



FCC TEST REPORT

**Test report
On Behalf of
Inspire Mobile
For
Rugged IP PTT
Model No.: IM-550**

FCC ID: 2AR6HIMP-R01W

Prepared for : Inspire Mobile
Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si,
Gyeonggi-do, 14057, Korea

Prepared By : Shenzhen HUAKE Testing Technology Co., Ltd.
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District, Shenzhen City, China

Date of Test: Dec. 28, 2018~Jan. 18, 2019

Date of Report: Jan. 18, 2019

Report Number: HK1901140099E



TEST RESULT CERTIFICATION

Applicant's name.....: Inspire Mobile
Address: Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Manufacture's Name: Inspire Mobile
Address: Rm1412, Daeryung Techno-Town 15th, 401, Simin-daero, Dongan-gu, Anyang-si, Gyeonggi-do, 14057, Korea
Factory's Name: Shenzhen Bee Technology co., Ltd
Address.....: 4 Floor,ABuilding,Chuangjin No.1,No.125 Chuangye 2nd rood,BaoanDistrict,Shenzhen
Product description: Rugged IP PTT
Brand Name: IM-550
Mode Name: IM-550
Standards.....: FCC Rules and Regulations Part 15 Subpart C Section 15.247
KDB 558074 D01 15.247 Meas Guidance v05

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Date of Test.....
Date (s) of performance of tests **Dec. 28, 2018~Jan. 18, 2019**
Date of Issue **Jan. 18, 2019**
Test Result **Pass**

Testing Engineer : Gary Qian
(Gary Qian)

Technical Manager : Eden Hu
(Eden Hu)

Authorized Signatory : Jason Zhou
(Jason Zhou)



Revision	Issue Date	Revisions	Revised By
V1.0	Jan. 18, 2019	Initial Issue	Jason Zhou



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1. GENERAL INFORMATION

1.1. PRODUCT DESCRIPTION

The EUT is designed as “Rugged IP PTT”. It is designed by way of utilizing the DSSS and OFDM technology to achieve the system operation.

A major technical description of EUT is described as following

Operation Frequency	2.412 GHz~2.462GHz
Output Power	IEEE 802.11b: 13.19 dBm, IEEE 802.11g: 11.03 dBm; IEEE 802.11n(20): 10.99 dBm,IEEE 802.11n(40): 10.58 dBm
Modulation	DSSS(DBPSK/DQPSK/CCK);OFDM(BPSK/QPSK/16-QAM/64-QAM)
Number of channels	11 Channels (IEEE802.11b/g/n20)& 7 Channels (IEEE802.11n40)
Hardware Version	K2_US_Main_Rev1.0
Software Version	D08
Antenna Designation	FPC Antenna
Antenna Gain	1.2dBi
Power Supply	DC3.8V by Built-in Li-ion Battery

1.2. TABLE OF CARRIER FREQUENCIES

Frequency Band	Channel Number	Frequency
2400~2483.5MHZ	1	2412 MHZ
	2	2417 MHZ
	3	2422 MHZ
	4	2427 MHZ
	5	2432 MHZ
	6	2437 MHZ
	7	2442 MHZ
	8	2447 MHZ
	9	2452 MHZ
	10	2457 MHZ
	11	2462 MHZ

Note: For 20MHZ bandwidth system use Channel 1 to Channel 11

For 802.11n 40MHZ bandwidth system use Channel 3 to Channel 9.



1.3. IEEE 802.11N MODULATION SCHEME

MCS Index	Nss	Modulation	R	NBPS	NCBPS		NDBPS		Data rate(Mbps)			
					800nsGI		20MHz	40MHz	20MHz	40MHz	20MHz	40MHz
					20MHz	40MHz						
0	1	BPSK	1/2	1	52	108	26	54	6.5	13.5		
1	1	QPSK	1/2	2	104	216	52	108	13.0	27.0		
2	1	QPSK	3/4	2	104	216	78	162	19.5	40.5		
3	1	16-QAM	1/2	4	208	432	104	216	26.0	54.0		
4	1	16-QAM	3/4	4	208	432	156	324	39.0	81.0		
5	1	64-QAM	2/3	6	312	648	208	432	52.0	108.0		
6	1	64-QAM	3/4	6	312	648	234	489	58.5	121.5		
7	1	64-QAM	5/6	6	312	648	260	540	65.0	135.0		

Symbol	Explanation
NSS	Number of spatial streams
R	Code rate
NBPS	Number of coded bits per single carrier
NCBPS	Number of coded bits per symbol
NDBPS	Number of data bits per symbol
GI	Guard interval

1.4. RELATED SUBMITTAL(S) / GRANT (S)

This submittal(s) (test report) is intended for **FCC ID: 2AR6HIMP-R01W** filing to comply with the FCC Part 15 requirements.



1.5. TEST METHODOLOGY

Both conducted and radiated testing was performed according to the procedures in ANSI C63.10 (2013).

Radiated testing was performed at an antenna to EUT distance 3 meters.

Others testing (listed at item 5.3) was performed according to the procedures in FCC Part 15.247 rules KDB 558074 D01 DTS Meas Guidance v05.

1.6. SPECIAL ACCESSORIES

Refer to section 5.2.

1.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.



2. MEASUREMENT UNCERTAINTY

Test	Measurement Uncertainty	Notes
Transmitter power conducted	± 0.57 dB	(1)
Transmitter power Radiated	± 2.20 dB	(1)
Conducted spurious emission 9KHz-40 GHz	± 2.20 dB	(1)
Occupied Bandwidth	± 0.01 ppm	(1)
Radiated Emission 30~1000MHz	± 4.10 dB	(1)
Radiated Emission Above 1GHz	± 4.32 dB	(1)
Conducted Disturbance 0.15~30MHz	± 3.20 dB	(1)

Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of $k=2$.



3. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating

Note:
Transmit by 802.11b with Data rate (1/2/5.5/11)
Transmit by 802.11g with Data rate (6/9/12/18/24/36/48/54)
Transmit by 802.11n (20MHz) with Data rate (6.5/13/19.5/26/39/52/58.5/65)
Transmit by 802.11n (40MHz) with Data rate (13.5/27/40.5/54/81/108/121.5/135)

Note:

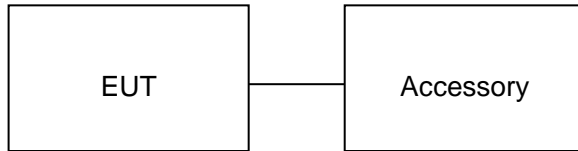
1. The EUT has been set to operate continuously on the lowest, middle and highest operation frequency Individually, and the eut is operating at its maximum duty cycle>or equal 98%
2. All modes under which configure applicable have been tested and the worst mode test data recording in the test report, if no other mode data.
3. For Radiated Emission, 3axis were chosen for testing for each applicable mode.



4 SYSTEM TEST CONFIGURATION

4.1. CONFIGURATION OF EUT SYSTEM

Configure:



4.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Rugged IP PTT	IM-550	2AR6HIMP-R01W	EUT
2	Adapter	M050200E111U1	DC 5.0V 2A	Accessory
3	Battery	K2	DC3.8V/ 3600mAh	Accessory
4	USB	N/A	N/A	Accessory

Note: All the accessories have been used during the test in conduction emission test.

4.3. SUMMARY OF TEST RESULTS

FCC RULES	DESCRIPTION OF TEST	RESULT
§15.247	Output Power	Compliant
§15.247	6 dB Bandwidth	Compliant
§15.247	Conducted Spurious Emission	Compliant
§15.247	Maximum Conducted Output Power SPECTRAL Density	Compliant
§15.209	Radiated Emission	Compliant
§15.247	Band Edges	Compliant
§15.207	Line Conduction Emission	Compliant



5. TEST FACILITY

Site	Shenzhen HUAKE Testing Technology Co., Ltd.
Location	1F, B2 Building, Junfeng Zhongcheng Zhizao Innovation Park, Fuhai Street, Bao'an District, Shenzhen City, China
Designation Number	CN1229
Test Firm Registration Number : 616276	

ALL TEST EQUIPMENT LIST

RF Test Room				
Equipment	Manufacturer	Model	Serial Number	Calibration Due
Power meter	Agilent	E4417B	HKE-107	Dec. 26, 2019
Power Sensor	Agilent	E9327A	HKE-113	Dec. 26, 2019
RF cable	Times	1-40G	HKE-034	Dec. 26, 2019
RF automatic control unit	Tonscend	JS0806-2	HKE-060	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
RF Cable (9KHz-26.5GHz)	Tonscend	170660	N/A	Dec. 26, 2019
Signal generator	Agilent	N5183A	HKE-071	Dec. 26, 2019
Receiver	R&S	ESCI-7	HKE-010	Dec. 26, 2019
Spectrum analyzer	Agilent	N9020A	HKE-048	Dec. 26, 2019
Preamplifier	EMCI	EMC051845SE	HKE-015	Dec. 26, 2019
Preamplifier	Agilent	83051A	HKE-016	Dec. 26, 2019
Loop antenna	Schwarzbeck	FMZB 1519 B	HKE-014	Dec. 26, 2019
Broadband antenna	Schwarzbeck	VULB 9163	HKE-012	Dec. 26, 2019
Horn antenna	Schwarzbeck	9120D	HKE-013	Dec. 26, 2019
Antenna Mast	Keleto	CC-A-4M	N/A	N/A
Position controller	Taiwan MF	MF7802	HKE-011	Dec. 26, 2019
Radiated test software	Tonscend	TS+ Rev 2.5.0.0	HKE-082	N/A
RF cable (9KHz-1GHz)	Times	381806-001	N/A	N/A
RF cable	Times	1-40G	HKE-034	Dec. 26, 2019



Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	HKE-094	Feb. 28, 2020
Horn Ant (18G-40GHz)	ETS	QWH_SL_18_40_K_SG	HKE-092	Feb. 28, 2020



6. OUTPUT POWER

6.1. MEASUREMENT PROCEDURE

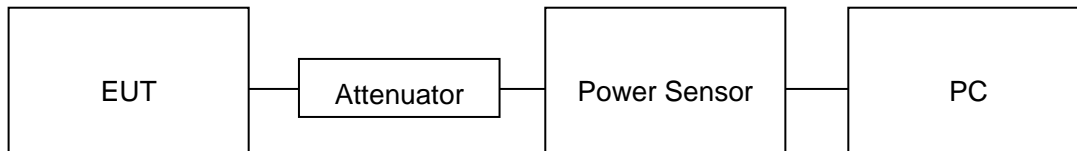
For max average conducted output power test:

1. Connect EUT RF output port to power probe through an RF attenuator.
2. Connect the power probe to the PC.
3. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
4. Record the maximum power from the software.

Note : The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

AVERAGE POWER SETUP



**6.3. LIMITS AND MEASUREMENT RESULT**

TEST ITEM	OUTPUT POWER
TEST MODE	802.11b with data rate 1

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	13.19	30	Pass
2.437	13.09	30	Pass
2.462	13.01	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11g with data rate 6

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	9.49	30	Pass
2.437	11.03	30	Pass
2.462	10.80	30	Pass

TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 20 with data rate 6.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.412	9.44	30	Pass
2.437	10.99	30	Pass
2.462	10.76	30	Pass



TEST ITEM	OUTPUT POWER
TEST MODE	802.11n 40 with data rate 13.5

Frequency (GHz)	Average Power (dBm)	Applicable Limits (dBm)	Pass or Fail
2.422	9.81	30	Pass
2.437	10.58	30	Pass
2.452	10.34	30	Pass



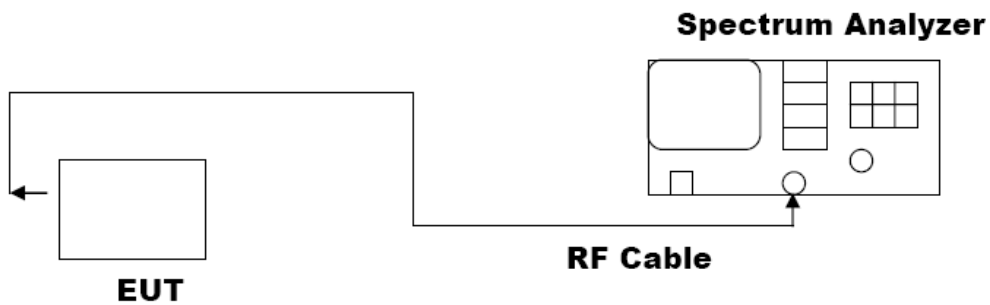
7. 6dB BANDWIDTH

7.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Centre Frequency = Operation Frequency, RBW= 100 KHz, VBW \geq 3 \times RBW.
4. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

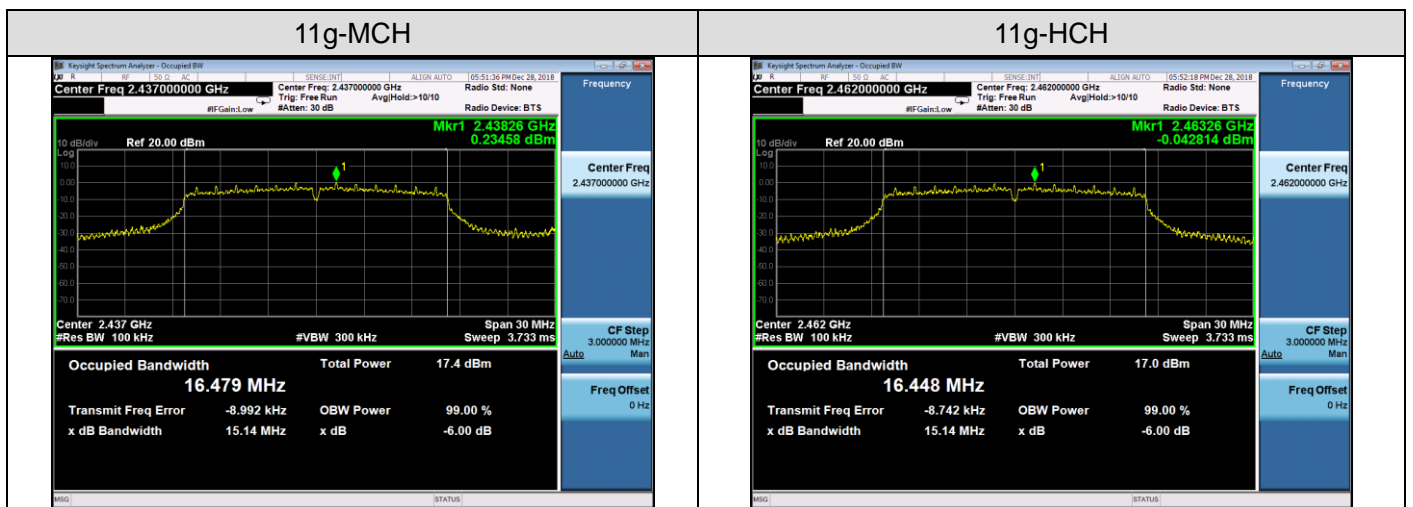
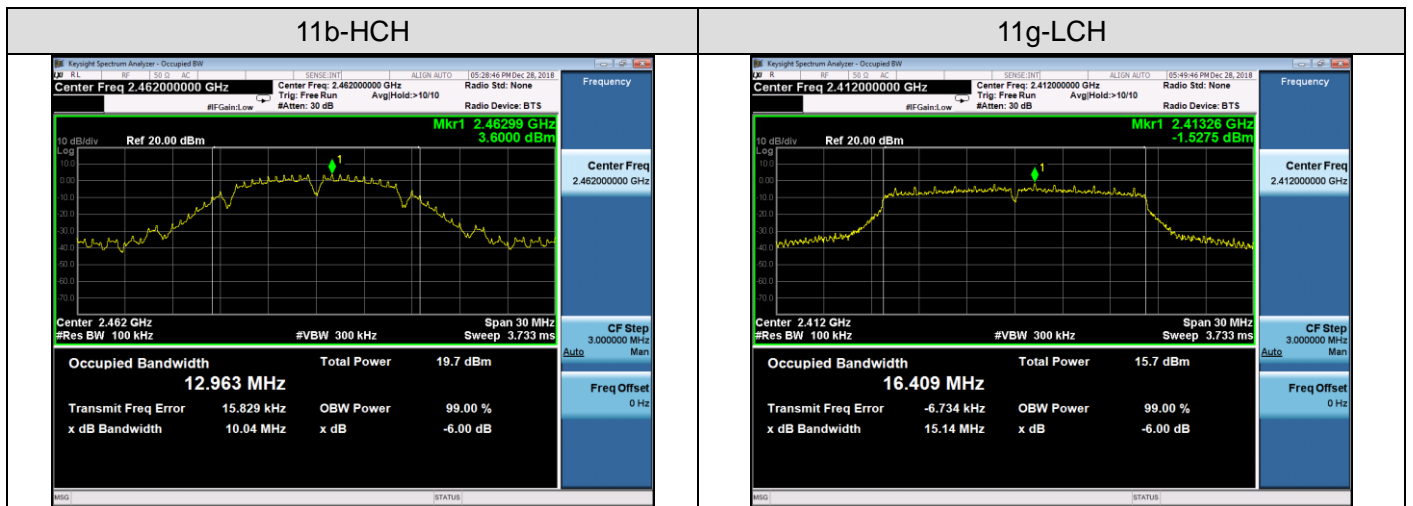
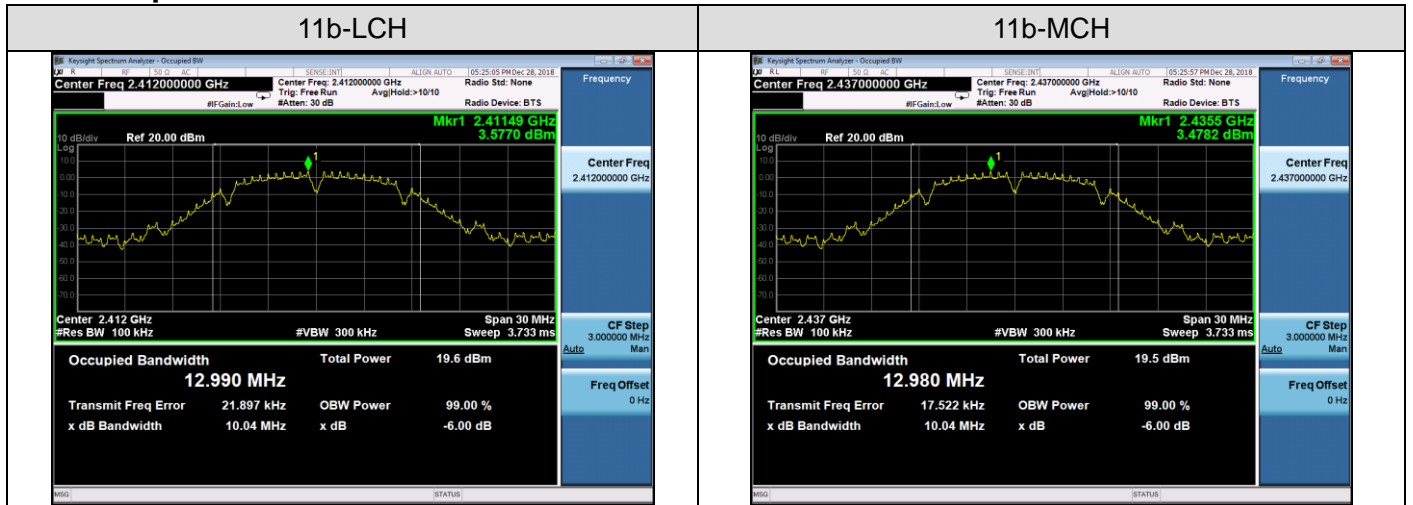


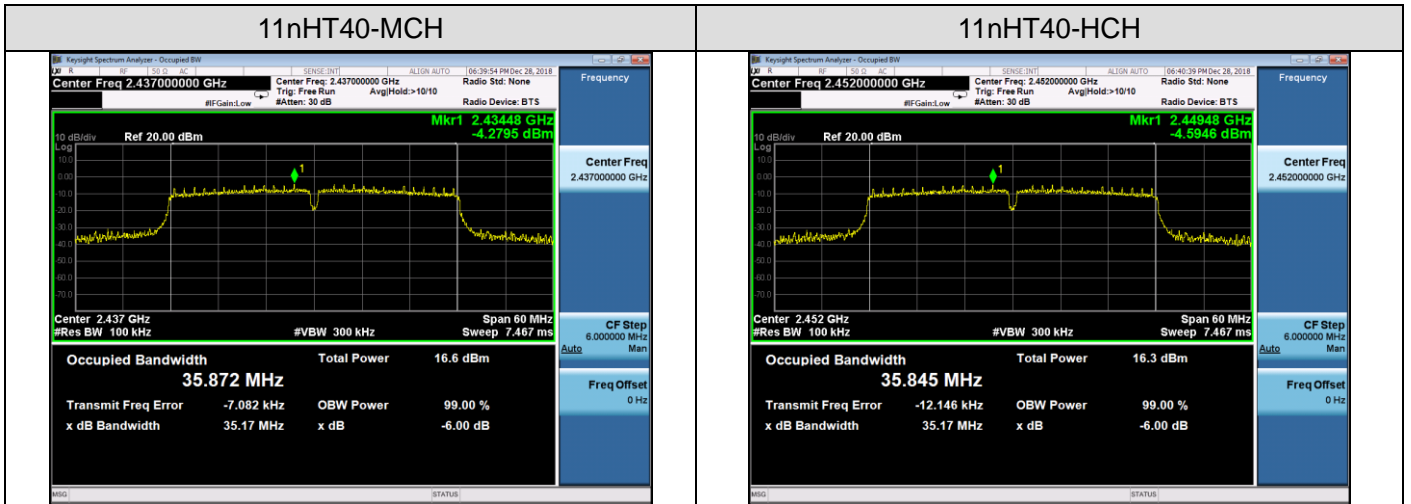
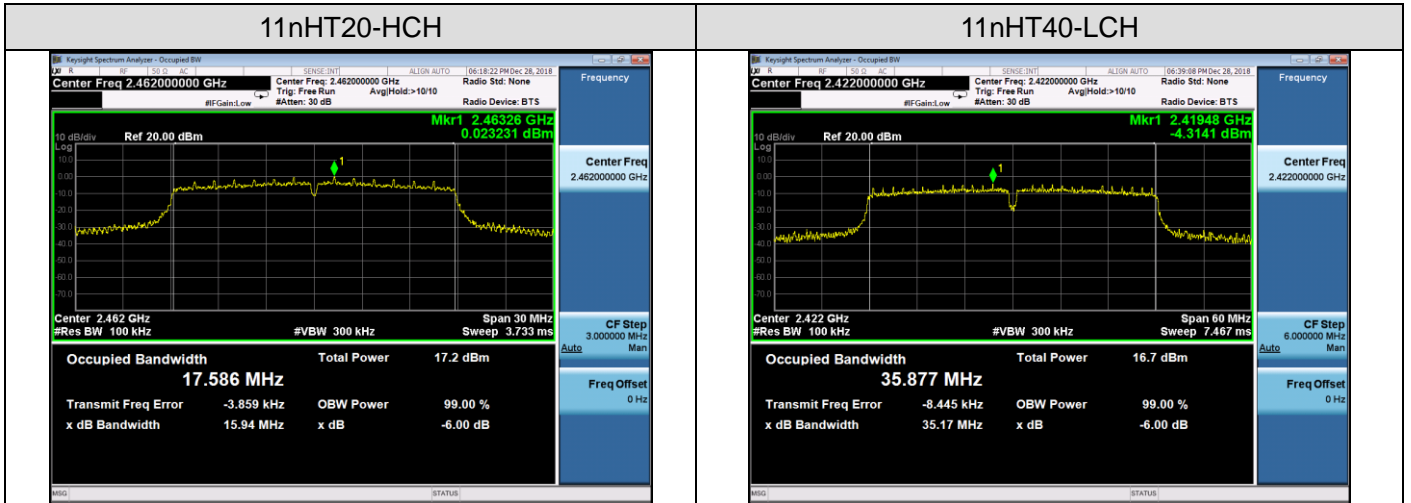
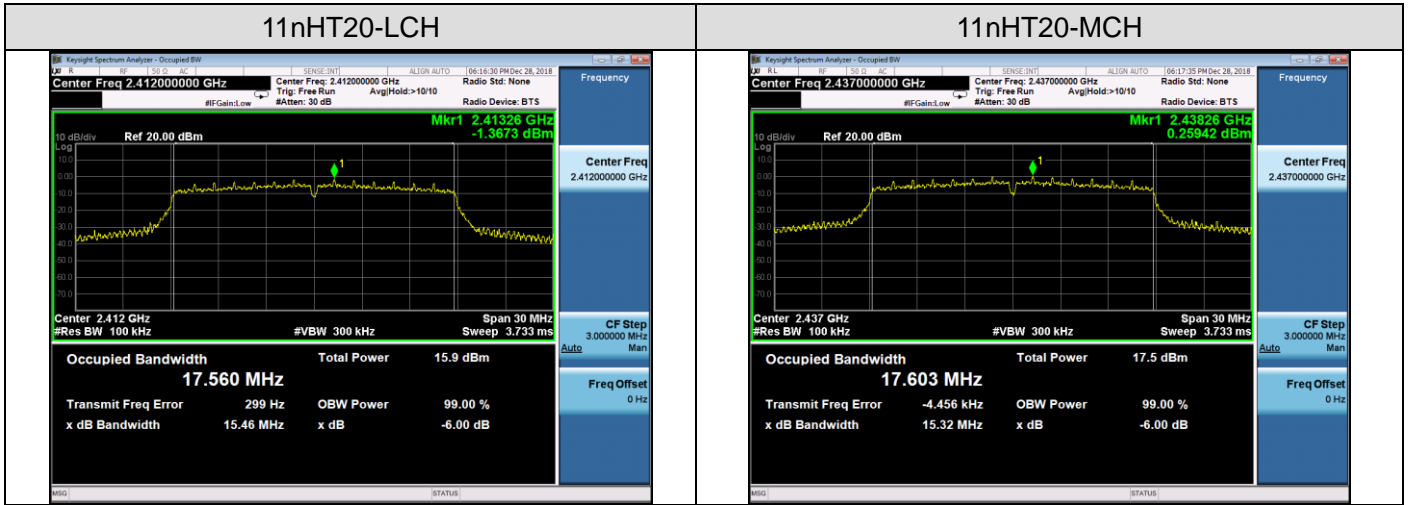
**7.3. LIMITS AND MEASUREMENT RESULTS**

Mode	Channel	6dB Bandwidth [MHz]	Verdict
11b	LCH	10.04	PASS
	MCH	10.04	PASS
	HCH	10.04	PASS
11g	LCH	15.14	PASS
	MCH	15.14	PASS
	HCH	15.14	PASS
11nHT20	LCH	15.46	PASS
	MCH	15.32	PASS
	HCH	15.94	PASS
11nHT40	LCH	35.17	PASS
	MCH	35.17	PASS
	HCH	35.17	PASS



Test Graph







9. CONDUCTED SPURIOUS EMISSION

9.1. MEASUREMENT PROCEDURE

1. Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
2. Set the EUT Work on the top, the middle and the bottom operation frequency individually.
3. Set SPA Trace 1 Max hold, then View.

Note: The EUT was tested according to KDB 558074 for compliance to FCC 47CFR 15.247 requirements.

Owing to satisfy the requirements of the number of measurement points, we set the RBW=1MHz, VBW>RBW, scan up through 10th harmonic, and consider the tested results as the worst case, if the tested results conform to the requirement, we can deem that the real tested results(set the RBW=100KHz, VBW>RBW) are conform to the requirement.

9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

The same as described in section 8.2.

9.3. MEASUREMENT EQUIPMENT USED

The same as described in section 6.

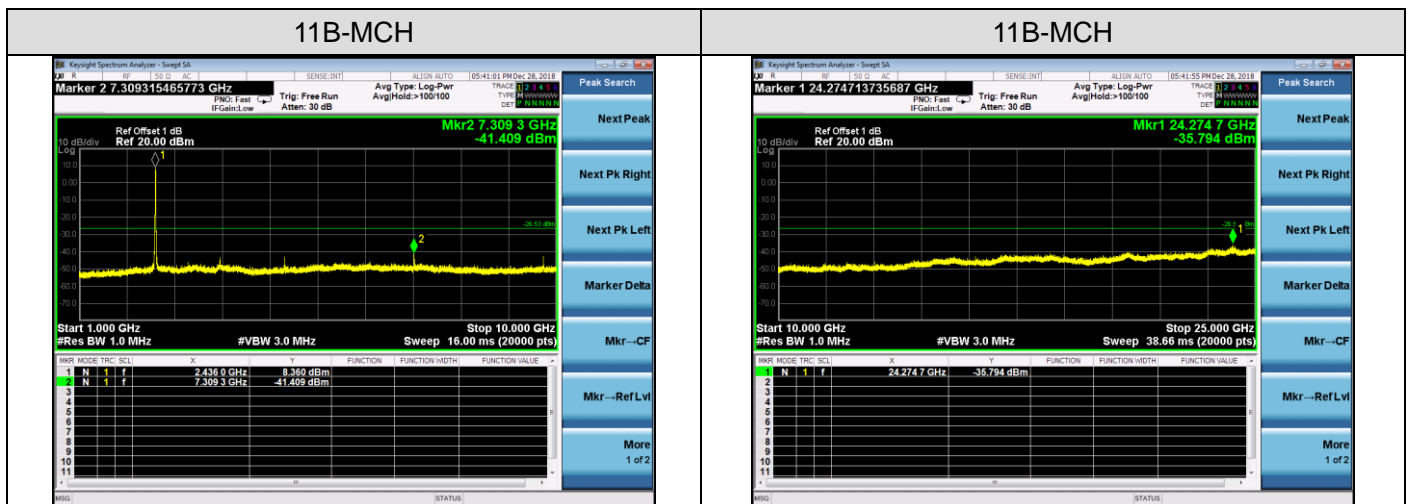
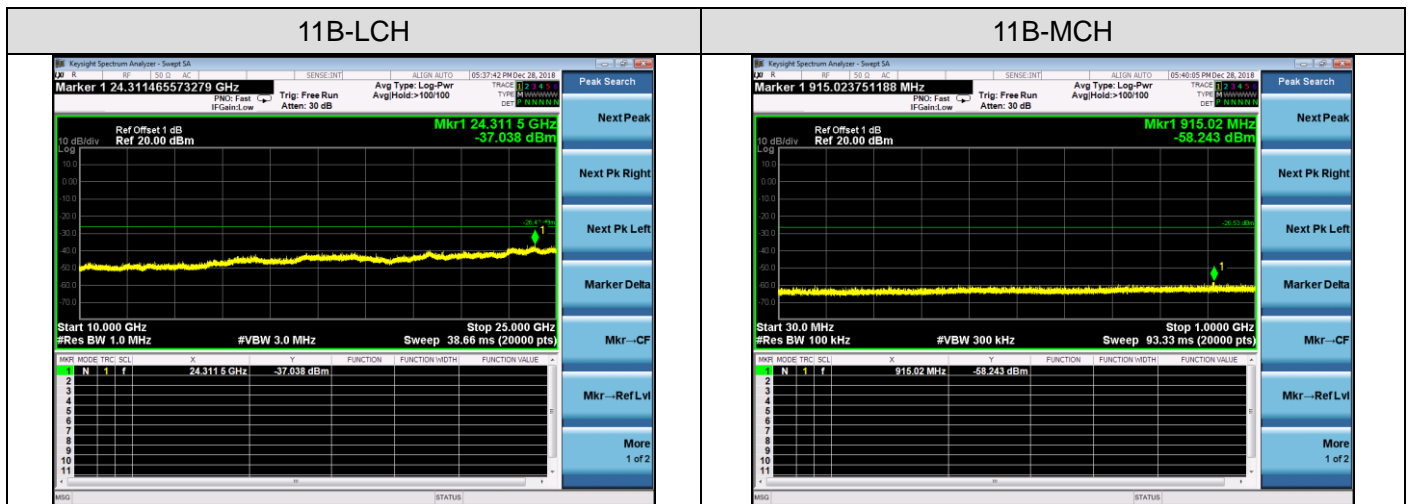
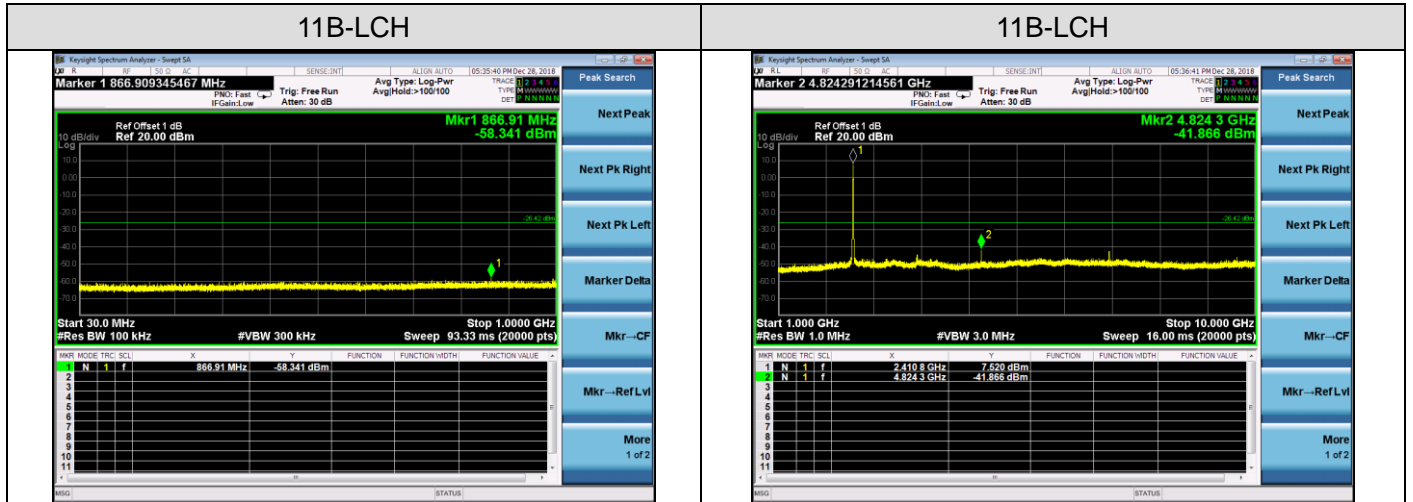


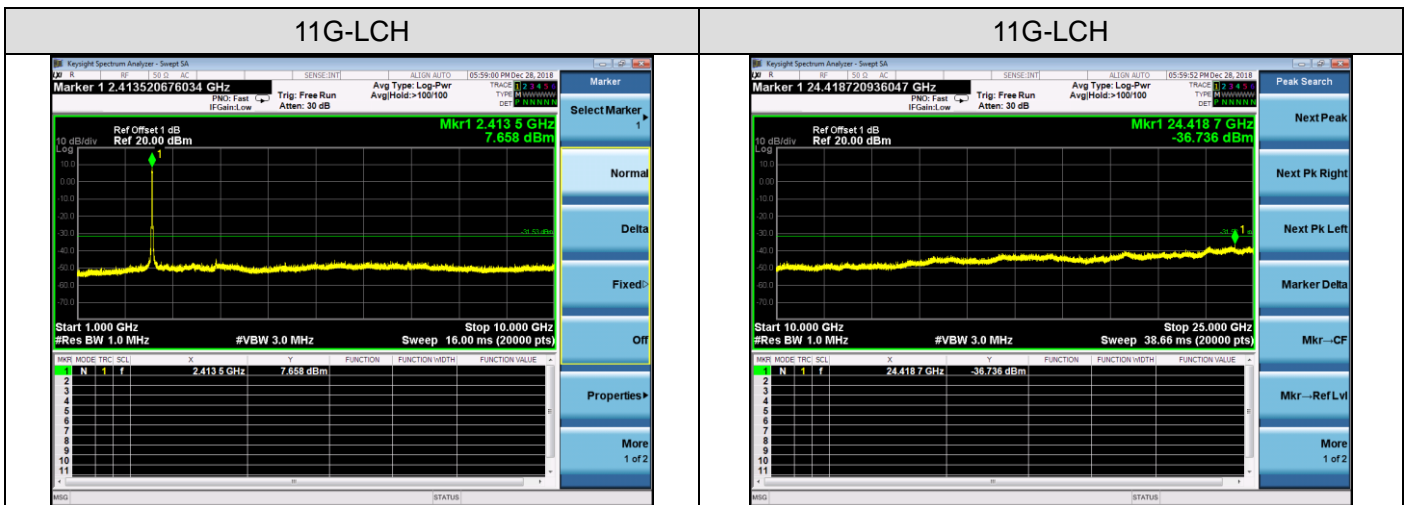
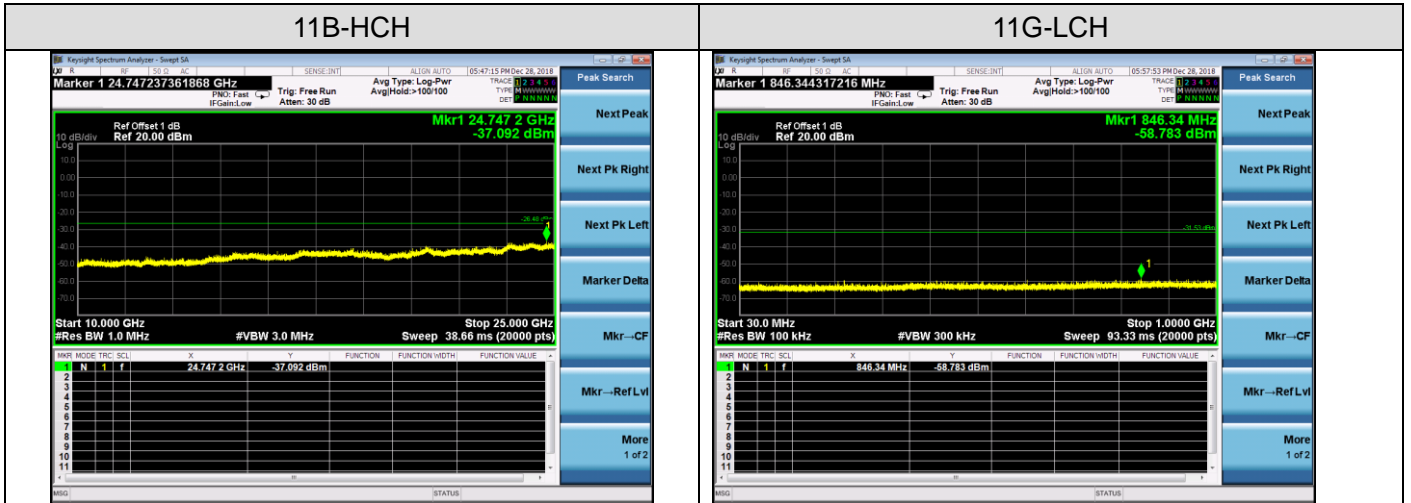
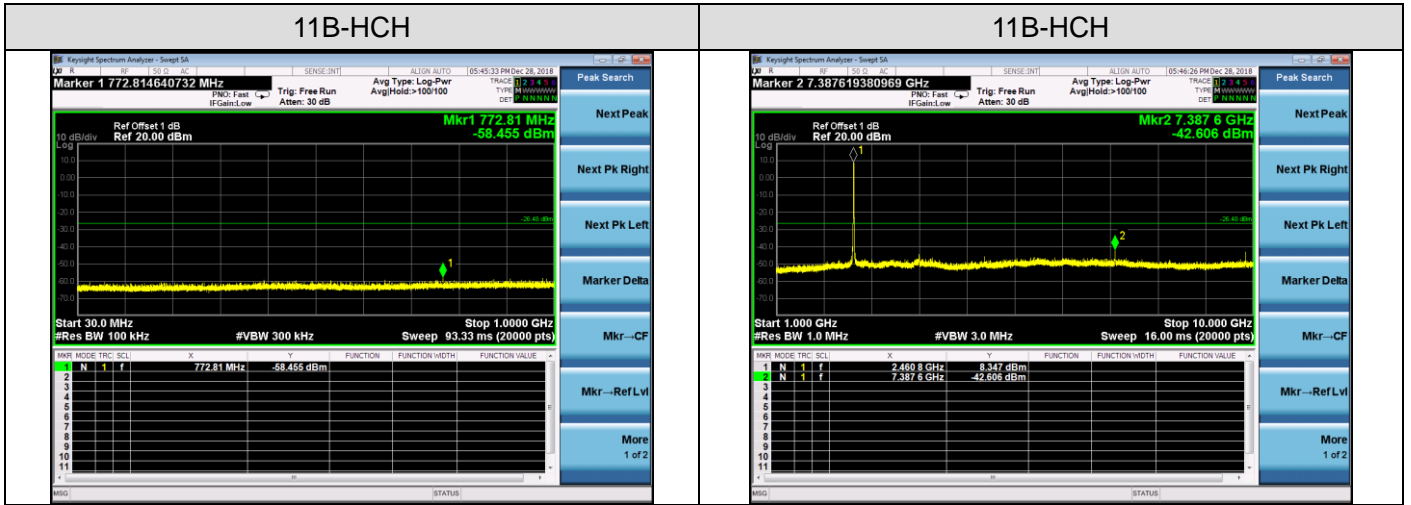
9.4. LIMITS AND MEASUREMENT RESULT

LIMITS AND MEASUREMENT RESULT		
Applicable Limits	Measurement Result	
	Test Data	Criteria
<p>In any 100 KHz Bandwidth Outside the frequency band in which the spread spectrum intentional radiator is operating, the radio frequency power that is produce by the intentional radiator shall be at least 30 dB below that in 100KHz bandwidth within the band that contains the highest level of the desired power.</p> <p>In addition, radiation 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)</p>	<p>Refer Test Graph</p>	<p>PASS</p>



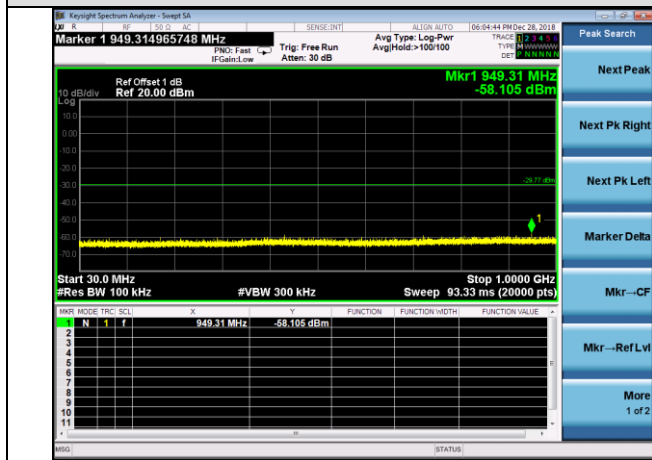
Test Graph



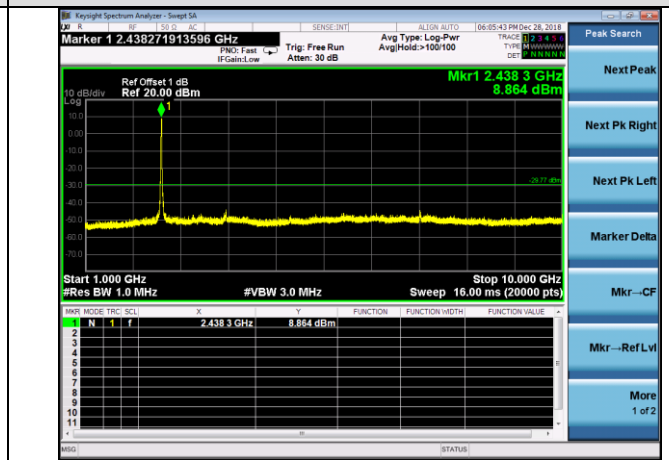




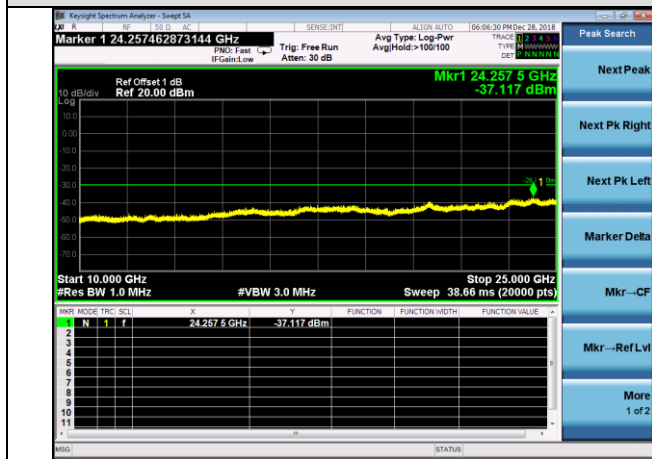
11G-MCH



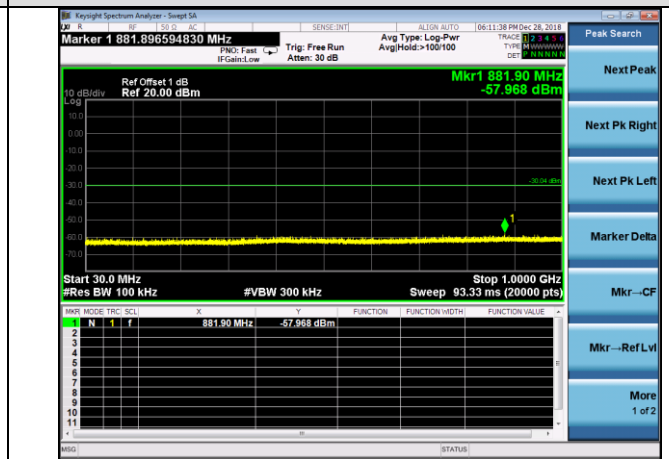
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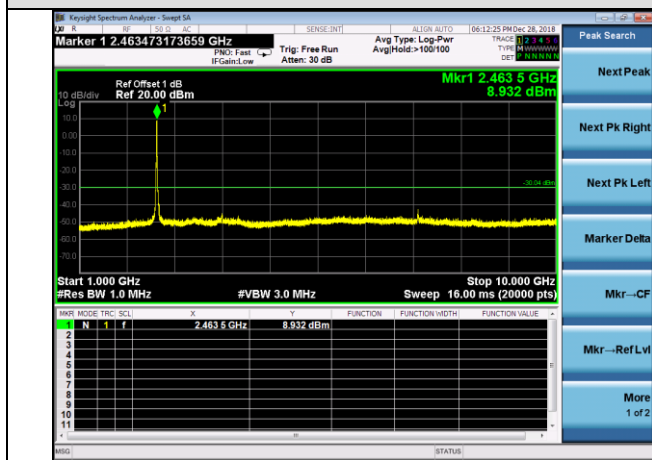
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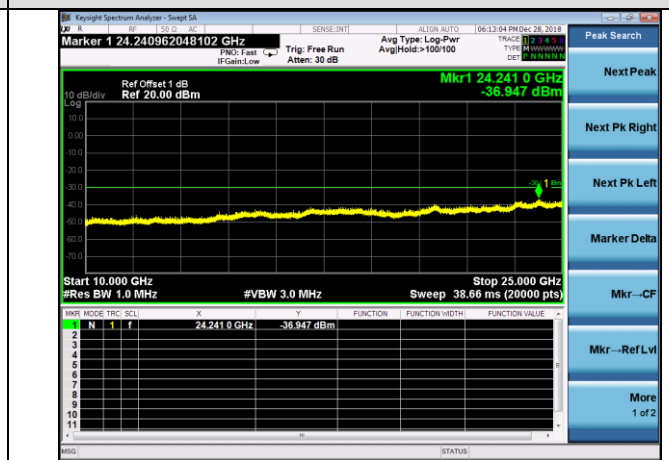
11G-HCH



11G-HCH

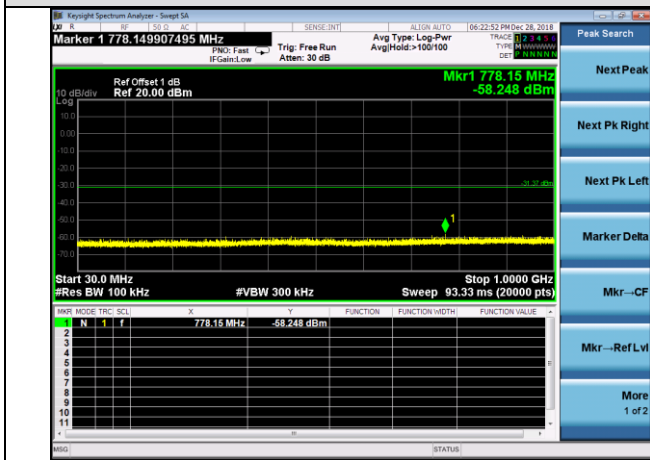


11G-HCH

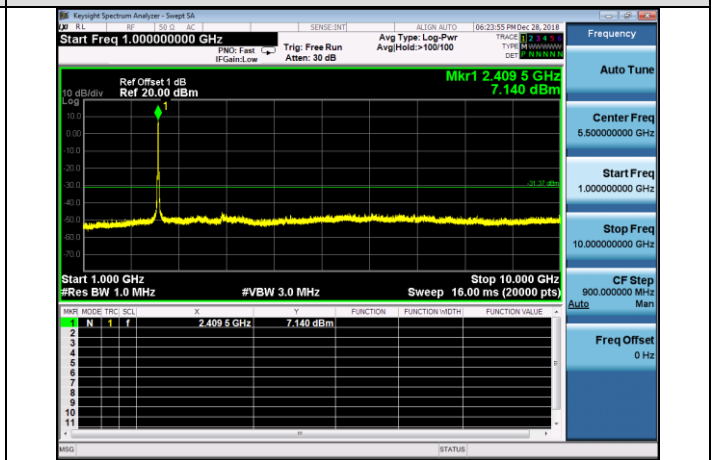




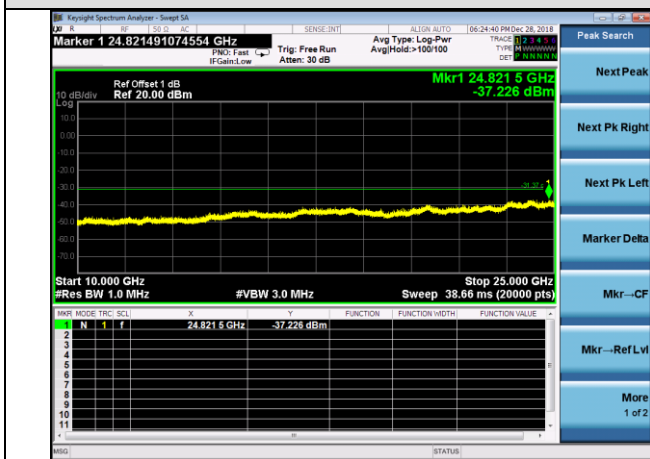
11nHT20-LCH



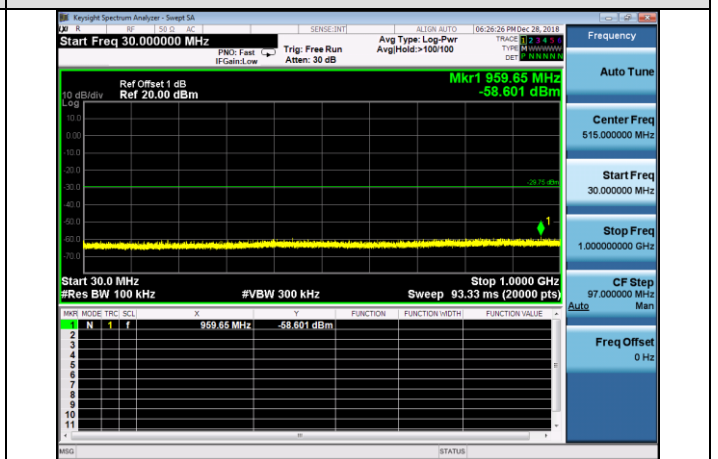
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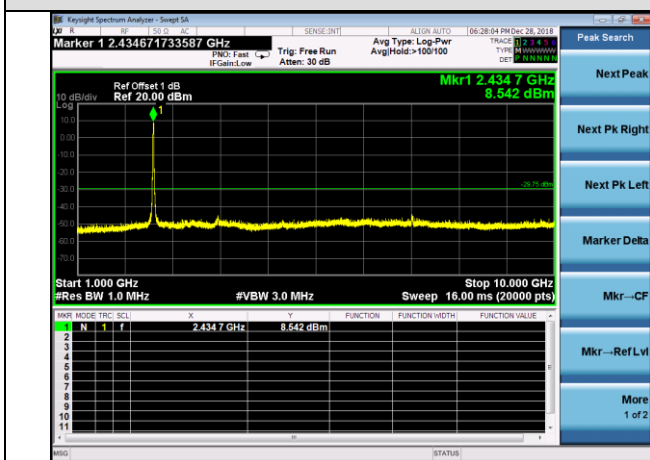
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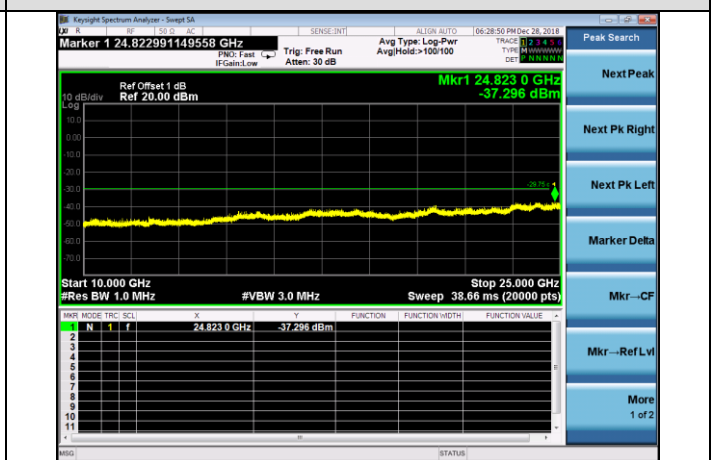
11nHT20-MCH



11nHT20-MCH

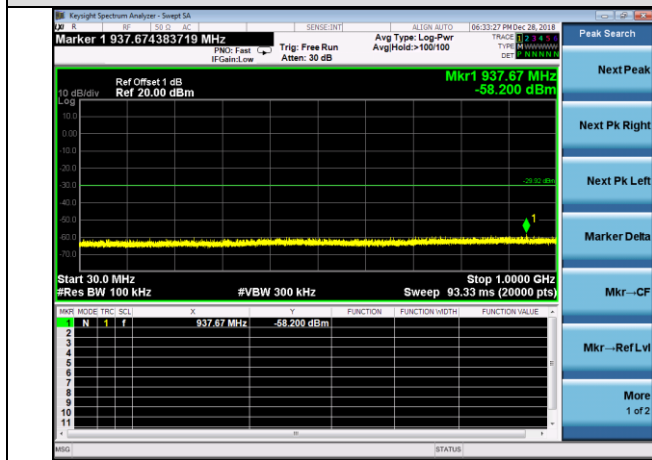


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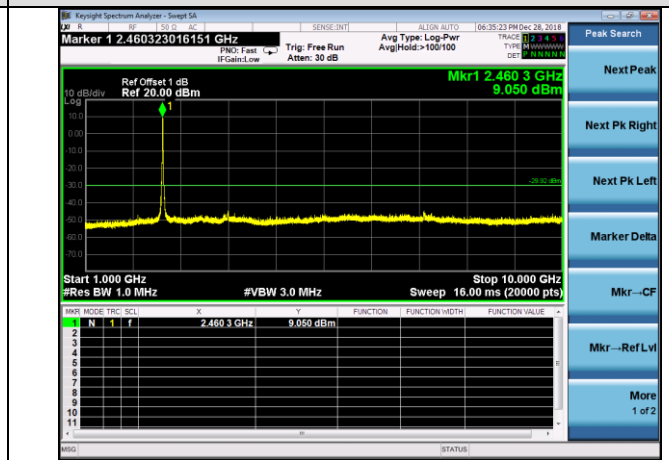




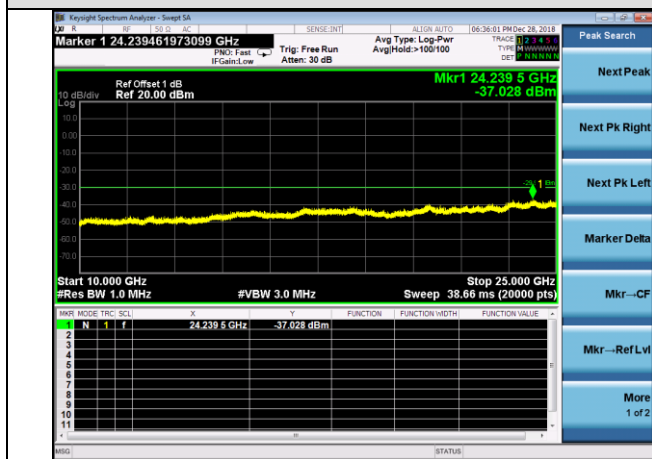
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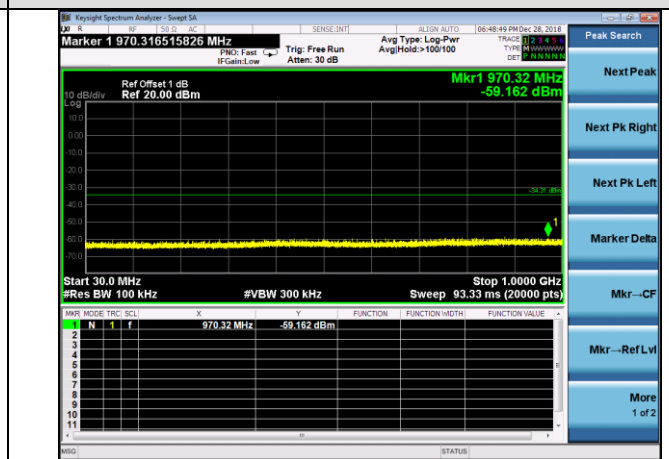
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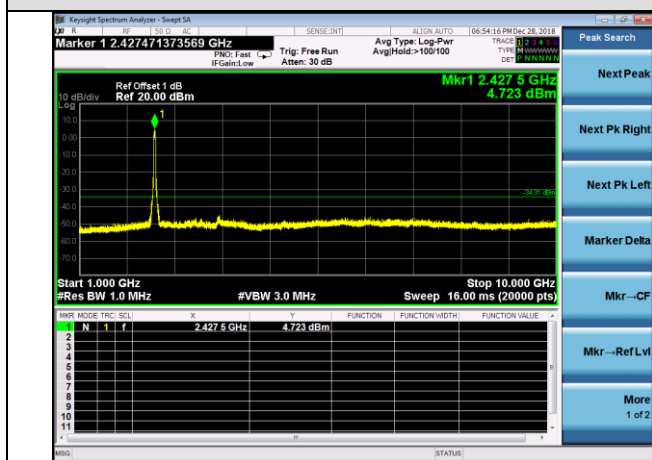
11nHT20-HCH



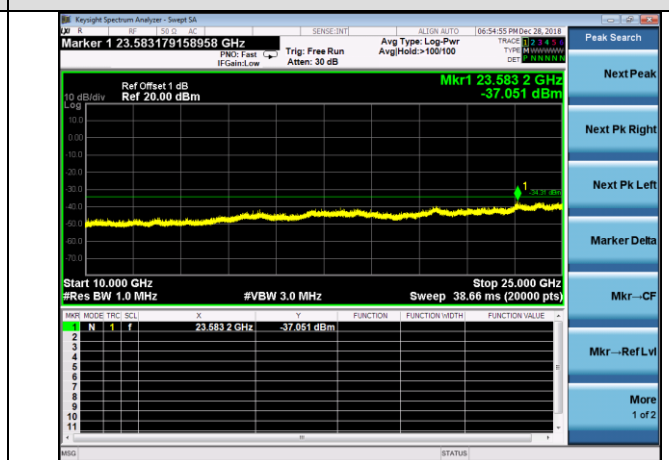
11nHT40-LCH



11nHT40-LCH

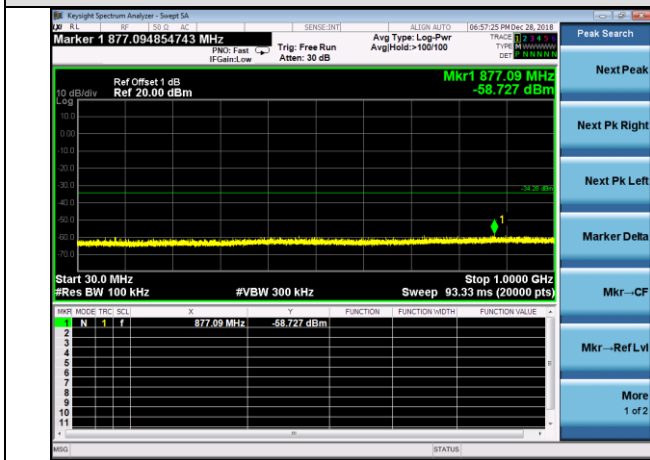


11nHT40-LCH

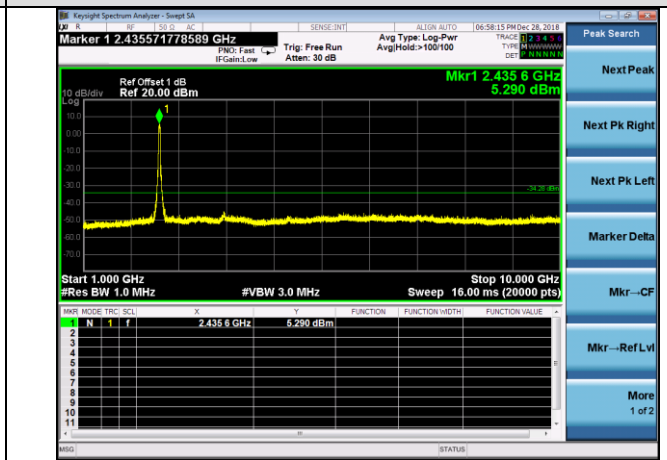




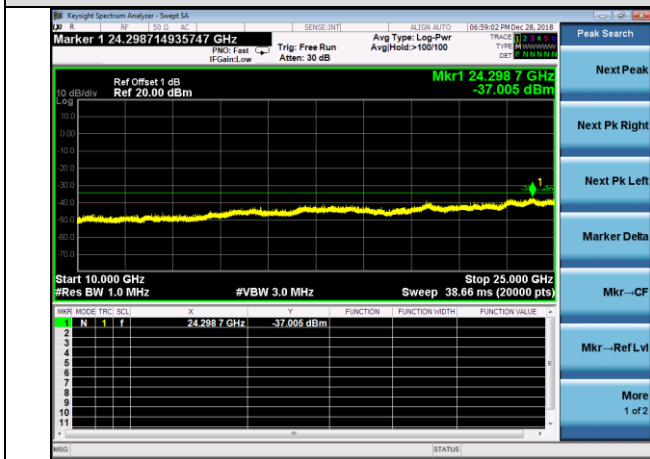
11nHT40-MCH



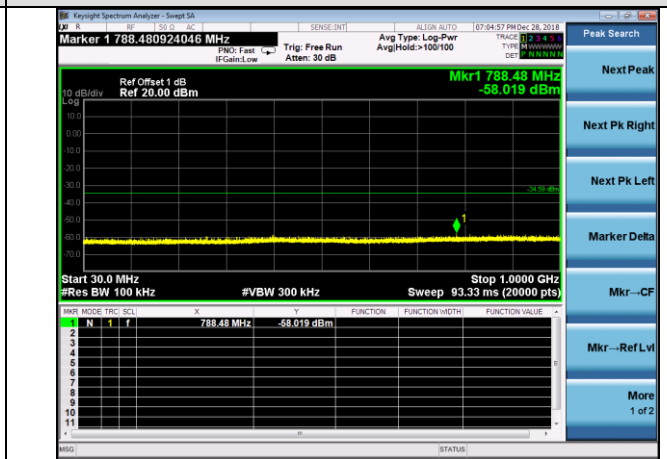
11nHT40-MCH



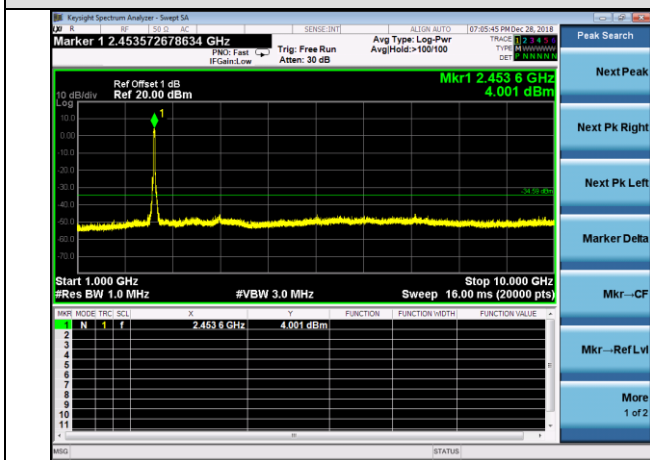
11nHT40-MCH



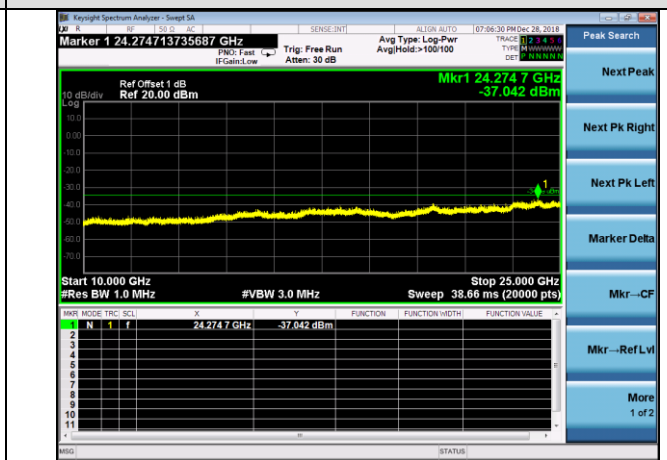
11nHT40-HCH



11nHT40-HCH



11nHT40-HCH





10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY

10.1 MEASUREMENT PROCEDURE

- (1). Connect EUT RF output port to the Spectrum Analyzer through an RF attenuator
- (2). Set the EUT Work on the top, the middle and the bottom operation frequency individually.
- (3). Set SPA Trace 1 Max hold, then View.

Note: The method of AVGPSD-1 in the ANSI C63.10 (2013) item 11.10 was used in this testing.

10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

Refer To Section 8.2.

10.3 MEASUREMENT EQUIPMENT USED

Refer To Section 6.

**10.4 LIMITS AND MEASUREMENT RESULT**

Mode	Channel	PSD [dBm/20kHz]	Limit[dBm/3kHz]	Verdict
11b	LCH	-0.790	8	PASS
	MCH	0.372	8	PASS
	HCH	-0.829	8	PASS
11g	LCH	-0.790	8	PASS
	MCH	0.372	8	PASS
	HCH	-0.829	8	PASS
11nHT20	LCH	-0.790	8	PASS
	MCH	0.372	8	PASS
	HCH	-0.829	8	PASS
11NHT40	LCH	-0.790	8	PASS
	MCH	0.372	8	PASS
	HCH	-0.829	8	PASS