

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

CONSUMER CAMERA

MODEL NUMBER: IPC-C22CN-D

ADDTIONAL MODEL NUMBER: IPC-C22CP-D-imou; IPC-C22CN-D-imou; IPC-C22CP-D

PROJECT NUMBER: 4790196205-3

REPORT NUMBER: 4790196205-3-1

FCC ID: 2AVYF-IPC-CX2C-D

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Prepared for

Hangzhou Huacheng Network Technology Co., LTD

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	12/10/2021	Initial Issue	



TABLE OF CONTENTS

1.	AT	TESTATION OF TEST RESULTS	4
2.	TES	ST METHODOLOGY	6
3.	FA	CILITIES AND ACCREDITATION	6
4.	CA	LIBRATION AND UNCERTAINTY	7
4	.1.	MEASURING INSTRUMENT CALIBRATION	7
4	.2.	MEASUREMENT UNCERTAINTY	7
5.	EQ	UIPMENT UNDER TEST	8
5	5.1.	DESCRIPTION OF EUT	8
5	.2.	MAXIMUM OUTPUT POWER	9
5	.3.	CHANNEL LIST	9
5	.4.	TEST CHANNEL CONFIGURATION	10
5	5.5.	THE WORSE CASE POWER SETTING PARAMETER	10
5	.6.	DESCRIPTION OF AVAILABLE ANTENNAS	11
5	.7.	THE WORSE CASE CONFIGURATIONS	11
5	.8.	DESCRIPTION OF TEST SETUP	12
5	.9.	MEASURING INSTRUMENT AND SOFTWARE USED	13
6.	ME	ASUREMENT METHODS	14
7.	AN	TENNA PORT TEST RESULTS	15
7	.1.	TEST ENVIRONMENT	15
7	.2.	ON TIME AND DUTY CYCLE	16
7	.3.	6 dB BANDWIDTH	19
7	.4.	CONDUCTED POWER	33
7	.5.	POWER SPECTRAL DENSITY	35
7	.6.	CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS	43
7		RADIATED TEST RESULTS	
	7.7. 7.7.	.1. LIMITS AND PROCEDURE	
		.3. SPURIOUS EMISSIONS	
8.	AC	POWER LINE CONDUCTED EMISSIONS	.153
9.	AN	TENNA REQUIREMENTS	.156



1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Address:	Hangzhou Huacheng Network Technology Co.,Ltd. No.2930, Nanhuan Road, Binjiang District, Hangzhou, China
Manufacturer Information Company Name: Address:	Hangzhou Huacheng Network Technology Co.,Ltd. No.2930, Nanhuan Road, Binjiang District, Hangzhou, China
EUT Description Product Name: Model Name: Additional No. : Sample Number: Data of Receipt Sample: Date Tested:	CONSUMER CAMERA IPC-C22CN-D IPC-C22CP-D-imou; IPC-C22CN-D-imou;IPC-C22CP-D 4382969 Nov 09, 2021 Nov 10, 2021~ Dec 10, 2021
	APPLICABLE STANDARDS

APPLICABLE STANDARDS						
STANDARD	TEST RESULTS					
CFR 47 Part 15 Subpart C	PASS					



Summary of Test Results							
Clause	Test Items FCC Rules Test Res						
1	6db DTS Bandwidth	FCC 15.247 (a) (2)	Complied				
2	Conducted Power	FCC 15.247 (b) (3)	Complied				
3	Power Spectral Density FCC 15.247 (e) Con						
4	Conducted Band edge And Spurious emission	FCC 15.247 (d)	Complied				
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	Complied				
6 Conducted Emission Test For AC Power Port FCC 15.207 Complied							
7	7 Antenna Requirement FCC 15.203 Complied						
Remark: 1) The mea							

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> when <Accuracy Method> decision rule is applied.

Prepared By:

Reviewed By:

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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.

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, 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.



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)			
	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.				



5. EQUIPMENT UNDER TEST

5.1. DESCRIPTION OF EUT

Product Name:	CONSUMER CAMERA
Model No.:	IPC-C22CN-D
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:	SecureCRT (manufacturer declare)
Antenna Type:	Monopole antenna
Antenna Gain:	Antenna1: 2.84 dBi
	Remark: This data is provided by customer and our lab isn't responsible for this data
Test Voltage	AC120V

Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	IPC-C22CN-D	2	IPC-C22CP-D-imou	3	IPC-C22CN-D-imou
4	IPC-C22CP-D				

Only the main model **IPC-C22CN-D** was tested and only the data of this model is shown in this test report. Since Their electrical circuit design, layout, components used and internal wiring are identical, only the name of the models.



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]	14.77
1	IEEE 802.11G SISO	1-11[11]	13.03
1	IEEE 802.11nHT20	1-11[11]	12.94
1	IEEE 802.11nHT40	3-9[7]	11.19

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			

J.4. 1231 Ch	ANNEL 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
WiFi TX(802.11n HT40)	CH 3, CH 6, CH 9	2422MHz, 2437MHz, 2452MHz

5.4. TEST CHANNEL CONFIGURATION

5.5. THE WORSE CASE POWER SETTING PARAMETER

The W	The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band											
Test Softw	vare			Secu	reCRT							
	Transmit			Test C	Channel							
Modulation Mode	Antenna	1	NCB: 40MHz	<u>r</u>								
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9					
802.11b	1	N/A	N/A	N/A								
802.11g	1	N/A	N/A N/A N/A /									
802.11n HT20	1	N/A	N/A	N/A								
802.11n HT40	1		/		60	60	60					



5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	Monopole antenna	2.84

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 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 802.11g mode: 6 Mbps 802.11n HT20 mode: MCS0 802.11n HT40 mode: MCS0



5.8. DESCRIPTION OF TEST SETUP

SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	Description
1	Laptop	ThinkPad	E590	N/A
2	SD Card	N/A	N/A	Supply by UL Lab

<u>I/O PORT</u>

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB to TTL	USB	100cm Length	N/A

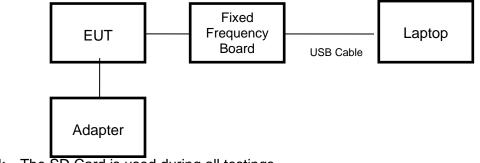
ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	AC Adapter	AC POWER	NBS05B050100 VUU	INPUT:100-240V~, 50/60Hz, 0.2A OUTPUT:5.0V=1.0A

TEST SETUP

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

SETUP DIAGRAM FOR TESTS



Remark: The SD Card is used during all testings.



5.9. MEASURING INSTRUMENT AND SOFTWARE USED

	Conducted Emissions (Instrument)													
Used	Equipment	Manufacturer	Model	No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.						
\checkmark	EMI Test Receiver	R&S	ESR	3	126700	2019-12-12	2020-12-05	2021-12-04						
	Two-Line V- Network	R&S	ENV2	16	126701	2019-12-12	2020-12-05	2021-12-04						
	Artificial Mains Networks	R&S	ENY8	31	126711	2019-12-12	2020-12-05	2021-12-04						
				Soft	ware									
Used	Des	cription		Ma	nufacturer	Name	Version							
\checkmark	Test Software for C	Conducted distu	irbance		R&S	EMC32	Ver. 9.25							
		Ra	diated E	missi	i ons (Instrum	nent)								
Used	Equipment	Manufacturer	Model		Serial No.	Upper Last Cal.	Last Cal.	Next Cal.						
\checkmark	Spectrum Analyzer	Keysight	N901	0B	155727	2020-05-10	2021-05-09	2022-05-08						
\checkmark	EMI test receiver	R&S	ESR2	26	126703	2019-12-12	2020-12-05	2021-12-04						
\checkmark	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1	1513	155456	2018-06-15	2021-06-03	2022-06-02						
	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1		177821	N/A	2019-01-28	2022-01-27						
	Receiver Antenna (1GHz-18GHz)	R&S	HF90)7	126705	2018-01-29	2019-01-28	2022-01-27						
V	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9170		126706	2018-01-06	2019-01-05	2022-01-04						
V	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G18- 50		177825	2019-03-18	2020-12-05	2022-03-25						
V	Pre-amplification (To 26.5GHz)	R&S	SCU-2	26D	135391	2020-09-27	2021-10-12	2022-10-11						
	Band Reject Filter	Wainwright	WRCJ 2350-24 2483. 2533.5-4	400- .5-	1	2020-05-10	2021-05-09	2022-05-08						
	Highpass Filter	Wainwright	WHKX 2700-30 18000-4	000-	2	2020-05-10	2021-05-09	2022-05-08						
				Soft	ware									
Used	Descr	-		Inufac	turer	Name	Version							
	Test Software for R	adiated disturba		onsce		TS+	Ver. 2.5							
			Oth	er ins	truments									
Used	Equipment	Manufacturer	Model	No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.						
	Spectrum Analyzer	Keysight	N901	0B	155368	2020-05-10	2021-05-09	2022-05-08						
V	Power Meter	Keysight	U2021	XA	155370	2020-05-10	2021-05-09	2022-05-08						



6. MEASUREMENT METHODS

No.	Test Item	KDB Name	Section
1	6dB Bandwidth	KDB 558074 D01 15.247 Meas Guidance v05r02	8.2
2	Conducted Output Power	KDB 558074 D01 15.247 Meas Guidance v05r02	8.3.2.3
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



7. ANTENNA PORT TEST RESULTS

7.1. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests
Relative Humidity	55%
Atmospheric Pressure:	102kPa
Temperature	21°C



7.2. ON TIME AND DUTY CYCLE

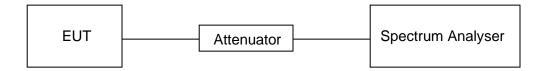
<u>LIMITS</u>

None; for reporting purposes only

PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

TEST SETUP



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	8.379	8.453	0.991	99.1	0.04	0.12	0.01(Note 4)
11G	1.391	1.4597	0.953	95.3	0.21	0.72	1
11N HT20	5.079	5.152	0.986	98.6	0.06	0.20	0.01(Note 4)
11N HT40	2.466	2.537	0.972	97.2	0.12	0.41	1

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) The minimum VBW should be 10Hz if the duty cycle is over 98%.



				11B	ON TIM	E AND D	UTY (CYCL	LE	MID CH	H (WC	RS	E CA	ASE)		
Spectrum Swept S/	A		•	+											Frequency	· · · 😤
KEYSI RL	GH1 ·≁·	Input: I Coupli Align: J	ng: DC	Cor	ut Z: 50 Ω rections: Off q Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: F Gate: 0 IF Gair Sig Tra	Off 1: Low		#Avg Type: Po Trig: Free Rur	1	₩₩₩	456 ₩₩₩ ΑΑΑ		Frequency 000000 GHz	Settings
1 Spectru Scale/Di		JB	v			Ref Level 23.00					Mkr3	15.4(L	00000 Hz vept Span	
Log 13.0 3.00					X ₂			<mark>∢</mark> 3¥2	2					Ze	ero Span Full Span	
-7.00 -17.0 -27.0					<u>∧∼2</u>									Start Fi		
-37.0 -47.0 -57.0					<u> </u>									Stop Fi		
-67.0	2.4370	00000 (GHz			#Video BW 8.0	MHz*					Spa	n 0 Hz	AL	JTO TUNE	
Res BW 5 Marker	8 MH		v							Swee	p 25.07 m			CF Ste 8.0000	р)00 MHz	
1 4	lode ∆2	Trace 1	Scale t	(Δ)		Υ (Δ) 0.2095 dB		on	Fun	ction Width	Funct	ion Val	ue	AL Ma	an	
_	F N	1	t t		6.947 ms 15.40 ms									Freq O 0 Hz		
5 6														X Axis Lo Li	g	
	っ	6			ov 12, 2021 37:29 PM	$\square \triangle$							\mathbf{X}	Signal [*] (Span Z		1

11G ON TIME AND DUTY CYCLE MID CH (WORSE CASE)				
Spectrum Analyzer 1				Frequency 🔹 🔆
	Z: 50 Ω #Atten: 40 dB tions: Off Preamp: Off Ref: Int (S)	PNO: Fast #Av Gate: Off Trig IF Gain: Low Sig Track: Off		3 4 5 6 Center Frequency 2.437000000 GHz A A A A
1 Spectrum v Scale/Div 10 dB	Ref Level 23.00 di		Mkr3 2.2	Span
Log 13.0 3.00 -7.00				Euli Span
-17.0 -27.0 -37.0				Start Freq 2.437000000 GHz
-47.0				Stop Freq 2.437000000 GHz
Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 MH	Hz*	Si Sweep 5.000 ms (8	pan 0 Hz 3001 pts) CF Step
5 Marker Table				8.000000 MHz
Mode Trace Scale Σ 1 Δ2 1 t (Δ) 2 F 1 t 3 N 1 t 4	X Y 1.391 ms (Δ) 1.245 dB 811.3 μs -0.08861 dBm 2.271 ms -0.8582 dBm	Function Functio	on Width Function \	Value Man Freq Offset 0 Hz X Axis Scale
	12, 2021 5:25 PM			Log Lin Signal Track (Span Zoom)

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11N H	IT20 ON TIME AND	DUTY CYCI	E MID CH (WORS	E CASE)	
Spectrum Analyzer 1				Frequency	· ₩
RL + Coupling: DC Align: Auto F	Input Z: 50 Ω #Atten: 40 dB Corrections: Off Preamp: Off Freq Ref: Int (S)	PNO: Fast # Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 Frig: Free Run A A A A A	2.437000000 GHz	Settings
1 Spectrum V Scale/Div 10 dB	Ref Level 23.00		Mkr3 7.426 m -1.47 dB	Span 0.00000000 Hz Swept Span	
Log 13.0 3.00 -7.00	NA 1997 DATE AND A 1997 DATE OF A 19	2 • • • • • • • • • • • • • • • • • • •	den manager over finder og fil flere den fingerer at en	Zero Span Full Span	
-17.0 -27.0 -37.0				Start Freq 2.437000000 GHz	
-47.0 -57.0 -67.0				Stop Freq 2.437000000 GHz	
Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 I	MHz*	Span 0 Sweep 15.47 ms (8001 p		
5 Marker Table Mode Trace Scale 1 Δ2 1 t (Δ)	X Y 5.079 ms (Δ) -0.6235 dB	Function Fund	tion Width Function Value	Auto Man	
2 F 1 t 3 N 1 t 4	2.274 ms -1.277 dBm 7.426 ms -1.475 dBm			Freq Offset 0 Hz X Axis Scale	
	Nov 12, 2021			Log Lin	
	2:37:58 PM		🖬 🚮 🖬 🗡	Signal Track (Span Zoom)	

11N HT40 ON TIME AND DUTY CYCLE MID CH (WORSE CASE)				
Spectrum Analyzer 1			Frequency v	
KEYSIGHT Input: RF Input Z: 50 Ω R L Coupling DC Corrections: Off Align: Auto Freq Ref: Int (S)	#Atten: 40 dB PNO: Fast Preamp: Off Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 6 Trig: Free Run A A A A A A	2.437000000 GHz	
1 Spectrum v Scale/Div 10 dB Log	Ref Level 23.00 dBm	Mkr3 3.955 ms -5.65 dBm	Swept Span	
13.0 3.00 -7.00 broken to the total state of total			Zero Span Full Span	
-17.0 -27.0 -37.0			Start Freq 2.437000000 GHz Stop Freq	
-47.0 -57.0 -67.0			2.437000000 GHz	
Center 2.437000000 GHz Res BW 8 MHz 5 Marker Table	#Video BW 8.0 MHz*	Span 0 Hz Sweep 7.467 ms (8001 pts)		
Mode Trace Scale X 1 Δ2 1 t (Δ) 2.466 ms	s (Δ) -0.4212 dB	nction Width Function Value	Auto Man Freq Offset	
2 F 1 t 1.419 ms 3 N 1 t 3.955 ms 4 5			0 Hz X Axis Scale	
6 Nov 12, 2021			Log Lin Signal Track	
2:38:28 PM			(Span Zoom)	

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7.3. 6 dB BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C			
Section Test Item Limit Frequency Range (MHz)			
FCC 15.247(a)(2)	6dB Bandwidth	>= 500KHz	2400-2483.5

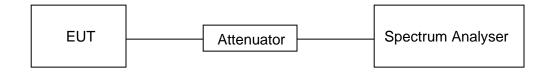
TEST PROCEDURE

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
BBW	For 6dB Bandwidth :100K For 99% Occupied Bandwidth :1% to 5% of the occupied bandwidth
VBW	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





RESULTS

Test Mode	Test Channel	6dB bandwidth (MHz)	99% bandwidth (MHz)	Result
	LCH	10.05	15.119	Pass
11B	MCH	10.05	15.097	Pass
	HCH	10.06	15.135	Pass
	LCH	16.35	16.767	Pass
11G	MCH	16.34	16.773	Pass
	HCH	16.35	16.801	Pass
	LCH	17.63	17.818	Pass
11N HT20	MCH	17.60	17.807	Pass
	HCH	17.59	17.831	Pass
11N HT40	LCH	36.31	36.483	Pass
	MCH	36.30	36.465	Pass
	НСН	36.34	36.511	Pass

Remark: The 99% Bandwidth is for reporting purposes only.



For 6dB Bandwidth part:



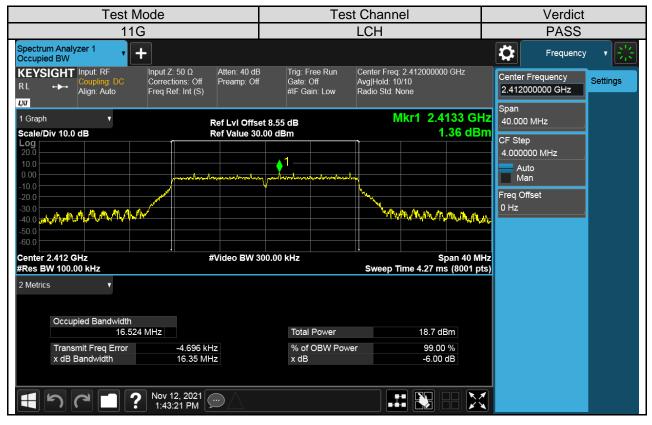


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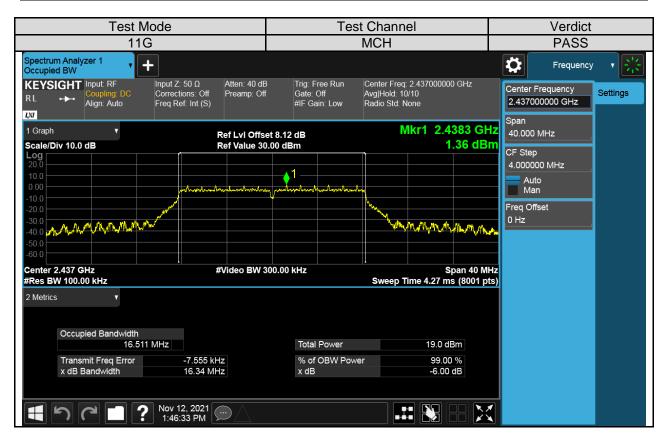
UL-CCIC COMPANY LIMITED

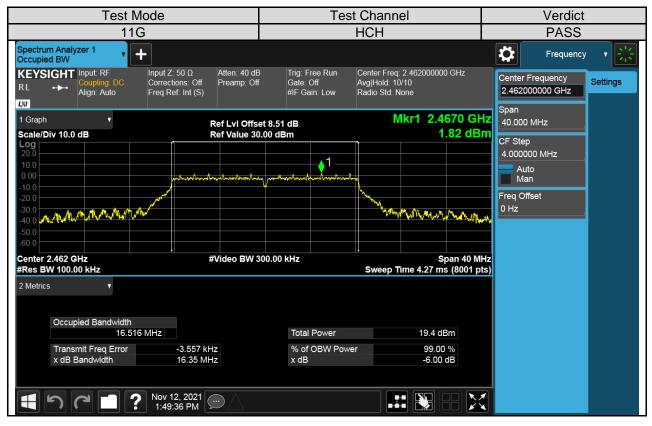


















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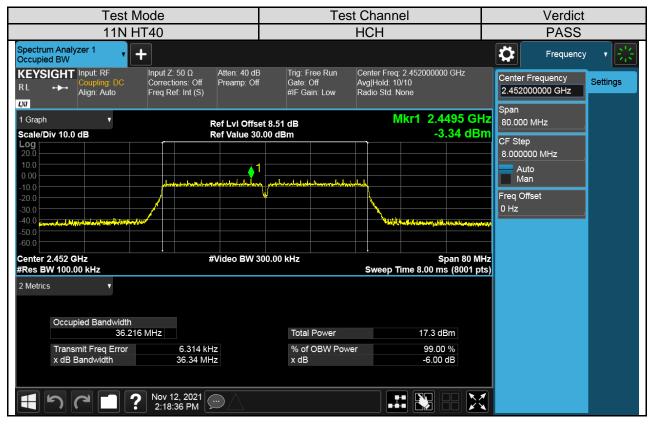




UL-CCIC COMPANY LIMITED



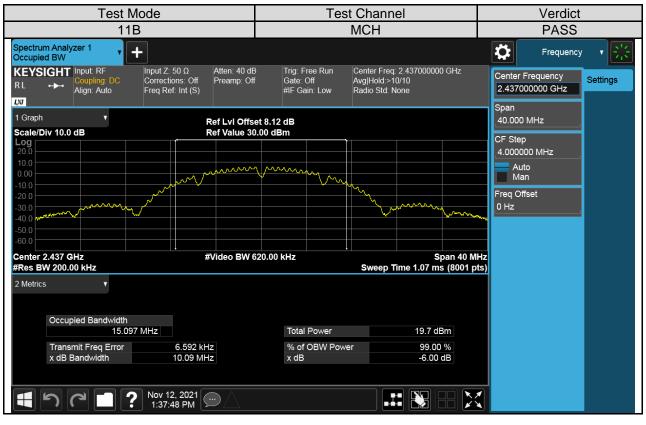






For 99% Bandwidth part:



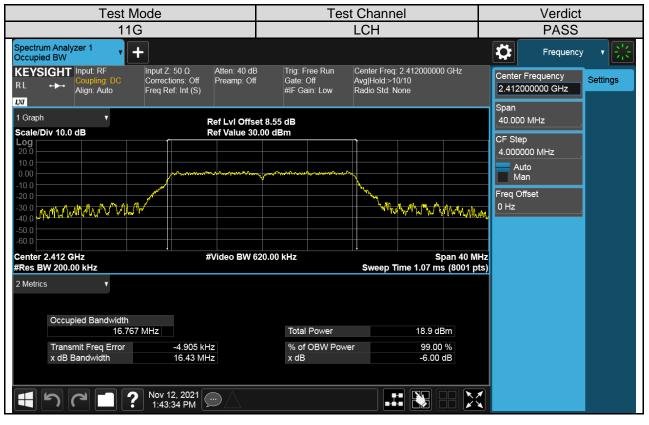


Form-ULID-008536-9 V1.0

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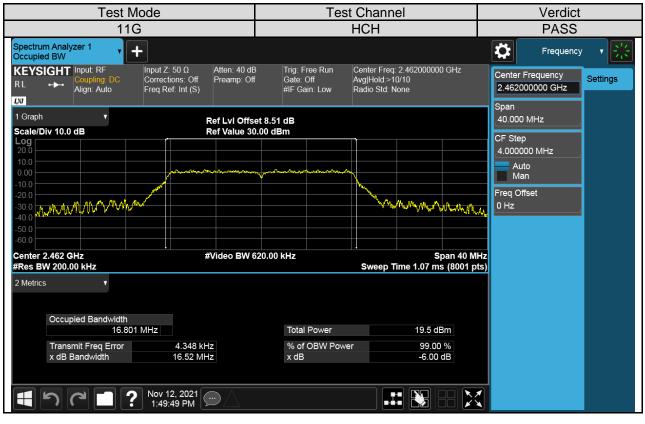




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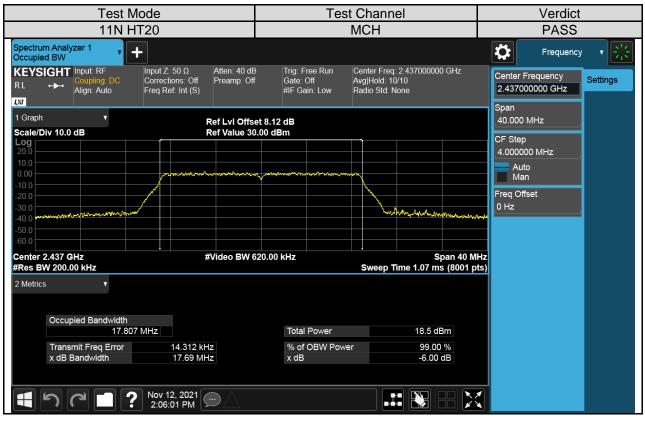




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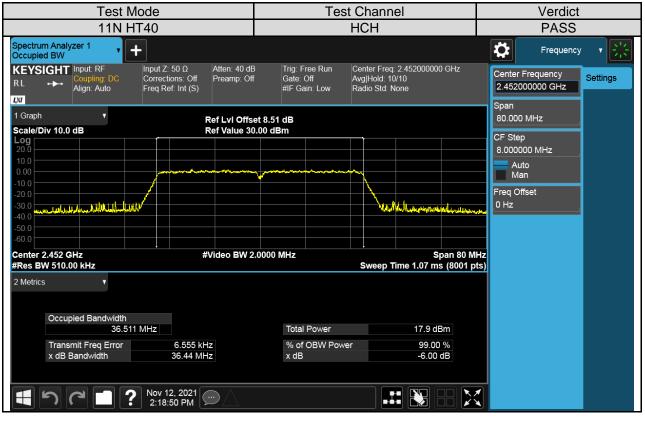




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7.4. CONDUCTED POWER

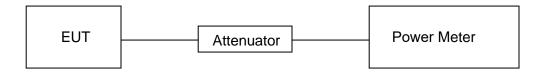
LIMITS

FCC Part15 (15.247) Subpart C			
Section Test Item Limit Frequency Range (MHz)			
FCC 15.247(b)(3)	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 Meter. Measure the power of each channel. AVG Detector use for AVG result.

TEST SETUP



RESULTS

Test Mode	Test Channel	Measurement Output Power (AV)	10log(1/x) Factor	Maximum Conducted Output Power (AV)	Result
		dBm	dB	dBm	
	LCH	14.35	0.04	14.39	Pass
11B	MCH	14.28	0.04	14.32	Pass
	НСН	14.73	0.04	14.77	Pass
	LCH	12.29	0.21	12.50	Pass
11G	MCH	12.37	0.21	12.58	Pass
	HCH	12.82	0.21	13.03	Pass
	LCH	12.46	0.06	12.52	Pass
11N HT20	MCH	12.17	0.06	12.23	Pass
11120	НСН	12.88	0.06	12.94	Pass
	LCH	10.90	0.12	11.02	Pass
11N HT40	MCH	10.56	0.12	10.68	Pass
	HCH	11.07	0.12	11.19	Pass

Remark:

1) For all the test results has been adjusted the duty cycle factor.

2) For Correction Factor is refer to the result in section 7.2



7.5. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247) Subpart C			
Section Test Item Limit Frequency Range (MHz)			
FCC §15.247 (e)	Power Spectral Density	8 dBm in any 3 kHz band	2400-2483.5

TEST PROCEDURE

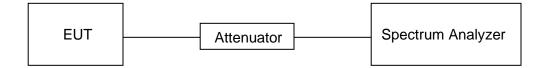
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

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 SETUP





RESULTS

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	-0.46	Pass
11B	MCH	-0.24	Pass
	HCH	0.56	Pass
	LCH	-3.68	Pass
11G	MCH	-3.90	Pass
	HCH	-2.52	Pass
	LCH	-3.82	Pass
11N HT20	MCH	-4.57	Pass
	НСН	-4.52	Pass
	LCH	-8.86	Pass
11N HT40	MCH	-8.60	Pass
	НСН	-8.19	Pass



Test Graphs:





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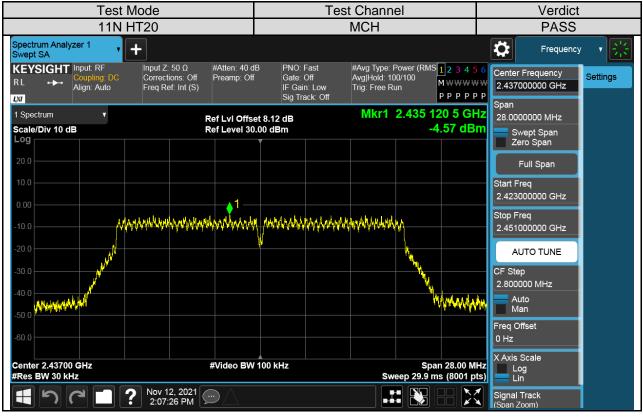




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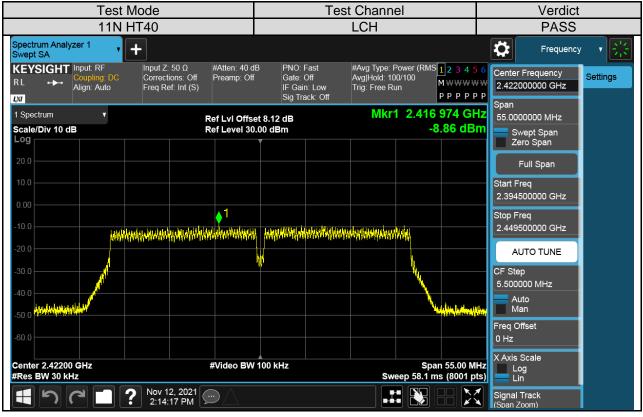




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7.6. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

<u>LIMITS</u>

FCC Part15 (15.247) Subpart C							
Section	Section Test Item Limit						
FCC §15.247 (d)	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.

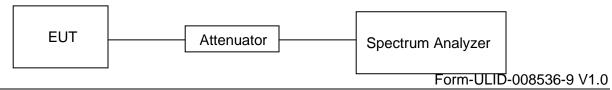
settings:

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



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Part I : Conducted Bandedge

RESULTS TABLE

Test Mode	Test Antenna	Test Channel	Test Result	Verdict
11B	Antenna 1	LCH	See the test graphs	PASS
ПВ	Antenna I	НСН	See the test graphs	PASS
11G	Antenna 1	LCH	See the test graphs	PASS
ПG	Antenna i	НСН	See the test graphs	PASS
11N HT20	Antenna 1	LCH	See the test graphs	PASS
	Antenna I	НСН	See the test graphs	PASS
11N HT40	Antenna 1	LCH	See the test graphs	PASS
	Antenna T	НСН	See the test graphs	PASS

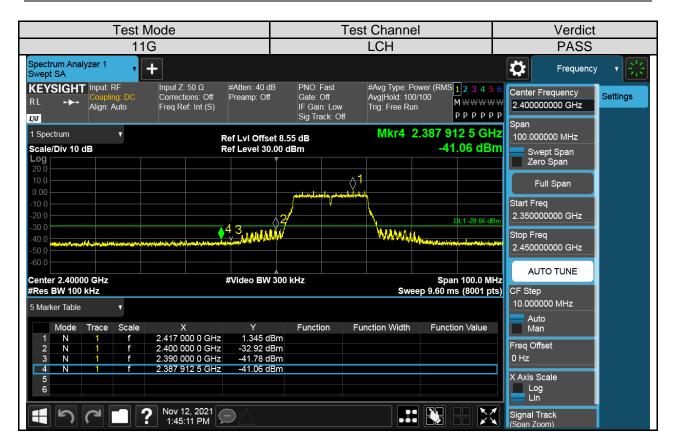


Test Mode Test Channel Verdict 11B LCH PASS Spectrum Analyzer 1 Swept SA Ö + Frequency Input Z: 50 Ω Corrections: Off Freq Ref: Int (S) #Avg Type: Power (RMS 1 2 3 4 5 6 Avg|Hold: 100/100 Trig: Free Run KEYSIGHT Input: RF #Atten: 40 dB PNO: Fast Center Frequency Settings Gate: Off IF Gain: Low Preamp: Off Align: Auto 2.400000000 GHz рррррр Sig Track: Off L)XI Span Mkr4 2.381 412 5 GHz 1 Spectrum Ref Lvi Offset 8.55 dB Ref Level 30.00 dBm 100.000000 MHz -41.24 dBm Scale/Div 10 dB Swept Span Zero Span Log \Diamond^1 Full Span Start Freq 2.350000000 GHz 35 dB ₹4 Stop Freq 2.450000000 GHz AUTO TUNE Center 2.40000 GHz #Res BW 100 kHz Span 100.0 MHz Sweep 9.60 ms (8001 pts) #Video BW 300 kHz CF Step 10.000000 MHz 5 Marker Table v Auto Man Mode Trace Scale Function Function Width Function Value Х 2.411 487 5 GHz 2.400 000 0 GHz 2.390 000 0 GHz 4.650 dBm -32.90 dBm -44.46 dBm Ν Freq Offset 2 3 Ν 0 Hz Ν Δ Ν 2.381 412 5 GHz -41.24 dBm X Axis Scale 5 Log Lin Nov 12, 2021 1:35:04 PM \gtrsim ? う P \mp (\cdots) Signal Track in Zoom)

Test Mode		Test Channel			Verdict	
11B			HCH		PASS	
Spectrum Analyzer 1					Frequency	▼ <mark>\$</mark> *
KEYSIGHT Input: RF Input: 2: 50 Ω RL Coupling: DC Corrections: Off Align: Auto Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Powe Avg Hold: 100/10 Trig: Free Run	ег (RMS <mark>1</mark> 2345)0 М ₩₩₩₩ Р Р Р Р Р	₩ 2.483500000 GHz	Settings
1 Spectrum Scale/Div 10 dB Log 20.0	Ref LvI Offset 8. Ref Level 30.00		Mkr4 2.4	184 262 5 GH -41.28 dBr		
10.0 0.00					Full Span	
-10.0 -20.0 -30.0	Y			DL1-24.90 dB	Start Freq 2.433500000 GHz	
-40.0 -50.0	V		hadinen jan olennet olenni	in a state of the	Stop Freq 2.533500000 GHz	
-60.0 Center 2.48350 GHz	#Video BW 300) kHz		Span 100.0 Mł		
#Res BW 100 kHz 5 Marker Table			Sweep	9.60 ms (8001 pt	 S) CF Step 10.000000 MHz 	
Mode Trace Scale X 1 N 1 f 2.461 500 0 GHz 2 N 1 f 2.483 500 0 GHz 3 N 1 f 2.483 500 0 GHz 4 N 1 f 2.484 262 5 6 Nov 12, 2021 1:42:13 PM	-44.11 dBm -43.39 dBm		nction Width	Function Value	Auto Man Freq Offset 0 Hz X Axis Scale Log Lin Signal Track (Span Zoom)	
				Fo	rm-ULID-00853	6-9 V1.0

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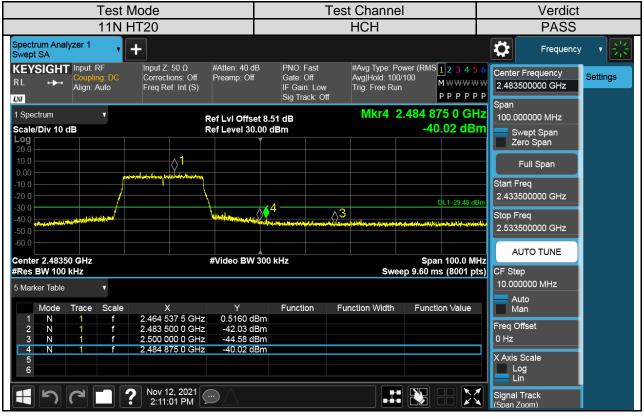




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Test Mode	Te	est Channel	Verdict
11N HT20		LCH	PASS
Spectrum Analyzer 1			Frequency V
KEYSIGHT Input: RF Input Z: 50 Ω RL ← Coupling: DC Corrections: Off Align: Auto Freq Ref: Int (S)	#Atten: 40 dB PNO: Fast Preamp: Off Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 Avg Hold: 100/100 Trig: Free Run P P P P P	
	Ref LvI Offset 8.55 dB Ref Level 30.00 dBm	Mkr4 2.384 862 5 GH -41.37 dBr	
10.0 0.00			Full Span
-10.0		DL1 -28.59 dB	Start Freq 2.350000000 GHz
-30.0 -40.0 -50.0	and the second	Billindegalenanging Balterin Bilanan Januar Barran Barran Barran Barran Barran Barran Barran Barran Barran Barr	Stop Freq 2.450000000 GHz
-60.0 Center 2.40000 GHz	#Video BW 300 kHz	Span 100.0 MH	
#Res BW 100 kHz 5 Marker Table		Sweep 9.60 ms (8001 pt	s) CF Step 10.000000 MHz
Mode Trace Scale X 1 N 1 f 2.413 275 0 GHz 2 N 1 f 2.400 000 0 GHz 3 N 1 f 2.384 862 5 GHz	1.411 dBm -40.55 dBm -44.28 dBm	Function Width Function Value	Man Freq Offset 0 Hz
			X Axis Scale Log Lin
E D C D ? Nov 12, 2021 2:04:41 PM			Signal Track (Span Zoom)



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Test Mo	ode	Tes	t Channel	Verdict
11N HT	Г40		PASS	
Spectrum Analyzer 1	•			Frequency v 🔆
KEYSIGHT Input: RF RL Implication Align: Auto	Input Z: 50 Ω #Atten: 40 dE Corrections: Off Freq Ref: Int (S)	B PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RMS 1 2 3 4 5 Avg Hold:>100/100 Trig: Free Run P P P P F	2.40000000 GHz
1 Spectrum v Scale/Div 10 dB Log	Ref Lvi Offse Ref Level 30.		Mkr4 2.387 900 0 GI -40.86 dB	
10.0 0.00 -10.0 -20.0		1	ler, perskelenskerederederederederederederederederedere	Full Span Start Freq 2.35000000 GHz
-30.0 -40.0 -50.0 -60.0		<i>J</i>		Stop Freq 2.450000000 GHz
Center 2.40000 GHz #Res BW 100 kHz	#Video BW	300 kHz	Span 100.0 M Sweep 9.60 ms (8001 p	
2 N 1 f 3 N 1 f	X Y 2.413 275 0 GHz -3.858 dE 2.400 000 0 GHz -42.57 dE 2.390 000 0 GHz -44.33 dE 2.387 900 0 GHz -40.86 dE	Bm Bm Bm	nction Width Function Value	Auto Man Freq Offset 0 Hz X Axis Scale Log Lin
	Nov 12, 2021 2:14:28 PM			Signal Track (Span Zoom)



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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 SISO	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		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 SISO	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		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
		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 HT40	Antenna 1	MCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS
		HCH	See the test graphs	<limit< td=""><td>PASS</td></limit<>	PASS



Test Mode	Channel	Verdict
11B	LCH	PASS

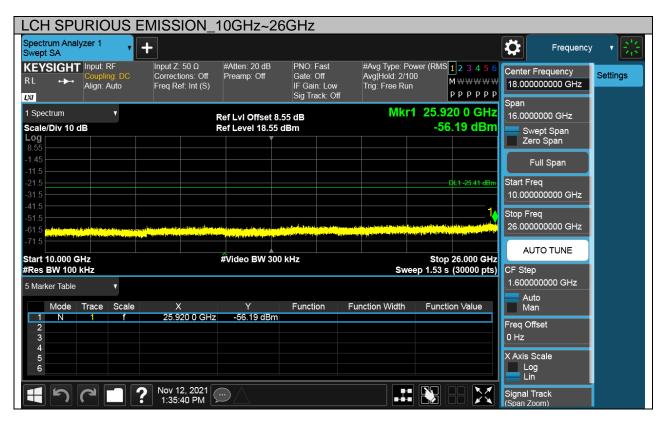




REPORT No.: 4790196205-3-1 Page 51 of 156

Puw test Plot

LCH SPL	JRIOU	S EMIS	SION_(30MHz~10)GHz						
Spectrum Analy Swept SA	yzer 1	• +							\$	Frequency	() 宗
KEYSIGHT RL ↔→	Input: RF Coupling: E Align: Auto	C Corre	Z: 50 Ω ections: Off Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Lo Sig Track:	w	#Avg Type: P Avg Hold: 9/1 Trig: Free Ru		₩₩ 5.01	er Frequency 5000000 GHz	Settings
1 Spectrum Scale/Div 10 c	, 1B			Ref LvI Offset 8.4 Ref Level 18.55 c			M	(r2 2.560 1 G -55.25 dE	Sim and s	000000 GHz Swept Span	
8.55 -1.45 -11.5		1								Zero Span Full Span	
-21.5 -31.5 -41.5		2	_					DL1-25.41 (00000 MHz	
-51.5 -61.5 -71.5	A Mary and the American State	and the second			nan a ta bhaile an		n a stilleting for an destroyed in the second		10.0	AUTO TUNE	
Start 30 MHz #Res BW 100	kHz v			#Video BW 300	kHz		Swee	Stop 10.000 C ep 954 ms (30000 p	Hz ots) CF S		
Mode 1 N	Trace Sc 1	f 2	X .411 6 GHz		Function	Fur	nction Width	Function Value		Auto Man	
2 N 3 4 5		f 2	.560 1 GHz	-55.25 dBm					0 Hz	Offset s Scale	
		Nov	12, 2021							_og _in I Track	
			5:31 PM							Zoom)	





Test Mode	Channel	Verdict
11B	MCH	PASS





REPORT No.: 4790196205-3-1 Page 53 of 156

Puw test Plot

MCH SPU	URIC	DUS	EMISSION	_30MHz~1	0GHz					
Spectrum Analy Swept SA	·	Ţ	+						Frequency	
KEYSIGHT RL +++	Input: RI Coupling Align: Au	g: DC	Input Ζ: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Lov Sig Track: C	Avg Hold: 8/10 / Trig: Free Rur		5.015	Frequency 000000 GHz	Settings
1 Spectrum Scale/Div 10 d		•	۵ 1	Ref LvI Offset 8.1 Ref Level 18.12 c		Mk	r2 2.560 1 GHz -55.73 dBm	9.970	00000 GHz wept Span ero Span	
8.12 -1.88 -11.9 -21.9							DL1-25.30 dBm	Start F	Full Span	
-31.9 -41.9 -51.9 -61.9			2	tilling an annaly stranged to the state		Note	Annu scharzen gegen en feter aus ein partier ein der	Stop F	0000 MHz req 0000000 GHz	
ALC: NOT A CONTRACT OF A CONTR	kHz			#Video BW 300	kHz	Swee	Stop 10.000 GHz p 954 ms (30000 pts)			
5 Marker Table		▼						997.0	00000 MHz	
Mode 1 N 2 N 3 4 5 6	Trace 1 1	Scale f	X 2.438 8 GH 2.560 1 GH	z -55.73 dBm	Function	Function Width	Function Value	Freq C 0 Hz X Axis	Scale og	
	<u>ר</u>		? Nov 12, 2021 1:39:38 PM	\bigcirc				Signal (Span 2	Track Zoom)	

MCH SPURIOUS EMISSIO	N_10GHz~26GHz		
Spectrum Analyzer 1			Frequency 🔹
KEYSIGHT Input: RF Input: Z: 50 Ω R L Coupling: DC Corrections: Align: Auto Freq Ref: Int	Off Preamp: Off Gate: Off		Center Frequency 18.00000000 GHz
1 Spectrum v Scale/Div 10 dB	Ref LvI Offset 8.12 dB Ref Level 18.12 dBm	Mkr1 25.660 8 GHz -56.15 dBm	Span 16.0000000 GHz Swept Span
Log 8.12 -1.88			Zero Span Full Span
-11.9 -21.9 -31.9		DL1 25.30 dBm	Start Freq 10.000000000 GHz
-41.9 -51.9 -61.9 granutifie that the manufactory play provide a defended in the -71.9	to the most firm of a gas gas gas and an even or all are given a firm of a most and first and a most and a most of the most the firm of a most are given a most any processing (and a most of the first and a most of the first		Stop Freq 26.00000000 GHz
Start 10.000 GHz #Res BW 100 kHz	#Video BW 300 kHz	Stop 26.000 GHz Sweep 1.53 s (30000 pts)	
5 Marker Table			1.600000000 GHz
Mode Trace Scale X	Y Function GHz -56.15 dBm	Function Width Function Value	Auto Man
			Freq Offset 0 Hz
5 6			X Axis Scale Log Lin
Nov 12, 20 1:39:47 P			Signal Track (Span Zoom)



Test Mode	Channel	Verdict
11B	НСН	PASS

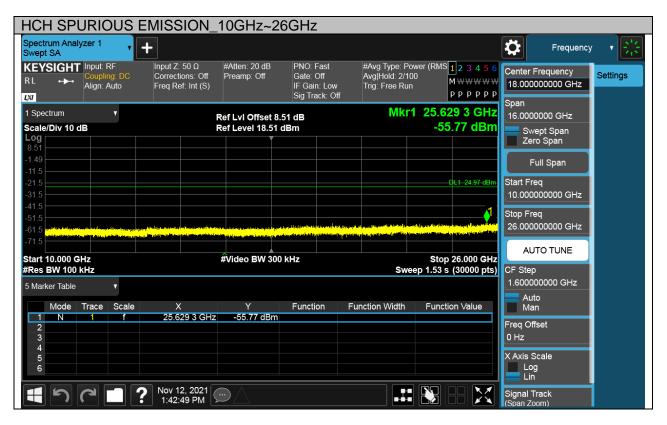




REPORT No.: 4790196205-3-1 Page 55 of 156

Puw test Plot

HCH SPI	JRIC	OUS	EMISSION	_30MHz~1	0GHz					
Spectrum Analy Swept SA	yzer 1	T	+						Frequency	
KEYSIGHT	Input: F Couplir Align: A	ng: DC	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S		PNO: Fast Gate: Off IF Gain: Low Sig Track: O	Avg Hold: 8/1 Trig: Free Ru		5.015	Frequency 000000 GHz	Settings
1 Spectrum Scale/Div 10 c	iB	v		Ref LvI Offset 8. Ref Level 18.51		Mk	r2 3.704 4 GHz -57.52 dBm	5.510	00000 GHz wept Span	
Log 8.51 -1.49			1						ero Span Full Span	
-11.5 -21.5 -31.5							DL1 24.97 dBm	Start F 30.00	req 0000 MHz	
						Alteração de la Alterna de La Constante da Constante da Constante da Constante da Constante da Constante da Const		Stop F 10.00	req 0000000 GHz	
Start 30 MHz				#Video BW 300	kHz		Stop 10.000 GHz			
#Res BW 100 5 Marker Table	KHZ	•				Swee	ep 954 ms (30000 pts)	997.0	00000 MHz	
Mode 1 N 2 N 3 4 5 6	Trace 1 1	Scale f	X 2.462 4 Gi 3.704 4 Gi	Hz -57.52 dBm	Function	Function Width	Function Value	Freq C 0 Hz X Axis		
1 5	C		Nov 12, 2021 1:42:40 PM	$\bigcirc \bigtriangleup$				Signal (Span 2		





Test Mode	Channel	Verdict
11G	LCH	PASS

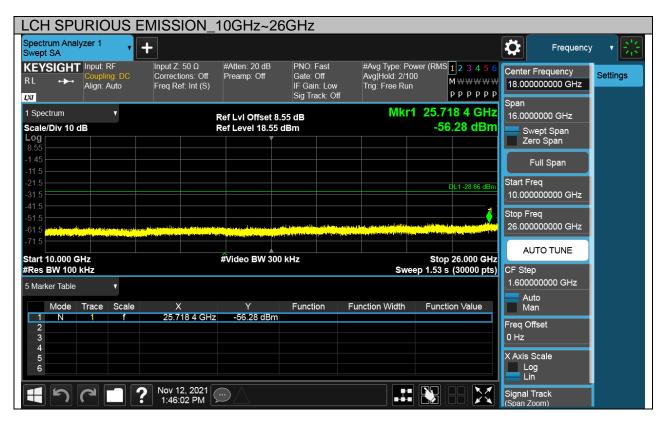




REPORT No.: 4790196205-3-1 Page 57 of 156

Puw test Plot

LCH SI	PURIC	DUS	EMISSION_3	30MHz~10)GHz					
Spectrum A Swept SA	nalyzer 1	•	+						Frequency	
KEYSIGI RL ↔	Coup	RF ling: DC Auto	Input Ζ: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Of	Avg Hold: 6/10 Trig: Free Rur		5.015	r Frequency 5000000 GHz	Settings
1 Spectrum Scale/Div 1	10 dB	T		Ref LvI Offset 8.5 Ref Level 18.55 d		Mk	r2 2.560 1 GHz -54.11 dBm	S.S/C	000000 GHz wept Span	
Log 8.55 -1.45 -11.5			1						ero Span Full Span	
-21.5 -31.5 -41.5			2				DL1 -28.86 dBm		00000 MHz	
-51.5 -61.5 -71.5				New York of the latter of the second se		eleging ang basanting tang ang			00000000 GHz	
Start 30 MH #Res BW 1				#Video BW 300	kHz	Swee	Stop 10.000 GHz p 954 ms (30000 pts)		NUTO TUNE	
5 Marker Tal	ble	▼							000000 MHz luto	
Mod 1 N 2 N 3 4	e Trace 1 1	Scale f f	X 2.416 9 GHz 2.560 1 GHz	Y 1.333 dBm -54.11 dBm	Function	Function Width	Function Value	Freq 0 0 Hz	1an	
			? Nov 12, 2021 1:45:52 PM						.og .in I Track	





Test Mode	Channel	Verdict
11G	MCH	PASS





REPORT No.: 4790196205-3-1 Page 59 of 156

Puw test Plot

MCH SP	URIO	US I	EMISSION	_30MHz~1	0GHz					
Spectrum Anal Swept SA		Ţ	+						Frequency	√ ▼ ¹ / ₂ × ¹ / ₂
	Input: RF Coupling: Align: Aut		Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 20 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Lov Sig Track: C	Avg Hold: 8/1 v Trig: Free Rui		5.015	r Frequency 0000000 GHz	Settings
1 Spectrum Scale/Div 10 o	, B			Ref LvI Offset 8. Ref Level 18.12 o		Mk	r2 2.560 1 GHz -55.91 dBm		00000 GHz wept Span	
Log 8.12 -1.88			1					Z	ero Span Full Span	
-11.9 -21.9 -31.9							DL1 -28.55 dBm	Start P 30.00	req 0000 MHz	
-41.9 -51.9 -61.9			2			tilles and any star product of the star		Stop F 10.00	req 0000000 GHz	
Start 30 MHz		^		#Video BW 300	kHz		Stop 10.000 GHz			
#Res BW 100 5 Marker Table	KHZ V					Swee	ep 954 ms (30000 pts)	997.0	00000 MHz	
Mode 1 N 2 N 3 4 5 6	Trace S 1 1	Scale f f	X 2.435 8 GH 2.560 1 GH		Function	Function Width	Function Value	Freq C 0 Hz X Axis		
<u>ר</u> ה	C		Nov 12, 2021 1:48:37 PM	$\bigcirc \bigtriangleup$					in Track	

MCH SPURIOUS	EMISSION_10)GHz~26G	SHz				
Spectrum Analyzer 1 Swept SA	+					Frequency	() 器
KEYSIGHT Input: RF RL Coupling: DC Align: Auto		eamp: Off G	PNO: Fast Gate: Off F Gain: Low Sig Track: Off	#Avg Type: Pow Avg Hold: 2/100 Trig: Free Run	ver (RMS <mark>1</mark> 23456 М₩₩₩₩₩ РРРРРР	Center Frequency 18.00000000 GHz Span	Settings
1 Spectrum ▼ Scale/Div 10 dB		LvI Offset 8.12 d Level 18.12 dBm		Mkr1	25.714 7 GHz -56.18 dBm	16.0000000 GHz	
Log 8.12 -1.88						Zero Span Full Span	
-11.9 -21.9 -31.9					DL1 -28.55 dBm	Start Freq 10.00000000 GHz	
-41.9 -51.9 -61.9 -71.9	a for a first for the second state of the seco	The lower of more larger of my even shifts in the state of the state o		an a		Stop Freq 26.00000000 GHz	
Start 10.000 GHz #Res BW 100 kHz	#V	ideo BW 300 kHz	z	Swee	Stop 26.000 GHz p 1.53 s (30000 pts)	AUTO TUNE	
5 Marker Table V					<u></u> (1.60000000 GHz	
Mode Trace Scale 1 N 1 f 2 3 4 5	X 25.714 7 GHz	Y F -56.18 dBm	Function Fur	nction Width	Function Value	Auto Man Freq Offset 0 Hz X Axis Scale	
	? Nov 12, 2021					Log Lin Signal Track (Span Zoom)	