Choose Scandinavian trust

RADIO TEST REPORT – REP009881

Type of assessment:

Final product testing

Applicant:

Netsens Srl

Via delle Cantine, 97

50041 Calenzano (FI) – Italy

Product:

IoT wireless data detection unit

Model:

MN-0147-EO

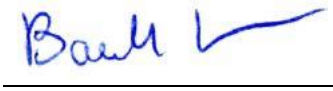
FCC ID:

2A6TE-MN014XEO

Specifications:

- FCC 47 CFR Part 15 Subpart C, §15.247

Date of issue: April 13, 2023

P. Barbieri	
Tested by	Signature
D. Guarnone	
Reviewed by	Signature

Lab locations

Company name	Nemko Spa
Address	Via del Carroccio, 4
City	Biassono
Province	MB
Postal code	20853
Country	Italy
Telephone	+39 039 220 12 01
Facsimile	+39 039 220 12 21
Website	www.nemko.com
Test site registration	682159

Limits of responsibility

Note that the results contained in this report relate only to the items tested and were obtained in the period between the date of initial receipt of samples and the date of issue of the report. This test report has been completed in accordance with the requirements of ISO/IEC 17025. All results contain in this report are within Nemko Spa ISO/IEC 17025 accreditation.

Copyright notification

Table of Contents

Section 1 Report summary

1.1 Test specifications

FCC 47 CFR Part 15, Subpart C, Clause 15.247	Operation in the 902–928 MHz, 2400–2483.5 MHz, and 5725–585 MHz

1.2 Test methods

558074 D01 15.247 Meas Guidance v05r02 (April 2, 2019)	Guidance for compliance measurements on digital transmission system, frequency hopping spread spectrum system, and hybrid system devices operating under section 15.247 of the FCC rules.
662911 D01 Multiple Transmitter Output v02r01 (October 31, 2013)	Emissions Testing of Transmitters with Multiple Outputs in the Same Band
DA 00-705, Released March 30, 2000	Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems
ANSI C63.10 v2013	American National Standard of Procedures for Compliance Testing of Unlicensed Wireless Devices

1.3 Exclusions

None

1.4 Statement of compliance

In the configuration tested, the EUT was found compliant.

Testing was performed against all relevant requirements of the test standard except as noted in section 1.3 above. Results obtained indicate that the product under test complies In full with the requirements tested. The test results relate only to the items tested.

See "Summary of test results" for full details.

1.5 Test report revision history

Table 1.5-1: *Test report revision history*

Revision #	Date of issue	Details of changes made to test report
REP009881	April 13, 2023	Original report issued

Section 2 Engineering considerations

2.1 Modifications incorporated in the EUT for compliance

The following modifications were performed by client: the transmission time has been reduced

2.2 Technical judgment

None

2.3 Deviations from laboratory tests procedures

No deviations were made from laboratory procedures.

Section 3 Test conditions

3.1 Atmospheric conditions

Temperature	15 °C – 35 °C
Relative humidity	20 % – 75 %
Air pressure	86 kPa (860 mbar) – 106 kPa (1060 mbar)

When it is impracticable to carry out tests under these conditions, a note to this effect stating the ambient temperature and relative humidity during the tests shall be recorded and stated.

The following instruments are used to monitor the environmental conditions:

Equipment	Manufacturer	Model no.	Asset no.	Cal date	Next cal.
Thermo-hygrometer data loggers	Testo	175-H2	20012380/305	2022-12	2024-12
Thermo-hygrometer data loggers	Testo	175-H2	38203337/703	2022-12	2024-12
Barometer	Castle	GPB 3300	072015	2022-04	2023-04

3.2 Power supply range

The normal test voltage for equipment to be connected to the mains shall be the nominal mains voltage. For the purpose of the present document, the nominal voltage shall be the declared voltage, or any of the declared voltages ±5 %, for which the equipment was designed.

Section 4 Measurement uncertainty

4.1 Uncertainty of measurement

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:

EUT	Type	Test	Range	Measurement Uncertainty	Notes
Transmitter	Conducted	Frequency error	0.001 MHz ÷ 40 GHz	0.08 ppm	(1)
		Carrier power RF Output Power	0.009 MHz ÷ 30 MHz	1.1 dB	(1)
			30 MHz ÷ 18 GHz	1.5 dB	(1)
			18 MHz ÷ 40 GHz	3.0 dB	(1)
			40 MHz ÷ 140 GHz	5.0 dB	(1)
		Adjacent channel power	1 MHz ÷ 18 GHz	1.4 dB	(1)
		Conducted spurious emissions	0.009 MHz ÷ 18 GHz	3.0 dB	(1)
			18 GHz ÷ 40 GHz	4.2 dB	(1)
			40 GHz ÷ 220 GHz	6.0 dB	(1)
		Intermodulation attenuation	1 MHz ÷ 18 GHz	2.2 dB	(1)
		Attack time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Attack time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Release time – frequency behaviour	1 MHz ÷ 18 GHz	2.0 ms	(1)
		Release time – power behaviour	1 MHz ÷ 18 GHz	2.5 ms	(1)
		Transient behaviour of the transmitter– Transient frequency behaviour	1 MHz ÷ 18 GHz	0.2 kHz	(1)
		Transient behaviour of the transmitter – Power level slope	1 MHz ÷ 18 GHz	9%	(1)
		Frequency deviation - Maximum permissible frequency deviation	0.001 MHz ÷ 18 GHz	1.3%	(1)
		Frequency deviation - Response of the transmitter to modulation frequencies above 3 kHz	0.001 MHz ÷ 18 GHz	0.5 dB	(1)
		Dwell time	-	3%	(1)
		Hopping Frequency Separation	0.01 MHz ÷ 18 GHz	1%	(1)
		Occupied Channel Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
		Modulation Bandwidth	0.01 MHz ÷ 18 GHz	2%	(1)
	Radiated	Radiated spurious emissions	0.009 MHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 dB	(1)
		Effective radiated power transmitter	10 kHz ÷ 26.5 GHz	6.0 dB	(1)
			26.5 GHz ÷ 66 GHz	8.0 dB	(1)
			66 GHz ÷ 220 GHz	10 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 for a normal distribution corresponds to a coverage probability of approximately 95 %

Section 5 Information provided by the applicant

5.1 Disclaimer

This section contains information provided by the applicant and has been utilized to support the test plan. Inaccurate information provided by the applicant can affect the validity of the results contained within this test report. Nemko accepts no responsibility for the information contained within this section and the impact it may have on the test plan and resulting measurements.

5.2 Applicant/Manufacture

Applicant name	Netsens Srl
Applicant address	Via delle Cantine, 97 – 50041 Calenzano (FI) – Italy
Manufacture name	Same as applicant
Manufacture address	Same as applicant

5.3 EUT information

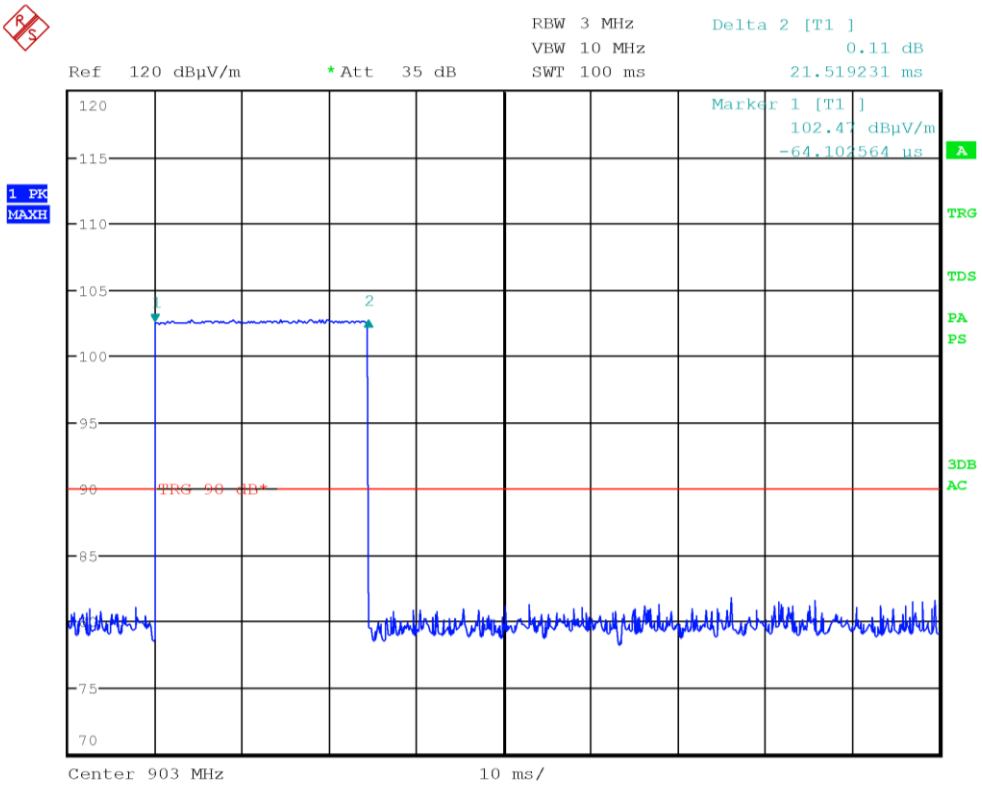
Product	IoT wireless data detection unit
Model	MN-0147-EO
Serial number	S/N 22230611
Power supply requirements	12 V DC
Product description and theory of operation	The Netsens IoT system consists of a base and receiving station, and a series of remote wireless units installed in the field, independent of each other. The wireless units are powered by a long-life internal battery, which guarantees long maintenance and replacement intervals. Each base station has an IoT receiver that acquires the data of the units in the field and allows the transmission to the central acquisition system.

5.4 Radio technical information

Category of Wideband Data Transmission equipment	☐ Frequency Hopping Spread Spectrum (FHSS) equipment
	☒ Other types of Wideband Data Transmission equipment (e.g. DSSS, OFDM, etc.).
Frequency band	902–928 MHz
Frequency Min (MHz)	903 MHz
Frequency Max (MHz)	914.2 MHz
Channel numbers	8
RF power Max (W), Conducted	13.5 dBm
Field strength, dBµV/m @ 3 m	111.3 dBµV/m
Measured BW (kHz), -6 dB OBW	637.4 kHz
Type of modulation	LoRa
Emission classification	F1D, W7D
Transmitter spurious, dBµV/m @ 3 m	66.8 (@5419.4 MHz)
Antenna information	Customer integral antenna on PCB, max gain 2.6 dBi

5.5 EUT setup details

5.5.1 Radio exercise details

Operating conditions	The EUT has been put in transmission mode with a test mode included in the EUT firmware as following: 1) After EUT start-up push the knob until CFG appear on the display.  2) Rotate the knob to TST menu.  3) Push the know to start the transmission.
Transmitter state	Transmitting for about 24 ms every 7 second, according to manufacturer declaration (it was not possible to put the EUT in continuous transmission mode)  The duty cycle correction factor for average value is: 20 log (21.52 ms / 100 ms) = -13.3 dB

5.5.2 EUT setup configuration

Table 5.5-1: *EUT sub assemblies*

Description	Brand name	Model, Part number, Serial number, Revision level
--	--	--

Table 5.5-2: *EUT interface ports*

Description	Qty.
DC Power Line	1

Table 5.5-3: *Support equipment*

Description	Brand name	Model, Part number, Serial number, Revision level
--	--	--

Table 5.5-4: *Inter-connection cables*

Cable description	From	To	Length (m)
DC Powe Line	EUT	DC Power Supply	3

EUT setup configuration, continued

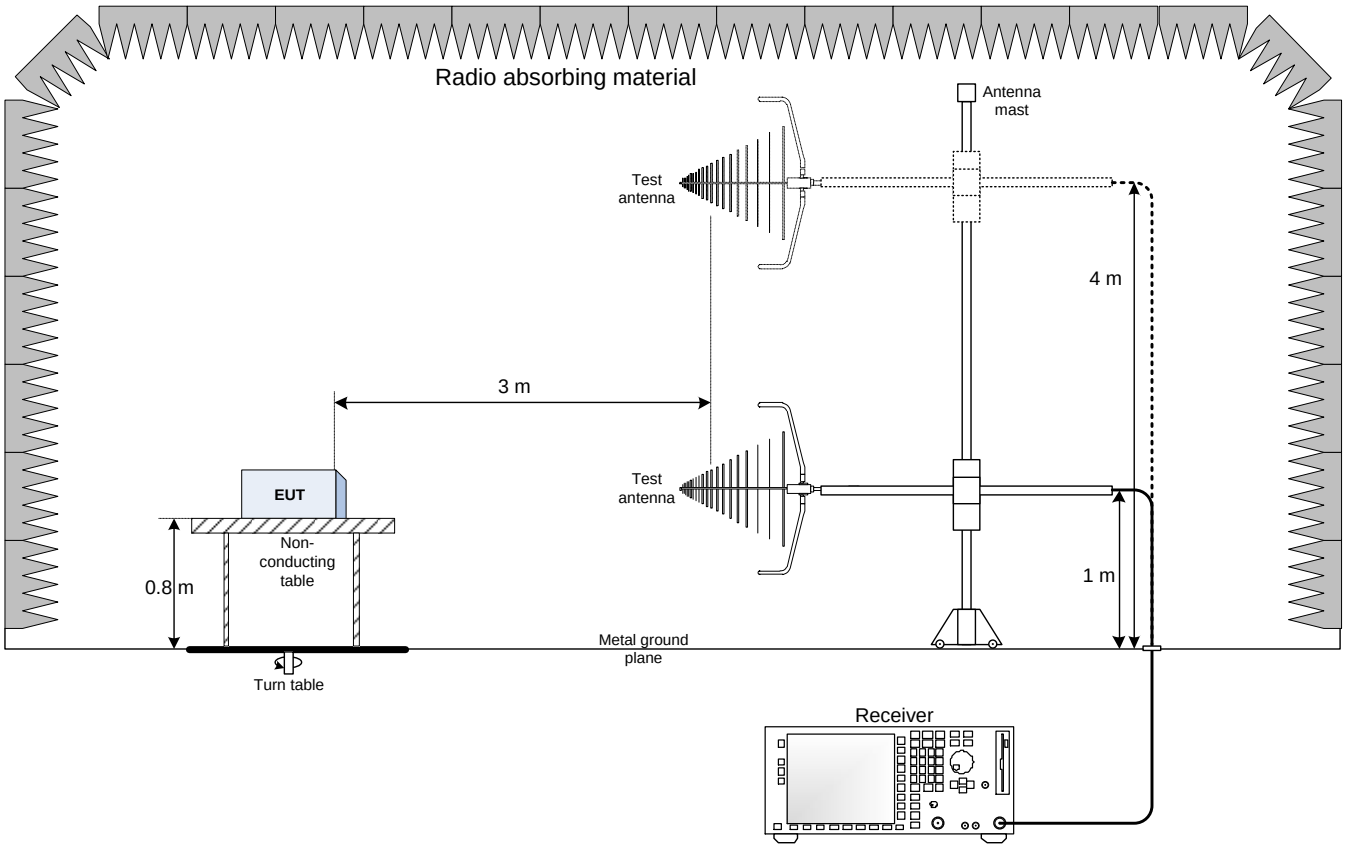


Figure 5.5-1: *Radiated testing block diagram (below 1 GHz)*

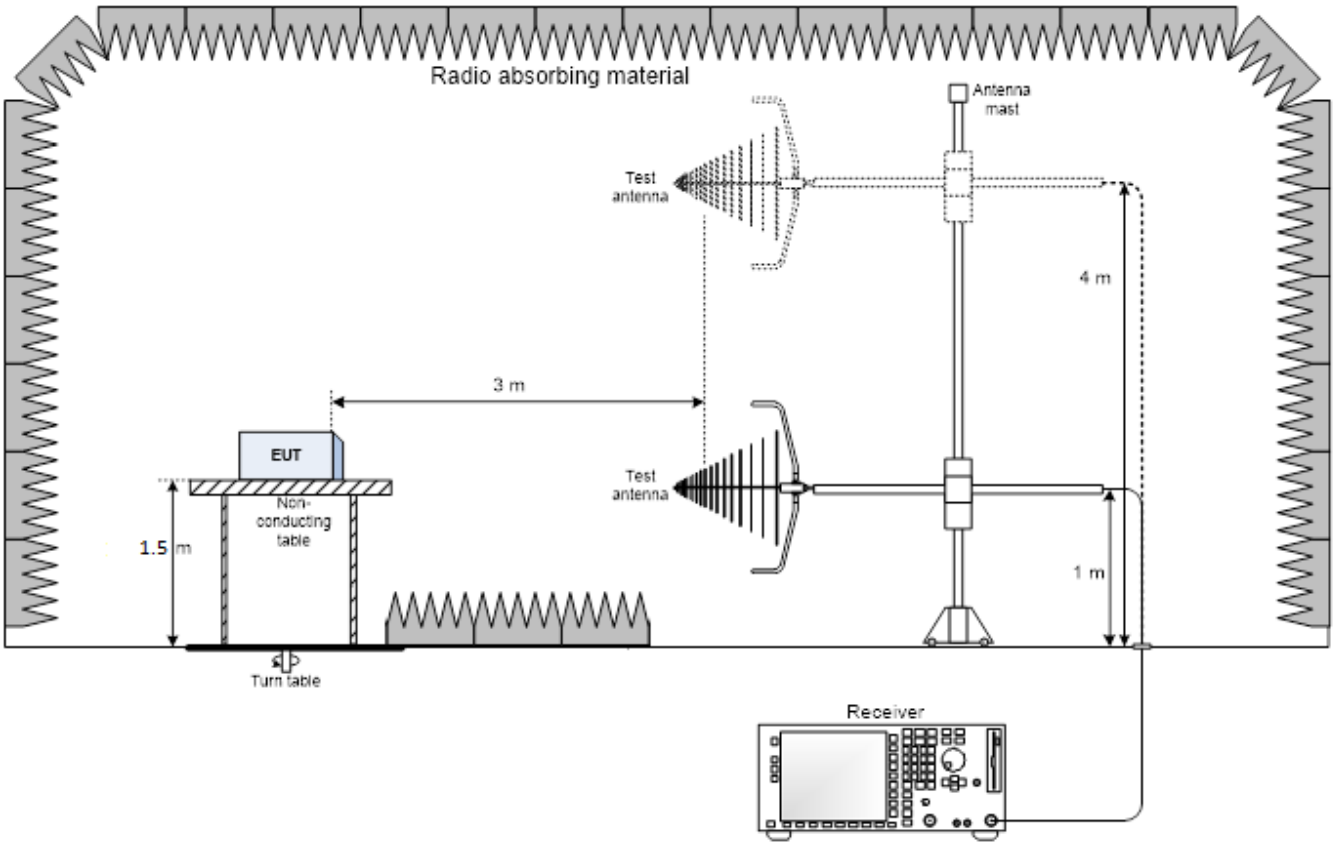


Figure 5.5-2: *Radiated testing block diagram (above 1 GHz)*

Section 6 Summary of test results

6.1 Testing location

Test location (s)	Nemko S.p.A. Via Del Carroccio, 4 20853 Biassono (MB) Italy

6.2 Testing period

Test start date	January 4, 2023	Test end date	January 17, 2023

6.3 Sample information

Receipt date	December 27, 2022	Nemko sample ID number(s)	4658670002

6.4 FCC Part 15 Subpart A and C, general requirements test results

Table 6.4-1: *FCC general requirements results*

Part	Test description	Verdict
§15.207(a)	Conducted limits	Pass
§15.31I	Variation of power source	Pass
§15.31(m)	Number of tested frequencies	Pass
§15.203	Antenna requirement	Pass

Notes: --

6.5 FCC Part §15.247 test results for frequency hopping spread spectrum systems (FHSS)

Table 6.5-1: *FCC FHSS requirements results*

Part	Test description	Verdict
§15.247(a)(1)(i)	Requirements for operation in the 902–928 MHz band	Not applicable
§15.247(a)(1)(ii)	Requirements for operation in the 5725–5850 MHz band	Not applicable
§15.247(a)(1)(iii)	Requirements for operation in the 2400–2483.5 MHz band	Not applicable
§15.247(b)(1)	Maximum peak output power in the 2400–2483.5 MHz band and 5725–5850 MHz band	Not applicable
§15.247(b)(2)	Maximum peak output power in the 902–928 MHz band	Not applicable
§15.247I(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247I(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Not applicable
§15.247(f)	Time of occupancy for hybrid systems	Not applicable
§15.247(i)	Radiofrequency radiation exposure evaluation	Not applicable

Notes: --

6.6 FCC Part §15.247 test results for digital transmission systems (DTS)

Table 6.6-1: *FCC DTS requirements results*

Part	Test description	Verdict
§15.247(a)(2)	Minimum 6 dB bandwidth	Pass
§15.247(b)(3)	Maximum peak output power in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands	Pass
§15.247I(1)	Fixed point-to-point operation with directional antenna gains greater than 6 dBi	Not applicable
§15.247I(2)	Transmitters operating in the 2400–2483.5 MHz band that emit multiple directional beams	Not applicable
§15.247(d)	Spurious emissions	Pass
§15.247I	Power spectral density	Pass
§15.247(f)	Time of occupancy for hybrid systems	Not applicable

Notes: --

Section 7 Test equipment

7.1 Test equipment list

Table 7.1-1: *Equipment list*

Equipment	Manufacturer	Model no.	Asset no.	Cal cycle	Next cal.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767	2023-01	2024-01
EMI Receiver	Rohde & Schwarz	ESW44	101620	2022-08	2023-08
EMI Receiver	Rohde & Schwarz	ESU8	100202	2022-09	2023-09
Antenna Trilog 25MHz - 8GHz	Schwarzbeck Mess-Elektronik	VULB9162	9162-025	2021-07	2024-07
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242	2021-06	2024-06
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152	2021-09	2024-09
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40	2020-04	2023-04
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121	2022-03	2023-03
Broadband Bench Top Amplifier	Sage	STB-1834034030-KFKF-L1	18490-01	2022-05	2023-05
Controller	Maturo	FCU3.0	10041	NCR	NCR
Tilt antenna mast	Maturo	TAM4.0-E	10042	NCR	NCR
Turntable	Maturo	TT4.0-5T	2.527	NCR	NCR
3m Semi anechoic chamber	Comtest	SAC-3	1711-150	2022-09	2024-09
Semi-anechoic chamber	Nemko S.p.a.	10m semi-anechoic chamber	530	2021-09	2023-09
Attenuator	Aeroflex / Weinschel	2	CC8577	2022-08	2023-08
LISN	Rohde & Schwarz	ENV432	101714	2022-08	2023-08
Shielded room	Siemens	Conducted emission test room	1862	NCR	NCR

Notes: NCR - no calibration required, VOU - verify on use

Section 8 Testing data

8.1 Variation of power source

8.1.1 References, definitions and limits

FCC §15.31 (e):

For intentional radiators, measurements of the variation of the input power or the radiated signal level of the fundamental frequency component of the emission, as appropriate, shall be performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage. For battery operated equipment, the equipment tests shall be performed using a new battery.

8.1.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 13, 2023

8.1.3 Observations, settings and special notes

The testing was performed as per ANSI C63.10 Section 5.13.

a) Where the device is intended to be powered from an external power adapter, the voltage variations shall be applied to the input of the adapter provided with the device at the time of sale. If the device is not marketed or sold with a specific adapter, then a typical power adapter shall be used.
b) For devices, where operating at a supply voltage deviating ±15% from the nominal rated value may cause damages or loss of intended function, test to minimum and maximum allowable voltage per manufacturer's specification and document in the report.
c) For devices with wide range of rated supply voltage, test at 15% below the lowest and 15% above the highest declared nominal rated supply voltage.
d) For devices obtaining power from an input/output (I/O) port (USB, firewire, etc.), a test jig is necessary to apply voltage variation to the device from a support power supply, while maintaining the functionalities of the device.

For battery-operated equipment, the equipment tests shall be performed using a variable power supply.

8.1.4 Test data

EUT Power requirements:	☐ AC	☒ DC	☐ Battery
If EUT is an AC or a DC powered, was the noticeable output power variation observed?	☐ YES	☒ NO	☐ N/A
If EUT is battery operated, was the testing performed using fresh batteries?	☐ YES	☐ NO	☒ N/A
If EUT is rechargeable battery operated, was the testing performed using fully charged batteries?	☐ YES	☐ NO	☒ N/A

8.2 Number of frequencies

8.2.1 References, definitions and limits

FCC §15.31:

(m) Measurements on intentional radiators or receivers shall be performed and, if required, reported for each band in which the device can be operated with the device operating at the number of frequencies in each band specified in the following table.

Table 8.2-1: *Frequency Range of Operation*

Frequency range over which the device operates (in each band)	Number of test frequencies required	Location of measurement frequency inside the operating frequency range
1 MHz or less	1	Center (middle of the band)
1–10 MHz	2	1 near high end, 1 near low end
Greater than 10 MHz	3	1 near high end, 1 near center and 1 near low end

Notes: "near" means as close as possible to or at the centre / low end / high end of the frequency range over which the device operates.

8.2.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 13, 2023

8.2.3 Observations, settings and special notes

ANSI C63.10, Clause 5.6.2.1:

The number of channels tested can be reduced by measuring the center channel bandwidth first and then applying the following relaxations as appropriate:

a) For each operating mode, if the measured channel bandwidth on the middle channel is at least 150% of the minimum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.

b) For multiple-input multiple-output (MIMO) systems, if the measured channel bandwidth on testing the middle channel exceeds the minimum permitted bandwidth by more than 50% on one transmit chain, then it is not necessary to repeat testing on the other chains.

c) If the measured channel bandwidth on the middle channel is less than 50% of the maximum permitted bandwidth, then it is not necessary to measure the bandwidth on the high and low channels.

ANSI C63.10, Clause 5.6.2.2:

For devices with multiple operating modes, measurements on the middle channel can be used to determine the worst-case mode(s). The worst-case modes are as follows:

a) Band edge requirements—Measurements on the mode with the widest bandwidth can be used to cover the same channel (center frequency) on modes with narrower bandwidth that have the same or lower output power for each modulation family (e.g., OFDM and direct sequence spread spectrum).

b) Spurious emissions—Measure the mode with the highest output power and the mode with the highest output power spectral density for each modulation family (e.g., OFDM and direct sequence spread spectrum).

c) In-band PSD—Measurements on the mode with the narrowest bandwidth can be used to cover all modes within the same modulation family of an equal or lower output power provided the result is less than 50% of the limit.

8.2.4 Test data

Table 8.2-2: *Test channels selection*

Start of Frequency range, MHz	End of Frequency range, MHz	Frequency range bandwidth, MHz	Low channel, MHz	Mid channel, MHz	High channel, MHz
902	928	26	903.0	907.8	914.2

8.3 Antenna requirement

8.3.1 References, definitions and limits

FCC §15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

FCC §15.247:

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

8.3.2 Test summary

Verdict	Pass		
Tested by	P. Barbier	Test date	January 13, 2023

8.3.3 Observations, settings and special notes

None

8.3.4 Test data

Must the EUT be professionally installed? ☐ YES ☒ NO

Does the EUT have detachable antenna(s)? ☐ YES ☒ NO

If detachable, is the antenna connector(s) non-standard? ☐ YES ☐ NO ☒ N/A

Table 8.3-1: *Antenna information*

Antenna type	Manufacturer	Model number	Maximum gain	Connector type
PCB antenna	Netsens Srl	--	4.1 dBi	--

8.4 AC power line conducted emissions limits

8.4.1 References, definitions and limits

FCC §15.207:

(a) Except as shown in paragraphs (b) and (c) of this section, for an intentional radiator 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 Ω 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 boundary between the frequency ranges.

ANSI C63.10, Clause 6.2:

If the EUT normally receives power from another device that in turn connects to the public utility ac power lines, measurements shall be made on that device with the EUT in operation to demonstrate that the device continues to comply with the appropriate limits while providing the EUT with power. If the EUT is operated only from internal or dedicated batteries, with no provisions for connection to the public utility ac power lines (600 VAC or less) to operate the EUT (such as an adapter), then ac power-line conducted measurements are not required.

For direct current (dc) powered devices where the ac power adapter is not supplied with the device, an "off-the-shelf" unmodified ac power adapter shall be used. If the device is supposed to be installed in a host (e.g., the device is a module or PC card), then it is tested in a typical compliant host.

Table 8.4-1: *Conducted emissions limit*

	Conducted emissions limit, dBµV	
Frequency of emission, MHz	**Quasi-peak**	**Average****
0.15–0.5	66 to 56*	56 to 46*
0.5–5	56	46
5–30	60	50

Notes: * - The level decreases linearly with the logarithm of the frequency.
** - A linear average detector is required.

8.4.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 5, 2023

8.4.3 Observations, settings and special notes

Port under test – Coupling device	DC Power Port – Artificial Mains Network (AMN)
EUT power input during test	12 V_{DC} (via commercial 100–240 V_{AC}, 50/60 Hz power adapter)
EUT setup configuration	Table top
Measurement details	A preview measurement was generated with the receiver in continuous scan mode. Emissions detected within 10 dB or above the limit were re-measured with the appropriate detector against the correlating limit and recorded as the final measurement.
Additional notes:	– The EUT was set up as tabletop configuration per ANSI C63.10-2013 measurement procedure. – The spectral scan has been corrected with transducer factors (i.e. cable loss, LISN factors, and attenuators) for determination of compliance. Correction factor (dB) = LISN factor IL (dB) + cable loss (dB) + attenuator (dB) – Emissions that were continuously present for a minimum of 1 second and occurred more than once for every 15 seconds observation period were considered valid emissions. The maximum value of valid emissions has been recorded.

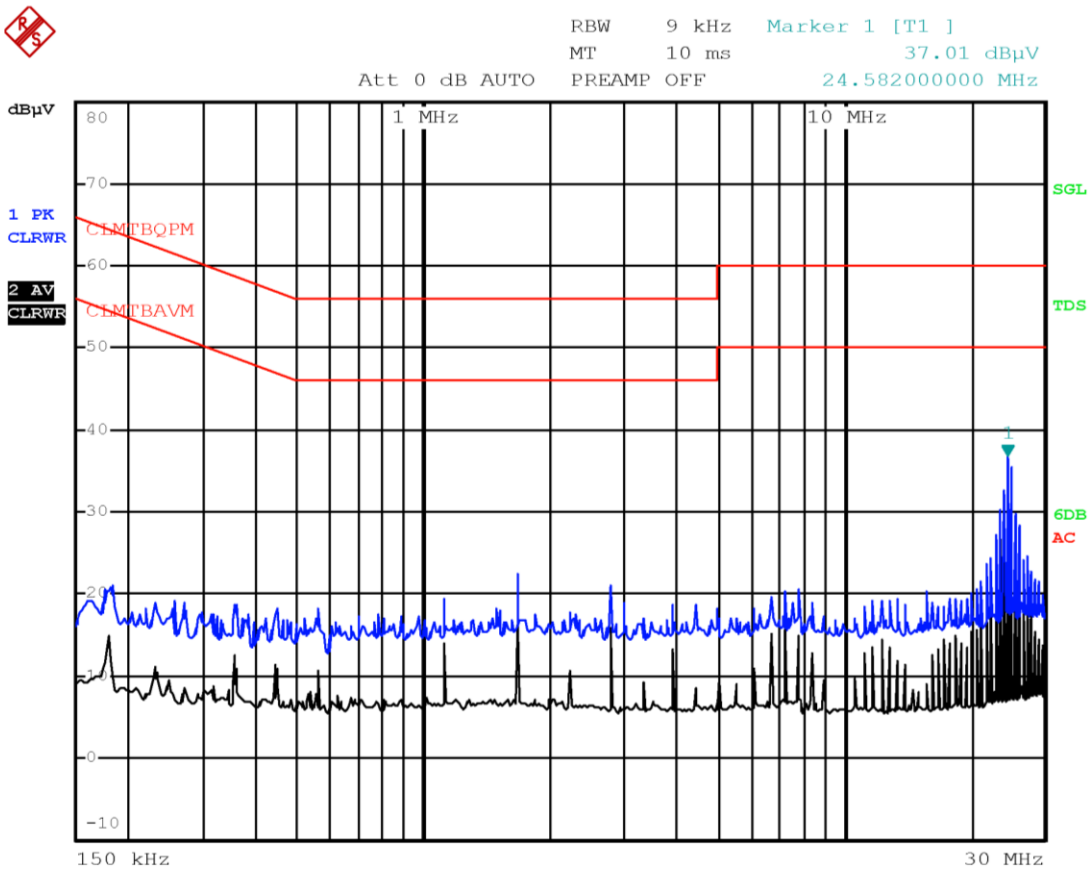
Receiver settings:

Resolution bandwidth	9 kHz
Video bandwidth	30 kHz
Detector mode	Peak and Average (Preview), Quasi-peak and Average (Final)
Trace mode	Max Hold
Measurement time	100 ms (Preview), 1 s (Final)

8.4.4 Test equipment used

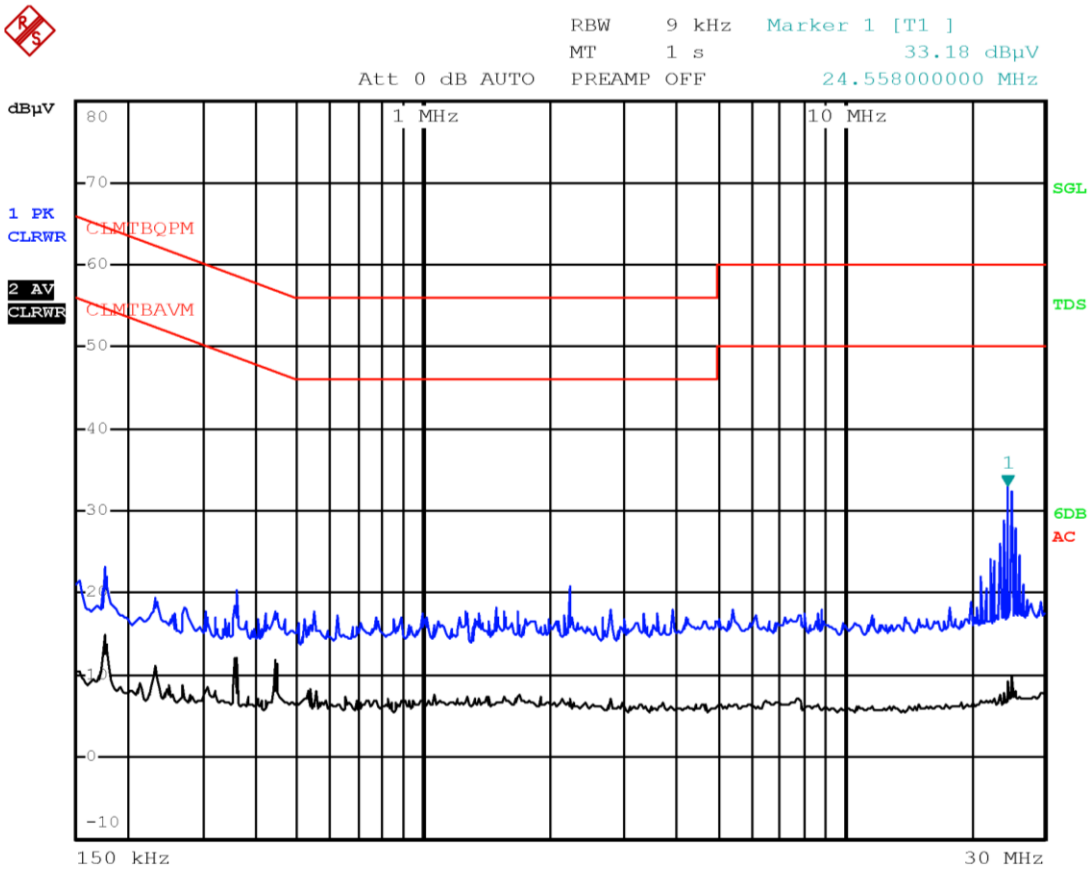
Equipment	Manufacturer	Model no.	Asset no.
EMI Receiver	Rohde & Schwarz	ESU8	100202
Attenuator	Aeroflex / Weinschel	2	CC8577
LISN	Rohde & Schwarz	ENV432	101714
Shielded room	Siemens	Conducted emission test room	1862

8.4.5 Test data



Plot 8.4-1: *Conducted emissions on phase line*

Test data, continued



Plot 8.4-2: *Conducted emissions on neutral line*

8.5 Minimum 6 dB bandwidth for DTS systems

8.5.1 References, definitions and limits

FCC §15.247:

(a) Operation under the provisions of this Section is limited to frequency hopping and digitally modulated intentional radiators that comply with the following provisions:

(2) Systems using digital modulation techniques may operate in the 902–928 MHz, 2400–2483.5 MHz, and 5725–5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

8.5.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 16, 2023

8.5.3 Observations, settings and special notes

The test was performed as per KDB 558074, section 8.2 with reference to ANSI C63.10 subclause 11.8.
Spectrum analyser settings:

Resolution bandwidth	6 dB BW: 100 kHz; 99% OBW: 1–5% of OBW
Video bandwidth	≥3 × RBW
Frequency span	3 × OBW
Detector mode	Peak
Trace mode	Max Hold

8.5.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
3m Semi anechoic chamber	Comtest	SAC-3	1711-150

8.5.5 Test data

Table 8.5-1: *99% occupied bandwidth results*

Modulation	Frequency, MHz	99% occupied bandwidth, kHz
LoRa	903.0	499.5
LoRa	907.8	496.0
LoRa	914.2	497.6

Notes: There is no 99% occupied bandwidth limit in the standard's requirements, the measurement results provided for information purposes only.

Table 8.5-2: *6 dB bandwidth results*

Modulation	Frequency, MHz	6 dB bandwidth, kHz	Minimum limit, kHz	Margin, kHz
GFSK	903.0	637.4	500	137.4
	907.8	637.4	500	137.4
	914.2	629.4	500	129.4

Test data, continued

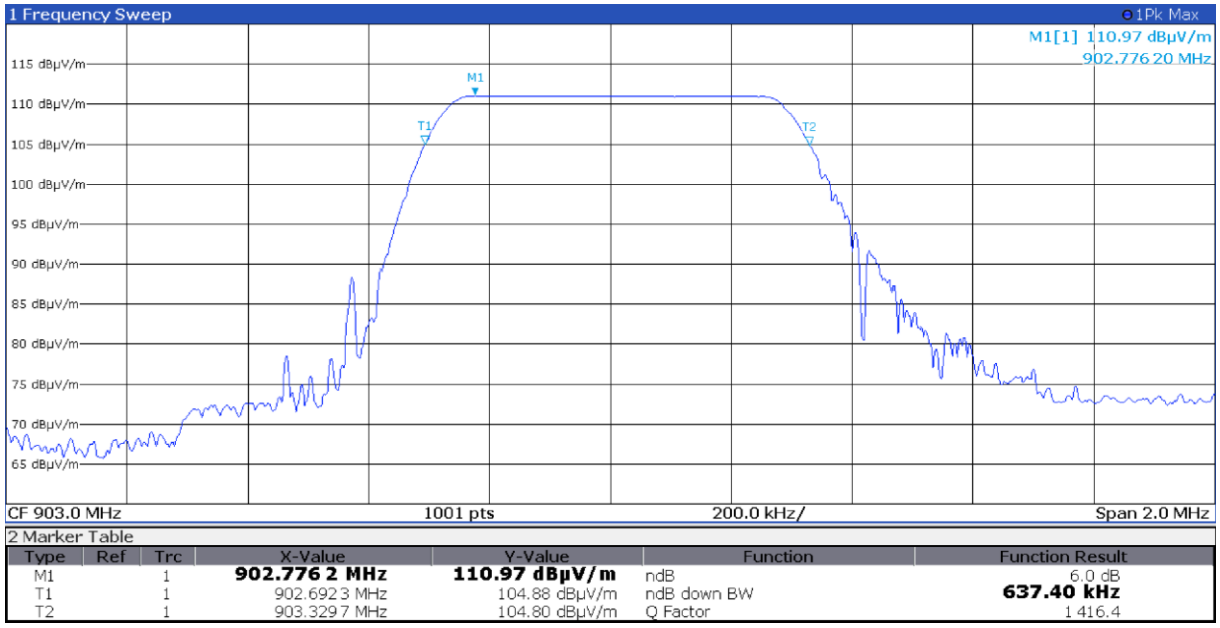


Figure 8.5-1: *6 dB bandwidth on low channel*

Test data, continued

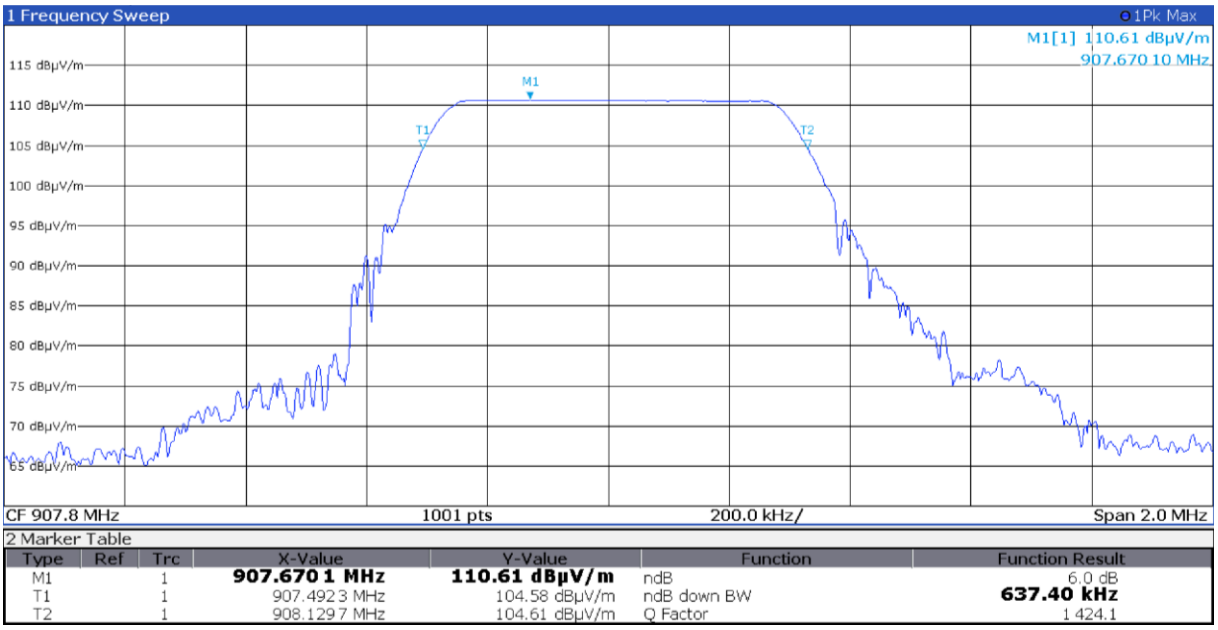


Figure 8.5-2: *6 dB bandwidth on mid channel*

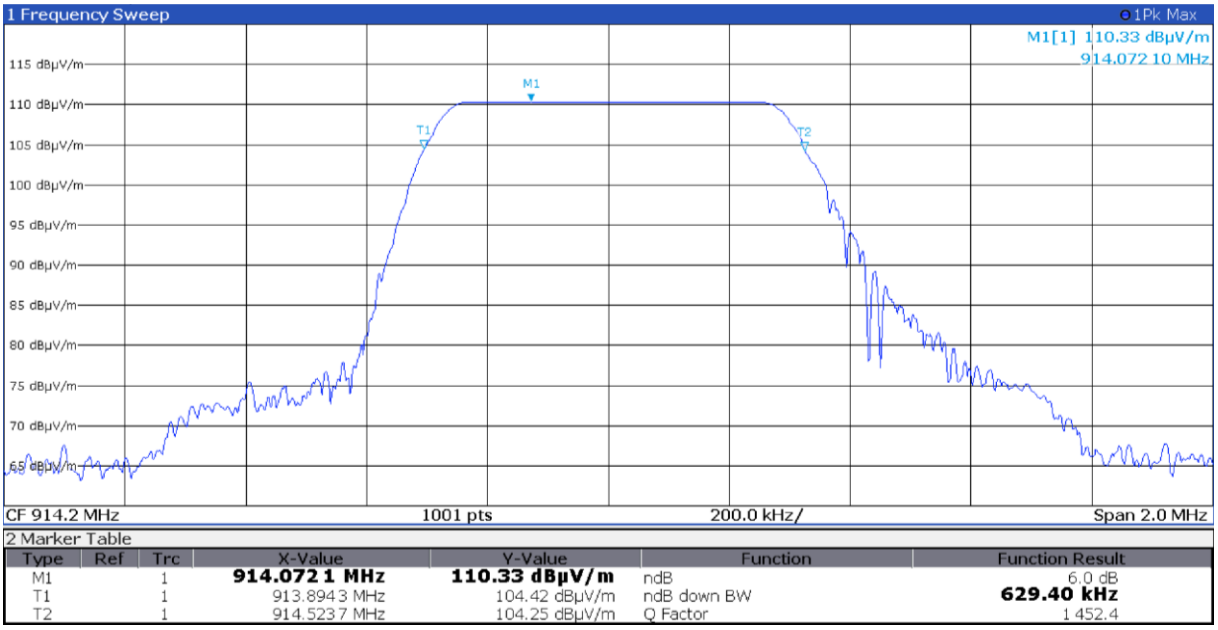


Figure 8.5-3: *6 dB bandwidth on high channel*

Test data, continued

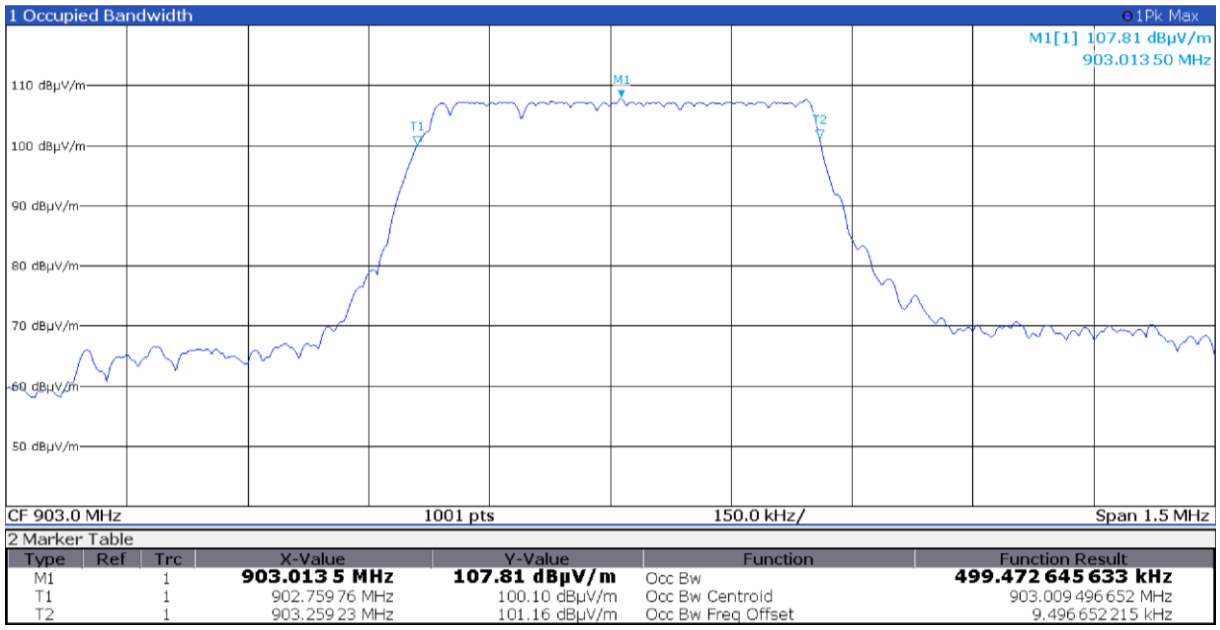


Figure 8.5-4: *99% bandwidth on low channel*

Test data, continued

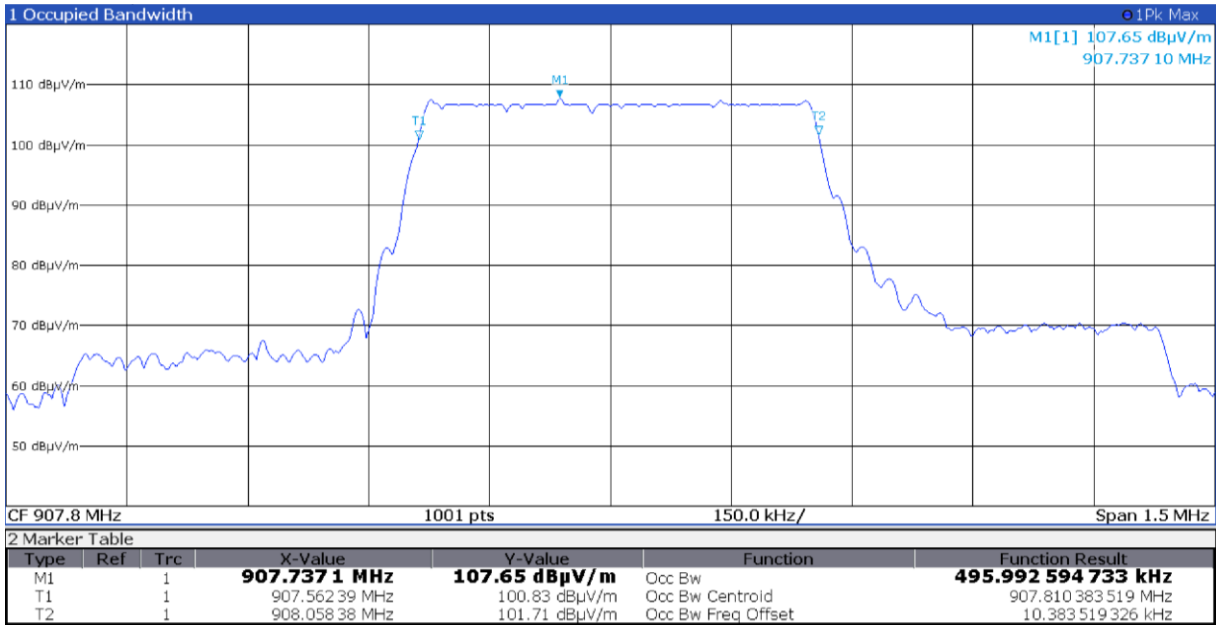


Figure 8.5-5: *99% bandwidth on mid channel*

Test data, continued

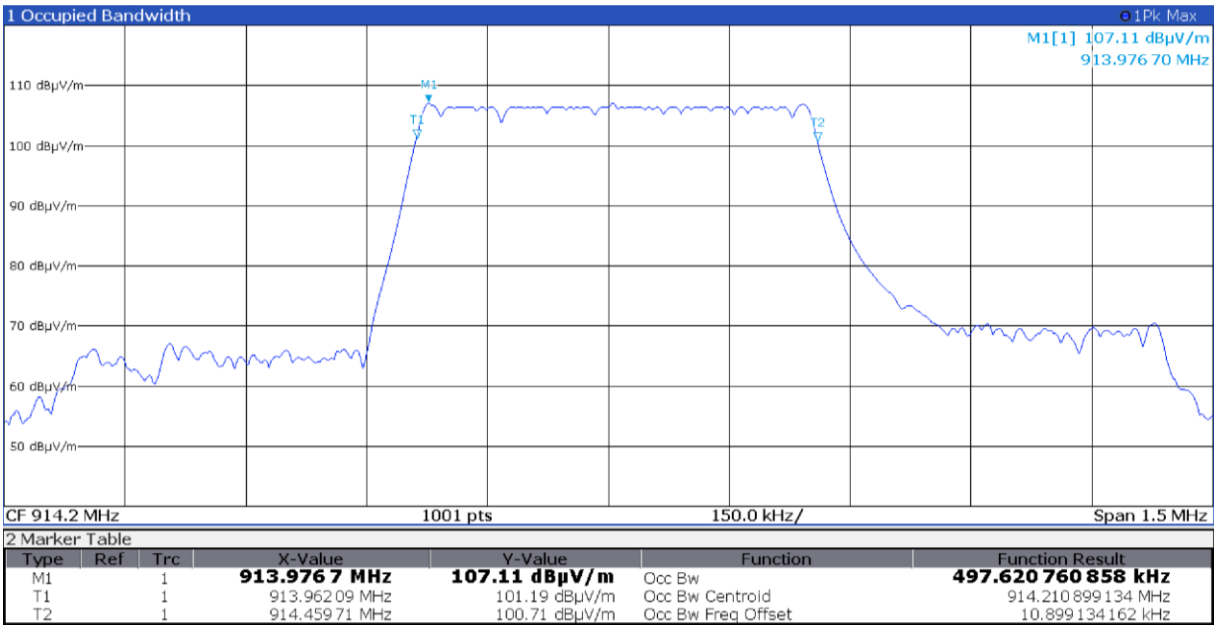


Figure 8.5-6: *99% bandwidth on high channel*

8.6 Transmitter output power and e.i.r.p. requirements for DTS in 900 MHz

8.6.1 References, definitions and limits

FCC §15.247:

(b) The maximum peak conducted output power of the intentional radiator shall not exceed the following:

(3) For systems using digital modulation in the 902–928 MHz band: 1 W (30 dBm). As an alternative to a peak power measurement, compliance with the one Watt limit can be based on a measurement of the maximum conducted output power. Maximum Conducted Output Power is defined as the total transmit power delivered to all antennas and antenna elements averaged across all symbols in the signaling alphabet when the transmitter is operating at its maximum power control level. Power must be summed across all antennas and antenna elements. The average must not include any time intervals during which the transmitter is off or is transmitting at a reduced power level. If multiple modes of operation are possible (e.g., alternative modulation methods), the maximum conducted output power is the highest total transmit power occurring in any mode.

(4) The conducted output power limit specified in paragraph (b) of this section is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from the intentional radiator shall be reduced below the stated values in paragraphs (b)(1), (b)(2), and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

(c) Operation with directional antenna gains greater than 6 dBi.

(1) Fixed point-to-point operation:

(iii) Fixed, point-to-point operation, as used in paragraphs (c)(1)(i) and (c)(1)(ii) of this section, excludes the use of point-to-multipoint systems, omnidirectional applications, and multiple co-located intentional radiators transmitting the same information. The operator of the spread spectrum or digitally modulated intentional radiator or, if the equipment is professionally installed, the installer is responsible for ensuring that the system is used exclusively for fixed, point-to-point operations. The instruction manual furnished with the intentional radiator shall contain language in the installation instructions informing the operator and the installer of this responsibility.

8.6.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 16, 2023

8.6.3 Observations, settings and special notes

The test was performed as per KDB 558074, section 8.3 with reference to ANSI C63.10 subclause 11.9.1 (peak power) using method RBW≥DTS bandwidth (Maximum peak conducted output power).
Spectrum analyser settings:

Resolution bandwidth	1 MHz
Video bandwidth	≥3 × RBW
Frequency span	5 MHz
Detector mode	Peak
Trace mode	Max hold

8.6.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
3m Semi anechoic chamber	Comtest	SAC-3	1711-150

8.6.5 Test data

Table 8.6-1: *Output power and EIRP results (radiated measurement)*

Frequency, MHz	Field strength, dBµV/m	EIRP, dBm	EIRP limit, dBm	EIRP margin, dB	Antenna gain, dBi	Output power, dBm	Output power limit, dBm	Output power margin, dB
903.0	111.2	16.0	36	-20.0	2.6	13.4	30	-16.6
907.8	111.3	16.1	36	-19.9	2.6	13.5	30	-16.5
914.2	110.5	15.3	36	-20.7	2.6	12.7	30	-17.3

Note: EIRP [dBm] = Field Strength [dBµV/m] – 95.23 [dB]; Output power [dBm] = EIRP [dBm] – Antenna gain [dBi]
Output power declared by the manufacturer: 12 dBm

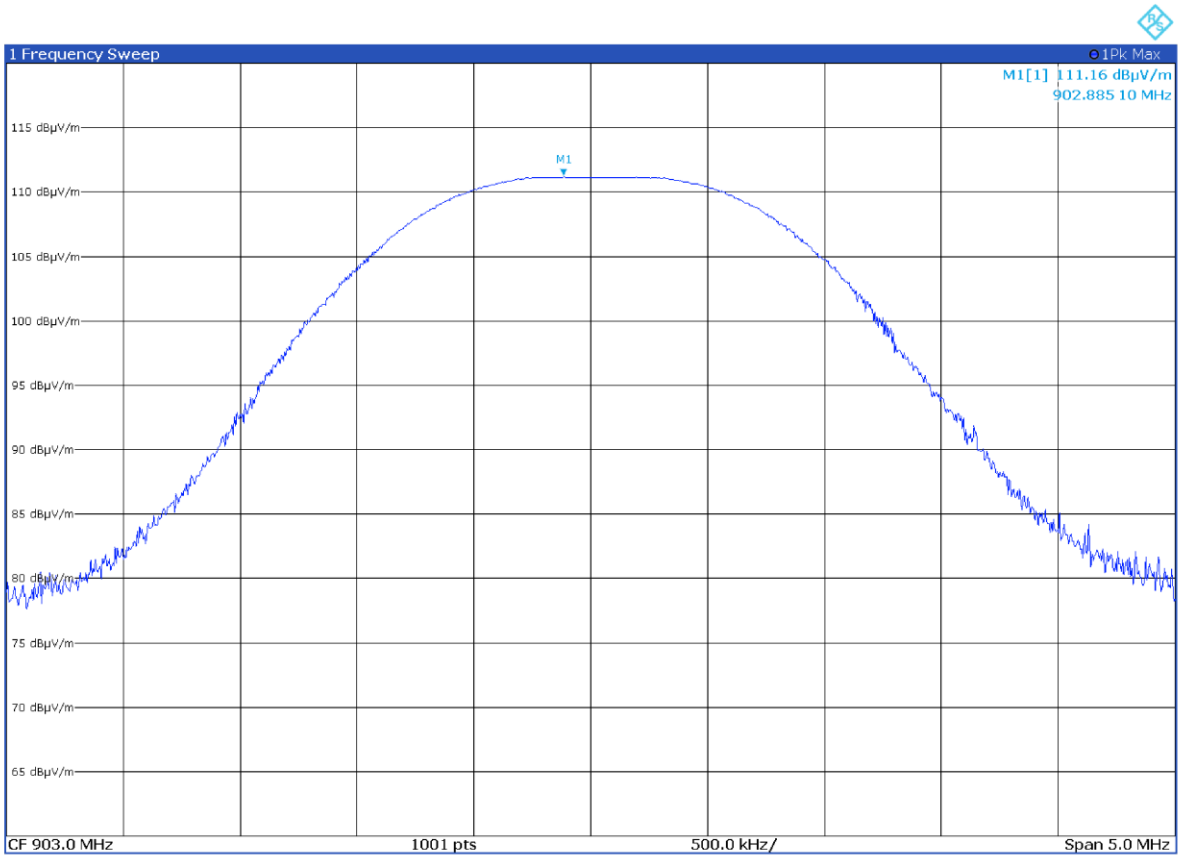


Figure 8.6-1: *Output power on low channel*

Test data, continued

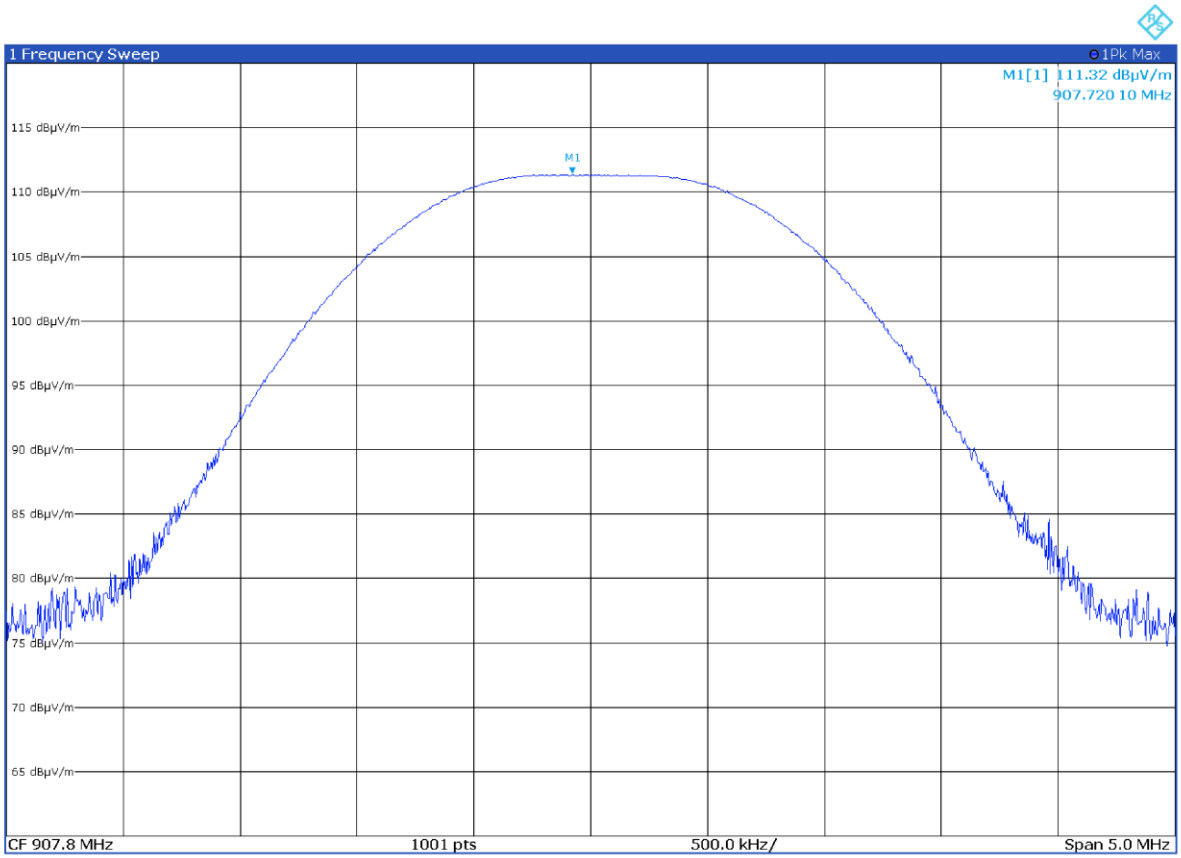


Figure 8.6-2: *Output power on mid channel*

Test data, continued

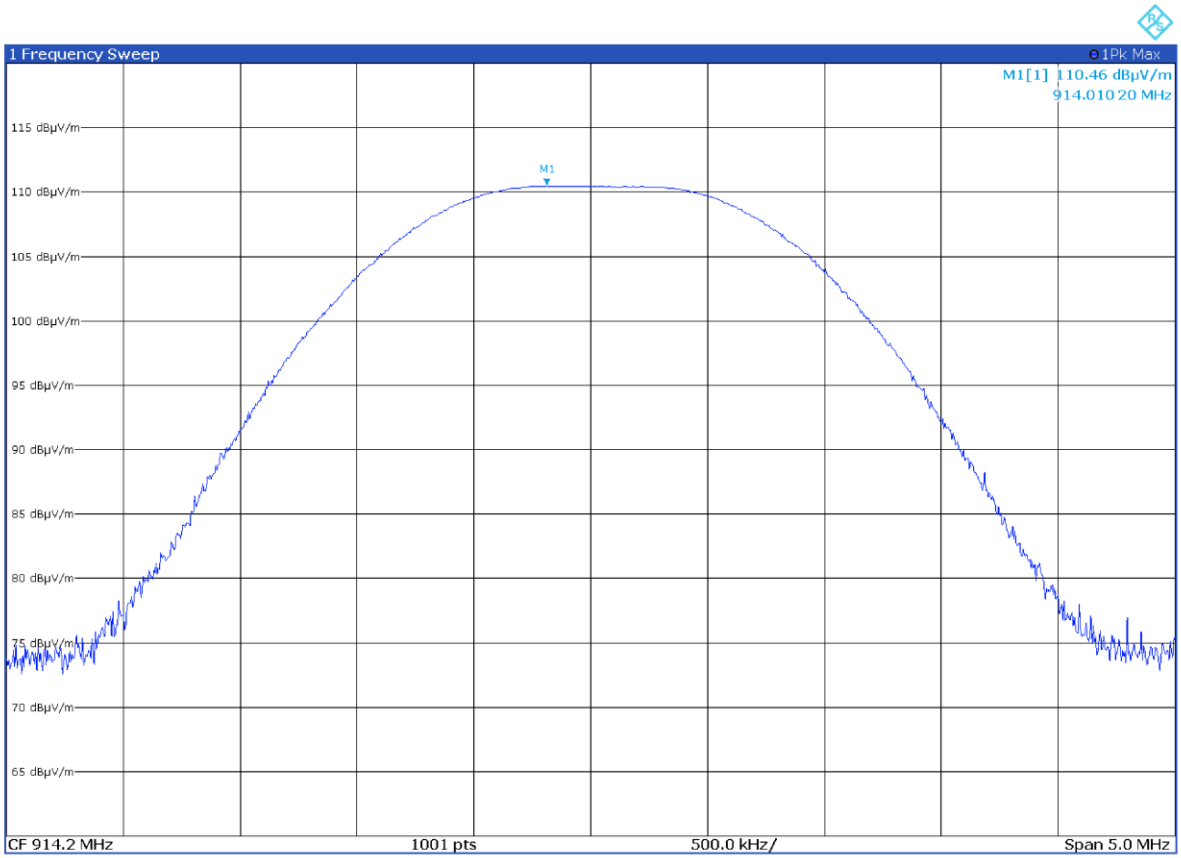


Figure 8.6-3: *Output power on high channel*

8.7 Spurious (out-of-band) unwanted emissions

8.7.1 References, definitions and limits

FCC §15.247:

(d) In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, 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)).

Table 8.7-1: *FCC §15.209 – Radiated emission limits*

Field strength of emissions			
Frequency, MHz	**µV/m**	**dBµV/m**	**Measurement distance, m**
0.009–0.490	2400/F	$67.6 - 20 \times \log_{10}(F)$	300
0.490–1.705	24000/F	$87.6 - 20 \times \log_{10}(F)$	30
1.705–30.0	30	29.5	30
30–88	100	40.0	3
88–216	150	43.5	3
216–960	200	46.0	3
above 960	500	54.0	3

Notes: In the emission table above, the tighter limit applies at the band edges.
For frequencies above 1 GHz the limit on peak RF emissions is 20 dB above the maximum permitted average emission limit applicable to the equipment under test.

Table 8.7-2: *FCC restricted frequency bands*

MHz	MHz	MHz	GHz
0.090–0.110	16.42–16.423	399.9–410	4.5–5.15
0.495–0.505	16.69475–16.69525	608–614	5.35–5.46
2.1735–2.1905	16.80425–16.80475	960–1240	7.25–7.75
4.125–4.128	25.5–25.67	1300–1427	8.025–8.5
4.17725–4.17775	37.5–38.25	1435–1626.5	9.0–9.2
4.20725–4.20775	73–74.6	1645.5–1646.5	9.3–9.5
6.215–6.218	74.8–75.2	1660–1710	10.6–12.7
6.26775–6.26825	108–121.94	1718.8–1722.2	13.25–13.4
6.31175–6.31225	123–138	2200–2300	14.47–14.5
8.291–8.294	149.9–150.05	2310–2390	15.35–16.2
8.362–8.366	156.52475–156.52525	2483.5–2500	17.7–21.4
8.37625–8.38675	156.7–156.9	2690–2900	22.01–23.12
8.41425–8.41475	162.0125–167.17	3260–3267	23.6–24.0
12.29–12.293	167.72–173.2	3332–3339	31.2–31.8
12.51975–12.52025	240–285	3345.8–3358	36.43–36.5
12.57675–12.57725	322–335.4	3600–4400	Above 38.6
13.36–13.41			

8.7.2 Test summary

Verdict	Pass		
Tested by	P. Barbieri	Test date	January 16, 2023

8.7.3 Observations, settings and special notes

- As part of the current assessment, the test range of 9 kHz to 10th harmonic has been fully considered and compared to the actual frequencies utilized within the EUT. Since the EUT contains a transmitter in the GHz range, the EUT has been deemed compliant without formal testing in the 9 kHz to 30 MHz test range, therefore formal test results (tabular data and/or plots) are not provided within this test report.
- EUT was set to transmit with a 1 % duty cycle.
- Radiated measurements were performed at a distance of 3 m.
- DTS emissions in non-restricted frequency bands test was performed as per KDB 558074, section 8.5 with reference to ANSI C63.10 subclause 11.11.
- Since fundamental power was tested using the maximum peak conducted output power procedure to demonstrate compliance, the spurious emissions limit is −20 dBc/100 kHz.
- DTS emissions in restricted frequency bands test was performed as per KDB 558074, section 8.6 with reference to ANSI C63.10 subclause 11.12.
- DTS band-edge emission measurements test was performed as per KDB 558074, section 8.7 with reference to ANSI C63.10 subclause 11.13.

Spectrum analyser settings for radiated measurements within restricted bands below 1 GHz:

Resolution bandwidth:	100 kHz
Video bandwidth:	300 kHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for peak radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	3 MHz
Detector mode:	Peak
Trace mode:	Max Hold

Spectrum analyser settings for average radiated measurements within restricted bands above 1 GHz:

Resolution bandwidth:	1 MHz
Video bandwidth:	10 Hz
Detector mode:	Peak
Trace mode:	Max Hold

8.7.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
EMI Receiver	Rohde & Schwarz	ESW44	101620
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242
Antenna 1 - 18 GHz	Schwarzbeck Mess-Elektronik	STLP9148	STLP 9148-152
Double Ridge Horn Antenna	RFSpin	DRH40	061106A40
Broadband Amplifier	Schwarzbeck Mess-Elektronik	BBV9718C	00121
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
3m Semi anechoic chamber	Comtest	SAC-3	1711-150

8.7.5 Test data

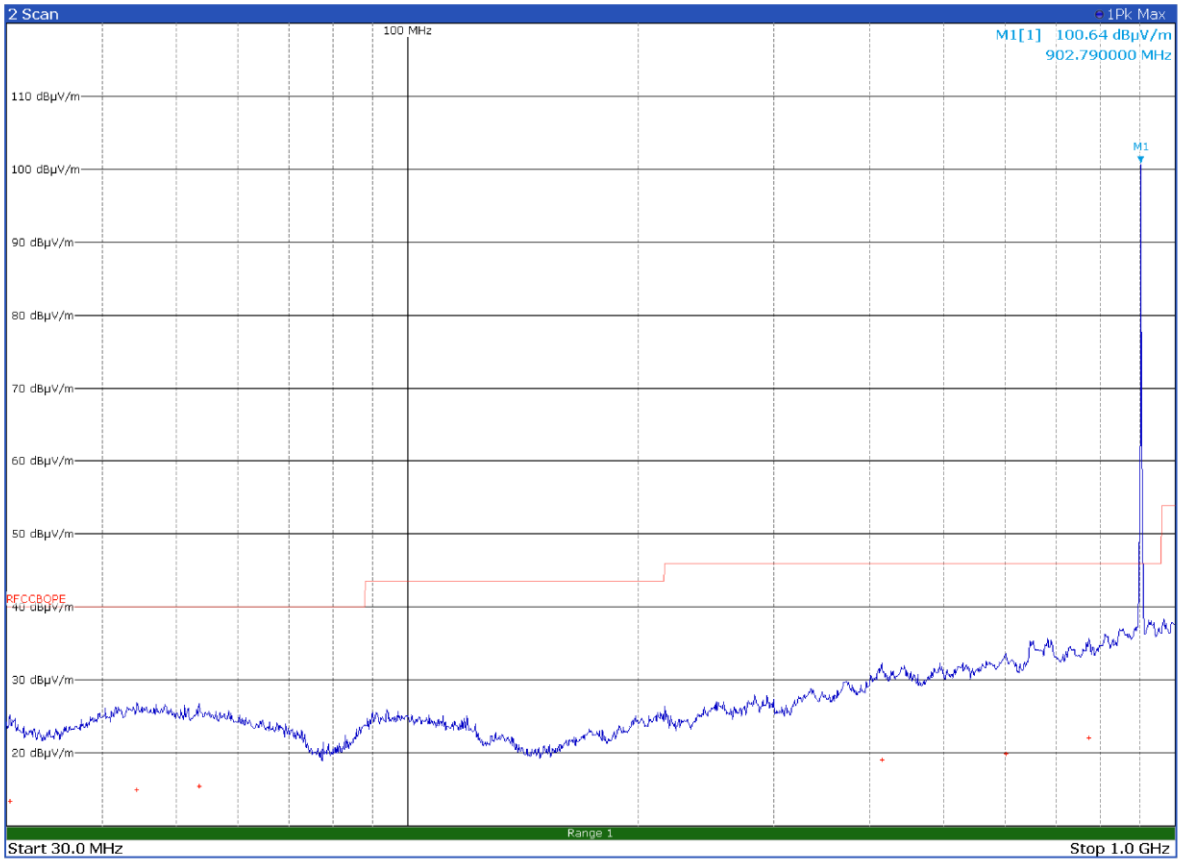


Figure 8.7-1: *Radiated spurious emissions on low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.3300	13.4	40.0	-26.6	QP
44.4000	15.0	40.0	-25.0	QP
53.4300	15.4	40.0	-24.6	QP
414.6300	19.1	46.0	-26.9	QP
601.5300	20.0	46.0	-26.0	QP
772.1700	22.1	46.0	-23.9	QP
Note: Limit exceeded by the carrier				

Test data, continued

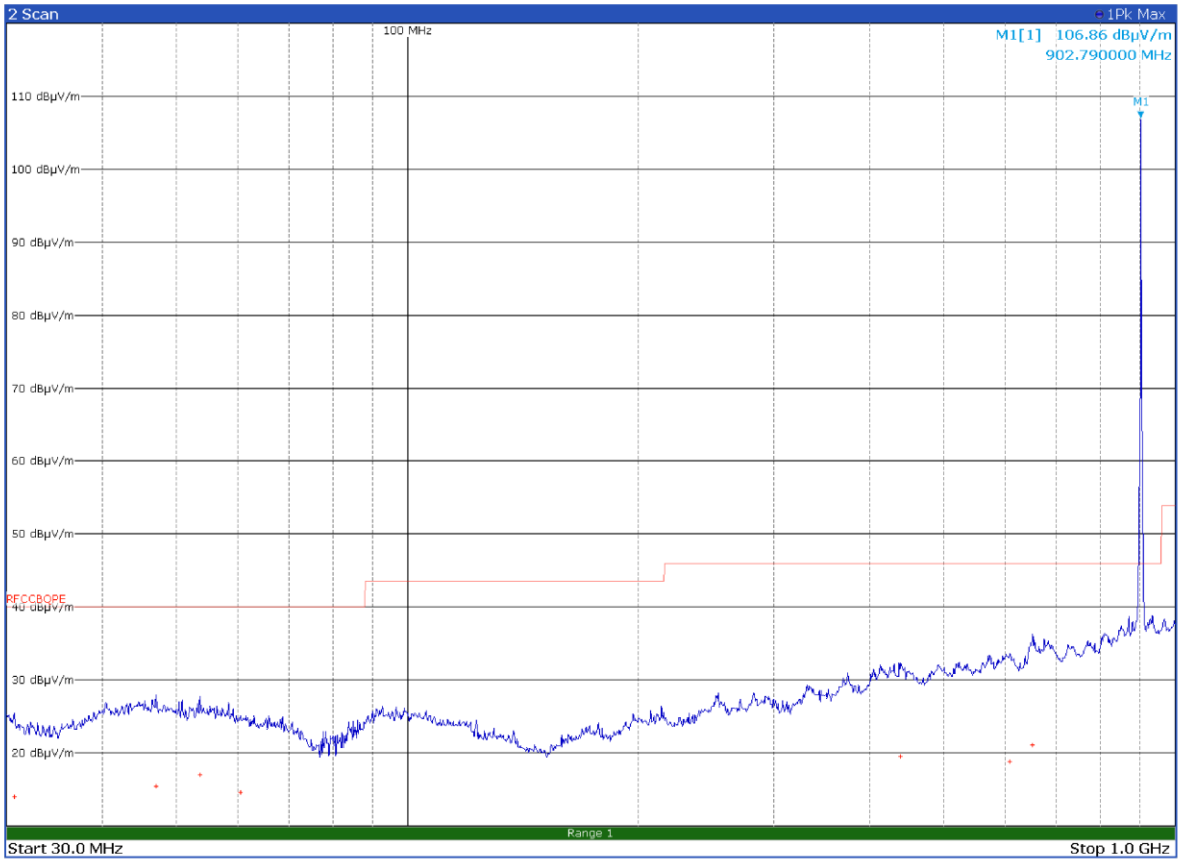


Figure 8.7-2: *Radiated spurious emissions on low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6900	14.0	40.0	-26.0	QP
46.9800	15.5	40.0	-24.5	QP
53.5800	17.1	40.0	-22.9	QP
60.6000	14.6	40.0	-25.4	QP
438.7800	19.6	46.0	-26.4	QP
609.1800	18.8	46.0	-27.2	QP
652.4100	21.1	46.0	-24.9	QP
Note: Limit exceeded by the carrier				

Test data, continued

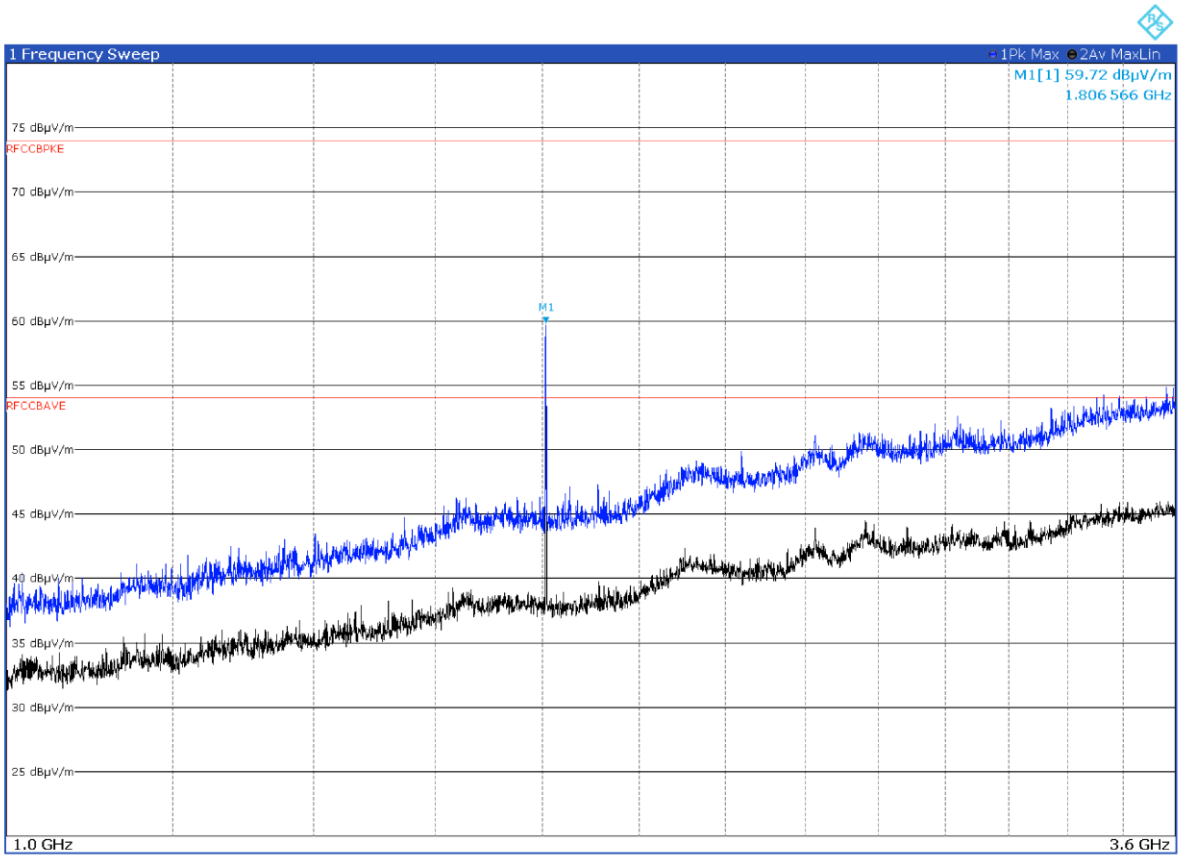


Figure 8.7-3: *Radiated spurious emissions on low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1806.6	59.7	84.6	-24.9	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 104.6 dBµV/m– 20 dBµV/m = 84.6 dBµV/m				

Test data, continued

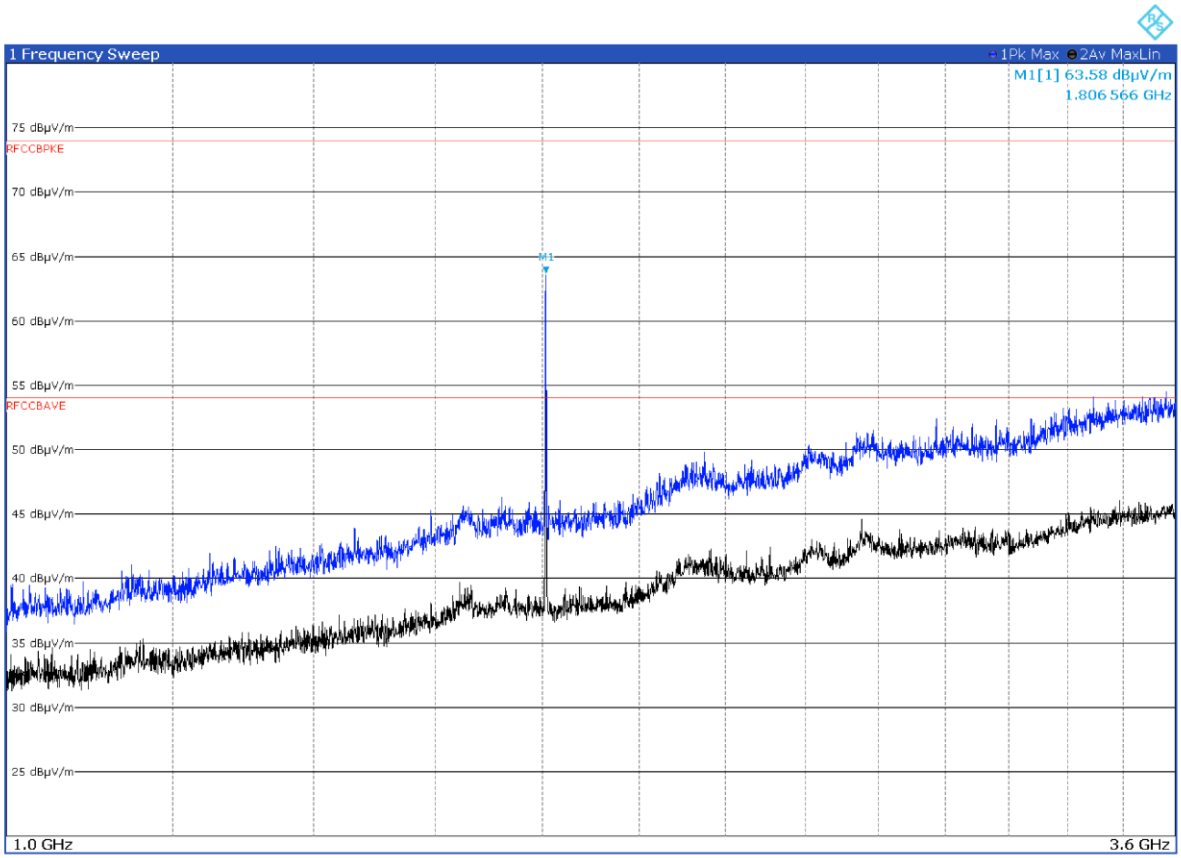


Figure 8.7-4: *Radiated spurious emissions on low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1806.6	63.6	86.9	-23.3	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 106.9 dBµV/m– 20 dBµV/m = 86.9 dBµV/m				

Test data, continued

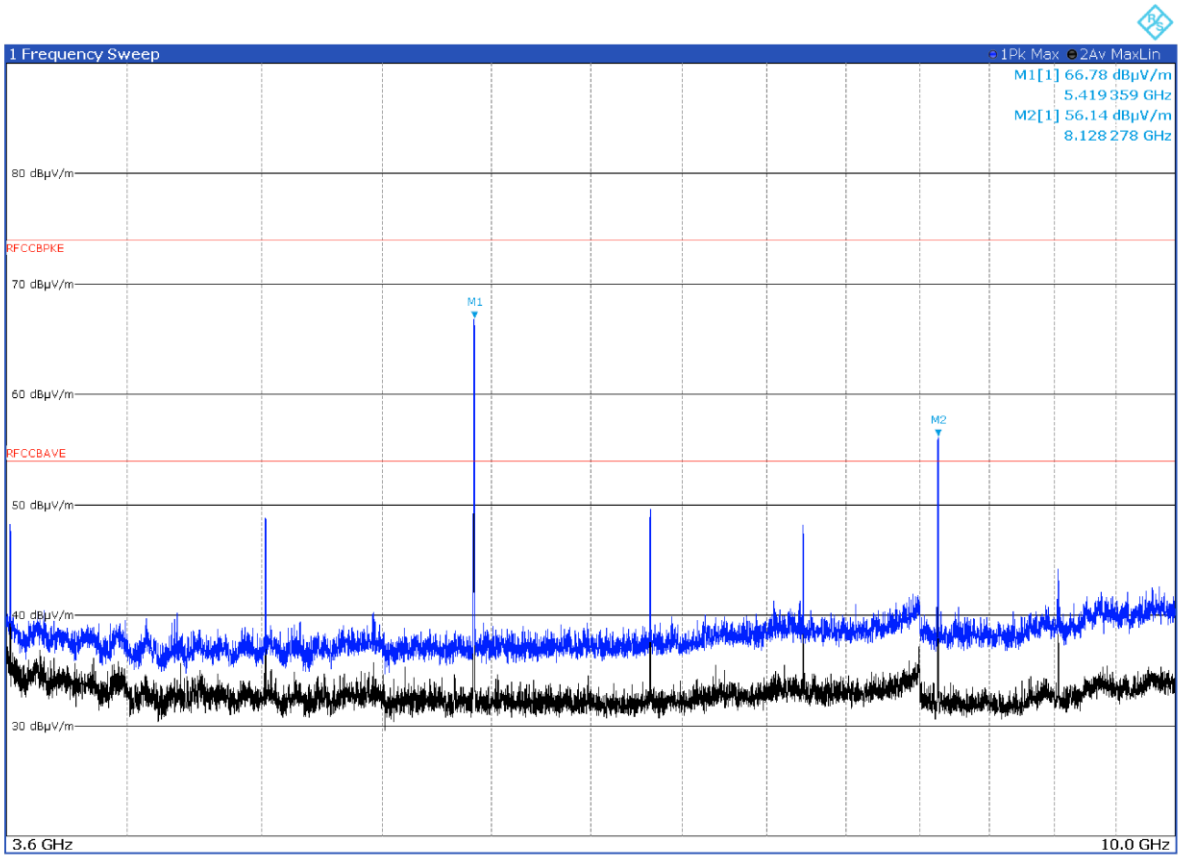


Figure 8.7-5: *Radiated spurious emissions on low channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5419.4	66.8	74.0	-7.2	PK
5419.4	53.5	54.0	-0.5	AV
8128.3	56.2	74.0	-17.8	PK
8128.3	42.9	54.0	-11.1	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor				

Test data, continued

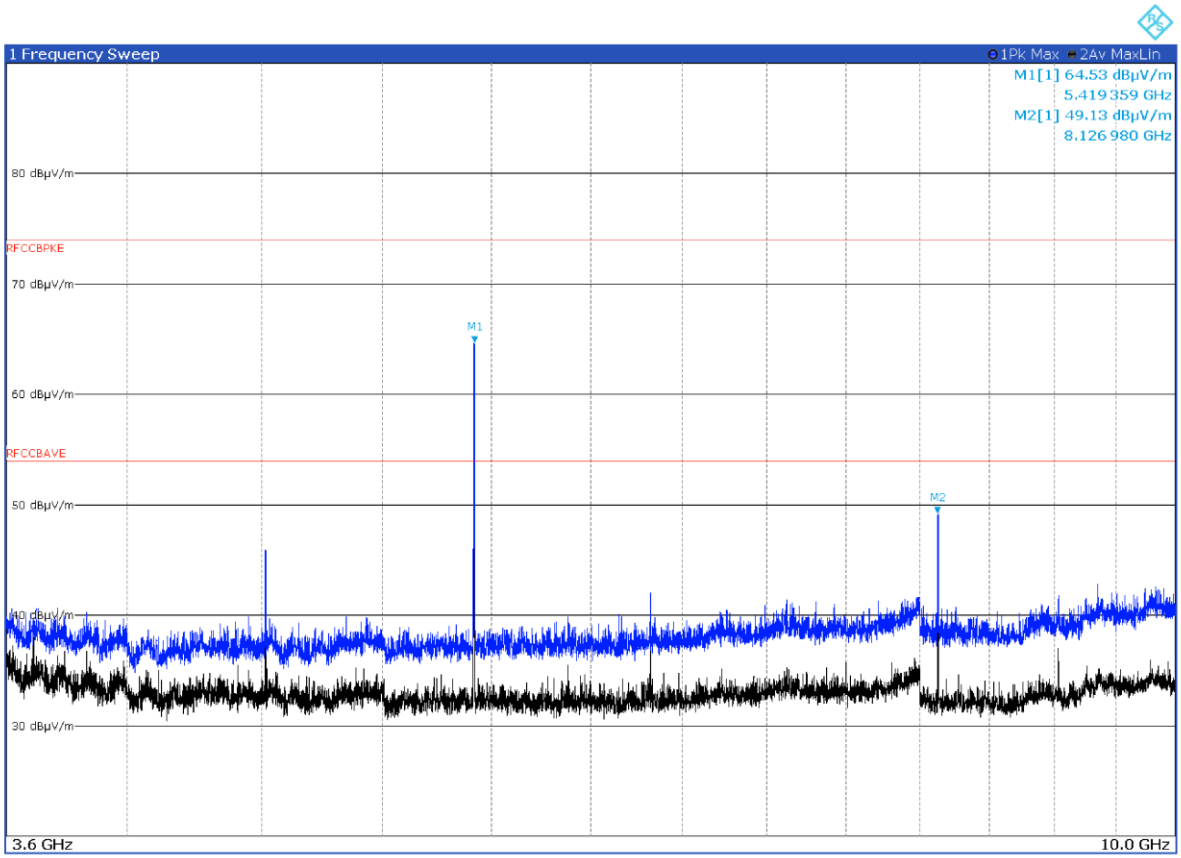


Figure 8.7-6: *Radiated spurious emissions on low channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5419.4	64.5	74.0	-9.5	PK
5419.4	51.2	54.0	-1.9	AV
8127.0	49.2	74.0	-24.5	PK
8127.0	35.9	54.0	-18.1	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor				

Test data, continued

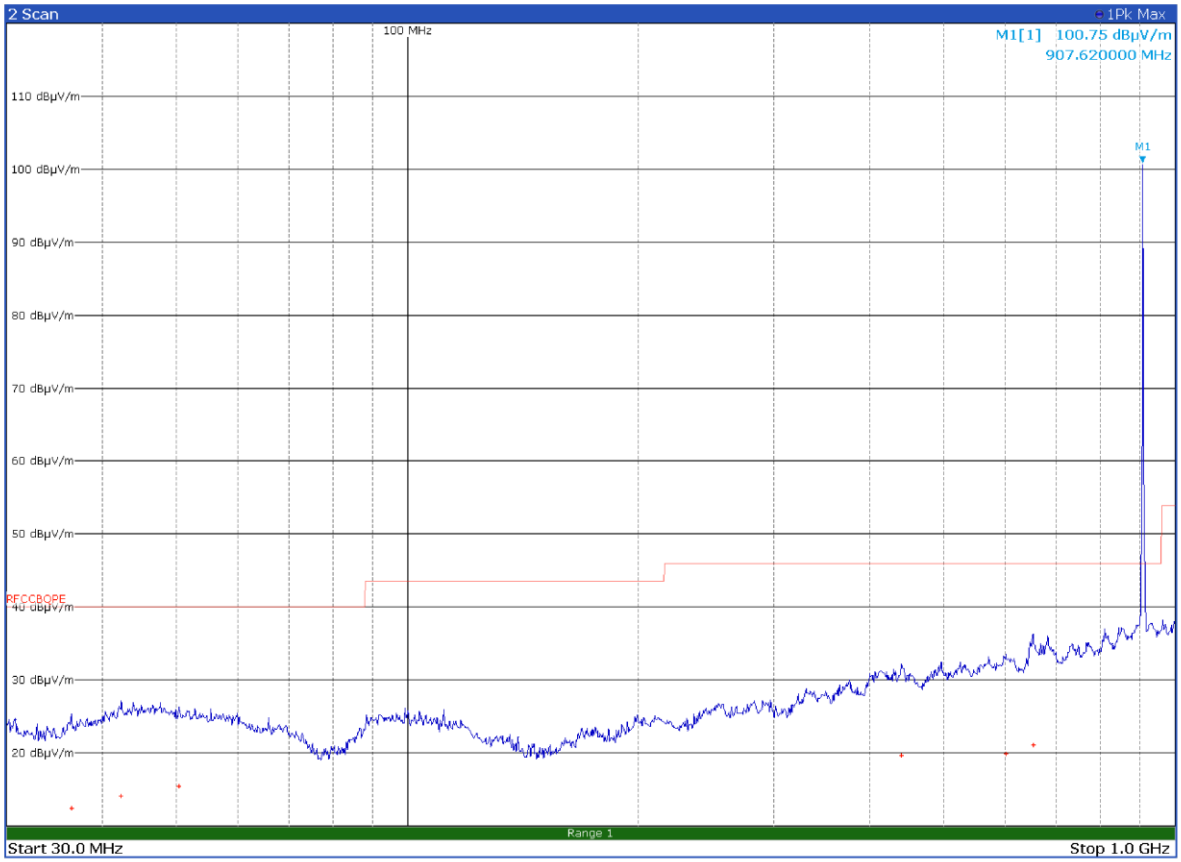


Figure 8.7-7: *Radiated spurious emissions on mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
36.4500	12.5	40.0	-27.5	QP
42.3300	14.2	40.0	-25.8	QP
50.3100	15.5	40.0	-24.5	QP
439.8300	19.7	46.0	-26.3	QP
602.3400	19.9	46.0	-26.1	QP
653.0700	21.1	46.0	-24.9	QP
Note: Limit exceeded by the carrier				

Test data, continued

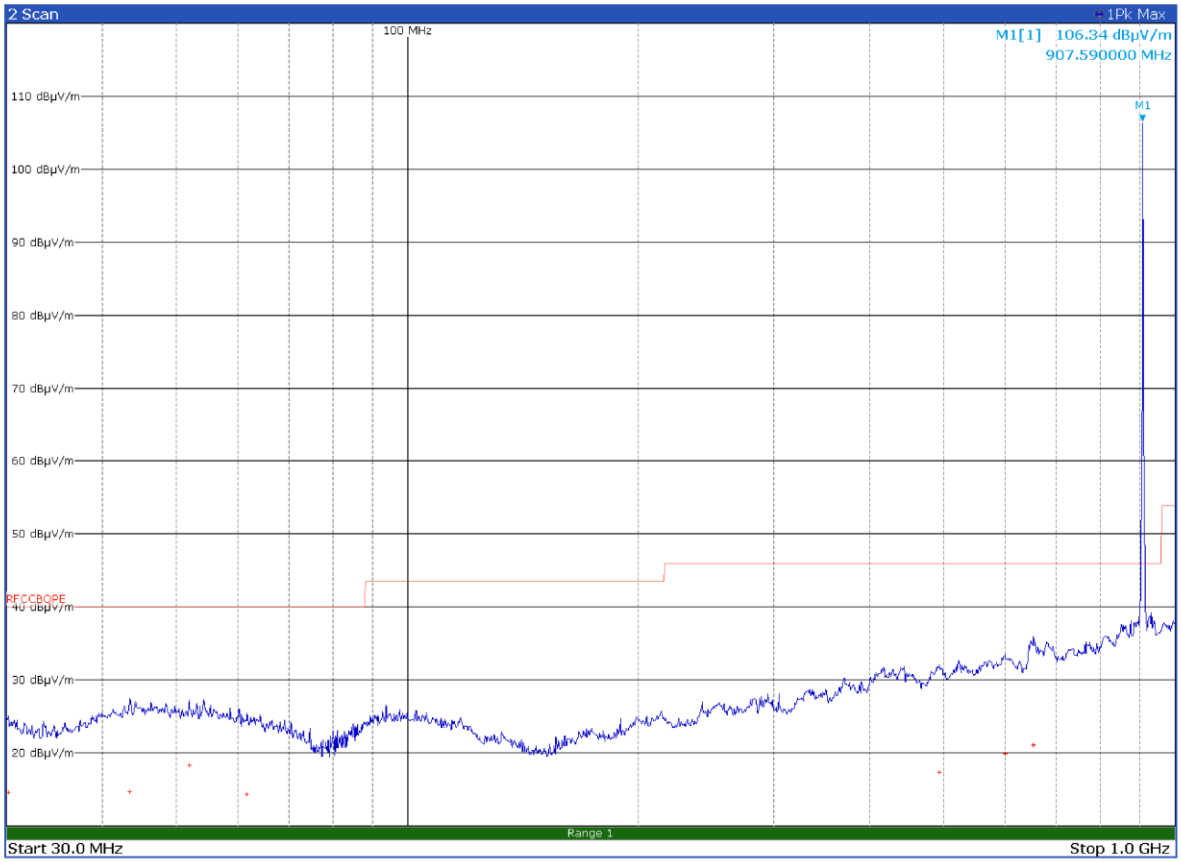


Figure 8.7-8: *Radiated spurious emissions on mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.1800	14.7	40.0	-25.3	QP
43.4400	14.8	40.0	-25.2	QP
51.9300	18.4	40.0	-21.6	QP
61.7400	14.4	40.0	-25.6	QP
492.8100	17.4	46.0	-28.6	QP
600.1800	20.0	46.0	-26.0	QP
653.8200	21.2	46.0	-24.8	QP
Note: Limit exceeded by the carrier				

Test data, continued

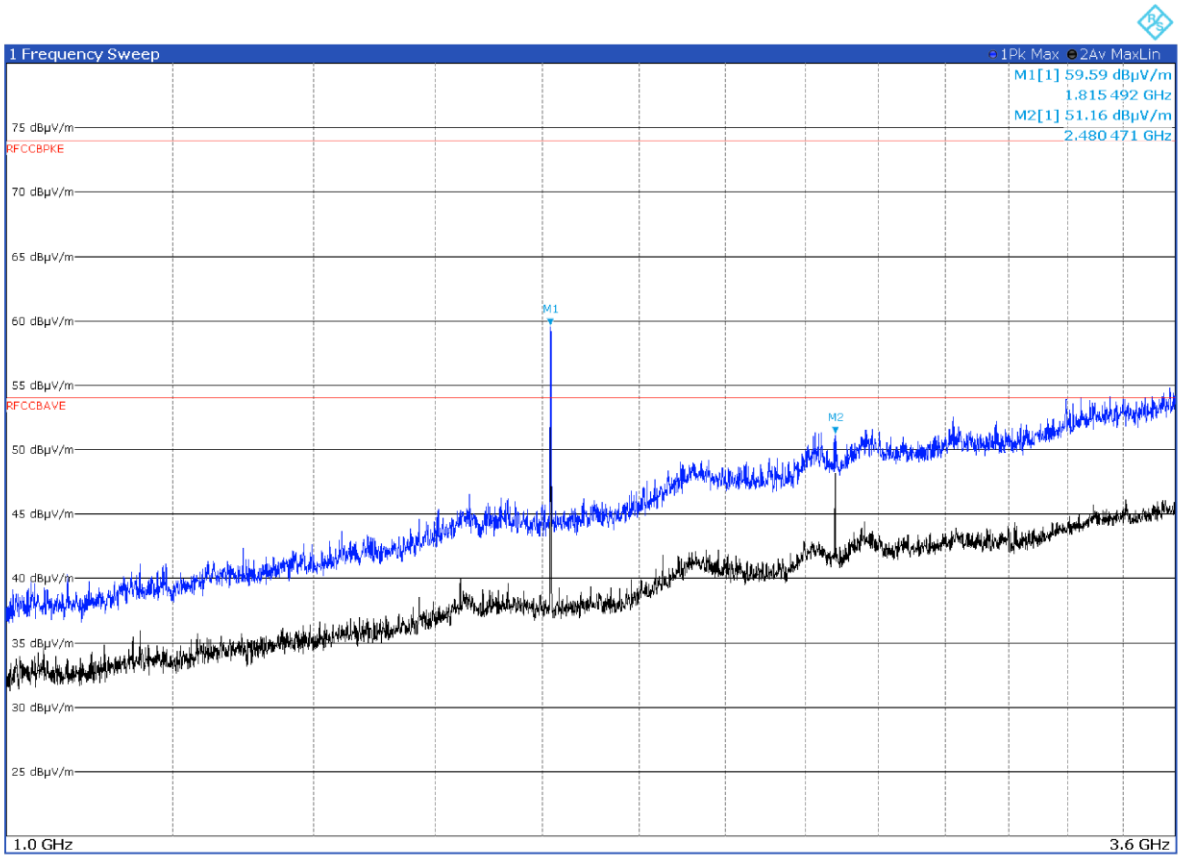


Figure 8.7-9: *Radiated spurious emissions on mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1815.5	59.6	80.7	-21.1	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 100.7 dBµV/m– 20 dBµV/m = 80.7 dBµV/m				

Test data, continued

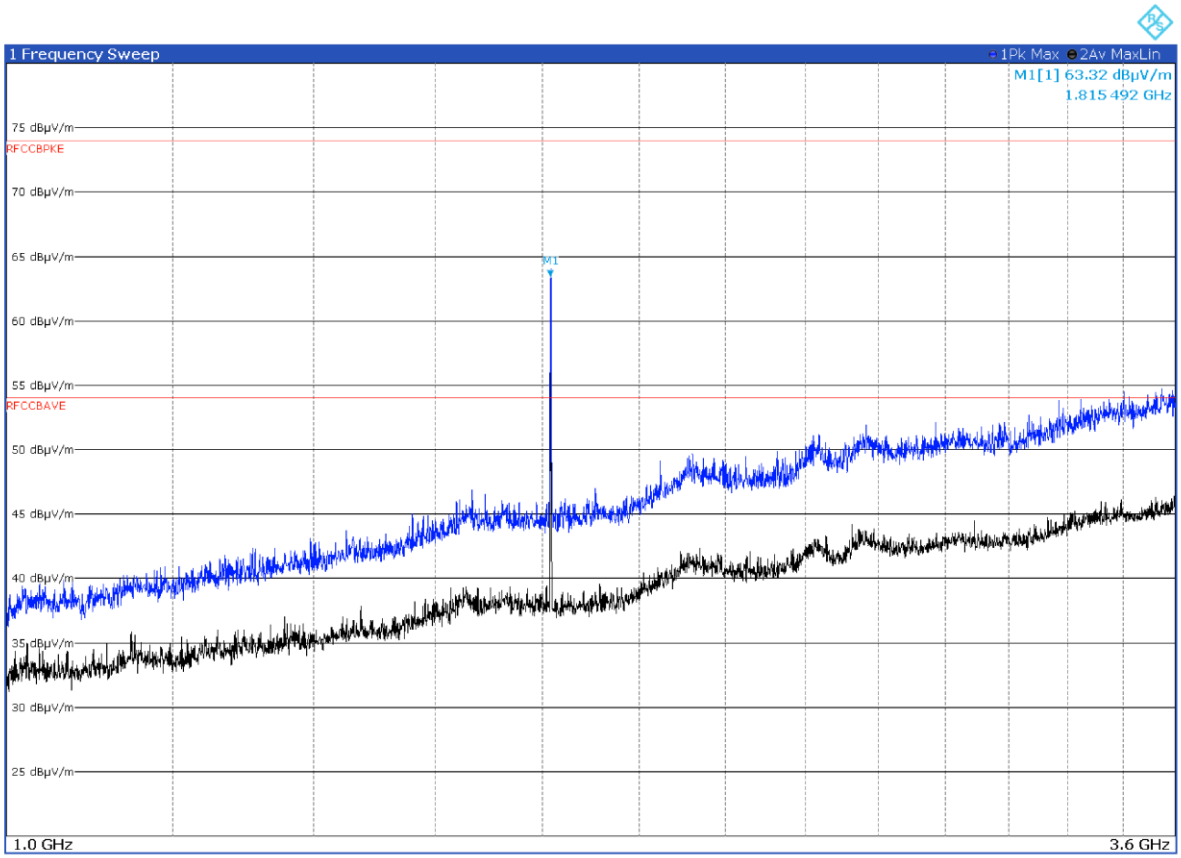


Figure 8.7-10: *Radiated spurious emissions on mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1815.5	63.3	86.3	-23.0	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 106.3 dBµV/m– 20 dBµV/m = 86.3 dBµV/m				

Test data, continued

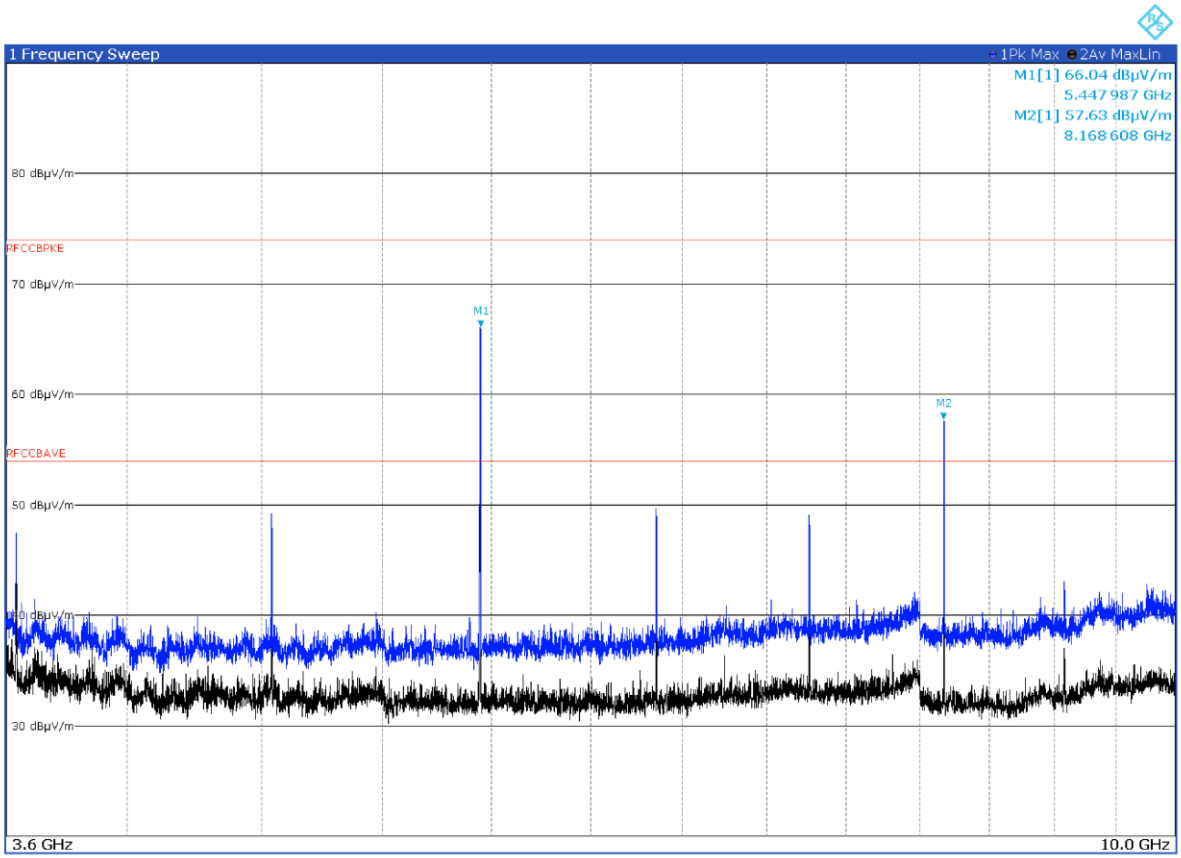


Figure 8.7-11: *Radiated spurious emissions on mid channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5448.0	66.0	74.0	-8.0	PK
5448.0	52.7	54.0	-1.3	AV
8168.6	57.6	74.0	-16.4	PK
8168.6	44.3	54.0	-9.7	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor				

Test data, continued

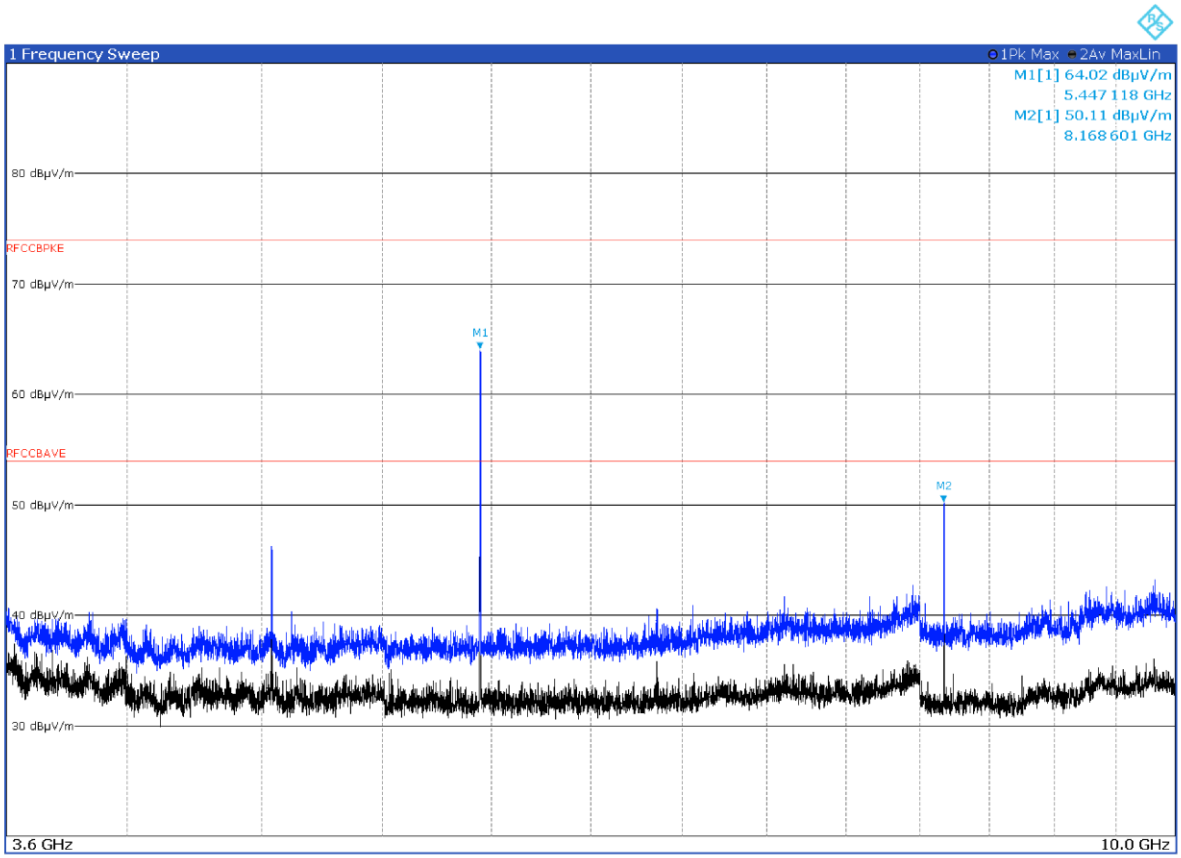


Figure 8.7-12: *Radiated spurious emissions on mid channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5447.1	64.0	74.0	-10.0	PK
5447.1	50.7	54.0	-3.3	AV
8168.6	50.1	74.0	-23.9	PK
8168.6	36.8	54.0	-17.2	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor				

Test data, continued

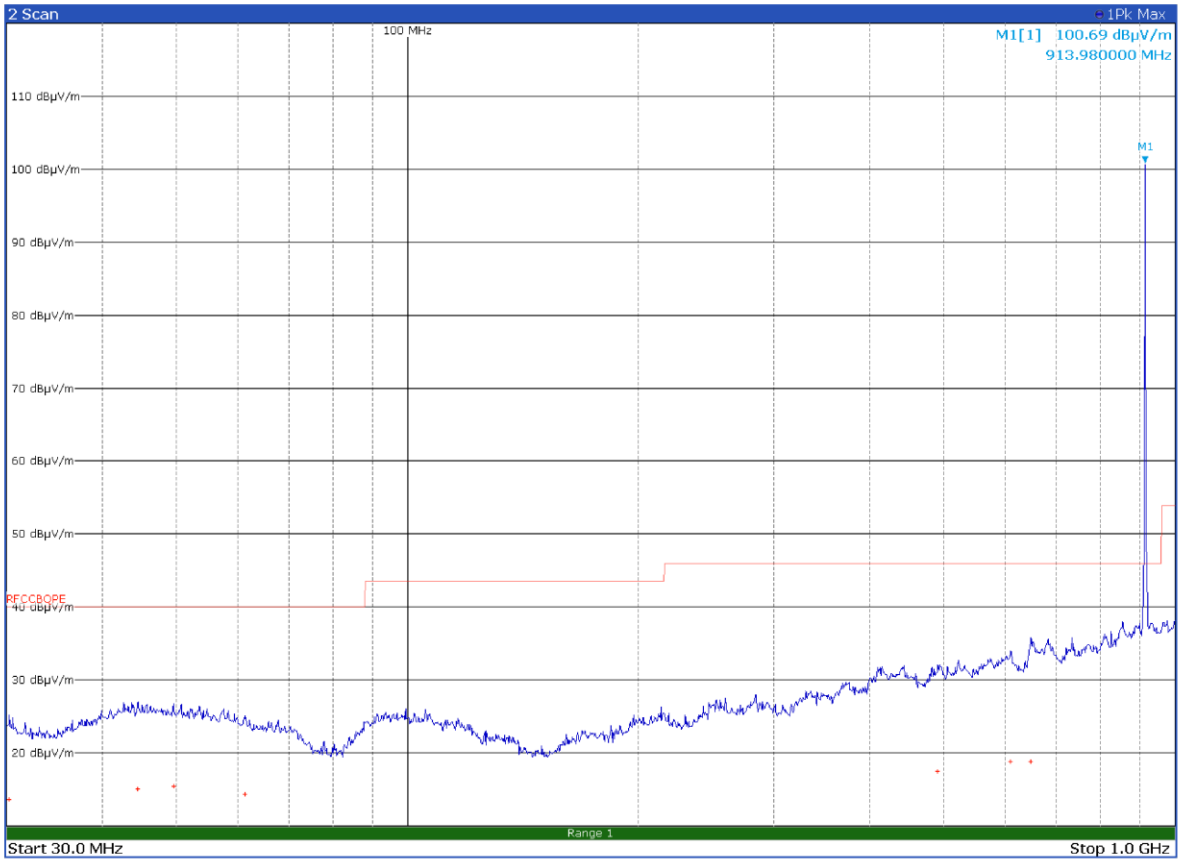


Figure 8.7-13: *Radiated spurious emissions on high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.2400	13.6	40.0	-26.4	QP
44.5200	15.1	40.0	-24.9	QP
49.5000	15.5	40.0	-24.5	QP
61.3800	14.4	40.0	-25.6	QP
490.4700	17.5	46.0	-28.5	QP
610.8000	18.8	46.0	-27.2	QP
649.0800	18.8	46.0	-27.2	QP
Note: Limit exceeded by the carrier				

Test data, continued

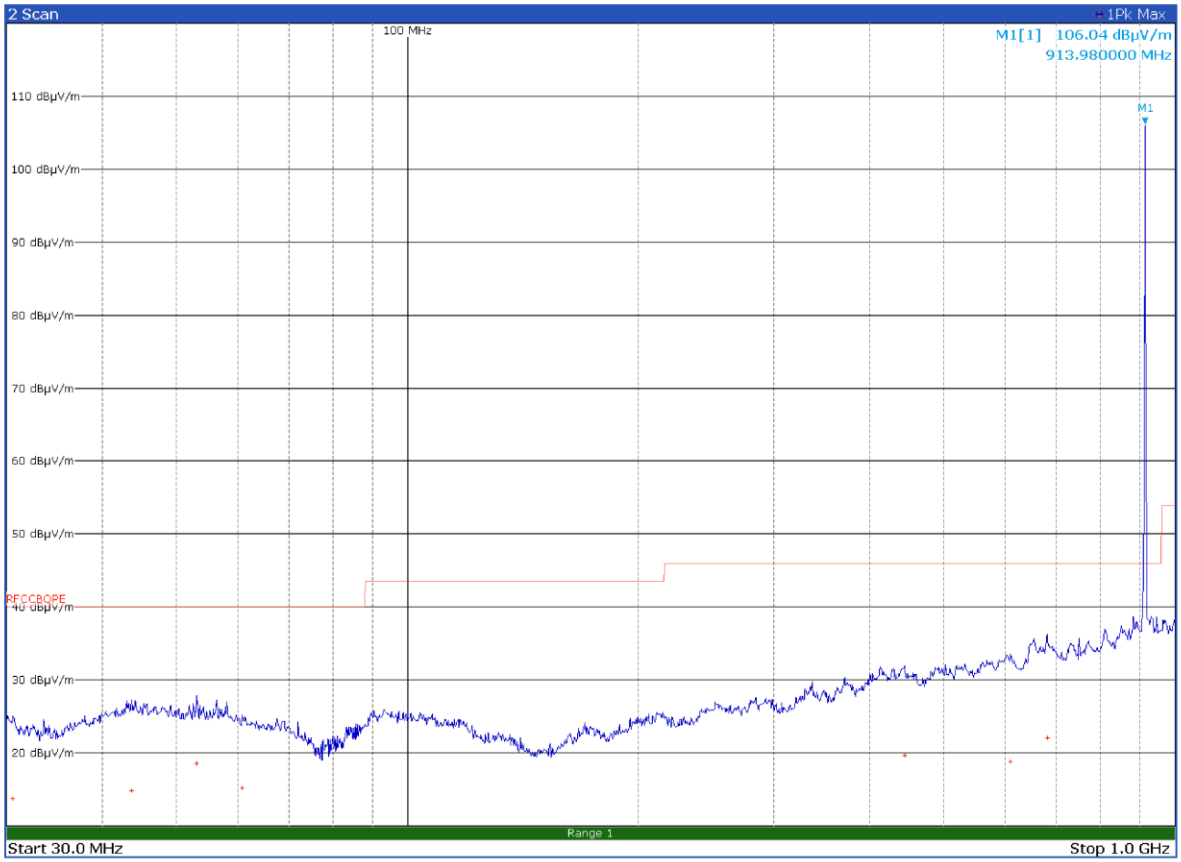


Figure 8.7-14: *Radiated spurious emissions on high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
30.6000	13.7	40.0	-26.3	QP
43.6500	14.8	40.0	-25.2	QP
53.0700	18.6	40.0	-21.4	QP
60.8400	15.2	40.0	-24.8	QP
444.0600	19.7	46.0	-26.3	QP
610.3200	18.9	46.0	-27.1	QP
681.2400	22.2	46.0	-23.8	QP
Note: Limit exceeded by the carrier				

Test data, continued

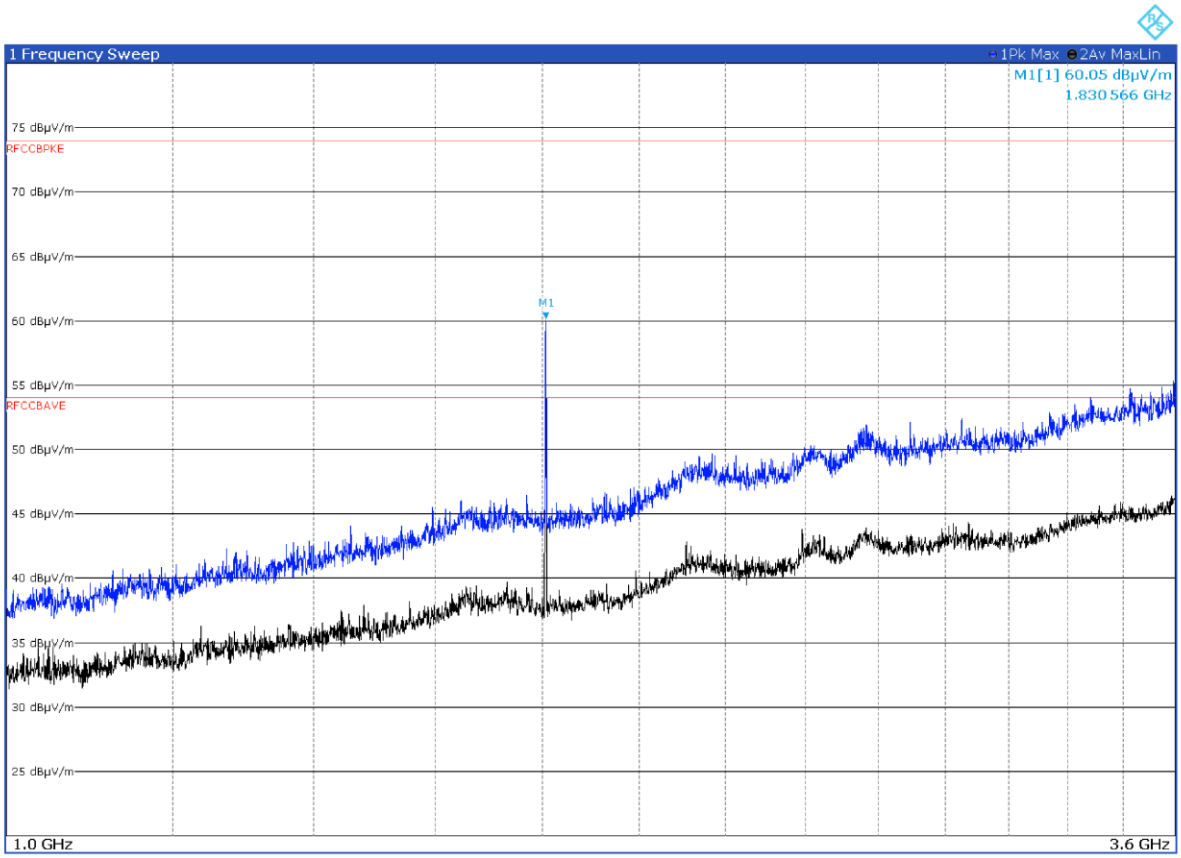


Figure 8.7-15: *Radiated spurious emissions on high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1830.6	60.1	80.7	-20.6	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 106.0 dBµV/m– 20 dBµV/m = 86.0 dBµV/m				

Test data, continued

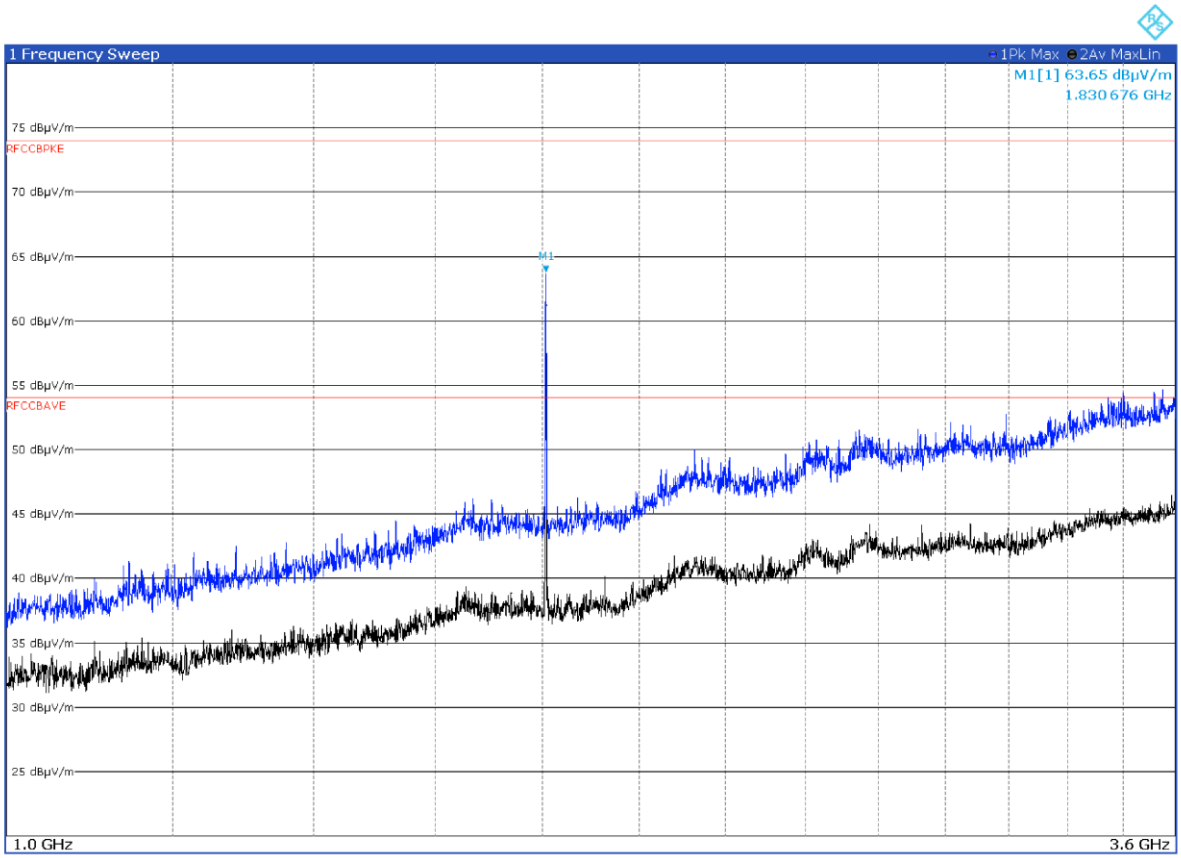


Figure 8.7-16: *Radiated spurious emissions on high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
1830.7	63.6	86.0	-22.4	PK
Note: The spurious emissions limit is −20 dBc/100 kHz = 106.0 dBµV/m– 20 dBµV/m = 86.0 dBµV/m				

Test data, continued

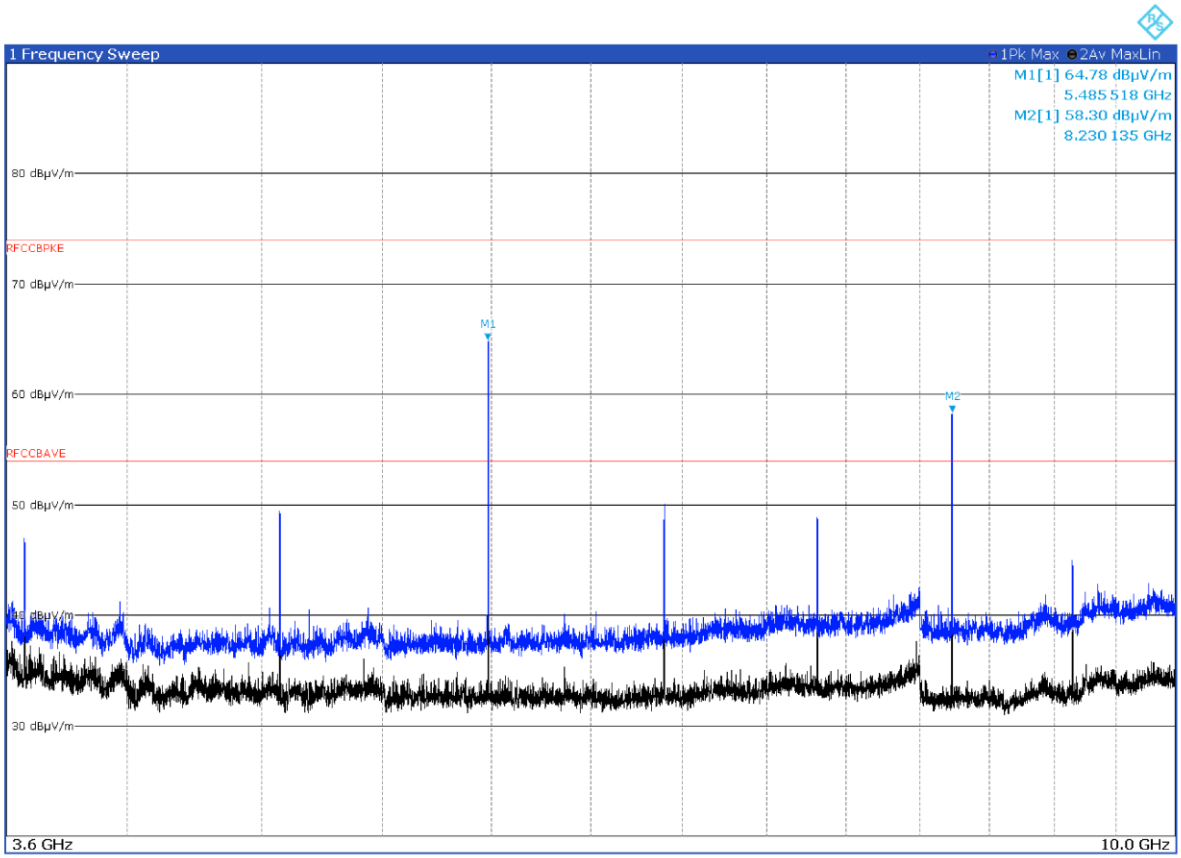


Figure 8.7-17: *Radiated spurious emissions on high channel with antenna in horizontal polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5485.5	64.8	80.7	-15.9	PK
8230.1	58.3	74.0	-15.7	PK
8230.1	45.0	54.0	-9.0	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor. The spurious emissions limit is −20 dBc/100 kHz = 100.7 dBµV/m– 20 dBµV/m = 80.7 dBµV/m				

Test data, continued

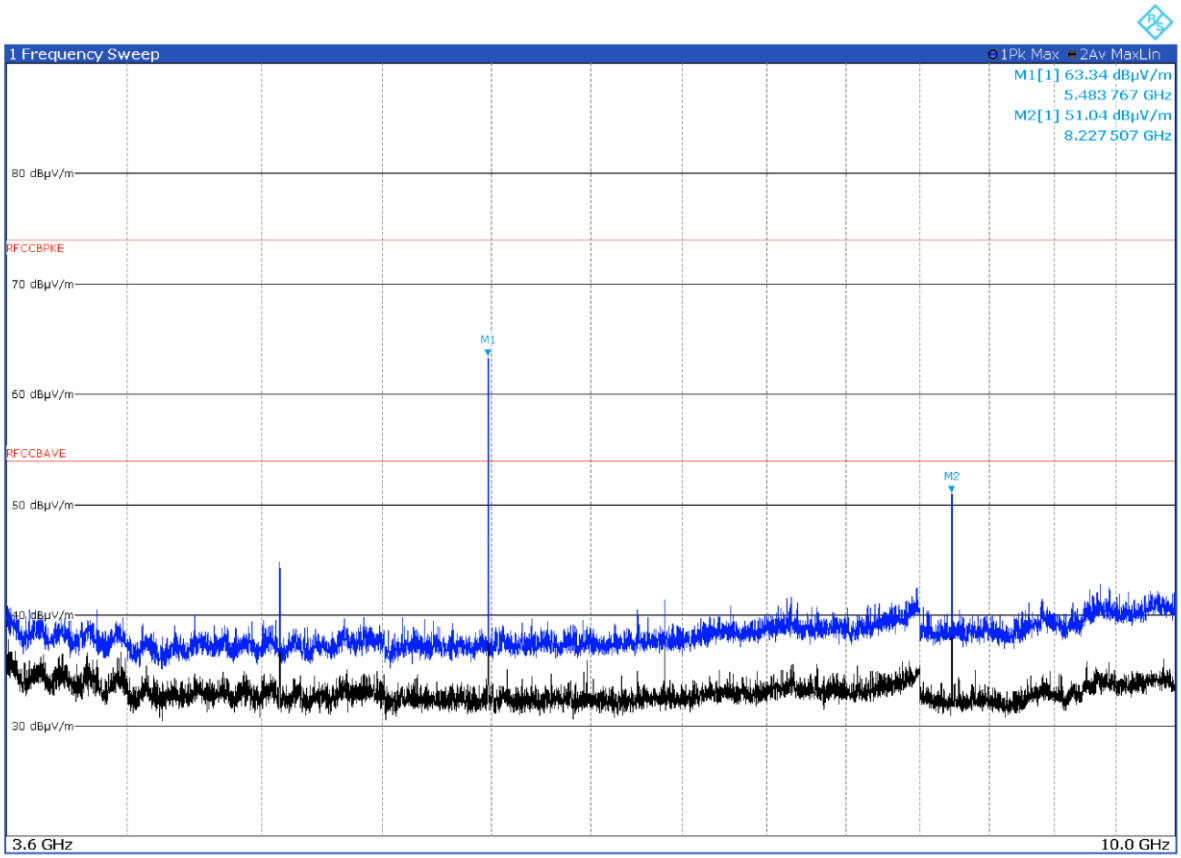


Figure 8.7-18: *Radiated spurious emissions on high channel with antenna in vertical polarization*

Frequency (MHz)	Level (dBµV/m)	Limit (dBµV/m)	Margin (dB)	Detector
5483.8	63.3	86.0	-22.7	PK
8227.5	51.0	74.0	-23.0	PK
8227.5	37.7	54.0	-16.3	AV
Note: Average value calculated with the duty cycle correction factor of -13.3 dB (see clause 5.5.1). Av value = Pk value + correction factor. The spurious emissions limit is −20 dBc/100 kHz = 106.0 dBµV/m– 20 dBµV/m = 86.0 dBµV/m				

Test data, continued

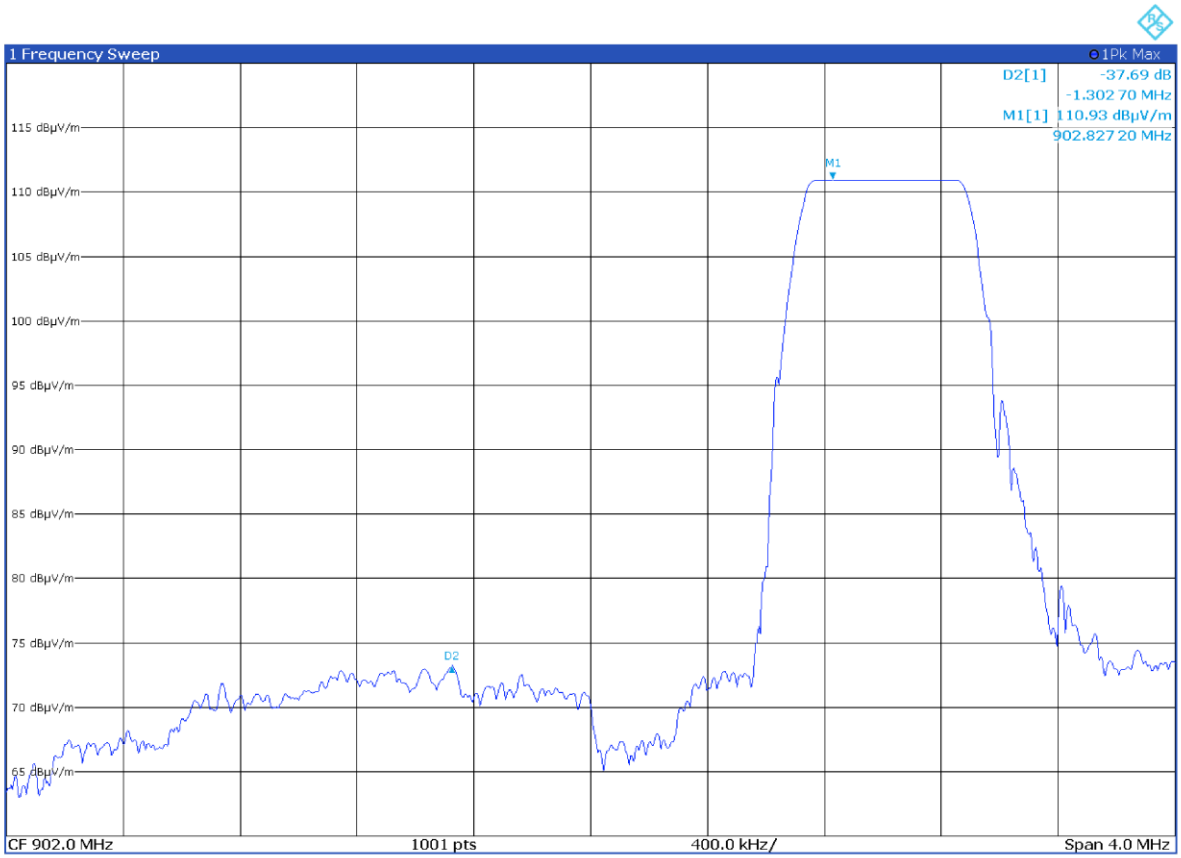


Figure 8.7-19: *Band edge spurious emissions*

8.8 Power spectral density for digitally modulated devices

8.8.1 References, definitions and limits

FCC §15.247:

(e) For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

(f) For the purposes of this section, hybrid systems are those that employ a combination of both frequency hopping and digital modulation techniques. The frequency hopping operation of the hybrid system, with the direct sequence or digital modulation operation turned-off, shall have an average time of occupancy on any frequency not to exceed 0.4 seconds within a time period in seconds equal to the number of hopping frequencies employed multiplied by 0.4. The power spectral density conducted from the intentional radiator to the antenna due to the digital modulation operation of the hybrid system, with the frequency hopping operation turned off, shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission.

8.8.2 Test summary

Verdict	Pass		
Tested by	P.Barbieri	Test date	January 16, 2023

8.8.3 Observations, settings and special notes

Power spectral density test was performed as per KDB 558074, section 8.4 with reference to ANSI C63.10 subclause 11.10.
The test was performed using method PKPSD (peak PSD).
Spectrum analyser settings:

Resolution bandwidth:	3 kHz ≤ RBW ≤ 100 kHz
Video bandwidth:	≥3 × RBW
Frequency span:	1.5 times the DTS BW (Peak)
Detector mode:	Peak
Trace mode:	Max hold

8.8.4 Test equipment used

Equipment	Manufacturer	Model no.	Asset no.
Spectrum Analyzer	Rohde & Schwarz	FSW43	101767
Antenna Trilog 25-2000 MHz	Schwarzbeck Mess-Elektronik	VULB9168	9168-242
Controller	Maturo	FCU3.0	10041
Tilt antenna mast	Maturo	TAM4.0-E	10042
Turntable	Maturo	TT4.0-5T	2.527
3m Semi anechoic chamber	Comtest	SAC-3	1711-150

8.8.5 Test data

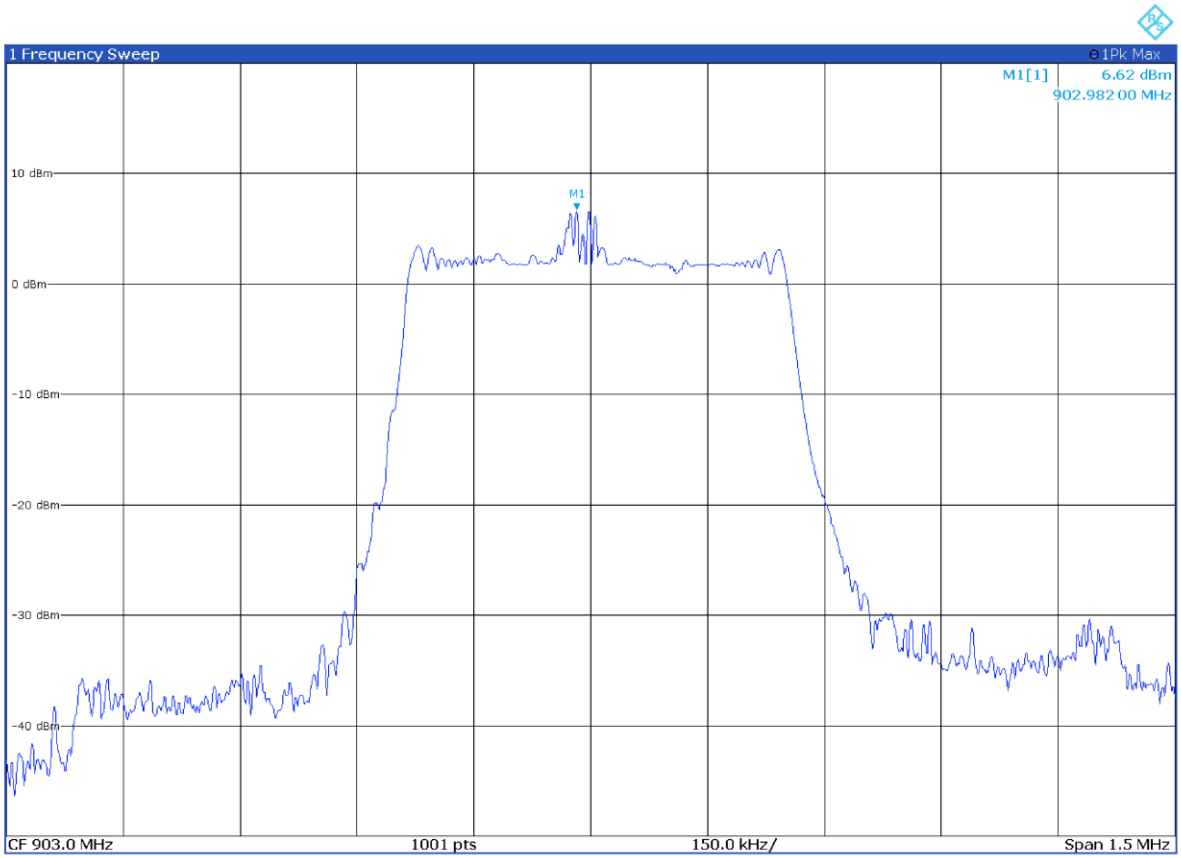


Figure 8.8-1: *PSD on low channel*

Test data, continued

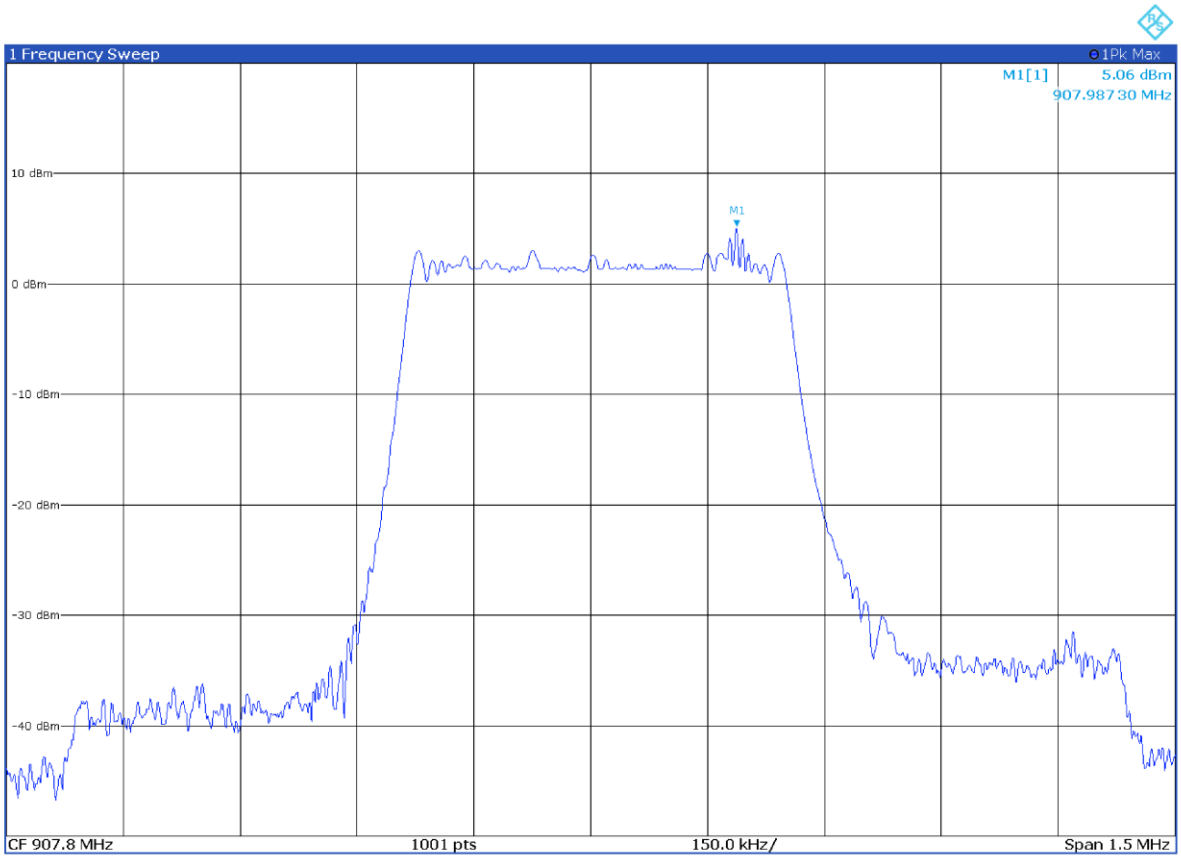


Figure 8.8-2: *PSD on mid channel*

Test data, continued

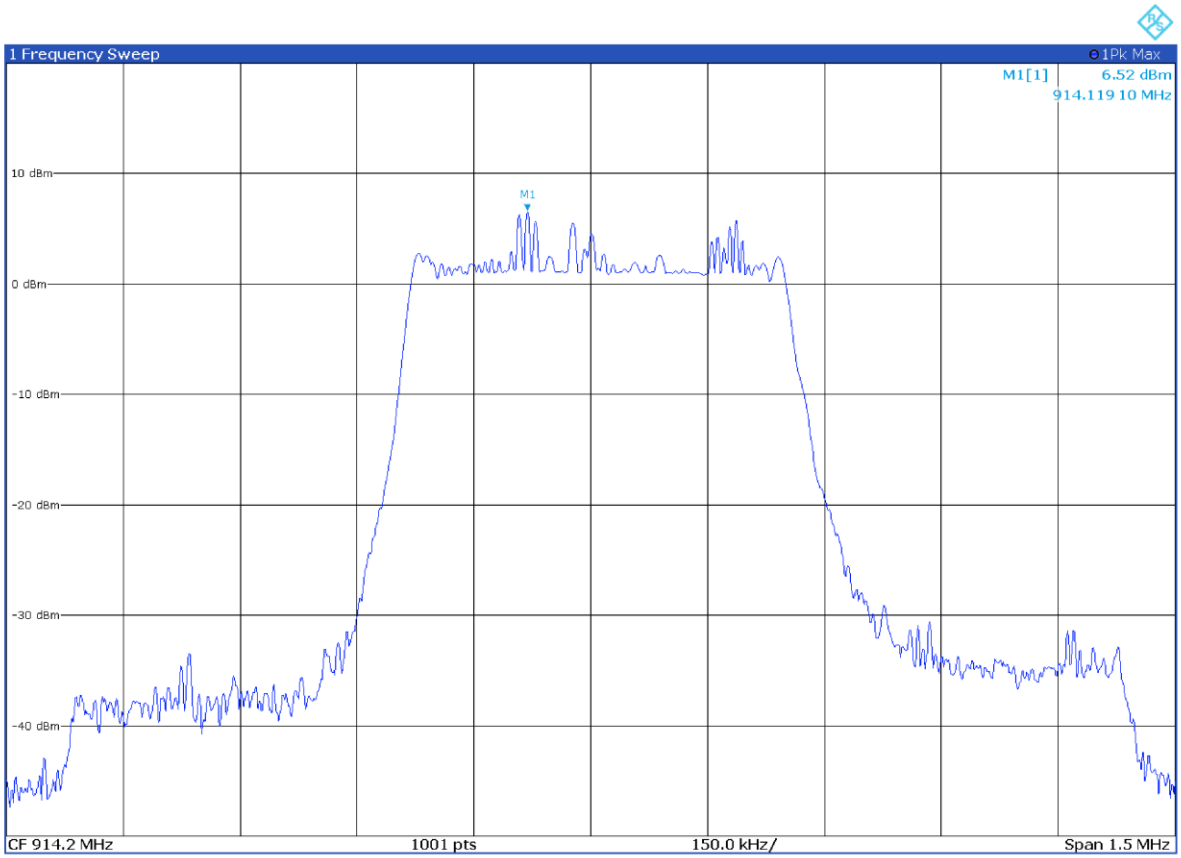


Figure 8.8-3: *PSD on high channel*

Section 9 EUT photos

9.1 Set-up photos

Figure 9.1-1: *Radiated emissions set-up for frequencies below 1 GHz*

Figure 9.1-2: *Radiated emissions set-up for frequencies above 1 GHz*

Figure 9.1-3: *Conducted emissions set-up*

9.2 External photos

Figure 9.2-1: *Front view photo*

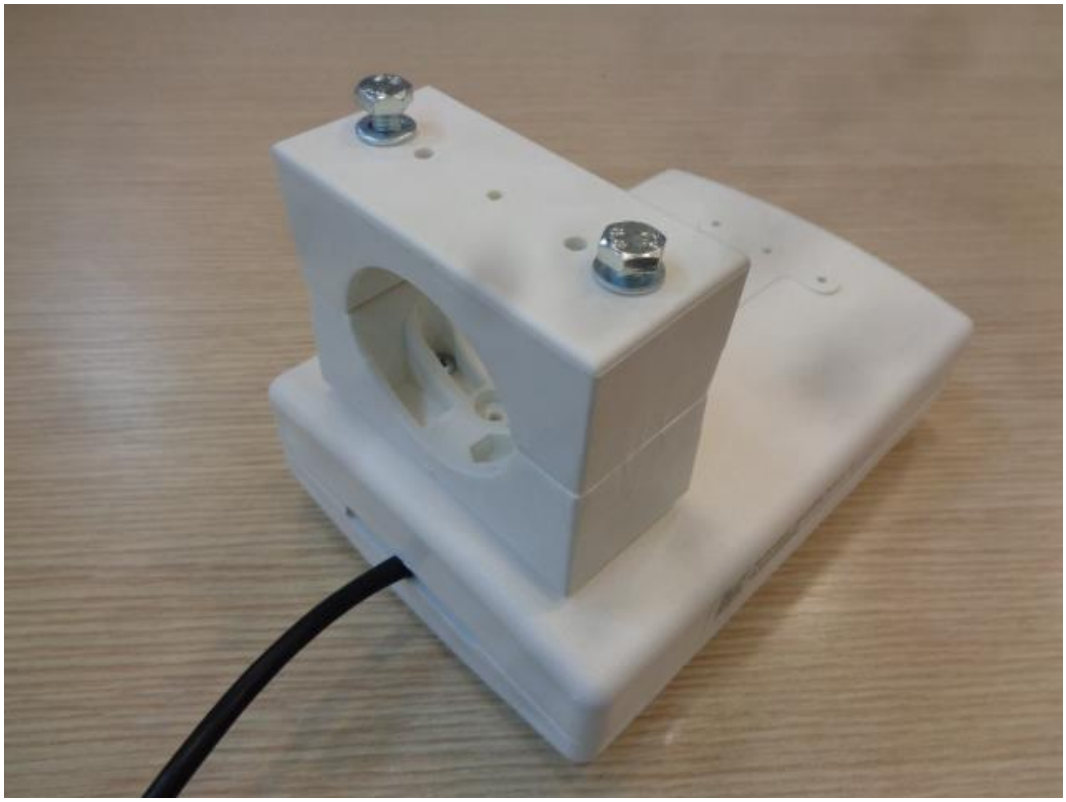


Figure 9.2-2: *Rear view photo*

Figure 9.2-3: *Internal view photo*

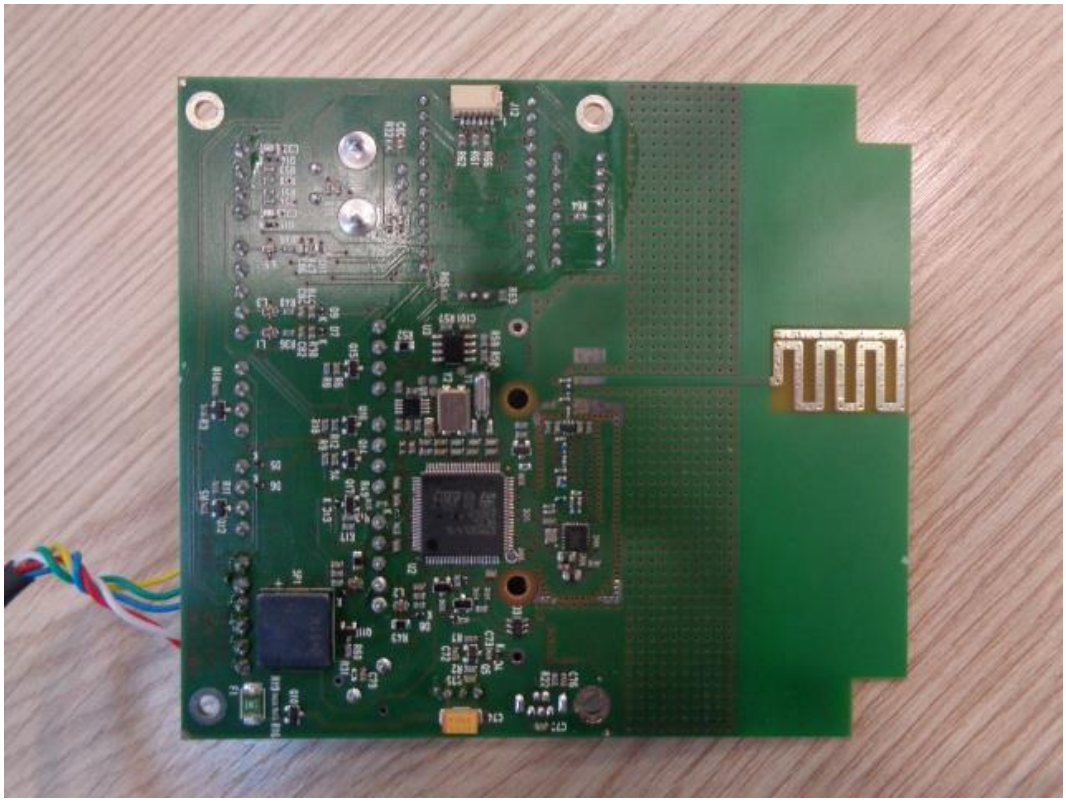


Figure 9.2-4: *Side view photo*

End of the test report