

## FCC 47 CFR PART 15 SUBPART C

## **CERTIFICATION TEST REPORT**

For

## **CONSUMER CAMERA**

MODEL NUMBER: DH-IPC-G26P, IPC-G26P, DH-IPC-G26N, IPC-G26N, TF2, DH-IPC-G26, IPC-G26

## PROJECT NUMBER: 4788109955

**REPORT NUMBER: 4788109955-5** 

FCC ID: SVNDH-IPC-GX6

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Prepared for

Zhejiang Dahua Vision Technology Co., Ltd.

Prepared by

UL Verification Services (Guangzhou) Co., Ltd, Song Shan Lake Branch Room 101, Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China Tel: +86 769 33817100 Fax: +86 769 33244054 Website: www.ul.com

## **Revision History**

Rev.	Issue Date	Revisions	Revised By
	12/10/2017	Initial Issue	

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# **1. ATTESTATION OF TEST RESULTS**

Applicant Information	
Company Name:	Zhejiang Dahua Vision Technology Co., Ltd.
Address:	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.
Factory Information	
Company Name:	ZHEJIANG DAHUA VISION TECHNOLOGY CO.,LTD
Address:	No.1199, Bin'an road, Binjiang District, Hangzhou, P.R.China.
Company Name:	ZHEJIANG DAHUA ZHILIAN CO.,LTD.
Address:	No.28, Dongqiao Road, Dongzhou Street, Fuyang District, Hangzhou,P.R.China.
EUT Description	<b>0</b>
Product Name	CONSUMER CAMERA
Model Name	DH-IPC-G26P
Additional No.	IPC-G26P, DH-IPC-G26N, IPC-G26N, TF2, DH-IPC-G26, IPC-G26
Sample Number	1155429-001
Data of Receipt Sample	Aug 11, 2017
Date Tested	Aug 15, 2017 ~ Dec. 8, 2017

## APPLICABLE STANDARDS

STANDARD

TEST RESULTS

CFR 47 Part 15 Subpart C

PASS

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Summary of Test Results						
Clause	Test Items	FCC/IC Rules	Test			
1	6db DTS Bandwidth	FCC 15.247 (a) (2)	Complied			
2	Peak Conducted Power	FCC 15.247 (b) (3)	Complied			
3	Power Spectral Density	FCC 15.247 (e)	Complied			
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	6 Conducted Emission Test For AC Power Port FCC 15.207 Complied					
7	7 Antenna Requirement FCC 15.203 Complied					
Remark: For this product, it has two antennas, antenna1 and antenna2, the 802.11B SISO&802.11G SISO modes are use the SISO technical, the 802.11N20&802.11N40 are use the MIMO technical.						

Tested By:

Ven Bucu

Denny Huang Engineer Project Associate Approved By:

ephenous

Check By:

Sherry les

Shawn Wen Laboratory Leader

Stephen Guo Laboratory Manage

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# 2. TEST METHODOLOGY

The tests documented in this report were performed in accordance with FCC KDB 558074 D01 DTS Meas Guidance v04, ANSI C63.10-2013, FCC CFR 47 Part 2, FCC CFR 47 Part 15.

# 3. FACILITIES AND ACCREDITATION

Test Location	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch.
Address	Building 10, Innovation Technology Park, Song Shan Lake Hi tech Development Zone, Dongguan, 523808, China
Accreditation Certificate	UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been accredited by A2LA for technical competence in the field of electrical testing, and proved to be in compliance with ISO/IEC 17025: 2005 General Requirements for the Competence of Testing and Calibration Laboratories and any additional program requirements in the identified field of testing. The Certificate Registration Number is 4102.01. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Federal Communications Commission). The Designation Number is CN1187. UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch. EMC Laboratory has been registered and fully described in a report filed with the FCC (Sederal Communications Commission).

Note: The test anechoic chamber in UL Verification Services (Guangzhou) Co., Ltd. Song Shan Lake Branch had been calibrated and compared to the open field sites and the test anechoic chamber is shown to be equivalent to or worse case from the open field site.

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# 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		
Uncertainty for Conduction emission test	2.90dB		
Uncertainty for Radiation Emission test(include Fundamental emission) (30MHz-1GHz)	4.52dB		
Uncertainty for Radiation Emission test	5.04dB(1-6GHz)		
(1GHz to 26GHz)( include Fundamental	5.30dB (6GHz-18Gz)		
emission)	5.23dB (18GHz-26Gz)		
Note: This uncertainty represents an expanded uncertainty expressed at approximately the 95% confidence level using a coverage factor of k=2.			

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# 5. EQUIPMENT UNDER TEST

# 5.1. DESCRIPTION OF EUT

Product Name:	CONSUMER CAMERA				
Model No.:	DH-IPC-G26P				
Operating Frequency:	IEEE 802.11B SIS	SO/g/n(HT20): 2412MHz to 2462MHz			
	IEEE 802.11n(HT	40): 2422MHz to 2452MHz			
Type of Modulation:		SISO: DSSS (CCK, DQPSK, DBPSK)			
	IEEE for 802.11G	SISO: OFDM (64QAM, 16QAM, QPSK, BPSK)			
	IEEE for 802.11n	(HT20 and HT40): OFDM (64QAM, 16QAM, QPSK, BPSK)			
Channel Number:	IEEE 802.11B SIS	SO/g, IEEE 802.11n(HT20): 11 Channels			
	IEEE 802.11n(HT40): 7 Channels				
Channels Step:	Channels with 5MHz step				
Sample Type:	Fixed production				
Test power grade:	Antenna1:28 (manufacturer declare)				
	Antenna2:24 (ma	nufacturer declare)			
Test software of EUT:	Secure CRT (mar	nufacturer declare)			
Antenna Type:	External Antenna				
Antenna Gain:	Antenna 1: 1 dBi				
	Antenna 2: 1 dBi				
Power Supply	Supply Adapter Model:ADS-12AM-12 12012EPCU				
		INPUT:100-240V~50/60Hz Max.0.3A			
		OUTPUT:12.0V 1.0A			

### Remark:

Model No.:

Number:	Name:	Number:	Name:	Number:	Name:
1	DH-IPC-G26P	2	IPC-G26P	3	DH-IPC-G26N
4	IPC-G26N	5	TF2	6	IPC-G26
7	DH-IPC-G26				

Only the main model **DH-IPC-G26P** was tested and only the data of this model is shown in this test report. Since the electrical circuit design, layout, components used and internal wiring were identical for the above models, with difference being of **only the sales area.** 

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# 5.2. MAXIMUM OUTPUT POWER

Frequency Range (MHz)	Number of Transmit Chains (NTX)	IEE Std. 802.11	Frequency (MHz)	Channel Number	Max PK Conducted Power-Antenna 1 (dBm)	Max PK Conducted Power- Antenna 2 (dBm)
2400-2483.5	1/2	IEEE 802.11B SISO	2412-2462	1-11[11]	15.29	11.53
2400-2483.5	1/2	IEEE 802.11G SISO	2412-2462	1-11[11]	14.26	11.1
2400-2483.5	1/2	IEEE 802.11nHT20	2412-2462	1-11[11]	14.49	11.34
2400-2483.5	1/2	IEEE 802.11nHT40	2422-2452	3-9[7]	13.75	10.8

# 5.3. CHANNEL LIST

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

	Channel List for 802.11n (40 MHz)						
Channel	Frequency (MHz)	Channel	Frequenc y(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 SISO	MCH: CH06 2437
	HCH: CH11 2462
	LCH :CH01 2412
IEEE 802.11G SISO	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

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# 5.5. THE WORSE CASE POWER SETTING PARAMETER

1) For SISO test items:

Test Asterna	Test Software Version		SecureCRT	8.1
Test Antenna	Test Mode	Test Channel	Setting TX Power	Setting data rate (Mbps)
		LCH	28	CCK_1Mbps
	IEEE 802.11B SISO	MCH	28	CCK_1Mbps
		HCH	28	CCK_1Mbps
		LCH	28	NO HT_6Mbps
	IEEE 802.11G SISO	MCH	28	NO HT_6Mbps
Antonio A		HCH	28	NO HT_6Mbps
Antenna 1		LCH	28	HT20_MCS_0_20
	IEEE 802.11n HT20	MCH	28	HT20_MCS_0_20
		HCH	28	HT20_MCS_0_20
	IEEE 802.11n HT40	LCH	28	HT40+MCS_0_40
		MCH	28	HT40+MCS_0_40
		HCH	28	HT40+MCS_0_40
	IEEE 802.11B SISO	LCH	24	CCK_1Mbps
		MCH	24	CCK_1Mbps
		HCH	24	CCK_1Mbps
		LCH	24	NO HT_6Mbps
	IEEE 802.11G SISO	MCH	24	NO HT_6Mbps
Asterna		HCH	24	NO HT_6Mbps
Antenna 2		LCH	24	HT20_MCS_0_20
	IEEE 802.11n HT20	MCH	24	HT20_MCS_0_20
		HCH	24	HT20_MCS_0_20
		LCH	24	HT40+MCS_0_40
	IEEE 802.11n HT40	MCH	24	HT40+MCS_0_40
		HCH	24	HT40+MCS_0_40

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#### REPORT NO: 4788109955-5 FCC ID: SVNDH-IPC-GX6 1) For MIMO test items:

1) For MIMO test items:							
Test Antenna	Test Software Version	SecureCRT8.1					
	Test Mode	Test Channel	Setting TX Power	Setting data rate (Mbps)			
		LCH	28	HT20_MCS_0_20			
	IEEE 802.11n HT20	MCH	28	HT20_MCS_0_20			
		HCH	28	HT20_MCS_0_20			
Antenna 1	IEEE 802.11n HT40	LCH	28	HT40+MCS_0_40			
		MCH	28	HT40+MCS_0_40			
		HCH	28	HT40+MCS_0_40			
		LCH	24	HT20_MCS_0_20			
	IEEE 802.11n HT20	MCH	24	HT20_MCS_0_20			
Antenna 2		HCH	24	HT20_MCS_0_20			
		LCH	24	HT40+MCS_0_40			
	IEEE 802.11n HT40	MCH	24	HT40+MCS_0_40			
		HCH	24	HT40+MCS_0_40			

Remark: For the MIMO testing, can through the software commands to control the power level of antenna 1 and antenna 2 at different values simultaneously.

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5.6. DESCRIPTION OF AVAILABLE ANTENNAS	5.6.	DESCRIPTION	<b>OF AVAI</b>	LABLE AN	ITENNAS
--	------	-------------	----------------	----------	---------

Ant.	Frequency (MHz)	Antenna Type	Antenna Gain (dBi)
1	2400-2483.5	External Antenna	1.0
2	2400-2483.5	External Antenna	1.0

Test Mode	Transmit and Receive Mode	Description
WIFI	⊠2TX, 2RX	Both antennas can be used as transmitting/receiving antenna.



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## 5.7. 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	DC 12.0V			
	VH	N/A			

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

TN= Normal Temperature

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## 5.8. DESCRIPTION OF TEST SETUP

#### SUPPORT EQUIPMENT

Item	Equipment	Brand Name	Model Name	FCC ID
1	Laptop	ThinkPad	T410	N/A

### I/O PORT

Cable No	Port	Connector Type	Cable Type	Cable Length(m)	Remarks
1	LAN	LAN	N/A	N/A	N/A

#### ACCESSORY

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

#### TEST SETUP

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

#### SETUP DIAGRAM FOR TESTS



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5.9. MEASURING INSTRUMENT AND SOFTWARE USED									
		Conducted	Emiss	sions(Ir	nstrum	nent)			
Used	Equipment	Manufacturer	Mode	el No.	Seria	al No.	Last Cal.	Next Cal.	
$\checkmark$	EMI Test Receiver	R&S	ES	SR3	101	961	Dec.20, 2016	Dec.19, 2017	
	Two-Line V- Network	R&S	EN\	/216	101	983	Dec.20, 2016	Dec.19, 2017	
$\checkmark$	Artificial Mains Networks	Schwarzbeck	NSLK	K 8126	812	6465	Feb.10, 2017	Feb.10, 2018	
Software									
Used	Des	cription		Manu	ufactu	rer	Name	Version	
$\checkmark$	Test Software for C	Conducted distu	rbance		UL		Antenna port	Ver. 7.2	
		Radiated	Emissi	i <b>ons(</b> Ins	strume	ent)			
Used	Equipment	Manufacturer	Mode	el No.	Seria	al No.	Last Cal.	Next Cal.	
V	MXE EMI Receiver	KESIGHT	N90	)38A		6400 36	Feb. 24, 2017	Feb. 24, 2018	
V	Hybrid Log Periodic Antenna	TDK	HLP-:	3003C		960	Jan.09, 2016	Jan.09, 2019	
V	Preamplifier	HP	844	47D		A090 9	Feb. 13, 2017	Feb. 13, 2018	
V	EMI Measurement Receiver	R&S	ES	R26	101	377	Dec. 20, 2016	Dec. 20, 2017	
$\checkmark$	Horn Antenna	TDK	HRN-0118		130	939	Jan. 09, 2016	Jan. 09, 2019	
V	High Gain Horn Antenna	Schwarzbeck	BBHA-9170		69	91	Jan.06, 2016	Jan.06, 2019	
	Preamplifier	TDK	PA-02-0118		00	-305- 066	Jan. 14, 2017	Jan. 14, 2018	
	Preamplifier	TDK	PA-	02-2		-307- 003	Dec. 20, 2016	Dec. 20, 2017	
$\checkmark$	Loop antenna	Schwarzbeck	15 <sup>-</sup>	19B	00	800	Mar. 26, 2016	Mar. 26, 2019	
V	Band Reject Filter	Wainwright	WRCJV8- 2350-2400- 2483.5- 2533.5-40SS			4	Dec. 20, 2016	Dec. 20, 2017	
			Softv	vare					
Used	Descr	iption Manufac			turer		Name	Version	
$\checkmark$	Test Software for Ra	are for Radiated disturbance Farac		ł		Ver. UL-3A1			
Other instruments									
Used	Equipment	Manufacturer	Model No.		Seria	al No.	Last Cal.	Next Cal.	
	Spectrum Analyzer	Keysight	N90	)30A		5410 12	Dec. 20, 2016	Dec. 20, 2017	
V	Power Meter	Keysight	N90	)31A		5416 24	Feb. 13, 2017	Feb. 13, 2018	
V	Power Sensor	Keysight	N93	323A		5440 13	Feb. 13, 2017	Feb. 13, 2018	
			000 15						

## 5.9. MEASURING INSTRUMENT AND SOFTWARE USED

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# 6. ANTENNA PORT TEST RESULTS

# 6.1. ON TIME AND DUTY CYCLE

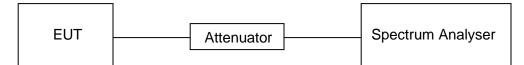
### <u>LIMITS</u>

None; for reporting purposes only

### PROCEDURE

FCC KDB 558074 Zero-Span Spectrum Analyzer Method

### TEST SETUP



### **RESULTS**

Mode	On Time (msec)	Period (msec)	Duty Cycle x (Linear)	Duty Cycle (%)	Duty Cycle Correction Factor (db)	1/T Minimum VBW (KHz)
11B SISOSISO	100	100	1	100	0	0.01
11G SISOSISO	100	100	1	100	0	0.01
11N20MIMO	100	100	1	100	0	0.01
11N40MIMO	100	100	1	100	0	0.01

Note: Duty Cycle Correction Factor=10log(1/x). Where: x is Duty Cycle(Linear) Where: T is On Time (transmit duration)

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### DATE: Dec. 10, 2017

## ON TIME AND DUTY CYCLE MID CH

11B SISO							
Spectrum Analyzer 1					₽	Frequency 🔻	22
KEYSIGHT         Input: RF         Input: RF         Input Z: 50 Ω           RL         ++         Coupling: DC         Corrections: Off           Align: Auto/No RF         Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RM Trig: Free Run	S <mark>1</mark> 23456 WWWWWW AAAAAA	Center Fr	equency 0000 GHz	js
1 Spectrum V					Span 0.00000	000 Hz	
Scale/Div 10 dB Log 13.0	Ref Level 23.00	dBm				pt Span Span	
3.00					Fu	ll Span	
-17.0					Start Free 2 43700	4 0000 GHz	
-37.0					Stop Free		
-57.0						0000 GHz	
Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 N	//Hz*	Sweep 20.27	Span 0 Hz	AUT CF Step	OTUNE	
5 Marker Table V			Sweep 20.27	113 (0001 pts)	8.00000		
Mode Trace Scale X	Y	Function Fi	unction Width Fund	tion ∨alue	Auto Man		
2 3					Freq Offs 0 Hz	et	
4 5 6					X Axis So Log	ale	
4ug 30, 2017 2:58:33 PM					Signal Tra	ack	
					(Span Zoo		
11G SISO							
Spectrum Analyzer 1						Frequency 🔻	崇
KEYSIGHT         Input: RF         Input: Z: 50 Ω           RL         →         Coupling: DC         Corrections: Off           Align: Auto/No RF         Freq Ref: Int (S)	#Atten: 40 dB Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (RM Trig: Free Run	S 1 2 3 4 5 6 WWWWWW A A A A A A A		equency 0000 GHz	js
1 Spectrum		I			Span 0.00000	000 Hz	
Scale/Div 10 dB Log 13.0	Ref Level 23.00	dBm				pt Span Span	
3.00					Fu	ll Span	
-17.0					Start Free 2.43700	7 0000 GHz	
-37.0					Stop Free		
-57.0						0000 GHz	
Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 N	//Hz*	Sweep 20.27	Span 0 Hz ms (8001 pts)	CF Step	OTUNE	
5 Marker Table					8.00000		
Mode Trace Scale X	Y	Function Fu	unction Width Fund	tion Value	Man		
2 3 4					Freq Offs 0 Hz		
5 6					X Axis So Log	ale	
Aug 30, 2017 3.19:29 PM	$\bigcirc \land$				Lin Signal Tra	ack	
	$\sim \square$				(Span Zoo		

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11N20MIMO							
Spectrum Analyzer 1					₽	Frequency	▼ ₩
KEYSIGHT         Input: RF         Input Z: 50 Ω           RL         Coupling: DC         Corrections: Off           Align: Auto/No RF         Freq Ref: Int (S)		PNO: Fast Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R Trig: Free Run	MS <mark>1</mark> 23456 WWWWWW AAAAAA	Center Fre 2.4370000		Settings
1 Spectrum		_			Span 0.0000000	00 Hz	
Scale/Div 10 dB Log 13.0	Ref Level 23.00	dBm			Swept Zero S		
3.00 -7.00					Full	Span	
-17.0					Start Freq 2.4370000	000 GHz	
-37.0					Stop Freq		
-67.0					2.437000		
Center 2.437000000 GHz Res BW 8 MHz	#Video BW 8.0 I	MHz*	Sweep 20.2	Span 0 Hz / ms (8001 pts)	CF Step	TONE	
5 Marker Table					8.000000	MHz	
Mode Trace Scale X	Y	Function F	Function Width Fu	nction Value	Man Freq Offse		
2 3 4					0 Hz		
5 6					X Axis Sca Log Lin	le	
Aug 30, 2017 3:26:51 PM	$\bigcirc \land$				Signal Trac		
11N40MIMO						-	
11N40MIMO							, 52
Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF Input Ζ: 50 Ω	#Atten: 40 dB	PNO: Fast	#Avg Type: Power (R		\$	Frequency	
Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF RL ↔ Coupling: DC Aign: Auto/No RF	Preamp: Off	PNO: Fast Gate: Off IF Gain: Low Sig Track: Off			Center Fre 2.4370000	Frequency	v 🐹 Settings
Spectrum Analyzer 1 Swept SA     •       KEYSIGHT     Input: RF Coupling: DC Align: Auto/No RF     Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)       I     •     Align: Auto/No RF       I     Spectrum     •	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Fre	Frequency quency 000 GHz	Settings
Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF RL → Align: Auto/No RF 1 Spectrum Scale/Div 10 dB Log	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Fre 2.4370000 Span	Frequency J00 GHz J00 Hz Span	Settings
Spectrum Analyzer 1 Swept SA KEYSIGHT Input: RF RL → Coupling: DC Align: Auto/No RF 1 Spectrum Scale/Div 10 dB	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Fre 2.4370000 Span 0.0000000	Frequency J00 GHz J00 Hz Span	Settings
Spectrum Analyzer 1 Swept SA       •         KEYSIGHT       Input: RF         RL       •         Align: Auto/No RF       Freq Ref: Int (S)         1 Spectrum       •         Scale/Div 10 dB       -         Log       -         3.00       -	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Fre 2.4370000 Span 0.0000000	Frequency JOO GHZ JOO HZ Span Span	Settings
Spectrum Analyzer 1 Swept SA         •           KEYSIGHT RL         Input: RF Coupling: DC Align: Auto/No RF         Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)           1 Spectrum         •           Scale/Div 10 dB         •           13.0         •           3.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •           -7.00         •	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Fre 2.4370000 Span 0.0000000 Zero S Full Start Freq 2.4370000 Stop Freq	Frequency JOO GHz Span Span DOO GHz	Settings
Spectrum Analyzer 1 Swept SA <ul> <li>F</li> <li>KEYSIGHT</li> <li>Input: RF</li> <li>Coupling: DC</li> <li>Align: Auto/No RF</li> <li>Freq Ref: Int (S)</li> </ul> 1 Spectrum            Scale/Div 10 dB           Log <ul> <li>3.0</li> <li>3.0</li></ul>	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off	#Avg Type: Power (R	MS <mark>1</mark> 23456 WWWWWW	Center Free 2.4370000 Span 0.0000000 Swepj Zero S Full Start Freq 2.4370000 Stop Freq 2.4370000	Frequency Quency DO HZ Span Span DO GHZ DO GHZ	Settings
Spectrum Analyzer 1 Swept SA       •         KEYSIGHT RL       Input: RF Coupling: DC Align: Auto/No RF       Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)         V       Scale/Div 10 dB         Log 13.0       •         3.00       •         -7.0       •         -37.0       •         -47.0       •         -57.0       •	Preamp: Off	Gate: Off IF Gain: Low Sig Track: Off dBm	#Avg Type: Power (R Trig: Free Run	MS <mark>1</mark> 23456 WWWWWW	Center Free 2.4370000 Span 0.0000000 Swepj Zero S Full Start Freq 2.4370000 Stop Freq 2.4370000	Frequency JOO GHz Span Span DOO GHz	Settings
Spectrum Analyzer 1         •           Swept SA         •           KEYSIGHT         Input: RF           RL         •           Align: Auto/No RF         Freq Ref: Int (S)           Scale/Div 10 dB         •           13.0         •           3.00         •           -7.00         •           -37.0         •           -47.0         •           -57.0         •           -67.0         •           Center 2.437000000 GHz         •	Preamp: Off Ref Level 23.00	Gate: Off IF Gain: Low Sig Track: Off dBm	#Avg Type: Power (R Trig: Free Run	MS 1 2 3 4 5 6 WWWWWW A A A A A A A Span 0 Hz	Center Fre 2.4370000 Span 0.0000000 Swept Zero S Full Start Freq 2.4370000 Stop Freq 2.4370000 AUTC	Frequency quency D00 GHz Span Span D00 GHz D00 GHz TUNE	Settings
Spectrum Analyzer 1 Swept SA       •         KEYSIGHT RL       Input: RF Coupling: DC Aign: Auto/No RF       Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)         1 Spectrum       •         Scale/Div 10 dB       •         Log 13.0       •         3.0       •         -7.01       •         -7.02       •         -7.03       •         -7.04       •      <	Preamp: Off Ref Level 23.00	Gate: Off IF Gain: Low Sig Track: Off dBm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm	#Avg Type: Power (R Trig: Free Run	MS 1 2 3 4 5 6 WWWWWW A A A A A A A Span 0 Hz	Center Fre 2.4370000 Span 0.0000000 Svepi Zero S Full Start Freq 2.4370000 Stop Freq 2.4370000 CF Step 8.000000 Auto Man	Frequency quency 100 GHz Span Span 500 GHz 000 GHz TUNE MHz	Settings
Spectrum Analyzer 1 Swept SA       Imput RF         Input Z: 50 Ω       Corrections: Off         RL       Imput Z: 50 Ω         Align: Auto/No RF       Freq Ref. Int (S)         Scale/Div 10 dB       Scale/Div 10 dB         Log       Imput Z: 50 Ω         1 Spectrum       Imput Z: 50 Ω         Scale/Div 10 dB       Imput Z: 50 Ω         Log       Imput Z: 50 Ω         3.00       Imput Z: 50 Ω         -7.00       <	Preamp: Off Ref Level 23.00	Gate: Off IF Gain: Low Sig Track: Off dBm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm	#Avg Type: Power (R Trig: Free Run	MS 1 2 3 4 5 6 W WWW WW A A A A A A A Span 0 Hz Y ms (8001 pts)	Center Fre 2.4370000 Span 0.0000000 Swepi Zero S Full Start Freq 2.4370000 Stop Freq 2.4370000 CF Step 8.000000 Auto Man Freq Offse 0 Hz	Frequency quency 000 GHz Span Span 000 GHz TUNE MHz t	Settings
Spectrum Analyzer 1 Swept SA       Input RF         KEYSIGHT RL       Input RF         Outping: DC Align: Auto/No RF       Input Z: 50 Ω Corrections: Off Freq Ref: Int (S)         1 Spectrum          Scale/Div 10 dB          130          300          -7.00	Preamp: Off Ref Level 23.00	Gate: Off IF Gain: Low Sig Track: Off dBm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm 4 Bm	#Avg Type: Power (R Trig: Free Run	MS 1 2 3 4 5 6 W WWW WW A A A A A A A Span 0 Hz Y ms (8001 pts)	Center Fre 2.4370000 Span 0.0000000 Suppression Full Start Freq 2.4370000 Stop Freq 2.4370000 CF Step 8.000000 Auto Man Freq Offse	Frequency quency 000 GHz Span Span 000 GHz TUNE MHz t	Settings

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### <u>LIMITS</u>

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

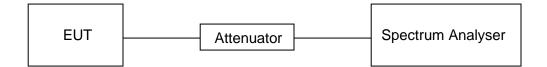
### TEST PROCEDURE

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

Center Frequency	The centre frequency of the channel under test
Detector	Peak
IBBW/	For 6 dB Bandwidth :100K For 99% Bandwidth :1% to 5% of the occupied bandwidth
IV BWV	For 6dB Bandwidth : ≥3 × RBW For 99% 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 and 99% relative to the maximum level measured in the fundamental emission.

### TEST SETUP



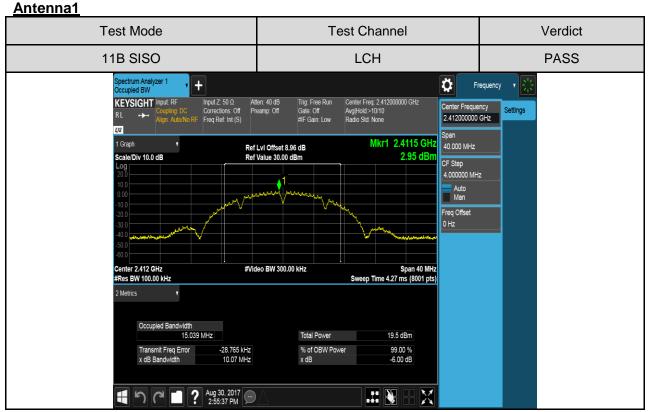
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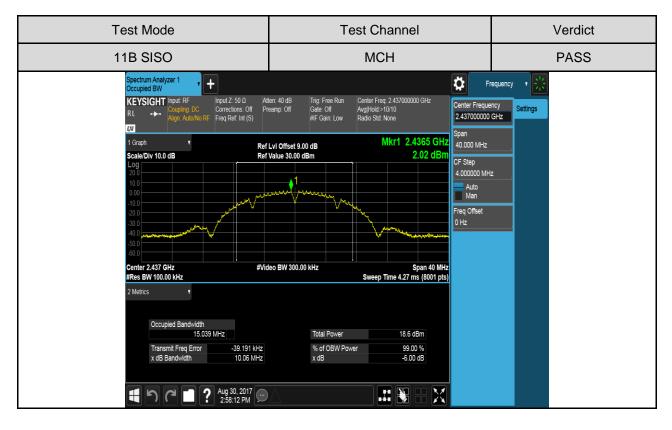
### **RESULTS**

Test Mode	Test Antenna	Test Channel	6dB bandwidth (MHz)	Result
		LCH	10.07	Pass
	Antenna 1	MCH	10.06	Pass
11B SISO		НСН	10.07	Pass
116 3130		LCH	10.05	Pass
	Antenna 2	MCH	10.05	Pass
		НСН	10.06	Pass
		LCH	16.57	Pass
	Antenna 1	MCH	16.58	Pass
11G SISO		НСН	16.59	Pass
110 3130		LCH	16.58	Pass
	Antenna 2	MCH	16.58	Pass
		НСН	16.58	Pass
		LCH	17.81	Pass
	Antenna 1	MCH	17.80	Pass
11N20MIMO		НСН	17.81	Pass
		LCH	17.80	Pass
	Antenna 2	MCH	17.79	Pass
		HCH	17.78	Pass
		LCH	36.43	Pass
	Antenna 1	MCH	36.45	Pass
11N40MIMO		НСН	36.43	Pass
		LCH	36.42	Pass
	Antenna 2	MCH	36.39	Pass
		НСН	36.43	Pass

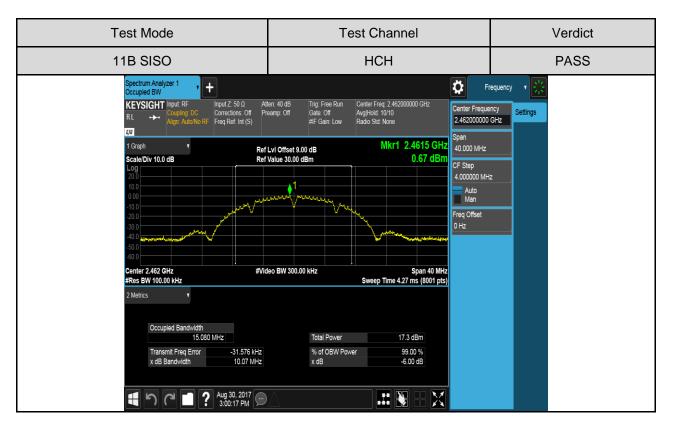
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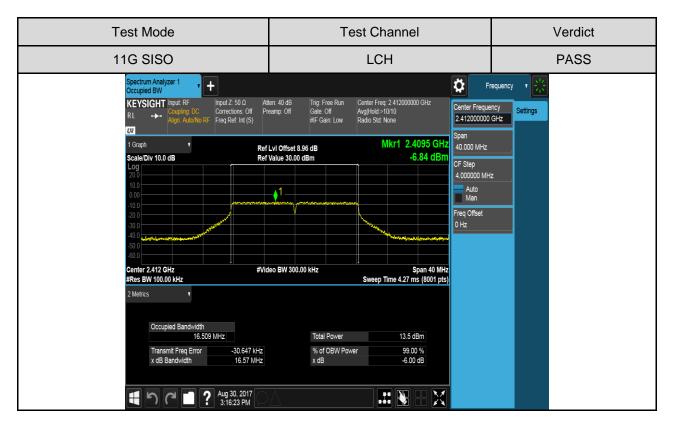
# Test Graphs



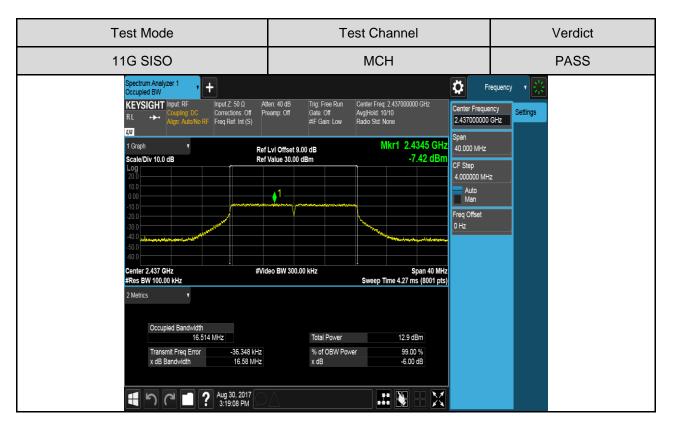


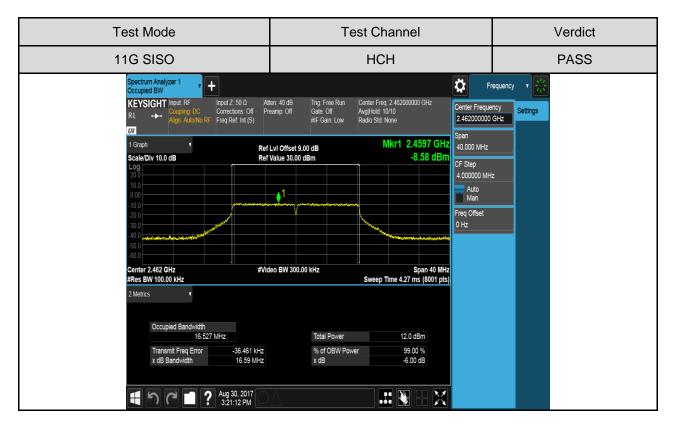
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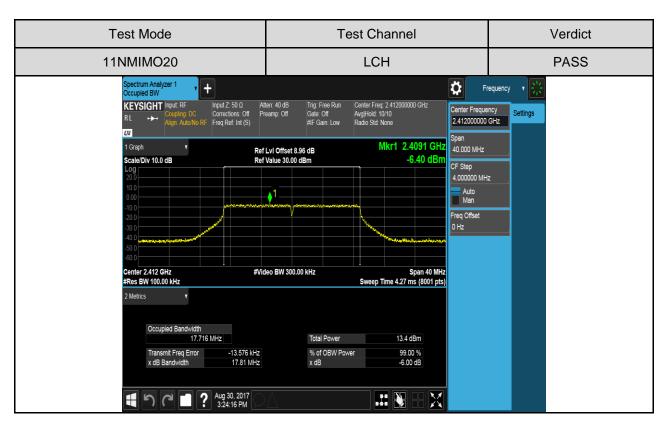


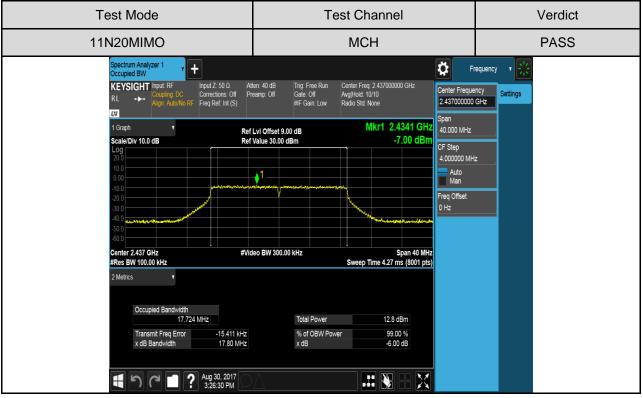
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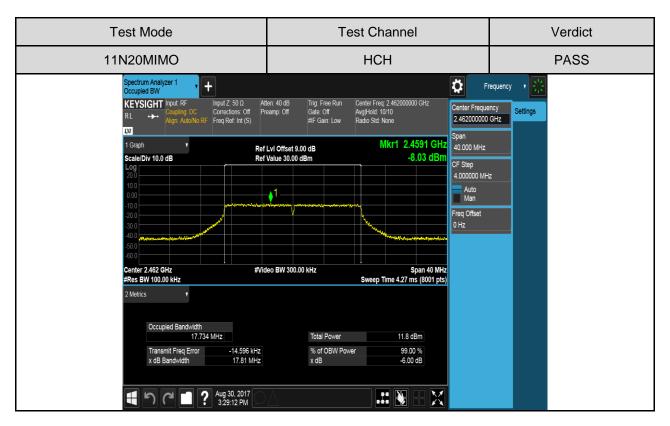


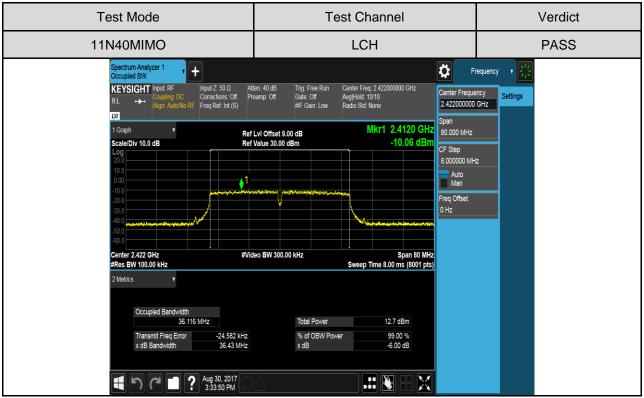
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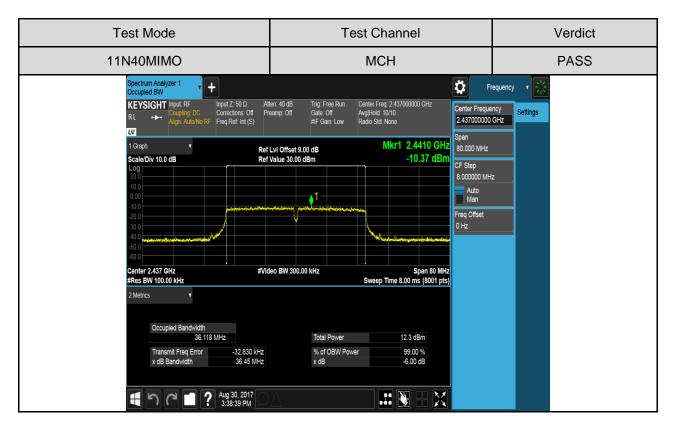


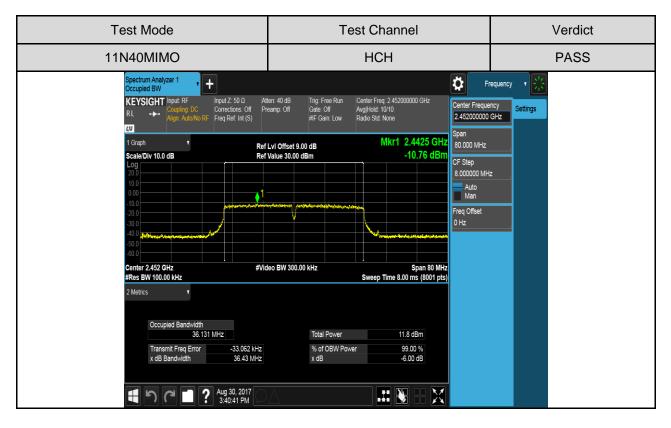
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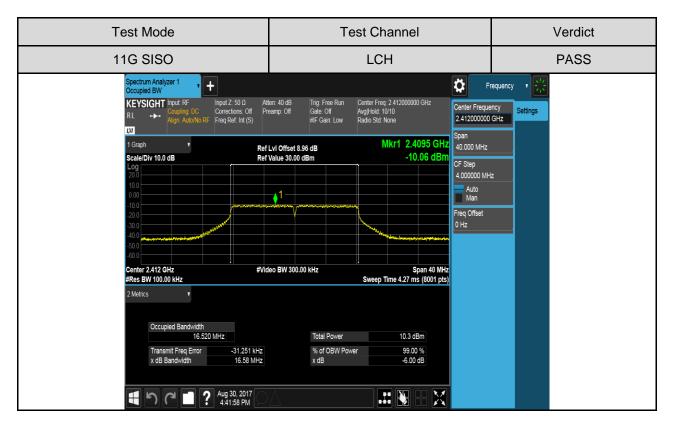
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Test Mode	Test Channel	Verdict
11B SISO	LCH	PASS
RL     →     Coupling DC Align AutoNo RF     Corrections: Off Freq Ref. Int (S)     Previous       1 Graph      Ref.       Scale/Div 10.0 dB     Ref.       0 00        -10 0        -30 0        -40 0        -50 0	an: 40 dB Ting: Free Run Gale: Off Hilf Gain: Low Radio Std: None Radio Std: N	CF Step 4.00000 MHz Auto Man Freq Offset 0 Hz
Occupied Bandwidth 15.044 MHz Transmit Freq Error -27.603 kHz x dB Bandwidth 10.05 MHz US5 MHz Aug 30, 2017 4.35:01 PM	Total Power         15.6 dBm           % of OBW Power         \$9.00 %           x dB         -6.00 dB	

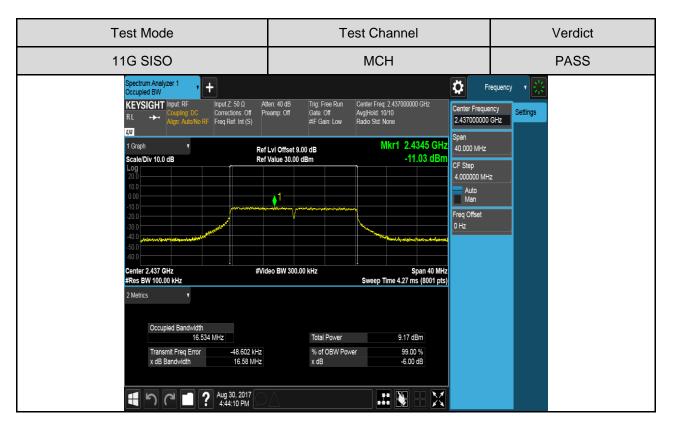


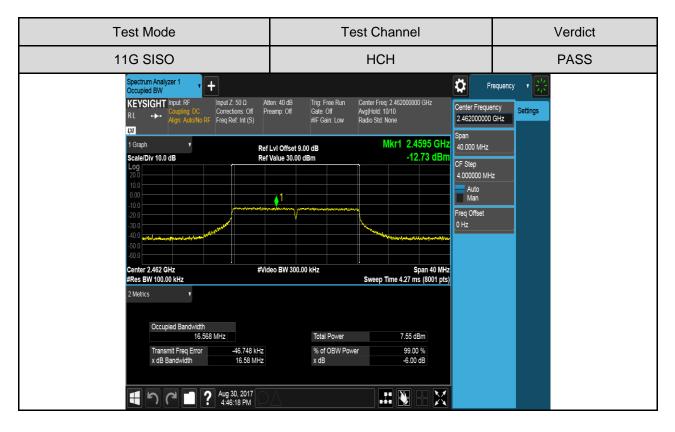
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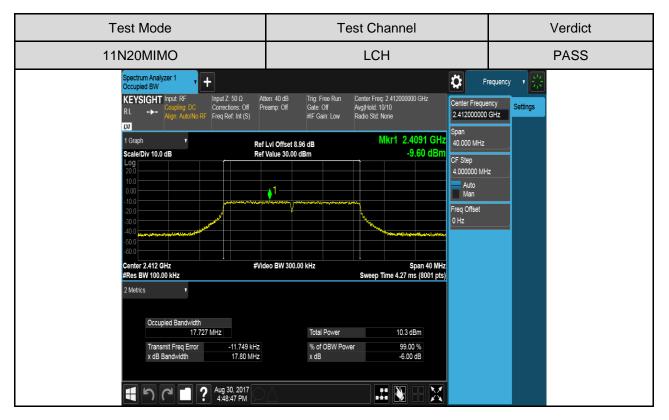


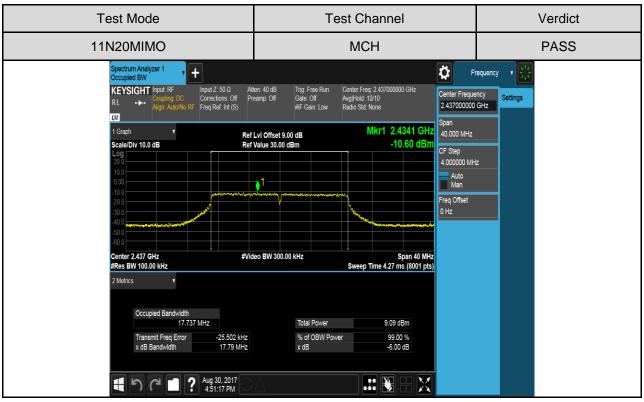
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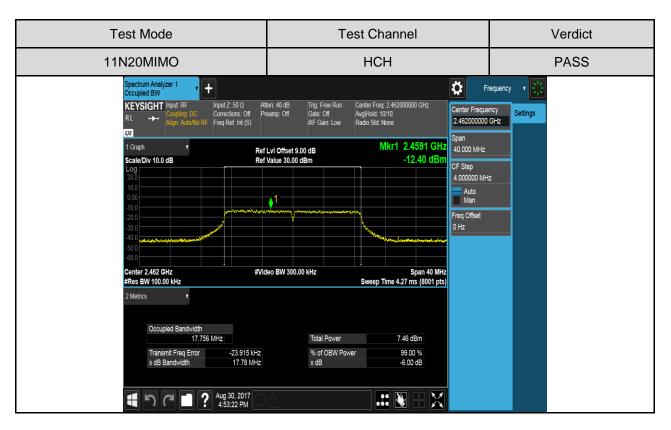


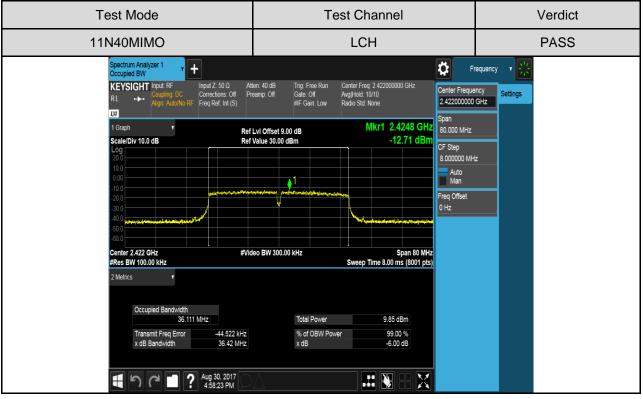
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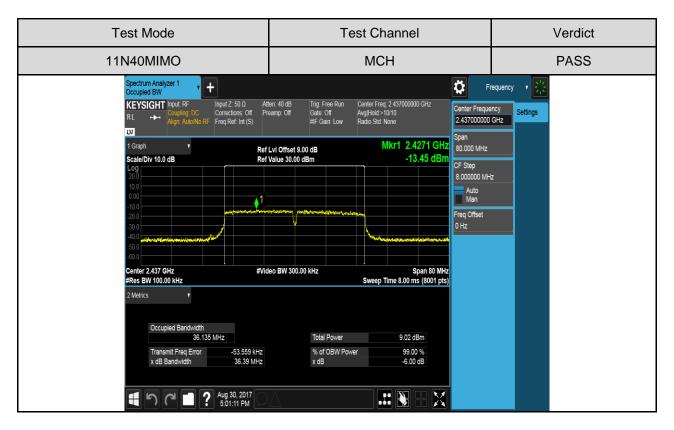


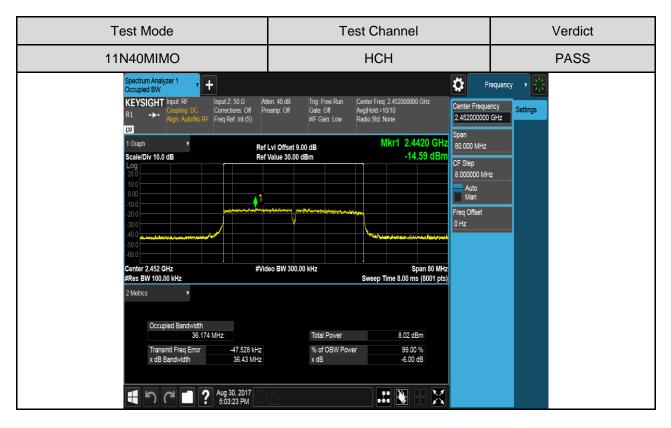
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# 6.3. PEAK CONDUCTED OUTPUT POWER

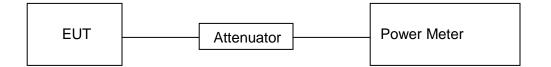
### LIMITS

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

### TEST PROCEDURE

Refer to FCC KDB 558074

### TEST SETUP



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<u>RESULTS</u>
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Test Mode	Test Antenna				
rest mode	Test Antenna	Test Channel	Maximum Peak Conducted Output Power(dBm)	EIRP (dBm)	Result
		LCH	15.29	16.29	Pass
	Antenna 1	MCH	14.40	15.4	Pass
11B SISO		HCH	13.07	14.07	Pass
110 0100		LCH	11.53	12.53	Pass
	Antenna 2	MCH	10.31	11.31	Pass
		HCH	8.64	9.64	Pass
		LCH	14.26	15.26	Pass
	Antenna 1	MCH	13.60	14.6	Pass
11G SISO		HCH	12.66	13.66	Pass
110 3130		LCH	11.10	12.1	Pass
	Antenna 2	MCH	9.91	10.91	Pass
		HCH	8.27	9.27	Pass
	Antenna 1	LCH	14.49	15.49	Pass
		MCH	13.79	14.79	Pass
		HCH	12.83	13.83	Pass
		LCH	11.34	12.34	Pass
11N20MIMO	Antenna 2	MCH	10.13	11.13	Pass
		HCH	8.46	9.46	Pass
		LCH	16.20	17.20	Pass
	Antenna 1+2	MCH	15.34	16.34	Pass
		HCH	14.18	15.18	Pass
		LCH	13.75	14.75	Pass
	Antenna 1	MCH	13.26	14.26	Pass
		HCH	12.75	13.75	Pass
		LCH	10.80	11.8	Pass
11N40MIMO	Antenna 2	MCH	9.95	10.95	Pass
		HCH	8.99	9.99	Pass
		LCH	15.53	15.53	Pass
	Antenna 1+2	MCH	14.92	15.92	Pass
		НСН	14.28	15.28	Pass

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## 6.4. POWER SPECTRAL DENSITY

### <u>LIMITS</u>

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

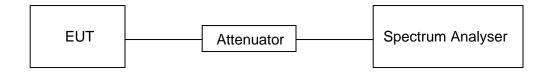
Refer to FCC KDB 558074, connect the UUT to the spectrum analyser and use the following settings:

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



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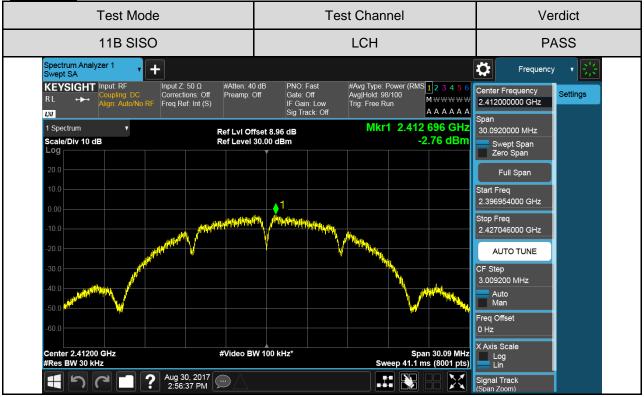
### **RESULTS**

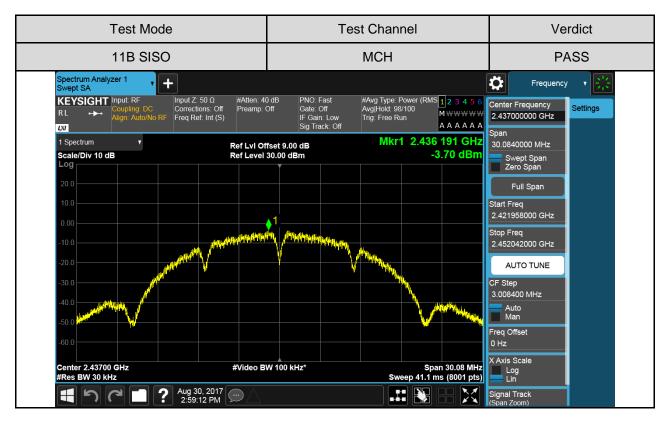
Test Mode	Test Antenna	Test Channel	Maximum Peak power spectral density (dBm)	Result
		LCH	-2.76	Pass
	Antenna 1	MCH	-3.70	Pass
		НСН	-4.95	Pass
11B SISO		LCH	-6.60	Pass
	Antenna 2	MCH	-7.79	Pass
		НСН	-9.50	Pass
		LCH	-10.20	Pass
	Antenna 1	MCH	-10.91	Pass
		НСН	-11.89	Pass
11G SISO		LCH	-13.31	Pass
	Antenna 2	MCH	-14.62	Pass
		НСН	-16.36	Pass
		LCH	-9.70	Pass
	Antenna 1	МСН	-10.36	Pass
		НСН	-11.46	Pass
		LCH	-13.40	Pass
11N20MIMO	Antenna 2	MCH	-14.13	Pass
		HCH	-15.77	Pass
		LCH	-8.16	Pass
	Antenna 1+2	MCH	-8.84	Pass
		НСН	-10.09	Pass
		LCH	-14.06	Pass
	Antenna 1	MCH	-14.74	Pass
		НСН	-15.25	Pass
		LCH	-16.71	Pass
11N40MIMO	Antenna 2	MCH	-17.10	Pass
		НСН	-17.88	Pass
		LCH	-12.18	Pass
	Antenna 1+2	MCH	-12.75	Pass
		HCH	-13.36	Pass

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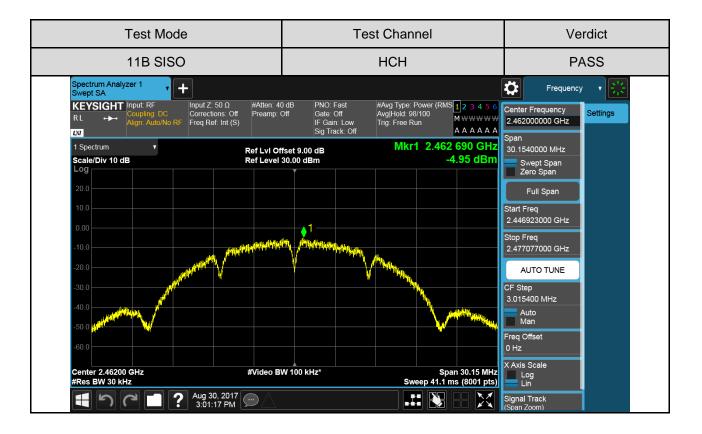
# Test Graphs:

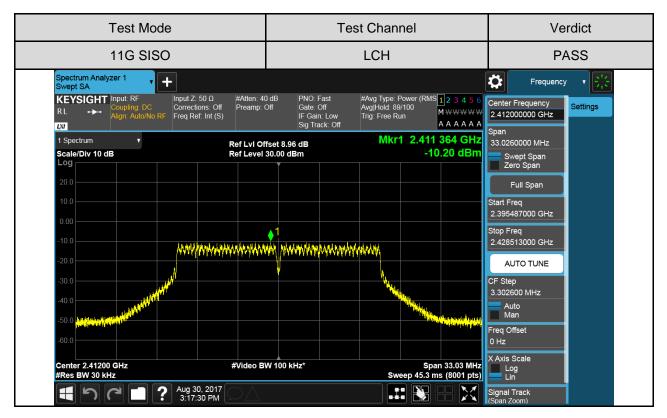
# Antenna1



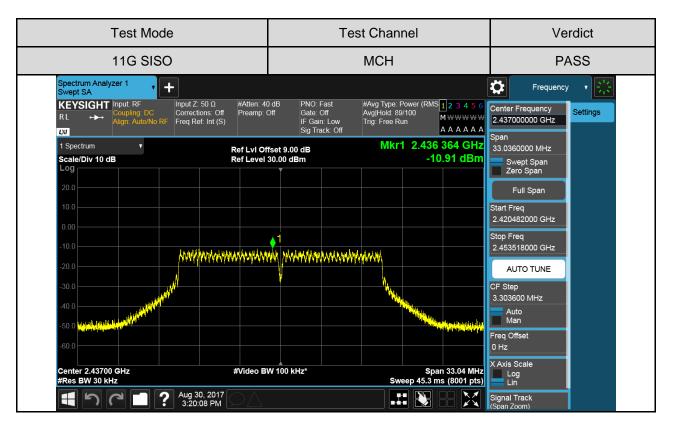


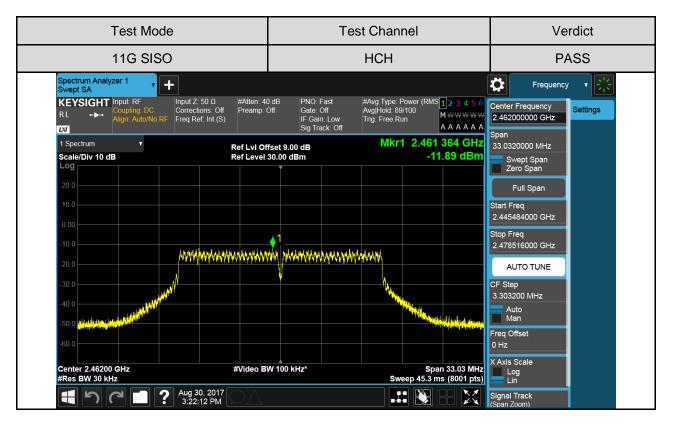
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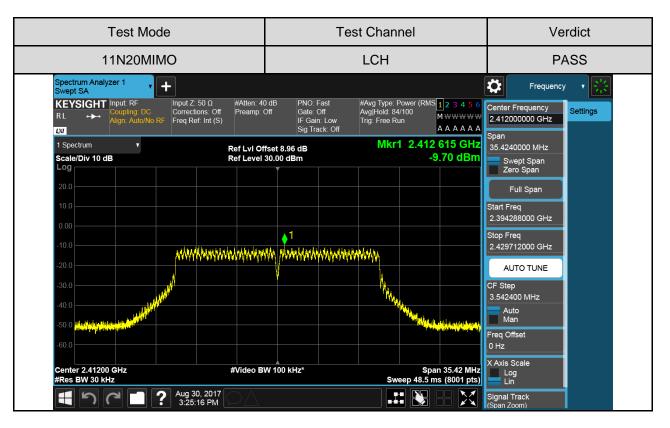


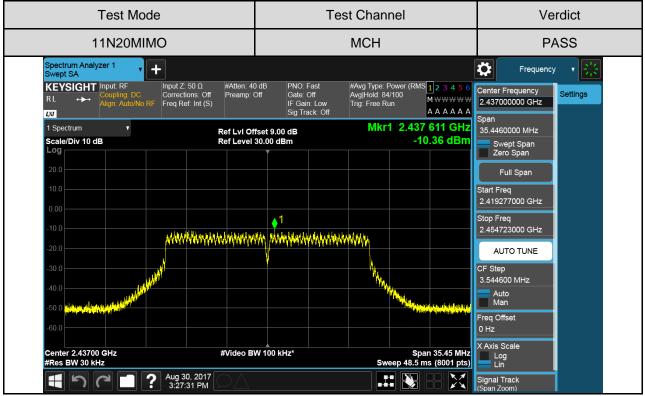
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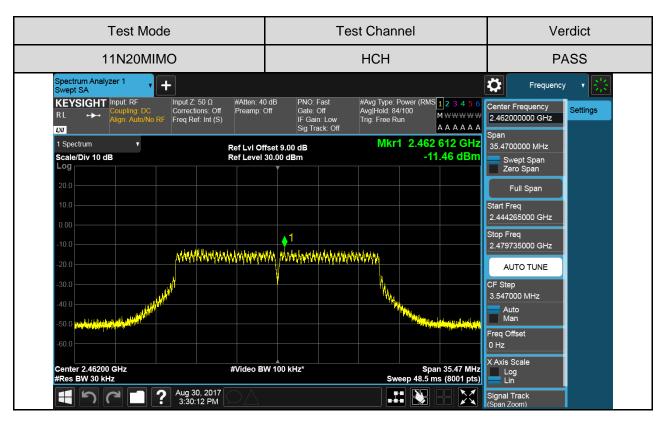


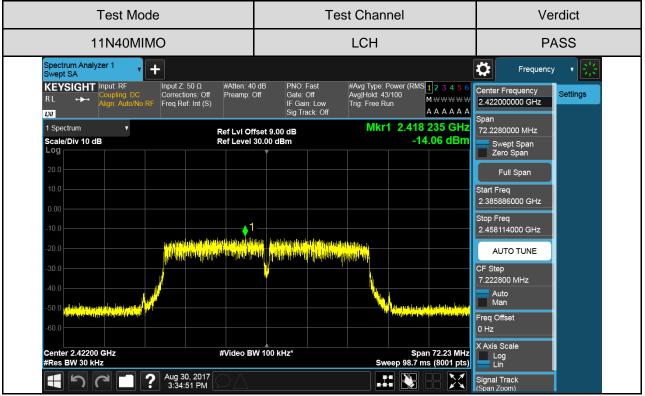
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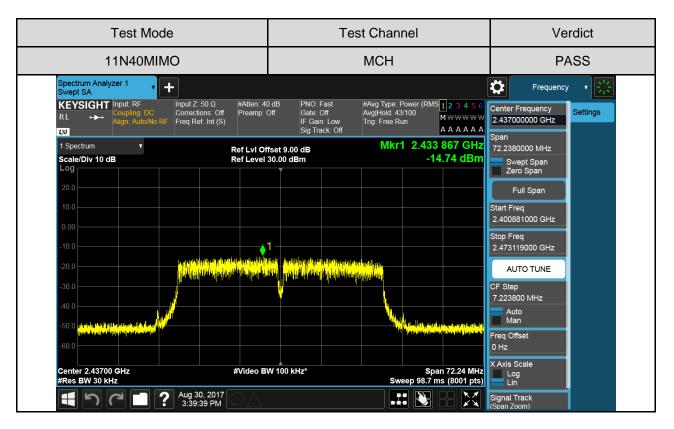


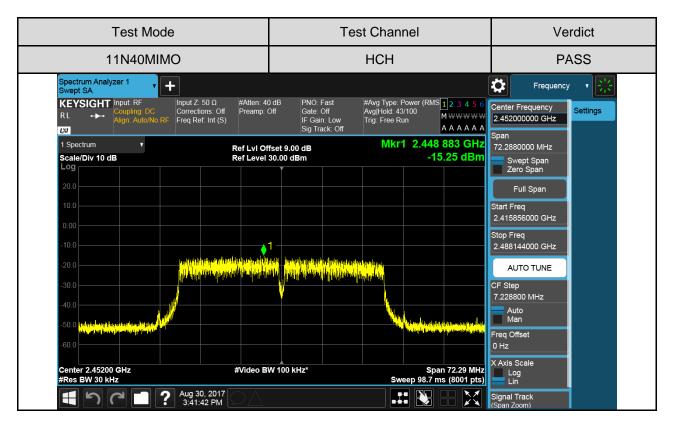
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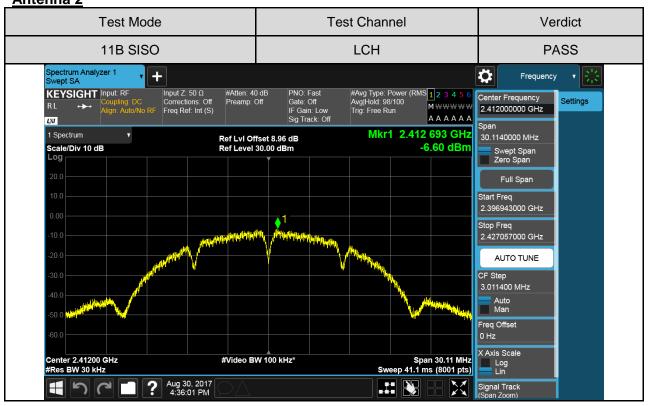


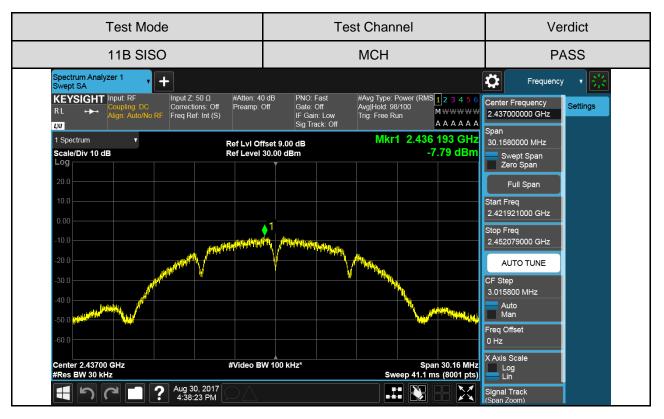
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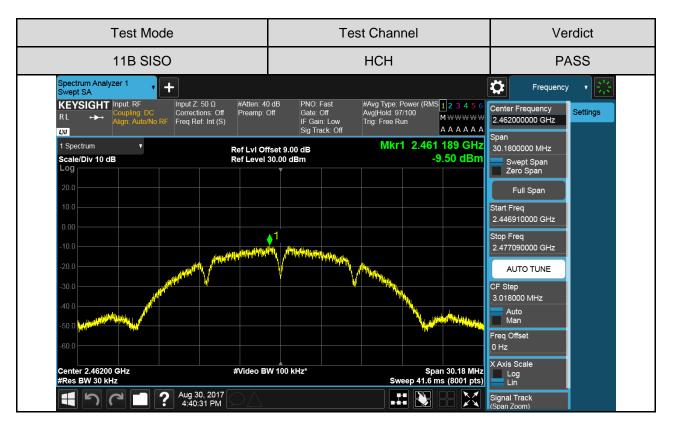


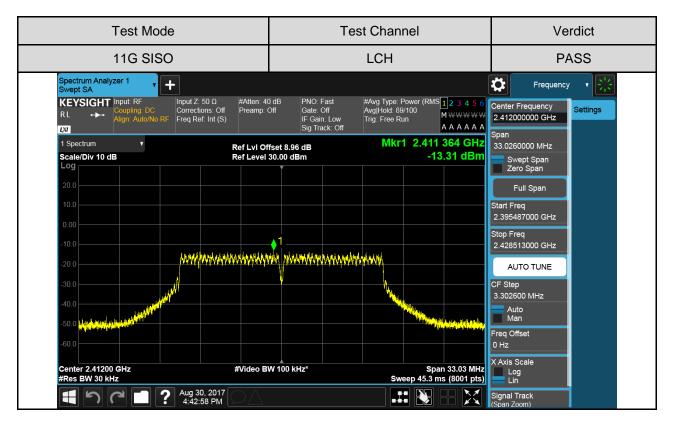
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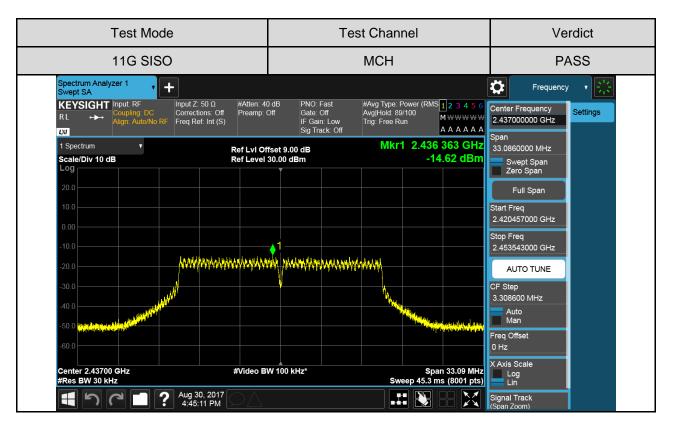


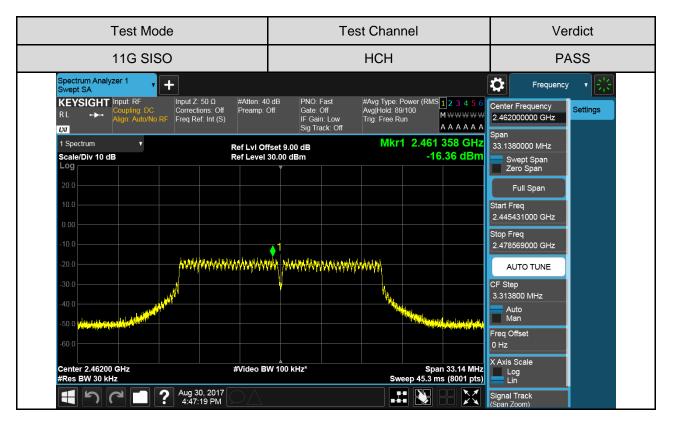
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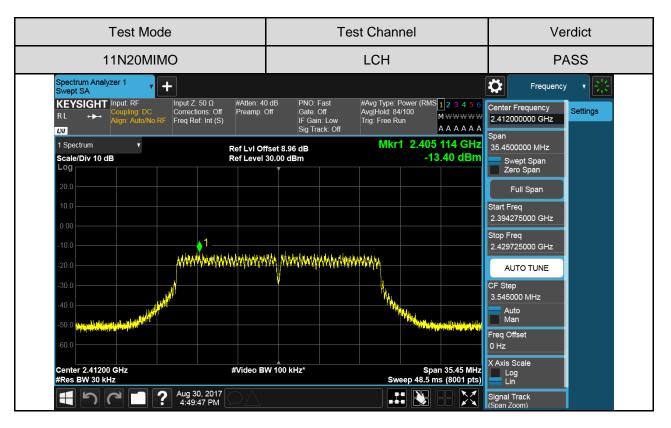


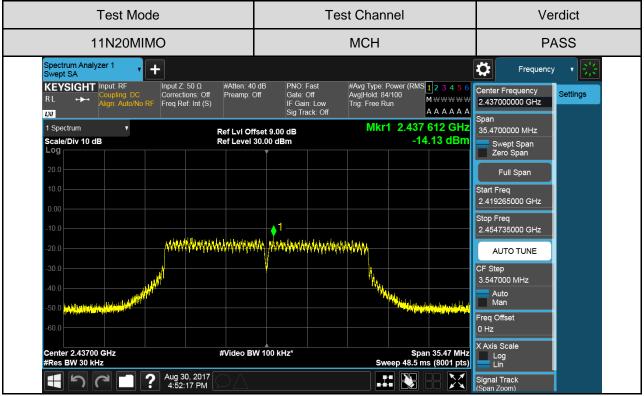
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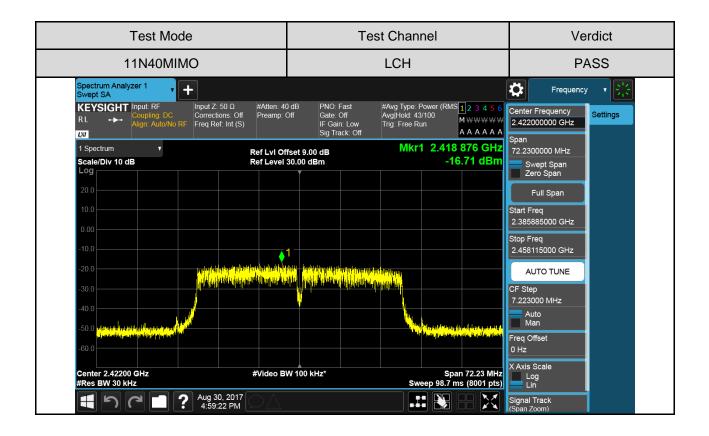
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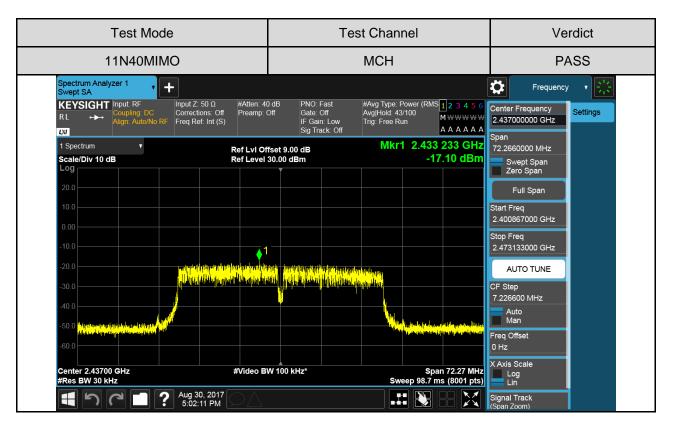


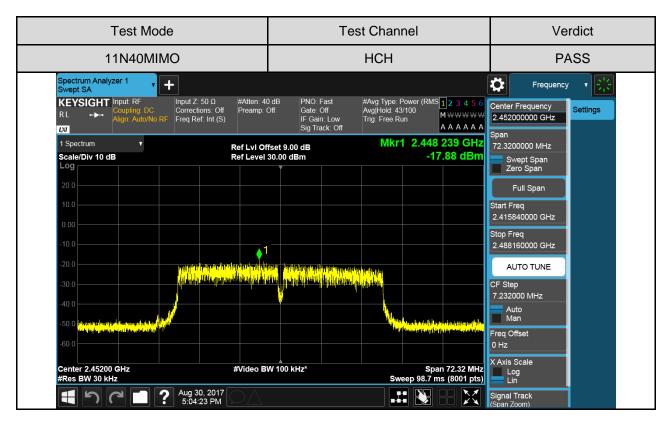
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Test Mode		Test Channel		Verdict	
11N20MIMO	11N20MIMO HCH		PASS		
Spectrum Analyzer 1 Swept SA KEYSIGHT Coupling: DC RL ↔ Coupling: DC Align: AutoNo RF Scale/Div 10 dB Corrections: Freq Ref: Int Scale/Div 10 dB Coupling: DC Align: AutoNo RF Scale/Div 10 dB Coupling: DC Coupling: DC Align: AutoNo RF Scale/Div 10 dB Coupling: DC Coupling: DC	Off Preamp: Off Gat (S) IF 0	D: Fast #Avg Type: Power (R Avg Hold: 84/100 Trig: Free Run Mkr1 2.4/	MWWWWW A A A A A A A 52 608 GHz 15.77 dBm	PASS         Frequency       Settings         Center Frequency       Settings         2.462000000 GHz       Settings         Span       Settings         35.5100000 MHz       Settings         Swept Span       Zero Span         Full Span       Start Freq         2.444245000 GHz       Stop Freq         2.479755000 GHz       Auto TUNE         CF Step       3.551000 MHz         Auto TUNE       CF Step         7.551000 MHz       Auto         Man       Man	
-60.0 Center 2.46200 GHz #Res BW 30 kHz Aug 30, 20 4:54:22 P	#Video BW 100 kHz*		5pan 35.51 MHz 5 ms (8001 pts)	0 Hz X Axis Scale Log Lin Signal Track (Span Zoom)	



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# 6.5. CONDUCTED BANDEDGE AND SPURIOUS EMISSIONS

## <u>LIMITS</u>

FCC Part15 (15.247) , Subpart C			
Section	Test Item	Limit	
FCC §15.247 (d) Spurious Emissions		at least 20 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

P	
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.
sottings:	

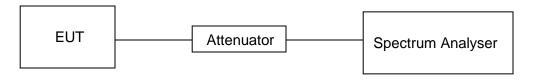
settings:

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

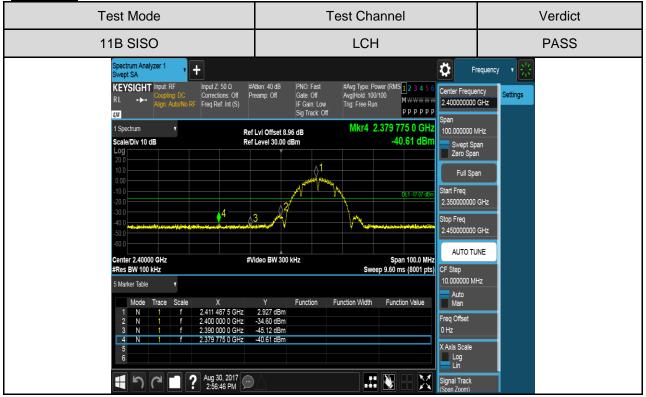
## RESULTS TABLE

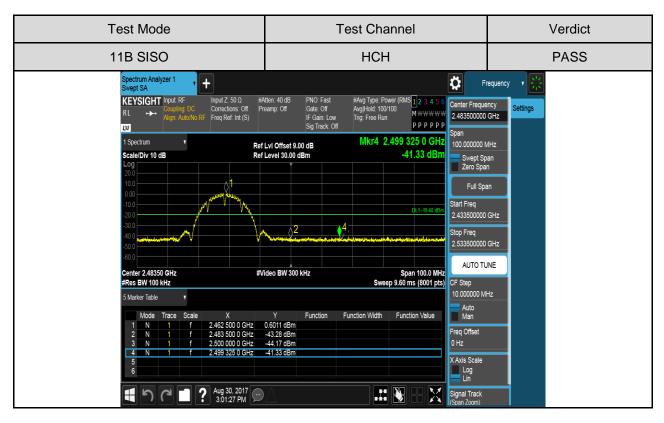
Test Mode	Test Antenna	Test Channel	Carrier Power[dBm]	Max. Spurious Level [dBm]	Limit [dBm]	Verdict
11B SISO	Antenna 1	2412	2.927	-40.609	-17.07	PASS
		2462	0.601	-41.332	-19.40	PASS
	Antenna 2	2412	-0.846	-40.648	-20.85	PASS
		2462	-3.815	-40.525	-23.82	PASS
11G SISO	Antenna 1	2412	-6.774	-41.086	-26.77	PASS
		2462	-8.560	-41.302	-28.56	PASS
	Antenna 2	2412	-9.973	-41.158	-29.97	PASS
		2462	-12.797	-40.886	-32.8	PASS
11N20MIMO	Antenna 1	2412	-6.419	-41.035	-26.42	PASS
		2462	-8.128	-39.961	-28.13	PASS
	Antenna 2	2412	-9.775	-40.926	-29.78	PASS
		2462	-12.813	-38.957	-32.81	PASS
11N40MIMO	Antenna 1	2422	-9.896	-41.307	-29.90	PASS
		2452	-10.986	-40.740	-30.99	PASS
	Antenna 2	2422	-12.730	-40.368	-32.73	PASS
		2452	-14.429	-41.220	-34.43	PASS

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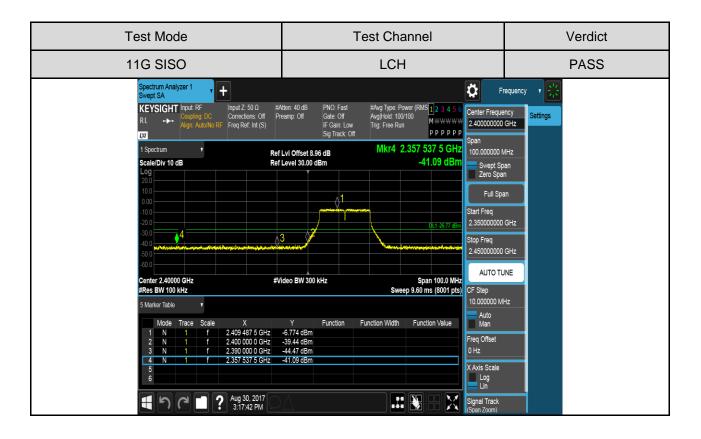
# **TEST GRAPHS**

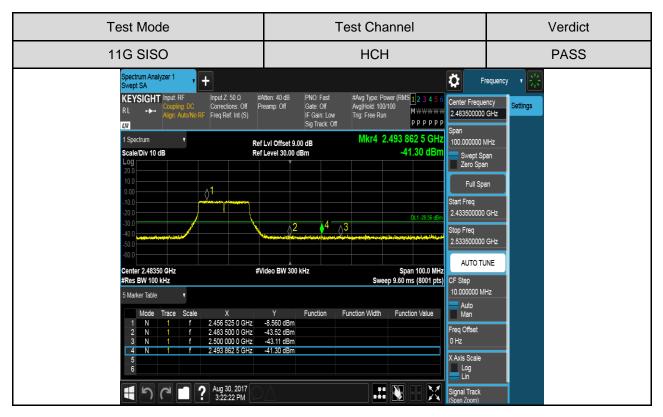
#### Antenna1





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