

# FCC 47 CFR PART 15 SUBPART C

## **CERTIFICATION TEST REPORT**

For

**IP Indoor Monitor** 

## MODEL NUMBER: DHI-VTH8642KMS-W

ADDITIONAL MODEL NUMBER: VTH8642KMS-W, DHI-VTH8642KMS-W-USA

PROJECT NUMBER: 4790254061-21

REPORT NUMBER: 4790254061-21-1

FCC ID: SVN-VTH8642KMSW

ISSUE DATE: Jun. 17, 2022

Prepared for

Zhejiang Dahua Vision 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



## **Revision History**

Rev.	Issue Date	Revisions	Revised By
V0	06/17/2022	Initial Issue	



# **TABLE OF CONTENTS**

1.	ATT	ESTATION OF TEST RESULTS 4	ł
2.	TES	T METHODOLOGY 6	;
3.	FAC	CILITIES AND ACCREDITATION6	;
4.	CAI	IBRATION AND UNCERTAINTY	,
2	<b>1</b> .1.	MEASURING INSTRUMENT CALIBRATION	7
2	4.2.	MEASUREMENT UNCERTAINTY	7
5.	EQI	JIPMENT UNDER TEST	3
Ę	5.1.	DESCRIPTION OF EUT	3
Ę	5.2.	MAXIMUM OUTPUT POWER	)
Ę	5.3.	CHANNEL LIST	)
ξ	5.4.	TEST CHANNEL CONFIGURATION	)
ł	5.5.	THE WORSE CASE POWER SETTING PARAMETER	)
ł	5.6.	DESCRIPTION OF AVAILABLE ANTENNAS	1
Ę	5.7.	THE WORSE CASE CONFIGURATIONS11	1
Ę	5.8.	TEST ENVIRONMENT	>
Ę	5.9.	DESCRIPTION OF TEST SETUP	3
Ę	5.10.	MEASURING INSTRUMENT AND SOFTWARE USED14	1
6.	ME	ASUREMENT METHODS14	ł
7.	AN	TENNA PORT TEST RESULTS16	;
7	7.1.	ON TIME AND DUTY CYCLE	3
7	7.2.	6 dB BANDWIDTH	)
7	7.3.	CONDUCTED OUTPUT POWER	7
7	7.4.	POWER SPECTRAL DENSITY	)
7	7.5.	CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS	7
7	7.6. 7.6. 7.6.		3 9
8.	AC	POWER LINE CONDUCTED EMISSIONS142	2
9.	AN	ENNA REQUIREMENTS145	5



# **1. ATTESTATION OF TEST RESULTS**

## **Applicant Information**

Company Name: Address:	Zhejiang Dahua Vision Technology Co., Ltd. No.1199, Bin'an road, Binjiang District, Hangzhou, P.R. China.
Manufacturer Information	
Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	No.1199, Bin'an road, Binjiang District, Hangzhou, P.R. China.
EUT Description	
Product Name:	IP Indoor Monitor
Model Name:	DHI-VTH8642KMS-W
Additional No.:	VTH8642KMS-W, DHI-VTH8642KMS-W-USA
Model Difference:	Their electrical circuit design, layout, components used and internal wiring are identical, only the color and model name is different. The Model DHI-VTH8642KMS-W was selected as the representative model for compliance test.
Sample Number:	4761594
Data of Receipt Sample:	Apr. 07, 2022
Test Date:	Apr. 08, 2022 ~ Jun. 16, 2022

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



Summary of Test Results					
Clause	Test Items FCC Rules Test F				
1	6db DTS Bandwidth	PASS			
2	Conducted Power	FCC 15.247 (b) (3)	PASS		
3	Power Spectral Density	FCC 15.247 (e)	PASS		
4	Conducted Band edge And Spurious emission	FCC 15.247 (d)	PASS		
5	Radiated Band edges and Spurious emission	FCC 15.247 (d) FCC 15.209 FCC 15.205	PASS		
6	Conducted Emission Test for AC Power Port	FCC 15.207	PASS		
7	Antenna Requirement FCC 15.203 P				
Remark: The measurement result for the sample received is <pass> according to &lt; ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15C&gt; when <accuracy method=""> decision rule is applied.</accuracy></pass>					

Prepared By:

Reviewed By:

Tom Tang

Leon Wu

Tom Tang Project Engineer Leon Wu Senior Project Engineer

Authorized By:

Chris Zhong

Chris Zhong Laboratory Leader



# 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.
------------------------------	---

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-18GHz)	
	4.2dB (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:	IP Indoor Monitor
Model No.:	DHI-VTH8642KMS-W
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:	Secure CRT (manufacturer declare)
Antenna Type:	FPC Antenna
	4.834 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]	17.10
1	IEEE 802.11G	1-11[11]	14.63
1	IEEE 802.11N HT20	1-11[11]	14.68
1	IEEE 802.11N HT40	3-9[7]	14.56

# 5.3. CHANNEL LIST

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

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



# 5.4. TEST CHANNEL CONFIGURATION

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

# 5.5. THE WORSE CASE POWER SETTING PARAMETER

The W	The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band						
Test Softw	/are			Secu	reCRT		
	Transmit		Test Channel				
Modulation Mode	Antenna	1	NCB: 20MHz			ICB: 40MHz	2
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9
802.11B	1	default	default	default			
802.11G	1	default	default default default			/	
802.11N HT20	1	default default default					
802.11N HT40	1		/		default	default	default



# 5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	FPC Antenna	4.834

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:	101kPa			
Temperature	TN	23 ~ 28°C		
	VL	N/A		
Voltage:	VN	AC 120V		
	VH	N/A		

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



# 5.9. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

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

### I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	USB	USB to TTL	USB	100cm Length	/
2	RJ45	RJ45	LAN	100cm Length	/

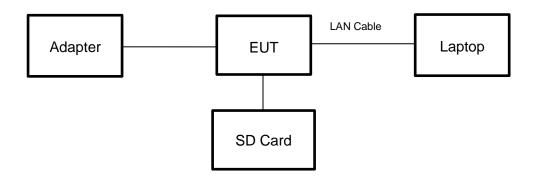
### ACCESSORY

Item	Accessory	Brand Name	Model Name	Description
1	AC Adapter	ΗΟΝΟΤΟ	ADS-65LSI-52-1 48060G	INPUT: 100-240V~ 50/60Hz, Max 1.5A OUTPUT: 48V=1.25A 60.0W
	Door Station	DAHUA	VTO2311-WP	Supplied by customer
	AC Adapter	ΗΟΝΟΤΟ	ADS-24S-12 1224GPCU	INPUT: 100-240V~ 50/60Hz, Max 0.7A OUTPUT: 12V=2.0A
2	SD Card	Sandisk	A1	32GB
3	Monitor	/	/	/

### TEST SETUP

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

### SETUP DIAGRAM FOR TESTS



This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



# 5.10. MEASURING INSTRUMENT AND SOFTWARE USED

Conducted Emissions (Instrument)									
Used	Equipment	Manufacturer		del No.		al No.	Upper Last Cal.	Last Cal.	Next Cal.
$\checkmark$	EMI Test Receiver	R&S	E	ESR3		6700	2020-12-05	2021-12-04	2022-12-03
$\checkmark$	Two-Line V-Network	R&S	EN	IV216	12	6701	2020-12-05	2021-12-04	2022-12-03
$\checkmark$	Artificial Mains Networks	R&S	EI	NY81	12	6711	2020-10-13	2021-10-12	2022-10-11
				Soft	ware				
Used Description Manufacturer Name Version									
$\checkmark$	Test Software for (	Conducted distur	bance		R&S	5	EMC32	Ver. 9.25	
		Ra	diate	d Emissi	ions (	Instrum	nent <b>)</b>		
Used	Equipment	Manufacturer	Мос	del No.	Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.
$\checkmark$	Spectrum Analyzer	Keysight	NS	010B	15	5727	2021-05-09	2022-04-09	2023-04-08
$\checkmark$	EMI test receiver	R&S	E	SR26	12	6703	2020-12-05	2021-12-04	2022-12-03
V	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZ	B 1513	15	5456	2018-06-15	2021-06-03	2024-06-02
$\checkmark$	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion		JB1	17	7821	2019-01-19	2022-01-18	2025-01-17
$\checkmark$	Receiver Antenna (1GHz-18GHz)	R&S	HF907		12	6705	2019-01-27	2022-02-28	2025-02-27
V	Receiver Antenna (18GHz-26.5GHz)	ETS	31	60-10	15	5565	2019-01-05	2021-07-15	2024-07-14
V	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-	1G18-50	17	8825	2021-03-26	2022-03-01	2023-02-28
	Pre-amplification (To 26.5GHz)	R&S	SC	U-26D	13	5391	2020-12-05	2021-12-04	2022-12-03
V	Band Reject Filter	Wainwright	2350 2483.9	WRCJV8- 2350-2400- 2483.5-2533.5- 40SS		1	2021-05-09	2022-04-09	2023-04-08
V	Highpass Filter	Wainwright	2700	IKX10- 0-3000- 00-40SS		2	2021-05-09	2022-04-09	2023-04-08
				Soft	ware				
Used		ription		Manufac			Name	Version	
$\checkmark$	Test Software for R	adiated disturbar		Tonsce			TS+	Ver. 2.5	
			C	Other ins	trum	ents			
Used	Equipment	Manufacturer	Model No.		Seri	al No.	Upper Last Cal.	Last Cal.	Next Cal.
$\checkmark$	Spectrum Analyzer	Keysight	NS	010B	15	5368	2021-05-09	2022-04-09	2023-04-08
	Power Meter	MWT	MW10	00-RFCB	22	1694	/	2022-05-23	2023-05-22
$\checkmark$	Attenuator	PASTERNACK	PE	7087-6	1	624	2021-05-24	2022-05-23	2023-05-22



# 6. MEASUREMENT METHODS

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



# 7. ANTENNA PORT TEST RESULTS

# 7.1. ON TIME AND DUTY CYCLE

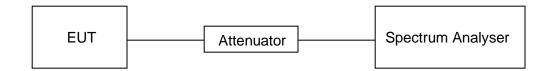
## <u>LIMITS</u>

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) The duty cycle is above 98%, so the Final VBW is 10Hz.

UL-CCIC COMPANY LIMITED

This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



### **TEST GRAPHS**







11N HT20 ON TIME AND DUTY CYCLE MID (	CH (WORSE CASE)
Spectrum Analyzer 1 , +	Frequency • 🔀
KEYSIGHT       Input Z. 50 Ω       #Atten: 30 dB       PNO: Fast       #Arg Type: Power (RMS]       2:3:4:5         RL       →       Company DC       Concentions: Off       Preamp: Off       Gate: Off       Ting: Voleo       WWWWW         RL       →       Align: Audo       Freq Ref: Int (S)       Freq Ref: Int (S)       Ting: Voleo       WWWWW         R1       →       Align: Audo       Freq Ref: Int (S)       Freq Ref: Int (S)       Ting: Voleo       WWWWW	2.437000000 GHz
1 Spectrum • Ref Lvi Offset 8.23 dB Scale/Div 10 dB Ref Level 28.23 dBm	Span 0.00000000 Hz Swept Span
Log 182 823 1.177	Full Span
-118 -218 -318	Start Freq 2.437000000 GHz
418	Stop Freq 2 43700000 GHz AUTO TUNE
Center 2.437000000 GHz ≢Video BW 8.0 MHz* Sweep 100.0 ms (1001 p Res BW 8 MHz Sweep 100.0 ms (1001 p 5 Marter Table	Hz
s hasher lable Mode Trace Scale X Y Function Function Volue	Auto
2 3 4	Freq Offset 0 Hz X Avis Scale
	Log
■ つ C <sup>*</sup> ■ ? May 07,2022 ●	Signal Track (Span Zoom)

11N HT	40 ON TIME A	ND DUTY CYCLE	E MID CH (WOR	SE CASE)
Si	pectrum Analyzer 1 v +		Frequency	
K R	EYSIGHT Input: RF L →→ Coupling: DC Alian: Auto Freq Ref. Int (S)	#Atten: 30 dB PNO: Fast #Avg Type: F Preamp: Off Gate: Off Trig: Video IF Gain: Low Trig Delay 2	00.0 µs V 2.437000000 GHz	Settings
1		Sig Track: Off Ref LvI Offset 8.23 dB	A A A A A A Span 0.00000000 Hz	
		Ref Level 28.23 dBm	Swept Span Zero Span	
1	82 23 77		Full Span	
-4			Start Freq 2.437000000 GHz	
4	11.8		Stop Freq 2.43700000 GHz	
-6	enter 2.437000000 GHz	#Video BW 8.0 MHz*	Span 0 Hz AUTO TUNE	
Re	es BW 8 MHz Marker Table		ep 100.0 ms (1001 pts) 8.000000 MHz	
	Mode Trace Scale X	Y Function Function Width	Function Value Man	
	2 3		Freq Offset 0 Hz	
	4 5 6		X Axis Scale Log	
	May 07, 2022 12:47:41 PM		Signal Track (Span Zoom)	



# 7.2. 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 ANSI C63.10-2013 clause 11.8 for DTS bandwidth.

Max hold

Auto couple

Somect the LOT to the spectrum analyser and use the following settings.			
Center Frequency	The centre frequency of the channel under test		
Detector	Peak		
RBW	For 6 dB Bandwidth :100 kHz		
VBW	For 6dB Bandwidth: ≥3 x RBW		

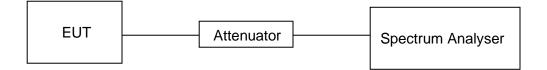
Connect the EUT to the spectrum analyser and use the following settings:

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

Trace

Sweep





### **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)	Result
	LCH	9.00	Pass
11B	MCH	9.04	Pass
	HCH	9.04	Pass
	LCH	16.56	Pass
11G	MCH	16.56	Pass
	HCH	16.56	Pass
	LCH	17.76	Pass
11N HT20	MCH	17.68	Pass
	HCH	17.72	Pass
	LCH	36.48	Pass
11N HT40	MCH	36.40	Pass
	HCH	36.40	Pass



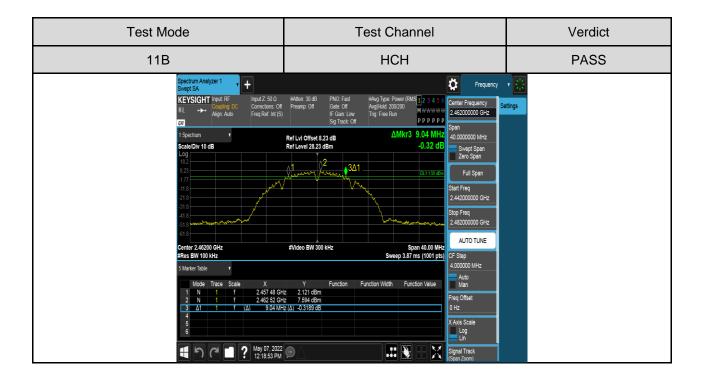
# <u>TEST GRAPHS</u>

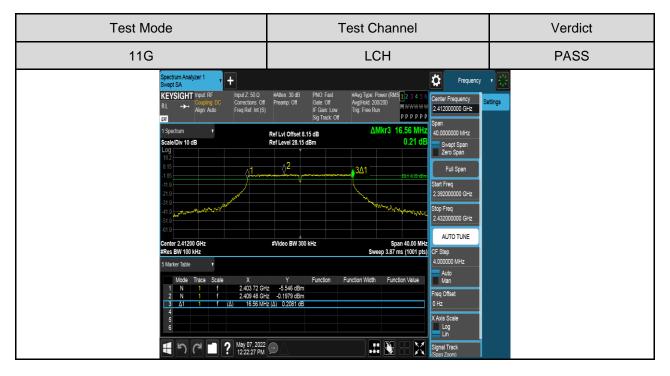
### 6dB Bandwdith



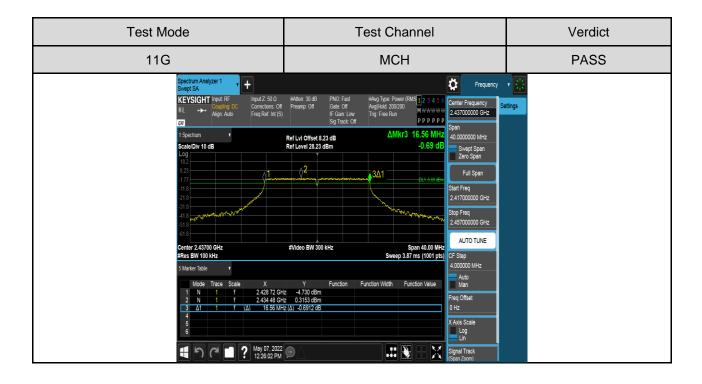


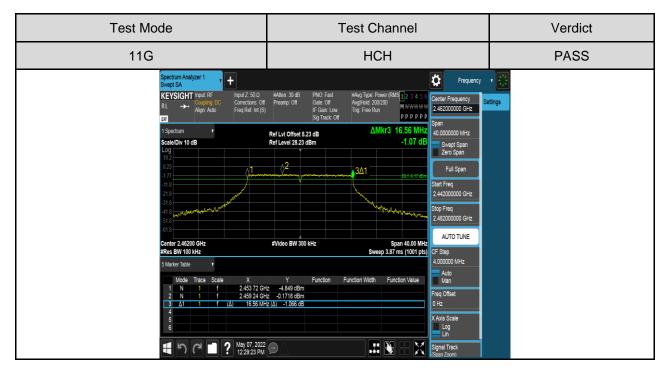






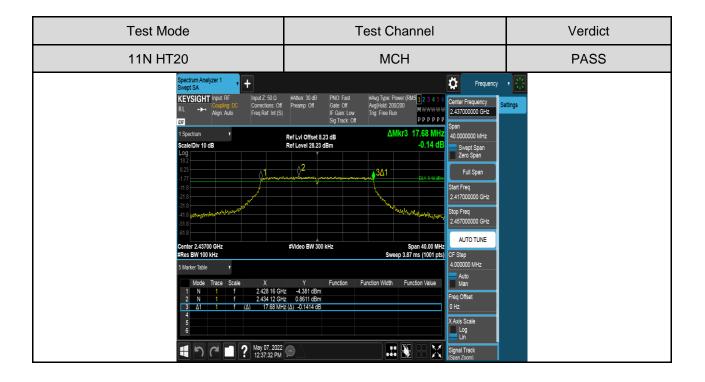






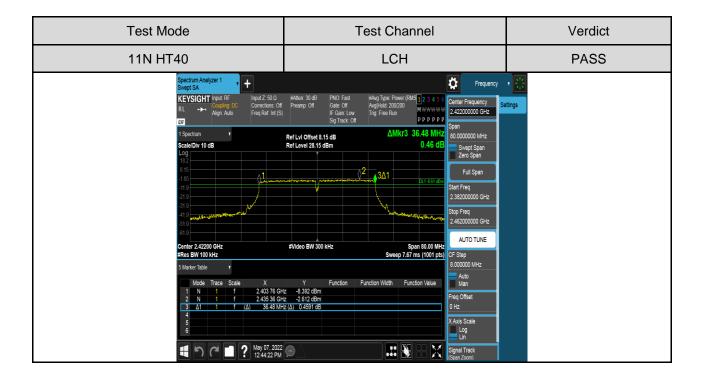


Test Mode Test Channel	Verdict
11N HT20 LCH	PASS
Spectrum       Analyzer 1 Unget Z: 50.0. RL       +       Frequency (MUX+WW)       Center Frequency (MUX+W)       Center Frequency (MUX+W)       Center Frequency (MUX+W)       Center Frequency (MUX+W)       Center Frequency (MUX+W)       Center FreqUX+W)       Center Frequency (MUX+W	Settings



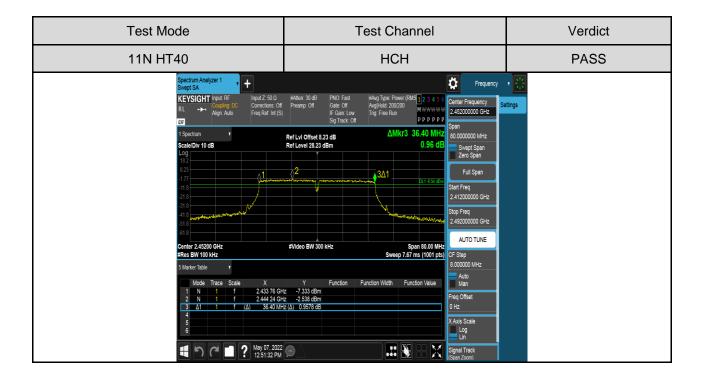


Test Mode	Test Channel	Verdict
11N HT20	НСН	PASS
2 N 1 f 2.459 12 G	IF Cant. Low Sig Track. Off         Trig: Free Run         MWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWWW	ettings





Test Mode	Test Channel	Verdict
11N HT40	MCH	PASS
RL Preq Ref. Int (S)	Adden 30 dB         PNO Fast Gate Off IF Gan Low         #Avg Type Power (RMS 1 2 3 4 5 0 AvgHold 200200 Trg: Free Run         1 2 3 4 5 0 M WWWWW         Center Frequency 2 437000000 GHz         Se           Ref Lvi Offset 8.23 dB         AMIKr3 36.40 MHz 2.06 dB         Span 2.06 dB         Span 2.07 Span         Span	ettings
2 N 1 f 2.439 16 GH	#Video BW 300 kHz         Span 80.00 kHz           Sweep 7.67 ms (1001 pts)         CF Step 8.000000 MHz           Y         Function           Y         Function Function Width           2         -8.10 dBm           -2.755 dBm         0 Hz           2(Δ)         2.065 dB           U         Value           L         L           L         2.055 dB           L         L           L         L           L         L           L         L           L         L	
H つ で 1 ? May 07, 2022     1247:54 PM		





# 7.3. CONDUCTED OUTPUT POWER

#### <u>LIMITS</u>

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

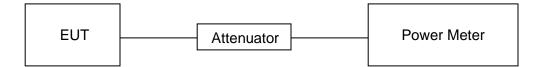
#### TEST PROCEDURE

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 sensor. Measure the power of each channel. AVG Detector used for AVG result.

#### TEST ENVIRONMENT

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

#### TEST SETUP





### **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	16.93	0	16.93	30
11B	MCH	17.10	0	17.10	30
	НСН	16.79	0	16.79	30
	LCH	14.28	0	14.28	30
11G	MCH	14.63	0	14.63	30
	HCH	14.31	0	14.31	30
	LCH	14.19	0	14.19	30
11N HT20	MCH	14.68	0	14.68	30
	НСН	14.23	0	14.23	30
	LCH	14.51	0	14.51	30
11N HT40	MCH	14.42	0	14.42	30
	HCH	14.56	0	14.56	30



# 7.4. POWER SPECTRAL DENSITY

#### **LIMITS**

FCC Part15 (15.247), Subpart C				
Section Test Item Limit Frequency Range (MHz)				
FCC §15.247 (e)	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.

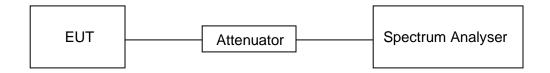
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

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

#### **TEST ENVIRONMENT**

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

### TEST SETUP



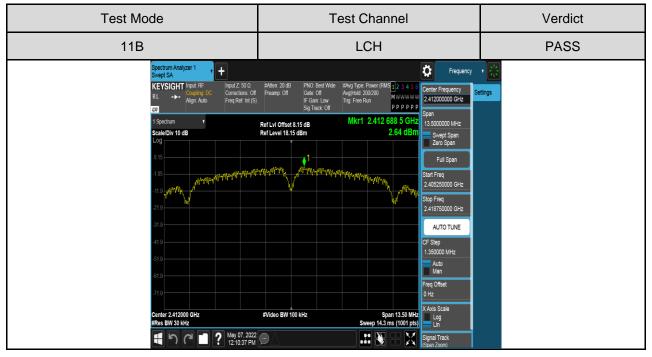


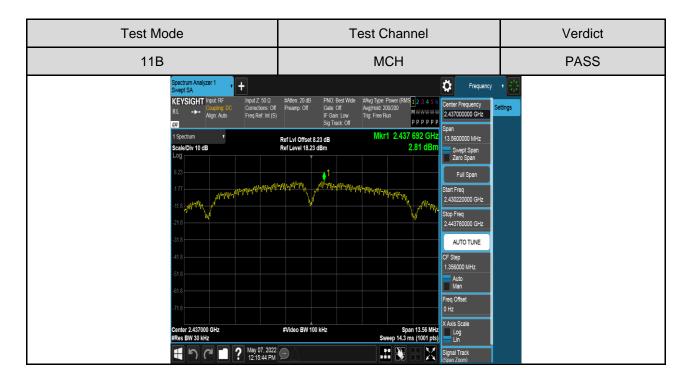
## TEST RESULTS TABLE

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	2.64	Pass
11B	MCH	2.81	Pass
	HCH	2.47	Pass
	LCH	-2.71	Pass
11G	MCH	-2.49	Pass
	HCH	-2.89	Pass
	LCH	-2.30	Pass
11N HT20	MCH	-1.79	Pass
	HCH	-2.40	Pass
	LCH	-5.19	Pass
11N HT40	MCH	-5.56	Pass
	HCH	-5.50	Pass

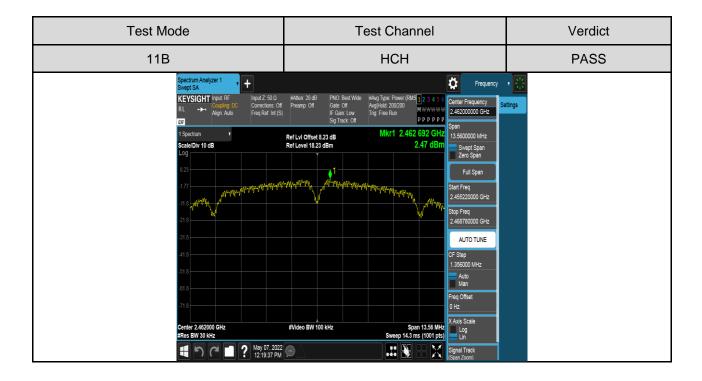


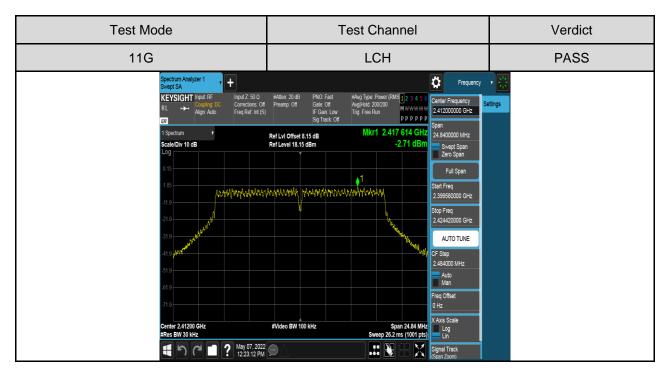
### **TEST GRAPHS**





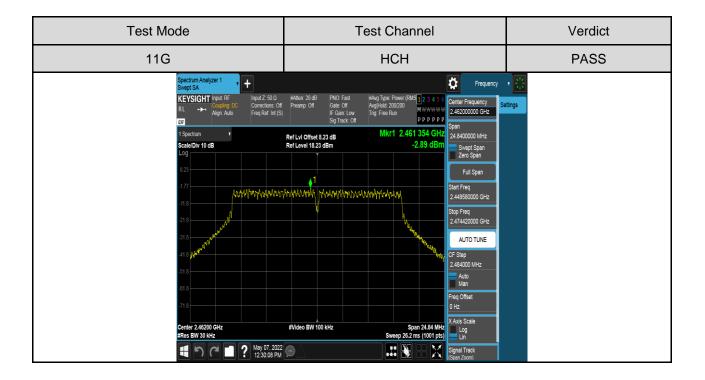






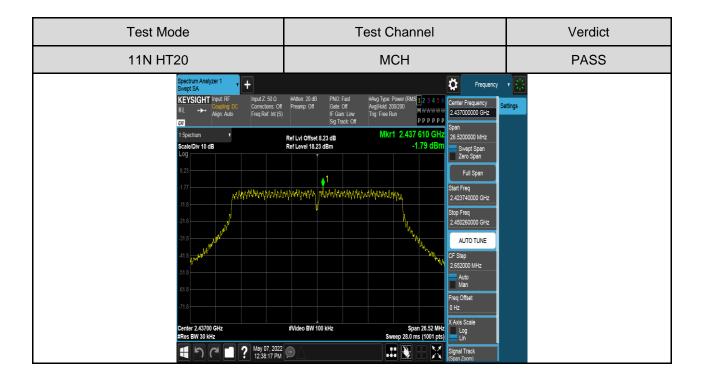


Test Mode	Test Channel	Verdict
11G	МСН	PASS
Spectrum Analyzer 1       +         Swept SA       Input RF         RL       →       Cometors Off         1 Spectrum       *         Scale/Div 10 dB       0         23       0         177       -         18       -         21       -         23       -         177       -         18       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         21       -         22       -         21       -         21       -         22       -         23       -         24       -	IF Gam. Low Sig Track off         Trig: Free Run         WWWWWW         243700000 GHz           Ref Lvi Offset 8.23 dB         Mkr1 2.436 379 GHz         Span         24840000 MHz           Ref Lvi Offset 8.23 dB         -2.49 dGm         24840000 MHz         Swept Span           Viet Level 18.23 dB         -2.49 dGm         24840000 MHz         Swept Span           Viet Level 18.23 dB         -2.49 dGm         Zero Span         Full Span           Viet Level 18.23 dB         -2.49 dGm         Swept Span         Zero Span           Viet Level 18.23 dB         -2.49 dGm         Swept Span         Zero Span           Viet Level 18.23 dB         -2.49 dGm         Start Freq         2.42460000 GHz           Start Freq         2.42460000 GHz         Start Freq         2.42460000 GHz           Viet Level 18.23 dB         -2.49 dGm         Start Freq         2.42460000 GHz           Viet Level 19.2         -2.49 dGm         -2.49 dGm         Zero Span           Viet Level 19.2         -2.49 dGm         -2.49 dGm         Zero Span           Viet Level 19.2         -2.49 dGm         -2.49 dGm         -2.49 dGm           Viet Level 19.2         -2.49 dGm         -2.49 dGm         -2.49 dGm           Viet Level 19.2         -2.49 dGm         -2.49 dGm <td>stings</td>	stings



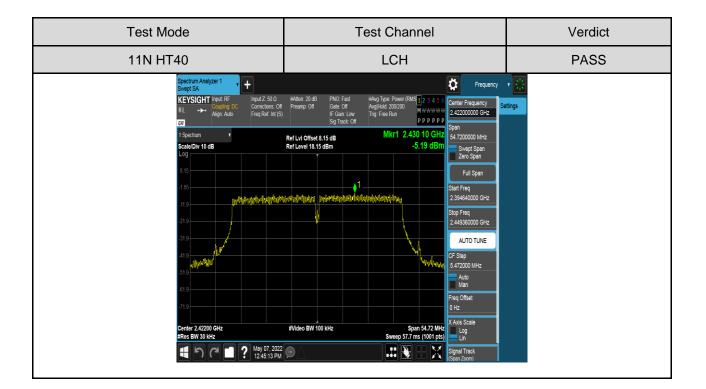


Test Mode	Test Channel	Verdict
11N HT20	LCH	PASS
Spectrum Analyzer 1       +         Snept SA       Input IP         KEYSIGHT Input IP       Input IP         RL       →         Agen Audo       Correctors. Off         I Spectrum       I         ScaleDiv 10 dB       I         Log       I         119       I         219       I         319       I         Center 2.41200 CHz       I         #Res BW 30 KHz       I         III Sector       IIII Sector         III Sector       IIII Sector         III Sector       IIII Sector         III Sector       IIII Sector         III Sector       IIIII Sector         III Sector       IIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIIII	IF Gan. Low Sig Track. Off         Trig: Free Run         WWWWWW         24/200000 GHz           Ref Lvi Offset 8.15 dB         Mkr1 2.412 G13 GHZ         26 540000 MHz           Ref Level 18.15 dB         -2.30 dBM         26 540000 MHz           J         -2.30 dBM         Sweet Span           Video BW 100 kHz         Span 28.64 MHz         Span 28.64 MHz           Svideo BW 100 kHz         Span 28.64 MHz         Ling	stings



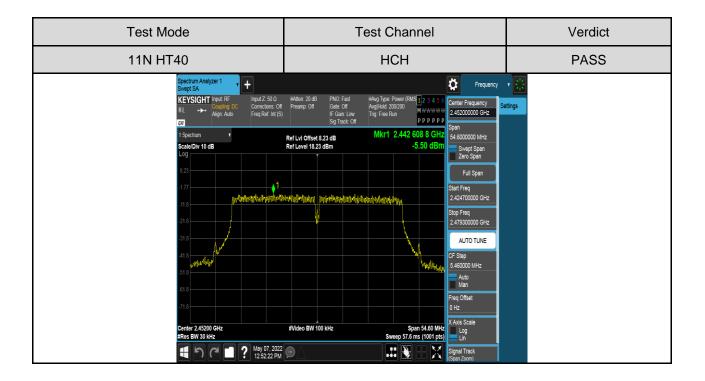


Test Mode	Test Channel	Verdict
11N HT20	НСН	PASS
Spectrum Analyzer 1       +         Snept SA       Input Z 50 0         RL       →       Align Auto         Tspectrum       *         Sade/Div 10 dB       0         Log       0         0.23       -         -177       -         -18       -         -18       -         -18       -         -18       -         -18       -         -18       -         -18       -         -18       -         -17       -         -18       -         -178       -         -18       -         -18       -         -178       -         -18       -         -178       -         -18       -         -178       -         -18       -         -178       -         -178       -         -178       -         -178       -         -178       -         -178       -         -178       -         -178       -         -	IF Gan. Low Sig Track. Off         Trig: Free Run         NUMMARY         2.45200000 GHz           Ref Lvi Offset 8.23 dB         Mkr1 2.462 611 GHZ         Span         26 580000 MHz           Ref Level 18.23 dB         -2.40 dBB         36 580000 MHz         Sweet Span           1         -2.40 dBB         Skeet Span         26 580000 MHz           1         -2.40 dBB         Skeet Span         26 580000 MHz           1         -2.40 dBB         Skeet Span         26 580000 GHz           1         -2.40 dBB         Skeet Span         2470 Span           2.448710000 GHz         Stop Freq         2.448710000 GHz           2.47520000 GHz         -47520000 GHz         Man           2.476 GBB	ettings





11N HT40	MCH	PASS
Scale/Div 10 dB         Ref Level           Log         8.23           4.77         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -           -11.8         -	Mit         Case of IFG San Low         Avgirkik 200000 Trig. Free Run         Merry Werw Werk P P P P P P P P P P P P P P P P P P Sonn         Sonn Sonn         Sonn Sonn         Sonn         Sonn <td>Time and the second se</td>	Time and the second se





# 7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

#### **LIMITS**

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	
FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	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 settings:

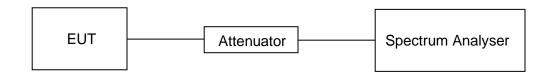
Center Frequency	The centre frequency of the channel under test
Detector	Peak
RBW	100 kHz
VBW	≥3 × RBW
Span	1.5 x DTS bandwidth
Trace	Max hold
Sweep time	Auto couple.

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	100 kHz
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



This report shall not be reproduced except in full, without the written approval of UL-CCIC COMPANY LIMITED.



#### **TEST ENVIRONMENT**

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

#### PART 1: REFERENCE LEVEL MEASUREMENT

#### TEST RESULTS TABLE

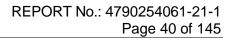
Test Mode	Test Channel	Result[dBm]
	LCH	7.75
11B	MCH	7.92
	HCH	7.56
	LCH	-0.14
11G	MCH	0.41
	HCH	0.02
	LCH	-0.08
11N HT20	MCH	0.48
	HCH	0.23
	LCH	-2.76
11N HT40	MCH	-2.88
	НСН	-2.57



## **TEST GRAPHS**

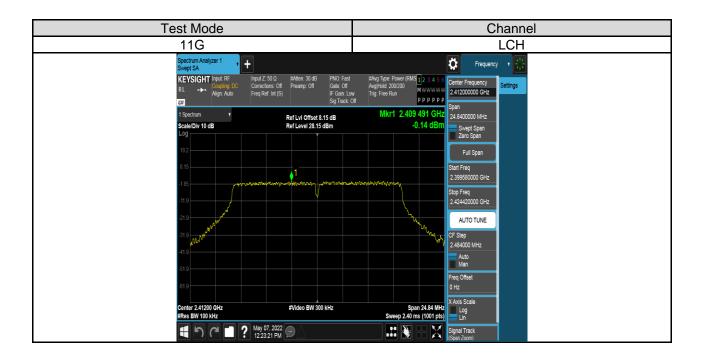






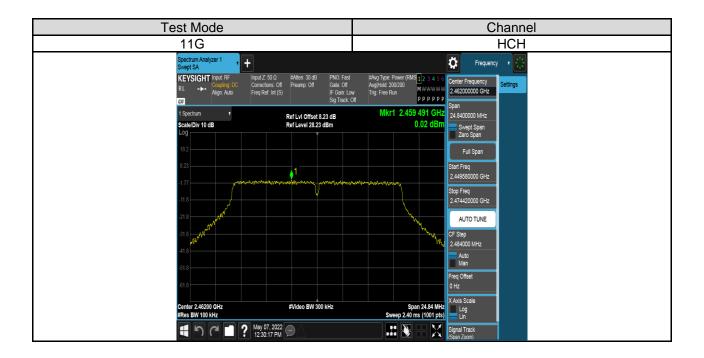


Test Mode		Channel
11B		НСН
onept on t	+	Frequency •
KEYSIGHT Input.RF RL →→ Cooping DC Align: Auto	Input Z 50 Ω #Atten: 30 dB PNO: Best V Corrections: Off Preamp: Off Gate: Off Freq Ref: Int (S) IF Gain: Low Sig Track: Ol	AvgHold:         200/200         Center / requercy         Settings           w         Trig: Flee Run         P <t< td=""></t<>
1 Spectrum  Scale/Div 10 dB Log	Ref Lvi Offset 8.23 dB Ref Level 28.23 dBm	Mkr1         2.462         502         GHz         Span           7.56         dBm         Swept Span         Swept Span           Zero Span         Zero Span         Swept Span
18.2		Ful Span
-1.77 March 1	mmmmm	Stat Freq 245522000 GHz Stop Freq
-118		2.468780000 GHz
-31.8		CF Step 1.356000 MHz
.518		Auto Man Freq Offset 0 Hz
Center 2.462000 GHz #Res BW 100 kHz	#Video BW 300 kHz	Span 13.56 MHz Sweep 1.33 ms (1007 pts)
	<b>?</b> May 07, 2022	Signal Track Signal Track





Test Mode		Char	nnel
11G		MCH	
Spectrum Analyzer 1 Swept SA	+	Frequency 🔻	5,5
KEYSIGHT Input RF RL → Coupung DC Align: Auto	Input Z: 50 Ω #Atten: 30 dB PNO: Fast Corrections: Off Preamp: Off Gate: Off Freq Ref: Int (S) IF Gain: Low Sig Track: Off	#Avg Type Power (RMS 1 2 3 4 5 6 Avg Hold 200200 Trig: Free Run P P P P P P	<b>35</b>
1 Spectrum v Scale/Div 10 dB Log	Ref Lvi Offset 8.23 dB Ref Level 28.23 dBm	Mkr1 2.434 491 GHz 0.41 dBm Swept Span Z4 8400000 MHz Swept Span	
18.2		Full Span	
8.23	1	Start Freq 2.424580000 GHz	
-11.8		Stop Freq 2.449420000 GHz	
-21.8 -31.8		AUTO TUNE CF Step	
41.8 51.9		2.484000 MHz	
-61.8		Freq Offset 0 Hz	
Center 2.43700 GHz #Res BW 100 kHz	#Video BW 300 kHz	Span 24.84 MHz Sweep 2.40 ms (1001 pts)	
	May 07, 2022	Signal Track (Span Zoom)	





Test Mode		Channel	
11N HT20		LCH	
Spectrum Analyzer 1 v +			
Coupling: DC Corre	Z 50 Ω #Atten: 30 dB PNO: Fast ctions: Off Preamp: Off Gate: Off Ref: Int (S) IF Gain: Low Sig Track: Off	Trig: Free Run РРРРРР 2.41200000 GHz	ttings
1 Spectrum + Scale/Div 10 dB Log	Ref LvI Offset 8.15 dB Ref Level 28.15 dBm	Mkr1 2.409 123 GHz -0.08 dBm Swept Span Zer Span	
18.2		Full Span	
8.15	1 Martine Martine Martine	Start Freq 2.398680000 GHz	
-11.9	A state of the second s	Stop Freq 2.425320000 GHz	
-21.9		AUTO TUNE CF Step	
41.9 Marth		CF Step 2.664000 MHz Auto	
-519		Man Freq Offset	
0.13		0 Hz X Axis Scale	
Center 2.41200 GHz #Res BW 100 KHz	#Video BW 300 kHz	Span 26.64 MHz Sweep 2.60 ms (1001 pts)	
	07, 2022 💬 🛆	Signal Track (Span Zoom)	





Test Mode	Channel	
11N HT20	НСН	
Spectrum Analyzer 1     Image: Comparison of the system of	Frequency         Frequency           Cale: Off         Avg1Hidd 200200         M:W:W:WW         2:3:4:5:6         Center Frequency         Settings           Figan.tow         Tig Free Run         M:W:W:WW         2:45:00000 GHz         Settings           Sig Track: Off         Sp p p p p         p p p p p         p p p p p         Span	
1 Spectrum v Ref LvI Offset 8.2 Scale/Div 10 dB Ref Level 28.23 d	dB Mkr1 2.459 103 GHz 26.5800000 MHz	
18 2 8 23 4 1	Full Span Star Freq 2.44871000 GHz	
-1.77 -11.8 -74.9	Stop Freq 2.475290000 GHz	
318 418 100000000000000000000000000000000000	CF Siep 2.655000 MHz Auto	
-51.8	Man Freq Offset 0 Hz	
Center 2.46200 GHz #Video BW 300 H #Res BW 100 KHz	Sweep 2.60 ms (1001 pts)	
<b>H D C I ?</b> May 07, 2022	Signal Track (Span Zoom)	





Test Mode		Channel	
11N HT40		MCH	
Spectrum Analyzer 1 Swept SA	<b>'</b> +	Frequency •	
KEYSIGHT Input.RF RL →→ Aign: Auto	Input Z: 50 Ω #Atten: 30 dB PNO: Fast Corrections: Off Preamp: Off Gate: Off Freq Ref: Int (S) IF Gain: Low Sig Track: O		
1 Spectrum ¥ ScaleDiv 10 dB Lög	Ref Lvi Offset 8.23 dB Ref Level 28.23 dBm	Mkr1         2.432         249         8 GHz         54 8000000 MHz           -2.88         dBm         Swept Span           Zero Span         Zero Span	
18.2		Full Span	
8 23	1	Start Freq 2.409700000 GHz	
-11.8		Stop Freq 2.464300000 GHz	
21.8		AUTO TUNE CF Step	
-41.8 ////////////////////////////////////		5.460000 MHz	
-51.8		Freq Offset 0 Hz	
Center 2.43700 GHz #Res BW 100 KHz	#Video BW 300 kHz	Span 54.60 MHz Sweep 5.27 ms (1001 pts)	
	May 07, 2022	III N III III III IIII IIII IIII	



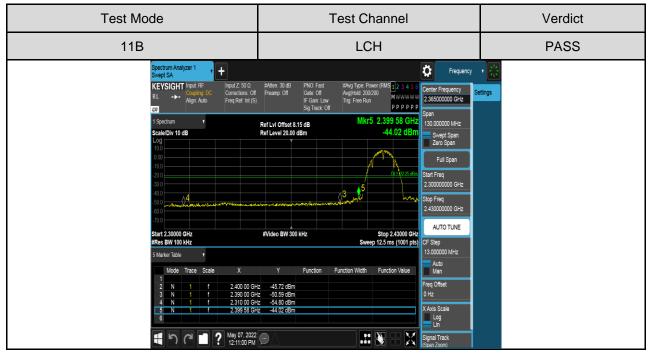
### PART 2: CONDUCTED BANDEDGE

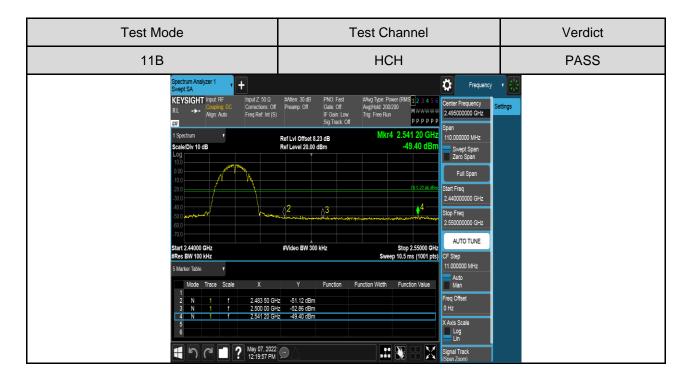
## TEST RESULTS TABLE

Test Mode	Test Channel	Result	Verdict
11B	LCH	Refer to the Test Graph	PASS
ПВ	HCH	Refer to the Test Graph	PASS
11G	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS
11N HT20	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS
11N HT40	LCH	Refer to the Test Graph	PASS
	HCH	Refer to the Test Graph	PASS



### **TEST GRAPHS**







Test Mode	Test Channel	Verdict
11G	LCH	PASS
Spectrum Analyzer 1         +           KEYSIGHT Input RF         Input RF           RL         →           Aign Auto         Contentions O           I Spectrum         I           Scale Div 10 dB         Log           100         0           000         0           100         0           100         0           110         1           111         1           111         1	(a)         IF Gam Low Sg Track Off         Trig Free Run         MWHWWWW         235500000 GHz           Sg Track Off         Sg Track Off         Sp P P P P P         Sp an           Ref Lui Offset 8.15 dB         Mkr5 2.39 97 GHz         130.000000 MHz           Ref Level 20.00 dBm         -34.10 dBm         Sweep t3an           Full         Full Span         Start Freq           2.4500000 GHz         Stop 2.4000 GHz           #Video BW 300 KHz         Stop 2.4000 GHz           Sweep 12.5 ms (1001 pb)         CF Step           1.0.00000 MHz         Auto           Y         Function           Y         Function Width           Function Width         Function Value           Y         Function Width           Feal Coll         DHz           XAvis Scale         Ling	etings

