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C.I.F. A29507456

DEKRA

ilac-MRA ENAC ENSAYOS Nº 51/LE147

Test report No:
NIE: 64195RRF.003

Test Report

USA FCC Part 15.231, 15.209
CANADA RSS-Gen, RSS-210

(*) Identification of item tested	Telematics Control Unit for trucks with TPMS support, GSM, BLE, LF Transmitter and GNSS receiver
(*) Trademark	LDL Technology
(*) Model and /or type reference	19239
Other identification of the product	HW version: 319-158-2090 SW version: 414069191013 FCC ID: T4519239 IC: 6450A-19239 Cell module FCC ID: RI7ME910C1WW Cell module IC: 5131A-ME910C1WW IMEI TAC: 35308109
(*) Features	Bluetooth LE, RF 434, GSM/LTE, GNSS receiver
Applicant	LDL TECHNOLOGY Parc Technologique du Canal, 3 rue Giotto, 31520, Ramonville-Saint-Agne, FRANCE
Test method requested, standard	USA FCC Part 15.231 (10-1-19 Edition): Periodic operation in the band 40.66-40.70 MHz and above 70 MHz. USA FCC Part 15.209 (10-1-19 Edition): Radiated emission limits, general requirements. CANADA RSS-Gen Issue 5 Amendment 1 (April 2018). General Requirements for Compliance of Radio Apparatus. CANADA RSS-210 Issue 10 (December 2019). Licence-Exempt Radio Apparatus: Category I Equipment. ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	José Carlos Luque RF Lab. Supervisor 74841983Y JOSE CARLOS LUQUE (C:A29507456) Firmado digitalmente por 74841983Y JOSE CARLOS LUQUE (C:A29507456) Fecha: 2020.09.28 09:53:33 +02'00'
Date of issue	2020-09-28
Report template No	FDT08_22 (*) "Data provided by the client"

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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 a FCC-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test report.

DEKRA Testing and Certification is an ISED-recognized accredited testing laboratory with appropriate scope of accreditation that include testing performed in this test 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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General conditions

1. This report is only referred to the item that has undergone the test.
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.

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 model 19239 is a system that aims to offer telematic services and the device acts like gateway, receiving and transmitting data.

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 result.

Usage of samples

Samples undergoing test have been selected by: The client.

Sample S/01 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
64195C/010	Telematics Control Unit	19239	--	2020-03-25
64195C/019	Harness	--	--	2020-03-25

Sample S/01 has undergone the test(s): The conducted tests indicated in the Appendix A.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
64195C/005	Telematics Control Unit	19239	--	2020-03-25
64195C/020	Harness	--	--	2020-03-25
64195C/030	Bracket TCU 1.2	--	--	2020-06-09

Sample S/02 has undergone the test(s): The Radiated tests indicated in Appendix A.

Test sample description

Ports..... :	Port name and description	Cable					
		Specified max length [m]	Attached during test	Shielded	Coupled to patient(3)		
	Power and data (RS232) test cable	1	☒	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
			☐	☐	☐		
Supplementary information to the ports..... :							
Rated power supply .....:	Voltage and Frequency		Reference poles				
			L1	L2	L3	N	PE
	☐	AC:	☐	☐	☐	☐	☐
	☐	AC:	☐	☐	☐	☐	☐
	☒	DC: nominal 12V/24V (according to vehicle battery)					
	☒	DC: tolerated range: 8 to 32V					
Rated Power .....:	12W						
Clock frequencies .....:	8MHz, 32 MHz, 32.768 KHz, 16 MHz						

Other parameters.....:			
Software version .....:	414069191013		
Hardware version.....:	319-158-2090		
Dimensions in cm (W x H x D)....:	18 x 6.5 x 13		
Mounting position.....:	☐	Table top equipment	
	☐	Wall/Ceiling mounted equipment	
	☐	Floor standing equipment	
	☐	Hand-held equipment	
	☒	Other: attached to provided bracket, mounted on vehicle	
Modules/parts .....:	Module/parts of test item	Type	Manufacturer
	TCU 1.2 4G Autolocation	EUT	LDL Technology
	TCU 1.2 Bracket	Metallic mounting bracket	LDL Technology
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

LDL TECHNOLOGY

Parc Technologique du Canal, 3 rue Giotto, 31520, Ramonville-Saint-Agne, FRANCE

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2020-06-03
Date (finish)	2020-07-22

Document history

Report number	Date	Description
64195RRF.003	2020-09-28	First release

Environmental conditions

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

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

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

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

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

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

Remarks and comments

The tests have been performed by the technical personnel: Javier Miguel Nadales, Miguel Ángel Torres, Nicolás Salguero, Alfonso Gutiérrez.

Used instrumentation:

Conducted Measurements:

		Last Calibration	Due Calibration
1.	Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2019/09	2021/09
2.	DC Power Supply 40V/40A Rohde & Schwarz NGPE40	2018/03	2021/03

Radiated Measurements:

		Last Calibration	Due Calibration
1.	Semianechoic Absorber Lined Chamber ETS LINDGREN FACT 3 200 STP	N.A.	N.A.
2.	Shielded Room ETS LINDGREN S101	N.A.	N.A.
3.	Biconical/Log Antenna 30 MHz - 6 GHz ETS LINDGREN 3142E	2020/04	2023/04
4.	Attenuator 3dB, 2W, DC-18GHz, TECHNIWAVE TWTS2G	2020/01	2021/01
5.	EMI Test Receiver 7 GHz ROHDE AND SCHWARZ ESR7	2019/10	2021/10
6.	Power supply DC 20 V / 165 A, AGILENT TECHNOLOGIES N8734A	N.A.	N.A.
7.	Horn Antenna 1-18 GHz SCHWARZBECK MESS-ELEKTRONIK BBHA 9120 D	2019/11	2022/11
8.	RF Pre-amplifier, 40 dB ,1-18 GHz BONN ELEKTRONIK BLMA 0118-1M	2020/05	2021/05
9.	Signal and Spectrum Analyzer 10 Hz - 40 GHz ROHDE AND SCHWARZ FSV40	2019/09	2021/09
10.	Digital Multimeter FLUKE 175	2019/10	2020/10

Testing verdicts

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

Summary

1. SRD 433 MHz.

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

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TEST CONDITIONS

POWER SUPPLY (V):

V nonimal:	12 Vdc
Type of Power Supply:	DC external (car battery).

ANTENNA:

Type of Antennas:	Internal (helix).

TEST FREQUENCIES:

Nominal Operating Frequency:	433.92 MHz

CONDUCTED MEASUREMENTS

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

RADIATED MEASUREMENTS

The equipment under test was scanned for spurious emissions in the frequency range 30 to 10000 MHz.

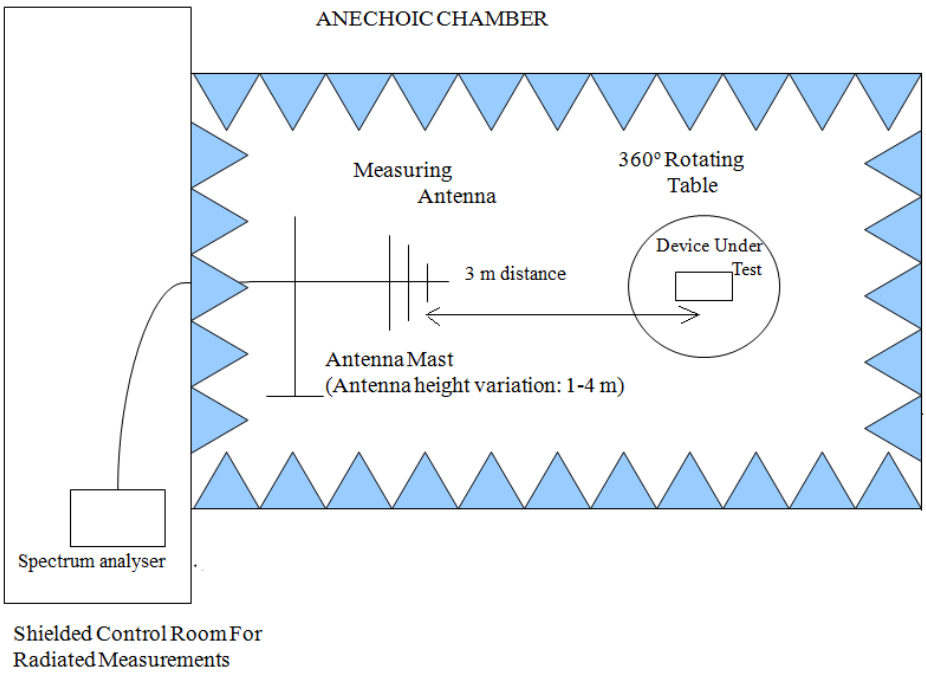
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 3m for the frequency range 1 GHz-5 GHz (1 GHz-18 GHz Double ridge horn antenna).

For radiated emissions in the range 1 GHz-5 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 sample is prepared so that transmits continuously when the batteries are connected.

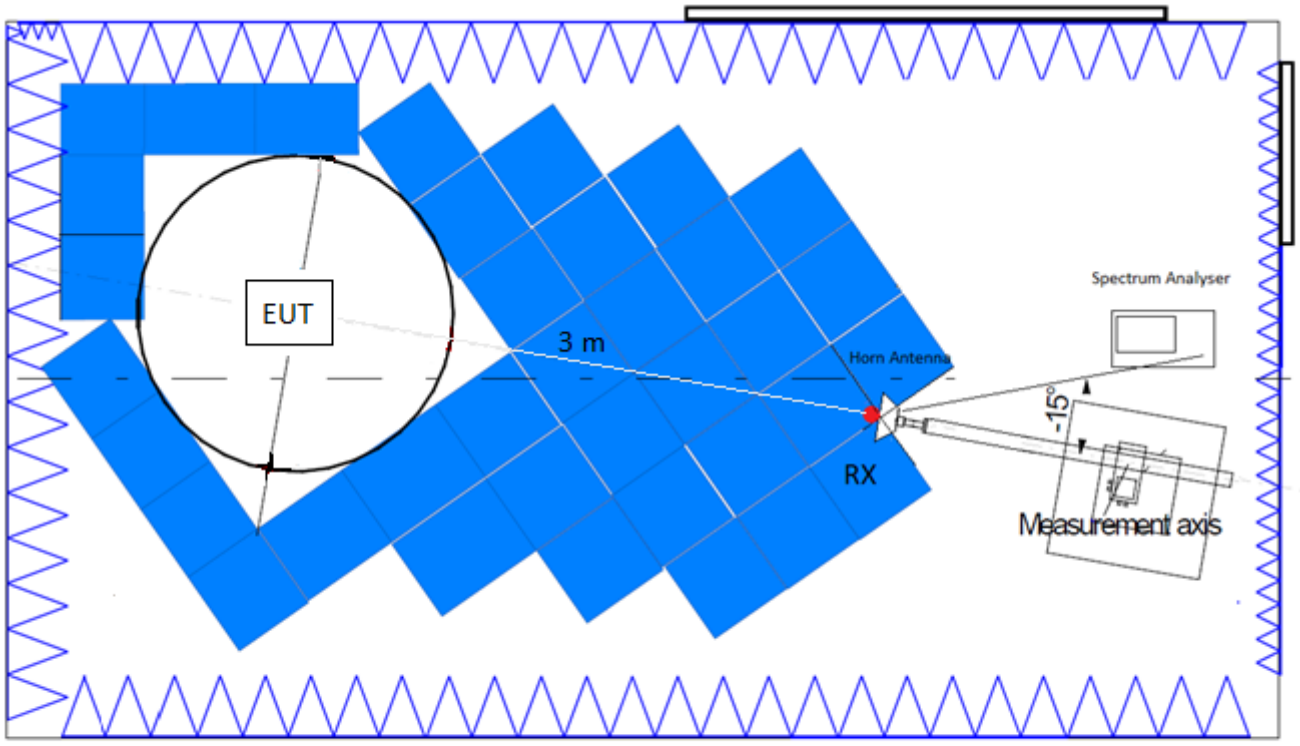
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

Radiated measurements setup f < 1 GHz:



Radiated measurements setup f > 1 GHz:



Occupied Bandwidth

SPECIFICATION:

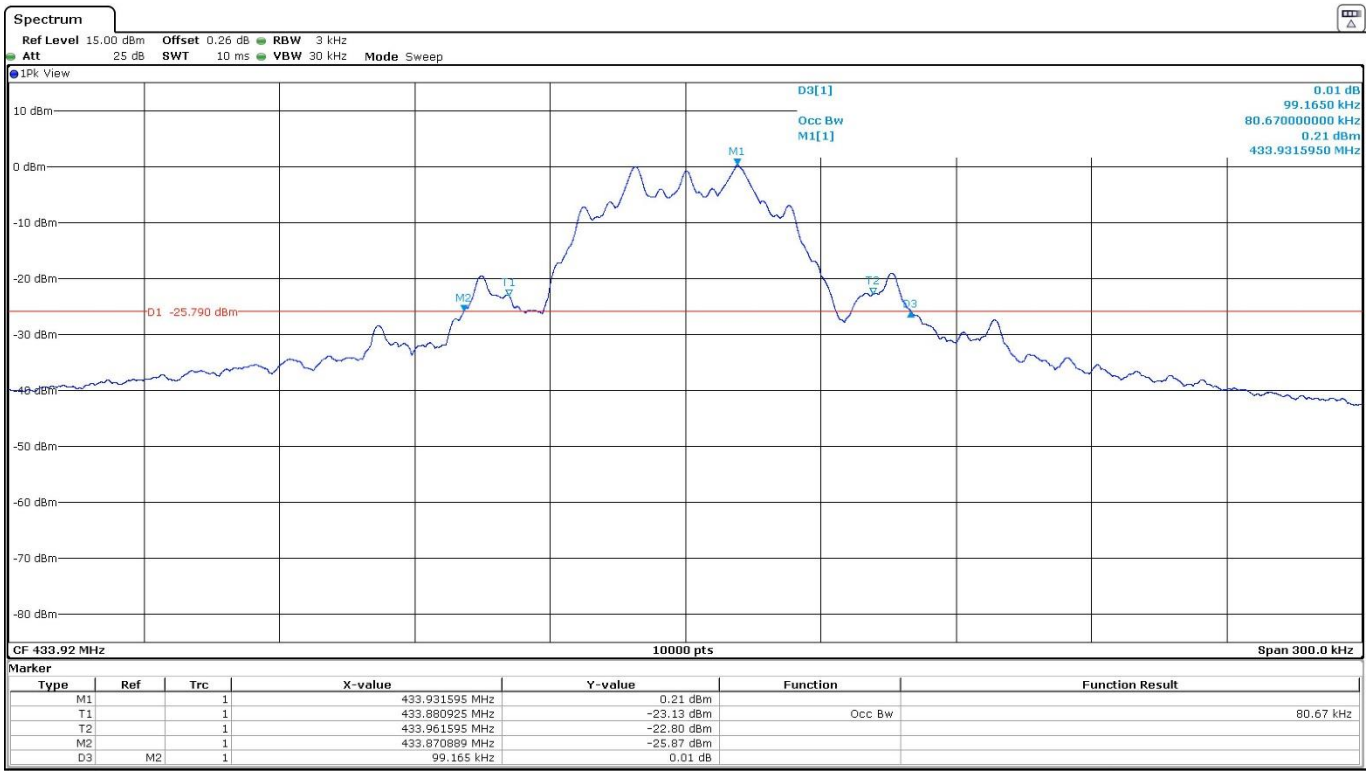
RSS-210 A.1.3.: The 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz.

RESULTS:

Nominal Centre Frequency = 433.92 MHz

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

Measured 99% Bandwidth (kHz)	80.67
-26 dBc Bandwidth (kHz)	99.165
Measurement uncertainty (kHz)	<± 0.38



Verdict: Pass

FCC 15.231 (e) / RSS-210 A.1.4. Transmitter deactivation

SPECIFICATION:

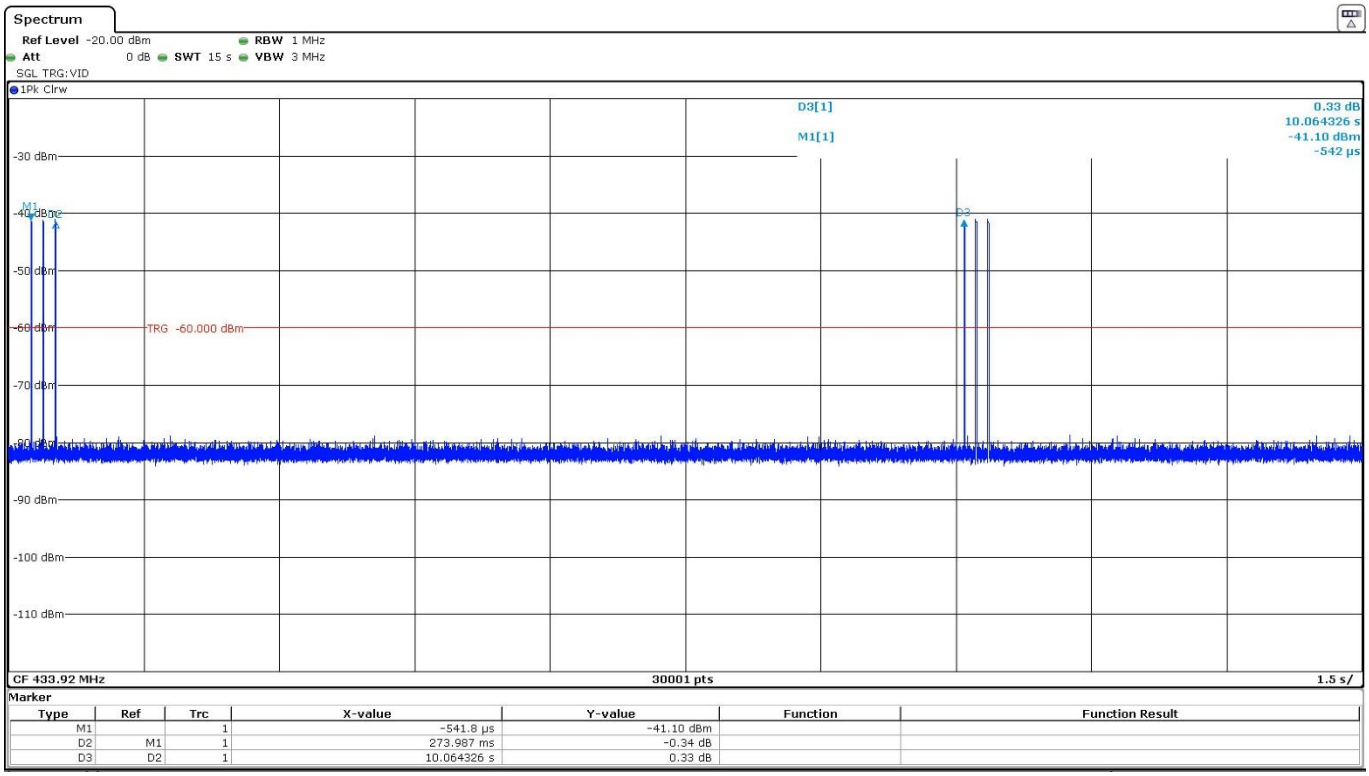
Devices operated under the provisions of this paragraph shall be provided with a means for automatically limiting operation so that the duration of each transmission shall not be greater than one second and the silent period between transmissions shall be at least 30 times the duration of the transmission but in no case less than 10 seconds.

RSS-210:

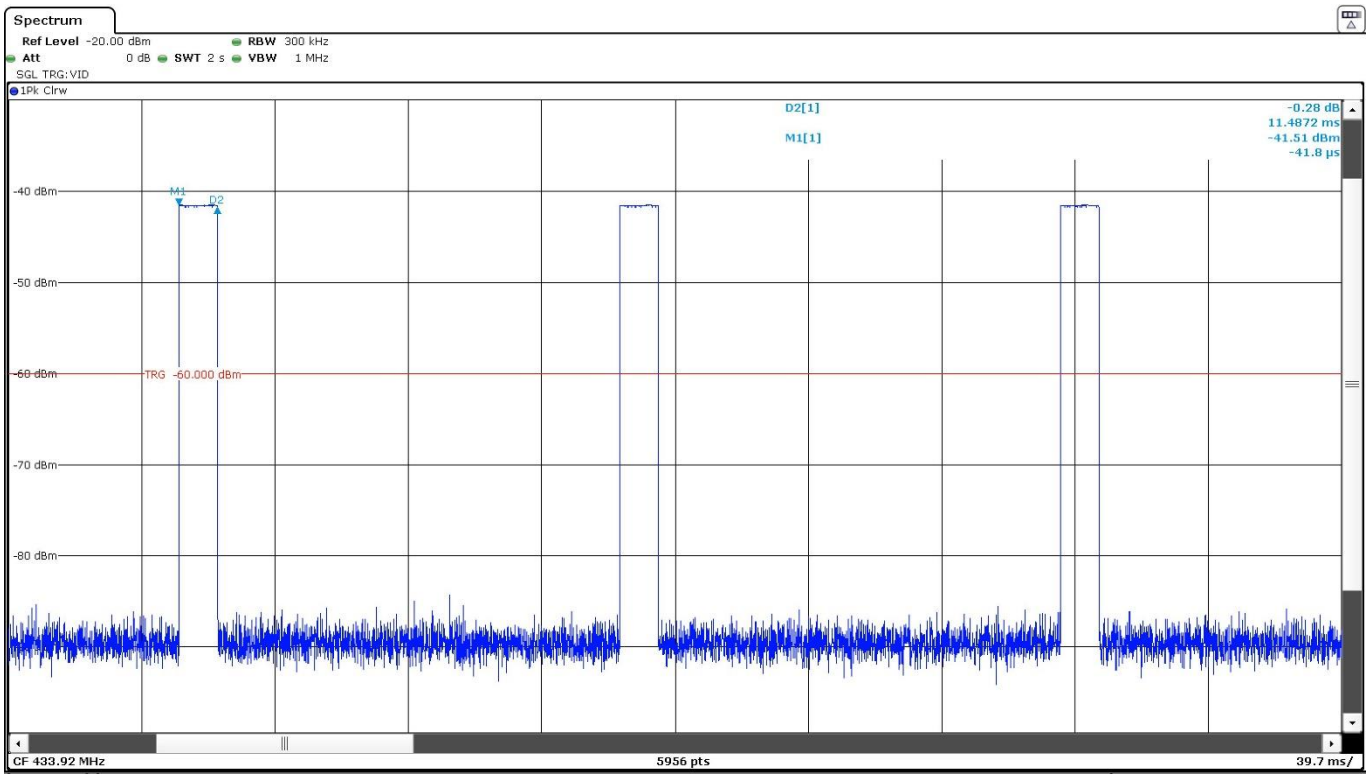
Devices operated under the provisions of this section shall be capable of automatically limiting their operation so that the duration of each transmission is not greater than 1 second and the silent period between transmissions is at least 30 times the duration of the transmission, but not less than 10 seconds under any circumstances. However, devices that are designed for limited use for the purpose of initial programming, reprogramming or installing, and not for regular operations, may operate for up to 5 seconds, provided.

RESULTS:

1. Burst period= 10.338 s
2. Silent period between transmissions= 10.064 s



3. Pulse duration= 11.4872 ms



The equipment transmits 3 pulses of 11.4872 ms (total transmission time = 3 x 11.4872 ms = 34.4616 ms) every 10.338 second (see plots above).

30 times the duration of the transmission is 1.033 seconds.

The silent period between transmissions is 10.064 seconds

Measurements uncertainty (%)	<±0.01

Verdict: PASS

FCC 15.231 (c) / RSS-210 A.1.3. Bandwidth

SPECIFICATION:

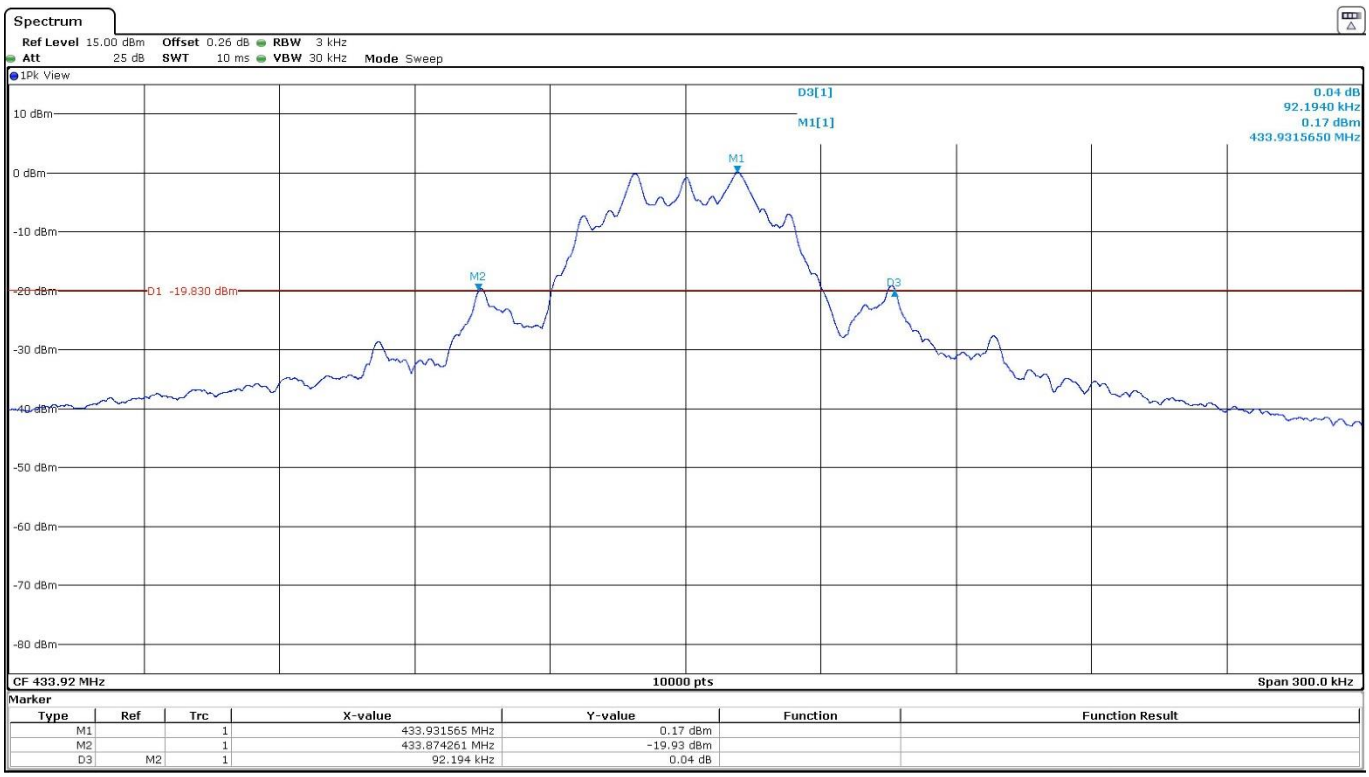
FCC 15.231: The bandwidth of the emission shall be no wider than 0.25 % of the centre frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RESULTS:

Nominal Centre Frequency = 433.92 MHz

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

Measured 20 dB Bandwidth (kHz)	92.194
Measurement uncertainty (kHz)	<± 0.38



Verdict: Pass

FCC 15.231 (e), 15.209 (a) / RSS-Gen 8.9., RSS-210 A.1.2. 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	1,000	100
70 – 130	500	50
130 - 174	500 to 1,500 **	50 to 150 **
174 - 260	1,500	150
260 - 470	1,500 to 5,000 **	150 to 500 **
Above 470	5,000	500

**: 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.

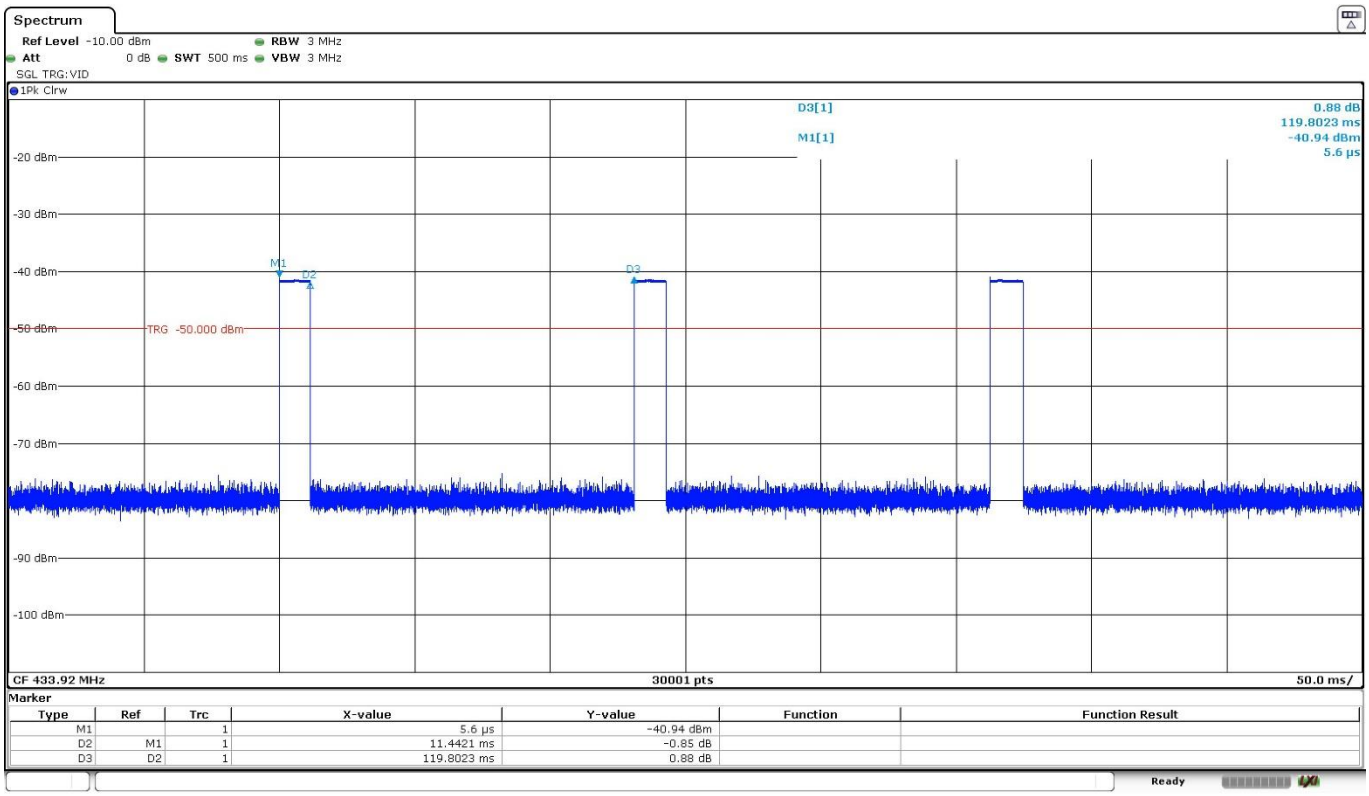
For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

RESULTS:

The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. 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 the standard ANSI C63.10-2013.

Calculation of the Duty Cycle Correction Factor (δ):



Number of pulses within 100 ms: 1 pulse.

	"On Time" (ms)
1 pulses within 100 ms	11.4421
TOTAL "On Time":	11.4421

Duty Cycle Correction Factor (δ) = (TOTAL "On Time") / 100 = 0.1144

Duty Cycle Correction Factor (δ) (dB) = 20 log (δ) = -18.83 dB

I. Fundamental emission:

Frequency range 30 MHz - 1000 MHz:

Frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Limits (µV/m) 15.231 (e) / 15.209
433.934 (Fundamental)	H	Peak	87.53	44,004 (92.87 dBµV/m) / ---

Calculation for Average level:

Frequency (MHz)	Emission Level (dBµV/m) Peak	Duty Cycle Correction Factor δ (dB)	Average Corrected Emission Level (dBµV/m)	Limits (µV/m) 15.231 (e) / 15.209
433.934	87.53	-18.83	68.70	4,4004 (72.87 dBµV/m) / ---

Measurement uncertainty (dB): <± 4.65 dB

II. Spurious emissions:

Frequency range 30 MHz - 1000 MHz:

Highest spurious emission levels:

Frequency (MHz)	Polarization	Detector	Emission Level (dBµV/m)	Limits (dBµV/m) 15.231 (e) / 15.209
843.329	V	Quasi-Peak	44.92	52.87 / 46.00

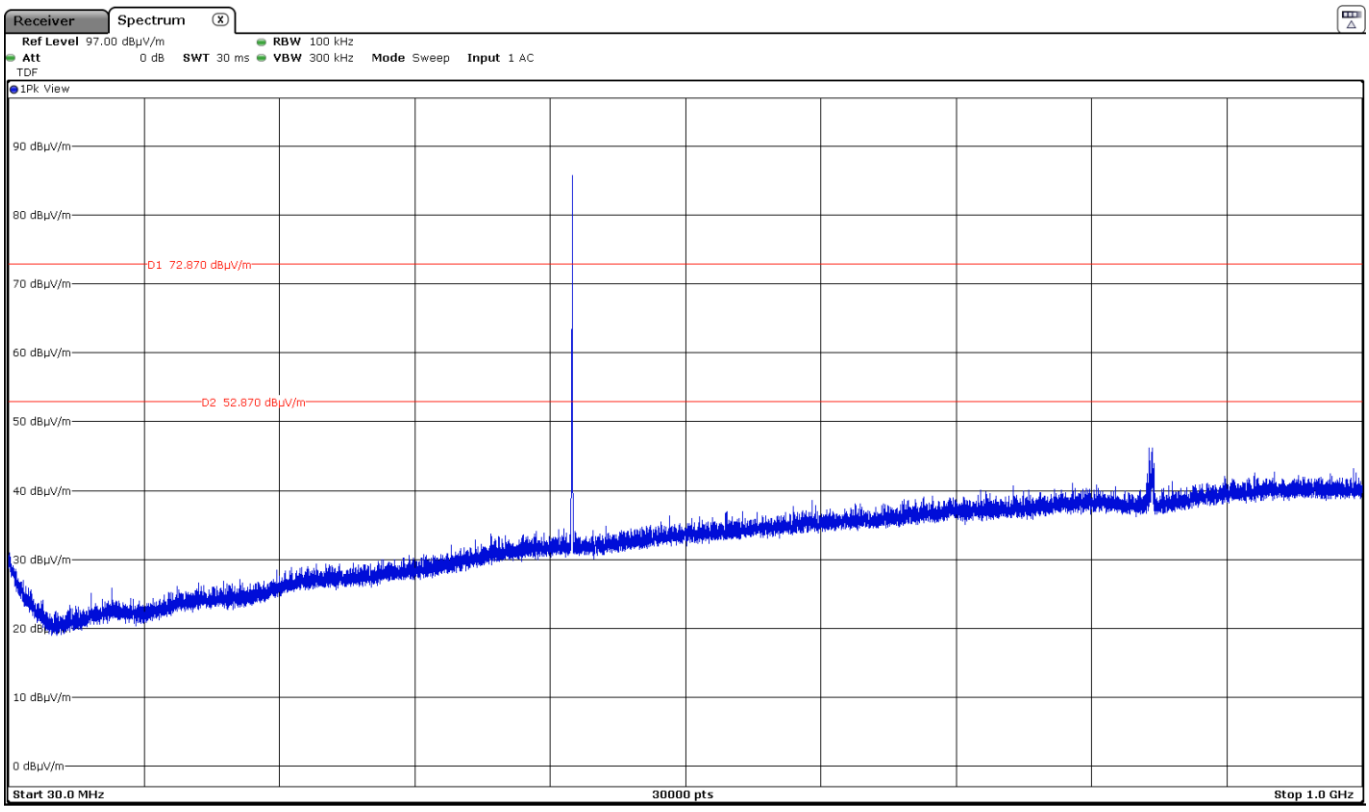
Frequency range 1 - 5 GHz:

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

Measurement uncertainty (dB): <± 4.98 dB

Verdict: PASS

FREQUENCY RANGE 30 MHz - 1 GHz:



The peak above the limit is the carrier frequency SRD 433.92 MHz.

FREQUENCY RANGE 1 - 5 GHz: