

ISED CABid: ES1909

Lab. Company Number: 4621A

Test Report No:

82427RRF.003A1

Test report

USA FCC Part 15.231, 15.209

CANADA RSS-Gen, RSS-210

(*) Identification of item tested	Remote Car key
(*) Trademark	AUMOVIO
(*) Model and /or type reference	FERKEY25
Other identification of the product	FCC ID: KR5FERKEY25 IC: 7812D-FERKEY25
(*) Features	125 kHz RX mode, 433 MHz TX mode, 13.56MHz tag passive HW version: AAA2452950400 SW version: SW25.01
Manufacturer	AUMOVIO Germany GmbH Guerickestrasse 7, 60488 Frankfurt am Main, Germany
Test method requested, standard	USA FCC Part 15.231 (10-1-24 Edition): Periodic operation in the band 40.66-40.70 MHz and above 70 MHz. USA FCC Part 15.209 (10-1-24 Edition): Radiated emission limits; general requirements. CANADA RSS-Gen Issue 5 amendment 2 (February 2021). CANADA RSS-210 Issue 11 (July 2024) ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Manuel Gómez Galván EMC Consumer & RF Lab. Manager 
Date of issue	2026-02-04
Report template No	FDT08_27 (*) "Data provided by the client"

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Acronyms

Acronym ID	Acronym Description
Detector	Detector used
Equipment	Equipment Type
Freq	Frequency
Freq Rng	Frequency Range
MP	Measurement Point
Mod	Modulation
Operation Band	Operation Band
Pol	Polarization
Port	Active Port
RU	Resource Unit
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.

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

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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 conducted testing of EUT is:

Occupied Bandwidth 99%: Measurement uncertainty (kHz) $<\pm 1.42$

Bandwidth: Measurement uncertainty (kHz) $<\pm 1.42$

Transmitter Deactivation: Measurement uncertainty (ms) $<\pm 0.839$

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

Fundamental emissions: Measurement uncertainty (dB) $<\pm 4.11$ dB

Spurious emissions:

Measurement uncertainty from 30MHz – 1000MHz (dB): $<\pm 5.35$ dB

Measurement uncertainty from 1GHz – 17GHz (dB): $<\pm 4.32$ dB

Measurement uncertainty from 17GHz – 26,5GHz (dB): $<\pm 5.51$ 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 consists of a transmitter designed to provide remote keyless entry, passive entry, passive engine start and immobilization functionality. The term that Ferrari customer uses to describe such a transmitter is a SMART KeyFob. The Ferrari KeyFob F244 is going to be launched using 315MHz working frequency for Japan market and 433.92MHz working frequency for the rest of the countries.

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 N°	Date Reception of	Application
S/01	82427B_1.1	Remote Car key (Radiated)	FERKEY25	--	2025-10-07	Element Under Test
S/02	82427B_9.1	Remote Car key (Conducted)	FERKEY25	--	2025-10-21	Element Under Test
S/03	82427B_5.1	Remote Car key (Serial)	FERKEY25	--	2025-10-07	Element Under Test
S/04	82427B_34.1	Remote Car key (Radiated)	FERKEY25	--	2025-12-03	Element Under Test

Notes referenced to samples during the project:

Id	Type
S/01	Sample used for radiated test with FSK modulation.
S/02	Sample used for conducted test except Transmitter deactivation test and Duty cycle calculation.
S/03	Sample used for Transmitter deactivation test and Duty cycle calculation.
S/04	Sample used for radiated testing with ASK modulation.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient ⁽³⁾		
			[]	[]	[]		
			[]	[]	[]		
.....		[]	[]	[]			
Supplementary information to the ports..... :							
Rated power supply	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	[]	AC:	[]	[]	[]	[]	[]
	[X]	DC: +3V battery					
Rated Power	-11 dBm						
Clock frequencies.....	27.6 MHz						
Other parameters							
Software version	SW25.01						
Hardware version	AAA2452950400						
Dimensions in cm (W x H x D)	height 1.21cm, width 4.214cm, length 6.7cm						
Mounting position	[]	Table top equipment					
	[]	Wall/Ceiling mounted equipment					
	[]	Floor standing equipment					
	[X]	Hand-held equipment					
	[]	Other:					
Modules/parts.....	Module/parts of test item		Type		Manufacturer		
							
Accessories (not part of the test item)	Description		Type		Manufacturer		
							
Documents as provided by the applicant.....	Description		File name		Issue date		
							

⁽³⁾ Only for Medical Equipment

Identification of the client

AUMOVIO Germany GmbH
Guerickestrasse 7, 60488 Frankfurt am Main, Germany

Testing period and place

Test Location	DEKRA TESTING AND CERTIFICATION S.A.U. C/ Severo Ochoa, 6 - Parque Tecnológico de Andalucía; 29590 Campanillas (Málaga)
Date (start)	2025-10-30
Date (finish)	2025-11-06

Document history

Report number	Date	Description
82427RRF.003	2026-01-27	First release.
82427RRF.003	2026-02-04	Second version of the test report. Some typos were corrected and additional information was added.

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 conducted chamber, 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 y Carmen Vázquez.

Used instrumentation:

Control No.	Equipment	Model	Manufacturer	Next Calibration
06791	SEMIANECHOIC ABSORBER LINED CHAMBER IV	FACT 3 200 STP	ETS LINDGREN	N/A
06609	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2026-04-21
06615	ETHERNET TEMPERATURE AND HUMIDITY LOGGER	HWg-STE	HW GROUP	2026-04-24
06143	HYBRID BILOG ANTENNA 30MHz-6GHz	3142E	ETS LINDGREN	2027-01-22
04611	HORN ANTENNA 1-18GHz	BBHA 9120 D	SCHWARZBECK MESS-ELEKTRONIK	2026-01-16
07817	EMI TEST RECEIVER 2Hz-44GHz	ESW44	ROHDE AND SCHWARZ	2026-07-01
07760	DIGITAL MULTIMETER	175	FLUKE	2025-11-07
05880	DC POWER SUPPLY 30V/5A	U8002A	KEYSIGHT TECHNOLOGIES	N/A
6157	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2027-03-17
06793	SHIELDED ROOM	S101	ETS LINDGREN	N/A
06611	TEMPERATURE AND HUMIDITY PROBE	HWg-STE	HW GROUP	2026-04-21
07794	SIGNAL AND SPECTRUM ANALYZER 10Hz-40GHz	FSV40	ROHDE AND SCHWARZ	2027-06-10
05850	DIGITAL MULTIMETER	179	FLUKE	2026-11-06

Testing verdicts

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

Summary

Appendix A

FCC 15.231 / RSS-210 PARAGRAPH			
Requirement – Test case		Verdict	Remark
RSS-Gen (6.7)	Occupied Bandwidth	P	-
FCC 15.231 (a)(1) / RSS-210 (A.1.2)(a)	Transmitter deactivation	P	-
Section 15.231 (b) / 15.209 (a) / RSS-210 (A.1.3) / RSS-Gen (8.9)	Field strength and Emission limitations radiated (Transmitter)	P	-
FCC 15.231 (c) / RSS-210 (A.1.4)	Bandwidth	P	-
<u>Supplementary information and remarks:</u>			
None			

Appendix A: Test results

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FCC 15.231 (B), 15.209 (A) / RSS-210 (A.1.3), RSS-GEN (8.9) FIELD STRENGTH AND EMISSION LIMITATIONS RADIATED (TRANSMITTER).....	19
FCC 15.231 (C) / RSS-210 (A.1.4) BANDWIDTH.....	26

TEST CONDITIONS

(*): Data provided by the client.

POWER SUPPLY (*):

Vnominal:	+3.0 Vdc
Type of Power Supply:	DC voltage from internal button battery

TEMPERATURE (*):

Tnormal:	+25 °C
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ANTENNA (*):	Internal, 3D loop antenna
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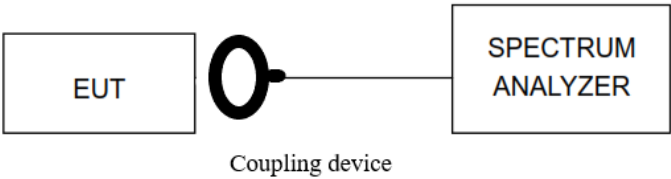
TEST FREQUENCIES (*):

Nominal Operating Frequency:	433.92 MHz
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TEST SETUP

CONDUCTED MEASUREMENTS

The equipment under test was set up in a shielded room and it is connected to the spectrum analyser through a RF cable and a coupling device.



RADIATED MEASUREMENTS

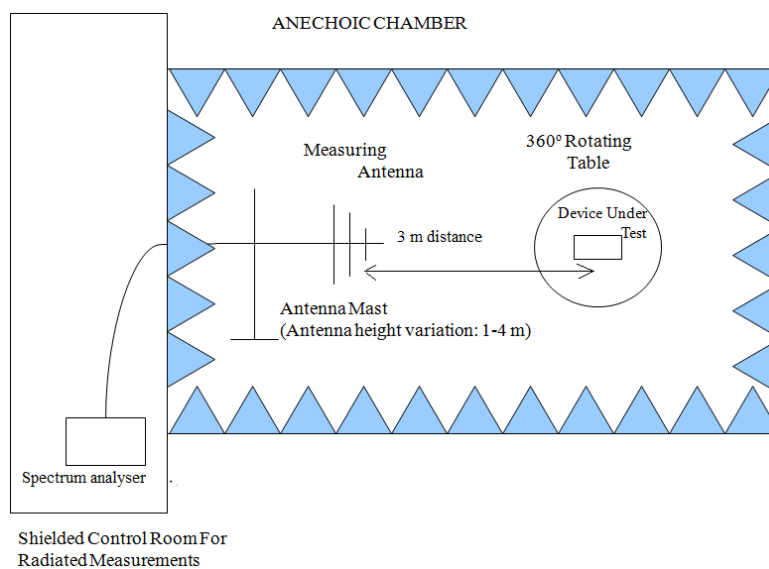
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m (Bilog antenna for 30 MHz to 1 GHz) and for the frequency range 1 GHz-5 GHz (1 GHz-18 GHz Double ridge horn antenna).

The sample is prepared so that transmits continuously when the batteries are connected

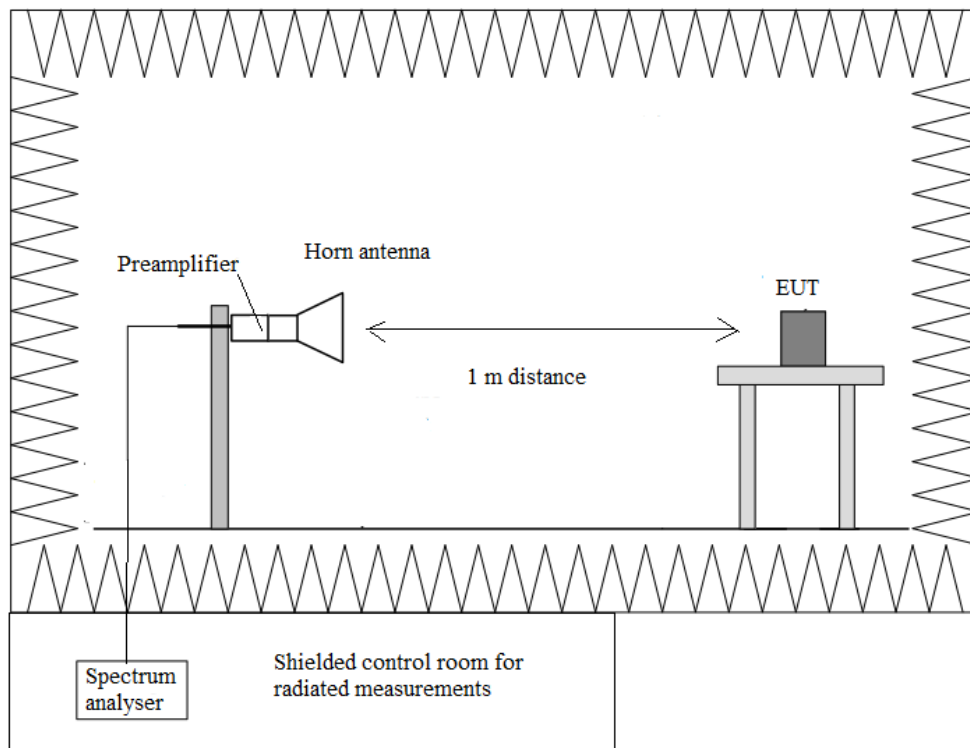
The equipment under test was set up on a non-conductive platform above the ground plane and its situation and orientation were varied to find the maximum radiated emission. It was also rotated 360° and the height of the bilog antenna was varied from 1 to 4 meters to find the maximum radiated emission.

The measurements were made in the three different orientation planes of the EUT to determine the maximum received field. Measurements above 30 MHz were made in both horizontal and vertical planes of polarization.

Radiated measurements setup $f > 30$ MHz:



Radiated measurements setup $f > 1$ GHz



TEST CASES DETAILS

RSS-Gen (6.7) Occupied Bandwidth

Specification

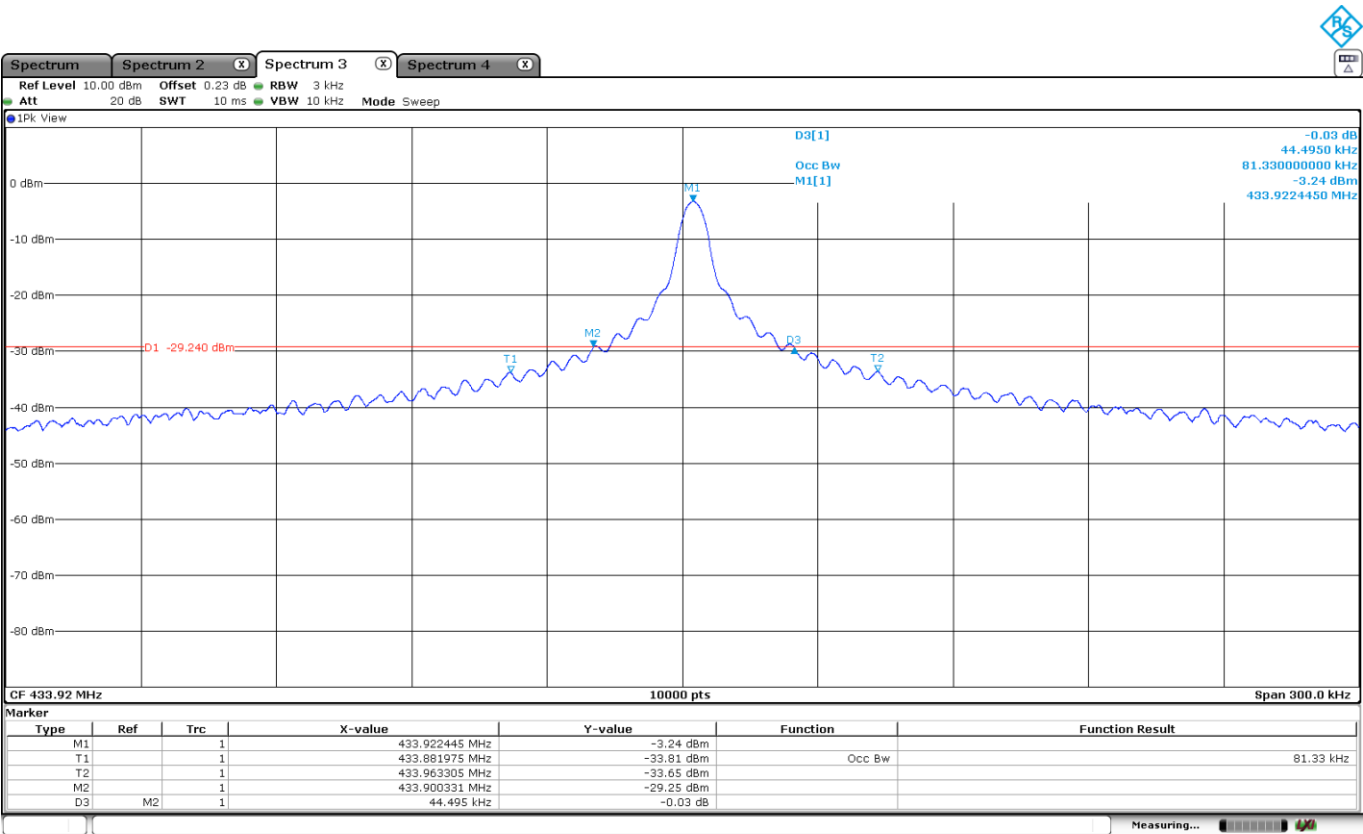
The occupied bandwidth or the “99% emission bandwidth” is defined as the frequency range between two points, one above and the other below the carrier frequency, within which 99% of the total transmitted power of the fundamental transmitted emission is contained.

Results

Modulation ASK (Remote Keyless Entry – RKE mode)

Nominal Centre Frequency = 433.92 MHz

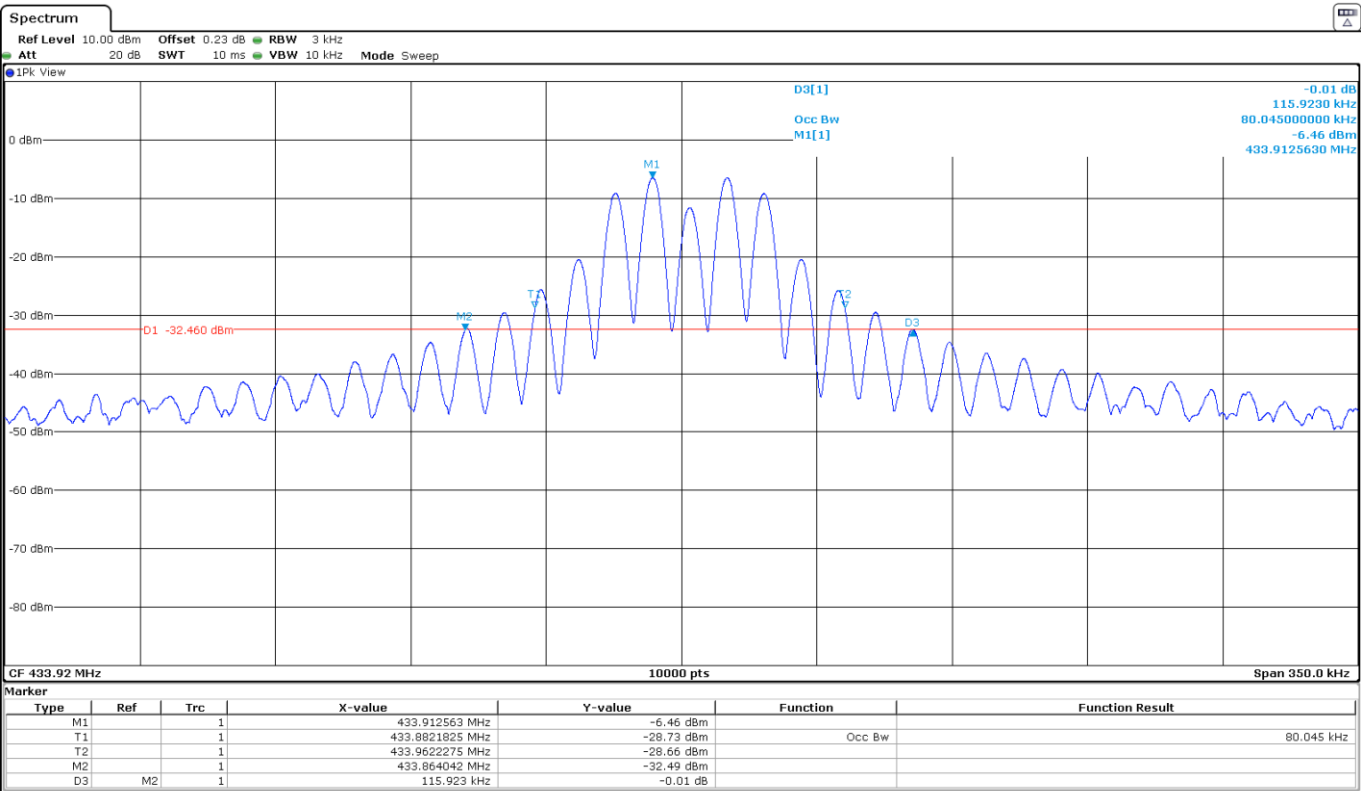
Measured 99% Bandwidth (kHz)	81,33
-26 dBc Bandwidth (kHz)	44,495



Modulation FSK (Passive Entry and Passive Start – PASE mode)

Nominal Centre Frequency = 433.92 MHz

Measured 99% Bandwidth (kHz)	80,05
-26 dBc Bandwidth (kHz)	115,923



Date: 30.OCT.2025 15:07:18

Verdict

Pass

FCC 15.231 (a) / RSS-210 (A.1.2). Transmitter deactivation

Specification

47 CFR § 15.231:

(a)(1) A manually operated transmitter shall employ a switch that will automatically deactivate the transmitter within not more than 5 seconds of being released.

(a)(2) A transmitter activated automatically shall cease transmission within 5 seconds after activation.

RSS-210:

(A.1.2)(a) A manually operated transmitter shall be equipped with a push-to-operate switch and be under manual control at all times during transmission. When released, the transmitter shall cease transmission within no more than 5 seconds of being released.

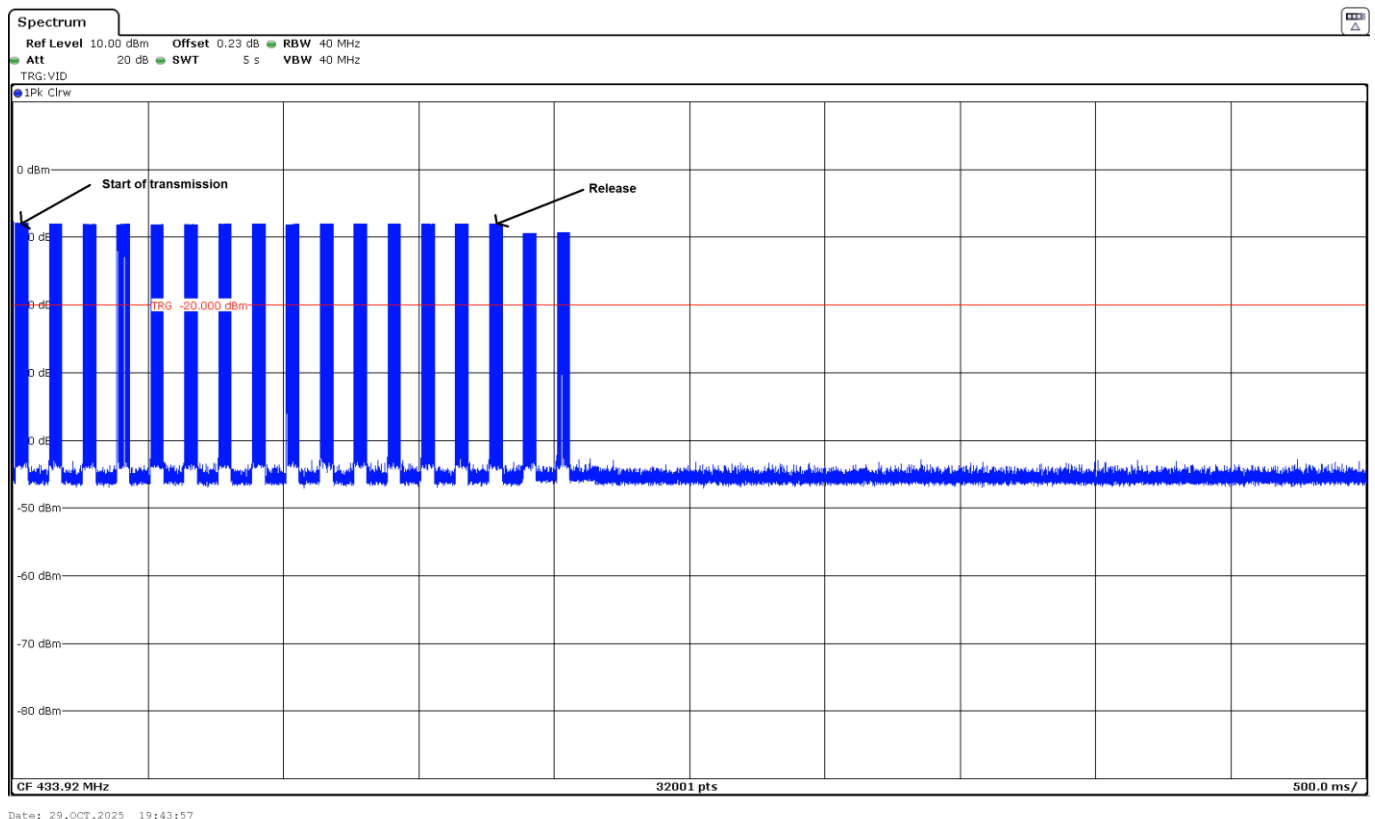
(A.1.2)(b) A transmitter that has been activated automatically shall cease transmission within 5 seconds of activation.

Results

The equipment can operate in both automatically and manually modes.

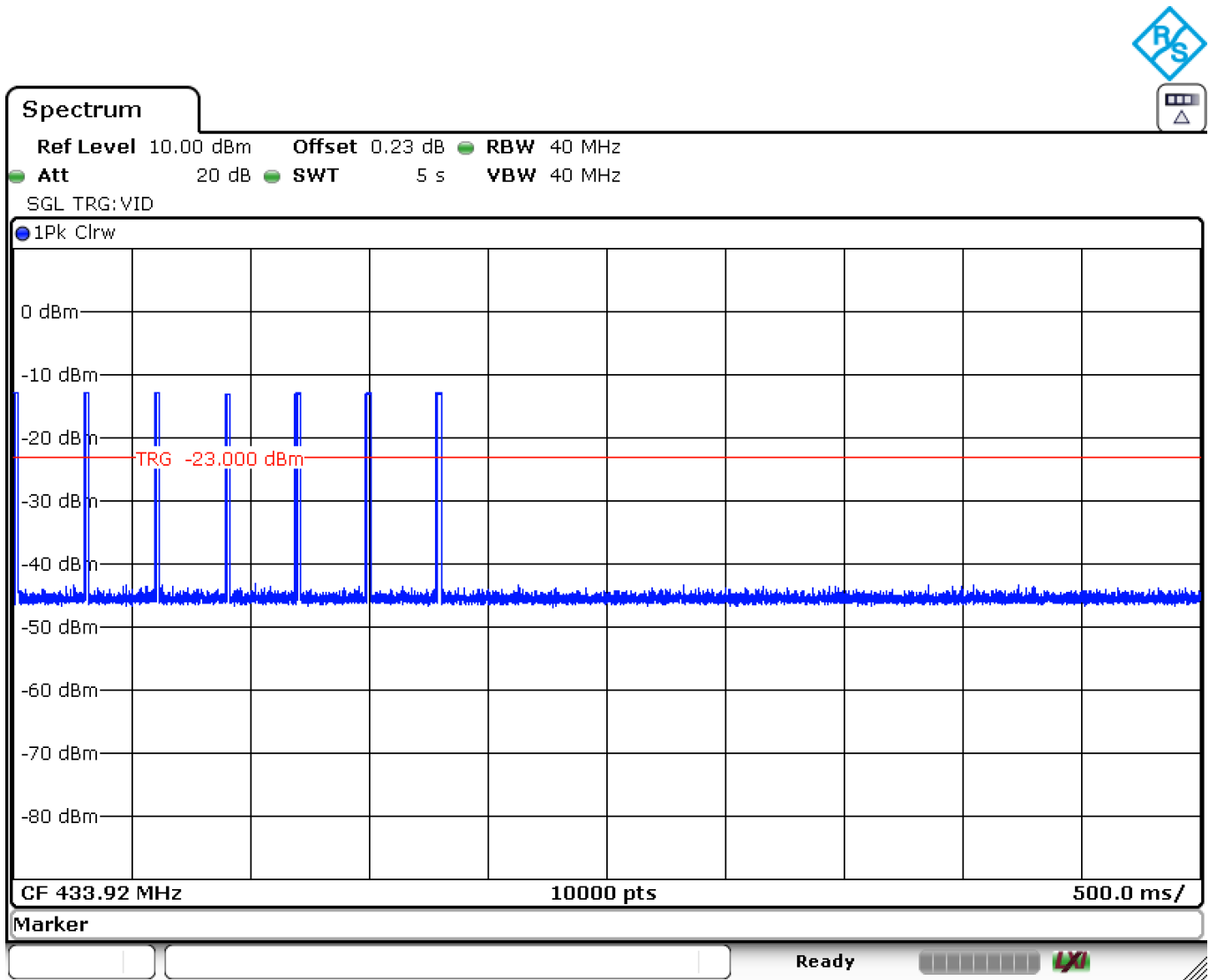
Modulation ASK (Remote Keyless Entry – RKE mode)

The transmission is activated by pressing a button and ceases after releasing it in less than 5 seconds.



Modulation FSK (Passive Entry and Passive Start – PASE mode)

The transmission is activated automatically and ceases in less than 5 seconds after activation.



Verdict

Pass

FCC 15.231 (b), 15.209 (a) / RSS-210 (A.1.3), RSS-Gen (8.9) Field strength and Emission limitations radiated (Transmitter)

Specification:

The field strength of emissions from intentional radiators shall not exceed the following:

Fundamental frequency (MHz)	Field strength of fundamental (µV/m)	Field strength of spurious emission (µV/m)
40.66 – 40.70	2,250	225
70 – 130	1,250	125
130 - 174	1,250 to 3,750 **	125 to 375 **
174 - 260	3,750	375
260 - 470	3,750 to 12,500 **	375 to 1,250 **
Above 470	12,500	1,250

** : Linear Interpolations: The maximum permitted unwanted emission level is 20 dB below the maximum permitted fundamental level.

Spurious emissions shall be attenuated to the limits shown in the above table or to the general limits shown in Section 15.209 / RSS-Gen, whichever limit permits a higher field strength.

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

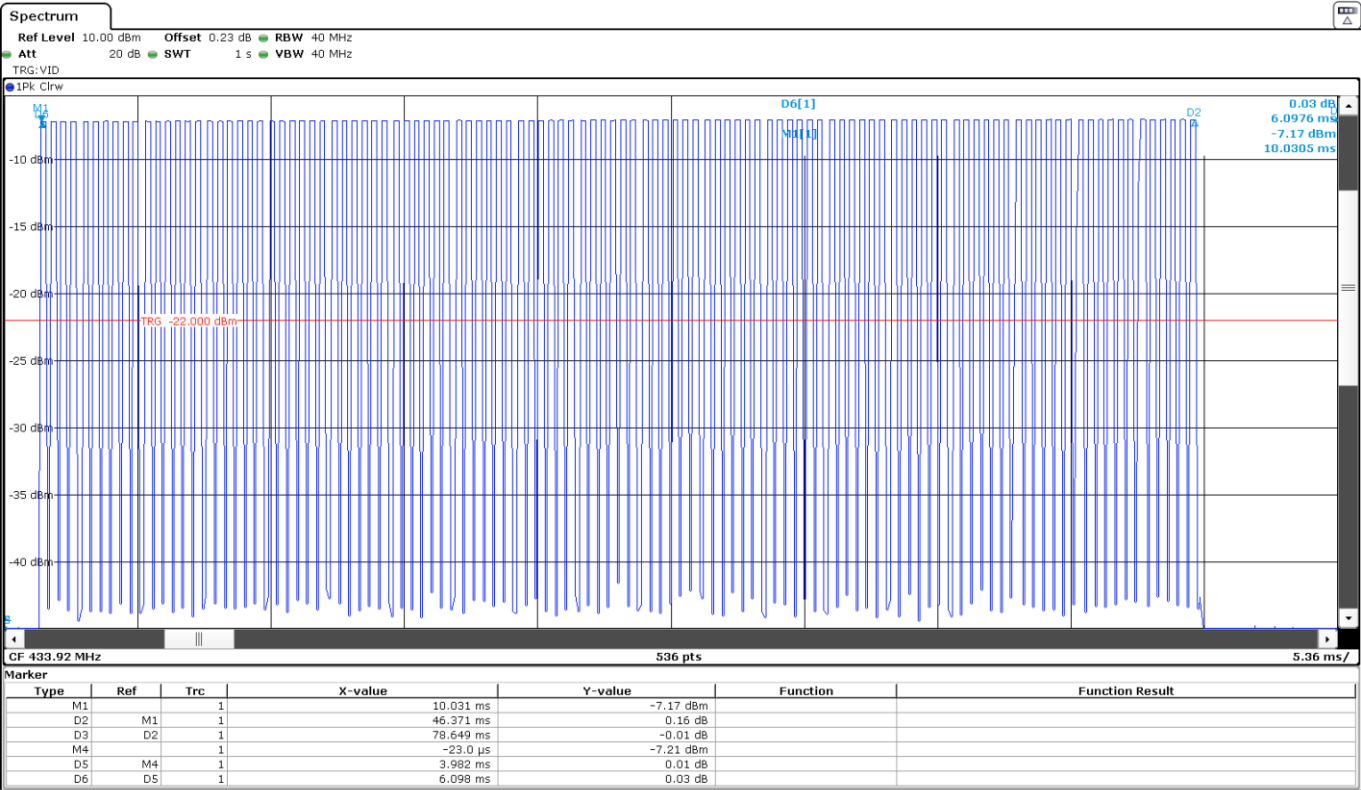
Results:

The field strength is calculated by adding correction factor to the measured level from the spectrum analyser. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

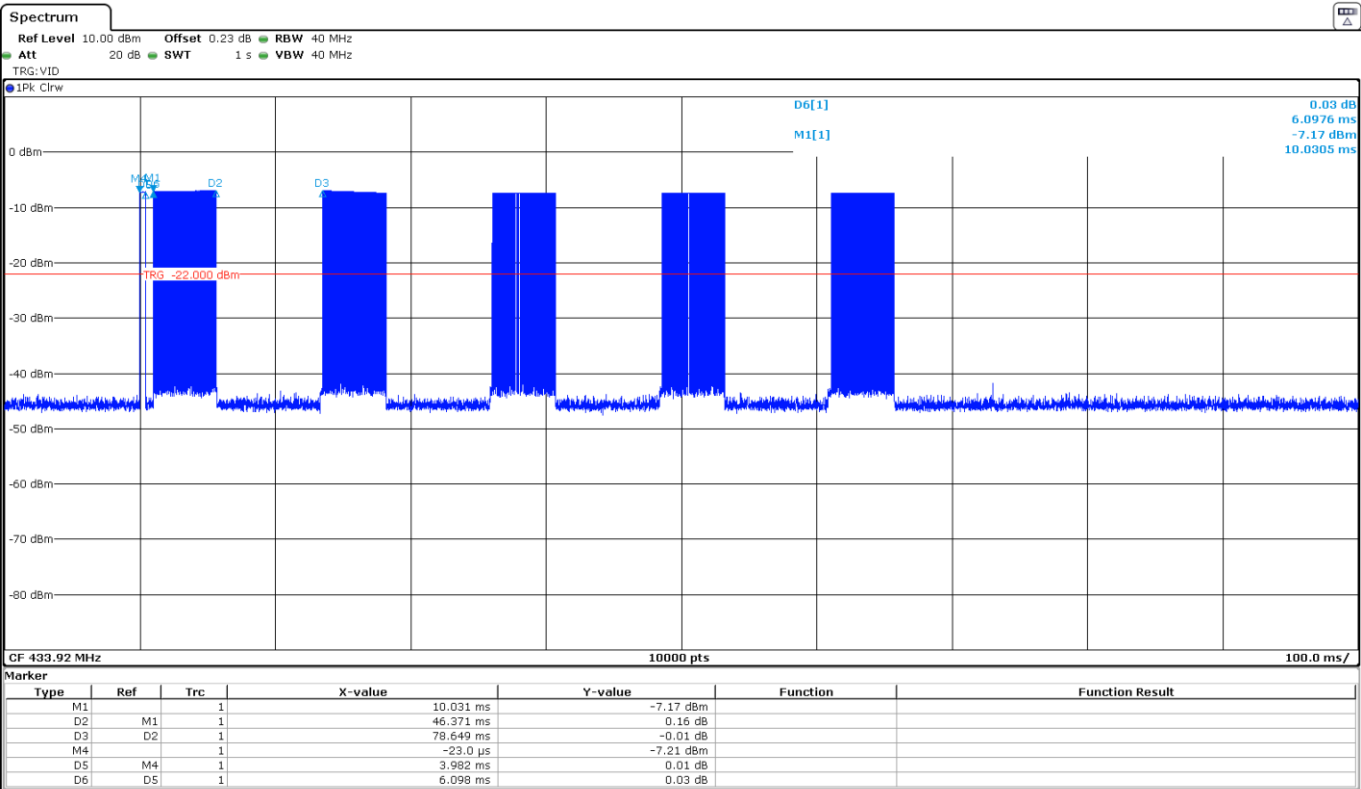
The transmission is pulsed so the average values of transmitter fundamental and spurious emissions are calculated from the measured peak values using the duty cycle correction factor δ as indicated in standard ANSI C63.10-2020 + Cor.1-2023 + C63.10a-2024 + Errata to C63.10a-2024.

Modulation ASK (Remote Keyless Entry – RKE mode)

Computation of duty-cycle correction factor



Date: 29.OCT.2025 17:17:49



Date: 29.OCT.2025 17:16:54

According to ANSI C63.10, paragraph 7.5, we can determinate the Duty Cycle in this way:

Duty cycle correction factor $\delta = 20 \cdot \log (\text{Tx ON (ms)} \cdot \text{Number of pulses within 100 ms}) / 100 \text{ ms}$

Number of pulses within 100 ms: 1

Sub-pulse	Duration (ms)	Number of pulses	Sub-pulse "On Time" (ms)
1	46.371	1	46.371
TOTAL ON TIME			46.371

Duty cycle correction factor $\delta = 46.371 / 100 = 0.46371$

$\delta = 20 \log (0.46371) = -6.675 \text{ dB}$

Frequency range 30 MHz-1000 MHz (see next plots)

I. Fundamental:

Frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Limit 15.231 (b) / 15.209 (dB μ V/m)
433,920967 (Fundamental)	H	Peak	68	100.82

Calculation for Average level:

Frequency (MHz)	Detector	Average Emission Level (dB μ V/m)	Duty-cycle correction factor δ (dB)	Corrected Average Emission Level (dB μ V/m)	Limit 15.231 (b) / 15.209 (dB μ V/m)
433.909833	Average	67.94	-6.675	61.265	80.82

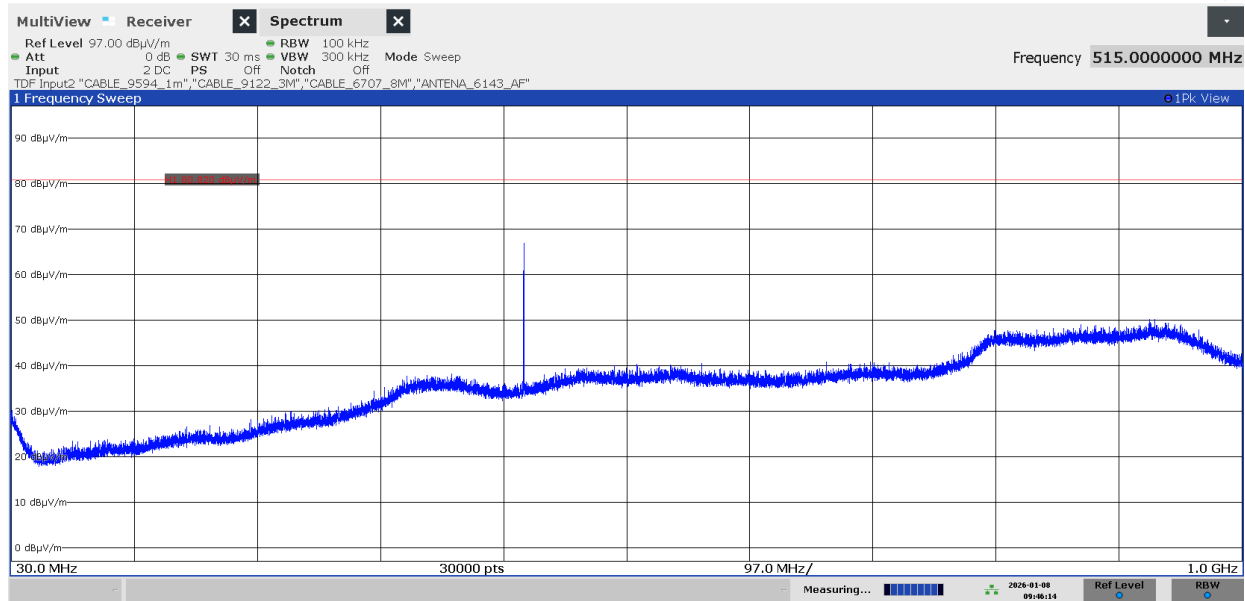
Verdict

Pass

II. Spurious emissions:

Frequency range 30 MHz - 1000 MHz:

No spurious emissions were found at less than 20 dB below the limit.

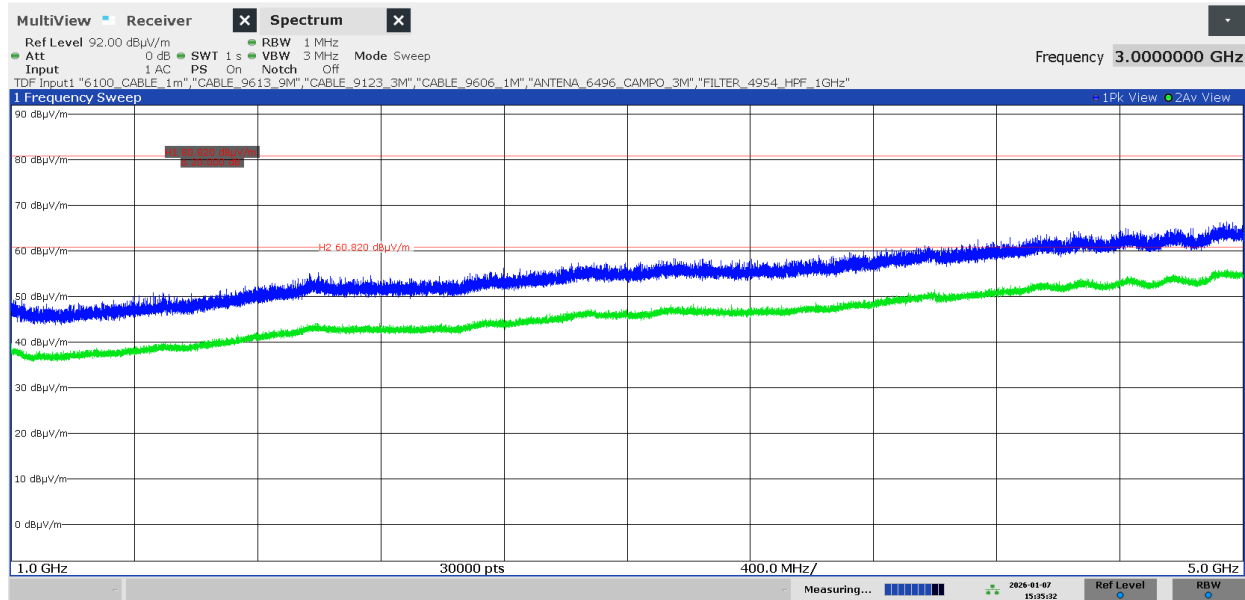


09:46:14 AM 01/08/2026

Note: The plot above shows the results of the scan using peak detector. For spurious emissions measurement the carrier frequency (fundamental) was attenuated using a notch filter. The highest peak shown in the plot is the carrier frequency.

Frequency range 1 - 5 GHz:

No spurious emissions were found at less than 20 dB below the limit.



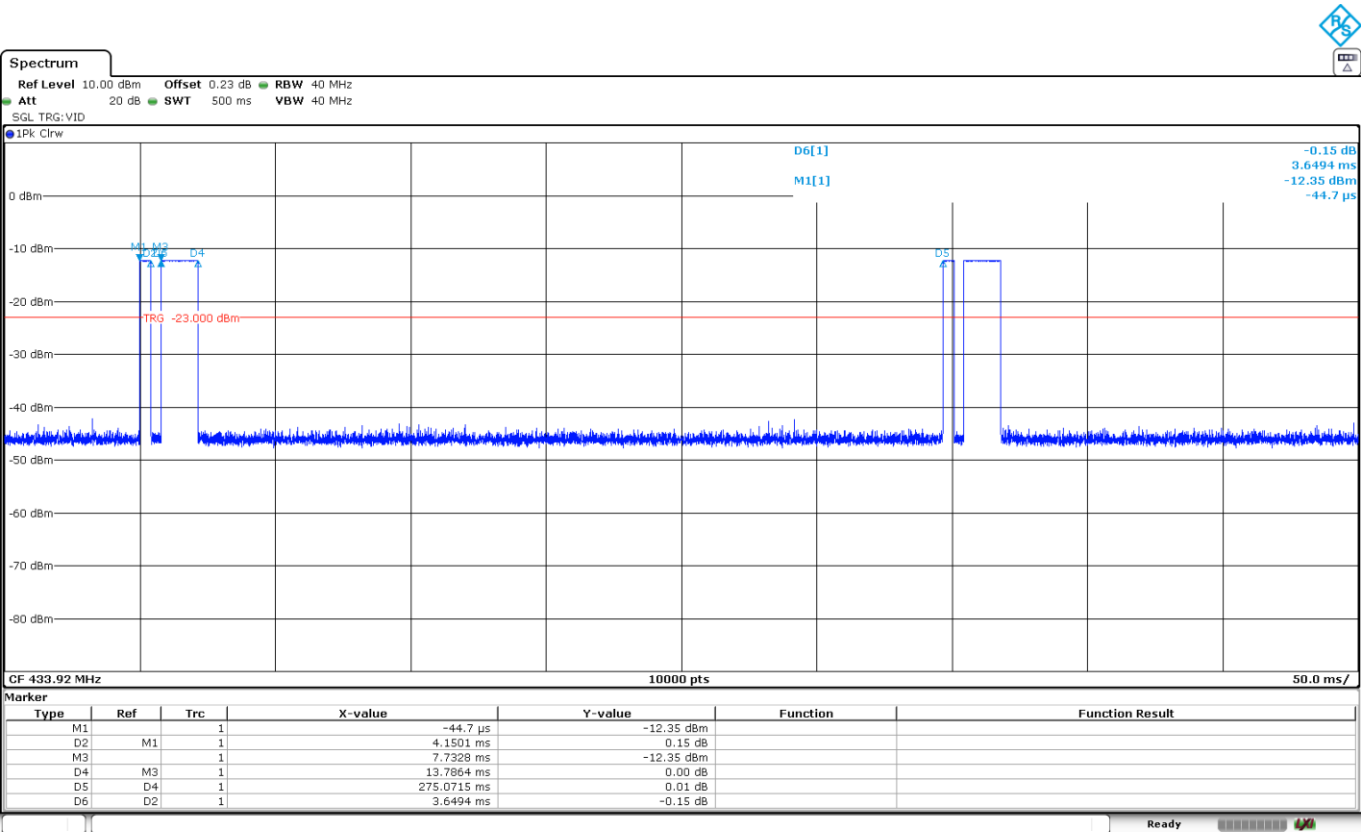
03:35:33 PM 01/07/2026

Verdict

Pass

Modulation FSK (Passive Entry and Passive Start – PASE mode)

Computation of duty-cycle correction factor



According to ANSI C63.10, paragraph 7.5, we can determinate the Duty Cycle in this way:

Duty cycle correction factor $\delta = 20 * \log (\text{Tx ON (ms)} * \text{Number of pulses within 100 ms}) / 100 \text{ ms}$

Number of pulses within 100 ms: 1

Sub-pulse	Duration (ms)	Number of pulses	Sub-pulse “On Time” (ms)
1	25.6693	1	25.6693
TOTAL ON TIME			25.6693

Duty cycle correction factor $\delta = 25.6693 / 100 = 0.2567$

$\delta = 20 \log (0.2567) = -11.81 \text{ dB}$

I. Fundamental:

Frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Limit 15.231 (b) / 15.209 (dBµV/m)
433.909833 (Fundamental)	H	Peak	86.09	100.82 dBµV/m

Calculation for Average level:

Frequency (MHz)	Detector	Average Emission Level (dBµV/m)	Duty-cycle correction factor δ (dB)	Corrected Average Emission Level (dBµV/m)	Limit 15.231 (b) / 15.209 (dBµV/m)
433.909833	Average	86.09	-11.81	74.28	80.82 dBµV/m / ---

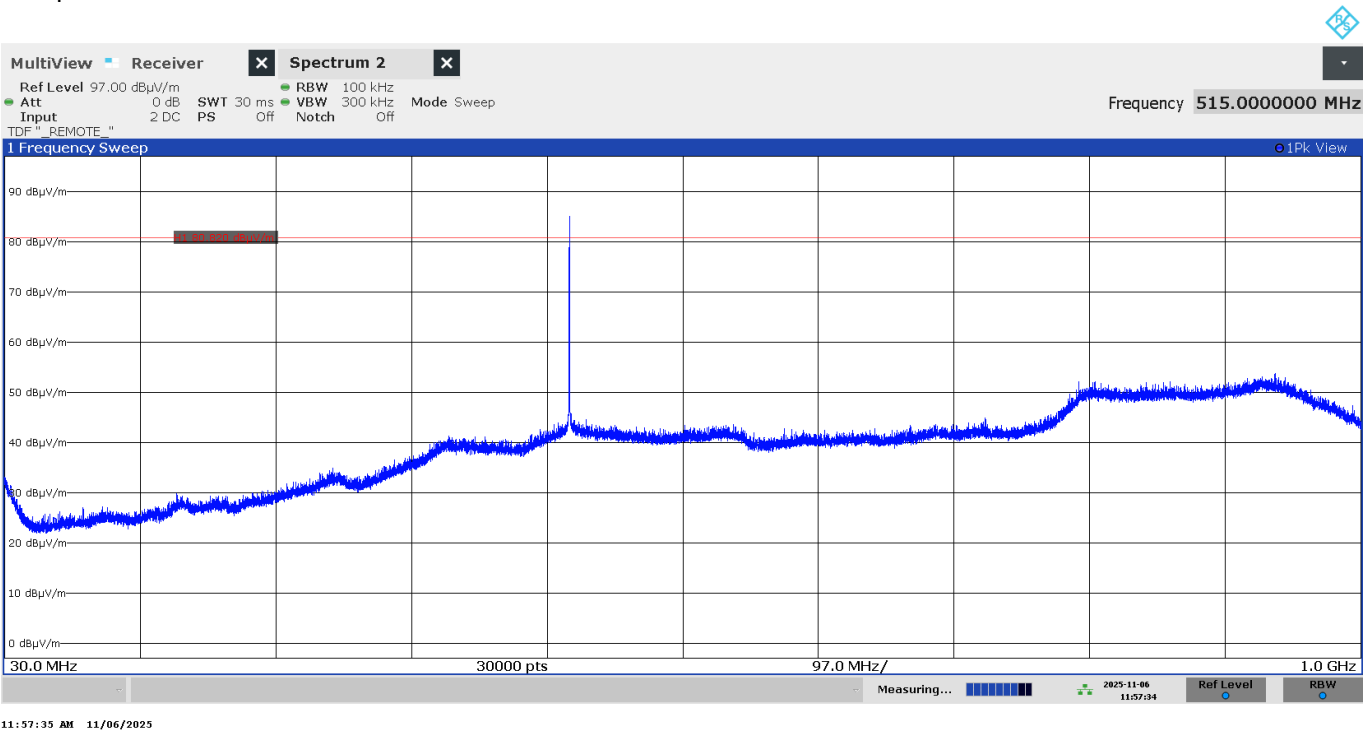
Verdict

Pass

II. Spurious emissions:

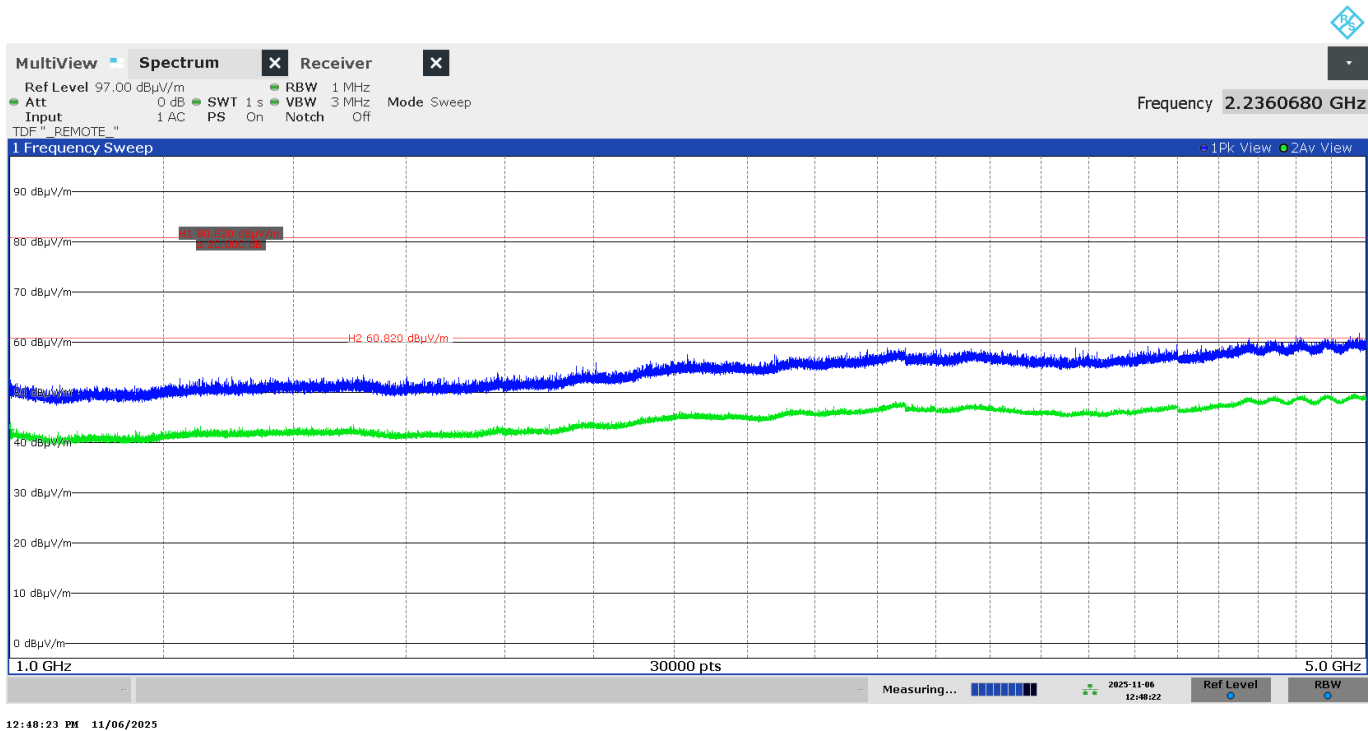
Frequency range 30 MHz - 1000 MHz:

No spurious emissions were found at less than 20 dB below the limit.



Frequency range 1 - 5 GHz:

No spurious emissions were found at less than 20 dB below the limit.



Verdict

Pass

FCC 15.231 (c) / RSS-210 (A.1.4) Bandwidth

Specification

47 CFR § 15.231:

The bandwidth of the emission shall be no wider than 0.25 % of the centre frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RSS-210:

The occupied bandwidth of momentarily operated devices shall be less than or equal to 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz.

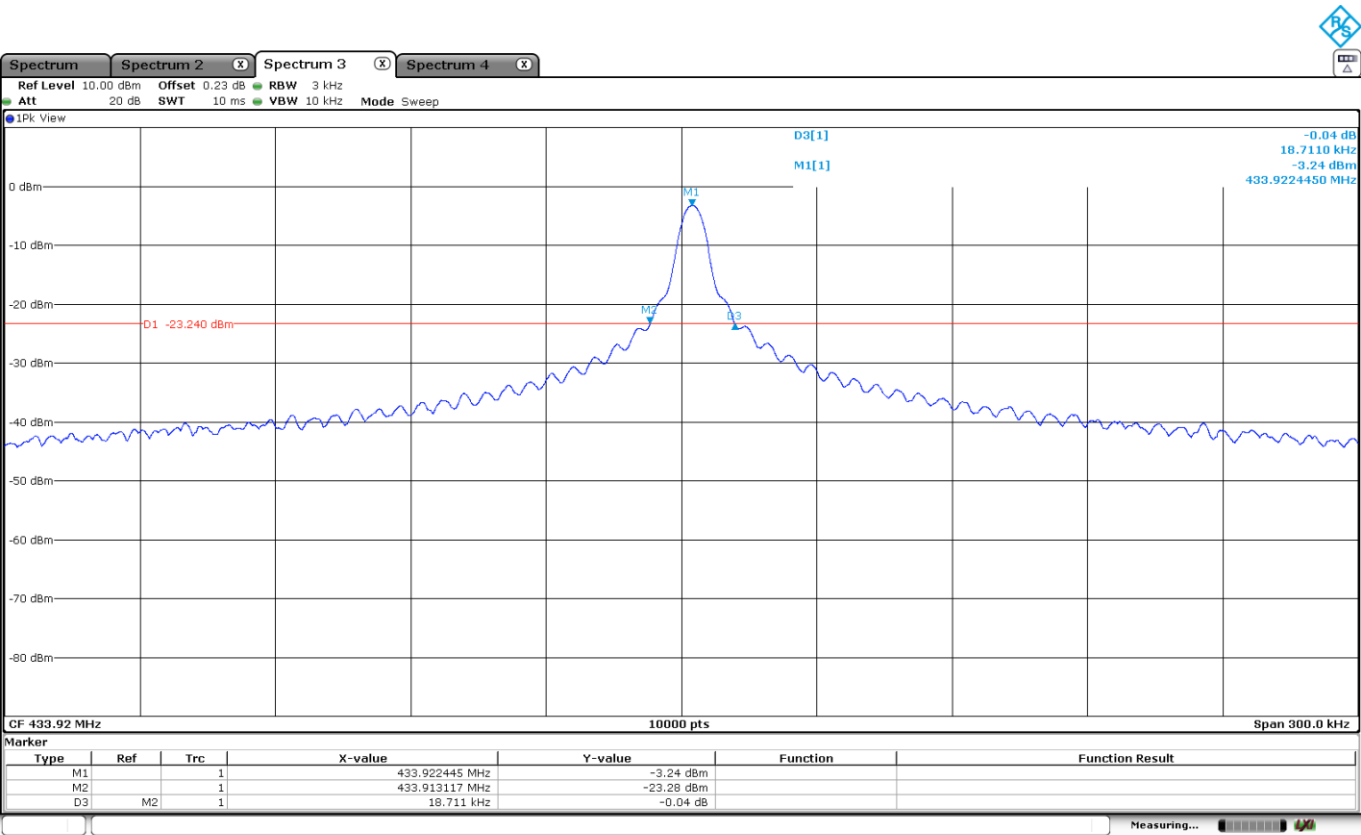
Results

Modulation ASK (Remote Keyless Entry – RKE mode)

Nominal Centre Frequency = 433.92 MHz

Limit of Spectrum Bandwidth = 0.25 % x Nominal Centre Frequency = 1084.80 kHz

Measured 20 dB Bandwidth (kHz)	18.711
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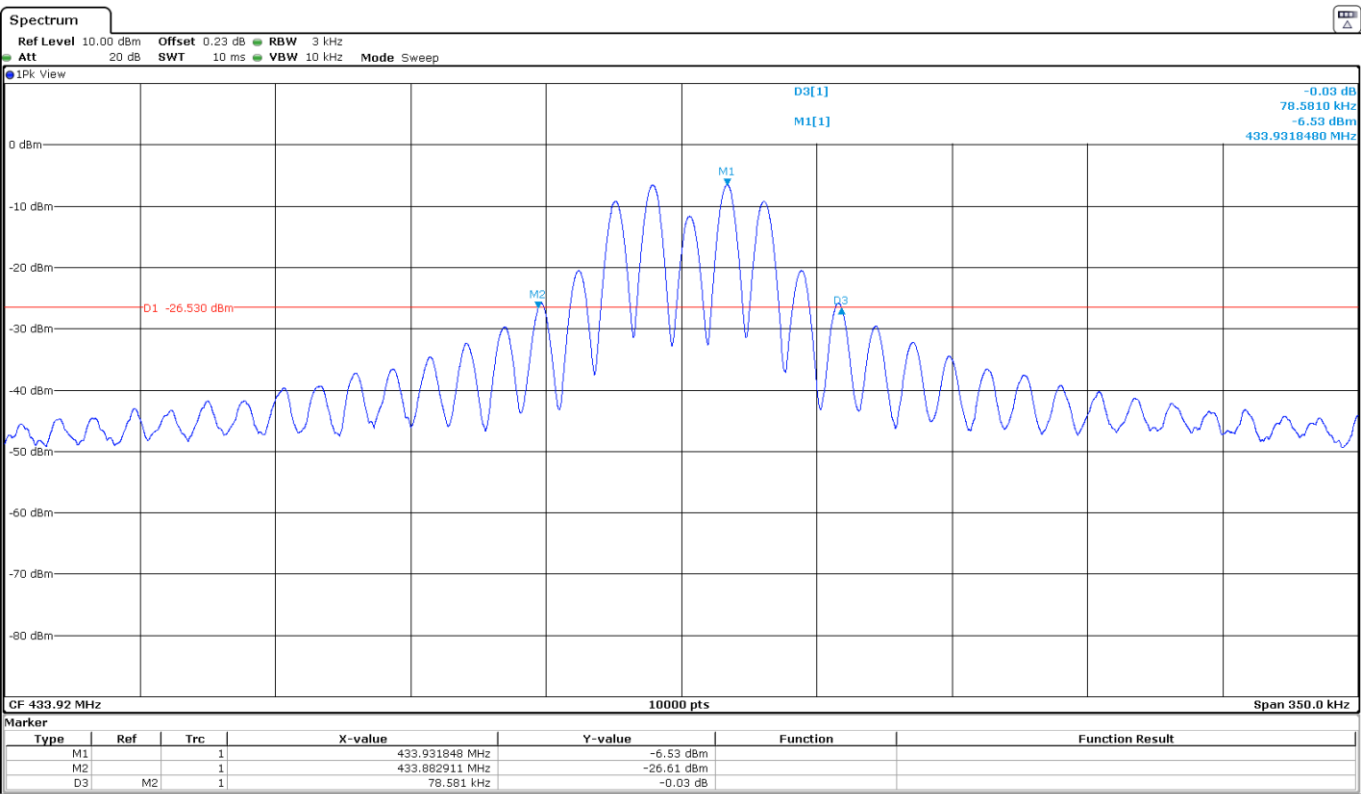


Modulation FSK (Passive Entry and Passive Start – PASE mode)

Nominal Centre Frequency = 433.92 MHz

Limit of Spectrum Bandwidth = 0.25 % x Nominal Centre Frequency = 1084.80 kHz

Measured 20 dB Bandwidth (kHz)	78.581
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Date: 30.OCT.2025 15:11:37

Verdict

Pass