

ISED CABid: ES1909
Lab. Company Number: 4621A

Test Report No:
82686RRF.001A1

Partial Test Report

USA FCC Part 15.247, 15.209

CANADA RSS-247, RSS-Gen

(*) Identification of item tested	Audio Controller
(*) Trademark	IDNEO
(*) Model and /or type reference	TUX BLUETOOTH
Other identification of the product	FCC ID: 2BGE31TUX0624
(*) Features	Bluetooth BR/EDR HW version: Sample B4 SW version: 3.10.4
Applicant	IDNEO Technologies, S.A.U Carrer Rec de Dalt, 3, 08100, Mollet del Vallès, Barcelona, SPAIN
Test method requested, standard	USA FCC Part 15.247 (10-1-24 Edition): Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz. USA FCC Part 15.209 (10-1-24 Edition): Radiated emission limits; general requirements. CANADA RSS-247 Issue 4 (July 2025). CANADA RSS-Gen Issue 5 amendment 2 (February 2021). Guidance for Performing Compliance Measurements on Digital Transmission System, Frequency Hopping Spread Spectrum System, and Hybrid Systems Devices Operating Under Section 15.247 of the FCC Rules. 558074 D01 Meas Guidance v05r02 dated April 2, 2019. ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices.
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager  Firmado digitalmente por 53680346W JOSE MANUEL GOMEZ (C:A29507456)
Date of issue	2025-12-03
Report template No	FDT08_25
	(*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
	E.I.R.P.
Avg Power	Maximum Average Conducted Output Power
BW	Bandwidth
Detector	Detector used
Ebw	Emission Bandwidth
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
Inband Peak Lvl	Inband Peak Level
Lvl	Level
MP	Measurement Point
Mod	Modulation
Mode	MIMO Mode
Occ Ch BW	Occupied Channel Bandwidth
PSD	Power Spectral Density
Pol	Polarization
Port	Active Port
Unwanted Freq	Unwanted Emissions Frequency
Unwanted Lvl	Unwanted Emissions Level

Competences and guarantees

DEKRA Testing and Certification S.A.U. is a testing laboratory accredited by the National Accreditation Body (ENAC -Entidad Nacional de Acreditación), to perform the tests indicated in the Certificate No. 51/LE 147.

DEKRA Testing and Certification S.A.U. is an FCC-recognized accredited testing laboratory with appropriate scope of accreditation that covers the performed tests in this report.

DEKRA Testing and Certification S.A.U. is an ISED-recognized accredited testing laboratory, CABid: ES1909, Company Number: 4621A, with the appropriate scope of accreditation that covers the performed tests in this report.

In order to assure the traceability to other national and international laboratories, DEKRA Testing and Certification S.A.U. has a calibration and maintenance program for its measurement equipment.

DEKRA Testing and Certification S.A.U. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Testing and Certification S.A.U. at the time of performance of the test.

DEKRA Testing and Certification S.A.U. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
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4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Testing and Certification S.A.U. and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the DEKRA Testing and Certification S.A.U. internal document PODT000.

The total uncertainty of the measurement system for the radiated emissions of EUT from 30 MHz to 1 GHz is:
Measurement uncertainty $\leq \pm 5,35$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 1 GHz to 17 GHz is:
Measurement uncertainty $\leq \pm 4,32$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the radiated emissions of EUT from 17 GHz to 26 GHz is:
Measurement uncertainty $\leq \pm 5,51$ dB with factor ($k = 2$).

The total uncertainty of the measurement system for the conducted testing of EUT is:

RF Peak Output Power: Measurement uncertainty $\leq \pm 0,80$ dB

RF Average Output Power: Measurement uncertainty $\leq \pm 0,99$ dB

Data provided by the client

The following data has been provided by the client:

1. Information relating to the description of the sample ("Identification of the item tested", "Trademark", "Model and/or type reference tested").
2. The sample of the TUX Controller is a general purpose Linux-based controller that operates system-level functions such as audio and speech processing and BT interfaces.

DEKRA Testing and Certification S.A.U. declines any responsibility with respect to the information provided by the client and that may affect the validity of results. The laboratory is not responsible for such information and it is not covered by accreditation.

Usage of samples

Samples undergoing test have been selected by: The client.

ID	Control number	Description	Model	Serial number	Date reception	Application
S/01	82686B_3.1	Module Controller ASM, TUX-UI	TUX BLUETOOTH	25118-00886	2025-05-30	Element Under Test
S/01	82686B_4.1	Fakra to 4 Multipin Cable	-	-	2025-05-30	Auxiliary Element
S/01	82686B_5.1	Power Cable	-	-	2025-05-30	Auxiliary Element
S/01	82686B_7.1	Power Cable	-	-	2025-05-30	Auxiliary Element
S/01	82686B_8.1	Module	-	25119-00556	2025-05-30	Auxiliary Element
S/01	82686B_9.1	Module	-	25119-00539	2025-05-30	Auxiliary Element
S/01	82686B_10.1	Module	-	25119-00538	2025-05-30	Auxiliary Element
S/01	82686B_11.1	Module	-	25119-00557	2025-05-30	Auxiliary Element

Notes referenced to samples during the project:

Id	Type
S/01	All tests.

Test sample description

Ports..... :	Port name and description		Cable				
			Specified max length [m]	Attached during test	Shielded		
	Ethernet			X			
	A2B			X			
	Speakers			X			
Supplementary information to the ports..... :	-						
Rated power supply	Voltage and Frequency			Reference poles			
				L1	L2	L3	N
		AC:					
	X	DC: 12V					
Rated Power..... :	-						
Clock frequencies..... :	I2S=3.072MHz, TDM=12.288MHz, A2B=48MHz, DDR4 = 4267MHz, eMMC=400MHz						
Other parameters	DCDC=2.2MHz, 100BaseT1=100MHz, RGMII=125MHz, SPI = 1MHz, I2C=100kHz						
Software version..... :	3.10.4						
Hardware version	Sample B4						
Dimensions in cm (W x H x D) ... :	-						
Mounting position		Table top equipment					
		Wall/Ceiling mounted equipment					
		Floor standing equipment					
		Hand-held equipment					
	X	Other: Automotive Component					
Modules/parts..... :	Module/parts of test item			Type		Manufacturer	
	ENW89823C4KF			Bluetooth		Panasonic	
	R8A77960JBR1BG			Microcontroller		Renesas	
Accessories (not part of the test item)	Description			Type		Manufacturer	
	-			-		-	
	Description			File name		Issue date	

Documents as provided by the applicant	-	-	-
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Identification of the client

IDNEO Technologies, S.A.U
Carrer Rec de Dalt, 3, 08100 Mollet del Vallès, Barcelona. Spain

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U. C/ Severo Ochoa 2. PTA, Málaga, Spain.
Date (start)	2025-07-17
Date (finish)	2025-08-13

Document history

Report number	Date	Description
82686RRF.001	2025-09-29	First release.
82686RRF.001A1	2025-11-27	Second release. Modification due to ANSI standard update. This report replaces and cancels the report 82686RRF001s.

Environmental conditions

In the control chamber, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the semianechoic chamber, the following limits were not exceeded during the test.

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

In the chamber for conducted measurements, the following limits were not exceeded during the test:

Temperature	Min. = 15 °C Max. = 35 °C
Relative humidity	Min. = 20 % Max. = 75 %

Remarks and comments

The tests have been performed by the technical personnel: Antonio Maireles, Valentín Andarias, Pablo Redondo.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06668	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2027-04-01
07796	EXTENSION FOR OPEN SWITCH UNIT UP TO 40 GHz	OSP-B157Wx	ROHDE AND SCHWARZ	2027-01-09
08848	OPEN SWITCH UNIT UP TO 7.5 GHz	OSP-B157W8 PLUS	ROHDE & SCHWARZ	2027-01-02
09335	DC POWER SUPPLY 200v/25A	EA-PSI-9200-25-DT	ROHDE AND SCHWARZ	N/A
05850	DIGITAL MULTIMETER	179	FLUKE	2025-11-04
06165	EMI TEST RECEIVER 9 kHz-7 GHz	ESR7	ROHDE AND SCHWARZ	2025-12-27
07611	PREAMPLIFIER BOX	-	INTERNO	2026-01-23
04578	HYBRID BILOG ANTENNA 30 MHz - 6 GHz	3142E	ETS LINDGREN	2026-06-01
07692	ATTENUATOR 3 dB, 2 W, DC, 18 GHz	TWTS2G	TECHNIWAVE	2026-02-03
04716	SIGNAL AND SPECTRUM ANALYZER 2 Hz - 50 GHz	FSW50	ROHDE AND SCHWARZ	2026-08-02
04611	HORN ANTENNA 1-18 GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
05705	PRE-AMPLIFIER G>40dB, 1-18 GHz	BLMA 0118-1M	BONN ELEKTRONIK	2026-07-23
06157	SIGNAL AND SPECTRUM ANALYZER 10 Hz - 40 GHz	FSV40	ROHDE AND SCHWARZ	2027-03-17
10573	PRE-AMPLIFIER G>46dB 18-40 GHz	BLMA 1840-5G	BONN ELEKTRONIK	2026-03-07
04657	HORN ANTENNA 18-40GHz	BBHA 9170	SCHWARZBECK	2026-06-12
04825	SEMIANECHOIC ABSORBER LINED CHAMBER II	FACT 3 200 STP	ETS LINDGREN	N/A
04826	SHIELDED ROOM	S101	ETS LINDGREN	N/A
07547	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-22
07548	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-04
04848	EMC/RF MEASUREMENT SOFTWARE	EMC32	ROHDE AND SCHWARZ	N/A
07798	WMS32	WMS32	ROHDE AND SCHWARZ	N/A

Testing verdicts

Fail	F
Inconclusive	I
Not applicable	N/A
Not measured	N/M
Pass	P

Summary

Bluetooth EDR:

Requirement – Test case	FCC PART 15 PARAGRAPH / RSS-247	Verdict	Remark
FCC 15.247 (a) (1) / RSS-247 5.1 (b)	20 dB Bandwidth	N/M	(1)
FCC 15.247 (a) (1) (iii) / RSS-247 5.1 (d)	Time of Occupancy (Dwell Time)	N/M	(1)
FCC 15.247 (b) / RSS-247 5.4. (b)	Maximum peak output power and antenna	P	
FCC 15.247 (a) (1) (iii) / RSS-247 5.1 (d)]	Number of hopping channels	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5	Band-edge emissions compliance	N/M	(1)
FCC 15.247 (d) / RSS-247 5.5	Emission limitations radiated (Transmitter)	P	
<u>Supplementary information and remarks:</u> (1) Test not requested. (2) Spot-check on the worst case channel of the Bluetooth EDR: Modulation 8DPSK, Middle Channel 2441 MHz.			

Appendix A: Test results. Bluetooth EDR

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<i>RSS-247 5.4 (b) / FCC 15.247 (b) (1) [Pkcp] Maximum Peak Conducted output power</i>	<i>16</i>
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TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal: 12V DC
Type of Power Supply: Vehicle battery

ANTENNA (*):

Type of Antenna: External
Maximum Declared Antenna Gain: -1.54 dBi

TEST FREQUENCIES (*):

Modulation	Data rates	Middle Channel
BTEDR 8DPSK	3-DH5	2441 MHz

During transmitter test the EUT was controlled by a SW tool provided by the client to operate in a continuous transmit mode on the modulation schemes and test channels as required.

CONDUCTED MEASUREMENTS:

The equipment under test was set up in a shielded room and it is connected to the TS8997 using a low loss RF cable. The reading of the spectrum analyser is corrected taking into account the cable loss.



RADIATED MEASUREMENTS:

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Bilog antenna for the range between 30 MHz to 1000 MHz and 1 GHz-17 GHz Double ridge horn antenna) is situated at a distance of 3 m and at a distance of 1.5 m for the frequency range 17 GHz-26 GHz (17 GHz-40 GHz horn antenna).

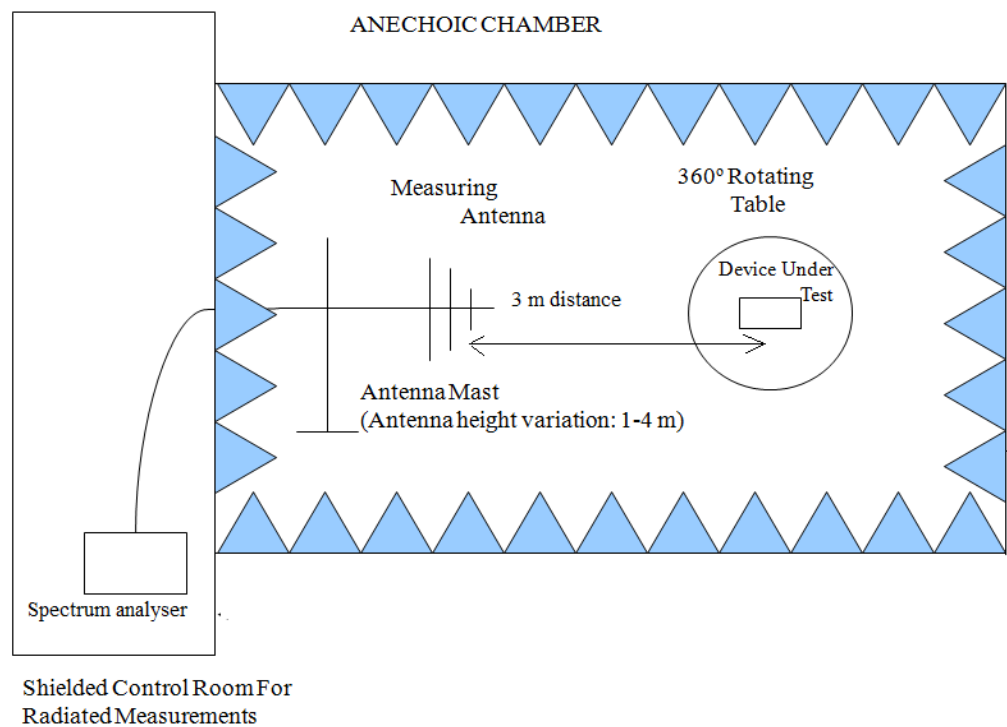
For radiated emissions in the range 17 GHz-26 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and the antenna height (Bilog antenna and Double ridge horn antenna) was varied from 1 to 4 meters to find the maximum radiated emission.

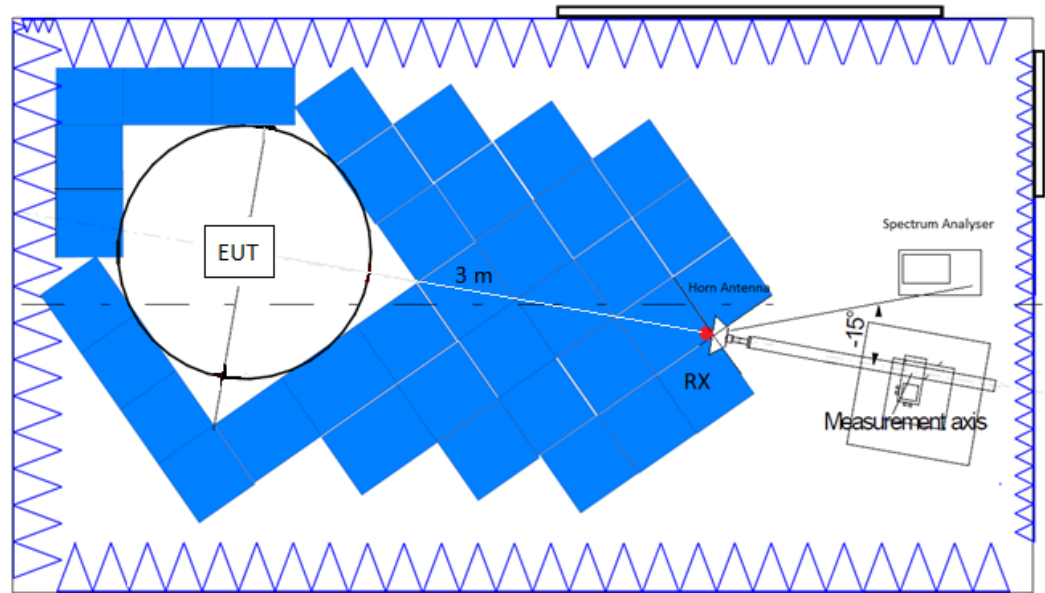
Measurements were made in both horizontal and vertical planes of polarization.

A resolution bandwidth/video bandwidth of 100 kHz / 300 kHz was used for frequencies below 1 GHz and 1 MHz / 3 MHz for frequencies above 1 GHz.

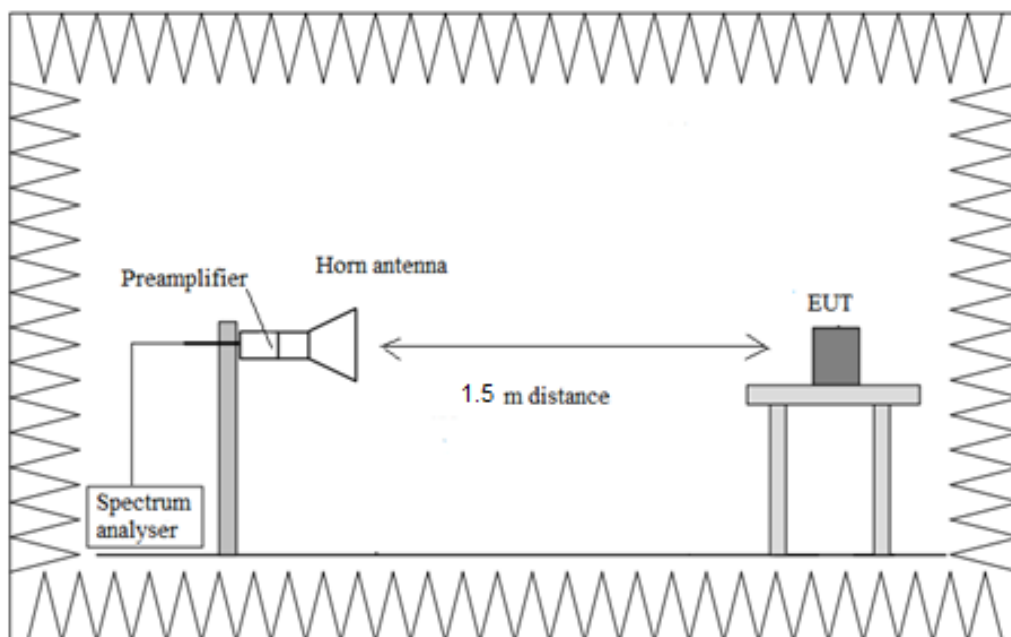
Radiated measurements setup from 30 MHz to 1 GHz:



Radiated measurements setup from 1 GHz to 17 GHz:



Radiated measurements setup $f > 17$ GHz:



TEST CASES DETAILS

RSS-247 5.4 (b) / FCC 15.247 (b) (1) [Pkcp] Maximum Peak Conducted output power

Limits

For frequency hopping systems operating in the 2400-2483.5 MHz band employing at least 75 hopping channels: 1 watt (30 dBm).

RSS-247:

The e.i.r.p. shall not exceed 4 W (RSS-247).

Results

The maximum peak conducted output power level of the fundamental emission was measured according to clause 7.8.5 “Output power test procedure for frequency-hopping spread-spectrum (FHSS) devices” of ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024.

The EIRP power (dBm) is calculated by adding the maximum declared antenna gain to the measured conducted power.

Maximum Declared Antenna Gain: -1.54 dBi

The maximum directional gain of the antenna is less than 6 dBi and therefore the maximum output power is not required to be reduced from the stated values.

Modulation: BT (8DPSK 3-DH5)

MIMO Mode: SISO

Results

Equipment	BW (MHz)	Freq (MHz)	Port	Peak Power (dBm)	EIRP (dBm)
Frequency Hopping Spread Spectrum systems (DSS)	1	2441.00000	1	9.148	7.608

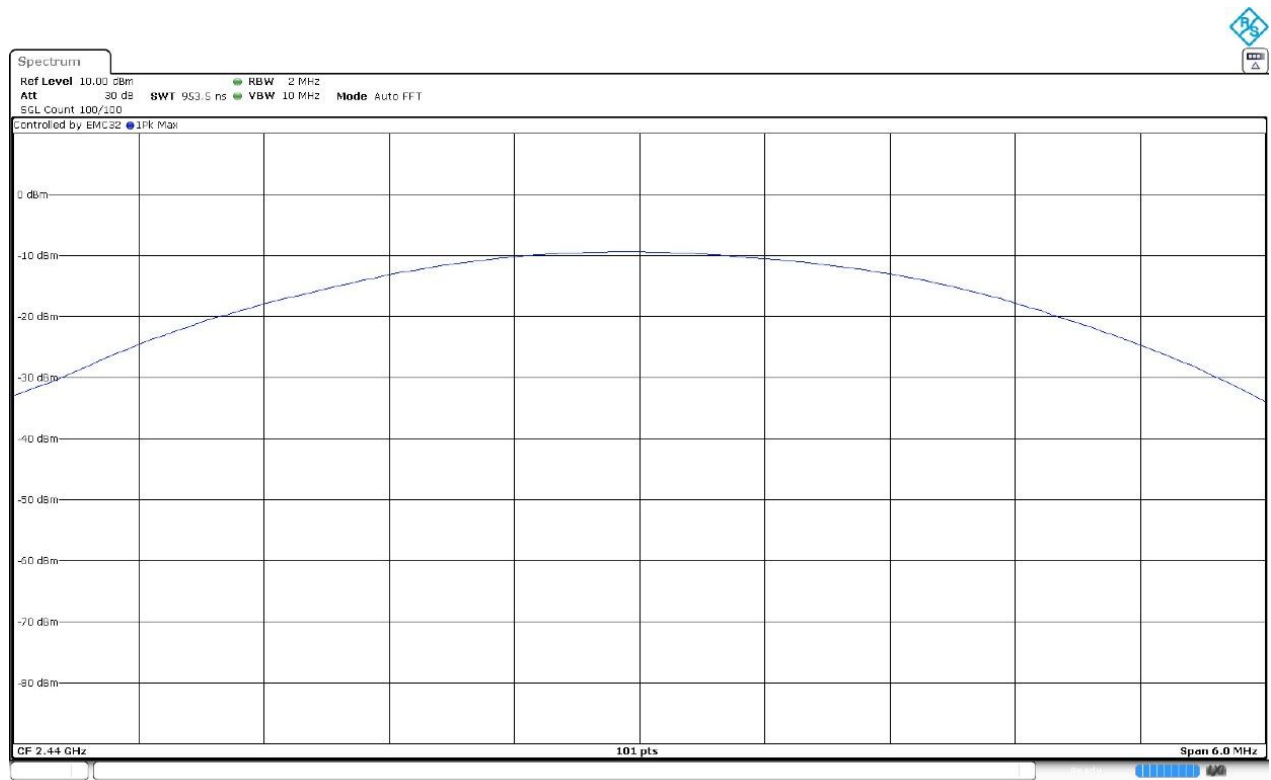
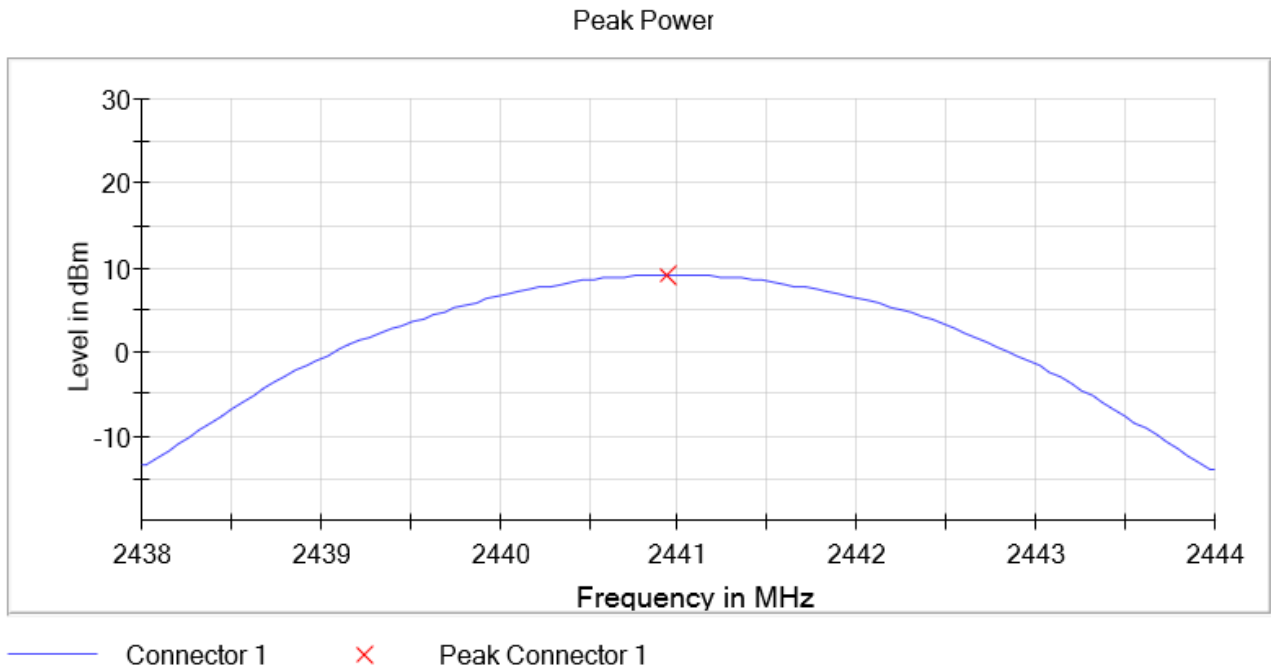
Verdict

Pass

Attachments

Equipment Type = Frequency Hopping Spread Spectrum systems (DSS) Bandwidth MHz = 1
Modulation = BT (8DPSK 3-DH5) Frequency MHz = 2441.00000
MIMO Mode = SISO Active Port = 1

Images:



RSS-247 5.5 / FCC 15.247 (d) [RSE] Emission limitations radiated (Transmitter)

Limits

Radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c) / RSS-Gen):

Frequency Range (MHz)	Field strength ($\mu\text{V/m}$)	Field strength (dB $\mu\text{V/m}$)	Measurement distance (m)
0.009 - 0.490	2400/F(kHz)	-	300
0.490 - 1.705	24000/F(kHz)	-	30
1.705 - 30.0	30	-	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table, specified when measuring with peak detector function.

RSS-247:

Attenuation below the general field strength limits specified in RSS-Gen is not required.

Frequency range tested for Radiated emissions:

Start frequency: no radiofrequency signal generated in the device found below 10th sub-harmonic, no further investigation required.

Stop frequency: it has been performed the radiated spurious emissions until 10th harmonic.

Modulation: BT (8DPSK 3-DH5)

MIMO Mode: SISO

Results

Frequency (MHz)	QuasiPeak (dBµV/m)	MaxPeak (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Pol	Azimuth (deg)	Sig Path (dB)
34.819688	---	30.31	---	---	V	105.0	-36.6
34.819688	26.55	---	40.00	13.45	V	105.0	-36.6
36.850625	---	32.20	---	---	V	141.0	-36.5
36.850625	30.02	---	40.00	9.98	V	141.0	-36.5
50.127500	29.87	---	40.00	10.13	V	0.0	-36.4
50.127500	---	34.83	---	---	V	0.0	-36.4
61.434063	---	36.63	---	---	V	359.0	-36.3
61.434063	35.00	---	40.00	5.00	V	359.0	-36.3
64.525938	29.34	---	40.00	10.66	V	0.0	-36.3
64.525938	---	32.32	---	---	V	0.0	-36.3
76.772188	---	32.00	---	---	V	255.0	-36.2
76.772188	29.40	---	40.00	10.60	V	255.0	-36.2
86.017500	33.51	---	40.00	6.49	V	185.0	-36.0
86.017500	---	34.44	---	---	V	185.0	-36.0
110.570625	26.84	---	43.50	16.66	V	272.0	-35.8
110.570625	---	28.03	---	---	V	272.0	-35.8
135.154063	---	43.74	---	---	H	265.0	-35.7
135.154063	43.29	---	43.50	0.21	H	265.0	-35.7
144.369063	34.89	---	43.50	8.61	H	87.0	-35.7
144.369063	---	36.17	---	---	H	87.0	-35.7
147.460938	33.22	---	43.50	10.28	H	78.0	-35.7
147.460938	---	34.61	---	---	H	78.0	-35.7
150.522500	---	34.56	---	---	H	78.0	-35.7
150.522500	33.01	---	43.50	10.49	H	78.0	-35.7
156.675938	28.62	---	43.50	14.88	H	78.0	-35.6
156.675938	---	30.73	---	---	H	78.0	-35.6
159.737500	---	39.51	---	---	H	70.0	-35.6
159.737500	38.65	---	43.50	4.85	H	70.0	-35.6
184.351250	34.22	---	43.50	9.28	H	194.0	-35.4
184.351250	---	37.10	---	---	H	194.0	-35.4
207.419063	---	41.87	---	---	H	70.0	-35.2
207.419063	37.58	---	43.50	5.92	H	70.0	-35.2
307.207813	---	30.37	---	---	H	150.0	-34.6
307.207813	28.81	---	46.00	17.19	H	150.0	-34.6
340.096875	---	28.92	---	---	H	320.0	-34.5
340.096875	25.02	---	46.00	20.98	H	320.0	-34.5
599.753750	---	47.01	---	---	H	301.0	-33.4
599.753750	43.42	---	46.00	2.58	H	301.0	-33.4
618.850625	---	32.44	---	---	H	301.0	-33.3
618.850625	27.83	---	46.00	18.17	H	301.0	-33.3

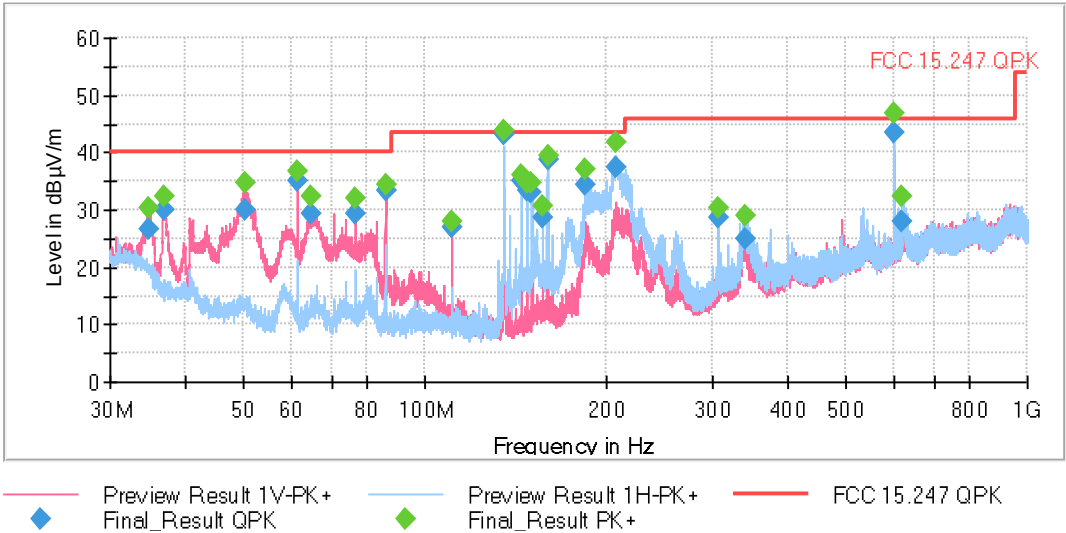
Verdict

Pass

Attachments

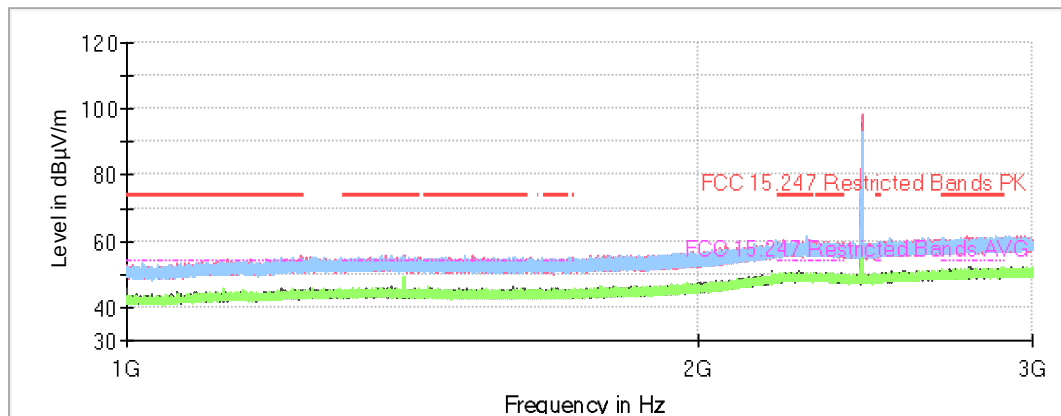
Frequency Range GHz = [0.03, 1] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Modulation = BT (8DPSK 3-DH5) Frequency MHz = 2441.00000
MIMO Mode = SISO Active Port = 1

Images:



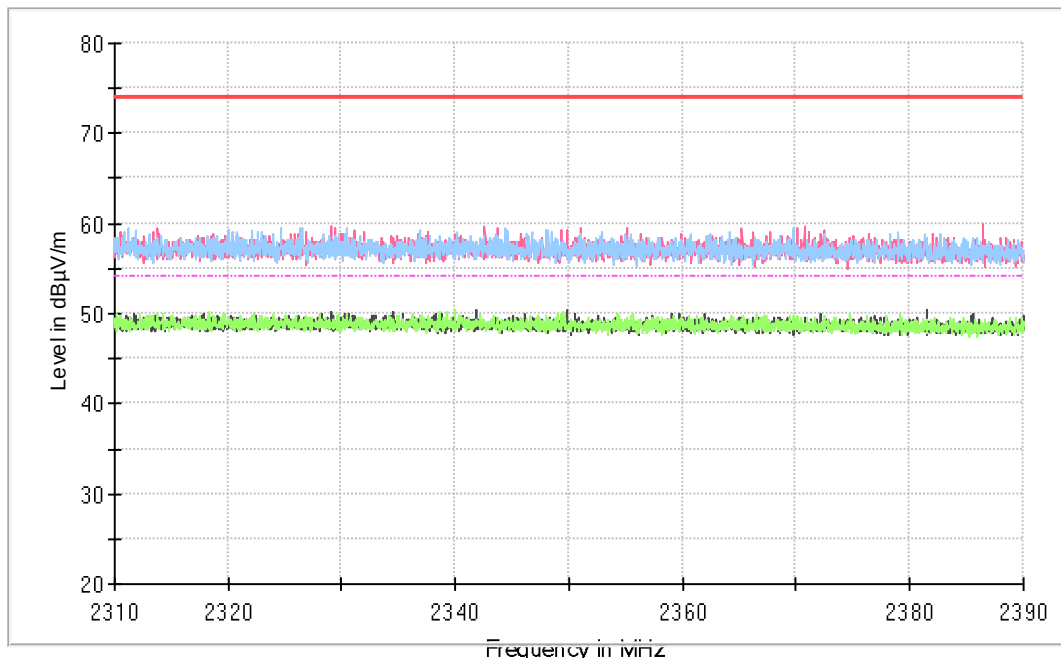
Frequency Range GHz = [1, 26] Equipment Type = Frequency Hopping Spread Spectrum systems (DSS)
Modulation = BT (8DPSK 3-DH5) Frequency MHz = 2441.00000
MIMO Mode = SISO Active Port = 1

Images:



— Preview Result 2V-AVG
— Preview Result 2H-AVG
— FCC 15.247 Restricted Bands PK
◆ Final_Result PK+
— Preview Result 1V-PK+
— Preview Result 1H-PK+
— FCC 15.247 Restricted Bands AVG
◆ Final_Result AVG

Full Spectrum



— Preview Result 2V-AVG
— Preview Result 2H-AVG
— FCC 15.247 Restricted Bands PK
◆ Final_Result PK+
— Preview Result 1V-PK+
— Preview Result 1H-PK+
— FCC 15.247 Restricted Bands AVG
◆ Final_Result AVG

Full Spectrum

