

FCC 47 CFR PART 15 SUBPART C ISED RSS-247 Issue 3

TEST REPORT

For

Robotic Vacuum Cleaner

MODEL NUMBER: QX1PEC

PROJECT NUMBER: 4791155019

REPORT NUMBER: 4791155019-3

FCC ID: 2AN2O-QX1PEC02

IC: 23317-QX1PEC02

HVIN: QX1PEC-BLM8

ISSUE DATE: Feb. 06, 2024

Prepared for

Beijing Roborock Technology Co., Ltd.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	02/06/2024	Initial Issue	

Form-ULID-008536-9 V3.0



TABLE OF CONTENTS

1.	APPLICANT INFORMATION4			
2.	TEST	METHODOLOGY	6	
3.	FACILITIES AND ACCREDITATION6			
4.	CALI	BRATION AND UNCERTAINTY	7	
	4.1.	MEASURING INSTRUMENT CALIBRATION	7	
	4.2.	MEASUREMENT UNCERTAINTY	7	
5.	EQUI	PMENT UNDER TEST	8	
	5.1.	DESCRIPTION OF EUT	8	
	5.2.	MAXIMUM OUTPUT POWER	9	
	5.3.	CHANNEL LIST	9	
	5.4.	TEST CHANNEL CONFIGURATION	10	
	5.5.	THE WORSE CASE POWER SETTING PARAMETER	10	
	5.6.	DESCRIPTION OF AVAILABLE ANTENNAS	11	
	5.7.	THE WORSE CASE CONFIGURATIONS	11	
	5.8.	TEST ENVIRONMENT	11	
	5.9.	DESCRIPTION OF TEST SETUP	12	
	5.10.	MEASURING INSTRUMENT AND SOFTWARE USED	14	
6.	MEAS	SUREMENT METHODS	15	
7.	ANTE	ENNA PORT TEST RESULTS	16	
	7.1.	ON TIME AND DUTY CYCLE	16	
	7.2.	6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH	19	
	7.3.	CONDUCTED OUTPUT POWER	33	
	7.4.	POWER SPECTRAL DENSITY	35	
	7.5.	CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS	43	
8.	RADI	ATED TEST RESULTS	69	
	8.1.	LIMITS AND PROCEDURE	69	
	8.2.	TEST ENVIRONMENT	76	
	8.3.	RESTRICTED BANDEDGE	76	
	8.4.	SPURIOUS EMISSIONS	93	
9.	AC P	OWER LINE CONDUCTED EMISSIONS	149	
10.	ANTE	ENNA REQUIREMENTS	152	
			Form-ULID-008536-9 V3.0	



1. APPLICANT INFORMATION

Applicant Information

Company Name: Address:	Beijing Roborock Technology Co., Ltd. Room 1001, Floor 10, Building 3, Yard 17, Anju Road, Changping District, Beijing, P.R. China
Manufacturer Information	
Company Name:	Beijing Roborock Technology Co., Ltd.
Address:	Room 1001, Floor 10, Building 3, Yard 17, Anju Road,
	Changping District, Beijing, P.R. China
EUT Description	
Product Name:	Robotic Vacuum Cleaner
Model Name:	QX1PEC
Additional No.:	1
Model Difference:	1
Sample Number:	6813106
Data of Receipt Sample:	Jan. 09, 2024
Test Date:	Jan. 09, 2024~ Feb. 02, 2024

APPLICABLE STANDARDS				
STANDARD	TEST RESULTS			
FCC 47 CFR Part 15 Subpart C	PASS			
ISED RSS-247 Issue 3	PASS			
ISED RSS-GEN Issue 5	PASS			



Summary of Test Results					
Clause	Test Items	FCC&ISED Rules	Test Results		
1	6 dB Bandwidth and 99% Occupied Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a) RSS-Gen Clause 6.7	PASS		
2	Conducted Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (d) RSS-Gen Clause 6.12	PASS		
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	PASS		
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13	PASS		
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205 RSS-247 Clause 5.5 RSS-GEN Clause 6.13 RSS-GEN Clause 8.9 RSS-GEN Clause 8.10	PASS		
6	Conducted Emission Test for AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	PASS		
7	Antenna Requirement	FCC 15.203 RSS-GEN Clause 6.8	PASS		
Note: The measurement result for the sample received is <pass> according to < ANSI C63.10-2013, FCC 47 CFR Part 2, FCC 47 CFR Part 15C, ISED RSS-247, ISED RSS-Gen > when <accuracy< td=""></accuracy<></pass>					

Method> decision rule is applied.

Prepared By:

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2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with KDB 558074 D01 15.247 Meas Guidance v05r02, 414788 D01 Radiated Test Site v01r01, FCC 47 CFR Part 2, FCC 47 CFR Part 15, ANSI C63.10-2013, ISED RSS-247 Issue 3 and ISED RSS-GEN Issue 5.

3. FACILITIES AND ACCREDITATION

Accreditation Certificate	A2LA (Certificate No.: 4829.01) UL-CCIC COMPANY LIMITED has been assessed and proved to be in compliance with A2LA. FCC (FCC Designation No.: CN1247) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules. IC (IC Designation No.: 25056; CAB No.: CN0073) UL-CCIC COMPANY LIMITED has been recognized to perform compliance testing on equipment subject to the Commission's Declaration of Conformity (DoC) and Certification rules.
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Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, China.

Note 2: For below 30MHz, lab had performed measurements at test anechoic chamber and comparing to measurements obtained on an open field site. These measurements below 30MHz had been correlated to measurements performed on an OFS.

Note 3: The test anechoic chamber in UL-CCIC COMPANY LIMITED had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worst case from the open field site.



4. CALIBRATION AND UNCERTAINTY

4.1. MEASURING INSTRUMENT CALIBRATION

The measuring equipment utilized to perform the tests documented in this report has been calibrated in accordance with the manufacturer's recommendations and is traceable to recognized national standards.

4.2. MEASUREMENT UNCERTAINTY

Where relevant, the following measurement uncertainty levels have been estimated for tests performed on the apparatus:

Test Item	Uncertainty		
Conduction emission	3.1 dB		
DTS Bandwidth	1.9 %		
Maximum Conducted Output Power	1.3 dB		
Maximum Power Spectral Density Level	1.5 dB		
Band-edge Compliance	1.9%		
Unwanted Emissions in Non-restricted Freq Bands	9kHz-30MHz: ±0.90dB 30MHz-1GHz: ±1.5 dB 1GHz-12.75GHz: ±1.9dB 12.75GHz-26.5GHz: ±2.1dB		
Radiation Emission test (include Fundamental emission) (9kHz-30MHz)	3.4dB		
Radiation Emission test (include Fundamental emission) (30MHz-1GHz)	3.4dB		
Radiation Emission test (1GHz to 26GHz) (include Fundamental emission)	3.5dB (1GHz-18GHz)		
	3.9dB (18GHz-26.5GHz)		
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			



5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	Robotic Vacuum Cleaner			
Model No.:	QX1PEC			
Operating Frequency:	IEEE 802.11B/G/N(HT20): 2412MHz to 2462MHz IEEE 802.11N(HT40): 2422MHz to 2452MHz			
Type of Modulation:	IEEE for 802.11B: DSSS (CCK, DQPSK, DBPSK) IEEE for 802.11G: OFDM (64QAM, 16QAM, QPSK, BPSK) IEEE for 802.11N(HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)			
Channels Step:	Channels with 5MHz step			
Test software of EUT:	ADB (manufacturer declare)			
Antenna Type:	PCB Antenna			
	1.78 dBi			
Antenna Gain:	Note: This data is provided by customer and our lab isn't responsible for this data.			



5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max AVG Conducted Power (dBm)
1	IEEE 802.11B	1-11[11]	15.77
1	IEEE 802.11G	1-11[11]	12.14
1	IEEE 802.11N HT20	1-11[11]	11.32
1	IEEE 802.11N HT40	3-9[7]	10.08

5.3. CHANNEL LIST

	Channel List for 802.11B/G/N(20 MHz)							
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	
1	2412	4	2427	7	2442	10	2457	
2	2417	5	2432	8	2447	11	2462	
3	2422	6	2437	9	2452			

	Channel List for 802.11N(40 MHz)						
Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)	Channel	Frequency (MHz)
3	2422	5	2432	7	2442	9	2452
4	2427	6	2437	8	2447		

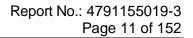


5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel (MHz)
	LCH: CH01 2412
IEEE 802.11B	MCH: CH06 2437
	HCH: CH11 2462
	LCH: CH01 2412
IEEE 802.11G	MCH: CH06 2437
	HCH: CH11 2462
	LCH: CH01 2412
IEEE 802.11N HT20	MCH: CH06 2437
	HCH: CH11 2462
	LCH: CH03 2422
IEEE 802.11N HT40	MCH: CH06 2437
	HCH: CH09 2452

5.5. THE WORSE CASE POWER SETTING PARAMETER

The W	Vorse Case	e Power Setting Parameter under 2400 ~ 2483.5MHz Band			1		
Test Softw	vare	ADB					
	Transmit	Test Channel					
Modulation Mode	Antenna	1	NCB: 20MH	lz	Ν	ICB: 40MHz	
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11B	1	40	40	40			
802.11G	1	44	44	44		/	
802.11N HT20	1	42	42	42			
802.11N HT40	1		/		40	40	40





5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	PCB Antenna	1.78

Note: This data is provided by customer and our lab isn't responsible for this data.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11B	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11G	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11N HT20	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.
IEEE 802.11N HT40	⊠1TX, 1RX	Antenna1 can be used as transmitting/receiving antenna independently.

5.7. THE WORSE CASE CONFIGURATIONS

For WIFI module, the worst-case data rates as provided by the client were: 802.11B mode: 1 Mbps 802.11G mode: 6 Mbps 802.11N HT20 mode: MCS0 802.11N HT40 mode: MCS0

5.8. TEST ENVIRONMENT

Environment Parameter	Selected Va	lues During Tests
Relative Humidity:	55	5 ~ 65%
Atmospheric Pressure:	1	025Pa
Temperature:	TN	23 ~ 28°C
	VL	N/A
Voltage:	VN	AC 120V
	VH	N/A

Note: VL= Lower Extreme Test Voltage VN= Nominal Voltage VH= Upper Extreme Test Voltage TN= Normal Temperature



5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E590	/

<u>I/O PORT</u>

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB	USB	100cm Length	/

ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	Empty Wash Fill Docker 1	roborock	EWFD24LRR	Input: 120V~ 60Hz Output: 20V 1.5A
2	Empty Wash Fill Docker 2	roborock	EWFD24LRR	Input: 120V~ 60Hz Output: 20V- 1.5A

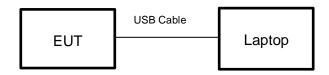


TEST SETUP

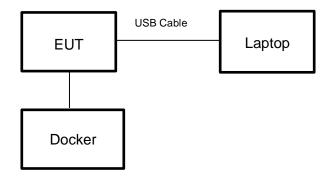
The EUT can work in an engineer mode with a software through a laptop.

SETUP DIAGRAM FOR TESTS

For Antenna Port test and Radiated Test:



For Conducted Emission Test:





5.10. MEASURING INSTRUMENT AND SOFTWARE USED

		Cor	nducted	Emiss	sions	(Instru	ment)		
Used	Equipment	Manufacturer	Mode	l No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.
\checkmark	EMI Test Receiver	R&S	ESF	₹3	12	6700	2022-11-26	2023-11-25	2024-11-24
\checkmark	Two-Line V-Network	R&S	ENV	216	12	6701	2022-11-26	2023-11-25	2024-11-24
V	Artificial Mains Networks	R&S	ENY	′81	12	6712	2022-09-27	2023-09-26	2024-09-25
				Soft	ware				
Used	Des	cription		Ma	nufac	turer	Name	Version	
\checkmark	Test Software for (Conducted distur	bance		R&S	;	EMC32	Ver. 9.25	
		Ra	diated	Emissi	ions (Instrum	nent)		
Used	Equipment	Manufacturer	Mode	l No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.
\checkmark	EMI test receiver	R&S	ESF			2993	2022-05-20	2023-04-08	2024-04-07
	EMI test receiver	R&S	ESR			6703	2022-11-26	2023-11-25	2024-11-24
	Spectrum Analyzer	R&S	FSV3	3044	22	2992	2022-05-20	2023-04-08	2024-04-07
	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB	1513	15	5456	2018-06-04	2021-06-03	2024-06-02
V	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB	1	177821		2019-01-28	2022-01-18	2025-01-17
\checkmark	Receiver Antenna (1GHz-18GHz)	R&S	HF9	07	12	6705	2019-01-27	2022-02-28	2025-02-27
V	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA	9170	126706		2019-02-29	2022-02-28	2025-02-27
	Pre-amplification (To 18GHz)	Tonscned	TAP010	18050	050 224539		2022-10-11	2023-10-10	2024-10-09
	Pre-amplification (To 18GHz)	R&S	SCU-	18D	13	4667	2022-11-26	2023-11-25	2024-11-24
V	Pre-amplification (To 26.5GHz)	R&S	SCU-	26D	13	5391	2022-11-26	2023-11-25	2024-11-24
N	Band Reject Filter	Wainwright	WRCG 2375-2 2485-2 405	2400- 2510-		1	2022-12-19	2023-12-18	2024-12-17
V	High Pass Filter	Wainwright	WHK) 5850-6 1800-4	6500-		2	2022-12-19	2023-12-18	2024-12-17
			Soft		ware				
Used	Desci	ription	Manufac		turer		Name	Version	
\checkmark	Test Software for R	adiated disturbar			nd		TS+	Ver. 2.5	
			Other ins		trum	ents			
Used	Equipment	Manufacturer	Model No.		Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.
V	Spectrum Analyzer	Keysight	N901	10B	15	5368	2022-05-20	2023-04-08	2024-04-07
	Power Meter	MWT	MW100-	-RFCB	22	1694	2022-05-23	2023-04-08	2024-04-07
	Attenuator	PASTERNACK	PE70	87-6	1	624	2022-05-23	2023-04-08	2024-04-07

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6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth and 99% Occupied Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.2.3 (Method PM)
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4 (Method PKPSD)
4	Out-of-band emissions in non-restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.5
5	Out-of-band emissions in restricted bands	KDB 558074 D01 15.247 Meas Guidance v05r02	8.6
6	Band-edge	KDB 558074 D01 15.247 Meas Guidance v05r02	8.7
7	Conducted Emission Test for AC Power Port	ANSI C63.10-2013	6.2



7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

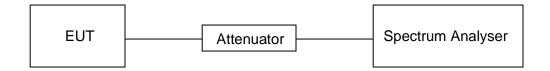
<u>LIMITS</u>

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

TEST RESULTS TABLE

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)	Final VBW (kHz)
11B	100	100	1	100%	0	0.01	0.01
11G	100	100	1	100%	0	0.01	0.01
802.11N HT20	100	100	1	100%	0	0.01	0.01
802.11N HT40	100	100	1	100%	0	0.01	0.01

Note: 1) Duty Cycle Correction Factor=10log(1/x).

2) Where: x is Duty Cycle (Linear)

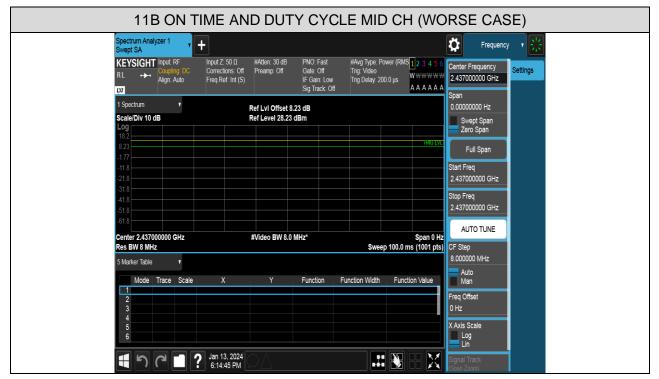
3) Where: T is On Time (transmit duration)

4) If the duty cycle is above 98%, the Final VBW is 10Hz.

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TEST GRAPHS







11N	HT20 (ON TIME	AND D	UTY C	YCLE N	/ID CH (WORSE (CASE)
Spectrum A Swept SA	nalyzer 1	· +					Frequency	, "
KEYSIGI RL ↔	HT Input: RF Coupling: D Align: Auto	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 30 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pov Trig: Video Trig Delay: 200	ver (RMS <mark>1</mark> 23456 0 μs ΑΑΑΑΑΑ	2.437000000 GHZ	Settings
1 Spectrum	۷		Ref Lvl Offset 8				0.00000000 Hz	
Scale/Div 1	0 dB		Ref Level 28.23	dBm			Swept Span Zero Span	
8.23						TRIG LVL	Full Span	
-11.8							Start Freq 2.437000000 GHz	
-31.8							Stop Freq	
-51.8							2.437000000 GHz	
Center 2.43	7000000 GHz		#Video BW 8.0	MHz*		Span 0 Hz		
Res BW 8 I 5 Marker Tat					Sweep	100.0 ms (1001 pts)	CF Step 8.000000 MHz	
Mod	e Trace Sca	le X	Y	Function	Function Width	Function Value	Auto Man	
1							Freq Offset	
3 4 5							0 Hz X Axis Scale	
6								
	6	? Jan 13, 2024 8:22:08 PM					Signal Track (Span Zoom)	





7.2. 6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

FCC Part15 (15.247), Subpart C				
Section Test Item Limit Frequency Range (MHz)				
FCC 47 CFR 15.247(a)(2) 6dB Bandwidth >= 500kHz 2400-24 ISED RSS-247 5.2 (a) 6dB Bandwidth >= 500kHz 2400-24				
ISED RSS-Gen Clause 6.799% Occupied BandwidthFor reporting purposes only2400-2483.				

TEST PROCEDURE

Refer to ANSI C63.10-2013 clause 11.8 for DTS bandwidth and clause 6.9 for Occupied Bandwidth.

Connect the EUT to the spectrum analyser and use the following settings:

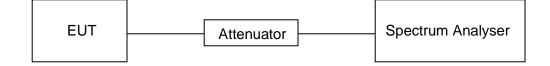
Center Frequency	The centre frequency of the channel under test
Detector	Peak
IBBW/	For 6 dB Bandwidth: 100 kHz For 99% Occupied Bandwidth: 1% to 5% of the occupied bandwidth
NRW	For 6 dB Bandwidth: ≥3 × RBW For 99% Occupied Bandwidth: ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

a) Use the 99% power bandwidth function of the instrument, allow the trace to stabilize and report the measured bandwidth.

b) Allow the trace to stabilize and measure the maximum width of the emission that is constrained by the frequencies associated with the two outermost amplitude points (upper and lower frequencies) that are attenuated by 6 dB relative to the maximum level measured in the fundamental emission.



TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

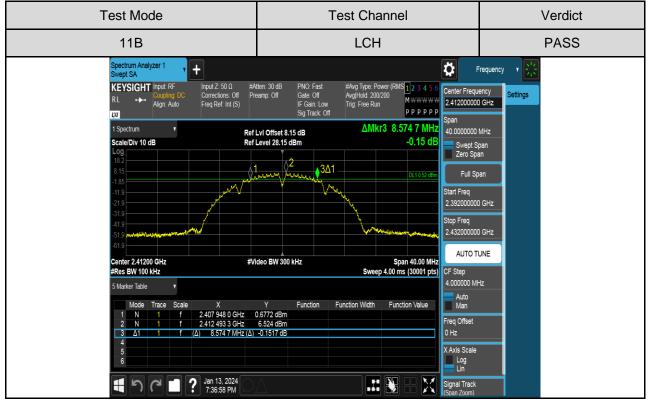
TEST RESULTS TABLE

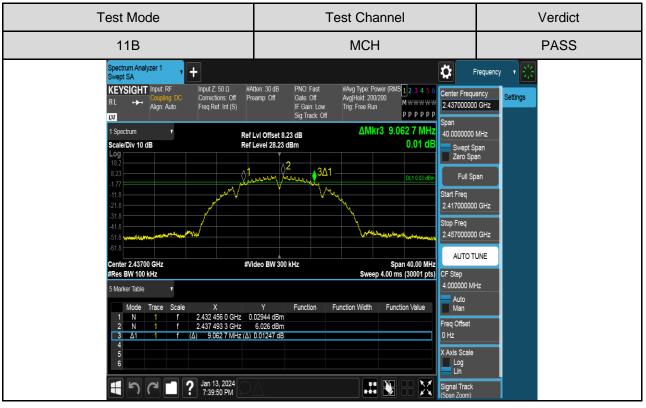
Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
	LCH	8.5747	13.435	Pass
11B	MCH	9.0627	13.410	Pass
	HCH	9.0493	13.423	Pass
	LCH	16.5573	16.598	Pass
11G	MCH	16.5680	16.597	Pass
	HCH	16.5560	16.606	Pass
	LCH	17.7133	17.762	Pass
11N HT20	MCH	17.7253	17.749	Pass
	HCH	17.7347	17.767	Pass
	LCH	36.4533	36.271	Pass
11N HT40	MCH	36.4533	36.264	Pass
	НСН	36.4667	36.270	Pass



TEST GRAPHS

6dB Bandwdith

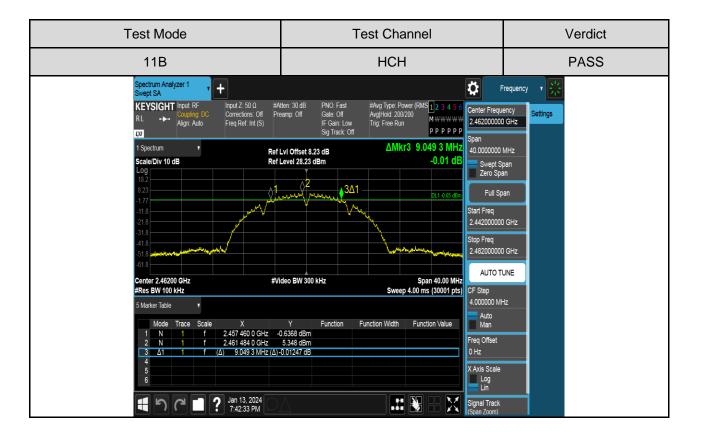


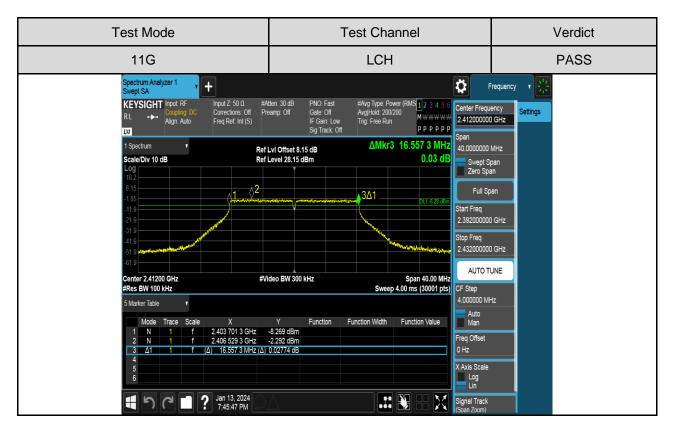


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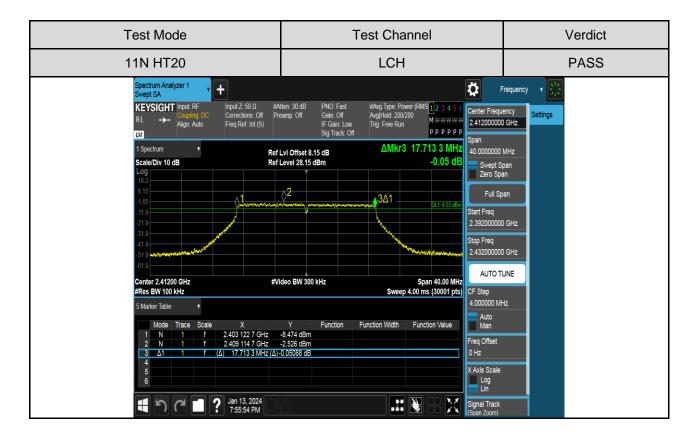






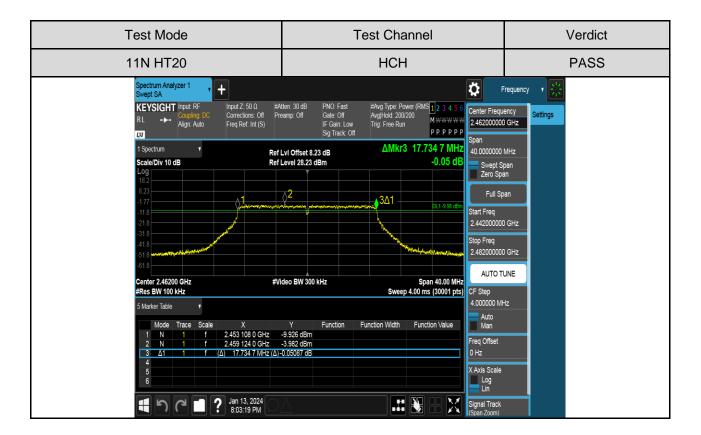






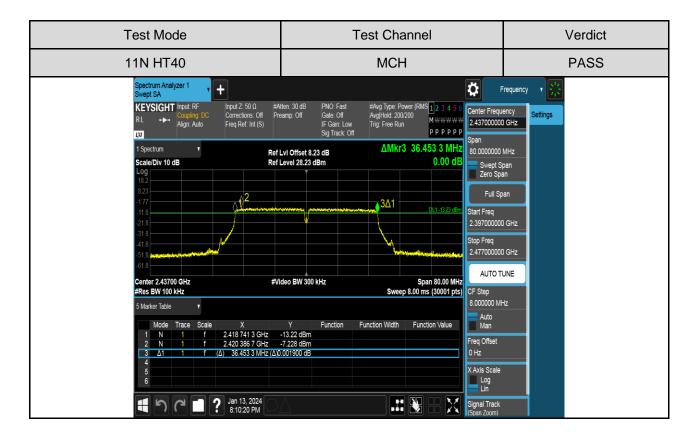
Test Mode	Test Channel	Verdict
11N HT20	МСН	PASS
RL → Couping DC Align Auto Corrections: Off Freq Ref. Int (S) 1 Spectrum * Ref 2 Scale/Div 10 dB Ref 1.3 - - - 1.4 - - - - 1.5 - - - - 1.6 - - - - 1.7 - - - - 1.1.8 - - - - 21.8 - - - - 21.8 - - - - - 21.8 - - - - - - 21.8 - <t< td=""><td>Atten: 30 dB PNO: Fast Gate: Off #Avg Type: Power (RMS] 2 3 4 5 6 C eamp: Off Gate: Off Avg[Hold: 200200 M ₩₩₩₩₩₩ P P P P P P Lvi Offset 8.23 dB ΔMKr3 17.725 3 MHz 4 Level 28.23 dB -0.01 dB -0.01 dB 2 2 3Δ1 D1-393 dB S 2 3Δ1 D1-393 dB S 1/deo BW 300 kHz Sparat.00 MHz Sparat.00 MHz S Sweep 4.00 ms (30001 pts) C 4 -0.01 dB 5 Y Function Function Width Function Value -0.01 dB 5 -0.01049 dB -0.01049 dB -0.01049 dB -0.01049 dB 5 5</td><td>Frequency Settings enter Frequency Settings enter Frequency Settings pan 0.0000000 GHz pan 2.437000000 GHz Swept Span 2.ero Span Full Span Latr Freq Auto TUNE F Step L00000 MHz Axis Scale Log Ln Full Span F</td></t<>	Atten: 30 dB PNO: Fast Gate: Off #Avg Type: Power (RMS] 2 3 4 5 6 C eamp: Off Gate: Off Avg[Hold: 200200 M ₩₩₩₩₩₩ P P P P P P Lvi Offset 8.23 dB ΔMKr3 17.725 3 MHz 4 Level 28.23 dB -0.01 dB -0.01 dB 2 2 3Δ1 D1-393 dB S 2 3Δ1 D1-393 dB S 1/deo BW 300 kHz Sparat.00 MHz Sparat.00 MHz S Sweep 4.00 ms (30001 pts) C 4 -0.01 dB 5 Y Function Function Width Function Value -0.01 dB 5 -0.01049 dB -0.01049 dB -0.01049 dB -0.01049 dB 5 5	Frequency Settings enter Frequency Settings enter Frequency Settings pan 0.0000000 GHz pan 2.437000000 GHz Swept Span 2.ero Span Full Span Latr Freq Auto TUNE F Step L00000 MHz Axis Scale Log Ln Full Span F





Test Mode	Test Channel	Verdict
11N HT40	LCH	PASS
RL → Coupling DC Align: Auto Corrections: Off Pre 1 Spectrum I Spectrum Ref 1 N 1 f 2 State Spectrum 1 N 1 f 2 Log Log 1 N 1 f	Iten: 30 dB PNO. Fast Gate: Off #Avg Type: Power (RMS) 1 2 3 4 5 6 Avg Hold: 200200 C IF Gan: Low Sig Track Off Ting: Free Run M + + + + + + + + + + + P P P P P P P Lvi Offset 8.15 dB ΔMkr3 36.453 3 MHz 8 Level 28.15 dB -0.07 dB 9 2 2 3Δ1 C(1-132.65) 3 2 3Δ1 C(1-132.65) 5 4deo BW 300 kHz Span 80.00 MHz Sweep 8.00 ms (30001 pts) 5 Y Function Function Width Function Value 7 -13.14 dBm -0.05661 dB -0.05661 dB 0 0	Frequency enter Frequency 2422000000 GHz pan 0.0000000 MHz Swept Span Zero Span Full Span tart Freq 2.82000000 GHz tart Freq 2.8200000 GHz top Freq 2.4620000 GHz AUTO TUNE F Step 0.000000 MHz Auto Man req Offset Hz Axito Scale Lin





Test Mode	Test Channel	Verdict
11N HT40	НСН	PASS
RL → Coupling DC Align: Auto Corrections: Off Print 1 Spectrum Image: Spectrum Image: Spectrum Ref 1 Spectrum Image: Spectrum Image: Spectrum Ref 1 Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Image: Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Image: Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Image: Spectrum Image: Spectrum Image: Spectrum Image: Spectrum 1 Image: Spectrum Image: Spectrum Image: Spectrum Image: Spectrum	Comp On Dif Gain Low Sig Track. Off Trig: Free Run M.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W.W	000000 GHz req 000000 GHz UTO TUNE pp 000 MHz .to an iffset Scale 29 n



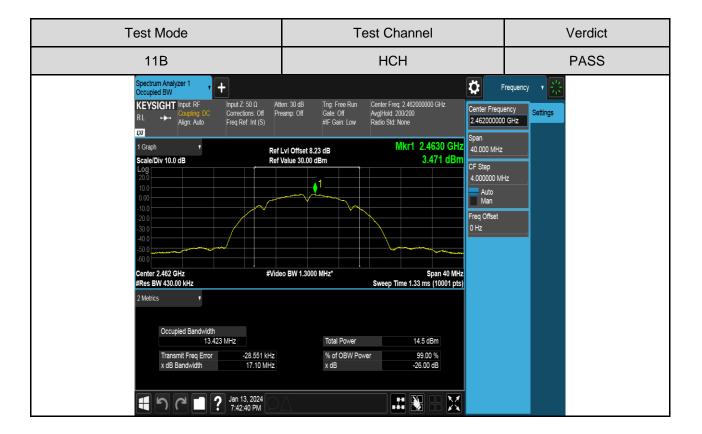
99% Bandwidth





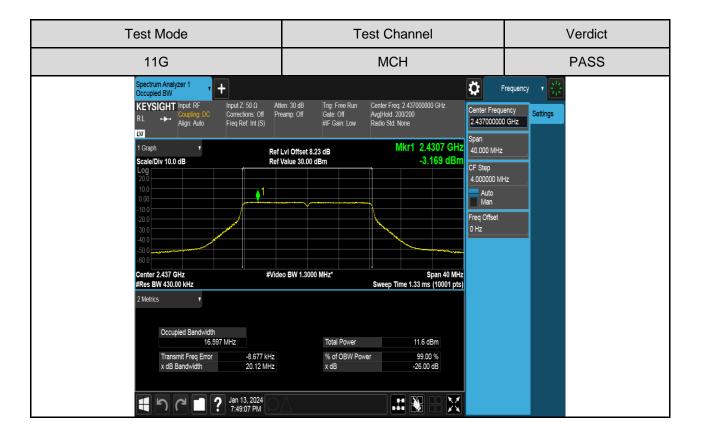
Form-ULID-008536-9 V3.0





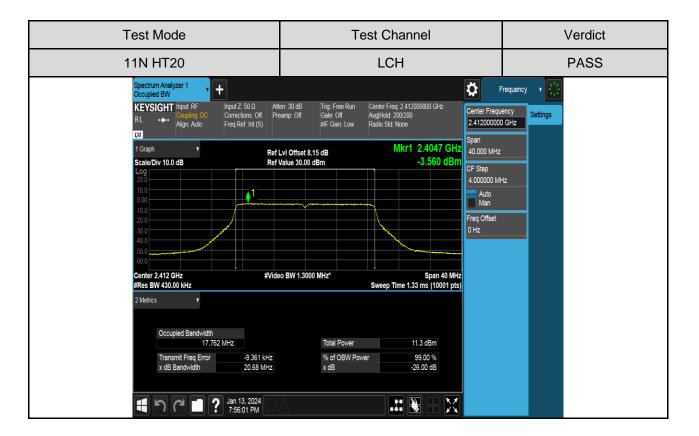
Test Mode	Test Channel	Verdict
11G	LCH	PASS
Spectrum Analyzer 1 Cocupied BW KEYSIGHT Input: RF RL → Align: Auto 1 Graph 1	en: 30 dB Trig: Free Run Center Freq: 2.41200000 GHz Aamp: Off Gate: Off Avg Hold: 200200 #IF Gain: Low Radio Std None vi Offset 8.15 dB Mkr1 2.4046 GHz value 30.00 dBm -2.528 dBm -2.528 dBm o BW 1.3000 MHz* Span 40 MHz Sweep Time 1.33 ms (10001 pts)	PASS Frequency Frequency Settings 2.41200000 GHz Ppan 40.000 MHz F Step 4.00000 MHz F Step 4.00000 MHz Phan F Step 4.0000 MHz F Step 4.0000 MHz F Step Auto Man Req Offset D Hz
Transmit Freq Error -11.228 kHz x dB Bandwidth 20.10 MHz	% of OBW Power 99.00 % x dB -26.00 dB	
I C I ? Jan 13, 2024		





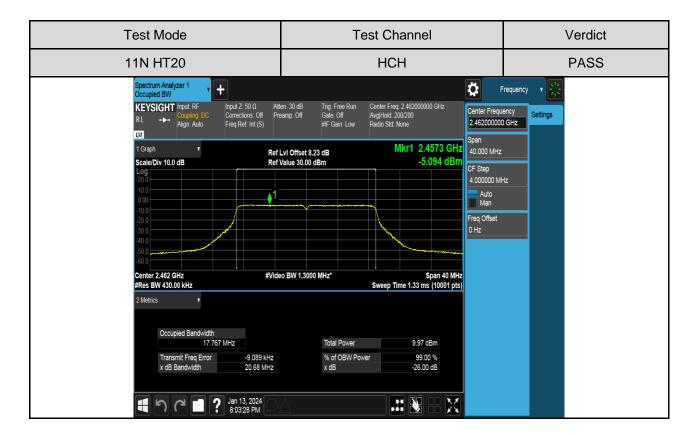
Test Mode	Test Channel	Verdict
11G	HCH	PASS
Spectrum Analyzer 1 Cccupied BW KEYSIGHT Input: RF RL →→ Align: Auto 1 Graph 1 Graph 1 Graph 1 Graph 1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	en: 30 dB Trig: Free Run Center Freq: 2.462000000 GHz amp: Off Gate: Off Avg[Hold: 200/200 #IF Gain: Low Radio Std: None Lvl Offset 8.23 dB Mkr1 2.4560 GHz Value 30.00 dBm -3.727 dBm	Center Frequency Center Frequency Settings
4 5 C 1 ? Jan 13, 2024		





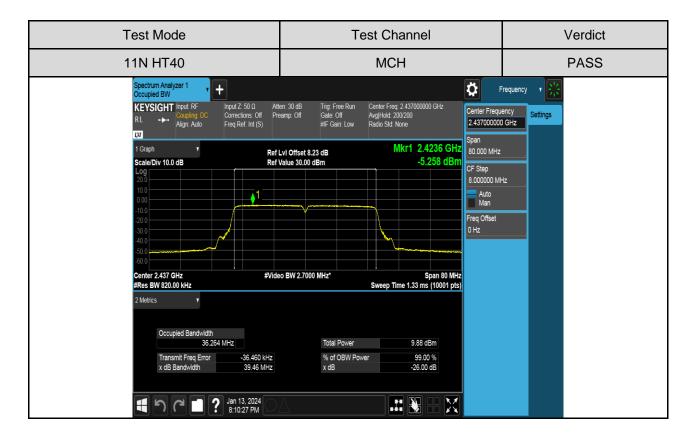
Test Mode	Test Channel	Verdict
11N HT20	МСН	PASS
Spectrum Analyzer 1 Occupied BW ↓ KEYSIGHT Input RF Couping DC Align: Auto Corrections: Off Freq Ref. Int (S) U 1 Graph Ref Scale/Div 10.0 dB Ref 100 0 20 0 0 0	IVICH	Frequency Vettings OU GHZ Hz MHz
手り (? 1 2 Jan 13, 2024 8:00:27 PM		











Test Mode	Test Channel	Verdict
11N HT40	НСН	PASS
RL →→ Coupling DC Corrections: Off Pre Align: Auto Freq Ref. Int (S)	en: 30 dB Trig: Free Run Center Freq 2.452000000 GHz AvglHold: 200/200 Free Radio Std: None 2.45200000 GHz 2.4520000 GHz 2.4520000 GHz 2.4520000 GHz 2.4520000 GHz 2.45200000 GHz 2.452000000 GHz 2.452000000 GHz 2.452000000 GHz 2.45200000 GHz 2.452	0 GHz
Scale/Div 10.0 dB Ref V Log 200 100 -0	Auto 30.00 dBm -5.538 dBm CF Step 8.000000 M Auto Man Freq Offset 0 Hz Sweep Time 1.33 ms (10001 pts)	Hz
2 Metrics 2 Metrics Coccupied Bandwidth 36 270 MHz Transmit Freq Error x dB Bandwidth 39.48 MHz Interpret Press 4 13, 2024 8:13:33 PM	Total Power 9.31 dBm % of OBW Power 99.00 % x dB -26.00 dB	



7.3. CONDUCTED OUTPUT POWER

LIMITS

FCC Part15 (15.247), Subpart C				
Section Test Item Limit Frequency Range (MHz)				
FCC 15.247(b)(3) ISED RSS-247 5.4 (d) RSS-Gen Clause 6.12	Output Power	1 watt or 30dBm	2400-2483.5	

TEST PROCEDURE

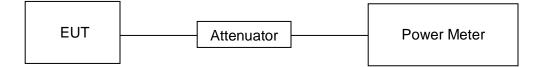
Place the EUT on the table and set it in the transmitting mode.

Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.

Measure the power of each channel. $A_{A}(C)$

AVG Detector used for AVG result.

TEST SETUP





TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

TEST RESULTS TABLE

Test Mode	Test Channel	Measurement Output Power (AV)	10log(1/x) Factor	Maximum Conducted Output Power (AV)	LIMIT
		dBm	dBm	dBm	dBm
	LCH	15.77	0	15.77	30
11B	MCH	15.16	0	15.16	30
	HCH	14.43	0	14.43	30
	LCH	12.14	0	12.14	30
11G	MCH	11.92	0	11.92	30
	HCH	10.88	0	10.88	30
	LCH	11.32	0	11.32	30
11N HT20	MCH	10.87	0	10.87	30
	HCH	9.97	0	9.97	30
	LCH	10.08	0	10.08	30
11N HT40	MCH	9.84	0	9.84	30
	HCH	9.32	0	9.32	30



7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) ISED RSS-247 5.2 (b)	Power Spectral Density	8 dBm/3 kHz	2400-2483.5

TEST PROCEDURE

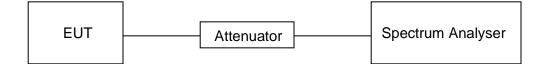
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

Center Frequency	The centre frequency of the channel under test	
Detector	Peak	
RBW	3 kHz ≤ RBW ≤100 kHz	
VBW	≥3 × RBW	
Span	1.5 x DTS bandwidth	
Trace	Max hold	
Sweep time	Auto couple.	

Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

If measured value exceeds limit, reduce RBW (no less than 3 kHz) and repeat.

TEST SETUP





TEST ENVIRONMENT

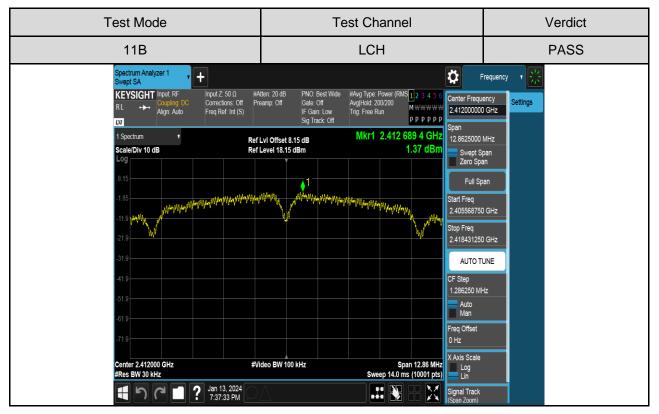
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

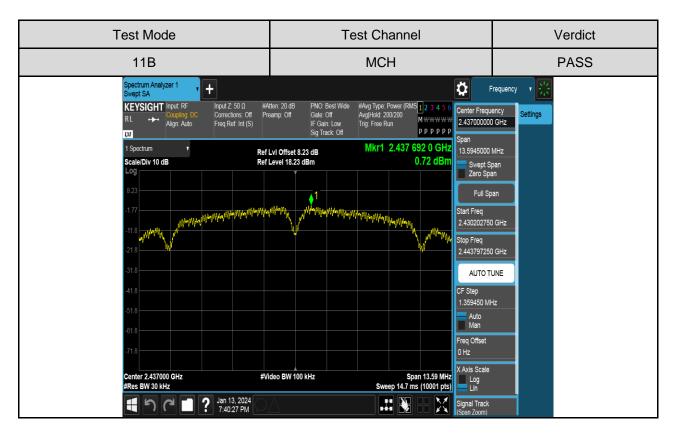
TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	1.37	Pass
11B	MCH	0.72	Pass
	HCH	0.04	Pass
	LCH	-5.10	Pass
11G	MCH	-5.55	Pass
	HCH	-6.32	Pass
	LCH	-5.40	Pass
11N HT20	MCH	-5.82	Pass
	HCH	-6.69	Pass
	LCH	-9.97	Pass
11N HT40	MCH	-10.35	Pass
	HCH	-10.78	Pass



TEST GRAPHS

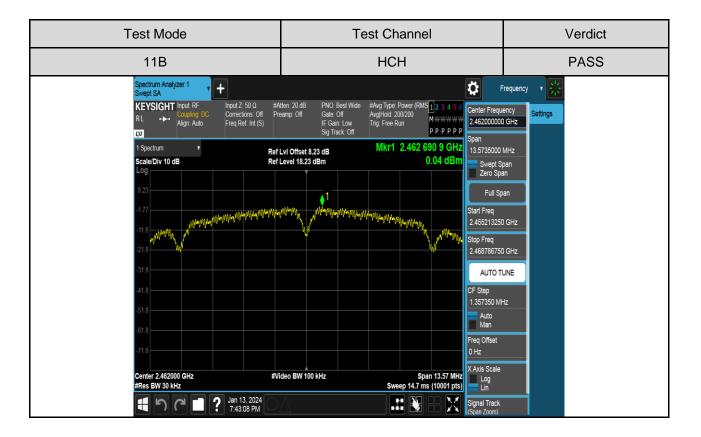


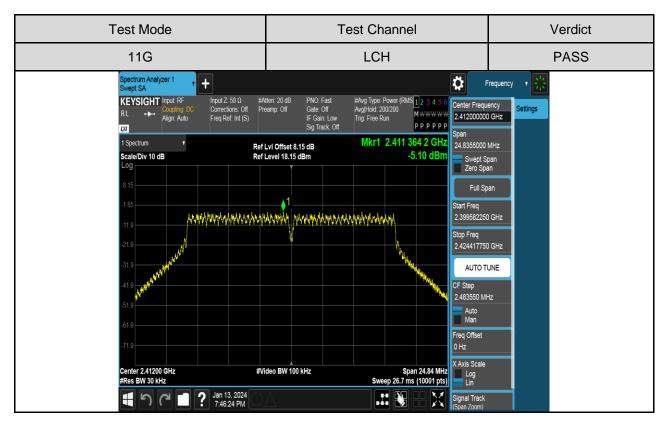


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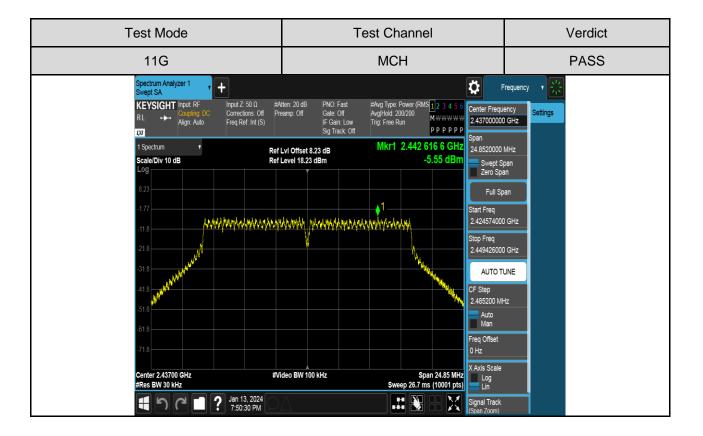
UL-CCIC COMPANY LIMITED

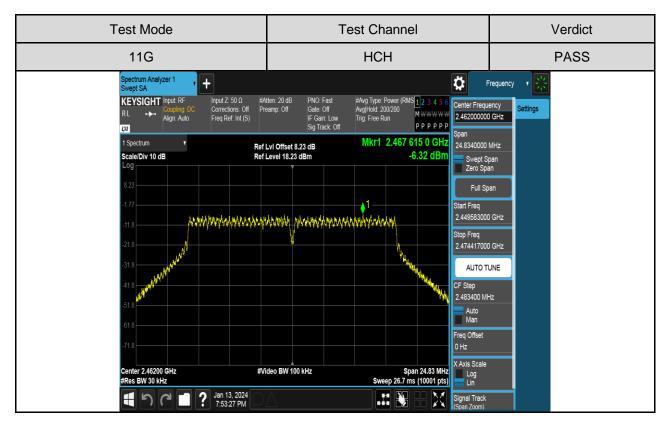




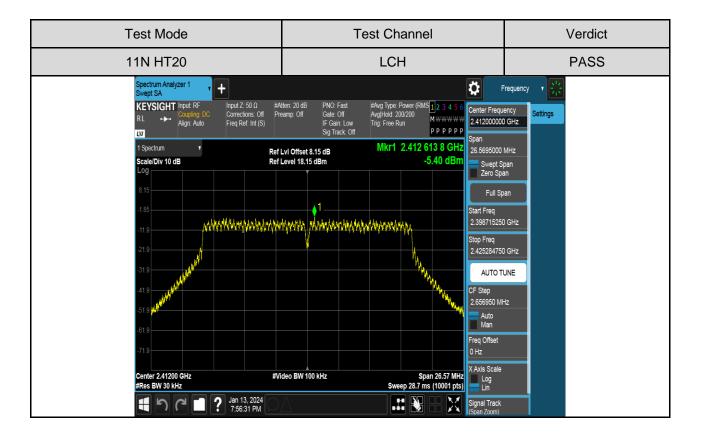


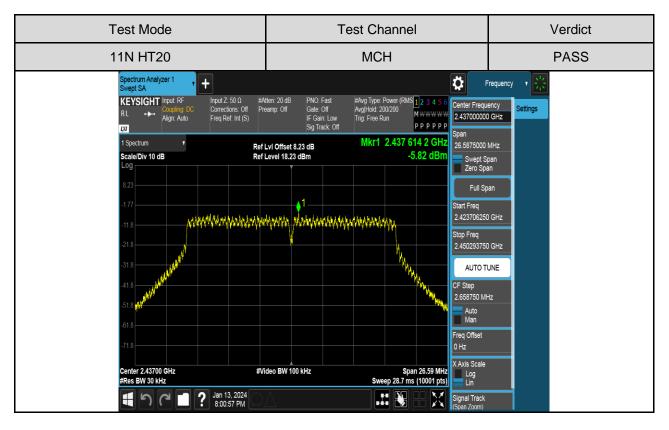




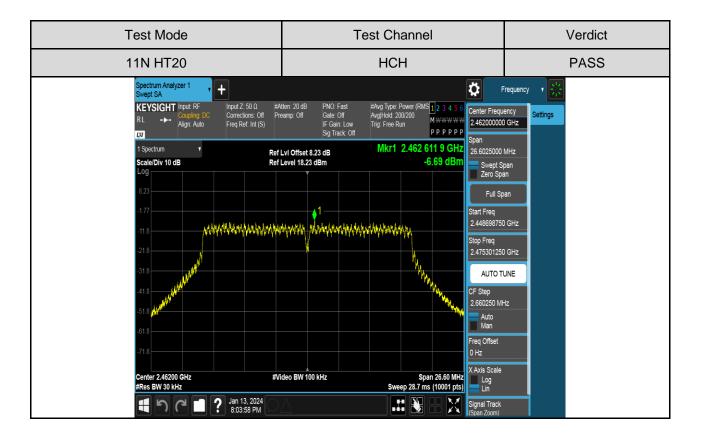


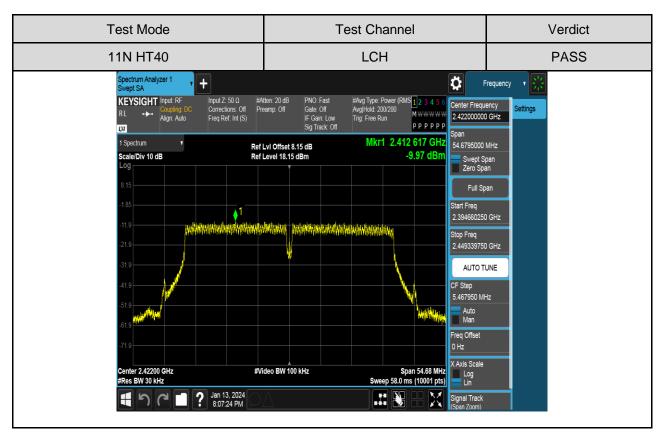






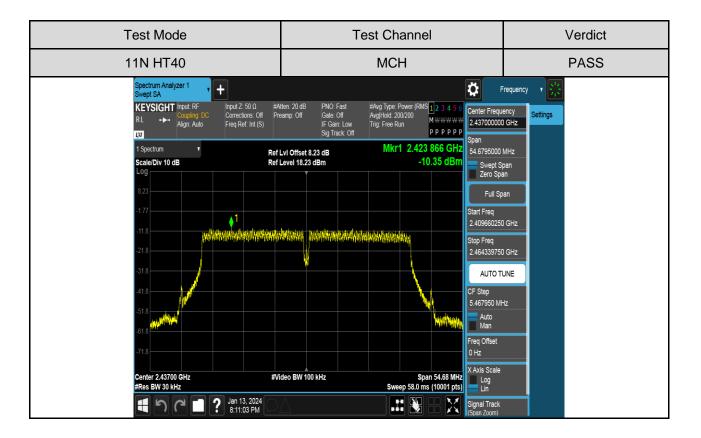


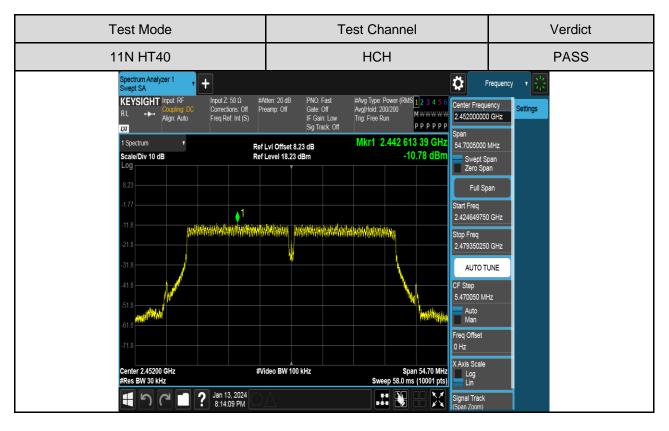




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7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	
FCC §15.247 (d)	Conducted	30 dB below that in the 100 kHz bandwidth	
RSS-247 Clause 5.5	Bandedge and	within the band that contains the highest	
RSS-GEN Clause 6.13	Spurious Emissions	level of the desired power	

TEST PROCEDURE

Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

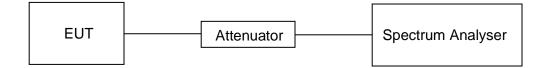
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100K
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

Use the peak marker function to determine the maximum PSD level.

Span	Set the center frequency and span to encompass frequency range to be measured	
Detector	Peak	
RBW	100K	
VBW	≥3 x RBW	
measurement points	≥span/RBW	
Trace	Max hold	
Sweep time	Auto couple.	

Use the peak marker function to determine the maximum amplitude level.

TEST SETUP





TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

PART 1: REFERENCE LEVEL MEASUREMENT

TEST RESULTS TABLE

Test Mode	Test Channel	Result[dBm]
	LCH	6.52
11B	MCH	5.94
	HCH	5.13
	LCH	-2.14
11G	MCH	-2.73
	HCH	-3.50
	LCH	-2.54
11N HT20	MCH	-3.22
	HCH	-4.04
	LCH	-7.30
11N HT40	MCH	-7.53
	НСН	-8.18



TEST GRAPHS





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