
FCC Test Report

Report No.:AGC01684200301FE04

FCC ID : 2AJ2B-TPS980
APPLICATION PURPOSE : Original Equipment
PRODUCT DESIGNATION : Smart Terminals
BRAND NAME : Telpo
MODEL NAME : TPS980
APPLICANT : Telepower Communication Co., Ltd.
DATE OF ISSUE : Apr. 20, 2020
STANDARD(S) : FCC Part 15.247
TEST PROCEDURE(S) : KDB 558074 D01 DTS Meas Guidance v04
REPORT VERSION : V1.0

Attestation of **Global Compliance (Shenzhen) Co., Ltd**

CAUTION:

This report shall not be reproduced except in full without the written permission of the test laboratory and shall not be quoted out of context.



Report Revise Record

Report Version	Revise Time	Issued Date	Valid Version	Notes
V1.0	/	Apr. 20, 2020	Valid	Initial Release

TABLE OF CONTENTS

1. VERIFICATION OF CONFORMITY	5
2. GENERAL INFORMATION.....	6
2.1. PRODUCT DESCRIPTION	6
2.2. TABLE OF CARRIER FREQUENCIES	6
2.3. IEEE 802.11N MODULATION SCHEME.....	7
2.4. RELATED SUBMITTAL(S) / GRANT (S)	7
2.5. TEST METHODOLOGY	8
2.6. SPECIAL ACCESSORIES.....	8
2.7. EQUIPMENT MODIFICATIONS	8
3. MEASUREMENT UNCERTAINTY.....	9
4. DESCRIPTION OF TEST MODES.....	10
5 SYSTEM TEST CONFIGURATION	11
5.1. CONFIGURATION OF EUT SYSTEM	11
5.2. EQUIPMENT USED IN EUT SYSTEM.....	11
5.3. SUMMARY OF TEST RESULTS.....	11
6. TEST FACILITY	12
6. OUTPUT POWER	13
6.1. MEASUREMENT PROCEDURE	13
6.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	13
6.3. LIMITS AND MEASUREMENT RESULT	14
7. 6DB BANDWIDTH.....	16
7.1. MEASUREMENT PROCEDURE	16
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	16
7.3. LIMITS AND MEASUREMENT RESULTS	17
9. CONDUCTED SPURIOUS EMISSION	21
9.1. MEASUREMENT PROCEDURE	21
9.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	21
9.3. MEASUREMENT EQUIPMENT USED.....	21
9.4. LIMITS AND MEASUREMENT RESULT	22
10. MAXIMUM CONDUCTED OUTPUT POWER SPECTRAL DENSITY	32
10.1 MEASUREMENT PROCEDURE	32
10.2 TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION).....	32
10.3 MEASUREMENT EQUIPMENT USED.....	32
10.4 LIMITS AND MEASUREMENT RESULT	33
11. RADIATED EMISSION.....	37

11.1. MEASUREMENT PROCEDURE	37
11.2. TEST SETUP	38
11.3. LIMITS AND MEASUREMENT RESULT	39
11.4. TEST RESULT	40
12. BAND EDGE EMISSION	43
12.1. MEASUREMENT PROCEDURE	43
12.2. TEST SET-UP.....	43
12.3. TEST RESULT.....	44
13. FCC LINE CONDUCTED EMISSION TEST	60
13.1. LIMITS OF LINE CONDUCTED EMISSION TEST.....	60
13.2. BLOCK DIAGRAM OF LINE CONDUCTED EMISSION TEST	60
13.3. PRELIMINARY PROCEDURE OF LINE CONDUCTED EMISSION TEST	61
13.4. FINAL PROCEDURE OF LINE CONDUCTED EMISSION TEST	62
13.5. TEST RESULT OF LINE CONDUCTED EMISSION TEST	63
APPENDIX A: PHOTOGRAPHS OF TEST SETUP	65

1. VERIFICATION OF CONFORMITY

Applicant	Telepower Communication Co., Ltd.
Address	5 Bld, Zone A, Hantian Technology Town, No.17 ShenHai RD, Nanhai District Foshan, China
Manufacturer	Telepower Communication Co., Ltd.
Address	5 Bld, Zone A, Hantian Technology Town, No.17 ShenHai RD, Nanhai District Foshan, China
Factory	Telepower Communication Co., Ltd.
Address	5 Bld, Zone A, Hantian Technology Town, No.17 ShenHai RD, Nanhai District Foshan, China
Product Designation	Smart Terminals
Brand Name	Telpo
Test Model	TPS980
Date of test	Mar. 20, 2020~Apr. 20, 2020
Deviation	None
Condition of Test Sample	Normal
Report Template	AGCRT-US-BGN/RF

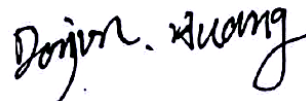
We hereby certify that:

The above equipment was tested by Attestation of Global Compliance(Shenzhen) Co., Ltd. The test data, data evaluation, test procedures, and equipment configurations shown in this report were made in accordance with the procedures given in ANSI C63.10 (2013) and the energy emitted by the sample EUT tested as described in this report is in compliance with requirement of FCC Part 15 Rules requirement.

The test results of this report relate only to the tested sample identified in this report.

s

Prepared By



Donjon Huang
(Project Engineer)

Apr. 20, 2020

Reviewed By



Max Zhang
(Reviewer)

Apr. 20, 2020

Approved By



Forrest Lei
(Authorized Officer)

Apr. 20, 2020

2. GENERAL INFORMATION

2.1. PRODUCT DESCRIPTION

The EUT is designed as “Smart Terminals”. 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: 13.41 dBm, IEEE 802.11g: 11.08 dBm; IEEE 802.11n(20): 9.99 dBm, IEEE 802.11n(40): 10.15 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	980Q-MAIN-V1.1
Software Version	TPS980_ALL_V1.0.0
Antenna Designation	PIFA Antenna(Comply with requirements of the FCC part 15.203)
Antenna Gain	0dBi
Power Supply	DC 12V

2.2. 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.

2.3. 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

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

This submittal(s) (test report) is intended for **FCC ID: 2AJ2B-TPS980** filing to comply with the FCC Part 15 requirements.

2.5. 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.

2.6. SPECIAL ACCESSORIES

Refer to section 5.2.

2.7. EQUIPMENT MODIFICATIONS

Not available for this EUT intended for grant.

3. 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	±0.01ppm	(1)
Radiated Emission 30~1000MHz	±4.10dB	(1)
Radiated Emission Above 1GHz	±4.32dB	(1)
Conducted Disturbance0.15~30MHz	±3.20dB	(1)

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

4. DESCRIPTION OF TEST MODES

NO.	TEST MODE DESCRIPTION
1	Low channel TX
2	Middle channel TX
3	High channel TX
4	Normal operating
<p>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)</p>	

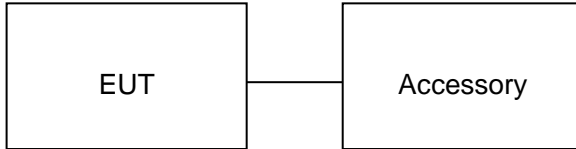
Note:

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.

5 SYSTEM TEST CONFIGURATION

5.1. CONFIGURATION OF EUT SYSTEM

Configure:



5.2. EQUIPMENT USED IN EUT SYSTEM

Item	Equipment	Model No.	ID or Specification	Remark
1	Smart Terminals	TPS980	FCC ID: 2AJ2B-TPS980	EUT
2	Adapter	BI24-120200-AdU	DC 12V 2A	AE
3	Power Line	N/A	N/A	AE

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

5.3. 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

6. TEST FACILITY

Test Site	Attestation of Global Compliance (Shenzhen) Co., Ltd
Location	1-2/F, Building 19, Junfeng Industrial Park, Chongqing Road, Heping Community, Fuhai Street, Bao'an District, Shenzhen, Guangdong, China
Designation Number	CN1259
FCC Test Firm Registration Number	975832
A2LA Cert. No.	5054.02
Description	Attestation of Global Compliance(Shenzhen) Co., Ltd is accredited by A2LA

ALL TEST EQUIPMENT LIST

Equipment	Manufacturer	Model	S/N	Cal. Date	Cal. Due
TEST RECEIVER	R&S	ESPI	101206	Jun. 12, 2019	Jun. 11, 2020
LISN	R&S	ESH2-Z5	100086	Aug.26, 2019	Aug.25, 2020
TEST RECEIVER	R&S	ESCI	10096	Jun. 12, 2019	Jun. 11, 2020
EXA Signal Analyzer	Aglient	N9010A	MY53470504	Dec. 18, 2019	Dec. 17, 2020
Horn antenna	SCHWARZBECK	BBHA 9170	#768	Mar. 01, 2018	Feb. 28, 2020
preamplifier	ChengYi	EMC184045SE	980508	Sep.23, 2019	Sep.22, 2020
Double-Ridged Waveguide Horn	ETS LINDGREN	3117	00034609	May. 17, 2019	May. 16, 2021
Broadband Preamplifier	SCHWARZBECK	BBV 9718	9718-205	Jun. 12, 2019	Jun. 11, 2020
ANTENNA	SCHWARZBECK	VULB9168	D69250	Mar. 01, 2018	Feb. 28, 2020
SIGNAL ANALYZER	Agilent	N9020A	MY52090123	Sep.09, 2019	Sep.08, 2020
USB Wideband Power Sensor	Agilent	U2021XA	MY54110007	Sep.09, 2019	Sep.08, 2020
LOOP ANTENNA	A.H	SAS-562B	/	Mar. 01, 2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	Schwarzbeck	BBHA 9170	/	Mar.01,2018	Feb. 28, 2020
Horn Ant (18G-40GHz)	ETS	QWH_SL_18_40_K_SG	/	Mar.01,2018	Feb. 28, 2020

6. OUTPUT POWER

6.1. MEASUREMENT PROCEDURE

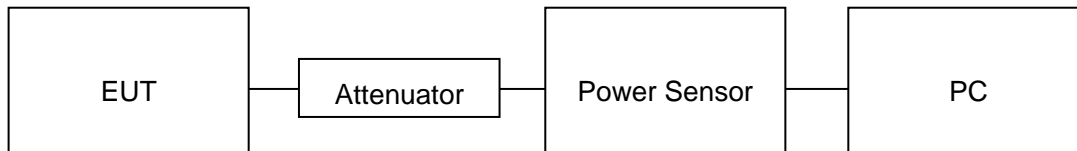
For max average conducted output power test:

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	12.56	30	Pass
2.437	13.30	30	Pass
2.462	13.41	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	10.60	30	Pass
2.437	11.02	30	Pass
2.462	11.08	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	9.28	30	Pass
2.437	9.99	30	Pass
2.462	9.94	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	9.11	30	Pass
2.437	10.15	30	Pass
2.452	9.75	30	Pass

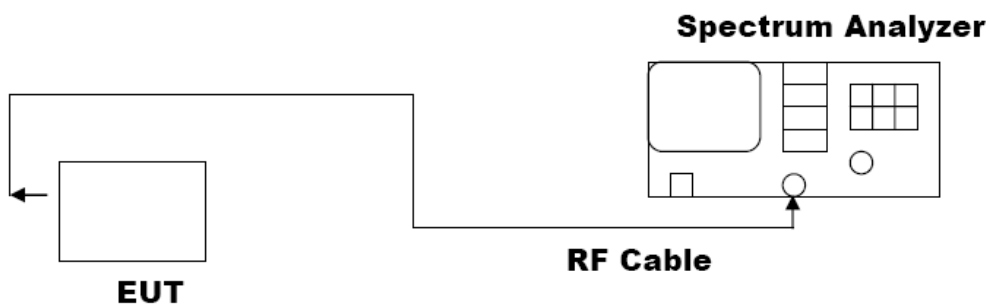
7. 6dB BANDWIDTH

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.

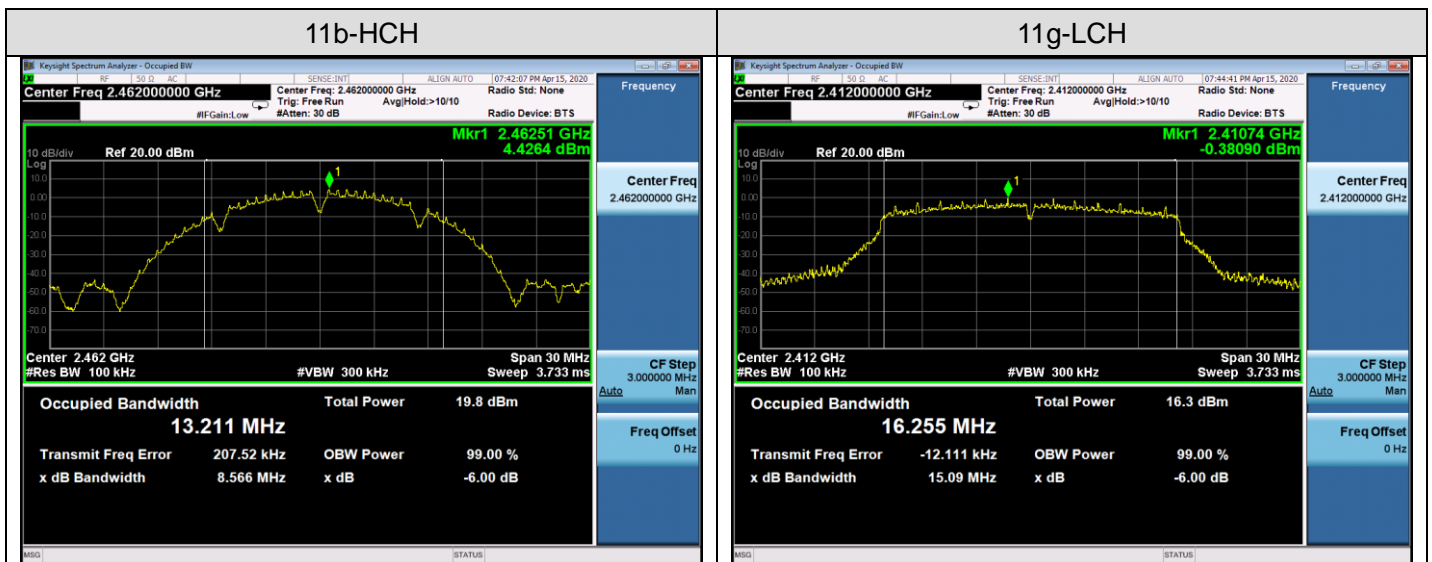
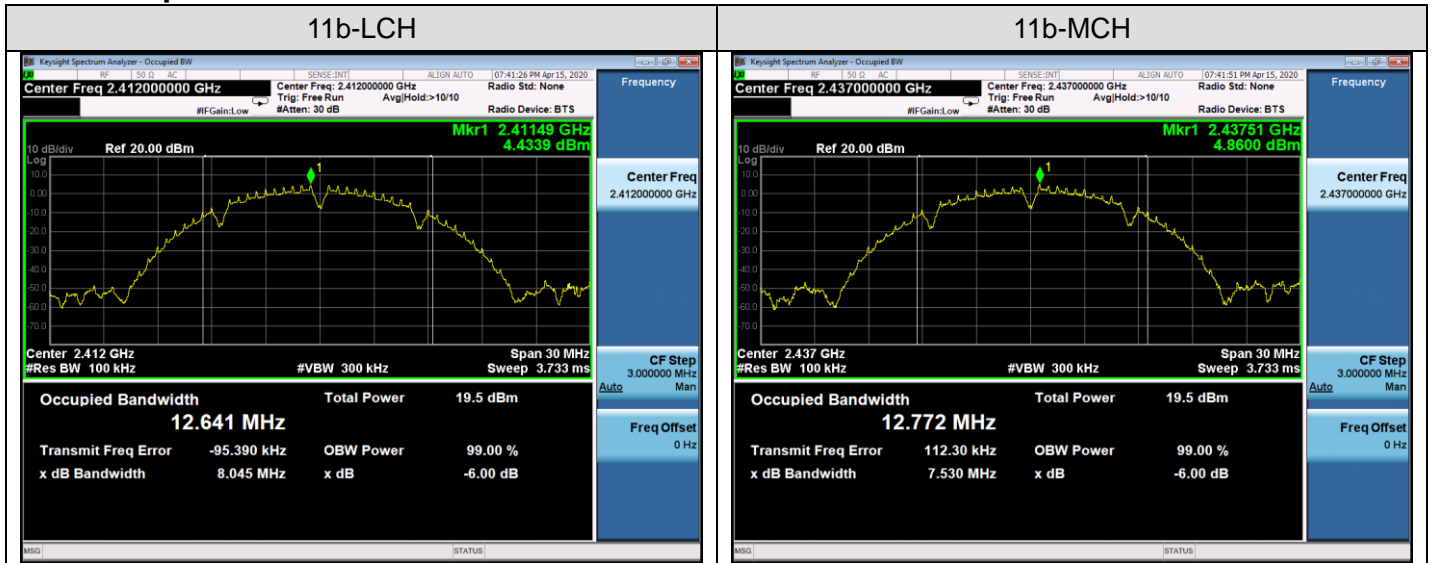
7.2. TEST SET-UP (BLOCK DIAGRAM OF CONFIGURATION)

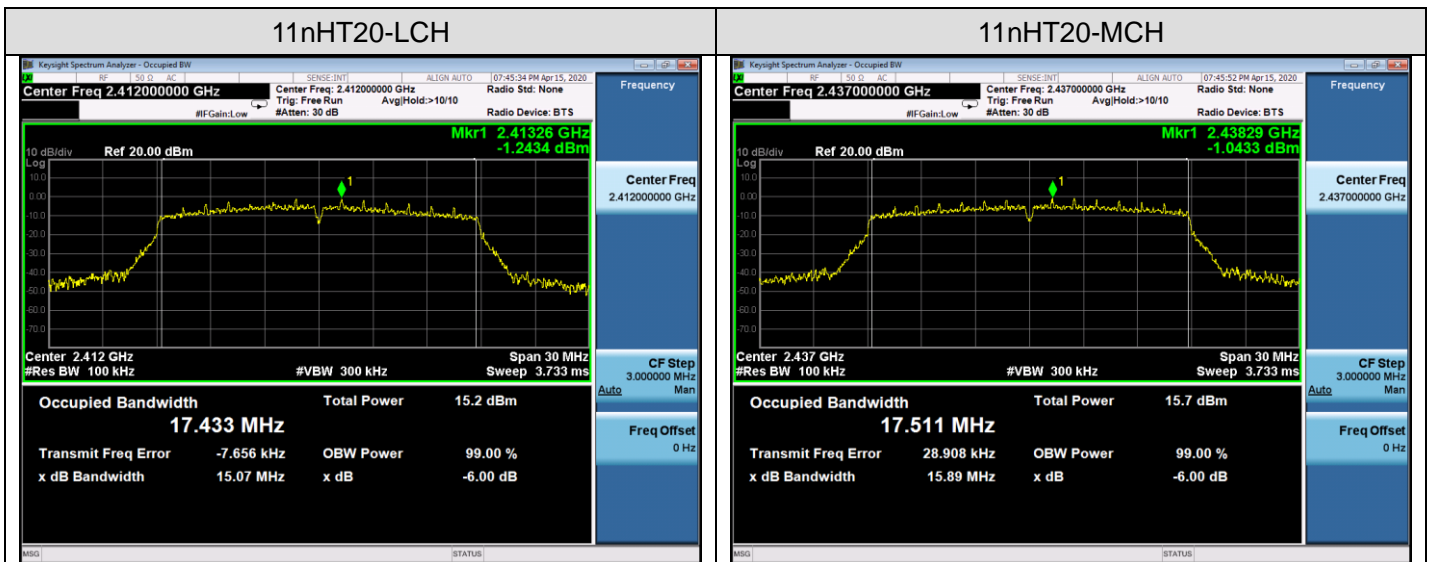
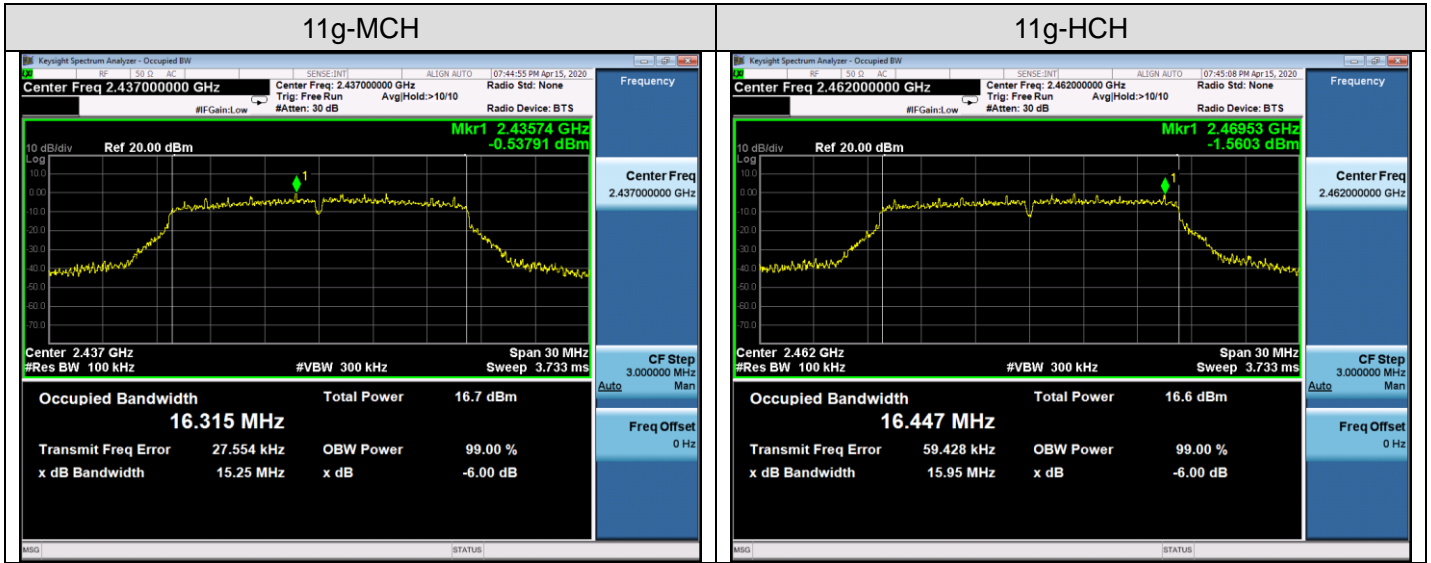


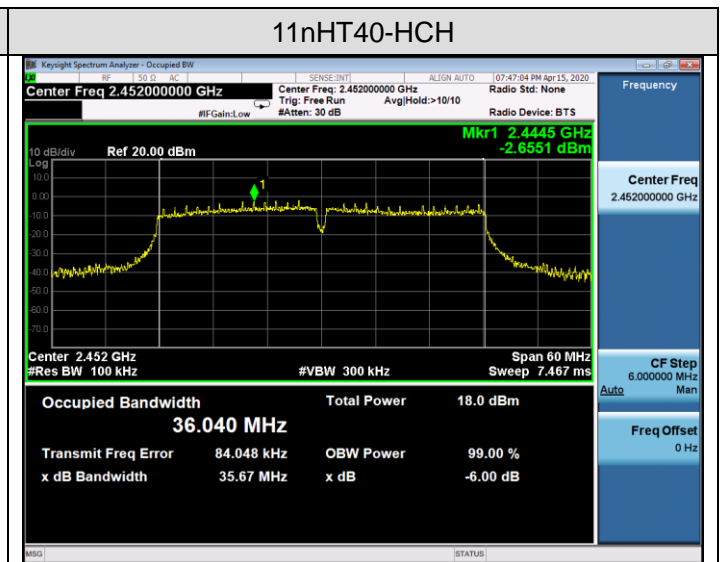
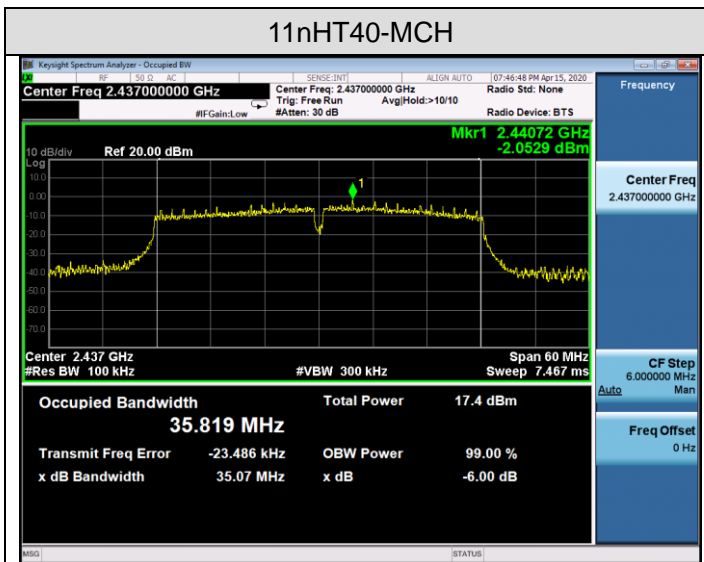
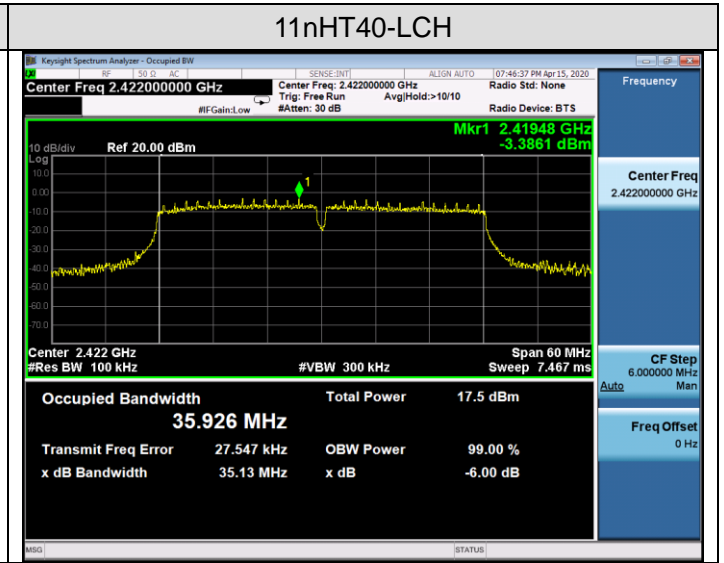
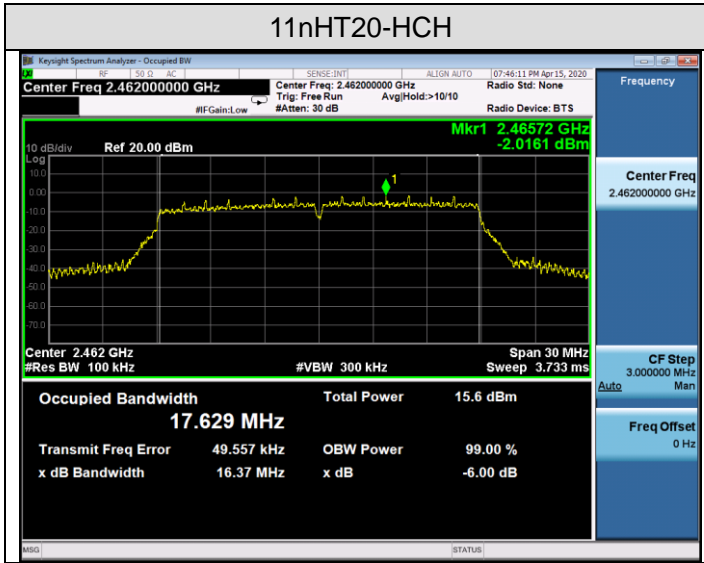
7.3. LIMITS AND MEASUREMENT RESULTS

Mode	Channel	6dB Bandwidth [MHz]	Verdict
11b	LCH	8.045	PASS
	MCH	7.530	PASS
	HCH	8.566	PASS
11g	LCH	15.09	PASS
	MCH	15.25	PASS
	HCH	15.95	PASS
11nHT20	LCH	15.07	PASS
	MCH	15.89	PASS
	HCH	16.37	PASS
11nHT40	LCH	35.13	PASS
	MCH	35.07	PASS
	HCH	35.67	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>	Refer Test Graph	PASS

Test Graph

