Registration No. DAT-P-207/05

FCC ID: V74-KTS340

EMI -- T E S T R E P O R T

- FCC Part 15.247 -

Test Report No. :	**T32432-00-02HS**	19 August 2008 Date of issue

Type / Model Name	:	KTS340
Product Description	:	Vehicle diagnosis tester
Applicant	**:**	Robert Bosch GmbH
Address	:	Franz-Oechsle-Str. 4 73201 PLOCHINGEN GERMANY
Manufacturer	**:**	Robert Bosch GmbH
Address	:	Franz-Oechsle-Str. 4 73201 PLOCHINGEN GERMANY
Licence holder	**:**	Robert Bosch GmbH
Address	:	Franz-Oechsle-Str. 4 73201 PLOCHINGEN GERMANY

Test Result according to the standards listed in clause 1 test standards:	**Positive**

Deutscher Akkreditierungs Rat

DAT-P-207/05-00

Contents

1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 1 – General Rules of Practice and Procedure (October 01, 2007)

Part 1, Section 1.1310	Radio frequency exposure limits

FCC Rules and Regulations Part 2 - General Rules and Regulations (October 01, 2007)

Part 2, Section 2.1093	RFE portable device

FCC Rules and Regulations Part 15 Subpart A - General (May 04, 2007)

Part 15, Subpart A, Section 15.31	Measuring standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (May 04, 2007)

Part 15, Subpart B, Section 15.107(a)	AC Line conducted emissions
Part 15, Subpart B, Section 15.109(a)	Radiated emissions, general requirements

FCC Rules and Regulations Part 15 Subpart C - Intentional Radiators (May 04, 2007)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207(a)	AC Line conducted emissions
Part 15, Subpart C, Section 15.209(a)	Radiated emissions, general requirements
Part 15, Subpart C, Section 15.247(d)	Radiated emissions, outside the used frequency band
Part 15, Subpart C, Section 15.247(a)(2)	Bandwidth requirement
Part 15, Subpart C, Section 15.247(b)(3)	Maximum Peak conducted output Power
Part 15, Subpart C, Section 15.247(i)	Exposure of radio frequency energy levels

2 SUMMARY

GENERAL REMARKS:

The frequency range was scanned from 30 MHz to 25;000 MHz. All emissions not reported in this test report are more than 10 dB below the specified limit.

The EUT consists of 1 WLAN module.

Available Features on KTS343:

The KTS343 is the US-Version of the KTS340.

The WLAN module is compatible with 802.11b, 802.11g Standard. It supports the 2.4 GHz frequency band.
- 802.11b/g Mode 2.400 GHz – 2.4835 GHz

The module use DSSS or OFDM modulation and are capable to provide following data rates:
- 802.11b Mode 11, 5.5, 2, 1 Mbps (Mbps = *megabits per second)*
- 802.11g Mode 54, 48, 36, 24, 18, 12, 9, 6 Mbps

There is only one chip-antenna is used internally, soldered on PCB-Board and listed following:

Number	Characteristic	Certification name	Plug	Frequency [GHz]	Gain [dBi]
1	Omni	ACX3216-B2R7HAA	No	2.4	0.5

The tests have been carried out in the following frequency bands: 2.400 GHz – 2.4835 GHz

Pre-scan has been performed to determine the worst-case mode from all possible combinations between available modulations and data rates. The maximum output power depends on used data rate.

As worst case the following data rates are used:
- **802.11b: 11 Mbps**
- **802.11g: 12 Mbps**

The firmware supports the following listed channels and limits its max. power settings:

802.11b mode, Country code = US:

Channel	Max. Power setting	Frequency
1	13	2412 MHz
2	17	2417 MHz
3	17	2422 MHz
4	17	2427 MHz
5	17	2432 MHz
6	17	2437 MHz
7	17	2442 MHz
8	17	2447 MHz
9	17	2452 MHz
10	17	2457 MHz
11	13	2462 MHz

802.11g mode, Country code = US:

Channel	Max. Power setting	Frequency
1	13	2412 MHz
2	14	2417 MHz
3	14	2422 MHz
4	14	2427 MHz
5	14	2432 MHz
6	14	2437 MHz
7	14	2442 MHz
8	14	2447 MHz
9	14	2452 MHz
10	14	2457 MHz
11	13	2462 MHz

The country code is settable only by the test software to ensure that all available channels can be choosen for transmitting. The later firmware does not support the adhoc mode and give the user no possibility to choose the channel for data transmission. The EUT works as client and search for transmission the channel of the access point.

The EUT was set with test modulation to transmit data during the tests with a duty cycle (X) of about X=1.

Due to the various abilities of the EUT to be supplied with DC-Power, 9.6 V internally battery, 12 V DC from externally car battery, 15 V DC from AC mains adapter and 24 V from externally car battery, the supply with 24 V DC is the worst case and used for all measurements as nominal voltage. The extreme voltage is stated by the manufacturer as:

Possibility	External connector	External nominal voltage DC	Extrem voltage (+)	Extrem voltage (-)	Internal voltage deviation smaller than +/-1% of the WLAN-supply-voltage of 3.3V DC
1	barrel connector (AC mains adapter)	15V (115 V/60 Hz)	28 V	12 V	Yes
2	OBD (car battery)	12V	32 V	7 V	Yes
3	OBD (car battery)	24V	32 V	7 V	Yes

FINAL ASSESSMENT:

The equipment under test **fulfills** the EMI requirements cited in clause 1 test standards.

Date of receipt of test sample : acc. to storage records

Testing commenced on : 10 March 2008

Testing concluded on : 16 April 2008

Checked by:

Klaus Gegenfurtner
Ich bestätige die Richtigkeit und Integrität dieses Dokuments
2008.08.19 11:14:31 +02'00'

Klaus Gegenfurtner
Dipl.-Ing.(FH)
Manager: Radio Group

Tested by:

Digital unterschrieben von Hermann Smetana
Grund: Ich bin der Verfasser dieses Dokuments
Datum: 2008.08.19 10:29:31 +02'00'

Hermann Smetana
Dipl.-Ing.(FH)
Radio Expert

3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT - Please refer Attachment A

3.2 Power supply system utilised

Power supply voltage : 115 V / 60 Hz / 1ϕ, 12 V / DC, 24 V / DC, 9,6 V / DC internally

3.3 Short description of the Equipment under Test (EUT)

The EUT is supports the service of a vehicle in terms of reading data and error messages from an event memory via OBD-Cable. Additional it reads the settings of the engine control unit and that can compared with the default data set of the car type downloadable from host via WLAN connection. WLAN supports the storage of the customer data onto host too, in order to compare it the next time in service. It supports the measurement of current, voltage and resistance at a separate input port. The USB-Slave-Port is used for data transmission to or from host if the WLAN access is not available or not used. A USB-Keyboard helps the user to control the diagnosis tester or type data in. The tester may be also controlled about the touch screen. As power supply of the EUT is either available an internal battery or an AC mains adapter. The power supply from the vehicular battery is via the OBD-Cable available for the voltage 12 V and 24 V dependent from the tested car.

Number of tested samples: 1
Serial number: Prototype

EUT operation mode:

The equipment under test was operated during the measurement under the following conditions:

- TX continuous mode, unmodulated

- TX continuous mode modulated

- RX-Mode

EUT configuration:

(The CDF filled by the applicant can be viewed at the test laboratory.)

The following peripheral devices and interface cables were connected during the measurements:

-	AC mains adapter, (115V/60 Hz) 15V / 4,6A	Model :	CINCON, TR70A1523A03
-	OBD-Cable, 3 m	Model :	No. 1684465557
-	URI-Measurement cable, 3 m	Model :	No. 1684463214
-		Model :	
-		Model :	
-		Model :	

4 TEST ENVIRONMENT

4.1 Address of the test laboratory

mikes-testingpartners gmbh
Ohmstrasse 2-4
94342 STRASSKIRCHEN
GERMANY

4.2 Environmental conditions

During the measurement the environmental conditions were within the listed ranges:

Temperature:	15-35 ° C
Humidity:	30-60 %
Atmospheric pressure:	86-106 kPa

4.3 Statement of the measurement uncertainty

The data and results referenced in this document are true and accurate. The reader may notice that tolerances within the calibration of the equipment and facilities may cause additional uncertainty. The measurement uncertainty is calculated for all measurements listed in this test report acc. to CISPR 16-4-2 /11.2003 „Uncertainties, statistics and limit modelling – Uncertainty in EMC measurement“ and documented in the mikes-testingpartners gmbh quality system acc. to DIN EN ISO/IEC 17025. Furthermore, component diversity and modifications in production process of devices may result in additional deviation. If necessary, refer to the test lab for the actual measurement uncertainty for the specific test. The manufacturer has the sole responsibility of continued compliance of the EUT.

4.4 Measurement Protocol for FCC, VCCI and AUSTEL

4.4.1 GENERAL INFORMATION

4.4.1.1 Test Methodology

Conducted and radiated disturbance testing is performed according to the procedures in International Special Committee on Radio Interference (CISPR) Publication 22, European Standard EN 55022 as shown under section 1 of this report.

In compliance with 47 CFR Part 15 Subpart A Section 15.38 testing for FCC compliance may be done following the ANSI C63.4-2003 procedures and using the CISPR 22 Limits.

4.4.1.2 Justification

The Equipment Under Test (EUT) is configured in a typical user arrangement in accordance with the manufacturer's instructions. A cable is connected to each available port and either terminated with a peripheral using the appropriate impedance characteristic or left unterminated. Where appropriate, cables are manually manipulated with respect to each other thus obtaining maximum disturbances from the unit.

4.4.2 DETAILS OF TEST PROCEDURES

4.4.2.1 General Standard Information

The test methods used comply with CISPR Publication 22, EN 55022 - " Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement" and with ANSI C63.4-2003 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz."

4.5 Determination of worst case measurement conditions

Measurements have been made in all three orthogonal axes and the settings of the EUT were changed to locate at which position and at what setting the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X position with the settings described in the general remarks. This settings were determined by the customer and are based on measurements .

5 TEST CONDITIONS AND RESULTS

5.1 Conducted emissions

For test instruments and accessories used see section 6 Part **A 4**.

5.1.1 Description of the test location

Test location: Shielded Room S2

5.1.2 Photo documentation of the test set-up

5.1.3 Description of Measurement

The final level, expressed in dBμV, is arrived at by taking the reading directly from the EMI receiver. This level is compared directly to the FCC Limit or to the CISPR limit.

To convert between dBμV and μV, the following conversions apply:

dBμV = 20(log μV)

μV = 10^(dBμV/20)

Conducted emissions on the 60 Hz power interface of the EUT are measured in the frequency range of 150 kHz to 30 MHz. The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a Line Impedance Stabilization Network (LISN) with 50Ω/50 μH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 centimetres from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

5.1.4 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin -3.5 dB at 565 kHz

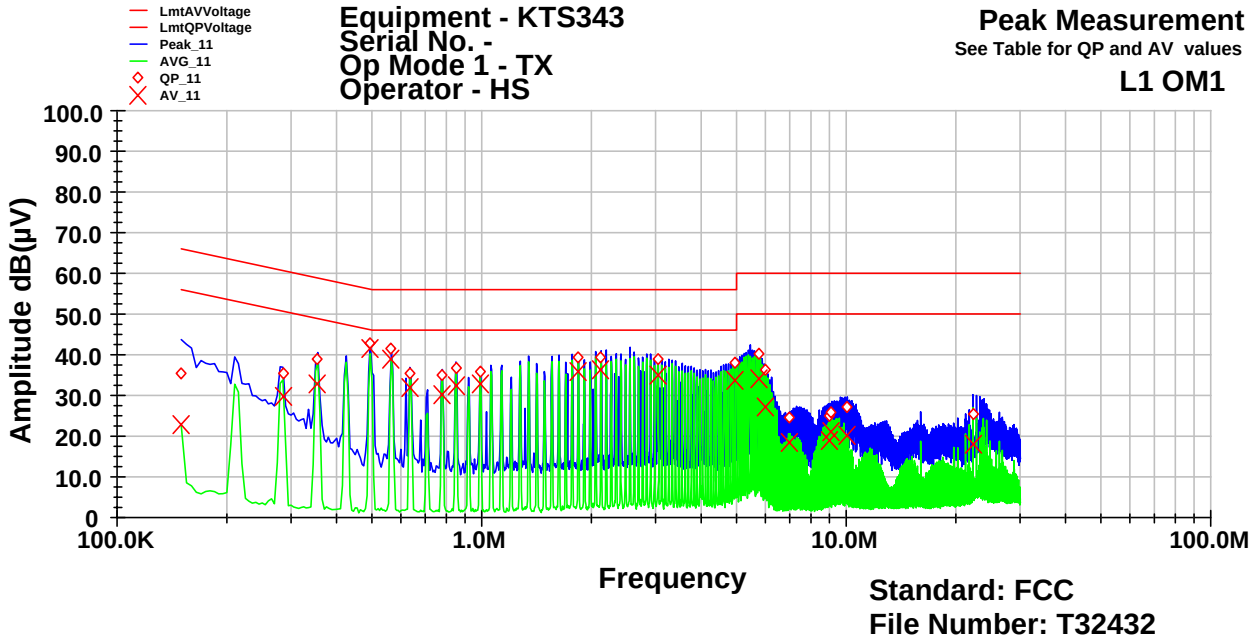
The requirements are **FULFILLED.**

Remarks: The measurement was performed with AC (115V, 60 Hz) at the side of the power supply.

The TX-Mode at 2400 MHz means the worst case.

5.1.5 Test protocol

Test point L1 Result: passed
Operation mode: TX continuous mode modulated
Remarks: Memtest + sd-Test + WLAN ad-hoc normal ping (Kanal1)

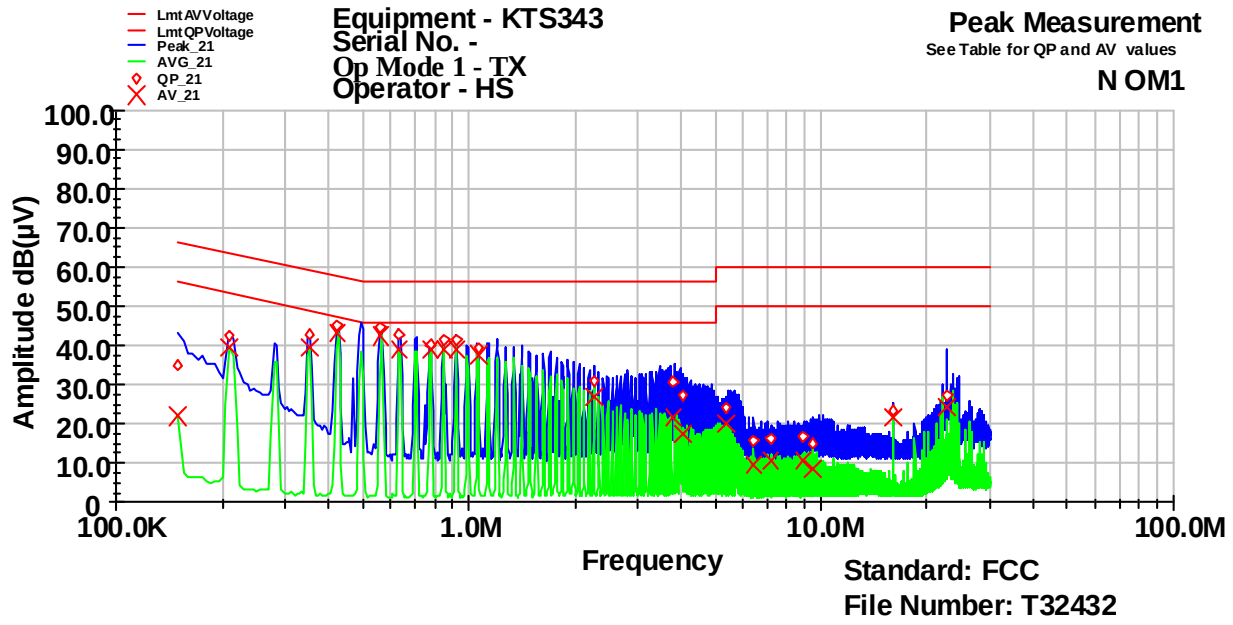


Frequency	QP Level	QP Margin	QP Limit	AV Level	AV Margin	AV Limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.15	35.6	-30.4	66.0	22.9	-33.1	56.0
0.285	35.4	-25.3	60.7	29.9	-20.8	50.7
0.355	39.0	-19.8	58.8	32.8	-16.1	48.8
0.495	42.8	-13.3	56.1	41.3	-4.7	46.1
0.565	41.4	-14.6	56.0	39.0	-7.0	46.0
0.635	35.6	-20.4	56.0	32.0	-14.0	46.0
0.78	34.9	-21.1	56.0	30.4	-15.6	46.0
0.85	36.7	-19.3	56.0	32.2	-13.8	46.0
0.99	35.9	-20.1	56.0	32.8	-13.2	46.0
1.84	39.4	-16.6	56.0	36.0	-10.0	46.0
2.125	39.5	-16.5	56.0	36.3	-9.7	46.0
3.045	38.9	-17.1	56.0	35.0	-11.0	46.0
4.96	37.8	-18.2	56.0	33.8	-12.2	46.0
5.74	40.4	-19.6	60.0	33.9	-16.1	50.0
6.025	36.2	-23.8	60.0	27.0	-23.0	50.0
7.015	24.4	-35.6	60.0	18.6	-31.4	50.0
9	24.9	-35.1	60.0	19.1	-30.9	50.0
9.07	25.6	-34.4	60.0	21.0	-29.0	50.0
10.06	27.0	-33.0	60.0	20.2	-29.8	50.0
22.245	25.3	-34.7	60.0	18.1	-31.9	50.0

FCC ID: V74-KTS340

Test point: N
Operation mode: TX continuous mode modulated
Remarks: Memtest + sd-Test + WLAN ad-hoc normal ping (Kanal1)

Result: passed



Frequency	QP Level	QP Margin	QP Limit	AV Level	AV Margin	AV Limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.15	34.8	-31.2	66.0	21.9	-34.2	56.0
0.21	42.5	-20.7	63.2	39.5	-13.7	53.2
0.355	42.7	-16.1	58.8	39.3	-9.5	48.8
0.425	45.0	-12.4	57.3	43.1	-4.2	47.3
0.565	44.5	-11.5	56.0	42.5	-3.5	46.0
0.635	42.8	-13.2	56.0	39.1	-6.9	46.0
0.78	40.2	-15.8	56.0	38.8	-7.2	46.0
0.85	41.4	-14.6	56.0	39.1	-6.9	46.0
0.92	41.4	-14.6	56.0	38.9	-7.1	46.0
1.06	39.1	-16.9	56.0	37.5	-8.5	46.0
2.265	31.2	-24.8	56.0	26.9	-19.1	46.0
3.825	30.5	-25.5	56.0	21.6	-24.4	46.0
4.035	27.3	-28.7	56.0	17.4	-28.6	46.0
5.385	24.2	-35.8	60.0	20.0	-30.0	50.0
6.445	15.7	-44.3	60.0	9.9	-40.1	50.0
7.225	16.4	-43.6	60.0	10.7	-39.3	50.0
8.925	16.5	-43.5	60.0	10.4	-39.6	50.0
9.42	14.9	-45.1	60.0	8.4	-41.6	50.0
16	23.3	-36.7	60.0	21.5	-28.5	50.0
22.74	27.1	-32.9	60.0	23.9	-26.1	50.0

5.2 Maximum Peak Output Power Conducted

For test instruments and accessories used see section 6 Part **CPC 3**.

5.2.1 Description of the test location

Test location: AREA4

5.2.2 Photo documentation of the test set-up

5.2.3 Description of Measurement

Maximum conducted peak output power:
The transmitter output was connected to the spectrum analyzer through an attenuator. The center frequency of the spectrum analyzer is set to the fundamental frequency using 1 MHz RBW and 300 kHz VBW. The span of the spectrum analyzer should be larger than the Emission Bandwidth (EBW). To get the total power of the occupied bandwidth the function “Channel Power Measurement” of the analyzer has been used. The channel bandwidth has been set to EBW. With peak detector and power mode “Max Hold” the result is the summed maximum output power of the EBW.

Analyzer settings:
Detector: Max. peak
RBW: 1 MHz
VBW: 300 kHz
Sweep Time: Coupled

5.2.4 Test result

802.11b

Channel	Frequency [MHz]	Power setting	Measured power [dBm]	Cable loss correction [dB]	Corr. peak power [dBm]	Peak power limit [dBm]	Delta [dB]
1	2412	13	9.4	1.0	10.4	30	-19.6
6	2437	17	13.1	1.0	14.1	30	-15.9
11	2462	13	8.6	1.0	9.6	30	-20.4

802.11g

Channel	Frequency [MHz]	Power setting	Measured power [dBm]	Cable loss correction [dB]	Corr. peak power [dBm]	Peak power limit [dBm]	Delta [dB]
1	2412	13	4.3	1.0	5.3	30	-24.7
6	2437	14	7.3	1.0	8.3	30	-21.7
11	2462	13	4.2	1.0	5.2	30	-24.8

Peak Power Limit according to FCC Subpart 15.247(b)(3):

Frequency [MHz]	Peak Power Limit	
	[dBm]	[Watt]
902-928	30	1.0
2400-2483.5	**30**	**1.0**
5725-5850	30	1.0

The requirements are **FULFILLED.**

Remarks: This test has been performed conducted at internal antenna jack of the WLAN-Module. A notebook as testframe for the conducted measurements on the WLAN-Module was used because the software tools for TX continuous mode was only available for a Windows XP driven PC. The EUT has a stabilised supply voltage for the power supply of the WLAN-Module so in our experience no reaction on voltage variations is awaiting. The temperature test on the evaluation board of the manufacturer for PCI-interface means a worst case for the module.

5.3 Transmitter spurious emissions

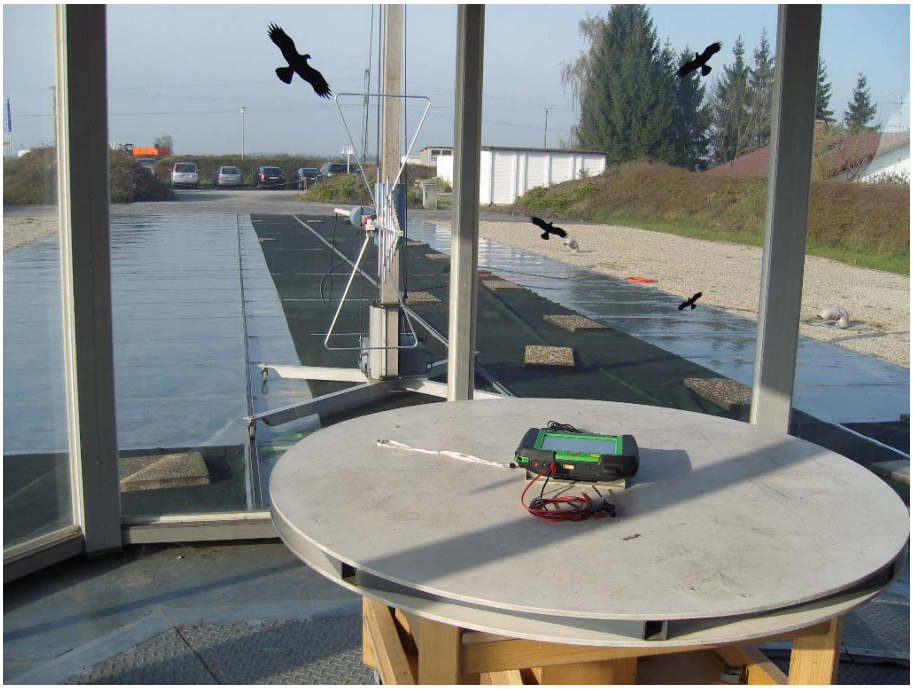
For test instruments and accessories used see section 6 Part **SER 2 and SER 3**.

5.3.1 Description of the test location

Test location: OATS1
Test location: Anechoic Chamber2

Test distance: 3 metres
Test distance: 3 metres

5.3.2 Photo documentation of the test set-up



5.3.3 Applicable standard

According to FCC Part 15 Subpart 15.247 (d): In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.50 MHz and 5725 – 5850 MHz, the digitally modulated 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. Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limit specified in §15.209(a) (see §15.205(c)).

5.3.4 Description of Measurement

Radiated spurious emissions from the EUT are measured in the frequency range of 30 MHz to 1000 MHz using a tuned receiver and appropriate broadband linearly polarized antennas. The measurements are made with 120 kHz/6 dB bandwidth and quasi-peak detection. The EUT is placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the Equipment under test will be in accordance to ANSI C63.4-2003.
The antenna was positioned 3 metres horizontally from the EUT. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 metres, measurement scans are made with both horizontal and vertical antenna polarization's and the EUT are rotated 360 degrees.

The final level, expressed in dBµV/m, is arrived by taking the reading from the EMI receiver (Level dBµV) and adding the correction factors and cable loss factor (Factor dB) to it. This is done automatically in the EMI receiver, where the correction factors are stored.

The radiated emissions from the EUT are measured in the frequency range of 1 GHz to maximum frequency as specified in section 15.33, using a Spectrum Analyzer and appropriate linearly polarized antennas. The EUT is placed on a 1.0 X 1.5 metres non-conducting table 80 centimetres above the ground plane. The set up of the EUT will be in accordance to ANSI C63.4-2003. The antenna was positioned 3 m horizontally from the EUT.

Measurement are made in both the horizontal and vertical planes of polarization in a fully anechoic room using a spectrum analyzer with the detector function set to peak, RBW 1 MHz and VBW set to 3 MHz for any spurious emission or modulation product that falls in **Restricted bands** as defined in Section 15.205.
All tests are performed at a test-distance of 3 metres. During the tests the EUT measurement scans are made with both horizontal and vertical antenna polarization's and the EUT are rotated 360 degrees.

Average values were measured with spectrum analyzer settings:
RBW: 1 MHz
VBW: 10 Hz
Sweep: Auto

5.3.5 Test result

Frequency range: f < 1 GHz

Standard 802.11b
Corrected field strength of fundamental wave as reference for radiated emissions: 117.4 dBµV/m

Channel 1												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Corrected field strength of fundamental wave as reference for radiated emissions: 121.1 dBµV/m

Channel 6												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Corrected field strength of fundamental wave as reference for radiated emissions: 116.6 dBµV/m

Channel 11												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Standard 802.11g
Corrected field strength of fundamental wave as reference for radiated emissions: 112.3 dBµV/m

Channel 1												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Corrected field strength of fundamental wave as reference for radiated emissions: 115.3 dBµV/m

Channel 6												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Corrected field strength of fundamental wave as reference for radiated emissions: 112.2 dBµV/m

Channel 11												
Frequency [MHz]	Restricted Band	Reading Level QP [dBµV]	Reading Level AV [dBµV]	Reading Level PK [dBµV]	Bandwidth [kHz]	Correct. factor [dB]	Corrected Level QP [dBµV/m]	Corrected Level AV [dBµV/m]	Corrected Level PK [dBµV/m]	Limit [dBµV/m] PK	Limit [dBµV/m] QP	Delta [dB]
30-1000												
30-88	■				120		< 30				40	> -10,0
88-216	■				120		< 30				43,5	> -13,5
216-960	■				120		< 30				46	> -16,0
960-1000	■				120		< 30				54	> -24,0

Frequency range: f > 1 GHz

Standard 802.11b
Corrected field strength of fundamental wave as reference for radiated emissions: 117.4 dBµV/m

Channel 1											
Frequency [MHz]	Restricted Band	Reading Level PK [dBµV]	Corr. Duty Cycle [dB]	Level AV [dBµV] *)	Band-width [kHz]	Correct. Factor [dB]	Corrected Level PK [dBµV/m]	Corrected Level AV [dBµV/m]	Limit PK [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
4822	■	49.5			1000	-0.3		49,2		54	-4.8

FCC ID: V74-KTS340

Corrected field strength of fundamental wave as reference for radiated emissions: 121.1 dBµV/m

Channel 6											
Frequency [MHz]	Restricted Band	Reading Level PK [dBµV]	Corr. Duty Cycle [dB]	Level AV [dBµV] *)	Band-width [kHz]	Correct. Factor [dB]	Corrected Level PK [dBµV/m]	Corrected Level AV [dBµV/m]	Limit PK [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
4877	■	44.5	-		1000	-0.5	44.0			54	-10.0

Corrected field strength of fundamental wave as reference for radiated emissions: 116.6 dBµV/m

Channel 11											
Frequency [MHz]	Restricted Band	Reading Level PK [dBµV]	Corr. Duty Cycle [dB]	Level AV [dBµV] *)	Band-width [kHz]	Correct. Factor [dB]	Corrected Level PK [dBµV/m]	Corrected Level AV [dBµV/m]	Limit PK [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
4910	■	44.7	-		1000	-0.4	44.3			54	-9.7

Standard 802.11g
Corrected field strength of fundamental wave as reference for radiated emissions: 112.3 dBµV/m

Channel 1											
Frequency [MHz]	Restricted Band	Reading Level PK [dBµV]	Corr. Duty Cycle [dB]	Level AV [dBµV] *)	Band-width [kHz]	Correct. Factor [dB]	Corrected Level PK [dBµV/m]	Corrected Level AV [dBµV/m]	Limit PK [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
4824	■	48.7			1000	-0.3	48,4			54	-5.6

Corrected field strength of fundamental wave as reference for radiated emissions: 115.3 dBµV/m

Channel 6											
Frequency [MHz]	Restricted Band	Reading Level PK [dBµV]	Corr. Duty Cycle [dB]	Level AV [dBµV] *)	Band-width [kHz]	Correct. Factor [dB]	Corrected Level PK [dBµV/m]	Corrected Level AV [dBµV/m]	Limit PK [dBµV/m]	Limit AV [dBµV/m]	Delta [dB]
4875	■	45,6	-		1000	-0.4	45.2			54	-8.8

FCC ID: V74-KTS340

Corrected field strength of fundamental wave as reference for radiated emissions: 112.2 dBµV/m

Channel 11											
Frequency [MHz]	**Restricted Band**	**Reading Level PK [dBµV]**	**Corr. Duty Cycle [dB]**	**Level AV [dBµV] *)**	**Band-width [kHz]**	**Correct. Factor [dB]**	**Corrected Level PK [dBµV/m]**	**Corrected Level AV [dBµV/m]**	**Limit PK [dBµV/m]**	**Limit AV [dBµV/m]**	**Delta [dB]**
4941	■	44,9	-		1000	-0.2		44.3		54	-9.7

*) Average values were measured with spectrum analyzer by taking the following Settings
RBW: 1 MHz
VBW: 10 Hz
Sweep: Auto

Peak-Limit according to FCC Subpart 15.247(d):
In any 100 kHz bandwidth outside the frequency band 2400 – 2483.50 MHz, 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. Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limit specified in §15.209(a) (see §15.205(c)).

Final radiated limits for spurious emissions which fall not in restricted band:

Standard 802.11b

Frequency [MHz]	Limits acc. 15.209 [dBµV/m]	Measurement distance [metres]	Limits acc. 15.247(c) [dBµV/m]			Final Radiated Limits [dBµV/m]		
			Ch 1	Ch 6	Ch 11	Ch 1	Ch 6	Ch 11
0,009-0,490	2400/F(kHz)	300	117.4	121.1	116.6	37.4	41.1	36.6
0,490-1,705	24000/F(kHz)	30	117.4	121.1	116.6	77.4	81.1	76.6
1,705-30	30	30	117.4	121.1	116.6	77.4	81.1	76.6
30-88	40	3	117.4	121.1	116.6	117.4	121.1	116.6
88-216	43,5	3	117.4	121.1	116.6	117.4	121.1	116.6
216-960	46	3	117.4	121.1	116.6	117.4	121.1	116.6
Above 960	54	3	117.4	121.1	116.6	117.4	121.1	116.6

Standard 802.11g

Frequency [MHz]	Limits acc. 15.209 [dBµV/m]	Measurement distance [metres]	Limits acc. 15.247(c) [dBµV/m]			Final Radiated Limits [dBµV/m]		
			Ch 1	Ch 6	Ch 11	Ch 1	Ch 6	Ch 11
0,009-0,490	2400/F(kHz)	300	112.3	115.3	112.2	32.3	35.3	32.2
0,490-1,705	24000/F(kHz)	30	112.3	115.3	112.2	72.3	75.3	72.2
1,705-30	30	30	112.3	115.3	112.2	72.3	75.3	72.2
30-88	40	3	112.3	115.3	112.2	112.3	115.3	112.2
88-216	43,5	3	112.3	115.3	112.2	112.3	115.3	112.2
216-960	46	3	112.3	115.3	112.2	112.3	115.3	112.2
Above 960	54	3	112.3	115.3	112.2	112.3	115.3	112.2

FCC ID: V74-KTS340

Radiated limits according to FCC Part 15 Subpart 15.209(a) for spurious emissions which fall in restricted band:

Frequency	Field strength of spurious emissions		Measurement distance [metres]
[MHz]	[µV/m]	[dBµV/m]	
0,009-0,490	2400/F(kHz)		300
0,490-1,705	24000/F(kHz)		30
1,705-30	30	29,5	30
30-88	100	40	3
88-216	150	43.5	3
216-960	200	46	3
Above 960	500	54	3

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in §15.209

MHz	MHz	MHz	GHz
0.090 – 0.110	16.42 – 16.423	399.9 – 410	4.5 – 5.15
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
6.215 – 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	2690 – 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	

The requirements are **FULFILLED.**

Remarks: During the test, the EUT was set into normal modulation mode as intended for use.

The measurement was performed up to the 10th harmonic (25 000 MHz).

5.4 6 dB Bandwidth

For test instruments and accessories used see section 6 Part **MB**.

5.4.1 Description of the test location

Test location: AREA4

5.4.2 Photo documentation of the test set-up

5.4.3 Applicable standard

According to FCC Part 15 Subpart 15.247 (a) (2):
Systems using digital modulation techniques may operate in the 902 - 928 MHz, 2400 – 2483.5 MHz and 5725 – 5850 MHz bands. The minimum 6 dB bandwidth shall be at least 500 kHz.

5.4.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level by a specified ratio of -6 dB. The reference level is the level of the highest amplitude signal observed from the transmitter at either the fundamental frequency or the first-order modulation products in all typical modes of operation, including the unmodulated carrier, even if atypical. The measurement was performed with a modulated signal and the analyzer function “n-dB down” to determine the bandwidth automatically.

Spectrum analyzer settings:
RBW=100 kHz
VBW=300 kHz
Peak Detector

The table below shows the settings according to ANSI C63.4-2003.

Fundamental frequency	Minimum resolution bandwidth
9 kHz to 30 MHz	1kHz
30 to 1000 MHz	10 kHz
1000 MHz to 40 GHz	100 kHz

5.4.5 Test result

Standard 802.11b

Channel number	Fundamental frequency [MHz]	6 dB Bandwidth [MHz]	Minimum limit [MHz]
1	2412	8.56	0,5
6	2437	7.60	0,5
11	2462	7.92	0,5

Standard 802.11g

Channel number	Fundamental frequency [MHz]	6 dB Bandwidth [MHz]	Minimum limit [MHz]
1	2412	16.64	0,5
6	2437	16.56	0,5
11	2462	16.64	0,5

Limit according to FCC Subpart 15.247 (a)(2):

The minimum 6 dB bandwidth shall be at least 500 kHz

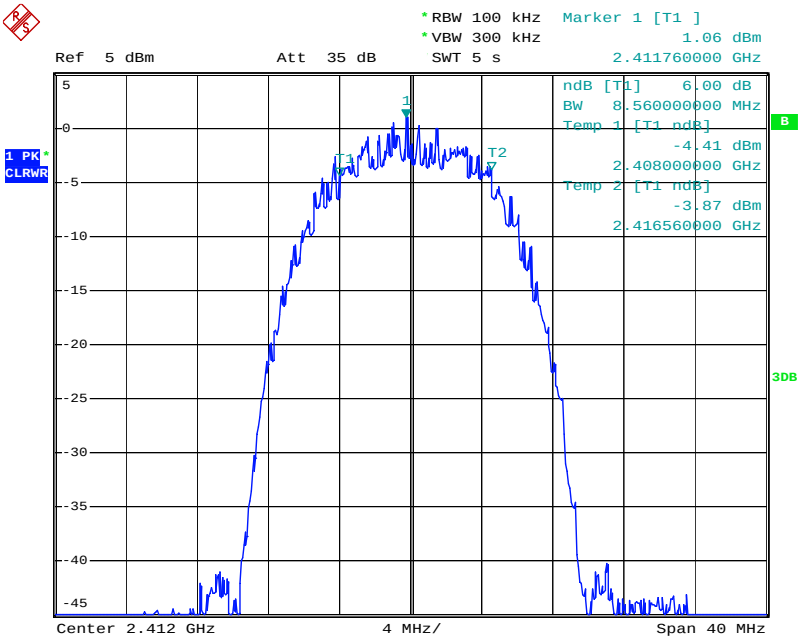
The requirements are **FULFILLED.**

Remarks: For detailed test result please refer to following test protocol.

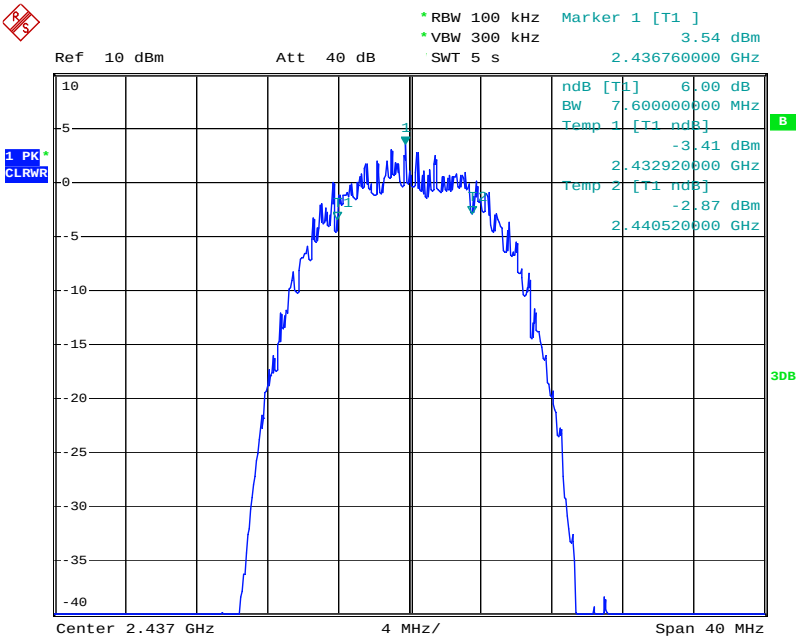
5.4.6 Test protocol

802.11b, 6dB Bandwidth Measurement

Channel 1

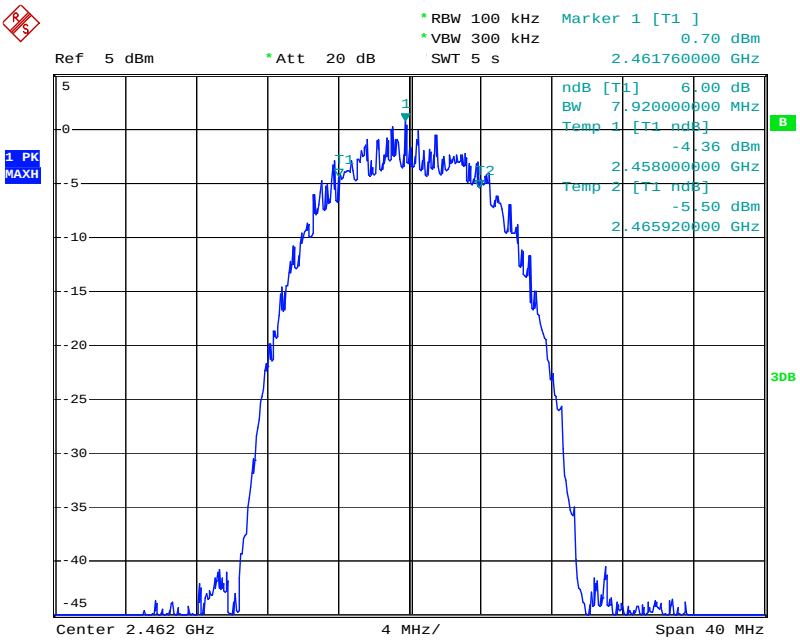


Channel 6



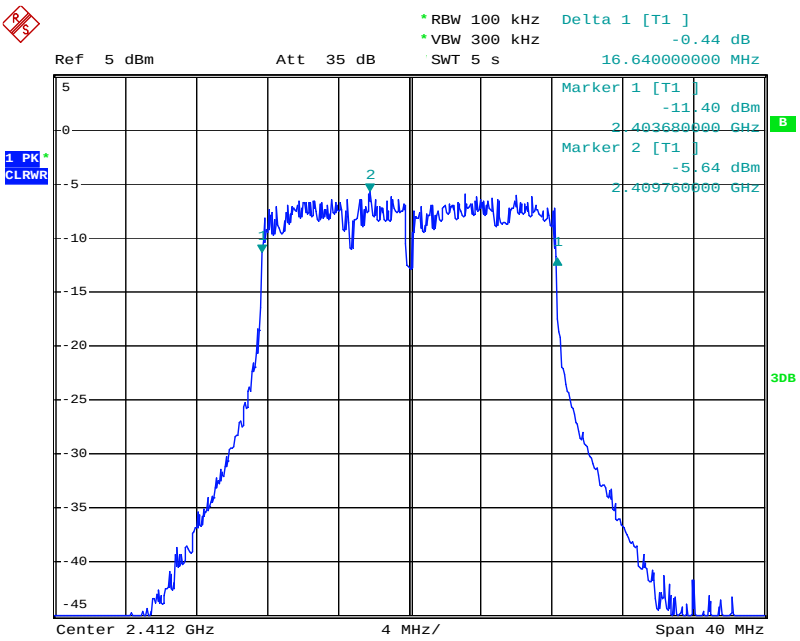
6dB Bandwidth Measurement

Channel 11



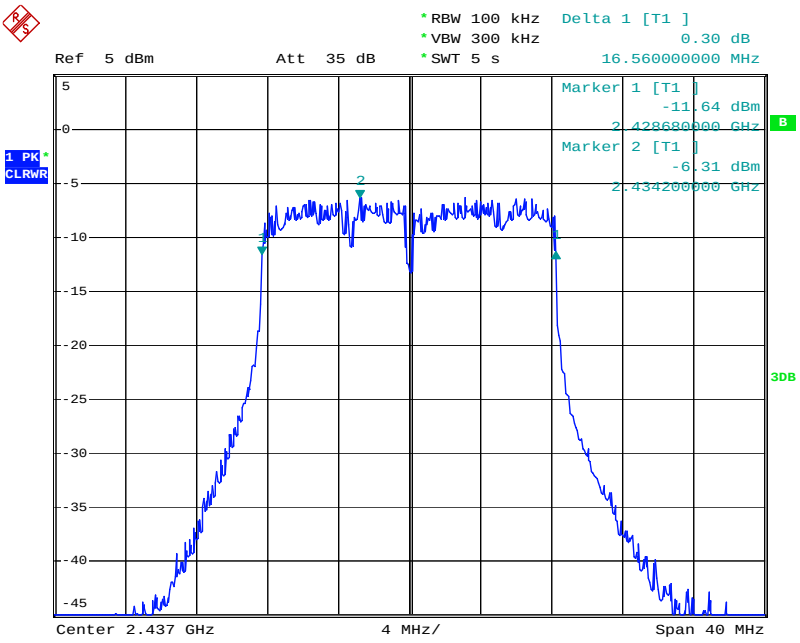
802.11g, 6dB Bandwidth Measurement

Channel 1

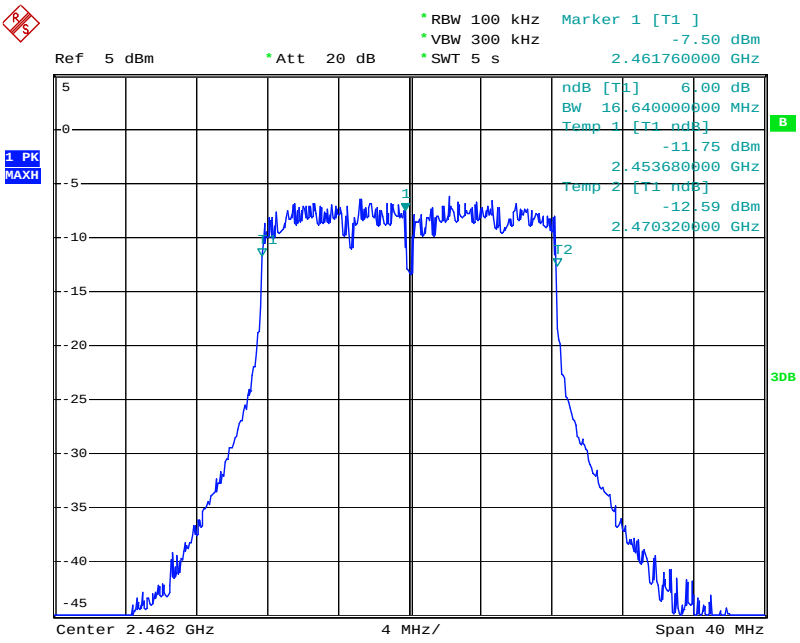


802.11g, 6dB Bandwidth Measurement

Channel 6



Channel 11



5.5 Band edge test

For test instruments and accessories used see section 6 Part **MB**.

5.5.1 Description of the test location

Test location: AREA4

5.5.2 Photo documentation of the test set-up

5.5.3 Description of Measurement

The EUT was connected to the spectrum analyzer with a suitable attenuator. The span of the spectrum analyzer was set wide enough to capture the peak level of the emission operating on the channel closest to the band edge, as well as any modulation products which fall outside of the authorized band of operation. The highest amplitude appearing on spectral display was measured and it was set as the reference level for the emission mask. It was allowed the trace to stabilize and after then it was set the emission mask on the reference level to show the compliance with the band edge requirements.

Further settings on the spectrum analyzer:

RBW:	≥ 1% of the span
VBW:	≥ RBW
Sweep:	Auto
Detector function:	Peak

5.5.4 Test result

Standard 802.11b

Frequency [MHz]	Peak Power Output [dBm]	Spurious emission read value [dBm]	Result of Band edge [dBc]	Band edge LIMIT [dBc]
< 2400	-9.4	-54.7	44.3	≥ 30
> 2483,5	-9.6	-67.5	57.9	≥ 30

Standard 802.11g

Frequency [MHz]	Peak Power Output [dBm]	Spurious emission read value [dBm]	Result of Band edge [dBc]	Band edge LIMIT [dBc]
< 2400	-13.8	-45.1	31.3	≥ 30
> 2483,5	-13.2	-62.5	49.3	≥ 30

Peak-Limit according to FCC Subpart 15.247(d):

In any 100 kHz bandwidth outside the frequency band 2400 – 2483.5 MHz, 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. Attenuation below the general limits specified in §15.209(a) is not required.
In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limit specified in §15.209(a) (see §15.205(c)).

Additional requirement according to 15.205(a) restricted band (2310 – 2390 MHz) and (2483.5 – 2500.0 MHz):

Standard 802.11b

Channel	Frequency [MHz]	Power setting	Measured power AV [dBm]	Cable loss correction [dB]	Corrected power [dBm]	Limit AV [dBm]	Delta [dB]
1	2390.0	13	-66.5	1.0	-65.5	-53.0	-12.5
11	2483.5	13	-67.5	1.0	-66.5	-53.0	-13.5

Standard 802.11g

Channel	Frequency [MHz]	Power setting	Measured power AV [dBm]	Cable loss correction [dB]	Corrected power [dBm]	Limit AV [dBm]	Delta [dB]
1	2390.0	13	-63.5	1.0	-62.5	-53.0	-9.5
11	2483.5	13	-62.5	1.0	-61.5	-53.0	-8.5

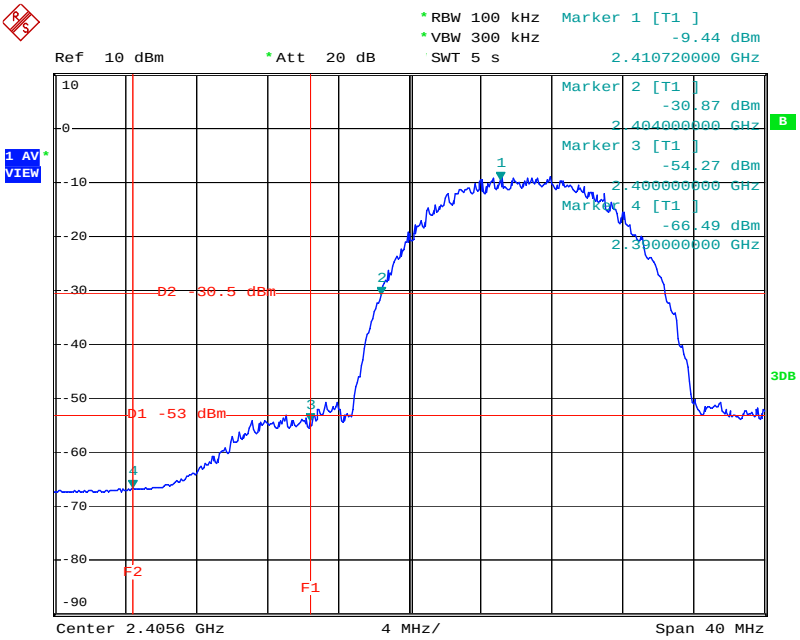
The requirements are **FULFILLED.**

Remarks: For detailed test results please refer to following test protocol.

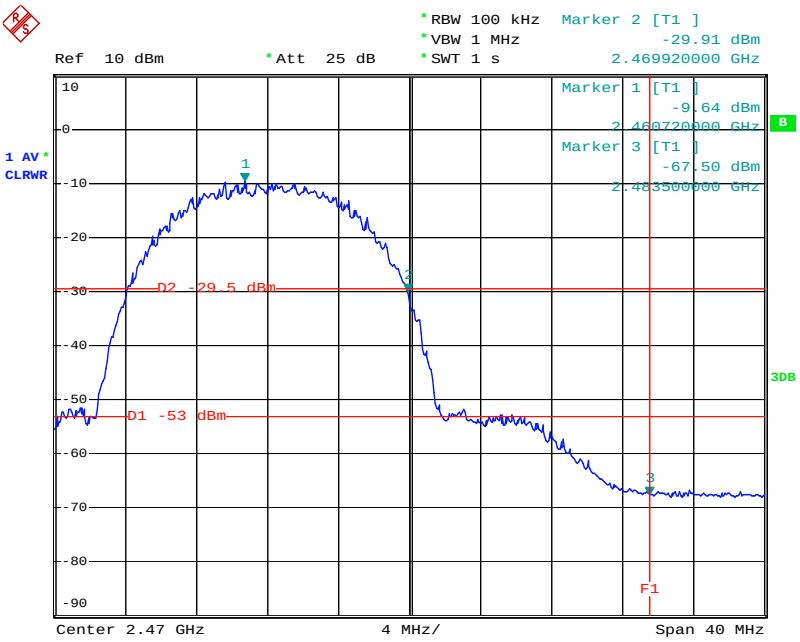
5.5.5 Test protocol

Standard 802.11b

Channel 1, 2412 MHz

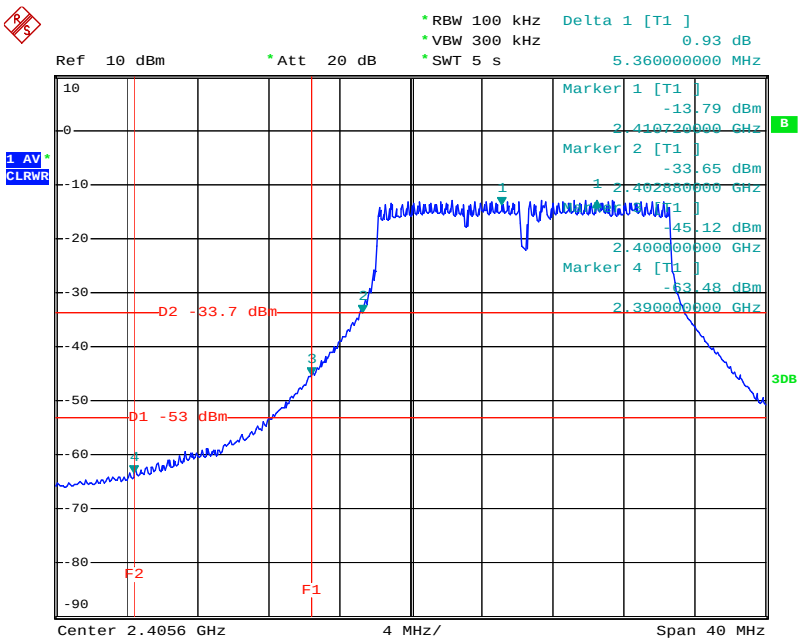


Channel 11, 2462 MHz

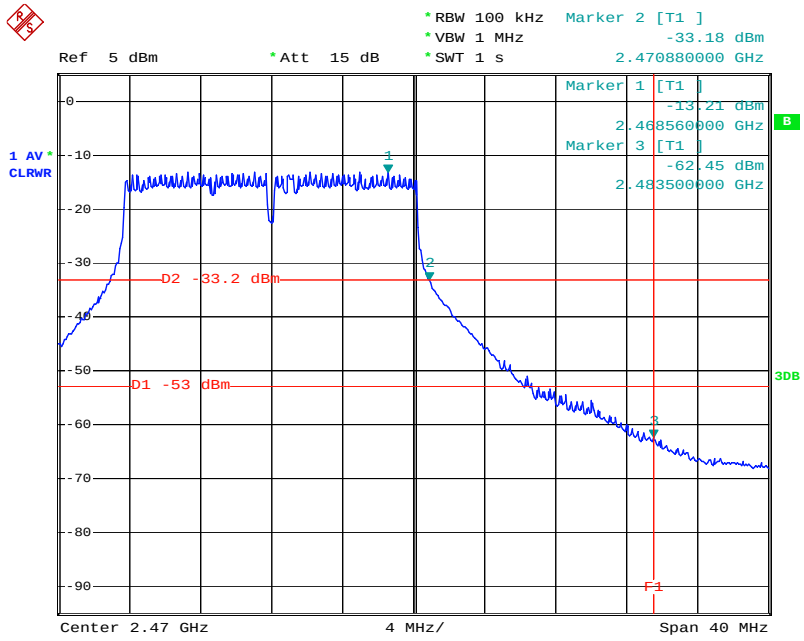


Standard 802.11g

Channel 1, 2412 MHz



Channel 11, 2462 MHz

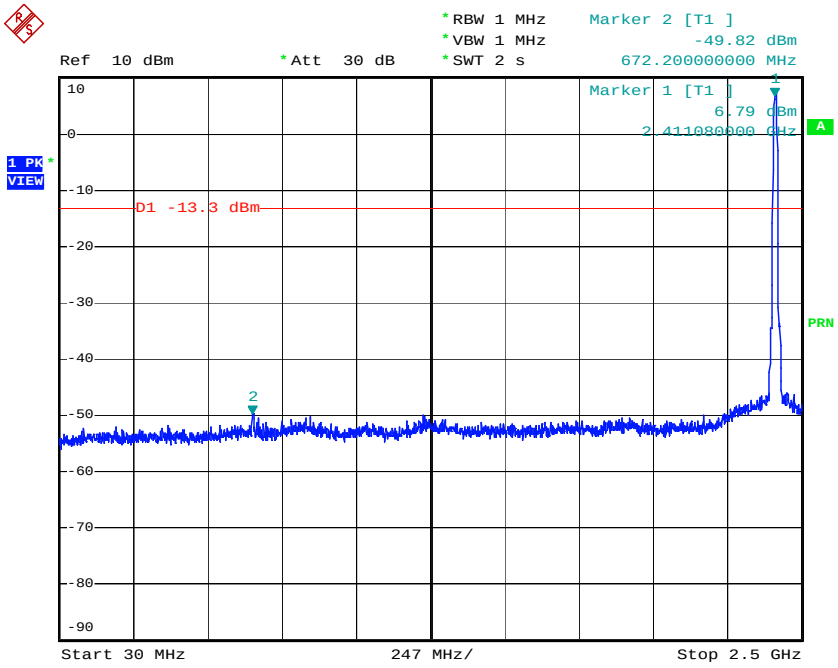


Plots of spurious emissions conducted out of operating frequency bands (-20 dBc)

Conducted spurious emissions from 30 MHz to 2.5 GHz (worst case)

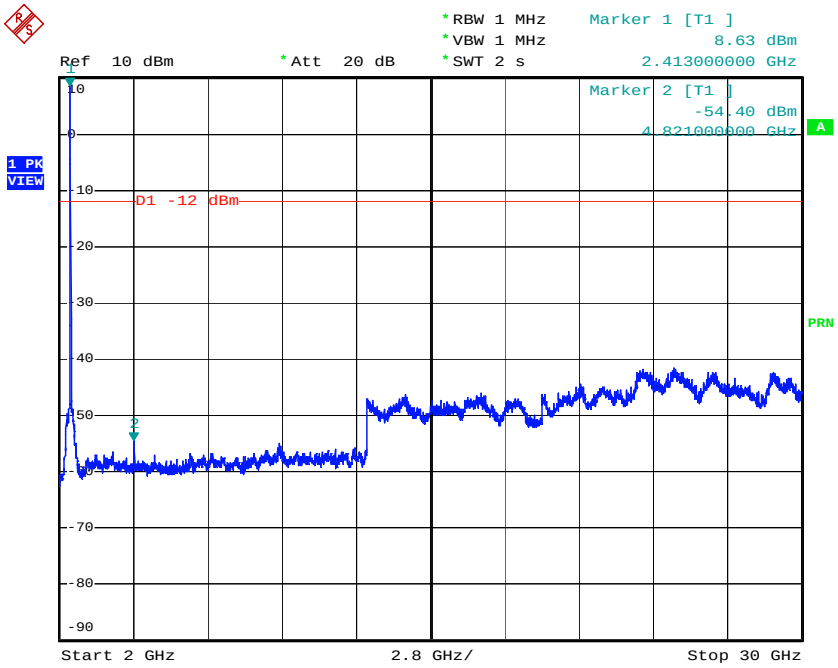
Standard 802.11a

Channel 1



Comment: SEC2, Ch1b, Power set 14, NC
Date: 22.APR.2008 16:05:02

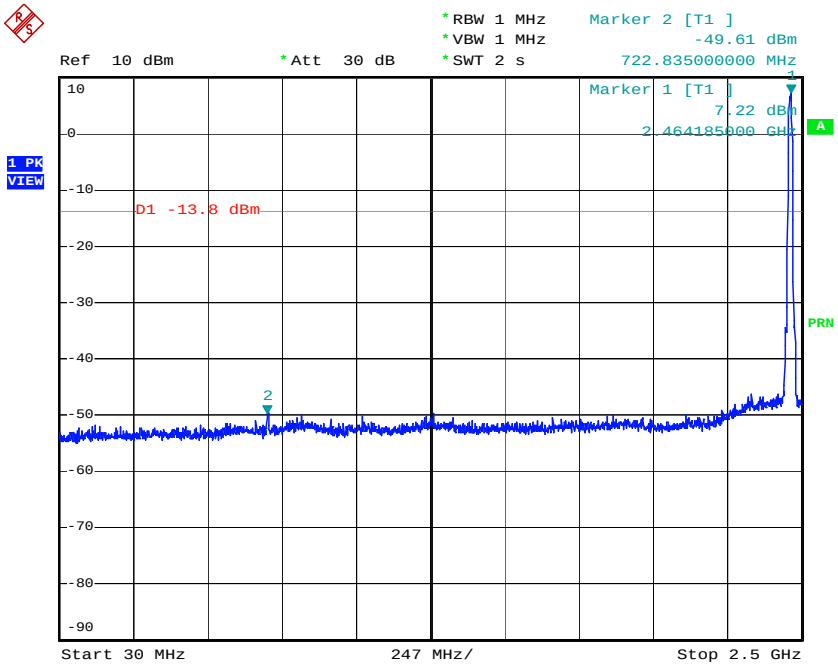
Conducted spurious emissions from 2 GHz to 30 GHz (worst case)



Comment: Ch1b, Power set 14, NC
Date: 23.APR.2008 11:00:20

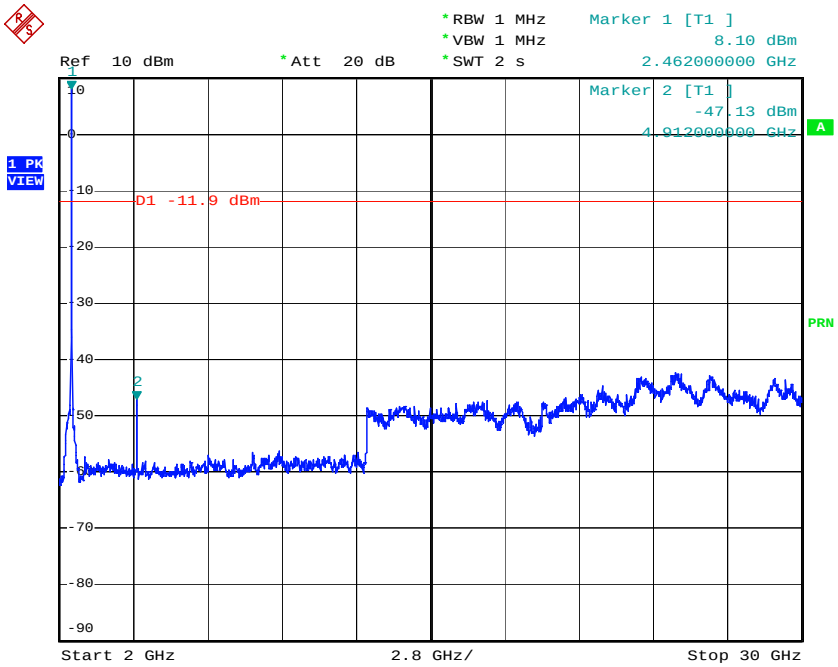
Conducted spurious emissions from 30 MHz to 2.5 GHz (worst case)

Channel 11



Comment: SEC2, Ch11B, Power set 14, NC
Date: 22.APR.2008 16:23:22

Conducted spurious emissions from 2 GHz to 30 GHz (worst case)

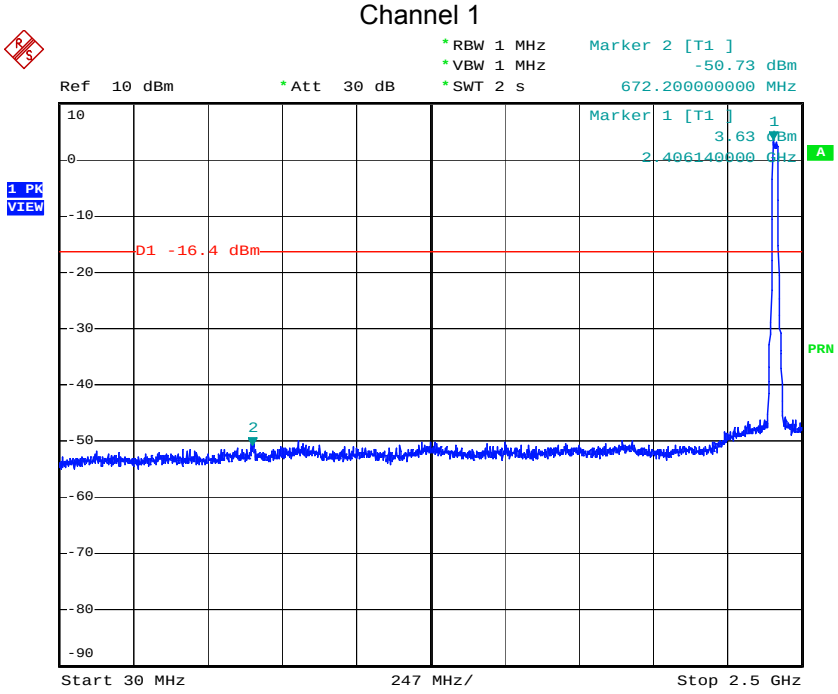


Comment: SEC2, Ch11b, Power set 14, NC
Date: 22.APR.2008 16:14:36

Conducted spurious emissions from 30 MHz to 2.5 GHz (worst case)

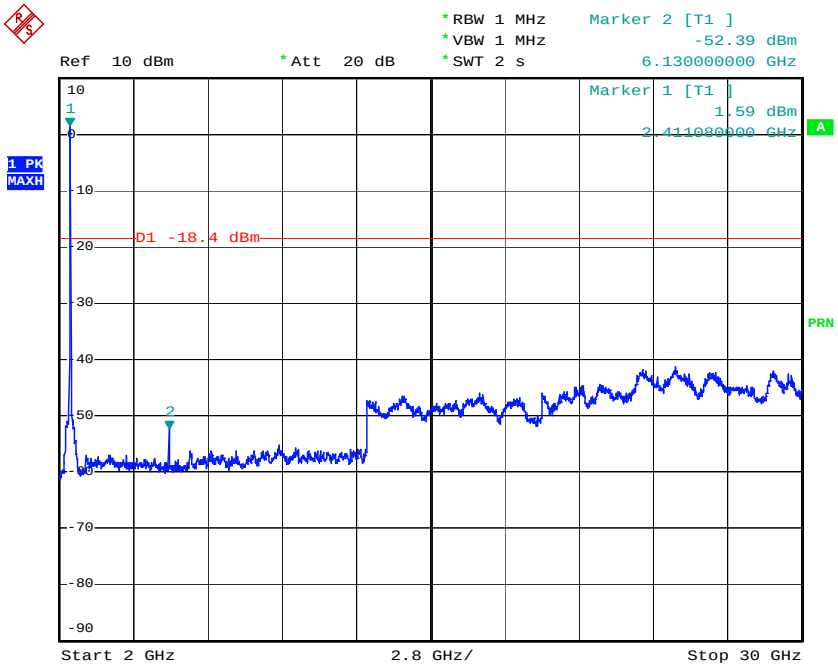
Standard 802.11g

Channel 1



Comment: SEC2, Ch1G, Power set 14, NC
Date: 22.APR.2008 16:27:00

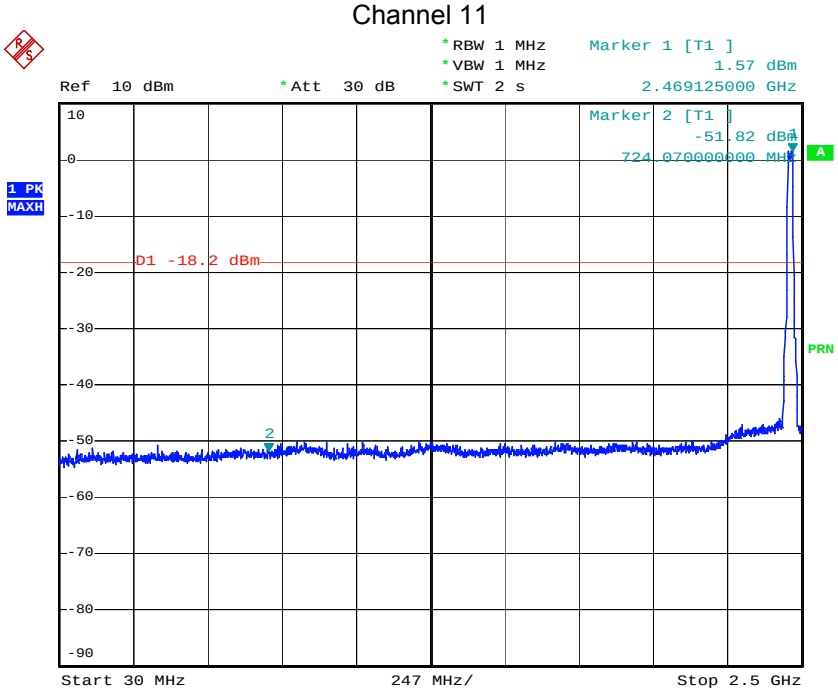
Conducted spurious emissions from 2 GHz to 30 GHz (worst case)



Comment: SEC2, Ch1g, Power set 14, NC
Date: 22.APR.2008 16:10:29

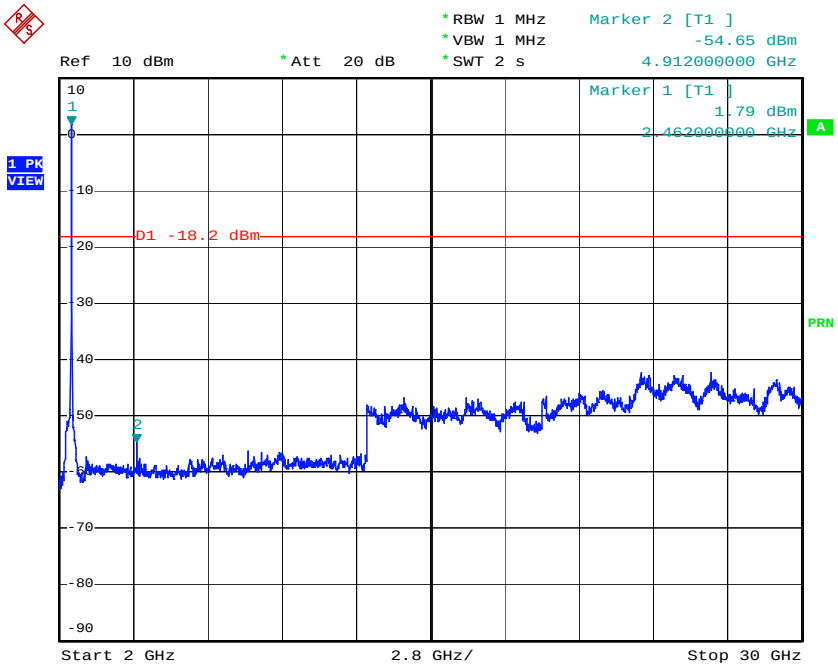
Conducted spurious emissions from 30 MHz to 2.5 GHz (worst case)

Channel 11



Comment: SEC2, Ch11G, Power set 14, NC
Date: 22.APR.2008 16:20:49

Conducted spurious emissions from 2 GHz to 30 GHz (worst case)



Comment: SEC2, Ch11G, Power set 14, NC
Date: 22.APR.2008 16:17:51

5.6 Peak Power Density

For test instruments and accessories used see section 6 Part **CPC 3**.

5.6.1 Description of the test location

Test location: AREA4

5.6.2 Photo documentation of the test set-up

5.6.3 Applicable standard

According to FCC Part 15 Subpart 15.247 (e): For digitally modulated systems, the power spectral density conducted from the intentional radiator to the antenna shall not be greater than 8 dBm in any 3 kHz band during any time interval of continuous transmission. This power spectral density shall be determined in accordance with the provisions of paragraph (b) of this section. The same method of determining the conducted output power shall be used to determine the power spectral density.

5.6.4 Description of Measurement

The EUT was connected to the spectrum analyzer with a suitable attenuator. The bandwidth of the fundamental frequency was measured with the spectrum analyzer using 3 kHz RBW and 30 kHz VBW, set sweep time equal to span/3 kHz. The power spectral density was measured using the analyzer function “Channel Power” in dBm/Hz. The result is calculated by adding 35 dB (10log3000 Hz/Hz) as band width correction factor to the analyzer reading. The measurement was performed at the antenna plug of the WLAN-Module.

Spectrum analyzer settings:
RBW: 10 kHz
VBW: 30 kHz
Sweep time: auto
Detector function: AV

5.6.5 Test result

Standard 802.11b

Channel	Frequency [MHz]	Reading [dBm/Hz]	Correction to 3 kHz [dB]	PSD [dBm]	Limit [dBm]
1	2412	-64.0	35	-29.0	8
6	2437	-59.4	35	-24.4	8
11	2462	-64.7	35	-29.3	8

Standard 802.11g

Channel	Frequency [MHz]	Reading [dBm/Hz]	Correction to 3 kHz [dB]	PSD [dBm]	Limit [dBm]
1	2412	-68.2	35	-33.2	8
6	2437	-65.3	35	-30.3	8
11	2462	-68.3	35	-33.3	8

Limit according to FCC Subpart 15.247 (e)

The peak power spectral density shall not be greater than 8 dBm in any 3 kHz band.

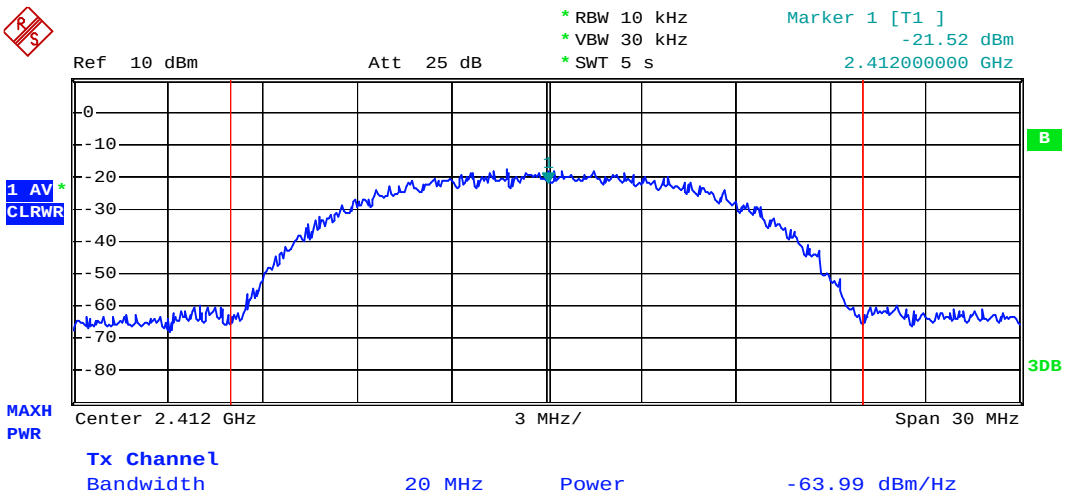
The requirements are **FULFILLED.**

Remarks: The measurement was performed with the WLAN-Module driven via PC and a test software based on a Windows operating system because of no special test software for the EUT operating system.

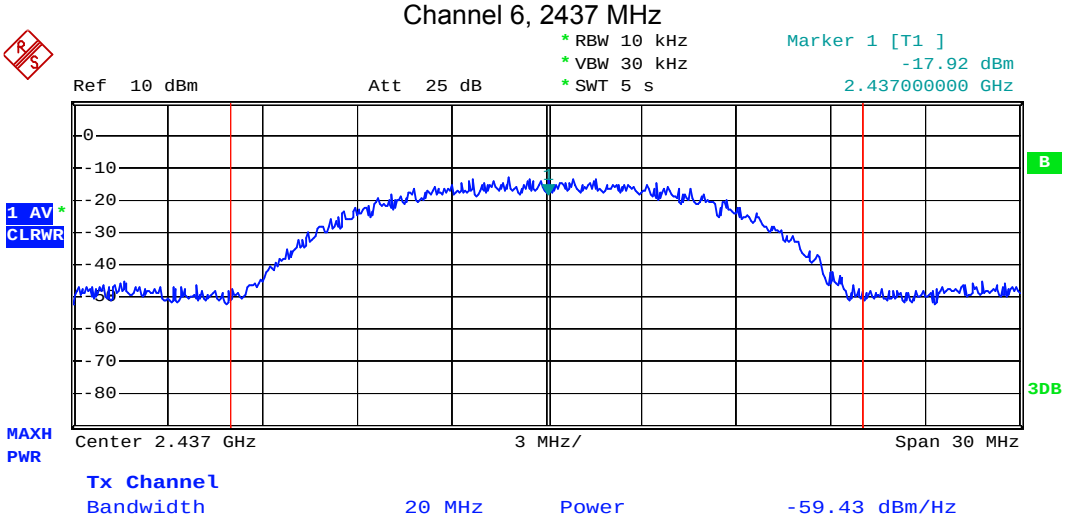
5.6.6 Test protocol

Standard 802.11b

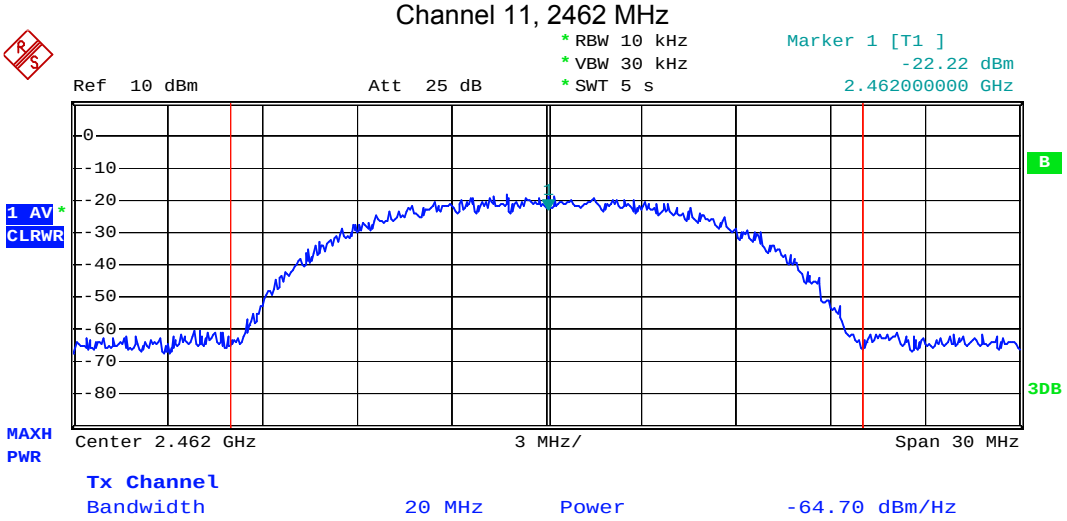
Channel 1, 2412 MHz



Channel 6, 2437 MHz

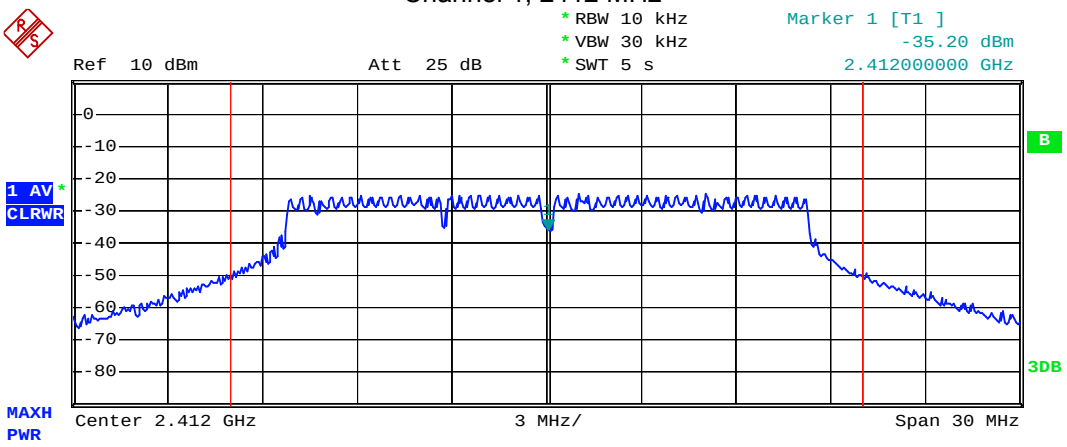


Channel 11, 2462 MHz



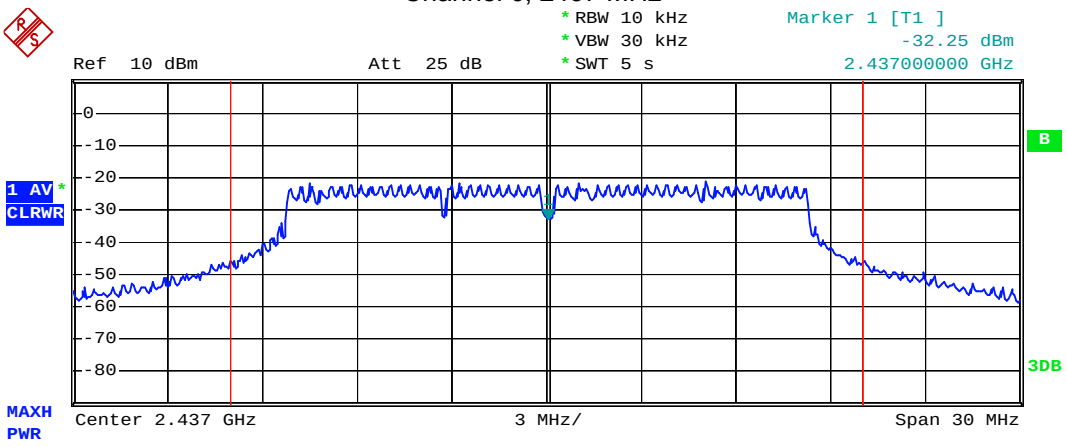
Standard 802.11g

Channel 1, 2412 MHz



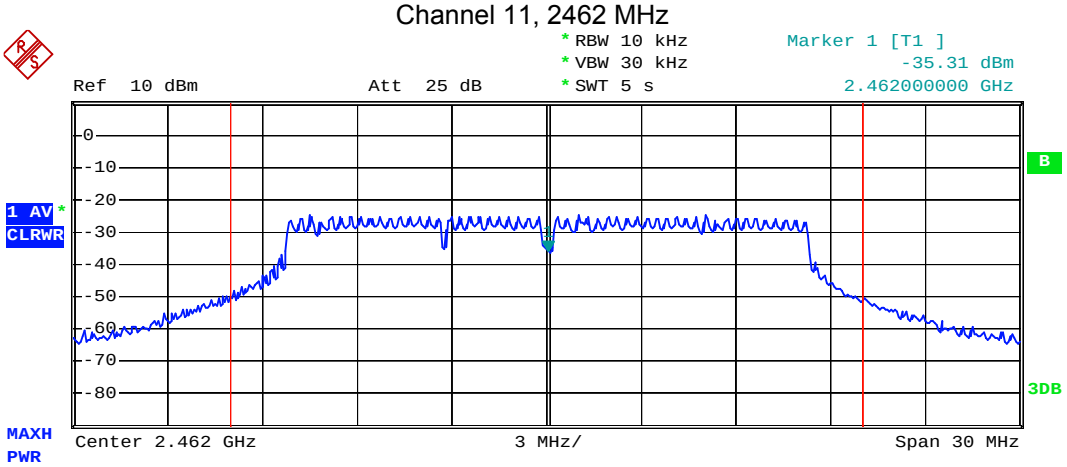
Tx Channel
Bandwidth 20 MHz Power -68.23 dBm/Hz

Channel 6, 2437 MHz



Tx Channel
Bandwidth 20 MHz Power -65.27 dBm/Hz

Channel 11, 2462 MHz



Tx Channel
Bandwidth 20 MHz Power -68.26 dBm/Hz

5.7 Receiver conducted disturbances

For test instruments and accessories used see section 6 Part **A 4**.

5.7.1 Description of the test location

Test location:

5.7.2 Photo documentation of the test set-up

5.7.3 Applicable standard

According to FCC Part 15C, Section 15.107(a):
Except as shown in paragraphs (b) and (c) of this Section, for an unintentional radiator that is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table.

Frequency of Emission (MHz)	Conducted Limit (dBµV)	
	Quasi-peak	Average
0.15-0.5	66 to 56 *	56 to 46 *
0.5-5	56	46
5-30	60	50

* Decreases with the logarithm of the frequency

5.7.4 Description of Measurement

The measurements are performed using a receiver, which has CISPR characteristic bandwidth and quasi-peak detection and a line impedance stabilization network (LISN) with 50Ω/50 µH (CISPR 16) characteristics. Table top equipment is placed on a non-conducting table 80 centimetres above the floor and is positioned 40 cm from the vertical ground plane (wall) of the screen room. If the minimum limit margin appears to be less than 20 dB with a peak mode measurement, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

To convert between dBµV and µV, the following conversions apply:

dBµV = 20 log µV

µV = 10^(dBµV/20)

5.7.5 Test result

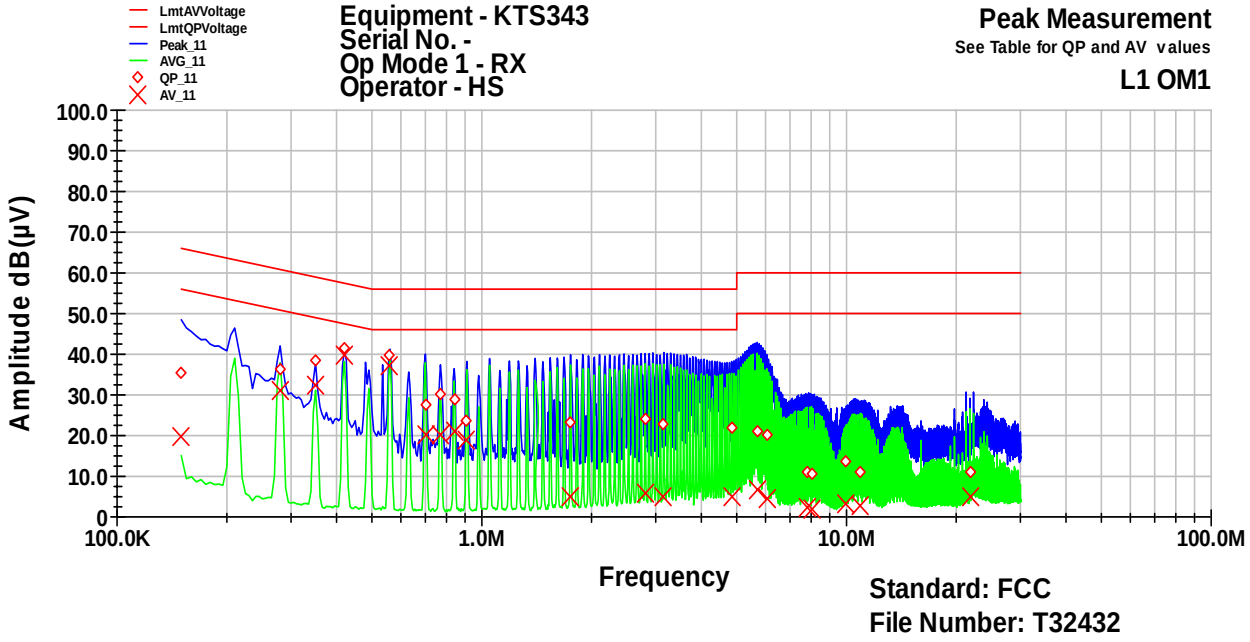
Frequency range:	0.15 MHz - 30 MHz
Min. limit margin	-4.5 dB at 0.565 MHz

The requirements are

Remarks: For detailed test result please refer to following test protocols

5.7.6 Test protocol

Test point L1 Result: passed
Operation mode: RX-Mode
Remarks:

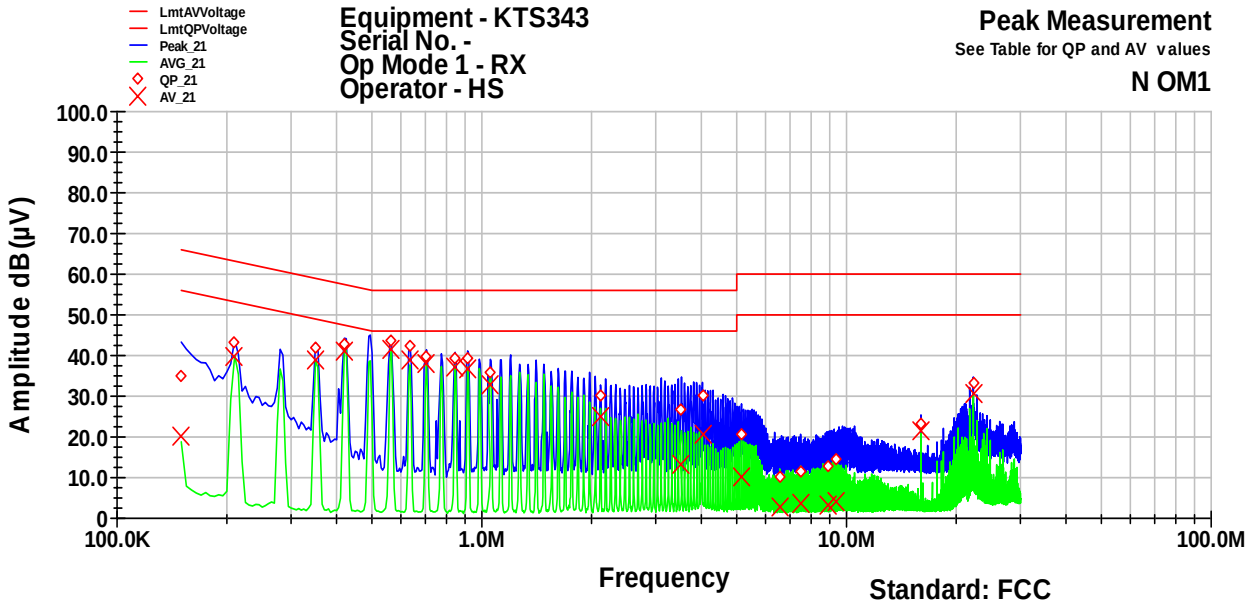


Frequency	QP Level	QP Margin	QP Limit	AV Level	AV Margin	AV Limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.15	35.2	-30.8	66.0	19.8	-36.2	56.0
0.28	36.2	-24.6	60.8	31.0	-19.8	50.8
0.35	38.3	-20.7	59.0	32.5	-16.5	49.0
0.42	41.7	-15.7	57.4	39.8	-7.7	47.4
0.56	39.9	-16.1	56.0	37.0	-9.0	46.0
0.7	27.4	-28.6	56.0	20.4	-25.6	46.0
0.77	30.2	-25.8	56.0	20.1	-25.9	46.0
0.84	29.0	-27.0	56.0	21.2	-24.8	46.0
0.91	23.8	-32.2	56.0	18.9	-27.1	46.0
1.75	23.4	-32.6	56.0	5.0	-41.0	46.0
2.805	24.0	-32.0	56.0	5.8	-40.2	46.0
3.155	22.7	-33.3	56.0	5.0	-41.0	46.0
4.84	22.0	-34.0	56.0	4.9	-41.0	46.0
5.685	21.0	-39.0	60.0	6.5	-43.5	50.0
6.04	20.3	-39.7	60.0	4.5	-45.5	50.0
7.8	11.1	-48.9	60.0	2.2	-47.8	50.0
8.01	10.5	-49.5	60.0	2.0	-48.0	50.0
9.985	13.7	-46.3	60.0	3.3	-46.7	50.0
10.905	10.9	-49.1	60.0	2.7	-47.3	50.0
21.78	11.1	-48.9	60.0	4.8	-45.2	50.0

FCC ID: V74-KTS340

Test point: N
Operation mode: RX-Mode
Remarks:

Result: passed



Frequency	QP Level	QP Margin	QP Limit	AV Level	AV Margin	AV Limit
MHz	dB(µV)	dB	dB	dB(µV)	dB	dB
0.15	34.8	-31.2	66.0	20.0	-36.0	56.0
0.21	43.1	-20.1	63.2	39.7	-13.5	53.2
0.35	41.8	-17.1	59.0	38.7	-10.3	49.0
0.42	42.9	-14.5	57.4	40.9	-6.5	47.4
0.565	43.8	-12.2	56.0	41.5	-4.5	46.0
0.635	42.4	-13.6	56.0	38.9	-7.1	46.0
0.705	39.9	-16.1	56.0	37.9	-8.1	46.0
0.845	39.5	-16.5	56.0	37.0	-9.0	46.0
0.915	39.3	-16.8	56.0	36.7	-9.3	46.0
1.055	35.7	-20.3	56.0	33.0	-13.0	46.0
2.115	30.3	-25.7	56.0	25.1	-20.9	46.0
3.525	26.7	-29.3	56.0	13.3	-32.7	46.0
4.025	30.0	-26.0	56.0	20.6	-25.4	46.0
5.15	20.7	-39.3	60.0	10.1	-39.9	50.0
6.56	10.3	-49.7	60.0	2.7	-47.3	50.0
7.48	11.3	-48.7	60.0	3.6	-46.4	50.0
8.89	12.6	-47.4	60.0	3.4	-46.6	50.0
9.385	14.3	-45.7	60.0	3.9	-46.1	50.0
16	23.3	-36.7	60.0	21.4	-28.6	50.0
22.25	33.1	-26.9	60.0	30.5	-19.5	50.0

5.8 Receiver radiated emissions

For test instruments and accessories used see section 6 Part **SER2** and **SER3**.

5.8.1 Description of the test location

Test location: NONE

Remarks: The measurement is not applicable. The EUT has no mode RX only, search pulses for an AP disturb or make the measurement in RX impossible.

5.9 Antenna application

5.9.1 Antenna requirements

The EUT's antenna meets the requirement of FCC part 15C section 15.203 and 15.204.

FCC part 15C section 15.247(c) requirement:
Systems operating in the 2400-2483,5 MHz band that are used exclusively for fixed, point to point operations may employ transmitting antennas with directional gain greater than 6 dBi provided the maximum peak output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6 dBi.

5.9.2 Result

The antenna connector is inside and not designed for changing the antenna by user. As internally antenna is used a Chip-Antenna ACX3216-B2R7HAAT/LF on a separate PCB-Board connected via a short UFL-R-Cable. The max. gain of the complete antenna structure (cable + PCB-Board + Chip-Antenna) is -3.0 dBi based on measurement. (Please see the data sheet for further details to the Chip-Antenna)

5.10 Maximum Permissible Exposure (MPE)

For test instruments and accessories used see section 6 Part **CPC3**.

5.10.1 Description of the test location

Test location: AREA4

5.10.2 Photo documentation of the test set-up

5.10.3 Calculation of MPE

For MPE-Calculation the following formula has been used:

Friis transmission formula: $\mathbf{P_d} = \frac{P_{out} * G}{4 * \Pi * r^2}$

Limits for Maximum Permissible Exposure (MPE)

Frequency Range [MHz]	Electric Field Strength [V/m]	Magnetic Field Strength [A/m]	Power Density [mW/cm^2]	Averaging Time [minutes]
(B) Limits for General Population / Uncontrolled Exposure				
0.3 – 3.0	614	1.63	100	30
3.0 – 30	824/f	2.19/f	180/ f^2	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	f/1500	30
1500-100000	**---**	**---**	**1.0**	**30**

f = Frequency in MHz

The EUT is according to FCC Rules Part 2.1093(b) not a portable device. The EUT is designed to be used that radiating structures are outside of 20 cm of the body of the user.

5.10.4 Test result

Standard 802.11b

Worst case: Internally antenna with an gain of G = -3.0 dBi, power setting Ch6: 17, r = 20 cm

Channel No.	Frequency	G	P_{out} conducted	P_{out} radiated	P_d	Limit of P_d
	[MHz]	[dBi]	[dBm]	[mW]	[mW/cm^2]	[mW/cm^2]
1	2412	-3.0	10.4	5	0.001	1.0
6	2437	-3.0	14.1	13	0.003	1.0
11	2462	-3.0	9.6	4	0.0009	1.0

The requirements for a non harmful use are **FULFILLED.**

Remarks: The level of the max. power in the standard 802.11g is smaller than the level in standard 802.11b.

Therefore is no need for measure the standard 802.11g, too.

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used, in addition to the test accessories, are calibrated and verified regularly.

The calibration intervals and the calibration history will be given out on request.

Test ID	Model / Type	Kind of Equipment	Manufacturer	Equipment No.
A 4	ESHS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-002
	NNLK 8129	LISN	Schwarzbeck Mess-Elektron	02-02/20-05-001
	N-4000-BNC	RF Cable	mikes-testingpartners gmbh	02-02/50-05-138
	N-1500-N	RF Cable	mikes-testingpartners gmbh	02-02/50-05-140
	ESH 3 - Z 2	Pulse Limiter	Rohde & Schwarz München	02-02/50-05-155
CPC 3	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
MB	FSP 7	Spectrum Analyzer	Rohde & Schwarz München	01-02/11-05-002
	WK-340/40	Climatic Chamber	Weiss Umwelttechnik GmbH	02-02/45-05-001
	6543A	Power Supply	HP Hewelett-Packard	02-02/50-05-157
SER 2	ESVS 30	EMI Test Receiver	Rohde & Schwarz München	02-02/03-05-003
	BBA 9106 / VHA 9103	Biconical Antenna	Schwarzbeck Mess-Elektron	02-02/24-05-002
	UHALP 9108 A	Log. Per. Antenna	Schwarzbeck Mess-Elektron	02-02/24-05-003
	KK-EF393-21N-16	RF Cable 20m	Huber + Suhner	02-02/50-05-035
	HF 7/8 inch	Antenna Cable 20m	Huber + Suhner	02-02/50-05-116
	RG 214/U	RF Cable 2m	Huber + Suhner	02-02/50-05-117
SER 3	FSP 30	Spectrum Analyzer	Rohde & Schwarz München	02-02/11-05-001
	AFS4-01000400-10-10P-4	RF Amplifier 1-4 GHz	PARZICH GMBH	02-02/17-05-003
	AMF-4F-04001200-15-10P	RF Amplifier 4-12 GHz	PARZICH GMBH	02-02/17-05-004
	AFS5-12001800-18-10P-6	RF Amplifier 12-18 GHz	PARZICH GMBH	02-02/17-06-002
	BBHA 9120 E 251	Broad-Band Horn Anten	Schwarzbeck Mess-Elektron	02-02/24-05-006
	WBH218H N	Horn Antenna 2-18 GHz	Q-par Angus Ltd	02-02/24-05-007
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-075
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-083
	Sucoflex N-2000-SMA	RF Cable	novotronik Signalverarbeit	02-02/50-05-088

Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
02-02/03-05-002	04/20/2008	04/20/2007		
02-02/20-05-001	12.08.2008	06.08.2007		
02-02/50-05-138				
02-02/50-05-140				
02-02/50-05-155	03/25/2008	09/25/2007		
02-02/11-05-001	12.06.2008	12.06.2006		
01-02/11-05-002	08/27/2008	08/27/2007		
02-02/45-05-001	09.01.2008	09.01.2005	06.07.2008	12.07.2007
02-02/50-05-157				
02-02/03-05-003	04/26/2008	04/26/2007		
02-02/24-05-002	04/15/2008	04/15/2005	08.07.2008	02.07.2008
02-02/24-05-003	04/15/2008	04/15/2005	08.07.2008	02.07.2008
02-02/50-05-035				
02-02/50-05-116				
02-02/50-05-117				
02-02/11-05-001	12.06.2008	12.06.2006		
02-02/17-05-003				
02-02/17-05-004				
02-02/17-06-002				
02-02/24-05-006	04/15/2008	04/15/2005	02/23/2008	11/23/2007
02-02/24-05-007	12.06.2008	12.06.2007		
02-02/50-05-075				
02-02/50-05-083				
02-02/50-05-088				