



**EUROFINS ETS PRODUCT SERVICE GMBH**

# **TEST - REPORT**

**FCC RULES PARTS 15.247  
IC RADIO STANDARDS RSS-210 Issue 7**

**FCC ID: JYCC530**

**Model Name: C530**

**Test report no.: G5M208040014-P-15**



**Certificate #1983.01**



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## 1 General information

### 1.1 Notes

The purpose of conformity testing is to increase the probability of adherence to the essential requirements or conformity specifications, as appropriate.

The complexity of the technical specifications, however, means that full and thorough testing is impractical for both technical and economic reasons.

Furthermore, there is no guarantee that a test sample which has passed all the relevant tests conforms to a specification.

Neither is there any guarantee that such a test sample will interwork with other genuinely open systems.

The existence of the tests nevertheless provides the confidence that the test sample possesses the qualities as maintained and that its performance generally conforms to representative cases of communications equipment.

The test results of this test report relate exclusively to the item tested as specified in 1.5.

The test report may only be reproduced or published in full.

Reproduction or publication of extracts from the report requires the prior written approval of the Eurofins ETS Product Service GmbH.

#### Operator:

17.07.2008

W. Meng



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Date

Eurofins-Lab.

Name

Signature

#### Technical responsibility for area of testing:

17.07.2008

K. Damm



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Date

Eurofins-Lab.

Name

Signature

## 1.2 Testing laboratory

### 1.2.1 Location

EUROFINS ETS PRODUCT SERVICE GMBH  
Storkower Straße 38c  
D-15526 Reichenwalde b. Berlin  
Germany  
Telephone : +49 33631 888 00  
Telefax : +49 33631 888 660

### 1.2.2 Details of accreditation status

**DAR ACCREDITED TESTING LABORATORY**  
DAR-REGISTRATION NUMBER: DAT-P-268/08

**RECOGNIZED NOTIFIED BODY EMC**  
REGISTRATION NUMBER: BNetzA-bS EMV-07/61

**RECOGNIZED NOTIFIED BODY R&TTE**  
REGISTRATION NUMBER: BNetzA-bS-02/51-53

**FCC FILED TEST LABORATORY**  
REG.-No. 96970

**A2LA ACCREDITED TESTING LABORATORY**  
CERTIFICATE No. 1983.01

**BLUETOOTH QUALIFICATION TEST FACILITY (BQTF)**  
ACCREDITED BY BLUETOOTH QUALIFICATION REVIEW BOARD

**INDUSTRY CANADA FILED TEST LABORATORY**  
REG. No. IC 3470

## 1.3 Details of approval holder

|           |  |
|-----------|--|
| Name      | : Pantech Co., Ltd.  |
| Street    | : Pantech Bldg, I-2 DMC, Sangam-dong                       |
| Town      | : Mapo-gu, Seoul   |
| Country   | : Korea  |
| Telephone | : +82-2-2030-1320  |
| Contact   | : Mr. B.W. Kim   |
| E-Mail    | : <a href="mailto:bwkim@pantech.com">bwkim@pantech.com</a> |

## 1.4 Application details

Date of receipt of application : 28.04.2008  
Date of receipt of test item : 28.04.2008  
Date of test : 16.07.2008 – 17.07.2008

## 1.5 Test item

Description of test item : GSM phone  
Type identification : C530  
Serial number : without  
Photos : See annex A.

## Technical data

Frequency band : 2.4 - 2.4835 GHz  
Frequency Ch A : 2402 MHz  
Frequency Ch B : 2441 MHz  
Frequency Ch C : 2480 MHz

| <b>Transmitter</b>  | <b>V<sub>nom</sub></b> | <b>V<sub>nom -15 %</sub></b> | <b>V<sub>nom +15 %</sub></b> |
|---------------------|------------------------|------------------------------|------------------------------|
| <b>Power (ch A)</b> | Conducted: 3.17 dBm    | Conducted: 2.86 dBm          | Conducted: 3.05 dBm          |
| <b>Power (ch B)</b> | Conducted: 3.66 dBm    | Conducted: 3.54 dBm          | Conducted: 3.52 dBm          |
| <b>Power (ch C)</b> | Conducted: 2.55 dBm    | Conducted: 2.46 dBm          | Conducted: 2.47 dBm          |

Antenna Type : internal antenna  
Antenna Gain : -5 dBi  
Power supply : 3.8 V DC 120 V AC/DC Adapter  
Operating mode : duplex  
Type of modulation : FHSS  
Host device : none

Classification :

|   |                                     |
|---|-------------------------------------|
| Fixed Device                                  | <input type="checkbox"/>            |
| Mobile Device (Human Body distance > 20 cm)   | <input type="checkbox"/>            |
| Portable Device (Human Body distance < 20 cm) | <input checked="" type="checkbox"/> |

**Manufacturer:**  
(if applicable)

Name : Pantech Co., Ltd.  
Street : Pantech Bldg, I-2 DMC, Sangam-dong  
Town : Mapo-gu, Seoul  
Country : Korea

## Additional information:

The test sample is designed as Bluetooth device. Its pseudorandom hopping scheme, authentication, receiver parameters, synchronization procedure and other parameters are determined by Bluetooth Core Specification.

According to attached declaration of manufacturer this device don't work in master inquiry mode.  
So we have only one frequency hopping system and the hopping sequence of the master inquiry mode is not verified.

## 1.6 Test standards

Technical standard: FCC Parts: 15.247  
IC Standards: RSS 210 Issue 7 Annex 8.1

## 2 Technical test

## 2.1 Summary of test results

No deviations from the technical specification(s) were ascertained in the course of the tests performed.

or

The deviations as specified in 2.5 were ascertained in the course of the tests performed. □

## 2.2 Test environment

Temperature : 25 °C

Relative humidity content : 20 ... 75 %

Air pressure : 86 ... 103 kPa

Details of power supply : 3.8 V DC 120 V AC/DC Adapter

Extreme conditions parameters: : test voltage - extreme min.: 3.6 V DC (V<sub>nom</sub> - 15%)  
max: 4.2 V DC (V<sub>nom</sub> + 15%)

## 2.3 Test equipment utilized

| No.      | Test equipment         | Type        | Manufacturer |
|----------|------------------------|-------------|--------------|
| ETS 0012 | Biconical Antenna      | HK 116      | R & S        |
| ETS 0013 | LPD Antenna            | HL 223      | R & S        |
| ETS 0015 | Log Periodical Antenna | HL 025      | R & S        |
| ETS 0018 | Horn antenna           | BBHA 9120 D | Schwarzbeck  |
| ETS 0253 | Spectrum Analyzer      | FSIQ 26     | R & S        |
| ETS 0271 | Spectrum Analyzer      | FSEK 30     | R & S        |
| ETS 0288 | Artificial mains       | ESH2-Z5     | R & S        |
| ETS 0311 | Anechoic chamber       | AC 4        | Frankonia    |
| ETS 0474 | EMI Test Receiver      | ESCS 30     | R&S          |

## 2.4 General test procedure

POWER LINE CONDUCTED INTERFERENCE: The procedure used was ANSI STANDARD C63.4-2003 5.2 using a 50  $\mu$ H LISN (if necessary). Both lines were observed. The bandwidth of the spectrum analyzer was 10 kHz with an appropriate sweep speed.

RADIATION INTERFERENCE: The test procedure used was ANSI STANDARD C63.4-2003 6.4 using a spectrum analyzer. The resolution bandwidth of the spectrum analyzer was 100 kHz for measurements below 1 GHz and RBW 1 MHz was used above 1 GHz. The analyzer was calibrated in dB above a microvolt at the output of the antenna.

FORMULA OF CONVERSION FACTORS for Field strength: The Field Strength at 3 m was established by adding the meter reading of the spectrum analyzer (which is set to read in units of dB $\mu$ V) to the antenna correction factor supplied by the antenna manufacturer. The antenna correction factors are stated in terms of dB.

Example:

|             |  |
|-------------|--|
| Freq. (MHz) | METER READING + ACF + CABLE LOSS (to the receiver) = FS    |
| 33          | 20 dB $\mu$ V + 10.36 dB + 6 dB = 36.36 dB $\mu$ V/m @ 3 m |

ANSI STANDARD C63.4-2003 6.2.1 MEASUREMENT PROCEDURES: The UUT was placed on a table 80 cm high and with dimensions of 1 m by 1.5 m (non metallic table). The UUT was placed in the center of the table. The table used for radiated measurements is capable of continuous rotation. The spectrum was scanned from 30 MHz to at least 10<sup>th</sup> harmonic of the fundamental.

Peak readings were taken in three (3) orthogonal planes and the highest readings.

Measurements were made by Eurofins ETS Product Service GmbH at the registered open field test site located at Storkower Str. 38c, 15526 Reichenwalde, Germany.

When an emission was found, the table was rotated to produce the maximum signal strength. At this point, the antenna was raised and lowered from 1 m to 4 m. The antenna was placed in both the horizontal and vertical planes.

### RF Exposure Compliance Requirements

According to FCC OET Bulletin 65 Edition 97-01 Supplement C and RSS-102 § 2.5, this spread spectrum transmitter is categorically excluded from routine environmental evaluation because of the low power level, where there is a high likelihood of compliance with RF exposure standards.

The antenna used for this transceiver must not be co-located or operating in conjunction with any other antenna or transmitter.

### ANTENNA & GROUND:

This unit uses internal antenna.

## 2.5 Test results

1<sup>st</sup> test       test after modification       production test

| SECT. | TEST CASE                         | FCC<br>47CFR PART | IC<br>RSS- | Required                            | Test<br>passed                      | Test failed              |
|-------|-----------------------------------|-------------------|------------|-------------------------------------|-------------------------------------|--------------------------|
| 3     | <i>TRANSMITTER PARAMETERS</i>     |                   |            |                                     |                                     |                          |
| 3.1   | RF power output conducted         | 15.247 (b)        | 210 A8.4   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.2   | RF power output radiated (EIRP)   | 15.247 (b)        | 210 A8.4   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> |
| 3.3   | 20dB bandwidth                    | 15.247 (a)(1)     | 210 A8.1   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.4   | Time of occupancy (dwell time)    | 15.247 (a)(1)     | 210 A8.1   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.5   | Number of hopping channels        | 15.247 (a)(1)     | 210 A8.1   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.6   | Carrier frequency separation      | 15.247 (a)(1)     | 210 A8.1   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.7   | Spurious emission conducted       | 15.247 (d)        | 210 A8.5   | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> |
| 3.8   | Spurious emission radiated        | 15.247 (d)        | 210 A8.5   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.9   | Band-edge compliance              | 15.247 (d)        | 210 A8.5   | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 3.10  | AC power line conducted emissions | 15.207            | Gen 7.2.2  | <input checked="" type="checkbox"/> | <input checked="" type="checkbox"/> | <input type="checkbox"/> |
| 4     | <i>RECEIVER PARAMETERS</i>        |                   |            |                                     |                                     |                          |
| 4.1   | Radiated emissions                | 15.107            | Gen 7.2.3  | <input type="checkbox"/>            | <input type="checkbox"/>            | <input type="checkbox"/> |

### 3 Transmitter parameters

#### 3.1 RF power output, conducted

##### Reference

|     |                        |
|-----|------------------------|
| FCC | 47 CFR part 15.247 (b) |
| IC  | RSS-210 A 8.4          |

##### Method of measurement

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

The power was measured with modulation (declared by the applicant).

##### Limits

| Frequency band    | FCC and IC   |
|-------------------|--|
| 5725 - 5850 MHz   | 1 Watt (30 dBm) for systems with $\geq$ 75 hopping channels  |
| 2400 - 2483.5 MHz | 1 Watt (30 dBm) for systems with $\geq$ 75 non - overlapping hopping channels<br>0.125 Watt (21 dBm) for all other hopping systems, but at least 15 hopping channels |
| 902 - 928 MHz     | 1 Watt (30 dBm) for systems with $\geq$ 50 hopping channels<br>0.25 Watt (24 dBm) for all other hopping systems, but at least 25 hopping channels                    |

##### Test results

| Test conditions  | Channel A | Channel B | Channel C |
|--|-----------|-----------|-----------|
|  | [dBm]     | [dBm]     | [dBm]     |
| $T_{\text{nom}} = 25^\circ \text{C}$<br>$V_{\text{nom}} = 3.8 \text{ V}$ | 3.17      | 2.86      | 3.05      |
| $T_{\text{nom}} = 25^\circ \text{C}$<br>$V_{\text{min}} = 3.6 \text{ V}$ | 3.66      | 3.54      | 3.52      |
| $T_{\text{nom}} = 25^\circ \text{C}$<br>$V_{\text{max}} = 4.2 \text{ V}$ | 2.55      | 2.46      | 2.47      |
| Measurement uncertainty  |           | < 3 dB    |           |

See attached diagrams

**Test equipment:** ETS 0253, ETS 0271

### 3.2 RF power output, radiated

#### Reference

|     |                        |
|-----|------------------------|
| FCC | 47 CFR part 15.247 (b) |
| IC  | RSS-210 A8.4           |

#### Method of measurement

This measurement applies to equipment with an integral antenna and to equipment with an antenna connector and equipped with an antenna as declared by the applicant.

The power was measured with modulation (declared by the applicant).

#### Limits

| Frequency band    | FCC and IC  |
|-------------------|---|
| 5725 - 5850 MHz   | 4 Watt (36 dBm) for systems with $\geq$ 75 hopping channels.  |
| 2400 - 2483.5 MHz | 4 Watt (36 dBm) for systems with $\geq$ 75 non – overlapping hopping channels<br>0.631 Watt (28 dBm) for all other hopping systems, but at least 15 hopping channels  |
| 902 - 928 MHz     | 4 Watt (36 dBm) for systems with $\geq$ 50 hopping channels<br>1.585 Watt (32 dBm) for all other hopping systems, but at least 25 hopping channels  |
| FCC               | 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.  |
| IC                | Systems in the 2400 - 2483.5 MHz and 5725 - 5850 MHz which have an e.i.r.p. above 4 W are permitted only for point-to-point systems (i.e. point-to-multipoint systems and multiple co-located transmitters transmitting the same information are prohibited from exceeding 4 W e.i.r.p.). Point-to-point systems in these two bands may use higher e.i.r.p. as necessary for satisfactory operation provided that the higher e.i.r.p. is achieved by employing higher gain directional antennas and not higher transmitter output powers. However, remote stations of point-to-multipoint systems shall be allowed to operate under the same condition as point-to-point systems. |

**Test Results**

| Test conditions  | Channel A  | Channel B  | Channel C  |
|--|------------|------------|------------|
|  | EIRP [dBm] | EIRP [dBm] | EIRP [dBm] |
| $T_{\text{nom}} = 25 \text{ }^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8 \text{ V}$ | --         | --         | --         |
| Measurement uncertainty  |            | < 3 dB     |            |

**Test equipment:** ETS 0012, ETS, 0013, ETS, 0015, ETS 0018, ETS 0253, ETS 0271, ETS 0311

### 3.3 20 dB bandwidth

#### Reference

|     |                        |
|-----|------------------------|
| FCC | CFR part 15.247 (a)(1) |
| IC  | RSS-210 A8.1           |

#### Method of measurement

The 20 dB bandwidth is measured on the lowest, middle and highest hopping channel. 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. Alternatively, frequency hopping systems operating in the 2400 - 2483.5 MHz band may have hopping channel carrier frequencies that are separated by 25 kHz or two-thirds of the 20 dB bandwidth of the hopping channel, whichever is greater, provided the systems operate with an output power no greater than 125 mW. Frequency hopping systems may avoid or suppress transmissions on a particular hopping frequency provided that a minimum of 15 channels are used.

#### Limits

| Frequency band    | FCC and IC  |
|-------------------|---|
| 5725 - 5850 MHz   | $\leq$ 1 MHz  |
| 2400 - 2483.5 MHz | $\leq$ carrier frequencies separation for hopping systems with max cond. power of 1 Watt<br>$\leq$ 1.5 of the carrier frequencies separation for hopping systems with max cond. power of 0.125 Watt |
| 902 - 928 MHz     | $<$ 250 kHz for systems with $\geq$ 50 hopping channels<br>250 kHz $\leq$ 500 kHz for all other hopping systems   |

#### Test results

| Test conditions                             | Channel A | Channel B | Channel C |
|---|-----------|-----------|-----------|
|   | kHz       | kHz       | kHz       |
| $T_{nom} = 25^\circ C$<br>$V_{nom} = 3.8 V$ | 924.592   | 930.741   | 921.941   |
| Measurement uncertainty                     |           | $< 10$ Hz |           |

#### System receiver input bandwidth:

The manufacturer declares that the receiver input bandwidth matches to the bandwidth of the transmitter signal.

## Occupied Bandwidth (99%) – RSS Gen

| Test conditions   | Channel A | Channel B | Channel C |
|---|-----------|-----------|-----------|
|   | MHz       | MHz       | MHz       |
| $T_{\text{nom}} = 25^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8 \text{ V}$ | --        | --        | --        |
| Measurement uncertainty   |           | < 10 Hz   |           |

See attached diagrams

**Test equipment:** ETS 0271

### 3.4 Time of occupancy (dwell time)

#### Reference

|     |                        |
|-----|------------------------|
| FCC | CFR part 15.247 (a)(1) |
| IC  | RSS-210 A8.1           |

#### Method of measurement

The EUT has its hopping function enabled.

Spectrum analyzer settings:

Span: zero span, centered on hopping channel  
 RBW: 1 MHz  
 VBW: > RBW  
 Sweep: as necessary to capture the entire dwell time per hopping channel  
 Detector: peak  
 Trace: max hold

#### Limits

| Frequency band    | FCC and IC   |
|-------------------|--|
| 5725 - 5850 MHz   | ≤ 0,4 s at measurement period of 30 seconds  |
| 2400 - 2483.5 MHz | ≤ 0.4 s multiplied by the number of hopping channels employed  |
| 902 - 928 MHz     | ≤ 0,4 s at measurement period of 20 seconds for max 250 kHz 20 dB BW allowed<br>≤ 0,4 s at measurement period of 10 seconds for max 500 kHz 20 dB BW allowed |

#### Test results

| Test conditions  | Operating mode      | Measurement period | Time of occupancy |
|--|---------------------|--------------------|-------------------|
|  |                     | [s]                | [ms]              |
| $T_{\text{nom}} = 25^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8\text{ V}$ | normal transmitting | 31,6               | 184.716           |
|  | inquiry mode        | --                 | --                |
| Measurement uncertainty  | < 1 $\mu\text{s}$   |                    |                   |

See attached diagrams

**Test equipment:** ETS 0271

### 3.5 Number of hopping channels

#### Reference

|     |                        |
|-----|------------------------|
| FCC | CFR part 15.247 (a)(1) |
| IC  | RSS-210 A8.1           |

#### Method of measurement

According to FCC rules part 15 subpart C §15.247 frequency hopping systems operating in the 2400 - 2483.5 MHz and 5725 - 5850 MHz bands shall use at least 75 hopping frequencies.

According to FCC 00-312 appendix B systems in the 2400 - 2483.5 MHz band may utilize hopping channels whose 20 dB bandwidth is greater than 1 MHz provide the systems use at least 15 non-overlapping channels.

#### Limits

| Frequency band    | FCC and IC   |
|-------------------|--|
| 5725 - 5850 MHz   | ≥ 75 hopping channels  |
| 2400 - 2483.5 MHz | ≥ 75 hopping channels for >0.125 Watt<br>≥ 15 hopping channels for ≤0.125 Watt |
| 902 - 928 MHz     | ≥ 50 hopping channels for >0.25 Watt<br>≥ 25 hopping channels for ≤0.25 Watt   |

#### Test results

| Test conditions  | Operating mode      | Number of channel |
|--|---------------------|-------------------|
| $T_{\text{nom}} = 25^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8\text{ V}$ | Normal transmitting | 79                |
|  | Inquiry mode        | --                |

See attached diagrams

**Test equipment:** ETS 0271

### 3.6 Carrier frequency separation

#### Reference

|            |                        |
|------------|------------------------|
| <b>FCC</b> | CFR part 15.247 (a)(1) |
| <b>IC</b>  | RSS-210 A8.1           |

#### Method of measurement

Carrier frequency separation was measured with modulation (declared by manufacturer)

#### Limits

| Frequency band    | FCC and IC  |
|-------------------|---|
| 5725 - 5850 MHz   | minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater, but $\leq 1$ MHz   |
| 2400 - 2483.5 MHz | minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater<br>minimum of 25 kHz or 2/3 of the 20 dB bandwidth of the hopping channel, whichever is greater, for $P_{out} \leq 0.125$ W |
| 902 - 928 MHz     | minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater   |

#### Test results

| Test conditions                        | Channel B<br>[GHz] | Channel Separation<br>[kHz] |
|--|--------------------|-----------------------------|
| $T_{nom} = 25$ °C<br>$V_{nom} = 3.8$ V | 2.441              | 842.628                     |
| Measurement uncertainty                |                    | < 10 Hz                     |

See attached diagram

**Test equipment:** ETS 0271

### 3.7 Spurious emission conducted

#### Reference

|     |                     |
|-----|---------------------|
| FCC | CFR part 15.247 (d) |
| IC  | RSS-210 A8.5        |

#### Method of measurement

The EUT is connected to the spectrum analyzer via a low loss cable. If the EUT is not equipped with an antenna connector, a temporary antenna connector has to be installed. The EUT is switched on, the hopping function is disabled.

The analyzer setting was as following:

| Frequency range | RES bandwidth |         | Video bandwidth |         |
|-----------------|---------------|---------|-----------------|---------|
|                 | Pk            | Avg     | Pk              | Avg     |
| f < 1 GHz       | 100 kHz       | 100 kHz | 100 kHz         | 100 kHz |
| f > 1 GHz       | 1 MHz         | 1 MHz   | 1 MHz           | 1 MHz   |

#### Limits

|     |                               |
|-----|-------------------------------|
| FCC | 20 dB below peak output power |
| IC  | 20 dB below peak output power |

#### Test results

| Frequency | Result [dBm] | Limit [dBm] | Margin [dB] | Reference level [dBm] |
|-----------|--------------|-------------|-------------|-----------------------|
| --        | --           | --          | --          | --                    |
| --        | --           | --          | --          | --                    |
| --        | --           | --          | --          | --                    |
| --        | --           | --          | --          | --                    |
| --        | --           | --          | --          | --                    |

### 3.8 Spurious emission radiated

#### Reference

|     |   |
|-----|---|
| FCC | CFR part 15.247(d), 15.205, 15.209, 15.35 |
| IC  | RSS-210 A8.5, RSS-210 2.7                 |

#### Method of measurement

Spurious emission was measured with modulation (declared by manufacturer).

According to 47 CFR 15, Part 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 Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

#### Calculation of Limit:

All results are updated by an automatic measuring system in accordance to point 2.3

Limit = max. reading (because peak detector is used)  
 91.74 dB $\mu$ V/m

Limit = Max. reading - 20 dB (because average detector is used)  
 91.74 dB $\mu$ V/m - 20 dB = 71.74 dB $\mu$ V/m

#### Limits for restricted bands

|                     |  |                |                  |
|---------------------|--|----------------|------------------|
| <b>FCC &amp; IC</b> | 20 dB below peak output power, emissions which fall in the restricted bands (15.205(a)) / (RSS-210 2.7) must comply the following limits:<br>Frequencies below 1GHz:                     |                |                  |
|                     | Frequency of emission  | Field strength | Field strength   |
|                     | [MHz]  | [ $\mu$ V / m] | [dB $\mu$ V / m] |
|                     | 30 - 88  | 100            | 40.0             |
|                     | 88 - 216   | 150            | 43.5             |
|                     | 216 - 960  | 200            | 46.0             |
|                     | Above 960  | 500            | 54.0             |
|                     | For frequencies above 1 GHz (Avg measurements): 54.0 dB $\mu$ V / m<br>For frequencies above 1 GHz (Pk measurements):<br>Limit + 20 dB = 54.0 dB $\mu$ V / m + 20 dB = 74 dB $\mu$ V / m |                |                  |

Calculation of test results:

Such factors like antenna correction, cable loss, external attenuation etc. are already included in the provided measurement results.

The peak and average spurious emission plots was measured with the average limits.

In the Table being listed the critical peak and average value an exhibit the compliance with the above calculated Limits.

If in the column's correction factor states a value then the max. Field strength in the same row is corrected by a value gained from the "Marker-Delta-Method" or the „Duty-Cycle Correction Factor“.

15.35 (c) Duty cycle correction average value

When the radiated emission limits are expressed in terms of the average value of the emission, and pulsed operation is employed, the measurement field strength shall be determined by averaging over one complete pulse train, including blanking intervals, as long as the pulse train does not exceed 0.1 seconds.

Duty cycle correction =  $20 \log (\text{dwell time} / 100 \text{ ms or less})$

DA 00-705 Duty cycle correction peak value

The analyzer setting was as following:

| Frequency range | RES bandwidth |         | Video bandwidth |       |
|-----------------|---------------|---------|-----------------|-------|
|                 | Pk            | Avg     | Pk              | Avg   |
| f < 1GHz        | 100 kHz       | 100 kHz | 10 Hz           | 10 Hz |
| f > 1GHz        | 1 MHz         | 1 MHz   | 10 Hz           | 10 Hz |

Set the VBW to 10 Hz, while maintaining all of the other instrument settings. This peak level, once corrected, must comply with the limit specified in Section 15.209. If the dwell time per channel of the hopping signal is less than 100 ms, then the reading obtained with the 10 Hz VBW may be further adjusted by a "duty cycle correction factor", derived from  $20 \log (\text{dwell time} / 100 \text{ ms})$ , in an effort to demonstrate compliance with the 15.209 limit. Submit this data.

If the intentional radiator operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

**Test results**
**Summary table with radiated data of the test plots**

| <b>Freq.</b> | <b>Used Ch.</b> | <b>Frequency Marker [GHz]</b> | <b>Polari-zation</b> | <b>Δ correc-tions dB</b> | <b>Max. Field Strength [dB<math>\mu</math>V/m]</b> | <b>Compliance Limit [dB<math>\mu</math>V/m]</b> | <b>Detec-tor</b> | <b>BW [MHz]</b> | <b>Margin [dB]</b> |
|--------------|-----------------|-------------------------------|----------------------|--------------------------|--|---|------------------|-----------------|--------------------|
| 3            | M               | 3.325                         | V                    |                          | 45.43  | 74  | P                | 1               | -28.57             |
| 3            | M               | 1.996                         | H                    |                          | 47.99  | 74  | P                | 1               | -26.01             |

**Freq. - Frequency Range:**

|    |     |   |          |
|----|-----|---|----------|
| 1: | 30  | – | 200 MHz  |
| 2: | 200 | – | 1000 MHz |
| 3: | 1   | – | 4 GHz    |
| 4: | 4   | – | 8 GHz    |
| 5: | 8   | – | 12 GHz   |
| 6: | 12  | – | 17 GHz   |
| 7: | 17  | – | 26,5 GHz |

All other not noted test plots do not contain significant test results in relation to the limits.

See attached diagrams.

**Test equipment:** ETS 0012, ETS 0013, ETS 0015, ETS 0018, ETS 0271, ETS 0253, ETS 0311

### 3.9 Band edge compliance

#### Reference

|     |                     |
|-----|---------------------|
| FCC | CFR part 15.247 (d) |
| IC  | RSS-210 A8.5        |

#### Method of measurement

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 Section 15.209(a) is not required.

In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a) (see Section 15.205(c)).

#### Limits

|     |                               |
|-----|-------------------------------|
| FCC | 20 dB below peak output power |
| IC  | 20 dB below peak output power |

#### Test results

| Test conditions  | Single frequency (hopping disabled) |                 |
|--|-------------------------------------|-----------------|
|  | Lower band-edge                     | Upper band-edge |
| $T_{\text{nom}} = 25^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8\text{ V}$ | 47.73 dB                            | 47.82 dB        |
| Measurement uncertainty  | < 100 Hz                            |                 |

| Test conditions  | Hopping frequency (hopping enabled) |                 |
|--|-------------------------------------|-----------------|
|  | Lower band-edge                     | Upper band-edge |
| $T_{\text{nom}} = 25^{\circ}\text{C}$<br>$V_{\text{nom}} = 3.8\text{ V}$ | 45.87 dB                            | 45.06 dB        |
| Measurement uncertainty  | < 100 Hz                            |                 |

See attached diagrams.

**Test equipment:** ETS 0271

### 3.10 AC power line conducted emissions

#### Reference

|     |                 |
|-----|-----------------|
| FCC | CFR part 15.207 |
| IC  | RSS-Gen 7.2.2   |

#### Method of measurement

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits. Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line and ground at the power terminals.

This measurement was transact first with instrumentation using an average and peak detector and a 10 kHz bandwidth. If the peak detector achieves a calculated level, the measurement is repeated by an instrumentation using a quasi-peak detector.

#### Limits

| FCC & IC | Frequency of emission | Conducted limit field strength [dB $\mu$ V] |         |
|----------|-----------------------|---|---------|
|          | [MHz]                 | Quasi Peak                                  | Avg     |
|          | 0.15 - 0.5            | 66 to 56                                    | 56 - 46 |
|          | 0.5 - 5               | 56  | 46      |
|          | 5 - 30                | 60  | 50      |

#### Test results

| Frequency | Level            |                  |
|-----------|------------------|------------------|
|           | Quasi-peak       | Average          |
| 150 kHz   | Lower limit line | Lower limit line |

See attached diagrams.

**Test equipment:** ETS 0288, ETS 0474

## 4 Receiver parameters

### 4.1 Radiated emissions

#### Reference

|     |               |
|-----|---------------|
| FCC | Part 15.109   |
| IC  | RSS-Gen 7.2.3 |

#### Method of measurement

The compliance of the EUT Receiver with the Limits of spurious emissions was performed according to the radiated measurement method.

The spectrum analyzer RBW was set to 100 kHz for measurements below 100 kHz and 1.0 MHz above 1.0 GHz. The measurement results are evaluated according to the procedure described in section 2.4 of this test report.

#### Limits

|          | Spurious frequency | Field strength         |
|----------|--------------------|------------------------|
|          | MHz                | microvolt/m at 3 meter |
| FCC & IC | 30 - 88            | 100                    |
|          | 88 - 216           | 150                    |
|          | 216 - 960          | 200                    |
|          | above 960          | 500                    |
|          |                    |                        |

#### Test Results

| Device Frequency<br>2441 MHz | Frequency marker indication<br>[MHz] | Antenna polarization | Worst case emission level<br>[ $\mu$ V/m] | Compliance limit<br>[ $\mu$ V/m] | Results<br>[ $\mu$ V/m] |
|------------------------------|--------------------------------------|----------------------|---|----------------------------------|-------------------------|
| --                           | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |
|                              | --                                   | --                   | --  | --                               | --                      |

Not required.

Test equipment: --

## **Annex**

|   |                                   |          |
|---|-----------------------------------|----------|
| A | Pictures                          | 18 pages |
| B | RF power output conducted         | 9 pages  |
| C | 20 dB bandwidth                   | 3 pages  |
| D | Time of occupancy (dwell time)    | 2 pages  |
| E | Number of hopping frequencies     | 4 pages  |
| F | Carrier frequency separation      | 1 page   |
| G | Spurious emission radiated        | 23 pages |
| H | Band-edge compliance              | 4 pages  |
| I | AC power line conducted emissions | 2 pages  |