RF TEST REPORT

Test item	:	Wireless Comm. Module
Model No.	:	AAX74688001
Order No.	:	DEMC1407-03058, DEMC1407-03076
Date of receipt	:	2014-07-24
Test duration	:	2014-07-24 ~ 2014-07-28
Date of issue	:	2014-08-12
Use of report	:	FCC & IC Original Grant

Applicant : LG Electronics USA
1000 Sylvan Avenue, Englewood Cliffs NJ 07632

Test laboratory : DT&C Co., Ltd.
42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935

Test specification	:	FCC Part 15 Subpart C 247 RSS-210 Issue 8: 2010
Test environment	:	See appended test report
Test result	:	☒ Pass ☐ Fail

The test results presented in this test report are limited only to the sample supplied by applicant and the use of this test report is inhibited other than its purpose. This test report shall not be reproduced except in full, without the written approval of DT&C CO., LTD.

Tested by:

Engineer
JaeJin Lee

Reviewed by:

General Manager
GeunKi Son

Test Report Version

Test Report No.	Date	Description
DRTFCC1408-1005	Aug. 05, 2014	Initial issue
DRTFCC1408-1005(1)	Aug. 12, 2014	Added the test data of radiated band edge

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1. GENERAL INFORMATION

Applicant	:	LG Electronics USA
Address	:	1000 Sylvan Avenue, Englewood Cliffs NJ 07632
FCC ID	:	BEJAAX74688001
IC	:	2703H-AAX74688001
EUT	:	Wireless Comm. Module
Model	:	AAX74688001
Additional Model(s)	:	NA
Data of Test	:	2014-07-24 ~ 2014-07-28
Contact person	:	Jacob Cho

2. EUT DESCRIPTION

Product	Wireless Comm. Module
Model Name	AAX74688001
Power Supply	DC 3.3 V
Frequency Range	2405 ~ 2480 MHz (16 channels)
Max. RF Output Power	20.21 dBm
Modulation Type	O-QPSK
Antenna Specification	Antenna Type: Internal Antenna Gain: 4.40 dBi(PK)

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3. SUMMARY OF TESTS

FCC Part Section(s)	RSS Section(s)	Parameter	Limit	Test Condition	Status Note 1
I. Transmitter Mode (TX)					
15.247(a)	RSS-210 [A8.2]	6 dB Bandwidth	> 500 kHz	Conducted	C
15.247(b)	RSS-210 [A8.4]	Transmitter Output Power	< 1Watt		C Note2
15.247(d)	RSS-210 [A8.5]	Out of Band Emissions / Band Edge	20dBc in any 100kHz BW		C
15.247(e)	RSS-210 [A8.2]	Transmitter Power Spectral Density	< 8dBm / 3kHz		C
-	RSS Gen [4.6.1]	Occupied Bandwidth (99%)	RSS-Gen(4.6.1)		C
15.205 15.209	RSS-210 [A8.5]	General Field Strength Limits (Restricted Bands and Radiated Emission Limits)	<FCC 15.209 limits	Radiated	C Note3
15.207	RSS-Gen [7.2.4]	AC Conducted Emissions	< FCC 15.207 limits	AC Line Conducted	C
15.203	-	Antenna Requirements	FCC 15.203	-	C

Note 1: **C**=Comply **NC**=Not Comply **NT**=Not Tested **NA**=Not Applicable

Note 2: Added the 15, 19, 20, 25 channels by applicant request in the report.

Note 3: This test item was performed in each axis and the worst case data was reported.

Note 4: For purposes of test the device was operated with the transmitter continuously on.(100 % duty cycle)

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4. TEST METHODOLOGY

Generally the tests were performed according to the KDB558074 v03r02. And ANSI C63.10-2009 was used to reference appropriate EUT setup and maximizing procedures of radiated spurious emission and AC line conducted emission testing.

4.1 EUT CONFIGURATION

The EUT configuration for testing is installed on RF field strength measurement to meet the Commissions requirement and operating in a manner that intends to maximize its emission characteristics in a continuous normal application.

4.2 EUT EXERCISE

The EUT was operated in the engineering mode to fix the TX frequency that was for the purpose of the measurements. According to its specifications, the EUT must comply with the requirements of the Section 15.207, 15.209 and 15.247 under the FCC Rules Part 15 Subpart C.

4.3 GENERAL TEST PROCEDURES

Conducted Emissions

According to the requirements in Section 6.2 of ANSI C63.10, the EUT is placed on the turntable, which is 0.8 m above ground plane and the conducted emissions from the EUT are measured in the frequency range between 0.15 MHz and 30MHz using CISPR Quasi-peak and Average detector.

Radiated Emissions

The EUT is placed on a turntable, which is 0.8 m above ground plane. The turntable shall rotate 360 degrees to determine the position of maximum emission level. EUT is set 3 m away from the receiving antenna, which varied from 1 m to 4 m to find out the highest emission. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical. In order to find out the highest emission, the relative positions of this hand-held transmitter (EUT) was rotated through three orthogonal axes according to the requirements in Section 6.3 of ANSI C63.10

4.4 DESCRIPTION OF TEST MODES

The EUT has been tested with the operating condition for maximizing the emission characteristics. A test program is used to control the EUT for staying in continuous transmitting. The Zigbee mode and below low, middle and high channels were tested and reported.

Test Mode	Channel	Frequency [MHz]
ZIGBEE	11	2405
	18	2440
	26	2480

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5. INSTRUMENT CALIBRATION

The measuring equipment, which was utilized in performing the tests documented herein, has been calibrated in accordance with the manufacturer's recommendations for utilizing calibration equipments, which is trace able to recognized national standards.

6. FACILITIES AND ACCREDITATIONS

6.1 FACILITIES

The open area test site(OATS) or semi anechoic chamber and conducted measurement facility used to collect the radiated and conducted test data are located at the 42, Yurim-ro, 154beon-gil, Cheoin-gu, Yongin-si, Gyeonggi-do, Korea 449-935. The site is constructed in conformance with the requirements.

- Semi anechoic chamber registration Number: FCC(678747), IC(5740A-2)

6.2 EQUIPMENT

Radiated emissions are measured with one or more of the following types of Linearly polarized antennas: tuned dipole, bi-conical, log periodic, bi-log, and/or ridged waveguide, horn. Spectrum analyzers with pre-selectors and peak, quasi-peak detectors are used to perform radiated measurements. Conducted emissions are measured with Line Impedance Stabilization Networks and EMI Test Receivers. Calibrated wideband preamplifiers, coaxial cables, and coaxial attenuators are also used for making measurements.

All receiving equipment conforms to CISPR Publication 16-1, “Radio Interference Measuring Apparatus and Measurement Methods.”

7. ANTENNA REQUIREMENTS

According to FCC 47 CFR §15.203:

“An intentional radiator antenna shall be designed to ensure that no antenna other than that furnished by the responsible party can 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 internal antenna of this E.U.T is permanently attached using the soldering.

Therefore this E.U.T Complies with the requirement of §15.203

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8. TEST RESULT

8.1 6dB Bandwidth Measurement

Test Requirements and limit, §15.247(d) & RSS-210[A8.2]

The bandwidth at 6dB down from the highest in-band spectral density is measured with a spectrum analyzer connected to the receive antenna while the EUT is operating in transmission mode at the appropriate frequencies.

The minimum permissible 6dB bandwidth is 500 kHz.

▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The transmitter output is connected to the Spectrum Analyzer and used following test procedure of **KDB558074 v03r02**.

1. Set resolution bandwidth (RBW) = 100 KHz
2. Set the video bandwidth (VBW) ≥ 3 x RBW.
   (RBW: 100 KHz/VBW: 300 KHz)
3. Detector = **Peak**.
4. Trace mode = **max hold**.
5. Sweep = **auto couple**.
6. Allow the trace to stabilize.
7. Measure the maximum width of the emission that is constrained by the frequencies associated with the two outer most amplitude points (upper and lower) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.

▣ TEST RESULTS: Comply

Test Mode	Frequency [MHz]	Test Results [KHz]
ZIGBEE	2405	1579
	2440	1599
	2480	1577

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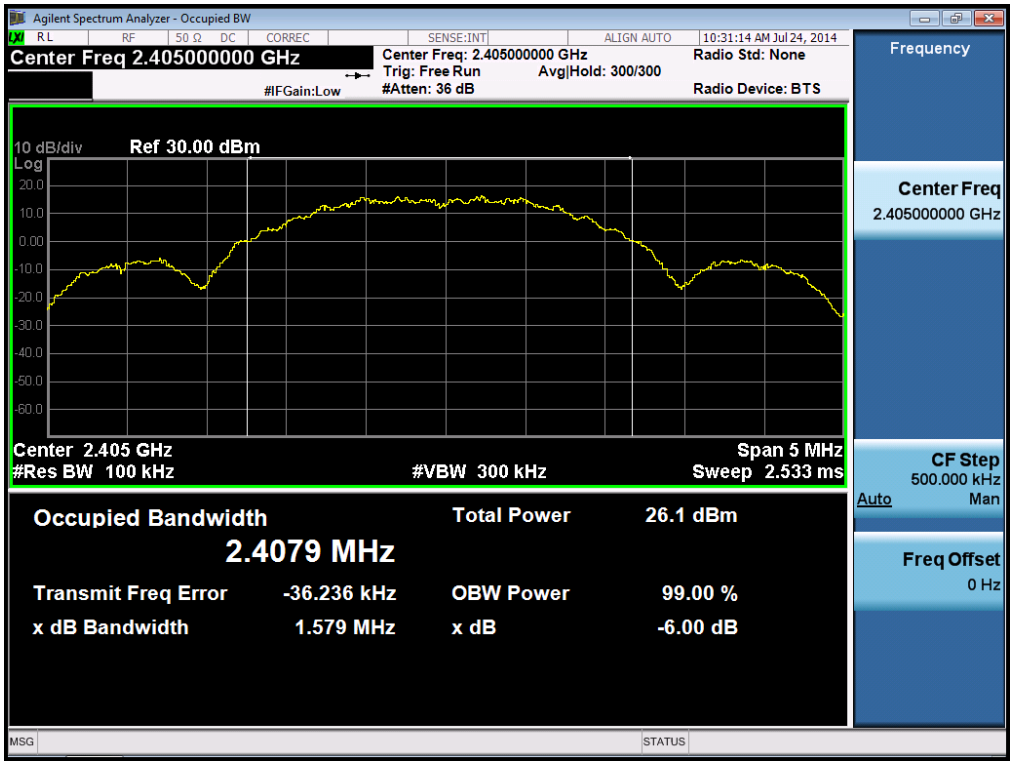
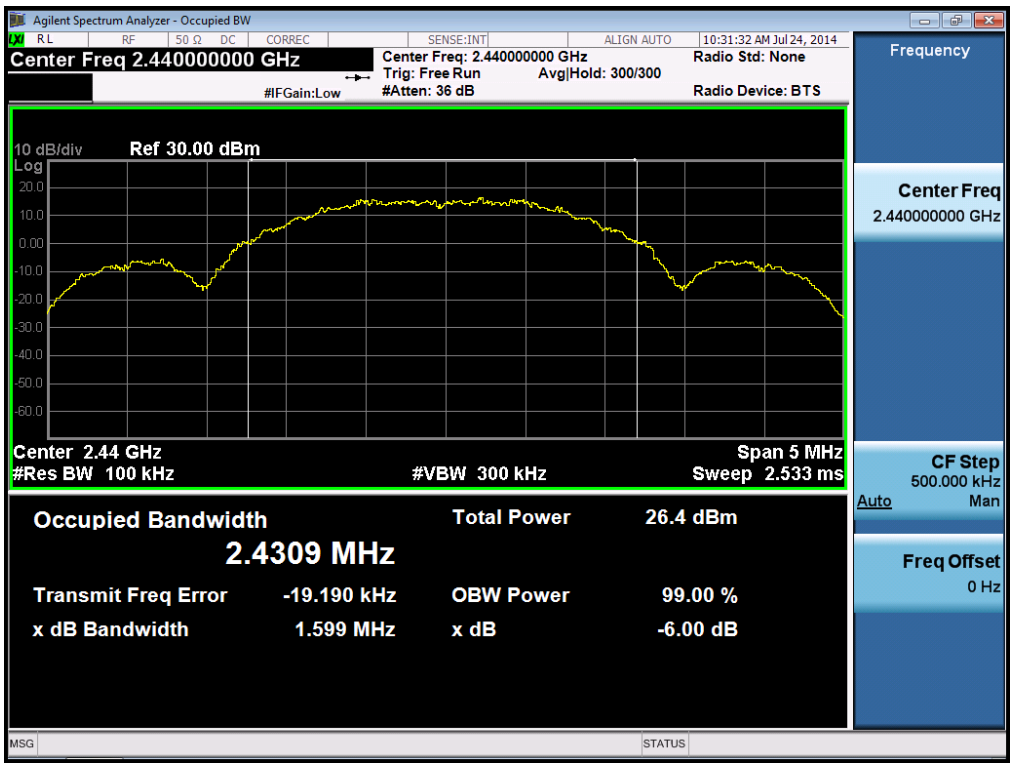
▣ RESULTPLOTS

6 dB Bandwidth Test Frequency: 2405 MHz



6 dB Bandwidth Test Frequency: 2440 MHz



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6 dB Bandwidth Test Frequency: 2480 MHz

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8.2 Maximum Peak Conducted Output Power

Test Requirements and limit, §15.247(b) & RSS-210[A8.4]

A transmitter antenna terminal of EUT is connected to the input of a spectrum analyzer.

Measurement is made while the EUT is operating in transmission mode at the appropriate frequencies.

The maximum permissible conducted output power is 1 Watt.

▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST CONFIGURATION:

Maximum Peak Conducted Output Power is measured using Measurement Procedure Option1 of KDB558074 v03r02.

1. Set the RBW ≥ DTS bandwidth. **Actual RBW = 2 MHz**
2. Set VBW ≥ 3 x RBW. **Actual VBW = 8 MHz**
3. Set span **≥ 3 x RBW.**
4. Sweep time = **auto couple**
5. Detector = **peak**
6. Trace mode = **max hold**
7. Allow trace to fully stabilize
8. Use peak marker function to determine the peak amplitude level.

▣ TEST RESULTS: Comply

Frequency[MHz]	Channel	Test Results[dBm]
2405	11	19.81
2425	15	20.20
2440	18	20.05
2445	19	**20.21**
2450	20	20.11
2475	25	15.37
2480	26	-4.24

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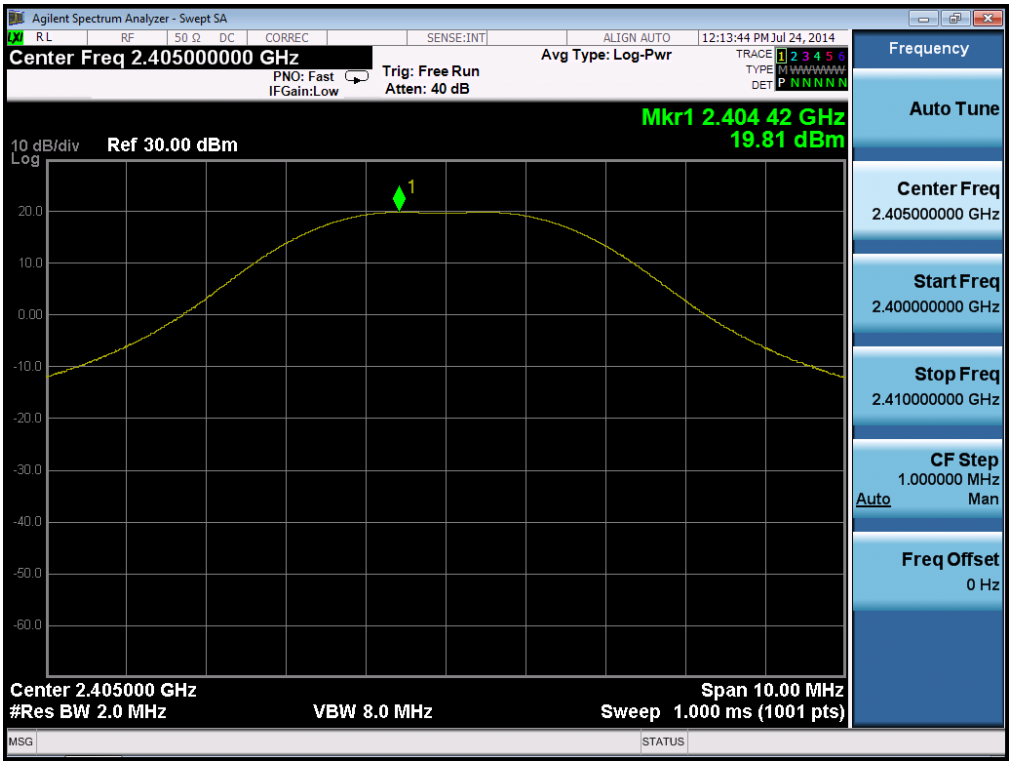
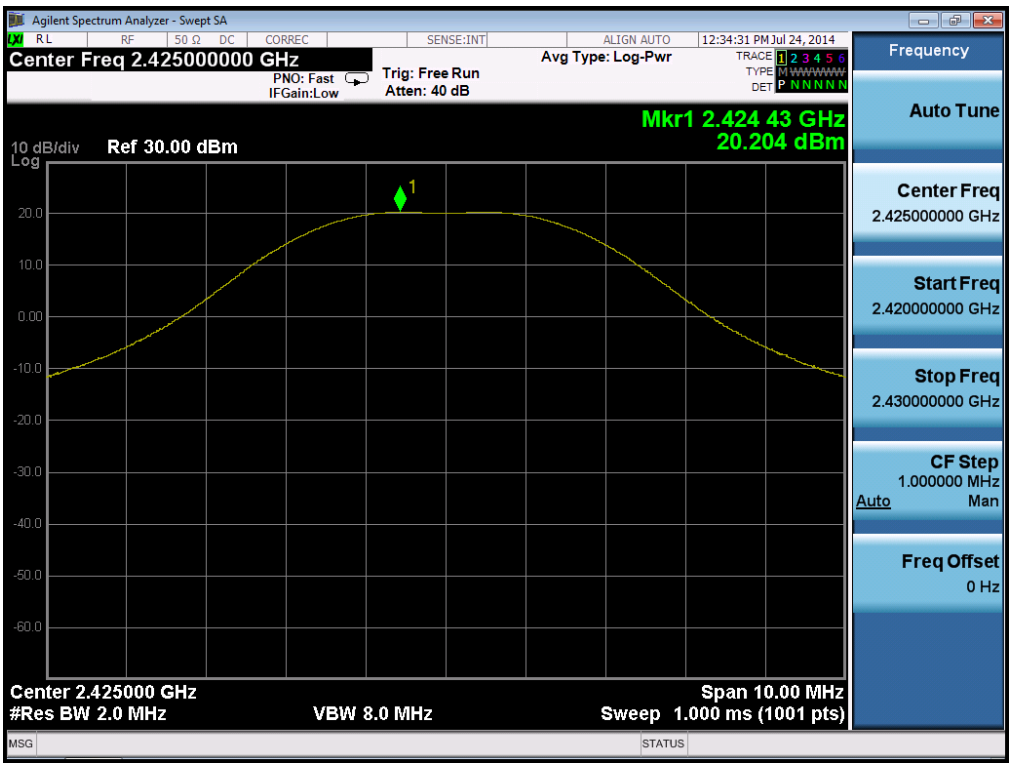
▣ RESULT PLOTS

Maximum Power Test Frequency: 2405 MHz



Maximum Power Test Frequency: 2425 MHz



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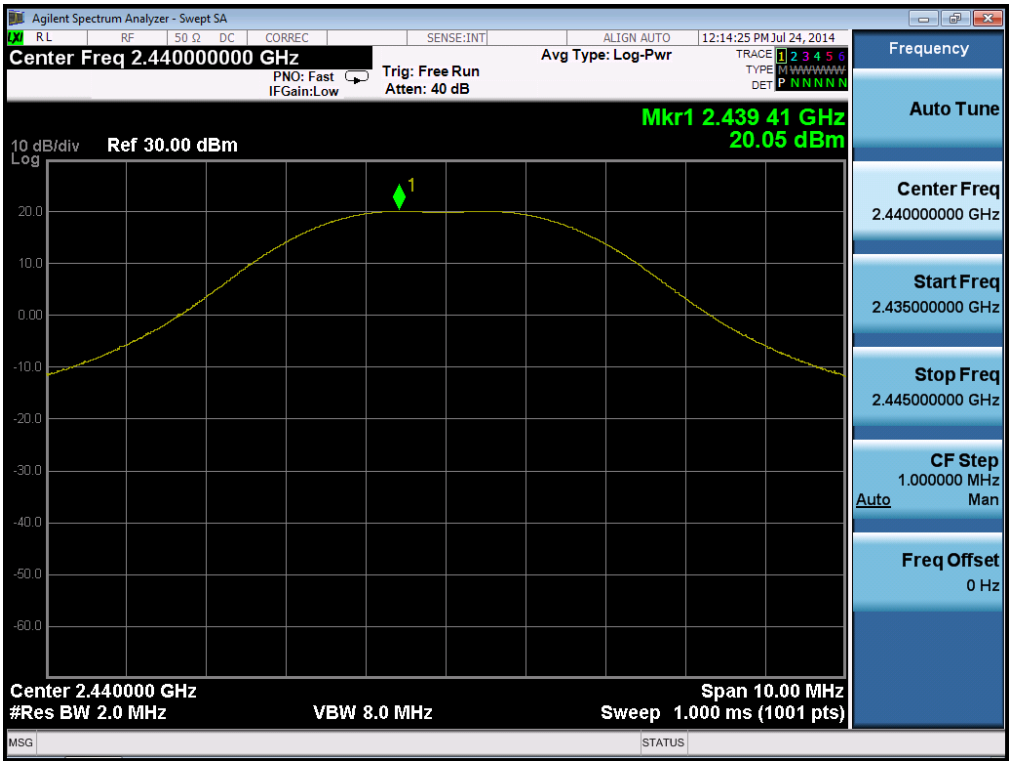
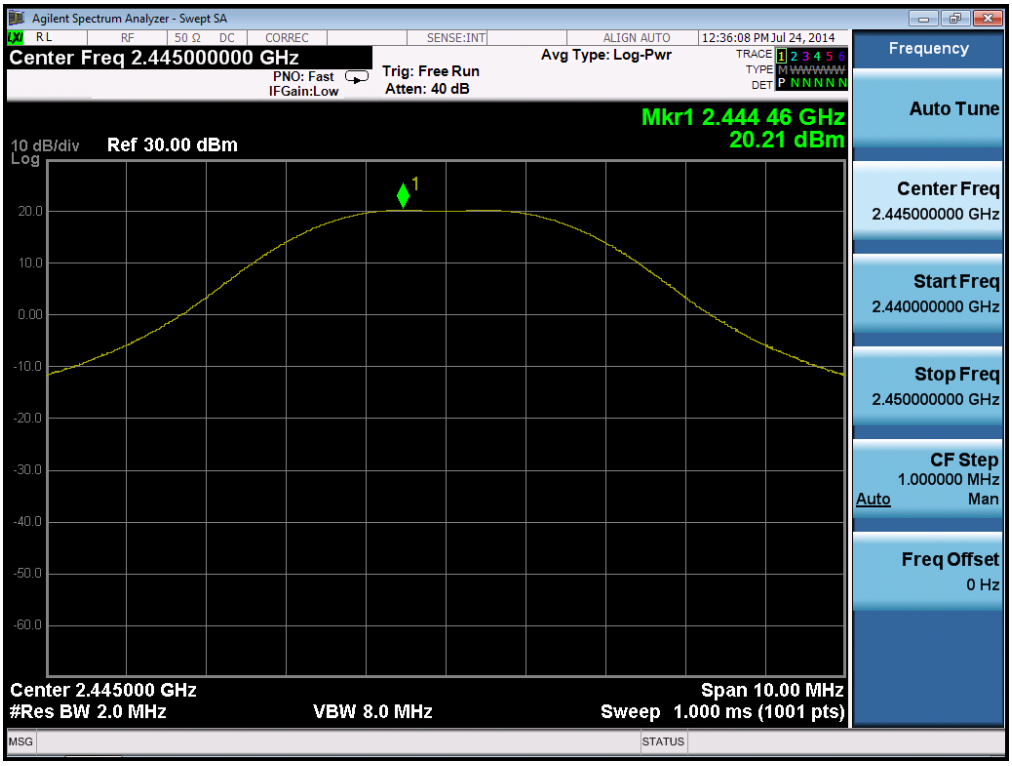
Maximum Power Test Frequency: 2440 MHz



Maximum Power Test Frequency: 2445 MHz



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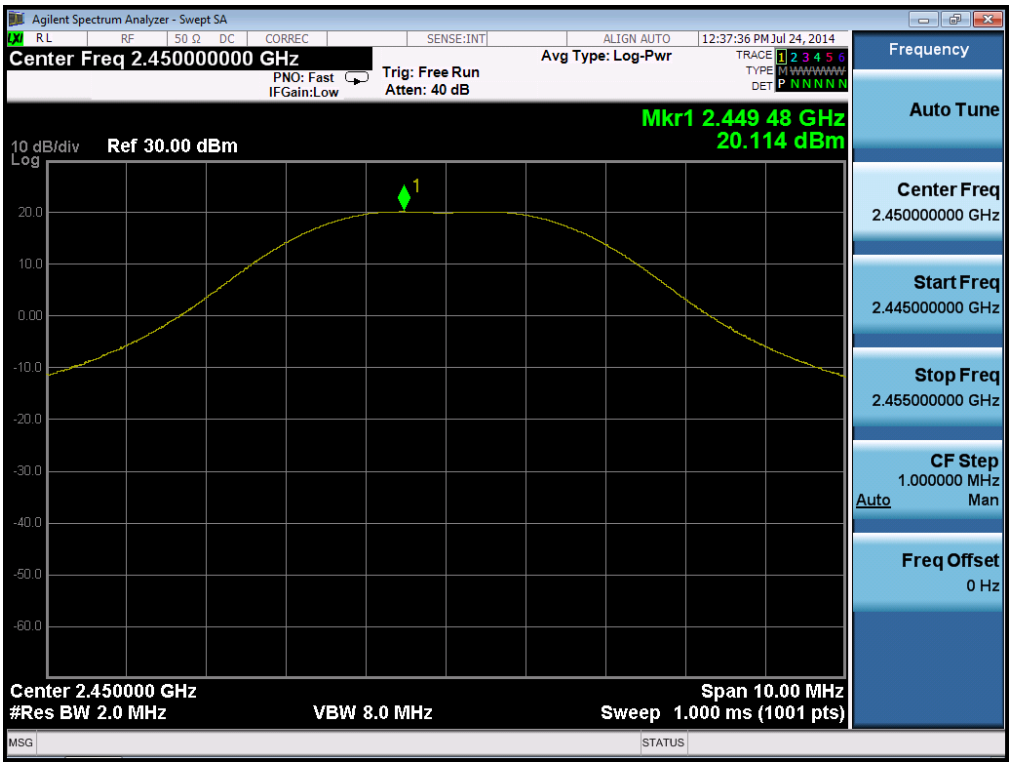
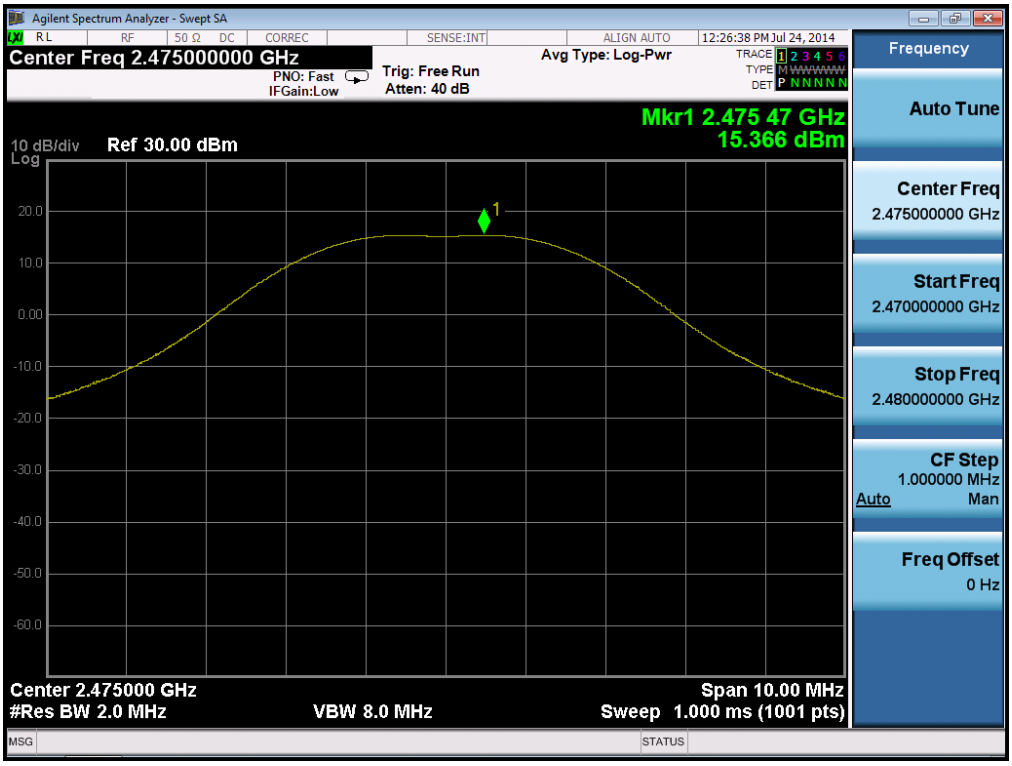
Maximum Power Test Frequency: 2450 MHz



Maximum Power Test Frequency: 2475 MHz



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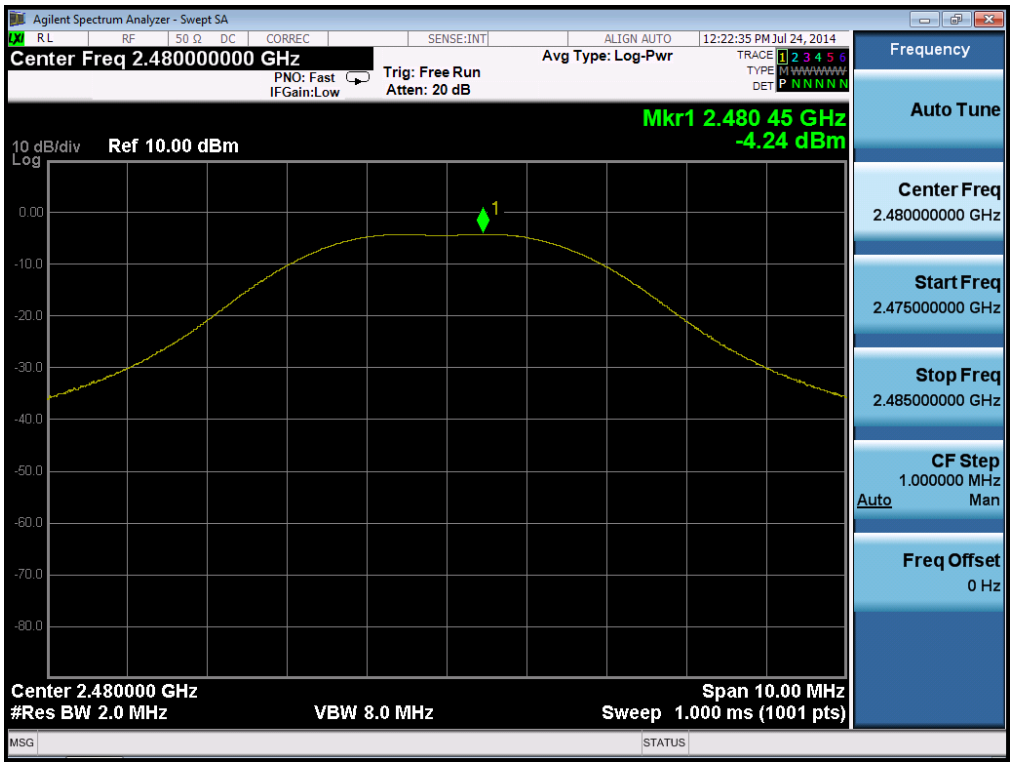
Maximum Power Test Frequency: 2480 MHz



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8.3 Maximum Power Spectral Density.

Test requirements and limit, §15.247(e) & RSS-210[A8.2]

The peak power density is measured with a spectrum analyzer connected to the antenna terminal while the EUT is operating in transmission mode at the appropriate frequencies.

Minimum Standard –specifies a conducted power spectral density (PSD) limit of 8 dBm in any 3 kHz band segment within the fundamental EBW during any time interval of continuous transmission.

▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE:

Method PKPSD of KDB558074 v03r02 is used.
1. Set analyzer center frequency to DTS channel center frequency.
2. Set the span to **1.5 times** the DTS bandwidth.
3. Set the RBW to: **3 kHz ≤ RBW ≤ 100 kHz**.
4. Set the VBW ≥ **3 x RBW.**
5. Detector = **peak.**
6. Sweep time = **auto couple.**
7. Trace mode = **max hold.**
8. Allow trace to fully stabilize.
9. Use the **peak marker function** to determine the maximum amplitude level within the RBW.
10. If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

▣ TEST RESULTS: Comply

Test Mode	Frequency [MHz]	PKPSD [dBm]
ZIGBEE	2405	5.33
	2440	**5.71**
	2480	-18.72

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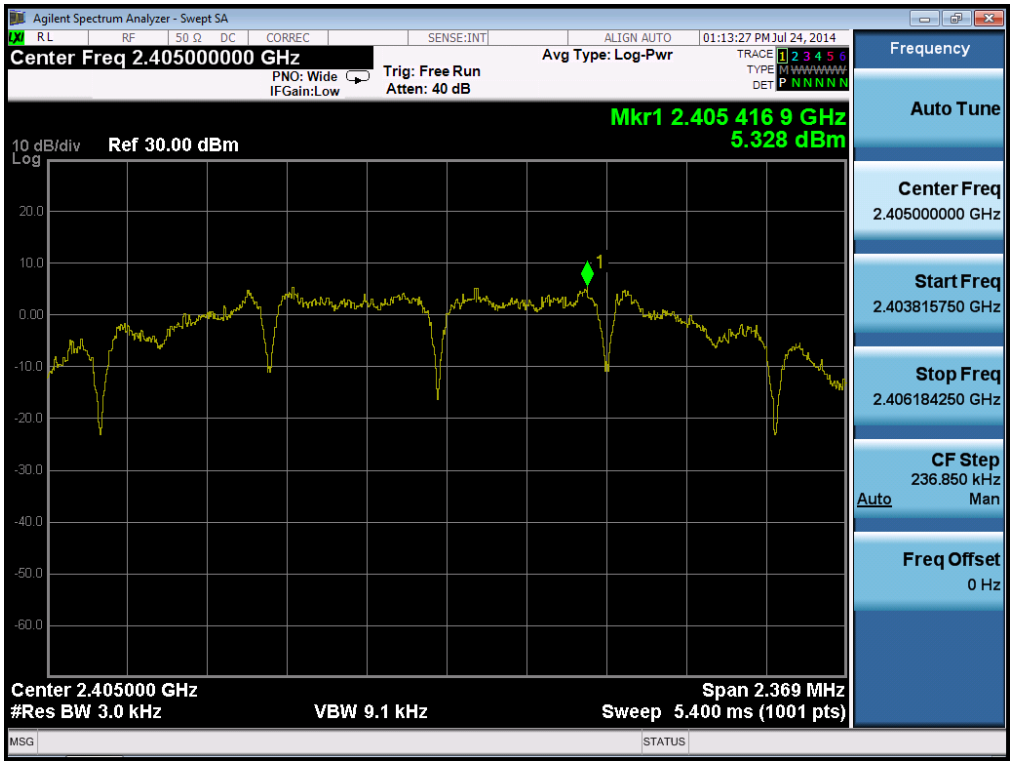
▣ RESULT PLOTS

Maximum PKPSD Test Frequency: 2405 MHz



Maximum PKPSD Test Frequency: 2440 MHz

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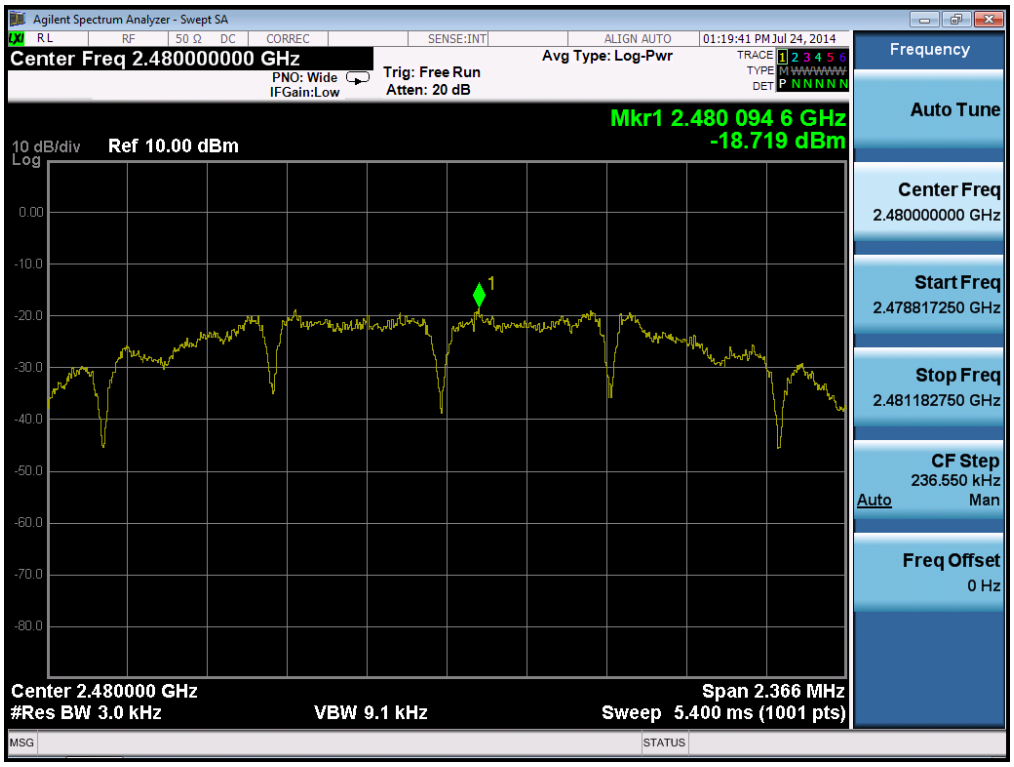
Maximum PKPSD Test Frequency: 2480 MHz



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8.4 Out of Band Emissions at the Band Edge/ Conducted Spurious Emissions

Test requirements and limit, §15.247(d) & RSS-210[A8.5]

§15.247(d) specifies that in any 100 kHz bandwidth outside of the authorized frequency band, the power shall be attenuated according to the following conditions:

If **the peak output power procedure** is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the peak conducted output power measured within any 100 kHz outside the authorized frequency band shall be attenuated **by at least 20dB** relative to the maximum measured in-band peak PSD level.

If the average output power procedure is used to measure the fundamental emission power to demonstrate compliance to **15.247(b)(3)** requirements, then the power in any 100 kHz outside of the authorized frequency band shall be attenuated by at least 30 dB relative to the maximum measured in band average PSD level.

In either case, attenuation to levels below the general emission limits specified in **§15.209(a)** is not required.

▣ TEST CONFIGURATION

Refer to the APPENDIX I.

▣ TEST PROCEDURE

The transmitter output is connected to a spectrum analyzer.

- Measurement Procedure 1 – Reference Level

1. Set instrument center frequency to DTS channel center frequency.
2. Set the span to ≥ 1.5 times the DTS bandwidth.
3. Set the RBW = 100 kHz.
4. Set the VBW ≥ 3 x RBW.
5. Detector = peak.
6. Sweep time = auto couple.
7. Trace mode = max hold.
8. Allow trace to fully stabilize.
9. Use the peak marker function to determine the maximum PSD level

- Measurement Procedure 2 - Unwanted Emissions

1. Set the center frequency and span to encompass frequency range to be measured.
2. Set the RBW = **100 kHz.**
3. Set the VBW **≥ 3 x RBW.**
4. Detector = **peak**.
5. Sweep time = **auto couple.**
6. Trace mode = **max hold.**
7. **Allow the trace to stabilize** (this may take some time, depending on the extent of the span).
8. Use the peak marker function to determine the maximum amplitude level.

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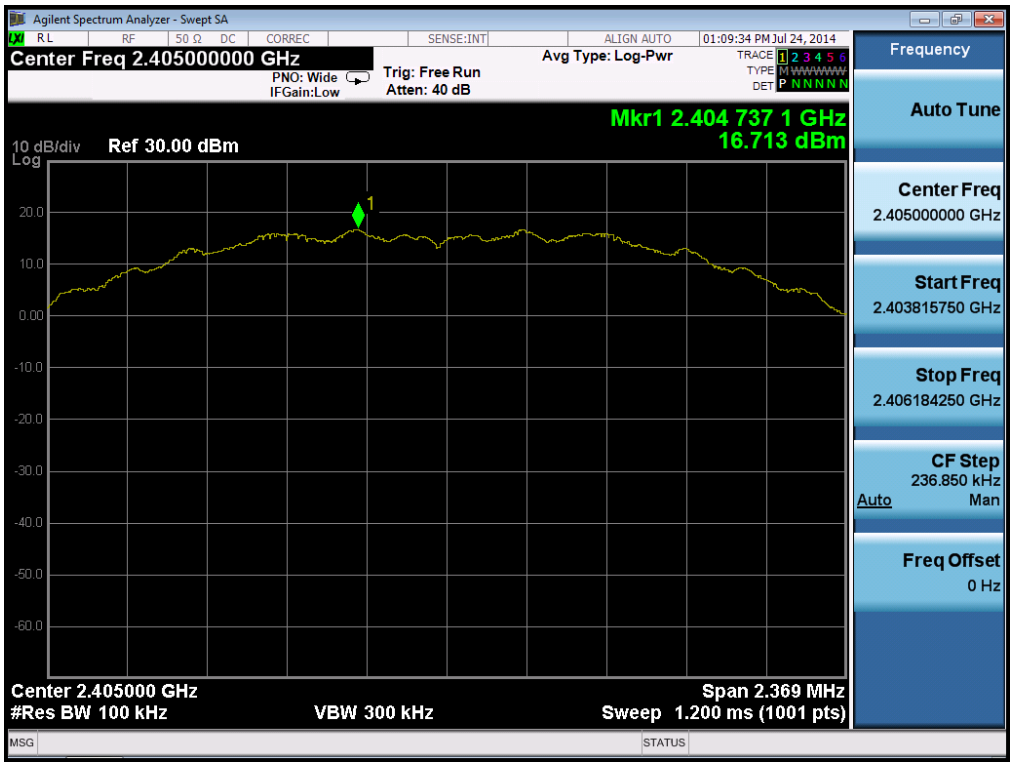
▣ TEST RESULTS: Comply

▣ RESULT PLOTS

ZIGBEE & 2405MHz

Reference



Low Band-edge

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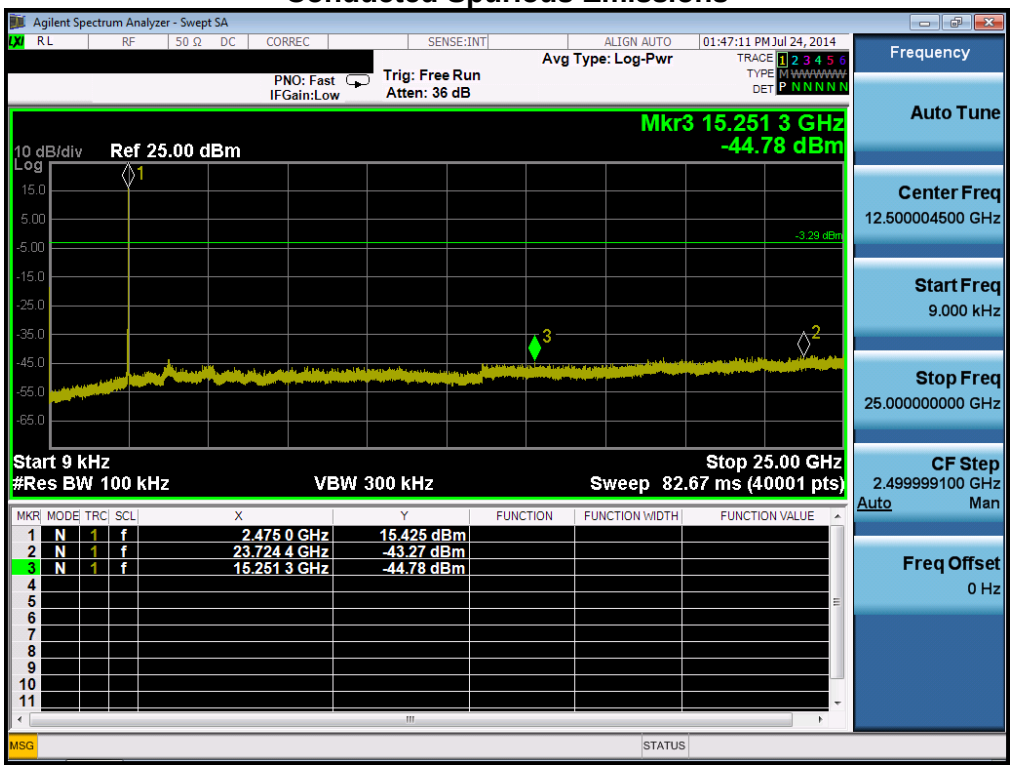
Conducted Spurious Emissions



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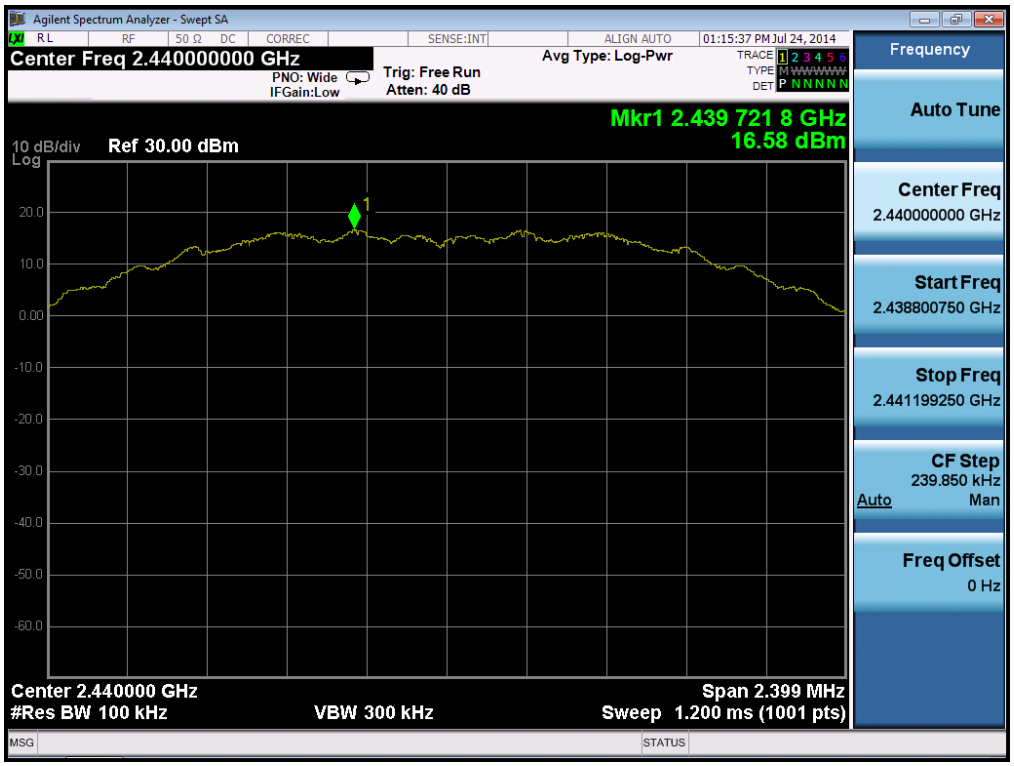
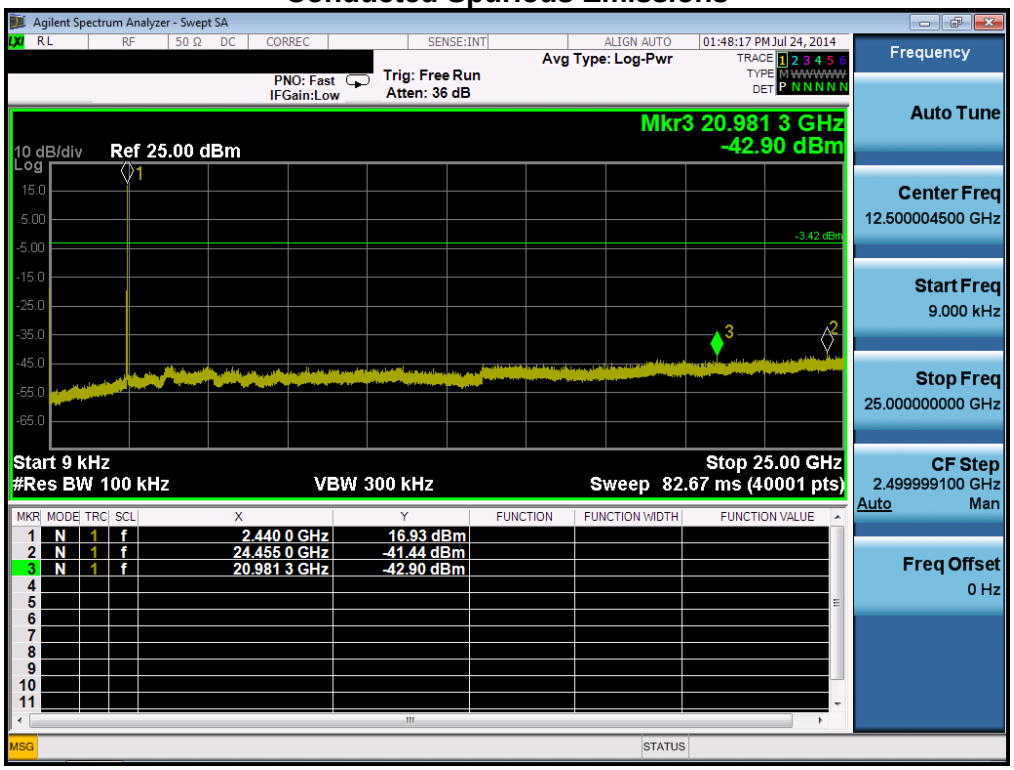
ZIGBEE & 2440MHz

Reference



Conducted Spurious Emissions



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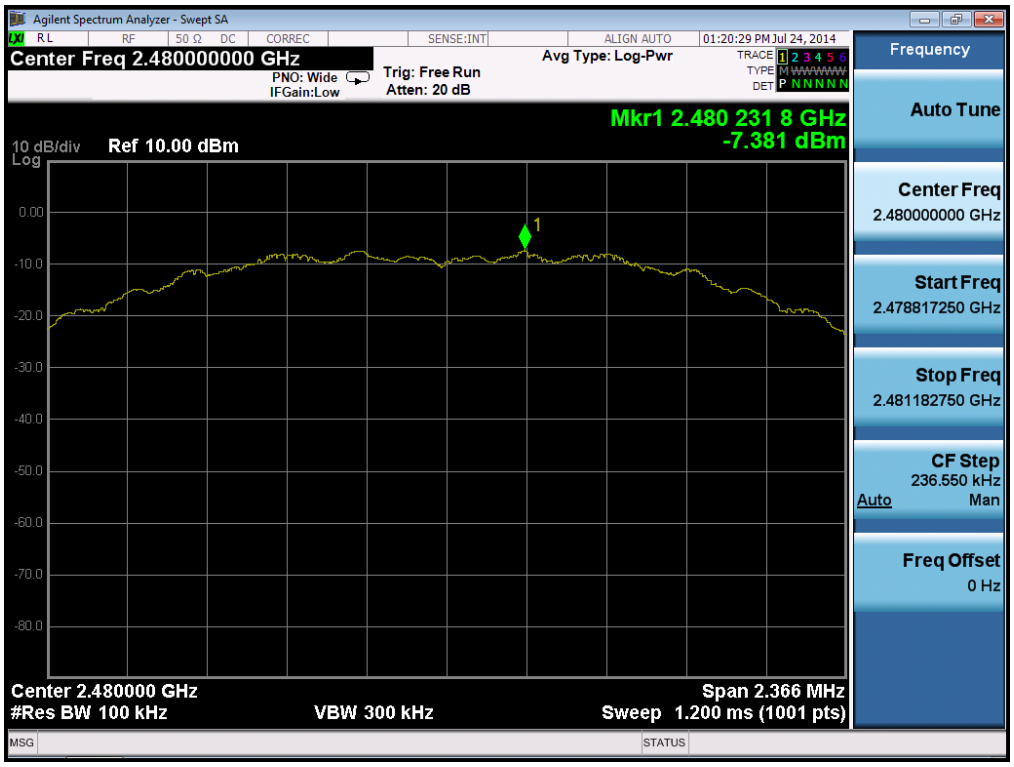
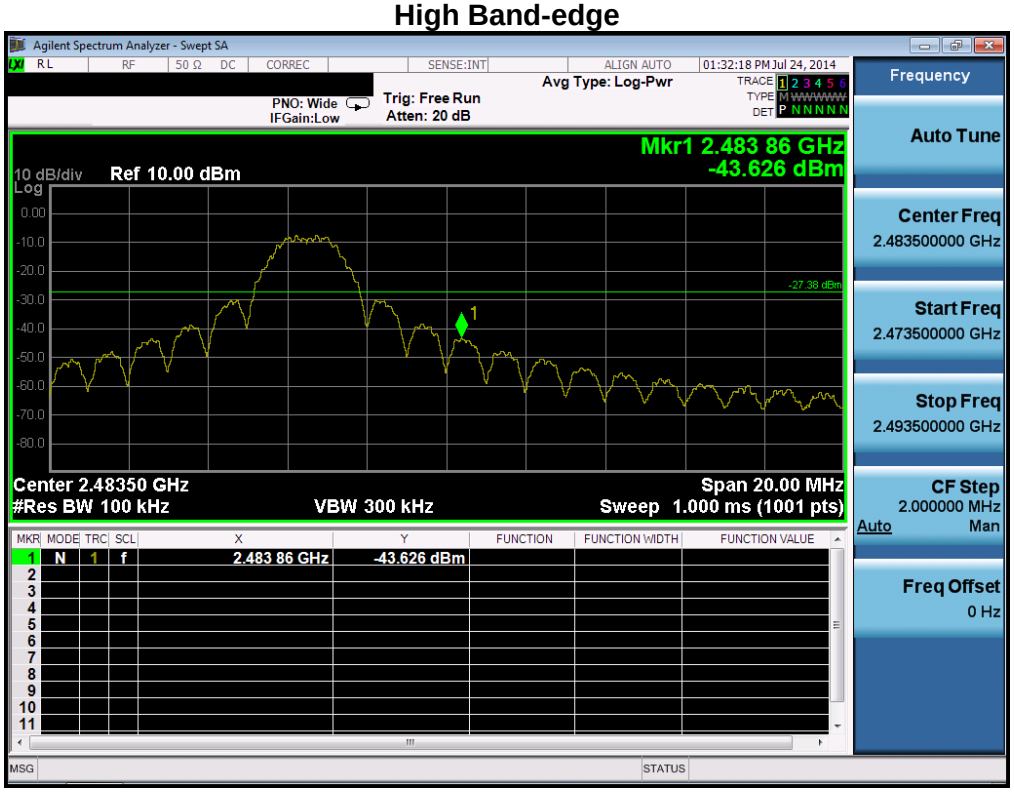
ZIGBEE & 2480MHz

Reference



High Band-edge



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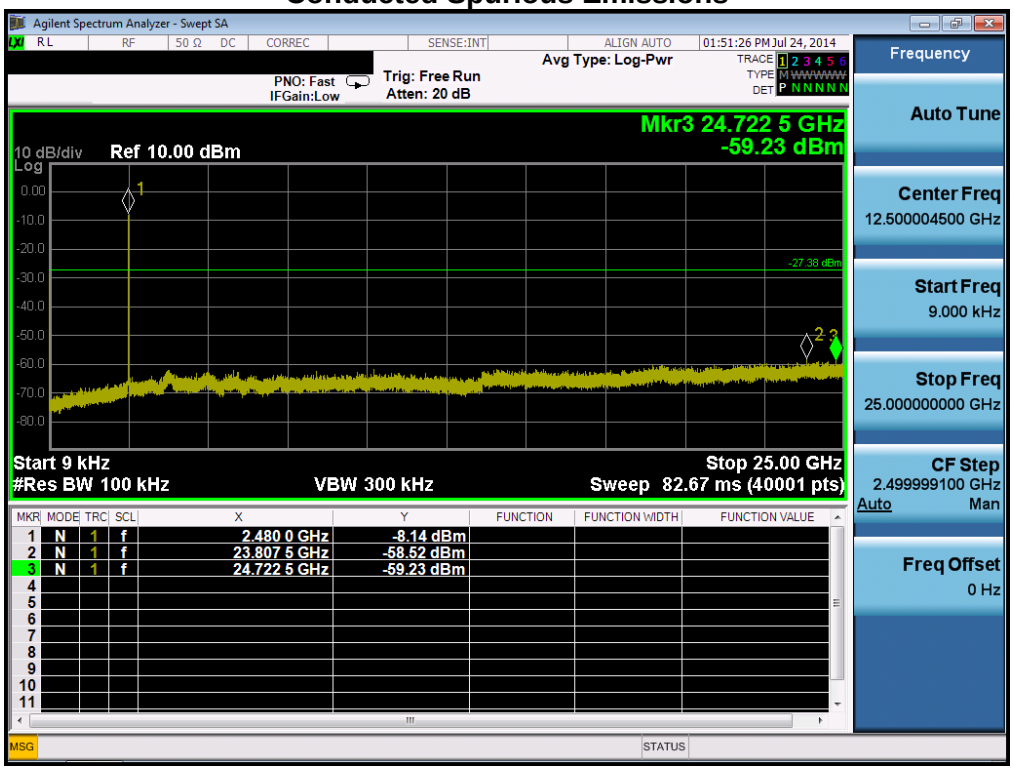
Conducted Spurious Emissions



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8.5 Radiated Measurement.

8.5.1 Radiated Spurious Emissions.

Test Requirements and limit, §15.247(d) & RSS-210[A8.5]

In any 100 kHz bandwidth outside the operating frequency band. In case the emission fall within the restricted band specified on 15.205(a) and (b), then the 15.209(a) limit in the table below has to be followed

▪ **FCC Part 15.209(a) and (b)**

Frequency (MHz)	Limit (uV/m)	Measurement Distance (meter)
0.009 – 0.490	2400/F(KHz)	300
0.490 – 1.705	24000/F(KHz)	30
1.705 – 30.0	30	30
30 ~ 88	100 **	3
88 ~ 216	150 **	3
216 ~ 960	200 **	3
Above 960	500	3

** Except as provided in 15.209(g), fundamental emissions from intentional radiators operating under this Section shall not be located in the frequency bands 54-72 MHz, 76-88 MHz, 174-216 MHz or 470-806 MHz. However, operation within these frequency bands is permitted under other sections of this Part, e.g. 15.231 and 15.241.

▪ **FCC Part 15.205 (a):** Only spurious emissions are permitted in any of the frequency bands listed below:

MHz	MHz	MHz	MHz	GHz	GHz
0.009 ~ 0.110	8.41425 ~ 8.41475	108 ~ 121.94	1300 ~ 1427	4.5 ~ 5.15	14.47 ~ 14.5
0.495 ~ 0.505	12.29 ~ 12.293	123 ~ 138	1435 ~ 1626.5	5.35 ~ 5.46	15.35 ~ 16.2
2.1735 ~ 2.1905	12.51975 ~	149.9 ~ 150.05	1645.5 ~ 1646.5	7.25 ~ 7.75	17.7 ~ 21.4
4.125 ~ 4.128	12.52025	156.52475 ~	1660 ~ 1710	8.025 ~ 8.5	22.01 ~ 23.12
4.17725 ~ 4.17775	12.57675 ~	156.52525	1718.8 ~ 1722.2	9.0 ~ 9.2	23.6 ~ 24.0
4.20725 ~ 4.20775	12.57725	156.7 ~ 156.9	2200 ~ 2300	9.3 ~ 9.5	31.2 ~ 31.8
6.215 ~ 6.218	13.36 ~ 13.41	162.0125 ~ 167.17	2310 ~ 2390	10.6 ~ 12.7	36.43 ~ 36.5
6.26775 ~ 6.26825	16.42 ~ 16.423	167.72 ~ 173.2	2483.5 ~ 2500	13.25 ~ 13.4	Above 38.6
6.31175 ~ 6.31225	16.69475 ~	240 ~ 285	2655 ~ 2900		
8.291 ~ 8.294	16.69525	322 ~ 335.4	3260 ~ 3267		
8.362 ~ 8.366	16.80425 ~	399.90 ~ 410	3332 ~ 3339		
8.37625 ~ 8.38675	16.80475	608 ~ 614	3345.8 ~ 3358		
	25.5 ~ 25.67	960 ~ 1240	3600 ~ 4400		
	37.5 ~ 38.25				
	73 ~ 74.6				
	74.8 ~ 75.2				

▪ **FCC Part 15.205(b):** 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.

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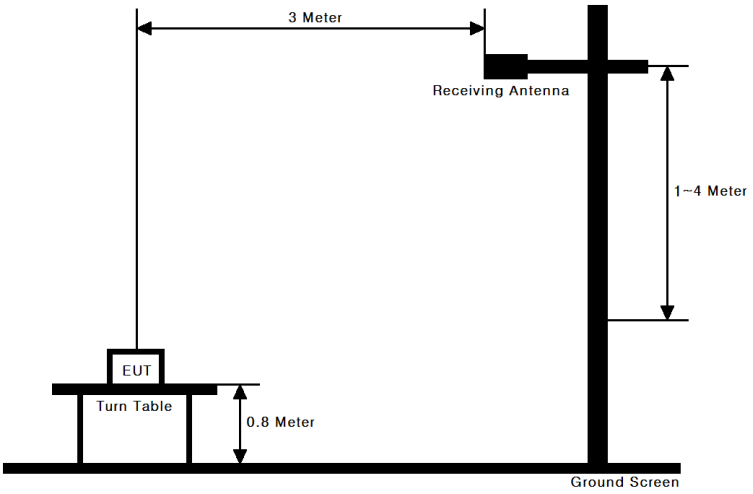
Test Configuration



TEST PROCEDURE

1. The EUT is placed on a turntable, which is 0.8 m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3 m away from the receiving antenna, which is varied from 1m to 4m to find out the highest emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.

Note: Measurement Instrument Setting for Radiated Emission Measurements.

Peak Measurement

RBW = As specified in below table , VBW ≥ 3 x RBW, Sweep = Auto, Detector = Peak, Trace mode = Max Hold until the trace stabilizes.

Frequency	RBW
9-150 kHz	200-300 Hz
0.15-30 MHz	9-10 kHz
30-1000 MHz	100-120 kHz
> 1000 MHz	1 MHz

Average Measurement

RBW = 1MHz, VBW = 10Hz, Detector = Peak, Average-VBW = Voltage, Sweep = Auto, Trace mode = Max Hold until the trace stabilizes.

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9 kHz ~ 25GHz Data

▪ Lowest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
240.26	H	X	QP	50.36	-9.00	-	41.36	46.00	4.64
265.45	H	X	QP	49.50	-8.30	-	41.20	46.00	4.80
2389.32	V	Y	PK	64.15	-3.78	-	60.37	74.00	13.63
2390.00	V	Y	AV	55.44	-3.78	-	51.66	54.00	2.34
4810.89	H	Y	PK	51.08	5.10	-	56.18	74.00	17.82
4811.06	H	Y	AV	42.98	5.10	-	48.08	54.00	5.92
7213.20	V	Y	PK	48.91	10.72	-	59.63	74.00	14.37
7213.11	V	Y	AV	40.00	10.72	-	50.72	54.00	3.28

▪ Middle Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
240.12	H	X	QP	51.08	-9.00	-	42.08	46.00	3.92
265.34	H	X	QP	49.43	-8.30	-	41.13	46.00	4.87
4880.95	H	Y	PK	53.31	5.42	-	58.73	74.00	15.27
4880.90	H	Y	AV	45.21	5.42	-	50.63	54.00	3.37
7321.17	V	Y	PK	49.56	10.82	-	60.38	74.00	13.62
7321.43	V	Y	AV	40.88	10.82	-	51.70	54.00	2.30
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

▪ Highest Channel

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
240.18	H	X	QP	50.92	-9.00	-	41.92	46.00	4.08
265.30	H	X	QP	49.65	-8.30	-	41.35	46.00	4.65
2483.54	V	Y	PK	63.60	-3.32	-	60.28	74.00	13.72
2483.50	V	Y	AV	55.92	-3.32	-	52.60	54.00	1.40
4959.21	H	Y	PK	44.65	5.88	-	50.53	74.00	23.47
4959.09	H	Y	AV	32.86	5.88	-	38.74	54.00	15.26
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Note.
1. No other spurious and harmonic emissions were reported greater than listed emissions above table.
2. Above listed point data is the worst case data.
3. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain
   DCF = duty cycle factor

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Radiated band edge data: Operating Frequency 2470MHz, 2475MHz

▪ Operating Frequency: 2470MHz

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.55	V	Y	PK	63.67	-3.32	-	60.35	74.00	13.65
2483.51	V	Y	AV	55.40	-3.32	-	52.08	54.00	1.92
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

▪ Operating Frequency: 2475MHz

Frequency (MHz)	ANT Pol	EUT Position (Axis)	Detector Mode	Reading (dBuV)	T.F (dB/m)	DCF	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)
2483.61	V	Y	PK	65.34	-3.32	-	62.02	74.00	11.98
2483.52	V	Y	AV	56.51	-3.32	-	53.19	54.00	0.81
-	-	-	-	-	-	-	-	-	-
-	-	-	-	-	-	-	-	-	-

Note.
1. Sample Calculation.
   Margin = Limit – Result / Result = Reading + T.F+DCF / T.F = AF + CL – AG
   Where, T.F = Total Factor, AF = Antenna Factor, CL = Cable Loss, AG = Amplifier Gain
   DCF = duty cycle factor

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8.6 POWERLINE CONDUCTED EMISSIONS

Test Requirements and limit, §15.207 & RSS-Gen[7.2.2]

For an intentional radiator which is designed to be connected to the public utility (AC) power line, the radio frequency voltage that is conducted back onto the AC power line on any frequency or frequencies within the band 150 kHz to 30 MHz shall not exceed the limits in the following table, as measured using a 50uH/50 ohms line impedance stabilization network (LISN).

Frequency Range (MHz)	Conducted Limit (dBuV)	
	Quasi-Peak	Average
0.15 ~ 0.5	66 to 56 *	56 to 46 *
0.5 ~ 5	56	46
5 ~ 30	60	50

* Decreases with the logarithm of the frequency

Compliance with this provision shall be based on the measurement of the radio frequency voltage between each power line (LINE and NEUTRAL) and ground at the power terminals.

▣ Test Configuration

See test photographs for the actual connections between EUT and support equipment.

▣ TEST PROCEDURE

1. The EUT is placed on a wooden table 80 cm above the reference ground plane.
2. The EUT is connected via LISN to a test power supply.
3. The measurement results are obtained as described below:
4. Detectors – Quasi Peak and Average Detector.

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▣ RESULT PLOTS

AC Line Conducted Emissions (Graph)

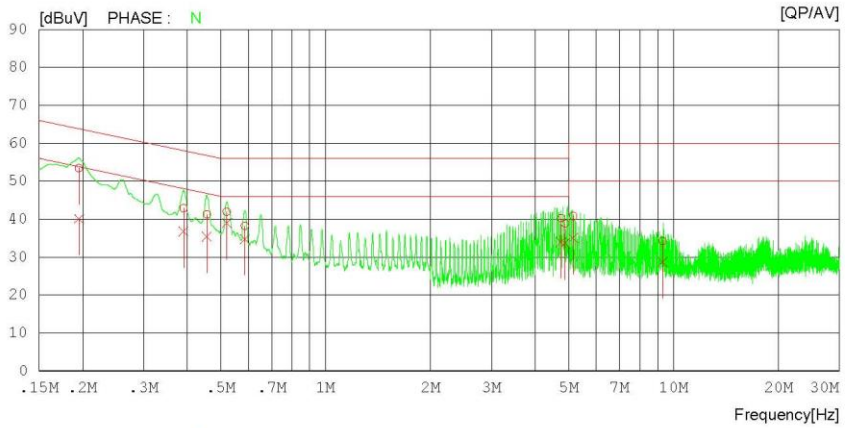
Test Mode: Zigbee & 2440MHz

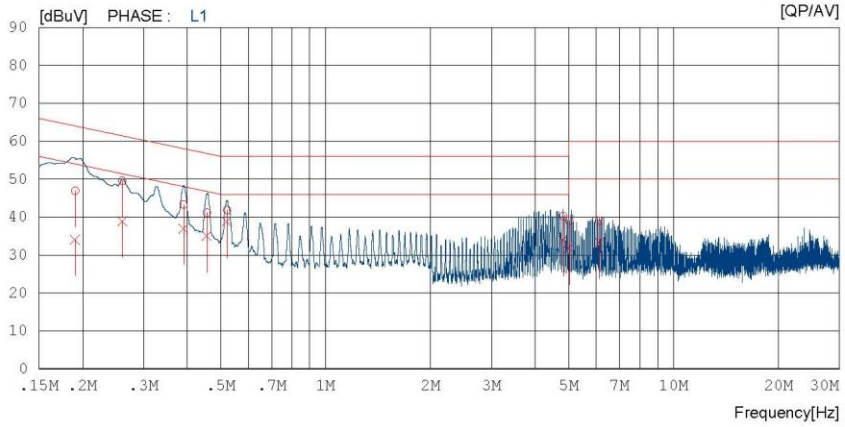
Results of Conducted Emission

Digital EMC
Date : 2014-07-24 21:05:41

Model No.	:	AAX74688001	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 42 % R.H.
Test Condition	:	Zigbee	Operator	:	J.J.LEE
Memo	:	2440MHz			

LIMIT : FCC P15.207 QP
FCC P15.207 AV





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AC Line Conducted Emissions (List)

Test Mode: Zigbee & 2440MHz

Results of Conducted Emission

Digital EMC
Date : 2014-07-24 21:05:41

Model No.	:	AAX74688001	Referrence No.	:	
Type	:		Power Supply	:	120 V 60 Hz
Serial No.	:	Identical prototype	Temp/Humi.	:	23 'C 42 % R.H.
Test Condition	:	Zigbee	Operator	:	J.J.LEE

Memo : 2440MHz

LIMIT : FCC P15.207 QP
FCC P15.207 AV

NO	FREQ [MHz]	READING QP [dBuV]	READING AV [dBuV]	C.FACTOR [dB]	RESULT QP [dBuV]	RESULT AV [dBuV]	LIMIT QP [dBuV]	LIMIT AV [dBuV]	MARGIN QP [dBuV]	MARGIN AV [dBuV]	PHASE
1	0.19518	43.4	30.1	10.0	53.4	40.1	63.8	53.8	10.4	13.7	N
2	0.39030	32.8	26.6	10.1	42.9	36.7	58.1	48.1	15.2	11.4	N
3	0.45519	31.2	25.3	10.1	41.3	35.4	56.8	46.8	15.5	11.4	N
4	0.52030	31.9	28.8	10.1	42.0	38.9	56.0	46.0	14.0	7.1	N
5	0.58550	28.1	24.7	10.1	38.2	34.8	56.0	46.0	17.8	11.2	N
6	4.74885	30.2	23.9	10.1	40.3	34.0	56.0	46.0	15.7	12.0	N
7	4.87727	28.8	23.5	10.1	38.9	33.6	56.0	46.0	17.1	12.4	N
8	5.14192	30.7	25.0	10.1	40.8	35.1	60.0	50.0	19.2	14.9	N
9	9.30343	23.8	18.3	10.4	34.2	28.7	60.0	50.0	25.8	21.3	N
10	0.19050	36.8	23.9	10.1	46.9	34.0	64.0	54.0	17.1	20.0	L1
11	0.26023	39.4	28.8	10.1	49.5	38.9	61.4	51.4	11.9	12.5	L1
12	0.39024	33.1	26.7	10.2	43.3	36.9	58.1	48.1	14.8	11.2	L1
13	0.45531	31.0	25.0	10.1	41.1	35.1	56.8	46.8	15.7	11.7	L1
14	0.52048	31.7	28.6	10.1	41.8	38.7	56.0	46.0	14.2	7.3	L1
15	4.81553	30.1	23.8	10.1	40.2	33.9	56.0	46.0	15.8	12.1	L1
16	5.01206	28.8	21.6	10.1	38.9	31.7	60.0	50.0	21.1	18.3	L1
17	6.11666	28.6	22.9	10.3	38.9	33.2	60.0	50.0	21.1	16.8	L1

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8.7 Occupied Bandwidth

Test Requirements, RSS-Gen [4.6.1]

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

▣ TEST CONFIGURATION

▣ TEST PROCEDURE

The resolution bandwidth shall be set to as close to 1% of the selected span as is possible without being below 1%.
The video bandwidth shall be set to 3 times the resolution bandwidth. Video averaging is not permitted.
Where practical, a sampling detector shall be used given that a peak or peak hold may produce a wider bandwidth than actual.

▣ TEST RESULTS: Comply

Test Mode	Data Rate	Frequency [MHz]	Test Results[MHz]
ZIGBEE	1Mbps	2405	2.389
		2440	**2.410**
		2480	2.398

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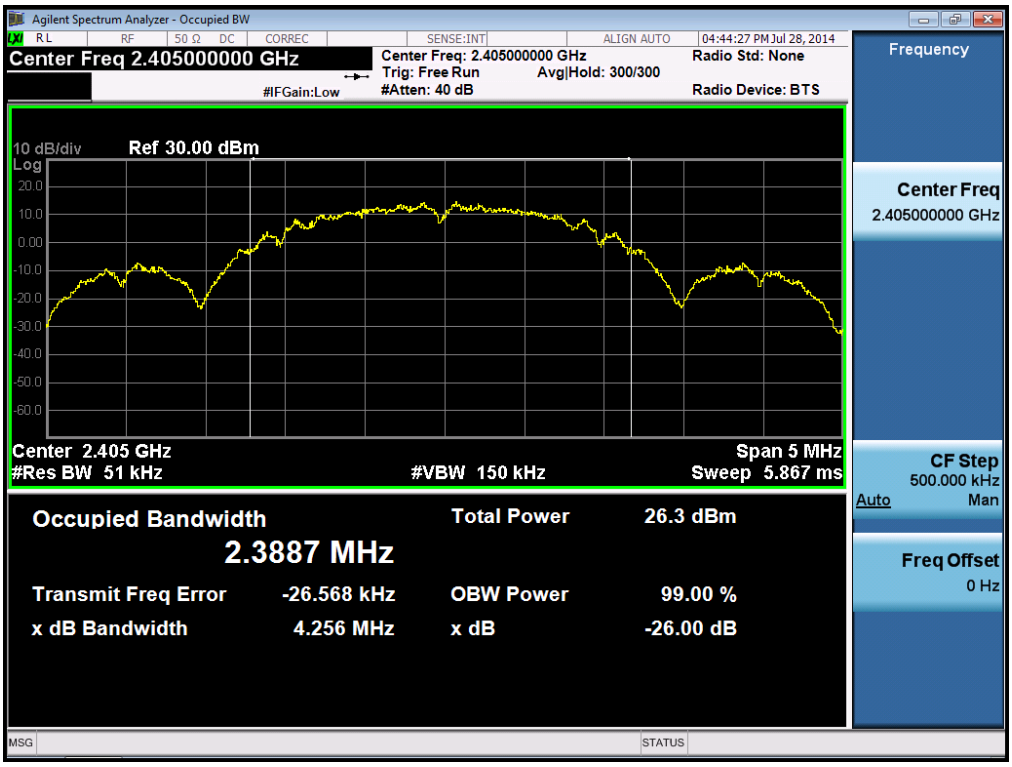
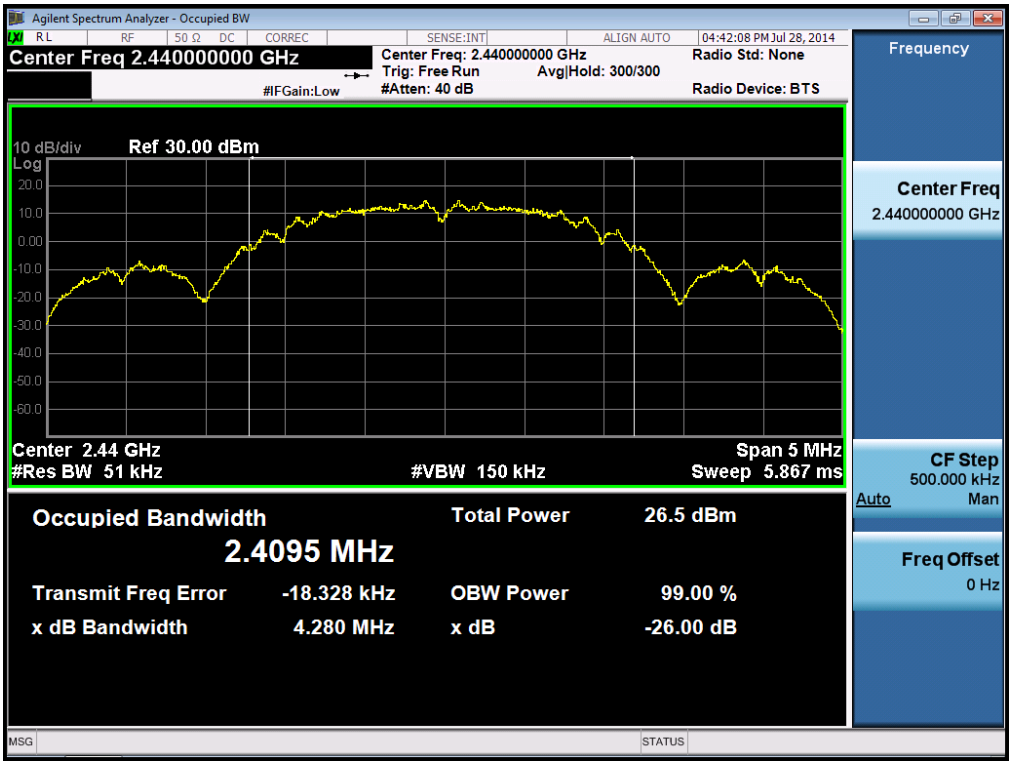
Occupied Bandwidth (99%) Test Mode: 1Mbps & 2405MHz



Occupied Bandwidth (99%) Test Mode: 1Mbps & 2440MHz



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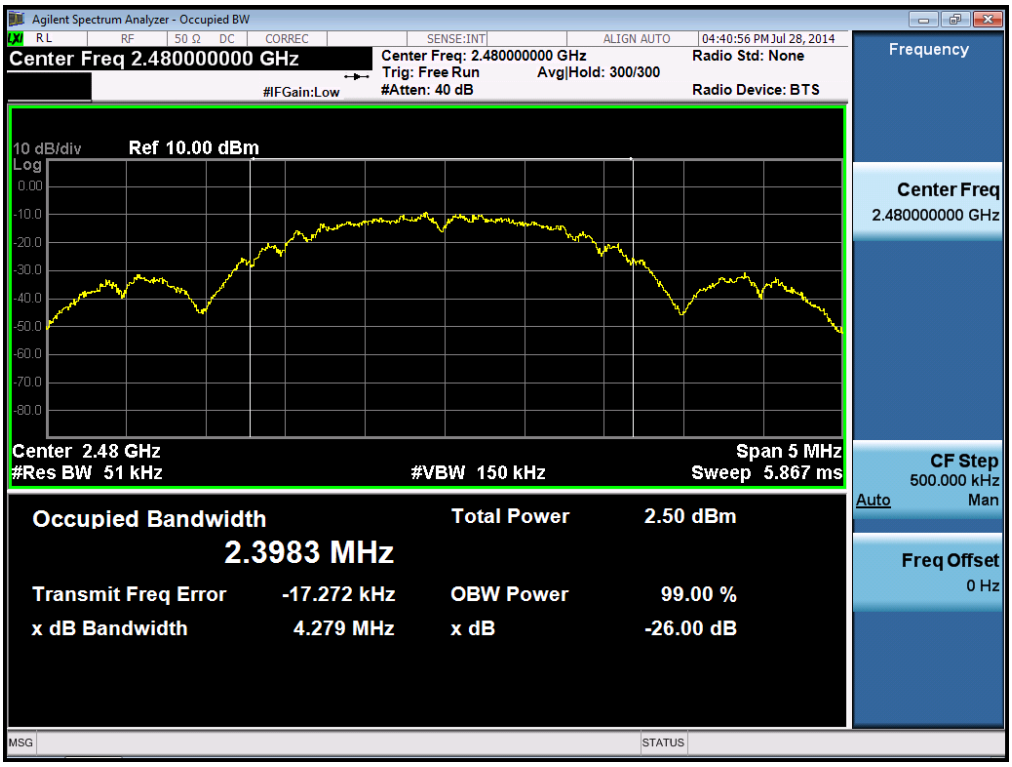
Occupied Bandwidth (99%) Test Mode: 1Mbps & 2480MHz



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9. LIST OF TEST EQUIPMENT

Type	Manufacturer	Model	Cal.Date (yy/mm/dd)	Next.Cal.Date (yy/mm/dd)	S/N
PXA Signal Analyzer	Agilent Technologies	N9030A	13/10/29	14/10/29	MY53310140
Spectrum Analyzer	Agilent	N9020A	14/03/28	15/03/28	MY50510026
Digital Multimeter	H.P	34401A	14/02/27	15/02/27	3146A13475
DC Power Supply	SM techno	SDP30-5D	13/10/10	14/10/10	305DMG304
Thermohygrometer	BODYCOM	BJ5478	14/03/03	15/03/03	1209
Vector Signal Generator	Rohde Schwarz	SMJ100A	14/01/07	15/01/07	100148
Signal Generator	Rohde Schwarz	SMF100A	14/07/01	15/07/01	102341
Attenuator(3dB)	SMAJK	SMAJK-2-3	13/10/22	14/10/22	3
High-pass filter	Wainwright	WHKX3.0	13/09/12	14/09/12	9
LOOP Antenna	Schwarzbeck	FMZB1513	14/04/29	16/04/29	1513-128
BILOG Antenna	SCHAFFNER	CBL6112B	12/11/06	14/11/06	2737
Horn Antenna	ETS	3115	14/02/26	16/02/26	6419
Horn Antenna	A.H.Systems	SAS-574	13/03/20	15/03/20	154
Amplifier (22dB)	H.P	8447E	14/01/07	15/01/07	2945A02865
Amplifier (30dB)	Agilent	8449B	14/02/27	15/02/27	3008A00370
EMI Test Receiver	R&S	ESU	14/01/07	15/01/07	100014
EMI Test Receiver	R&S	ESR	14/02/27	15/02/27	101061
PULSE LIMITER	R&S	ESH3-Z2	14/01/08	15/01/08	101334
CVCF	NF ELECTRONIC	4420	14/02/28	15/02/28	304935/337980
LISN	Narda	PMM L2-16B	14/06/26	15/06/26	000WX20305

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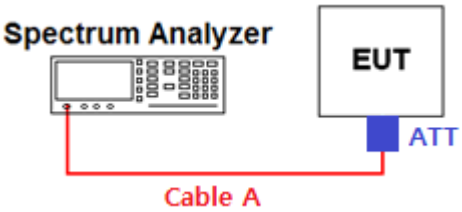
APPENDIX I
Conducted Test set up Diagram & Path loss Information

▪Conducted Measurement



Path loss information

Frequency (GHz)	Path Loss (dB)	Frequency (GHz)	Path Loss (dB)
0.03	3.09	5	3.59
1	3.18	10	4.07
2.405	3.31	15	4.34
2.440	3.39	20	4.60
2.480	3.42	25	4.96
-	-	-	-

Note. 1: The path loss from EUT to Spectrum analyzer was measured and used for conducted test.
Path loss (=S/A's correction factor)
= Cable A + ATT (Attenuator, Applied only when it was used externally)

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APPENDIX II
Duty cycle plots

▣ TEST PROCEDURE

Duty Cycle measured using **section 6.0 b) of KDB558074 v03r02:**

The zero-span mode on a spectrum analyzer or EMI receiver if the response time and spacing between bins on the sweep are sufficient to permit accurate measurements of the on and off times of the transmitted signal.

Set the center frequency of the instrument to the center frequency of the transmission. Set RBW ≥ OBW if possible; otherwise, set RBW to the largest available value. Set VBW ≥ RBW. Set detector = peak or average.

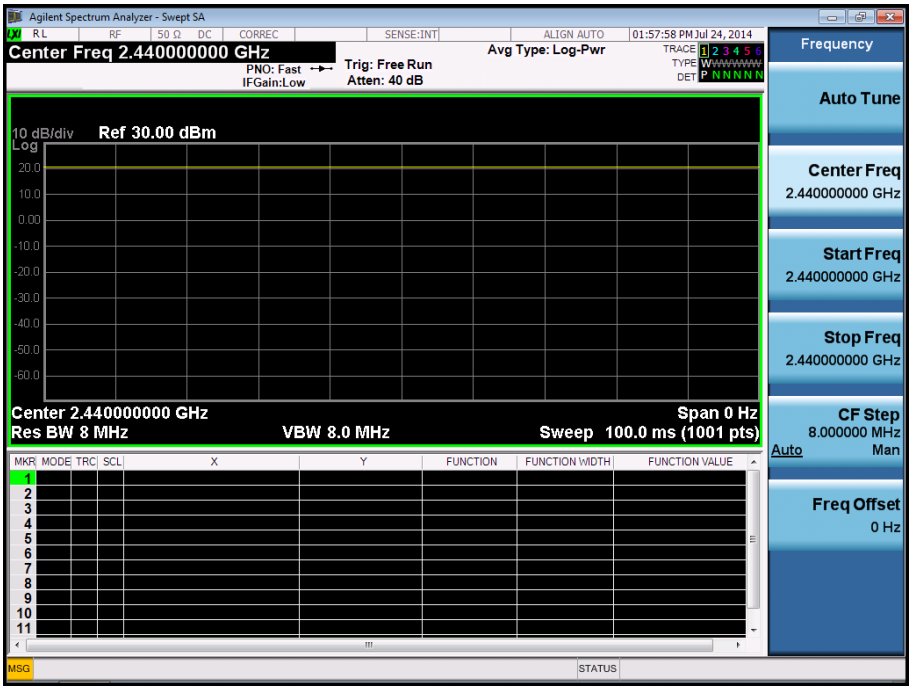
The zero-span measurement method shall not be used unless both RBW and VBW are > 50/T and the number of sweep points across duration T exceeds 100. (For example, if VBW and/or RBW are limited to 3 MHz, then the zero-span method of measuring duty cycle shall not be used if T ≤ 16.7 microseconds.)

Measurement set-up of RBW

Mode	T	50/T	RBW (≤VBW)
-	-	-	-
-	-	-	-

Test Plots :

Duty Cycle Test Mode: Zigbee & 2440MHz



Duty Cycle = 100%

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