



TEST REPORT

Eurofins KCTL Co.,Ltd. 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea TEL: 82-70-4904-0113 FAX: 82-505-299-8311 www.kctl.co.kr	Report No.: KR26-SRF0002 Page (1) of (46)	eurofins KCTL
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1. Client

- Name : WIRobotics Inc.
- Address : 1600, Chungjeol-ro, Byeongcheon-myeon, Dongnam-gu,
Cheonan-si, Chungcheongnam-do, Republic of Korea
- Date of Receipt : 2025-05-15

2. Use of Report : Certification

3. Name of Product / Model : Wearable mobility robot / WIR-WIMS-KRA

4. Manufacturer / Country of Origin : WIRobotics Inc. / Korea

5. FCC ID : 2BNNQ-WIRWIMSKRA

6. IC Certificate No. : 33535- WIRWIMSKRA

7. Date of Test : 2025-09-12 to 2026-01-08

8. Location of Test : ☒ Permanent Testing Lab ☐ On Site Testing
 (Address: 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea)

9. Test method used : FCC Part 15 Subpart C, 15.247
 RSS-247 Issue 4 July 2025
 RSS-Gen Issue 5 February 2021

10. Test Result : Refer to the test result in the test report

Affirmation	Tested by Name : Dongyeon Yoon (Signature)	Technical Manager Name : Seungyong Kim (Signature)
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2026-01-13

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REPORT REVISION HISTORY

Date	Revision	Page No
2026-01-13	Originally issued	-

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General remarks for test reports

Statement concerning the uncertainty of the measurement systems used for the tests

(may be required by the product standard or client)

☐ Internal procedure used for type testing through which traceability of the measuring uncertainty has been established:

Procedure number, issue date and title:

Calculations leading to the reported values are on file with the testing laboratory that conducted the testing.

☒ Statement not required by the standard or client used for type testing

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1. General information

Client : WIRobotics Inc.
 Address : 1600, Chungjeol-ro, Byeongcheon-myeon, Dongnam-gu, Cheonan-si,
 Chungcheongnam-do, Republic of Korea
 Manufacturer : WIRobotics Inc.
 Address : 1600, Chungjeol-ro, Byeongcheon-myeon, Dongnam-gu, Cheonan-si,
 Chungcheongnam-do, Republic of Korea
 Laboratory : Eurofins KCTL Co.,Ltd.
 Address : 65, Sinwon-ro, Yeongtong-gu, Suwon-si, Gyeonggi-do, 16677, Korea
 Accreditations : FCC Site Designation No: KR0040, FCC Site Registration No: 687132
 VCCI Registration No. : R-20080, G-20078, C-20059, T-20056
 CAB Identifier: KR0040
 ISED Number: 8035A
 KOLAS No.: KT231

2. Device information

Equipment under test : Wearable mobility robot
 Model : WIR-WIMS-KRA
 Derivative model : WIMS1-CDG, WIMS1-CBD
 Modulation technique : Bluetooth Low Energy : GFSK
 Number of channels : 40 ch
 Power source : DC 14.4 V
 Antenna specification : Chip Antenna
 Antenna gain : 3.5 dBi
 Frequency range : 2 402 MHz ~ 2 480 MHz
 Software version : 1.0.0
 Hardware version : 1.0.0
 Test device serial No. : USB254B00003
 Operation temperature : -20 °C ~ 45 °C

2.1. Information about derivative model

The difference between basic model and derivative models is:

Radio Hardware such as circuits and electrical components and Software are the same.

Model Name	Information
WIMS1-CDG	Color difference (Dark gray)
WIMS1-CBD	Color difference (Burgundy)

2.2. Frequency/channel operations

This device contains the following capabilities:

Bluetooth Low Energy

Ch.	Frequency (MHz)
00	2 402
.	.
19	2 440
.	.
39	2 480

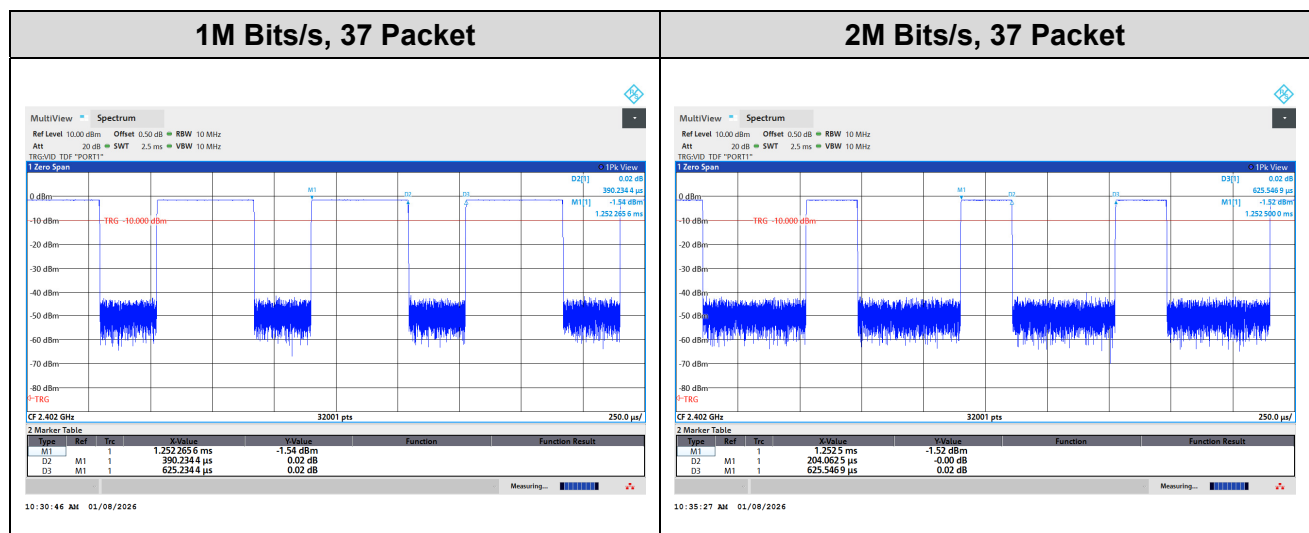
Table 2.2.1. Bluetooth Low Energy(1 Mbps/2 Mbps)

2.3. Duty Cycle Factor

Test mode	Period (ms)	On time (ms)	Duty cycle		Duty Cycle Factor (dB)
			(Linear)	(%)	
1M Bits/s, 37 packet	0.625 01	0.391	0.626 0	62.60	2.03
2M Bits/s, / 37 packet	0.624 99	0.204	0.327 0	32.70	4.86

Notes:

1. Duty cycle (Linear) = $T_{\text{On time}} / \text{Period}$
2. DCF(Duty cycle factor) = $10\log(1/\text{duty cycle})$
3. DCF is not compensated to average result if the duty cycle is more than 98%



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3. Antenna requirement

Requirement of FCC part section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section.

Requirement of RSS-Gen Section 6.8:

The applicant for equipment certification shall provide a list of all antenna types that may be used with the transmitter, where applicable (i.e. for transmitters with detachable antenna), indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna. The test report shall demonstrate the compliance of the transmitter with the limit for maximum equivalent isotropically radiated power (e.i.r.p.) specified in the applicable RSS, when the transmitter is equipped with any antenna type, selected from this list.

For expediting the testing, measurements may be performed using only the antenna with highest gain of each combination of transmitter and antenna type, with the transmitter output power set at the maximum level. However, the transmitter shall comply with the applicable requirements under all operational conditions and when in combination with any type of antenna from the list provided in the test report (and in the notice to be included in the user manual, provided below).

When measurements at the antenna port are used to determine the RF output power, the effective gain of the device's antenna shall be stated, based on a measurement or on data from the antenna's manufacturer.

The test report shall state the RF power, output power setting and spurious emission measurements with each antenna type that is used with the transmitter being tested.

Immediately following the above notice, the manufacturer shall provide a list of all antenna types which can be used with the transmitter, indicating the maximum permissible antenna gain (in dBi) and the required impedance for each antenna type.

- The transmitter has permanently attached Chip antenna (internal antenna) on board.
- The E.U.T Complies with the requirement of §15.203, §15.247.

4. Summary of tests

FCC Part section(s)	IC Rule Reference	Parameter	Test Condition	Test results
15.247(b)(3)	RSS-247 (6.3.2)	Maximum Peak Output Power	Conducted	Pass
15.247(e)	RSS-247 (6.3.1)(b)	Peak Power Spectral Density		Pass
15.247(a)(2)	RSS-247 (6.3.1)(a)	6 dB Channel Bandwidth		Pass
-	RSS-Gen (6.7)	Occupied Bandwidth		Pass
15.207(a)	RSS-Gen (8.8)	AC Conducted Emissions		Pass
15.247(d)	RSS-247 (6.6)	Conducted Spurious Emissions		Pass
15.205(a), 15.209(a)	RSS-247 (6.6) RSS-Gen (8.9), (8.10)	Spurious emission	Radiated	Pass
		Band-edge, restricted band		Pass

Notes: (N/T: Not Tested, N/A: Not Applicable)

- All modes of operation and data rates were investigated. The test results shown in the following sections represent the worst case emissions.
- According to exploratory test no any obvious emission were detected from 9 kHz to 30 MHz. Although these tests were performed other than open field site, adequate comparison measurements were confirmed against 30 m open field site. Therefore sufficient tests were made to demonstrate that the alternative site produces results that correlate with the ones of tests made in an open field based on KDB 414788.
- EUT was investigated in three orthogonal orientations X, Y and Z. it was determined that **X** orientation was worst-case orientation. Therefore, all final radiated testing was performed with the EUT in **X** orientation.
- The test procedure(s) in this report were performed in accordance as following.
 - ANSI C63.10-2020
 - ANSI C63.10-2020+Cor.1-2023+C63.10a-2024+Errata to C63.10a-2024
 - KDB 558074 D01 v05r02
- The worst-case data rate were:
 - 1M Bits/s, Packet length 37 Bytes
 - 2M Bits/s, Packet length 37 Bytes

5. Measurement uncertainty

The measurement uncertainties shown below were calculated in accordance with the requirements of ANSI C63.10-2020, ANSI C63.10-2020+Cor.1-2023+C63.10a-2024+Errata to C63.10a-2024.

All measurement uncertainty values are shown with a coverage factor of $k=2$ to indicated a 95 % level of confidence. The measurement data shown herein meets or exceeds the U_{CISPR} measurement uncertainty values specified in CISPR 16-4-2 and thus, can be compared directly to specified limits to determine compliance.

Parameter	Expanded uncertainty ($\pm$)	
Maximum Peak Output Power	0.9 dB	
Peak Power Spectral Density	1.0 dB	
6 dB Channel Bandwidth	0.1 %	
Occupied Bandwidth	0.1 %	
Conducted spurious emission	2.0 dB	
Radiated spurious Emissions (Bandedge, restricted band)	Below 30 MHz	2.3 dB
	30 MHz to 1 000 MHz	2.6 dB
	1 000 MHz to 18 000 MHz	4.8 dB
	Above 18 000 MHz	4.8 dB
AC Conducted Emissions	150 kHz to 30 MHz	2.9 dB

6. Measurement results explanation example

The offset level is set in the spectrum analyzer to compensate the RF cable loss factor between EUT conducted output port and spectrum analyzer.

With the offset compensation, the spectrum analyzer reading level is exactly the EUT RF output level.

Frequency (MHz)	Factor(dB)	Frequency (MHz)	Factor(dB)
30	9.66	11 000	11.88
50	9.67	12 000	11.67
100	9.77	13 000	11.92
200	9.87	14 000	11.98
300	9.95	15 000	12.12
400	9.99	16 000	11.95
500	10.08	17 000	12.34
600	10.10	18 000	12.47
700	10.16	19 000	12.57
800	10.20	20 000	12.86
900	10.25	21 000	13.72
1 000	10.22	22 000	15.78
2 000	10.46	23 000	14.54
3 000	10.71	24 000	13.07
4 000	10.74	25 000	12.90
5 000	11.16	26 000	13.31
6 000	11.16	26 500	13.75
7 000	11.37	27 000	13.32
8 000	11.50	28 000	13.80
9 000	11.35	29 000	13.32
10 000	11.59	30 000	12.87

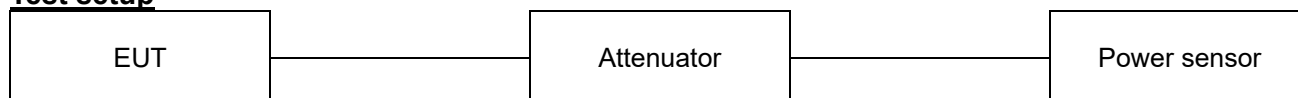
Notes:

Offset(dB) = RF cable loss(dB) + Attenuator(dB)

7. Test results

7.1. Maximum peak output power

Test setup



Limit

FCC

According to §15.247(b)(3),

For systems using digital modulation in the 902-928 MHz, 2 400-2 483.5 MHz, and 5 725-5 850 MHz bands: 1 Watt. As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

According to §15.247(b)(4)

The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

IC

According to RSS-247 (6.3.2),

For DTS operating in the bands 2400-2483.5 MHz, the maximum peak conducted output power shall not exceed 1 W, and the e.i.r.p. shall not exceed 4 W, except as provided in section 6.5 a) and b).

As an alternative to a peak power measurement, compliance can be based on a measurement of the maximum conducted output power.

Test procedure

ANSI C63.10 - Section 11.9.1.2, 11.9.2.3.1

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Test settings

General

Section 15.247 permits the maximum conducted (average) output power to be measured as an alternative to the maximum peak conducted output power for demonstrating compliance to the limit. When this option is exercised, the measured power is to be referenced to the OBW rather than the DTS bandwidth (see ANSI C63.10 for measurement guidance).

When using a spectrum analyzer or EMI receiver to perform these measurements, it shall be capable of utilizing a number of measurement points in each sweep that is greater than or equal to twice the span/RBW to set a bin-to-bin spacing of $\leq \text{RBW}/2$ so that narrowband signals are not lost between frequency bins.

If possible, configure or modify the operation of the EUT so that it transmits continuously at its maximum power control level. The intent is to test at 100 % duty cycle; however a small reduction in duty cycle (to no lower than 98 %) is permitted, if required by the EUT for amplitude control purposes. Manufacturers are expected to provide software to the test lab to permit such continuous operation.

If continuous transmission (or at least 98 % duty cycle) cannot be achieved due to hardware limitations (e.g., overheating), the EUT shall be operated at its maximum power control level, with the transmit duration as long as possible, and the duty cycle as high as possible during which sweep triggering/signal gating techniques may be used to perform the measurement over the transmission duration.

11.9.1.2. PKPM1 Peak power meter method

The maximum peak conducted output power may be measured using a broadband peak RF power meter. The power meter shall have a video bandwidth that is greater than or equal to the DTS bandwidth and shall use a fast-responding diode detector.

11.9.2.3.1. Measurement using a power meter (PM)

Method AVGPM is a measurement using an RF average power meter, as follows:

- a) As an alternative to spectrum analyzer or EMI receiver measurements, measurements may be performed using a wideband RF power meter with a thermocouple detector or equivalent if all of the conditions listed below are satisfied:
 - 1) The EUT is configured to transmit continuously, or to transmit with a constant duty cycle.
 - 2) At all times when the EUT is transmitting, it shall be transmitting at its maximum power control level.
 - 3) The integration period of the power meter exceeds the repetition period of the transmitted signal by at least a factor of five.
- b) If the transmitter does not transmit continuously, measure the duty cycle, D, of the transmitter output signal as described in 11.6.
- c) Measure the average power of the transmitter. This measurement is an average over both the ON and OFF periods of the transmitter.
- d) Correct the measurement in dBm by adding $[10 \log(1/D)]$, where D is the duty cycle

Notes:

A peak responding power sensor is used, where the power sensor system video bandwidth is greater than the occupied bandwidth of the EUT.

Test results

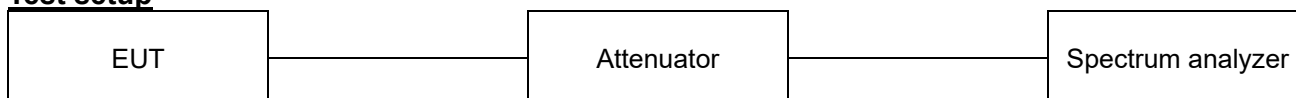
Frequency(MHz)	Data rate (Bits/s)	Packet length (Bytes)	Measured output power (dBm)						
			Conducted output power (dBm)		Limit (dBm)	ANT Gain (dBi)	Max. e.i.r.p (dBm)		Max. e.i.r.p Limit (dBm)
			Peak	Average			Peak	Average	
2 402	1M	37	-0.20	-2.60	30.00	3.50	3.30	2.95	36.02
2 440			-0.74	-3.21			2.76	2.34	
2 480			-1.39	-3.95			2.11	1.60	
2 402	2M	37	-0.24	-5.37	30.00	3.50	3.26	2.99	36.02
2 440			-0.77	-6.00			2.73	2.36	
2 480			-1.44	-6.72			2.06	1.64	

Notes:

1. Average conducted output power (dBm) = Reading value of average power (dBm) + D.C.F (dB)
2. E.I.R.P. Calculation: E.I.R.P. (dBm) = Conducted output power (dBm) + Antenna gain (dBi)

7.2. Peak Power Spectral Density

Test setup



Limit

According to §15.247(e),

For digitally modulated systems, the 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. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

According to RSS-247(6.3.1)(b),

The following applies to the bands 902-928 MHz and 2 400-2 483.5 MHz.

The transmitter power spectral density conducted from the transmitter to the antenna(s) shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

This power spectral density shall be determined in accordance with the provisions of section 6.3.2.

The power spectral density shall be determined using the same method as is used to determine the maximum conducted output power.

Test procedure

ANSI C63.10 - Section 11.10.2

Test settings

Method PKPSD (peak PSD)

The following procedure shall be used if maximum peak conducted output power was used to determine compliance, and it is optional if the maximum conducted (average) output power was used to determine compliance:

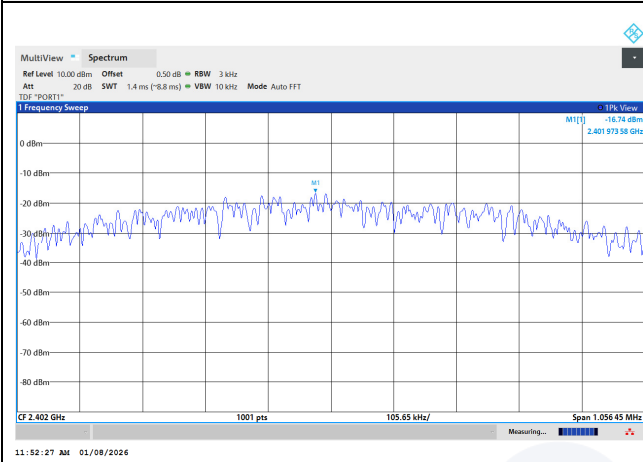
- Set analyzer center frequency to DTS channel center frequency.
- Set the span > 1.5 times the DTS bandwidth.
- Set the RBW to: $3 \text{ kHz} \leq \text{RBW} \leq 100 \text{ kHz}$.
- Set the VBW $\geq 3 \times \text{RBW}$.
- Detector = peak.
- Sweep time = No faster than coupled (auto) time.
- Trace mode = max hold.
- Allow trace to fully stabilize.
- Use the peak marker function to determine the maximum amplitude level within the RBW.
- If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

Test results

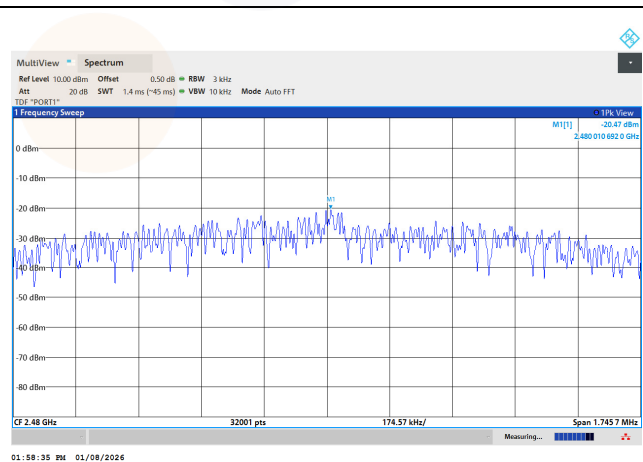
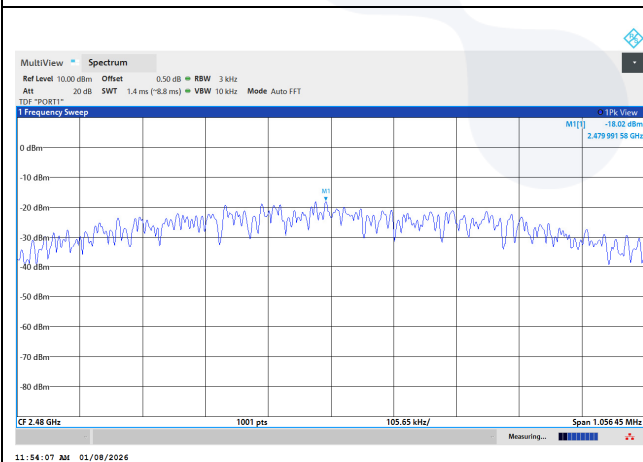
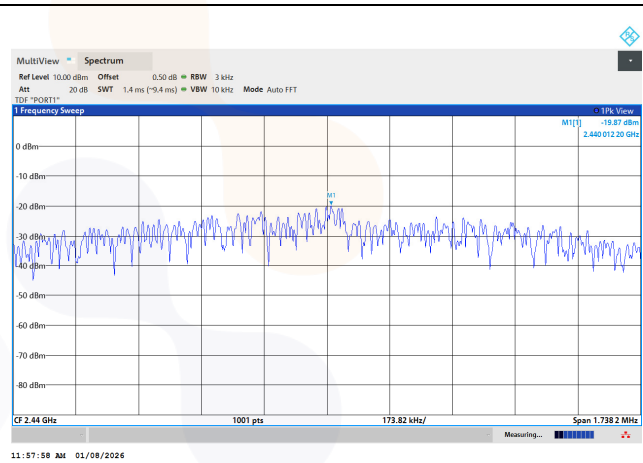
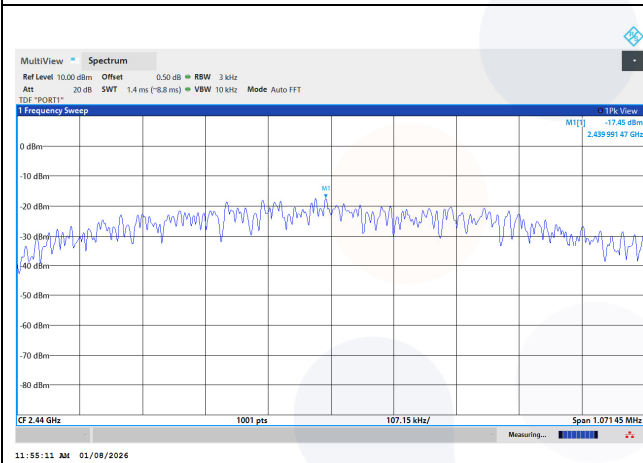
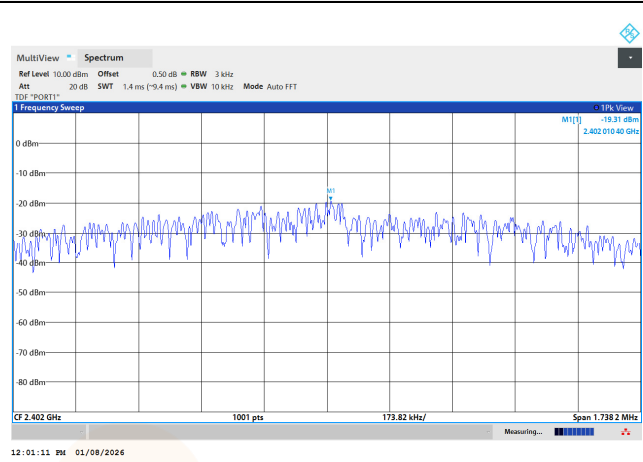
Frequency(MHz)	Data rate	Packet length	PSD(dBm/3 kHz)	Limit(dBm/3 kHz)
	(Bits/s)	(Bytes)		
2 402	1M	37	-16.74	8.00
2 440			-17.45	
2 480			-18.02	
2 402	2M	37	-19.31	
2 440			-19.87	
2 480			-20.47	



BLE_1 MBits/s

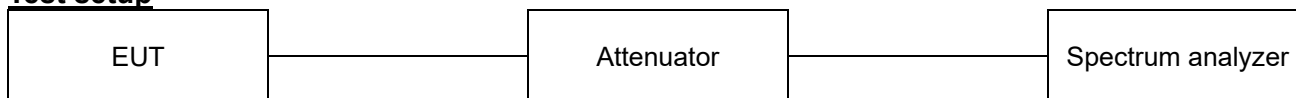


BLE_2 MBits/s



7.3. 6 dB Bandwidth(DTS Channel Bandwidth) & 99% Bandwidth

Test setup



Limit

According to §15.247(a)(2),

For Systems using digital modulation techniques may operate in the 902–928 MHz, 2 400–2 483.5 MHz, and 5 725–5 850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

According to RSS-247(6.3.1)(a),

The following applies to the bands 902-928 MHz and 2 400-2 483.5 MHz
 The minimum 6 dB bandwidth shall be 500 kHz.

Test procedure

ANSI C63.10 – Section 11.8.2, 6.9.3

Test settings

DTS bandwidth

One of the following procedures may be used to determine the modulated DTS bandwidth.

Option 1

- Set RBW = Shall be in the range of 1% to 5% of the OBW but not less than 100 kHz.
- Set the video bandwidth (VBW) $\geq 3 \times$ RBW.
- Detector = Peak.
- Trace mode = max hold.
- Sweep = No faster than coupled (auto) time.
- Allow the trace to stabilize.
- Measure the maximum width of the emission by placing two markers, one at the lowest frequency and the other at the highest frequency of the envelope of the spectral display, such that each marker is at or slightly below the “-6 dB down amplitude”. If a marker is below this “-6 dB down amplitude” value, then it shall be as close as possible to this value.

Option 2

The automatic bandwidth measurement capability of an instrument may be employed using the X dB bandwidth mode with X set to 6 dB, if the functionality described in 11.8.1 (i.e., RBW = 100 kHz, VBW $\geq 3 \times$ RBW, and peak detector with maximum hold) is implemented by the instrumentation function. When using this capability, care shall be taken so that the bandwidth measurement is not influenced by any intermediate power nulls in the fundamental emission that might be ≥ 6 dB.

Occupied bandwidth (or 99% emission bandwidth)

The occupied bandwidth is the frequency bandwidth such that, below its lower and above its upper frequency limits, the mean powers are each equal to 0.5% of the total mean power of the given emission.

The following procedure shall be used for measuring 99% power bandwidth:

- a) The instrument center frequency is set to the nominal EUT channel center frequency. The frequency span for the spectrum analyzer shall be between 1.5 times and 5.0 times the OBW.
- b) The nominal IF filter bandwidth (3 dB RBW) shall be in the range of 1% to 5% of the OBW, and VBW shall be at least three times the RBW, unless otherwise specified by the applicable requirement.
- c) Set the reference level of the instrument as required, keeping the signal from exceeding the maximum input mixer level for linear operation. In general, the peak of the spectral envelope shall be more than $[10 \log (OBW/RBW)]$ below the reference level. Specific guidance is given in 4.1.6.2.
- d) Step a) through step c) might require iteration to adjust within the specified range.
- e) Video averaging is not permitted. Where practical, a sample detection and single sweep mode shall be used. Otherwise, peak detection and max-hold mode (until the trace stabilizes) shall be used.
- f) Use the 99% power bandwidth function of the instrument (if available) and report the measured bandwidth.
- g) If the instrument does not have a 99% power bandwidth function, then the trace data points are recovered and directly summed in linear power terms. The recovered amplitude data points, beginning at the lowest frequency, are placed in a running sum until 0.5% of the total is reached; that frequency is recorded as the lower frequency. The process is repeated until 99.5% of the total is reached; that frequency is recorded as the upper frequency. The 99% power bandwidth is the difference between these two frequencies.

The occupied bandwidth shall be reported by providing spectral plot(s) of the measuring instrument display; the plot axes and the scale units per division shall be clearly labeled. Tabular data may be reported in addition to the plot(s).

Notes: it may be necessary to repeat the measurement a few times until the RBW and VBW are in compliance with the above requirement.

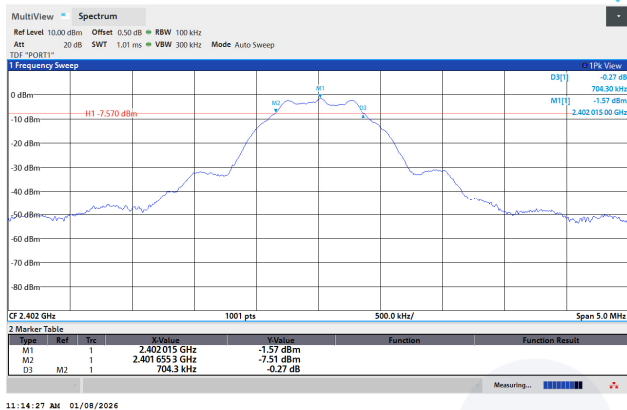
Test results

Frequency(MHz)	Data rate	6 dB Bandwidth(MHz)	99% Bandwidth(MHz)	Limit (MHz)
2 402	1 Mbps	0.704	1.048	0.500
2 440		0.714	1.052	
2 480		0.704	1.050	
2 402	2 Mbps	1.159	2.056	
2 440		1.159	2.058	
2 480		1.164	2.065	



6 dB Bandwidth

BLE_1 Mbits/s



BLE_2 Mbits/s

