



FCC LISTED,
REGISTRATION NUMBER:
720267

Test report No:
NIE: 57623RRF.001

ISED LISTED
REGISTRATION NUMBER
ISED 4621A-2

Test report

USA FCC Part 15.231, 15.209

CANADA RSS-210, RSS-Gen

Radio Frequency Devices. Periodic operation in the band 40.66-40.70 MHz and above 70 MHz.

Licence-Exempt Radio Apparatus (All Frequency Bands): Category I Equipment.

General Requirements and Information for the Certification of Radio Apparatus.

Identification of item tested	IML gen2 (Smart Key)
Trademark	Valeo
Model and /or type reference	IM3C
Other identification of the product	FCC ID: N5F-IM3C
Features	Not provided data
Applicant	VALEO COMFORT & DRIVING ASSISTANCE SYSTEMS, SAS. 76, Rue Auguste Perret, 94046 Créteil CEDEX, FRANCE
Test method requested, standard	USA FCC Part 15.231 10-1-15 Edition: Periodic operation in the band 40.66-40.70 MHz and above 70 MHz. USA FCC Part 15.209 10-1-15 Edition: Radiated emission limits; general requirements. CANADA RSS-210 Issue 9 (August 2016). CANADA RSS-Gen Issue 5 (April 2018). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.
Summary	IN COMPLIANCE
Approved by (name / position & signature)	A. Llamas RF Lab. Manager

Date of issue	2018-11-07
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Competences and guarantees

DEKRA Testing and Certification 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 is a laboratory with a measurement facility in compliance with the requirements of Section 2.948 of the FCC rules and has been added to the list of facilities whose measurements data will be accepted in conjunction with applications for Certification under Parts 15 or 18 of the Commission's Rules. Registration Number: 720267.

DEKRA Testing and Certification is a laboratory with a measurement site in compliance with the requirements of RSS 212, Issue 1 (Provisional) and has been added to the list of filed sites of the Canadian Certification and Engineering Bureau. Reference File Number: ISED 4621A-2.

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

DEKRA Testing and Certification 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 at the time of performance of the test.

DEKRA Testing and Certification 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 and the Accreditation Bodies.

Uncertainty

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

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
57623B/099	IML gen2 (Smart Key)	IM3C	---	2018-08-27
57623B/102	Manual Car Key	---	---	2018-08-27

1. Sample S/01 has undergone the following test(s):

All tests indicated in Appendix A except test Transmitter deactivation.

Sample S/02 is composed of the following elements:

Control Nº	Description	Model	Serial Nº	Date of reception
57623B/092	IML gen2 (Smart Key)	IM3C	---	2018-08-27

1. Sample S/02 has undergone the following test(s):

Test Transmitter deactivation indicated in Appendix A.

Test sample description

Description of product.....:	Smart ECU for keyless car access and start		
Rated power supply	Voltage and Frequency		
	<input type="checkbox"/>	AC:	
	<input checked="" type="checkbox"/>	DC: 3 Vdc.	
Software version	CW: V01.02 Customer: V08.01		
Hardware version.....:	b122051_A		
Mounting position.....:	<input type="checkbox"/>	Table top equipment	
	<input type="checkbox"/>	Wall/Ceiling mounted equipment	
	<input type="checkbox"/>	Floor standing equipment	
	<input checked="" type="checkbox"/>	Hand-held equipment	
	<input type="checkbox"/>	Other:	
Accessories (not part of the test item)	Description	Type	Manufacturer
	N/A		

Identification of the client

VALEO COMFORT & DRIVING ASSISTANCE SYSTEMS, SAS
76 rue Auguste Perret, 94046 Créteil CEDEX, FRANCE

Testing period and place

Test Location	DEKRA Testing and Certification S.A.U.
Date (start)	2018-09-18
Date (finish)	2018-09-21

Document history

Report number	Date	Description
57623RRF.001	2018-11-07	First release

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 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω

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 %
Air pressure	Min. = 860 mbar Max. = 1060 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 1 Ω
Normal site attenuation (NSA)	< ±4 dB at 10 m distance between item under test and receiver antenna, (30 MHz to 1000 MHz)
Field homogeneity	More than 75% of illuminated surface is between 0 and 6 dB (26 MHz to 1000 MHz).

Remarks and comments

The tests have been performed by the technical personnel: Ignacio Cabra and Carlos Alberto Contreras.

Used instrumentation:

Conducted Measurements:

		Last Cal. date	Cal. due date
1.	Spectrum analyser Rohde & Schwarz FSV40	2018/02	2020/02

Radiated Measurements:

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber ETS FACT3 200STP	N.A.	N.A.
2.	Multi Device Controller EMCO 2090	N.A.	N.A.
3.	BiconicalLog antenna ETS LINDGREN 3142E	2017/04	2020/04
4.	Double-ridge Guide Horn antenna 1-18 GHz SCHWARZBECK BBHA 9120 D	2016/11	2019/11
5.	RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLNA 0360-01N	2018/07	2019/07
6.	RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-3A	2018/03	2019/03
7.	EMI Test Receiver R&S ESR7	2017/08	2019/08
8.	Spectrum analyser Rohde & Schwarz FSW50	2018/02	2020/02

Testing verdicts

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

Summary

FCC PART 15 PARAGRAPH / RSS-210		
Requirement – Test case	Verdict	Remark
Section 15.231 Subclause (a) (1) / RSS-210 A.1.1.	Transmitter deactivation	P
Section 15.231 Subclause (c) / RSS-210 A.1.3	Bandwidth	P
Section 15.231 Subclause (b) / 15.209 / RSS-210 A.1.2. / RSS-Gen	Field strength and Emission limitations radiated (Transmitter)	P
<u>Supplementary information and remarks:</u>		
None.		

Appendix A: Test results

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TEST CONDITIONS

Power supply (V):

Vnominal = 3 Vdc

Type of power supply = DC voltage from battery.

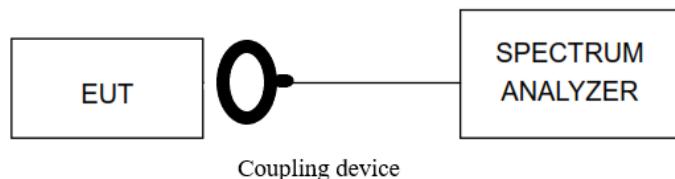
Type of antenna = integral.

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 analyzer through a RF cable and a coupling device.



RADIATED MEASUREMENTS

The equipment under test was scanned for spurious emissions in the frequency range 30 to 5000 MHz.

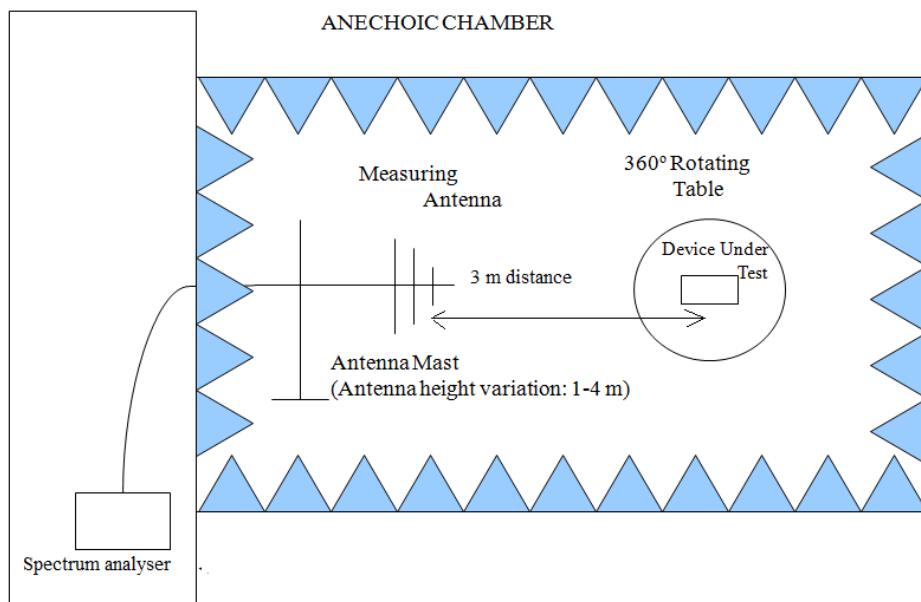
All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at a distance of 3 m for the frequency range 30 MHz-1000 MHz (30 MHz-1000 MHz Bilog antenna) and at a distance of 1m for the frequency range 1 GHz-5 GHz (1 GHz-18 GHz Double ridge horn antenna).

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 360° and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

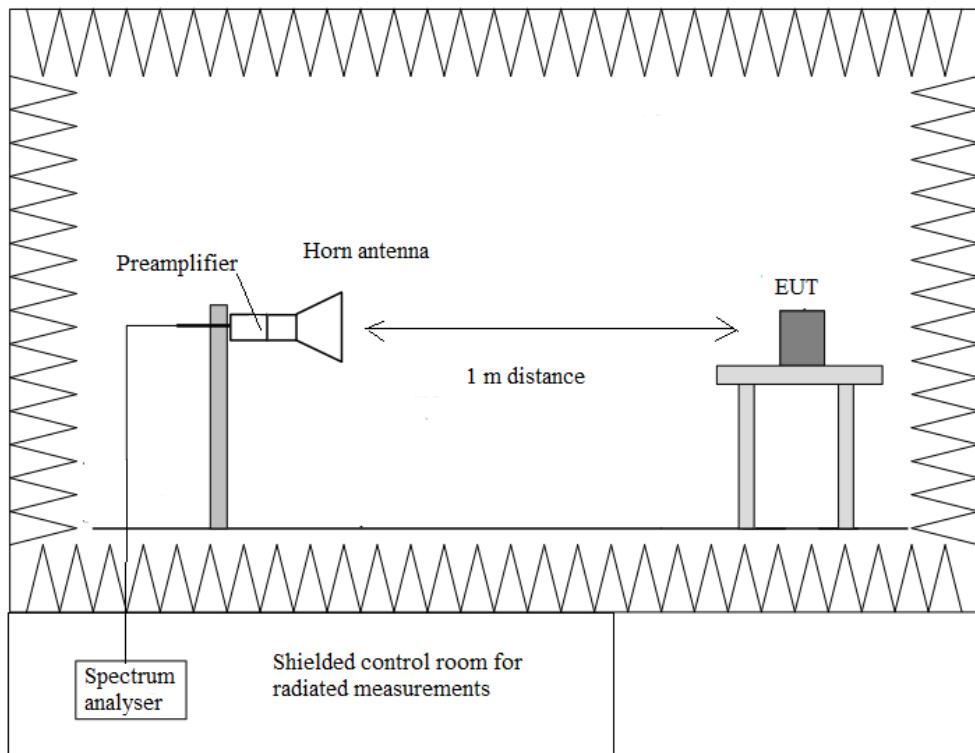
Measurements were made in both horizontal and vertical planes of polarization.

Radiated measurements setup $f < 1$ GHz



Shielded Control Room For
Radiated Measurements

Radiated measurements setup $f > 1$ GHz



Section 15.231 Subclause (a) (1) / RSS-210 A.1.1. Transmitter deactivation.

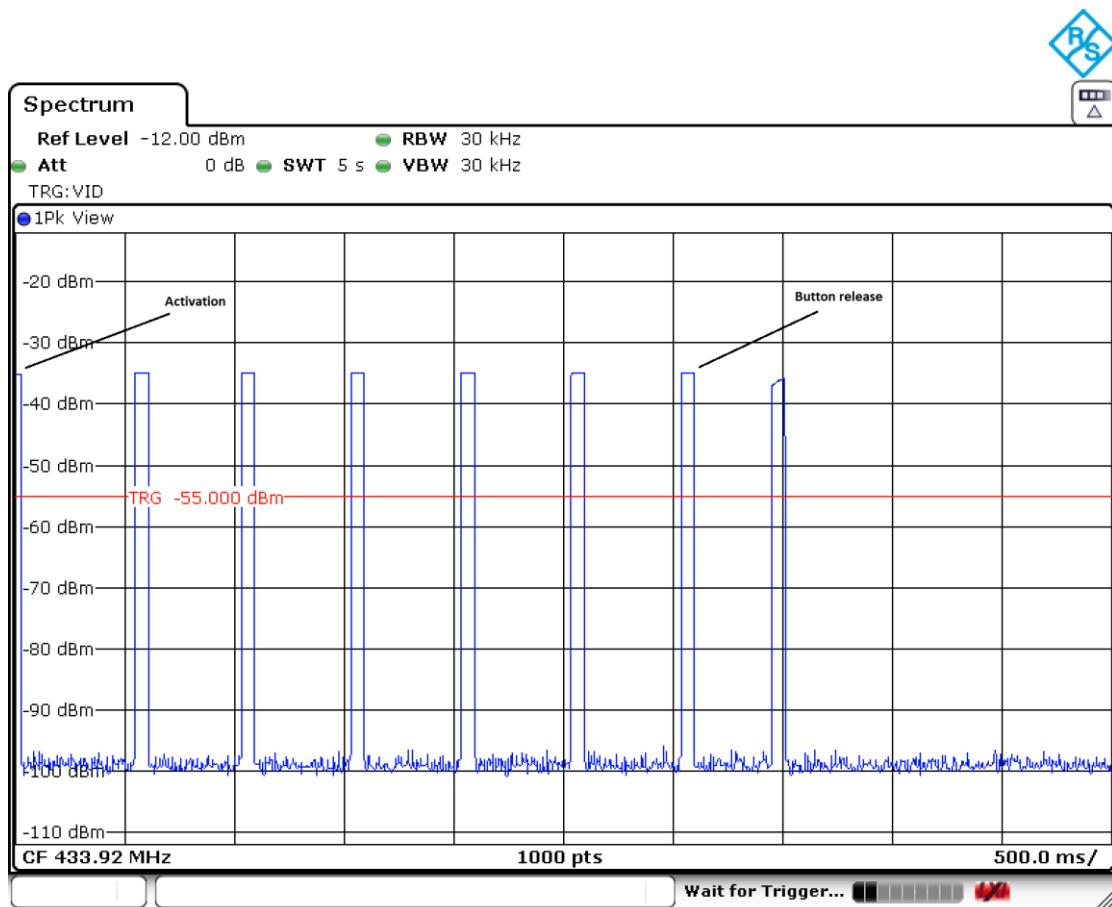
SPECIFICATION

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

RESULTS

The equipment can only operate in manual mode.

The transmission is activated by pressing a button and ceases after releasing it in less than 5 seconds (see next plot).



Verdict: PASS

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

SPECIFICATION

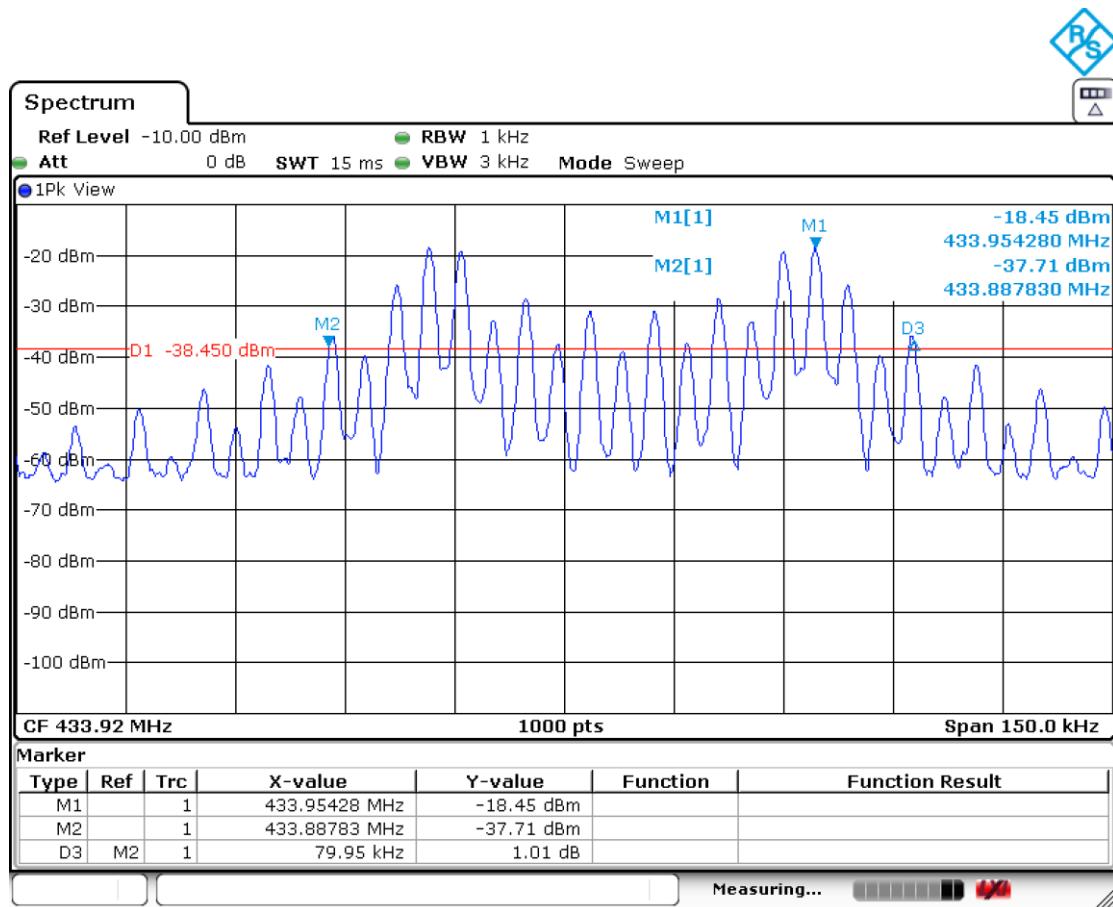
FCC 15.231: The bandwidth of the emission shall be no wider than 0.25 % of the centre frequency for devices operating above 70 MHz and below 900 MHz. Bandwidth is determined at the points 20 dB down from the modulated carrier.

RESULTS (see next plots)

Nominal centre frequency = 433.92 MHz

Limit of spectrum bandwidth = 0.25 % of 433.92 MHz = 1084.80 kHz

Measured 20 dB Bandwidth (kHz)	79.95
Measurement uncertainty (kHz)	<±0.09



Verdict: PASS

SPECIFICATION

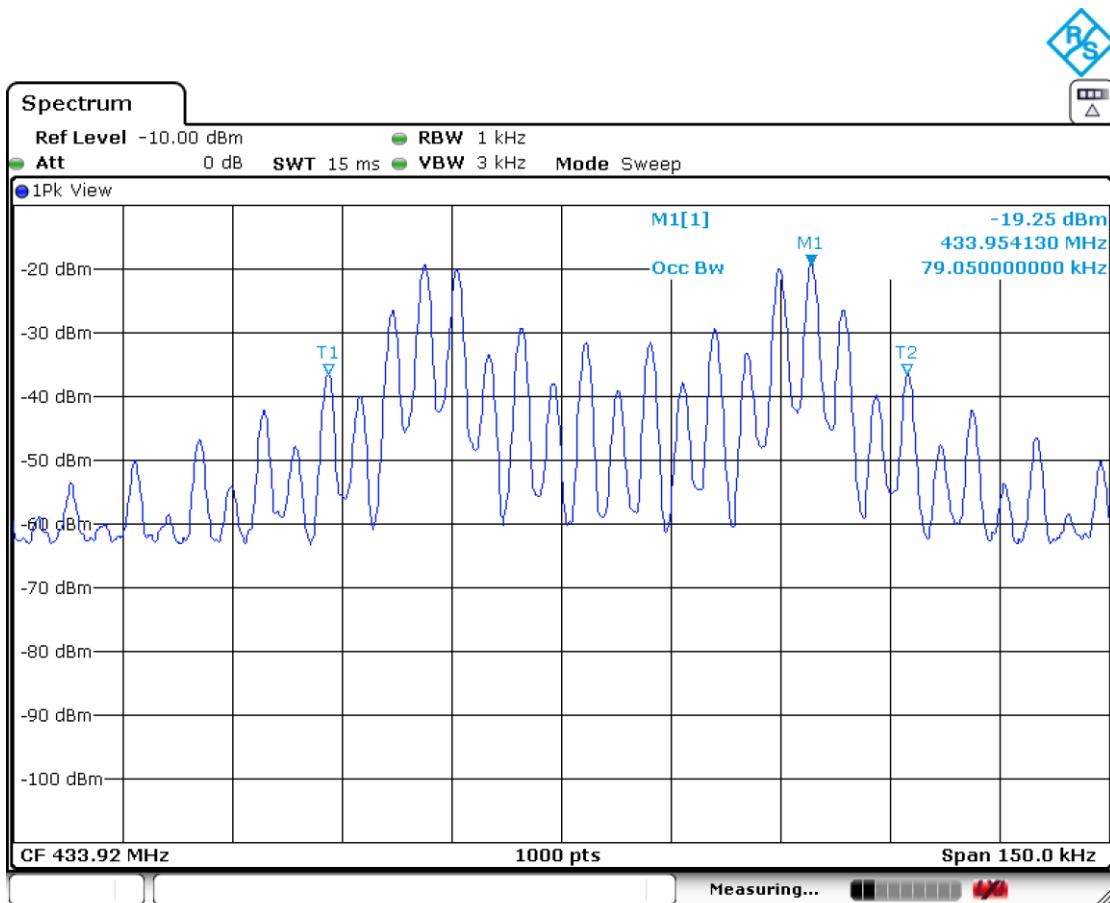
RSS-210. A.1.3.: the 99% bandwidth shall be no wider than 0.25% of the centre frequency for devices operating between 70 MHz and 900 MHz.

RESULTS (see next plots).

Nominal centre frequency = 433.92 MHz

Limit of spectrum bandwidth = 0.25 % of 433.92 MHz = 1084.80 kHz

99% bandwidth (kHz)	79.05
Measurement uncertainty (kHz)	<±0.09



Section 15.231 Subclause (b) /15.209 / RSS-210 A.1.2. / RSS-Gen. 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 (μ V/m)	Field strength of spurious emissions (μ V/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 20dB 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.

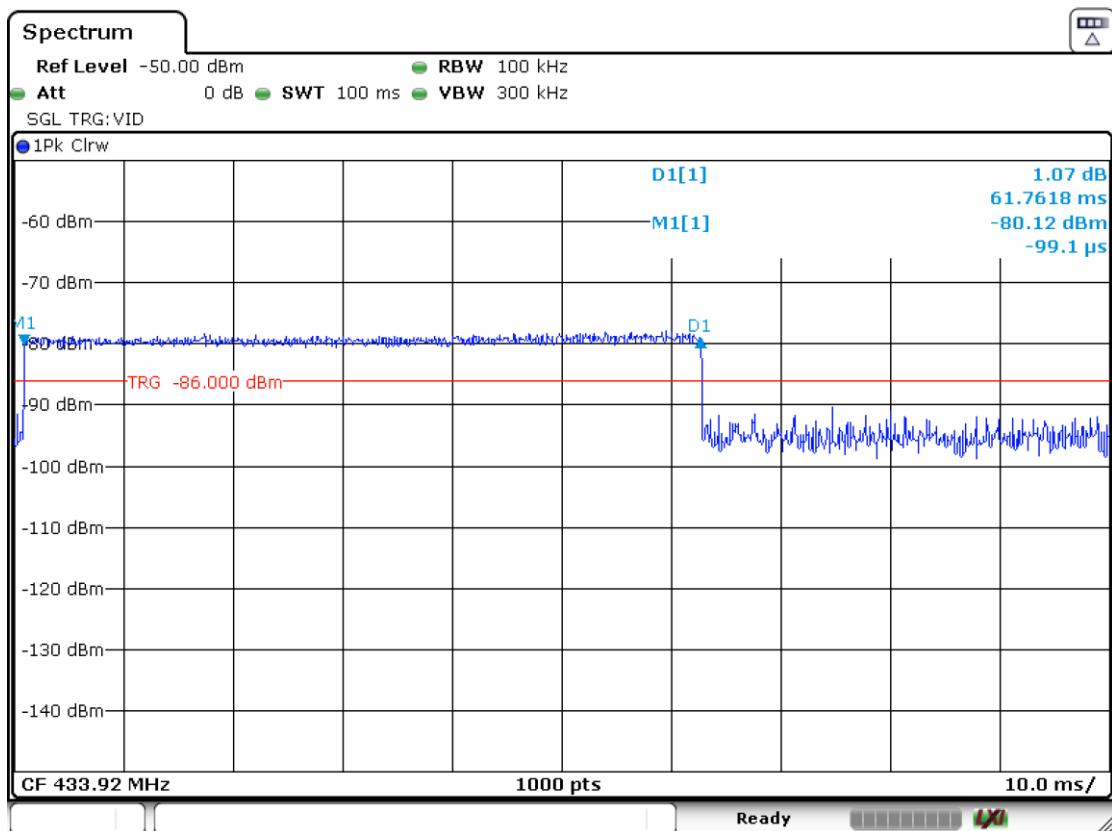
For average radiated emission measurements above 1000 MHz, there is also a limit corresponding to 20 dB above the indicated values in the table is specified when measuring with peak detector function.

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 C63.10-2013.

Computation of duty-cycle correction factor



Number of pulses within 100 ms: 1

Sub-pulse	Duration (ms)	Number of pulses	Sub-pulse “On Time” (ms)
1	61.7618	1	61.7618
		TOTAL ON TIME	61.7618

Duty cycle correction factor $\delta = 61.7618 / 100 = 0.6176$

$\delta = 20 \log (0.6176) = -4.19 \text{ dB}$

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

I. Fundamental

Frequency (MHz)	Polarization	Detector	Emission Level (μ V/m)	Limits (μ V/m)
433.92 (Fundamental)	V	Peak	17,298.16 (84.76 dB μ V/m)	109,972.5 (100.82 dB μ V/m)

Calculation for average level

Spurious frequency (MHz)	Emission Level (dB μ V/m) Peak	Duty-cycle correction factor δ (dB)	Corrected Emission Level (dB μ V/m) Average	Limits (μ V/m)
433.92 (Fundamental)	84.76	-4.19	80.57	10,997.25 (80.82 dB μ V/m)

Measurement uncertainty (dB): $<\pm 3.88$ dB.

II. Spurious emissions

Highest spurious emissions levels:

Frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Limits (μ V/m)
30.760	V	Quasi-peak	21.14	1,099.725 (60.82 dB μ V/m) / 100 (40.0 dB μ V/m)

Measurement uncertainty (dB): $<\pm 3.88$ dB.

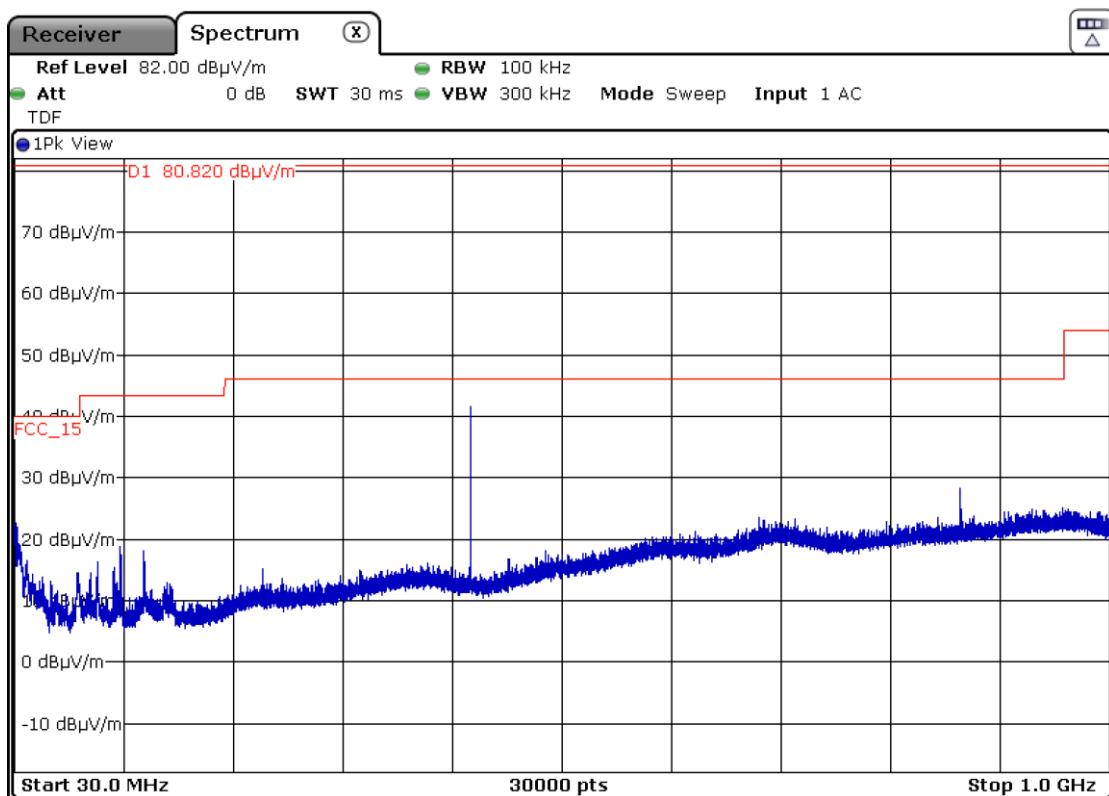
Frequency range 1 GHz-5 GHz (see next plots)

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

Measurement uncertainty (dB): $<\pm 3.70$ dB.

Verdict: PASS.

FREQUENCY RANGE 30 MHz-1000 MHz



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 GHz to 5 GHz

