**DEKRA Certification, Inc.**
405 Glenn Dr. Suite 12,
Sterling, VA 20164
United States of America

DEKRA

ACCREDITED
Test Lab
Cert 2764.01

FCC LISTED, REGISTRATION NUMBER: 2764.01

ISED LISTED REGISTRATION NUMBER: 23595-1

Test report No:
2279ERM.006A2

# Test report

**USA FCC Part 15.247, 15.209**
**CANADA RSS-247, RSS-Gen**
**Radio Frequency Devices. Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz.**
**Digital Transmission Systems (DTSs), Frequency Hopping Systems (FHSs) and Licence-Exempt Local Area Network (LE-LAN) Devices.**

| | |
|---|---|
| Identification of item tested | Wireless Sensor Node |
| Trademark | AIRTHINGS AS |
| Model and /or type reference | Wave Mini |
| Other identification of the product | FCC ID: 2APPT - 2920<br>IC: 23900-2920 |
| Features | Wave Mini (VOC, Pressure, Temp, Humidity sensors)<br>Visual indicator: Red/Yellow/Green glow point<br>Long battery life<br>Wireless connection Bluetooth or Airthings SmartLink |
| Manufacturer | Airthings AS<br>Wergelandsveien 7, 0167 Oslo, Norway |
| Test method requested, standard | USA FCC Part 15.247, 10-1-17 Edition: Operation within the bands 902 - 928 MHz, 2400 -2483.5 MHz, and 5725 - 5850 MHz<br>USA FCC Part 15.209, 10-1-17 Edition: Radiated emission limits; general requirements<br>CANADA RSS-247 Issue 2 (February 2017).<br>CANADA RSS-Gen Issue 4 (November 2014).<br>Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.<br>ANSI C63.10-2013: American National Standard for Testing Unlicensed Wireless Devices. |
| Summary | IN COMPLIANCE |
| Approved by (name / position & signature) | Domingo Galvez<br>EMC&RF Lab Manager<br>Digitally signed by Domingo Galvez<br>DN: cn=Domingo Galvez, o=DEKRA Certification Inc., ou=Regulatory Lab, email=dgalvez@dekra.com, c=US<br>Date: 2019.01.30 00:23:40 -05'00' |
| Date of issue | 01-29-2019 |
| Report template No | FDT08_21 |

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# Competences and guarantees

DEKRA Certification Inc. is a testing laboratory accredited by A2LA (The American Association for Laboratory Accreditation), to perform the tests indicated in the Certificate 2764.01

DEKRA Certification Inc. is a testing laboratory competent to carry out the tests described in this report.

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

DEKRA Certification Inc. guarantees the reliability of the data presented in this report, which is the result of the measurements and the tests performed to the item under test on the date and under the conditions stated on the report and, it is based on the knowledge and technical facilities available at DEKRA Certification at the time of performance of the test.

DEKRA Certification Inc. is liable to the client for the maintenance of the confidentiality of all information related to the item under test and the results of the test.

The results presented in this Test Report apply only to the particular item under test established in this document.

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# General conditions

1. This report is only referred to the item that has undergone the test.
2. This report does not constitute or imply on its own an approval of the product by the Certification Bodies or competent Authorities.
3. This document is only valid if complete; no partial reproduction can be made without previous written permission of DEKRA Certification Inc.
4. This test report cannot be used partially or in full for publicity and/or promotional purposes without previous written permission of DEKRA Certification Inc. and the Accreditation Bodies.

# Uncertainty

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

| Frequency (MHz) | U(k=2) | Units |
|---|---|---|
| 30-180 | 3.82 | dB |
| 180-1000 | 2.61 | dB |
| 1000-18000 | 2.92 | dB |
| 18000-40000 | 2.15 | dB |

## Data provided by the client

Indoor Air Quality Instrument.

DEKRA declines any responsibility with respect to the information provided by the client and that may affect the validity of results.

## 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 |
|---|---|---|---|---|
| 2279.06 | Radon Sensor prepared for RF Conducted SRD 915 MHz Testing | Wave Mini | CERT #4 | 08/08/2018 |

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

   All conducted tests indicated in appendix A.

Sample S/02 is composed of the following elements:

| Control Nº | Description | Model | Serial Nº | Date of reception |
|---|---|---|---|---|
| 2279.02 | Radon Sensor prepared for RF Radiated SRD 915 MHz Testing | Wave Mini | CERT # 2 | 08/08/2018 |

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

   All radiated tests indicated in appendix A.

# Test sample description

| | | | | | | |
|---|---|---|---|---|---|---|
| Ports…… : | Port name and description | | Cable | | | |
| | | | Specified length [m] | Attached during test | Shielded | |
| | *Not provided data* | | | ☐ | ☐ | |
| | | | | ☐ | ☐ | |
| Supplementary information to the ports…… : | *Not provided data* | | | | | |
| Rated power supply .....: | Voltage and Frequency | | Reference poles | | | |
| | | | L1 | L2 | L3 | N | PE |
| | ☐ | AC: 230Vac / 50Hz. | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | AC: | ☐ | ☐ | ☐ | ☐ | ☐ |
| | ☐ | DC: | | | | | |
| | ☒ | DC: 4.5 (3AA Battery) | | | | | |
| Rated Power .....: | *Not provided data* | | | | | | |
| Clock frequencies .....: | *Not provided data* | | | | | | |
| Other parameters.....: | *Not provided data* | | | | | | |
| Software version .....: | 1.0 | | | | | | |
| Hardware version.....: | 1.0 | | | | | | |
| Dimensions in cm (L x W x D) ....: | *Not provided data* | | | | | | |
| Mounting position.....: | ☐ | Table top equipment | | | | | |
| | ☒ | Wall/Ceiling mounted equipment | | | | | |
| | ☐ | Floor standing equipment | | | | | |
| | ☐ | Hand-held equipment | | | | | |
| | ☐ | Other: | | | | | |
| Modules/parts .....: | Module/parts of test item | | Type | | Manufacturer | |
| | *Not provided data* | | | | | |
| | | | | | | |
| Accessories (not part of the test item) .....: | Description | | Type | | Manufacturer | |
| | *Not provided data* | | | | | |
| | | | | | | |

| Documents as provided by the applicant.....: | Description | File name | Issue date |
|---|---|---|---|
| | Declaration Equipment Data | FDT30_14 Declaration Equipment Data | |
| | Transmission equipment Data | FCC15247+FCC15249_ FDT58_02 Test Samples for RF Testing v 1.0_Generic (1) | |

**Copy of marking plate:**

## Identification of the client

AIRTHINGS AS

Wergelandsveien 7, 0167 Oslo, Norway

## Testing period and place

| | |
|---|---|
| **Test Location** | DEKRA Certification Inc. |
| **Date (start)** | 11-13-2018 |
| **Date (finish)** | 12-3-2018 |

## Document history

| Report number | Date | Description |
|---|---|---|
| 2279ERM.006 | 12-20-2018 | First release |
| 2279ERM.006A1 | 01-03-2019 | Second release |
| 2279ERM.006A2 | 01-29.2019 | Third release |

# Modifications to the reference test report

It was introduced the following modifications in respect to the test report number 2279ERM.006A1 related with the same samples, in the next clauses and sub-clauses:

| Clauses/ Sub-Clauses | Modification | Justification |
|---|---|---|
| Page 21, 22, 23 /Description/ Graphs | Modified the reference number and graphs. | Documentation error |

This modification test report cancels and replaces the test report 2279ERM.006A1

# Environmental conditions

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

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 30 %<br>Max. = 75 % |
| **Air pressure** | Min. = 860 mbar<br>Max. = 1060 mbar |

In the semi anechoic chamber, the following limits were not exceeded during the test.

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 30 %<br>Max. = 75 % |
| **Air pressure** | Min. = 860 mbar<br>Max. = 1060 mbar |

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

| | |
|---|---|
| **Temperature** | Min. = 15 ºC<br>Max. = 35 ºC |
| **Relative humidity** | Min. = 30 %<br>Max. = 60 % |
| **Air pressure** | Min. = 860 mbar<br>Max. = 1060 mbar |

# Remarks and comments

The tests have been performed by the technical personnel: Divya Adusumilli and Koji Nishimoto.

# Testing verdicts

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

# Summary

| FCC PART 15 PARAGRAPH / RSS-247 (Bluetooth Low Energy) | | | | | |
|---|---|---|---|---|---|
| **Section** | **15.247 Spec Clause** | **RSS Spec Clause** | **Test Description** | **Verdict** | **Remark** |
| A.1 | § 15.247 (a) (1) | RSS-247 5.1 (b) | 20 dB Bandwidth and Carrier Frequency Separation | P | N/A |
| A.2 | § 15.247 (a) (1) (i) | RSS-247 5.1. (c) | Number of hopping channels | P | N/A |
| A.3 | § 15.247 (a) (1) (i) | RSS-247 5.1. (c) | Time of Occupancy (Dwell Time) | P | N/A |
| A.3 | § 15.247 (b) (2) | RSS-247 5.4. (a) | Maximum peak conducted output power and antenna gain | P | N/A |
| A.4 | § 15.247 (d) | RSS-247 5.5. | Band-edge emissions compliance (Transmitter) | P | N/A |
| A.5 | § 15.247 (d) | RSS-247 5.5. | Emission limitations conducted (Transmitter) | P | N/A |
| A.6 | § 15.247 (d) | RSS-247 5.5. | Emission limitations radiated (Transmitter) | P | N/A |
| Notes: None | | | | | |

# List of equipment used during the test

Conducted Measurements

Test system Rohde & Schwarz TS 8997:

| CONTROL NUMBER | DESCRIPTION | LAST CALIBRATION | NEXT CALIBRATION |
|---|---|---|---|
| 1039 | Signal analyzer Rohde & Schwarz FSV40 | 2017/03 | 2019/03 |
| 1040 | Switch unit Rohde & Schwarz with power detector OSP120 / OSP-B157 | 2017/03 | 2019/03 |
| 1041 | RF generator Rohde & Schwarz SMB100A | 2017/04 | 2019/04 |
| 1042 | RF generator Rohde & Schwarz SMBV100A | 2018/01 | 2019/01 |
| 101 | Climatic chamber Espec | 2017/12 | 2018/12 |

Radiated Measurements

| CONTROL NUMBER | DESCRIPTION | LAST CALIBRATION | NEXT CALIBRATION |
|---|---|---|---|
| 1179 | Semi anechoic Absorber Lined Chamber Frankonia SAC 3 plus “L” | N/A | N/A |
| 1065 | BiconicalLog antenna ETS LINDGREN 3142E | 2017/03 | 2020/03 |
| 1058 | Double-ridge Waveguide Horn antenna 1-18 GHz | 2017/03 | 2019/03 |
| 1014 | Spectrum analyzer Rohde & Schwarz FSV40 | 2017/03 | 2019/03 |
| 0980 | RF pre-amplifier 30 MHz-6 GHz Bonn Elektronik BLMA 0360-01N | 2017/05 | 2019/05 |
| 0981 | RF pre-amplifier 1-18 GHz Bonn Elektronik BLMA 0118-2A | 2017/05 | 2019/05 |
| 1015, 1017, 1019, 1020 | Rohde & Schwarz EMC32 software | N/A | N/A |

# **Appendix A:** Test results

# Appendix A Content

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# PRODUCT INFORMATION

The following information is provided by the client

| Information | Description |
|---|---|
| Modulation | FHSS |
| RF Output Power | 14 dBm |
| Operation mode 1: Single Antenna Equipment | Equipment with only one antenna |
| - Operating Frequency Range | 902 - 928 MHz |
| - Nominal Channel Bandwidth | 200 KHz |
| Extreme operating conditions | |
| - Temperature range | -20 ºC to +54 ºC |
| Antenna type | Integral antenna |
| Antenna gain | +5 dBi |
| Nominal Voltage | |
| - Supply Voltage | 4.5 Vdc |
| - Type of power source | DC voltage from battery |
| Equipment type | SRD |
| Geo-location capability | No |

Test modes available:

- Continuous modulated carrier at 905 MHz, 915 MHz and 926 MHz
- Continuous reception at 905 MHz, 915 MHz and 926 MHz

# DESCRIPTION OF TEST CONDITIONS

| TEST CONDITIONS | DESCRIPTION |
|---|---|
| TC#01 | <u>Power supply (V):</u><br>$V_{nominal}$ = 4.5 Vdc<br><br><u>Type of power suppl:</u><br>DC voltage from internal rechargeable battery.<br><br><u>Temperature (ºC):</u><br>$T_{nom}$ = +15 to + 35<br>$T_{min}$ = -20 (*)<br>$T_{max}$ = +54 (*)<br><br>The subscript nom indicates normal test conditions.<br>The subscripts min and max indicate extreme test conditions (minimum and maximum respectively).<br>N/A: Not Applicable.<br>(*) Declared by applicant.<br><br><u>Test Frequencies for Conducted tests:</u><br>Lowest channel: 905 MHz<br>Middle channel: 915 MHz<br>Highest channel: 926 MHz<br><br><u>Test Frequencies for Radiated tests:</u><br>Lowest range: 905 MHz<br>Middle channel: 915 MHz<br>Highest channel: 926 MHz |

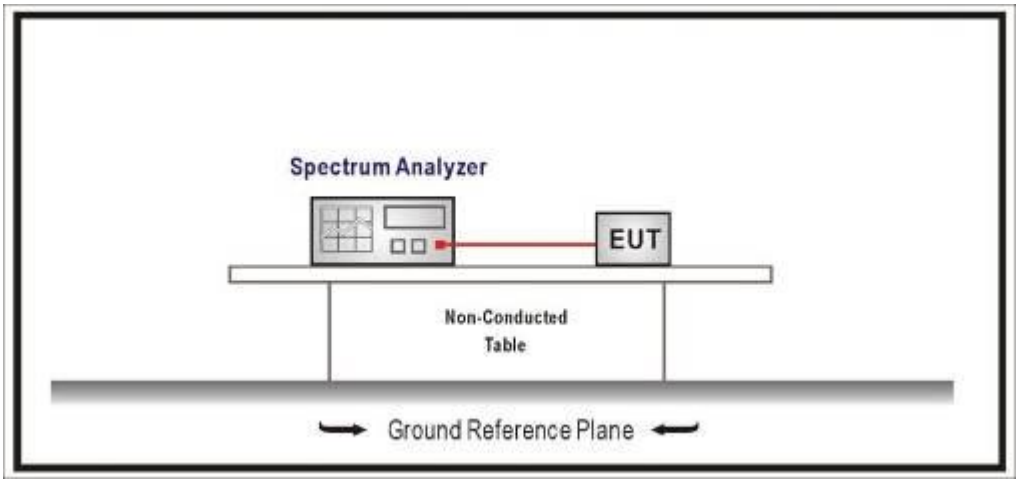
# TEST A.1: 20 DB BANDWIDTH AND CARRIER FREQUENCY SEPARATION

| LIMITS: | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
|---|---|---|
| | Test standard: | Part 15 Subpart C §15.247(a)(1) and RSS-247 5.1(b) |

LIMITS

Frequency Hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 KHz or the 20 dB Bandwidth of the hopping channel, whichever is greater.

**TEST SETUP:**

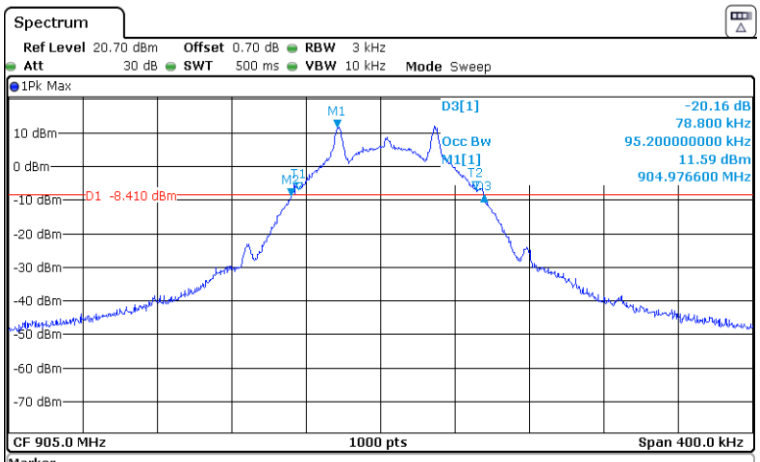



| | |
|---|---|
| **TESTED SAMPLES:** | S/01 |
| **TESTED CONDITIONS MODES:** | TC#01 |
| **TEST RESULTS :** | PASS |

| | Lowest frequency 905 MHz | Middle frequency 915 MHz | Highest frequency 926 MHz |
|---|---|---|---|
| 20 dB Spectrum bandwidth (KHz) | 78.8 | 77.6 | 77.2 |
| Measurement uncertainty (kHz) | <± 5.00 | | |

| TEST RESULTS (Cont.): | |
|---|---|

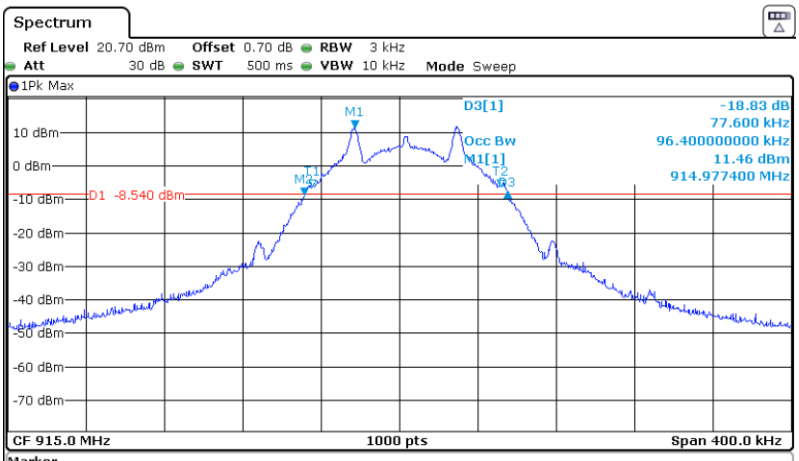
## Lowest Channel




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 904.9766 MHz | 11.59 dBm | | |
| T1 | | 1 | 904.9558 MHz | -6.93 dBm | Occ Bw | 95.2 kHz |
| T2 | | 1 | 905.051 MHz | -6.70 dBm | | |
| M2 | | 1 | 904.95193 MHz | -8.80 dBm | | |
| D3 | M1 | 1 | 78.8 kHz | -20.16 dB | | |

## Middle Channel

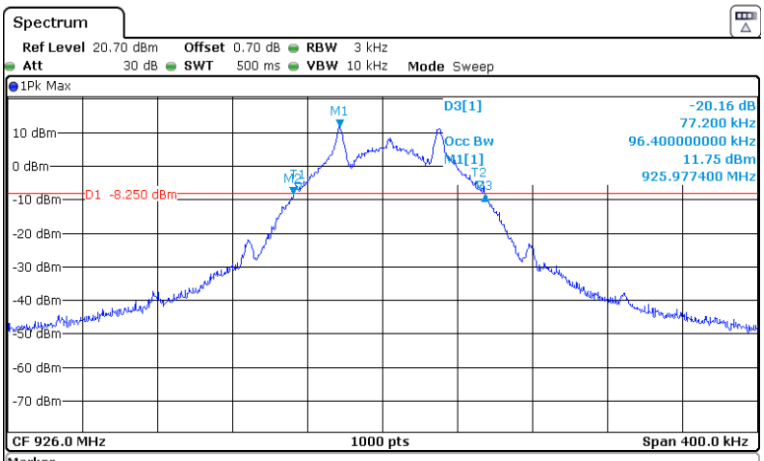



Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 914.9774 MHz | 11.46 dBm | | |
| T1 | | 1 | 914.9554 MHz | -6.46 dBm | Occ Bw | 96.4 kHz |
| T2 | | 1 | 915.0518 MHz | -6.33 dBm | | |
| M2 | | 1 | 914.9514 MHz | -8.76 dBm | | |
| D3 | M1 | 1 | 77.6 kHz | -18.83 dB | | |

| TEST RESULTS (Cont.) | |
|---|---|

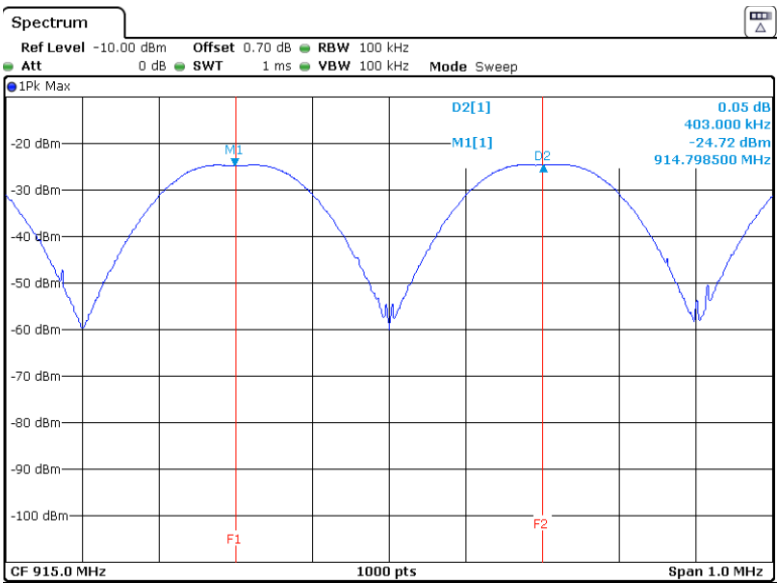
## Highest Channel




Marker

| Type | Ref | Trc | X-value | Y-value | Function | Function Result |
|---|---|---|---|---|---|---|
| M1 | | 1 | 925.9774 MHz | 11.75 dBm | | |
| T1 | | 1 | 925.955 MHz | -7.36 dBm | Occ Bw | 96.4 kHz |
| T2 | | 1 | 926.0514 MHz | -6.54 dBm | | |
| M2 | | 1 | 925.9522 MHz | -8.38 dBm | | |
| D3 | M1 | 1 | 77.2 kHz | -20.16 dB | | |

## CARRIER FREQUENCY SEPARATION




The hopping channel carrier frequencies are separated by a minimum of the of the 20 dB bandwidth of the hopping channel.

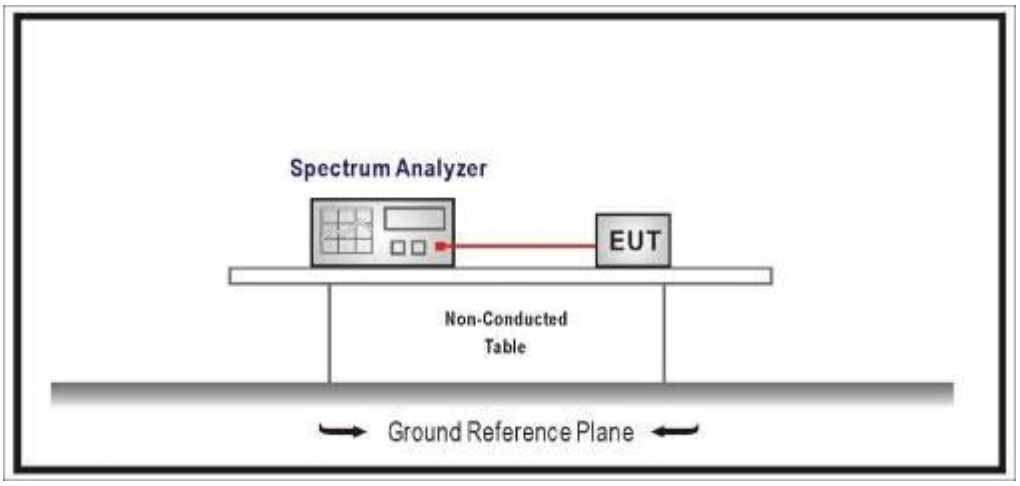
## TEST A.2: NUMBER OF HOPPING CHANNELS

| | | |
|---|---|---|
| **LIMITS:** | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
| | Test standard: | Part 15 Subpart C §15.247(a)(1)(i) and RSS-247 5.1(c) |

LIMITS

Frequency hopping system in the 902-928 MHz band shall use at least 50 hopping frequencies.

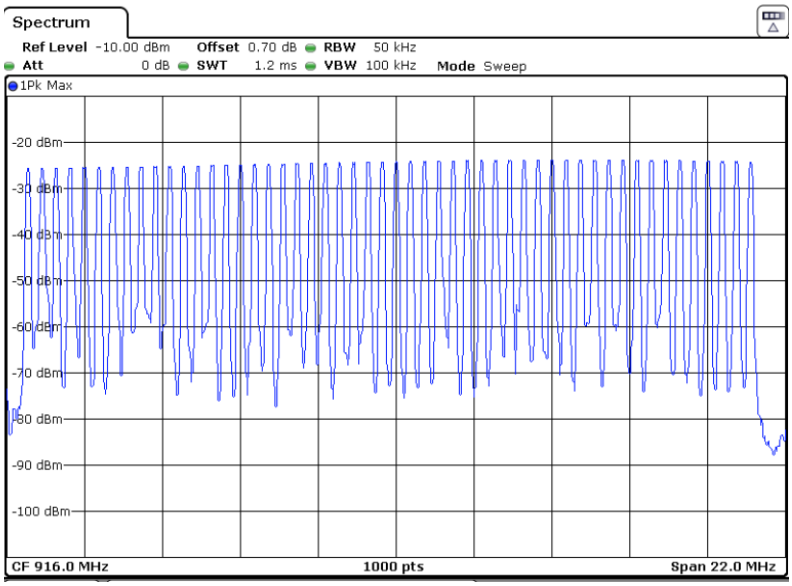
| | |
|---|---|
| **TEST SETUP:** | |




| | |
|---|---|
| **TESTED SAMPLES:** | S/01 |
| **TESTED CONDITIONS MODES:** | TC#01 |
| **TEST RESULTS:** | PASS |

The Number of hopping channels is 52 (See next plot).

| TEST RESULTS (Cont.): | |
|---|---|



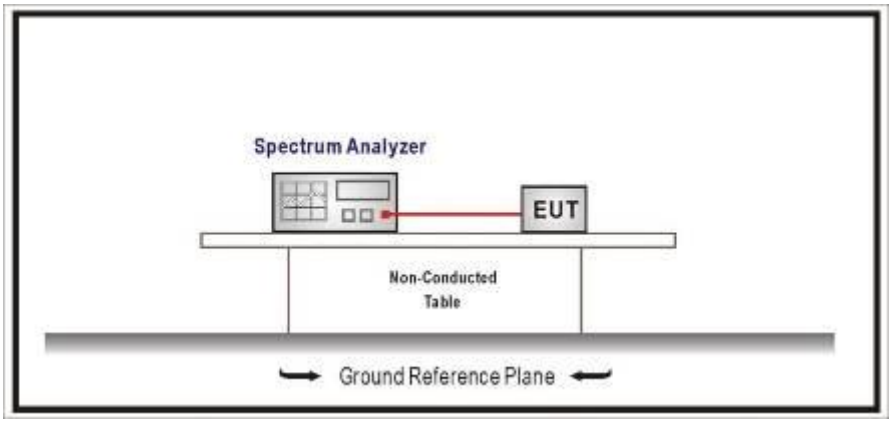
## TEST A.3: TIME OF OCCUPANCY (DWELL TIME)

| | | |
|---|---|---|
| **LIMITS:** | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
| | Test standard: | Part 15 Subpart C §15.247(a)(1)(i) and RSS-247 5.1(c) |

LIMITS

The average time of occupancy on any frequency shall not be greater than 0.4 seconds (400 ms) within 20 second period.

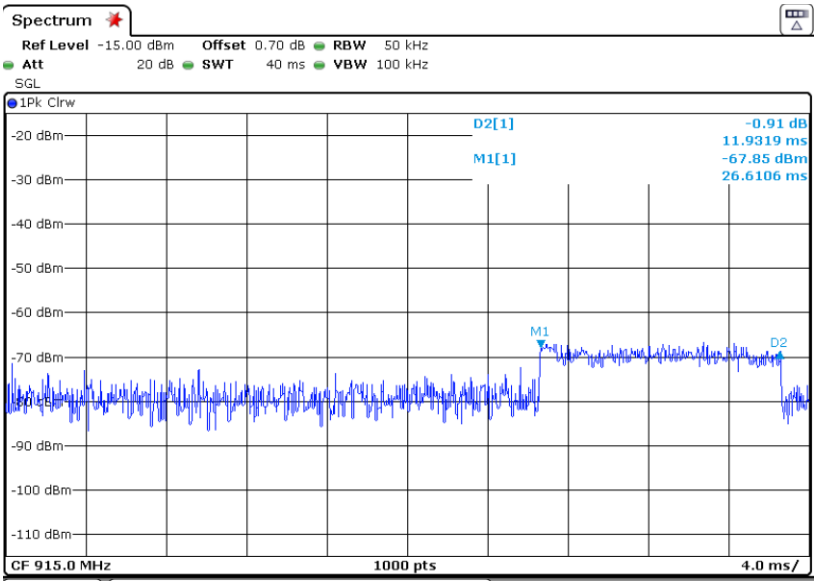
| | |
|---|---|
| **TEST SETUP:** | |



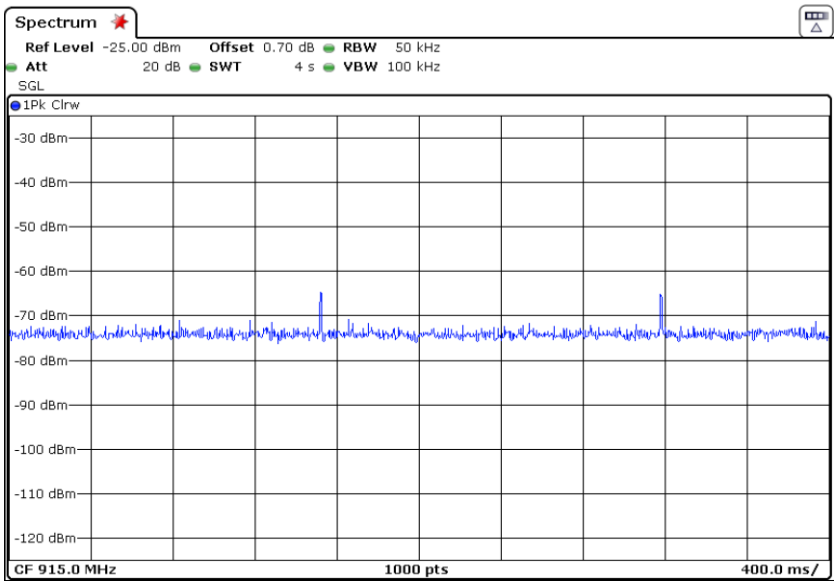

| | |
|---|---|
| **TESTED SAMPLES:** | S/01 |
| **TESTED CONDITIONS MODES:** | TC#01 |
| **TEST RESULTS:** | PASS |

- Tx- time per hop = 11.93 ms (see next plot).

| TEST RESULTS (Cont.): | |
|---|---|




Number of hops over a period of 4 seconds = 2 (see next plot).




Number of hops in the period specified in the requirements = (2 hops) x (21.2 s / 4 s) = 10.6 hops.

Averaging time of occupancy = 11.93 ms x 10.6 hops = 126.46 ms per 21.2 second period (52 hopping frequencies).

| | |
|---|---|
| Measurement uncertainty (%) | <±0.01 |

## TEST A.4: MAXIMUM OUTPUT POWER AND ANTENNA GAIN

| LIMITS: | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
|---|---|---|
| | Test standard: | Part 15 Subpart C §15.247(b)(2) and RSS-247 5.4(a) |

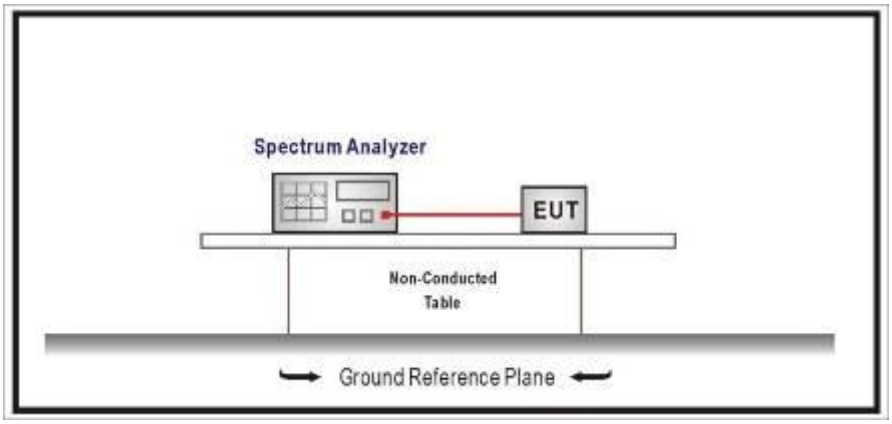
LIMITS

For frequency hopping systems operating in the 902-928 MHz band: 1 watt (30 dBm) for systems employing at least 50 hopping channels.
The e.i.r.p. shall not exceed 4 W (36 dBm) (Canada).

**TEST SETUP:**

The maximum peak conducted output power was measured using the method according to point 9.2.2.2 of Guidance for Performing Compliance Measurements on Digital Transmission Systems (DTS) Operating Under §15.247 558074 D01 DTS Meas Guidance v04 dated 05/04/2017.

The EIRP power (dBm) is calculated by adding the declared maximum antenna gain to the measured conducted power.



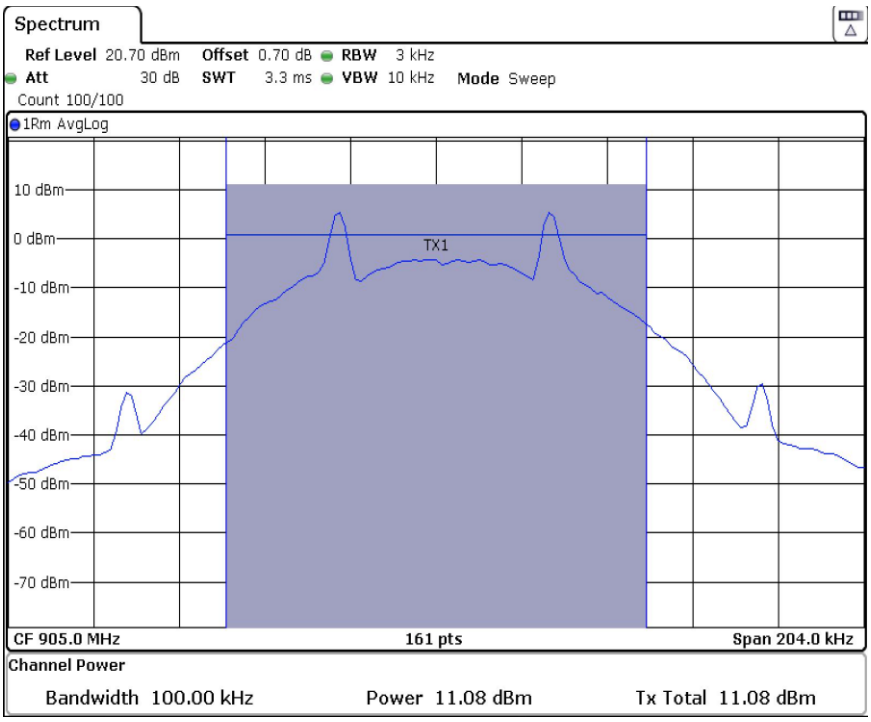
| | |
|---|---|
| **TESTED SAMPLES:** | S/01 |
| **TESTED CONDITIONS MODES:** | TC#01 |
| **TEST RESULTS:** | PASS |

Maximum declared antenna gain: +5dBi.

| | Lowest frequency 905 MHz | Middle frequency 915 MHz | Highest frequency 926 MHz |
|---|---|---|---|
| Maximum Conducted Power (dBm) | 11.08 | 11.01 | 11.05 |
| Maximum EIRP power (dBm) | 16.08 | 16.01 | 16.05 |
| Measurement uncertainty (dB) | <±0.78 | | |

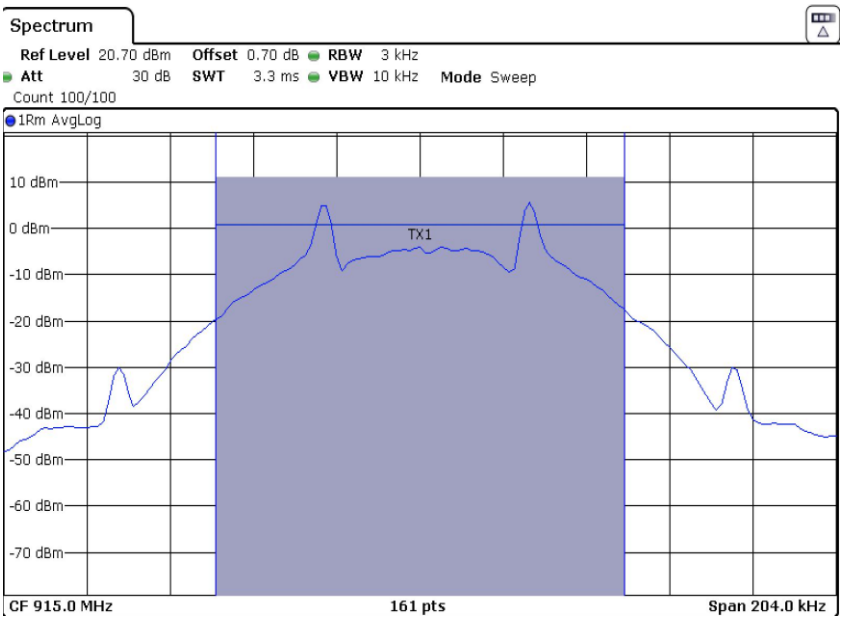
MAXIMUM OUTPUT POWER. See next plots.

**Lowest Channel**

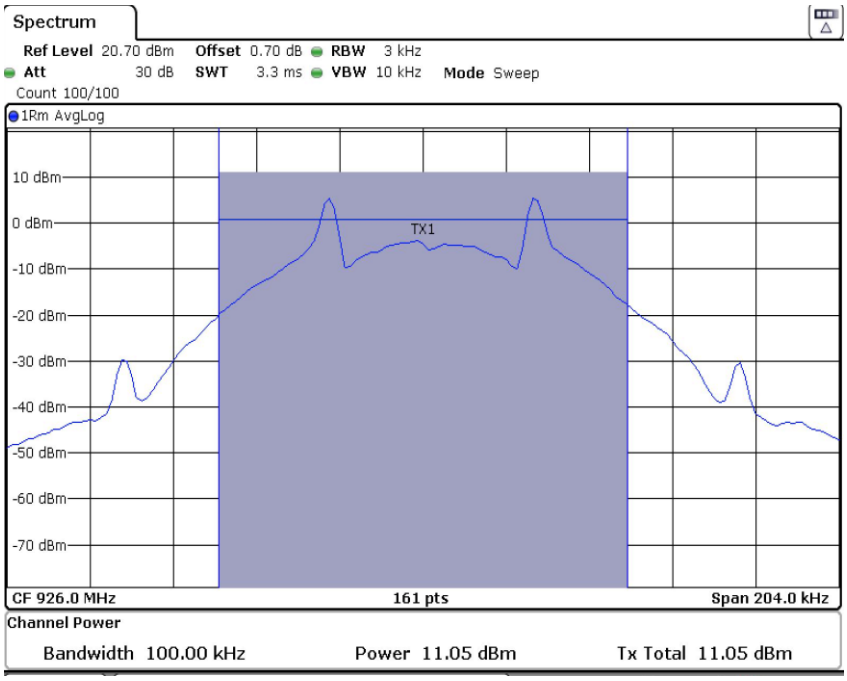


| TEST RESULTS (Cont.): | |
|---|---|

### Middle Channel




### Highest Channel



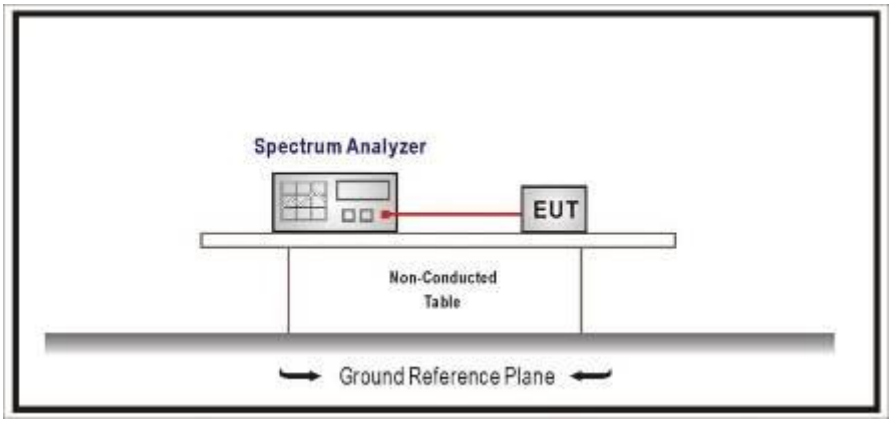
## TEST A.5: BAND-EDGE EMISSIONS COMPLIANCE (TRANSMITTER)

| | | |
|---|---|---|
| **LIMITS:** | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
| | Test standard: | Part 15 Subpart C §15.247(d) and RSS-247 5.5 |

LIMITS

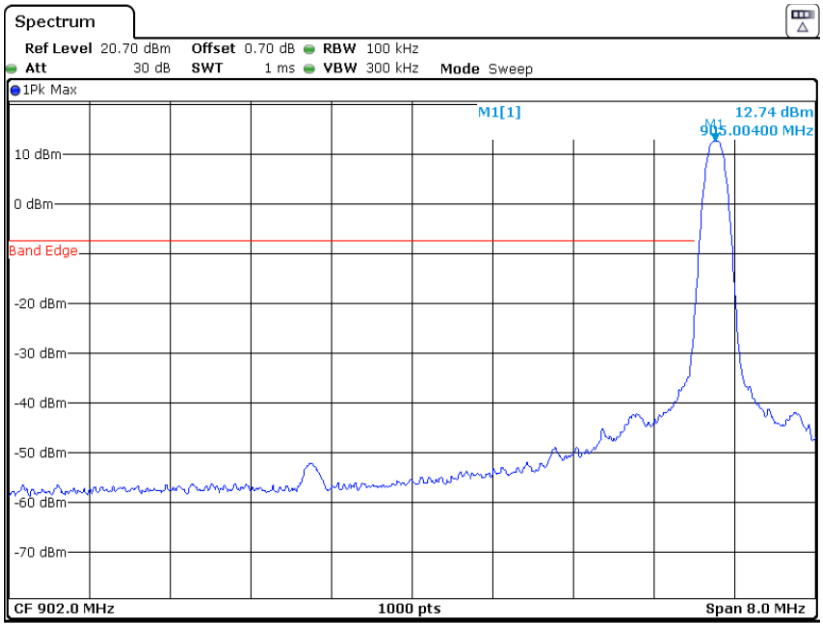
Emissions outside the frequency band in which the intentional radiator is operating shall be at least 20dB below the highest level of the desired power.

**TEST SETUP:**

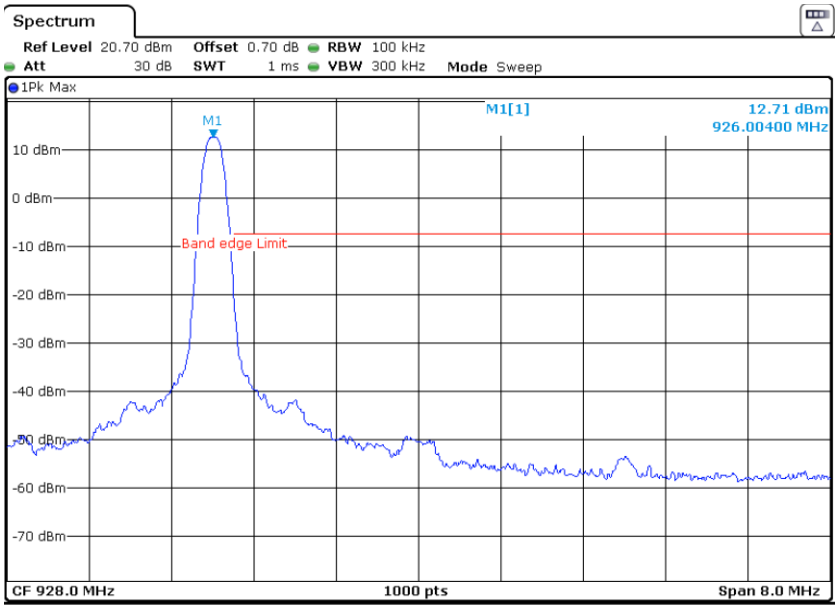


| TESTED SAMPLES: | S/01 |
|---|---|
| TESTED CONDITIONS MODES: | TC#01 |
| TEST RESULTS: | PASS |

**Lowest Frequency (HOP OFF)**

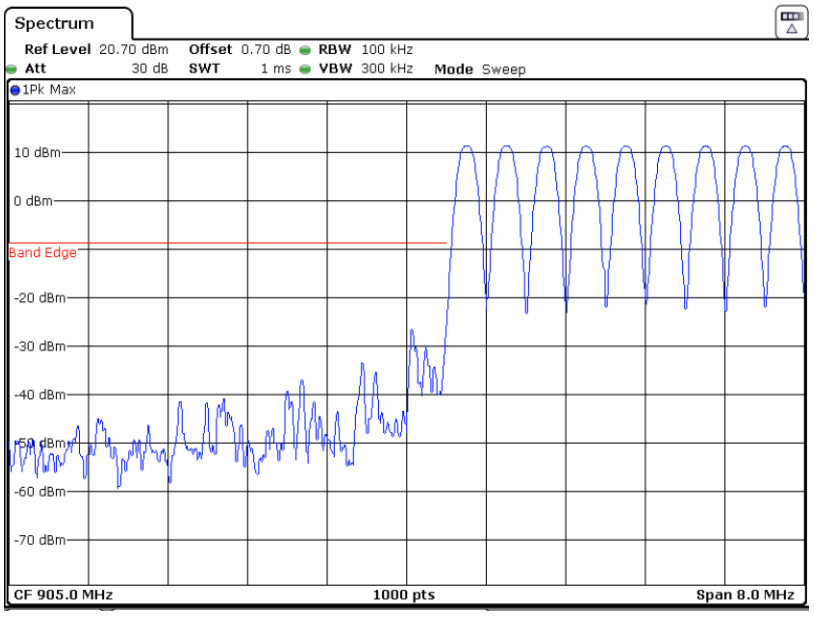



**Highest Frequency (HOP OFF)**

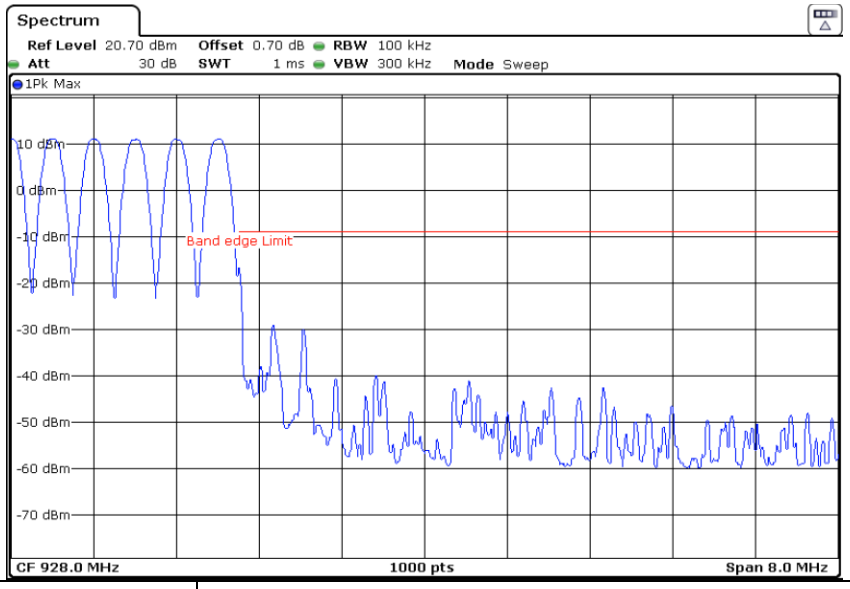


| TEST RESULTS (Cont.): | |
|---|---|

**Lowest Frequency (HOP ON)**




**Highest Frequency (HOP ON)**




| | |
|---|---|
| Measurement Uncertainty | <±2.03 |

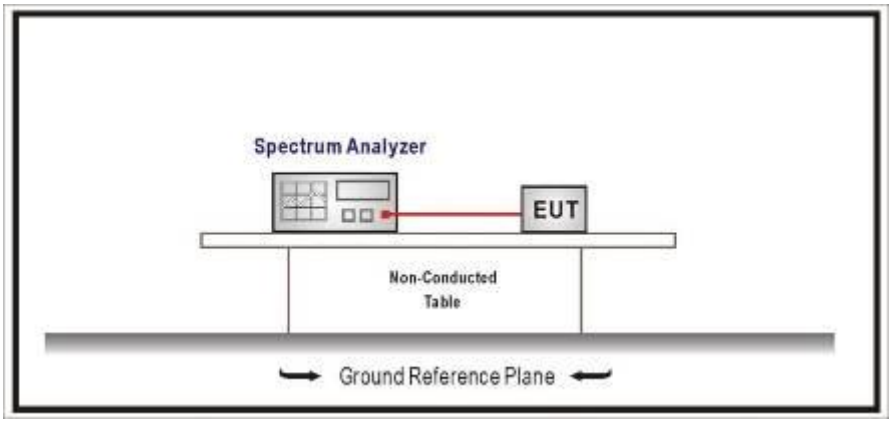
# TEST A.6: EMISSION LIMITATIONS CONDUCTED (TRANSMITTER)

| | | |
|---|---|---|
| **LIMITS:** | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
| | Test standard: | Part 15 Subpart C §15.247(d) and RSS-247 5.5 |

LIMITS

In any 100 kHz bandwidth outside the frequency band in which the 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. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required shall be 30 dB instead of 20 dB.

| **TEST SETUP** | |
|---|---|



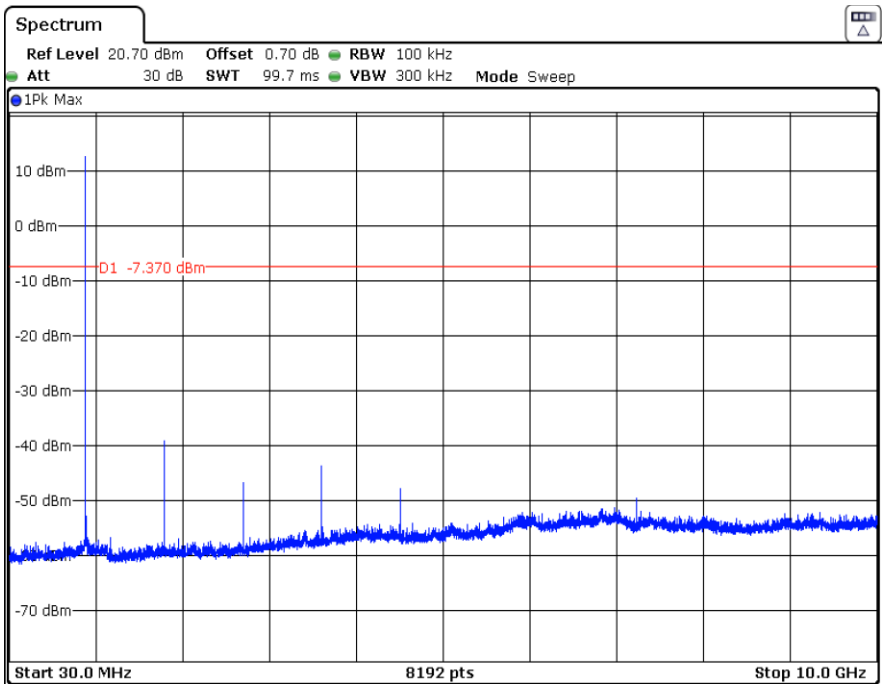

| | |
|---|---|
| **TESTED SAMPLES:** | S/01 |
| **TESTED CONDITIONS MODES:** | TC#01 |
| **TEST RESULTS:** | PASS |

| | Lowest frequency 905 MHz | Middle frequency 915 MHz | Highest frequency 926 MHz |
|---|---|---|---|
| Reference Level Measurement (dBm) | 12.63 | 12.61 | 12.59 |
| Measurement uncertainty (dB) | <±0.78 | | |

| TEST RESULTS (Cont.): | |
|---|---|

**Lowest frequency: 905 MHz**

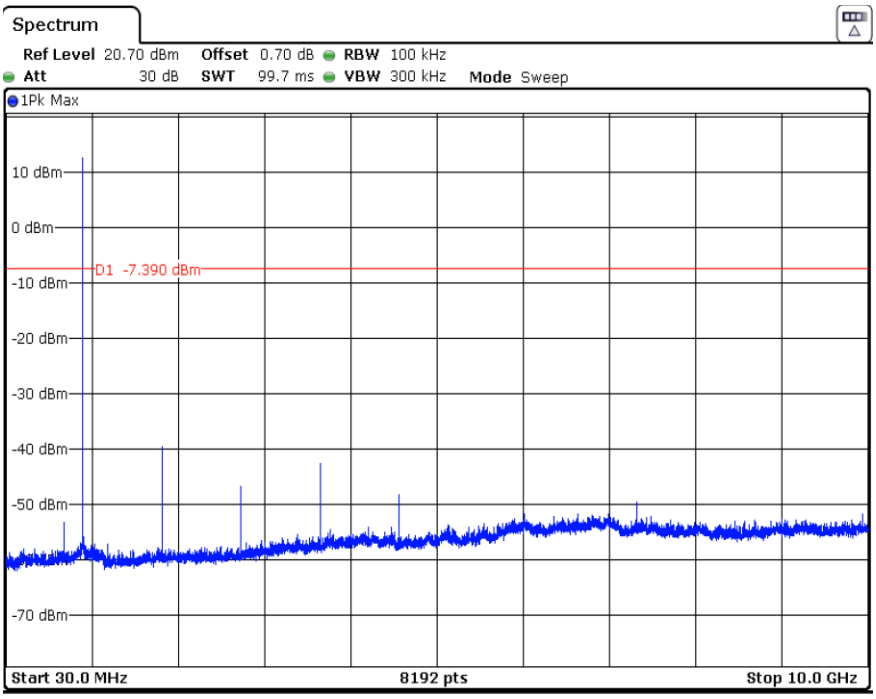
| Frequency (GHz) | Emission limitations conducted (dBm) | Limit (dBm) |
|---|---|---|
| 1.188 | -56.58 | -7.37 |
| 1.809 | -39.11 | -7.37 |
| 2.716 | -46.67 | -7.37 |
| 3.612 | -43.64 | -7.37 |
| 4.525 | -47.68 | -7.37 |



| TEST RESULTS (Cont.): | |
|---|---|

**Middle frequency: 915 MHz**

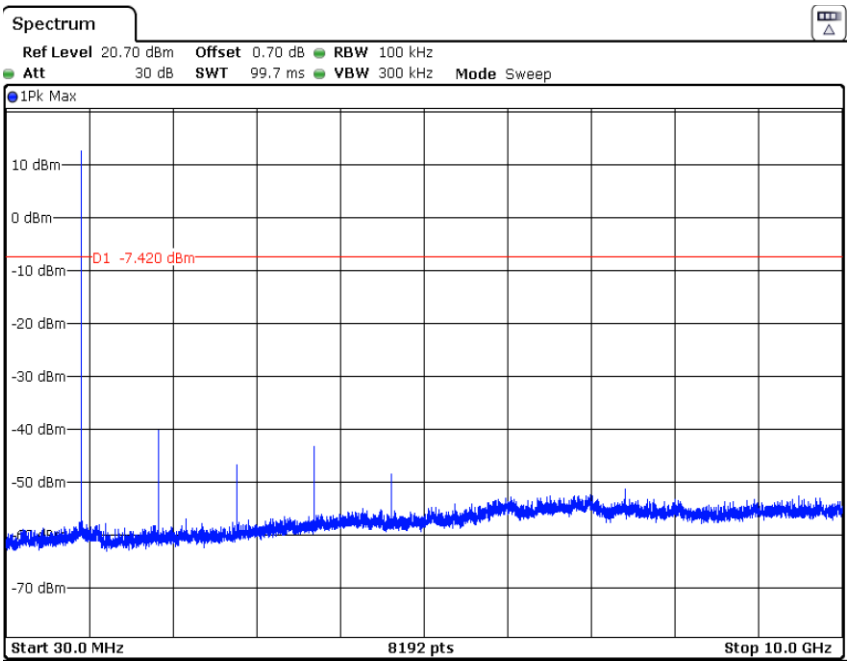
| Frequency (GHz) | Emission limitations conducted (dBm) | Limit (dBm) |
|---|---|---|
| 1.1830 | -39.49 | -7.39 |
| 2.746 | -48.39 | -7.39 |
| 3.66 | -42.60 | -7.39 |
| 4.575 | -48.40 | -7.39 |
| 7.312 | -49.49 | -7.39 |



| TEST RESULTS (Cont.): | |
|---|---|

**Highest frequency: 926 MHz**

| Frequency (GHz) | Emission limitations conducted (dBm) | Limit (dBm) |
|---|---|---|
| 1.853 | -40.15 | -7.42 |
| 2.777 | -46.56 | -7.42 |
| 3.703 | -42.50 | -7.42 |
| 4.63 | -48.38 | -7.42 |



## TEST A.7: EMISSION LIMITATIONS RADIATED (TRANSMITTER)

| **LIMITS:** | Product standard: | Part 15 Subpart C §15.247 and RSS-247 |
|---|---|---|
| | Test standard: | Part 15 Subpart C §15.247(d) and RSS-247 5.5 |

LIMITS

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) / RSS-Gen):

| 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) | - | 30 |
| 1.705 - 30.0 | 30 | - | 30 |
| 30 - 88 | 100 | 40 | 3 |
| 88 - 216 | 150 | 43.5 | 3 |
| 216 - 960 | 200 | 46 | 3 |
| 960 - 25000 | 500 | 54 | 3 |

The emission limits shown in the above table are based on measurements employing CISPR quasi-peak detector except for the frequency bands 9-90 kHz, 110-490 kHz and above 1000 MHz. Radiated emission limits in these three bands are based on measurements employing an average detector.

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

RSS-247. Attenuation below the general field strength limits specified in RSS-Gen is not required

**TEST SETUP:**

All radiated tests were performed in a semi-anechoic chamber. The measurement antenna is situated at 3 m for the frequency range 30-1000 MHz (Bilog antenna) and at a distance of 1m for the frequency range 1-40 GHz (1 GHz-18 GHz and 18 GHz-40 GHz Double ridge horn antennas).

For radiated emissions in the range 1-40 GHz that is performed at a distance closer than the specified distance, an inverse proportionality factor of 20 dB per decade is used to normalize the measured data for determining compliance.

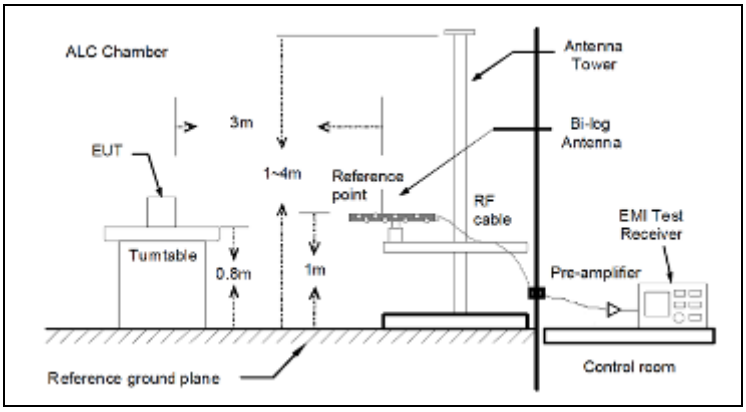
The equipment under test was set up on a non-conductive platform above the ground plane and the situation and orientation was varied to find the maximum radiated emission. It was also rotated 360º and the antenna height was varied from 1 to 4 meters to find the maximum radiated emission.

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

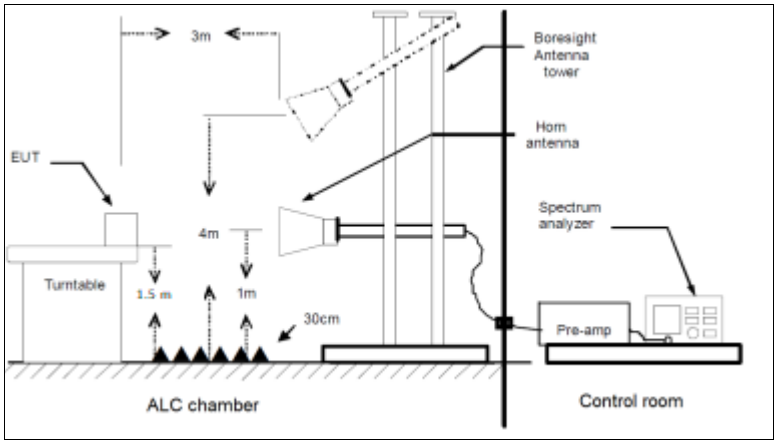
The field strength is calculated by adding correction factor to the measured level from the spectrum analyzer. This correction factor includes antenna factor, cable loss and pre-amplifiers gain.

| TEST SETUP (CONT.): | |
|---|---|

Radiated measurements Setup f < 1 GHz




Radiated measurements setup f > 1 GHz




| TESTED SAMPLES: | S/02 |
|---|---|
| TESTED CONDITIONS MODES: | TC#01 |
| TEST RESULTS: | PASS |

**Frequency range 30 MHz – 1000 MHz**

The spurious emissions for the lowest, middle and highest operating channels are showed in the tables of each frequency range.

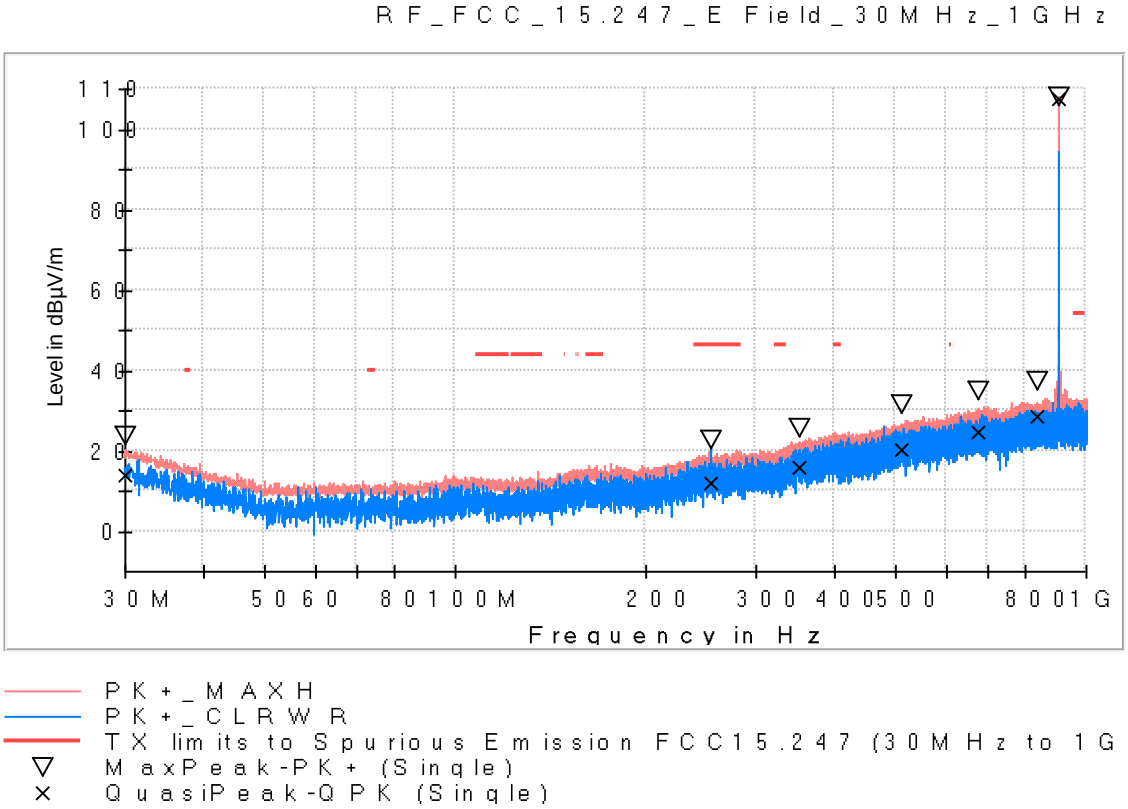
**Frequency range 1 GHz – 18 GHz**

The spurious emissions for the lowest, middle and highest operating channels are showed in the tables of each frequency range.

| TEST RESULTS (Cont.): | 30-1000 MHz (Lowest Channel) |
|---|---|

**Lowest Channel 905 MHZ:**

30MHz_1GHz_HP & VP_CH Low




## Maximizations

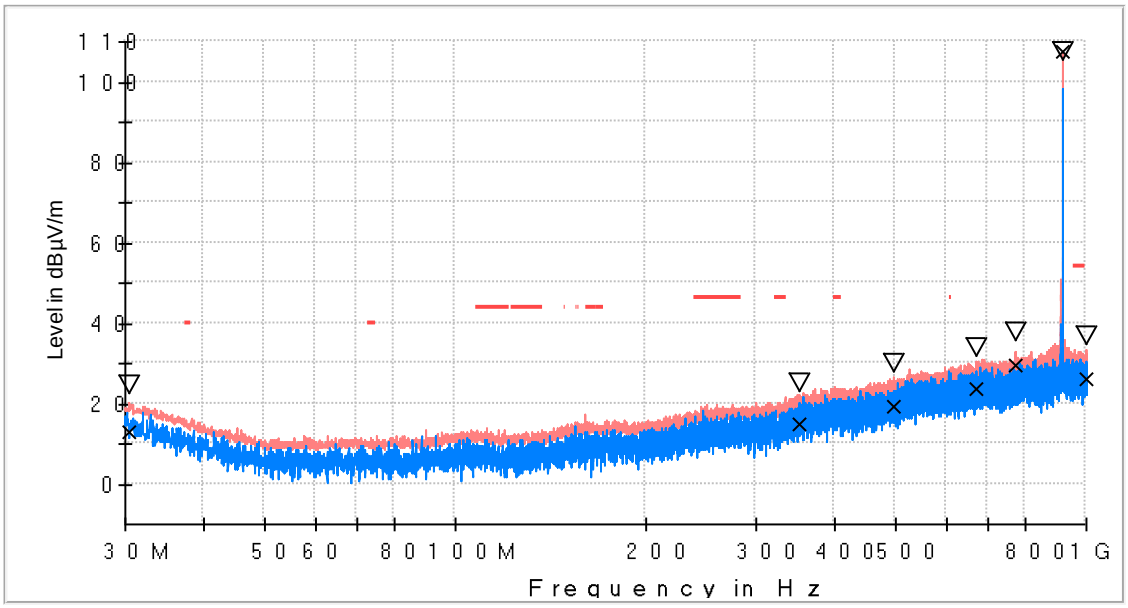
| Frequency (MHz) | MaxPeak (dBµV/m) | QuasiPeak (dBµV/m) |
|---|---|---|
| 30.048500 | 23.71 | 13.81 |
| 254.215500 | 22.73 | 11.84 |
| 351.118500 | 25.77 | 15.67 |
| 508.064500 | 31.58 | 20.29 |
| 673.207000 | 34.85 | 24.42 |
| 833.014500 | 37.54 | 28.33 |
| 905.037000 | 107.88 | 107.75 |

| TEST RESULTS (Cont.): | 30-1000 MHz (Middle Channel) |
|---|---|

**Middle Channel 915 MHz:**

30MHz_1GHz_HP & VP_CH Mid

RF_FCC_15.247_Field_30MHz_1GHz




PK+_MAXH
PK+_CLRWR
TX limits to Spurious Emission FCC15.247 (30MHz to 1GHz
▽ MaxPeak-PK+ (Single)
× QuasiPeak-QPK (Single)

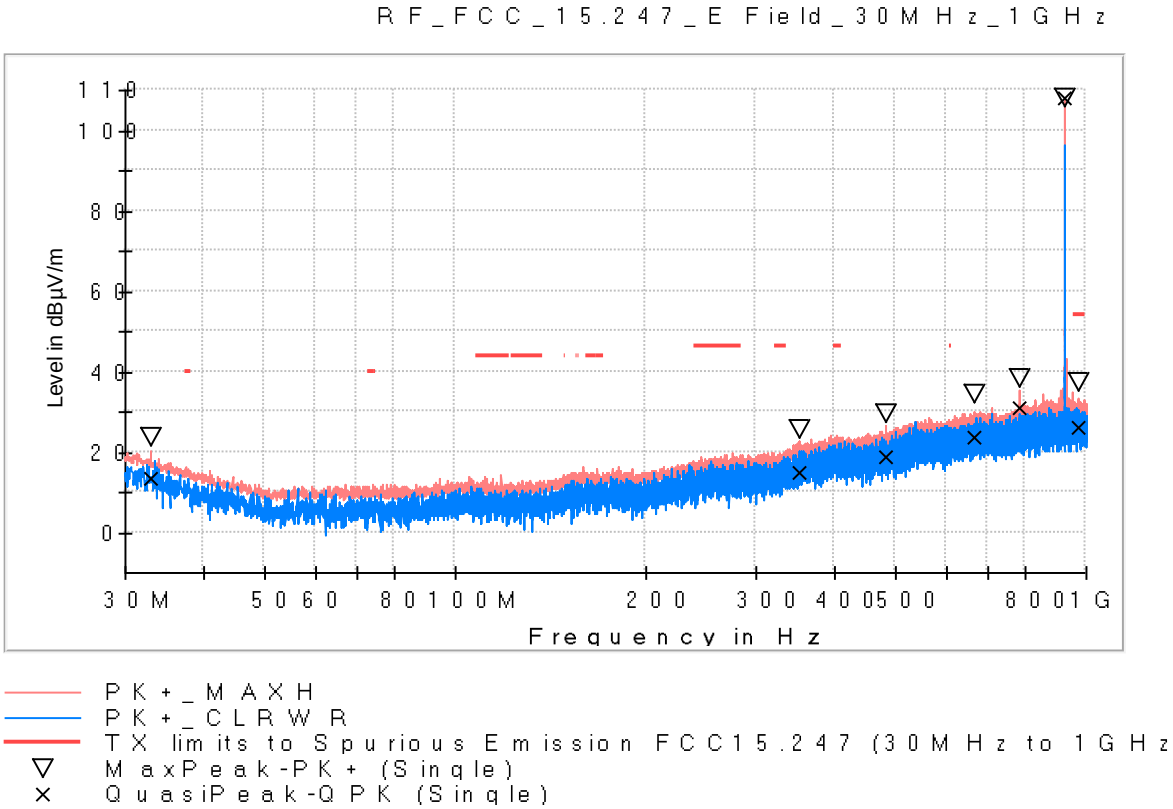
## Maximizations

| Frequency (MHz) | MaxPeak (dBµV/m) | QuasiPeak (dBµV/m) |
|---|---|---|
| 30.436500 | 24.47 | 13.00 |
| 351.700500 | 25.29 | 14.99 |
| 496.424500 | 29.85 | 19.05 |
| 669.230000 | 33.88 | 23.59 |
| 770.983000 | 37.73 | 29.44 |
| 915.028000 | 107.72 | 107.68 |
| 999.078500 | 36.98 | 26.12 |

| TEST RESULTS (Cont.): | 30-1000 MHz (Highest Channel) |
|---|---|

**Highest Channel 926 MHz:**

30MHz_1GHz_HP & VP_CH High



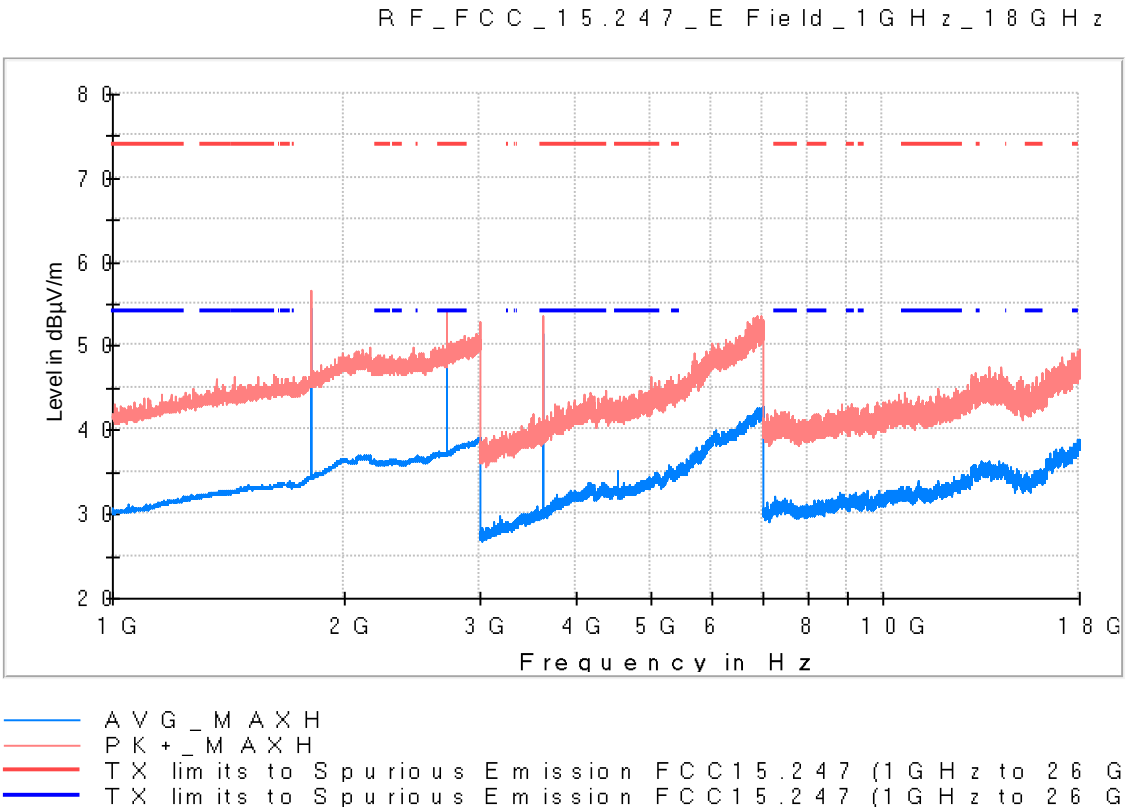

## Maximizations

| Frequency (MHz) | MaxPeak (dBµV/m) | QuasiPeak (dBµV/m) |
|---|---|---|
| 32.910000 | 23.44 | 13.32 |
| 351.943000 | 25.40 | 14.94 |
| 482.844500 | 29.29 | 18.54 |
| 666.029000 | 34.46 | 23.57 |
| 781.362000 | 38.21 | 31.15 |
| 926.037500 | 108.18 | 108.05 |
| 968.281000 | 37.20 | 25.94 |

| TEST RESULTS (Cont.): | 1-18 GHz (Lowest Channel) |
|---|---|

**Lowest Channel 905 MHz:**

1GHz_18GHz_ HP & VP_CH Low




## Maximizations

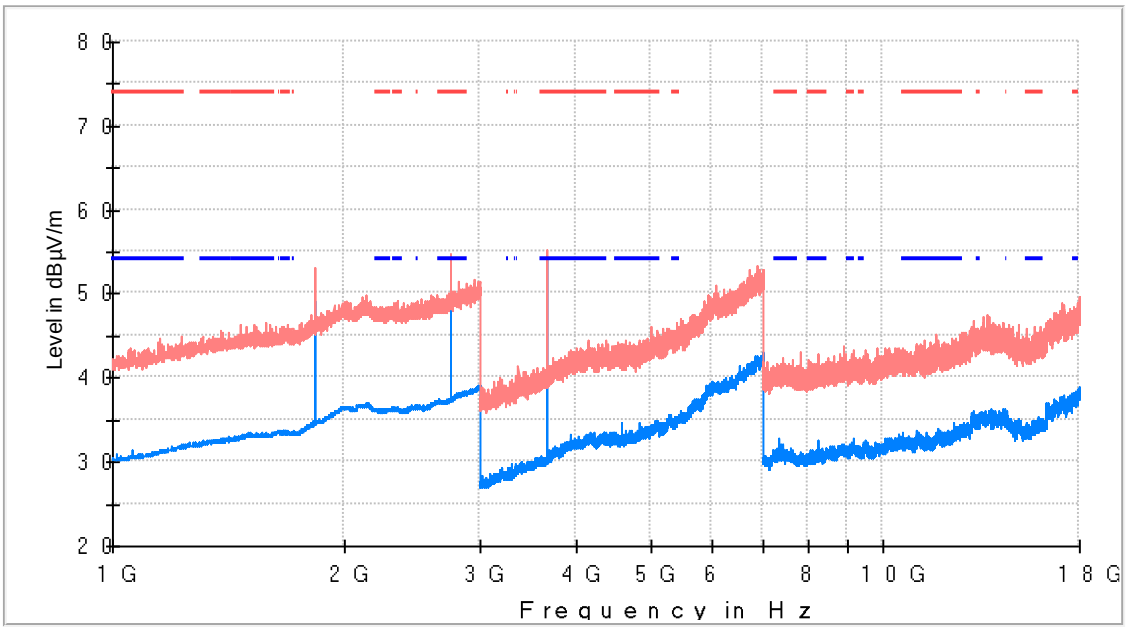
| Frequency (MHz) | PK+_MAXH (dBµV/m) | AVG_MAXH (dBµV/m) | Pol | Azimuth (deg) | Comment |
|---|---|---|---|---|---|
| 1810.000000 | 56.61 | 54.65 | H | -118.0 | Fundamental |
| 2715.000000 | 54.00 | 50.08 | H | 44.0 | |
| 3620.000000 | 52.92 | 51.51 | H | 82.0 | |
| 4525.000000 | 43.36 | 35.13 | V | -179.0 | |

| TEST RESULTS (Cont.): | 1-18 GHz (Middle Channel) |
|---|---|

**Middle Channel 915 MHz:**

1GHz_18GHz_HP & VP_CH Mid

RF_FCC_15.247_E Field_1GHz_18GHz




AVG_MAXH
PK+_MAXH
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz
TX limits to Spurious Emission FCC15.247 (1GHz to 26 GHz

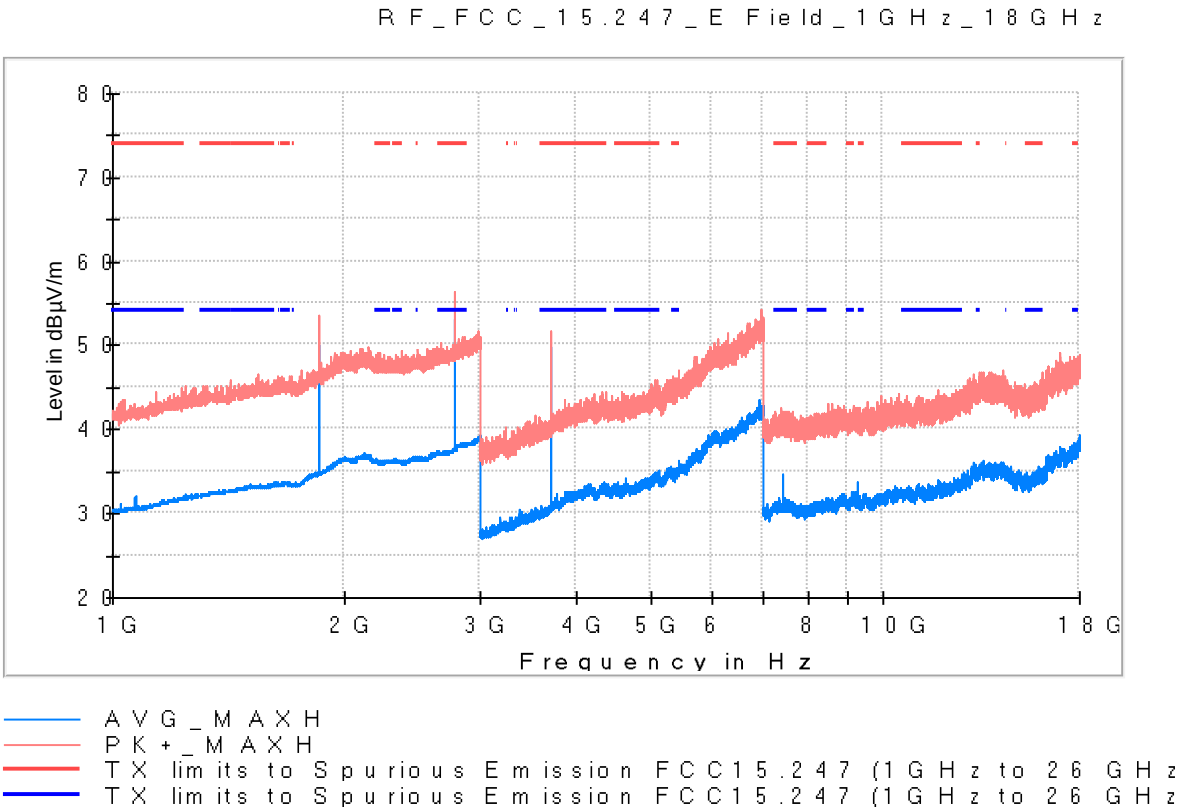
## Maximizations

| Frequency (MHz) | PK+_MAXH (dBµV/m) | AVG_MAXH (dBµV/m) | Pol | Azimuth (deg) | Comment |
|---|---|---|---|---|---|
| 1830.000000 | 53.10 | 49.10 | V | 172.0 | Fundamental |
| 2745.000000 | 54.80 | 50.39 | H | 63.0 | |
| 3660.000000 | 55.25 | 54.06 | V | 180.0 | |
| 4574.500000 | 44.08 | 34.67 | H | 73.0 | |
| 5450.000000 | 44.81 | 36.19 | H | -119.0 | |

| TEST RESULTS (Cont.): | 1-18 GHz (Highest Channel) |
|---|---|

**Highest Channel 926 MHz:**

1GHz_18GHz_HP & VP_CH High




## Maximizations

| Frequency (MHz) | PK+_MAXH (dBµV/m) | AVG_MAXH (dBµV/m) | Pol | Azimuth (deg) | Comment |
|---|---|---|---|---|---|
| 1852.000000 | 53.66 | 50.19 | V | -113.0 | Fundamental |
| 2778.000000 | 56.32 | 53.24 | H | 50.0 | |
| 3703.500000 | 51.54 | 49.78 | V | -179.0 | |
| 7408.000000 | 41.40 | 34.71 | V | 55.0 | |
| 9260.000000 | 40.97 | 33.84 | V | -172.0 | |