

TEST REPORT

Reference No. : WTS16S0858734-3E
FCC ID..... : 2AB9WW01
Applicant : XYZprinting, Inc.
Address : 10F., No.99, Sec. 5, Nanjing E. Rd., Songshan Dist., Taipei City 10571,
Taiwan (R.O.C.)
Manufacturer : Kinpo Electronics(China)Co,Ltd.
Address : Sha-Tou Control District, Changan Town, Dongguan City,
Guangdong,China
Product Name : Wheeled Robot
Model No. : W-01
Brand : XYZrobot
Standards..... : FCC CFR47 Part 15 C Section 15.247:2015
Date of Receipt sample..... : Aug. 19, 2016
Date of Test..... : Aug. 20 – Sep. 06, 2016
Date of Issue : Sep. 14, 2016
Test Result : **Pass**

Remarks:

The results shown in this test report refer only to the sample(s) tested, this test report cannot be reproduced, except in full, without prior written permission of the company.

The report would be invalid without specific stamp of test institute and the signatures of compiler and approver.

Prepared By:

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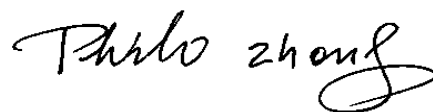
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Compiled by:



Zero Zhou / Test Engineer

Approved by:



Philo Zhong / Manager

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3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTS16S0858734-3E	Aug. 19, 2016	Aug. 20 – Sep. 06, 2016	Sep. 11, 2016	original	-	Replaced
WTS16S0858734-3E	Aug. 19, 2016	Aug. 20 – Sep. 06, 2016	Sep. 14, 2016	Revision1	added Multiple Transmitter Output testing	Valid

4 General Information

4.1 General Description of E.U.T.

Product Name:	Wheeled Robot
Model No.:	W-01
Model Difference:	N/A
Operation Frequency:	2402MHz ~ 2480MHz, separated by 2MHz,40 channels in total for BT 2412MHz ~ 2462MHz for Wi-Fi
The Lowest Oscillator:	32.768KHz
Antenna Type:	chip antenna for BT monopole antenna for Wi-Fi
Antenna Gain:	1.3 dBi for BT 2.0 dBi for Wi-Fi
Type of modulation:	GFSK(BLE only) IEEE 802.11b (CCK/QPSK/BPSK,11Mbps max.) IEEE 802.11g (BPSK/QPSK/16QAM/64QAM,54Mbps max.) IEEE 802.11n (BPSK/QPSK/16QAM/64QAM,HT20:72Mbps max.)

4.2 Details of E.U.T.

Technical Data:	DC 12V by 8*1.5V (UM-3 OR SIZE"AA" OR EQUIV) Batteries
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4.3 Channel List

BT mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
0	2402	1	2404	2	2406	3	2408
4	2410	5	2412	6	2414	7	2416
8	2418	9	2420	10	2422	11	2424
12	2426	13	2428	14	2430	15	2432
16	2434	17	2436	18	2438	19	2440
20	2442	21	2444	22	2446	23	2448
24	2450	25	2452	26	2454	27	2456
28	2458	29	2460	30	2462	31	2464
32	2466	33	2468	34	2470	35	2472
36	2474	37	2476	38	2478	39	2480

Wi-Fi mode

Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)	Channel No.	Frequency (MHz)
1	2412	2	2417	3	2422	4	2427
5	2432	6	2437	7	2442	8	2447
9	2452	10	2457	11	2462	12	-

4.4 Test Facility

The test facility has a test site registered with the following organizations:

- **IC – Registration No.: 7760A-1**

Waltek Services(Shenzhen) Co., Ltd. Has been registered and fully described in a report filed with the Industry Canada. The acceptance letter from the Industry Canada is maintained in our files.

Registration number 7760A-1, October 15, 2015.

- **FCC Test Site 1#– Registration No.: 880581**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 880581, April 29, 2014.

- **FCC Test Site 2#– Registration No.: 328995**

Waltek Services(Shenzhen) Co., Ltd. EMC Laboratory `has been registered and fully described in a report filed with the (FCC) Federal Communications Commission. The acceptance letter from the FCC is maintained in our files. Registration 328995, December 3, 2014.

5 Equipment Used during Test

5.1 Equipments List

3m Semi-anechoic Chamber for Radiation Emissions Test site 1#						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1	EMC Analyzer	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2	Active Loop Antenna	Beijing Dazhi	ZN30900A	-	Sep.15,2015	Sep.14,2016
3	Trilog Broadband Antenna	SCHWARZBECK	VULB9163	336	Sep.15,2015	Sep.14,2016
4	Coaxial Cable (below 1GHz)	Top	TYPE16(13M)	-	Sep.15,2015	Sep.14,2016
5	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9120 D	667	Sep.15,2015	Sep.14,2016
6	Broad-band Horn Antenna	SCHWARZBECK	BBHA 9170	335	Sep.15,2015	Sep.14,2016
7	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	Sep.15,2015	Sep.14,2016
8	Coaxial Cable (above 1GHz)	Top	1GHz-25GHz	EW02014-7	Sep.15,2015	Sep.14,2016
RF Conducted Testing						
Item	Equipment	Manufacturer	Model No.	Serial No.	Last Calibration Date	Calibration Due Date
1.	EMC Analyzer (9k~26.5GHz)	Agilent	E7405A	MY45114943	Sep.15,2015	Sep.14,2016
2.	Spectrum Analyzer (9k-6GHz)	R&S	FSL6	100959	Sep.15,2015	Sep.14,2016
3.	Signal Analyzer (9k~26.5GHz)	Agilent	N9010A	MY50520207	Sep.15,2015	Sep.14,2016

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	$\pm 1 \times 10^{-6}$
RF Power	± 1.0 dB
RF Power Density	± 2.2 dB
Radiated Spurious Emissions test	± 5.03 dB (30M~1000MHz)
	± 5.47 dB (1000M~25000MHz)
Conducted Spurious Emissions test	± 3.64 dB (AC mains 150KHz~30MHz)

5.3 Test Equipment Calibration

All the test equipments used are valid and calibrated by CEPREI Certification Body that address is No.110 Dongguan Zhuang RD. Guangzhou, P.R.China.

6 Test Summary

Test Items	Test Requirement	Result
Maximum Peak Output Power	15.247(b)(1)	C
Power Spectral Density	15.247(e)	C
Maximum Permissible Exposure (Exposure of Humans to RF Fields)	1.1307(b)(1)	C
Note: C=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Maximum Peak Output Power

Test Requirement:

FCC CFR47 Part 15 Section 15.247

Test Method:

558074 D01 DTS Meas Guidance v03r05

662911 D01 Multiple Transmitter Output v02r01

7.1 Test Procedure

558074 D01 DTS Meas Guidance v03r05

662911 D01 Multiple Transmitter Output v02r01

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 1MHz. VBW = 3MHz. Sweep = auto; Detector Function = Peak, Set the span to fully encompass the DTS bandwidth.
3. Keep the EUT in transmitting at lowest, medium and highest channel individually. Record the max value.

7.2 Test Result

BT Test Mode

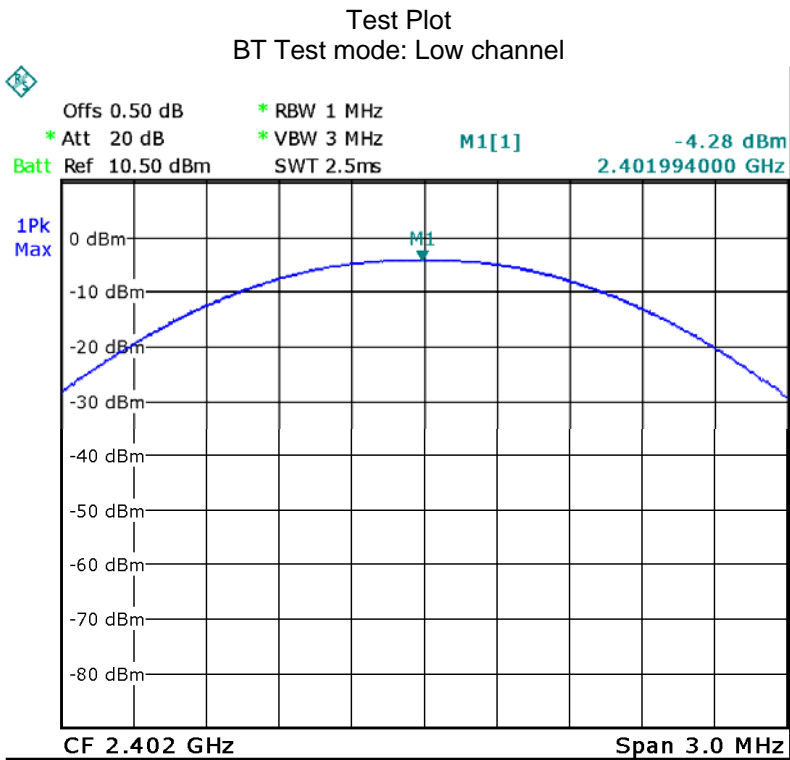
Maximum Peak Output Power (dBm)		
Low channel	Middle channel	High channel
-4.28	-3.87	-2.80
Limit: 1W/30dBm		

Wi-Fi Test Mode

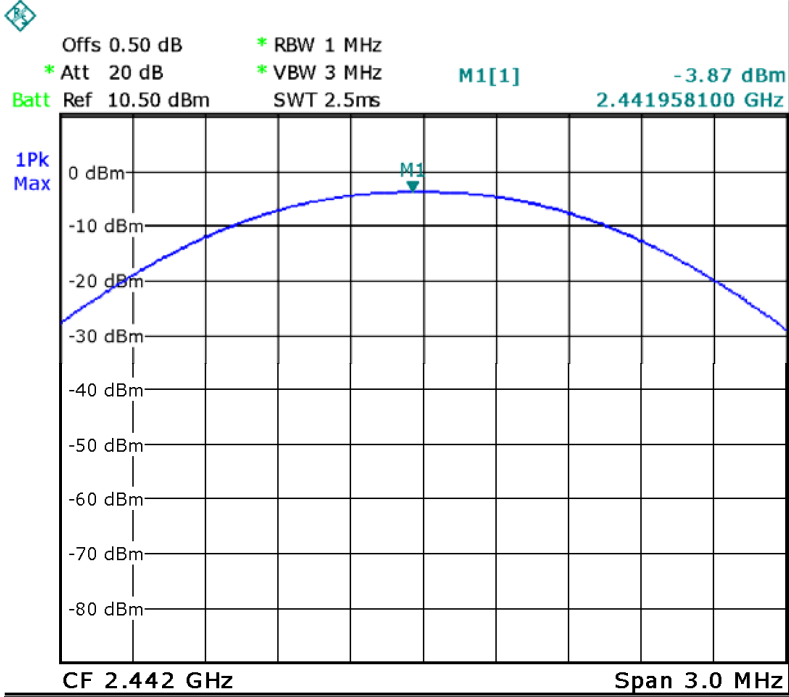
Test mode :TX 11b		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.33	9.20	9.15
Limit: 1W/30dBm		
Test mode :TX 11g		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.45	9.19	9.03
Limit: 1W/30dBm		
Test mode :TX 11n HT20		
Maximum Peak Output Power (dBm)		
2412MHz	2437MHz	2462MHz
9.32	9.46	9.38
Limit: 1W/30dBm		

Wi-Fi and BT transmitters operating simultaneously Test Mode

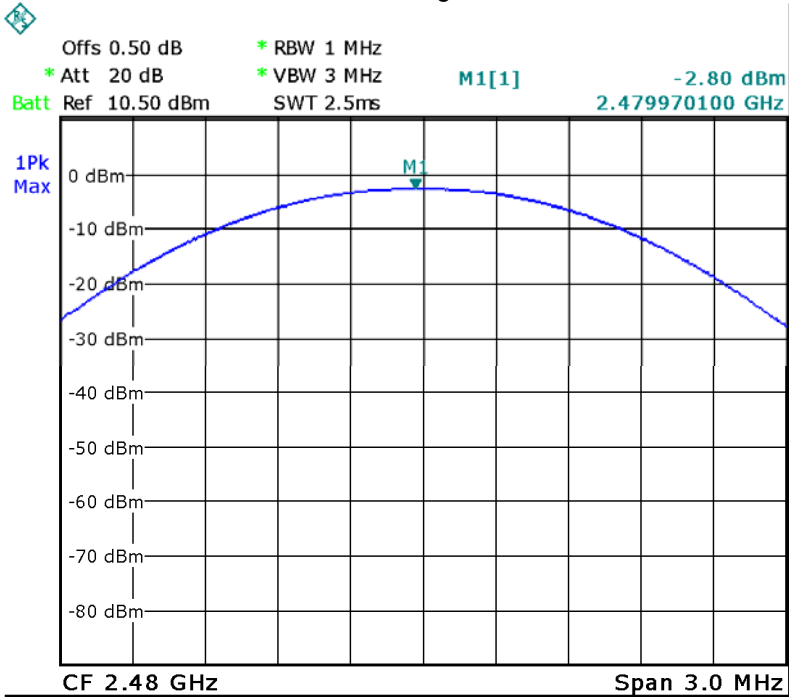
Maximum Peak Output Power (dBm)		
BT Maximum Peak Output Power(dBm)	Wi-Fi Maximum Peak Output Power(dBm)	Total Peak Output Power(dBm)
-2.80	9.46	9.71
Limit: 1W/30dBm		

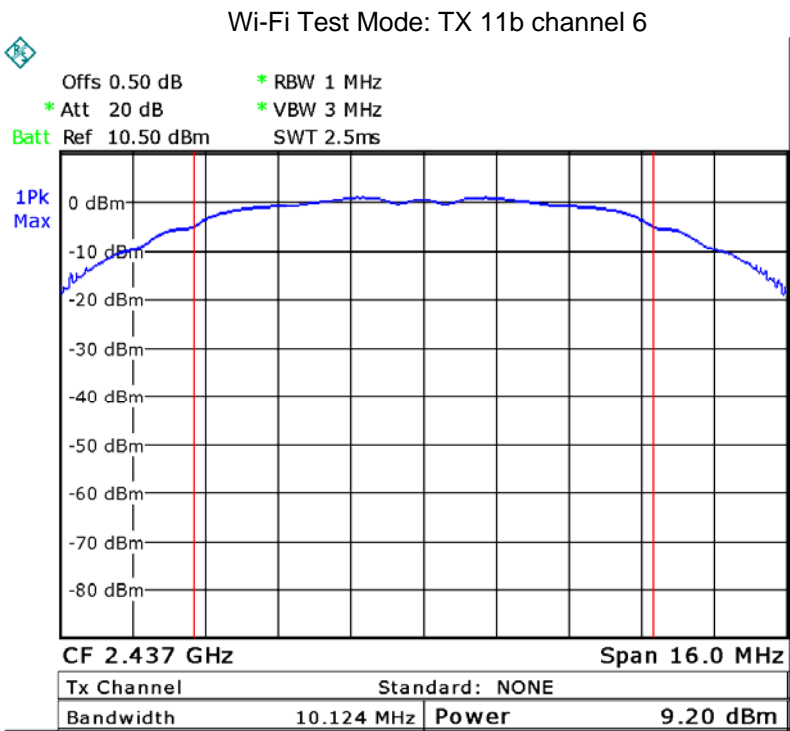
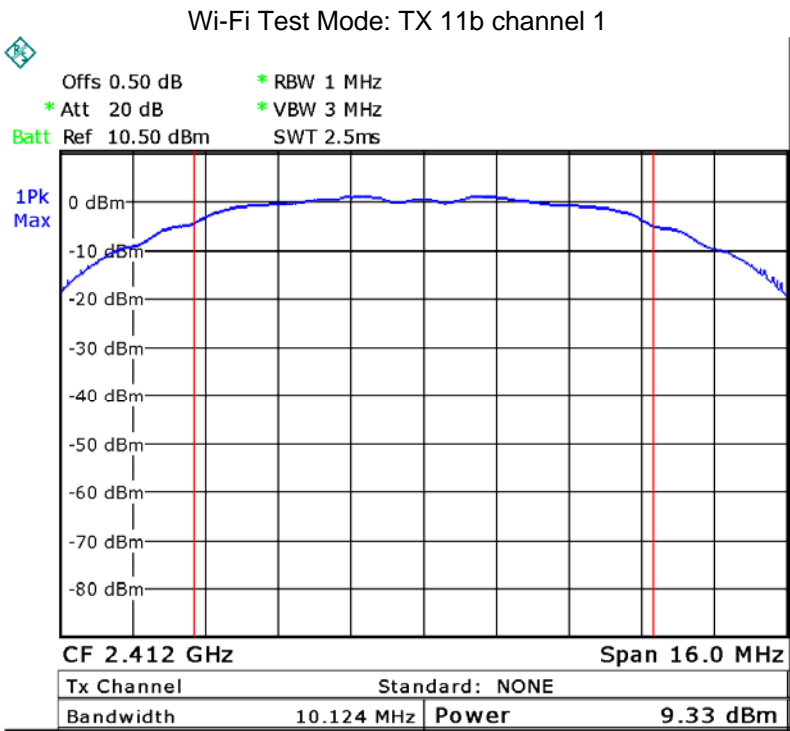


BT Test mode :Middle channel

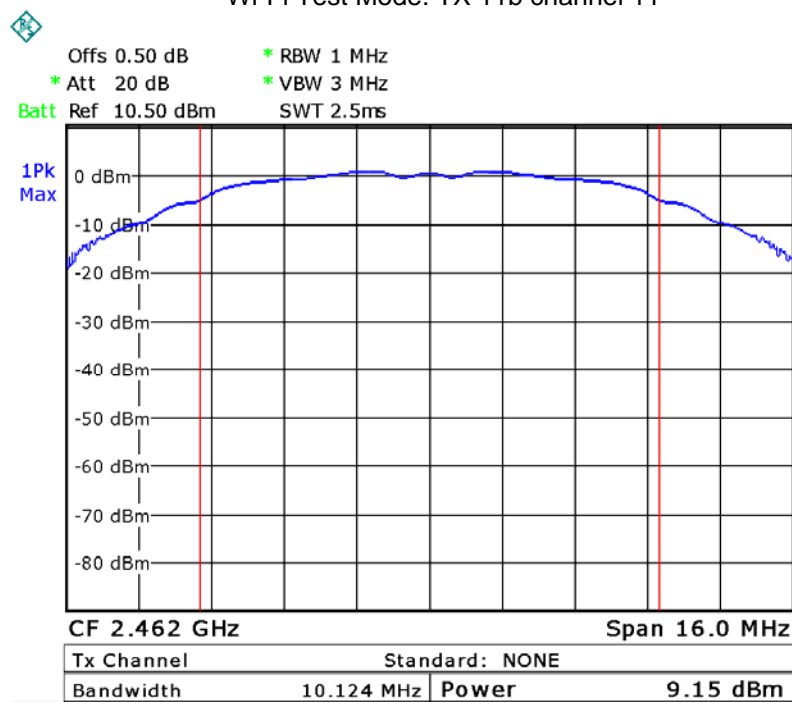


BT Test mode: High channel

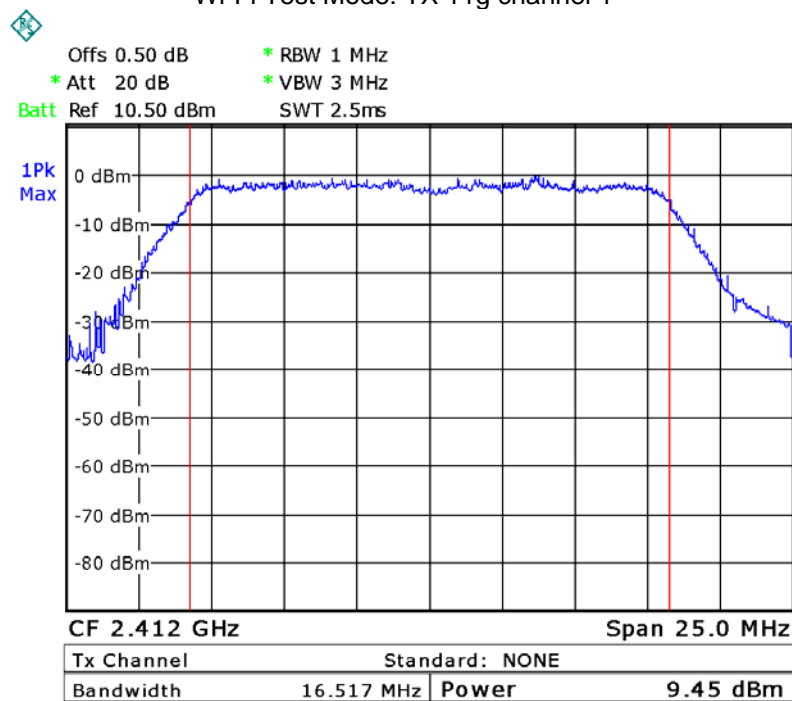




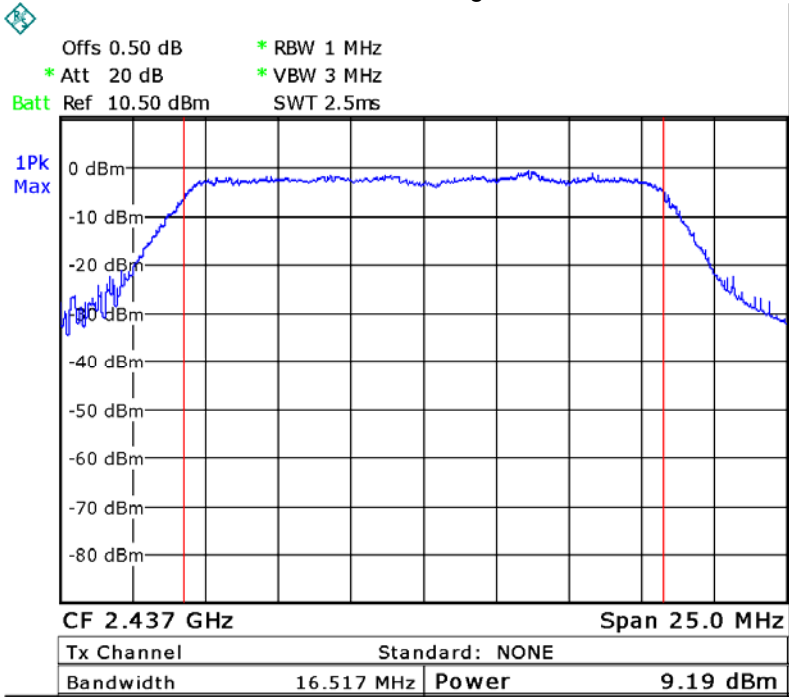
Wi-Fi Test Mode: TX 11b channel 11



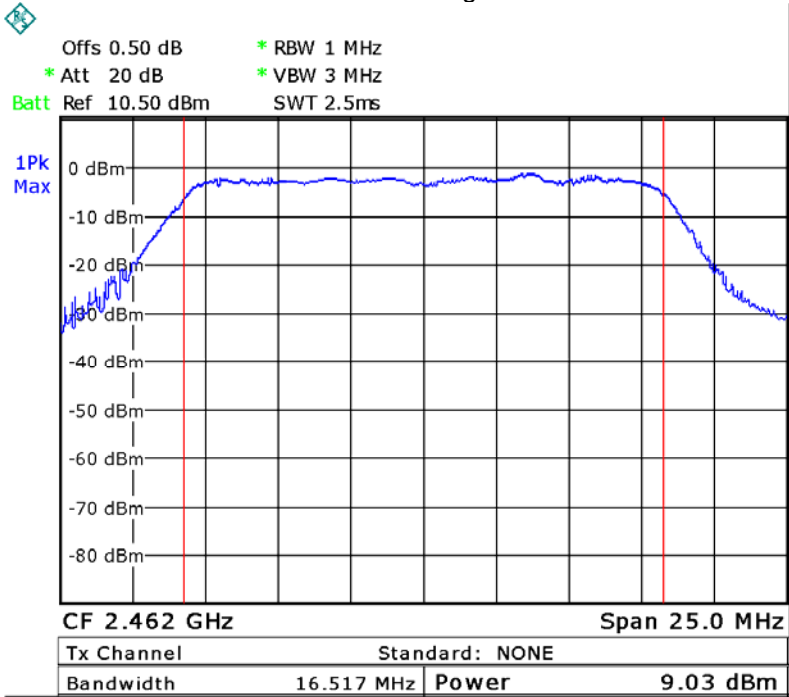
Wi-Fi Test Mode: TX 11g channel 1



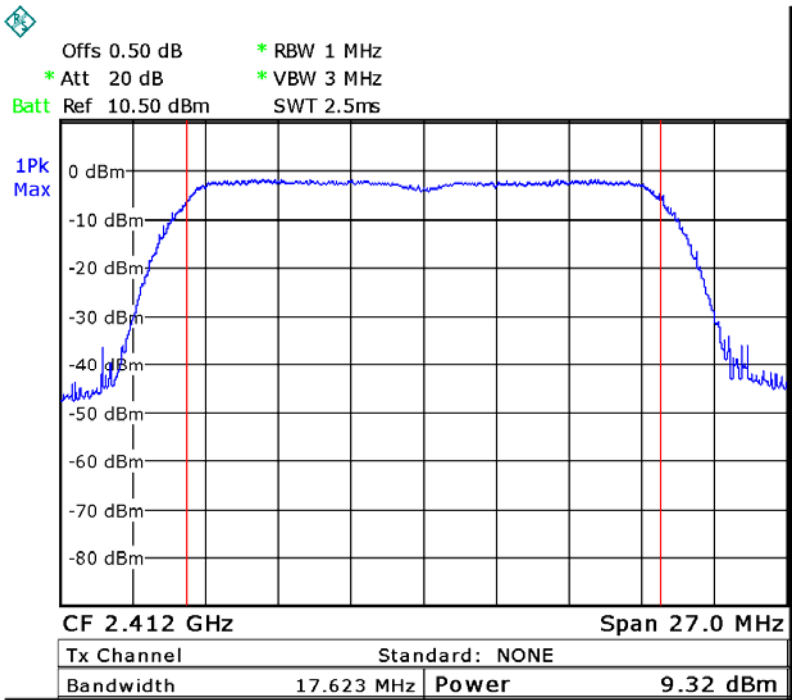
Wi-Fi Test Mode: TX 11g channel 6



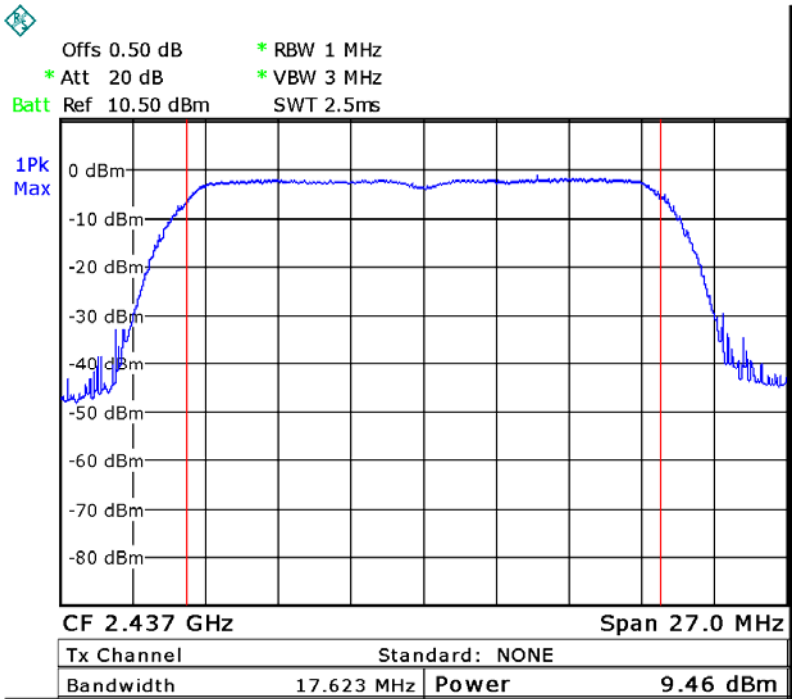
Wi-Fi Test Mode: TX 11g channel 11

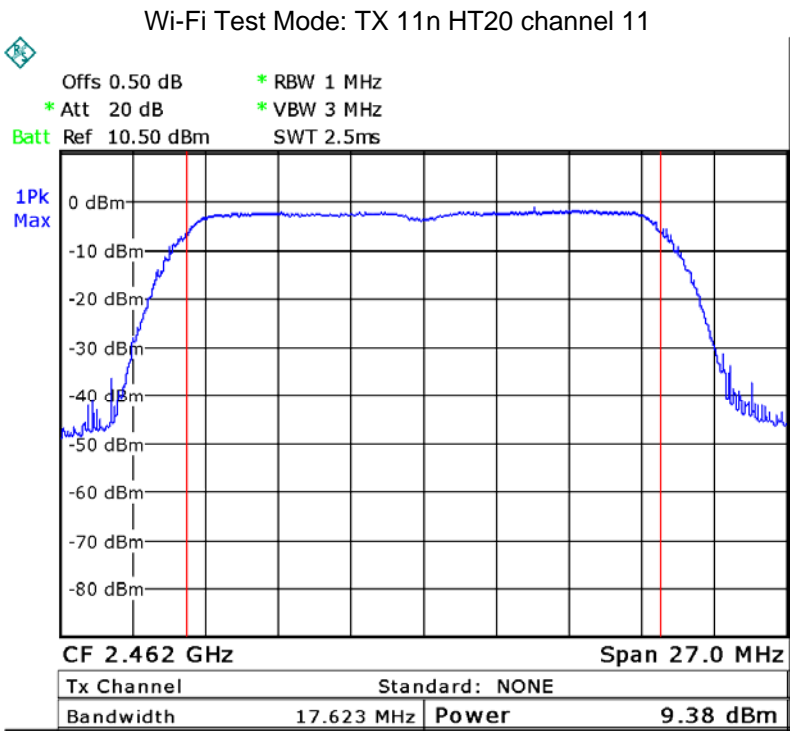


Wi-Fi Test Mode: TX 11n HT20 channel 1



Wi-Fi Test Mode: TX 11n HT20 channel 6





8 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247
 Test Method: 558074 D01 DTS Meas Guidance v03r05
 662911 D01 Multiple Transmitter Output v02r01

8.1 Test Procedure

558074 D01 DTS Meas Guidance v03r05

662911 D01 Multiple Transmitter Output v02r01

1. Remove the antenna from the EUT and then connect a low RF cable from the antenna port to the spectrum.
2. Set the spectrum analyzer: RBW = 3kHz. VBW = 10kHz , Span = 1.5 times the DTS channel bandwidth(6 dB bandwidth). Sweep = auto; Detector Function = Peak. Trace = Max hold.
3. Allow the trace to stabilize. Use the marker-delta function to determine the separation between the peaks of the adjacent channels. The limit is specified in one of the subparagraphs of this Section Submit this plot.

8.2 Test Result

BT Test Mode

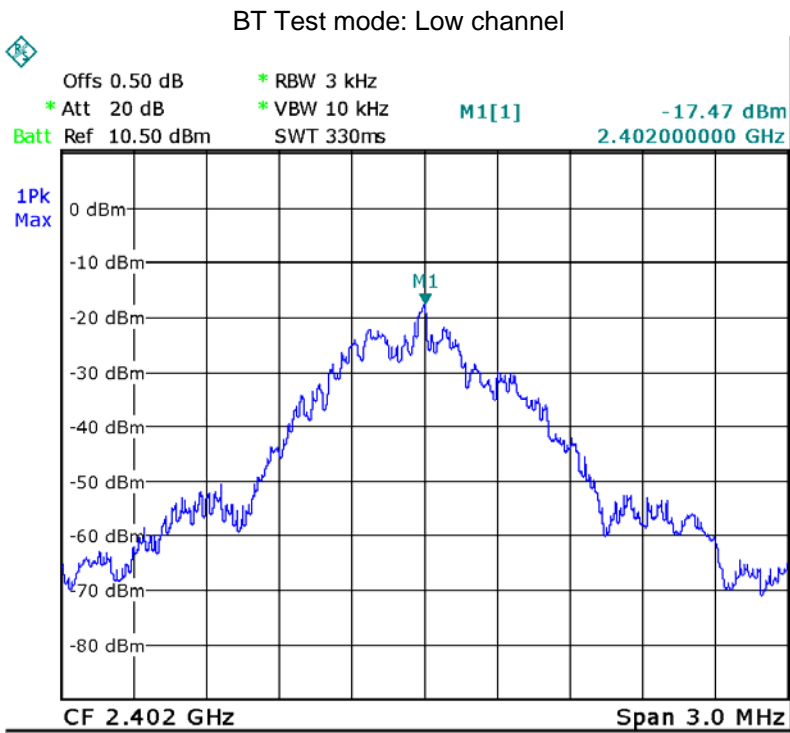
Power Spectral Density		
Low channel	Middle channel	High channel
-17.47	-17.46	-16.73
Limit : 8dBm per 3kHz		

Wi-Fi Test Mode

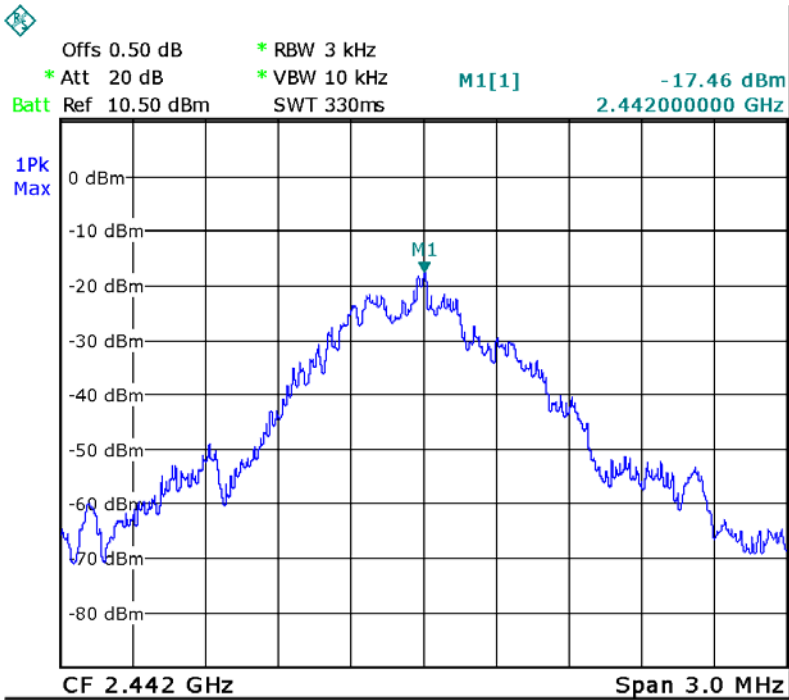
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-17.51	-18.26	-17.91
Limit: 8dBm per 3kHz		
Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-24.83	-25.95	-27.31
Limit: 8dBm per 3kHz		
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-25.28	-24.32	-25.52
Limit: 8dBm per 3kHz		

Wi-Fi and BT transmitters operating simultaneously Test Mode

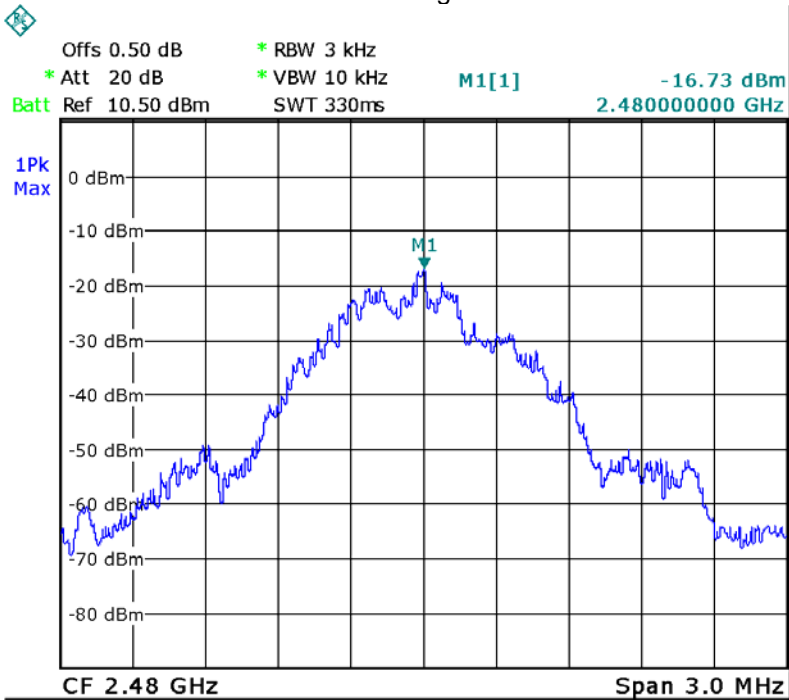
Power Spectral Density		
BT Maximum Power Spectral Density dBm per 3KHz	Wi-Fi Maximum Power Spectral Density dBm per 3KHz	Total Power Spectral Density dBm per 3KHz
-17.46	-17.51	-14.49
Limit : 8dBm per 3kHz		

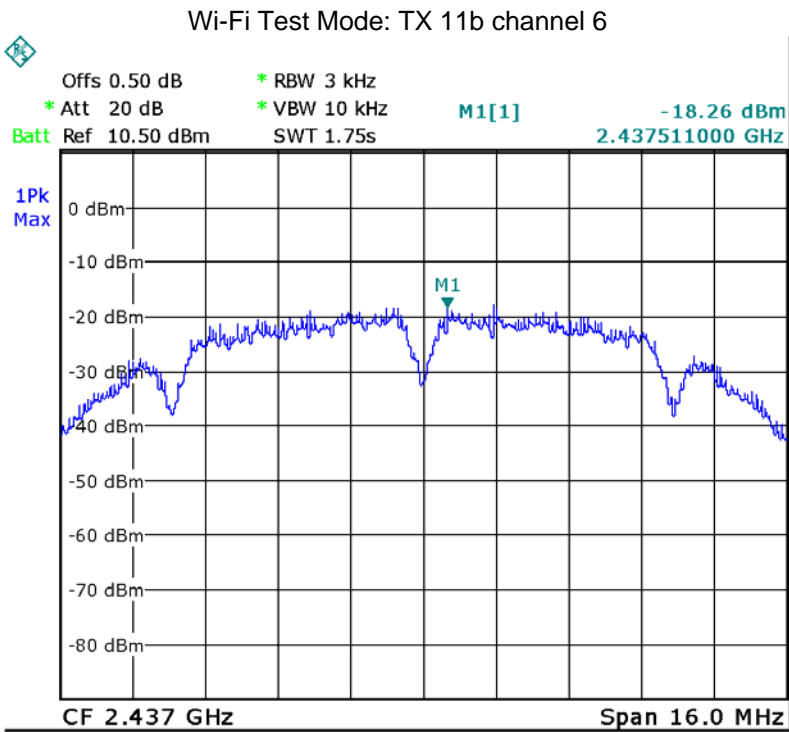
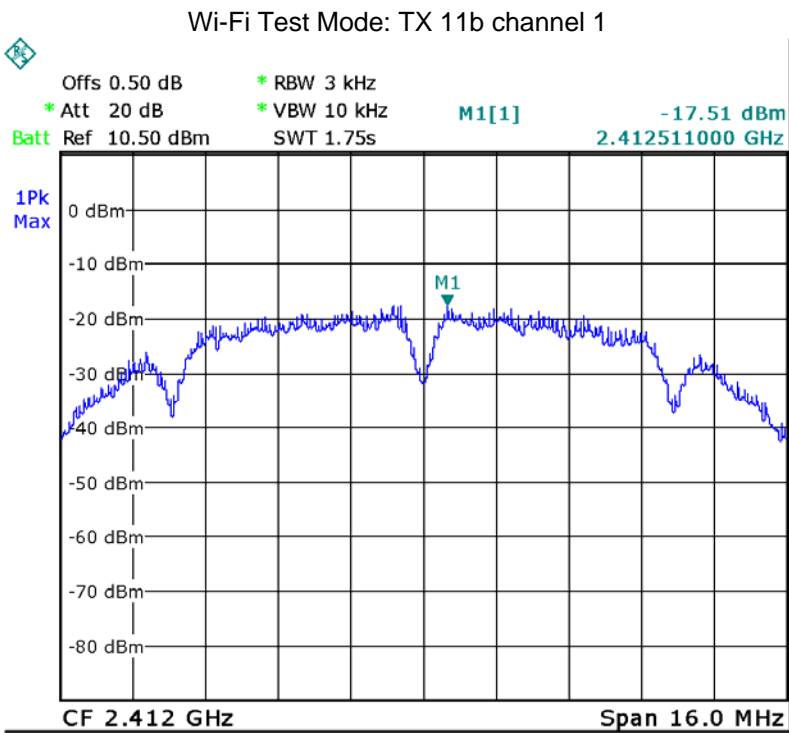


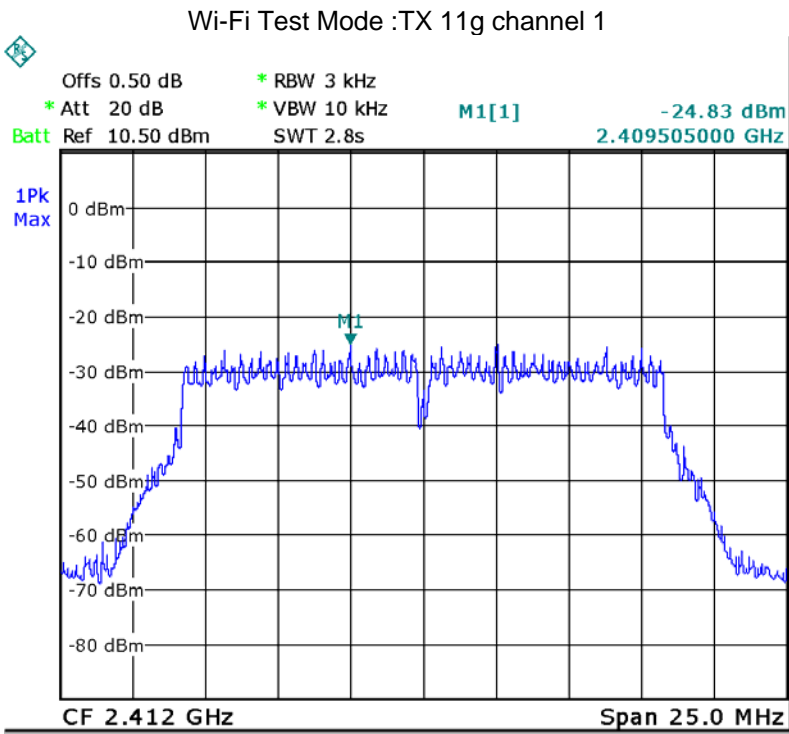
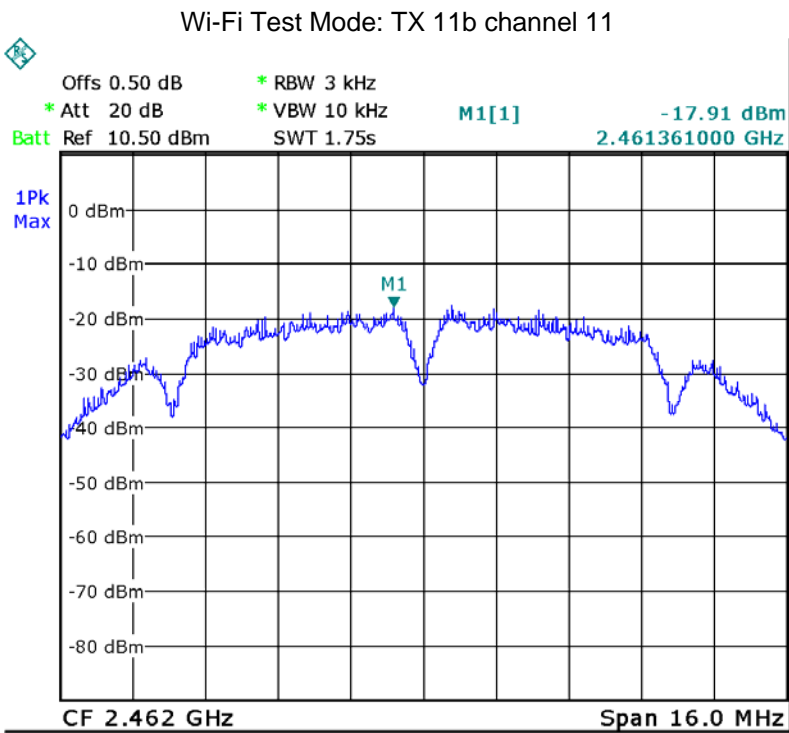
BT Test mode: Middle channel

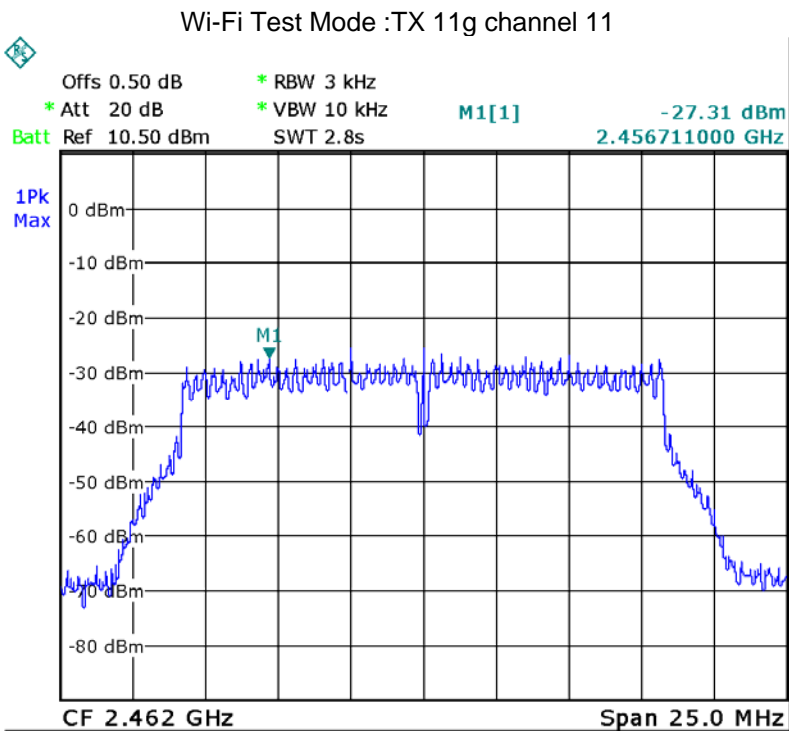
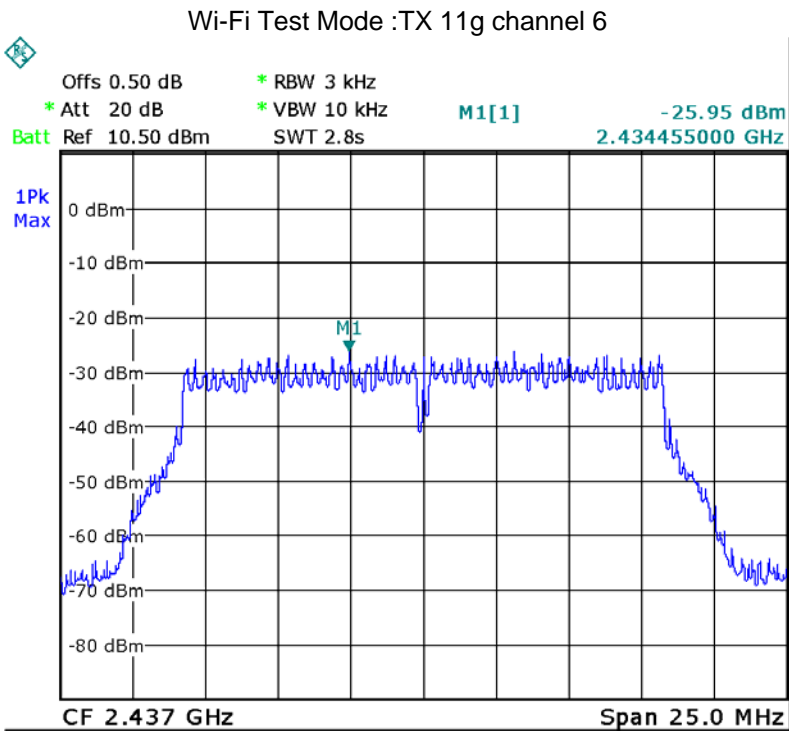


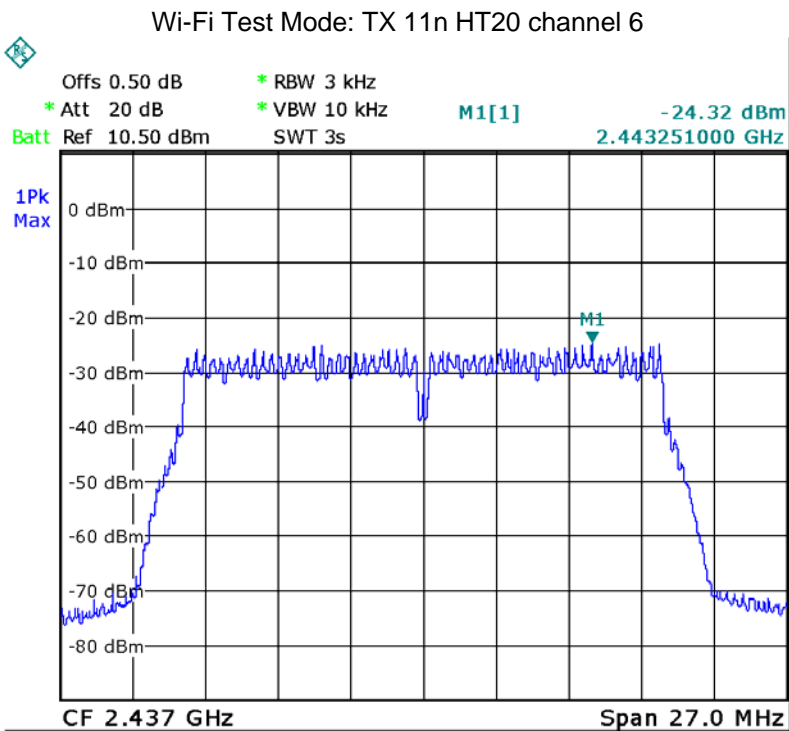
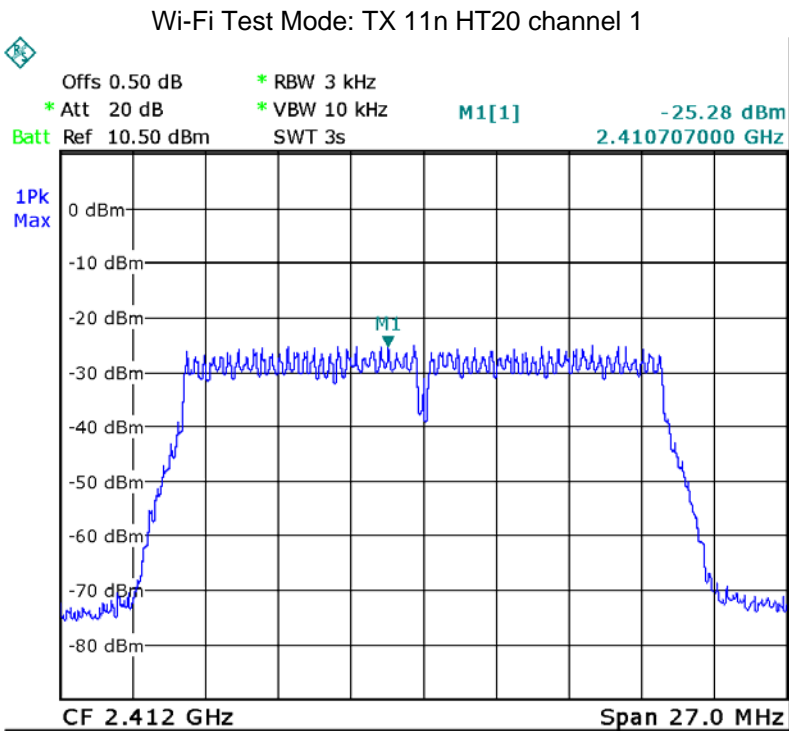
BT Test mode: High channel

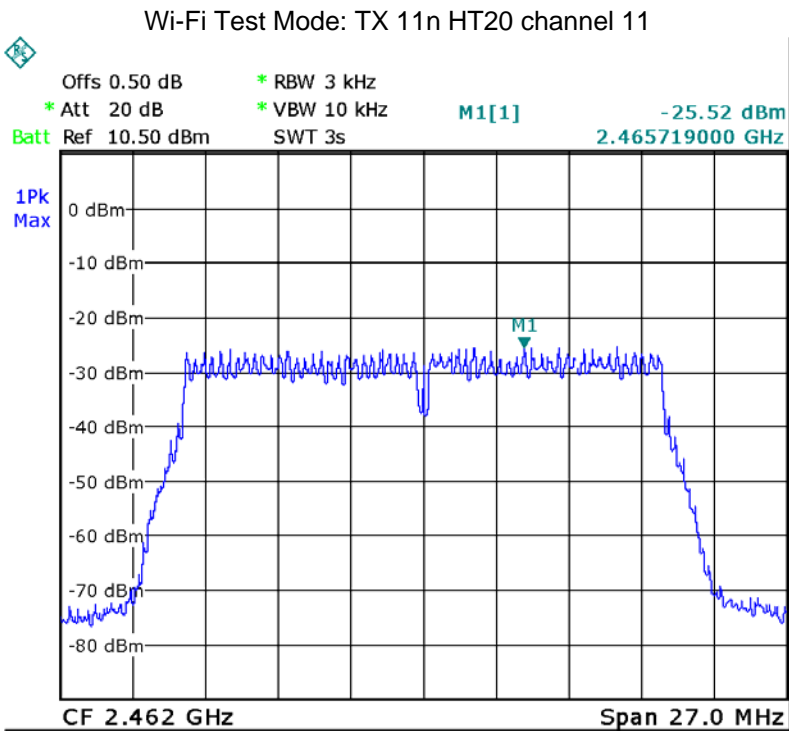












9 RF Exposure

Test Requirement:

FCC Part 1.1307

Evaluation Method:

FCC Part 2.1091

KDB 447498 D01 General RF Exposure Guidance v06

9.1 Requirements

Systems operating under the provisions of this section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy levels in excess limit for maximum permissible exposure. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as a mobile device whereby a distance of 0.2 m normally can be maintained between the user and the device.

9.2 The procedures / limit

(A) Limits for Occupational / Controlled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-3.0	614	1.63	(100)*	6
3.0-30	1842 / f	4.89 / f	(900 / f)*	6
30-300	61.4	0.163	1.0	6
300-1500			F/300	6
1500-100,000			5	6

(B) Limits for General Population / Uncontrolled Exposure

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/ cm ²)	Averaging Time E ² , H ² or S (minutes)
0.3-1.34	614	1.63	(100)*	30
1.34-30	824/f	2.19/f	(180/f)*	30
30-300	27.5	0.073	0.2	30
300-1500			F/1500	30
1500-100,000			1.0	30

Note: f = frequency in MHz ; *Plane-wave equivalent power density

9.3 MPE Calculation Method

$$S = \frac{P \times G}{4 \times \pi \times R^2}$$

S = power density (in appropriate units, e.g. mW/cm²)

P = output power to the antenna (in appropriate units, e.g., mW).

G = power gain of the antenna in the direction of interest relative to an isotropic radiator, the power gain factor, is normally numeric gain.

R = distance to the center of radiation of the antenna (appropriate units, e.g., cm)

From the peak EUT RF output power, the minimum mobile separation distance, R=20cm, as well as the gain of the used antenna, the RF power density can be obtained

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Peak Output Power (mW)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
1.3 (for BT)	1.349	-2.80	0.525	0.000141	1
2.0 (for Wi-Fi)	1.585	9.46	8.83	0.00278	1

Wi-Fi and BT transmitters operating simultaneously

BT Power Density Ratios (%)	Wi-Fi Power Density Ratios (%)	Total Power Density Ratios (%)	Limit of Power Density Ratios (%)
0.0141	0.278	0.2921	100

Note: Power Density Ratios= Power Density/Limit

=====End of Report=====