

**Radio Test Report:** 99416130

**Applicant:** Matsushita Electric Industrial Co., Ltd.  
4-3-1, Tsunashima-higashi, Kohoku-ku  
223-8639, Yokohama  
Japan

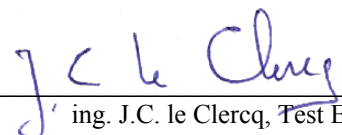
**Equipment Under Test:** JT-H200PR-\*\*

**FCC ID:** ACJJT-H200PR

**In Accordance With:** **FCC Part 15, Subpart C, 15.247 (10-1-02 edition)**  
Frequency Hopping Transmitters

**Tested By:** Telefication bv  
Edisonstraat 12a  
6902 PK Zevenaar  
The Netherlands

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**Date:** 5 October 2003

**Total Number of Pages:** 47

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## Section 1. Summary of Test Results

Manufacturer: Matsuhita Electric Industrial Co., Ltd.  
Model No.: JT-H200PR-\*\*  
Serial No.: 2092009101  
Date Received In Laboratory: 7 April 2003

These tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with Part 15, Subpart C, Paragraph 15.247 for Frequency Hopping Spread Spectrum devices. Radiated tests were conducted in accordance with ANSI C63.4-2001.

|                                     |                            |                                     |                     |
|-------------------------------------|----------------------------|-------------------------------------|---------------------|
| <input checked="" type="checkbox"/> | New Submission             | <input checked="" type="checkbox"/> | Production Unit     |
| <input type="checkbox"/>            | Class II Permissive Change | <input type="checkbox"/>            | Pre-Production Unit |
| <input type="checkbox"/>            | Family Listing             |                                     |                     |

THIS TEST REPORT RELATES ONLY TO THE ITEM(S) TESTED.

THE FOLLOWING DEVIATIONS FROM, ADDITIONS TO, OR EXCLUSIONS FROM THE  
TEST SPECIFICATIONS HAVE BEEN MADE.

See "Summary of Test Data".



Telefication complies with the accreditation criteria for test laboratories as laid down in ISO/IEC 17025:1999. The accreditation covers the quality system of the laboratory as well as the specific activities as described in the authorized annex bearing the accreditation number L021 and is granted on 30 November 1990 by the Dutch Council For Accreditation (RvA: Raad voor Accreditatie).

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**Summary Of Test Data**

| NAME OF TEST                              | PARA. NO.        | SPEC.                                        | MEAS.                | RESULT |
|-------------------------------------------|------------------|----------------------------------------------|----------------------|--------|
| Powerline Conducted Emissions             | 15.207(a)        | 48 dB $\mu$ V                                | N.A.                 | N.A.   |
| Channel Separation                        | 15.247(a)(1)     | Greater than<br>25 kHz or 20<br>dB bandwidth | 1 MHz                | PASS   |
| Pseudorandom Hopping<br>Algorithm         | 15.247(a)(1)     |                                              | Bluetooth            | PASS   |
| Time of Occupancy                         | 15.247(a)(1)(ii) | $\leq$ 0.4 sec in<br>30 sec                  | 0.120 sec            | PASS   |
| 20 dB Occupied Bandwidth                  | 15.247(a)(1)     | $\leq$ 1 MHz                                 | 0.542 MHz            | PASS   |
| Peak Power Output                         | 15.247(b)        | 1 Watt                                       | 1.2 mW               | PASS   |
| Spurious Emissions<br>(Antenna Conducted) | 15.247(c)        | -20 dBc                                      | N.A.                 | N.A.   |
| Spurious Emissions (Radiated)             | 15.247(c)        | Table<br>15.209(a)                           | See<br><b>Note 1</b> | PASS   |

**Test Conditions:****Indoor**Temperature: 26 °CHumidity: 52 %**Note 1:**

See test report by TNO Electronic Products & Services (EPS),  
project number 03081901.r03, dated September 4, 2003

## **Section 2. Equipment Under Test (E.U.T.)**

### **General Equipment Information**

|                                   |                                                                                                 |
|-----------------------------------|-------------------------------------------------------------------------------------------------|
| <b>Frequency Band:</b>            | <input type="checkbox"/> 902 – 928 MHz<br><input checked="" type="checkbox"/> 2400 – 2483.5 MHz |
| <b>Number of Channels:</b>        | 79                                                                                              |
| <b>Channel Spacing:</b>           | 1 MHz                                                                                           |
| <b>Emissions Designator:</b>      | 1M00G1D                                                                                         |
| <b>User Frequency Adjustment:</b> | Software controlled                                                                             |

**Description of Modification for Modification Filing**

**Not applicable**

**Family List Rational**

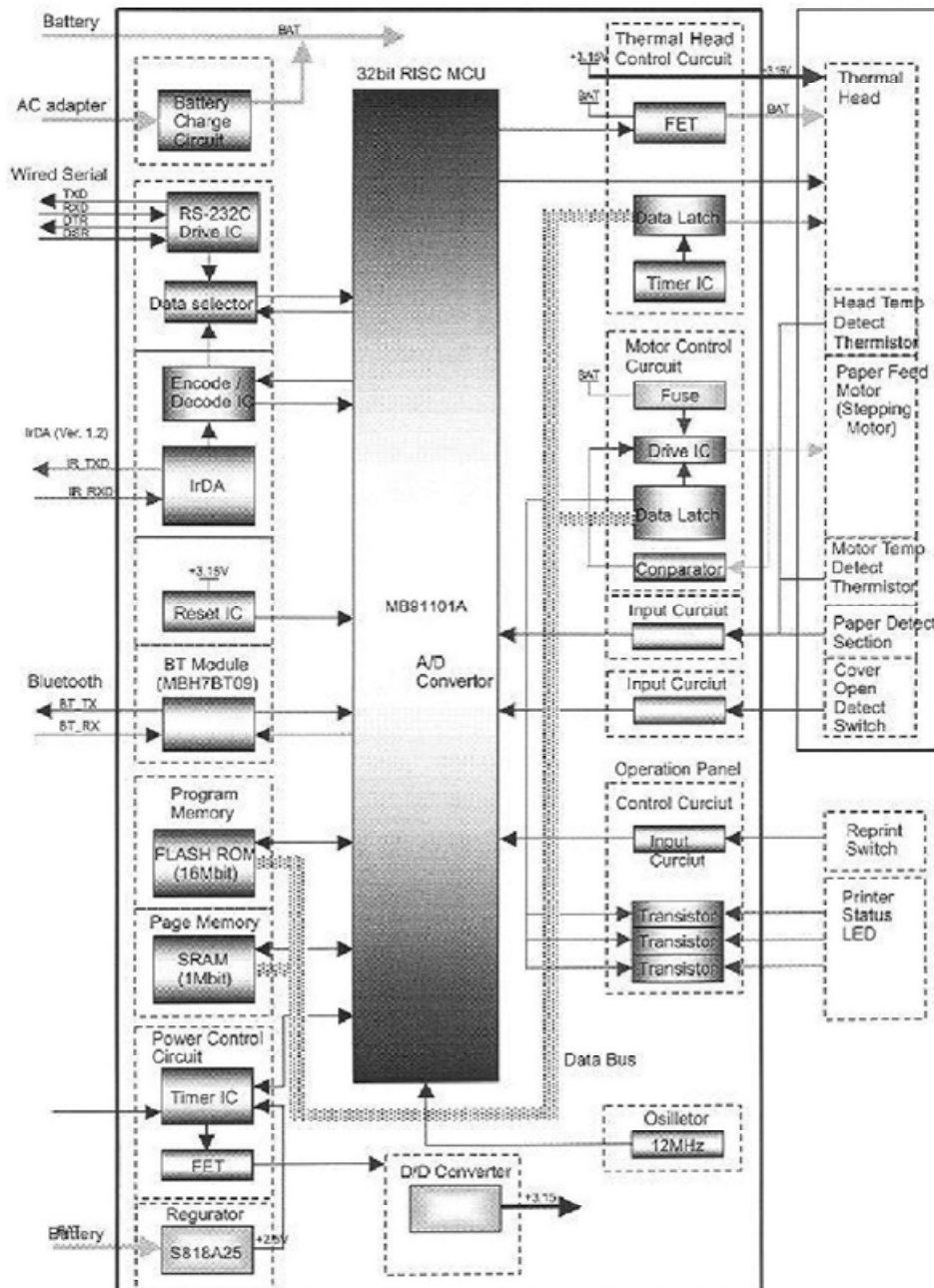
**Not applicable**

**Theory of Operation**

The JT-H200PR-\*\* contains a spread spectrum frequency hopping transceiver and is designated for operation in the frequency band of 2400-2483.5 MHz. The equipment is a small printer intended to be connected to a PC via a Bluetooth radio link. The equipment is provided with an integral antenna.

## System Diagram

PRINTER (JT-H200PR-50) CIRCUIT BLOCK DIAGRAM



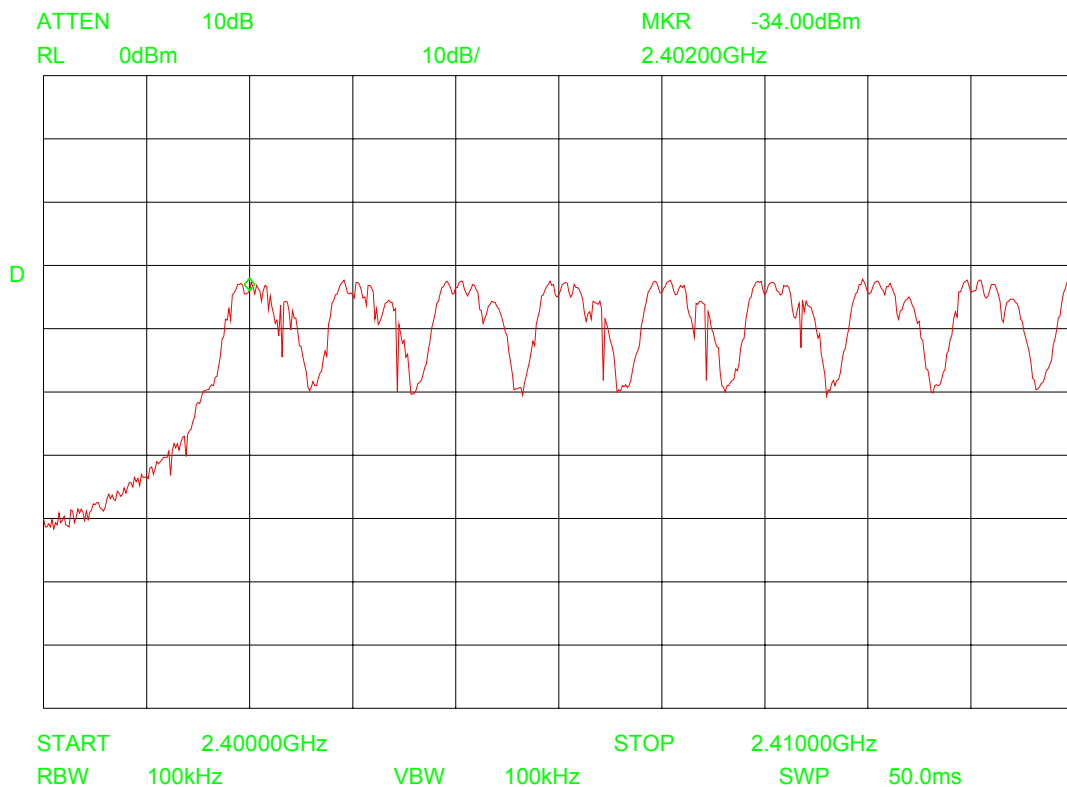
### Section 3. Channel Separation

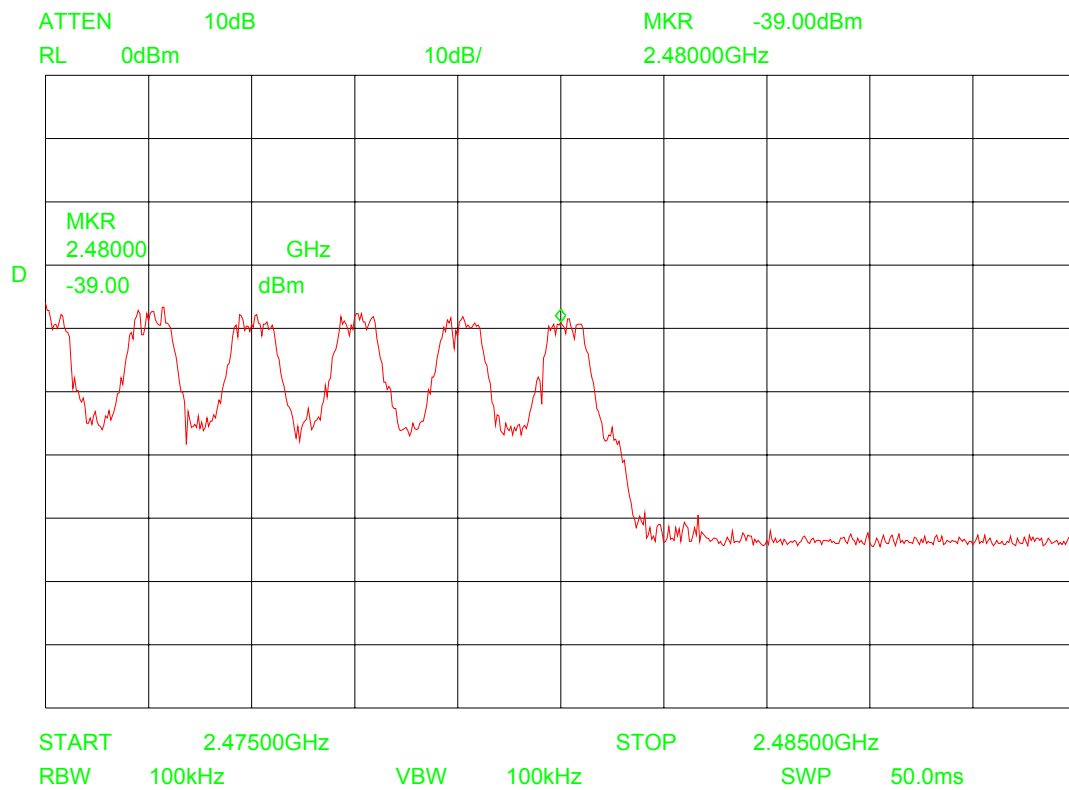
NAME OF TEST: Channel Separation

PARA. NO.: 15.247(a)(1)

**Test Results:** Complies.

**Measurement Data:** See attached plots  
See also 20 dB BW plot  
Measured 20 dB bandwidth: 0.542 MHz  
Channel separation: 1 MHz





**Section 4. Pseudorandom Hopping Algorithm**

NAME OF TEST: Pseudorandom Hopping Algorithm

PARA. NO.: 15.247(a)(1)

**Test Results:**

Complies.

**Measurement Data:**

Hopping sequence: according to Bluetooth protocol

Number of Hopping Frequencies: 79

Number of Hopping Patterns: according to Bluetooth protocol

## Section 5. Time of Occupancy

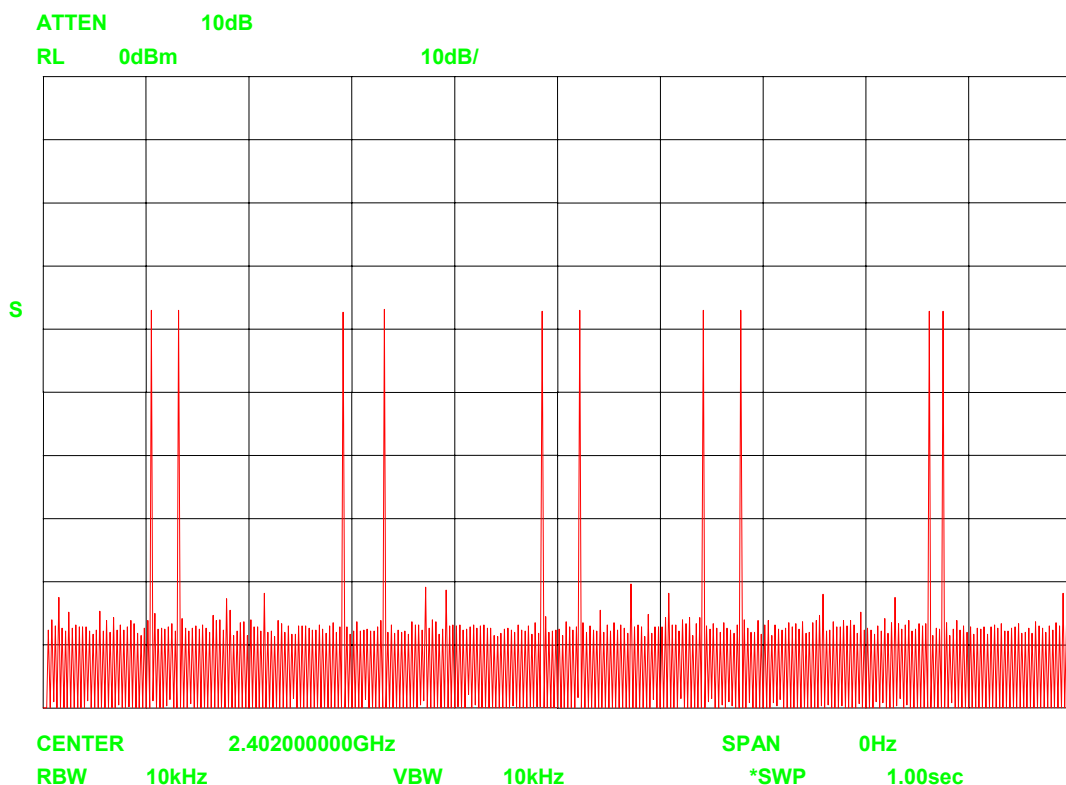
NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)

**Test Results:** Complies.**Measurement Data:**

Maximum dwell time on any channel: 0.4 ms

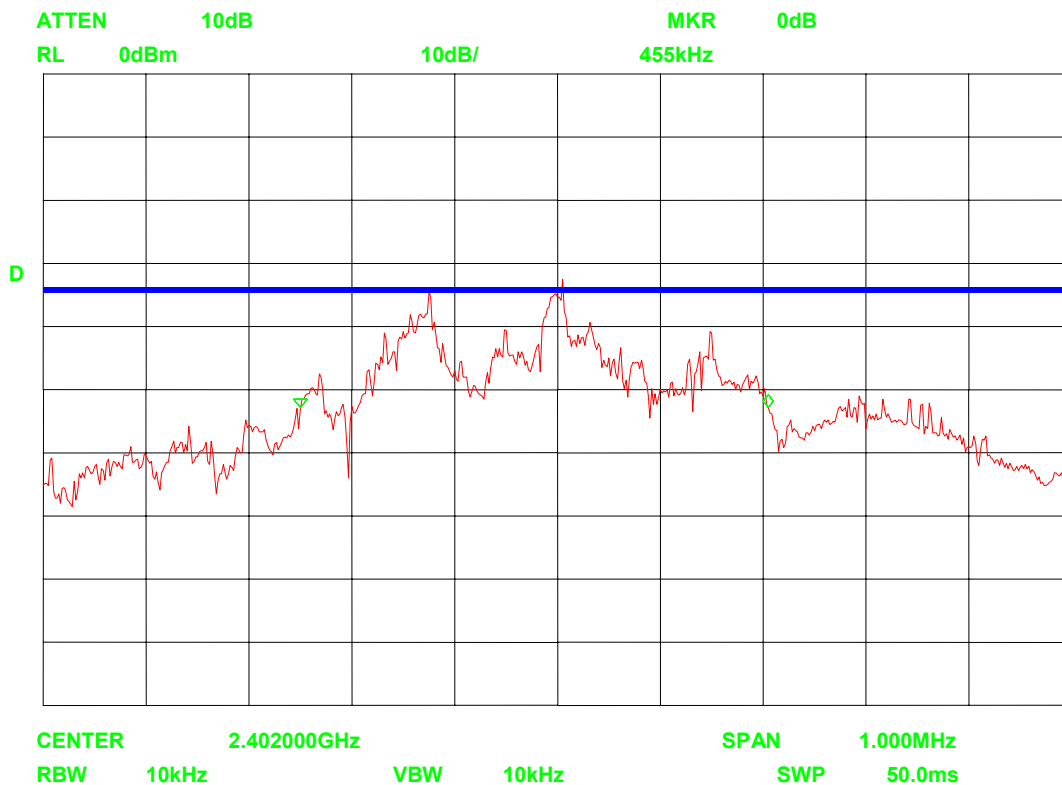
Number of transmissions per second / per channel: 10

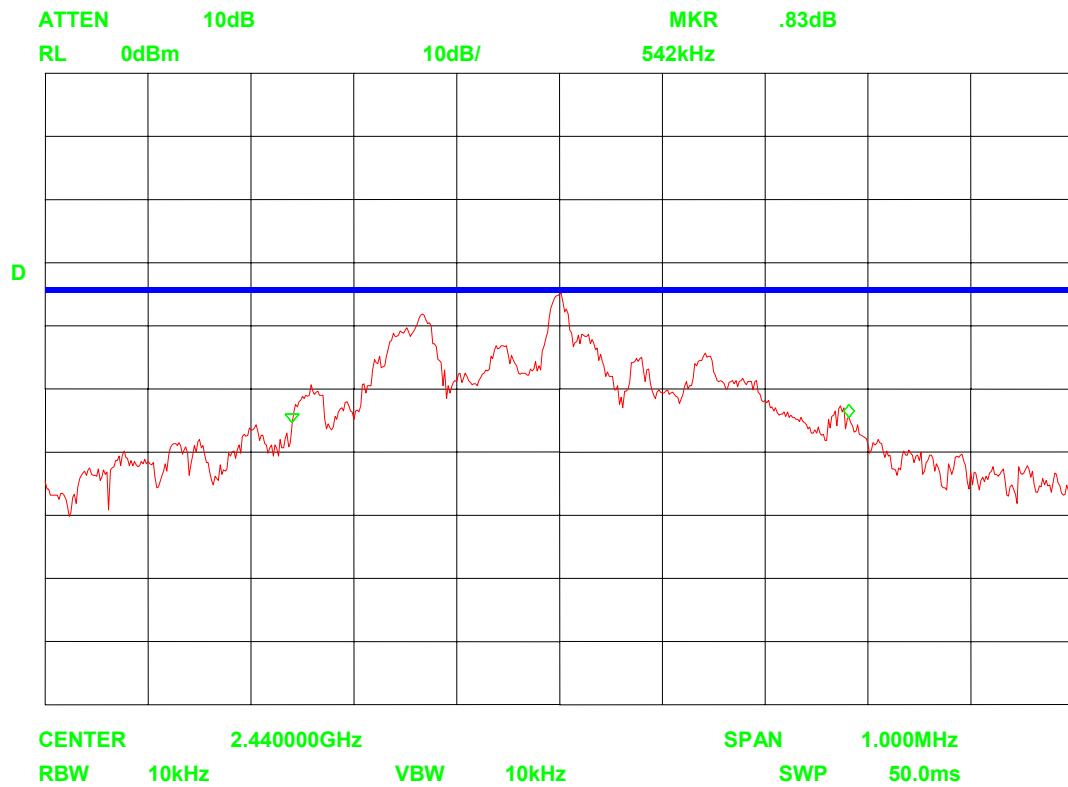
Occupance time in one measurement period: 120 ms  
30 x 10 x 0.4**Limit:** Average time of occupancy:  $\leq 0.4$  sec in 30 sec.

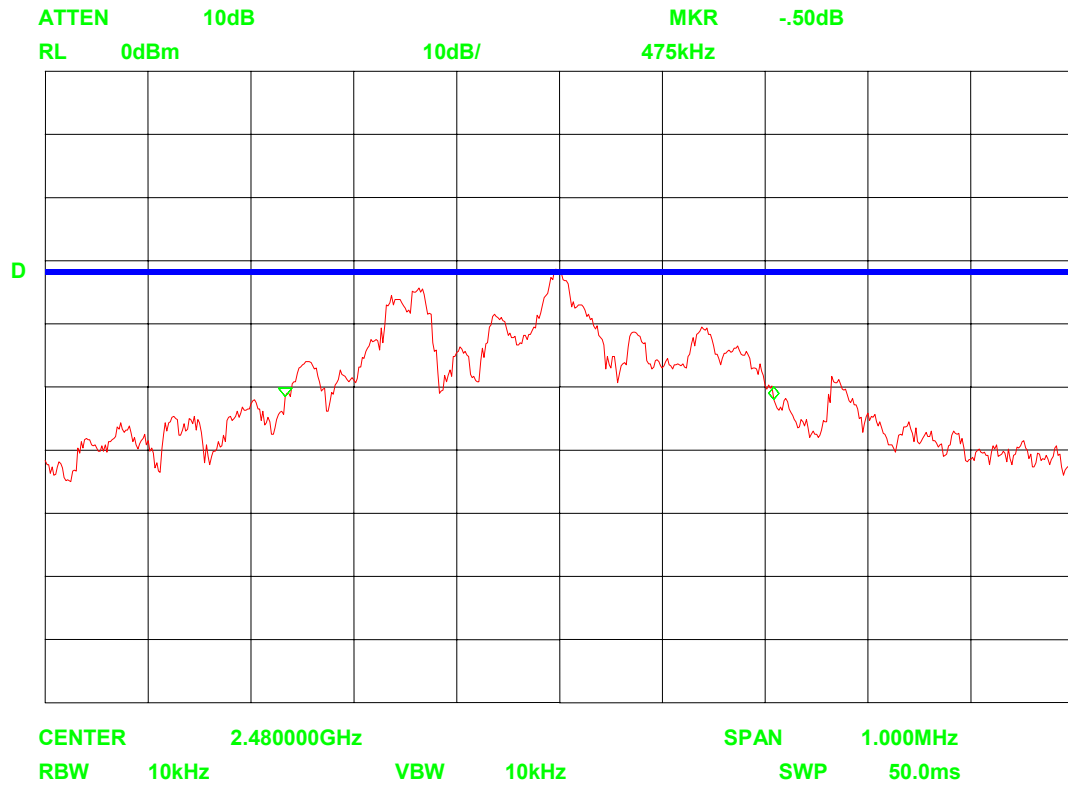
## Section 6. Occupied Bandwidth

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(1)(i)

**Test Results:** Complies**Measurement Data:** See attached plots.  
Measured 20 dB BW: 0,542 MHz (max)





**Section 7. Peak Power Output**

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247 (b)

**Test Results:** Complies.**Measurement Data:** See attached tableDetachable antenna? ☐ Yes ☒ No

If yes, state the type of non-standard connector used:

**Antennas:**

| Model    | Type | Manufacturer | Gain (dBi) | E.I.R.P. (dBm) |
|----------|------|--------------|------------|----------------|
| integral | NA   | NA           | 0          | 1.1            |
|          |      |              |            |                |
|          |      |              |            |                |

Peak power output at antenna port(dBm): not applicable

Field Strength: 98 dB $\mu$ V/m @ 3m or 79 mV/m @ 3m.

**Section 8. Spurious Emissions (Exploratory Radiated)**

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

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**Test Results:**

Inconclusive

The preliminary test in an anechoic room did reveal that the only spurious signal present is on 4.8 GHz. The spurious signal on 4.8 GHz is approximately 40 dB weaker than the desired signal on 2.4 GHz. The level of the spurious signal on 4.8 GHz is -48 dBm<sub>erp</sub>.

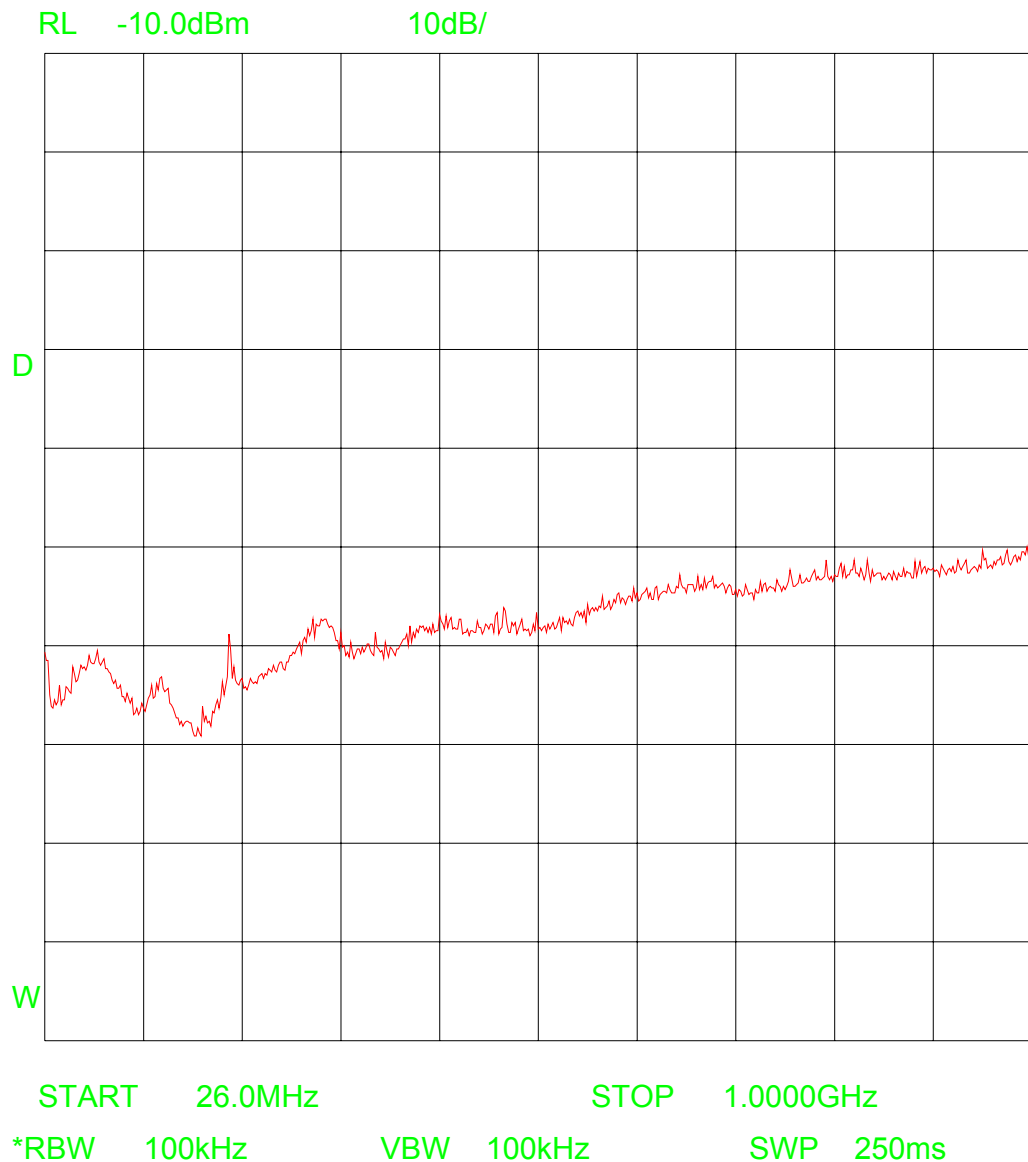
**Requirement:**

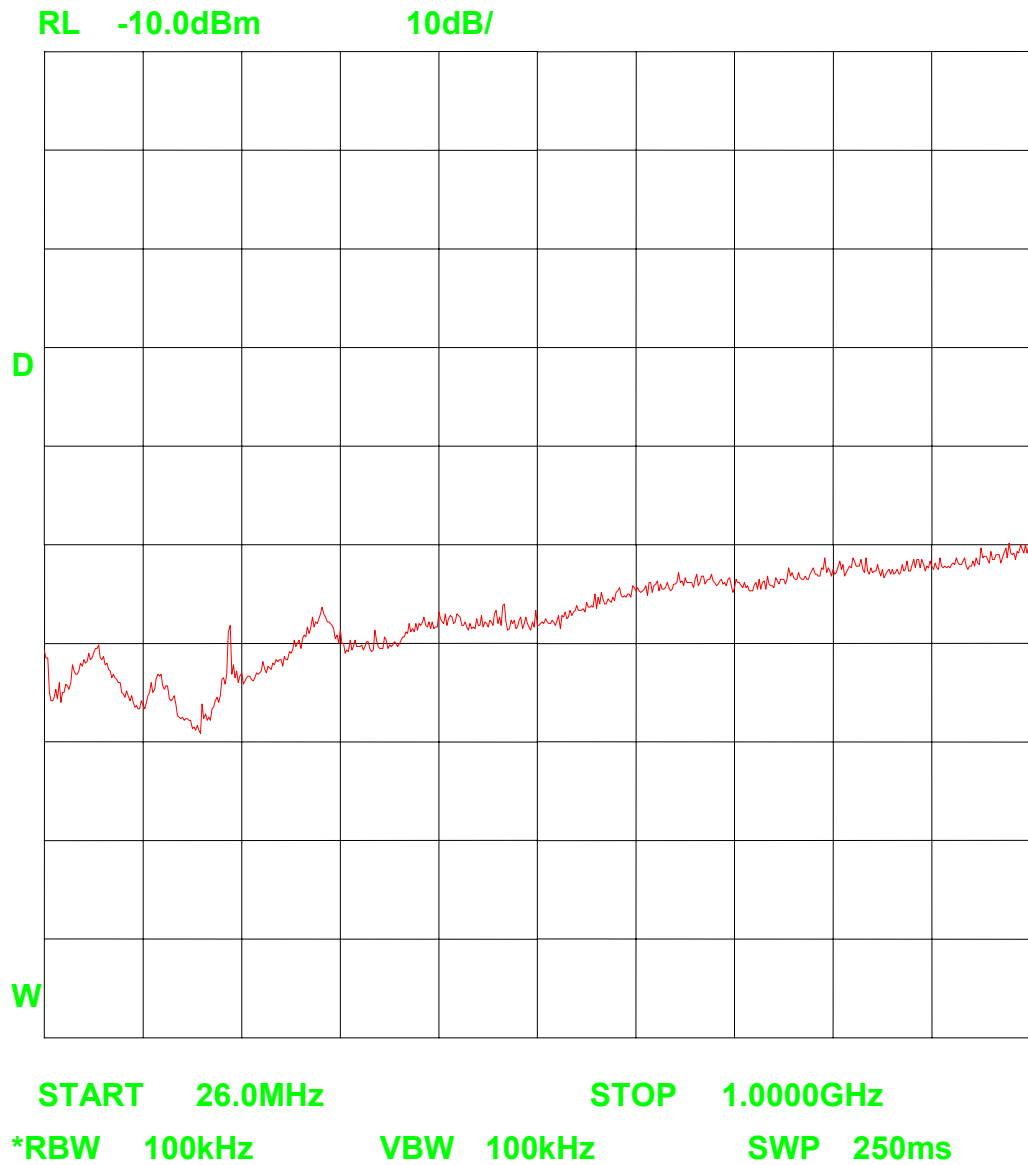
Spurious signals in the restricted bands shall comply with §15.205.  
In addition spurious signals shall be at least 20 dB weaker than the desired signal.

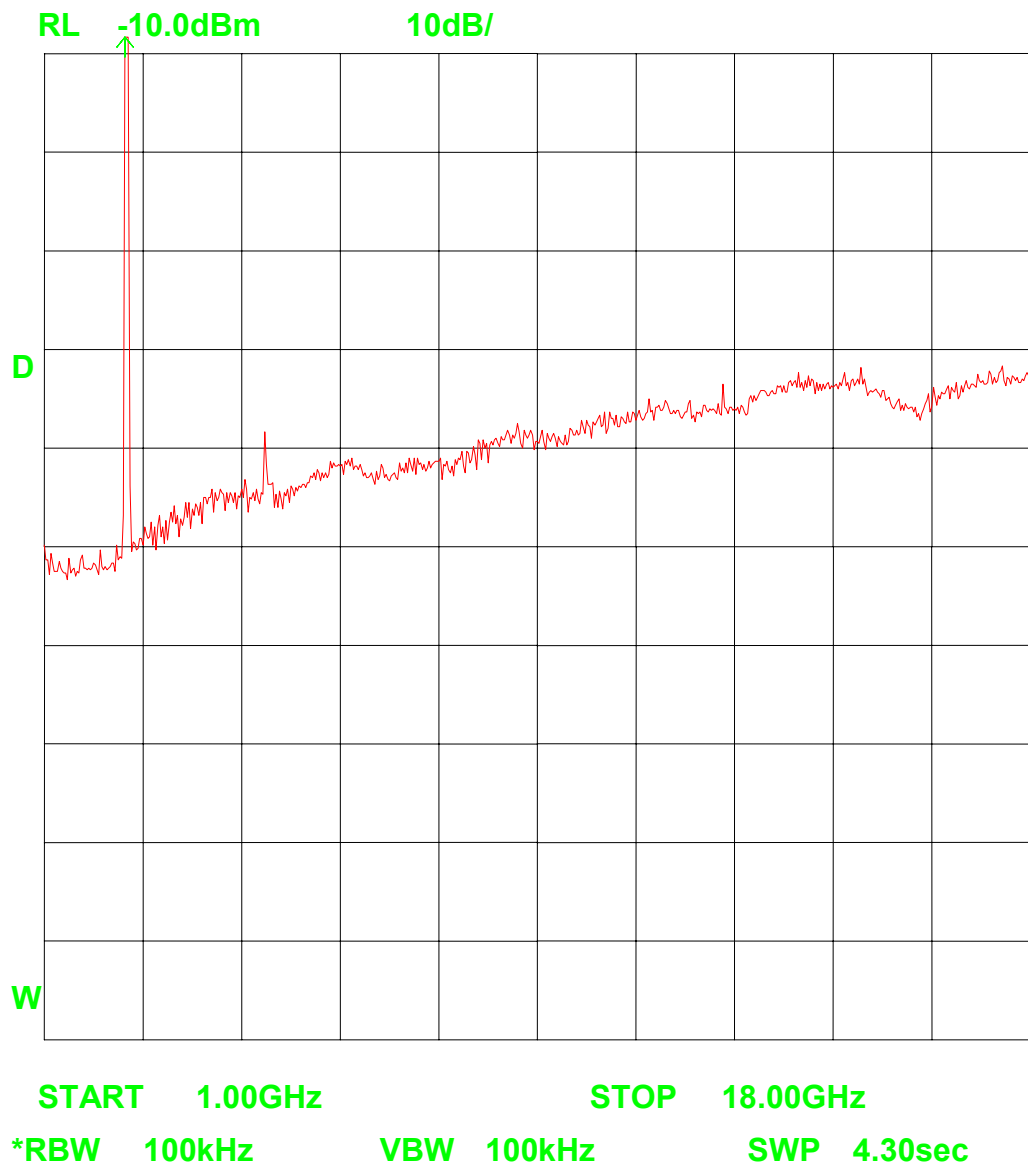
**Measurement Data:**

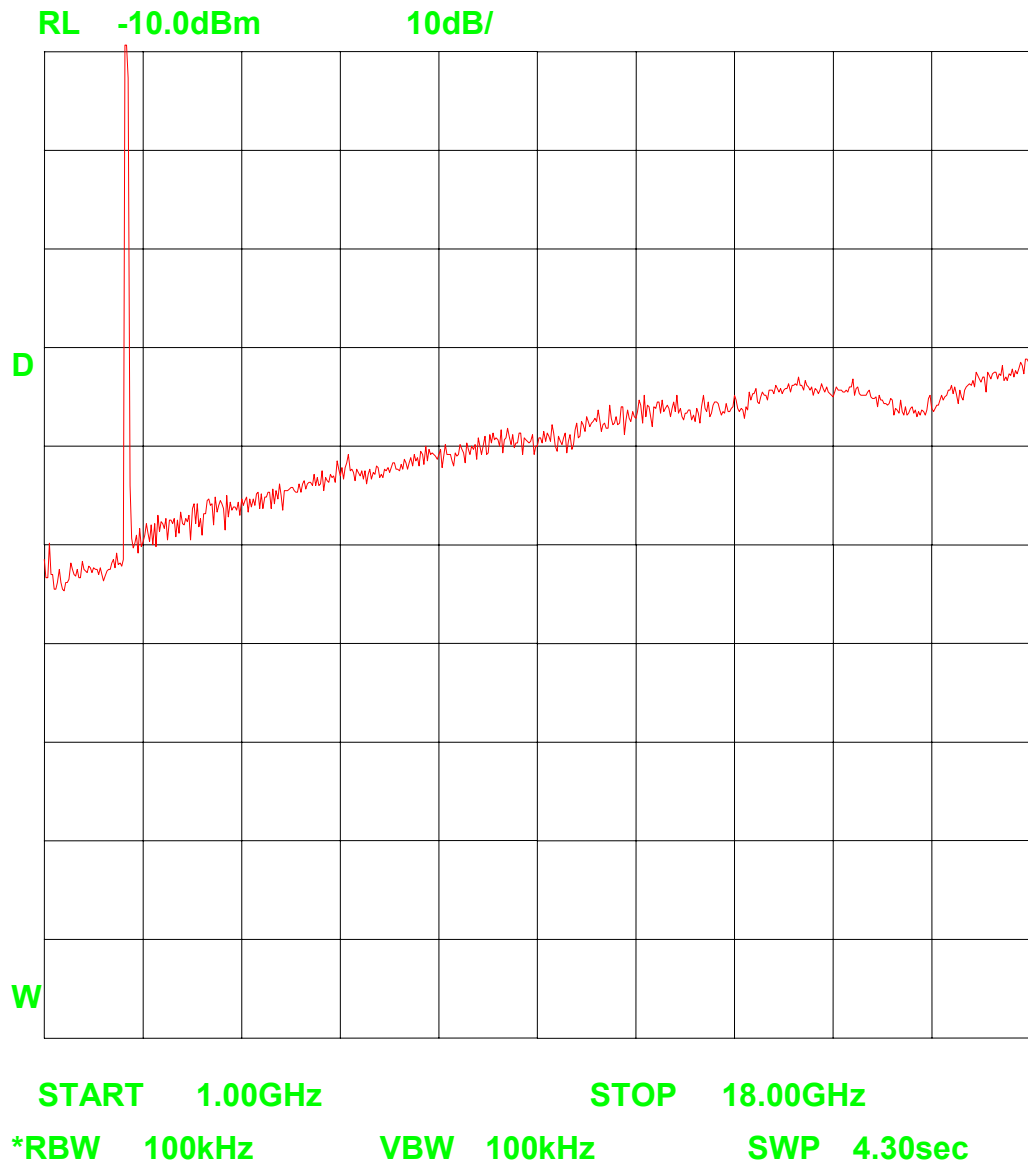
See attached graphs.

**Note:** The graphs represent values calibrated in effective radiated power (erp).The displayed limit is converted by using the relationship:  $ERP_{dBm} = E_{dB\mu V/m} - 97_{dB}$

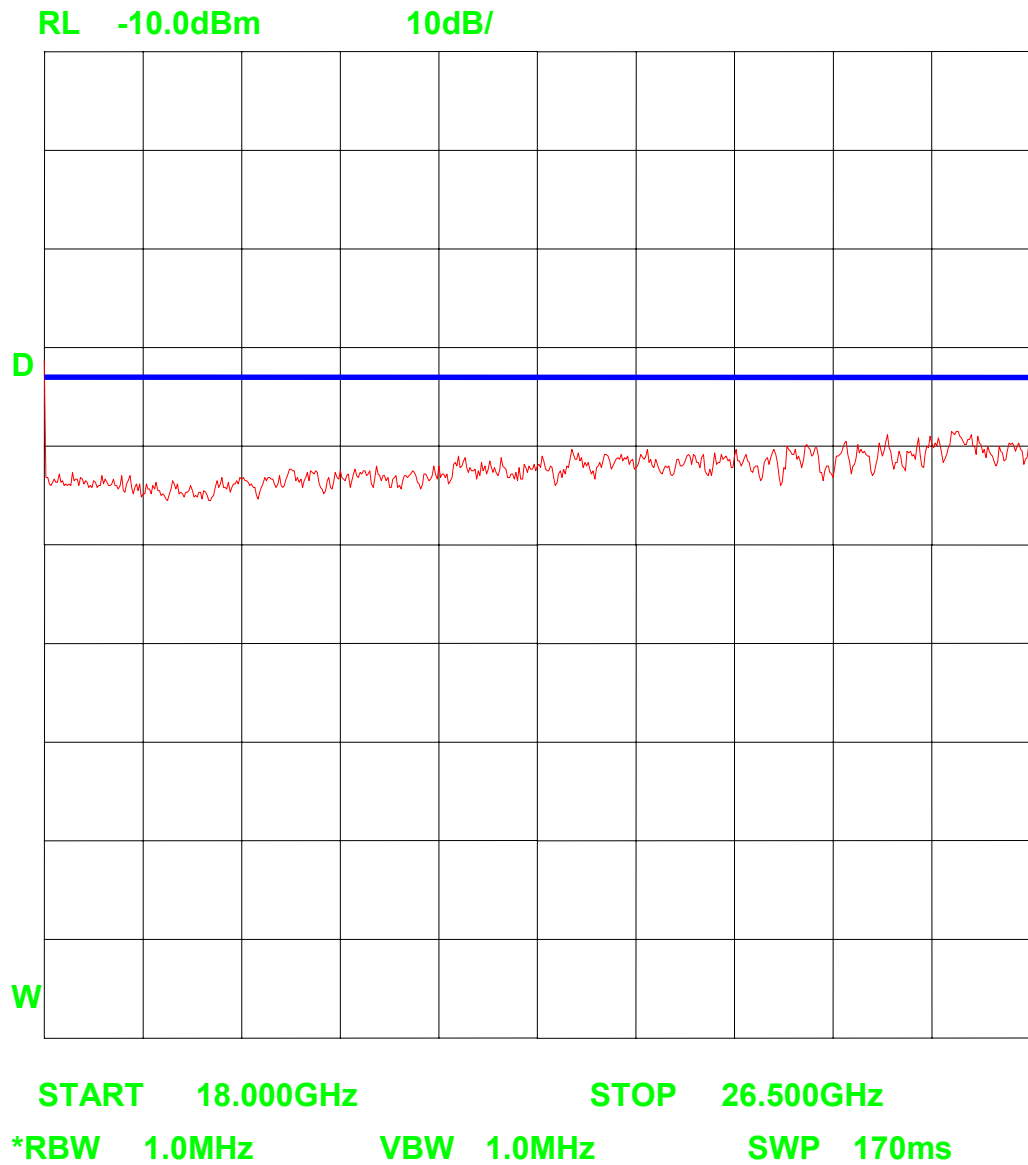
**Test Data - Radiated Emissions (Peak)***Vertical polarization*

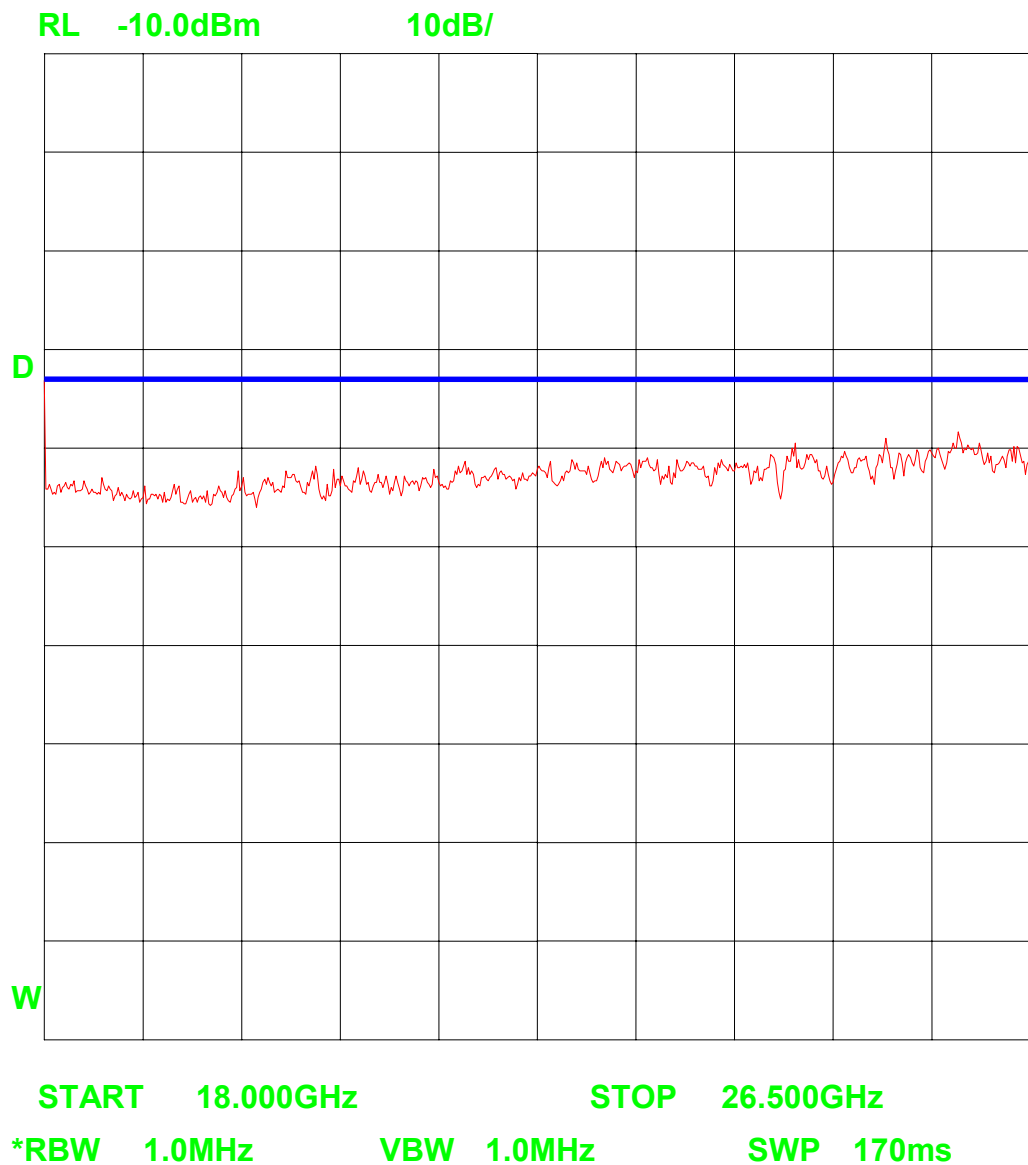
*Horizontal polarization*

*Vertical polarization*

*Horizontal polarization*

Vertical polarization



*Horizontal polarization*

**Section 9. Spurious Emissions (Radiated)**

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

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**Test Results:**

Complies.

Radiated emission tests have been performed by TNO Electronic Products & Services (E.P.S.) B.V. See measurement/technical report 03081901.r03, dated September 4, 2003. The test methodology used is based on the requirements of 47 CFR Part 15, sections 15.109 and 15.209.

**Section 10. Spurious Emissions (Restricted bands Radiated)**

NAME OF TEST: Spurious Emissions (Radiated)

PARA. NO.: 15.247(c)

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**Test Results:**

Complies

Radiated emission tests have been performed by TNO Electronic Products & Services (E.P.S.) B.V. See measurement/technical report 03081901.r03, dated September 4, 2003. The test methodology used is based on the requirements of 47 CFR Part 15, sections 15.109 and 15.209.

**Section 11. Test Equipment List**

| Description                      | Manufacturer       | Model     | Identification | Used at                          |
|----------------------------------|--------------------|-----------|----------------|----------------------------------|
| Anechoic chamber                 | Euroshield         | RFD-F-100 | --             | 15.207(a);15.247(a)(2); (c); (d) |
| Spectrum analyzer                | Hewlett Packard    | 8563E     | TE 00481       | 15.207(a);15.247(a)(2); (c); (d) |
| Standard gain horn               | Scientific Atlanta | 12A-18    | TE 00608       | 15.247(c)                        |
| Double ridged guide horn antenna | EMCO               | 3115      | TE 00531       | 15.247(c)                        |
| Biconilog antenna                | EMCO               | 3143      | TE 00744       | 15.247(c)                        |
| Pre-amplifier                    | Hewlett Packard    | 8449B     | TE 00092       | 15.247(c)                        |
| Pre-amplifier                    | Rohde & Schwarz    | ESV-Z3    | TE 00098       | 15.247(c)                        |
| Power meter                      | Hewlett Packard    | 435 B     | TE 00249       | 15.247(b)(3)                     |
| Power sensor                     | Hewlett Packard    | 8484 A    | TE 00245       | 15.247(b)(3)                     |

**ANNEX A TEST DETAILS**

|                                  |                         |
|----------------------------------|-------------------------|
| NAME OF TEST: Channel Separation | PARA. NO.: 15.247(a)(1) |
|----------------------------------|-------------------------|

**Minimum Standard:**

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.

NAME OF TEST: Pseudorandom Hopping Algorithm

PARA. NO.: 15.247(a)(1)

**Minimum Standard:**  
from

The system shall hop to channel frequencies that are selected from a pseudorandomly ordered list of hopping frequencies. Each frequency must be used equally on average by each transmitter. The system receivers shall have input bandwidths that match the hopping channel bandwidths of their transmitters and shall shift frequencies in synchronization with the transmitted signals.

NAME OF TEST: Time of Occupancy

PARA. NO.: 15.247(a)(1)(ii)

**Minimum Standard:**

| Frequency Band (MHz) | 20 dB Bandwidth | No. of Hopping Channels | Average Time of Occupancy |
|----------------------|-----------------|-------------------------|---------------------------|
| 902 - 928            | <250 kHz        | 50                      | =<0.4 sec. in 20 sec.     |
| 902 - 928            | =>250 kHz       | 25                      | =<0.4 sec. in 10 sec.     |
| 2400 - 2483.5        | -----           | 75                      | =<0.4 sec. in 30 sec.     |
| 5725 - 5850          | -----           | 75                      | =<0.4 sec. in 30 sec.     |

**Method Of Measurement:**

The spectrum analyzer is set as follows:

RBW: 1 MHz

VBW: = RBW

Span: 0 Hz

LOG dB/div.: 10 dB

Sweep: Sufficient to see one hop time sequence.

Trigger: Video

The occupancy time of one hop is measured as above. The average time of occupancy is calculated over the appropriate period of time from above table (10, 20, or 30 seconds).

Avg. time of occupancy = (period from table/duration of one hop)/no. of channels multiplied by the duration of one hop.

For instance:

If a 2.4 GHz system has a measured hop duration time of 1 msec. and uses 75 channels, then the average time of occupancy would be:

$(30 \text{ sec.} / .001 \text{ sec.}) / 75 \text{ chan.} = 400 \times 1 \text{ msec.} = 400 \text{ msec. or } 0.4 \text{ sec. in } 30 \text{ sec.}$

NAME OF TEST: Occupied Bandwidth

PARA. NO.: 15.247(a)(2)

**Minimum Standard:**

| Frequency Band (MHz) | Maximum 20 dB Bandwidth |
|----------------------|-------------------------|
| 902 - 928            | 500 kHz                 |
| 2400 – 2483.5        | 1 MHz                   |
| 5725 – 5850          | 1 MHz                   |

**Method Of Measurement:**

The spectrum analyzer is set as follows:

RBW: At least 1% of span/div.

VBW: >RBW

Span: Sufficient to display 20 dB bandwidth

LOG dB/div.: 10 dB

Sweep: Auto

Number of channels tested:

| Tuning range     | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less    | 1                         | middle                   |
| 1 to 10 MHz      | 2                         | top and bottom           |
| more than 10 MHz | 3                         | top, middle, bottom      |

NAME OF TEST: Peak Power Output

PARA. NO.: 15.247(b)

**Minimum Standard:**

| Frequency Band (MHz) | No. of Hopping Channels | Maximum Peak Power Output at Antenna Port |
|----------------------|-------------------------|-------------------------------------------|
| 902 - 928            | at least 50             | 1 Watt                                    |
| 902 – 928            | 25 - 49                 | 0.25 Watts                                |
| 2400 – 2483.5        | 75                      | 1 Watt                                    |
| 5725 – 5850          | 75                      | 1 Watt                                    |

If transmitting antennas of directional gain greater than 6 dBi are used, the power shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

Systems operating in the 2400-2483.5 MHz band that are used exclusively for fixed, point to point operation may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceed 6 dBi.

Systems operating in the 5725 – 5850 MHz band that are used exclusively for fixed, point-to-point operation may employ transmitting antennas with directional gain greater than 6 dBi without any corresponding reduction in transmitter peak output power.

**Direct Measurement Method For Detachable Antennas:**

If the antenna is detachable, a peak power meter is used to measure the power output with the transmitter operating into a 50 ohm load. The dBi gain of the antenna(s) employed shall be reported.

**Calculation Of EIRP For Integral Antenna:**

If the antenna is not detachable from the circuit then the Peak Power Output is derived from the peak radiated field strength of the fundamental emission by using the relationship for 3 m distance as follows:

$$\text{EIRP} = E - 97$$

where,

EIRP = the equivalent isotropic radiated power in dBm

E = the maximum measured field strength in dB $\mu$ V/m

The RBW of the spectrum analyzer shall be set to a value greater than the measured 20 dB occupied bandwidth of the E.U.T.

Number of channels tested:

| Tuning range     | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less    | 1                         | middle                   |
| 1 to 10 MHz      | 2                         | top and bottom           |
| more than 10 MHz | 3                         | top, middle, bottom      |
|                  |                           |                          |

NAME OF TEST: Radiated Spurious Emissions

PARA. NO.: 15.247(c)

**Minimum Standard:** In any 100 kHz bandwidth outside the frequency band in which the transmitter is operating, emissions shall be at least 20 dB below the fundamental emission and shall not exceed the following field strength limits when falling in the restricted bands.

**Emissions falling in the restricted bands of 15.205 shall not exceed the following field strength limits:**

| Frequency (MHz) | Field Strength ( $\mu\text{V/m}$ @ 3m) | Field Strength (dB @ 3m) |
|-----------------|----------------------------------------|--------------------------|
| 30 - 88         | 100                                    | 40.0                     |
| 88 - 216        | 150                                    | 43.5                     |
| 216 - 960       | 200                                    | 46.0                     |
| Above 960       | 500                                    | 54.0                     |

**THE SPECTRUM WAS SEARCHED TO THE 10th HARMONIC**

#### 15.205 Restricted Bands

| MHz               | MHz                 | MHz           | GHz         |
|-------------------|---------------------|---------------|-------------|
| 0.09-0.11         | 16.42-16.423        | 399.9-410     | 4.5-5.25    |
| 0.495-0.505       | 16.69475-16.69525   | 608-614       | 5.35-5.46   |
| 2.1735-2.1905     | 16.80425-16.80475   | 960-1240      | 7.25-7.75   |
| 4.125-4.128       | 25.5-25.67          | 1300-1427     | 8.025-8.5   |
| 4.17725-4.17775   | 37.5-38.25          | 1435-1626.5   | 9.0-9.2     |
| 4.20725-4.20775   | 73-74.6             | 1645.5-1646.5 | 9.3-9.5     |
| 6.125-6.218       | 74.8-75.2           | 1660-1710     | 10.6-12.7   |
| 6.26775-6.26825   | 108-121.94          | 1718.8-1722.2 | 13.25-13.4  |
| 6.31175-6.31225   | 123-138             | 2200-2300     | 14.47-14.5  |
| 8.291-8.294       | 149.9-150.05        | 2310-2390     | 15.35-16.2  |
| 8.362-8.366       | 156.52475-156.52525 | 2483.5-2500   | 17.7-21.4   |
| 8.37625-8.38675   | 156.7-156.9         | 2655-2900     | 22.01-23.12 |
| 8.41425-8.41475   | 162.0125-167.17     | 3260-3267     | 23.6-24.0   |
| 12.29-12.293      | 167.72-173.2        | 3332-3339     | 31.2-31.8   |
| 12.51975-12.52025 | 240-285             | 3345.8-3358   | 36.43-36.5  |
| 12.57675-12.57725 | 322-335.4           | 3600-4400     | Above 38.6  |
| 13.36-13.41       | 1718                |               |             |

Number of channels tested:

| Tuning range     | Number of channels tested | Channel location in band |
|------------------|---------------------------|--------------------------|
| 1 MHz or less    | 1                         | middle                   |
| 1 to 10 MHz      | 2                         | top and bottom           |
| more than 10 MHz | 3                         | top, middle, bottom      |

## **ANNEX B   PHOTOGRAPHS**

Test sample, overview



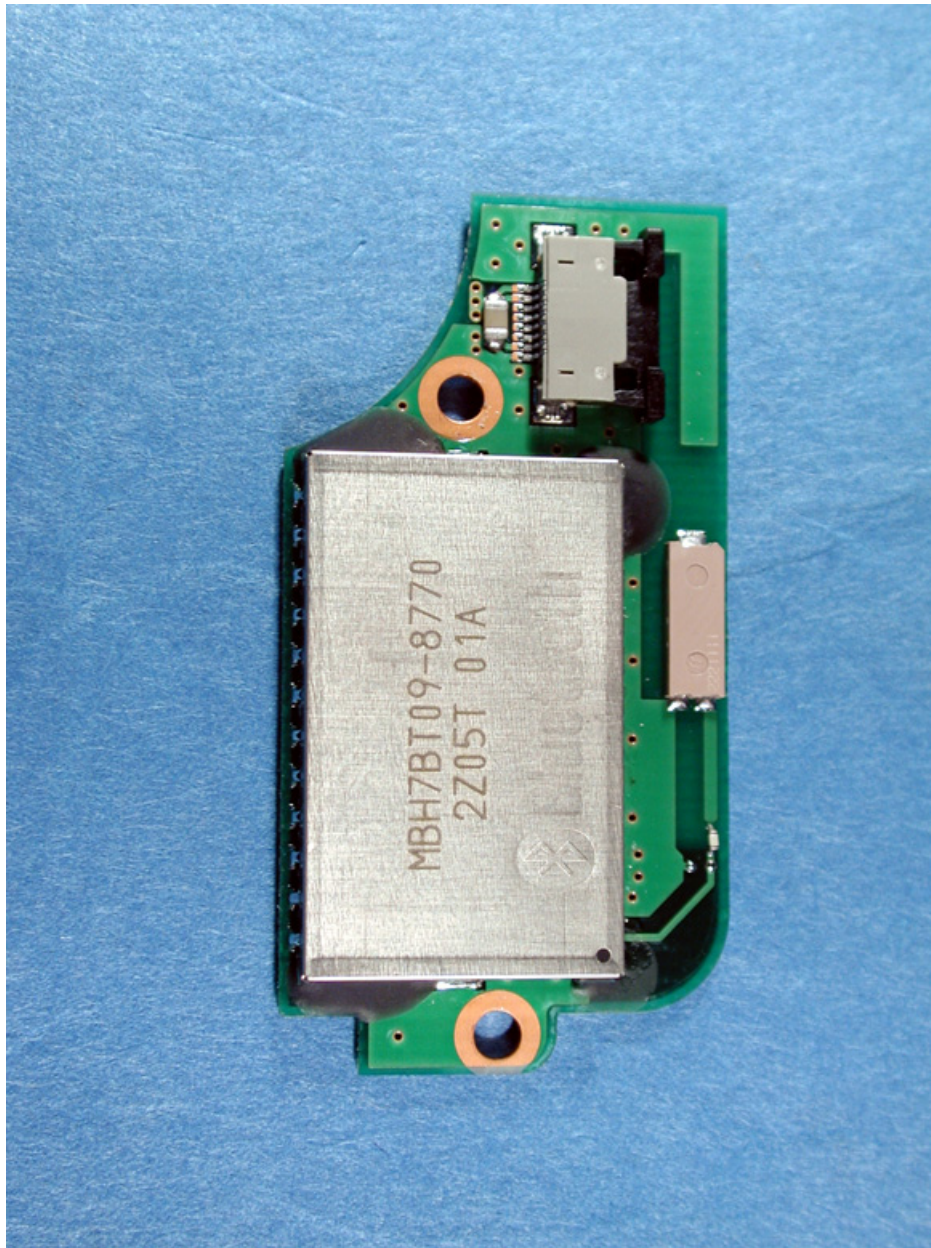
Test sample, interior, right side



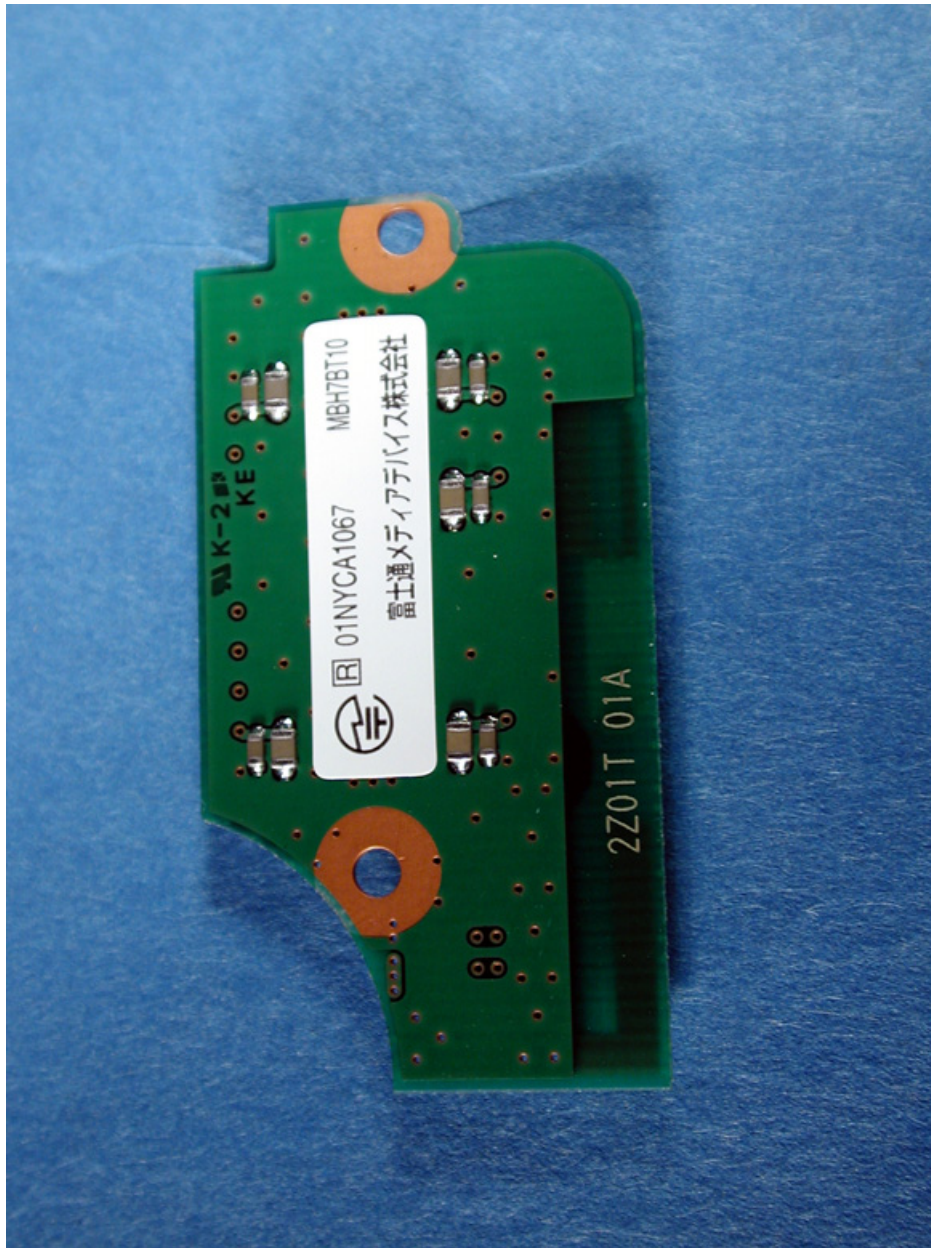
Test sample, interior, left side



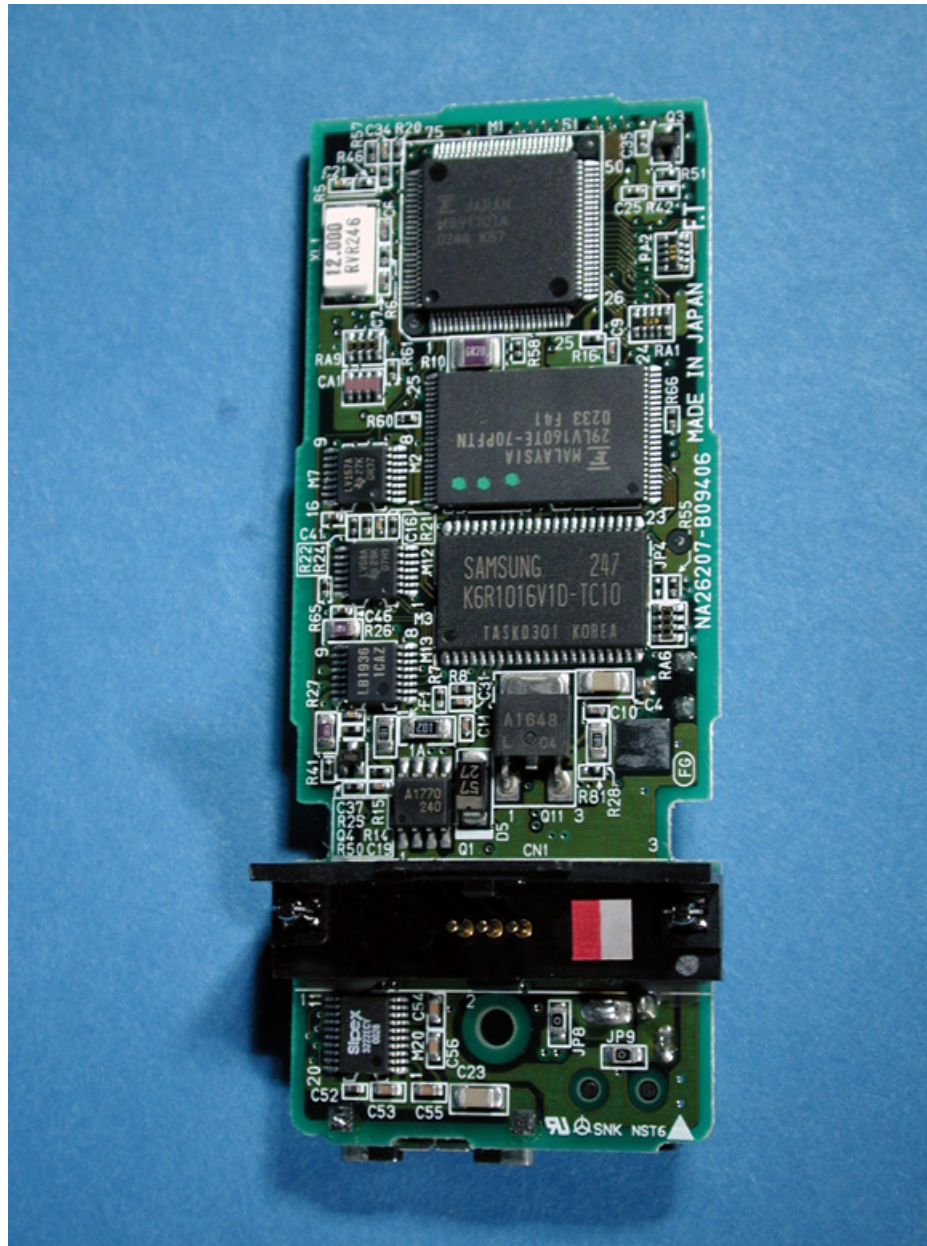
Test sample, bluetooth module, top side



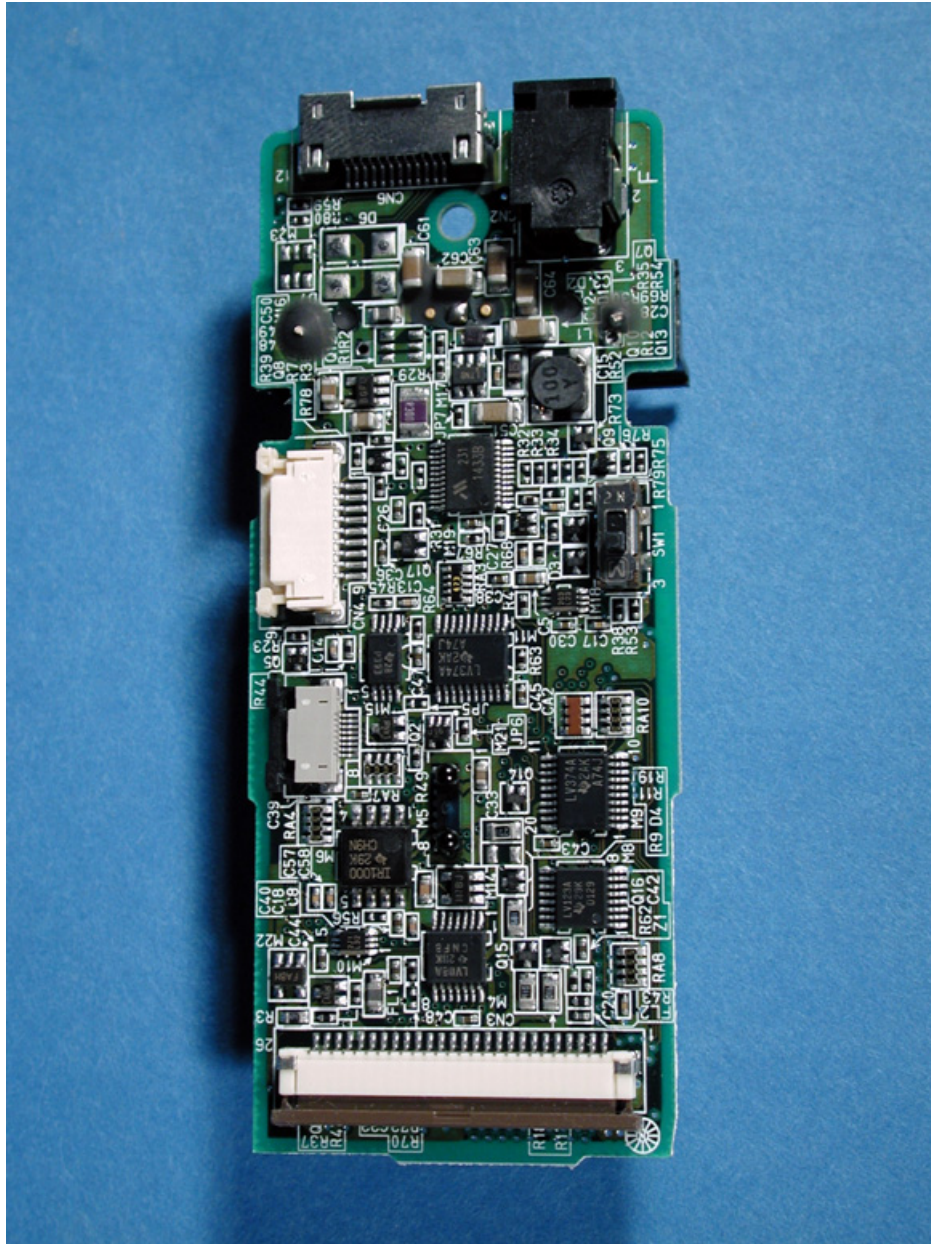
Test sample, bluetooth module, bottom side



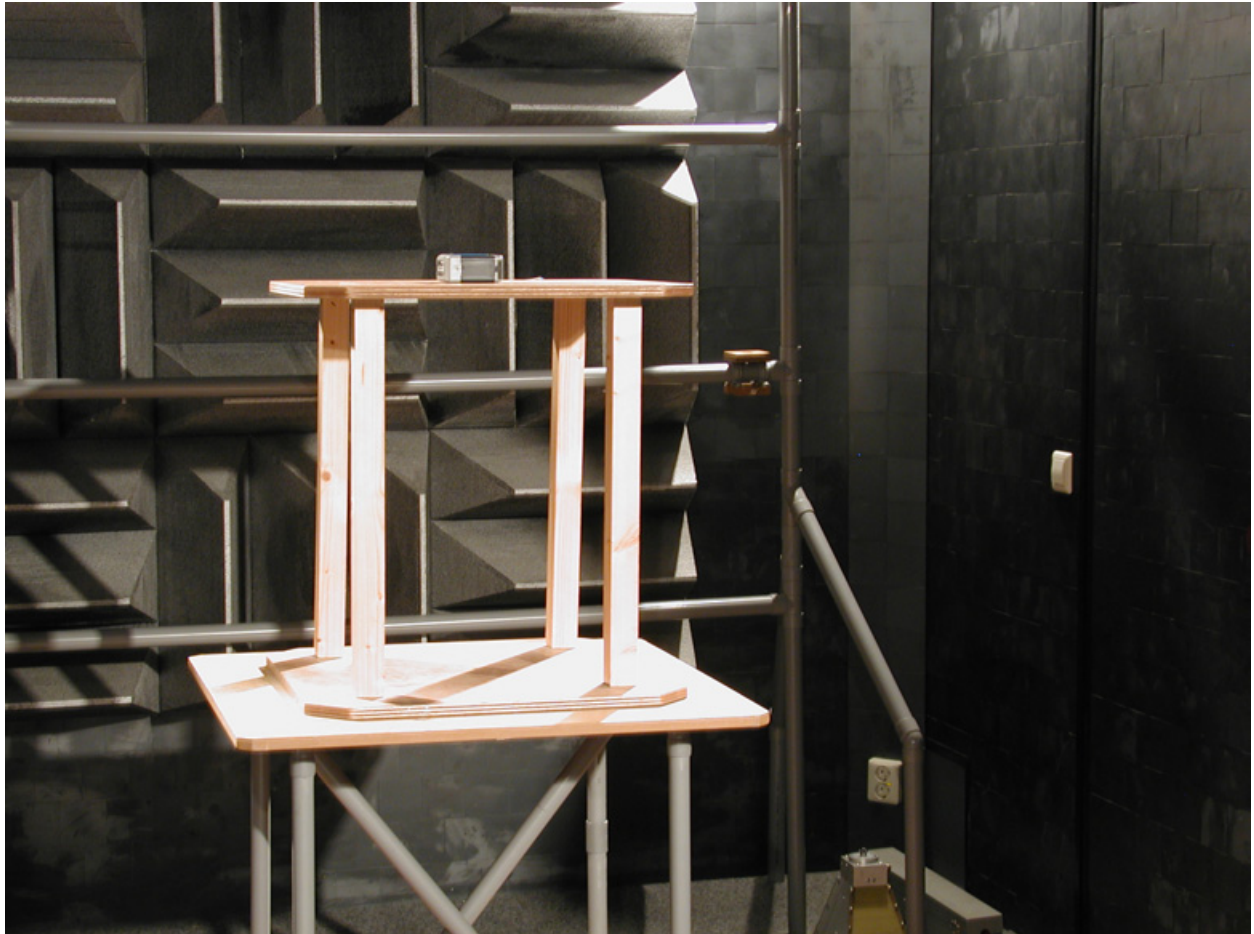
Test sample, PCB, top side



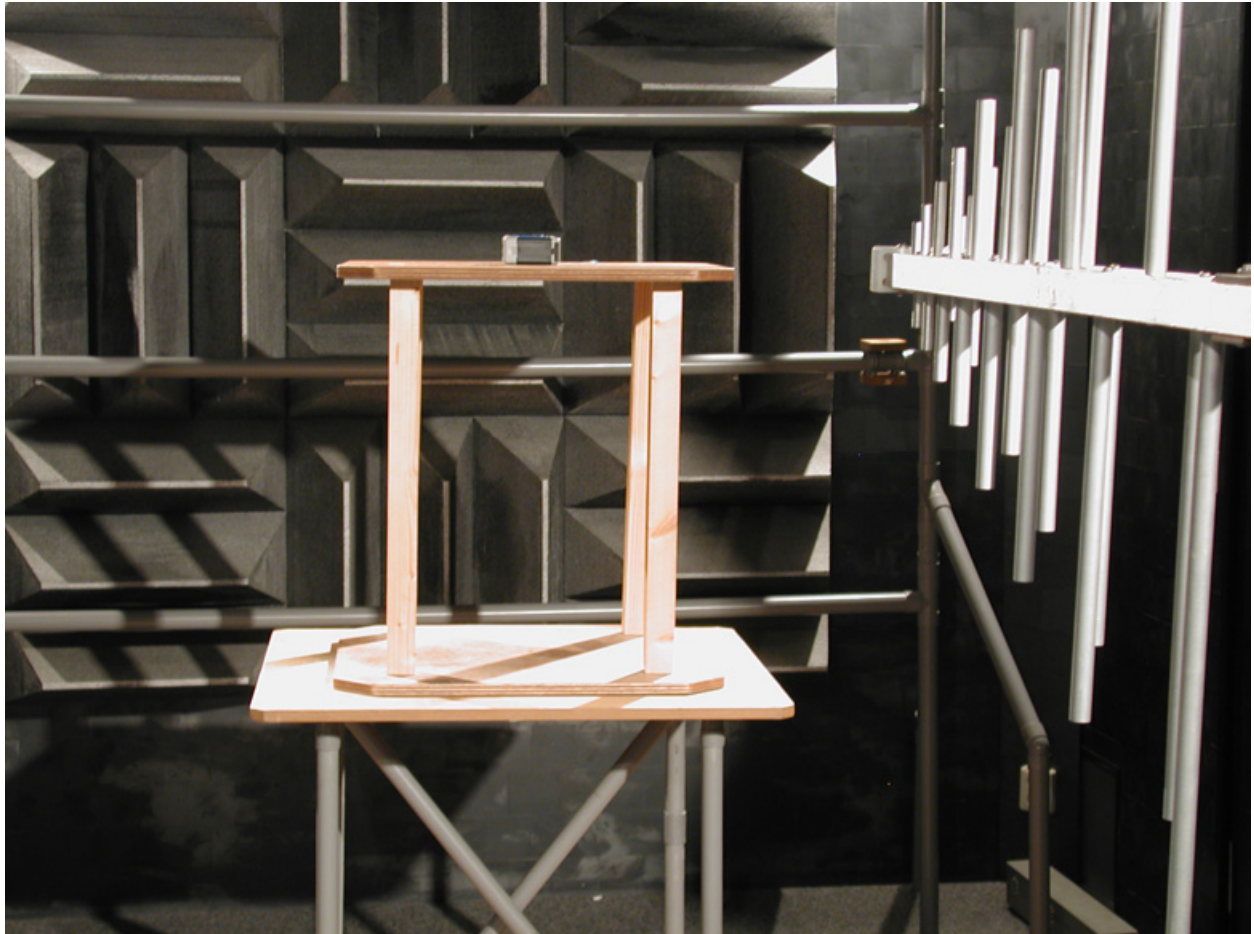
Test sample, PCB, bottom side



Set up test sample and turntable



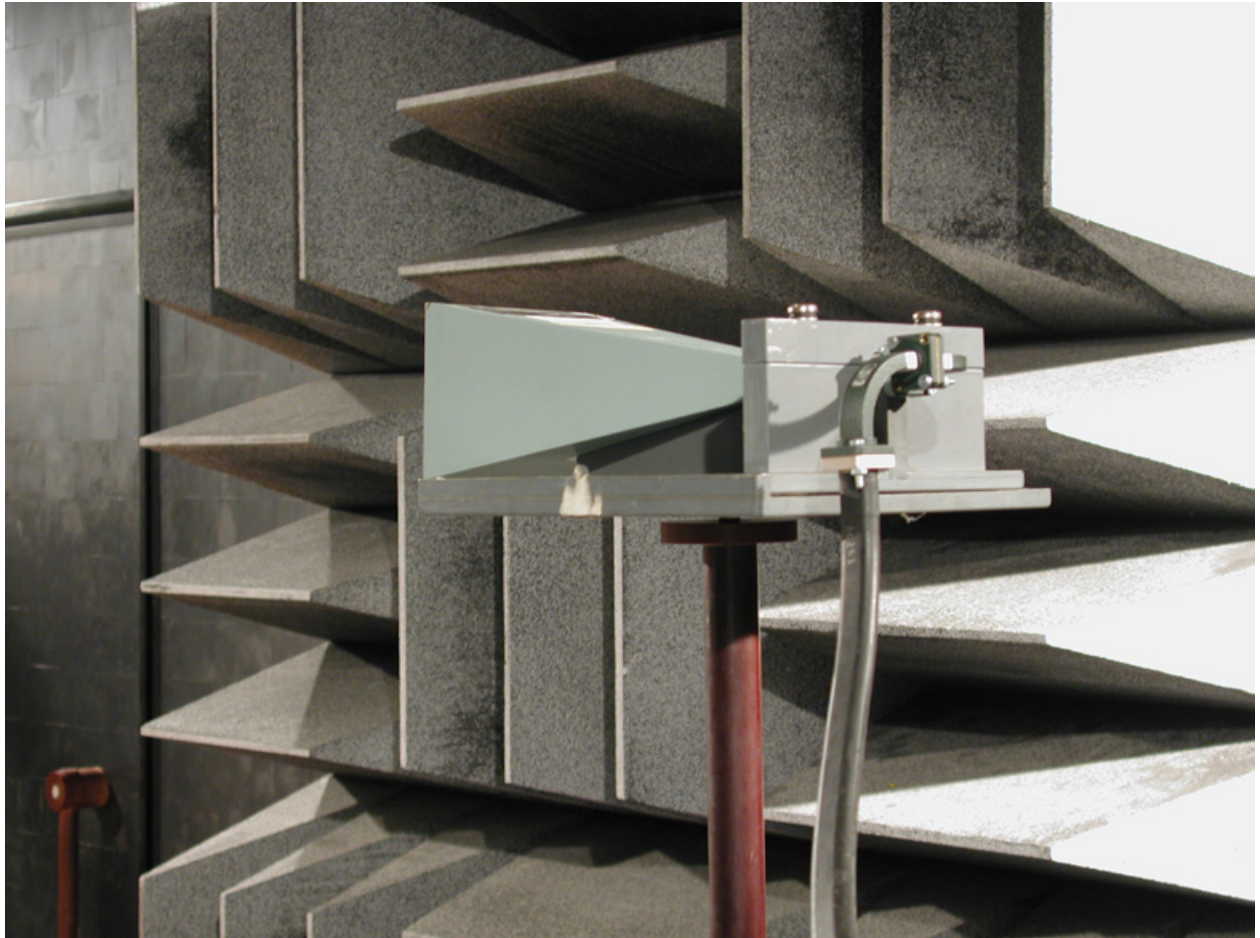
Set up 0.03 - 1 GHz



Set up 1 – 18 GHz



Set up 18 - 26 GHz



Set up 18 – 26 GHz



Set up 18 – 26 GHz

