TEST REPORT
FCC CFR 47 Part 15 Subpart B

Report Reference No.....:	403055TRFFCC		
Tested by (name, function and signature).....:	S. Tessa	(project handler)	Sara Tessa
Approved by (name, function and signature).....:	P. Barbieri	(verifier)	Paul L
Date of issue.....:	2020-08-05		
Testing Laboratory.....:	**Nemko Spa**		
Address.....:	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy		
Testing location	Nemko Spa		
Address.....:	Via del Carroccio, 4 – 20853 Biassono (MB) – Italy		
Registration number:	682159		
Applicant's name.....:	**Ask Industries Spa**		
Address.....:	Via dell'Industria, 12, 14, 16 – 60037 Monte San Vito (AN) – Italy		
Test specification:			
Standard .....:	FCC CFR 47 Part 15 Subpart B		
	Conducted emission		☒
	Radiated emission		☒
	Antenna power conduction emission		☒
Test procedure.....:	Nemko WM L0077, WM L0177 and WM L1002		
Test Report Form No.....:	FCCTRF		
TRF Originator.....:	Nemko Spa		
Master TRF.....:	2014-03		

Test item description ..... :	**Vehicle antenna amplifier and receiver**
Trade Mark .....:	ASK
Manufacturer.....:	Ask Industries Spa
Address of manufacturer .....:	Via dell'Industria, 12, 14, 16 – 60037 Monte San Vito (AN) – Italy
FCC ID.....:	2AXHC-F6
Model.....:	F6 family (Customer P/N 5802128245, ASK PN 83852800) F6 family (Customer P/N 5802707245, ASK PN 83862700)
Ratings.....:	8.5 ÷ 16 Vdc, 20 ÷ 90 mA

Test Report No. : 403055TRFFCC	2020-08-05 Date of issue

Short description of the EuT	Copy of marking plate
EUT is an amplified antenna for vehicular use. Its works in the following operative bandwidth: AM-L1, FM-L1, DAB-W	See photos at the end of report

Number of tested samples:	2
Serial number:	403055 1/2 (Number assigned by Nemko spa)
	403055 2/2 (Number assigned by Nemko spa)
Max internal operating frequency:	< 1 GHz
Equipment Class:	JAV - Other Non-Digital SDoC Devices
Device type:	Vehicular
Accessories and detachable parts included:	The E.U.T. is composed by a single unit
Other options included:	--
Field Strength (dBµV/m, @3m):	13.9 dBµV/m (@ 30.240 MHz)
Testing	
Date of receipt of test sample:	2020-07-17
Testing commenced on:	2020-07-23
Testing concluded on:	2020-08-04
Possible test case verdicts:	
test case does not apply to the test object:	N (Not applicable)
test object does meet the requirement:	P (Pass)
test object does not meet the requirement:	F (Fail)

Symbols used in this test report

☒ The crossed square indicates that the listed condition or equipment is applicable for this report.

☐ The empty square indicates that the listed condition or equipment is not applicable for this report.

Throughout this report point is used as decimal separator.

The results contained in this report reflect the results for this particular model and serial number. It is the responsibility of the manufacturer to ensure that all production models meet the intent of the requirements detailed within this report.

Verdict according to the standards listed at page 5:	**Pass**

PROJECT HISTORY		
Report number	**Modification to the report / comments**	**Date**
403055TRFFCC	First release	2020-08-05
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REMARKS		

PRODUCT VARIANTS		
Variant model	**Difference against the main model**	**Additional test performed**
Customer P/N 5802707245, ASK PN 83862700	Different mounting system	Radiated and conducted emissions
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REMARKS		

Contents

1 TEST STANDARDS

The tests were performed according to following standards and procedures.

NEMKO WM L0177: General routines for using instruments at Nemko

NEMKO WM L1002: Measurement Uncertainty - Policy and Statement

NEMKO WM L0077: General routines to perform EMC tests

FCC CFR 47 Part 15 Subpart B
Code of Federal Regulations – Title 47 – Part 15 Radio Frequency Devices – Subpart B Unintentional radiation

The main standard above contains references to other standards, which are listed below.

ANSI C63.4 (2014)
'Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz''

2 SUMMARY OF TEST RESULTS

FCC Part 15 Subpart B requirements			
Part	**Test description**	**Frequency range**	**Verdict**
§15.107	Conducted emission	150 kHz to 30 MHz	P
§15.109	Radiated emission	30 MHz to 5 GHz	P
§15.111	RX antenna port: conducted emission	30 MHz to 5 GHz	P
GENERAL REMARKS			
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3 EQUIPMENT UNDER TEST

3.1 Power supply system utilised

Power supply voltage:	☐	230V/50 Hz / 1ϕ	☐	115V/60Hz / 1ϕ
	☐	400V/50 Hz 3PE	☐	400V/50 Hz 3NPE
	☐	14.5 VDC	☒	13.5 V DC

3.2 EuT operation modes

Mode	Description
1	Normal working condition

3.3 EuT configuration modes

The EuT was configured to measure its highest possible radiation level. The test modes selected are according to EuT instruction manual.

Mode	Description
1	The EUT has been tested connected to a DC power supply

3.4 Input/Output Ports

Port	Name	Type*	Cable Max. >3m	Cable Shielded	Description
0	Enclosure	N/E	—	—	—
1	AM/FM	DC+I/O	☐	☐	Fakra connector
2	DAB	DC+I/O	☐	☐	Fakra connector

AC = AC Power Port DC = DC Power Port N/E = Non-Electrical

I/O = Signal/Control Input or Output Port TP = Telecommunication Ports

3.5 Equipment Used During Test

Use*	Product Type	Manufacturer	Model	Comments
AE	DC Power Supply	Philips	PE1542	—
AE	Phantom power supply	ASK	MOPAR	Used to connect EUT to Power supplay
AE	Multimeter	Fluke	45	Used to monitor the current absorption

Note: * Use

EUT - Equipment Under Test

AE - Auxiliary/Associated Equipment (Not Subjected to Test)

SIM - Simulator (Not Subjected to Test)

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

Nemko Spa
Via del Carroccio, 4
20853 Biassono (MB) - Italy

4.2 Environmental conditions

In the laboratory, the following ambient conditions are respected for each test reported below:

Ambient temperature:	18 ÷ 33 °C (1)
Relative Humidity:	25 ÷ 70 % (2)
Atmospheric pressure:	860 ÷ 1060 hPa

(1) For luminaire, temperature during tests was verified to be within 18 ÷ 30 °C
(2) During ESD test, humidity was verified to be within 30 ÷ 60 %

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model	Serial N°
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703
Barometer	Castle	GPB 3300	072015

4.3 Measurement uncertainty and assessment of conformity

The measurement uncertainty was calculated for each test and quantity listed in this test report, according to CISPR 16-4-2 and other specific test standard and is documented in Nemko Spa working manual WML1002.

The assessment of conformity for each test performed on the equipment is performed not taking into account the measurement uncertainty. The two following possible verdicts are stated in the report:

P (Pass) - The measured values of the equipment respect the specification limit at the points tested. The specific risk of false accept is up to 50% when the measured result is close to the limit.

F (Fail) - One or more measured values of the equipment do not respect the specification limit at the points tested. The specific risk of false reject is up to 50% when the measured result is close to the limit.

Hereafter Nemko's measurement uncertainties are reported:

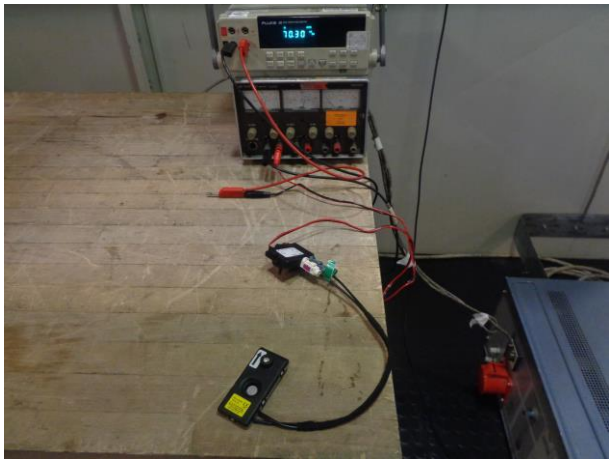
Test	Range	Measurement Uncertainty	Notes
Radiated Disturbance 10m Chamber	Antenna distance 3 m, 10 m 0.009 ÷ 200 MHz	5.0 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 200 ÷ 1000 MHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m, 10 m 1 ÷ 6 GHz	5.2 dB	(1)
	Antenna distance 1 m, 3 m 6 ÷ 18 GHz	5.5 dB	(1)
	Antenna distance 1 m, 3 m 18 ÷ 40 GHz	7.2 dB	
Conducted Disturbance	0.02 ÷ 150 kHz with AMN	3.8 dB	(1)
	150 kHz ÷ 30 MHz with AMN	3.4 dB	(1)
	150 kHz ÷ 30 MHz with AAN	4.6 dB	(1)
	9 kHz ÷ 30 MHz with voltage probe	2.9 dB	(1)
	150 kHz ÷ 30 MHz with current probe	2.9 dB	(1)

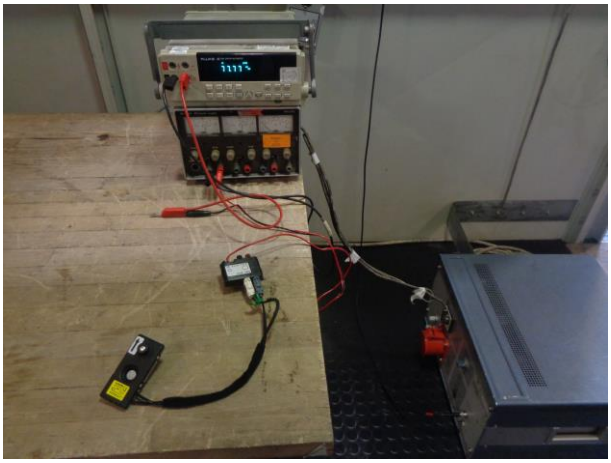
NOTES:
(1) The reported expanded uncertainty of measurement is stated as the standard uncertainty of measurement multiplied by the coverage factor k = 2 which has been derived from the assumed normal probability distribution with infinite degrees of freedom and for a coverage probability of 95 %;

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emission

5.1.1 Photo documentation of the test set-up





5.1.2 Test method

Measurements were made on a ground plane that extends 1-meter minimum beyond all sides of the system under test. All power was connected to the system through Line Impedance Stabilization Networks (LISN). Conducted voltage measurements on mains lines were made at the output of the LISN.

5.1.3 Limits for AC mains port

Except for Class A digital devices, for equipment that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50µH/50ohms line impedance stabilization network (LISN). Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the band edges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	66 to 56*	59 to 46*
0.50 to 5	56	46
5 to 30	60	50

*The limits decrease linearly with the logarithm of the frequency

For a Class A digital device that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50 µH/50 ohms LISN. Compliance with the provisions of this paragraph shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminal. The lower limit applies at the boundary between the frequency ranges.

Frequency of emission (MHz)	Conducted limit (dBµV)	
	Quasi-Peak	Average
0.15 to 0.50	79	66
0.50 to 30	73	60

5.1.4 Test result

Verdict:	☒ P ☐ F ☐ N
Frequency range:	0.15 MHz – 30 MHz
Kind of test site:	Shielded room
Remarks: DC version tested with a laboratory power supply.	

5.1.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°	Cal Date	Due Date
EMI receiver 9 kHz ÷ 3 GHz	Rohde & Schwarz	ESCI	100888	2019-10	2020-10
LISN three phase 9 kHz to 30 MHz	Rohde & Schwarz	ESH2-Z5	872 460/041	2019-09	2020-09
Shielded room	Siemens	Conducted emission test room	1862	NSC	NSC

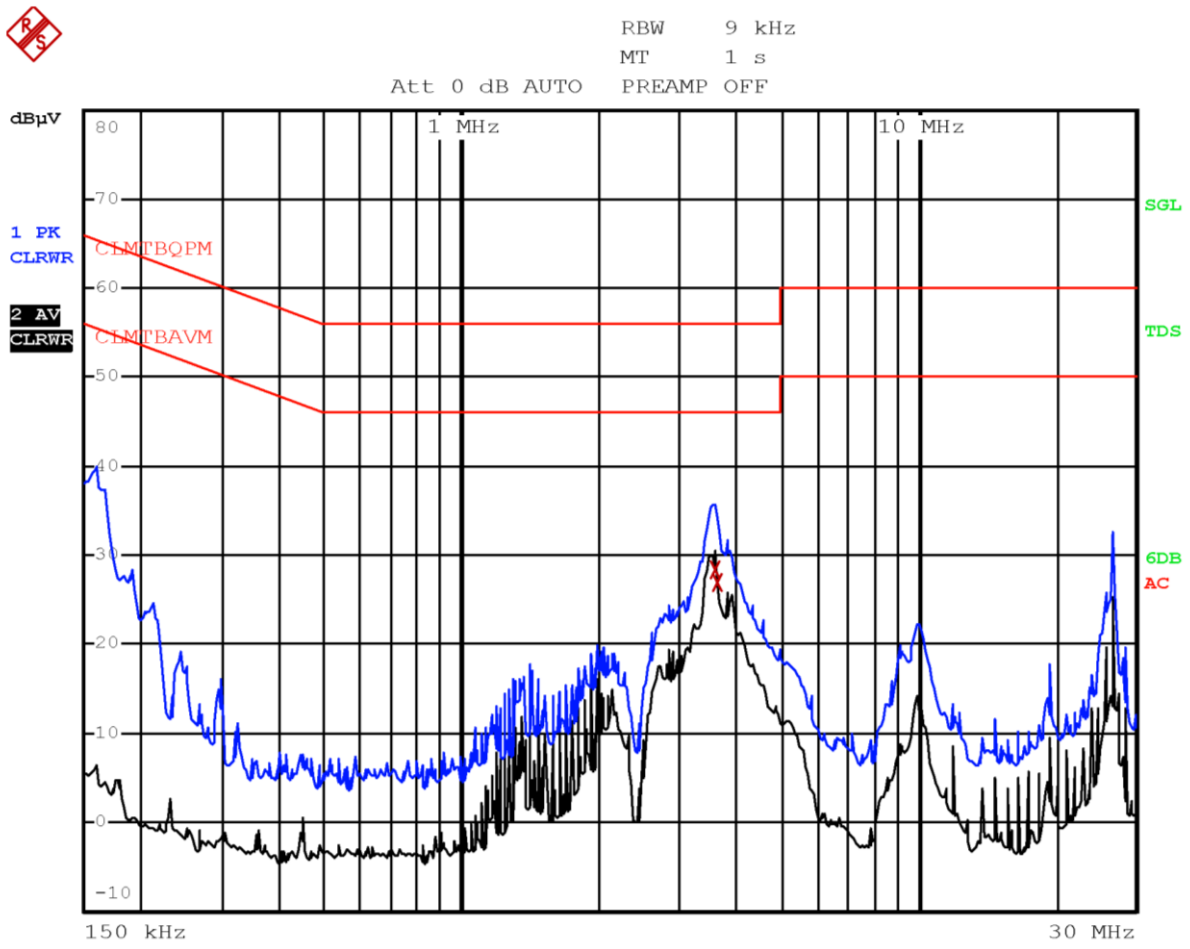
NSC = Not Subject to Calibration

5.1.6 Conducted emissions from AC mains power ports test software details

Manufacturer of Software	Details
-	-

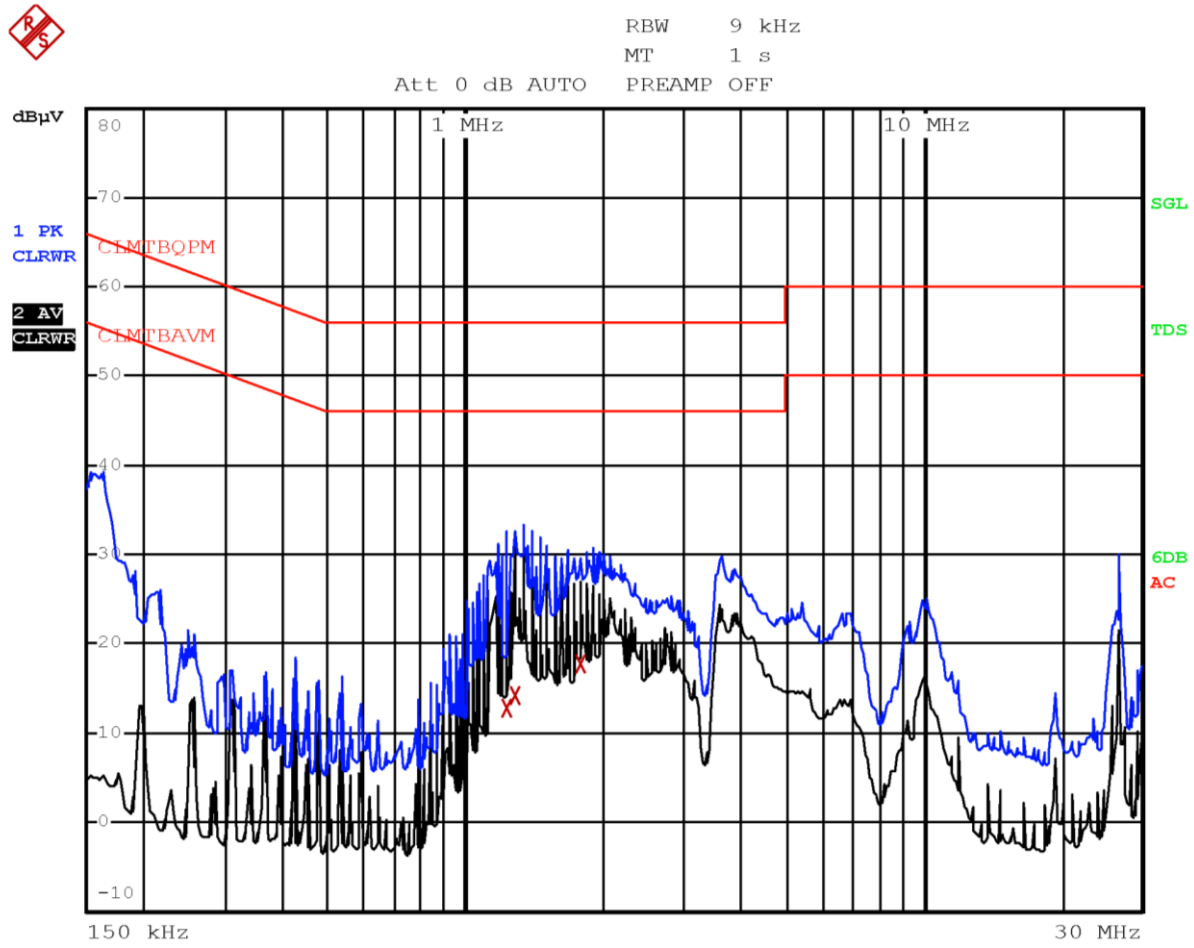
5.1.7 Test protocol

Test point: Phase line Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Main model



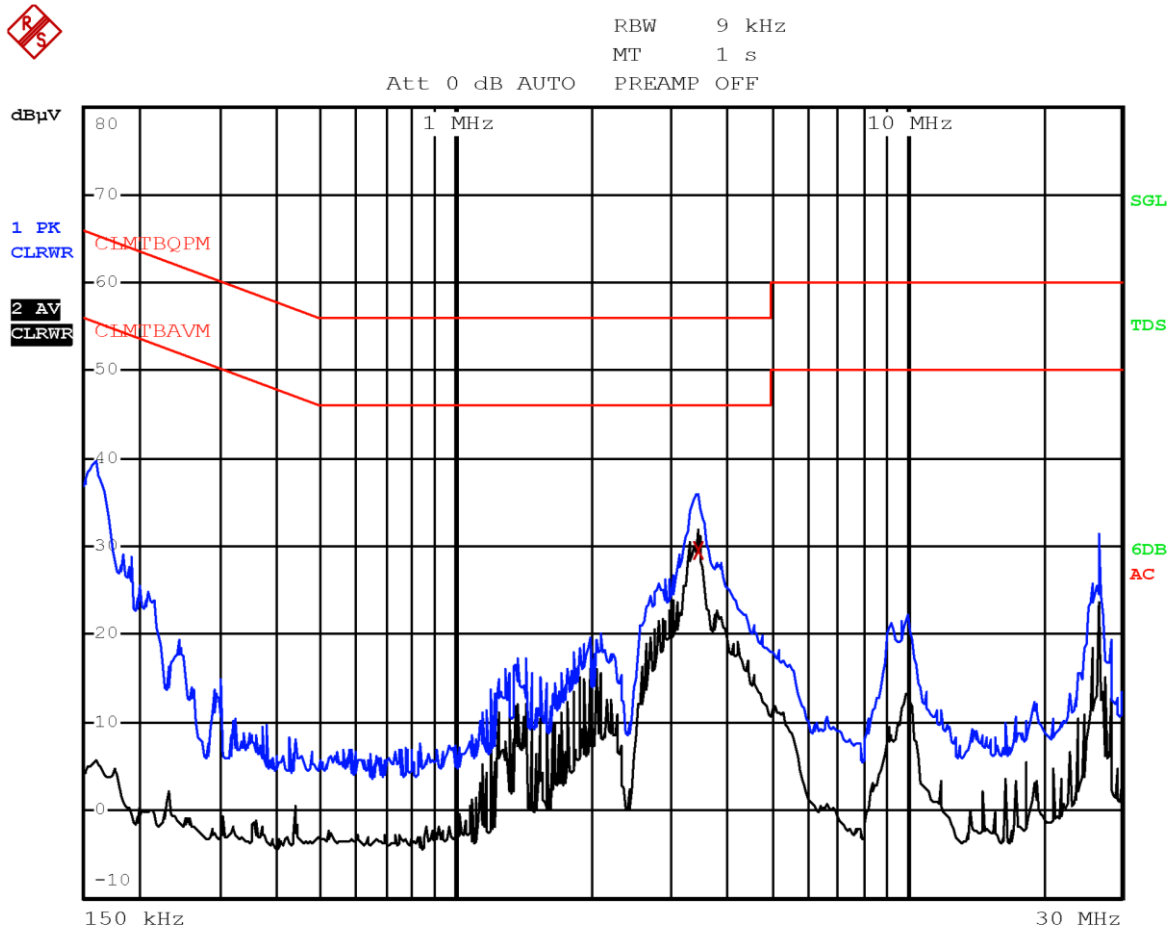
Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
3.5980	28.4	46.0	-17.6	Av
3.6260	26.9	46.0	-19.1	Av

Test point: Neutral line Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Main model



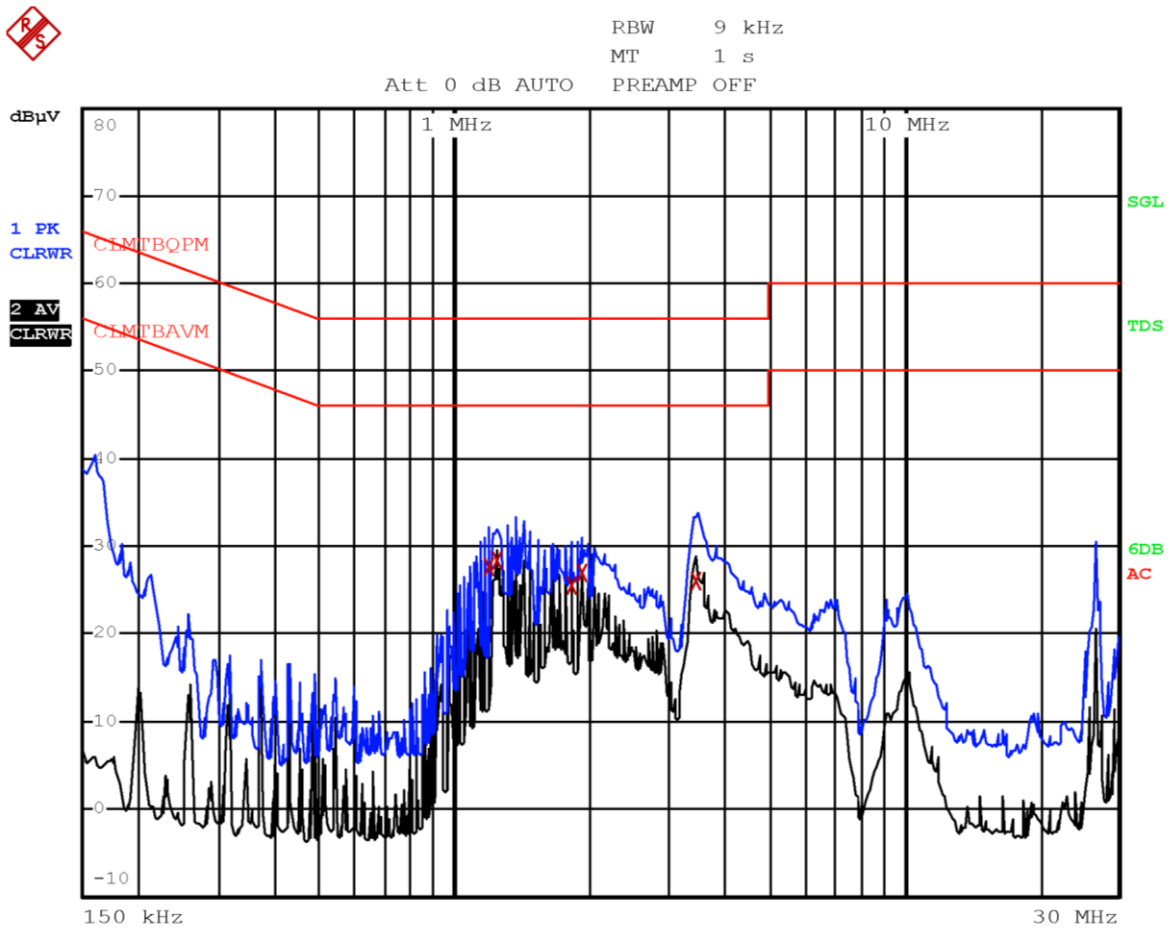
Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1.2340	12.9	46.0	-33.1	Av
1.2900	14.2	46.0	-31.8	Av
1.7940	17.7	46.0	-28.3	Av

Test point: Phase line Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Variant



Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
3.4380	29.6	46.0	-16.4	Av

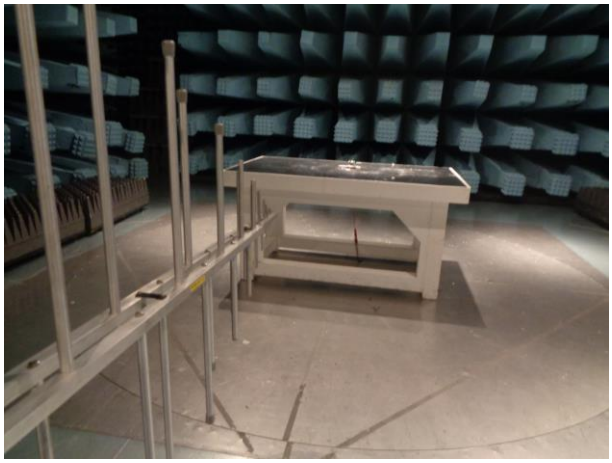
Test point: Neutral line Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Variant

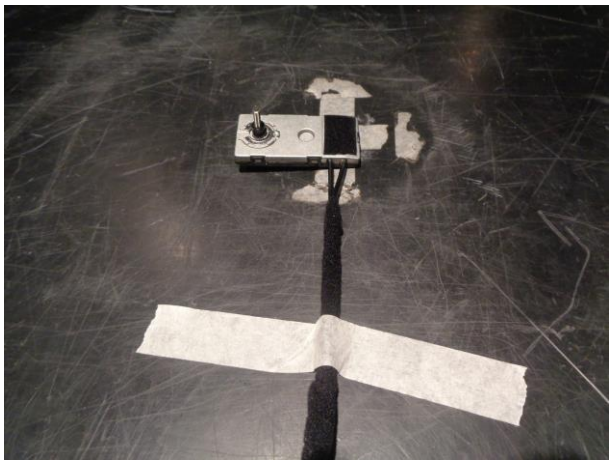


Frequency (MHz)	Level (dBµV)	Limit (dBµV)	Margin (dB)	Detector
1.1940	27.8	46.0	-18.2	Av
1.2500	28.4	46.0	-17.6	Av
1.8180	25.6	46.0	-20.4	Av
1.9340	26.9	46.0	-19.1	Av
3.4380	26.0	46.0	-20.0	Av

5.2 Radiated emissions

5.2.1 Photo documentation of the test set-up






5.2.2 Test method

Measurements were made on a semi anechoic chamber. Preliminary (peak) measurements were performed at an antenna to EUT separation distance of 3 or 10 meters with the receive antenna located at a fixed height (from 1 to 4 meter) in both horizontal and vertical polarities. Final measurements (quasi-peak) were then performed by rotating the EUT 360° and adjusting the receive antenna height from 1 to 4 meters. All frequencies were investigated in both horizontal and vertical antenna polarity, where applicable.

5.2.3 Limits for enclosure

Except for Class A digital devices, the field strength of radiated emissions from unintentional radiators at a distance of 3 meters shall not exceed the following values:

Frequency of emission (MHz)	Field strength (µV/m)	Field strength (dBµV/m)
30–88	100	40.0
88–216	150	43.5
216–960	200	46.0
Above 960	500	54.0

The field strength of radiated emissions from a Class A digital device, as determined at a distance of 10 meters, shall not exceed the following:

Frequency of emission (MHz)	Field strength (µV/m)	Field strength (dBµV/m)
30–88	90	39.0
88–216	150	43.5
216–960	210	46.4
Above 960	300	49.5

5.2.4 Test result

Verdict:	☒ P ☐ F ☐ N
Frequency range:	30MHz - 5000MHz
Kind of test site:	Semi anechoic chamber
Measurement distance:	3 m

Remarks: for an unintentional radiator, including a digital device, the spectrum shall be investigated from the lowest radio frequency signal generated or used in the device, without going below the lowest frequency for which a radiated emission limit is specified, up to the frequency shown in the following table:

Highest frequency generated or used in the device or on which the device operates or tunes (MHz)	Upper frequency of measurement range (MHz)
Below 1.705	30.
1.705-108	1000.
108-500	2000.
500-1000	5000.
Above 1000	5th harmonic of the highest frequency or 40 GHz, whichever is lower.

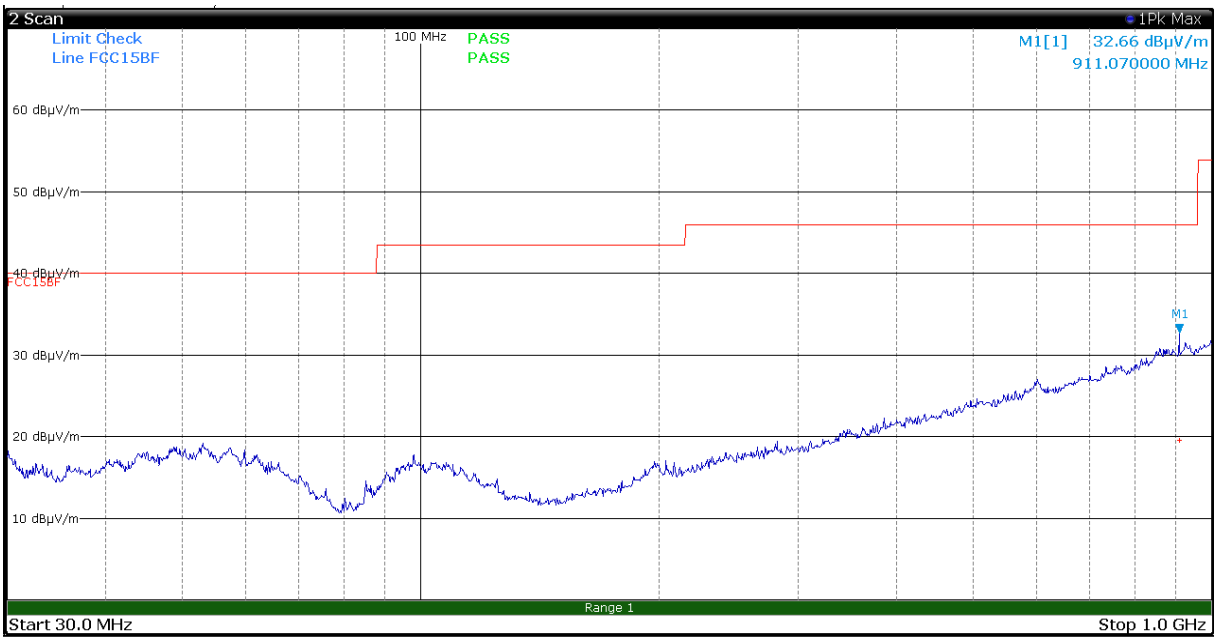
5.2.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°	Cal Date	Due Date
EMI receiver 2 Hz ÷ 44 GHz	Rohde & Schwarz	ESW44	101620	2019-08	2020-08
Trilog Broadband Antenna 25 ÷ 8000 MHz	Schwarzbeck	VULB 9162	9162-025	2018-07	2021-07
Antenna 1-18GHz	Schwarzbeck	STLP9148	STLP9148-123	2018-07	2021-07
Broadband preamplifier	Schwarzbeck	BBV 9718	9718-137	2019-09	2020-09
Controller	Maturo	FCU3.0	10041	NSC	NSC
Tilt antenna mast	Maturo	TAM4.0-E	10042	NSC	NSC
Turntable	Maturo	TT4.0-5T	2.527	NSC	NSC
Semi-anechoic chamber	Nemko	10m semi-anechoic chamber	530	2019-09	2021-09
Shielded room	Siemens	10m control room	1947	NSC	NSC

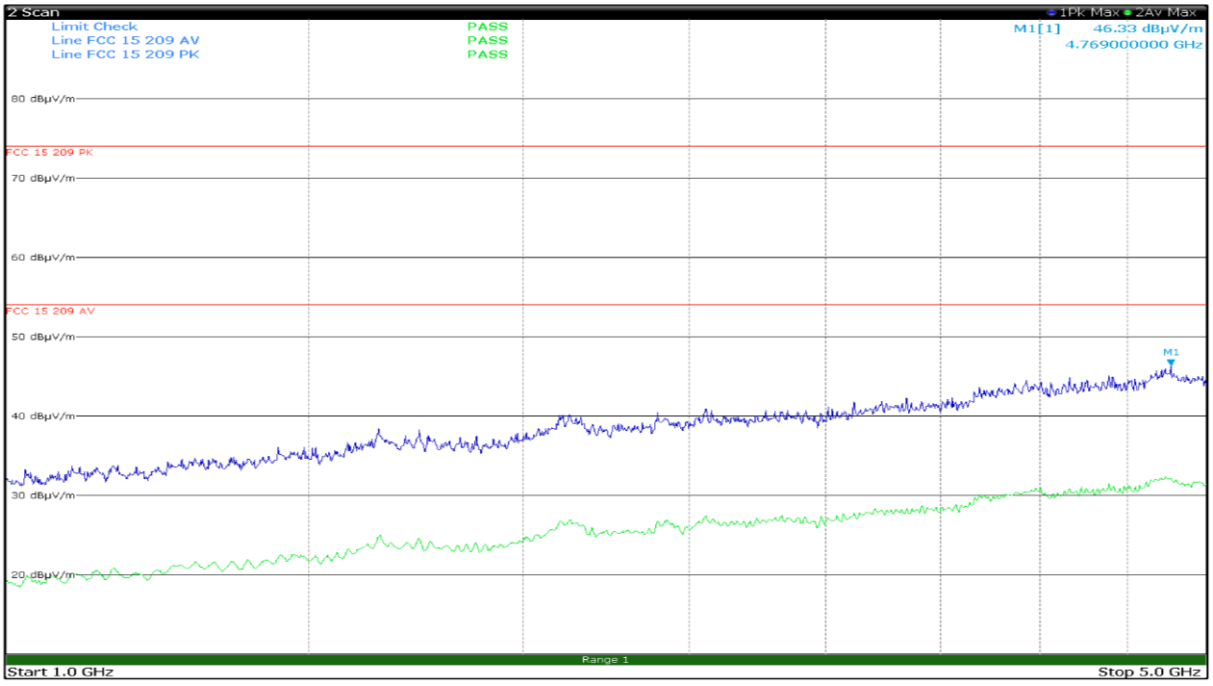
NSC = Not Subject to Calibration

5.2.6 Test protocol

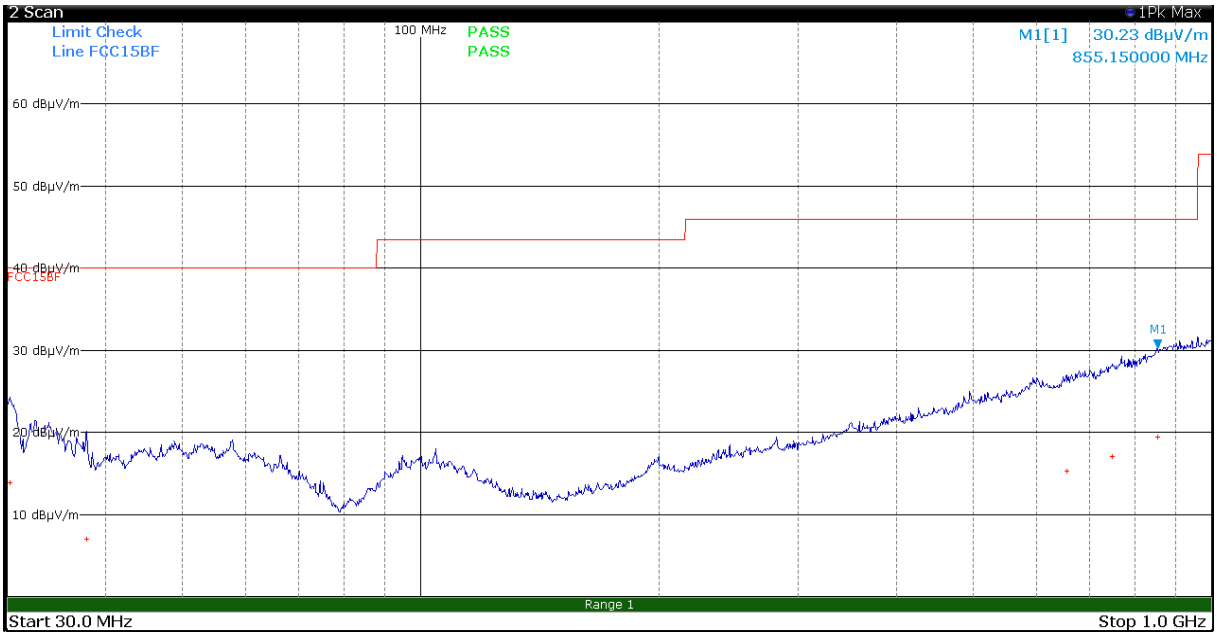
Antenna polarization: Horizontal Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Main model; Frequency range 30 MHz to 5 GHz



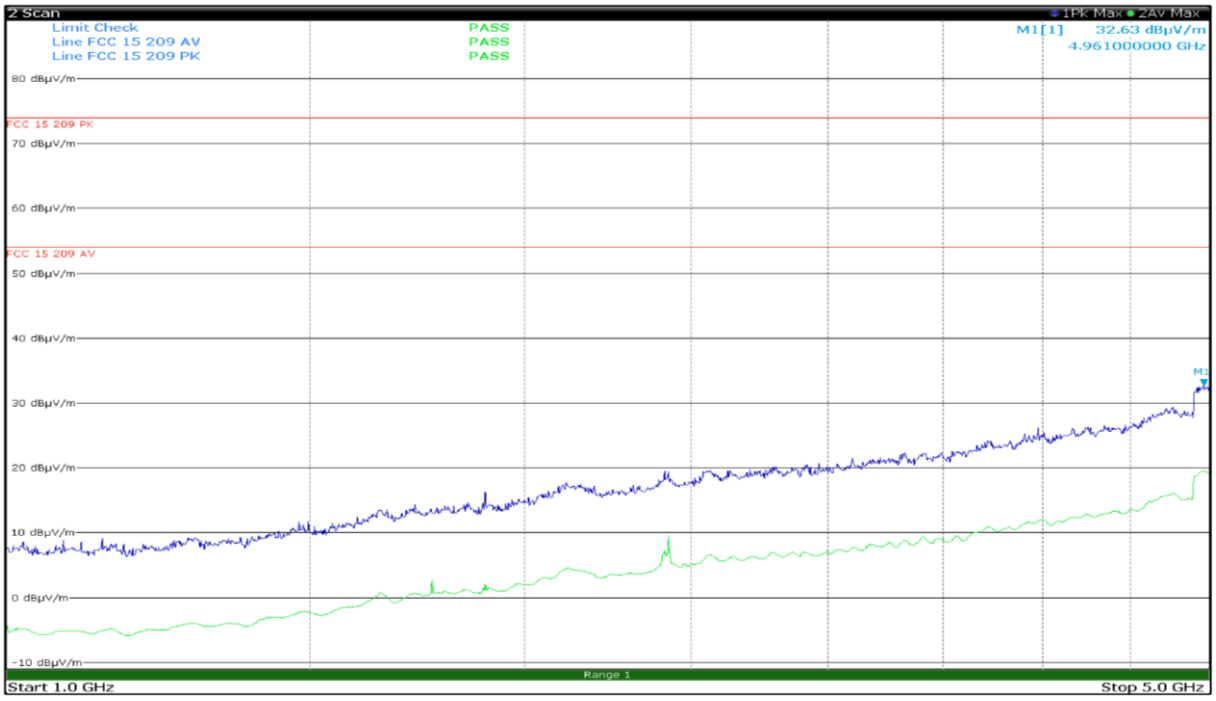
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
911.0700	19.6	46.0	-26.4	QP



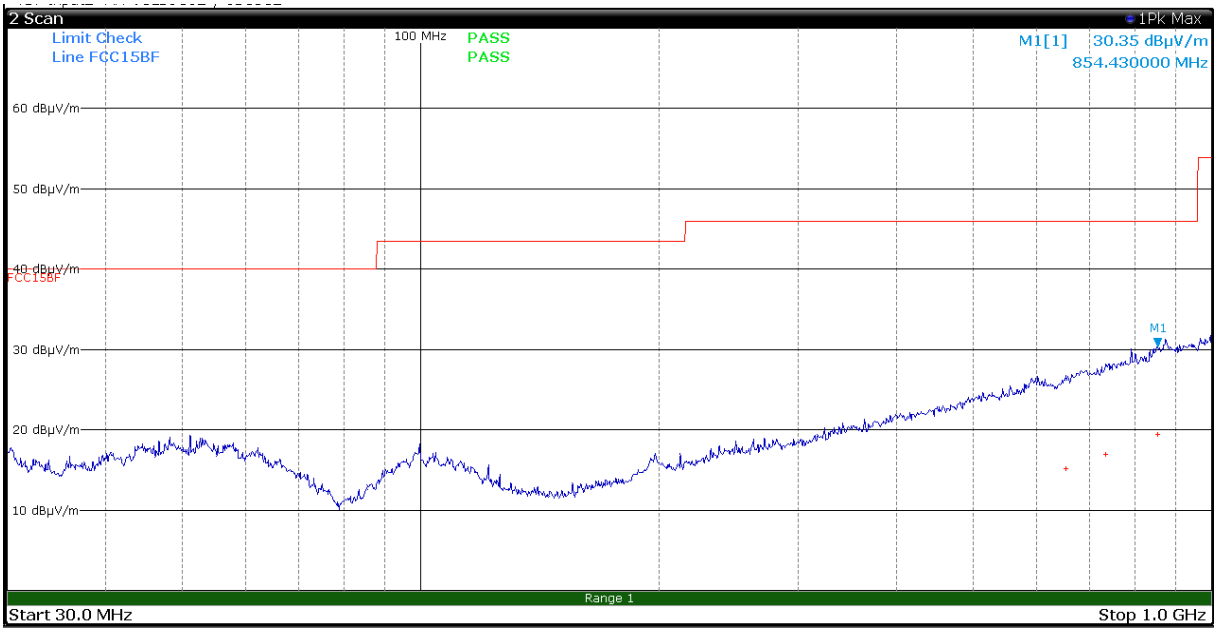
Antenna polarization: Vertical Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Main model; Frequency range 30 MHz to 5 GHz



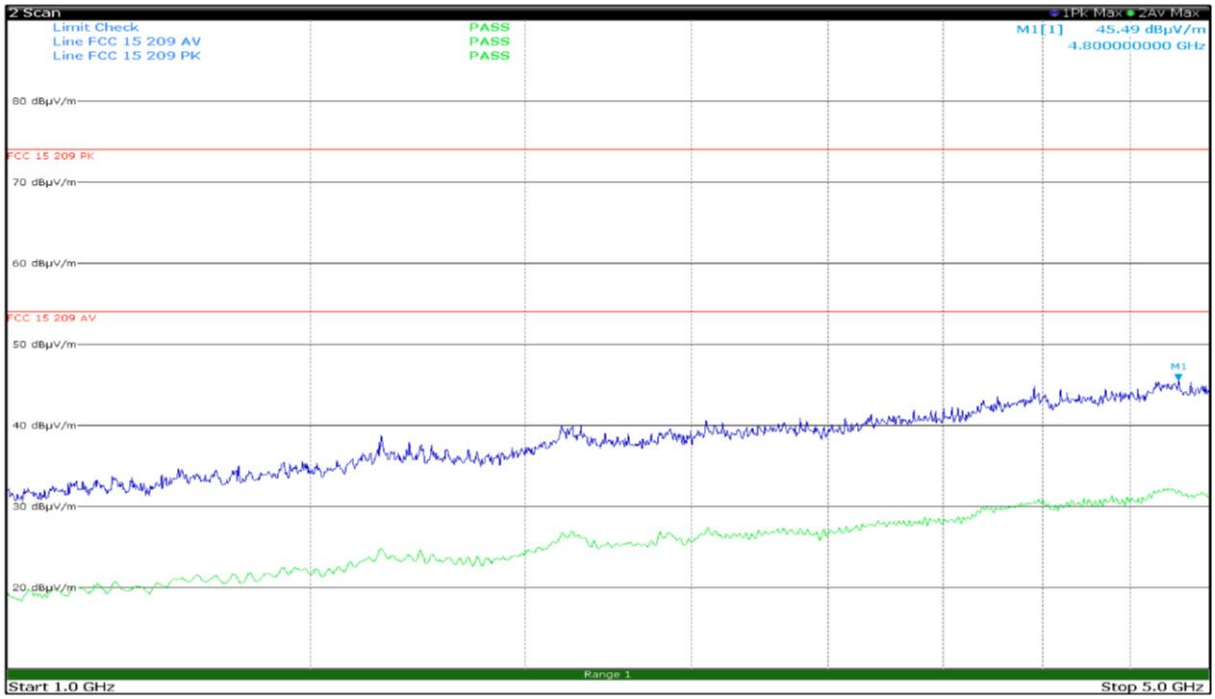
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.2400	13.9	40.0	-26.1	QP
37.7700	7.0	40.0	-33.0	QP
655.5600	15.3	46.0	-30.7	QP
749.3700	17.1	46.0	-28.9	QP
855.1500	19.5	46.0	-26.5	QP



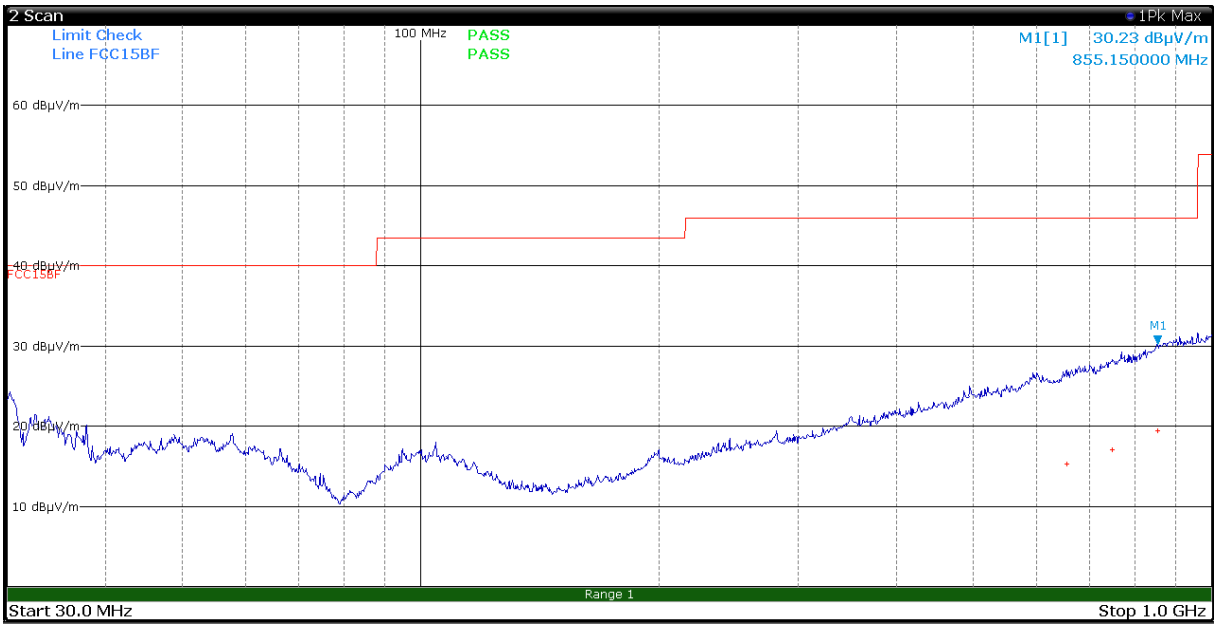
Antenna polarization: Horizontal Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Variant; Frequency range 30 MHz to 5 GHz



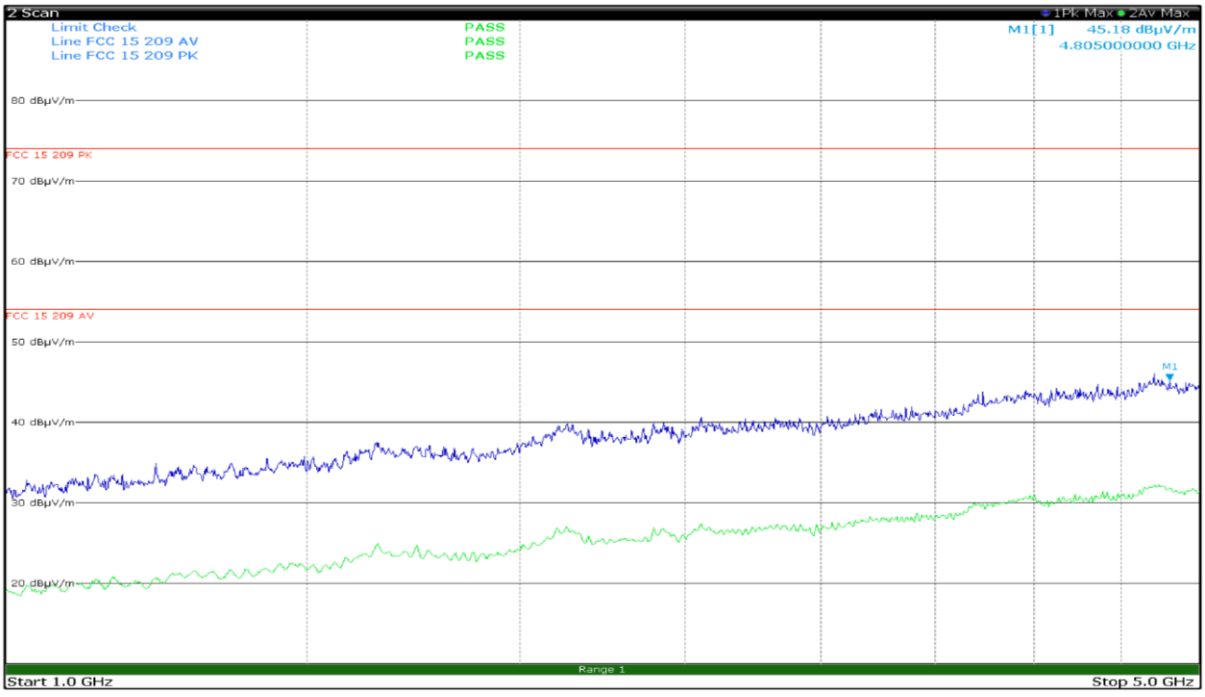
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
653.8500	15.2	46.0	-30.8	QP
734.7600	16.9	46.0	-29.1	QP
854.4300	19.5	46.0	-26.5	QP



Antenna polarization: Vertical Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Variant; Frequency range 30 MHz to 5 GHz

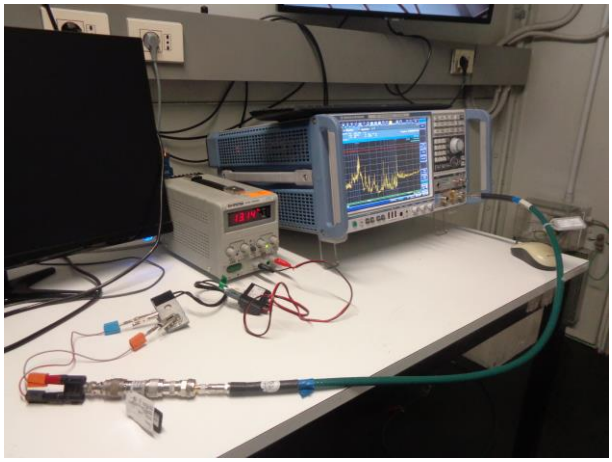


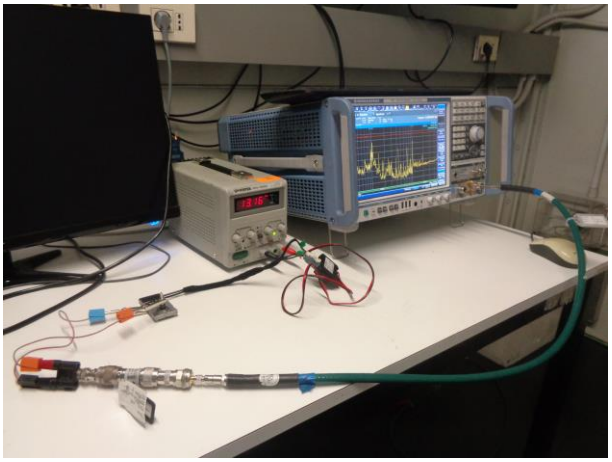
Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
653.3400	15.2	46.0	-30.8	QP
739.5600	17.1	46.0	-28.9	QP
861.6000	19.8	46.0	-26.2	QP



5.3 Clause 15.111 – Antenna power conduction emission

5.3.1 Photo documentation of the test set-up





5.3.2 Test method

In addition to the radiated emission limits, receivers that operate (tune) in the frequency range 30 to 960 MHz and CB receivers that provide terminals for the connection of an external receiving antenna may be tested to demonstrate compliance with the provisions of §15.109 of FCC CFR 47 Part 15 Subpart B with the antenna terminals shielded and terminated with a resistive termination equal to the impedance specified for the antenna, provided these receivers also comply with the antenna power conduction limits for receivers. The test has been performed connecting the EUT directly to the receiver.

5.3.3 Limits for receiver antenna port

Additional requirement for antenna power conduction limits for receivers. With the receiver antenna terminal connected to a resistive termination equal to the impedance specified or employed for the antenna, the power at the antenna terminal at any frequency within the range of measurements specified in §15.33 of FCC CFR 47 Part 15 Subpart B shall not exceed 2.0 nanowatts.

5.3.4 Test result

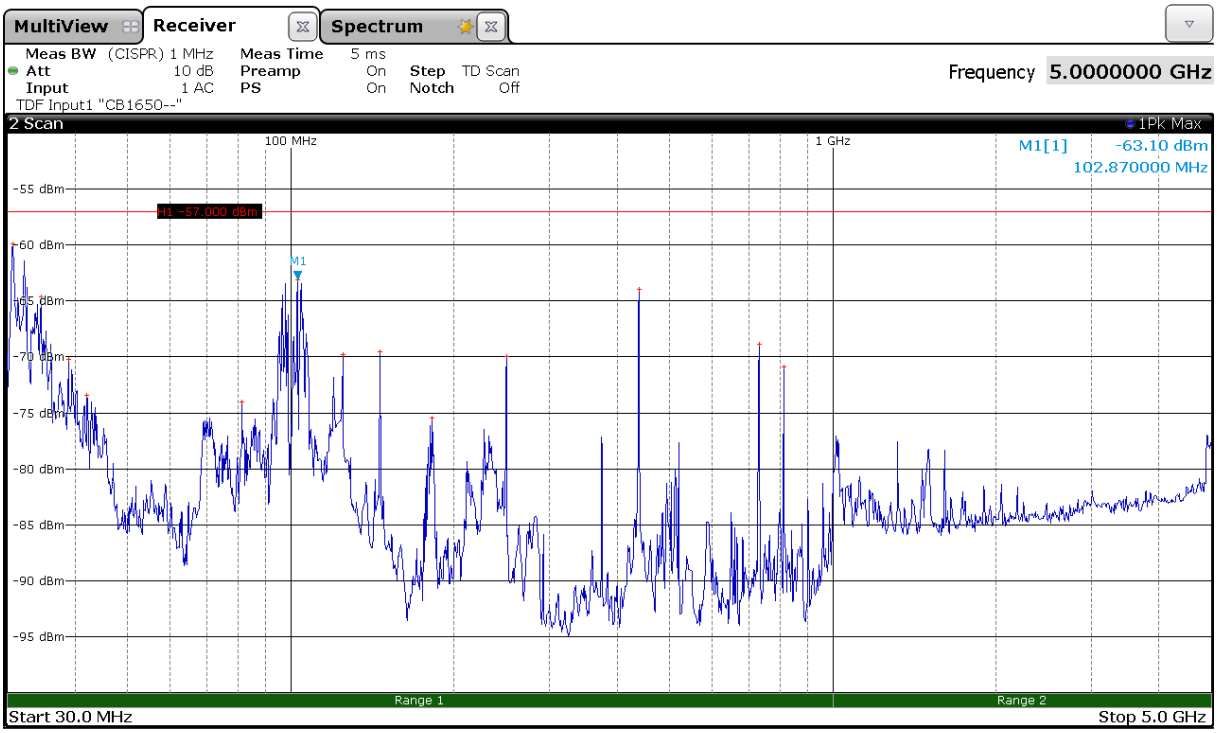
Verdict:	☒ P ☐ F ☐ N
Frequency range:	30 MHz – 5000 MHz
Kind of test site:	Shielded room
Remarks: Test performed using a laboratory DC power source.	

5.3.5 Test equipment used

Equipment	Manufacturer	Model	Serial N°	Cal Date	Due Date
EMI receiver 2 Hz ÷44 GHz	Rohde & Schwarz	ESW44	101620	2019-08	2020-08
Shielded room	Siemens	Conducted emission test room	1862	NSC	-

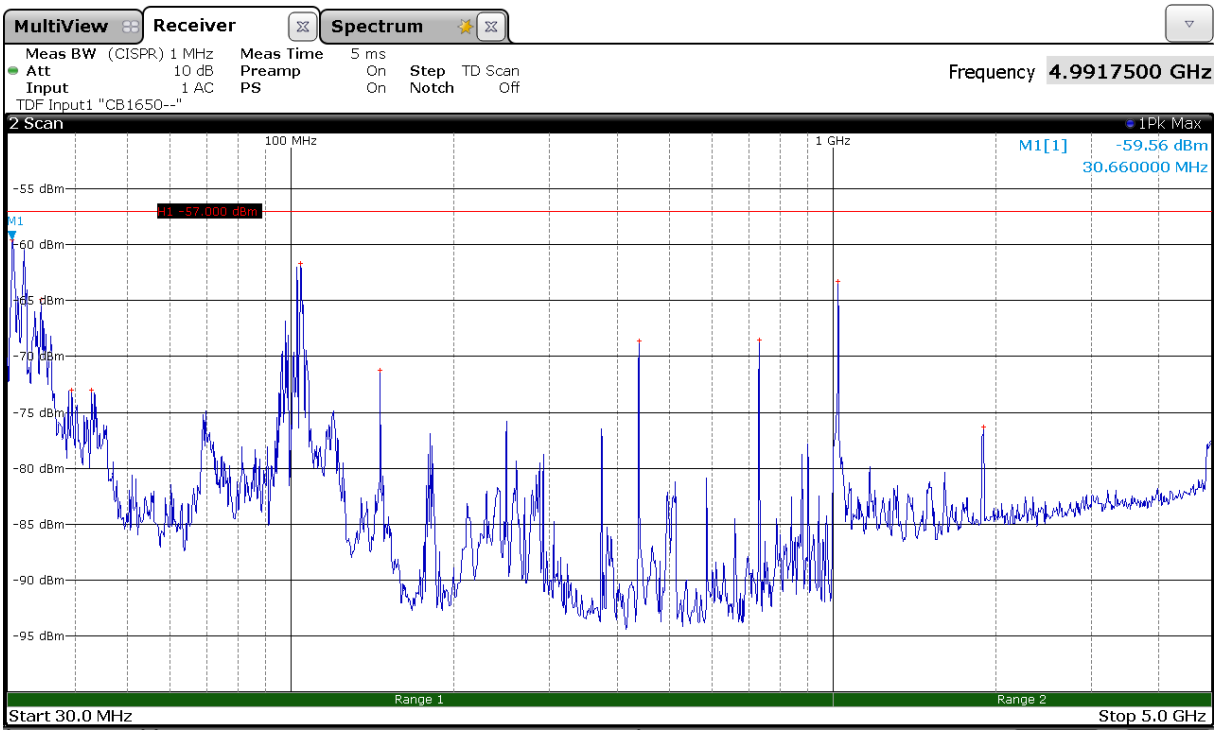
5.3.6 Test protocol

Test point: RX Antenna Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Main model; Frequency range 30 MHz to 5 GHz



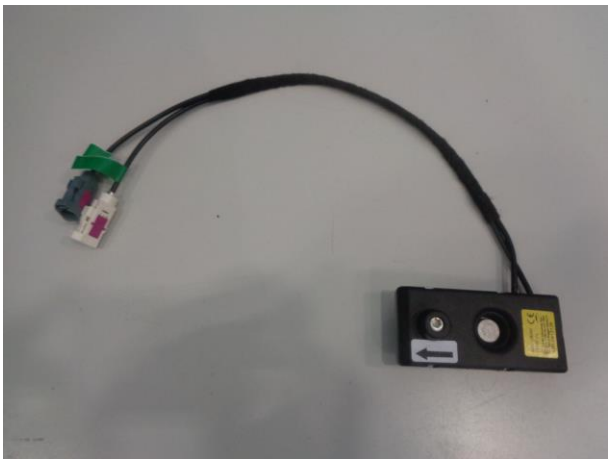
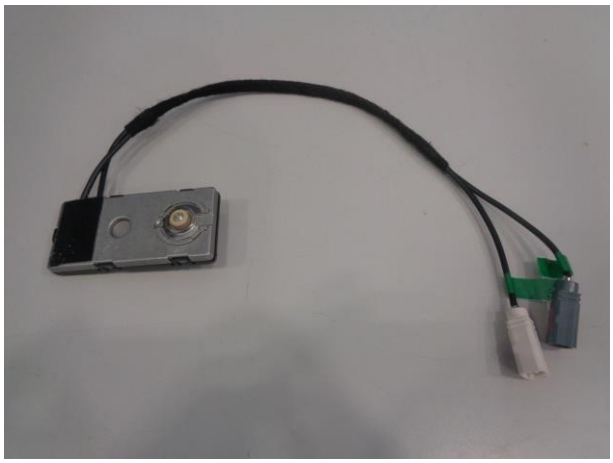
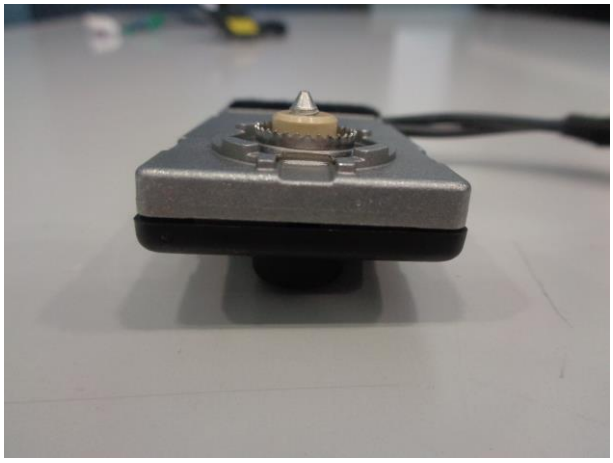
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
30.6900	-60.0	-57.0	-3.0	Pk
34.6500	-64.7	-57.0	-7.7	Pk
38.9700	-70.3	-57.0	-13.3	Pk
42.1200	-73.5	-57.0	-16.5	Pk
81.2400	-74.1	-57.0	-17.1	Pk
102.8700	-63.1	-57.0	-6.1	Pk
125.0100	-69.8	-57.0	-12.8	Pk
146.2500	-69.6	-57.0	-12.6	Pk
182.2500	-75.5	-57.0	-18.5	Pk
250.0200	-70.0	-57.0	-13.0	Pk
438.7500	-64.0	-57.0	-7.0	Pk
731.2800	-68.9	-57.0	-11.9	Pk
812.4900	-70.9	-57.0	-13.9	Pk

Test point: RX Antenna Verdict: Pass
Operation mode: 1
Configuration mode: 1
Remarks: Variant; Frequency range 30 MHz to 5 GHz

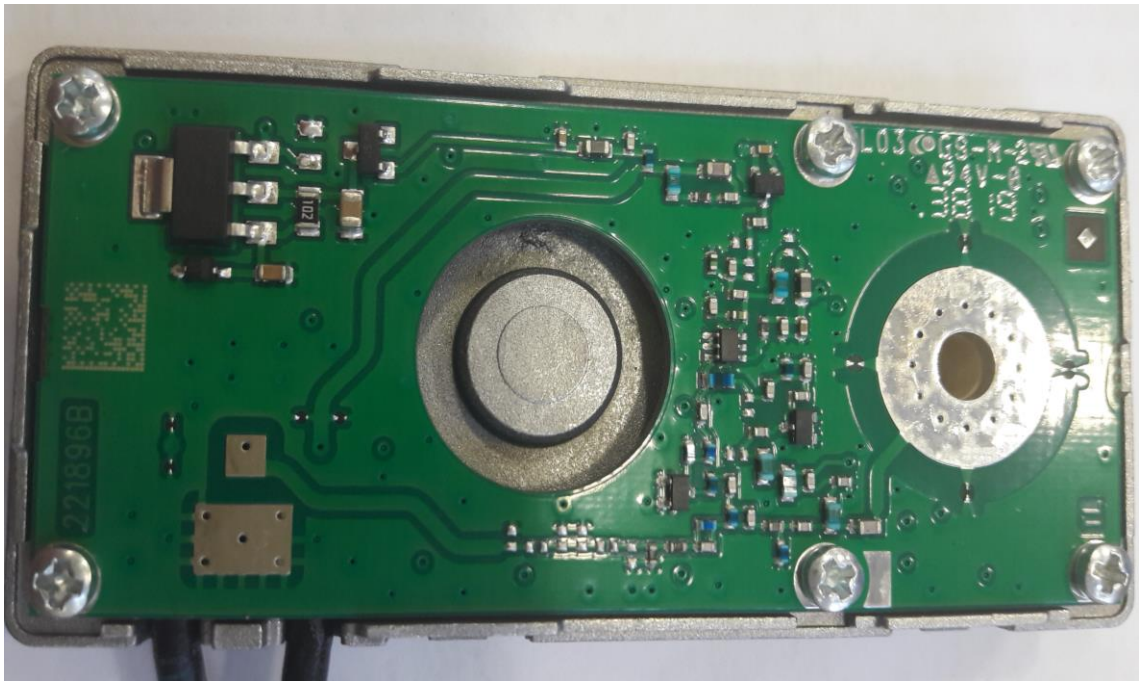


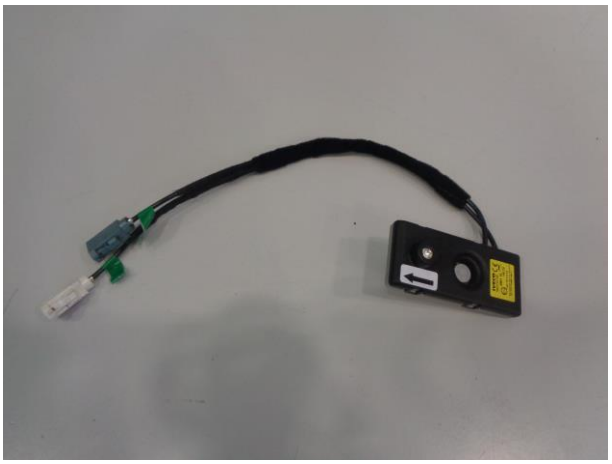
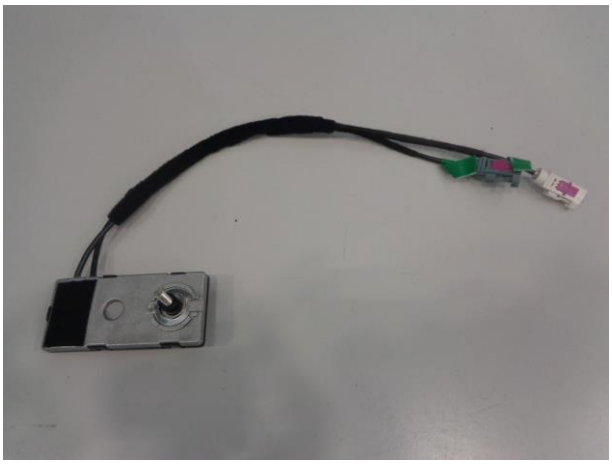
Frequency (MHz)	Level (dBm)	Limit (dBm)	Margin (dB)	Detector
30.6600	-59.6	-57.0	-2.6	Pk
34.6500	-65.0	-57.0	-8.0	Pk
39.4800	-73.1	-57.0	-16.1	Pk
42.9600	-73.1	-57.0	-16.1	Pk
104.4300	-61.7	-57.0	-4.7	Pk
146.2500	-71.3	-57.0	-14.3	Pk
438.7500	-68.6	-57.0	-11.6	Pk
731.2500	-68.5	-57.0	-11.5	Pk
1023.7500	-63.3	-57.0	-6.3	Pk
1897.7500	-76.4	-57.0	-19.4	Pk

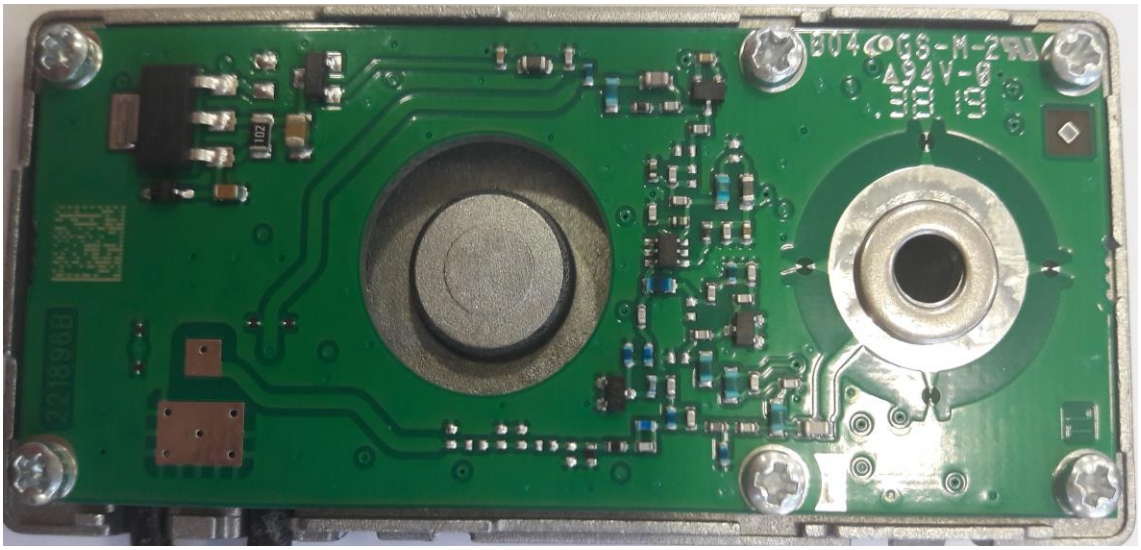
6 EUT PHOTOS

Main model	
	
	
	


5802128245
18120 PL
E3
ASK Industries Spa
C.P 110 c/o U.P. RE2
42121 Reggio Emilia IT
10R-0413126



Variant	
	
	
	



End of report