Testing and certification of,
consultancy and research concerning,
electronic and electric appliances,
systems, installations and
telecommunication systems

# TEST REPORT OF A 2.4 GHz WLAN USB TRANSCEIVER, BRAND INTERSIL, MODEL ISL37300XU, IN CONFORMITY WITH FCC PART 15, ED. FEBRUARY 28, 2001.

FCC report layout endorsed by the FCC by Public Notice of March 11, 1992.

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# MEASUREMENT/TECHNICAL REPORT

## Intersil Corporation, The Netherlands

## Model : ISL37300XU

## FCC ID: OSZ37300XU

September 27, 2001

| | |
|---|---|
| This report concerns (check one): | Original grant ~~Class 1 change~~ |
| Equipment type: Direct Sequence Spread Spectrum Transceiver | |
| Deferred grant requested per 47 CFR 0.457(d)(1)(ii)? | ~~Yes~~ no |
| If yes defer until: | _____ |
| Intersil Corporation The Netherlands, Rembrandtlaan 1a, 3723 BG Bilthoven, The Netherlands. Agrees to notify the Commission by _____ of the intended date of announcement of the product so that the grant can be issued on that date. | |

| Report prepared by: | | |
|---|---|---|
| | Name | : O.H. Hoekstra |
| | Company name | : TNO Certification EPS B.V. |
| | Address | : Smidshornerweg 18 |
| | Telephone number | : + 31-59450-50 05 |
| | Telefax number | : + 31-59450-48 04 |
| | Mailing address | : P.O. Box 15 |
| | City/Place/Postal code. | : 9822 ZG Niekerk |
| | Country | : The Netherlands |

***The data taken for this test and report herein was done in accordance with FCC Part 15 and measurement Procedures of ANSI C63.4-1992. TNO Certification EPS B.V. at Niekerk, The Netherlands, certifies that the data is accurate and contains a true representation of the emission-profile of the Equipment Under Test (EUT) on the date of the test noted in the test report. I have reviewed the test report and find it to be an accurate description of the test(s) performed and the EUT so tested.***

Date: September 27, 2001 Signature:
P. de Beer

Department EMC and Telecommunication

**Table of Contents** **Page**

# 1 General information.

## 1.1 Product description.

The USB WLAN is designed to operate in the 2.4 GHz ISM frequency band, channels 1 to 11, as specified by the FCC in the USA. The Card will also operate on channels 12 to 14, where permitted by local regulatory authorities. Operation channels are firmware programmed prior to end-user shipment so only the regulatory allowed channels are implemented.
The Intersil PRISM Chip Set allows for high level integration for reduced size, increased throughput, improved radio performance and faster time to market. The WLAN implements Direct Sequence Spread Spectrum DSSS technology providing superiour noise and signal jamming immunity including less severe impact from unintentional radiators such as microwave ovens. The user can connect the USB WLAN in an ad-hoc peer to peer networking scheme, allowing for instant network setup in any office environment. By using an access point, the WLAN can be set up to allow for a greater number of users to interconnect, and to increase the coverage area.

## 1.2 Related Submittal(s)/Grant(s).

Not applicable.

## 1.3 Tested System Details.

The FCC ID's for all equipment, plus descriptions of all cables used in the tested system (included inserted cards, which have Grants) are:

| Model | Serial # | FCC ID | Description | Cable Descriptions |
|---|---|---|---|---|
| **EUT:** ISL37300XU | - | OSZ37300XU | 2.4 GHz WLAN Transceiver | - Screened USB cable |
| | | | | |
| IBM Thinkpad type 2626 | 55-0634L | - | Laptop PC | - unshielded power cord to adapter |
| type 2k06543 | 2M04T793A0Z | - | AC to DC adapter 100-240 Vac to 16 Vdc / 3.36 A | - unshielded power cord to laptop PC<br>- direct connection to AC Mains |

## 1.4 Test Methodology.

The test methodology used has been based on the requirements of FCC Part 15, issue February 28, 2001, relevant clauses 15.107, 15.109, 15.205, 15.207, 15.209, 15.247. The used measuring methods are based on the ANSI C63.4 - 1992 document.
Radiated tests above 30 MHz were performed at a distance of 3 meter. Below 30 MHz the measurement was carried out at a distance of 10 meter. The eventual found results will be calculated to values for the required measuring distance of 30/300 meter.
Fieldstrength measurements on frequencies above 1 GHz were measured with appropriate pre-amplifiers, antennas and a spectrum analyzer. At found frequencies the actual level at the input of the pre-amplifier was generated with aid of a signal generator. The output level of the signal generator was increased with the antenna-factor to obtain the fieldstrength.

## 1.5 Test Facility

The FCC has per Public Notice declared that the measurement facilities located at the TNO Certification EPS B.V. Testsite Niekerk, Smidshornerweg 18, The Netherlands, has been reviewed and found to be in compliance with the requirements of section 2.948 of the FCC rules per October 23, 2000.

The description of the measuring facilities have been filed at the FCC's Offices The facility has been added to the list of those who perform these measurement services for the public on a fee basis. An up-to-date list of such public test facilities is available on the Internet on the FCC Website at WWW.FCC.GOV, E-Filing, OET Equipment Authorization Electronic Filing.

# 2 Product labelling.

## 2.1 FCC ID Label

The following label shall be attached to the device under test.

FCC ID: OSZ37300XU
This Device complies with Part 15 of the FCC rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) This device must accept any interference received, including interference that may cause undesired operation.

Figure 2.1.1 FCC ID Caller

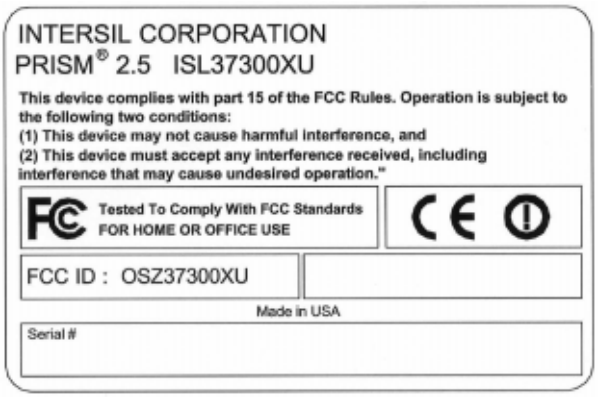



Figure 2.1.2 FCC ID Caller, label

## 2.2 Location of the FCC ID Label on the EUT

The FCC ID Label will be placed on the frontside of the WLAN USB transmitter.

See attached documentation-sheet for more detailed information.

# 3 System test configuration.

## 3.1 Justification.

The system was configured for testing in a typical fashion (as a customer would normally use it)

The justification of cables and equipment has been carried out as prescribed in the ANSI C63.4-1992 document.

The measurements were performed at the lowest operating frequency (channel 1: 2412 MHz), the operating frequency in the middle of the specified frequency band (channel 6: 2437 MHz) and the highest operating frequency (channel 11: 2462 MHz).

**Operating frequencies and rated output power levels.**

| channel | operating frequencies (MHz) | Rated output power (dBm) | test performed |
|---|---|---|---|
| 1 | 2412 | 20 | yes |
| 2 | 2417 | 20 | no |
| 3 | 2422 | 20 | no |
| 4 | 2427 | 20 | no |
| 5 | 2432 | 20 | no |
| 6 | 2437 | 20 | yes |
| 7 | 2442 | 20 | no |
| 8 | 2447 | 20 | no |
| 9 | 2452 | 20 | no |
| 10 | 2457 | 20 | no |
| 11 | 2462 | 20 | yes |

To complete the configuration required by the FCC, the transmitter was tested in laptop PC with the antenna connected to the antenna port.

The transmitter antenna connector is unique and is non-interchangeable.

## 3.2 EUT exercise software.

The EUT was enabled to transmit or receive continuously.

## 3.3 Special accessories.

No special accessories are used to achieve FCC compliance.

## 3.4 Equipment modifications.

No modifications have been made to the equipment to achieve compliance.

| | | | |
|---|---|---|---|
| Applicant Signature | : n.a. | Date | : n.a. |
| Typed/Printed Name | : n.a. | Position | : n.a. |

### 3.5 Configuration of the tested system.

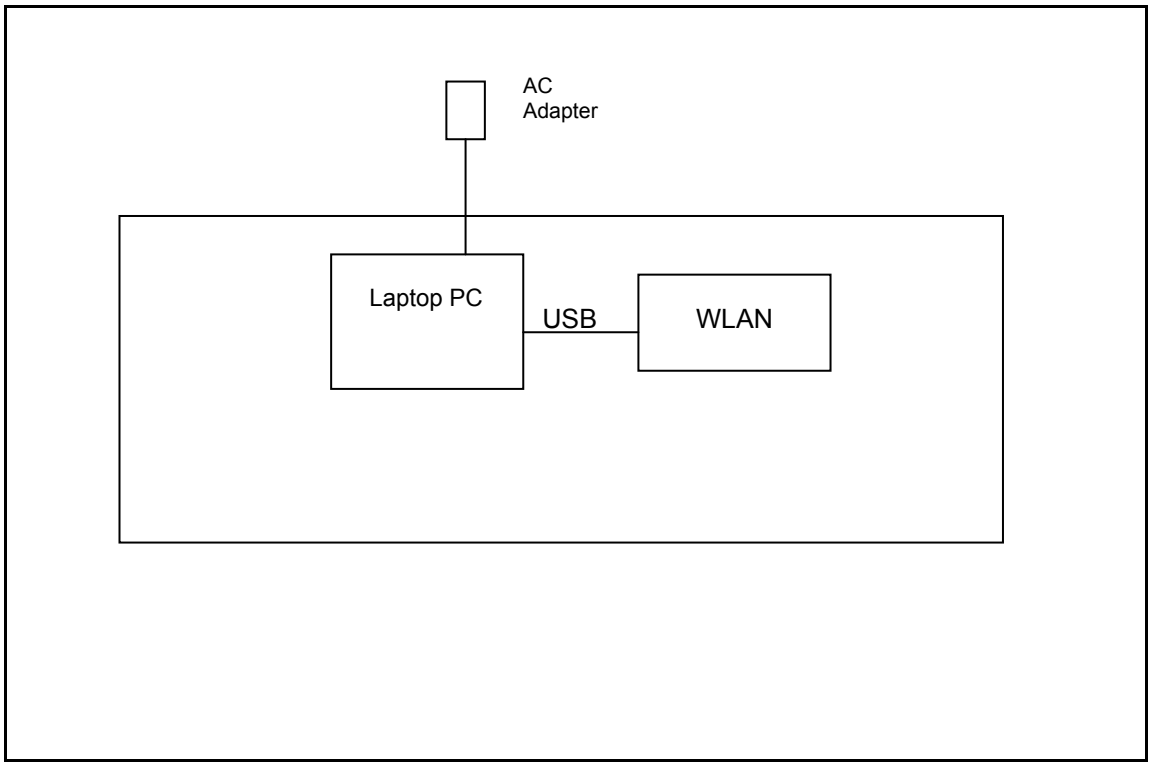



figure 1. Configuration of the tested system.

## 4 Block diagram(s) of the tested model.

Information is annexed in the technical documentation supplied by the applicant.

# 5 Conducted and radiated measurement photos.

## 5.1 Conducted emission configuration.

## 5.2 Radiated emission configuration.

# 6 Radiated emission data

## 6.1 Radiated emission data in accordance with FCC 15.109, receive mode.

Reception on channel 1, 2412 MHz

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 48.0 | 23.0 | <20.0 | QP | 120 | 40.0 |
| 96.0 | 20.7 | <20.0 | QP | 120 | 43.5 |
| 132.0 | 32.2 | 22.7 | QP | 120 | 43.5 |
| 163.1 | 18.6 | 23.9 | QP | 120 | 43.5 |
| 166.3 | 20.4 | 25.7 | QP | 120 | 43.5 |
| 195.7 | 24.6 | 30.6 | QP | 120 | 43.5 |
| 211.9 | 22.7 | 24.9 | QP | 120 | 43.5 |
| 220.0 | 27.9 | 25.1 | QP | 120 | 46.0 |
| 228.3 | 25.1 | 27.3 | QP | 120 | 46.0 |
| 232.9 | 24.3 | 33.0 | QP | 120 | 46.0 |
| 244.7 | 21.9 | 29.0 | QP | 120 | 46.0 |
| 260.9 | 31.0 | 33.0 | QP | 120 | 46.0 |
| 326.1 | 36.5 | 33.6 | QP | 120 | 46.0 |
| 456.6 | 36.3 | 32.7 | QP | 120 | 46.0 |
| 652.3 | 38.3 | 37.6 | QP | 120 | 46.0 |
| 782.7 | 37.0 | 36.0 | QP | 120 | 46.0 |
| 994.3 | <37.0 | <37.0 | QP | 120 | 54.0 |
| 1133 | 35.4 | 34.8 | PK | 1000 | 54.0 |
| 1200 | 34.2 | 30.0 | PK | 1000 | 54.0 |
| 1228 | 35.1 | <25.0 | PK | 1000 | 54.0 |
| 1261 | 35.7 | 31.9 | PK | 1000 | 54.0 |
| 1594 | 35.4 | 33.9 | PK | 1000 | 54.0 |
| 1732 | 34.5 | 32.0 | PK | 1000 | 54.0 |
| 1860 | 34.7 | 36.3 | PK | 1000 | 54.0 |
| 2038 | 27.7 | 21.4 | PK | 1000 | 74.0 |
| 2038 | 27.7 | 21.4 | AV | 1000 | 54.0 |
| 4076 | 34.8 | 35.2 | PK | 1000 | 74.0 |
| 4076 | 34.8 | 35.2 | AV | 1000 | 54.0 |
| 6114 | 32.7 | 31.0 | PK | 1000 | 74.0 |
| 6114 | 32.7 | 31.0 | AV | 1000 | 54.0 |
| 8152 | 46.5 | 44.3 | PK | 1000 | 74.0 |
| 8152 | 46.5 | 44.3 | AV | 1000 | 54.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Above 1 GHz, the peak values are below the limits for measurement with the average detector. Therefore, not all spurious emissions are measured with the average detector.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

Reception on channel 6: 2437 MHz.

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 48.0 | 23.0 | <20.0 | QP | 120 | 40.0 |
| 96.0 | 20.7 | <20.0 | QP | 120 | 43.5 |
| 132.0 | 32.2 | 22.7 | QP | 120 | 43.5 |
| 163.1 | 18.6 | 23.9 | QP | 120 | 43.5 |
| 166.3 | 20.4 | 25.7 | QP | 120 | 43.5 |
| 195.7 | 24.6 | 30.6 | QP | 120 | 43.5 |
| 211.9 | 22.7 | 24.9 | QP | 120 | 43.5 |
| 220.0 | 27.9 | 25.1 | QP | 120 | 46.0 |
| 228.3 | 25.1 | 27.3 | QP | 120 | 46.0 |
| 232.9 | 24.3 | 33.0 | QP | 120 | 46.0 |
| 244.7 | 21.9 | 29.0 | QP | 120 | 46.0 |
| 260.9 | 31.0 | 33.0 | QP | 120 | 46.0 |
| 326.1 | 36.5 | 33.6 | QP | 120 | 46.0 |
| 456.6 | 36.3 | 32.7 | QP | 120 | 46.0 |
| 652.3 | 38.3 | 37.6 | QP | 120 | 46.0 |
| 782.7 | 37.0 | 36.0 | QP | 120 | 46.0 |
| 994.3 | <37.0 | <37.0 | QP | 120 | 54.0 |
| 1133 | 35.4 | 34.8 | PK | 1000 | 54.0 |
| 1200 | 34.2 | 30.0 | PK | 1000 | 54.0 |
| 1228 | 35.1 | <25.0 | PK | 1000 | 54.0 |
| 1261 | 35.7 | 31.9 | PK | 1000 | 54.0 |
| 1594 | 35.4 | 33.9 | PK | 1000 | 54.0 |
| 1732 | 34.5 | 32.0 | PK | 1000 | 54.0 |
| 1860 | 34.7 | 36.3 | PK | 1000 | 54.0 |
| 2062 | 27.8 | 22.0 | PK | 1000 | 74.0 |
| 2062 | 27.8 | 22.0 | AV | 1000 | 54.0 |
| 4124 | 34.2 | 36.9 | PK | 1000 | 74.0 |
| 4124 | 34.2 | 36.9 | AV | 1000 | 54.0 |
| 6286 | 34.9 | 32.0 | PK | 1000 | 74.0 |
| 6286 | 34.9 | 32.0 | AV | 1000 | 54.0 |
| 8248 | 45.9 | 42.2 | PK | 1000 | 74.0 |
| 8248 | 45.9 | 42.2 | AV | 1000 | 54.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Above 1 GHz, the peak values are below the limits for measurement with the average detector. Therefore, not all spurious emissions are measured with the average detector.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

Reception on channel 11: 2462 MHz.

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 48.0 | 23.0 | <20.0 | QP | 120 | 40.0 |
| 96.0 | 20.7 | <20.0 | QP | 120 | 43.5 |
| 132.0 | 32.2 | 22.7 | QP | 120 | 43.5 |
| 163.1 | 18.6 | 23.9 | QP | 120 | 43.5 |
| 166.3 | 20.4 | 25.7 | QP | 120 | 43.5 |
| 195.7 | 24.6 | 30.6 | QP | 120 | 43.5 |
| 211.9 | 22.7 | 24.9 | QP | 120 | 43.5 |
| 220.0 | 27.9 | 25.1 | QP | 120 | 46.0 |
| 228.3 | 25.1 | 27.3 | QP | 120 | 46.0 |
| 232.9 | 24.3 | 33.0 | QP | 120 | 46.0 |
| 244.7 | 21.9 | 29.0 | QP | 120 | 46.0 |
| 260.9 | 31.0 | 33.0 | QP | 120 | 46.0 |
| 326.1 | 36.5 | 33.6 | QP | 120 | 46.0 |
| 456.6 | 36.3 | 32.7 | QP | 120 | 46.0 |
| 652.3 | 38.3 | 37.6 | QP | 120 | 46.0 |
| 782.7 | 37.0 | 36.0 | QP | 120 | 46.0 |
| 994.3 | <37.0 | <37.0 | QP | 120 | 54.0 |
| 1133 | 35.4 | 34.8 | PK | 1000 | 54.0 |
| 1200 | 34.2 | 30.0 | PK | 1000 | 54.0 |
| 1228 | 35.1 | <25.0 | PK | 1000 | 54.0 |
| 1261 | 35.7 | 31.9 | PK | 1000 | 54.0 |
| 1594 | 35.4 | 33.9 | PK | 1000 | 54.0 |
| 1732 | 34.5 | 32.0 | PK | 1000 | 54.0 |
| 1860 | 34.7 | 36.3 | PK | 1000 | 54.0 |
| 2087 | 29.0 | 23.1 | PK | 1000 | 74.0 |
| 2087 | 29.0 | 23.1 | AV | 1000 | 54.0 |
| 4174 | 34.2 | 38.3 | PK | 1000 | 74.0 |
| 4174 | 34.2 | 38.3 | AV | 1000 | 54.0 |
| 6261 | 34.2 | 31.8 | PK | 1000 | 74.0 |
| 6261 | 34.2 | 31.8 | AV | 1000 | 54.0 |
| 8348 | 45.4 | 40.2 | PK | 1000 | 74.0 |
| 8348 | 45.4 | 40.2 | AV | 1000 | 54.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Above 1 GHz, the peak values are below the limits for measurement with the average detector. Therefore, not all spurious emissions are measured with the average detector.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 6.2 Radiated emission data in restricted bands in accordance with FCC 15.205, transmit mode .

The following data lists the significant emission frequencies, measured levels in accordance with FCC 15.205.

Transmitting on channel 1, 2412 MHz

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 132.0 | 32.1 | 22.8 | QP | 120 | 43.5 |
| 163.1 | 21.7 | 25.8 | QP | 120 | 43.5 |
| 166.3 | 18.9 | 24.4 | QP | 120 | 43.5 |
| 244.7 | 22.5 | 28.2 | QP | 120 | 46.0 |
| 260.9 | 30.8 | 34.3 | QP | 120 | 46.0 |
| 326.1 | 38.4 | 33.1 | QP | 120 | 46.0 |
| 994.3 | 42.1 | 42.4 | QP | 120 | 54.0 |
| 1000 | 39.7 | 35.4 | PK | 1000 | 74.0 |
| 1014 | 37.0 | 25.9 | AV | 1000 | 54.0 |
| 1133 | 33.8 | 32.6 | PK | 1000 | 74.0 |
| 1394 | 32.4 | 34.6 | AV | 1000 | 54.0 |
| 1461 | 32.7 | 34.4 | PK | 1000 | 74.0 |
| 1594 | 32.5 | 31.8 | AV | 1000 | 54.0 |
| 2800 | 36.4 | 34.2 | PK | 1000 | 74.0 |
| 2800 | 36.4 | 34.2 | AV | 1000 | 54.0 |
| 4824 | 38.2 | <33.5 | PK | 1000 | 74.0 |
| 4824 | 30.9 | 28.4 | AV | 1000 | 54.0 |
| 7236 | <40.0 | <40.0 | PK | 1000 | 54.0 |
| 7236 | 30.6 | 26.0 | AV | 1000 | 74.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Radiated emission tests are performed with all bitrates. The highest values are given here.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

Transmitting on channel 6: 2437 MHz.

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 132.0 | 32.1 | 22.8 | QP | 120 | 43.5 |
| 163.1 | 21.7 | 25.8 | QP | 120 | 43.5 |
| 166.3 | 18.9 | 24.4 | QP | 120 | 43.5 |
| 244.7 | 22.5 | 28.2 | QP | 120 | 46.0 |
| 260.9 | 30.8 | 34.3 | QP | 120 | 46.0 |
| 326.1 | 38.4 | 33.1 | QP | 120 | 46.0 |
| 994.3 | 42.1 | 42.4 | QP | 120 | 54.0 |
| 1000 | 39.7 | 35.4 | PK | 1000 | 74.0 |
| 1014 | 37.0 | 25.9 | AV | 1000 | 54.0 |
| 1133 | 33.8 | 32.6 | PK | 1000 | 74.0 |
| 1394 | 32.4 | 34.6 | AV | 1000 | 54.0 |
| 1461 | 32.7 | 34.4 | PK | 1000 | 74.0 |
| 1594 | 32.5 | 31.8 | AV | 1000 | 54.0 |
| 4874 | 37.5 | <33.5 | PK | 1000 | 74.0 |
| 4874 | 30.9 | 28.1 | AV | 1000 | 54.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Radiated emission tests are performed with all bitrates. The highest values are given here.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

Transmitting on channel 11: 2462 MHz.

| Frequency (MHz) | Results for horizontal and vertical polarisation of measurement antenna (dBμV/m) | | Detector type: QP=Quasi peak AV=Average PK=Peak | Resolution Bandwidth of field strength meter (kHz) | Limits (dBμV/m) |
|---|---|---|---|---|---|
| | Vertical | Horizontal | | | |
| 132.0 | 32.1 | 22.8 | QP | 120 | 43.5 |
| 163.1 | 21.7 | 25.8 | QP | 120 | 43.5 |
| 166.3 | 18.9 | 24.4 | QP | 120 | 43.5 |
| 244.7 | 22.5 | 28.2 | QP | 120 | 46.0 |
| 260.9 | 30.8 | 34.3 | QP | 120 | 46.0 |
| 326.1 | 38.4 | 33.1 | QP | 120 | 46.0 |
| 994.3 | 42.1 | 42.4 | QP | 120 | 54.0 |
| 1000 | 39.7 | 35.4 | PK | 1000 | 74.0 |
| 1014 | 37.0 | 25.9 | AV | 1000 | 54.0 |
| 1133 | 33.8 | 32.6 | PK | 1000 | 74.0 |
| 1394 | 32.4 | 34.6 | AV | 1000 | 54.0 |
| 1461 | 32.7 | 34.4 | PK | 1000 | 74.0 |
| 1594 | 32.5 | 31.8 | AV | 1000 | 54.0 |
| 4924 | 38.2 | <33.5 | PK | 1000 | 74.0 |
| 4924 | 32.0 | 28.7 | AV | 1000 | 54.0 |
| other freq. | <40.0 | <40.0 | PK | 1000 | 54.0 |

Note: Radiated emission tests are performed with all bitrates. The highest values are given here.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

# 7 Conducted emission data at the AC power line terminals in accordance with FCC 15.207.

The following table lists worst case conducted emission data from transmissions / receptions with various bitrates on various channels in accordance with FCC 15.207. The conducted test was performed with the EUT exercise program loaded.

| Frequency (MHz) | Measurement results dB(µV) Neutral | | Measurement results dB(µV) Line | | Limits dB(µV) | Margin (dB) Neutral | Margin (dB) Line | Result |
|---|---|---|---|---|---|---|---|---|
| | QP | AV | QP | AV | QP | QP | QP | |
| 0.82 | 32.0 | 21.8 | 24.5 | 11.9 | 48.0 | 16.0 | 23.5 | PASS |
| 1.75 | 21.9 | 23.1 | 22.4 | 17.4 | 48.0 | 26.1 | 25.6 | PASS |
| 2.44 | 29.9 | 19.8 | 25.8 | 16.2 | 48.0 | 18.1 | 22.2 | PASS |
| 5.22 | 21.8 | 10.7 | 21.5 | 10.4 | 48.0 | 26.2 | 26.5 | PASS |
| 7.00 | 30.6 | 14.2 | 33.2 | 14.5 | 48.0 | 17.4 | 14.8 | PASS |
| 9.08 | 26.8 | 11.3 | 37.7 | 14.1 | 48.0 | 21.2 | 10.3 | PASS |
| 16.45 | 26.0 | 13.4 | 25.9 | 12.1 | 48.0 | 22.0 | 22.1 | PASS |

Table 6.1: Worst case disturbance voltage levels.
Measurement results are average and quasi peak results.

The conducted emission measurement has been carried with AC supply voltage of 120 V.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

# 8 Testresults of measurements in accordance with FCC 15.247.

## 8.1 (a)(2) Minimum 6 dB bandwidth.

| Bitrate | Minimum 6 dB bandwidth (kHz) | | | Limit (kHz) |
|---|---|---|---|---|
| | Channel 1 2412 MHz | Channel 6 2437 MHz | Channel 11 2462 MHz | |
| 1 Mbit/s | 11250 | 11250 | 11330 | >500 |
| 2 Mbit/s | 11250 | 11250 | 9750 | >500 |
| 5.5 Mbit/s | 10430 | 10350 | 10280 | >500 |
| 11 Mbit/s | 9820 | 10130 | 10430 | >500 |

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 8.2 (b)(1) Maximum peak output power of the intentional radiator.

| Bitrate | Maximum peak output power (dBm) | | | Limit (dBm) |
|---|---|---|---|---|
| | Channel 1 2412 MHz | Channel 6 2437 MHz | Channel 11 2462 MHz | Gain <6 dBi |
| 1 Mbit/s | 18.2 | 18.3 | 17.6 | 30.0 |
| 2 Mbit/s | 18.2 | 18.2 | 17.6 | 30.0 |
| 5.5 Mbit/s | 18.0 | 17.9 | 17.2 | 30.0 |
| 11 Mbit/s | 18.1 | 18.2 | 17.5 | 30.0 |

Notes:
Maximum values from measurements with supply voltages varied between 85% and 115% are noted down here.
There are no diffences in measurement results due to voltage variations between 85% and 115%.
As the antenna gain does not exceed 6 dBi, no reduction of the maximum peak output power is required.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 8.3 (c) Radiated emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band.

| Frequency (MHz) | dB below working channel (based on field strength) | Limits (dB) |
|---|---|---|
| 994.25 | -37.2 | <-20.0 |
| 2397.50 | -31.0 | <-20.0 |
| 2400 | -32.6 | <-20.0 |
| Other frequencies | <-40.0 | <-20.0 |

Note: Worst case situations for transmissions with all bitrate / channel 1, channel 6, channel 11 combinations.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 8.4 (c) Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band.

| Frequency (MHz) | dB below working channel | Limits (dB) |
|---|---|---|
| 2397.50 | -31.0 | -20.0 |
| 2400 | -32.6 | -20.0 |

Note: Summary for transmissions with all bitrate / channel 1, channel 6, channel 11 combinations.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 8.5 (d) Peak power spectral density conducted from the intentional radiator in any 3 kHz band.

| Bitrate | Peak power spectral density in any 3 kHz band (dBm) | | | Limit (dBm) |
|---|---|---|---|---|
| | Channel 1 2412 MHz | Channel 6 2437 MHz | Channel 11 2462 MHz | |
| 1 Mbit/s | -12.1 | -12.2 | -12.9 | <8.0 |
| 2 Mbit/s | -5.4 | -5.5 | -6.2 | <8.0 |
| 5.5 Mbit/s | -6.6 | -6.7 | -7.4 | <8.0 |
| 11 Mbit/s | -6.9 | -6.9 | -7.7 | <8.0 |

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

## 8.6 (e) Processing gain of a direct sequence system.

Test performed by others.

Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

# 9 Plots of measurement data.

For reference purposes and spectrum analyzer settings during the measurements, a selection of plots of measurement data is presented here.

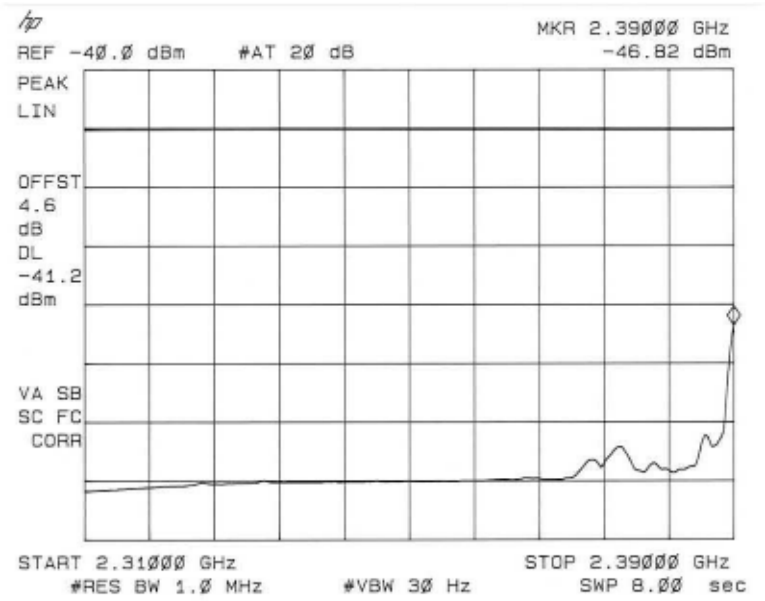
Test personnel:

Tester signature:  Date: September 27, 2001

Name : Onno H. Hoekstra

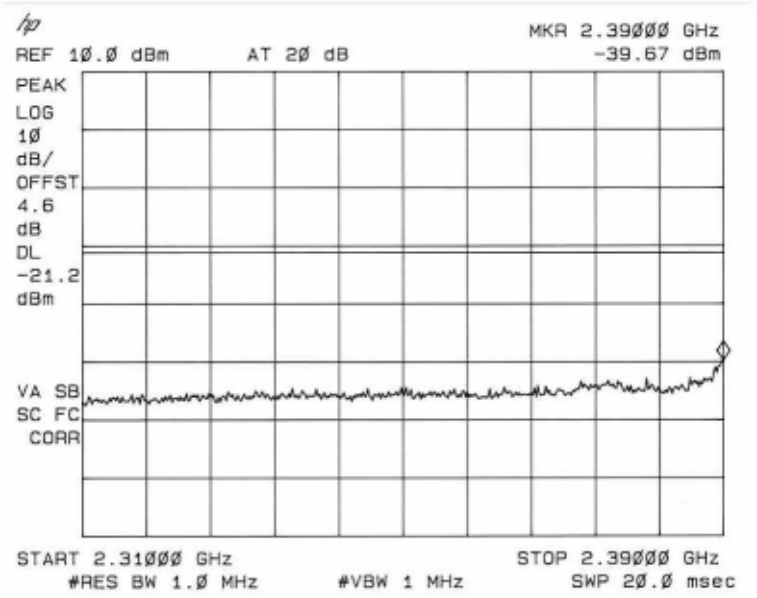
## 9.1 Emission in restricted bands nearest to the band 2400 - 2483.5 MHz.

### 9.1.1 Average values in restricted band 2310 - 2390 MHz.



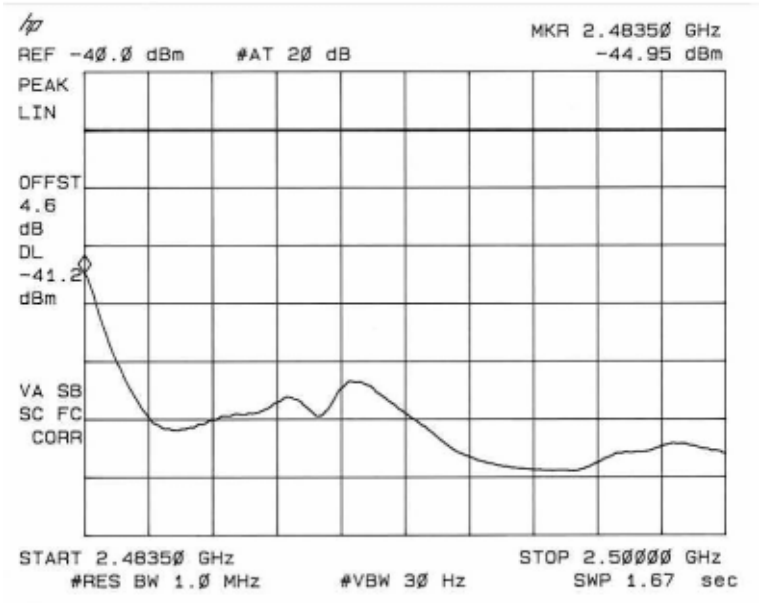

Average values in restricted band, All bitrate settings, conducted measurement,
corrected for 2 dBi antenna gain and 2.6 dB cable losses.
54 dBµV/m :: -41.2 dBm display line setting

### 9.1.2 Peak values in restricted band 2310 - 2390 MHz.



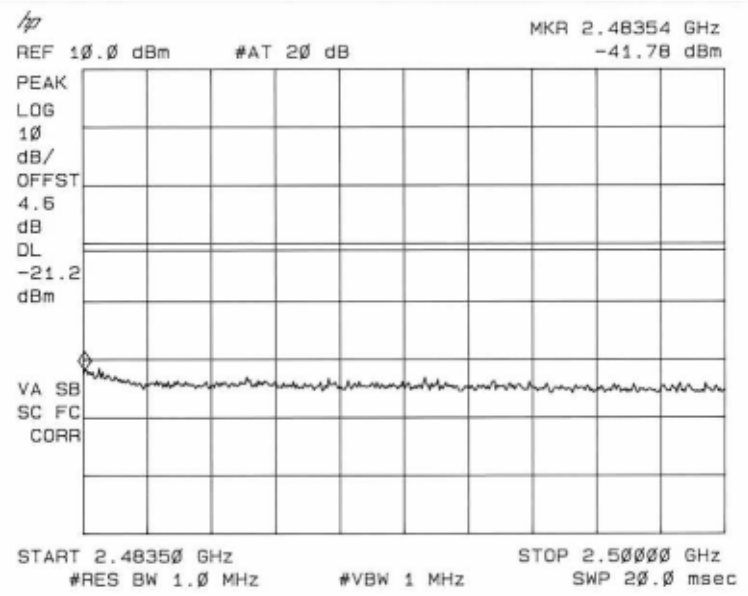

Peak values in restricted band, All bitrate settings, conducted measurement,
corrected for 2 dBi antenna gain and 2.6 dB cable losses.
74 dBµV/m :: -21.2 dBm display line setting

### 9.1.3 Average values in restricted band 2483.5 - 2500 MHz.



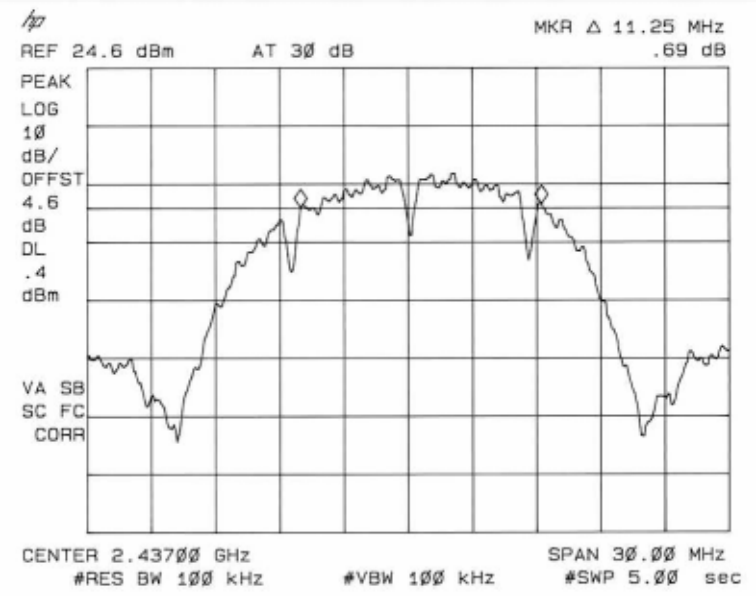

Average values in restricted band, All bitrate settings, conducted measurement,
corrected for 2 dBi antenna gain and 2.6 dB cable losses.
54 dBµV/m :: -41.2 dBm display line setting

### 9.1.4 Peak values in restricted band 2483.5 - 2500 MHz.

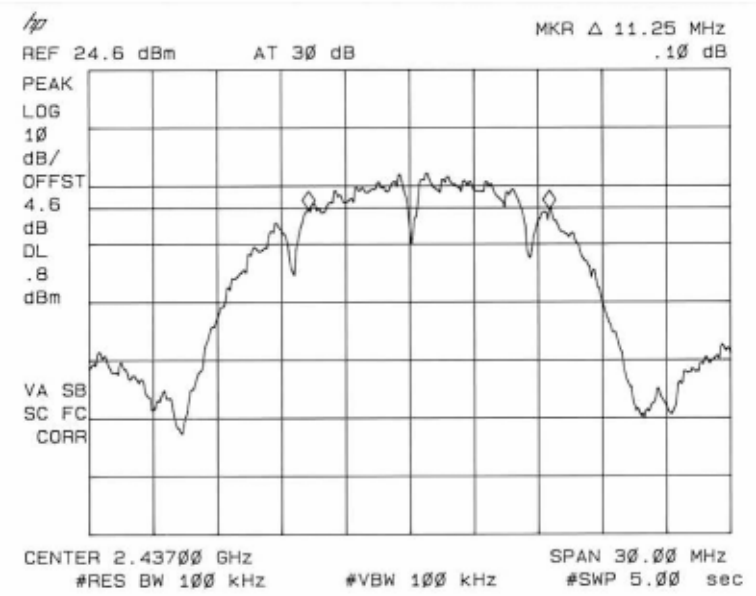



Peak values in restricted band, All bitrate settings, conducted measurement,
corrected for 2 dBi antenna gain and 2.6 dB cable losses.
74 dBµV/m :: -21.2 dBm display line setting

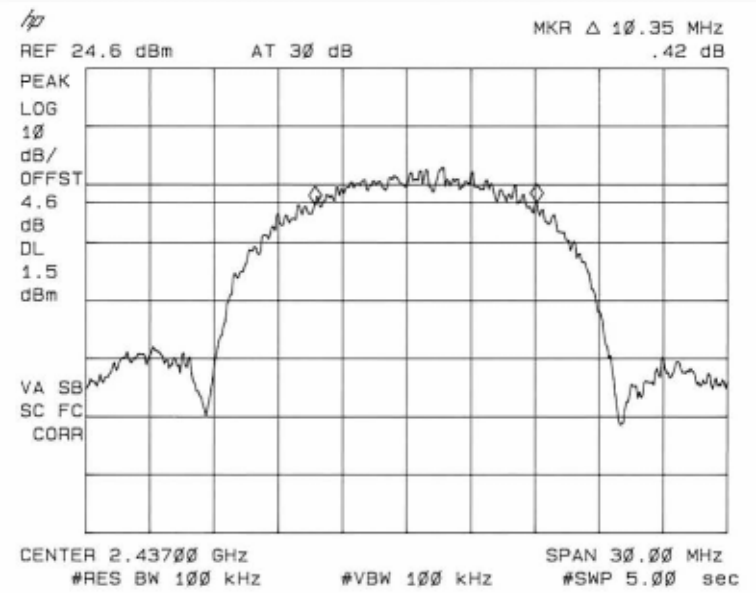
## 9.2 (a)(2) Minimum 6 dB bandwidth.



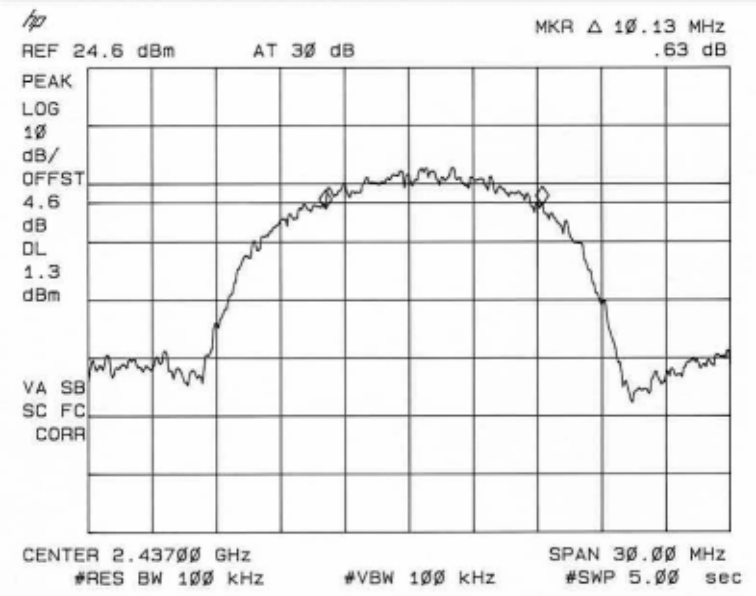

Minimum 6 dB bandwidth at 1 Mbit/s.




Minimum 6 dB bandwidth at 2 Mbit/s.

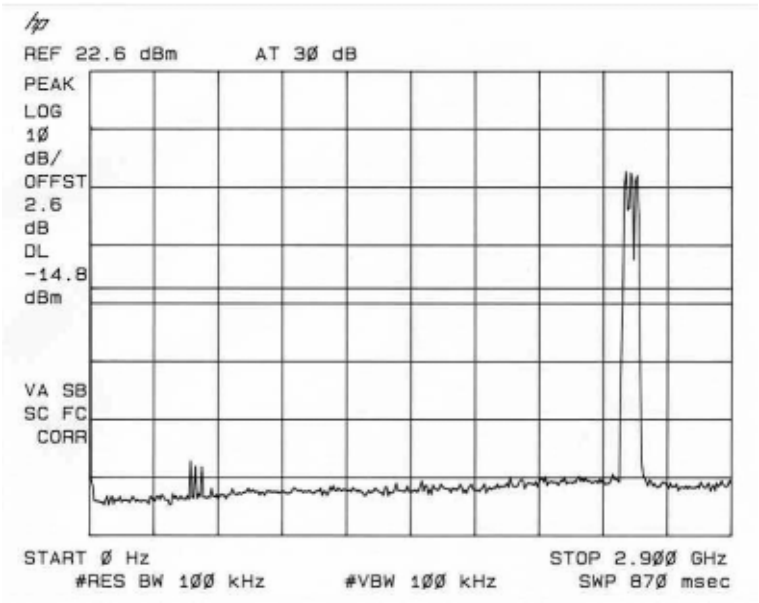



Minimum 6 dB bandwidth at 5.5 Mbit/s.

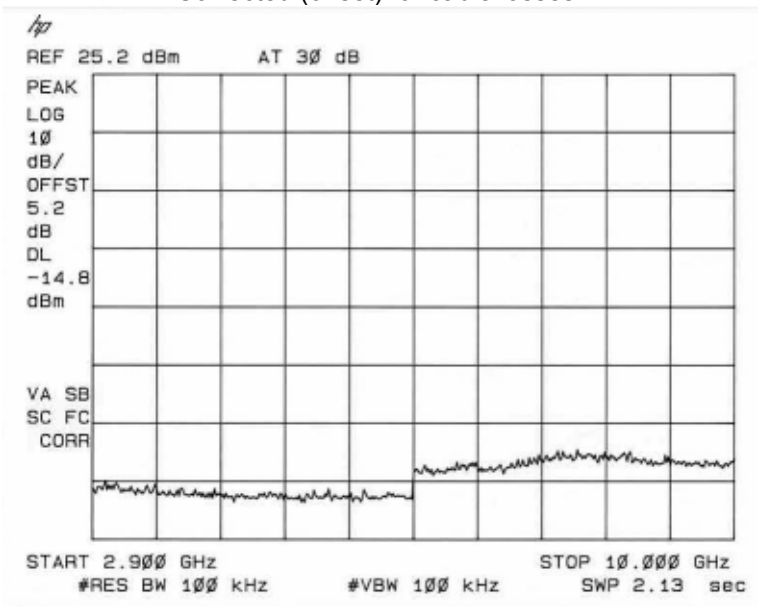



Minimum 6 dB bandwidth at 11 Mbit/s.

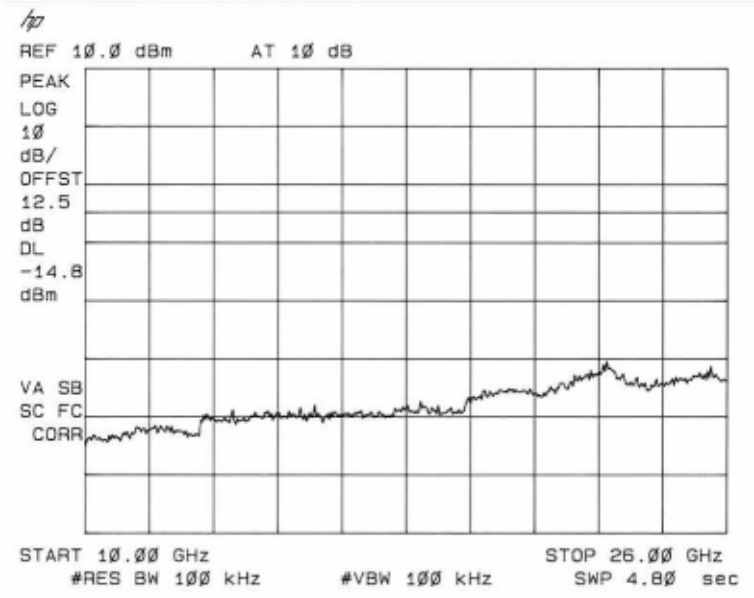
## 9.3 (c) Conducted emission data outside restricted bands in a 100 kHz bandwidth shall be at least 20 dB below the highest level in a 100 kHz bandwidth within the band.




Conducted emission outside restricted band.
Display line :: -20 dB limit line.
Corrected (offset) for cable losses.

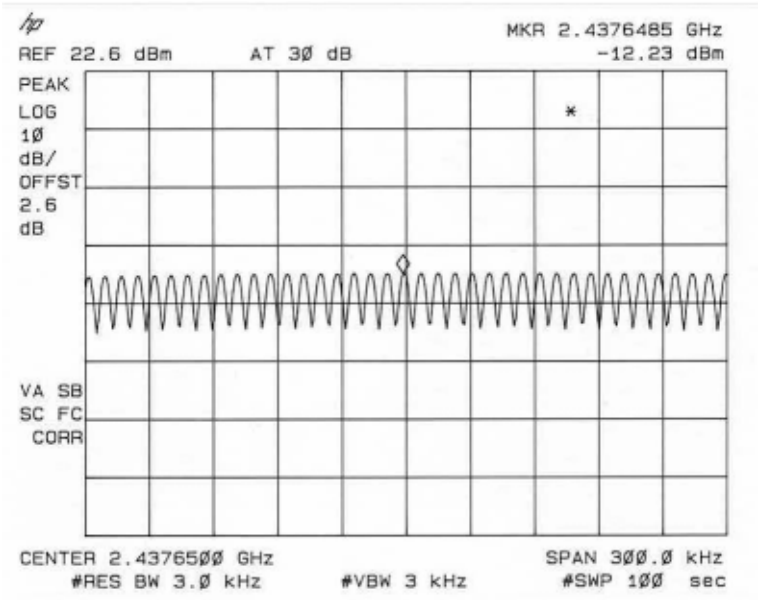



Conducted emission outside restricted band.
Display line :: -20 dB limit line.
Corrected (offset) for cable losses.

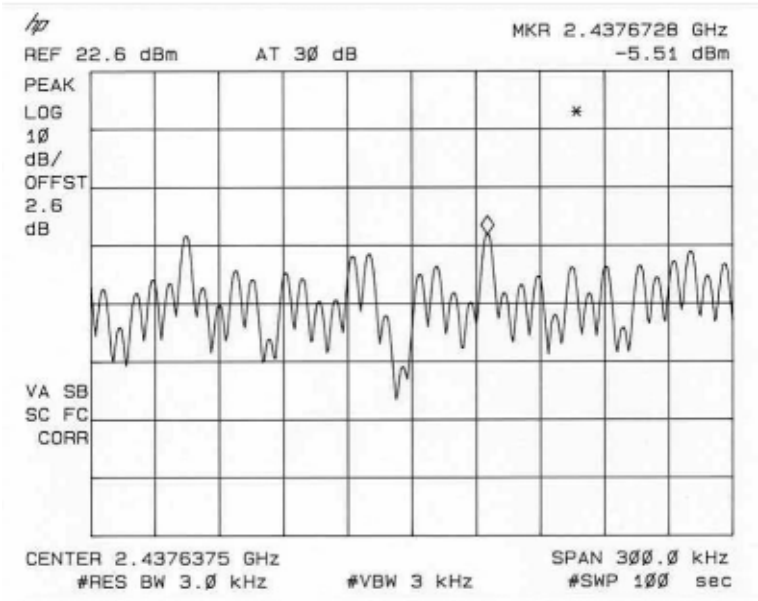



Conducted emission outside restricted band.
Display line :: -20 dB limit line.
Corrected (offset) for cable losses.

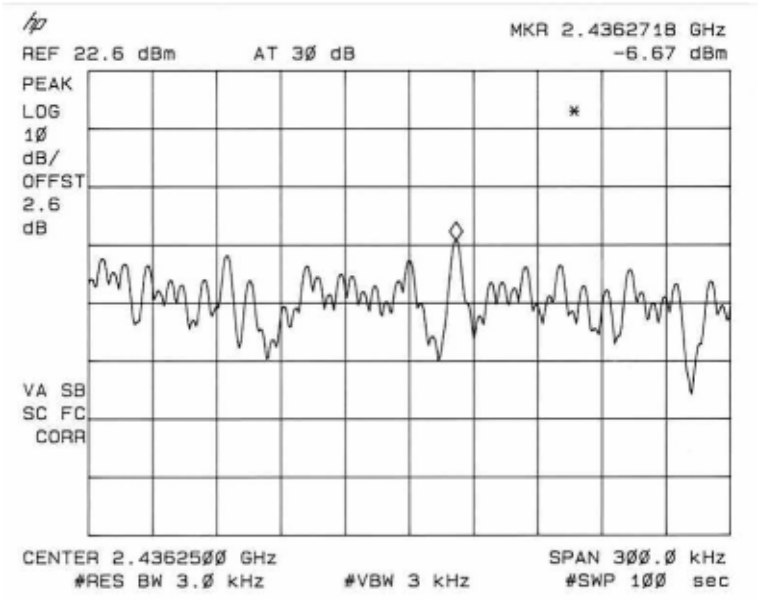
## 9.4 (d) Peak power spectral density conducted from the intentional radiator in any 3 kHz band.



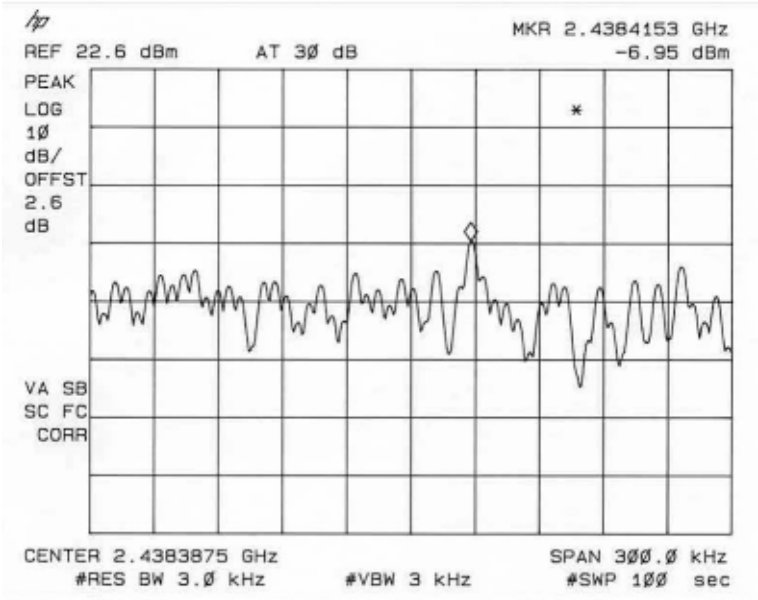

Peak power density in a 3 kHz bandwidth at 1 Mbit/s.
Corrected (offset) for cable losses.




Peak power density in a 3 kHz bandwidth at 2 Mbit/s.
Corrected (offset) for cable losses.




Peak power density in a 3 kHz bandwidth at 5.5 Mbit/s.
Corrected (offset) for cable losses.




Peak power density in a 3 kHz bandwidth at 11 Mbit/s.
Corrected (offset) for cable losses.

# 10 List of used measuring equipment

| TNO number | Description | Brand | Type |
|---|---|---|---|
| 12471 | Biconical antenna 20MHz-200MHz | EATON | 94455-1 |
| 12473 | Log-per antenna 200-1000MHz | EATON | 96005 |
| 12476 | Antenna mast | EMCO | TR3 |
| 12477 | Antenna mast 1-4 mtr | Poelstra | -- |
| 12482 | Loop antenna | EMCO | 6507 |
| 12483 | Guidehorn | EMCO | 3115 |
| 12484 | Guidehorn | EMCO | 3115 |
| 12488 | Guidehorn 18 - 26.5 GHz | EMCO | RA42-K-F-4B-C |
| 12533 | Signalgenerator | MARCONI | 2032 |
| 12559 | Digital storage oscilloscope | Le Croy | 9310M |
| 12561 | DC Power Supply 20A/70V | DELTA | SM7020D |
| 12567 | Plotter | HP | 7440A |
| 12605 | calibrated dipole 28MHz-1GHz | Emco | 3121c |
| 12608 | HF milliwattmeter | Hewlett Packard | HP435a |
| 12609 | Power sensor 10MHz-18GHz | Hewlett Packard | HP8481A |
| 12636 | Polyester chamber | Polyforce | -- |
| 12640 | Temperature chamber | Heraeus | VEM03/500 |
| 13664 | Spectrum analyzer | HP | HP8593E |
| 13078 | Preamplifier 0.1 GHz - 12 GHz | Miteq | AMF-3D-001120-35-14p |
| 13452 | Digital multi meter | HP | 34401A |
| 13526 | Signalgenerator 20 GHz | Hewlett & Packard | 83620A |
| 13594 | Preamplifier 10 GHz - 25 GHz | Miteq | AMF-6D-100250-10p |
| 13886 | Open Area testsite | Comtest | -- |
| 14051 | Anechoic room | Comtest | -- |
| 14450 | 2.4 GHz bandrejectfilter | BSC | XN-1783 |
| 15633 | Biconilog Testantenna | Chase | CBL 6111B |
| 15667 | Measuring receiver | R&S | ESCS 30 |
| 99045 | DC Power Supply 3A/30V | DELTA | E030/3 |
| 99055 | Non-conducting support | NMi | -- |
| 99061 | Non-conducting support 150cm | NMi | -- |
| 99068 | Detector N-F/BNC-F | Radiall | R451576000 |
| 99069 | Cable 5m RG214 | NMi | -- |
| 99071 | Cable 10m RG214 | NMi | -- |
| 99076 | Bandpassfilter 4 - 10 GHz | Reactel | 7AS-7G-6G-511 |
| 99077 | Regulating trafo | RFT | LTS006 |
| 99112 | Tripod | Chase | -- |
| 99136 | Bandpassfilter 10 - 26.5 GHz | Reactel | 9HS-10G/26.5G-S11 |