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TEST REPORT

Report Number: 15120965HKG-001

Application
for
Original Grant of 47 CFR Part 15 Certification
New Family of RSS-247 Issue 1 Equipment Certification

Warmup Smart WiFi Thermostat,
Programmable WIFI Thermostat with/without GFCI

FCC ID: 2AHBW4IENA

IC: 21121-4IENA

Prepared and Checked by:

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March 08, 2016

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GENERAL INFORMATION

Applicant Name:	Warmup PLC
Applicant Address:	702 Tudor Estate, Abbey Road, London NW10 7UW, United Kingdom
FCC Specification Standard:	FCC Part 15, October 1, 2014 Edition
FCC ID:	2AHBW4IENA
FCC Model(s):	4IE-02-XX-YY, 4IE-04-XX-YY
IC Specification Standard:	RSS-247 Issue 1, May 2015 RSS-Gen Issue 4, November 2014
IC:	21121-4IENA
HVIN(s):	4IE-02-OB-01, 4IE-04-OB-01
Additional HVIN(s)	4IE-02-CW-01, 4IE-04-CW-01, 4IE-02-BP-01, 4IE-04-BP-01
PMN:	4IE-02-OB-01, 4IE-04-OB-01 4IE-02-CW-01, 4IE-04-CW-01, 4IE-02-BP-01, 4IE-04-BP-01
Type of EUT:	Spread Spectrum Transmitter
Description of EUT:	Warmup Smart WiFi Thermostat, Programmable WIFI Thermostat with/without GFCI
Serial Number:	N/A
Sample Receipt Date:	December 23, 2015
Date of Test:	December 23, 2015 to January 26, 2016
Report Date:	March 08, 2016
Environmental Conditions:	Temperature: +10 to 40°C Humidity: 10 to 90%

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**EXHIBIT 1
TEST RESULTS SUMMARY & STATEMENT OF COMPLIANCE**

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1.0 Test Results Summary & Statement of Compliance

1.1 Summary of Test Results

Test Items	FCC Part 15 Section	RSS-247/ RSS-Gen [#] Section	Results	Details see section
Antenna Requirement	15.203	7.1.2 [#]	Pass	2.1
Max. Conducted Output Power (average)	15.247(b)(3)&(4)	5.1(2)	Pass	4.1
Min. 6dB RF Bandwidth	15.247(a)(2)	5.1(1)	Pass	4.2
Max. Power Density (average)	15.247(e)	5.1	Pass	4.3
Out of Band Antenna Conducted Emission	15.247(d)	5.5	Pass	4.4
Radiated Emission in Restricted Bands and Spurious Emissions	15.247(d), 15.209 & 15.109	7.2.4 [#]	Pass	4.6

Note: Pursuant to FCC Part 15 Section 15.215(c), the 20dB bandwidth of the emission was contained within the frequency band designated (mentioned as above) which the EUT operated. The effects, if any, from frequency sweeping, frequency hopping, other modulation techniques and frequency stability over expected variations in temperature and supply voltage were considered.

1.2 Statement of Compliance

The equipment under test is found to be complying with the following standards:

FCC Part 15, October 1, 2014 Edition
RSS-247 Issue 1, May 2015
RSS-Gen Issue 4, November 2014

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**EXHIBIT 2
GENERAL DESCRIPTION**

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2.0 General Description

2.1 Product Description

The Equipment-Under-Test (EUT) 4IE-04-OB-01 and 4IE-02-OB-01 are a Wifi Thermostat. The EUT contains WLAN (Wifi). The EUT can be connected to the server by going to the website through Wifi to the router. The EUT is powered by 100-240VAC.

For 802.11b mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via direct-sequence spread spectrum (DSSS) modulation. Maximum bit rate can be up to 11Mbps. For 802.11g mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can be up to 54Mbps. For 802.11n (with 20MHz bandwidth) mode, it operates at frequency range of 2412.000MHz to 2462.000MHz with 11 channels. It transmits via Orthogonal Frequency Division Multiplexing (OFDM) modulation. Maximum bit rate can support up to 65Mbps.

For FCC, Series 4IE-02-XX-YY and 4IE-04-XX-YY are use the same insulating material and have the similar outlines. 4IE-02-XX-01 is with WIFI function only, 4IE-04-XX-01 is with both WIFI and GFCI function. XX represents different colour code, e.g. BK=Black. YY represents different packaging, e.g. 01.

The difference in between 4IE-02 series and 4IE-04 series are without GFCI function on 4IE-02 series only, all related components for GFCI function are removed.

For Canada, The HVIN (Model(s)): 4IE-04-CW-01, 4IE-04-BP-01, 4IE-02-CW-01 & 4IE-02-BP-01 are the same as the Model: 4IE-04-OB-01 and 4IE-02-OB-01 in electrical designs including software & firmware, PCB layout and construction design/physical design/enclosure. The models are difference in colour only.

The difference in between 4IE-02 series and 4IE-04 series are without GFCI function on 4IE-02 series only, all related components for GFCI function are removed.

The antenna(s) used in the EUT is integral, and the test sample is a prototype.

The circuit description is saved with filename: descri.pdf.

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2.2 Test Methodology

Radiated emission measurements was performed according to the procedures in ANSI C63.4 (2014). Preliminary radiated scans and all radiated measurements were performed in Open Area Test Sites. All Radiated tests were performed at an antenna to EUT distance of 3 meters, unless stated otherwise in the "Justification Section" of this Application. Antenna port conducted measurements were performed according to ANSI C63.10 (2013). All other measurements were made in accordance with the procedures in 47 CFR Part 2.

2.3 Test Facility

The radiated emission test site and antenna port conducted measurement facility used to collect the radiated data and conductive data are at Workshop No. 3, G/F., World-Wide Industrial Centre, 43-47 Shan Mei Street, Fo Tan, Sha Tin, N.T., Hong Kong. This test facility and site measurement data have been fully placed on file with the FCC and Industry Canada.

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**EXHIBIT 3
SYSTEM TEST CONFIGURATION**

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3.0 System Test Configuration

3.1 Justification

For radiated emissions testing, the equipment under test (EUT) was setup to transmit / receive continuously to simplify the measurement methodology. Care was taken to ensure proper power supply voltages during testing. During testing, all cables (if any) were manipulated to produce worst case emissions.

The EUT was powered by 120VAC 60Hz.

For the measurements, the EUT was attached to a plastic stand if necessary and placed on the wooden turntable. If the base unit attached to peripherals, they were connected and operational (as typical as possible).

The signal was maximized through rotation and placement in the three orthogonal axes. The antenna height and polarization were varied during the search for maximum signal level. The antenna height was varied from 1 to 4 meters. Radiated emissions were taken at three meters unless the signal level was too low for measurement at that distance. If necessary, a pre-amplifier was used and/or the test was conducted at a closer distance.

For any intentional radiator powered by AC power line, measurements of the radiated signal level of the fundamental frequency component of the emission was performed with the supply voltage varied between 85% and 115% of the nominal rated supply voltage.

Radiated emission measurement for transmitter were performed from the lowest radio frequency signal generated in the device which is greater than 9 kHz to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Emission that are directly caused by digital circuits in the transmit path and transmitter portion were measured, and the limit are according to FCC Part 15 Section 15.209. Digital circuitries used to control additional functions other than the operation of the transmitter are subject to FCC Part 15 Section 15.109 Limits.

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3.1 Justification - Cont'd

Detector function for radiated emissions was in peak mode. Average readings, when required, were taken by measuring the duty cycle of the equipment under test and subtracting the corresponding amount in dB from the measured peak readings. A detailed description for the calculation of the average factor can be found in section 4.2.3.

Determination of pulse desensitization was made according to Hewlett Packard Application Note 150-2, Spectrum Analysis... Pulsed RF. The effective period (Teff) was referred to Exhibit 4.6.3. With the resolution bandwidth 1MHz and spectrum analyzer IF bandwidth 3dB, the pulse desensitization factor was 0dB.

The EUT along with its peripherals were placed on a 1.0m(W)x1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT power cord connected to one LISN (Line impedance stabilization network), which provided 50ohm coupling impedance for measuring instrument. Meanwhile, the peripheral or support equipment power cords connected to a separate LISN. The ac powers for all LISNs were obtained from the same power source. The LISN housing, measuring instrument case, reference ground plane, and vertical ground plane were bounded together. The excess power cable between the EUT and the LISN was bundled. Power cords of non-EUT equipment (peripherals) were not bundled. AC power cords of peripheral equipments draped over the rear edge of the table, and routed them down onto the floor of the ac power line conducted emission test site to the second LISN.

All connecting cables of EUT and peripherals were manipulated to find the maximum emission.

Different data rates have been tested. Worst case is reported only.

All relevant operation modes have been tested, and the worst case data is included in this report.

All data rates were tested under normal mode of WiFi. Only the worst-case data is shown in the report for DSSS and OFDM.

As the circuitry and PCB layout of 4IE-02-OB-01 is identical to 4IE-04-OB-01 except all related components for GFCI function are removed from the PCB only, Thus all conductive RF test data of model 4IE-04-OB-01 is shown on report only.

3.2 EUT Exercising Software

The EUT exercise program (if any) used during radiated and conducted testing was designed to exercise the various system components in a manner similar to a typical use.

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3.3 Details of EUT and Description of Accessories

Details of EUT:

- (1) The EUT is powered by 120VAC

Description of Accessories:

- (1) 15A lightbulb for loading

3.4 Measurement Uncertainty

When determining of the test conclusion, the Measurement Uncertainty of test at a level of confidence of 95% has been considered. The values of the Measurement uncertainty for radiated emission test and RF conducted measurement test are $\pm 5.3\text{dB}$ and $\pm 0.99\text{dB}$ respectively. The value of the Measurement uncertainty for conducted emission test is $\pm 4.2\text{dB}$.

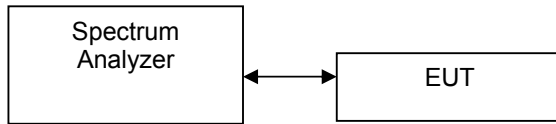
Uncertainty and Compliance - Unless the standard specifically states that measured values are to be extended by the measurement uncertainty in determining compliance, all compliance determinations are based on the actual measured value.

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**EXHIBIT 4
TEST RESULTS**

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4.0 Test Results



4.1 Maximum Conducted (average) Output Power at Antenna Terminals

Occupied Bandwidth

IEEE 802.11b (DSSS, 11 Mbps) - Antenna Gain = 4dBi	
Frequency (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2422	12240
Middle Channel: 2437	12180
High Channel: 2452	12240

IEEE 802.11g (OFDM, 6 Mbps) Antenna Gain = 4 dBi	
Frequency (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2422	16480
Middle Channel: 2437	16480
High Channel: 2452	16480

IEEE 802.11n (HT20, MCS0) Antenna Gain = 4 dBi	
Frequency (MHz)	Occupied Bandwidth (kHz)
Low Channel: 2422	17520
Middle Channel: 2437	17520
High Channel: 2452	17520

Maximum Conducted (Average) Output Power at Antenna Terminals

The antenna port of the EUT was connected to the input of a spectrum analyzer.

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4.1 Maximum Conducted Output Power at Antenna Terminal (Cont'd)

The antenna port of the EUT was connected to the input of a spectrum analyzer.

- External attenuation and cable loss were compensated for using the OFFSET function of the analyser. The measurement procedure 9.2.2.2 was used.
- The EUT should be configured to transmit continuously (at a minimum duty cycle of 98%) at full power over the measurement duration. The measurement procedure AVGSA-1 was used.

IEEE 802.11b (DSSS, 11 Mbps) - Antenna Gain = 4dBi			
Frequency (MHz)		Output in dBm	Output in mW
Low Channel:	2412	14.11	25.76
Middle Channel:	2437	14.09	25.64
High Channel:	2462	13.90	24.55

IEEE 802.11g (OFDM, 54 Mbps) - Antenna Gain = 4dBi			
Frequency (MHz)		Output in dBm	Output in mW
Low Channel:	2412	9.53	8.97
Middle Channel:	2437	9.45	8.81
High Channel:	2462	9.43	8.77

IEEE 802.11n (20MHz) (OFDM, MCS7) - Antenna Gain = 4dBi			
Frequency (MHz)		Output in dBm	Output in mW
Low Channel:	2412	8.27	6.71
Middle Channel:	2437	8.32	6.79
High Channel:	2462	8.25	6.68

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4.1 Maximum Conducted Output Power at Antenna Terminal (Cont'd)

Cable loss: 0.5 dB External attenuation: 10 dB

Cable loss, external attenuation: included in OFFSET function
 added to SA raw reading

IEEE 802.11b (DSSS, 11 Mbps)

dBm max. output level = 14.11 dBm

IEEE 802.11g (OFDM, 54 Mbps)

dBm max. output level = 9.53 dBm

IEEE 802.11n (20MHz) (OFDM, MCS7)

dBm max. output level = 8.32 dBm

Limits:

0.125W (21dBm) for antennas with gains of 6dBi or less

0.25W (24dBm) for antennas with gains of 6dBi or less

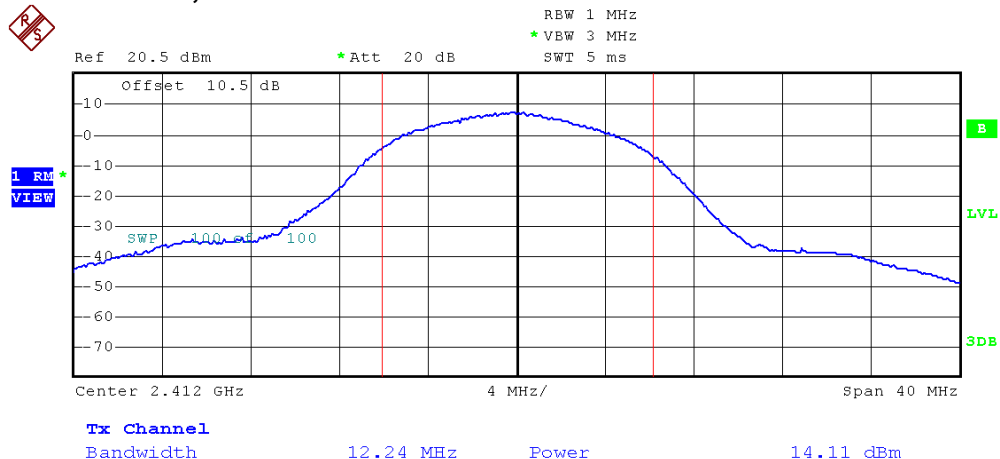
1W (30dBm) for antennas with gains of 6dBi or less

___W (___dBm) for antennas with gains more than 6dBi

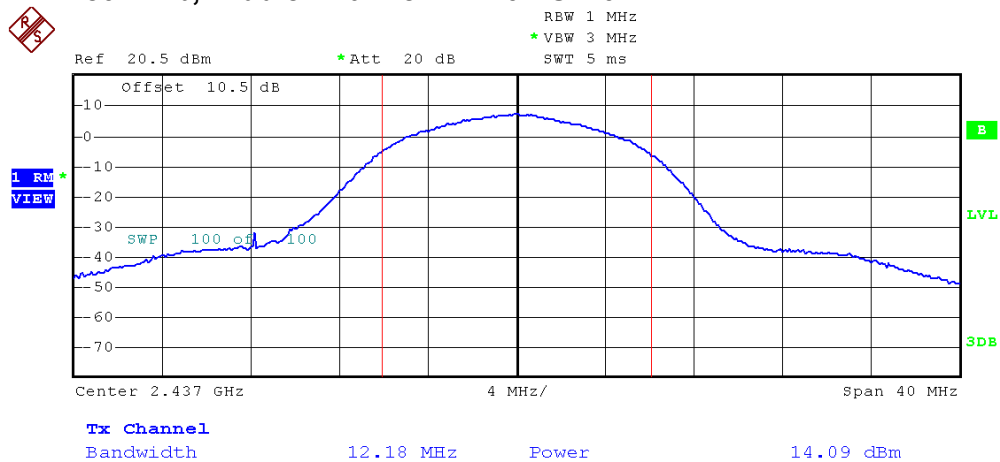
The plots of conducted output power are saved as below.

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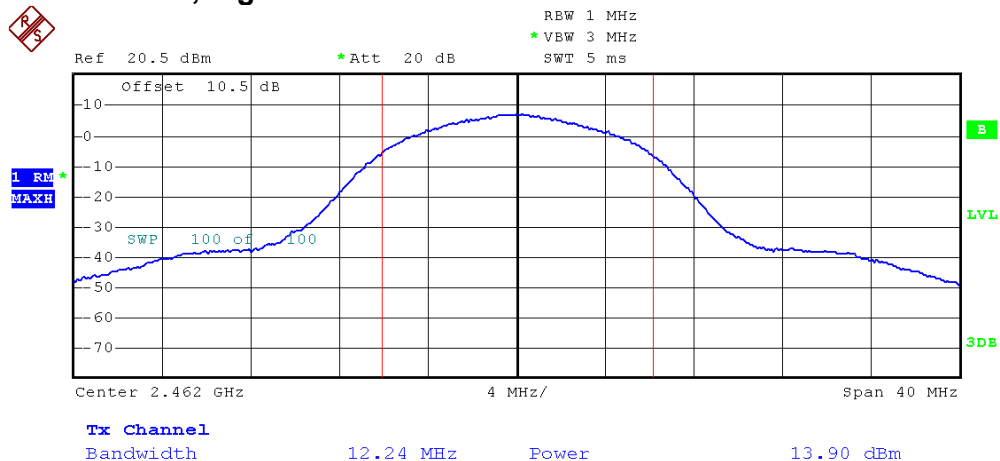
Plots of conducted output power IEEE 802.11b, Lowest Channel - 4IE-04-OB-01



IEEE 802.11b, Middle Channel - 4IE-04-OB-01

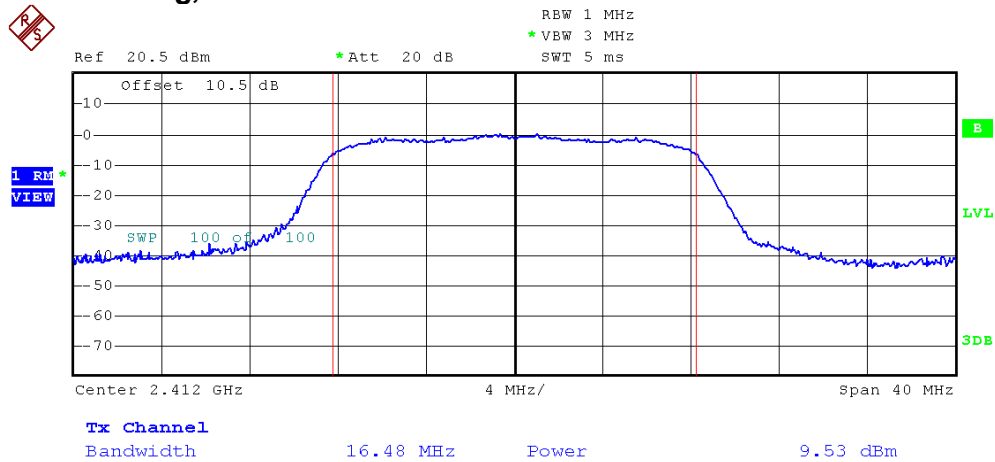


IEEE 802.11b, Highest Channel - 4IE-04-OB-01

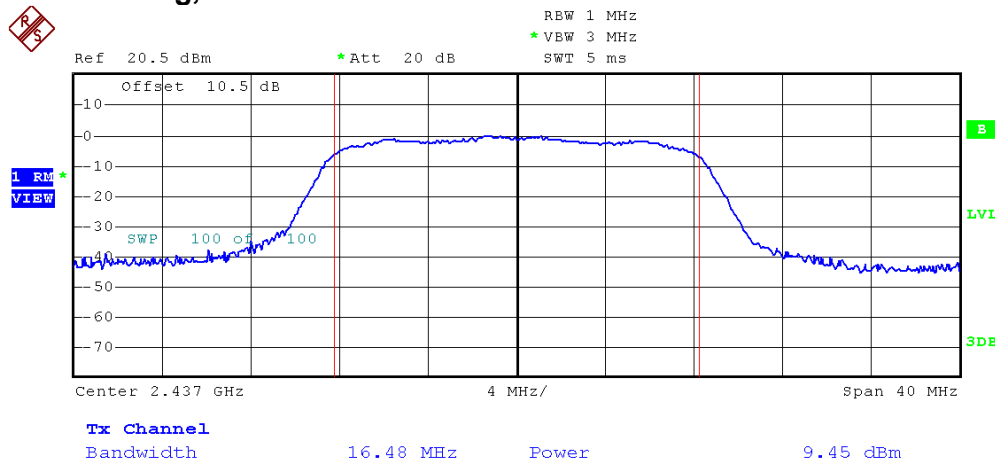


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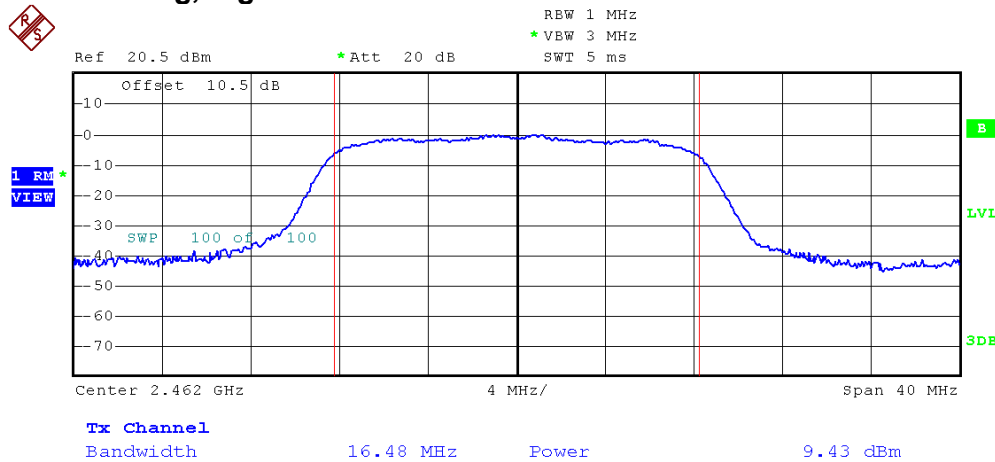
Plots of conducted output power IEEE 802.11g, Lowest Channel - 4IE-04-OB-01



IEEE 802.11g, Middle Channel - 4IE-04-OB-01

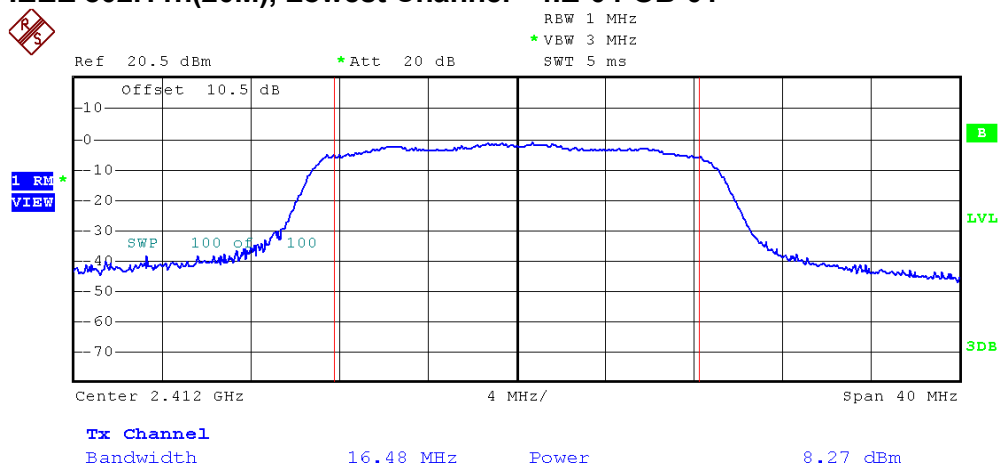


IEEE 802.11g, Highest Channel - 4IE-04-OB-01

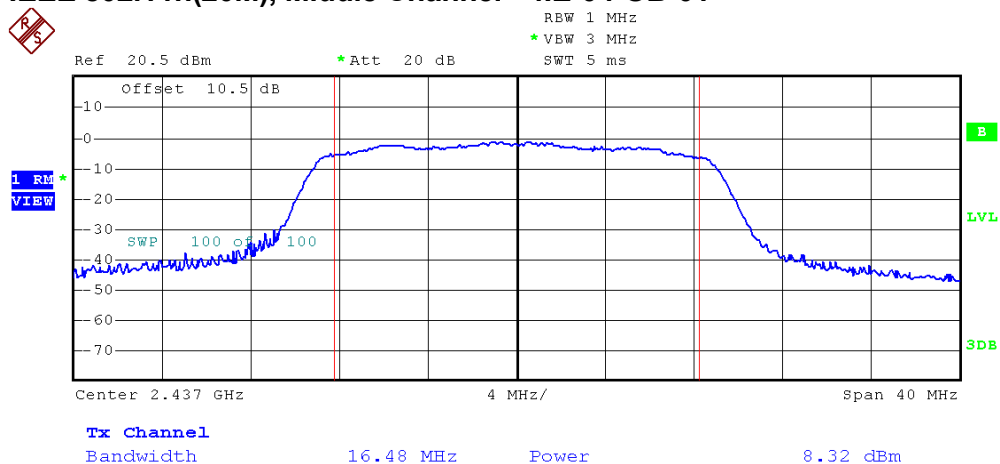


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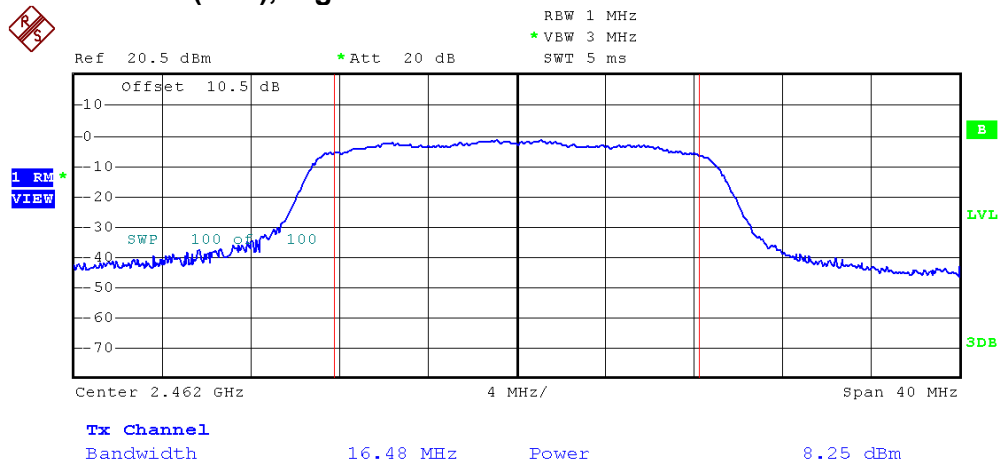
Plots of conducted output power IEEE 802.11n(20M), Lowest Channel - 4IE-04-OB-01



IEEE 802.11n(20M), Middle Channel - 4IE-04-OB-01



IEEE 802.11n(20M), Highest Channel - 4IE-04-OB-01



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4.2 Minimum 6dB RF Bandwidth

The antenna port of the EUT was connected to the input of a spectrum analyzer. The EBW measurement procedure was used. A PEAK output reading was taken, a DISPLAY line was drawn 6dB lower than PEAK level. The 6dB bandwidth was determined from where the channel output spectrum intersected the display line.

IEEE 802.11b (DSSS, 11 Mbps)		
Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	8.64
Middle Channel:	2437	8.24
High Channel:	2462	8.56

IEEE 802.11g (OFDM, 54 Mbps)		
Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	16.40
Middle Channel:	2437	16.44
High Channel:	2462	16.32

IEEE 802.11n (20MHz) (OFDM, MCS7)		
Frequency (MHz)		6dB Bandwidth (MHz)
Low Channel:	2412	17.00
Middle Channel:	2437	16.20
High Channel:	2462	17.44

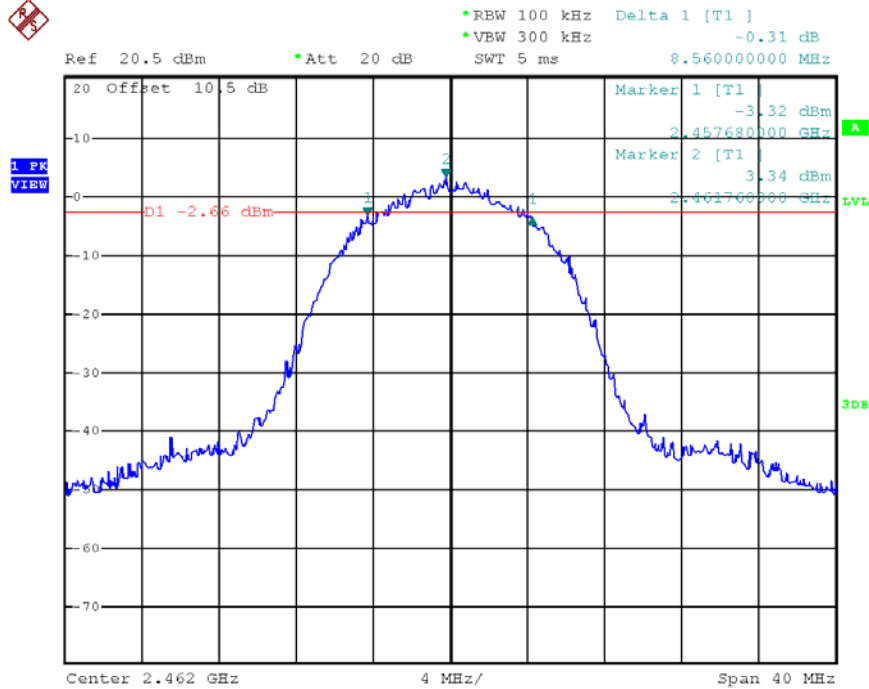
Limits

6 dB bandwidth shall be at least 500kHz

The plots of 6dB RF bandwidth and occupied bandwidth are saved as below.

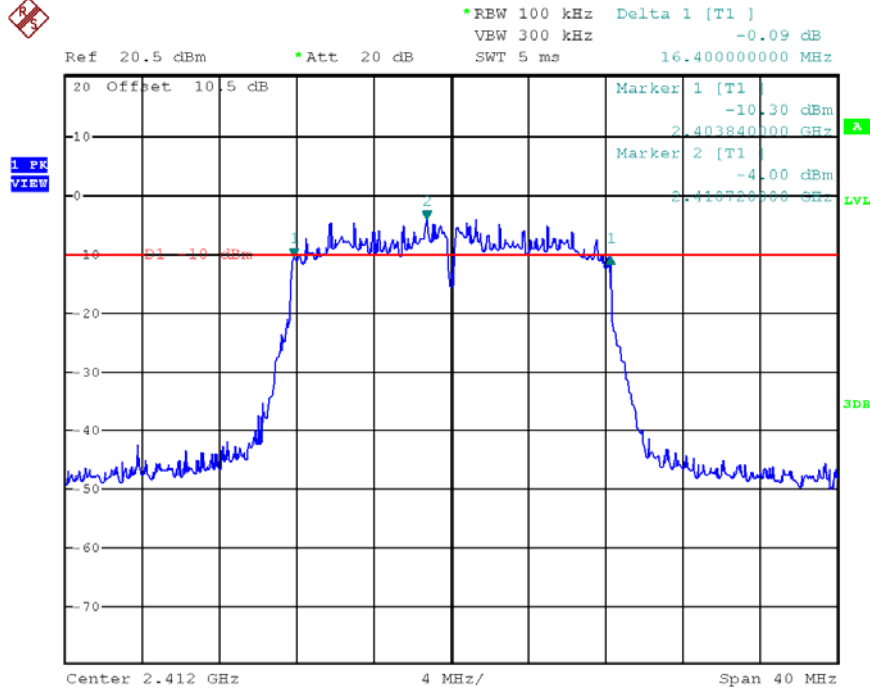
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Plots of 6dB RF bandwidth 802.11b, Highest Channel - 4IE-04-OB-01

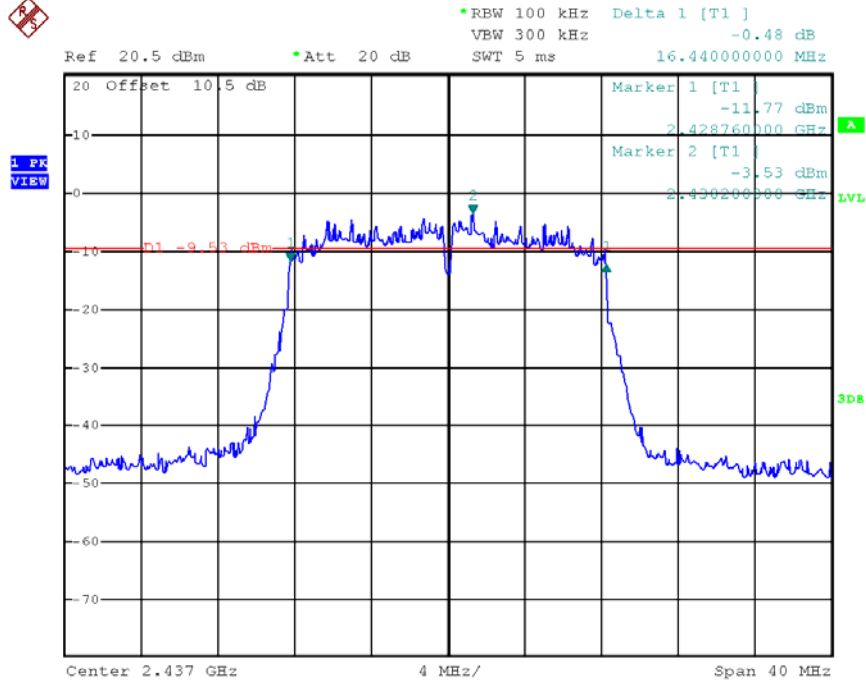


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Plots of 6dB RF bandwidth 802.11g, Lowest Channel - 4IE-04-OB-01

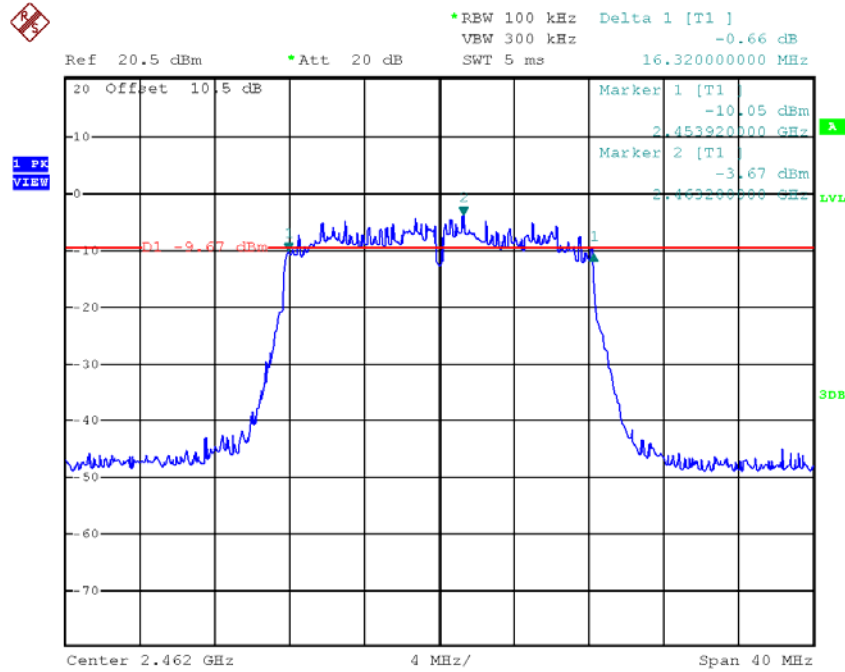


802.11g, Middle Channel - 4IE-04-OB-01



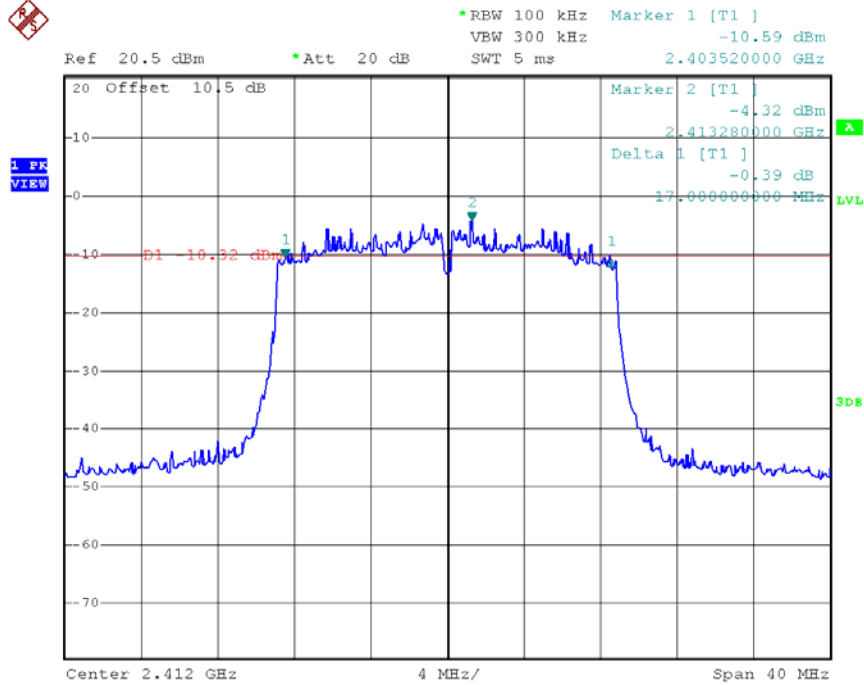
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Plots of 6dB RF bandwidth 802.11g, Highest Channel - 4IE-04-OB-01

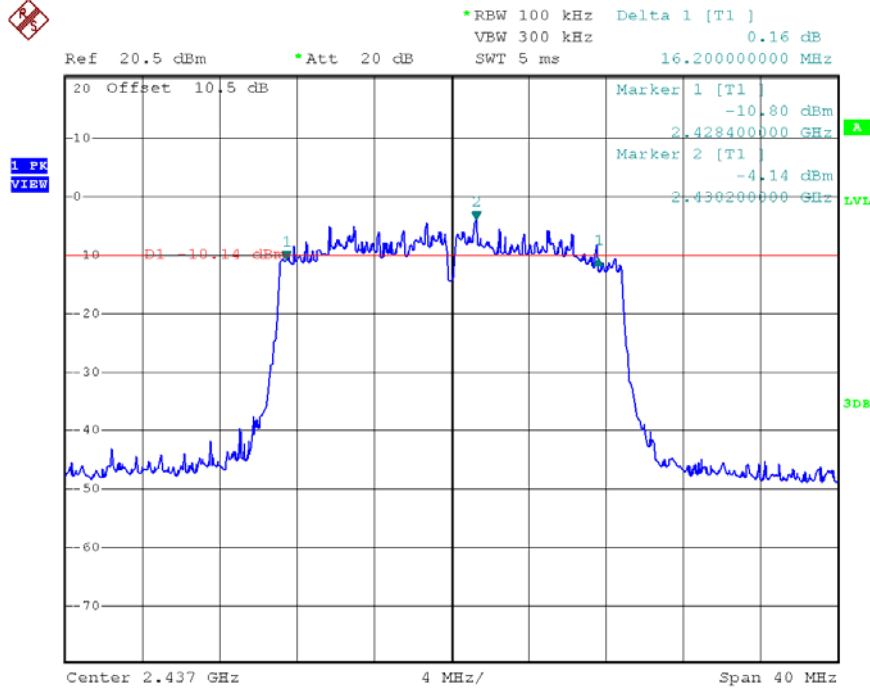


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Plots of 6dB RF bandwidth 802.11n(20M), Lowest Channel - 4IE-04-OB-01

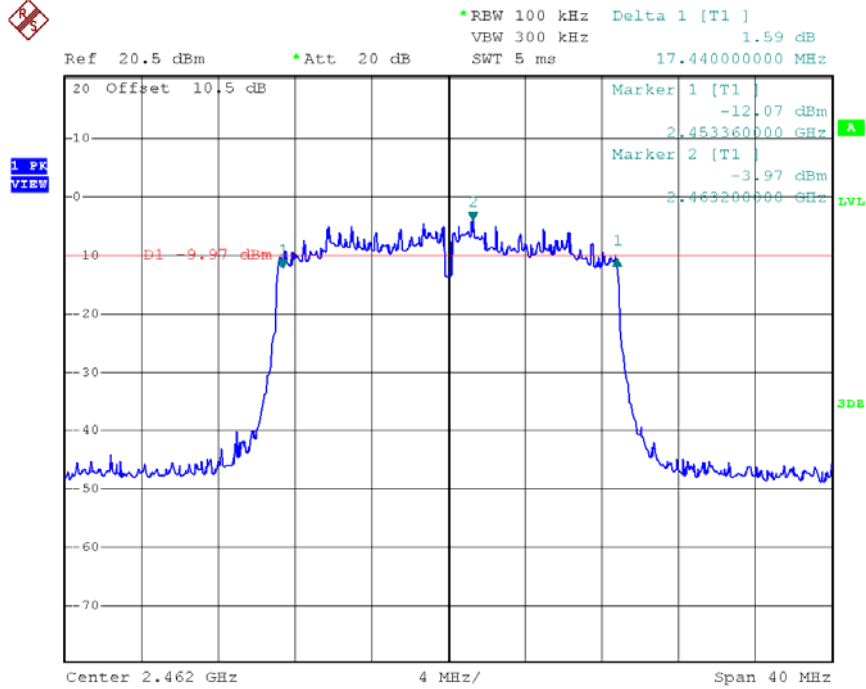


802.11n(20M), Middle Channel - 4IE-04-OB-01



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Plots of 6dB RF bandwidth 802.11n(20M), Highest Channel - 4IE-04-OB-01



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4.3 Maximum Power Spectral Density

Antenna output of the EUT was coupled directly to spectrum analyzer. The measurement procedure 10.3 AVGPSD-1 was used. If an external attenuator and/or cable was used, these losses are compensated for using the OFFSET function of the analyser.

IEEE 802.11b (DSSS, 11 Mbps)	
Frequency (MHz)	PSD in 100kHz (dBm)
Low Channel: 2412	3.14
Middle Channel: 2442	3.28
High Channel: 2462	2.52

IEEE 802.11g (OFDM, 54 Mbps)	
Frequency (MHz)	PSD in 100kHz (dBm)
Low Channel: 2412	-4.14
Middle Channel: 2442	-4.16
High Channel: 2462	-4.33

IEEE 802.11n (20MHz) (OFDM, MCS7)	
Frequency (MHz)	PSD in 100kHz (dBm)
Low Channel: 2412	-5.22
Middle Channel: 2442	-5.23
High Channel: 2462	-5.14

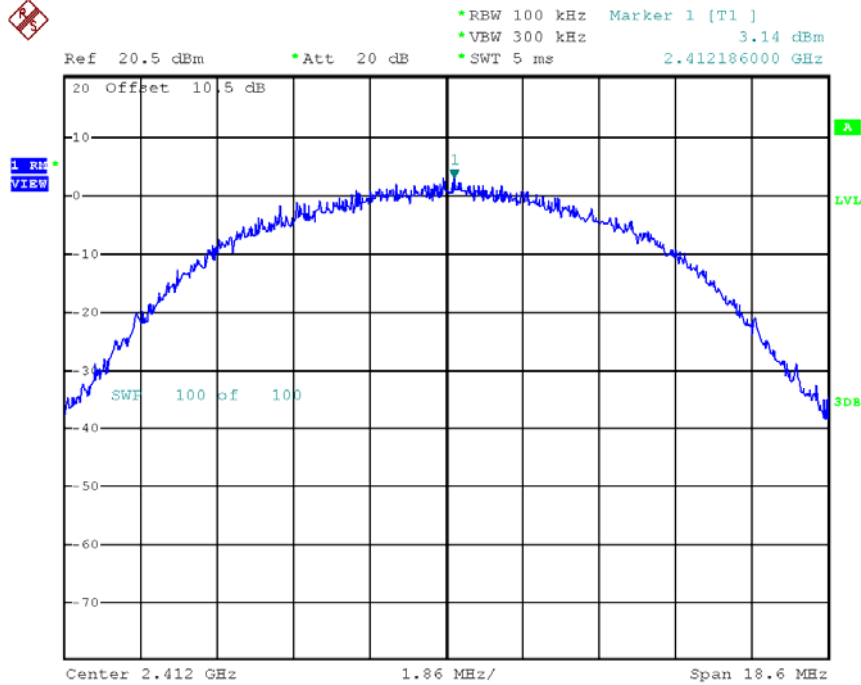
Cable Loss: 0.5 dB

Limit:
8dBm

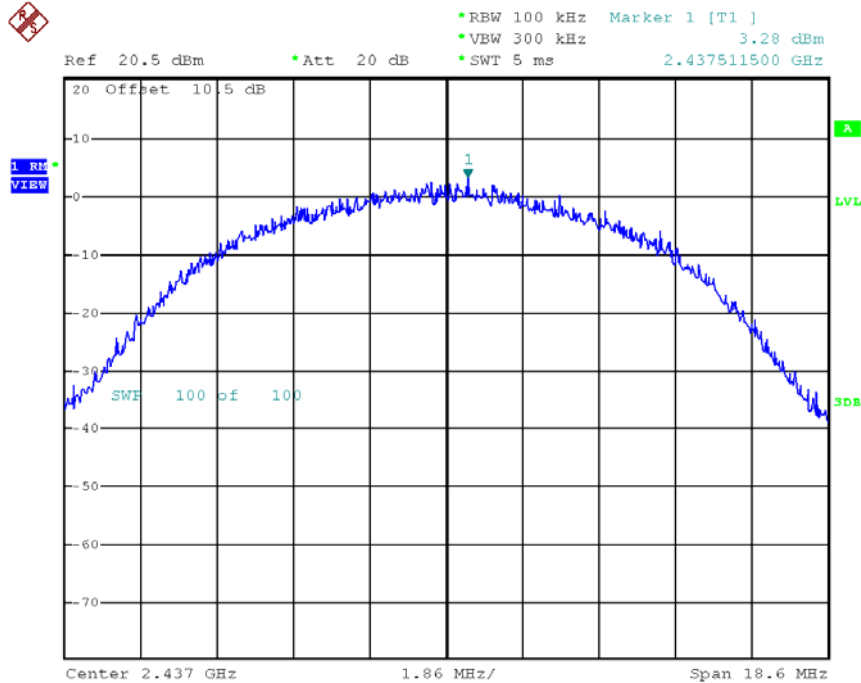
The plots of n power spectral density are as below.

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Plots of power spectral density IEEE 802.11b, Lowest Channel - 4IE-04-OB-01

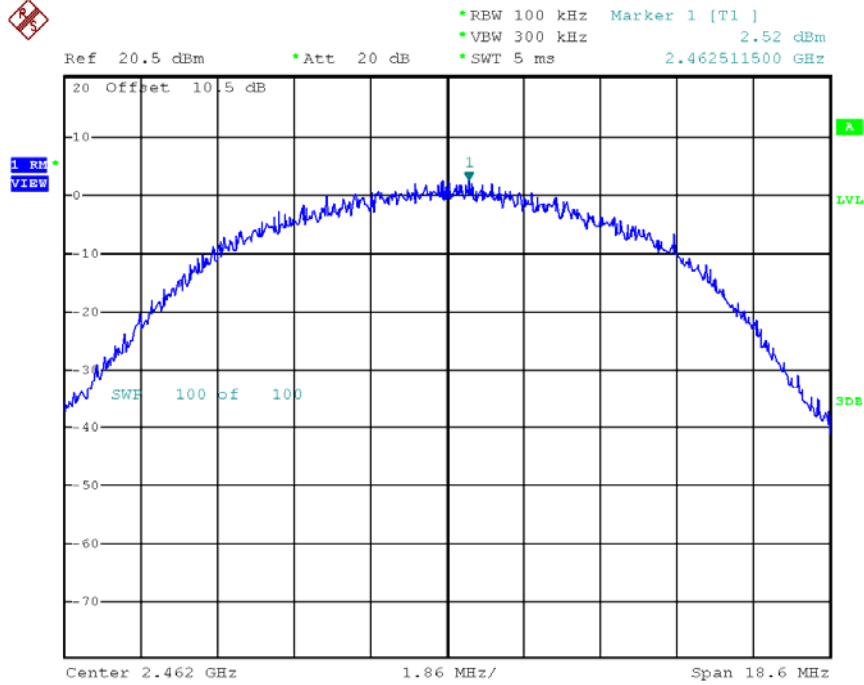


IEEE 802.11b, Middle Channel - 4IE-04-OB-01



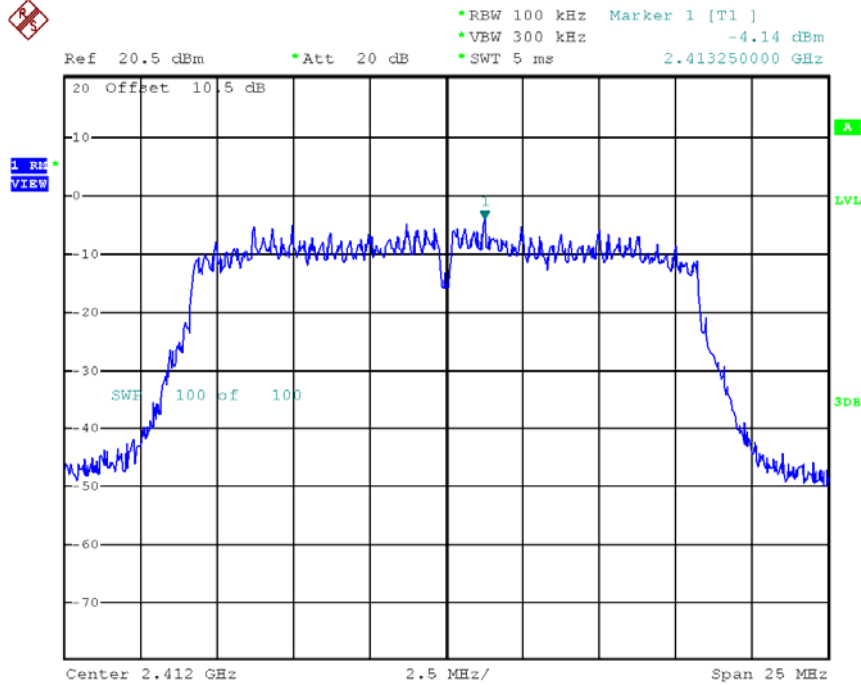
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Plots of power spectral density IEEE 802.11b, Highest Channel - 4IE-04-OB-01

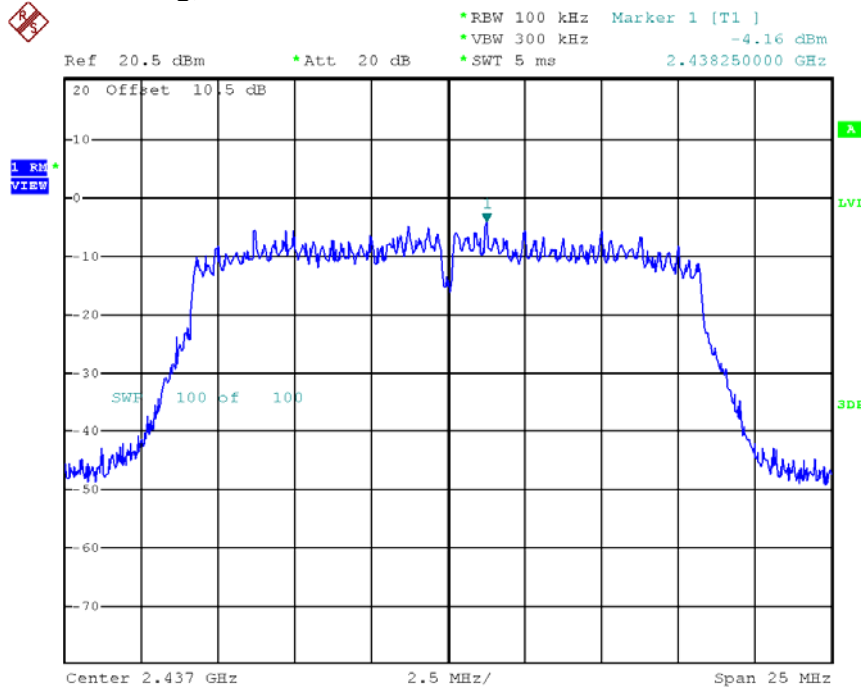


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Plots of power spectral density IEEE 802.11g, Lowest Channel - 4IE-04-OB-01

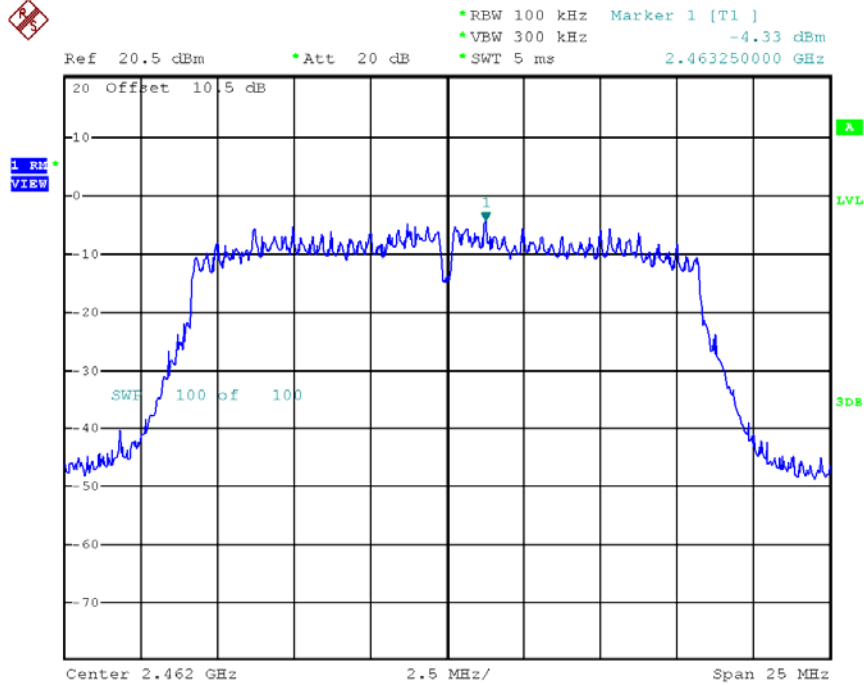


IEEE 802.11g, Middle Channel - 4IE-04-OB-01



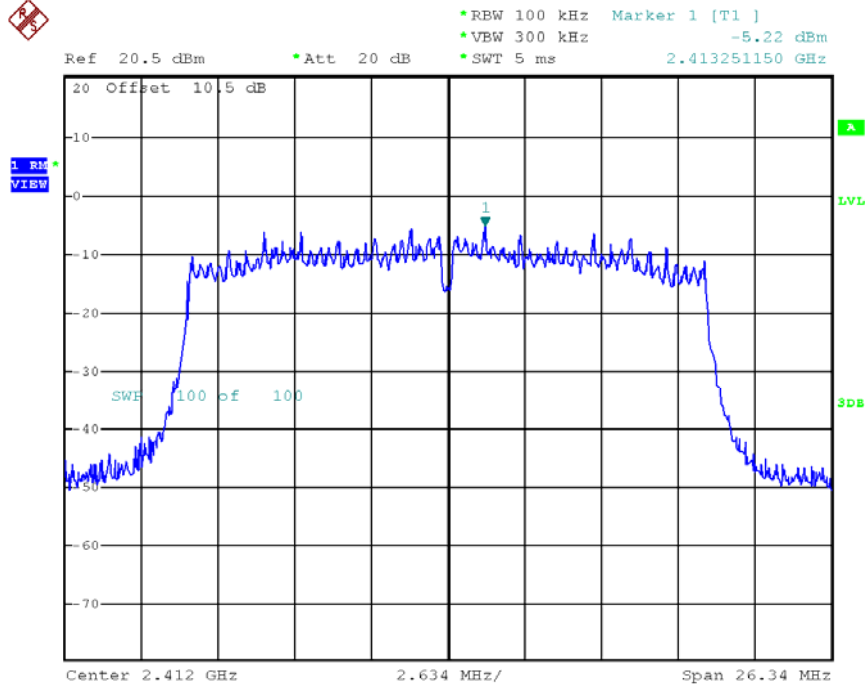
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Plots of power spectral density IEEE 802.11g, Highest Channel - 4IE-04-OB-01

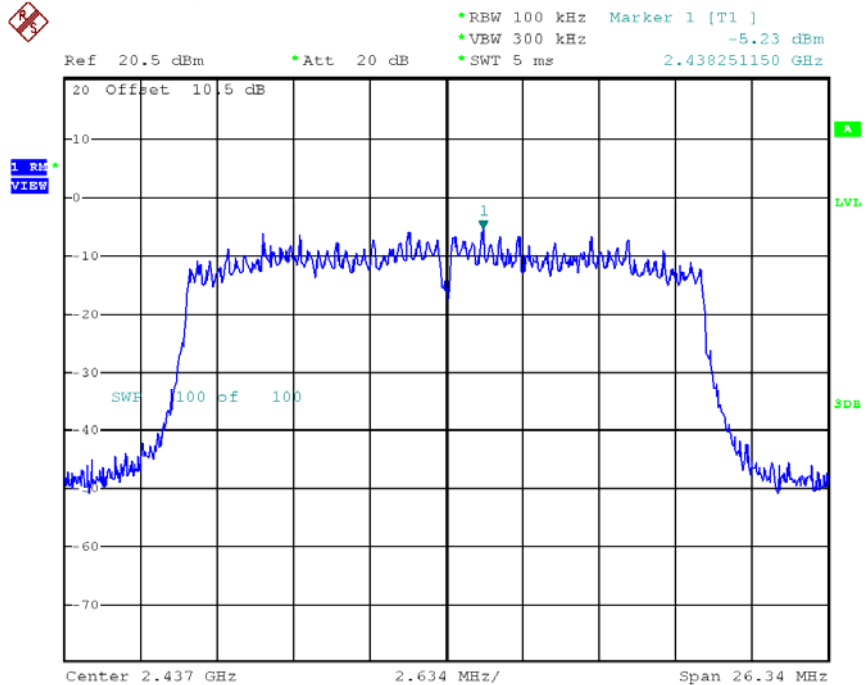


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Plots of power spectral density IEEE 802.11n, Lowest Channel - 4IE-04-OB-01

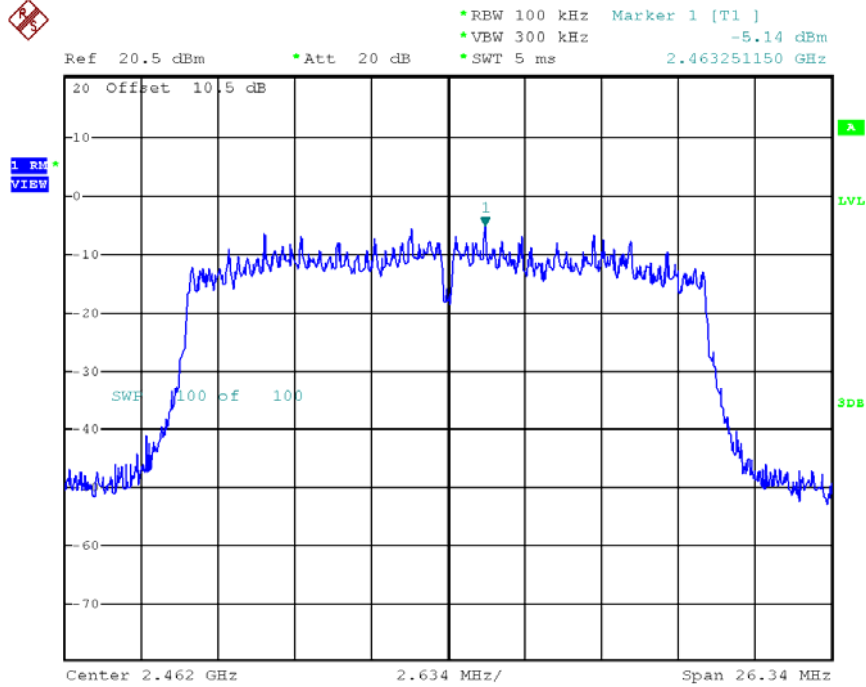


IEEE 802.11n, Middle Channel - 4IE-04-OB-01



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Plots of power spectral density IEEE 802.11n, Highest Channel - 4IE-04-OB-01



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4.4 Out of Band Conducted Emissions

The maximum conducted (average) output power was used to demonstrate compliance as described in 9.2. Then the display line (in red) shown in the following plots denotes the limit at 30dB below maximum measured in-band peak PSD level in 100 KHz bandwidth.

The measurement procedures under sections 11 of KDB558074 D01 v03r04 (07-Jan-2016) were used.

Furthermore, delta measurement technique for measuring bandedge emissions was incorporated in the test of the edge at 2483.5MHz.

Limits:

All spurious emission and up to the tenth harmonic was measured and they were found to be at least 30 dB below the maximum measured in-band peak PSD level.

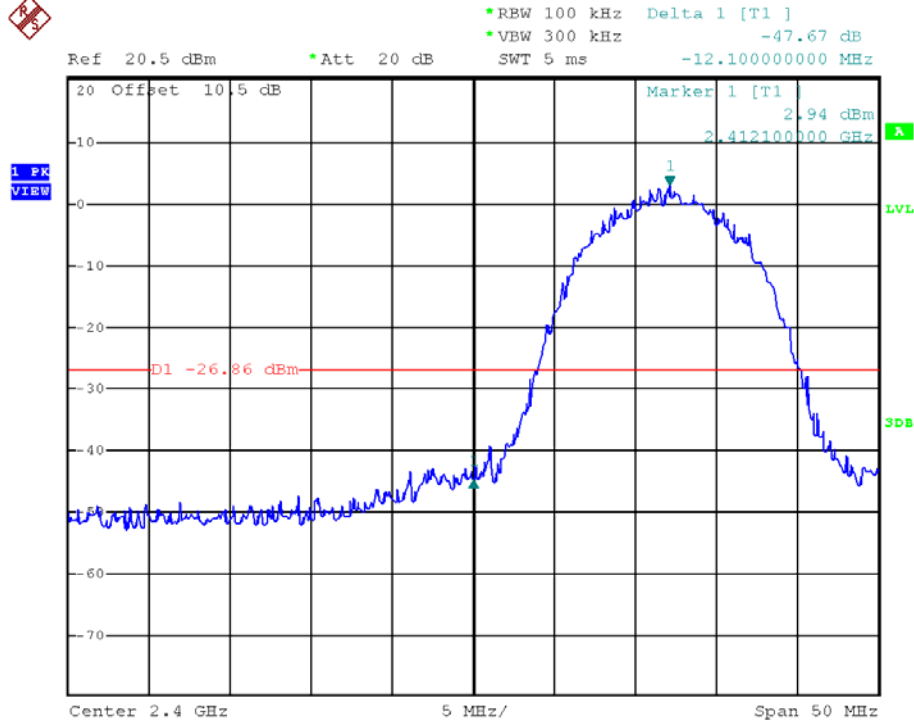
The plots of reference level measurement and out of band conducted emissions are as below.

INTERTEK TESTING SERVICES

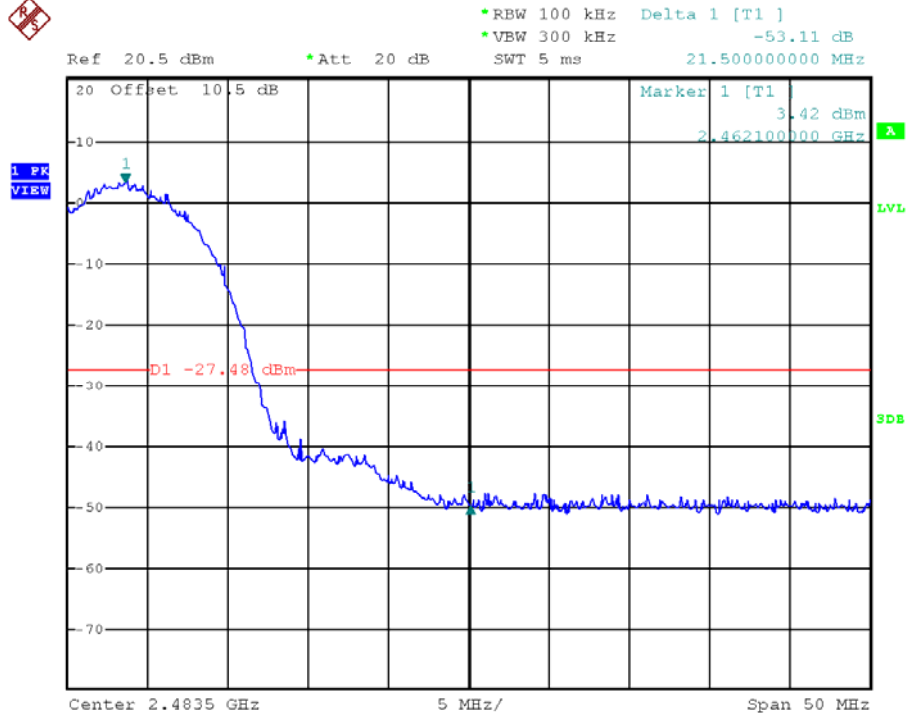
Plots of out of band conducted emissions

IEEE 802.11b - 4IE-04-OB-01

2400

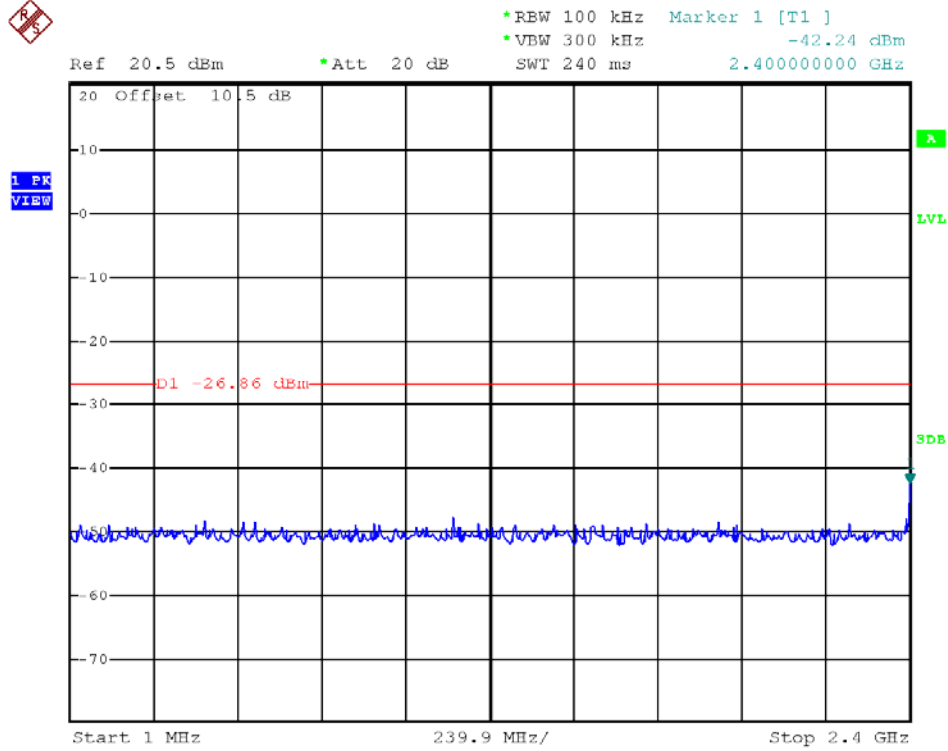


2483.5

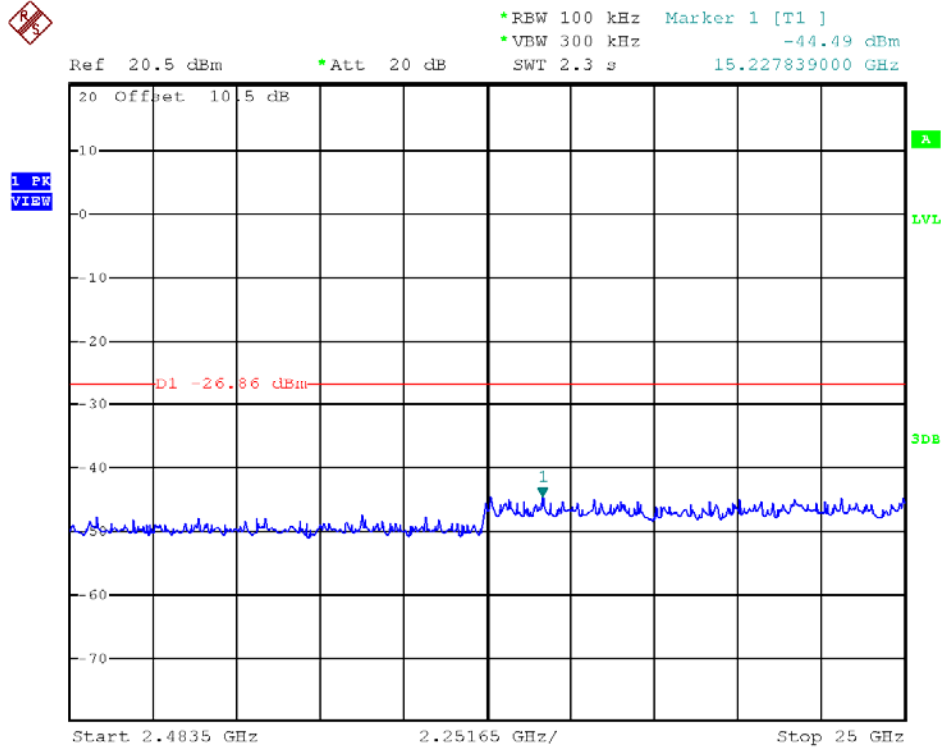


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11b, Lowest Channel, Plot A - 4IE-04-OB-01

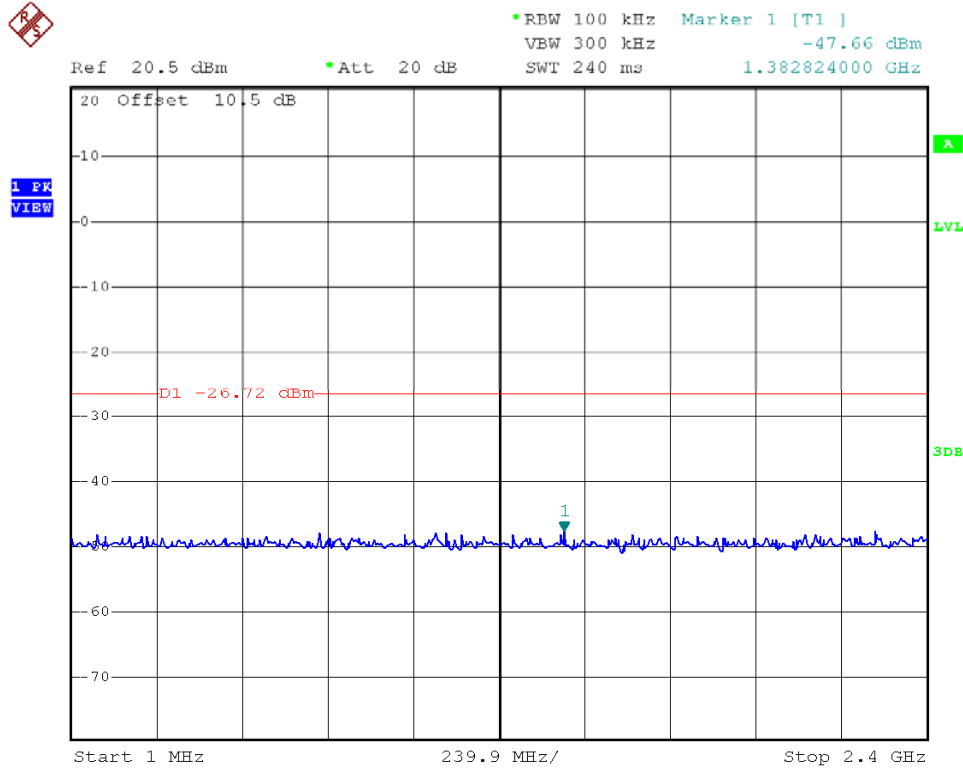


IEEE 802.11b, Lowest Channel, Plot B - 4IE-04-OB-01

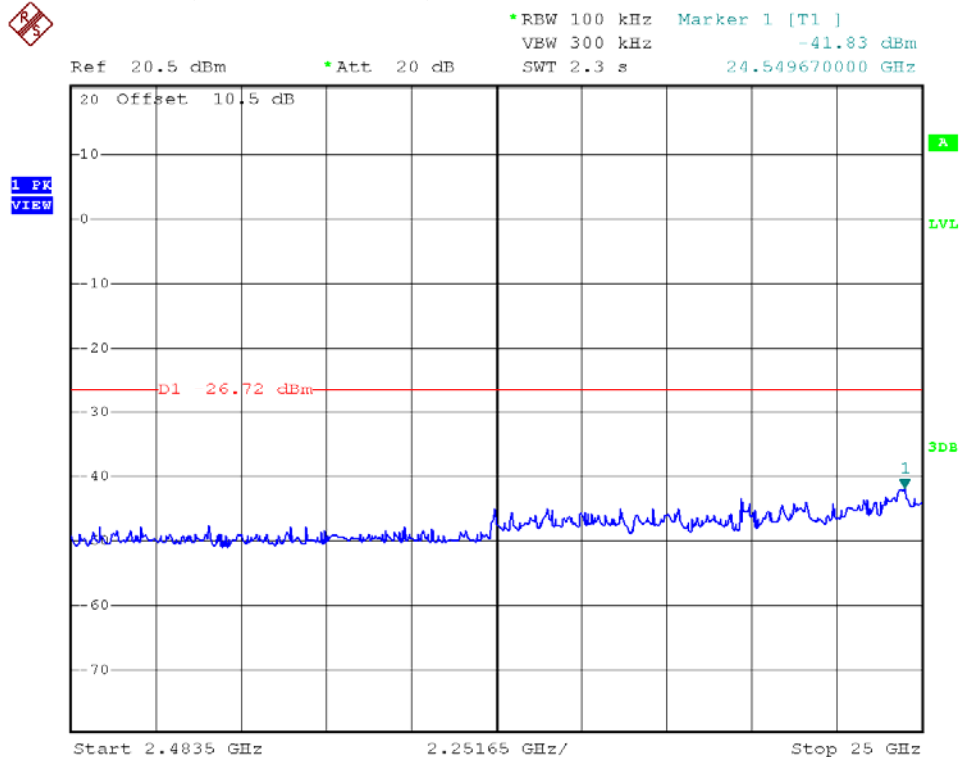


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11b, Middle Channel, Plot A - 4IE-04-OB-01

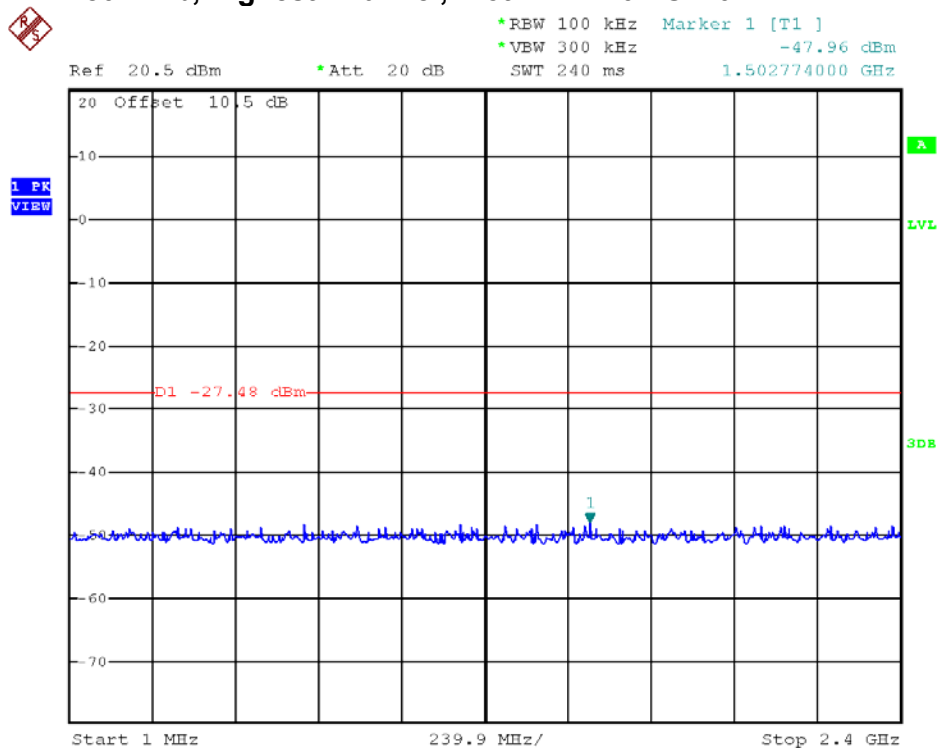


IEEE 802.11b, Middle Channel, Plot B - 4IE-04-OB-01

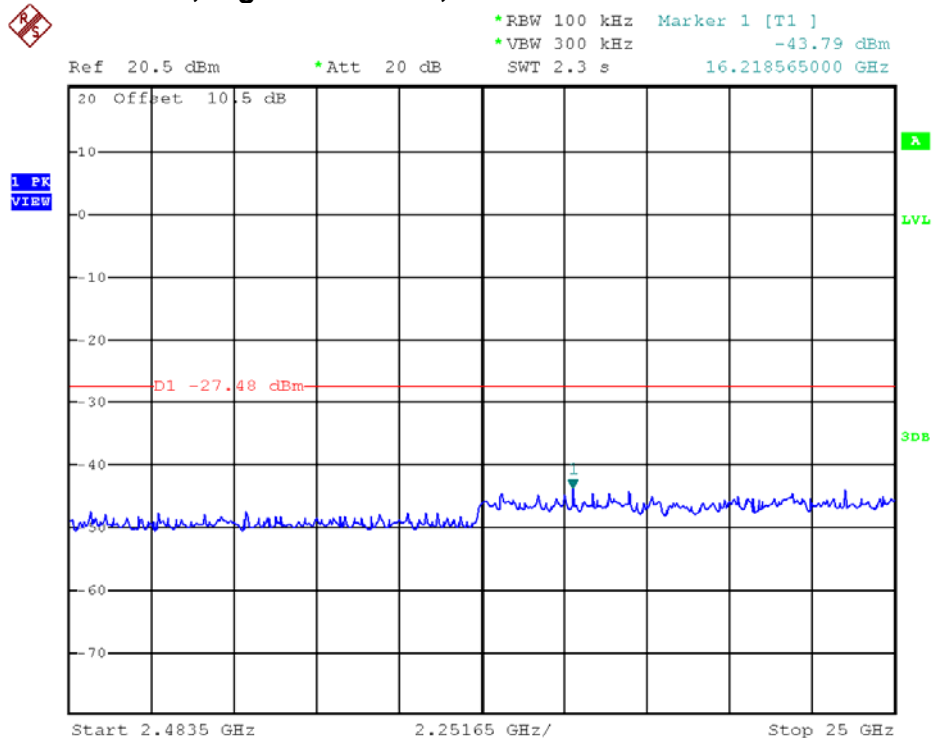


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11b, Highest Channel, Plot A - 4IE-04-OB-01



IEEE 802.11b, Highest Channel, Plot B - 4IE-04-OB-01

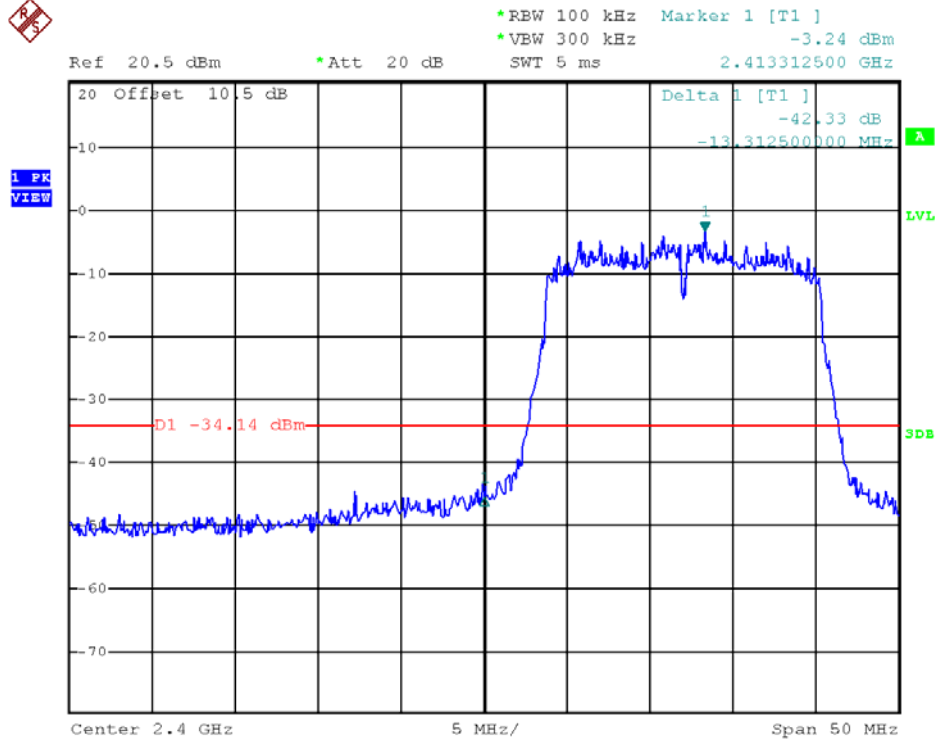


INTERTEK TESTING SERVICES

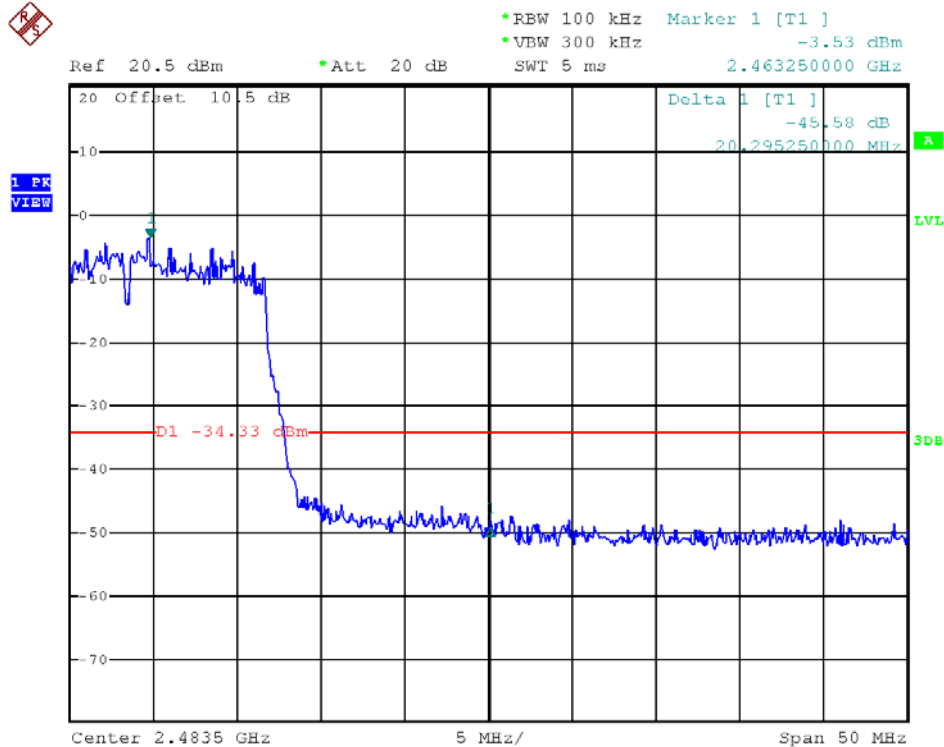
Plots of out of band conducted emissions

IEEE 802.11g - 4IE-04-OB-01

2400

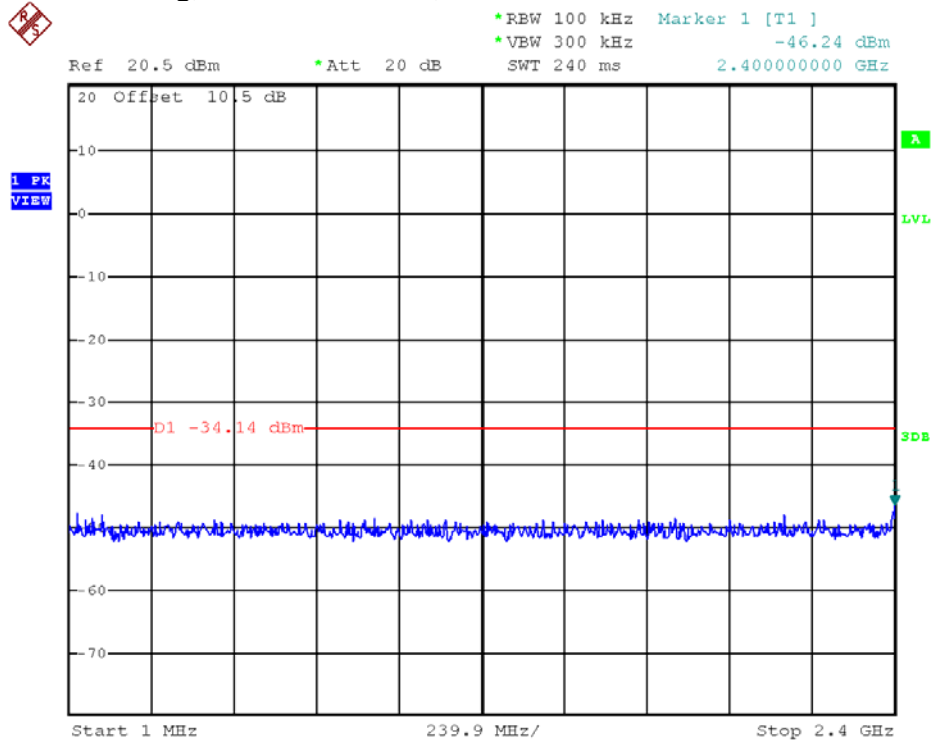


2483.5

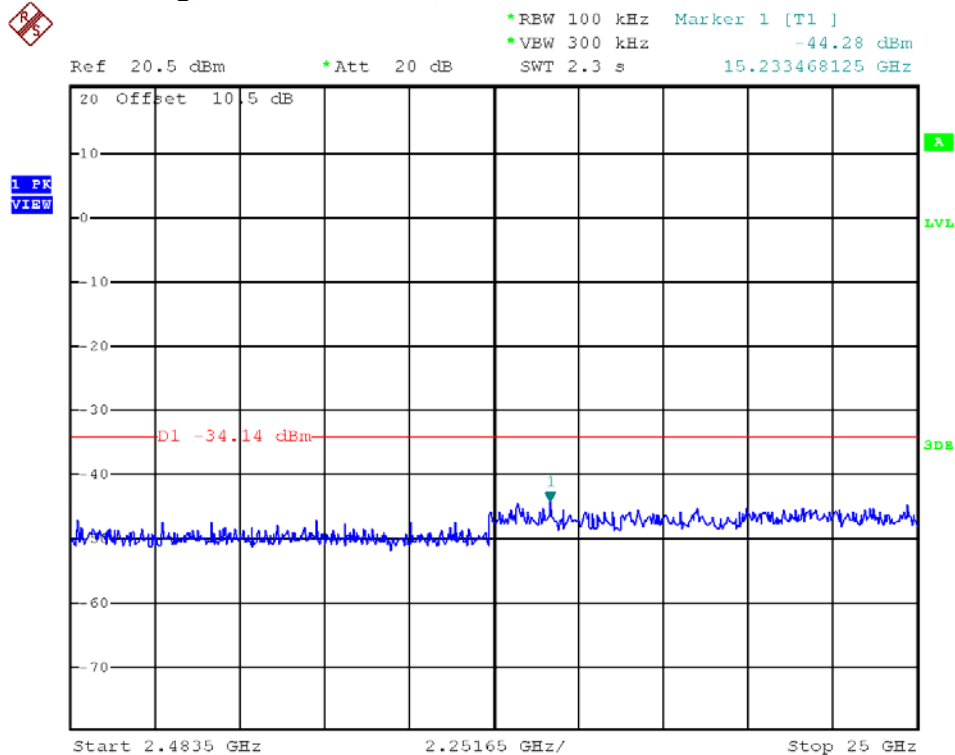


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11g, Lowest Channel, Plot A - 4IE-04-OB-01

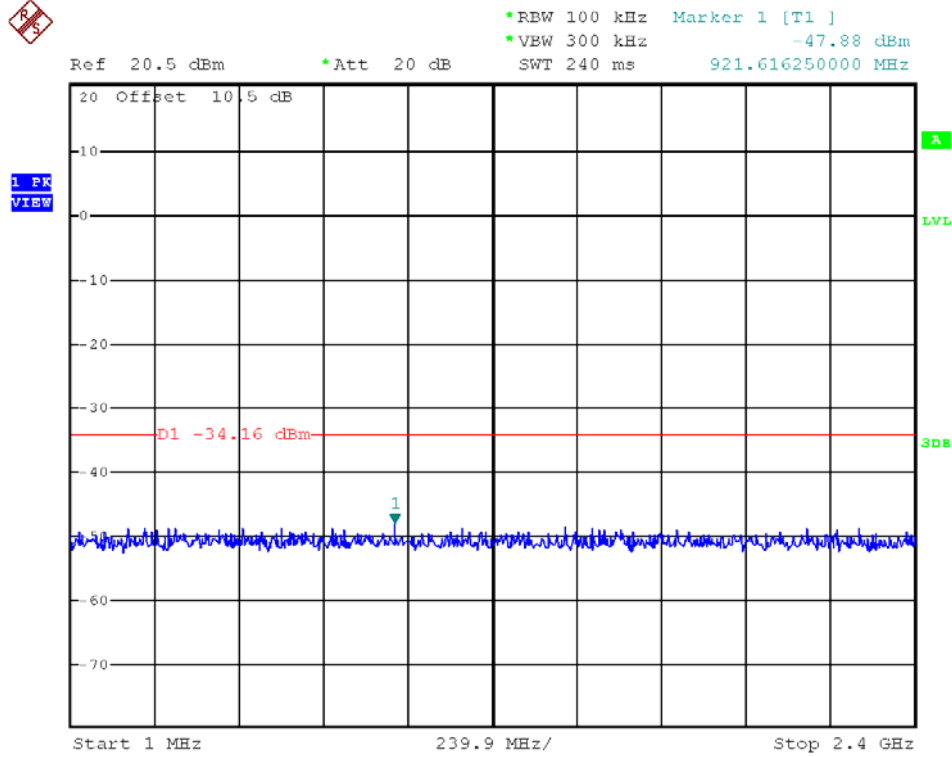


IEEE 802.11g, Lowest Channel, Plot B - 4IE-04-OB-01

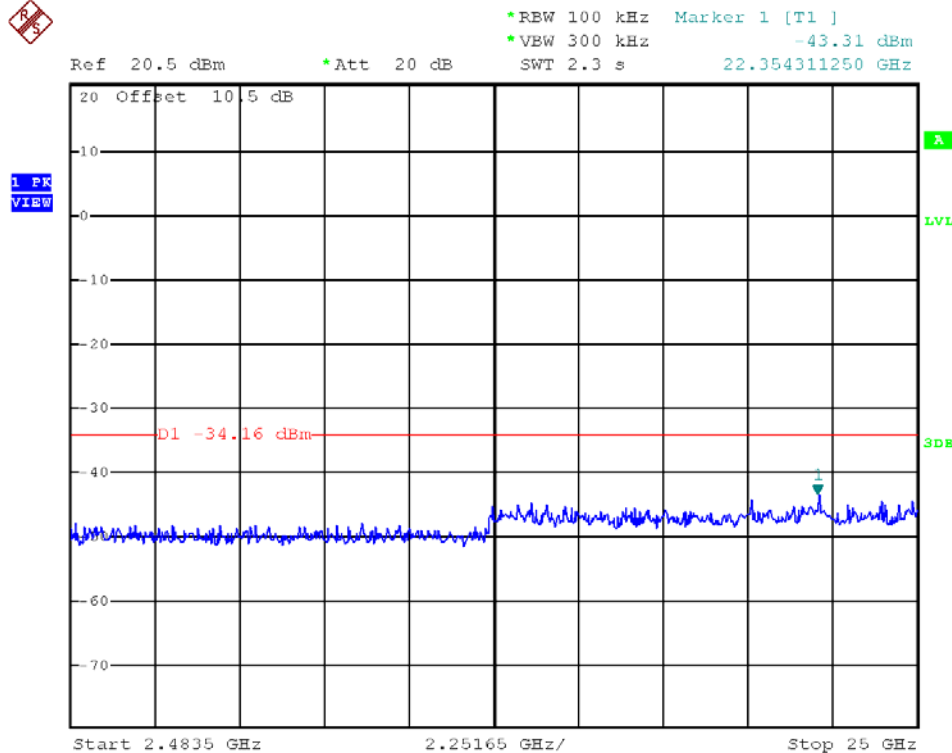


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11g, Middle Channel, Plot A - 4IE-04-OB-01

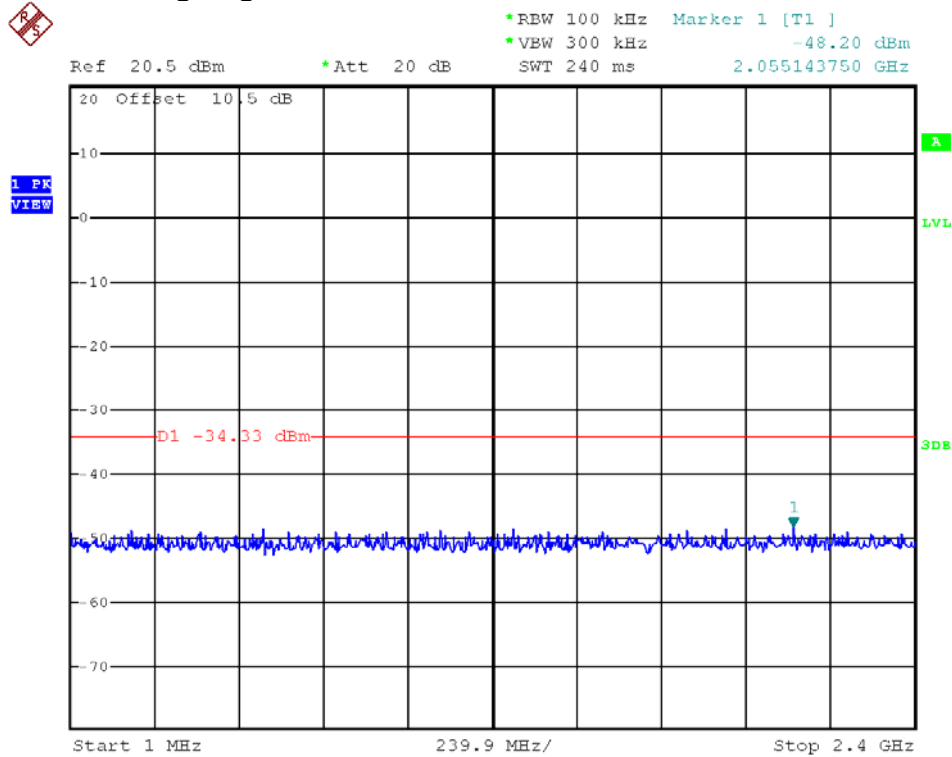


IEEE 802.11g, Middle Channel, Plot B - 4IE-04-OB-01

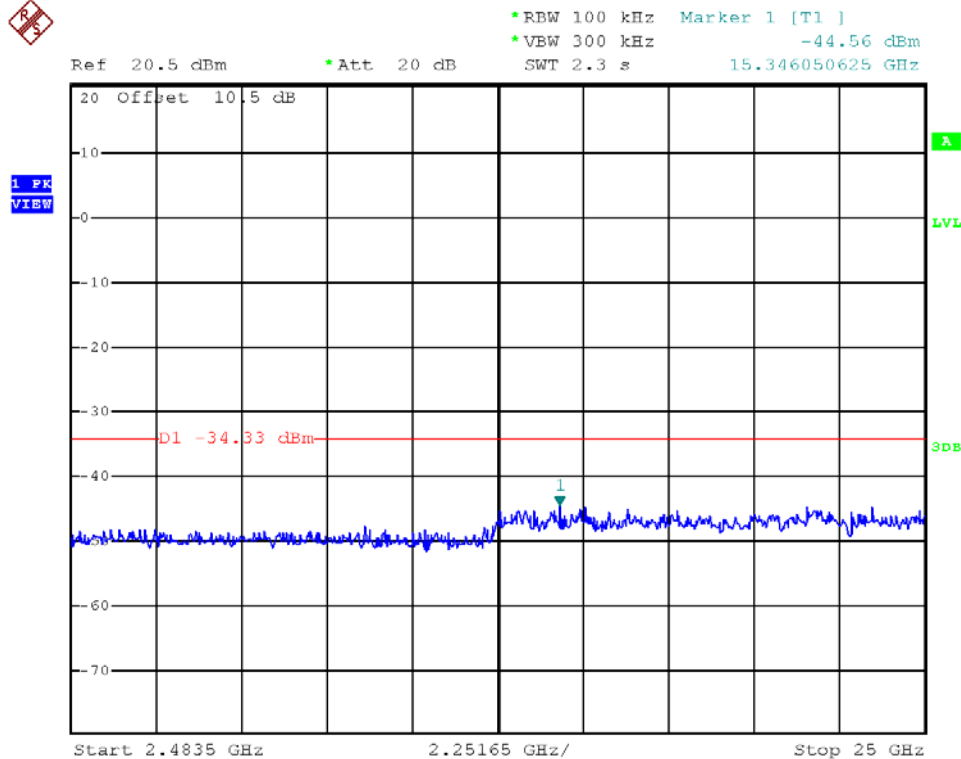


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11g, Highest Channel, Plot A - 4IE-04-OB-01



IEEE 802.11g, Highest Channel, Plot B - 4IE-04-OB-01

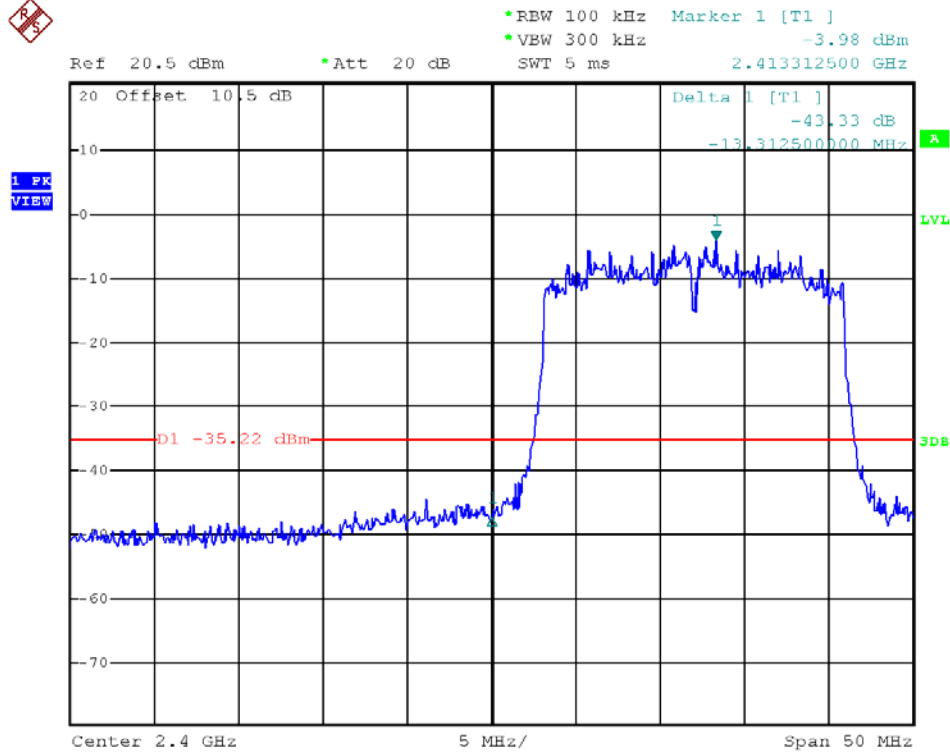


INTERTEK TESTING SERVICES

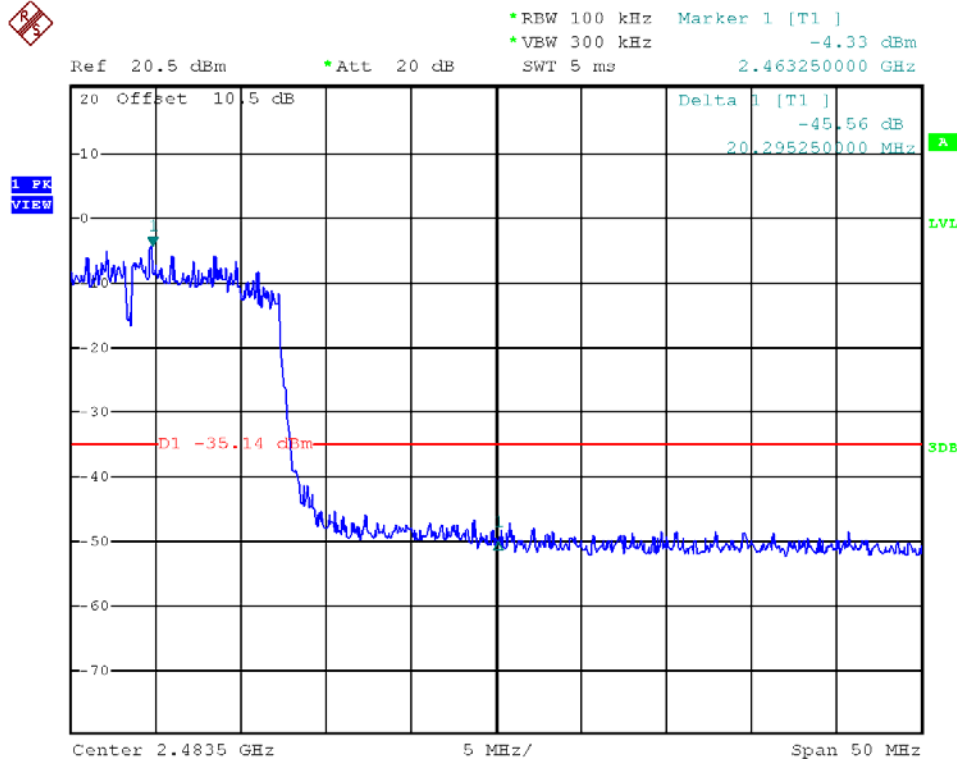
Plots of out of band conducted emissions

IEEE 802.11n(20M) - 4IE-04-OB-01

2400



2483.5

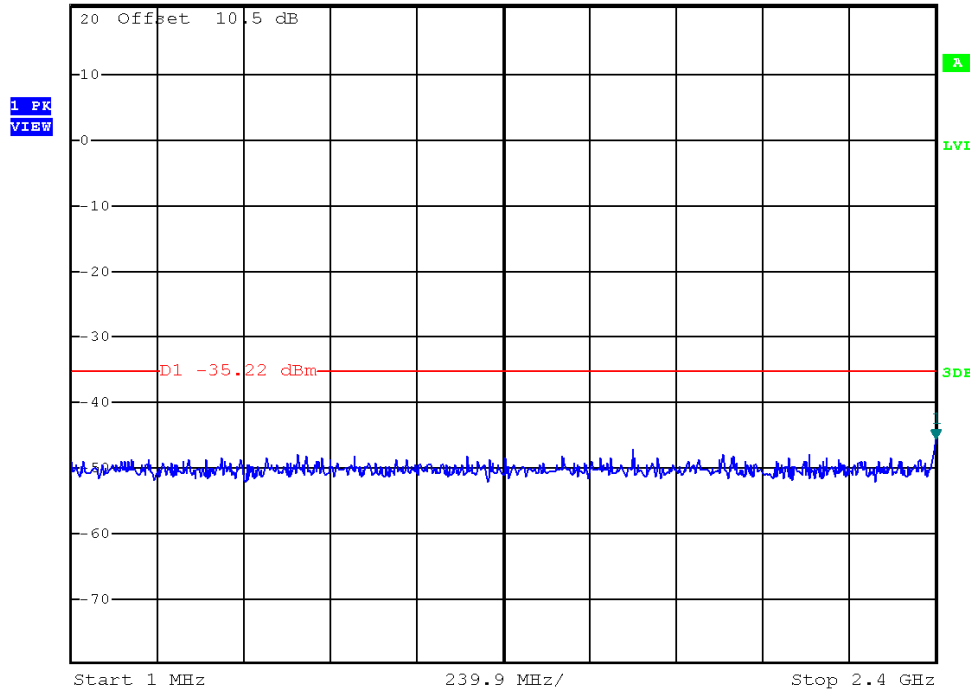


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11n(20M), Lowest Channel, Plot A - 4IE-04-OB-01



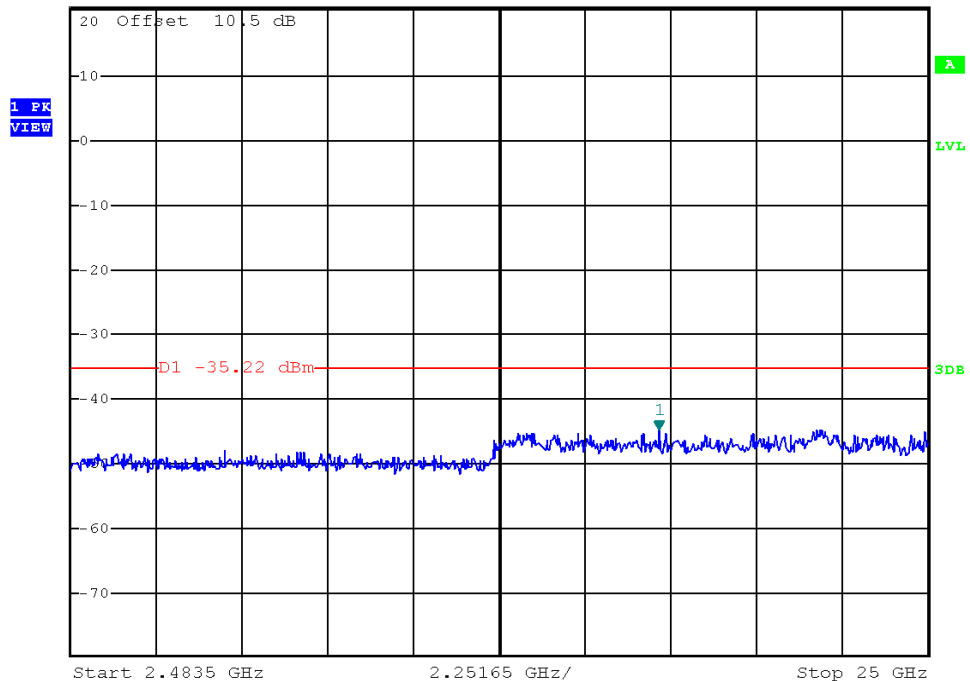
Ref 20.5 dBm *Att 20 dB SWT 240 ms 2.400000000 GHz
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -45.51 dBm



IEEE 802.11n(20M), Lowest Channel, Plot B - 4IE-04-OB-01

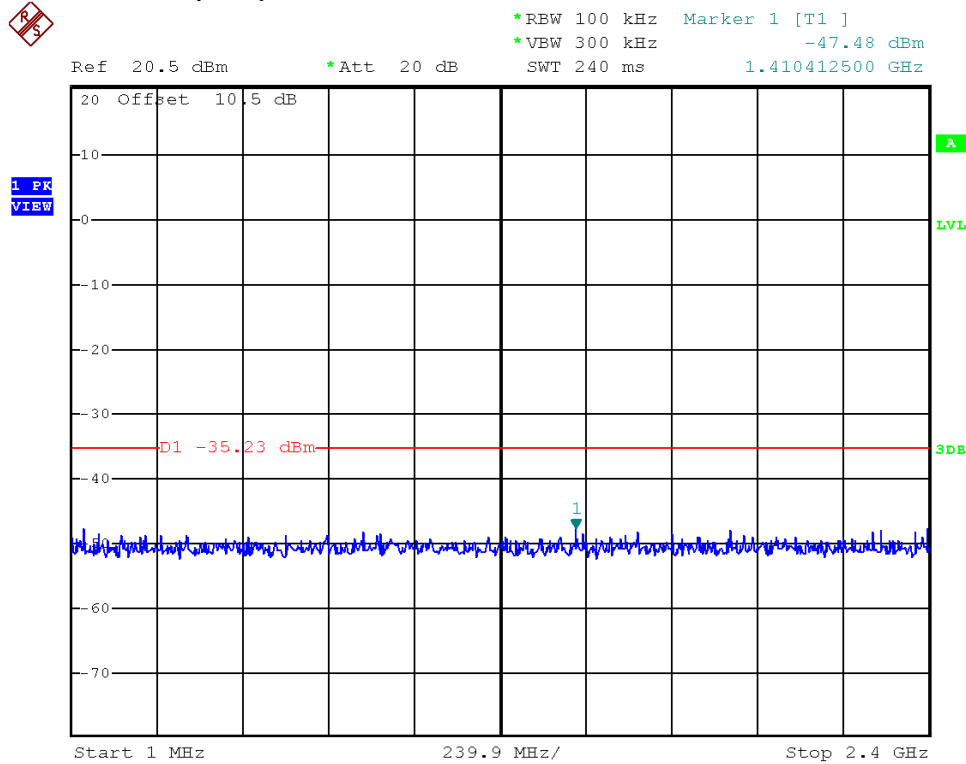


Ref 20.5 dBm *Att 20 dB SWT 2.3 s 17.907302500 GHz
*RBW 100 kHz Marker 1 [T1]
*VBW 300 kHz -44.65 dBm

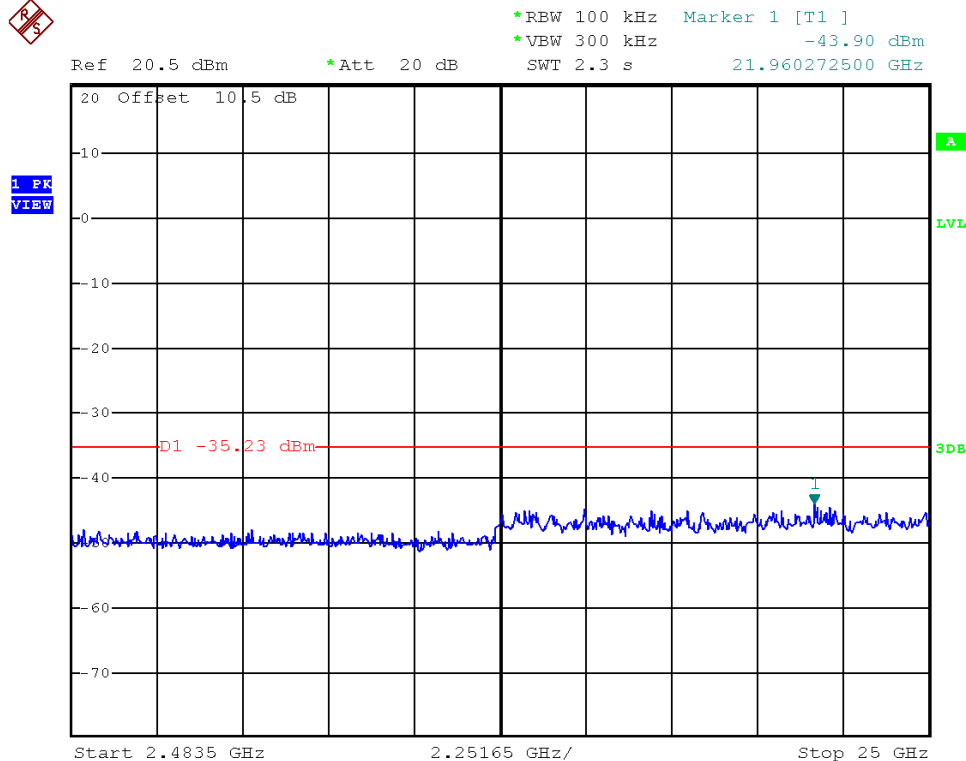


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11n(20M), Middle Channel, Plot A - 4IE-04-OB-01

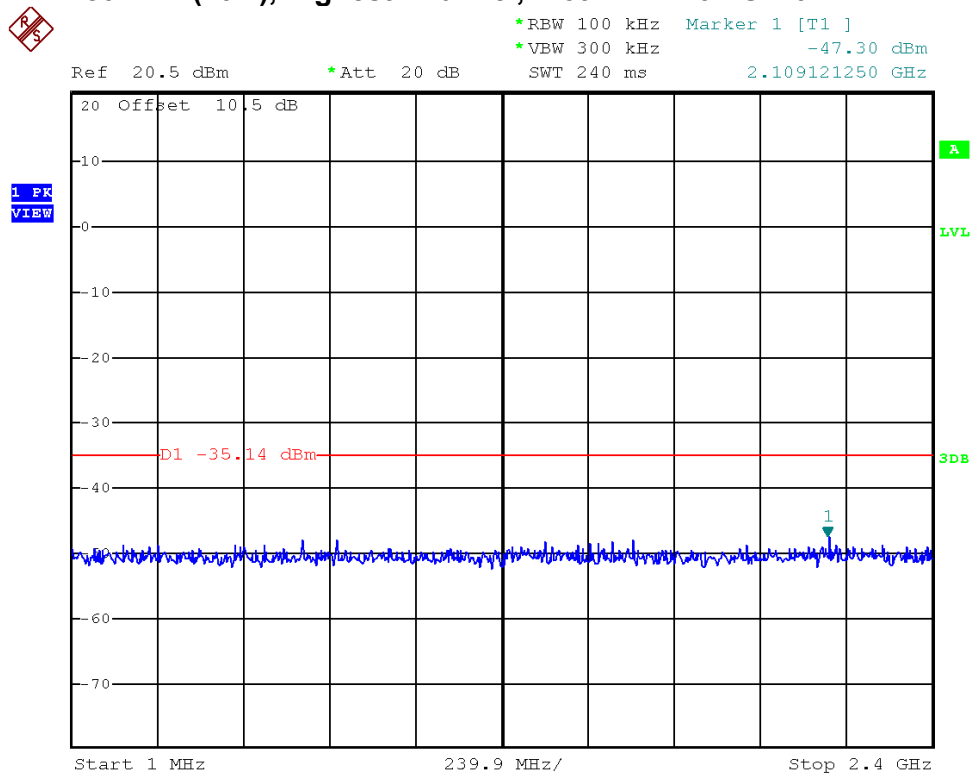


IEEE 802.11n(20M), Middle Channel, Plot B - 4IE-04-OB-01

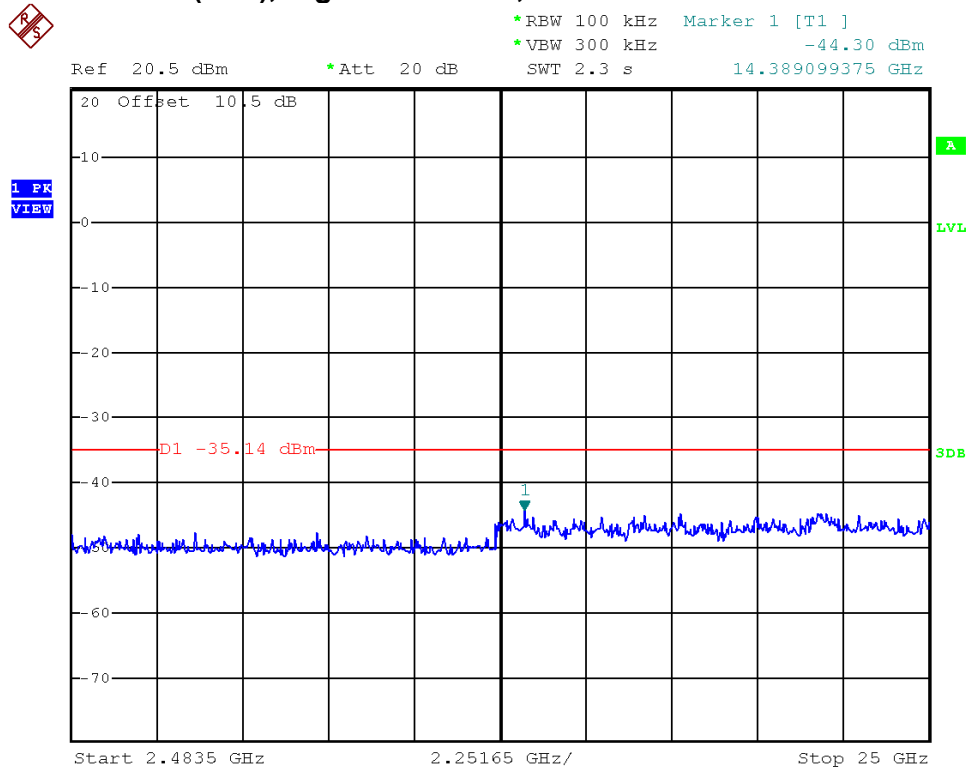


INTERTEK TESTING SERVICES

Plots of out of band conducted emissions IEEE 802.11n(20M), Highest Channel, Plot A - 4IE-04-OB-01



IEEE 802.11n(20M), Highest Channel, Plot B - 4IE-04-OB-01



INTERTEK TESTING SERVICES

4.5 Field Strength Calculation

The field strength is calculated by adding the reading on the Spectrum Analyzer to the factors associated with preamplifiers (if any), antennas, cables, pulse desensitization and average factors (when specified limit is in average and measurements are made with peak detectors). A sample calculation is included below.

$$FS = RA + AF + CF - AG + PD + AV$$

Where

- FS = Field Strength in dB μ V/m
- RA = Receiver Amplitude (including preamplifier) in dB μ V
- CF = Cable Attenuation Factor in dB
- AF = Antenna Factor in dB
- AG = Amplifier Gain in dB
- PD = Pulse Desensitization in dB
- AV = Average

In the radiated emission table which follows, the reading shown on the data table may reflect the preamplifier gain. An example of the calculations, where the reading does not reflect the preamplifier gain, follows:

$$FS = RA + AF + CF - AG + PD + AV$$

Example

Assume a receiver reading of 62.0 dB μ V is obtained. The antenna factor of 7.4 dB and cable factor of 1.6 dB is added. The amplifier gain of 29.0 dB is subtracted. The pulse desensitization factor of the spectrum analyzer is 0.0 dB, and the resultant average factor is -10.0 dB. The net field strength for comparison to the appropriate emission limit is 32.0 dB μ V/m. This value in dB μ V/m is converted to its corresponding level in μ V/m.

$$RA = 62.0 \text{ dB}\mu\text{V}$$
$$AF = 7.4 \text{ dB}$$

$$CF = 1.6 \text{ dB}$$

$$AG = 29.0 \text{ dB}$$

$$PD = 0.0 \text{ dB}$$
$$AV = -10 \text{ dB}$$

$$FS = 62.0 + 7.4 + 1.6 - 29.0 + 0.0 + (-10.0) = 32.0 \text{ dB}\mu\text{V/m}$$

$$\text{Level in } \mu\text{V/m} = \text{Common Antilogarithm} [(32.0 \text{ dB}\mu\text{V/m})/20] = 39.8 \mu\text{V/m}$$

INTERTEK TESTING SERVICES

4.6 Transmitter Radiated Emissions in Restricted Bands and Spurious Emissions

Data is included of the worst case configuration (the configuration which resulted in the highest emission levels). A sample calculation, configuration photographs and data tables of the emissions are included.

The data on the following pages list the significant emission frequencies, the limit and the margin of compliance.

4.6.1 Radiated Emission Configuration Photograph

Worst Case Restricted Band Radiated Emission
at

For Model 4IE-02-OB-01: 150.242MHz & 150.287 MHz

For Model 4IE-04-OB-01: 150.469 MHz

The worst case radiated emission configuration photographs are saved with filename:
config photos.pdf

4.6.2 Radiated Emission Data

The data in tables 1-24 list the significant emission frequencies, the limit and the margin of compliance.

Judgement -

For Model 4IE-02-OB-01 - Passed by 1.0 dB margin

For Model 4IE-04-OB-01 - Passed by 1.0 dB margin

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 01

Table 1
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	52.4	33	29.4	48.8	54.0	-5.2
V	4824.000	39.4	33	34.9	41.3	54.0	-12.7
V	7236.000	37.5	33	37.9	42.4	54.0	-11.6
V	9648.000	36.9	33	40.4	44.3	54.0	-9.7
V	12060.000	39.6	33	40.5	47.1	54.0	-6.9
V	14472.000	42.1	33	40.0	49.1	54.0	-4.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	65.0	33	29.4	61.4	74.0	-12.6
V	4824.000	49.5	33	34.9	51.4	74.0	-22.6
V	7236.000	48.7	33	37.9	53.6	74.0	-20.4
V	9648.000	49.1	33	40.4	56.5	74.0	-17.5
V	12060.000	51.1	33	40.5	58.6	74.0	-15.4
V	14472.000	52.8	33	40.0	59.8	74.0	-14.2

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 07

Table 2
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.5	33	34.9	41.4	54.0	-12.6
V	7311.000	37.4	33	37.9	42.3	54.0	-11.7
V	9748.000	36.8	33	40.4	44.2	54.0	-9.8
V	12185.000	39.7	33	40.5	47.2	54.0	-6.8
V	14622.000	43.6	33	38.4	49.0	54.0	-5.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.6	33	34.9	51.5	74.0	-22.5
V	7311.000	48.5	33	37.9	53.4	74.0	-20.6
V	9748.000	48.9	33	40.4	56.3	74.0	-17.7
V	12185.000	51.2	33	40.5	58.7	74.0	-15.3
V	14622.000	54.3	33	38.4	59.7	74.0	-14.3

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 11

Table 3
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	52.0	33	29.4	48.4	54.0	-5.6
V	4924.000	39.3	33	34.9	41.2	54.0	-12.8
V	7386.000	37.1	33	37.9	42.0	54.0	-12.0
V	9848.000	37.0	33	40.4	44.4	54.0	-9.6
V	12310.000	39.5	33	40.5	47.0	54.0	-7.0
V	14772.000	43.9	33	38.4	49.3	54.0	-4.7

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	64.9	33	29.4	61.3	74.0	-12.7
V	4924.000	49.3	33	34.9	51.2	74.0	-22.8
V	7386.000	48.2	33	37.9	53.1	74.0	-20.9
V	9848.000	49.2	33	40.4	56.6	74.0	-17.4
V	12310.000	50.9	33	40.5	58.4	74.0	-15.6
V	14772.000	54.6	33	38.4	60.0	74.0	-14.0

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 01

Table 4
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	2390.000	52.2	33	29.4	48.6	54.0	-5.4
V	4824.000	39.4	33	34.9	41.3	54.0	-12.7
V	7236.000	37.4	33	37.9	42.3	54.0	-11.7
V	9648.000	37.1	33	40.4	44.5	54.0	-9.5
V	12060.000	39.6	33	40.5	47.1	54.0	-6.9
V	14472.000	42.4	33	40.0	49.4	54.0	-4.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	2390.000	67.9	33	29.4	64.3	74.0	-9.7
V	4824.000	49.5	33	34.9	51.4	74.0	-22.6
V	7236.000	48.6	33	37.9	53.5	74.0	-20.5
V	9648.000	49.2	33	40.4	56.6	74.0	-17.4
V	12060.000	50.9	33	40.5	58.4	74.0	-15.6
V	14472.000	53.2	33	40.0	60.2	74.0	-13.8

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 07

Table 5
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.3	33	34.9	41.2	54.0	-12.8
V	7311.000	37.6	33	37.9	42.5	54.0	-11.5
V	9748.000	36.8	33	40.4	44.2	54.0	-9.8
V	12185.000	39.5	33	40.5	47.0	54.0	-7.0
V	14622.000	43.8	33	38.4	49.2	54.0	-4.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.3	33	34.9	51.2	74.0	-22.8
V	7311.000	48.8	33	37.9	53.7	74.0	-20.3
V	9748.000	49.0	33	40.4	56.4	74.0	-17.6
V	12185.000	50.8	33	40.5	58.3	74.0	-15.7
V	14622.000	54.7	33	38.4	60.1	74.0	-13.9

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 11

Table 6
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	51.9	33	29.4	48.3	54.0	-5.7
V	4924.000	39.2	33	34.9	41.1	54.0	-12.9
V	7386.000	37.3	33	37.9	42.2	54.0	-11.8
V	9848.000	37.1	33	40.4	44.5	54.0	-9.5
V	12310.000	39.7	33	40.5	47.2	54.0	-6.8
V	14772.000	43.6	33	38.4	49.0	54.0	-5.0

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	65.9	33	29.4	62.3	74.0	-11.7
V	4924.000	49.3	33	34.9	51.2	74.0	-22.8
V	7386.000	48.6	33	37.9	53.5	74.0	-20.5
V	9848.000	49.3	33	40.4	56.7	74.0	-17.3
V	12310.000	51.1	33	40.5	58.6	74.0	-15.4
V	14772.000	54.5	33	38.4	59.9	74.0	-14.1

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 01

Table 7
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	52.0	33	29.4	48.4	54.0	-5.6
V	4824.000	39.4	33	34.9	41.3	54.0	-12.7
V	7236.000	37.6	33	37.9	42.5	54.0	-11.5
V	9648.000	36.8	33	40.4	44.2	54.0	-9.8
V	12060.000	39.8	33	40.5	47.3	54.0	-6.7
V	14472.000	41.9	33	40.0	48.9	54.0	-5.1

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	66.4	33	29.4	62.8	74.0	-11.2
V	4824.000	49.5	33	34.9	51.4	74.0	-22.6
V	7236.000	48.7	33	37.9	53.6	74.0	-20.4
V	9648.000	48.9	33	40.4	56.3	74.0	-17.7
V	12060.000	51.3	33	40.5	58.8	74.0	-15.2
V	14472.000	52.7	33	40.0	59.7	74.0	-14.3

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 07

Table 8
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.2	33	34.9	41.1	54.0	-12.9
V	7311.000	37.4	33	37.9	42.3	54.0	-11.7
V	9748.000	36.9	33	40.4	44.3	54.0	-9.7
V	12185.000	39.7	33	40.5	47.2	54.0	-6.8
V	14622.000	44.0	33	38.4	49.4	54.0	-4.6

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.2	33	34.9	51.1	74.0	-22.9
V	7311.000	48.5	33	37.9	53.4	74.0	-20.6
V	9748.000	49.0	33	40.4	56.4	74.0	-17.6
V	12185.000	51.1	33	40.5	58.6	74.0	-15.4
V	14622.000	54.9	33	38.4	60.3	74.0	-13.7

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: TX-Channel 11

Table 9
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	51.8	33	29.4	48.2	54.0	-5.8
V	4924.000	39.4	33	34.9	41.3	54.0	-12.7
V	7386.000	37.6	33	37.9	42.5	54.0	-11.5
V	9848.000	37.1	33	40.4	44.5	54.0	-9.5
V	12310.000	39.4	33	40.5	46.9	54.0	-7.1
V	14772.000	43.7	33	38.4	49.1	54.0	-4.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	64.5	33	29.4	60.9	74.0	-13.1
V	4924.000	49.5	33	34.9	51.4	74.0	-22.6
V	7386.000	48.8	33	37.9	53.7	74.0	-20.3
V	9848.000	49.2	33	40.4	56.6	74.0	-17.4
V	12310.000	50.9	33	40.5	58.4	74.0	-15.6
V	14772.000	54.7	33	38.4	60.1	74.0	-13.9

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Horn antenna is used for the emission over 1000MHz.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
Mode: Transmission

Table 10
IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	31.242	34.1	16	10.0	28.1	40.0	-11.9
V	135.054	39.3	16	14.0	37.3	43.5	-6.2
V	144.384	42.8	16	14.0	40.8	43.5	-2.7
V	150.287	44.5	16	14.0	42.5	43.5	-1.0
H	227.760	40.8	16	18.0	42.8	46.0	-3.2
H	240.865	40.4	16	19.0	43.4	46.0	-2.6
H	243.721	38.9	16	20.0	42.9	46.0	-3.1
V	259.024	35.0	16	21.0	40.0	46.0	-6.0
V	481.257	29.2	16	26.0	39.2	46.0	-6.8
V	506.120	32.2	16	27.0	43.2	46.0	-2.8

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
 Mode: Transmission

Table 11
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	31.274	34.4	16	10.0	28.4	40.0	-11.6
V	135.105	39.5	16	14.0	37.5	43.5	-6.0
V	144.356	42.7	16	14.0	40.7	43.5	-2.8
V	150.214	44.4	16	14.0	42.4	43.5	-1.1
H	227.737	40.6	16	18.0	42.6	46.0	-3.4
H	240.818	40.5	16	19.0	43.5	46.0	-2.5
H	243.755	38.8	16	20.0	42.8	46.0	-3.2
V	259.035	30.5	16	21.0	35.5	46.0	-10.5
V	481.238	26.3	16	26.0	36.3	46.0	-9.7
V	506.149	32.1	16	27.0	43.1	46.0	-2.9

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

INTERTEK TESTING SERVICES

Model : 4IE-02-OB-01
Mode: Transmission

Table 12
IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	31.233	34.3	16	10.0	28.3	40.0	-11.7
V	135.119	39.4	16	14.0	37.4	43.5	-6.1
V	144.350	42.8	16	14.0	40.8	43.5	-2.7
V	150.242	44.5	16	14.0	42.5	43.5	-1.0
H	227.770	40.7	16	18.0	42.7	46.0	-3.3
H	240.796	40.3	16	19.0	43.3	46.0	-2.7
H	243.694	38.6	16	20.0	42.6	46.0	-3.4
V	259.108	30.7	16	21.0	35.7	46.0	-10.3
V	481.255	26.2	16	26.0	36.2	46.0	-9.8
V	506.182	32.1	16	27.0	43.1	46.0	-2.9

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 4. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 01

Table 13
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	2390.000	53.9	33	29.4	50.3	54.0	-3.7
V	4824.000	39.3	33	34.9	41.2	54.0	-12.8
V	7236.000	37.8	33	37.9	42.7	54.0	-11.3
V	9648.000	36.8	33	40.4	44.2	54.0	-9.8
V	12060.000	39.6	33	40.5	47.1	54.0	-6.9
V	14472.000	42.2	33	40.0	49.2	54.0	-4.8

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	2390.000	66.6	33	29.4	63.0	74.0	-11.0
V	4824.000	49.3	33	34.9	51.2	74.0	-22.8
V	7236.000	48.9	33	37.9	53.8	74.0	-20.2
V	9648.000	49.0	33	40.4	56.4	74.0	-17.6
V	12060.000	51.3	33	40.5	58.8	74.0	-15.2
V	14472.000	52.9	33	40.0	59.9	74.0	-14.1

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 07

Table 14
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.4	33	34.9	41.3	54.0	-12.7
V	7311.000	37.6	33	37.9	42.5	54.0	-11.5
V	9748.000	36.7	33	40.4	44.1	54.0	-9.9
V	12185.000	39.5	33	40.5	47.0	54.0	-7.0
V	14622.000	43.7	33	38.4	49.1	54.0	-4.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.5	33	34.9	51.4	74.0	-22.6
V	7311.000	48.7	33	37.9	53.6	74.0	-20.4
V	9748.000	48.8	33	40.4	56.2	74.0	-17.8
V	12185.000	51.0	33	40.5	58.5	74.0	-15.5
V	14622.000	54.3	33	38.4	59.7	74.0	-14.3

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 11

Table 15
 IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	51.6	33	29.4	48.0	54.0	-6.0
V	4924.000	39.5	33	34.9	41.4	54.0	-12.6
V	7386.000	37.5	33	37.9	42.4	54.0	-11.6
V	9848.000	37.1	33	40.4	44.5	54.0	-9.5
V	12310.000	39.5	33	40.5	47.0	54.0	-7.0
V	14772.000	44.0	33	38.4	49.4	54.0	-4.6

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	65.4	33	29.4	61.8	74.0	-12.2
V	4924.000	49.6	33	34.9	51.5	74.0	-22.5
V	7386.000	48.6	33	37.9	53.5	74.0	-20.5
V	9848.000	49.2	33	40.4	56.6	74.0	-17.4
V	12310.000	51.1	33	40.5	58.6	74.0	-15.4
V	14772.000	54.7	33	38.4	60.1	74.0	-13.9

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 01

Table 16
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	51.9	33	29.4	48.3	54.0	-5.7
V	4824.000	39.4	33	34.9	41.3	54.0	-12.7
V	7236.000	37.6	33	37.9	42.5	54.0	-11.5
V	9648.000	36.8	33	40.4	44.2	54.0	-9.8
V	12060.000	39.6	33	40.5	47.1	54.0	-6.9
V	14472.000	42.1	33	40.0	49.1	54.0	-4.9

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	67.1	33	29.4	63.5	74.0	-10.5
V	4824.000	49.4	33	34.9	51.3	74.0	-22.7
V	7236.000	48.7	33	37.9	53.6	74.0	-20.4
V	9648.000	48.9	33	40.4	56.3	74.0	-17.7
V	12060.000	51.1	33	40.5	58.6	74.0	-15.4
V	14472.000	52.8	33	40.0	59.8	74.0	-14.2

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 07

Table 17
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.2	33	34.9	41.1	54.0	-12.9
V	7311.000	37.5	33	37.9	42.4	54.0	-11.6
V	9748.000	37.0	33	40.4	44.4	54.0	-9.6
V	12185.000	39.3	33	40.5	46.8	54.0	-7.2
V	14622.000	44.0	33	38.4	49.4	54.0	-4.6

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.2	33	34.9	51.1	74.0	-22.9
V	7311.000	48.6	33	37.9	53.5	74.0	-20.5
V	9748.000	49.1	33	40.4	56.5	74.0	-17.5
V	12185.000	50.8	33	40.5	58.3	74.0	-15.7
V	14622.000	54.8	33	38.4	60.2	74.0	-13.8

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 11

Table 18
 IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	51.5	33	29.4	47.9	54.0	-6.1
V	4924.000	39.2	33	34.9	41.1	54.0	-12.9
V	7386.000	37.3	33	37.9	42.2	54.0	-11.8
V	9848.000	37.2	33	40.4	44.6	54.0	-9.4
V	12310.000	39.7	33	40.5	47.2	54.0	-6.8
V	14772.000	43.8	33	38.4	49.2	54.0	-4.8

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2483.500	64.1	33	29.4	60.5	74.0	-13.5
V	4924.000	49.3	33	34.9	51.2	74.0	-22.8
V	7386.000	48.4	33	37.9	53.3	74.0	-20.7
V	9848.000	49.3	33	40.4	56.7	74.0	-17.3
V	12310.000	51.2	33	40.5	58.7	74.0	-15.3
V	14772.000	54.6	33	38.4	60.0	74.0	-14.0

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 01

Table 19
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	52.1	33	29.4	48.5	54.0	-5.5
V	4824.000	39.5	33	34.9	41.4	54.0	-12.6
V	7236.000	37.7	33	37.9	42.6	54.0	-11.4
V	9648.000	36.7	33	40.4	44.1	54.0	-9.9
V	12060.000	39.7	33	40.5	47.2	54.0	-6.8
V	14472.000	42.0	33	40.0	49.0	54.0	-5.0

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
H	2390.000	68.0	33	29.4	64.4	74.0	-9.6
V	4824.000	49.5	33	34.9	51.4	74.0	-22.6
V	7236.000	48.8	33	37.9	53.7	74.0	-20.3
V	9648.000	48.8	33	40.4	56.2	74.0	-17.8
V	12060.000	51.1	33	40.5	58.6	74.0	-15.4
V	14472.000	52.6	33	40.0	59.6	74.0	-14.4

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 07

Table 20
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dB μ V/m)	Average Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	39.2	33	34.9	41.1	54.0	-12.9
V	7311.000	37.3	33	37.9	42.2	54.0	-11.8
V	9748.000	37.0	33	40.4	44.4	54.0	-9.6
V	12185.000	39.5	33	40.5	47.0	54.0	-7.0
V	14622.000	44.1	33	38.4	49.5	54.0	-4.5

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dB μ V/m)	Peak Limit at 3m (dB μ V/m)	Margin (dB)
V	4874.000	49.3	33	34.9	51.2	74.0	-22.8
V	7311.000	48.4	33	37.9	53.3	74.0	-20.7
V	9748.000	49.0	33	40.4	56.4	74.0	-17.6
V	12185.000	51.0	33	40.5	58.5	74.0	-15.5
V	14622.000	54.9	33	38.4	60.3	74.0	-13.7

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
 Mode: TX-Channel 11

Table 21
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Average (dBμV/m)	Average Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	51.5	33	29.4	47.9	54.0	-6.1
V	4924.000	39.6	33	34.9	41.5	54.0	-12.5
V	7386.000	37.3	33	37.9	42.2	54.0	-11.8
V	9848.000	37.1	33	40.4	44.5	54.0	-9.5
V	12310.000	39.6	33	40.5	47.1	54.0	-6.9
V	14772.000	43.9	33	38.4	49.3	54.0	-4.7

Polarization	Frequency (MHz)	Reading (dBμV)	Pre-Amp Gain (dB)	Antenna Factor (dB)	Net at 3m - Peak (dBμV/m)	Peak Limit at 3m (dBμV/m)	Margin (dB)
H	2483.500	63.7	33	29.4	60.1	74.0	-13.9
V	4924.000	49.7	33	34.9	51.6	74.0	-22.4
V	7386.000	48.5	33	37.9	53.4	74.0	-20.6
V	9848.000	49.1	33	40.4	56.5	74.0	-17.5
V	12310.000	51.1	33	40.5	58.6	74.0	-15.4
V	14772.000	54.8	33	38.4	60.2	74.0	-13.8

- NOTES:
1. Peak/Average detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 6. Horn antenna is used for the emission over 1000MHz.
 7. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.
 6. For the measurement of radiated emission, summation method was used which numerical integrating (in terms of linear power) over the transmitter occupied bandwidth.
 7. For the linear power measurement, data in 1MHz spacing was collected by spectrum analyzer with 1MHz resolution bandwidth.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
Mode: Transmission

Table 22
IEEE 802.11b (DSSS, 11 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	30.614	34.2	16	10.0	28.2	40.0	-11.8
V	144.236	40.8	16	14.0	38.8	43.5	-4.7
V	150.469	44.5	16	14.0	42.5	43.5	-1.0
V	165.500	41.2	16	17.0	42.2	43.5	-1.3
V	246.731	38.1	16	20.0	42.1	46.0	-3.9
V	243.974	38.3	16	20.0	42.3	46.0	-3.7
V	258.746	35.9	16	21.0	40.9	46.0	-5.1
V	480.563	29.2	16	26.0	39.2	46.0	-6.8
V	505.501	29.2	16	27.0	40.2	46.0	-5.8

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

INTERTEK TESTING SERVICES

Model : 4IE-04-OB-01
Mode: Transmission

Table 23
IEEE 802.11g (OFDM, 54 Mbps)

Radiated Emission Data

Polarization	Frequency (MHz)	Reading (dB μ V)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dB μ V/m)	Limit at 3m (dB μ V/m)	Margin (dB)
V	30.635	34.4	16	10.0	28.4	40.0	-11.6
V	144.186	40.7	16	14.0	38.7	43.5	-4.8
V	150.472	44.4	16	14.0	42.4	43.5	-1.1
V	165.592	41.3	16	17.0	42.3	43.5	-1.2
V	246.694	38.0	16	20.0	42.0	46.0	-4.0
V	243.896	37.6	16	20.0	41.6	46.0	-4.4
V	258.813	31.2	16	21.0	36.2	46.0	-9.8
V	480.524	27.8	16	26.0	37.8	46.0	-8.2
V	505.573	32.3	16	27.0	43.3	46.0	-2.7

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

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Model : 4IE-04-OB-01
 Mode: Transmission

Table 24
 IEEE 802.11n (20MHz) (OFDM, MCS7)

Radiated Emission Data

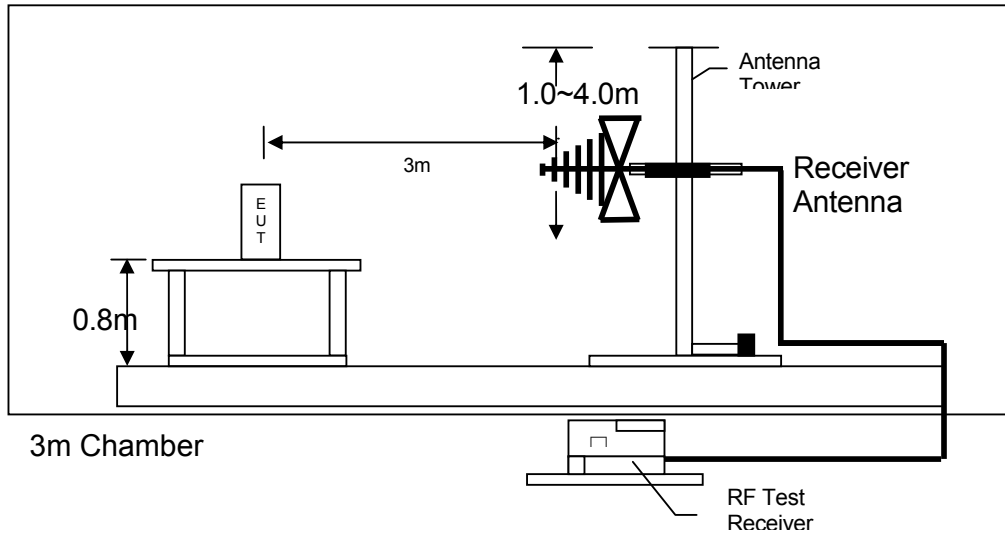
Polarization	Frequency (MHz)	Reading (dBμV)	Pre-amp (dB)	Antenna Factor (dB)	Net at 3m (dBμV/m)	Limit at 3m (dBμV/m)	Margin (dB)
V	30.434	34.5	16	10.0	28.5	40.0	-11.5
V	144.251	40.5	16	14.0	38.5	43.5	-5.0
V	150.436	44.3	16	14.0	42.3	43.5	-1.2
V	165.551	41.1	16	17.0	42.1	43.5	-1.4
V	246.648	37.8	16	20.0	41.8	46.0	-4.2
V	243.915	37.5	16	20.0	41.5	46.0	-4.5
V	258.758	31.2	16	21.0	36.2	46.0	-9.8
V	480.463	26.2	16	26.0	36.2	46.0	-9.8
V	505.630	32.4	16	27.0	43.4	46.0	-2.6

- NOTES:
1. Peak detector is used for the emission measurement.
 2. All measurements were made at 3 meters. Radiated emissions not detected at the 3-meter distance were measured at 0.3-meter and an inverse proportional extrapolation was performed to compare the signal level to the 3-meter limit. No other radiated emissions than those reported were detected at a test distance of 0.3-meter.
 3. Negative value in the margin column shows emission below limit.
 5. Emission (the row indicated by **bold italic**) within the restricted band meets the requirement of FCC Part 15 Section 15.205.

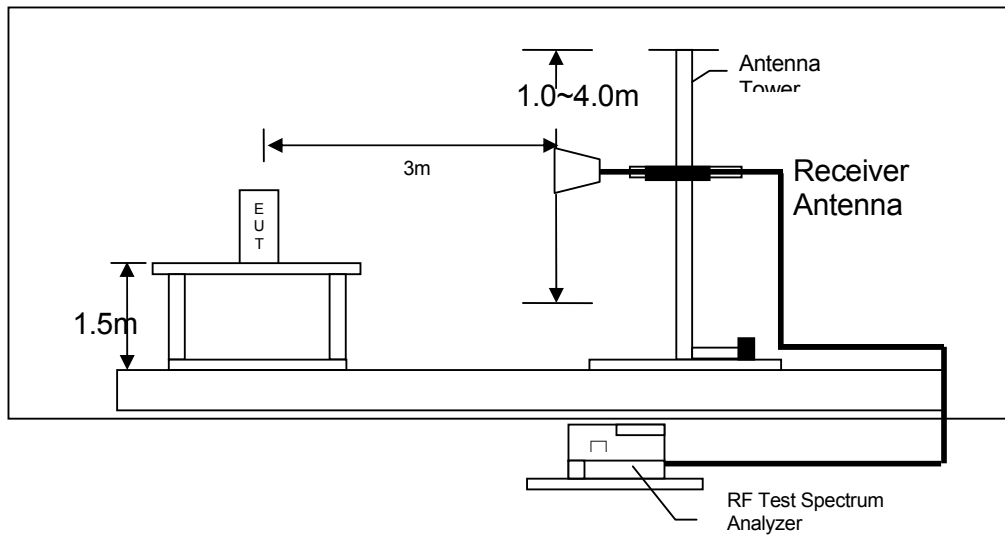
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Radiated Emission Test Setup

The figure below shows the test setup, which is utilized to make these measurements.



Test setup of radiated emissions upto 1GHz



Test setup of radiated emissions above 1GHz

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4.6.3 Transmitter Duty Cycle Calculation

Not applicable – No average factor is required.

4.7 AC Power Line Conducted Emission

- Not applicable – EUT is only powered by battery for operation.
- EUT connects to AC power line. Emission Data is listed in following pages.
- Base Unit connects to AC power line and has transmission. Handset connects to AC power line but has no transmission. Emission Data of Base Unit is listed in following pages.

4.7.1 AC Power Line Conducted Emission Configuration Photograph

Worst Case Line-Conducted Configuration
at

For Model 4IE-02-OB-01: 0.5775 MHz
For Model 4IE-04-OB-01: 0.5415 MHz

The worst case line conducted configuration photographs are attached in the Appendix and saved with filename: config photos.pdf

4.7.2 AC Power Line Conducted Emission Data

The plot(s) and data in the following pages list the significant emission frequencies, the limit and the margin of compliance

For Model 4IE-02-OB-01: Passed by 13.84 dB margin compare with average limit
For Model 4IE-04-OB-01: Passed by 7.13 dB margin compare with average limit

INTERTEK TESTING SERVICES

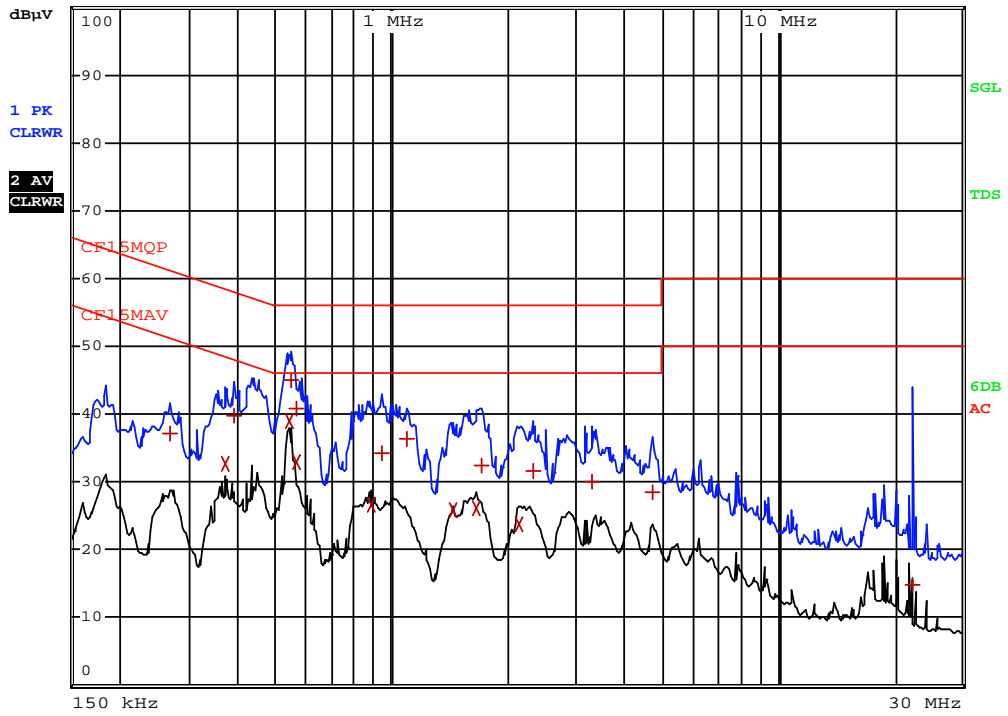
Phase: Live / Neutral
Model No.: 4IE-04-OB-01
Worst Case: Normal operation



RBW 9 kHz

MT 1 s

Att 10 dB AUTO PREAMP OFF



INTERTEK TESTING SERVICES

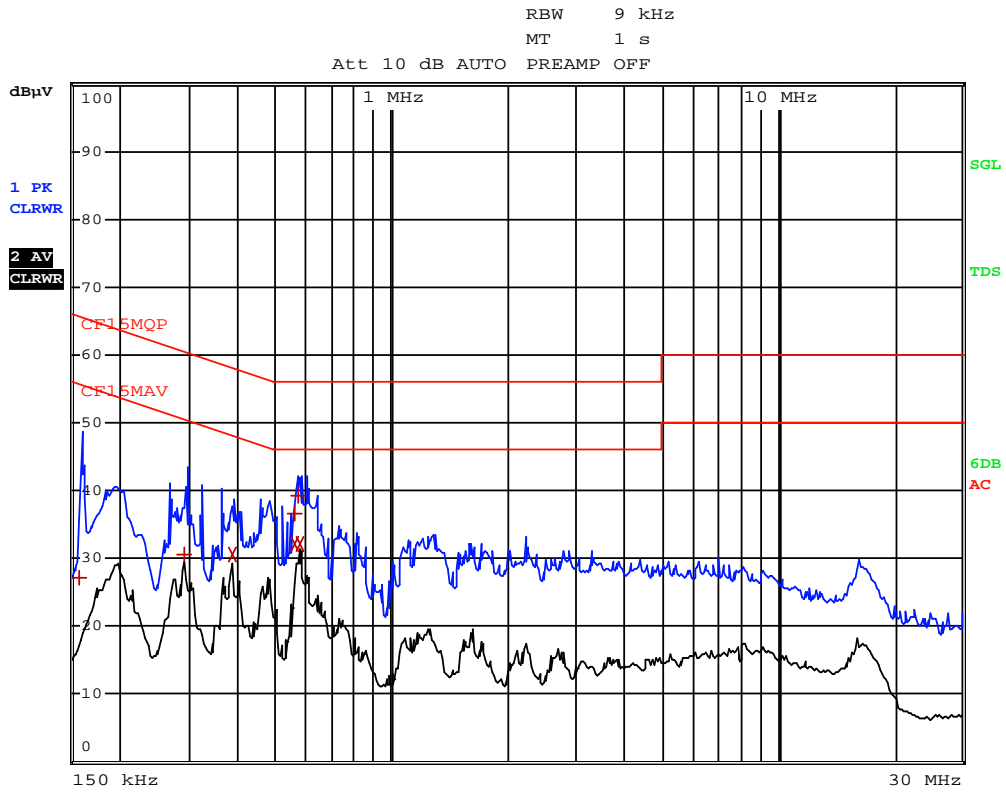
Phase: Live / Neutral
Model No.: 4IE-04-OB-01
Worst Case: Normal operation

EDIT PEAK LIST (Final Measurement Results)

Trace1:	CF15MQP				
Trace2:	CF15MAV				
Trace3:	---				
TRACE	FREQUENCY	LEVEL	dB μ V	DELTA	LIMIT dB
1 Quasi Peak	267 kHz	37.05	N gnd	-24.15	
2 CISPR Average	370.5 kHz	32.59	N gnd	-15.89	
1 Quasi Peak	388.5 kHz	39.70	L1 gnd	-18.39	
2 CISPR Average	541.5 kHz	38.86	N gnd	-7.13	
1 Quasi Peak	550.5 kHz	44.88	N gnd	-11.11	
1 Quasi Peak	568.5 kHz	40.80	L1 gnd	-15.19	
2 CISPR Average	568.5 kHz	32.98	N gnd	-13.01	
2 CISPR Average	888 kHz	26.74	N gnd	-19.25	
1 Quasi Peak	942 kHz	34.29	L1 gnd	-21.70	
1 Quasi Peak	1.0995 MHz	36.34	L1 gnd	-19.65	
2 CISPR Average	1.4505 MHz	25.97	L1 gnd	-20.03	
2 CISPR Average	1.653 MHz	26.18	L1 gnd	-19.81	
1 Quasi Peak	1.7115 MHz	32.32	L1 gnd	-23.67	
2 CISPR Average	2.1345 MHz	23.87	L1 gnd	-22.12	
1 Quasi Peak	2.319 MHz	31.75	L1 gnd	-24.24	
1 Quasi Peak	3.3045 MHz	29.99	L1 gnd	-26.00	
1 Quasi Peak	4.7625 MHz	28.35	L1 gnd	-27.64	
1 Quasi Peak	22.299 MHz	14.73	L1 gnd	-45.26	

INTERTEK TESTING SERVICES

Phase: Live / Neutral
Model No.: 4IE-02-OB-01
Worst Case: Normal operation



INTERTEK TESTING SERVICES

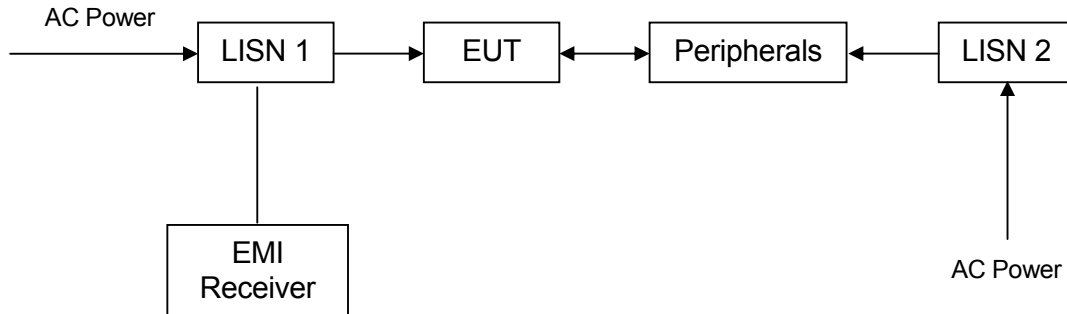
Phase: Live / Neutral
Model No.: 4IE-02-OB-01
Worst Case: Normal operation

EDIT PEAK LIST (Final Measurement Results)				
Trace1:	CF15MQP			
Trace2:	CF15MAV			
Trace3:	---			
TRACE	FREQUENCY	LEVEL	dB μ V	DELTA LIMIT dB
1 Quasi Peak	159 kHz	27.18	L1	-38.33
1 Quasi Peak	294 kHz	30.48	N	-29.92
2 CISPR Average	384 kHz	30.60	N	-17.58
1 Quasi Peak	564 kHz	36.68	N	-19.31
2 CISPR Average	564 kHz	32.23	N	-13.76
1 Quasi Peak	573 kHz	39.16	L1	-16.83
2 CISPR Average	577.5 kHz	32.15	N	-13.84

INTERTEK TESTING SERVICES

Conducted Emission Measurements

Test Setup and Procedure



The EUT along with its peripherals were placed on a 1.0m(W)×1.5m(L) and 0.8m in height wooden table and the EUT was adjusted to maintain a 0.4 meter space from a vertical reference plane. The EUT was connected to power mains through a line impedance stabilization network (LISN), which provided 50 ohm coupling impedance for measuring instrument and the chassis ground was bounded to the horizontal ground plane of shielded room. The excess power cable between the EUT and the LISN was bundled.

All connecting cables of EUT and peripherals were moved to find the maximum emission.

The EUT setup configuration please refers to the photo of test configuration in Appendix B1.

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**EXHIBIT 5
EQUIPMENT LIST**

INTERTEK TESTING SERVICES

5.0 Equipment List

1) Radiated Emissions Test

Equipment	BiConiLog Antenna	Spectrum Analyzer
Registration No.	EW-3061	EW-2253
Manufacturer	EMCO	R&S
Model No.	3412E	FSP40
Calibration Date	Jul. 17, 2014	May 27, 2015
Calibration Due Date	Jul. 17, 2015	May 27, 2016

Equipment	Double Ridged Guide Antenna	EMI Test Receiver
Registration No.	EW-0194	EW-2666
Manufacturer	EMCO	R&S
Model No.	3115	ESCI7
Calibration Date	Jan. 29, 2015	May 13, 2015
Calibration Due Date	Jul. 29, 2016	May 13, 2016

2) Conductive RF Measurement Test

Equipment	Spectrum Analyzer
Registration No.	EW-2329
Manufacturer	R&S
Model No.	FSP3
Calibration Date	Jun. 17, 2015
Calibration Due Date	Jun. 17, 2016

3) AC Mains Conducted Emissions Test

Equipment	EMI Test Receiver	LISN
Registration No.	EW-3095	EW-2501
Manufacturer	R&S	R&S
Model No.	ESCI	ENV-216
Calibration Date	Nov. 05, 2015	Jan. 28, 2016
Calibration Due Date	Nov. 05, 2016	Jan. 28, 2017

END OF TEST REPORT