

FCC LISTED, REGISTRATION

NUMBER: 720267

Test report No:

IC LISTED REGISTRATION NUMBER IC 4621A-1

NIE: 43480RRF.003

Test report REFERENCE STANDARD: USA FCC Part 15.225 and Part 15.209

| Identificación del objeto ensayado: Identification of item tested | SmartPhone |
|--|---|
| Marca: Trade | YotaPhone |
| Modelo y/o referencia tipo | YD201 |
| Other identification of the product: | Commercial name: YOTAPHONE2 FCC ID: 2ADHW201 IC ID: 12469A-201 |
| Final HW version: | P2 |
| Final SW version: | 3.9 |
| IMEI TAC: | 004402600038271, 004402600038354 |
| Características: Features | Bluetooth EDR+LE, WiFi b/g/n20, NFC and 2G/3G cellular |
| Peticionario: Applicant | YOTA DEVICES LTD Arch. Makariou & Kalograion, 4, Nicolaides Sea View City, 9th Floor, Flat/Offices 903 -904, Block A-B, 6016, Larnaca, Cyprus. Contact person: Jukka Ollila Telephone: +358405433264 e-mail: jollila@yotadevices.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) | A. Llamas RF Lab. Manager |
| Fecha de realización | 2014-12-04 |

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Formato de informe No. FDT08_15 Report template No



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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 conjuction 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 S/01 is composed of the following elements:

| Control Nº | Description | Model | Serial Nº | Date of reception |
|------------|----------------------------------|-------|-----------------------|-------------------|
| 43116/027 | Smartphone with integral antenna | YD201 | IMEI: 004402600038271 | 2014-07-11 |

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

All radiated tests indicated in appendix A.



Sample S/02 is composed of the following elements:

| Control Nº | Description | Model | Serial N° | Date of reception |
|------------|----------------------------------|-------|-----------------------|-------------------|
| 43116/038 | Smartphone with integral antenna | YD201 | IMEI: 004402600038354 | 2014-07-18 |

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

All conducted tests indicated in appendix A.

Test sample description

The test sample consists of a smartphone with Bluetooth EDR+LE, WiFi b/g/n20, NFC and 2G/3G cellular.

Test samples supplier

YOTA DEVICES LTD

Arch. Makariou & Kalograion, 4, Nicolaides Sea View City, 9th Floor, Flat/Offices 903 -904, Block A-B, 6016, Larnaca, Cyprus.

Contact person: Jukka Ollila Telephone: +358405433264 e-mail: jollila@yotadevices.com

Testing period

The performed test started on 2014-10-03 and finished on 2014-10-17.

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. = 21.5 °C Max. = 21.9 °C |
|-------------------------------|----------------------------------|
| Relative humidity | Min. = 54.8 % Max. = 56.0 % |
| Shielding effectiveness | > 100 dB |
| Electric insulation | $> 10 \text{ k}\Omega$ |
| 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 |
|-------------------------------|---|
| Temperature | Max. = 20.9 °C |
| D.1.42 | Min. = 46.0 % |
| Relative humidity | Max. = 47.7 % |
| A : | Min. = 1002 mbar |
| Air pressure | Max. = 1009 mbar |
| Shielding effectiveness | > 100 dB |
| Electric insulation | $> 10 \text{ k}\Omega$ |
| 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. = 23.7 °C | |
|-------------------------------|--------------------------|--|
| _ | $Max. = 24.6 ^{\circ}C$ | |
| Relative humidity | Min. = 41.3 % | |
| | Max. = 52.7 % | |
| Air pressure | Min. = 1010 mbar | |
| | Max. = 1020 mbar | |
| Shielding effectiveness | > 100 dB | |
| Electric insulation | $> 10 \text{ k}\Omega$ | |
| Reference resistance to earth | $< 0.5 \Omega$ | |

Remarks and comments

1: Used instrumentation.

Conducted Measurements

| | | Last Cal. date | Cal. due date |
|----|--------------------------------------|-------------------|---------------|
| 1. | Spectrum analyser Agilent PSA E4440A | 2014/05 | 2016/05 |
| 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. | BiconicalLog antenna ETS | 2014/03 | 2017/03 |
| 3. | LINDGREN 3142E | | |
| 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 9231A. | 2013/06 | 2015/06 |
| 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 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 | | |

AT4 wireless, S.A.

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Appendix A – Test result



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| TEST CONDITIONS |
|--|
| Occupied Bandwidth |
| Section 15.225 Subclause (a) / RSS-210 Clause A2.6 (a). Field strength of emissions within the band 13.553 MHz -13.567 MHz |
| 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 |
| $Section\ 15.225\ Subclause\ (c)\ /\ RSS-210\ Clause\ A2.6\ (c).\ Field\ strength\ of\ emissions\ within\ the\ band\ 13.110\ MHz\ -13.410\ MHz\ and\ 13.710\ MHz\ -14.010\ MHz\24$ |
| 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 |
| Section 15.225 Subclause (e) / RSS-210 Clause A2.6. Frequency tolerance of the carrier signal |



TEST CONDITIONS

Power supply (V):

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

 $V_{max} = 4.2 \text{ Vdc (*)}$

 $V_{min} = 3.4 \text{ Vdc} (*)$

The subscripts nom, min and max indicate voltage test conditions (nominal, minimum and maximum respectively, as declared by the applicant).

(*): Declared by applicant

Type of power supply = DC voltage from rechargeable battery.

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.

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Occupied Bandwidth

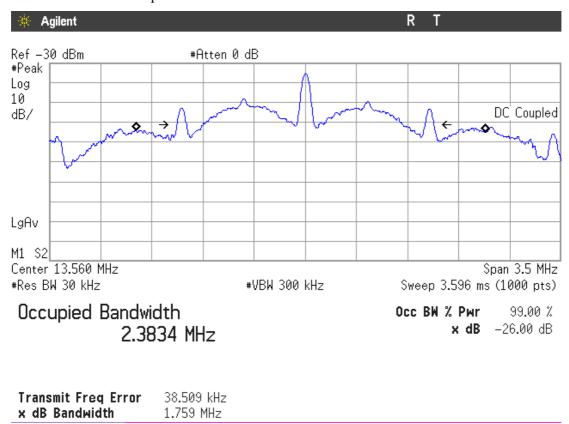
RESULTS

99 % Occupied Bandwidth (see next plots).

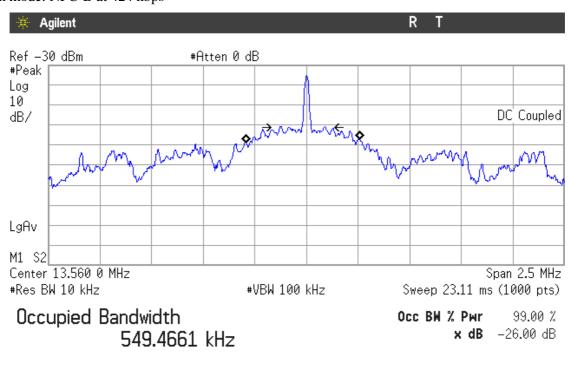
| Operation mode | 99% occupied bandwith (kHz) |
|------------------------------|-----------------------------|
| NFC-A at 424 kbps | 2383.40 |
| NFC-B at 424 kbps | 549.47 |
| NFC-F at 424 kbps | 1356.30 |
| Measurement uncertainty (Hz) | ±16 |



Operation mode: NFC-A at 424 kbps



Operation mode: NFC-B at 424 kbps



Transmit Freq Error -18.416 kHz x dB Bandwidth 223.129 kHz

Transmit Freq Error

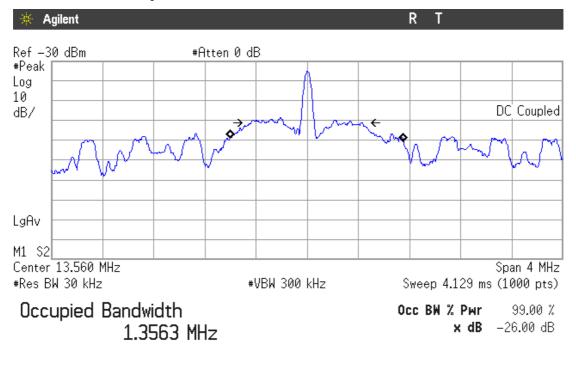
x dB Bandwidth

74.592 kHz

867.550 kHz



Operation mode: NFC-F at 424 kbps





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

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



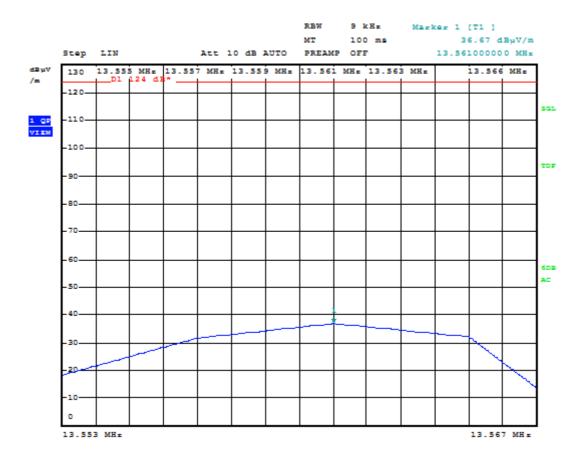
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) |
|------------------------------|---|---|
| 13.561 | 35.52 | -4.48 |
| Measurement uncertainty (dB) | ±3 | .2 |



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



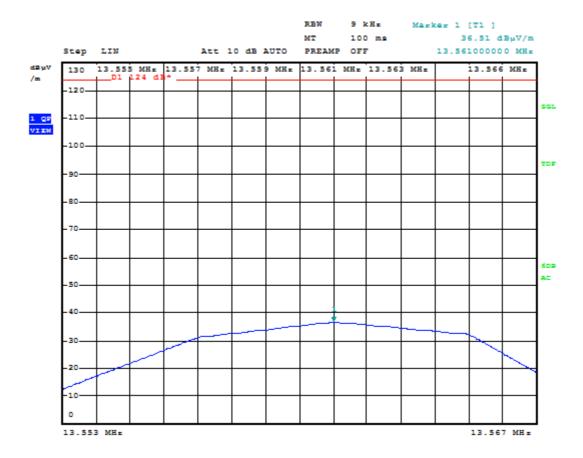
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) |
|------------------------------|---|---|
| 13.561 | 36.67 | -3.33 |
| Measurement uncertainty (dB) | ±3.2 | |



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



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) |
|------------------------------|---|---|
| 13.561 | 36.51 | -3.49 |
| Measurement uncertainty (dB) | ±3.2 | |



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 ($50.47 \text{ dB}\mu\text{V/m}$) at 30 meters.

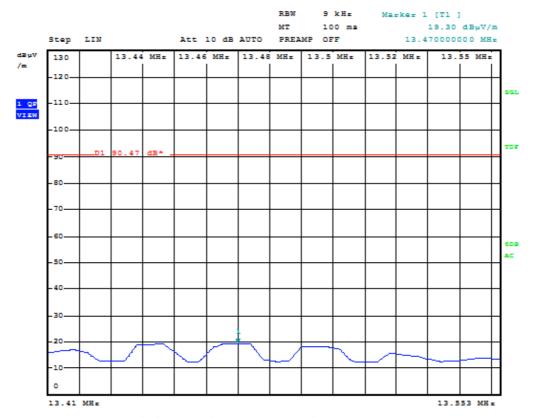
RESULTS

Band 13.410-13.553 MHz

Measurement distance: 3 meters

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



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) |
|------------------------------|---|---|
| 13.470 | 19.30 | -20.70 |
| Measurement uncertainty (dB) | ±3 | .2 |

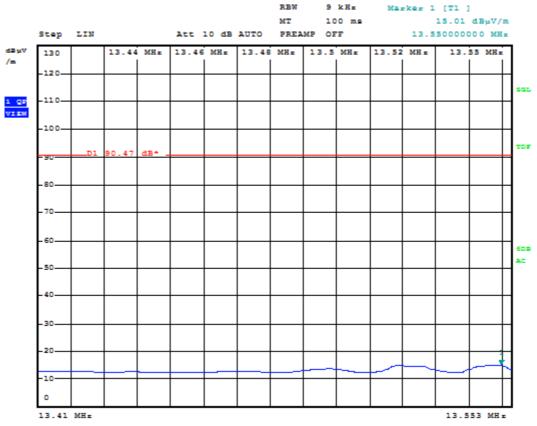
Verdict: PASS

2014-12-04



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



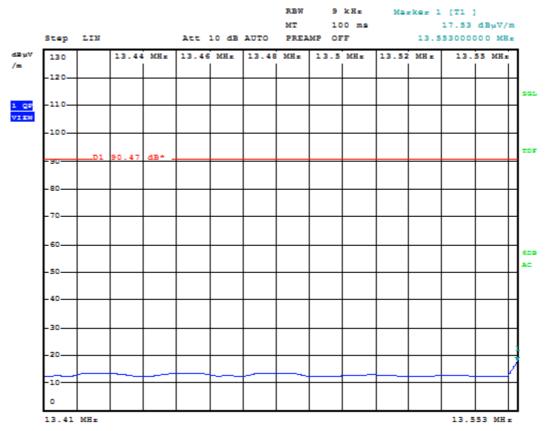
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) |
|------------------------------|---|---|
| 13.550 | 15.01 | -24.99 |
| Measurement uncertainty (dB) | ±3 | 3.2 |



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



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) |
|------------------------------|---|---|
| 13.553 | 17.53 | -22.47 |
| Measurement uncertainty (dB) | ±3 | 3.2 |

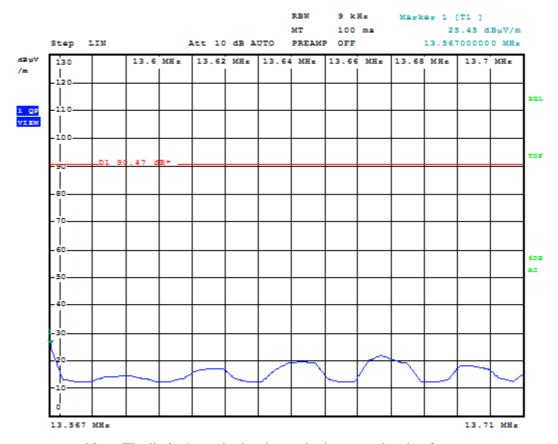


Band 13.567-13.710 MHz

Measurement distance: 3 meters

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



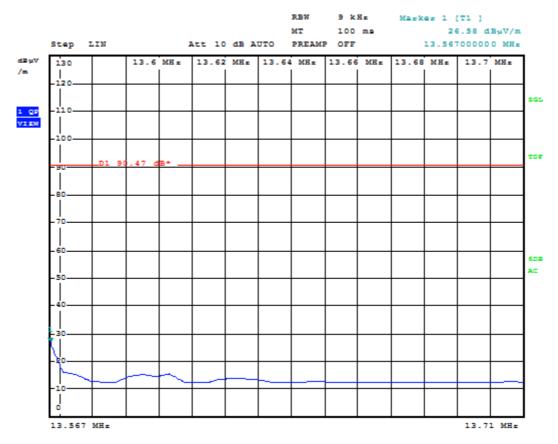
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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 | 25.45 | -14.55 |
| Measurement uncertainty (dB) | ±3 | 3.2 |



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



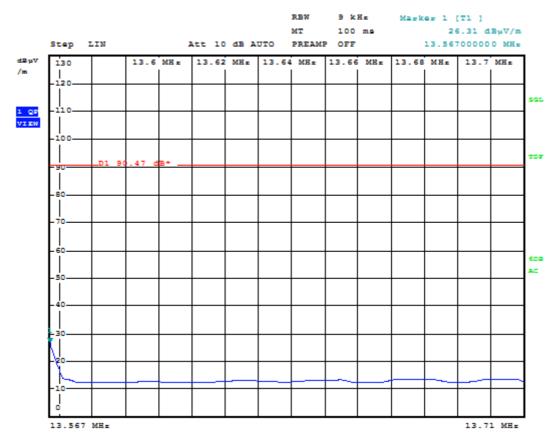
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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 | 26.58 | -13.42 |
| Measurement uncertainty (dB) | ±3 | 3.2 |



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



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 | 26.31 | -13.69 |
| Measurement uncertainty (dB) | ±3.2 | |



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 ($40.51 \text{ dB}\mu\text{V/m}$) at 30 meters.

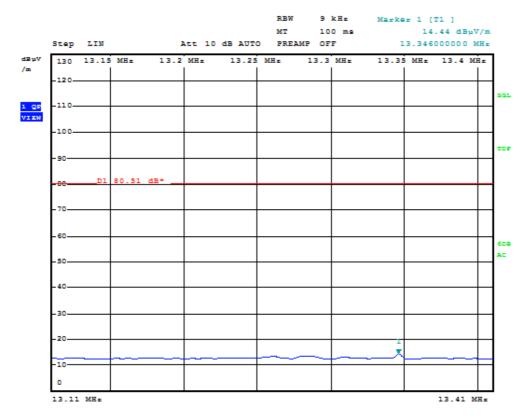
RESULTS

Band 13.110-13.410 MHz

Measurement distance: 3 meters

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



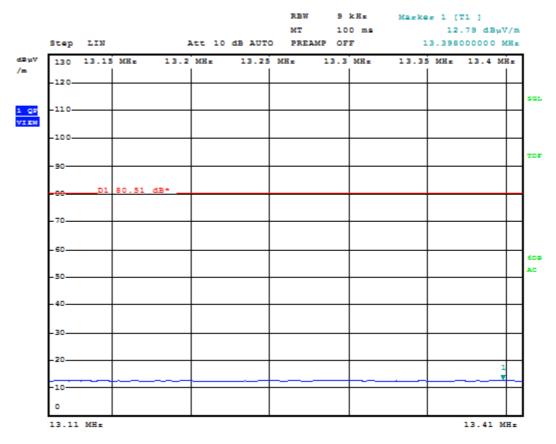
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) |
|------------------------------|---|---|
| 13.346 | 14.44 | -25.56 |
| Measurement uncertainty (dB) | ±3 | 3.2 |



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



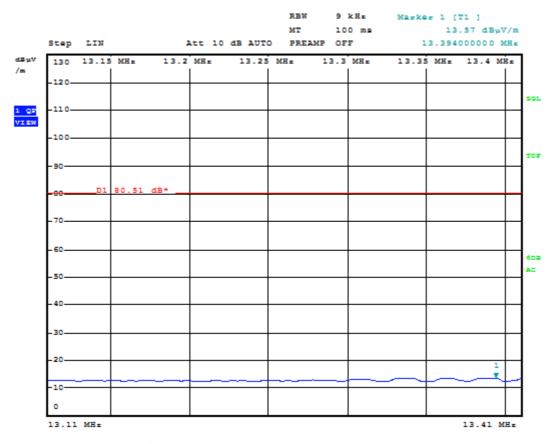
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) |
|------------------------------|---|---|
| 13.398 | 12.79 | -27.21 |
| Measurement uncertainty (dB) | ±3.2 | |



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



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) | |
|------------------------------|---|---|--|
| 13.394 | 13.57 | -26.43 | |
| Measurement uncertainty (dB) | ±3.2 | | |

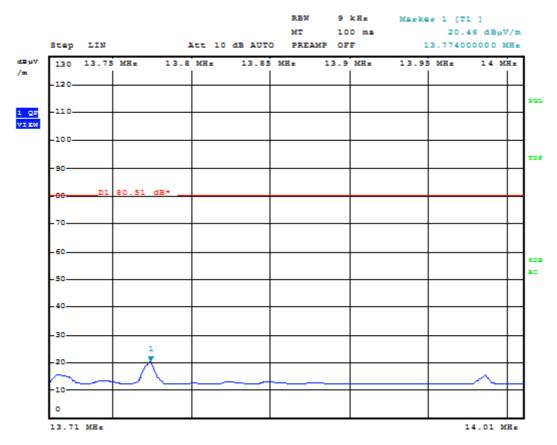


Band 13.710-14.010 MHz

Measurement distance: 3 meters

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



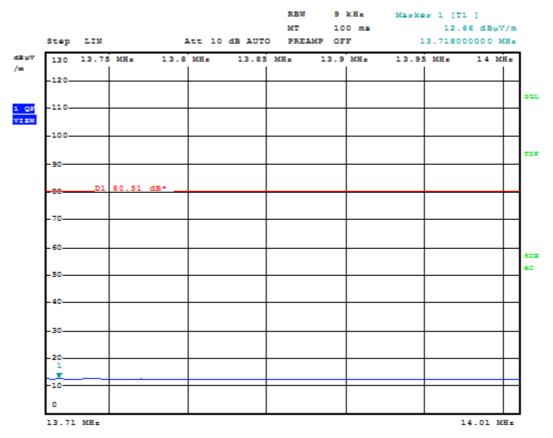
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) | |
|------------------------------|---|---|--|
| 13.774 | 20.46 | -19.54 | |
| Measurement uncertainty (dB) | ±3.2 | | |



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



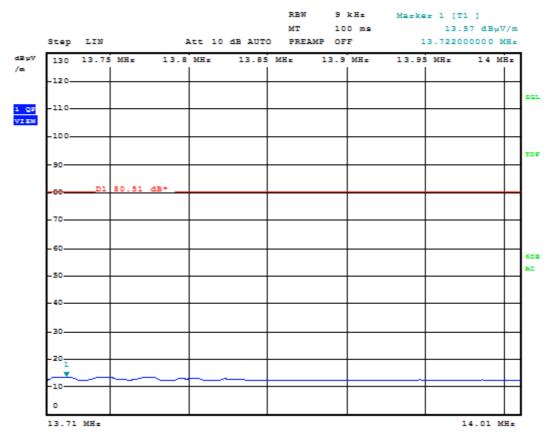
Note: The limit shown in the above plot is extrapolated to 3 meters

| 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) | |
|------------------------------|---|---|--|
| 13.718 | 12.66 | -27.34 | |
| Measurement uncertainty (dB) | ±3.2 | | |



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



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) | |
|------------------------------|---|---|--|
| 13.722 | 13.57 | -26.43 | |
| Measurement uncertainty (dB) | ±3.2 | | |



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

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 (µV/m) | Field strength (dBµV/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 |

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 for all NFC-A, NFC-B and NFC-F operation modes at less than 20 dB below the limit.



Frequency range 30 MHz-200 MHz

1. Operation mode: NFC-A.

No spurious signals were found for NFC-A operation mode at less than 20 dB below the limit.

2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.

Spurious levels at less than 20 dB below the limit

| Spurious frequency (MHz) | Polarization | Detector | Emission Level (dBµV/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|------------|-------------------------|---------------------------------|
| 48.041 | V | Quasi-Peak | 21.60 | ± 3.8 |

3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.

Spurious levels at less than 20 dB below the limit

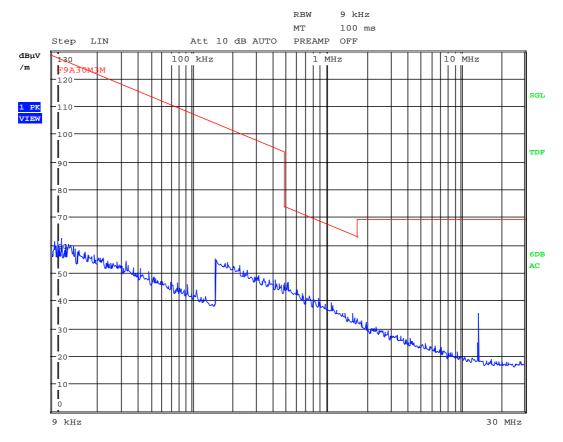
| Spurious frequency (MHz) | Polarization | Detector | Emission Level (dBµV/m) | Measurement Uncertainty (dB) |
|--------------------------|--------------|------------|-------------------------|---------------------------------|
| 40.434 | V | Quasi-Peak | 21.62 | ± 3.8 |
| 81.468 | V | Quasi-Peak | 20.10 | ± 3.8 |



FREQUENCY RANGE 9 kHz-30 MHz.

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



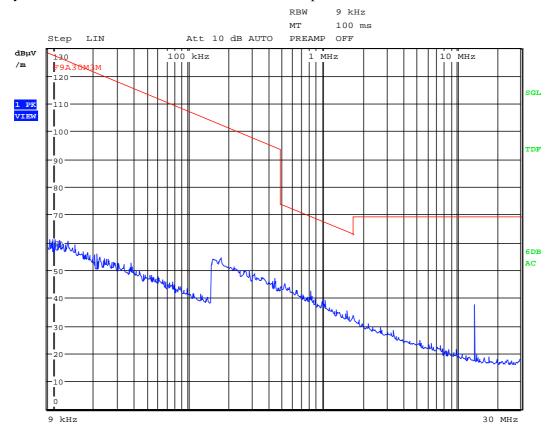
Resolution bandwidth: 200 Hz for 9 kHz \leq f \leq 150 kHz 9 kHz for 150 kHz \leq f \leq 30 MHz

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



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.



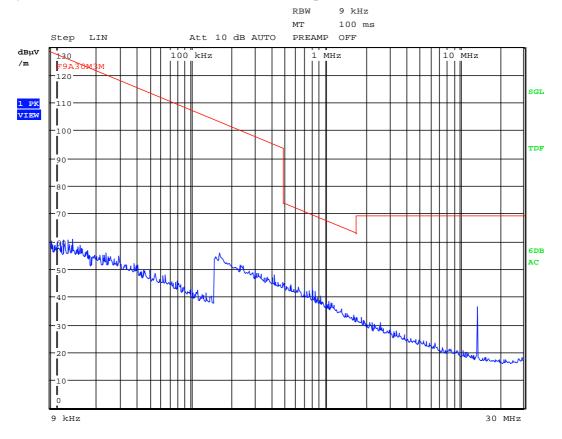
Resolution bandwidth: 200 Hz for 9 kHz \leq f \leq 150 kHz 9 kHz for 150 kHz \leq f \leq 30 MHz

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



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



Resolution bandwidth: 200 Hz for 9 kHz \leq f \leq 150 kHz 9 kHz for 150 kHz \leq f \leq 30 MHz

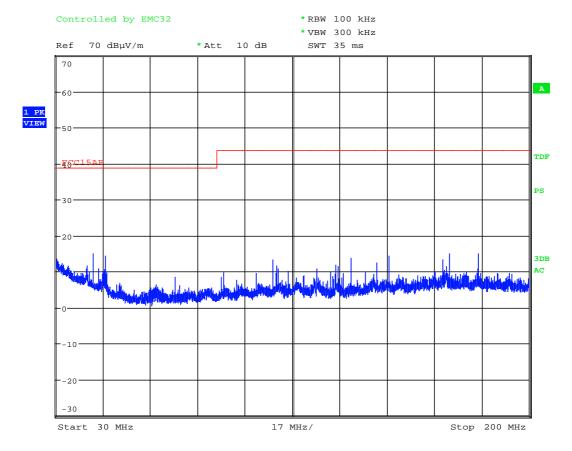
Note: The limits shown in the above plot are extrapolated to 3 meters. The highest peak corresponds to the carrier level.



FREQUENCY RANGE 30 MHz to 200 MHz.

1. Operation mode: NFC-A.

A preliminary scan determined that the worst case is for 106 kbps bit rate.

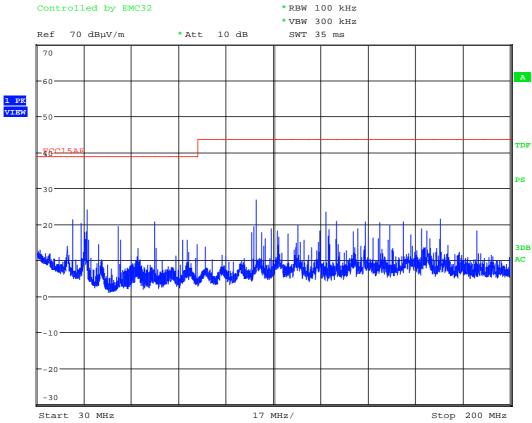


Note: The above plot shows the results of the scan using peak detector. The highest peaks are maximized and remeasured using a quasi-peak detector.



2. Operation mode: NFC-B.

A preliminary scan determined that the worst case is for 106 kbps bit rate.

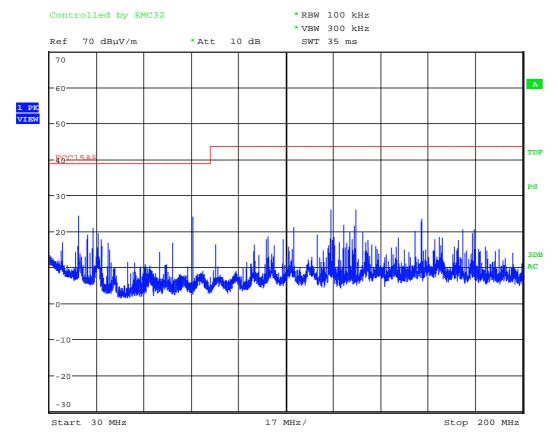


Note: The above plot shows the results of the scan using peak detector. The highest peaks are maximized and remeasured using a quasi-peak detector.



3. Operation mode: NFC-F.

A preliminary scan determined that the worst case is for 212 kbps bit rate.



Note: The above plot shows the results of the scan using peak detector. The highest peaks are maximized and remeasured using a quasi-peak detector.



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 \pm 0.01% of the operating frequency over a temperature variation of \pm 20 degrees to \pm 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 | 1136 | 0.0083776 | |
| +40 | 1129 | 0.0083260 | |
| +30 | 1126 | 0.0083038 | |
| +20 | 1131 | 0.0083407 | |
| +10 | 1186 | 0.0087463 | |
| 0 | 1198 | 0.0088348 | |
| -10 | 1229 | 0.0090634 | |
| -20 | 1240 | 0.0091445 | |

Frequency stability over voltage variations.

| Battery Supply voltage | Voltage (V) | Frequency Error (Hz) | Frequency Error (%) |
|------------------------|-------------|----------------------|---------------------|
| Vmax | 4.4 | 1178 | 0.0086873 |
| Vmin | 3.4 (*) | 1136 | 0.0083776 |

(*): Operating end point specified by the manufacturer.

Verdict: PASS

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