FCC RF Co-location Test Report

APPLICANT	:	Nest Labs Inc.
EQUIPMENT	:	Nest Hello
MODEL NAME	:	A0077
FCC ID	:	ZQANC51
STANDARD	:	FCC Part 15 Subpart E §15.407
CLASSIFICATION	:	(NII) Unlicensed National Information Infrastructure

The product was completed on Oct. 20, 2017. We, SPORTON INTERNATIONAL INC., would like to declare that the tested sample has been evaluated in accordance with the test procedures and has been in compliance with the applicable technical standards.

The test results in this report apply exclusively to the tested model / sample. Without written approval of SPORTON INTERNATIONAL INC., the test report shall not be reproduced except in full.

Reviewed by: Joseph Lin / Supervisor

Approved by: Jones Tsai / Manager

Testing Laboratory
1190

SPORTON INTERNATIONAL INC.
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REVISION HISTORY

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FR733120-01F	Rev. 01	Initial issue of report	Nov. 01, 2017

SUMMARY OF TEST RESULT

Report Section	FCC Rule	Description	Limit	Result
3.1	15.407(b)	Unwanted Emissions	≤ -17, -27 dBm (depend on band)&15.209(a)	Pass
3.2	15.203 & 15.407(a)	Antenna Requirement	N/A	Pass

1 General Description

1.1 Applicant

Nest Labs Inc.
3400 Hillview Ave.Palo Alto, CA 94304 USA

1.2 Product Feature of Equipment Under Test

Bluetooth, Wi-Fi 2.4GHz 802.11b/g/n/ac, Wi-Fi 5GHz 802.11a/n/ac and Zigbee

Product Specification subjective to this standard	
Antenna Type	WLAN: IFA Antenna Bluetooth: IFA Antenna Zigbee: IFA Antenna

1.3 Modification of EUT

No modifications are made to the EUT during all test items.

1.4 Testing Location

Sporton Lab is accredited to ISO 17025 by Taiwan Accreditation Foundation (TAF code : 1190) and the FCC designation No. TW0007 under the FCC 2.948(e) by Mutual Recognition Agreement (MRA) in FCC Test.

Test Site	SPORTON INTERNATIONAL INC.
Test Site Location	No.58, Aly. 75, Ln. 564, Wenhua 3rd Rd. Guishan Dist, Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-0868 FAX: +886-3-327-0855
Test Site No.	**Sporton Site No.**
	03CH11-HY

Note: The test site complies with ANSI C63.4 2014 requirement.

1.5 Applicable Standards

According to the specifications of the manufacturer, the EUT must comply with the requirements of the following standards:

- FCC Part 15 Subpart E
- FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04
- FCC KDB 662911 D01 Multiple Transmitter Output v02r01.
- FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v04
- ANSI C63.10-2013

Remark: All test items were verified and recorded according to the standards and without any deviation during the test.

2 Test Configuration of Equipment Under Test

a. The EUT has been associated with peripherals and configuration operated in a manner tended to maximize its emission characteristics in a typical application. Frequency range investigated: radiation emission (9 kHz to the 10th harmonic of the highest fundamental frequency or to 40 GHz, whichever is lower). For radiated measurement, pre-scanned in four orthogonal panels, X, Y, Z, Back. The worst cases (X plane) were recorded in this report.

2.1 Carrier Frequency and Channel

2400-2483.5 MHz Zigbee		2400-2483.5 MHz Bluetooth LE	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
25	2475	39	2480

2400-2483.5 MHz 802.11b		5470-5725 MHz Band 3 (U-NII-2C)	
Channel	**Freq. (MHz)**	**Channel**	**Freq. (MHz)**
11	2462	102	5510

2.2 Test Mode

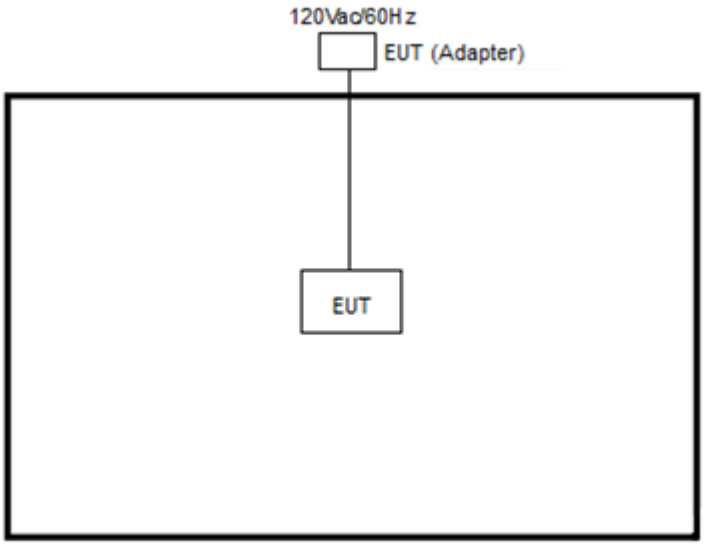
Final test mode of conducted test items and radiated spurious emissions are considering the modulation and worse data rates as below table.

<Co-Location>

Modulation	Data Rate
Bluetooth LE + Zigbee	**1 Mbps + 250 kbps**
802.11b + Zigbee	**1 Mbps + 250 kbps**
802.11n HT40 + Zigbee	**MCS0 + 250 kbps**

2.3 Connection Diagram of Test System

<Co-Location Tx Mode>



2.4 EUT Operation Test Setup

The RF test items, programmed RF utility, “tera term” installed in the notebook make the EUT provide functions like channel selection and power level for continuous transmitting and receiving signals.

3 Test Result

3.1 Unwanted Emissions Measurement

3.1.1 Limit of Unwanted Emissions

(1) Unwanted spurious emissions fallen in restricted bands shall comply with the general field strength limits as below table,

Frequency (MHz)	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 – 30.0	30	30
30 – 88	100	3
88 – 216	150	3
216 - 960	200	3
Above 960	500	3

Note: The following formula is used to convert the EIRP to field strength.

$$E=\frac{1000000\sqrt{30P}}{3}$$ μV/m, where P is the eirp (Watts)

EIRP (dBm)	Field Strength at 3m (dBµV/m)
- 27	68.3

(2) KDB789033 D02 v01r04 G)2)c)

(i) Sections 15.407(b)(1) to (b)(3) specify the unwanted emission limits for the U-NII-1 and U-NII-2 bands. As specified, emissions above 1000 MHz that are outside of the restricted bands are subject to a peak emission limit of -27 dBm/MHz.[3]

(ii) Section 15.407(b)(4) specifies the unwanted emission limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are in terms of a Peak detector. An alternative to the band emissions mask is specified in Section 15.407(b)(4)(ii). The alternative limits are based on the highest antenna gain specified in the filing. There are also marketing and importation restrictions for the devices using the alternative limit.[4]

Note 3: An out-of-band emission that complies with both the average and peak limits of Section 15.209 is not required to satisfy the -27 dBm/MHz peak emission limit.

Note 4: Only devices with antenna gains of 10 dBi or less may be approved using the emission limits specified in Section 15.247(d) till March 2, 2018; all other devices operating in this band must use the mask specified in Section 15.407(b)(4)(i).

3.1.2 Measuring Instruments

The measuring equipment is listed in the section 4 of this test report.

3.1.3 Test Procedures

1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v01r04. Section G) Unwanted emissions measurement.

   (1) Procedure for Unwanted Emissions Measurements Below 1000MHz

   - RBW = 120 kHz
   - VBW = 300 kHz
   - Detector = Peak
   - Trace mode = max hold

(2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz

- RBW = 1 MHz
- VBW ≥ 3 MHz
- Detector = Peak
- Sweep time = auto
- Trace mode = max hold

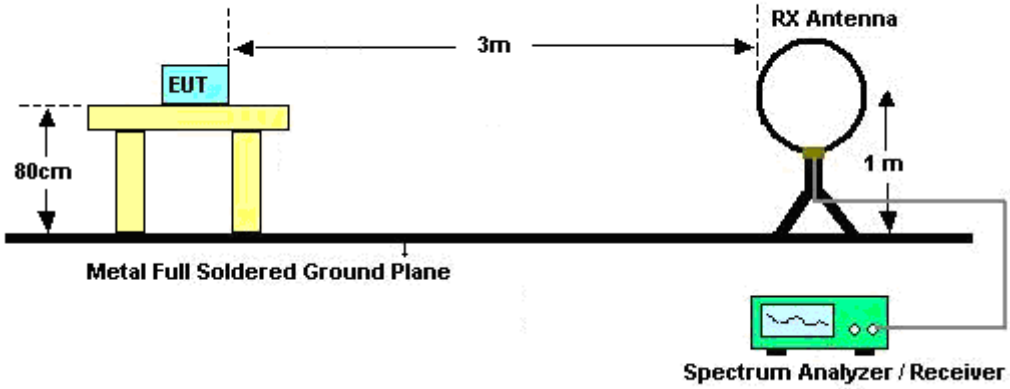
(3) Procedures for Average Unwanted Emissions Measurements Above 1000MHz

- RBW = 1 MHz
- 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.

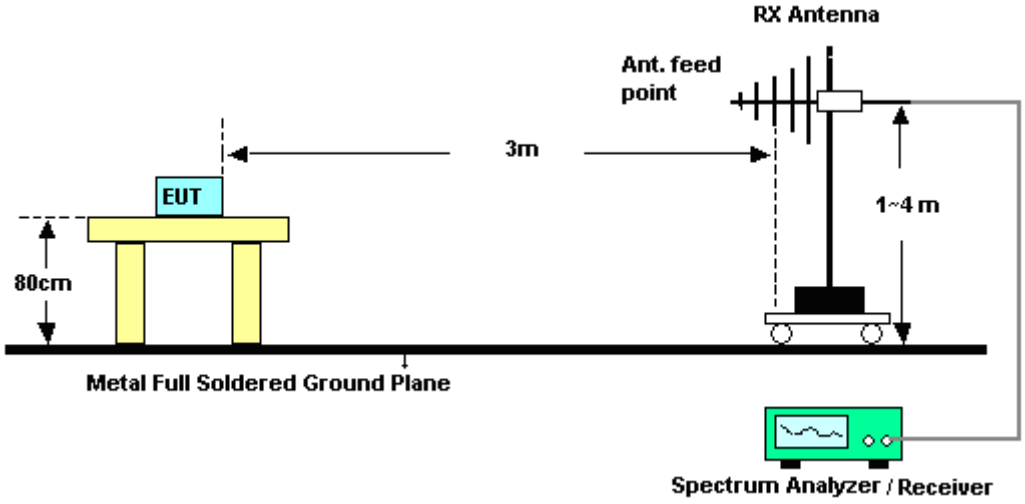
2. he EUT was placed on a turntable with 0.8 meter for frequency below 1GHz and 1.5 meter for frequency above 1GHz respectively above ground.
3. The EUT was set 3 meters from the interference receiving antenna which was mounted on the top of a variable height antenna tower.
4. The antenna is a broadband antenna and its height is adjusted between one meter and four meters above ground to find the maximum value of the field strength for both horizontal polarization and vertical polarization of the antenna.
5. For each suspected emission, the EUT was arranged to its worst case and then adjust the antenna tower (from 1 m to 4 m) and turntable (from 0 degree to 360 degrees) to find the maximum reading.
6. For testing below 1GHz, if the emission level of the EUT in peak mode was 3 dB lower than the limit specified, then peak values of EUT will be reported, otherwise, the emissions will be repeated one by one using the CISPR quasi-peak method and reported.
7. For testing above 1GHz, the emission level of the EUT in peak mode was 20dB lower than average limit (that means the emission level in average mode also complies with the limit in average mode), then peak values of EUT will be reported, otherwise, the emissions will be measured in average mode again and reported.

3.1.4 Test Setup

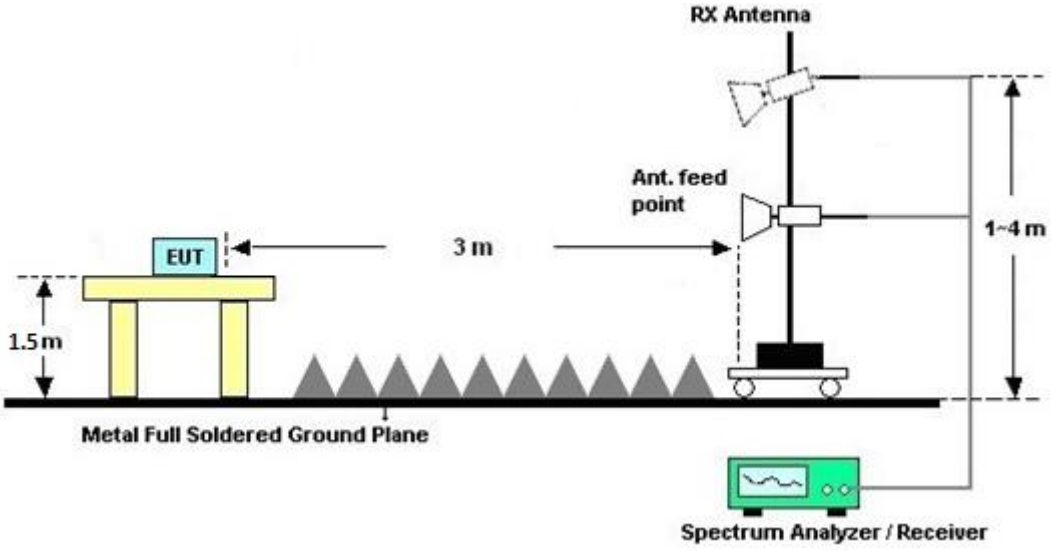
For radiated emissions below 30MHz



For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



3.1.5 Test Results of Radiated Spurious Emissions (9 kHz ~ 30 MHz)

The low frequency, which started from 9 kHz to 30MHz, was pre-scanned and the result which was 20dB lower than the limit line was not reported.

There is a comparison data of both open-field test site and semi-Anechoic chamber, and the result came out very similar.

3.1.6 Test Result of Radiated Spurious at Band Edges

Please refer to Appendix A and B.

3.1.7 Duty Cycle

Please refer to Appendix C.

3.1.8 Test Result of Radiated Spurious Emissions (30MHz ~ 10th Harmonic)

Please refer to Appendix A and B.

3.2 Antenna Requirements

3.2.1 Standard Applicable

If transmitting antenna directional gain is greater than 6 dBi, both the peak transmit power and the peak power spectral density shall be reduced by the amount in dB that the directional gain of the antenna exceeds 6 dBi.

3.2.2 Antenna Anti-Replacement Construction

An embedded-in antenna design is used.

3.2.3 Antenna Gain

The antenna peak gain of EUT is less than 6 dBi. Therefore, it is not necessary to reduce maximum peak output power limit.

4 List of Measuring Equipment

Instrument	Manufacturer	Model No.	Serial No.	Characteristics	Calibration Date	Test Date	Due Date	Remark
Preamplifier	MITEQ	TTA1840-35-HG	1887435	18GHz~40GHz	Oct. 13, 2016	Jul. 01, 2017 ~ Jul. 25, 2017	Oct. 12, 2017	Radiation (03CH11-HY)
Amplifier	MITEQ	TTA1840-35-HG	1871923	18GHz~40GHz, VSWR : 2.5:1 max	Jul. 18, 2017	Jul. 26, 2017 ~ Oct. 20, 2017	Jul. 17, 2018	Radiation (03CH11-HY)
Amplifier	SONOMA	310N	187312	9kHz~1GHz	Nov. 10, 2016	Jul. 01, 2017 ~ Oct. 20, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100488	9 kHz~30 MHz	Oct. 20, 2016	Jul. 01, 2017 ~ Oct. 20, 2017	Oct. 19, 2018	Radiation (03CH11-HY)
Preamplifier	Keysight	83017A	MY53270080	1GHz~26.5GHz	Nov. 10, 2016	Jul. 01, 2017 ~ Oct. 20, 2017	Nov. 09, 2017	Radiation (03CH11-HY)
Preamplifier	MITEQ	AMF-7D-00101800-30-10P	1902247	1GHz~18GHz	Jun. 23, 2017	Jul. 01, 2017 ~ Oct. 20, 2017	Jun. 22, 2018	Radiation (03CH11-HY)
Antenna Mast	EMEC	AM-BS-4500-B	N/A	1~4m	N/A	Jul. 01, 2017 ~ Oct. 20, 2017	N/A	Radiation (03CH11-HY)
Turn Table	EMEC	TT 2000	N/A	0~360 Degree	N/A	Jul. 01, 2017 ~ Oct. 20, 2017	N/A	Radiation (03CH11-HY)
Bilog Antenna	TESEQ	CBL6111D&00800N1D01N-06	41912&05	30MHz to 1GHz	Jan. 07, 2017	Jul. 01, 2017 ~ Oct. 20, 2017	Jan. 06, 2018	Radiation (03CH11-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170584	18GHz- 40GHz	Nov. 08, 2016	Jul. 01, 2017 ~ Oct. 20, 2017	Nov. 07, 2017	Radiation (03CH11-HY)
EMI Test Receiver	Agilent	N9038A(MXE)	MY53290053	20Hz to 26.5GHz	Jan. 12, 2017	Jul. 01, 2017 ~ Oct. 20, 2017	Jan. 11, 2018	Radiation (03CH11-HY)
Horn Antenna	SCHWARZBECK	BBHA 9120 D	9120D-1522	1G~18GHz	Mar. 17, 2017	Jul. 01, 2017 ~ Oct. 20, 2017	Mar. 16, 2018	Radiation (03CH11-HY)
Signal Analyzer	Rohde & Schwarz	FSV 30	100895	9kHz~30GHz	Apr. 25, 2017	Jul. 01, 2017 ~ Oct. 20, 2017	Apr. 24, 2018	Radiation (03CH11-HY)

5 Uncertainty of Evaluation

Uncertainty of Radiated Emission Measurement (30 MHz ~ 1000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.20

Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.50

Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% (U = 2Uc(y))	5.20

Appendix A. Radiated Spurious Emission

Test Engineer :	Hao Hsu, Jacky Hung and Ken Wu	Temperature :	20-25°C
		Relative Humidity :	50-55%

Co-location

WIFI 802.11b and Zigbee (Harmonic @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
		(MHz)	(dBμV/m)	Limit (dB)	Line (dBμV/m)	Level (dBμV)	Factor (dB/m)	Loss (dB)	Factor (dB)	Pos (cm)	Pos (deg)	Avg. (P/A)	(H/V)
802.11b CH11 2462MHz and Zigbee CH25 2475MHz		4924	45.51	-28.49	74	66.79	31.48	9.55	62.75	100	0	P	H
		7386	57.65	-16.35	74	72.24	36.47	11.3	62.74	234	199	P	H
		7386	53.06	-0.94	54	67.65	36.47	11.3	62.74	234	199	A	H
		4924	43.51	-30.49	74	64.79	31.48	9.55	62.75	100	0	P	V
		7386	56.35	-17.65	74	70.94	36.47	11.3	62.74	300	160	P	V
		7386	51.87	-2.13	54	66.46	36.47	11.3	62.74	300	160	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

WIFI 802.11n CDD and Zigbee (Harmonic @ 3m)

	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH102 5510MHz and Zigbee CH25 2475MHz		11020	46.25	-27.75	74	55.3	39.52	15.11	63.97	100	0	P	H
		16530	43.02	-30.98	74	48.55	38.11	18.76	62.7	100	0	P	H
		11020	46.12	-27.88	74	55.17	39.52	15.11	63.97	100	0	P	V
		16530	42.06	-31.94	74	47.59	38.11	18.76	62.7	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

BLE and Zigbee (Harmonic @ 3m)

	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH39 2480MHz and Zigbee CH25 2475MHz		4950	38.04	-35.96	74	58.67	32.11	9.53	62.71	100	0	P	H
		4960	39.9	-34.1	74	60.47	32.14	9.53	62.68	100	0	P	H
		7425	43.21	-30.79	74	56.69	37.57	11.34	62.76	100	0	P	H
		7440	43.6	-30.4	74	57.03	37.62	11.34	62.77	100	0	P	H
		4950	38.16	-35.84	74	58.79	32.11	9.53	62.71	100	0	P	V
		4960	40.23	-33.77	74	60.8	32.14	9.53	62.68	100	0	P	V
		7425	42.86	-31.14	74	56.34	37.57	11.34	62.76	100	0	P	V
		7440	43.28	-30.72	74	56.71	37.62	11.34	62.77	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

Emission below 1GHz

WIFI 802.11b and Zigbee (LF @ 3m)

	Note	Frequency	Level	Over Limit	Limit Line	Read Level	Antenna Factor	Cable Loss	Preamp Factor	Ant Pos	Table Pos	Peak Avg.	Pol.
		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH11 2462MHz and Zigbee CH25 2475MHz		50.25	21.03	-18.97	40	38.38	14.11	1.02	32.49			P	H
		217.38	22.2	-23.8	46	37.64	15.17	1.72	32.39			P	H
		264.9	33.7	-12.3	46	44.37	19.54	2.09	32.38			P	H
		323.8	31.39	-14.61	46	41.8	19.57	2.31	32.36			P	H
		619.9	33.01	-12.99	46	36.17	26.06	3.15	32.46			P	H
		860	34.17	-11.83	46	32.8	29.42	3.67	31.87	100	0	P	H
		48.9	30.31	-9.69	40	46.81	14.96	1.02	32.49	100	0	P	V
		81.57	26.47	-13.53	40	44.3	13.42	1.22	32.48			P	V
		270.03	26.98	-19.02	46	37.9	19.29	2.09	32.38			P	V
		580	30.81	-15.19	46	34.42	25.72	3.03	32.44			P	V
		619.9	32.37	-13.63	46	35.53	26.06	3.15	32.46			P	V
		955.9	33.66	-12.34	46	29.67	31.06	3.9	31.14			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

WIFI 802.11n CDD and Zigbee (LF @ 3m)

	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
802.11n HT40 CH102 5510MHz and Zigbee CH25 2475MHz		238.98	35.69	-10.31	46	48.97	17.08	1.95	32.38			P	H
		255.45	36.41	-9.59	46	47.45	19.18	2.09	32.38	200	161	P	H
		290.01	32.80	-13.20	46	43.89	18.97	2.22	32.37			P	H
		312.6	31.14	-14.86	46	41.73	19.37	2.31	32.36			P	H
		619.9	32.76	-13.24	46	35.92	26.06	3.15	32.46			P	H
		941.9	35.02	-10.98	46	31.85	30.45	3.82	31.27			P	H
		31.89	29.80	-10.2	40	38.12	23.33	0.82	32.49			P	V
		37.29	31.86	-8.14	40	43.19	20.33	0.82	32.49	160	277	P	V
		62.13	31.68	-8.32	40	51.37	11.76	1.02	32.49			P	V
		474.3	29.04	-16.96	46	34.95	23.65	2.77	32.37			P	V
		659.8	33.04	-12.96	46	35.77	26.43	3.2	32.47			P	V
		959.4	35.03	-10.97	46	30.89	31.18	3.9	31.12			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

BLE and Zigbee (LF @ 3m)

	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Cable Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
BLE CH39 2480MHz and Zigbee CH25 2475MHz		240.33	35.47	-10.53	46	48.53	17.3	1.95	32.38			P	H
		257.07	35.76	-10.24	46	46.55	19.43	2.09	32.38	150	169	P	H
		294.87	32.62	-13.38	46	43.58	19.09	2.22	32.37			P	H
		311.2	31.2	-14.8	46	41.81	19.36	2.31	32.37			P	H
		659.8	33.04	-12.96	46	35.77	26.43	3.2	32.47			P	H
		937.7	35.36	-10.64	46	32.39	30.29	3.82	31.31			P	H
		31.62	30.79	-9.21	40	39.11	23.33	0.82	32.49			P	V
		36.48	29.97	-10.03	40	40.82	20.82	0.82	32.49			P	V
		62.4	31.29	-8.71	40	50.98	11.76	1.02	32.49	200	258	P	V
		474.3	29.03	-16.97	46	34.94	23.65	2.77	32.37			P	V
		619.9	34.38	-11.62	46	37.54	26.06	3.15	32.46			P	V
		952.4	34.93	-11.07	46	31.14	30.9	3.9	31.18			P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												

Note symbol

*	**Fundamental Frequency** which can be ignored. However, the level of any unwanted emissions shall not exceed the level of the fundamental frequency.
!	Test result is **over limit** line.
P/A	**P**eak or **A**verage
H/V	**H**orizontal or **V**ertical

A calculation example for radiated spurious emission is shown as below:

WIFI	Note	Frequency	Level	Over	Limit	Read	Antenna	Cable	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
1+2		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
802.11b CH 01 2412MHz		2390	55.45	-18.55	74	54.51	32.22	4.58	35.86	103	308	P	H
		2390	43.54	-10.46	54	42.6	32.22	4.58	35.86	103	308	A	H

1. Level(dBμV/m) =

Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

2. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 54.51(dBμV) – 35.86 (dB)

= 55.45 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 55.45(dBμV/m) – 74(dBμV/m)

= -18.55(dB)

For Average Limit @ 2390MHz:

1. Level(dBμV/m)

= Antenna Factor(dB/m) + Cable Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)

= 32.22(dB/m) + 4.58(dB) + 42.6(dBμV) – 35.86 (dB)

= 43.54 (dBμV/m)

2. Over Limit(dB)

= Level(dBμV/m) – Limit Line(dBμV/m)

= 43.54(dBμV/m) – 54(dBμV/m)

= -10.46(dB)

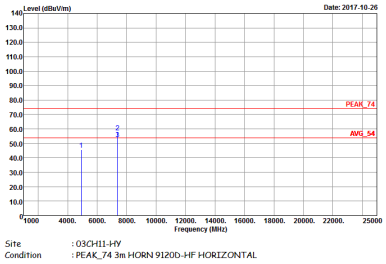
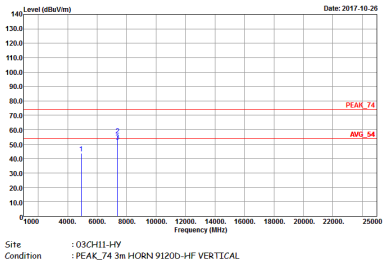
Both peak and average measured complies with the limit line, so test result is “PASS”.

Appendix B. Radiated Spurious Emission Plots

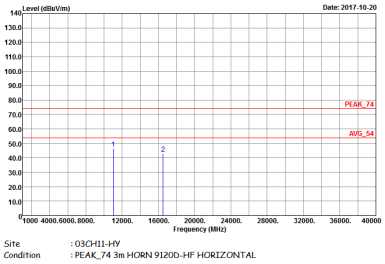
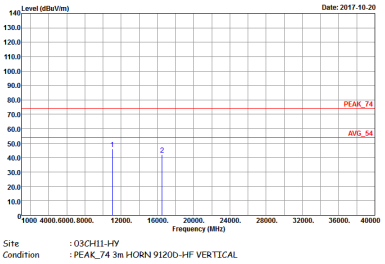
Test Engineer :	Hao Hsu, Jacky Hung and Ken Wu	**Temperature :**	20-25°C
		Relative Humidity :	50-55%

Co-location Mode

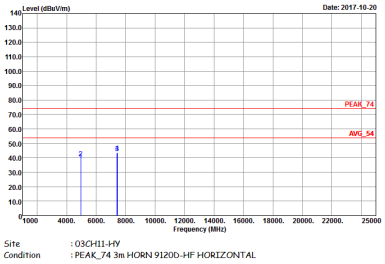
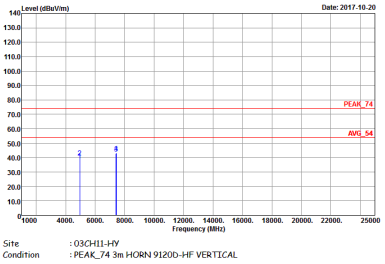
WIFI 802.11b and Zigbee (Harmonic @ 3m)

	Co-location mode Harmonic @ 3m	
	802.11b CH11 2462MHz and Zigbee CH25 2475MHz	
	Horizontal	**Vertical**
Peak **Avg.**		

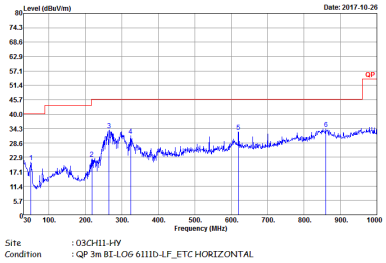
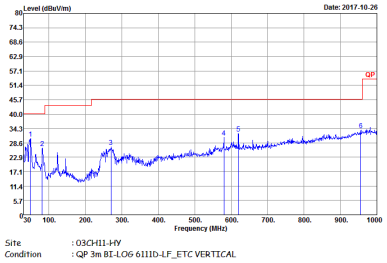
WIFI 802.11n CDD and Zigbee (Harmonic @ 3m)

	Co-location mode Harmonic @ 3m	
	WIFI 802.11n HT40 CH102 5510MHz and Zigbee CH25 2475MHz	
	Horizontal	Vertical
Peak Avg.		

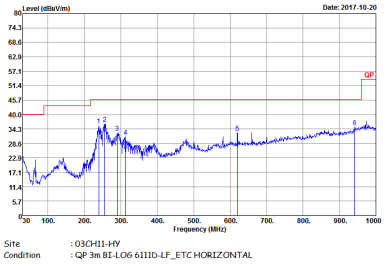
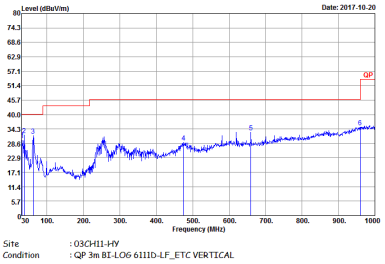
BLE and Zigbee (Harmonic @ 3m)

	Co-location mode Harmonic @ 3m	
	BLE CH39 2480MHz and Zigbee CH25 2475MHz	
	Horizontal	Vertical
Peak Avg.		

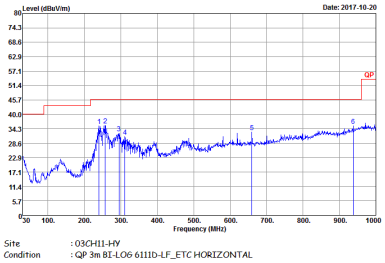
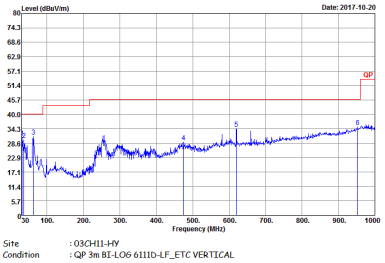
Emission below 1GHz
WIFI 802.11b and Zigbee (LF)

	Co-location mode	
	802.11b CH11 2462MHz and Zigbee CH25 2475MHz LF	
	Horizontal	Vertical
QP / Peak		

WIFI 802.11n CDD and Zigbee (LF)

	Co-location mode	
	WIFI 802.11n HT40 CH102 5510MHz and Zigbee CH25 2475MHz LF	
	Horizontal	Vertical
QP / Peak		

BLE and Zigbee (LF)

	Co-location mode	
.	BLE CH39 2480MHz and Zigbee CH25 2475MHz LF	
	Horizontal	Vertical
QP / Peak		

Appendix C. Duty Cycle Plots

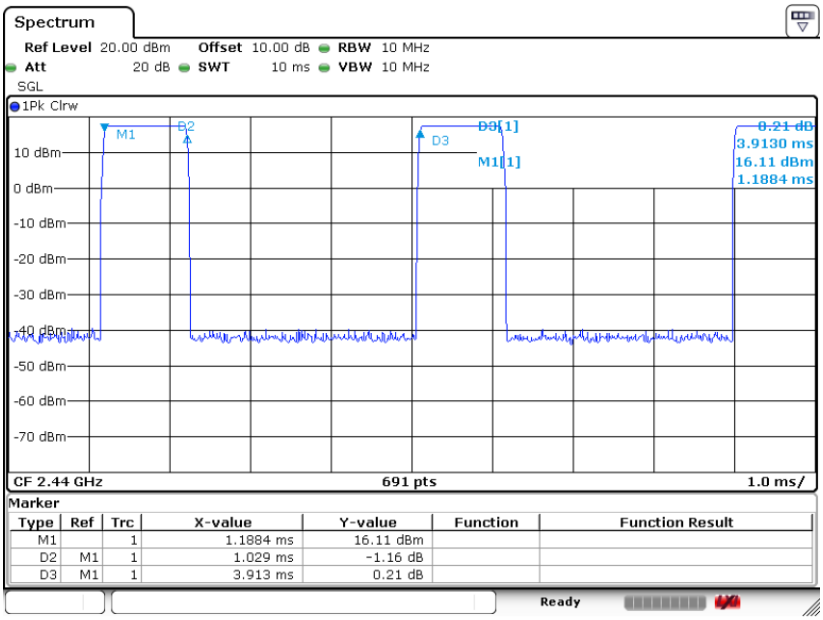
Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
Zigbee 2.4 GHz Band	26.30	1029	0.97	1kHz
Bluetooth -LE	61.78	388	2.58	3kHz
802.11b for Ant. 1	98.62	-	-	10Hz
802.11b for Ant. 2	98.62	-	-	10Hz

<CDD Modes>

Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting
802.11n HT40 for Ant. 1	87.01	670	1.49	3kHz
802.11n HT40 for Ant. 2	86.84	660	1.52	3kHz

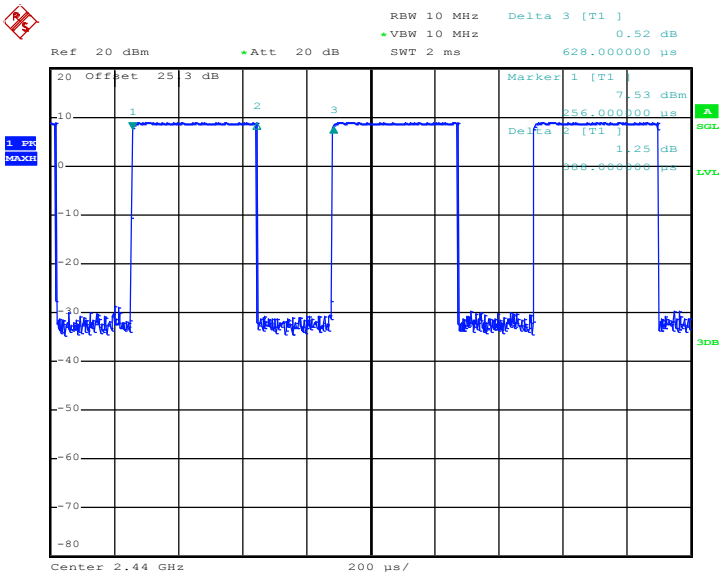
For the co-location mode, the larger VBW will apply.

Zigbee 2.4 GHz



Date: 5.JUL.2017 10:55:24

Bluetooth - LE



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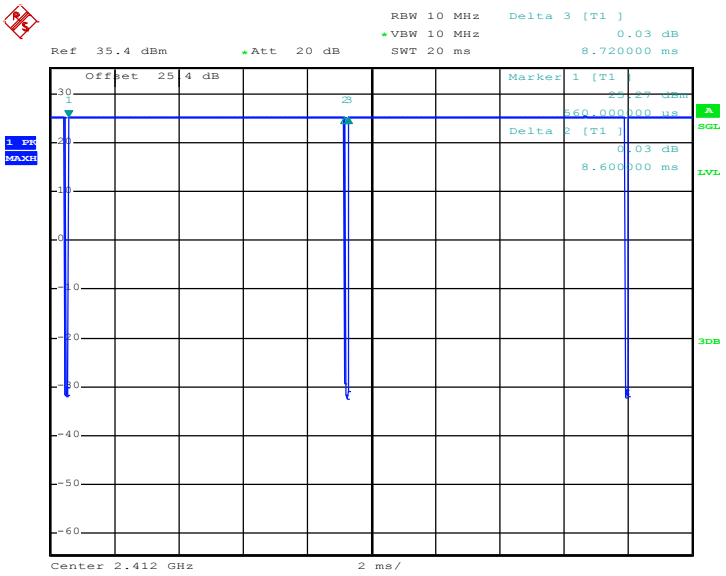
<Ant. 1>

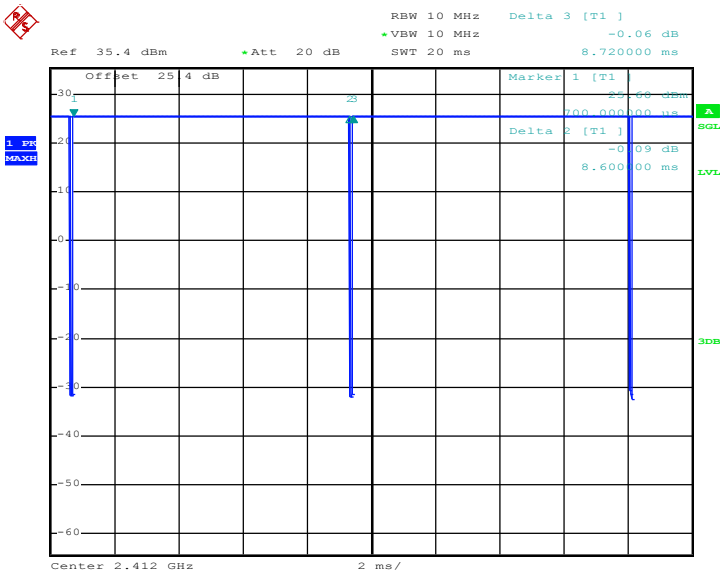
802.11b



Date: 18.OCT.2017 15:26:23

<Ant. 2>

802.11b



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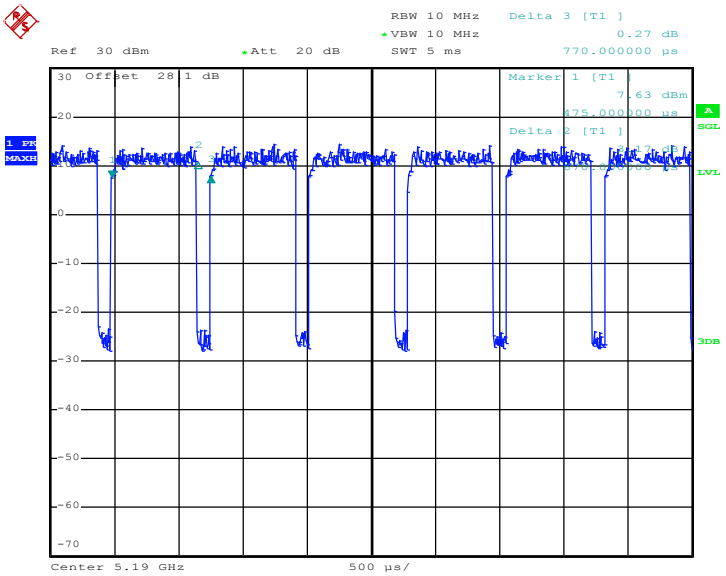
MIMO <Ant. 1>

802.11n HT40



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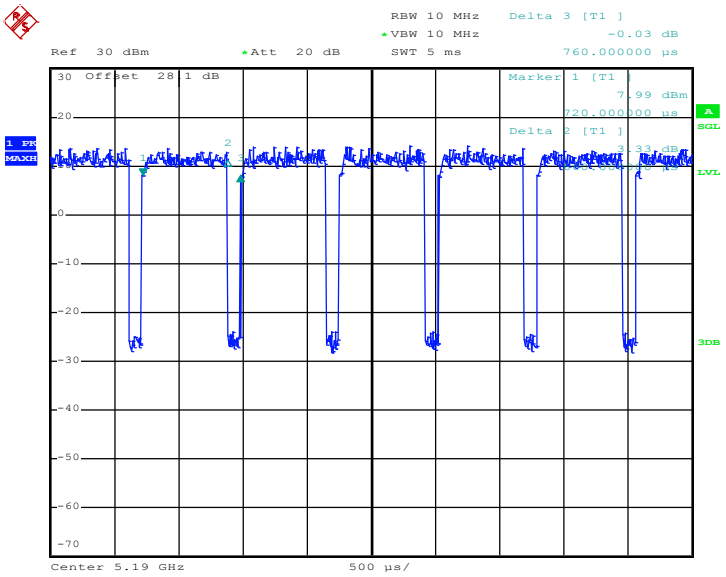
MIMO <Ant. 2>

802.11n HT40



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