



FCC CO-LOCATION RADIO TEST REPORT

FCC ID : 2AJ3Y-1013
Equipment : Wireless Game Controller
Model Name : T28B69
Applicant : Zippy Hippy Twister Limited Liability Company
2000 Town Center, Suite 1900 Southfield, MI 48075
United States
Standard : FCC Part 15 Subpart E §15.407

The product was received on Oct. 31, 2019 and testing was started from Jan. 17, 2020 and completed on Jan. 18, 2020. We, SPORTON INTERNATIONAL INC., EMC & Wireless Communications Laboratory, 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 report must not be used by the client to claim product certification, approval, or endorsement by TAF or any agency of government.

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

Louis Wu

Approved by: Louis Wu

SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory

No. 52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.)



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History of this test report

Report No.	Version	Description	Issued Date
FR952805-03F	01	Initial issue of report	Feb. 20, 2020

Summary of Test Result

Report Clause	Ref Std. Clause	Test Items	Result (PASS/FAIL)
3.1	15.407(b)	Unwanted Emissions	Pass
3.2	15.203 15.407(a)	Antenna Requirement	Pass

Declaration of Conformity:

The test results with all measurement uncertainty excluded are presented in accordance with the regulation limits or requirements declared by manufacturers.

Comments and Explanations:

The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.

Reviewed by: Wii Chang

Report Producer: Lucy Wu

1 General Description

1.1 Product Feature of Equipment Under Test

Product Feature	
Equipment	Wireless Game Controller
Model Name	T28B69
FCC ID	2AJ3Y-1013
EUT supports Radios application	WLAN 11a/b/g/n HT20 WLAN 11ac VHT20 Bluetooth BR/EDR/LE

1.2 Product Specification of Equipment Under Test

Standards-related Product Specification	
Tx/Rx Channel Frequency Range	2400 MHz ~ 2483.5 MHz 5180 MHz ~ 5240 MHz
Antenna Gain / Gain	Bluetooth: PCB Inv F Antenna with gain 2.56 dBi <2412 MHz ~ 2462 MHz> Stamped PIFA Antenna with gain 2.90 dBi <5180 MHz ~ 5240 MHz> Stamped PIFA Antenna with gain 5.47 dBi
Type of Modulation	Bluetooth LE: GFSK 802.11b : DSSS (DBPSK / DQPSK / CCK) 802.11a/n : OFDM (BPSK / QPSK / 16QAM / 64QAM)

1.3 Modification of EUT

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



1.4 Testing Location

Test Site	SPORTON INTERNATIONAL INC. EMC & Wireless Communications Laboratory
Test Site Location	No.52, Huaya 1st Rd., Guishan Dist., Taoyuan City, Taiwan (R.O.C.) TEL: +886-3-327-3456 FAX: +886-3-328-4978
Test Site No.	Sporton Site No.
	03CH07-HY

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

FCC designation No.: TW1190

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 v02r01.
- ♦ FCC KDB 414788 D01 Radiated Test Site v01r01.
- ♦ FCC KDB Publication No. 558074 D01 DTS Meas. Guidance v05
- ♦ 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 three orthogonal panels, X, Y, Z. The worst cases (X plane for Mode 3 / 4 ; Y plane for Mode 1 / 2 / 5) were recorded in this report.
- b. AC power line Conducted Emission was tested under maximum output power.

2.1 Carrier Frequency and Channel

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz Bluetooth-LE	6	2414	7	2416
	39	2480		

Frequency Band	Channel	Freq. (MHz)	Channel	Freq. (MHz)
2400-2483.5 MHz 802.11b	5	2432	6	2437

Frequency Band	Channel	Freq. (MHz)
5150-5250 MHz 802.11a	36	5180

Frequency Band	Channel	Freq. (MHz)
5150-5250 MHz 802.11n HT20	44	5220

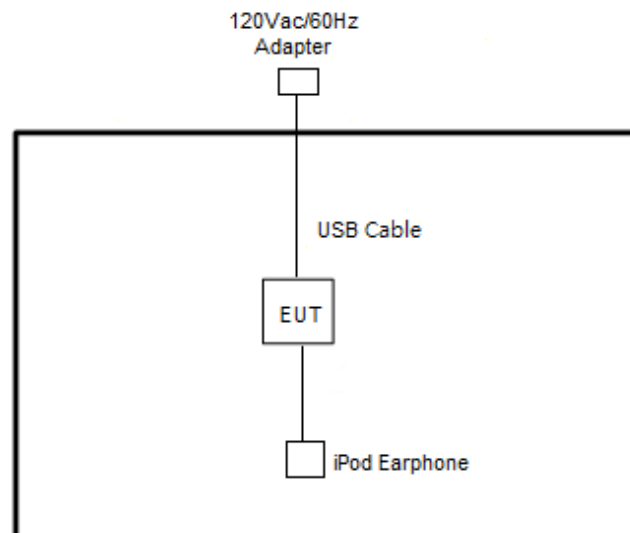
2.2 Test Mode

Final test modes are considering the modulation and worse data rates as below table.

<Co-Location>

Mode	Modulation	Data Rate
1	802.11b (CH05) for Ant. 1 + Bluetooth-LE (CH39) for Ant. 2	6 Mbps + 2 Mbps
2	802.11b (CH06) for Ant. 1 + Bluetooth-LE (CH07) for Ant. 2	6 Mbps + 2 Mbps
3	802.11n HT20 (CH36) for Ant. 1 + Bluetooth-LE (CH39) for Ant. 2	MCS0 + 2 Mbps
4	802.11a (CH44) for Ant. 1 + Bluetooth-LE (CH39) for Ant. 2	6 Mbps + 2 Mbps
5	802.11b (CH06) for Ant. 1 + Bluetooth-LE (CH06) for Ant. 2	6 Mbps + 2 Mbps

2.3 Connection Diagram of Test System



2.4 Support Unit used in test configuration and system

Item	Equipment	Trade Name	Model Name	FCC ID	Data Cable	Power Cord
1.	iPod Earphone	Apple	N/A	Verification	Unshielded, 1.0 m	N/A

2.5 EUT Operation Test Setup

The RF test items, utility “Compliance tool (1.0.0.57)” was installed in Notebook which was programmed in order to make the EUT get into the engineering modes to provide channel selection, power level, data rate and the application type and for continuous transmitting 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.

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

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

- (2) KDB789033 D02 v02r01 G)2)c)

- (i) Sections 15.407(b)(1-3) specifies the unwanted emissions limit 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.
- (ii) Section 15.407(b)(4) specifies the unwanted emissions limit for the U-NII-3 band. A band emissions mask is specified in Section 15.407(b)(4)(i). The emission limits are based on the use of a peak detector.

3.1.2 Measuring Instruments

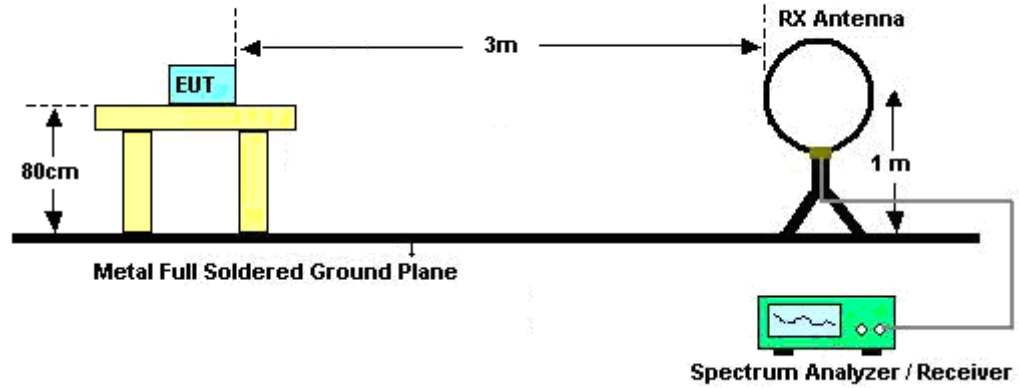
See list of measuring equipment of this test report.

3.1.3 Test Procedures

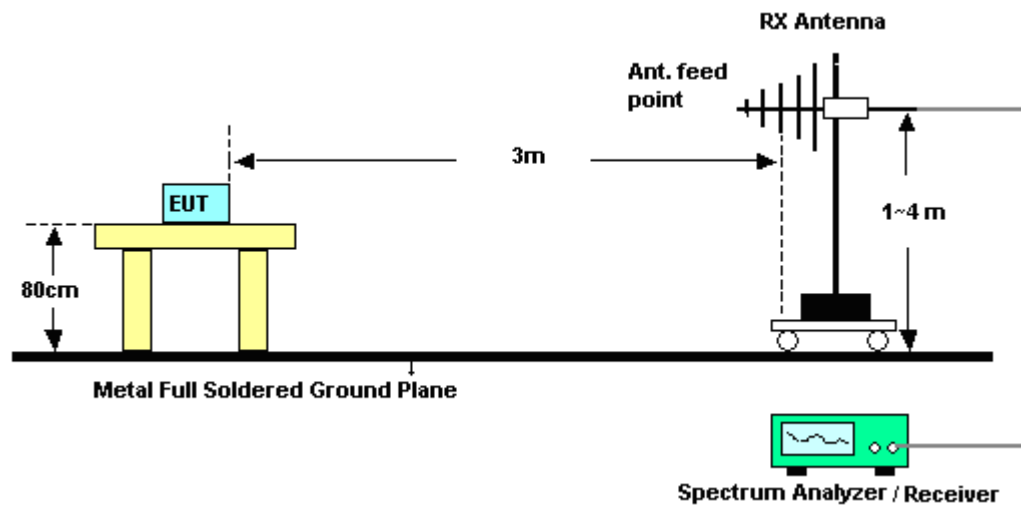
1. The testing follows FCC KDB 789033 D02 General UNII Test Procedures New Rules v02r01. Section G) Unwanted emissions measurement.
 - (1) Procedure for Unwanted Emissions Measurements Below 1000MHz
 - RBW = 120 kHz
 - VBW = 300 kHz
 - Detector = Peak
 - Trace mode = max hold
 - (2) Procedure for Peak Unwanted Emissions Measurements Above 1000 MHz
 - RBW = 1 MHz
 - VBW \geq 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 \geq 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. The 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

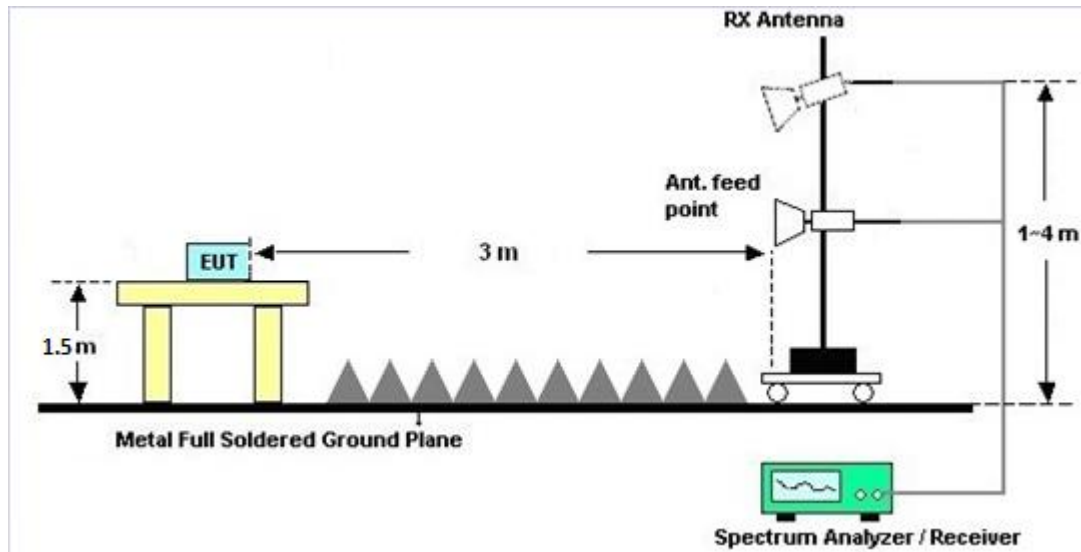
For radiated emissions below 30MHz



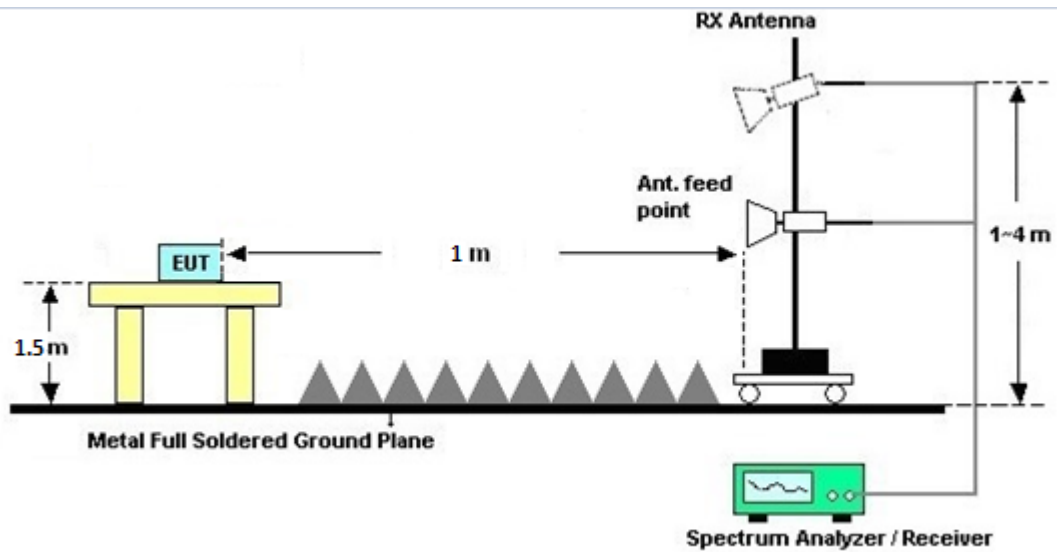
For radiated emissions from 30MHz to 1GHz



For radiated emissions above 1GHz



For radiated emissions from 18GHz~40GHz



**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 alternative test site - semi-Anechoic chamber according to 414788 D01 Radiated Test Site v01r01, 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
Bilog Antenna	TESEQ	CBL 6111D & 00800N1D01 N-06	35419 & 03	30MHz~1GHz	Apr. 30, 2019	Jan. 17, 2020~ Jan. 18, 2020	Apr. 29, 2020	Radiation (03CH07-HY)
Double Ridge Horn Antenna	ESCO	3117	00075962	1GHz ~ 18GHz	Dec. 06, 2019	Jan. 17, 2020~ Jan. 18, 2020	Dec. 05, 2020	Radiation (03CH07-HY)
EMI Test Receiver	Rohde & Schwarz	ESU26	100472	20Hz~26.5GHz	Jan. 10, 2020	Jan. 17, 2020~ Jan. 18, 2020	Jan. 09, 2021	Radiation (03CH07-HY)
Hygrometer	Testo	HTC-2	1	N/A	Jun. 17, 2019	Jan. 17, 2020~ Jan. 18, 2020	Jun. 16, 2020	Radiation (03CH07-HY)
Loop Antenna	Rohde & Schwarz	HFH2-Z2	100315	9 kHz~30 MHz	Dec. 26, 2019	Jan. 17, 2020~ Jan. 18, 2020	Dec. 25, 2020	Radiation (03CH07-HY)
Preamplifier	MITEQ	AMF-7D-0010 1800-30-10P	1590075	1GHz~18GHz	Apr. 24, 2019	Jan. 17, 2020~ Jan. 18, 2020	Apr. 23, 2020	Radiation (03CH07-HY)
Preamplifier	COM-POWER	PA-103A	161241	10MHz~1GHz	May 20, 2019	Jan. 17, 2020~ Jan. 18, 2020	May 19, 2020	Radiation (03CH07-HY)
Preamplifier	Agilent	8449B	3008A02362	1GHz~26.5GHz	Nov. 01, 2019	Jan. 17, 2020~ Jan. 18, 2020	Oct. 31, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY24971/4, MY28655/4	9kHz~30MHz	Feb. 26, 2019	Jan. 17, 2020~ Jan. 18, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	30MHz~1GHz	Feb. 26, 2019	Jan. 17, 2020~ Jan. 18, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 104	MY28655/4, MY24971/4, MY15682/4	1GHz~18GHz	Feb. 26, 2019	Jan. 17, 2020~ Jan. 18, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
Controller	ChainTek	Chaintek 3000	N/A	Control Turn table	N/A	Jan. 17, 2020~ Jan. 18, 2020	N/A	Radiation (03CH07-HY)
Controller	Max-Full	MF7802	MF780208368	Control Ant Mast	N/A	Jan. 17, 2020~ Jan. 18, 2020	N/A	Radiation (03CH07-HY)
Antenna Mast	Max-Full	MFA520BS	N/A	1m~4m	N/A	Jan. 17, 2020~ Jan. 18, 2020	N/A	Radiation (03CH07-HY)
Turn Table	ChainTek	Chaintek 3000	N/A	0~360 Degree	N/A	Jan. 17, 2020~ Jan. 18, 2020	N/A	Radiation (03CH07-HY)
SHF-EHF Horn Antenna	SCHWARZBECK	BBHA 9170	BBHA9170576	18GHz~40GHz	May 14, 2019	Jan. 17, 2020~ Jan. 18, 2020	May 13, 2020	Radiation (03CH07-HY)
Spectrum Analyzer	Agilent	N9030A	MY52350276	3Hz~44GHz	Apr. 02, 2019	Jan. 17, 2020~ Jan. 18, 2020	Apr. 01, 2020	Radiation (03CH07-HY)
Software	Audix	E3 6.2009-8-24	N/A	N/A	N/A	Jan. 17, 2020~ Jan. 18, 2020	N/A	Radiation (03CH07-HY)
RF Cable	HUBER + SUHNER	SUCOFLEX 102	MY2858/2	18GHz~40GHz	Feb. 26, 2019	Jan. 17, 2020~ Jan. 18, 2020	Feb. 25, 2020	Radiation (03CH07-HY)
Preamplifier	EMEC	EM18G40G	060715	18GHz~40GHz	Dec. 13, 2019	Jan. 17, 2020~ Jan. 18, 2020	Dec. 12, 2020	Radiation (03CH07-HY)

5 Uncertainty of Evaluation

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

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	4.6
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Uncertainty of Radiated Emission Measurement (1000 MHz ~ 18000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.2
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Uncertainty of Radiated Emission Measurement (18000 MHz ~ 40000 MHz)

Measuring Uncertainty for a Level of Confidence of 95% ($U = 2Uc(y)$)	5.3
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Appendix A. Radiated Spurious Emission

Test Engineer :	Jesse Wang , Stan Hsieh, Ken Wu	Temperature :	21~24°C
		Relative Humidity :	56~60%

2.4GHz 2400~2483.5MHz (Band Edge @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 1 Ant 1 11b Ch05 + Ant2 BLE 2M Ch39		2383.95	54.67	-19.33	74	40.33	31.83	17.74	35.23	186	335	P	H
		2383.95	46.08	-7.92	54	31.74	31.83	17.74	35.23	186	335	A	H
	*	2432	104.95	-	-	90.49	31.93	17.79	35.26	186	335	P	H
	*	2432	101.85	-	-	87.39	31.93	17.79	35.26	186	335	A	H
		2495.16	53.92	-20.08	74	39.28	32.1	17.84	35.3	186	335	P	H
		2483.544	43.81	-10.19	54	29.19	32.07	17.84	35.29	186	335	A	H
		2384.12	54.93	-19.07	74	40.59	31.83	17.74	35.23	100	348	P	V
		2383.95	46.23	-7.77	54	31.89	31.83	17.74	35.23	100	348	A	V
	*	2432	104.31	-	-	89.85	31.93	17.79	35.26	100	348	P	V
	*	2432	101.14	-	-	86.68	31.93	17.79	35.26	100	348	A	V
		2485.304	53.7	-20.3	74	39.08	32.07	17.84	35.29	100	348	P	V
		2483.544	43.83	-10.17	54	29.21	32.07	17.84	35.29	100	348	A	V
Remark	1. No other spurious found.												
	2. All results are PASS against Peak and Average limit line.												



BLE (Band Edge @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 1 Ant 1 11b Ch05 + Ant2 BLE 2M Ch39		2383.61	54.48	-19.52	74	40.14	31.83	17.74	35.23	160	36	P	H
		2384.12	47.15	-6.85	54	32.81	31.83	17.74	35.23	160	36	A	H
	*	2480	96.68	-	-	82.06	32.07	17.84	35.29	160	36	P	H
	*	2480	93.34	-	-	78.72	32.07	17.84	35.29	160	36	A	H
		2499.56	54.78	-19.22	74	40.14	32.1	17.84	35.3	160	36	P	H
		2486.008	44.7	-9.3	54	30.08	32.07	17.84	35.29	160	36	A	H
		2383.44	53.8	-20.2	74	39.46	31.83	17.74	35.23	100	74	P	V
		2383.95	46.73	-7.27	54	32.39	31.83	17.74	35.23	100	74	A	V
	*	2480	96.92	-	-	82.3	32.07	17.84	35.29	100	74	P	V
	*	2480	95.18	-	-	80.56	32.07	17.84	35.29	100	74	A	V
		2486.272	53.89	-20.11	74	39.27	32.07	17.84	35.29	100	74	P	V
		2499.736	44.7	-9.3	54	30.06	32.1	17.84	35.3	100	74	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz (Harmonic @ 3m)**

Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Mode 1 Ant 1 11b Ch05 + Ant2 BLE 2M Ch39		2384	58.51	-15.49	74	44.17	31.83	17.74	35.23	142	341	P	H
		2384	50.6	-3.4	54	36.26	31.83	17.74	35.23	142	341	A	H
		2384	58.88	-15.12	74	44.54	31.83	17.74	35.23	120	348	P	V
		2384	49.24	-4.76	54	34.9	31.83	17.74	35.23	120	348	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz (Band Edge @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 2 Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07		2389.9	54.82	-19.18	74	40.51	31.8	17.74	35.23	188	341	P	H
		2390	43.8	-10.2	54	29.49	31.8	17.74	35.23	188	341	A	H
	*	2437	109.35	-	-	94.82	32	17.79	35.26	188	341	P	H
	*	2437	106.2	-	-	91.67	32	17.79	35.26	188	341	A	H
		2486.36	54.84	-19.16	74	40.22	32.07	17.84	35.29	188	341	P	H
		2483.72	43.74	-10.26	54	29.12	32.07	17.84	35.29	188	341	A	H
		2320.54	54.85	-19.15	74	40.58	31.87	17.59	35.19	100	347	P	V
		2390	43.63	-10.37	54	29.32	31.8	17.74	35.23	100	347	A	V
	*	2437	108.24	-	-	93.71	32	17.79	35.26	100	347	P	V
	*	2437	105.11	-	-	90.58	32	17.79	35.26	100	347	A	V
		2491.552	53.64	-20.36	74	38.99	32.1	17.84	35.29	100	347	P	V
		2483.544	43.83	-10.17	54	29.21	32.07	17.84	35.29	100	347	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BLE (Band Edge @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 2 Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07		2348.93	54.22	-19.78	74	39.87	31.9	17.66	35.21	103	44	P	H
		2389.56	44.44	-9.56	54	30.13	31.8	17.74	35.23	103	44	A	H
	*	2416	98.86	-	-	84.5	31.87	17.74	35.25	103	44	P	H
	*	2416	97.15	-	-	82.79	31.87	17.74	35.25	103	44	A	H
		2483.984	54.43	-19.57	74	39.81	32.07	17.84	35.29	103	44	P	H
		2493.84	44.66	-9.34	54	30.02	32.1	17.84	35.3	103	44	A	H
		2354.2	54.5	-19.5	74	40.18	31.87	17.66	35.21	100	61	P	V
		2389.39	44.42	-9.58	54	30.11	31.8	17.74	35.23	100	61	A	V
	*	2416	97.99	-	-	83.63	31.87	17.74	35.25	100	61	P	V
	*	2416	96.32	-	-	81.96	31.87	17.74	35.25	100	61	A	V
		2496.92	53.92	-20.08	74	39.28	32.1	17.84	35.3	100	61	P	V
		2490.056	44.65	-9.35	54	30	32.1	17.84	35.29	100	61	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz (Harmonic @ 3m)**

Ant. Simultaneously	Note	Frequency (MHz)	Level (dB μ V/m)	Over Limit (dB)	Limit Line (dB μ V/m)	Read Level (dB μ V)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Mode 2 Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07		2390	52.3	-21.7	74	37.99	31.8	17.74	35.23	162	320	P	H
		2390	44.22	-9.78	54	29.91	31.8	17.74	35.23	162	320	A	H
		2390	53.26	-20.74	74	38.95	31.8	17.74	35.23	232	56	P	V
		2390	44.33	-9.67	54	30.02	31.8	17.74	35.23	232	56	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**Band 1 5150~5250MHz (Band Edge @ 3m)**

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 3 Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39		5148.98	62.66	-11.34	74	52.39	34.4	11.29	35.42	100	285	P	H
		5149.76	49.45	-4.55	54	39.18	34.4	11.29	35.42	100	285	A	H
	*	5180	107.9	-	-	97.55	34.47	11.29	35.41	100	285	P	H
	*	5180	98.95	-	-	88.6	34.47	11.29	35.41	100	285	A	H
		5145.6	63.16	-10.84	74	52.89	34.4	11.29	35.42	103	64	P	V
		5150	48.62	-5.38	54	38.35	34.4	11.29	35.42	103	64	A	V
	*	5180	105.95	-	-	95.6	34.47	11.29	35.41	103	64	P	V
	*	5180	97.65	-	-	87.3	34.47	11.29	35.41	103	64	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



BLE (Band Edge @ 3m)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 3 Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39	*	2480	97.44	-	-	82.82	32.07	17.84	35.29	200	29	P	H
	*	2480	95.75	-	-	81.13	32.07	17.84	35.29	200	29	A	H
		2485.72	54.26	-19.74	74	39.64	32.07	17.84	35.29	200	29	P	H
		2499.52	44.45	-9.55	54	29.81	32.1	17.84	35.3	200	29	A	H
	*	2480	95.44	-	-	80.82	32.07	17.84	35.29	346	36	P	V
	*	2480	91.24	-	-	76.62	32.07	17.84	35.29	346	36	A	V
		2483.56	57.48	-16.52	74	42.86	32.07	17.84	35.29	346	36	P	V
		2485.32	44.47	-9.53	54	29.85	32.07	17.84	35.29	346	36	A	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



2.4GHz 2400~2483.5MHz, Band 1 5150~5250MHz (Harmonic @ 3m)

Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Mode 4 Ant 1 11a Ch44 + Ant 2 BLE 2M Ch39		4960	50.12	-23.88	74	40.3	34.23	11.05	35.46	100	0	P	H
		4960	40.11	-13.89	54	30.29	34.23	11.05	35.46	100	0	A	H
		7440	41.78	-32.22	74	49.93	35.5	14.73	58.38	100	0	P	H
		10440	44.06	-24.14	68.2	48.13	37.53	17.94	59.54	100	0	P	H
		15660	45.4	-28.6	74	40.58	40.45	21.07	56.7	100	0	P	H
		4960	50.01	-23.99	74	40.19	34.23	11.05	35.46	100	0	P	V
		4960	39.87	-14.13	54	30.05	34.23	11.05	35.46	100	0	A	V
		7440	40.14	-33.86	74	48.29	35.5	14.73	58.38	100	0	P	V
		10440	44.59	-23.61	68.2	48.66	37.53	17.94	59.54	100	0	P	V
		15660	44.95	-29.05	74	40.13	40.45	21.07	56.7	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												

**2.4GHz 2400~2483.5MHz (Harmonic @ 3m)**

Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Mode 5 Ant 1 11b Ch06 + Ant 2 BLE 2M Ch06		4828	40.99	-33.01	74	54.17	34.05	11.8	59.03	100	0	P	H
		4874	42.86	-31.14	74	55.79	34.1	11.89	58.92	100	0	P	H
		7311	41.81	-32.19	74	50.11	35.6	14.4	58.3	100	0	P	H
		4828	40.04	-33.96	74	53.22	34.05	11.8	59.03	100	0	P	V
		4874	43.17	-30.83	74	56.1	34.1	11.89	58.92	100	0	P	V
		7311	41.45	-32.55	74	49.75	35.6	14.4	58.3	100	0	P	V
Remark	1. No other spurious found. 2. All results are PASS against Peak and Average limit line.												



Emission below 1GHz

2.4GHz 2400~2483.5MHz and Band 1 5150~5250MHz (LF)

	Note	Frequency	Level	Over	Limit	Read	Antenna	Path	Preamp	Ant	Table	Peak	Pol.
Ant.				Limit	Line	Level	Factor	Loss	Factor	Pos	Pos	Avg.	
Simultaneously		(MHz)	(dBμV/m)	(dB)	(dBμV/m)	(dBμV)	(dB/m)	(dB)	(dB)	(cm)	(deg)	(P/A)	(H/V)
Mode 4 Ant 1 11a Ch44 + Ant 2 BLE 2M Ch39		30	23	-17	40	27.18	24.6	1.2	29.98	-	-	P	H
		47.82	20.63	-19.37	40	33.94	15.48	1.2	29.99	-	-	P	H
		79.95	17.5	-22.5	40	32.68	13.19	1.62	29.99	-	-	P	H
		602.4	30.54	-15.46	46	30.88	25.46	3.91	29.71	-	-	P	H
		854.4	31.83	-14.17	46	27.32	28.88	4.72	29.09	-	-	P	H
		953.8	33.85	-12.15	46	26.79	30.54	5.06	28.54	100	0	P	H
		30	30.32	-9.68	40	34.5	24.6	1.2	29.98	100	0	P	V
		48.36	26.41	-13.59	40	40.12	15.07	1.21	29.99	-	-	P	V
		58.62	24.49	-15.51	40	41.3	11.97	1.21	29.99	-	-	P	V
		500.2	29.62	-16.38	46	31.91	23.86	3.65	29.8	-	-	P	V
		759.2	30.3	-15.7	46	27.52	27.83	4.36	29.41	-	-	P	V
		937.7	33.61	-12.39	46	27.52	29.75	5	28.66	-	-	P	V
Remark	1. No other spurious found. 2. All results are PASS against limit line.												



Emission below 1GHz
2.4GHz 2400~2483.5MHz (LF)

Ant. Simultaneously	Note	Frequency (MHz)	Level (dBμV/m)	Over Limit (dB)	Limit Line (dBμV/m)	Read Level (dBμV)	Antenna Factor (dB/m)	Path Loss (dB)	Preamp Factor (dB)	Ant Pos (cm)	Table Pos (deg)	Peak Avg. (P/A)	Pol. (H/V)
Mode 5 Ant 1 11b Ch06 + Ant 2 BLE 2M Ch06		30.54	22.43	-17.57	40	27.12	24.09	1.2	29.98	-	-	P	H
		98.58	18.15	-25.35	43.5	30.78	15.7	1.66	29.99	-	-	P	H
		238.71	22.36	-23.64	46	32.64	17.01	2.53	29.82	-	-	P	H
		500.2	32.21	-13.79	46	34.5	23.86	3.65	29.8	-	-	P	H
		860.7	31.86	-14.14	46	27.03	29.03	4.87	29.07	-	-	P	H
		956.6	33.23	-12.77	46	26	30.69	5.06	28.52	100	0	P	H
		30	32.16	-7.84	40	36.34	24.6	1.2	29.98	100	0	P	V
		58.62	24.28	-15.72	40	41.09	11.97	1.21	29.99	-	-	P	V
		202.26	27.9	-15.6	43.5	40.5	14.97	2.28	29.85	-	-	P	V
		500.2	31.16	-14.84	46	33.45	23.86	3.65	29.8	-	-	P	V
		787.9	31.07	-14.93	46	27.89	27.97	4.53	29.32	-	-	P	V
		949.6	33.4	-12.6	46	26.58	30.33	5.06	28.57	-	-	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	Peak or Average
H/V	Horizontal or Vertical

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

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

1. Path Loss(dB) = Cable loss(dB) + Filter loss(dB) + Attenuator loss(dB)
2. Level(dBμV/m) = Antenna Factor(dB/m) + Path Loss(dB) + Read Level(dBμV) - Preamp Factor(dB)
3. Over Limit(dB) = Level(dBμV/m) – Limit Line(dBμV/m)

For Peak Limit @ 2390MHz:

1. Level(dBμV/m)
 = Antenna Factor(dB/m) + Path 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) + Path 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

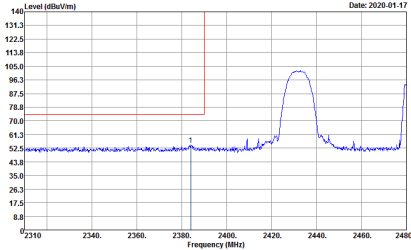
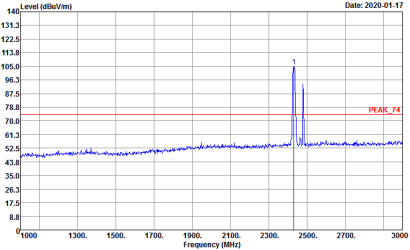
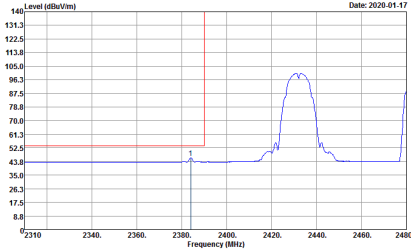
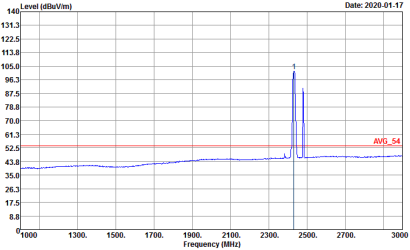
Test Engineer :	Jesse Wang , Stan Hsieh, Ken Wu	Temperature :	21~24°C
		Relative Humidity :	56~60%

Note symbol

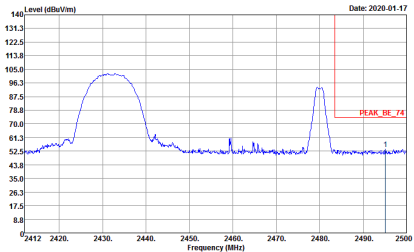
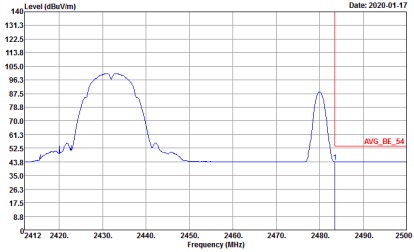
-L	Low channel location
-R	High channel location



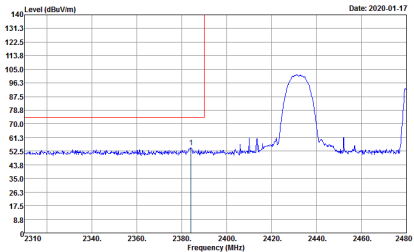
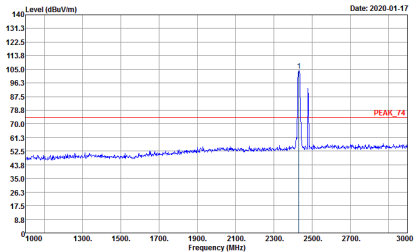
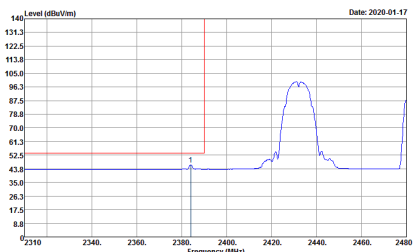
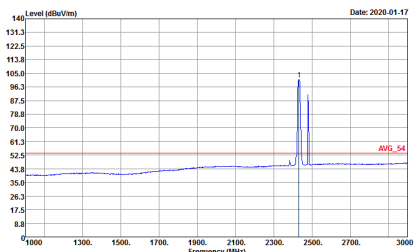
2.4GHz 2400~2483.5MHz (Band Edge @ 3m)

ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - L	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>

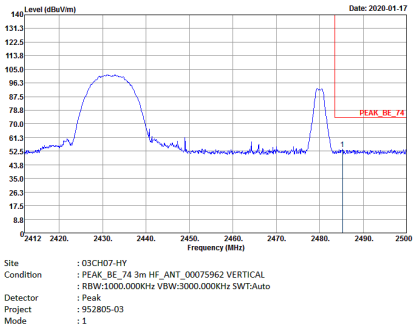
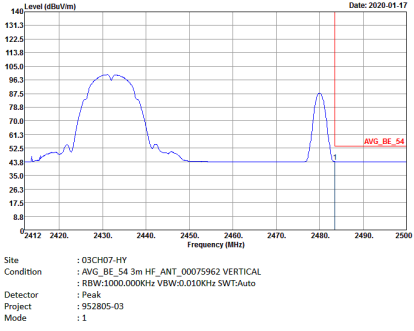


ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - R	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank



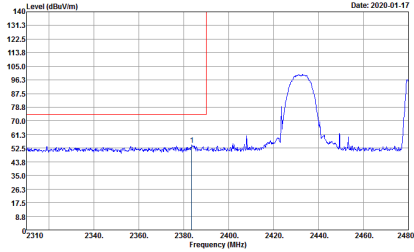
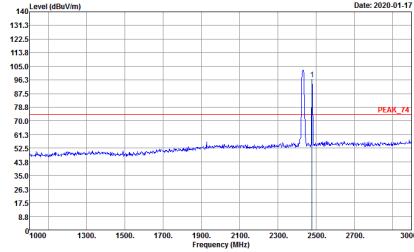
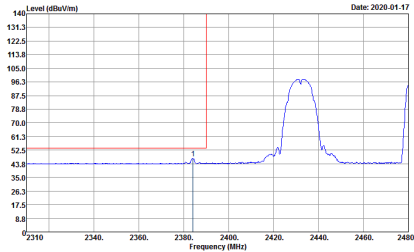
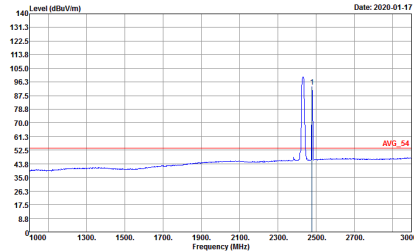
ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - L	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>
Avg.	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:0.010KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>



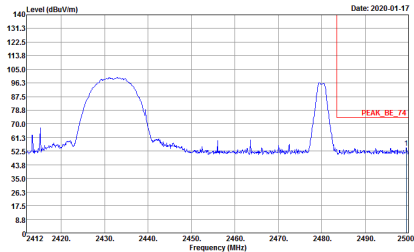
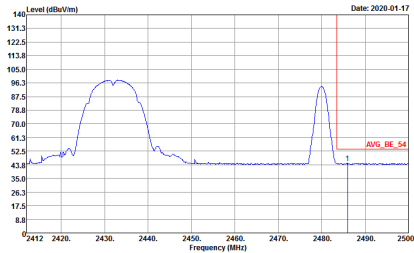
ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - R	
Simultaneously	Vertical	Fundamental
Peak		Left blank
Avg.		Left blank



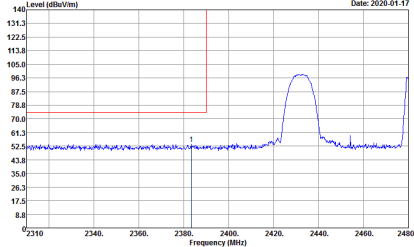
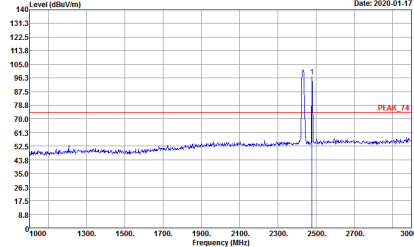
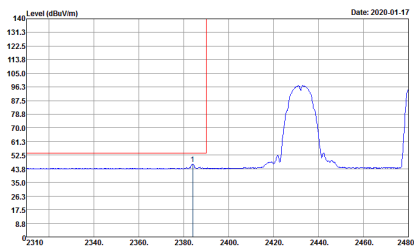
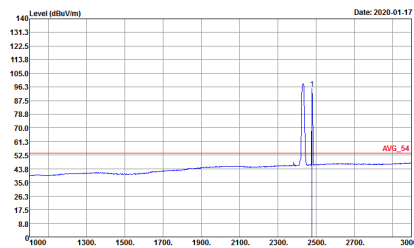
BLE (Band Edge @ 3m)

ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - L	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>
Avg.	<div><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p></div>

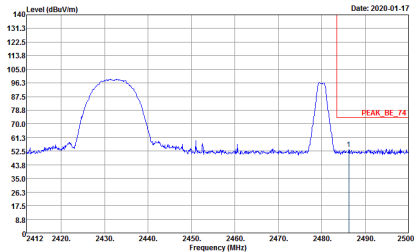
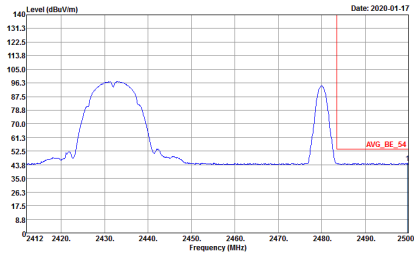


ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - R	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank



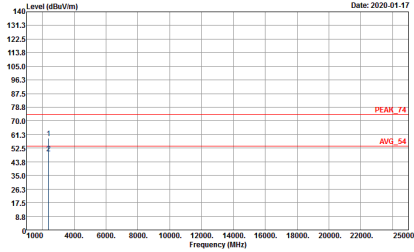
ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - L	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 1</p></div>
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_S4 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 1</p></div>	<div><p>Site : 03CH07-HY Condition : AVG_S4 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 1</p></div>



ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39 - R	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_0007596Z VERTICAL : RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_0007596Z VERTICAL : RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 1</p></div>	Left blank

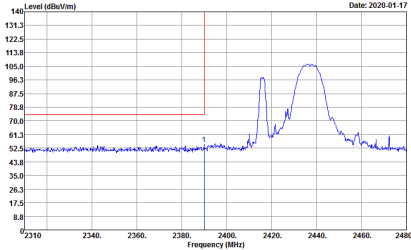
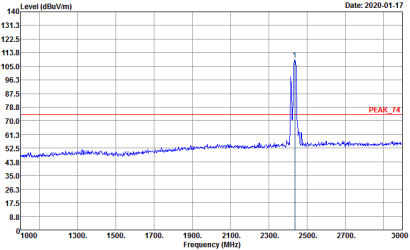
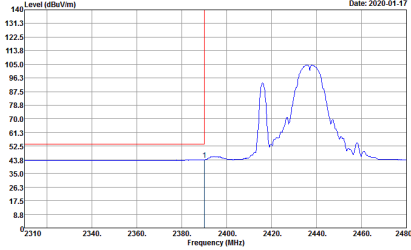
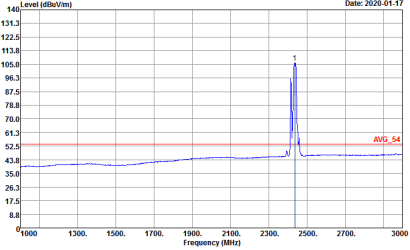


2.4GHz 2400~2483.5MHz (Harmonic @ 3m)

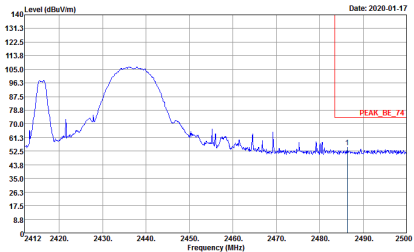
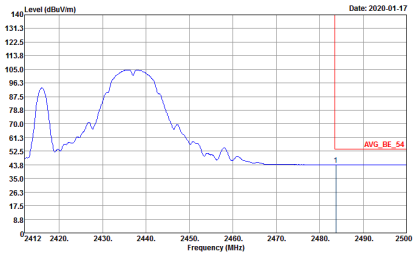
ANT	Mode 1: Ant 1 11b Ch05 + Ant 2 BLE 2M Ch39	
Simultaneously	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 1</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 1</p>



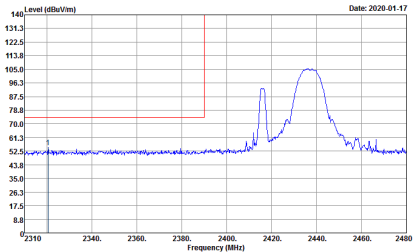
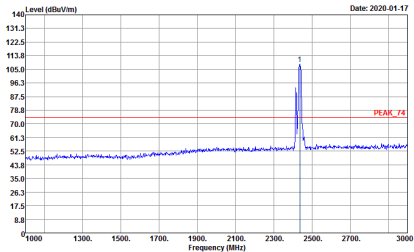
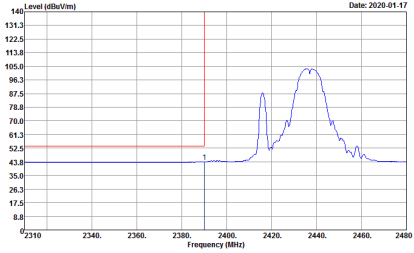
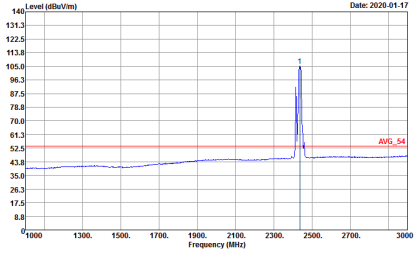
2.4GHz 2400~2483.5MHz (Band Edge @ 3m)

ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - L	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>
Avg.	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>

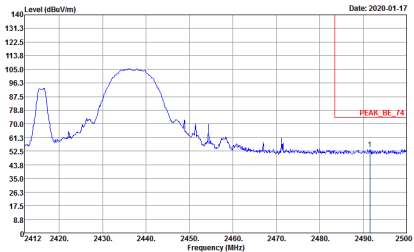
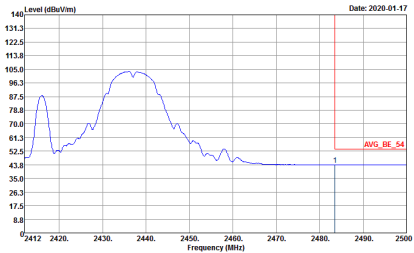


ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - R	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank



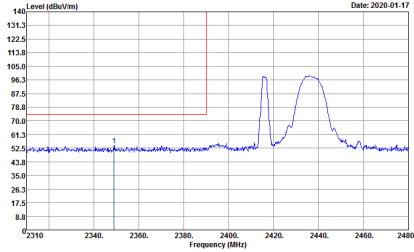
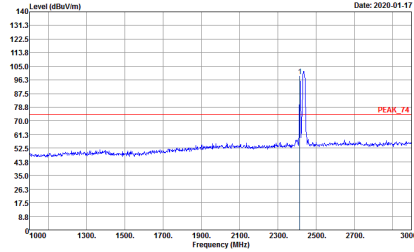
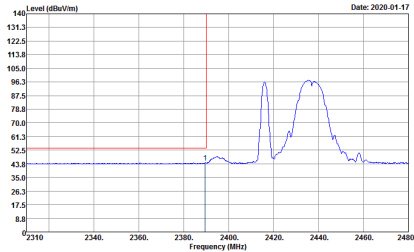
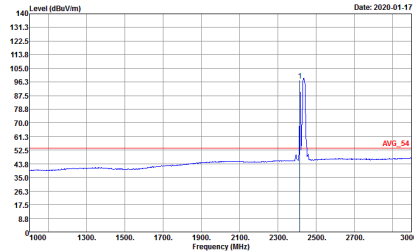
ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - L	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>
Avg.	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL RBW:1000.000kHz VBW:0.010kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL RBW:1000.000kHz VBW:0.010kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>



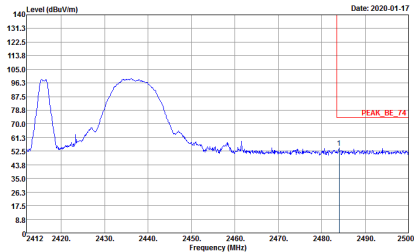
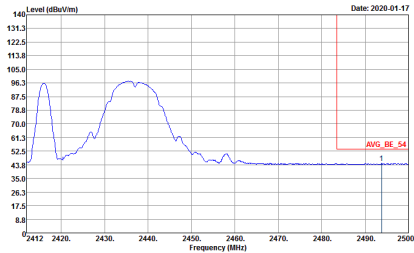
ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - R	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF ANT_00075962 VERTICAL RBW:1000.000kHz VBW:3000.000kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF ANT_00075962 VERTICAL RBW:1000.000kHz VBW:30.010kHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank



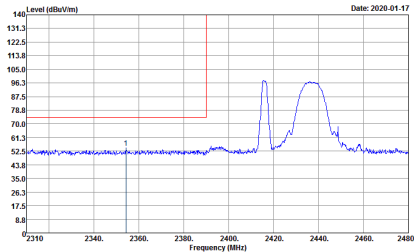
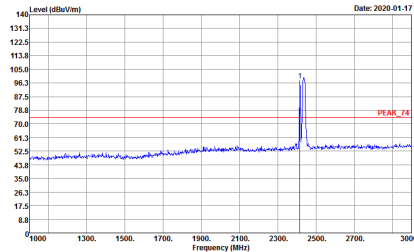
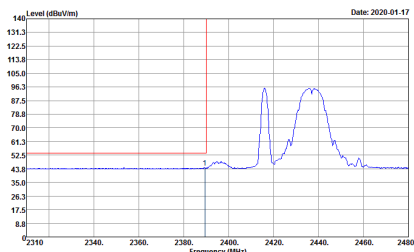
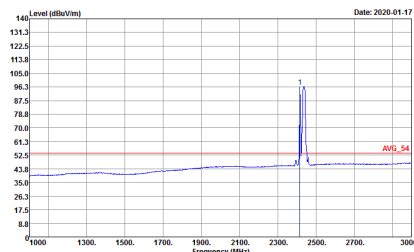
BLE (Band Edge @ 3m)

ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - L	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Level (dBuV/m) vs Frequency (MHz)</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m) vs Frequency (MHz)</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>
Avg.	<div><p>Level (dBuV/m) vs Frequency (MHz)</p><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m) vs Frequency (MHz)</p><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>

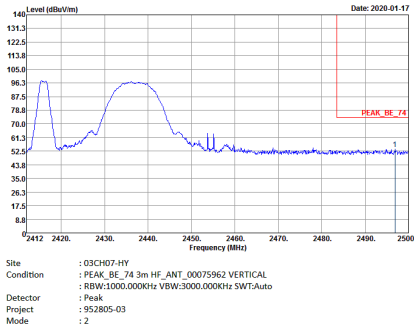
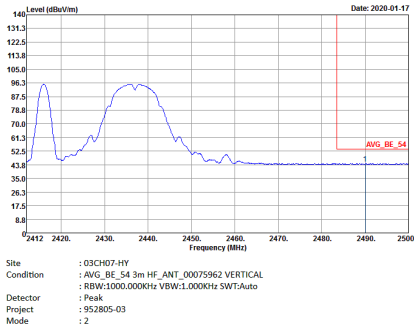


ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - R	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_S4 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p></div>	Left blank



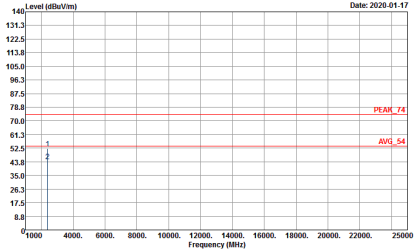
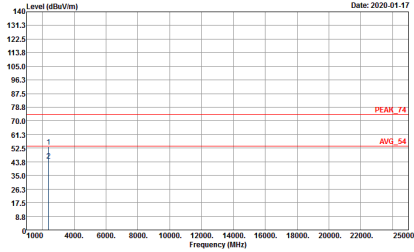
ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - L	
Simultaneously	Vertical	Fundamental
Peak	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:3000.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>
Avg.	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_BE_S4 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>	<div><p>Level (dBuV/m)</p><p>Frequency (MHz)</p><p>Date: 2020-01-17</p><p>Site : 03CH07-HY Condition : AVG_S4 3m HF_ANT_00075962 VERTICAL RBW:1000.000KHz VBW:1.000KHz SWT:Auto Detector : Peak Project : 952805-03 Mode : 2</p></div>



ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07 - R	
Simultaneously	Vertical	Fundamental
<p>Peak</p>		<p>Left blank</p>
<p>Avg.</p>		<p>Left blank</p>

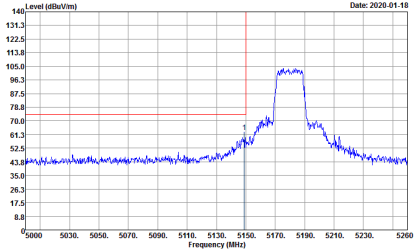
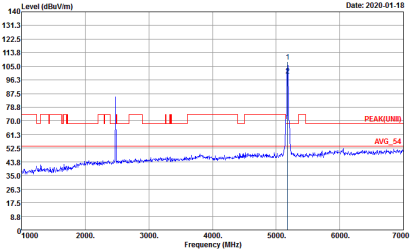
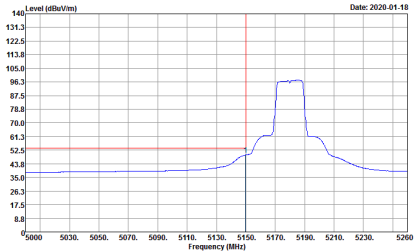


2.4GHz 2400~2483.5MHz (Harmonic @ 3m)

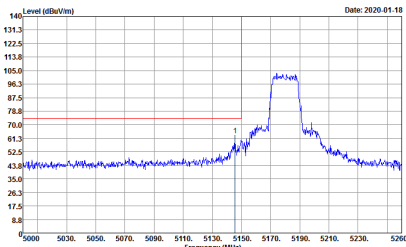
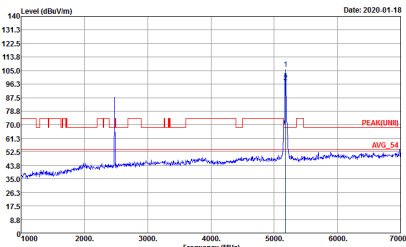
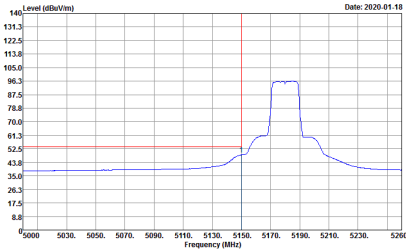
ANT	Mode 2: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch07	
Simultaneously	Horizontal	Vertical
Peak Avg.	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 2</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 2</p>



Band 1 5150~5250MHz (Band Edge @ 3m)

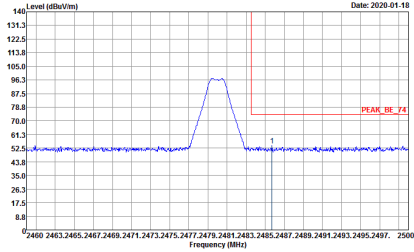
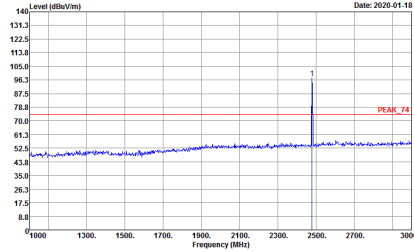
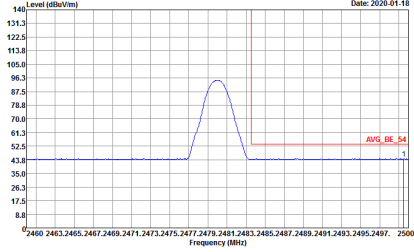
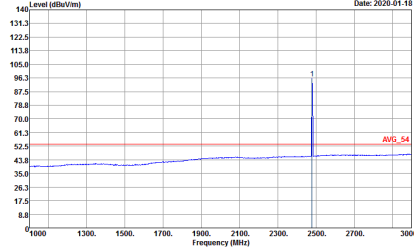
ANT	Mode 3: Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK(UNII) 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p></div>
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_S4 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p></div>	Left blank

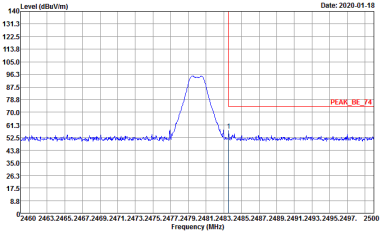
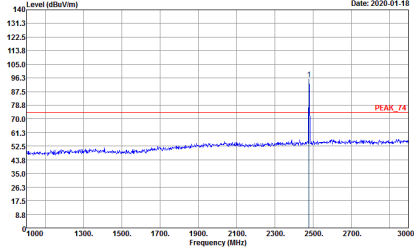
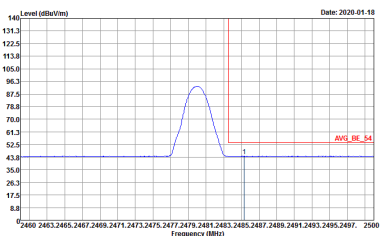
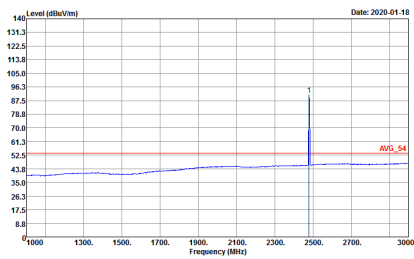


ANT	Mode 3: Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39	
Simultaneously	Vertical	Fundamental
Peak	 <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p>	 <p>Site : 03CH07-HY Condition : PEAK(UNII) 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p>
Avg.	 <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p>	Left blank



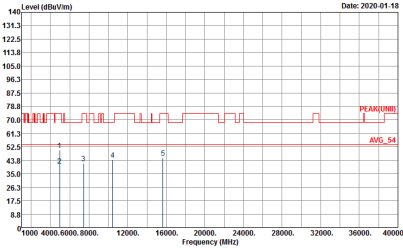
BLE (Band Edge @ 3m)

ANT	Mode 3: Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39	
Simultaneously	Horizontal	Fundamental
Peak	<div><p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p></div>
Avg.	<div><p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p></div>	<div><p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 Wifi setting : 15 BLE setting : 7/0</p></div>

ANT	Mode 3: Ant 1 11n HT20 Ch36 + Ant 2 BLE 2M Ch39	
Simultaneously	Vertical	Fundamental
Peak	 <p>Site : 03CH07-HY Condition : PEAK_BE_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p>	 <p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p>
Avg.	 <p>Site : 03CH07-HY Condition : AVG_BE_54 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p>	 <p>Site : 03CH07-HY Condition : AVG_54 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11an(20)_Tx_Ch36+BLE(2M)_Tx_Ch39 WiFi setting : 15 BLE setting : 7/0</p>



2.4GHz 2400~2483.5MHz, Band 1 5150~5250MHz (Harmonic @ 3m)

ANT	Mode 4: Ant 1 11a Ch44 + Ant 2 BLE 2M Ch39	
Simultaneously	Horizontal	Vertical
Peak Avg.	<div><p>Site : 03CH07-HY Condition : PEAK[UNII] 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11a_Tx_Ch44+BLE(2M)_Tx_Ch39 WiFi setting : 17 BLE setting : 7/0</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK[UNII] 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11a_Tx_Ch44+BLE(2M)_Tx_Ch39 WiFi setting : 17 BLE setting : 7/0</p></div>



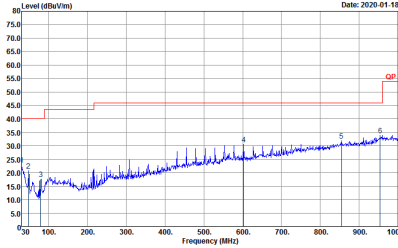
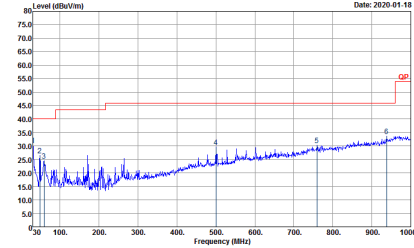
2.4GHz 2400~2483.5MHz (Harmonic @ 3m)

ANT	Mode 5: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch06	
Simultaneously	Horizontal	Vertical
Peak Avg.	<div><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11b_Tx_Ch06+BLE(2M)_Tx_Ch06 Wifi setting : 17 BLE setting : 7/0</p></div>	<div><p>Site : 03CH07-HY Condition : PEAK_74 3m HF_ANT_00075962 VERTICAL Detector : Peak Project : 952805-03 Mode : 11b_Tx_Ch06+BLE(2M)_Tx_Ch06 Wifi setting : 17 BLE setting : 7/0</p></div>



Emission below 1GHz

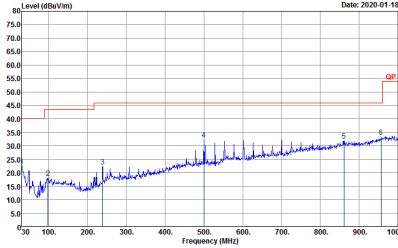
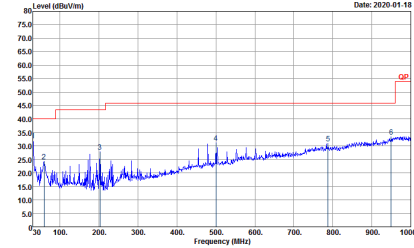
2.4GHz 2400~2483.5MHz, Band 1 5150~5250MHz (LF)

ANT	Mode 4: Ant 1 11a Ch44 + Ant 2 BLE 2M Ch39	
Simultaneously	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11a_Tx_Ch44+BLE(2M)_Tx_Ch39 Wifi setting : 17 BLE setting : 7/0</p>	 <p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) VERTICAL Detector : Peak Project : 952805-03 Mode : 11a_Tx_Ch44+BLE(2M)_Tx_Ch39 Wifi setting : 17 BLE setting : 7/0</p>



Emission below 1GHz

2.4GHz 2400~2483.5MHz (LF)

ANT	Mode 5: Ant 1 11b Ch06 + Ant 2 BLE 2M Ch06	
Simultaneously	Horizontal	Vertical
QP / Peak	 <p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) HORIZONTAL Detector : Peak Project : 952805-03 Mode : 11b_Tx_Ch06+BLE(2M)_Tx_Ch06 Wifi setting : 17 BLE setting : 7/0</p>	 <p>Site : 03CH07-HY Condition : QP 3m LF-ANT-35419(6) VERTICAL Detector : Peak Project : 952805-03 Mode : 11b_Tx_Ch06+BLE(2M)_Tx_Ch06 Wifi setting : 17 BLE setting : 7/0</p>



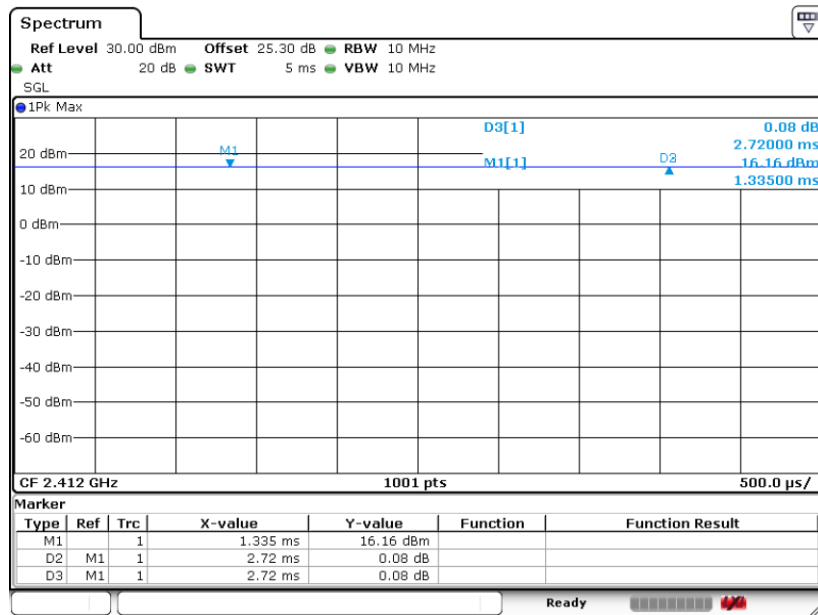
Appendix C. Duty Cycle Plots

Antenna	Band	Duty Cycle(%)	T(us)	1/T(kHz)	VBW Setting	Duty Factor(dB)
2	Bluetooth –LE for 2Mbps	56.80	1065	0.94	1kHz	2.46
1	2.4GHz 802.11b	100	-	-	10Hz	0.00
1	5GHz 802.11a	98.56	-	-	10Hz	0.06
1	5GHz 802.11n HT20	98.46	-	-	10Hz	0.07



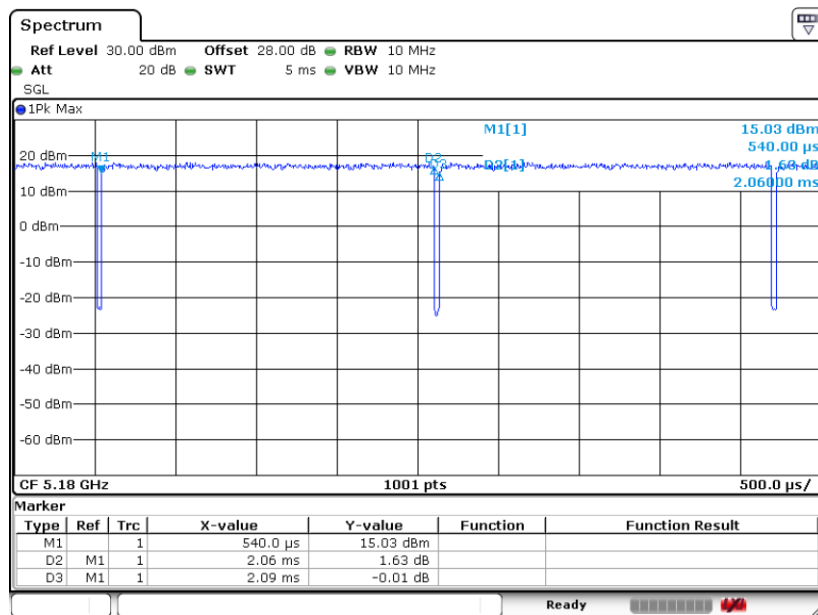
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802.11b

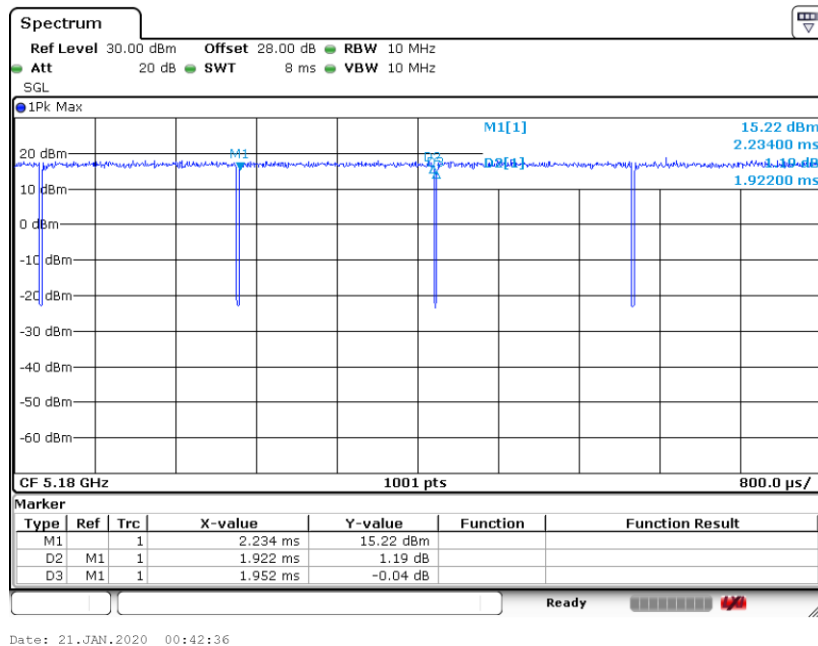


Date: 20.JAN.2020 22:55:48

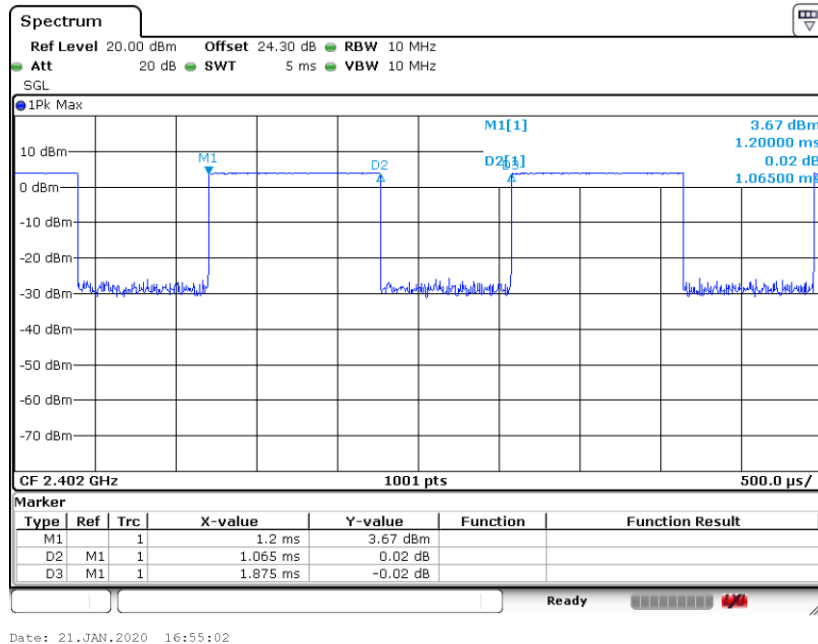
802.11a



Date: 21.JAN.2020 00:41:30

**802.11n HT20**

<Ant. 2>

Bluetooth-LE for 2Mbps

—THE END—