

FCC ID:V74-KTS340A

EMI - TEST REPORT

- FCC Part 15.247, RSS210 -



Test Report No. :	T35231-00-02HS	17. August 2011 Date of issue
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Type / Model Name : KTS340A

Product Description : Vehicle diagnosis tester

Applicant : Robert Bosch GmbH

Address : Franz-Oechsle-Str. 4

73207 PLOCHINGEN, GERMANY

Manufacturer : Robert Bosch GmbH

Address : Franz-Oechsle-Str. 4

73207 PLOCHINGEN, GERMANY

Licence holder : Robert Bosch GmbH

Address : Franz-Oechsle-Str. 4

73207 PLOCHINGEN, GERMANY

Test Result according to the standards listed in clause 1 test standards:	POSITIVE
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The test report merely corresponds to the test sample.
It is not permitted to copy extracts of these test results
without the written permission of the test laboratory.

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Attachment A, T35231

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1 TEST STANDARDS

The tests were performed according to following standards:

FCC Rules and Regulations Part 15, Subpart A - General (September, 2010)

Part 15, Subpart A, Section 15.31	Measurement standards
Part 15, Subpart A, Section 15.33	Frequency range of radiated measurements
Part 15, Subpart A, Section 15.35	Measurement detector functions and bandwidths

FCC Rules and Regulations Part 15 Subpart B - Unintentional Radiators (September, 2010)

Part 15, Subpart B, Section 15.107	AC Line conducted emission <input type="checkbox"/> Class A device <input checked="" type="checkbox"/> Class B device
Part 15, Subpart B, Section 15.109	Radiated emission, general requirements

FCC Rules and Regulations Part 15, Subpart C - Intentional Radiators (September, 2010)

Part 15, Subpart C, Section 15.203	Antenna requirement
Part 15, Subpart C, Section 15.204	External radio frequency power amplifiers and antenna modifications
Part 15, Subpart C, Section 15.205	Restricted bands of operation
Part 15, Subpart C, Section 15.207	Conducted limits
Part 15, Subpart C, Section 15.209	Radiated emission limits, general requirements
Part 15, Subpart C, Section 15.247	Operation within the bands 902 - 928 MHz, 2400 - 2483.5 MHz and 5725 - 5850 MHz

FCC Rules and Regulations Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969

Part 1, Subpart I, Section 1.1310	Radiofrequency radiation exposure limits
Part 1, Subpart 2, Section 2.1093	Radiofrequency radiation exposure evaluation: portable device

OET Bulletin 65, 65A, 65B, 65C Edition 97-01, August 1997 – Evaluating Compliance with FCC Guidelines for Human Exposure to Radio Frequency Electromagnetic Fields.

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.
ANSI C95.1:1992	IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz
CISPR 16-4-2: 2003	Uncertainty in EMC measurement
CISPR 22: 2005 EN 55022: 2006	Information technology equipment
KDB 558074	Measurement of digital transmission systems operating under Section 15.247. March 23, 2005.

2 SUMMARY

2.1 Test result summary

WLAN device using digital modulation:

Operating in the 2.400 GHz – 2.4835 GHz band:

FCC Rule Part	RSS Rule Part	Description	Result
15.207(a)	RSS Gen, 7.2.4.	AC power line conducted emissions	passed
15.247(a)(2)	RSS210, A8.2(a)	-6 dB EBW	passed
15.247(b)(3)	RSS-210, A8.4(4)	Peak power	passed
15.247(d)	RSS-210, A8.5	Out-of-band emission, radiated	passed
15.247(d)	RSS-Gen, 7.2.2	Emissions in restricted bands	passed
15.247(e)	RSS-210, A8.2(b)	PSD	passed
15.35(c)	RSS-Gen, 4.5	Pulsed operation	not applicable
15.247(i)	RSS 102, 2.5.2	MPE	passed
15.247(b)(4)	RSS-Gen, 7.1.2	Antenna requirement	passed
15.107	RSS Gen, 7.2.4.	AC power line conducted emissions	passed
15.109(a)	RSS-Gen, 6.1	Receiver spurious emissions, radiated	passed
	RSS-Gen, 7.2.6	Transmitter frequency stability	not applicable
	RSS-Gen, 4.6.1	99% Bandwidth	passed
OET Bulletin 65	RSS102, 3.2	Co-location, Co-transmission	passed

The mentioned RSS Rule Parts in the above table are related to:

RSS Gen, Issue 3, December 2010

RSS 210, Issue 8, December 2010

RSS 102, Issue 4, March 2010

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GENERAL REMARKS:

The EUT consists of 1 WLAN module.

Available Features on KTS340A:

The KTS340A is the US-Version of the KTS340.

The EUT works as client only and for transmission the channel of the access point searched. The firmware does not support the adhoc mode and gives the user no possibility to choose the channel for data transmission.

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 intergrated chip-antenna soldered on PCB-Board and listed below:

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

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

802.11b mode:

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

802.11g mode:

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

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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:

Ability	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 : 07 July 2011

Testing concluded on : 15 July 2011

Checked by:

Tested by:

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

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

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3 EQUIPMENT UNDER TEST

3.1 Photo documentation of the EUT – Detailed photos see attachment A

3.2 Power supply system utilised

Power supply voltage : 100 VAC – 240 VAC, 50 – 60 Hz, 15 VDC, 4600 mA

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-Keybaord 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 KTS340 and 1 SD-Card test jig with WLAN module
 Serial number: EMV2

EUT operation mode:

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

- 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, TenPao, 100 – 240 VAC	Model : S075AQ1500460, P/N 1687023601
- OBD-Cable 3 m	Model : No. 1684465557
- Test jig, Z-COM Inc.	Model : SDIO to XG-182M Adapter, V0.2
- Notebook	Model : HP Compaq 6910, SN CND8032FTW

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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 „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. For all measurements shown in this report, the measurement uncertainty of the test laboratory, mikes-testingpartners gmbh, is below the measurement uncertainty as defined by CISPR. Therefore, no special measures must be taken into consideration with regard to the limits according to CISPR. 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 and IC

4.4.1 GENERAL INFORMATION

4.4.1.1 Test methodology

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

The Open Area test site is a listed Open Site under the Canadian Test-Sites File-No:

IC 3009A-1

In compliance with RSS 210 Issue 7 testing for RSS compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

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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.

4.4.1.3 Details of test procedures

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 - "Methods of Measurement of Radio-Noise Emissions from Low-Voltage Electrical and Electronic Equipment in the Range of 9 kHz to 40 GHz". In compliance with 47 CFR Part 15 Subpart A, Section 15.38 testing for FCC compliance may be achieved by following the procedures set out in ANSI C63.4 and applying the CISPR 22 limits.

4.4.1.4 Conducted emission

The final level, expressed in dB μ V, 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 dB μ V and μ V, the following conversion formula apply:

$$\begin{aligned} \text{dB}\mu\text{V} &= 20 \cdot \log(\mu\text{V}); \\ \mu\text{V} &= 10^{(\text{dB}\mu\text{V}/20)}; \end{aligned}$$

Conducted emissions on the 50 Hz and/or 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 50 Ω /50 μ H (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 of a peak mode measurement appears to be less than 20 dB, the emissions are remeasured using a tuned receiver with quasi-peak and average detection and recorded on the data sheets.

4.4.1.5 Radiated emission (electrical field 30 MHz - 1 GHz)

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 polarised antennas. Measurements between 30 MHz and 1000 MHz are made with 120 kHz/6 dB bandwidth and quasi-peak detection. Table top equipment is placed on a 1.0 X 1.5 m non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is established in accordance with ANSI C63.4. The interface cables that are closer than 40 cm to the ground plane are bundled in the center in a serpentine fashion so that they are at least 40 cm from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. The antenna is positioned 3, 10 or 30 m horizontally from the EUT and is repeated vertically. To locate maximum emissions from the test sample the antenna is varied in height from 1 to 4 m and the EUT is rotated 360 degrees.

The final level in dB μ V/m is calculated by add on the reading value from the EMI receiver (level dB μ V) the correction factor. The FCC or CISPR limit is subtracted from this result in order to provide the limit margin listed in the measurement protocol.

The resolution bandwidth setting:

30 MHz – 1000 MHz: RBW: 120 kHz

Example:

Frequency (MHz)	Level (dB μ V)	+	Factor (dB)	=	Level (dB μ V/m)	-	CISPR Limit (dB μ V/m)	=	Delta (dB)
719.0	75.0	+	32.6	=	107.6	-	110.0	=	-2.4

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4.4.1.6 Radiated emission (electrical field 1 GHz - 40 GHz)

Radiated emissions from the EUT are measured in the frequency range 1 GHz up to the maximum frequency as specified in 47 CFR Part 15, Subpart A, Section 15.33, using a spectrum analyser and appropriate linearly polarized antennas. Table top equipment is placed on a 1.0 X 1.5 metre non-conducting table 80 centimetres above the ground plane. Floor standing equipment is placed directly on the turntable/ground plane. The setup of the equipment under test is following set out in ANSI C63.4. The interface cables that are closer than 40 centimetres to the ground plane are bundled in the center in a serpentine fashion so they are at least 40 centimetres from the ground plane. Cables to simulators/testers (if used in this test) are routed through the center of the table and to a screened room located outside the test area. Measurements are made in both the horizontal and vertical polarization planes in a fully anechoic room using a spectrum analyser set to max peak detector function and a resolution 1 MHz and video bandwidth 3 MHz for peak and 10 Hz for average measurement. The conditions determined as worst case will then be used for the final measurements. When the EUT is larger than the beam width of the measuring antenna it will be moved over the surface for the four sides of the equipment. Where appropriate, the test distance may be reduced in order to detect emissions under better uncertainty and are calculated at the specified test distance.

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 of the EUT produce the maximum of the emissions. For the further measurement the EUT is set in X position.

The tests are carried out in the following frequency band:

2400 MHz - 2.4835 MHz

Preliminary tests were performed to find the worse case mode from all possible combinations between available modulations, data rates. The maximum output power depends on used data rate. As worse case the 802.11b mode (data rate of 1 Mbps) and 802.11g mode (data rate of 6 Mbps) is used.

The EUT is controlled for several tests with special test software (Lab tool sd8686 XG182M) used for testing only where continuous signals are needed. The WLAN module is placed onto a test jig applied to a SD slot of a notebook. For the tests a duty cycle (x) of $x = 1$ is set.

Following channels and test modes were selected for the final test as listed below:

WLAN	Available channel	Tested channels	Power setting	Modulation	Modulation type	Data rate (Mbps)
802.11b	1 to 11	1, 6, 11	10	CCK	DBPSK	1
802.11g	1 to 11	1, 6, 11	13	OFDM	BPSK	6

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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 Applicable standard

According to FCC Part 15, Section 15.207(a):

Except as shown in paragraphs (b) and (c) of this Section, for an intentional 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 given limits.

5.1.4 Description of Measurement

The measurements are performed following the procedures set out in ANSI C63.4 described under item 4.4.3. 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.

5.1.5 Test result

Frequency range: 0.15 MHz - 30 MHz

Min. limit margin 8.8 dB at 0.485 MHz

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Limit according to FCC Part 15, Section 15.207(a):

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

The requirements are **FULFILLED**.

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

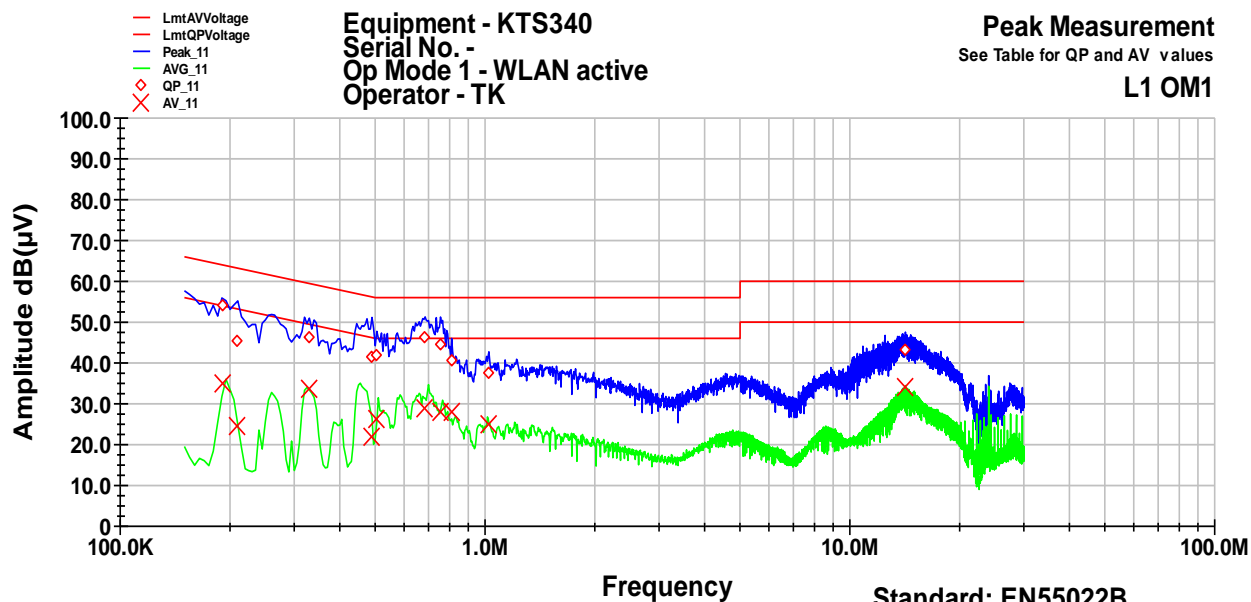
mikes

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5.1.6 Test protocol

Test point L1
Operation mode: TX continuous mode, modulated
Remarks:

Result: passed

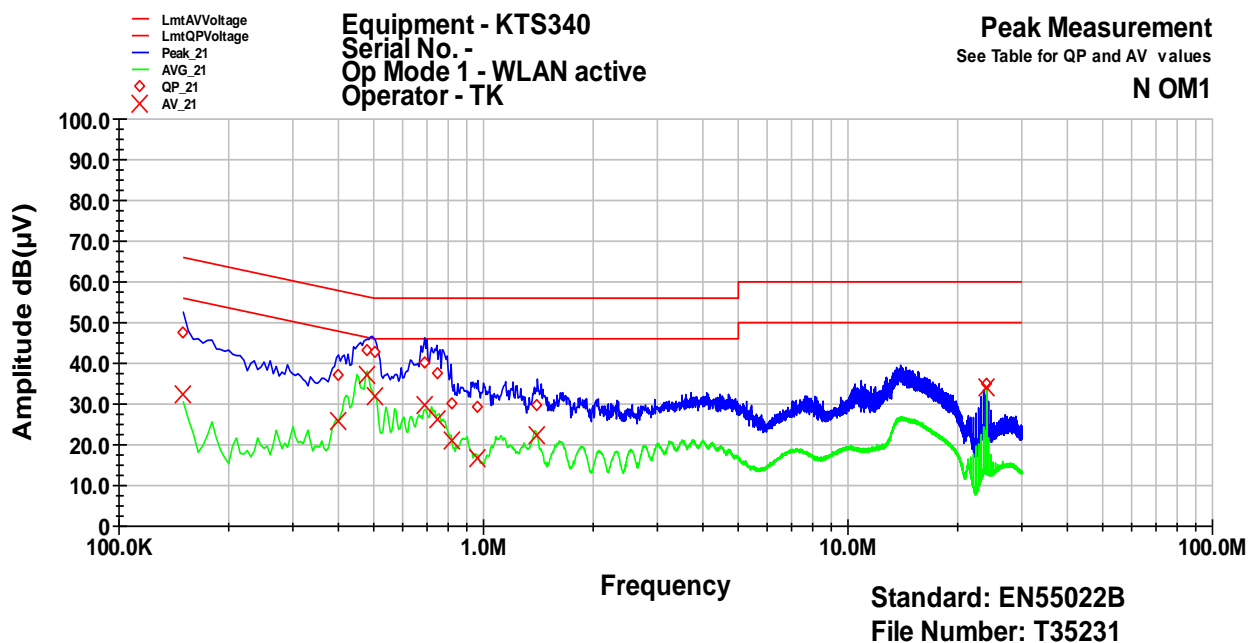


Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.19	54.0	-10.1	64.0	35.0	-19.0	54.0
0.21	45.6	-17.6	63.2	24.5	-28.7	53.2
0.33	46.2	-13.3	59.5	33.7	-15.7	49.5
0.49	41.6	-14.5	56.2	21.9	-24.3	46.2
0.505	42.0	-14.0	56.0	26.1	-19.9	46.0
0.685	46.2	-9.8	56.0	29.0	-17.0	46.0
0.755	44.6	-11.4	56.0	28.0	-18.0	46.0
0.81	40.7	-15.3	56.0	27.9	-18.1	46.0
1.025	37.8	-18.2	56.0	24.8	-21.2	46.0
14.19	43.2	-16.8	60.0	34.2	-15.8	50.0

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Test point: N
Operation mode: TX continuous mode, modulated
Remarks:

Result: passed

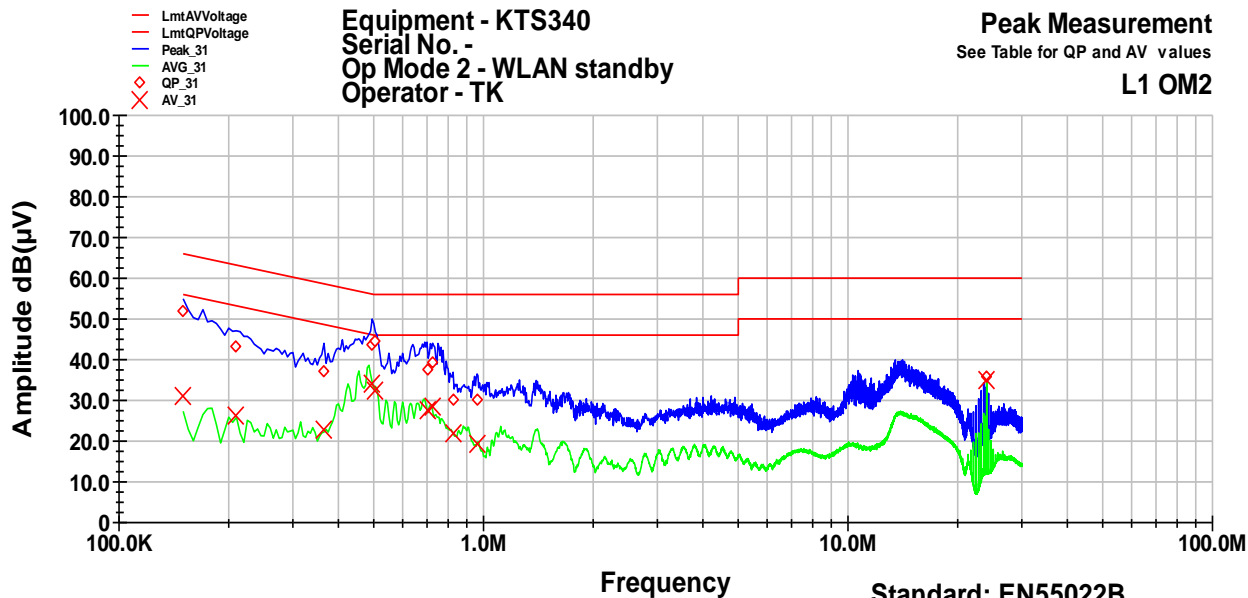


Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.15	47.7	-18.3	66.0	32.3	-23.7	56.0
0.4	37.0	-20.9	57.9	25.7	-22.1	47.9
0.48	43.2	-13.1	56.3	37.3	-9.0	46.3
0.505	42.8	-13.2	56.0	31.8	-14.2	46.0
0.69	40.4	-15.6	56.0	29.7	-16.3	46.0
0.745	37.4	-18.6	56.0	26.1	-19.9	46.0
0.815	30.0	-26.0	56.0	21.0	-25.0	46.0
0.965	29.4	-26.6	56.0	16.8	-29.2	46.0
1.405	29.8	-26.3	56.0	22.4	-23.6	46.0
24	35.0	-25.0	60.0	34.0	-16.0	50.0

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Test point L1
Operation mode: RX mode
Remarks:

Result: passed

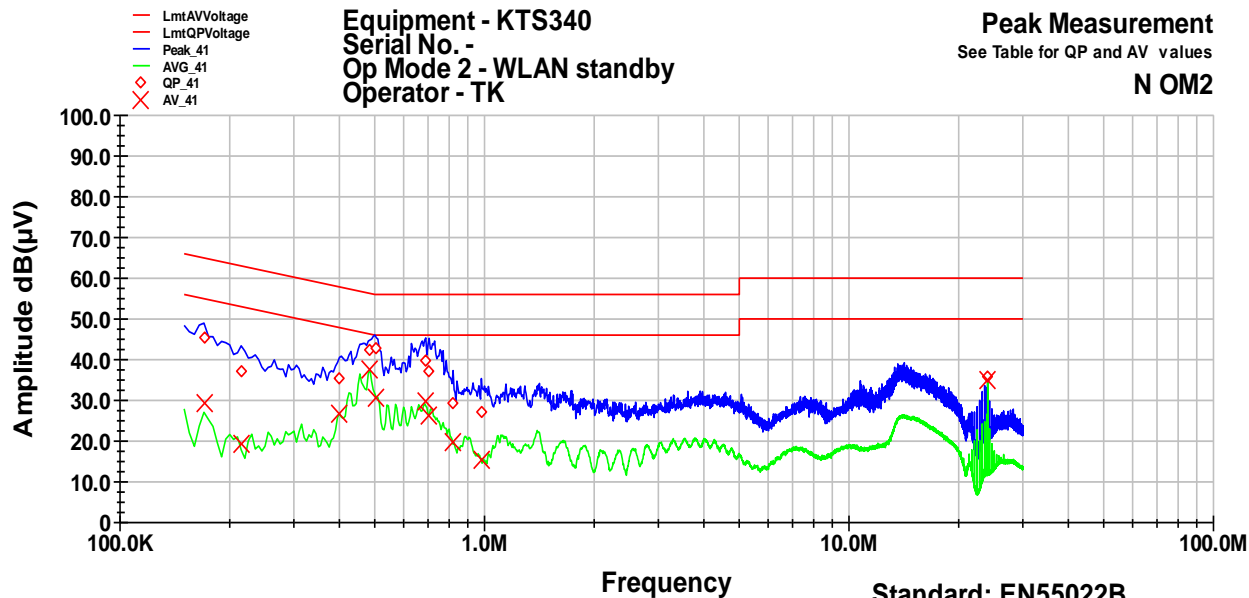


Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.15	51.8	-14.2	66.0	31.1	-24.9	56.0
0.21	43.0	-20.2	63.2	26.4	-26.8	53.2
0.365	37.0	-21.7	58.6	22.9	-25.7	48.6
0.495	43.8	-12.2	56.1	34.2	-11.9	46.1
0.505	44.4	-11.6	56.0	32.5	-13.5	46.0
0.7	37.6	-18.4	56.0	27.7	-18.3	46.0
0.725	39.1	-16.9	56.0	28.3	-17.7	46.0
0.825	30.1	-25.9	56.0	22.0	-24.0	46.0
0.96	30.0	-26.0	56.0	19.5	-26.5	46.0
24	35.8	-24.2	60.0	34.9	-15.1	50.0

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Test point N
Operation mode: RX mode
Remarks:

Result: passed



Frequency MHz	QP Level dB(μV)	QP Margin dB	QP Limit dB	AV Level dB(μV)	AV Margin dB	AV Limit dB
0.17	45.3	-19.6	65.0	29.1	-25.8	55.0
0.215	37.0	-26.0	63.0	19.4	-33.7	53.0
0.4	35.3	-22.5	57.9	26.8	-21.1	47.9
0.485	42.5	-13.8	56.3	37.5	-8.8	46.3
0.505	42.9	-13.1	56.0	30.5	-15.5	46.0
0.69	39.9	-16.1	56.0	29.6	-16.4	46.0
0.705	37.1	-18.9	56.0	26.4	-19.6	46.0
0.82	29.5	-26.5	56.0	19.9	-26.1	46.0
0.98	27.3	-28.7	56.0	15.5	-30.5	46.0
24	35.7	-24.3	60.0	34.8	-15.2	50.0

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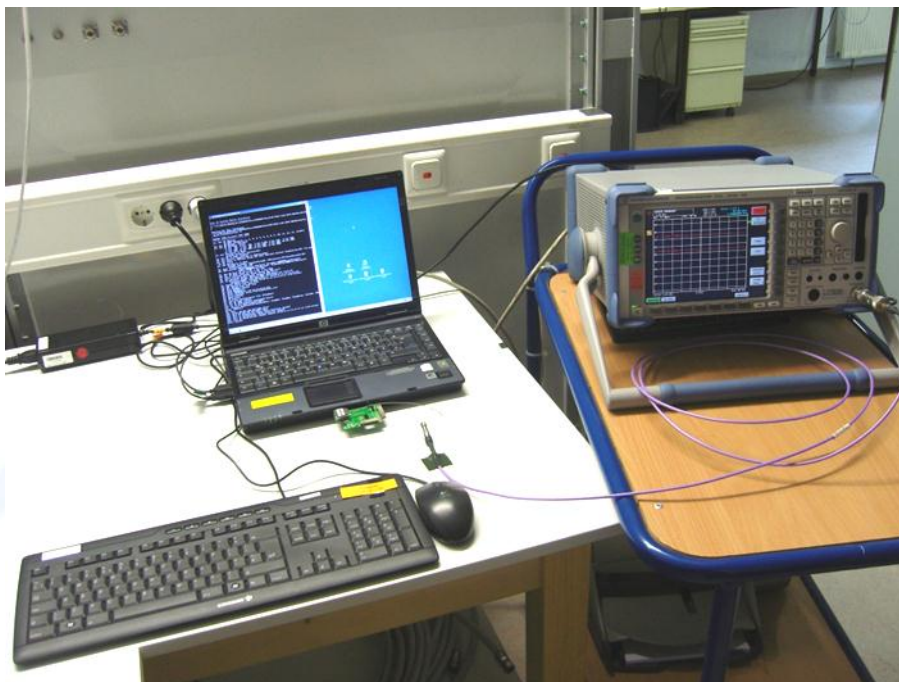
5.2 Emission bandwidth

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

5.2.1 Description of the test location

Test location: AREA 4

5.2.2 Photo documentation of the test set-up



5.2.3 Applicable standard

According to FCC Part 15, Section 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.

5.2.4 Description of Measurement

The bandwidth was measured at an amplitude level reduced from the reference level of a modulated channel by a ratio of -6 dB. The reference level is the level of the highest signal amplitude observed at 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. An alternative is to use the bandwidth measurement of the analyser.

Spectrum analyser settings:

RBW: 100 kHz, VBW: 300 kHz, Detector: Peak, Sweep time: 5 s;

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

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

5.2.5 Test result

WLAN Standard 802.11b

Channel number	Fundamental frequency (MHz)	6 dB Bandwidth (MHz)	Minimum limit (MHz)
1	2412	10.08	0.5
6	2437	10.08	0.5
11	2462	10.08	0.5

WLAN Standard 802.11g

Channel number	Fundamental frequency (MHz)	6 dB Bandwidth (MHz)	Minimum limit (MHz)
1	2412	16.56	0.5
6	2437	16.62	0.5
11	2462	16.68	0.5

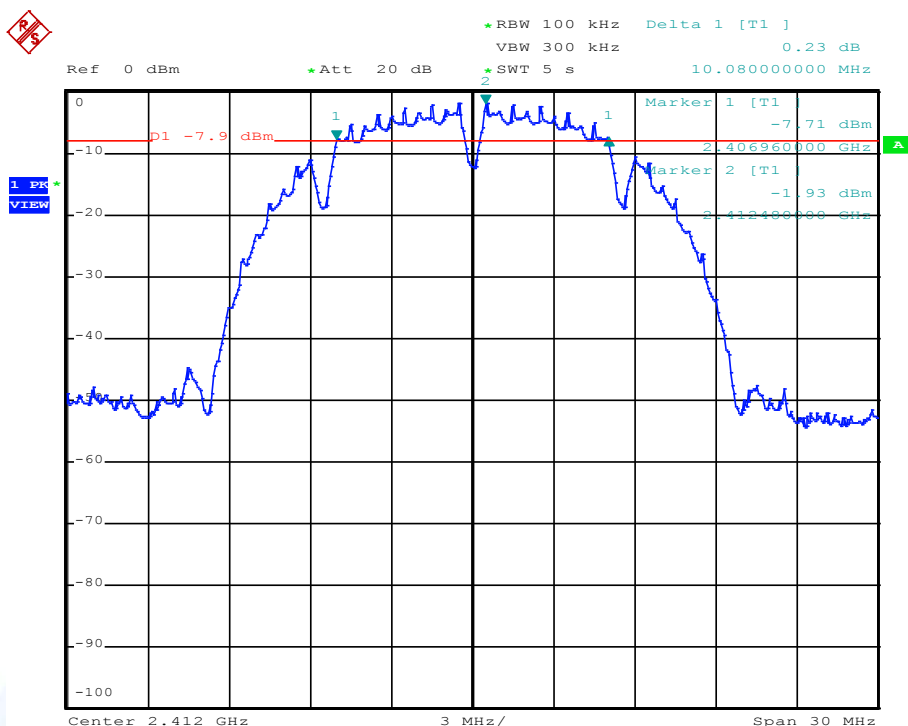
The requirements are **FULFILLED**.

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

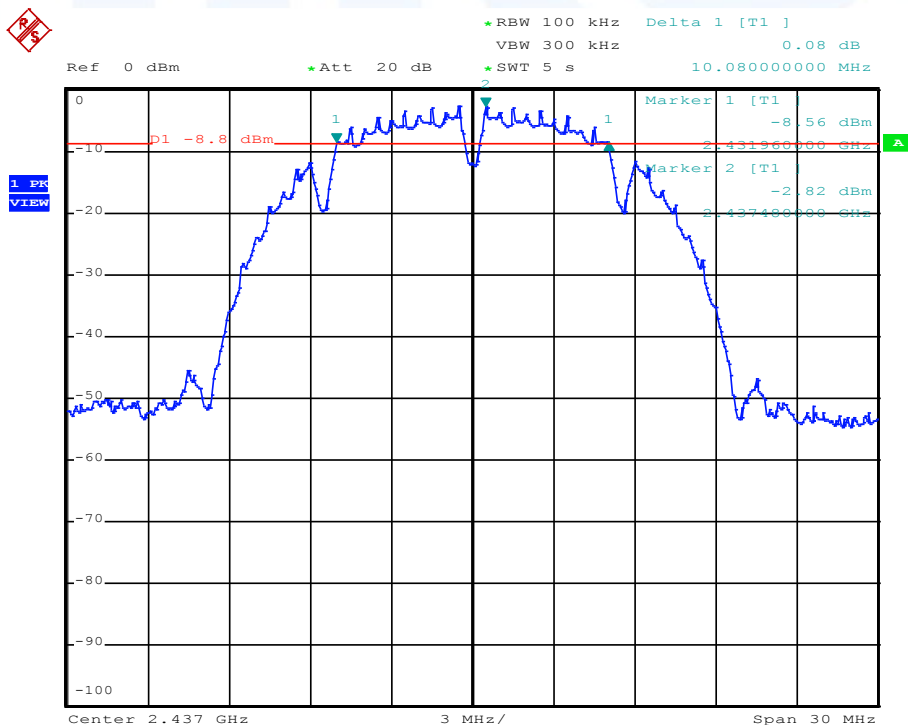
FCC ID:V74-KTS340A

5.2.6 Test protocols

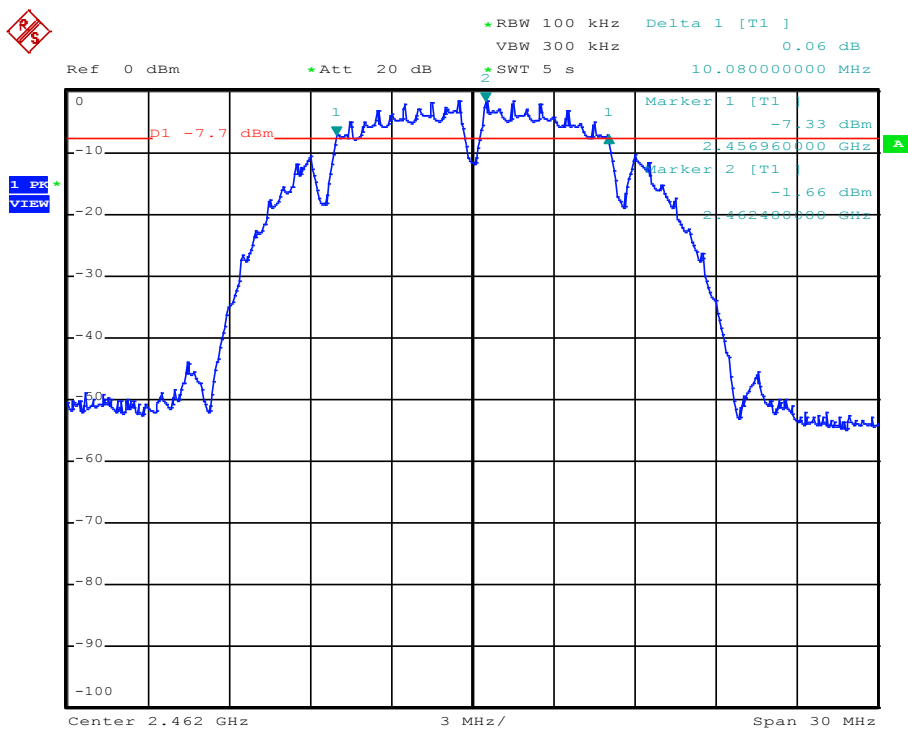
802.11b, Channel 1 (2412 MHz)



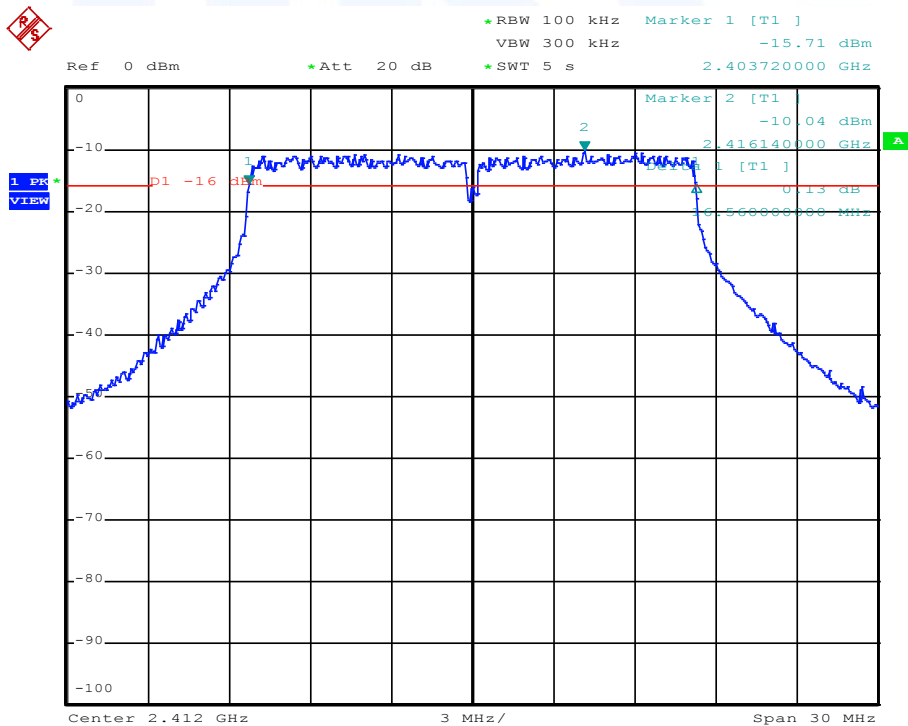
802.11b, Channel 6 (2437 MHz)



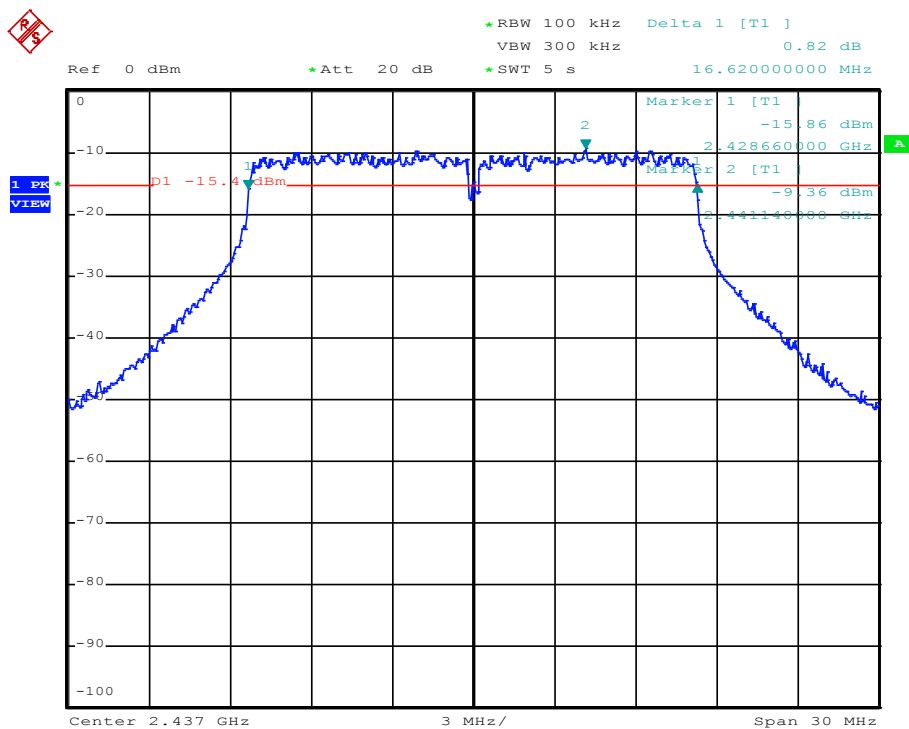
FCC ID:V74-KTS340A
802.11b, Channel 11 (2462 MHz)



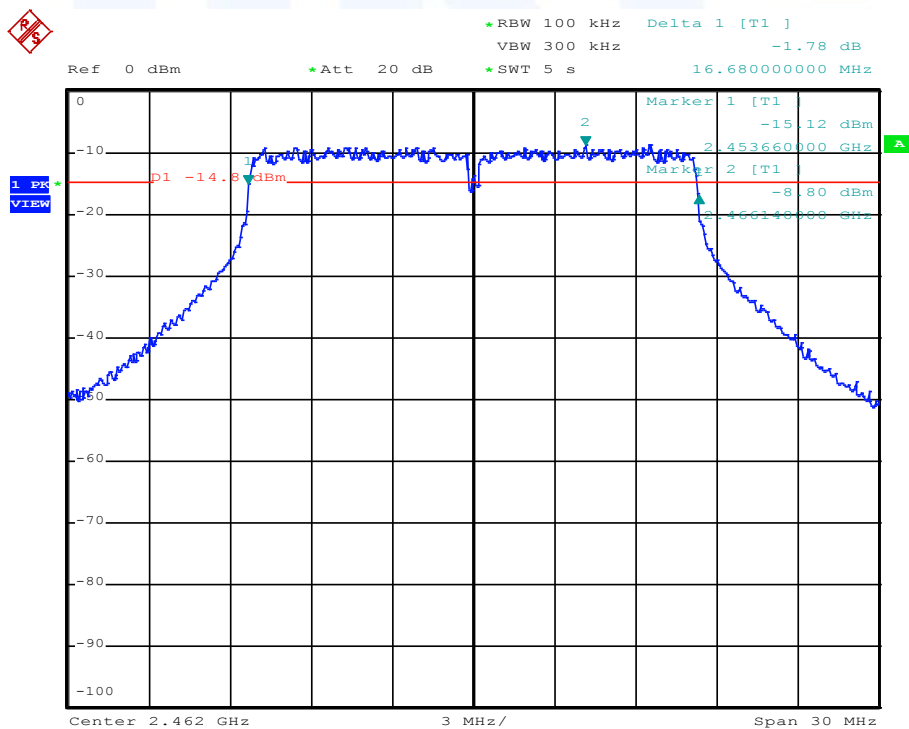
802.11g, Channel 1 (2412 MHz)



FCC ID:V74-KTS340A
802.11g, Channel 6 (2437 MHz)



802.11g, Channel 11 (2462 MHz)



FCC ID:V74-KTS340A

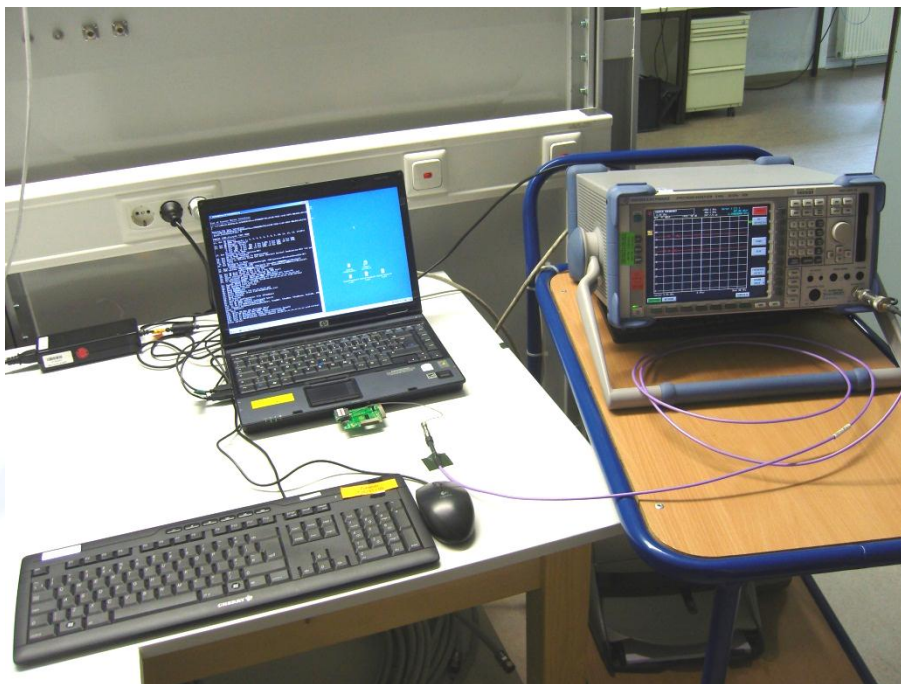
5.3 Occupied bandwidth

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

5.3.1 Description of the test location

Test location: AREA 4

5.3.2 Photo documentation of the test set-up



5.3.1 Applicable standard

According to RSS-Gen, 4.6.1:

When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported is to be its 99% emission bandwidth, as calculated or measured.

5.3.2 Description of Measurement

The bandwidth was measured with the function “bandwidth measurement” of the spectrum analyser. The EUT is connected via suitable attenuator at the spectrum analyser. The measurement is repeated for every different modulation standard of the EUT and recorded.

Spectrum analyser settings:

RBW: 300 kHz, VBW: 1 MHz, Detector: Peak, Sweep time: auto;

FCC ID:V74-KTS340A

5.3.3 Test result

WLAN Standard 802.11b

Channel number	Fundamental frequency (MHz)	99 % Bandwidth (MHz)
1	2412	13.80
6	2437	13.86
11	2462	13.68

WLAN Standard 802.11g

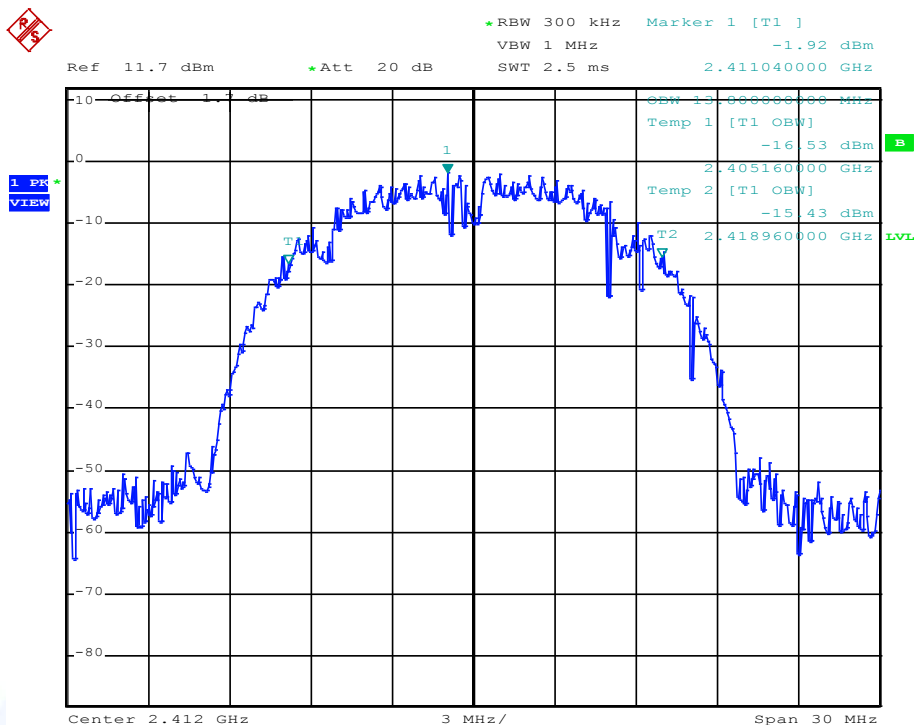
Channel number	Fundamental frequency (MHz)	99 % Bandwidth (MHz)
1	2412	16.56
6	2437	16.56
11	2462	16.86

Remarks: For detailed test result please refer to following test protocols. The RSS Gen defines no limit for the occupied bandwidth!

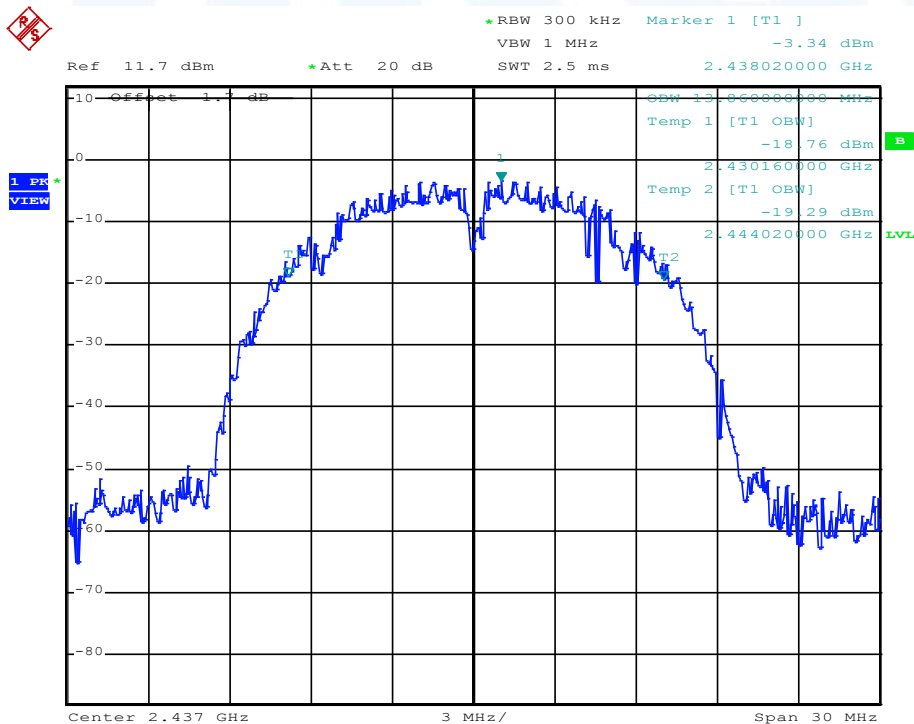
FCC ID:V74-KTS340A

5.3.1 Test protocols

802.11b, Channel 1 (2412 MHz)

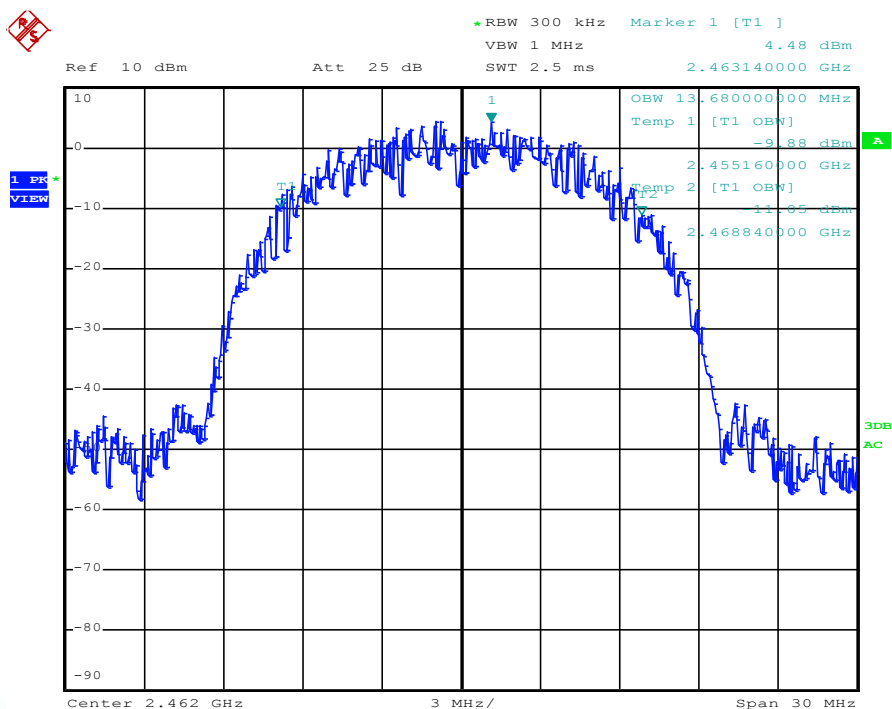


802.11b, Channel 6 (2437 MHz)

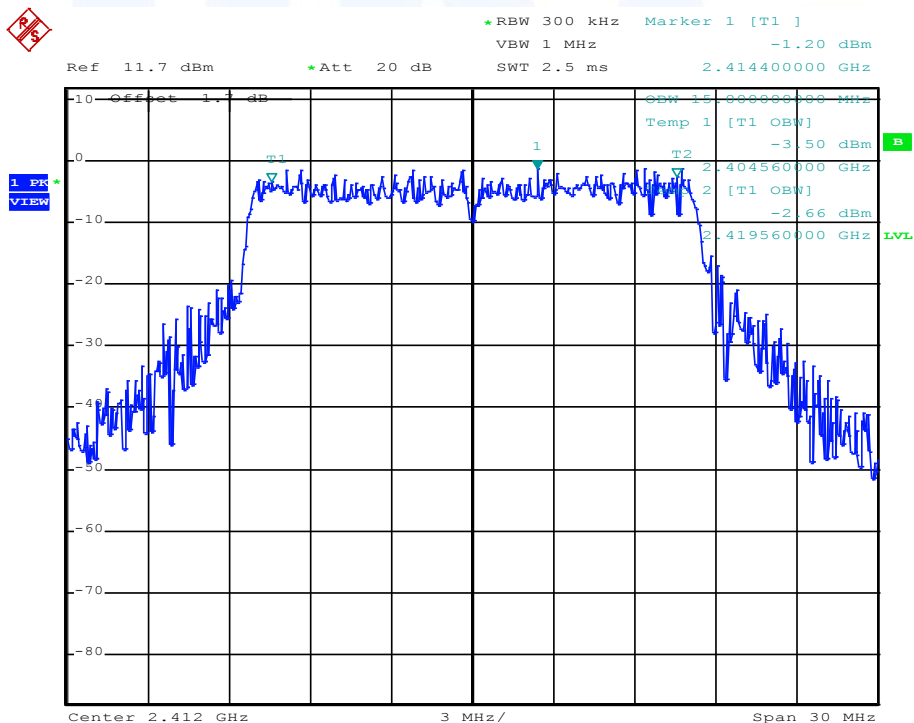


FCC ID:V74-KTS340A

802.11b, Channel 11 (2462 MHz)

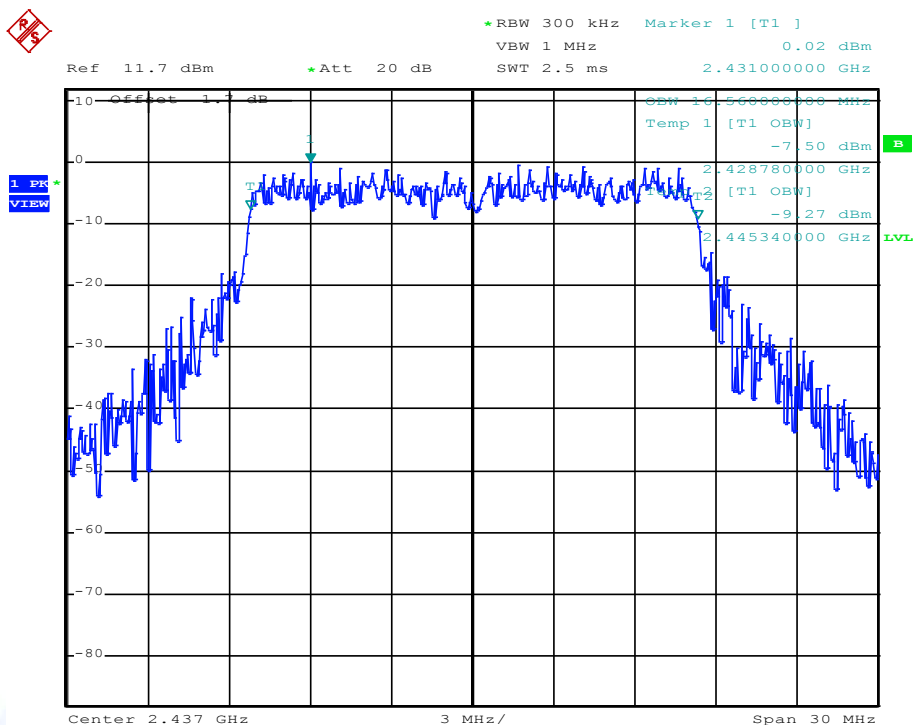


802.11g, Channel 1 (2412 MHz)

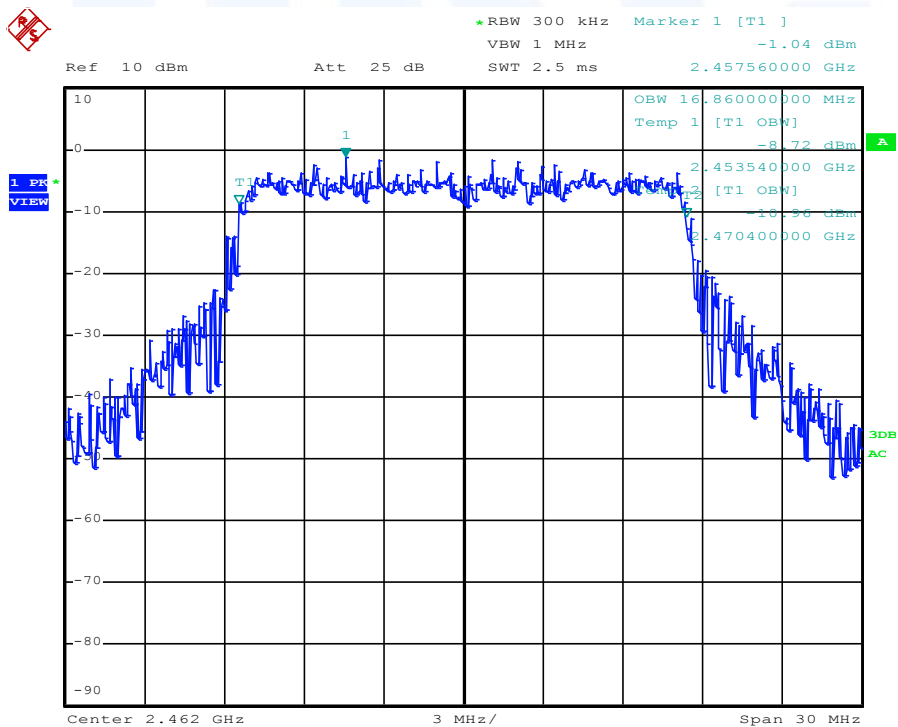


FCC ID:V74-KTS340A

802.11g, Channel 6 (2437 MHz)



802.11g, Channel 11 (2462 MHz)

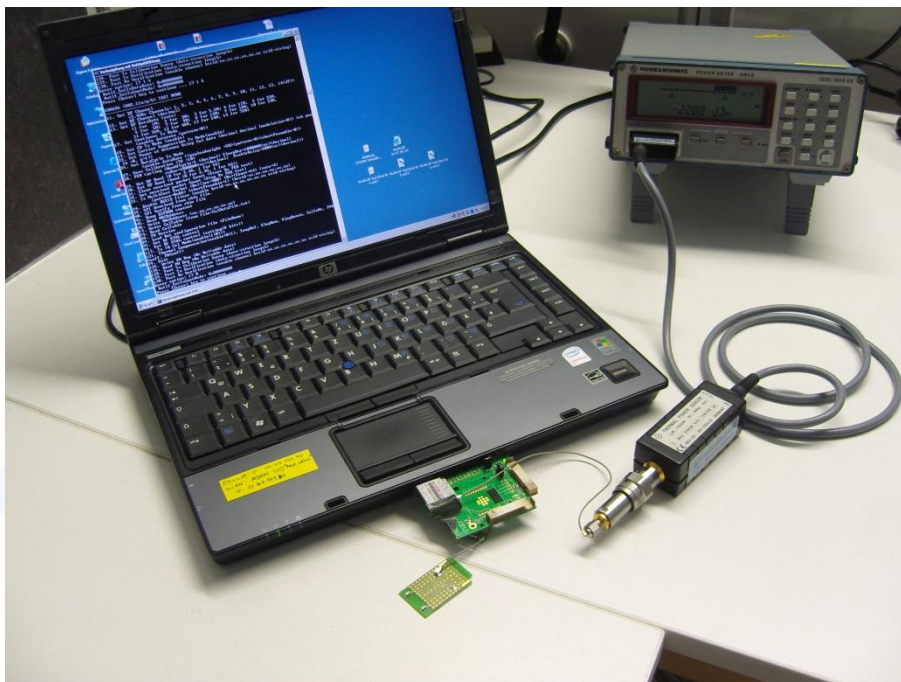


FCC ID:V74-KTS340A**5.4 Maximum peak conducted output power**

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

5.4.1 Description of the test location

Test location: AREA 4

5.4.2 Photo documentation of the test set-up**5.4.3 Applicable standard**

According to FCC Part 15, Section 15.247(b)(3):

For systems using digital modulation in the 2400-2483.5 MHz and 5725 – 5850 MHz bands, the maximum peak output power of the transmitter shall not exceed 1 Watt. The limit is based on transmitting antennas of directional gain that do not exceed 6 dBi.

5.4.4 Description of measurement

The output power is measured using the power meter method according ANSI C63.10, clause 6.10.2.1(a) and KDB -558074, Option 1. The EUT is set while measuring in TX continuous mode with a duty cycle, $x = 1$. The output power is related to the output of the UFL-Cable. No further cable is used for this measurement.

FCC ID:V74-KTS340A

5.4.5 Test result

WLAN Standard 802.11b

Channel	Frequency (MHz)	Power settings	Measured power (dBm)	Cable loss correction (dB)	Corr. peak power (dBm)	Peak power limit (dBm)	Delta (dB)
1	2412	10	7.6	-	7.6	30.0	-22.4
6	2437	10	8.3	-	8.3	30.0	-21.7
11	2462	10	8.7	-	8.7	30.0	-21.3

WLAN Standard 802.11g

Channel	Frequency (MHz)	Power settings	Measured power (dBm)	Cable loss correction (dB)	Corr. peak power (dBm)	Peak power limit (dBm)	Delta (dB)
1	2412	13	11.0	-	11.0	30.0	-19.0
6	2437	13	10.5	-	10.5	30.0	-19.5
11	2462	13	11.3	-	11.3	30.0	-18.7

Peak Power Limit according to FCC Part 15, Section 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**.

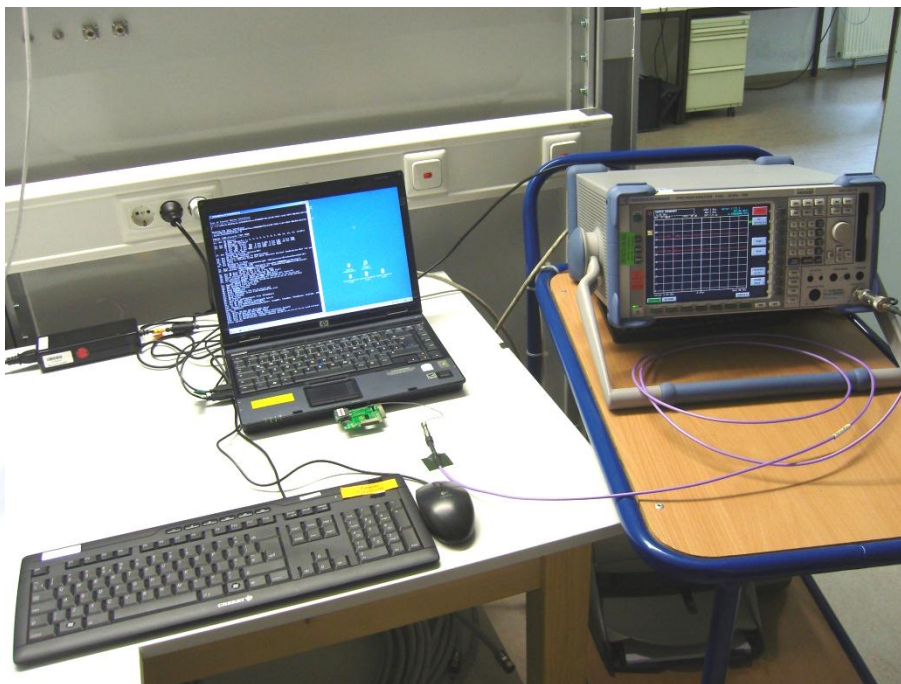
Remarks:

FCC ID:V74-KTS340A**5.5 Power spectral density**

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

5.5.1 Description of the test location

Test location: AREA 4

5.5.2 Photo documentation of the test set-up**5.5.3 Applicable standard**

According to FCC Part 15, Section 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.

5.5.4 Description of Measurement

The measurement is performed using the procedure set out in KDB-558074. The power measurement was done using a power meter, option 1. Therefore the PSD is measured with PSD option 1. The max peak was located and zoomed in with the spectrum analyser. The cable loss of 1.7 dB @ 2.4 GHz is taken into account with an amplitude offset at the spectrum analyser. No further correction has to be done. The zoom is done with the following settings.

Spectrum analyser settings:

RBW: 3 kHz, VBW: 10 kHz, Detector: Peak, Sweep time: 10 s,

FCC ID:V74-KTS340A

5.5.5 Test result

WLAN Standard 802.11b

Channel	Fundamental frequency (MHz)	Level reading (dBm/3 kHz)	Correction (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)
1	2412	-20.7	-	-20.7	8
6	2437	-20.5	-	-20.5	8
11	2462	-19.6	-	-19.6	8

WLAN Standard 802.11g

Channel	Fundamental frequency (MHz)	Level reading (dBm/3 kHz)	Correction (dB)	Total PSD (dBm/3 kHz)	Limit (dBm/3 kHz)
1	2412	-13.6	-	-13.6	8
6	2437	-12.1	-	-12.1	8
11	2462	-12.9	-	-12.9	8

Power spectral density limit according to FCC Part 15, Section 15.247(e):

Frequency (MHz)	Power spectral density limit
	(dBm/3 kHz)
2400 - 2483.5	8

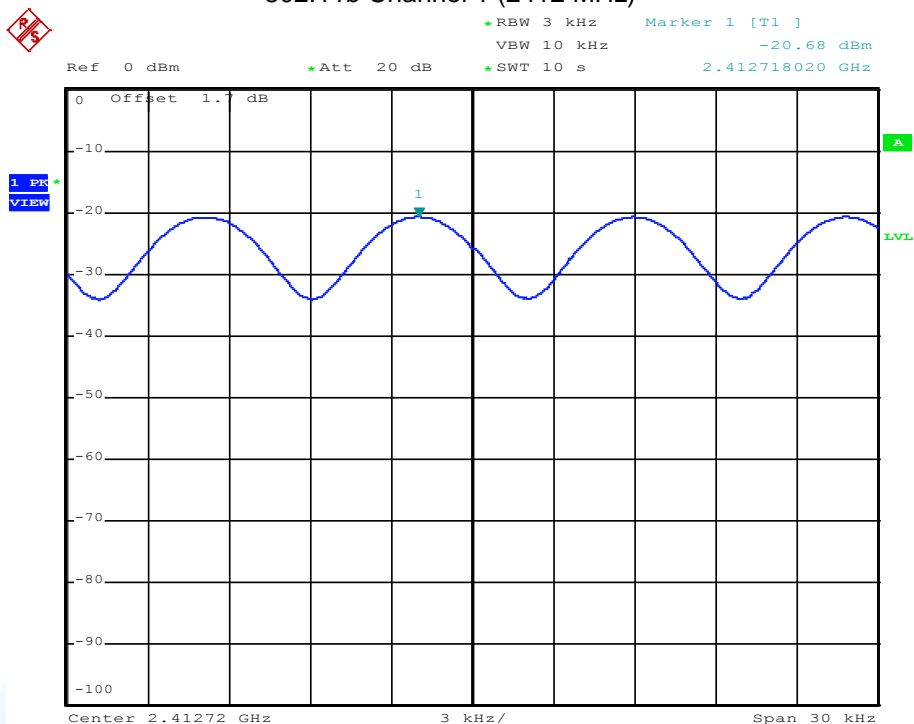
The requirements are **FULFILLED**.

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

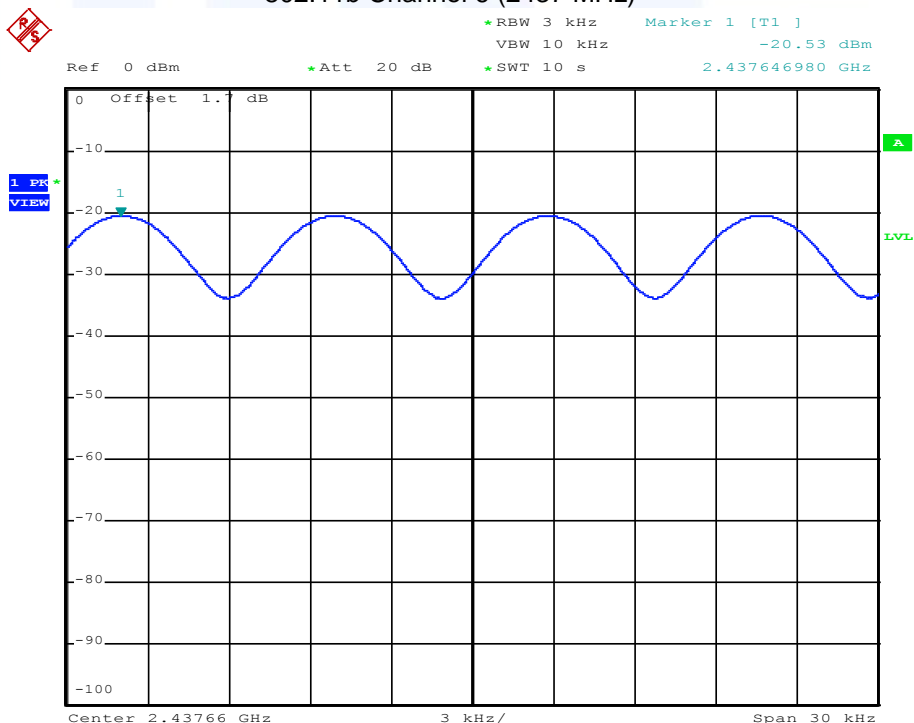
FCC ID:V74-KTS340A

5.5.6 Test protocols power spectral density

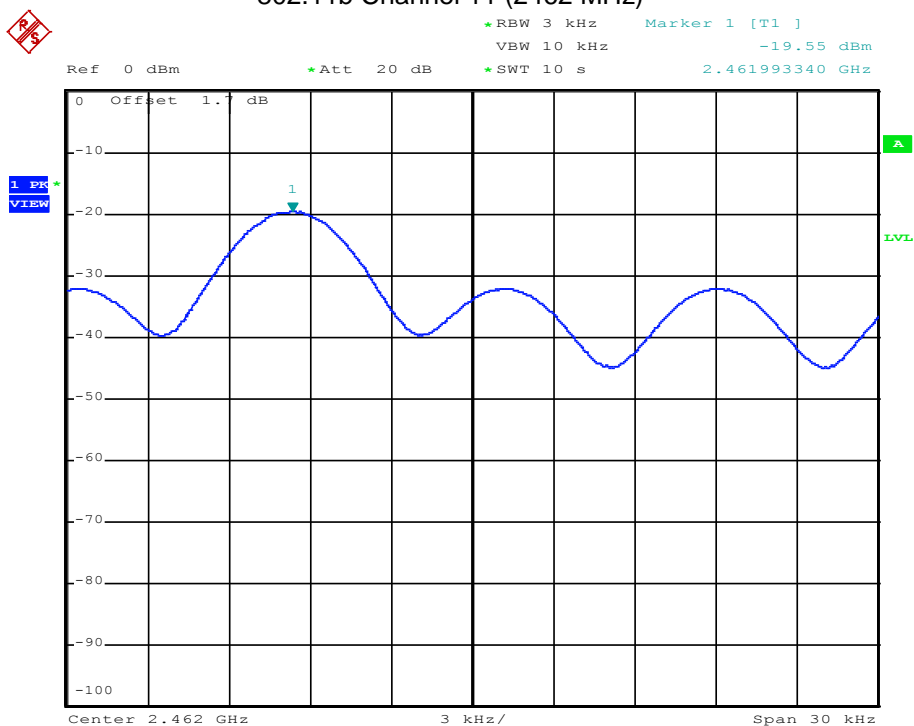
802.11b Channel 1 (2412 MHz)



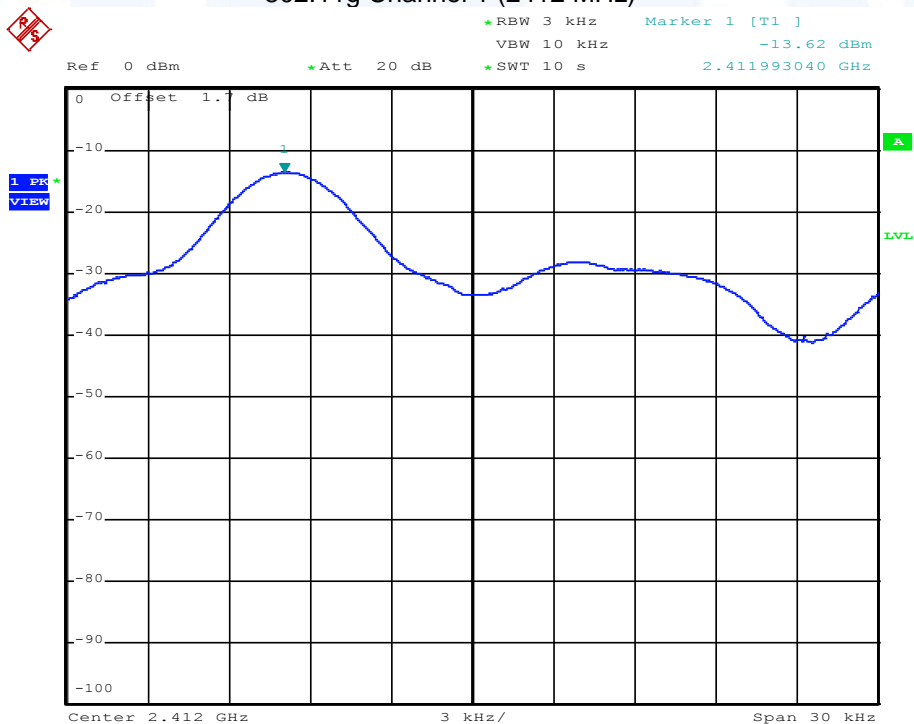
802.11b Channel 6 (2437 MHz)



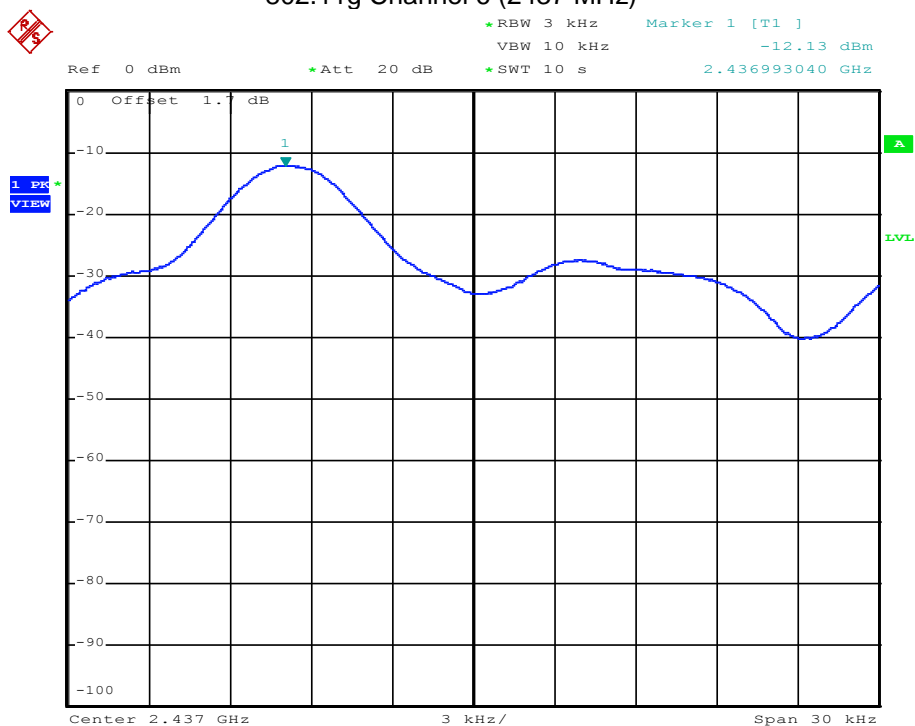
FCC ID:V74-KTS340A 802.11b Channel 11 (2462 MHz)



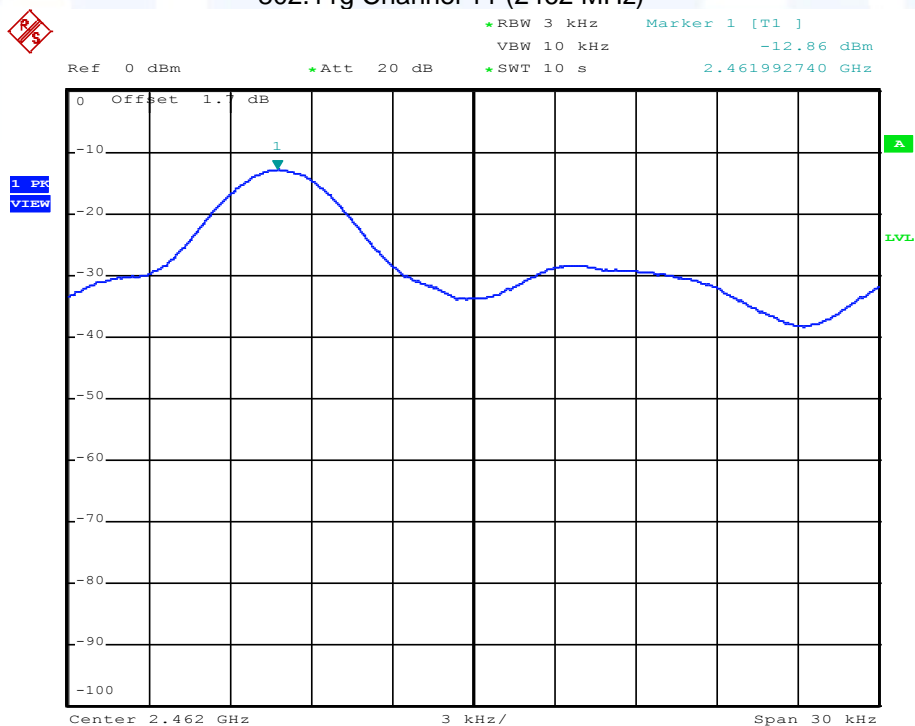
802.11g Channel 1 (2412 MHz)



FCC ID:V74-KTS340A
802.11g Channel 6 (2437 MHz)



802.11g Channel 11 (2462 MHz)

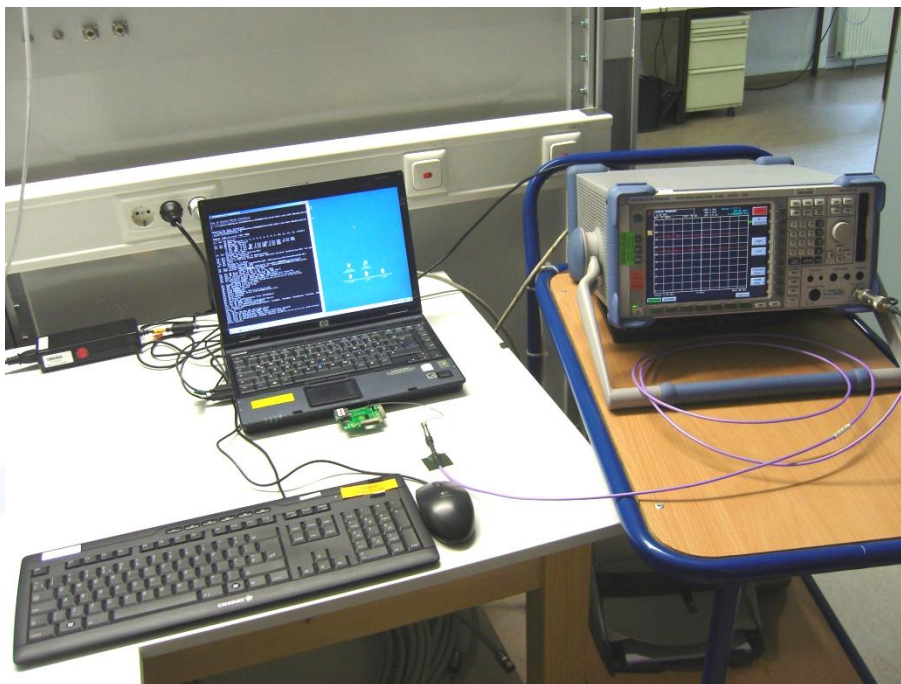


FCC ID:V74-KTS340A**5.6 Spurious emissions conducted**

For test instruments and accessories used see section 6 Part SEC 1, SEC 2 and SEC 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, Section 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 an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limit specified in Section 15.209(a) (see Section 15.205(c)).

5.6.4 Description of measurement

The spurious emissions are measured conducted using a spectrum analyser in a test setup following the procedures set out in KDB 558074 for DTS. The transmitter is set to the lowest operating frequency (CH1), the middle (CH6) and to the highest operating frequency (CH11). The frequency spectrum outside from the operating frequency range (2400 - 2483.5 MHz) is scanned for emissions that exceed the defined limit. The measurement is performed at normal test conditions in modulated TX continuous mode.

Spectrum analyser search setting:

RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace Mode: Max hold, Sweep time: 1 s;

FCC ID:V74-KTS340A

5.6.5 Test result

Lowest frequency generated in the EUT is 6 MHz.

802.11b

Highest level of the desired power:

101.7 dBμV

CH1 (2412 MHz)			CH6 (2437 MHz)			CH11 (2462 MHz)		
f (MHz)	Level PK (dBμV)	Limit (dBμV)	f (MHz)	Level PK (dBμV)	Limit (dBμV)	f (MHz)	Level PK (dBμV)	Limit (dBμV)
-	-	81.7	-	-	81.7	-	-	81.7

802.11g

Highest level of the desired power:

102.1 dBμV

CH1 (2412 MHz)			CH6 (2437 MHz)			CH11 (2462 MHz)		
f (MHz)	Level PK (dBμV)	Limit (dBμV)	f (MHz)	Level PK (dBμV)	Limit (dBμV)	f (MHz)	Level PK (dBμV)	Limit (dBμV)
-	-	82.1	-	-	82.1	-	-	82.1

Limit according to FCC Part 15, Section 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 an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

Frequency (MHz)	Spurious emission limit
Below 960	20 dB below the highest level of the desired power
Above 960	20 dB below the highest level of the desired power

The requirements are **FULFILLED**.

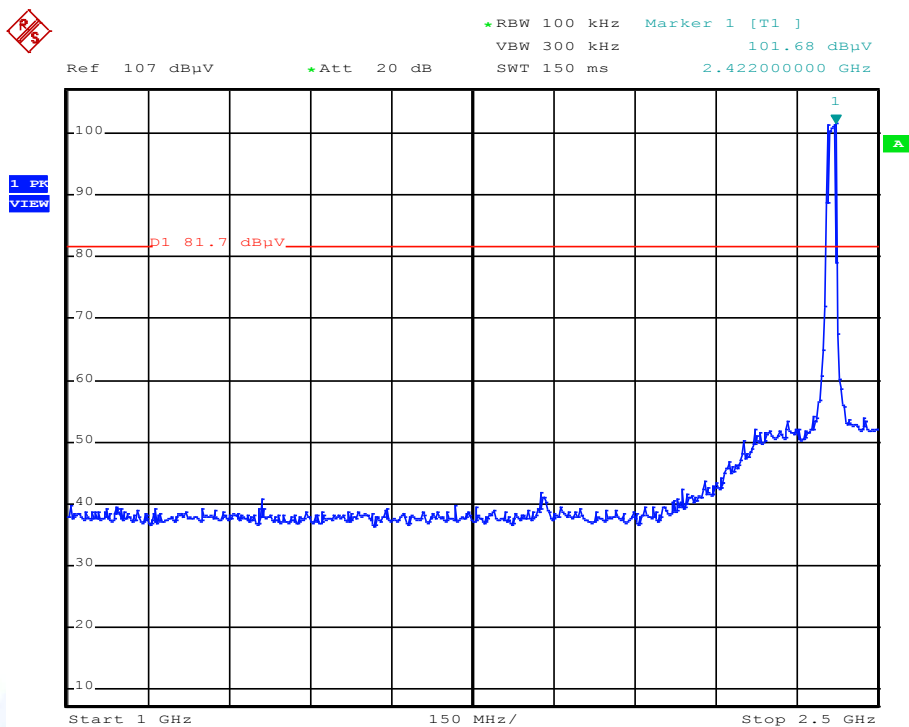
Remarks:

All emissions more than 20 dB below the specified limit need not to be reported. For detailed test results please refer to following test protocols. Due to no significant emissions could be detected in the range $f < 30$ MHz, no radiated measurement were done in this range.

FCC ID:V74-KTS340A

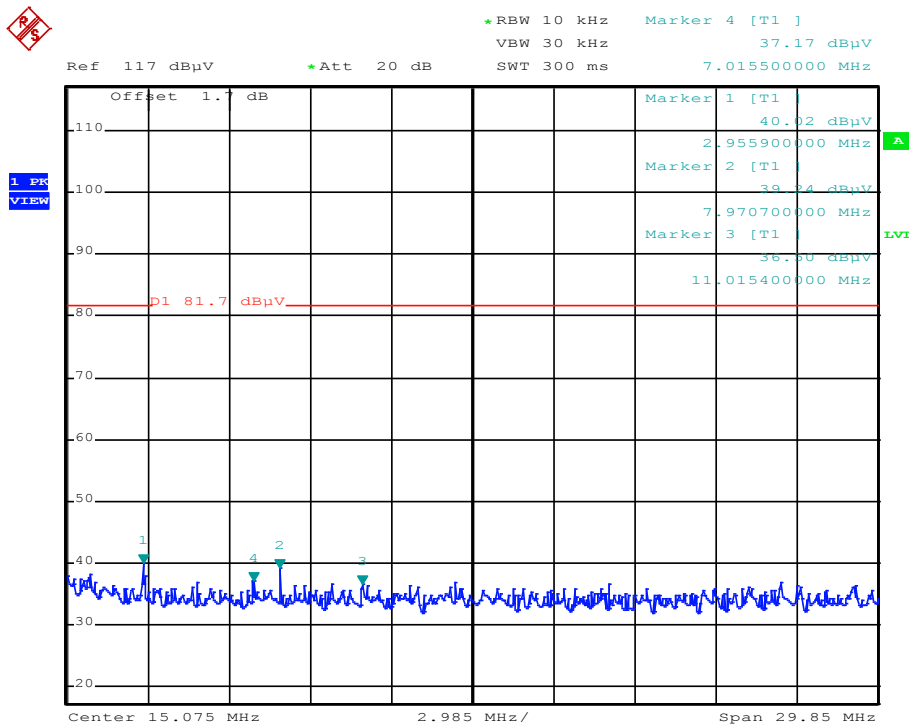
5.6.6 Test protocols

Determination of the reference level and limit



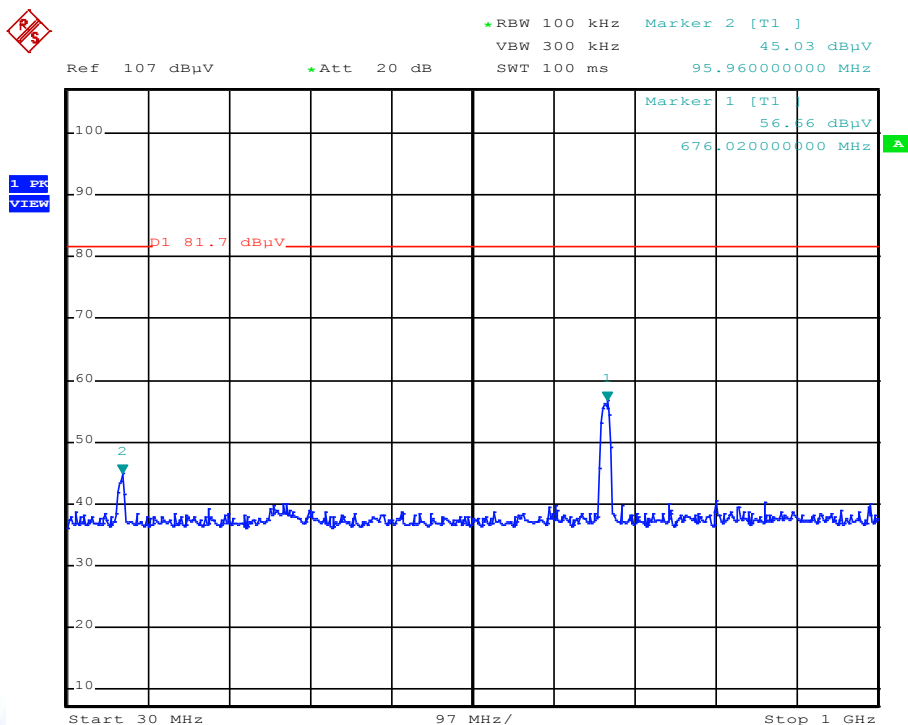
Plots of spurious emissions conducted out of operating frequency bands (-20 dBc) 802.11b, Ch1

Spurious emissions conducted from 150 kHz to 30 MHz

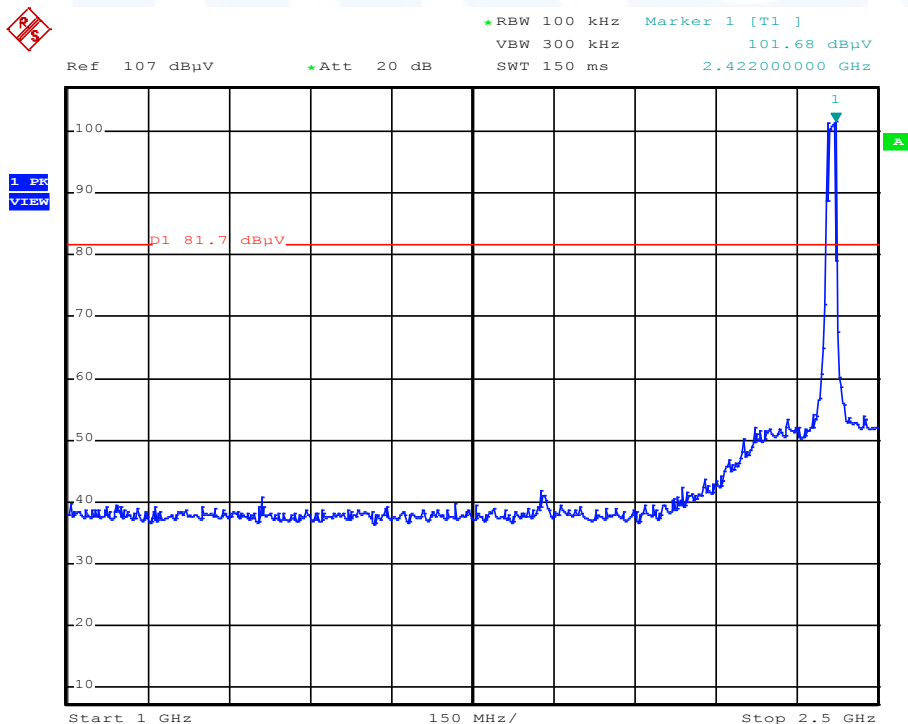


FCC ID:V74-KTS340A

Spurious emissions conducted from 30 MHz to 1 GHz

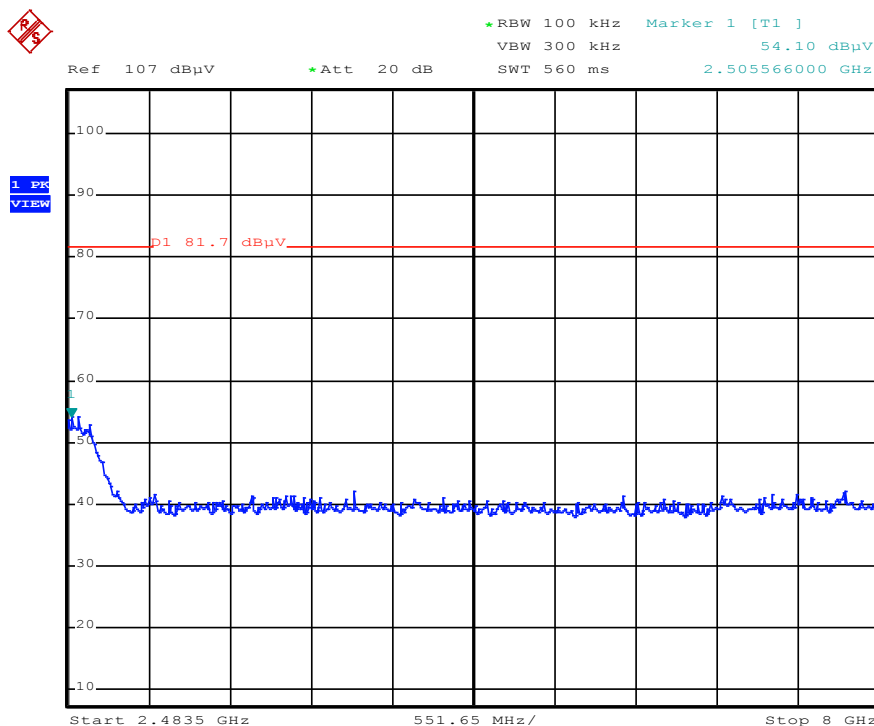


Spurious emissions conducted from 1 GHz to 2.5 GHz

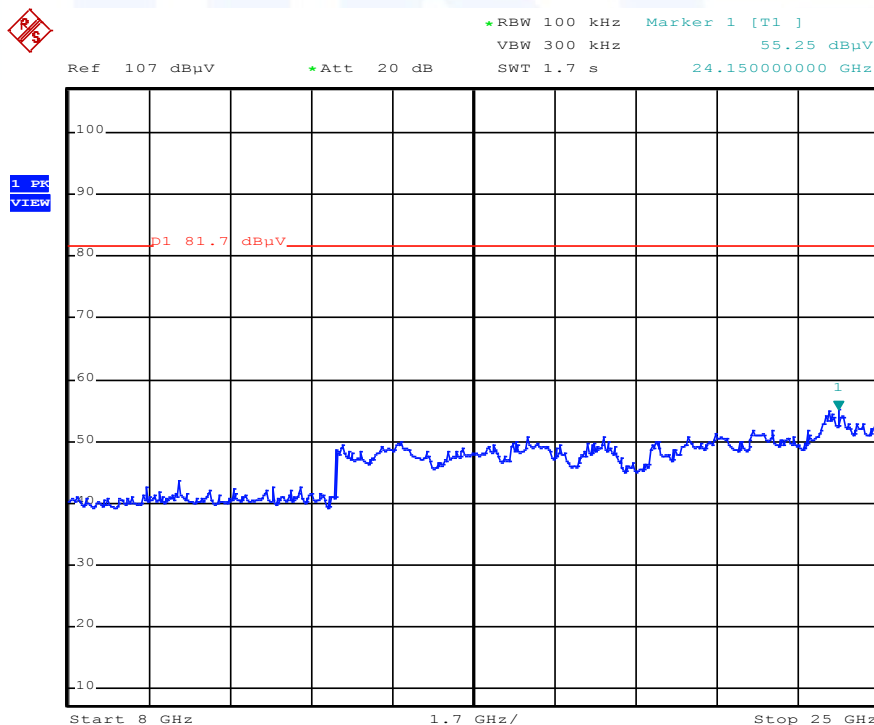


FCC ID:V74-KTS340A

Spurious emissions conducted from 2.5 GHz to 8 GHz



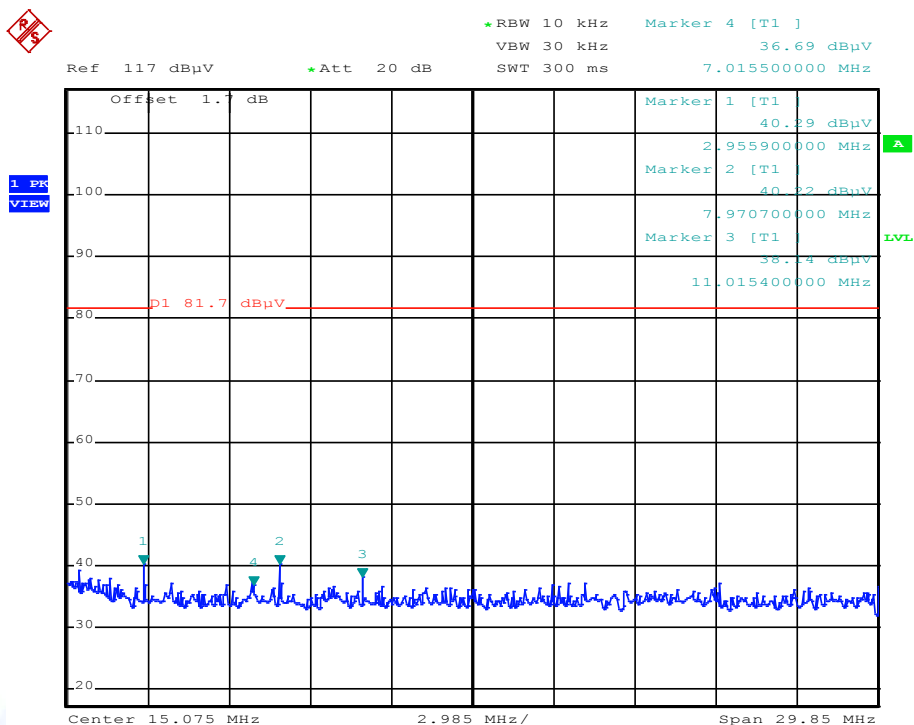
Spurious emissions conducted from 8 GHz to 25 GHz



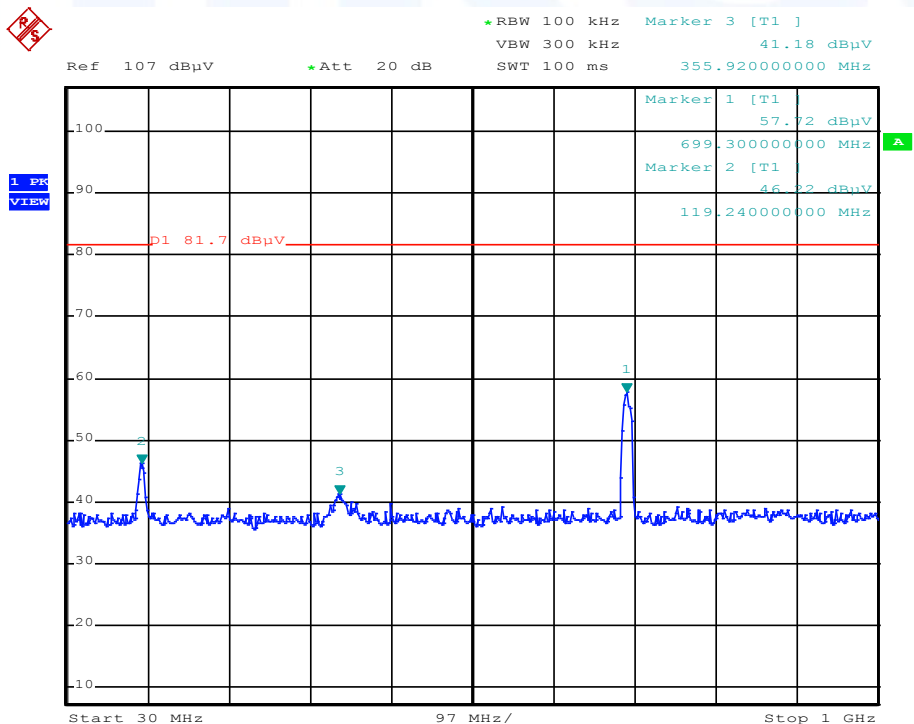
802.11b, Ch6

FCC ID:V74-KTS340A

Spurious emissions conducted from 150 kHz to 30 MHz

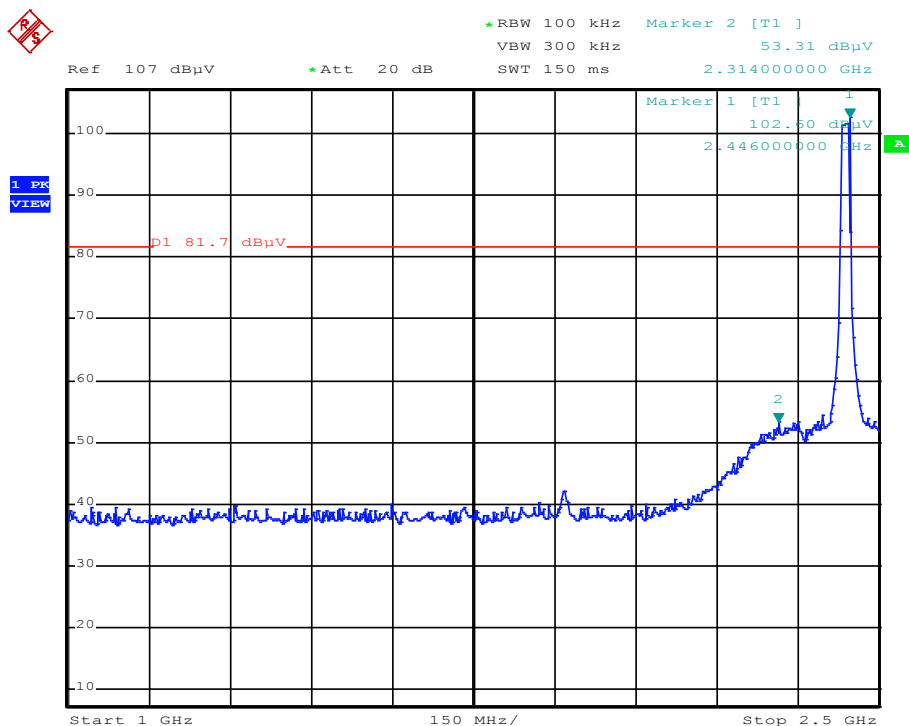


Spurious emissions conducted from 30 MHz to 1 GHz

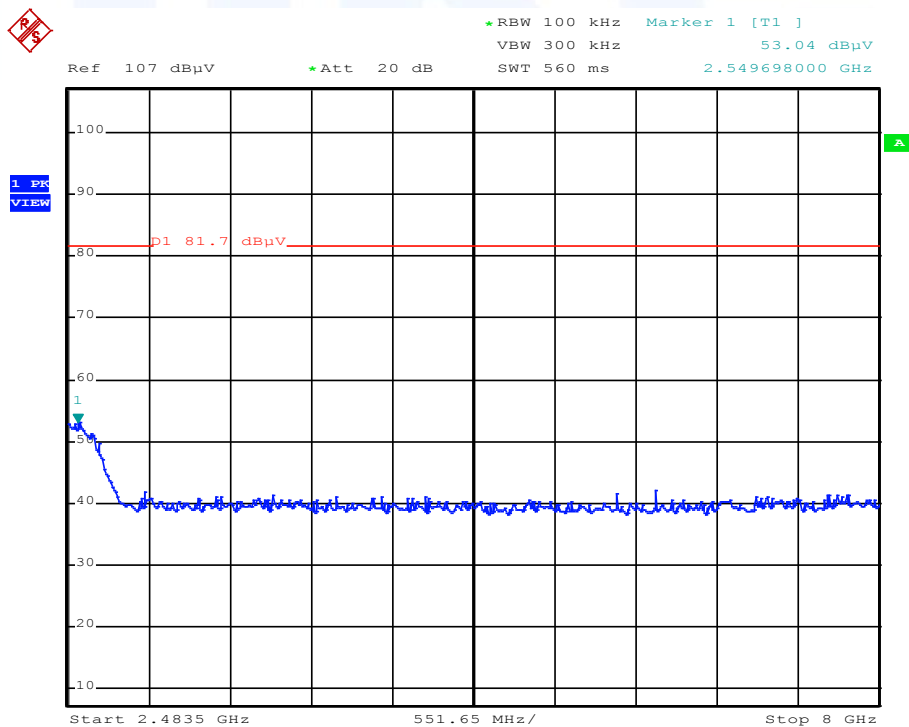


FCC ID:V74-KTS340A

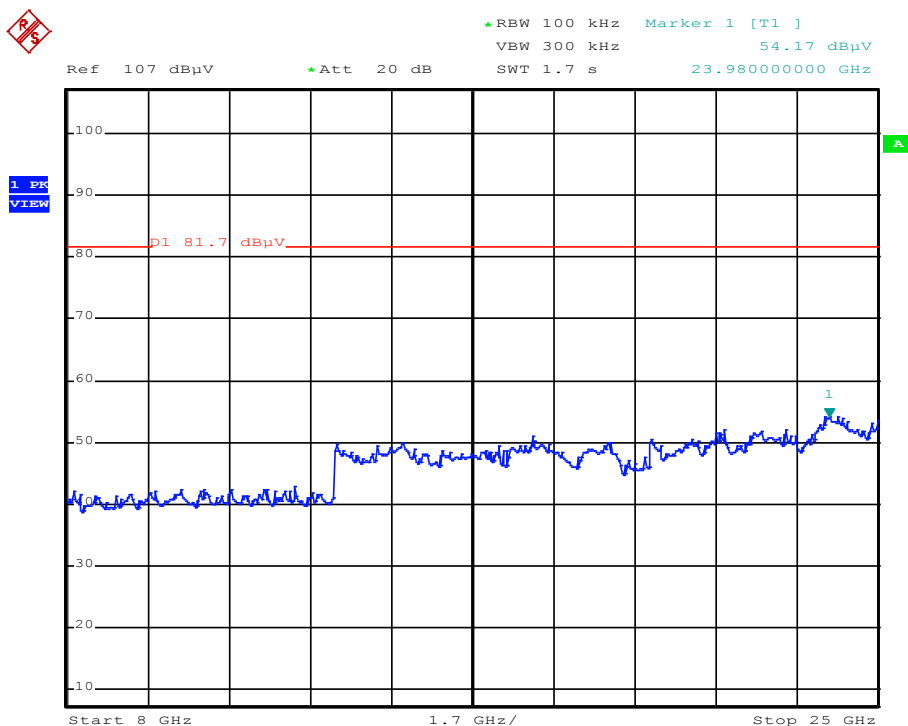
Spurious emissions conducted from 1 GHz to 2.5 GHz



Spurious emissions conducted from 2.5 GHz to 8 GHz

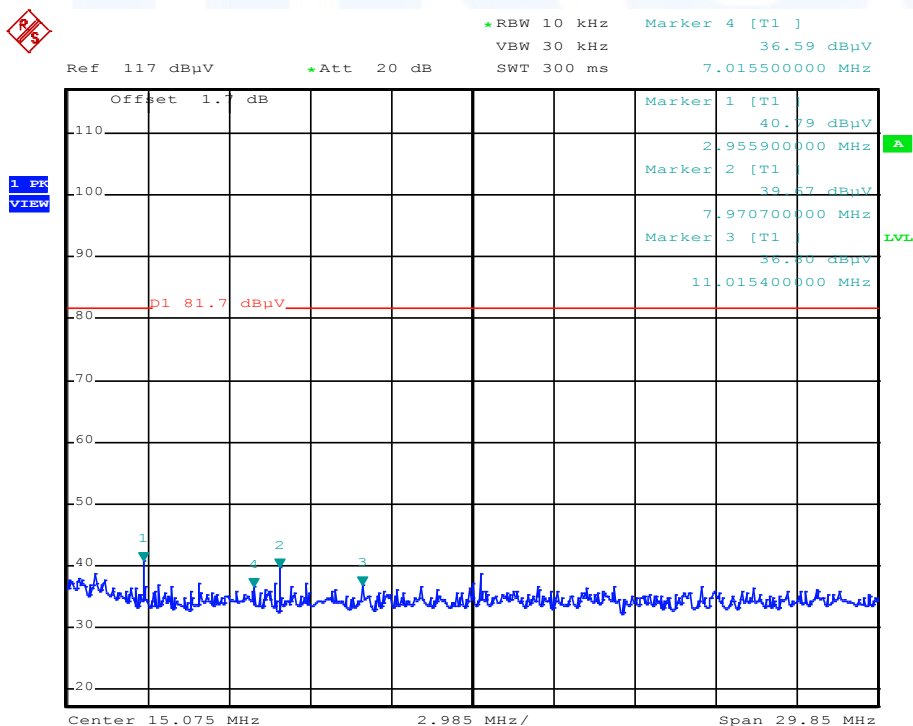


FCC ID:V74-KTS340A
Spurious emissions conducted from 8 GHz to 25 GHz



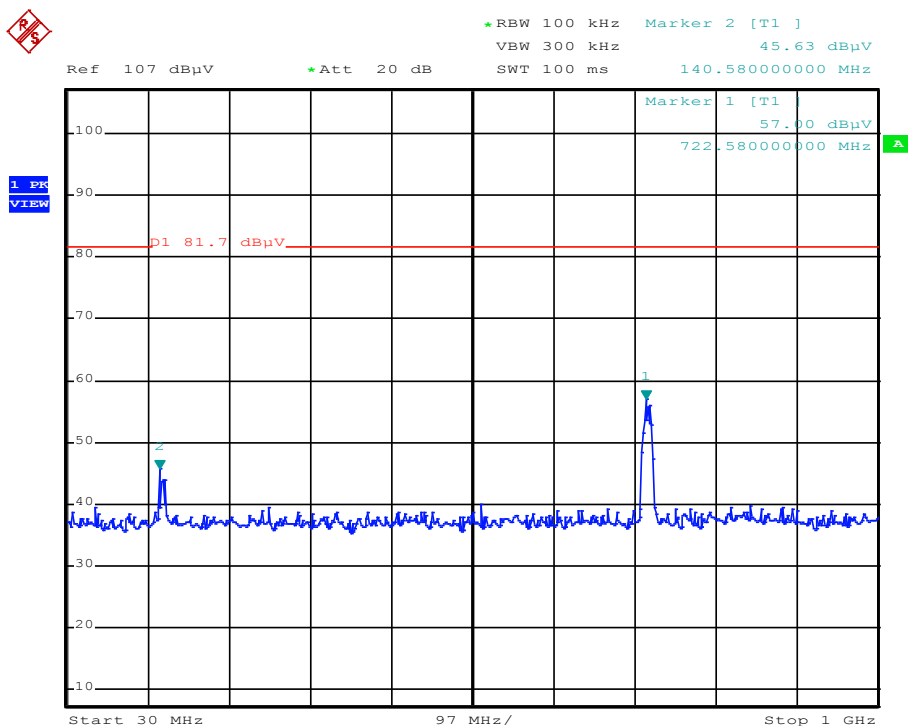
802.11b, Ch11

Spurious emissions conducted from 150 kHz to 30 MHz

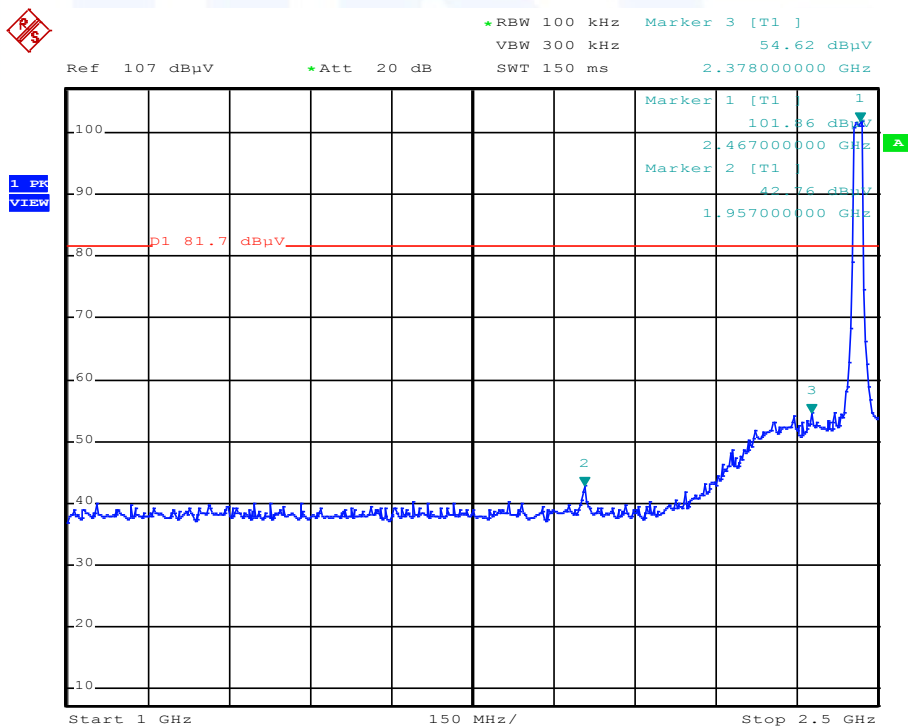


FCC ID:V74-KTS340A

Spurious emissions conducted from 30 MHz to 1 GHz

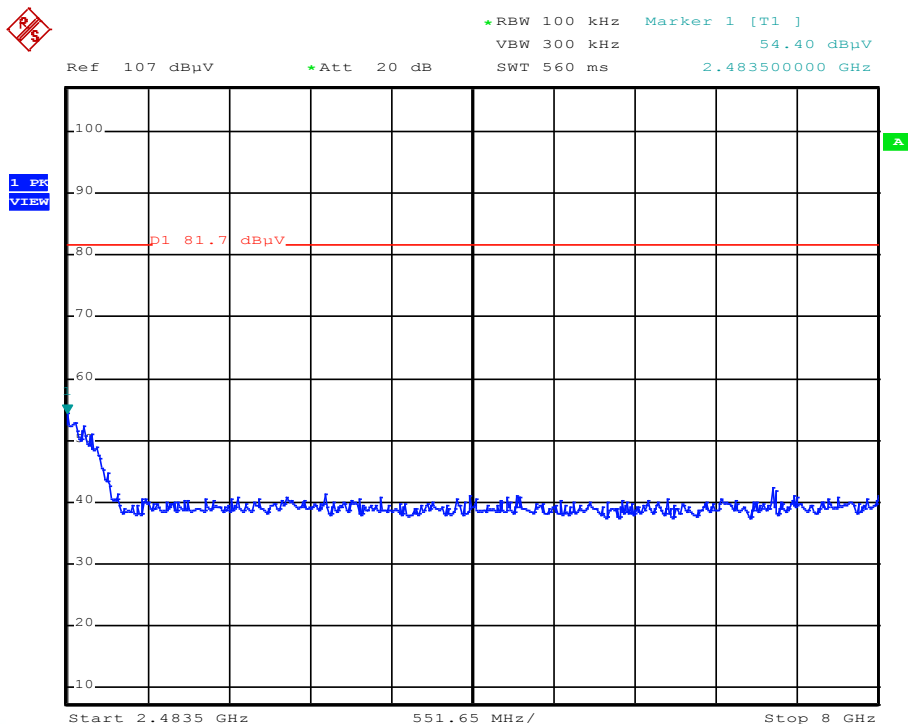


Spurious emissions conducted from 1 GHz to 2.5 GHz

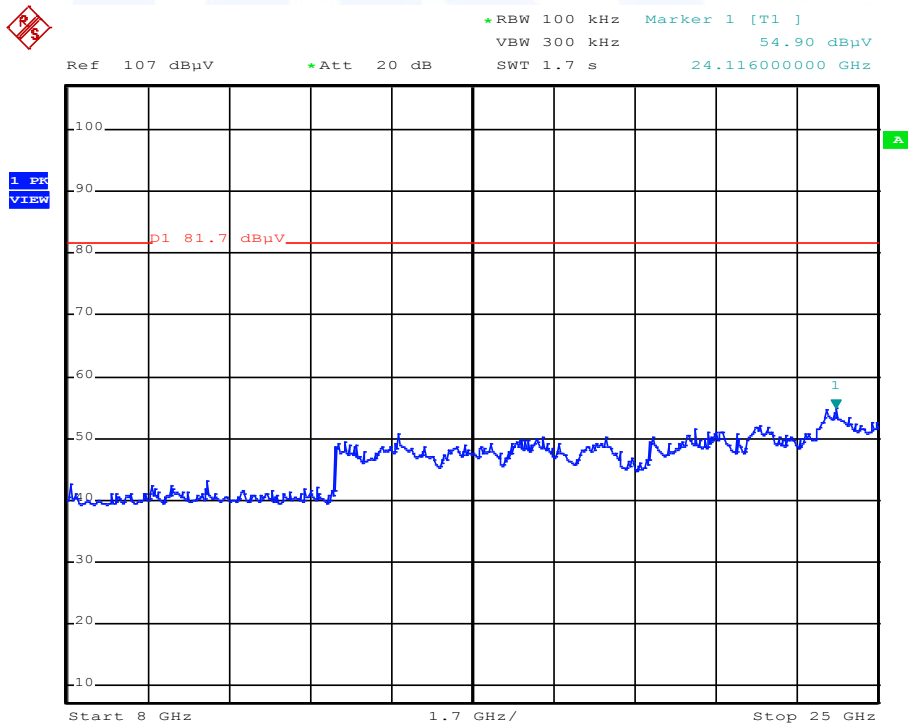


FCC ID:V74-KTS340A

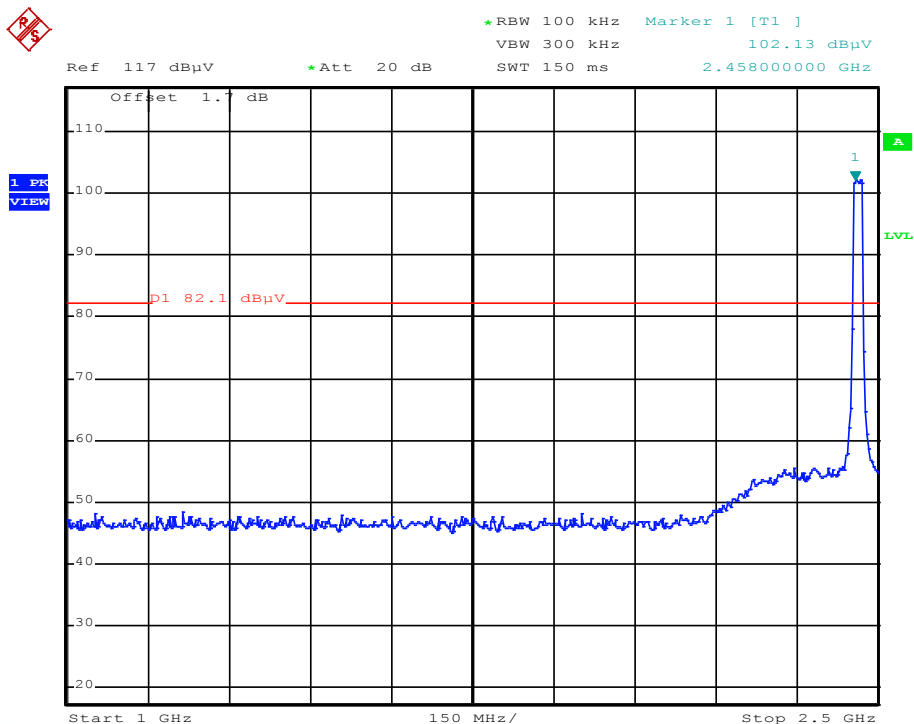
Spurious emissions conducted from 2.5 GHz to 8 GHz



Spurious emissions conducted from 8 GHz to 25 GHz

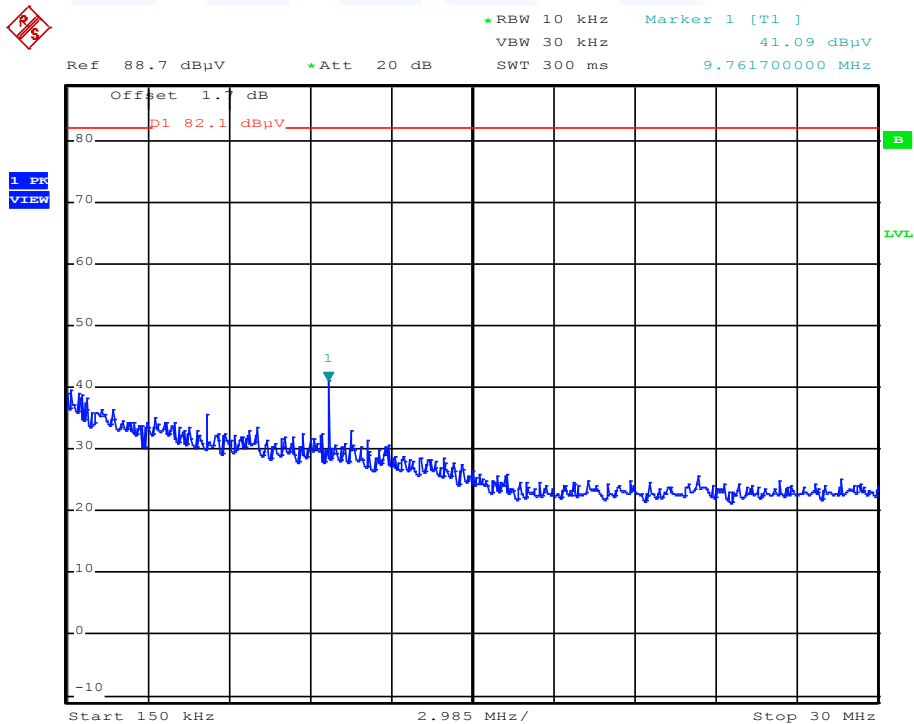


FCC ID:V74-KTS340A Determination of the reference level and limit

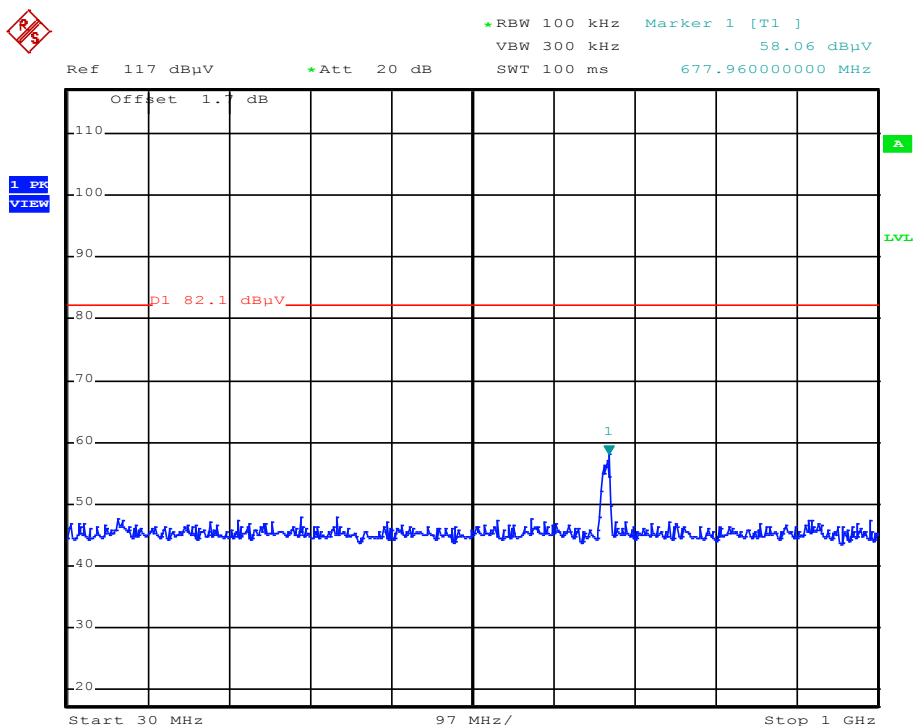


802.11g, Ch1

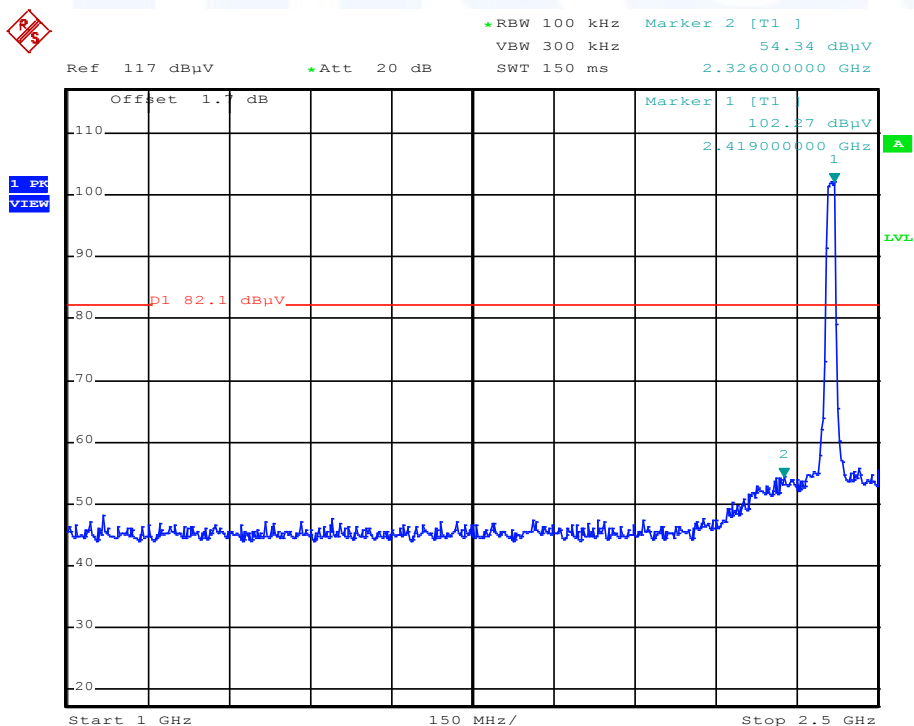
Spurious emissions conducted from 150 kHz to 30 MHz



FCC ID:V74-KTS340A Spurious emissions conducted from 30 MHz to 1 GHz

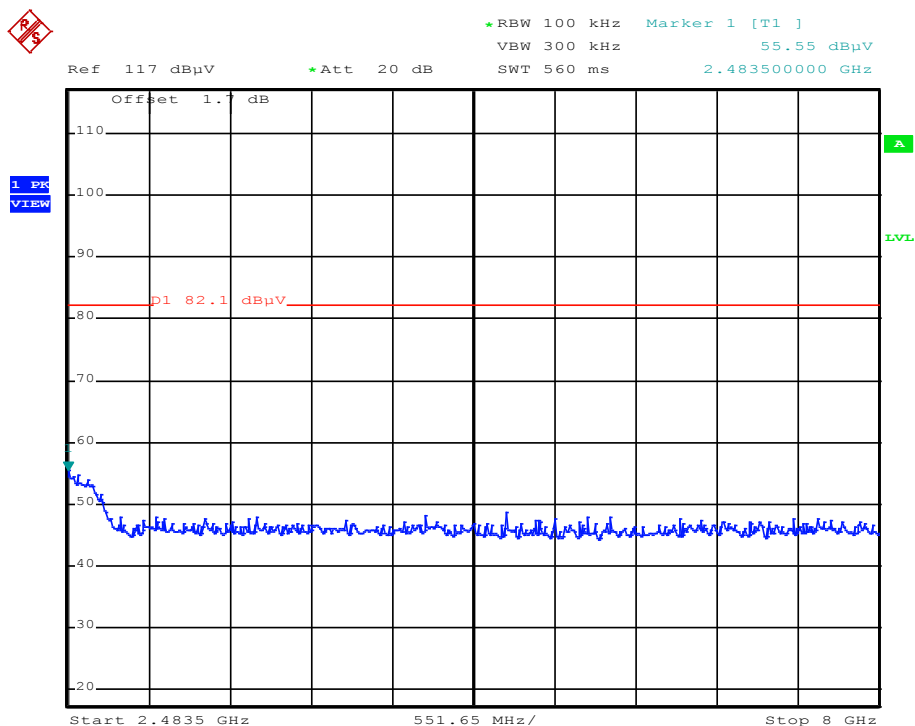


Spurious emissions conducted from 1 GHz to 2.5 GHz

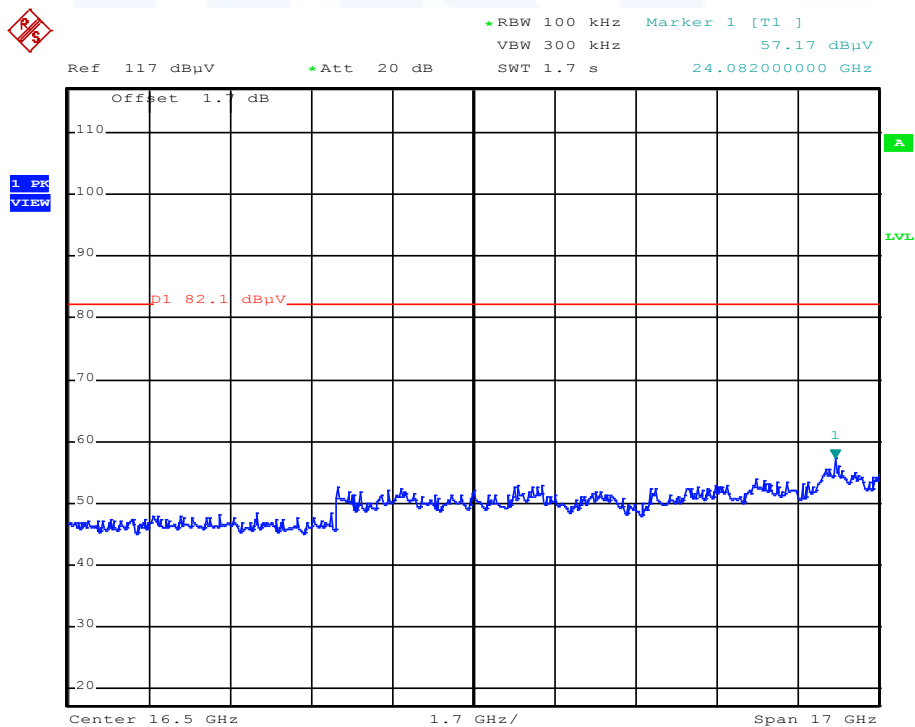


FCC ID:V74-KTS340A

Spurious emissions conducted from 2.5 GHz to 8 GHz



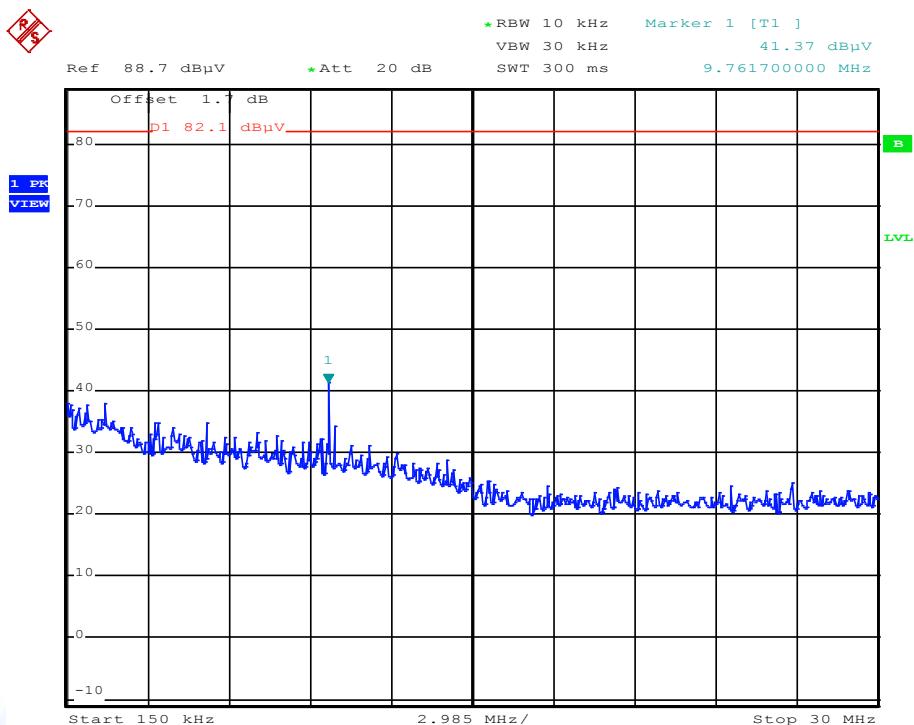
Spurious emissions conducted from 8 GHz to 25 GHz



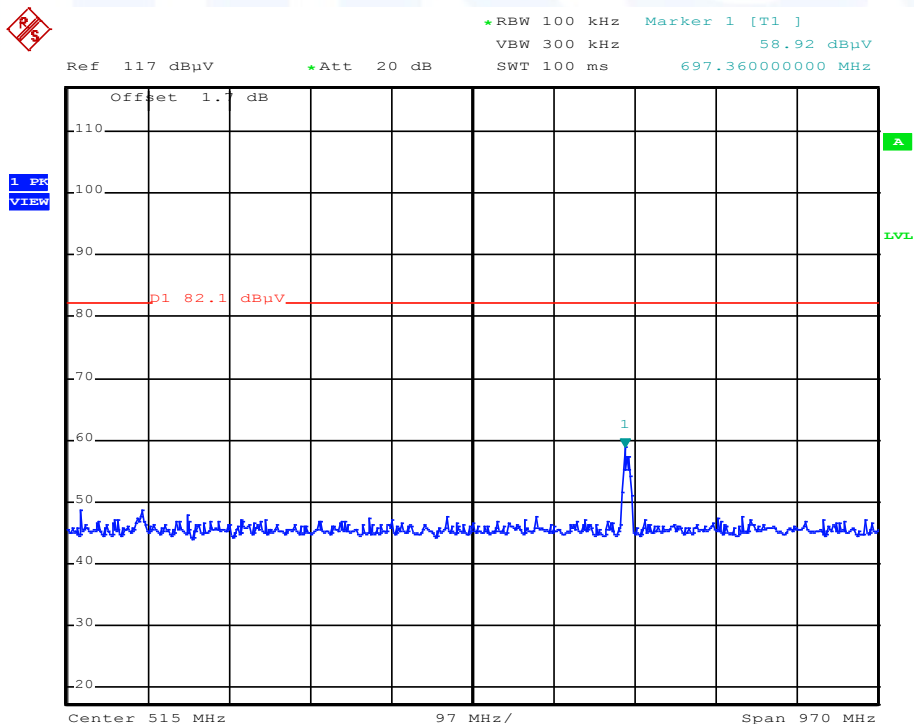
FCC ID:V74-KTS340A

802.11g, Ch6

Spurious emissions conducted from 150 kHz to 30 MHz

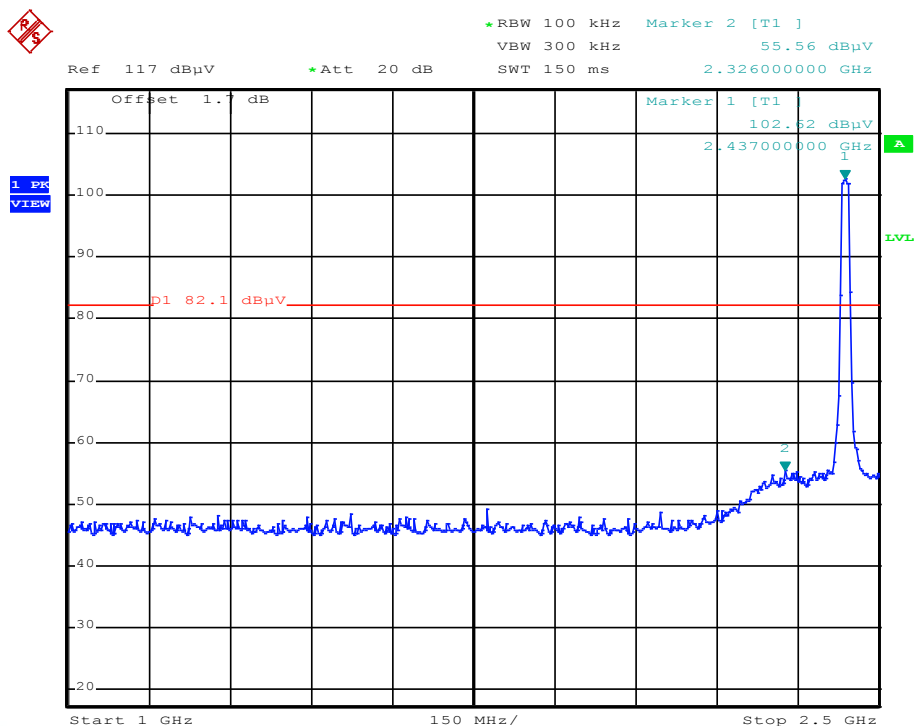


Spurious emissions conducted from 30 MHz to 1 GHz

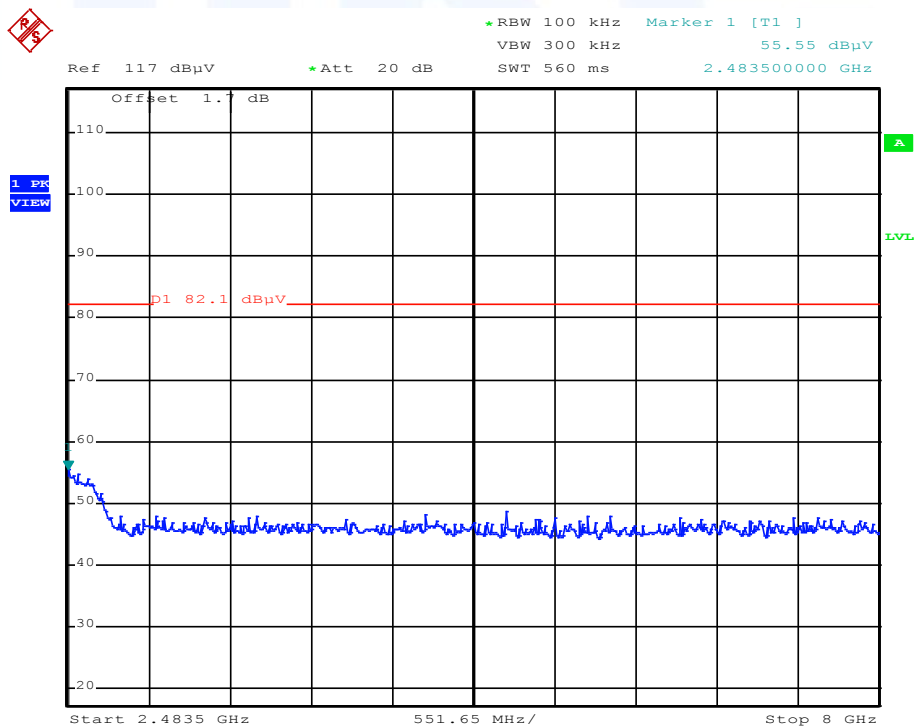


FCC ID:V74-KTS340A

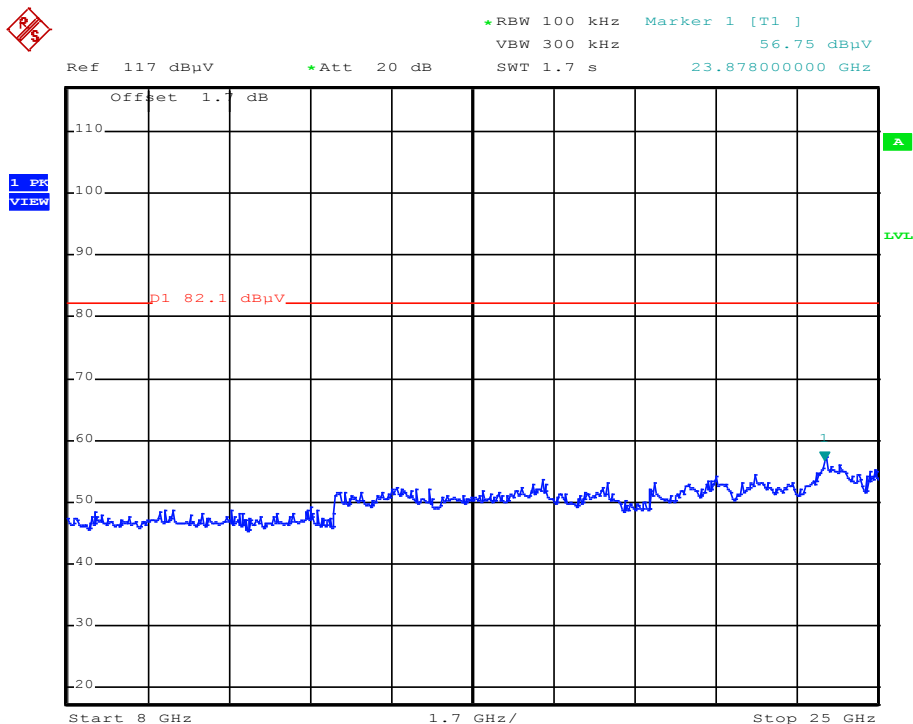
Spurious emissions conducted from 1 GHz to 2.5 GHz



Spurious emissions conducted from 2.5 GHz to 8 GHz

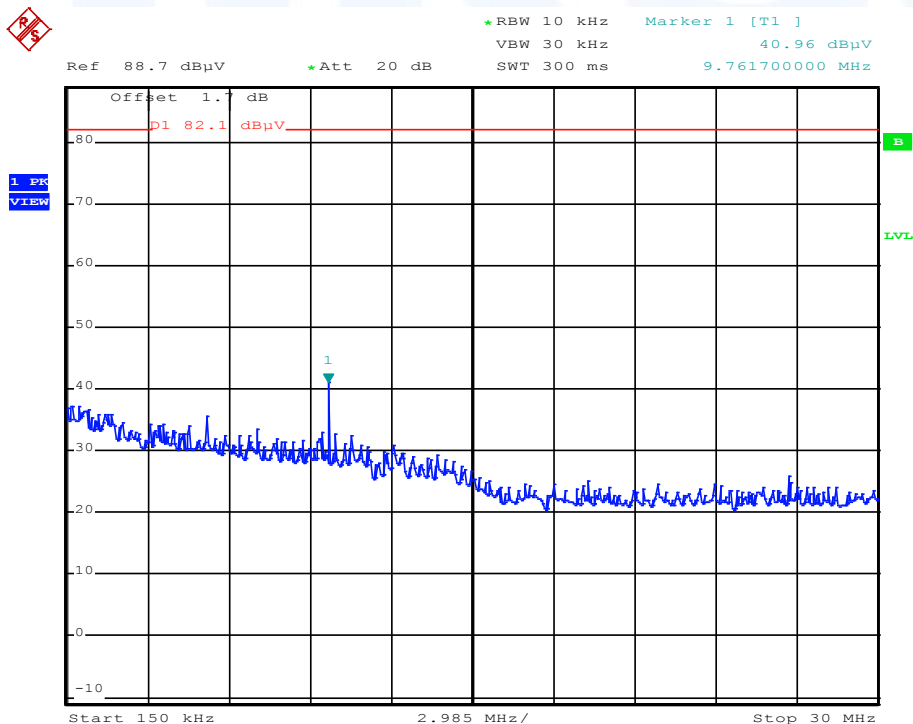


FCC ID:V74-KTS340A
Spurious emissions conducted from 8 GHz to 25 GHz



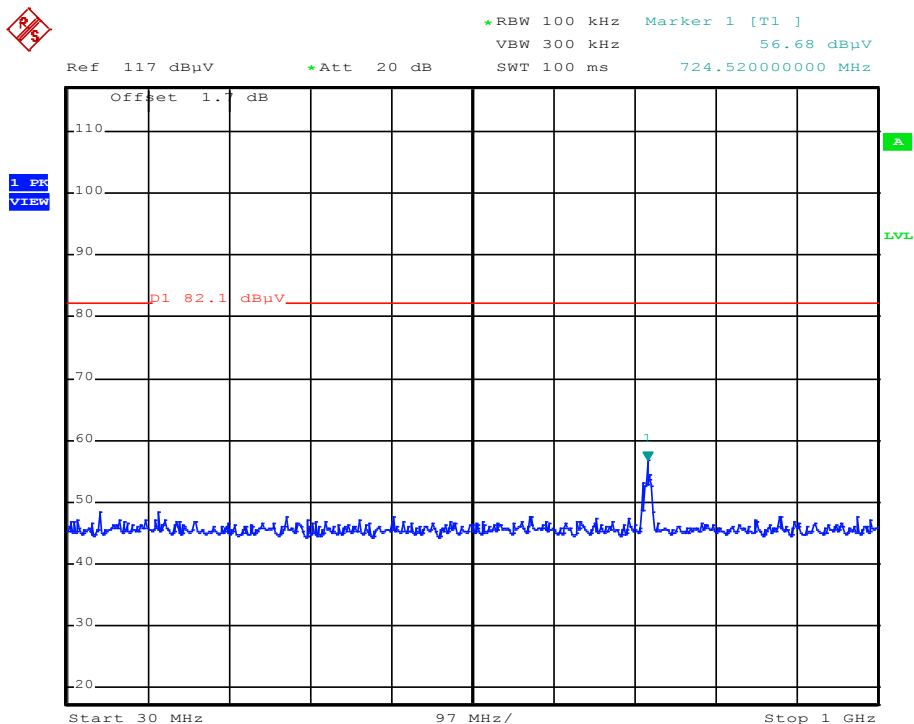
802.11g, Ch11

Spurious emissions conducted from 150 kHz to 30 MHz

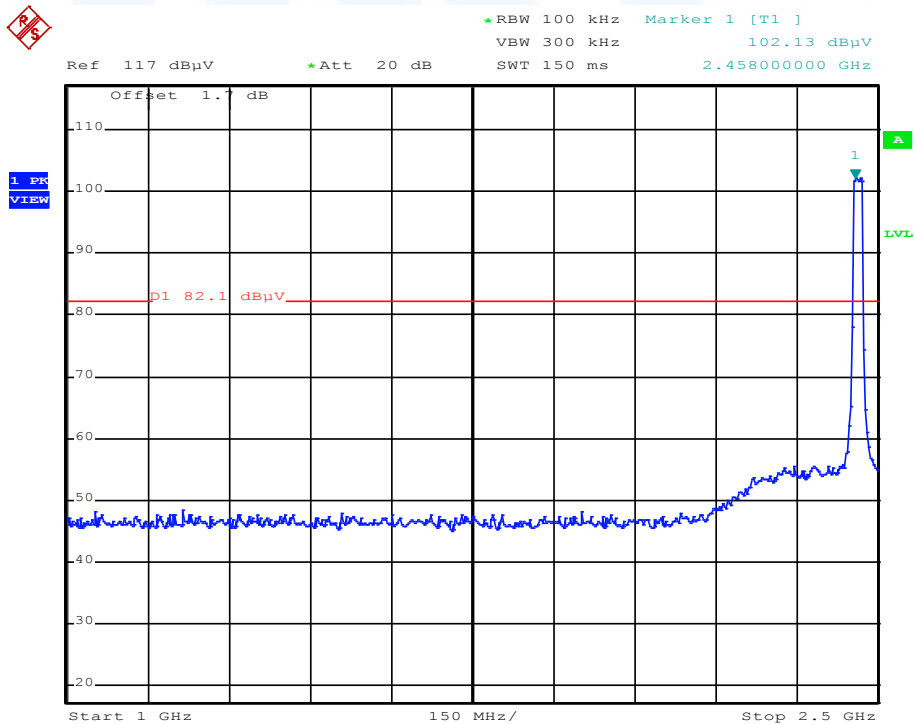


FCC ID:V74-KTS340A

Spurious emissions conducted from 30 MHz to 1 GHz

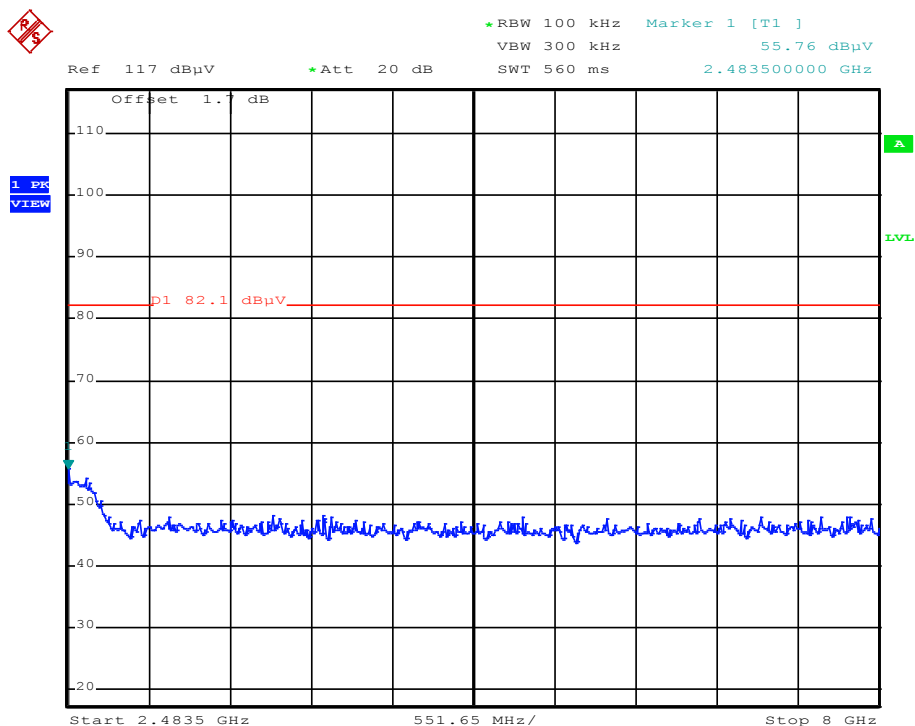


Spurious emissions conducted from 1 GHz to 2.5 GHz

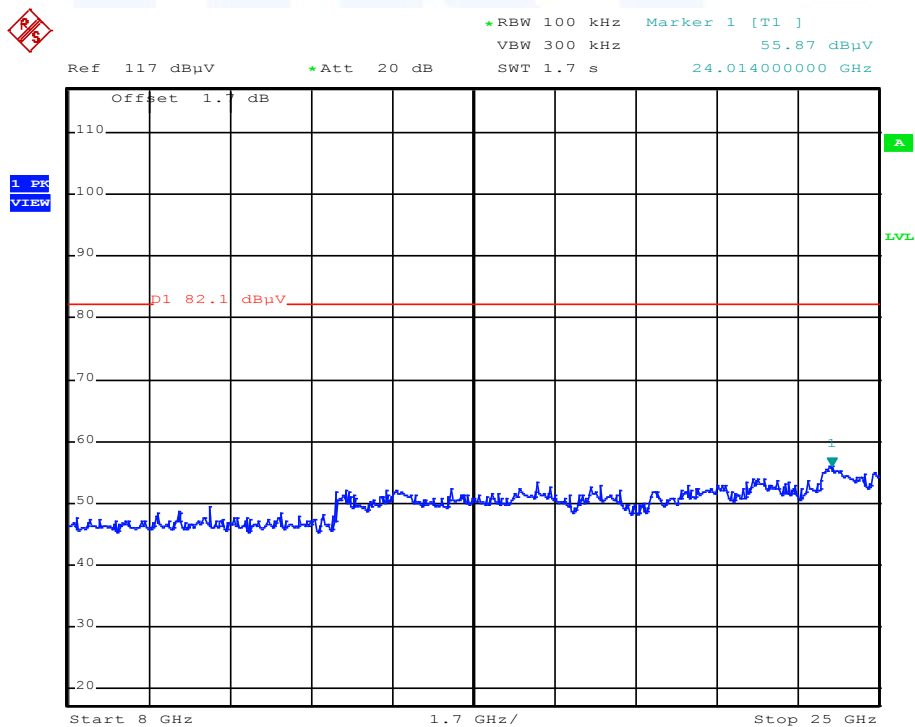


FCC ID:V74-KTS340A

Spurious emissions conducted from 2.5 GHz to 8 GHz



Spurious emissions conducted from 8 GHz to 25 GHz

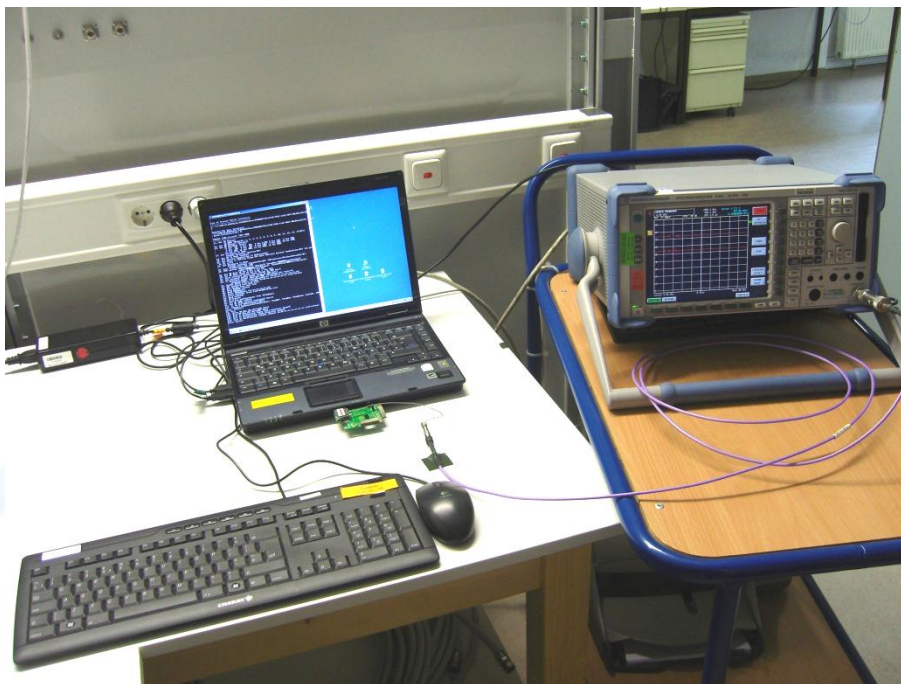


FCC ID:V74-KTS340A**5.7 Band edge compliance**

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

5.7.1 Description of the test location

Test location: AREA4

5.7.2 Photo documentation of the test set-up**5.7.3 Applicable standard**

According to FCC Part 15C, Section 15.247(d):

In any 100 kHz bandwidth outside the frequency bands 2400 – 2483.5 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 an radiated measurement. Attenuation below the general limits specified in Section 15.209(a) is not required.

5.7.4 Description of Measurement

A spectrum analyser is connected to the output of the transmitter via a suitable attenuator while EUT was operating in transmit mode at the assigned frequency according Publication Number 913591, 03/26/2007.

Spectrum analyser settings:

RBW: 100 kHz, VBW: 300 kHz, Detector: Max peak, Trace: Max hold, Sweep: auto

FCC ID:V74-KTS340A

5.7.5 Test result

Standard 802.11b

f (MHz)	Delta level (dBc)	Limit (dBc)
Low Channel	-47.0	< -20
High Channel	-53.4	< -20

Standard 802.11g

f (MHz)	Delta level (dBc)	Limit (dBc)
Low Channel	-32.1	< -20
High Channel	-45.2	< -20

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)).

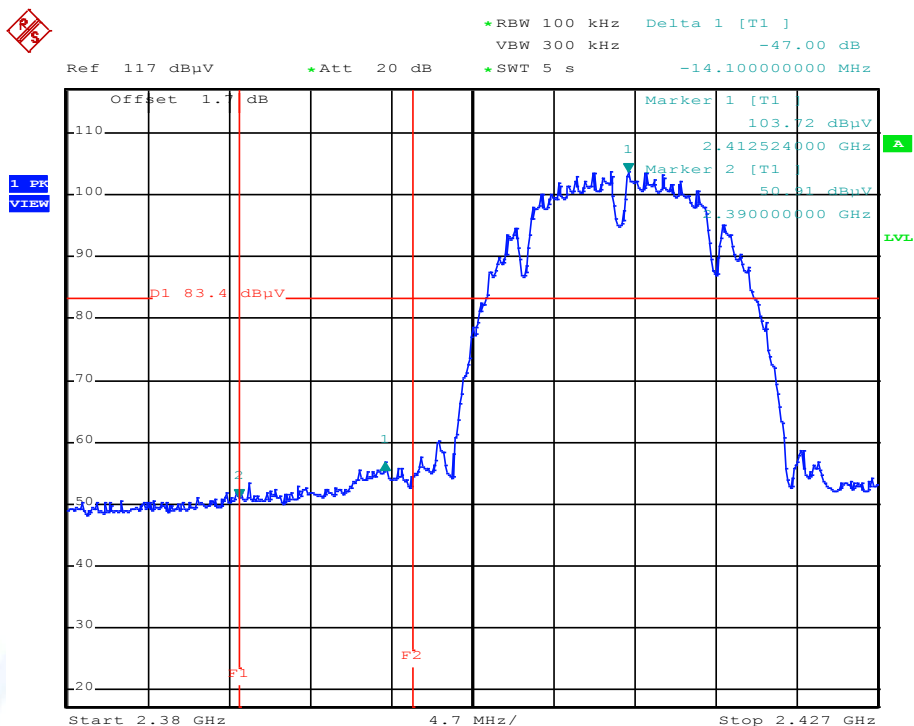
The requirements are **FULFILLED**.

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

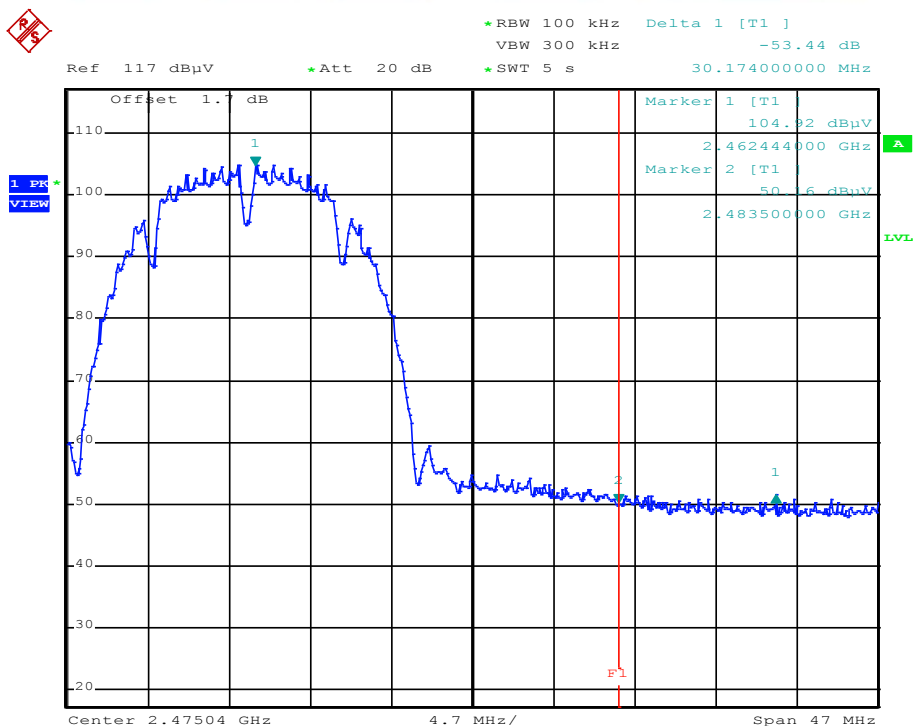
FCC ID:V74-KTS340A

5.7.6 Test protocol 802.11b

Channel 1, 2412 MHz



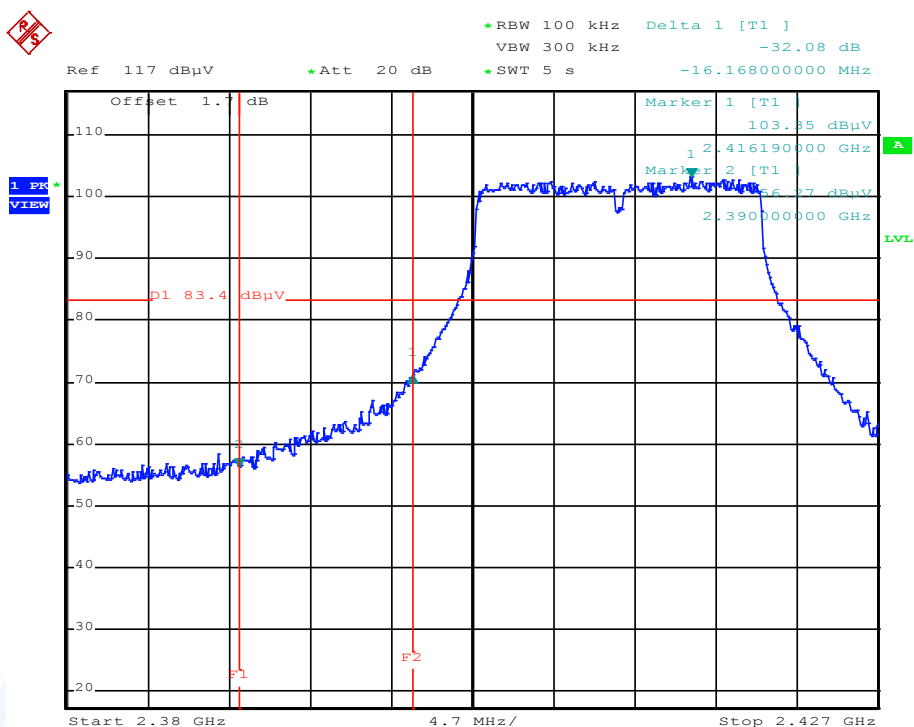
Channel 11, 2462 MHz



FCC ID:V74-KTS340A

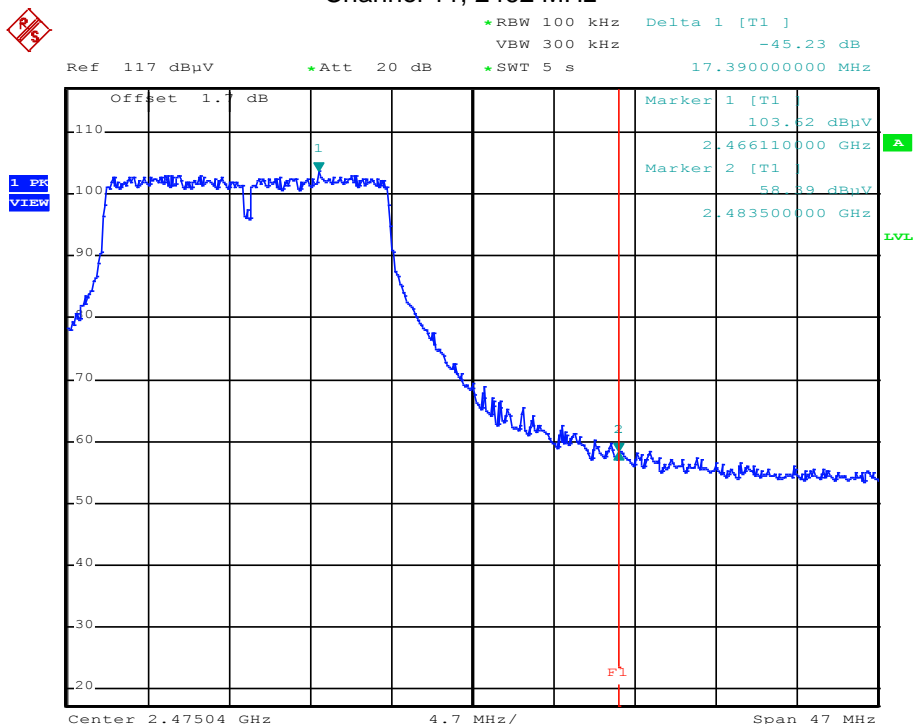
802.11g

Channel 1, 2412 MHz



Comment:
Date: 8.JUL.2011 11:00:54

Channel 11, 2462 MHz



FCC ID:V74-KTS340A

5.8 Radiated emissions in restricted bands

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

5.8.1 Description of the test location

Test location: OATS 1
Test location: Anechoic Chamber A2
Test distance: 3 metres

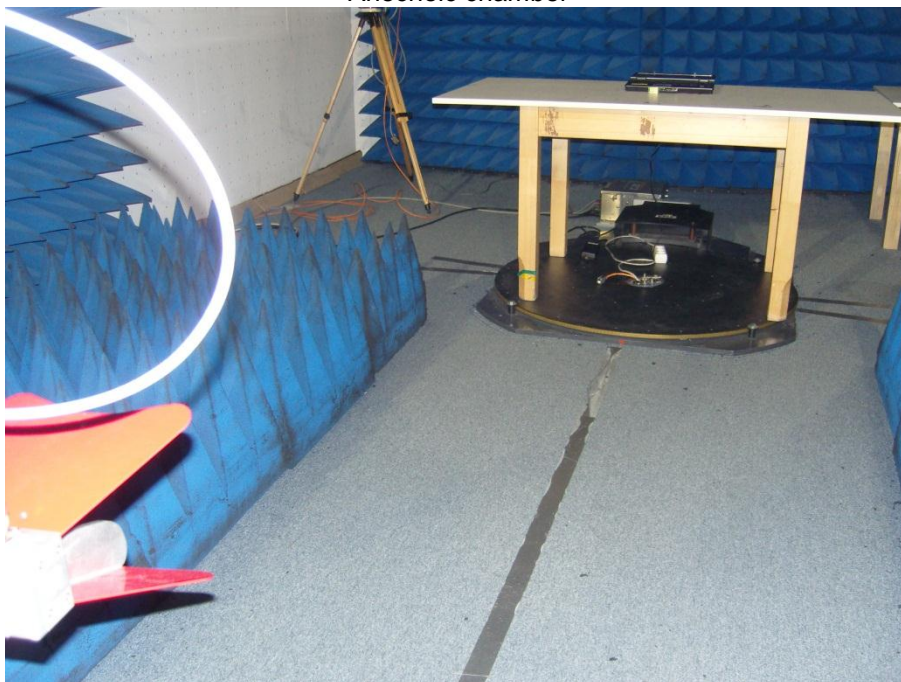
5.8.2 Photo documentation of the test set-up

Open area test site



FCC ID:V74-KTS340A

Anechoic chamber



According to FCC Part 15, Section 15.205(a):

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

5.8.3 Description of Measurement

The restricted bands are measured radiated following the methods are set out in the ANSI C93.4. The span of the spectrum analyser is set wide enough to capture the restricted band and measure 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 restricted bands are measured falling emissions into it and the nearest restricted band are checked for emissions also the restricted band for the harmonics of the carrier.

Spectrum analyser settings:

RBW: 1 MHz, VBW: 3 MHz, Sweep: Auto, Detector function: Peak

For the radiated test a test jig with the PCB antenna ACX3216-B2R7HAA is used. The antenna gain is 0.5 dBi.

5.8.4 Test result

WLAN Standard 802.11b

Power setting 10

Restricted band: 108 – 121.94 MHz

Channel 6 (2437 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
119.24	24.0	63.5	-	43.5

FCC ID:V74-KTS340A

Restricted band: 2310 - 2390 MHz

Channel 1 (2412 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
2835	53.1	74.0	-	54.0

Restricted band: 2483.5 - 2500 MHz

Channel 11 (2462 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
2692	46.4	74.0	-	54.0

Restricted band: 2655 - 2900 MHz (Canada))

Channel 11 (2462 MHz) Channel 6 (2437 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
2692	46.4	74.0	-	54.0

Restricted band: 4500 - 5150 MHz

Channel 1 (2412 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4825	57.0	74.0	53.6	54.0

Channel 6 (2437 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4874	56.0	74.0	53.8	54.0

Channel 11 (2462 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4923	57.1	74.0	53.9	54.0

WLAN Standard 802.11g

Power setting 13

Restricted band: 2310 - 2390 MHz

Channel 1 (2412 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
2390	54.0	74.0	-	54.0

Restricted band: 2483.5 - 2500 MHz

Channel 11 (2462 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
24836	62.1	74.0	44.1	54.0

FCC ID:V74-KTS340A

Restricted band: 2655 - 2900 MHz (Canada))

Channel 11 (2462 MHz) Channel 6 (2437 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
2704	45.6	74.0	-	54.0

Restricted band: 4500 - 5150 MHz

Channel 1 (2412 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4815	62.7	74.0	50.4	54.0

Channel 6 (2437 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4884	66.7	74.0	53.8	54.0

Channel 11 (2462 MHz)

Frequency (MHz)	Peak		Average	
	Value dB(μV/m)	Limit dB(μV/m)	Value dB(μV/m)	Limit dB(μV/m)
4927	66.7	74.0	52.7	54.0

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

Frequency (MHz)	Field strength of spurious emissions		Measurement distance
	(μV/m)	dB(μV/m)	(metres)
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

FCC ID:V74-KTS340A

Restricted bands of operation:

The field strength of emissions appearing within these frequency bands shall not exceed the limits shown in Section 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	Above 38.6

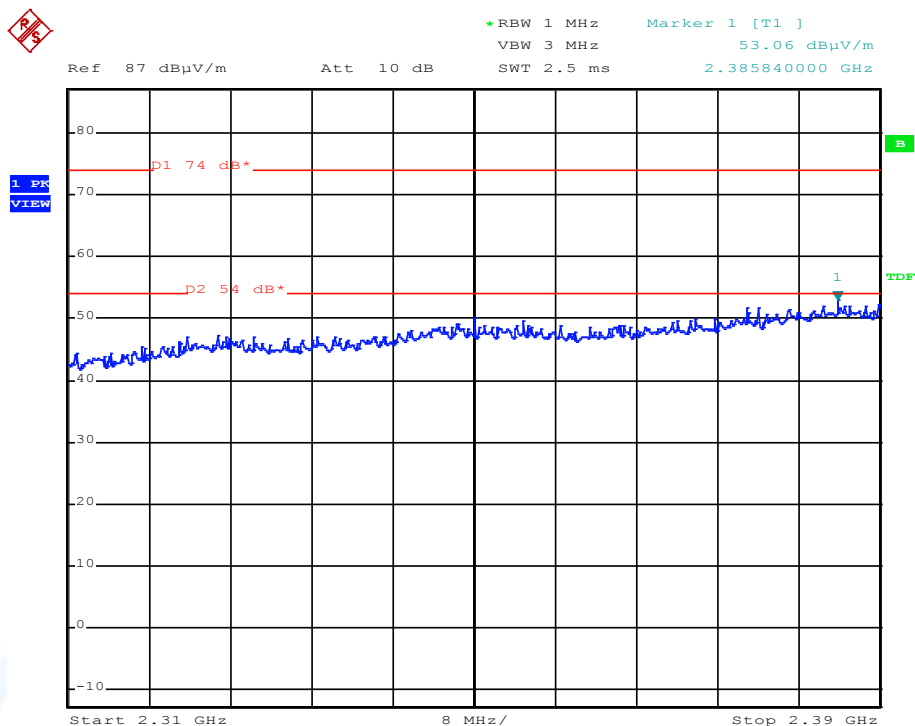
The requirements are **FULFILLED**.

Remarks: The measurement was performed up to the 10th harmonic. For detailed test results please see to following test protocols. Only the worst cases of the plots are listed.

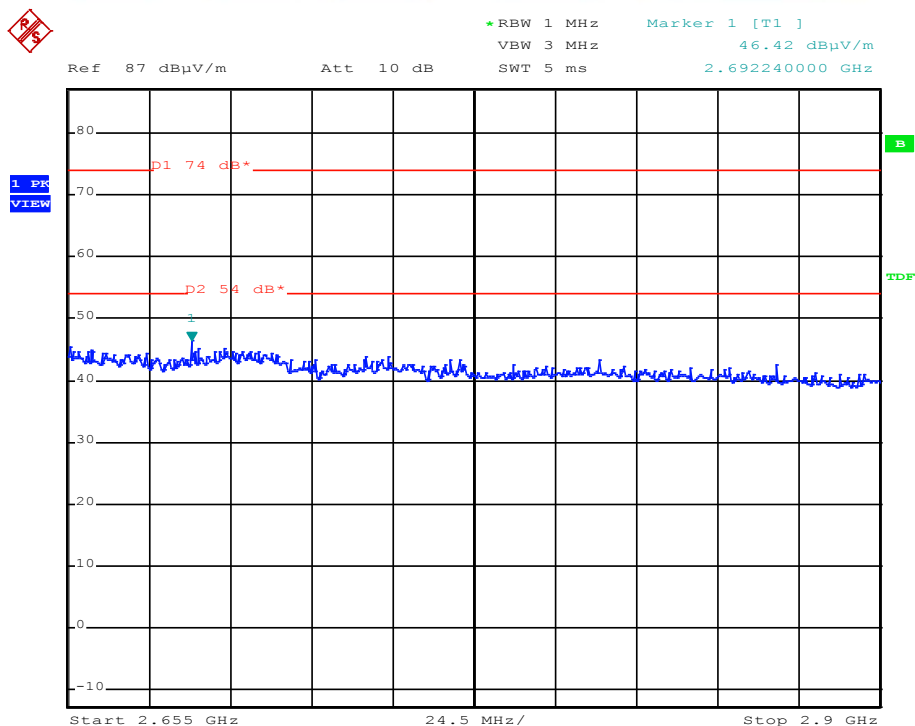
FCC ID:V74-KTS340A

5.8.5 Test protocols of restricted band emissions 802.11b

Restricted band 2.31 GHz to 2.39 GHz, low channel

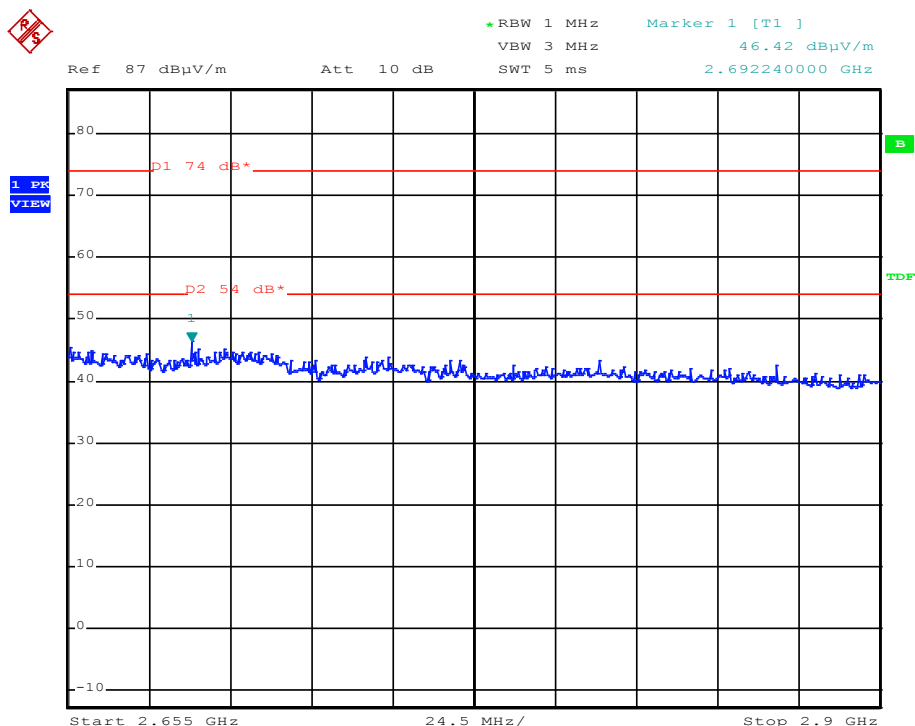


Restricted band 2.4835 GHz to 2.5 GHz, high channel

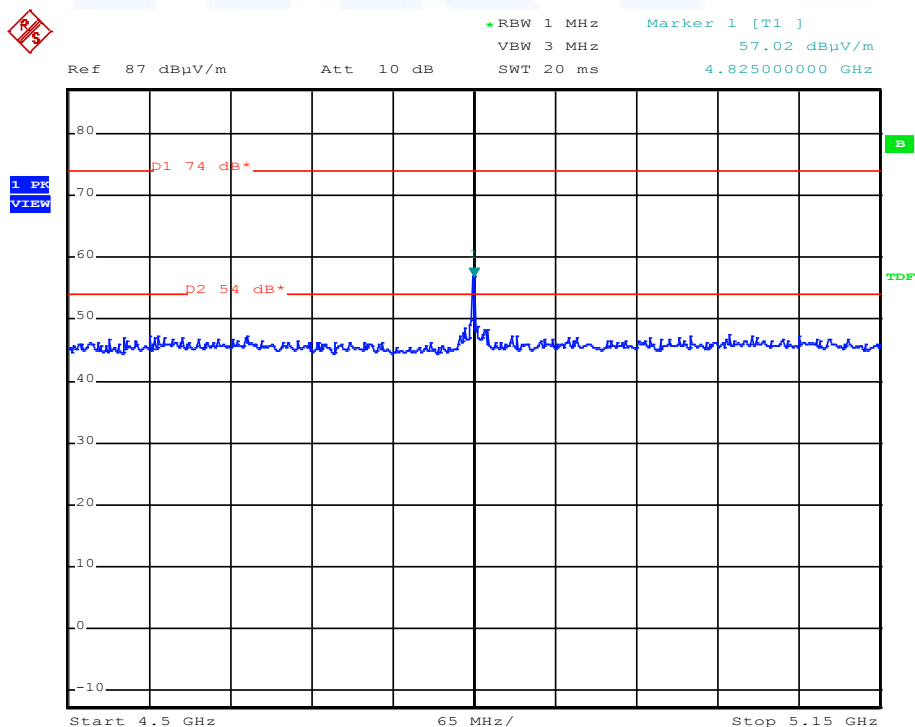


FCC ID:V74-KTS340A

Restricted band 2.655 – 2.9 GHz (Canada), high channel



Restricted band 4.5 GHz to 5.15 GHz, low channel

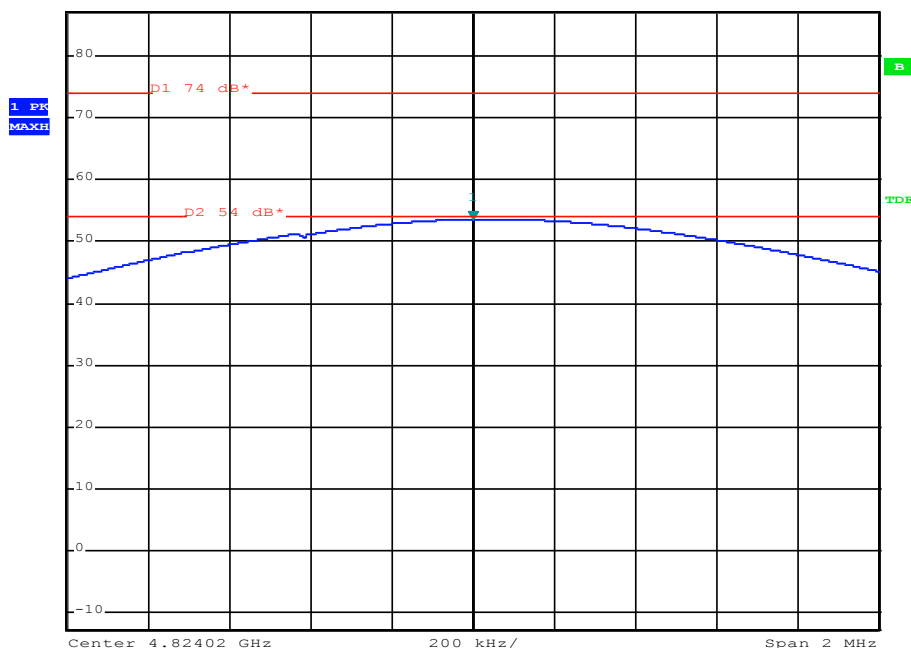


FCC ID:V74-KTS340A

AV-measurement



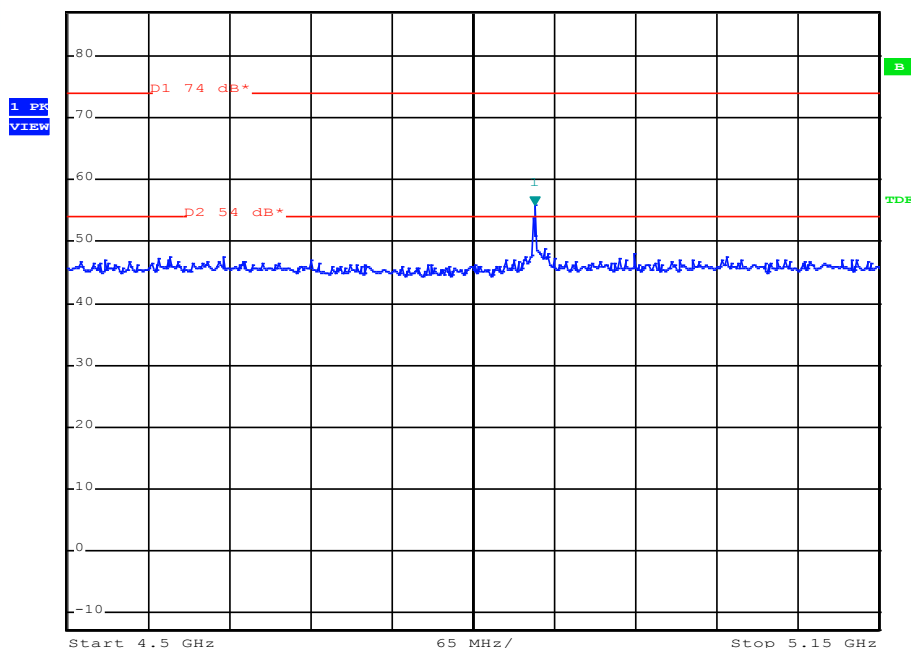
Ref 87 dBµV/m Att 10 dB RBW 1 MHz Marker 1 [T1]
 VBW 10 Hz 53.61 dBµV/m
 SWT 500 ms 4.824020000 GHz



Restricted band 4.5 GHz to 5.15 GHz, mid channel

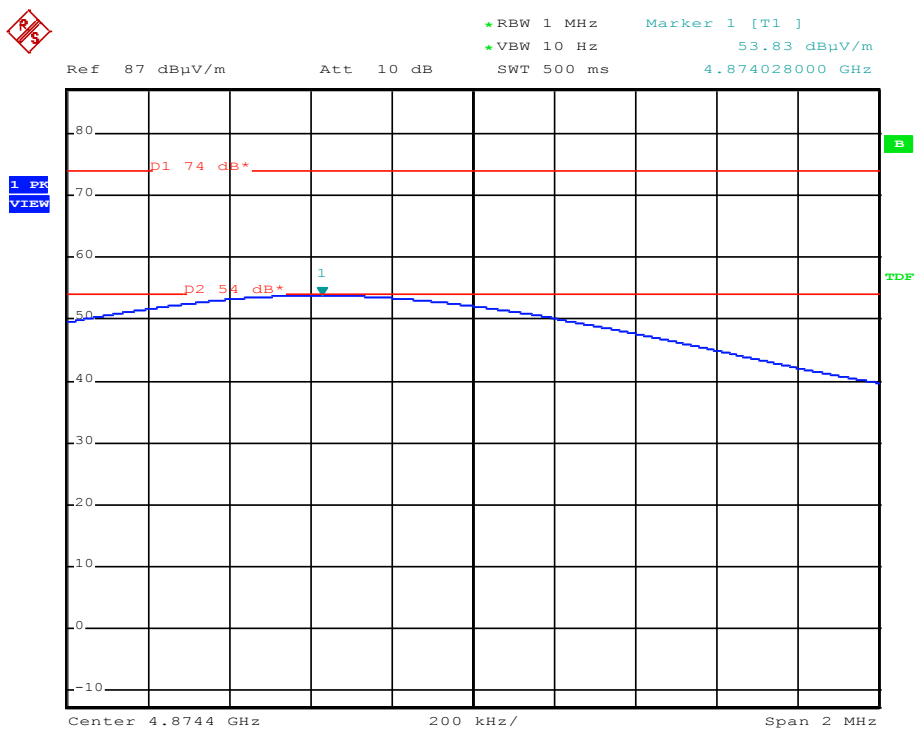


Ref 87 dBµV/m Att 10 dB RBW 1 MHz Marker 1 [T1]
 VBW 3 MHz 56.00 dBµV/m
 SWT 20 ms 4.874400000 GHz

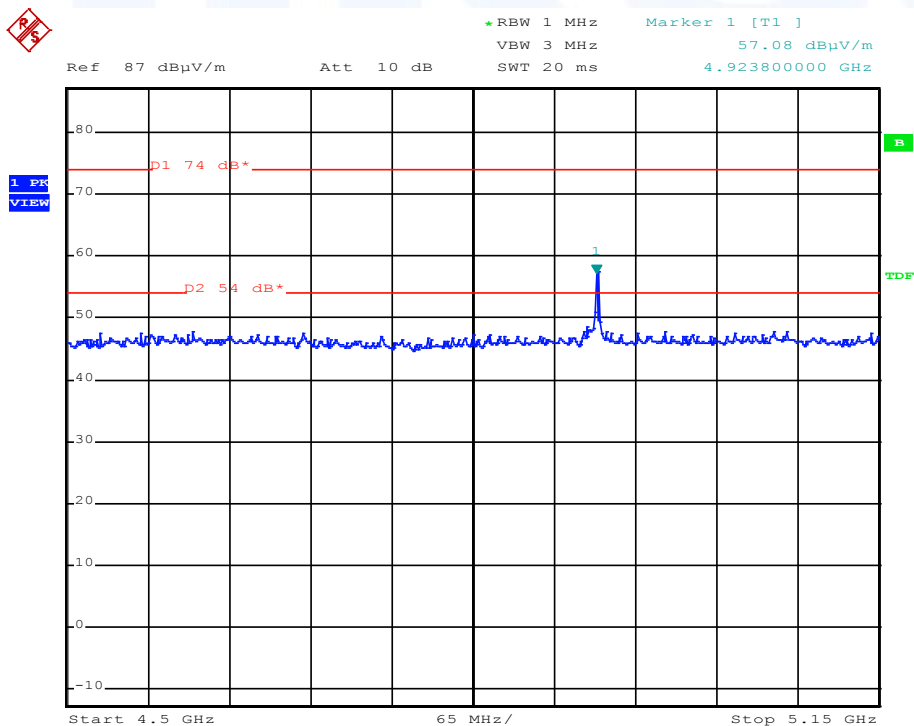


FCC ID:V74-KTS340A

AV-measurement

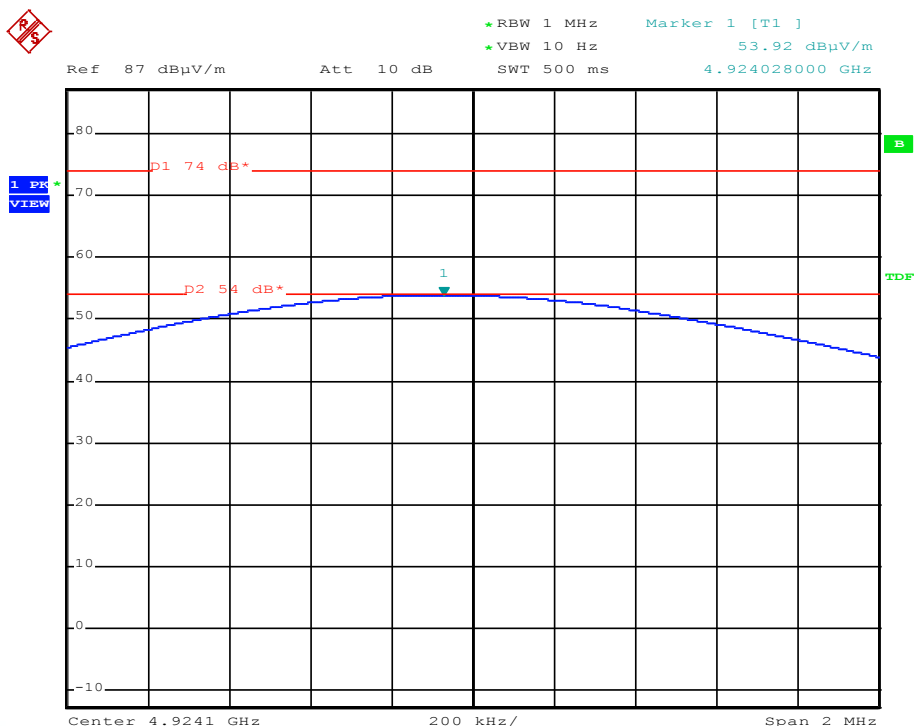


Restricted band 4.5 GHz to 5.15 GHz, high channel



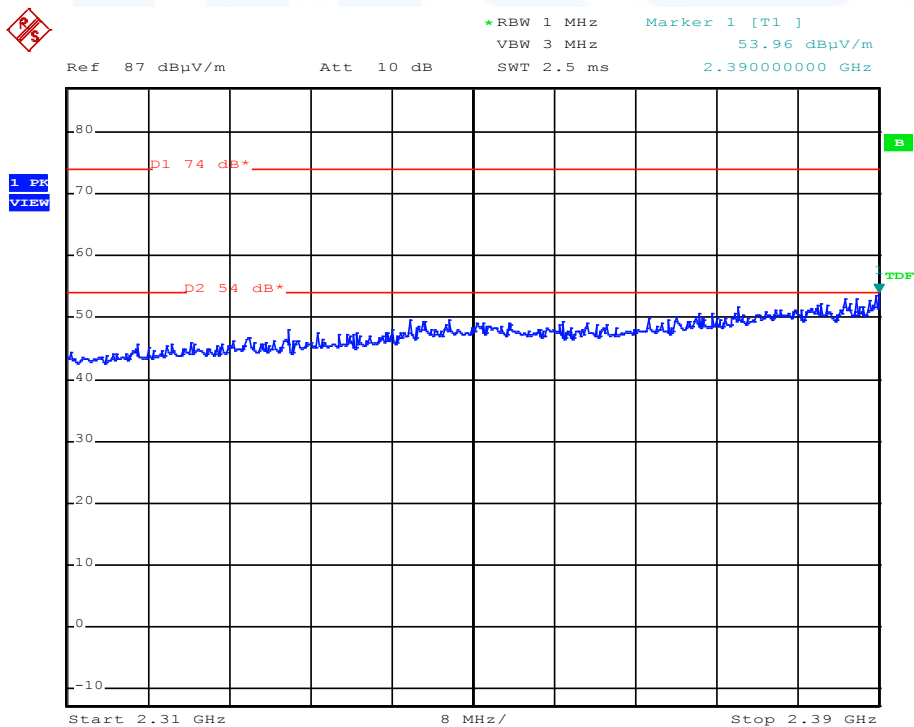
FCC ID:V74-KTS340A

AV-measurement

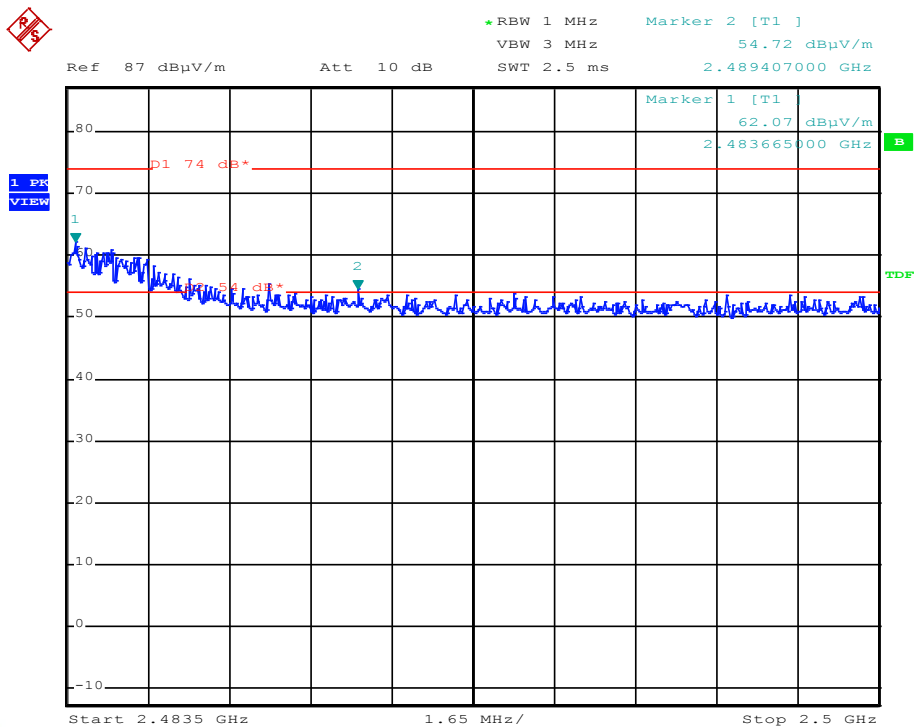


802.11g

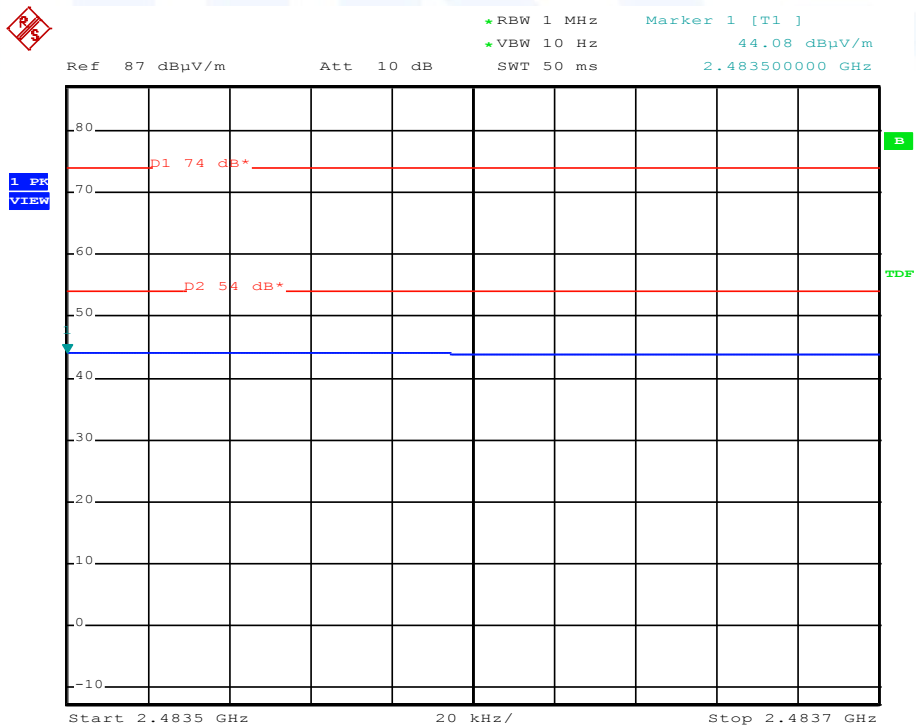
Restricted band 2.31 GHz to 2.39 GHz, low channel



FCC ID:V74-KTS340A
Restricted band 2.4835 GHz to 2.5 GHz, high channel



AV-measurement

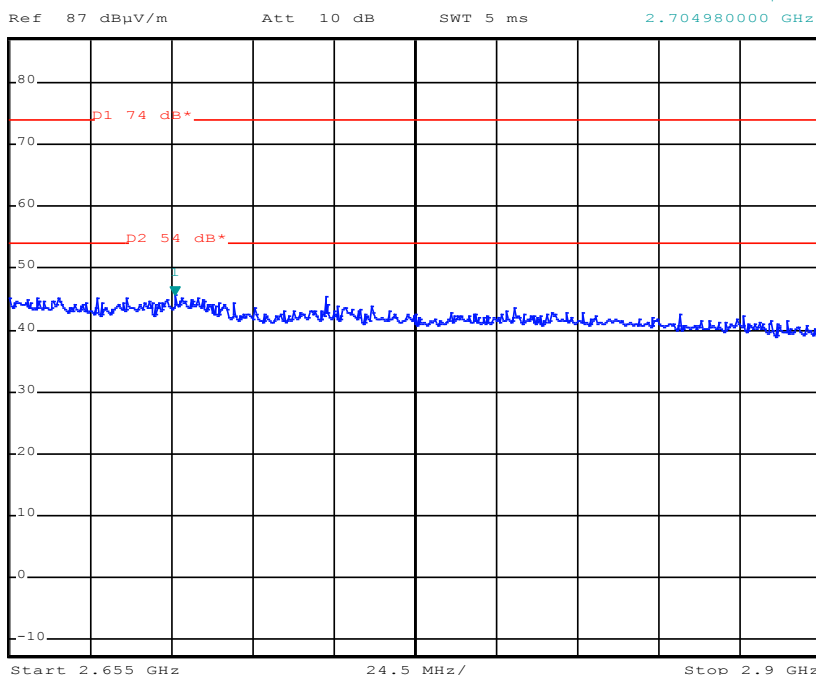


FCC ID:V74-KTS340A

Restricted band 2.655 – 2.9 GHz (Canada), high channel



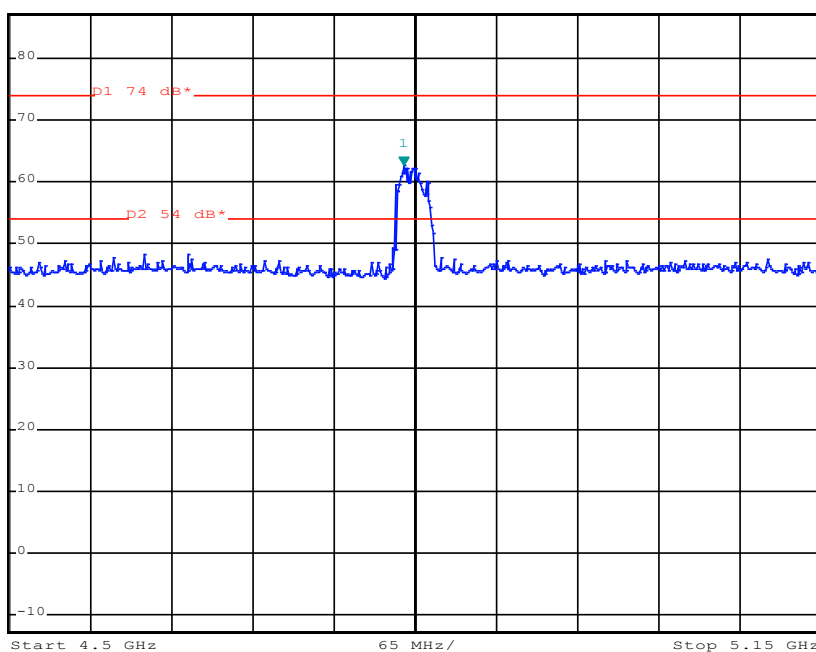
*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz 45.64 dBμV/m
SWT 5 ms 2.704980000 GHz



Restricted band 4.5 GHz to 5.15 GHz, low channel

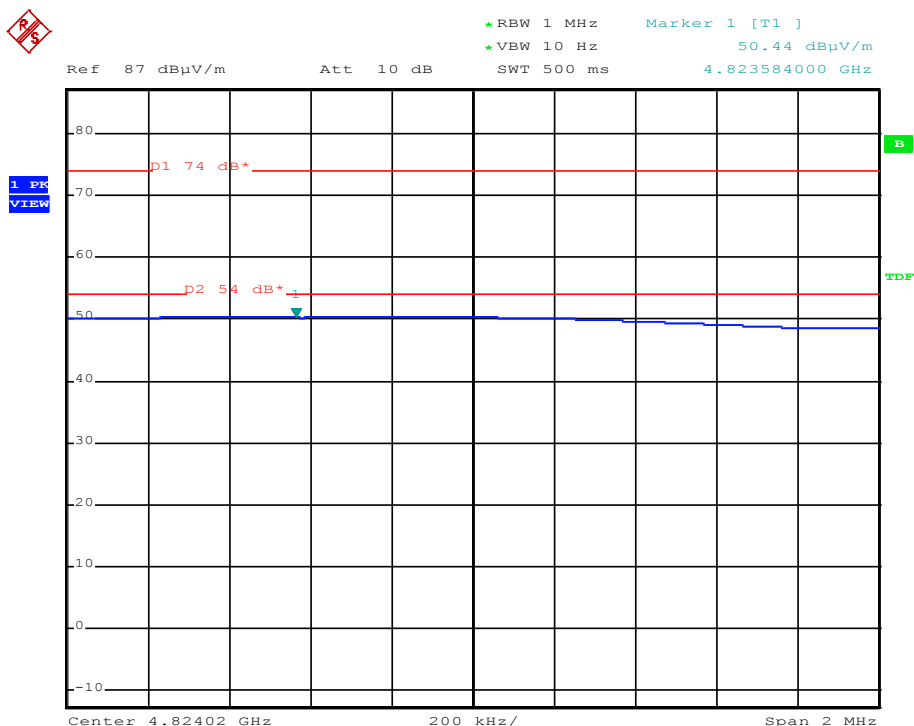


*RBW 1 MHz Marker 1 [T1]
VBW 3 MHz 62.71 dBμV/m
SWT 20 ms 4.815900000 GHz

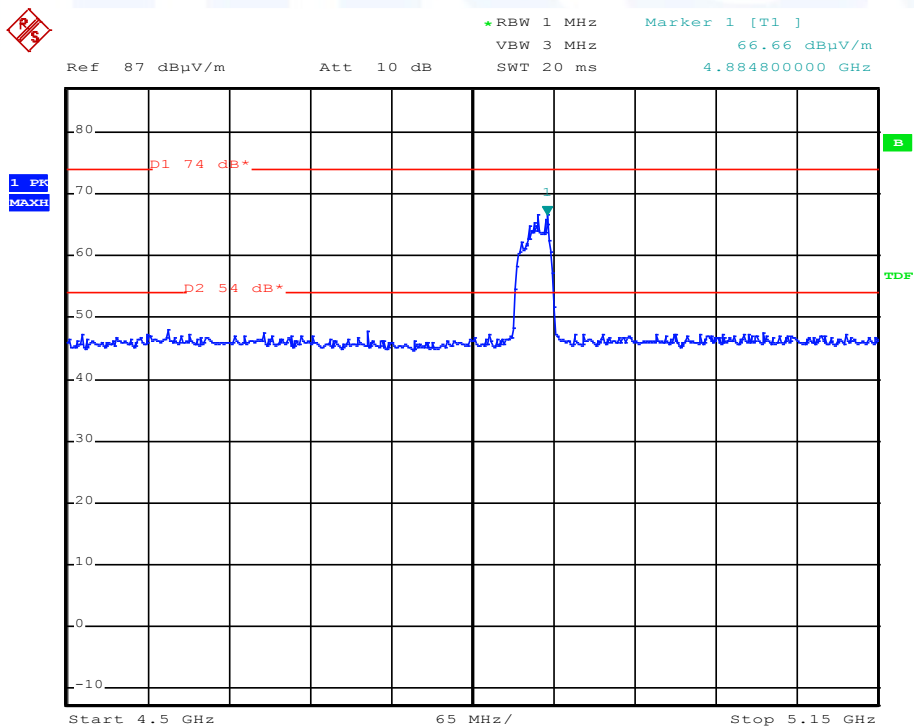


FCC ID:V74-KTS340A

AV-measurement

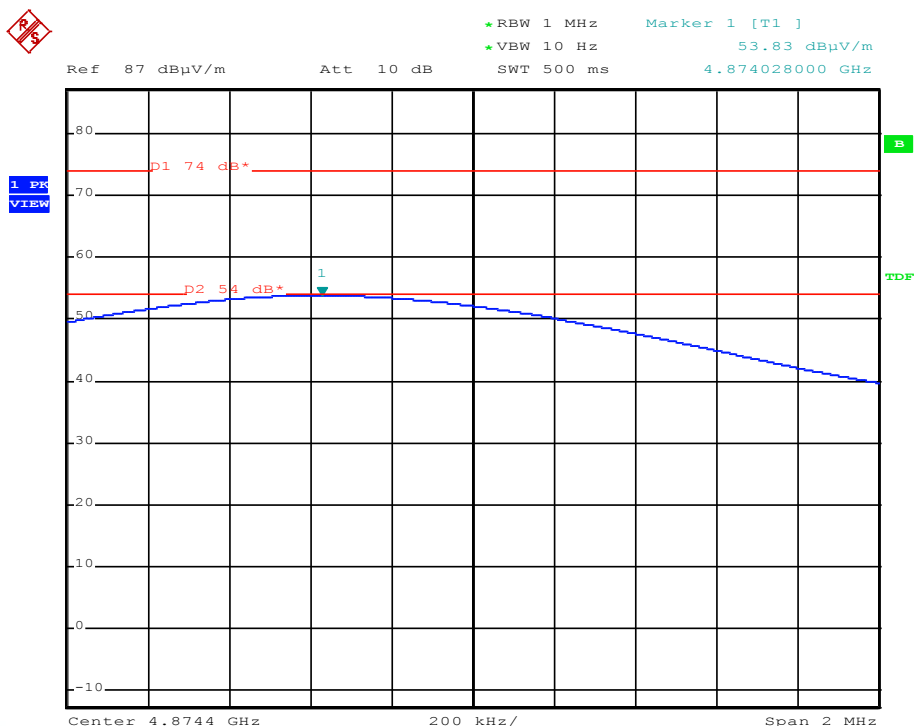


Restricted band 4.5 GHz to 5.15 GHz, mid channel

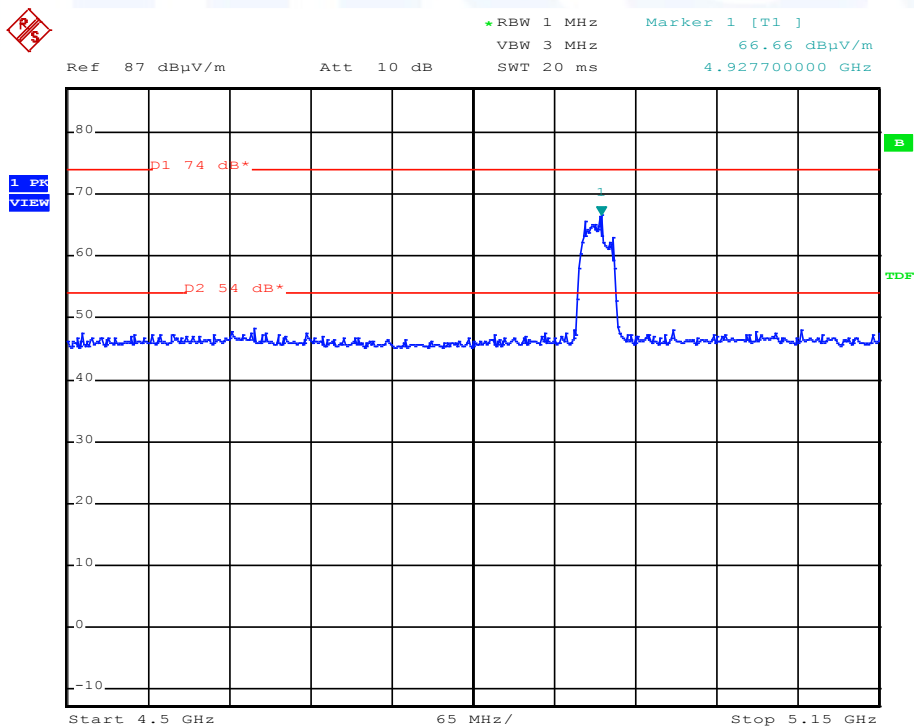


FCC ID:V74-KTS340A

AV-measurement



Restricted band 4.5 GHz to 5.15 GHz, high channel

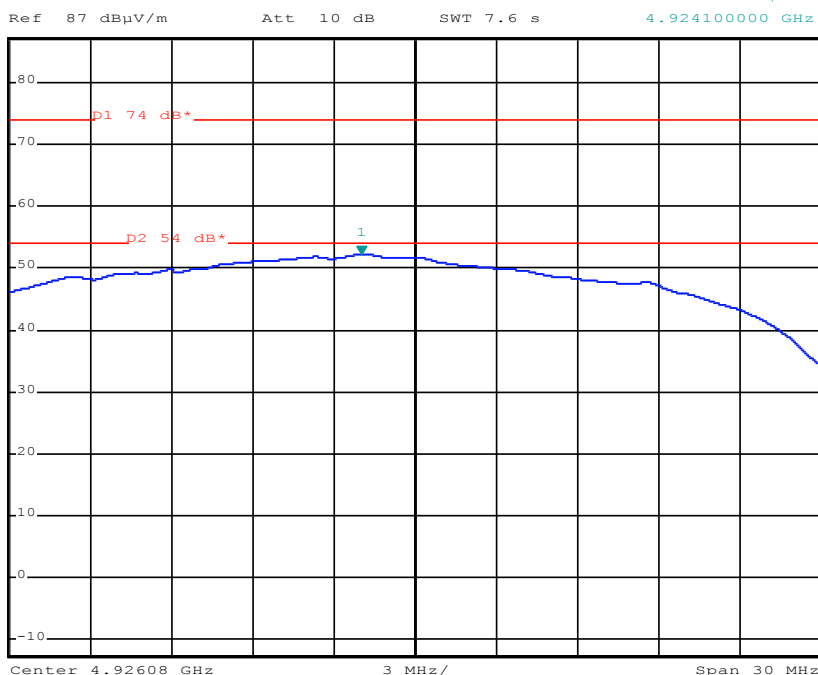


FCC ID:V74-KTS340A

AV-measurement



*RBW 1 MHz Marker 1 [T1]
*VBW 10 Hz 52.26 dBμV/m
SWT 7.6 s 4.924100000 GHz



FCC ID:V74-KTS340A

5.9 Maximum permissible exposure (MPE)

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

5.9.1 Description of the test location

Test location: AREA 4

5.9.2 Applicable standard

According to FCC Part 15, Section 15.247(i):

Systems operating under the provisions of this section shall be operated in a manner that the public is not exposed to radio frequency energy levels in excess of the Commission's guidelines.

The test methods used comply with ANSI/IEEE C95.1, "IEEE Standard for Safety Levels with respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz".

This test report shows the compliance with the limits for Maximum Permissible Exposure (MPE) specified in FCC Part 1, Section 1.1310 and the criteria to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in FCC Part 1, Section 1.1307(b).

5.9.3 Description of Measurement

The maximum total power input to the antenna has been measured conducted as described in clause 5.3 of this document. Through the Friis transmission formula, the known maximum gain of the antenna and the maximum power, can be calculated the MPE in a defined distance away from the product.

Friis transmission formula:

$$P_d = \frac{P_{out} * G}{4 * \pi * r^2}$$

Where:

P_d = power density (mW/cm²)

P_{out} = output power to antenna (mW)

G = gain of antenna (linear scale)

r = distance between antenna and observation point (cm)

According to FCC Rules 47CFR 2.1093(b) the EUT is not a portable device. The EUT is designed to be used that radiating structures are 20 cm outside of the body of the user. ($r = 20$ cm)

FCC ID:V74-KTS340A
5.9.4 Test result
WLAN Standard 802.11b

Worst case: PCB antenna ACX3216-B2R7HAA with an antenna gain of 0.5 dBi, Power setting: 10

Channel No.	Frequency	Max power output to antenna		Antenna gain	Power density	Limit of power density
	(MHz)	(dBm)	(mW)	(lin)	(mW/cm ²)	(mW/cm ²)
1	2412	7.6	5.75	1.12	0.0065	1.0
6	2437	8.3	6.76	1.12	0.0076	1.0
11	2462	8.7	7.41	1.12	0.0083	1.0

WLAN Standard 802.11g

Worst case: PCB antenna ACX3216-B2R7HAA with an antenna gain of 0.5 dBi, Power setting: 13

Channel No.	Frequency	Max power output to antenna		Antenna gain	Power density	Limit of power density
	(MHz)	(dBm)	(mW)	(lin)	(mW/cm ²)	(mW/cm ²)
1	2412	11	12.59	1.12	0.0028	1.0
6	2437	10.5	11.22	1.12	0.0025	1.0
11	2462	11.3	13.49	1.12	0.0030	1.0

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/ <i>f</i>	2.19/ <i>f</i>	180/ <i>f</i> ²	30
30 - 300	27.5	0.073	0.2	30
300-1500	---	---	<i>f</i> /1500	30
1500-100000	---	---	1.0	30

f = Frequency in MHz

The requirements are **FULFILLED**.

Remarks:

FCC ID:V74-KTS340A**5.10 Co-location and Co-transmission****Applicable standard:**

OET Bulletin 65, Edition 97-01, Section 2: Multiple-transmitter sites and Complex Environments

The FCC's MPE limits vary with frequency. Therefore, in mixed or broadband RF fields where several sources and frequencies are involved, the fraction of the recommended limit (in terms of power density or square of the electric or magnetic field strength) incurred within each frequency interval should be determined, and the sum of all fractional contributions should not exceed 1.0, or 100 % in terms of percentage.

There is no co-location or co-transmission issue because only one transmitter is in the EUT.

Remarks:

5.11 Antenna application**5.11.1 Applicable standard**

According to FCC Part 15C, Section 15.203:

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit that broken antennas can be replaced by the user, but the use of a standard antenna jack is prohibited.

The EUT has an integrated antenna. No other antenna can be used with the device.

All supplied antennas meet the requirements of part 15.203 and 15.204.

5.11.2 Antenna requirements

According to FCC Part 15C, Section 15.247(b)(4):

The conducted output power limit specified in paragraph (b) of 15.247 is based on the use of antennas with directional gains that do not exceed 6 dBi. Except as shown in paragraph (c) of this section, if transmitting antennas of directional gain greater than 6 dBi are used, the conducted output power from intentional radiator shall be reduced below the stated values in paragraph (b)(1), (b)(2) and (b)(3) of this section, as appropriate, by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

The output power has not to be reduced using the antenna type ACX3216-B2R7HAA.

FCC ID:V74-KTS340A**5.12 Receiver radiated emissions**

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

5.12.1 Description of the test location

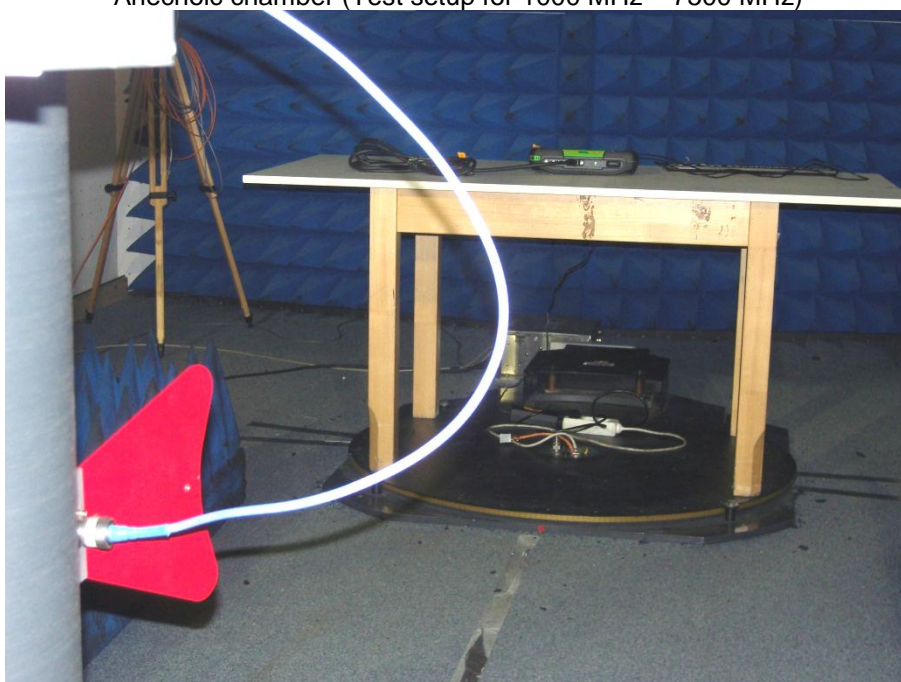
Test location: OATS 1
Test location: Anechoic Chamber A2
Test distance: 3 metres

5.12.2 Photo documentation of the test set-up

Open area test site (Test setup for 30 MHz – 1000 MHz)



Anechoic chamber (Test setup for 1000 MHz – 7500 MHz)



FCC ID:V74-KTS340A

5.12.3 Applicable standard

According to RSS-Gen, Section 6:

Receivers shall comply with the limits of spurious emissions set out in this section, measured over the frequency range determined in accordance with Section 4.10.

5.12.4 Description of Measurement

Radiated emissions from the EUT are measured following the methods set out in the ANSI C93.4. The measured frequency range of 30 MHz to maximum frequency as specified in section RSS Gen 4.10. For testing above 1 GHz, the emission level of the EUT in peak mode complies with the average limit then testing will be stopped and peak values of the EUT will be reported, otherwise, the emission will be measured again in average mode and reported. In RX test mode no channel and transmission standard can be set.

5.12.5 Test result

$f < 1$ GHz:

Frequency (MHz)	L: QP (dB μ V)	Bandwidth (kHz)	Correct. (dB/m)	L: QP (dB μ V/m)	Limit (dB μ V/m)	Delta (dB)
89	22.0	120	10.3	32.3	43.5	-11.2
90	21.4	120	10.1	31.5	43.5	-12.0
96	26.0	120	11.3	37.3	43.5	-6.2
106.1	27.0	120	12.5	39.5	43.5	-4.0
108.1	25.3	120	12.7	38.0	43.5	-5.5
117.6	16.0	120	12.8	28.8	43.5	-14.7
118.1	16.4	120	12.9	29.3	43.5	-14.2
118.6	20.4	120	13.5	33.9	43.5	-9.6
119.05	20.1	120	13.6	33.7	43.5	-9.8
205.8	29.3	120	13.1	42.4	43.5	-1.1
206.8	30.3	120	13.2	43.5	43.5	0.0
207.4	28.6	120	13.2	41.8	43.5	-1.7
209.5	26.0	120	13.3	39.3	43.5	-4.2
264.0	15.0	120	28.0	43.4	46.0	-2.6

Note: 15.31(o) Emissions more than 20 dB below the permissible value needs not be reported.

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f > 1 GHz:

Frequency band 2.4 GHz to 2.4835 GHz

The control software for the EUT enables only RX setting but not to set a channel or the standard b or g.

f (MHz)	Level (dBμV/m)	Limit (dBμV/m)	f (MHz)	Level (dBμV/m)	Limit (dBμV/m)
-	-	74.0	-	-	74.0

Note: 15.31(o) Emissions more than 20 dB below the permissible value needs not be reported.

Limit according to RSS-Gen, Table 2:

Frequency (MHz)	Limit (μV/m)	Limit (dBμV/m)
30 - 88	100	40
88 - 216	150	43.5
216 - 960	200	46
Above 960	500	54

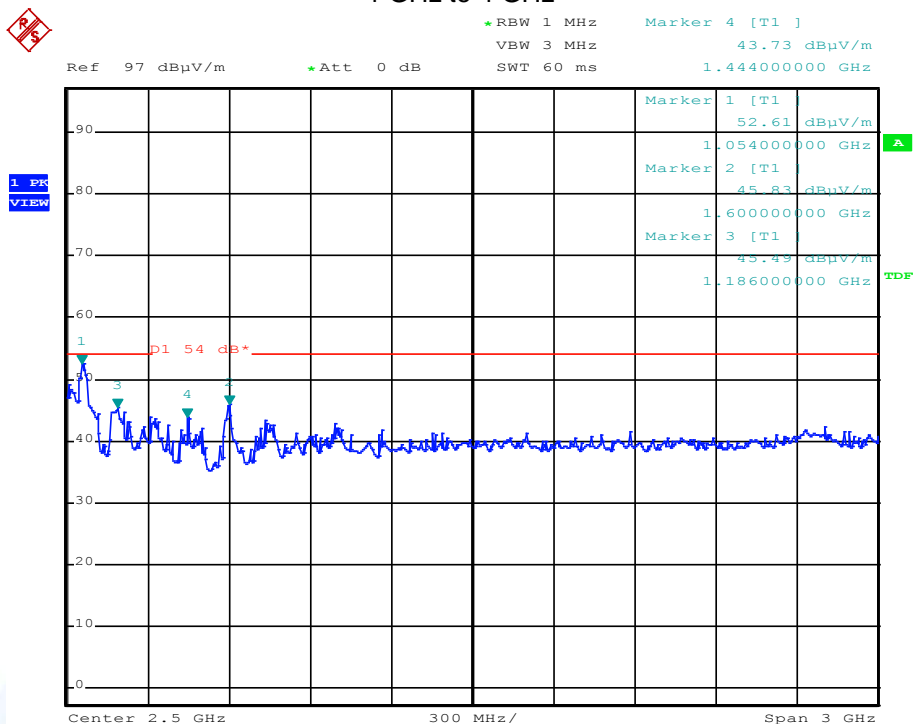
The requirements are **FULFILLED**.

Remarks: During the test, the EUT was set into continuous receiving mode. The measurement was performed up to the 3rd harmonic (7500 MHz). For detailed test results please see the following test protocols.

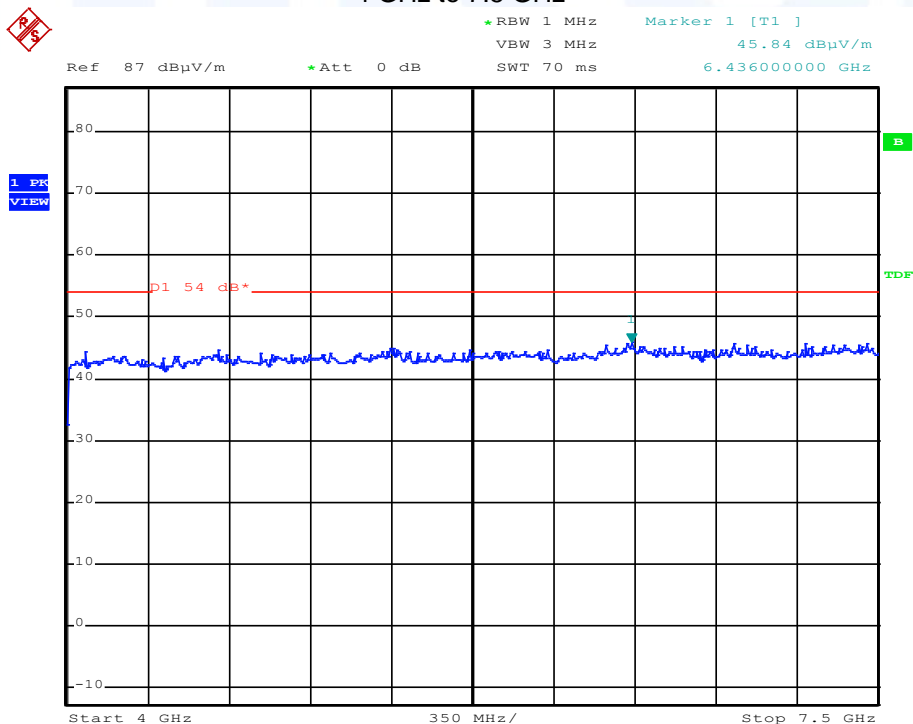
FCC ID:V74-KTS340A

5.12.6 Test protocols receiver spurious emissions

1 GHz to 4 GHz



4 GHz to 7.5 GHz



FCC ID:V74-KTS340A

6 USED TEST EQUIPMENT AND ACCESSORIES

All test instruments used are calibrated and verified regularly. The calibration history is available on request.

Test ID	Model Type	Equipment No.	Next Calib.	Last Calib.	Next Verif.	Last Verif.
A 4	ESHS 30	02-02/03-05-002	30/06/2012	30/06/2011		
	ESH 2 - Z 5	02-02/20-05-004	12/05/2013	12/05/2011	12/11/2011	12/05/2011
	EMV D 30000/PAS	02-02/30-05-006				
	N-4000-BNC	02-02/50-05-138				
	N-1500-N	02-02/50-05-140				
	ESH 3 - Z 2	02-02/50-05-155	06/10/2011	06/04/2011		
CPC 3	NRVS	02-02/07-05-005				
	NRV-Z51	02-02/07-06-006	05/08/2011	05/08/2010		
MB	FSP 30	02-02/11-05-001	17/05/2012	17/05/2011		
SEC 1-3	FSP 30	02-02/11-05-001	17/05/2012	17/05/2011		
SER 2	ESVS 30	02-02/03-05-006	20/06/2012	20/06/2011		
	VULB 9168	02-02/24-05-005	07/03/2012	07/03/2011	17/09/2011	17/03/2011
	S10162-B	02-02/50-05-031				
	KK-EF393-21N-16	02-02/50-05-033				
	NW-2000-NB	02-02/50-05-113				
SER 3	AFS4-01000400-10-10P-4	02-02/17-05-003				
	AMF-4F-04001200-15-10P	02-02/17-05-004				
	AFS5-12001800-18-10P-6	02-02/17-06-002				
	FSP 30	02-02/11-05-001	17/05/2012	17/05/2011		
	3117	02-02/24-05-009	11/02/2012	11/02/2011		
	Sucoflex N-1600-SMA	02-02/50-05-073				
	Sucoflex N-2000-SMA	02-02/50-05-075				