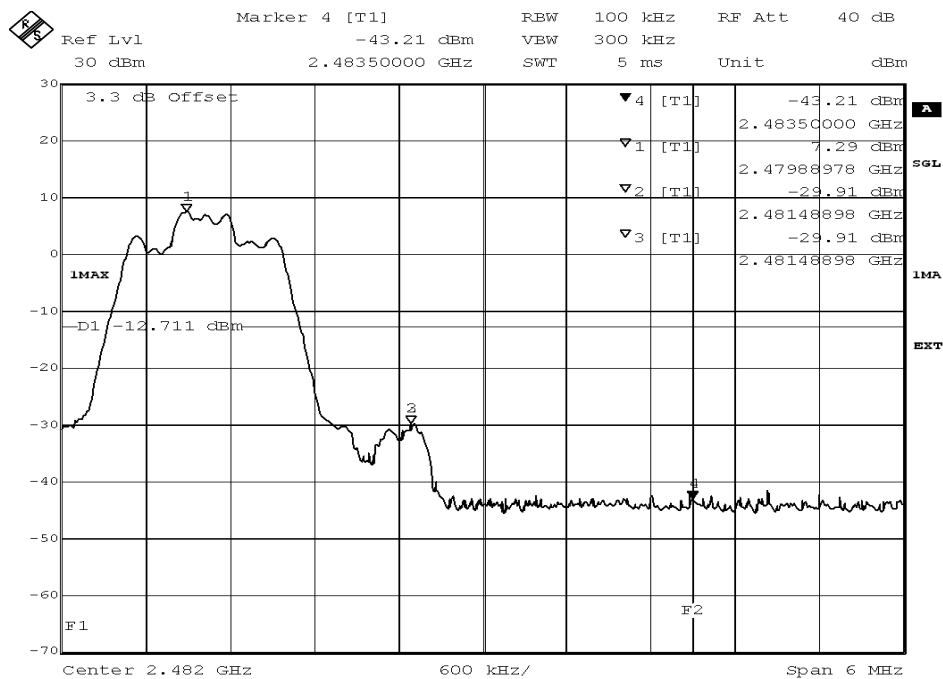


Radio Technology = Bluetooth EDR 2, Operating Frequency = low, Band Edge = low  
(S01\_7\_AB01)



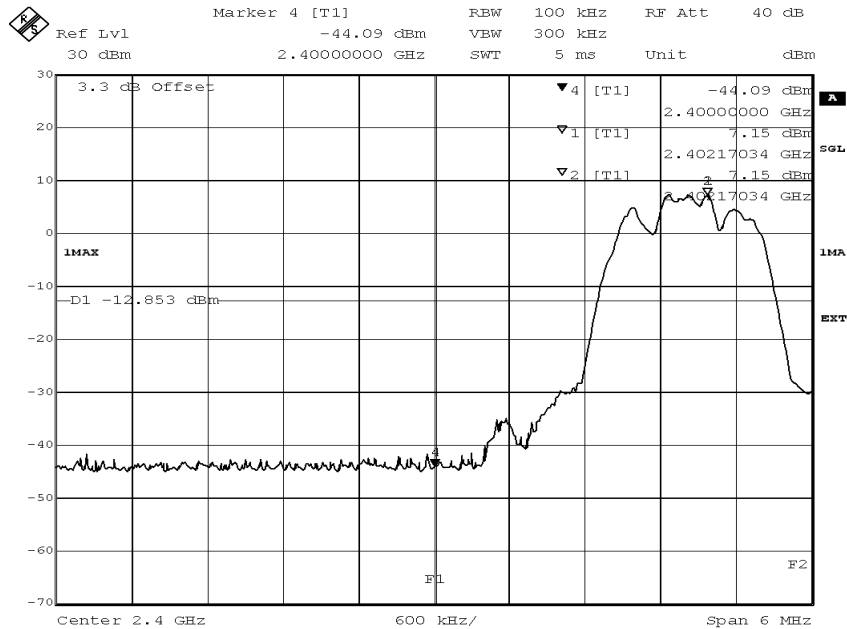
Title: Band Edge Compliance  
Comment A: CH B: 2402 MHz  
Date: 5.DEC.2017 09:14:18

Radio Technology = Bluetooth EDR 2, Operating Frequency = high, Band Edge = high  
(S01\_7\_AB01)



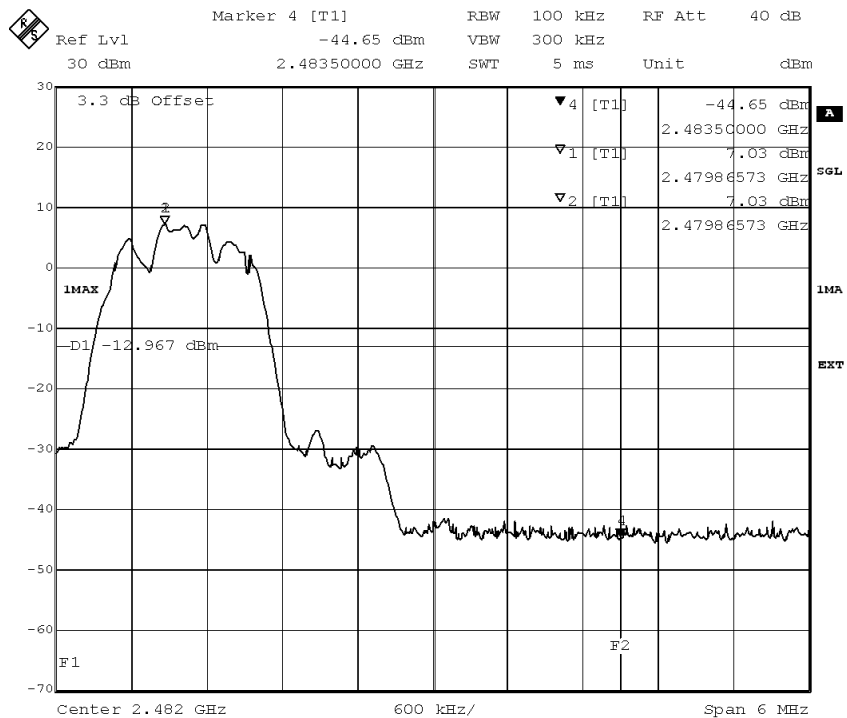
Title: Band Edge Compliance  
Comment A: CH T: 2480 MHz  
Date: 5.DEC.2017 11:15:09

Radio Technology = Bluetooth EDR 3, Operating Frequency = low, Band Edge = low  
(S01\_7\_AB01)



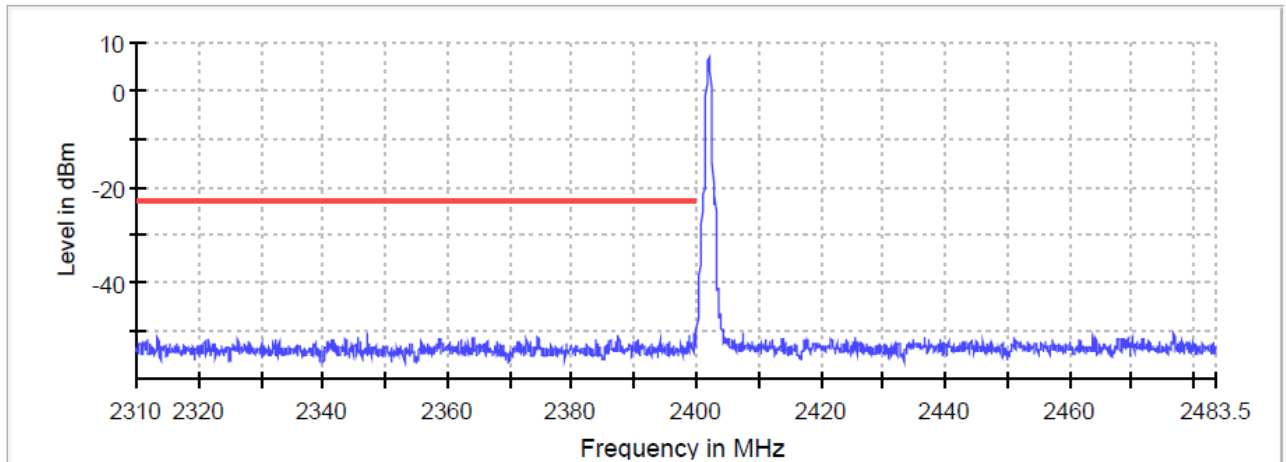
Title: Band Edge Compliance  
Comment A: CH B: 2402 MHz  
Date: 5.DEC.2017 09:30:55

Radio Technology = Bluetooth EDR 3, Operating Frequency = high, Band Edge = high  
(S01\_7\_AB01)



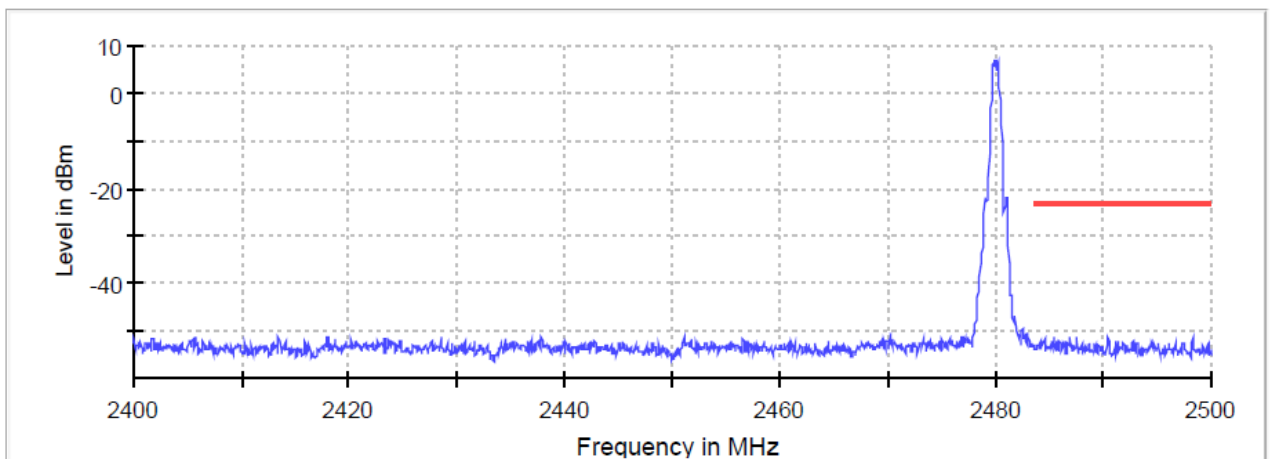
Title: Band Edge Compliance  
Comment A: CH T: 2480 MHz  
Date: 5.DEC.2017 11:32:07

Radio Technology = Bluetooth Low Energy, Operating Frequency = low, Band Edge = low  
(S01\_7\_AA01)



— Limit    — Sum Level    × Fail

Radio Technology = Bluetooth Low Energy, Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)



— Limit    — Sum Level    × Fail

Radio Technology = WLAN b, Operating Frequency = low, Band Edge = low  
(S01\_7\_AA01)



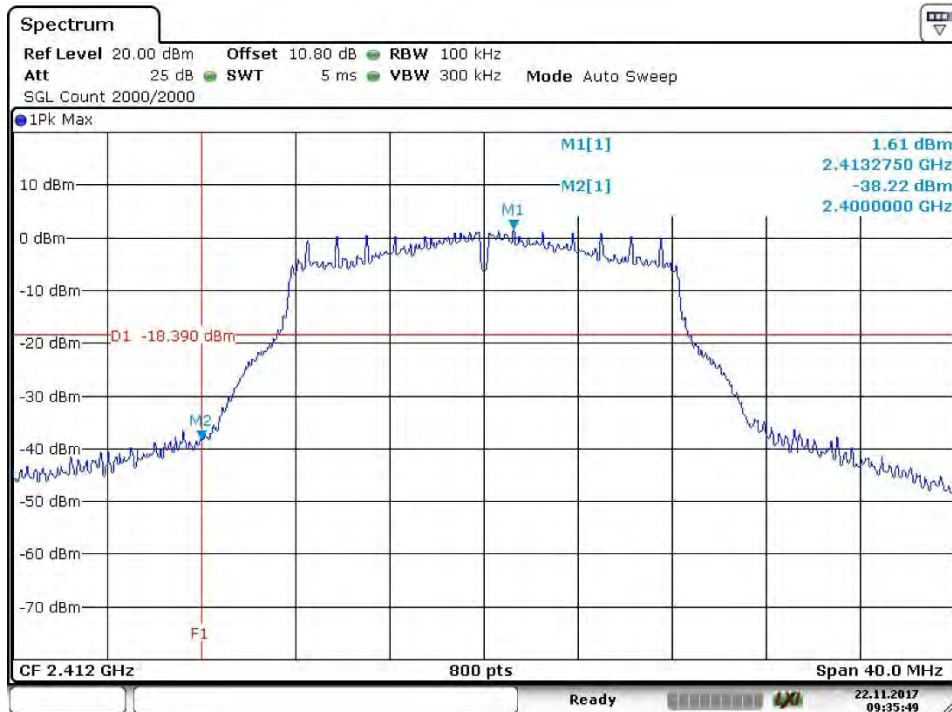
Date: 22.NOV.2017 09:18:53

Radio Technology = WLAN b, Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)



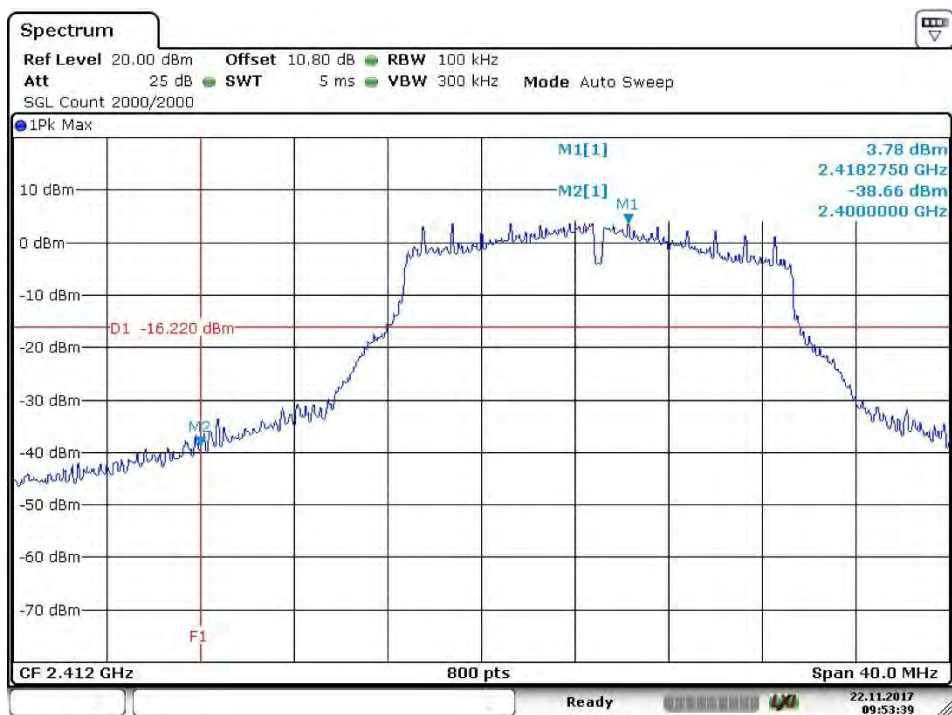
Date: 22.NOV.2017 13:26:48

Radio Technology = WLAN g, Operating Frequency = low, Band Edge = low  
(S01\_7\_AA01)



Date: 22.NOV.2017 09:35:49

WLAN g Ch. 1

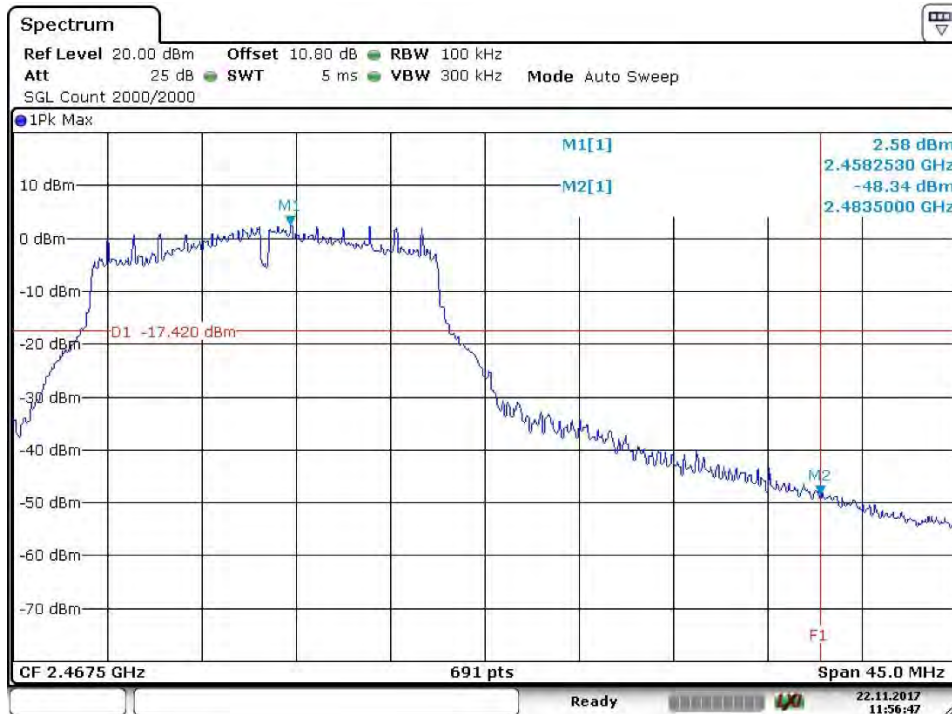


Date: 22.NOV.2017 09:53:39

WLAN g Ch. 2



Radio Technology = WLAN g, Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)



Date: 22.NOV.2017 11:56:48

WLAN g Ch. 10

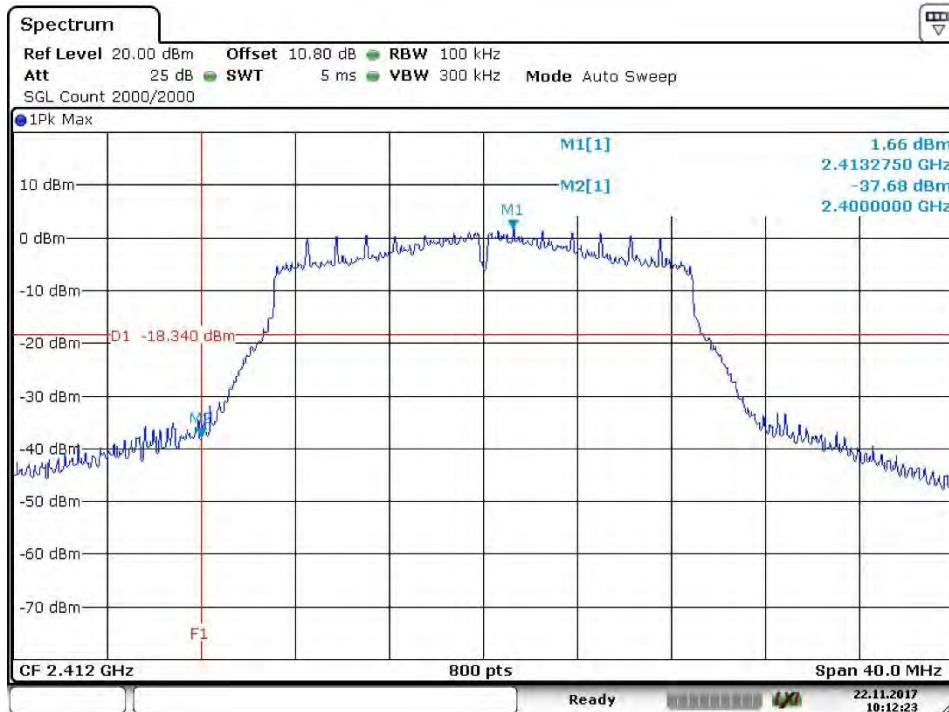


Date: 22.NOV.2017 13:45:40

WLAN g Ch. 11

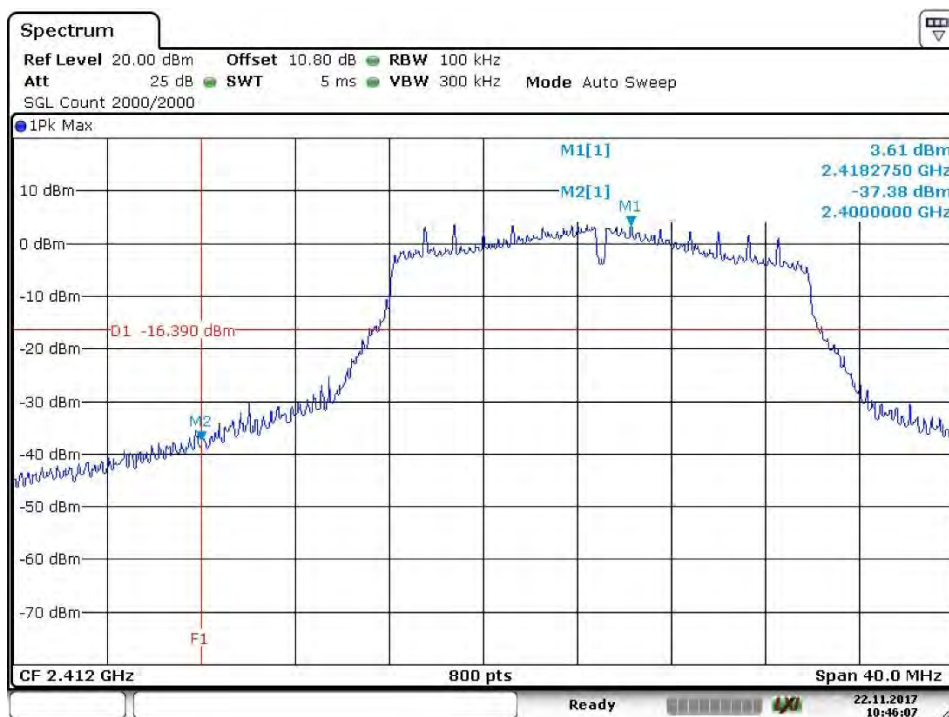


Radio Technology = WLAN n 20 MHz, Operating Frequency = low, Band Edge = low  
(S01\_7\_AA01)



Date: 22.NOV.2017 10:12:24

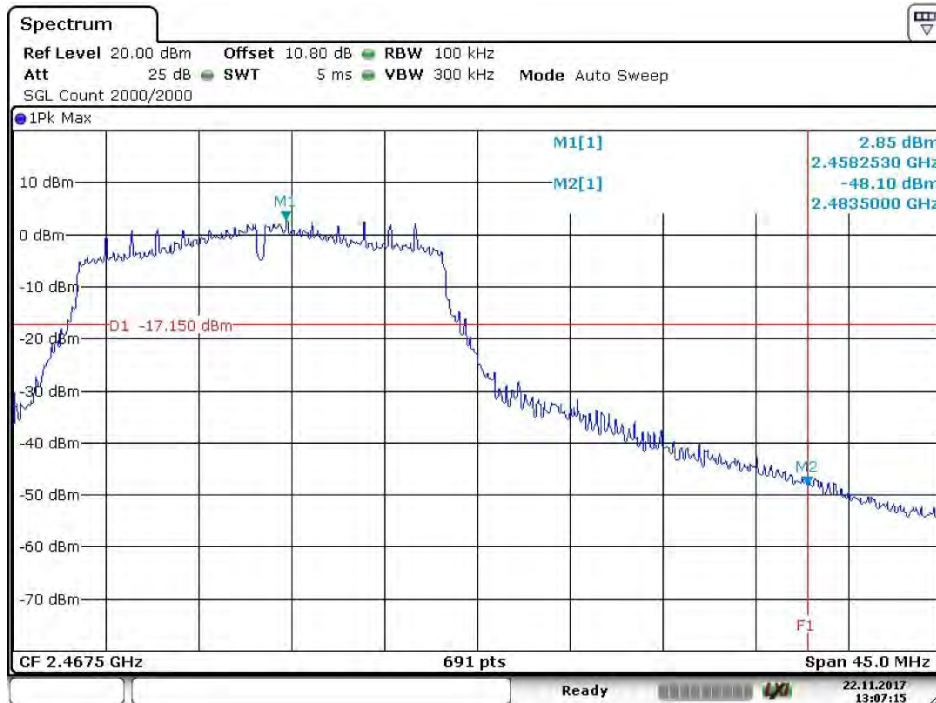
WLAN n Ch. 1



Date: 22.NOV.2017 10:46:07

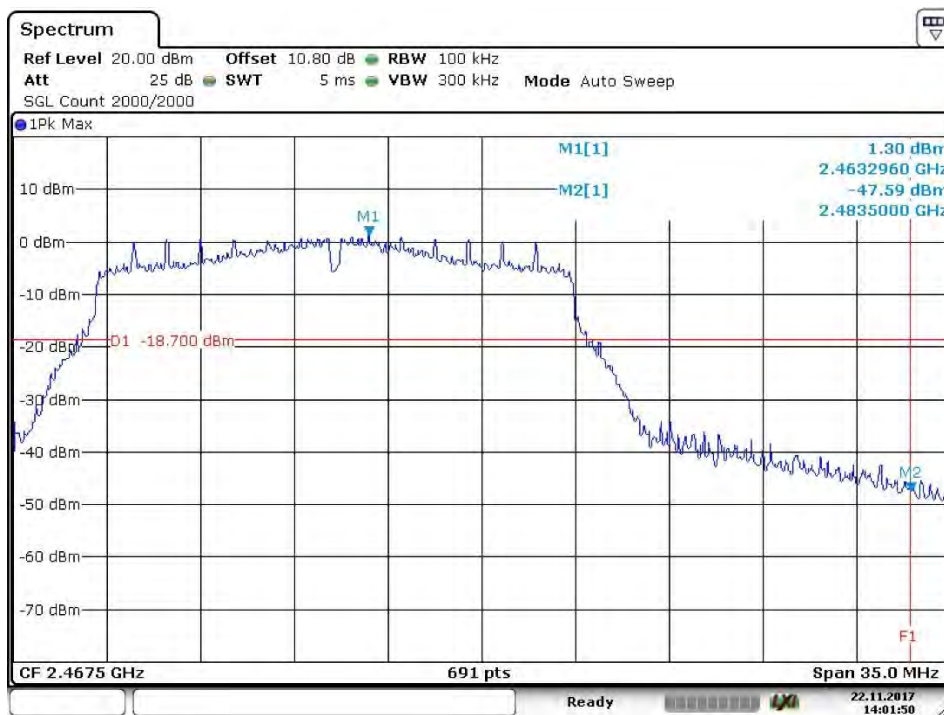
WLAN n Ch. 2

Radio Technology = WLAN n 20 MHz, Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)



Date: 22.NOV.2017 13:07:15

WLAN n Ch. 10



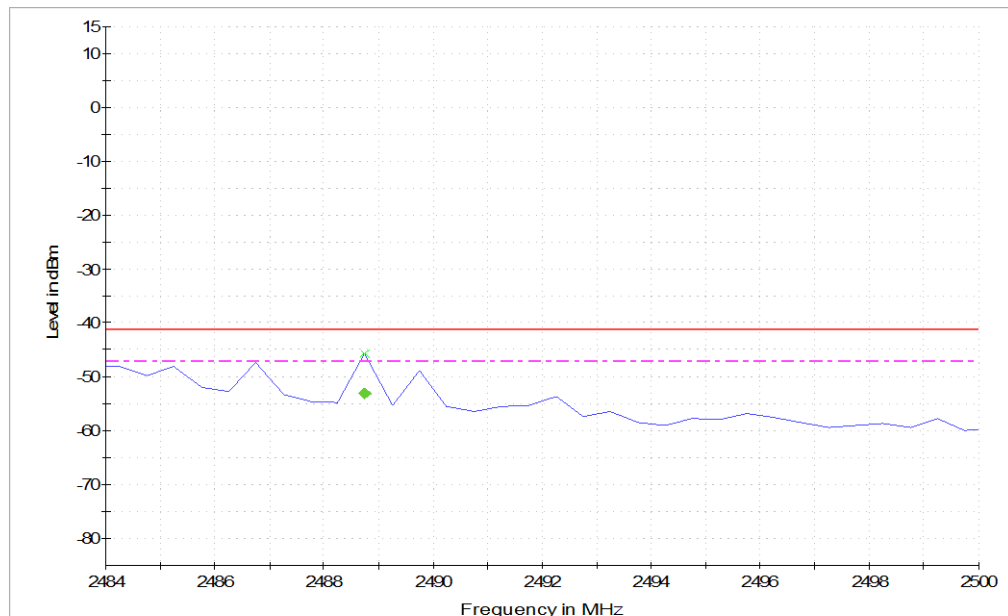
Date: 22.NOV.2017 14:01:50

WLAN n Ch. 11

In Restricted Bands:

Radio Technology = Bluetooth GFSK (1-DH1), Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)

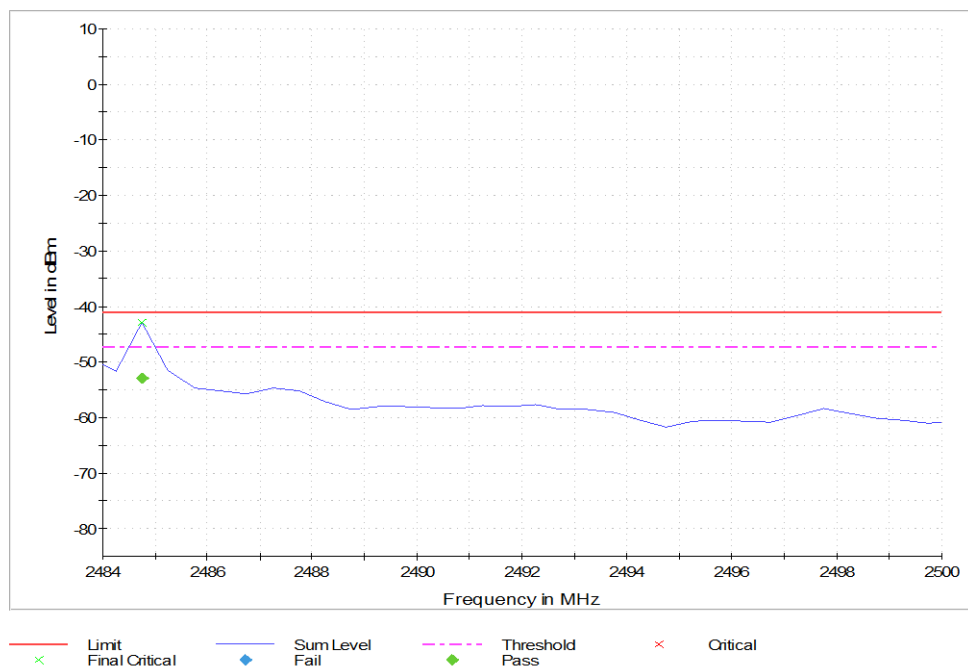
Spurious



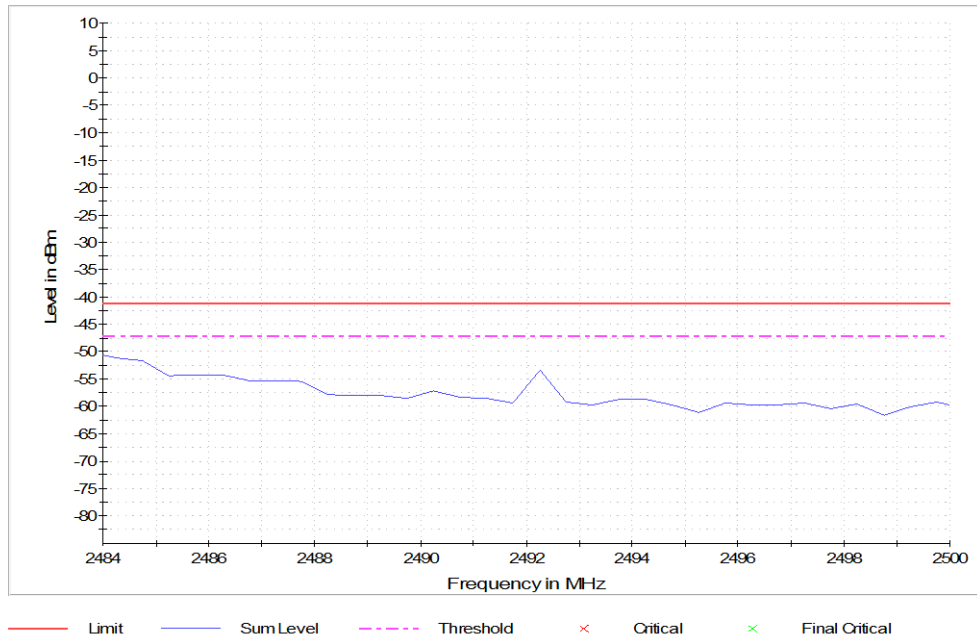
Radio Technology = Bluetooth  $\pi/4$  DQPSK (2-DH1), Operating Frequency = high, Band Edge = high

(S01\_7\_AA01)

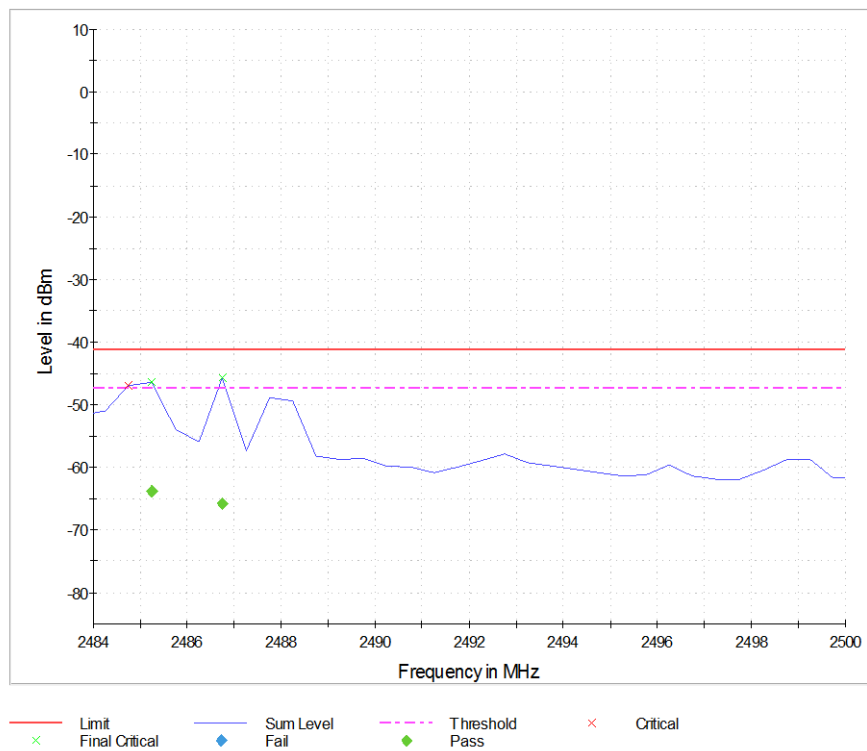
Spurious



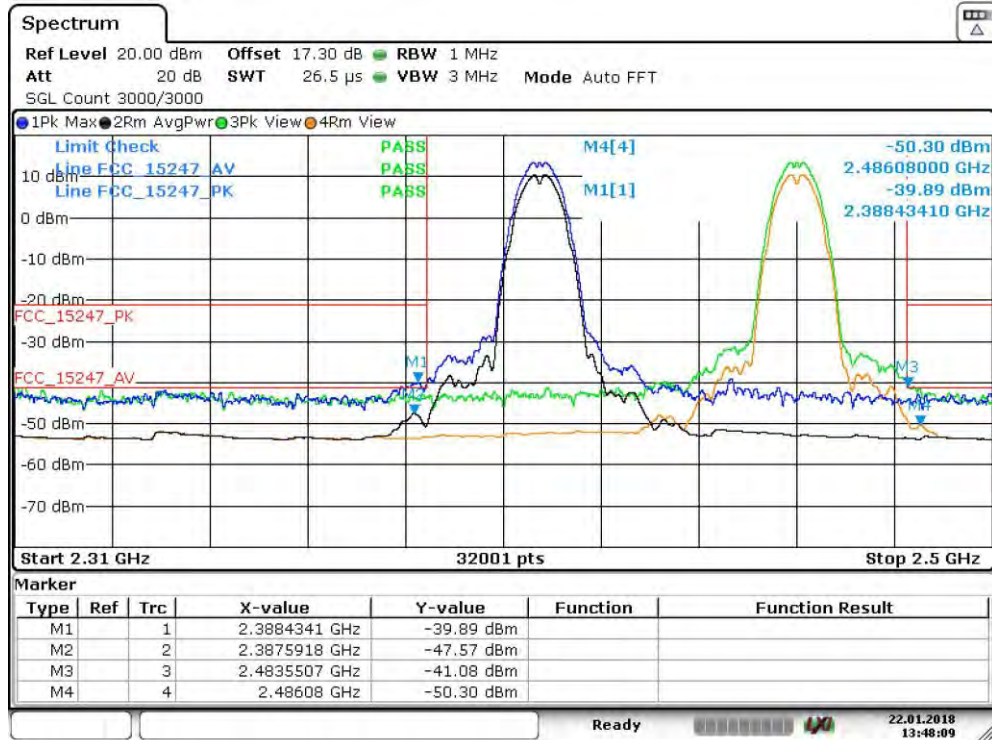
Radio Technology = Bluetooth 8-DPSK (3-DH1), Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)  
Spurious



Radio Technology = Bluetooth Low Energy, Operating Frequency = high, Band Edge = high  
(S01\_7\_AA01)  
Spurious



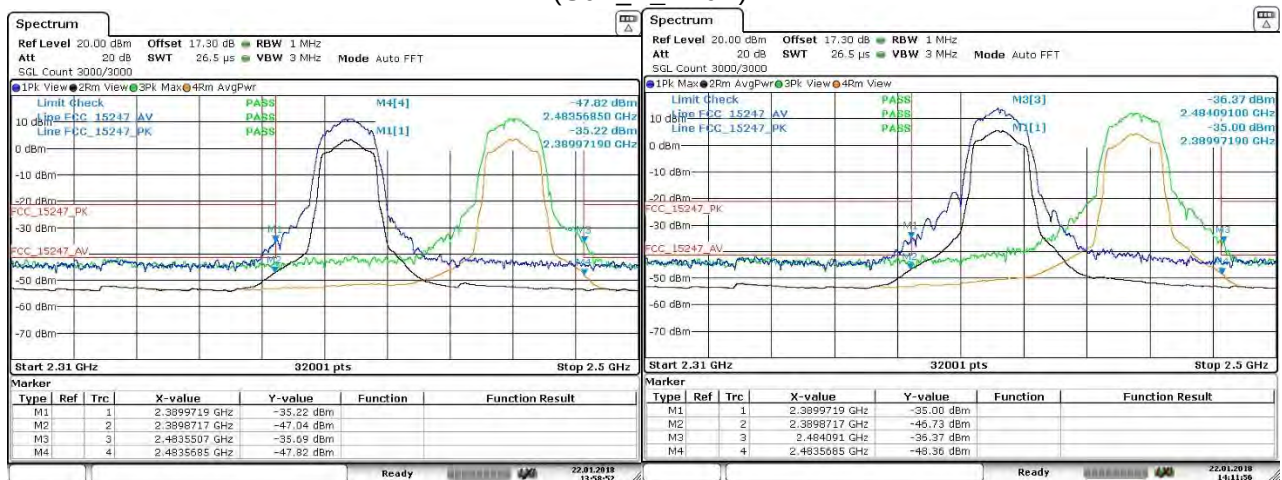
Radio Technology = WLAN b, Operating Frequency = low + high, Band Edge = low + high  
(S01\_7\_AA01)



Date: 22.JAN.2018 13:48:09

TX on 2412 + 2462 MHz

Radio Technology = WLAN g, Operating Frequency = low + high, Band Edge = low + high  
(S01\_7\_AA01)



Date: 22.JAN.2018 13:58:52

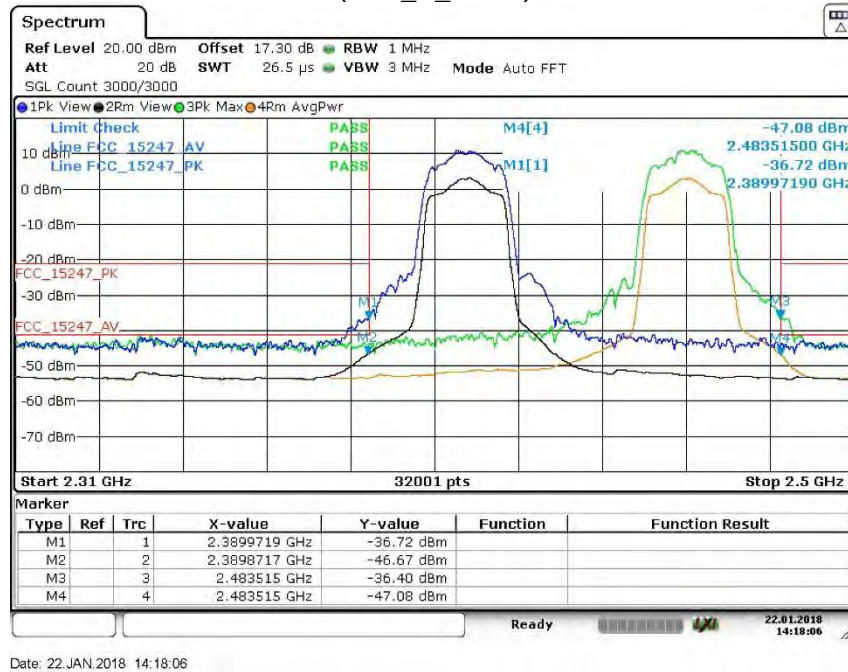
Date: 22.JAN.2018 14:11:56

TX on 2412 + 2462 MHz

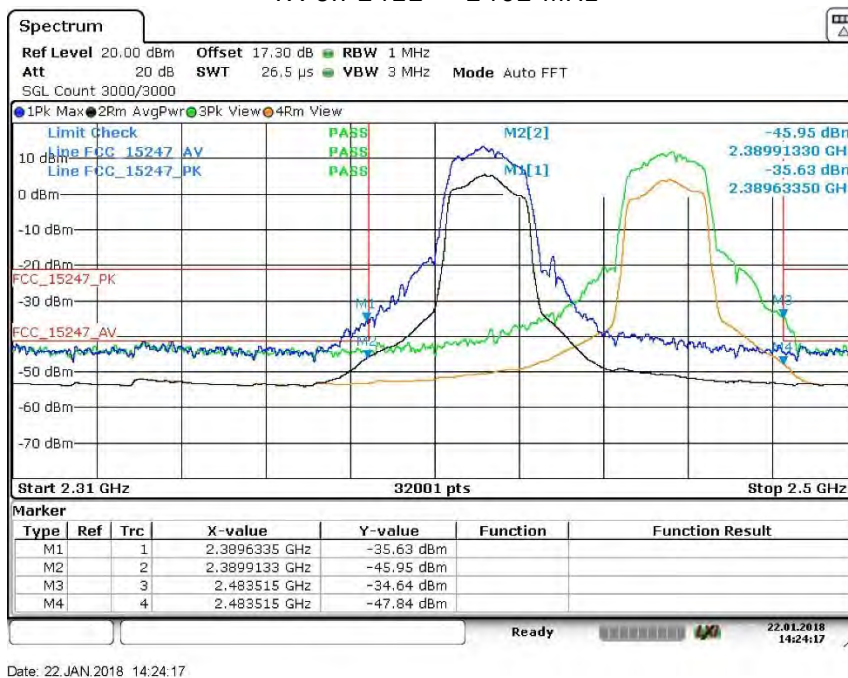
TX on 2417 + 2457 MHz



Radio Technology = WLAN n, Operating Frequency = low + high, Band Edge = low + high  
(S01\_7\_AA01)



TX on 2412 + 2462 MHz



TX on 2417 + 2457 MHz

#### 4.7.5 TEST EQUIPMENT USED

- Regulatory Bluetooth RF Test Solution
- R&S TS8997

## 4.8 BAND EDGE COMPLIANCE RADIATED

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

### 4.8.1 TEST DESCRIPTION

Please see test description for the test case "Spurious Radiated Emissions"

### 4.8.2 TEST REQUIREMENTS / LIMITS

For band edges connected to a restricted band, the limits are specified in Section 15.209(a)

FCC Part 15, Subpart C, §15.209, Radiated Emission Limits

| Frequency in MHz | Limit (μV/m)     | Measurement distance (m) | Limits (dBμV/m)    |
|------------------|------------------|--------------------------|--------------------|
| 0.009 – 0.49     | 2400/F(kHz)@300m | 3                        | (48.5 – 13.8)@300m |
| 0.49 – 1.705     | 24000/F(kHz)@30m | 3                        | (33.8 – 23.0)@30m  |
| 1.705 – 30       | 30@30m           | 3                        | 29.5@30m           |

The measured values are corrected with an inverse linear distance extrapolation factor (40 dB/decade) according FCC 15.31 (2).

| Frequency in MHz | Limit (μV/m) | Measurement distance (m) | Limits (dBμV/m) |
|------------------|--------------|--------------------------|-----------------|
| 30 – 88          | 100@3m       | 3                        | 40.0@3m         |
| 88 – 216         | 150@3m       | 3                        | 43.5@3m         |
| 216 – 960        | 200@3m       | 3                        | 46.0@3m         |
| 960 – 26000      | 500@3m       | 3                        | 54.0@3m         |
| 26000 – 40000    | 500@3m       | 1                        | 54.0@3m         |

The measured values above 26 GHz are corrected with an inverse linear distance extrapolation factor (20 dB/decade).

§15.35(b) ..., there is also a limit on the radio frequency emissions, as measured using instrumentation with a peak detector function, corresponding to 20 dB above the maximum permitted average limit....

Used conversion factor:  $\text{Limit (dB}\mu\text{V/m)} = 20 \log (\text{Limit } (\mu\text{V/m})/1\mu\text{V/m})$

#### 4.8.3 TEST PROTOCOL

Ambient temperature: 22 °C  
 Air Pressure: 1012 hPa  
 Humidity: 37 %  
 BT GFSK (1-DH1)  
 Applied duty cycle correction (AV): 0 dB

| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 78      | 2480                   | 2483.5                | 54.6                    | PEAK     | 1000      | 74.0           | 19.4                 | BE         |
| 78      | 2480                   | 2483.5                | 42.8                    | AV       | 1000      | 54.0           | 11.2                 | BE         |

BT n/4 DQPSK (2-DH1)  
 Applied duty cycle correction (AV): 0 dB

| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 78      | 2480                   | 2483.5                | 53.1                    | PEAK     | 1000      | 74.0           | 20.9                 | BE         |
| 78      | 2480                   | 2483.5                | 39.4                    | AV       | 1000      | 54.0           | 14.6                 | BE         |

BT 8-DPSK (3-DH1)  
 Applied duty cycle correction (AV): 0 dB

| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 78      | 2480                   | 2483.5                | 53.3                    | PEAK     | 1000      | 74.0           | 20.7                 | BE         |
| 78      | 2480                   | 2483.5                | 39.5                    | AV       | 1000      | 54.0           | 14.5                 | BE         |

WLAN b-Mode; 20 MHz; 1 Mbit/s  
 Applied duty cycle correction (AV): 0 dB

| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 11      | 2462                   | 2483.5                | 54.2                    | PEAK     | 1000      | 74.0           | 19.8                 | BE         |
| 11      | 2462                   | 2483.5                | 39.2                    | AV       | 1000      | 54.0           | 14.8                 | BE         |

WLAN g-Mode; 20 MHz; 6 Mbit/s  
 Applied duty cycle correction (AV): 0 dB

| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 11      | 2462                   | 2483.5                | 55.2                    | PEAK     | 1000      | 74.0           | 18.8                 | BE         |
| 11      | 2462                   | 2483.5                | 39.3                    | AV       | 1000      | 54.0           | 14.7                 | BE         |

WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0  
 Applied duty cycle correction (AV): 0 dB

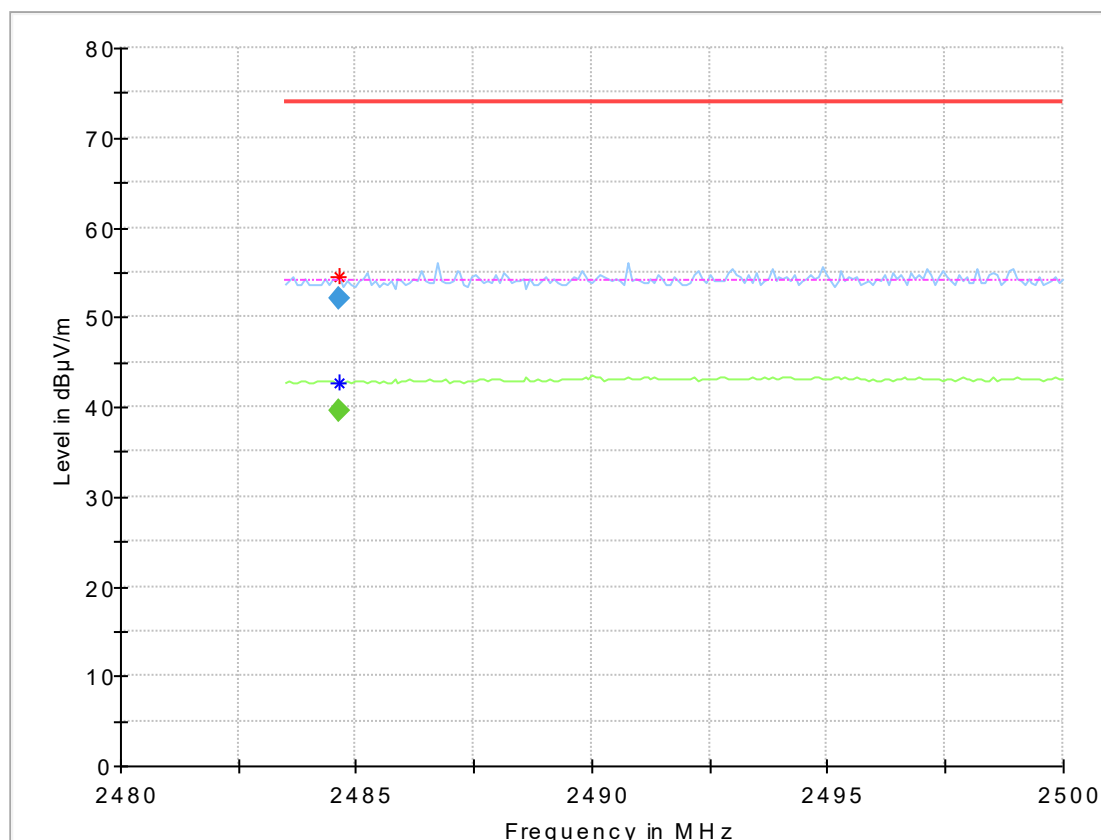
| Ch. No. | Ch. Center Freq. [MHz] | Band Edge Freq. [MHz] | Spurious Level [dBμV/m] | Detector | RBW [kHz] | Limit [dBμV/m] | Margin to Limit [dB] | Limit Type |
|---------|------------------------|-----------------------|-------------------------|----------|-----------|----------------|----------------------|------------|
| 11      | 2462                   | 2483.5                | 55.5                    | PEAK     | 1000      | 74.0           | 18.5                 | BE         |
| 11      | 2462                   | 2483.5                | 39.2                    | AV       | 1000      | 54.0           | 14.8                 | BE         |

Remark: Antenna port of EUT terminated with 50 Ohm.  
 Please see next sub-clause for the measurement plot.



#### 4.8.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

Radio Technology = Bluetooth BDR, Operating Frequency = high, Band Edge = high  
(S01\_3\_AC01)



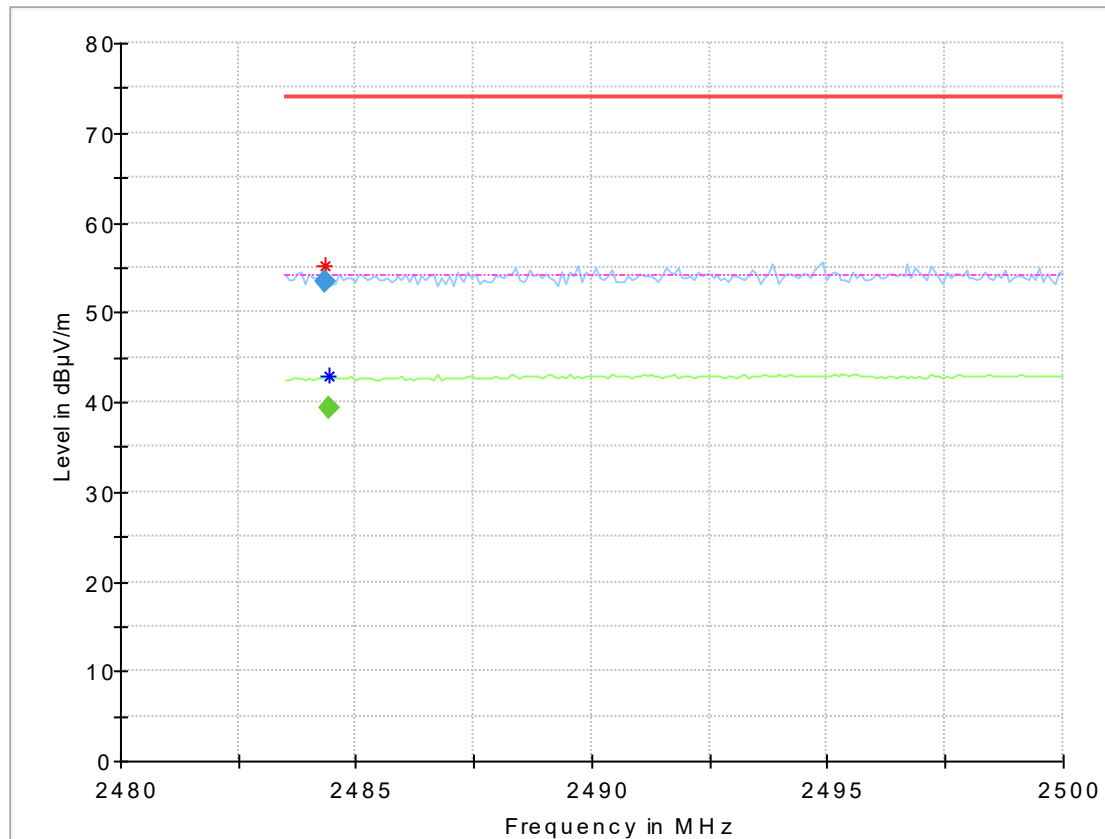
#### Critical\_Freqs

| Frequency (MHz) | MaxPeak (dBμV/m) | Average (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.655000     | 54.61            | ---              | 74.00          | 19.39       | ---             | ---             | 150.0       | V   | -130.0        | 14.7            |
| 2484.655000     | ---              | 42.79            | 54.00          | 11.21       | ---             | ---             | 150.0       | H   | 151.0         | 14.8            |

#### Final\_Result

| Frequency (MHz) | MaxPeak (dBμV/m) | CAverage (dBμV/m) | Limit (dBμV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|-------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.655000     | ---              | 39.47             | 54.00          | 14.53       | 1000.0          | 1000.000        | 150.0       | H   | 151.0         | 14.8            |
| 2484.655000     | 52.13            | ---               | 74.00          | 21.87       | 1000.0          | 1000.000        | 150.0       | V   | -130.0        | 14.7            |

Radio Technology = WLAN g, Operating Frequency = high, Band Edge = high  
(S01\_3\_AB01)



### Critical Freqs

| Frequency (MHz) | MaxPeak (dBµV/m) | Average (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.325000     | 55.15            | ---              | 74.00          | 18.85       | ---             | ---             | 150.0       | V   | -184.0        | -9.3            |
| 2484.407500     | ---              | 42.85            | 54.00          | 11.15       | ---             | ---             | 150.0       | V   | 100.0         | 104.8           |

### Final Result

| Frequency (MHz) | MaxPeak (dBµV/m) | CAverage (dBµV/m) | Limit (dBµV/m) | Margin (dB) | Meas. Time (ms) | Bandwidth (kHz) | Height (cm) | Pol | Azimuth (deg) | Elevation (deg) |
|-----------------|------------------|-------------------|----------------|-------------|-----------------|-----------------|-------------|-----|---------------|-----------------|
| 2484.325000     | 53.34            | ---               | 74.00          | 20.66       | 1000.0          | 1000.000        | 150.0       | V   | -184.0        | -9.2            |
| 2484.407500     | ---              | 39.27             | 54.00          | 14.73       | 1000.0          | 1000.000        | 150.0       | V   | 101.0         | 104.8           |

### 4.8.5 TEST EQUIPMENT USED

- Radiated Emissions

## 4.9 POWER DENSITY

Standard FCC Part 15 Subpart C

The test was performed according to:  
ANSI C63.10

### 4.9.1 TEST DESCRIPTION

The Equipment Under Test (EUT) was set up in a shielded room to perform the Power Density measurements.

The results recorded were measured with the modulation which produces the worst-case (highest) power density.

The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

Analyzer settings:

- see plots

### 4.9.2 TEST REQUIREMENTS / LIMITS

FCC Part 15, Subpart C, §15.247 (e)

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

...

The same method of determining the conducted output power shall be used to determine the power spectral density.

#### 4.9.3 TEST PROTOCOL

Ambient temperature: 23 °C  
Air Pressure: 1012 hPa  
Humidity: 41 %

##### BT GFSK (1-DH1)

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 3kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|----------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | 1.6                        | 8.0                | 6.4                  |
|             | 19          | 2440            | 1.5                        | 8.0                | 6.5                  |
|             | 39          | 2480            | 1.5                        | 8.0                | 6.5                  |

##### BT π/4 DQPSK (2-DH1)

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 3kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|----------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | -4.7                       | 8.0                | 12.7                 |
|             | 19          | 2440            | -4.4                       | 8.0                | 12.4                 |
|             | 39          | 2480            | -4.5                       | 8.0                | 12.5                 |

##### BT 8-DPSK (3-DH1)

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 3kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|----------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | -4.5                       | 8.0                | 12.5                 |
|             | 19          | 2440            | -4.7                       | 8.0                | 12.7                 |
|             | 39          | 2480            | -4.4                       | 8.0                | 12.4                 |

##### BT LE

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 10kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|-----------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 0           | 2402            | -0.8                        | 8.0                | 8.8                  |
|             | 19          | 2440            | -0.7                        | 8.0                | 8.7                  |
|             | 39          | 2480            | -0.9                        | 8.0                | 8.9                  |

##### WLAN b-Mode; 20 MHz; 1 Mbit/s

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 100kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|------------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | 1.7                          | 8.0                | 6.3                  |
|             | 6           | 2437            | 0.1                          | 8.0                | 7.9                  |
|             | 11          | 2462            | 1.8                          | 8.0                | 6.2                  |

##### WLAN g-Mode; 20 MHz; 6 Mbit/s

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 100kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|------------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | -4.6                         | 8.0                | 12.6                 |
|             | 2           | 2417            | -2.1                         | 8.0                | 10.1                 |
|             | 6           | 2437            | -4.4                         | 8.0                | 12.4                 |
|             | 10          | 2457            | -3.3                         | 8.0                | 11.3                 |
|             | 11          | 2462            | -4.4                         | 8.0                | 12.4                 |

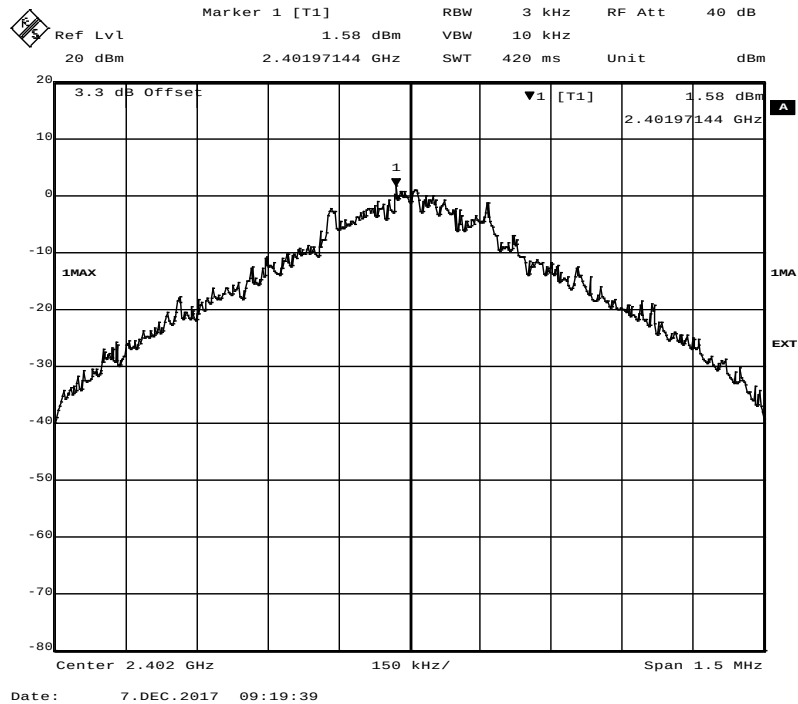
##### WLAN n-Mode; 20 MHz; 6,5 Mbit/s MCS0

| Band        | Channel No. | Frequency [MHz] | Power Density [dBm / 100kHz] | Limit [dBm / 3kHz] | Margin to Limit [dB] |
|-------------|-------------|-----------------|------------------------------|--------------------|----------------------|
| 2.4 GHz ISM | 1           | 2412            | -4.6                         | 8.0                | 12.6                 |
|             | 2           | 2417            | -2.3                         | 8.0                | 10.3                 |
|             | 6           | 2437            | -4.7                         | 8.0                | 12.7                 |
|             | 10          | 2457            | -3.4                         | 8.0                | 11.4                 |
|             | 11          | 2462            | -4.7                         | 8.0                | 12.7                 |

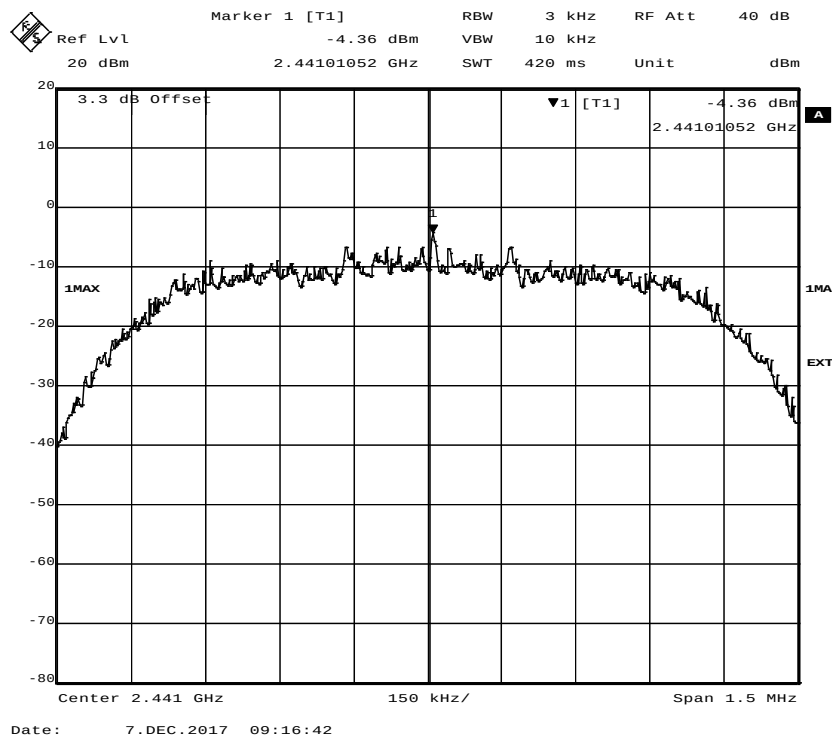
Remark: Please see next sub-clause for the measurement plot.

#### 4.9.4 MEASUREMENT PLOT (SHOWING THE HIGHEST VALUE, "WORST CASE")

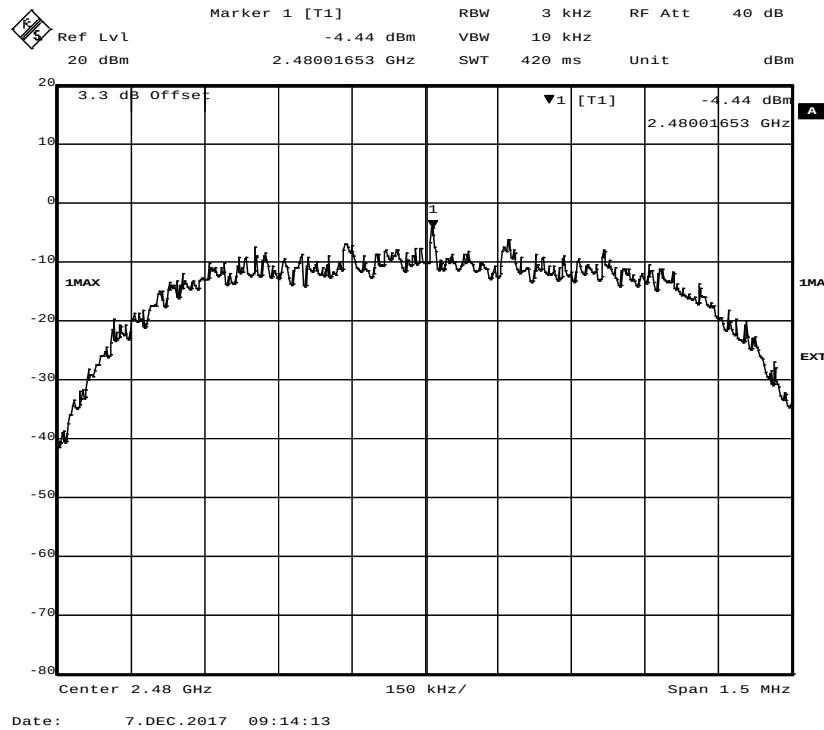
Radio Technology = BT GFSK (1-DH1), Operating Frequency = low  
(S01\_3\_AE01)



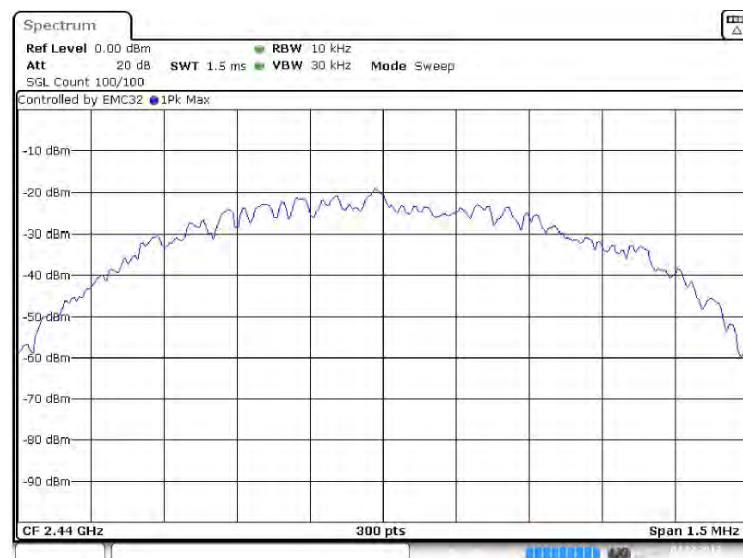
Radio Technology = BT  $\pi/4$  DQPSK (2-DH1), Operating Frequency = mid  
(S01\_3\_AE01)



Radio Technology = BT 8-DPSK (3-DH1), Operating Frequency = high  
(S01\_3\_AE01)



Radio Technology = Bluetooth LE, Operating Frequency = mid  
(S01\_3\_AA01)



### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) |
|---------------------|-----------------|-----------|-----------------|
| 2440.000000         | 2439.982500     | -0.664    | 8.0             |

Radio Technology = WLAN b, Operating Frequency = high  
(S01\_3\_AA01)



#### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) |
|---------------------|-----------------|-----------|-----------------|
| 2462.000000         | 2461.325000     | 1.773     | 8.0             |

Radio Technology = WLAN g, Operating Frequency = low  
(S01\_3\_AA01)



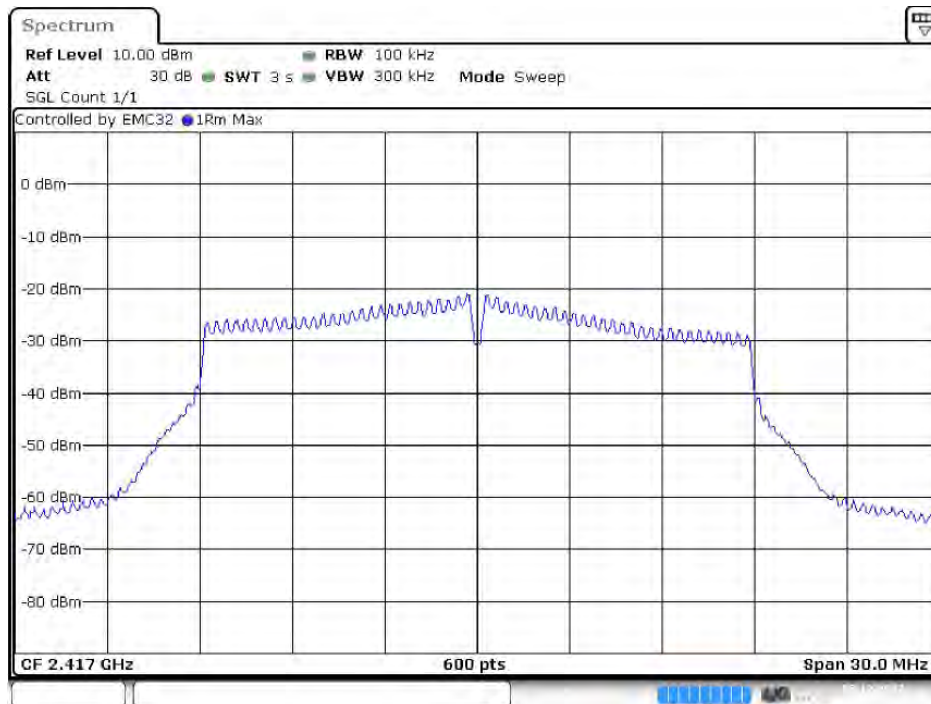
#### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) |
|---------------------|-----------------|-----------|-----------------|
| 2417.000000         | 2416.725000     | -2.053    | 8.0             |

WLAN g Ch. 2



Radio Technology = WLAN n 20 MHz, Operating Frequency = high  
(S01\_3\_AA01)



### Result

| DUT Frequency (MHz) | Frequency (MHz) | PSD (dBm) | Limit Max (dBm) |
|---------------------|-----------------|-----------|-----------------|
| 2417.000000         | 2416.675000     | -2.309    | 8.0             |

WLAN n Ch. 2

#### 4.9.5 TEST EQUIPMENT USED

- Radio Lab
- R&S TS8997
- Regulatory Bluetooth RF Test Solution

## 5 TEST EQUIPMENT

1 R&S TS8997  
EN300328/301893 Test Lab

| Ref.No. | Device Name          | Description                                | Manufacturer                      | Serial Number  | Last Calibration | Calibration Due |
|---------|----------------------|--------------------------------------------|-----------------------------------|----------------|------------------|-----------------|
| 1.1     | SMB100A              | Signal Generator 9 kHz - 6 GHz             | Rohde & Schwarz                   | 107695         | 2017-07          | 2020-07         |
| 1.2     | MFS                  | Rubidium Frequency Standard                | Datum-Beverly                     | 5489/001       | 2017-07          | 2018-07         |
| 1.3     | 1515 / 93459         | Broadband Power Divider SMA (Aux)          | Weinschel Associates              | LN673          |                  |                 |
| 1.4     | FSV30                | Signal Analyzer 10 Hz - 30 GHz             | Rohde & Schwarz                   | 103005         | 2016-02          | 2018-02         |
| 1.5     | Fluke 177            | Digital Multimeter 03 (Multimeter)         | Fluke Europe B.V.                 | 86670383       | 2016-02          | 2018-02         |
| 1.6     | VT 4002              | Climatic Chamber                           | Vötsch                            | 58566002150010 | 2016-03          | 2018-03         |
| 1.7     | A8455-4              | 4 Way Power Divider (SMA)                  |                                   | -              |                  |                 |
| 1.8     | Opus10 THI (8152.00) | ThermoHygro Datalogger 03 (Environ)        | Lufft Mess- und Regeltechnik GmbH | 7482           | 2017-03          | 2019-03         |
| 1.9     | SMBV100A             | Vector Signal Generator 9 kHz - 6 GHz      | Rohde & Schwarz                   | 259291         | 2016-10          | 2019-10         |
| 1.10    | OSP120               | Switching Unit with integrated power meter | Rohde & Schwarz                   | 101158         | 2016-11          | 2018-11         |

2 Radiated Emissions  
Lab to perform radiated emission tests

| Ref.No. | Device Name           | Description                               | Manufacturer                      | Serial Number | Last Calibration | Calibration Due |
|---------|-----------------------|-------------------------------------------|-----------------------------------|---------------|------------------|-----------------|
| 2.1     | NRV-Z1                | Sensor Head A                             | Rohde & Schwarz                   | 827753/005    | 2017-05          | 2018-05         |
| 2.2     | MFS                   | Rubidium Frequency Normal MFS             | Datum GmbH                        | 002           | 2017-10          | 2018-10         |
| 2.3     | Opus10 TPR (8253.00)  | ThermoAirpressure Datalogger 13 (Environ) | Lufft Mess- und Regeltechnik GmbH | 13936         | 2017-04          | 2019-04         |
| 2.4     | Anechoic Chamber      | 10.58 x 6.38 x 6.00 m <sup>3</sup>        | Frankonia                         | none          | 2016-05          | 2019-05         |
| 2.5     | HL 562                | Ultralog new biconicals                   | Rohde & Schwarz                   | 830547/003    | 2015-06          | 2018-06         |
| 2.6     | 5HC2700/12750 -1.5-KK | High Pass Filter                          | Trilithic                         | 9942012       |                  |                 |
| 2.7     | ASP 1.2/1.8-10 kg     | Antenna Mast                              | Maturo GmbH                       | -             |                  |                 |

| Ref.No. | Device Name                   | Description                                     | Manufacturer                      | Serial Number          | Last Calibration | Calibration Due |
|---------|-------------------------------|-------------------------------------------------|-----------------------------------|------------------------|------------------|-----------------|
| 2.8     | Fully Anechoic Room           | 8.80m x 4.60m x 4.05m (l x w x h)               | Albatross Projects                | P26971-647-001-PRB     | 2015-06          | 2018-06         |
| 2.9     | Fluke 177                     | Digital Multimeter 03 (Multimeter)              | Fluke Europe B.V.                 | 86670383               | 2016-02          | 2018-02         |
| 2.10    | JS4-18002600-32-5P            | Broadband Amplifier 18 GHz - 26 GHz             | Miteq                             | 849785                 |                  |                 |
| 2.11    | FSW 43                        | Spectrum Analyzer                               | Rohde & Schwarz                   | 103779                 | 2016-12          | 2018-12         |
| 2.12    | 3160-09                       | Standard Gain / Pyramidal Horn Antenna 26.5 GHz | EMCO Elektronik GmbH              | 00083069               |                  |                 |
| 2.13    | WHKX 7.0/18G-8SS              | High Pass Filter                                | Wainwright                        | 09                     |                  |                 |
| 2.14    | 4HC1600/12750-1.5-KK          | High Pass Filter                                | Trilithic                         | 9942011                |                  |                 |
| 2.15    | Chroma 6404                   | AC Power Source                                 | Chroma ATE INC.                   | 64040001304            |                  |                 |
| 2.16    | JS4-00102600-42-5A            | Broadband Amplifier 30 MHz - 26 GHz             | Miteq                             | 619368                 |                  |                 |
| 2.17    | TT 1.5 WI                     | Turn Table                                      | Maturo GmbH                       | -                      |                  |                 |
| 2.18    | HL 562 Ultralog               | Log.-per. Antenna                               | Rohde & Schwarz                   | 100609                 | 2016-04          | 2019-04         |
| 2.19    | 3160-10                       | Standard Gain / Pyramidal Horn Antenna 40 GHz   | EMCO Elektronik GmbH              | 00086675               |                  |                 |
| 2.20    | 5HC3500/18000-1.2-KK          | High Pass Filter                                | Trilithic                         | 200035008              |                  |                 |
| 2.21    | HFH2-Z2                       | Loop Antenna                                    | Rohde & Schwarz                   | 829324/006             | 2014-11          | 2017-11         |
| 2.22    | Opus10 THI (8152.00)          | ThermoHygro Datalogger 12 (Environ)             | Lufft Mess- und Regeltechnik GmbH | 12482                  | 2017-03          | 2019-03         |
| 2.23    | ESR 7                         | EMI Receiver / Spectrum Analyzer                | Rohde & Schwarz                   | 101424                 | 2016-11          | 2018-11         |
| 2.24    | JS4-00101800-35-5P            | Broadband Amplifier 30 MHz - 18 GHz             | Miteq                             | 896037                 |                  |                 |
| 2.25    | AS 620 P                      | Antenna mast                                    | HD GmbH                           | 620/37                 |                  |                 |
| 2.26    | Tilt device Maturo (Rohacell) | Antrieb TD1.5-10kg                              | Maturo GmbH                       | TD1.5-10kg/024/3790709 |                  |                 |
| 2.27    | ESIB 26                       | Spectrum Analyzer                               | Rohde & Schwarz                   | 830482/004             | 2015-12          | 2017-12         |
| 2.28    | PAS 2.5 - 10 kg               | Antenna Mast                                    | Maturo GmbH                       | -                      |                  |                 |
| 2.29    | AM 4.0                        | Antenna mast                                    | Maturo GmbH                       | AM4.0/180/11920513     |                  |                 |
| 2.30    | HF 907                        | Double-ridged horn                              | Rohde & Schwarz                   | 102444                 | 2015-05          | 2018-05         |

#### Conducted Radio Test Lab

| Ref.No. | Device Name | Description                           | Manufacturer         | Serial Number  | Last Calibration | Calibration Due |
|---------|-------------|---------------------------------------|----------------------|----------------|------------------|-----------------|
| 3.1     | SMB100A     | Signal Generator 9 kHz - 6 GHz        | Rohde & Schwarz      | 107695         | 2017-07          | 2020-07         |
| 3.2     | MFS         | Rubidium Frequency Standard           | Datum-Beverly        | 5489/001       | 2017-07          | 2018-07         |
| 3.3     | FSV30       | Signal Analyzer 10 Hz - 30 GHz        | Rohde & Schwarz      | 103005         | 2016-02          | 2018-02         |
| 3.4     | Fluke 177   | Digital Multimeter 03 (Multimeter)    | Fluke Europe B.V.    | 86670383       | 2016-02          | 2018-02         |
| 3.5     | SMP03       | Signal Generator 2 GHz - 27 GHz       | Rohde & Schwarz      | 833680/003     | 2017-09          | 2020-09         |
| 3.6     | FSIQ26      | Signal Analyser                       | Rohde & Schwarz      | 840061/005     | 2017-05          | 2019-05         |
| 3.7     | Chroma 6404 | AC Power Source                       | Chroma ATE INC.      | 64040001304    |                  |                 |
| 3.8     | VT 4002     | Climatic Chamber                      | Vötsch               | 58566002150010 | 2016-03          | 2018-03         |
| 3.9     | WA1515      | Broadband Power Divider SMA           | Weinschel Associates | A855           |                  |                 |
| 3.10    | A8455-4     | 4 Way Power Divider (SMA)             |                      | -              |                  |                 |
| 3.11    | SMBV100A    | Vector Signal Generator 9 kHz - 6 GHz | Rohde & Schwarz      | 259291         | 2016-10          | 2019-10         |

#### 4 Regulatory Bluetooth RF Test Solution Regulatory Bluetooth RF Tests

| Ref.No. | Device Name          | Description                            | Manufacturer                      | Serial Number  | Last Calibration | Calibration Due |
|---------|----------------------|----------------------------------------|-----------------------------------|----------------|------------------|-----------------|
| 4.1     | MFS                  | Rubidium Frequency Normal MFS          | Datum GmbH                        | 002            | 2017-10          | 2018-10         |
| 4.2     | EX520                | Digital Multimeter 12 (Multimeter)     | Extech Instruments Corp           | 05157876       | 2016-02          | 2018-02         |
| 4.3     | NRV Z1 A             | Power Sensor                           | Rohde & Schwarz                   | 832279/013     | 2017-09          | 2018-09         |
| 4.4     | Opus10 THI (8152.00) | T/H Logger 15                          | Lufft Mess- und Regeltechnik GmbH | 13985          | 2017-04          | 2019-04         |
| 4.5     | TOCT Switching Unit  |                                        | 7layers, Inc.                     | 040107         |                  |                 |
| 4.6     | KWP 120/70           | Temperature Chamber Weiss 01           | Weiss                             | 59226012190010 | 2016-03          | 2018-03         |
| 4.7     | ADU 200 Relay Box 7  | used for automated testing (EMMI) only | Ontrak Control Systems Inc        | A04380         |                  |                 |

| Ref.No. | Device Name | Description            | Manufacturer    | Serial Number | Last Calibration | Calibration Due |
|---------|-------------|------------------------|-----------------|---------------|------------------|-----------------|
| 4.8     | CBT         | IL BT RF Test Solution | Rohde & Schwarz | 100302        | 2017-02          | 2018-02         |
| 4.9     | NRVD        | Powermeter             | Rohde & Schwarz | 832025/059    | 2017-09          | 2018-09         |
| 4.10    | FSIQ26      | Signal Analyser        | Rohde & Schwarz | 832695/007    | 2016-09          | 2018-09         |
| 4.11    | SMP02       | Signal Generator SMP   | Rohde & Schwarz | 833286/0014   | 2016-05          | 2019-05         |
| 4.12    | SMIQ03B     | Signal Generator       | Rohde & Schwarz | 832870/017    | 2016-06          | 2019-06         |
| 4.13    | CBT         | Bluetooth Tester       | Rohde & Schwarz | 100589        | 2015-01          | 2018-01         |
| 4.14    | NGSM 32/10  | Power Supply           | Rohde & Schwarz | 2725          | 2017-06          | 2019-06         |

The calibration interval is the time interval between "Last Calibration" and "Calibration Due"

## 6 ANTENNA FACTORS, CABLE LOSS AND SAMPLE CALCULATIONS

This chapter contains the antenna factors with their corresponding path loss of the used measurement path for all antennas as well as the insertion loss of the LISN.

### 6.1 LISN R&S ESH3-Z5 (150 KHZ – 30 MHZ)

| Frequency |  | Corr. | LISN<br>insertion<br>loss<br>ESH3-<br>Z5 | cable<br>loss<br>(incl. 10<br>dB<br>atten-<br>uator) |
|-----------|--|-------|------------------------------------------|------------------------------------------------------|
| MHz       |  | dB    | dB                                       | dB                                                   |
| 0.15      |  | 10.1  | 0.1                                      | 10.0                                                 |
| 5         |  | 10.3  | 0.1                                      | 10.2                                                 |
| 7         |  | 10.5  | 0.2                                      | 10.3                                                 |
| 10        |  | 10.5  | 0.2                                      | 10.3                                                 |
| 12        |  | 10.7  | 0.3                                      | 10.4                                                 |
| 14        |  | 10.7  | 0.3                                      | 10.4                                                 |
| 16        |  | 10.8  | 0.4                                      | 10.4                                                 |
| 18        |  | 10.9  | 0.4                                      | 10.5                                                 |
| 20        |  | 10.9  | 0.4                                      | 10.5                                                 |
| 22        |  | 11.1  | 0.5                                      | 10.6                                                 |
| 24        |  | 11.1  | 0.5                                      | 10.6                                                 |
| 26        |  | 11.2  | 0.5                                      | 10.7                                                 |
| 28        |  | 11.2  | 0.5                                      | 10.7                                                 |
| 30        |  | 11.3  | 0.5                                      | 10.8                                                 |

#### Sample calculation

$$U_{\text{LISN}} (\text{dB } \mu\text{V}) = U (\text{dB } \mu\text{V}) + \text{Corr. (dB)}$$

U = Receiver reading

LISN Insertion loss = Voltage Division Factor of LISN

Corr. = sum of single correction factors of used LISN, cables, switch units (if used)

Linear interpolation will be used for frequencies in between the values in the table.

## 6.2 ANTENNA R&S HFH2-Z2 (9 KHZ – 30 MHZ)

| Frequency<br>MHz | AF<br>HFH-Z2)<br>dB (1/m) | Corr.<br>dB | cable<br>loss 1<br>(inside<br>chamber)<br>dB | cable<br>loss 2<br>(outside<br>chamber)<br>dB | cable<br>loss 3<br>(switch<br>unit)<br>dB | cable<br>loss 4<br>(to<br>receiver)<br>dB | distance<br>corr.<br>(-40 dB/<br>decade)<br>dB | d <sub>Limit</sub><br>(meas.<br>distance<br>(limit)<br>m | d <sub>used</sub><br>(meas.<br>distance<br>(used)<br>m |
|------------------|---------------------------|-------------|----------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
| 0.009            | 20.50                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.01             | 20.45                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.015            | 20.37                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.02             | 20.36                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.025            | 20.38                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.03             | 20.32                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.05             | 20.35                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.08             | 20.30                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.1              | 20.20                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.2              | 20.17                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.3              | 20.14                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.49             | 20.12                     | -79.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -80                                            | 300                                                      | 3                                                      |
| 0.490001         | 20.12                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 0.5              | 20.11                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 0.8              | 20.10                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 1                | 20.09                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 2                | 20.08                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 3                | 20.06                     | -39.6       | 0.1                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 4                | 20.05                     | -39.5       | 0.2                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 5                | 20.05                     | -39.5       | 0.2                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 6                | 20.02                     | -39.5       | 0.2                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 8                | 19.95                     | -39.5       | 0.2                                          | 0.1                                           | 0.1                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 10               | 19.83                     | -39.4       | 0.2                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 12               | 19.71                     | -39.4       | 0.2                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 14               | 19.54                     | -39.4       | 0.2                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 16               | 19.53                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 18               | 19.50                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 20               | 19.57                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 22               | 19.61                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 24               | 19.61                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 26               | 19.54                     | -39.3       | 0.3                                          | 0.1                                           | 0.2                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 28               | 19.46                     | -39.2       | 0.3                                          | 0.1                                           | 0.3                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |
| 30               | 19.73                     | -39.1       | 0.4                                          | 0.1                                           | 0.3                                       | 0.1                                       | -40                                            | 30                                                       | 3                                                      |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

distance correction =  $-40 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values

### 6.3 ANTENNA R&S HL562 (30 MHz – 1 GHz)

( $d_{\text{Limit}} = 3 \text{ m}$ )

| Frequency | AF<br>R&S<br>HL562 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 30        | 18.6               | 0.6   |
| 50        | 6.0                | 0.9   |
| 100       | 9.7                | 1.2   |
| 150       | 7.9                | 1.6   |
| 200       | 7.6                | 1.9   |
| 250       | 9.5                | 2.1   |
| 300       | 11.0               | 2.3   |
| 350       | 12.4               | 2.6   |
| 400       | 13.6               | 2.9   |
| 450       | 14.7               | 3.1   |
| 500       | 15.6               | 3.2   |
| 550       | 16.3               | 3.5   |
| 600       | 17.2               | 3.5   |
| 650       | 18.1               | 3.6   |
| 700       | 18.5               | 3.6   |
| 750       | 19.1               | 4.1   |
| 800       | 19.6               | 4.1   |
| 850       | 20.1               | 4.4   |
| 900       | 20.8               | 4.7   |
| 950       | 21.1               | 4.8   |
| 1000      | 21.6               | 4.9   |

| cable<br>loss 1<br>(inside<br>chamber) | cable<br>loss 2<br>(outside<br>chamber) | cable<br>loss 3<br>(switch<br>unit) | cable<br>loss 4<br>(to<br>receiver) | distance<br>corr.<br>(-20 dB/<br>decade) | $d_{\text{Limit}}$<br>(meas.<br>distance<br>(limit)) | $d_{\text{used}}$<br>(meas.<br>distance<br>(used)) |
|----------------------------------------|-----------------------------------------|-------------------------------------|-------------------------------------|------------------------------------------|------------------------------------------------------|----------------------------------------------------|
| dB                                     | dB                                      | dB                                  | dB                                  | dB                                       | m                                                    | m                                                  |
| 0.29                                   | 0.04                                    | 0.23                                | 0.02                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.39                                   | 0.09                                    | 0.32                                | 0.08                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.56                                   | 0.14                                    | 0.47                                | 0.08                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.73                                   | 0.20                                    | 0.59                                | 0.12                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.84                                   | 0.21                                    | 0.70                                | 0.11                                | 0.0                                      | 3                                                    | 3                                                  |
| 0.98                                   | 0.24                                    | 0.80                                | 0.13                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.04                                   | 0.26                                    | 0.89                                | 0.15                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.18                                   | 0.31                                    | 0.96                                | 0.13                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.28                                   | 0.35                                    | 1.03                                | 0.19                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.39                                   | 0.38                                    | 1.11                                | 0.22                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.44                                   | 0.39                                    | 1.20                                | 0.19                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.55                                   | 0.46                                    | 1.24                                | 0.23                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.59                                   | 0.43                                    | 1.29                                | 0.23                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.67                                   | 0.34                                    | 1.35                                | 0.22                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.67                                   | 0.42                                    | 1.41                                | 0.15                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.87                                   | 0.54                                    | 1.46                                | 0.25                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.90                                   | 0.46                                    | 1.51                                | 0.25                                | 0.0                                      | 3                                                    | 3                                                  |
| 1.99                                   | 0.60                                    | 1.56                                | 0.27                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.14                                   | 0.60                                    | 1.63                                | 0.29                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.22                                   | 0.60                                    | 1.66                                | 0.33                                | 0.0                                      | 3                                                    | 3                                                  |
| 2.23                                   | 0.61                                    | 1.71                                | 0.30                                | 0.0                                      | 3                                                    | 3                                                  |

( $d_{\text{Limit}} = 10 \text{ m}$ )

|      |      |      |
|------|------|------|
| 30   | 18.6 | -9.9 |
| 50   | 6.0  | -9.6 |
| 100  | 9.7  | -9.2 |
| 150  | 7.9  | -8.8 |
| 200  | 7.6  | -8.6 |
| 250  | 9.5  | -8.3 |
| 300  | 11.0 | -8.1 |
| 350  | 12.4 | -7.9 |
| 400  | 13.6 | -7.6 |
| 450  | 14.7 | -7.4 |
| 500  | 15.6 | -7.2 |
| 550  | 16.3 | -7.0 |
| 600  | 17.2 | -6.9 |
| 650  | 18.1 | -6.9 |
| 700  | 18.5 | -6.8 |
| 750  | 19.1 | -6.3 |
| 800  | 19.6 | -6.3 |
| 850  | 20.1 | -6.0 |
| 900  | 20.8 | -5.8 |
| 950  | 21.1 | -5.6 |
| 1000 | 21.6 | -5.6 |

|      |      |      |      |       |    |   |
|------|------|------|------|-------|----|---|
| 0.29 | 0.04 | 0.23 | 0.02 | -10.5 | 10 | 3 |
| 0.39 | 0.09 | 0.32 | 0.08 | -10.5 | 10 | 3 |
| 0.56 | 0.14 | 0.47 | 0.08 | -10.5 | 10 | 3 |
| 0.73 | 0.20 | 0.59 | 0.12 | -10.5 | 10 | 3 |
| 0.84 | 0.21 | 0.70 | 0.11 | -10.5 | 10 | 3 |
| 0.98 | 0.24 | 0.80 | 0.13 | -10.5 | 10 | 3 |
| 1.04 | 0.26 | 0.89 | 0.15 | -10.5 | 10 | 3 |
| 1.18 | 0.31 | 0.96 | 0.13 | -10.5 | 10 | 3 |
| 1.28 | 0.35 | 1.03 | 0.19 | -10.5 | 10 | 3 |
| 1.39 | 0.38 | 1.11 | 0.22 | -10.5 | 10 | 3 |
| 1.44 | 0.39 | 1.20 | 0.19 | -10.5 | 10 | 3 |
| 1.55 | 0.46 | 1.24 | 0.23 | -10.5 | 10 | 3 |
| 1.59 | 0.43 | 1.29 | 0.23 | -10.5 | 10 | 3 |
| 1.67 | 0.34 | 1.35 | 0.22 | -10.5 | 10 | 3 |
| 1.67 | 0.42 | 1.41 | 0.15 | -10.5 | 10 | 3 |
| 1.87 | 0.54 | 1.46 | 0.25 | -10.5 | 10 | 3 |
| 1.90 | 0.46 | 1.51 | 0.25 | -10.5 | 10 | 3 |
| 1.99 | 0.60 | 1.56 | 0.27 | -10.5 | 10 | 3 |
| 2.14 | 0.60 | 1.63 | 0.29 | -10.5 | 10 | 3 |
| 2.22 | 0.60 | 1.66 | 0.33 | -10.5 | 10 | 3 |
| 2.23 | 0.61 | 1.71 | 0.30 | -10.5 | 10 | 3 |

#### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + \text{AF (dB 1/m)} + \text{Corr. (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

distance correction =  $-20 \cdot \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

Linear interpolation will be used for frequencies in between the values in the table.

Tables show an extract of values.



#### 6.4 ANTENNA R&S HF907 (1 GHZ – 18 GHZ)

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 1000      | 24.4               | -19.4 |
| 2000      | 28.5               | -17.4 |
| 3000      | 31.0               | -16.1 |
| 4000      | 33.1               | -14.7 |
| 5000      | 34.4               | -13.7 |
| 6000      | 34.7               | -12.7 |
| 7000      | 35.6               | -11.0 |

| cable<br>loss 1<br>(relay +<br>cable<br>inside<br>chamber) | cable<br>loss 2<br>(outside<br>chamber) | cable<br>loss 3<br>(switch<br>unit,<br>atten-<br>uator &<br>pre-amp) | cable<br>loss 4 (to<br>receiver) |  |  |
|------------------------------------------------------------|-----------------------------------------|----------------------------------------------------------------------|----------------------------------|--|--|
| dB                                                         | dB                                      | dB                                                                   | dB                               |  |  |
| 0.99                                                       | 0.31                                    | -21.51                                                               | 0.79                             |  |  |
| 1.44                                                       | 0.44                                    | -20.63                                                               | 1.38                             |  |  |
| 1.87                                                       | 0.53                                    | -19.85                                                               | 1.33                             |  |  |
| 2.41                                                       | 0.67                                    | -19.13                                                               | 1.31                             |  |  |
| 2.78                                                       | 0.86                                    | -18.71                                                               | 1.40                             |  |  |
| 2.74                                                       | 0.90                                    | -17.83                                                               | 1.47                             |  |  |
| 2.82                                                       | 0.86                                    | -16.19                                                               | 1.46                             |  |  |

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 3000      | 31.0               | -23.4 |
| 4000      | 33.1               | -23.3 |
| 5000      | 34.4               | -21.7 |
| 6000      | 34.7               | -21.2 |
| 7000      | 35.6               | -19.8 |

| cable<br>loss 1<br>(relay<br>inside<br>chamber) | cable<br>loss 2<br>(inside<br>chamber) | cable<br>loss 3<br>(outside<br>chamber) | cable<br>loss 4<br>(switch<br>unit,<br>atten-<br>uator &<br>pre-amp) | cable<br>loss 5 (to<br>receiver) | used<br>for<br>FCC<br>15.247 |
|-------------------------------------------------|----------------------------------------|-----------------------------------------|----------------------------------------------------------------------|----------------------------------|------------------------------|
| dB                                              | dB                                     | dB                                      | dB                                                                   | dB                               |                              |
| 0.47                                            | 1.87                                   | 0.53                                    | -27.58                                                               | 1.33                             |                              |
| 0.56                                            | 2.41                                   | 0.67                                    | -28.23                                                               | 1.31                             |                              |
| 0.61                                            | 2.78                                   | 0.86                                    | -27.35                                                               | 1.40                             |                              |
| 0.58                                            | 2.74                                   | 0.90                                    | -26.89                                                               | 1.47                             |                              |
| 0.66                                            | 2.82                                   | 0.86                                    | -25.58                                                               | 1.46                             |                              |

| Frequency | AF<br>R&S<br>HF907 | Corr. |
|-----------|--------------------|-------|
| MHz       | dB (1/m)           | dB    |
| 7000      | 35.6               | -57.3 |
| 8000      | 36.3               | -56.3 |
| 9000      | 37.1               | -55.3 |
| 10000     | 37.5               | -56.2 |
| 11000     | 37.5               | -55.3 |
| 12000     | 37.6               | -53.7 |
| 13000     | 38.2               | -53.5 |
| 14000     | 39.9               | -56.3 |
| 15000     | 40.9               | -54.1 |
| 16000     | 41.3               | -54.1 |
| 17000     | 42.8               | -54.4 |
| 18000     | 44.2               | -54.7 |

| cable<br>loss 1<br>(relay<br>inside<br>chamber) | cable<br>loss 2<br>(High<br>Pass) | cable<br>loss 3<br>(pre-<br>amp) | cable<br>loss 4<br>(inside<br>chamber) | cable<br>loss 5<br>(outside<br>chamber) | cable<br>loss 6<br>(to<br>receiver) |
|-------------------------------------------------|-----------------------------------|----------------------------------|----------------------------------------|-----------------------------------------|-------------------------------------|
| dB                                              | dB                                | dB                               | dB                                     | dB                                      | dB                                  |
| 0.56                                            | 1.28                              | -62.72                           | 2.66                                   | 0.94                                    | 1.46                                |
| 0.69                                            | 0.71                              | -61.49                           | 2.84                                   | 1.00                                    | 1.53                                |
| 0.68                                            | 0.65                              | -60.80                           | 3.06                                   | 1.09                                    | 1.60                                |
| 0.70                                            | 0.54                              | -61.91                           | 3.28                                   | 1.20                                    | 1.67                                |
| 0.80                                            | 0.61                              | -61.40                           | 3.43                                   | 1.27                                    | 1.70                                |
| 0.84                                            | 0.42                              | -59.70                           | 3.53                                   | 1.26                                    | 1.73                                |
| 0.83                                            | 0.44                              | -59.81                           | 3.75                                   | 1.32                                    | 1.83                                |
| 0.91                                            | 0.53                              | -63.03                           | 3.91                                   | 1.40                                    | 1.77                                |
| 0.98                                            | 0.54                              | -61.05                           | 4.02                                   | 1.44                                    | 1.83                                |
| 1.23                                            | 0.49                              | -61.51                           | 4.17                                   | 1.51                                    | 1.85                                |
| 1.36                                            | 0.76                              | -62.36                           | 4.34                                   | 1.53                                    | 2.00                                |
| 1.70                                            | 0.53                              | -62.88                           | 4.41                                   | 1.55                                    | 1.91                                |

#### Sample calculation

$$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Tables show an extract of values.

## 6.5 ANTENNA EMCO 3160-09 (18 GHZ – 26.5 GHZ)

| Frequency | AF<br>EMCO<br>3160-09 | Corr. | cable<br>loss 1<br>(inside<br>chamber) | cable<br>loss 2<br>(pre-<br>amp) | cable<br>loss 3<br>(inside<br>chamber) | cable<br>loss 4<br>(switch<br>unit) | cable<br>loss 5<br>(to<br>receiver) |
|-----------|-----------------------|-------|----------------------------------------|----------------------------------|----------------------------------------|-------------------------------------|-------------------------------------|
| MHz       | dB (1/m)              | dB    | dB                                     | dB                               | dB                                     | dB                                  | dB                                  |
| 18000     | 40.2                  | -23.5 | 0.72                                   | -35.85                           | 6.20                                   | 2.81                                | 2.65                                |
| 18500     | 40.2                  | -23.2 | 0.69                                   | -35.71                           | 6.46                                   | 2.76                                | 2.59                                |
| 19000     | 40.2                  | -22.0 | 0.76                                   | -35.44                           | 6.69                                   | 3.15                                | 2.79                                |
| 19500     | 40.3                  | -21.3 | 0.74                                   | -35.07                           | 7.04                                   | 3.11                                | 2.91                                |
| 20000     | 40.3                  | -20.3 | 0.72                                   | -34.49                           | 7.30                                   | 3.07                                | 3.05                                |
| 20500     | 40.3                  | -19.9 | 0.78                                   | -34.46                           | 7.48                                   | 3.12                                | 3.15                                |
| 21000     | 40.3                  | -19.1 | 0.87                                   | -34.07                           | 7.61                                   | 3.20                                | 3.33                                |
| 21500     | 40.3                  | -19.1 | 0.90                                   | -33.96                           | 7.47                                   | 3.28                                | 3.19                                |
| 22000     | 40.3                  | -18.7 | 0.89                                   | -33.57                           | 7.34                                   | 3.35                                | 3.28                                |
| 22500     | 40.4                  | -19.0 | 0.87                                   | -33.66                           | 7.06                                   | 3.75                                | 2.94                                |
| 23000     | 40.4                  | -19.5 | 0.88                                   | -33.75                           | 6.92                                   | 3.77                                | 2.70                                |
| 23500     | 40.4                  | -19.3 | 0.90                                   | -33.35                           | 6.99                                   | 3.52                                | 2.66                                |
| 24000     | 40.4                  | -19.8 | 0.88                                   | -33.99                           | 6.88                                   | 3.88                                | 2.58                                |
| 24500     | 40.4                  | -19.5 | 0.91                                   | -33.89                           | 7.01                                   | 3.93                                | 2.51                                |
| 25000     | 40.4                  | -19.3 | 0.88                                   | -33.00                           | 6.72                                   | 3.96                                | 2.14                                |
| 25500     | 40.5                  | -20.4 | 0.89                                   | -34.07                           | 6.90                                   | 3.66                                | 2.22                                |
| 26000     | 40.5                  | -21.3 | 0.86                                   | -35.11                           | 7.02                                   | 3.69                                | 2.28                                |
| 26500     | 40.5                  | -21.1 | 0.90                                   | -35.20                           | 7.15                                   | 3.91                                | 2.36                                |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

## 6.6 ANTENNA EMCO 3160-10 (26.5 GHZ – 40 GHZ)

| Frequency<br>GHz | AF<br>EMCO<br>3160-10<br>dB (1/m) | Corr.<br>dB | cable<br>loss 1<br>(inside<br>chamber)<br>dB | cable<br>loss 2<br>(outside<br>chamber)<br>dB | cable<br>loss 3<br>(switch<br>unit)<br>dB | cable<br>loss 4<br>(to<br>receiver)<br>dB | distance<br>corr.<br>(-20 dB/<br>decade)<br>dB | d <sub>Limit</sub><br>(meas.<br>distance<br>(limit)<br>m | d <sub>used</sub><br>(meas.<br>distance<br>(used)<br>m |
|------------------|-----------------------------------|-------------|----------------------------------------------|-----------------------------------------------|-------------------------------------------|-------------------------------------------|------------------------------------------------|----------------------------------------------------------|--------------------------------------------------------|
| 26.5             | 43.4                              | -11.2       | 4.4                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 27.0             | 43.4                              | -11.2       | 4.4                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 28.0             | 43.4                              | -11.1       | 4.5                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 29.0             | 43.5                              | -11.0       | 4.6                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 30.0             | 43.5                              | -10.9       | 4.7                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 31.0             | 43.5                              | -10.8       | 4.7                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 32.0             | 43.5                              | -10.7       | 4.8                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 33.0             | 43.6                              | -10.7       | 4.9                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 34.0             | 43.6                              | -10.6       | 5.0                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 35.0             | 43.6                              | -10.5       | 5.1                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 36.0             | 43.6                              | -10.4       | 5.1                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 37.0             | 43.7                              | -10.3       | 5.2                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 38.0             | 43.7                              | -10.2       | 5.3                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 39.0             | 43.7                              | -10.2       | 5.4                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |
| 40.0             | 43.8                              | -10.1       | 5.5                                          |                                               |                                           |                                           | -15.6                                          | 3                                                        | 0.5                                                    |

### Sample calculation

$E \text{ (dB } \mu\text{V/m)} = U \text{ (dB } \mu\text{V)} + AF \text{ (dB 1/m)} + Corr. \text{ (dB)}$

U = Receiver reading

AF = Antenna factor

Corr. = sum of single correction factors of used cables, switch unit, distance correction, amplifier (if applicable)

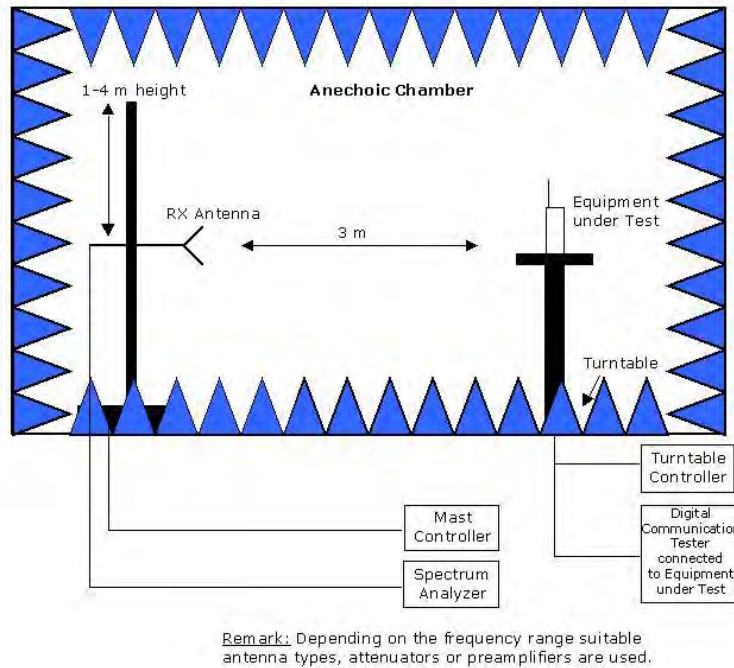
Linear interpolation will be used for frequencies in between the values in the table.

distance correction =  $-20 * \text{LOG} (d_{\text{Limit}} / d_{\text{used}})$

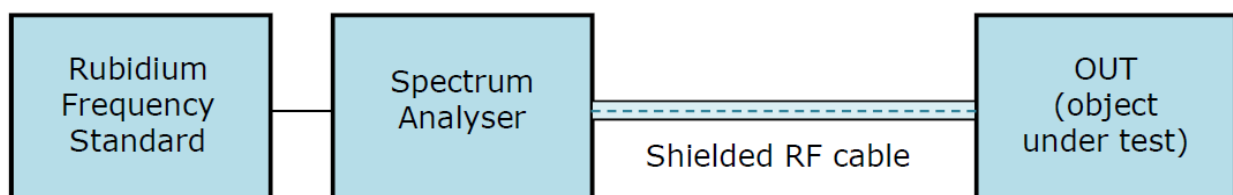
Linear interpolation will be used for frequencies in between the values in the table.

Table shows an extract of values.

## 7 SETUP DRAWINGS



Drawing 1: Setup in the Anechoic chamber. For measurements below 1 GHz the ground was replaced by a conducting groundplane.



Drawing 2: Setup for conducted radio tests.

## 8 MEASUREMENT UNCERTAINTIES

| Test Case                            | Parameter          | Uncertainty                    |
|--------------------------------------|--------------------|--------------------------------|
| AC Power Line                        | Power              | $\pm 3.4$ dB                   |
| Field Strength of spurious radiation | Power              | $\pm 5.5$ dB                   |
| 6 dB / 26 dB / 99% Bandwidth         | Power<br>Frequency | $\pm 2.9$ dB<br>$\pm 11.2$ kHz |
| Conducted Output Power               | Power              | $\pm 2.2$ dB                   |
| Band Edge Compliance                 | Power<br>Frequency | $\pm 2.2$ dB<br>$\pm 11.2$ kHz |
| Frequency Stability                  | Frequency          | $\pm 25$ Hz                    |
| Power Spectral Density               | Power              | $\pm 2.2$ dB                   |

## 9 PHOTO REPORT

Please see separate photo report.