

FCC 47 CFR PART 15 SUBPART C ISED RSS-247 Issue 2

CERTIFICATION TEST REPORT

For

Smart Cordless Vacuum & Washer

MODEL NUMBER: FW101100CA

ADDTIONAL MODEL NUMBER: FW100300CA, FW100200US, FW100100US

PROJECT NUMBER:4789837850

REPORT NUMBER: 4789837850-1

FCC ID: 2AV7A-FS10

IC: 26039-FS10

ISSUE DATE: Apr. 30, 2021

Prepared for

Tineco Intelligent Technology Co., Ltd.

Prepared by

UL-CCIC COMPANY LIMITED

No. 2, Chengwan Road, Suzhou Industrial Park, People's Republic of China

Tel: + 86-512-6808 6400 Fax: + 86-512-6808 4099 Website: www.ul.com



Page 2 of 132

Revision History

Rev.	Issue Date	Revisions	Revised By
V0	04/30/2021	Initial Issue	



TABLE OF CONTENTS

1.	Α	TTES	STATION OF TEST RESULTS	. 4
2.	Т	EST I	METHODOLOGY	. 6
3.	F	ACIL	ITIES AND ACCREDITATION	. 6
4.	С	ALIB	RATION AND UNCERTAINTY	. 7
	4.1.	M	EASURING INSTRUMENT CALIBRATION	. 7
	4.2.	M	EASUREMENT UNCERTAINTY	. 7
5.	Е	QUIP	MENT UNDER TEST	. 8
	5.1.	DI	ESCRIPTION OF EUT	. 8
	5.2.	M	AXIMUM OUTPUT POWER	. 9
	5.3.	C	HANNEL LIST	. 9
	5.4.	TE	EST CHANNEL CONFIGURATION	10
	5.5.	TH	HE WORSE CASE POWER SETTING PARAMETER	10
	5.6.	DI	ESCRIPTION OF AVAILABLE ANTENNAS	11
	5.7.	TH	HE WORSE CASE CONFIGURATIONS	11
	5.8.	TE	EST ENVIRONMENT	12
	5.9.	DI	ESCRIPTION OF TEST SETUP	13
	5.10	0.	MEASURING INSTRUMENT AND SOFTWARE USED	14
6.	M	IEAS	UREMENT METHODS	15
7.	Α	NTE	NNA PORT TEST RESULTS	16
	7.1.	O	N TIME AND DUTY CYCLE	16
	7.2.	6	dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH	18
	7.3.	C	ONDUCTED POWER	31
	7.4.	P	OWER SPECTRAL DENSITY	33
	7.5.	C	ONDUCTED BANDEDGE AND SPURIOUS EMISSIONS4	40
	7.6.		ADIATED TEST RESULTS	
		.6.1. .6.2.	LIMITS AND PROCEDURE	
	7.	.6.3.	RESTRICTED BANDEDGE	71
	7.	.6.4.	SPURIOUS EMISSIONS	34
8.	Α	C PO	WER LINE CONDUCTED EMISSIONS12	29
9.	Α	NTE	NNA REQUIREMENTS1	32



Page 4 of 132

1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Tineco Intelligent Technology Co., Ltd.

Address: 108 Shihu Road West, Wuzhong Zone, Suzhou, 215168

P.R.China

Manufacturer Information

Company Name: Tineco Intelligent Technology Co., Ltd.

Address: 108 Shihu Road West, Wuzhong Zone, Suzhou, 215168

P.R.China

Factory Information

Company Name: Tineco Intelligent Technology Co., Ltd.

Address: 108 Shihu Road West, Wuzhong Zone, Suzhou, 215168

P.R.China

EUT Description

Product Name: Smart Cordless Vacuum & Washer

Model Name: FW101100CA

Additional No.: FW100300CA, FW100200US, FW100100US

Sample Number: 3683138

Data of Receipt Sample: Mar. 04, 2021

Date Tested: Mar. 05, 2021 ~ Apr. 26, 2021

APPLICABLE STANDARDS	
STANDARD	TEST RESULTS
CFR 47 Part 15 Subpart C	PASS
ISED RSS-247 Issue 2	PASS
ISED RSS-GEN Issue 5	PASS



Page 5 of 132

Summary of Test Results						
Clause	Test Items	FCC Rules	Test Results			
1	6db DTS Bandwidth and 99% Bandwidth	FCC 15.247 (a) (2) RSS-247 Clause 5.2 (a) RSS-Gen Clause 6.7	Complied			
2	Conducted Power	FCC 15.247 (b) (3) RSS-247 Clause 5.4 (d) RSS-Gen Clause 6.12	Complied			
3	Power Spectral Density	FCC 15.247 (e) RSS-247 Clause 5.2 (b)	Complied			
4	Conducted Band edge And Spurious emission	FCC 15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13	Complied			
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 8.9 RSS-GEN Clause 6.13	Complied			
6	Conducted Emission Test For AC Power Port	FCC 15.207 RSS-GEN Clause 8.8	Complied			
7 Antenna Requirement		FCC 15.203 RSS-GEN Clause 6.8	Complied			

Remark:

1) The measurement result for the sample received is <Pass> according to < ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C, ISED RSS-GEN, ISED RSS-247> when <Accuracy Method> decision rule is applied.

Prepared By:	Reviewed By:		
Jason Yang	Leon Wu		
Jason Yang Engineer	Leon Wu Senior Project Engineer		
Authorized By:			
Chris Zhong			
Chris Zhong Laboratory Leader			



Page 6 of 132

2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 15.247 Meas Guidance v05r02, KDB 414788 D01 Radiated Test Site v01r01, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15, ISED RSS-GEN ISSUE5, ISED RSS-247 ISSUE2.

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) 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.
------------------------------	--

Note 1: All tests measurement facilities use to collect the measurement data are located at No. 2, Chengwan Road, Suzhou Industrial Park, Suzhou 215122, People's Republic of 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.



REPORT No.: 4789837850-1 Page 7 of 132

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	
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)	3.9dB (1GHz-18Gz)	
Nets This was attained a paragraph on a was add up	4.2dB (18GHz-26.5Gz)	

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



Page 8 of 132

5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	Smart Cordless Vacuum & Washer	
Model No.:	FW101100CA	
Operating Frequency:	IEEE 802.11b/g/n(HT20): 2412MHz to 2462MHz	
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): OFDM (64QAM, 16QAM, QPSK, BPSK)	
Channels Step:	Channels with 5MHz step	
Test software of EUT:	EspRFTestTool V2.0 (manufacturer declare)	
Antenna Type:	PIFA antenna	
Antenna Gain:	Antenna1: 2 dBi	
	Remark: This data is provided by customer and our lab isn't responsible for this data	
Power Supply:	Adapter Manufacturer: Dongguan Masspower Electronic Co., Ltd. Model: S030-1B260100HU Input: AC 100-240V, 50/60Hz, 0.8A Output: DC 26V, 1.0A	
Battery:	DC 21.6V, 4000mAh rechargeable Li-ion battery	



Page 9 of 132

5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max AV Conducted Power (dBm)
1	IEEE 802.11B SISO	1-11[11]	15.86
1	IEEE 802.11G SISO	1-11[11]	15.04
1	IEEE 802.11nHT20	1-11[11]	14.98

5.3. CHANNEL LIST

	Channel List for 802.11b/g/n (20 MHz)							
Channel	Frequency (MHz)	Channel	Frequenc y(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			



Page 10 of 132

5.4. TEST CHANNEL CONFIGURATION

Test Mode	Test Channel	Frequency
WiFi TX(802.11b)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11g)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz
WiFi TX(802.11n HT20)	CH 1, CH 6, CH 11	2412MHz, 2437MHz, 2462MHz

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band							
Test Software		EspRFtestTool					
	Transmit Antenna Number		Test Channel				
Modulation Mode		NCB: 20MHz					
Mode		CH 1	CH 6	CH 11			
802.11b	1	N/A	N/A	N/A			
802.11g	1	N/A	N/A	N/A			
802.11n HT20	1	N/A	N/A	N/A			



Page 11 of 132

5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	PIFA antenna	2.0

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.

5.7. THE WORSE CASE CONFIGURATIONS

For the product, there two transmission antennas, and pre-testing both of them, only the worse data for the antenna is recorded in the report.

Worst-case data rates as provided by the client were:

802.11b mode: 1 Mbps 802.11b mode: 6 Mbps 802.11n HT20 mode: MCS0



Page 12 of 132

5.8. **TEST ENVIRONMENT**

Environment Parameter	Selected Values During Tests		
Relative Humidity	55	5 ~ 65%	
Atmospheric Pressure:	10	12 mbar	
Temperature	TN	20 ~ 25°C	
	VL	N/A	
Voltage :	VN	AC 120V, 60Hz	
	VH	N/A	

Note: VL= Lower Extreme Test Voltage

VN= Nominal Voltage

VH= Upper Extreme Test Voltage TN= Normal Temperature

Page 13 of 132

5.9. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E550c	N/A
2	Fixed Frequency Board	N/A	N/A	Supply by Client

I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB-A	Mini-USB	USB-A to Mini-USB cable	1.2	

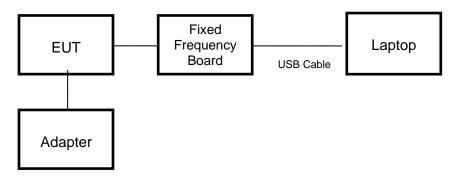
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	N/A	N/A	N/A	N/A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS





Page 14 of 132

5.10. MEASURING INSTRUMENT AND SOFTWARE USED

	Conducted Emissions (Instrument)							
		Col	lauctea		510115 (111511UI			
Used	Equipment	Manufacturer	Model No.		Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
$\overline{\checkmark}$	EMI Test Receiver	R&S	ESR	3	126700	2019-12-12	2020-12-05	2021-12-04
$\overline{\checkmark}$	Two-Line V-Network	R&S	ENV2	16	126701	2019-12-12	2020-12-05	2021-12-04
V	Artificial Mains Networks	R&S	ENY8	31	126711	2019-12-12	2020-12-05	2021-12-04
	Software							
Used	Des	cription		Ma	nufacturer	Name	Version	
V	Test Software for 0	Conducted distur	bance		R&S	EMC32	Ver. 9.25	
		Ra	diated E	miss	ions (Instrum	ent)		
Used	Equipment	Manufacturer	Model	No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
$\overline{\checkmark}$	Spectrum Analyzer	Keysight	N9010	0B	MY57110128	2019-05-29	2020-05-10	2021-05-09
$\overline{\checkmark}$	EMI test receiver	R&S	ESR2	26	1267603	2019-12-12	2020-12-05	2021-12-04
V	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1	1513	513-265	N/A	2018-06-15	2021-06-14
V	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1		177821	N/A	2019-01-28	2022-01-27
V	Receiver Antenna (1GHz-18GHz)	R&S	HF907		126705	2018-01-29	2019-01-28	2022-01-27
V	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170		126706	2019-02-06	2020-12-05	2021-12-04
V	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G ²	18-50	14140-13467	2019-03-18	2020-12-05	2021-12-04
V	Pre-amplification (To 26.5GHz)	R&S	SCU-2	26D	134668	2019-02-06	2020-09-27	2021-09-26
	Band Reject Filter	Wainwright	WRCJ' 2350-24 2483.5-25 4083	400- 533.5-	1	2019-05-29	2020-05-10	2021-05-09
V	Highpass Filter	Wainwright	WHKX 2700-30 18000-4	000-	2	2019-05-29	2020-05-10	2021-05-09
				Soft	ware			
Used	Desci	ription	Ma	anufac	turer	Name	Version	
$\overline{\checkmark}$	Test Software for R	adiated disturbar	ance Tonsce		end	JS32	V1.0	
			Oth	er ins	truments			
Used	Equipment	Manufacturer	Model	No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.
V	Spectrum Analyzer	Keysight	N9010	0B	MY57110128	2019-05-29	2020-05-10	2021-05-09
V	Power Meter	Keysight	U2021	XA	MY57110002	2019-06-12	2020-05-10	2021-05-09



Page 15 of 132

6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth and 99% Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Conducted Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.1.3/8.3.2.3
3	Power Spectral Density	KDB 558074 D01 15.247 Meas Guidance v05r02	8.4
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

Page 16 of 132

7. ANTENNA PORT TEST RESULTS

7.1. ON TIME AND DUTY CYCLE

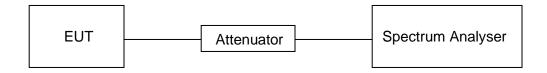
LIMITS

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	1012mbar	Test Voltage	AC 120V,60Hz

RESULTS

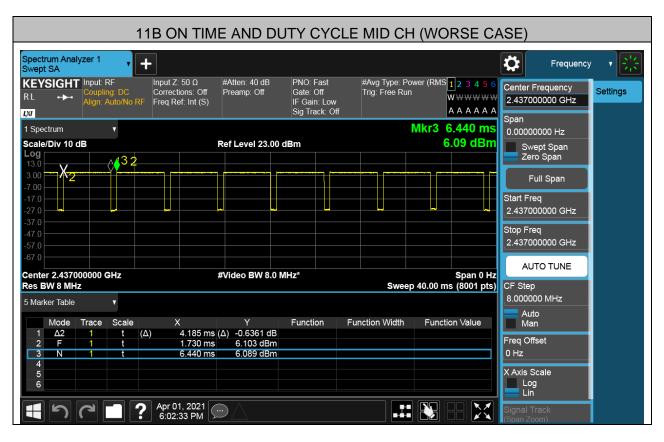
Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)	Final Minimum VBW (KHz)
11B	4.185	4.71	0.8885	88.85%	0.51	0.24	1
11G	0.6906	0.7955	0.8681	86.81%	0.61	1.45	2
11N HT20	0.6544	0.7588	0.8624	86.24%	0.64	1.53	2

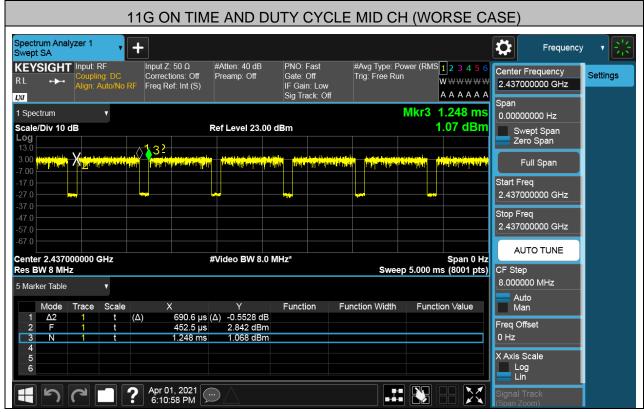
Note: 1) Duty Cycle Correction Factor=10log(1/x).

2) Where: x is Duty Cycle(Linear)

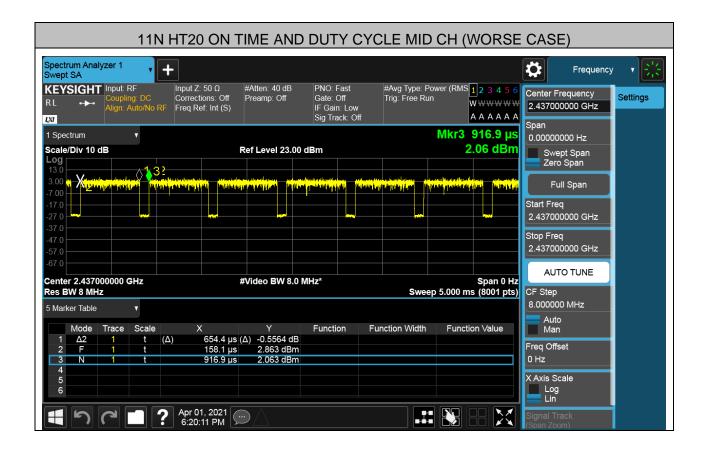
3) Where: T is On Time (transmit duration)











7.2. 6 dB BANDWIDTH AND 99% OCCUPIED BANDWIDTH

LIMITS

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



Page 19 of 132

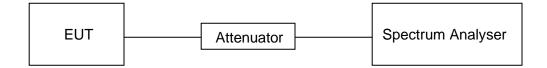
TEST PROCEDURE

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

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

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





Page 20 of 132

RESULTS

Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
11B	LCH	8.090	10.662	Pass
	MCH	8.077	10.491	Pass
	HCH	8.093	10.526	Pass
11G	LCH	16.33	16.643	Pass
	MCH	16.32	16.580	Pass
	HCH	16.34	16.611	Pass
11N HT20	LCH	17.28	17.712	Pass
	MCH	16.68	17.651	Pass
	HCH	17.31	17.681	Pass

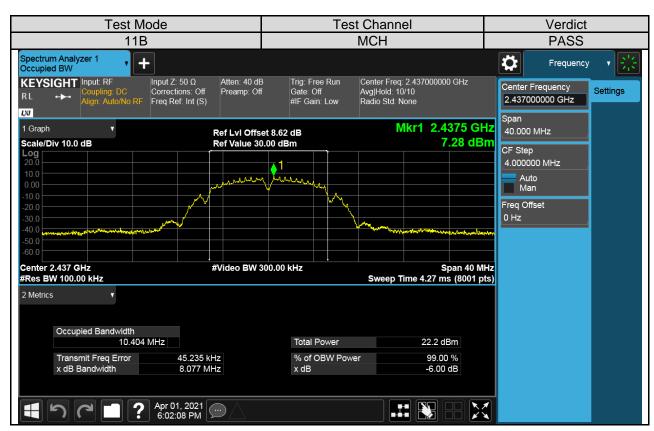


Page 21 of 132

Test Graphs

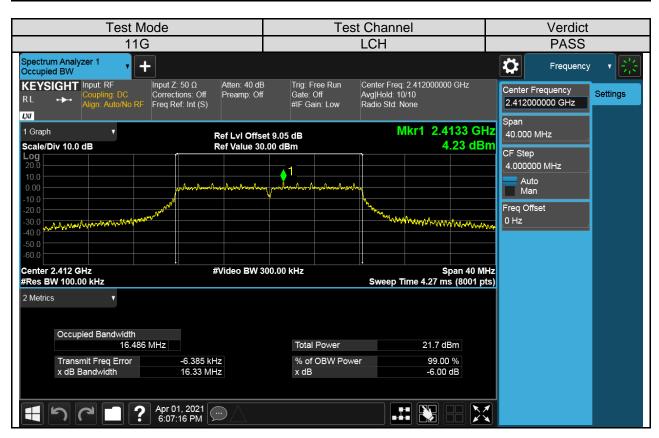
For 6dB Bandwidth part:



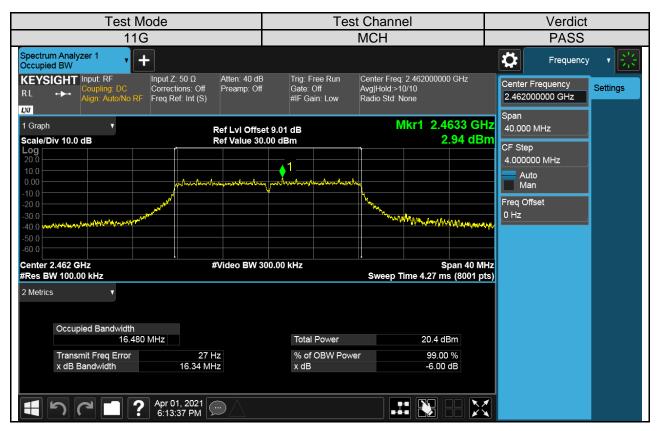


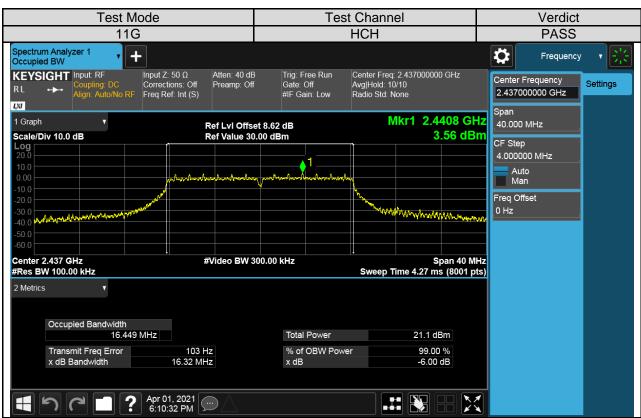


Test Channel Test Mode Verdict 11B **HCH PASS** Spectrum Analyzer 1 Occupied BW Ö Frequency KEYSIGHT Input: RF Atten: 40 dB Input Z: 50 Ω Trig: Free Run Center Freq: 2.462000000 GHz Center Frequency Corrections: Off Freq Ref: Int (S) Avg|Hold:>10/10 Radio Std: None Settings Preamp: Off Gate: Off 2.462000000 GHz #IF Gain: Low ĻXI Mkr1 2.4635 GHz 1 Graph Ref Lvi Offset 9.01 dB Ref Value 30.00 dBm 40.000 MHz Scale/Div 10.0 dB 6.09 dBm CF Step _og 4.000000 MHz Auto MANAMA Freq Offset 0 Hz #Video BW 300.00 kHz Center 2.462 GHz #Res BW 100.00 kHz Sweep Time 4.27 ms (8001 pts) 2 Metrics Occupied Bandwidth 10.416 MHz Total Power 21.4 dBm Transmit Freq Error 36.000 kHz 99.00 % % of OBW Power 8.093 MHz -6 00 dB x dB Bandwidth x dB Apr 01, 2021 6:04:32 PM

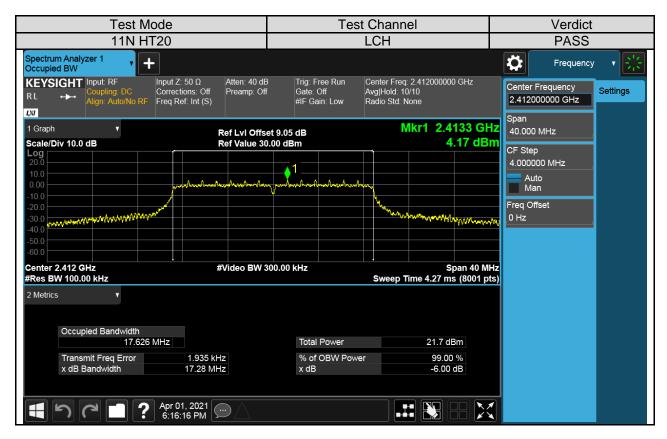


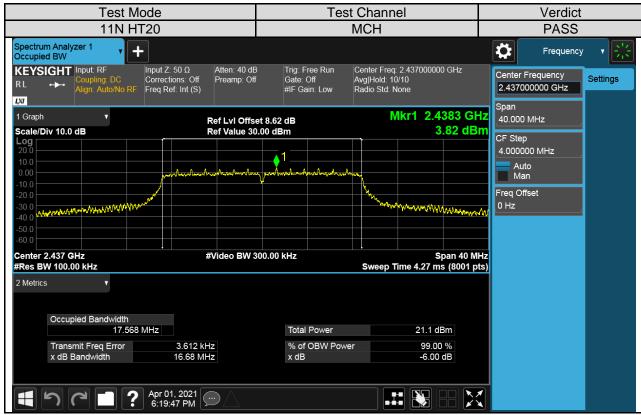






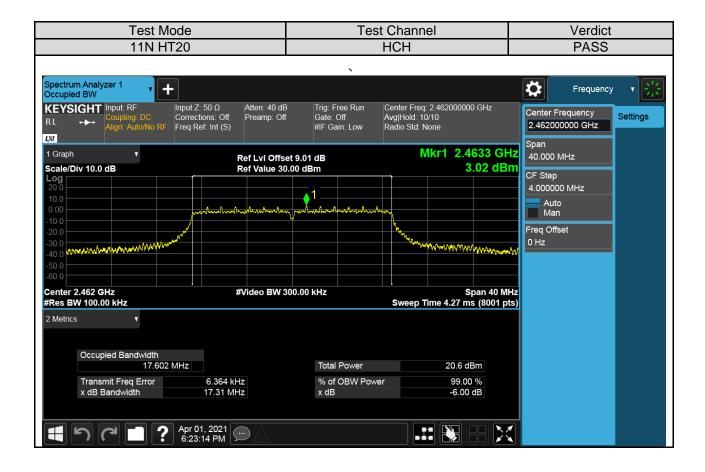


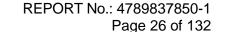






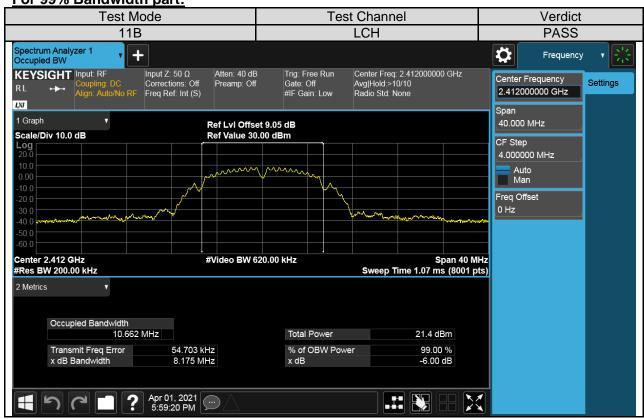
Page 25 of 132







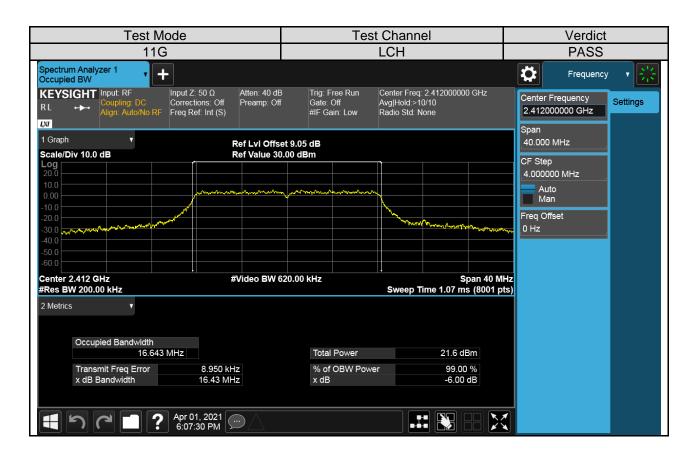
For 99% Bandwidth part:



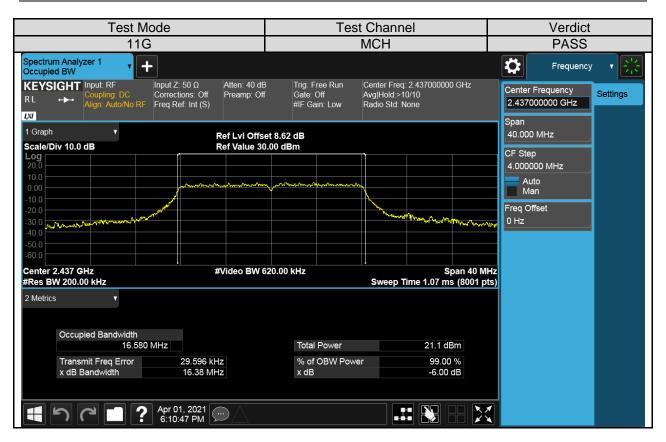


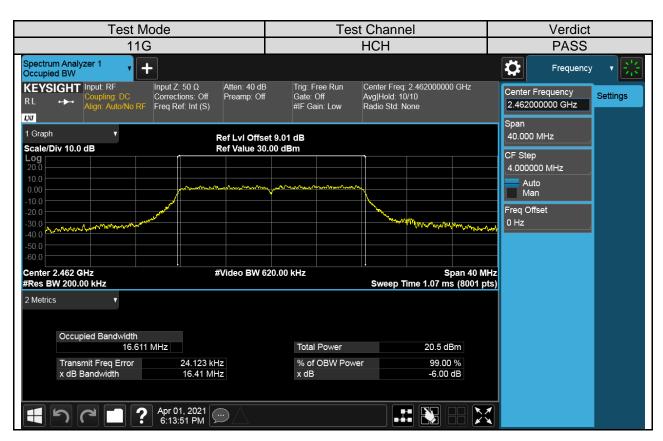


Test Channel Test Mode Verdict 11B **HCH PASS** Spectrum Analyzer 1 Occupied BW Ö Frequency KEYSIGHT Input: RF Input Z: 50 Ω Atten: 40 dB Trig: Free Run Center Freq: 2.462000000 GHz Center Frequency Corrections: Off Freq Ref: Int (S) Avg|Hold: 10/10 Radio Std: None Settings Preamp: Off Gate: Off 2.462000000 GHz #IF Gain: Low ĻXI Span 1 Graph Ref Lvi Offset 9.01 dB Ref Value 30.00 dBm 40.000 MHz Scale/Div 10.0 dB CF Step _og 4.000000 MHz Auto Freq Offset 0 Hz Center 2.462 GHz #Video BW 620.00 kHz #Res BW 200.00 kHz Sweep Time 1.07 ms (8001 pts) 2 Metrics Occupied Bandwidth 10.526 MHz Total Power 19.7 dBm Transmit Freq Error 72.221 kHz % of OBW Power 99.00 % 8.591 MHz -6 00 dB x dB Bandwidth x dB Apr 01, 2021 6:04:50 PM

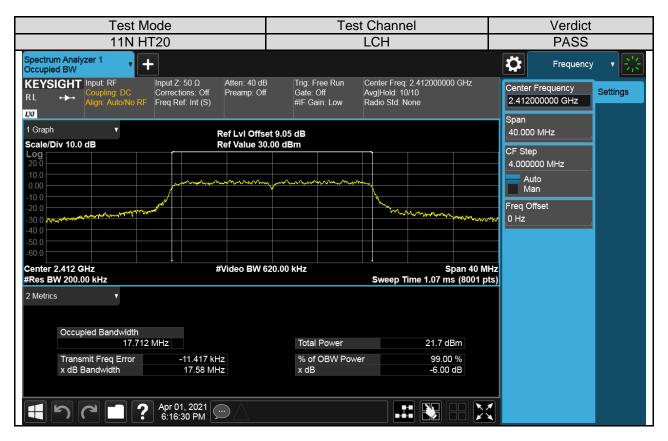


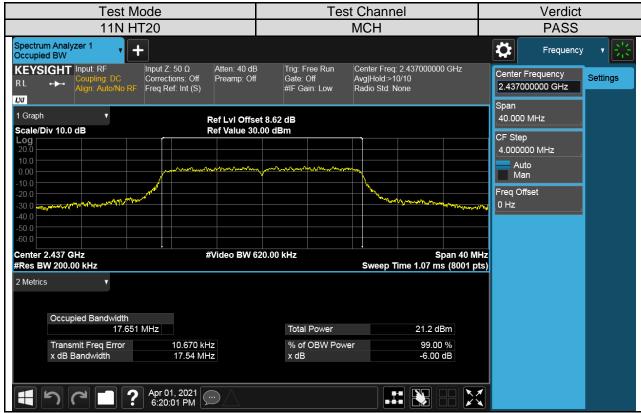






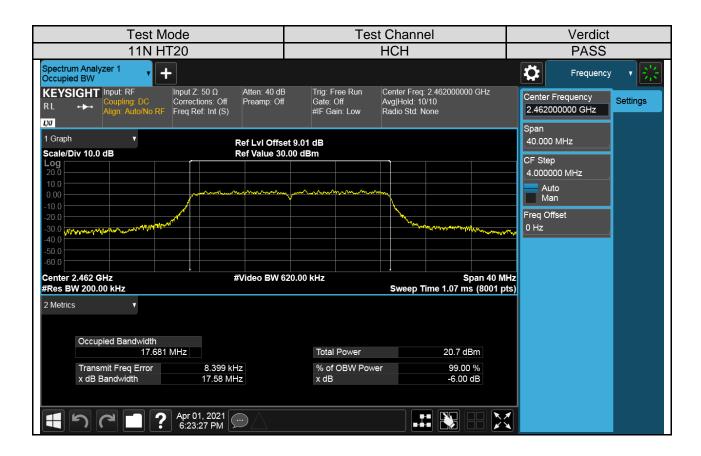








Page 30 of 132





Page 31 of 132

7.3. CONDUCTED POWER

LIMITS

FCC Part15 (15.247) Subpart C, , ISED RSS-247 ISSUE 2			
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

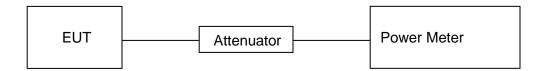
Place the EUT on the table and set it in the transmitting mode.

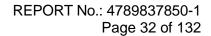
Remove the antenna from the EUT and then connect a low loss RF cable from the antenna port to the Power sensor.

Measure the power of each channel.

AVG Detector use for AVG result.

TEST SETUP







RESULTS

Test Mode	Test Channel	Maximum Conducted Output Power (AV) dBm	Result
11B	LCH	15.86	Pass
	MCH	15.10	Pass
	HCH	14.36	Pass
11G	LCH	15.04	Pass
	MCH	14.64	Pass
	HCH	14.06	Pass
11N HT20	LCH	14.98	Pass
	MCH	14.55	Pass
	HCH	14.02	Pass

Remark:

- For all the test results has been adjusted the duty cycle factor.
 For Correction Factor is refer to the result in section 7.1



Page 33 of 132

7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2			
Section	Test Item	Limit	Frequency Range (MHz)
FCC §15.247 (e) ISED RSS-247 5.2 (b)	Power Spectral Density	8 dBm in any 3 kHz band	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.

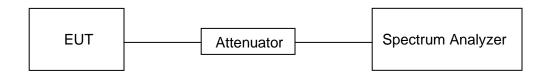
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

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

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	1012 mbar	Test Voltage	AC 120V, 60Hz

TEST SETUP





REPORT No.: 4789837850-1 Page 34 of 132

RESULTS

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	4.249	Pass
11B	MCH	3.218	Pass
	HCH	3.002	Pass
11G	LCH	-1.072	Pass
	MCH	-1.858	Pass
	HCH	-2.056	Pass
11N HT20	LCH	-0.417	Pass
	MCH	-1.021	Pass
	HCH	-1.238	Pass



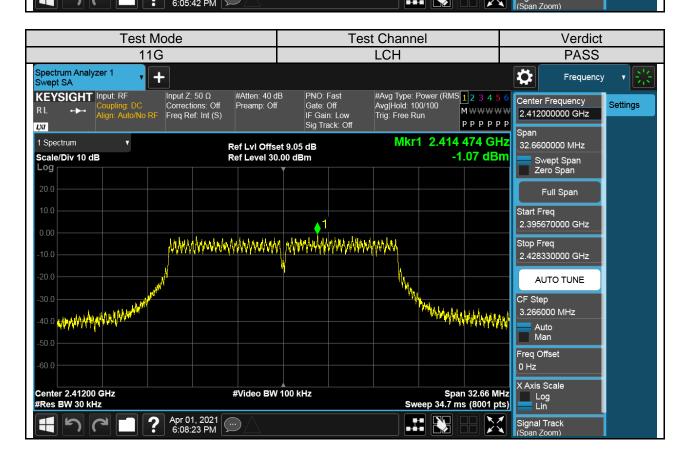
Test Graphs:





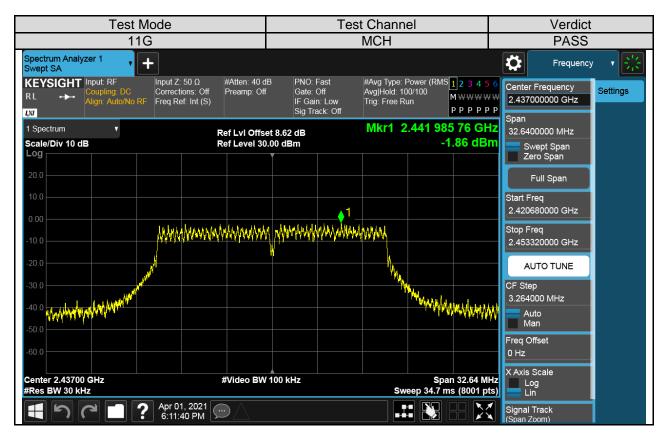


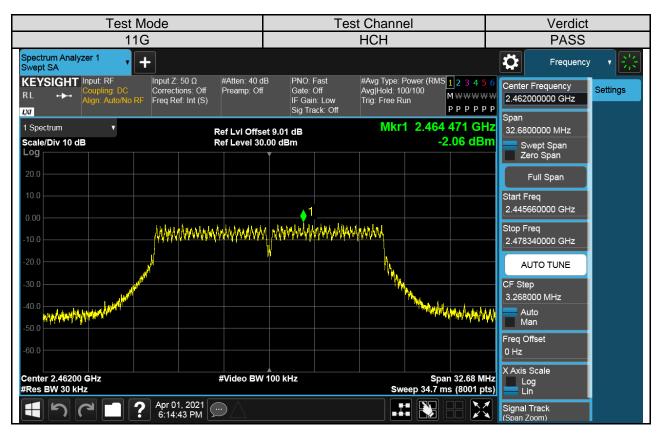
Test Channel Test Mode Verdict 11B **HCH PASS** Spectrum Analyzer 1 Swept SA + Ö Frequency KEYSIGHT Input: RF #Avg Type: Power (RMS 1 2 3 4 5 6 Avg|Hold: 100/100 M www.ww Input Z: 50 Ω #Atten: 40 dB PNO: Best Wide Center Frequency Corrections: Off Freq Ref: Int (S) Gate: Off IF Gain: Low Sig Track: Off Settings Preamp: Off M + W + W + WTrig: Free Run 2.462000000 GHz PPPPPP ĻXI Mkr1 2.462 987 3 GHz 1 Spectrum 16.1860000 MHz Ref Lvl Offset 9.01 dB Scale/Div 10 dB Ref Level 30.00 dBm 3.00 dBm Swept Span Zero Span Log Full Span Start Freq 2.453907000 GHz Stop Freq 2.470093000 GHz AUTO TUNE CF Step 1.618600 MHz Auto Man Freq Offset 0 Hz X Axis Scale Span 16.19 MHz Center 2.462000 GHz #Video BW 100 kHz Log Lin #Res BW 30 kHz Sweep 17.1 ms (8001 pts) Apr 01, 2021 6:05:42 PM Signal Track



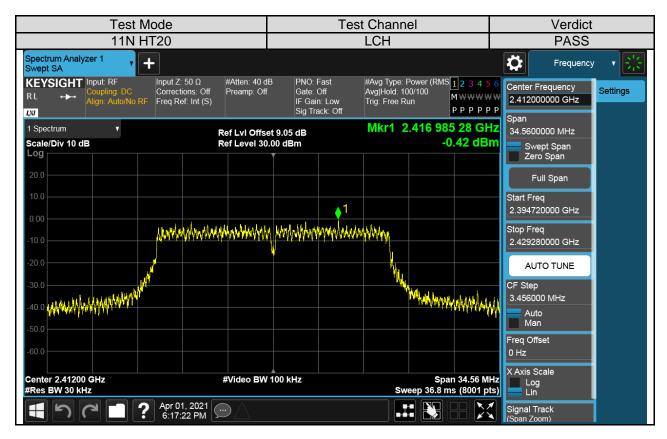


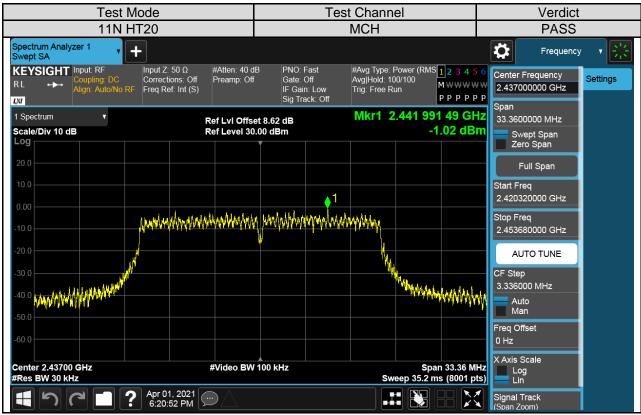
Page 37 of 132





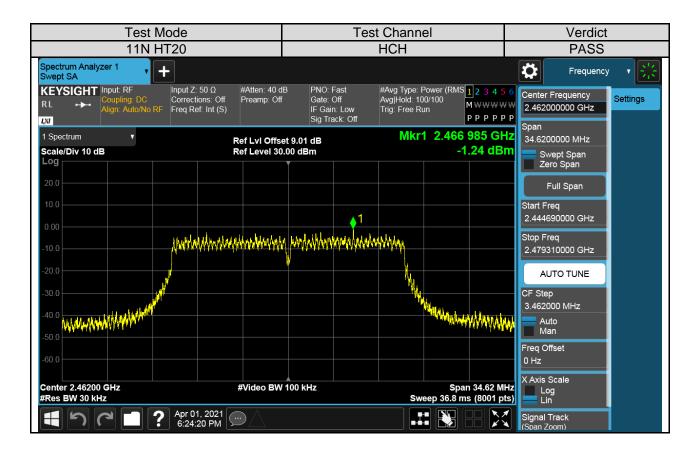








Page 39 of 132





7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247) Subpart C, ISED RSS-247 ISSUE 2				
Section Test Item Limit				
FCC §15.247 (d) RSS-247 Clause 5.5 RSS-GEN Clause 6.13 Conducted Bandedge and Spurious Emissions At least 30 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power				

TEST PROCEDURE

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

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.

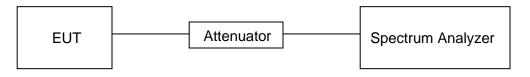
settings:

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 × 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





Page 41 of 132

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	1012 mbar	Test Voltage	AC 120V, 60Hz



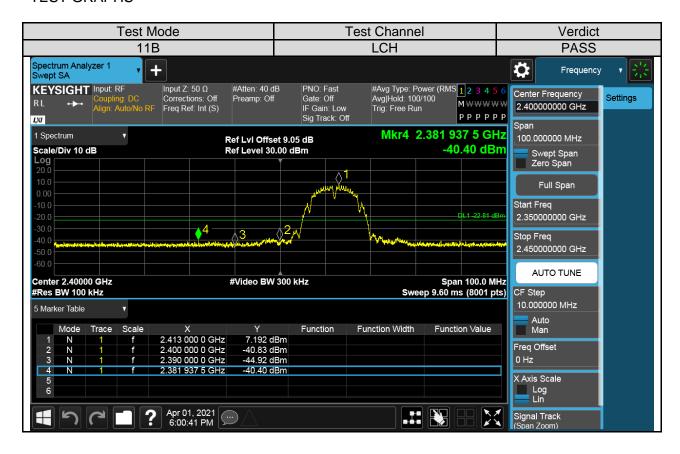
REPORT No.: 4789837850-1 Page 42 of 132

Part I: Conducted Bandedge

RESULTS TABLE

Test Mode	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
44D	LCH	7.192	-40.399	-22.81	PASS
11B	HCH	5.480	-40.898	-24.52	PASS
110	LCH	3.516	-37.247	-26.48	PASS
11G	HCH	3.138	-38.080	-26.86	PASS
44N UT20	LCH	4.179	-36.384	-25.82	PASS
11N HT20	HCH	3.147	-37.554	-26.85	PASS

TEST GRAPHS



















Page 46 of 132

Part II: Conducted Emission

Test Result Table

Test Mode	Test Antenna	Channel	Pref(dBm)	Puw(dBm)	Verdict
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11B	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
	, untorma	HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11G	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
110	7 tillorilla 1	HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		LCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
11N HT20	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
1111111120	, anoma i	HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS



Page 47 of 132

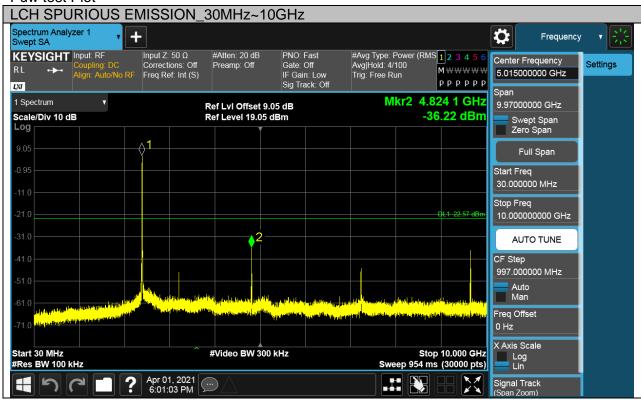
Test Plots

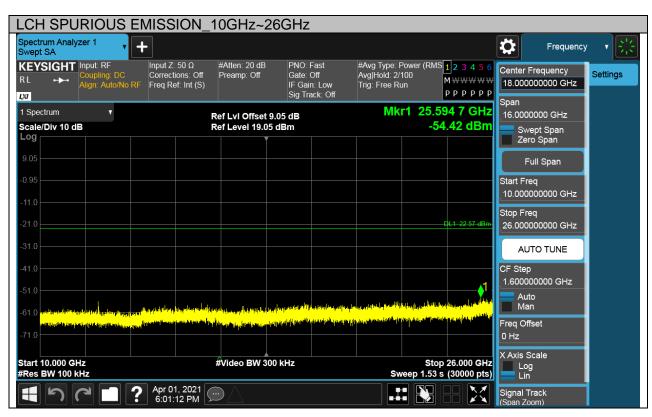
Test Mode	Channel	Verdict
11B	LCH	PASS





Page 48 of 132







Page 49 of 132

Test Mode	Channel	Verdict
11B	MCH	PASS





Start 30 MHz

#Res BW 100 kHz

REPORT No.: 4789837850-1

0 Hz X Axis Scale

Log Lin

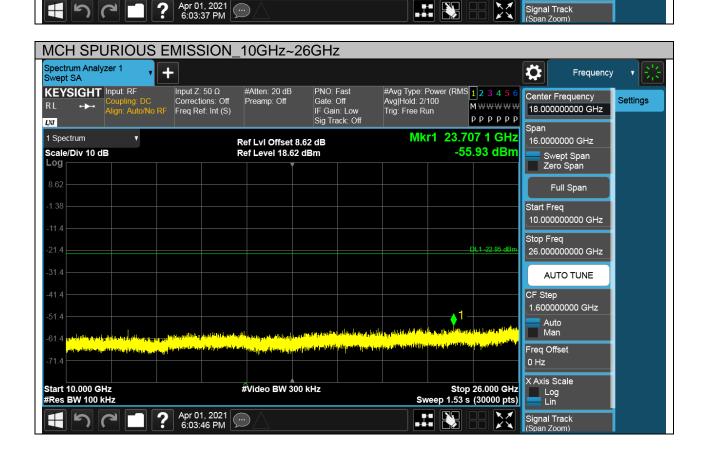
Stop 10.000 GHz

Sweep 954 ms (30000 pts)

Page 50 of 132

Puw test Plot MCH SPURIOUS EMISSION_30MHz~10GHz Spectrum Analyzer 1 Swept SA Ö Frequency #Avg Type: Power (RMS 1 2 3 4 5 6 Avg|Hold: 4/100 Input Z: 50 Ω #Atten: 20 dB KEYSIGHT Input: RF PNO: Fast Center Frequency Corrections: Off Preamp: Off Gate: Off Settings MWWWW 5.015000000 GHz Freq Ref: Int (S) IF Gain: Low Trig: Free Run PPPPPP LXI Sig Track: Off Mkr2 9.748 1 GHz 1 Spectrum 9.97000000 GHz Ref Lvl Offset 8.62 dB -39.10 dBm Scale/Div 10 dB Ref Level 18.62 dBm Swept Span Zero Span Log Full Span Start Freq 30.000000 MHz Stop Freq 10.000000000 GHz AUTO TUNE CF Step 997.000000 MHz 61 4 Freq Offset

#Video BW 300 kHz





Page 51 of 132

Test Mode	Channel	Verdict
11B	HCH	PASS





Start 30 MHz

#Res BW 100 kHz

Puw test Plot

REPORT No.: 4789837850-1

AUTO TUNE

CF Step 997.000000 MHz

Freq Offset 0 Hz X Axis Scale

Log Lin

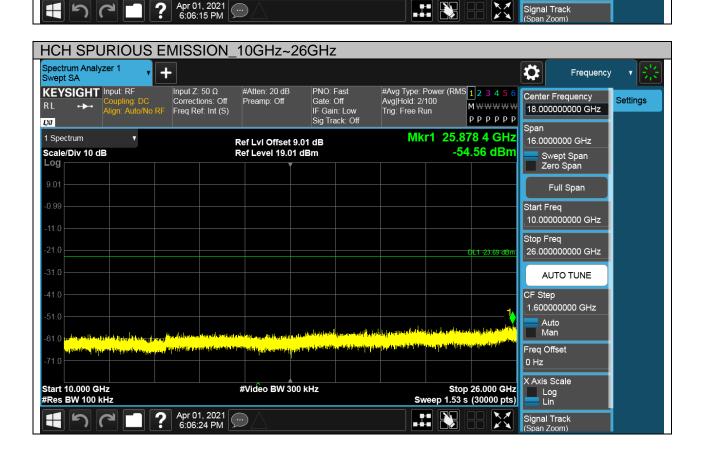
Stop 10.000 GHz

Sweep 954 ms (30000 pts)

Page 52 of 132

HCH SPURIOUS EMISSION_30MHz~10GHz Spectrum Analyzer 1 Swept SA Ö Frequency #Avg Type: Power (RMS 1 2 3 4 5 6 Avg|Hold: 4/100 Input Z: 50 Ω #Atten: 20 dB KEYSIGHT Input: RF PNO: Fast Center Frequency Corrections: Off Preamp: Off Gate: Off Settings MWWWW 5.015000000 GHz Freq Ref: Int (S) IF Gain: Low Trig: Free Run PPPPP LXI Sig Track: Off Mkr2 9.848 1 GHz 1 Spectrum 9.97000000 GHz Ref Lvl Offset 9.01 dB -39.19 dBm Scale/Div 10 dB Ref Level 19.01 dBm Swept Span Zero Span Log \Diamond^{1} Full Span Start Freq 30.000000 MHz Stop Freq 10.000000000 GHz

#Video BW 300 kHz





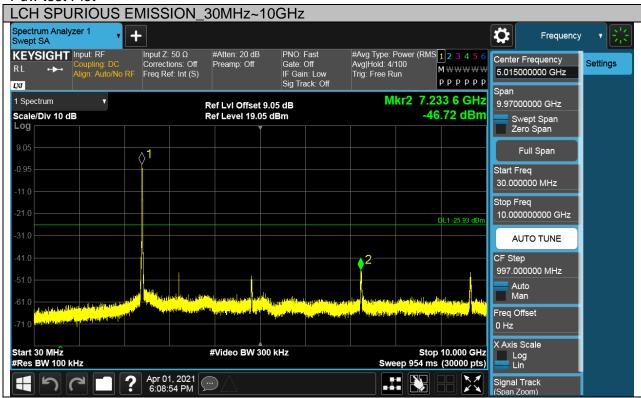
Page 53 of 132

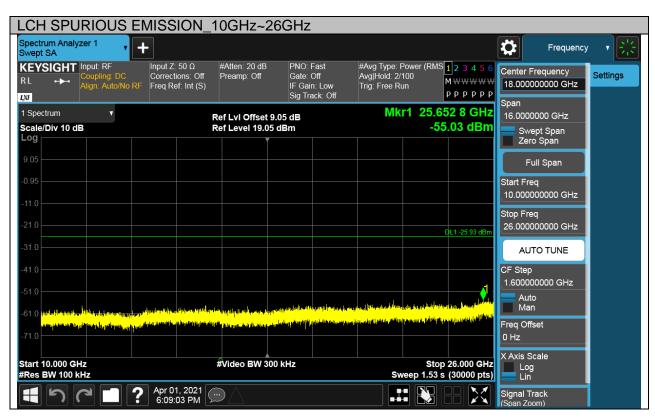
Test Mode	Channel	Verdict
11G	LCH	PASS





Page 54 of 132







Page 55 of 132

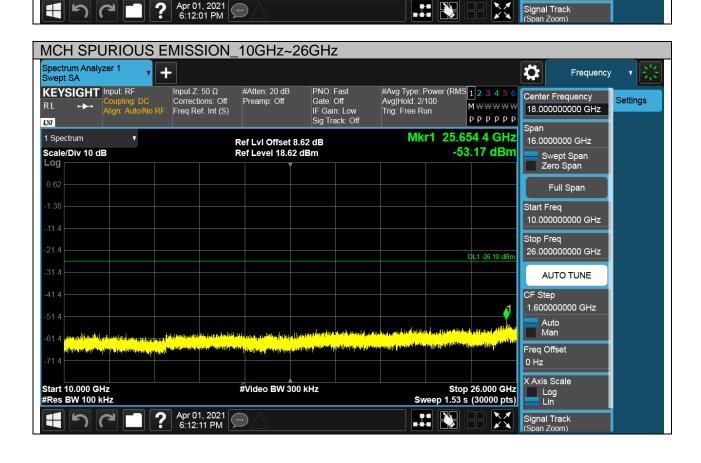
Test Mode	Channel	Verdict
11G	MCH	PASS





Page 56 of 132

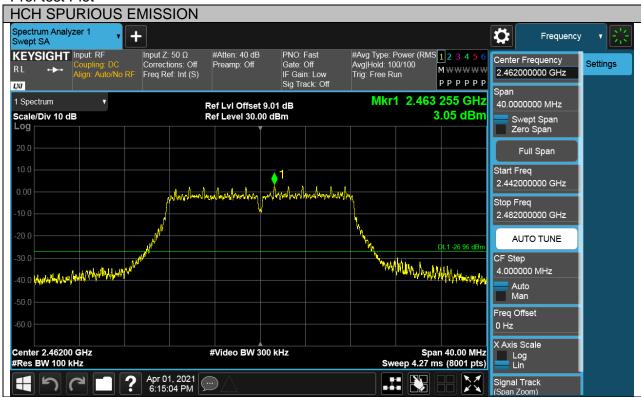
Puw test Plot MCH SPURIOUS EMISSION_30MHz~10GHz Spectrum Analyzer 1 Swept SA Ö Frequency #Avg Type: Power (RMS 1 2 3 4 5 6 Avg|Hold: 4/100 Input Z: 50 Ω #Atten: 20 dB KEYSIGHT Input: RF PNO: Fast Center Frequency Corrections: Off Preamp: Off Gate: Off Settings MWWWW 5.015000000 GHz Freq Ref: Int (S) IF Gain: Low Trig: Free Run PPPPPP LXI Sig Track: Off Mkr2 7.313 7 GHz 1 Spectrum 9.97000000 GHz Ref Lvl Offset 8.62 dB -45.24 dBm Scale/Div 10 dB Ref Level 18.62 dBm Swept Span Zero Span Log Full Span Start Freq 30.000000 MHz Stop Freq 10.000000000 GHz DL1 -26.10 dBr **AUTO TUNE** 2 CF Step 997.000000 MHz Man 61 4 Freq Offset 0 Hz X Axis Scale Start 30 MHz #Video BW 300 kHz Stop 10.000 GHz Log Lin #Res BW 100 kHz Sweep 954 ms (30000 pts)





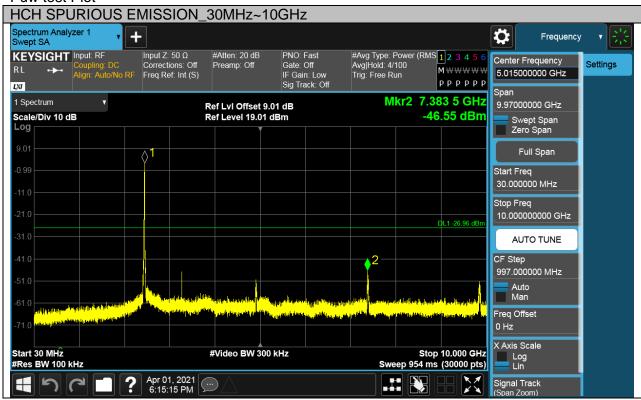
Page 57 of 132

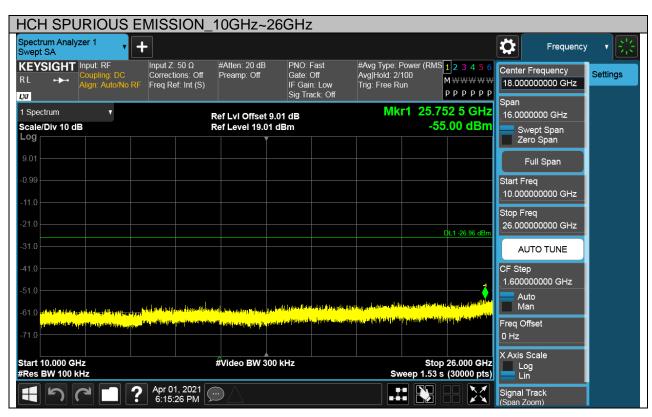
Test Mode	Channel	Verdict
11G	HCH	PASS





Page 58 of 132







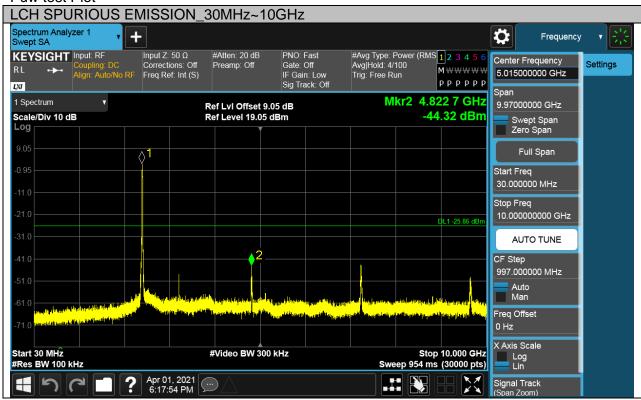
Page 59 of 132

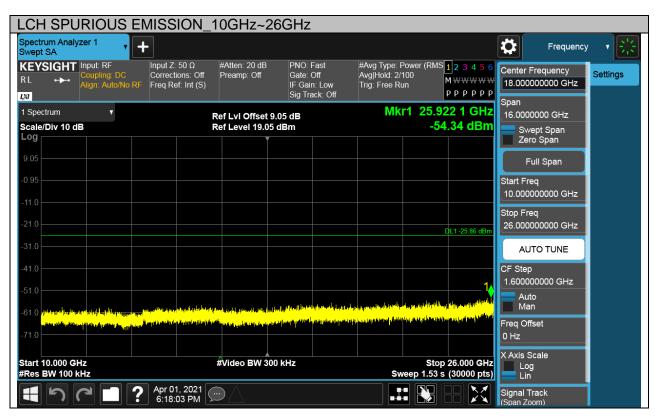
Test Mode	Channel	Verdict
11N HT20	LCH	PASS





Page 60 of 132







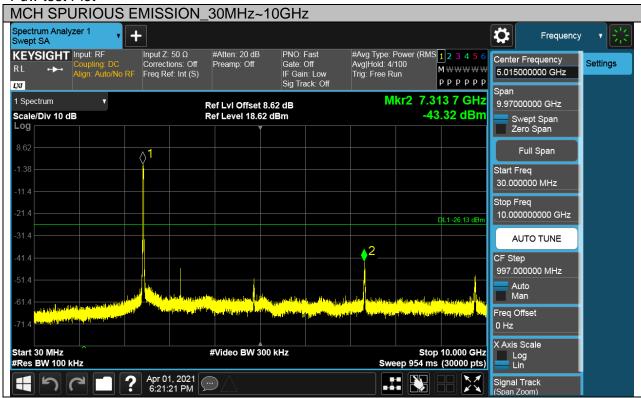
Page 61 of 132

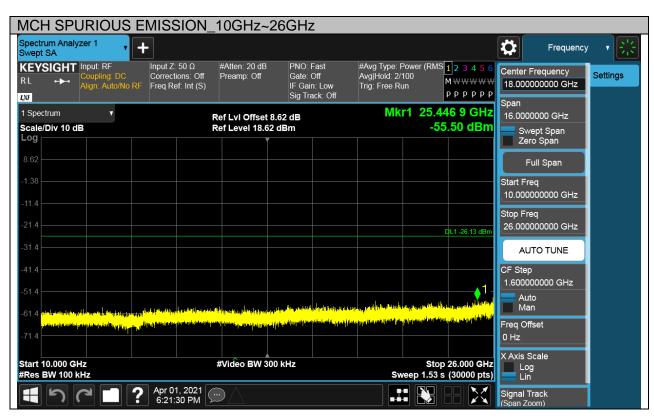
Test Mode	Channel	Verdict
11N HT20	MCH	PASS





Page 62 of 132







Page 63 of 132

Test Mode	Channel	Verdict
11N HT20	HCH	PASS

