

**FCC LISTED, REGISTRATION
NUMBER: 720267**

Test report No:

**IC LISTED REGISTRATION
NUMBER IC 4621A-1**

NIE: 39838RRF.003

Test report

REFERENCE STANDARD: USA FCC Part 15.225 and Part 15.209 CANADA RSS-210, RSS-Gen

Identificación del objeto ensayado.....: Identification of item tested	ATOP MODULE 3.5G
Marca Trade	TELIT
Modelo y/o referencia tipo Model and /or type reference	OM12030/100
Other identification of the product	FCC ID: RI7OM12030-100; IC: 5131A-OM12030100
Final HW version	B2.6
Final SW version	4.6
IMEI TAC	---
Características Features	GSM and GPS functionalities combined with flexible application SW stack. Security and NFC features
Peticionario Applicant	Telit Communications S.p.A. Via Stazione di Prosecco, 5/B 34010 Sgonico. Trieste. ITALY VAT: IT03711600266 Contact person: William Watté Telephone: +32 16390866 e-mail: William.watte@telit.com
Método de ensayo solicitado, norma.....: Test method requested, standard	USA FCC Part 15.225 (10–1–13 Edition): Operation within the band 13.110 -14.010. USA FCC Part 15.209 (10–1–13 Edition): Radiated emission limits, general requirements CANADA RSS-210 Issue 8 (December 2010). CANADA RSS-Gen Issue 4 (November 2014). ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices.

Resultado.....: Summary	IN COMPLIANCE
Aprobado por (nombre / cargo y firma) Approved by (name / position & signature)	A. Llamas RF Lab. Manager
Fecha de realización Date of issue	2015-02-18
Formato de informe No. Report template No	FDT08_15

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Competences and guarantees

AT4 wireless 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.

AT4 wireless 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: IC 4621A-1.

In order to assure the traceability to other national and international laboratories, AT4 wireless has a calibration and maintenance program for its measurement equipment.

AT4 wireless 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 AT4 wireless at the time of performance of the test.

AT4 wireless 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.

IMPORTANT: No parts of this report may be reproduced or quoted out of context, in any form or by any means, except in full, without the previous written permission of AT4 wireless.

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.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of AT4 wireless.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of AT4 wireless and the Accreditation Bodies.

Uncertainty

Uncertainty (factor $k=2$) was calculated according to the AT4 wireless internal document PODT000.

Usage of samples

Samples undergoing test have been selected by: **the client**.

Sample M/01 is composed of the following elements:

Control N°	Description	Model	Serial N°	Date of reception
39838C/007	Module with external connectos	OM12030/100	---	2014-03-11
39838C/003	External GPS antenna	---	---	2014-03-07
39838C/004	External GPS antenna	---	---	2014-03-07
39838C/005	External NFC antenna board	PN532-C106	---	2014-03-07
39838C/006	External GSM antena	---	---	2014-03-07

1. Sample M/01 has undergone the test(s).

All tests indicated in appendix A.

Test sample description

The test sample consists of a 33 x 33 RF Module mounted on development board with GSM, 3G, 3.5 G, GPS receiver and NFC.

Test samples supplier

Telit Communications S.p.A.

Via Stazione di Prosecco, 5/B 34010 Sgonico. Trieste. ITALY

VAT: IT03711600266

Contact person: William Watté

Telephone: +32 16390866

e-mail: William.watte@telit.com

Testing period

The performed test started on 2014-04-21 and finished on the same day.

The tests have been performed at AT4 wireless.

Environmental conditions

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

Temperature	Min. = 21.4 °C Max. = 21.9 °C
Relative humidity	Min. = 54.8 % Max. = 56.0 %
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

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

Temperature	Min. = 20.4 °C Max. = 20.9 °C
Relative humidity	Min. = 46.0 % Max. = 47.7 %
Air pressure	Min. = 1019 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 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).

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

Temperature	Min. = 23.4 °C Max. = 24.9 °C
Relative humidity	Min. = 47.0 % Max. = 47.7 %
Air pressure	Min. = 1020 mbar Max. = 1020 mbar
Shielding effectiveness	> 100 dB
Electric insulation	> 10 kΩ
Reference resistance to earth	< 0,5 Ω

Remarks and comments

1: Used instrumentation.

Conducted Measurements

		Last Cal. date	Cal. due date
1.	Spectrum analyser Agilent PSA E4440A	2013/010	2014/10
2.	Climatic chamber HERAEUS VM 07/100	2012/10	2015/10
3.	DC power supply R&S NGPE 40/40	2011/11	2014/11

Radiated Measurements

		Last Cal. date	Cal. due date
1.	Semianechoic Absorber Lined Chamber IR 11. BS	N.A.	N.A.
2.	Control Chamber IR 12.BC	N.A.	N.A.
3.	Hybrid Bilog antenna Sunol Sciences Corporation JB6	2011/05	2014/05
4.	Antenna mast EM 1072 NMT	N.A.	N.A.
5.	Rotating table EM 1084-4. ON	N.A.	N.A.
6.	Loop antenna HP 1196 A.	2014/03	2016/03
7.	EMI Test Receiver R&S ESIB26	2013/05	2015/05
8.	Multi Device Controller EMCO 2090	N.A.	N.A.
9.	RF pre-amplifier Schaffner CPA 9232.	2011/06	2013/06
10.	Antenna tripod EMCO 11968C.	N.A.	N.A.

Testing verdicts

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

FCC PART 15 / RSS-210 PARAGRAPH	VERDICT			
	NA	P	F	NM
15.225 Subclause (a) / RSS-210 Clause A2.6 (a). Field strength of emissions within the band 13.553 MHz -13.567 MHz		P		
15.225 Subclause (b) / RSS-210 Clause A2.6 (b). Field strength of emissions within the band 13.410 - 13.553 MHz and 13.567 – 13.710 MHz		P		
15.225 Subclause (c) / RSS-210 Clause A2.6 (c). Field strength of emissions within the band 13.110 - 13.410 MHz and 13.710 – 14.010 MHz		P		
15.225 Subclause (d) / RSS-210 Clause A2.6 (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz		P		
15.225 Subclause (e) / RSS-210 Clause A2.6. Frequency tolerance of the carrier signal		P		

Appendix A – Test result

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TEST CONDITIONS

Power supply (V):

$$V_{\text{nominal}} = 3.8 \text{ Vdc}$$

Type of power supply = DC voltage from external power supply.

Type of antenna = Integral antenna

Operating Temperature Range (°C):

$$T_n = +15 \text{ to } +35$$

TEST FREQUENCIES:

Nominal Operating frequency: 13.56 MHz

CONDUCTED MEASUREMENTS

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

RADIATED MEASUREMENTS

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna (Loop antenna for the range between 9 kHz to 30 MHz and Bilog antenna for the range between 30 MHz to 200 MHz) is situated at a distance of 3 m.

For radiated emissions in the range 9 kHz to 30 MHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 40 dB per decade is used to normalize the measured data for determining compliance.

The equipment under test was set up on a non-conductive (wooden) platform one meter above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360° and in the range between 30 MHz and 200 MHz the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

In the range between 9 kHz and 30 MHz the measurements were made in the three different orientation planes of the loop antenna to determine the maximum received field.

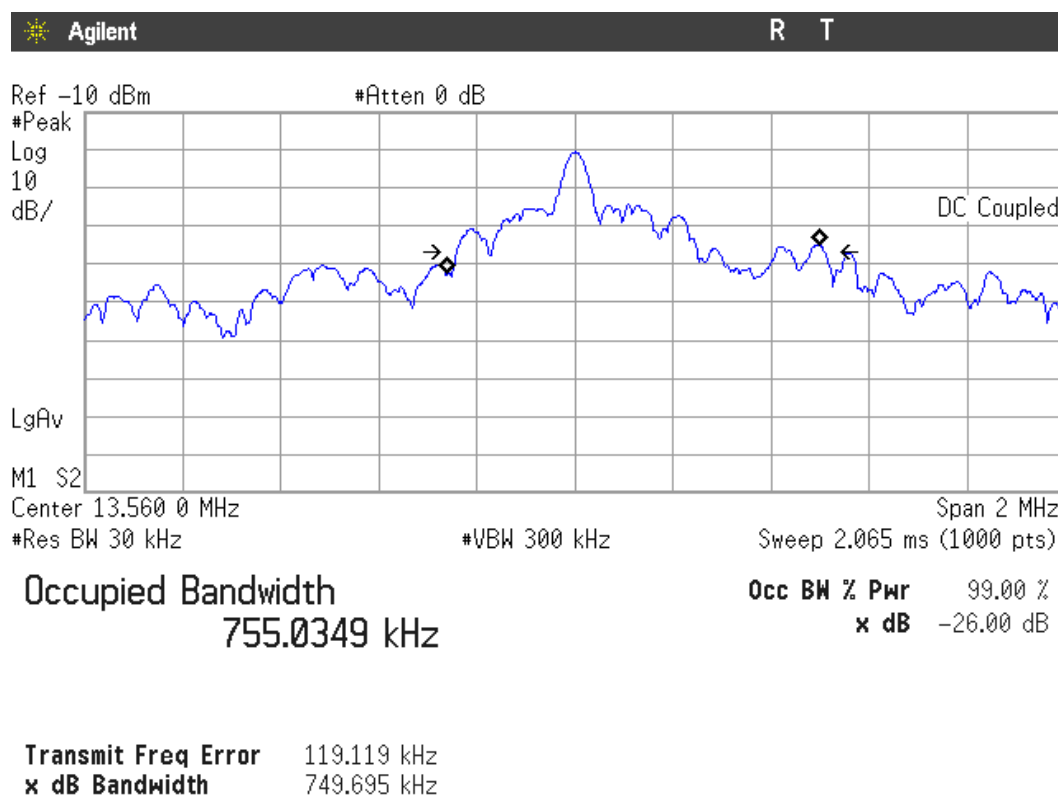
In the range between 30 MHz and 200 MHz the measurements were made in both horizontal and vertical planes of polarization.

Occupied Bandwidth

RESULTS

99 % Occupied Bandwidth and 26 dB Bandwidth (see next plot).

99% occupied bandwidth (kHz)	26 dB Spectrum bandwidth (kHz)
755.0349	749.695
Measurement uncertainty (Hz): ±16	



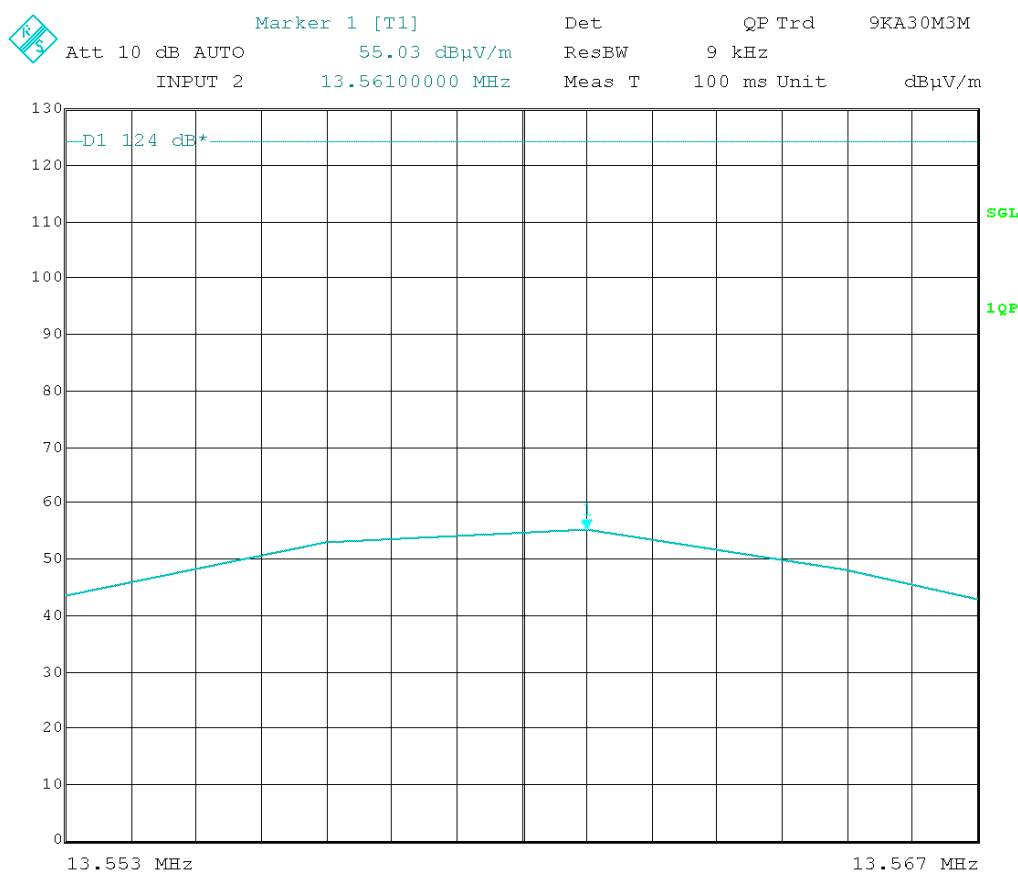
Section 15.225 Subclause (a) / RSS-210 Clause A2.6 (a). Field strength of emissions within the band 13.553 MHz -13.567 MHz

SPECIFICATION

The field strength of any emissions within the band 13.553 – 13.567 MHz shall not exceed 15,848 microvolts/meter (84 dB μ V/m) at 30 meters.

RESULTS

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dB μ V/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dB μ V/m) extrapolated to 30 m (40 dB/decade)
13.561	55.03	15.03
Measurement uncertainty (dB)	± 3.2	

Verdict: PASS

Section 15.225 Subclause (b) / RSS-210 Clause A2.6 (b). Field strength of emissions within the band 13.410 MHz -13.553 MHz and 13.567 MHz -13.710 MHz

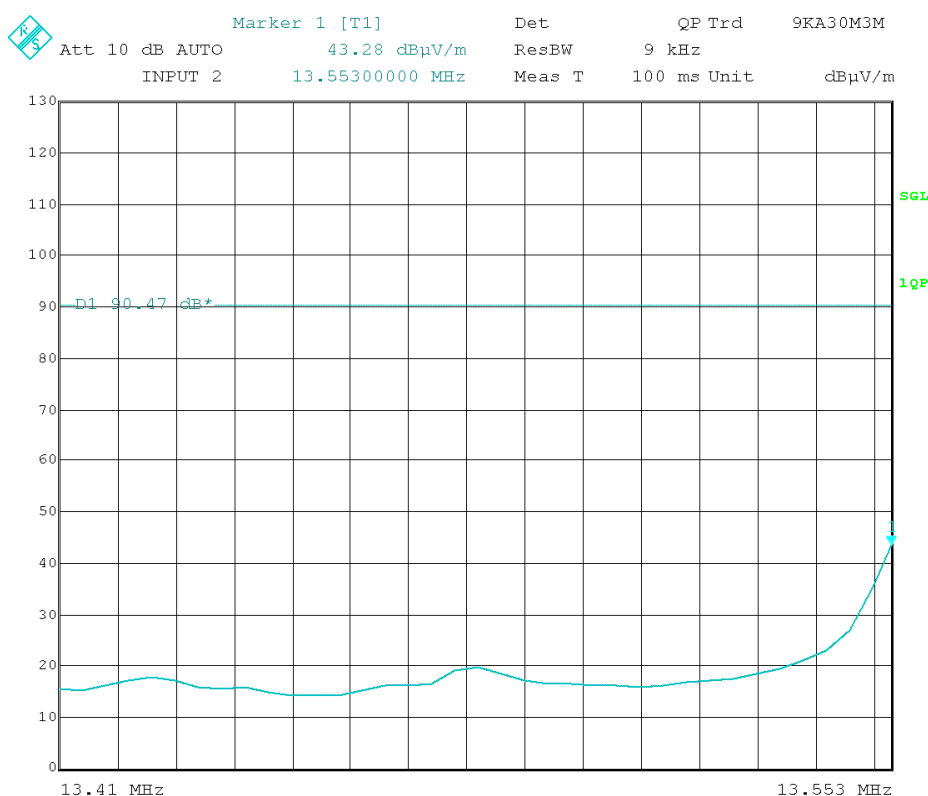
SPECIFICATION

Within the bands 13.410-13.553 MHz and 13.567-13.710 MHz, the field strength of any emissions shall not exceed 334 microvolts/meter (50.47 dB μ V/m) at 30 meters.

RESULTS

Band 13.410-13.553 MHz

Measurement distance: 3 meters



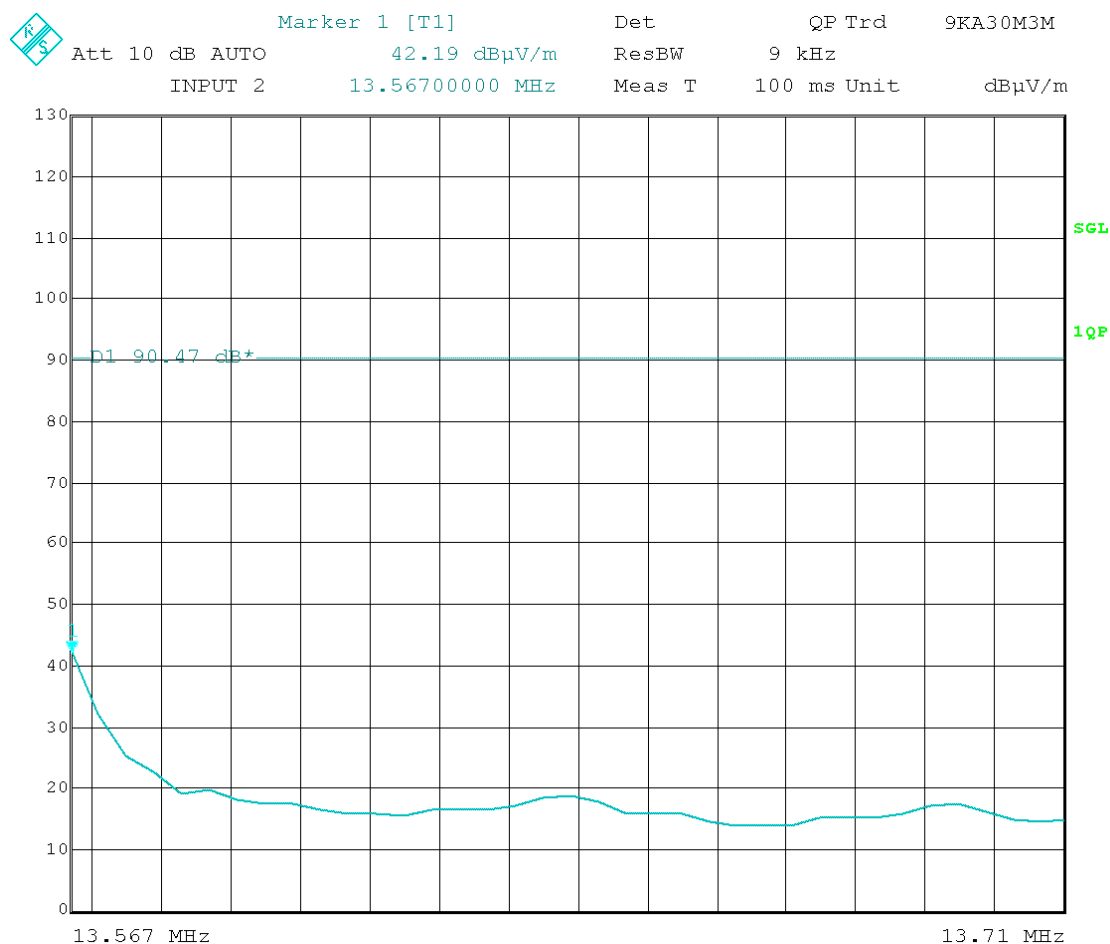
Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dB μ V/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dB μ V/m) extrapolated to 30 m (40 dB/decade)
13.553	43.28	3.28
Measurement uncertainty (dB)	± 3.2	

Verdict: PASS

Band 13.567-13.710 MHz

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBμV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBμV/m) extrapolated to 30 m (40 dB/decade)
13.567	42.19	2.19
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Section 15.225 Subclause (c) / RSS-210 Clause A2.6 (c). Field strength of emissions within the band 13.110 MHz -13.410 MHz and 13.710 MHz -14.010 MHz

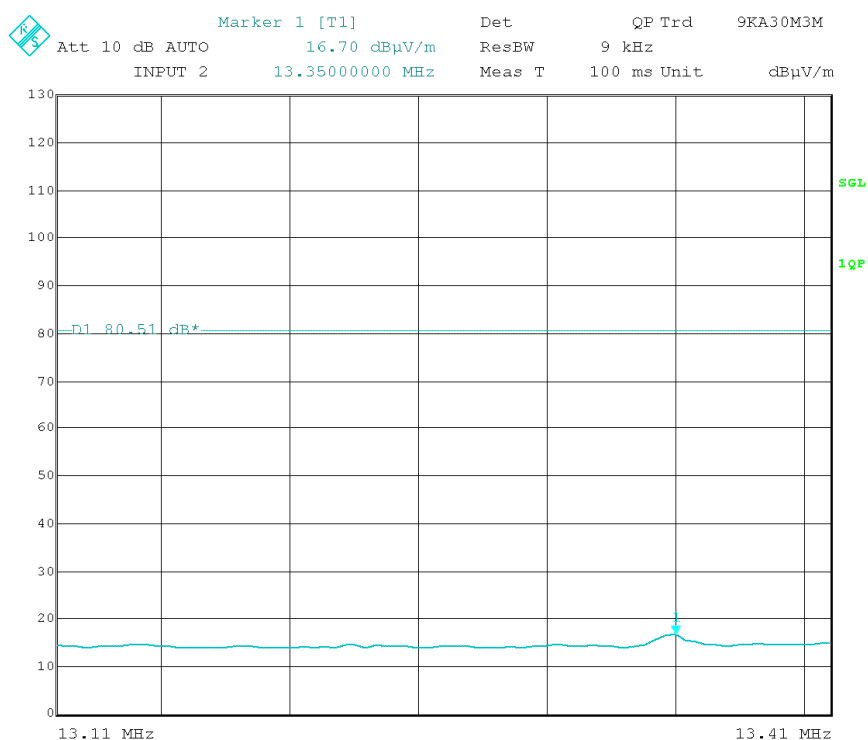
SPECIFICATION

Within the bands 13.110-13.410 MHz and 13.710-14.010 MHz, the field strength of any emissions shall not exceed 106 microvolts/meter (40.51 dB μ V/m) at 30 meters.

RESULTS

Band 13.110-13.410 MHz

Measurement distance: 3 meters



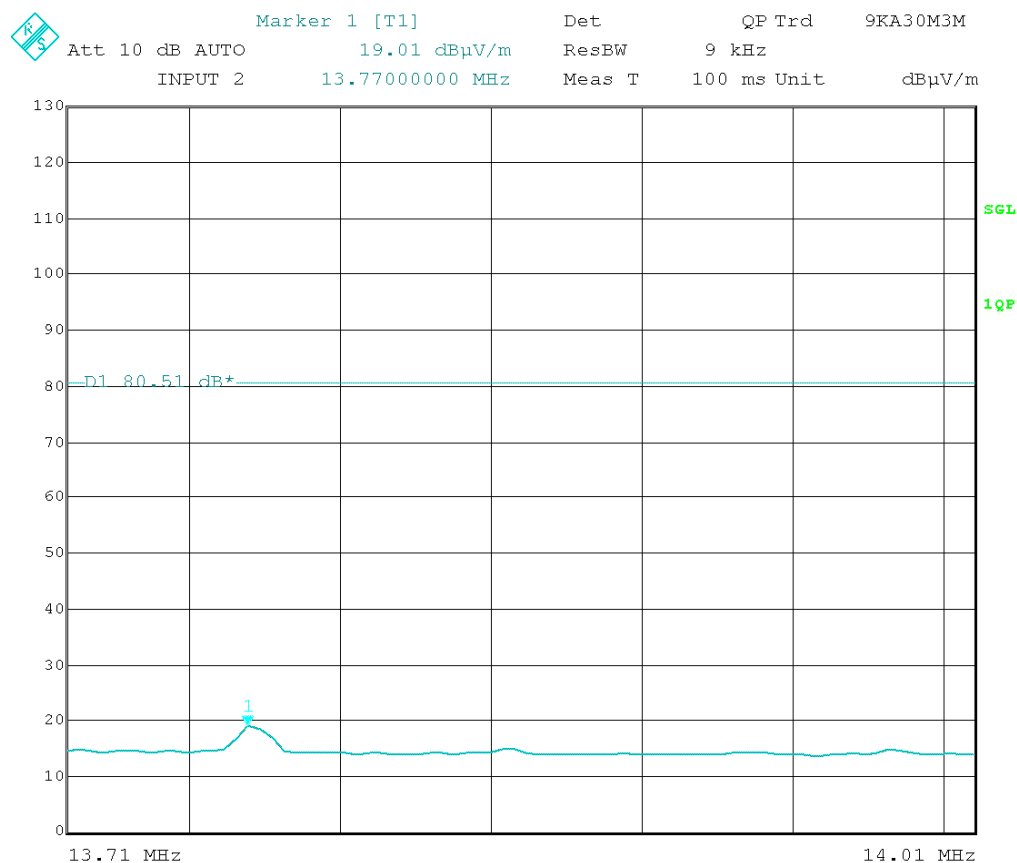
Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dB μ V/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dB μ V/m) extrapolated to 30 m (40 dB/decade)
13.350	16.70	-23.30
Measurement uncertainty (dB)	± 3.2	

Verdict: PASS

Band 13.710-14.010 MHz

Measurement distance: 3 meters



Note: The limit shown in the above plot is extrapolated to 3 meters

Frequency (MHz)	Maximum field strength (dBμV/m) measured at 3 m (quasi-peak detector)	Maximum field strength (dBμV/m) extrapolated to 30 m (40 dB/decade)
13.770	19.01	-20.99
Measurement uncertainty (dB)	±3.2	

Verdict: PASS

Section 15.225 Subclause (d) / RSS-210 Clause A2.6 (d). Field strength of emissions outside of the band 13.110 MHz -14.010 MHz

SPECIFICATION

FCC 15.225

The field strength of any emissions appearing outside of the band 13.110 MHz - 14.010 MHz band shall not exceed the general radiated emission limits in 15.209:

Frequency Range (MHz)	Field strength (μ V/m)	Field strength (dB μ V/m)	Measurement distance (m)
0.009-0.490	2400/F(kHz)	-	300
0.490-1.705	24000/F(kHz)	-	300
1.705 - 30.0	30	29.54	30
30 - 88	100	40	3
88 - 216	150	43.5	3
216 - 960	200	46	3
Above 960	500	54	3

RSS-210

The field strength of any emissions appearing outside of the band 13.110 MHz - 14.010 MHz band shall not exceed 30 microvolts/meter (29.5 dB μ V/m) at 30 meters.

RESULTS:

All tests were performed in a semi-anechoic chamber at a distance of 3 m.

The spectrum was inspected from 9 kHz to 200 MHz searching for spurious signals.

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-amplifier gain.

Frequency range 9 kHz-30 MHz.

No spurious signals were found.

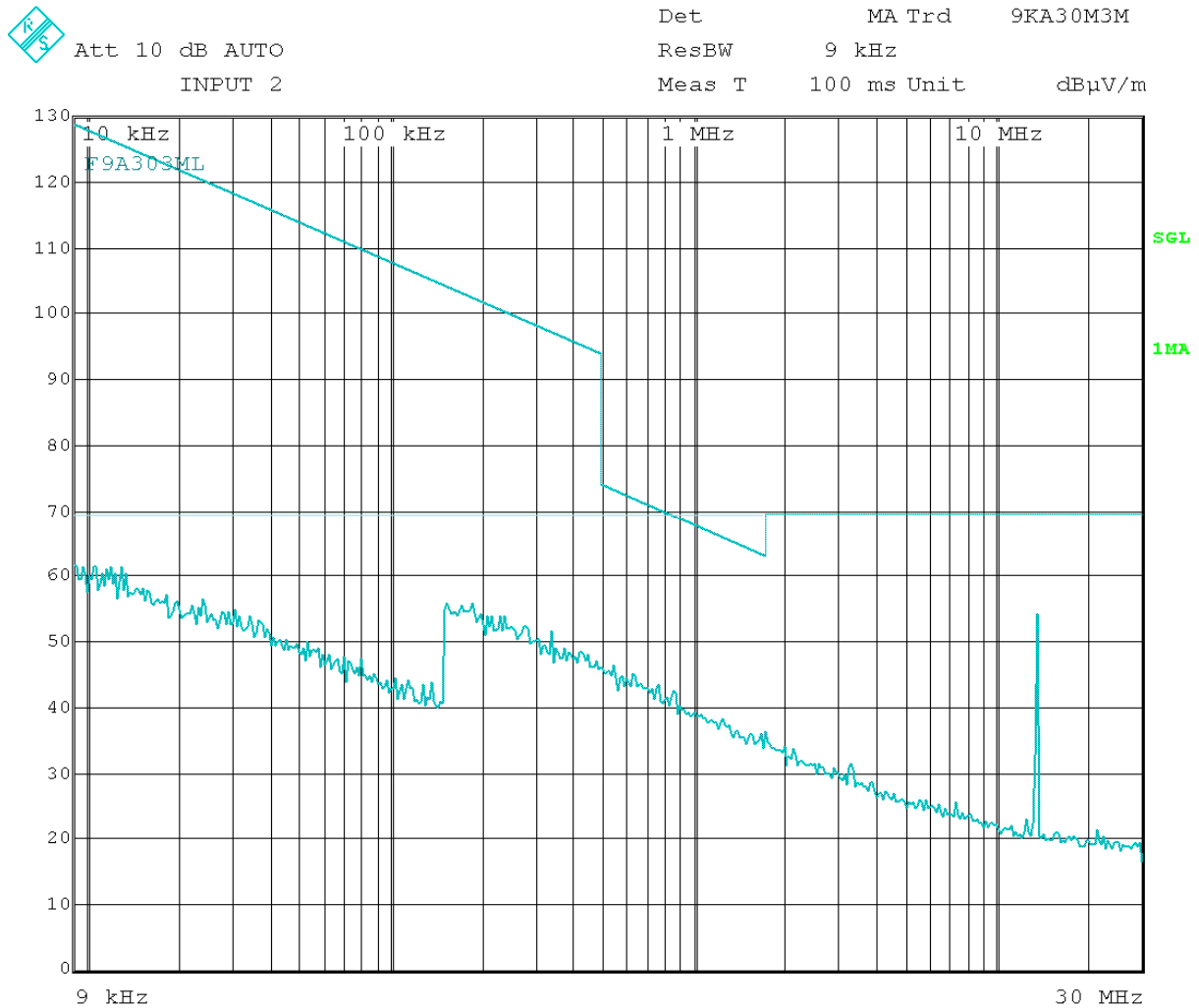
Frequency range 30 MHz-200 MHz

Spurious levels closest to the limit

Spurious frequency (MHz)	Polarization	Detector	Emission Level (dB μ V/m)	Measurement Uncertainty (dB)
49.7596	V	Quasi-Peak	26.88	± 3.8
99.8397	V	Quasi-Peak	20.16	± 3.8

Verdict: PASS

FREQUENCY RANGE 9 kHz-30 MHz.



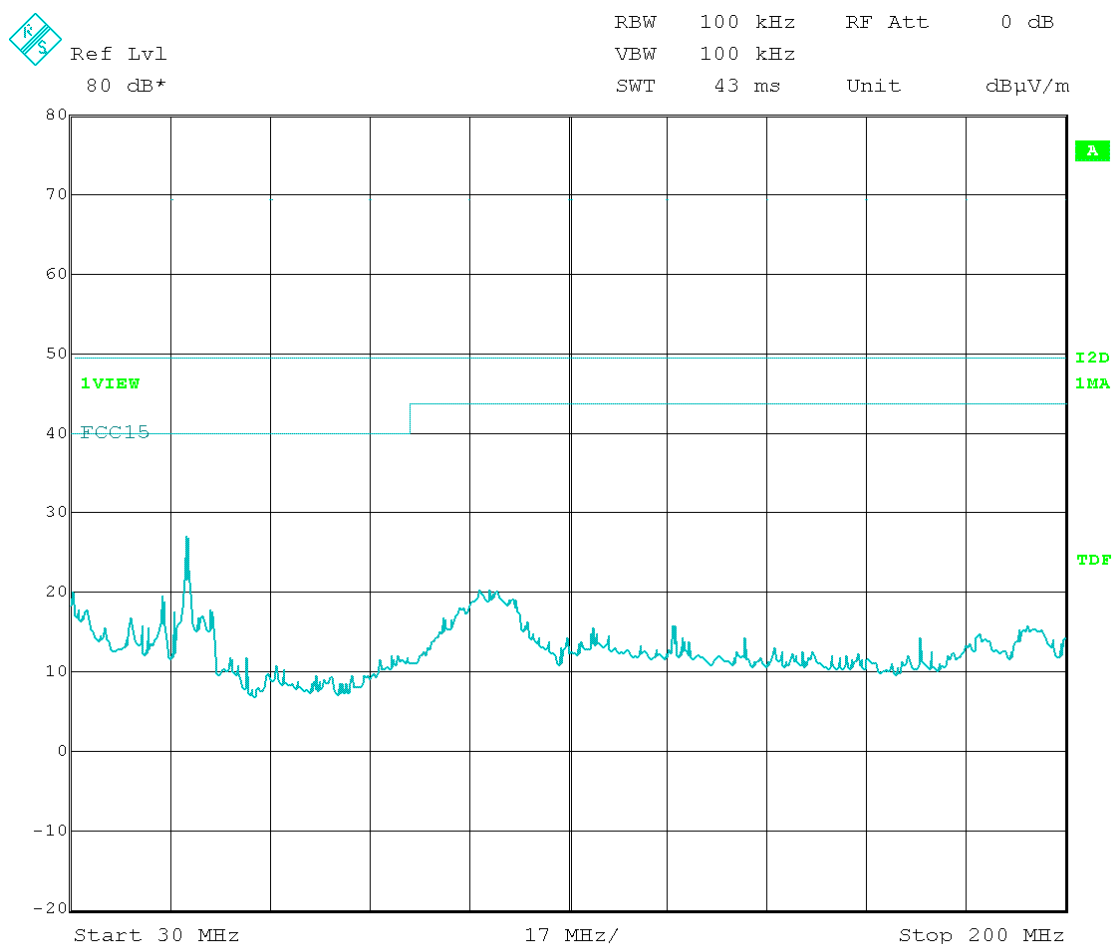
Resolution bandwidth:

200 Hz for $9 \text{ kHz} \leq f \leq 150 \text{ kHz}$

9 kHz for $150 \text{ kHz} \leq f \leq 30 \text{ MHz}$

Note: The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.

FREQUENCY RANGE 30 MHz to 200 MHz.



Note: The above plot shows the results of the scan using peak detector. The highest peaks are maximized and re-measured using a quasi-peak detector.
 The limit shown in the above plot for RSS-210 is extrapolated to 3 meters.

Section 15.225 Subclause (e) / RSS-210 Clause A2.6. Frequency tolerance of the carrier signal

SPECIFICATION

FCC §2.1055 (d) and §15.225 (e).

The frequency tolerance of the carrier signal shall be maintained within +/- 0.01% of the operating frequency over a temperature variation of -20 degrees to +50 degrees C at normal supply voltage, and for a variation in the primary supply voltage from 85% to 115% of the rated supply voltage at a temperature of 20 degrees C. For hand carried, battery powered equipment, reduce primary supply voltage to the battery operating end point which shall be specified by the manufacturer.

RESULTS

Nominal operating frequency: 13.56 MHz

Frequency stability over temperature variations.

Temperature (°C)	Frequency Error (Hz)	Frequency Error (%)
+50	+349	0.0025728
+40	-325	-0.0023964
+30	-413	-0.0030446
+20	-259	-0.0019131
+10	-251	-0.0018525
0	+105	0.0007776
-10	+143	0.0010555
-20	-150	0.0011032

Frequency stability over voltage variations.

Battery Supply voltage	Voltage (V)	Frequency Error (Hz)	Frequency Error (%)
Vmax	4.37	-598	-0.0044112
Vmin	3.23	-460	-0.0033895

Verdict: PASS