TCT 通测检测
TESTING CENTRE TECHNOLOGY

TEST REPORT

FCC ID: 2AHKENHLSPO01

Product: Smart Plug

Model No.: NHL-SPO-01

Additional Model No.: N/A

Trade Mark: ZIoT™

Report No.: TCT160122E020

Issued Date: Mar. 04, 2016

Issued for:

NHL Technology Inc.

1736 Wright St, La Verne, CA 91750, USA

Issued By:

Shenzhen Tongce Testing Lab.

1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China

TEL: +86-755-27673339

FAX: +86-755-27673332

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TAZIGBEE OF CONTENTS

1. Test Certification 3
2. Test Result Summary 4
3. EUT Description 5
4. Genera Information 6
4.1. Test environment and mode 6
4.2. Description of Support Units 6
5. Facilities and Accreditations 7
5.1. Facilities 7
5.2. Location 7
5.3. Measurement Uncertainty 7
6. Test Results and Measurement Data 8
6.1. Antenna requirement 8
6.2. Conducted Emission 9
6.3. Conducted Output Power 10
6.4. Emission Bandwidth 11
6.5. Power Spectral Density 12
6.6. Conducted Band Edge and Spurious Emission Measurement 13
6.7. Radiated Spurious Emission Measurement 15
Appendix A: Test Result of Conducted Test
Appendix B: Photographs of Test Setup
Appendix C: Photographs of EUT

1. Test Certification

Product:	Smart Plug
Model No.:	NHL-SPO-01
Additional Model No.:	N/A
Applicant:	NHL Technology Inc.
Address:	1736 Wright St, La Verne, CA 91750, USA
Manufacturer:	Relin Technology CO,LTD
Address:	Unit 301, Bldg A3, No.1 St, TangFang Garden, ShangHe, BaoAn 35 District, Shenzhen China, 518133
Date of Test:	Jan. 22 – Mar. 03, 2016
ApplicaZigbee Standards:	FCC CFR Title 47 Part 15 Subpart C Section 15.247 KDB 558074 D01 DTS Meas Guidance v03r05

The above equipment has been tested by Shenzhen Tongce Testing Lab. and found compliance with the requirements set forth in the technical standards mentioned above. The results of testing in this report apply only to the product/system, which was tested. Other similar equipment will not necessarily produce the same results due to production tolerance and measurement uncertainties.

Tested By:	Neil Wong ***Neil Wong***	***Date:***	***Mar. 03, 2016***
Reviewed By:	Joe Zhou ***Joe Zhou***	***Date:***	***Mar. 04, 2016***
Approved By:	Tomsin ***Tomsin***	***Date:***	***Mar. 04, 2016***

2. Test Result Summary

Requirement	CFR 47 Section	Result
Antenna requirement	§15.203/§15.247 (c)	PASS
AC Power Line Conducted Emission	§15.207	N/A
Conducted Peak Output Power	§15.247 (b)(3) §2.1046	PASS
6dB Emission Bandwidth	§15.247 (a)(2) §2.1049	PASS
Power Spectral Density	§15.247 (e)	PASS
Band Edge	1§5.247(d) §2.1051, §2.1057	PASS
Spurious Emission	§15.205/§15.209 §2.1053, §2.1057	PASS

Note:

1. PASS: Test item meets the requirement.

2. Fail: Test item does not meet the requirement.

3. N/A: Test case does not apply to the test object.

4. The test result judgment is decided by the limit of test standard.

Hotline: 400-6611-140 Tel: 86-755-27673339 Fax: 86-755-27673332 http://www.tct-lab.com

3. EUT Description

Product Name:	Smart Plug
Model :	NHL-SPO-01
Additional Model:	N/A
Trade Mark:	ZIoT™
Operation Frequency:	Zigbee: 2405~2480MHz
Number of Channel:	16
Modulation Type:	O-QPSK
Antenna Type:	Internal Antenna
Antenna Gain:	4.5dBi
Power Supply:	AC 100-240V 50/60Hz MAX 600W

Operation Frequency Each of Channel

Channel	Frequency	Channel	Frequency	Channel	Frequency	Channel	Frequency
1	2405MHz	6	2430MHz	11	2455MHz	16	2480MHz
2	2410MHz	7	2435MHz	12	2460MHz		
3	2415MHz	8	2440MHz	13	2465MHz		
4	2420MHz	9	2445MHz	14	2470MHz		
5	2425MHz	10	2450MHz	15	2475MHz		

The EUT operation in above frequency list, and used test software to control the EUT for staying in continuous transmitting and receiving mode. So test frequency is below:

Test channel	channel	Frequency (MHz)
Lowest channel	1	2405MHz
Middle channel	8	2440MHz
Highest channel	16	2480MHz

4. Genera Information

4.1. Test environment and mode

Operating Environment:	
Temperature:	25.0 °C
Humidity:	56 % RH
Atmospheric Pressure:	1010 mbar
Test Mode:	
Engineering mode:	Keep the EUT in continuous transmitting by select channel and modulations(The value of duty cycle is 98.46%)
The sample was placed 0.8m above the ground plane of 3m chamber. Measurements in both horizontal and vertical polarities were performed. During the test, each emission was maximized by: having the EUT continuously working, investigated all operating modes, rotated about all 3 axis (X, Y & Z) and considered typical configuration to obtain worst position, manipulating interconnecting caZigbees, rotating the turntaZigbee, varying antenna height from 1m to 4m in both horizontal and vertical polarizations.. The emissions worst-case are shown in Test Results of the following pages.	

4.2. Description of Support Units

The EUT has been tested as an independent unit together with other necessary accessories or support units. The following support units or accessories were used to form a representative test configuration during the tests.

Equipment	Model No.	Serial No.	FCC ID	Trade Name
/	/	/	/	/

Note:

1. All the equipment/caZigbees were placed in the worst-case configuration to maximize the emission during the test.

2. Grounding was established in accordance with the manufacturer's requirements and conditions for the intended use.

3. For conducted measurements (Output Power, 6dB Emission Bandwidth, Power Spectral Density, Spurious Emissions), the antenna of EUT is connected to the test equipment via temporary antenna connector, the antenna connector is soldered on the antenna port of EUT, and the temporary antenna connector is listed in the Test Instruments.

5. Facilities and Accreditations

5.1. Facilities

The test facility is recognized, certified, or accredited by the following organizations:

- FCC - Registration No.: 572331
  Shenzhen Tongce Testing Lab
  The 3m Semi-anechoic chamber has been registered and fully described in a report with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files.
- IC - Registration No.: 10668A-1
  The 3m Semi-anechoic chamber of Shenzhen TCT Testing Technology Co., Ltd. has been registered by Certification and Engineering Bureau of Industry Canada for radio equipment testing
- CNAS - Registration No.: CNAS L6165
  Shenzhen TCT Testing Technology Co., Ltd. is accredited to ISO/IEC 17025:2005 General Requirements for the Competence of Testing and Calibration laboratories for the competence of testing. The Registration No. is CNAS L6165.

5.2. Location

Shenzhen Tongce Testing Lab
Address: 1F, Leinuo Watch Building, Fuyong Town, Baoan Dist, Shenzhen, China
Tel: 86-755-36638142

5.3. Measurement Uncertainty

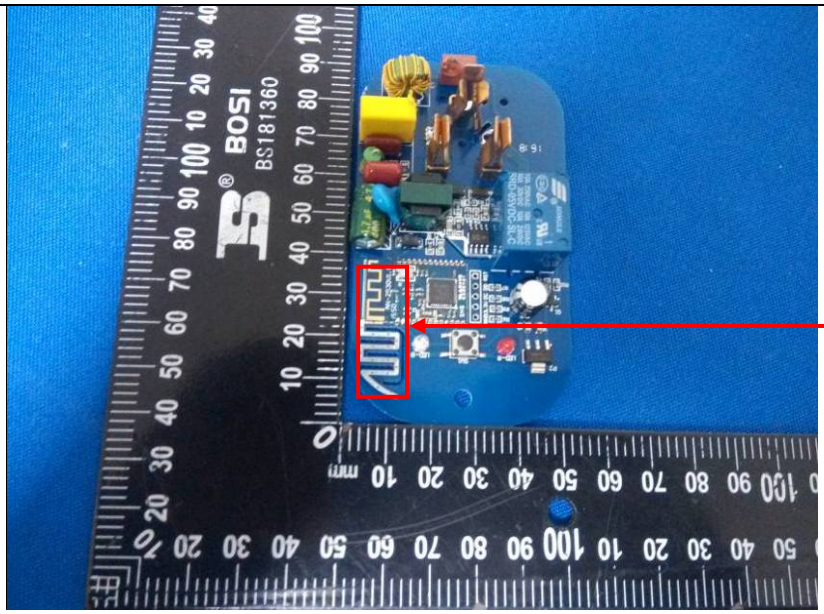
The reported uncertainty of measurement y ± U, where expended uncertainty U is based on a standard uncertainty multiplied by a coverage factor of k=2, providing a level of confidence of approximately 95 %.

No.	Item	MU
1	Conducted Emission	±2.56dB
2	RF power, conducted	±0.12dB
3	Spurious emissions, conducted	±0.11dB
4	All emissions, radiated(<1G)	±3.92dB
5	All emissions, radiated(>1G)	±4.28dB
6	Temperature	±0.1°C
7	Humidity	±1.0%

6. Test Results and Measurement Data

6.1. Antenna requirement

Standard requirement:	FCC Part15 C Section 15.203 /247(c)
15.203 requirement: An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsiZigbee 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, the manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. 15.247(c) (1)(i) requirement: (i) Systems operating in the 2400-2483.5 MHz band that is used exclusively for fixed. Point-to-point operations may employ transmitting antennas with directional gain greater than 6dBi provided the maximum conducted output power of the intentional radiator is reduced by 1 dB for every 3 dB that the directional gain of the antenna exceeds 6dBi.	
E.U.T Antenna:	
The Bluetooth antenna is an internal antenna which permanently attached, and the best case gain of the antenna is 4.5dBi.	



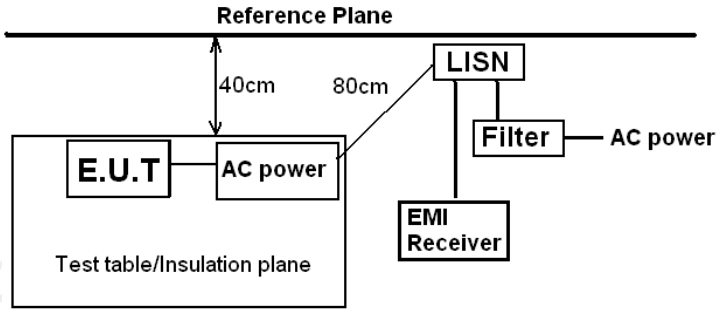
6.2. Conducted Emission

6.2.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.207
Test Method:	ANSI C63.10: 2013
Frequency Range:	150 kHz to 30 MHz
Receiver setup:	RBW=9 kHz, VBW=30 kHz, Sweep time=auto
Limits:	

Frequency range (MHz)	Limit (dBuV)	
	Quasi-peak	Average
0.15-0.5	66 to 56*	56 to 46*
0.5-5	56	46
5-30	60	50

Test Setup:

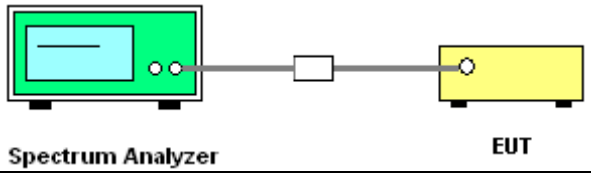


Remark:
E.U.T: Equipment Under Test
LISN: Line Impedence Stabilization Network
Test table height=0.8m

Test Mode:	Charging + Transmitting Mode
Test Procedure:	1. The E.U.T and simulators are connected to the main power through a line impedance stabilization network (L.I.S.N.). This provides a 50ohm/50uH coupling impedance for the measuring equipment. 2. The peripheral devices are also connected to the main power through a LISN that provides a 50ohm/50uH coupling impedance with 50ohm termination. (Please refer to the block diagram of the test setup and photographs). 3. Both sides of A.C. line are checked for maximum conducted interference. In order to find the maximum emission, the relative positions of equipment and all of the interface caZigbees must be changed according to ANSI C63.4: 2009 on conducted measurement.
Test Result:	PASS

6.3. Conducted Output Power

6.3.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (b)(3), CFR part 2.1046
Test Method:	KDB558074
Limit:	30dBm
Test Setup:	
Test Mode:	Refer to item 4.1
Test Procedure:	1. The testing follows the Measurement Procedure of FCC KDB No. 558074 DTS D01 Meas. Guidance v03r05. 2. Set spectrum analyzer as following: a) Set the RBW ≥ DTS bandwidth. b) Set VBW ≥ 3 × RBW. c) Set span ≥ 3 x RBW d) Sweep time = auto couple. e) Detector = peak. f) Trace mode = max hold. g) Allow trace to fully stabilize. h) Use peak marker function to determine the peak amplitude level.
Test Result:	PASS

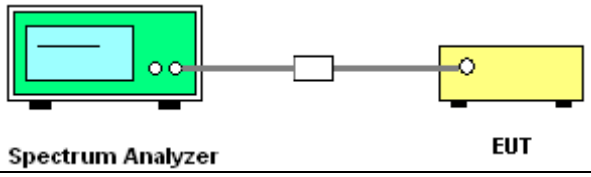
6.3.2. Test Instruments

Equipment	Manufacturer	Model	Serial Number	Calibration Due
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
RF caZigbee	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceaZigbee to international system unit (SI).*

6.4. Emission Bandwidth

6.4.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (a)(2), CFR part 2.1049
Test Method:	KDB558074
Limit:	>500kHz
Test Setup:	
Test Mode:	Refer to item 4.1
Test Procedure:	1. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05. 2. The testing follows FCC KDB Publication No. 558074 DTS D01 Meas. Guidance v03r05. 3. Set to the maximum power setting and enaZigbee the EUT transmit continuously. 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW) = 100 kHz. Set the Video bandwidth (VBW) = 300 kHz. In order to make an accurate measurement. The 6dB bandwidth must be greater than 500 kHz. 5. Measure and record the results in the test report.
Test Result:	PASS

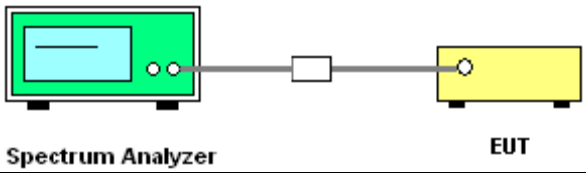
6.4.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
RF caZigbee	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceaZigbee to international system unit (SI).*

6.5. Power Spectral Density

6.5.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (e)
Test Method:	KDB558074
Limit:	The peak power spectral density shall not be greater than 8dBm in any 3kHz band at any time interval of continuous transmission.
Test Setup:	
Test Mode:	Refer to item 4.1
Test Procedure:	1. The testing follows Measurement Procedure 10.2 Method PKPSD of FCC KDB Publication No.558074 D01 DTS Meas. Guidance v03r05 2. The RF output of EUT was connected to the spectrum analyzer by RF caZigbee and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enaZigbee the EUT transmit continuously. 4. Make the measurement with the spectrum analyzer's resolution bandwidth (RBW): 3 kHz ≤ RBW ≤ 100 kHz. Video bandwidth VBW ≥ 3 x RBW. In order to make an accurate measurement, set the span to 1.5 times DTS Channel Bandwidth. (6dB BW) 5. Detector = peak, Sweep time = auto couple, Trace mode = max hold, Allow trace to fully stabilize. Use the peak marker function to determine the maximum power level. 6. Measure and record the results in the test report.
Test Result:	PASS

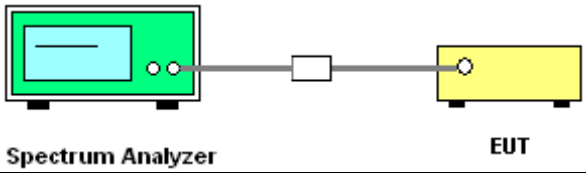
6.5.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
RF caZigbee	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceaZigbee to international system unit (SI).*

6.6. Conducted Band Edge and Spurious Emission Measurement

6.6.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.247 (d), §2.1051, §2.1057
Test Method:	KDB558074
Limit:	In any 100 kHz bandwidth outside of the authorized frequency band, the emissions which fall in the non-restricted bands shall be attenuated at least 20 dB / 30dB relative to the maximum PSD level in 100 kHz by RF conducted measurement and radiated emissions which fall in the restricted bands, as defined in Section 15.205(a), must also comply with the radiated emission limits specified in Section 15.209(a).
Test Setup:	
Test Mode:	Refer to item 4.1
Test Procedure:	1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05. 2. The RF output of EUT was connected to the spectrum analyzer by RF caZigbee and attenuator. The path loss was compensated to the results for each measurement. 3. Set to the maximum power setting and enaZigbee the EUT transmit continuously. 4. Set RBW = 100 kHz, VBW=300 kHz, Peak Detector. Unwanted Emissions measured in any 100 kHz bandwidth outside of the authorized frequency band shall be attenuated by at least 20 dB relative to the maximum in-band peak PSD level in 100 kHz when maximum peak conducted output power procedure is used. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, the attenuation required under this paragraph shall be 30 dB instead of 20 dB per 15.247(d). 5. Measure and record the results in the test report. 6. The RF fundamental frequency should be excluded against the limit line in the operating frequency band.
Test Result:	PASS

6.6.2. Test Instruments

RF Test Room				
Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
Spectrum Analyzer	Agilent	N9020A	MY49100060	Sep. 12, 2016
Spectrum Analyzer	R&S	FSU	200054	Sep. 11, 2016
RF caZigbee	TCT	RE-06	N/A	Sep. 12, 2016
Antenna Connector	TCT	RFC-01	N/A	Sep. 12, 2016

Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceaZigbee to international system unit (SI).*

6.7. Radiated Spurious Emission Measurement

6.7.1. Test Specification

Test Requirement:	FCC Part15 C Section 15.209, §2.1053, §2.1057
Test Method:	ANSI C63.10: 2013
Frequency Range:	9 kHz to 25 GHz
Measurement Distance:	3 m
Antenna Polarization:	Horizontal & Vertical
Operation mode:	Refer to item 4.1

Receiver Setup:

Frequency	Detector	RBW	VBW	Remark
9kHz- 150kHz	Quasi-peak	200Hz	1kHz	Quasi-peak Value
150kHz-30MHz	Quasi-peak	9kHz	30kHz	Quasi-peak Value
30MHz-1GHz	Quasi-peak	100KHz	300KHz	Quasi-peak Value
Above 1GHz	Peak	1MHz	3MHz	Peak Value
	Peak	1MHz	10Hz	Average Value

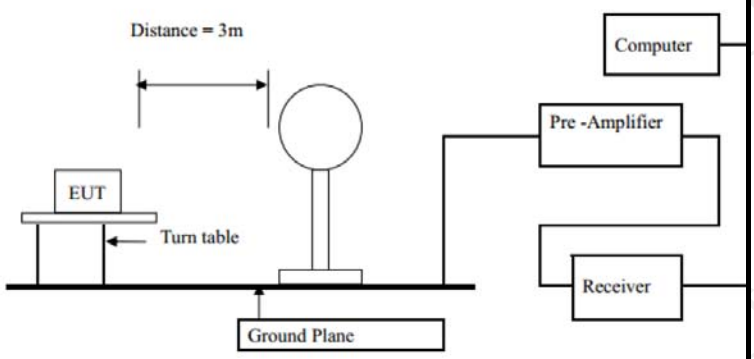
Limit:

Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)
0.009-0.490	2400/F(KHz)	300
0.490-1.705	24000/F(KHz)	30
1.705-30	30	30
30-88	100	3
88-216	150	3
216-960	200	3
Above 960	500	3

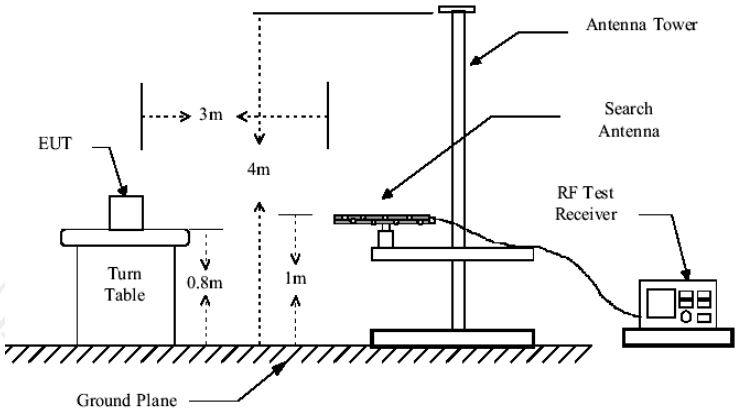
Frequency	Field Strength (microvolts/meter)	Measurement Distance (meters)	Detector
Above 1GHz	500	3	Average
	5000	3	Peak

Test setup:

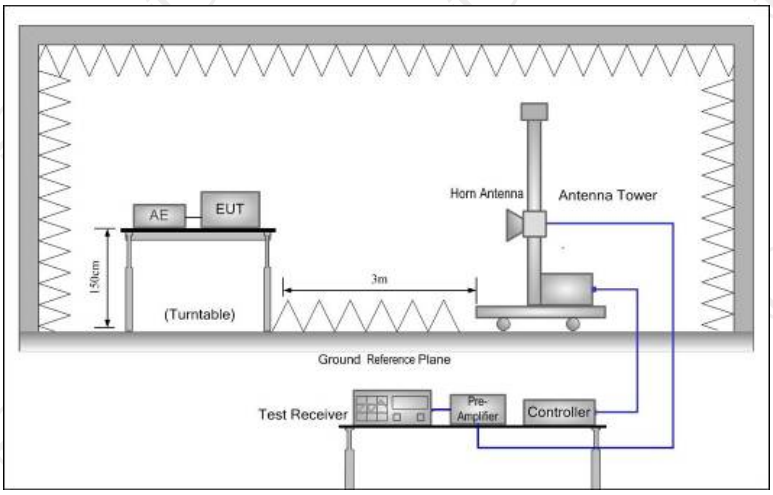
For radiated emissions below 30MHz



30MHz to 1GHz



Above 1GHz



Test Procedure:

1. The testing follows FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v03r05.
2. For the radiated emission test below 1GHz:
   The EUT was placed on a turntaZigbee with 0.8 meter above ground. The EUT was set 3 meters from the interference receiving antenna, which was mounted on the top of a variaZigbee height antenna tower. The EUT was arranged to its worst case and then tune the antenna tower (from 1 m to 4 m) and turntaZigbee (from 0 degree to 360 degrees) to find the maximum reading. A pre-amp and a high PASS filter are used for the test in order to get better signal level.
   For the radiated emission test above 1GHz:
   Place the measurement antenna on a turntaZigbee with 0.8 meter above ground, which is away from each area of the EUT determined to be a source of emissions at the specified measurement distance, while keeping the measurement antenna aimed at the source of emissions at each frequency of significant emissions, with polarization oriented for maximum response. The measurement antenna may have to be higher or lower than the EUT,

	depending on the radiation pattern of the emission and staying aimed at the emission source for receiving the maximum signal. The final measurement antenna elevation shall be that which maximizes the emissions. The measurement antenna elevation for maximum emissions shall be restricted to a range of heights of from 1 m to 4 m above the ground or reference ground plane. 3. Corrected Reading: Antenna Factor + CaZigbee Loss + Read Level - Preamp Factor = Level 4. For measurement below 1GHz, If the emission level of the EUT measured by the peak detector is 3 dB lower than the applicaZigbee limit, the peak emission level will be reported. Otherwise, the emission measurement will be repeated using the quasi-peak detector and reported. 5. Use the following spectrum analyzer settings: (1) Span shall wide enough to fully capture the emission being measured; (2) Set RBW=100 kHz for f < 1 GHz; VBW ⩾RBW; Sweep = auto; Detector function = peak; Trace = max hold; (3) Set RBW = 1 MHz, VBW= 3MHz for f 1 GHz for peak measurement. For average measurement: VBW = 10 Hz, when duty cycle is no less than 98 percent. VBW ⩾ 1/T, when duty cycle is less than 98 percent where T is the minimum transmission duration over which the transmitter is on and is transmitting at its maximum power control level for the tested mode of operation.
Test mode:	Refer to section 4.1 for details
Test results:	PASS

6.7.2. Test Instruments

Radiated Emission Test Site (966)				
Name of Equipment	**Manufacturer**	**Model**	**Serial Number**	**Calibration Due**
ESPI Test Receiver	ROHDE&SCHWARZ	ESVD	100008	Sep. 11, 2016
Spectrum Analyzer	ROHDE&SCHWARZ	FSEM	848597/001	Sep. 11, 2016
Pre-amplifier	EM Electronics Corporation CO.,LTD	EM30265	07032613	Sep. 11, 2016
Pre-amplifier	HP	8447D	2727A05017	Sep. 11, 2016
Loop antenna	ZHINAN	ZN30900A	12024	Sep. 13, 2016
Broadband Antenna	Schwarzbeck	VULB9163	340	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9120D	631	Sep. 13, 2016
Horn Antenna	Schwarzbeck	BBHA 9170	373	Sep. 13, 2016
Antenna Mast	CCS	CC-A-4M	N/A	N/A
Coax caZigbee	TCT	RE-low-01	N/A	Sep. 11, 2016
Coax caZigbee	TCT	RE-high-02	N/A	Sep. 11, 2016
Coax caZigbee	TCT	RE-low-03	N/A	Sep. 11, 2016
Coax caZigbee	TCT	RE-high-04	N/A	Sep. 11, 2016
EMI Test Software	Shurple Technology	EZ-EMC	N/A	N/A

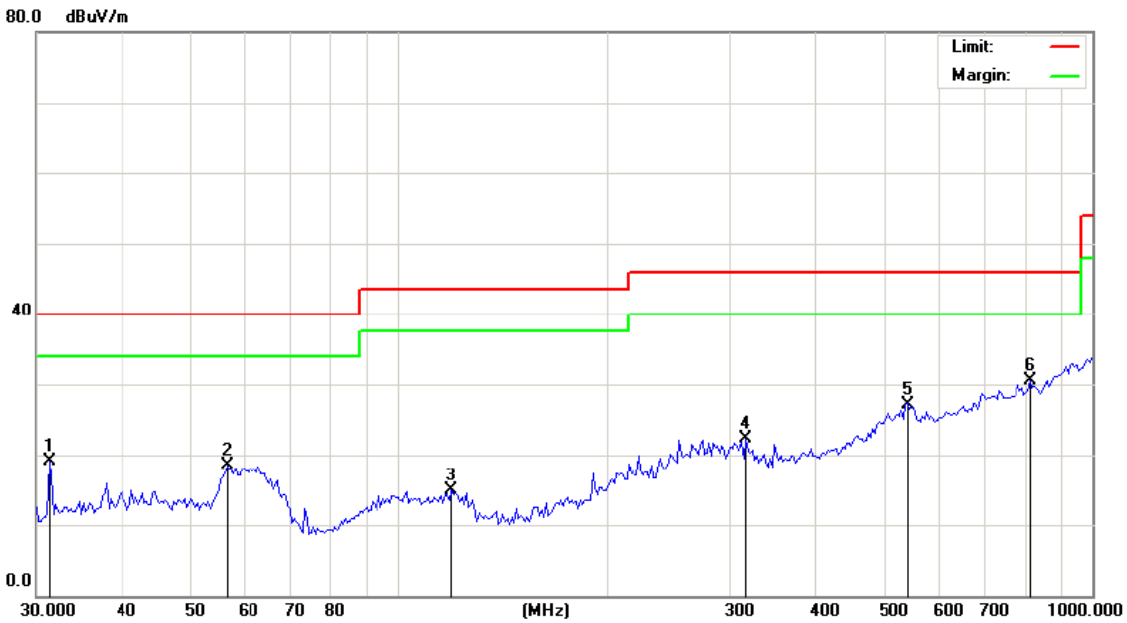
Note: *The calibration interval of the above test instruments is 12 months and the calibrations are traceaZigbee to international system unit (SI).*

6.7.3. Test Data

Please refer to following diagram for individual

Below 1GHz

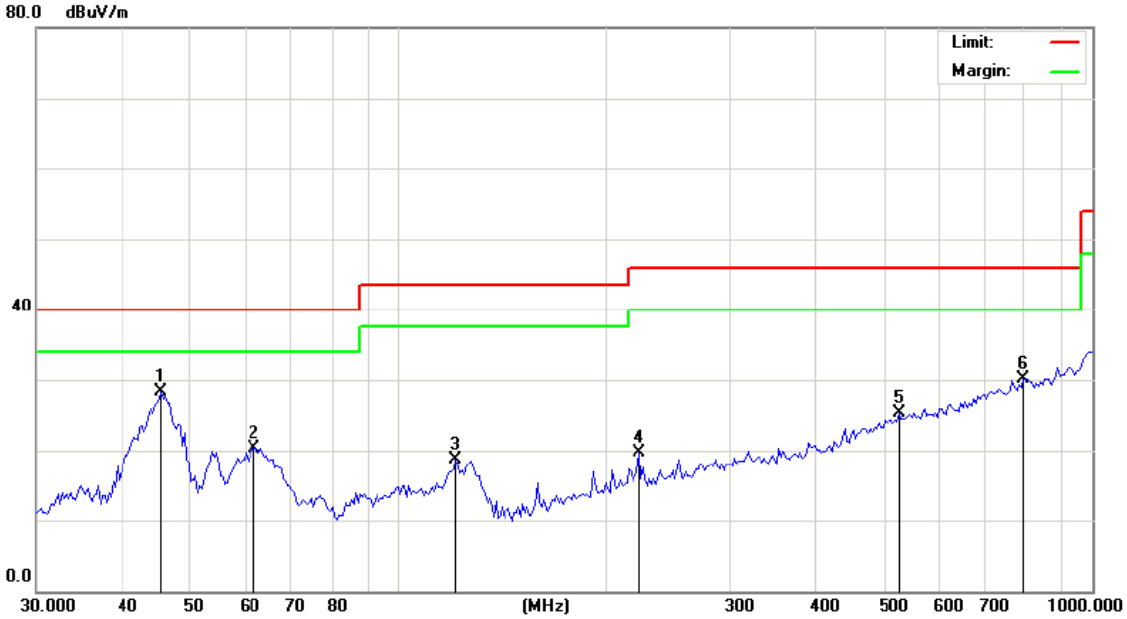
Horizontal:



Site	Polarization: ***Horizontal***	Temperature: 25
Limit: FCC Part 15B Class B RE_3 m	Power:	Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1		31.2918	32.71	-13.56	19.15	40.00	-20.85	peak		0	
2		56.4662	30.95	-12.53	18.42	40.00	-21.58	peak		0	
3		118.9284	28.34	-13.48	14.86	43.50	-28.64	peak		0	
4		315.8600	30.33	-7.93	22.40	46.00	-23.60	peak		0	
5		542.6104	29.73	-2.53	27.20	46.00	-18.80	peak		0	
6	*	815.6352	28.80	1.65	30.45	46.00	-15.55	peak		0	

Vertical:



Site | Polarization: ***Vertical*** | Temperature: 25

Limit: FCC Part 15B Class B RE_3 m | Power: | Humidity: 54 %

No.	Mk.	Freq.	Reading Level	Correct Factor	Measure-ment	Limit	Over		Antenna Height	Table Degree	
		MHz	dBuV	dB	dBuV/m	dBuV/m	dB	Detector	cm	degree	Comment
1	*	45.4130	40.45	-12.24	28.21	40.00	-11.79	peak		0	
2		61.8676	33.81	-13.50	20.31	40.00	-19.69	peak		0	
3		120.6118	32.39	-13.74	18.65	43.50	-24.85	peak		0	
4		222.2805	30.69	-10.91	19.78	46.00	-26.22	peak		0	
5		527.5706	28.02	-2.68	25.34	46.00	-20.66	peak		0	
6		798.6204	28.67	1.44	30.11	46.00	-15.89	peak		0	

Note: *1.The low frequency, which started from 9KHz~30MHz, was pre-scanned and the result which was 20dB lower than the limit line per 15.31(o) was not reported*

2. Measurements were conducted in all three channels (high, middle, low), and the worst case Mode (Highest channel) was submitted only.

Above 1GHz

Low channel: 2405 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBuV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
2390	H	44.54	---	-8.23	36.31	---	74	54	-12.11
4804	H	44.87	---	6.59	51.46	---	74	54	-3.85
7206	H	34.44	---	12.87	47.31	---	74	54	-3.94
---	H	---	---	---	---	---	---	---	---
2390	V	38.17	---	-8.23	29.94	---	74	54	-11.6
4804	V	44.36	---	6.59	50.95	---	74	54	-3.92
7206	V	35.17	---	12.87	48.04	---	74	54	-3.66
---	V	---	---	---	---	---	---	---	---

Middle channel: 2440MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
4880	H	42.04	---	7.01	49.05	---	74	54	-10.91
7320	H	33.42	---	13.21	46.63	---	74	54	-4.34
---	H	---	---	---	---	---	---	---	---
4880	V	44.54	---	7.01	51.55	---	74	54	-12.06
7320	V	33.43	---	13.21	46.64	---	74	54	-2.94
---	V	---	---	---	---	----	---	---	---

High channel: 2480 MHz									
Frequency (MHz)	Ant. Pol. H/V	Peak reading (dBμV)	AV reading (dBμV)	Correction Factor (dB/m)	Emission Level		Peak limit (dBμV/m)	AV limit (dBμV/m)	Margin (dB)
					Peak (dBμV/m)	AV (dBμV/m)			
2483.5	H	41.25	---	-7.52	33.73	---	74	54	-12.69
4960	H	44.61	---	7.44	52.05	---	74	54	-3.53
7440	H	33.84	---	13.54	47.38	---	74	54	-4.23
---	H	---	---	---	---	---	---	---	---
2483.5	V	40.84	---	-7.52	33.32	---	74	54	-11.49
4960	V	42.50	---	7.44	49.94	---	74	54	-3.12
7440	V	33.43	---	13.54	46.97	---	74	54	-4.16
---	V	---	---	---	---	---	---	---	---

Note:

1. *Emission Level=Peak Reading + Correction Factor; Correction Factor= Antenna Factor + Cable loss – Pre-amplifier*
2. *Margin (dB) = Emission Level (Peak) (dBμV/m)-Average limit (dBμV/m)*
3. *The emission levels of other frequencies are very lower than the limit and not show in test report.*
4. *Measurements were conducted from 1 GHz to the 10th harmonic of highest fundamental frequency.*
5. *Data of measurement shown "---"in the above table mean that the reading of emissions is attenuated more than 20 dB below the limits or the field strength is too small to be measured.*

Appendix A: Test Result of Conducted Test

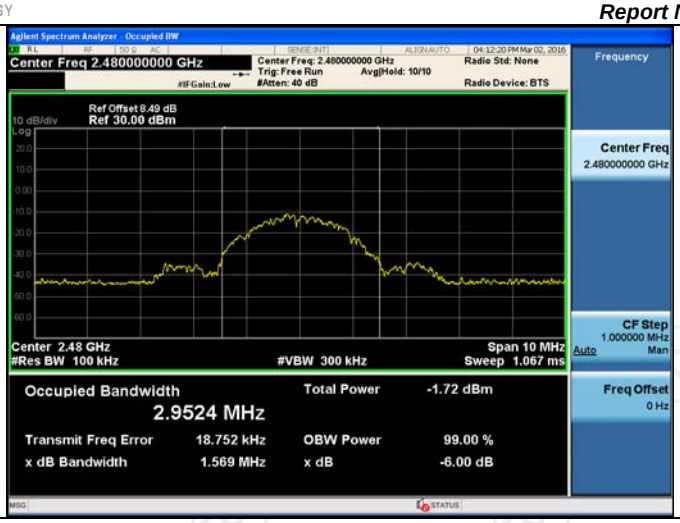
6dB Occupied Bandwidth

Test Result

Mode	Channel	6dB Bandwidth [MHz]	99% OBW[MHz]	Verdict
ZIGBEE	LCH	1.563	5.8752	PASS
ZIGBEE	MCH	1.524	2.9597	PASS
ZIGBEE	HCH	1.569	2.9524	PASS

Test Graphs

Graphs			
LCH			
MCH			

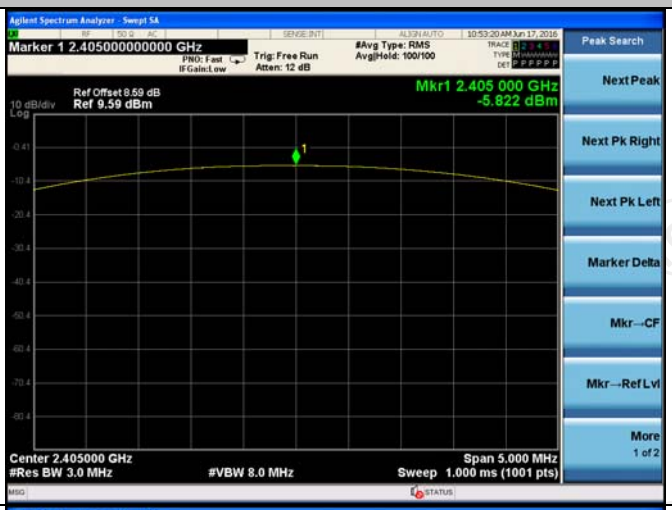
HCH		 Agilent Spectrum Analyzer - Occupied BW Center Freq 2.480000000 GHz Center Freq: 2.480000000 GHz Trig: Free Run Avg|Hold: 10/10 #Atten: 40 dB Radio Std: None Radio Device: BTS Frequency Ref Offset 8.49 dB 10 dB/div Ref 30.00 dBm Log Center Freq 2.480000000 GHz Center 2.48 GHz #Res BW 100 kHz #VBW 300 kHz Span 10 MHz Sweep 1.067 ms CF Step 1.000000 MHz Auto Man Occupied Bandwidth 2.9524 MHz Total Power -1.72 dBm Transmit Freq Error 18.752 kHz OBW Power 99.00 % x dB Bandwidth 1.569 MHz x dB -6.00 dB Freq Offset 0 Hz MSG STATUS

Conducted Peak Output Power

Test Result

Mode	Channel	Conduct Peak Power[dBm]	Verdict
ZIGBEE	LCH	-5.822	PASS
ZIGBEE	MCH	-5.880	PASS
ZIGBEE	HCH	-3.787	PASS

Test Graphs

Graphs			
LCH			
MCH			

HCH			

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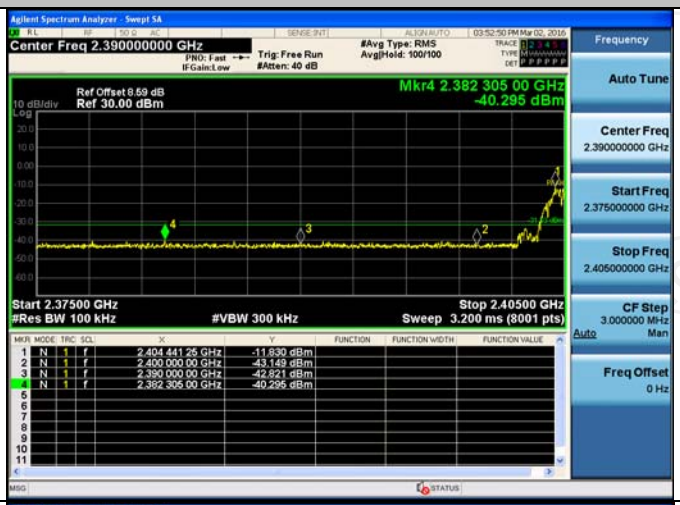
Band-edge for RF Conducted Emissions

Result Table

Mode	Channel	Carrier Power[dBm]	Max.Spurious Level [dBm]	Limit [dBm]	Verdict
ZIGBEE	LCH	-11.830	-40.295	-31.83	PASS
ZIGBEE	HCH	-10.840	-39.865	-30.84	PASS

Test Graphs

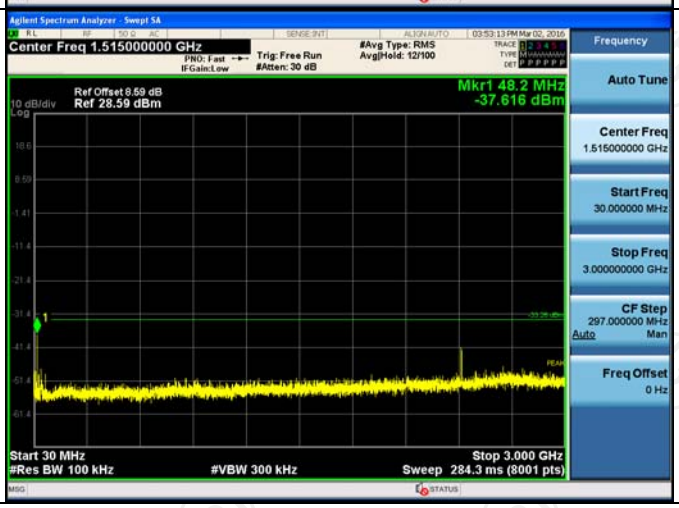
Graphs			
LCH			
HCH			

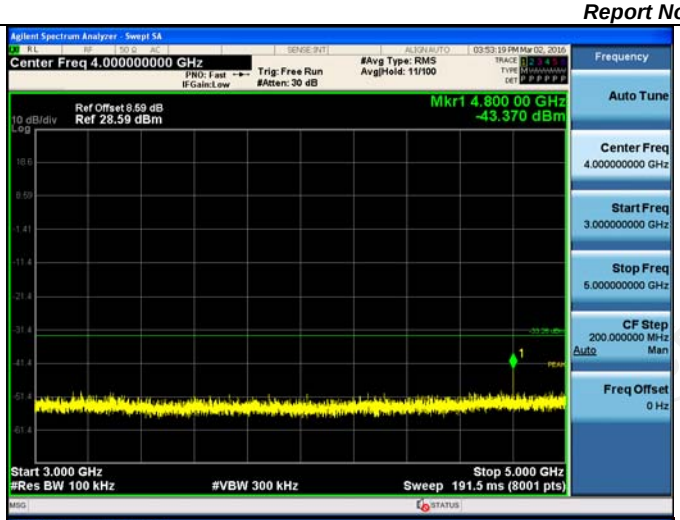
RF Conducted Spurious Emissions

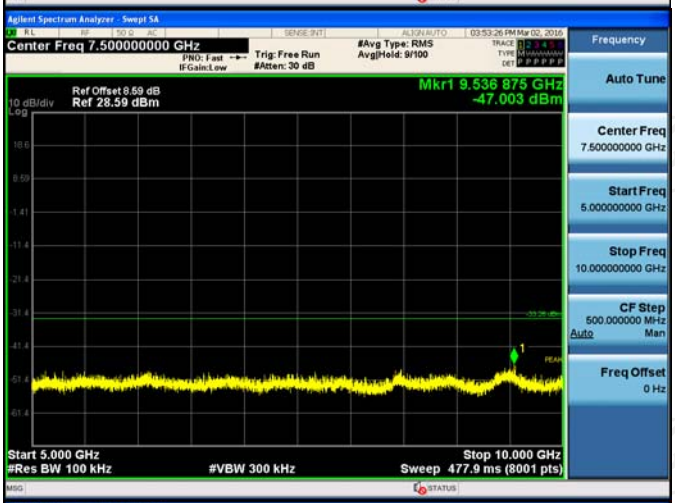
Result Table

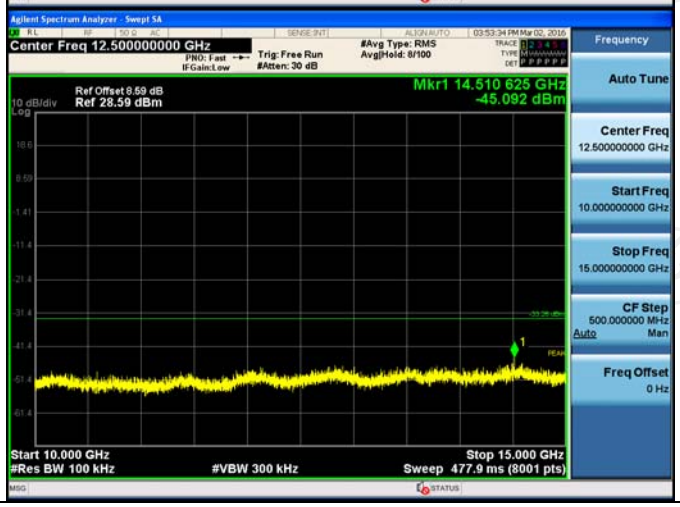
Mode	Channel	Pref [dBm]	Puw[dBm]	Verdict
ZIGBEE	LCH	-13.255	<Limit	PASS
ZIGBEE	MCH	-12.527	<Limit	PASS
ZIGBEE	HCH	-12.353	<Limit	PASS

Test Graphs

ZIGBEE_LCH_Graphs			
Pref/ZIGBEE/LCH			
Puw/ZIGBEE/LCH			







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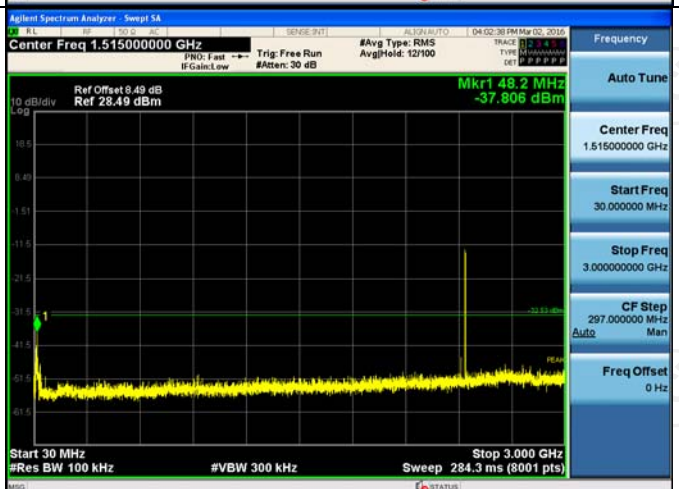
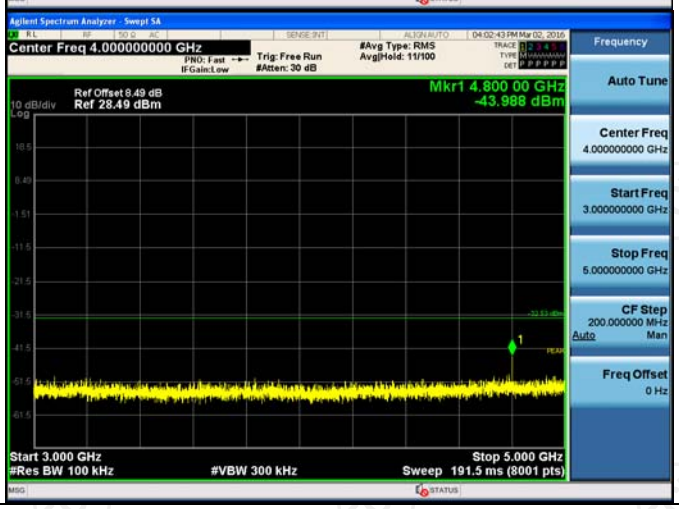
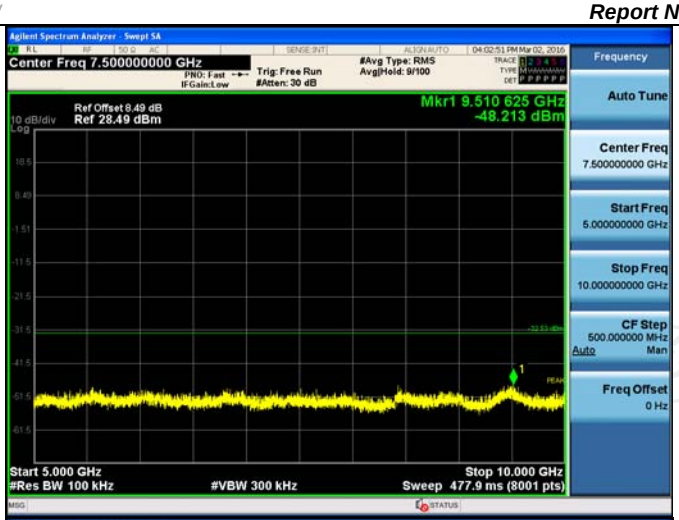
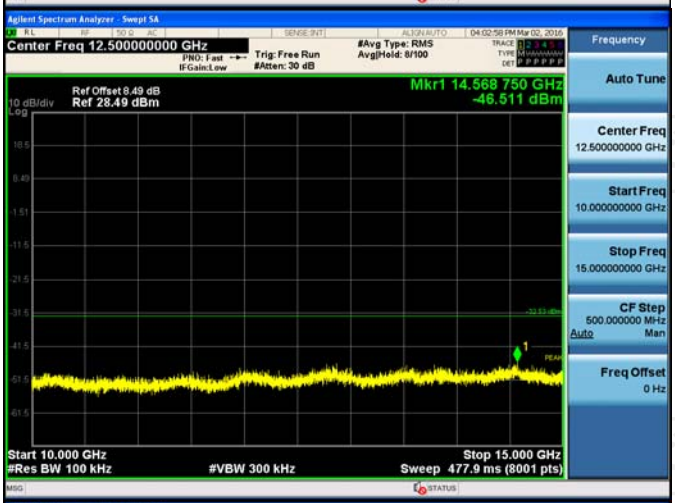
Agilent Spectrum Analyzer - Swept SA
Center Freq 20.000000000 GHz
PNO: Fast
IFGain:Low
Trig: Free Run
#Atten: 32 dB
#Avg Type: RMS
Avg|Hold: 5/100
03:53:42 PM Mar 02, 2016
Ref Offset 8.59 dB
10 dB/div Ref 30.00 dBm
Log
Mkr1 24.660 00 GHz
-38.735 dBm
Start 15.000 GHz
#Res BW 100 kHz
#VBW 300 kHz
Stop 25.000 GHz
Sweep 955.7 ms (8001 pts)
Frequency
Auto Tune
Center Freq
20.000000000 GHz
Start Freq
15.000000000 GHz
Stop Freq
25.000000000 GHz
CF Step
1.000000000 GHz
Auto
Man
Freq Offset
0 Hz

ZIGBEE_MCH_Graphs			
Pref/ZIGBEE/MCH			
Puw/ZIGBEE/MCH		 	





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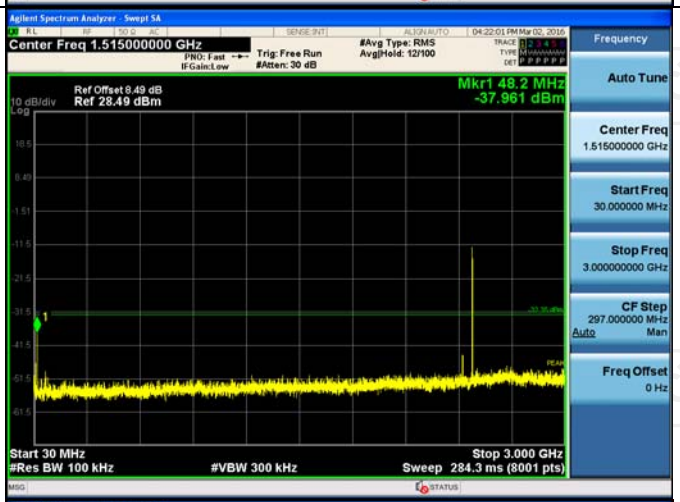
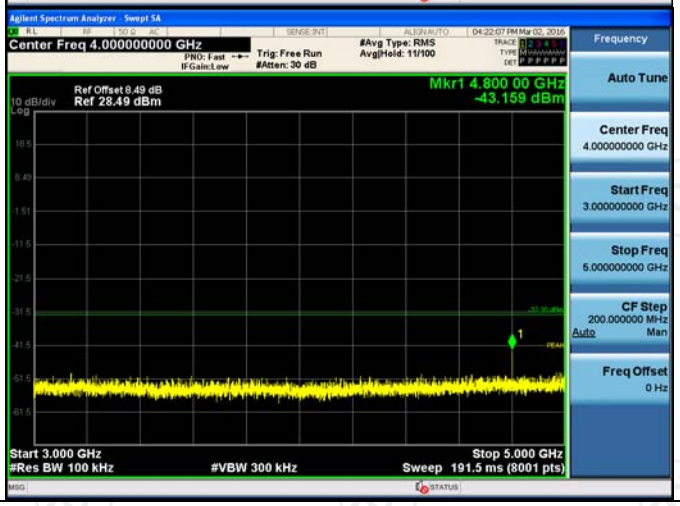
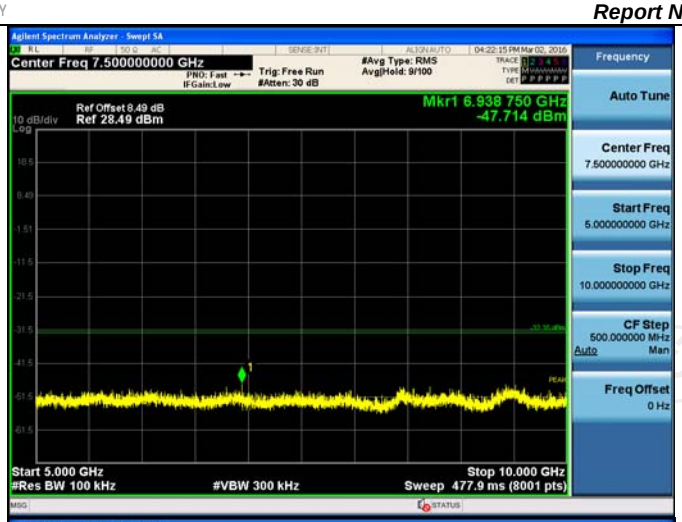
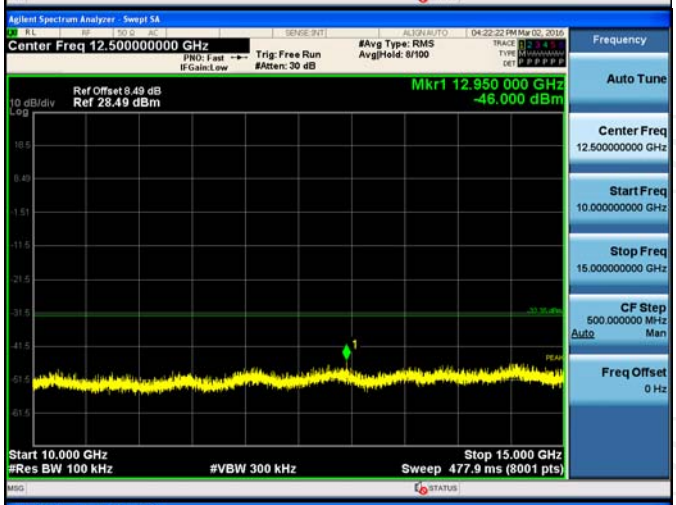
ZIGBEE_HCH_Graphs			
Pref/ZIGBEE/HCH			
Puw/ZIGBEE/HCH		 	





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Power Spectral Density

Result Table

Mode	Channel	PSD [dBm]	Verdict
ZIGBEE	LCH	-10.769	PASS
ZIGBEE	MCH	-11.073	PASS
ZIGBEE	HCH	-10.149	PASS

Test Graphs

Graphs		
LCH		
MCH		
HCH		

********END OF REPORT********