



Inter**Lab**[®]

FCC Measurement/Technical Report on

Bluetooth transceiver
ELF

Report Reference: MDE_DataI_0901_FCCa

Test Laboratory:

7 layers AG
Borsigstrasse 11
40880 Ratingen
Germany
email: info@7Layers.de



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 testing laboratory.

7 layers AG
Borsigstrasse 11
40880 Ratingen, Germany
Phone: +49 (0) 2102 749 0
Fax: +49 (0) 2102 749 350
www.7Layers.com

Aufsichtsratsvorsitzender •
Chairman of the Supervisory Board:
Markus Becker
Vorstand • Board:
Dr. H.-J. Meckelburg
Wilfried Klassmann

Registergericht • registered in:
Düsseldorf, HRB 44096
USt-IdNr • VAT No.:
DE 203159652
TAX No. 147/5869/0385

InterLab[®] is a registered trademark of 7 layers AG



Table of Contents

0 Summary	3
0.1 Technical Report Summary	3
0.2 Measurement Summary	4
1 Administrative Data	7
1.1 Testing Laboratory	7
1.2 Project Data	7
1.3 Applicant Data	7
1.4 Manufacturer Data	7
2 Test object Data	8
2.1 General EUT Description	8
2.2 EUT Main components	9
2.3 Ancillary Equipment	9
2.4 Auxiliary Equipment	9
2.5 EUT Setups	10
2.6 Operating Modes	10
2.7 Product labelling	10
3 Test Results	11
3.1 Conducted emissions (AC power line)	11
3.2 Occupied bandwidth	13
3.3 Peak power output	16
3.4 Spurious RF conducted emissions	19
3.5 Spurious radiated emissions	22
3.6 Band edge compliance	28
3.7 Dwell time	32
3.8 Channel separation	34
3.9 Number of hopping frequencies	36
4 Test Equipment	37
5 Photo Report	44
6 Setup Drawings	48
7 Annex measurement plots	49
7.1 AC Mains conducted	49
7.2 Occupied bandwidth	50
7.3 Peak power output	53
7.4 Band edge compliance conducted and Spurious RF conducted emissions	56
7.5 Band edge compliance radiated	62
7.6 Radiated emissions (f < 30 MHz)	63
7.7 Dwell time	65
7.8 Channel separation	66
7.9 Number of hopping frequencies	67



0 Summary

0.1 Technical Report Summary

Type of Authorization

Certification for an Intentional Radiator (Frequency Hopping Spread Spectrum).

Applicable FCC Rules

Prepared in accordance with the requirements of FCC Rules and Regulations as listed in 47 CFR Ch.1 Parts 2 (10-1-09 Edition) and 15 (10-1-09 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 and 5725-5850 MHz

Note:

The tests were selected and performed with reference to the FCC Public Notice DA 00-705, released March 30, 2000.

Instead of applying ANSI C63.4-1992 which is referenced in the FCC Public Note, the newer ANSI C63.4-2003 is applied.

Summary Test Results:

The EUT complied with all performed tests as listed in chapter 0.2 Measurement Summary.



0.2 Measurement Summary

FCC Part 15, Subpart C § 15.207

Conducted emissions (AC power line)			
The measurement was performed according to ANSI C63.4			
OP-Mode	Setup	Port	Final Result
op-mode 2-co	Setup_04	AC Port (power line)	2003 passed

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

Occupied bandwidth			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_03	Temp ant.connector	10-1-09 Edition passed
op-mode 2	Setup_03	Temp ant.connector	passed
op-mode 3	Setup_03	Temp ant.connector	passed
op-mode 6	Setup_03	Temp ant.connector	passed
op-mode 7	Setup_03	Temp ant.connector	passed
op-mode 8	Setup_03	Temp ant.connector	passed
op-mode 10	Setup_03	Temp ant.connector	passed
op-mode 11	Setup_03	Temp ant.connector	passed
op-mode 12	Setup_03	Temp ant.connector	passed

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

Peak power output			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_03	Temp ant.connector	10-1-09 Edition passed
op-mode 2	Setup_03	Temp ant.connector	passed
op-mode 3	Setup_03	Temp ant.connector	passed
op-mode 6	Setup_03	Temp ant.connector	passed
op-mode 7	Setup_03	Temp ant.connector	passed
op-mode 8	Setup_03	Temp ant.connector	passed
op-mode 10	Setup_03	Temp ant.connector	passed
op-mode 11	Setup_03	Temp ant.connector	passed
op-mode 12	Setup_03	Temp ant.connector	passed

FCC Part 15, Subpart C § 15.247 (d)

Spurious RF conducted emissions			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_03	Temp ant.connector	10-1-09 Edition passed
op-mode 2	Setup_03	Temp ant.connector	passed
op-mode 3	Setup_03	Temp ant.connector	passed
op-mode 6	Setup_03	Temp ant.connector	passed
op-mode 7	Setup_03	Temp ant.connector	passed
op-mode 8	Setup_03	Temp ant.connector	passed
op-mode 10	Setup_03	Temp ant.connector	passed
op-mode 11	Setup_03	Temp ant.connector	passed
op-mode 12	Setup_03	Temp ant.connector	passed



FCC Part 15, Subpart C

§ 15.247 (d), § 15.35 (b), § 15.209

Spurious radiated emissions

The measurement was performed according to ANSI C63.4

2003

OP-Mode	Setup	Port	Final Result
op-mode 1-co	Setup_01/02	Enclosure	passed
op-mode 2-co	Setup_01/02	Enclosure	passed
op-mode 3-co	Setup_01/02	Enclosure	passed
op-mode 6-co	Setup_02	Enclosure	passed
op-mode 7-co	Setup_02	Enclosure	passed
op-mode 8-co	Setup_02	Enclosure	passed
op-mode 10-co	Setup_02	Enclosure	passed
op-mode 11-co	Setup_02	Enclosure	passed
op-mode 12-co	Setup_02	Enclosure	passed

FCC Part 15, Subpart C

§ 15.247 (d)

Band edge compliance

The measurement was performed according to FCC § 15.31 / ANSI C63.4

10-1-09 Edition / 2003

OP-Mode	Setup	Port	Final Result
op-mode 1	Setup_03	Temp ant.connector	passed
op-mode 3	Setup_03	Temp ant.connector	passed
op-mode 3-co	Setup_02	Enclosure	passed
op-mode 6	Setup_03	Temp ant.connector	passed
op-mode 8	Setup_03	Temp ant.connector	passed
op-mode 8-co	Setup_02	Enclosure	passed
op-mode 10	Setup_03	Temp ant.connector	passed
op-mode 12	Setup_03	Temp ant.connector	passed
op-mode 12-co	Setup_02	Enclosure	passed

FCC Part 15, Subpart C **§ 15.247 (a) (1) (iii)**

Dwell time			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 2	Setup_03	Temp ant.connector	10-1-09 Edition passed

FCC Part 15, Subpart C **§ 15.247 (a) (1)**

Channel separation			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 4	Setup_03	Temp ant.connector	10-1-09 Edition passed

FCC Part 15, Subpart C **§ 15.247 (a) (iii)**

Number of hopping frequencies			
The measurement was performed according to FCC § 15.31			
OP-Mode	Setup	Port	Final Result
op-mode 4	Setup_03	Temp ant.connector	10-1-09 Edition passed

Important Note:

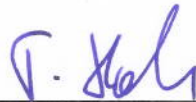
The radiated tests (spurious radiated emissions and band edge compliance) are performed in a scenario where the Bluetooth transmitter is operating simultaneously with the WLAN transmitter.

But the scope of this test report is only Bluetooth radio functionality.



7 layers AG, Borsigstr. 11
40880 Ratingen, Germany
Phone +49 (0)2102 749 0

Responsible for
Accreditation Scope:



Responsible
for Test Report:





1 Administrative Data

1.1 Testing Laboratory

Company Name: 7 Layers AG
Address Borsigstr. 11
40880 Ratingen
Germany

This facility has been fully described in a report submitted to the FCC and accepted under the registration number 96716.

The test facility is also accredited by the following accreditation organisation:
- Deutscher Akkreditierungs Rat DAR-Registration no. DGA-PL-192/99-02

Responsible for Accreditation Scope: Dipl.-Ing. Bernhard Retka
Dipl.-Ing. Robert Machulec
Dipl.-Ing. Thomas Hoell
Dipl.-Ing. Andreas Petz

Report Template Version: 2010-05-07

1.2 Project Data

Responsible for testing and report: Dipl.-Ing. Andreas Petz
Date of Test(s): 2010-04-23 to 2010-05-05
Date of Report: 2010-05-10

1.3 Applicant Data

Company Name: Datalogic Mobile s.r.l.
Address: Via S. Vitalino, 13
Lippo di Calderara di Reno
40012 Bologna
Italy
Contact Person: Mr. Davide E. Vaccaneo

1.4 Manufacturer Data

Company Name: please see applicant data
Address:
Contact Person:



2 Test object Data

2.1 General EUT Description

Equipment under Test	Bluetooth transceiver
Type Designation:	ELF
Kind of Device: (optional)	Handheld Mobile Computer (PDA) incorporating Bluetooth radio application
Voltage Type:	AC / DC (of AC/DC converter) / DC (internal battery)
Voltage level:	120 V / 5.0 V / Li-Ion 3.7 V / 3 Ah
Modulation Type:	GFSK, 8DPSK, $\pi/4$ DQPSK

General product description:

Bluetooth is a short-range radio link intended to be a cable replacement between portable and/or fixed electronic devices.

Bluetooth operates in the unlicensed ISM Band at 2.4 GHz. In the US a band of 83.5 MHz width is available. In this band, the Bluetooth technology defines 79 RF channels spaced 1 MHz (2402 - 2480 MHz). The actual RF channel is chosen from a pseudo-random hopping sequence through the 79 channels. A channel is occupied for a defined amount of time slots, with a nominal slot length of 625 μ s. The maximum time slot length on one channel is defined by the packet type and is 0.625 ms for DH1 packets, 1.875 ms for DH3 and 3.125 ms for DH5. The nominal hop rate is 1600 hops/s for DH1, 1600/3 for DH3 and 1600/5 for DH5. All frequencies are equally used. The maximum nominal average time of occupancy is 0.4 s within a period of 79*0.4 seconds.

The basic data rate of 1 Mbps uses GFSK modulation and the enhanced data rate uses PSK modulation. For the enhanced data rate of 3 Mbps 8DPSK modulation and of 2 Mbps $\pi/4$ DQPSK modulation is used.

Specific product description for the EUT:

The EUT is a handheld mobile computer (PDA) which uses Bluetooth technology to setup radio links to other Bluetooth devices.
The EUT (this sample as a variant) includes also a WLAN module which is not covered by this test report. Some tests are performed while WLAN is also active when results are re-used for other purposes.

The EUT provides the following ports:

Ports

Temp antenna connector
Enclosure
USB Port (connectable to AC power line)
System Connector (to Cradle)
AC port (by Ancillary)

The main components of the EUT are listed and described in Chapter 2.2.

2.2 EUT Main components

Type, S/N, Short Descriptions etc. used in this Test Report

Short Description	Equipment under Test	Type Designation	Serial No.	HW Status	SW Status	Date of Receipt
EUT A (Code: EX000bc03)	Bluetooth transceiver	ELF	D10P00131	1.0	1.0 RC3	2010-04-22
Remark: EUT A is equipped with an integral antenna (gain = 4.5 dBi).						
EUT B (Code: EX003da01)	Bluetooth transceiver	ELF	D10P00085	1.0	1.0 RC3	2010-03-08
Remark: EUT B is equipped with a temporary antenna connector.						
EUT C (Code: EX000bc04)	Bluetooth transceiver	ELF	D10P00131	1.0	1.0 RC4	2010-05-03
Remark: EUT C is identical to EUT A besides the software was updated.						

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

2.3 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.

Short Description	Equipment under Test	Type Designation	Serial no.	HW Status	SW Status	FCC ID
AE 1 (Code: EX201USBC01)	AC/DC adapter "USB"	Phihong Switching power supply PSM08R-050	P85201119A1	(100-240 V / 300 mA 5 V / 1600 mA)	-	-

2.4 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.

Short Description	Equipment under Test	Type Designation	Serial no.	HW Status	SW Status	FCC ID
-						



2.5 EUT Setups

This chapter describes the combination of EUTs and ancillary equipment used for testing.

Setup No.	Combination of EUTs	Description
Setup_01	EUT A	setup for radiated measurements
Setup_02	EUT C	setup for radiated measurements
Setup_03	EUT B	setup for conducted measurements (temp. ant. connector)
Setup_04	EUT C + AE 1	setup for conducted measurements at AC port

2.6 Operating Modes

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

Op. Mode	Description of Operating Modes	Remarks
op-mode 1	The EUT transmits on 2402 MHz	Local TX mode, basic data rate 1 Mbps
op-mode 1-co	same as op-mode 1 + WLAN on 2462 MHz	same as op-mode 1 + WLAN 802.11g 6 Mbps
op-mode 2	The EUT transmits on 2441 MHz	Local TX mode, basic data rate 1 Mbps
op-mode 2-co	same as op-mode 2 + WLAN on 2437 MHz	same as op-mode 1 + WLAN 802.11g 6 Mbps
op-mode 3	The EUT transmits on 2480 MHz	Local TX mode, basic data rate 1 Mbps
op-mode 3-co	same as op-mode 3 + WLAN on 2412 MHz	same as op-mode 1 + WLAN 802.11g 6 Mbps
op-mode 4	The EUT is in hopping mode	The EUT is hopping on 79 channels, 1 Mbps
op-mode 5	not used	–
op-mode 6	The EUT transmits on 2402 MHz	Local TX mode, enhanced data rate 3 Mbps
op-mode 6-co	same as op-mode 6 + WLAN on 5260 MHz	same as op-mode 1 + WLAN 802.11a 6 Mbps
op-mode 7	The EUT transmits on 2441 MHz	Local TX mode, enhanced data rate 3 Mbps
op-mode 7-co	same as op-mode 7 + WLAN on 5500 MHz	same as op-mode 1 + WLAN 802.11a 6 Mbps
op-mode 8	The EUT transmits on 2480 MHz	Local TX mode, enhanced data rate 3 Mbps
op-mode 8-co	same as op-mode 8 + WLAN on 5825 MHz	same as op-mode 1 + WLAN 802.11a 6 Mbps
op-mode 9	not used	–
op-mode 10	The EUT transmits on 2402 MHz	Local TX mode, enhanced data rate, 2 Mbps
op-mode 10-co	same as op-mode 10 + WLAN on 2462 MHz	same as op-mode 1 + WLAN 802.11b 1 Mbps
op-mode 11	The EUT transmits on 2441 MHz	Local TX mode, enhanced data rate, 2 Mbps
op-mode 11-co	same as op-mode 11 + WLAN on 2437 MHz	same as op-mode 1 + WLAN 802.11b 1 Mbps
op-mode 12	The EUT transmits on 2480 MHz	Local TX mode, enhanced data rate, 2 Mbps
op-mode 12-co	same as op-mode 12 + WLAN on 2412 MHz	same as op-mode 1 + WLAN 802.11b 1 Mbps

2.7 Product labelling

2.7.1 FCC ID label

Please refer to the documentation of the applicant.

2.7.2 Location of the label on the EUT

Please refer to the documentation of the applicant.



3 Test Results

3.1 Conducted emissions (AC power line)

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: ANSI C 63.4, 2003

3.1.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. 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 μ 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 ES-K1 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
- Frequency range: 150 kHz – 30 MHz
- Frequency steps: 5 kHz
- IF-Bandwidth: 9 kHz
- Measuring time / Frequency step: 20 ms
- 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.



3.1.2 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).

3.1.3 Test Protocol

Temperature: 25 °C
 Air Pressure: 1016 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 2-co	Setup_04	AC Port (power line)

Power line	Frequency MHz	Measured value dBµV	Delta to limit dBµV	Remarks
-	-	-	-	-

Remark: No final measurement was performed because no frequencies (peaks) were found within the offset for acceptance analysis during the preliminary scan. Please see annex for the measurement plot.

3.1.4 Test result: Conducted emissions (AC power line)

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 2-co	passed



3.2 Occupied bandwidth

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.31

3.2.1 Test Description

The Equipment Under Test (EUT) was setup 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 produces the worst-case (widest) occupied bandwidth. The resolution bandwidth for measuring the reference level and the occupied bandwidth was 30 kHz.

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

3.2.2 Test Requirements / Limits

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

Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater. Alternatively, frequency hopping systems operating in the 2400–2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. The system shall hop to channel frequencies that are selected at the system hopping rate from a pseudo randomly ordered list of hopping frequencies. Each frequency must be used equally on the average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their corresponding transmitters and shall shift frequencies in synchronization with the transmitted signals.

Implication by the test laboratory:

Since the Bluetooth technology defines a fixed channel separation of 1 MHz this design parameter defines the maximum allowed occupied bandwidth depending on the EUT's output power:

1. Under the provision that the system operates with an output power not greater than 125 mW (21.0 dBm):
Implicit Limit: Max. 20 dB BW = $1.0 \text{ MHz} / 2/3 = 1.5 \text{ MHz}$
2. If the system output power exceeds 125 mW (21.0 dBm):
Implicit Limit: Max. 20 dB BW = 1.0 MHz

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

The measured output power of the system is below 125 mW (21.0 dBm).

For the results, please refer to the related chapter of this report.

Therefore the limit is determined as 1.5 MHz.

3.2.3 Test Protocol

Temperature: 23 °C
 Air Pressure: 1020 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 1	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
0.890	-

Remark: None

Op. Mode	Setup	Port
op-mode 2	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
0.896	-

Remark: None

Op. Mode	Setup	Port
op-mode 3	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
0.896	-

Remark: None

Op. Mode	Setup	Port
op-mode 6	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.228	-

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 7	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.246	-

Remark: Please see annex for the measurement plot.



Op. Mode	Setup	Port
op-mode 8	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.252	-

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 10	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.221	-

Remark: None

Op. Mode	Setup	Port
op-mode 11	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.221	-

Remark: None

Op. Mode	Setup	Port
op-mode 12	Setup_03	Temp ant.connector

20 dB bandwidth MHz	Remarks
1.221	-

Remark: None

3.2.4 Test result: Occupied bandwidth

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 6	passed
	op-mode 7	passed
	op-mode 8	passed
	op-mode 10	passed
	op-mode 11	passed
	op-mode 12	passed



3.3 Peak power output

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.31

3.3.1 Test Description

The Equipment Under Test (EUT) was set up to perform the output power measurements. The resolution bandwidth for measuring the output power was set to 3 MHz. The reference level of the spectrum analyzer was set higher than the output power of the EUT. The EUT was connected to the spectrum analyzer via a short coax cable with a known loss.

3.3.2 Test Requirements / Limits

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

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(1) For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels, and all frequency hopping systems in the 5725-5850 MHz band: 1 watt.

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

==> Maximum Output Power: 30 dBm

3.3.3 Test Protocol

Temperature: 23 °C
 Air Pressure: 1020 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 1	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.9	The EIRP including antenna gain (4.5 dBi) is 3.6 dBm

Remark: None

Op. Mode	Setup	Port
op-mode 2	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.7	The EIRP including antenna gain (4.5 dBi) is 3.8 dBm

Remark: None

Op. Mode	Setup	Port
op-mode 3	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.6	The EIRP including antenna gain (4.5 dBi) is 3.9 dBm

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 6	Setup_03	Temp.ant.connector

Output power dBm	Remarks
0.0	The EIRP including antenna gain (4.5 dBi) is 4.5 dBm

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 7	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.4	The EIRP including antenna gain (4.5 dBi) is 4.1 dBm

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 8	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-1.0	The EIRP including antenna gain (4.5 dBi) is 3.5 dBm

Remark: None



Op. Mode	Setup	Port
op-mode 10	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.2	The EIRP including antenna gain (4.5 dBi) is 4.3 dBm

Remark: None

Op. Mode	Setup	Port
op-mode 11	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-0.6	The EIRP including antenna gain (4.5 dBi) is 3.9 dBm

Remark: None

Op. Mode	Setup	Port
op-mode 12	Setup_03	Temp.ant.connector

Output power dBm	Remarks
-1.2	The EIRP including antenna gain (4.5 dBi) is 3.3 dBm

Remark: None

3.3.4 Test result: Peak power output

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 6	passed
	op-mode 7	passed
	op-mode 8	passed
	op-mode 10	passed
	op-mode 11	passed
	op-mode 12	passed



3.4 Spurious RF conducted emissions

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: FCC §15.31

3.4.1 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:

- Detector: Peak-Maxhold
- Frequency range: 30 – 25000 MHz
- Resolution Bandwidth (RBW): 100 kHz
- Video Bandwidth (VBW): 300 kHz
- Sweep Time: 330 s

The reference value for the measurement of the spurious RF conducted emissions is determined during the test “band edge compliance” (cf. chapter 3.6). This value is used to calculate the 20 dBc limit.

3.4.2 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.

3.4.3 Test Protocol

Temperature: 23 °C
 Air Pressure: 1020 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 1	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-0.9	-20.9	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 2	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-0.8	-20.8	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 3	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-0.7	-20.7	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 6	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-0.6	-20.6	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 7	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-1.3	-21.3	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 8	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-1.9	-21.9	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 10	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-0.9	-20.9	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 11	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-1.3	-21.3	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.

Op. Mode	Setup	Port
op-mode 12	Setup_03	Temp ant.connector

Frequency MHz	Corrected measurement value dBm	Reference value dBm	Limit dBm	Delta to limit dB
-	-	-1.9	-21.9	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
Please see annex for the measurement plot.

3.4.4 Test result: Spurious RF conducted emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1	passed
	op-mode 2	passed
	op-mode 3	passed
	op-mode 6	passed
	op-mode 7	passed
	op-mode 8	passed
	op-mode 10	passed
	op-mode 11	passed
	op-mode 12	passed

3.5 Spurious radiated emissions

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: ANSI C 63.4, 2003

3.5.1 Test Description

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table 1.0 x 2.0 m in the semi-anechoic chamber. The test was performed at the distance of 3 m between the EUT and the receiving antenna.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S.

1. Measurement up to 30 MHz

The test set-up was made in accordance to the general provisions of ANSI C 63.4-2003. The Equipment Under Test (EUT) was set up on a non-conductive table in the anechoic chamber.

The radiated emissions measurements were made in a typical installation configuration. The measurement procedure is implemented into the EMI test software ES-K1 from R&S. The Loop antenna HFH2-Z2 is used.

Step 1: pre-measurement

- Anechoic chamber
- Antenna distance: 10 m
- Detector: Peak-Maxhold
- Frequency range: 0.009 - 0.15 and 0.15 – 30 MHz
- Frequency steps: 0.1 kHz and 5 kHz
- IF-Bandwidth: 0.2 kHz and 10 kHz
- Measuring time / Frequency step: 100 ms

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: 200 Hz - 10 kHz
- Measuring time / Frequency step: 100 ms

2. Measurement above 30 MHz and up to 1 GHz

Step 1: Preliminary scan

Preliminary test to identify the highest amplitudes relative to the limit.

Settings for step 1:

- Detector: Peak-Maxhold
- Frequency range: 30 – 1000 MHz
- Frequency steps: 60 kHz
- IF-Bandwidth: 120 kHz
- Measuring time / Frequency step: 100 μ s (BT Timing 1.25 ms)

- Turntable angle range: -180 to 180°
- Turntable step size: 90°
- 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: second 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 out the approximate turntable angle and antenna height for each frequency.

- Detector: Peak – Maxhold
- Measured frequencies: in step 1 determined frequencies
- IF – Bandwidth: 120 kHz
- Measuring time: 100 ms
- Turntable angle range: -180 to 180°
- Turntable step size: 45°
- Height variation range: 1 – 4 m
- Height variation step size: 0.5 m
- Polarisation: horizontal + vertical

After this step the EMI test system has determined the following values for each frequency (of step 1):

- Frequency
- Azimuth value (of turntable)
- Antenna height

The last two values have now the following accuracy:

- Azimuth value (of turntable): 45°
- Antenna height: 0.5 m

Step 3: final 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 be slowly varied by $\pm 22.5^\circ$ 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 is also slowly varied by ± 25 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: -22.5° to $+ 22.5^\circ$ around the determined value
- Height variation range: -0.25 m to $+ 0.25$ m around the determined value

Step 4: 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



3. Measurement above 1 GHz

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

The measurement distance was reduced to 1 m. The results were extrapolated by the extrapolation factor of 20 dB/decade (inverse linear-distance for field strength measurements, inverse linear-distance squared for the power reference level measurements). Due to the fact that in this frequency range a double ridged wave guided horn antenna (up to 18 GHz) and a horn antenna (18-25 GHz) are used, the steps 2-4 are omitted. Step 1 was performed with one height of the receiving antenna only.

EMI receiver settings:

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

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.

For the enhanced data rate packets the test is performed as worst-case-check in order to verify that emissions have a comparable level as found at basic data rate. Typically, the measurement for these packets is performed in the frequency range 1 to 8 GHz but it depends on the emissions found during the test for the basic data rate. Please refer to the results for the used frequency range.

3.5.2 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 (µV/m)	Measurement distance (m)	Limit(dBµV/m @10m)
0.009 – 0.49	2400/F(kHz)	300	Limit (dBµV/m)+30dB
0.49 – 1.705	24000/F(kHz)	30	Limit (dBµV/m)+10dB
1.705 - 30	30	30	Limit (dBµV/m)+10dB

Frequency in MHz	Limit (µV/m)	Measurement distance (m)	Limit (dBµV/m)
30 - 88	100	3	40.0
88 - 216	150	3	43.5
216 - 960	200	3	46.0
above 960	500	3	54.0

§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: $\text{Limit (dBµV/m)} = 20 \log (\text{Limit (µV/m)}/1\mu\text{V/m})$

3.5.3 Test Protocol

Temperature: 23 – 26 °C
 Air Pressure: 1007 – 1023 hPa
 Humidity: 27 – 35 %

3.5.3.1 Measurement up to 30 MHz

Op. Mode	Setup	Port
op-mode 2-co	Setup_02	Enclosure

Polarisation	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
0°	-	-	-	-	-	-	-	-	-
90°	-	-	-	-	-	-	-	-	-

Remark: No (further) spurious emissions in the range 20 dB below the limit found therefore step 2 was not performed. The found peaks at 91.2 / 99.2 kHz are emissions from loop antenna's power supply. Please see annex for the measurement plots.

3.5.3.2 Measurement above 30 MHz

Op. Mode	Setup	Port
op-mode 1-co	Setup_01/02	Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	1326	-	45.5	35.1	-	74.0	54.0	28.5	18.9
Hor. + Vert.	1602	-	47.1	35.2	-	74.0	54.0	26.9	18.8
Hor. + Vert.	2344	-	54.6	40.3	-	74.0	54.0	19.4	13.7
Hor. + Vert.	2389	-	53.9	39.7	-	74.0	54.0	20.1	14.3
Hor. + Vert.	2484	-	63.7	46.7	-	74.0	54.0	10.3	7.3
Hor. + Vert.	4924	-	46.6	34.0	-	74.0	54.0	27.5	20.0

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement is performed for setup_01 at frequency ranges: 30 MHz - 1 GHz, 5 GHz - 18 GHz and for setup_02 at frequency ranges: 1 GHz - 5 GHz, 18 GHz - 25 GHz.

Op. Mode	Setup	Port
op-mode 2-co	Setup_01/02	Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/m	Limit dBµV/m	Limit dBµV/m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	1170	-	44.5	34.1	-	74.0	54.0	29.5	19.9
Hor. + Vert.	1326	-	44.6	34.9	-	74.0	54.0	27.4	19.1
Hor. + Vert.	2344	-	53.7	41.1	-	74.0	54.0	20.3	12.9
Hor. + Vert.	4874	-	48.7	36.0	-	74.0	54.0	25.3	18.0

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement is performed for setup_01 at frequency ranges: 30 MHz - 1 GHz, 5 GHz - 18 GHz and for setup_02 at frequency ranges: 1 GHz - 5 GHz, 18 GHz - 25 GHz.

Op. Mode **Setup** **Port**
 op-mode 3-co Setup_01/02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	1326	-	45.3	35.3	-	74.0	54.0	28.7	18.7
Hor. + Vert.	2330	-	52.0	39.7	-	74.0	54.0	22.0	14.3
Hor. + Vert.	2390	-	57.9	43.8	-	74.0	54.0	16.1	10.2
Hor. + Vert.	2484	-	56.9	41.5	-	74.0	54.0	17.1	12.5
Hor. + Vert.	4824	-	56.1	43.2	-	74.0	54.0	17.9	10.8

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement is performed for setup_01 at frequency ranges: 30 MHz - 1 GHz, 5 GHz - 18 GHz
 and for setup_02 at frequency ranges: 1 GHz - 5 GHz, 18 GHz - 25 GHz.

Op. Mode **Setup** **Port**
 op-mode 6-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	1602	-	46.9	39.0	-	74.0	54.0	27.1	15.0
Hor. + Vert.	2400	-	60.9	48.0	-	74.0	54.0	13.3	6.0

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 15 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.

Op. Mode **Setup** **Port**
 op-mode 7-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	3666	-	39.3	35.9	-	74.0	54.0	34.7	18.1
Hor. + Vert.	11002	-	47.9	35.1	-	74.0	54.0	26.1	18.9

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 15 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.

Op. Mode **Setup** **Port**
 op-mode 8-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	2483	-	53.4	39.6	-	74.0	54.0	20.6	14.4
Hor. + Vert.	3883	-	39.3	35.4	-	74.0	54.0	34.7	18.6
Hor. + Vert.	5850	-	62.4	43.2	-	74.0	54.0	11.6	10.8

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 15 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.



Op. Mode **Setup** **Port**
 op-mode 10-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	1305	-	46.4	34.6	-	74.0	54.0	27.6	19.4
Hor. + Vert.	4924	-	51.6	50.4	-	74.0	54.0	22.4	3.6

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 8 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.

Op. Mode **Setup** **Port**
 op-mode 11-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	2344	-	52.5	38.7	-	74.0	54.0	21.5	15.3
Hor. + Vert.	4874	-	51.6	49.7	-	74.0	54.0	22.4	4.3

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 8 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.

Op. Mode **Setup** **Port**
 op-mode 12-co Setup_02 Enclosure

Polarisation Horizontal / Vertical	Frequency MHz	Corrected value dBµV/m			Limit dBµV/ m	Limit dBµV/ m	Limit dBµV/ m	Delta to limit dB	Delta to limit dB
		QP	Peak	AV	QP	Peak	AV	QP/Peak	AV
Hor. + Vert.	2387	-	52.6	39.2	-	74.0	54.0	21.4	14.8
Hor. + Vert.	4824	-	52.7	51.5	-	74.0	54.0	21.3	2.5

Remark: No (further) spurious emissions in the range 20 dB below the limit found.
 The measurement was performed from 1 GHz up to 8 GHz because no significant spurious emissions were found outside this frequency range in op-mode 1-co, 2-co and 3-co.

3.5.4 Test result: Spurious radiated emissions

FCC Part 15, Subpart C	Op. Mode	Result
	op-mode 1-co	passed
	op-mode 2-co	passed
	op-mode 3-co	passed
	op-mode 6-co	passed
	op-mode 7-co	passed
	op-mode 8-co	passed
	op-mode 10-co	passed
	op-mode 11-co	passed
	op-mode 12-co	passed

3.6 Band edge compliance

Standard FCC Part 15, 10-1-09 Edition Subpart C

The test was performed according to: ANSI C 63.4, 2003 FCC §15.31

3.6.1 Test Description

The procedure to show compliance with the band edge requirement is divided into two measurements: 1. Show compliance of the lower band edge by a conducted measurement and 2. show compliance of the higher band edge by a radiated and conducted measurement.

For the first measurement the EUT is set to transmit on the lowest channel (2402 MHz). The lower band edge is 2400 MHz.

Analyzer settings:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

For the second measurement the EUT is set to transmit on the highest channel (2480 MHz). The higher band edge is 2483.5 MHz.

Analyzer settings for conducted measurement:

- Detector: Peak
- RBW= 100 kHz
- VBW= 300 kHz

EMI receiver settings:

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

3.6.2 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.

...

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 measurement of the **lower band edge** 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..."

For the measurement of the **higher band edge** the limit is "specified in Section 15.209(a)".

3.6.3 Test Protocol

3.6.3.1 Lower band edge

Conducted measurement

Temperature: 23 °C
 Air Pressure: 1020 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 1	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400.00	-31.8	-0.9	-20.9	10.9

Remark: Please see annex for the measurement plot.

Op. Mode	Setup	Port
op-mode 6	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400.00	-43.3	-0.5	-20.5	22.8

Remark: None

Op. Mode	Setup	Port
op-mode 10	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2400.00	-44.6	-0.9	-20.9	23.7

Remark: None

3.6.3.2 Higher band edge

Conducted measurement

Temperature: 23 °C
 Air Pressure: 1020 hPa
 Humidity: 31 %

Op. Mode	Setup	Port
op-mode 3	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.50	-46.4	-0.7	-20.7	25.7

Remark: None

Op. Mode	Setup	Port
op-mode 8	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.50	-45.7	-1.9	-21.9	23.8

Remark: None

Op. Mode	Setup	Port
op-mode 12	Setup_03	Temp ant.connector

Frequency MHz	Measured value dBm	Reference value dBm	Limit dBm	Delta to limit dB
2483.50	-45.7	-1.9	-21.9	23.8

Remark: Please see annex for the measurement plot.