

**ELECTROMAGNETIC COMPATIBILITY
TEST REPORT TO
FCC 47 CFR Part 15 SUBPART C
& INDUSTRY CANADA RSS-210 Issue 8, RSS-Gen Issue 4
For Transmitter Intentional Radiator**

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Accreditations (ISO 17025):



Standard Council of Canada: Accredited Laboratory No. 743
International Accreditation Service Inc.: Accredited Laboratory: No. TL-239

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Applicant's name: Recon Instruments Inc.
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Industry Canada Registration : 9717A-009
FCC Registration: ZW5009

Test specifications:

Standard.....: RSS-Gen, Issue 4; RSS-210, Issue 8; FCC Part 15.247.
Test procedure.....: As called by the standard above
Non-standard test method.....: N/A

Test Item Description: Head Mounted Display system for sports eyewear
Manufacturer: Recon Instruments, Inc.
Model Number: 009
Model Descr: RI-JET





RI-JET (EUT)

Revision History

Date	Report Number	Rev #	Details	Authors Initials
Jan 15, 2015	E10415-1402	0.0	Draft Test Report	JQ
Feb 10, 2015	E10415-1402	1.0	Final Test Report	JQ
Feb 18, 2015	E10415-1402	2.0	Updated Final Test Report based on TIMCO comments	JQ

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Section I. GENERAL TEST INFORMATION

EMC TEST SUMMARY

The following tests demonstrate testimony for the FCC & IC Marks for Transceivers / electromagnetic compatibility testing for this EUT.

Test / Requirement Description	Applicable FCC Rule Parts	Applicable Industry Canada Rule Parts	Pass / Fail
Antenna Requirements	FCC 47 CFR Part 15.203	RSS-Gen, Issue 4	Pass
Peak Conducted Output Power	FCC Subpart C 15.247	RSS-210, Issue 8	Pass
Radiated Spurious Emissions	FCC Subpart C 15.209	RSS-210, Issue 8	Pass
Power Spectral Density in Fundamental Emission	FCC Subpart C 15.247	RSS-210, Issue 8	Pass
AC Mains Power Line Conducted Emissions	FCC Subpart C 15.207	RSS-210, Issue 8	Pass
Occupied Bandwidth	FCC Subpart C 15.247	RSS-210, Issue 8	Pass
Band Edge	FCC Subpart C 15.209	RSS-210, Issue 8	Pass
Conducted Spurious Emissions	FCC Subpart C 15.247, 15.209	RSS-210, Issue 8	Pass
Hopping Frequency Separation	FCC Subpart C 15.247	RSS-210, Issue 8	Pass
Number of Hopping Channels	FCC Subpart C 15.247	RSS-210, Issue 8	Pass
Average Time of Occupancy	FCC Subpart C 15.247	RSS-Gen, Issue 4	Pass
RF Exposure Compliance	FCC KDB447498; CFR 47, Part 1.1307, 1310; Part 2, Subpart J 1091	RSS-Gen, Issue 4, RSS-102(2.5.1)	Pass
Frequency Stability	FCC Part 15.215(c)	RSS-210 Issue 8 (8.11)	Pass

Tests were conducted on a sample of the equipment for the purpose of demonstrating compliance with CFR 47 FCC Part 15 Subpart C and Industry Canada RSS-Gen Issue 4, RSS-210 Issue 8. The manufacturer is responsible for the tested product configuration, continued product compliance with these standards listed, and for the appropriate auditing of subsequent products as required.

X

Written By Jack Qin
Technical writer/EMC Test Engineer

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Reviewed By Aman Jathaul,
EMC Project Manager

PRODUCT DESCRIPTION

Equipment Under Test:

EUT	Head Mounted Display system for sports eyewear
Functional Description	RI-JET-009 is a Head Mounted Display system for sports eyewear. It measures the athlete's performance using an onboard GPS receiver and multiple motion sensors, displays the sensor data in real-time on a small LCD, and records sensor data in non-volatile memory for post processing.
Operational Description	A Bluetooth (BT), a Bluetooth Low Energy (BLE) as well as WiFi technology is implemented in JET to receive control signals from a Recon Remote and communicate with various computer programs. The BLE & WiFi transceiver inside the JET was programmed to transmit the maximum output power at the low, mid and high channels of the Bluetooth (2402, 2441 and 2480 MHz) and Wi-Fi band (2412, 2442, and 2477 MHz) respectively). In order to set the eyewear in a continuous transmission mode a Laptop PC was used to the send the various commands.
Manufacturer	Recon Instruments Inc.
Model/Type	RI-JET
Serial No.	Black unit, B2-23 FCC6; White unit, B2-22 FCC5; Bare board 1, FCC7, 4614440029; Bare board 2, FCC2, 4614330027
Frequency Range	IEEE 802.11b: 2412 – 2462 MHz IEEE 802.11g: 2412 – 2462 MHz IEEE 802.11n: 2412 – 2462 MHz Bluetooth GFSK: 2402 – 2480 MHz Bluetooth EDR2: 2402 – 2480MHz BTLE: 2402 – 2480 MHz ANT: 2402 – 2480 MHz
Transmit Power	IEEE 802.11b – 6.6mW IEEE 802.11g – 6.5 mW IEEE 802.11n – 6.6mW Bluetooth GFSK-1.23mW Bluetooth EDR2 - 2.45 mW BTLE – 4.45mW ANT – 1.04mW
Modulation	IEEE 802.11b – DSSS IEEE 802.11g – OFDM, DSSS IEEE 802.11n – OFDM 20MHz Bluetooth Low Energy – GFSK Bluetooth - EDR2 (Tested using Frequency Hopping Procedures) ANT+-GFSK
Number of Channels	IEEE 802.11b – 13 IEEE 802.11g – 13 IEEE 802.11n – 2 Bluetooth – 79 BTLE - 40
Ratings	+3.7Vdc Rechargeable Battery – charged by 100-240Vac 50-60Hz adapter via mini-USB cable
Software and Firmware	The EUT driver software installed in the host laptop equipment during testing was GNOME Terminal firmware version 3.4.1.1. The operation system is Ubuntu 64-bit & Recon OS 4.0.
Received Date	Nov 15 2014
Received By	Aman Jathaul
Sample Log	QAI Product Control Log (QM 1305 - Sample Inventory)

Auxiliary Equipment	Description	+5Vdc Switch Mode Power Supply
	Manufacturer	Recon Instruments
	Model No.	3A-053WP05
	Input	100-240Vac 50-60Hz 0.2A
	Output	+5Vdc .1.0A
	Plug	NEMA 1-15 Un-polarized 2 prong blade Type A

Cables	Description	Length	Connector A	Connector B	Shielddd	Ferrites
	USB Power/Communications	1m	USB A	USB MicroB	Yes	No

ANTENNA DESCRIPTION

WiFi/ BT

Polarization	Linear
Power	0.007 Watts
Compact Size	40mm length x 26mm width
Weight	0.2 grams
VSWR	
RoHS	Yes
Frequency Range	1949 MHz to 2498 MHz
Linear Max Gain	-3.68dBi @ 1949 MHz, -4.51dBi @ 2450 MHz, -6.11dBi @ 2498 MHz
Impedance	50 Ohms
Efficiency	-9.27dB @ 1949 MHz, -9.99dB @ 2450 MHz, -10.81dB @ 2498 MHz
Part Number	830-00054

GPS

Polarization	Linear
Power	N/A (Receive only)
Compact Size	90mm length x 12.5mm width
Weight	0.4 grams
VSWR	
RoHS	Yes
Frequency Range	1383 MHz to 1575.42 MHz
Linear Max Gain	-1.86dBi @ 1383 MHz, -7.38dBi @ 1575.42 MHz
Impedance	50 Ohm
Efficiency	-7.62dB @ 1383 MHz, -13.35dB @ 1575.42 MHz
Part Number	830-00039

FACILITIES AND ACCREDITATION

Main Laboratory Headquarters: Quality Auditing Institute
Headquarters Location/Address: 16 – 211 Schoolhouse Street, Coquitlam, BC, 3K 4X9, Canada
Associated Laboratory: Quality Auditing Institute (Remote Location)
EMC Laboratory Address: 19473 Fraser Way, Pitt Meadows, BC, V3Y 2V4, Canada
FCC Test Site Registration Number: (3 m /10 m Open Area Test Site [OATS] and 3 m Semi-Anechoic Chamber [SAC]): 226383

Industry Canada Test Site Registration Number (3m SAC): 9543B-1
Standard Council of Canada: ISO/IEC 17025:2005 Accredited Laboratory No. 743
International Accreditation Service Inc.: ISO/IEC 17025:2005 Accredited Laboratory: No. TL-239

ENVIROMENTAL CONDITIONS: INDOORS

Temperature: 22-28°C R.H.: 39.7 - 54.4%

TESTING METHODOLOGY

The tests documented in this report were performed in accordance with ANSI C63.4-2009, ANSI C63.10-2009, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, and RSS-Gen, Issue 4 and RSS-210, Issue 8. The FCC testing was also done using the FCC KDB 558074 D01 DTS Measurement Guidance v03r02 for the Wi-Fi and BLE transmitters and the FCC Public Notice DA 00-705 Filing and Measurement Guidelines for Frequency Hopping Spread Spectrum Systems

EUT TESTING CONFIGURATION

For the purpose of compliance testing, the EUT was powered using the +5.0Vdc power supply since the battery would not have enough power to complete the testing. The transmitter was set for continuous operation on various frequencies in modulated modes of operation.

WORST TEST CASE

The worst-case channel is determined as the channel with the highest output power. The highest measured output power was at 2441 MHz for the Wi-Fi 802.11b mode.

TEST SETUP

For conducted tests the EUT is installed in a test fixture connected to An EMI receiver and Spectrum Analyzer as well as a host laptop computer during the tests. Test software exercised the radio card. A separate EUT connected to an AC power adapter was used for the radiated tests.

GENERAL TEST PROCEDURES

RF Conducted Emissions

The EUT is placed on a test bench connected directly to an EMI Receive and Spectrum Analyzer. Conducted emissions are measured in the frequency range 10kHz to 25GHz using CISPR Peak, Quasi-Peak and Average detectors.

AC Mains Conducted Emissions

The EUT is placed on the turntable 0.8m above a ground plane. Conducted emissions are measured in the frequency range 0.15 – 30MHz using CISPR quasi-peak and average detector.

Radiated Emissions

The EUT is placed on the turntable 0.8m above a ground plane 3m away from a receiving antenna. Height of receiving antenna varied from 1m to 4m, its polarity changes from vertical to horizontal. Turntable rotates 360 degrees. Motion of turntable and receiving antenna allows determining position of maximum emission level. Quasi-peak detector applies for measurements of emissions with frequency range of 30 to 1000MHz. and average/peak detector otherwise.

RESTRICTED BANDS OF OPERATION

(a) Except as shown in paragraph (d) of this section, only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	GHz
0.090-0.110	16.42-16.423	399.9-410	4.5-5.15
1 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	(2)
13.36-13.41			

* - note FCC-specific .

Canada-specific frequency ranges - 3.020-3.026, 5.677-5.683, 121.94-123.0, 149.9-150.05, 162.0125-167.17, 167.72-173.2, 1300-1427, 2483.5-2500, 3500-3600,

(2) Above 38,6 GHz

(b) Except as provided in paragraphs (d) and (e) of this section, the field strength of emissions appearing within these frequency bands shall not exceed the limits shown in § 15.209. At frequencies equal to or less than 1000 MHz, compliance with the limits in § 15.209 shall be demonstrated using measurement instrumentation employing a CISPR quasi-peak detector. Above 1000 MHz, compliance with the emission limits in § 15.209 shall be demonstrated based on the average value of the measured emissions. The provisions in § 15.35 apply to these measurements.

MEASUREMENT UNCERTAINTY

Radio Frequency: $\pm 1,5 \times 10^{-5}$
 Total RF power, conducted.....: ± 1 dB
 RF power density, conducted.....: ± 2.75 dB
 Spurious emissions, conducted.....: ± 3 dB
 All emissions, radiated.....: ± 3.5 dB
 Temperature.....: $\pm 1^{\circ}\text{C}$
 Humidity.....: ± 5 %
 DC and low frequency voltages.....: ± 3 %

TESTING EQUIPMENT

Test Equipment List

Semi-Anechoic Chamber Equipment List

Manufacturer	Model	Description	Serial No.	Last Cal	Cal Due Date
ETS Lindgren	2165	Turntable	00043677	N/A	N/A
ETS Lindgren	2125	Mast	00077487	N/A	N/A
Rohde & Schwarz	ESU40	EMI Receiver	100011	26-June-2012	26-Jun-2015
FCC	FCC-LISN-50-25-2	LISN (150kHz-30MHz)	9927	30-Nov-2012	30-Nov-2015
EMCO	6502	Loop Antenna 10kHz-30MHz	2178	8/21/2014	8/21/2017
Sunol Sciences	JB3	Biconilog Antenna 30MHz-3GHz (Prescan use only)	A120106	28-Oct-2013	28-Oct-2015
ETS Lindgren	3117	Horn Antenna 1GHz-18GHz	00075944	29-Aug-2013	29-Aug-2015
EMCO	3160-09	Horn Antenna 18GHz-26.54GHz	9701-1071	30-Aug-13	30-Aug-15
ETS Lindgren	S201	5 meter Semi-Anechoic Chamber	1030	N/A	N/A
A.H.Systems Inc	PAM-1840VH	Preamplifier	152	14-Jun-2013	14-Jun-2016
A.H.Systems Inc	SAC-40G-2.25	RF cable	396	Conditional use	
A.H.Systems Inc	SAC-40G-0.3	RF cable	395	Conditional use	

Measurement Software List

Manufacturer	Model	Version	Description
Rhode & Schwarz	EMC 32	6.20.0	Emissions Pre-scan Test Software

Section II. Requirements for the US (FCC) & Canadian Market(IC):

Summary of requirements RSS-Gen issue 4, RSS-210 Issue 8 and FCC 15.247

	Test	Wi-Fi Standard	Bluetooth Standard	BTLE Standard	ANT Standard	Description	Result
Part 1	Antenna requirement	FCC 47 CFR Part 15.203 RSS-Gen Issue 4 (7.1.2)	FCC 47 CFR Part 15.203 RSS-Gen Issue 4 (7.1.2)	FCC 47 CFR Part 15.203 RSS-Gen Issue 4 (7.1.2)	FCC 47 CFR Part 15.203 RSS-Gen Issue 4 (7.1.2)	Soldered, non-replaceable antenna	Complies
Part 2	Output power conducted	RSS-210 FCC Subpart C 15.247 (a) (2)	RSS-210 FCC Subpart C 15.247 (b)	RSS-210 FCC Subpart C 15.247 (a) (2)	RSS-210 FCC Subpart C 15.247 (a) (2)	Digitally modulated and frequency hopping systems emissions should not exceed the limits	Complies
Part 3	Radiated spurious emissions	RSS-210 FCC Subpart C 15.209 (a)	RSS-210 FCC Subpart C 15.209 (a)	RSS-210 FCC Subpart C 15.209 (a)	RSS-210 FCC Subpart C 15.209 (a), FCC 15.249	Emissions from intentional radiator should not exceed the limits	Complies
Part 4	Power Spectral Density	RSS-210 FCC Subpart C 15.247 (e)	N/A	RSS-210 FCC Subpart C 15.247 (e)	N/A	Conducted power spectral density shall be not higher than 8 dBm in any 3 kHz band segment	Complies
Part 5	AC Mains Conducted Emissions	RSS-210 FCC Subpart C 15.207 (a)	RSS-210 FCC Subpart C 15.207 (a)	RSS-210 FCC Subpart C 15.207 (a)	RSS-210 FCC Subpart C 15.207 (a)	The Conducted Emissions are measured on the Phase and Neutral Power lines in the 0.15 - 30.0 MHz range	Complies
Part 6	6 dB Occupied Bandwidth	FCC Subpart C 15.247 (a) (2)	N/A	FCC Subpart C 15.247 (a) (2)	N/A	The transmitted signal bandwidth to be reported adjusted to be 6 dB	Complies
Part 7	20 dB Occupied Bandwidth	RSS-Gen Issue 4 (4.6.1)	RSS-Gen Issue 4 (4.6.1) FCC Subpart C 15.247 (a) (2)	RSS-Gen Issue 4 (4.6.1)	RSS-Gen Issue 4 (4.6.1)	The transmitted signal bandwidth to be reported adjusted to be 20 dB	Complies
Part 8	Band edge	RSS-210 FCC Subpart C 15.209	RSS-210 FCC Subpart C 15.247 (c)	RSS-210 FCC Subpart C 15.209	RSS-210 FCC Subpart C 15.209	Spurious emissions shall be 50dBc	Complies
Part 9	Conducted Spurious Emissions	RSS-210 (A2.9)(e) FCC Subpart C 15.209 (a)	RSS-210 (A2.9)(e) FCC Subpart C 15.247 (c)	RSS-210 (A2.9)(e) FCC Subpart C 15.209 (a)	RSS-210 (A2.9)(e) FCC Subpart C 15.209 (a)	Radiated Spurious emissions shall be 50dBc	Complies

Part 10	Hopping Frequency Separation	N/A	RSS-210 FCC Subpart C 15.247 (a)	N/A	N/A	Should be frequency separation between peaks in adjacent channels	Complies
Part 11	Number of Hopping Channels	N/A	RSS-210 FCC Subpart C 15.247 (a)	N/A	N/A	EUT must have number of hopping channels enabled	Complies
Part 12	Average Time of Occupancy	N/A	RSS-Gen Issue 4 (4.6.1) FCC Subpart C 15.247 (a)	N/A	N/A	Value of dwell time should not be less the limit	Complies
Part 13	RF Exposure Evaluation	IC RSS-102(2.5.1), FCC KDB447498; CFR 47, Part 1.1307, 1310; Part 2, Subpart J 1091	IC RSS-102(2.5.1), FCC KDB447498; CFR 47, Part 1.1307, 1310; Part 2, Subpart J 1091	IC RSS-102(2.5.1), FCC KDB447498; CFR 47, Part 1.1307, 1310; Part 2, Subpart J 1091	IC RSS-102(2.5.1), FCC KDB447498; CFR 47, Part 1.1307, 1310; Part 2, Subpart J 1091	Any radio transmitter should not emit higher the limit.	Complies
Part 14	Frequency Stability	FCC Part 15.215(c) & RSS-Gen Issue 4 (8.11)	FCC Part 15.215(c) & RSS-Gen Issue 4 (8.11)	FCC Part 15.215(c) & RSS-Gen Issue 4 (8.11)	FCC Part 15.215(c) & RSS-Gen Issue 4 (8.11)	Measured at temperatures of -30°C (-4°F), +20°C (+68°F) and +50°C (+122°F)	Complies

Part 1 - Antenna Requirements

DATE: Dec-01-2014

TEST STANDARD: FCC 47 CFR Part 15.203 and IC Rss-Gen Issue 4 Section 7.1.2

APPLICABLE REGULATIONS: - "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 so that the user can replace a broken antenna, but the use of a standard antenna jack or electrical connector is prohibited."... "the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this Part are not exceeded."

RESULT : This unit meets this requirement. There are 2 antennas in this unit – GPS and Wi-Fi/Bluetooth antenna (see Antenna Description section). Antennas are soldered to the circuit board and are not accessible to the end-user.

Part 2 – RF Power Conducted

DATE: Nov-21-2014

TEST STANDARD: IC RSS-210 Annex 2 Section (A2.9)(a)
FCC Subpart C §§15.247(a) (2), 15.247(b)

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: 1 W (30 dBm)

TEST SETUP: The antenna port of EUT was directly connected to a spectrum analyser.

MEASUREMENT METHOD: As called by the standards above. For the measurement of Wi-Fi peak power output the power meter was used so that the plots were not provided.

DEVICE DESCRIPTIONS: As described in the above EUT description and set up section.

OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

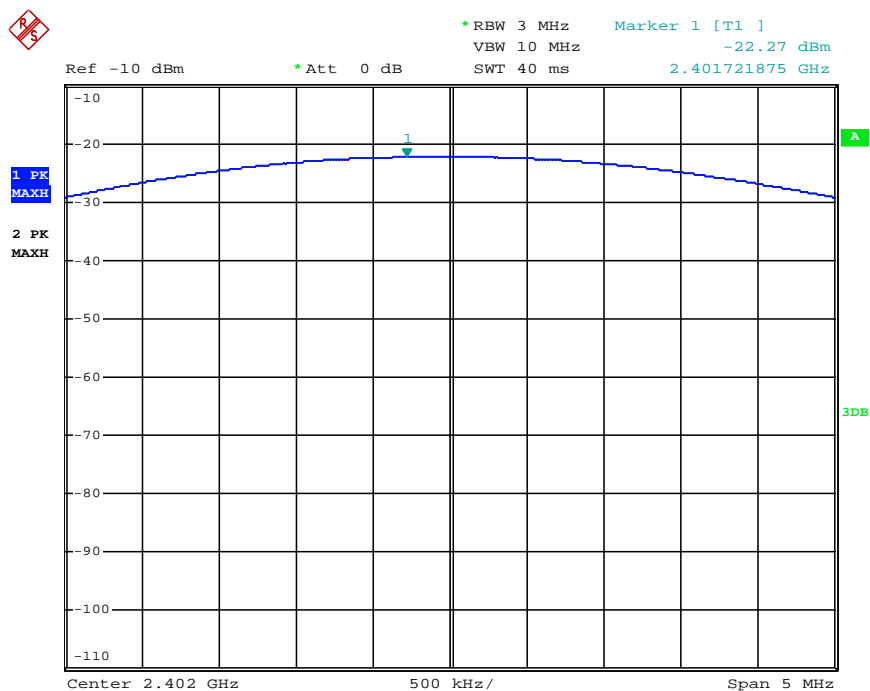
EMISSIONS DATA & PLOT:

Conducted Peak Output Power

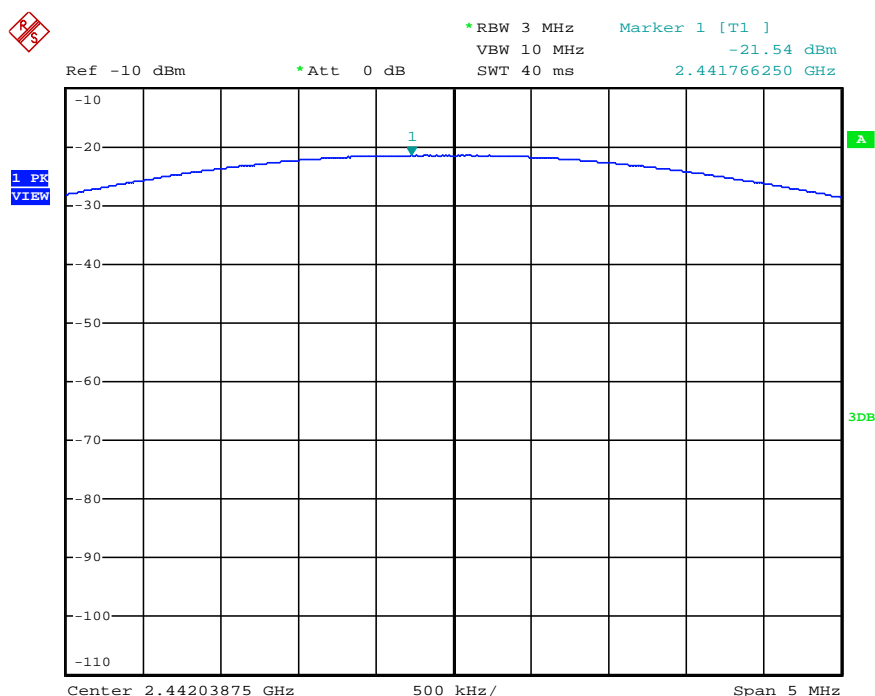
Modulation		Channel	Frequency	Un-corr Power	Correction Factos	Output Power	Result
			MHz	dBm	dB	dBm	
Wi-Fi	IEEE 802.11b	Low	2412	-13.5	21.7	8.2	Pass
		Mid	2442	-13.5	21.7	8.2	Pass
		High	2462	-13.6	21.7	8.1	Pass
	IEEE 802.11g	Low	2412	-13.7	21.7	8	Pass
		Mid	2442	-13.6	21.7	8.1	Pass
		High	2462	-13.8	21.7	7.9	Pass
	IEEE 802.11n	Low	2412	-13.7	21.7	8	Pass
		Mid	2442	-13.5	21.7	8.2	Pass
		High	2462	-13.9	21.7	7.8	Pass
Bluetooth	GFSK	Low	2402	-22.7	21.7	-1	Pass
		Mid	2442	-21.5	21.7	0.2	Pass
		High	2480	-20.8	21.7	0.9	Pass
	EDR2	Low	2402	-19.13	21.7	2.57	Pass
		Mid	2442	-18.21	21.7	3.49	Pass
		High	2480	-17.81	21.7	3.89	Pass
BTLE	GFSK	Low	2402	-16.26	21.7	5.44	Pass
		Mid	2442	-15.89	21.7	5.81	Pass
		High	2480	-15.22	21.7	6.48	Pass
ANT	GFSK	Low	2402	-3.17	1.7	-1.47	Pass
		Mid	2442	-2.68	1.7	-0.98	Pass
		High	2480	-1.55	1.7	0.15	Pass

EIRP Output Power

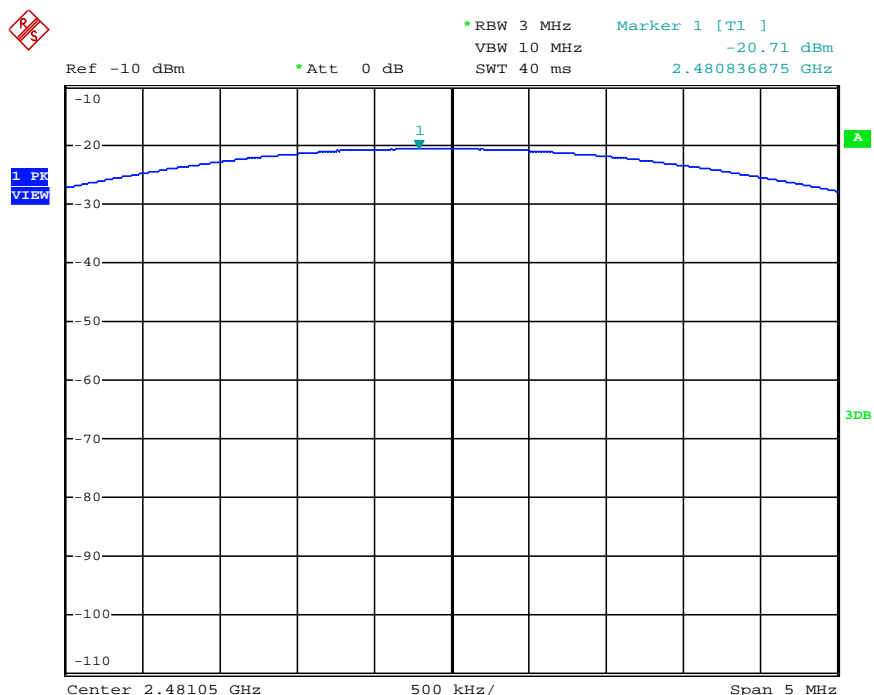
Modulation		Channel	Frequency	Field Strength	EIRP	limit	Result
			MHz	dBuV/m	dBm	dBm	
Wi-Fi	IEEE 802.11b	Low	2412	97.4	2.14	36	Pass
		Mid	2442	99.1	3.84	36	Pass
		High	2462	100.4	5.14	36	Pass
	IEEE 802.11g	Low	2412	98.38	3.12	36	Pass
		Mid	2442	99.9	4.64	36	Pass
		High	2462	100.85	5.59	36	Pass
	IEEE 802.11n	Low	2412	98.85	3.59	36	Pass
		Mid	2442	101.07	5.81	36	Pass
		High	2462	102.5	7.24	36	Pass
Bluetooth	GFSK	Low	2402	94.4	-0.86	36	Pass
		Mid	2442	96.7	1.44	36	Pass
		High	2480	98.2	2.94	36	Pass
	EDR2	Low	2402	92.8	-2.46	36	Pass
		Mid	2442	94.6	-0.66	36	Pass
		High	2480	96.2	0.94	36	Pass
BTLE	GFSK	Low	2402	96.24	0.98	36	Pass
		Mid	2442	98.02	2.76	36	Pass
		High	2480	99.55	4.29	36	Pass
ANT	GFSK	Low	2402	91.5	-3.76	36	Pass
		Mid	2442	92.1	-3.16	36	Pass
		High	2480	92.98	-2.28	36	Pass



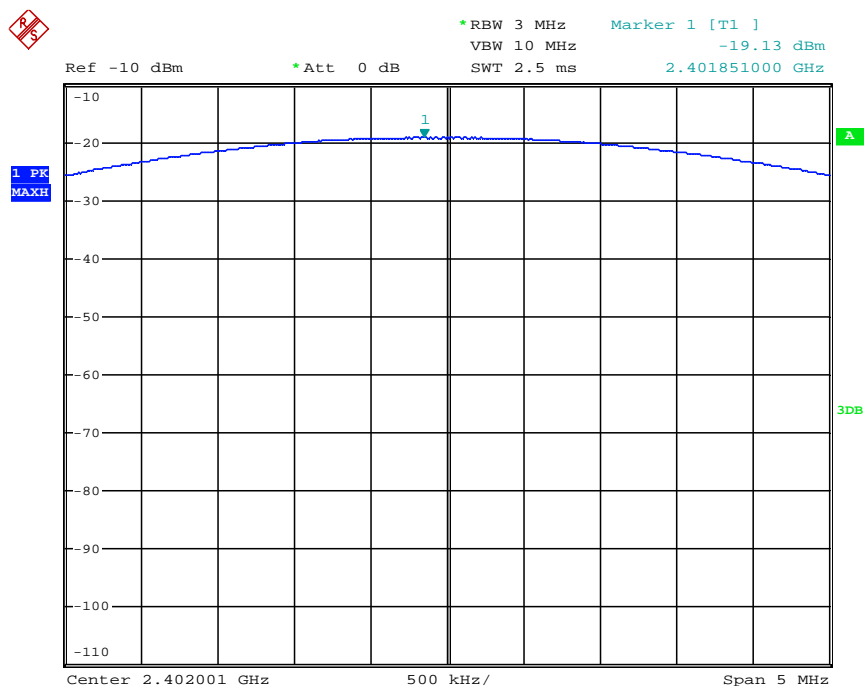
Plot of Peak Power - Bluetooth_GFSK_Low Channel



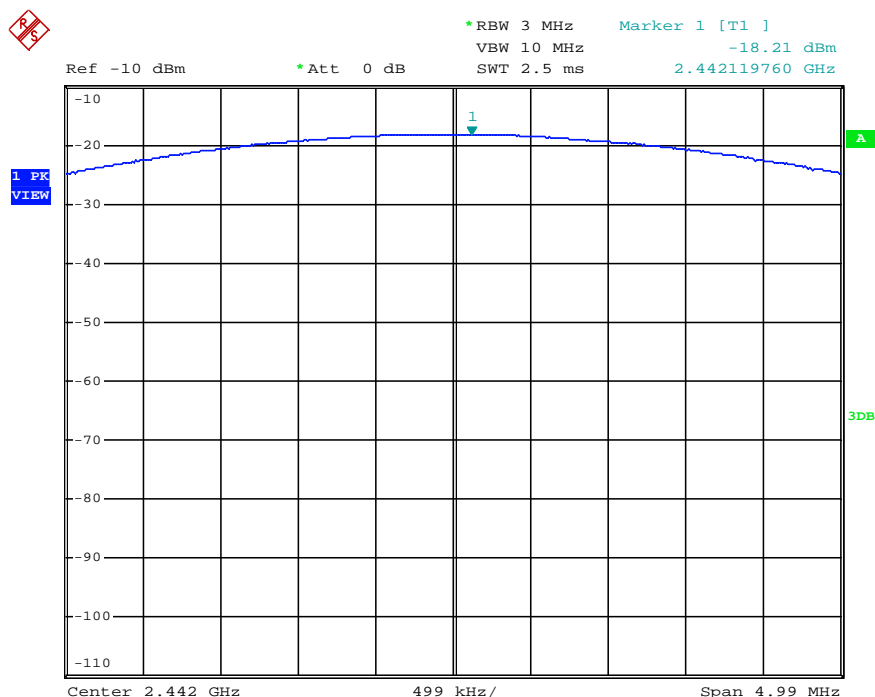
Plot of Peak Power - Bluetooth_GFSK_Mid Channel



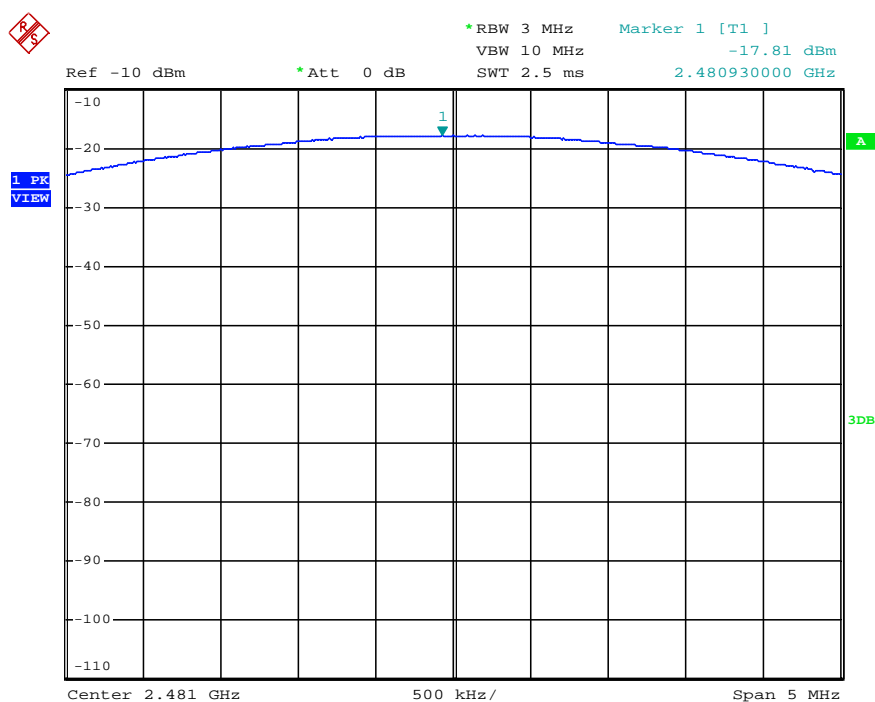
Plot of Peak Power - Bluetooth_GFSK_High Channel



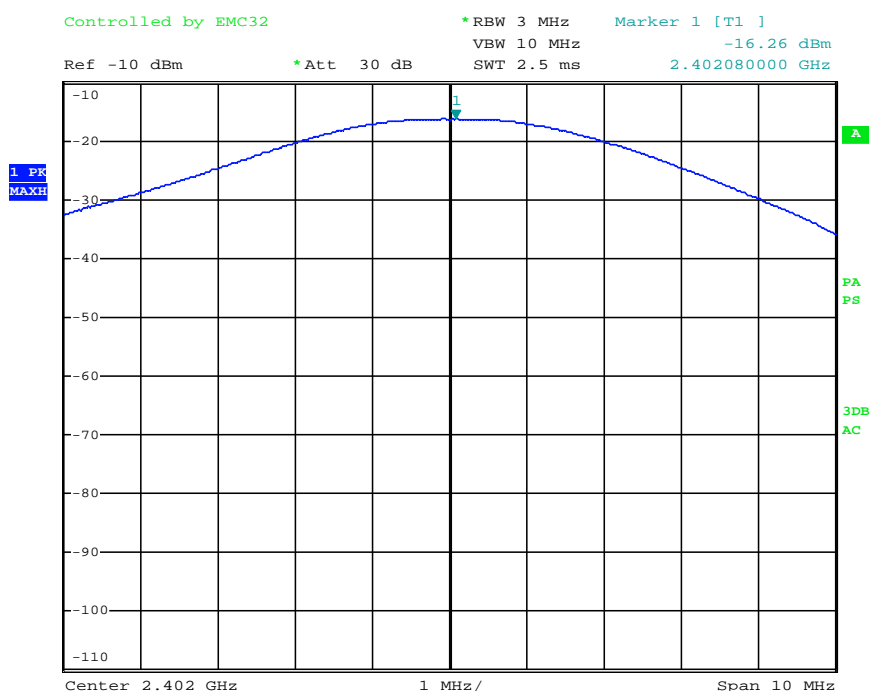
Plot of Peak Power - Bluetooth_EDR2_Low Channel



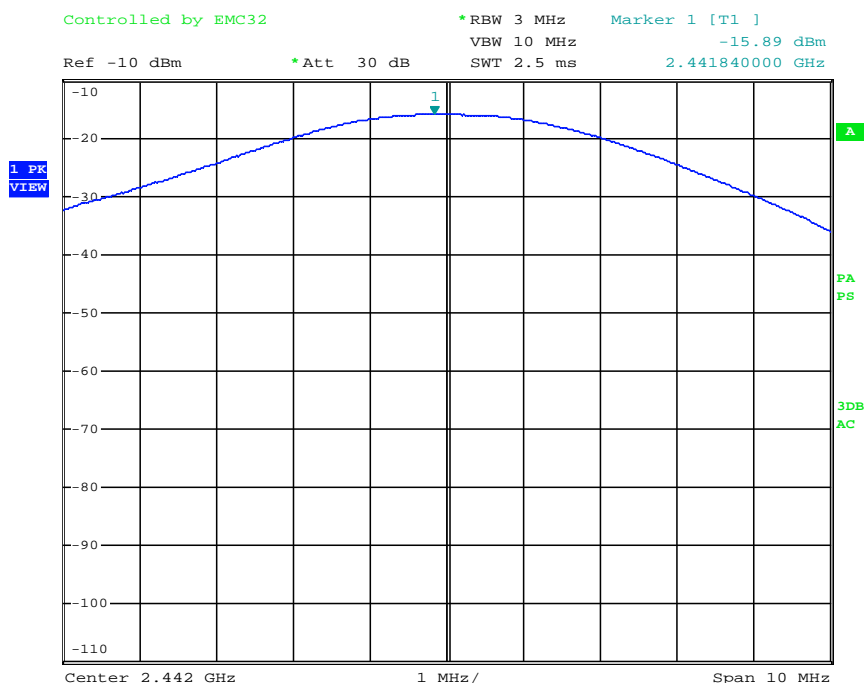
Plot of Peak Power - Bluetooth_EDR2_Mid Channel



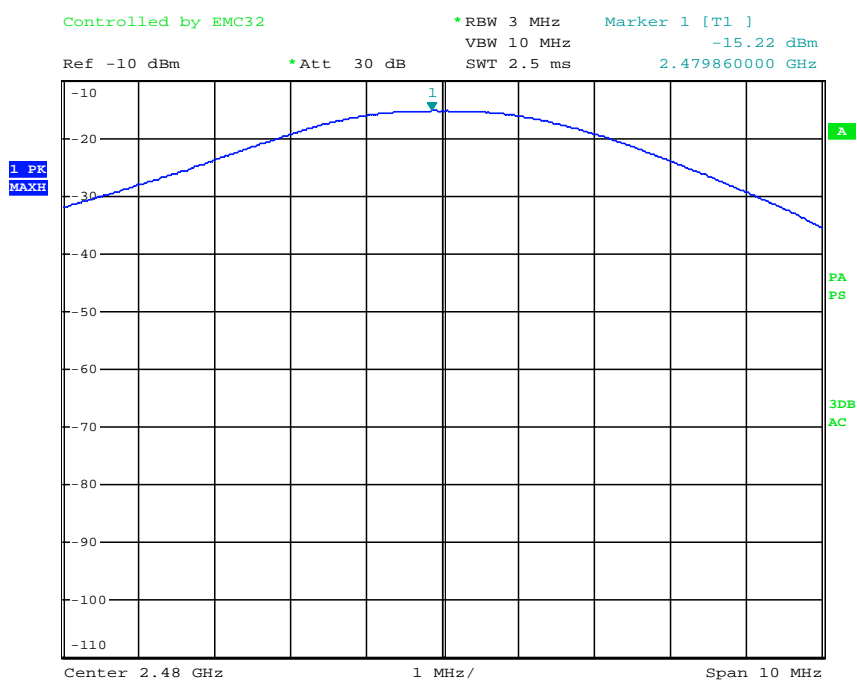
Plot of Peak Power - Bluetooth_EDR2_High Channel



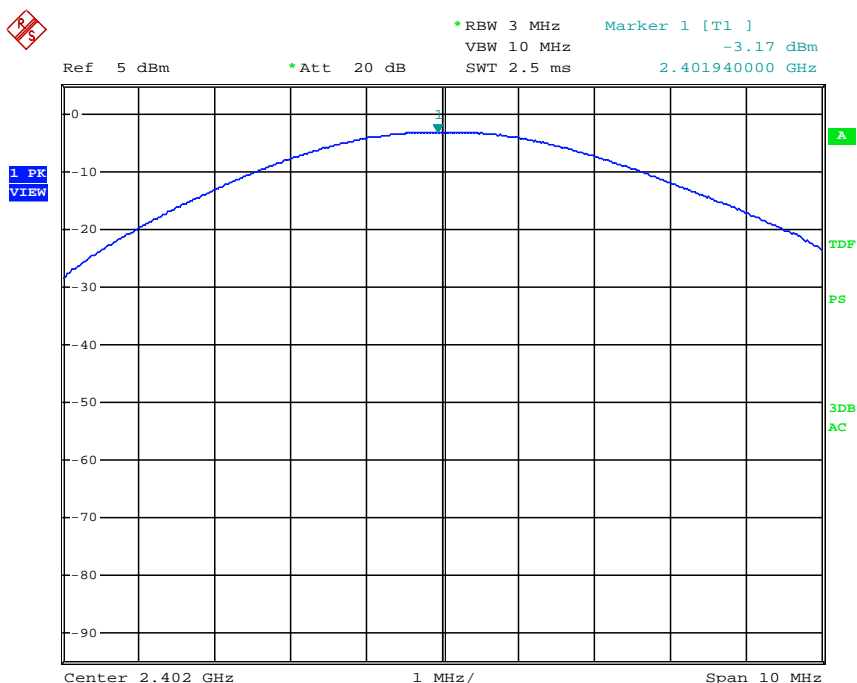
Plot of Peak Power - BTLE_Low Channel



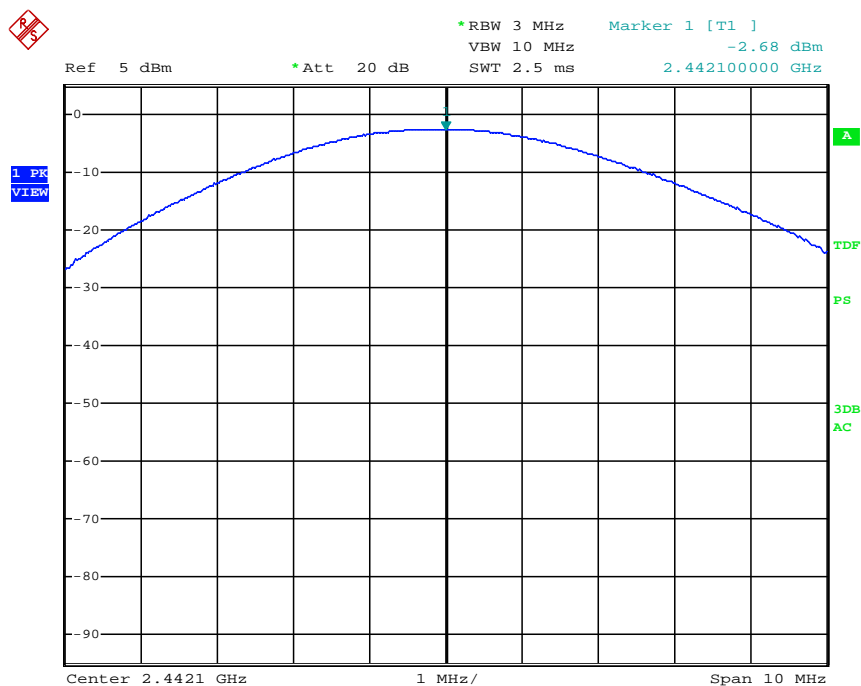
Plot of Peak Power - BTLE_Mid Channel



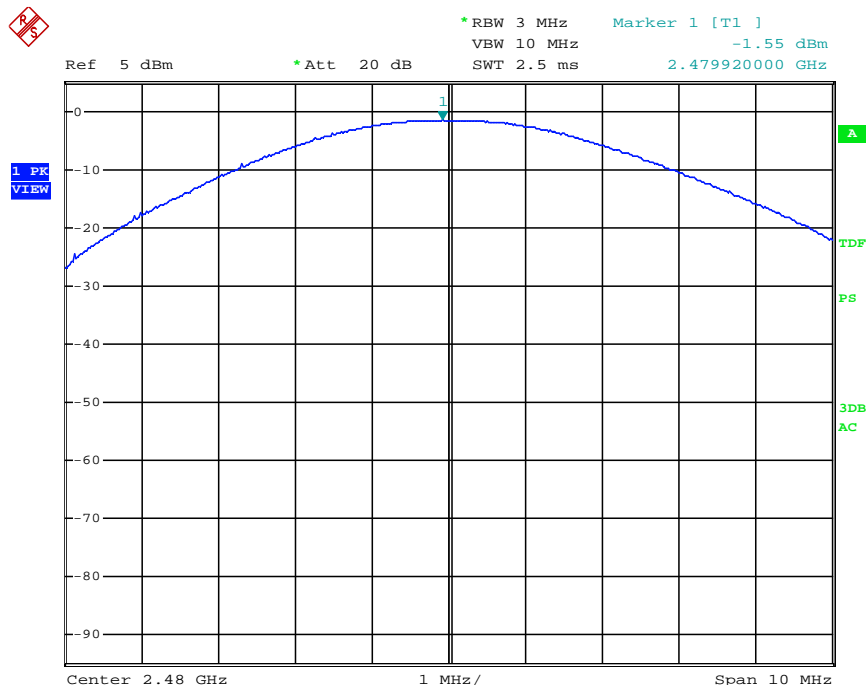
Plot of Peak Power - BTLE_High Channel



Plot of Peak Power - ANT_Low Channel



Plot of Peak Power - ANT_Mid Channel



Plot of Peak Power - ANT_High Channel

Part 3 - Radiated Spurious Emissions

DATE: Dec -12-2014

TEST STANDARD: IC RSS-210 Annex 2 Section (A2.9)(b), RSS-Gen Issue 4 Section (7.2.5);
FCC Subpart C §§15.209(a) and 15.247(c), FCC Part 15.249 (ANT+)

TEST VOLTAGE: 5Vdc from AC Power Adapter

TEST CONDITIONS: Indoor

MINIMUM STANDARD: (b) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

In measuring unwanted emissions, the spectrum shall be investigated from 30 MHz or the lowest radio frequency signal generated in the equipment, whichever is lower, without going below 9 kHz, up to at least the frequency ... if the equipment operates below 10 GHz: to the tenth harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower.

Table 1: General Field Strength Limits for Transmitters at Frequencies Above 30 MHz

Frequency (MHz)	Field Strength	
	uV/m @ 3-m	Calculated dBµV/m at 3m
30 – 88	100	40.0
88 - 216	150	43.5
216 - 960	200	46.0
960 - 1000	500	54.0

TEST SETUP: The EUT was tested in our 3 m SAC and was positioned on the center of the turntable and connected to a 5Vdc power supply. The transmitter was set for continuous transmission. The lowest, middle and highest channels in the 2400-2483.5 MHz band were measured for all radiated emissions 10kHz to 18 GHz. The EUT was pre-scanned in 3 different orthogonal orientations and was found to radiate highest when placed flat on the table top as indicated in the test photos.

MEASUREMENT METHOD: Measurements were made using spectrum analyser and receiver, 200Hz RBW average detector for the frequency range 9-150KHz; 9kHz RBW average detector for the Frequency range 150kHz to 30MHz; 120kHz RBW quasi-peak detector using the appropriate antennas, amplifiers and filters.

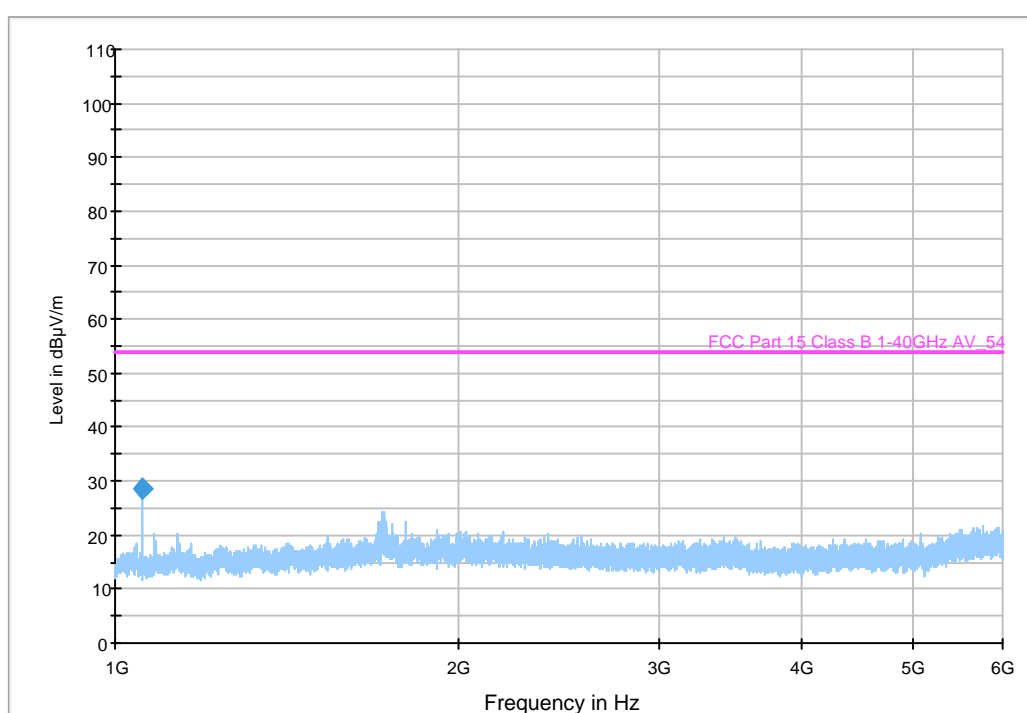
DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

MODIFICATIONS: The EUT did not require any modifications.

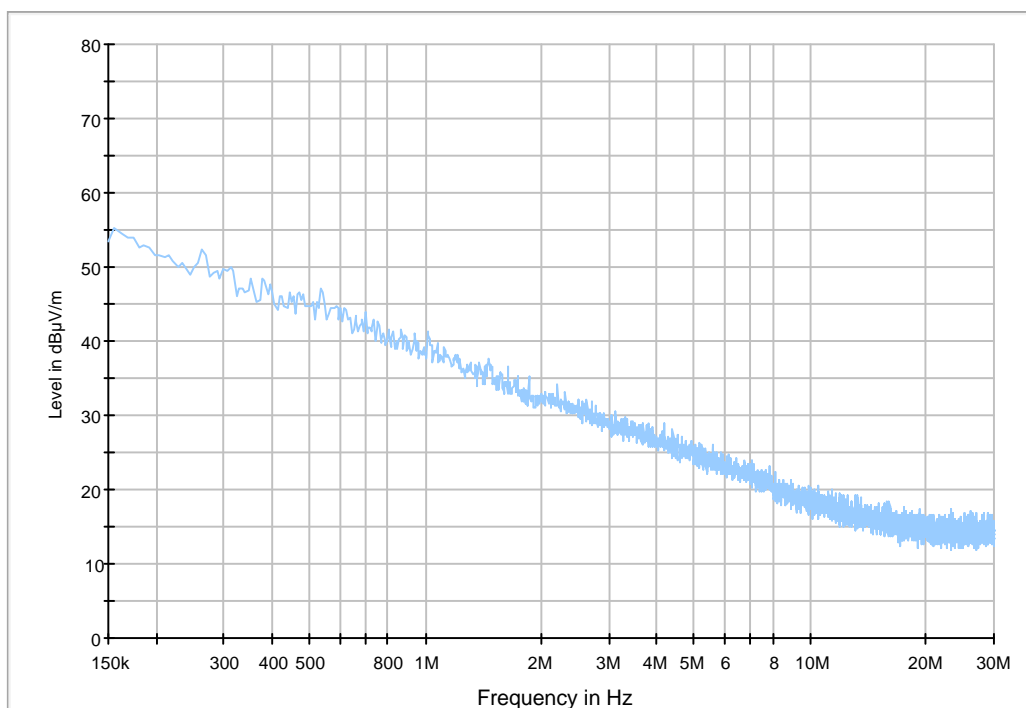
PERFORMANCE: Complies with Standard

EMISSIONS DATA & PLOT:

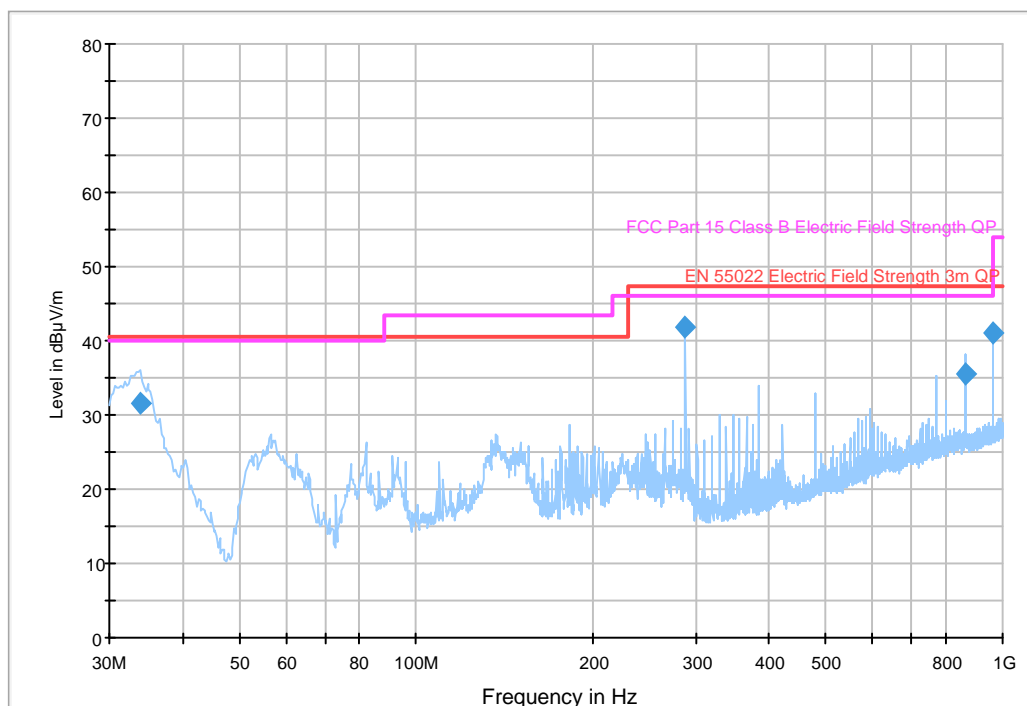
- Note: 1) The measurements of Radiated Emissions were performed on all of operational modes of the EUT.
For the purpose of the report the plots of the worst case were added only.
- 2) Radiated Emissions were verified up to 10th harmonics of fundamental frequency. But all spurious emissions above 18GHz were at least 20dB below the limit line or were undetectable.



Plot of Radiated Emissions 1-6GHz, No-TX

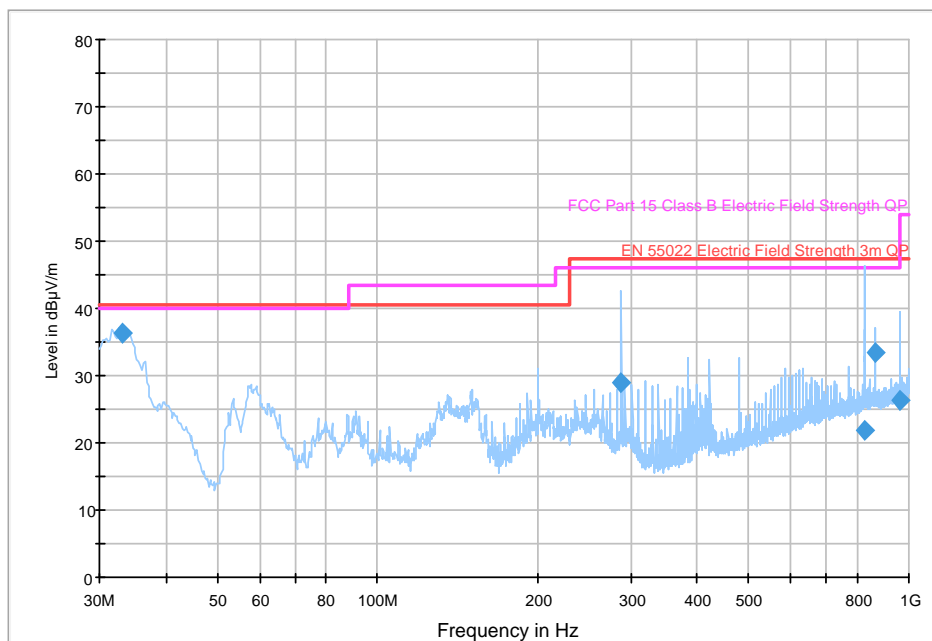


Plot of Radiated Emissions 150 kHz-30 MHz at 3m - TX mode

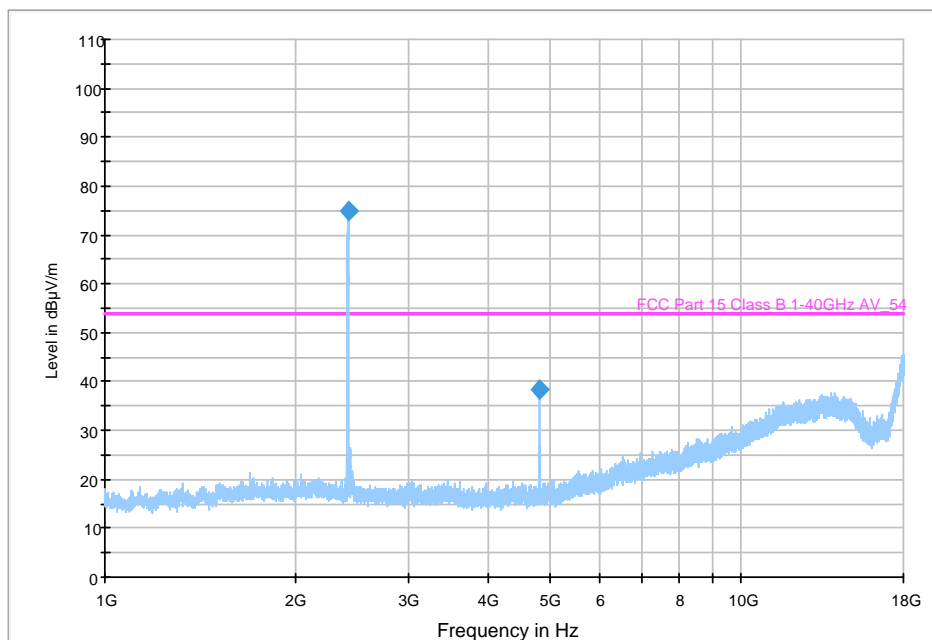


Plot of Radiated Emissions 30MHz-1GHz, TX-ON

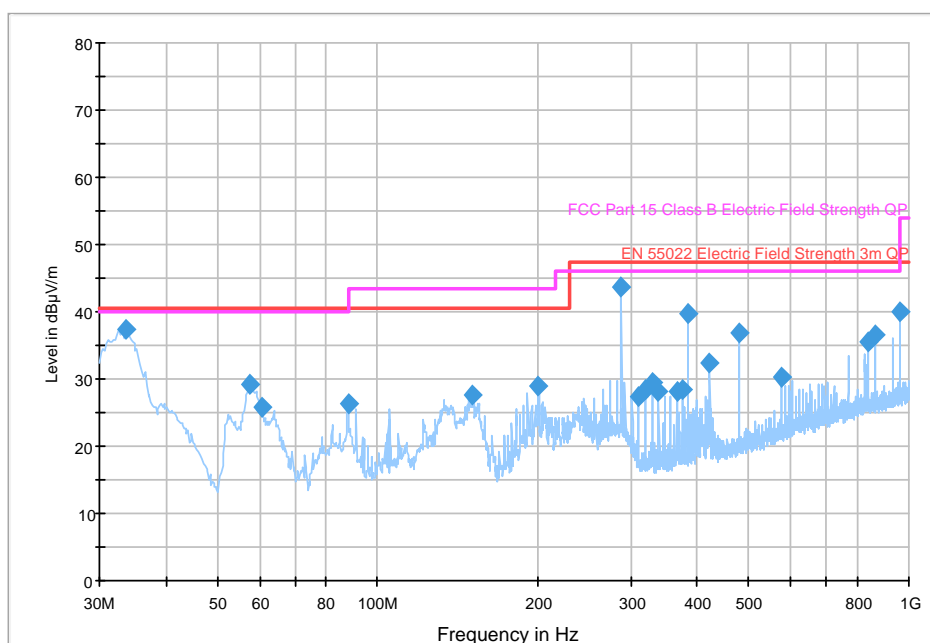
Frequency (MHz)	QuasiPeak (dBμV/m)	Meas. Time (ms)	Bandwidth (kHz)	Antenna height (cm)	Polarity	Turntable position (deg)	Corr. (dB)	Margin (dB)	Limit (dBμV/m)
287.996000	43.5	1000.000	120.000	110.0	H	188.0	15.3	2.5	46
960.013700	43.9	1000.000	120.000	100.0	H	117.1	26.4	10.1	54



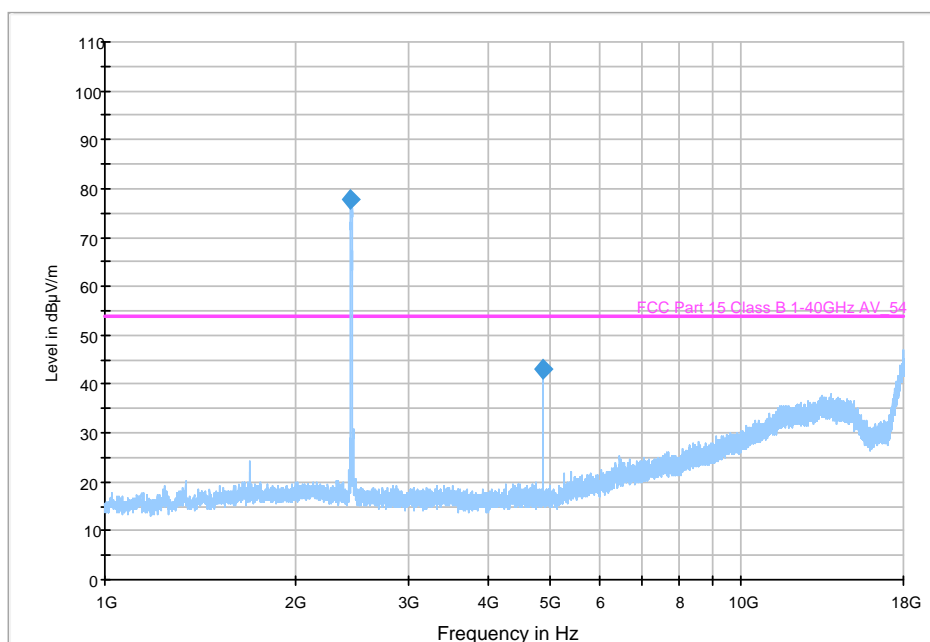
Radiated Spurious Emissions 30MHz-1GHz - Wi-Fi 802.11b Low Channel



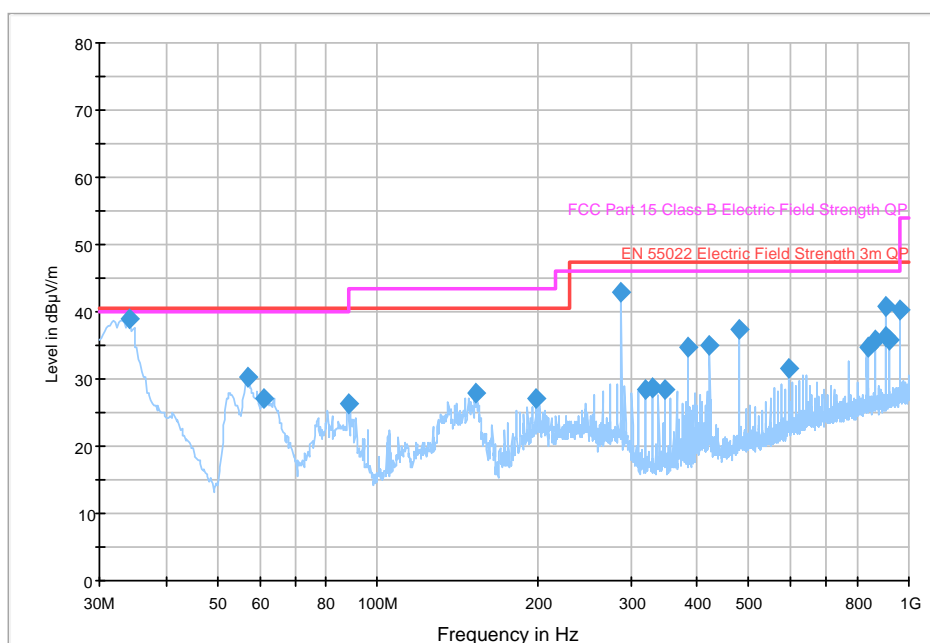
Radiated Spurious Emissions 1GHz-18GHz - Wi-Fi 802.11b Low Channel



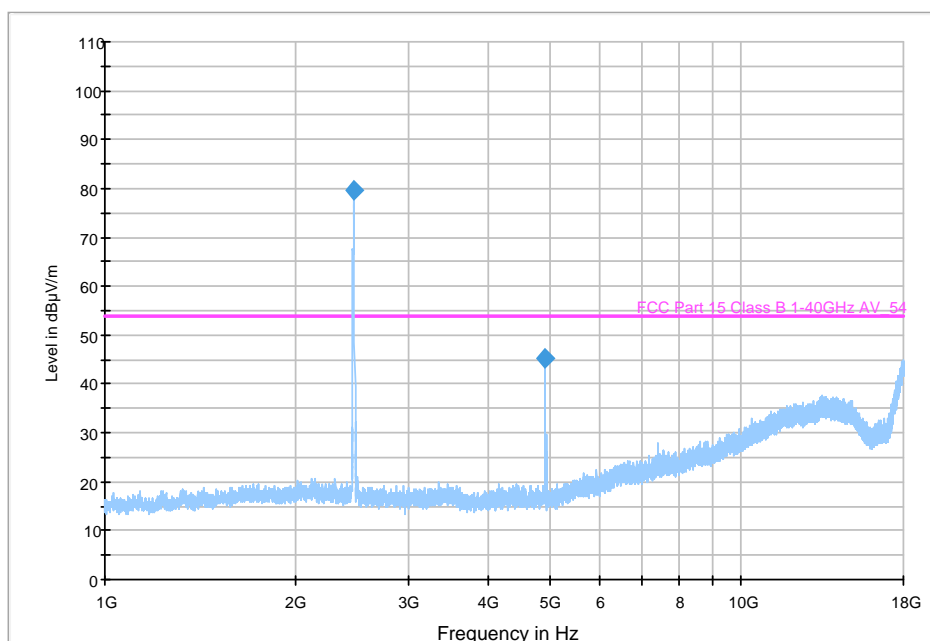
Radiated Spurious Emissions 30MHz-1GHz - Wi-Fi 802.11b Mid Channel



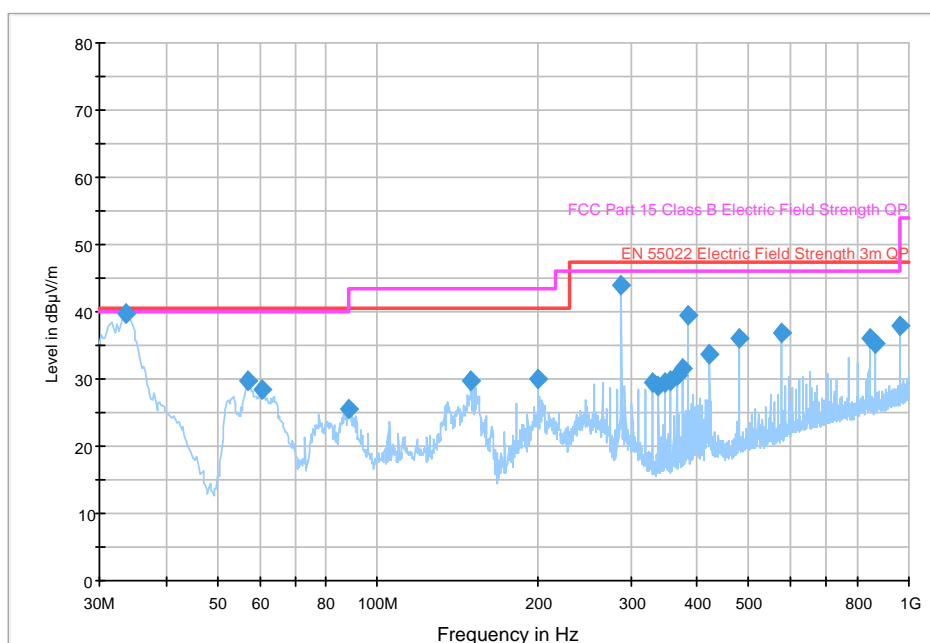
Radiated Spurious Emissions 1GHz-18GHz - Wi-Fi 802.11b Mid Channel



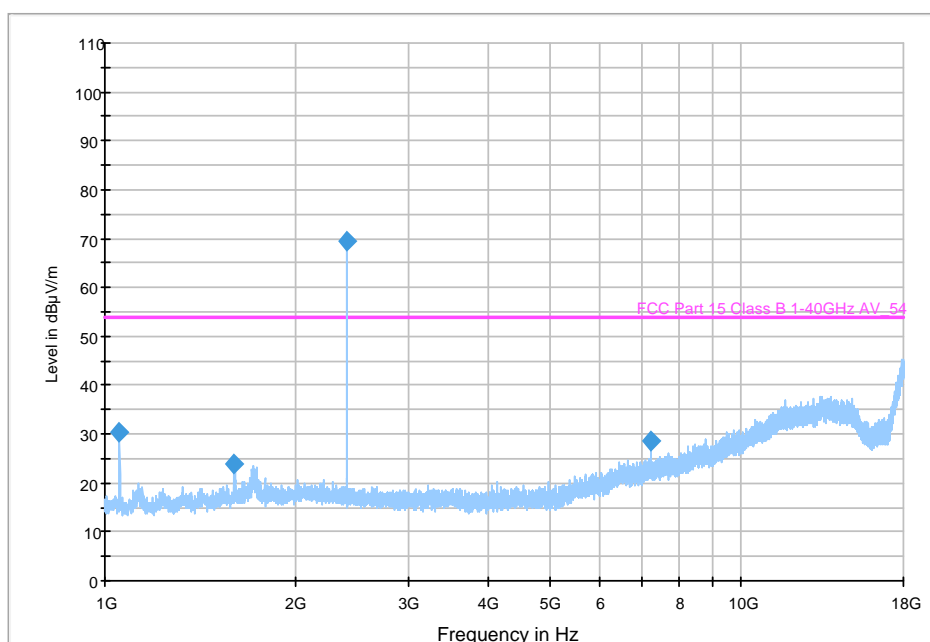
Radiated Spurious Emissions 30MHz-1GHz - Wi-Fi 802.11b High Channel



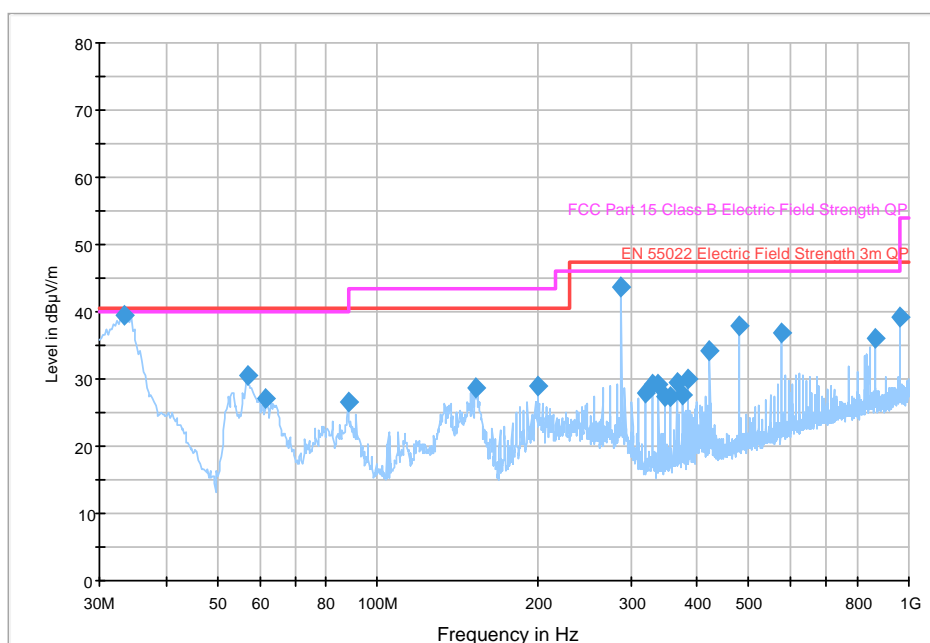
Radiated Spurious Emissions 1GHz-18GHz - Wi-Fi 802.11b High Channel



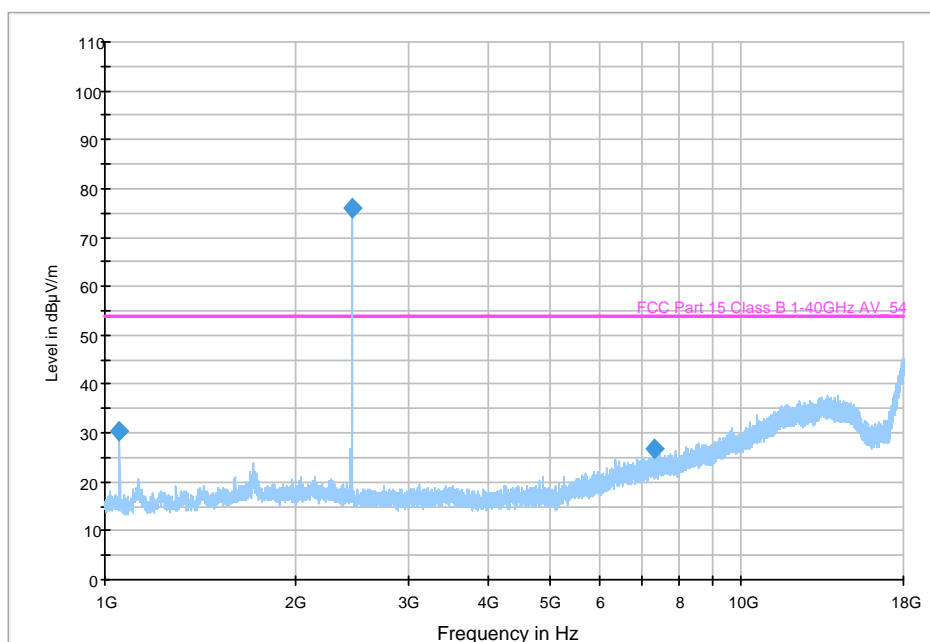
Radiated Spurious Emissions 30MHz-1GHz – Bluetooth GFSK Low Channel



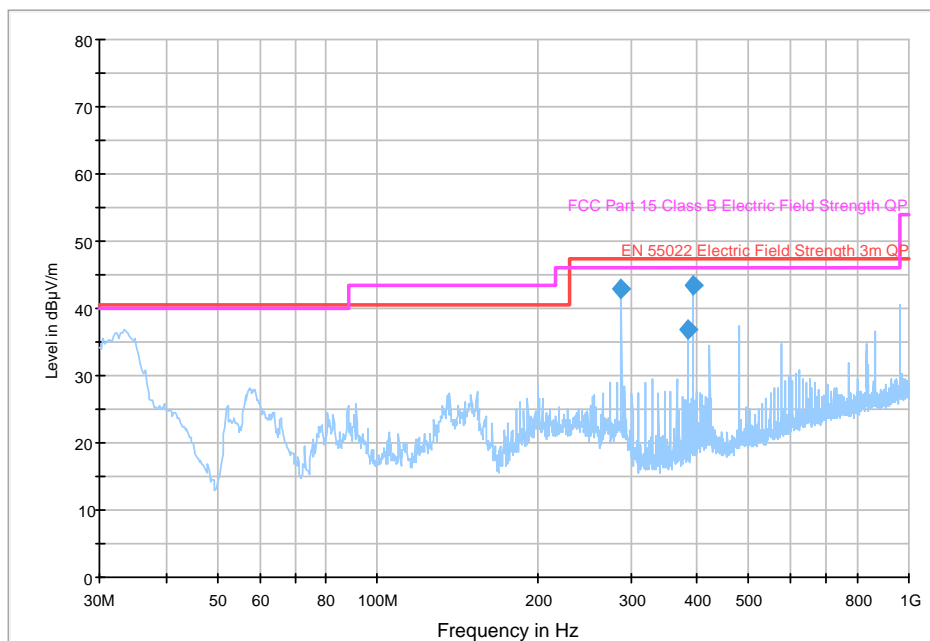
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth GFSK Low Channel



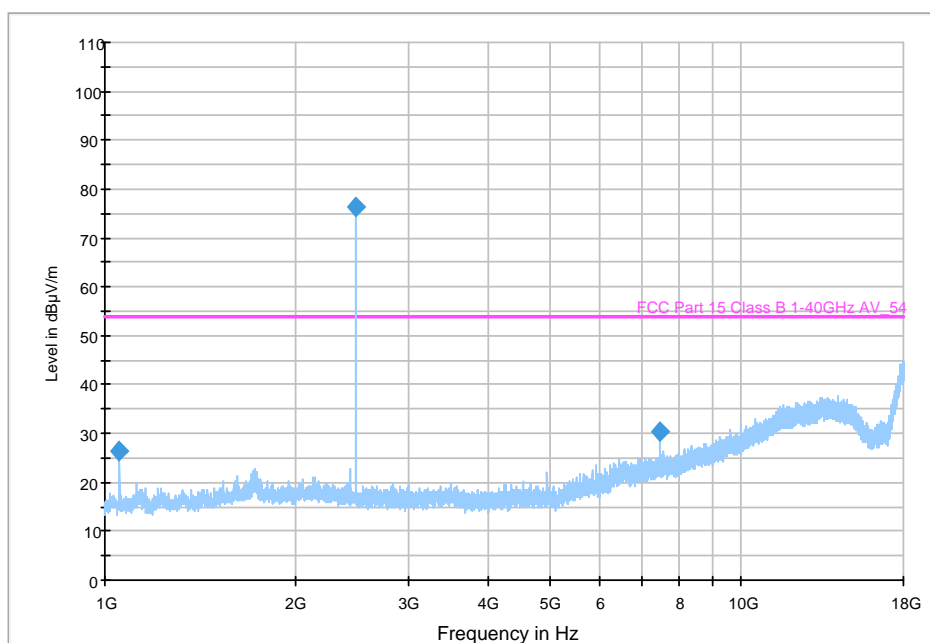
Radiated Spurious Emissions 30MHz-1GHz – Bluetooth GFSK Mid Channel



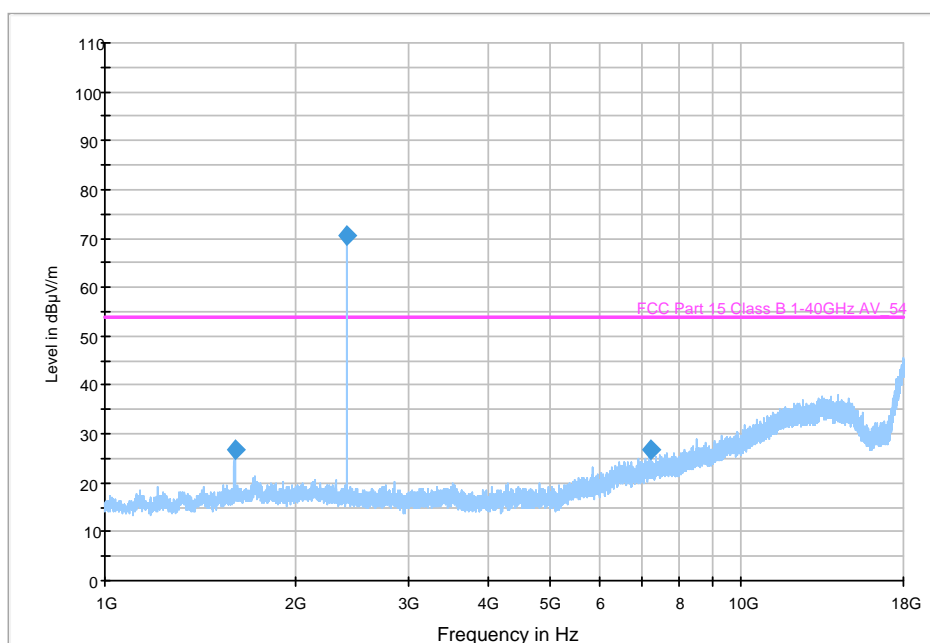
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth GFSK Mid Channel



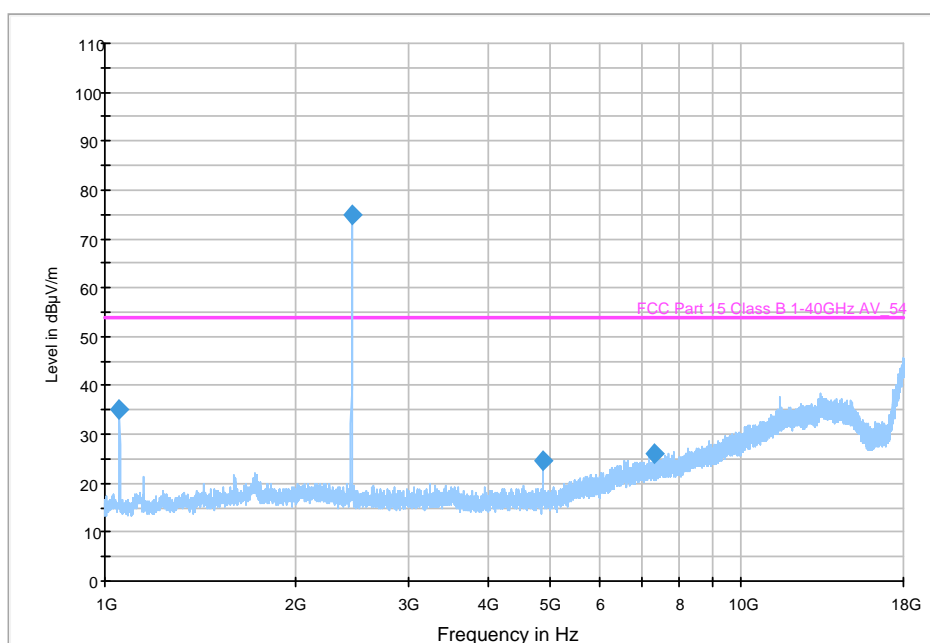
Radiated Spurious Emissions 30MHz-1GHz – Bluetooth GFSK High Channel



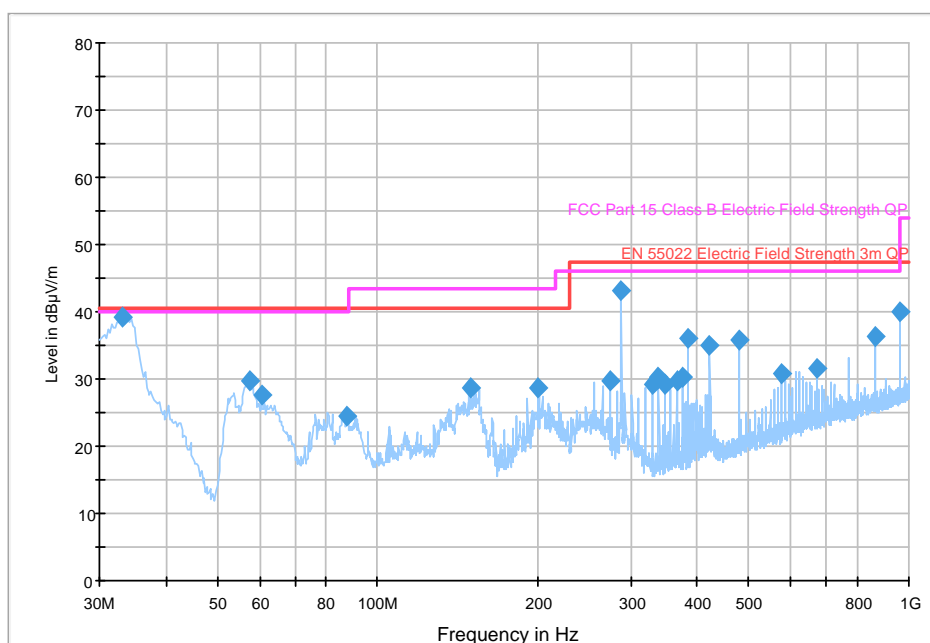
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth GFSK High Channel



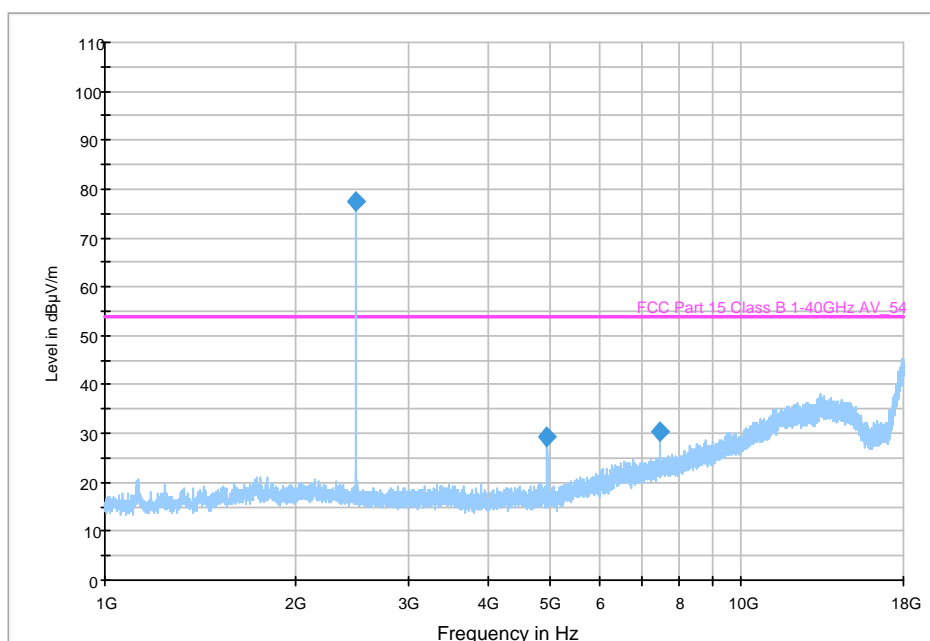
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth EDR2 Low Channel



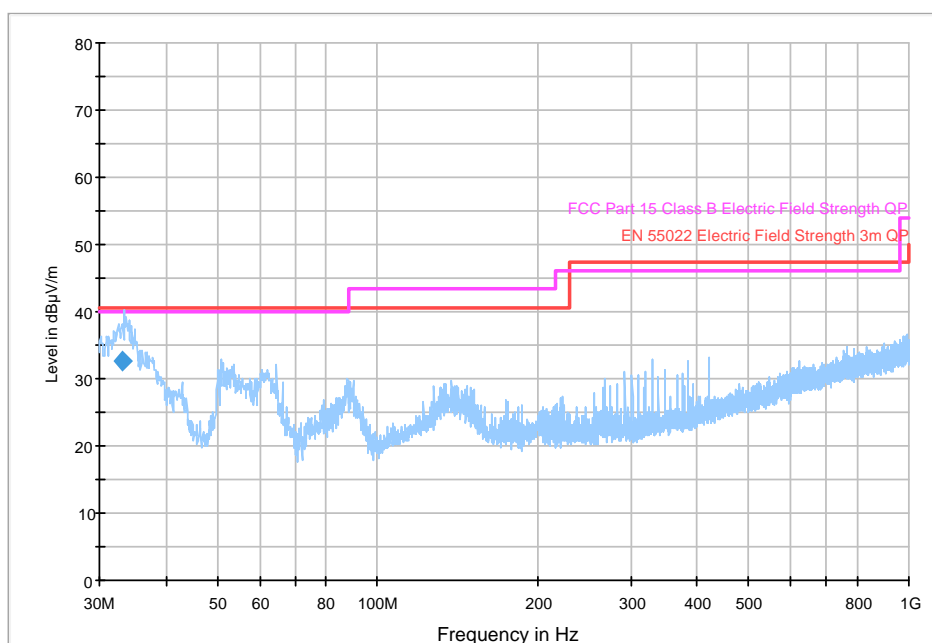
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth EDR2 Mid Channel



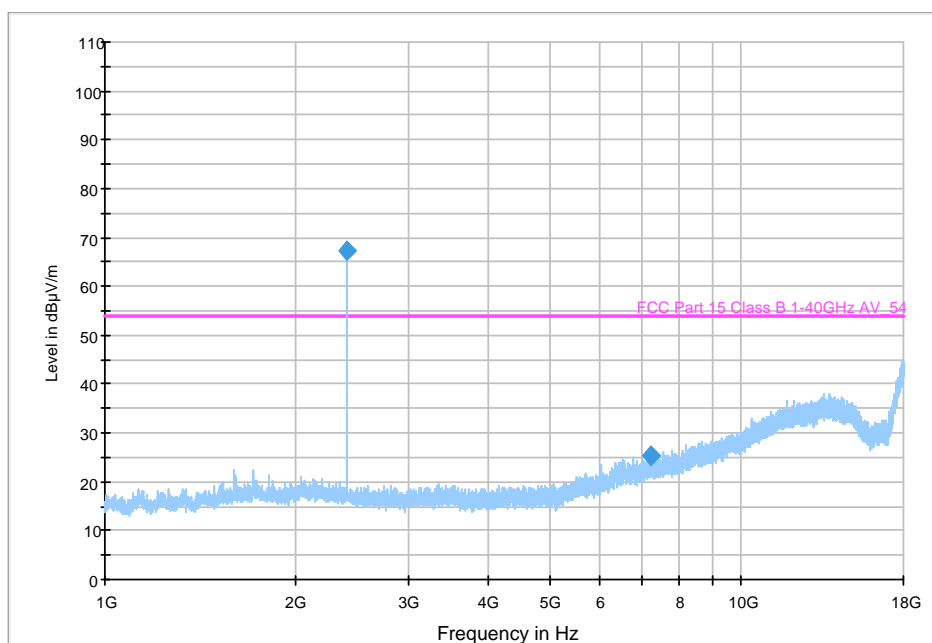
Radiated Spurious Emissions 30MHz-1GHz – Bluetooth EDR2 High Channel



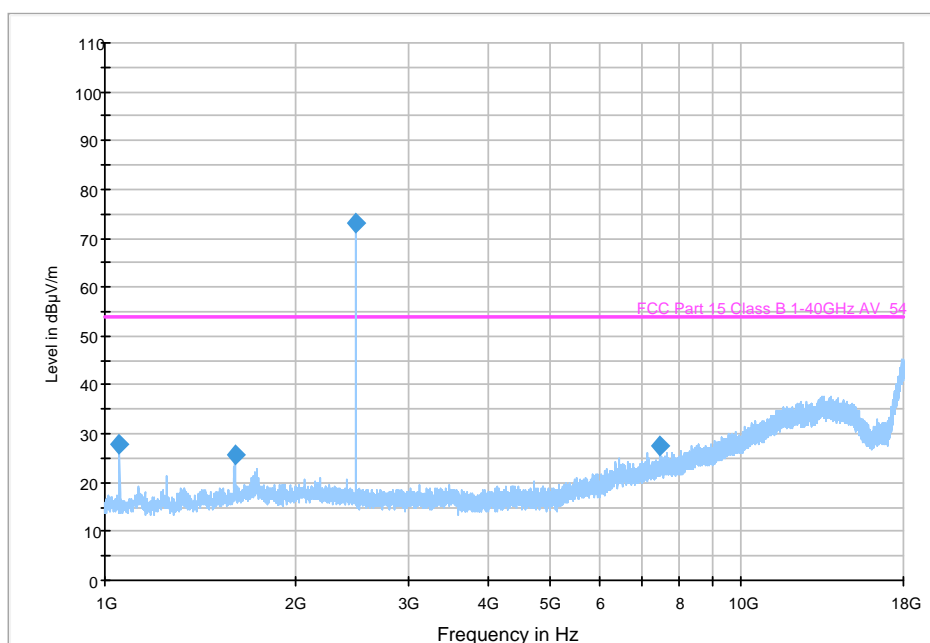
Radiated Spurious Emissions 1GHz-18GHz - Bluetooth EDR2 High Channel



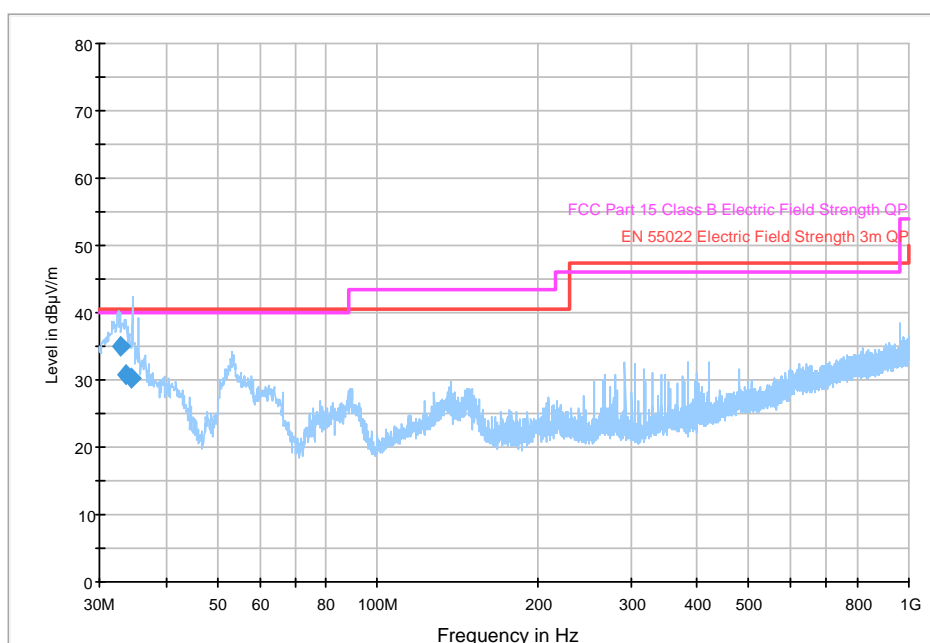
Radiated Spurious Emissions 30MHz-1GHz –BLTE Low Channel



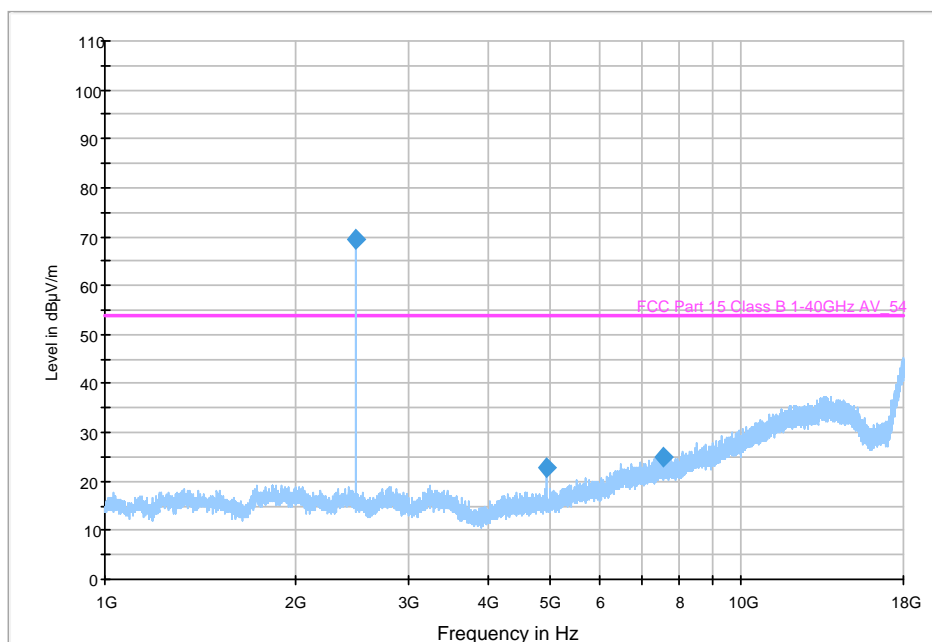
Radiated Spurious Emissions 1GHz-18GHz - BLTE Low Channel



Radiated Spurious Emissions 1GHz-18GHz – BLTE High Channel



Radiated Spurious Emissions 30MHz-1GHz – ANT High Channel



Radiated Spurious Emissions 1GHz-18GHz – ANT High Channel

Data of Radiated Spurious Emissions 1-18 GHz, WI-Fi

Freq.	UnCorr. PK	UnCorr. AVG	Ant Height	Pol	Ang	Ant. Factors	System Loss	Corr. PK	Corr. AVG	Margin Peak	Margin Avg	Limit Peak	Limit Avg
MHz	dBuV/m	dBuV/m	cm	V/H	deg	dB	dB	dBuV/m	dBuV/m	dB	dB	dBuV/m	dBuV/m
Low Channel 802.11 b													
4824	38.1	29.7	100	V	142	34.1	-26.4	45.8	37.4	28.2	16.6	74	54
4824	36.6	25.5	112	H	92.7	34.1	-26.4	44.3	33.2	29.7	20.8	74	54
Middle Channel 802.11 b													
4884	38.1	30.8	100	V	145	34.1	-27.3	44.9	37.6	29.1	16.4	74	54
4884	36.1	27.1	100	H	62	34.1	-27.3	42.9	33.9	31.1	20.1	74	54
High Channel 802.11 b													
4924	39.3	31.5	125	V	139	34.1	-27.2	46.2	38.4	27.8	15.6	74	54
4924	39	31	115	H	63	34.1	-27.2	45.9	37.9	28.1	16.1	74	54
Low Channel 802.11 g													
4824	Noise					34.1	-26.4	7.7	7.7	66.3	46.3	74	54
4824	Noise					34.1	-26.4	7.7	7.7	66.3	46.3	74	54
Middle Channel 802.11 g													
4884	Noise					34.1	-27.3	6.8	6.8	67.2	47.2	74	54
4884	Noise					34.1	-27.3	6.8	6.8	67.2	47.2	74	54
High Channel 802.11 g													
4924	Noise					34.1	-27.2	6.9	6.9	67.1	47.1	74	54
4924	Noise					34.1	-27.2	6.9	6.9	67.1	47.1	74	54
Low Channel 802.11 n													
4824	35.2	22	100	V	0	34.1	-26.4	42.9	29.7	31.1	24.3	74	54
4824	35	22	100	H	0	34.1	-26.4	42.7	29.7	31.3	24.3	74	54
Middle Channel 802.11 n													
4884	35	22	100	V	0	34.1	-27.3	41.8	28.8	32.2	25.2	74	54
4884	35.1	22	100	H	0	34.1	-27.3	41.9	28.8	32.1	25.2	74	54
High Channel 802.11 n													
4924	35	22	100	V	0	34.1	-27.2	41.9	28.9	32.1	25.1	74	54
4924	35.1	22	100	H	0	34.1	-27.2	42	28.9	32	25.1	74	54

Radiated Spurious Emissions, Bluetooth

Freq.	UnCorr. PK	UnCorr. AVG	Ant Height	Pol	Ang	Ant. Factors	System Loss	Corr. PK	Corr. AVG	Margin Peak	Margin Avg	Limit Peak	Limit Avg
MHz	dBuV/m	dBuV/m	cm	V/H	deg	dB	dB	dBuV/m	dBuV/m	dB	dB	dBuV/m	dBuV/m
Low Channel Bluetooth GFSK Power Level 0x0F													
4804	32	21.5	100	V	142	34.1	-23.9	42.2	31.7	31.8	22.3	74	54
4804	31.5	21	112	H	92.7	34.1	-23.9	41.7	31.2	32.3	22.8	74	54
7206	34.5	25.3	100	V	343	35.6	-18.9	51.2	42	22.8	12	74	54
7206	34.7	25.4	100	H	100	35.6	-18.9	51.4	42.1	22.6	11.9	74	54
1055.53	51.8	43.7	120	V	72	28.5	-32	48.3	40.2	25.7	13.8	74	54
Middle Channel Bluetooth GFSK Power Level 0x0F													
4884	32	21.5	100	V	360	34.1	-23.7	42.4	31.9	31.6	22.1	74	54
4884	31.5	21	115	H	63	34.1	-23.7	41.9	31.4	32.1	22.6	74	54
7326	34.6	25.67	108	V	277	35.6	-19	51.2	42.27	22.8	11.73	74	54
7326	32.6	22.6	100	H	100	35.6	-19	49.2	39.2	24.8	14.8	74	54
1055.53	51.8	43.7	120	V	72	28.5	-32	48.3	40.2	25.7	13.8	74	54
High channel GFSK Power Level 0x0F													
4961.99	32.3	21.7	100	V	360	34.1	-23.3	43.1	32.5	30.9	21.5	74	54
4961.99	31.5	21	115	H	63	34.1	-23.3	42.3	31.8	31.7	22.2	74	54
7442.9	36.42	28.6	146	V	277	35.6	-18.2	53.82	46	20.18	8	74	54
7442.9	33.7	24	126	H	343	35.6	-18.2	51.1	41.4	22.9	12.6	74	54
1055.53	52	43.7	120	V	90	28.5	-32	48.5	40.2	25.5	13.8	74	54
Low Channel Bluetooth EDR2 Power Level 0x0F													
4804	32	21.5	100	V	142	34.1	-23.9	42.2	31.7	31.8	22.3	74	54
4804	31.5	21	112	H	92.7	34.1	-23.9	41.7	31.2	32.3	22.8	74	54
7206	34.67	24.7	100	V	333	35.6	-18.9	51.37	41.4	22.63	12.6	74	54
7206	33.7	22.6	100	H	100	35.6	-18.9	50.4	39.3	23.6	14.7	74	54
1600.1	40.8	32.4	100	H	60	28.8	-32	37.6	29.2	36.4	24.8	74	54
Middle Channel Bluetooth EDR2 Power Level 0x0F													
4884	32	21.5	100	V	360	34.1	-23.7	42.4	31.9	31.6	22.1	74	54
4884	33	21	115	H	63	34.1	-23.7	43.4	31.4	30.6	22.6	74	54
7326	34.8	25.2	110	V	270	35.6	-19	51.4	41.8	22.6	12.2	74	54
7326	32.9	19.76	103	H	997	35.6	-19	49.5	36.36	24.5	17.64	74	54
1055.53	53	44.1	120	V	72	28.5	-32	49.5	40.6	24.5	13.4	74	54
High Channel Bluetooth EDR2 Power Level 0x0F													
4961.99	32.3	21.7	100	V	360	34.1	-23.3	43.1	32.5	30.9	21.5	74	54
4961.99	31.5	21	115	H	63	34.1	-23.3	42.3	31.8	31.7	22.2	74	54
7442.9	37	28.4	120	V	283	35.6	-18.2	54.4	45.8	19.6	8.2	74	54
7442.9	34	25.6	110	H	343	35.6	-18.2	51.4	43	22.6	11	74	54

Radiated Spurious Emissions, BTLE

Freq.	UnCorr. PK	UnCorr. AVG	Ant Height	Pol	Ang	Ant. Factors	System Loss	Corr. PK	Corr. AVG	Margin Peak	Margin Avg	Limit Peak	Limit Avg
MHz	dBuV/m	dBuV/m	cm	V/H	deg	dB	dB	dBuV/m	dBuV/m	dB	dB	dBuV/m	dBuV/m
Low Channel Bluetooth GFSK Power Level 0x0F													
4804	38.08	27.9	100	V	329	34.1	-23.9	48.28	38.1	25.72	15.9	74	54
4804	39.42	26.8	205	H	360	34.1	-23.9	49.62	37	24.38	17	74	54
7206	35.78	27.7	168	V	330	35.6	-18.9	52.48	44.4	21.52	9.6	74	54
7206	34.5	25.8	169	H	45	35.6	-18.9	51.2	42.5	22.8	11.5	74	54
9608	27.7	17.7	100	V	59	37	-10.59	54.11	44.11	19.89	9.89	74	54
9608	27	17.5	100	H	360	37	-10.59	53.41	43.91	20.59	10.09	74	54
Middle Channel Bluetooth GFSK Power Level 0x0F													
4884	38.29	26.1	100	V	147	34.1	-23.7	48.69	36.5	25.31	17.5	74	54
4884	38.54	28.1	187	H	53	34.1	-23.7	48.94	38.5	25.06	15.5	74	54
7326	36.93	26.9	152	V	282	35.6	-19	53.53	43.5	20.47	10.5	74	54
7326	35.54	27.6	152	H	51	35.6	-19	52.14	44.2	21.86	9.8	74	54
9768	27.9	17.7	100	V	20	37	-10.59	54.31	44.11	19.69	9.89	74	54
9768	27.1	17.2	100	H	290	37	-10.59	53.51	43.61	20.49	10.39	74	54
High channel GFSK Power Level 0x0F													
4961.99	40.73	31.2	117	V	141	34.1	-23.3	51.53	42	22.47	12	74	54
4961.99	39.46	30.4	177	H	291	34.1	-23.3	51.53	41.2	22.47	12.8	74	54
7440	38.14	28	146	V	277	35.6	-18.2	55.54	45.4	18.46	8.6	74	54
7440	36.16	28.1	155	H	195	35.6	-18.2	53.56	45.5	20.44	8.5	74	54
9768	27.8	17.6	100	V	42	37.1	-10.59	54.31	44.11	19.69	9.89	74	54
9768	27.3	17.2	100	H	330	37.1	-10.59	53.81	43.71	20.19	10.29	74	54

Radiated Spurious Emissions, ANT

Freq.	UnCorr. PK	UnCorr. AVG	Ant Height	Pol	Ang	Ant. Factors	System Loss	Corr. PK	Corr. AVG	Margin Peak	Margin Avg	Limit Peak	Limit Avg
MHz	dBuV/m	dBuV/m	cm	V/H	deg	dB	dB	dBuV/m	dBuV/m	dB	dB	dBuV/m	dBuV/m
Low Channel													
2402	50.4	50	100	V	305	32.5	5.5	88.4	88	25.6	6	114	94
2402	53.5	52.9	100	H	114	32.5	5.5	91.5	90.9	22.5	3.1	114	94
4804	30.6	24.5	100	V	329	34.1	-23.9	40.8	34.7	33.2	19.3	74	54
4804	31.1	24.9	205	H	360	34.1	-23.9	41.3	35.1	32.7	18.9	74	54
7206	31.9	26	168	V	330	35.6	-18.9	48.6	42.7	25.4	11.3	74	54
7206	32.5	26.3	169	H	45	35.6	-18.9	49.2	43	24.8	11	74	54
Middle Channel													
2442	52.6	52.4	100	V	266	32.6	5.6	90.8	90.6	23.2	3.4	114	94
2442	53.9	53.5	137	H	121	32.6	5.6	92.1	91.7	21.9	2.3	114	94
4884	30.6	24.5	100	V	100	34.1	-23.7	41	34.9	33	19.1	74	54
4884	31.1	24.9	100	H	23	34.1	-23.7	41.5	35.3	32.5	18.7	74	54
7326	31.9	26	100	V	280	35.6	-19	48.5	42.6	25.5	11.4	74	54
7326	32.5	26.3	115	H	75	35.6	-19	49.1	42.9	24.9	11.1	74	54
High channel													
2480	51.34	50.9	100	V	9.5	32.7	5.8	89.84	89.4	24.16	4.6	114	94
2480	54.48	54.3	107	H	46.5	32.7	5.8	92.98	92.8	21.02	1.2	114	94
4962	30.8	24.4	100	V	230	34.1	-23.3	41.6	35.2	32.4	18.8	74	54
4962	31.3	24.9	100	H	200	34.1	-23.3	41.6	35.7	32.4	18.3	74	54
7440	32.3	26.5	100	V	44	35.6	-18.2	49.7	43.9	24.3	10.1	74	54
7440	32.8	26.6	100	H	75	35.6	-18.2	50.2	44	23.8	10	74	54

Part 4 – Power Spectral Density

DATE: Dec -02-2014

TEST STANDARD: RSS-210, Issue 8
FCC Subpart C §15.247(e)

TEST METHOD: As called by the standards above

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: 8 dBm in any 3 kHz band

TEST SETUP: The EUT was connected to the DUT in conducted mode likewise for output power measurements.

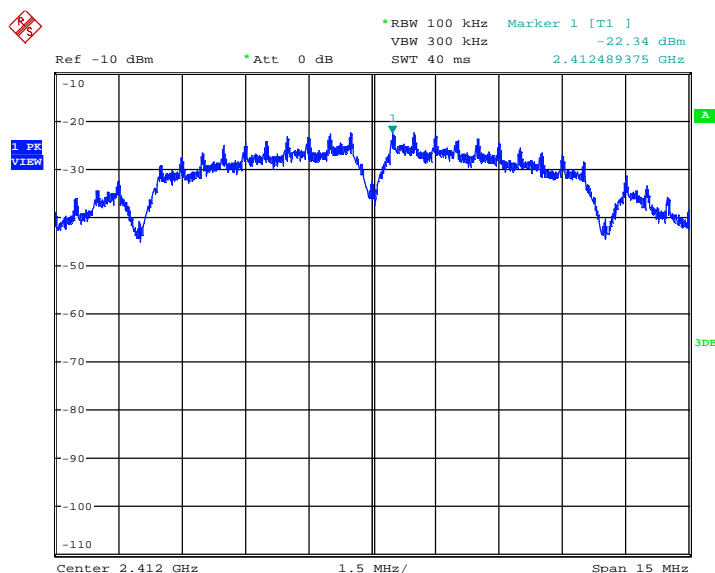
METHOD OF MEASUREMENT: Measurements were made using a spectrum analyser with 100 kHz resolution bandwidth, peak and detector.

DEVICE DESCRIPTIONS: As described in the equipment under test section, above.

PERFORMANCE: Complies with Standard

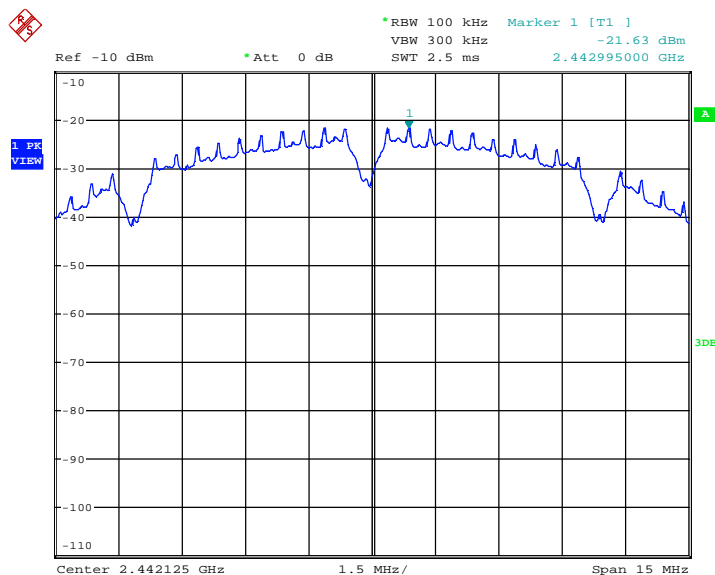
MEASUREMENT DATA & PLOT:

Modulation		Channel	Frequency	PSD	Result
			MHz	dBm	
Wi-Fi	IEEE 802.11b	Low	2412	-22.34	Pass
		Mid	2442	-21.63	Pass
		High	2462	-21.90	Pass
	IEEE 802.11g	Low	2412	-26.12	Pass
		Mid	2442	-24.93	Pass
		High	2462	-24.32	Pass
	IEEE 802.11n	Low	2412	-25.96	Pass
		Mid	2442	-24.61	Pass
		High	2462	-23.65	Pass
BTLE	GFSK	Low	2402	-34.32	Pass
		Mid	2442	-33.99	Pass
		High	2480	-33.32	Pass



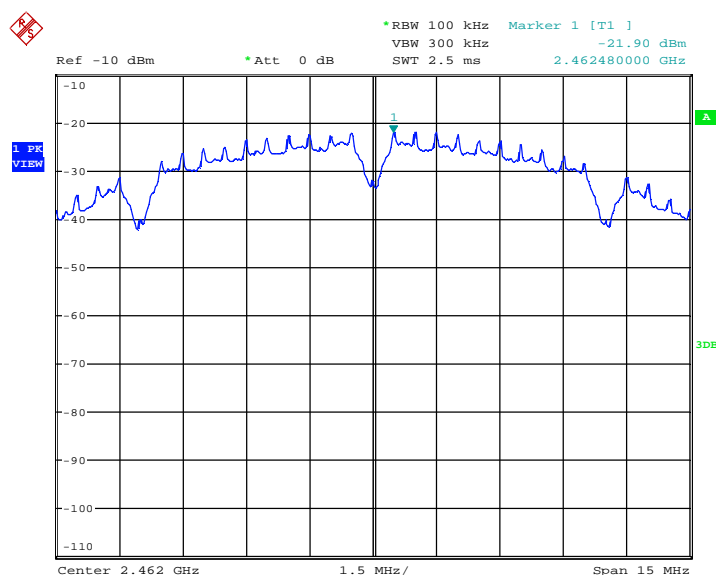
Date: 2.DEC.2014 11:04:10

PSD, Wi-Fi IEEE 802.11b - Low Channel



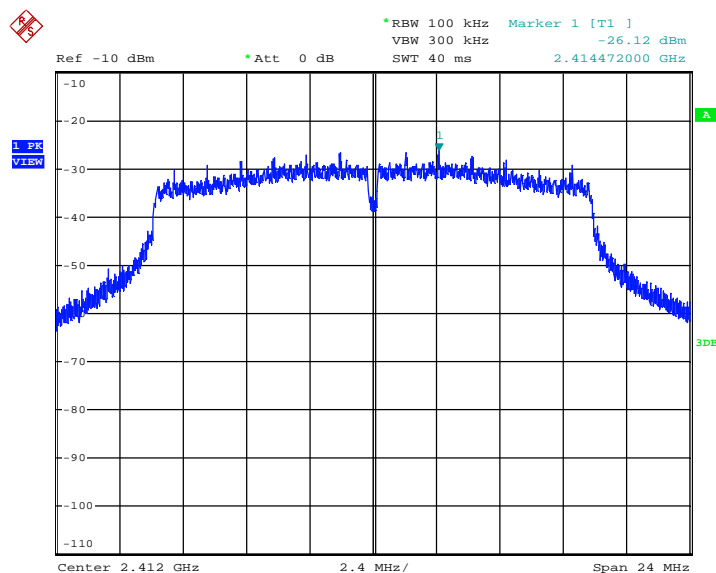
Date: 1.DEC.2014 16:13:09

PSD, Wi-Fi IEEE 802.11b - Mid Channel



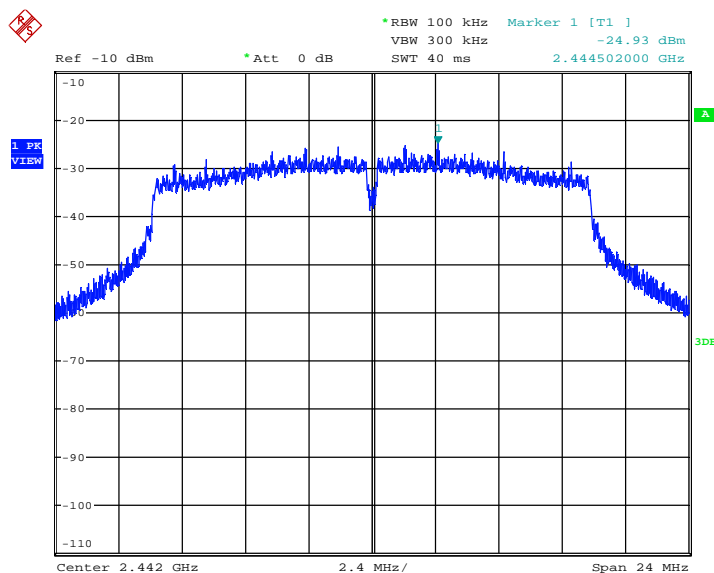
Date: 1.DEC.2014 16:42:28

PSD, Wi-Fi IEEE 802.11b - High Channel



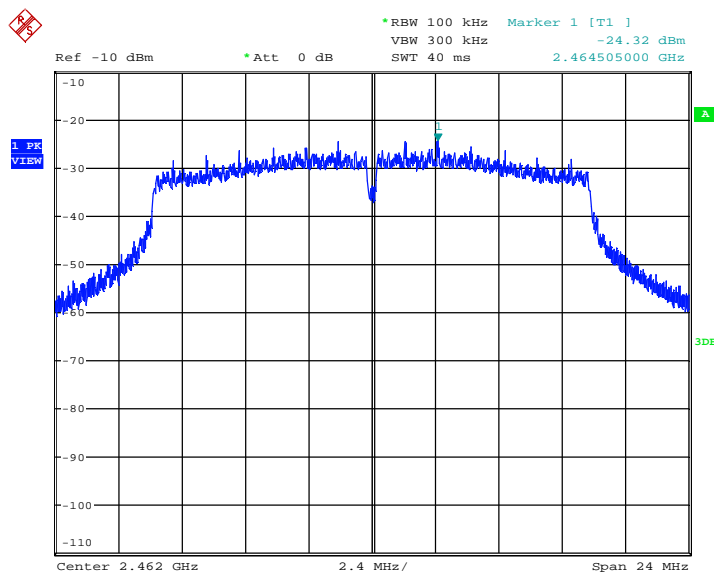
Date: 2.DEC.2014 11:13:15

PSD, Wi-Fi IEEE 802.11g - Low Channel



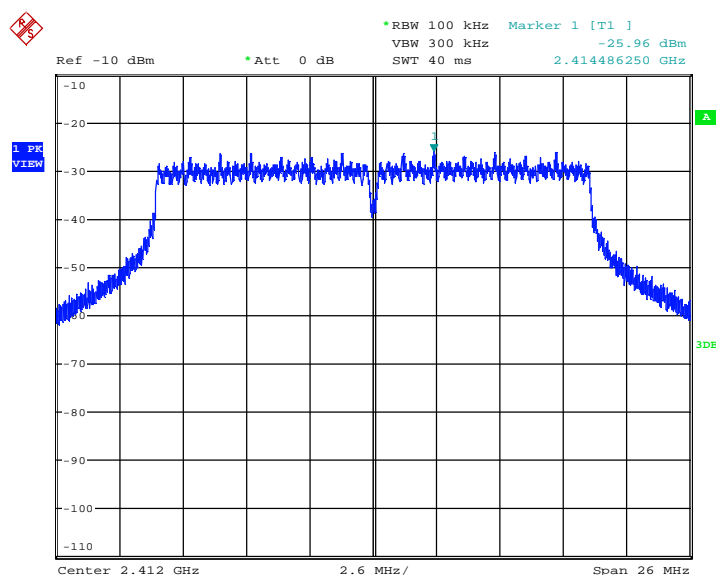
Date: 2.DEC.2014 11:21:30

PSD, Wi-Fi IEEE 802.11g - Mid Channel



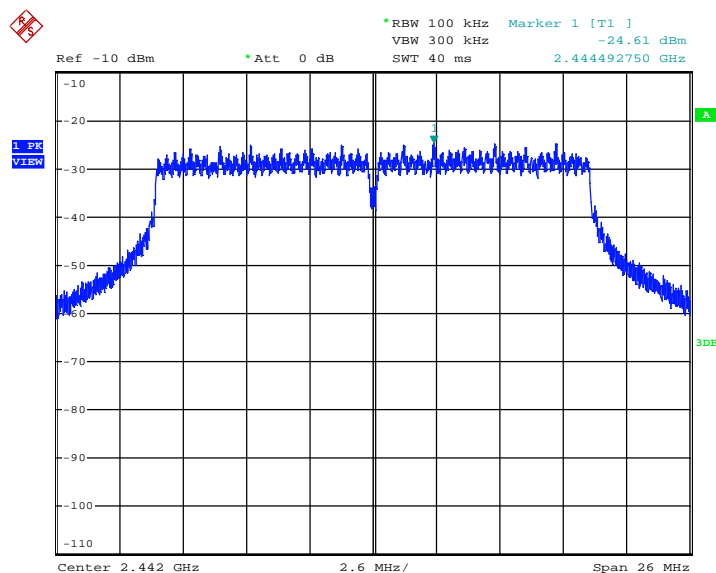
Date: 2.DEC.2014 11:27:29

PSD, Wi-Fi IEEE 802.11g - High Channel



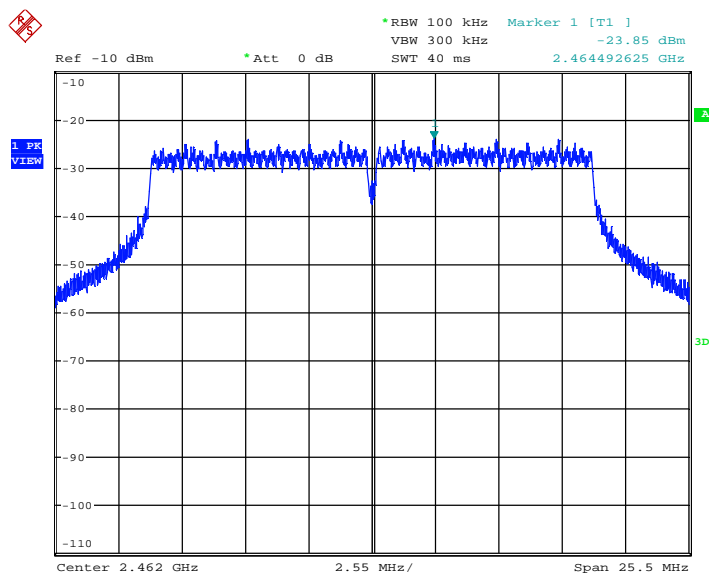
Date: 2.DEC.2014 11:55:24

PSD, Wi-Fi IEEE 802.11n - Low Channel



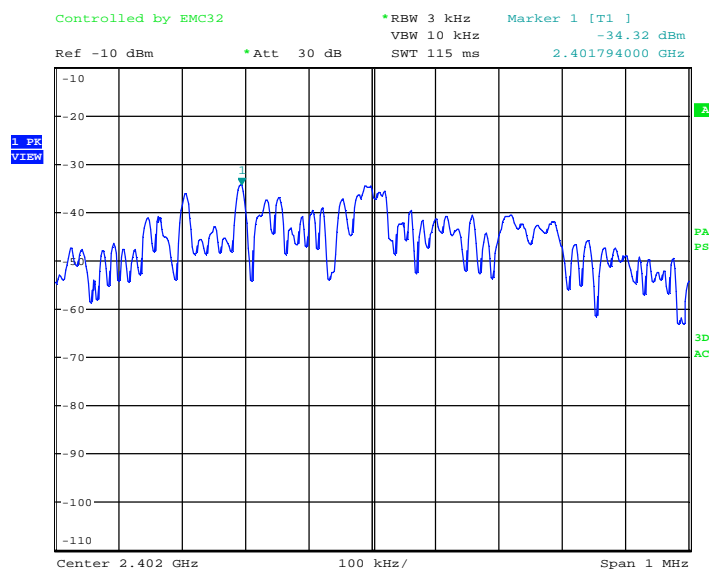
Date: 2.DEC.2014 11:51:50

PSD, Wi-Fi IEEE 802.11n- Mid Channel



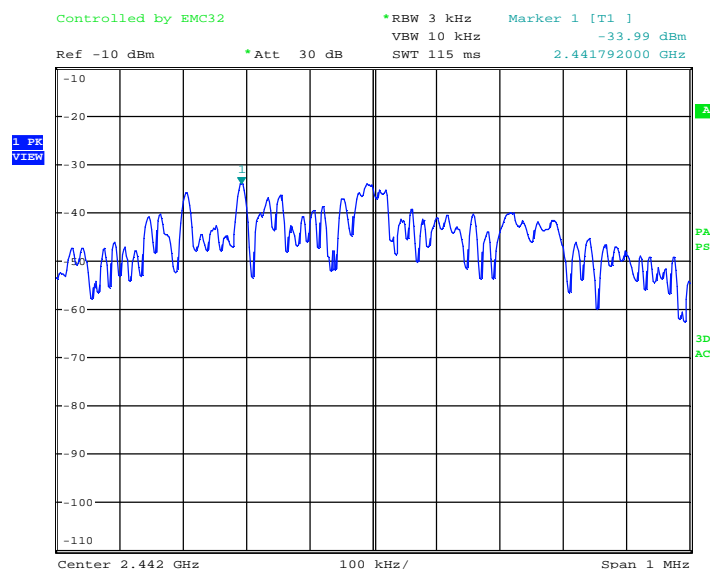
Date: 2.DEC.2014 11:40:04

PSD, Wi-Fi IEEE 802.11n - High Channel



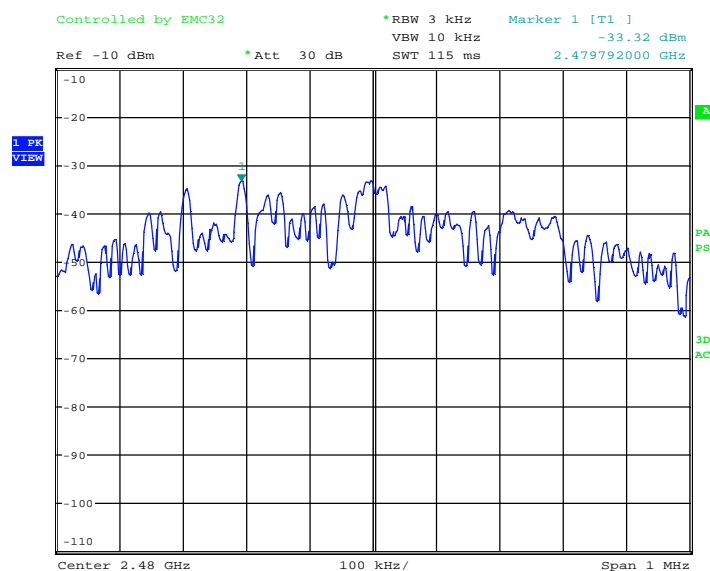
Date: 7.JAN.2015 11:34:09

PSD, BTLE GFSK - Low Channel



Date: 7.JAN.2015 11:33:19

PSD, BTLE GFSK - Mid Channel



Date: 7.JAN.2015 11:32:22

PSD, BTLE GFSK - High Channel

Part 5 – AC Mains Conducted Emissions

DATE: Dec-10-2014

TEST STANDARD: RSS-210, Issue 8; FCC Subpart C §15.207(a)

TEST METHOD: RSS-Gen Issue 4 (7.1.4); CAN/USA – IEC CISPR 22; FCC Subpart C §15.207(a)

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: Class B Limit:

Frequency (MHz)	Conducted Limit (dBμV)	
	Quasi-Peak	Average
0.15 - 0.50	66 to 56	56 to 46
0.5 – 5	56	46
5 – 30	60	50
Note 1 The lower limit shall apply at the transition frequencies		
Note 2 The limit decreases linearly with the logarithm of the frequency in the 0.15 to 0.50 MHz..		

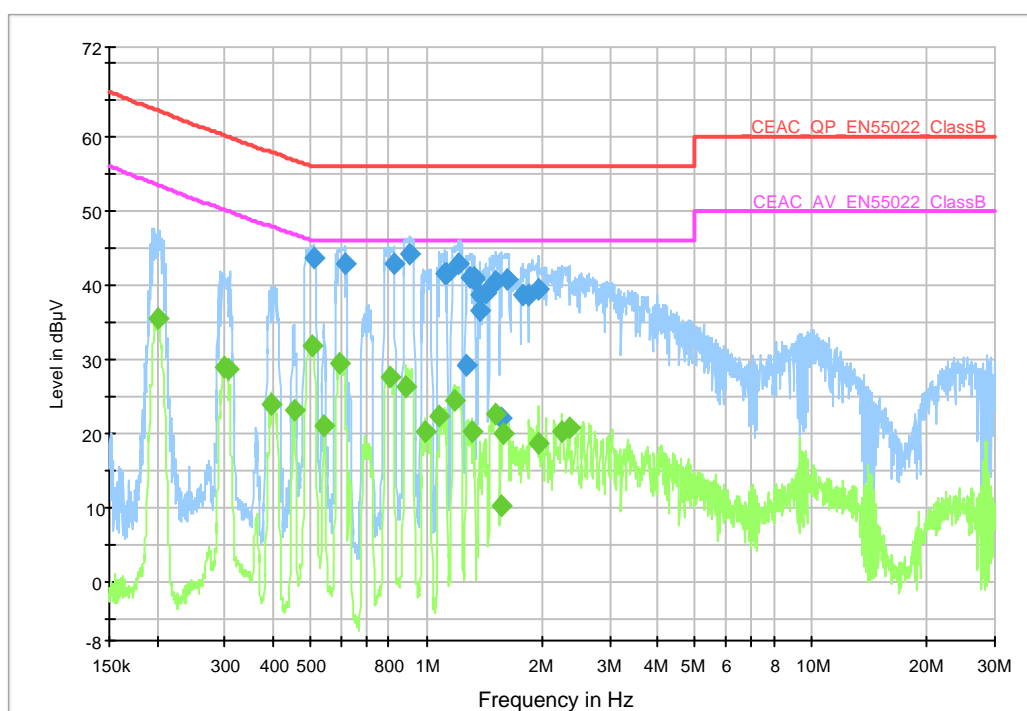
TEST SETUP: The EUT was connected to the conducted emissions LISN apparatus. The equipment was operated and tested at 120Vac 60Hz while in continuous mode of operation.

METHOD OF MEASUREMENT: Measurements were made using a test receiver with 9 kHz bandwidth, quasi-peak and average detector.

DEVICE DESCRIPTIONS: As described in the equipment test section above.

PERFORMANCE: Complies with Standard

DATA & PLOT: Pre-testings were performed to find out the worst case which is Wi-Fi transmitter on



Line 1, 120Vac, Wi-Fi transmitter on

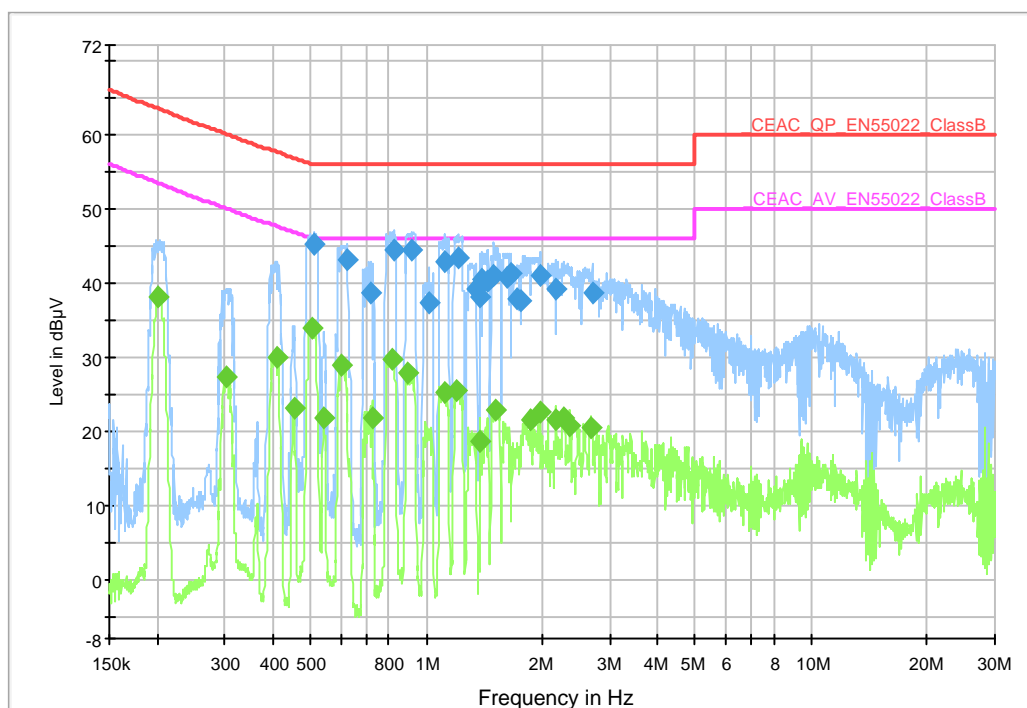
Final Result, quasi-peak detector, Line 1, 120Vac, Wi-Fi transmitter on

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.508474	43.5	1000.000	9.000	Off	0.4	12.5	56.0
0.615985	42.9	1000.000	9.000	Off	0.4	13.1	56.0
0.819699	42.9	1000.000	9.000	Off	0.5	13.1	56.0
0.909444	44.1	1000.000	9.000	Off	0.5	11.9	56.0
1.119487	41.4	1000.000	9.000	Off	0.5	14.6	56.0
1.126218	41.5	1000.000	9.000	Off	0.5	14.5	56.0
1.207793	42.8	1000.000	9.000	Off	0.5	13.2	56.0
1.267120	29.1	1000.000	9.000	Off	0.5	26.9	56.0
1.303065	41.0	1000.000	9.000	Off	0.5	15.0	56.0
1.326708	41.0	1000.000	9.000	Off	0.5	15.0	56.0
1.337354	40.8	1000.000	9.000	Off	0.5	15.2	56.0
1.369806	36.6	1000.000	9.000	Off	0.5	19.4	56.0
1.378041	38.6	1000.000	9.000	Off	0.5	17.4	56.0
1.428503	38.9	1000.000	9.000	Off	0.5	17.1	56.0
1.516746	40.4	1000.000	9.000	Off	0.5	15.6	56.0
1.559771	22.0	1000.000	9.000	Off	0.5	34.0	56.0
1.626609	40.7	1000.000	9.000	Off	0.5	15.3	56.0
1.779633	38.7	1000.000	9.000	Off	0.5	17.3	56.0
1.837444	38.6	1000.000	9.000	Off	0.5	17.4	56.0
1.954850	39.5	1000.000	9.000	Off	0.5	16.5	56.0

Final Result, average detector, Line 1, 120Vac, Wi-Fi transmitter on

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.200406	35.3	1000.000	9.000	Off	0.5	18.1	53.4
0.299449	28.9	1000.000	9.000	Off	0.4	21.1	50.0
0.304274	28.6	1000.000	9.000	Off	0.4	21.3	49.9
0.395309	23.7	1000.000	9.000	Off	0.4	24.1	47.8
0.451932	23.0	1000.000	9.000	Off	0.4	23.8	46.8
0.507460	31.7	1000.000	9.000	Off	0.4	14.3	46.0
0.543130	21.0	1000.000	9.000	Off	0.4	25.0	46.0
0.595414	29.4	1000.000	9.000	Off	0.4	16.6	46.0
0.809931	27.5	1000.000	9.000	Off	0.5	18.5	46.0
0.882593	26.2	1000.000	9.000	Off	0.5	19.8	46.0
0.989055	20.0	1000.000	9.000	Off	0.5	26.0	46.0
1.082101	22.4	1000.000	9.000	Off	0.5	23.6	46.0
1.176826	24.3	1000.000	9.000	Off	0.5	21.7	46.0
1.321417	20.2	1000.000	9.000	Off	0.5	25.8	46.0
1.507682	22.5	1000.000	9.000	Off	0.5	23.5	46.0
1.562891	10.2	1000.000	9.000	Off	0.5	35.8	46.0
1.581739	19.8	1000.000	9.000	Off	0.5	26.2	46.0
1.950948	18.7	1000.000	9.000	Off	0.5	27.3	46.0
2.252795	20.2	1000.000	9.000	Off	0.5	25.8	46.0

2.363453	20.6	1000.000	9.000	Off	0.5	25.4	46.0
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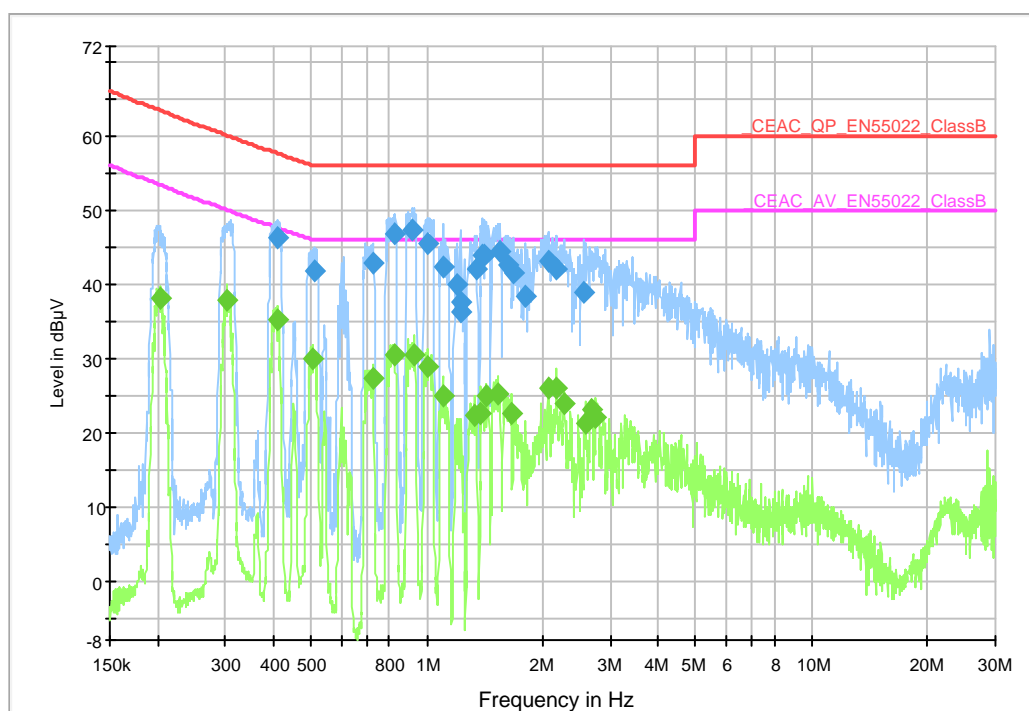
Line 2, 120Vac, Wi-Fi transmitter on

Final Result, quasi-peak detector, Line 2, 120Vac, Wi-Fi transmitter on

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.511531	45.0	1000.000	9.000	Off	0.4	11.0	56.0
0.622170	42.9	1000.000	9.000	Off	0.4	13.1	56.0
0.716997	38.6	1000.000	9.000	Off	0.5	17.4	56.0
0.824627	44.4	1000.000	9.000	Off	0.5	11.6	56.0
0.916742	44.4	1000.000	9.000	Off	0.5	11.6	56.0
1.019146	37.2	1000.000	9.000	Off	0.5	18.8	56.0
1.117253	42.7	1000.000	9.000	Off	0.5	13.3	56.0
1.205382	43.3	1000.000	9.000	Off	0.5	12.7	56.0
1.345394	39.2	1000.000	9.000	Off	0.5	16.8	56.0
1.375290	38.1	1000.000	9.000	Off	0.5	17.9	56.0
1.386326	40.4	1000.000	9.000	Off	0.5	15.6	56.0
1.442845	40.2	1000.000	9.000	Off	0.5	15.8	56.0
1.501669	40.9	1000.000	9.000	Off	0.5	15.1	56.0
1.616888	40.7	1000.000	9.000	Off	0.5	15.3	56.0
1.659435	41.2	1000.000	9.000	Off	0.5	14.8	56.0
1.720201	37.9	1000.000	9.000	Off	0.5	18.1	56.0
1.758426	37.4	1000.000	9.000	Off	0.5	18.6	56.0
1.970536	40.9	1000.000	9.000	Off	0.5	15.1	56.0
2.177561	39.1	1000.000	9.000	Off	0.5	16.9	56.0
2.696600	38.6	1000.000	9.000	Off	0.5	17.4	56.0

Final Result, average detector, Line 2, 120Vac, Wi-Fi transmitter on

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.201209	38.1	1000.000	9.000	Off	0.5	15.3	53.4
0.301852	27.2	1000.000	9.000	Off	0.4	22.8	50.0
0.407335	29.8	1000.000	9.000	Off	0.4	17.8	47.6
0.451932	22.9	1000.000	9.000	Off	0.4	23.9	46.8
0.502415	33.8	1000.000	9.000	Off	0.4	12.2	46.0
0.542046	21.7	1000.000	9.000	Off	0.4	24.3	46.0
0.598994	28.8	1000.000	9.000	Off	0.4	17.2	46.0
0.721307	21.8	1000.000	9.000	Off	0.5	24.2	46.0
0.816430	29.6	1000.000	9.000	Off	0.5	16.4	46.0
0.896813	27.7	1000.000	9.000	Off	0.5	18.3	46.0
1.117253	25.0	1000.000	9.000	Off	0.5	21.0	46.0
1.198179	25.3	1000.000	9.000	Off	0.5	20.7	46.0
1.380797	18.5	1000.000	9.000	Off	0.5	27.5	46.0
1.504672	22.7	1000.000	9.000	Off	0.5	23.3	46.0
1.867049	21.6	1000.000	9.000	Off	0.5	24.4	46.0
1.970536	22.5	1000.000	9.000	Off	0.5	23.5	46.0
2.168877	21.6	1000.000	9.000	Off	0.5	24.4	46.0
2.275413	21.8	1000.000	9.000	Off	0.5	24.2	46.0
2.363453	20.7	1000.000	9.000	Off	0.5	25.3	46.0
2.664466	20.4	1000.000	9.000	Off	0.5	25.6	46.0



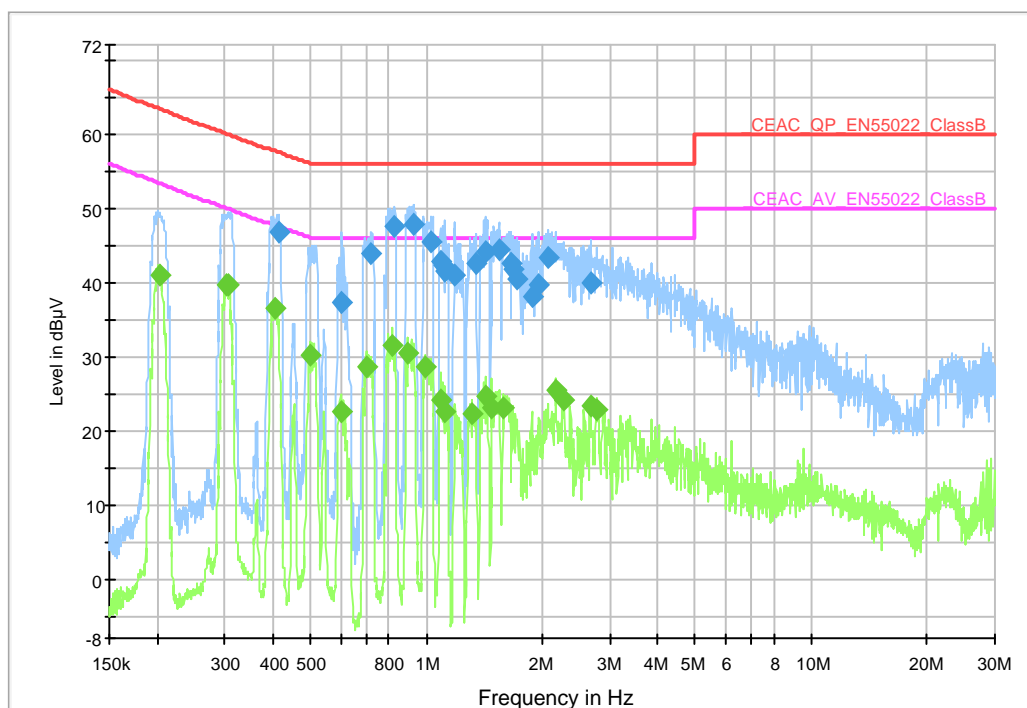
Line 1, 230Vac, Wi-Fi transmitter on

Final Result, quasi-peak detector, Line 1, 230Vac, Wi-Fi transmitter on

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.408966	46.2	1000.000	9.000	Off	0.4	11.4	57.6
0.508474	41.8	1000.000	9.000	Off	0.4	14.2	56.0
0.721307	42.7	1000.000	9.000	Off	0.5	13.3	56.0
0.826277	46.7	1000.000	9.000	Off	0.5	9.3	56.0
0.914912	47.3	1000.000	9.000	Off	0.5	8.7	56.0
1.007001	45.4	1000.000	9.000	Off	0.5	10.6	56.0
1.101736	42.3	1000.000	9.000	Off	0.5	13.7	56.0
1.191018	39.9	1000.000	9.000	Off	0.5	16.1	56.0
1.219919	37.5	1000.000	9.000	Off	0.5	18.5	56.0
1.232168	36.1	1000.000	9.000	Off	0.5	19.9	56.0
1.342709	42.0	1000.000	9.000	Off	0.5	14.0	56.0
1.400245	43.9	1000.000	9.000	Off	0.5	12.1	56.0
1.405851	43.9	1000.000	9.000	Off	0.5	12.1	56.0
1.550450	44.3	1000.000	9.000	Off	0.5	11.7	56.0
1.626609	42.6	1000.000	9.000	Off	0.5	13.4	56.0
1.676096	41.5	1000.000	9.000	Off	0.5	14.5	56.0
1.804698	38.2	1000.000	9.000	Off	0.5	17.8	56.0
2.071464	43.1	1000.000	9.000	Off	0.5	12.9	56.0
2.173215	42.0	1000.000	9.000	Off	0.5	14.0	56.0
2.554984	38.9	1000.000	9.000	Off	0.5	17.1	56.0

Final Result, average detector, Line 1, 230Vac, Wi-Fi transmitter on

Frequency (MHz)	Average (dBμV)	Meas. Time	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.202418	38.1	1000.000	9.000	Off	0.5	15.2	53.3
0.302456	37.7	1000.000	9.000	Off	0.4	12.2	49.9
0.408966	35.2	1000.000	9.000	Off	0.4	12.3	47.5
0.505436	29.9	1000.000	9.000	Off	0.4	16.1	46.0
0.721307	27.2	1000.000	9.000	Off	0.5	18.8	46.0
0.819699	30.5	1000.000	9.000	Off	0.5	15.5	46.0
0.927798	30.4	1000.000	9.000	Off	0.5	15.6	46.0
1.007001	28.8	1000.000	9.000	Off	0.5	17.2	46.0
1.097342	24.9	1000.000	9.000	Off	0.5	21.1	46.0
1.334684	22.3	1000.000	9.000	Off	0.5	23.7	46.0
1.383559	22.6	1000.000	9.000	Off	0.5	23.4	46.0
1.428503	25.0	1000.000	9.000	Off	0.5	21.0	46.0
1.531974	25.2	1000.000	9.000	Off	0.5	20.8	46.0
1.656123	22.5	1000.000	9.000	Off	0.5	23.5	46.0
2.071464	25.8	1000.000	9.000	Off	0.5	20.2	46.0
2.173215	26.1	1000.000	9.000	Off	0.5	19.9	46.0
2.266339	23.8	1000.000	9.000	Off	0.5	22.2	46.0
2.590969	21.3	1000.000	9.000	Off	0.5	24.8	46.0
2.680485	23.1	1000.000	9.000	Off	0.5	22.9	46.0
2.756522	22.0	1000.000	9.000	Off	0.5	24.0	46.0



Line 2, 230Vac, Wi-Fi transmitter on

Final Result, quasi-peak detector , Line 2, 230Vac, Wi-Fi transmitter on

Frequency (MHz)	QuasiPeak (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.414726	46.8	1000.000	9.000	Off	0.4	10.6	57.4
0.603800	37.2	1000.000	9.000	Off	0.4	18.8	56.0
0.719868	43.9	1000.000	9.000	Off	0.5	12.1	56.0
0.827929	47.6	1000.000	9.000	Off	0.5	8.4	56.0
0.927798	47.7	1000.000	9.000	Off	0.5	8.3	56.0
1.029378	45.4	1000.000	9.000	Off	0.5	10.6	56.0
1.086434	42.8	1000.000	9.000	Off	0.5	13.2	56.0
1.101736	42.3	1000.000	9.000	Off	0.5	13.7	56.0
1.115023	41.6	1000.000	9.000	Off	0.5	14.4	56.0
1.183901	41.1	1000.000	9.000	Off	0.5	14.9	56.0
1.345394	42.7	1000.000	9.000	Off	0.5	13.3	56.0
1.419966	44.1	1000.000	9.000	Off	0.5	11.9	56.0
1.541184	44.3	1000.000	9.000	Off	0.5	11.7	56.0
1.659435	42.6	1000.000	9.000	Off	0.5	13.4	56.0
1.676096	41.7	1000.000	9.000	Off	0.5	14.3	56.0
1.716768	40.3	1000.000	9.000	Off	0.5	15.7	56.0
1.885795	38.1	1000.000	9.000	Off	0.5	17.9	56.0
1.954850	39.6	1000.000	9.000	Off	0.5	16.4	56.0
2.071464	43.2	1000.000	9.000	Off	0.5	12.8	56.0
2.669795	39.8	1000.000	9.000	Off	0.5	16.2	56.0

Final Result, average detector, Line 2, 230Vac, Wi-Fi transmitter on

Frequency (MHz)	Average (dBμV)	Meas. Time (ms)	Bandwidth (kHz)	Filter	Corr. (dB)	Margin (dB)	Limit (dBμV)
0.203635	40.9	1000.000	9.000	Off	0.5	12.4	53.3
0.303060	39.7	1000.000	9.000	Off	0.4	10.2	49.9
0.304274	39.6	1000.000	9.000	Off	0.4	10.3	49.9
0.404093	36.5	1000.000	9.000	Off	0.4	11.1	47.6
0.501412	30.1	1000.000	9.000	Off	0.4	15.9	46.0
0.598994	22.5	1000.000	9.000	Off	0.4	23.5	46.0
0.697219	28.6	1000.000	9.000	Off	0.5	17.4	46.0
0.816430	31.4	1000.000	9.000	Off	0.5	14.6	46.0
0.895023	30.5	1000.000	9.000	Off	0.5	15.5	46.0
0.996991	28.5	1000.000	9.000	Off	0.5	17.5	46.0
1.088607	24.0	1000.000	9.000	Off	0.5	22.0	46.0
1.117253	22.5	1000.000	9.000	Off	0.5	23.5	46.0
1.318780	22.2	1000.000	9.000	Off	0.5	23.8	46.0
1.422806	24.6	1000.000	9.000	Off	0.5	21.4	46.0
1.480813	23.2	1000.000	9.000	Off	0.5	22.8	46.0
1.588073	23.2	1000.000	9.000	Off	0.5	22.8	46.0
2.168877	25.5	1000.000	9.000	Off	0.5	20.5	46.0
2.275413	24.2	1000.000	9.000	Off	0.5	21.8	46.0
2.669795	23.3	1000.000	9.000	Off	0.5	22.7	46.0
2.778641	22.8	1000.000	9.000	Off	0.5	23.2	46.0

Part 6 - 6 dB Occupied Bandwidth

DATE: Dec-01-2014

TEST STANDARD: RSS-210, §15.247(a)(2)

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: The minimum 6 dB bandwidth shall be at least 500 kHz.

TEST SETUP: The EUT was directly connected to a spectrum analyser. The transmitter was set for continuous transmission..

MEASUREMENT METHOD: Measurements were made using an spectrum analyser 100kHz RBW peak detector set on maximum hold using the appropriate antennas, amplifiers and filters.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

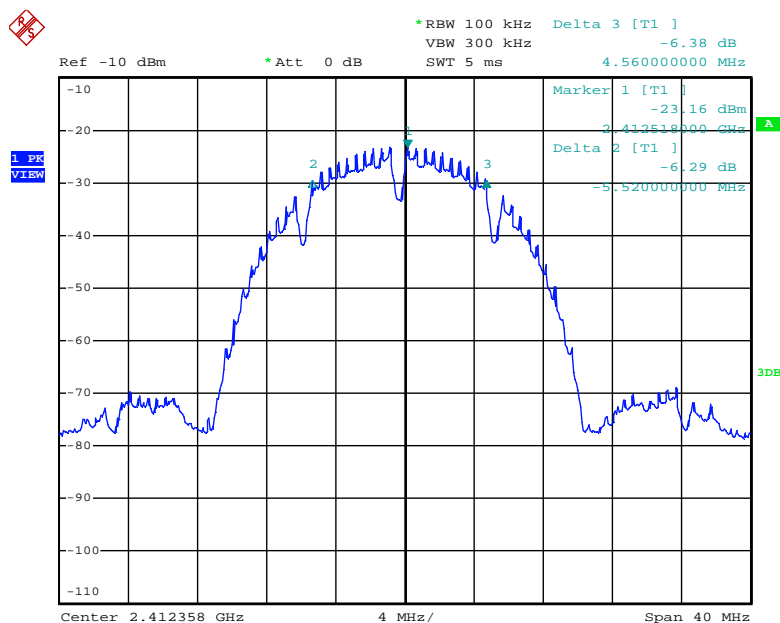
DATA:

Modulation		Channel	Frequency	6dB Occupied bandwidth	Limit	Result
			MHz	MHz	kHz	
Wi-Fi	IEEE 802.11b	Low	2412	10.08	500	Pass
		Mid	2442	10.08	500	Pass
		High	2462	10	500	Pass
	IEEE 802.11g	Low	2412	15.875	500	Pass
		Mid	2442	15.99	500	Pass
		High	2462	16.025	500	Pass
	IEEE 802.11n	Low	2412	17.84	500	Pass
		Mid	2442	17.84	500	Pass
		High	2462	17.84	500	Pass
BTLE	GFSK	Low	2402	0.666	500	Pass
		Mid	2442	0.669	500	Pass
		High	2480	0.667	500	Pass

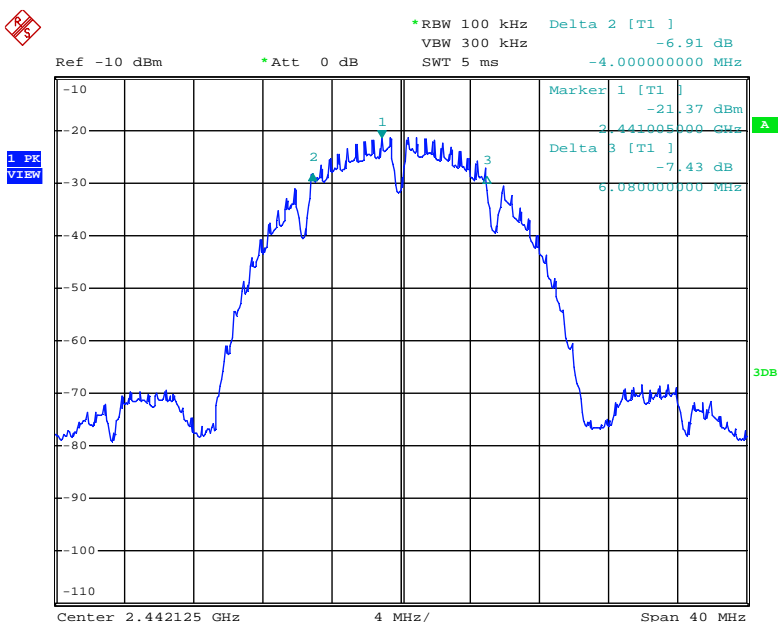
OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

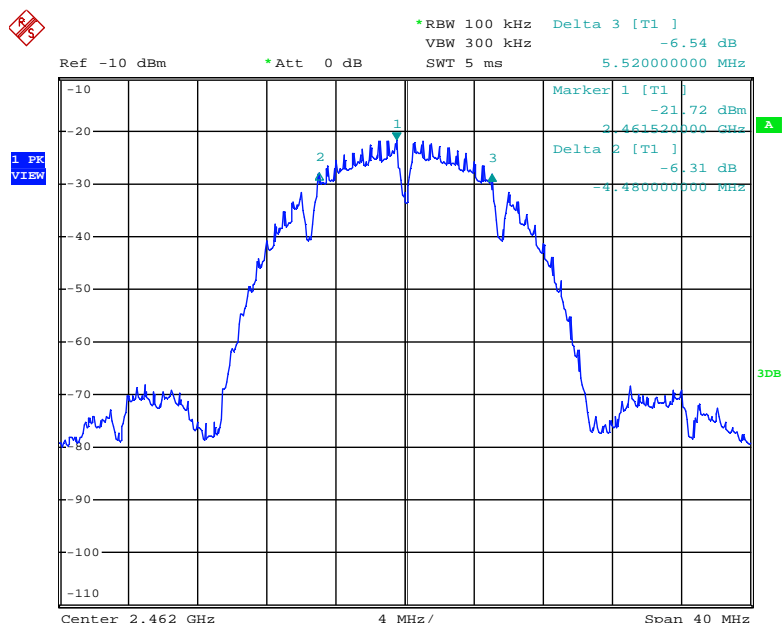
PLOT:



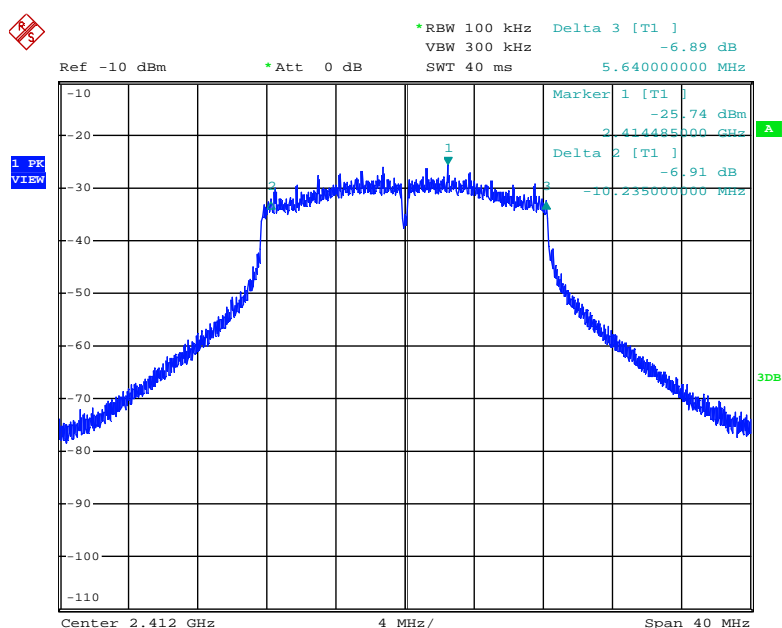
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11b, Low Channel



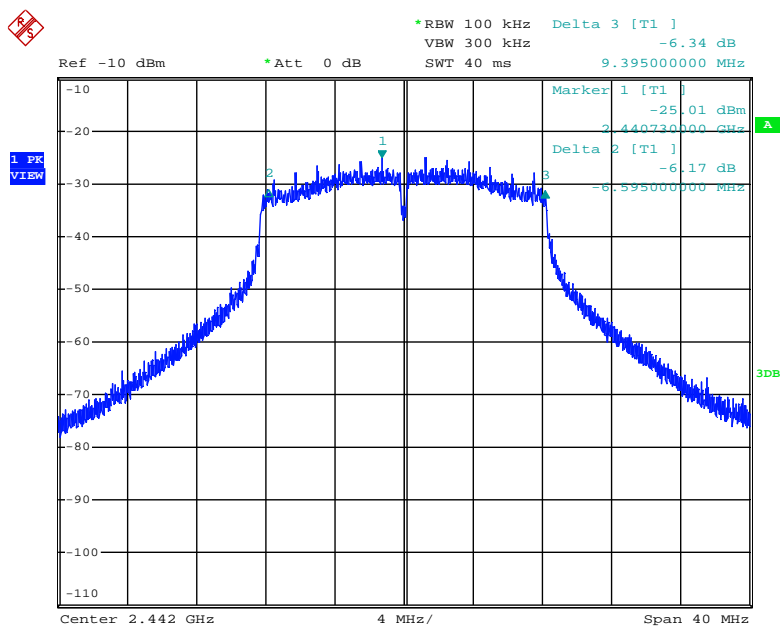
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11b, Mid Channel



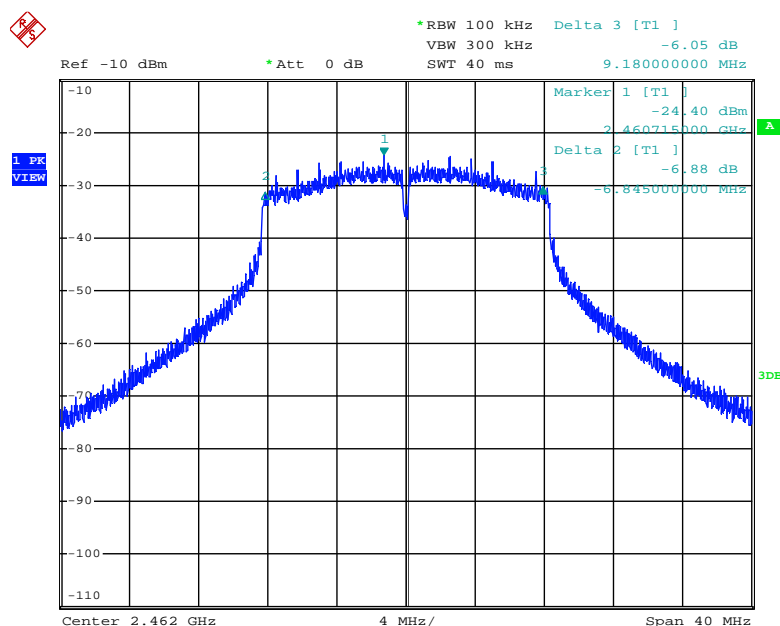
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11b, High Channel



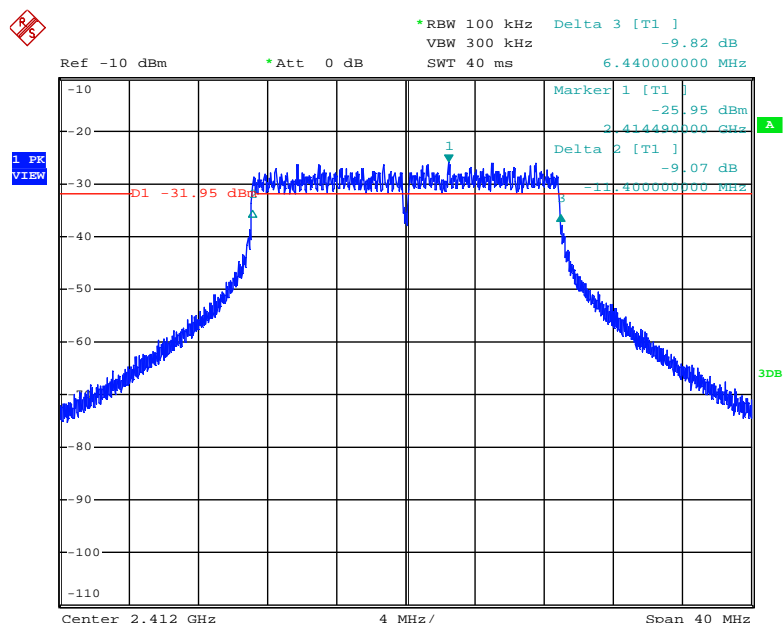
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11g, Low Channel



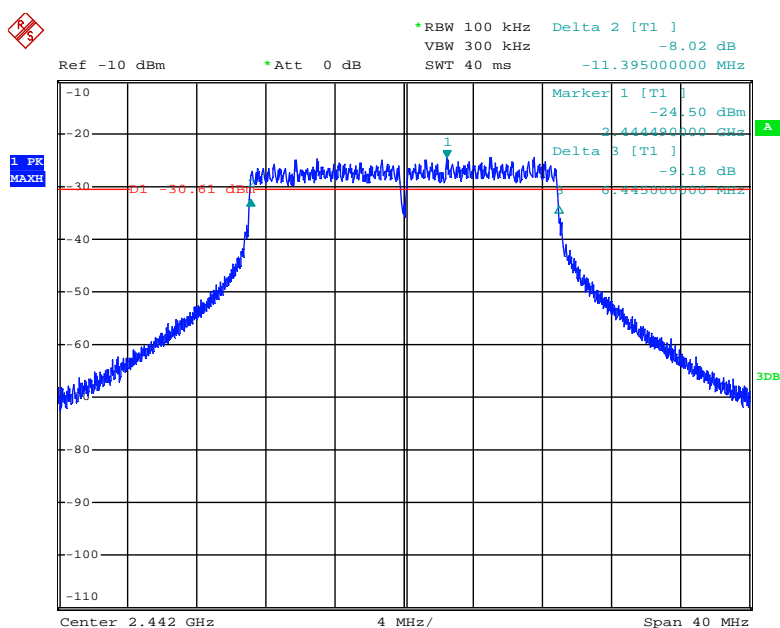
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11g, Mid Channel



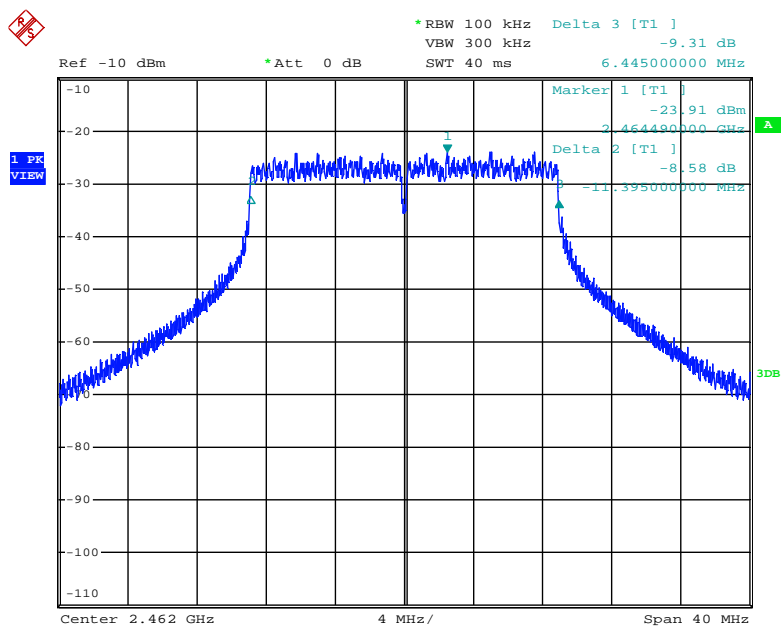
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11g, High Channel



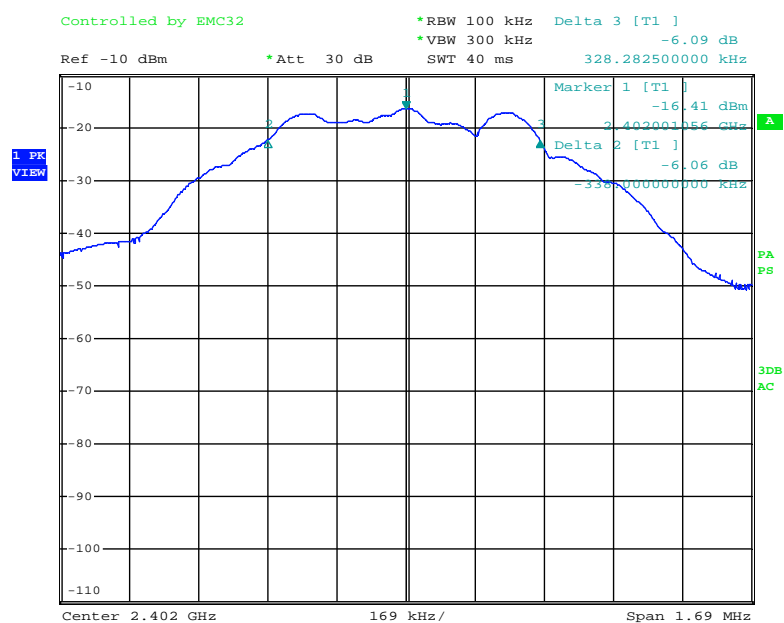
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11n, Low Channel



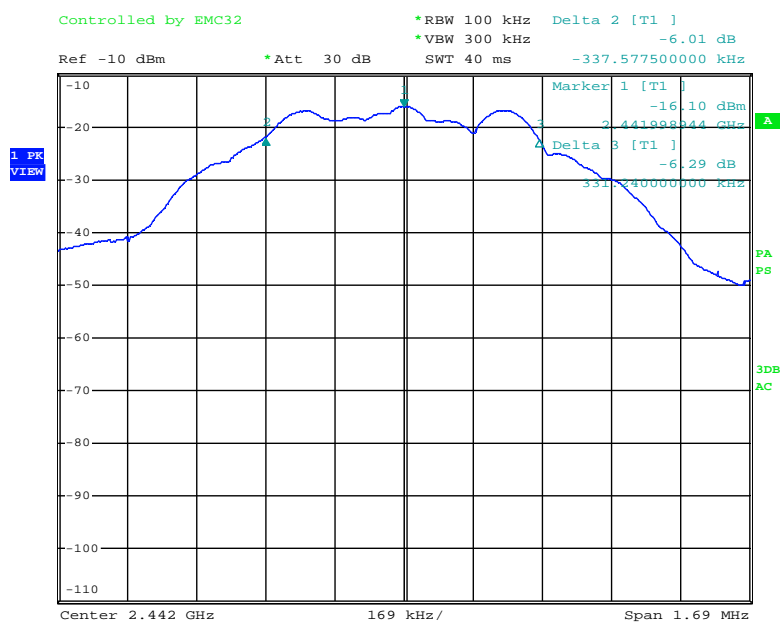
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11n, Mid Channel



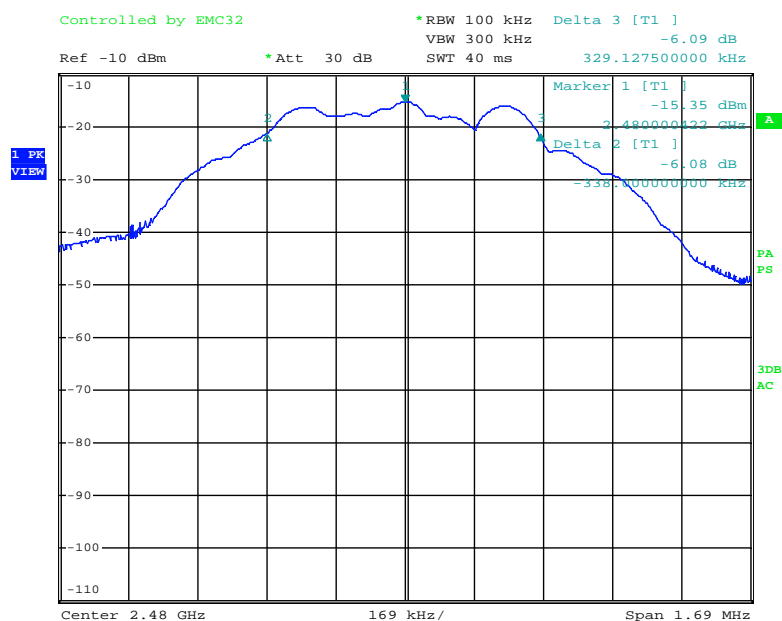
6 dB Occupied Bandwidth, Wi-Fi IEEE 802.11n, High Channel



6 dB Occupied Bandwidth, BTLE- GFSK, Low Channel



6 dB Occupied Bandwidth, BTLE-GFSK, Mid Channel



6 dB Occupied Bandwidth, BTLE-GFSK, High Channel

Part 7 – 20 dB Occupied Bandwidth

DATE: Nov-26-2014

TEST STANDARD: RSS-210 §A8.2(1), RSS-Gen Issue 4 § (4.6.1); §15.247(a)(2)

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: When an occupied bandwidth value is not specified in the applicable RSS, the transmitted signal bandwidth to be reported.

TEST SETUP: The EUT was directly connected to a spectrum analyser.

MEASUREMENT METHOD: Measurements were made using spectrum analyser with 100 kHz RBW, peak detector set on maximum hold using the appropriate antennas, amplifiers and filters.

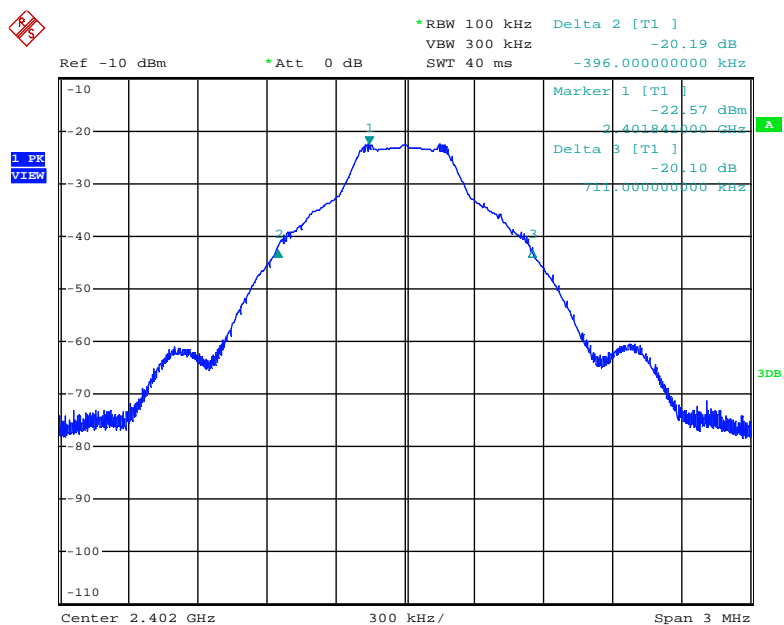
DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA:

Modulation		Channel	Frequency	Bandwidth	Result
			MHz	MHz	
Bluetooth	GFSK	Low	2402	1.107	Pass
		Mid	2442	1.092	Pass
		High	2480	1.116	Pass
	EDR-2	Low	2402	1.450	Pass
		Mid	2442	1.460	Pass
		High	2480	1.460	Pass
ANT		Low	2402	1.112	Pass
		Mid	2442	1.116	Pass
		High	2480	1.112	Pass

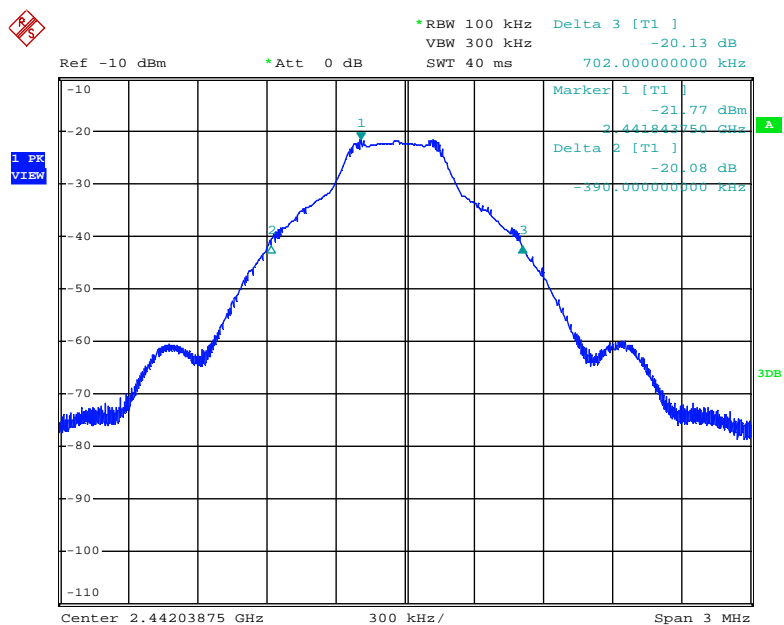
OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies



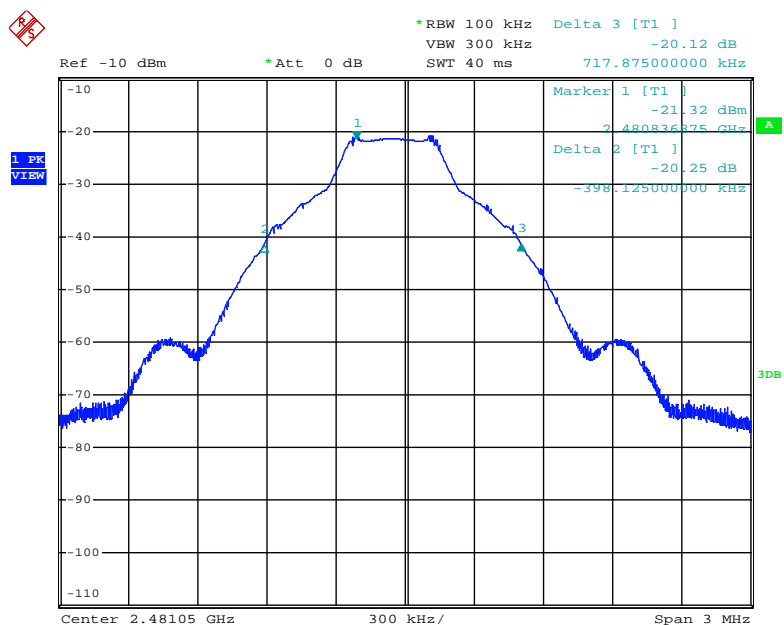
Date: 26.NOV.2014 13:48:24

20 dB Occupied Bandwidth, Bluetooth – GFSK, Low Channel



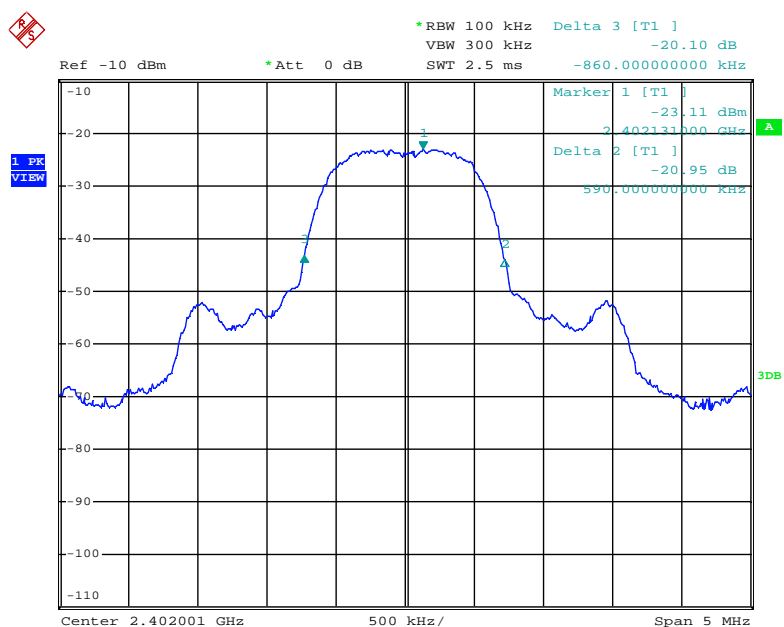
Date: 26.NOV.2014 14:04:33

20 dB Occupied Bandwidth, Bluetooth – GFSK, Mid Channel



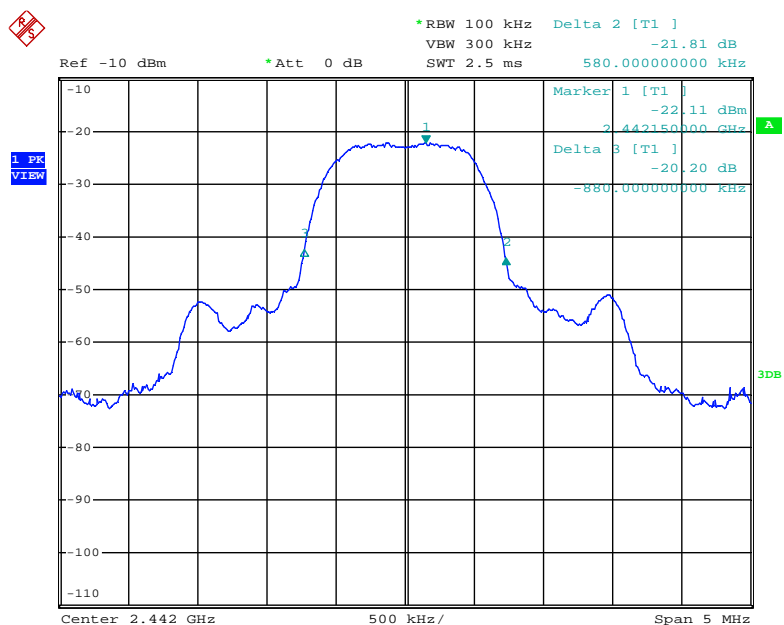
Date: 26.NOV.2014 14:22:07

20 dB Occupied Bandwidth, Bluetooth – GFSK, High Channel



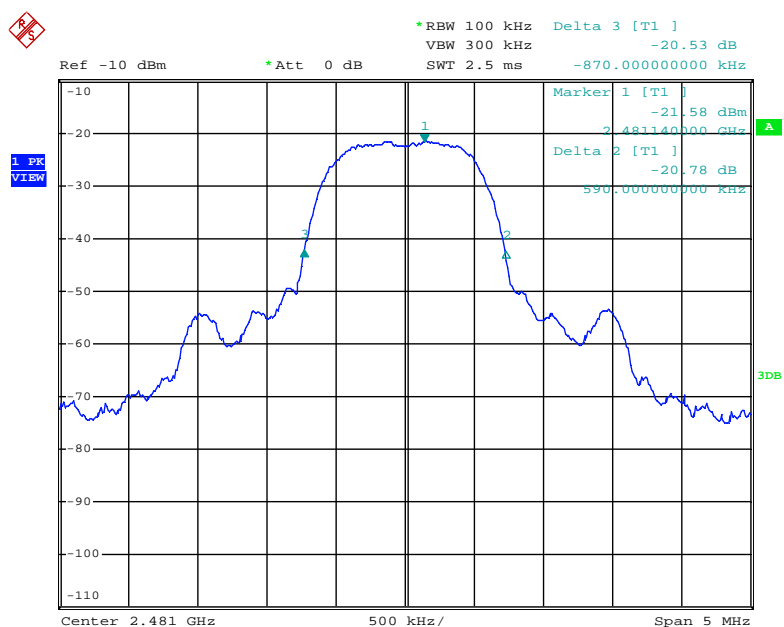
Date: 27.NOV.2014 14:24:03

20 dB Occupied Bandwidth, Bluetooth – EDR-2, Low Channel



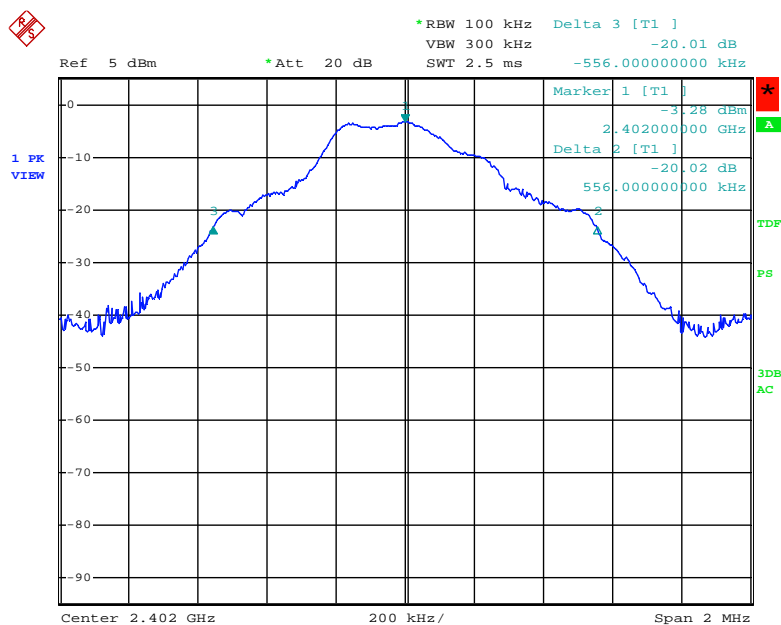
Date: 27.NOV.2014 14:39:02

20 dB Occupied Bandwidth, Bluetooth – EDR-2, Mid Channel



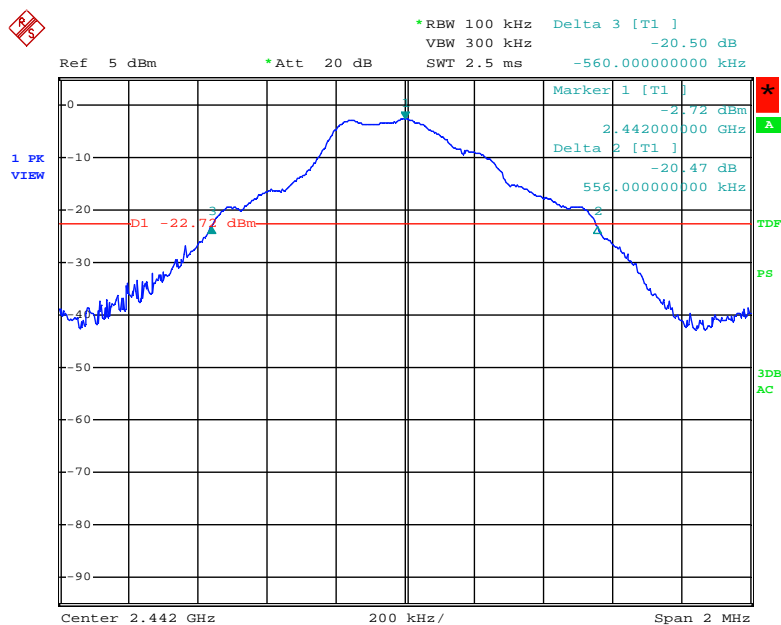
Date: 27.NOV.2014 14:43:00

20 dB Occupied Bandwidth, Bluetooth – EDR-2, High Channel



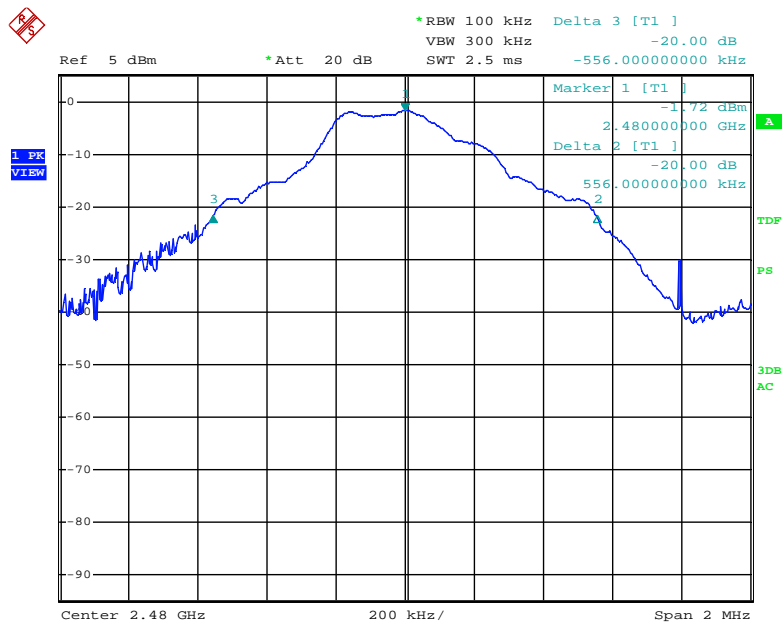
Date: 12.JAN.2015 19:33:10

20 dB Occupied Bandwidth, ANT, Low Channel



Date: 12.JAN.2015 19:51:47

20 dB Occupied Bandwidth, ANT, Mid Channel



Date: 12.JAN.2015 20:05:10

20 dB Occupied Bandwidth, ANT, High Channel

Part 8 – Band Edge

DATE: Dec-02-2014

TEST STANDARD: RSS-210, FCC Subpart C §§15.209(d) and 15.247(c);

TEST VOLTAGE: 5Vdc

MINIMUM STANDARD:(d) Emissions radiated outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general radiated emission limits in § 15.209, whichever is the lesser attenuation.
(e) As shown in § 15.35(b), for frequencies above 1000 MHz, the field strength limits in paragraphs (a) and (b) of this section are based on average limits. However, the peak field strength of any emission shall not exceed the maximum permitted average limits specified above by more than 20dB under any condition of modulation.

15.209 General Field Strength Limits

Frequency (MHz)	Field Strength	
	uV/m @ 3-m	Calculated dBµV/m at 3m
30 - 88	100	40.0
88 - 216	150	43.5
16 - 960	200	46.0
960 - 1000	500	54.0

TEST SETUP: The EUT was directly connected to a spectrum analyser. The transmitter was set for continuous transmission.

MEASUREMENT METHOD: Measurements were made using a spectrum analyser with 300 kHz RBW peak detector using the appropriate antennas, amplifiers and filters.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

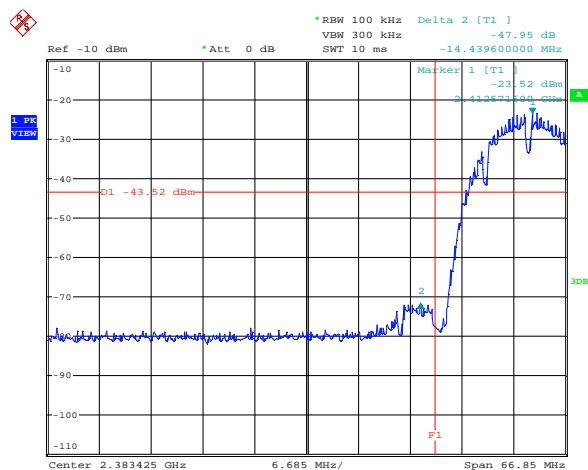
OBSERVATIONS: The EUT performed as expected.

PERFORMANCE: Complies.

DATA & PLOT

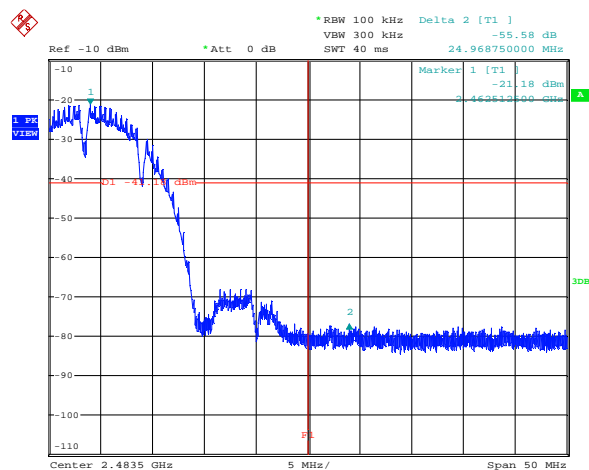
Band Edge, Wi-Fi, IEEE 802.11b

Low Channel



Date: 1.DEC.2014 15:57:21

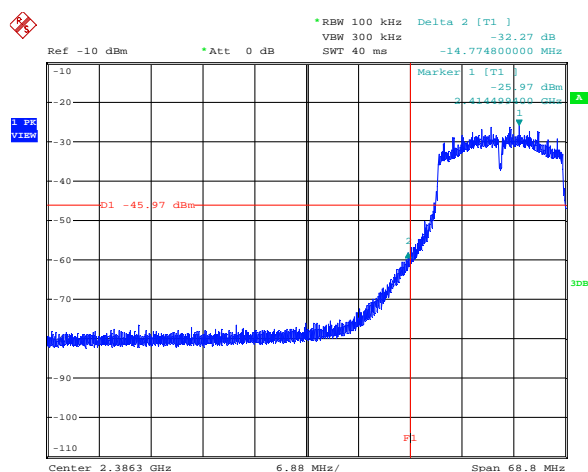
High Channel



Date: 2.DEC.2014 11:01:40

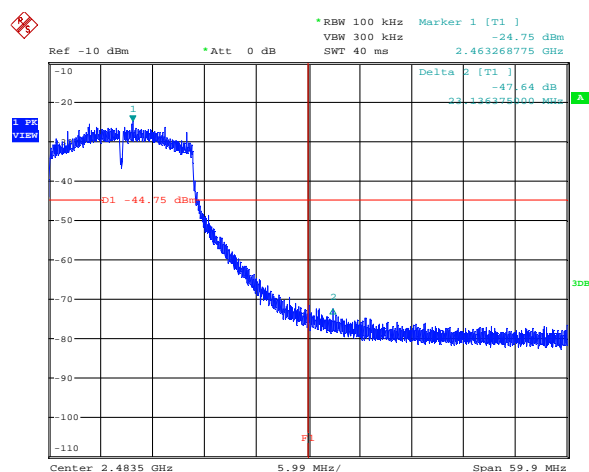
Band Edge, Wi-Fi, IEEE 802.11g

Low Channel

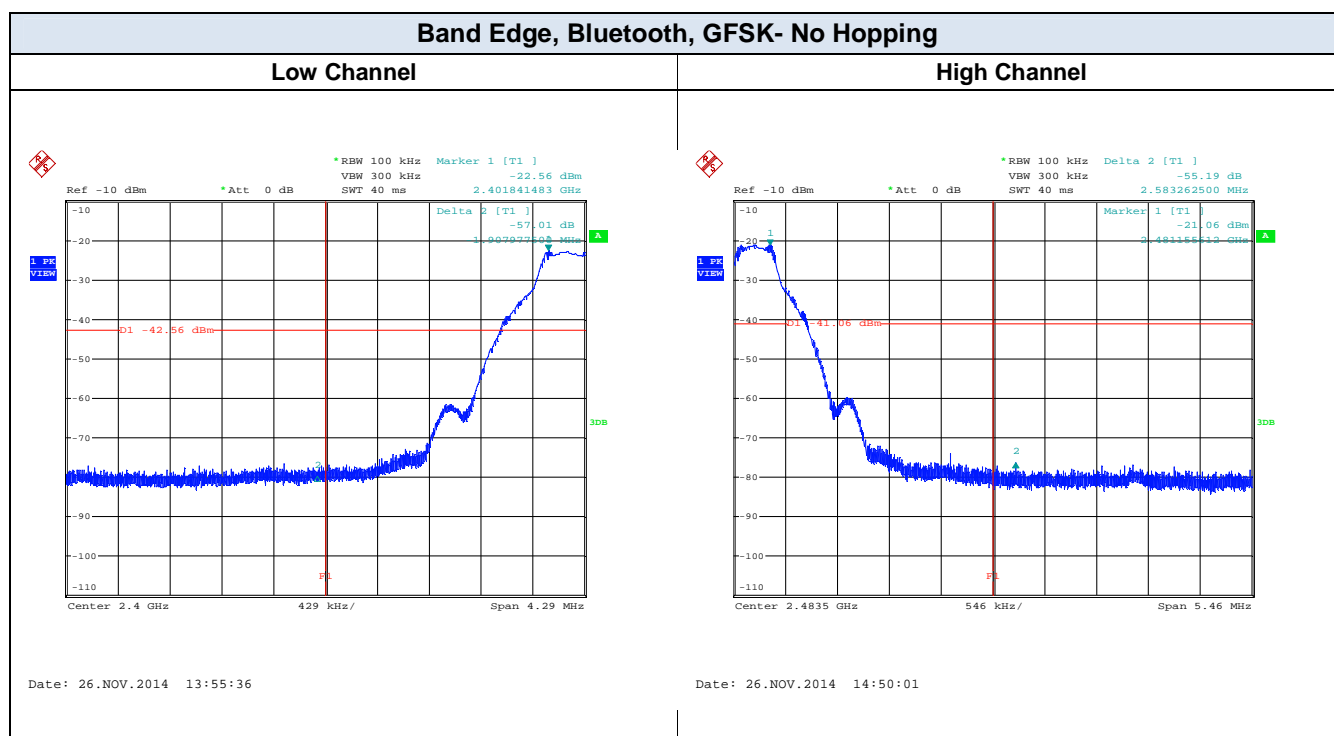
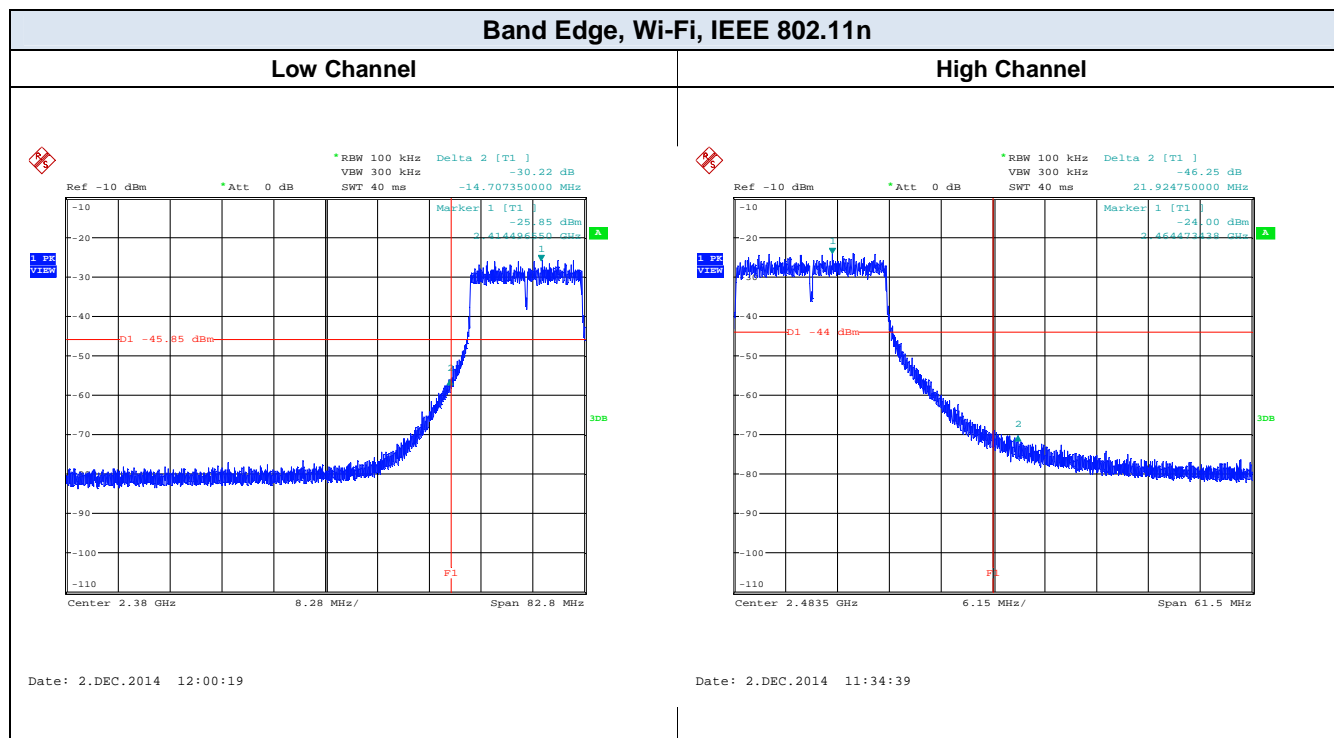


Date: 2.DEC.2014 11:17:07

High Channel

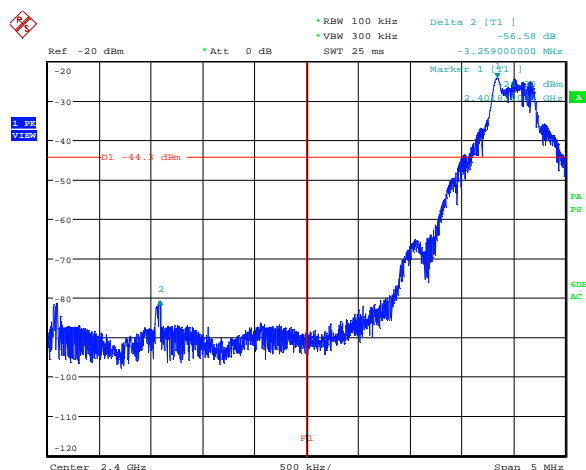


Date: 2.DEC.2014 11:31:38



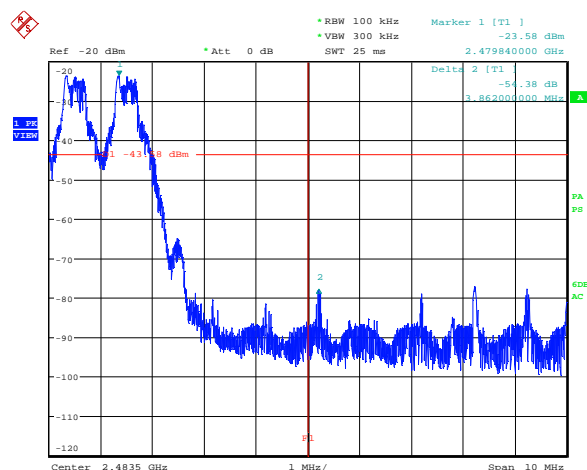
Band Edge, Bluetooth, GFSK - Hopping

Low Channel



Date: 27.JAN.2015 18:42:48

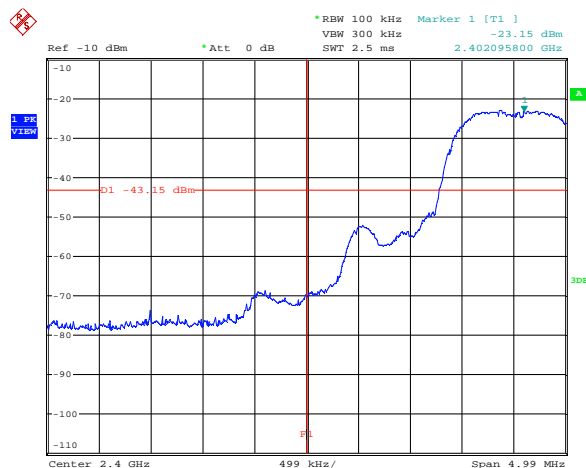
High Channel



Date: 27.JAN.2015 18:51:36

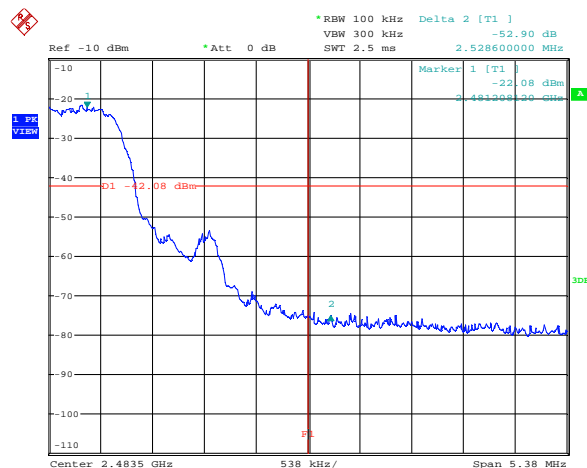
Band Edge, Bluetooth, EDR2

Low Channel

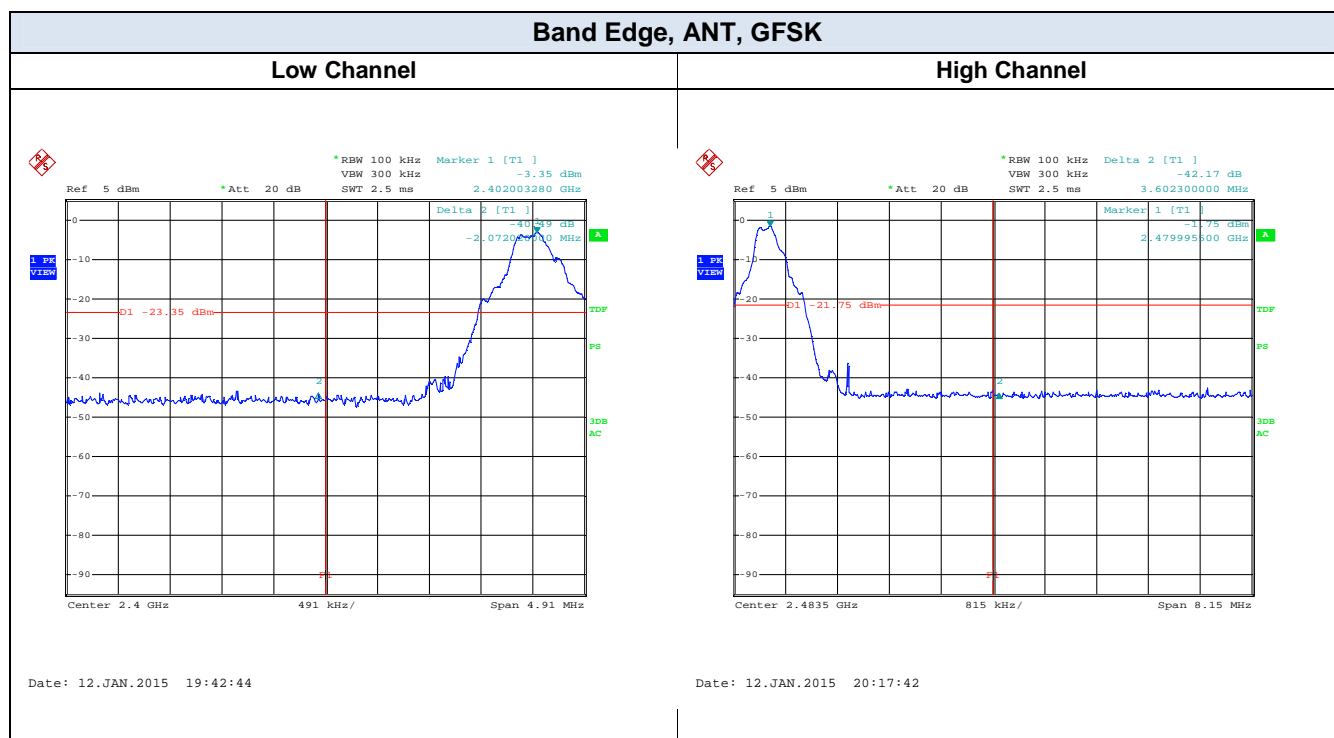
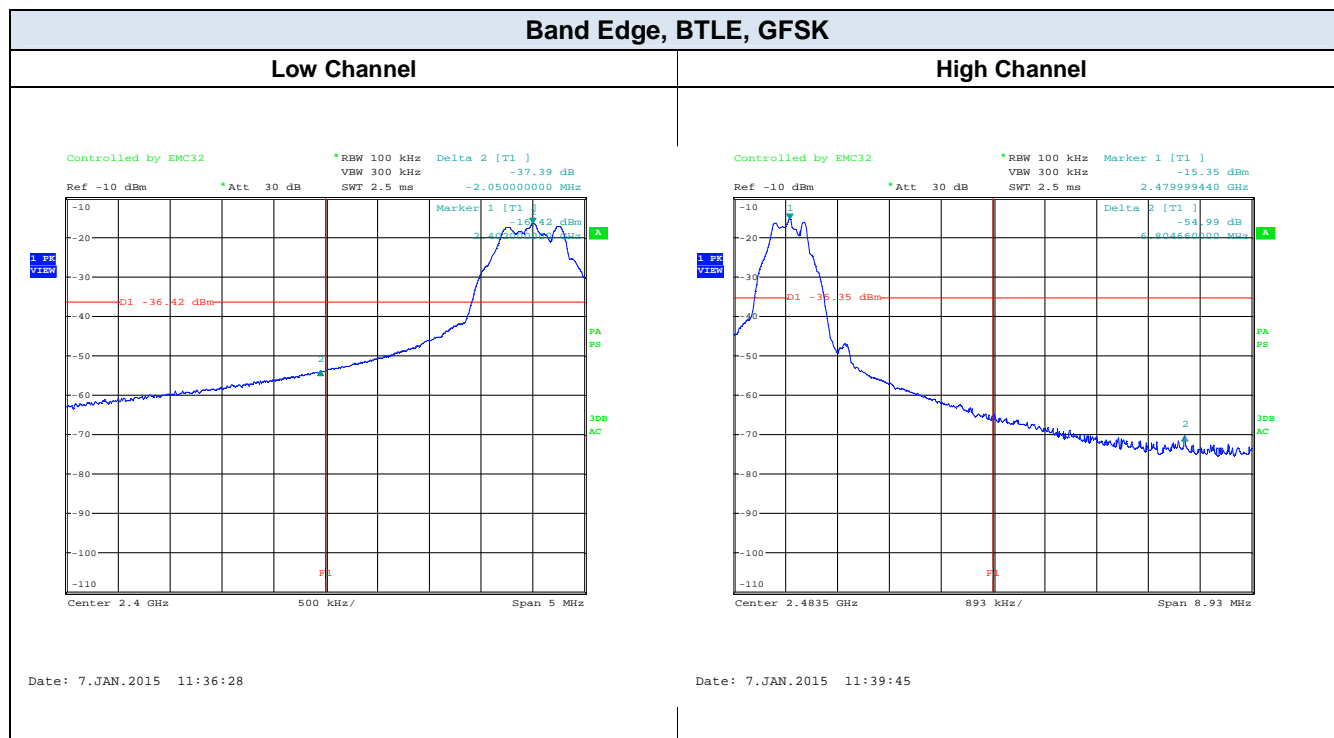


Date: 27.NOV.2014 14:30:14

High Channel



Date: 27.NOV.2014 14:48:20



Part 9 – Conducted Spurious Emissions

DATE: Dec-01-2014

TEST STANDARD: IC RSS-210 Annex 2 Section (A2.9)(b); FCC Subpart C §15.247(c)
RSS-Gen Issue 4 Section (7.2.5)

TEST VOLTAGE: 5Vdc from AC Power Adapter

TEST CONDITIONS: Indoor

MINIMUM STANDARD: (b) Emissions emitted outside of the specified frequency bands, except for harmonics, shall be attenuated by at least 50 dB below the level of the fundamental or to the general field strength limits listed in RSS-Gen, whichever is less stringent.

TEST SETUP: The EUT was directly connected to a spectrum analyser. The transmitter was set for continuous transmission. Measurements were done up to 25GHz.

MEASUREMENT METHOD: Measurements were made using a spectrum analyser with 300kHz RBW quasi-peak detector using the appropriate antennas, amplifiers and filters.

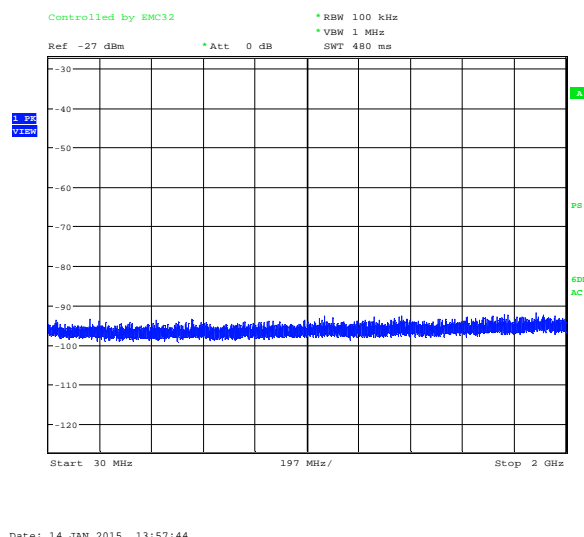
DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

EMISSIONS DATA & PLOT:

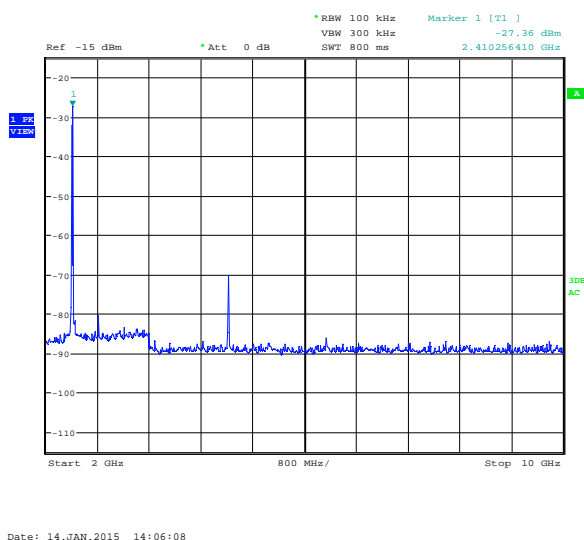
Conducted Spurious Emissions, Wi-Fi 802.11b, Low Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.814	-79.63	22.18	-57.45	-19.48
4.824	-70.31	22.79	-47.52	-19.48
7.236	-88.6	23.16	-65.44	-19.48
9.6479	-88.4	21.04	-67.36	-19.48
12.066	-87.36	19.41	-67.95	-19.48
14.447	-87.3	16.45	-70.85	-19.48
16.883	-83.59	15.73	-67.86	-19.48
19.296	-84.8	15.37	-69.43	-19.48

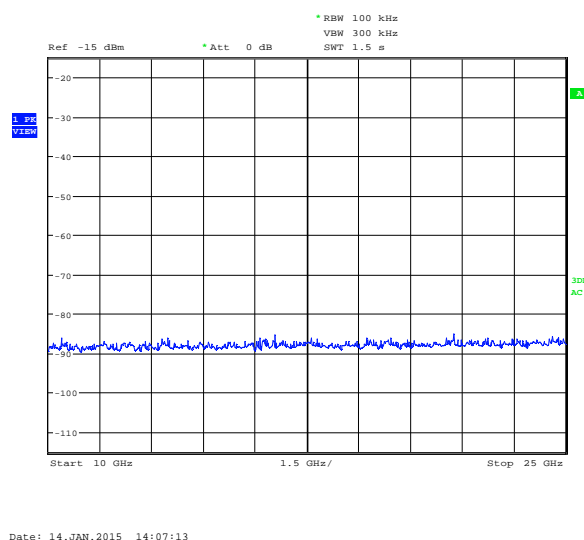
Conducted Spurious Emissions, 30MHz-2GHz



Conducted Spurious Emissions, 2GHz-10GHz



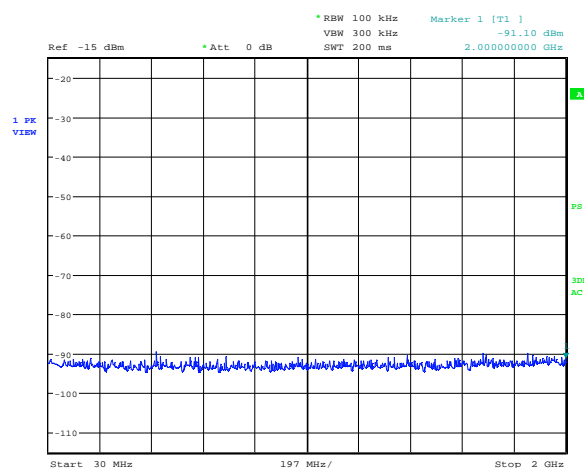
Conducted Spurious Emissions, 10GHz-25GHz



Conducted Spurious Emissions, Wi-Fi 802.11b, Mid Channel

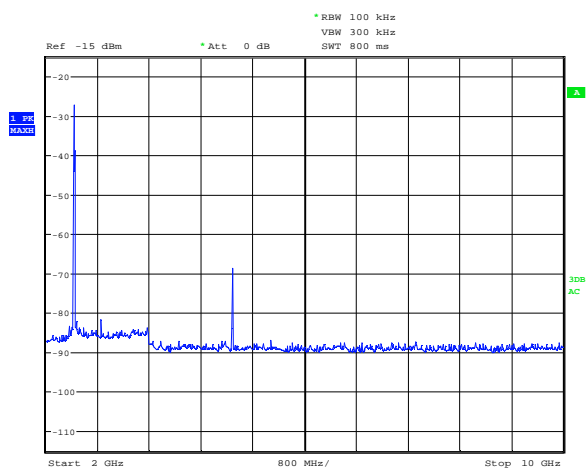
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8489	-80.4	22.22	-58.18	-19.48
4.884	-68.27	23.08	-45.19	-19.48
7.3259	-88.2	22.99	-65.21	-19.48
9.768	-89.2	21.63	-67.57	-19.48
12.21	-87.23	20.63	-66.6	-19.48
14.652	-86.13	18.35	-67.78	-19.48
17.094	-82.01	14.1	-67.91	-19.48
19.536	-84.6	13.89	-70.71	-19.48

Conducted Spurious Emissions, 30MHz-2GHz



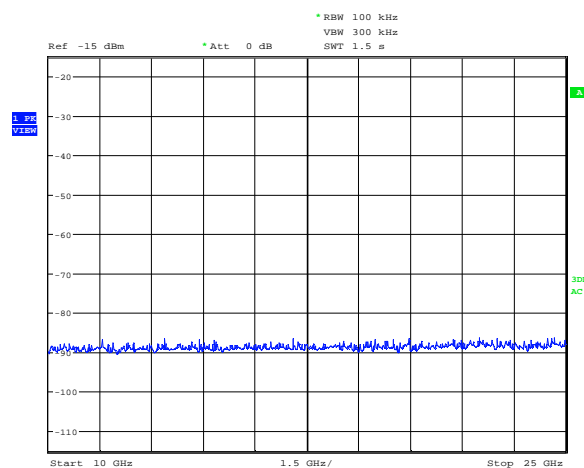
Date: 14.JAN.2015 14:22:14

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 14:22:56

Conducted Spurious Emissions, 10GHz-25GHz

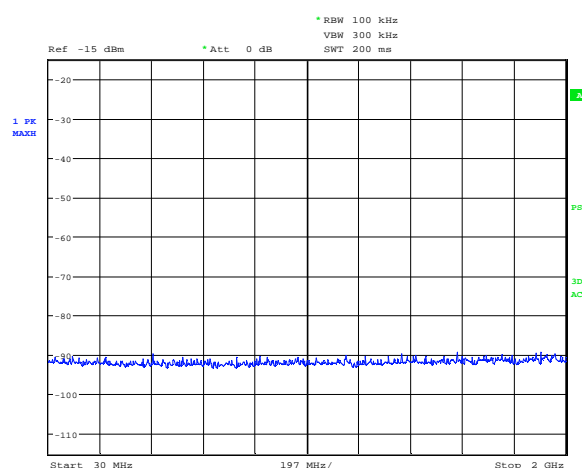


Date: 14.JAN.2015 14:23:35

Conducted Spurious Emissions, Wi-Fi 802.11b, High Channel

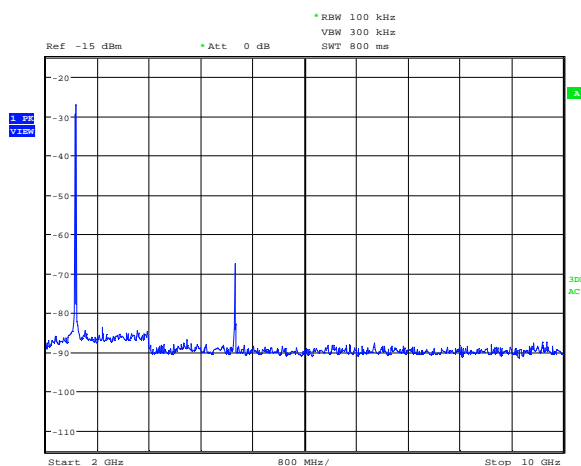
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8723	-80.89	21.99	-58.9	-19.48
4.924	-66.27	23.12	-43.15	-19.48
7.386	-87.26	22.83	-64.43	-19.48
9.848	-87.1	21.48	-65.62	-19.48
12.31	-86.5	19.37	-67.13	-19.48
14.772	-86.36	18.95	-67.41	-19.48
17.234	-81.8	13.37	-68.43	-19.48
19.696	-85.28	12.38	-72.9	-19.48

Conducted Spurious Emissions, 30MHz-2GHz



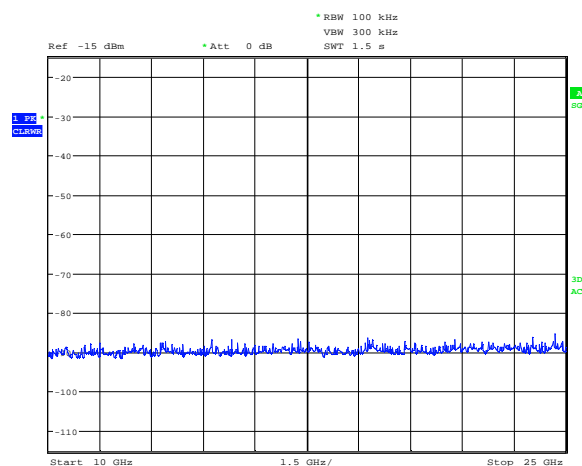
Date: 14.JAN.2015 14:38:51

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 14:39:45

Conducted Spurious Emissions, 10GHz-25GHz

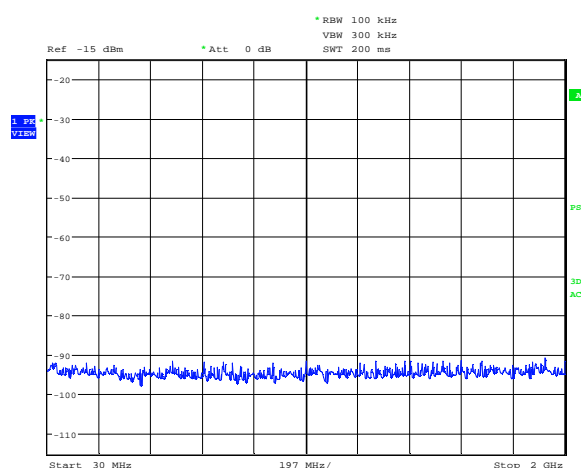


Date: 14.JAN.2015 14:40:59

Conducted Spurious Emissions, Wi-Fi 802.11g, Low Channel

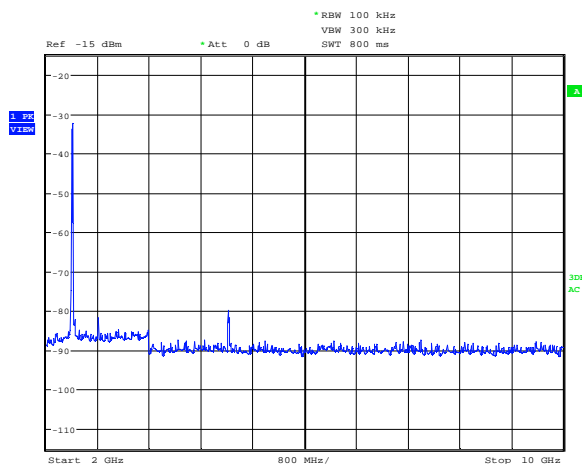
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.814	-79.03	22.18	-56.85	-23.05
4.824	-77.83	22.79	-55.04	-23.05
7.236	-87.47	23.16	-64.31	-23.05
9.6479	-87.5	21.04	-66.46	-23.05
12.066	-87.36	19.41	-67.95	-23.05
14.447	-86.14	16.45	-69.69	-23.05
16.883	-84.54	15.73	-68.81	-23.05
19.296	-85.36	15.37	-69.99	-23.05

Conducted Spurious Emissions, 30MHz-2GHz



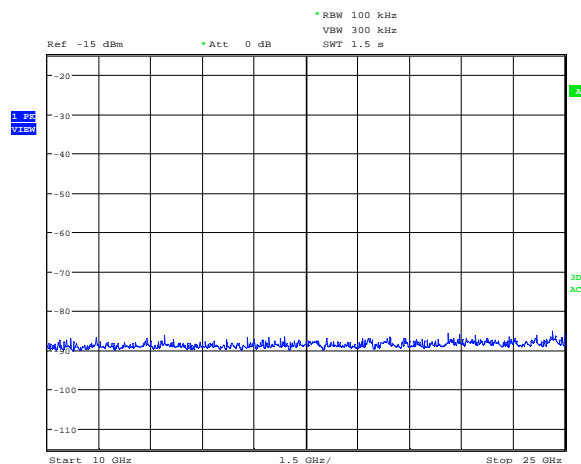
Date: 14.JAN.2015 14:59:27

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 14:58:23

Conducted Spurious Emissions, 10GHz-25GHz

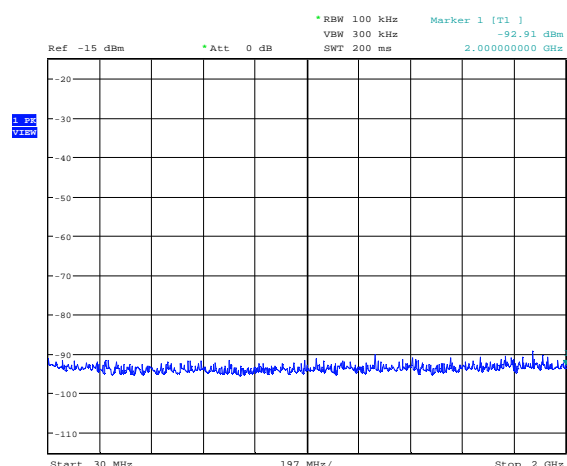


Date: 14.JAN.2015 14:57:54

Conducted Spurious Emissions, Wi-Fi 802.11g, Mid Channel

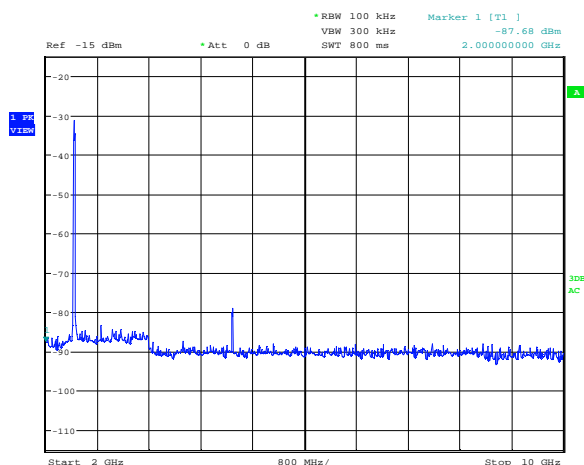
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8489	-80.56	22.22	-58.34	-23.05
4.884	-76.37	23.08	-53.29	-23.05
7.3259	-87.53	22.99	-64.54	-23.05
9.768	-87.59	21.63	-65.96	-23.05
12.21	-86.54	20.63	-65.91	-23.05
14.652	-86.87	18.35	-68.52	-23.05
17.094	-83.56	14.1	-69.46	-23.05
19.536	-85.3	13.89	-71.41	-23.05

Conducted Spurious Emissions, 30MHz-2GHz



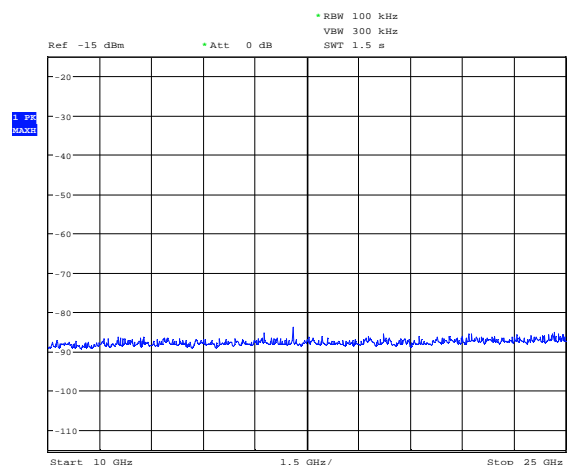
Date: 14.JAN.2015 14:54:42

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 14:55:11

Conducted Spurious Emissions, 10GHz-25GHz

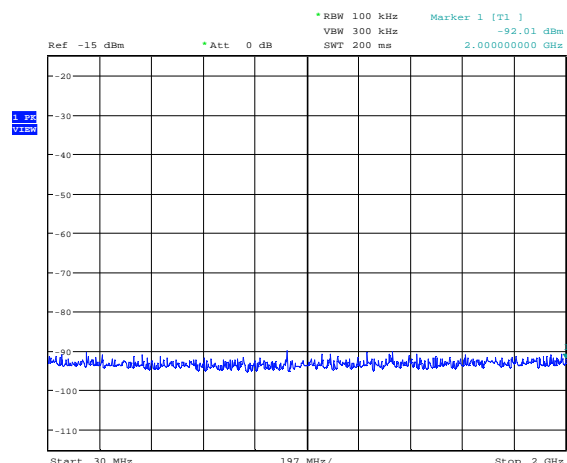


Date: 14.JAN.2015 14:56:13

Conducted Spurious Emissions, Wi-Fi 802.11g, High Channel

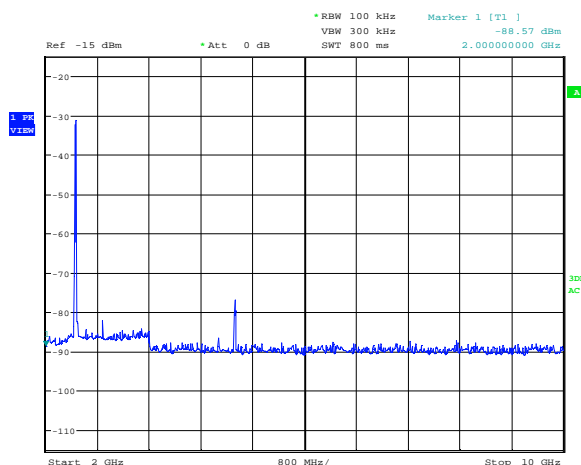
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8723	-80.9	21.99	-58.91	-23.05
4.924	-74.21	23.12	-51.09	-23.05
7.386	-87.2	22.83	-64.37	-23.05
9.848	-87.67	21.48	-66.19	-23.05
12.31	-86.96	19.37	-67.59	-23.05
14.772	-86.49	18.95	-67.54	-23.05
17.234	-81.9	13.37	-68.53	-23.05
19.696	-84.9	12.38	-72.52	-23.05

Conducted Spurious Emissions, 30MHz-2GHz



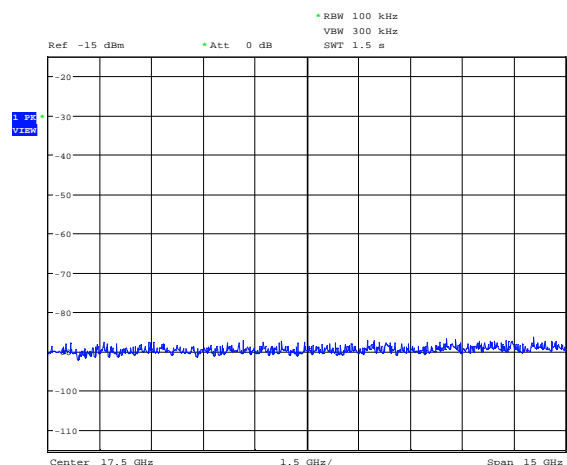
Date: 14.JAN.2015 14:45:52

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 14:46:24

Conducted Spurious Emissions, 10GHz-25GHz

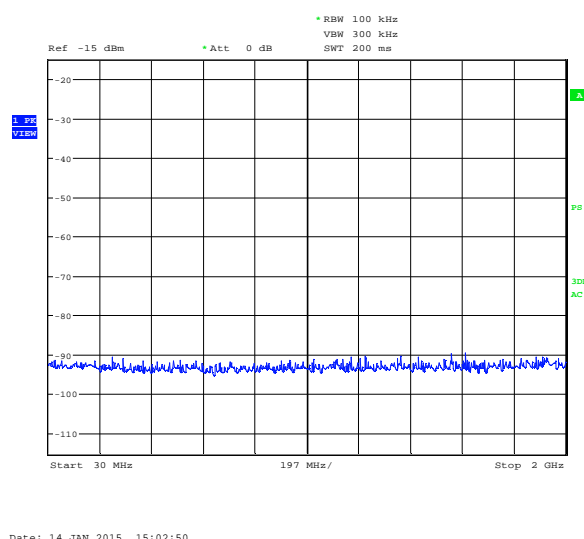


Date: 14.JAN.2015 14:46:49

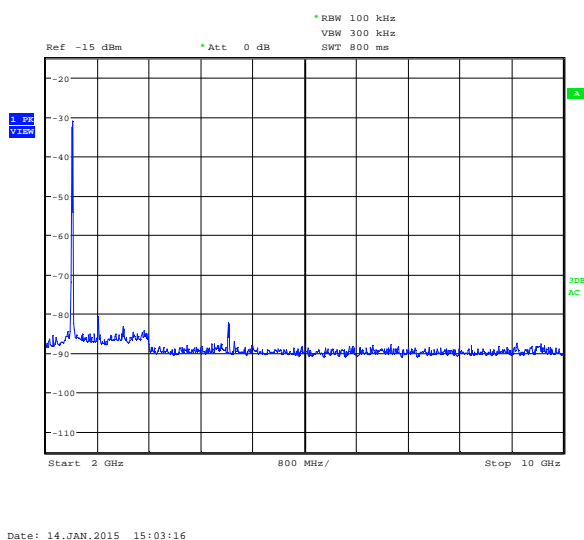
Conducted Spurious Emissions, Wi-Fi 802.11n, Low Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.814	-78.88	22.18	-56.7	-22.3
4.824	-79.37	22.79	-56.58	-22.3
7.236	-86.6	23.16	-63.44	-22.3
9.6479	-86.7	21.04	-65.66	-22.3
12.066	-87.3	19.41	-67.89	-22.3
14.447	-86.95	16.45	-70.5	-22.3
16.883	-84.3	15.73	-68.57	-22.3
19.296	-84.5	15.37	-69.13	-22.3

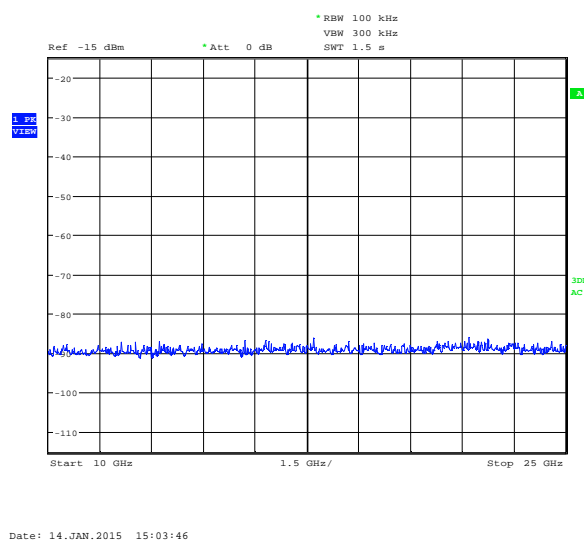
Conducted Spurious Emissions, 30MHz-2GHz



Conducted Spurious Emissions, 2GHz-10GHz



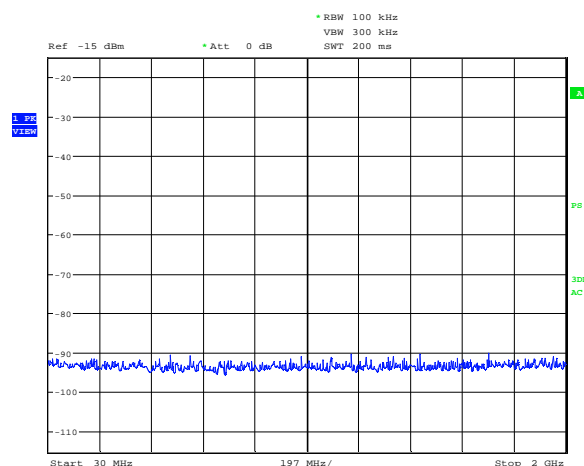
Conducted Spurious Emissions, 10GHz-25GHz



Conducted Spurious Emissions, Wi-Fi 802.11n, Mid Channel

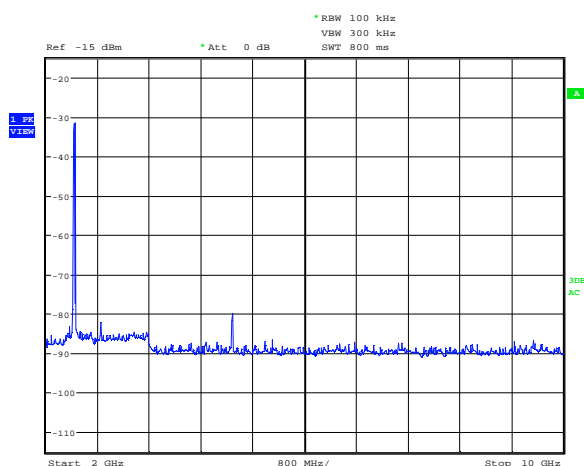
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8489	-79.6	22.22	-57.38	-22.3
4.884	-77.08	23.08	-54	-22.3
7.3259	-87.42	22.99	-64.43	-22.3
9.768	-87.78	21.63	-66.15	-22.3
12.21	-86.7	20.63	-66.07	-22.3
14.652	-86.1	18.35	-67.75	-22.3
17.094	-82.6	14.1	-68.5	-22.3
19.536	-84.8	13.89	-70.91	-22.3

Conducted Spurious Emissions, 30MHz-2GHz



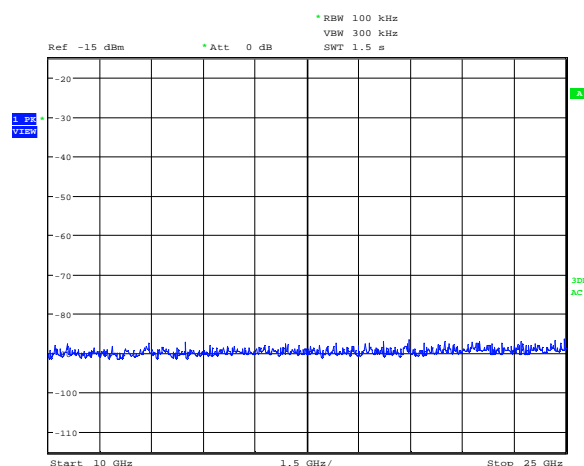
Date: 14.JAN.2015 15:07:36

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 15:06:53

Conducted Spurious Emissions, 10GHz-25GHz

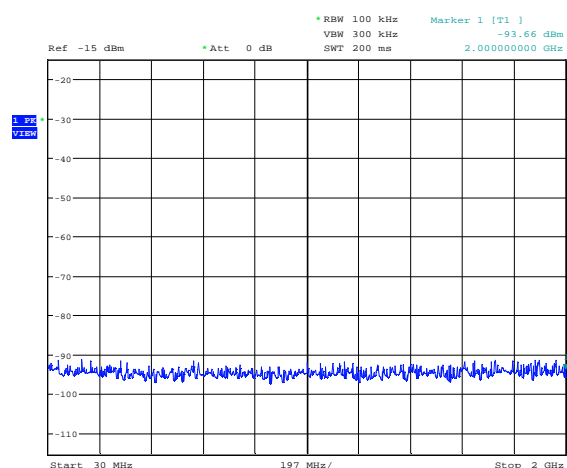


Date: 14.JAN.2015 15:07:11

Conducted Spurious Emissions, Wi-Fi 802.11n, High Channel

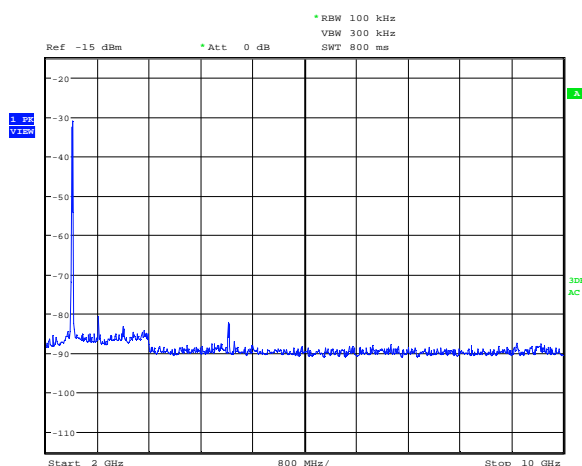
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
2.8723	-80.73	21.99	-58.74	-22.3
4.924	-75.34	23.12	-52.22	-22.3
7.386	-87.08	22.83	-64.25	-22.3
9.848	-86.92	21.48	-65.44	-22.3
12.31	-85.8	19.37	-66.43	-22.3
14.772	-86	18.95	-67.05	-22.3
17.234	-81.9	13.37	-68.53	-22.3
19.696	-84.8	12.38	-72.42	-22.3

Conducted Spurious Emissions, 30MHz-2GHz



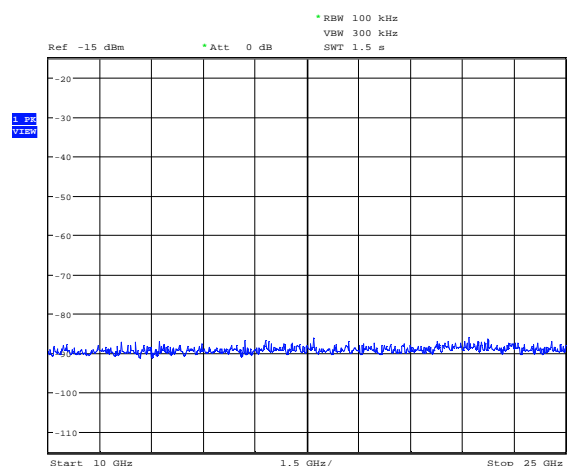
Date: 14.JAN.2015 15:11:27

Conducted Spurious Emissions, 2GHz-10GHz



Date: 14.JAN.2015 15:03:16

Conducted Spurious Emissions, 10GHz-25GHz



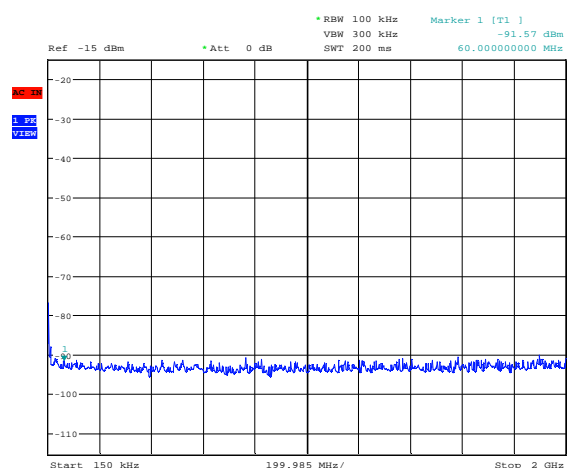
Date: 14.JAN.2015 15:03:46

Conducted Spurious Emissions, Bluetooth - GFSK, Low Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.804	-80.03	22.91	-57.12	-23.01
7.206	-61.22	23.05	-38.17	-23.01
9.608	-80.3	21.63	-58.67	-23.01
12.01	-79.7	20.61	-59.09	-23.01
14.412	-73.1	17.24	-55.86	-23.01
16.814	-81.3	17.12	-64.18	-23.01
19.216	-83.7	15.27	-68.43	-23.01

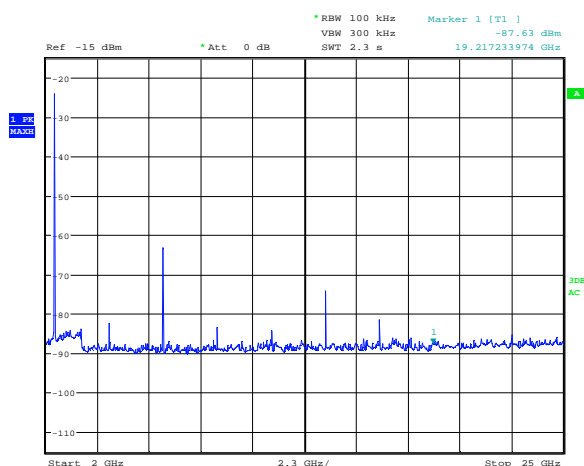
20db below -3.01dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 16:04:44

Conducted Spurious Emissions, 2GHz-25GHz



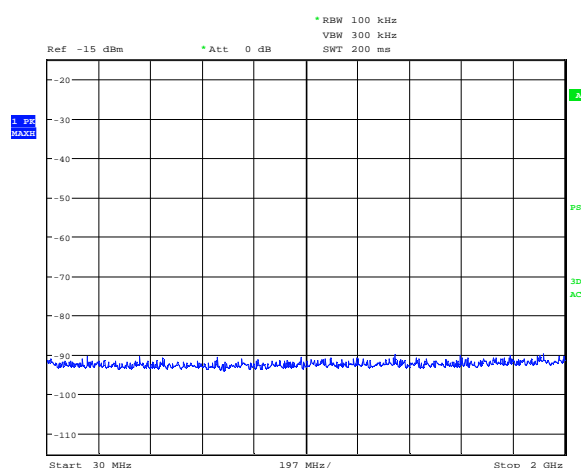
Date: 14.JAN.2015 16:04:10

Conducted Spurious Emissions, Bluetooth - GFSK, Mid Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.884	-78.62	23.07	-55.55	-22.04
7.326	-64.55	22.94	-41.61	-22.04
9.768	-81.87	21.67	-60.2	-22.04
12.21	-75.9	20.33	-55.57	-22.04
14.652	-74.8	18.56	-56.24	-22.04
17.094	-80.1	13.99	-66.11	-22.04
19.536	-83.2	13.72	-69.48	-22.04

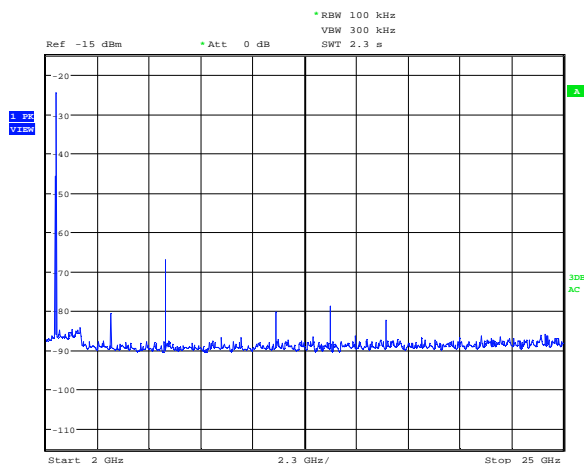
20db below -2.04dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 15:59:44

Conducted Spurious Emissions, 2GHz-25GHz



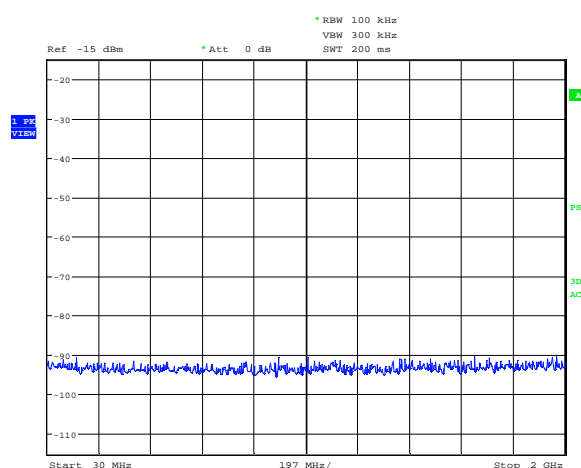
Date: 14.JAN.2015 15:59:19

Conducted Spurious Emissions, Bluetooth - GFSK, High Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.962	-77.32	23.19	-54.13	-21.33
7.443	-67.1	22.22	-44.88	-21.33
9.924	-80.22	20.75	-59.47	-21.33
12.405	-75.9	20.81	-55.09	-21.33
14.886	-76.67	18.41	-58.26	-21.33
17.367	-79.1	12.94	-66.16	-21.33
19.848	-83.3	13.32	-69.98	-21.33

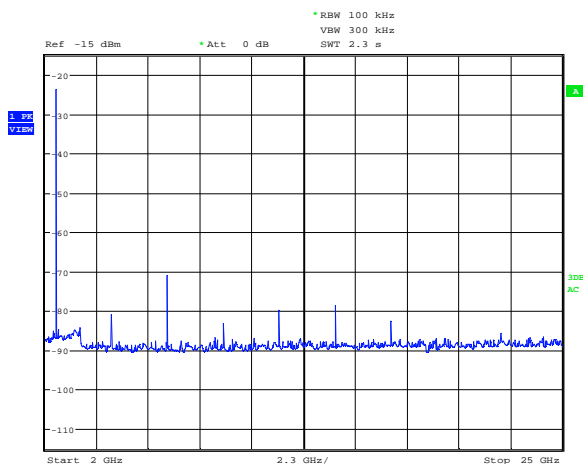
20db below -1.33dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 15:56:08

Conducted Spurious Emissions, 2GHz-25GHz

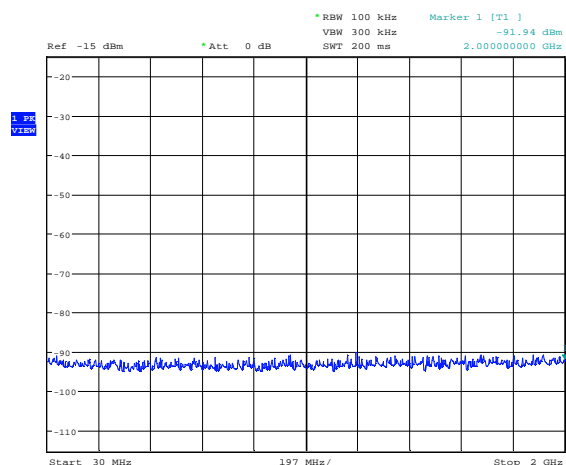


Date: 14.JAN.2015 15:56:36

Conducted Spurious Emissions, EDR-2, Low Channel

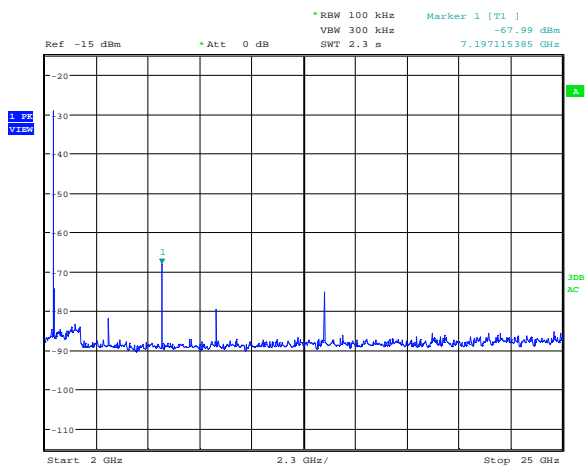
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.804	-79.7	22.91	-56.79	-20.38
7.206	-63.95	23.05	-40.9	-20.38
9.608	-77.3	21.63	-55.67	-20.38
12.01	-85.03	20.61	-64.42	-20.38
14.412	-71.41	17.24	-54.17	-20.38
16.814	-85.9	17.12	-68.78	-20.38
19.216	-84.5	15.27	-69.23	-20.38

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 15:34:17

Conducted Spurious Emissions, 2GHz-25GHz

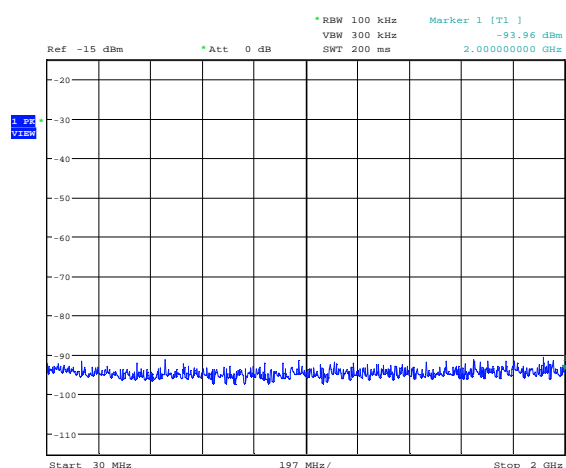


Date: 14.JAN.2015 15:33:36

Conducted Spurious Emissions, EDR-2, Mid Channel

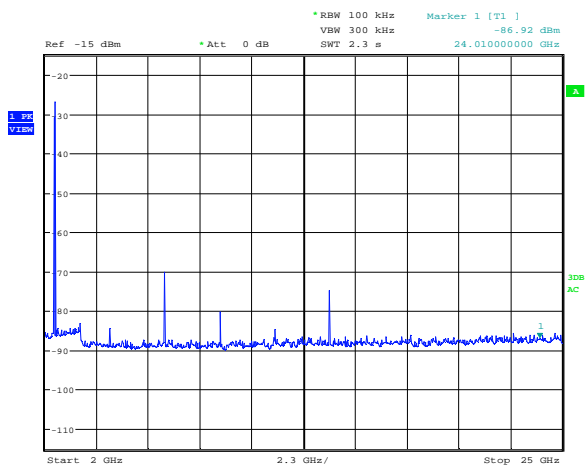
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.884	-80.88	23.07	-57.81	-20.38
7.326	-67.3	22.94	-44.36	-20.38
9.768	-78.33	21.67	-56.66	-20.38
12.21	-81.3	20.33	-60.97	-20.38
14.652	-73.3	18.56	-54.74	-20.38
17.094	-85.4	13.99	-71.41	-20.38
19.536	-85.1	13.72	-71.38	-20.38

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 15:48:02

Conducted Spurious Emissions, 2GHz-25GHz

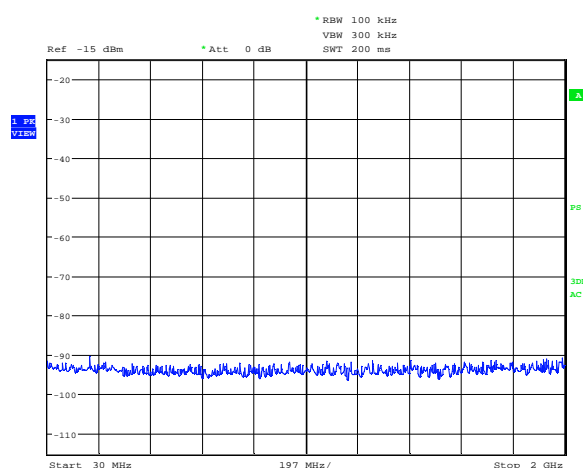


Date: 14.JAN.2015 15:47:40

Conducted Spurious Emissions, EDR-2, High Channel

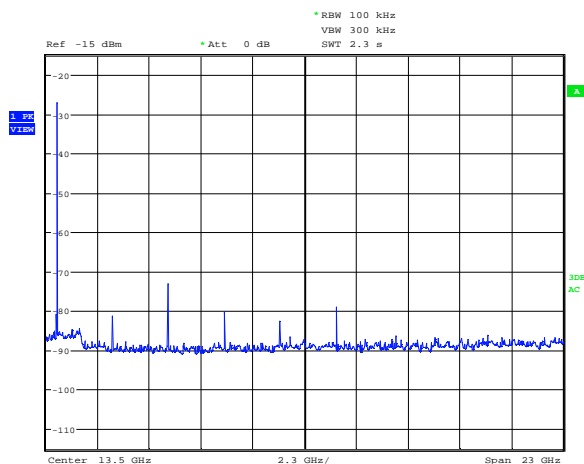
Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.962	-79.37	23.19	-56.18	-20.38
7.443	-69.98	22.22	-47.76	-20.38
9.924	-77.02	20.75	-56.27	-20.38
12.405	-81.2	20.81	-60.39	-20.38
14.886	-73.7	18.41	-55.29	-20.38
17.367	-84.17	12.94	-71.23	-20.38
19.848	-84.2	13.32	-70.88	-20.38

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 15:53:59

Conducted Spurious Emissions, 2GHz-25GHz



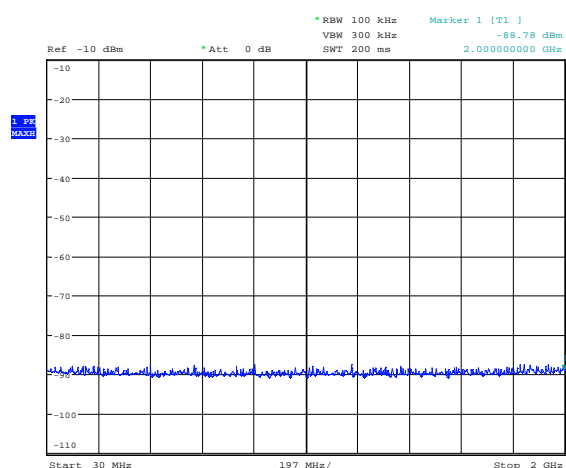
Date: 14.JAN.2015 15:53:40

Conducted Spurious Emissions, BTLE, Low Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.804	-69.17	22.91	-46.26	-16.09
7.206	-56.74	23.05	-33.69	-16.09
9.608	-71.7	21.63	-50.07	-16.09
12.01	-77.8	20.61	-57.19	-16.09
14.412	-63.2	17.24	-45.96	-16.09
16.814	-82.08	17.12	-64.96	-16.09
19.216	-80.1	15.27	-64.83	-16.09

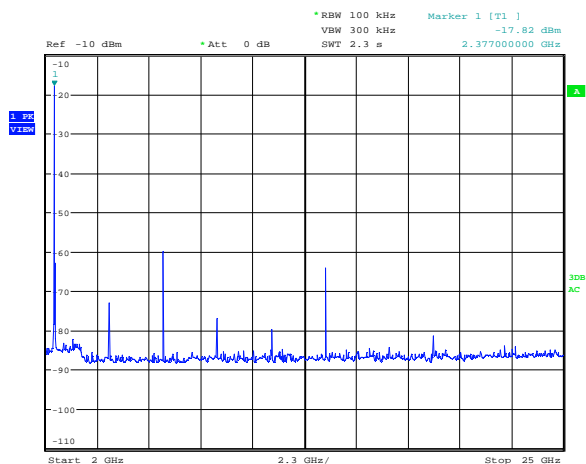
20db below 3.91dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 16:16:50

Conducted Spurious Emissions, 2GHz-25GHz



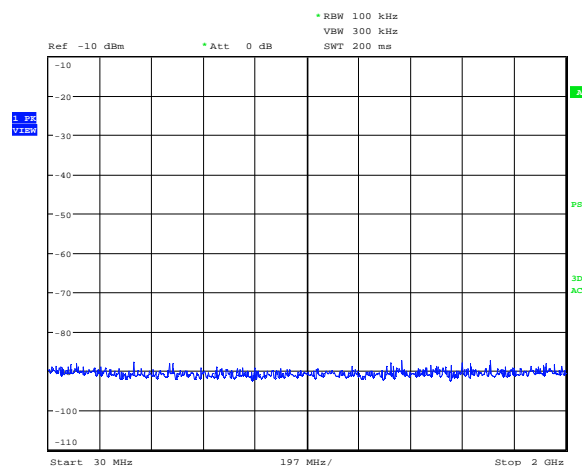
Date: 14.JAN.2015 16:18:05

Conducted Spurious Emissions, BTLE, Mid Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.884	-68.23	23.07	-45.16	-15.94
7.326	-59.83	22.94	-36.89	-15.94
9.768	-74.85	21.67	-53.18	-15.94
12.21	-72.8	20.33	-52.47	-15.94
14.652	-64.03	18.56	-45.47	-15.94
17.094	-80.7	13.99	-66.71	-15.94
19.536	-78.1	13.72	-64.38	-15.94

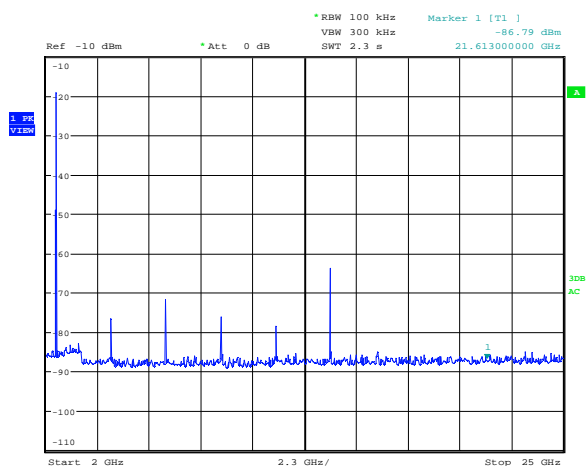
20db below 4.06dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 16:34:59

Conducted Spurious Emissions, 2GHz-25GHz



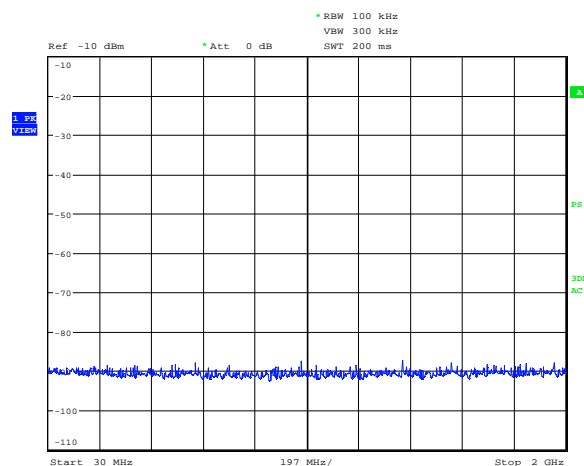
Date: 14.JAN.2015 16:34:04

Conducted Spurious Emissions, BTLE, High Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.96	-66.65	23.19	-43.46	-15.47
7.44	-61.36	22.22	-39.14	-15.47
9.92	-73	20.75	-52.25	-15.47
12.4	-73.2	20.81	-52.39	-15.47
14.88	-67.9	18.41	-49.49	-15.47
17.36	-79.8	12.94	-66.86	-15.47
19.84	-77.3	13.32	-63.98	-15.47

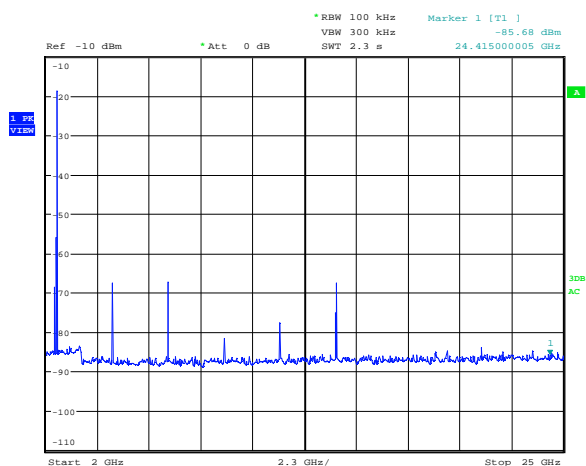
20db below 4.53dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 16:39:01

Conducted Spurious Emissions, 2GHz-25GHz



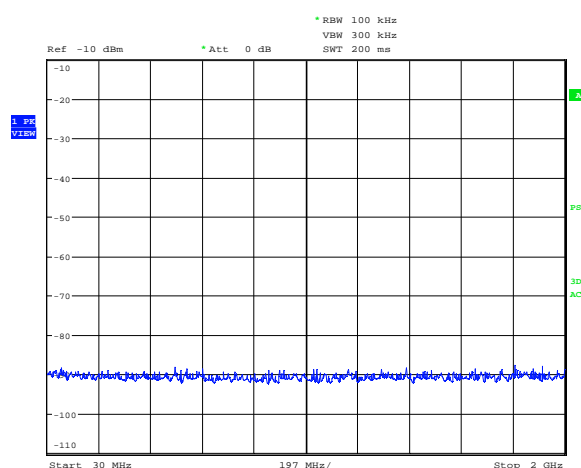
Date: 14.JAN.2015 16:38:17

Conducted Spurious Emissions, ANT, Low Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.804	-79.84	22.91	-56.93	-23.01
7.206	-61.99	23.05	-38.94	-23.01
9.608	-79.55	21.63	-57.92	-23.01
12.01	-79.02	20.61	-58.41	-23.01
14.412	-73.12	17.24	-55.88	-23.01
16.814	-80.88	17.12	-63.76	-23.01
19.216	-83.37	15.27	-68.1	-23.01

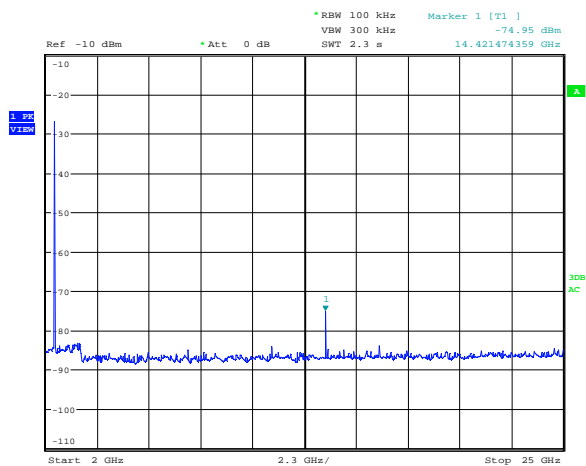
20db below -3.01dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 17:19:29

Conducted Spurious Emissions, 2GHz-25GHz



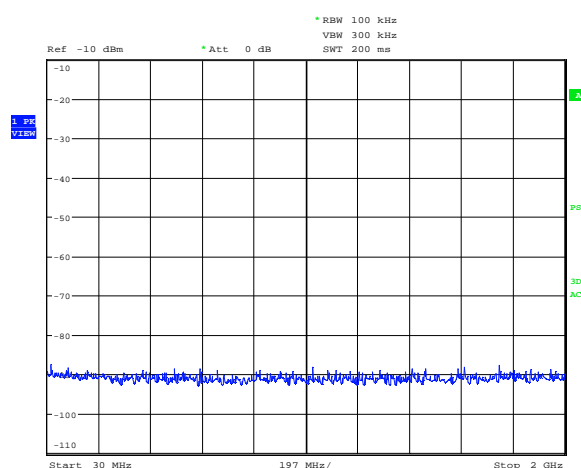
Date: 14.JAN.2015 17:20:28

Conducted Spurious Emissions, ANT, Mid Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.884	-77.64	23.07	-54.57	-22.04
7.326	-64.54	22.94	-41.6	-22.04
9.768	-80.05	21.67	-58.38	-22.04
12.21	-75.15	20.33	-54.82	-22.04
14.652	-73	18.56	-54.44	-22.04
17.094	-78.5	13.99	-64.51	-22.04
19.536	-81.66	13.72	-67.94	-22.04

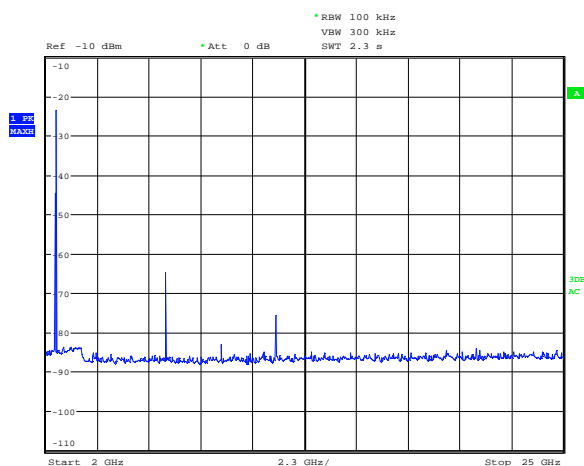
20db below -2.04dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 17:25:35

Conducted Spurious Emissions, 2GHz-25GHz



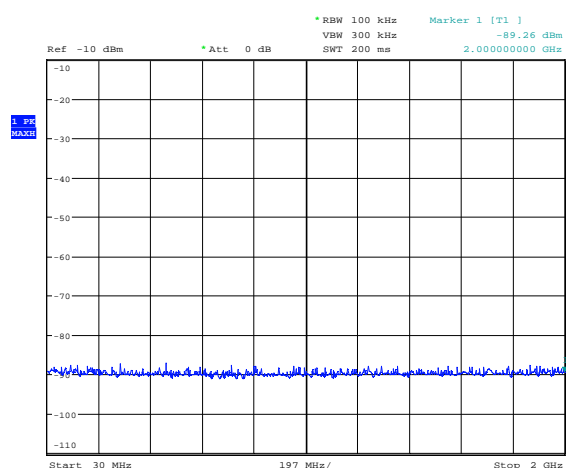
Date: 14.JAN.2015 17:25:09

Conducted Spurious Emissions, ANT, High Channel

Frequency (GHz)	level (dBm)	cable Loss (dBm)	Corr-peak (dBm)	Limit (dBm)
4.96	-76.17	23.19	-52.98	-21.33
7.44	-66.05	22.22	-43.83	-21.33
9.92	-77.8	20.75	-57.05	-21.33
12.4	-76	20.81	-55.19	-21.33
14.88	-75.63	18.41	-57.22	-21.33
17.36	-77.7	12.94	-64.76	-21.33
19.84	-80.9	13.32	-67.58	-21.33

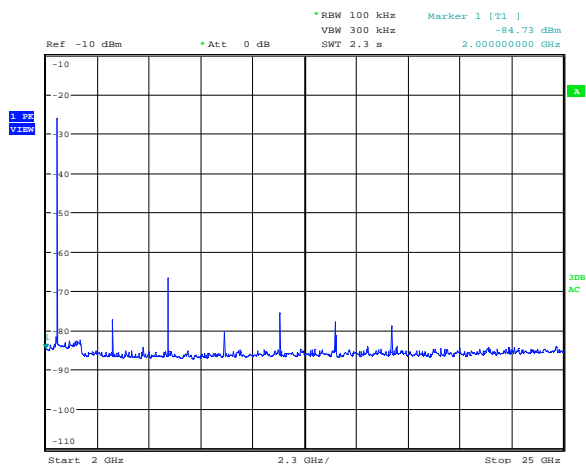
20db below -1.33dBm fundamental level

Conducted Spurious Emissions, 30MHz-2GHz



Date: 14.JAN.2015 17:29:06

Conducted Spurious Emissions, 2GHz-25GHz



Date: 14.JAN.2015 17:34:47

Part 10 – Hopping Carrier Frequency Separation

DATE: Dec-01-2014

TEST STANDARD: IC RSS-210 Annex 2 Section (A2.9)(b), RSS-Gen Issue 4 Section (7.2.5);
FCC Subpart C §15.247(a)

TEST VOLTAGE: 5Vdc from AC Power Adapter

TEST CONDITIONS: Indoor

MINIMUM STANDARD: Frequency hopping systems shall have hopping channel carrier frequencies separated by a minimum of 25 kHz or the 20 dB bandwidth of the hopping channel, whichever is greater.

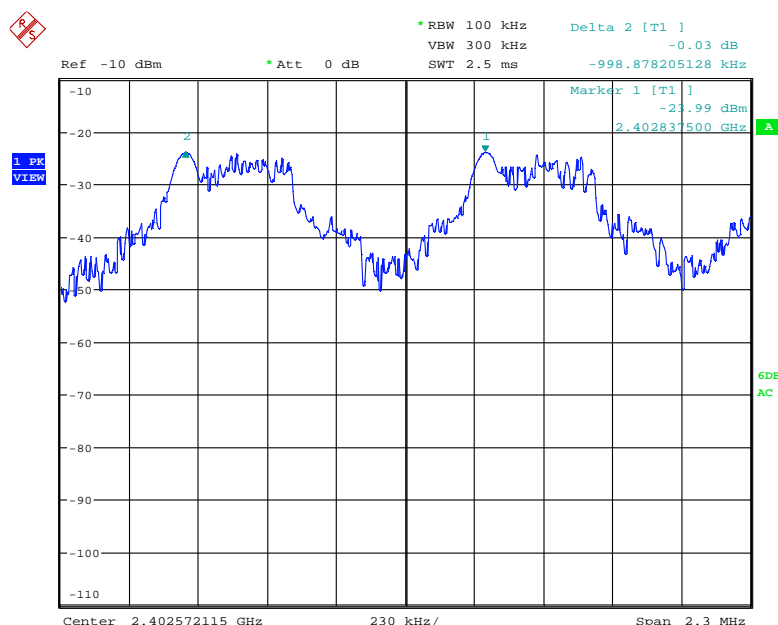
TEST SETUP: The EUT is directly connected to a spectrum analyser.

MEASUREMENT METHOD: Measurements were made using spectrum analyser with RBW and VBW of 100 kHz using the appropriate antennas, amplifiers and filters.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

RESULTS: Compliance to standard is confirmed.

DATA & PLOT:



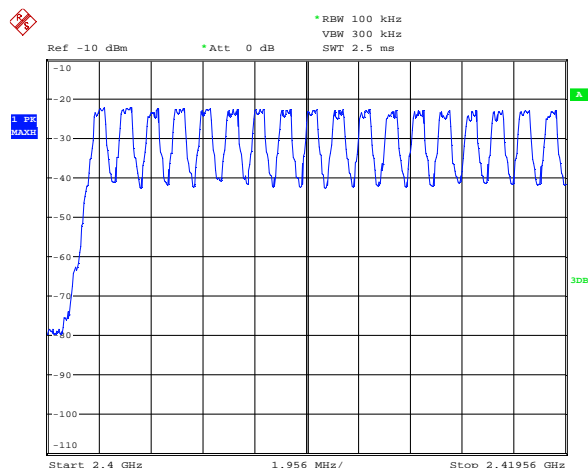
Date: 26.JAN.2015 22:13:24

Part 11 – Number of Hopping Frequencies

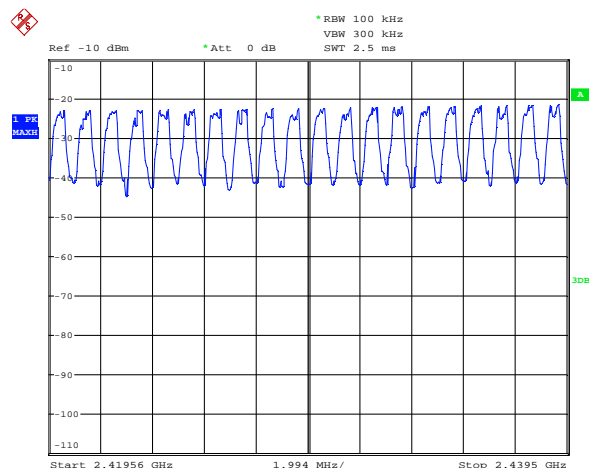
DATE:	Dec-01-2014
TEST STANDARD:	IC RSS-210 Annex 2 Section (A2.9)(b), RSS-Gen Issue 4 Section (7.2.5); FCC Subpart C §15,247(a)
TEST VOLTAGE:	5Vdc from AC Power Adapter
TEST CONDITIONS:	Indoor
MINIMUM STANDARD:	Frequency hopping systems in the 2400 – 2483.5 MHz shall use at least 15 non-overlapping channels.
TEST SETUP:	The EUT is directly connected to a spectrum analyser. The span is set to cover authorised band, in either a single sweep or in multiple contiguous sweeps. The RBW is set to 1% of the span. The analyser is set to Max Hold.
MEASUREMENT METHOD:	Measurements were made using spectrum analyser using the appropriate antennas, amplifiers and filters.
DEVICE DESCRIPTIONS:	As described in the above EUT description and setup section.
DATA:	79 channels
OBSERVATIONS:	The EUT performed as expected.
PERFORMANCE:	Complies

PLOT:

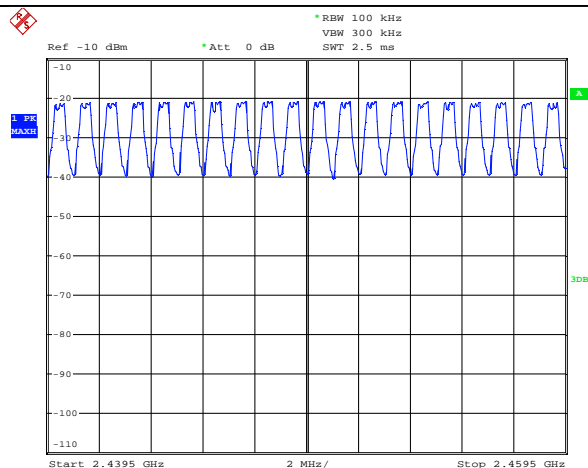
79 Hopping Frequencies, Bluetooth



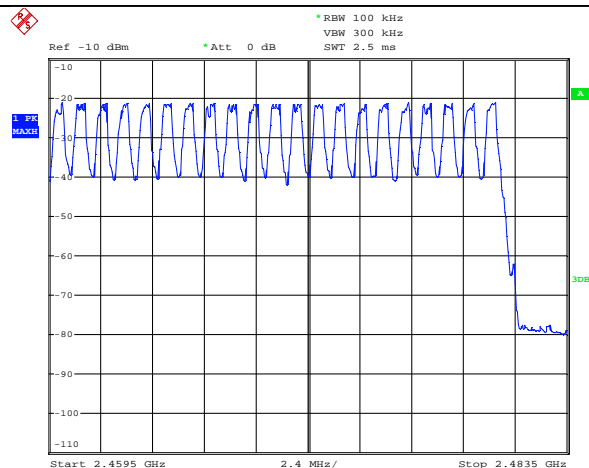
Date: 27.NOV.2014 17:25:58



Date: 27.NOV.2014 17:30:57



Date: 27.NOV.2014 17:45:52



Date: 27.NOV.2014 17:50:48

Part 12 – Time Of Occupancy (Dwell Time)

DATE: Dec-01-2014

TEST STANDARD: IC RSS-210 Annex 2 Section (A2.9)(b)
RSS-Gen Issue 4 Section (7.2.5)

TEST VOLTAGE: 5Vdc from AC Power Adapter

TEST CONDITIONS: Indoor

MINIMUM STANDARD: For frequency hopping systems average time of occupancy on any channel shall not be greater than 0.4 seconds within a period of 0.4 seconds multiplied by the number of hopping channels employed.

TEST SETUP: The EUT is directly connected to a spectrum analyser. The span is set to 0 Hz, centered on a single, selected hopping channel. The width of a single pulse is measured in a fast scan. The number of pulses is measured in a second scan to enable resolution of each occurrence.

The averaged time of occupancy in the specified period 31.6 seconds (79X0.4 s) is equal to 316X(# of pulses in 100 ms) X pulse width.

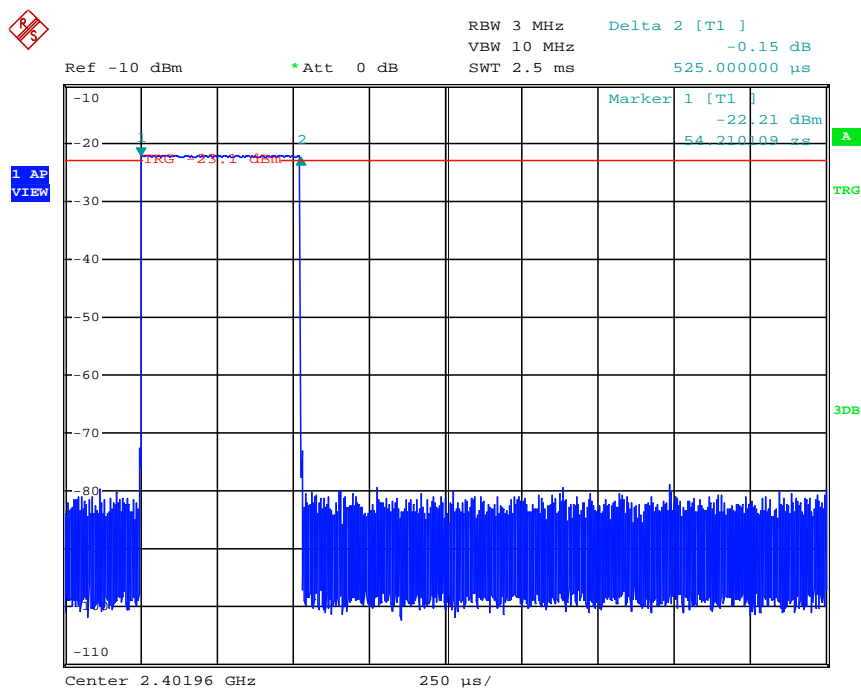
MEASUREMENT METHOD: Measurements were made using spectrum analyser using the appropriate antennas, amplifiers and filters.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section.

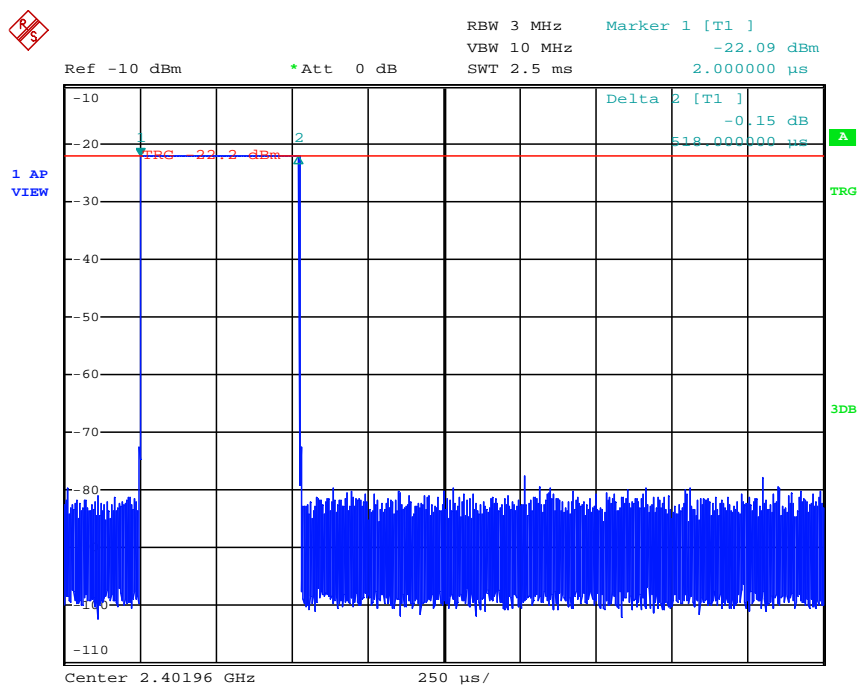
RESULTS: Compliance standard is confirmed

DATA & PLOT:

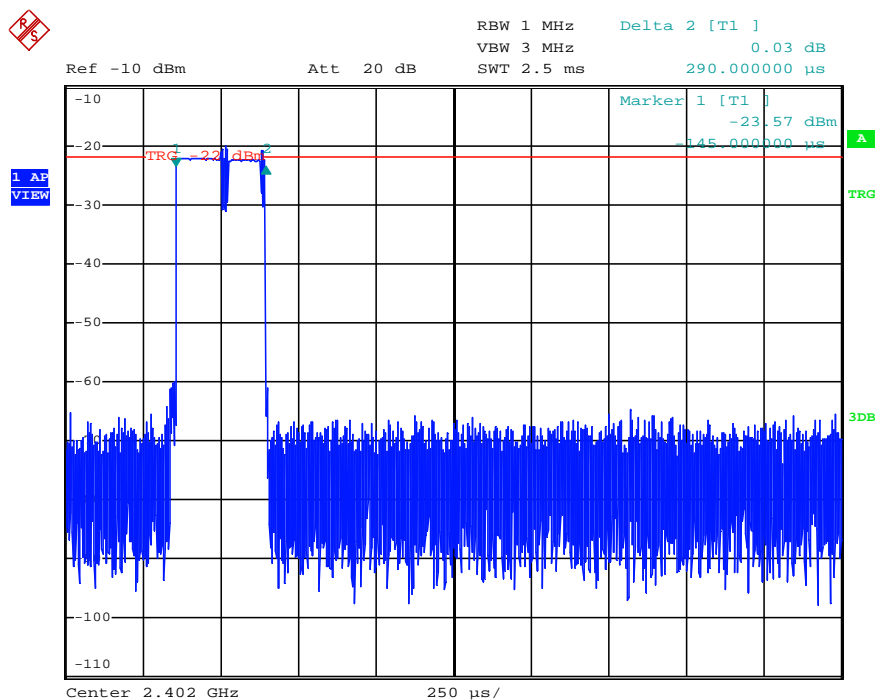
Settings	Basic Rate:	Dwell Time msec	Number of pulses in 100msec	Time of Occupancy (ms)	Limit (ms)
0x02	DM3, medium speed	0.525	2	331.8	400
0x04	DM5, medium speed	0.518	2	327.376	400
2Mbps speed:					
0x07	2-DH3,	0.29	2	183.28	400
3Mbps speed					
0x0B	3-DH5	0.245	2	154.84	400



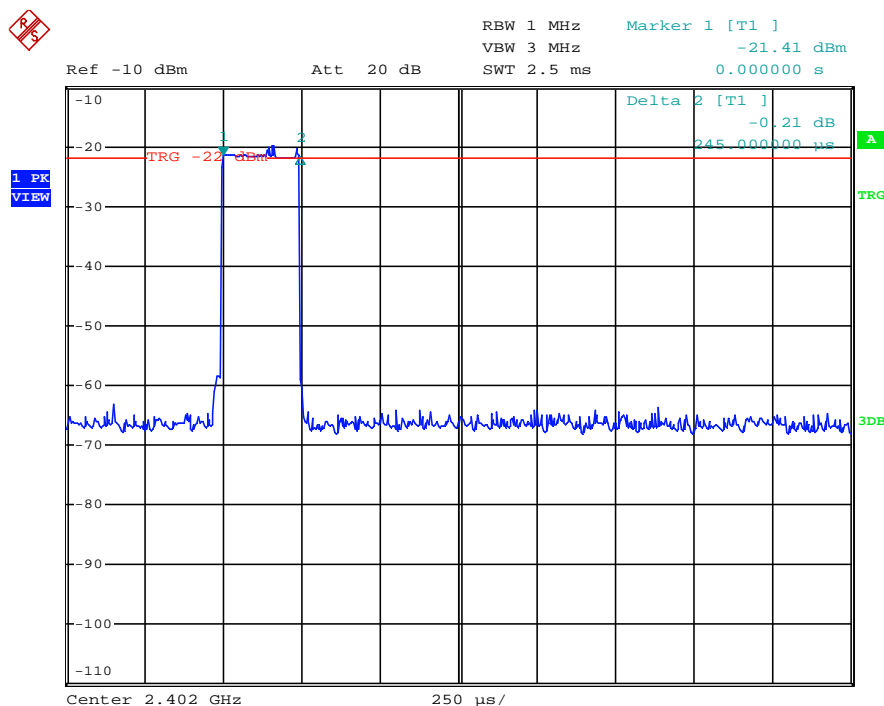
Dwell Time per Pulse – DM3



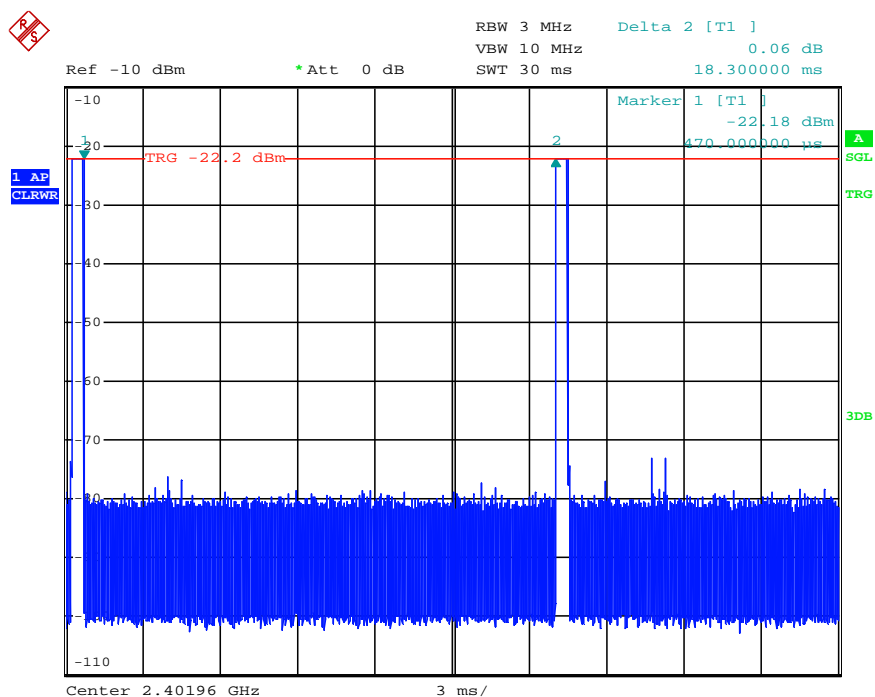
Dwell Time per Pulse – DM5



Dwell Time per Pulse – DH3



Dwell Time per Pulse – DH5



Number of Pulses in 100msec

Part 13 – RF Exposure Compliance

DATE: Dec-01-2014

TEST STANDARD: IC RSS-Gen Issue 4 Section 5.6, RSS-102 Section 2.5
FCC KDB447498

TEST CONDITIONS: Indoor

MINIMUM STANDARD: RSS-102 Section 2.5
SAR evaluation is required if the separation distance between the user and the radiating element of the device is less than or equal to 20 cm, except when the device operates as follows:
above 2.2 GHz and up to 3 GHz inclusively, and with output power (i.e. the higher of the conducted or radiated (e.i.r.p.) source-based, time-averaged output power) that is less than or equal to 20 mW for general public use and 100 mW for controlled use;

KDB447498, sec. 4.3.1:

As stated in Appendix A SAR test exclusion limit for 2450 GHz with separation distance < 5mm is 10mW. The equation and threshold in section 4.3.1 must be applied to determine SAR test exclusion.

The 1-g and 10-g SAR test exclusion thresholds for 100 MHz to 6 GHz at test separation distances

≤ 50 mm are determined by:

$$[(\text{max. power of channel, including tune-up tolerance, mW}) / (\text{min. test separation distance, mm})] \cdot [\sqrt{f(\text{GHz})}] \leq 3.0 \text{ for 1-g SAR and } \leq 7.5 \text{ for 10-g extremity SAR, (1)}$$
where

- $f(\text{GHz})$ is the RF channel transmit frequency in GHz
- Power and distance are rounded to the nearest mW and mm before calculation²⁶

- The result is rounded to one decimal place for comparison

- 3.0 and 7.5 are referred to as the numeric thresholds in the step 2 below

The test exclusions are applicable only when the minimum test separation distance is ≤ 50 mm and for transmission frequencies between 100 MHz and 6 GHz. When the minimum test separation distance is < 5 mm, a distance of 5 mm according to 5) in section 4.1 is applied to determine SAR test exclusion.

EUT DESIGN PARAMETERS: Minimum separation distance: 4.5mm;

Antenna gain: -4.12 dBi.

RESULT: The EUT is exempt from SAR evaluation.

Mode	Maxium Conducted Pout	Antenna Gain	E.I.R.P	E.I.R.P	Result	Limit
	dBm	dBi	dBm	mW		
Wi-Fi 802.1b	8.2	-4.12	4.08	2.56	0.90	3.0
Wi-Fi 802.1g	8.1	-4.12	3.98	2.50	0.88	3.0
Wi-Fi 802.1n	8.2	-4.12	4.08	2.56	0.90	3.0
Bluetooth GFSK	0.9	-4.12	-3.22	0.48	0.17	3.0
Bluetooth EDR2	3.89	-4.12	-0.23	0.95	0.33	3.0
BTLE	6.48	-4.12	2.36	1.72	0.60	3.0
ANT	0.15	-4.12	-3.97	0.40	0.14	3.0

Part 14 - Frequency Stability

DATE:

TEST STANDARD: FCC Part 15.215(c) and RSS-Gen Issue 4 (8.11)

MINIMUM STANDARD: Not specified.
RSS-Gen (8.8): Transmitter frequency stability for licence-exempt radio apparatus shall be measured in accordance with Section 6.11. For licence-exempt radio apparatus, the frequency stability shall be measured at temperatures of -20°C (-4°F), +20°C (+68°F) and +50°C (+122°F) instead of at the temperatures specified in Section 6.11. If the frequency stability of the licence-exempt radio apparatus is not specified in the applicable standard (RSS), measurement of the frequency stability is not required provided that the occupied bandwidth of the licence-exempt radio apparatus lies entirely outside the restricted bands and the prohibited TV bands of 54-72 MHz, 76-88 MHz, 174-216 MHz, 470-608 MHz and 614-806 MHz.
FCC (15.215(c)): The 20dB bandwidth must remain within the designated frequency band over the expected variations in temperature and voltage range

TEST SETUP: The EUT was bench tested and in our temperature chamber. Due to the outdoor location and mounting method of the EUT, the EUT voltage and temperature range was specified by the manufacturer and verified at 2.6, 3 and 5Vdc; +50 to -30° Celsius. The transmitter was set for Carrier Wave (CW) mode and the lowest and highest channel Frequency was measured at each Temperature setting, after the Transmitter stabilized at the temperature.

MEASUREMENT METHOD: Measurements were made using a Spectrum Analyzer with 120kHz RBW Average detector while directly connected to the EUT through the antenna port.

DEVICE DESCRIPTIONS: As described in the above EUT description and setup section

Measurement Data:

Frequency Stability, Wi-Fi 802.11b

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2412	55	2.412001600	-15	21.70	6.70	1.700
	40	2.412000400	-14.70	21.70	7.00	1.400
	30	2.411999600	-13.70	21.70	8.00	0.400
	20	2.411960500	-13.30	21.70	8.40	0.000
	10	2.411994800	-13.00	21.70	8.70	-0.300
	0	2.412001900	-12.60	21.70	9.10	-0.700
	-10	2.412001600	-11.80	21.70	9.90	-1.500
	-20	2.412001600	-11.52	21.70	10.18	-1.780
	-30	2.411990000	-11.50	21.70	10.20	-1.800
2442	55	2.441999200	-14.00	21.70	7.70	1.800
	40	2.441999200	-13.60	21.70	8.10	1.400
	30	2.441998400	-12.60	21.70	9.10	0.400
	20	2.441980000	-12.20	21.70	9.50	0.000
	10	2.441998600	-12.00	21.70	9.70	-0.200
	0	2.441999200	-11.60	21.70	10.10	-0.600
	-10	2.442000410	-11.00	21.70	10.70	-1.200
	-20	2.442001800	-10.91	21.70	10.79	-1.290
	-30	2.442009768	-10.90	21.70	10.80	-1.300
2462	55	2.462001200	-13.20	21.70	8.50	1.800
	40	2.462000800	-12.90	21.70	8.80	1.500
	30	2.461997200	-11.82	21.70	9.88	0.420
	20	2.461980000	-11.40	21.70	10.30	0.000
	10	2.462001000	-11.30	21.70	10.40	-0.100
	0	2.461998600	-10.90	21.70	10.80	-0.500
	-10	2.462000400	-10.30	21.70	11.40	-1.100
	-20	2.461999600	-10.11	21.70	11.59	-1.290
	-30	2.462009768	-10.10	21.70	11.60	-1.300

Frequency Stability, Wi-Fi 802.11g

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2412	55	2.412004800	-16.30	21.7	5.4	1.800
	40	2.411999200	-16.00	21.7	5.7	1.500
	30	2.412000400	-15.00	21.7	6.7	0.500
	20	2.412009000	-14.50	21.7	7.2	0.000
	10	2.412006400	-14.37	21.7	7.3	-0.130
	0	2.411999200	-13.90	21.7	7.8	-0.600
	-10	2.411998100	-13.20	21.7	8.5	-1.300
	-20	2.412002800	-12.97	21.7	8.7	-1.530
	-30	2.412000800	-12.90	21.7	8.8	-1.600
2442	55	2.441999600	-15.10	21.7	6.6	1.800
	40	2.441998800	-14.80	21.7	6.9	1.500
	30	2.441998400	-13.90	21.7	7.8	0.600
	20	2.442010000	-13.30	21.7	8.4	0.000
	10	2.441997200	-13.30	21.7	8.4	0.000
	0	2.442000000	-13.00	21.7	8.7	-0.300
	-10	2.441996400	-12.10	21.7	9.6	-1.200
	-20	2.441994400	-12.00	21.7	9.7	-1.300
	-30	2.441999900	-11.90	21.7	9.8	-1.400
2462	55	2.462005600	-14.50	21.7	7.2	1.700
	40	2.461998400	-14.30	21.7	7.4	1.500
	30	2.461994400	-13.23	21.7	8.5	0.430
	20	2.462010000	-12.80	21.7	8.9	0.000
	10	2.462001000	-12.70	21.7	9.0	-0.100
	0	2.461996800	-12.10	21.7	9.6	-0.700
	-10	2.461997200	-11.70	21.7	10.0	-1.100
	-20	2.462001610	-11.50	21.7	10.2	-1.300
	-30	2.462009768	-11.40	21.7	10.3	-1.400

Frequency Stability, Wi-Fi 802.11n

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2412	55	2.412001600	-15.50	21.70	6.20	1.800
	40	2.411980000	-15.20	21.70	6.50	1.500
	30	2.411998800	-14.20	21.70	7.50	0.500
	20	2.412001000	-13.70	21.70	8.00	0.000
	10	2.412008000	-13.70	21.70	8.00	0.000
	0	2.411996000	-13.30	21.70	8.40	-0.400
	-10	2.419984000	-12.40	21.70	9.30	-1.300
	-20	2.412000400	-12.20	21.70	9.50	-1.500
	-30	2.412002200	-12.00	21.70	9.70	-1.700
2442	55	2.442001200	-14.50	21.70	7.20	1.700
	40	2.441997600	-14.10	21.70	7.60	1.300
	30	2.442002400	-13.20	21.70	8.50	0.400
	20	2.442010000	-12.80	21.70	8.90	0.000
	10	2.441994000	-12.70	21.70	9.00	-0.100
	0	2.442001200	-12.10	21.70	9.60	-0.700
	-10	2.442003600	-11.67	21.70	10.03	-1.130
	-20	2.441997600	-11.50	21.70	10.20	-1.300
	-30	2.442001800	-11.40	21.70	10.30	-1.400
2462	55	2.462004800	-14.40	21.70	7.30	1.700
	40	2.462000400	-13.40	21.70	8.30	0.700
	30	2.462001600	-12.50	21.70	9.20	-0.200
	20	2.462010000	-12.70	21.70	9.00	0.000
	10	2.462001000	-11.90	21.70	9.80	-0.800
	0	2.462001100	-11.70	21.70	10.00	-1.000
	-10	2.462001600	-11.00	21.70	10.70	-1.700
	-20	2.462000800	-10.90	21.70	10.80	-1.800
	-30	2.461999200	-11.30	21.70	10.40	-1.400

Frequency Stability, Bluetooth-GFSK

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2402	55	2.4020364	-21.61	21.70	0.09	-0.430
	40	2.4020272	-21.96	21.70	-0.26	-0.080
	30	2.4020073	-22.30	21.70	-0.60	0.260
	20	2.4019980	-22.04	21.70	-0.34	0.000
	10	2.4020032	-21.76	21.70	-0.06	-0.280
	0	2.4020140	-22.09	21.70	-0.39	0.050
	-10	2.4020021	-21.88	21.70	-0.18	-0.160
	-20	2.4020054	-21.70	21.70	0.00	-0.340
	-30	2.4021060	-21.52	21.70	0.18	-0.520
2442	55	2.4420035	-21.13	21.70	0.57	-0.570
	40	2.4420020	-21.47	21.70	0.23	-0.230
	30	2.4419996	-21.88	21.70	-0.18	0.180
	20	2.4419980	-21.70	21.70	0.00	0.000
	10	2.4420034	-21.41	21.70	0.29	-0.290
	0	2.4420030	-21.81	21.70	-0.11	0.110
	-10	2.4420028	-21.60	21.70	0.10	-0.100
	-20	2.4419999	-21.48	21.70	0.22	-0.220
	-30	2.4420400	-21.30	21.70	0.40	-0.400
2480	55	2.4810260	-20.26	21.70	1.44	-0.440
	40	2.4810900	-20.51	21.70	1.19	-0.190
	30	2.4810027	-20.92	21.70	0.78	0.220
	20	2.4810100	-20.70	21.70	1.00	0.000
	10	2.4810164	-20.44	21.70	1.26	-0.260
	0	2.4810301	-20.90	21.70	0.80	0.200
	-10	2.4810104	-20.60	21.70	1.10	-0.100
	-20	2.4810077	-20.55	21.70	1.15	-0.150
	-30	2.4810300	-20.30	21.70	1.40	-0.400

Frequency Stability, Bluetooth-EDR2

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2402	55	2.4020036	-19.16	21.70	2.54	-0.340
	40	2.4019986	-19.40	21.70	2.30	-0.100
	30	2.4019985	-19.73	21.70	1.97	0.230
	20	2.4019980	-19.50	21.70	2.20	0.000
	10	2.4019900	-19.50	21.70	2.20	0.000
	0	2.4019998	-19.65	21.70	2.05	0.150
	-10	2.4019960	-19.38	21.70	2.32	-0.120
	-20	2.4020010	-19.31	21.70	2.39	-0.190
	-30	2.4019980	-19.00	21.70	2.70	-0.500
2442	55	2.4419890	-18.62	21.70	3.08	-0.520
	40	2.4419860	-18.93	21.70	2.77	-0.210
	30	2.4420016	-19.50	21.70	2.20	0.360
	20	2.4419980	-19.14	21.70	2.56	0.000
	10	2.4419993	-19.18	21.70	2.52	0.040
	0	2.4419994	-19.60	21.70	2.10	0.460
	-10	2.4419860	-19.30	21.70	2.40	0.160
	-20	2.4419880	-18.90	21.70	2.80	-0.240
	-30	2.4419978	-18.80	21.70	2.90	-0.340
2480	55	2.4809884	-17.80	21.70	3.90	-0.440
	40	2.4809920	-18.10	21.70	3.60	-0.140
	30	2.4809883	-18.49	21.70	3.21	0.250
	20	2.4810040	-18.24	21.70	3.46	0.000
	10	2.4809920	-18.19	21.70	3.51	-0.050
	0	2.4810074	-18.20	21.70	3.50	-0.040
	-10	2.4810069	-18.15	21.70	3.55	-0.090
	-20	2.4810076	-18.10	21.70	3.60	-0.140
	-30	2.4809991	-17.90	21.70	3.80	-0.340

Frequency Stability, ANT

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2402	55	2.4020036	-25.97	21.70	-4.27	-0.340
	40	2.4019986	-26.21	21.70	-4.51	-0.100
	30	2.4019985	-26.54	21.70	-4.84	0.230
	20	2.4019980	-26.31	21.70	-4.61	0.000
	10	2.4019900	-26.31	21.70	-4.61	0.000
	0	2.4019998	-26.46	21.70	-4.76	0.150
	-10	2.4019960	-26.19	21.70	-4.49	-0.120
	-20	2.4020010	-26.12	21.70	-4.42	-0.190
	-30	2.4019980	-25.81	21.70	-4.11	-0.500
2442	55	2.4419890	-25.43	21.70	-3.73	-0.520
	40	2.4419860	-25.74	21.70	-4.04	-0.210
	30	2.4420016	-26.31	21.70	-4.61	0.360
	20	2.4419980	-25.95	21.70	-4.25	0.000
	10	2.4419993	-25.99	21.70	-4.29	0.040
	0	2.4419994	-26.41	21.70	-4.71	0.460
	-10	2.4419860	-26.11	21.70	-4.41	0.160
	-20	2.4419880	-25.71	21.70	-4.01	-0.240
	-30	2.4419978	-25.61	21.70	-3.91	-0.340
2480	55	2.4809884	-24.61	21.70	-2.91	-0.440
	40	2.4809920	-24.91	21.70	-3.21	-0.140
	30	2.4809883	-25.30	21.70	-3.60	0.250
	20	2.4810040	-25.05	21.70	-3.35	0.000
	10	2.4809920	-25.00	21.70	-3.30	-0.050
	0	2.4810074	-25.01	21.70	-3.31	-0.040
	-10	2.4810069	-24.96	21.70	-3.26	-0.090
	-20	2.4810076	-24.91	21.70	-3.21	-0.140
	-30	2.4809991	-24.71	21.70	-3.01	-0.340

Frequency Stability, BTLE

Frequency (MHz)	T (°C)	Frequency (MHz)	Uncorr-Peak (dBm)	Cable loss (dB)	Peak Power (dBm)	Power Variance
2402	55	2.4020036	-17.42	21.70	4.28	-0.340
	40	2.4019986	-17.66	21.70	4.04	-0.100
	30	2.4019985	-17.99	21.70	3.71	0.230
	20	2.4019980	-17.76	21.70	3.94	0.000
	10	2.4019900	-17.76	21.70	3.94	0.000
	0	2.4019998	-17.91	21.70	3.79	0.150
	-10	2.4019960	-17.64	21.70	4.06	-0.120
	-20	2.4020010	-17.57	21.70	4.13	-0.190
	-30	2.4019980	-17.26	21.70	4.44	-0.500
2442	55	2.4419890	-16.88	21.70	4.82	-0.520
	40	2.4419860	-17.19	21.70	4.51	-0.210
	30	2.4420016	-17.76	21.70	3.94	0.360
	20	2.4419980	-17.40	21.70	4.30	0.000
	10	2.4419993	-17.44	21.70	4.26	0.040
	0	2.4419994	-17.86	21.70	3.84	0.460
	-10	2.4419860	-17.56	21.70	4.14	0.160
	-20	2.4419880	-17.16	21.70	4.54	-0.240
	-30	2.4419978	-17.06	21.70	4.64	-0.340
2480	55	2.4809884	-16.06	21.70	5.64	-0.440
	40	2.4809920	-16.36	21.70	5.34	-0.140
	30	2.4809883	-16.75	21.70	4.95	0.250
	20	2.4810040	-16.50	21.70	5.20	0.000
	10	2.4809920	-16.45	21.70	5.25	-0.050
	0	2.4810074	-16.46	21.70	5.24	-0.040
	-10	2.4810069	-16.41	21.70	5.29	-0.090
	-20	2.4810076	-16.36	21.70	5.34	-0.140
	-30	2.4809991	-16.16	21.70	5.54	-0.340

Part 15 – 99% Bandwidth

DATE: Dec-02-2014

TEST STANDARD: RSS-Gen Issue 4

TEST VOLTAGE: 5Vdc from AC Power Adapter

MINIMUM STANDARD: The Occupied Channel Bandwidth is the bandwidth that contains 99 % of the power of the signal.
The Occupied Channel Bandwidth shall fall completely within the range between 2,4 GHz and 2,4835 GHz.

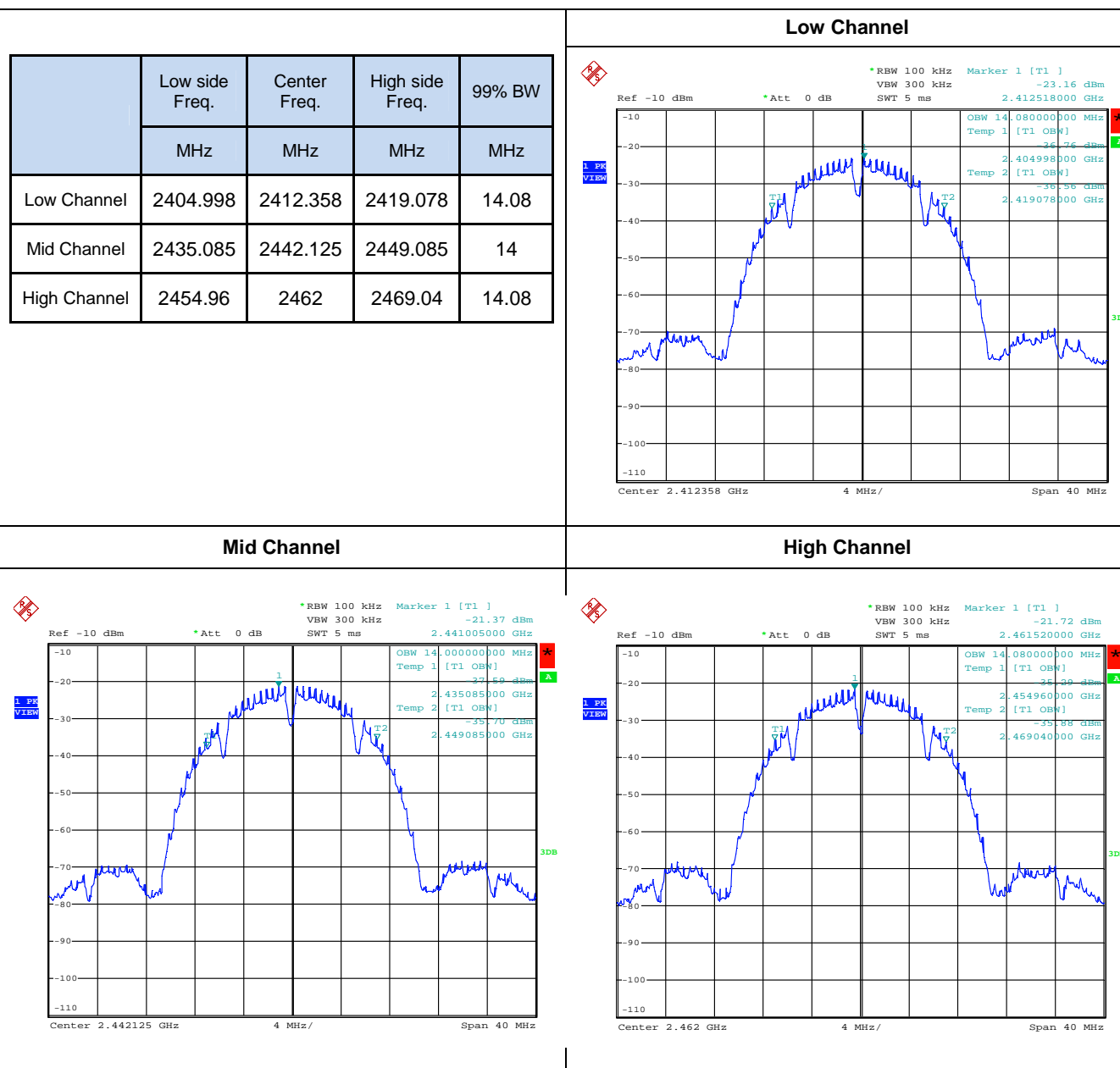
TEST SETUP: The antenna port of EUT was directly connected to a spectrum analyser.

MODIFICATIONS: No modification is required to comply for this test.

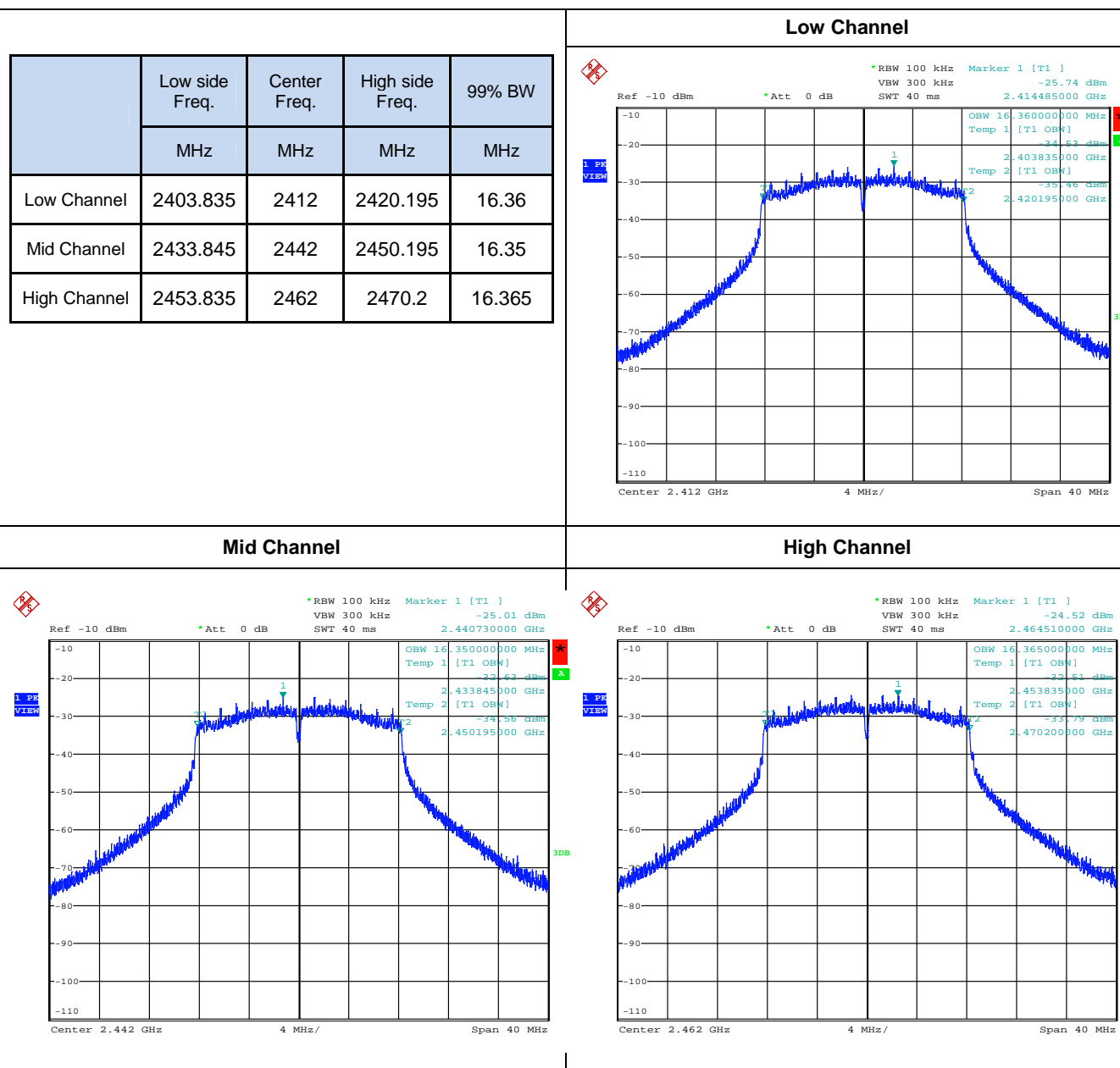
PERFORMANCE: Complies with standard

DATA & PLOT:

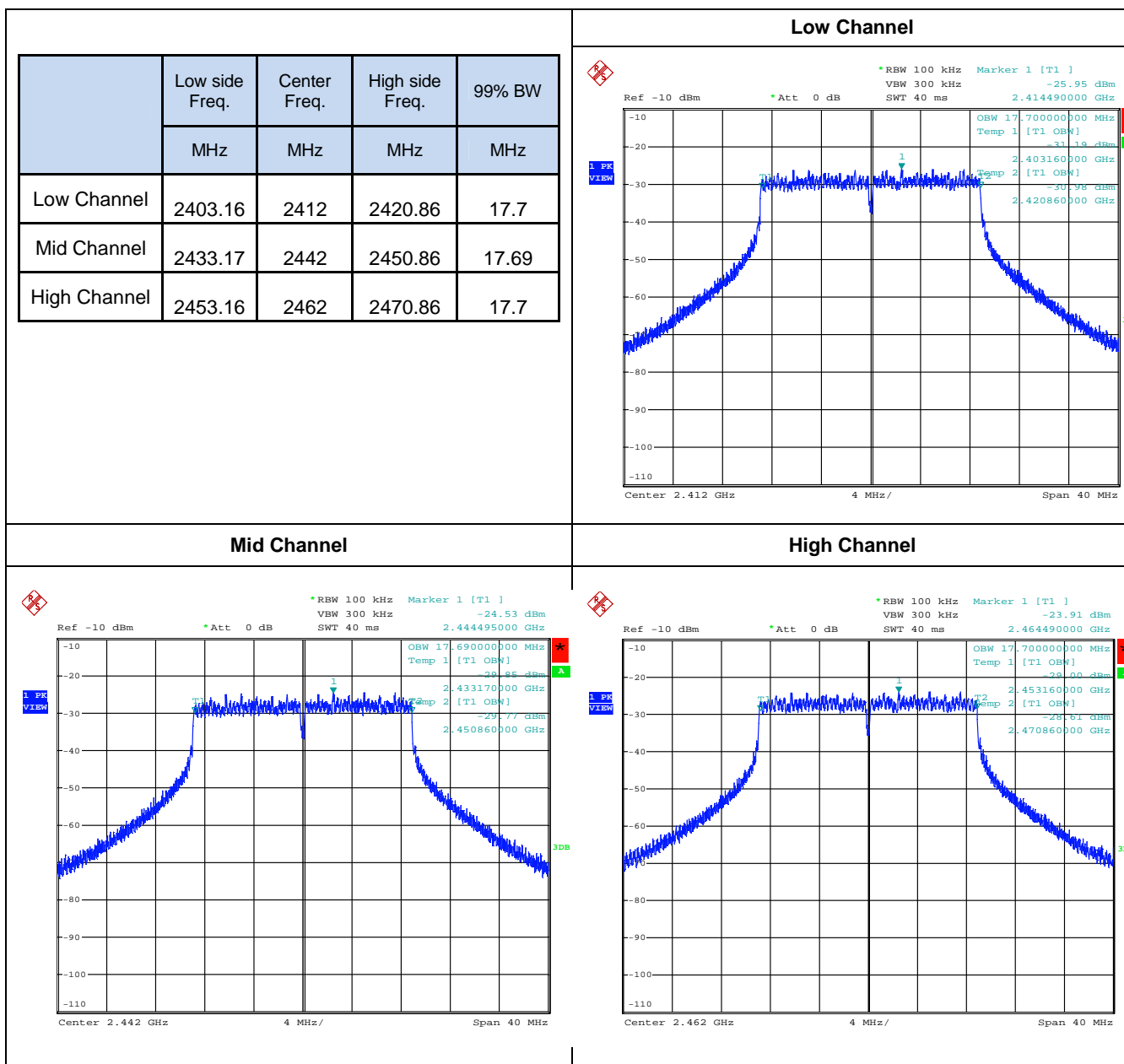
99% Occupied Channel Bandwidth, Wi-Fi, 802.11b



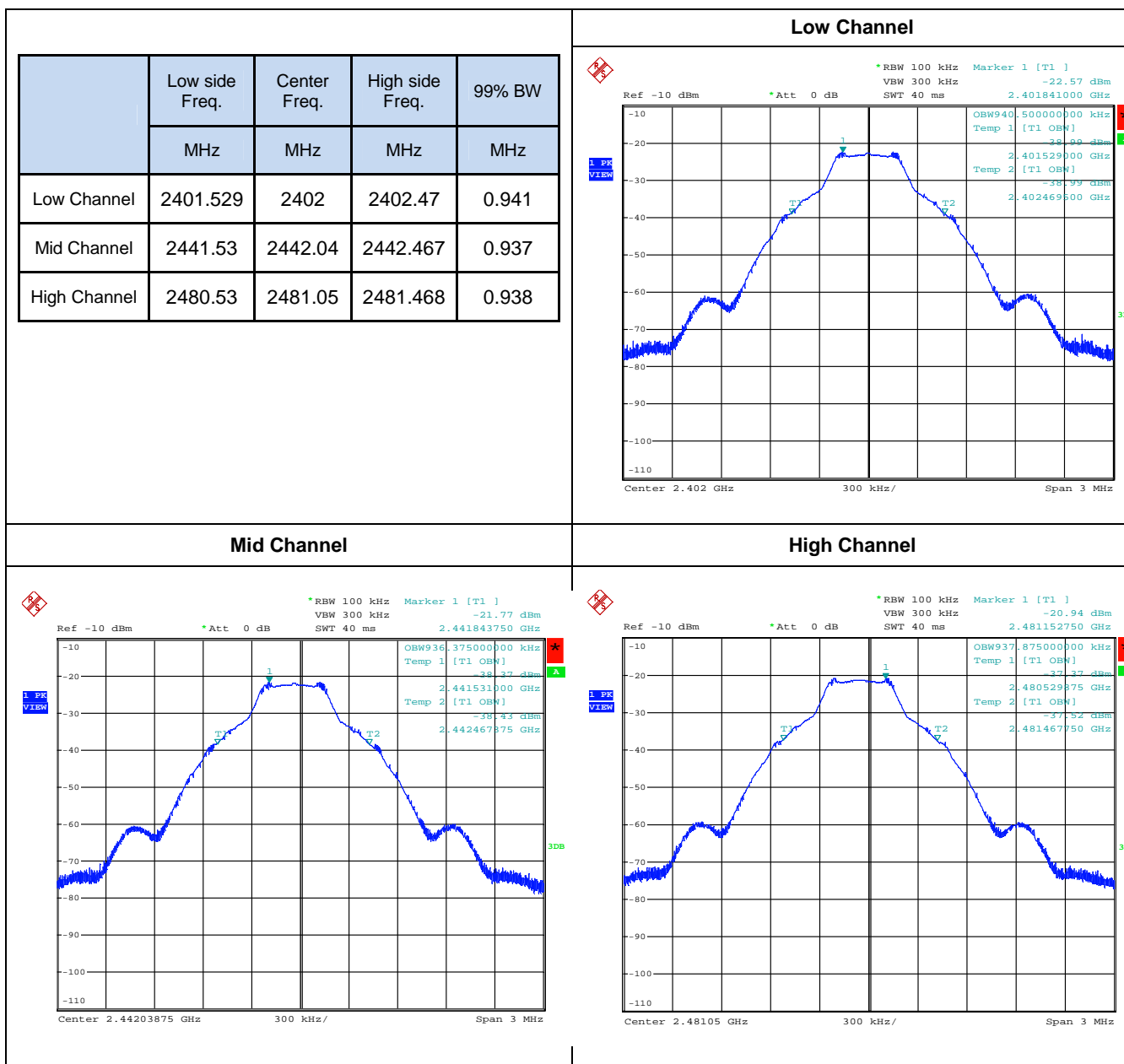
99% Occupied Channel Bandwidth, Wi-Fi, 802.11g



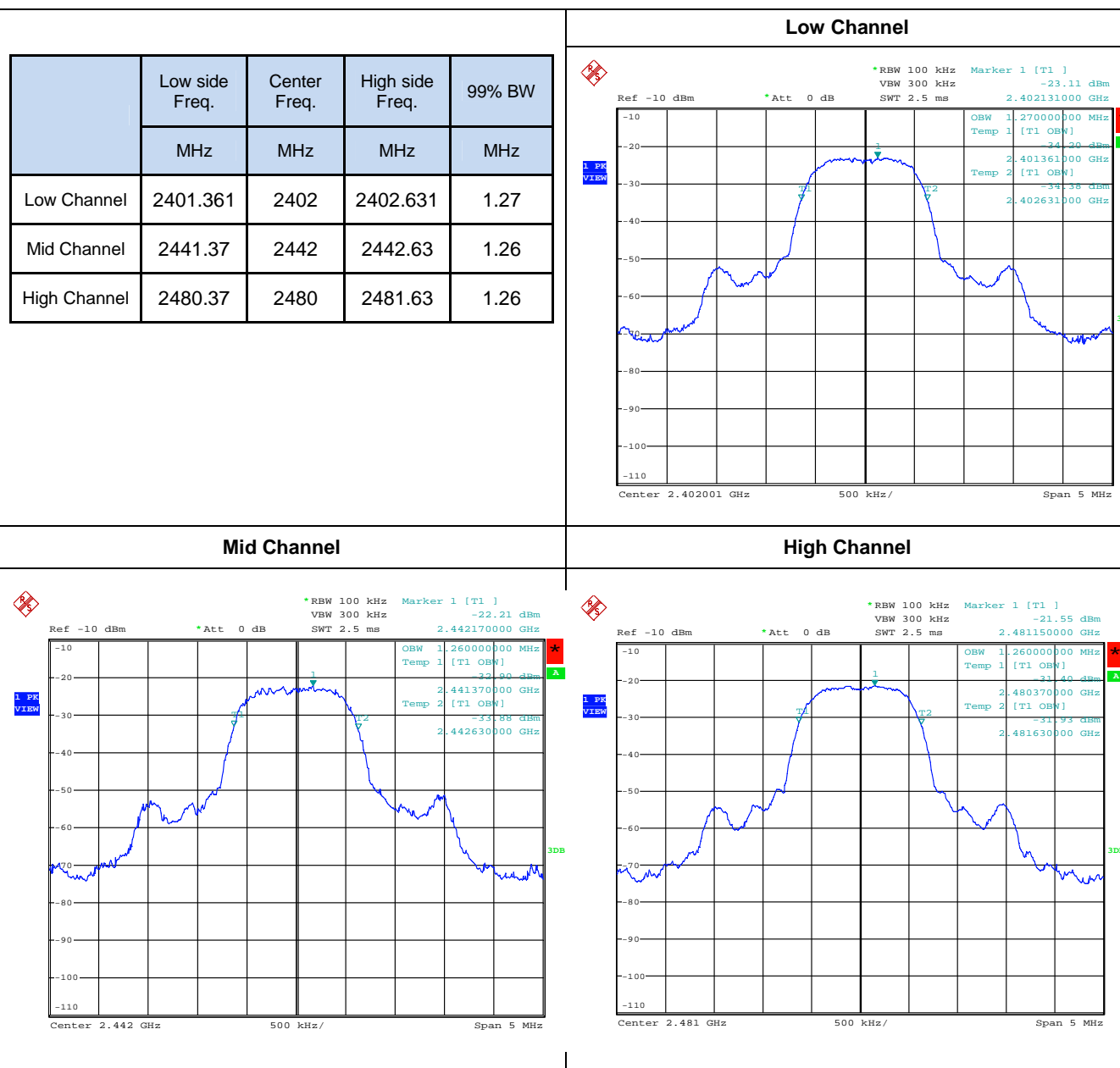
99% Occupied Channel Bandwidth, Wi-Fi, 802.11n



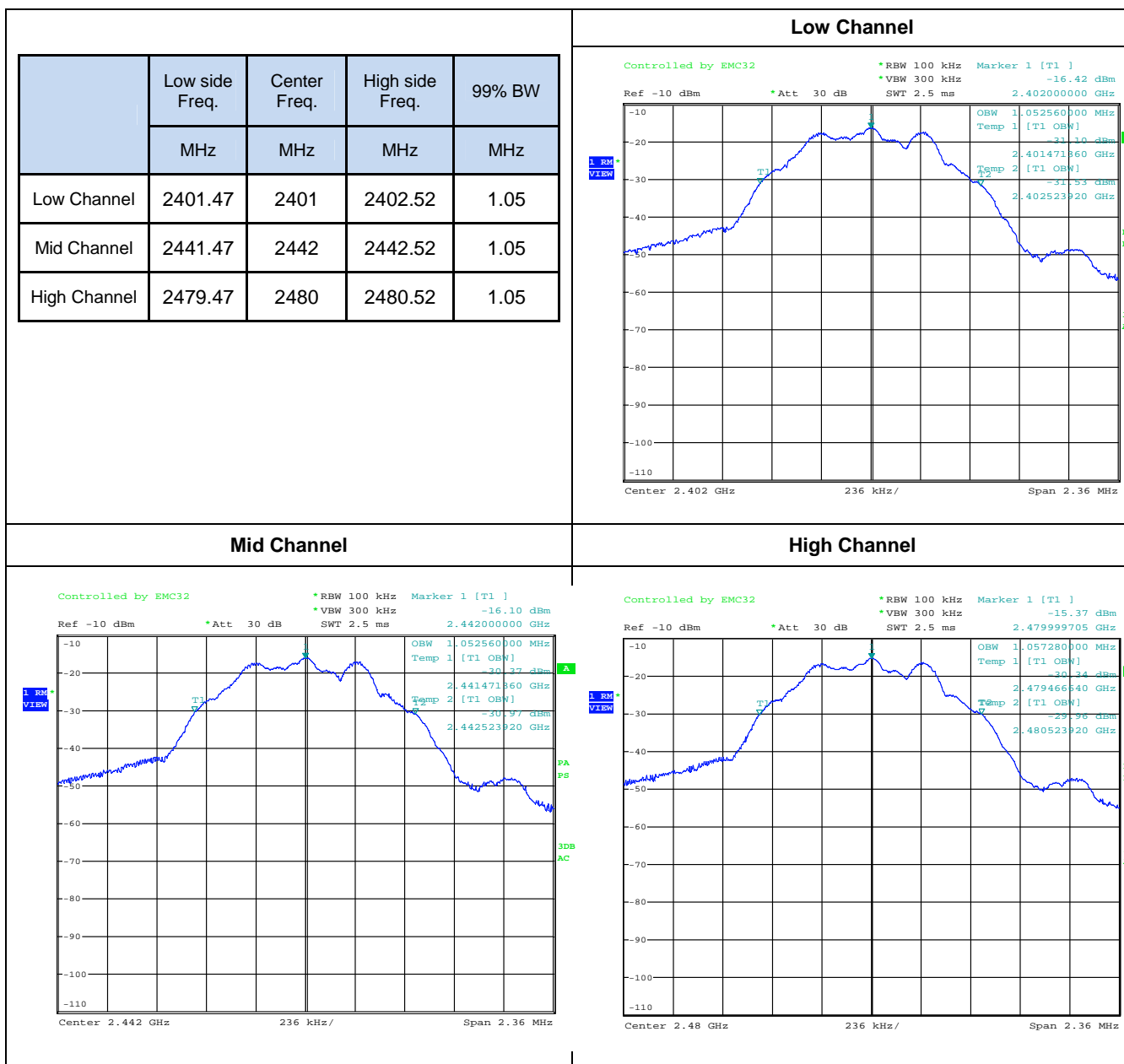
99% Occupied Channel Bandwidth, Bluetooth-GFSK



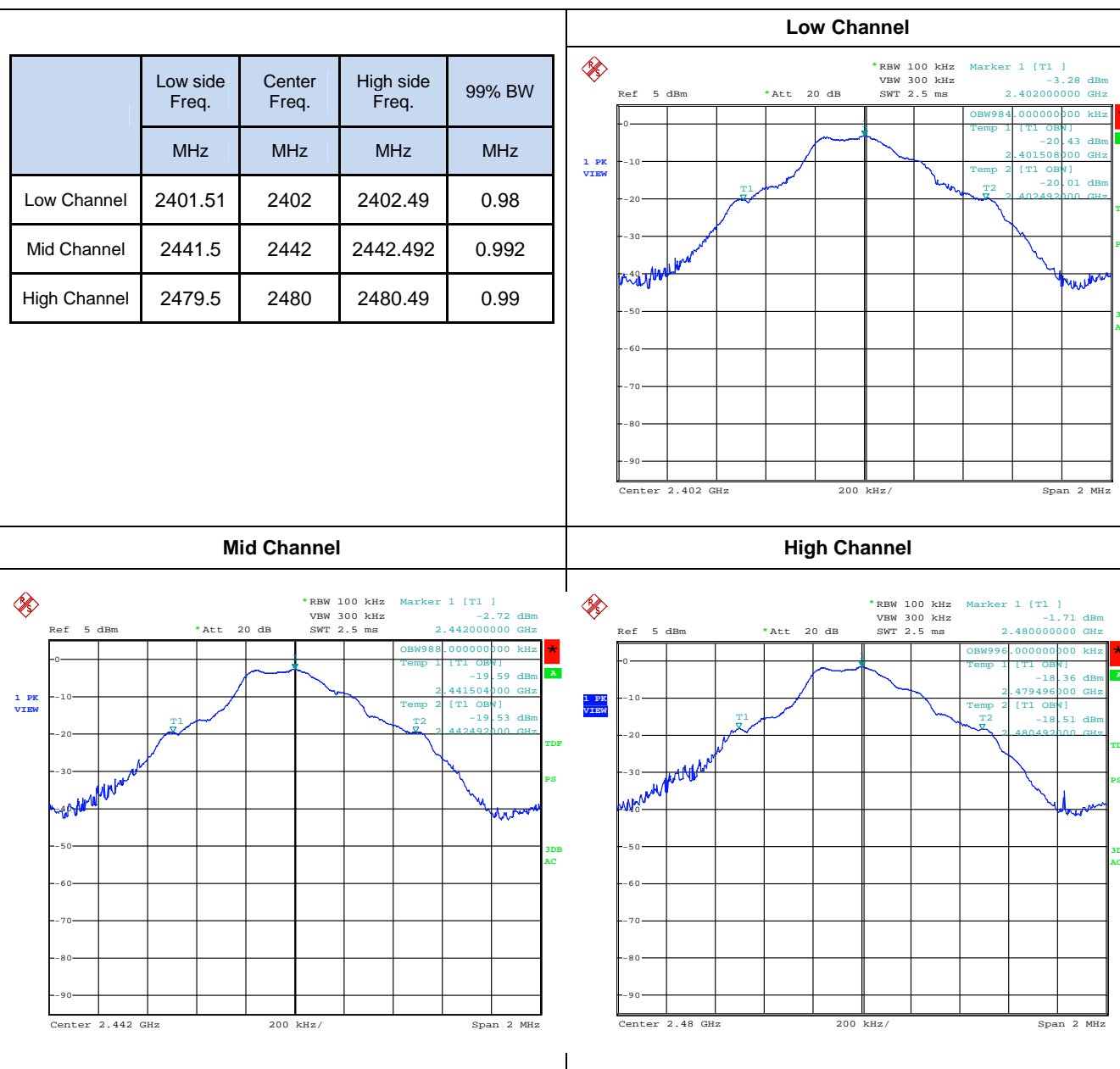
99% Occupied Channel Bandwidth, Bluetooth-EDR2



99% Occupied Channel Bandwidth, BTLE



99% Occupied Channel Bandwidth, ANT



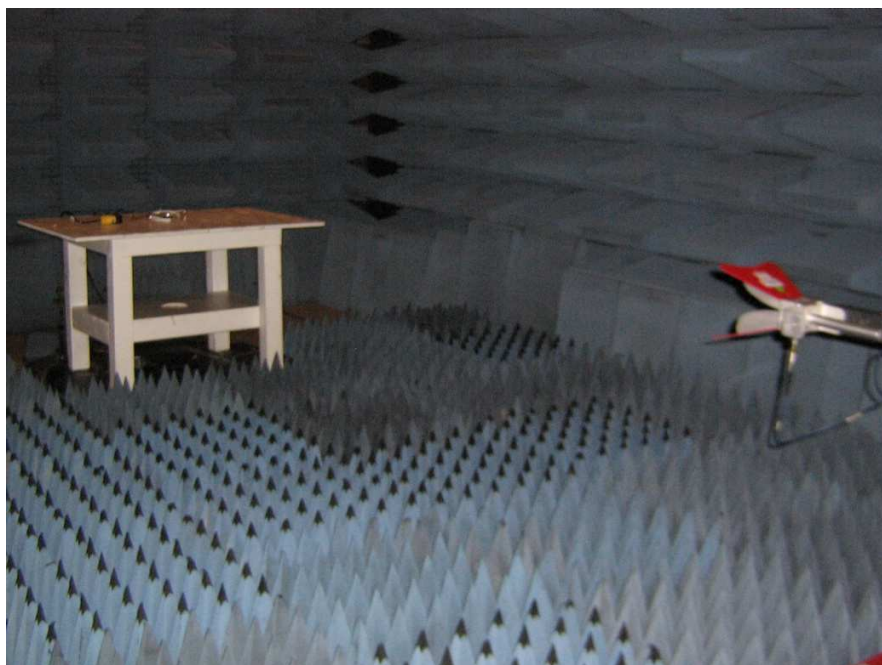
Appendix A: EUT photos during the testing



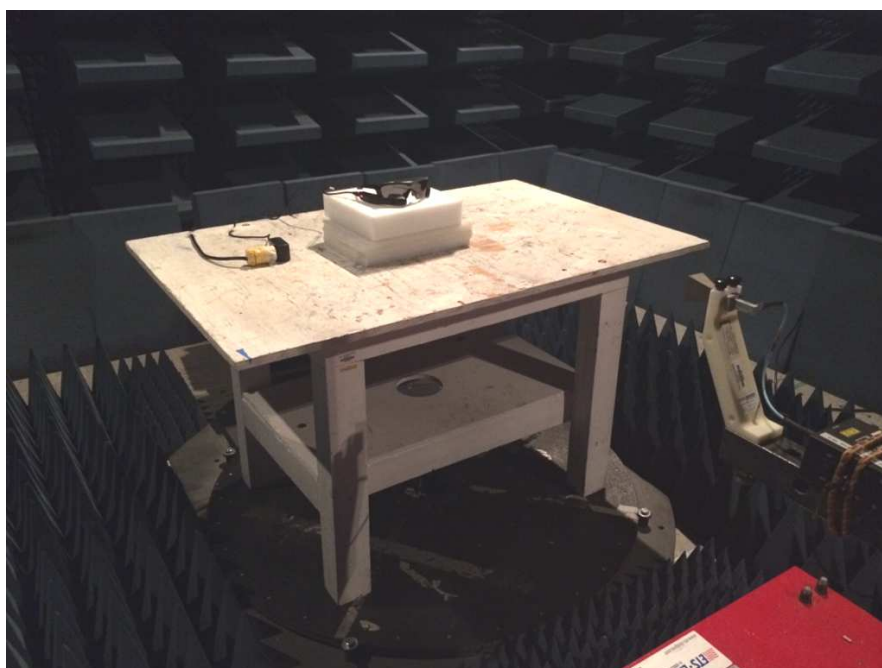
Radiated Emissions Test Setup – below 30MHz



Radiated Emissions Test Setup - 30MHz-1GHz



Radiated Emissions Test Setup - 1GHz to 18GHz



Radiated Emissions Test Setup - 18GHz to 26.54GHz



Radiated Emissions Test Setup



Conducted Emissions Test Setup

End of report

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last page of this test report***