

FCC 47 CFR PART 15 SUBPART C

CERTIFICATION TEST REPORT

For

Amcrest 1080P Wi-Fi Video Doorbell

MODEL NUMBER: AD110

ADDITIONAL MODEL NUMBER: AD110-EU; AD110-UK

PROJECT NUMBER: 4789451811

REPORT NUMBER: 4789451811-1

FCC ID: ZZ2-Z05

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Prepared for

Amcrest Technologies LLC

Prepared by

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Revision History

Rev.	Issue Date	Revisions	Revised By
V0	05/06/2020	Initial Issue	



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1. ATTESTATION OF TEST RESULTS

Applicant Information

Company Name: Address:	Amcrest Technologies LLC 16727 Park Row Dr, Houston, Texas, 77084
Manufacturer Information Company Name: Address:	Amcrest Technologies LLC 16727 Park Row Dr, Houston, Texas, 77084
Factory Information	
Company Name: Address:	ZHEJIANG DAHUA VISION TECHNOLOGY CO.,LTD. No.1199, Bin'an Road, Binjiang District, Hangzhou, P.R. China
Company Name: Address:	ZHEJIANG DAHUA ZHILIAN CO.,LTD. No. 28, Dongqiao Road, Dongzhou Street, Fuyang District, Hangzhou, P.R.China
EUT Description	
Product Name	Amcrest 1080P Wi-Fi Video Doorbell
Model Name	AD110
Additional No.	AD110-EU; AD110-UK 2962866
Sample Number Data of Receipt Sample	Mar. 20, 2020
Date Tested	Mar.21, 2019 ~ Apr. 27, 2020

APPLICABLE STANDARDS

STANDARD

TEST RESULTS

CFR 47 Part 15 Subpart C

PASS



	Summary of Test Results							
Clause	Test Items	FCC Rules	Test Results					
1	6dB Bandwidth	FCC Part 15.247 (a) (2)	Complied					
2	Conducted Output Power	FCC Part 15.247 (b) (3)	Complied					
3	Power Spectral Density	FCC Part 15.247 (e)	Complied					
4	Conducted Bandedge and Spurious Emission	FCC Part 15.247 (d)	Complied					
5	Radiated Bandedge and Spurious Emission	FCC Part 15.247 (d) FCC Part 15.209 FCC Part 15.205	Complied					
6	Conducted Emission Test For AC Power Port	FCC Part 15.207	Complied					
7	Antenna Requirement FCC Part 15.203 Complied							
Remark: 1) The measurement result for the sample received is <pass> according to < ANSI C63.10-2013,</pass>								

FCC CFR 47 Part 2, FCC CFR 47 Part 15C> when <Accuracy Method> decision rule is applied.

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Reviewed By:

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Authorized By:

Chris Zhong

Chris Zhong Laboratory Leader



2. TEST METHODOLOGY

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

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.
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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	3.00dB		
Radiation Emission test(include Fundamental emission) (9KHz-30MHz)	3.31dB		
Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	3.31dB		
Radiation Emission test (1GHz to 26GHz)(include Fundamental emission)	3.83dB (1GHz-18Gz)		
	4.13dB (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:	Amcrest 1080P Wi-Fi Video Doorbell
Model No.:	AD110
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 power grade:	40
Test software of EUT:	Secure CRT (manufacturer declare)
Antenna Type:	IFA Antenna
Antenna Gain:	1.28 dBi

Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	AD110	2	AD110-EU	3	AD110-UK

Only the main model AD110 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 model name and selling area are different.



5.2. MAXIMUM OUTPUT POWER

Number of Transmit Chains (NTX)	IEE Std. 802.11	Channel Number	Max Peak Conducted Power (dBm)	Max AVG Conducted Power (dBm)
1	IEEE 802.11B	1-11[11]	18.86	16.19
1	IEEE 802.11G	1-11[11]	18.45	10.70
1	IEEE 802.11nHT20	1-11[11]	18.58	10.65
1	IEEE 802.11nHT40	3-9[7]	N/A	9.12

5.3. CHANNEL LIST

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

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



5.4. TEST CHANNEL CONFIGURATION

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

5.5. THE WORSE CASE POWER SETTING PARAMETER

The Worse Case Power Setting Parameter under 2400 ~ 2483.5MHz Band								
Test Software				Secu	reCRT			
	Transmit		Test Channel					
Modulation Mode	Antenna	1	NCB: 20MH	lz	NCB: 40MHz			
Mode	Number	CH 1	CH 6	CH 11	CH 3	CH 6	CH 9	
802.11b	1	40	40	40				
802.11g	1	40	40	40	/			
802.11n HT20	1	40	40	40]			
802.11n HT40	1		/		40	40	40	



5.6. DESCRIPTION OF AVAILABLE ANTENNAS

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)	
1	2400-2483.5	IFA Antenna	1.28	

Remark: The antenna gain is provided by customer and our lab isn't responsible for it.

Test Mode	Transmit and Receive Mode	Description
IEEE 802.11b	⊠1TX, 1RX	The antenna can be used as transmitting/receiving antenna independently.
IEEE 802.11g	⊠1TX, 1RX	The antenna can be used as transmitting/receiving antenna independently.
IEEE 802.11N (HT20)	⊠1TX, 1RX	The antenna can be used as transmitting/receiving antenna independently.
IEEE 802.11N (HT40)	⊠1TX, 1RX	The antenna can be used as transmitting/receiving antenna independently.

5.7. THE WORSE CASE CONFIGURATIONS

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 802.11n HT40 mode: MCS0



5.8. TEST ENVIRONMENT

Environment Parameter	Selected Values During Tests				
Relative Humidity	55 ~ 65%				
Atmospheric Pressure:	1025Pa				
Temperature	TN	23 ~ 28°C			
	VL	N/A			
Voltage:	VN	AC 24V			
	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	n Equipment Brand Na		Model Name	Description	
1	Laptop	ThinkPad	E550c	N/A	

I/O PORT

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

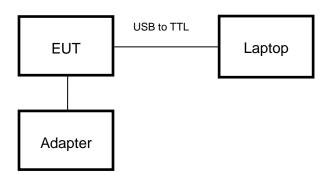
ACCESSORY

Item	Accessory Brand Name		Model Name	Description	
1	SD Card Kingston		32GB	Supply by UL Lab	
2	24V AC Adapter HK		HKA-A24300-230	Supply by UL Lab	

TEST SETUP

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

SETUP DIAGRAM FOR TESTS





5.10. 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	2018-12-13	2019-12-12	2020-12-11		
\checkmark	Two-Line V-Network	R&S	ENV2	16	126701	2018-12-13	2019-12-12	2020-12-11		
\checkmark	Artificial Mains Networks	R&S	ENY8	31	126711	2018-12-13	2019-12-12	2020-12-11		
Software										
Used	Des	cription		Ma	nufacturer	Name	Version			
\checkmark	Test Software for (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.		
\checkmark	Spectrum Analyzer	Keysight	N901		MY57110128	2018-05-30	2019-05-29	2020-05-28		
V	EMI test receiver	R&S	ESR2	26	1267603	2018-12-13	2019-12-22	2020-12-21		
	Receiver Antenna (9kHz-30MHz)	Schwarzbeck	FMZB 1	513	513-265	2018-06-17	2019-06-16	2020-06-15		
	Receiver Antenna (30MHz-1GHz)	SunAR RF Motion	JB1		126704	N/A	2019-01-28	2022-01-27		
\checkmark	Receiver Antenna (1GHz-18GHz)	R&S	HF90)7	126705	2019-01-26	2020-01-26	2021-01-25		
\checkmark	Receiver Antenna (18GHz-26.5GHz)	Schwarzbeck	BBHA9	170	126706	2019-02-06	2020-02-05	2021-02-04		
\checkmark	Receiver Antenna (26.5GHz-40GHz)	ΤΟΥΟ	HAP 26-	40W	00000012	2018-07-25	2019-07-23	2020-07-22		
	Pre-amplification (To 1GHz)	R&S	SCU-0	3D	134666	2019-02-06	2020-02-05	2021-02-04		
	Pre-amplification (To 18GHz)	Compliance Direction System Inc.	PAP-1G	18-50	14140-13467	2019-03-18	2020-03-17	2021-03-16		
	Pre-amplification (To 26.5GHz)	R&S	SCU-2	26D	134668	2019-02-06	2020-02-05	2021-02-04		
V	Band Reject Filter	Wainwright	WRCJ 2350-24 2483.5-25 40S5	400- 533.5- S	1	2018-05-30	2019-05-29	2020-05-28		
V	Highpass Filter	Wainwright	WHKX 2700-30 18000-4	-000	2	2018-05-30	2019-05-29	2020-05-28		
				Soft	ware					
Used	Desci	ription	Ma	nufac	turer	Name	Version			
\checkmark	Test Software for R	adiated disturbar	I	Tonsce		JS32	V1.0			
			Oth	er ins	truments					
Used	Equipment	Manufacturer	Model	No.	Serial No.	Upper Last Cal.	Last Cal.	Next Cal.		
\checkmark	Spectrum Analyzer	Keysight	N901	0B	MY57110128	2018-05-30	2019-05-29	2020-05-28		
\checkmark	Power Meter	Keysight	U2021	XA	MY57110002	2018-06-13	2019-06-12	2020-06-11		

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

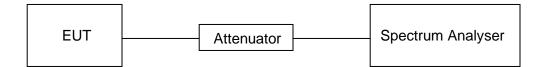
<u>LIMITS</u>

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 24V

RESULTS

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (kHz)
11B	40	40	1	100%	0	0.025
11G	40	40	1	100%	0	0.025
802.11n HT20	40	40	1	100%	0	0.025
802.11n HT40	40	40	1	100%	0	0.025

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

2) Where: x is Duty Cycle (Linear)

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

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	11B	ON TIME	AND D	UTY CYCL	E MID C	H (WORSE	CASE)	
Spectrum Anal Swept SA	yzer 1	F					Frequency	/ ▼₩
KEYSIGHT RL +>-	Input: RF Coupling: DC Align: Auto/No RF	Input Ζ: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Run	wer (RMS <mark>1</mark> 23456 W WWWW A A A A A A	2.437000000 GHz	Settings
1 Spectrum Scale/Div 10 o Log 13.0	iB		Ref Level 23.0	00 dBm			Span 0.00000000 Hz Swept Span Zero Span	
3.00 -7.00 -17.0 -27.0 -37.0							Full Span Start Freq .2.437000000 GHz	
-37.0 -47.0 -57.0 -67.0 Center 2.4370			#Video BW 8.	0 MLI-*		Shan 0 lin	Stop Freq 2.437000000 GHz	
Res BW 8 MH		X	#VIdeo BW 8.1		Sween	Span 0 Hz 0 40.00 ms (8001 pts) Function Value	CF Step 8.000000 MHz Auto Man	
1 2 3 4							Freq Offset 0 Hz X Axis Scale	
	<	Mar 21, 2020 12:34:13 PM					Log Lin Signal Track (Span Zoom)	

	11G	ON TIME	AND D	JTY CYCL	E MID C	H (WORSE	CASE)	
Spectrum Ana Swept SA	alyzer 1 🛛 🔻 🗖	ł					Frequency	· • 👯
KEYSIGH RL ↔→•	Courling DO	Input Ζ: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Run	wer(RMS <mark>1</mark> 23456 W WWWW AAAAAA	2.437000000 GHZ	Settings
1 Spectrum Scale/Div 10 Log 13.0 -7.00 -17.0 -27.0 -37.0 -47.0 -57.0	dB		Ref Level 23.0	0 dBm			Span 0.00000000 Hz Swept Span Full Span Start Freq 2.437000000 GHz Stop Freq 2.437000000 GHz	
- 37.0 -67.0 Center 2.437 Res BW 8 MI 5 Marker Table Mode	Ηz	×	#Video BW 8.0		Sweep Function Width	Span 0 Hz 9 40.00 ms (8001 pts) Function Value		
	C . ?	Mar 21, 2020 12:41:06 PM					Freq Offset 0 Hz X Axis Scale Lin Signal Track (Saan Zoom)	



	11N (HT	20) ON T	IME AND	DUTY C	YCLE MI	D CH (WOR	SE CASE)	
Spectrum Anal Swept SA	yzer 1 ү 🖣	F					Frequency	· · · 👬
KEYSIGHT RL ↔→→	Input: RF Coupling: DC Align: Auto/No RF	Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Po Trig: Free Run	wer (RMS <mark>1</mark> 23456 W\#\#\#\# AAAAAA	Center Frequency 2.437000000 GHz	Settings
1 Spectrum Scale/Div 10 o	v ∃B		Ref Level 23.00				Span 0.00000000 Hz Swept Span Zero Span	
13.0 3.00 -7.00 -17.0				ne den e rigen e Renderjohn - Kengelage ber			Full Span Start Freq	
-27.0 -37.0 -47.0							2.437000000 GHz Stop Freq 2.437000000 GHz	
-57.0 -67.0 Center 2.4370 Res BW 8 MH			#Video BW 8.0	MHz*	Succe	Span 0 Hz 0 40.00 ms (8001 pts)	AUTO TUNE	
5 Marker Table	z v Trace Scale	X	Y	Function	Function Width	Function Value	8.000000 MHz Auto Man	
1 2 3							Freq Offset 0 Hz	
4 5 6							X Axis Scale Log Lin	
1	C 🗌 ?	Mar 21, 2020 12:48:21 PM	\square				Signal Track (Span Zoom)	

Spectrum Anal Swept SA	yzer 1	•	+						Frequer	1cy 🔻 洪
KEYSIGHT RL ↔→ I	Couplin	:F g: DC .uto/No RF	Input Ζ: 50 Ω Corrections: Off Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Pow Trig: Free Run	W	2 3 4 5 6 WWWWW A A A A A	Center Frequency 2.437000000 GHz Span	Settings
1 Spectrum Scale/Div 10 c Log 13.0	IB			Ref Level 23.	00 dBm				0.00000000 Hz Swept Span Zero Span	
3.00 -7.00 -17.0 -27.0 -37.0									Full Span Start Freq 2.437000000 GHz	
-47.0 -57.0 -67.0									Stop Freq 2.437000000 GHz AUTO TUNE	
Center 2.4370 Res BW 8 MH		Hz		#Video BW 8	.0 MHz*	Sweep		Span 0 Hz (8001 pts)	CF Step	
	Trace	▼ Scale	Х	Y	Function	Function Width	Function	i Value	8.000000 MHz Auto Man	
2 3 4									Freq Offset 0 Hz	
5									X Axis Scale Log	



7.2. 6 dB BANDWIDTH

LIMITS

FCC Part15 (15.247) Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	
CFR 47 FCC 15.247(a)(2)	6 dB Bandwidth	≥ 500KHz	2400-2483.5	

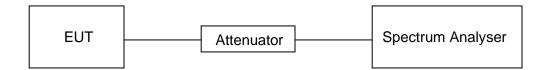
TEST PROCEDURE

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	For 6dB Bandwidth :100kHz
VBW	For 6dB Bandwidth : ≥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	10.06	15.057	Pass
11B	MCH	10.06	15.003	Pass
	HCH	10.04	15.008	Pass
	LCH	16.58	16.693	Pass
11G	MCH	16.57	16.672	Pass
	HCH	16.58	16.674	Pass
	LCH	17.81	17.828	Pass
11n HT20	MCH	17.80	17.815	Pass
	HCH	17.81	17.835	Pass
	LCH	36.41	36.265	Pass
11n HT40	MCH	36.40	36.204	Pass
	HCH	36.42	36.271	Pass



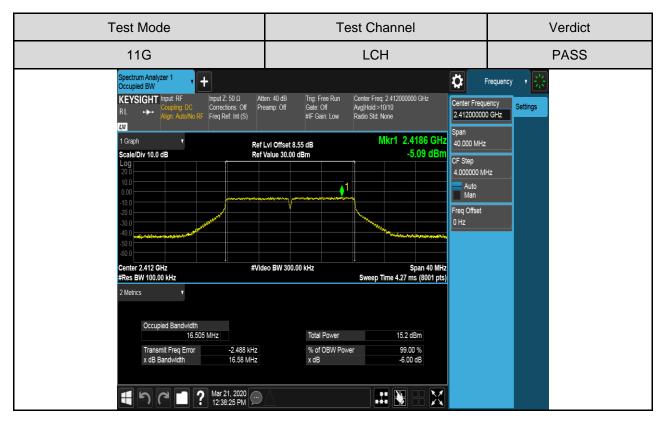
Test Graphs



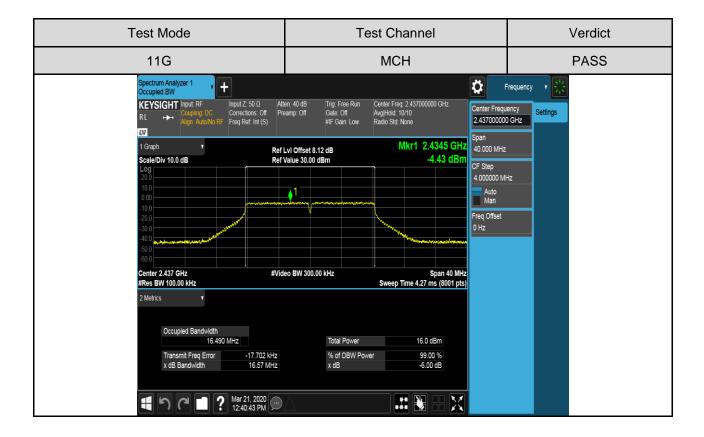


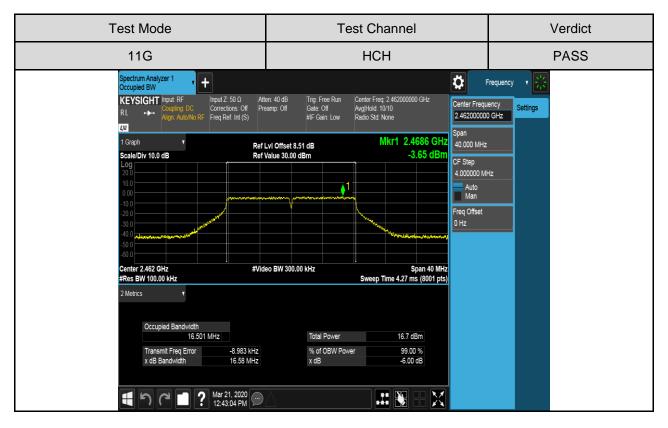




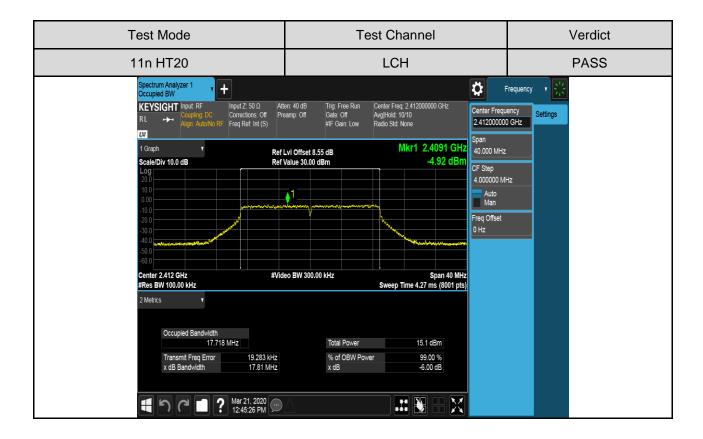


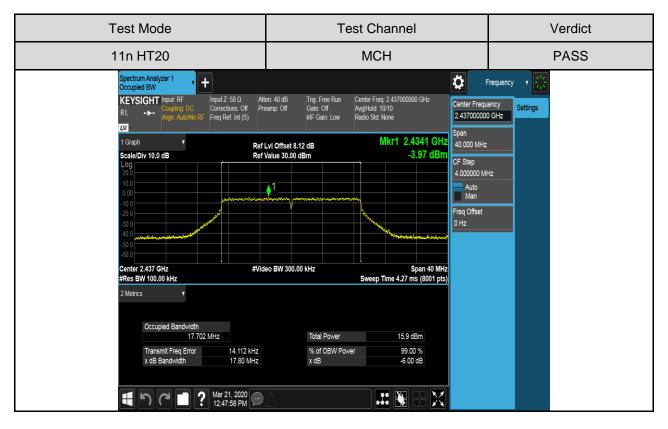




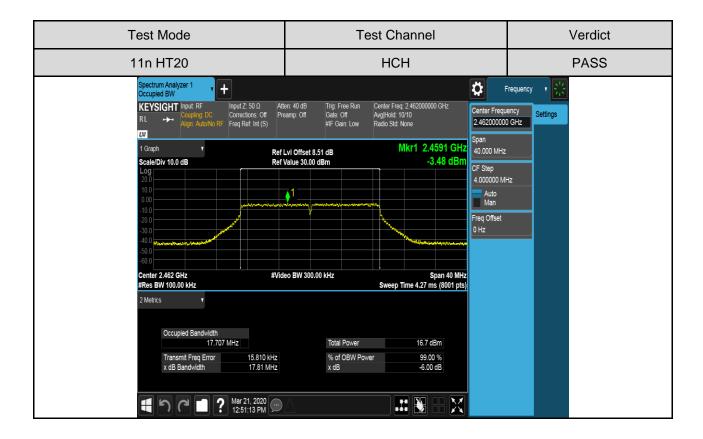






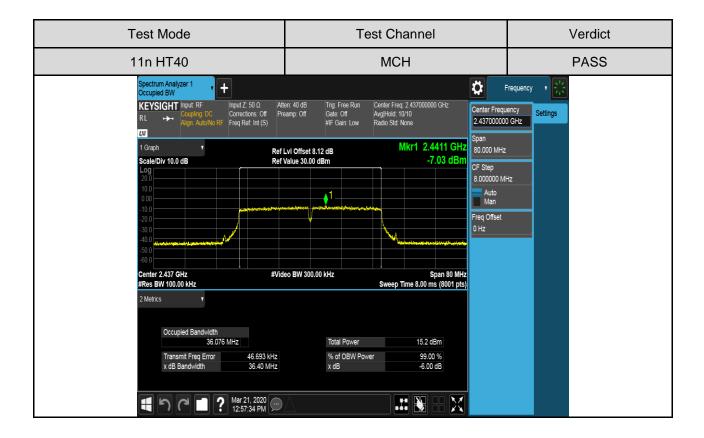


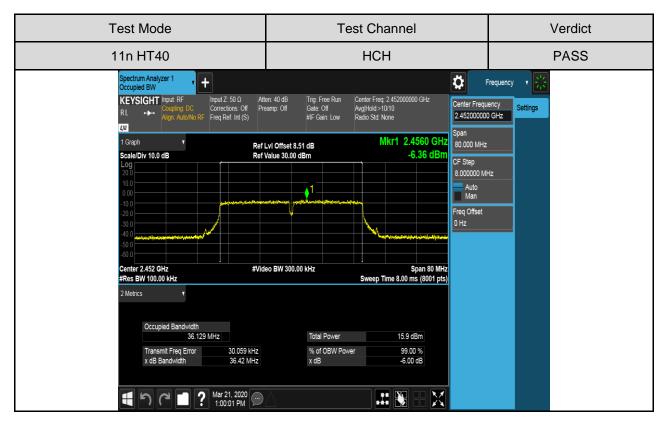




Test Mode	Те	st Channel	Verdict
11n HT40		LCH	PASS
Spectrum Analyzer 1 Cccupied BW KEYSIGHT Input RF RL KEYSIGHT Input RF Couping: DC Correcti Align: AutoNo RF Freq Re CV Scale/Div 10.0 dB	ons: Off Preamp: Off Gate: Off	Center Freq: 2.42200000 GHz Avg Hold: 10/10 Radio Std: None Mkr1 2.4301 GHz -7.57 dBm	100 GHz
Log 200 10.0 -000 -300 -300 -60.0 Center 2.422 GHz #Res BW 100.00 KHz	#Video BW 300.00 kHz	CF Step 8.00000 Auto Man Freq Offse 0 Hz Span 80 MHz Sweep Time 8.00 ms (8001 pts)	
2 Metrics Coccupied Bandwidth 36.088 MHz Transmit Freq Error x dB Bandwidth	Total Power 43.463 kHz % of OBW Power 36.41 MHz x dB 1, 2020	14.8 dBm	









7.3. CONDUCTED OUTPUT POWER

<u>LIMITS</u>

FCC Part15 (15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	
CFR 47 FCC 15.247(b)(3)	Output Power	1 watt or 30dBm	2400-2483.5	

Note: For b/g/n HT20 mode the average data is for reference only.

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.

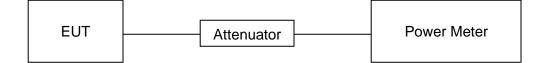
Peak Detector used for Peak result.

AVG Detector used for AVG result.

TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 24V

TEST SETUP





RESULTS

Test Mode	Test Channel	Maximum Conducted Output Power (PK)	Maximum Conducted Output Power (AV)	LIMIT
		dBm	dBm	dBm
	LCH	17.41	14.72	30
11B	MCH	18.19	15.39	30
	НСН	18.86	16.19	30
	LCH	16.95	9.23	30
11G	MCH	17.72	9.87	30
	HCH	18.45	10.70	30
	LCH	17.09	9.18	30
11n HT20	MCH	17.84	9.81	30
	HCH	18.58	10.65	30
	LCH	N/A	7.91	30
11n HT40	MCH	N/A	8.41	30
	HCH	N/A	9.12	30



7.4. POWER SPECTRAL DENSITY

LIMITS

FCC Part15 (15.247), Subpart C				
Section	Test Item	Limit	Frequency Range (MHz)	
CFR 47 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.

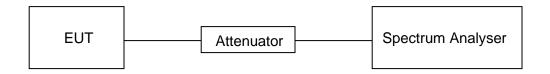
Allow trace to fully stabilize and use the peak marker function to determine the maximum amplitude level within the RBW.

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 24V

TEST SETUP





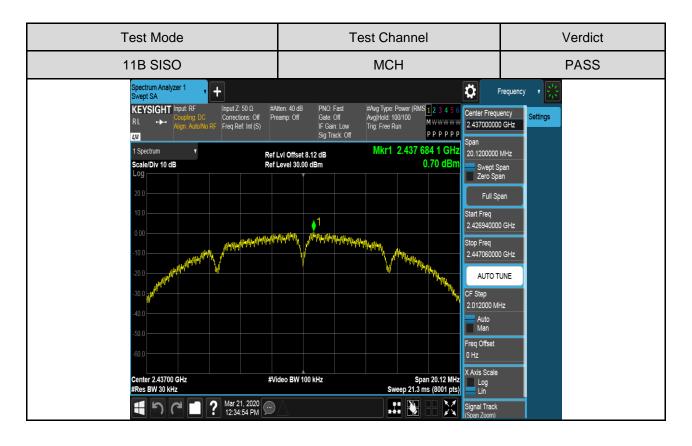
RESULTS

Test Mode	Test Channel	Maximum Peak power spectral density (dBm/30kHz)	Result
	LCH	-0.14	Pass
11B	MCH	0.70	Pass
	HCH	1.39	Pass
	LCH	-7.70	Pass
11G	MCH	-7.06	Pass
	HCH	-6.36	Pass
	LCH	-7.37	Pass
11n HT20	MCH	-6.52	Pass
	HCH	-5.89	Pass
	LCH	-10.89	Pass
11n HT40	MCH	-10.11	Pass
	HCH	-9.54	Pass

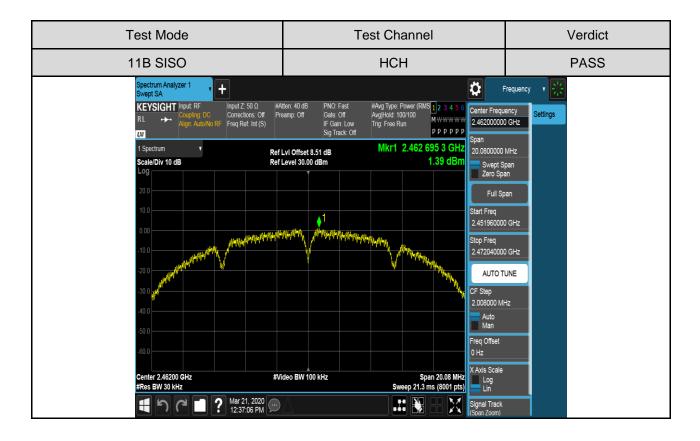


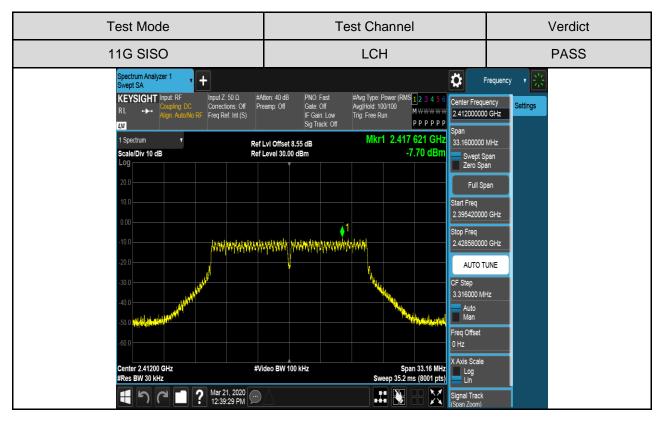
Test Graphs:



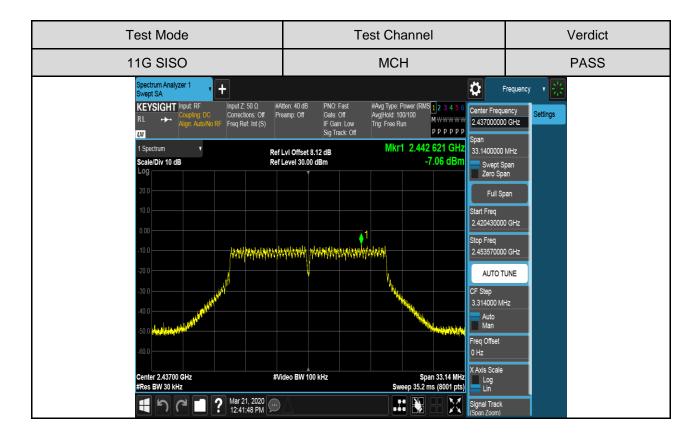


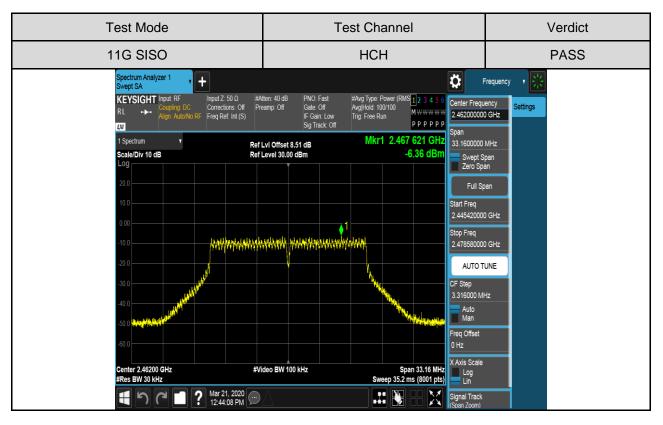




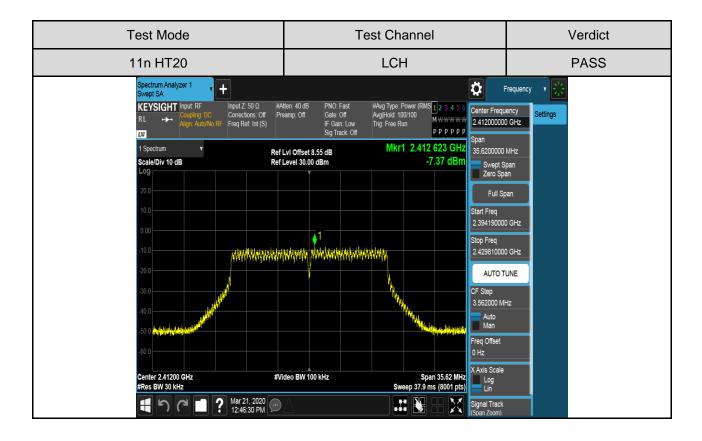


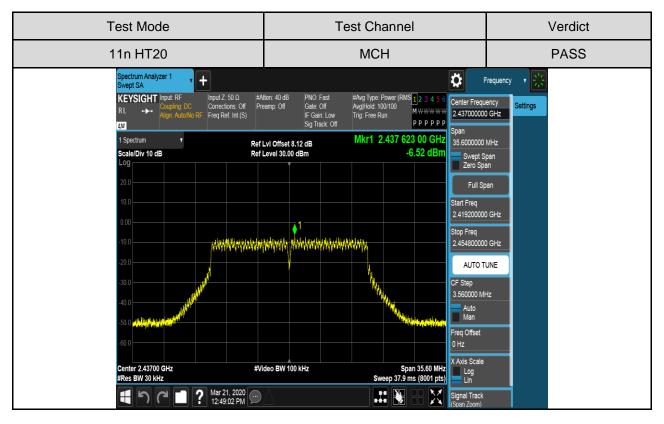




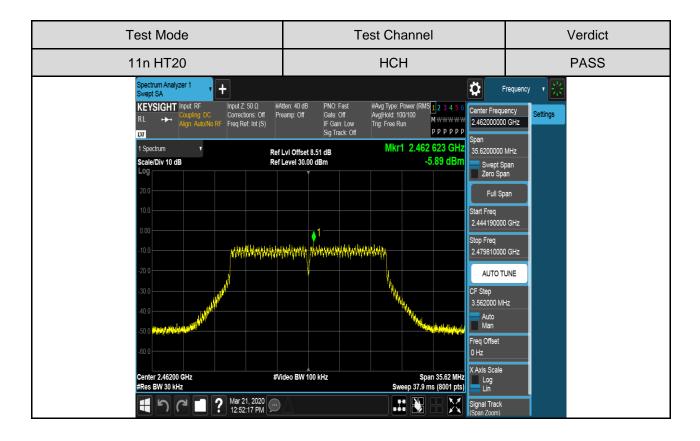


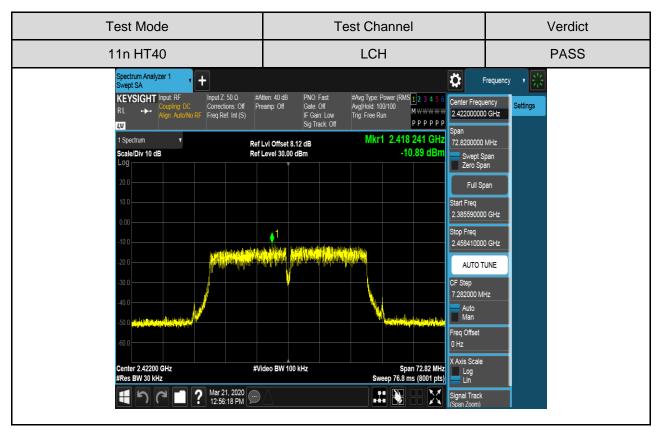






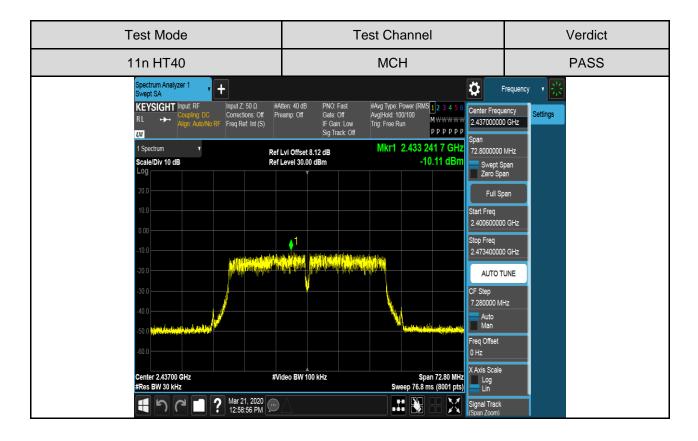


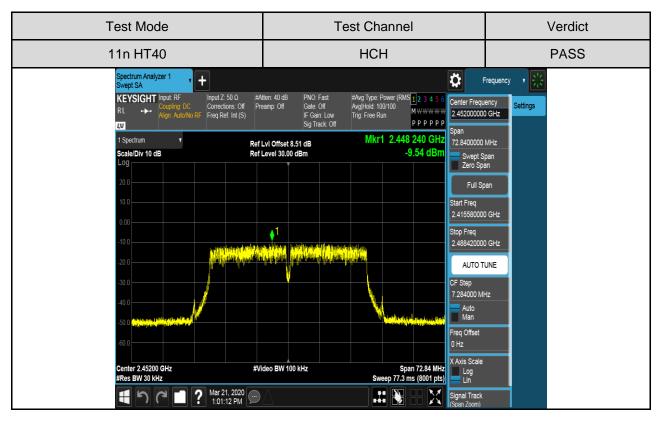




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7.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

LIMITS

FCC Part15 (15.247), Subpart C			
Section	Test Item	Limit	
CFR 47 FCC §15.247 (d)	Conducted Bandedge and Spurious Emissions	For b/g/n HT20 modes: at least 20 dB below that in the 100 kHz bandwidth within the band that contains the highest level of the desired power For HT40 mode: 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

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

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

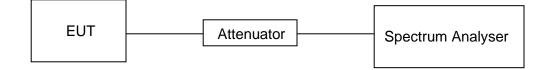
Use the peak marker function to determine the maximum PSD level.

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

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



TEST SETUP



TEST ENVIRONMENT

Temperature	22°C	Relative Humidity	56%
Atmosphere Pressure	101kPa	Test Voltage	AC 24V

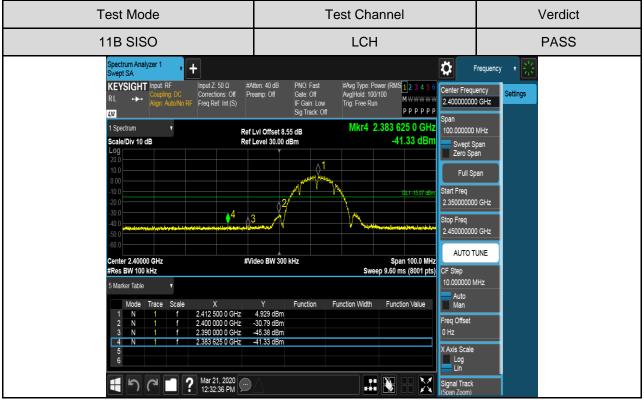
Part I :Conducted Bandedge

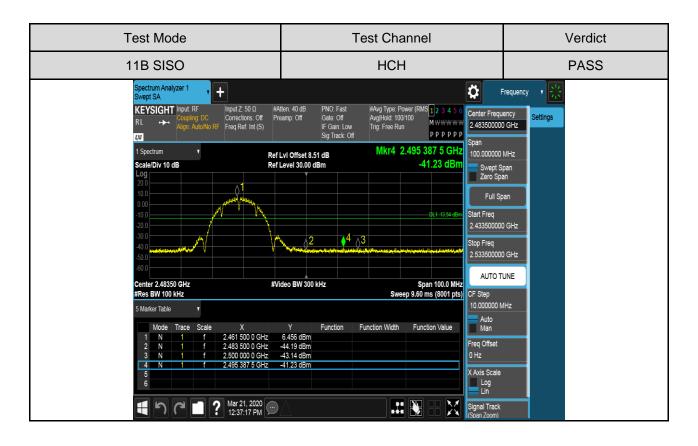
RESULTS TABLE

Test Mode	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B	LCH	4.929	-41.33	-15.07	PASS
ПВ	НСН	6.456	-41.23	-13.54	PASS
110	LCH	-5.118	-41.94	-25.12	PASS
11G	НСН	-3.695	-41.21	-23.70	PASS
11N HT20	LCH	-5.056	-41.41	-25.06	PASS
TIN HIZU	HCH	-3.463	-41.04	-23.46	PASS
	LCH	-7.480	-42.11	-37.48	PASS
11N HT40	НСН	-6.248	-41.14	-36.25	PASS



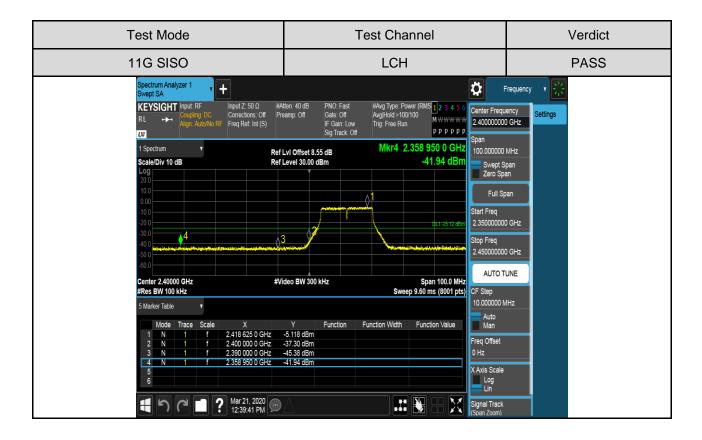
TEST GRAPHS





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Test Mode	Test Channel	Verdict
11G SISO	НСН	PASS
RL Coupling DC Align Automo RF Corrections: Off Freq Ref. Int (S) I Spectrum I I Spectrum Ref Scale/Div 10 dB Ref Log I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 0 I 1 N 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 I 1 1 <td>tten: 40 dB PNO. Fast #Avg Type: Power (RMS) 2 3 4 5 6 eamp. Off Gate: Off AvgHold: 100/100 Trig: Free Run JE Cain: Low Trig: Free Run P P P P P P Lvi Offset 8.51 dB 44.2483 750 0 GHz Level 30.00 dBm 41.21 dBm 4 3 d4 3 d5 50 mm d4 3 d4 3 d5 Span 100.0 MHz Sweep 9.60 ms (8001 pts) Y Function 43.46 dBm 42.49 dBm 41.21 dBm</td> <td>Span 100.000000 MHz Swept Span Zero Span Full Span Full Span Start Freq 2.433500000 GHz Stop Freq 2.533500000 GHz</td>	tten: 40 dB PNO. Fast #Avg Type: Power (RMS) 2 3 4 5 6 eamp. Off Gate: Off AvgHold: 100/100 Trig: Free Run JE Cain: Low Trig: Free Run P P P P P P Lvi Offset 8.51 dB 44.2483 750 0 GHz Level 30.00 dBm 41.21 dBm 4 3 d4 3 d5 50 mm d4 3 d4 3 d5 Span 100.0 MHz Sweep 9.60 ms (8001 pts) Y Function 43.46 dBm 42.49 dBm 41.21 dBm	Span 100.000000 MHz Swept Span Zero Span Full Span Full Span Start Freq 2.433500000 GHz Stop Freq 2.533500000 GHz

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Test Mode	Test Channel	Verdict
11n HT20	НСН	PASS
RL Coupling DC Corrections: Off Preamp: Off G RL ++ Coupling DC Corrections: Off Preamp: Off G Ispectrum Ref Lvl Offset 8.51 dl Scale/Div 10 dB Ref Level 30.00 dBm Coup 200 200 200 200 200 200 200 20	N0: Fast #Avg Type: Power (RMS 1 2 3 4 5 6 AvgIHold: 100100 Trig: Free Run P P P P P P B Mkr4 2.4844 437 5 GHz -41.04 dBm Gain: Low d Mkr4 2.484 437 5 GHz -41.04 dBm Gain Low d Mkr4 2.485 6 GHz -41.04 GHz -41.04 GHz -41.04 GHz -41.04 GHz -4	0 GHz pan 0 GHz 0 GHz UNE MHz





Test Mode	Test Channel	Verdict
11n HT40	НСН	PASS
RL Couping DC Corrections: Off Preventions: Off 1 Spectrum • Ref Scale/Div 10 dB • Ref 100 • • Ref 100 • • Ref 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 000 • • • 1 N 1 f 2.480 102 5 GHz	tten: 40 dB amp Off Gate Off Fig Cain: Low Sig Track: Off Lvi OffSet 8.51 dB Level 30.00 dBm 41.14 dBm 2 2 4 4 4 2 4 4 5 6 MWr4 2.489 250 0 GHz -41.14 dBm 0(1-3; 25 dBm -41.14 dBm 0(1-3; 25 dBm -41.14 dBm	2-400500000 GHz Span 100.000000 MHz Zero Span Full Span Start Freq 2.433500000 GHz Stop Freq 2.533500000 GHz AUTO TUNE

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Part II :Conducted Emission

Test Result Table				
Test Mode	Channel	Pref(dBm)	Puw(dBm)	Verdict
_	LCH	4.87	<limit< td=""><td>PASS</td></limit<>	PASS
11B	MCH	5.73	<limit< td=""><td>PASS</td></limit<>	PASS
	HCH	6.40	<limit< td=""><td>PASS</td></limit<>	PASS
	LCH	-5.13	<limit< td=""><td>PASS</td></limit<>	PASS
11G	MCH	-4.43	<limit< td=""><td>PASS</td></limit<>	PASS
	HCH	-3.71	<limit< td=""><td>PASS</td></limit<>	PASS
	LCH	-5.06	<limit< td=""><td>PASS</td></limit<>	PASS
11n HT20	MCH	-4.14	<limit< td=""><td>PASS</td></limit<>	PASS
	HCH	-3.49	<limit< td=""><td>PASS</td></limit<>	PASS
	LCH	-7.64	<limit< td=""><td>PASS</td></limit<>	PASS
11n HT40	MCH	-7.43	<limit< td=""><td>PASS</td></limit<>	PASS
	HCH	-6.66	<limit< td=""><td>PASS</td></limit<>	PASS

Test Plots

Test Mode	Channel	Verdict
11B	LCH	PASS

Pref test Plot



Puw test Plot

