TEST REPORT

Reference No.	:	WTD18S07118403-1W
FCC ID.....	:	N3ITFDG2684
Applicant	:	Teamforce Company Limited
Address	:	6FL, No. 190, Section 2, Chung Hsin Road, Hsin Tien District, New Taipei City 23146, Taiwan
Manufacturer	:	Teamforce Company Limited
Address	:	6FL, No. 190, Section 2, Chung Hsin Road, Hsin Tien District, New Taipei City 23146, Taiwan
Product.....	:	DMG MORI serviceCAM
Model(s).....	:	DG-2684
Standards.....	:	FCC CFR47 Part 15 C Section 15.247:2018
Date of Receipt sample..	:	2018-07-18
Date of Test.....	:	2018-07-19 to 2018-10-18
Date of Issue	:	2018-10-19
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:
Waltek Services (Shenzhen) Co., Ltd.
Address: 1/F., Fukangtai Building, West Baima Road, Songgang Street, Baoan District, Shenzhen, Guangdong, China
Tel :+86-755-83551033
Fax:+86-755-83552400

Compiled by: Approved by:

Robin Zhou / Test Engineer Philo Zhong / Manager

1 Laboratories Introduction

Waltek Services (Shenzhen) Co., Ltd is a professional third-party testing and certification laboratory with multi-year product testing and certification experience, established strictly in accordance with ISO/IEC 17025 requirements, and accredited by ILAC (International Laboratory Accreditation Cooperation) member. A2LA (American Association for Laboratory Accreditation, the certification number is 4243.01) of USA, CNAS (China National Accreditation Service for Conformity Assessment, the registration number is L3110) of China.Meanwhile, Waltek has got recognition as registration and accreditation laboratory from EMSD (Electrical and Mechanical Services Department), and American Energy star, FCC(The Federal Communications Commission), CEC(California energy efficiency), ISED Canada (Innovation, Science and Economic Development Canada). It's the strategic partner and data recognition laboratory of international authoritative organizations, such as Intertek(ETL-SEMKO), TÜV Rheinland, TÜV SÜD, etc.

Waltek Services (Shenzhen) Co., Ltd is one of the largest and the most comprehensive third party testing laboratory in China. Our test capability covered four large fields: safety test. ElectroMagnetic Compatibility(EMC), and energy performance, wireless radio. As a professional, comprehensive, justice international test organization, we still keep the scientific and rigorous work attitude to help each client satisfy the international standards and assist their product enter into globe market smoothly.

1.1 Test Facility

A. Accreditations for Conformity Assessment (International)

Country/Region	Scope Covered By	Scope	Note
USA	ISO/IEC 17025	FCC ID \ SDoC(VOC/DOC)	1
Canada		IC ID \ VOC	2
Japan		MIC-T \ MIC-R	-
Europe		EMCD \ RED	-
Taiwan		NCC	-
Hong Kong		OFCA	-
Australia		RCM	-
India		WPC	-
Thailand		NTC	-
Singapore		IDA	-

Note:

1. FCC Designation No.: CN1201. Test Firm Registration No.: 523476.
2. ISED Canada Registration No.: 7760A

B.TCBs and Notify Bodies Recognized Testing Laboratory.

Recognized Testing Laboratory of …	Notify body number
TUV Rheinland	Optional.
Intertek	
TUV SUD	
SGS	
Phoenix Testlab GmbH	0700
Element Materials Technology Warwick Ltd.	0891
Timco Engineering, Inc.	1177
Eurofins Product Service GmbH	0681

2 Contents

Page

COVER PAGE 1
1 LABORATORIES INTRODUCTION 2
1.1 TEST FACILITY 3
2 CONTENTS 4
3 REVISION HISTORY 6
4 GENERAL INFORMATION 7
4.1 GENERAL DESCRIPTION OF E.U.T. 7
4.2 DETAILS OF E.U.T. 7
4.3 CHANNEL LIST 7
4.4 TEST MODE 8
5 EQUIPMENT USED DURING TEST 9
5.1 EQUIPMENT'S LIST 9
5.2 MEASUREMENT UNCERTAINTY 10
5.3 TEST EQUIPMENT CALIBRATION 10
6 TEST SUMMARY 11
7 CONDUCTED EMISSION 12
7.1 E.U.T. OPERATION 12
7.2 EUT SETUP 12
7.3 MEASUREMENT DESCRIPTION 12
7.4 CONDUCTED EMISSION TEST RESULT 13
8 RADIATED EMISSIONS 15
8.1 EUT OPERATION 15
8.2 TEST SETUP 16
8.3 SPECTRUM ANALYZER SETUP 17
8.4 TEST PROCEDURE 18
8.5 CORRECTED AMPLITUDE & MARGIN CALCULATION 18
8.6 SUMMARY OF TEST RESULTS 19
9 BAND EDGE MEASUREMENT 24
9.1 TEST PRODUCE 24
9.2 TEST SETUP 25
9.3 TEST RESULT 25
10 BANDWIDTH MEASUREMENT 30
10.1 TEST PROCEDURE: 30
10.2 TEST SETUP 30
10.3 TEST RESULT: 30
11 MAXIMUM CONDUCTED (AVERAGE) OUTPUT POWER 37
11.1 TEST PROCEDURE: 37
11.2 TEST SETUP 37
11.3 TEST RESULT: 37
12 POWER SPECTRAL DENSITY 39
12.1 TEST PROCEDURE: 39
12.2 TEST SETUP 39
12.3 TEST RESULT: 39
13 ANTENNA REQUIREMENT 46
14 SAR EVALUATION 47

15 PHOTOGRAPHS – MODEL DG-2684 TEST SETUP 48
15.1 RADIATED EMISSION 48
15.2 CONDUCTED EMISSION 49
16 PHOTOGRAPHS - CONSTRUCTIONAL DETAILS 50
16.1 MODEL DG-2684–EXTERNAL PHOTOS 50
16.2 MODEL DG-2684 – INTERNAL PHOTOS 56

3 Revision History

Test report No.	Date of Receipt sample	Date of Test	Date of Issue	Purpose	Comment	Approved
WTD18S07118403-1W	2018-07-18	2018-07-19 to 2018-10-18	2018-10-19	original	-	Replaced
WTD18S07118403-1W V1	2018-07-18	2018-07-19 to 2018-10-18	2018-11-20	revision1	Added duty cycle description	Valid

4 General Information

4.1 General Description of E.U.T.

Product:	DMG MORI serviceCAM
Model(s):	DG-2684
Operation Frequency:	802.11b/g/n HT20: 2412MHz ~ 2462MHz, 802.11n HT40: 2422MHz~2452MHz
Antenna Gain:	2.0 dBi
Type of modulation:	IEEE 802.11b: DQPSK/DBPSK/DSSS/CCK IEEE 802.11g: QPSK/BPSK/16QAM/64QAM/OFDM IEEE 802.11n: QPSK/BPSK/16QAM/64QAM/OFDM

4.2 Details of E.U.T

Ratings:

DC 3.7V, 2600mAh, 9.62Wh by Battery;
Charging: DC 5V by Charging station
or DC 5V by SWITCH-MODE POWER SUPPLY
SWITCH-MODE POWER SUPPLY:
(Model: 6A-104WP05B, Output: DC 5V, 2.0A,
Input: 100-240V~, 50-60Hz, 0.3A,
Manufacturer: ENG ELECTRONIC COMPANY)

4.3 Channel List

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 Mode

Table 1 Tests Carried Out Under FCC part 15.247

Test Items	Mode	Data Rate	Channel	TX/RX
Maximum conducted (average) output power	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Power Spectral Density	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Bandwidth	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX
Band Edge	802.11b	1 Mbps	1/11	TX
	802.11g	6 Mbps	1/11	TX
	802.11n HT20	MCS0	1/11	TX
	802.11n HT40	MCS0	3/9	TX
Transmitter Spurious Emissions	802.11b	1 Mbps	1/6/11	TX
	802.11g	6 Mbps	1/6/11	TX
	802.11n HT20	MCS0	1/6/11	TX
	802.11n HT40	MCS0	3/6/9	TX

Note :Parameters set by test software during channel & power tests, the software provided by the customer was used to set the operating channels as well as the output power level. The RF output power set is the power expected by the manufacturer and is going to be fixed on the firmware of the final product .

The EUT has been tested under its typical operating condition. Pre-defined engineering program for regulatory testing used to control the EUT for staying in continuous transmitting and the transmit duty cycle is not less than 98%.

Only the worst case data were reported.

5 Equipment Used during Test

5.1 Equipment's List

Conducted Emissions Test Site						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	EMI Test Receiver	R&S	ESCI	101155	2018-09-15	2019-09-14
2.	LISN	SCHWARZBECK	NSLK 8128	8128-259	2018-09-15	2019-09-14
3.	Limiter	CYBERTEK	EM5010	261115-001-0024	2018-09-15	2019-09-14
4.	Cable	**Laplace**	RF300	-	2018-07-18	2019-07-17
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1	Spectrum Analyzer	R&S	FSP30	100091	2018-04-20	2019-04-19
2	Broad-band Horn Antenna(1-18GHz)	SCHWARZBECK	BBHA 9120 D	667	2018-05-18	2019-05-17
3	Broadband Preamplifier	COMPLIANCE DIRECTION	PAP-1G18	2004	2018-04-07	2019-04-06
4	Coaxial Cable (above 1GHz)	Top	1GHz-18GHz	EW02014-7	2018-04-07	2019-04-06
5	Spectrum Analyzer	R&S	FSP40	100501	2017-10-20	2018-10-19
6	Broad-band Horn Antenna(18-40GHz)	SCHWARZBECK	BBHA 9170	335	2017-10-25	2018-10-24
7	Microwave Broadband Preamplifier (18-40GHz)	SCHWARZBECK	BBV 9721	100472	2017-10-25	2018-10-24
8	Cable	Top	18-40GHz	-	2017-10-25	2018-10-24
3m Semi-anechoic Chamber for Radiation Emissions						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No**	**Last Calibration Date**	**Calibration Due Date**
1	Test Receiver	R&S	ESCI	101296	2018-04-20	2019-04-19
2	Trilog Broadband Antenna	SCHWARZBECK	VULB9160	9160-3325	2018-04-19	2019-04-18
3	Active Loop Antenna	Com-power	AL-130R	10160007	2018-04-17	2019-04-16
4	Amplifier	ANRITSU	MH648A	M43381	2018-04-20	2019-04-19
5	Cable	HUBER+SUHNER	CBL2	525178	2018-04-20	2019-04-19
6	Coaxial Cable (below 1GHz)	Top	TYPE16 (13M)	-	2018-04-20	2019-04-19
RF Conducted Testing						
Item	**Equipment**	**Manufacturer**	**Model No.**	**Serial No.**	**Last Calibration Date**	**Calibration Due Date**
1.	Spectrum Analyzer	R&S	FSP40	100501	2017-10-20	2018-10-19

2.	Coaxial Cable	Top	10Hz-30GHz	-	2018-09-12	2019-09-11
3	Antenna Connector*	Realacc	45RSm	-	2018-09-12	2019-09-11
4	DC Block	Gwave	GDCB-3G-N-SMA	140307001	2018-09-12	2019-09-11
"*": The temporary antenna connector is soldered on the PCB board in order to perform conducted tests and this temporary antenna connector is listed in the equipment list.						

5.2 Measurement Uncertainty

Parameter	Uncertainty
Radio Frequency	± 1 x 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 GUANG ZHOU GRG METROLOGY & TEST CO., L TD. address is No.163, Pingyun Rd. West of Huangpu Ave,Tianhe District, Guangzhou, Guangdong, China.

6 Test Summary

Test Items	Test Requirement	Result
Radiated Spurious Emissions	15.247(d) 15.205(a) 15.209(a)	Pass
Conducted Emissions	15.207(a)	Pass
Bandwidth	15.247(a)(2)	Pass
Maximum conducted (average) output power	15.247(b)(3),(4)	Pass
Power Spectral Density	15.247(e)	Pass
Band Edge	15.247(d)	Pass
Antenna Requirement	15.203	Pass
SAR Evaluation	1.1307(b)(1)	Pass
Note: Pass=Compliance; NC=Not Compliance; NT=Not Tested; N/A=Not Applicable.		

7 Conducted Emission

Test Requirement: FCC CFR 47 Part 15 Section 15.207

Test Method: ANSI C63.10:2013

Test Result: PASS

Frequency Range: 150kHz to 30MHz

Class/Severity: Class B

Limit:

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

7.1 E.U.T. Operation

Operating Environment :

Temperature: 21.5 °C

Humidity: 51.9 % RH

Atmospheric Pressure: 101.2kPa

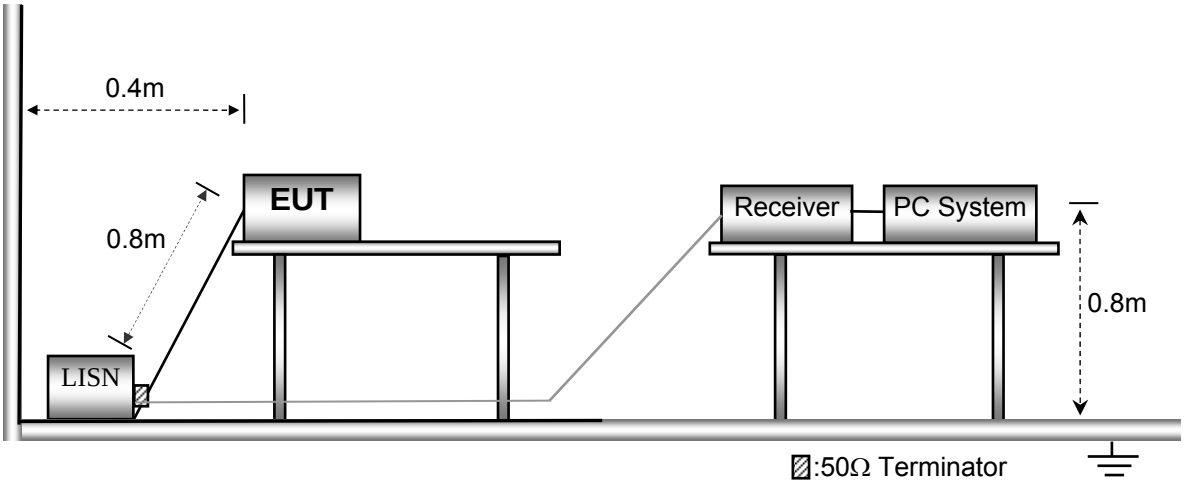
Test Voltage: AC 120V

EUT Operation:

The test was performed in Wi-Fi Transmitting mode, the worst test data (Wi-Fi b mode low channel) were shown in the report.

7.2 EUT Setup

The conducted emission tests were performed using the setup accordance with the ANSI C63.10:2013.



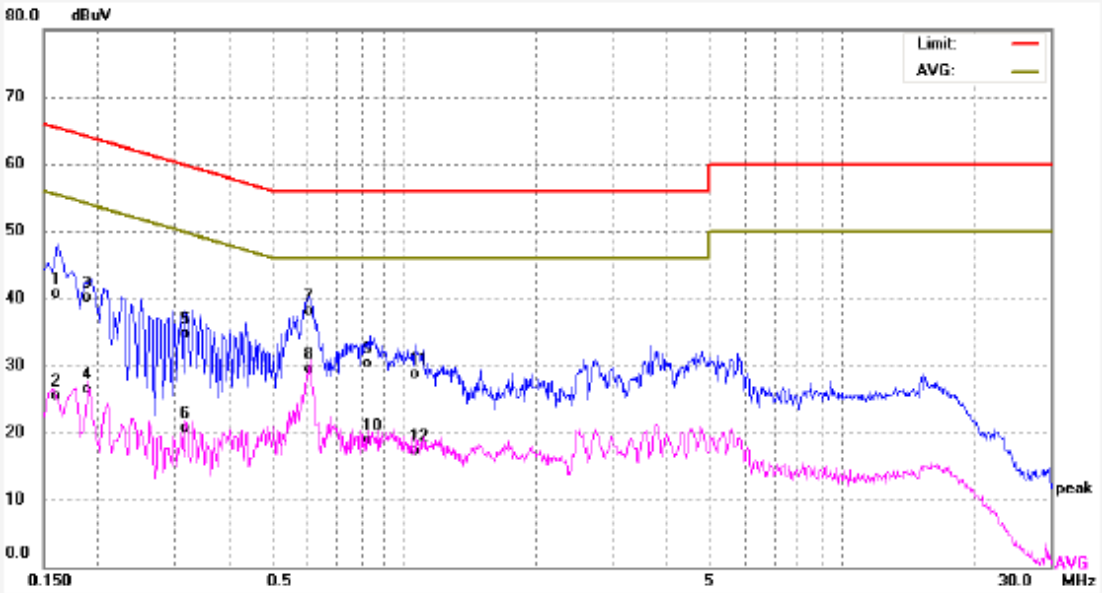
7.3 Measurement Description

The maximised peak emissions from the EUT was scanned and measured for both the Live and Neutral Lines. Quasi-peak & average measurements were performed if peak emissions were within 6dB of the average limit line.

7.4 Conducted Emission Test Result

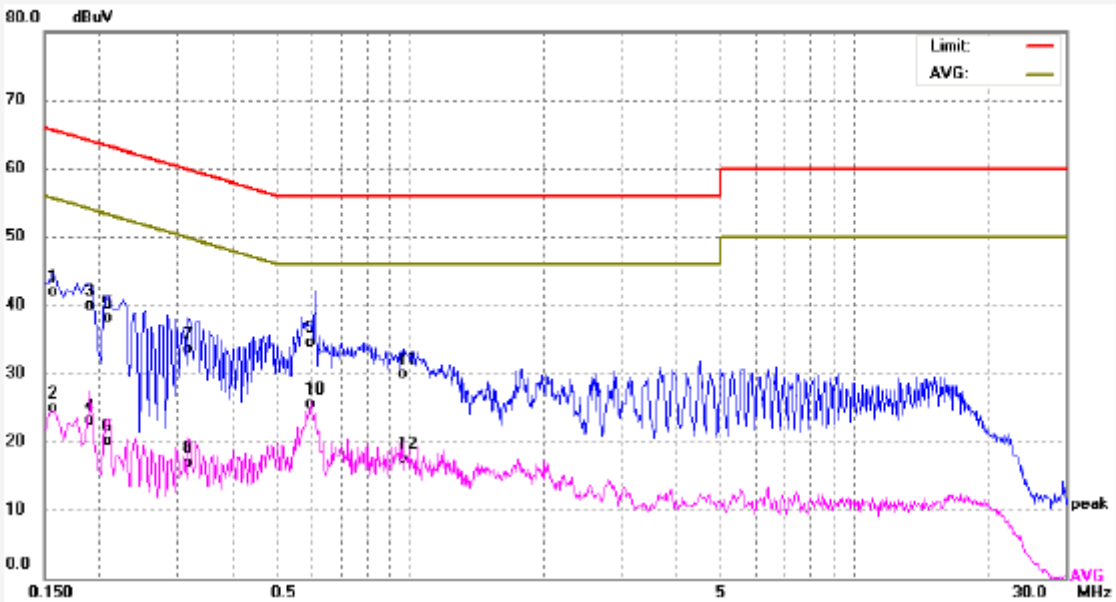
An initial pre-scan was performed on the live and neutral lines.

Live line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1620	30.36	10.28	40.64	65.36	-24.72	QP	
2	0.1620	15.31	10.28	25.59	55.36	-29.77	AVG	
3	0.1900	29.83	10.31	40.14	64.03	-23.89	QP	
4	0.1900	16.24	10.31	26.55	54.03	-27.48	AVG	
5	0.3180	24.20	10.41	34.61	59.76	-25.15	QP	
6	0.3180	10.20	10.41	20.61	49.76	-29.15	AVG	
7	0.6060	27.65	10.49	38.14	56.00	-17.86	QP	
8	0.6060	18.98	10.49	29.47	46.00	-16.53	AVG	
9	0.8380	19.94	10.44	30.38	56.00	-25.62	QP	
10	0.8380	8.53	10.44	18.97	46.00	-27.03	AVG	
11	1.0580	18.22	10.44	28.66	56.00	-27.34	QP	
12	1.0580	6.78	10.44	17.22	46.00	-28.78	AVG	

Neutral line:



No.	Freq. (MHz)	Reading (dBuV)	Factor (dB)	Result (dBuV)	Limit dBuV	Margin (dB)	Detector	Remark
1	0.1580	31.66	10.27	41.93	65.56	-23.63	QP	
2	0.1580	14.72	10.27	24.99	55.56	-30.57	AVG	
3	0.1900	29.56	10.31	39.87	64.03	-24.16	QP	
4	0.1900	12.77	10.31	23.08	54.03	-30.95	AVG	
5	0.2100	27.84	10.34	38.18	63.20	-25.02	QP	
6	0.2100	9.80	10.34	20.14	53.20	-33.06	AVG	
7	0.3180	23.07	10.41	33.48	59.76	-26.28	QP	
8	0.3180	6.55	10.41	16.96	49.76	-32.80	AVG	
9	0.5980	24.03	10.49	34.52	56.00	-21.48	QP	
10	0.5980	15.02	10.49	25.51	46.00	-20.49	AVG	
11	0.9660	19.54	10.44	29.98	56.00	-26.02	QP	
12	0.9660	7.13	10.44	17.57	46.00	-28.43	AVG	

8 Radiated Emissions

Test Requirement: FCC CFR47 Part 15 Section 15.209 & 15.247

Test Method: ANSI C63.10:2013

Test Result: PASS

Measurement Distance: 3m

Limit:

Frequency (MHz)	Field Strength		Field Strength Limit at 3m Measurement Dist	
	uV/m	Distance (m)	uV/m	dBuV/m
0.009 ~ 0.490	2400/F(kHz)	300	10000 * 2400/F(kHz)	$20\log^{(2400/F(kHz))} + 80$
0.490 ~ 1.705	24000/F(kHz)	30	100 * 24000/F(kHz)	$20\log^{(24000/F(kHz))} + 40$
1.705 ~ 30	30	30	100 * 30	$20\log^{(30)} + 40$
30 ~ 88	100	3	100	$20\log^{(100)}$
88 ~ 216	150	3	150	$20\log^{(150)}$
216 ~ 960	200	3	200	$20\log^{(200)}$
Above 960	500	3	500	$20\log^{(500)}$

8.1 EUT Operation

Operating Environment :

Temperature: 23.5 °C

Humidity: 52.1 % RH

Atmospheric Pressure: 101.2kPa

Test Voltage: DC 3.7V

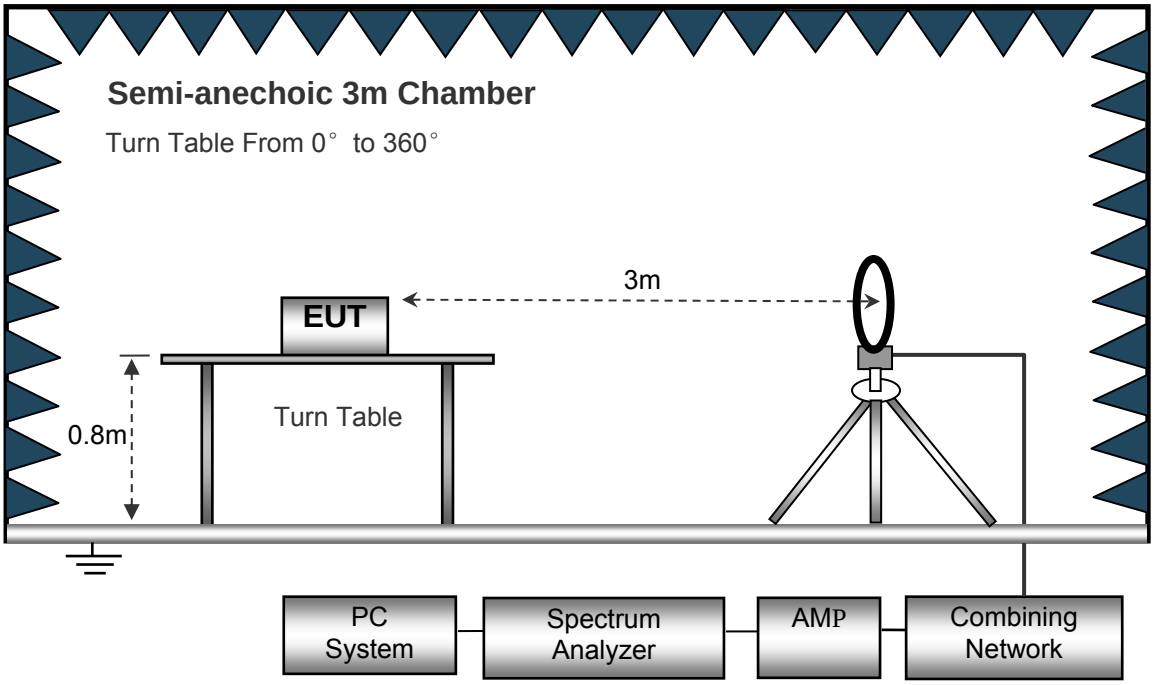
EUT Operation:

The test was performed in Wi-Fi Transmitting mode, the test data were shown in the report.

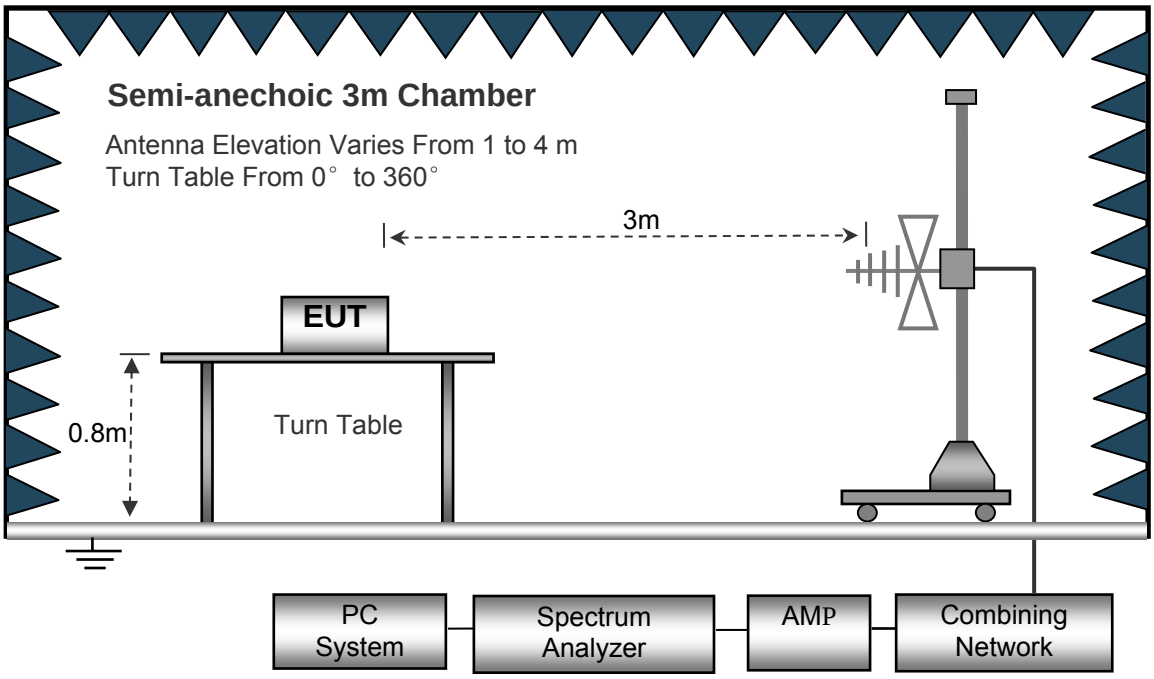
8.2 Test Setup

The radiated emission tests were performed in the 3m Semi- Anechoic Chamber test site, using the setup accordance with the ANSI C63.10:2013.

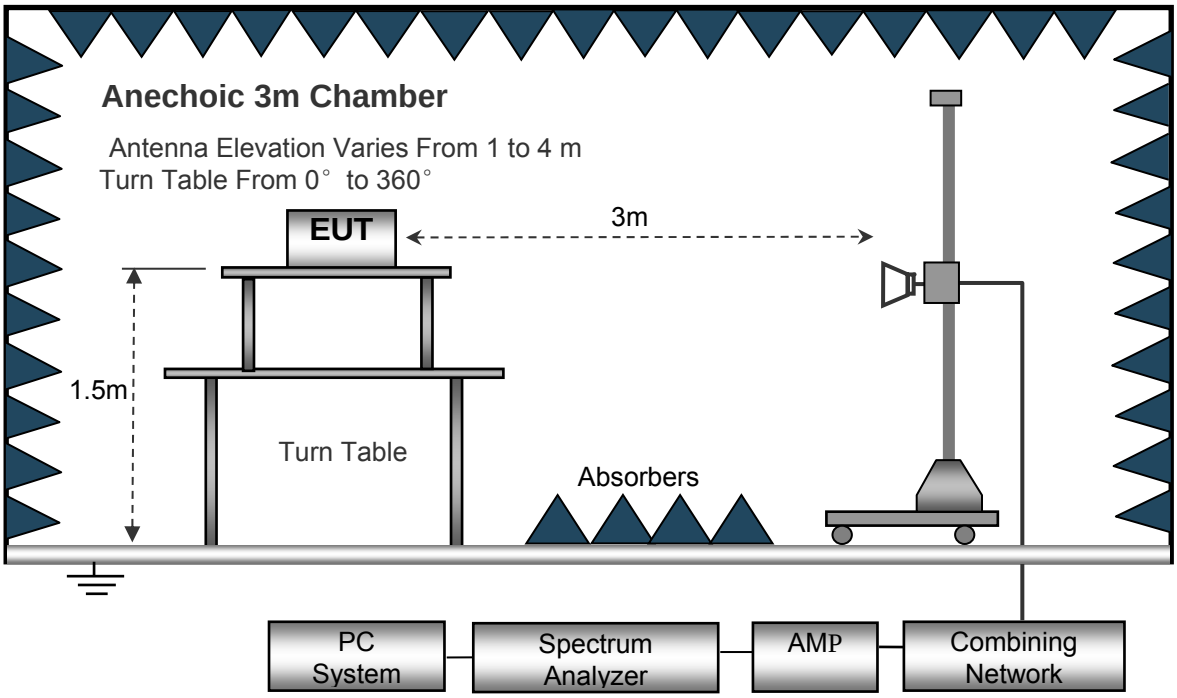
The test setup for emission measurement below 30MHz.



The test setup for emission measurement from 30 MHz to 1 GHz.



The test setup for emission measurement above 1 GHz.



8.3 Spectrum Analyzer Setup

Below 30MHz

Sweep Speed ..... Auto
IF Bandwidth..... 10kHz
Video Bandwidth..... 10kHz
Resolution Bandwidth..... 10kHz

30MHz ~ 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 100kHz
Video Bandwidth..... 300kHz

Above 1GHz

Sweep Speed ..... Auto
Detector ..... PK
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 3MHz
Detector ..... Ave.
Resolution Bandwidth..... 1MHz
Video Bandwidth..... 10Hz

8.4 Test Procedure

1. The EUT is placed on a turntable. For below 1GHz, the EUT is 0.8m above ground plane; For above1GHz, the EUT is 1.5m above ground plane.
2. The turntable shall be rotated for 360 degrees to determine the position of maximum emission level.
3. EUT is set 3m away from the receiving antenna, which is moved from 1m to 4m to find out the maximum emissions.
4. Maximum procedure was performed on the six highest emissions to ensure EUT compliance.
5. And also, each emission was to be maximized by changing the polarization of receiving antenna both horizontal and vertical.
6. Repeat above procedures until the measurements for all frequencies are complete.
7. The radiation measurements are performed in X,Y and Z axis positioning(X denotes lying on the table, Y denotes side stand and Z denotes vertical stand),the worst condition was tested putting the eut in X axis,so the worst data were shown as follow.
8. A 2.4GHz high –pass filter is used druing radiated emissions above 1GHz measurement.

8.5 Corrected Amplitude & Margin Calculation

The Corrected Amplitude is calculated by adding the Antenna Factor and Cable Factor, and subtracting the Amplifier Gain from the Amplitude reading. The basic equation is as follows:

Corr. Ampl. = Indicated Reading + Antenna Factor + Cable Factor - Amplifier Gain

The “Margin” column of the following data tables indicates the degree of compliance with the applicable limit. For example, a margin of -7dB means the emission is 7dB below the maximum limit for Class B. The equation for margin calculation is as follows:

Margin = Corr. Ampl. – Limit

8.6 Summary of Test Results

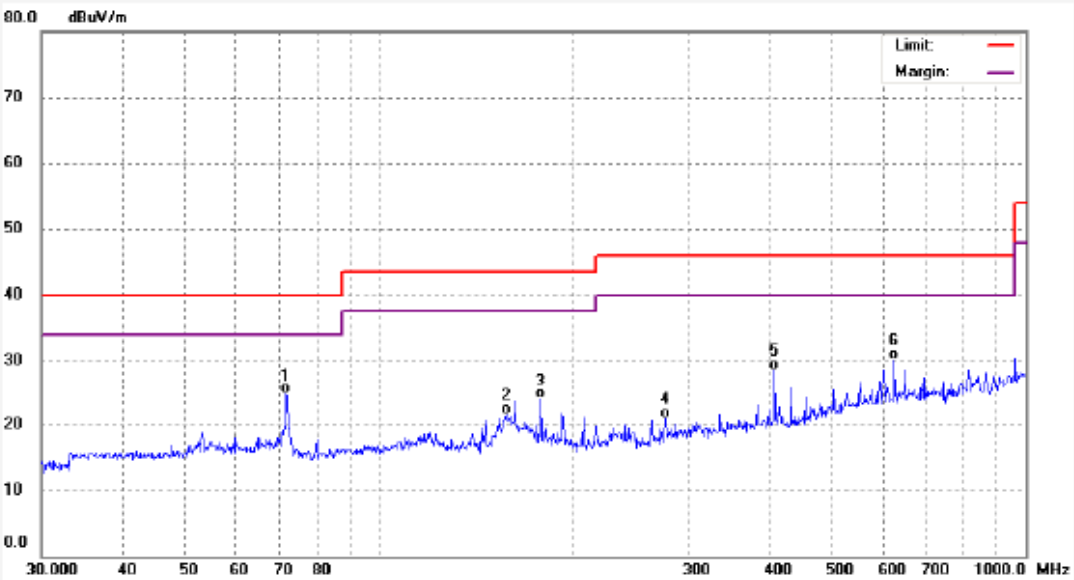
Test Frequency : 9kHz to 30MHz

The measurements were more than 20 dB below the limit and not reported.

Test Frequency : 30MHz ~ 1GHz

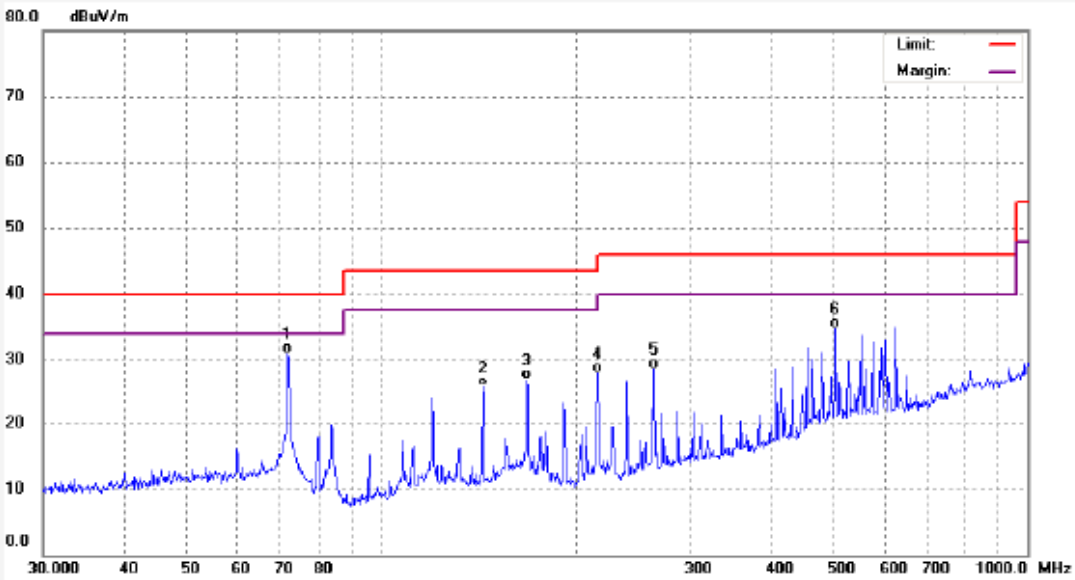
Note: the worst test data (Wi-Fi b mode low channel) were shown in the report.

Antenna Polarization: Vertical



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	71.8319	43.31	-18.55	24.76	40.00	-15.24	QP	
2	157.0072	36.93	-15.52	21.41	43.50	-22.09	QP	
3	177.5089	40.45	-16.59	23.86	43.50	-19.64	QP	
4	277.0935	36.15	-15.22	20.93	46.00	-25.07	QP	
5	408.9458	40.65	-12.24	28.41	46.00	-17.59	QP	
6	625.0779	37.57	-7.42	30.15	46.00	-15.85	QP	

Antenna Polarization: Horizontal



No.	Freq. (MHz)	Reading (dBuV/m)	Factor (dB)	Result (dBuV/m)	Limit (dBuV/m)	Margin (dB)	Detector	Remark
1	71.8320	49.36	-18.55	30.81	40.00	-9.19	QP	
2	143.8295	42.45	-16.70	25.75	43.50	-17.75	QP	
3	167.8243	42.68	-15.86	26.82	43.50	-16.68	QP	
4	216.0240	45.91	-18.00	27.91	46.00	-18.09	QP	
5	263.8190	44.37	-15.86	28.51	46.00	-17.49	QP	
6	504.7062	44.21	-9.52	34.69	46.00	-11.31	QP	

Test Frequency : 1GHz ~ 18GHz

Note: the worst test data (Wi-Fi b mode) were shown in the report.

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Low Channel 2412MHz									
4824.00	49.51	PK	101	1.5	V	-1.06	48.45	74.00	-25.55
4824.00	45.07	Ave	101	1.5	V	-1.06	44.01	54.00	-9.99
7236.00	48.34	PK	216	1.5	H	1.33	49.67	74.00	-24.33
7236.00	41.25	Ave	216	1.5	H	1.33	42.58	54.00	-11.42
2327.06	45.00	PK	149	1.6	V	-13.19	31.81	74.00	-42.19
2327.06	39.14	Ave	149	1.6	V	-13.19	25.95	54.00	-28.05
2356.43	42.62	PK	237	1.1	H	-13.14	29.48	74.00	-44.52
2356.43	37.02	Ave	237	1.1	H	-13.14	23.88	54.00	-30.12
2496.81	44.11	PK	112	1.4	V	-13.08	31.03	74.00	-42.97
2496.81	36.64	Ave	112	1.4	V	-13.08	23.56	54.00	-30.44

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: Middle Channel 2437MHz									
4874.00	49.42	PK	112	1.9	V	-0.62	48.80	74.00	-25.20
4874.00	43.96	Ave	112	1.9	V	-0.62	43.34	54.00	-10.66
7311.00	48.15	PK	284	1.1	H	2.21	50.36	74.00	-23.64
7311.00	40.73	Ave	284	1.1	H	2.21	42.94	54.00	-11.06
2325.20	45.30	PK	24	1.7	V	-13.19	32.11	74.00	-41.89
2325.20	39.44	Ave	24	1.7	V	-13.19	26.25	54.00	-27.75
2357.52	42.58	PK	237	1.5	H	-13.14	29.44	74.00	-44.56
2357.52	38.88	Ave	237	1.5	H	-13.14	25.74	54.00	-28.26
2492.72	44.81	PK	259	1.1	V	-13.08	31.73	74.00	-42.27
2492.72	38.99	Ave	259	1.1	V	-13.08	25.91	54.00	-28.09

Frequency	Receiver Reading	Detector	Turn table Angle	RX Antenna		Corrected Factor	Corrected Amplitude	FCC Part 15.247/209/205	
				Height	Polar			Limit	Margin
(MHz)	(dBμV)	(PK/QP/Ave)	Degree	(m)	(H/V)	(dB)	(dBμV/m)	(dBμV/m)	(dB)
11b: High Channel 2462MHz									
4924.00	48.86	PK	131	1.0	V	-0.24	48.62	74.00	-25.38
4924.00	43.22	Ave	131	1.0	V	-0.24	42.98	54.00	-11.02
7386.00	46.96	PK	84	1.4	H	2.84	49.80	74.00	-24.20
7386.00	40.52	Ave	84	1.4	H	2.84	43.36	54.00	-10.64
2346.50	45.07	PK	308	1.1	V	-13.19	31.88	74.00	-42.12
2346.50	38.89	Ave	308	1.1	V	-13.19	25.70	54.00	-28.30
2356.56	44.66	PK	177	1.1	H	-13.14	31.52	74.00	-42.48
2356.56	36.41	Ave	177	1.1	H	-13.14	23.27	54.00	-30.73
2495.68	42.41	PK	93	1.6	V	-13.08	29.33	74.00	-44.67
2495.68	37.38	Ave	93	1.6	V	-13.08	24.30	54.00	-29.70

Test Frequency: 18GHz~25GHz

The measurements were more than 20 dB below the limit and not reported.

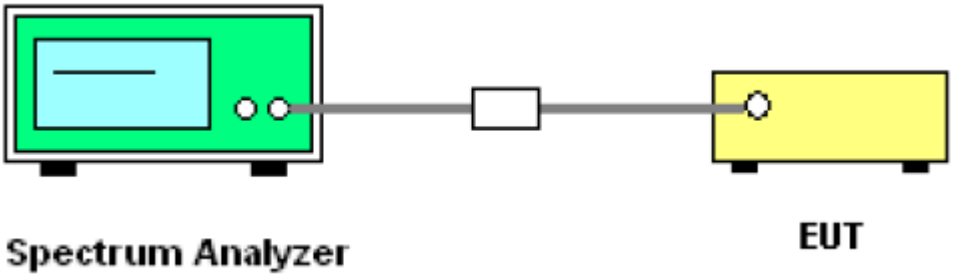
9 Band Edge Measurement

Test Requirement:	FCC CFR47 Part 15 Section 15.247
Test Method:	558074 D01 15.247 Meas Guidance v05, August 24, 2018
Test Limit:	Regulation 15.247 (d),In any 100 kHz bandwidth outside the frequency band in which the spread spectrum or digitally modulated intentional radiator is operating, the radio frequency power that is produced by the intentional radiator shall be at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power, based on either an RF conducted or a radiated measurement, provided the transmitter demonstrates compliance with the peak conducted power limits. If the transmitter complies with the conducted power limits based on the use of RMS averaging over a time interval, as permitted under paragraph (b)(3) of this section, the attenuation required under this paragraph shall be 30 dB instead of 20 dB. Attenuation below the general limits specified in §15.209(a) is not required. In addition, radiated emissions which fall in the restricted bands, as defined in §15.205(a), must also comply with the radiated emission limits specified in §15.209(a) (see §15.205(c)).
Test Mode:	Transmitting

9.1 Test Produce

1. Check the calibration of the measuring instrument using either an internal calibrator or a known signal from an external generator.
2. Position the EUT without connection to measurement instrument. Turn on the EUT and connect its antenna terminal to measurement instrument via a low loss cable. Then set it to any one measured frequency within its operating range, and make sure the instrument is operated in its linear range.
3. Set RBW to 100 kHz and VBW of spectrum analyzer to 300 kHz with a convenient frequency span including 100 kHz bandwidth from band edge.
4. Measure the highest amplitude appearing on spectral display and set it as a reference level. Plot the graph with marking the highest point and edge frequency.
5. Repeat above procedures until all measured frequencies were complete.

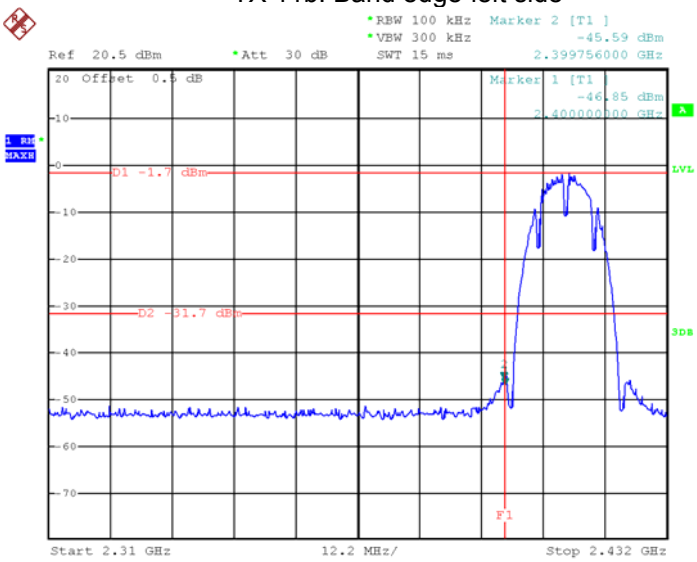
9.2 Test Setup



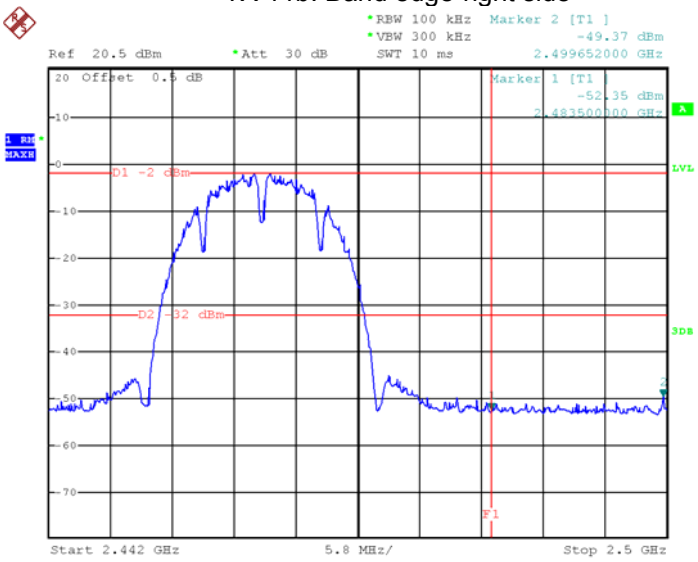
9.3 Test Result

Test result plots shown as follows:

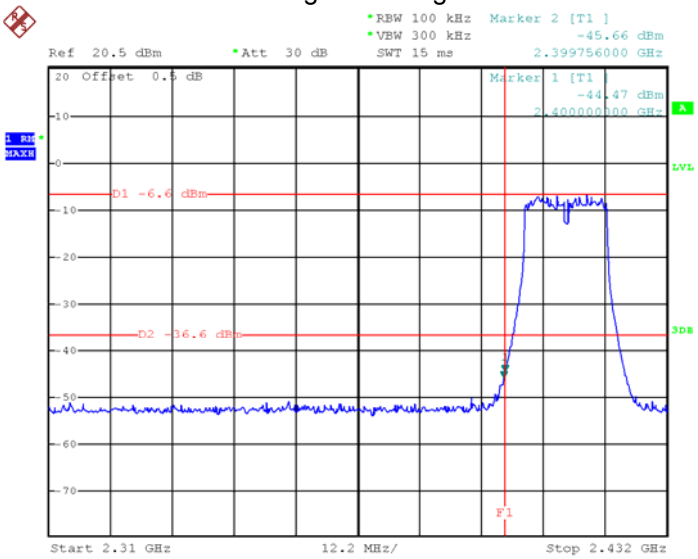
TX 11b: Band edge-left side



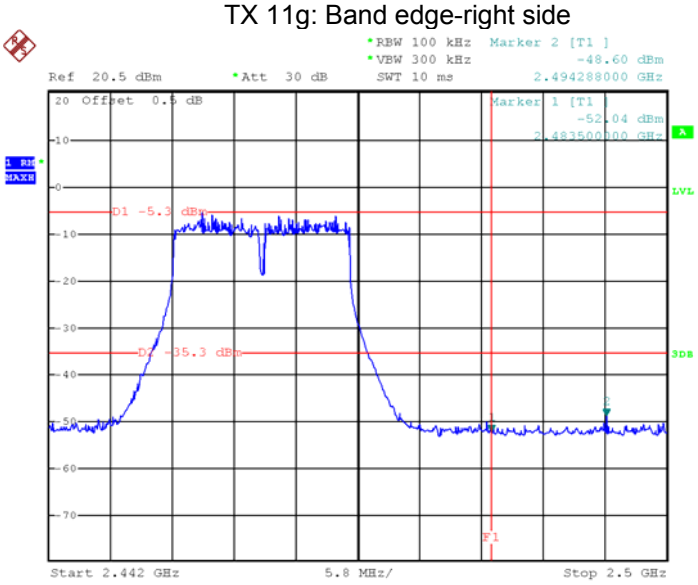
TX 11b: Band edge-right side



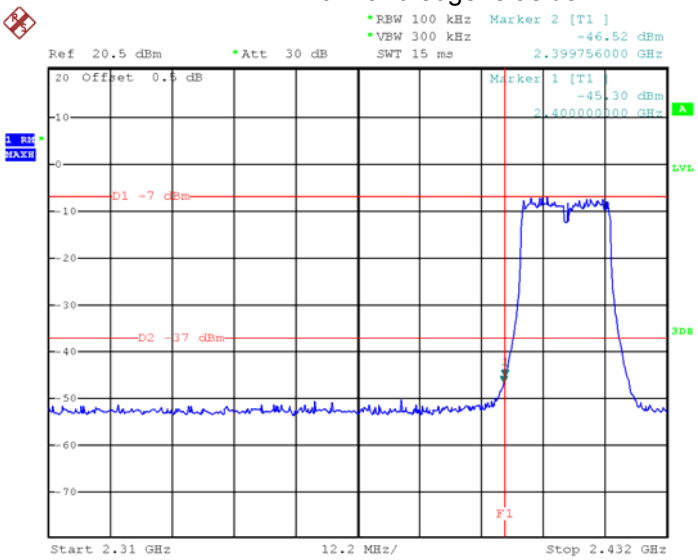
TX 11g: Band edge-left side



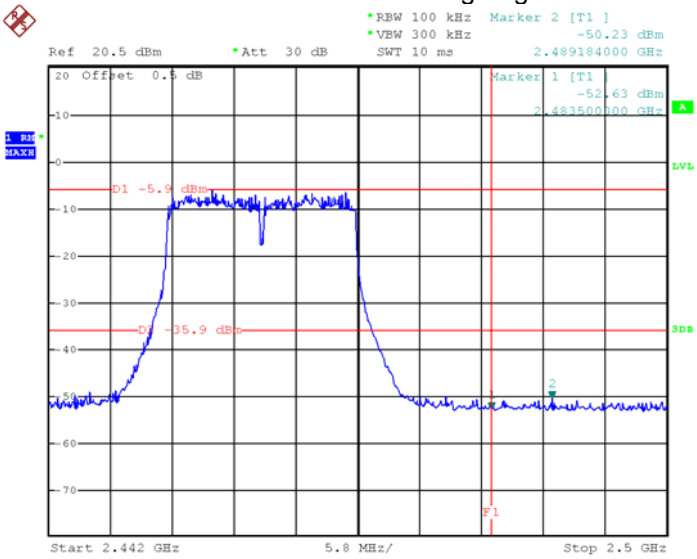
TX 11g: Band edge-right side



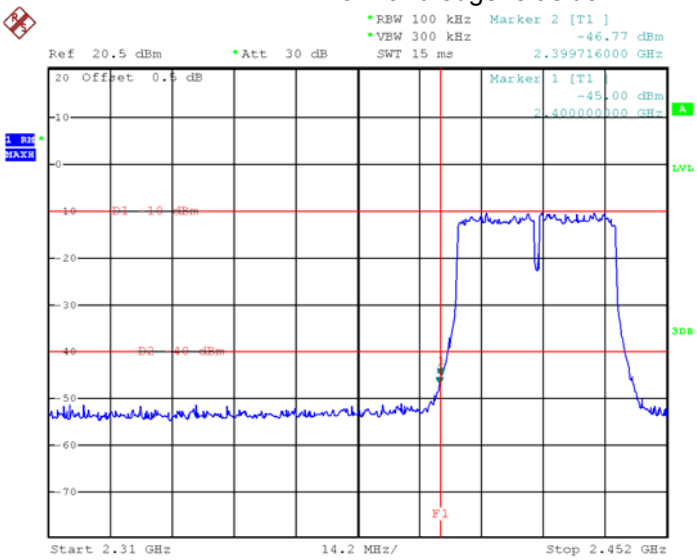
11n HT20: Band edge-left side



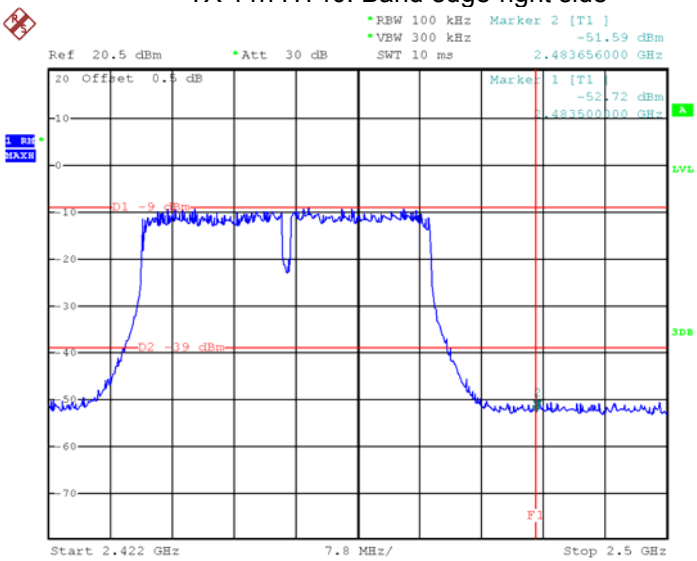
TX 11n HT20: Band edge-right side



TX 11n HT40: Band edge-left side



TX 11n HT40: Band edge-right side



10 Bandwidth Measurement

Test Requirement: FCC CFR47 Part 15 Section 15.247

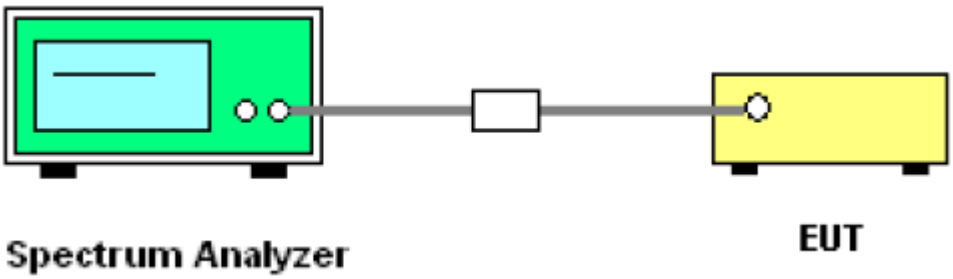
Test Method: 558074 D01 15.247 Meas Guidance v05, August 24, 2018

10.1 Test Procedure:

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 = 100kHz, VBW = 300kHz

10.2 Test Setup

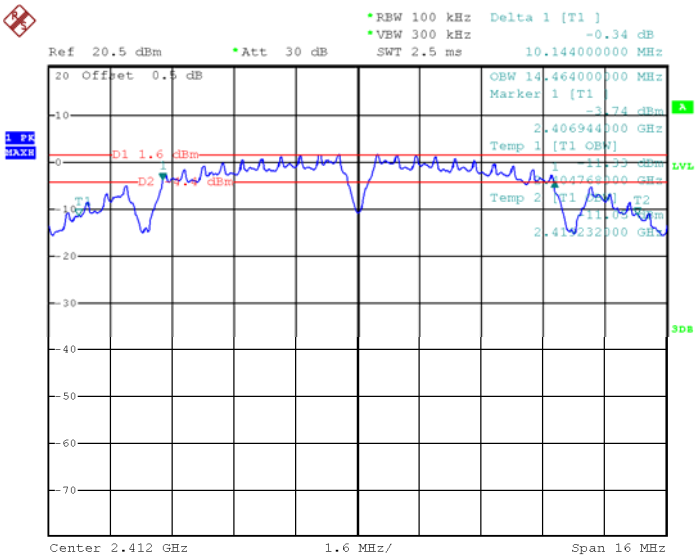


10.3 Test Result:

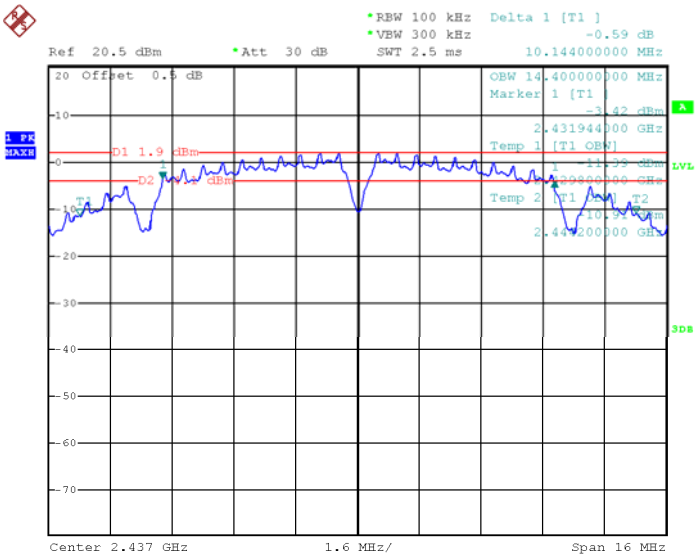
Operation mode	6dB Bandwidth (MHz)			99% Bandwidth (MHz)		
TX 11b	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	10.144	10.144	10.144	14.464	14.400	14.432
TX 11g	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	16.550	16.550	16.550	16.500	16.500	16.500
TX 11n HT20	Channel 1	Channel 6	Channel 11	Channel 1	Channel 6	Channel 11
	17.820	17.820	17.820	17.658	17.658	17.658
TX 11n HT40	Channel 3	Channel 6	Channel 9	Channel 3	Channel 6	Channel 9
	36.520	36.520	36.520	36.190	36.190	36.190

Test result plot as follows:

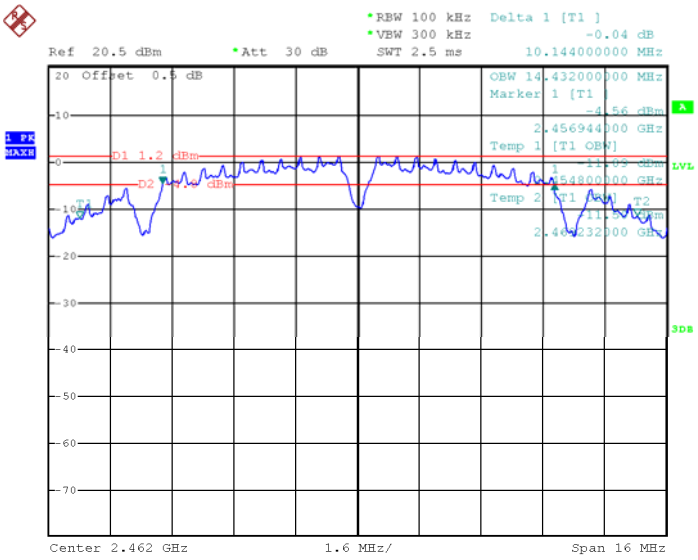
Mode: TX 11b channel 1



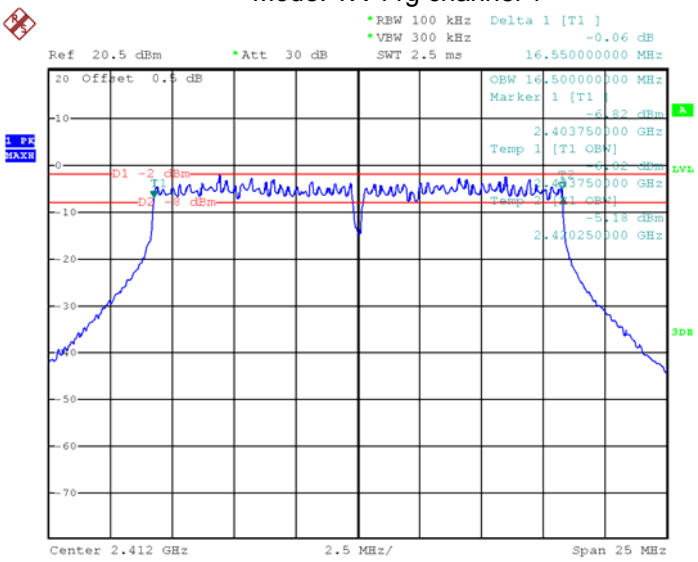
Mode: TX 11b channel 6



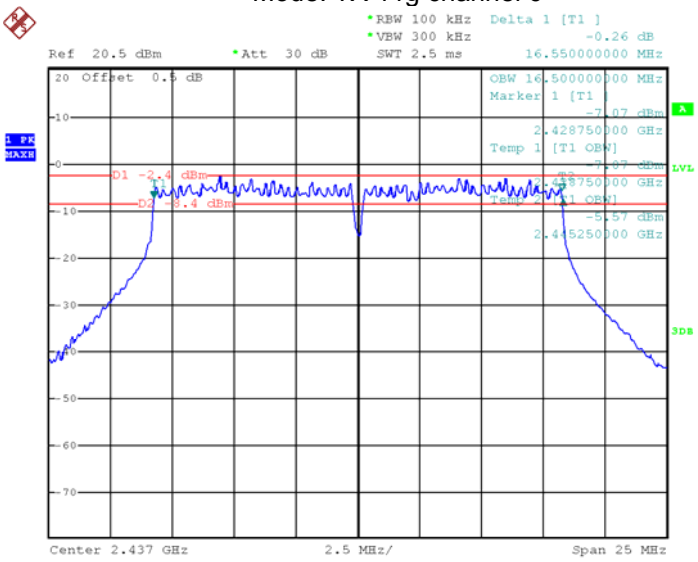
Mode: TX 11b channel 11



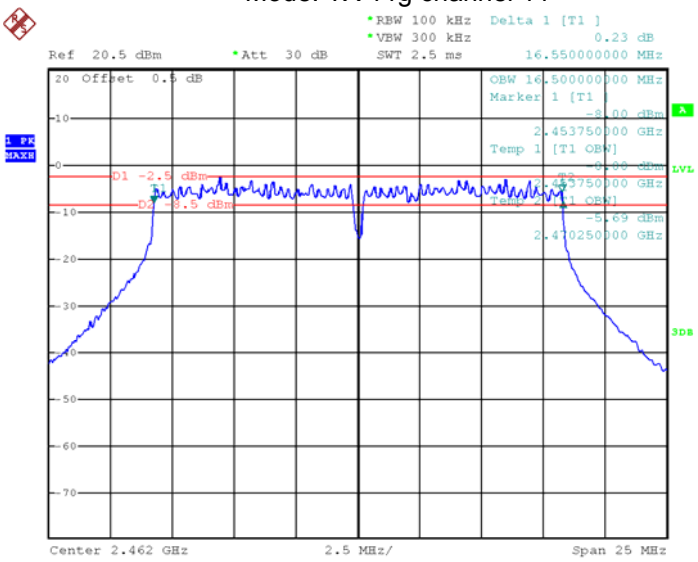
Mode: TX 11g channel 1



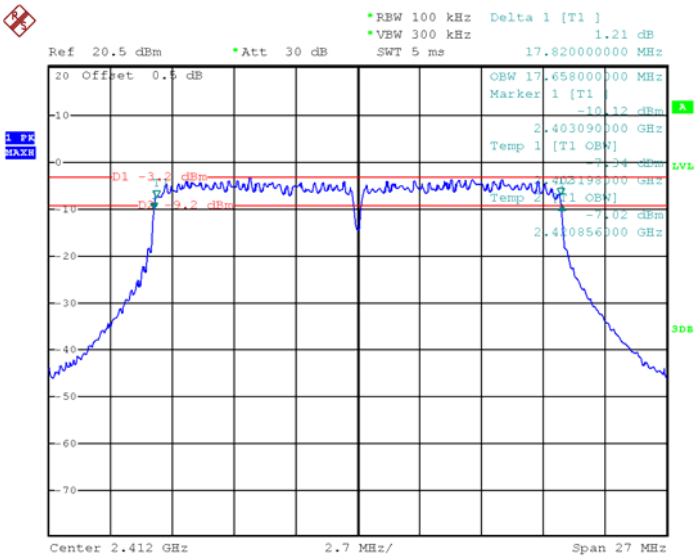
Mode: TX 11g channel 6



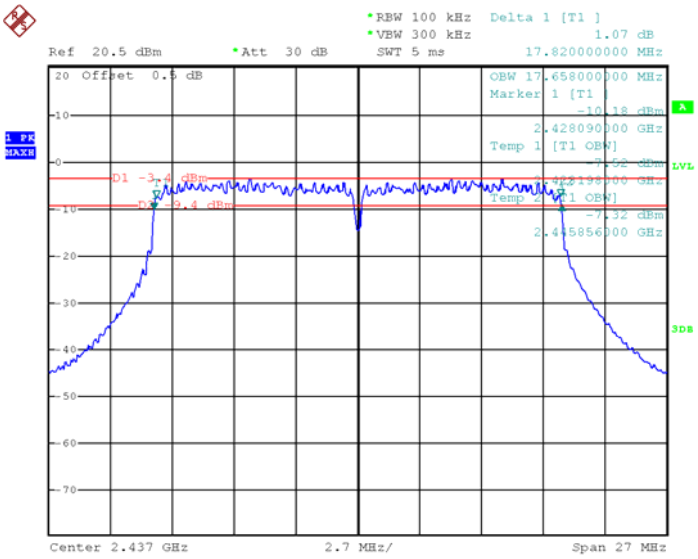
Mode: TX 11g channel 11



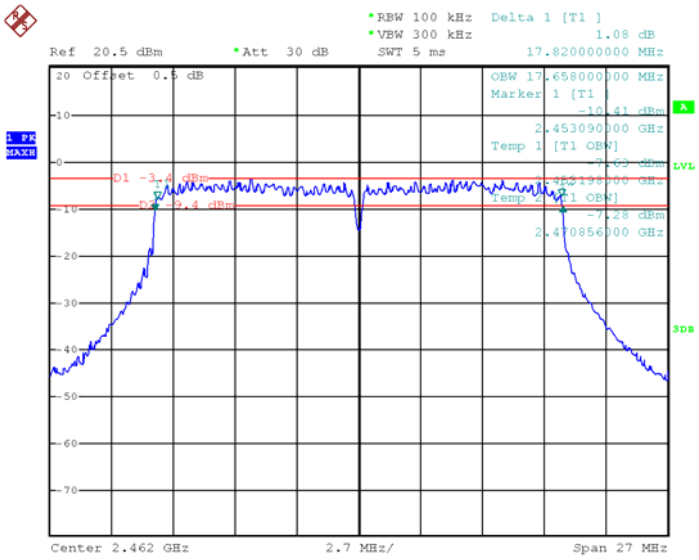
Mode: TX 11n HT20 channel 1



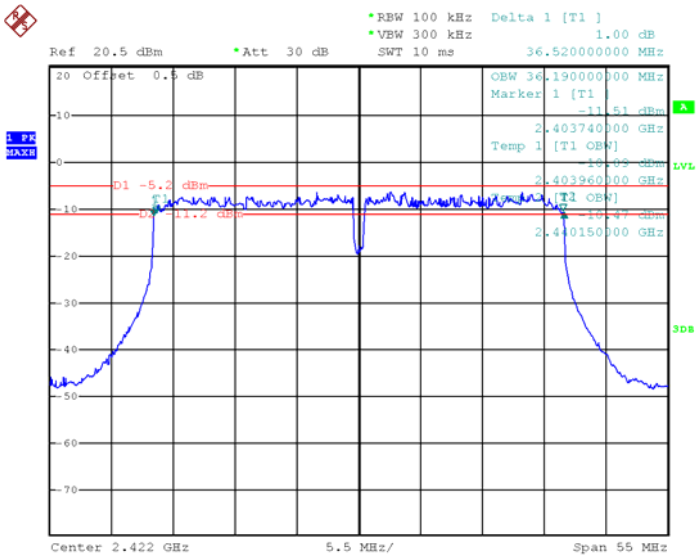
Mode: TX 11n HT20 channel 6



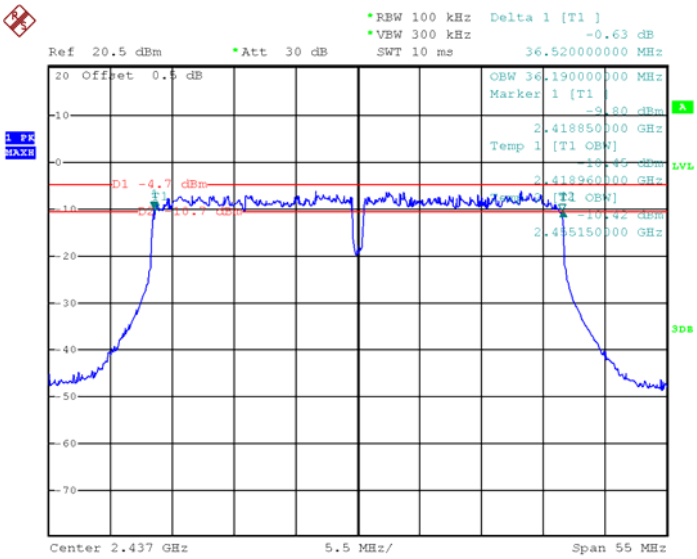
Mode: TX 11n HT20 channel 11



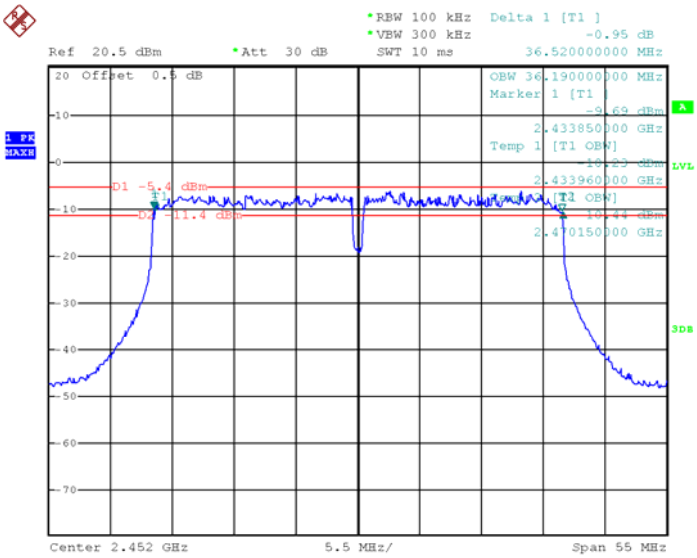
Mode: TX 11n HT40 channel 3



Mode: TX 11n HT40 channel 6



Mode: TX 11n HT40 channel 9



11 Maximum conducted (average) output power

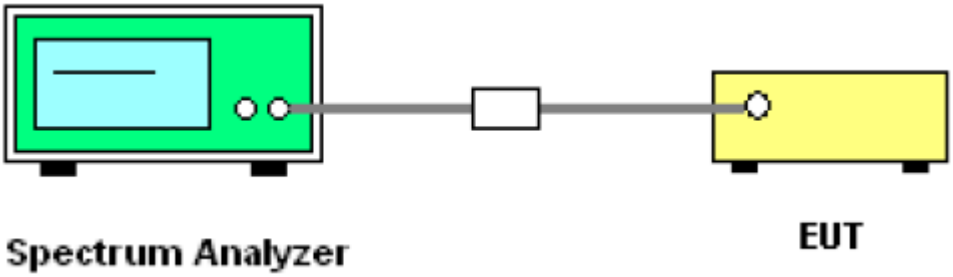
Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05, August 24, 2018

11.1 Test Procedure:

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 = 1 MHz. VBW = 3 MHz. Sweep = auto; Detector Function = RMS, 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.

11.2 Test Setup



11.3 Test Result:

Test mode :TX 11b		
Maximum conducted (average) output power (dBm)		
2412MHz	2437MHz	2462MHz
12.21	**12.56**	12.21
Limit: 1W/30dBm		

Test mode :TX 11g		
Maximum conducted (average) output power (dBm)		
2412MHz	2437MHz	2462MHz
12.25	12.15	12.06
Limit: 1W/30dBm		

Test mode :TX 11n HT20		
Maximum conducted (average) output power (dBm)		
2412MHz	2437MHz	2462MHz
12.47	12.24	12.21
Limit: 1W/30dBm		

Test mode : TX 11n HT40		
Maximum conducted (average) output power (dBm)		
2422MHz	2437MHz	2452MHz
12.23	12.44	12.53
Limit: 1W/30dBm		

12 Power Spectral density

Test Requirement: FCC CFR47 Part 15 Section 15.247

Test Method: 558074 D01 15.247 Meas Guidance v05, August 24, 2018

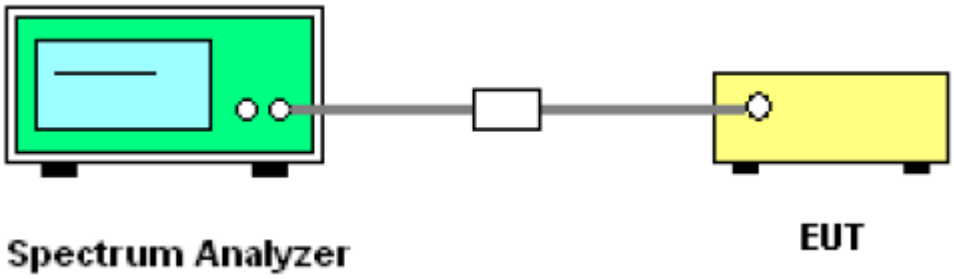
12.1 Test Procedure:

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.

12.2 Test Setup



12.3 Test Result:

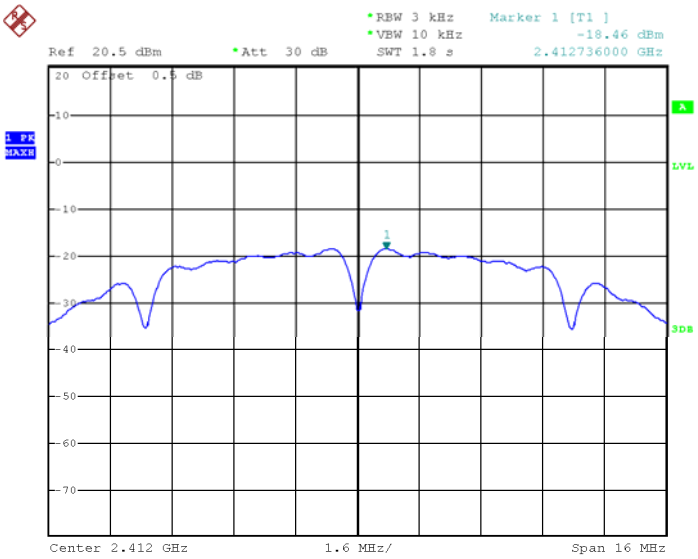
Test mode :TX 11b		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-18.46	-18.36	-18.98
Limit: 8dBm per 3kHz		

Test mode :TX 11g		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-16.51	-16.76	-16.70
Limit: 8dBm per 3kHz		

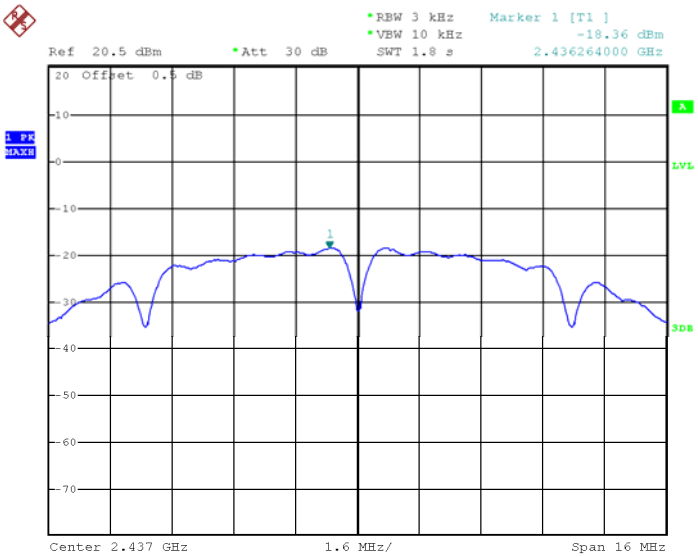
Test mode :TX 11n HT20		
Power Spectral (dBm per 3kHz)		
2412MHz	2437MHz	2462MHz
-16.66	-17.56	-17.70
Limit: 8dBm per 3kHz		

Test mode : TX 11n HT40		
Power Spectral (dBm per 3kHz)		
2422MHz	2437MHz	2452MHz
-18.92	-19.16	-19.89
Limit: 8dBm per 3kHz		

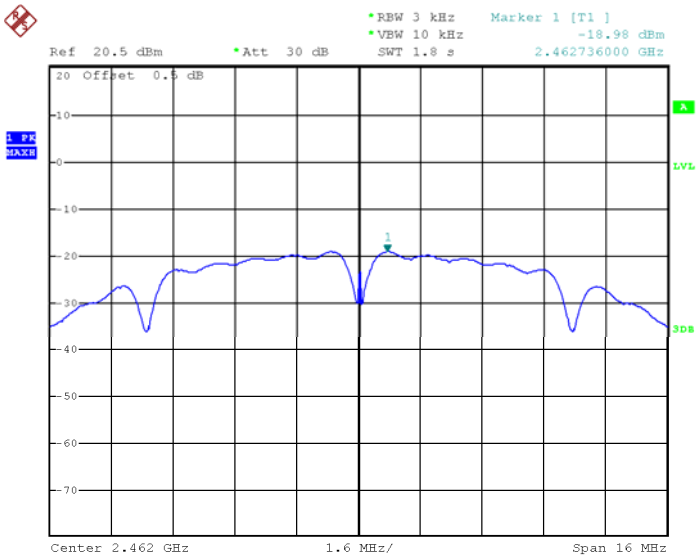
Mode: TX 11b 2412MHz



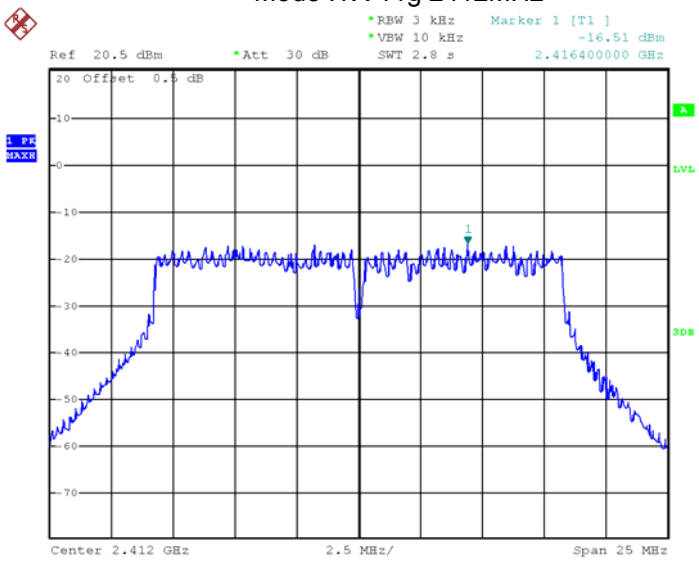
Mode: TX 11b 2437MHz



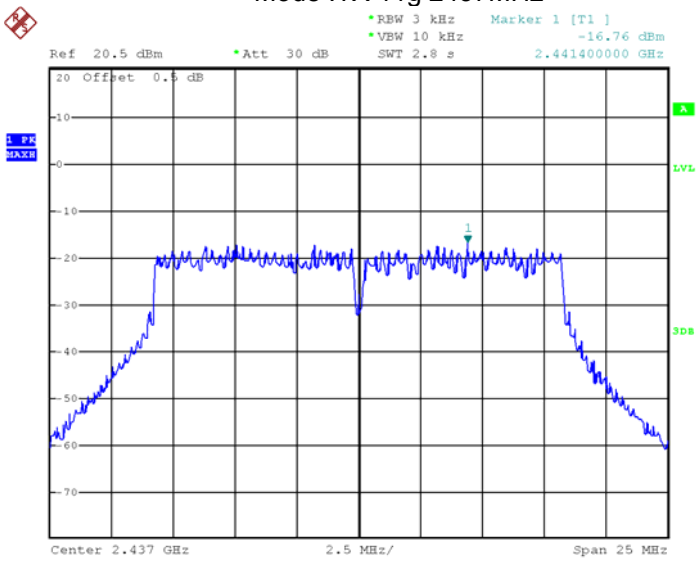
Mode: TX 11b 2462MHz



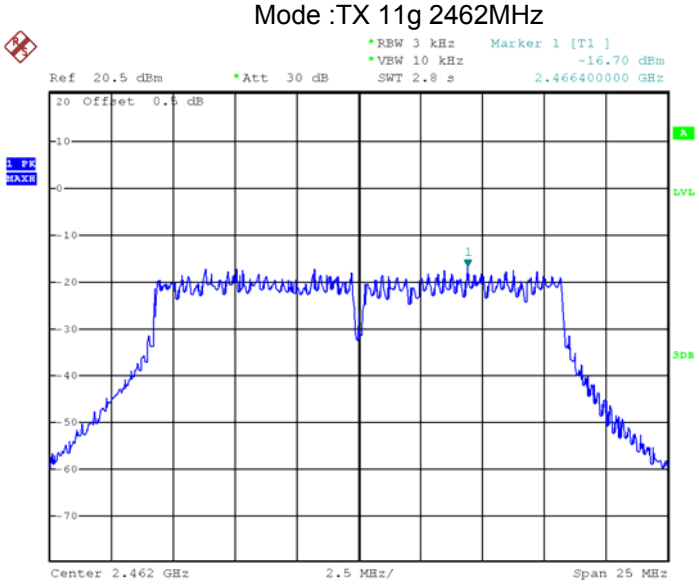
Mode :TX 11g 2412MHz



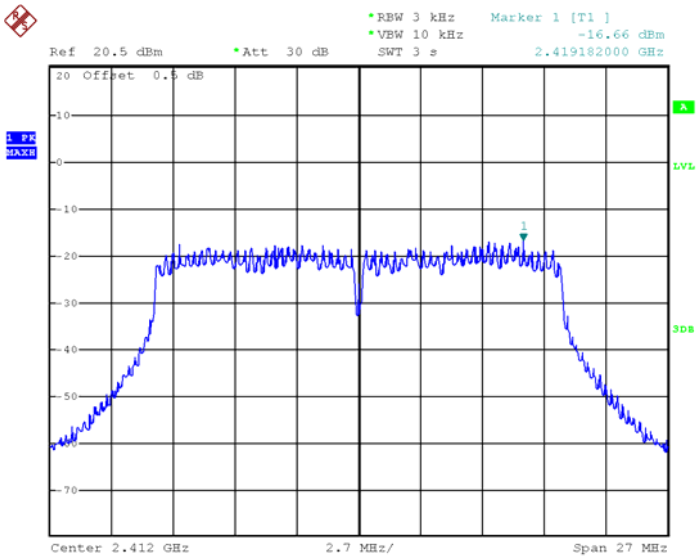
Mode :TX 11g 2437MHz



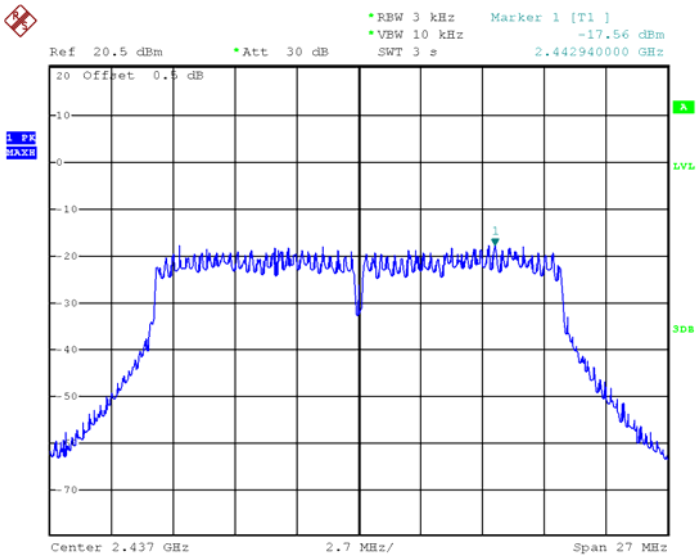
Mode :TX 11g 2462MHz



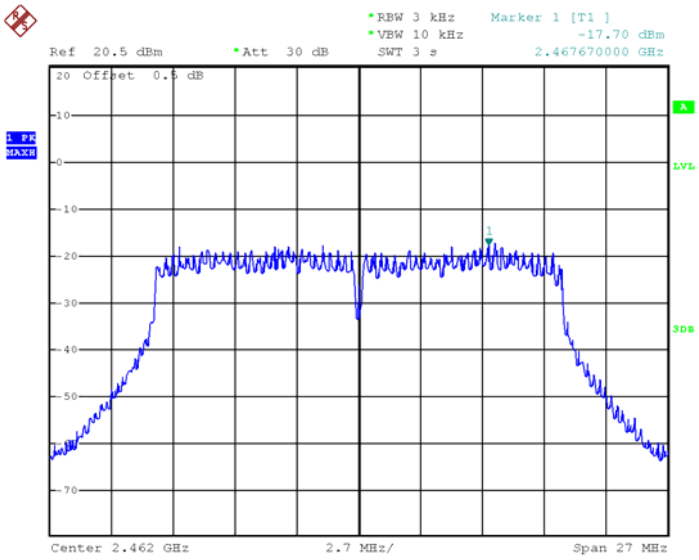
Mode: TX 11n HT20 2412MHz



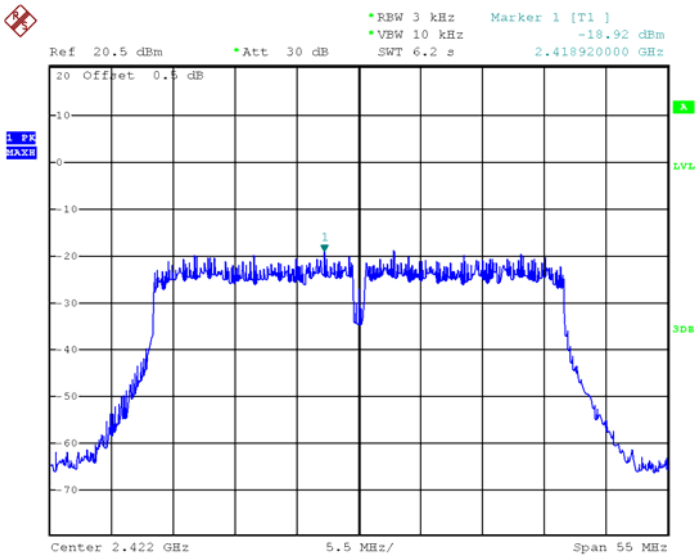
Mode: TX 11n HT20 2437MHz



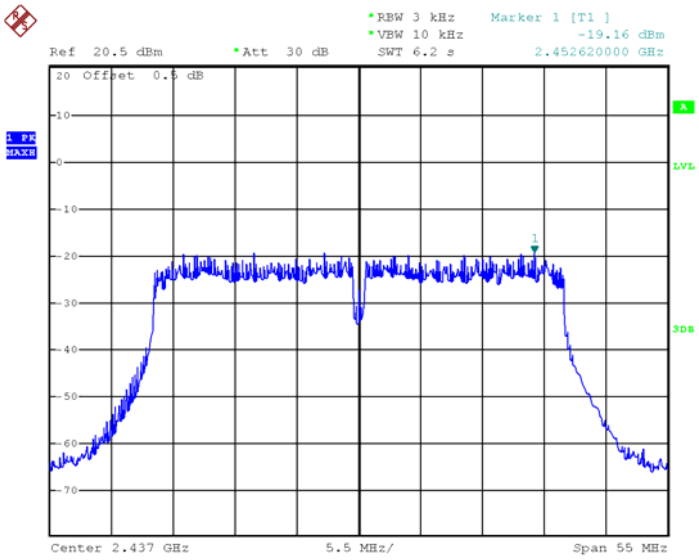
Mode: TX 11n HT20 2462MHz



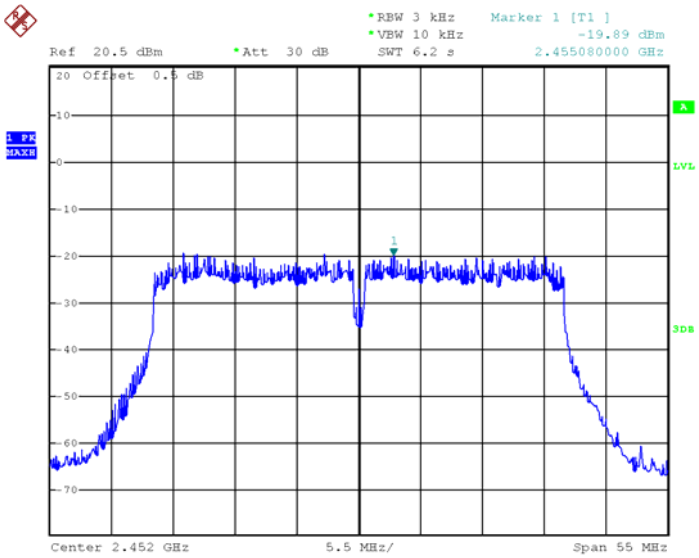
Mode: TX 11n HT40 2422MHz



Mode: TX 11n HT40 2437MHz



Mode: TX 11n HT40 2452MHz



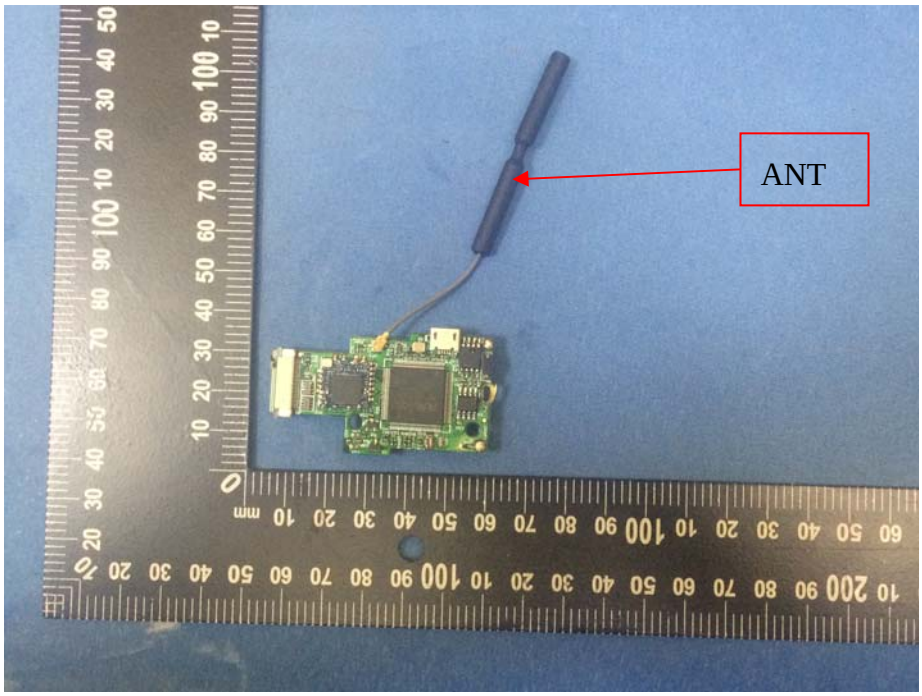
13 Antenna Requirement

An intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device. The use of a permanently attached antenna or of an antenna that uses a unique coupling to the intentional radiator shall be considered sufficient to comply with the provisions of this section. The manufacturer may design the unit so that a broken antenna can be replaced by the user, but the use of a standard antenna jack or electrical connector is prohibited. This requirement does not apply to carrier current devices or to devices operated under the provisions of §15.211, §15.213, §15.217, §15.219, or §15.221. Further, this requirement does not apply to intentional radiators that must be professionally installed, such as perimeter protection systems and some field disturbance sensors, or to other intentional radiators which, in accordance with §15.31(d), must be measured at the installation site. However, the installer shall be responsible for ensuring that the proper antenna is employed so that the limits in this part are not exceeded.

For intentional device, according to FCC 47 CFR Section 15.203, an intentional radiator shall be designed to ensure that no antenna other than that furnished by the responsible party shall be used with the device.

Result:

The EUT has one Internal Integrated Antenna, antenna again 2.0dBi, meets the requirements of FCC 15.203.



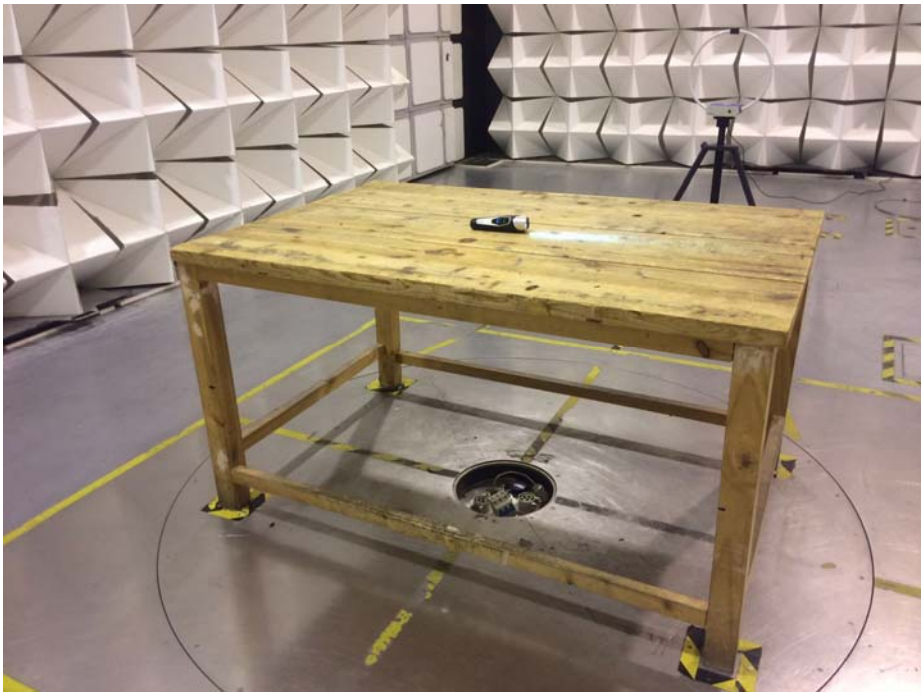
14 SAR Evaluation

Note: Please refer to SAR test report: WTD18S07118405W.

15 Photographs – Model DG-2684 Test Setup

15.1 Radiated Emission

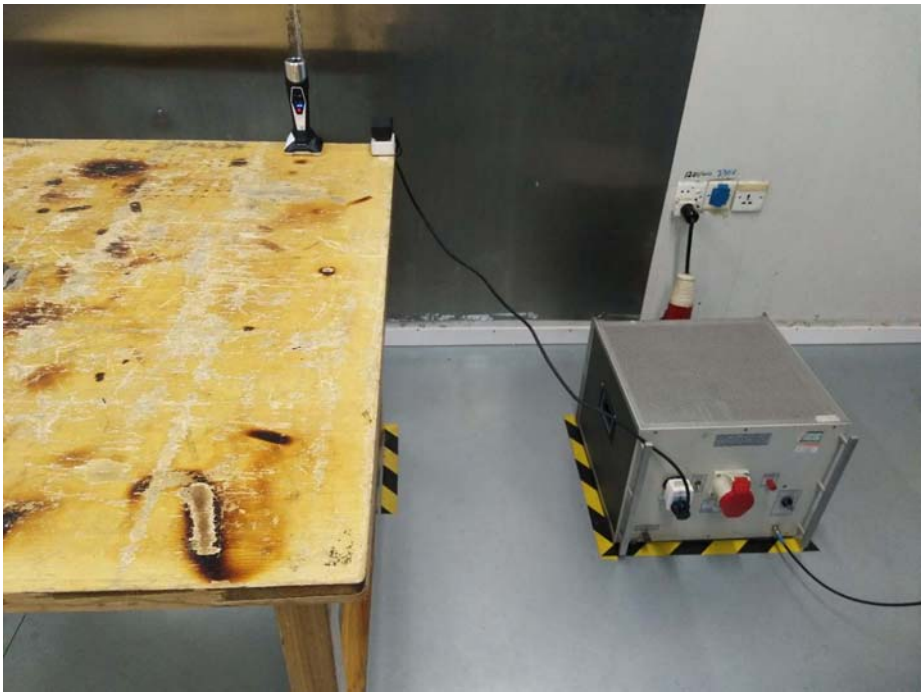
Test frequency 9kHz to 30MHz



Test frequency from 30MHz to 1GHz

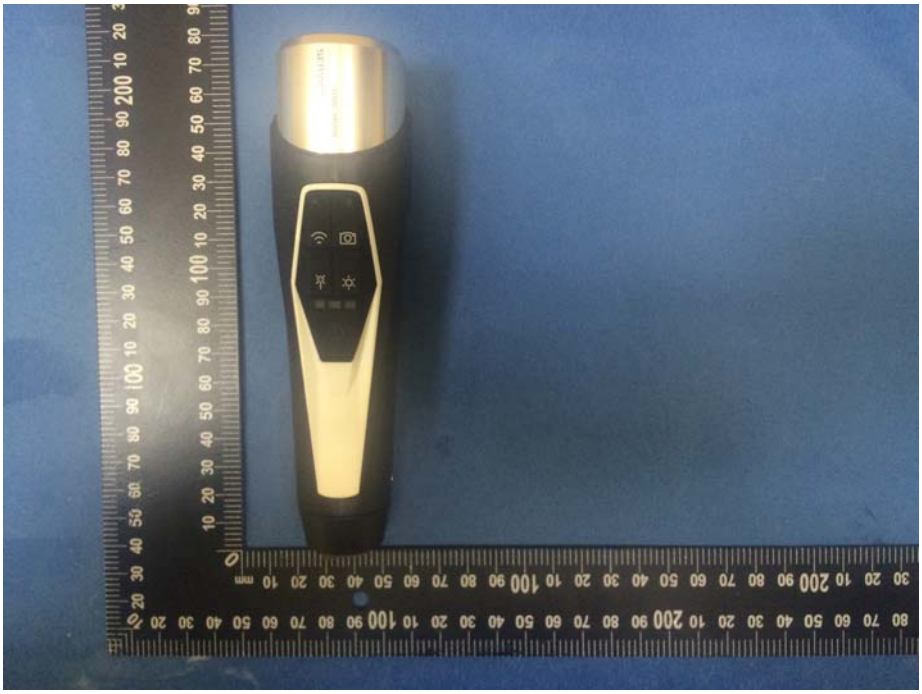
Test frequency above 1GHz

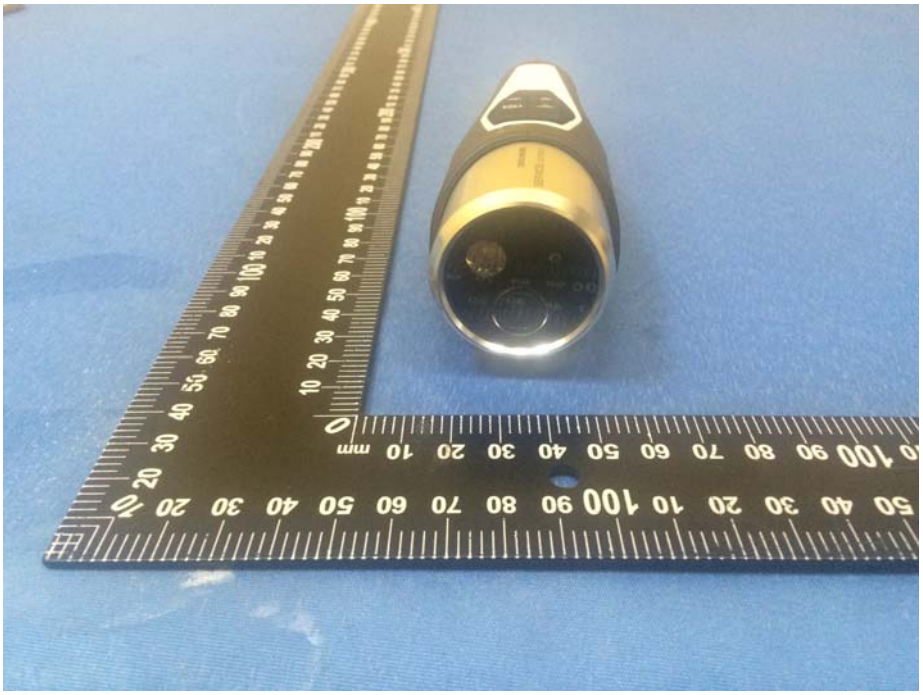
15.2 Conducted Emission

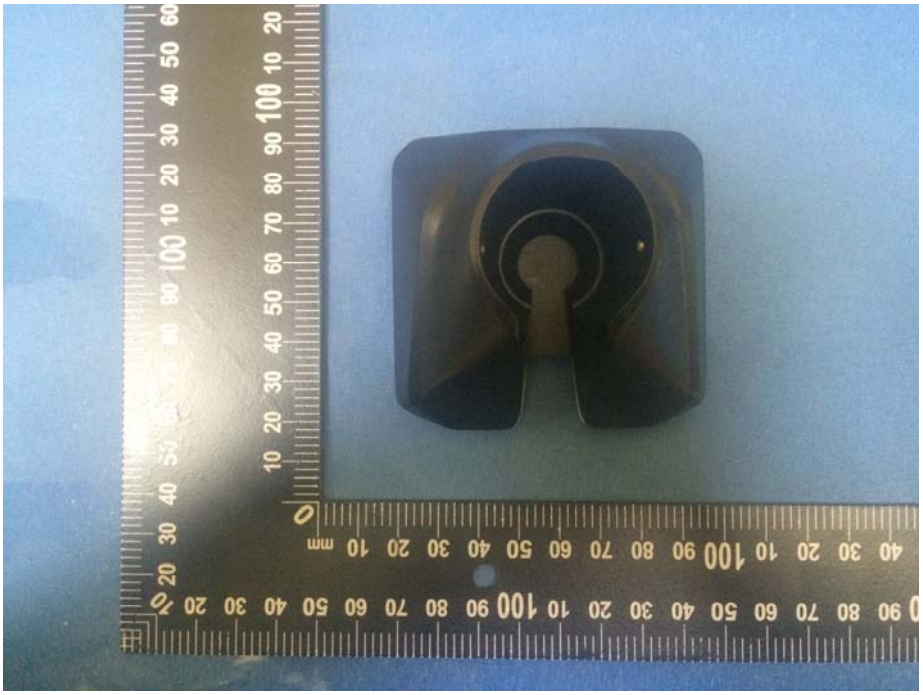


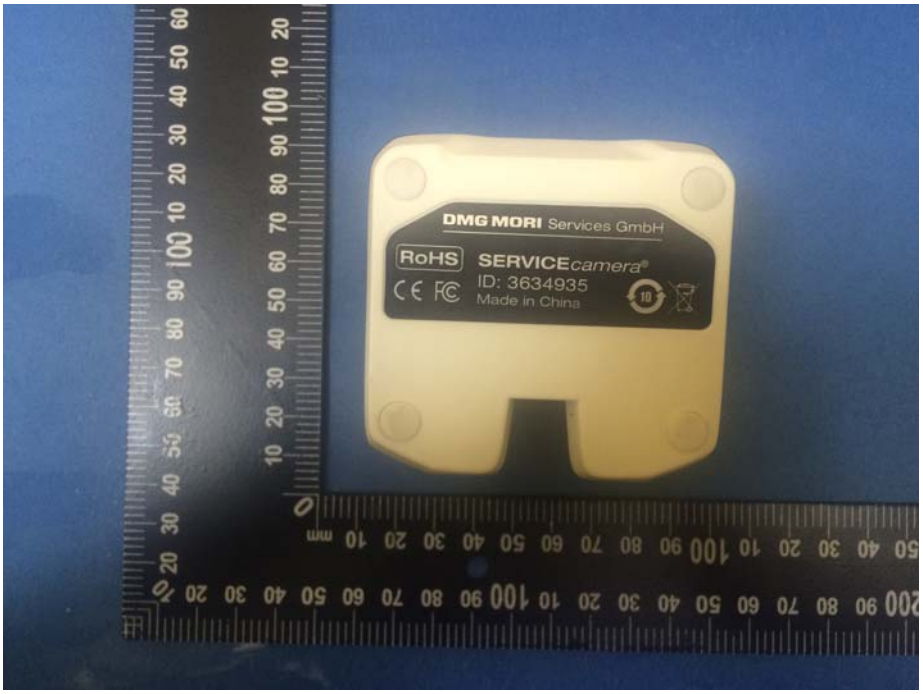
16 Photographs - Constructional Details

16.1 Model DG-2684–External Photos



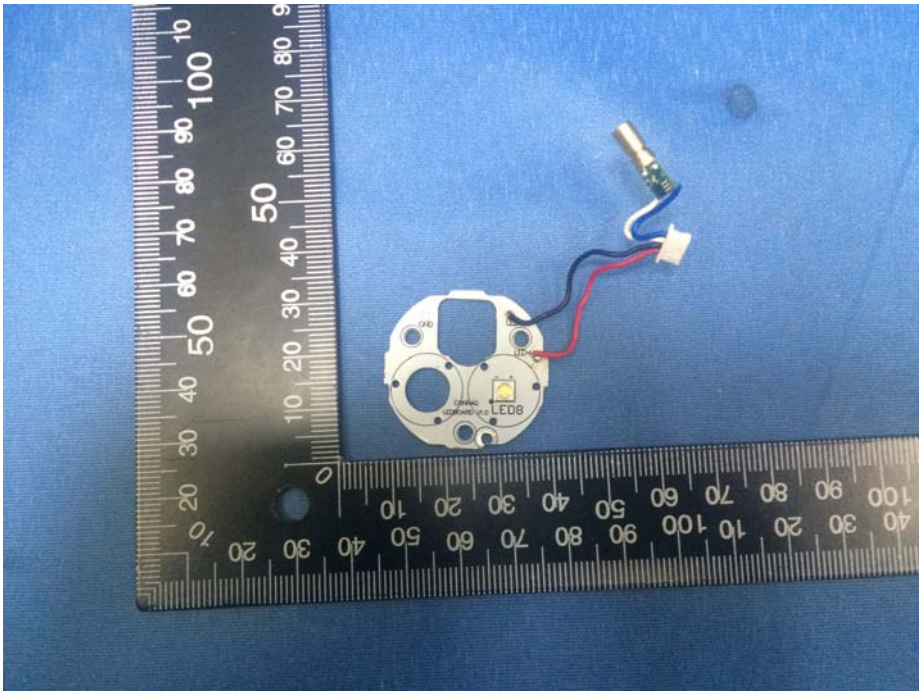


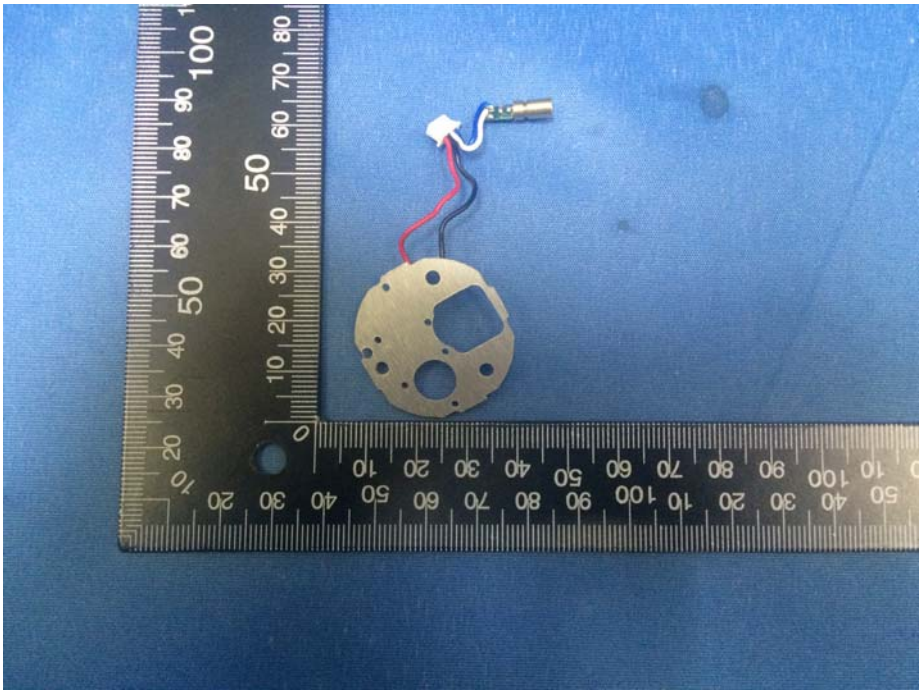


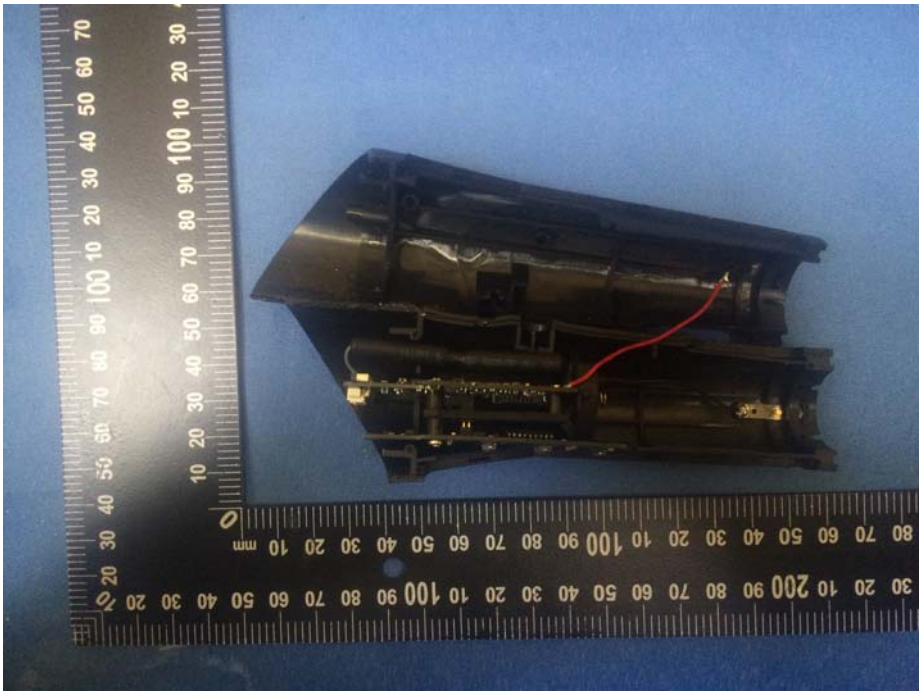

DMG MORI Services GmbH
RoHS
SERVICEcamera®
ID: 3634935
Made in China

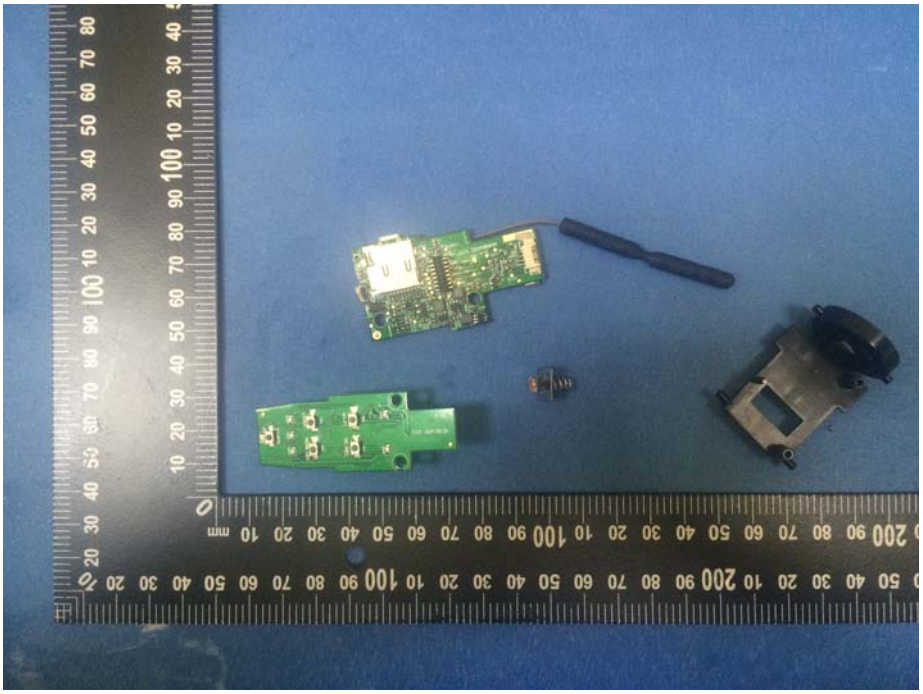
SWITCH-MODE POWER SUPPLY
MODEL: 6A-104WP05B
INPUT: 100-240V~, 50-60Hz, 0.3A
OUTPUT: 5V 2.0A
FOR I.T.E. USE ONLY
EFFICIENCY LEVEL V
1824 S
MADE IN CHINA

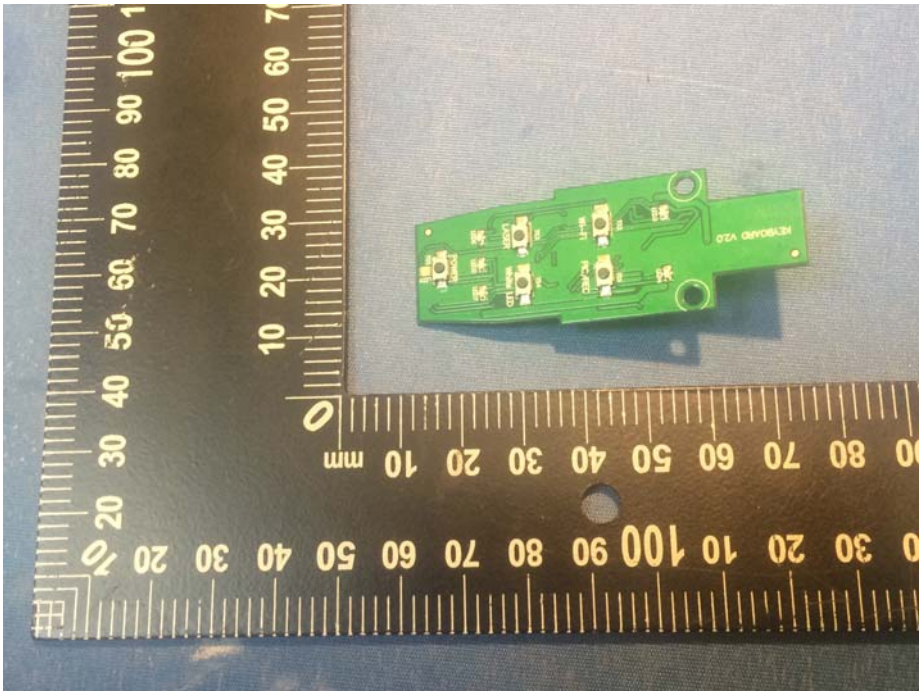
16.2 Model DG-2684 – Internal Photos

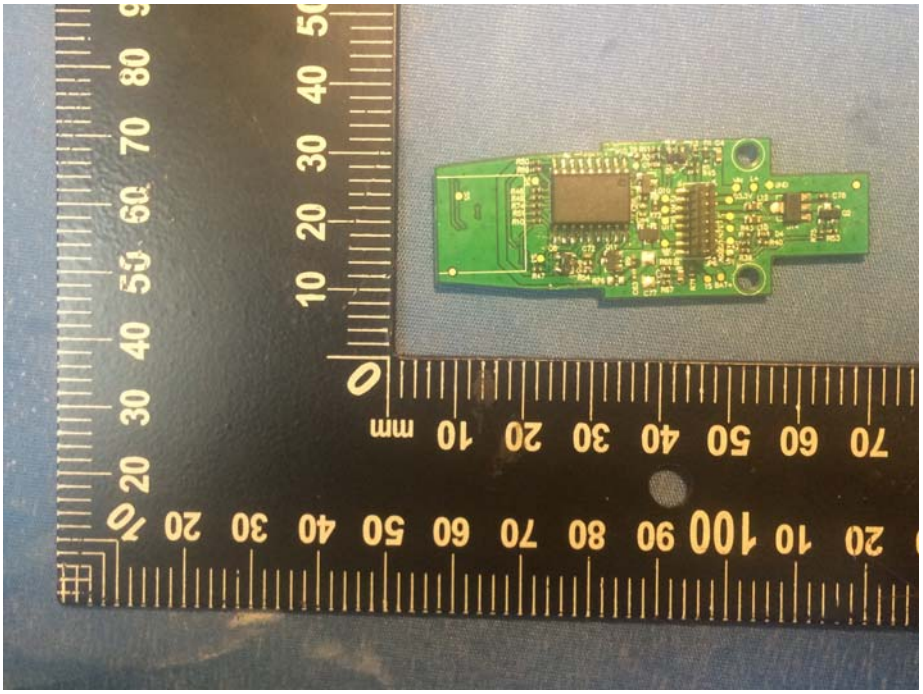

LED8

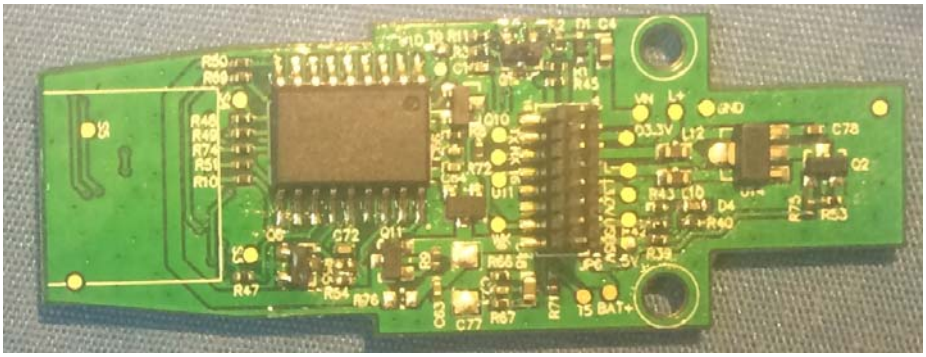


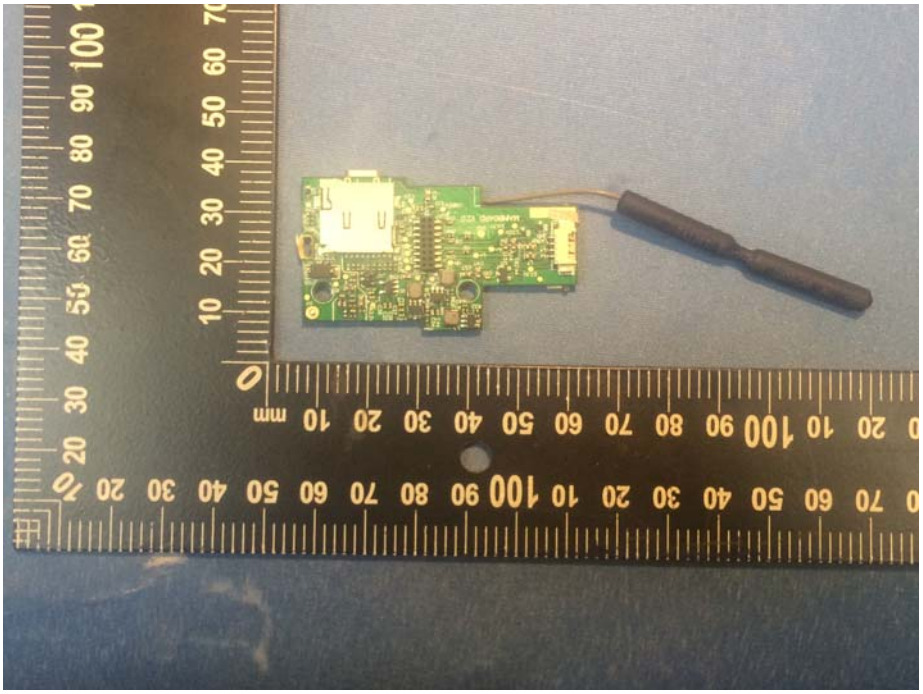


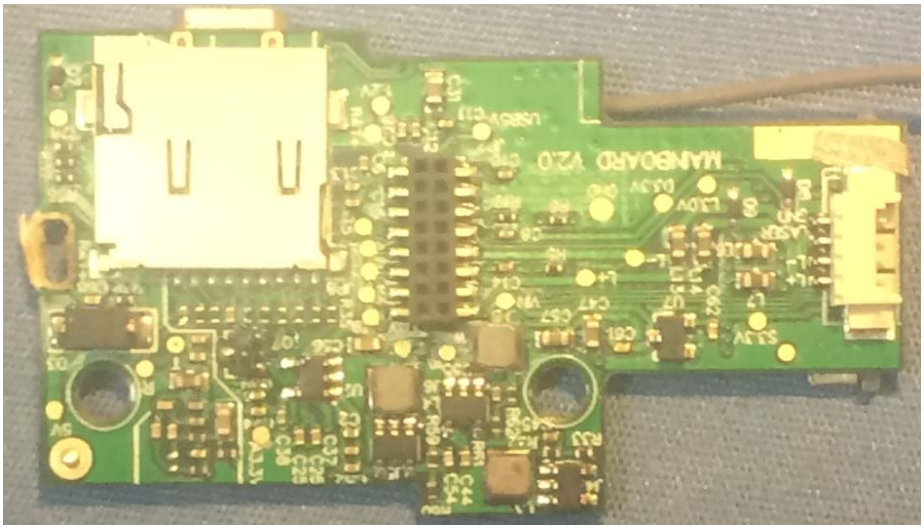


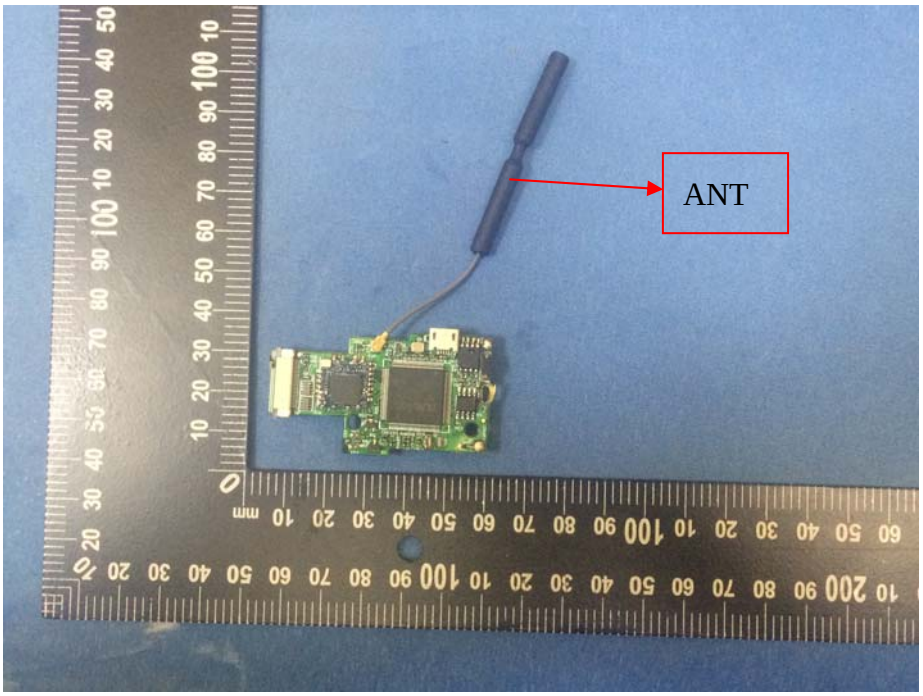


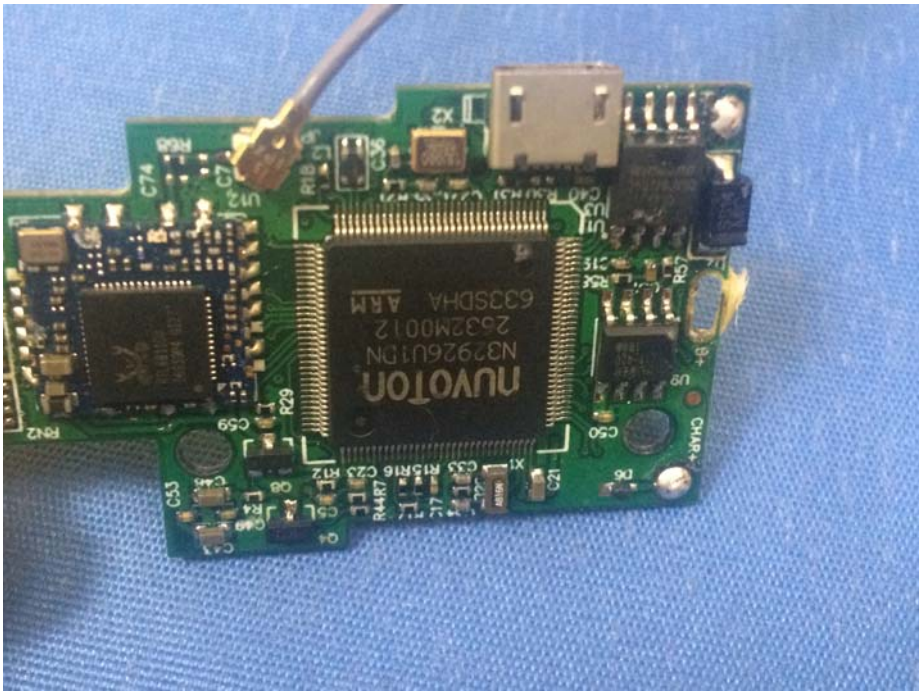


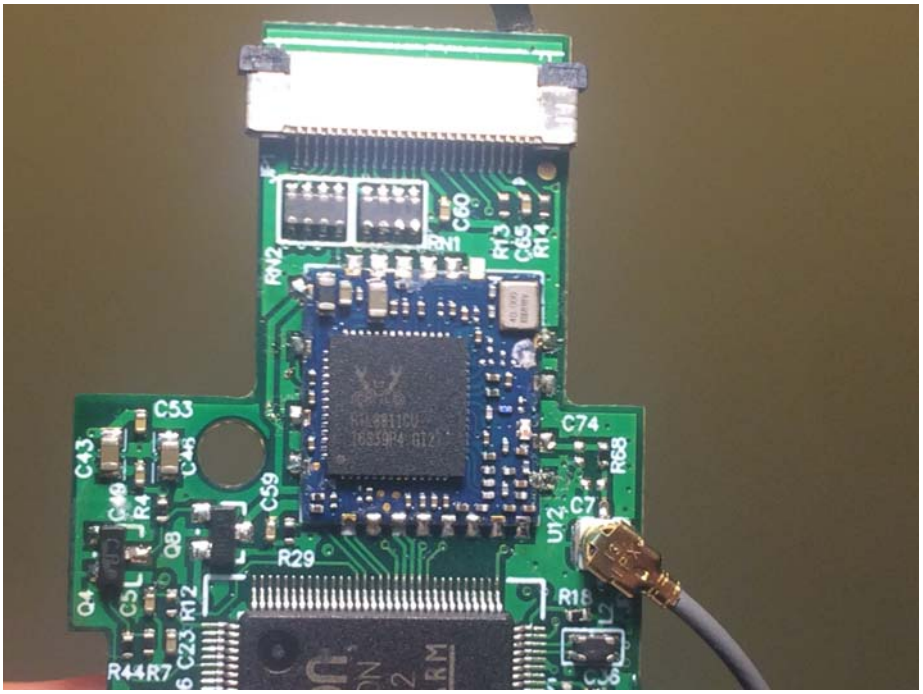





MAINBOARD V2.0


ANT





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