

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

TEST REPORT

For

Robotic Vacuum Cleaner

MODEL NUMBER: QR0PEP

PROJECT NUMBER: 4790937230

REPORT NUMBER: 4790937230-1

FCC ID: 2AN2O-QR0PEP02

IC: 23317-QR0PEP02

HVIN: QR0PEP-FNF8

ISSUE DATE: Sep. 20, 2023

Prepared for

Beijing Roborock Technology Co., Ltd.

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	09/20/2023	Initial Issue	

Form-ULID-008536-9 V3.0



TABLE OF CONTENTS

1.	APPL	ICANT INFORMATION	4
2.	TEST	METHODOLOGY	
3.	FACII	LITIES AND ACCREDITATION	6
4.	CALI	BRATION AND UNCERTAINTY	7
	4.1.	MEASURING INSTRUMENT CALIBRATION	7
	4.2.	MEASUREMENT UNCERTAINTY	7
5.	EQUI	PMENT UNDER TEST	
	5.1.	DESCRIPTION OF EUT	
	5.2.	MAXIMUM OUTPUT POWER	
	5.3.	CHANNEL LIST	
	5.4.	TEST CHANNEL CONFIGURATION	
	5.5.	THE WORSE CASE POWER SETTING PARAMETER	
	5.6.	DESCRIPTION OF AVAILABLE ANTENNAS	
	5.7.	THE WORSE CASE CONFIGURATIONS	11
	5.8.	TEST ENVIRONMENT	
	5.9.	DESCRIPTION OF TEST SETUP	
	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	
	7.2.	6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH	
	7.3.	CONDUCTED OUTPUT POWER	
	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	INNA 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:	QR0PEP
Additional No.:	/
Model Difference:	/
Sample Number:	6404643
Data of Receipt Sample:	Aug. 31, 2023
Test Date:	Aug. 31, 2022~ Sep. 20, 2022

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



Summary of Test Results				
Clause	Test Items	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,</pass>				

FCC 47 CFR Part 2, FCC 47 CFR Part 15C, ISED RSS-247, ISED RSS-Gen > when <Accuracy Method> decision rule is applied.

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Form-ULID-008536-9 V3.0



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, CFR 47 FCC Part 2, CFR 47 FCC 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	3.1dB		
Maximum Conduct Output Power	± 1.3dB		
DTS Bandwidth	±1.9 %		
Maximum Conducted Output Power	± 0.69dB		
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.:	QR0PEP			
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			
Sample Type:	Fixed production			
Test software of EUT:	CMD (manufacturer declare)			
Antenna Type:	PCB Antenna			
	2.22 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]	16.33
1	IEEE 802.11G	1-11[11]	12.40
1	IEEE 802.11N HT20	1-11[11]	11.32
1	IEEE 802.11N HT40	3-9[7]	10.52

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 Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band									
Test Softw	vare		CMD						
Modulation	Transmit								
	Antenna	1	NCB: 20MH	łz	١	NCB: 40MHz	:		
Widde	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	7				
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	2.22

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 Values During Tests				
Relative Humidity:	55 ~ 65%				
Atmospheric Pressure:	1025Pa				
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

Form-ULID-008536-9 V3.0



5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

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

I/O PORT

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	EWFD16LRR	Input: 120V~ 60Hz Output: 20V 1.5A
2	Empty Wash Fill Docker 2	roborock	EWFD16LRR	Input: 120V~ 60Hz Output: 20V 1.5A

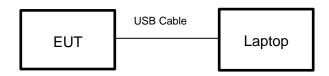


TEST SETUP

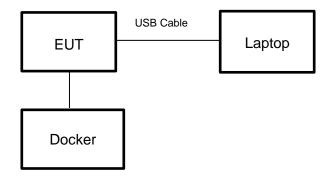
The EUT can work in an engineer mode with a software through a laptop.

SETUP DIAGRAM FOR TESTS

For Antenna Port test and Radiated Test:



For Conducted Emission Test:





5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument)													
			luuci		510113	(เกอแน	Upper Last						
Used	Equipment	Manufacturer		del No.	Serial No.		Cal.	Last Cal.	Next Cal.				
\checkmark	EMI Test Receiver	R&S	E	SR3	12	6700	2021-12-04	2022-12-03	2023-12-02				
\checkmark	Two-Line V-Network	R&S	E١	V216	12	6701	2021-12-04	2022-12-03	2023-12-02				
	Artificial Mains Networks	R&S	E	NY81	12	6712	2021-10-12	2022-10-09	2023-10-08				
	Software												
Used	Des	Version											
\checkmark	Test Software for 0	Conducted distur	bance		R&S	;	EMC32	Ver. 9.25					
Radiated Emissions (Instrument)													
Used	Equipment	Manufacturer		del No.		al No.	Upper Last Cal.	Last Cal.	Next Cal.				
\checkmark	EMI test receiver	R&S	E	SR7	22	2993	2022-05-20	2023-04-08	2024-04-07				
\checkmark	EMI test receiver	R&S		SR26		6703	2021-12-04	2022-12-03	2023-12-02				
\checkmark	Spectrum Analyzer	R&S	FS	V3044	22	2992	2022-05-20	2023-04-08	2024-04-07				
	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FM2	ZB 1513	15	5456	2018-06-04	2021-06-03	2024-06-02				
	Receiver Antenna (30MHz-1GHz)	Schwarzbeck	VUL	B 9163	126704		2019-01-19	2022-01-18	2025-01-17				
	Receiver Antenna (1GHz-18GHz)	R&S	н	F907	126705		2019-01-27	2022-02-28	2025-02-27				
	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBI	BBHA9170		6706	2019-02-29	2022-02-28	2025-02-27				
	Pre-amplification (To 18GHz)	Tonscned	TAPC	AP01018050		TAP01018050		4539	/	2022-10-20	2023-10-19		
	Pre-amplification (To 18GHz)	R&S	SC	U-18D	13	4667	2021-12-04	2022-12-03	2023-12-02				
	Pre-amplification (To 26.5GHz)	R&S	SC	U-26D	13	5391	2021-12-04	2022-12-03	2023-12-02				
V	Band Reject Filter	Wainwright	237 248	CGV12- 5-2400- 5-2510- IOSS		1	2022-05-20	2023-04-08	2024-04-07				
	High Pass Filter	COM-MW	ZBF1	3-3-18G- 01		2	2022-05-20	2023-04-08	2024-04-07				
				Soft	ware								
Used	Descr	ription		Manufac	turer		Name	Version					
\checkmark	Test Software for Ra			Tonsce			TS+	Ver. 2.5					
\checkmark	Test Software for Ra	adiated disturbar	nce	Chinese-	EMC	F	RE_RSE	Ver. 3.03					
			(Other ins	trum	ents							
Used	Equipment	Manufacturer	Мо	Model No.		al No.	Upper Last Cal.	Last Cal.	Next Cal.				
V	Spectrum Analyzer	Keysight	N	9010B	15	5368	2022-05-20	2023-04-08	2024-04-07				
	Power Meter	MWT	MW1	00-RFCB	22	1694	2022-05-23	2023-04-08	2024-04-07				
	Attenuator	PASTERNACK	PE	7087-6	1	624	2022-05-23	2023-04-08	2024-04-07				

Form-ULID-008536-9 V3.0



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 AVGSA-2)
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

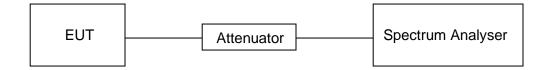
<u>LIMITS</u>

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)

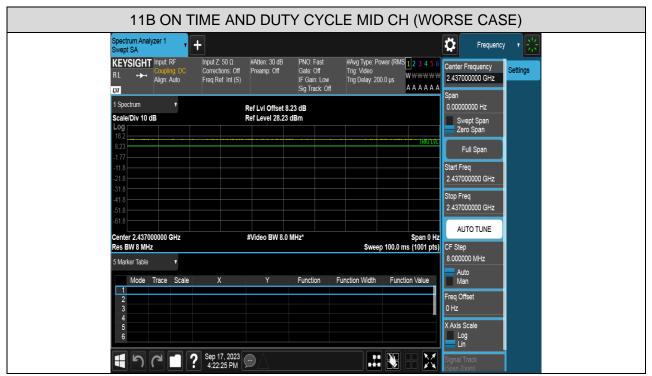
4) If the duty cycle is above 98%, the Final VBW is 10Hz.

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TEST GRAPHS







11N	HT20	ON TIME	AND D	UTY C	YCLE N	MID CH (WORSE O	CASE)	
Swept SA KEYSI	Analyzer 1 GHT Input: RF Coupling: D Align: Auto	Corrections: Off Freq Ref: Int (S)	#Atten: 30 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Video Trig Delay: 200	wer (RMS <mark>1</mark> 2345) 0.0 µs A A A A A A	2.437000000 GHZ	Settings	
1 Spectrui Scale/Di Log			Ref LvI Offset 8. Ref Level 28.23				0.00000000 Hz Swept Span Zero Span		
823 -1.77 -11.8 -21.8						IRIG LVI	Full Span Start Freq 2.437000000 GHz		
-318 -418 -518 -618							Stop Freq 2.437000000 GHz		
Center 2. Res BW 5 Marker			#Video BW 8.0	MHz*	Sweep	Span 0 H 5 100.0 ms (1001 pts			
1 2 3	ode Trace Sc	ale X	Y	Function	Function Width	Function Value	Auto Man Freq Offset 0 Hz		
4 5 6		Sep 17, 2023			H		X Axis Scale Log Lin Signal Track		





7.2. 6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

FCC Part15 (15.247), Subpart C			
Section Test Item Limit Frequency Range (MHz)			
CFR 47 FCC 15.247(a)(2) ISED RSS-247 5.2 (a)	6dB Bandwidth	>= 500kHz	2400-2483.5
ISED RSS-Gen Clause 6.7	99 % Occupied Bandwidth	For reporting purposes only	2400-2483.5

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:

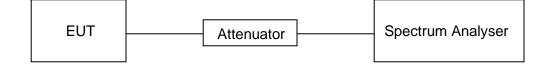
Center Frequency	The centre frequency of the channel under test
Detector	Peak
IBBW/	For 6 dB Bandwidth: 100 kHz For 99 % Occupied Bandwidth: 1 % to 5 % of the occupied bandwidth
	For 6 dB Bandwidth: ≥3 × RBW For 99 % Occupied Bandwidth: ≥3 × RBW
Trace	Max hold
Sweep	Auto couple

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

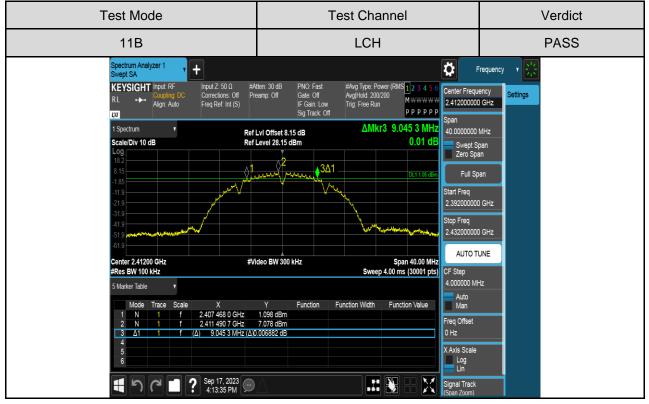
TEST RESULTS TABLE

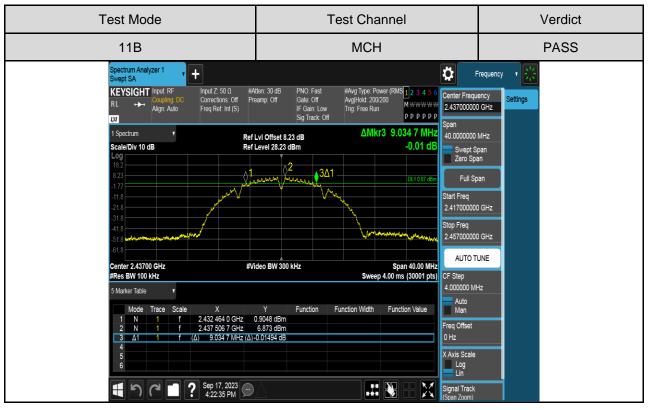
Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
	LCH	9.0453	13.405	Pass
11B	MCH	9.0347	13.377	Pass
	HCH	9.0560	13.421	Pass
	LCH	16.5533	16.577	Pass
11G	MCH	16.5453	16.571	Pass
	HCH	16.5373	16.574	Pass
	LCH	17.7653	17.732	Pass
11N HT20	MCH	17.6480	17.721	Pass
	HCH	17.6760	17.731	Pass
	LCH	36.3920	36.162	Pass
11N HT40	MCH	36.3680	36.157	Pass
	НСН	36.4027	36.193	Pass



TEST GRAPHS

6dB Bandwdith

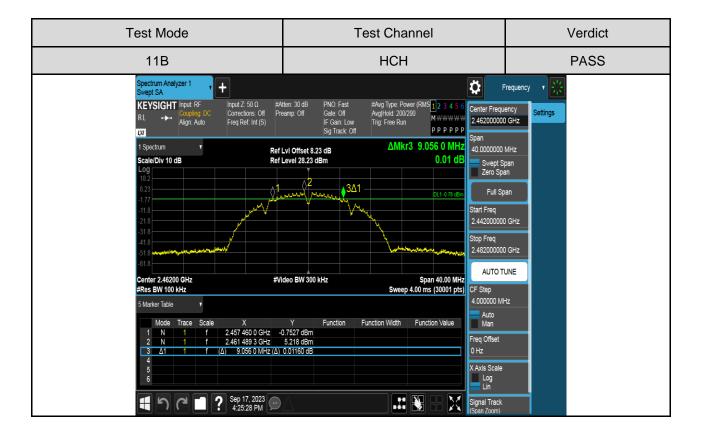




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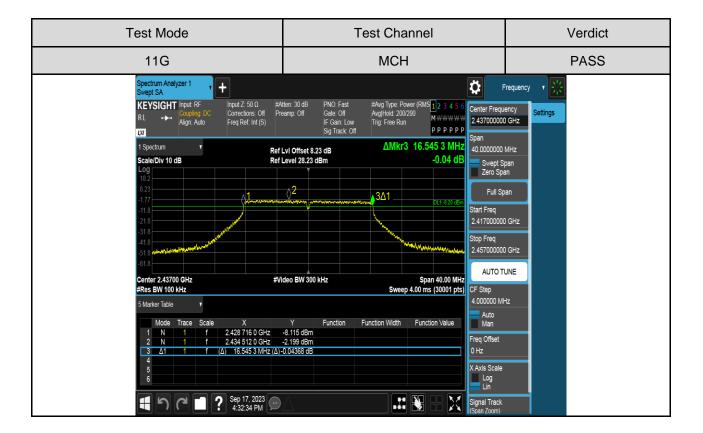




Test Mode	Test Channel	Verdict
11G	LCH	PASS
RL Coupling DC Corrections: Oil Pr 1 Spectrum Image: Auto Freq Ref. Int (S) 1 Spectrum Image: Ref. Int (S) 1 Spectrum Ref. 1 N Image: Ref.	tten: 30 dB PNO: Fast #Avg Type: Power (RMS 1 2 3 4 5 6 eamp: Off Gate: Off Tig: Free Run May P P P P P Sig Track: Off 30 AMkr3 16:553 3 MHz Level 28:15 dB -0.06 dB -0.06 dB 2 3 4 5 6 2 3 4 5 6 Avg/Hoid: 200200 Tig: Free Run AMkr3 16:553 3 MHz -0.06 dB -0.06 dB 2 3 4 5 6 3 4 1 0 1 8:05 65 1 8 10 1 8 10 1 8:05 65 1 8 10 1 8	Frequency Center Frequency 241200000 GHz Span 40.000000 MHz Swept Span Zero Span Full Span Start Freq 2.39200000 GHz Stop Freq 2.4200000 GHz Stop Freq 4.000000 MHz CF Step 4.000000 MHz Autro TUNE CF Step 4.000000 MHz Auto TUNE CF Step 4.000000 MHz Auto TUNE Cr Step Log Lin Signal Track Signal Track

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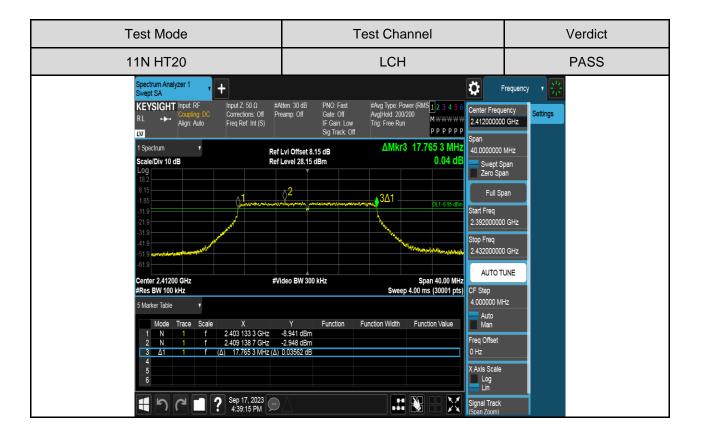




Test Mode	Test Channel	Verdict
11G	НСН	PASS
Spectrum Analyzer 1 + Swept SA Input Z: 50 0. KEYSIGHT Input RF Input Z: 50 0. RL → 1 Spectrum Ref Scale/Div 10 dB Ref 10 10 10 10 10 10 10 10 110 10 110 10 113 10 114 10 115 10 116 10 117 110 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10 118 10	Nter: 30 dB PNO: Fast #Avg Type: Power (RMS] 1 2 3 4 5 6 eamp: Off Gate: Off Avg Hold: 200/200 M W W W W P P P P P Sig Track Off Trg: Free Run M P P P P P Lvi Offset 8.23 dB ΔMkr3 16.537 3 MHz Level 28.23 dB -0.07 dB 2 3Δ1 0.1-33 dE 2 3Δ1 0.1-33 dE 3 Spart 40.00 MHz Spart 40.00 MHz Sweep 4.00 ms (30001 pts) C Y Function Function Width -3.339 dBm -0.07248 dB	Frequency Center Frequency 2.462000000 GHz Span 40.000000 MHz Swept Span Zero Span Full Span Start Freq 2.482000000 GHz Auto Man Greq Offset DHz Axto Man Greq Offset DHz Axto Signal Track Signal Track

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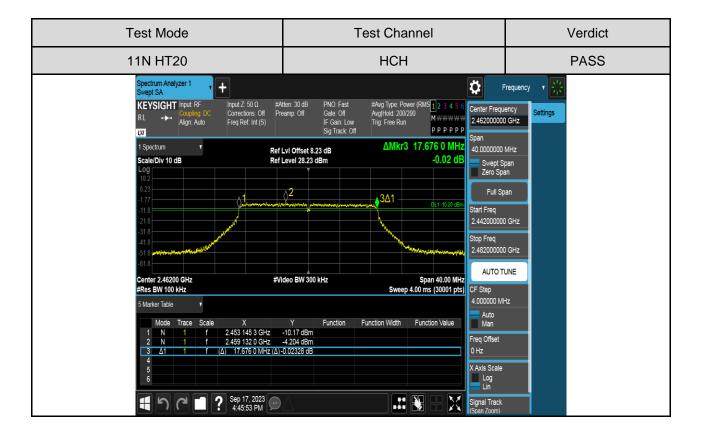




11N HT20 MCH PASS	Test Mode	Test Channel	Verdict
	11N HT20	MCH	PASS
Spectrum Analyzer 1 Swept SA Input Z 50 0 RL Mater 30 dB Parage Null (S) PNO Fact Prequency Market Sale Center Frequency Settings 1 Spectrum Nativez 1 Augn Aulo Parage Null (S) Paragee Null (S)	Sivept SA ▼ KEYSIGHT Input IF RL Input ISA Input ISA Input ISA Input ISA Input ISA Input ISA Input ISA I Spectrum Input ISA I Spectrum Ispectrum I I I I I I I I I I I I I I I I I I I	Iten: 30 dB eamp. Off PNO: Fast Gate: Off #Avg Type: Power (RMS] 1 2 3 4 5 6 MWHWWWW Center Fre 2 437000 IF Gain: Low Sig Track. Off Trig: Free Run MWHWWWW P P P P P Span Lvi Offset 8.23 dB AMkr3 17.648 0 MHz Span Span 0.001 dB Lvi Offset 8.23 dB 0.01 dB Start Freq 2.437000 Start Freq 2.417000 Start Freq 2.417000 Q2 3Δ1 Li 853 dB Start Freq 2.457000 Start Freq 2.457000 Full Q2 Start Freq 2.457000 Start Freq 2.457000 Start Freq 2.457000 Full Q4 Sweep 4.00 ms (30001 pts) Freq Offse 0.42 CF Step 4.000000 AUTO Y Function Function Width Function Value Freq Offse 0.42 Yaxis Scr 1007675 dB 1 1 Start Scr DHz Xaxis Scr	equency 2000 GHz 1 Span 1 Span 2 000 GHz 2 000 GHz 2 000 GHz 2 000 GHz 2 100 GHz 2 100 GHz 2 100 GHz 2 10 10 10 10 10 10 10 10 10 10 10 10 10

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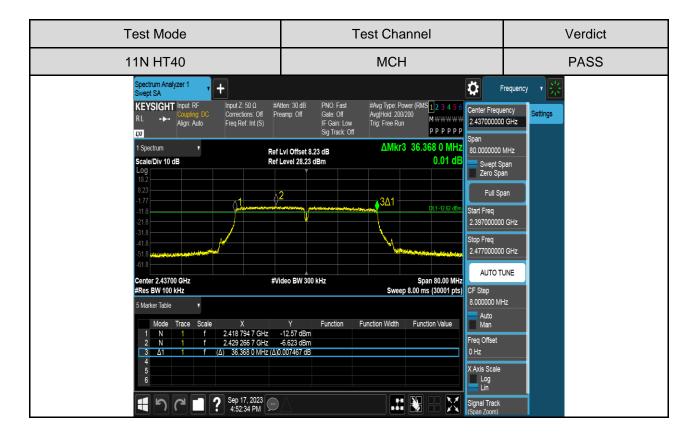




Test Mode	Test Channel	Verdict
11N HT40	LCH	PASS
RL → Coupling DC Align: Auto Corrections: Off Print 1 Spectrum Image: Spectrum Ref 1 Spectrum The spectrum 1 Spectrum The spectrum 1 Spectrum The spectrum 1 Spectrum Spectrum 2 Spectrum Spectrum 3 Spectrum Spectrum 3 Spectrum Spectrum 3 Spectrum Spectrum 3 Spectrum Spectrum 4 Spectrum Spectrum 5 Mode Trace 4 N Spect	Iten: 30 dB PNO: Fast. #Avg Type. Power (RMS] 1 ≥ 3 4 5 6 Avg Hold: 200200 JF Gain: Low Trg: Free Run M HWHW W P P P P P P P Lvi Offset 8.15 dB ΔMIKr3 36.392 0 MHz 3 Level 28.15 dB 0.03 dB 0.03 dB S 2 3Δ1 011-12.84 dB S 4deo BW 300 kHz Span 80.00 MHz S S Y Function Function Width Function Value S -12.76 dBm 0.03266 dB S S S	Frequency Settings Center Frequency Settings Span Settings Bab Southers Swept Span Zero Span Full Span Full Span Start Freq 2.42200000 GHz Skapt Freq 2.422000000 GHz Start Freq 2.82000000 GHz Start Freq 2.462000000 GHz Start Freq 2.462000000 GHz AUTO TUNE FStep S.000000 MHz Auto Auto Man req Offset DHz Lin Lin Ling Ling

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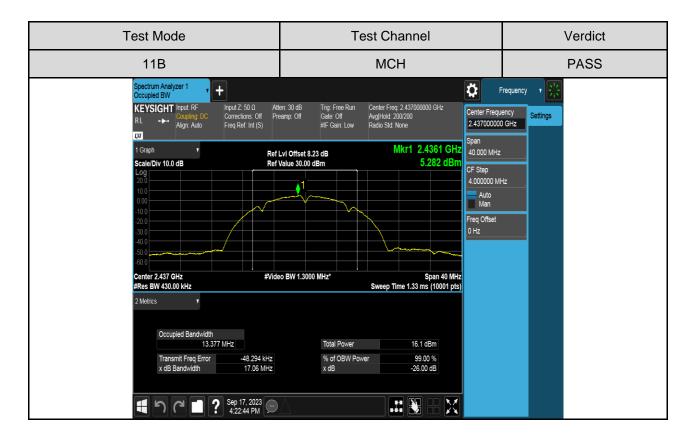
Test Mode	Test Channel	Verdict
11N HT40	НСН	PASS
RL → Coupling DC Align: Auto Corrections: Off Print 1 Spectrum Image: Spectrum Ref 1 Spectrum Image: Spectrum Ref 10 10 Image: Spectrum Image: Spectrum 1 Spectrum Image: Spectrum Image: Spectrum 1 1 Image: Spectrum Image: Spectrum 10 1 Image: Spectrum Image: Spectrum 113 1 Image: Spectrum Image: Spectrum 113 1 Image: Spectrum Image: Spectrum 113 1 Image: Spectrum Image: Spectrum 114 1 Image: Spectrum Image: Spectrum 113 1 Image: Spectrum Image: Spectrum 114 1 Image: Spectrum Image: Spectrum 115 1 Image: Spectrum Image: Spectrum 1 1 Image: Spectrum Image: Spectrum 1 1 Image: Spectrum Image: Spectrum	Iten: 30 dB PNO: Fast. #Avg Type. Power (RMS] 1 ≥ 3 4 5 6 Avg Hold: 200200 JF Gain: Low Trg: Free Run M ₩₩₩₩₩ P P P P P P P Lvi Offset 8.23 dB ΔMIKr3 36.402 7 MHz 3 Level 28.23 dB -0.09 dB -0.09 dB 3 2 3Δ1 PI + 12 0.456 5 2 3Δ1 PI + 12 0.456 5 4deo BW 300 kHz Span 80.00 MHz Sweep 8.00 ms (30001 pts) 5 Y Function Function Width Function Value 7 -12.96 dBm -7.076 dBm -0.0918 dB 5 5	Frequency Settings Center Frequency 2.452000000 GHz Span 80.000000 MHz Swept Span Zero Span Full Span Start Freq 2.412000000 GHz Stop Freq 2.49200000 GHz Auto Man Freq Offset 0 Hz Log Lin

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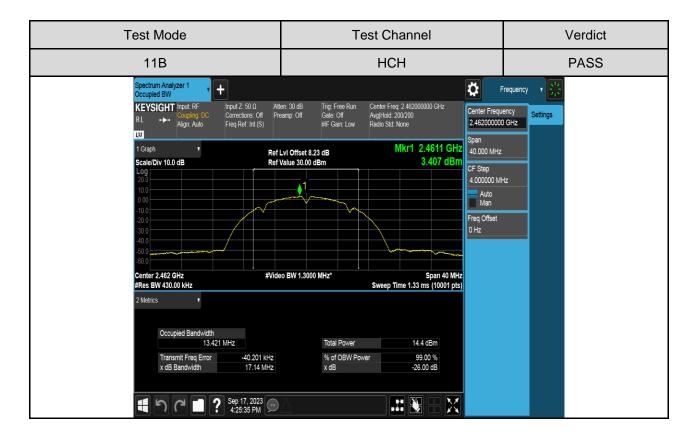
99% Bandwidth

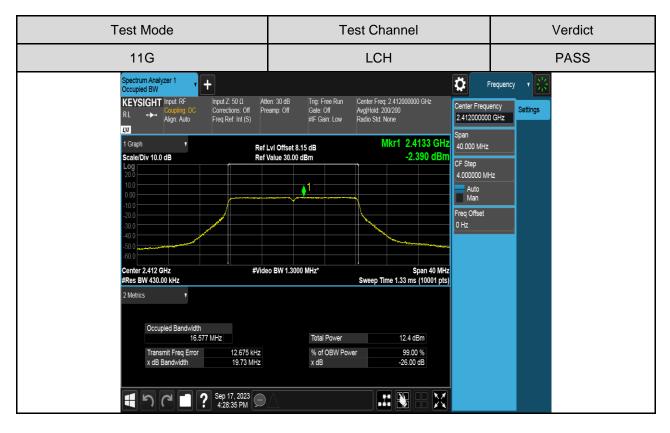




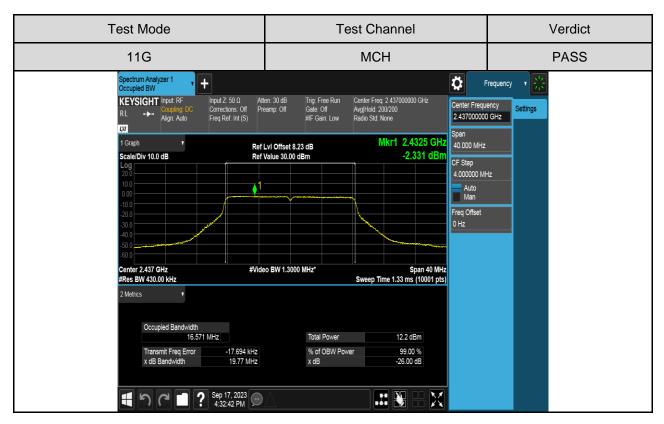
Form-ULID-008536-9 V3.0

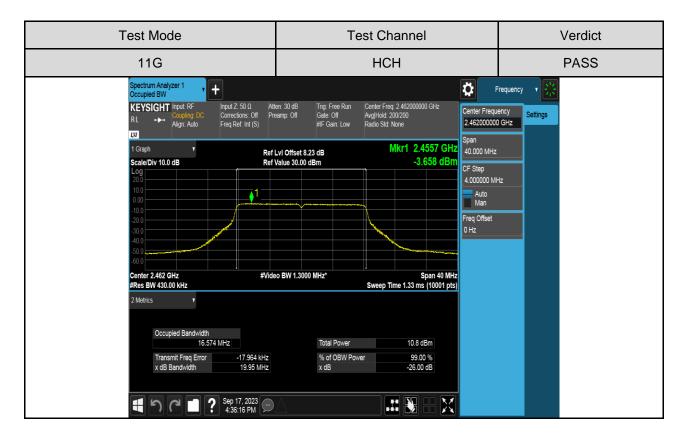




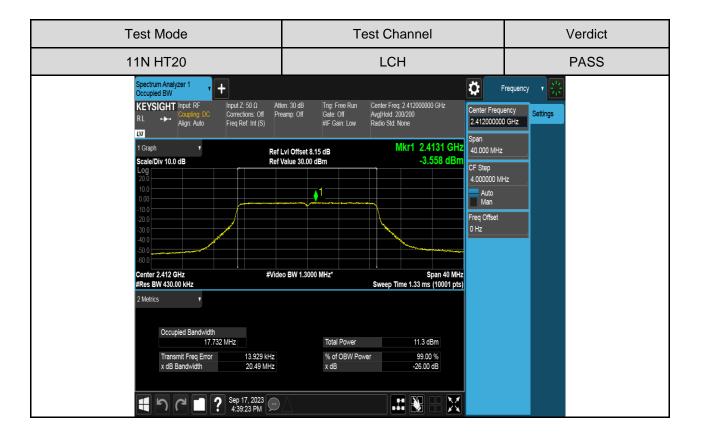












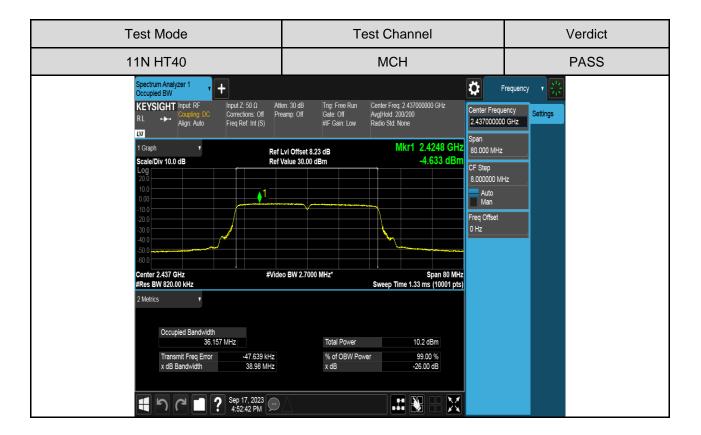
Test Mode	Test Channel	Verdict
11N HT20	MCH	PASS
Spectrum Analyzer 1 Occupied BW + KEYSIGHT Input RF RL → Coupling DC Align: Auto Input Z: 50 Ω Corrections: Off Freq Ref. Int (S) U 1 Graph	an: 30 dB amp: Olf Gate: Olf #IF Gain: Low Center Freq: 2.437000000 GHz AvgIHold: 200/200 Radio Std: None AvgIHold: 200/200 Radio Std: None AvgIHold: 200/200 Radio Std: None AvgIHold: 200/200 Radio Std: None Center AvgIHold: 200/200 Center AvgIHold: 200/200 Center AvgIHold: 200/200 Center AvgIHold: 200/200 Center Cente	Frequency Settings n 000 MHz Auto Man q Offset
-50.0	o BW 1.3000 MHz* Span 40 MHz Sweep Time 1.33 ms (10001 pts) Total Power 11.1 dBm % of OBW Power 99.00 % x dB -26.00 dB	





Test Mode	Test Channel	Verdict
11N HT40	LCH	PASS
	en: 30 dB Trig: Free Run Center Freq: 2.422000000 GHz aamo: Off Gate: Off AvoiHold: 200/200	Frequency Center Frequency Settings
1 Graph Ref I Scale/Div 10.0 dB Ref	Lvi Offset 8.15 dB Mkr1 2.4312 GHz	Span 80.000 MHz CF Step
Log 200 100 		8.00000 MHz Auto Man Freq Offset 0 Hz
-40.0 -50.0 -60.0	to BW 2.7000 MHz* Span 80 MHz Sweep Time 1.33 ms (10001 pts)	
2 Metrics Cccupied Bandwidth 36.162 MHz	Total Power 10.5 dBm	
Transmit Freq Error 5.425 kHz x dB Bandwidth 39.39 MHz	% of OBW Power 99.00 % x dB -26.00 dB	
モッペロ? Sep 17, 2023 🗩		





Test Mode	Test Channel	Verdict
11N HT40	НСН	PASS
Spectrum Analyzer 1 Occupied BW + KEYSIGHT RL Input Z: 50 Ω Corrections: Off Align: Auto I Graph Re Scale/Div 10.0 dB Copy 100 00 100 00 000 00 000 00 000 00 000 00 000 00 000 00 000 00	tten: 30 dB Trig: Free Run Center Freq: 2.452000000 GHz reamp: Off Gate: Off AvglHold: 200/200 #IF Gain: Low Radio Std: None f Lvi Offset 8.23 dB Mkr1 2.4396 GHz Value 30.00 dBm -4.929 dBm	Frequency Fieldency 245200000 GHz Span 80.000 MHz CF Step 8.00000 MHz Auto Man Freq Offset 0 Hz
E 5 C I ? Sep 17, 2023 4:56:21 PM		



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

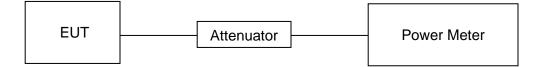
Place the EUT on the table and set it in the transmitting mode.

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.

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	16.33	0	16.33	30
11B	MCH	16.05	0	16.05	30
	HCH	14.62	0	14.62	30
	LCH	12.40	0	12.40	30
11G	MCH	12.23	0	12.23	30
	НСН	10.80	0	10.80	30
	LCH	11.32	0	11.32	30
11N HT20	MCH	11.14	0	11.14	30
	НСН	9.66	0	9.66	30
	LCH	10.52	0	10.52	30
11N HT40	MCH	10.25	0	10.25	30
	HCH	9.56	0	9.56	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

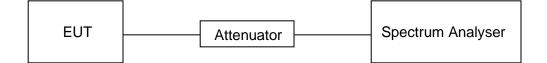
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

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

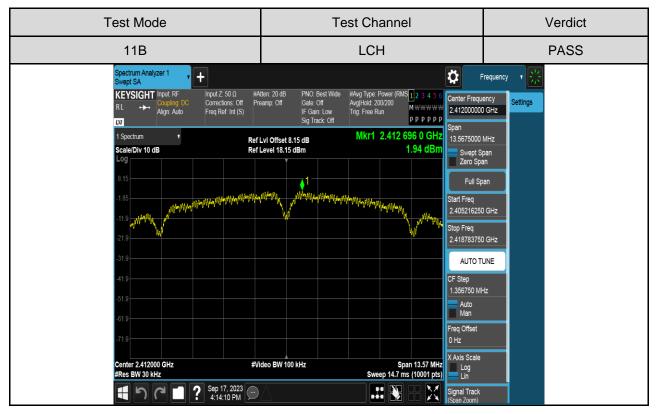
Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 120V

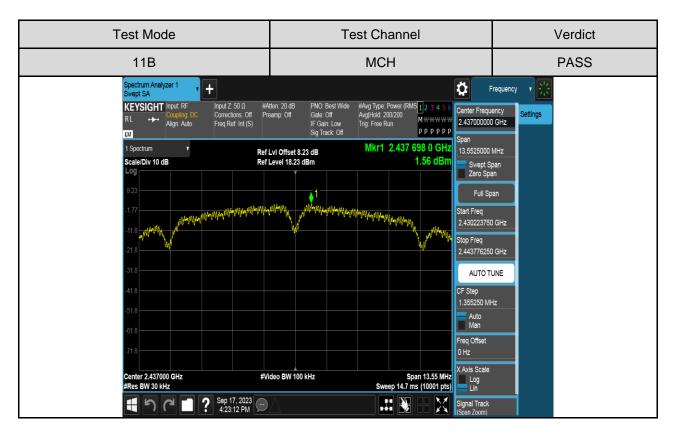
TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	1.94	Pass
11B	MCH	1.56	Pass
	HCH	0.01	Pass
	LCH	-4.72	Pass
11G	MCH	-4.98	Pass
	HCH	-6.51	Pass
	LCH	-5.28	Pass
11N HT20	MCH	-5.65	Pass
	HCH	-7.08	Pass
	LCH	-9.48	Pass
11N HT40	MCH	-9.54	Pass
	HCH	-10.25	Pass



TEST GRAPHS

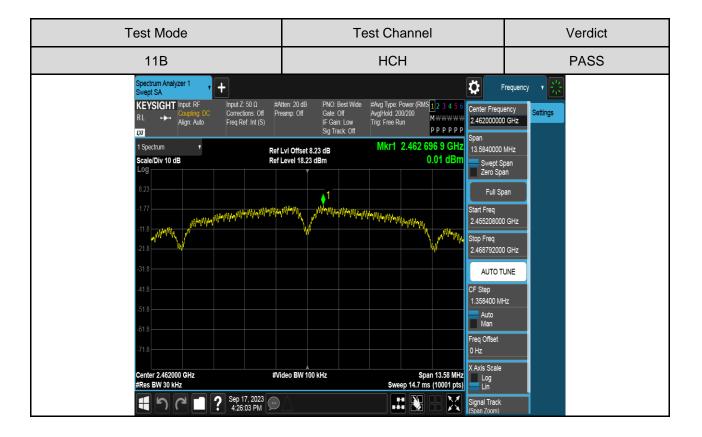


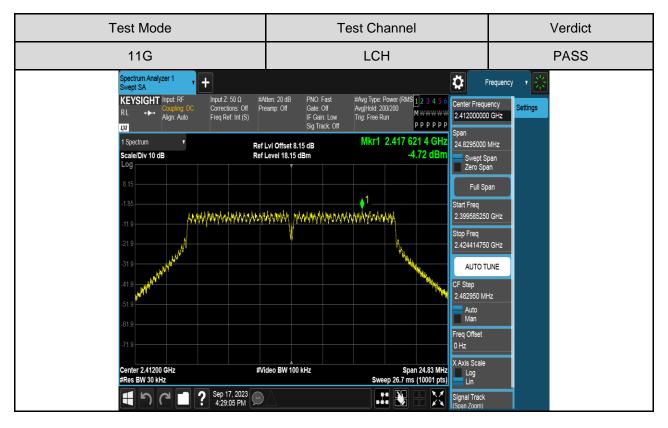


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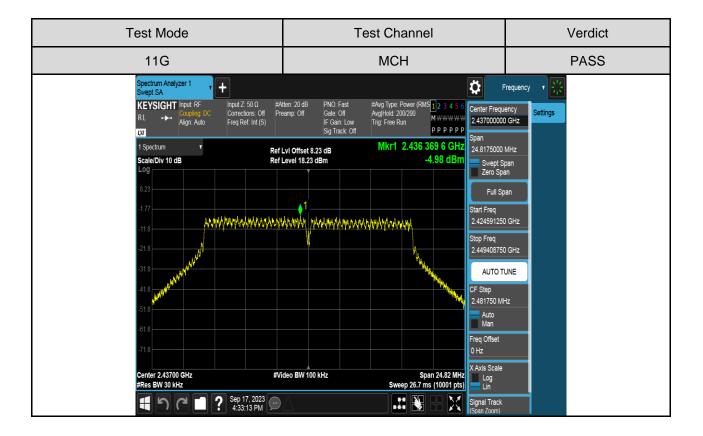
UL-CCIC COMPANY LIMITED

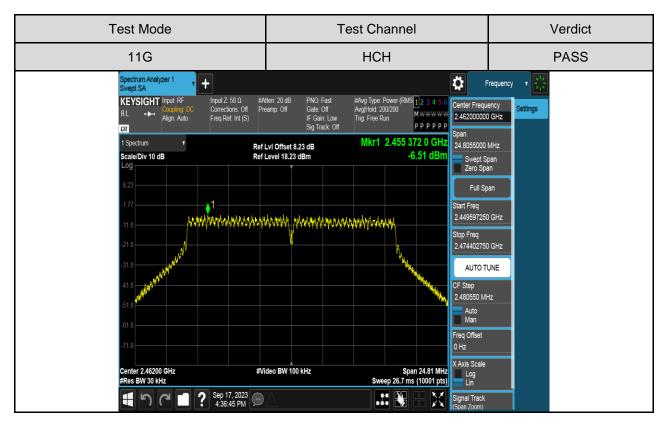




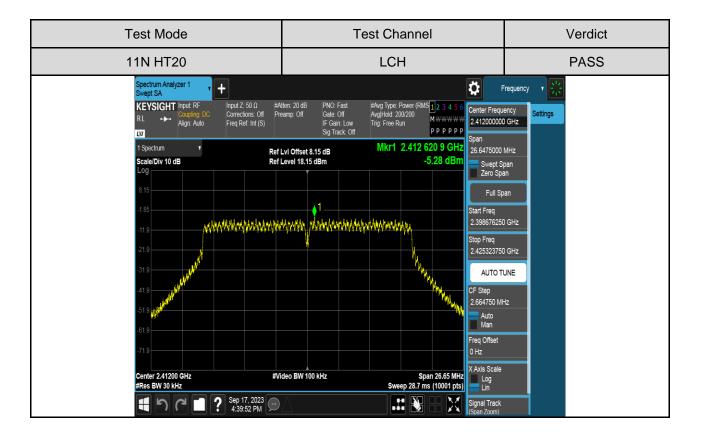


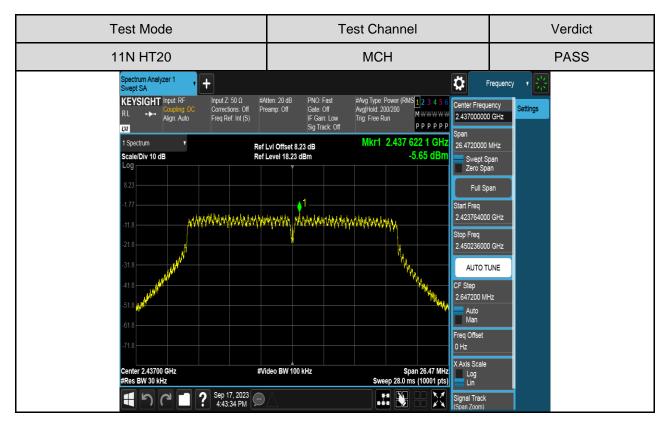




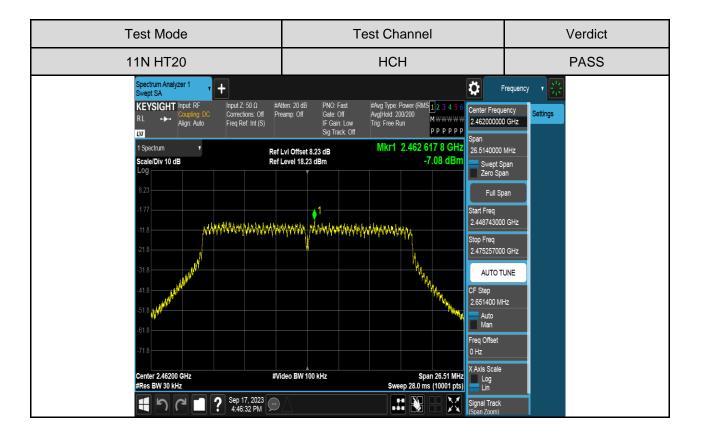


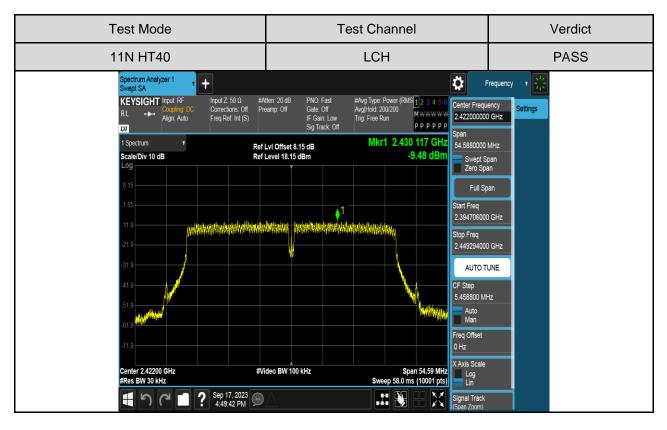




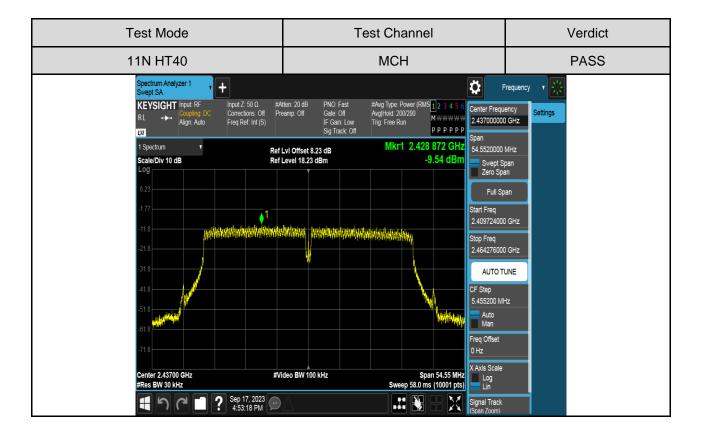


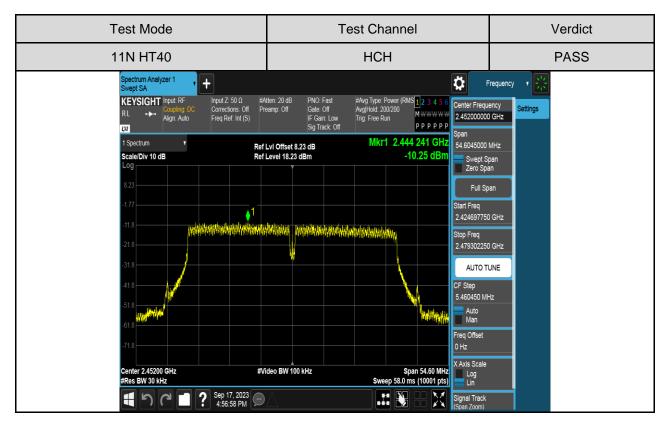














7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

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:

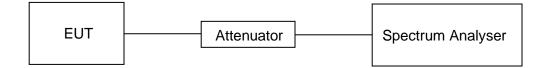
Center Frequency	The centre frequency of the channel under test	
Detector	Peak	
RBW	100K	
VBW	≥3 × RBW	
Span	1.5 x DTS bandwidth	
Trace	Max hold	
Sweep time	Auto couple.	

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	7.10
11B	MCH	6.80
	HCH	5.14
	LCH	-2.09
11G	MCH	-2.07
	HCH	-3.58
	LCH	-2.79
11N HT20	MCH	-2.81
	HCH	-4.46
	LCH	-6.88
11N HT40	MCH	-6.75
	НСН	-7.48